ORDER NO. VM1104038CE
B27

Service Manual

High Definition Mobile Camera

Model No. HM-TA2P
HM-TA2PC
HM-TA2PU
HM-TA2EB
HM-TA2EC
HM-TA2EE
HM-TA2EF
HM-TA2EG
HM-TA2EP
HM-TA2GC
HM-TA2GN

Vol. 2

Colour
(K).....Black Type
(W).....White Type (except EC/EE/EF/EP/GC)
(R).....Red Type (only P/PC/EB/EG/GN)
(V).....Violet Type (only EB)

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

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1 Safety Precautions

1.1. General Guidelines

1. **IMPORTANT SAFETY NOTICE**
   There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Layout, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.
2. An Isolation Transformer should always be used during the servicing of AC Adaptor whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect AC Adaptor from being damaged by accidental shorting that may occur during servicing.
3. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

1.2. Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 MΩ and 5.2 MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinity.

1.3. Leakage Current Hot Check (See Figure 1.)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5 kΩ, 10 W resistor, in parallel with a 0.15 μF capacitor, between each exposed metallic part on the set and a good earth ground, as shown in Figure 1.
3. Use an AC voltmeter, with 1 kΩ/V or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 V RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 mA. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

Hot-Check Circuit

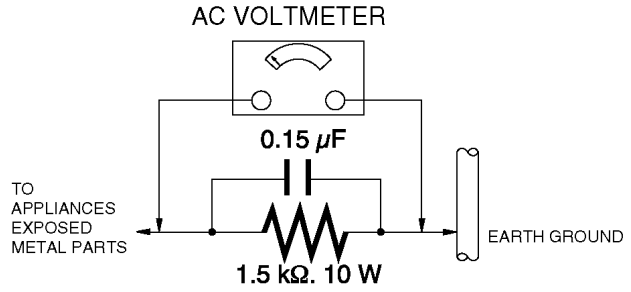


Figure. 1

2 Warning

2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by electrostatic discharge (ESD).

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an antistatic solder removal device. Some solder removal devices not classified as "antistatic (ESD protected)" can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION :
   Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).

2.2. How to Recycle the Lithium Ion Battery (U.S. Only)

ENGLISH

A lithium ion/polymer battery that is recyclable powers the product you have purchased. Please call 1-800-8-BATTERY for information on how to recycle this battery.

FRANÇAIS

L’appareil que vous vous êtes procuré est alimenté par une batterie au lithium-ion/lithium-polymère. Pour des renseignements sur le recyclage de la batterie, veuillez composer le 1-800-8-BATTERY.

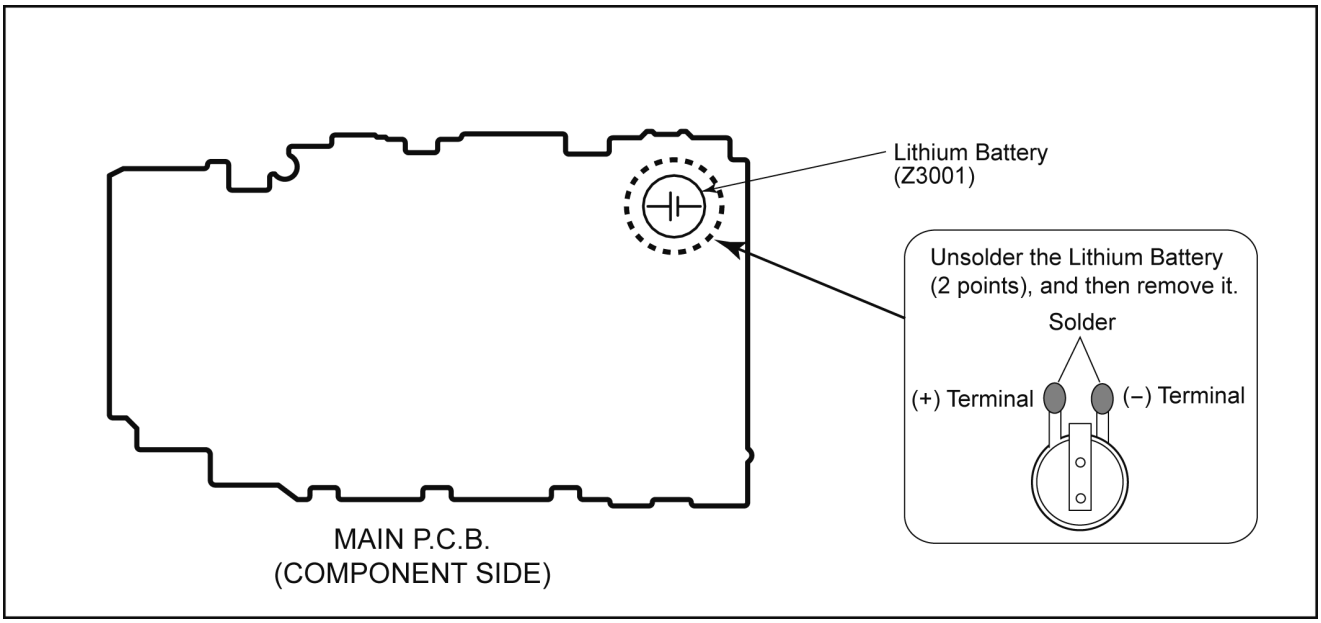
2.3. How to Replace the Lithium Battery

2.3.1. Replacement Procedure

1. Remove the MAIN P.C.B.. (Refer to Disassembly Procedures.)
2. Unsolder the each soldering point of electric lead terminal for Lithium battery (Ref. No. “Z3001” at component side of MAIN P.C.B.) and remove the Lithium battery together with electric lead terminal. Then replace it into new one.

NOTE:

The Type No. VU6450736544 includes electric lead terminals.



NOTE:

This Lithium battery is a critical component.
It must never be subjected to excessive heat or discharge.
It must therefore only be fitted in requirement designed specifically for its use.
Replacement batteries must be of same type and manufacture.
They must be fitted in the same manner and location as the original battery, with the correct polarity contacts observed.
Do not attempt to re-charge the old battery or re-use it for any other purpose.
It should be disposed of in waste products destined for burial rather than incineration.

(For English)

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer’s instructions.

(For German)

ACHTUNG

Explosionsgefahr bei falschem Anbringen der Batterie. Ersetzen Sie nur mit einem äquivalentem vom Hersteller empfohlenem Typ.
Behandeln Sie gebrauchte Batterien nach den Anweisungen des Herstellers.

(For French)

MISE EN GARDE

Une batterie de remplacement inappropriée peut exploser. Ne remplacez qu’avec une batterie identique ou d’un type recommandé par le fabricant. L’élimination des batteries usées doit être faite conformément aux instructions du manufacturier.

NOTE:

Above caution is applicable for a battery pack which is for HM-TA2 series, as well.

3 Service Navigation

3.1. Introduction

This service manual contains technical information, which allow service personnel's to understand and service this model.
Please place orders using the parts list and not the drawing reference numbers.
If the circuit is changed or modified, the information will be followed by service manual to be controlled with original service manual.

3.2. General Description About Lead Free Solder (PbF)

The lead free solder has been used in the mounting process of all electrical components on the printed circuit boards used for this equipment in considering the globally environmental conservation.
The normal solder is the alloy of tin (Sn) and lead (Pb). On the other hand, the lead free solder is the alloy mainly consists of tin (Sn), silver (Ag) and Copper (Cu), and the melting point of the lead free solder is higher approx.30°C (86°F) more than that of the normal solder.

Distinction of P.C.B. Lead Free Solder being used

The letter of "PbF" is printed either foil side or components side on the P.C.B. using the lead free solder.(See right figure)	PbF

Service caution for repair work using Lead Free Solder (PbF)

- The lead free solder has to be used when repairing the equipment for which the lead free solder is used.
  (Definition: The letter of "PbF" is printed on the P.C.B. using the lead free solder.)
- To put lead free solder, it should be well molten and mixed with the original lead free solder.
- Remove the remaining lead free solder on the P.C.B. cleanly for soldering of the new IC.
- Since the melting point of the lead free solder is higher than that of the normal lead solder, it takes the longer time to melt the lead free solder.
- Use the soldering iron (more than 70W) equipped with the temperature control after setting the temperature at 350±30°C (662±86°F).

