

User Manual

Model Name:

SKI.WB7638U.1_MT7668BU

REVISION HISTORY

| VERSION | DATE | BOARD ID | PAGE | DESCRIPTION | AUTHOR |
|---------|------------|-------------------------|------|---------------|--------|
| V0 | 2019.07.23 | TD.MS6886.762 A19267 | All | First Issued. | Sannis |
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Installation Guidance

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device. The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements.

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

If power exceeds the limit and the distance (Over 20cm distance in actual use between the device and user) is compliant with the requirement FCC RF Radiation Exposure Statement: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body. The device must be professionally installed. The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required. The user has no access to the connector. Installation must be controlled. Installation requires special training.

Canada Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1) L'appareil ne doit pas produire de brouillage;

2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Please notice that if the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 26332-MT7668BU" any similar wording that expresses the same meaning may be used.

L'appareil hôte doit porter une étiquette donnant le numéro de certification du module d'Industrie Canada, précédé des mots « Contient un module d'émission », du mot « IC: 26332-MT7668BU » ou d'une formulation similaire exprimant le même sens, comme suit.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur.

Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

This radio transmitter 26332-MT7668BU has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio 26332-MT7668BU a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

The concrete contents to check are the following three points.

1) Must use a FPC antenna such as IPEX-113 with gain not exceeding 2.3 dBi

2) Should be installed so that the end user cannot modify the antenna;

3) Feed line should be designed in 50ohm

Fine tuning of return loss etc. can be performed using a matching network.

Le contenu concret à vérifier sont les trois points suivants.

1) doit utiliser une antenne comme IPEX-113 avec FPC gain n'excédant pas 2.3 dBi

2) doivent être installés de façon que l'utilisateur final ne peut pas modifier l'antenne

3) La ligne d'alimentation doit être conçue en 50ohm

Le réglage précis de la perte de rendement, etc. peut être effectué en utilisant un réseau correspondant.

| Frequency (MHz) | Antenna Type | Antenna Gain (dBi) |
|-----------------|--------------|--------------------|
| 2412-2462 | FPC Antenna | 2.3 |
| 2402-2480 | FPC Antenna | 2.3 |
| 5180-5825 | FPC Antenna | 2.3 |

Warning: Changes or modifications to this unit not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

Notice to OEM integrator

Must use the device only in host devices that meet the FCC/ISED RF exposure category of mobile, which means the device is installed and used at distances of at least 20cm from persons.

The end user manual shall include FCC Part 15 /ISED RSS GEN compliance statements related to the transmitter as show in this manual.

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B, ICES 003.

Host manufacturer is strongly recommended to confirm compliance with FCC/ISED requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 2AWY6-MT7668BU, IC: 26332-MT7668BU

l'hôte doit utiliser l'instrument uniquement dans des dispositifs qui répondent à la fcc / (catégorie d'exposition rf mobile, ce qui signifie le dispositif est installé et utilisé à une distance d'au moins 20 cm de personnes. le manuel de l'utilisateur final doit inclure la partie 15 / (fac rss gen déclarations de conformité relatives à l'émetteur que de montrer dans ce manuel. le fabricant est responsable de la conformité de l'hôte, le système d'accueil avec le module installé avec toutes les autres exigences applicables du système comme la partie 15 b, ices - 003.

