MS-7785M1 Version : 11

CPU :

INTEL Ivy Bridge Processor

System Chipset :

INTEL Panther Point Chipset

On Board Chipset :

VRM 12 -- ISL6366CRZ-T 6+1 Phase
Gigabit LAN -- RTL8111E-VL-CG
HDA Codec -- Realtek ALC892-CG
Super I/O -- Fintek/F71889AD LAC
SPI Flash 64Mb

Main Memory :

2 Channel DDR III * 4 (Max 32GB)

Expansion Slot :

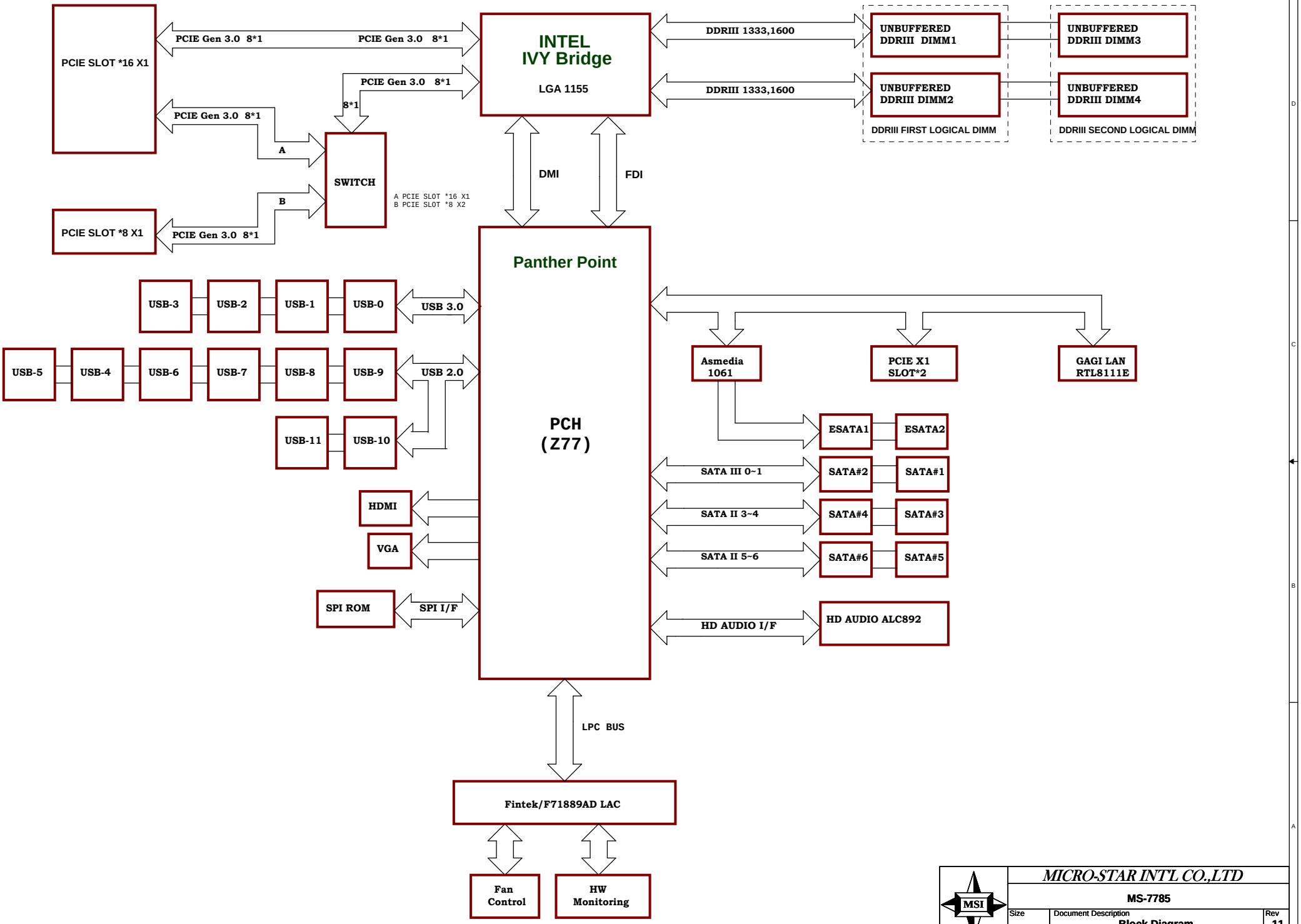
PCI Express x16 Slot * 2
(16X Gen3 * 1 or 8X Gnen 3 * 2)
PCI Express x1 Slot * 2

MICRO-STAR INTL CO.,LTD

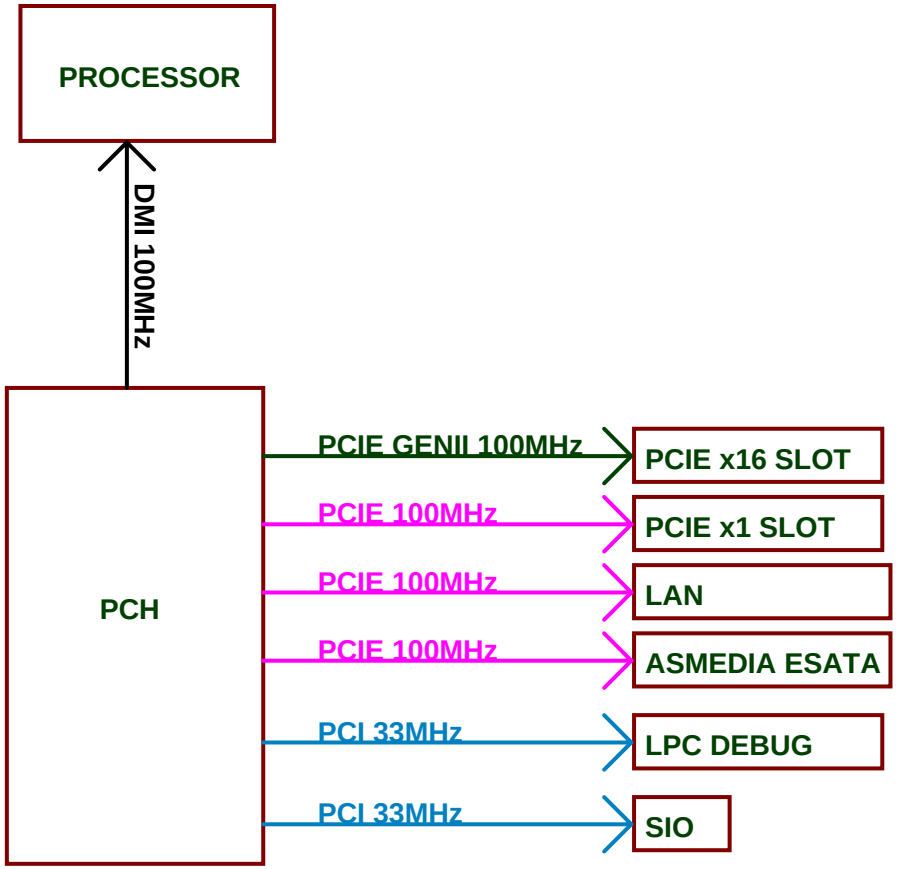
MS-7785

Size	Document Description	Rev
	Cover Sheet	11

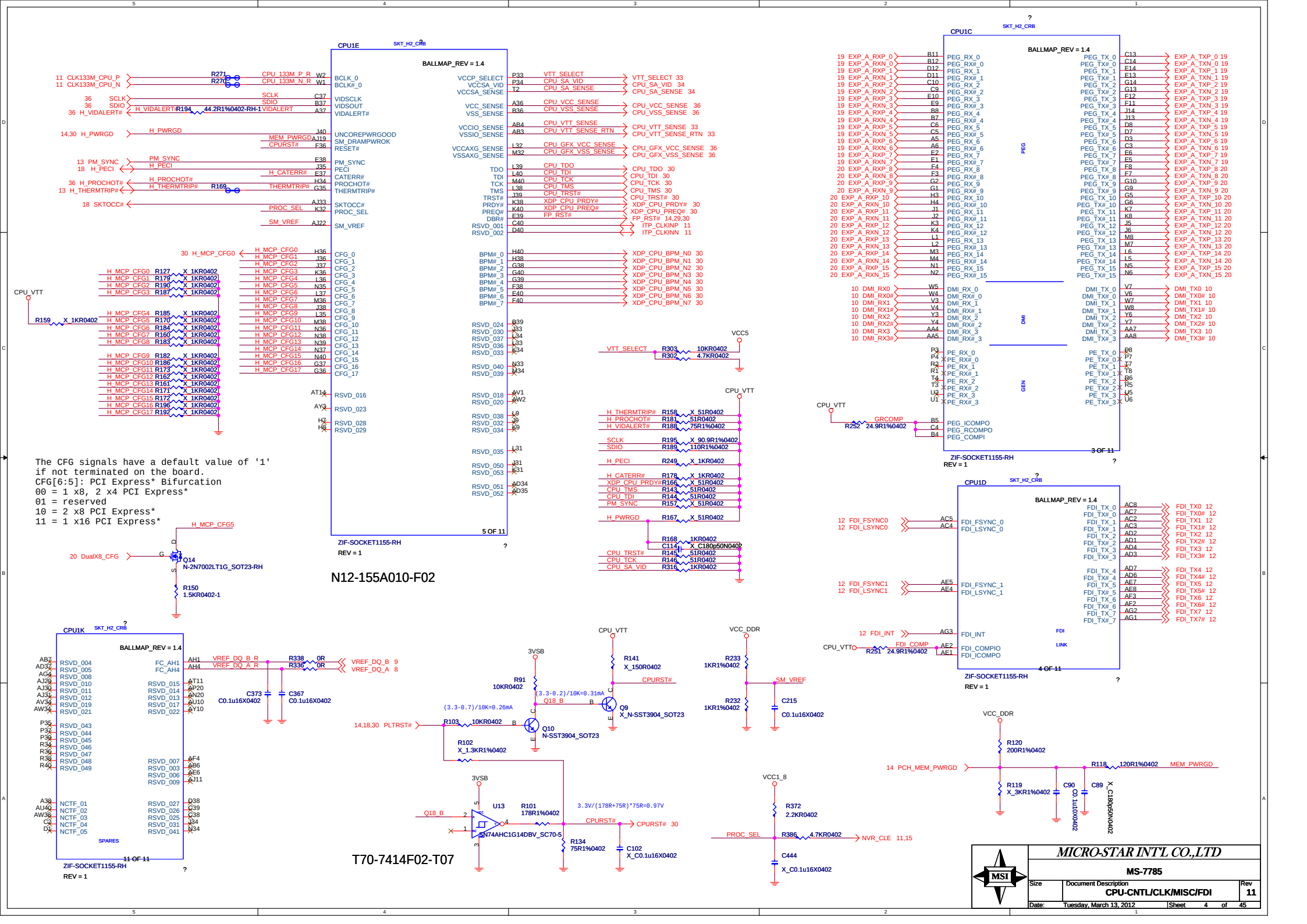
Date: Wednesday, March 14, 2012 Sheet 1 of 45



MICRO-STAR INTL CO.,LTD		
MS-7785		
Size	Document Description: Block Diagram	Rev: 11
Date: Friday, March 09, 2012	Sheet 2 of 45	



MSI	MICRO-STAR INT'L CO.,LTD	
	MS-7785	
Size	Document Description: Clock Distribution	Rev: 11
Date: Friday, March 09, 2012	Sheet 3 of 45	


CPU1E
SKT_H2_CRB
BALLMAP_REV = 1.4
ZIF-SOCKET1155-RH
REV = 1
5 OF 11
CPU1C
PEG
DMI
GEN
3 OF 11
CPU1D
FDI
LINK
4 OF 11
CPU1K
SPARES
11 OF 11
The CFG signals have a default value of '1'
if not terminated on the board.
CFG[6:5]: PCI Express* Bifurcation
00 = 1 x8, 2 x4 PCI Express*
01 = reserved
10 = 2 x8 PCI Express*
11 = 1 x16 PCI Express*
N12-155A010-F02
T70-7414F02-T07
MICRO-STAR INTL CO.,LTD
MS-7785
CPU-CNTL/CLK/MISC/FDI
Rev 11
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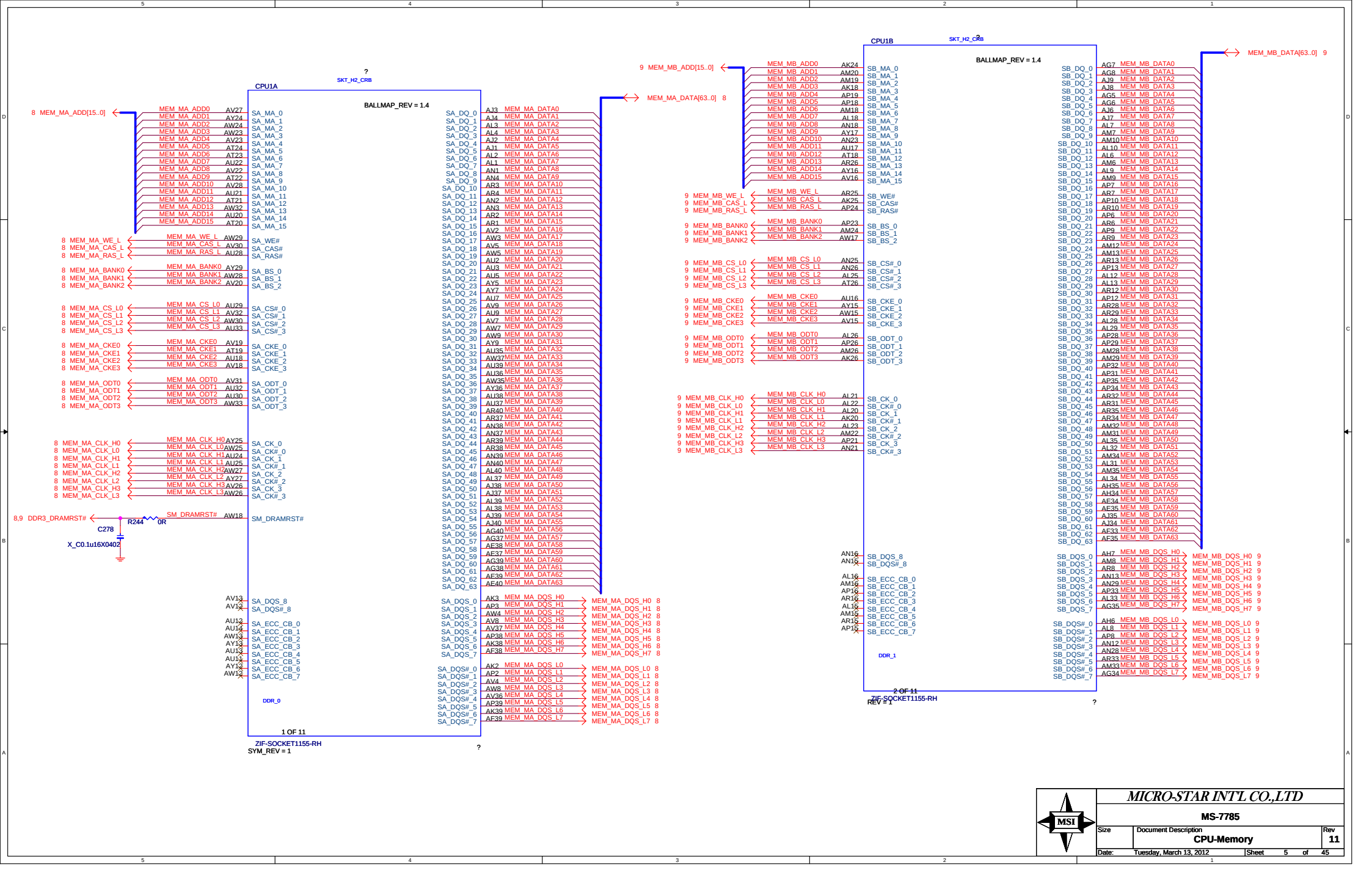
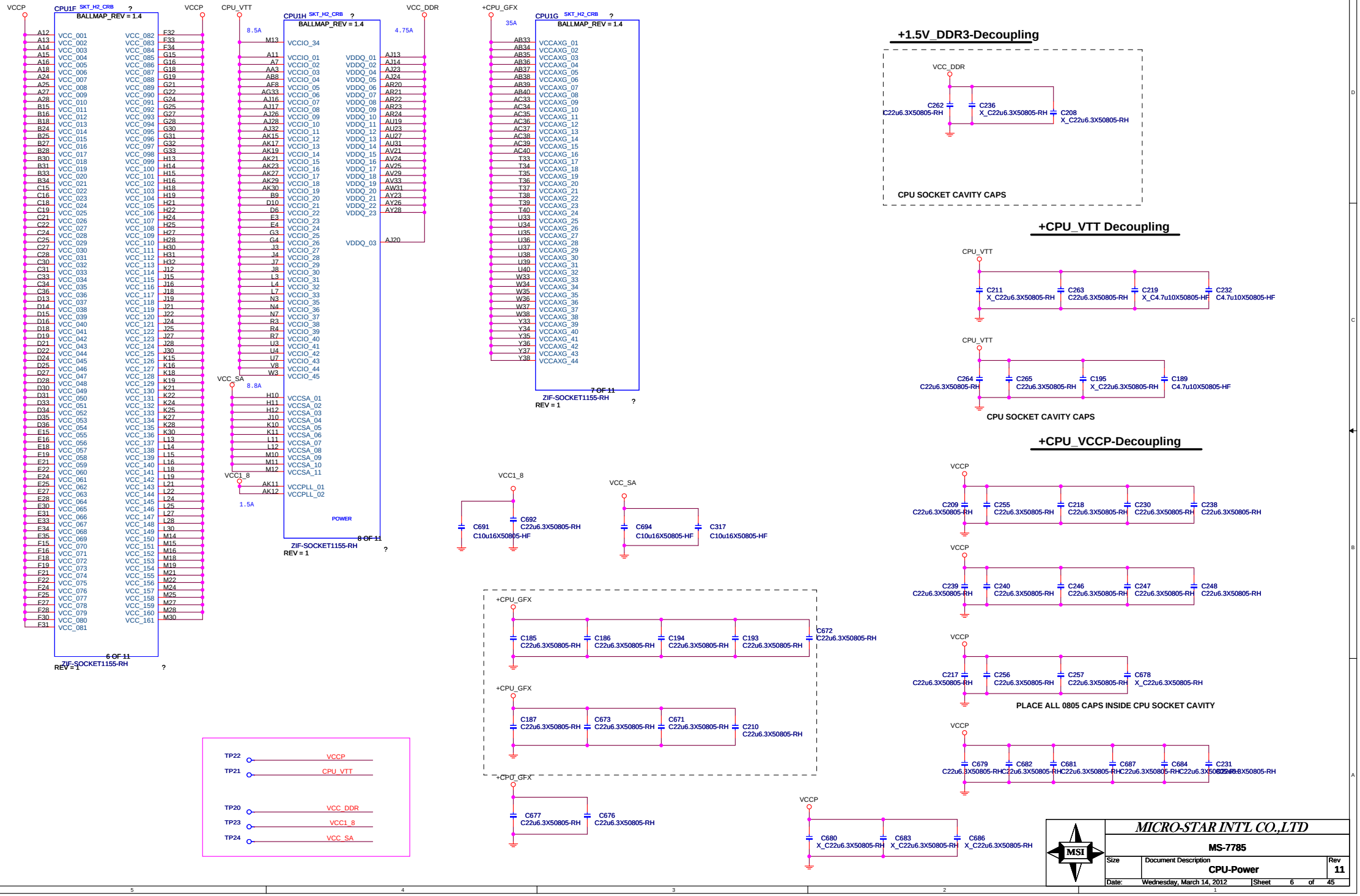


MICRO-STAR INTL CO.,LTD		
MS-7785		
Size	Document Description: CPU-Memory	Rev: 11
Date: Tuesday, March 13, 2012	Sheet 5 of 45	


