MSB1236C
Digital DVB-T/T2 Demodulator

Preliminary Data Sheet Version 0.1

REVISION HISTORY

Revision No.	Description	Date
0.1	• Initial release	11/29/2012

FEATURES

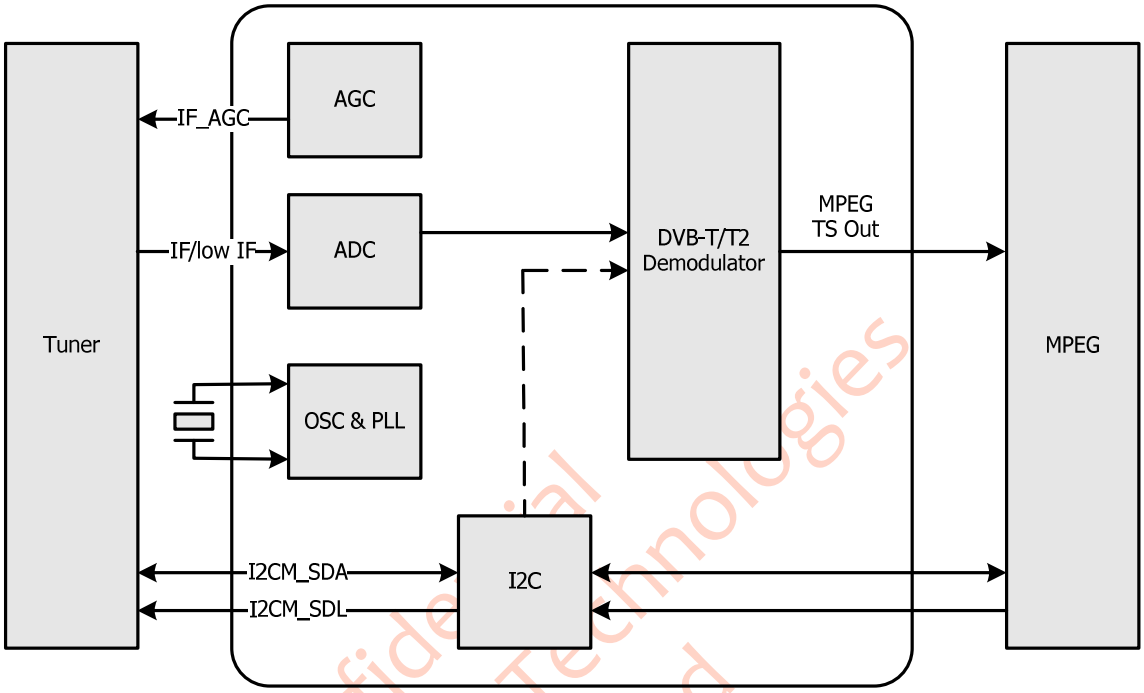
Integrated DVB-T/T2 Receiver

- Compliant with DVB-T (ETSI EN 300 744)
- Compliant with DVB-T2 (ETSI EN 302 755)
- Supports all guard intervals (1/128 to 1/4)
- Supports all FFT modes from 1K to 32K
- Supports all long and short block code rates (1/2, 3/5, 2/3, 3/4, 4/5, 5/6)
- Supports all constellations (QPSK, 16-QAM, 64-QAM, 256-QAM)
- Transmit diversity (MISO) support
- Supports all scattered pilot patterns (PP1 to PP8)
- Supports rotated and non-rotated constellations
- Supports single and multiple PLPs
- Nordig 2.3, D-Book 7.0
- Automatic co-channel and adjacent channel interference suppression
- All digital demodulation and timing recovery loops for tracking frequency and clock offset
- CCI and ACI rejection capability
- Impulse-Noise suppression
- Advanced performance for SFN networks

Miscellaneous

- Accept IF, low IF inputs in 1.7, 5, 6, 7, 8MHz channel bandwidths
- Configurable parallel/serial MPEG-2 transport stream interface
- Fast channel acquisition and auto-scan time
- Clock generation from a single crystal
- On chip MCU to reduce host control overhead
- Supports I2C interface with bypass mode
- 48 pin LQFP package