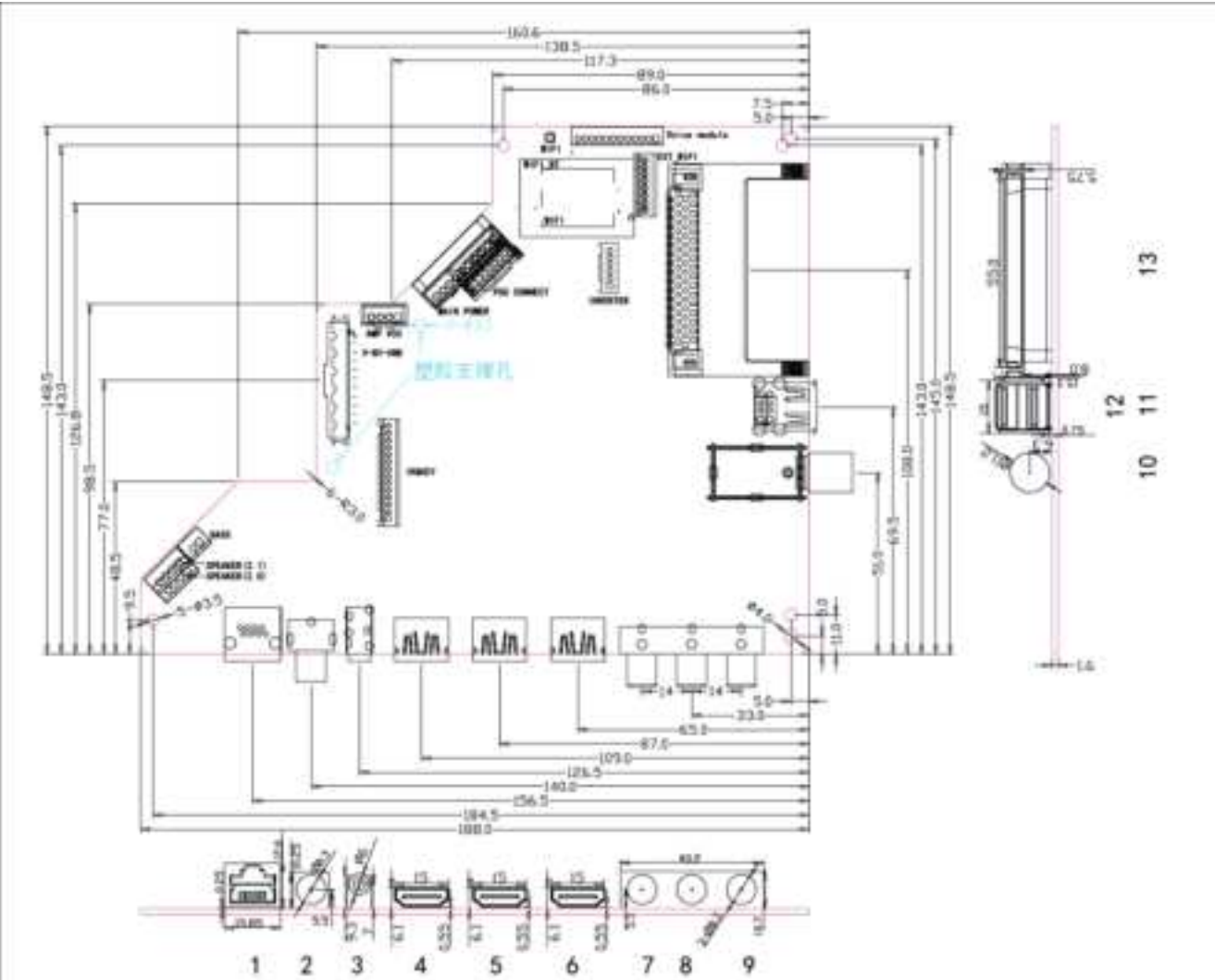
accueillir le fabricant est fortement recommandé de confirmer la conformité avec les exigences de la fcc / (émetteur lorsque le module est installé dans l'hôte.

le dispositif d'accueil doivent avoir une étiquette indiquant contient FCC ID: 2AWY6-MT7668BU, IC: 26332-MT7668BU

1. STANDARD CONFIGURATION

| | |
|------------|--|
| FRONT VIEW |  |
| SIDE VIEW |  |

2. BOARD PICTURE



Size: 188mm(L)*148.5mm(W)*1.6mm(H)

| NO. | Description |
|-----|---------------|
| 1 | RJ45 IN |
| 2 | COAX OUT |
| 3 | EARPHONE OUT |
| 4 | HDMI1 IN(2.0) |
| 5 | HDMI2 IN(2.0) |
| 6 | HDMI3 IN(2.0) |
| 7 | CVBS IN |
| 8 | CVBS LIN |
| 9 | CVBS RIN |
| 10 | RF IN(S/S2) |
| 11 | RF IN(T/T2) |
| 12 | USB1 IN |
| 13 | USB2 IN |
| 14 | CI SLOT |

