

Project Name: BRASWELL NDBW1401

PAGE CONTENT

- 1. INDEX
- 2. SYSTEM BLOCK
- 3. POWER DIAGRAM & SEQUENCE
- 4. GPIO & Power Consumption
- 5. BW DDR3L
- 6. BW DISPLAY/SD CARD
- 7. BW SATA/PCI-E/FSPI/CODEC/CLK
- 8. BW I2C/GPIO
- 9. BW USB2.0/3.0
- 10. BW PMU/RTC/LPC/SVID
- 11. BW POWER1
- 12. BW POWER2
- 13. BW GND
- 14. DDR3L
- 15. eDP / LVDS
- 16. HDMI
- 17. EC IT8928/BIOS/KB CONN
- 18. PWRBTN
- 19. HDD/ODD/WIFI/DEBUG
- 20. LAN/CARD READER/SD_DB_CN
- 21. CODEC(ALC269Q)/INT MIC/SPKR
- 22. HP_J/USB2.0/FAN/G-SEN/TH-SEN
- 23. DC IN/TPM/(TV/3G)/D-Resis
- 24. BATT IN/CHARGER(OZ8660)
- 25. +CPU_VCORE/+VGXF_CORE
- 26. +5VA/+3VA/+1.05V
- 27. +1.35V/+1.8VA/+1.5VS
- 28. VCC Switch
- 29. TP/LED/USB3.0
- 30. USB HUB
- 31. TP Dome DB

