

FEATURES

■ Video Decoder

- Supports NTSC and PAL video input formats
- 2D NTSC and PAL comb-filter for Y/C separation of CVBS input
- Single CVBS and S-video input
- Supports Closed-caption and V-chip
- ACC, AGC, and DCGC (Digital Chroma Gain Control)

■ Color Engine

- Brightness, contrast, saturation, and hue adjustment
- 9-tap programmable multi-purpose FIR (Finite Impulse Response) filter
- Differential 3-band peaking engine
- Luminance Transient Improvement (LTI)
- Chrominance Transient Improvement (CTI)
- Black Level Extension (BLE)
- White Level Extension (WLE)
- Favor Color Compensation (FCC)
- 3-channel gamma curve adjustment

■ Scaling Engine/TCON

- Supports analog panels with the resolution of 960x234, 1200x234, 1400x234, and more
- Supports various displaying modes
- Supports horizontal panorama scaling

■ Digital PWM Controller

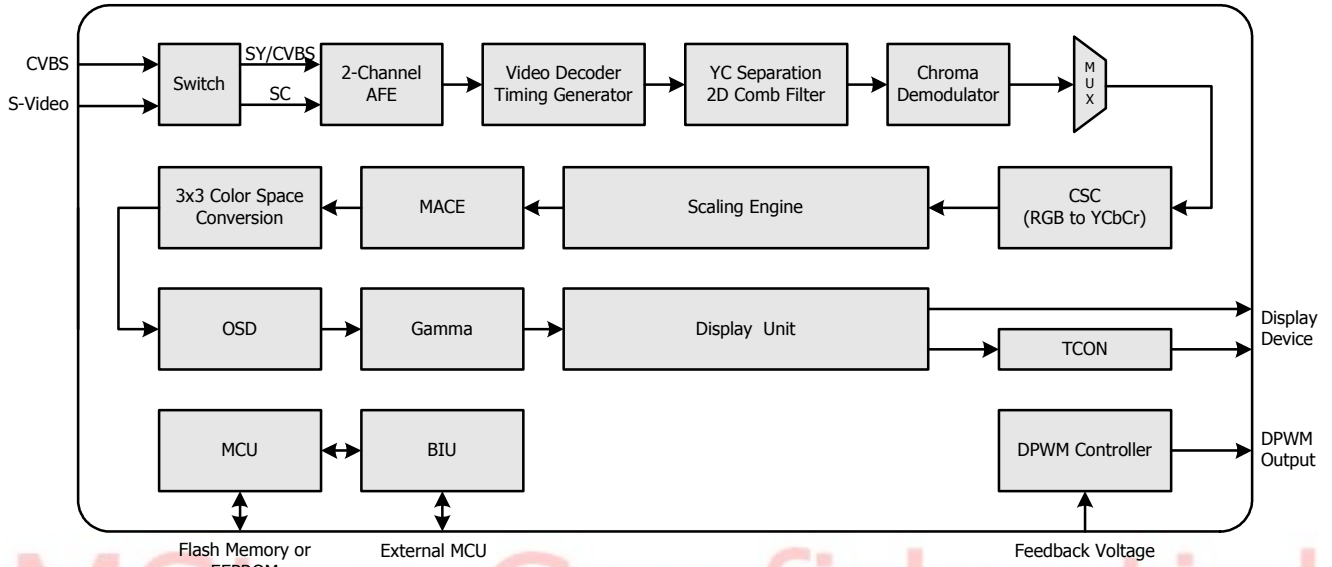
- Integrated general purpose digital PWM control loop

- Programmable startup operating frequency and period with output voltage regulation
- Programmable output current regulation; 40KHz~70KHz switching frequency, sync. to HSYNC possible
- Burst-mode or continuous-mode for output current regulation; 150Hz~300Hz burst-mode frequency, sync. to VSYNC possible
- Programmable protection level for input voltage and fault detection

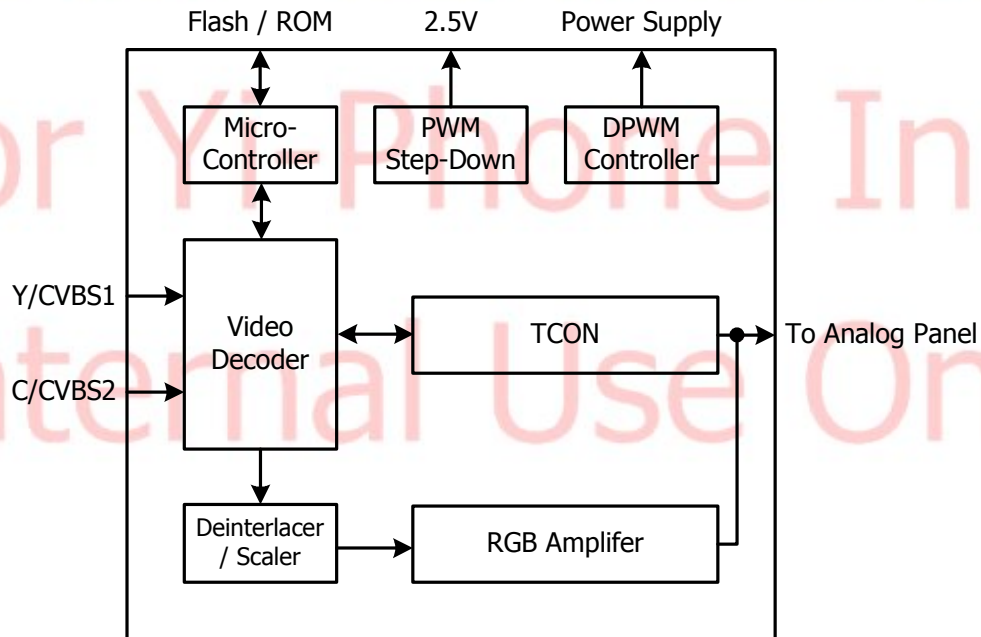
■ Miscellaneous

- Built-in MCU
- 3-wire serial bus interface for configuration setup
- Built-in step-down PWM circuits for input 2.5V
- Built-in VCOM DC level adjusting circuits
- Built-in internal OSD with 256 programmable fonts, 16-color palettes, and 12-bit color resolution
- 3-channel low-power 8-bit DAC integration for RGB output, dynamic range 0.1-4.9V
- Built-in VCOM DC/AC level adjustment circuit
- Spread spectrum clocks
- Optional 3.3V / 5V output pads with programmable driving current
- 100-pin LQFP package

BLOCK DIAGRAM



SYSTEM APPLICATION DIAGRAM

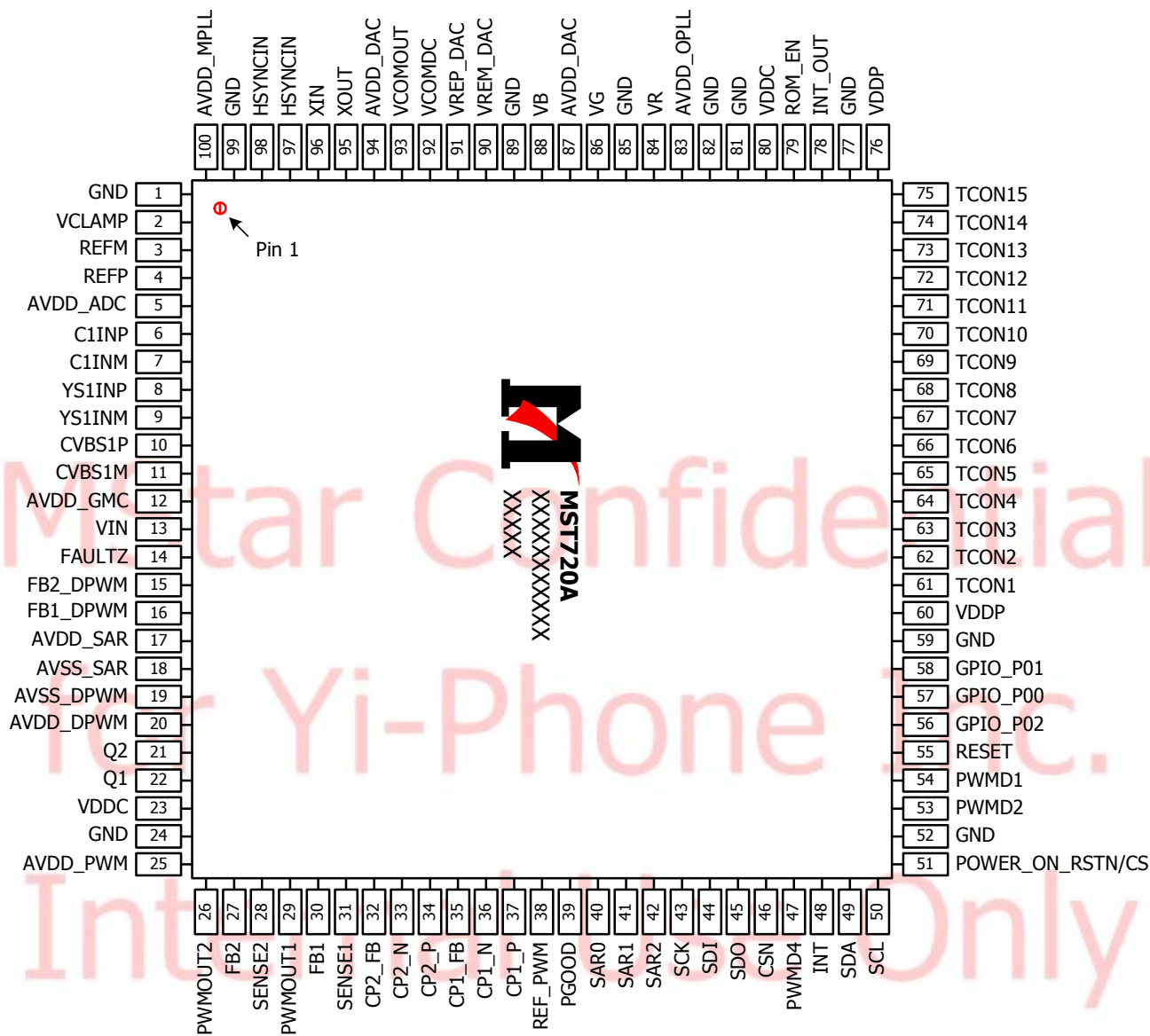


GENERAL DESCRIPTION

The MST720A is a high quality ASIC for NTSC/PAL car TV application. It receives analog NTSC/PAL CVBS and S-Video inputs from TV tuners, DVD or VCR sources, including weak and distorted signals. Automatic gain control (AGC) and 8-bit 3-channel A/D converters provide high resolution video quantization. With automatic video source and mode detection, users can easily switch and adjust variety of signal sources. Multiple internal adaptive PLLs precisely extract pixel clock from video source and perform sharp color demodulation. Built-in line-buffer supports adaptive 2-D comb-filter, 2-D sharpening, and synchronization stabler in a condense manner. The output format of MST720A supports 3.5"~7" analog TFT-LCD modules.

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PIN DIAGRAM (MST720A)



PIN DESCRIPTION

Analog Interface

Pin Name	Pin Type	Function	Pin
VCLAMP		CVBS/YC Mode Clamp Voltage Bypass	2
REFM		Internal ADC Bottom De-coupling Pin	3
REFP		Internal ADC Top De-coupling Pin	4
C1INP	Analog Input	Analog Chroma Input for TV S-Video1 / Analog Composite Input of TV CVBS4	6
C1INM	Analog Input	Reference Ground for Analog Chroma Input of TV S-Video1 / Analog Composite Input of TV CVBS4	7
YS1INP	Analog Input	Analog Luma Input of TV S-Video1 / Analog Composite Input of TV CVBS3	8
YS1INM	Analog Input	Reference Ground for Analog Luma Input of TV S-Video1 / Analog Composite Input of TV CVBS3	9
CVBS1P	Analog Input	Analog Composite Input for TV CVBS1	10
CVBS1M	Analog Input	Reference Ground for Analog Composite Input of TV CVBS1	11
HSYNCIN	Schmitt Trigger Input w/ 5V-tolerant	HSYNC / Composite Sync for VGA Input	98
VSYNCIN	Schmitt Trigger Input w/ 5V-tolerant	VSYNC for VGA Input	97

Analog Panel Output Interface

Pin Name	Pin Type	Function	Pin
VR	Analog Output	Red Channel Output 4.0 Vp-p	84
VG	Analog Output	Green Channel Output 4.0 Vp-p	86
VB	Analog Output	Blue Channel Output 4.0 Vp-p	88
REFM_DAC		DAC Bottom Reference Voltage Decoupling Cap. 1uF to Ground	90
REFP_DAC		DAC Top Reference Voltage Decoupling Cap. 1uF to Ground	91
TCON[15:1]	Output	TCON Output	75-61

VCOM Interface

Pin Name	Pin Type	Function	Pin
VCOMDC	Analog Output	Reference DC Voltage Output for Common Amplifier	92
VCOMOUT	Analog Output	Pulse Output for Common Voltage.	93

Switching Power and PWM Interface

Pin Name	Pin Type	Function	Pin
PWMOUT2	Output	Switching Pulse Output for DC-DC Converter	26
FB2	Analog Input	Error Voltage Feedback Input Pin for PWM2; voltage = 1.2V	27
SENSE2	Analog Input	Sense Circuit Connection for PWM2	28
PWMOUT1	Output	Switching Pulse Output for DC-DC Converter	29
FB1	Analog Input	Error Voltage Feedback Input Pin for PWM1; voltage = 1.2V	30
SENSE1	Analog Input	Sense Circuit Connection for PWM1	31
CP2_FB	Analog Input	Error Voltage Feedback Input Pin for CP2; voltage = 1.2V	32
CP2_N	Output	Charge Pump Negative Pulse for DC-DC Negative Voltage Converter	33
CP2_P	Output	Charge Pump Positive Pulse for DC-DC Negative Voltage Converter	34
CP1_FB	Analog Input	Error Voltage Feedback Input Pin for CP1; voltage = 1.2V	35
CP1_N	Output	Charge Pump Negative Pulse for DC-DC Negative Voltage Converter	36
CP1_P	Output	Charge Pump Positive Pulse for DC-DC Negative Voltage Converter	37
REF_PWM		PWM Reference; voltage = 2.4V	38
PGOOD	Output	Power Good Detector	39

Internal MCU Interface with Serial Flash Memory

Pin Name	Pin Type	Function	Pin
SAR2	Analog Input	SAR Low Speed ADC Input 2	42
SAR1	Analog Input	SAR Low Speed ADC Input 1	41
SAR0	Analog Input	SAR Low Speed ADC Input 0	40
SCK	Output	SPI Interface Sampling Clock	43
SDI	Output	SPI Interface Data-In	44
SDO	Input w/ 5V-tolerant	SPI Interface Data-Out	45
CSN	Output	SPI Interface Chip Select	46
GPIO_P00	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	57
GPIO_P01	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	58
GPIO_P05	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	56
INT	Input	Interrupt Input for IR Receiver	48
SDA	I/O w/ 5V-tolerant	3-Wire Serial Bus Data	49

Pin Name	Pin Type	Function	Pin
SCL	Input w/ 5V-tolerant	3-Wire Serial Bus Clock	50
POWER_ON_RSTN/CS	Input w/ 5V-tolerant	Power On Reset Signal / Chip Selection for 3-wire Serial	51

Digital PWM Interface

Pin Name	Pin Type	Function	Pin
Q1	Output	DPWM Output 1	22
Q2	Output	DPWM Output 2	21
FB1_DPWM	Analog Input	Input for 1 st Feedback Loop	16
FB2_DPWM	Analog Input	Input for 2 nd Feedback Loop	15
FAULTZ	Analog Input	Fault Detection (Low Enable)	14
VIN	Analog Input	System Input Voltage Detection	13

Misc. Interface

Pin Name	Pin Type	Function	Pin
RESET	Schmitt Trigger Input w/ 5V-tolerant	Hardware Reset; active high	55
XIN	Analog Input	Crystal Oscillator Input	96
XOUT	Analog Output	Crystal Oscillator Output	95
PWMD4	Output	Pulse Width Modulation Output; 4mA driving strength	47
PWMD2	Output	Pulse Width Modulation Output; 4mA driving strength	53
PWMD1	Output	Pulse Width Modulation Output; 4mA driving strength	54
INT_OUT	Output	Mode Detection Interrupt Output	78
ROM_EN	Input	Internal ROM Enable. 0: Disable. 1: Enable.	79

Power Pins

Pin Name	Pin Type	Function	Pin
AVDD_ADC	2.5V Power	ADC Power	5
AVDD_GMC	5V Power	GMC Power	12
AVDD_SAR	2.5V/5V Power	SAR Power	17
AVDD_DPWM	5V Power	DPWM Power	20
AVDD_PWM	5V Power	PWM Power	25
AVDD_OPLL	2.5V Power	OPLL Power	83
AVDD_DAC	5V Power	Voltage DAC Power	87, 94

Pin Name	Pin Type	Function	Pin
AVDD_MPLL	2.5V Power	MPLL Power	100
VDDC	2.5V Power	Digital Core Power	23, 80
VDDP	3.3V/5V Power	Digital Input/Output Power	60, 76
AVSS_SAR	Ground	SAR Ground	18
AVSS_DPWM	Ground	DPWM Ground	19
GND	Ground	Ground	1, 24, 52, 59, 81, 82, 85, 89, 99

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ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
5.0V Supply Voltages	V_{VDD_50}	-0.3		5.5	V
3.3V Supply Voltages	V_{VDD_33}	-0.3		3.6	V
2.5V Supply Voltages	V_{VDD_25}	-0.3		2.75	V
Input Voltage (5V tolerant inputs)	$V_{IN5Vtol}$	-0.3		5.0	V
Input Voltage (non 5V tolerant inputs)	V_{IN}	-0.3		V_{VDD_33}	V
Ambient Operating Temperature (commercial use)	T_A	0		70	°C
Ambient Operating Temperature (extended temp. range)	T_A	-20		80	°C
Storage Temperature	T_{STG}	-40		125	°C
Operating Junction Temperature	T_J	0		125	°C
Thermal Resistance (Junction to Air) Natural Convection	θ_{JA}		TBD		°C/W
Thermal Resistance (Junction to Case) Natural Convection	θ_{JC}		TBD		°C/W

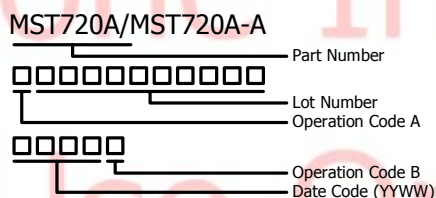
Note: Stress above those listed under Absolute Maximum Rating may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions outside of those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
MST720A	0°C to +70°C	LQFP	100
MST720A-A	-20°C to +80°C	LQFP	100
MST720A-LF	0°C to +70°C	LQFP	100
MST720A-A-LF	-20°C to +80°C	LQFP	100

Note: Product suffix "-LF" represents lead-free version and "-A" represents extended temperature range.

MARKING INFORMATION



DISCLAIMER

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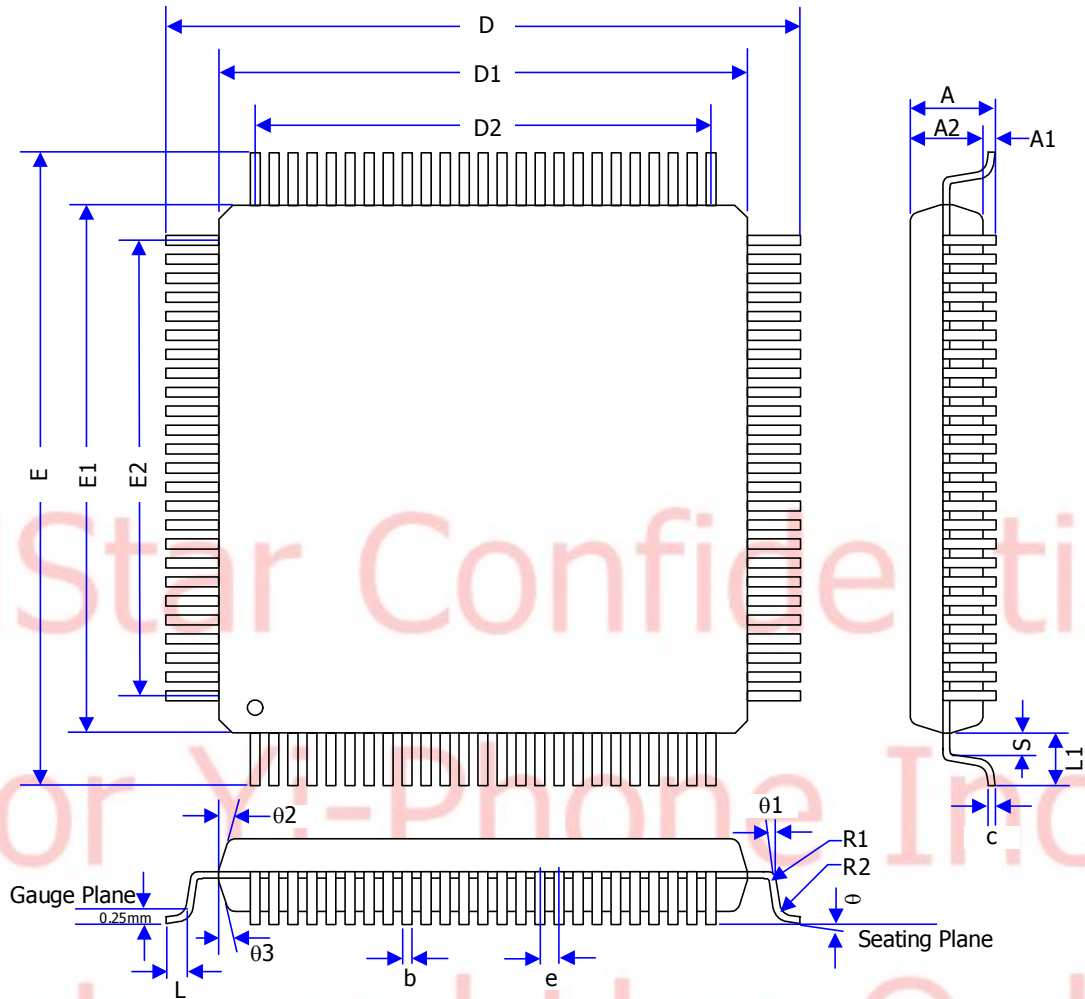
Electrostatic charges accumulate on both test equipment and human body and can discharge without detection. MST720A comes with ESD protection circuitry; however, the device may be permanently damaged when subjected to high energy discharges. The device should be handled with proper ESD precautions to prevent malfunction and performance degradation.

REVISION HISTORY

Document	Description	Date
MST720A_ds_v01	<ul style="list-style-type: none">• Initial release	Nov 2005
MST720A_ds_v02	<ul style="list-style-type: none">• Updated Pin Description \ Power Pins	Feb 2006
MST720A_ds_v03	<ul style="list-style-type: none">• Updated Features \ Video Decoder• Updated General Description• Updated Register Table	Mar 2006

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MECHANICAL DIMENSIONS



Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.60	-	-	0.063
A1	0.05	-	0.15	0.002	-	0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
D	16.00 BSC.			0.630 BSC.		
D1	14.00 BSC.			0.551 BSC.		
D2	12.00			0.472		
E	16.00 BSC.			0.630 BSC.		
E1	14.00 BSC.			0.551 BSC.		
E2	12.00			0.472		
R1	0.08	-	-	0.003	-	-
R2	0.08	-	0.20	0.003	-	0.008

Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
theta	0°	3.5°	7°	0°	3.5°	7°
theta1	0°	-	-	0°	-	-
theta2	11°	12°	13°	11°	12°	13°
theta3	11°	12°	13°	11°	12°	13°
b	0.17	0.20	0.27	0.007	0.008	0.011
c	0.09	-	0.20	0.004	-	0.008
e	0.50 BSC.			0.020 BSC.		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 Ref			0.039 Ref		
S	0.20	-	-	0.008	-	-

REGISTER DESCRIPTION

General Control Register

General Control Register				
Index	Name	Bits	Description	
00h	REGBK	7:0	Default : 0x00	Access : R/W
	XTAL_OK (RO)	7	Crystal ready.	
	MCU_SEL (RO)	6	0: Embedded MCU. 1: External serial bus interface.	
	-	5:4	Reserved.	
	AINC	3	Serial bus address auto Increase. 0: Enable. 1: Disable.	
	REGBK[2:0]	2:0	Register Bank Select. 000: Register of scaler. 001: Register of ADC/ACE/MCU. 010: Register of Video Decoder Front End (VFE). 011: Register of Video Decoder 2D Comb Filter (VCF). 100: Register of DPWM.	
01h ~	-	7:0	Default : -	Access : -
FFh	-	7:0	Reserved.	

Scaler Register (Bank = 00, Registers 01h ~ 9Fh)

Scaler Register (Bank=00, Registers 01h ~ 9Fh)				
Index	Name	Bits	Description	
01h	DBFC	7:0	Default : 0x80	Access : R/W
	-	7:3	Reserved.	
	DBL[1:0]	2:1	Double Buffer Load. 00: Keep old register value. 01: Load new data (auto reset to 00 when load finish). 10: Automatically load data at VSYNC blanking. 11: Reserved.	
	DB_EN	0	Double Buffer Enable. 0: Disable. 1: Enable.	
02h	ISELECT	7:0	Default : 0x00	Access : R/W
	NIS	7	No Input Source. 0: Input source active. 1: Input source inactive, output is free-run.	