VCCP
CPU1F SKT_H2_CRB
BALLMAP_REV = 1.4
6 OF 11
ZIF-SOCKET1155-RH
REV = 1
CPU_VTT
CPU1H SKT_H2_CRB
BALLMAP_REV = 1.4
8.5A
8 OF 11
ZIF-SOCKET1155-RH
REV = 1
VCC_DDR
4.75A
VCC_SA
8.8A
1.5A
VCC1_8
POWER
+CPU_GFX
CPU1G SKT_H2_CRB
BALLMAP_REV = 1.4
35A
7 OF 11
ZIF-SOCKET1155-RH
REV = 1
+1.5V_DDR3-Decoupling
VCC_DDR
C262 C22u6.3X50805-RH
C236 X_C22u6.3X50805-RH
C208 X_C22u6.3X50805-RH
CPU SOCKET CAVITY CAPS
+CPU_VTT Decoupling
CPU_VTT
C211 X_C22u6.3X50805-RH
C263 C22u6.3X50805-RH
C219 X_C4.7u10X50805-HF
C232 C4.7u10X50805-HF
CPU_VTT
C264 C22u6.3X50805-RH
C265 C22u6.3X50805-RH
C195 X_C22u6.3X50805-RH
C189 C4.7u10X50805-HF
CPU SOCKET CAVITY CAPS
+CPU_VCCP-Decoupling
VCCP
C209 C22u6.3X50805-RH
C255 C22u6.3X50805-RH
C218 C22u6.3X50805-RH
C230 C22u6.3X50805-RH
C238 C22u6.3X50805-RH
VCCP
C239 C22u6.3X50805-RH
C240 C22u6.3X50805-RH
C246 C22u6.3X50805-RH
C247 C22u6.3X50805-RH
C248 C22u6.3X50805-RH
VCCP
C217 C22u6.3X50805-RH
C256 C22u6.3X50805-RH
C257 C22u6.3X50805-RH
C678 X_C22u6.3X50805-RH
PLACE ALL 0805 CAPS INSIDE CPU SOCKET CAVITY
VCCP
C679 C22u6.3X50805-RH
C682 C22u6.3X50805-RH
C681 C22u6.3X50805-RH
C687 C22u6.3X50805-RH
C684 C22u6.3X50805-RH
C231 C22u6.3X50805-RH
VCC1_8
C691 C10u16X50805-HF
C692 C22u6.3X50805-RH
VCC_SA
C694 C10u16X50805-HF
C317 C10u16X50805-HF
+CPU_GFX
C185 C22u6.3X50805-RH
C186 C22u6.3X50805-RH
C194 C22u6.3X50805-RH
C193 C22u6.3X50805-RH
C672 C22u6.3X50805-RH
+CPU_GFX
C187 C22u6.3X50805-RH
C673 C22u6.3X50805-RH
C671 C22u6.3X50805-RH
C210 C22u6.3X50805-RH
+CPU_GFX
C677 C22u6.3X50805-RH
C676 C22u6.3X50805-RH
VCCP
C680 X_C22u6.3X50805-RH
C683 X_C22u6.3X50805-RH
C686 X_C22u6.3X50805-RH
TP22 VCCP
TP21 CPU_VTT
TP20 VCC_DDR
TP23 VCC1_8
TP24 VCC_SA
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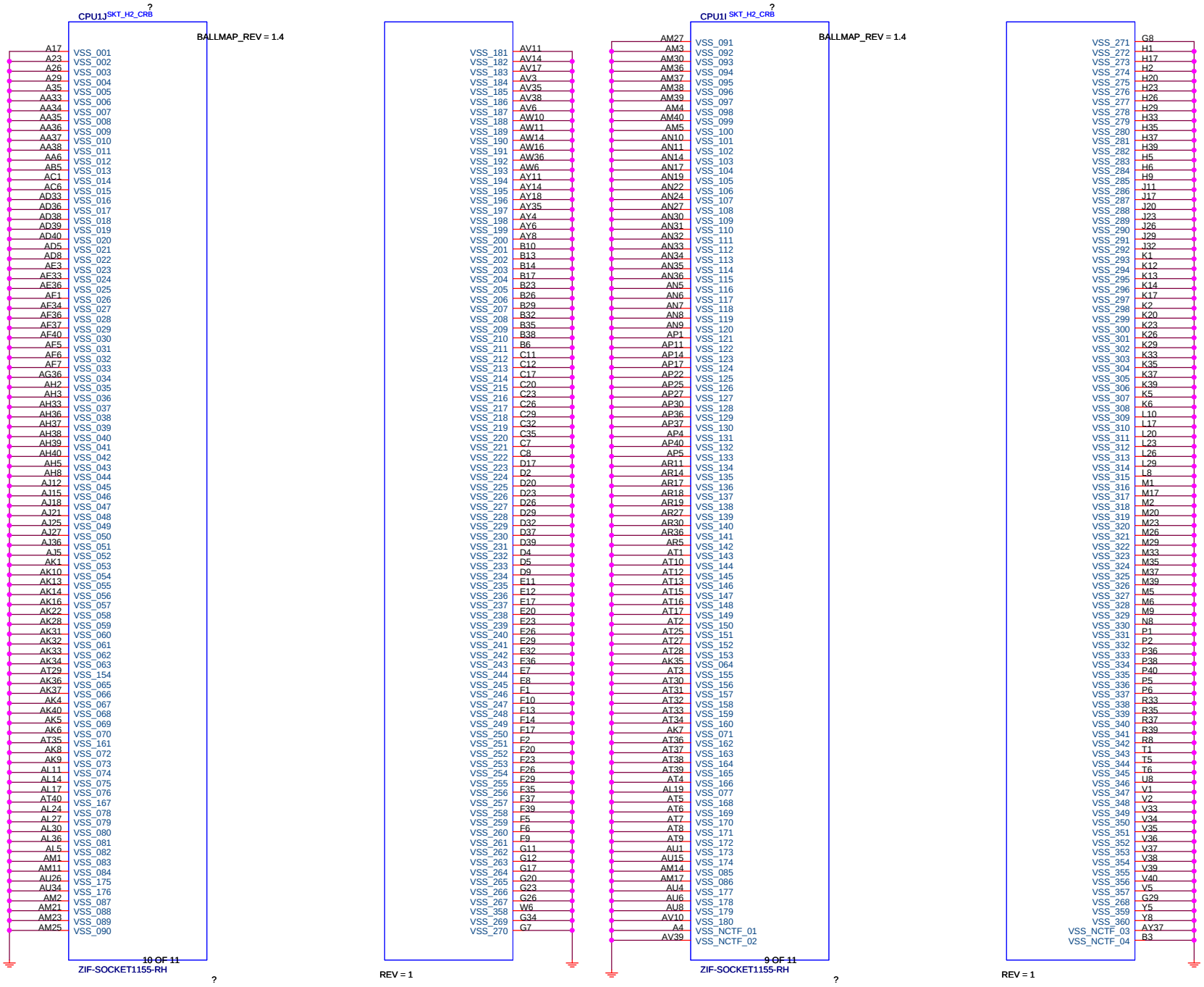
CPU1J SKT_H2_CRB
BALLMAP_REV = 1.4
A17 A23 A26 A29 A35 AA33 AA34 AA35 AA36 AA37 AA38 AA6 AB5 AC1 AC6 AD33 AD36 AD38 AD39 AD40 AD5 AD8 AE3 AE33 AE36 AE1 AE34 AE36 AE37 AE40 AE5 AE6 AE7 AG36 AH2 AH3 AH33 AH36 AH37 AH38 AH39 AH40 AH5 AH8 AJ12 AJ15 AJ18 AJ21 AJ25 AJ27 AJ36 AJ5 AK1 AK10 AK13 AK14 AK16 AK22 AK28 AK31 AK32 AK33 AK34 AT29 AK36 AK37 AK4 AK40 AK5 AK6 AT35 AK8 AK9 AL11 AL14 AL17 AT40 AL24 AL27 AL30 AL36 AL5 AM1 AM11 AU26 AU34 AM2 AM21 AM23 AM25
VSS_001 VSS_002 VSS_003 VSS_004 VSS_005 VSS_006 VSS_007 VSS_008 VSS_009 VSS_010 VSS_011 VSS_012 VSS_013 VSS_014 VSS_015 VSS_016 VSS_017 VSS_018 VSS_019 VSS_020 VSS_021 VSS_022 VSS_023 VSS_024 VSS_025 VSS_026 VSS_027 VSS_028 VSS_029 VSS_030 VSS_031 VSS_032 VSS_033 VSS_034 VSS_035 VSS_036 VSS_037 VSS_038 VSS_039 VSS_040 VSS_041 VSS_042 VSS_043 VSS_044 VSS_045 VSS_046 VSS_047 VSS_048 VSS_049 VSS_050 VSS_051 VSS_052 VSS_053 VSS_054 VSS_055 VSS_056 VSS_057 VSS_058 VSS_059 VSS_060 VSS_061 VSS_062 VSS_063 VSS_154 VSS_065 VSS_066 VSS_067 VSS_068 VSS_069 VSS_070 VSS_161 VSS_072 VSS_073 VSS_074 VSS_075 VSS_076 VSS_167 VSS_078 VSS_079 VSS_080 VSS_081 VSS_082 VSS_083 VSS_084 VSS_175 VSS_176 VSS_087 VSS_088 VSS_089 VSS_090
10 OF 11
ZIF-SOCKET1155-RH
VSS_181 VSS_182 VSS_183 VSS_184 VSS_185 VSS_186 VSS_187 VSS_188 VSS_189 VSS_190 VSS_191 VSS_192 VSS_193 VSS_194 VSS_195 VSS_196 VSS_197 VSS_198 VSS_199 VSS_200 VSS_201 VSS_202 VSS_203 VSS_204 VSS_205 VSS_206 VSS_207 VSS_208 VSS_209 VSS_210 VSS_211 VSS_212 VSS_213 VSS_214 VSS_215 VSS_216 VSS_217 VSS_218 VSS_219 VSS_220 VSS_221 VSS_222 VSS_223 VSS_224 VSS_225 VSS_226 VSS_227 VSS_228 VSS_229 VSS_230 VSS_231 VSS_232 VSS_233 VSS_234 VSS_235 VSS_236 VSS_237 VSS_238 VSS_239 VSS_240 VSS_241 VSS_242 VSS_243 VSS_244 VSS_245 VSS_246 VSS_247 VSS_248 VSS_249 VSS_250 VSS_251 VSS_252 VSS_253 VSS_254 VSS_255 VSS_256 VSS_257 VSS_258 VSS_259 VSS_260 VSS_261 VSS_262 VSS_263 VSS_264 VSS_265 VSS_266 VSS_267 VSS_358 VSS_269 VSS_270
AV11 AV14 AV17 AV3 AV35 AV38 AV6 AW10 AW11 AW14 AW16 AW36 AW6 AY11 AY14 AY18 AY35 AY4 AY6 AY8 B10 B13 B14 B17 B23 B26 B29 B32 B35 B38 B6 C11 C12 C17 C20 C23 C26 C29 C32 C35 C7 C8 D17 D2 D20 D23 D26 D29 D32 D37 D39 D4 D5 D9 E11 E12 E17 E20 E23 E26 E29 E32 E36 E7 E8 F1 F10 F13 F14 F17 F2 F20 F23 F26 F29 F35 F37 F39 F5 F6 F9 G11 G12 G17 G20 G23 G26 W6 G34 G7
REV = 1
CPU1I SKT_H2_CRB
BALLMAP_REV = 1.4
AM27 AM3 AM30 AM36 AM37 AM38 AM39 AM4 AM40 AM5 AN10 AN11 AN14 AN17 AN19 AN22 AN24 AN27 AN30 AN31 AN32 AN33 AN34 AN35 AN36 AN5 AN6 AN7 AN8 AN9 AP1 AP11 AP14 AP17 AP22 AP25 AP27 AP30 AP36 AP37 AP4 AP40 AP5 AR11 AR14 AR17 AR18 AR19 AR27 AR30 AR36 AR5 AT1 AT10 AT12 AT13 AT15 AT16 AT17 AT2 AT25 AT27 AT28 AK35 AT3 AT30 AT31 AT32 AT33 AT34 AK7 AT36 AT37 AT38 AT39 AT4 AL19 AT5 AT6 AT7 AT8 AT9 AU1 AU15 AM14 AM17 AU4 AU6 AU8 AV10 A4 AV39
VSS_091 VSS_092 VSS_093 VSS_094 VSS_095 VSS_096 VSS_097 VSS_098 VSS_099 VSS_100 VSS_101 VSS_102 VSS_103 VSS_104 VSS_105 VSS_106 VSS_107 VSS_108 VSS_109 VSS_110 VSS_111 VSS_112 VSS_113 VSS_114 VSS_115 VSS_116 VSS_117 VSS_118 VSS_119 VSS_120 VSS_121 VSS_122 VSS_123 VSS_124 VSS_125 VSS_126 VSS_127 VSS_128 VSS_129 VSS_130 VSS_131 VSS_132 VSS_133 VSS_134 VSS_135 VSS_136 VSS_137 VSS_138 VSS_139 VSS_140 VSS_141 VSS_142 VSS_143 VSS_144 VSS_145 VSS_146 VSS_147 VSS_148 VSS_149 VSS_150 VSS_151 VSS_152 VSS_153 VSS_064 VSS_155 VSS_156 VSS_157 VSS_158 VSS_159 VSS_160 VSS_071 VSS_162 VSS_163 VSS_164 VSS_165 VSS_166 VSS_077 VSS_168 VSS_169 VSS_170 VSS_171 VSS_172 VSS_173 VSS_174 VSS_085 VSS_086 VSS_177 VSS_178 VSS_179 VSS_180 VSS_NCTF_01 VSS_NCTF_02
9 OF 11
ZIF-SOCKET1155-RH
VSS_271 VSS_272 VSS_273 VSS_274 VSS_275 VSS_276 VSS_277 VSS_278 VSS_279 VSS_280 VSS_281 VSS_282 VSS_283 VSS_284 VSS_285 VSS_286 VSS_287 VSS_288 VSS_289 VSS_290 VSS_291 VSS_292 VSS_293 VSS_294 VSS_295 VSS_296 VSS_297 VSS_298 VSS_299 VSS_300 VSS_301 VSS_302 VSS_303 VSS_304 VSS_305 VSS_306 VSS_307 VSS_308 VSS_309 VSS_310 VSS_311 VSS_312 VSS_313 VSS_314 VSS_315 VSS_316 VSS_317 VSS_318 VSS_319 VSS_320 VSS_321 VSS_322 VSS_323 VSS_324 VSS_325 VSS_326 VSS_327 VSS_328 VSS_329 VSS_330 VSS_331 VSS_332 VSS_333 VSS_334 VSS_335 VSS_336 VSS_337 VSS_338 VSS_339 VSS_340 VSS_341 VSS_342 VSS_343 VSS_344 VSS_345 VSS_346 VSS_347 VSS_348 VSS_349 VSS_350 VSS_351 VSS_352 VSS_353 VSS_354 VSS_355 VSS_356 VSS_357 VSS_268 VSS_359 VSS_360 VSS_NCTF_03 VSS_NCTF_04
G8 H1 H17 H2 H20 H23 H26 H29 H33 H35 H37 H39 H5 H6 H9 J11 J17 J20 J23 J26 J29 J32 K1 K12 K13 K14 K17 K2 K20 K23 K26 K29 K33 K35 K37 K39 K5 K6 L10 L17 L20 L23 L26 L29 L8 M1 M17 M2 M20 M23 M26 M29 M33 M35 M37 M39 M5 M6 M9 N8 P1 P2 P36 P38 P40 P5 P6 R33 R35 R37 R39 R8 T1 T5 T6 U8 V1 V2 V33 V34 V35 V36 V37 V38 V39 V40 V5 G29 Y5 Y8 AY37 B3
REV = 1
MICRO-STAR INTL CO.,LTD
MS-7785
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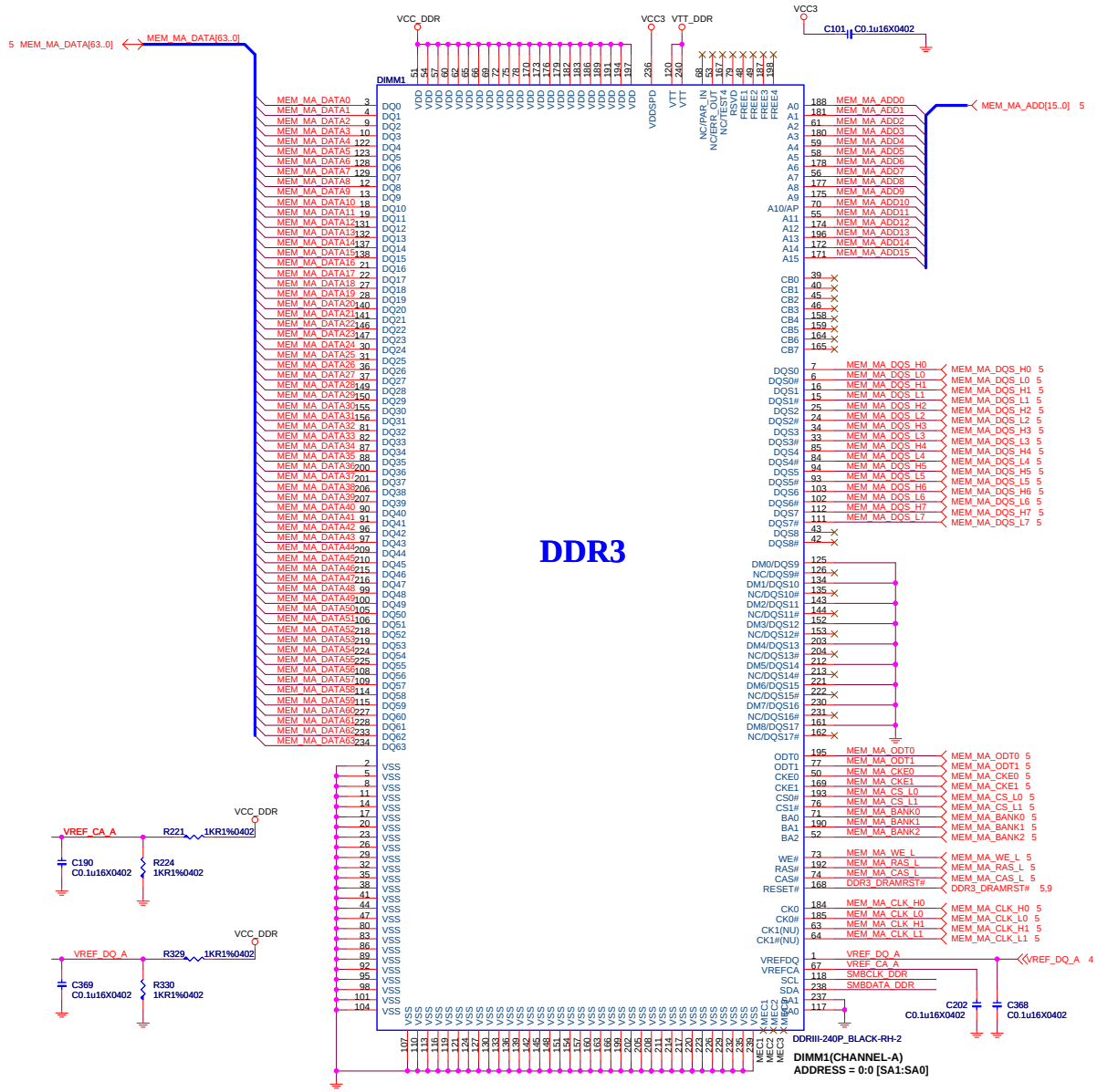
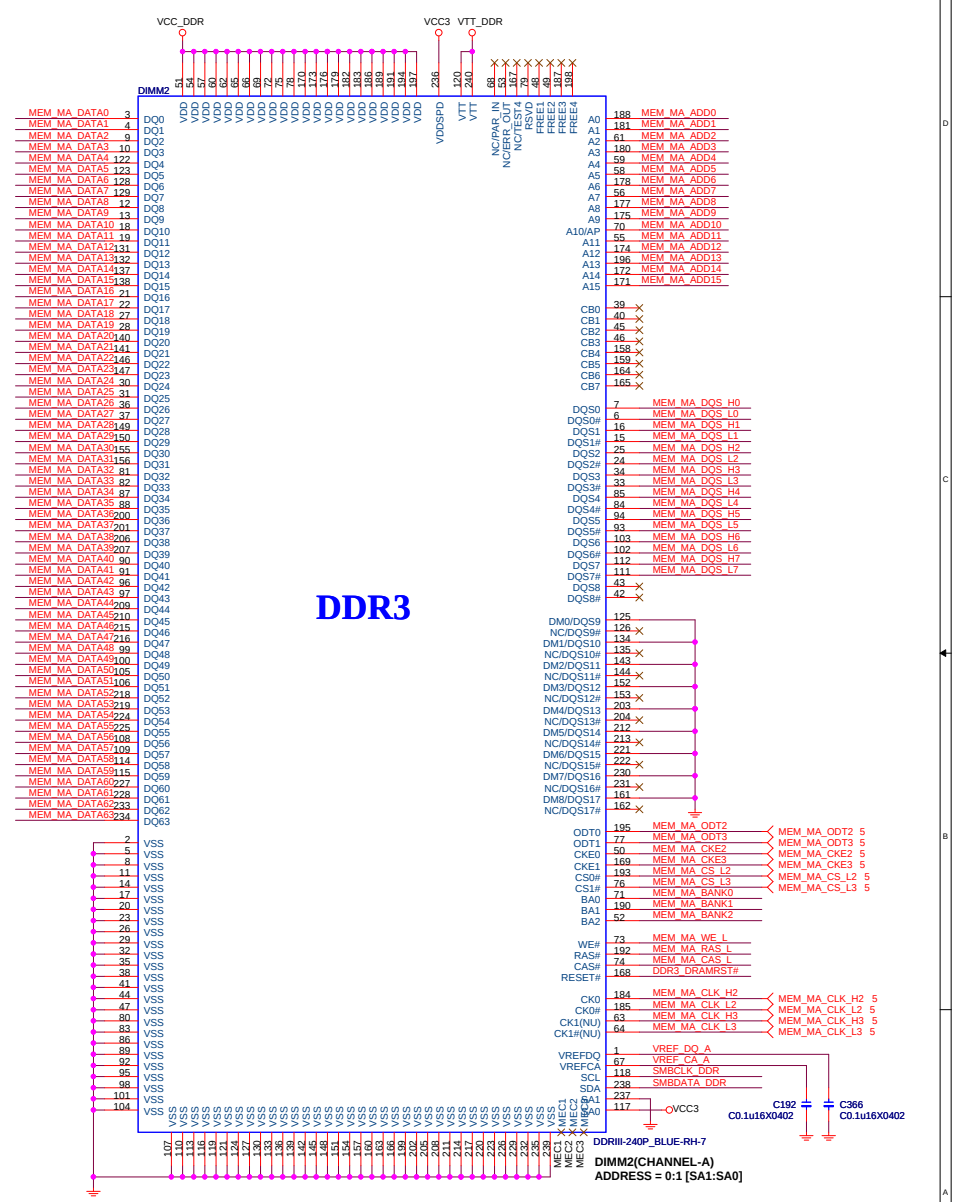
DDRIII DIMM_A1



N13-2400601-K06

DDRIII DIMM_A2



N13-2401121-K06

9 SMBCLK_DDR — SMBCLK_DDR R97 33R0402 — SMB_CLK_MAIN 14,30,33,36

9 SMBDATA_DDR — SMBDATA_DDR R105 33R0402 — SMB_DATA_MAIN 14,30,33,36

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	DDR3 Chanel-A DIMM1/2	11

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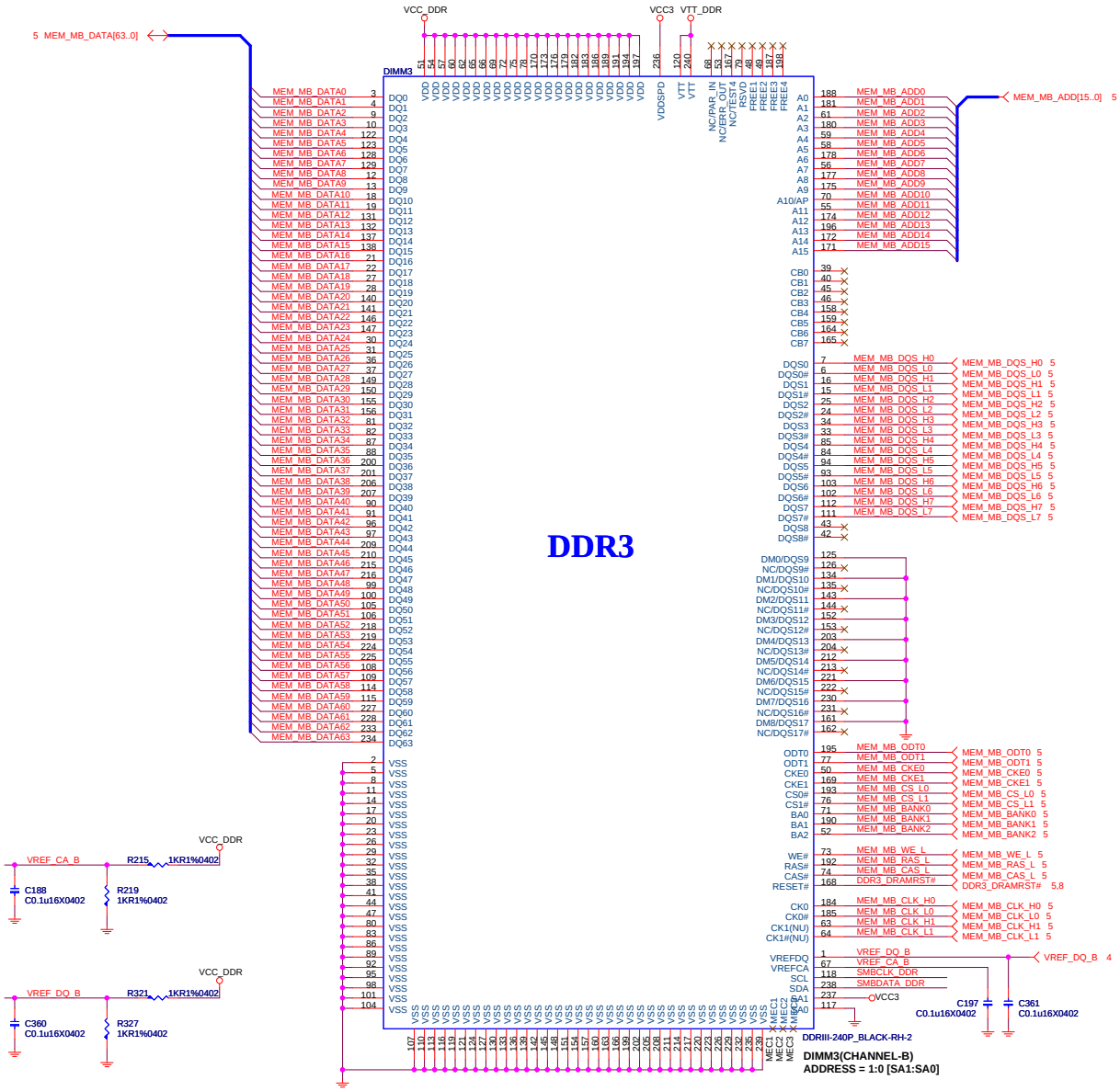
DDRIII DIMM_B1



N13-2400601-K06

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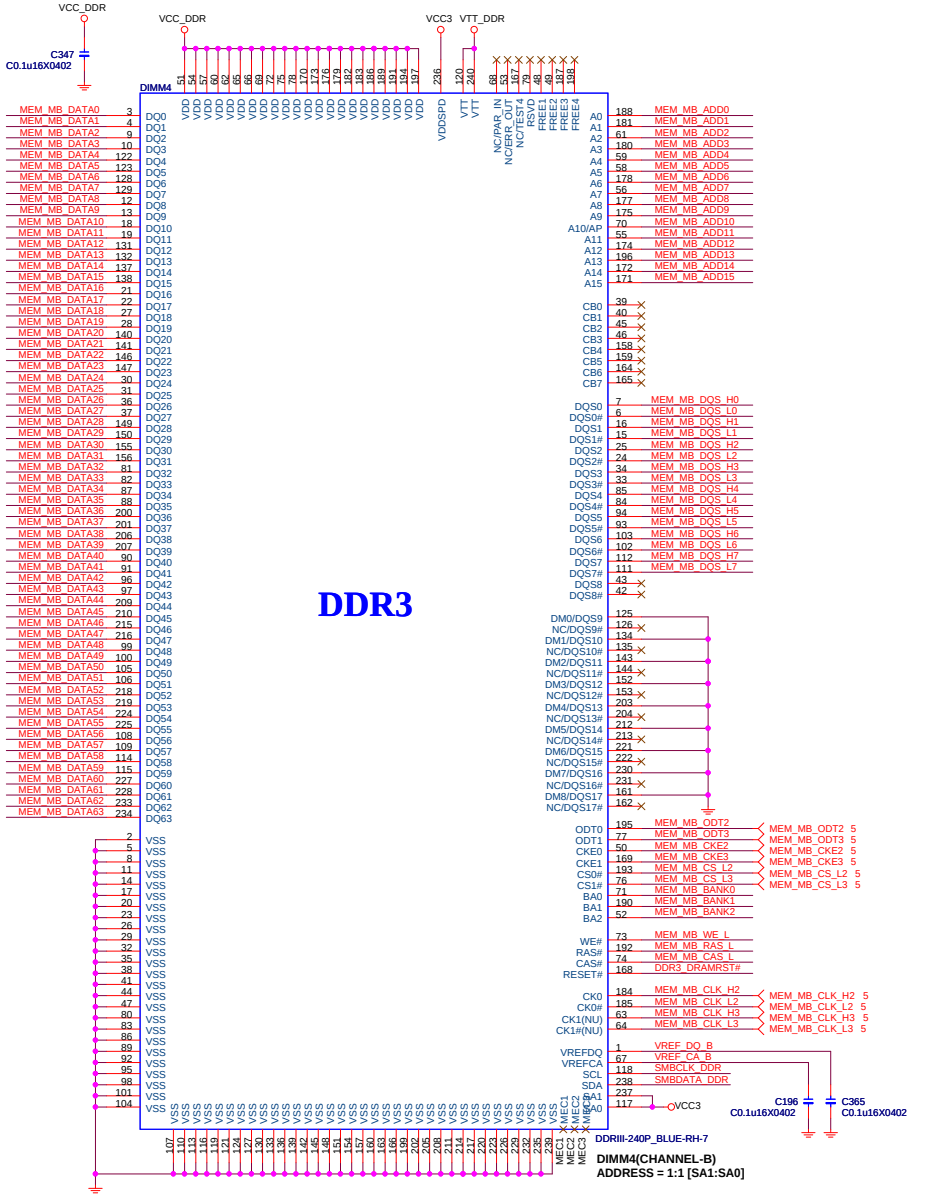

N13-2401121-K06

MICRO-STAR INTL CO.,LTD			
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Size	Document Description		Rev
	DDR3 Chanel-B DIMM3/4		11
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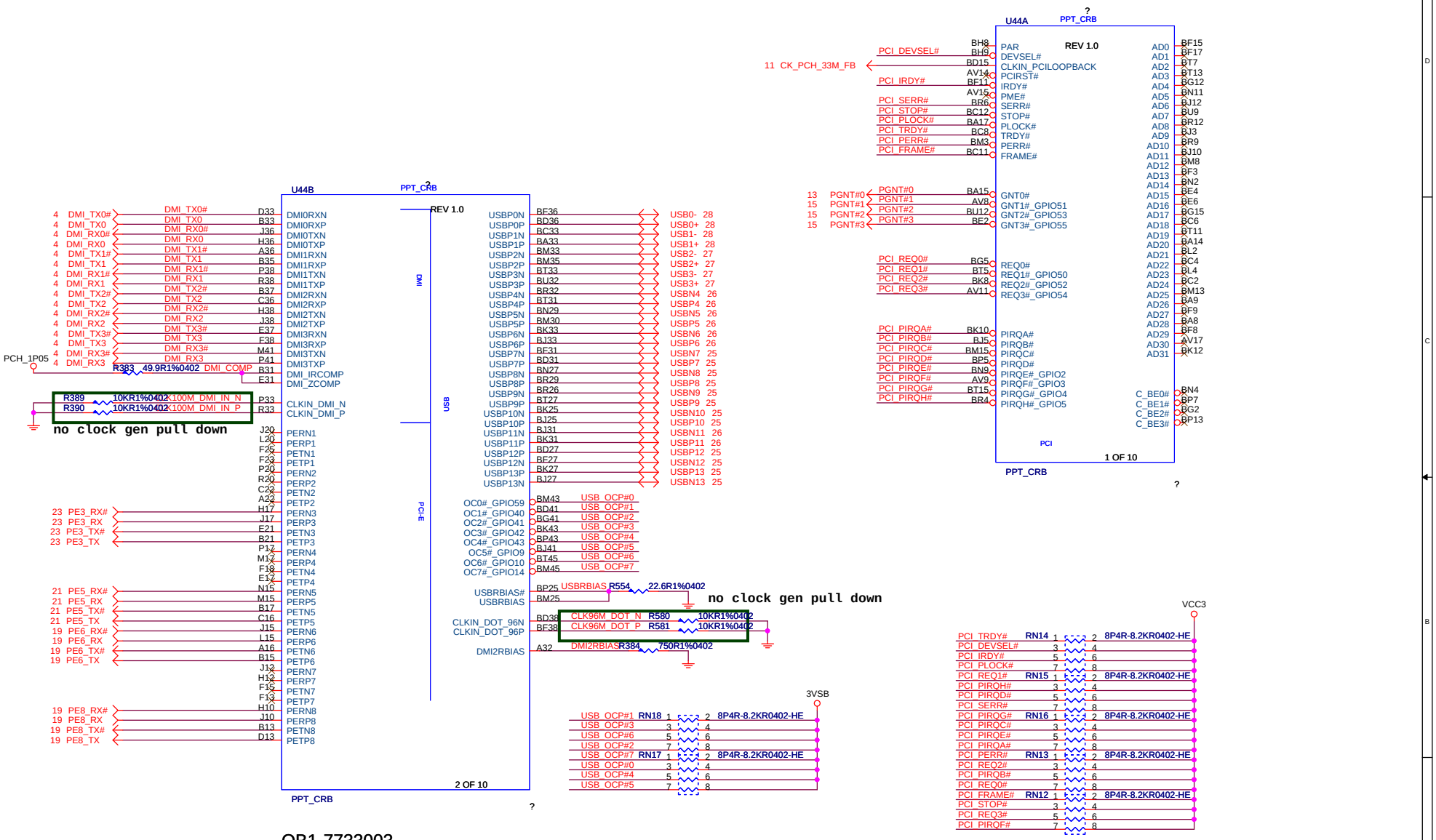