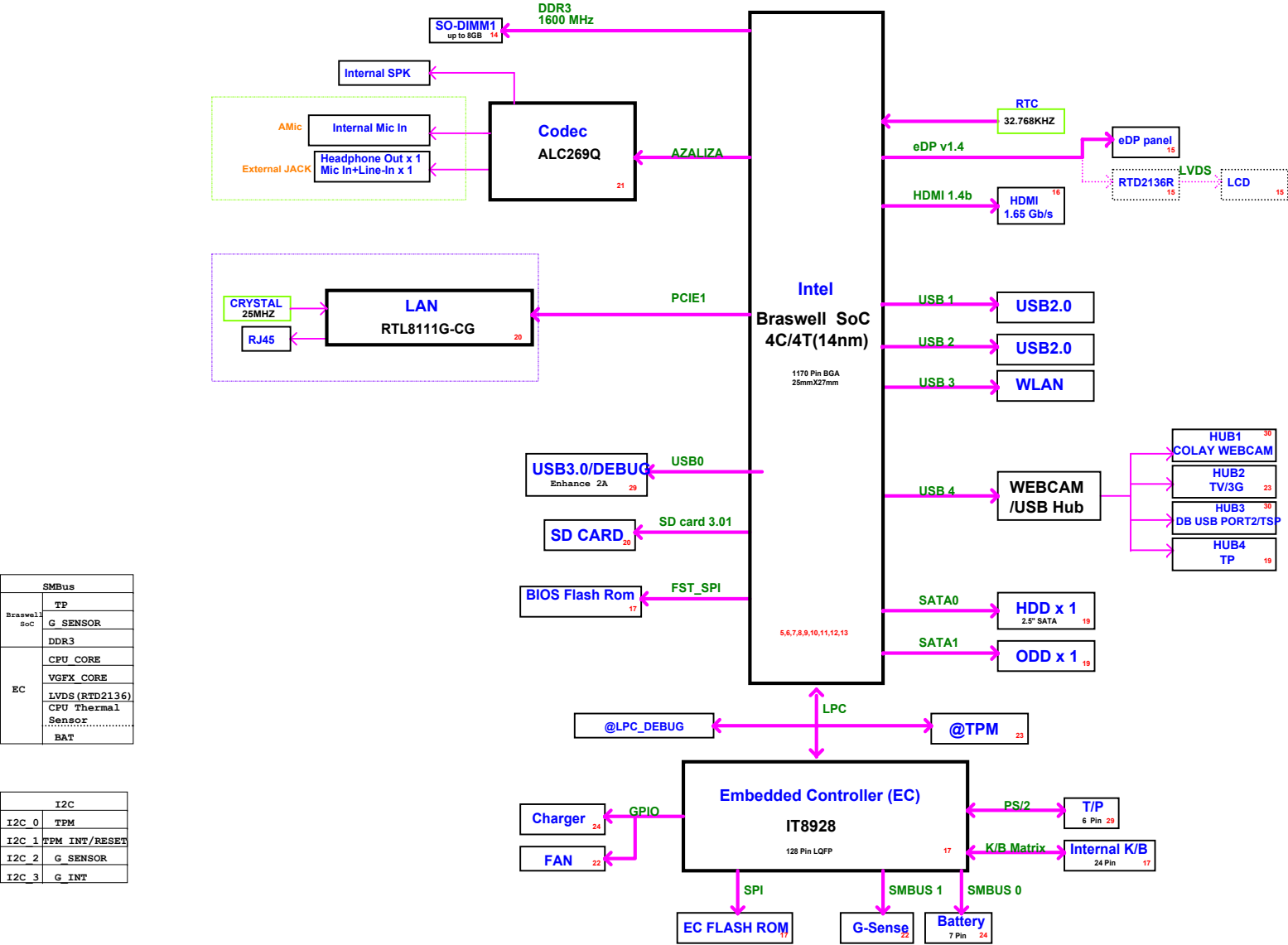
M/B Schematic Version Change List

Release Date	Version	PCB P/N	PCB Description	PCBA P/N	Note

Daughter Board Schematic Version Change List

Release Date	Version	PCB P/N	PCB Description	PCBA P/N	Note

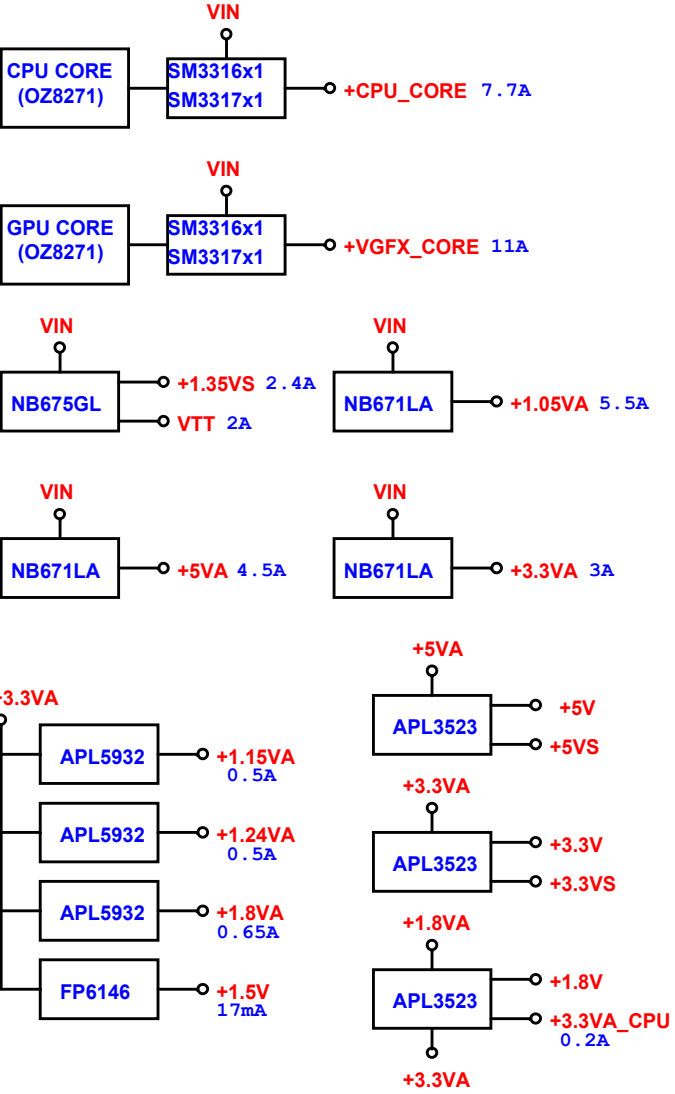
SYSTEM BLOCK DIAGRAM



SMBus	
Braswell SoC	TP
	G SENSOR
	DDR3
EC	CPU CORE
	VGFX CORE
	LVDS (RTD2136)
	CPU Thermal Sensor
	BAT