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	STYPE[1:0]	6:5	Input Sync Type. 00: Auto detected. 01: Input is separated HSYNC and VSYNC. 10: Input is Composite sync. 11: Input is sync-on-green (SOG).
	COMP	4	CSYNC/SOG select (only useful when STYPE = 00). 0: CSYNC. 1: SOG.
	ICS	3	Input Color Space. 0: RGB. 1: YCbCr.
	IHSU	2	Input Sync Usage. When EXTVD=0: 0: Use HSYNC to perform mode detection, HSOUT from ADC to sample pixel. 1: Use HSYNC only. When EXTVD=1: 0: Normal. 1: Output black at blanking.
	BYPASSMD	1	By-Pass Mode for interlace-input-interlace-output.
	EXTVD	0	0: Select analog input (CVBS/S-Video/RGB/YCbCr). 1: Select digital input (CCIR656).
03h	IPCTRL2	7:0	Default : 0x18 Access : R/W
	VDS_EN	7	Input data double sample In CCIR input mode, 0: for horizontal output resolution less than 720 pixels. 1: for horizontal output resolution more than 720 pixels. In analog input mode, 0: half sample of input data. 1: original sample of input data.
	VDS_MTHD	6	Input data double sample Method. 0: Using average. 1: Using advance GT filter.
	IVDS	5	Input VSYNC Delay Select. 0: Delay 1/4 input HSYNC (recommended). 1: No delay.
	HES	4	Input HSYNC reference Edge Select. 0: From HSYNC leading edge, default value. 1: From HSYNC tailing edge.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	VES	3	Input VSYNC reference Edge Select. 0: From VSYNC leading edge, default value. 1: From VSYNC tailing edge.
	ESLS	2	Early Sample Line Select. 0: 8 lines. 1: 16 lines.
	VWRP	1	Input image Vertical Wrap. 0: Disable. 1: Enable.
	HWRP	0	Input image Horizontal Wrap. 0: Disable. 1: Enable.
04h	ISCTRL	7:0	Default : 0x10 Access : R/W
	DDE	7	Direct DE mode for CCIR input. 0: Disable direct DE. 1: Enable direct DE.
	DEGR[2:0]	6:4	DE or HSYNC post Glitch removal Range.
	HSFL	3	Input HSYNC Filter. 0: Filter off. 1: Filter on.
	ISSM	2	Input Sync Sample Mode. 0: Normal. 1: Glitch-removal.
	MVD_SEL	1:0	MVD mode Select 0: CVBS. 1: S-Video. 2: YCbCr. 3: RGB.
05h	SPRVST_L	7:0	Default : 0x10 Access : R/W, DB
	SPRVST[7:0]	7:0	Image vertical sample start point, count by input HSYNC (lower 8 bits).
06h	SPRVST_H	7:0	Default : 0x00 Access : R/W, DB
	-	7:3	Reserved.
	SPRVST[10:8]	2:0	Image vertical sample start point, count by input HSYNC (higher 3 bits).
07h	SPRHST_L	7:0	Default : 0x01 Access : R/W, DB

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	SPRHST[7:0]	7:0	Image horizontal sample start point, count by input dot clock (higher 8 bits).
08h	SPRHST_H	7:0	Default : 0x00 Access : R/W, DB
	-	7:3	Reserved.
	SPRGST[10:8]	2:0	Image horizontal sample start point, count by input dot clock (lower 3 bits).
09h	SPRVDC_L	7:0	Default : 0x10 Access : R/W, DB
	SPRVDC[7:0]	7:0	Image vertical resolution (vertical display enable area count by line; lower 8 bits).
0Ah	SPRVDC_H	7:0	Default: 0x00 Access : R/W
	-	7:3	Reserved.
	SPRVDC[10:8]	2:0	Image vertical resolution (vertical display enable area count by line; higher 3 bits).
0Bh	SPRHDC_L	7:0	Default : 0x10 Access : R/W
	SPRHDC[7:0]	7:0	Image horizontal resolution (horizontal display enable area count by pixel; lower 8 bits).
0Ch	SPRHDC_L	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	SPRHDC[10:8]	2:0	Image horizontal resolution (horizontal display enable area count by pixel; higher 3 bits).
0Dh	LYL	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	LYL[3:0]	3:0	Lock Y Line.
0Eh	INTLX	7:0	Default : 0x00 Access : -
	ITU_EXT_FIELD	7	Using External FIELD for ITU interface. 0: Using EAV/SAV. 1: Using external FIELD.
	ITU_EXT_HS	6	Using External HSYNC for ITU interface. 0: Using EAV/SAV. 1: Using external HSYNC.
	ITU_EXT_VS	5	Using External VSYNC for ITU interface. 0: Using EAV/SAV. 1: Using external VSYNC.
	VDOE	4	Video reference Edge (for non-standard signal).
	INTLAC_LOCKAVG	3	Averaging Locking timing.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	LHC_MD	2	Long Horizontal Counter Mode. 1: On. 0: Off.
	-	1:0	Reserved.
0Fh	ASCTRL	7:0	Default : 0x90 Access : R/W
	IVB (RO)	7	Input VSYNC Blanking status. 0: In display. 1: In blanking.
	DLINE[2:0]	6:4	Line buffer read delay in number of lines.
	INTLAC_MANSTD	3	NTSC/PAL Manual Mode
	INTLAC_SETSTD	2	NTSC/PAL Setting in manual mode under run status. 0: NTSC. 1: PAL.
	UNDER (RO)	1	Under run status.
	OVER (RO)	0	Over run status.
10h	COCTRL1	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	AVI_SEL	5	Analog Video Input Select. 0: PC. 1: Component analog video.
	DLYV	4	Analog Delay line for component analog Video input. 0: Delay 1 line. 1: Do not delay.
	CSC_MD	3	Composite SYNC Cut Mode. 0: Disable. 1: Enable.
	EXVS	2	External VSYNC polarity (only used when COVS is 1). 0: Normal. 1: Invert.
	COV_SEL	1	Coast VSYNC Select. 0: Internal VSEP. 1: External VSYNC.
	CADC	0	Coast to ADC. 0: Disable. 1: Enable.
11h	COCTRL2	7:0	Default : 0x00 Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	COST[7:0]	7:0	Front tuning. 00: Coast start from 1 HSYNC leading edge. 01: Coast start from 2 HSYNC leading edge, default value. ... 254: Coast start from 255 HSYNC leading edge. 255: Coast start from 256 HSYNC leading edge.
12h	COCTRL3	7:0	Default : 0x00 Access : R/W
	COEND[7:0]	7:0	End tuning. 00: Coast end at 1 HSYNC leading edge. 01: Coast end at 2 HSYNC leading edge, default value. ... 254: Coast end at 255 HSYNC leading edge. 255: Coast end at 256 HSYNC leading edge.
13h	VFAC_OINI	7:0	Default: 0x00 Access : R/W
	VFACOINI[7:0]	7:0	Vertical Factor Odd Initial value.
14h	VFAC_EINI	7:0	Default: 0x80 Access : R/W
	VFACEINI[7:0]	7:0	Vertical Factor Even Initial value
15h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
16h	INTCTROL	7:0	Default : 0x00 Access : R/W
	CHG_HMD	7	Change H Mode for INT. 0: Only in leading/tailing of CHG period. 1: Every line generating INT pulse during CHG period.
	-	6:4	Reserved.
	IVSI	3	Input VSYNC interrupt generated by: 0: Leading edge. 1: Tailing edge.
	OVSI	2	Output VSYNC interrupt generated by: 0: Leading edge. 1: Tailing edge.
	TRGC	1	Trigger Condition. 0: Active low for level trigger/tailing edge trigger. 1: Active high for level trigger/leading edge trigger.
	INT_TRIG	0	Interrupt Trigger. 0: Generate an edge trigger interrupt. 1: Generate a level trigger interrupt.
17h	INTPULSE	7:0	Default : 0x0F Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	INTPULSE[7:0]	7:0	Interrupt Pulse width by reference clock.
18h	INTSTA	7:0	Default : 0x00 Access : R/W
	INTSTA[7:0]	7:0	Interrupt Status byte A. Bit 7: MVD input NOT "no signal". Bit 6: MVD "HSYNC lock". Bit 5: MVD NOT "no color". Bit 4: MVD degree error. Bit 3: MVD input "no signal". Bit 2: MVD NOT "HSYNC lock". Bit 1: MVD "no color". Bit 0: MVD HSYNC change.
19h	INTENA	7:0	Default : 0x00 Access : R/W
	INTENA[7:0]	7:0	Interrupt Enable control byte A. 0: Disable interrupt. 1: Enable interrupt.
1Ah	INTSTB	7:0	Default : 0x00 Access : R/W
	INTSTB[7:0]	7:0	Interrupt Status byte B. Bit 7: MCU D2B interrupt 2. Bit 6: MCU D2B interrupt 1. Bit 5: MCU D2B interrupt 0. Bit 4: MVD CC interrupt. Bit 3: Reserved. Bit 2: MVD PAL switch error. Bit 1: MVD "ADC7_0ACT". Bit 0: MVD NOT "ADC7_0ACT".
1Bh	INTENB	7:0	Default : 0x00 Access : R/C
	INTENB[7:0]	7:0	Interrupt Enable control byte B. 0: Disable interrupt. 1: Enable interrupt.
1Ch	INTSTC	7:0	Default : 0x00 Access : R/W
	INTSTC[7:0]	7:0	Interrupt Status byte C. Bit 7: Output VSYNC interrupt. Bit 6: Input VSYNC interrupt. Bit 5: ATG ready interrupt. Bit 4: ATP ready interrupt. Bit 3: ATS ready interrupt. Bit 2: MVD probe ready interrupt. Bit 1: MCU D2B interrupt 4. Bit 0: MCU D2B interrupt 3.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
1Dh	INTENC	7:0	Default : 0x00 Access : R/C
	INTENC[7:0]	7:0	Interrupt Enable control byte C. 0: Disable interrupt. 1: Enable interrupt.
1Eh	INTSTD	7:0	Default : 0x00 Access : R/W
	INTSTD[7:0]	7:0	Interrupt Status byte D. Bit 7: WDT interrupt. Bit 6: Keypad wake-up interrupt. Bit 5: Jitter interrupt. Bit 4: Horizontal total change interrupt. Bit 3: Vertical total change interrupt. Bit 2: Horizontal lost count interrupt. Bit 1: Vertical lost count interrupt. Bit 0: Standard change interrupt.
1Fh	INTEND	7:0	Default : 0x00 Access : R/C
	INTEND[7:0]	7:0	Interrupt Enable control byte D. 0: Disable interrupt. 1: Enable interrupt.
20h ~ 21h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
22h	MPL_M	7:0	Default : 0x6F Access : R/W
	MP_ICTRL[2:0]	7:5	Charge pump current set.
	MPL_M[4:0]	4:0	MPLL divider ratio setting.
23h	OPL_CTL0	7:0	Default : 0x40 Access : R/W
	-	7:6	Reserved.
	SSC_EN	6	Output PLL spread spectrum. 0: Disable. 1: Enable.
	SD_MD	5	Output PLL spread spectrum Mode. 0: Normal. 1: Reverse for mode 1.
	-	4:0	Reserved.
24h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
25h	OPL_SET0	7:0	Default : 0x44 Access : R/W, DB
	OPL_SET[7:0]	7:0	Output PLL Set.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
26h	OPL_SET1	7:0	Default : 0x55 Access : R/W, DB
	OPL_SET[15:8]	7:0	See description for OPL_SET [7:0].
27h	OPL_SET2	7:0	Default : 0x24 Access : R/W, DB
	OPL_SET [23:16]	7:0	See description for OPL_SET [7:0].
28h	OPL_STEP0	7:0	Default : 0x20 Access : R/W, DB
	OPL_STEP[7:0]	7:0	Output PLL spread spectrum Step.
29h	OPL_STEP1	7:0	Default : 0x00 Access : R/W, DB
	-	7	Reserved.
	-	6	Reserved.
	-	5	Reserved.
	-	4:3	Reserved.
	OPL_STEP[10:8]	2:0	See description for OPL_STEP[7:0].
2Ah	OPL_SPAN	7:0	Default : 0x00 Access : R/W, DB
	OPL_SPAN[7:0]	7:0	Output PLL spread spectrum Span.
2Bh	OPL_SPAN	7:0	Default : 0x00 Access : R/W, DB
	READ_FRAME	7	0: OPL_SET stores line-based value. 1: OPL_SET stores frame-based value.
	OPL_SPAN[14:8]	6:0	See description for OPL_SPAN[7:0].
2Ch ~ 2Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
30h	HSR_L	7:0	Default : 0x00 Access : R/W
	HSR [7:0]	7:0	Horizontal Scaling ratio (20 bits fraction) for scaling down $1/2^{20}$ to $(2^{20}-1)/2^{20}$ (lower 8 bits).
31h	HSR_M	7:0	Default : 0x00 Access : R/W
	HSR[15:8]	7:0	Horizontal Scaling ratio (20 bits fraction) for scaling down $1/2^{20}$ to $(2^{20}-1)/2^{20}$ (middle 8 bits).
32h	HSR_H	7:0	Default : 0x00 Access : R/W
	HS_EN	7	Horizontal Scaling Enable. 0: Disable. 1: Enable.
	CBILINEAR_EN	6	Complemental Bi-Linear Enable.
	FORCEBICOLOR	5	0: Chrominance using same setting as Luminance defined by CBILINEAR. 1: Chrominance always using bi-linear algorithm.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)				
Index	Name	Bits	Description	
	-	4	Reserved.	
	HSR[19:16]	3:0	Horizontal Scaling Ratio (20 bits fraction) for scaling down $1/2^{20}$ to $(2^{20}-1)/2^{20}$ (higher 8 bits).	
33h	VSR_L	7:0	Default : 0x00	Access : R/W
	VSR[7:0]	7:0	Vertical Scaling ratio (2 bits integer, 20 bits fraction) for scaling down to 1/2.9999 (lower 8 bits). xx.xxxxxxxxxxxxxxxxxxxxxx	
34h	VSR_M	7:0	Default : 0x00	Access : R/W
	VSR[15:8]	7:0	Vertical Scaling ratio (2 bits integer, 20 bits fraction) for scaling down to 1/2.9999 (middle 8 bits). xx.xxxxxxxxxxxxxxxxxxxxxx	
35h	VSR_H	7:0	Default : 0x00	Access : R/W
	VS_EN	7	Vertical Scaling Enable. 0: Disable. 1: Enable.	
	VSM_SEL	6	Vertical Scaling Method Select. 0: Original. 1: New.	
	VSR[21:16]	5:0	Vertical Scaling ratio (2 bits integer, 20 bits fraction) for scaling down to 1/2.9999 (higher 8 bits). xx.xxxxxxxxxxxxxxxxxxxxxx	
36h	VDSUSG	7:0	Default: 0x00	Access : R/W
	LBF_INCLK	7	Line-Buffer using Input Clock.	
	LBF_OUTCLK	6	Line-Buffer using Output Clock.	
	LBF_LIVE	5	Line-Buffer always Live.	
	OUTCLK_DIV3	4	Output Clock is 1/3 frequency of OPLL output.	
	EN_OFST	3	Enable Offset for even/odd scaling.	
	OFST_INV	2	Offset Inverting for even/odd scaling.	
	LBCLK_DIV2	1	Line-Buffer Clock frequency is divided by 2.	
	VSD_DITH_EN	0	VSD Dither Enable.	
37h	DIRSCAL_CTL	7:0	Default: 0x00	Access : R/W
	-	7:3	Reserved.	
	GOAL2_SEL	2	Goal2 Select.	
	DITH_ON	1	Dithering control. 0: Off. 1: On.	

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	DIRSCAL_EN	0	Function Enable.
38h	NLDTI	7:0	Default : 0x00 Access : R/W
	NL_EN	7	Non-Linear scaling Enable.
	NLSIO[6:0]	6:0	Non-Linear Scaling section Initial Offset.
39h	NLDT0	7:0	Default : 0x00 Access : R/W
	NLIOS	7	Non-Linear scaling section Initial Offset Sign. 0: Positive value. 1: Negative value.
	NLDT0[6:0]	6:0	Non-Linear Scaling Delta for Section 0, bit 7 is sign bit.
3Ah	NLDT1	7:0	Default : 0x00 Access : R/W
	-	7	Reserved
	NLDT1[6:0]	6:0	Non-Linear scaling Delta for Section 1, bit 7 is sign bit.
3Bh	NLDC0	7:0	Default : 0x00 Access : R/W
	NLDC0[7:0]	7:0	Non-Linear scaling section 0 Dot Count/2.
3Ch	NLDC1	7:0	Default : 0x00 Access : R/W
	NLDC1[7:0]	7:0	Non-Linear scaling section 1 Dot Count/2.
3Dh	NLDC2	7:0	Default : 0x00 Access : R/W
	NLDC2[7:0]	7:0	Non-Linear scaling section 2 Dot Count/2.
3Eh	DIRSCAL_TH1	7:0	Default: 0x80 Access : R/W
	DETH[7:0]	7:0	Threshold of maximum value for detection
3Fh	DIRSCAL_TH2	7:0	Default: 0x80 Access : R/W
	PCTTH[7:0]	7:0	Threshold of maximum value for protection
40h	VFDEST_L	7:0	Default : 0x01 Access : R/W
	VFDEST[7:0]	7:0	Output frame DE Vertical Start (lower 8 bits).
41h	DEVST_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	VFDEST[10:8]	2:0	Output frame DE Vertical Start (higher 3 bits).
42h	HFDEST_L	7:0	Default : 0x03 Access : R/W
	HFDEST[7:0]	7:0	Output frame DE Horizontal Start (lower 8 bits).
43h	HFDEST_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	HFDEST[10:8]	2:0	Output frame DE Horizontal Start (higher 3 bits).
44h	VFDEEND_L	7:0	Default : 0xEA Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	VFDEEND[7:0]	7:0	Output frame DE Vertical END (lower 8 bits).
45h	VFDEEND_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	DEVEND[10:8]	2:0	Output frame DE Vertical END (higher 3 bits).
46h	HFDEEND_L	7:0	Default : 0xE0 Access : R/W
	HFDEEND[7:0]	7:0	Output frame DE Horizontal END (lower 8 bits).
47h	HFDEEND_H	7:0	Default : 0x01 Access : R/W
	-	7:3	Reserved.
	HFDEEND[10:8]	2:0	Output frame DE Horizontal END (higher 3 bits).
48h	SIHST_L	7:0	Default : 0x01 Access : R/W
	SIHST[7:0]	7:0	Scaling Image window Horizontal Start (lower 8 bits).
49h	SIHST_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	SIHST[10:8]	2:0	Scaling Image window Horizontal Start (higher 3 bits).
4Ah	SIVEND_L	7:0	Default : 0xEA Access : R/W
	SIVEND[7:0]	7:0	Scaling Image window Vertical END (lower 8 bits).
4Bh	SIVEND_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	SIVEND[10:8]	2:0	Scaling Image window Vertical END (higher 3 bits).
4Ch	SIHEND_L	7:0	Default : 0xEA Access : R/W
	SIHEND[7:0]	7:0	Scaling Image window Horizontal END (lower 8 bits).
4Dh	SIHEND_H	7:0	Default : 0x01 Access : R/W
	-	7:3	Reserved.
	SIHEND[10:8]	2:0	Scaling Image window Horizontal END (higher 3 bits).
4Eh	VDTOT_L	7:0	Default : 0x00 Access : R/W
	VDTOT[7:0]	7:0	Output Vertical Total (lower 8 bits).
4Fh	VDTOT_H	7:0	Default : 0x02 Access : R/W
	-	7:3	Reserved.
	VDTOT[10:8]	2:0	Output Vertical Total (higher 3 bits).
50h	VSST_L	7:0	Default : 0xEA Access : R/W
	VSST[7:0]	7:0	Output VSYNC start (lower 8 bits).
51h	VSST_H	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	VSRU	3	VSYNC Register Usage. 0: Registers 20h – 23h are used to define output VSYNC. 1: Registers 20h and 21h are used to define No signal VSYNC. Registers 22h and 23h are used to define minimum H total.
	VSST[10:8]	2:0	Output VSYNC start (higher 3 bits).
52h	VSEND_L	7:0	Default : 0x06 Access : R/W
	VSEND[7:0]	7:0	Output VSYNC END (lower 8 bits).
53h	VSEND_H	7:0	Default : 0x00 Access : R/W DB
	-	7:3	Reserved.
	VSEND[10:8]	2:0	Output VSYNC END (higher 3 bits).
54h	HDTOT_L	7:0	Default : 0x3C Access : R/W DB
	HDTOT[7:0]	7:0	Output Horizontal Total (lower 8 bits).
55h	HDTOT_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	HDTOT[10:8]	2:0	Output Horizontal Total (higher 3 bits).
56h	HSEND	7:0	Default : 0x00 Access : R/W
	HSEND[7:0]	7:0	Output HSYNC END (lower 8 bits).
57h	OSCTRL1	7:0	Default : 0x4C Access : R/W
	AOVS	7	Auto Output VSYNC. 0: OVSYNC is defined automatically. 1: OVSYNC is defined manually (register 0x50 – 0x53).
	LCM	6	Frame Lock Mode. 0: Mode 0. 1: Mode 1.
	HRSM	5	HSYNC Remove Mode. 0: Normal. 1: Remove HSYNC.
	-	4:3	Reserved.
	Scal_1	2	Scaling range add 1.
	AHRT	1	Auto H total and Read start Tuning enable. 0: Disable. 1: Enable.
	CTRL	0	ATCTRL function enable. 0: Disable. 1: Enable.
58h	BRIGHTNESS_EN	7:0	Default : 0x00 Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	-	7:1	Reserved.
	BRI_EN	0	Brightness function Enable. 0: Disable. 1: Enable.
59h	BRI_R	7:0	Default : 0x80 Access : R/W
	BRI_R[7:0]	7:0	Brightness coefficient–Red color.
5Ah	BRI_G	7:0	Default : 0x80 Access : R/W
	BRI_G[7:0]	7:0	Brightness coefficient–Green color.
5Bh	BRI_B	7:0	Default : 0x80 Access : R/W
	BRI_B[7:0]	7:0	Brightness coefficient–Blue color.
5Ch	FRAME_COLOR_1	7:0	Default : 0x00 Access : R/W
	FCG[4:3]	7:6	Frame Color G[4:3].
	FCB[7:3]	5:1	Frame Color B[7:3].
	FC_EN	0	Frame Color Enable. 0: Diable. 1: Enable.
5Dh	FRAME_COLOR_2	7:0	Default : 0x00 Access : R/W
	FCR[7:3]	7:3	Frame Color R[7:3].
	FCG[7:5]	2:0	Frame Color G[7:5].
5Eh	PATTERN	7:0	Default : 0x00 Access : R/W
	EXT_OSD	7	EXT OSD pin as GPIO.
	EXT_VD	6	EXT VD pin as GPIO.
	-	5:3	Reserved.
	PTNWT	2	Pattern White.
	PTNBLK	1	Pattern Black.
	PTNRVS	0	Pattern Reverse.
5Fh	EXT_OSD_CTRL	7:0	Default : 0x00 Access : R/W
	EXTOSD_EN	7	External OSD function Enable. 0: Diable. 1: Enable.
	DATEXTMD[1:0]	6:5	Data Extend Mode.
	CKEY_EN	4	Color Key Enable. 0: Disable. 1: Enable.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	INVCKEY_EN	3	Inverse Color Key Enable. 0: Disable. 1: Enable.
	R_KEY	2	R color Key selected.
	G_KEY	1	G color Key selected.
	B_KEY	0	B color Key selected.
60h	DITHCTRL	7:0	Default : 0x02 Access : R/W
	DITHG[1:0]	7:6	Dither coefficient for G channel.
	DITHB[1:0]	5:4	Dither coefficient for B channel.
	SROT	3	Spatial coefficient Rotate. 0: Disable. 1: Enable.
	TROT	2	Temporal coefficient Rotate. 0: Disable. 1: Enable.
	OBN	1	Output Bits Number 0: 8-bit output. 1: 6-bit output (power on default value).
	DITH	0	Dither function. 0: Off. 1: On.
61h	DITHCOEF	7:0	Default : 0x2D Access : R/W
	TL[1:0]	7:6	Top-Left dither coefficient.
	TR[1:0]	5:4	Top-Right dither coefficient.
	BL[1:0]	3:2	Bottom-Left dither coefficient.
	BR[1:0]	1:0	Bottom-Right dither coefficient.
62h	DITHCTL1	7:0	Default : 0x00 Access : R/W
	PSRD	7	Pseudo Random, resets every 4 frames. 0: Enable. 1: Disable.
	ND_MD	6	Noise Dithering Method.
	AUTO_DTH	5	Auto Dither.
	PSDO_EN	4	Pseudo Enable. 0: Disable. 1: Enable.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	DTH_MNUS	3	Dither Minus.
	ABM[2:0]	2:0	Alpha Blending Mode. 000: No alpha blending. 001: Background alpha blending. 010: Foreground alpha blending. 011: Color key alpha blending. 100: Not color key alpha blending. 101: Entire OSD alpha blending. 11x: Reserved.
63h	OSD_CTL	7:0	Default : 0x00 Access : R/W
	CKIND[3:0]	7:4	Color Index of Color Key. 0000: Color index 0. 0001: Color index 1. 1111: Color index 15. When OSD register 0x10[7]=1, OSD is not backward compatible. When OSD register 0x10[7]=0, OSD is backward compatible. When 8-color palette is selected, only CKIND[2:0] are used. When 16-color palette is selected, OSD0xE0 bit[6] is color key bit[3] instead of using CKIND[3].
	NEW_BLND_MTHD	3	New Blending Level. 0: Original blending level (BLENDL=000 means 0% transparency). 1: New blending level (BLENDL=000 means 12.5% transparency).
	OSD_BLND_MD	2:0	OSD alpha blending Level. 000: 12.5% transparency. 001: 25.0% transparency. 010: 37.5% transparency. 011: 50.0%% transparency. 100: 62.5% transparency. 101: 75.0% transparency. 110: 87.5% transparency. 111: 100% transparency.
64h	CM11_L	7:0	Default : 0x00 Access : R/W
	CM11[7:0]	7:0	Color Matrix Coefficient 11 (lower 8 bits).
65h	CM11_H	7:0	Default : 0x04 Access : R/W
	-	7:5	Reserved.
	CM11[12:8]	4:0	Color Matrix Coefficient 11 (higher 5 bits).
66h	CM12_L	7:0	Default : 0x00 Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	CM12[7:0]	7:0	Color Matrix Coefficient 12 (lower 8 bits).
67h	CM12_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	CM12[12:8]	4:0	Color Matrix Coefficient 12 (higher 5 bits).
68h	CM13_L	7:0	Default : 0x00 Access : R/W
	CM13[7:0]	7:0	Color Matrix Coefficient 13 (lower 8 bits).
69h	CM13_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	CM13[12:8]	4:0	Color Matrix Coefficient 13 (higher 5 bits).
6Ah	CM21_L	7:0	Default : 0x00 Access : R/W
	CM21[7:0]	7:0	Color Matrix Coefficient 21 (lower 8 bits).
6Bh	CM21_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	CM21[12:8]	4:0	Color Matrix Coefficient 21 (higher 5 bits).
6Ch	CM22_L	7:0	Default : 0x00 Access : R/W
	CM22[7:0]	7:0	Color Matrix Coefficient 22 (lower 8 bits).
6Dh	CM22_H	7:0	Default : 0x04 Access : R/W
	-	7:5	Reserved.
	CM22[12:8]	4:0	Color Matrix Coefficient 22 (higher 5 bits).
6Eh	CM23_L	7:0	Default : 0x00 Access : R/W
	CM23[7:0]	7:0	Color Matrix Coefficient 23 (lower 8 bits).
6Fh	CM23_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	CM23[12:8]	4:0	Color Matrix Coefficient 23 (higher 5 bits).
70h	CM31_L	7:0	Default : 0x00 Access : R/W
	CM31[7:0]	7:0	Color Matrix Coefficient 31 (lower 8 bits).
71h	CM31_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	CM31[12:8]	4:0	Color Matrix Coefficient 31 (higher 5 bits).
72h	CM32_L	7:0	Default : 0x00 Access : R/W
	CM32[7:0]	7:0	Color Matrix Coefficient 32 (lower 8 bits).
73h	CM32_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	CM32[12:8]	4:0	Color Matrix Coefficient 32 (higher 5 bits).
74h	CM33_L	7:0	Default : 0x00 Access : R/W
	CM33[7:0]	7:0	Color Matrix Coefficient 33 (lower 8 bits).
75h	CM33_H	7:0	Default : 0x04 Access : R/W
	-	7:5	Reserved.
	CM33[12:8]	4:0	Color Matrix Coefficient 33 (higher 5 bits).
76h	COL_MATRIX_CTL	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	CMRND	5	Color Matrix Rounding control. 0: Disable. 1: Enable.
	CMC	4	Color Matrix Control. 0: Disable. 1: Enable.
	-	3	Reserved.
	RRAN	2	Red Range. 0: 0~255. 1: 128~127.
	GRAN	1	Green Range. 0: 0~255. 1: 128~127.
	BRAN	0	Blue Range. 0: 0~255. 1: 128~127.
77h	FBL_CTL	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved
	ODDF	3	Shift Odd Field. 0: Shift even field. 1: Shift odd field.
	SLN[2:0]	2:0	Shift Line Number. 000: Shift 0 line between odd and even fields. 001: Shift 1 line between odd and even fields. 010: Shift 2 line between odd and even fields. 011: Shift 3 line between odd and even fields. 1xx: Shift 4 line between odd and even fields.
78h	LCK_VCNT_L	7:0	Default : - Access : RO

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	LCK_VCNT[7:0]	7:0	Lock V total low byte [7:0].
79h	LCK_VCNT_H	7:0	Default : 0x00 Access : R/W
	SWCH_STS	7	Switch Status.
	-	6:3	Reserved.
	LCK_VCNT[10:8]	2:0	Lock V total high byte [10:8].
7Ah	CAP_VCNT_L	7:0	Default : - Access : RO
	CAP_VCNT[7:0]	7:0	Cap V total low byte [7:0].
7Bh	CAP_VCNT_H	7:0	Default : - Access : RO
	-	7:3	Reserved.
	CAP_VCNT[10:8]	2:0	Cap V total high byte [10:8].
7Ch	CAP_HCNT_L	7:0	Default : - Access : RO
	CAP_HCNT[7:0]	7:0	Cap H total low byte [7:0].
7Dh	CAP_HCNT_H	7:0	Default : - Access : RO
	-	7:3	Reserved.
	CAP_HCNT[10:8]	2:0	Cap H total high byte [10:8].
7Eh	EST_VCNT_L	7:0	Default : - Access : RO
	EST_VCNT[7:0]	7:0	Est V total low byte [7:0].
7Fh	EST_VCNT_H	7:0	Default : - Access : RO
	-	7:3	Reserved.
	EST_VCNT[10:8]	2:0	Est V total high byte [10:8].
80h	EST_HCNT_L	7:0	Default : 0x00 Access : R/W
	EST_HCNT[7:0]	7:0	Est H total low byte [7:0].
81h	EST_HCNT_H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	EST_HCNT[10:8]	2:0	Est H total low byte [10:8].
82h	SSC_TLRN	7:0	Default : 0x00 Access : R/W
	SSC_TLRN[7:0]	7:0	SSC Tolerance.
83h	Delta_L	7:0	Default : 0x00 Access : R/W
	DELTA[7:0]	2:0	Delta[7:0].
84h	Delta_H	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	DELTA[12:8]	4:0	Delta[12:8].
85h	SSC_SHIFT	7:0	Default : 0x00 Access : R/W

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	SSC_SHIFT[7:0]	7:0	SSC Shift.
86h	FNTN_TST	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	MSK_SHRT_LN_CLK	5	Mask the Clock when in Short Line.
	-	4	Reserved.
	SYNC_GATE_MD	3	Mask HYSNC and Clock Mode.
	RB_SWAP	2	Output channel RB Swap.
	LM_SWAP_6	1	Output Channel MSB LSB Swap in 6-bit bus mode.
	LM_SWAP_8	0	Output Channel MSB LSB Swap in 8-bit bus mode.
87h	DEBUG	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	EOCK	6	Select External ODCLK.
	-	5:4	Reserved.
	PTEN	3	PLL Test register protect bit Enable. 0: Disable. 1: Enable.
	-	2:0	Reserved.
88h	SL_CNTRL_1	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	LIM_HS	5	Limit HSYNC period enable.
	-	4:3	Reserved.
	INT_CAP_EN	2	Interlace Capture Enable.
	SHLN_FLD	1	Select Short Line Field.
	FRZ_SHLN	0	Stop Short Line Update.
89h	SL_TUNE_1	7:0	Default : 0x70 Access : R/W
	TNCOEF	7:5	Tune Coefficient.
	LCK_THRHD	4:0	Lock Threshold.
8Ah	SL_TUNE_2	7:0	Default : 0x00 Access : R/W
	LMT_D5D6D7_H	7:0	Limit PLL_SET High byte.
8Bh	SL_TUNE_3	7:0	Default : 0xC0 Access : R/W
	LMT_D5D6D7_L	7:0	Limit PLL_SET Low byte.
8Ch	TARGET_SL_L	7:0	Default : 0x00 Access : R/W
	TARGET_SL_L	7:0	Target Short Line Low byte.