OB1-7733003

MICRO-STAR INTL CO.,LTD		
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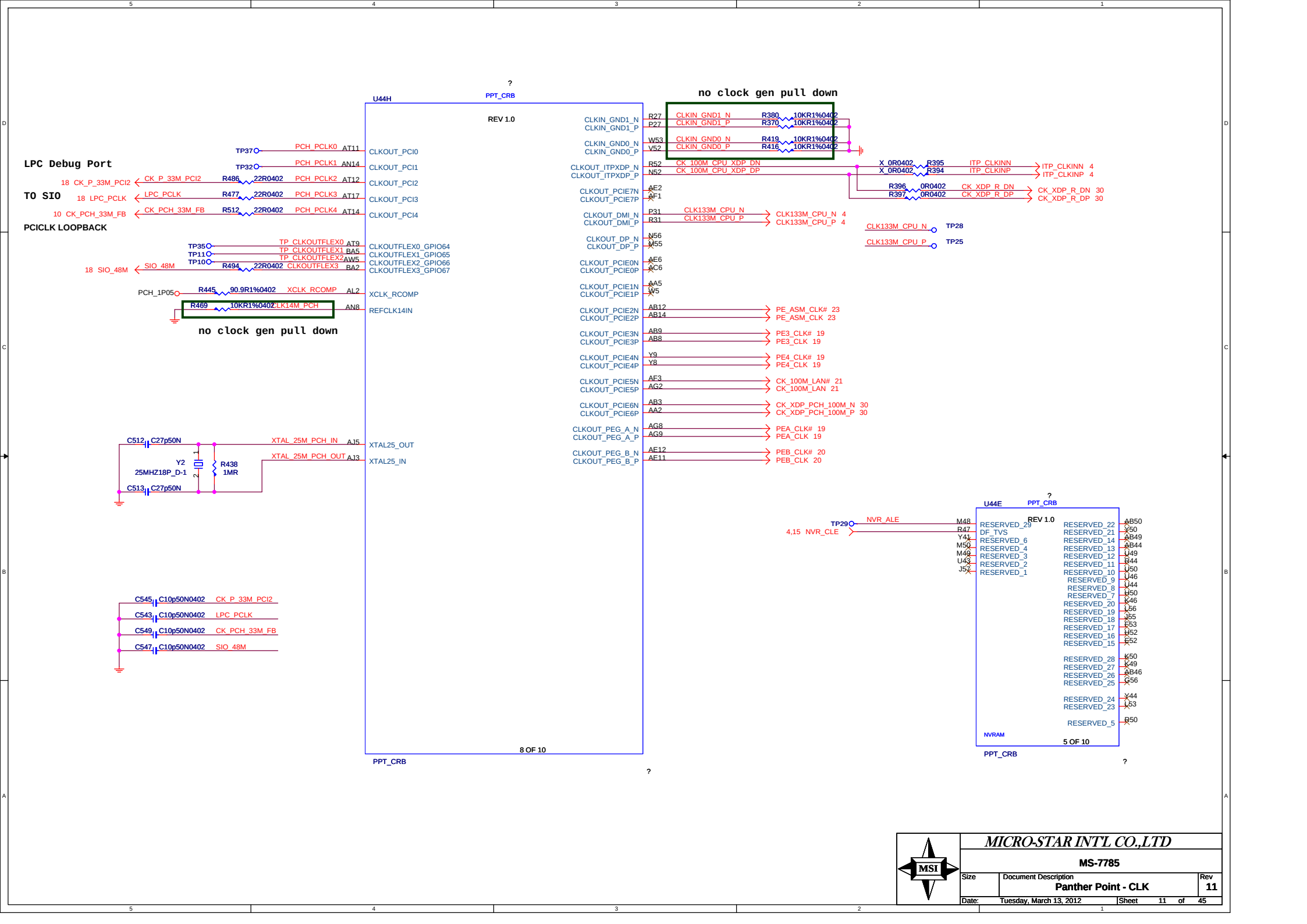
Size	Document Description: Panther Point - PCIE/DMI/USB	Rev: 11
Date: Tuesday, March 13, 2012	Sheet 10 of 45	


LPC Debug Port
TO SIO
PCICLK LOOPBACK
no clock gen pull down
no clock gen pull down
U44H
PPT_CRB
REV 1.0
8 OF 10
U44E
NVRAM
5 OF 10
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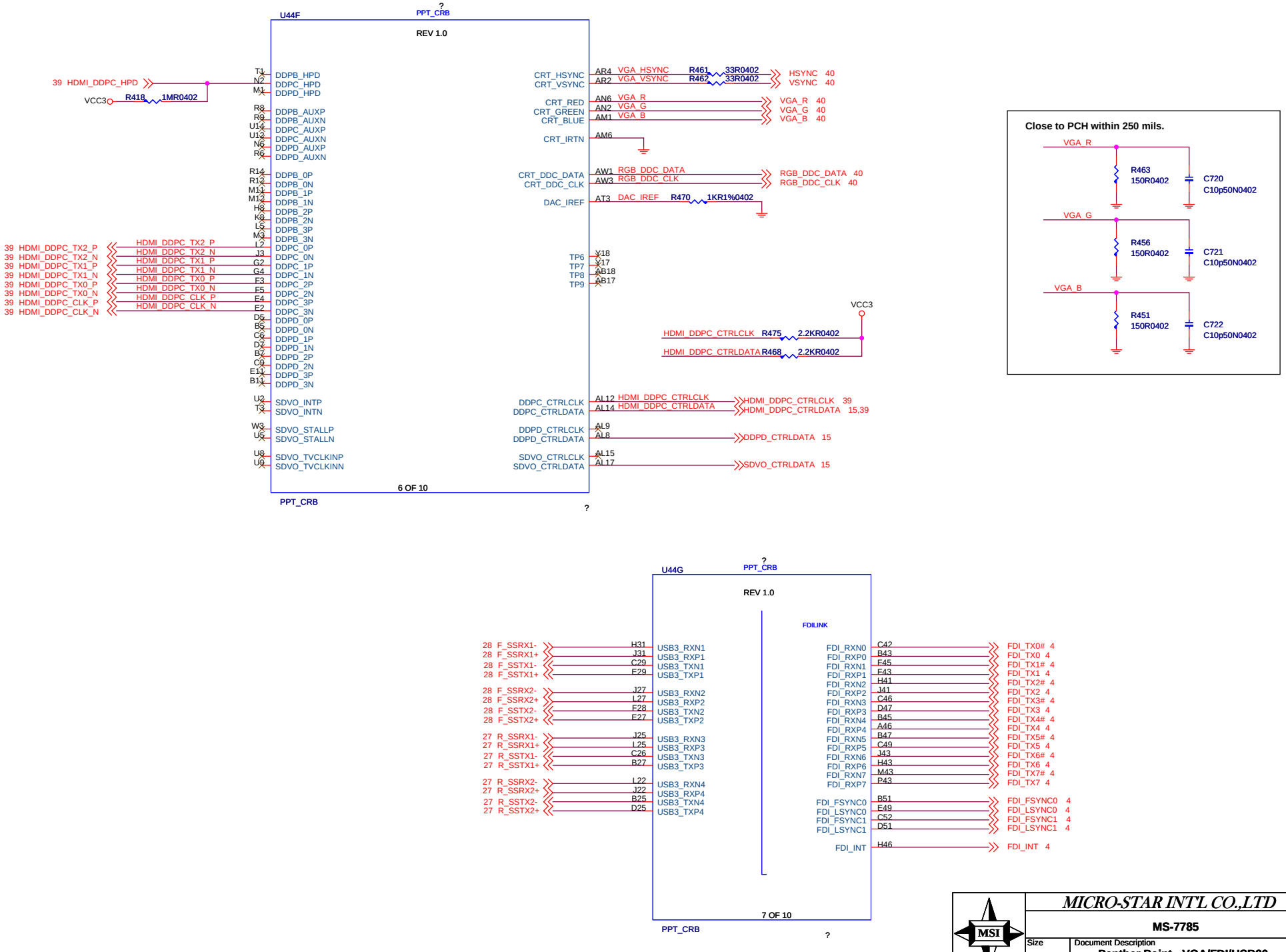
Panther Point - CLK
Tuesday, March 13, 2012


U44F
PPT_CRB
REV 1.0
39 HDMI_DDPC_HPD
VCC3
R418 1MR0402
DDPB_HPD
DDPC_HPD
DDPD_HPD
DDPB_AUXP
DDPB_AUXN
DDPC_AUXP
DDPC_AUXN
DDPD_AUXP
DDPD_AUXN
DDPB_0P
DDPB_0N
DDPB_1P
DDPB_1N
DDPB_2P
DDPB_2N
DDPB_3P
DDPB_3N
DDPC_0P
DDPC_0N
DDPC_1P
DDPC_1N
DDPC_2P
DDPC_2N
DDPC_3P
DDPC_3N
DDPD_0P
DDPD_0N
DDPD_1P
DDPD_1N
DDPD_2P
DDPD_2N
DDPD_3P
DDPD_3N
39 HDMI_DDPC_TX2_P
39 HDMI_DDPC_TX2_N
39 HDMI_DDPC_TX1_P
39 HDMI_DDPC_TX1_N
39 HDMI_DDPC_TX0_P
39 HDMI_DDPC_TX0_N
39 HDMI_DDPC_CLK_P
39 HDMI_DDPC_CLK_N
SDVO_INTP
SDVO_INTN
SDVO_STALLP
SDVO_STALLN
SDVO_TVCLKINP
SDVO_TVCLKINN
CRT_HSYNC
CRT_VSYNC
CRT_RED
CRT_GREEN
CRT_BLUE
CRT_IRTN
CRT_DDC_DATA
CRT_DDC_CLK
DAC_IREF
TP6
TP7
TP8
TP9
DDPC_CTRLCLK
DDPC_CTRLDATA
DDPD_CTRLCLK
DDPD_CTRLDATA
SDVO_CTRLCLK
SDVO_CTRLDATA
AR4 VGA_HSYNC R461 33R0402 HSYNC 40
AR2 VGA_VSYNC R462 33R0402 VSYNC 40
AN6 VGA_R VGA_R 40
AN2 VGA_G VGA_G 40
AM1 VGA_B VGA_B 40
AM6
AW1 RGB_DDC_DATA RGB_DDC_DATA 40
AW3 RGB_DDC_CLK RGB_DDC_CLK 40
AT3 DAC_IREF R470 1KR1%0402
VCC3
HDMI_DDPC_CTRLCLK R475 2.2KR0402
HDMI_DDPC_CTRLDATA R468 2.2KR0402
AL12 HDMI_DDPC_CTRLCLK HDMI_DDPC_CTRLCLK 39
AL14 HDMI_DDPC_CTRLDATA HDMI_DDPC_CTRLDATA 15,39
DDPD_CTRLDATA 15
SDVO_CTRLDATA 15
6 OF 10
PPT_CRB
Close to PCH within 250 mils.
VGA_R
R463 150R0402
C720 C10p50N0402
VGA_G
R456 150R0402
C721 C10p50N0402
VGA_B
R451 150R0402
C722 C10p50N0402
U44G
PPT_CRB
REV 1.0
FDILINK
28 F_SSRX1-
28 F_SSRX1+
28 F_SSTX1-
28 F_SSTX1+
28 F_SSRX2-
28 F_SSRX2+
28 F_SSTX2-
28 F_SSTX2+
27 R_SSRX1-
27 R_SSRX1+
27 R_SSTX1-
27 R_SSTX1+
27 R_SSRX2-
27 R_SSRX2+
27 R_SSTX2-
27 R_SSTX2+
USB3_RXN1
USB3_RXP1
USB3_TXN1
USB3_TXP1
USB3_RXN2
USB3_RXP2
USB3_TXN2
USB3_TXP2
USB3_RXN3
USB3_RXP3
USB3_TXN3
USB3_TXP3
USB3_RXN4
USB3_RXP4
USB3_TXN4
USB3_TXP4
FDI_RXN0
FDI_RXP0
FDI_RXN1
FDI_RXP1
FDI_RXN2
FDI_RXP2
FDI_RXN3
FDI_RXP3
FDI_RXN4
FDI_RXP4
FDI_RXN5
FDI_RXP5
FDI_RXN6
FDI_RXP6
FDI_RXN7
FDI_RXP7
FDI_FSYNC0
FDI_LSYNC0
FDI_FSYNC1
FDI_LSYNC1
FDI_INT
FDI_TX0# 4
FDI_TX0 4
FDI_TX1# 4
FDI_TX1 4
FDI_TX2# 4
FDI_TX2 4
FDI_TX3# 4
FDI_TX3 4
FDI_TX4# 4
FDI_TX4 4
FDI_TX5# 4
FDI_TX5 4
FDI_TX6# 4
FDI_TX6 4
FDI_TX7# 4
FDI_TX7 4
FDI_FSYNC0 4
FDI_LSYNC0 4
FDI_FSYNC1 4
FDI_LSYNC1 4
FDI_INT 4
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PPT_CRB
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MS-7785
Size
Document Description
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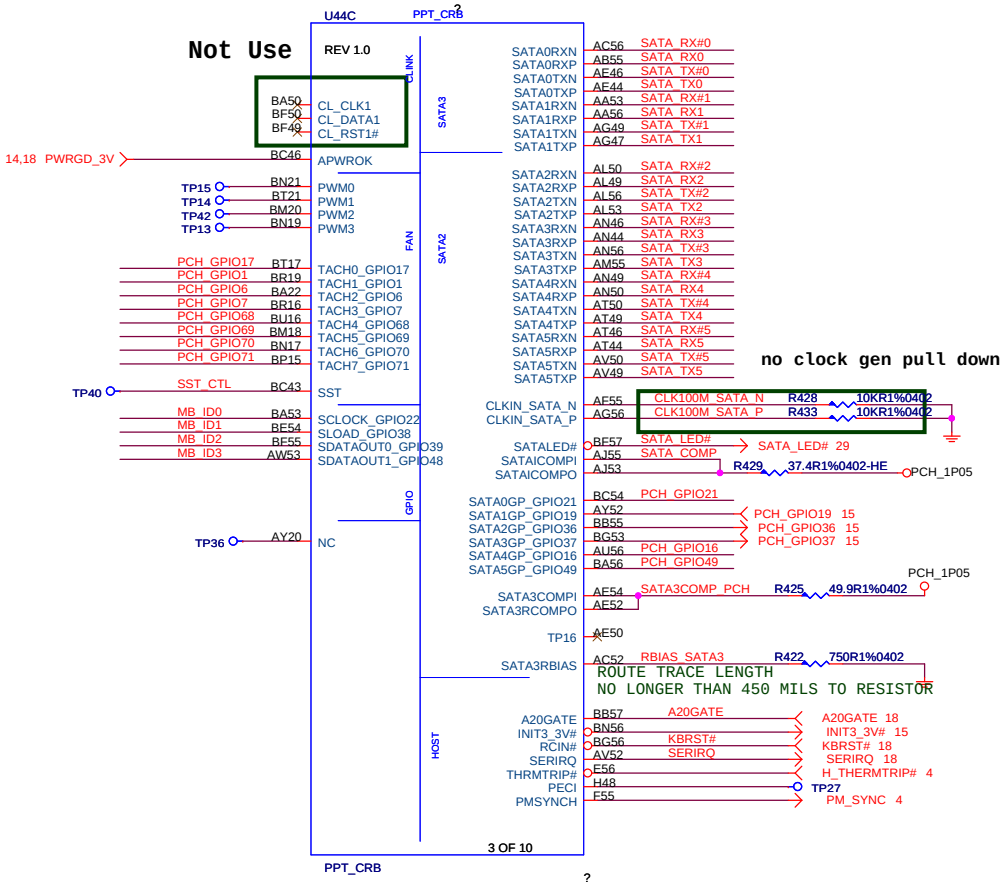
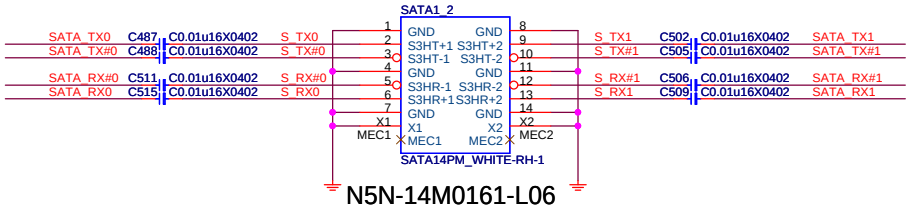
SATA Connector



SATA0,1 - WHITE (SATA3.0)

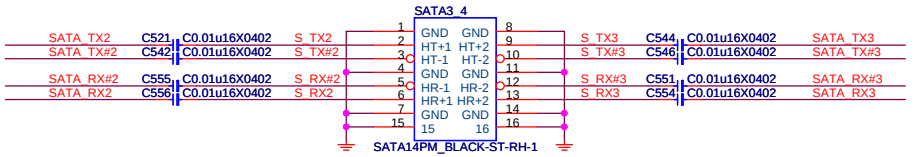
Gen3



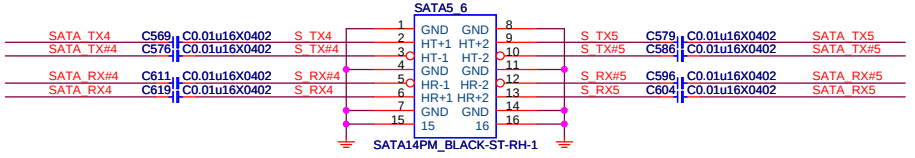
N5N-14M0161-L06

SATA3,4 - BLACK (SATA2.0)

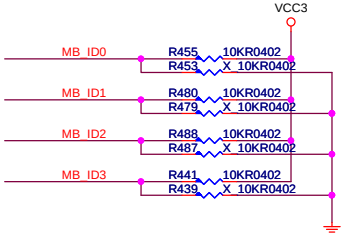
Gen2

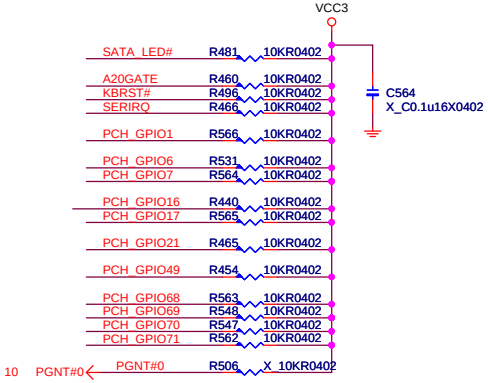


N5N-14M0071-W02



N5N-14M0071-W02





MICRO-STAR INTL CO.,LTD		
MS-7785		
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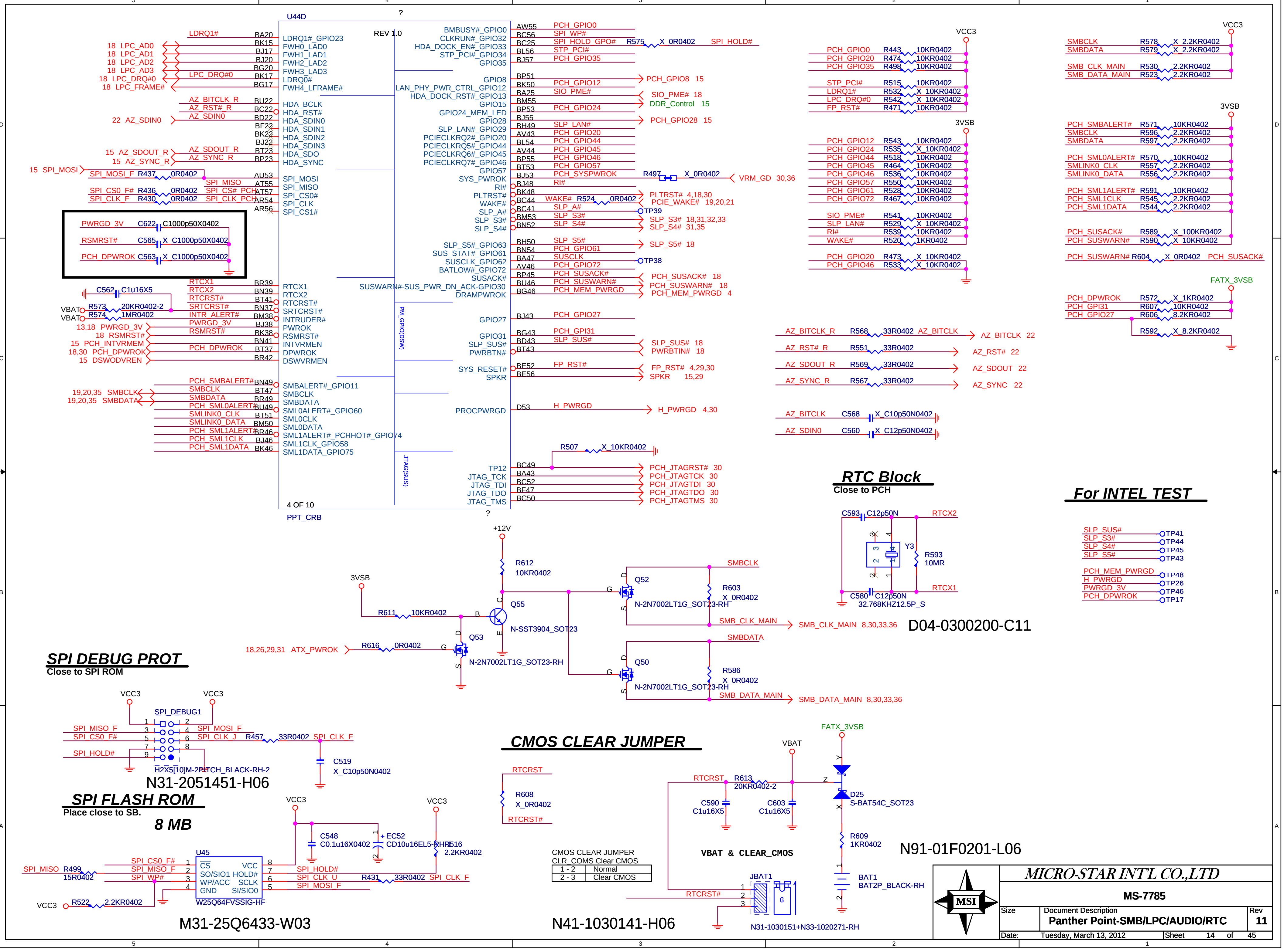

U44D
REV 1.0
4 OF 10
PPT_CRB
RTC Block
Close to PCH
For INTEL TEST
D04-0300200-C11
SPI DEBUG PROT
Close to SPI ROM
SPI_DEBUG1
H2X5[10]M-2PITCH_BLACK-RH-2
N31-2051451-H06
SPI FLASH ROM
Place close to SB.
8 MB
U45
W25Q64FVSSIG-HF
M31-25Q6433-W03
CMOS CLEAR JUMPER
CMOS CLEAR JUMPER
CLR_COMS Clear CMOS
1 - 2 Normal
2 - 3 Clear CMOS
N41-1030141-H06
VBAT & CLEAR_CMOS
JBAT1
N31-1030151+N33-1020271-RH
BAT1
BAT2P_BLACK-RH
D25
S-BAT54C_SOT23
N91-01F0201-L06
MICRO-STAR INT'L CO.,LTD
MSI
MS-7785
Size
Document Description
Panther Point-SMB/LPC/AUDIO/RTC
Rev
11
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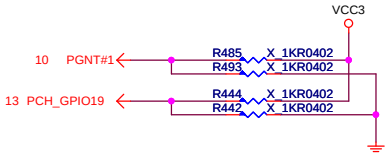
REQUIRED STRAPS

The signal has a weak internal pull-down.
If the signal is sampled high,this indicates that the system is strapped to the“No Reboot” mode.”
(PCH will disable the TCO Timer system reboot feature).

1: INIT3_3V to asserted for 16 PCI clock
to reset the processor by some evens occur.
0: Can not to reset the processor.

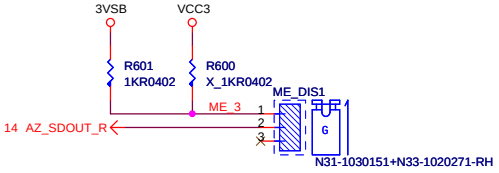
This signal has a weak internal pull-up.
INIT3_3# do not Pull low



Balls have an internal weak pull-up - Default destination is SPI

BOOT DEVICE	GNT1#/GPIO51	SATA1GP/GPIO19
SPI (Default)	floating	floating
PCI	0	floating
LPC	0	0

ESI Strap
(Server/Workstation Only)
This Signal has a weak internal pull-up
Do not pull low.
Tying this strap low configures DMI for ESI compatible operation.

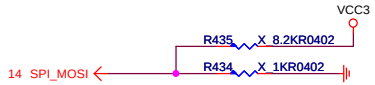


N41-1030141-H06

Disable ME in Manufacturing mode

2 - 3	Normal
1 - 2	Disable ME

Flash Descriptor Security Override / IntelME Debug mode
HDA_SDO need to be pulled high to disable flash securtity and ME Signal has a weak internal pull-down.



DMI RX Termination Voltage

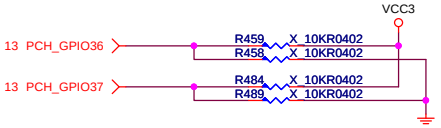
DMI and FDI Tx/Rx Termination Voltage
Internal weak pull Down. Do not pull up.

Enable TLS (Transport Layer Security):
Low = Intel ME Crypto TLS cipher suite with no confidentiality
High = Intel ME Crypto TLS cipher suite with confidentiality
This signal has a weak internal pull-down.
Leave NC. Internal pull down.

BTM : (Buffer Through Mode)
Leave floating. Do not pull low.
FCIM :(Full Clock Integration Mode)
Pull low with 1k Ohm to ground.

FCIM. Can be override by softstrap through ME.
This signal has a weak internal pull-up.

The On-Die PLL voltage regulator
(Default) Enabled when sampled high
Disabled when sampled low
Internal weak pull up. Do not pull low.

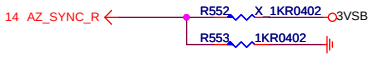


Since Pin has internal pull-down following guidelines are required to be

A) When Used as SATA2GP/SATA3GP
use 10K external pull-up that is enabled
B) When Used as GP Input (Pin HW default) –
Ensure GPI is not driven high during strap

When Unused as GPIO or SATA[x]GP – Use 8.2K-10K pull-down to ground.

The signal has a weak internal pull-up.
If the signal is sampled low, this indicates that the system is strapped to the “topblock swap” mode
(PCH inverts A16 for all cycles targeting BIOS space).



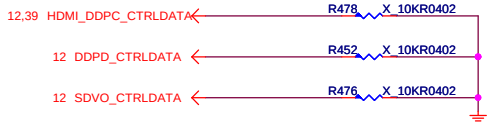
On-Die PLL Voltage Regulator Voltage Select

Internal weak pull down. Do not pull up.
High: VccVRM by 1.5 V
Low : VccVRM by 1.8 V

Integrated 1.05V VRM Enable / Disable
When high :Integrated 1.05 V VRMs is enabled
when low :External VR power source is used for DcpSus

NOTE: External VR powering option is for Mobile Only.
Other systems should not pull the strap low.

Deep S4/S5 Well On-Die Voltage Regulator Enable
If strap is sampled high, the Integrated Deep S4/S5 Well (DSW) On-Die VR mode is enabled.