I2C	
I2C 0	TPM
I2C 1	TPM INT/RESET
I2C 2	G SENSOR
I2C 3	G INT

POWER BLOCK DIAGRAM

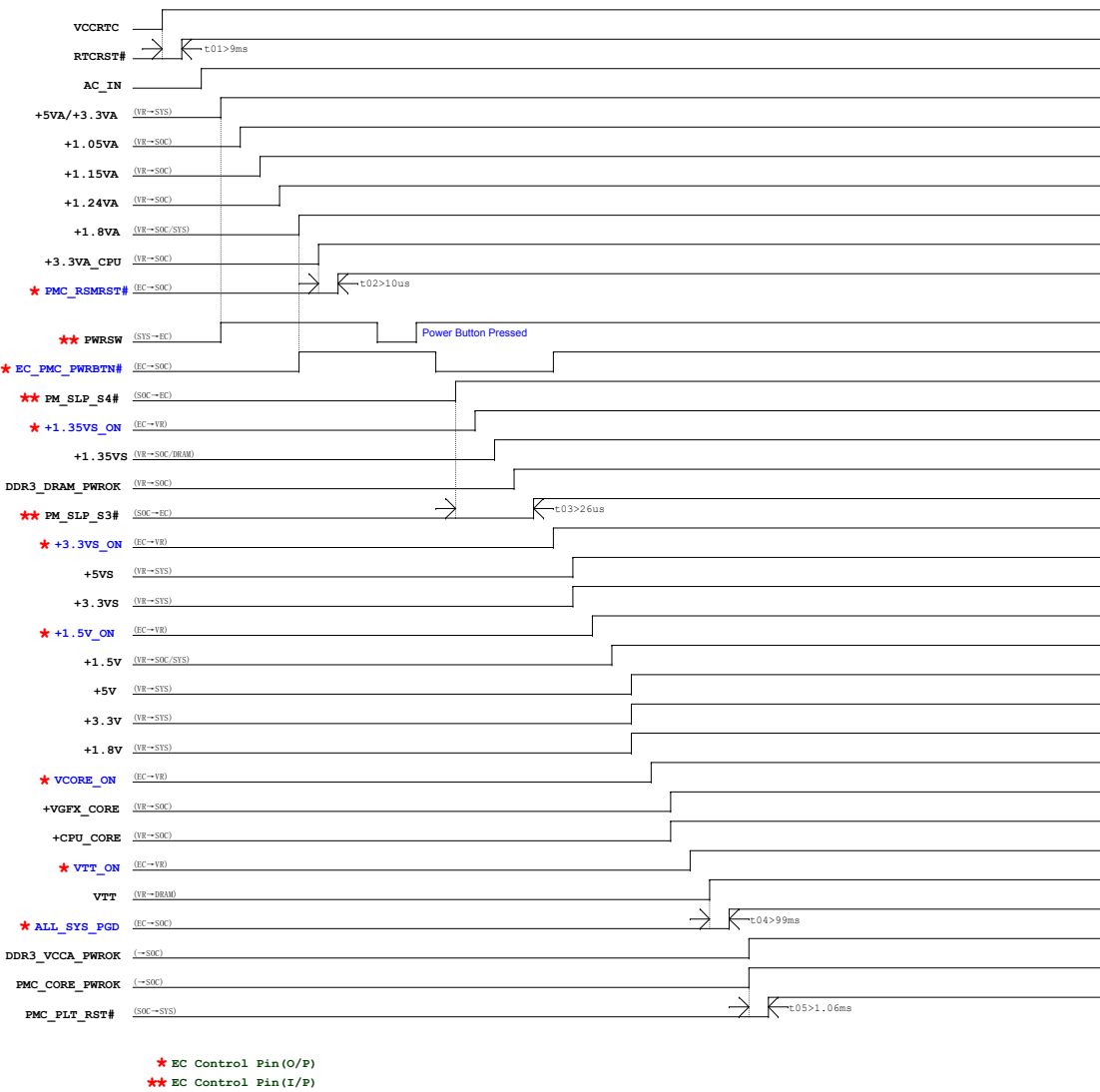


Input Power	Voltage	Current	Power Rail	Voltage	Current
VIN	19.0V	4.1A	+CPU_CORE	VID	7.7A
			+VGFX_CORE	VID	11.0A
			+1.35VS	1.35V	8.0A
			VTT	0.75V	2.0A
			+1.05VA	1.05V	5.5A
			+5VA	5.0V	5.5A
			+3.3VA	3.3V	3.0A

Input Power	Voltage	Current	Power Rail	Voltage	Current
+3.3VA	3.3V	3.0A	+3.3VA_CPU	3.3V	0.2A
			+1.15VA	1.15V	0.5A
			+1.24VA	1.24V	0.5A
			+1.08VA	1.8V	0.65A
			+1.5V	1.5V	0.02A
			+3.3V/+3.3VS	3.3V	1.5A

Input Power	Voltage	Current	Power Rail	Voltage	Current
+5VA	5.0V	5.5A	+5V/+5VS	5V	5.5A