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description	Access
8Dh	TARGET_SL_H	7:0	Default : 0x01	Access : R/W
	TARGET_SL_H	7:0	Target Short Line High byte.	
8Eh ~ 8Fh	-	7:0	Default : -	Access : RO
	-		Reserved.	
90h	GAMMA_EN	7:0	Default : 0x00	Access : R/W
	-	7:2	Reserved.	
	ADR_INC_EN	1	Address Increase Enable. 0: Disable. 1: Enable.	
	GAMMA_EN	0	Gamma Enable. 0: Disable. 1: Enable.	
91h	GAMMA_ADR_PORT	7:0	Default : 0x00	Access : R/W
	GMA_ADR_PORT[7:0]	7:0	Gamma Address Port [7:0].	
92h	GAMMA_DAT_PORT	7:0	Default : 0x00	Access : R/W
	GMA_DAT_PORT[7:0]	7:0	Gamma Data Port [7:0].	
93h	R_BIAS	7:0	Default : 0x00	Access : R/W
	R_BIAS[7:0]	7:0	DC level in R channel positive part.	
94h	R_RATIO	7:0	Default : 0x00	Access : R/W
	R_RATIO[7:0]	7:0	Ratio in R channel positive part.	
95h	G_BIAS	7:0	Default : 0x00	Access : R/W
	G_BIAS[7:0]	7:0	DC level in G channel positive part.	
96h	G_RATIO	7:0	Default : 0x00	Access : R/W
	G_RATIO[7:0]	7:0	Ratio in G channel positive part.	
97h	B_BIAS	7:0	Default : 0x00	Access : R/W
	B_BIAS[7:0]	7:0	DC level in B channel positive part.	
98h	B_RATIO	7:0	Default : 0x00	Access : R/W
	B_RATIO[7:0]	7:0	Ratio in B channel positive part.	
99h	R_BIASN	7:0	Default : 0x00	Access : R/W
	R_BIASN[7:0]	7:0	Dc level in R channel negative part.	
9Ah	R_RATIO	7:0	Default : 0x00	Access : R/W
	R_RATIO[7:0]	7:0	Ratio in R channel negative part.	
9Bh	G_BIASN	7:0	Default : 0x00	Access : R/W
	G_BIASN[7:0]	7:0	DC level in G channel negative part.	

Scaler Register (Bank=00, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
9Ch	G_RATIO	7:0	Default : 0x00 Access : R/W
	G_RATIO[7:0]	7:0	Ratio in G channel negative part.
9Dh	B_BIASN	7:0	Default : 0x00 Access : R/W
	B_BIASN[7:0]	7:0	DC level in B channel negative part.
9Eh	B_RATIO	7:0	Default : 0x00 Access : R/W
	B_RATIO[7:0]	7:0	Ratio in B channel negative part.
9Fh	-	7:0	Default : 0x00 Access : R/W
	-	7:0	Reserved.

OSD Register (Bank = 00, Registers A0h ~ AAh)

OSD Register (Bank=00)			
Index	Mnemonic	Bits	Description
A0h	OSDIOA	7:0	Default : 0x00 Access : R/W
	TOSB_MD	7	OSD SRAM I/O Access Burst Mode. 0: Disable. 1: Enable.
	CLR	6	OSD Clear Bit (write only). 0: Normal. 1: Clear code with 00h, attribute with 00h.
	-	5	Reserved.
	RF	4	OSD RAM Font I/O Access. 0: Disable. 1: Enable.
	DC	3	OSD Display Code I/O Access. 0: Disable. 1: Enable.
	DA	2	OSD Display Attribute I/O Access. 0: Disable. 1: Enable.
	ORBW_MD	1	OSD Register Burst Write Mode. 0: Disable. 1: Enable.
	ORBR_MD	0	OSD Register Burst Read Mode. 0: Disable. 1: Enable.

OSD Register (Bank=00)

Index	Mnemonic	Bits	Description	Access
A1h	OSDRA	7:0	Default : 0x00	Access : R/W
	-	7:6	Reserved.	
	OSDRA	5:0	OSD Register Address Port.	
A2h	OSDRD	7:0	Default : 0x00	Access : R/W
	OSDRD	7:0	OSD Register Data Port.	
A3h	OSDFA	7:0	Default : -	Access : WO
	OSDFA	7:0	OSD RAM Font Address Port.	
A4h	OSDFD	7:0	Default : -	Access : WO
	OSDFD	7:0	OSD RAM Font Data Port.	
A5h	DISPCA_L	7:0	Default : -	Access : WO
	DISPCA[7:0]	7:0	OSD Display Code Address Port.	
A6h	DISPCA_H	7:0	Default : -	Access : WO
	-	7:3	Reserved.	
	DISPCA[10:8]	2:0	OSD Display Code Address Port.	
A7h	DISPCD	7:0	Default : 0x00	Access : R/W
	DISPCD[7:0]	7:0	OSD Display Code Data Port (When write access disabled, this port report display code data).	
A8h	DISPAA_L	7:0	Default : -	Access : WO
	DISPAA[7:0]	7:0	OSD Display Attribute Address port.	
A9h	DISPAA_H	7:0	Default : -	Access : WO
	-	7:3	Reserved.	
	DISPAA[10:8]	2:0	OSD Display Attribute Address port.	
AAh	DISPAD	7:0	Default : 0x00	Access : R/W
	DISPAD[7:0]	7:0	OSD Display Attribute Data Port (When write access disabled, this port report display attribute data).	
AEh	DISPCA_CTL	7:0	Default : 0x00	Access : R/W
	-	7	Reserved.	
	DISPAD_RE[8]	6	When write access disabled, this bit report display attribute data (bit 8).	
	-	5	Reserved.	
	DISPCD_RE[8]	4	When write access disabled, this bit report display code data (bit 8).	
-	3	Reserved.		

OSD Register (Bank=00)

Index	Mnemonic	Bits	Description
	INS_DATA	2	OSD Code/Attribute 9th bit Data (Code (A7h)/Attribute (AAh) Data Extend bit).
	-	1	Reserved.
	CA_NO_WRITE	0	OSD Display Code and Attribute Write disable.
OSD CODE (9th bit)			
	ITALIC	8	OSD Italic Control 0: Disable. 1: Enable. (Please refer AEh bit 0 INS_DATA)
OSD Attribute (8-Color Palette)			
	HALF_TRAN	8	OSD Half-transparency Control. 0: Disable. 1: Enable. (Please refer AEh[0]: INS_DATA and 42h[2]: ALF_TRANEN)
	BLNK_CTRL	7	OSD Blink Control. 0: Disable. 1: Enable.
	FGCLR[2:0]	6:4	OSD Foreground Color Select. 000: Color index 0. 001: Color index 1. ... 111: Color index 7.
	BDER_CTRL	3	OSD Character Border Control. 0: Disable. 1: Enable. (Please refer 42h[5] UNDERLINE_MD)
	BGCLR[2:0]	2:0	OSD Background Color select. 000: color index 0. 001: color index 1. ... 111: color index 7.
OSD Attribute (16 Color Palette)			
	FGCLR[3:0]	7:4	OSD Foreground Color Select. 0000: color index 0. 0001: color index 1. ... 1111: color index 15.

OSD Register (Bank=00)

Index	Mnemonic	Bits	Description
	BGCLR[3:0]	3:0	OSD Background Color Select. 0000: color index 0. 0001: color index 1. ... 1111: color index 15.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)			
Index	Mnemonic	Bits	Description
01h	OSDDBC	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	DBL[1:0]	2:1	Double Buffer Load. 00: Keep old register value. 01: Load new data (auto reset to 00 when loading completes). 10: Automatically load data at VSYNC blanking. 11: Reserved.
	DB_EN	0	Double Buffer Enable. 0: Disable. 1: Enable.
02h	OHSTA-L	7:0	Default : 0x00 Access : R/W
	OHSTA[7:0]	7:0	OSD windows Horizontal Start position (pixel) (lower 8 bits).
03h	OHSTA-H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	OHSTA[10:8]	2:0	OSD windows Horizontal Start position (higher 3 bits).
04h	OVSTA-L	7:0	Default : 0x00 Access : R/W
	OVSTA[7:0]	7:0	OSD windows Vertical Start position (line) (lower 8 bits).
05h	OVSTA-H	7:0	Default : 0x00 Access : R/W
	-	7:2	Reserved.
	OVSTA[9:8]	1:0	OSD windows Vertical Start position (higher 2 bits).
06h	OSDW	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	OSDW[5:0]	5:0	OSD windows Width (OSDW + 1 (column)), maximum 64 columns.
07h	OSDH	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	OSDH[5:0]	5:0	OSD windows Height (OSDH + 1 (row)), maximum 64 rows.
08h	OHSPA	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	OHSPA[5:0]	5:0	OSD windows Horizontal Space start position (OHSPA + 1 (column)).
09h	OVSPA	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	OVSPA[4:0]	4:0	OSD windows Vertical Space start position (OVSPA + 1 (row)).
0Ah	OSPW	7:0	Default : 0x00 Access : R/W
	OSPW[7:0]	7:0	OSD Space Width (8 * OSPW (pixel)).
0Bh	OSPH	7:0	Default : 0x00 Access : R/W
	OSPH[7:0]	7:0	OSD Space Height (8 * OSPH (line)).
0Ch	IOSDC1	7:0	Default : 0x00 Access : R/W
	OVS[1:0]	7:6	OSD Vertical Scaling. 00: Vertical normal size. 01: Vertical enlarged x2 by repeated pixels. 10: Vertical enlarged x3 by repeated pixels. 11: Vertical enlarged x4 by repeated pixels.
	OHS[1:0]	5:4	OSD Horizontal Scaling. 00: Horizontal normal size. 01: Horizontal enlarged x2 by repeated pixels. 10: Horizontal enlarged x3 by repeated pixels. 11: Horizontal enlarged x4 by repeated pixels.
	-	3:1	Reserved.
	MWIN	0	OSD Main Window display. 0: Off. 1: On.
0Dh	IOSDC2	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	BDC	5	OSD Character Border type select. 0: All direction font boundary (border). 1: Bottom-right direction font boundary (shadow).
	BDW	4	OSD character Border Width control. 0: One pixel with for all scale. 1: Scale with OVS[1:0] and OHS[1:0].
	-	3	Reserved.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	BCLR[2:0]	2:0	OSD Border Color index. 000: color index 0. 001: color index 1. ... 111: color index 7.
0Eh	IOSDC3	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	SHALL	5	OSD Shadow with All Direction. 0: Shadow with Bottom-Right direction (shadow). 1: Shadow with all direction (border).
	SDC	4	OSD Window Shadow Control. 0: Off. 1: On.
	SCLR[3:0]	3:0	OSD window Shadow Color index. 0000: Color index 0. 0001: Color index 1. ... 1111: Color index 15.
0Fh	OSHC	7:0	Default : 0x00 Access : R/W
	OSDSH[3:0]	7:4	OSD Shadow Height.
	OSDSW[3:0]	3:0	OSD Shadow Width.
10h	IOSDC4	7:0	Default : 0x00 Access : R/W
	LINE_SHIFT_EN	7	OSD line shift Enable (Please refer 45h bit 4~2 LINE_SHIFT_VAL).
	FIELD_POL	6	OSD line shift Field Polarity.
	-	5	Reserved.
	EN_M4C	4	4 Color Font Enable. 0: Disable. 1: Enable.
	F16H	3	OSD font high control. 0: Font height is 18. 1: Font height is 16.
	PEXT	2	OSD 16 color palette extent method. 0: Extend with palette bit 3. 1: Extend with 0.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	TRANEN	1	OSD Transparency Enable. 0: No transparency. 1: Color index which hit OSD Color index for transparency[2:0] is transparent of 8 color palette/ Color index which hit OSD Color index for transparency[3:0] is transparent of 16 color palette. (Please refer 42h bit 3~0 OSD Color index for transparency.)
	T16C	0	OSD 16 Color Palette select. 0: 8 color palette. 1: 16 color palette.
12h	OCBUFO	7:0	Default : 0x00 Access : R/W
	CO_SEL	7	OSD Code buffer Offset Select. 0: Use OSDW[5:0] as offset. 1: Use OOFFSET[5:0] as offset.
	-	6	Reserved.
	OOFFSET[5:0]	5:0	OSD code buffer Offset Value.
13h	OSDBA-L	7:0	Default : 0x00 Access : R/W
	OSDBA[7:0]	7:0	OSD code Base Address (lower 8 bits).
14h	OSDBA-H	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	OSDBA[10:8]	2:0	OSD code Base Address (higher 3 bits) (Please refer 45h bit7 CCRAM608X2. When CCRAM608X2 = 0, OSDBA[10:0] is programming from 0 to 4BFh; when CCRAM608X2 = 1, OSDBA[9:0] is programming from 0 to 25fh and OSDBA[10] is programming to select low or high part code/attribute SRAM).
15h	GCCTRL	7:0	Default : 0x00 Access : R/W
	GVS[1:0]	7:6	Gradually color Vertical Scaling. 00: Vertical normal size. 01: Vertical enlarged x2 by repeated pixels. 10: Vertical enlarged x3 by repeated pixels. 11: Vertical enlarged x4 by repeated pixels.
	GHS[1:0]	5:4	Gradually color Horizontal Scaling. 00: Horizontal normal size. 01: Horizontal enlarged x2 by repeated pixels. 10: Horizontal enlarged x3 by repeated pixels. 11: Horizontal enlarged x4 by repeated pixels.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	GRAD	3	Enable OSD Gradual color function. 0: Disable. 1: Enable.
	ADC_PG	2	ADC Pattern Generator select. 0: Normal. 1: ADC.
	-	1:0	Reserved.
16h	GRADCLR	7:0	Default : 0x00 Access : R/W
	FCLR	7	Gradual color by Frame Color. 0: Use RCLR, GCLR, BCLR as starting gradual color. 1: Use Frame Color as starting gradual color.
	-	6	Reserved.
	RCLR[1:0]	5:4	Red starting gradual Color. 00: Red color is 00h. 01: Red color is 55h. 10: Red color is AAh. 11: Red color is FFh.
	GCLR[1:0]	3:2	Green starting gradual Color. 00: Green color is 00h. 01: Green color is 55h. 10: Green color is AAh. 11: Green color is FFh.
	BCLR[1:0]	1:0	Blue starting gradual Color. 00: Blue color is 00h. 01: Blue color is 55h. 10: Blue color is AAh. 11: Blue color is FFh.
17h	HGRADCR	7:0	Default : 0x00 Access : R/W
	SR	7	Sign bit of Red color. 0: Increase. 1: Decrease.
	IRH	6	Inverse bit of Red color. 0: Normal. 1: Invert.
	R_GRADH[5:0]	5:0	Increase/decrease value of Red color.
18h	HGRADCG	7:0	Default : 0x00 Access : R/W

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	SG	7	Sign bit of Green color. 0: Increase. 1: Decrease.
	IGH	6	Inverse bit of Green color. 0: Normal. 1: Invert.
	G_GRADH[5:0]	5:0	Increase/decrease value of Green color.
19h	HGRADCB	7:0	Default : 0x00 Access : R/W
	SB	7	Sign bit of Blue color. 0: Increase. 1: Decrease.
	IBH	6	Inverse bit of Blue color. 0: Normal. 1: Invert.
	B_GRADH[5:0]	5:0	Increase/decrease value of Blue color.
1Ah	HGRADSR	7:0	Default : 0x00 Access : R/W
	HGRADSR[7:0]	7:0	Horizontal Gradual Step of Red color.
1Bh	HGRADSG	7:0	Default : 0x00 Access : R/W
	HGRADSG[7:0]	7:0	Horizontal Gradual Step of Green color.
1Ch	HGRADSB	7:0	Default : 0x00 Access : R/W
	HGRADSB[7:0]	7:0	Horizontal Gradual Step of Blue color.
1Dh	VGRADCR	7:0	Default : 0x00 Access : R/W
	SR	7	Sign bit of Red color. 0: Increase. 1: Decrease.
	IRV	6	Inverse bit of Red color. 0: Normal. 1: Invert.
	R_GRADV[5:0]	5:0	Increase/decrease value of Red color.
1Eh	VGRADCG	7:0	Default : 0x00 Access : R/W
	SG	7	Sign bit of Green color. 0: Increase. 1: Decrease.
	IGV	6	Inverse bit of Green color. 0: Normal. 1: Invert.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	G_GRADV[5:0]	5:0	Increase/Decrease value of Green color.
1Fh	VGRADCB	7:0	Default : 0x00 Access : R/W
	SB	7	Sign bit of Blue color. 0: Increase. 1: Decrease.
	IBV	6	Inverse bit of Blue color. 0: Normal. 1: Invert.
	B_GRADV[5:0]	5:0	Increase/decrease value of Blue color.
20h	VGRADSR	7:0	Default : 0x00 Access : R/W
	VGRADSR[7:0]	7:0	Vertical Gradual Step of Red color.
21h	VGRADSG	7:0	Default : 0x00 Access : R/W
	VGRADSG[7:0]	7:0	Vertical Gradual Step of Green color.
22h	VGRADSB	7:0	Default : 0x00 Access : R/W
	VGRADSB[7:0]	7:0	Vertical Gradual Step of Blue color.
23h ~ 25h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
26h	TIMECTRL	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	FRG_EN	4	OSD Font Ram Gated Enable. 0: Disable. 1: Enable.
	-	3:2	Reserved
	VSTDLY	1	OSD Vertical Start Delay. 0: Normal. 1: Vertical Delay 1 line.
	-	0	Reserved.
27h	OSDRTP	7:0	Default : 0x00 Access : R/W
	-	7:3	Reserved.
	RTPT	2	OSD Random Test Pattern Type. 0: RGB is the same. 1: RGB is different.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	OSDRTP[1:0]	1:0	OSD Random Test Pattern. 00: Disable. 01: 1 random bit. 10: 2 random bit. 11: Reserved.
OSD Color Palette when T16_C = 0			
28h	CLR0R	7:0	Default : 0x00 Access : R/W
	CLR0R[7:0]	7:0	Red Color Index 0.
29h	CLR0G	7:0	Default : 0x00 Access : R/W
	CLR0G[7:0]	7:0	Green Color Index 0.
2Ah	CLR0B	7:0	Default : 0x00 Access : R/W
	CLR0B[7:0]	7:0	Blue Color Index 0.
2Bh	CLR1R	7:0	Default : 0x00 Access : R/W
	CLR1R[7:0]	7:0	Red Color Index 1.
2Ch	CLR1G	7:0	Default : 0x00 Access : R/W
	CLR1G[7:0]	7:0	Green Color Index 1.
2Dh	CLR1B	7:0	Default : 0x00 Access : R/W
	CLR1B[7:0]	7:0	Blue Color Index 1.
2Eh	CLR2R	7:0	Default : 0x00 Access : R/W
	CLR2R[7:0]	7:0	Red Color Index 2.
2Fh	CLR2G	7:0	Default : 0x00 Access : R/W
	CLR2G[7:0]	7:0	Green Color Index 2.
30h	CLR2B	7:0	Default : 0x00 Access : R/W
	CLR2B[7:0]	7:0	Blue Color Index 2.
31h	CLR3R	7:0	Default : 0x00 Access : R/W
	CLR3R[7:0]	7:0	Red Color Index 3.
32h	CLR3G	7:0	Default : 0x00 Access : R/W
	CLR3G[7:0]	7:0	Green Color Index 3.
33h	CLR3B	7:0	Default : 0x00 Access : R/W
	CLR3B[7:0]	7:0	Blue Color Index 3.
34h	CLR4R	7:0	Default : 0x00 Access : R/W
	CLR4R[7:0]	7:0	Red Color Index 4.
35h	CLR4G	7:0	Default : 0x00 Access : R/W

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	CLR4G[7:0]	7:0	Green Color Index 4.
36h	CLR4B	7:0	Default : 0x00 Access : R/W
	CLR4B[7:0]	7:0	Blue Color Index 4.
37h	CLR5R	7:0	Default : 0x00 Access : R/W
	CLR5R[7:0]	7:0	Red Color Index 5.
38h	CLR5G	7:0	Default : 0x00 Access : R/W
	CLR5G[7:0]	7:0	Green Color Index 5.
39h	CLR5B	7:0	Default : 0x00 Access : R/W
	CLR5B[7:0]	7:0	Blue Color Index 5.
3Ah	CLR6R	7:0	Default : 0x00 Access : R/W
	CLR6R[7:0]	7:0	Red Color Index 6.
3Bh	CLR6G	7:0	Default : 0x00 Access : R/W
	CLR6G[7:0]	7:0	Green Color Index 6.
3Ch	CLR6B	7:0	Default : 0x00 Access : R/W
	CLR6B[7:0]	7:0	Blue Color Index 6.
3Dh	CLR7R	7:0	Default : 0x00 Access : R/W
	CLR7R[7:0]	7:0	Red Color Index 7.
3Eh	CLR7G	7:0	Default : 0x00 Access : R/W
	CLR7G[7:0]	7:0	Green Color Index 7.
3Fh	CLR7B	7:0	Default : 0x00 Access : R/W
	CLR7B[7:0]	7:0	Blue Color Index 7.
OSD Color Palette when T16_C = 1 (16 color format: col[7:4], 4'b0 or col[7:4], {4{col[4]}})			
28h	CLR0R	7:0	Default : 0x00 Access : R/W
	CLR0R[7:4]	7:4	Red Color Index 0.
	CLR8R[3:0]	3:0	Red Color Index 8.
29h	CLR0G	7:0	Default : 0x00 Access : R/W
	CLR0G[7:4]	7:4	Green Color Index 0.
	CLR8G[3:0]	3:0	Green Color Index 8.
2Ah	CLR0B	7:0	Default : 0x00 Access : R/W
	CLR0B[7:4]	7:4	Blue Color Index 0.
	CLR8B[3:0]	3:0	Blue Color Index 8.
2Bh	CLR1R	7:0	Default : 0x00 Access : R/W

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	CLR1R[7:4]	7:4	Red Color Index 1.
	CLR9R[3:0]	3:0	Red Color Index 9.
2Ch	CLR1G	7:0	Default : 0x00 Access : R/W
	CLR1G[7:4]	7:4	Green Color Index 1.
	CLR9G[3:0]	3:0	Green Color Index 9.
2Dh	CLR1B	7:0	Default : 0x00 Access : R/W
	CLR1B[7:4]	7:4	Blue Color Index 1.
	CLR9B[3:0]	3:0	Blue Color Index 9.
2Eh	CLR2R	7:0	Default : 0x00 Access : R/W
	CLR2R[7:4]	7:4	Red Color Index 2.
	CLR10R[3:0]	3:0	Red Color Index 10.
2Fh	CLR2G	7:0	Default : 0x00 Access : R/W
	CLR2G[7:4]	7:4	Green Color Index 2.
	CLR10G[3:0]	3:0	Green Color Index 10.
30h	CLR2B	7:0	Default : 0x00 Access : R/W
	CLR2B[7:4]	7:4	Blue Color Index 2.
	CLR10B[3:0]	3:0	Blue Color Index 10.
31h	CLR3R	7:0	Default : 0x00 Access : R/W
	CLR3R[7:4]	7:4	Red Color Index 3.
	CLR11R[3:0]	3:0	Red Color Index 11.
32h	CLR3G	7:0	Default : 0x00 Access : R/W
	CLR3G[7:4]	7:4	Green Color Index 3.
	CLR11G[3:0]	3:0	Green Color Index 11.
33h	CLR3B	7:0	Default : 0x00 Access : R/W
	CLR3B[7:4]	7:4	Blue Color Index 3.
	CLR11B[3:0]	3:0	Blue Color Index 11.
34h	CLR4R	7:0	Default : 0x00 Access : R/W
	CLR4R[7:4]	7:4	Red Color Index 4.
	CLR12R[3:0]	3:0	Red Color Index 12.
35h	CLR4G	7:0	Default : 0x00 Access : R/W
	CLR4G[7:4]	7:4	Green Color Index 4.
	CLR12G[3:0]	3:0	Green Color Index 12.

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
36h	CLR4B	7:0	Default : 0x00 Access : R/W
	CLR4B[7:4]	7:4	Blue Color Index 4.
	CLR12B[3:0]	3:0	Blue Color Index 12.
37h	CLR5R	7:0	Default : 0x00 Access : R/W
	CLR5R[7:4]	7:4	Red Color Index 5.
	CLR13R[3:0]	3:0	Red Color Index 13.
38h	CLR5G	7:0	Default : 0x00 Access : R/W
	CLR5G[7:4]	7:4	Green Color Index 5.
	CLR13G[3:0]	3:0	Green Color Index 13.
39h	CLR5B	7:0	Default : 0x00 Access : R/W
	CLR5B[7:4]	7:4	Blue Color Index 5.
	CLR13B[3:0]	3:0	Blue Color Index 13.
3Ah	CLR6R	7:0	Default : 0x00 Access : R/W
	CLR6R[7:4]	7:4	Red Color Index 6.
	CLR14R[3:0]	3:0	Red Color Index 14.
3Bh	CLR6G	7:0	Default : 0x00 Access : R/W
	CLR6G[7:4]	7:4	Green Color Index 6.
	CLR14G[3:0]	3:0	Green Color Index 14.
3Ch	CLR6B	7:0	Default : 0x00 Access : R/W
	CLR6B[7:4]	7:4	Blue Color Index 6.
	CLR14B[3:0]	3:0	Blue Color Index 14.
3Dh	CLR7R	7:0	Default : 0x00 Access : R/W
	CLR7R[7:4]	7:4	Red Color Index 7.
	CLR15R[3:0]	3:0	Red Color Index 15.
3Eh	CLR7G	7:0	Default : 0x00 Access : R/W
	CLR7G[7:4]	7:4	Green Color Index 7.
	CLR15G[3:0]	3:0	Green Color Index 15.
3Fh	CLR7B	7:0	Default : 0x00 Access : R/W
	CLR7B[7:4]	7:4	Blue Color Index 7.
	CLR15B[3:0]	3:0	Blue Color Index 15.
40h	SCRLSPD	7:0	Default : 0x00 Access : R/W
	SCRLSPD[7:0]	7:0	OSD Scroll function speed (the numbers of VSYNC).

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
41h	SCROLLINE	7:0	Default : 0x00 Access : R/W
	SCREN	7	OSD Scroll function Enable. 0: Disable. 1: Enable.
	VSCR_FAST	6	Scroll at every VSYNC.
	TRUC_EN	5	Truncate code/attribute Enable. 0: Disable. 1: Enable.
	SCROLLINE[4:0]	4:0	OSD Scroll function (the numbers of scan lines per scroll).
42h	UNDERLINE	7:0	Default : 0x0F Access : R/W
	UNDERLINE_1	7	OSD Underline at last line.
	UNDERLINE_2	6	OSD Underline at second last line.
	UNDERLINE_MD	5	OSD Underline Mode enable (When this bit is asserted, OSD Attribute (8 Color) bit 3. (BDER) Character Boder Control change function to OSD Character Underline Control).
	HALF_TRANEN	4	OSD Half-Transparency Enable (When this bit is asserted, OSD Attribute (8 Color) bit 9 (HALF_TRAN) is active.).
	TRAN_INDEX[3:0]	3:0	OSD Color Index for Transparency (Define which color index is transparent).
43h	TRUNCATE	7:0	Default : 0x 1D Access : R/W
	TRUNCATENUM	7:0	OSD Truncate number (Please refer 45h bit7 CCRAM608X2. When CCRAM608X2=0, final row=(11'h4bf-TRUNCATENUM); when CCRAM608X2=1, final row=(11'h25f-TRUNCATENUM)).
44h	ITALIC	7:0	Default : 0x 00 Access : R/W
	ITALIC_OFFSET	7:6	OSD Italic right shift Offset (00: 1, 01: 2, 10: 3, 11: 4 (pixel)).
	ITALIC_1ST_LINE	5:4	OSD Italic start scan Line (00: 0, 01: 1, 10: 2, 11: 3 (line)).
	ITALIC_STEP	3:2	OSD Italic left shift Step (00: 0.001, 01: 0.010, 10: 0.011, 11: 0.100 (pixel , binary)).
	ITALIC_EN	1	OSD Italic function Enable. 0: Disable. 1: Enable.
	-	0	Reserved.
45h	MISC_CTL	7:0	Default : 0x00 Access : R/W
	CCRAM608X2	7	OSD 2 608 code/attribute SRAM (When CCRAM608X2 = 0, there is one 1216 code/attribute SRAM for using; when CCRAM608X2 = 1, there are two 608 code/attribute SRAM for using.).

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
	-	6:5	Reserved.
	LINE_SHIFT_VAL[2:0]	4:2	OSD Line shift value (Line shift number, 000: 1, ..., 111: 8).
	CARHG_EN	1	OSD code/attribute high part ram gated Enable. 0: Disable. 1: Enable.
	-	0	Reserved.
46h	OSD4CFFA	7:0	Default : 0x00 Access : R/W
	OSD4CFFA[7:0]	7:0	OSD 4 Color Font RAM start Address (must be even number).
47h ~ 49h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
4Ah	OHVSTA-H	7:0	Default : 0x00 Access : RO
	VSCR_OPT	7	Vscroll Option. 0: Original. 1: Fixed.
	-	6	Reserved.
	OVSTA[9:8]	5:4	OSD windows Vertical Start position (Read only).
	-	3	Reserved.
	OHSTA[10:8]	2:0	OSD windows Horizontal Start position. (Read only).
4Bh ~ 4Ch	-	7:0	Default : - Access : -
	-	7:0	Reserved.
4Dh	OSDBRI	7:0	Default : 0x00 Access : R/W
	OSDBRI_EN	7	OSD Brightness Enable. 0: Disable. 1: Enable.
	OSDBRI_DIR	6	OSD Brightness Control. 0: Add. 1: Subtract.
	OSDBRI_VAL[5:0]	5:0	OSD Brightness Value.
4Eh ~ 4Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
50h	CODECLRDATA_L	7:0	Default : 0x00 Access : R/W
	CODECLRDATA[7:0]	7:0	OSD Code Clear Data.
51h	ATRCLRDATA_L	7:0	Default : 0x00 Access : R/W
	ATRCLRDATA[7:0]	7:0	OSD Attribute Clear Data (lower 8 bits).