3. FEATURES

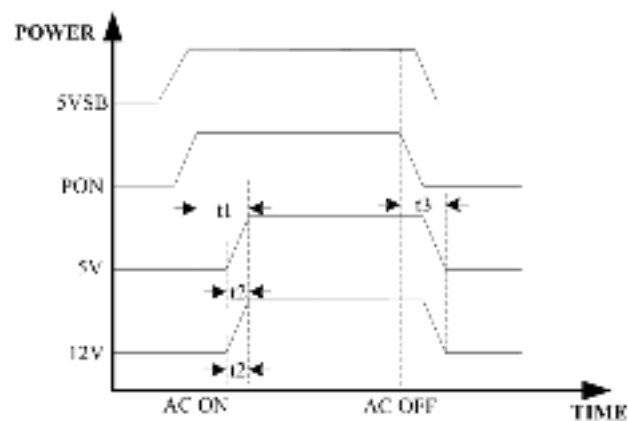
| | | | |
|--|--|---------------------------------------|---|
| MAIN CHIPSET | MSD6886NQHA-8-00H8 | | |
| PANEL | Panel Type | TFT LCD | |
| | Interface | V-by-one | |
| | Max Resolution | 3840*2160 | |
| VIDEO INPUT | TV | ATV(PAL,SECAM)/DTV(DVB-T/C/T2/S/S2) | |
| | | ATVNTSC)/DTV(ATSC) | |
| | CVBS | Video System | PAL/NTSC |
| | | Video level | 1.0 Vp-p±10% |
| | HDMI | 480i, 480p, 720p, 1080i, 1080p, 2160P | |
| | | *CEC, *ARC(HDMI 3), 4K2K(HDMI 1&2&3) | |
| AUDIO INPUT | CVBS | L/R RCA input | 0.2 – 2.0V _{RMS} |
| AUDIO OUTPUT | Earphone | Earphone output | 130 ~ 150mV _{RMS} |
| | COAX | PCM/RAW | |
| | Frequency response | Speaker | 100Hz-15KHz @±3dB(1KHz 0dB reference signal) |
| | | Earphone | 150Hz-15KHz @±3dB(1KHz 0dB reference signal) |
| | Max Output power | 2 x 8W (8Ω) | THD+N<10%@1KHz (Power Supply:12~24V,Audio Input: 0.5V _{RMS}) |
| | | 2 x 15W (6Ω) | |
| | | 2ch ≦2 x 10W, 0.1ch ≦15 W (6Ω) | |
| | POWER TO PANEL | 12V | |
| RJ45 NETWORK | 10/100M auto-identification and DHCP | | |
| Management | Standby Power Consumption < 0.2W(Board Only) | | |
| USB FUNCTION | software upgrade, multimedia play | | |
| Button Types | Ground Key Interface | | |
| Note: 1. Licenses involved in specifications above are supposed to be obtained by customers themselves. 2. When 3.3V panel Irush≥1000mA, Inormal≥600mA,please contact CVTE engineers to confirm 3.3V panel power supply component selection. 3. Max current of USB2.0: 500mA. Large impact current of USB device(exceeds 500mA) maylead to board abnormal work; 4. The normal operating current of 5V panel ≦1500mA. | | | |

3.1 ELECTRICAL CHARACTERISTICS & REQUIREMENTS

| Symbol | Voltage Range | | | Ripple | Total current | MAX. current(mA) of Individual part | | | | | | |
|--------|---------------|-----|------------------|-----------------------|------------------|-------------------------------------|------|-----|-----|-------|-----|----|
| | MIN | TYP | MAX | Voltage | | Mainboard | AMP | USB | MHL | Panel | DVD | |
| 24V | 22 | 24 | 26 | 500mV _{P-P} | 1.7A | -- | 1.7A | -- | -- | -- | -- | -- |
| 12V | 11 | 12 | 13 | 300 mV _{P-P} | 2A | 0.5A | -- | -- | -- | 1.5A | -- | -- |
| 5V | 4.9 | 5 | 5.3 ^① | 120 mV _{P-P} | 1.5A | 0.5A | -- | 1A | -- | -- | -- | -- |
| 5VSB | 4.9 | 5 | 5.3 ^① | 120mV _{P-P} | 1.5A | 1.5A | -- | -- | -- | -- | -- | -- |

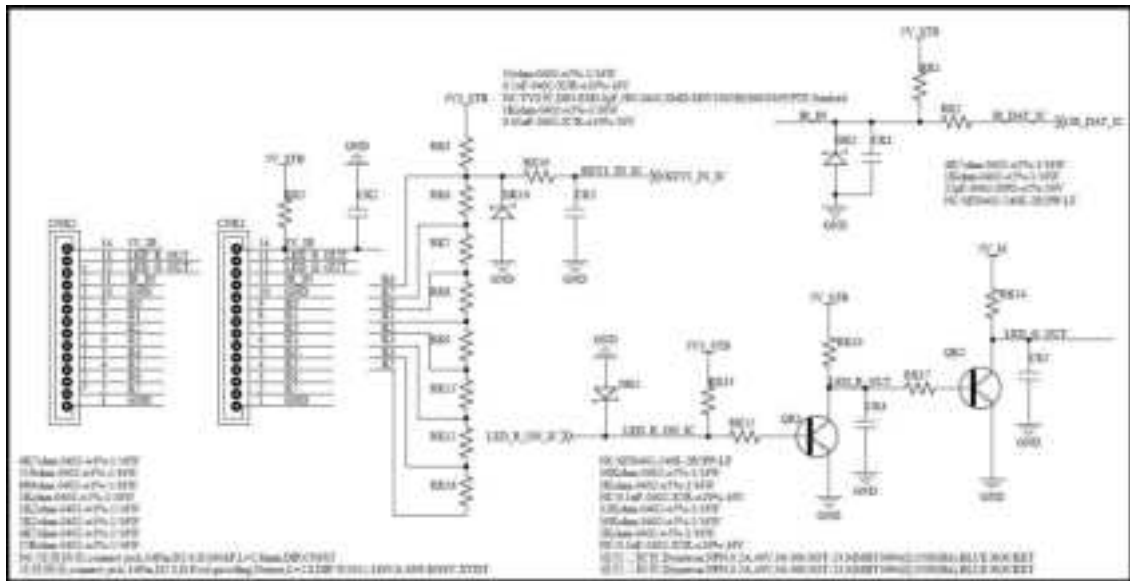
Note^①: Don't exceed 5.25V when make the certification practice test.

