# Request for Class II Permissive Change

FCC ID： IBAMF8235 Date：12th July 2017

## To：Federal Communication Commission

Please be notified that we，the undersigned，Creative Labs Inc declare the following changes to enhance product performance.

The major change filed under this application as follows:

| **MS2220A (I/O board)** | | |
|---|---|---|
| **Reason for change** | **Before** | **After** |
| 01) USB Bus switch control | | a) Add connection – USB_MUX_OE |
| 02) Resolve unable to wake using IR issue | a) -- | a) ADD BUFFER IC U270 & C1718 FOR IR SIGNAL |
| 03) Improve Audio Performance | a) R1551, R1550, R1548, R1549, R1543, R1544, R1545, R1546 (300ohm) | a) R1551, R1550, R1548, R1549, R1543, R1544, R1545, R1546 (1Kohm) |
| 04) Improve low power logic detection | a) Q94 (FDV301) | a) Q94 (PMBT3904) |
| 05) Audio mapping | a) –<br>b) -- | a) U71 (I/O ports remap)<br>b) HDMI 1 (Add HDMI_MCLK to GRIFFIN) (Optional) |
| 06) Improve HDMI trace impedance | a) –<br>b) –<br>c) –<br>d) -- | Add series resistor at HDMI RX port<br>a) R1886, R1885, R1890, R1892, R1887, R1888, R1889, R1891,<br>b) R1625, R1624, R1629, R1623, R1626, R1627, R1628, R1632,<br>c) R1894, R1896, R1897, R1899, R1895, R1896, R1897, R1899,<br>d) R1902, R1901, R1906, R1908, R1903, R1904, R1905, R1907 |
| 07) Improve CEC signal | a) R1882 (10K)<br>b) Diode D67, D80, D81, D82, D83, D85 | a) R1882 (27K)<br>b) Remove diode D67, D80, D81, D82, D83, D85 |
| 08) Improve Audio performance | a) -- | a) LINE-IN: Add Ferrite (L230) at CONN to Ground |
| 09) Recycle GPIO pin, improve THD | a) -- | a) SUBW: Change CONTROL SIGNAL to LI_OMP_EN<br>b) Add Mute circuit |
| 10) Improve Audio performance | LINE-IN: C1576, C1577, C1578, C1579<br>a) With polarity<br>b) 100uF | LINE-IN: C1576, C1577, C1578, C1579<br>a) Change E-cap to non-polarity type<br>b) 10uF |
| 11) CHANGE reduce OPAMP GAIN | | Change value: |

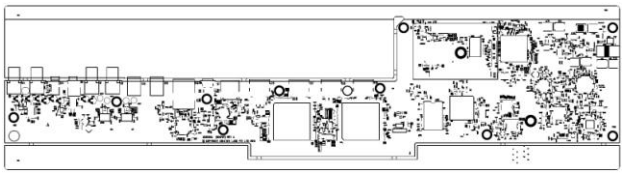
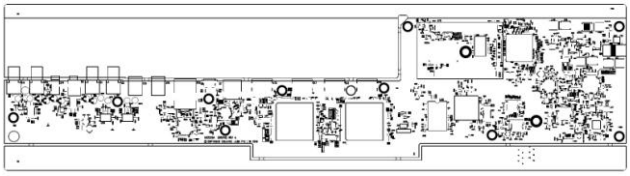
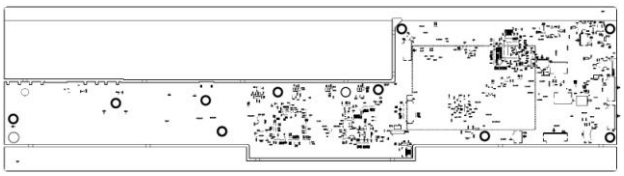
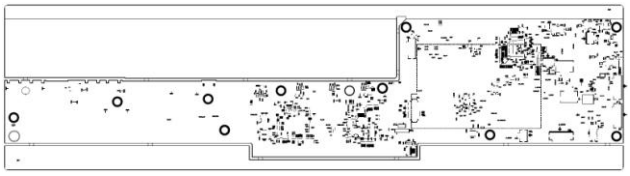
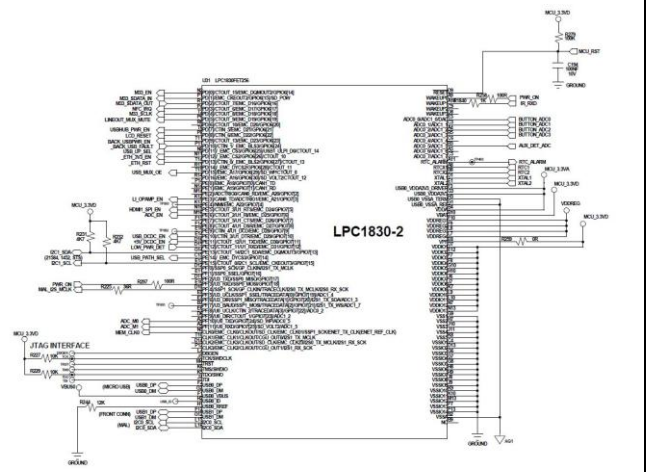
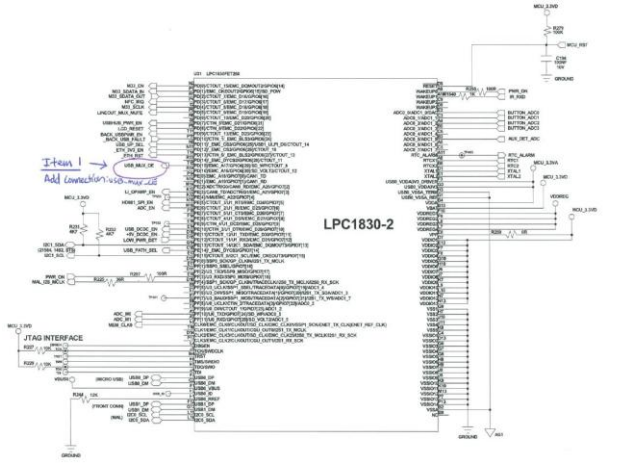
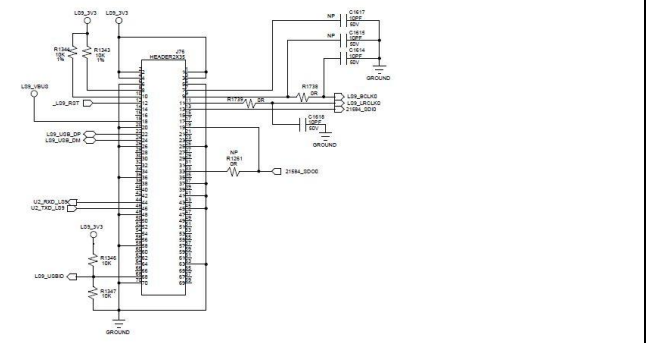
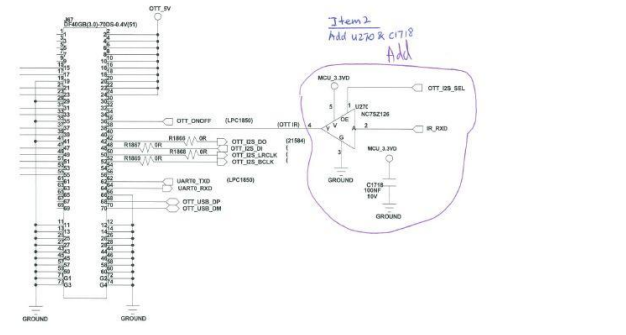
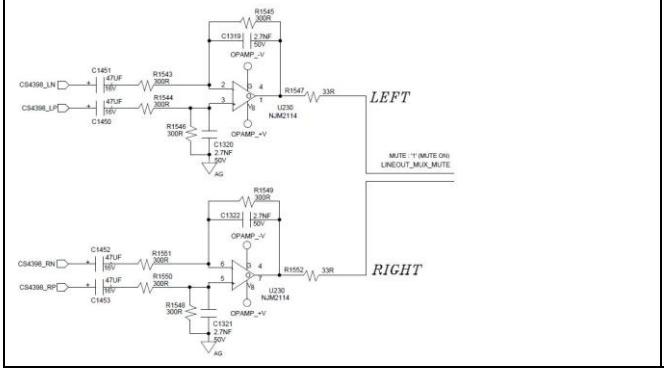
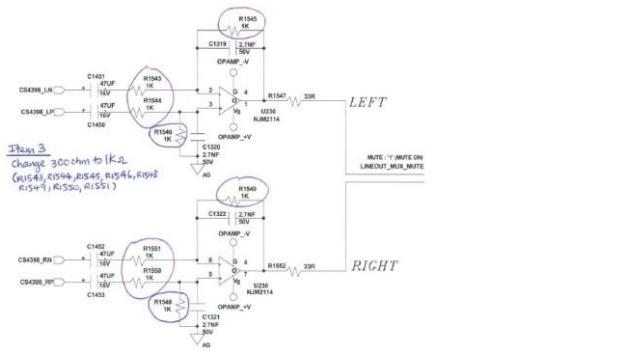
| | | |
|---|---|---|
| Improve THD & output matching | a) R1395 (1K),<br>b) R1165 (1K),<br>c) R1397 (1K),<br>d) R1396 (1K) | a) R1395 (11K),<br>b) R1165 (15K),<br>c) R1397 (15K),<br>d) R1396 (11K) |
| 12) EMI - patched at 4P board during the test | | a) INT MIC: Add 27pF between AG and GROUND |
| 13) Correction | a) J26 | a) J26: Swap Mic L R signal |
| 14) Help discharge USB HUB_3V3 faster | a) -- | a) Add Resistor (R1916) LOAD TO USB HUB_3V3 POWER |
| 15) Improve IC mcore IC 1V2 supply voltage | a) R1383 (3K) | Change value<br>a) R1383 (2K7) |
| 16) To meet DDC pull high spec | a) R1861, R1862, R1597, R1598 (47K) | Change value<br>a) R1861, R1862, R1597, R1598 (2K) |
| 17) Reduce mic noise | a) R1883 (0ohms) | a) Remove R1883 (0ohms) |
| 18) Add location | a) -- | a) Add J79 location (not mounted) |
| 19) Change control signal | a) U265 | a) U265 ( Change control signal) |
| 20) Set EEPROM to 8-bit mode for LAN7500 | a) U217 | a) U217 (Pull pin6 to low) |
| 21) Remove STS Audio Noise | a) – | a) Add decoupling caps (C1723 100nF 10V) in between STS_VDD and Ground) |
| 22) Connection correction | a) -- | a) U252 (Remove R657, and connect pin 52 to pin 10) |
| 23) Reduce pop sound | a) C1323 & C1324 (1800pF 50V) | a) C1323 & C1324 (Change to resistor 10K) |
| 24) Connection correction | a) U269 | a) U269 (Add 10K resistor in between pin12 and ground) |