OSD Register (Indirect mapping to Bank 00, Registers A1h/A2)

Index	Mnemonic	Bits	Description
52h	OSDCLRDATA	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	ATRCLRDATA[8]	4	OSD Attribute Clear Data.
	-	3:1	Reserved.
	CODECLRDATA[8]	0	OSD Code Clear Data.
53h	OSDCLRADR_L	7:0	Default : 0x00 Access : R/W
	OSDCLR_ADR[7:0]	7:0	OSD Clear Starting address (lower 8 bits).
54h	OSDCLRADR_H	7:0	Default : 0x00 Access : R/W
	ATR1_CLREN	7	OSD Attribute High Clear Enable.
	ATR0_CLREN	6	OSD Attribute Low Clear Enable.
	CODE1_CLREN	5	OSD Code High Clear Enable.
	CODE0_CLREN	4	OSD Code Low Clear Enable.
	-	3:2	Reserved.
	OSDCLR_ADR[9:8]	1:0	OSD Clear Starting Address.
55h	OSDCLR_OFST	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	OSDCLR_OFST[6:0]	6:0	OSD Clear Offset.
56h	OSDCLR_WID	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	OSDCLR_WID[6:0]	6:0	OSD Clear Width.
57h	OSDCLR_HIGT	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	OSDCLR_HIGT[6:0]	6:0	OSD Clear Height.
58h	OSDCLR_CTRL	7:0	Default : 0x00 Access : R/W
	-	7:1	Reserved.
	BLK_CLR_EN	0	OSD Block Clear Enable.
59h ~ 9Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)				
Index	Mnemonic	Bits	Description	
00h	Gamma_R00	7:0	Default : 0d00	Access : R/W
	Gamma_R00	7:0	Gamma_table R00 value.	
01h	Gamma_R01	7:0	Default : 0d07	Access : R/W
	Gamma_R01	7:0	Gamma_table R01 value.	
02h	Gamma_R02	7:0	Default : 0d15	Access : R/W
	Gamma_R02	7:0	Gamma_table R02 value.	
03h	Gamma_R03	7:0	Default : 0d23	Access : R/W
	Gamma_R03	7:0	Gamma_table R03 value.	
04h	Gamma_R04	7:0	Default : 0d31	Access : R/W
	Gamma_R04	7:0	Gamma_table R04 value.	
05h	Gamma_R05	7:0	Default : 0d39	Access : R/W
	Gamma_R05	7:0	Gamma_table R05 value.	
06h	Gamma_R06	7:0	Default : 0d47	Access : R/W
	Gamma_R06	7:0	Gamma_table R06 value.	
07h	Gamma_R07	7:0	Default : 0d55	Access : R/W
	Gamma_R07	7:0	Gamma_table R07 value.	
08h	Gamma_R08	7:0	Default : 0d63	Access : R/W
	Gamma_R08	7:0	Gamma_table R08 value.	
09h	Gamma_R09	7:0	Default : 0d71	Access : R/W
	Gamma_R09	7:0	Gamma_table R09 value.	
0Ah	Gamma_R10	7:0	Default : 0d79	Access : R/W
	Gamma_R10	7:0	Gamma_table R10 value.	
0Bh	Gamma_R11	7:0	Default : 0d87	Access : R/W
	Gamma_R11	7:0	Gamma_table R11 value.	
0Ch	Gamma_R12	7:0	Default : 0d95	Access : R/W
	Gamma_R12	7:0	Gamma_table R12 value.	
0Dh	Gamma_R13	7:0	Default : 0d103	Access : R/W
	Gamma_R13	7:0	Gamma_table R13 value.	
0Eh	Gamma_R14	7:0	Default : 0d111	Access : R/W
	Gamma_R14	7:0	Gamma_table R14 value.	
0Fh	Gamma_R15	7:0	Default : 0d119	Access : R/W
	Gamma_R15	7:0	Gamma_table R15 value.	

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
10h	Gamma_R16	7:0	Default : 0d127 Access : R/W
	Gamma_R16	7:0	Gamma_table R16 value.
11h	Gamma_R17	7:0	Default : 0d135 Access : R/W
	Gamma_R17	7:0	Gamma_table R17 value.
12h	Gamma_R18	7:0	Default : 0d143 Access : R/W
	Gamma_R18	7:0	Gamma_table R18 value.
13h	Gamma_R19	7:0	Default : 0d151 Access : R/W
	Gamma_R49	7:0	Gamma_table R19 value.
14h	Gamma_R20	7:0	Default : 0d159 Access : R/W
	Gamma_R20	7:0	Gamma_table R20 value.
15h	Gamma_R21	7:0	Default : 0d167 Access : R/W
	Gamma_R21	7:0	Gamma_table R21 value.
16h	Gamma_R22	7:0	Default : 0d175 Access : R/W
	Gamma_R22	7:0	Gamma_table R22 value.
17h	Gamma_R23	7:0	Default : 0d183 Access : R/W
	Gamma_R23	7:0	Gamma_table R23 value.
18h	Gamma_R24	7:0	Default : 0d191 Access : R/W
	Gamma_R24	7:0	Gamma_table R24 value.
19h	Gamma_R25	7:0	Default : 0d199 Access : R/W
	Gamma_R25	7:0	Gamma_table R25 value.
1Ah	Gamma_R26	7:0	Default : 0d207 Access : R/W
	Gamma_R26	7:0	Gamma_table R26 value.
1Bh	Gamma_R27	7:0	Default : 0d215 Access : R/W
	Gamma_R27	7:0	Gamma_table R27 value.
1Ch	Gamma_R28	7:0	Default : 0d223 Access : R/W
	Gamma_R28	7:0	Gamma_table R28 value.
1Dh	Gamma_R29	7:0	Default : 0d232 Access : R/W
	Gamma_R29	7:0	Gamma_table R29 value.
1Eh	Gamma_R30	7:0	Default : 0d239 Access : R/W
	Gamma_R30	7:0	Gamma_table R30 value.
1Fh	Gamma_R31	7:0	Default : 0d247 Access : R/W
	Gamma_R31	7:0	Gamma_table R31 value.
20h	Gamma_R32	7:0	Default : 0d255 Access : R/W

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
	Gamma_R32	7:0	Gamma_table R32 value.
21h	Gamma_G00	7:0	Default : 0d00 Access : R/W
	Gamma_G00	7:0	Gamma_table G00 value.
22h	Gamma_G01	7:0	Default : 0d07 Access : R/W
	Gamma_G01	7:0	Gamma_table G01 value.
23h	Gamma_G02	7:0	Default : 0d15 Access : R/W
	Gamma_G02	7:0	Gamma_table G02 value.
24h	Gamma_G03	7:0	Default : 0d23 Access : R/W
	Gamma_G03	7:0	Gamma_table G03 value.
25h	Gamma_G04	7:0	Default : 0d31 Access : R/W
	Gamma_G04	7:0	Gamma_table G04 value.
26h	Gamma_G05	7:0	Default : 0d39 Access : R/W
	Gamma_G05	7:0	Gamma_table G05 value.
27h	Gamma_G06	7:0	Default : 0d47 Access : R/W
	Gamma_G06	7:0	Gamma_table G06 value.
28h	Gamma_G07	7:0	Default : 0d55 Access : R/W
	Gamma_G07	7:0	Gamma_table G07 value.
29h	Gamma_G08	7:0	Default : 0d63 Access : R/W
	Gamma_G08	7:0	Gamma_table G08 value.
2Ah	Gamma_G09	7:0	Default : 0d71 Access : R/W
	Gamma_G09	7:0	Gamma_table G09 value.
2Bh	Gamma_G10	7:0	Default : 0d79 Access : R/W
	Gamma_G10	7:0	Gamma_table G10 value.
2Ch	Gamma_G11	7:0	Default : 0d87 Access : R/W
	Gamma_G11	7:0	Gamma_table G11 value.
2Dh	Gamma_G12	7:0	Default : 0d95 Access : R/W
	Gamma_G12	7:0	Gamma_table G12 value.
2Eh	Gamma_G13	7:0	Default : 0d103 Access : R/W
	Gamma_G13	7:0	Gamma_table G13 value.
2Fh	Gamma_G14	7:0	Default : 0d111 Access : R/W
	Gamma_G14	7:0	Gamma_table G14 value.
30h	Gamma_G15	7:0	Default : 0d119 Access : R/W
	Gamma_G15	7:0	Gamma_table G15 value.

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
31h	Gamma_G16	7:0	Default : 0d127 Access : R/W
	Gamma_G16	7:0	Gamma_table G16 value.
32h	Gamma_G17	7:0	Default : 0d135 Access : R/W
	Gamma_G17	7:0	Gamma_table G17 value.
33h	Gamma_G18	7:0	Default : 0d143 Access : R/W
	Gamma_G18	7:0	Gamma_table G18 value.
34h	Gamma_G19	7:0	Default : 0d151 Access : R/W
	Gamma_G19	7:0	Gamma_table G19 value.
35h	Gamma_G20	7:0	Default : 0d159 Access : R/W
	Gamma_G20	7:0	Gamma_table G20 value.
36h	Gamma_G21	7:0	Default : 0d167 Access : R/W
	Gamma_G21	7:0	Gamma_table G21 value.
37h	Gamma_G22	7:0	Default : 0d175 Access : R/W
	Gamma_G22	7:0	Gamma_table G22 value.
38h	Gamma_G23	7:0	Default : 0d183 Access : R/W
	Gamma_G23	7:0	Gamma_table G23 value.
39h	Gamma_G24	7:0	Default : 0d191 Access : R/W
	Gamma_G24	7:0	Gamma_table G24 value.
3Ah	Gamma_G25	7:0	Default : 0d199 Access : R/W
	Gamma_G25	7:0	Gamma_table G25 value.
3Bh	Gamma_G26	7:0	Default : 0d207 Access : R/W
	Gamma_G26	7:0	Gamma_table G26 value.
3Ch	Gamma_G27	7:0	Default : 0d215 Access : R/W
	Gamma_G27	7:0	Gamma_table G27 value.
3Dh	Gamma_G28	7:0	Default : 0d223 Access : R/W
	Gamma_G28	7:0	Gamma_table G28 value.
3Eh	Gamma_G29	7:0	Default : 0d232 Access : R/W
	Gamma_G29	7:0	Gamma_table G29 value.
3Fh	Gamma_G30	7:0	Default : 0d239 Access : R/W
	Gamma_G30	7:0	Gamma_table G30 value.
40h	Gamma_G31	7:0	Default : 0d247 Access : R/W
	Gamma_G31	7:0	Gamma_table G31 value.
41h	Gamma_G32	7:0	Default : 0d255 Access : R/W

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
	Gamma_G32	7:0	Gamma_table G32 value.
42h	Gamma_B00	7:0	Default : 0d00 Access : R/W
	Gamma_B00	7:0	Gamma_table B00 value.
43h	Gamma_B01	7:0	Default : 0d07 Access : R/W
	Gamma_B01	7:0	Gamma_table B01 value.
44h	Gamma_B02	7:0	Default : 0d15 Access : R/W
	Gamma_B02	7:0	Gamma_table B02 value.
45h	Gamma_B03	7:0	Default : 0d23 Access : R/W
	Gamma_B03	7:0	Gamma_table B03 value.
46h	Gamma_B04	7:0	Default : 0d31 Access : R/W
	Gamma_B04	7:0	Gamma_table B04 value.
47h	Gamma_B05	7:0	Default : 0d39 Access : R/W
	Gamma_B05	7:0	Gamma_table B05 value.
48h	Gamma_B06	7:0	Default : 0d47 Access : R/W
	Gamma_B06	7:0	Gamma_table B06 value.
49h	Gamma_B07	7:0	Default : 0d55 Access : R/W
	Gamma_B07	7:0	Gamma_table B07 value.
4Ah	Gamma_B08	7:0	Default : 0d63 Access : R/W
	Gamma_B08	7:0	Gamma_table B08 value.
4Bh	Gamma_B09	7:0	Default : 0d71 Access : R/W
	Gamma_B09	7:0	Gamma_table B09 value.
4Ch	Gamma_B10	7:0	Default : 0d79 Access : R/W
	Gamma_B10	7:0	Gamma_table B10 value.
4Dh	Gamma_B11	7:0	Default : 0d87 Access : R/W
	Gamma_B11	7:0	Gamma_table B11 value.
4Eh	Gamma_B12	7:0	Default : 0d95 Access : R/W
	Gamma_B12	7:0	Gamma_table B12 value.
4Fh	Gamma_B13	7:0	Default : 0d103 Access : R/W
	Gamma_B13	7:0	Gamma_table B13 value.
50h	Gamma_B14	7:0	Default : 0d111 Access : R/W
	Gamma_B14	7:0	Gamma_table B14 value.
51h	Gamma_B15	7:0	Default : 0d119 Access : R/W
	Gamma_B15	7:0	Gamma_table B15 value.

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
52h	Gamma_B16	7:0	Default : 0d127 Access : R/W
	Gamma_B16	7:0	Gamma_table B16 value.
53h	Gamma_B17	7:0	Default : 0d135 Access : R/W
	Gamma_B17	7:0	Gamma_table B17 value.
54h	Gamma_B18	7:0	Default : 0d143 Access : R/W
	Gamma_B18	7:0	Gamma_table B18 value.
55h	Gamma_B19	7:0	Default : 0d151 Access : R/W
	Gamma_B19	7:0	Gamma_table B19 value.
56h	Gamma_B20	7:0	Default : 0d159 Access : R/W
	Gamma_B20	7:0	Gamma_table B20 value.
57h	Gamma_B21	7:0	Default : 0d167 Access : R/W
	Gamma_B21	7:0	Gamma_table B21 value.
58h	Gamma_B22	7:0	Default : 0d175 Access : R/W
	Gamma_B22	7:0	Gamma_table B22 value.
59h	Gamma_B23	7:0	Default : 0d183 Access : R/W
	Gamma_B23	7:0	Gamma_table B23 value.
5Ah	Gamma_B24	7:0	Default : 0d191 Access : R/W
	Gamma_B24	7:0	Gamma_table B24 value.
5Bh	Gamma_B25	7:0	Default : 0d199 Access : R/W
	Gamma_B25	7:0	Gamma_table B25 value.
5Ch	Gamma_B26	7:0	Default : 0d207 Access : R/W
	Gamma_B26	7:0	Gamma_table B26 value.
5Dh	Gamma_B27	7:0	Default : 0d215 Access : R/W
	Gamma_B27	7:0	Gamma_table B27 value.
5Eh	Gamma_B28	7:0	Default : 0d223 Access : R/W
	Gamma_B28	7:0	Gamma_table B28 value.
5Fh	Gamma_B29	7:0	Default : 0d232 Access : R/W
	Gamma_B29	7:0	Gamma_table B29 value.
60h	Gamma_B30	7:0	Default : 0d239 Access : R/W
	Gamma_B30	7:0	Gamma_table B30 value.
61h	Gamma_B31	7:0	Default : 0d247 Access : R/W
	Gamma_B31	7:0	Gamma_table B31 value.
62h	Gamma_B32	7:0	Default : 0d255 Access : R/W

Gamma Register (Indirect mapping to Bank 00, Registers 91h/92h)

Index	Mnemonic	Bits	Description
	Gamma_B32	7:0	Gamma_table B32 value.

Scaler Register (Bank = 00, Registers B0h ~ FFh)

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
B0h	LINE_SHIFT	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	SEL_V_CLR	6	Select Vcounter Clear by DOWNCNT_EQ1 or EARLY_VS.
	-	5	Reserved.
	VCR_FF_MODE	4	Enable output VSYNC follow input VSYNC mode.
	FIELD_INV_VS	3	Line shift vs Field Inverse.
	LINE_SHIFT_NUM[2:0]	2:0	Line Shift Numbers.
B1h	SYNC_CONTROL	7:0	Default : 0x08 Access : R/W
	CLK_DLY[3:0]	7:4	Output clock delay select.
	CLK_INV	3	Output Clock invert enable.
	DE_INV	2	Output DE Invert enable.
	VS_INV	1	Output VSYNC Invert enable.
	HS_INV	0	Output HSYNC Invert enable.
B2h	SYNC_SEL	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	SEL_VDE	3	Select VDE output to VSYNC pin.
	SEL_HDE	2	Select HDE output to HSYNC pin.
	DATA_SKEW	1:0	Bus data Skew select.
B3h ~ BFh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
C0h	HSPRDL_L	7:0	Default : - Access : RO
	HSPRDL[7:0]	7:0	Number of system clock count at 512 HSYNCs.
C1h	HSPRDL_M	7:0	Default : - Access : RO
	HSPRDL[15:8]	7:0	Number of system clock count at 512 HSYNCs.
C2h	HSPRDL_H	7:0	Default : - Access : RO
	HSPRDL[23:16]	7:0	Number of system clock count at 512 HSYNCs.
C3h	YCDLYCTL	7:0	Default : 0x00 Access : R/W

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description	
	LNBF4_MD	7	Four Line Buffer Mode.	
	VSD_PIPE	6	VSD Pipe select. 0: Original. 1: Early pipe 2 cycle.	
	-	5:3	Reserved.	
	YC_DLY_CTL	2:0	YC Delay Control. 000: Normal. 001: Y early 1 cycle. 010: Y early 2 cycles. 011: Y early 3 cycles. 100: Normal. 101: C early 1 cycle. 110: C early 2 cycles. 111: C early 3 cycles.	
C4h	VTOTAL_MAX_L	7:0	Default : 0xFF	Access : R/W
	TOTAL_MAX[7:0]	7:0	Vertical Max Total (lower 8 bits).	
C5h	VTOTAL_MAX_H	7:0	Default : 0x07	Access : R/W
	-	7:3	Reserved.	
	TOTAL_MAX[10:8]	2:0	Vertical Max Total (higher 3 bits).	
C6h ~ C7h	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
C8h	ATGCTRL	7:0	Default : 0x00	Access : R/W
	MAXR (RO)	7	Max value flag for Red channel (read only). 0: Normal. 1: Max value (255) value when AGR = 0. Output over max value (255) when AGR = 1.	
	MAXG (RO)	6	Max value flag for Green channel (read only). 0: Normal. 1: Max value (255) value when AGR = 0. Output over max value (255) when AGR = 1.	
	MAXB (RO)	5	Max value flag for Blue channel (read only). 0: Normal. 1: Max value (255) value when AGR = 0. Output over max value (255) when AGR = 1.	
	AC_EN	4	ADC Calibration Enable. 0: Disable. 1: Enable.	

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	AGR	3	Auto Gain Result selection. 0: Output has max/min value. 1: Output is overflow/underflow.
	ATGM	2	Auto Gain Mode. 0: Normal mode (result will be cleared every frame). 1: History mode (result remains not cleared till ATGE = 0).
	ATGR (RO)	1	Auto Gain Result Ready. 0: Result not ready. 1: Result ready.
	ATGE	0	Auto Gain Function Enable. 0: Disable. 1: Enable.
C9h	ATGST	7:0	Default : -
	VCLP	7	Video auto gain mode. 0: RGB mode. 1: YPbPr Mode.
	-	6	Reserved.
	CALR (RO)	5	Calibration value flag for Red channel. 0: Normal. 1: Calibration result (needs to increase offset) when ACE=1.
	CALG (RO)	4	Calibration value flag for Green channel. 0: Normal. 1: Calibration result (needs to increase offset) when ACE=1.
	CALB (RO)	3	Calibration value flag for Blue channel. 0: Normal. 1: Calibration result (needs to increase offset) when ACE=1.
	MINR (RO)	2	Min value flag for Red channel. 0: Normal. 1: Min value (0) present when AGR = 0, ACE = 0. Output under min value (0) when AGR = 1, ACE = 0. Calibration result (needs to decrease offset) when ACE = 1.
	MING (RO)	1	Min value flag for Green channel. 0: Normal. 1: Min value (0) present when AGR = 0, ACE = 0. Output under min value (0) when AGR = 1, ACE = 0. Calibration result (needs to decrease offset) when ACE = 1.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	MINB (RO)	0	Min value flag for Blue channel. 0: Normal. 1: Min value (0) present when AGR = 0, ACE = 0. Output under min value (0) when AGR = 1, ACE = 0. Calibration result (needs to decrease offset) when ACE = 1.
CAh	ATFCHSEL	7:0	Default: 0x00 Access : R/W
	-	7:6	Reserved.
	ATPCHSEL[1:0]	5:4	Auto Phase R/G/B channel select 00: R/G/B 3 channels 01: only R channel 10: only G channel 11: only B channel
	-	3	Reserved.
	ATGCHSEL[2:0]	2:0	Auto Gain R/G/B channel min/max value select. 000: R min value 001: G min value 010: B min value 011: R max value 100: G max value 101: B max value 11x: Reserved
CBh	ATOCTRL	7:0	Default : 0x00 Access : R/W
	JITLR	7	Jitter function Left / Right result for 86h and 87h. 0: Left result. 1: right result.
	JITS	6	Jitter Software clear. 0: Not clear. 1: Clear.
	-	5	Reserved.
	JITM	4	Jitter function Mode. 0: Update every frame. 1: Keep the history value.
	JITR	3	Jitter function Result (Read Only). 0: No jitter. 1: Jitter present.
	ATOM	2	Auto position function Mode. 0: Update every frame. 1: Keep the history value.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	ATOR	1	Auto position result Ready (Read Only). 0: Result ready. 1: Result not ready.
	ATOE	0	Auto position function Enable. 0: Disable. 1: Enable. Disable-to-enable needs at least 2 frame apart for ready bit to settle.
CCh	AOVDV	7:0	Default : 0x00 Access : R/W
	AOVDV[3:0]	7:4	Auto position Valid Data Value. 0000: Valid if data >= 0000 0000. 0001: Valid if data >= 0001 0000. 0010: Valid if data >= 0010 0000. 1111: Valid if data >= 1111 0000.
	-	3:0	Reserved.
CDh	ATGVALUE (RO)	7:0	Default: - Access : RO
	ATGVALUE[7:0]	7:0	Auto Gain result based on 7Ah[2:0].
CEh	AOVST-L (RO)	7:0	Default : - Access : RO
	AOVST [7:0]	7:0	Auto position detected result Vertical Starting point.
CFh	AOVST-H (RO)	7:0	Default : - Access : RO
	-	7:3	Reserved.
	AOVST[10:8]	2:0	See description for AOVST [7:0].
D0h	AOHST-L (RO)	7:0	Default : - Access : RO
	AOHST[7:0]	7:0	Auto position detected result Horizontal Starting point.
D1h	AOHST-H (RO)	7:0	Default : - Access : DB
	-	7:3	Reserved.
	SPRGST[10:8]	2:0	Image horizontal sample start point, count by input dot clock.
D2h	AOVEND-L (RO)	7:0	Default : - Access : RO
	AOVEND[7:0]	7:0	Auto position detected result Vertical End point.
D3h	AOVEND-H (RO)	7:0	Default : - Access : RO
	-	7:3	Reserved.
	AOVEND[10:8]	2:0	See description for AOVEND[7:0].
D4h	AOHEND-L (RO)	7:0	Default : - Access : RO
	AOHEND[7:0]	7:0	Auto position detected result Horizontal End point.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description	Access
D5h	AOHEND-H (RO)	7:0	Default : -	Access : RO
	-	7:4	Reserved.	
	AOHEND[11:8]	2:0	See description for AOHEND[7:0].	
D6h	JLR-L (RO)	7:0	Default : -	Access : RO
	JLR[7:0]	7:0	Jitter function detected Left/Right most point state (previous frame) depend on Reg_7Bh[7].	
D7h	JLR-H (RO)	7:0	Default : -	Access : RO
	-	7:3	Reserved.	
	JLR[10:8]	2:0	See description for JLR[7:0].	
D8h	ANRF	7:0	Default : -	Access : RO
	-	7:6	Reserved.	
	HNEN	5	High level Noise reduction Enable. 0: Disable. 1: Enable.	
	BGEN	4	Background Noise reduction Enable. 0: Disable. 1: Enable.	
	-	3	Reserved.	
	ANLV[2:0]	2:0	Auto Noise Level, 000: Noise level = 1, 001: Noise level = 2, 010: Noise level = 4, 011: Noise level = 8, 100: Noise level = 9, 101: Noise level = 10, 110: Noise level = 12, 111: Noise level = 16.	
D9h	ATPGTH	7:0	Default : 0x01	Access : R/W
	ATPGTH[7:0]	7:0	Auto Phase Gray scale Threshold for ATPV3 when ATPN4 = 0.	
DAh	ATPTTH	7:0	Default : 0x10	Access : R/W
	ATPTTH[7:0]	7:0	Auto Phase Text Threshold for ATPV4.	
DBh	ATPCTRL	7:0	Default : 0x00	Access : R/W
	ATP_FLTRMD	7	0: Disable auto-position filter mode. 1: Enable auto-position filter mode.	
	GRY (RO)	6	Gray scale detect (read only).	

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	TXT (RO)	5	Text detect (read only).
	APMASK[2:0]	4:2	Nose Mask. 000: Mask 0 bit, default value. 001: Mask 1 bit. 010: Mask 2 bit. 011: Mask 3 bit. 100: Mask 4 bit. 101: Mask 5 bit. 110: Mask 6 bit. 111: Mask 7 bit.
	ATPR (RO)	1	Auto Phase Result ready. 0: Result not ready. 1: Result ready.
	ATPE	0	Auto Phase function Enable. 0: Disable. 1: Enable.
DCh	ATPV1 (RO)	7:0	Default : - Access : RO
	ATPVALUE[7:0]	7:0	Auto Phase Value.
DDh	ATPV2 (RO)	7:0	Default : - Access : RO
	ATPVALUE[15:8]	7:0	See description for ATPVALUE[7:0].
DEh	ATPV3 (RO)	7:0	Default : - Access : RO
	ATPVALUE[23:16]	7:0	See description for ATPVALUE[7:0].
DFh	ATPV4 (RO)	7:0	Default : - Access : RO
	ATPVALUE[31:24]	7:0	See description for ATPVALUE[7:0].
E0h	PDMD0	7:0	Default : 0x00 Access : R/W
	GCLK[1:0]	7:6	Gated Clock for SRAM. 00: Normal. 01: V Blank. 10: H Blank and V Blank. 11: Reserved.
	AUXCLK_GAT	5	0: Enable MVD MCU-support Clock. 1: Disable MVD MCU-support Clock.
	CMBCLK_GAT	4	0: Enable MVD comb-filter Clock. 1: Disable MVD comb-filter Clock.
	-	3	Reserved.
	EOCLK_INV	2	External OSD sample Clock Inverting.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	IDCLK_INV	1	Scaler input sample Clock Inverting.
	FSCCLK_INV	0	Sub-carrier Clock Inverting.
E1h	PDMD1	7:0	Default : 0x00 Access : R/W
	PDALL	7	All chip power down.
	BIUCLK_GAT	6	0: Enable register interface clock. 1: Disable register interface clock.
	OSDCLK_GAT	5	0: Enable OSD clock. 1: Disable OSD clock.
	PCCLK_GAT	4	0: Enable CRT output support clock. 1: Disable CRT output support clock.
	ADCCLK_GAT	3	0: Enable 3-channel ADC digital clock. 1: Disable 3-channel ADC digital clock.
	VDCLK_GAT	2	0: Enable CCIR and MVD interface clock. 1: Disable CCIR and MVD interface clock.
	IDCLK_GAT	1	0: Enable scaler clock. 1: Disable scaler clock.
	FSCCLK_GAT	0	0: Enable MVD digital front-end clock. 1: Disable MVD digital front-end clock.
E2h	SWRST0	7:0	Default : 0x00 Access : R/W
	REGR	7	Register Reset. 0: Normal operation. 1: Reset Register.
	ADCR	6	ADC Reset. 0: Normal operation. 1: Reset ADC.
	IPR	5	Digital Input Port Reset. 0: Normal operation. 1: Reset.
	OP1R	4	Scaler Reset. 0: Normal operation. 1: Reset.
	OP2R	3	Display Port Reset. 0: Normal operation. 1: Reset.
	-	2	Reserved.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	OSDR	1	Internal OSD Reset. 0: Normal operation. 1: Reset internal OSD.
	SWR	0	Software Reset (reset All digital core except system registers). 0: Normal operation. 1: Reset.
E3h	SWRST1	7:0	Default : 0x00 Access : R/W
	VFER	7	Video Decoder Front End Reset. 0: Normal operation. 1: Reset.
	VCFR	6	Video Decoder Comb Filter Reset. 0: Normal operation. 1: Reset.
	MCUR	5	Embedded MCU Reset. 0: Normal operation. 1: Reset.
	MCUR	4	GMC digital tune Reset. 0: Normal operation. 1: Reset.
	-	3:0	Reserved.
E4h	ISOVRD	7:0	Default : 0x00 Access : R/W
	SL	7	Shift Line. 0: Shift line method 0. 1: Shift line method 1 for interlace mode.
	CSHS	6	HSYNC in coast. 0: HSYOUT (recommended). 1: Re-shaped HSYNC.
	UVSP	5	User defined input VSYNC Polarity, active when IVSJ =1. 0: Active low. 1: Active high.
	IVSJ	4	Input VSYNC polarity judgment. 0: Use result of internal circuit detection. 1: Defined by user (UVSP).
	UHSP	3	User defined input HSYNC Polarity, active when IVSJ =1. 0: Active low. 1: Active high.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	IHSJ	2	Input HSYNC polarity judgment. 0: Use result of internal circuit detection. 1: Defined by user (UHSP).
	UINT	1	User defined non-interlace/interlace, active when INTJ = 1. 0: Non-interlace. 1: Interlace.
	INTJ	0	Interlace judgment. 0: Use result of internal circuit detection. 1: Defined by user (UINT).
E5h	MDCTRL	7:0	Default : 0x00 Access : R/W
	IP_TEST_MD	7:6	IP Test-bus selection.
	VERR	5	Video CCIR656 Error correct. 0: Disable. 1: Enable.
	Field_ABSMD	4	Field Position Absolute Value Mode.
	VFIV	3	Video Field Inversion. 0: Normal. 1: Invert.
	VEXF	2	Video External Field. 0: Use result of internal circuit detection. 1: Use external field.
	INTF	1	Interlace Field detect method select. 0: Use the HSYNC numbers of a field to judge. 1: Use the relationship of VSYNC and HSYNC to judge.
	IFI	0	Interlace Field Inverting. 0: Normal. 1: Invert.
E6h	HSPW (RO)	7:0	Default : - Access : RO
	HS_PW	7:0	HS Pulse Width
E7h	VFREE	7:0	Default : 0x00 Access : R/W
	AUTOOPCOAST_CLR	7	Set Auto-Coast-for-output status.
	AUTOOPCOAST	6	Enable Auto-Coast-for-output.
	MIN_VTT[5:0]	5:0	Minimum VTT to free-run.
E8h	HSTOL	7:0	Default : 0x05 Access : R/W
	VS2HS (RO)	7	Input VSYNC too close to input HSYNC.
	LN4_DETMD	6	4 Line Detect Mode for Hs, DE.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	HSTOL[5:0]	5:0	HSYNC Tolerance. 5: Default value.
E9h	VSTOL	7:0	Default : 0x01 Access : R/W
	AUTONOSIGNAL_CLR	7	Set Auto-No-Signal status.
	AUTONOSIGNAL	6	Enable Auto-No-Signal function.
	HTT_FILTERMD	5	HTT Filter Mode.
	HVTT_LOSE_MD	4	HVTT Lose Mode. 0: Original. 1: New by WDT sample.
	VS_TOL[3:0]	3:0	VSYNC Tolerance. 1: Default value.
EAh	HSPRD_L	7:0	Default : - Access : RO
	HSPRD[7:0]	7:0	Input Horizontal Period, count by reference clock.
EBh	HSPRD_H	7:0	Default : - Access : RO
	-	7:5	Reserved.
	HSPRD[12:8]	4:0	See description for HSPRD[7:0].
ECh	VTOTAL_L	7:0	Default : - Access : RO
	VTOTAL[7:0]	7:0	Input Vertical Total Length, count by HSYNC.
EDh	VTOTAL_H	7:0	Default : - Access : RO
	-	7:3	Reserved.
	VTOTAL[10:8]	2:0	See description for VTOTAL[7:0].
EEh	PDMD2	7:0	Default : 0x60 Access : RW
	MCUCLK_SEL	7	MCU Clock Source Select. 0: XTAL. 1: MPLL divided.
	MCUDIV	6:4	MCU Clock divided by MPLL. 000: 4. 001: 6. 010: 8. 011: 10. 100: 12. 101: 14. 110: 16.
	-	3:1	Reserved.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	CC_GAT	0	Comb Clock Gating. 1: Gating mode. 0: No gating.
EFh	STATUS2 (RO)	7:0	Default : - Access : RO
	HTT_CHG_CS	7	Htotal change in CSOG.
	-	6	Reserved.
	STD_PAL	5	0: NTSC. 1: PAL.
	CSD	4	CSYNC Detected status. 0: Input is not CSYNC. 1: Input is detected as CSYNC.
	INTM	3	Interlace / Non-interlace detecting result by this chip. 0: Non-interlace. 1: Interlace.
	INTF	2	Input odd/even Field detecting result by this chip. 0: Even. 1: Odd.
	IHSP	1	Incoming input HSYNC Polarity detecting result by this chip. 0: Active low. 1: Active high.
	IVSP	0	Incoming input VSYNC Polarity detecting result by this chip. 0: Active low. 1: Active high.
F0h	CHIP_ID	7:0	Default : 0x00 Access : RO
	CHIP_ID[7:0]	7:0	Chip id is 70h
F1h	CHIP_VERSION	7:0	Default : 0x01 Access : RO
	CHIP_VER[7:0]	7:0	Version is 01h
F2h ~ F3h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
F4h	TRISTATE	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	OBBUS_TRI	4	Output bus Tristate.
	VS_TRI	3	Output VSYNC Tristate.
	HSY_TRI	2	Output HSYNC Tristate.
	DE_TRI	1	Output DE Tristate.