This signal has a weak internal pull-down.
When ‘1’- Port B/C/D is detected;
When ‘0’- Port B/C/D is not detected

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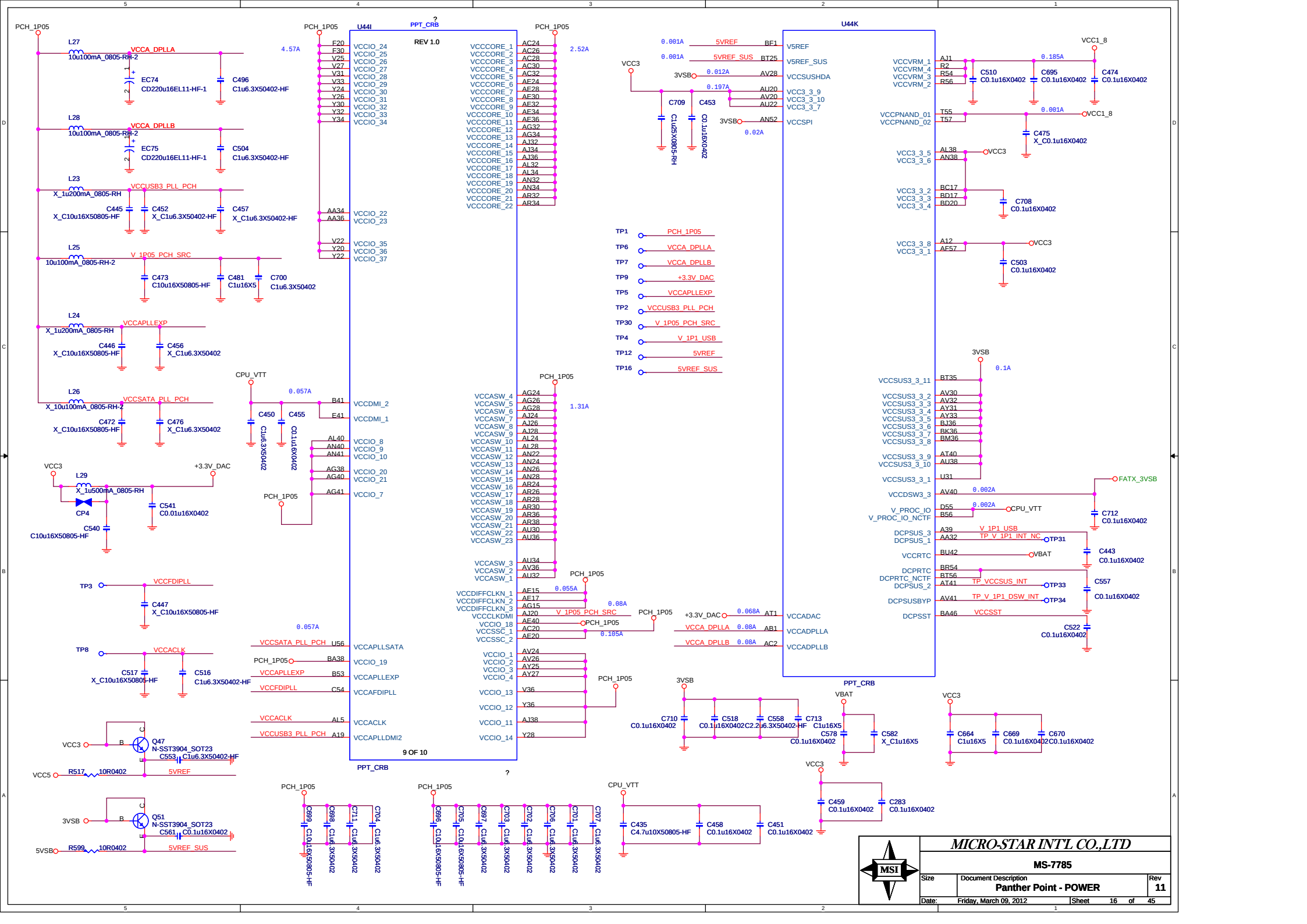
PCH_1P05
L27
10u100mA_0805-RH-2
VCCA_DPLLA
4.57A
EC74
CD220u16EL11-HF-1
C496
C1u6.3X50402-HF
L28
VCCA_DPLLB
EC75
CD220u16EL11-HF-1
C504
L23
X_1u200mA_0805-RH
VCCUSB3_PLL_PCH
C445
X_C10u16X50805-HF
C452
X_C1u6.3X50402-HF
C457
L25
V_1P05_PCH_SRC
C473
C481
C1u16X5
C700
C1u6.3X50402
L24
VCCAPLLEXP
C446
C456
X_C1u6.3X50402
L26
VCCSATA_PLL_PCH
C472
C476
CPU_VTT
0.057A
C450
C455
C1u6.3X50402
C0.1u16X0402
VCC3
+3.3V_DAC
L29
X_1u500mA_0805-RH
CP4
C541
C0.01u16X0402
C540
C10u16X50805-HF
TP3
VCCFDIPLL
C447
TP8
VCCACLK
C517
C516
C1u6.3X50402-HF
Q47
N-SST3904_SOT23
C553
R517
10R0402
5VREF
VCC5
Q51
3VSB
C561
R599
5VSB
5VREF_SUS
U44I
PPT_CRB
REV 1.0
VCCIO_24
VCCIO_25
VCCIO_26
VCCIO_27
VCCIO_28
VCCIO_29
VCCIO_30
VCCIO_31
VCCIO_32
VCCIO_33
VCCIO_34
VCCIO_22
VCCIO_23
VCCIO_35
VCCIO_36
VCCIO_37
VCCIO_8
VCCIO_9
VCCIO_10
VCCIO_20
VCCIO_21
VCCIO_7
VCCDMI_2
VCCDMI_1
VCCSATA_PLL_PCH
VCCAPLLSATA
VCCAPLLEXP
VCCAFDIPLL
VCCACLK
VCCAPLLDMI2
VCCIO_19
VCCSUSB3_PLL_PCH
9 OF 10
VCCCORE_1
VCCCORE_2
VCCCORE_3
VCCCORE_4
VCCCORE_5
VCCCORE_6
VCCCORE_7
VCCCORE_8
VCCCORE_9
VCCCORE_10
VCCCORE_11
VCCCORE_12
VCCCORE_13
VCCCORE_14
VCCCORE_15
VCCCORE_16
VCCCORE_17
VCCCORE_18
VCCCORE_19
VCCCORE_20
VCCCORE_21
VCCCORE_22
2.52A
VCCASW_4
VCCASW_5
VCCASW_6
VCCASW_7
VCCASW_8
VCCASW_9
VCCASW_10
VCCASW_11
VCCASW_12
VCCASW_13
VCCASW_14
VCCASW_15
VCCASW_16
VCCASW_17
VCCASW_18
VCCASW_19
VCCASW_20
VCCASW_21
VCCASW_22
VCCASW_23
1.31A
VCCASW_3
VCCASW_2
VCCASW_1
VCCDIFFCLKN_1
VCCDIFFCLKN_2
VCCDIFFCLKN_3
VCCCLKDMI
VCCIO_18
VCCSSC_1
VCCSSC_2
0.055A
0.08A
V_1P05_PCH_SRC
0.105A
VCCIO_1
VCCIO_2
VCCIO_3
VCCIO_4
VCCIO_13
VCCIO_12
VCCIO_11
VCCIO_14
U44K
V5REF
V5REF_SUS
VCCSUSHDA
VCC3_3_9
VCC3_3_10
VCC3_3_7
VCCSPI
0.001A
0.012A
0.197A
0.02A
C709
C453
C1u25X0805-RH
C0.1u16X0402
VCCVRM_1
VCCVRM_4
VCCVRM_3
VCCVRM_2
C510
C695
C474
0.185A
VCCPNAND_01
VCCPNAND_02
C475
X_C0.1u16X0402
VCC3_3_5
VCC3_3_6
VCC3_3_2
VCC3_3_3
VCC3_3_4
C708
VCC3_3_8
VCC3_3_1
C503
VCCSUS3_3_11
VCCSUS3_3_2
VCCSUS3_3_3
VCCSUS3_3_4
VCCSUS3_3_5
VCCSUS3_3_6
VCCSUS3_3_7
VCCSUS3_3_8
VCCSUS3_3_9
VCCSUS3_3_10
VCCSUS3_3_1
VCCDSW3_3
V_PROC_IO
V_PROC_IO_NCTF
DCPSUS_3
DCPSUS_1
VCCRTC
DCPRTC
DCPRTC_NCTF
DCPSUS_2
DCPSUSBYP
DCPSST
VCCADAC
VCCADPLLA
VCCADPLLB
0.068A
0.08A
C712
C443
C557
C522
TP_V_1P1_INT_NC
TP_VCCSUS_INT
TP_V_1P1_DSW_INT
VCCSST
TP1
TP6
TP7
TP9
TP5
TP2
TP30
TP4
TP12
TP16
PCH_1P05
VCCA_DPLLA
VCCA_DPLLB
+3.3V_DAC
VCCAPLLEXP
VCCUSB3_PLL_PCH
V_1P05_PCH_SRC
V_1P1_USB
5VREF
5VREF_SUS
3VSB
VBAT
VCC1_8
FATX_3VSB
CPU_VTT
C710
C518
C558
C713
C578
C582
C664
C669
C670
C459
C283
C435
C458
C451
C699
C698
C711
C704
C705
C697
C703
C702
C706
C701
C707
C696
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MS-7785
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Rev 11
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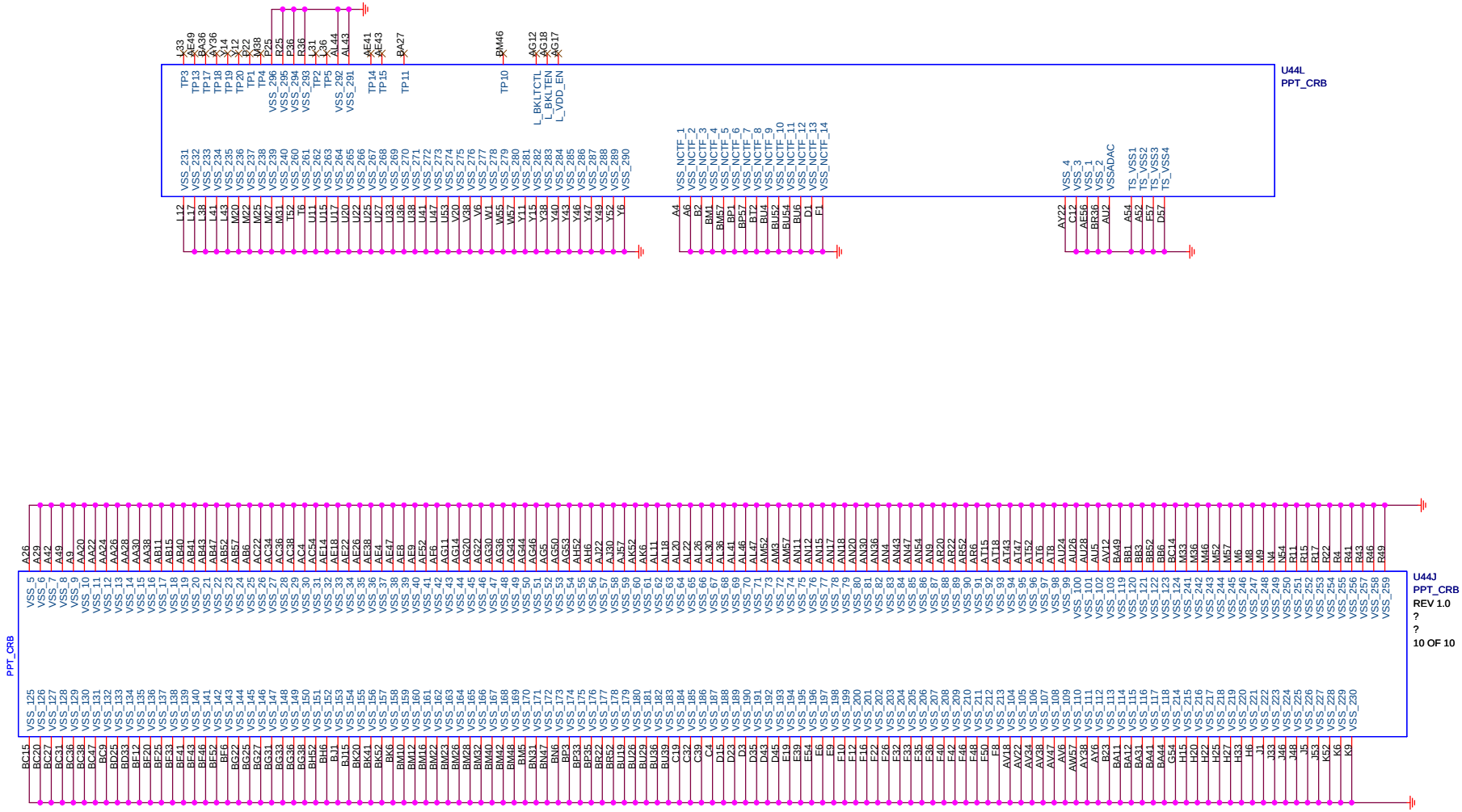

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MS-7785		
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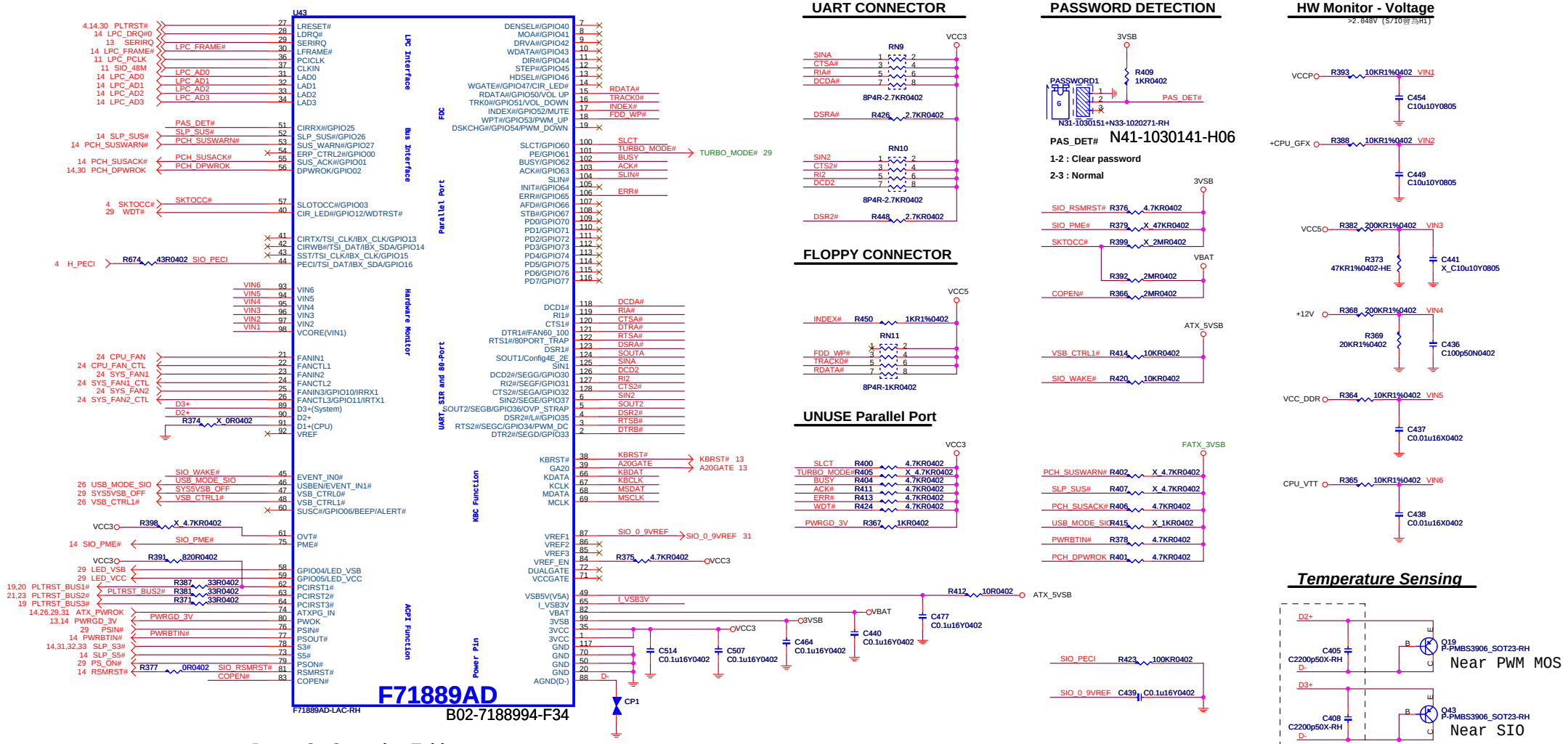


UART CONNECTOR

FLOPPY CONNECTOR

UNUSE Parallel Port

PASSWORD DETECTION

PAS_DET# N41-1030141-H06

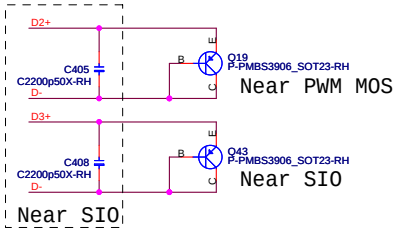
1-2 : Clear password

2-3 : Normal

HW Monitor - Voltage

>2.848V (S/10會為H1)

Temperature Sensing



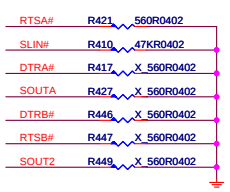
Power On Strapping Table

Default: Internal Pull-up

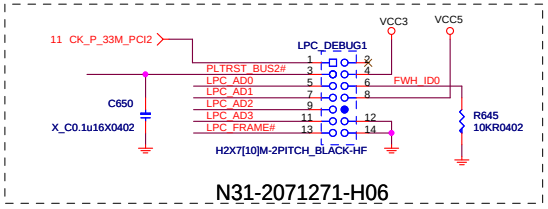
PLTRST_BUS1#	SLOT1 SLOT3
PLTRST_BUS2#	LPC Debug Port LAN1 eSATA
PLTRST_BUS3#	SLOT2 SLOT4

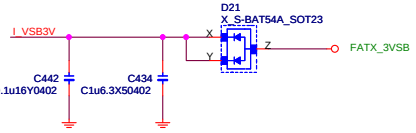
Symbol	Value	Description
RTSB#	1	Fan control mode: PWM mode.
	0	Fan control mode: DAC mode.
SLIN#	PU-1k	Pin 100-116 as LPT interfaces
	PU-20k	Pin 100-116 as PVID Controller
	PD-1k	Pin 102/103/111/112 as SVID Controller
	PD-47k	Pin 100-103 and pin 105-116 as GPIO pins
DTRA#	1	Fan full duty is 60%.
	0	Fan full duty is 100%.
RTSA#	1	Enable the 80 port function.
	0	Disable the 80 port function.
SOUTA	1	Configuration Register I/O port is 4E/4F.
	0	Configuration Register I/O port is 2E/2F.
SOUT2	1	OVP warning mode
	0	OVP force mode

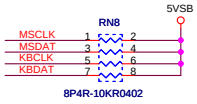
Power on Strapping Option



LPC Debug Port







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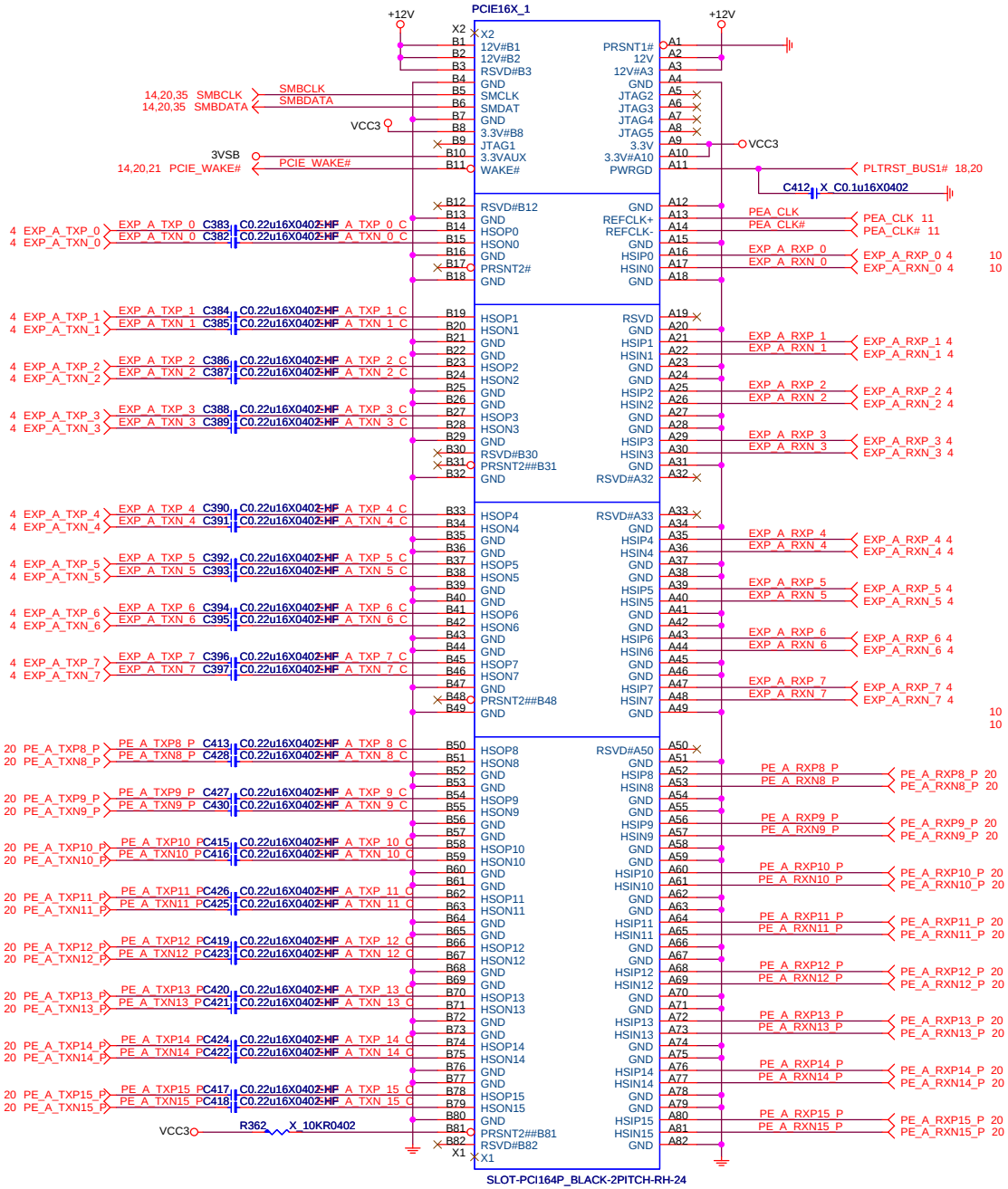
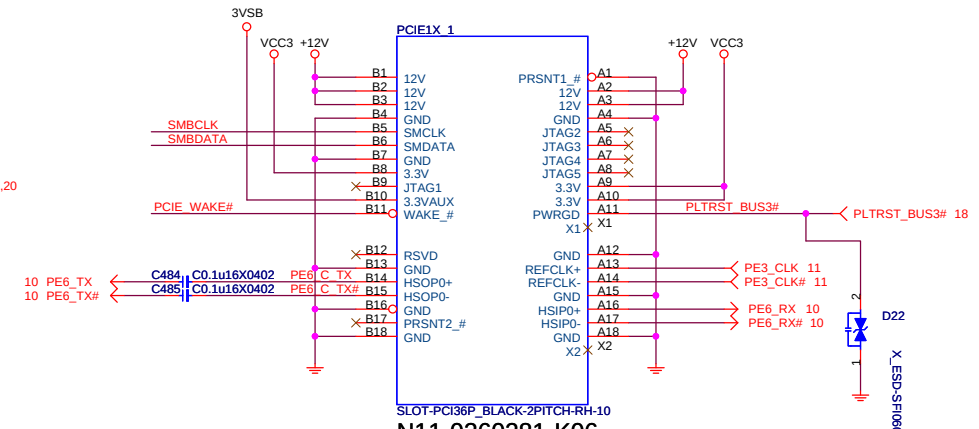
PCI_EXPRESS X16 SLOT



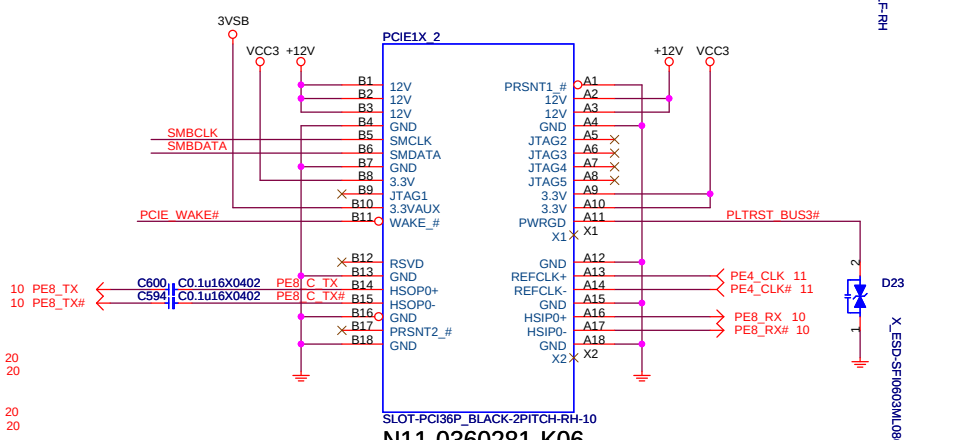
N11-1640851-W02

PCI_EXPRESS x1-PORT



N11-0360281-K06

PCI_EXPRESS x1-PORT



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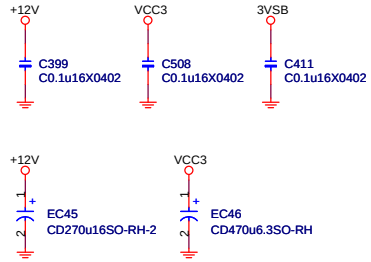

MICRO-STAR INTL CO.,LTD

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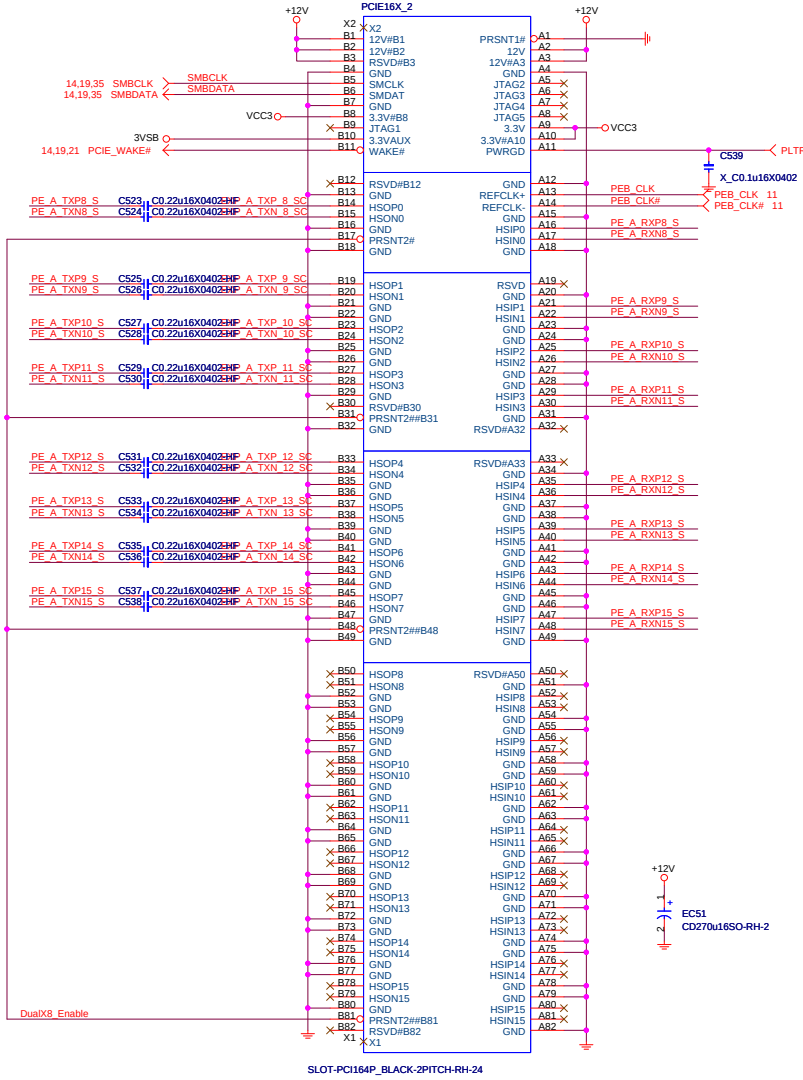
PCI EXPRESS X16 SLOT