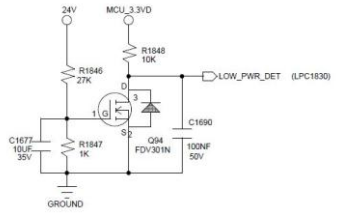
| **MS2220B (Power supply board)** | | |
|---|---|---|
| **Reason for change** | **Before** | **After** |
| 01) Improve power supply performance | a) –<br>b) -- | a) Add C656 (100uF 400V)<br>b) Add Diode D622 (FM4007) |
| 02) Resolve hissing noise | a) C623 (47pF) | a) Remove C623 (47pF) |
| 03) Improve power supply performance | a) D616 (4148)<br>b) R672 (1K)<br>c) R669 (10K)<br>d) R675 (1R)<br>e) R629 (3K3)<br>f) CM601 (2.8MH)<br>g) C646 (100nF) | Change value<br>a) D616 (4007)<br>b) R672 (47K)<br>c) R669 (100K)<br>d) R675 (0R1)<br>e) R629 (4K7)<br>f) CM601 (12.5MH)<br>g) C646 (10nF) |
| 04) Improve power supply performance | a) C628 (22pF) | a) Remove C628 (22pF) |
| 05) To improve EMC performance | a) -- | a) Add R683 (10R) |
| 06) To regulate voltage at U609 | a) -- | a) Add R682 (100R) |
| 07) To protect mosfet Q606 | a) R656 (18K) | a) R656 (1K) |

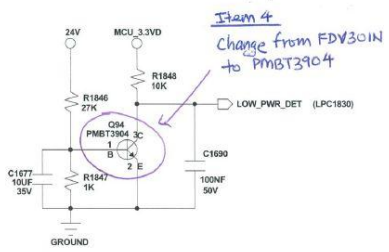
| MS2220C (Amplifier board) | | |
|---|---|---|
| **Reason for change** | **Before** | **After** |
| 01) Control PCM1690_VCC5 power sequence together with PCM1690_VDD33 via DAC_ENB | a) Q70, R825 | a) Remove Q70 (TRA0200030110) & R825 (REA01J4702J00) and link Q69's gate to DAC_ENB |
| 02) Unmute audio DAC permanently | a) –<br>b) -- | a) Remove both PCM1690A_AMUITEI control from U93 & U94,<br>b) Add R5063 (REA01J1002J00) pull up to both pin18 of U93 & U94 |
| 03) To control the REST of the USB host controller | a) -- | a) Add PCM1690_AMUTEI to control pin38 of U2010 |
| 04) Improve the audio performance of AUX- in | C2162, C2163, C2164, C2165<br>a) With polarity type<br>b) 100uF | Change: C2162, C2163, C2164, C2165 to<br>a) Non-polarity type<br>b) 10uF |
| 05) Connection correction | a) -- | a) Link AUX_REF_AG with GROUND via L2054 (NDA073600L022) |
| 06) Improve the power up sequence of TMDS_1V2 | a) R5052 (3K) | a) R5052 (5K6) |
| 07) Improve the power up sequence of TMDS_3V3 | a) -- | a) Change connection for R5053, connect between pin 5 of U2041 and Ground |
| 08) Connection correction | a) -- | a) Remove link pin 5 of U2041 and gate of Q76 |
| 09) Connection correction | a) -- | a) Connect pin5 of U2041 to DAC_5V_ENB and connect gate of Q76 to TMDS_1V2 |
| 10) Change the HDMI re-timer configuration | a) R5041, R5042 | a) Unmount REA01J1002J00 from R5041 & R5042 |
| 11) Remove I2C link | a) -- | a) Mount REA01J1002J00 on R5059 & R5062 |
| 12) Add location | a) -- | a) Add series resistor R5064 & R5065 location (Not mounted) |
| 13) To improve MIC audio performance | a) R2039, R2276 | a) Unmount REA01003J00 from R2039 & R2276 |
| 14) Add Front Mic HW detection for Mic amp | a) -- | a) Disconnect Mic BIAS from pin 10 of U2036 |
| 15) Power decoupling for MIC | a) C2024 (1uF 10V) | a) C2024 (22UF 10V) |
| 16) Add MIC Bias circuit | a) -- | a) Add new MICbias from M33_VCOD33 with R5068 (REA01J1001F00) & R5069 (REA01J2001F00) as potential divider |
| 17) Improve MIC signal performance | a) C2256,C2257,C2254,C2267,C2252 (100nF) | Change value<br>a) C2256,C2257,C2254,C2267,C2252 (1uF) |
| 18) HDMI retime hot plug detect fix | a) R2038 (1K5) | a) Remove R2038 (1K5) |

| Bluetooth, WiFi, Wireless Audio Module (No Changes) | | |
|---|---|---|
| **Description** | **Before** | **After** |
| Bluetooth Module<br>(U252 on PCB board MS2220A)<br>  | Sunitec BM880 | Sunitec BM880 |
| WiFi Module Libre<br>(Plug on PCB board MS2220A)<br>  | LS9-AC11DBT | LS9-AC11DBT |
| OTT board (WifFi Bluetooth Module)<br>(Plug on J67 connector on PCB board MS2220A)<br>  | OTT board: hi3798C V200<br>WiFi BT Module: CDW-B18821A-00 | OTT board: hi3798C V200<br>WiFi BT Module: CDW-B18821A-00 |
| Wireless Audio Module<br>(External board)<br>  | SMSC DWAM83 TB | SMSC DWAM83 TB |