Scaler Register (Bank=00, Registers B0h ~ FFh)

Index	Mnemonic	Bits	Description
	CLK_TRI	0	Output CLK Tristate.
F7h ~ FFh	-	7:0	Default : - Access : -
	-	7:0	Reserved.

Analog Register (Bank = 01)

Analog Register (Bank = 01)			
Index	Name	Bits	Description
01h	DBFC	7:0	Default : 0x00 Access : R/W
	-	7:1	Reserved.
	DBVB	0	Double Buffer load at Vertical Blanking. 0: Disable. 1: Enable.
02h	PLLDIVM	7:0	Default : 0x69 Access : R/W
	PLLDIV[11:4]	7:0	PLL Divider ratio. ADC PLL will multiply the horizontal line frequency by PLLDIV[11:0]+3 to generate the ADC sampling clock.
03h	PLLDIVL	7:0	Default : 0x50 Access : R/W
	PLLDIV[3:0]	7:4	PLL Divider ratio. ADC PLL will multiply the horizontal line frequency by PLLDIV[11:0]+3 to generate the ACD sampling clock. PLLDIV[11:0] default value: 1685 (1688-3).
		3:0	Reserved.
04h	RGAIN_ADC	7:0	Default : 0x80 Access : R/W
	RGAIN_ADC[7:0]	7:0	ADC Red channel Gain adjust.
05h	GGAIN_ADC	7:0	Default : 0x80 Access : R/W
	GGAIN_ADC[7:0]	7:0	ADC Green channel Gain adjust.
06h	BGAIN_ADC	7:0	Default : 0x80 Access : R/W
	BGAIN_ADC[7:0]	7:0	ADC Blue channel Gain adjust.
07h	ROFFS_ADC	7:0	Default : 0x80 Access : R/W
	ROFFS_ADC[7:0]	7:0	ADC Red channel Offset adjust.
08h	GOFFS_ADC	7:0	Default : 0x80 Access : R/W
	GOFFS_ADC[7:0]	7:0	ADC Green channel Offset adjust.
09h	BOFFS_ADC	7:0	Default : 0x80 Access : R/W

Analog Register (Bank = 01)

Index	Name	Bits	Description
	BOFFS_ADC[7:0]	7:0	ADC Blue channel Offset adjust.
0Ah	CLPACE	7:0	Default : 0x05 Access : R/W
	CLPACE	7:0	Clamp Placement based on ADC clock.
0Bh	CLDUR	7:0	Default : 0x05 Access : R/W
	CLDUR	7:0	Clamp Duration based on ADC clock.
0Ch	GCTRL	7:0	Default : 0x82 Access : R/W
	HSP	7	Input HSYNC Polarity. 0: Active low. 1: Active high.
	ECLK	6	External Clock. 0: ADC clock from internal ADC PLL. 1: ADC clock from external clock.
	HSLE	5	HS Lock Edge. Determines which edge of HSYNC the ADC PLL will lock to, assuming HSP is set correctly. 0: Leading edge of HSYNC. 1: Trailing edge of HSYNC.
	CLPE	4	Clamp reference Edge. 0: Trailing edge of HSYNC. 1: Leading edge of HSYNC.
	CCDIS	3	Disable PLL watchdog timer. 0: Always enable clamp. 1: Disable clamp during active coast.
	WDIS	2	Disable watchdog timer. 0: Enable PLL watchdog timer. A watchdog timer is used to reset the ADC PLL when the PLL remains much higher than PLLDIV*HSYNC_FREQ for a predetermined period. See WDTOL (Register 30h). 1: Disable PLL watchdog timer (should only be used when DPL_S=0).
	CSTP	1	Coast Polarity. 0: Active low. 1: Active high.
	-	0	Reserved.
0Dh	BWCOEF	7:0	Default : 0x85 Access : R/W

Analog Register (Bank = 01)

Index	Name	Bits	Description
	BWCOEF[7:6]	7:6	Damping coefficient mode control. 00: Default value – backward compatibility mode. 01: Reserved. 10: Automatic DCOEF control (recommended mode). 11: Reserved.
	BWCOEF[5:0]	5:0	PLL loop filter control.
0Eh	FCOEF	7:0	Default : 0x09 Access : R/W
	-	7:5	Reserved.
	FREQCOEF[4:0]	4:0	PLL loop filter control.
0Fh	DCOEF	7:0	Default : 0x03 Access : R/W
		7:4	Reserved.
	DAMPCOEF[3:0]	3:0	PLL loop filter control.
10h	CLKCTRL1	7:0	Default : 0x08 Access : R/W
	-	7	Reserved.
	STAT[2]	6	Status select; selects internal PLL status values to read from register 1Eh.
	PHASEADC	5:0	Clock Phase adjust for ADC (set to PHASECC+8).
11h	CLKCTRL2	7:0	Default : 0x00 Access : R/W
	STAT[1:0]	7:6	Status select; selects 1/8 internal PLL status values to read from register 1Eh.
	PHASECC[5:0]	5:0	Clock phase adjust for ADC sampling time point; phase is adjustable between 0 and 360° in 5.6° steps.
12h	VCOCTRL	7:0	Default : 0x15 Access : R/W
	PDGT	7	Phase digitizer frequency compensation disable.
	-	6:4	Reserved.
	SETCNT[3:0]	3:0	Setting time for ADC PLL phase detector, in ADC clock periods.
13h	RT_CT	7:0	Default : 0xC6 Access : R/W
	TOLCN[1:0]	7:6	Watchdog maximum Count. 0: 0. 1: 4. 2: 32. 3: 127.
	IQ1LEN[2:0]	5:3	Counter for IQ from high to low.
	IQ0LEN[2:0]	2:0	Counter for IQ from low to high.
14h	SOG_LVL	7:0	Default : 0x10 Access : R/W

Analog Register (Bank = 01)				
Index	Name	Bits	Description	
	RMID	7	Middle clamp of Red Channel. 0: Disable. 1: Enable (used when YPbPr input).	
	BMID	6	Middle clamp of Blue Channel. 0: Disable. 1: Enable (used when YPbPr input).	
	-	5:0	Reserved.	
15h	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
16h	DITHCTRL	7:0	Default : 0x00	Access : R/W
	DIT_TOG_LEN4	7	0: Select Length 2 Toggle Loop. 1: Select Length 4 Toggle Loop.	
	DIT_TOG_R	6	1: Enable ADC R Toggle Dither.	
	DIT_TOG_G	5	1: Enable ADC G Toggle Dither.	
	DIT_TOG_B	4	1: Enable ADC B Toggle Dither.	
	DIT_LVL_CAL	3:2	Select ADC Dither Level for CAL.	
	DIT_LVL	1:0	Select ADC Dither Level for display.	
17h	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
18h	CALEN	7:0	Default : 0x00	Access : R/W
	CALG_EN	7	ADC gain auto-cal function enable. 0: Disable. 1: Enable.	
	CALG_UPD	6	Auto update GAIN enable. 0: Disable. 1: Enable.	
	TRIG_CALG	5	Trigger gain calibration enable. 0: Disable. 1: Enable.	
	CALO_EN	4	ADC offset auto-cal function enable. 0: Disable. 1: Enable.	
	CALO_UPD	3	Auto update offset enable. 0: Disable. 1: Enable.	

Analog Register (Bank = 01)

Index	Name	Bits	Description
	TRIG_CALO	2	Trigger offset calibration enable. 0: Disable. 1: Enable.
	CAL_CHAN	1:0	Select manual mode calibration channel. 00: R. 01: G. 10: B. 11: Reserved.
19h	CALCTL	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	CAL_UPD_HS	5	Update CAL value during HS. 0: Disable. 1: Enable.
	CAL_ONESHOTZ	4	CAL on one-shot loop/real time. 0: CAL on one-shot loop time. 1: CAL on one-shot real time.
	CAL_STOP	3	Stop (halt) auto offset calibration. 0: Disable. 1: Enable.
	CAL_MODE2	2	Auto-stop calibration after 128 frames. 0: Enable. 1: Disable.
	BYPASSDOUT	1	Bypass DOUT during CAL. 0: Disable. 1: Enable.
	CAL_EDGE	0	CAL from HS leading/trailing edge. 0: CAL from HS leading edge. 1: CAL from HS trailing edge.
1Ah	CALSMP	7:0	Default : 0x00 Access : R/W
	STATUS_SEL[2:0]	7:5	Select status of STATUS_CAL. 000: {CAL_DOUT[5:0], 1'b0, CAL_DONE}. 001: Calibrated R offset. 010: Calibrated G offset. 011: Calibrated B offset. 100: CAL_DOUT[13:6]. 101: Digital Offset R. 110: Digital Offset G. 111: Digital Offset B.

Analog Register (Bank = 01)				
Index	Name	Bits	Description	
	SMPDLY_EN	4	Use default/SMPDLY as CAL sample delay. 0: Use internal default as CAL sample delay. 1: Use SMPDLY as CAL sample delay.	
	SMPDLY	3:0	Calibration sample delay.	
1Bh	CALDUR	7:0	Default : 0x00	Access : R/W
	CALCNT_EN	7	Use default/CALDLY-CALDUR to generate CAL pulse. 0: Use default to generate CAL pulse. 1: Use CALDLY-CALDUR to generate CAL pulse.	
	CALDUR[6:0]	6:0	CAL pulse duration register.	
1Ch	CALDLY	7:0	Default : 0x00	Access : R/W
	CALDLY[7:0]	7:0	CAL pulse delay register.	
1Dh	STATUS_CAL	7:0	Default : -	Access : RO
	Note: Calibration status is read based on STATUS_SEL[2:0] (Bank 01, Reg_1Ah[7:5]).			
	STATUS_SEL[2:0]			
	7:5		Reserved.	
	4		CAL_DOUT[13:6].	
	3		CAL_OFFSB.	
	2		CAL_OFFSG.	
	1		CAL_OFFSR.	
	0		{CAL_DOUT[5:0], 1'b0, CAL_DONE}.	
1Eh	STATUS_PLL	7:0	Default : -	Access : RO
	Note: PLL status is read based on STAT[2:0] (Bank 01, Reg_10h[6] and Bank 02, Reg-11h[76]).			
	STAT[2:0]			
	000	7	[2'd0, SAR_MIN].	
		6	{2'd0, SAR_MAX}.	
		5	{SAR_AVG[19:12].	
		4	{1'b0, ICAI_s[6:0]}.	
		3	{1'b0, SAR_s[6:0]}.	
		2	{FREQCTRL[15:8]}.	
		1	{FREQCTRL[23:16]}.	
		0	{LOCK, IQ, SLOW, FAST, FREERUN, 3'b000}.	
1Fh ~ 22h	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
23h	FPLL_STATUS	7:0	Default : -	Access : RO
	FPLL_STATUS[7:0]	7:0	FPLL Status.	
24h		7:0	Default : 0x40	Access : R/W

Analog Register (Bank = 01)

Index	Name	Bits	Description
	-	7:5	Reserved.
	FPLL_MD	4	FPLL Mode selection. 0: CVBS. 1: RGB.
	-	3:0	Reserved.
25h	FPLL_DIVN	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	FPLL_DIVN[3:0]	3:0	FPLL Feed back Divider. 0000: Divide by 1. 0001: Divide by 2. 0010: Divide by 3. ... 1111: Divide by 16.
26h ~ 28h	-	7:0	Default : - Access : -
	-	7:5	Reserved.
29h	ADC_REG	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	ADC_IMD	4:3	Set ADC total current.
	RENC_ADC	2	RGB mode: set to 0/CVBS mode: set to 1.
	GENC_ADC	1	RGB mode: set to 0/CVBS mode: set to 1.
	BENC_ADC	0	RGB mode: set to 0/CVBS mode: set to 1.
2Ah ~ 2Bh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
2Ch	RGB_BW_SEL1	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	-	5:4	Reserved.
	-	3	Reserved.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	R_BW[2:0]	2:0	R-channel input filter BW select. 000: 200 MHz. 001: 165 MHz. 010: 130 MHz. 011: 87 MHz. 100: 65 MHz. 101: 30 MHz. 110: 10 MHz. 111: 6 MHz.
2Dh	RGB_BW_SEL2	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	G_BW[2:0]	6:4	G-channel input filter BW select.
	-	3	Reserved.
	B_BW[2:0]	2:0	B-channel input filter BW select.
2Eh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
2Fh	ADC_MUX	7:0	Default : Access :
	-	7:6	Reserved.
	MUX[5:0]	5:0	See ADC MUX TABLE.
30h ~ 9Bh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
9Ch	ADC_MD_CTRL	7:0	Default : 0x00 Access : R/W
	ADC_DCTRL	7:6	Reserved for ADC DCTRL.
	GSHIFT_R	5	1: Enable ADC R Gain Range Shift for VD Mode.
	GSHIFT_G	4	1: Enable ADC G Gain Range Shift for VD Mode.
	GSHIFT_B	3	1: Enable ADC B Gain Range Shift for VD Mode.
	ADC_VCTRL	2:0	ADC Voltage Control (Recommend Setting = 3'b011).
9Dh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
9Eh	CAL_CTRL3	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	CAL_STSWEN	6	1: Enable Write to Internal CAL Registers through STATUS_CAL.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	CAL_SWOV	5:4	00: Normal Mode. 01: Switch ADC Input to Offset CAL Reference Voltage. 10: Reserved. 11: Reserved.
	CAL_HOLD	3	1: Hold Current CAL Result for Display.
	CAL_INPUT	2	0: CAL to Internal Offset Reference Voltage. 1: CAL to ADC Input.
	CAL_HYS	1	1: Enable CAL Update Hytheresis.
	DOFFS_EN	0	1: Enable Digital Offset Adjustment.
9Fh	ADCTOUT	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	ADCTOUT_SYNC	3	1: Enable ADC Test Out Sync to CKEXT.
	ADCTOUT_DIV	2:0	Select ADC Test Out Decimation Ratio (1~8).
A0h	RG_DRV	7:0	Default : 0x55 Access : R/W
	G[7:6]_DRV[1:0]	7:6	Pad G[7:4] Driving select.
	G[5:4]_DRV[1:0]	5:4	Pad G[3:0] Driving select.
	R[3:2]_DRV[1:0]	3:2	Pad R[7:4] Driving select.
	R[1:0]_DRV[1:0]	1:0	Pad R[3:0] Driving select.
A1h	RG_DRV	7:0	Default : 0x55 Access : R/W
	HS_DRV[1:0]	7:6	Pad Hsync Driving select.
	VS_DRV[1:0]	5:4	Pad Vsync Driving select.
	B[7:4]_DRV[1:0]	3:2	Pad B[7:4] Driving select.
	B[3:0]_DRV[1:0]	1:0	Pad B[3:0] Driving select.
A2h	RG_DRV	7:0	Default : 0x55 Access : R/W
	PWM2_DRV[1:0]	7:6	Pad PWM2 Driving select.
	PWM1_DRV[1:0]	5:4	Pad PWM1 Driving select.
	CLK_DRV[1:0]	3:2	Pad CLK Driving select.
	DE_DRV[1:0]	1:0	Pad DE Driving select.
A3h	EPD_R	7:0	Default : 0x00 Access : R/W
	EPD_R[7:0]	7:0	Enable Pull Down in R channel.
A4h	EPD_G	7:0	Default : 0x00 Access : R/W
	EPD_G[7:0]	7:0	Enable Pull Down in G channel.
A5h	EPD_B	7:0	Default : 0x00 Access : R/W
	EPD_B[7:0]	7:0	Enable Pull Down in B channel.

Analog Register (Bank = 01)

Index	Name	Bits	Description	Access
A6h	EPD_R	7:0	Default : 0x00	Access : R/W
	-	7:6	Reserved.	
	EPD_PWM2	5	Enable pull down in PWM2 pad.	
	EPD_PWM1	4	Enable pull down in PWM2 pad.	
	EPD_CLK	3	Enable pull down in CLK pad.	
	EPD_DE	2	Enable pull down in DE pad.	
	EPD_HS	1	Enable pull down in HSYNC pad.	
EPD_VS	0	Enable pull down in VSYNC pad.		
A7h ~ AAh	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
ABh	VDAC_ADJ2	7:0	Default : 0x00	Access : R/W
	-	7:5	Reserved.	
	ED[4:0]	4:0	Testing control for voltage DAC.	
ACh ~ C9h	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
CAh	POL_SET0	7:0	Default : 0x00	Access : R/W
	POL_OUT_INV	7	POL Output Invert.	
	POL_TP	6:0	POL Transition Point.	
CBh	POL_SET1	7:0	Default : 0x00	Access : R/W
	-	7:5	Reserved.	
	POL_SEL	4	0: VSYNC Frequency POL. 1: HSYNC Frequency POL.	
	POL_PVI_10IN	3	POL Output to SEQ_MOD Pin if EFh[7] = 0.	
-	2:0	Reserved.		
CCh	SCAL_ACT	7:0	Default : 0x00	Access : R/W
	-	7:6	Reserved.	
	TC_CLK_DIV2	5	TC Clock Divide 2.	
	-	4	Reserved.	
	LINE_ACT_D1L	3	Line Active Delay One Line time.	
	LINE_ACT_EN	2	TCON Line_Extract Mode work with Digital V_Scaling.	
	-	1:0	Reserved.	
CDh	GPO_OEV2_WIDTH	7:0	Default : 0x54	Access : R/W
	GPO_OEV2_DIS	7	OEV2 Disable.	

Analog Register (Bank = 01)			
Index	Name	Bits	Description
	GPO_OEV2_WIDTH [6:0]	6:0	OEV2 Pulse Width.
CEh	GPO_OEV3_WIDTH	7:0	Default : 0x54 Access : R/W
	GPO_OEV3_DIS	7	OEV3 Disable.
	GPO_OEV3_WIDTH [6:0]	6:0	OEV3 Pulse Width.
CFh	GPO_OEV_DELTA	7:0	Default : 0x54 Access : R/W
	-	7:4	Reserved.
	GPO_OEV_DELTA[3:0]	3:0	Adjust OEV distance.
D0h	PTC_MODE1	7:0	Default : 0x8C Access : R/W
	TC_MD	7	TC signal output enable. 0: Disable set low. 1: Enable.
	OEV_DELTA_EN	6	OEV distance adjust Enable.
	DOU_EXTR_MD[1:0]	5:4	00: Normal mode. 01: Paranoia extract mode. 10: Full extract mode. 11: Line duplicate mode.
	FRAME_INV_EN	3	0: Disable. 1: Enable.
	EARLY_VS	2	Early vs.
	FIELD_SEL	1	Select field inverse from IP.
	LN_SHIFT	0	Field Line Shift enable.
D1h	PTC_MODE2	7:0	Default : 0x3E Access : R/W
	TCCLK_CONF[1:0]	7:6	7: 13 CLK swap. 6: 3 CLK inverse.
	SEQ_MD	5	0: Single clock output mode. 1: Three clock output mode.
	TCCLK_MD	4	Select 3TC CLK or 1 TC CLK.
	STHLR_SEL	3	0: STHR. 1: STHL.
	STVLR_SEL	2	0: STVR. 1: STVL.
	L_R	1	0: L_R equal 0. 1: L_R equal 1.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	U_D	0	0: U_D=0. 1: U_D=1.
D2h	PTC_MODE3	7:0	Default : 0x84 Access : R/W
	SET_TCCLK23_VALUE	7	Set TCCLK23 High/Low.
	LG_MD	6	LG_panel Mode enable.
	DF_EXT_LN	5	Different frame, Different Extract Line mode. 0: Disable. 1: Enable.
	LN_DUP_MD[1:0]	4:3	Duplicate 2/3 Line Mode. 4: OEV3 enable. 3: OEV2 enable.
	FIELD_IN_SEL	2	Select Field source from OP2 or free-run.
	LINE_INV_DIS	1	Line Inverse Disable. 0: Enable. 1: Disable.
	FRP_VCOM_INV	0	VCOM Inverse to FRP.
D3h	LN_EXTR_CNT_LMT	7:0	Default : 0xDD Access : R/W
	LN_EXTR_CNT_LMT2	7:4	Line Extract/duplicate Counter 2.
	LN_EXTR_CNT_LMT1	3:0	Line Extract/duplicate Counter 1.
D4h	LN_EXTR_SET1_H	7:0	Default : 0x2F Access : R/W
	LN_EXTR_SET1[7:0]	7:0	Line Extract/duplicate set 1 High byte.
D5h	LN_EXTR_SET1_L	7:0	Default : 0xEF Access : R/W
	LN_EXTR_SET1[15:8]	7:0	Line Extract/duplicate set 1 Low byte.
D6h	LN_EXTR_SET2_H	7:0	Default : 0x1F Access : R/W
	LN_EXTR_SET2[7:0]	7:0	Line Extract/duplicate set 2 High byte.
D7h	LN_EXTR_SET2_L	7:0	Default : 0xE7 Access : R/W
	LN_EXTR_SET2[15:8]	7:0	Line Extract/duplicate set 2 Low byte.
D8h	EXTR_STT_LN1	7:0	Default : 0x02 Access : R/W
	EXTR_STT_LN1[7:0]	7:0	Line Extract/duplicate Start Line 1.
D9h	EXTR_END_LN1	7:0	Default : 0x30 Access : R/W
	EXTR_END_LN1[7:0]	7:0	Line Extract/duplicate End Line 1.
DAh	EXTR_STT_LN2	7:0	Default : 0x50 Access : R/W
	EXTR_STT_LN2[7:0]	7:0	Line Extract/duplicate Start Line 2.
DBh	EXTR_END_LN2	7:0	Default : 0x77 Access : R/W

Analog Register (Bank = 01)

Index	Name	Bits	Description
	EXTR_END_LN2[7:0]	7:0	Line Extract/duplicate End Line 2.
DCh	GPO_FRP_TRAN	7:0	Default : 0x13 Access : R/W
	OUT_INV	7	Output Inverse.
	GPO_FRP_TRAN_MULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_FRP_TRAN[4:0]	4:0	FRP Transition position.
DDh	GPO_STH_STT	7:0	Default : 0x46 Access : R/W
	OUT_INV	7	Output Inverse.
	GPO_STH_STT_MULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_STH_STT[4:0]	4:0	STH pulse Start position.
DEh	GPO_STH_WIDTH	7:0	Default : 0x01 Access : R/W
	-	7:6	Reserved.
	GPO_STH_WIDTH_MULT[1:0]	5:4	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_STH_WIDTH [3:0]	3:0	STH pulse Width.
DFh	GPO_OEH_STT	7:0	Default : 0xA3 Access : R/W
	OUT_INV	7	Output Inverse.
	GPO_OEH_STT_MULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_OEH_STT[4:0]	4:0	OEH pulse Start position.
E0h	GPO_OEH_WIDTH	7:0	Default : 0x0B Access : R/W
	-	7:6	Reserved.
	GPO_OEH_WIDTH_MULT[1:0]	5:4	00: x1. 01: x4. 10: x8. 11: x16.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	GPO_OEH_WIDTH [3:0]	3:0	OEH pulse Width.
E1h	GPO_OEV_STT	7:0	Default : 0x01 Access : R/W
	OUT_INV	7	Output Inverse.
	GPO_OEV_STT_MMULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_OEV_STT[1:0]	4:0	OEV pulse Start.
E2h	GPO_OEV_WIDTH	7:0	Default : 0x6D Access : R/W
	-	7:6	Reserved.
	GPO_OEV_WIDTH_MULT[1:0]	5:4	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_OEV_WIDTH [3:0]	3:0	OEV pulse Width.
E3h	GPO_CKV_STT	7:0	Default : 0x2D Access : R/W
	OUT_INV	7	Output Inverse.
	CKV_STT_MULT[1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_CKV_STT[4:0]	4:0	CKV pulse Start.
E4h	GPO_CKV_STT2	7:0	Default : 0x04 Access : R/W
	-	7:6	Reserved.
	CKV_STT2_MULT [1:0]	5:4	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_CKV_ST2[3:0]	3:0	CKV pulse Start 2.
E5h	GPO_CKV_WIDTH	7:0	Default : 0x5F Access : R/W
	-	7	Reserved.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	CKV_WIDTH_MULT[1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_CKV_WIDTH[4:0]	4:0	CKV pulse width.
E6h	GPO_STV_LN_TH	7:0	Default : 0x46 Access : R/W
	-	7	Reserved.
	GPO_STV_1LN	6	STV width is 1 Line.
	GPO_STV_LINE_TH	5:0	STV line position
E7h	GPO_STV_STT	7:0	Default : 0x29 Access : R/W
	OUT_INV	7	Output Inverse.
	STV_STT_MULT[1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_STV_STT[4:0]	4:0	STV pulse Start.
E8h	GPO_STV_WIDTH	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	STV_WIDTH_MULT [1:0]	5:4	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_STV_WIDTH [3:0]	3:0	STV pulse Width.
E9h	GPO_OEV2_STT	7:0	Default : 0x04 Access : R/W
	OUT_INV	7	Output Inverse.
	OEV2_STT_MULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_OEV2_STT[4:0]	4:0	OEV2 pulse Start.
EAh	GPO_OEV3_STT	7:0	Default : 0x04 Access : R/W
	OUT_INV	7	Output Inverse.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	OEV3_STT_MULT [1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_OEV3_STT[4:0]	4:0	OEV3 pulse Start.
EBh	HSTT_DLY_L	7:0	Default :0x04 Access : R/W
	HSTT_DLY[7:0]	7:0	H Start Delay numbers Low byte.
ECh	HSTT_DLY_H	7:0	Default :0xA4 Access : R/W
	EXT_DIS_RNG	7:4	Extraction start point in line extraction mode.
	-	3	Reserved.
	HSTT_DLY_EN	2	H Start Delay Enable.
	HSST_DLY[9:8]	1:0	H Start Delay numbers High byte.
EDh	CLK_DLY_SYNCOUT	7:0	Default : 0x00 Access : R/W
	FRPSETH	7	Set High to Invert RGB Data when FRP Disable (BK1_D2[1]=1).
	-	6	Reserved.
	TC_GPIO_SEL	5	0: TC function. 1: GPIO function.
	OEV_MD_SEL	4	0: Normal mode. 1: Special mode.
	CLK_DLY_SEL_TC [3:0]	3:0	TCCLK Delay Select.
EEh	GPO_CKV_END2	7:0	Default : 0x28 Access : R/W
	CKV2_EN	7	CKV2 Enable.
	CKV_END2_MULT[1:0]	6:5	00: x1. 01: x4. 10: x8. 11: x16.
	GPO_CKV_END2	4:0	CKV2 End point.
EFh	Q1H_SETTING	7:0	Default : 0x08 Access : R/W
	Q1H_ENABLE	7	Q1H output from SEQ_MODE pin, toggle point is using OEV3 signal start point.
	TCCLK_INV_MODE	6:3	0001: TCCLK invert every field. 0011: TCCLK invert when Q1H is high. 0101: TCCLK invert when Q1H and field are high. 1001: TCCLK invert when Q1H is low and field is high.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	-	2	Reserved.
	INTOUT_OEN	1	Testmode. PAD_INTOUT output enable control. 0: Output. 1: Input.
	CLKIN_SEL	0	Testmode External Clock Select. 0: PAD_INTOUT. 1: PAD_CLKIN.
F0h	WDT0	7:0	Default : 0x00 Access : R/W
	WDT_TESTMD	7	CSOG test mode for WDT counter.
	WDT_LD	6	Watch Dog Timer Load Value by SW.
	WDT_EN	5	Watch Dog Timer Enable Bit.
	-	4:0	Reserved.
F1h	WDT1	7:0	Default : 0x00 Access : R/W
	WDT_WIDTH	7:0	Watch Dog Timer Width.
F2h	WRLOCK0	7:0	Default : 0x00 Access : R/W
	WRLOCK0	7	Register lock (work with WRLOCK1). Register access is disabled when WRLOCK0 and WRLOCK1 are HIGH. Register access is enabled when WRLOCK0 and WRLOCK1 are LOW.
	-	6:0	Reserved.
F3h	PWMCLK	7:0	Default : 0x00 Access : R/W
	DB_EN	7	Double Buffer Enable. 0: Disable. 1: Enable.
	P2REN	6	PWM2 Reset every frame Enable. 0: Disable. 1: Enable.
	P1REN	5	PWM1 Reset every frame Enable. 0: Disable. 1: Enable.
	P2POL	4	PWM 2 Polarity when enhance PWM2 enable.
	EP2EN	3	Enhance PWM2 Enable. 0: Disable. 1: Enable.
	P1POL	2	PWM1 Polarity when enhance PWM1 enable.