Note^②: CtN = The sum of MAX. current(mA) of individual part.



| Alternation | Description | MIN | MAX | Unit |
|-------------|--------------------------|-----|-----|------|
| t1 | Startup time | 0 | 100 | mS |
| t2 | Rise time | 0 | 50 | mS |
| t3 | The drop time of voltage | 0 | 200 | mS |

4. SCHEMATICS OF IR & KEY BOARD



KEY FUNCTION: TV/AV, MENU, VOL+, VOL-, CH+, CH-, POWER

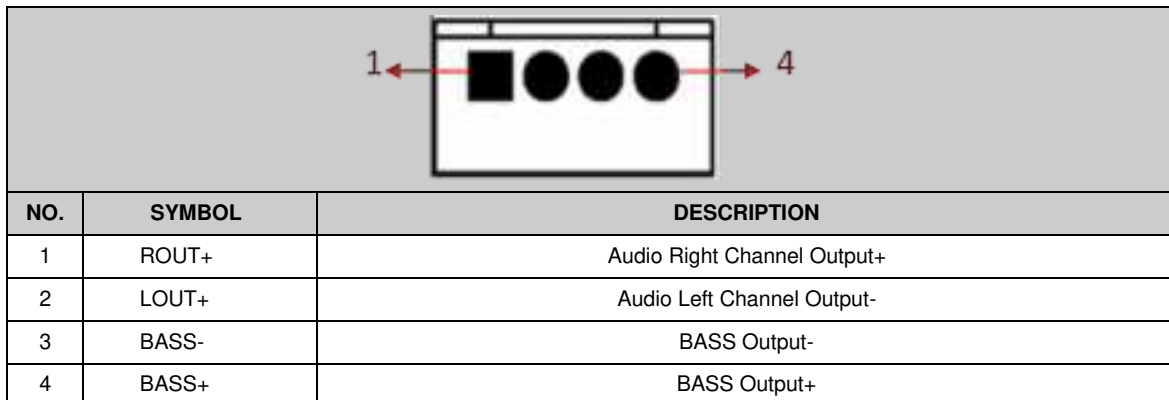
Note: The dividing resistor which is corresponding to the power key must be zero (equivalent to the voltage is zero).

Otherwise, the board will not work. K6 is default power.


5. INTERFACE DEFINITION

The optional connectors and terminals are marked with

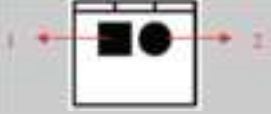
◆ CNA6(4PIN/2.50): SPEAKER(2.0) CONNECTOR 1




◆ ***CNA4(4PIN/2.50): SPEAKER(2.1) CONNECTOR 2**

|  | | |
|---|--------|-----------------------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | ROUT+ | Audio Right Channel Output+ |
| 2 | ROUT- | Audio Right Channel Output- |
| 3 | LOUT- | Audio Left Channel Output- |
| 4 | LOUT+ | Audio Left Channel Output+ |

◆ ***CNA8(2PIN/2.50): BASS CONNECTOR**


|  | | |
|---|--------|--------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | BASS- | BASS Output- |
| 2 | BASS+ | BASS Output+ |