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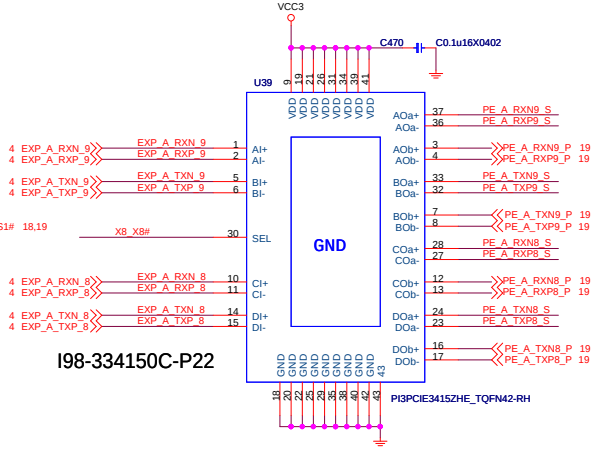
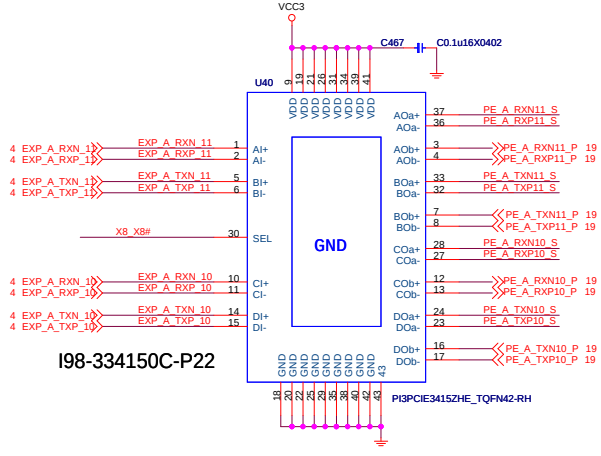
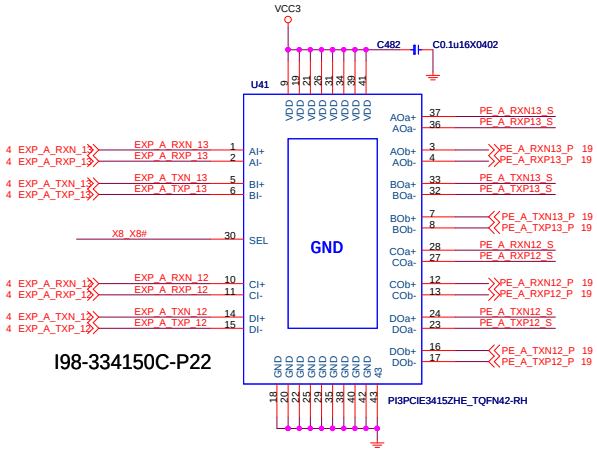
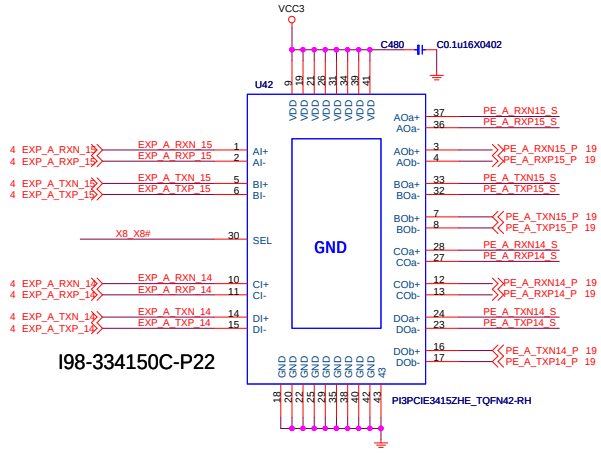


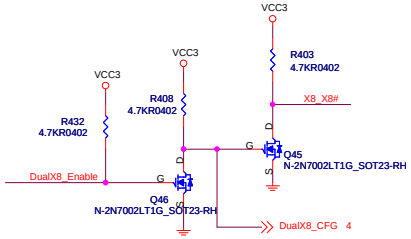


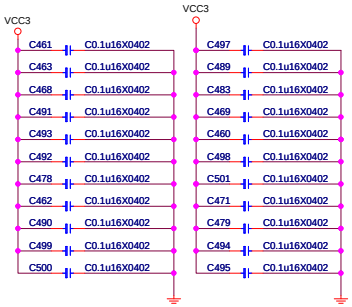




Digital Switch SEL pin — SLI function

SEL (DualX8_Enable)	Output	X8_SW	PCI-E_Slot 1/2
Low	B1	Low	X8 / X8
Hi	B2	Hi	X16





Company	MICRO-STAR INTL CO.,LTD
	MS-7785
Size	PCIE X8
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RTL8111E Giga LAN

Remove pull-up R if R existence on motherboard
(or SB has internal pull-up R).

LAN1_VDD33

LANWAKE# R228 X_10KR0402

VCC3 R227 1KR1%0402
R223 15KR1%0402 LAN1_ISO

ENSWREG:
1: Enable switching regulator
0: Disable switching regulator

10 PE5_TX C169 C0.1u16X0402 PE_LAN1_TX 17
10 PE5_TX# C172 C0.1u16X0402 PE_LAN1_TX# 18
11 CK_100M_LAN 19
11 CK_100M_LAN# 20
14,19,20 PCIE_WAKE# R237 0R0402 LAN1_ISO LANWAKE# 26 28
R214 2.49KR1%0402 LAN1_RSET 46
LAN1_VDD33 33

U22

HSIP HSIN — PCIE interface — HSOP HSON
REFCLK_P REFCLK_N
ISOLATEB LANWAKEB — PM
RSET ENSWREG
VDDREG VDDREG — Regulator
REGOUT
DVDD33 DVDD33
AVDD33 AVDD33 AVDD33 AVDD33
DVDD10 DVDD10 DVDD10 AVDD10
AVDD10 AVDD10 AVDD10
EVDD10
GND GND
Transceiver Interface — MDIP0 MDIN0 MDIP1 MDIN1 MDIP2 MDIN2 MDIP3 MDIN3
PERSTB CLKREQB
EEPROM — LED0 LED1/EESK EECS EEDI LED3/EEDO
GPO/SMBALERT
SMBCLK SMBDATA
CLOCK — CKXTAL1 CKXTAL2
RTL8111E-VL-CG-RH

22 PE_LAN1_RXPC C183 C0.1u16X0402 PE5_RX 10
23 PE_LAN1_RXNC C191 C0.1u16X0402 PE5_RX# 10
C198 C180p50N0402
25 R226 0R0402 PLTRST_BUS2# 18,23
16 R208 10KR0402 LAN1_VDD33

1 TR_D0+
2 TR_D0-
4 TR_D1+
5 TR_D1-
7 TR_D2+
8 TR_D2-
10 TR_D3+
11 TR_D3-

40 LAN1_LED0
37 LAN1_EESK
30 LAN1_EECS
32 LAN1_EEDI
31 LAN1_EEDO
R229 10KR0402
R234 10KR0402

38 R222 1KR1%0402 LAN1_VDD33
14 15 LAN1_SMB_DA R209 10KR0402
43 LAN1_CLK_LANI C233 C27p50N
44 LAN1_CLK_LANO C243 C27p50N
Y1 25MHZ18P_D-1

Near Lan Chip

8P4R-0R0402 RN5
TR_D0+ 7 8 LAN1_TR_D0+
TR_D0- 5 6 LAN1_TR_D0-
TR_D1+ 3 4 LAN1_TR_D1+
TR_D1- 1 2 LAN1_TR_D1-

8P4R-0R0402 RN4
TR_D2+ 7 8 LAN1_TR_D2+
TR_D2- 5 6 LAN1_TR_D2-
TR_D3+ 3 4 LAN1_TR_D3+
TR_D3- 1 2 LAN1_TR_D3-

GPO:
1: Link up
0: Link down

width>60mil

LAN1_VDD10 — CHOKE10 — LAN1_REGOUT
C212 C0.1u16X0402
C214 C10u6.3X50805 X5R
CH-4.7u0.85A170mS-HF

L04-47A7760-T04

near pin36 <200mil

width>40mil

C204 C4.7u6.3X50805
C201 C0.1u16X0402
near pin <200mil

LAN1_REGOUT 36
LAN1_VDD33 27 39 42 47 48 12
LAN1_VDD10 13 29 41 3 45 6 9
R213 0R
LAN1_EVDD10 21
C176 C1u6.3Y0402-RH
C177 C0.1u16X0402

2.2uH在PFM/PWM mode 切換的時候，switching regulator 轉出的電流會有spike產生，
評估日後會有issue風險，而4.7uH則沒有此抽大電流情況發生，
更進一步為了降低日後的debug effort，在此必須要先做個卡關
為了避免1.05v轉出電壓會有不正常的情況發生，
也許是ripple過大或者電壓偏高偏低等風險存在，
因此這顆產品才會強調要限制料件種類

B06-081112C-R09

Pin49: 9 via from top layer to GND layer
and make the via at the center of IC.

LAN Connector

Reserve ESD Protect

NEAR CONNECTOR

LAN1_VDD33
C138 C0.1u16X0402-RH-1
D5 ESD-IP4220-RH
LAN1_TR_D0- 6 4 LAN1_TR_D1-
LAN1_TR_D0+ 1 3 LAN1_TR_D1+
5 2

1pF
D0G-0422003-P03
D0G-0422003-N47

2pF
D0G-0200529-A68
D0G-0303309-C12

LAN1_VDD33
C130 C0.1u16X0402-RH-1
D4 ESD-IP4220-RH
LAN1_TR_D2- 6 4 LAN1_TR_D3-
LAN1_TR_D2+ 1 3 LAN1_TR_D3+
5 2

3.3v Power on rise time : 1~100ms.

MAX: 163mA
LAN1_VDD33
3VSB
CP22
CP21
Place near pin
27 39 42 47 48 12
C199 C184 C174 C161 C152 C154
C0.1u16X0402

Place near pin
LAN1_VDD10
3 13 19 45 41 6 9
C157 C153 C200 C170 C179 C156 C155
C0.1u16X0402

LAN1_VDD33
For EMI
C128 C0.1u16X0402

LAN1_TCT
C144 X_C0.01u16X0402

LAN1_EEDO R197 200R0402
LAN1_GND/RCT
R191 0R0402
LAN1_EESK R204 100R0402
LAN1_LED0 R679 100R0402

LAN_USB1B
LAN1_EEDO_ACT 19
LAN1_TCT 13
LAN1_TR_D0+ 18
LAN1_TR_D0- 12
LAN1_TR_D1+ 17
LAN1_TR_D1- 11
LAN1_TR_D2+ 16
LAN1_TR_D2- 10
LAN1_TR_D3+ 15
LAN1_TR_D3- 9
LAN1_GND/RCT 14
LAN1_LINK1000# 21
LAN1_LINK100# 22
19 20 PWR TD1+ TD1- TD2+ TD2- TD3+ TD3- TD4+ TD4- GND 21 22
RJ45_USBX2_LEDX2_TX-GIGA-RH-5

N58-22F0731-F02

Giga-Lan	10/100-Lan
N58-22F0731-F02	N58-22F0061-S42
N58-22F0731-S42	N58-22F0061-F02
N58-22F0731-I60	
Link Yellow	Link Yellow
Active Blinking	Active Blinking
1000 Orange	100 Green
100 Green	10 None
10 None	

19 — 20 Yellow — 21 Orange — 22 Green

R14, R15, R17請依據所使用的LAN connector上的LED亮度去調整阻值

only support LED0+LED1/LED1+LED3 dual color LED
combinations when using EEPROM

LAN1_EEDO_ACT
LAN1_LINK1000#
LAN1_LINK100#
C129 C140 C143
C0.1u16X0402

Near Connector

LAN1_VDD33
LAN1_EEDO_ACT
LAN1_LINK1000#
LAN1_LINK100#
D37 D38 D39 D40
X_ESD-MLVS0402M04-EM

8111E POWER Consumption

	3.3V	mW
10 M Idle/TxRx	12/66	40/218
100 M Idle/TxRx	31/44	102/145
Giga Idle/TxRx	135/163	452/538
ALDPS	4	13

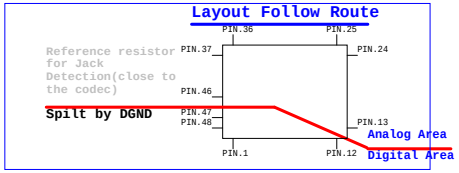
MICRO-STAR INTL CO.,LTD

MS-7785

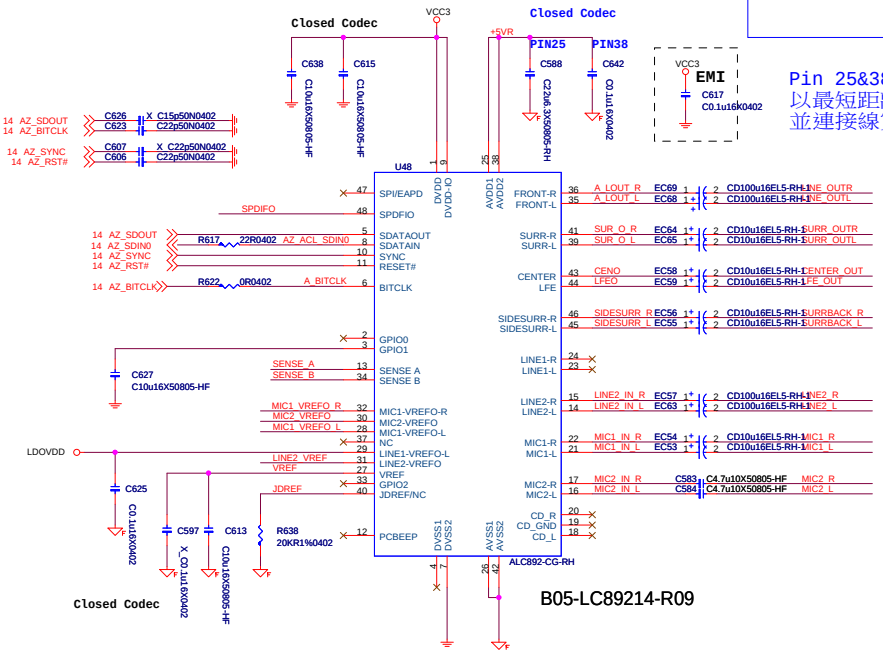
Size	Document Description	Rev
	LAN - RTL8111E-VL-CG	11

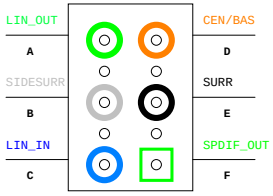
Date: Tuesday, March 13, 2012 Sheet 21 of 45

Azalia Codec - ALC892

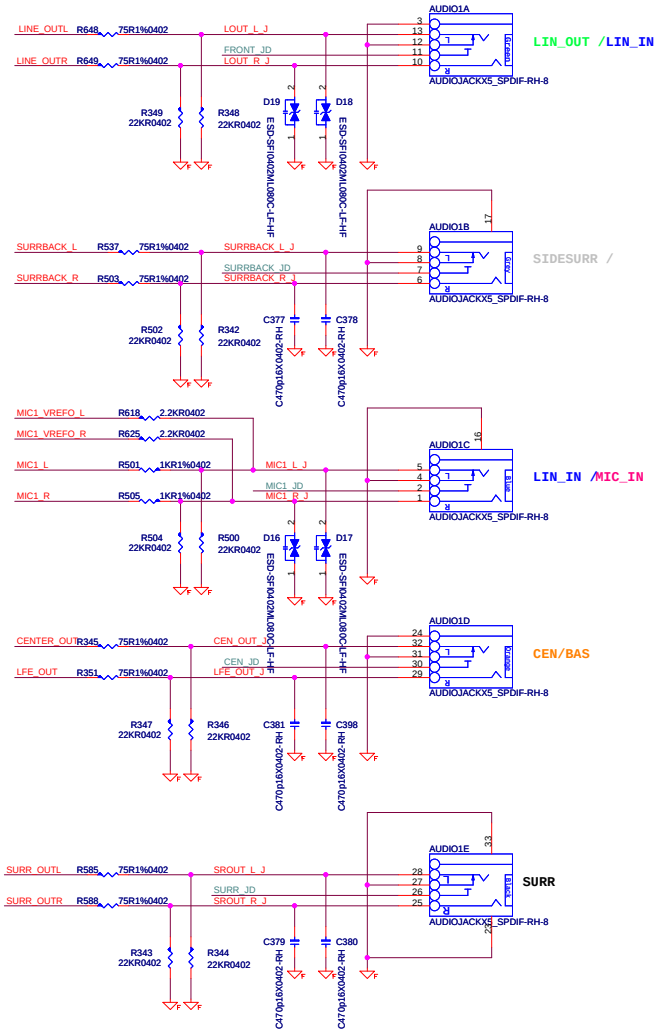


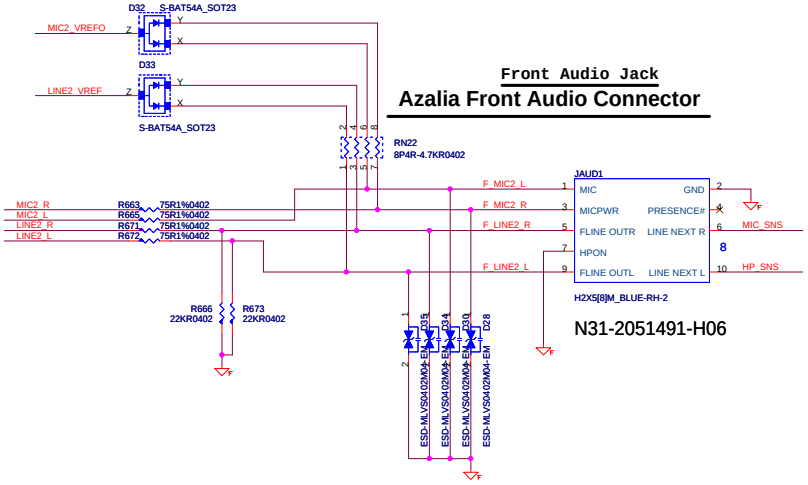
Pin 25&38請走Codec下方
以最短距離連接
並連接線寬最少40mils

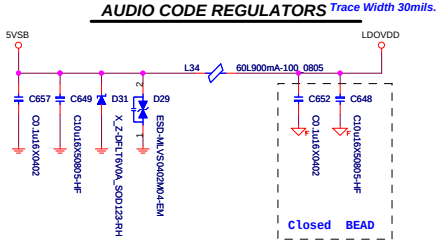


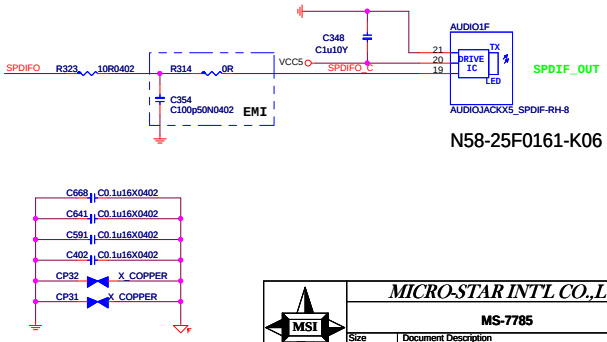


6 Port Real Audio connector (option)



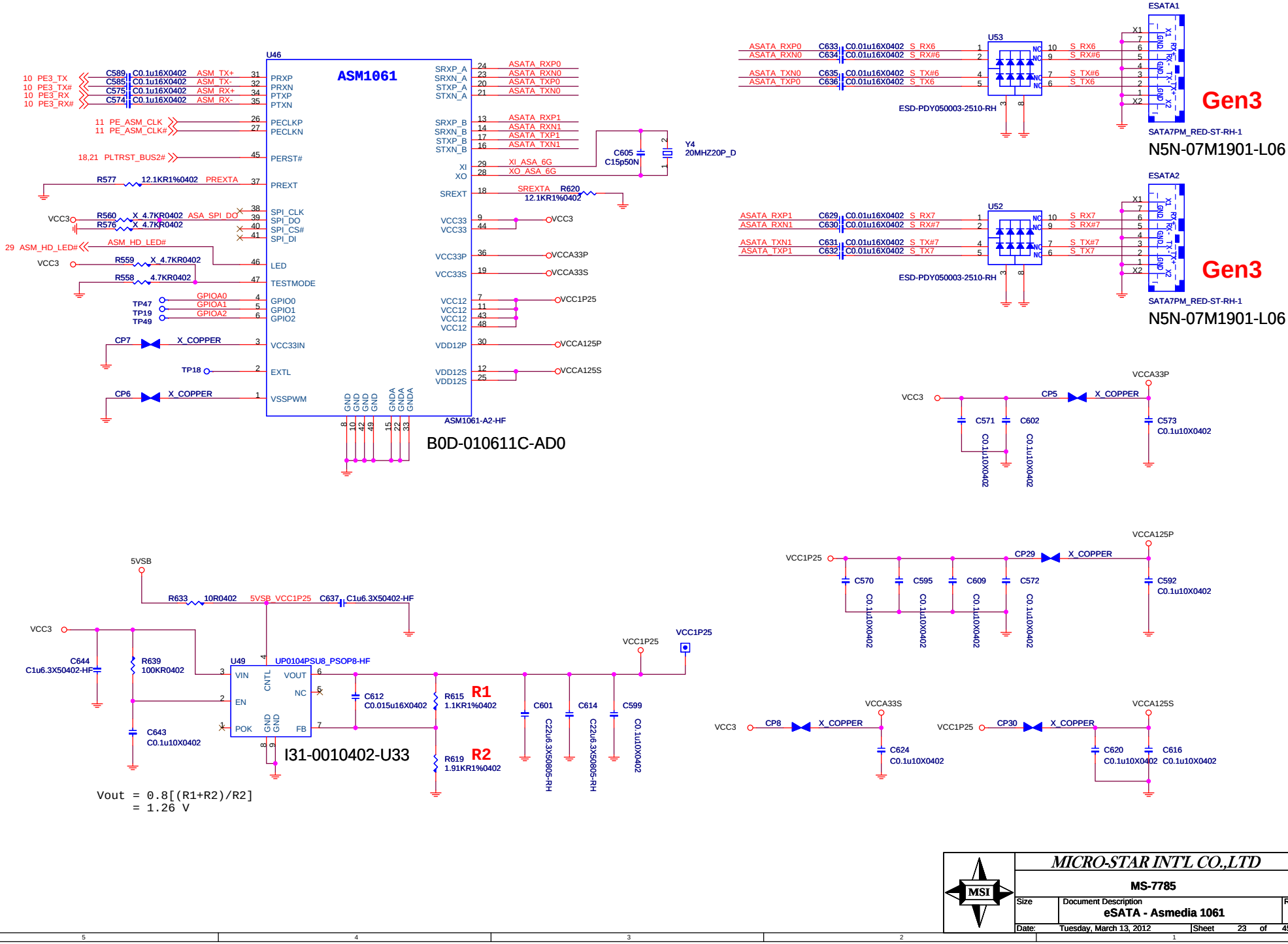






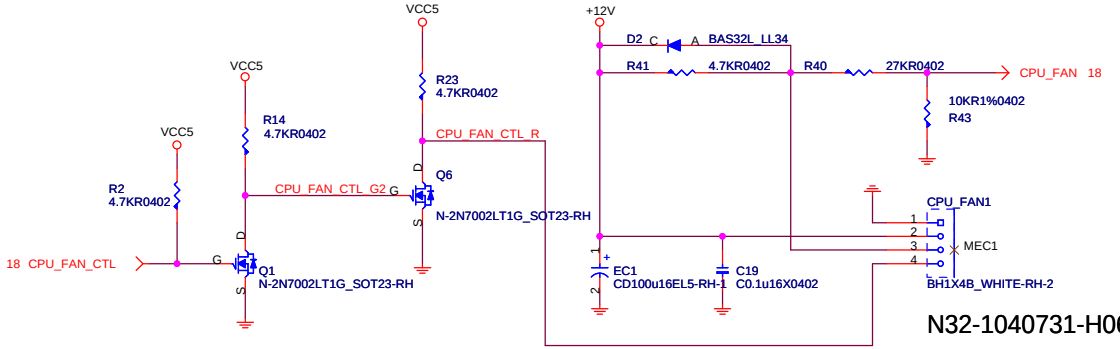
MICRO-STAR INT'L CO.,LTD		
MS-7785		
Size	Document Description: Audio Codec ALC892-CG	Rev: 11
Date: Tuesday, March 13, 2012	Sheet 22 of 45	

ESATA Connector



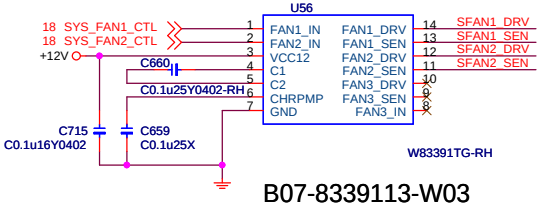
MICRO-STAR INTL CO.,LTD		
MS-7785		
Size	Document Description: eSATA - Asmedia 1061	Rev: 11
Date: Tuesday, March 13, 2012	Sheet 23 of 45	

CPU Fan

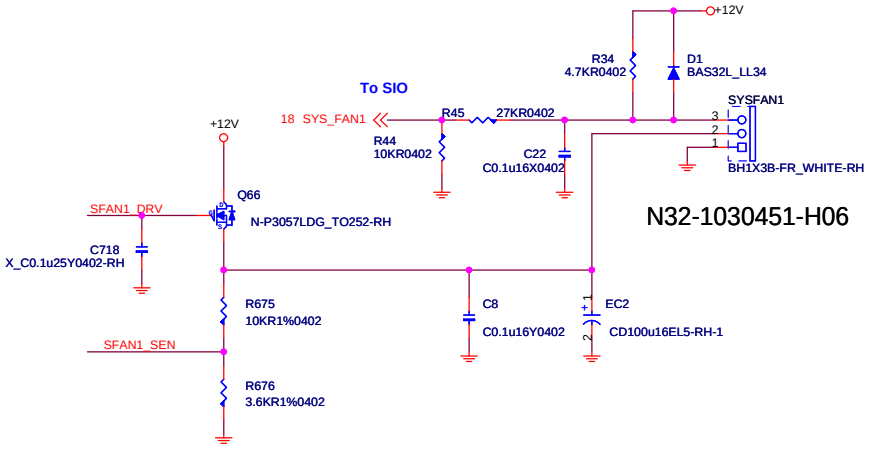


N32-1040731-H06

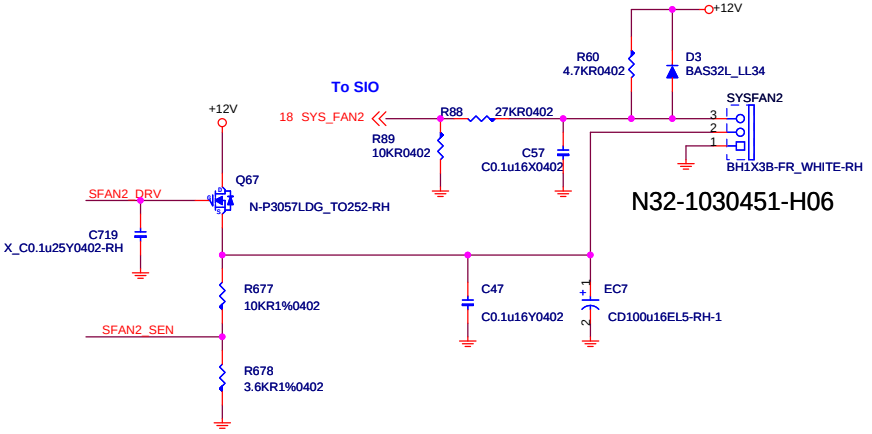
System Fan 1 , 2



B07-8339113-W03



N32-1030451-H06



N32-1030451-H06

MICRO-STAR INT'L CO.,LTD

MS-7785

Size	Document Description	Rev
	FAN	11

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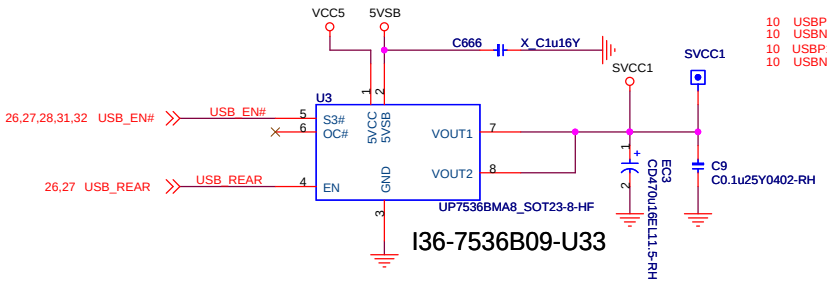
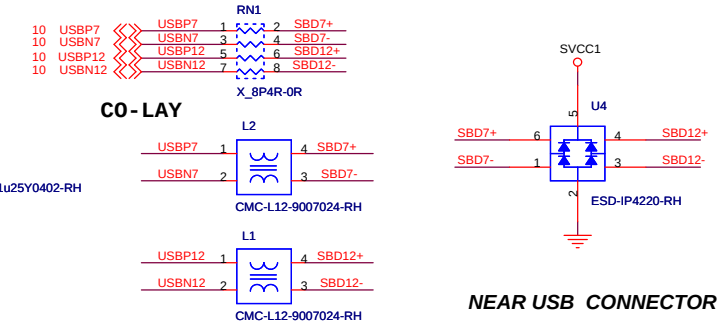
REAR USB PORT