Recommended Lead Free Solder (Service Parts Route.)

- The following 3 types of lead free solder are available through the service parts route.
  RFKZ03D01KS----------(0.3mm 100g Reel)
  RFKZ06D01KS----------(0.6mm 100g Reel)
  RFKZ10D01KS----------(1.0mm 100g Reel)

Note

* Ingredient: tin (Sn) 96.5%, silver (Ag) 3.0%, Copper (Cu) 0.5%, Cobalt (Co) / Germanium (Ge) 0.1 to 0.3%

3.3. How to Define the Model Suffix (NTSC or PAL model)

There are four kinds of HM-TA2.

- a) HM-TA2P/PC
- b) HM-TA2EB/EC/EF/EG/EP/GN
- c) HM-TA2EE
- d) HM-TA2GC/PU

What is the difference is that the “INITIAL SETTING” data which is stored in Flash ROM mounted on Main P.C.B..

3.3.1. Defining methods:

To define the model suffix to be serviced, refer to the rating label and caution label which are putted on the Unit.

a) HM-TA2P/PC

The nameplate for these models show the following Safety registration mark.

b) HM-TA2EB/EC/EF/EG/EP/GN

The nameplate for these models show the following Safety registration mark.

c) HM-TA2EE

The nameplate for this model shows the following Safety registration mark.

d) HM-TA2GC/PU

The nameplate for these models do not show any above Safety registration mark.

NOTE:

After replacing the MAIN P.C.B. or IC121, be sure to achieve update the Firmware and adjustment.

1. The firmware together with version up procedure are available at “software download” on the “Support Information from NWBG/VDBG-AVC” web-site in “TSN system”.
2. The adjustment instruction is available at “software download” on the “Support Information from NWBG/VDBG-AVC” web-site in “TSN system”, together with Maintenance software.

3.4. Formatting

[FORMAT MEDIA]

Please be aware that if a medium is formatted, then all the data recorded on the medium will be erased and cannot be restored. Back up important data on a PC etc.

[MENU] → → **[FORMAT MEDIA]**

- When the confirmation message appears, select [YES].

- Do not turn this unit off or remove the SD card, while formatting. Do not expose the unit to vibrations or shock.
- When formatting the built-in memory, start the formatting after removing the SD card.

Use this unit to format media.
Do not format an SD card using any other equipment such as a PC. The card may not be used on this unit.

4 Specifications

High Definition Mobile Camera
Information for your safety

Power source:
DC 5.0 V (When using USB)/DC 3.7 V (When using battery)
Power consumption:
Recording; 2.6 W/Charging; 2.5 W

Signal system:
1080/30p, 720/30p, 540/30p, 480/30p

Recording format:
MPEG-4 AVC file format compliant (.MP4)

Image sensor:
1/4″ MOS image sensor
Total; 5330 K
Effective pixels;
Motion picture; 2930 K (16:9), 2190 K (4:3)
Still picture; 2930 K (16:9), 5080 K (4:3)

Lens:
F2.8
Focal length; 4.1 mm
35 mm equivalent;
Motion picture; 49 mm (16:9)/59 mm (4:3)
Still picture; 49 mm (16:9)/39 mm (4:3)
Minimum focus distance;
Motion pictures; Approx. 30 cm (11.8″)
Still pictures; Approx. 10 cm (3.9″)

Zoom:
1× Optical Zoom, 4× Digital Zoom

Monitor:
3.0″ LCD monitor (Approx. 230 K dots)

Microphone:
Stereo

Speaker:
1 round speaker, dynamic type

White balance adjustment:
Auto tracking white balance system

Standard illumination:
1,400 lx

Minimum required illumination:
Approx. 9 lx (1/30)

HDMI mini connector video output level:
HDMI™ 1080i/576p/480p

HDMI mini connector audio output level:
Linear PCM

Headphone output:
10 mW+10 mW, 16 Ω (Stereo mini jack)

USB:
(EB/EC/EF/EG/EP areas)
Card reader function (No copyright protection support)
(Other areas)
Card reader/writer function (No copyright protection support)
Hi-Speed USB (USB 2.0), USB terminal Type A
Battery charging function (charge via USB terminal with the unit turned off)
WEB camera;
Compression; Motion JPEG
Picture size; 640×480, 320×240, 160×120

Dimensions:
59.8 mm (W)×108.9 mm (H)×16.9 mm (D)
[2.35″ (W)×4.29″ (H)×0.67″ (D)] (excluding projecting parts)

Mass (Weight) in operation:
Approx. 144 g (Approx. 0.317 lbs.)
[with an SD card (optional)]

Mass (Weight):
Approx. 142 g (Approx. 0.313 lbs.)
[without an SD card (optional)]

Operating temperature:
0 °C to 35 °C (32 °F to 95 °F)

Operating humidity:
10%RH to 80%RH

Battery operation time:
See “Charging and motion pictures recording time”

■ Motion pictures

Recording media:
SD Memory Card (FAT12 and FAT16 system compliant)
SDHC Memory Card (FAT32 system compliant)
SDXC Memory Card (exFAT system compliant)
Refer to “Cards that you can use with this unit” for details on SD cards usable in this unit.
Built-in memory; Approx. 10 MB

Compression:
MPEG-4 AVC/H.264, iFrame

Recording mode and transfer rate:
1080p; Approx. 12 Mbps (VBR)
720p; Approx. 9 Mbps (VBR)
480p; Approx. 3 Mbps (VBR)
iFrame; Approx. 24 Mbps (VBR)
Refer to “Recording modes/approximate recordable time (motion pictures)” for the recordable time.

Picture size:
1080p; 1920×1080/30p
720p; 1280×720/30p
480p; 640×480/30p
iFrame; 960×540/30p

Audio compression:
AAC (2 ch)

■ Still pictures

Recording media:
SD Memory Card (FAT12 and FAT16 system compliant)
SDHC Memory Card (FAT32 system compliant)
SDXC Memory Card (exFAT system compliant)
Refer to “Cards that you can use with this unit” for details on SD cards usable in this unit.
Built-in memory; Approx. 10 MB

Compression:
JPEG (Design rule for Camera File system, based on Exif 2.2 standard)

Picture size:
Picture aspect [4:3];
3264×2448/1600×1200/640×480
Picture aspect [16:9];
1920×1080
Refer to “Approximate number of recordable pictures” for the number of recordable pictures.

■ Voices

Recording media:
SD Memory Card (FAT12 and FAT16 system compliant)
SDHC Memory Card (FAT32 system compliant)
SDXC Memory Card (exFAT system compliant)
Refer to “Cards that you can use with this unit” for details on SD cards usable in this unit.
Built-in memory; Approx. 10 MB

Compression:
AAC

Specifications may change without prior notice.

Charging and motion pictures recording time

■ Charging/Recording time

- Temperature: 25 °C (77 °F)/humidity: 60%RH

Charging time	Recording mode	Maximum continuous recordable time*	Actual recordable time
4 h 20 min	1080p	1 h 25 min	50 min
	720p / iFrame	1 h 30 min	55 min
	480p	1 h 45 min	1 h

* Maximum continuous recordable time for one scene:
– If [Video Rec Mode] is set to 1080p / 720p / 480p :
29 min 59 sec
– If [Video Rec Mode] is set to iFrame :
Approx. 20 min (up to 4 GB recording capacity)

- These times are approximations.
- **The indicated charging time is for when the battery has been discharged completely. Charging time and recordable time vary depending on the usage conditions such as high/low temperature.**

Cards that you can use with this unit

This unit (an SDXC compatible device) is compatible with SD Memory Cards, SDHC Memory Cards and SDXC Memory Cards. When using an SDHC memory card/SDXC memory card with other equipment, check the equipment is compatible with these memory cards.