◆ **CNW8A (51PIN/0.5): V-BY-ONE CONNECTOR (V-BY-ONE) Note: FFC**

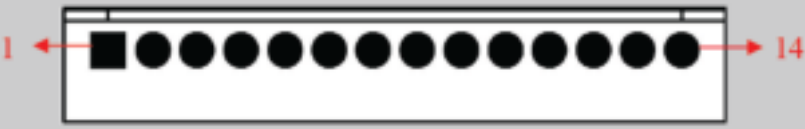
|  | | |
|--|--------|-------------------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | GND | Ground |
| 2 | VBY7P | V-by-One HS Data Lane 7 |
| 3 | VBY7N | V-by-One HS Data Lane 7 |
| 4 | GND | Ground |
| 5 | VBY6P | V-by-One HS Data Lane 6 |
| 6 | VBY6N | V-by-One HS Data Lane 6 |
| 7 | GND | Ground |
| 8 | VBY5P | V-by-One HS Data Lane 5 |
| 9 | VBY5N | V-by-One HS Data Lane 5 |
| 10 | GND | Ground |
| 11 | VBY4P | V-by-One HS Data Lane 4 |
| 12 | VBY4N | V-by-One HS Data Lane 4 |
| 13 | GND | Ground |

| | | |
|----|-----------|---|
| 14 | VBYP3P | V-by-One HS Data Lane 3 |
| 15 | VBYP3N | V-by-One HS Data Lane 3 |
| 16 | GND | Ground |
| 17 | VBYP2P | V-by-One HS Data Lane 2 |
| 18 | VBYP2N | V-by-One HS Data Lane 2 |
| 19 | GND | Ground |
| 20 | VBYP1P | V-by-One HS Data Lane 1 |
| 21 | VBYP1N | V-by-One HS Data Lane 1 |
| 22 | GND | Ground |
| 23 | VBYP0P | V-by-One HS Data Lane 0 |
| 24 | VBYP0N | V-by-One HS Data Lane 0 |
| 25 | GND | Ground |
| 26 | LOCKN_TX | Lock detect |
| 27 | HTPDN_TX | Hot Plug Detect |
| 28 | Bit_SEL | 'H' or NC=10bit(D) 'L'=8bit |
| 29 | AGP | 'H' or NC:AGP |
| 30 | LD_EN | Local Dimming Enable(default for High)for Panel |
| 31 | Bit_SEL_1 | 'H' or NC=10bit(D) 'L'=8bit |
| 32 | I2C_WP | I2C Write Protection/No Connection |
| 33 | SCL | I2C Clock signal |
| 34 | SDA | I2C Data signal |
| 35 | PCID_EN | PCID_EN |
| 36 | D_Fomat1 | Input Data Format [1:0] '00'=Mode 1,'01'=Mode 2, '10'=Mode 3,'11'=Mode 4, |
| 37 | D_Fomat0 | |
| 38 | GND | Ground |
| 39 | GND | |
| 40 | GND | |
| 41 | GND | |
| 42 | GND | |
| 43 | VCC_PANEL | Power Supply for Panel |
| 44 | VCC_PANEL | |
| 45 | VCC_PANEL | |
| 46 | VCC_PANEL | |
| 47 | VCC_PANEL | |
| 48 | VCC_PANEL | |
| 49 | VCC_PANEL | |
| 50 | VCC_PANEL | |
| 51 | VCC_PANEL | Power Supply for Panel |

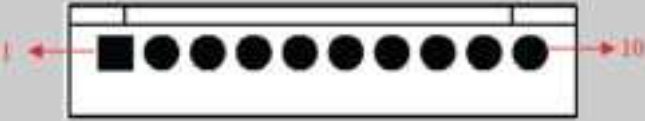
◆ **CNA1(4PIN/2.50): AMP VCC CONNECTOR**

|  | | |
|--|--------|------------------------------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | GND | Ground |
| 2 | GND | |
| 3 | 12/24V | +12/24V Power Supply for Amplifier |
| 4 | 12/24V | |

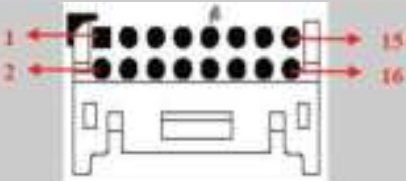
◆ **CNK1(14PIN/2.0): IR & KEY CONNECTOR**

|  | | |
|--|--------|---|
| NO. | SYMBOL | DESCRIPTION |
| 1 | GND | Ground |
| 2 | K7 | Key7(Reserved) |
| 3 | K6 | Key6 |
| 4 | K5 | Key5 |
| 5 | K4 | Key4 |
| 6 | K3 | Key3 |
| 7 | K2 | Key2 |
| 8 | K1 | Key1 |
| 9 | K0 | Key0 |
| 10 | GND | Ground |
| 11 | IR | IR Receiver, $V_{IH} \geq 2V$, $V_{IL} \leq 1V$, $I_{Lmin} : 1mA$, $I_{Hmin} : 1mA$ |
| 12 | GRN | Green Indicator, $V_{OH} \geq 2V$ ($I_{OHMAX} : 2mA$), $V_{OL} \leq 0.8V$ ($I_{OLMAX} : 2mA$) |
| 13 | RED | Red Indicator, $V_{OH} \geq 2V$ ($I_{OHMAX} : 1.3mA$), $V_{OL} \leq 0.8V$ ($I_{OLMAX} : 0.5mA$) |
| 14 | 5V | +5V DC Power Supply |