Analog Register (Bank = 01)

Index	Name	Bits	Description
	EP1EN	1	Enhance PWM1 Enable. 0: Disable. 1: Enable.
	PCLK	0	PWM1/2 base Clock select. 0: 14.318MHz. 1: 14.318MHz / 4.
F4h	PWM1C	7:0	Default : 0x00 Access : R/W
	PWM1_POL	7	PWM1 polarity.
	PWM1_CTUN[6:0]	6:0	PWM1 Coarse adjustment.
F5h	PWM2C	7:0	Default : 0x00 Access : R/W
	PWM2_POL	7	PWM2 polarity.
	PWM2_CTUN[6:0]	6:0	PWM2 Coarse adjustment.
F6h	PWM1EPL	7:0	Default : 0x00 Access : R/W
	EPWM1P[7:0]	7:0	Enhance PWM1 Period.
F7h	PWM1EPH	7:0	Default : 0x00 Access : R/W
	EPWM1P[15:8]	7:0	Enhance PWM1 Period.
F8h	PWM2EPL	7:0	Default : 0x00 Access : R/W
	EPWM2P[7:0]	7:0	Enhance PWM2 Period.
F9h	PWM2EPH	7:0	Default : 0x00 Access : R/W
	EPWM2P[15:8]	7:0	Enhance PWM2 Period.
FAh ~	-	7:0	Default : - Access : -
FFh	-	7:0	Reserved.

Video Decoder Register (Bank = 02)

Video Decoder Register (Bank = 02)			
Index	Name	Bits	Description
01h	STATUS1	7:0	Default : - Access : RO
	READBUS1	7:0	Test bus 1.
02h	STATUS2	7:0	Default : - Access : RO
	READBUS2	7:0	Test bus 2.
03h	STATUS3	7:0	Default : - Access : RO
	READBUS3	7:0	Test bus 3.
04h	STATUS_MUX	7:0	Default : 0x00 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	READBUS_CTRL	7:0	VIPTSTMUX Address Control of READBUS1, READBUS2, and READBUS3.
05h ~ 06h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
07h	DSP_ADD_PRT	7:0	Default : 0x00 Access : R/W
	DSP_ADD_PRT[7:0]	7:0	DSP register Address Port.
08h	DSP_WDAT_PRT	7:0	Default : 0x00 Access : R/W
	DSP_WDAT_PRT[7:0]	7:0	DSP register Write Data Port.
09h	DSP_RDAT_PRT	7:0	Default : - Access : RO
	DSP_RDAT_PRT[7:0]	7:0	DSP register Read Data Port.
10h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
11h	COMB_LL_EN	7:0	Default : 0x00 Access : R/W
	-	7:1	Reserved.
	APL_COMB_LL_EN	0	1: Mux to select Com Line Lock mode.
12h ~ 13h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
14h	SOFT_RST	7:0	Default : 0x10 Access : R/W
	SOFT_RST	7	1: Softrest AFEC modules.
	-	6:0	Reserved.
15h	FPGA_CTRL	7:0	Default : 0xA8 Access : R/W
	FPGA_CTRL	7:0	Reserved for FPGA control.
16h	REG_SOFT_RST2	7:0	Default : 0x00 Access : R/W
	REG_SOFT_RST2	7:0	Reserved for HW testing.
17h	CLK_CTRL	7:0	Default : 0xC9 Access : R/W
	FSCPLL_MODE	7	0: External FSC Clock Mode. 1: Internal FSC Clock Mode.
	ADC_DOUBLE	6	ADC Double Sample Rate Option.
	REG_CLK_VD_VIP	5:4	00: 4 Fsc Clock on Digital. 11: 8 Fsc Clock on Digital.
	REG_VCO_TYPE	3:2	10: VCO 16 Fsc. 01: VCO 8 Fsc. 00: VCO 4 Fsc.
	REG_ADC_CLK_LAG	1:0	CLK_CC / CLK_ADC Phase Diff.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
18h	CSTATE_CTRL	7:0	Default : 0x86 Access : R/W
	CTRL_MD	7:5	Default: 100b, Auto control mode.
	-	4	Reserved.
	CTRL_STATE	3:0	State Stable State Value; default: 0110b.
19h	MVDET_EN	7:0	Default : 0xC0 Access : R/W
	MV_DETEC_EN	7	Microvision Detect Enable. 0: Disable. 1: Enable.
	-	6:5	Reserved.
	DSP_SYNC_ALW	4	Allow DSP to Control SYNC_FOUND.
	DSP_APL_ALW	3:2	0: Allow DSP to Control APL_FREQ_IDEAL (Center Frequency).
	-	1:0	Reserved.
1Ah	SVD_EN	7:0	Default : 0x40 Access : R/W
	SVIDEO_EN	7	0: Chroma Source from CVBS-Channel Input. 1: Chroma Source from C-Channel Input.
	ADC_C_ALWY_ON	6	Chroma ADC 16Fsc-to-4Fsc Down-Sampling is Enabled.
	CLAMDSM_CTRL[15:10]	5:0	Clamping 12-bit Control code; integer parts.
1Bh	BKLVL_FORCE1	7:0	Default : 0x80 Access : R/W
	DISCLAMP3	7	HW Clamping frozen 3 times if SYNC magnitude is small.
	CLMP_FREZ_ZERO	6	HW Clamping set to Zero when Frozen.
	CLAMDSM_CTRL[9:4]	5:0	Clamping 12-bit control code; fractional parts.
1Ch	BKLVL_FORCE2	7:0	Default : 0xFF Access : R/W
	CLMFZE_VRGE	7:0	Clamp Freeze of V Range.
1Dh	VCR_VLSHT	7:0	Default : 0xFF Access : R/W
	CLMFZE_HRGE	7:0	Clamp Freeze of H Range.
1Eh	DSP_EN	7:0	Default : 0x80 Access : R/W
	DSP_EN_SYS	7	1: Enable SW DSP Function.
	-	6:0	Reserved.
1Fh	CLMP_C_EN	7:0	Default : 0x60 Access : R/W
	CLMP_C_EN	7	2nd ADC Chroma Clamping Enable.
	CLMP_K1_INI	6:0	HW Clamping K1 when system not stable.
20h	APLL_CTRL1	7:0	Default : 0xBC Access : R/W
	APL_EN	7	Analog burst-lock PLL Enable.
	APL_TYPE	6:4	APL Type.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	-	3:2	Reserved.
	APL_EN2	1	No state 7, when no bust.
	CLMP_6B_FORCE	0	Clamp value 6-bit test mode enable.
21h	APLL_CTRL2	7:0	Default : 0x18 Access : R/W
	CLMP_2DSM	7	Second order Clamp method.
	APL_COMB_LL_TST[1]	6	0: Comb-Line-Lock Disabled if VCR. 1: Com-Line-Lock Enabled even for VCR.
	APL_COMB_LL_TST[0]	5	0: Fractional SYNC Phase is used. 1: Integer PD from Comb.
	DPL_PHS_CAL	4	DPL Phase Calibration.
	APL_CEZANNE	3	For CEZANNE FPGA Test.
	PALSWH_MODE	2:1	PAL Switch Mode control.
	APL_COMB_LL_EN	0	Comb Line-Locked mode Enable.
22h	APL_FREQ_MD	7:0	Default : 0x61 Access : R/W
	APL_FREQ_MD[7:5]	7:5	APL Freq Mode.
	-	4:3	Reserved.
	ACLpz_WIDTH	2:0	Clamping Width.
23h	APLL_TRANGE	7:0	Default : 0x40 Access : R/W
	APL_FREQ_LMT	7:5	Burst PLL Frequency Limitation. 0: 125ppm. 2: 250ppm. 4: 500ppm. 6: 1000ppm.
	-	4:1	Reserved.
	APL_K_FORCE	0	APL K value Force enable.
24h	APL_K1_NOISY	7:0	Default : 0x04 Access : R/W
	APL_K1_NOISY[7:0]	7:0	APLL phase tracking coefficients for Noisy broadcast.
25h	APL_K2_NOISY	7:0	Default : 0x02 Access : R/W
	APL_K2_NOISY[7:0]	7:0	APLL frequency tracking coefficients for Noisy broadcast.
26h	APL_K1_NORM	7:0	Default : 0x10 Access : R/W
	APL_K1	7:0	APLL phase tracking coefficients for normal condition.
27h	APL_K2_NORM	7:0	Default : 0x08 Access : R/W
	APL_K2	7:0	APLL frequency tracking coefficients for normal condition.
28h	APL_K1_VCR	7:0	Default : 0x02 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	APL_K1_VCR	7:0	APLL phase tracking coefficients for VCR.
29h	APL_K2_VCR	7:0	Default : 0x01 Access : R/W
	APL_K2_VCR	7:0	APLL frequency tracking coefficients for VCR.
2Ah	MODE_PFSC	7:0	Default : 0x20 Access : R/W
	MD_PFSC[7]	7	0: Auto Fsc. 1: Manual Fsc.
	MD_PFSC[6:4]	6:4	When bit[7]=1, 000: fsc=4.43361875 MHz. 001: fsc=4.406 MHz. 010: fsc=3.579545 MHz. 100: fsc=3.57561149 MHz. 110: fsc=3.58205625 MHz.
	VDFD_ASWFSC	3	Internal blind FSC try.
	VDFD_ASWFSC1	2	Internal blind FSC try1.
	HALFWIN_OP	1	Half Window period Option. 0: Asserted between 1/4 to 3/4 line period. 1: Asserted between 1/2 to 1 line period.
	OEINV_MD	0	ODD_EVEN_INVERT bit inversion Mode. 0: Directly bypass. 1: Inverse.
	2Bh	VDFD_CTRL1	7:0
VDFD_FD_L		7:4	Fast attack frequency tracking time period.
VDFD_PHSSTD_L		3:0	Monitor Phase tracking time period.
2Ch	VDFD_CTRL2	7:0	Default : 0x67 Access : R/W
	PHS_DIFF_THRD	7:4	Phase tracking deviation large Threshold.
	PHS_STD_RANGE	3:0	Phase tracking deviation small threshold.
2Dh	FD_K	7:0	Default : 0xC0 Access : R/W
	FD_K	7:4	Fast Attack Frequency Tracking Coefficient.
	APL_PHS_OFST[11:8]	3:0	Preferred Phase Offset of the Analog Burst-locked PLL.
2Eh	APL_PHS_OFST	7:0	Default : 0x00 Access : R/W
	APL_PHS_OFST[7:0]	7:0	Preferred Phase Offset of the analog burst-locked PLL.
2Fh	BLACK_SEL	7:0	Default : 0x24 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	SETUP_YES	7:5	0x: Based on confirm mode auto determine. NTSC: setup. PAL: no setup. 10: Force no setup for NTSC. 11: Force setup for PAL.
	-	4:2	Reserved.
	-	1:0	Reserved.
30h	CLAMP_CTRL	7:0	Default : 0x01 Access : R/W
	CLAMPDAC_CTRL[7:6]	7:6	00: Auto clamping control. 01: Auto clamping control, but polarity inverted. 10: Force clamping control by bit[5:0]. 11: Auto clamping control.
	CLAMPDAC_CTRL[5:0]	5:0	Clamping control value.
31h	CLAMP_COEF1	7:0	Default : 0x40 Access : R/W
	CLMP_TYPE_ST3BOT	7	CLMP_BOT function enable in STAE3.
	CLMP_K1	6:0	Clamping speed; the larger the faster. 7'b101_1000 suggested for 1.00 uF. 7'b100_0000 suggested for 0.10 uF. (default) 7'b010_1000 suggested for 0.01 uF.
32h	CLAMP_COEF2	7:0	Default : 0xA0 Access : R/W
	CLMP_TYPE	7	Back-porch clamping enable (default =1).
	CLMP_K2	6:0	Leakage current tracking speed. Smaller value is preferred. 7'b001_0000 suggested for 1.00 uF. 7'b010_0000 suggested for 0.10 uF. (default). 7'b011_0000 suggested for 0.01 uF.
33h	CLAMP_COEF3	7:0	Default : 0x00 Access : R/W
	CLMP_LKG_MODE	7:4	Leakage control Mode.
	ADCLOSS_CNT	3:0	Count value of ADC Loss status.
34h	CLAMP_COEF4	7:0	Default : 0x82 Access : R/W
	CLMP_BOTSPD	7:6	Bottom reference LPF selection.
	CLMP_DLKG_MAC	5:0	Delta leakage is bounded by +- (CLAMP_DLKG_MAX/512).
35h	CLAMP_REF_SEL1	7:0	Default : 0x0A Access : R/W
	BLANKLVL_CTRL	7	Blank Level Control.
	BLANK_LVL[8]	6	Blank Level bit[8].