BLOCK DIAGRAM



GENERAL DESCRIPTION

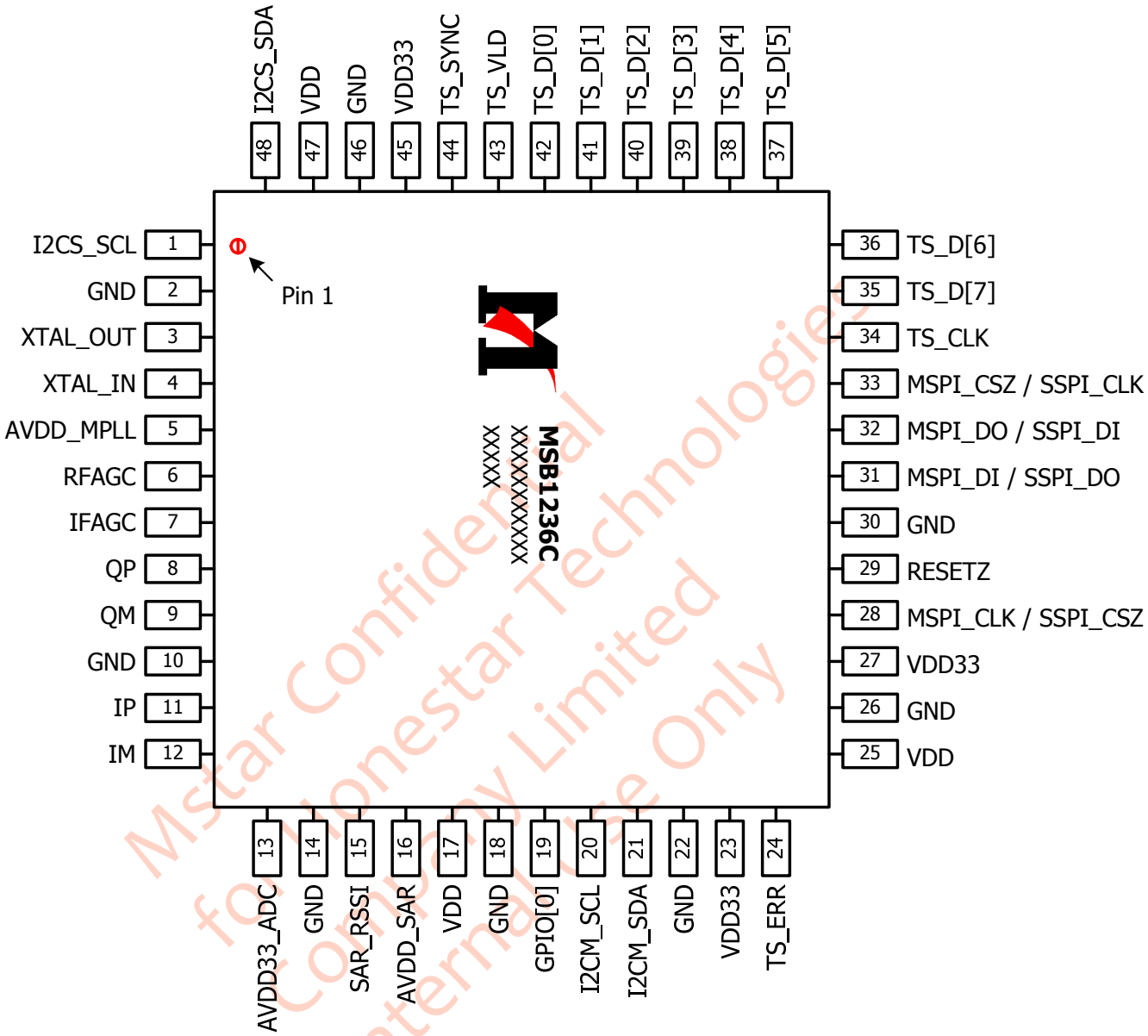
The MSB1236C is a single chip demodulator supporting DVB-T2 and DVB-T standards. The MSB1236C enables the design of ETSI EN302755 compliant receivers with performance exceeding DTG Dbook 7.0 requirements. The device integrates a house keeping microcontroller that takes care of all real time and algorithmic tasks simplifying the host control interface.

The MSB1236C front end can accept tuners that provide IF, low IF output. A high rejection channel filter has been included easing the channel filtering requirement of the tuner whilst still meeting the stringent requirements for adjacent channel interference. The MSB1236C may be clocked directly using a crystal, typically 24MHz.

The MSB1236C is capable of blind acquisition of DVB-T and T2 signals. All parameters may be detected in this mode enabling fast and accurate auto scanning. Its frequency recovery circuit is capable of compensating for all typical tuner and broadcast frequency errors.

For DVB-T, a novel impulsive interference filter has been implemented to remove impulsive interference without affecting normal operation thus reducing the effects of transient interference known to affect the quality of OFDM digital TV reception.