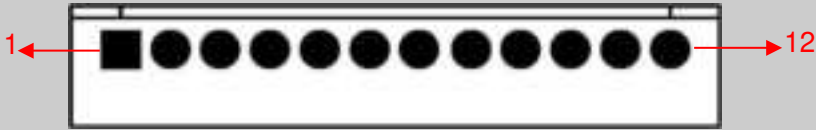
◆ **CN102(10PIN/2.54): MAIN POWER CONNECTOR**

|  | | |
|--|--------|---|
| NO. | SYMBOL | DESCRIPTION |
| 1 | 12V | +12V DC Power Supply |
| 2 | GND | Ground |
| 3 | 5V_M | Main +5V Power Supply |
| 4 | 5V_M | |
| 5 | PVCC | +5V/12V Power Supply for Panel |
| 6 | PVCC | |
| 7 | GND | Ground |
| 8 | GND | |
| 9 | PON | Power On/Off, $V_{OH} \geq 3V$ (I_{OHMAX} : 2mA), $V_{OL} \leq 0.8V$ (I_{OLMAX} : 0mA) |
| 10 | 5VSB | +5V Power Supply when Standby |

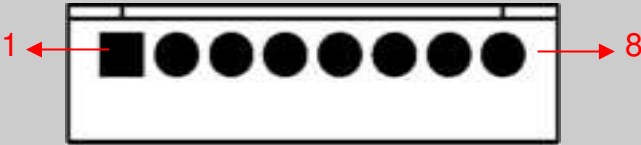
◆ ***CN103(2×8PIN/2.0): PSU CONNECTOR**

|  | | |
|--|---------|---|
| NO. | SYMBOL | DESCRIPTION |
| 1 | 12V/24V | Power Supply for Amplifier |
| 2 | 12V/24V | |
| 3 | GND | Ground |
| 4 | | |
| 5 | 12V_M | +12V Power Supply |
| 6 | 12V_M | |
| 7 | GND | Ground |
| 8 | 12V_M | +12V Power Supply |
| 9 | GND | Ground |
| 10 | | |
| 11 | 5V_M | +5V Power Supply |
| 12 | 5V_M | |
| 13 | PON | Power On/Off, $V_{OH} \geq 3V$ (I_{OHMAX} : 2mA), $V_{OL} \leq 0.8V$ (I_{OLMAX} : 0mA) |
| 14 | 5VSTB | +5V Power Supply When standby |
| 15 | BLO | Back-Light ON/OFF Control for Panel, $V_{OH} \geq 3V$ (I_{OHMAX} : 1mA), $V_{OL} \leq 0.8V$ (I_{OLMAX} : 1mA) |
| 16 | ADJ | Brightness Adjustment for Panel, $V_{OH} \geq 3V$ (I_{OHMAX} : 1mA), $V_{OL} \leq 0.8V$ (I_{OLMAX} : 1mA) |


◆ ***CN66(12PIN/2.0): Voice Module CONNECTOR**

|  | | |
|--|------------------|-------------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | Voice_DP | USB+ |
| 2 | Voice_DM | USB- |
| 3 | GND | Ground |
| 4 | TV_USB_Interrupt | TV USB Interrupt |
| 5 | NC | No Connection |
| 6 | NC | |
| 7 | NC | |
| 8 | NC | |
| 9 | TV_Interrupt | TV Interrupt |
| 10 | TV_Enable | TV Enable |
| 11 | GND | Ground |
| 12 | Voice_PWR | 3.3V or 12V Power |