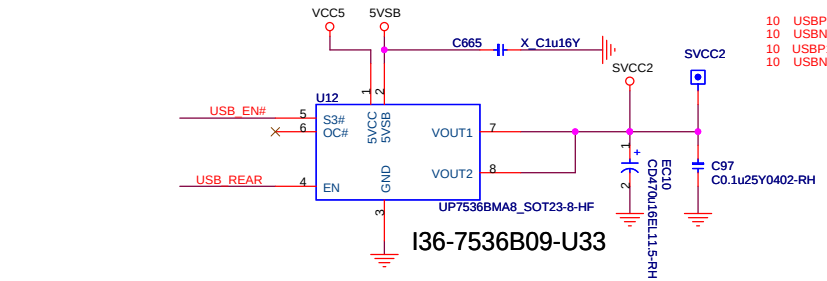
Power Circuit For USB Port 1, 9 (Connector ?) And KB/MS



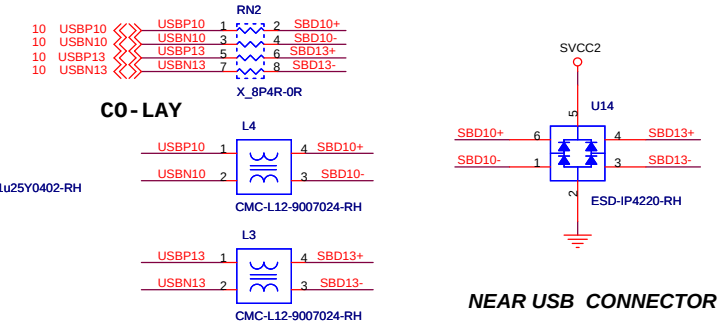
REAR PANEL USB CONNECTOR FOR USB PORT 0,1



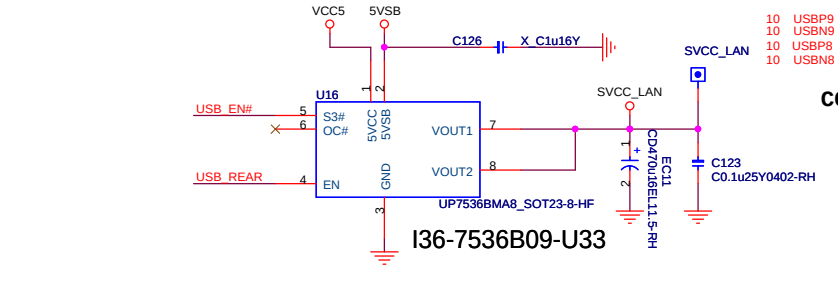
Power Circuit For USB Port 1, 9 (Connector ?) And KB/MS



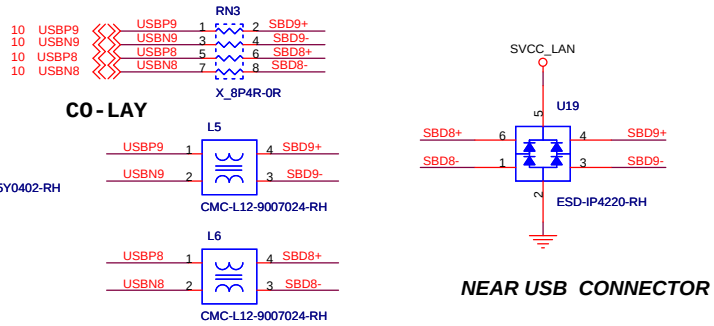
REAR PANEL USB CONNECTOR FOR USB PORT 0,1



Power Circuit For USB Port 5, 4 (Connector ?)



REAR PANEL USB CONNECTOR FOR USB PORT 4,5



ESD
PN :D0G-0200529-A68
footprint :D0G-0422003-P03

MICRO-STAR INTL CO.,LTD

MS-7785

Size	Document Description	Rev
	Rear USB Connectors	11
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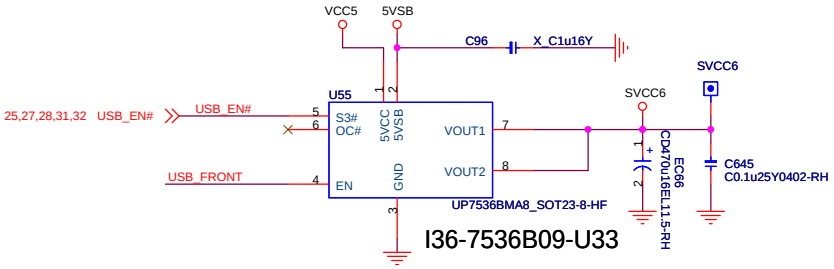
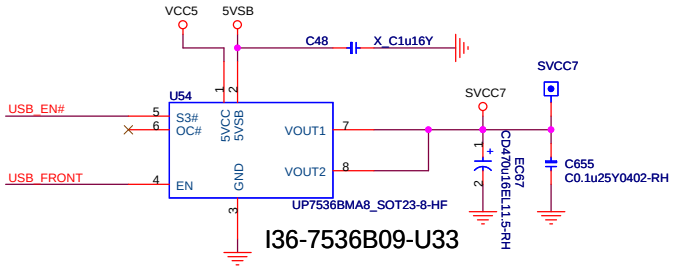
FRONT USB PORT

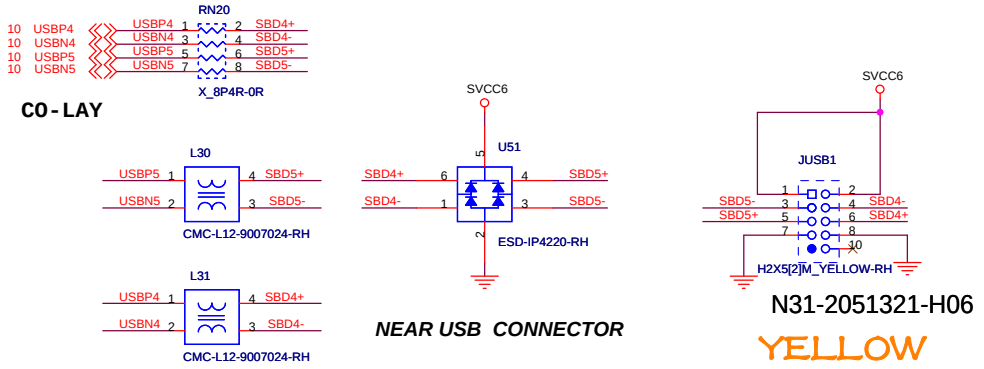
Power Circuit For USB Port 13, 12



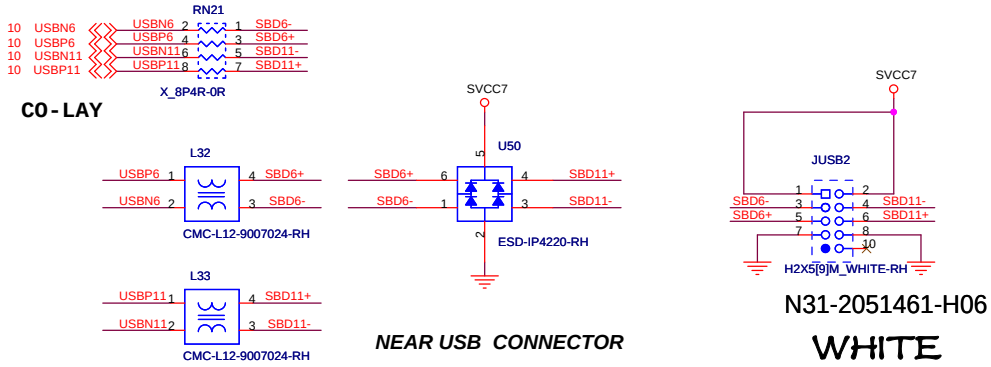
Power Circuit For USB Port 6 , 7



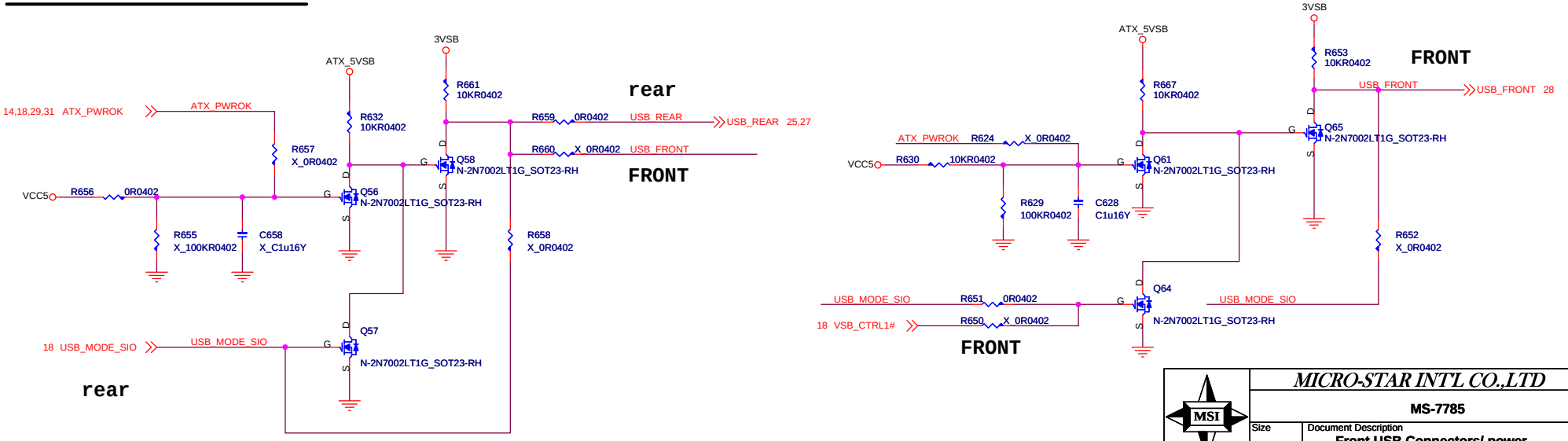
FRONT PANEL USB CONNECTOR FOR USB PORT 12,13



FRONT PANEL USB CONNECTOR FOR USB PORT 6,7



USB Power Control



MICRO-STAR INTL CO.,LTD

MS-7785

Size	Document Description	Rev
	Front USB Connectors/ power	11

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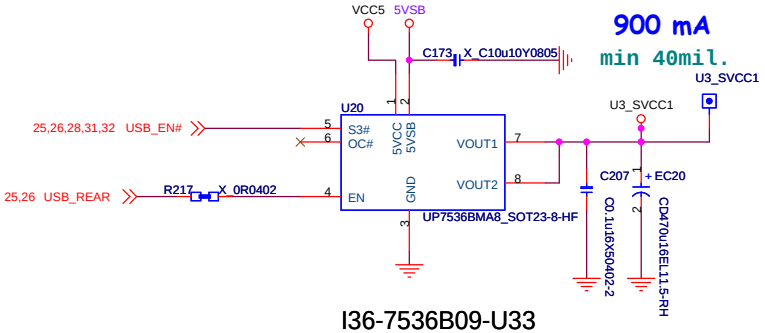
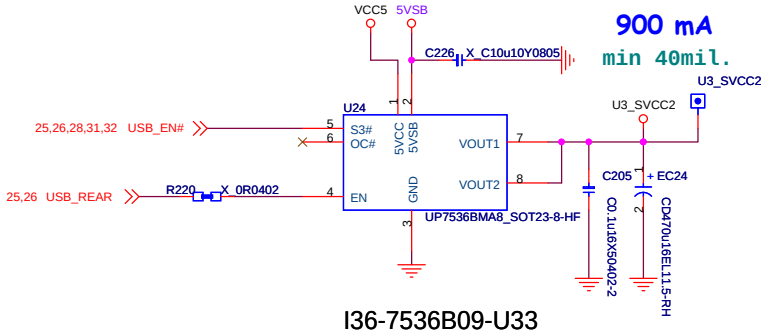
REAR USB3.0

USB3.0 Power Control

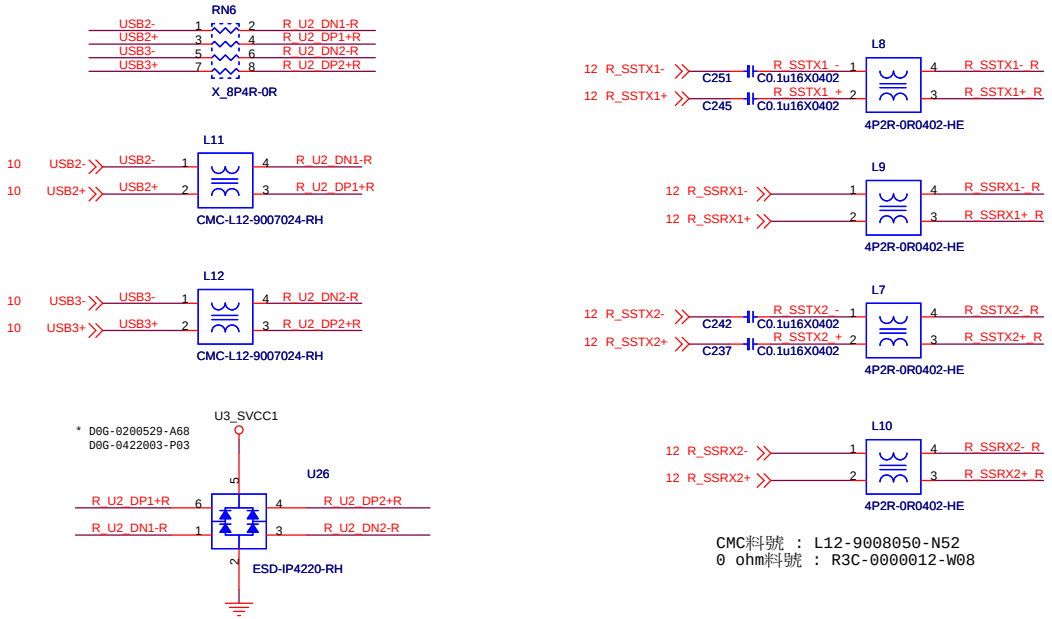


I36-7536B09-U33



I36-7536B09-U33

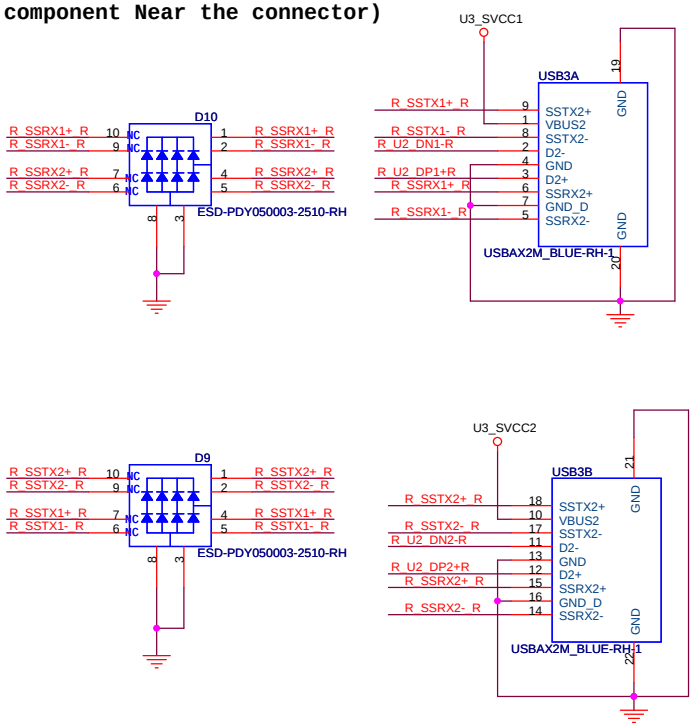
USB 2.0 ESD Protection



CMC料號 : L12-9008050-N52
0 ohm料號 : R3C-0000012-W08

Rear USB 3.0 ESD Protection

(All component Near the connector)



N53-18M0021-F02

MICRO-STAR INTL CO.,LTD		
MS-7785		
Size	Document Description: USB3.0-Real Port	Rev: 11
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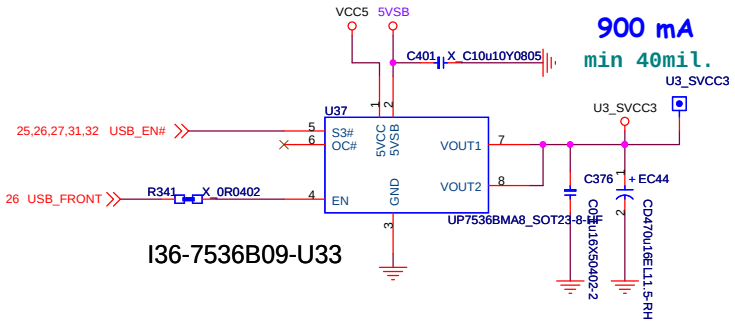
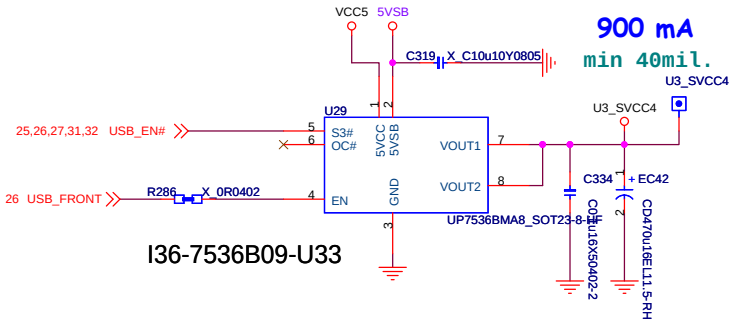
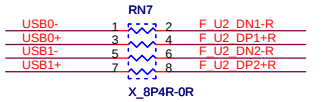
FRONT USB3.0

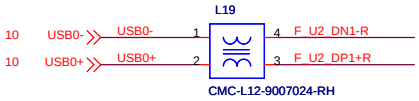
USB3.0 Power Control

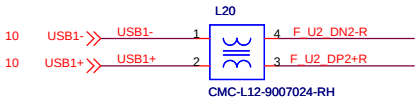


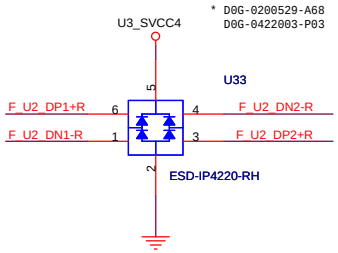


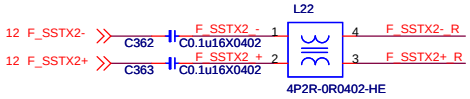
USB 2.0 ESD Protection

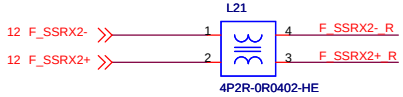


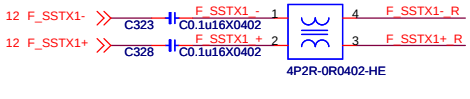


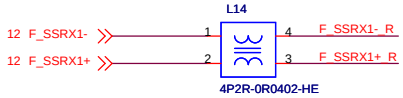








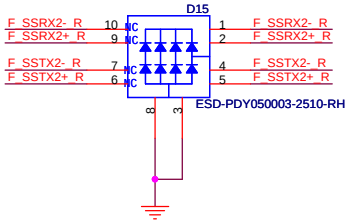


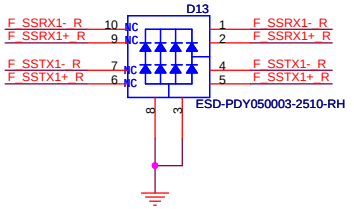


CMC料號 : L12-9008050-N52
0 ohm料號 : R3C-0000012-W08

Front USB 3.0 ESD Protection

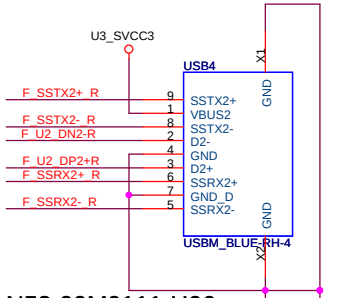
(All component Near the connector)

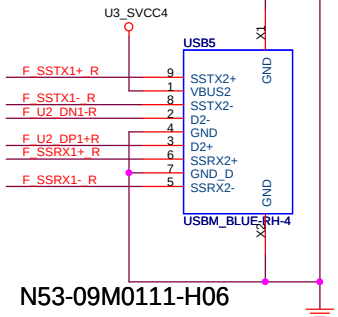




CO-LAY

Front Panel USB 3.0 Connector
From USB Port 2 , 3





直立式USB3.0 connector
N53-09M0111-H06

MICRO-STAR INTL CO.,LTD		
MS-7785		
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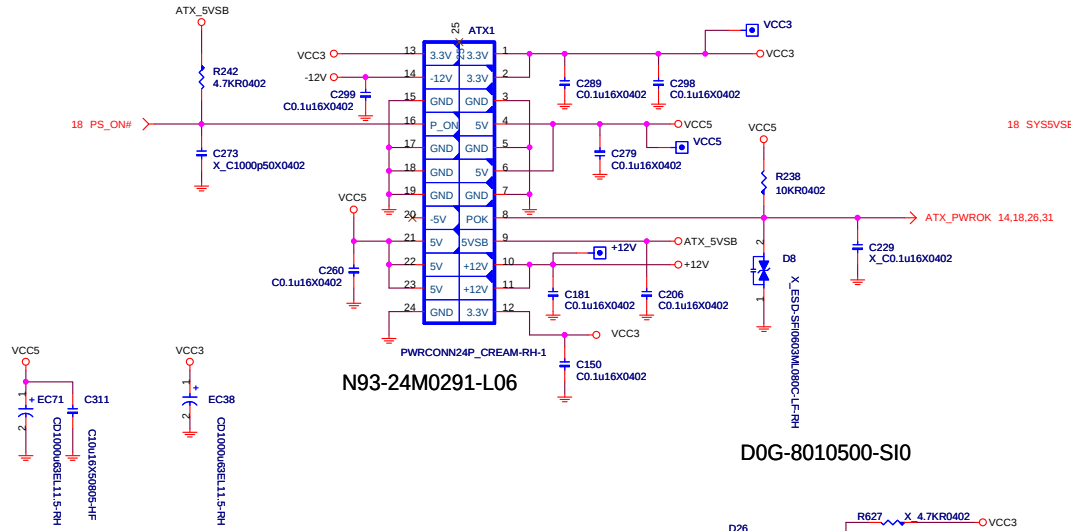
ATX Power Connector / Front Panel / LED