Power On Sequence



ITE8928

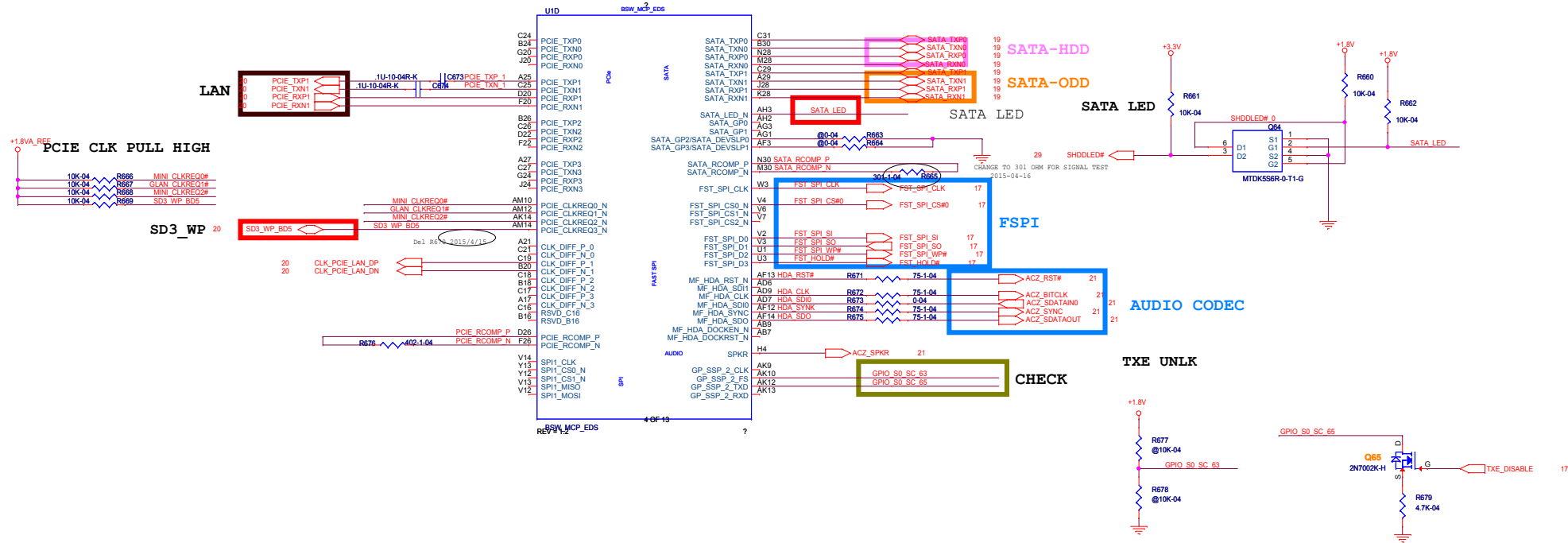
Default

	GPIO	Pull/Mode	DSN LEVEL	EC LEVEL	IC LEVEL	Comment
GPA0	PID_1_CHG_R_LED	UP/GPO	3.3VA	3.3V		Reserved
GPA1	PID_2_PWR_LED	UP/GPO	3.3VA	3.3V		Reserved
GPA2	BTL_BEEP	/GPO	3.3V	3.3V	3.3V	Reserved
GPA3	Fast_Charge	/GPO	3.3V	3.3V	3.3V	
GPA4	+1.05VA_ON	UP / GPO	3.3VA	3.3V	>1.25V	Reserved
GPA5	SENBAT_V	/ GPO	3.3V	3.3V	For NMOS	
GPA6	PMC_RSMRST#	Dn / GPI	3.3V	3.3V	3.3V	
GPA7	+1.35VS_ON	/ GPO	3.3V	3.3V	>1.25V	
GPB0	WLAN_HOST_WAKE	/ GPI	3.3V	3.3V	3.3V	Reserved
GPB1	WLAN_SUSPEND	/ GPO	3.3V	3.3V	3.3V	Reserved
GPB2	WEBCAM_ON	/ GPO	3.3V	3.3V	3.3V	
GPB3	BAT_SMBCLK1	UP/GPIO	3.3VA	1.8VA		
GPB4	BAT_SMBDAT1	UP/GPIO	3.3VA	1.8VA		
GPB5	SOC_BL_EN	/ GPI	1.8VA	1.8/3.3VA	MAX 5.0V	Reserved
GPB6	+3.3V_EC	UP / GPI	3.3VA	1.8/3.3VA	3.3V	
GPB7	SAFTY_PROTECT	Dn / GPO	3.3V	3.3V	For NMOS	
GPC0	3G_Power_ON_EC	/ GPO	3.3VA	1.8/3.3VA	3.3V	Reserved
GPC1	SMB_CLK_EC	UP / GPIO	3.3VA	1.8/3.3VA	3.3V	
GPC2	SMB_DATA_EC	UP / GPIO	3.3VA	1.8/3.3VA	3.3V	
GPC3	PWRBTN1#	UP / GPI	3.3VS	3.3V	3.3V	Reserved
GPC4	PANEL_DETECT_2	UP / GPI	3.3VA	3.3V	3.3V	
GPC5	CHG_HI_VOLT#	/ GPO	3.3V	3.3V	For NMOS	
GPC6	PANEL_3.3V_ON	UP /GPO	3.3V	3.3V	For NMOS	
GPC7	VTT_ON	/ GPO	3.3V	1.8/3.3VA	>1.25V	
GPD0	ADAP_IN	Dn / GPI	3.3V	1.8/3.3VA	For NMOS	
GPD1	EC_PMC_PWRBTN#	UP / GPO	1.8VA	1.8/3.3VA	1.8V	
GPD2	PLT_RST#	UP / GPI	3.3V	1.8/3.3VA	3.3V	
GPD3	SMC_WAKE_SCI#	Up / GPO	1.8VA	1.8/3.3VA	1.8V	Reserved
GPD4	EC_EXTSMI#	UP / GPO	1.8VA	1.8/3.3VA	1.8V	
GPD5	NC					
GPD6	+1.5V_ON	/ GPO	3.3V	3.3V	3.3V	
GPD7	PWR_USB#	UP/ GPO	3.3VA	3.3V	3.3V	
GPE0	LID#	UP/ GPI	3.3VA	1.8/3.3VA	3.3V	
GPE1	AMP_MUTE#	/ GPO	3.3V	3.3V	3.3V	
GPE2	ALL_SYS_PGD	/ GPO	3.3V	3.3V	For NMOS	
GPE3	VCORE_ON	/ GPO	3.3V	3.3V	3.3V	
GPE4	PWRSW	UP / GPI	3.3VA	3.3V	3.3V	
GPE5	LVDS_VIN	/ GPO	3.3V	3.3V	For NMOS	
GPE6	3G_SIM_DET_EC	/ GPI	3.3V	1.8/3.3VA	3.3V	Reserved
GPE7	PMC_SLP_S0IX#_R	/ GPI	3.3V	1.8/3.3VA	3.3V	Reserved
GPF0	PANEL_VCC	Dn / GPO	3.3V	3.3V	3.3V	Reserved
GPF1	TXE_DISABLE	/ GPO	3.3V	3.3V	For NMOS	
GPF2	3G_Reset_EC	/ GPO	3.3V	1.8/3.3VA	3.3V	Reserved
GPF3	WLAN_ON	/ GPO	3.3V	1.8/3.3VA	For NMOS	
GPF4	TP_CLK	UP / GPIO	3.3V	1.8/3.3VA	3.3V	
GPF5	TP_DATA	UP / GPIO	3.3V	1.8/3.3VA	3.3V	
GPF6	PM_SLP_S3#	UP / GPIO	3.3VA	1.8/3.3VA	connect to level shifter	
GPF7	PM_SLP_S4#	UP / GPI	3.3VA	1.8/3.3VA	connect to level shifter	
GPG0	NC					
GPG1	+3.3VS_ON	/GPO	3.3V	3.3V	3.3V	
GPG2	NC					
GPG3	SPI_CE#	/GPO		3.3V	3.3V	
GPG4	SPI_SI	/GPI		3.3V	3.3V	
GPG5	SPI_SO	/GPO		3.3V	3.3V	
GPG6	LAN_FW_EN	UP/GPO	3.3V	3.3V	For NMOS	
GPG7	SPI_CLK	/GPO		3.3V	3.3V	
GPH0	AUX_OFF	Dn/GPO	3.3VA	1.8/3.3VA	For NMOS	
GPH1	PID_3_RF_LED_ON#	/GPO	3.3VA	1.8/3.3VA	3.3V	
GPH2	EC_LCDVDD_EN	UP/GPO	1.8VA	1.8/3.3VA	1.8V	
GPH3	RST	/GPO	3.3V	3.3V	For NMOS	Reserved
GPH4	PLATFORM_ID1	UP/GPI/ID1	3.3VA	3.3V	3.3V	
GPH5	PLATFORM_ID2	UP/GPI/ID2	3.3VA	3.3V	3.3V	Reserved
GPH6	PLATFORM_ID3	Dn/GPI/ID3	3.3VA	3.3V	3.3V	
GPH7	NC					