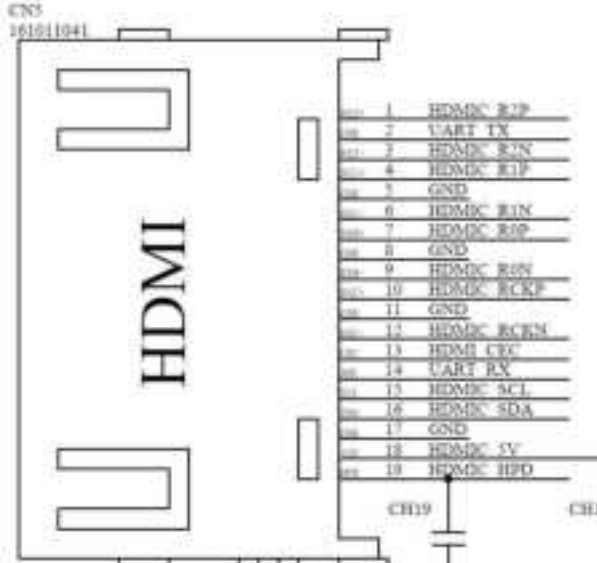
◆ ***CNU62(8PIN/2.0): EXT-WIFI CONNECTOR**

|  | | |
|--|--------------|---------------------------|
| NO. | SYMBOL | DESCRIPTION |
| 1 | RST | WIFI Reset |
| 2 | PWR | +5V Power Supply for WIFI |
| 3 | DM | WIFI Data- |
| 4 | DP | WIFI Data+ |
| 5 | GND | Ground |
| 6 | BT_HOST_WAKE | Bluetooth Wake |
| 7 | WL_HOST_WAKE | WIFI Wake |
| 8 | NC | No Connection |

◆ **CN2(6PIN/2.0): INVERTER CONNECTOR**

|  | | |
|--|--------|--|
| NO. | SYMBOL | DESCRIPTION |
| 1 | GND | Ground |
| 2 | GND | |
| 3 | ADJ | Brightness Adjustment for Panel, $V_{OH} \geq 3V$ ($I_{OHMAX}: 1mA$), $V_{OL} \leq 0.8V$ ($I_{OLMAX}: 1mA$) |
| 4 | BLO | Back-Light ON/OFF Control for Panel, $V_{OH} \geq 3V$ ($I_{OHMAX}: 1mA$), $V_{OL} \leq 0.8V$ ($I_{OLMAX}: 1mA$) |
| 5 | 12V_M | +12V DC Power Supply |
| 6 | 12V_M | |

◆ **CN5: UART CONNECTOR**

|  | | |
|---|--------|-------------|
| NO. | SYMBOL | DESCRIPTION |
| 2 | GND | UART_TX |
| 14 | ARC | UART_RX |

6. CONFIGURATION & GENERAL PRECAUTIONS

- Relative humidity: $\leq 80\%$.
- Storage temperature: $-10\sim 60^{\circ}\text{C}$.
- Operation temperature: $0\sim 40^{\circ}\text{C}$.
- Protect the board from static electricity in case of damage to the IC.
- Keep the board away from conductor when it is working.
- Do not press the PCBA during transportation or placement.
- Do not bend or deform the board during the whole machine assembling, especially when connecting the cable.
- Do not plug or unplug the cable while the board is working..
- Clean the board with soft dry cloth when it's dirty.
- Don't power on before panel is correctly connected.
- The whole machine certification performance will be subject to the impact of the whole machine, must use the whole machine to test and confirm.
- When using the I2C interface to communicate with the outside, please confirm the matching of the pull up resistance and the series resistance with CVTE hardware engineer.
- To ensure communicating properly between the mainboard and external expansion modules, it's recommend that test related control and communication signals and power supply voltage waveform after installing prototype to confirm whether to meet the relevant requirements

7. DECLARATION

- The product's USB supports most of the storage devices. If the device is not recognized, it may be caused by the device driver.
- Please refer to the specification for the value of voltage and current which is supplied by the USB slot, and the value is related to the loads of 5V LCD panel. Due to the difference of USB standard protocol and the interface specification of device, the device may cannot be recognized by TV player correctly.
- The difference of device and device capacity may leads to the TV player's reading speed slow down temporarily.
- Please don't plug the USB device while the file is being read.
- Due to the differences of USB's compatibility and stability, please initialize the system if the image stopped or not function.
- If the hard disk cannot be recognized, please power on the hard disk with external power supply or change the wire into shorter USB2.0 wire.