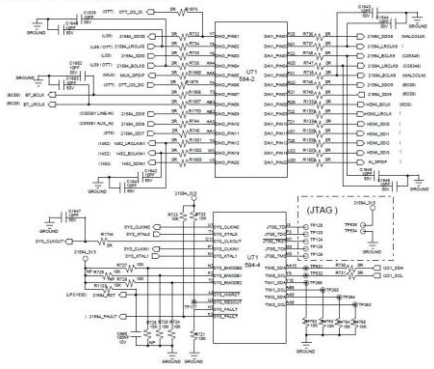
## MS2220A (I/O board)

| Before | After |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

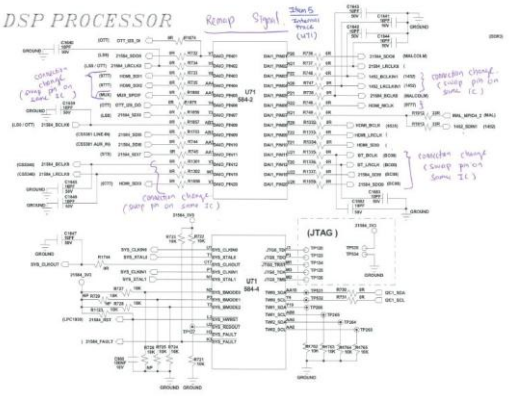


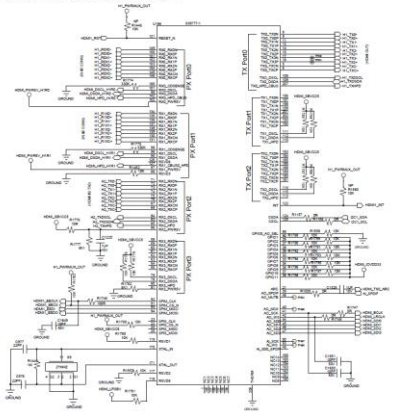

DSP PROCESSOR



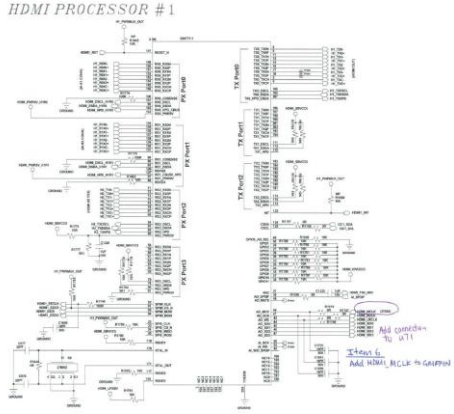

DSP PROCESSOR



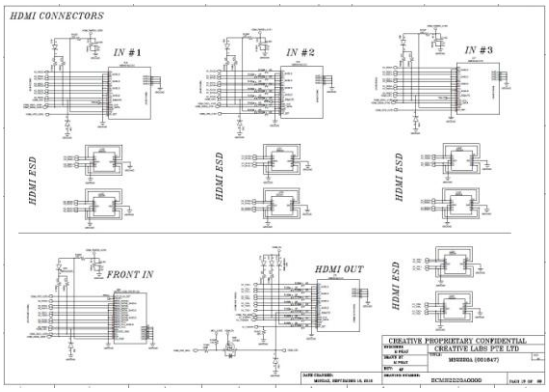

HDMI PROCESSOR #1



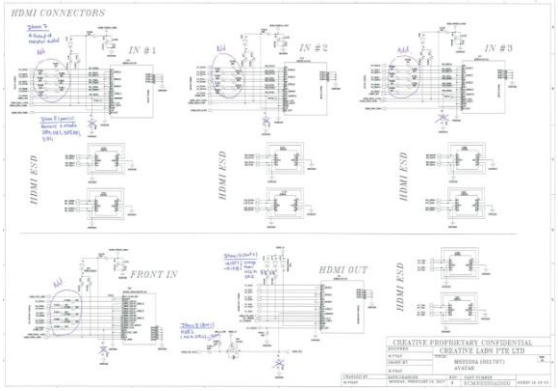
HDMI PROCESSOR #1

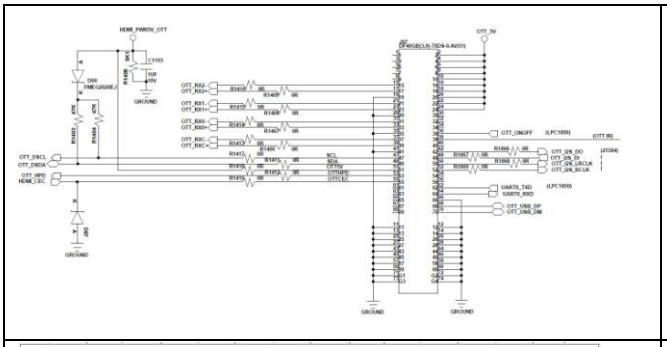


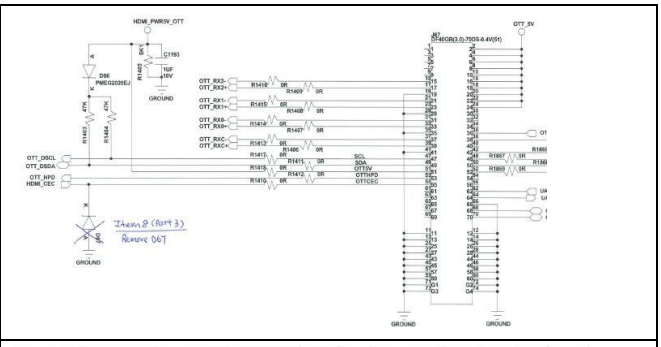

HDMI CONNECTORS

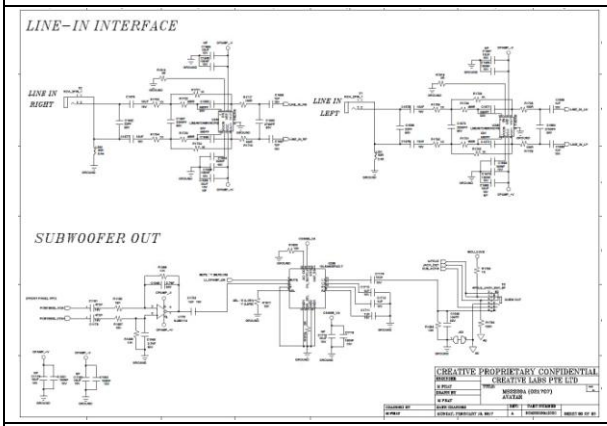


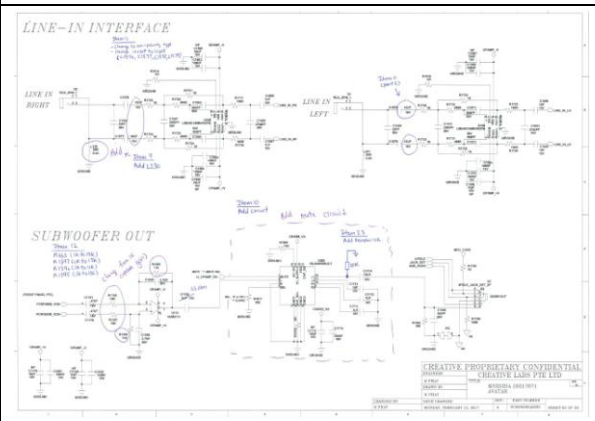

HDMI CONNECTORS

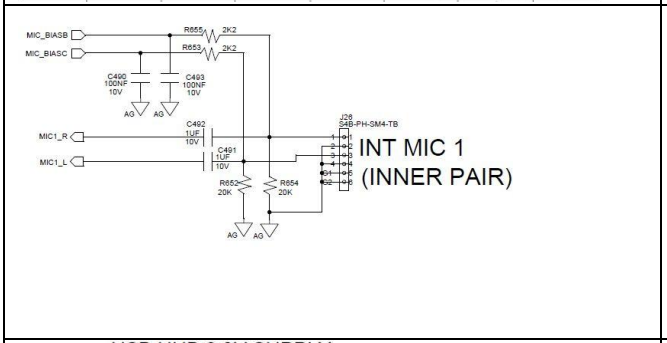


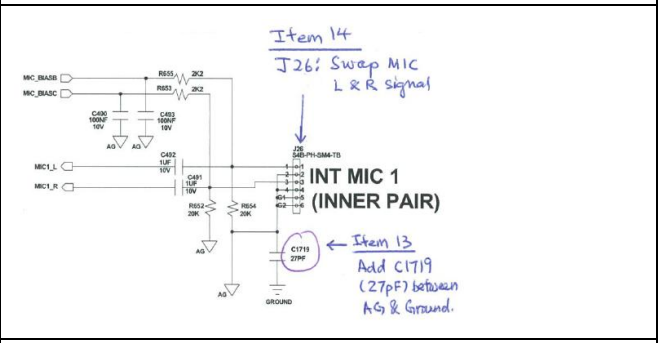


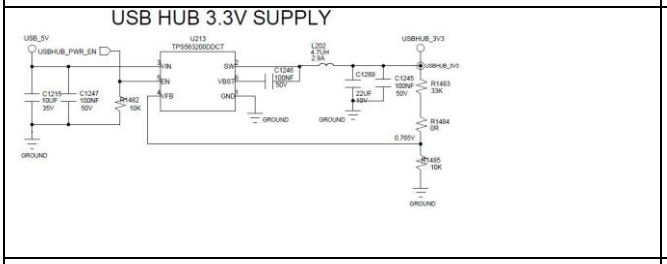

Item 8 (Part 3)
Remove D67

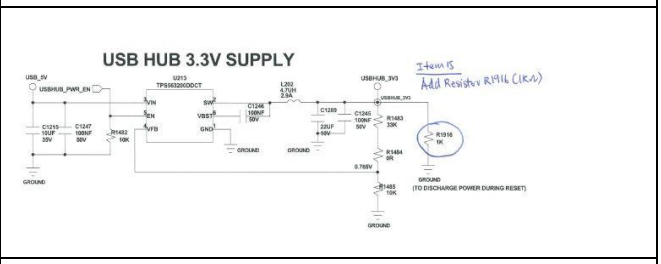

LINE-IN INTERFACE
LINE IN RIGHT
LINE IN LEFT
SUBWOOFER OUT
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD

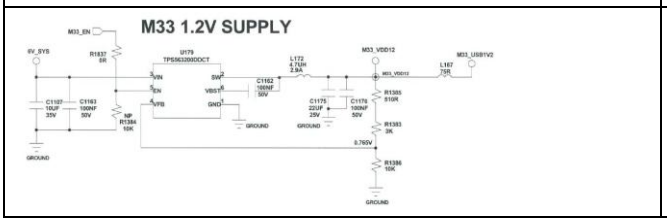

LINE-IN INTERFACE
LINE IN RIGHT
LINE IN LEFT
SUBWOOFER OUT
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD

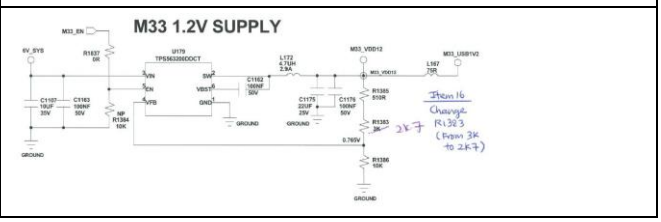

MIC_BIASB
MIC_BIASC
R655 2K2
R653 2K2
C490 100NF 10V
C493 100NF 10V
C492 1UF 10V
C491 1UF 10V
MIC1_R
MIC1_L
J26 S4B-PH-SM4-TB
R652 20K
R654 20K
AG
INT MIC 1
(INNER PAIR)

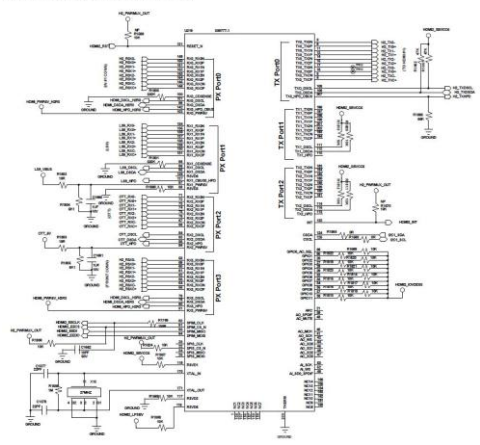

Item 14
J26: Swap MIC L & R signal
MIC_BIASB
MIC_BIASC
R655 2K2
R653 2K2
C490 100NF 10V
C493 100NF 10V
C492 1UF 10V
C491 1UF 10V
MIC1_L
MIC1_R
J26 S4B-PH-SM4-TB
R652 20K
R654 20K
AG
INT MIC 1
(INNER PAIR)
C1719 27PF
Item 13
Add C1719 (27pF) between AG & Ground.
GROUND

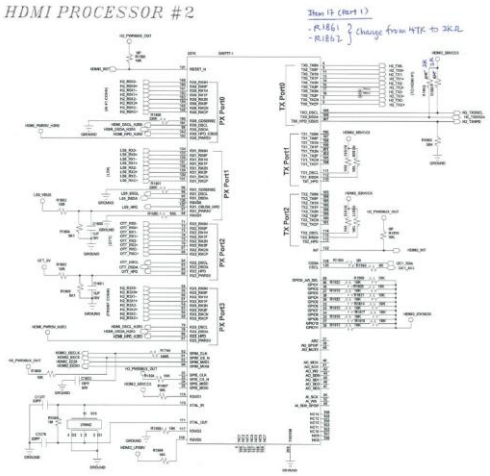

USB HUB 3.3V SUPPLY
USB_5V
USBHUB_PWR_EN
U213
TPS563200DDCT
USBHUB_3V3
C1215 10UF 35V
C1247 100NF 50V
R1482 10K
C1246 100NF 50V
C1269 22UF 10V
R1483 33K
R1484 0R
0.765V
R1485 10K
GROUND