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	CLMP_LKG	5:0	If CLAMP_LKG_MD = 1011, leakage is forced by CLAMP_LKG[4:0] * sign; where, sign=+1 if bit[5]=1, and sign=-1 if bit[5]=0. Default: 6'd10.
36h	CLAMP_COEF5	7:0	Default : 0x45 Access : R/W
	CLMP_BOTSEL	7:5	Clamp Bot Selection enable.
	CLMP_ERR_MAX	4:0	Back porch level Error for clamping is bounded by +- CLMP_ERR_MAX*8 (Default: 5'd25).
37h	CLAMP_REF_SEL2	7:0	Default : 0xF0 Access : R/W
	BLANK_LVL[7:0]	7:0	Blank Level.
38h	VSTROBE_LIMIT	7:0	Default : 0x13 Access : R/W
	BLACKLVL_CTRL	7	Black Level Control.
	BLACK_LVL[8]	6	Black Level bit[8].
	HV_VCNTSEL	5	1: Enable 2 nd Integration Protection for V Extraction.
	HV_VLINPROT	4	0: Enable Next V Extraction after 50 Lines. 1: Enable Next V Extraction after 200 Lines.
	BOTAV_INSEL	3	Bottom of active video Input Selection.
	BOT_INSEL	2:0	Bottom of whole line Input Selection.
39h	VSTROBE_PROTECT	7:0	Default : 0x6C Access : R/W
	WP_INSEL	7:5	Sync Input LPF BW Selection.
	HV_INSEL	4:2	HSYNC/VSYNC slicer level Selection.
	TOP_INSEL	1:0	Top level Input Selection.
3Ah	BLACK_LVL	7:0	Default : 0xCC Access : R/W
	BLACK_LVL[7:0]	7:0	Black Level value.
3Bh	HV_VEXTH	7:0	Default : 0x7D Access : R/W
	HV_VEXTH	7:0	0: V Extract by Line Length Unit. 1: V Extract by Manual Pixel Length Units.
3Ch	HV_C TRL1	7:0	Default : 0x2A Access : R/W
	HV_VSEL	7:6	00: V Extract native. 01: V Extrat Native Synchronize to next line start/middle. Other reserved.
	HV_VTHRSEL	5:4	00: 3/8 line. 01: 6/8 line. 10: 1.25 line. 11: 1.75 line. As Threshold for V Extract.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	HV_INTCNT	3:0	Composite SYNC Pixel Lengths Filter for V Extract.
3Dh	V_POSTCOAST	7:0	Default : 0x00 Access : R/W
	VCOST_FEXT	7:6	Coast forward control.
	VCOST_BEXT	5:0	Coast Backward control.
3Eh	HV_SLICTRL	7:0	Default : 0x0C Access : R/W
	HV_SLICTRL	7:0	HSYNC/VSYNC Slicer Control.
3Fh	HV_HSLIOFSTHYS	7:0	Default : 0xC0 Access : R/W
	HV_HSLIOFSTHYS	7:4	HSYNC slicer line Offset.
	AGC_FINE_LSB	3:0	AGC Fine gain (lower 4 bits).
40h	PGA_CTRL1	7:0	Default : 0xC1 Access : R/W
	PGA_AUTO	7	0: Manual PGA set by AGC_COARSE[1:0]. 1: Auto PGA switch.
	PGA_FSWT	6	0: PGA switch in VSYNC. 1: PGA switch in HSYNC.
	AGC_COARSE	5:4	00: PGA x 1. 01: PGA x 2.
	FREZ_CLMPDISBK	3	Freeze Clamp Function; VSYNC selection.
	SYNC_MAG_LOW_TH	2:0	If SYNC Magnitude is Low, Freeze HW Clamping 3 times.
41h	PGH_TOP_TH	7:0	Default : 0xDA Access : R/W
	PGA_TH_TOP	7:0	If AGC_FINE[11:0] >= 16*PGA_TH_TOP[7:0], use smaller PGA and 16*PGA_H2L[7:0].
42h	PGA_BOT_TH	7:0	Default : 0x40 Access : R/W
	PGA_TH_BOT	7:0	If AGC_FINE[11:0] <= 16*PGA_TH_BOT[7:0], use larger PGA and 16*PGA_L2H[7:0].
43h	AGC_CTRL1	7:0	Default : 0x14 Access : R/W
	-	7	Reserved.
	AGC_MD	6:5	00: Auto, REG_AGC_K used for both search and lock. 01: Auto, REG_AGC_K used for search, clipping delta-gain=-1, 0, +1 for lock. 10: Freeze gain. 11: Load gain=AGC_FINE*16. Default=1.
	AGC_LOCK_CTRL	4	AGC Lock Control.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	AGC_TYPE	3:2	00: Sync. 01: Sync. 10: Color burst. 11: Hybrid of 1 and 2. Default=1, HSYNC as primary reference, color burst is for ACC.
	AGC_LOWTH_PGA	1:0	During PGA switching, PGA must be larger than AGC_LOWTH_PGA.
44h	AGC_FINE	7:0	Default : 0xC0 Access : R/W
	AGC_FINE	7:0	Used when AGC_MODE=11.
45h	AGC_CTRL2	7:0	Default : 0x42 Access : R/W
	AGC_AVGL	7:5	AGC average lines= $2^{AGC_AVGL + 1}$.
	-	4	Reserved.
	AGC_WAITL	3:1	Lines to wait for analog settling down= 2^{AGC_WAITL} after each gain update.
	-	0	Reserved.
46h	AGC_K_CTRL	7:0	Default : 0x73 Access : R/W
	AGC_K_FAST	7:4	Fast-attack AGC update speed. $\Delta gain = \pm (AGC_K_FAST * 4 + 3) / 256 * gain_true$.
	AGC_K	3:0	Sync magnitude AGC update speed. $\Delta gain = amp_err / 256 * (1 + AGC_K) / 32 * gan_true$.
47h	AGC_CTRL3	7:0	Default : 0x3F Access : R/W
	AGC_BKLCLIP	7:5	AGC Black level Clip enable.
	AGC_CLIP	4:0	The sync magnitude error for AGC is bounded by $\pm 4 * REG_AGC_CLIP$.
48h	PGA_SWTICH_TH1	7:0	Default : 0xC0 Access : R/W
	PGA_L2H	7:0	Used when $AGC_FINE \leq PGA_TH_BOT * 16$. Default: $3072 / 16 = 8'd192$.
49h	PGA_SWCH_TH2	7:0	Default : Access : R/W
	PGA_H2L	7:0	Used when $AGC_FINE \leq PGA_TH_BOT * 16$. Default: $1238 / 16 = 8'd64$.
4Ah	AGC_LOWTH	7:0	Default : 0xA0 Access : R/W
	AGC_LOWTH	7:0	When $PGA = AGC_LOWTH_PGA$, $AGC_FINE[11:0]$ must be smaller than $16 * AGC_LOWTH$.
4Bh	PGA_OFST	7:0	Default : 0x40 Access : R/W
	PGA_OFST	7:0	ADC VREF offset = $VREF_min / (VREF_max - VREF_min) * 4096 / 16$.
4Ch	BRST_WINDOW1	7:0	Default : 0x62 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	BRST_MASK_0	7:5	HSYNC trailing edge transition region Maskout for Burst Calculation.
	BRST_BEG	4:0	Burst window Beginning position; move to SW.
4Dh	BRST_WINDOW2	7:0	Default : 0x40 Access : R/W
	BRST_END	7:0	Burst window End position; move to SW.
4Eh	BK_WINDOW1	7:0	Default : 0x05 Access : R/W
	BKPRH_CTR[8]	7	Back-Porch Window Center Position.
	BKPRH_SEL	6	Back-Porch Selection.
	BKPRH_AUTSW	5:4	Back-Porch Auto Switch.
	BKPRH_WIN	3:0	Back-porch Window width=($*4+4$).
4Fh	BK_WINDOW2	7:0	Default : 0x68 Access : R/W
	BKPRH_CTR[7:0]	7:0	Back-Porch Window Center Position.
50h	BRST_TH	7:0	Default : 0x80 Access : R/W
	BRST_THRD	7:4	Burst Threshold.
	BRST_AMP_THRD	3:0	Burst found Amplitude Threshold.
51h	BRSTMAG_CTRL	7:0	Default : 0x38 Access : R/W
	BRSTMAG_CTRL	7	Burst Magnitude Control.
	BRST_MAG[8:2]	6:0	Burst Magnitude value.
52h	COMB_LL_CTRL	7:0	Default : 0x04 Access : R/W
	BRST_MAG[1:0]	7:6	Burst Magnitude value.
	-	5:4	Reserved.
	PAL_BLIND_PD_EN	3	NTSC; 180 degree Phase Detection Enable.
	BRST_PHS_CHK_MAG	2	Burst Phase of the current line is ignored if $BRST_MAG < BRST_MAG_AVG/8$.
	-	1:0	Reserved.
53h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
54h	BRST_WINDOW3	7:0	Default : 0x23 Access : R/W
	FSC_THRD_LINES	7:5	FSC Threshold Lines.
	-	4:3	Reserved.
	FSC_TST_TRY[2]	2	Fsc selection 1.25*Fsc and 0.8*Fsc BPF magnitude type.
	FSC_TST_TRY[1]	1	Fsc selection 1.0*Fsc BPF magnitude type.
	FSC_TST_TRY[0]	0	Fsc selection BPF magnitude snapshot taken at the end of the burst window.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description	Access
55h	COLOR_OFF	7:0	Default : 0x08	Access : R/W
	KILL_CSPOUT	7:6	00 or 01: Auto Color Kill. 10: Force Show Color. 11: Force Kill Color.	
	-	5	Reserved.	
	PAL_LINES_TH	4:0	Lines for PAL/NTSC detection=64 * PAL_LINES_TH.	
56h	FSC443/357 DECT1	7:0	Default : 0x18	Access : R/W
	-	7:6	Reserved.	
	FSC_THRD1_PASS	5:0	FSC Threshold1 Pass.	
57h	FSC443/357 DECT2	7:0	Default : 0x28	Access : R/W
	-	7:6	Reserved.	
	FSC_THRD1_FAIL	5:0	FSC Threshold1 Fail.	
58h	FSC443/357 DECT3	7:0	Default : 0x10	Access : R/W
	-	7:6	Reserved.	
	FSC_THRD0_PASS	5:0	FSC Threshold0 Pass.	
59h	FSC443/357 DECT4	7:0	Default : 0x20	Access : R/W
	-	7:6	Reserved.	
	FSC_THRD0_FAIL	5:0	FSC Threshold0 Fail.	
5Ah	BRST_UNKNOW_TH	7:0	Default : 0x10	Access : R/W
	-	7	Reserved.	
	FSC_TST_MASK	6:4	HSYNC trailing edge Transition region Maskout for Fsc selection filters.	
	FSC_THRD_NO_BRST	3:0	FSC Threshold for No Burst detection.	
5Bh	FSC443/357 DECT5	7:0	Default : 0x98	Access : R/W
	FSC_THRD_MAG_HYST[3:2]	7:6	FSC Threshold Magnitude of HSYNC start.	
	FSC_THRD_MAG_443	5:0	FSC Threshold Magnitude of 4.43 MHz.	
5Ch	FSC443/357 DECT6	7:0	Default : 0x98	Access : R/W
	FSC_THRD_MAG_HYST[1:0]	7:6	FSC Threshold Magnitude of HSYNC start.	
	FSC_THRD_MAG_358	5:0	FSC Threshold Magnitude of 3.58 MHz.	
5Dh	ACC_CTRL	7:0	Default : 0x08	Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	ACC_CTRL	7:6	Auto Chroma Control. 01: Reset Chroma_Gain=1. 11: Load Chroma_Gain=ACC_GAIN[13:0]/64.
	ACC_GAIN[5:0]	5:0	Auto-Chroma-Control Gain.
5Eh	ACC_GAIN	7:0	Default : 0x20 Access : R/W
	ACC_GAIN[13:6]	7:0	Auto-Chroma-Control Gain.
5Fh	AGC_DELTA	7:0	Default : 0x28 Access : R/W
	AGC_DELTA[7:5]	7:5	AGC Delta value.
	WP_SIM_SPD	4:3	WP Simulation Speedup.
	WP_LVL_SPD	2:0	WP Level Speedup.
60h	WP_CTRL1	7:0	Default : 0x15 Access : R/W
	ACC_C_PEAK_LPF	7:6	Chroma Peak Detection Update Speed. 00: Slow, Narrow-Band-Width. 11: Fast, Wide-Band-Width.
	-	5	Reserved.
	WP_TH[8]	4	Desired white level=512+REG_WP_TH.
	AGC_K_WP	3:0	White peaking AGC update speed. $\Delta_{gain} = \text{white_err} / 256 * (1 + \text{REG_AGC_K}) / 32 * \text{gain_true}$.
61h	WP_THRD	7:0	Default : 0x24 Access : R/W
	WP_THRD[7:0]	7:0	White Peak Threshold value.
62h	AP_SYNTHRD2REAGC	7:0	Default : 0x78 Access : R/W
	WP_SYNTHRD2REAGC	7:0	WP Sync Threshold of AGC.
63h ~	-	7:0	Default : - Access : -
64h	-	7:0	Reserved.
65h	AGC_CTRL4	7:0	Default : 0x55 Access : R/W
	-	7:2	Reserved.
	WP_WAITTH	1:0	Number of sync-mag AGC operations before WP mode. 00: 255 operations. 01: 127 operations. 10: 63 operations. 11: 31 operations.
66h	WP_CTRL2	7:0	Default : 0x70 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	WP_MODE	7:5	0xx: Internally automatic white-peaking control. 100: Disable white-peaking. 101: Hold sync magnitude AGC if white level is too high. 110: Reserved. 111: Normal white-peaking AGC.
	WP_MONTR_SPD	4:2	WP Monitor Speed.
	ADCOVSLE_THRD	1:0	WP Threshold Selection.
67h	WP_REDO	7:0	Default : 0x17 Access : R/W
	ROUND_CTRL	7:5	AFEC signal rounding selection.
	REMOV_HF_NOISE	4	Enable 13-tap CVBS low-pass filter to Remove High-Frequency Noise.
	ROUND_CTRL[3:2]	3:2	7-tap chroma-trap filter, CCTRAP, Rounding. 00: Truncate. 01: Round. 10: Dither.
	ROUND_CTRL[1]	1	AFEC self-test 1D luminance Rounding. 0: Truncate. 1: Round.
	ROUND_CTRL[0]	0	AFEC self-test 1D chroma Rounding. 0: Truncate. 1: Round.
68h	CLK_CTRL1	7:0	Default : 0x45 Access : R/W
	ADC_84_ROUND	7:6	Round control for 8Fsc-to-4Fsc downsampling. 0: Truncate. 1: Round.
	DAC_LATCH_INV	5	Option for Datalatch from 4Fsc to 8Fsc.
	3DAC_EN	4	Enable AFEC Data Output to DAC.
	FILSEL	3:2	Filter Selection.
	ADC_168_ROUND	1:0	Round Control for 16Fsc-to-8Fsc Downsampling. 0: Truncate. 1: Round.
69h	SRC_CTRL1	7:0	Default : 0x00 Access : R/W
	SELYC	7	0: YC Source from AFEC for Testing Purpose. 1: YC Source from Comb for Display.
	-	6:5	Reserved.
	BYPASS_Y	4	Bypass CVBS Source for Testing purpose.
	COMB601H_SYNC	3	1: Use the HS444 as the MVDA_HS Output.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	COMB601V_SYNC	2	1: Use the VS444 as the MVDA_VS Output.
	COMB601F_SYNC	1	1: Use the Fld444 as the MVDA_F Output.
	COMBPASS_SYNC	0	1: The HS444 and VS444 as the Bypass SYNC. 0: AFEC_HS and AFEC_VS as the Bypass SYNC Output.
6Ah	VCR_DETECT1	7:0	Default : 0x51 Access : R/W
	VCR_MODE	7:6	VCR Mode enable.
	VCR_HD_DLY	5:4	VCR Head switch number.
	-	3	Reserved.
	VS_STB	2:0	VS Strobe.
6Bh	VCR_DETECT2	7:0	Default : 0xAA Access : R/W
	VCR_LDT	7:4	VCR Line Margin.
	FAST_VT_DET	3	Fast Vertical Line Detection.
	VCR_THRD	2:0	VCR Threshold.
6Ch	VCR_PRECOAST	7:0	Default : 0xF0 Access : R/W
	VCR_PRECOAST	7:4	Pre-Coast value for VCR mode.
	HV_HSLISEL_VCR	3:2	HSYNC Slicer Selection for VCR mode.
	HV_SLILOW_SEL	1:0	HSYNC/VSYSNCR slicer Low Selection.
6Dh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
6Eh	VCR_VLSET	7:0	Default : 0x14 Access : R/W
	VCR_VLSET	7:0	PAC/NTSC VLine tuning.
6Fh		7:0	Default : Access :
	RST_AFEC_SEL	7	0: Partial reset AFEC. 1: Global reset AFEC.
	-	6:4	Reserved.
	DPL_DDE_EN	3	DPL double DE Enable.
	DDE_EN	2	Double DE Enable.
	DPL_HS_EN	1	DPL HS Enable.
	DPL_DE_EN	0	DPL DE Enable.
70h	INI_CTRL1	7:0	Default : 0x84 Access : R/W
	FSTAGC_EN	7	Fast AGC mode.
	-	6	Reserved.
	CLMP_BOTMD	5:4	Clamp on Bottom Mode.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	ADSMAL_THRD	3:0	Threshold for detecting Small AOC swing.
71h	BOTREF_LVL	7:0	Default : 0xA0 Access : R/W
	BOTREF_LVL	7:0	Bottom Reference Level.
72h	HV_SLC_CTRL	7:0	Default : 0x37 Access : R/W
	HV_SLCFZE	7:6	HSYNC/VSYNC Slice Freeze control.
	HV_SLCDIF	5:4	HSYNC/VSYNC Slice Difference.
	HV_SLCDLT	3:0	HSYNC/VSYNC Slice Limit.
73h	INI_CTRL1	7:0	Default : 0x52 Access : R/W
	HV_VSLISEL	7:6	00: 2/8 syn_magnitude as hslice level. 01: 4/8 syn_magnitude as hslice level. 10: 5/8 syn_magnitude as hslice level. 11: 6/8 syn_magnitude as hslice level.
	HV_HSLISEL	5:4	00: 2/8 syn_magnitude as vslice level. 01: 4/8 syn_magnitude as vslice level. 10: 5/8 syn_magnitude as vslice level. 11: 6/8 syn_magnitude as vslice level.
	656_HDES_VCR_OFST	3:0	656 SAV Position Offset when VCR.
74h	SLICE_MUX	7:0	Default : 0x97 Access : R/W
	SLICE_MUX	7:0	Slicer level selection.
75h	656_OFST	7:0	Default : 0x40 Access : R/W
	-	7	Reserved.
	656_OFST	6:0	56 SAV Position Offset in VCR mode.
76h	656_CTRL1	7:0	Default : 0x02 Access : R/W
	-	7:5	Reserved.
	DBCLK_TEST	4	Clock Testing.
	-	3	Reserved.
	656_BLNK_MD	2	656 Blank Mode.
	656_EN	1	Enable 656 mode.
	ABNML_CHK	0	Abnormal check enable.
77h	656_BLNK_MAX	7:0	Default : 0x02 Access : R/W
	656_BLNK_MAX[7:0]	7:0	656 Blink Max value.
78h	YUV	7:0	Default : 0x00 Access : R/W
	YUV[7:0]	7:0	Used as Input of the 4Fsc-to-16Fsc Up-sampling if SELUPS=3.
79h	656_HDES1	7:0	Default : 0x18 Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	656_HDES_O[9:2]	7:0	SDA start position. (656_HDESM, 656_HDESL) ITU656 SAV Position. For VCR, 656_HDES=656_HDES_o-656_HDES_VCR_OFST*4. Otherwise, 656_HDES=656_HDES_o.
7Ah	656_HDES2	7:0	Default : 0x20 Access : R/W
	656_HDES_O[1:0]	7:6	ITU656 SAV position.
	-	5:2	Reserved.
	656_INV_F	1	656 Field Inverse.
	-	0	Reserved.
7Bh	656_HDEW	7:0	Default : 0xB3 Access : R/W
	656_HDEW	7:0	ITU656 active data Width (*8+7).
7Ch	SLMIS_CTRL	7:0	Default : 0xC0 Access : R/W
	SLMIS_CTRL[7:0]	7:0	Enable Slice Miss freeze.
7Dh	NOISE_MLINE	7:0	Default : 0x04 Access : R/W
	NOISE_MLINE	7:0	Move Noise level during specify Line Number.
7Eh	656_CTRL2	7:0	Default : 0x80 Access : R/W
	656_CLKINV	7	Used for FPGA testing.
	656_CLKDLY	6:5	Used for FPGA testing.
	656_LSTSEL	4	Used for FPGA testing.
	656_TEST	3:2	Used for FPGA testing.
	TEST_MODE	1:0	Used for FPGA testing.
7Fh	444_VD_CTRL	7:0	Default : 0x62 Access : R/W
	SELDAC	7:6	Source for 3 DACs. 00: Comb. 01: AFEC Test Mode. 10: 444. 11: Upsampling Source.
	3DAC_INSHV	5	Insert HV into Display DAC Source.
	3DAC_HSEL	4	Insert H's Source Selection. 0: Window PLL. 1: Display PLL.
	3DAC_INSBLACK	3	Insert Black Level back to DAC Source.
	REG_SELFB	2	0: YCbCr Source from AFEC Test Mode. 1: YCbCr Source from Comb444.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	REG_SELUPS	1:0	Upsampling Source. 10: Test Mode 444. 11: Comb YCbCr 444.
80h	NCO_FSC0	7:0	Default : 0x48 Access : R/W
	FSC_NCO0[23:16]	7:0	{NCO_FSC0} 4.43 MHz synthesis clock. Frequency Synthesizer 4*Fsc for 4.43361875 MHz. (For REG_FSC_TABLE[4]=0.) Synthesis-base/(4*Fsc)*2 ²² /8.
81h	NCO_FSC0	7:0	Default : 0x2D Access : R/W
	FSC_NCO0[15:8]	7:0	{NCO_FSC0} 4.43 MHz synthesis clock.
82h	NCO_FSC0	7:0	Default : 0x01 Access : R/W
	FSC_NCO0[7:0]	7:0	{NCO_FSC0} 4.43 MHz synthesis clock.
83h	NCO_FSC1	7:0	Default : 0x59 Access : R/W
	FSC_NCO1[23:16]	7:0	Frequency synthesizer 4*Fsc for 3.57954545 MHz (For FSC_TABLE[4]=0).
84h	NCO_FSC1	7:0	Default : 0x65 Access : R/W
	FSC_NCO1[15:8]	7:0	{NCO_FSC1} 3.579 MHz synthesis clock.
85h	NCO_FSC1	7:0	Default : 0x97 Access : R/W
	FSC_NCO1[7:0]	7:0	{NCO_FSC1} 3.579 MHz synthesis clock.
86h	NCO_FSC2	7:0	Default : 0x59 Access : R/W
	FSC_NCO2[23:16]	7:0	Frequency Synthesizer 4*Fsc for 3.57561149 MHz (For FSC_TABLE[4] = 0).
87h	NCO_FSC2	7:0	Default : 0x7E Access : R/W
	FSC_NCO2[15:8]	7:0	{NCO_FSC2} 3.582 MHz synthesis clock.
88h	NCO_FSC2	7:0	Default : 0x74 Access : R/W
	FSC_NCO2[7:0]	7:0	{NCO_FSC2} 3.582 MHz synthesis clock.
89h	NCO_FSC3	7:0	Default : 0x59 Access : R/W
	FSC_NCO3[23:16]	7:0	Frequency Sunthesizer 4*Fsc for 3.58205625 MHz (For FSC_TABLE[4] = 0).
8Ah	NCO_FSC3	7:0	Default : 0x55 Access : R/W
	FSC_NCO3[15:8]	7:0	{NCO_FSC3} 3.576 MHz synthesis clock.
8Bh	NCO_FSC3	7:0	Default : 0x8B Access : R/W
	FSC_NCO3[7:0]	7:0	{NCO_FSC3} 3.576 MHz synthesis clock.
8Ch	REG_FSC_NCO4	7:0	Default : 0x4A Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	FSC_NCO4[23:16]	7:0	Requency Synthesizer 4*Fsc for 4.28515625 MHz (For REG_FSC_TABLE[4] = 0).
8Dh	FSC_NCO4	7:0	Default : 0xAD Access : R/W
	FSC_NCO4[15:8]	7:0	Requency Synthesizer 4*Fsc for 4.28515625 MHz (For REG_FSC_TABLE[4] = 0).
8Eh	FSC_NCO4	7:0	Default : 0x27 Access : R/W
	FSC_NCO4[7:0]	7:0	Requency Synthesizer 4*Fsc for 4.28515625 MHz (For REG_FSC_TABLE[4] = 0).
8Fh	FSC_TABLE	7:0	Default : 0x00 Access : R/W
	-	7:5	Reserved.
	FSC_TABLE[4]	4	Frequency Synthesizer Control. 0: FSC_NCO0, 1, 2, 3, and 4 are used. 1: Specified by FSC_TABLE[3:2].
	FSC_TABLE[3:2]	3:2	Frequency Synthesizer Base. 00: 160MHz. 01: 15*14.31818MHz. 10: 216MHz. 11: 15*14.31818MHz. Only valid for FSC_TABLE[4] =1.
	FSC_TABLE[1:0]	1:0	Frequency Synthesizer Output. 00: 4*FSC. 01: 8*FSC. 10: 16*FSC. 11: 16*FSC.
90h	FSC_NCO_ERR_443	7:0	Default : 0x00 Access : R/W
	FSC_NCO_ERR_443 [15:8]	7:0	Frequency Synthesizer 4*Fsc Error for 4.43MHz; 2's Complement (Auto scaled internally for 3.58MHz).
91h	FSC_NCO_ERR_443	7:0	Default : 0x00 Access : R/W
	FSC_NCO_ERR_443 [7:0]	7:0	Frequency Synthesizer 4*Fsc Error for 4.43MHz; 2's Complement (Auto scaled internally for 3.58MHz).
92h	WINIIR_THRD_CTRL	7:0	Default : 0xA7 Access : R/W
	WINIIR_THRD1	7:4	IIR Window Threshold 1.
	WINIIR_THRD0	3:0	IIR Window Threshold 0.
93h	WINFIR_THRD_CTR L	7:0	Default : 0xA4 Access : R/W
	WINFIR_THRD1	7:4	IIR Window Threshold 1.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	WINFIR_THRD0	3:0	IIR Window Threshold 0.
94h	SPL_SPD_CTRL1	7:0	Default : 0x14 Access : R/W
	SPL_SPD_FORCE	7:5	Coarse HSYNC PLL Tracking Speed. Bit[2] forces using Bit[1:0]. SPL_SPD=3: Fastest. SPL_SPD=0: Slowest.
	SPL_SPD_SRCH	4:3	Coarse HSYNC PLL tracking Speed during HSYNC-Search.
	SPL_SPD_CLEAN	2:1	Coarse HSYNC PLL tracking Speed for Clean signal.
	-	0	Reserved.
95h	SPL_SPD_CTRL2	7:0	Default : 0x2A Access : R/W
	SPL_SPD_NOISY	7:6	Coarse HSYNC PLL tracking Speed for Noisy signal.
	SPL_SPD_VCR	5:4	Coarse HSYNC PLL phase tracking Speed for VCR outside VSYNC.
	SPL_SPD_VCR_V	3:2	Coarse HSYNC PLL Phase Tracking Speed for VCR during VSYNC.
	SPL_SPD_VCR_PRE	1:0	Coarse HSYNC PLL HSYNC-search lines. 00: 48. 01: 64. 10: 80. 11: 96.
96h	EDGES_NOISY_THR D	7:0	Default : 0xA0 Access : R/W
	NOISE_DC_SEL	7:6	Noise magnitude estimation DC level Selection. 00: IIR_8. 01: IIR_8. 10: CCTRAP_13. 11: CCTRAP.
	EDGES_NOISY	5:0	Threshold of the average number of sliced Edges per Line to determine Noisy mode (/ 4).
97h	EDGES_CLEAN_THR D	7:0	Default : 0x05 Access : R/W
	SYNC_INMUX[2:1]	7:6	Slicer input pre-filter selection. 00: CCTRAP. 01: CCTRAP_13. 10: IIR_8. 11: IIR_16.
	SYNC_INMUX[0]	5	Slicer Auxiliary Pre-Filter Selection. 0: IIR_8. 1: IIR_16.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	-	4	Reserved.
	EDGES_CLEAN	3:0	Threshold of the average number of sliced Edges per line to determine Clean mode (/ 4).
98h	SYNC_WIN_CTRL1	7:0	Default : 0x43 Access : R/W
	SYNC_INMUX_VCR [2:0]	7:5	HSYNC slicer Input selection.
	-	4	Reserved.
	WIN_NOISY	3:0	Coarse HSYNC PLL PD Limitation Window Width for Noisy Mode (*8+7).
99h	SYNC_WIN_CTRL2	7:0	Default : 0x88 Access : R/W
	SYNC_WIN	7:4	Coarse HSYNC PLL SYNC-lost detection Window width (*4+4).
	SYNC_WIN_SRCH	3:0	Coarse HSYNC PLL SYNC-found detection Window width (*4+4).
9Ah	SYNC_CTRL1	7:0	Default : 0xF0 Access : R/W
	SYNC_THRD_MISS	7:4	Coarse HSYNC PLL SYNC search fail Threshold.
	-	3:2	Reserved.
	SPL_SRCH LENG	1:0	SPL Search Length.
9Bh	SYNC_CTRL2	7:0	Default : 0x10 Access : R/W
	-	7:6	Reserved.
	SYNC_THRD	5:0	Coarse HSYNC PLL SYNC search pass (SYNC Found) Threshold (*4+3).
9Ch	SYNC_CTRL3	7:0	Default : 0x1C Access : R/W
	-	7	Reserved.
	SYNC_THRD_LOST	6:0	Coarse HSYNC PLL SYNC SYNC-Lost Threshold (*16+15).
9Dh	DPL_NSPL_HIGH	7:0	Default : 0x6C Access : R/W
	DPL_NSPL[10:3]	7:0	PI-Type Display PLL Number of Samples per Line (MSB); typically 864.
9Eh	DPL_NSPL_LOW	7:0	Default : 0x00 Access : R/W
	DPL_NSPL[2:0]	7:5	PI-type Display PLL Number of Samples per Line (LSB); typically 864.
	DPLL_TRUE8FSC	4	DPLL under 8 Fsc mode.
	-	3:0	Reserved.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
9Fh	SPL_K2_VCR	7:0	Default : 0x40 Access : R/W
	SPL_K2_VCR	7:6	Coarse HSYNC PLL Frequency Tracking Speed for VCR.
	SPL_NSPL_LMT	5:0	PI-type display PLL frequency coasts if the coarse HSYNC PLL deviation is larger than +/- 4*SPL_NSPL_LMT (Try).
A0h	DPL_K1_FORCE	7:0	Default : 0x20 Access : R/W
	DPL_K_FORCE	7	Force DPL K value.
	-	6	Reserved.
	DPL_K1	5:0	PI-type Display PLL phase tracking coefficient K1.
A1h	DPL_K2_FORCE	7:0	Default : 0x60 Access : R/W
	DPL_K2	7:0	PI-type Display PLL frequency tracking coefficient K2.
A2h	DPL_K1_NOISY	7:0	Default : 0x10 Access : R/W
	-	7:6	Reserved.
	DPL_K1_NOISY	5:0	PI-type Display PLL phase tracking coefficient for Noisy broadcast.
A3h	DPL_K2_NOISY	7:0	Default : 0x04 Access : R/W
	DPL_K2_NOISY	7:0	PI-type Display PLL frequency tracking coefficient for Noisy broadcast.
A4h	DPL_K1_VCR	7:0	Default : 0x34 Access : R/W
	-	7:6	Reserved.
	DPL_K1_VCR	5:0	PI-type Display PLL phase tracking coefficient for VCR.
A5h	DPL_K2_VCR	7:0	Default : 0x6A Access : R/W
	DPL_K2_VCR	7:0	PI-type Display PLL frequency tracking coefficient for VCR.
A6h	DPL_K1_VCR_V	7:0	Default : 0x34 Access : R/W
	-	7:6	Reserved.
	DPL_K1_VCR_V	5:0	PI-type Display PLL phase tracking coefficient for VCR during VSYNC.
A7h	DPL_K2_VCR	7:0	Default : 0x2C Access : R/W
	-	7:6	Reserved.
	DPL_VCR_FADE_SPD	5:4	PI-type Display PLL PD_MAX fading speed from VSYNC to active lines. 00: Slow. 11: Fast.
	DPL_VCR_FADE_START	3:0	PI-type Display PLL PE_MAX fading Start lines (*2).
A8h	DPL_K1_FAST	7:0	Default : 0x30 Access : R/W
	-	7:6	Reserved.

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	DPL_K1_FAST	5:0	PI-type Display PLL phase tracking coefficient for Fast mode and initialization.
A9h	DPL_K2_FAST	7:0	Default : 0x65 Access : R/W
	DPL_K2_FAST	7:0	PI-type Display PLL frequency tracking coefficient for Fast mode and initialization.
AAh	DPL_CTRL1	7:0	Default : 0x08 Access : R/W
	-	7:4	Reserved.
	DPL_FAST_LINES	3:0	PI-type Display PLL Fast Mode Lines. (*256)
ABh	DPL_PD_MAX	7:0	Default : 0x10 Access : R/W
	DPL_PD_MAX	7:0	PI-type Display PLL Phase Detector (DPL_PD) Limit. If bit[7]=1, force using bit[6:0].
ACh	DPL_PD_MAX_VCR	7:0	Default : 0xFF Access : R/W
	DPL_PD_MAX_VCR	7:0	PI-type Display PLL phase detector (DPL_PD) limit for VCR outside VSYNC area.
ADh	REG_656_CTRL	7:0	Default : 0x3A Access : R/W
	REG_656_OPTION1	7	Line Middle Method 0 Selection.
	REG_656_OPTION0	6	Line Middle Method 1 Selection.
	REG_DPL_WAIT_LENG	5:4	DPL Wait Length.
	REG_DPL_NCO_RST	3	DPL NCO Reset enable.
	DPL_FAST_RE_DO	2	PI-type Display PLL Re-Do Fast Mode.
	DPL_NO_STOP	1	PI-type Display PLL Never Stops. (Free Run when HSYNC not found.)
	DPL_COAST_T_FORCE	0	PI-type Display PLL Frequency Frozen Always. (except when Fast Mode and Initialization)
AEh	DPL_COAST_CTRL	7:0	Default : 0xB8 Access : R/W
	VSYNC_SEL	7	VSYNC source Selection.
	-	6	Reserved.
	COAST_V_ALWAYS	5	Always V Coast function.
	DPL_COAST_T_LINES	4:0	Lines where 656 PLL coast frequency during V. PI-type Display PLL Frequency Frozen Lines during VSYNC. (*2)
AFh	DPL_CTRL2	7:0	Default : 0x85 Access : R/W
	DPL_LOST_LINES	7:4	PI-type Display PLL Threshold on Lines to Determine Out-of-Lock. (*64).
	DPL_LOST_WIN	3:0	PI-type Display PLL HSYNC Window Width to Detect Out-of-Lock. (*8)

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description	
B0h	DPL_K1_FREE	7:0	Default : 0x86	Access : R/W
	DPL_K1_FREE	7:4	PI-type Display PLL Phase Tracking Coefficient during HSYNC not found.	
	BKPRH_JUMP_MAX	3:0	Back-Porch-Jump Maximal Lines. (Try.) (Can move to SW Clmp.)	
B1h	BKPRH_JUMP_CTRL	7:0	Default : 0x06	Access : R/W
	-	7	Reserved.	
	BKPRH_JUMP_MV_EN	6:5	Back-Porch-Jump used to Pause Clamping when Macrovision found (if set 01). (Try.) (Can move to SW Clmp.)	
	BKPRH_JUMP_THRD	4:0	Back-Porch-Jump Threshold. (*32+32). (Try.) (Can move to SW Clmp.)	
B2h	SPL_DELAY_FIR	7:0	Default : 0x19	Access : R/W
	-	7:6	Reserved.	
	SPL_DELAY_FIR	5:0	Coarse HSYNC PLL Delay with Respect to the Actual HSYNC Leading Edge if SYNC_INMUX selects CCTRAP or CCTRAP_13.	
B3h	SPL_DELAY_IIR	7:0	Default : 0x1E	Access : R/W
	-	7	Reserved.	
	SPL_DELAY_IIR	6:0	Coarse HSYNC PLL Delay with Respect to the Actual HSYNC Leading Edge if SYNC_INMUX selects IIR_8 or IIR_16.	
B4h	REG_PB_CTRL	7:0	Default : 0x00	Access : R/W
	REG_PB_EN	7	0: Hold ADC Data Probe. 1: Enable ADC Data Probe.	
	REG_PB_4FSC	6	0: Probe 8Fsc ADC Data when 8Fsc Clock. 1: Probe 4Fsc ADC Data when 8Fsc Clock.	
	REG_PB_LINE	5:4	1: Probe ADC Data in Next Line.	
	REG_PB_YC	3	0: Probe Y(CBVS) ADC Data. 1: Probe C ADC Data.	
	REG_PB_10B	2	0: Probe 8 bit Data. 1: Probe 10 bit Data.	
	-	1:0	Reserved.	
B5h	PROBE_OUT	7:0	Default : 0x00	Access : R
	PROBE_OUT	7:0	ADC Probe Data. (RP_LSB) ? {6'b0, PROBE_OUT1[1:0]} : PROBE_OUT1[9:2].	
B6h	REG_PB_HPOS	7:0	Default : 0x00	Access : R/W

Video Decoder Register (Bank = 02)

Index	Name	Bits	Description
	REG_PB_HPOS[7:0]	7:0	Start Probe Horizontal Position. (lower 8 bits)
B7h	REG_PB_BPOS1	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	REG_PB_VPOS[10:8]	5:4	Start Probe Vertical Position. (upper 3 bits)
	REG_PB_HPOS[10:8]	2:0	Start Probe Horizontal Position. (upper 3 bits)
B8h	REG_PB_VPOS2	7:0	Default : 0x00 Access : R/W
	REG_PB_VPOS[7:0]	7:0	Start Probe Vertical Position. (lower 8 bits)
B9h	REG_WP_HOVER THRD	7:0	Default : 0x1F Access : R/W
	REG_WP_HOVER THRD[7:0]	7:0	Overflow Threshold of ADC Value.
BAh	REG_WP_HUNDERT HRD	7:0	Default : 0x1F Access : R/W
	REG_WP_HUNDER THRD[7:0]	7:0	Underflow Threshold of ADC Value.
BBh ~ FFh	-	7:0	Default : - Access : -
	-	7:0	Reserved.

Comb-Filter Register (Bank = 03, Registers 01h ~ 9Fh)

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)			
Index	Name	Bits	Description
00h ~ 09h	-	7:0	Default : 0x00 Access : R/W
	-	7:0	Reserved.
10h	COMBCFGA	7:0	Default : 0x12 Access : R/W
	-	7	Reserved.
	SVDOCBP	6	Band Pass Filter for S-Video C Channel to kill the DC Level.
	DIRADCIN	5	Direct use ADC Input (Bypass AFEC).
	DDETSRCSEL	4	Degree Detect Source Select. 0: Without ACC. 1: After ACC.
	MANUCOMB	3	0: Auto Select Working Mode. 1: Manual Select Working Mode.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	WORKMD	2:0	Working Mode. 000: Off. 001: Notch. 010: 2D Comb. 011: 3D Comb. 100: 3D Comb with History.
11h	COMBCFGB	7:0	Default : 0x00 Access : R/W
	FORCE8BIT	7	Force 8 bit.
	GOODHS	6	Using Free Run HSYNC in Standard Input.
	AFEC_DEM	5	Select AFEC Demodulation.
	PALCMINV	4	PalCmpUp Inverse.
	-	3	Reserved.
	SYNCONY	2	SYNC on Y.
	CRMA_OFF	1	Turn Off the Chroma of video decoder output. 0: Normal. 1: Off.
	BST_OFF	0	Turn Off the Color Burst of video decoder output. 0: Normal. 1: Off.
12h	COMBCFGC	7:0	Default : 0x10 Access : R/W
	FREESYNC	7	H/V SYNC Free Run.
	FREECNTMD	6	Free Run Counter Mode. 0: NTSC. 1: PAL.
	SNOWTYPE	5:4	Snow Type. 00: Never snow. 01: Snow when VDOMD = 7. 10, 11: Force snow.
	RND_MD	3:2	Rounding Mode. 00: Truncate. 01: Rounding. 10: Dithering. 11: Error Feedback.
	-	1:0	Reserved.
13h	YGAIN	7:0	Default : 0xC8 Access : R/W

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	YGAIN	7:0	Luma Gain for U/V Demodulation. Out=In*Gain+16. 0: 0. 128: 1. 255: 1.992.
14h	CBGAIN	7:0	Default : 0x96 Access : R/W
	CBGAIN	7:0	Cb Gain for U/V Demodulation.
15h	CRGAIN	7:0	Default : 0x6A Access : R/W
	CRGAIN	7:0	Cr Gain for U/V Demodulation.
16h	DITHCTRLA	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	CTSTDITHEN	6	Dithering when Contrast Adjustment.
	CTSTDITHPOS	5:4	Dithering Position (Offset) of Contrast.
	-	3	Reserved.
	SATDITHEN	2	Dithering when Saturation Adjustment.
	SATDITHPOS	1:0	Dithering Position (Offset) of Saturation.
17h	DITHCTRLB	7:0	Default : 0x00 Access : R/W
	-	7	Reserved.
	YDEMDITHEN	6	Dithering when Demodulation Y-Gain.
	YDEMDITHPOS	5:4	Dithering Position (Offset) of Y Gain.
	-	3	Reserved.
	CDEMDITHEN	2	Dithering when Demodulation C-Gain.
	CDEMDITHPOS	1:0	Dithering Position (Offset) of C Gain.
18h	HORSTPOS	7:0	Default : 0xC0 Access : R/W
	HORSTPOS[7:0]	7:0	Horizontal Starting Position. 0..255 : -128..127.
19h	FRHTOTL	7:0	Default : 0x8D Access : R/W
	FRHTOTL	7:0	Free Run HSYNC Total Low Byte.
1Ah	FRHTOTH	7:0	Default : 0x03 Access : R/W
	FRHTOTH	7:0	Free Run HSYNC Total High Byte.
1Bh	PHSDETCFG	7:0	Default : 0x83 Access : R/W
	PHSDETEN	7	Line-Lock Phase Detection Enable.
	PHSDETINV	6	Output Inverse.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	-	5:3	Reserved.
	PHSDETSFT	2:0	Shift Bit Number. 000: Only output integer. 001: Output shift right 1 bit. ... 111: Output shift right 7 bit.
	CTRLSWCH	7:0	Default : 0xF0 Access : R/W
	HSFRAFEC	7	H-SYNC from AFEC.
	VSFRAFEC	6	V-SYNC from AFEC.
	BLKFRAFEC	5	Black Level from AFEC.
	DEGFRAFEC	4	Demodulation Degree from AFEC.
	-	3:2	Reserved.
	STDSEL	1:0	NTSC/PAL Decision. 01: force NTSC. 10: force PAL. Other: Auto detect.
20h	COMB2DCFGA	7:0	Default : 0x00 Access : R/W
	-	7:0	Reserved.
21h	COMB2DCFGB	7:0	Default : 0xD4 Access : R/W
	CRMATRP_EN	7	C-Trap of C Enable.
	NCHMD_Y[2:0]	6:4	Notch Mode of Y.
	CHRMFLT_EN	3	Chroma Median Filter Enable. 0: Off 1: Enable
	NCHMD_C[2:0]	2:0	Notch Mode of C.
22h	COMB2DCFGC	7:0	Default : 0x83 Access : R/W
	LNENDPOS	7:4	Line End Offset. 0~15: -8~7.
	SHARP2DMD	3:2	Sharpness Mode of 2D Comb. 00: Off. 01: Mode 1. 10: Mode 2. 11: Mode 3.
	CDEMCHK	1	Chroma Vertical Check (dem).
	FORCE5LN	0	Force use 5 Line even in 1D.
23h	HDYGAIN	7:0	Default : 0x40 Access : R/W