24 Pin ATX Power Connector

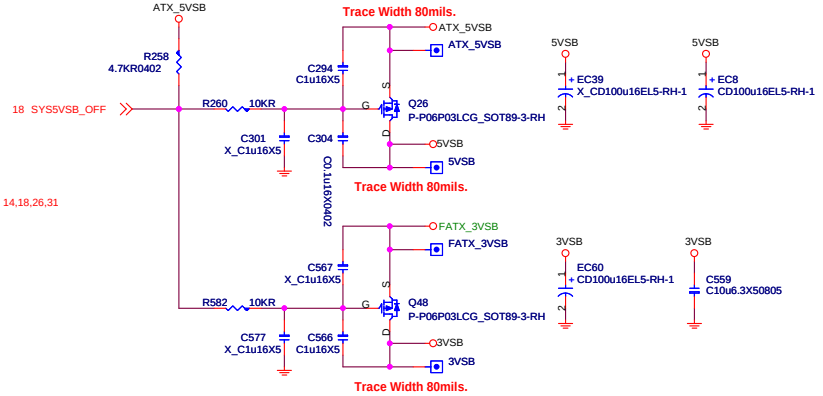


N93-24M0291-L06

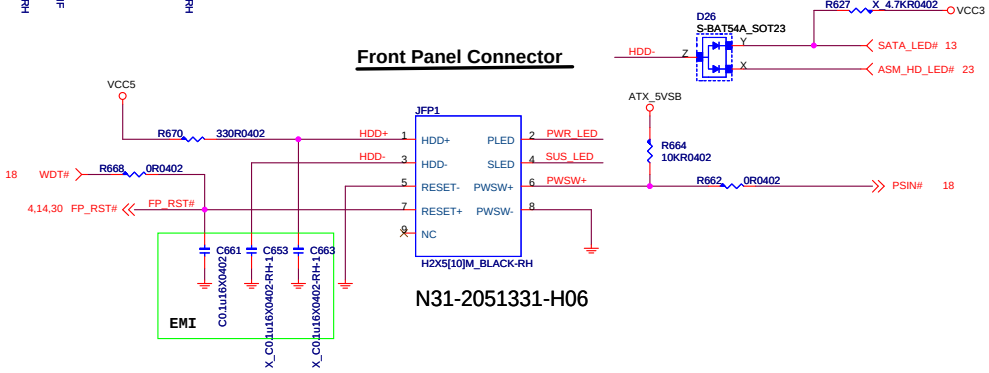
D0G-8010500-SI0

5VSB Power Switch

Tune 5VSB inrush current to 2A from 4A

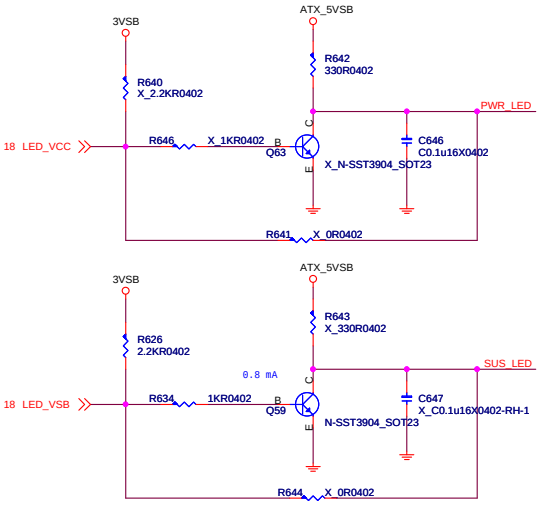


Front Panel Connector

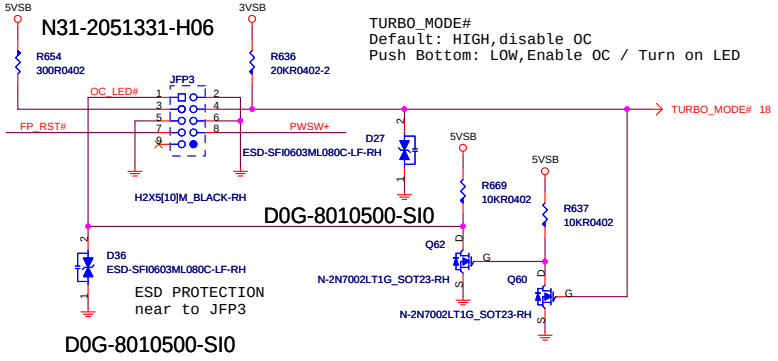


N31-2051331-H06

POWER LED

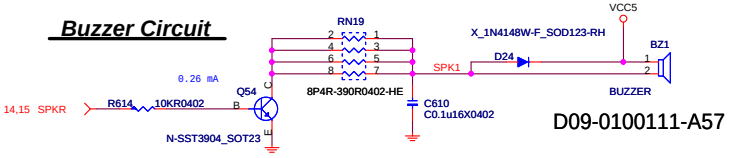


OC Panel



D0G-8010500-SI0

Buzzer Circuit



D09-0100111-A57

MICRO-STAR INT'L CO.,LTD		
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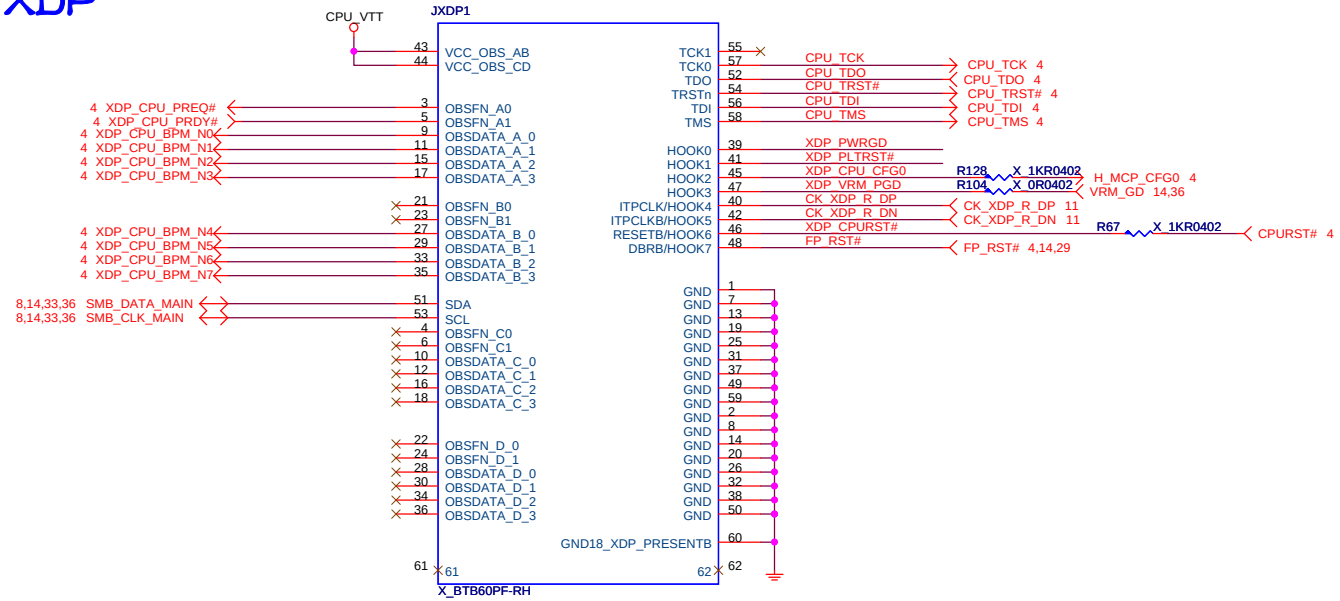
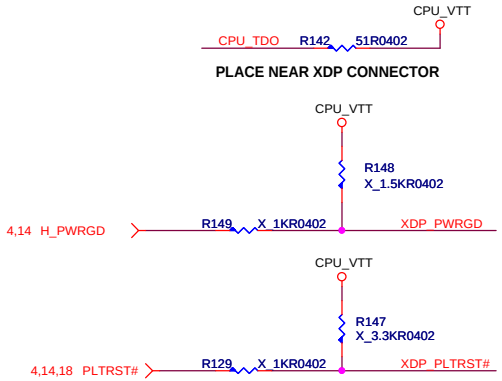
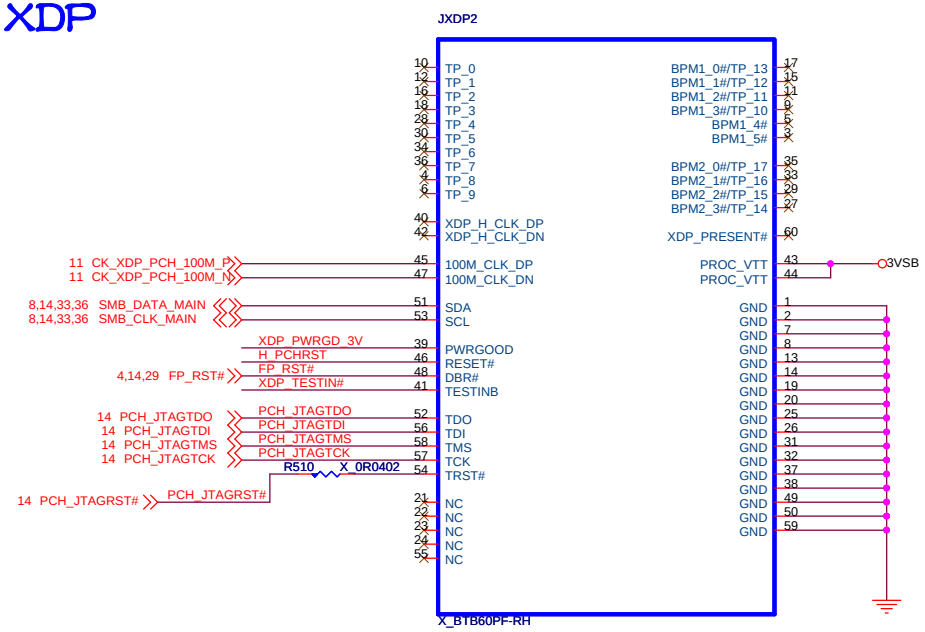
CPU XDP





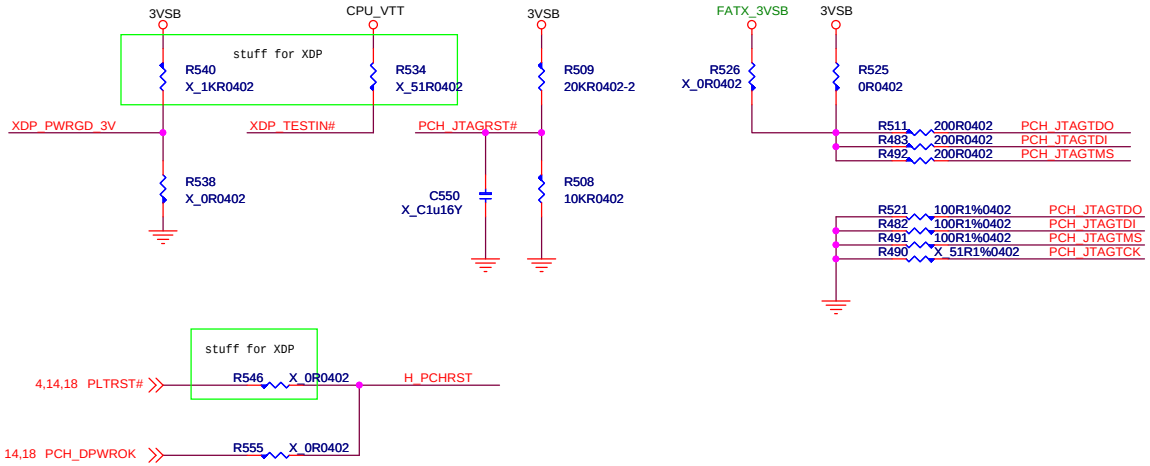
N5C-60F0040-S88

PCH XDP



N5C-60F0040-S88

PCH XDP PWRGD/RESET



MICRO-STAR INT'L CO.,LTD

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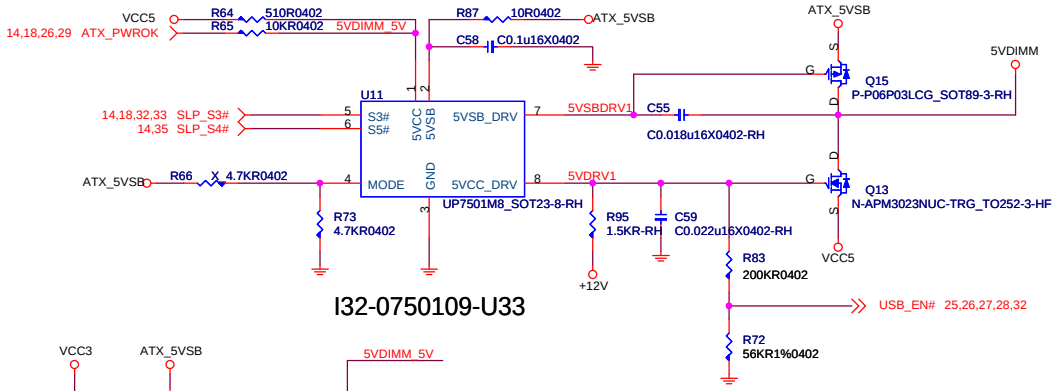
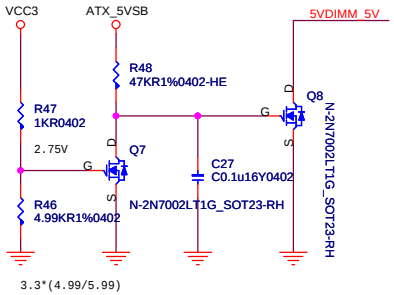
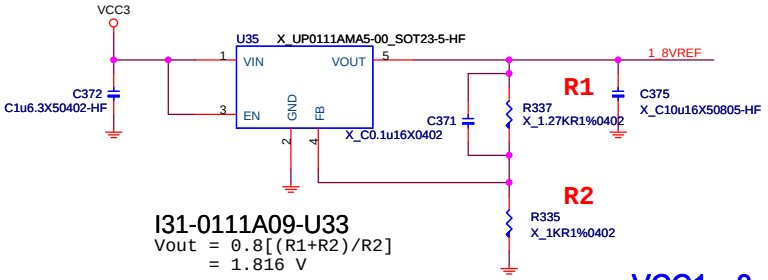
DDRIII Regulator Power Source



I32-0750109-U33



1.8V Reference Power

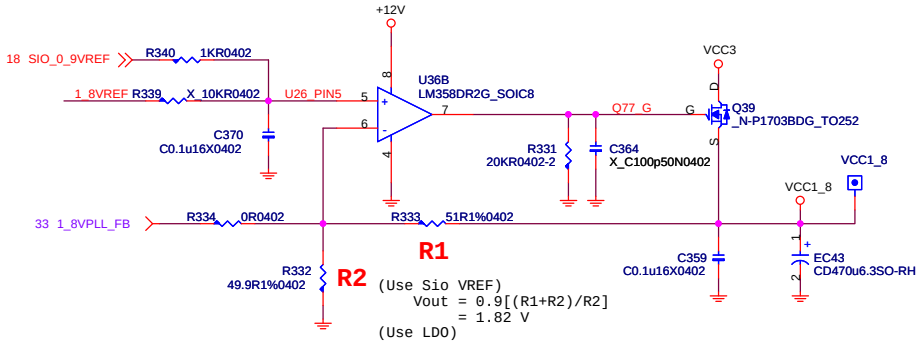


I31-0111A09-U33

```
Vout = 0.8[(R1+R2)/R2]
     = 1.816 V
```

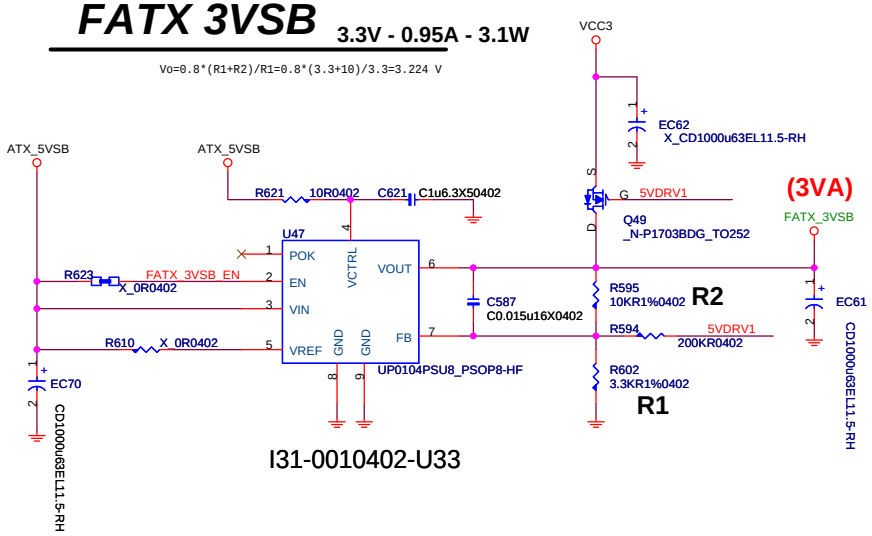
VCC1_8
=VccVRM+VCCPLL
1.8 V
0.186 A+1.5 A
=1.686 A

1.8V VSFR

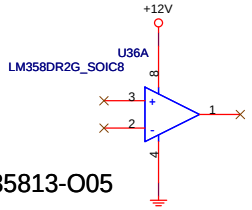


FATX 3VSB 3.3V - 0.95A - 3.1W

```
Vo=0.8*(R1+R2)/R1=0.8*(3.3+10)/3.3=3.224 V
```



I31-0010402-U33



I71-LM35813-O05

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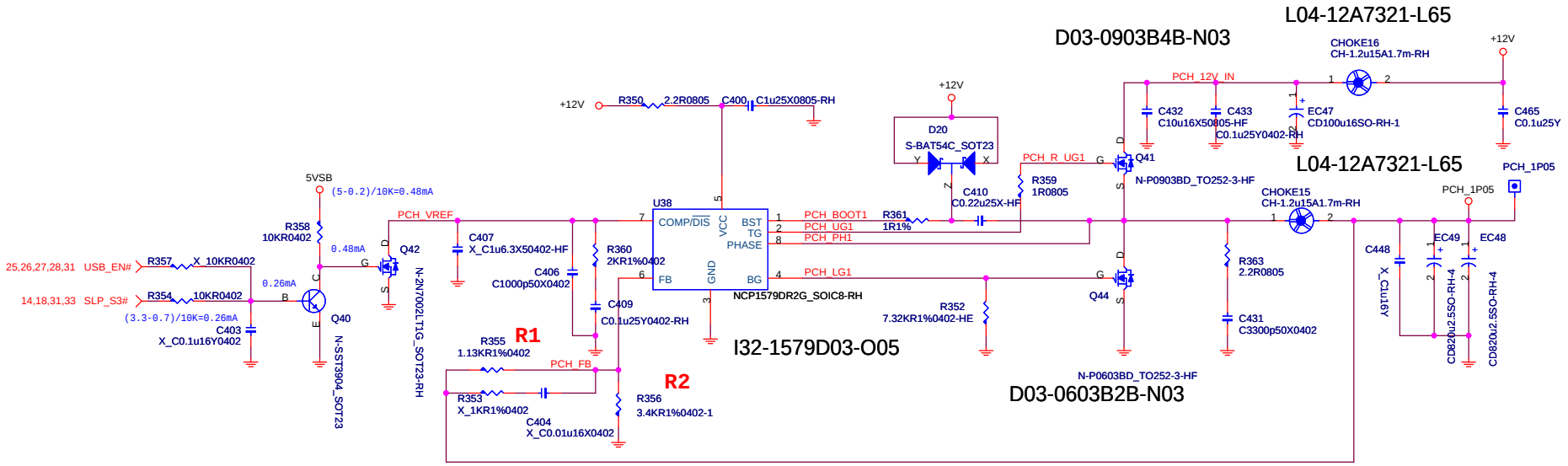
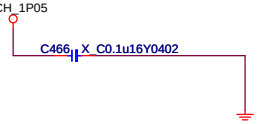
PCH _1P05
1.05 V
8.859 A
OCP=16A

PCH Core Power



Vout = 0.8[(R1+R2)/R2]
= 1.066 V

EMI Resevr



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CPU VTT Power

1. Rocest = Iout*DCR/Iocset ; Iocset = 10uA
   If DCR = 1m ; Iout = 20A, Rocset = 20A*1m/10uA --> Rocset = 2K

2. Csen = L/Rocset*DCR
   If DCR = 1m ; L = 1U, Csen = 1U/2K*1m --> Csen = 0.5U

VCCIO Voltage Selection
VTT_SELECT:
HIGH =1.05 V
LOW =1.00 V

ISL95870B
Vset3 = 1V Vset4=1.05V
VID1=LOW
VID0=LOW =Vset4
=HIGH =Vset3

+12VIN — CHOKE14 CH-1.2u15A1.7m-RH-2 — VTT_VIN
L04-12A7601-L65
EC40 CD100u16SO-RH-1

CPU _VTT
=VCCIO+ VCCSA
1.05 V
8.5 A +8.8 A
=17.3 A
OCP=32A

U31 ISL95870BHRZ-T QFN20-RH
D03-4921N13-O05
D03-4937N00-O05
I32-958700C-I11
L04-05A8031-L65
CHOKE13 CH-0.5u50A0.8m-HF
CP28 CP27

GND PAD CONNECT TO GND THROUGH 4 VIAS

U34 UP1811BMA8_SOT23-8-HF
0x2A:RH=OPEN,RL=1K
I34-1811B09-U33

FP CAP
EC36 EC37 C470u2.5pSO-RH
EC73 C470u2.5pSO-RH
Place bottom Side
C71-471022E-S03

MLCC
C689 C693 C685 C690 C674 C688 C250 C675 C22u6.3X5R0805-RH

UPI VOLTAGE CONSOLE

ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

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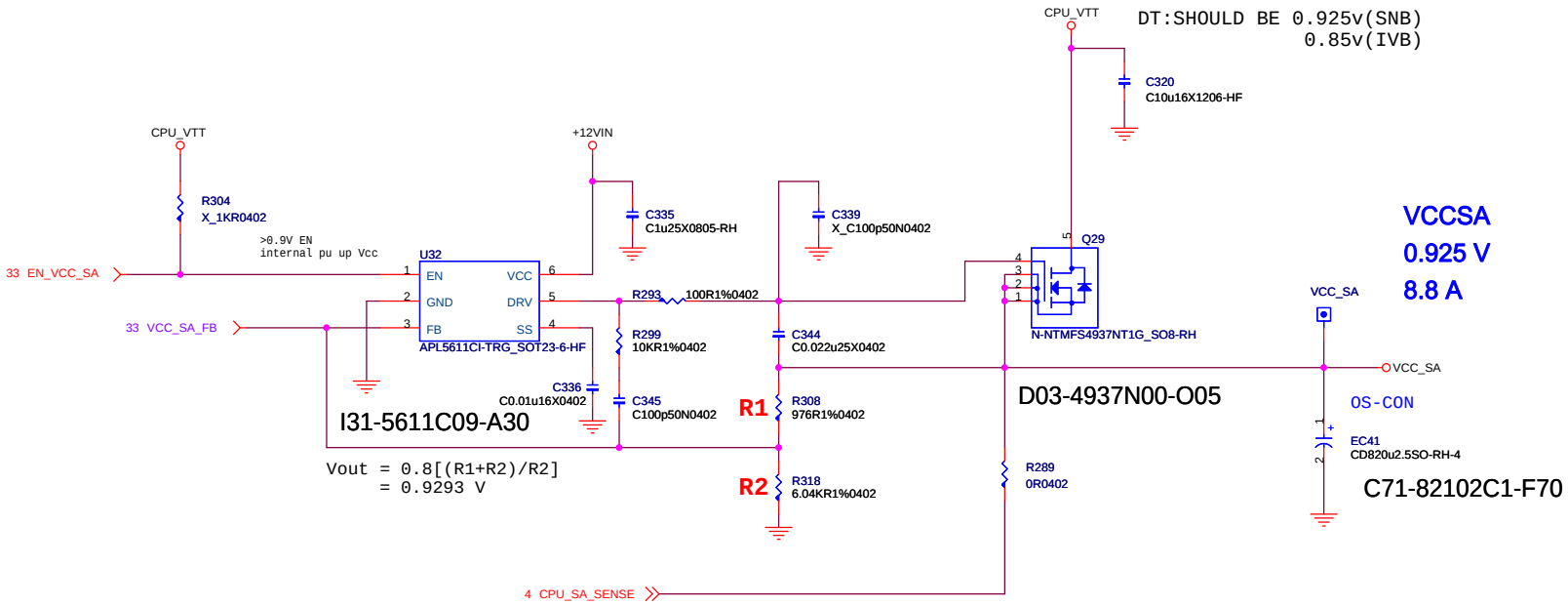
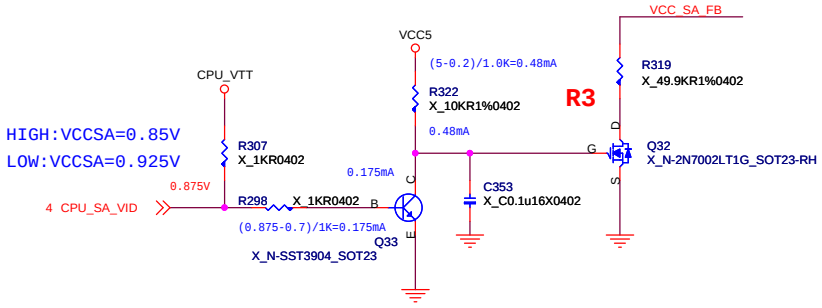
VCCSA



Reserved For CPU select SA_VID
R1= 1K
R2= 13.7K
R3= 11.8K



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	CPU VCC_SA	11

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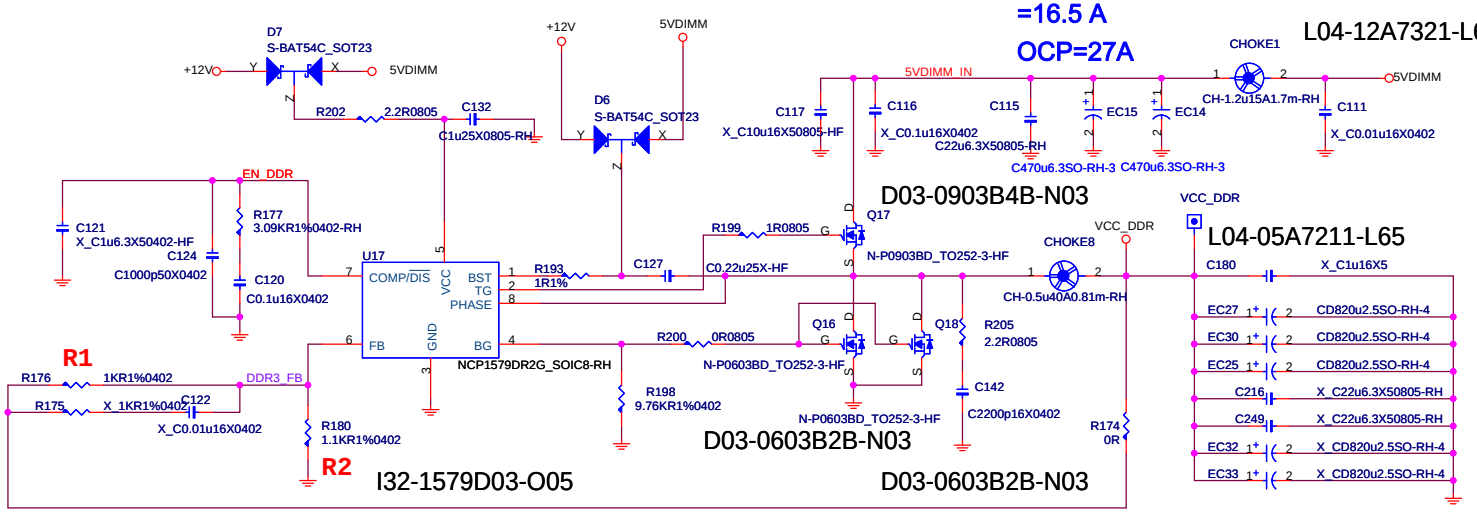
DDRIII Power

Iocp = Iocset*Rocset/Rds(on) ; Iocset=10uA
L-MOS : D03-0603B2B-N03
= 10uA*18.7K/2.9mohm = 64.5A
L-MOS: D03-0480600-O05
= 10uA*18.7K/4.7mohm = 39.8A
VCC_DDR

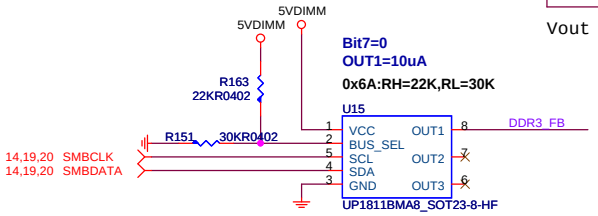
VCC _DDR
VDDQ+DDR POWER+VTT DDR
1.5 V
4.75 A +11 A+1 A
=16.5 A
OCP=27A

L04-12A7321-L65

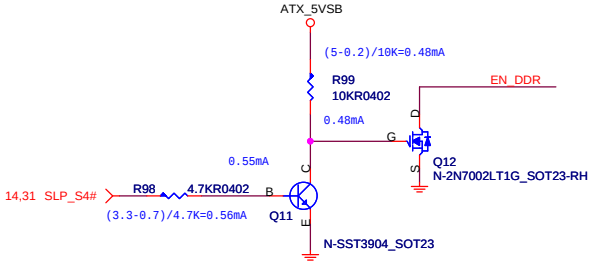


Vout = 0.8[(R1+R2)/R2]
= 1.527 V

DDRIII I/O power decoulping caps.