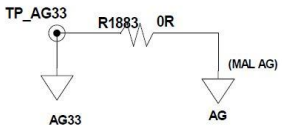

USB HUB 3.3V SUPPLY
Item 15
Add Resistor R1916 (1K+)
USB_5V
USBHUB_PWR_EN
U213
TPS563200DDCT
USBHUB_3V3
C1215 10UF 35V
C1247 100NF 50V
R1482 10K
C1246 100NF 50V
C1269 22UF 10V
R1483 33K
R1484 0R
R1916 1K
0.765V
R1485 10K
GROUND
(TO DISCHARGE POWER DURING RESET)

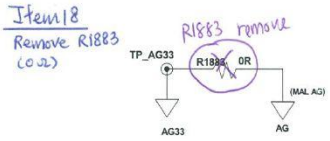

M33 1.2V SUPPLY
M33_EN
6V_SYS
R1837 0R
U179
TPS563200DDCT
L172 4.7UH 2.9A
M33_VDD12
M33_USB1V2
L167 75R
C1162 100NF 50V
C1175 22UF 25V
C1176 100NF 50V
R1385 510R
R1383 3K
0.765V
R1386 10K
GROUND

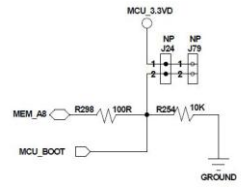

M33 1.2V SUPPLY
M33_EN
6V_SYS
R1837 0R
U179
TPS563200DDCT
L172 4.7UH 2.9A
M33_VDD12
M33_USB1V2
L167 75R
C1162 100NF 50V
C1175 22UF 25V
C1176 100NF 50V
R1385 510R
R1383 3K
2K7
Item 16
Change R1383 (From 3K to 2K7)
0.765V
R1386 10K
GROUND

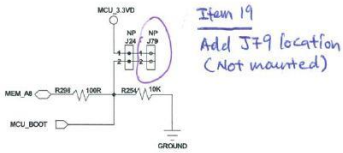

HDMI PROCESSOR #2

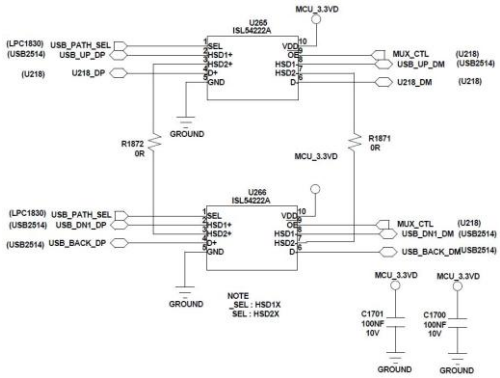

HDMI PROCESSOR #2
Item 17 (Part 1)
- R1861 } Change from 47K to 3K3
- R1863 }

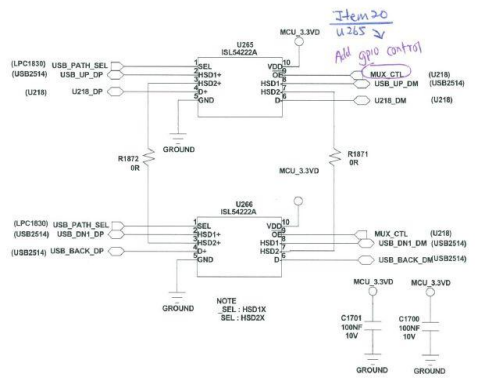

TP_AG33
R1883
0R
(MAL AG)
AG33
AG

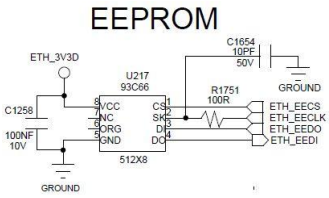

Item18
Remove R1883
(0 Ω)
R1883 remove
TP_AG33
R1883
0R
(MAL AG)
AG33
AG

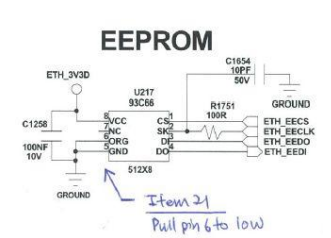

MCU_3.3VD
NP
J24
NP
J79
MEM_A8
R298
100R
R254
10K
MCU_BOOT
GROUND

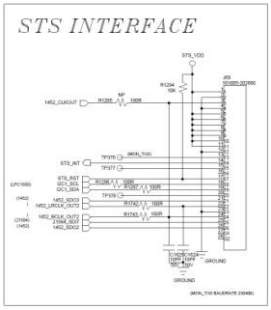

MCU_3.3VD
NP
J24
NP
J79
Item 19
Add J79 location
(Not mounted)
MEM_A8
R298
100R
R254
10K
MCU_BOOT
GROUND

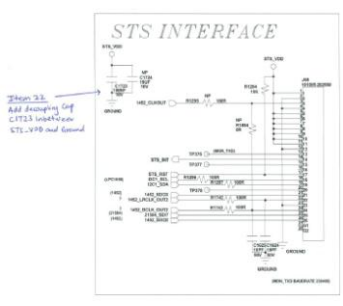

MCU_3.3VD
U265
ISL54222A
(LPC1830) USB_PATH_SEL
(USB2514) USB_UP_DP
(U218) U218_DP
MUX_CTL
USB_UP_DM (USB2514)
U218_DM (U218)
R1872
0R
R1871
0R
U266
ISL54222A
(LPC1830) USB_PATH_SEL
(USB2514) USB_DN1_DP
(USB2514) USB_BACK_DP
USB_DN1_DM (USB2514)
USB_BACK_DM (USB2514)
GROUND
NOTE
_SEL : HSD1X
SEL : HSD2X
C1701
100NF
10V
C1700
100NF
10V

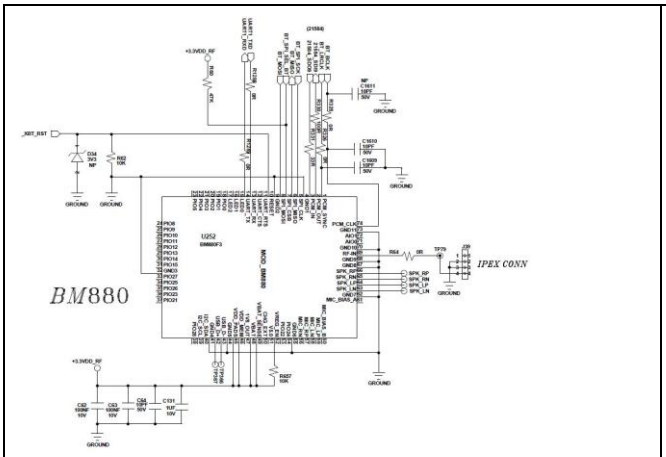

Item20
U265 ↘
Add gpio control
MCU_3.3VD
U265
ISL54222A
(LPC1830) USB_PATH_SEL
(USB2514) USB_UP_DP
(U218) U218_DP
MUX_CTL
USB_UP_DM (USB2514)
U218_DM (U218)
R1872
0R
R1871
0R
U266
ISL54222A
(LPC1830) USB_PATH_SEL
(USB2514) USB_DN1_DP
(USB2514) USB_BACK_DP
USB_DN1_DM (USB2514)
USB_BACK_DM (USB2514)
GROUND
NOTE
_SEL : HSD1X
SEL : HSD2X
C1701
100NF
10V
C1700
100NF
10V