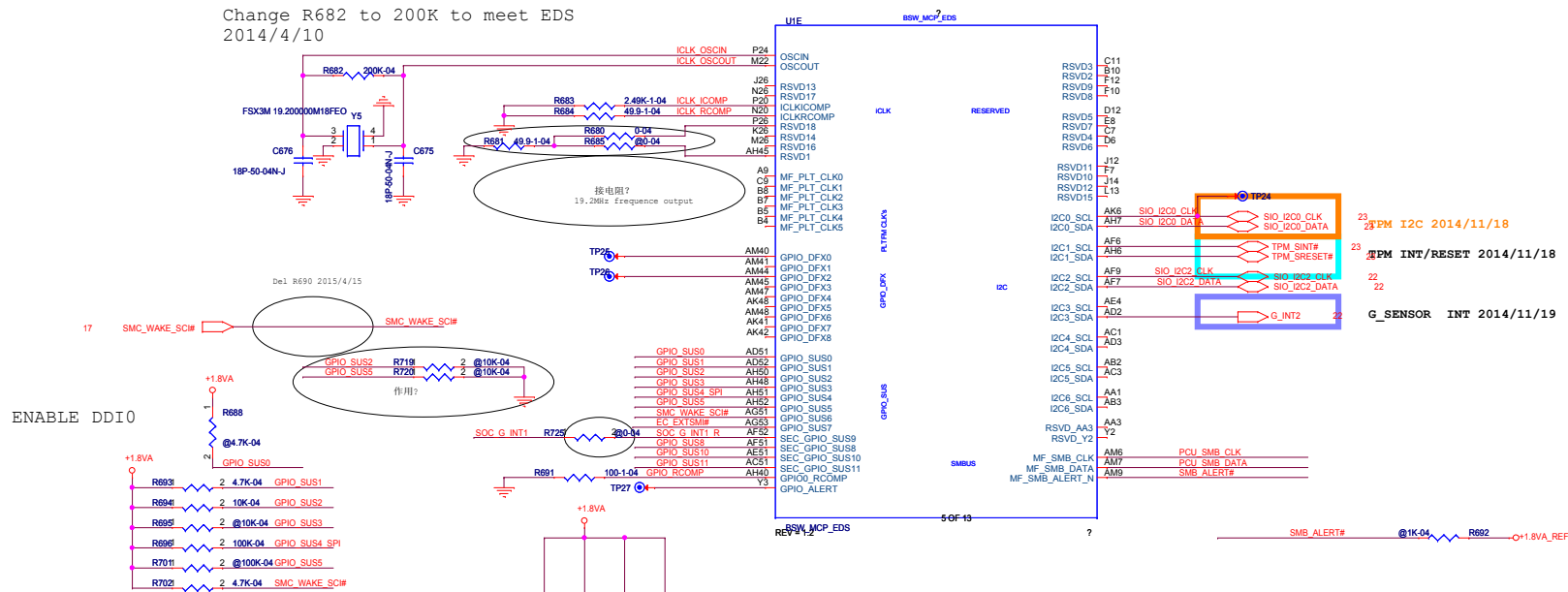
	GPIO	Pull/Mode	LEVEL	EC LEVEL	IC LEVEL	Comment
GPI0	CPU_THERMAL_SENSE	UP/GPI/ADC	3.3V	3.3V	3.3V	
GPI1	PANEL_DETECT	UP/GPI	3.3VA	3.3V	3.3V	
GPI2	LAN_WAKE#	UP/GPI	3.3VS	3.3V	3.3V	EC Reserved
GPI3	PWRBTN2#	UP/GPI	3.3VS	3.3V	3.3V	Reserved
GPI4	BAT_I	/GPI/ADC	3.3V	3.3V	3.3V	Reserved
GPI5	BATT_TEMP	UP/GPI/ADC	3.3VA	3.3V	3.3V	
GPI6	ADAPTOR	Dn/GPI/ADC	3.3V	3.3V	3.3V	
GPI7	BAT_V	/GPI/ADC	3.3V	3.3V	3.3V	
GPJ0	EC_BL_ON	/GPO	3.3V	3.3V	<5V	
GPJ1	EC_PROCHOT	/GPO	3.3V	3.3V	For NMOS	
GPJ2	FAN_CTRL0	/GPO/DAC	3.3V	3.3V	3.3V	
GPJ3	WK_TH	/GPO/DAC	3.3V	3.3V	3.3V	
GPJ4	CHG_I	/GPO/DAC	3.3V	3.3V	3V	
GPJ5	SET_V	Dn/GPO/DAC	3.3V	3.3V	3.3V	
GPJ6	BATT_VA_OFF#	Dn/GPO	3.3V	3.3V	For NMOS	
GPJ7	3G_Module_ON_EC	/GPO	3.3V	3.3V	3.3V	Reserved
GPM0	LPC_AD0_EC	/GPIO	1.8V	1.8V	1.8V	
GPM1	LPC_AD1_EC	/GPIO	1.8V	1.8V	1.8V	
GPM2	LPC_AD2_EC	/GPIO	1.8V	1.8V	1.8V	
GPM3	LPC_AD3_EC	/GPIO	1.8V	1.8V	1.8V	
GPM4	CLK_EC_LPC	/GPI	1.8V	1.8V	1.8V	
GPM5	LPC_FRAME#	/GPI	1.8V	1.8V	1.8V	
GPM6	INT_SERIRQ	UP/GPIO	1.8VA	1.8V	1.8V	
GPM7						