PIN DIAGRAM (MSB1236C)



PIN DESCRIPTION

Analog Interface

Pin Name	Pin Type	Function	Pin
SAR_RSSI	Analog Input	RSSI Input	15
QM*	Analog Input	ADC IF Q Negative Input	9
QP*	Analog Input	ADC IF Q Positive Input	8
IM	Analog Input	ADC IF I Negative Input	12
IP	Analog Input	ADC IF I Positive Input	11
XTAL_OUT	Crystal Oscillator Output	Crystal Oscillator Output	3
XTAL_IN	Crystal Oscillator Input	Crystal Oscillator Input	4

***QP/QM: MStar demodulator ZIF input interface is not supported by MSB101T, and the two pins must be connected to ground by a 0.1uF capacitor.**

I2C Interface

Pin Name	Pin Type	Function	Pin
I2CM_SCL	I/O w/5V-tolerant	I2C Master Clock	20
I2CM_SDA	I/O w/5V-tolerant	I2C Master Data	21
I2CS_SCL	Input w/ 5V-Tolerant	I2C Slave Clock	1
I2CS_SDA	I/O w/ 5V-Tolerant	I2C Slave Data	48

Transport Stream Interface

Pin Name	Pin Type	Function	Pin
TS_SYNC	Output	Transport Stream Packet Start	44
TS_VLD	Output	Transport Stream Data Valid	43
TS_D[7:0]	Output	Transport Stream Data Output	35, 36, 37, 38, 39, 40, 41, 42
TS_CLK	Output	Transport Stream Clock Out	34
TS_ERR	Output	Transport Stream Block Error	24

SPI Control Interface

Pin Name	Pin Type	Function	Pin
MSPI_CSZ/ SSPI_CLK	Output	SPI Flash Chip Select	33
	Input	SPI Clock Input	
MSPI_DO/ SSPI_DI	Input	SPI Flash Serial Data Output	32
		SPI Data Input	
MSPI_DI/ SSPI_DO	Output	SPI Flash Serial Data Input	31
		SPI Data Output	
MSPI_CLK/ SSPI_CSZ	Output	SPI Flash Serial Clock	28
	Input	SPI Chip Select Input	

Misc. Interface

Pin Name	Pin Type	Function	Pin
GPIO[0]	I/O w/ 5V-tolerant	General Purpose Input/Output	19
RESETZ	Input	Chip Reset Input; active low	29
RFAGC	I/O w/ 5V-tolerant	General Purpose Input/Output	6
IFAGC	Output	IF Auto Gain Control	7

Power Pins

Pin Name	Pin Type	Function	Pin
VDD	1.2V Power	Digital Core Power	17, 25, 47
VDD33	3.3V Power	Digital Input/Output Power	23, 27, 45
AVDD33	3.3V Power	Analog Power	5, 13, 16
GND	Ground	Ground	2, 10, 14, 18, 22, 26, 30, 46

ELECTRICAL SPECIFICATIONS

Analog Interface Characteristics

Parameter	Min	Typ	Max	Units
Demod ADC INPUT Input Signal Full Scale Range (AC-coupled Differential peak-to-peak)		1		Vdpp
SAR ADC Input	0		V_{VDD_33}	V
DIGITAL INPUTS				
Input Voltage, High (V_{IH})	2.5			V
Input Voltage, Low (V_{IL})			0.8	V
Input Current, High (I_{IH})			-1.0	uA
Input Current, Low (I_{IL})			1.0	uA
Input Capacitance		5		pF
DIGITAL OUTPUTS				
Output Voltage, High (V_{OH})	V_{VDD_33}-0.1			V
Output Voltage, Low (V_{OL})			0.1	V

Note: Specifications subject to change without notice.

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
3.3V Supply Voltages	V_{VDD_33}	3.14	3.3	3.46	V
1.2V Supply Voltages	V_{VDD_12}	1.14	1.2	1.26	V
Ambient Operating Temperature	T_A	0		70	°C
Junction Temperature	T_J			125	°C

Absolute Maximum Ratings

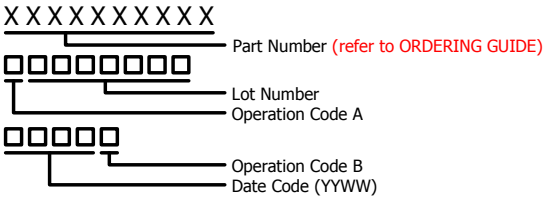
Parameter	Symbol	Min	Max	Units
3.3V Supply Voltages	V_{VDD_33}		3.6	V
1.2V Supply Voltages	V_{VDD_12}		1.32	V
Input Voltage (5V tolerant inputs)	$V_{IN5Vtol}$		5.0	V
Input Voltage (non 5V tolerant inputs)	V_{IN}		V_{VDD_33}	V
Storage Temperature	T_{STG}	-40	150	°C

Note: Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and does not imply functional operation of the device. Exposure to absolute maximum ratings for extended periods may affect device reliability.