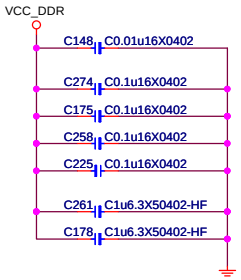
I34-1811B09-U33



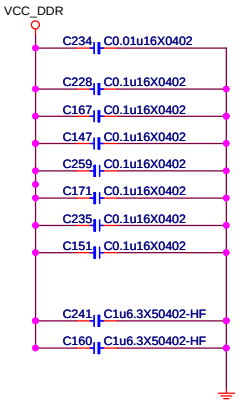
UPI VOLTAGE CONSOLE

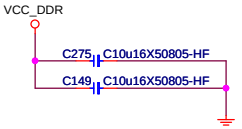
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

CHANNEL A

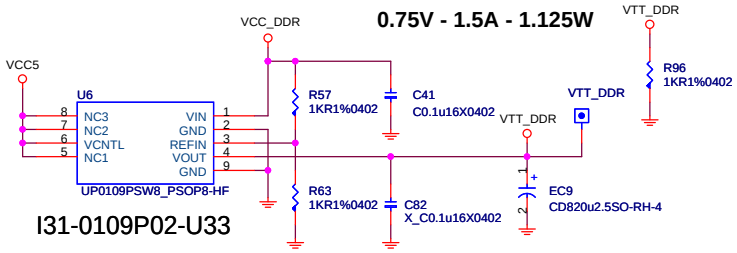


CHANNEL B

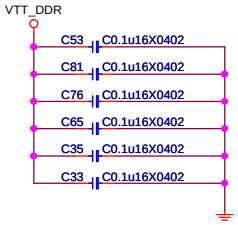


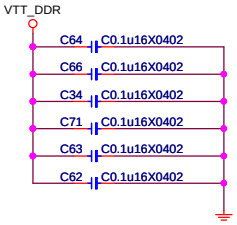


DDRIII Termination Power



I31-0109P02-U33





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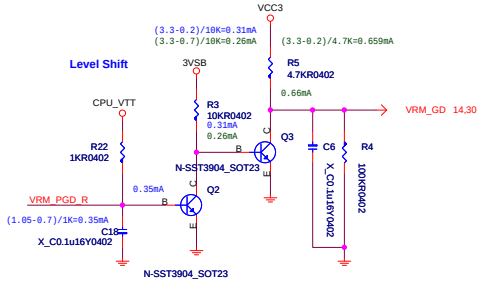
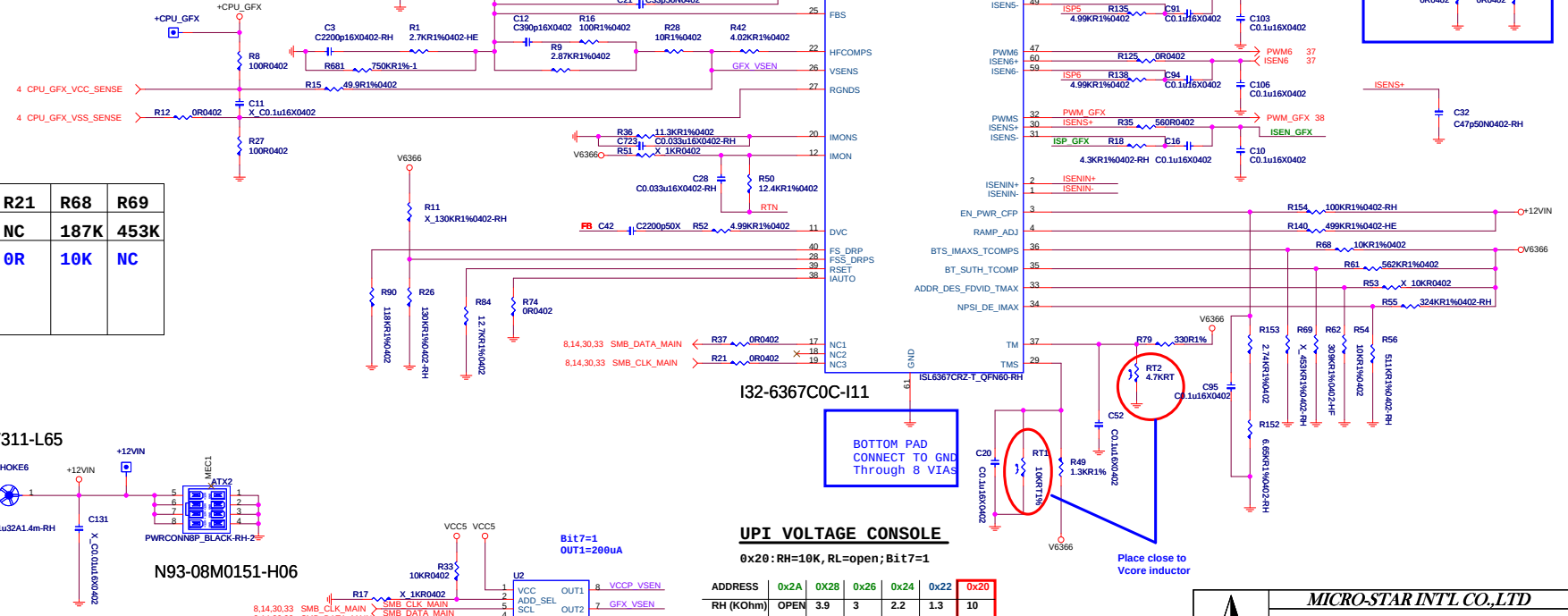
ISL6366CRZ-T VRD12 POWER CKT

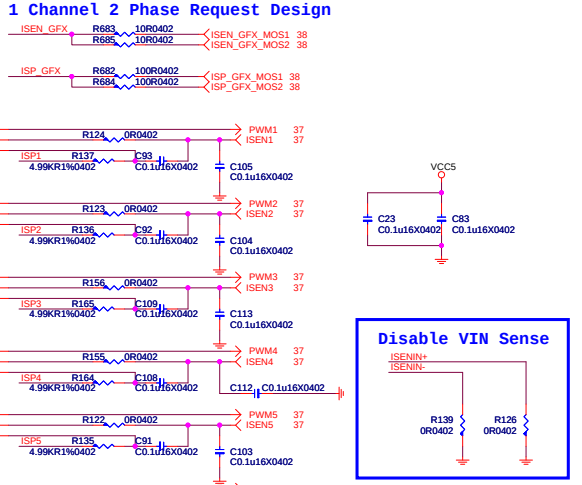
Voltage Regular Module (VRD12)

VCCP
130A
OCP=180A





GFX Power
1 Channel 2 Phase Request Design



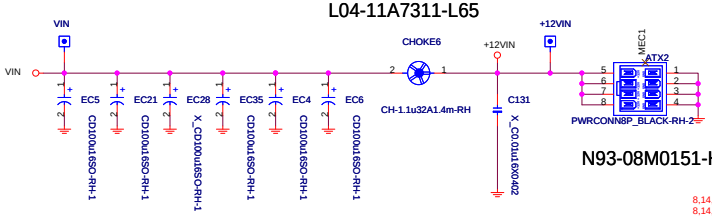
Disable VIN Sense

6366 6367 Option Table

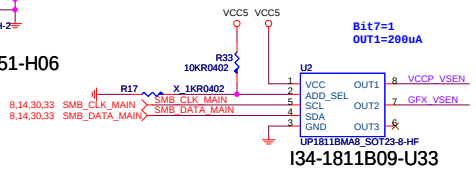
U5	R37	R21	R68	R69
6366 I32-6366C0C-I11	NC	NC	187K	453K
6367 I32-6367C0C-I11 PCB 1.0 Default Can use I2C to setting VCCP & +CPU_GFX Voltage and support Fix Mode	0R	0R	10K	NC

CPU Core Power +12V Input

L04-11A7311-L65



N93-08M0151-H06



UPI VOLTAGE CONSOLE

0x20:RH=10K,RL=open;Bit7=1

ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (Ohm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

Place close to Vcore inductor

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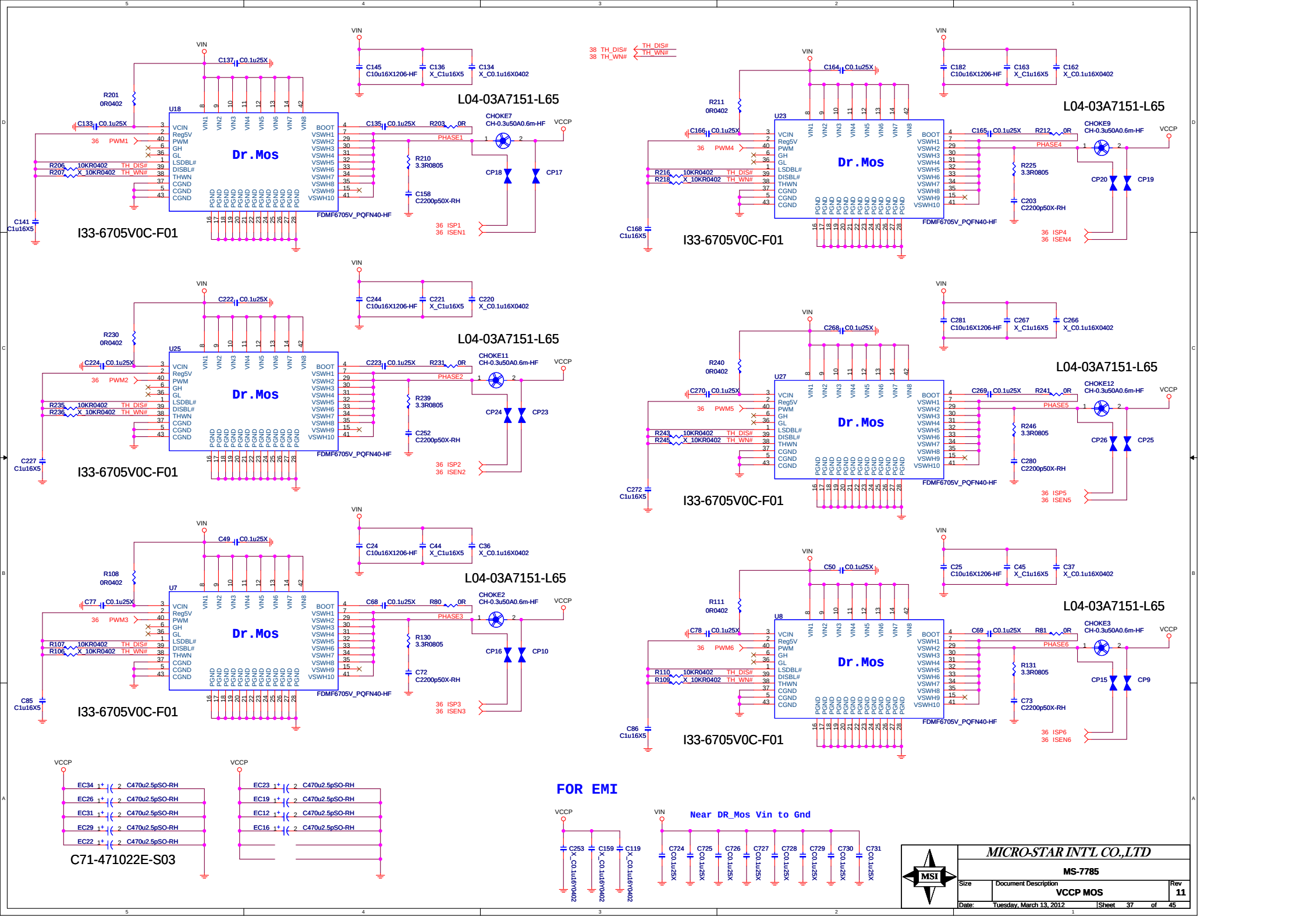
VIN
U18
U23
U25
U27
U7
U8
Dr.Mos
FDMF6705V_PQFN40-HF
L04-03A7151-L65
I33-6705V0C-F01
C71-471022E-S03
FOR EMI
Near DR_Mos Vin to Gnd
VCCP
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VCCP MOS
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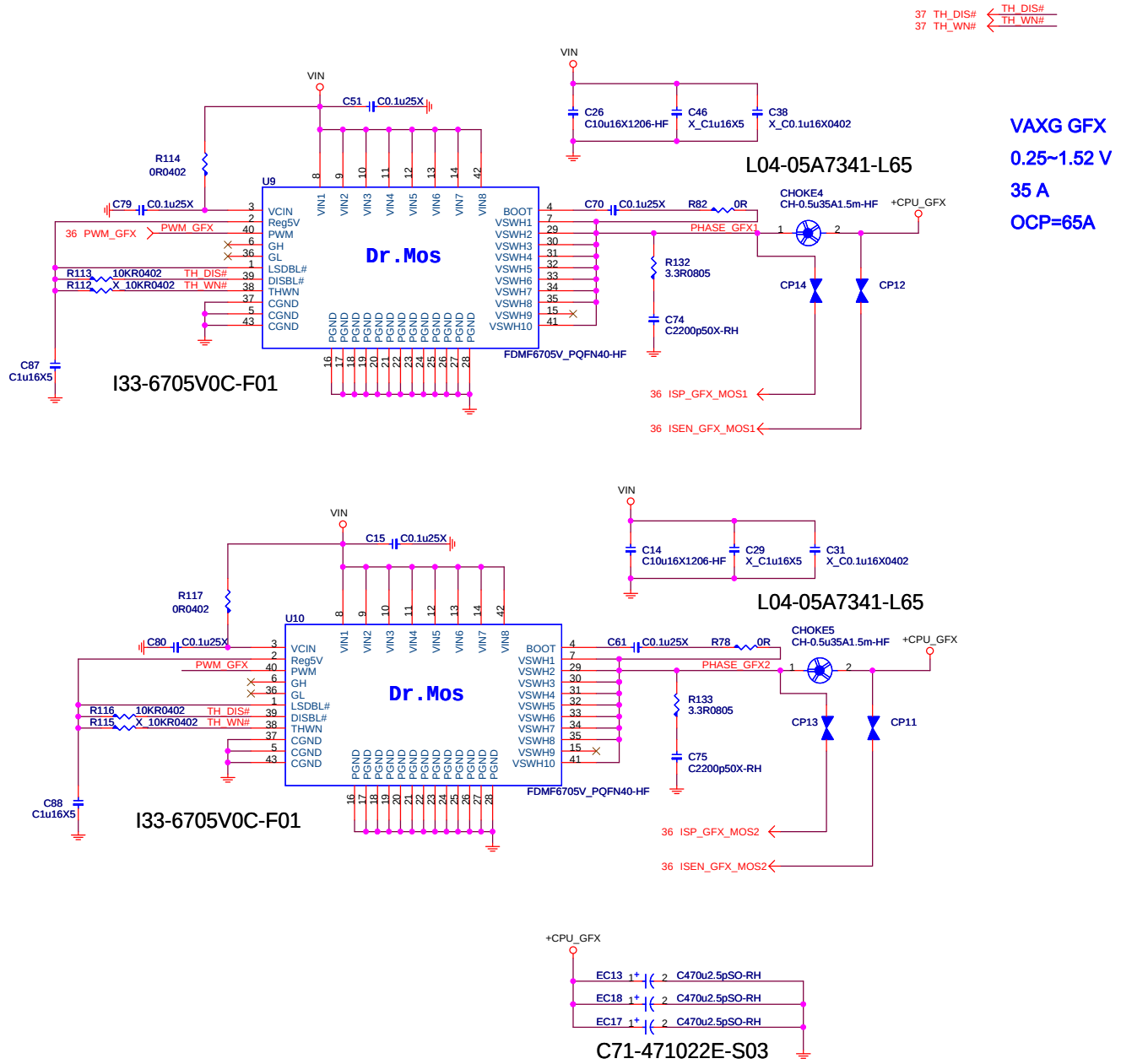

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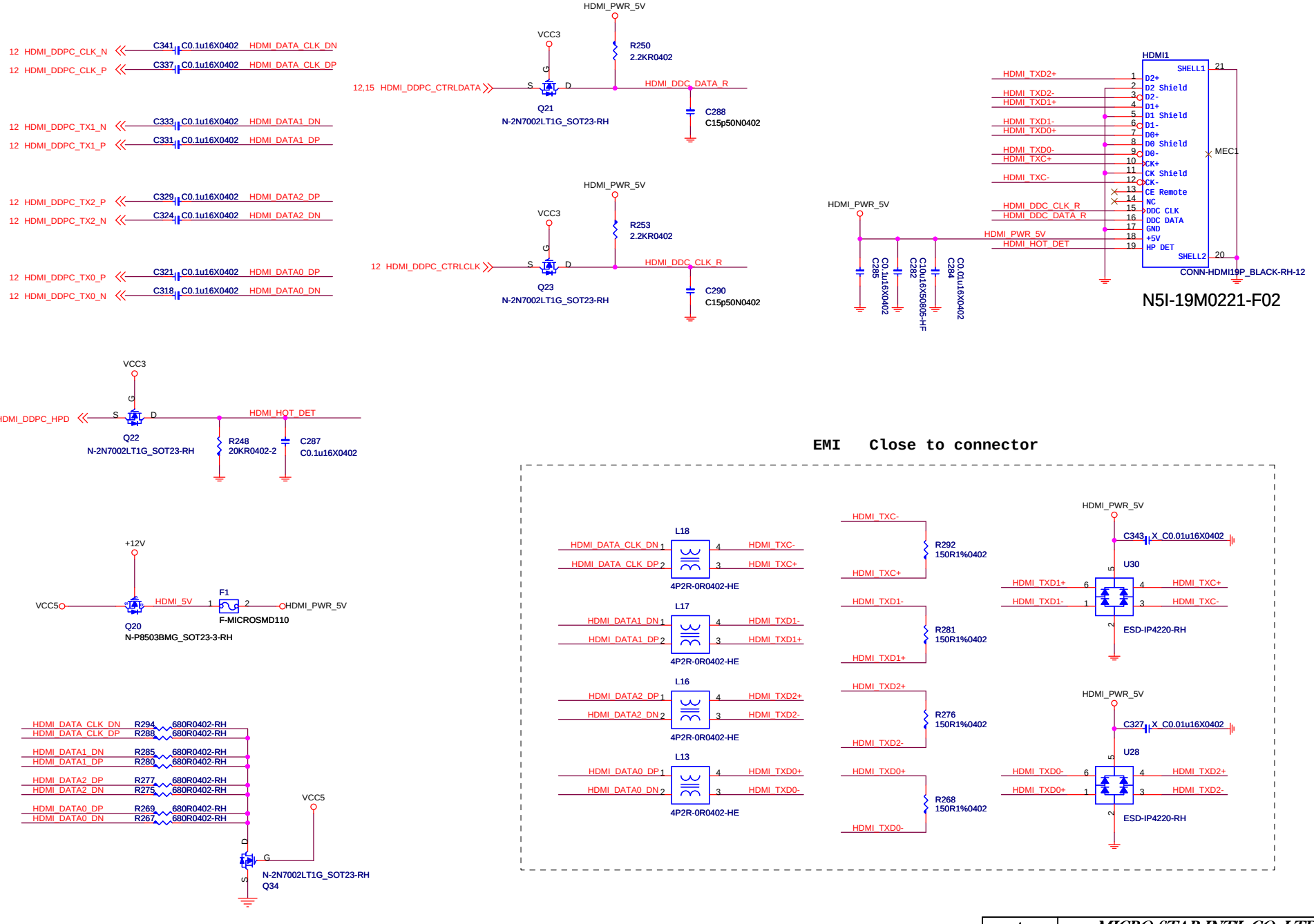
HDMI Connector



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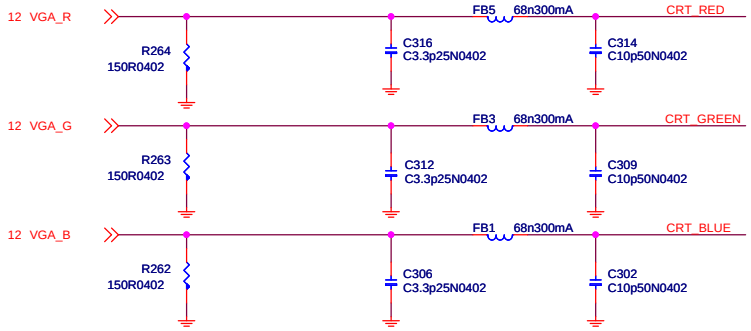

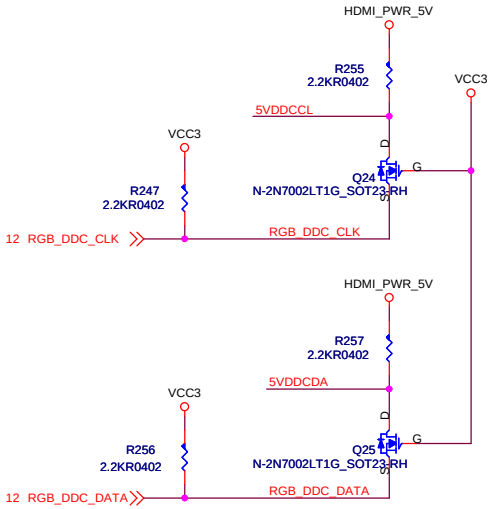

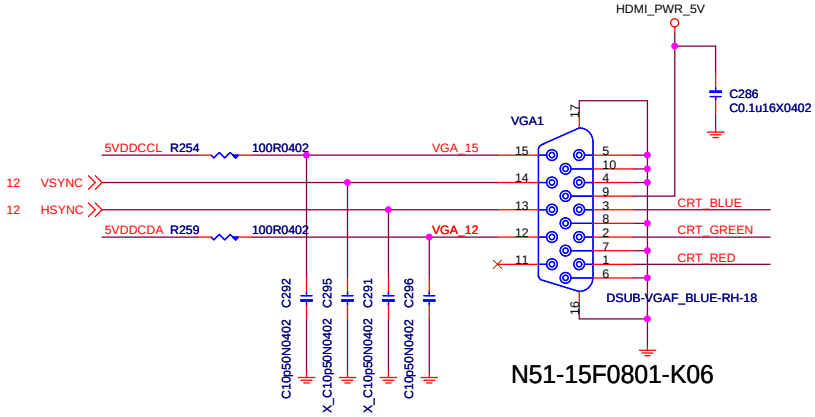

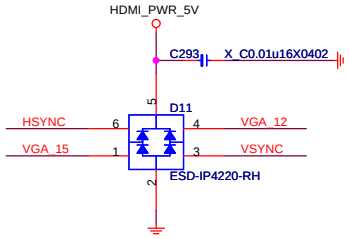

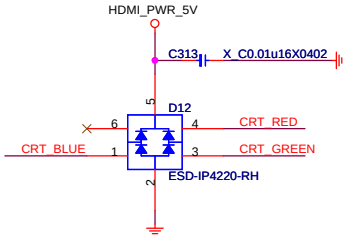

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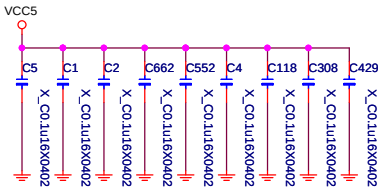
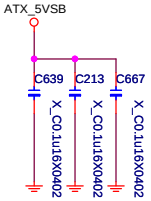
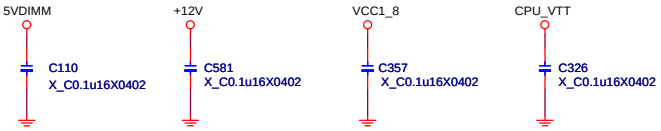
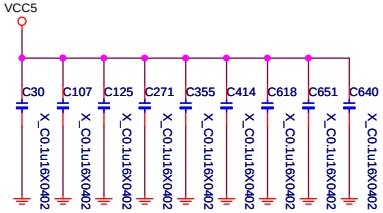
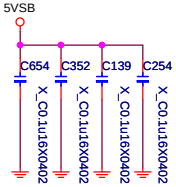
EMI CAPs

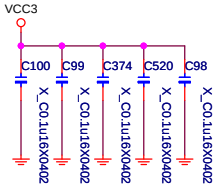


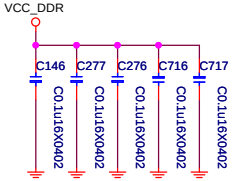


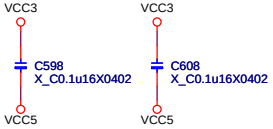


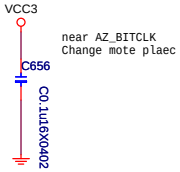












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MS-7785		
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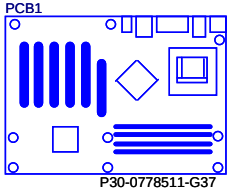
Manual Parts

PCB1

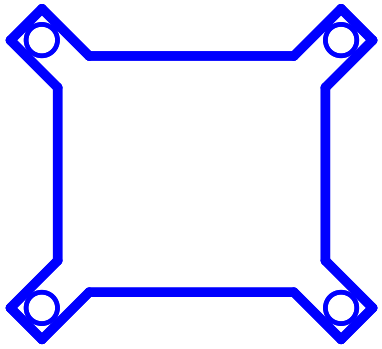


P30-0778511-G37
PCB

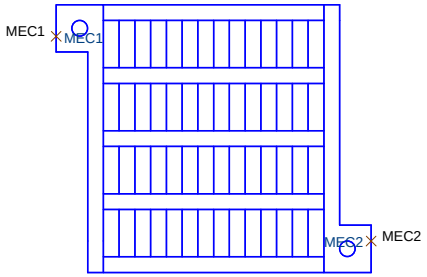
P30-0778511-G37
P30-0778511-E48

XU1_X2

X_CPU RETENTION BACKPLATE



U3_X1

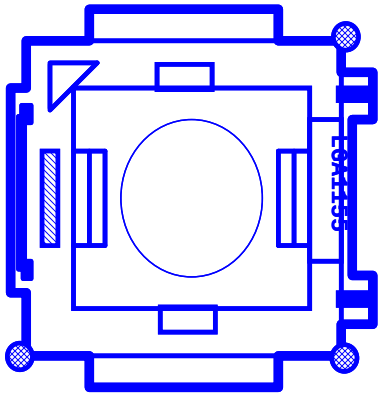


HS-0401634-RH

E31-0401634-K08

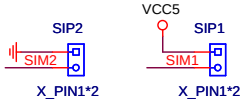
XU1_X1

CPU SOCKET



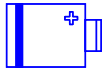
E21-7557060-F02

Simulation



X_PIN1*2 X_PIN1*2

VBAT-S1



BAT-BCR2032P-RH

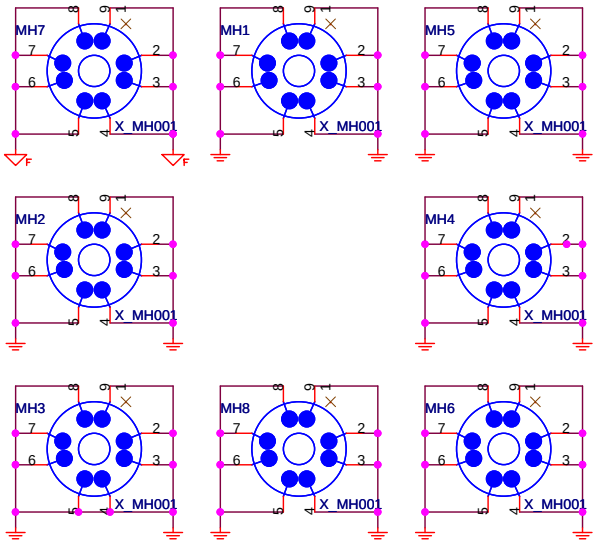
HDMI VIRTUAL PN

HDMI_ROYALTY

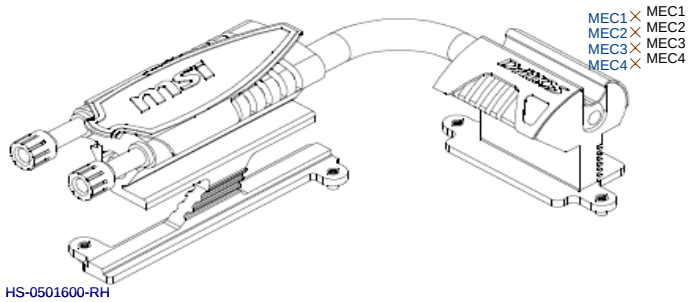
0.04 PER UNIT
Y01-RHDMI03-000

PCB Mounting Holes

Mounting Holes



U21



HS-0501600-RH

E31-0501600-K08

LABEL

LABEL1

AMI-UEFI_BIOS-LABEL

G51-M1SPXXA-A09

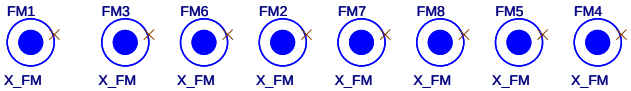
LABEL2

HDMI-LABEL

G51-M1SPX33-Q13

Optics Orientation Holes

Optical Fiducial Marks-120



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