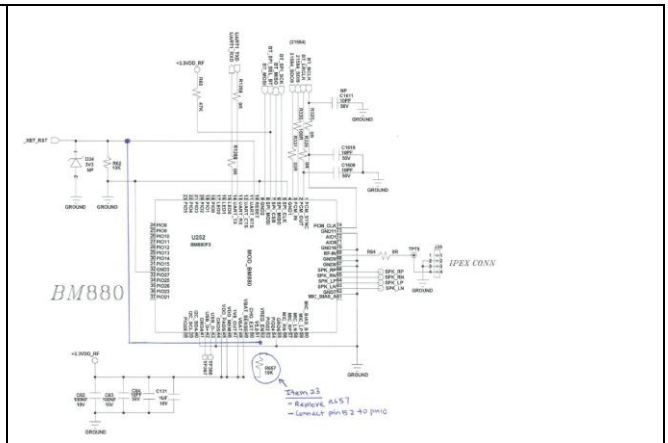

EEPROM
ETH_3V3D
C1654
10PF
50V
U217
93C66
R1751
100R
GROUND
C1258
100NF
10V
VCC
NC
ORG
GND
CS
SK
DI
DO
ETH_EECS
ETH_EECLK
ETH_EEDO
ETH_EEDI
512X8
GROUND

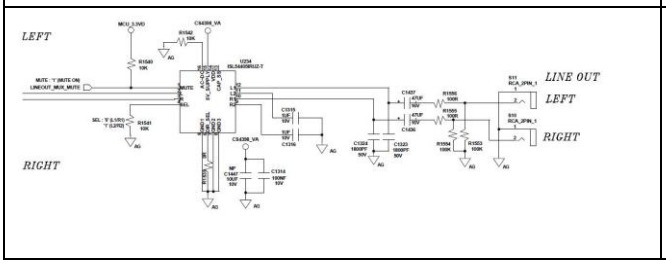

EEPROM
ETH_3V3D
C1654
10PF
50V
U217
93C66
R1751
100R
GROUND
C1258
100NF
10V
ETH_EECS
ETH_EECLK
ETH_EEDO
ETH_EEDI
512X8
GROUND
Item 21
Pull pin 6 to low

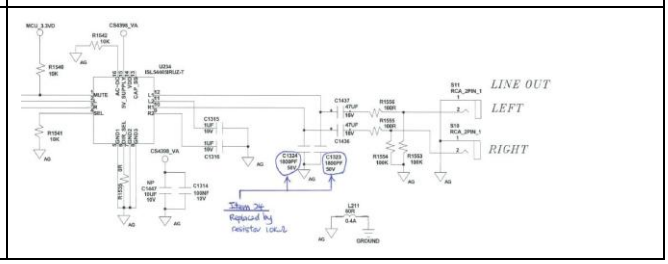

STS INTERFACE


STS INTERFACE
Item 22
Add decoupling Cap
C1723 inbetween
STS_VDD and Ground

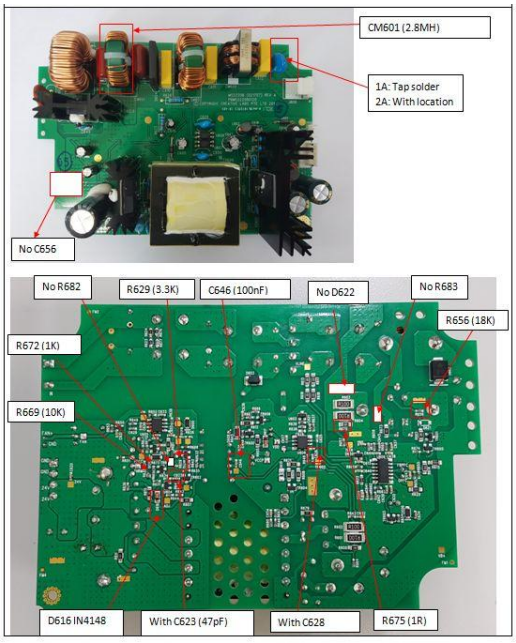
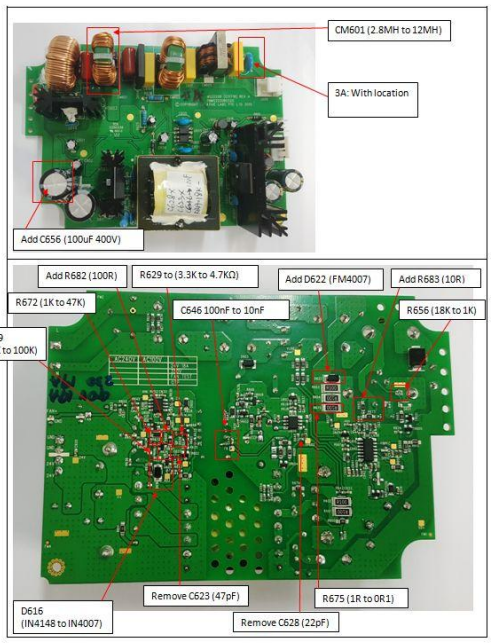
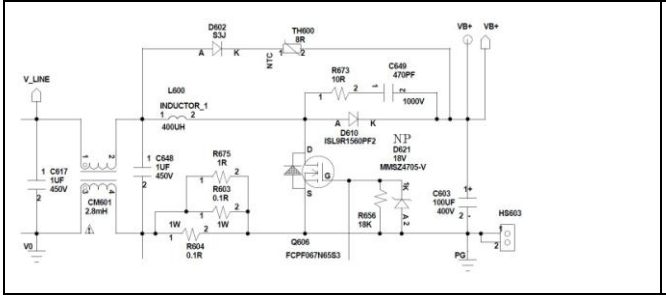
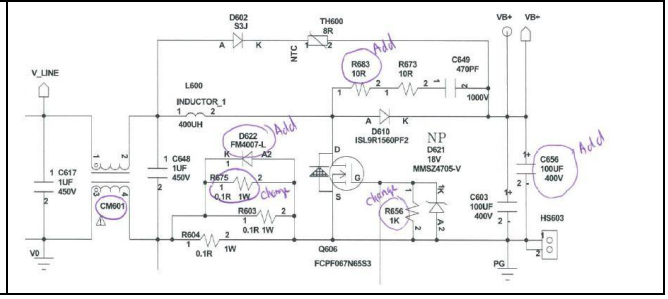