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	HDYGAIN	7:0	Gain of Chroma Trap for Hanging Dots.
24h	HDCGAIN	7:0	Default : 0x20 Access : R/W
	HDCGAIN	7:0	Gain of Chroma Trap for Hanging Dots.
25h	ETPREF	7:0	Default : 0x18 Access : R/W
	ETPREF	7:0	Gain of Chroma Trap for Hanging Dots.
26h	ETPTHH	7:0	Default : 0x00 Access : R/W
	ETPTHH	7:0	Horizontal Entropy Threshold for Chroma Trap in 2D Comb.
27h	ETPTHV	7:0	Default : 0x00 Access : R/W
	ETPTHV	7:0	Vertical Entropy Threshold for Chroma Trap in 2D Comb.
28h	THDEM	7:0	Default : 0x10 Access : R/W
	THDEM	7:0	Thresholds for 2D Comb Filter; check separated chroma complement with up/down line or not.
29h ~ 2Eh	-	7:0	Reserved.
2Fh	IFCOEF	7:0	Default : 0x00 Access : R/W
	IFCOEF	7:0	If compensation Coefficient. 2-bit integer, 6-bit fraction. $Crma=C_cn-(Coef*(C_left+C_right))$.
30h ~ 3Fh	-	7:0	Reserved.
40h	HVDETCFG	7:0	Default : 0x80 Access : R/W
	SENSYNCLVL	7:5	Sensitivity of SYNC Level Detect.
	-	4:3	Reserved.
	BLNKDETM	2	Blank Level Detect Mode. 0: Either 240 or 252. 1: 230~262 is possible.
	VDETM	1:0	Vertical Timing Detect Mode. 00, 01: Auto detect. 10: force 525 line system. 11: force 625 line system.
41h	SENSSIGDET	7:0	Default : 0x08 Access : R/W
	SENSSIGDET	7:0	Sensitivity of Signal Detect.
42h	SYNCLVTLRN	7:0	Default : 0xFF Access : R/W
	SYNCLVTLRN	7:0	SYNC Level Tolerance.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
43h	VCRCOASTLEN	7:0	Default : 0x60 Access : R/W
	VCRCOASTLEN	7:0	VCR Coast Length.
44h	REGHBIDLY	7:0	Default : 0x80 Access : R/W
	REGHBIDLY	7:0	Horizontal Blanking Region Delay. 0 ... 255 : Delay -128 .. 127 pixels.
45h ~ 47h	-	7:0	Default : - Access : -
	-	7:0	Reserved.
48h	DEGDETCFG	7:0	Default : 0x00 Access : R/W
	YCPIPE	7:6	Y/C Pipe Delay.
	DEGPIPE	5:4	Degree Pipe Delay.
	DEG1LNMD	3	Using just one line's Burst Determine the Degree.
	DEGSENS	2:0	Sensitivity of Degree Detect. 000: Directly use AFEC degree. 001: Tolerate 16384 errors. 010: Tolerate 8192 errors. 011: Tolerate 4096 errors. 100: Tolerate 2048 errors. 101: Tolerate 1024 errors. 110: Tolerate 512 errors. 111: Tolerate 256 errors.
49h	THBURST	7:0	Default : 0x1E Access : R/W
	THBURST	7:0	Degree Detection Tolerance Registers.
4Ah	TLRNSWCHERR	7:0	Default : 0xC8 Access : R/W
	TLRNSWCHERR	7:0	Degree Detection Tolerance Registers.
4Bh	HSLEADRGN	7:0	Default : 0x80 Access : R/W
	HSLEADRGN	7:0	HSYNC Leading Edge Range, for Even/Odd Detect.
4Ch ~ 4Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
50h	TIMDETCFGA	7:0	Default : 0x07 Access : R/W
	-	7:4	Reserved.
	AUTOSTOPSYNC	3	Automatic Stop H/V Sync when No Input.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	LNFREEMD	2:0	Line Buffer Free Run Mode. 000: Off (always synchronize). 001: 909 return. 010: 910 return. 011: 917 return. 100: 1127 return. 101: 1135 return. 110: Decided by register. 111: Automatic.
51h	TIMDETCFGB	7:0	Default : 0x00 Access : R/W
	STBCNTMD	7:6	Stable Counter Mode. 00: div 16. 01: div 32. 10: div 64. 11: div 128.
	HSSTBDEC	5:0	HSYNC Stable Counter Decrease Speed.
52h	HRETPOSL	7:0	Default : 0x8E Access : R/W
	HRETPOSL	7:0	Horizontal Return Position in Line Buffer Free Run Mode.
53h	HRETPOSH	7:0	Default : 0x03 Access : R/W
	HRETPOSH	7:0	Horizontal Return Position in Line Buffer Free Run Mode.
54h	TILTTLRN	7:0	Default : 0x02 Access : R/W
	TILTTLRN	7:0	Line Position Tilt Tolerance.
55h	JITTLRN3D	7:0	Default : 0x08 Access : R/W
	JITTLRN3D	7:0	3D Timing Detection Tolerance.
56h	LCKSTEP	7:0	Default : 0x80 Access : R/W
	LCKSTEP	7:0	3D Lock Counter Go Back Distance when SYNC Unstable.
57h	LCK3DTHU	7:0	Default : 0x33 Access : R/W
	LCK3DTHU	7:0	3D Timing Detection Threshold.
58h	LCK3DTHL	7:0	Default : 0x11 Access : R/W
	LCK3DTHL	7:0	3D Timing Detection Threshold.
59h	JITTLRN1	7:0	Default : 0x08 Access : R/W
	JITTLRN1	7:0	Tolerance of H-SYNC Jitter.
5Ah	JITTLRN2	7:0	Default : 0x20 Access : R/W
	JITTLRN2	7:0	Tolerance of H-SYNC Jitter.
5Bh	HSLCKTHU	7:0	Default : 0x10 Access : R/W

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	HSLCKTHU	7:0	Upper Bound Threshold of Hysteresis H-SYNC Lock Counter.
5Ch	HSLCKTHL	7:0	Default : 0x08 Access : R/W
	HSLCKTHL	7:0	Lower Bound Threshold of Hysteresis H-SYNC Lock Counter.
5Dh	HSCHGTLRN	7:0	Default : 0xFF Access : R/W
	HSCHGTLRN	7:0	Tolerance of HSYNC Counter Change Times. Even HSYNC locked, but if timing drifted too many times, systme still should turn off 2D/3D. 00h: immediately stop 2D/3D when HsChg happen. FFh: Never stop 2D/3D if HsLock.
5Eh	SYNCDLY	7:0	Default : 0x14 Access : R/W
	SYNCDLY	7:0	H SYNC (from Decoder to Scaler) Pipe Delay.
5Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
60h	IMGCTRL	7:0	Default : 0xF0 Access : R/W
	COLKILLMD	7:6	Color Kill Mode. 00: Off. 01: Auto. 10, 11: Decided by MCU.
	CGMODE	5:4	Auto Chroma Gain Mode. 00: Off. 01: Auto. 10, 11: Manual.
	AC_MD	3	Auto Contrast Mode. 0: Double at most. 1: 4 times at most.
	AUTO_CSTS	2	Auto Contrast Adjustment.
	-	1	Reserved.
	AUTO_SAT	0	Auto Saturation Adjustment.
61h	RSPNTIME	7:0	Default : 0x10 Access : R/W
	RSPNTIME	7:0	Response Time of Contrast/Brightness Adjust. 0... 255 => 1... 256 field.
62h	REGBSTHGHT	7:0	Default : 0x00 Access : R/W
	REGBSTHGHT	7:0	Burst Height for Auto Chroma Gain. 0: Auto, 112 for NTSC and 117 for PAL. Other: use RegBstHght/DetBstHght as C Gain.
63h	REGCTST	7:0	Default : 0x80 Access : R/W

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	REGCTST	7:0	Contrast adjustment Coefficient. 0... 255 => 0... (255/128).
64h	REGBRHT	7:0	Default : 0x80 Access : R/W
	REGBRHT	7:0	Brightness adjustment Coefficient. 0... 255 => -128... 127 in 8-bit precision.
65h	REGSAT	7:0	Default : 0x80 Access : R/W
	REGSAT	7:0	Saturation adjustment Coefficient. 0... 255 => (0... 255)/128.
66h	CKTHU	7:0	Default : 0x80 Access : R/W
	CKTHU	7:0	Upper Bound Threshold of Color Kill.
67h	CKTHL	7:0	Default : 0x30 Access : R/W
	CKTHL	7:0	Lower Bound Threshold of Color Kill.
68h	CRMAGAINL	7:0	Default : 0x80 Access : R/W
	CRMAGAINL	7:0	Chroma Gain Value for Manu Chroma Gain.
69h	CRMAGAINH	7:0	Default : 0x00 Access : R/W
	CRMAGAINH	7:0	Chroma Gain Value for Manu Chroma Gain.
6Ah	MAXLUMA	7:0	Default : 0xB0 Access : R/W
	MACLUMA	7:0	Max Luminance for Auto Contrast Adjust.
6Bh	MAXSAT	7:0	Default : 0xC0 Access : R/W
	MAXSAT	7:0	MAX Saturation for Auto Saturation Adjust.
6Ch	MAXCRMA	7:0	Default : 0xC0 Access : R/W
	MAXCRMA	7:0	MAX Chrominance for Auto Saturation Adjust.
6Dh	SNOWDELAY	7:0	Default : 0x80 Access : R/W
	SNOWDELAY	7:0	Latency of Snow Output after Signal Missing.
6Eh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
6Fh	CBCRLPCFG	7:0	Default : 0x04 Access : R/W
	CTIIRMD	7:6	IIR Coefficient for CTI. 00: 1/4. 01: 1/8. 10: 1/16. 11: 1/32.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	CTIMODE	5:4	CTI Mode. 00: Off. 01: Weak. 10: Normal. 11: Strong.
	YPIPDLY	3:2	Luma Pipe Delay. 00: -1 cycle. 01: 0 cycle. 10: 1 cycle. 11: 2 cycle.
	CBCRLPMD	1:0	Cb/Cr Low Pass Mode. 0: Off. 01: Cut off at 2.0MHz. 10: Cut off at 1.5MHz. 11: Cut off at 1.0MHz
70h	COMBSTATUSA	7:0	Default : - Access : Write one clear
	HSLOCK	7	HSYNC Lock Happen.
	LOCK3D	6	Good Timing (Lock3D) Happen.
	-	5:4	Reserved.
	HSLOCKZ	3	HSYNC Unlock Happen.
	LOC3DZ	2	Good Timing (Lock3D) Disappear.
	HSCHG	1	H-SYNC Counter Change.
	-	0	Reserved.
71h	COMBSTATUSB	7:0	Default : - Access : Write one clear
	-	7:6	Reserved.
	CCHNLACT	5	C-channel Active (maybe S-Video Input).
	CCHNLACT	4	C-channel Quiet (maybe CVBS Input0).
	-	3	Reserved.
	FLDCNTCHG	2	Field Counter Change.
	PALSWCHERR	1	PAL Switch Error.
	DEGERR	0	Degree Error (Degree Detect).
72h	COMBSTATUSC	7:0	Default : - Access : RO
	LN525	7	525 Line System.
	LN625	6	625 Line System.
	F358	5	3.58 MHz System.
	F443	4	4.43 MHz System.

Comb-Filter Register (Bank=03, Registers 01h ~ 9Fh)

Index	Name	Bits	Description
	NOINPUT	3	No Input.
	VDOMD	2:0	Video Mode. 000: NTSC(M). 001: NTSC(443). 010: PAL (M). 011: PAL(B,D,G,H,I,N). 100: PAL(Nc). 101: PAL(60). 110: Input without Burst. 111: Unknown.
73h	DETBLANKLVL	7:0	Default : - Access : RO
	DETBLANKLVL	7:0	Detected Blanking Level.
74h	CURBLANKLVL	7:0	Default : - Access : RO
	CURBLANKLVL	7:0	Detected Blanking Level.
75h	DETSYNCLVL	7:0	Default :- Access : RO
	DETSYNCLVL	7:0	Detected Sync Level.
76h	DETSYNCHGHT	7:0	Default : - Access : RO
	DETSYNCHGHT	7:0	Detected SYNC Height.
77h	DETBURSTHGT	7:0	Default : - Access : RO
	DETBURSTHGT	7:0	Detected Burst Level.
78h	DETHORTOTALL	7:0	Default : - Access : RO
	DETHORTOTALL	7:0	
79h	DETHORTOTALH	7:0	Default : - Access : R
	DETHORTOTALH	7:0	
7Ah ~ 7Ch	-	7:0	Default : - Access : -
	-	7:0	Reserved.
7Dh	COMBCTRL	7:0	Default : 0x00 Access : R/W
	COMBCTRL	7:0	Some Control Signals for FPGA.
7Eh	-	7:0	Default : - Access : -
	-	7:0	Reserved.
7Fh	FPGACTRL	7:0	Default : 0xE0 Access : R/W
	FPGACTRL	7:0	Some Control Signals for FPGA.
80h ~ 9Fh	-	7:0	Default : - Access : -
	-	7:0	Reserved.

DIGITAL PWM Register (Bank = 04)

DIGITAL PWM Register (Bank = 04)				
Index	Name	Bits	Description	
01h ~ 6Ah	-	7:0	Default : -	Access : -
	-	7:0	Reserved.	
6Bh	PROTECT_BIT	7:0	Default : 0x00	Access : R/W
	PROTECT_BIT	7:0	Have to set as 1 in that could view all PWM register setting.	
6Ch	STUS_RPRT	7:0	Default : -	Access : RO
	-	7:3	Reserved.	
	STUS_RPRT[2]	2	1: FAULTZ is high.	
	STUS_RPRT[1]	1	1: FB2 mode is on.	
	STUS_RPRT[0]	0	1: VIN is OK.	
6Dh	PWM_SWCH	7:0	Default : 0x00	Access : R/W
	-	7:2	Reserved.	
	PWM_SWCH[1:0]	1:0	Control PWM on/off; must set to "00" or "11". 00: PWM off. 11: PWM on. Others: Off (not recommended).	
6Eh	OP_MD	7:0	Default : 0x00	Access : R/W
	-	7	Reserved.	
	PWM_SWRST	6	Software-Reset bit to reset PWM. 0: No action. 1: Software reset and remain in initial state using a single pulse.	
	VSYNC_PLRTY_SEL	5	VSYNC polarity setting. 0: Same polarity to VSYNC. 1: Opposite polarity.	
	VSYNC_SEL	4	Use TCON's VSYNC for VSYNC-mode. 0: Use normal VSYNC. 1: Use TCON's VSYNC.	
	PWM_EN	3	PWM function on/off. 0: Use external controller. 1: User internal controller.	
	FAULTZ_H_MD_EN	2	FAULTZ High Mode on/off. 0: Off. 1: On.	
	VSYNC_MD_EN	1	VSYNC Mode on/off. 0: Off. 1: On.	

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
	BRST_MD_EN	0	Burst Mode on/off. 0: Off. 1: On.
6Fh	VIN_STAB_CNT	7:0	Default : 0x0A
	VIN_STAB_CNT	7:0	VIN Stable Count number.
70h	VIN_OV_CNT	7:0	Default : 0x0A
	VIN_OV_CNT	7:0	VIN Over-Voltage Count number.
71h	VIN_UV_CNT	7:0	Default : 0x0A
	VIN_UV_CNT	7:0	VIN Under-Voltage Count number.
72h	VIN_WRK_H_THRD	7:0	Default : 0xC3
	VIN_WRK_H_THRD	7:0	VIN Working High Threshold.
73h	VIN_STRTUP_H_THRD	7:0	Default : 0xBB
	VIN_STRTUP_H_THRD	7:0	VIN Startup High Threshold.
74h	VIN_STRTUP_L_THRD	7:0	Default : 0x99
	VIN_STRTUP_L_THRD	7:0	VIN Startup Low Threshold.
75h	VIN_WRK_L_THRD	7:0	Default : 0x90
	VIN_WRK_L_THRD	7:0	VIN Working Low Threshold.
76h	VIN_WAIT_CNT_L	7:0	Default : 0xFA
	VIN_WAIT_CNT[7:0]	7:0	VIN Waiting Count number (lower 8 bits).
77h	VIN_WAIT_CNT_H	7:0	Default : 0x00
	-	7:4	Reserved.
	VINWAIT_CNT[11:8]	3:0	VIN Waiting Count number (upper 4 bits)

When 6E[2] = 0, please refer to the following as register settings of 78h ~ 7Bh:

78h	FAULTZ_H_VAL	7:0	Default : 0xAA
	FAULTZ_H_VAL[7:0]	7:0	FAULTZ High boundary.
79h	FAULTZ_L_VAL	7:0	Default : 0x55
	FAULTZ_L_VAL[7:0]	7:0	FAULTZ Low boundary.
7Ah	FAULTZ_STB	7:0	Default : 0x0A
	FAULTZ_STB[7:0]	7:0	Counts for FAULTZ Stable.
7Bh	FAULTZ_DROP	7:0	Default : 0x0A
	FAULTZ_H_GO_LOW	7:0	Counts for FAULTZ High Go Low.

When 6E[2] = 1, please refer to the following as register settings of 78h ~ 7Bh:

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
78h	FAULTZ_H_VALUE	7:0	Default : 0xAA Access : R/W
	FB2_DET_TIME[7:0]	7:0	FB2 Detection Time after burst high when system is in FAULTZ high mode (lower 8 bits).
79h	FAULTZ_L_VALUE	7:0	Default : 0x55 Access : R/W
	-	7:2	Reserved.
	FB2_DETECT_TIME[9:8]	1:0	FB2 Detection Time after burst high when system is in FAULTZ high mode (higher 2 bits).
7Ah	FAULTZ_STB_CNT	7:0	Default : 0x0A Access : R/W
	FB2_DET_FAIL_T	7:0	Counts for FB2 failure is True.
7Bh	FAULTZ_DROP	7:0	Default : 0x0A Access : R/W
	FB2_L_FAULTZ_H_MD	7:0	FB2 Low Bound in FAULTZ High Mode.
7Ch	MSUR_OFST_L	7:0	Default : 0x0E Access : R/W
	MSUR_OFST[7:0]	7:0	Measure Offset time to get Data (lower 8 bits).
7Dh	MSUR_OFST_H	7:0	Default : 0x00 Access : R/W
	-	7:2	Reserved.
	MSUR_OFST[9:8]	1:0	Measure Offset time to get Data (higher 2 bits).
7Eh	2US	7:0	Default : 0x48 Access : R/W
	2US_CNT	7:0	Counts for 2us.
7Fh	2US_MSUR	7:0	Default : 0x14 Access : R/W
	2US_MSUR	7:0	Counts to get Data when PWM on time \leq 2us.
80h	FB1_COM	7:0	Default : 0xAA Access : RO
	FB1_COM[7:0]	7:0	FB1 Command.
81h	FB2_STRTUP	7:0	Default : 0xAA Access : R/W
	FB2_STRTUP	7:0	Start-up FB2 Command.
82h	FB2_SET	7:0	Default : 0xAA Access : R/W
	FB2_SET	7:0	FB2 Command; adjust for continuous output adjusting.
83h	CONT_AB	7:0	Default : 0xB7 Access : R/W
	CONT_A	7:4	A-value for Continuous-mode.
	CONT_B	3:0	B-value for Continuous-mode.
84h	BRST_AB	7:0	Default : 0xB7 Access : R/W
	BRST_A	7:4	A-value for Burst-mode.
	BRST_B	3:0	A-value for Burst-mode.

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
85h	STRK1_L	7:0	Default : 0xA9 Access : R/W
	STRK1_CNT[7:0]	7:0	1 st ignition and normal operation Count for PWM frequency; double buffer must fill-in from high to low.
86h	STRK1_H	7:0	Default : 0x00 Access : R/W
	-	7:2	Reserved.
	STRK1 [9:8]	1:0	1 st Ignition and normal operation count for PWM frequency; double buffer must fill-in from high to low.
87h	STRK1_LMT_L	7:0	Default : - Access : RO
	STRK1_LMT[7:0]	7:0	Maximum duty for 1 st ignition and normal operation; count for PWM frequency (lower 8 bits).
88h	STRK1_LMT_H	7:0	Default : - Access : RO
	-	7:2	Reserved.
	STRK1_LMT[9:8]	1:0	Maximum duty for 1 st ignition and normal operation; count for PWM frequency (higher 2 bits).
89h	STRK2_L	7:0	Default : 0xA9 Access : R/W
	STRK2_CNT[7:0]	7:0	2 nd ignition count for PWM frequency; double-buffer must fill-in from high to low (lower 8 bits).
8Ah	STRK2_H	7:0	Default : 0x00 Access : R/W
	-	7:2	Reserved.
	STRK2 [9:8]	1:0	2 nd ignition count for PWM frequency; double-buffer must fill-in from high to low (higher 2 bits).
8Bh	STRK2_LMT	7:0	Default : - Access : RO
	STRK2_LMT[7:0]	7:0	Maximum duty of 2 nd ignition; count for PWM frequency.
8Ch	STRK2_LMT	7:0	Default : - Access : RO
	-	7:2	Reserved.
	STRK2_LMT[9:8]	1:0	Maximum duty for 2 nd ignition; count for PWM frequency.
8Dh	CNT_MD	7:0	Default : 0x55 Access : R/W
	FB2_MD_CTRL	7:4	Counts for entering FB2 Mode Control.
	FAULTZ_OVP	3:0	Counts for FAULTZ Over-Voltage Protection.
8Eh	BRST_L	7:0	Default : 0x80 Access : R/W
	BRST_CNT[7:0]	7:0	Counts for Burst-mode frequency (lower 8 bits; filling sequence: 8Fh, 8Eh, 91h, 90h).
8Fh	BRST_H	7:0	Default : 0x00 Access : R/W

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
	-	7:2	Reserved.
	BRST_CNT[9:8]	1:0	Counts for Burst-mode frequency (higher 2 bits; filling sequence: 8Fh, 8Eh, 91h, 90h).
90h	BRST_DUTY_L	7:0	Default : 0x10 Access : R/W
	BRST_DUTY[7:0]	7:0	Counts for Burst-mode Duty (lower 8 bits; filling sequence: 8Fh, 8Eh, 91h, 90h).
91h	BRST_DUTY_H	7:0	Default : 0x01 Access : R/W
	-	7:2	Reserved.
	BRST_DUTY[9:8]	1:0	Counts for Burst-mode Duty (higher 2 bits; filling sequence: 8Fh, 8Eh, 91h, 90h).
92h	STRK1_TIME_L	7:0	Default : 0x50 Access : R/W
	STRK1_TIME[7:0]	7:0	Counts for 1 st ignition Time (lower 8 bits).
93h	STRK1_TIME_M	7:0	Default : 0xC3 Access : R/W
	STRK1_TIME[15:8]	7:0	Counts for 1 st Ignition Time (middle 8 bits).
94h	STRK1_TIME_H	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	STRK1_TIME[19:16]	3:0	Counts for 1 st ignition time (higher 4 bits).
95h	TTAL_STRK_TIME_L	7:0	Default : 0x38 Access : R/W
	TTAL_STRK_TIME[7:0]	7:0	Counts for 1 st ignition time + 2 nd ignition time (lower 8 bits).
96h	TTAL_STRK_TIME_M	7:0	Default : 0xC1 Access : R/W
	TTAL_STRK_TIME[15:8]	7:0	Counts for 1 st ignition time + 2 nd ignition time (middle 8 bits).
97h	TTAL_STRK_TIME_H	7:0	Default : 0x01 Access : R/W
	-	7:4	Reserved.
	TTAL_STRK_TIME[19:16]	3:0	Counts for 1 st ignition time + 2 nd ignition time (higher 4 bits).
98h	BRST_RAMP1	7:0	Default : 0x22 Access : Reserved
	BRST_RAMP1[7:0]	7:0	Burst-mode Ramp control (lower 8 bits).
99h	BRST_RAMP2	7:0	Default : 0x11 Access : Reserved
	PWM_MAX_DUTY	7	PWM Maximum Duty. 0: STRIKE minus 16. 1: STRIKE minus 32.
	STEPS	6:4	Counts for Steps.
	BRST_RAMP1[11:8]	3:0	Burst-mode Ramp control (higher 4 bits). Four steps: 99[3:1], {99[0], 98[7:6]}, 98[5:3], 98[2:0].

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description	Access
9Ah	KEY_PRTEC	7:0	Default : 0x00	Access : R/W
	KEY_PRTEC	7:0	Key, code=CF.	
9Bh	FAIL_STUS	7:0	Default : -	Access : RO
	FAIL_SAFE_ON	7	Fail-Safe finds PWM is over max-on time.	
	FAULTZ_H_MD_FB2_F	6	FAULTZ High-Mode, FB2 Fail.	
	FB1_OVP	5	FB1 Over-Voltage Protection while FAULTZ is high.	
	STRK_FAIL	4	Unable to force FAULTZ=1 after 2-step Striking.	
	FAULTZ_ABNRM	3	FAULTZ accidentally goes from high to low.	
	VIN_OV	2	VIN Over-Voltage.	
	VIN_UV	1	VIN Under-Voltage.	
	STRTUP_VIN_F	0	Startup VIN Fail.	
9Ch	SAR_FB2_DAT	7:0	Default : -	Access : RO
	SAR_FB2_DAT	7:0	SAR FB2 Data.	
9Dh	SAR_FB1_DAT	7:0	Default : -	Access : RO
	SAR_FB1_DAT	7:0	SAR FB1 Data.	
9Eh	SAR_FAULTZ_DAT	7:0	Default : -	Access : RO
	SAR_FAULTZ_DAT	7:0	SAR FAULTZ Data.	
9Fh	SAR_VIN_DAT	7:0	Default : -	Access : RO
	SAR_VIN_DAT	7:0	SAR VIN Data.	
A0h	DUTY_RPRT1	7:0	Default : -	Access : RO
	DUTY_RPRT1[7:0]	7:0	PWM Duty.	
A1h	DUTY_RPRT2	7:0	Default : -	Access : RO
	DUTY_RPRT2[7:0]	7:0	PWM Duty.	
A2h	DUTY_RPRT3	7:0	Default : -	Access : RO
	-	7:4	Reserved.	
	DUTY_RPRT3[5:0]	5:0	PWM Duty.	
A4h	SAR_SET1	7:0	Default : 0x09	Access : R/W
	FS_Q2_EN	7	Enable Q2-Fail Safe.	
	FS_Q1_EN	6	Enable Q1-Fail Safe.	
	SAR_CLK_SEL	5	Select SAR Clock source. 0: PWM clock. 1: MPLL_CLK_OUT.	
	SAR_CLK_DIV_RATIO	4:0	Divide Ratio for SAR Clock.	

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
A5h	SAR_SET2	7:0	Default : 0x00 Access : R/W
	-	7:4	Reserved.
	SAR_CH_SEL	3:2	Channel Select for SAR.
	SAR_DEBUNCE_SET	1:0	De-bounce Setting for SAR.
A6h	SAR_SET3	7:0	Default : 0x0B Access : R/W
	SAR_SAMPLE_PRD	7:0	System clock counts for Sample Period.
A7h	SAR_SET4	7:0	Default : 0x30 Access : R/W
	C1_Q2	7	Setting for programmable IO.
	C1_Q1	6	Setting for programmable IO.
	C0_Q2	5	Setting for programmable IO.
	C0_Q1	4	Setting for programmable IO.
	EPD_Q2	3	Enable input PAD_Q2 pull-down (default unused).
	EPD_Q1	2	Enable input PAD_Q1 pull-down (default unused).
	EN33V_DPWM	1	Enable 3.3V supply for AVDD_SAR.
SAR_TST	0	Set SAR ADC input to zero.	
ABh	HSYNC_PLL_SET	7:0	Default : 0x93 Access : R/W
	USE_CLKDIV_EN	7	Enable Bit for using Clock Divider instead of using PLL. 0: Disable. 1: Enable.
	PLL_LOCK	6	PLL Lock.
	STRK1_SEL	5	Choose to use STRIKE1 or synchronized STRIKE1.
	CLKIN_SEL	4	Select to use MPLL_CLK_OUT/(MPLL_CLK_OUT/2).
	PLL_MODE	3:2	PLL-Mode setting.
	HSYNC_SOURCE_SEL	1	Select-bit for Selecting the Source of HSYNC.
	HSYNC_PLL_EN	0	Enable bit for HSYNC PLL.
ACh	PLL_CD	7:0	Default : 0x00 Access : R/W
	PLL_M_CD	7:4	PLL M-Code; must be >0.
	PLL_N_CD	3:0	PLL N-Code; must be >0.
ADh	PLL_STUS1	7:0	Default : - Access : RO
	PLL_STUS_RPRT	7:0	HSYNC PLL Status Report.
AEh	PLL_STUS2	7:0	Default : - Access : RO
	HSYNC_IN	7	Monitor Input HSYNC.
	PLL_STUS_RPRT	6:0	HSYNC PLL Status Report.
AFh	DIVD_RATIO	7:0	Default : 0x30 Access : R/W

DIGITAL PWM Register (Bank = 04)

Index	Name	Bits	Description
	HSYNC_DIVD_RATIO	7:0	Divide-Ratio while PLL is in divider-mode.
B0h	WDT_L	7:0	Default : 0x00 Access : R/W
	WDT[7:0]	7:0	Counts for WDT; (wanted PWM maximum on-time)/(BIU Clock) (lower 8 bits).
B1h	WDT_H	7:0	Default : 0x00 Access : R/W
	-	7:6	Reserved.
	WDT[9:8]	1:0	Counts for WDT; (wanted PWM maximum on-time) / (BIU Clock) (higher 2 bits).
B2h	PLL_SET	7:0	Default : 0x20 Access : R/W
	-	7:6	Reserved.
	HSYNC_SAFE_MD	5	HSYNC Safe-Mode.
	PLL_CLAMP_RATIO	4:0	PLL Clamp Value.
B3h ~ FFh	-	7:0	Default : - Access : -
	-	7:0	Reserved.

REGISTER TABLE REVISION HISTORY

Date	Bank	Register
11/15/05		Created first version.
03/16/06	00	0x1A
	02	0x19
	03	Removed

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