Use SD cards conforming to Class 4 or higher of the SD Speed Class Rating* for motion picture recording.

Card type	Capacity	Motion picture/ Voice recording	Still picture recording
SD Memory Card	8 MB/ 16 MB/32 MB/64 MB/ 128 MB/256 MB	Cannot be guaranteed in operation.	Cannot be guaranteed in operation.
	512 MB/1 GB/2 GB	Can be used.	Can be used.
SDHC Memory Card	4 GB/6 GB/8 GB/ 12 GB/16 GB/24 GB/ 32 GB		
SDXC Memory Card	48 GB/64 GB		

* SD Speed Class Rating is the speed standard regarding continuous writing. Check via the label on the card, etc.

e.g.:

Recording modes/approximate recordable time (motion pictures)

- SD cards are only mentioned with their main memory size. The stated times are the approximate recordable times for continuous recording.

Recording mode		1080p	720p	480p	iFrame
		Ⓐ ← → Ⓑ			Ⓒ
Picture size		1920×1080	1280×720	640×480	960×540
SD card	4 GB	40 min	50 min	2 h 20 min	20 min
	16 GB	2 h 40 min	3 h 30 min	9 h 50 min	1 h 20 min
	64 GB	10 h	13 h 30 min	32 h	5 h 20 min
Built-in memory Approx. 10 MB		3 s	4 s	13 s	2 s

Ⓐ Favors image quality
Ⓑ Favors recording time
Ⓒ Use this to play back and edit using a Mac.

- The default setting is 720p .
- Maximum continuous recordable time for one scene:
– If [Video Rec Mode] is set to 1080p / 720p / 480p :
29 min 59 sec
– If [Video Rec Mode] is set to iFrame :
Approx. 20 min (up to 4 GB recording capacity)
- If a recording with a lot of action is recorded, the recording time is reduced.
- The recordable time may be reduced if recording of short scene is repeated.

Approximate number of recordable pictures

- SD cards are only mentioned with their main memory size. The stated number is the approximate number of recordable pictures.

Aspect ratio		4:3			16:9
Picture size		8M 3264×2448	2M 1600×1200	0.3M 640×480	2M 1920×1080
SD card	4 GB	1400	5400	23900	5200
	16 GB	5800	22100	97600	21200
	64 GB	23500	82300	247100	82300
Built-in memory Approx. 10 MB		4	16	71	15

Recording modes/approximate recordable time (voices)

- SD cards are only mentioned with their main memory size. The stated times are the approximate recordable times for continuous recording.

Recording mode		PCM	AAC 256	AAC 128 / AAC 128Low
File format		L-PCM	256 kbps AAC	128 kbps AAC/ 128 kbps AAC LowGain
SD card	4 GB	5 h 30 min	32 h	62 h 20 min
	16 GB	22 h	131 h 10 min	254 h 50 min
	64 GB	91 h	532 h	1033 h
Built-in memory Approx. 10 MB		30 s	3 min	7 min

- The default setting is PCM .
- Maximum continuous recordable time for one voice:
Approx. 5 h (up to 4 GB recording capacity)
- The recordable time may be reduced if short recording is repeated.

5 Service Fixture & Tools

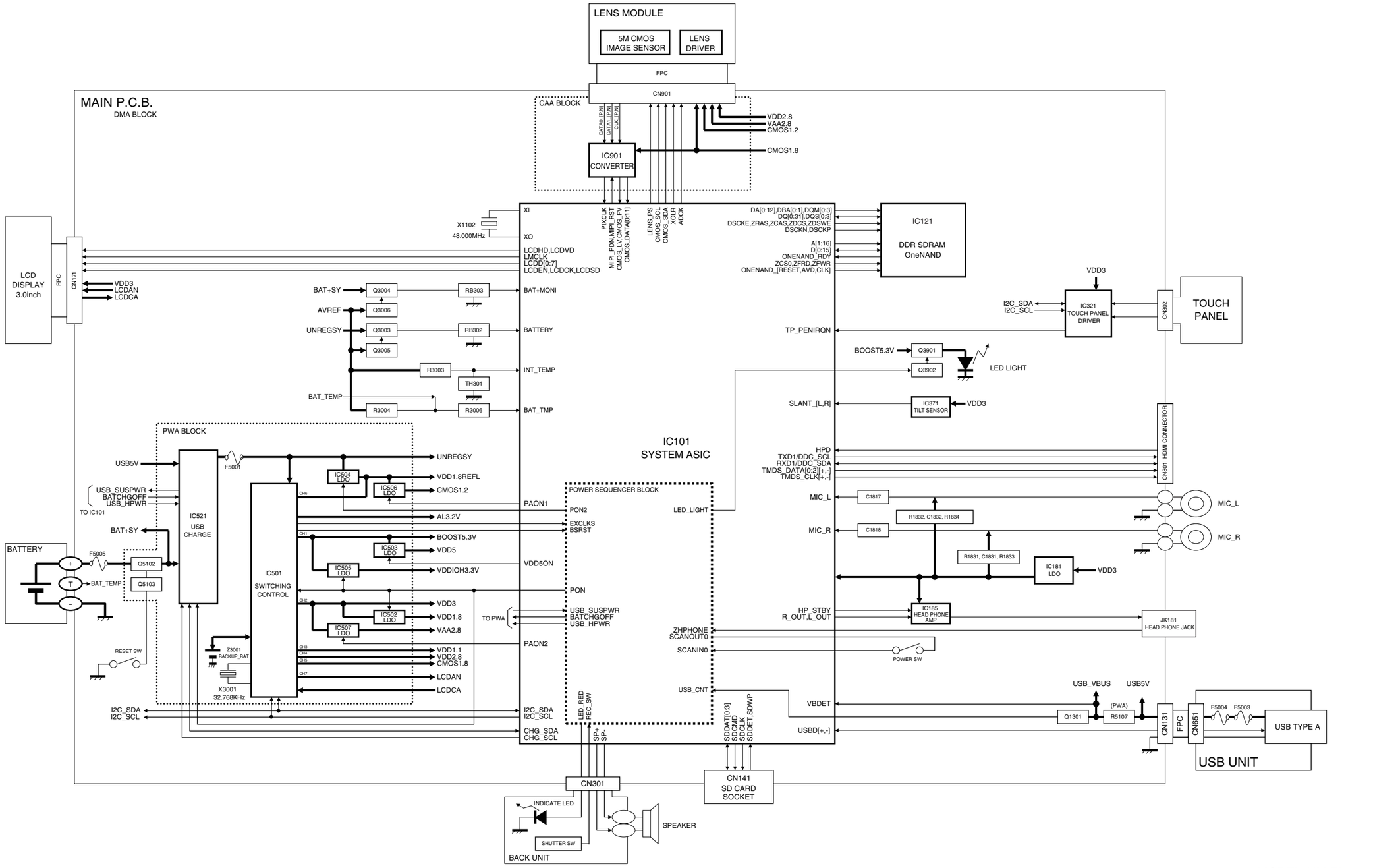
5.1. When Replacing the Main P.C.B.

After replacing the MAIN P.C.B. or IC121, be sure to achieve update the Firmware and adjustment.

1. The firmware together with version up procedure are available at "software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN system".
2. The adjustment instruction is available at "software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN system", together with Maintenance software.