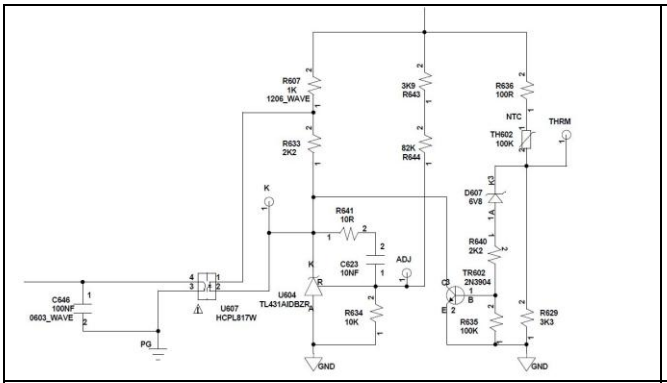



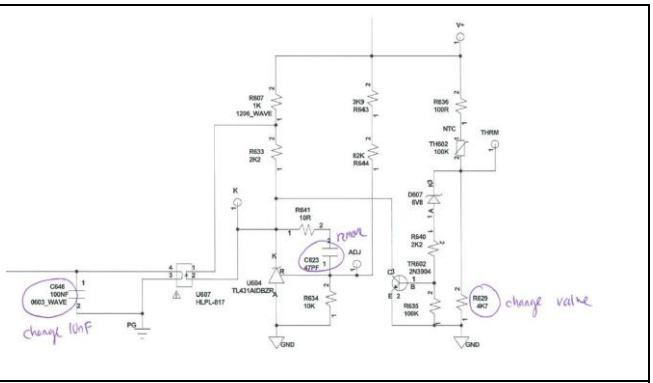



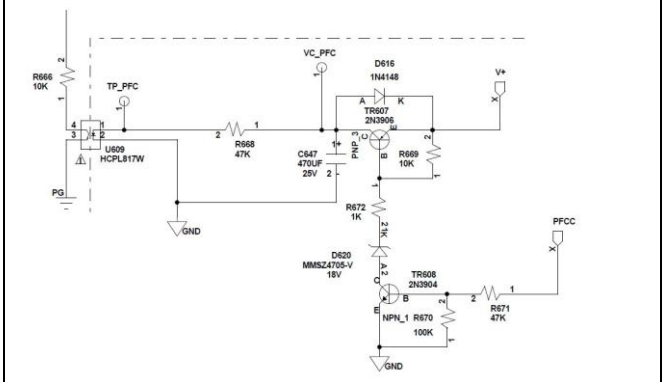



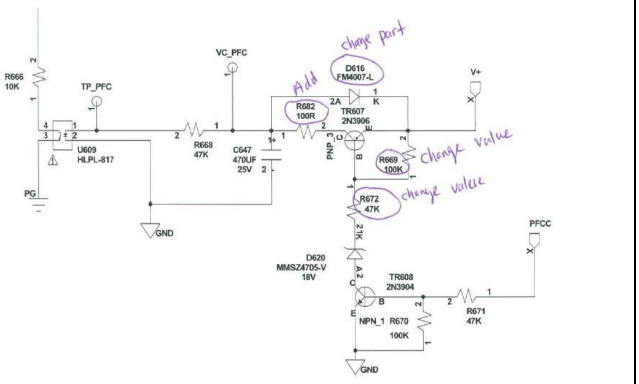

## MS2220B (Power Supply board)

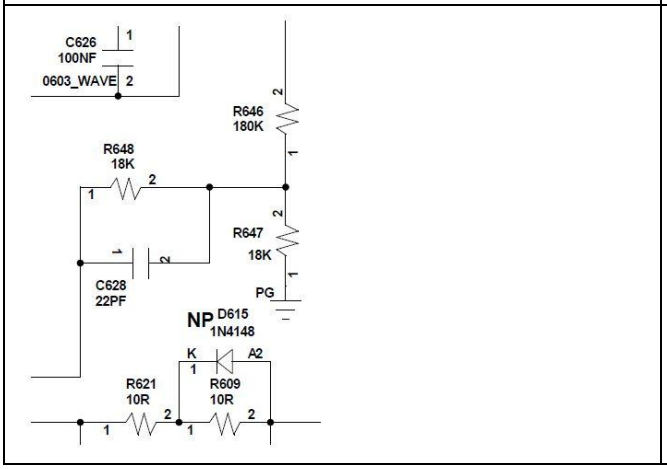
| Before | After |
|---|---|
|  |  |
|  |  |

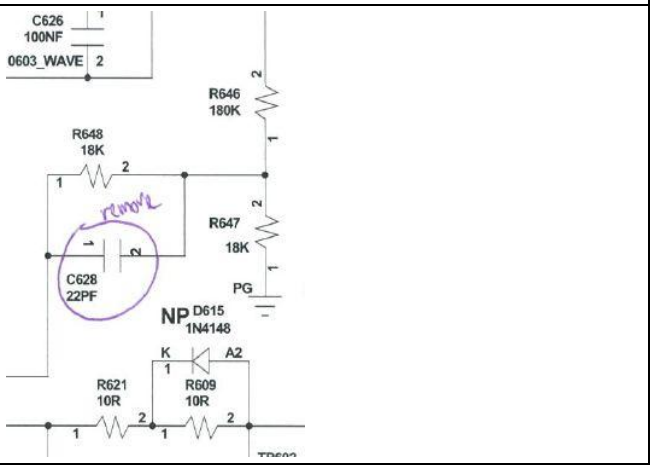


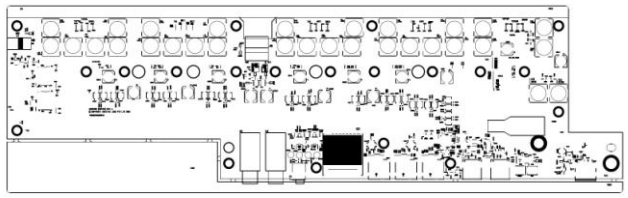
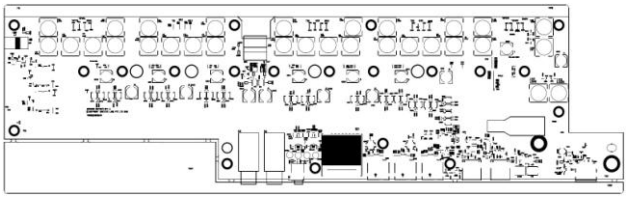
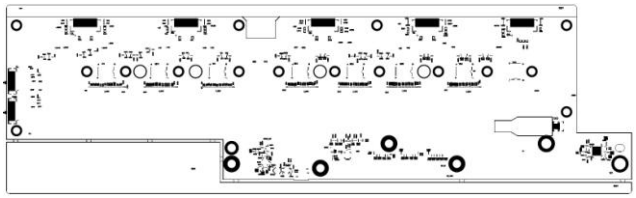
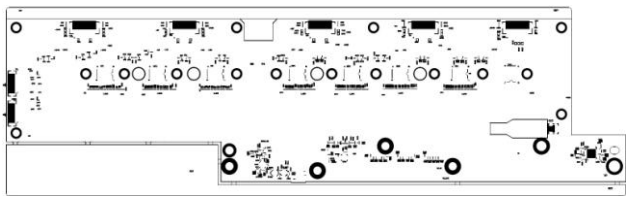