TongFang Inc
NDBW1401

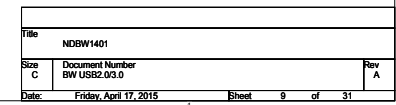
File	Document Number	Rev
Size	GPIO & Power Consumption	A
Custom		
Date	Friday, April 17, 2015	Sheet 4 of 31

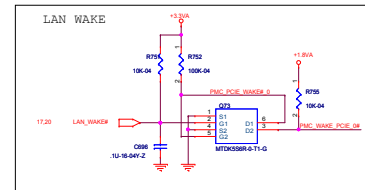
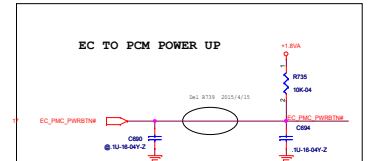
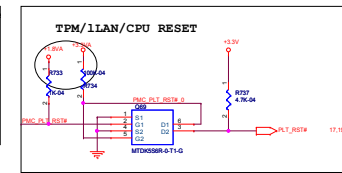
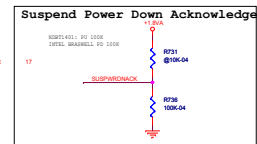


Change R682 to 200K to meet EDS
2014/4/10



USB0	USB3.0/DEBUG
USB1	USB2.0
USB2	USB2.0
USB3	USB WLAN
USB4	USB HUB/ WEBCAM



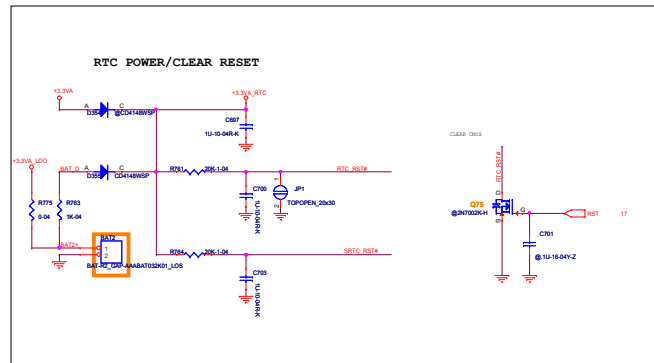
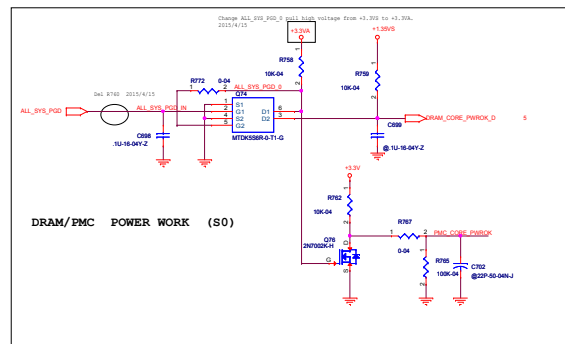
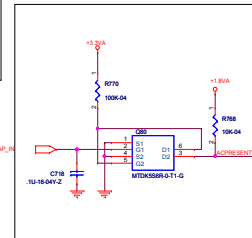
[illegible]