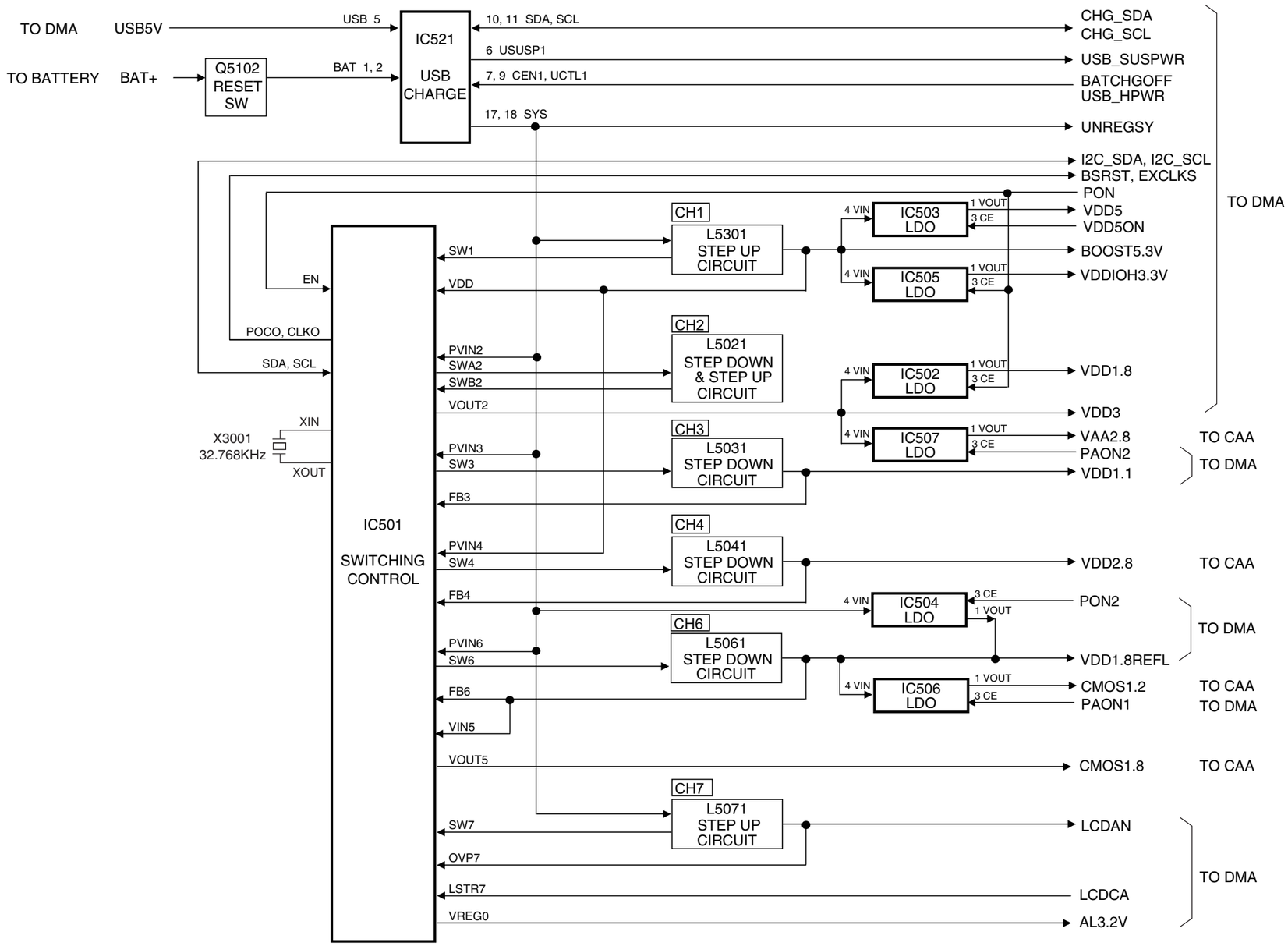
6 Block Diagram

6.1. Main Block Diagram



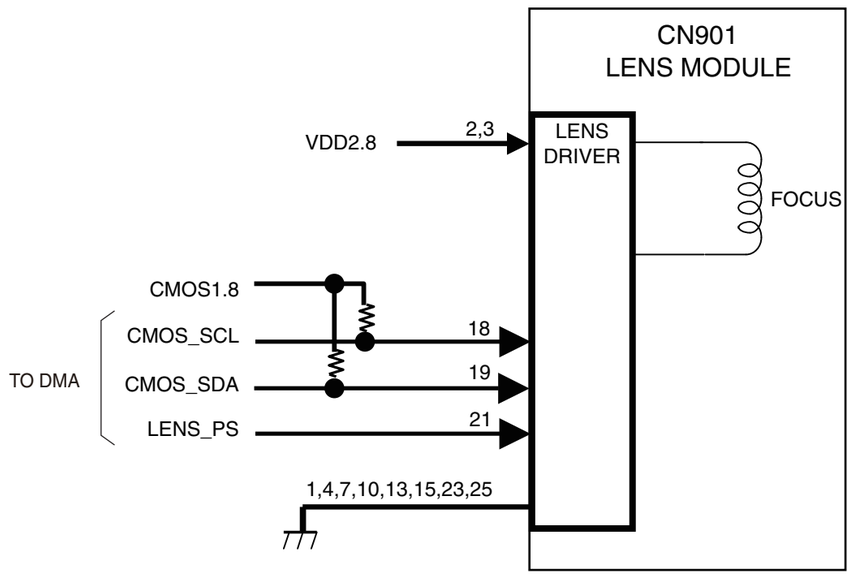
MODEL: HM-TA2
BLOCK DIAGRAM: MAIN

6.2. Power Block Diagram



MODEL: HM-TA2
BLOCK DIAGRAM: POWER

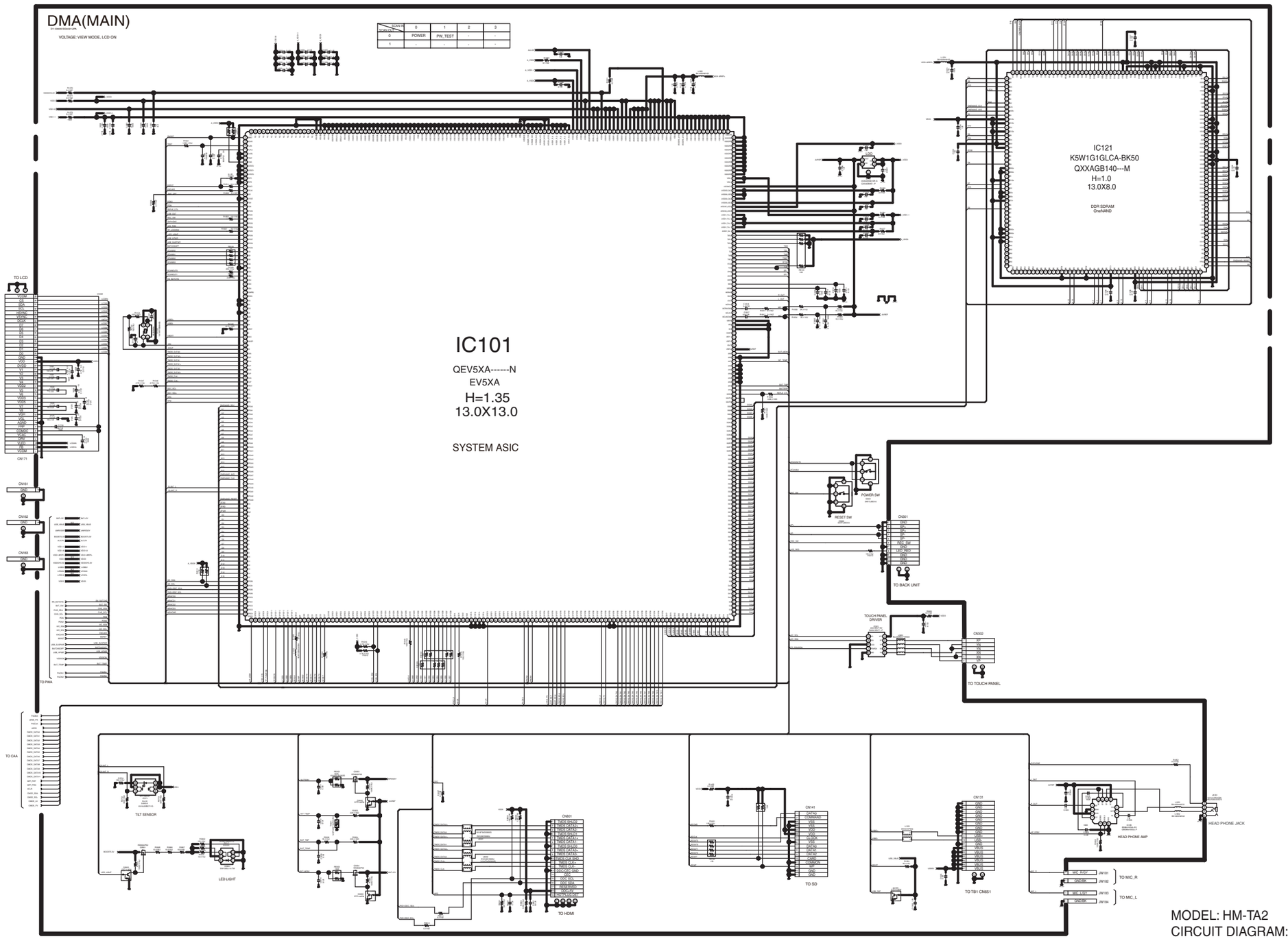
6.3. Lens Block Diagram