8. NOTICE REGARDING TV MEDIA FORMAT AND INTERFACE TECHNOLOGY

| Media type | | Interface technology and others | |
|----------------------------|-------------|---------------------------------|-----------------------|
| Dolby Digital Decoder | MPEG2/MPEG4 | HDMI | Hbbtv2.0 |
| Dolby Digital Plus Decoder | AMR-NB | HDCP | Netflix |
| Dolby MS11 | AMR-WB | Wi-Fi | Freeview Play |
| Dolby MS12 | DRA | USB | NTFS |
| Dolby Atmos | AAC/HEAAC | MHL | Seraphic Open Browser |
| Dolby Vision | H.264 | Bluetooth | Seraphic TV Portal |
| DTS Sound | H.265 | NFC | — |
| DTS TruSurround | DivX | DVB-T2 | — |
| DTS HD | RMVB | DVB-S2x | — |
| DTS 2.0+Digital Out | WMA | ATSC | — |
| DTS Express 5.1 | WMA Pro | PlayReady | — |
| DTS Studio Sound | dbx-tv | MSS | — |
| DTS Studio Sound II | — | Widevine | — |

Introduction

This document is used to specify media formats, interface technologies and others that may be involved in TV products.

| Media Format | | Interface Technology & Others | |
|----------------------------|---------------|-------------------------------|---------------|
| Dolby Digital Decoder | MPEG2 / MPEG4 | HDMI | Hbbtv2.0 |
| Dolby Digital Plus Decoder | AMR-NB | HDCP | Netflix |
| Dolby MS11 | AMR-WB | Wi-Fi | Freeview Play |
| Dolby MS12 | DRA | USB | NTFS |

| | | | |
|---------------------|-----------|-----------|-----------------------|
| Dolby Atmos | AAC/HEAAC | MHL | Seraphic Open Browser |
| Dolby Vision | H.264 | Bluetooth | Seraphic TV Portal |
| DTS Sound | H.265 | NFC | - |
| DTS TruSurround | DivX | DVB-T2 | - |
| DTS HD | RMVB | DVB-S2x | - |
| DTS 2.0+Digital Out | WMA | ATSC | - |
| DTS Express 5.1 | WMA Pro | PlayReady | - |
| DTS Studio Sound | dbx-tv | MSS | - |
| DTS Studio Sound II | - | Widevine | - |

Notice

In the event the LCD TV Driver Boards ("Boards") purchased or customized by your good company include any hardware(e.g. TV master chip, output connector) and/or software that support the above mentioned media formats, interface technologies & others which may involve third party technologies or intellectual properties, your company is hereby kindly reminded as follows:

1. The product price under the sale contracts between us does not include any royalties, licensing fees or expenses payable to the IP right holders for acquiring the right to use the third party technologies or the license of the third party's intellectual properties which may be involved due to the Boards' and relating TV sets' supporting of the above mentioned media formats, interface technologies & others. If the IP right holders so request, you shall obtain valid license from the right holders and make payment at your own cost for such license.
2. If your company requests to reduce or cancel the media formats or interface technologies & others supported by the Boards, you shall, upon your confirmation of the Boards' specifications, or upon payment of the contract price, whichever is earlier, notice us such requests in writing.
3. In the event the "Boards" purchased or customized by your good company do not include hardware and/or software that support part or entire of the above mentioned media formats and interface technologies & others, this Notice shall not be applicable to your company with respect to the media formats and interface technologies & others that not supported by the Boards.
4. The hardware, software and technologies related to the media formats and interface technologies & others that may be involved in the Boards are all provided by third parties. We may update this Notice from time to time. If you find any omissions, please do not hesitate to let us know.

Regarding the TV mainboard Products (following referred as “the Mainboard”), the technical requirements of which are wholly listed and defined under this Letter of Confirmation for Product Technical Requirements, due to the fact that it was ultimately confirmed and determined by the buyer regarding the software programmed to the Mainboard, and the Mainboard’s features and functions (including patented features and functions, whether the features and functions are realized and practiced through the chips embodied in the Mainboard, the Mainboard itself, or through the TV sets embodying the Mainboard), the buyer shall be responsible for obtaining appropriate licenses from the relating intellectual property right holders and other right holders, acquiring appropriate permissions to use the software programmed to the Mainboard, obtaining appropriate permissions to realize and practice the relating features and functions of the Mainboard, reporting the transaction data, arranging the payment of royalties, and performing other duties and responsibilities which are necessary to use, sell, offer for sale, import or otherwise to dispose of the Mainboard with programmed software without infringing the intellectual property rights of any third party.

As our company is specialized TV mainboard supplier and unable to acquire the performance or specifications requirements of the TV sets embodying the Mainboard, we hereby guarantee that the TV mainboard products supplied by our company are in conformance with the Letter of Confirmation for Product Technical Requirements which was confirmed in writing by both parties, and your company shall be responsible for the testing, debugging, tuning of the TV sets embodying the Mainboard, application for certifying the Mainboard and the TV sets embodying the Mainboard, and performing other duties and responsibilities which are necessary for complying with the law and regulations of the countries and regions, where the Mainboard and the TV sets embodying the Mainboard were imported and sold.