2015 4/7

Delete MOS level shift for S3,S4

PM_SLP_S3 17

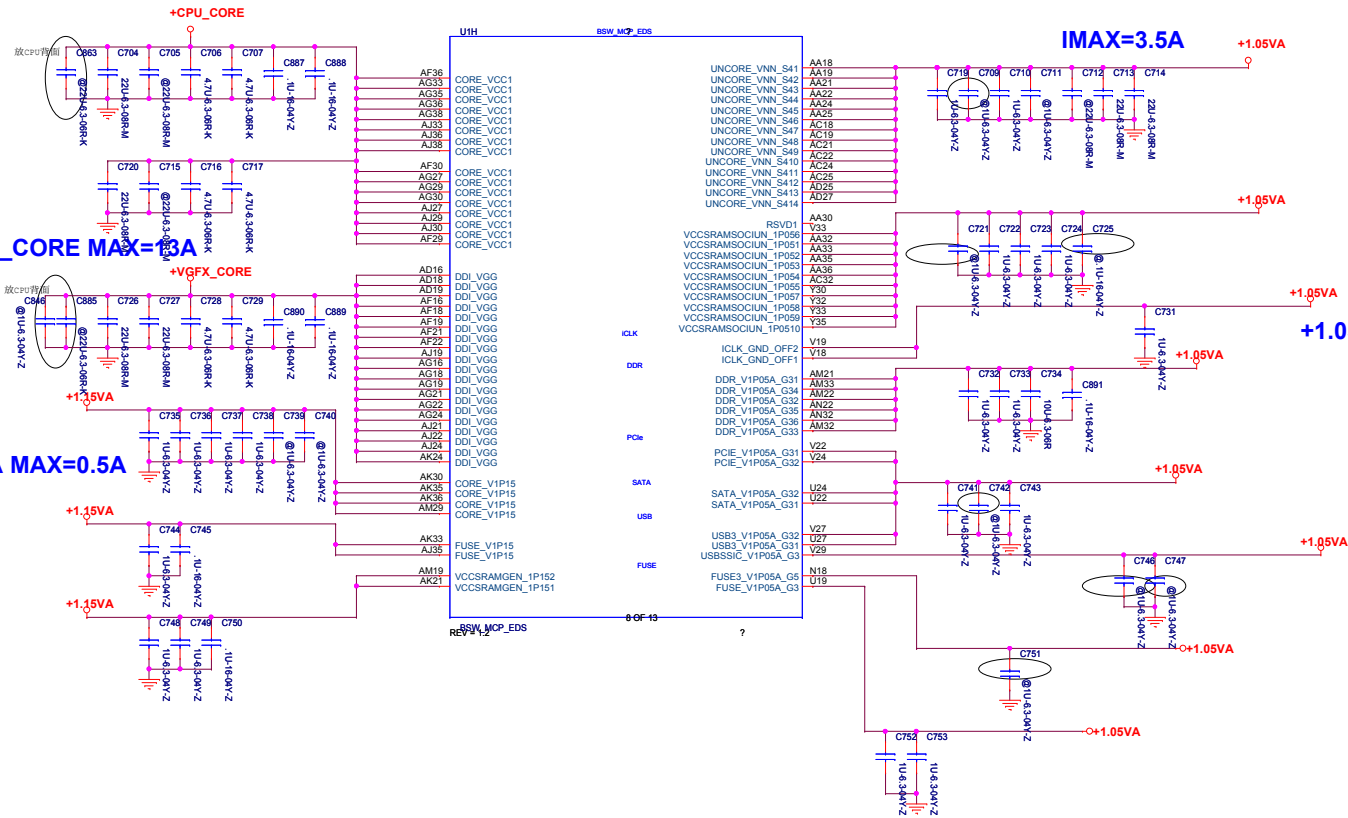
PM_SLP_S4 17

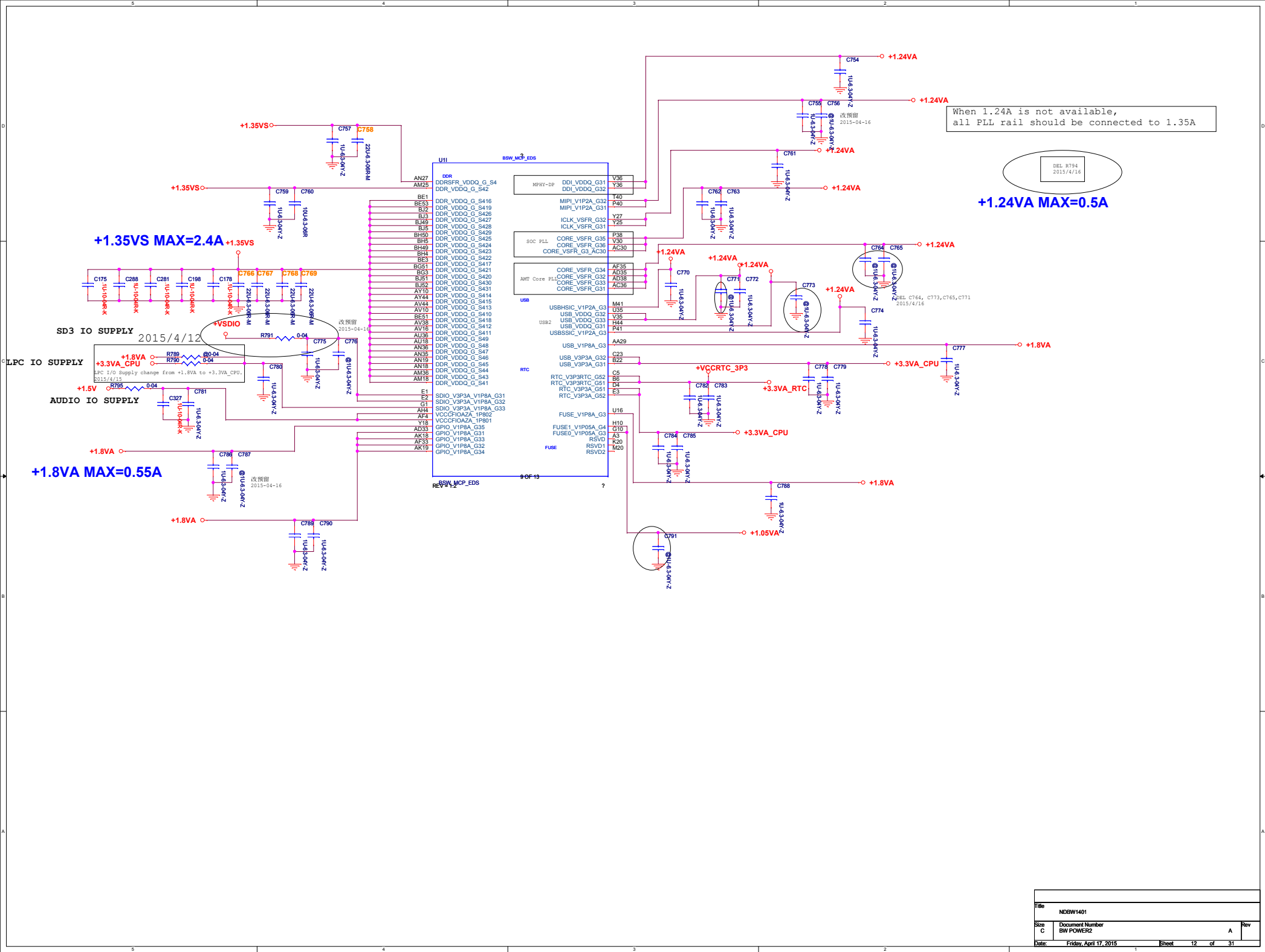