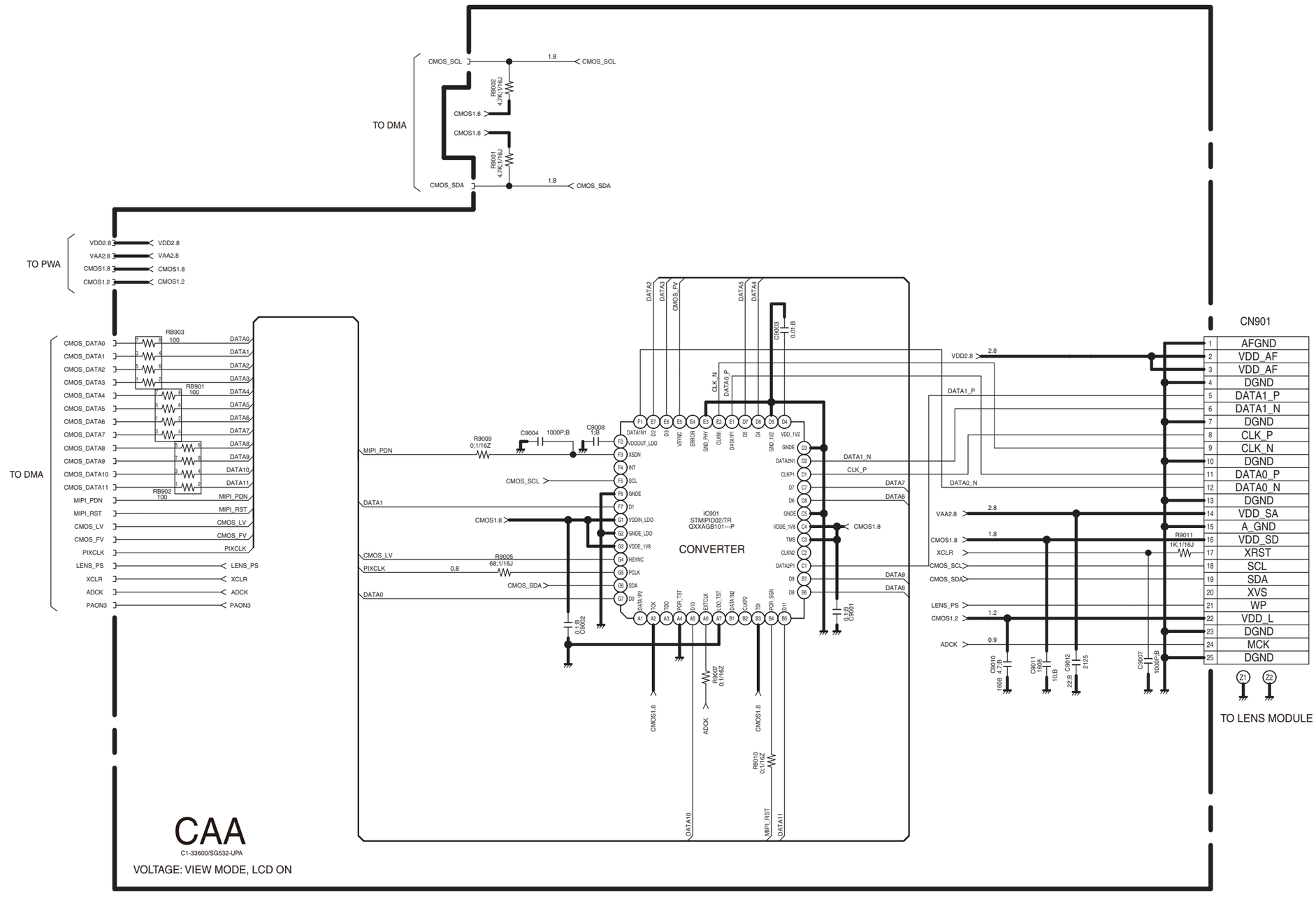
MODEL: HM-TA2
BLOCK DIAGRAM: LENS

7 Schematic Diagram

7.1. Main(DMA) Schematic Diagram



7.2. Main(CAA) Schematic Diagram



CAA

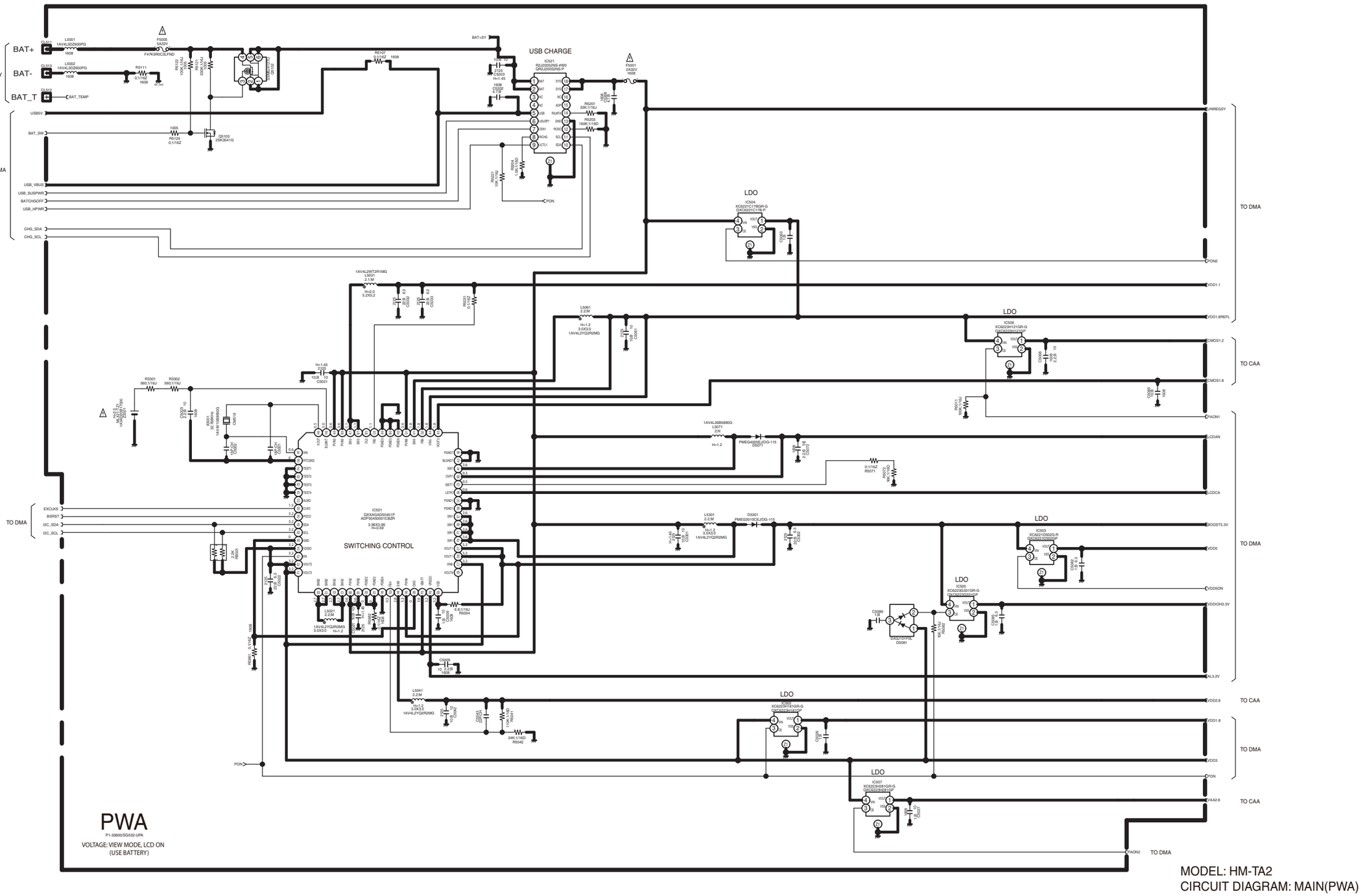
C1-33600/SG532-UPA

VOLTAGE: VIEW MODE, LCD ON

MODEL: HM-TA2

CIRCUIT DIAGRAM: MAIN(CAA)