ORDERING GUIDE

Part Number	Temperature Range	Package Description	Package Option
MSB1236C	0°C to +70°C	LQFP	48-pin

MARKING INFORMATION



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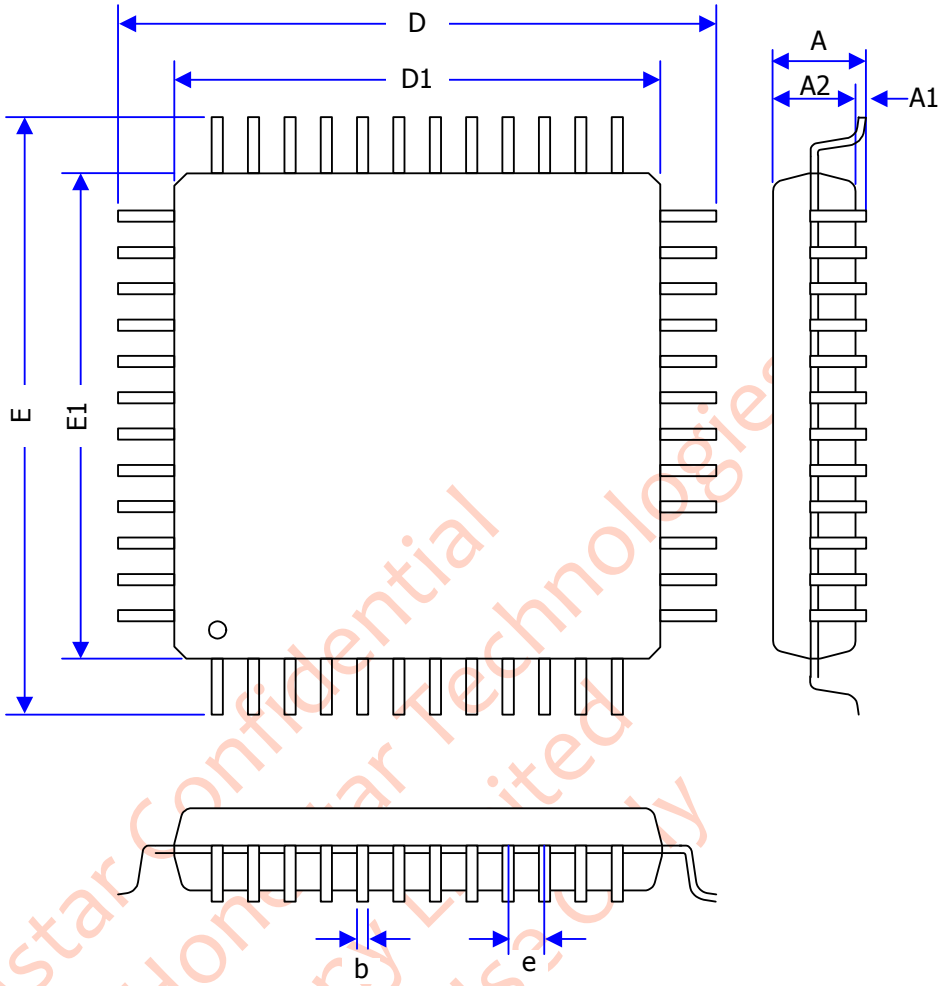
Electrostatic charges accumulate on both test equipment and human body and can discharge without detection. MSB1236C comes with ESD protection circuitry; however, the device may be permanently damaged when subjected to high energy discharges. The device should be handled with proper ESD precautions to prevent malfunction and performance degradation.

MECHANICAL DIMENSIONS



Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.6	-	-	0.063
A1	0.05	-	0.15	0.002	-	0.006
A2	1.35	1.4	1.45	0.053	0.055	0.057
D	8.8	9	9.2	0.346	0.354	0.362
D1	6.8	7	7.2	0.268	0.276	0.283
E	8.8	9	9.2	0.346	0.354	0.362
E1	6.8	7	7.2	0.268	0.276	0.283
b	0.17	0.2	0.27	0.007	0.008	0.011
e	0.42	0.5	0.58	0.017	0.020	0.023