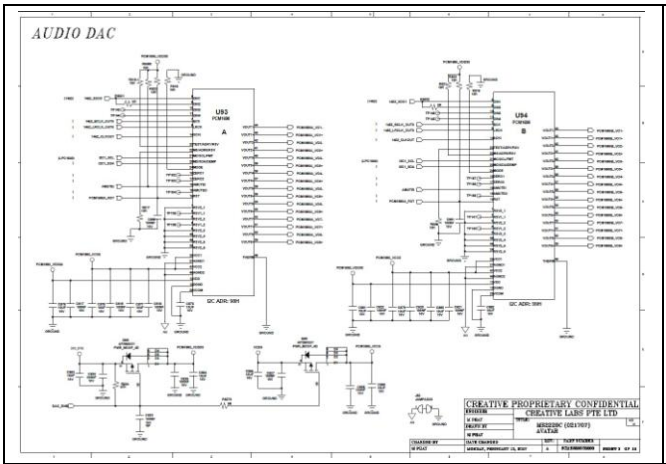



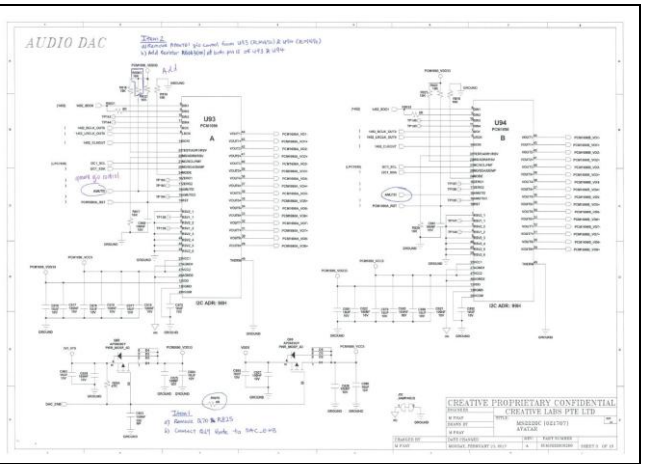



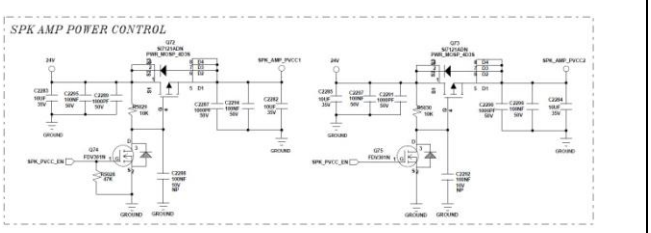



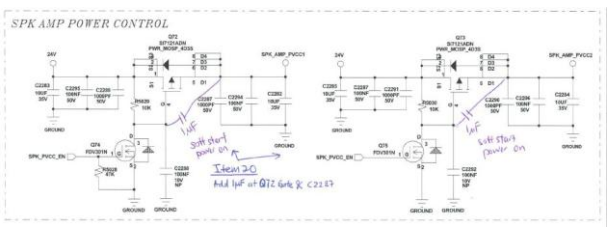



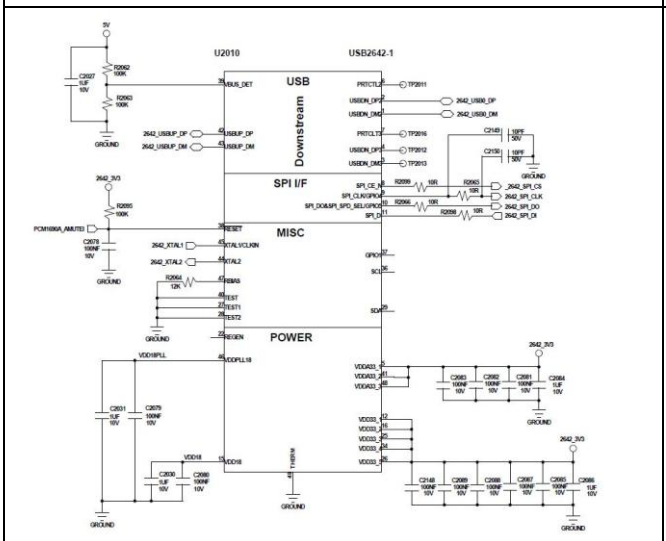

| MS2220C (Amplifier board) | |
|---|---|
| **Before** | **After** |
|  |  |
|  |  |

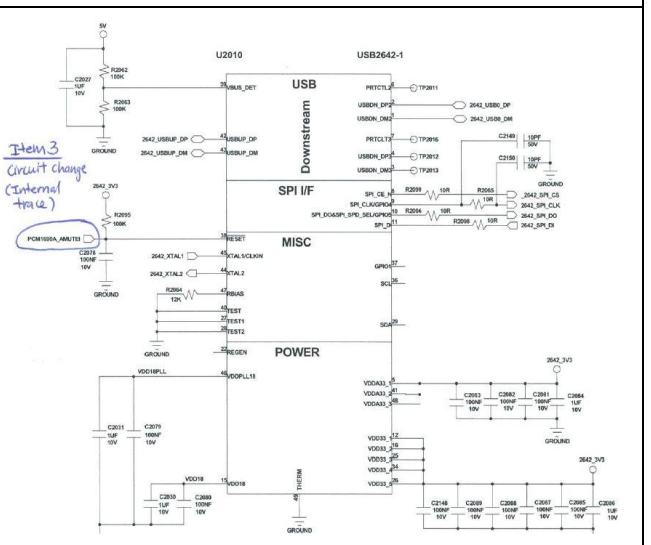

AUDIO DAC
U93
PCM186
A
U94
PCM186
B
I2C ADR: 98H
I2C ADR: 99H
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD
M2S22DC (021707)
AVATAR

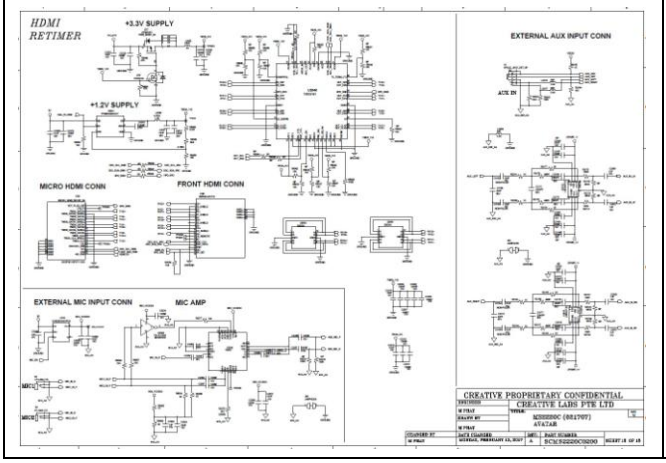

AUDIO DAC
U93
PCM186
A
U94
PCM186
B
I2C ADR: 98H
I2C ADR: 99H
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD
M2S22DC (021707)
AVATAR

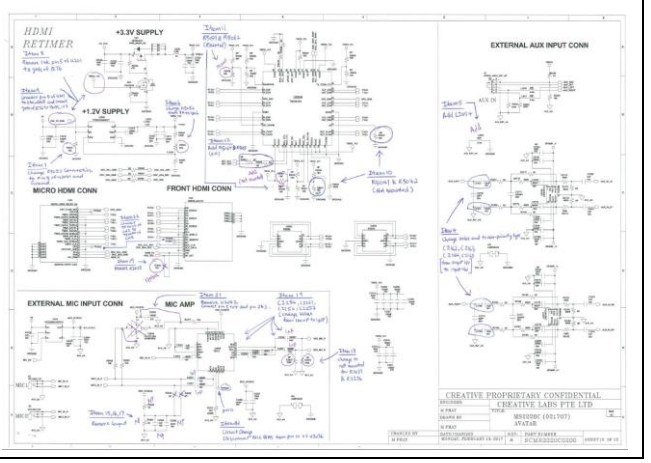

SPK AMP POWER CONTROL
SPK_AMP_PVCC1
SPK_AMP_PVCC2
SPK_PVCC_EN


SPK AMP POWER CONTROL
SPK_AMP_PVCC1
SPK_AMP_PVCC2
SPK_PVCC_EN


U2010
USB2642-1
USB
Downstream
SPI I/F
MISC
POWER


U2010
USB2642-1
USB
Downstream
SPI I/F
MISC
POWER

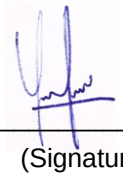

HDMI RETIMER
+3.3V SUPPLY
+1.2V SUPPLY
MICRO HDMI CONN
FRONT HDMI CONN
EXTERNAL MIC INPUT CONN
MIC AMP
EXTERNAL AUX INPUT CONN
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD


HDMI RETIMER
+3.3V SUPPLY
+1.2V SUPPLY
MICRO HDMI CONN
FRONT HDMI CONN
EXTERNAL MIC INPUT CONN
MIC AMP
EXTERNAL AUX INPUT CONN
CREATIVE PROPRIETARY CONFIDENTIAL
CREATIVE LABS PTE LTD

Issue date of original FCC ID is 03 May 2017

Thank you.

Yours Sincerely,

By: 

(Signature[1]) LIAN YAM FEI (Print name)

Title: Assoc Director of Product Development

On behalf of: Creative Labs Inc
(Company Name)

Telephone: +65 6895 4474

[1] - Must be signed by applicant contact given for applicant on the FCC site, or by the authorized agent if an appropriate authorized agent letter has been provided. Letters should be placed on appropriate letterhead.