7.3. Main(PWA) Schematic Diagram

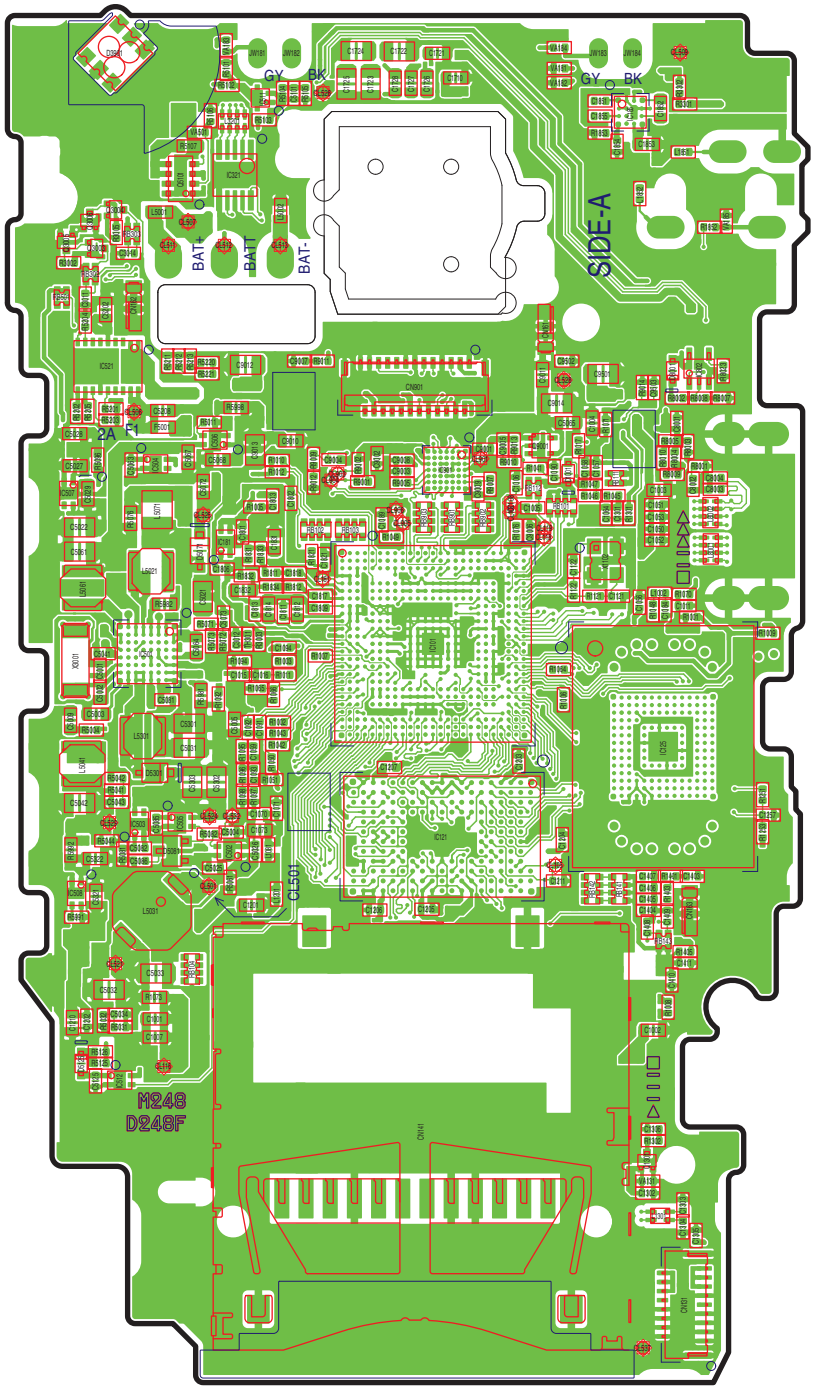


MODEL: HM-TA2
CIRCUIT DIAGRAM: MAIN(PWA)

8 Printed Circuit Board

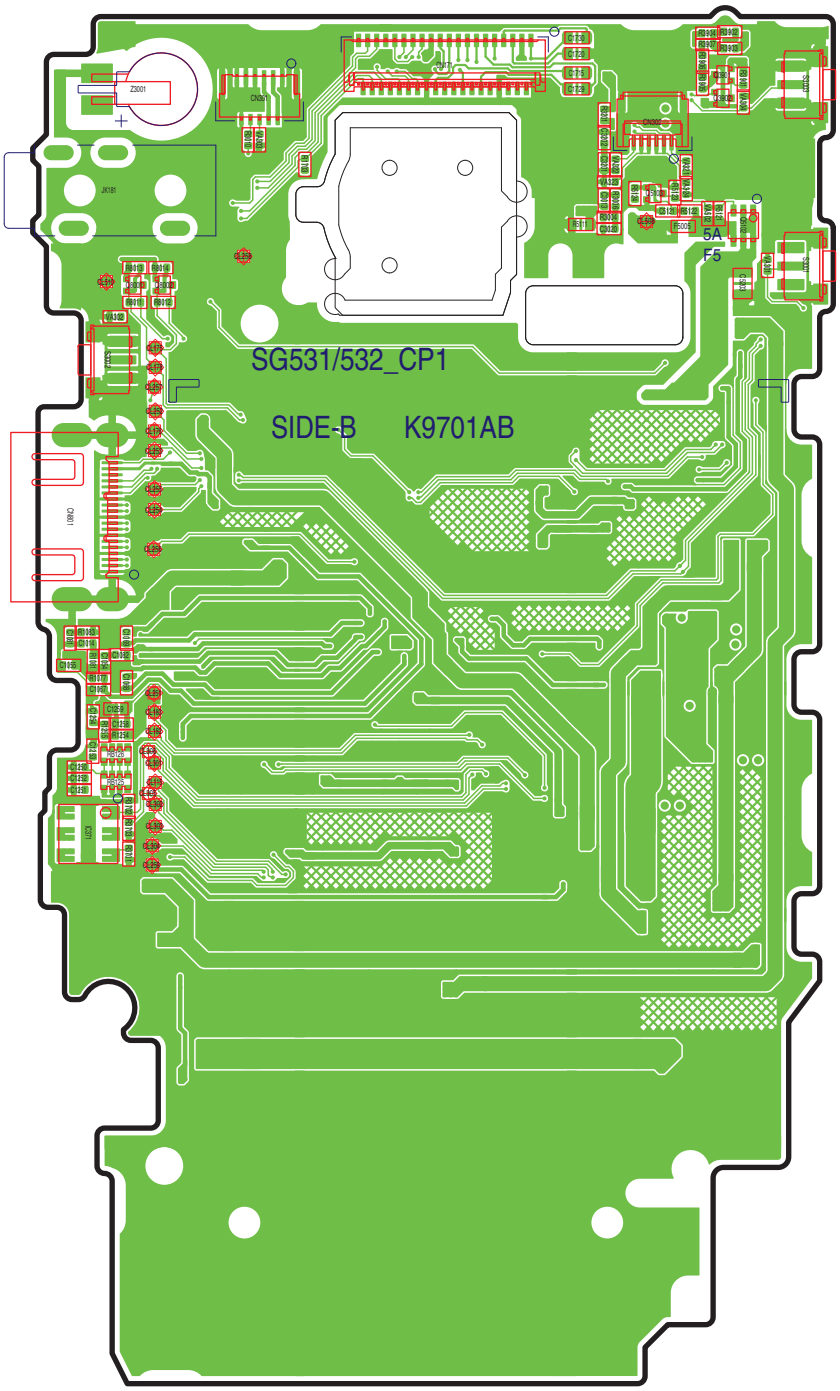
8.1. Main P.C.B.

SIDE-A



MODEL: HM-TA2
CIRCUIT BOARD: MAIN

SIDE-B



MODEL: HM-TA2
CIRCUIT BOARD: MAIN

9 Exploded View and Replacement Parts List

9.1. Replacement Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
		VU6361540452	MAIN P.C.B.	1	E.S.D.
	C1001	VU3033846419	C.CAPACITOR	1	
	C1002	VU3033846419	C.CAPACITOR	1	
	C1003	VU3033846419	C.CAPACITOR	1	
	C1004	VU3033846419	C.CAPACITOR	1	
	C1005	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1006	VU3032761317	C.CAPACITOR	1	
	C1011	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1014	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1015	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1016	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1050	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1051	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1052	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1053	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1054	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1055	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1056	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1057	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1058	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1059	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1067	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1068	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1069	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1070	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1071	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1073	VU3033846419	C.CAPACITOR	1	
	C1121	VU3033145314	C.CAPACITOR	1	
	C1122	VU3032762918	C.CAPACITOR	1	
	C1201	VU3033846419	C.CAPACITOR	1	
	C1202	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1203	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1204	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1205	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1206	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1207	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1302	VU3034331112	C.CAPACITOR	1	
	C1305	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1410	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1710	VU3033846419	C.CAPACITOR	1	
	C1715	VU3033846419	C.CAPACITOR	1	
	C1720	VU4034615417	C.CAPACITOR	1	
	C1721	VU4034615417	C.CAPACITOR	1	
	C1722	VU4034709413	C.CAPACITOR	1	
	C1723	VU4034709413	C.CAPACITOR	1	
	C1724	VU4034709314	C.CAPACITOR	1	
	C1725	VU4034709314	C.CAPACITOR	1	

Safety	Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
	C1726	VU3033827814	C.CAPACITOR	1	
	C1727	VU3033827814	C.CAPACITOR	1	
	C1728	VU3034085500	C.CAPACITOR 2.2U 16V	1	
	C1729	VU3034085500	C.CAPACITOR 2.2U 16V	1	
	C1730	VU4034615417	C.CAPACITOR	1	
	C1801	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1802	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1803	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1806	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1809	VU3032812306	C.CAPACITOR	1	
	C1811	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1812	VU3033846419	C.CAPACITOR	1	
	C1813	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C1814	VU3033846419	C.CAPACITOR	1	
	C1817	VU3033469816	C.CAPACITOR	1	
	C1818	VU3033469816	C.CAPACITOR	1	
	C1821	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1831	VU3033846419	C.CAPACITOR	1	
	C1832	VU3033846419	C.CAPACITOR	1	
	C1851	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1852	VU3033846310	C.CAPACITOR	1	
	C1853	VU3033846310	C.CAPACITOR	1	
	C1854	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C1855	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C3011	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C3012	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C3013	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C3014	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C3201	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C5001	VU3032762819	C.CAPACITOR	1	
	C5002	VU3033058515	C.CAPACITOR	1	
	C5003	VU3033827814	C.CAPACITOR	1	
	C5005	VU3033827814	C.CAPACITOR	1	
	C5009	VU3033785302	C.CAPACITOR	1	
	C5021	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5022	VU3033932617	C.CAPACITOR	1	
	C5026	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C5027	VU3033785302	C.CAPACITOR	1	
	C5031	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5032	VU3033932617	C.CAPACITOR	1	
	C5033	VU3033932617	C.CAPACITOR	1	
	C5042	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5043	VU3032761911	C.CAPACITOR	1	
	C5061	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5063	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C5065	VU4034737614	C.CAPACITOR 10U 6.3V	1	
	C5068	VU3033827814	C.CAPACITOR	1	
	C5072	VU3034085500	C.CAPACITOR 2.2U 16V	1	
	C5082	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C5085	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C5086	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C5202	VU3033846419	C.CAPACITOR	1	
	C5203	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5208	VU3033846419	C.CAPACITOR	1	
	C5301	VU3034207209	C.CAPACITOR 10U 10V	1	
	C5302	VU3033932617	C.CAPACITOR	1	
	C8001	VU3032761010	C.CAPACITOR	1	
	C8002	VU3033380309	C.CAPACITOR 0.1U 10V	1	

Safety	Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
	C9001	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C9002	VU3033380309	C.CAPACITOR 0.1U 10V	1	
	C9003	VU3032761010	C.CAPACITOR	1	
	C9004	VU3032761317	C.CAPACITOR	1	
	C9007	VU3032761317	C.CAPACITOR	1	
	C9008	VU3033818109	C.CAPACITOR 1U 6.3V	1	
	C9010	VU3033846419	C.CAPACITOR	1	
	C9011	VU4034737614	C.CAPACITOR 10U 6.3V	1	
	C9012	VU3033932617	C.CAPACITOR	1	
	CN131	VU6450976155	CONNECTOR	1	
	CN141	VU6451044228	CONNECTOR	1	
	CN161	VU6450625671	TERMINAL,EARTH	1	
	CN162	VU6450625671	TERMINAL,EARTH	1	
	CN163	VU6450625671	TERMINAL,EARTH	1	
	CN171	VU6450911590	CONNECTOR	1	
	CN301	VU6450955983	CONNECTOR 11P	1	
	CN302	VU6451034281	CONNECTOR	1	
	CN801	VU6451043245	CONNECTOR	1	
	CN901	VU6451032812	CONNECTOR 25P	1	
	D3901	VU4072697512	LED	1	E.S.D.
	D5071	VU4080692308	DIODE	1	E.S.D.
	D5081	VU4072725205	DIODE	1	E.S.D.
	D5301	VU4080692100	DIODE	1	E.S.D.
⚠	F5001	VU3230311700	FUSE	1	
⚠	F5005	VU3230316507	FUSE	1	
	IC101	VU4097090302	IC	1	E.S.D.
	IC121	VU4097145408	IC	1	E.S.D.
	IC181	VU4107101707	IC	1	E.S.D.
	IC185	VU4097114206	IC	1	E.S.D.
	IC321	VU4097115807	IC	1	E.S.D.
	IC371	VU6451041937	IC	1	E.S.D.
	IC501	VU4106989801	IC	1	E.S.D.
	IC502	VU4097095208	IC	1	E.S.D.
	IC503	VU4097025908	IC	1	E.S.D.
	IC504	VU4097027100	IC	1	E.S.D.
	IC505	VU4097101206	IC	1	E.S.D.
	IC506	VU4097095000	IC	1	E.S.D.
	IC507	VU4097102302	IC	1	E.S.D.
	IC521	VU4097065706	IC	1	E.S.D.
	IC901	VU4107113106	IC	1	E.S.D.
	JK181	VU6450331428	JK, HP	1	
	L1002	VU6450940521	INDUCTOR	1	
	L1081	VU9450535414	INDUCTOR	1	
	L1201	VU9450535414	INDUCTOR	1	
	L1301	VU6450956522	FILTER	1	
	L1851	VU9450535414	INDUCTOR	1	
	L1852	VU9450535414	INDUCTOR	1	
	L3201	VU6450720567	COIL	1	
	L5001	VU9450664718	COIL	1	
	L5002	VU9450664718	COIL	1	
	L5021	VU6451023452	COIL	1	
	L5031	VU6450984938	INDUCTOR 2.1U	1	
	L5041	VU6451023452	COIL	1	
	L5061	VU6451023452	COIL	1	
	L5071	VU6450958885	COIL	1	
	L5301	VU6451023452	COIL	1	
	L8001	VU6451037497	COIL	1	
	L8002	VU6451037497	COIL	1	
	Q1301	VU3051683703	TRANSISTOR	1	E.S.D.
	Q3003	VU4052238414	TRANSISTOR	1	E.S.D.
	Q3004	VU4052238414	TRANSISTOR	1	E.S.D.
	Q3005	VU3051683703	TRANSISTOR	1	E.S.D.
	Q3006	VU3051683703	TRANSISTOR	1	E.S.D.
	Q3901	VU4052238414	TRANSISTOR	1	E.S.D.
	Q3902	VU3051694511	TRANSISTOR	1	E.S.D.
	Q5102	VU4052248502	TRANSISTOR	1	E.S.D.
	Q5103	VU4052237219	TRANSISTOR	1	E.S.D.
	R1001	VU3012261516	M.RESISTOR	1	
	R1002	VU3012249316	M.RESISTOR	1	
	R1003	VU3012261516	M.RESISTOR	1	
	R1005	VU3012261516	M.RESISTOR	1	

Safety	Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
	R1007	VU3012249316	M.RESISTOR	1	
	R1010	VU3012251210	M.RESISTOR	1	
	R1011	VU3012249316	M.RESISTOR	1	
	R1012	VU3012251210	M.RESISTOR	1	
	R1041	VU3012248913	M.RESISTOR	1	
	R1042	VU3012257915	M.RESISTOR	1	
	R1043	VU3012257915	M.RESISTOR	1	
	R1045	VU4013522108	M.RESISTOR	1	
	R1046	VU3012249613	M.RESISTOR	1	
	R1047	VU3012249613	M.RESISTOR	1	
	R1048	VU3012251814	M.RESISTOR	1	
	R1049	VU3012293913	M.RESISTOR	1	
	R1050	VU3012580419	M.RESISTOR	1	
	R1051	VU3012587012	M.RESISTOR	1	
	R1064	VU3012249316	M.RESISTOR	1	
	R1066	VU3012261516	M.RESISTOR	1	
	R1070	VU3012261516	M.RESISTOR	1	
	R1071	VU3012261516	M.RESISTOR	1	
	R1073	VU3011057912	M.RESISTOR	1	
	R1076	VU3012248814	M.RESISTOR	1	
	R1077	VU3012261516	M.RESISTOR	1	
	R1081	VU3012261516	M.RESISTOR	1	
	R1083	VU3012261516	M.RESISTOR	1	
	R1121	VU3012670912	M.RESISTOR	1	
	R1122	VU3012249415	M.RESISTOR	1	
	R1301	VU3012249316	M.RESISTOR	1	
	R1401	VU3012248814	M.RESISTOR	1	
	R1405	VU3012261516	M.RESISTOR	1	
	R1811	VU3012261516	M.RESISTOR	1	
	R1812	VU3012261516	M.RESISTOR	1	
	R1831	VU3012249316	M.RESISTOR	1	
	R1832	VU3012249316	M.RESISTOR	1	
	R1833	VU3012636928	M.RESISTOR	1	
	R1834	VU3012636928	M.RESISTOR	1	
	R1852	VU3012249316	M.RESISTOR	1	
	R1853	VU3012248913	M.RESISTOR	1	
	R3002	VU3012248913	M.RESISTOR	1	
	R3003	VU3012620610	M.RESISTOR	1	
	R3004	VU3012620610	M.RESISTOR	1	
	R3005	VU3012248913	M.RESISTOR	1	
	R3006	VU3012249316	M.RESISTOR	1	
	R3010	VU3012249316	M.RESISTOR	1	
	R3201	VU3012261516	M.RESISTOR	1	
	R3301	VU3012262414	M.RESISTOR	1	
	R3302	VU3012262414	M.RESISTOR	1	
	R3701	VU3012262414	M.RESISTOR	1	
	R3702	VU3012352214	M.RESISTOR	1	
	R3703	VU3012352214	M.RESISTOR	1	
	R3901	VU3012248913	M.RESISTOR	1	
	R3902	VU3012258110	M.RESISTOR	1	
	R3903	VU3012258110	M.RESISTOR	1	
	R3904	VU3012258110	M.RESISTOR	1	
	R3905	VU3012409413	M.RESISTOR	1	
	R3906	VU3012258110	M.RESISTOR	1	
	R3907	VU3012258110	M.RESISTOR	1	
	R5004	VU3012409215	M.RESISTOR	1	
	R5011	VU3012248913	M.RESISTOR	1	
	R5031	VU3012261516	M.RESISTOR	1	
	R5041	VU3012886115	M.RESISTOR	1	
	R5042	VU3012749717	M.RESISTOR	1	
	R5071	VU3012261516	M.RESISTOR	1	
	R5072	VU3012845815	M.RESISTOR	1	
	R5082	VU3012249217	M.RESISTOR	1	
	R5107	VU3011057912	M.RESISTOR	1	
	R5111	VU3011057912	M.RESISTOR	1	
	R5121	VU3012250411	M.RESISTOR	1	
	R5122	VU3012248913	M.RESISTOR	1	
	R5124	VU3012261516	M.RESISTOR	1	
	R5201	VU3012250510	M.RESISTOR	1	
	R5203	VU3012783315	M.RESISTOR	1	
	R5204	VU3012625219	M.RESISTOR	1	
	R5221	VU3012249019	M.RESISTOR	1	
	R5981	VU3011057912	M.RESISTOR	1	

Safety	Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
	R5982	VU3011057912	M.RESISTOR	1	
	R8001	VU3012249019	M.RESISTOR	1	
	R8003	VU3012250213	M.RESISTOR	1	
	R8004	VU3012258516	M.RESISTOR	1	
	R8005	VU3012258516	M.RESISTOR	1	
	R8007	VU3012261516	M.RESISTOR	1	
	R8011	VU3012261516	M.RESISTOR	1	
	R8012	VU3012261516	M.RESISTOR	1	
	R9001	VU3012251210	M.RESISTOR	1	
	R9002	VU3012251210	M.RESISTOR	1	
	R9005	VU3012251913	M.RESISTOR	1	
	R9007	VU3012261516	M.RESISTOR	1	
	R9009	VU3012261516	M.RESISTOR	1	
	R9010	VU3012261516	M.RESISTOR	1	
	R9011	VU3012249316	M.RESISTOR	1	
	RB101	VU9450280710	RESISTOR NETWORKS	1	
	RB102	VU9450708771	RESISTOR NETWORKS	1	
	RB103	VU9450708771	RESISTOR NETWORKS	1	
	RB104	VU9450280703	RESISTOR NETWORKS	1	
	RB111	VU6450784941	RESISTOR NETWORKS	1	
	RB112	VU6450785719	RESISTOR NETWORKS	1	
	RB142	VU9450280697	RESISTOR NETWORKS	1	
	RB143	VU6450785719	RESISTOR NETWORKS	1	
	RB302	VU6450686405	RESISTOR NETWORKS	1	
	RB303	VU6450686405	RESISTOR NETWORKS	1	
	RB501	VU6450910005	RESISTOR NETWORKS	1	
	RB901	VU9450280697	RESISTOR NETWORKS	1	
	RB902	VU9450280697	RESISTOR NETWORKS	1	
	RB903	VU9450280697	RESISTOR NETWORKS	1	
	S3001	VU6451044402	SWITCH	1	
	S3002	VU6451044402	SWITCH	1	
	TH301	VU3080547700	THERMISTOR	1	
	X1102	VU6451041142	CRYSTAL OSCILLATOR	1	
	X3001	VU6450903298	CRYSTAL OSCILLATOR	1	
⚠	Z3001	VU6450736544	BATTERY	1	