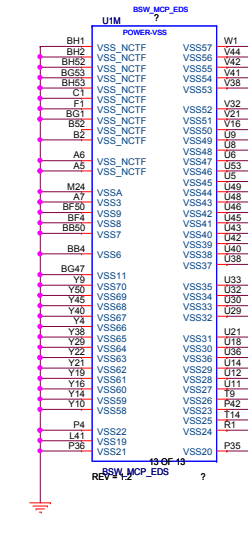
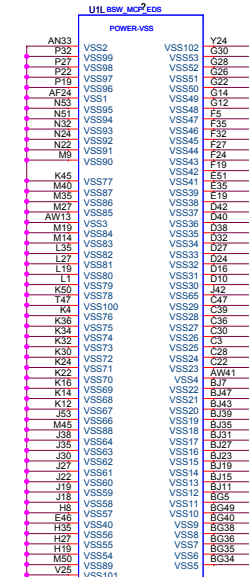
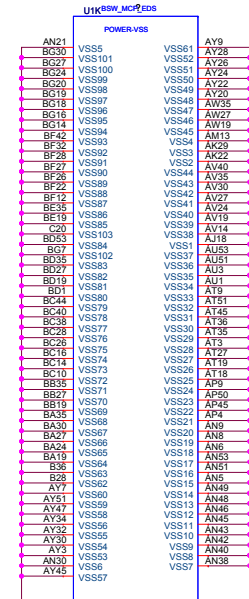
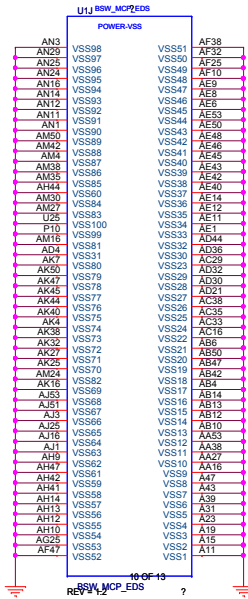
+CPU_CORE MAX=6.4A

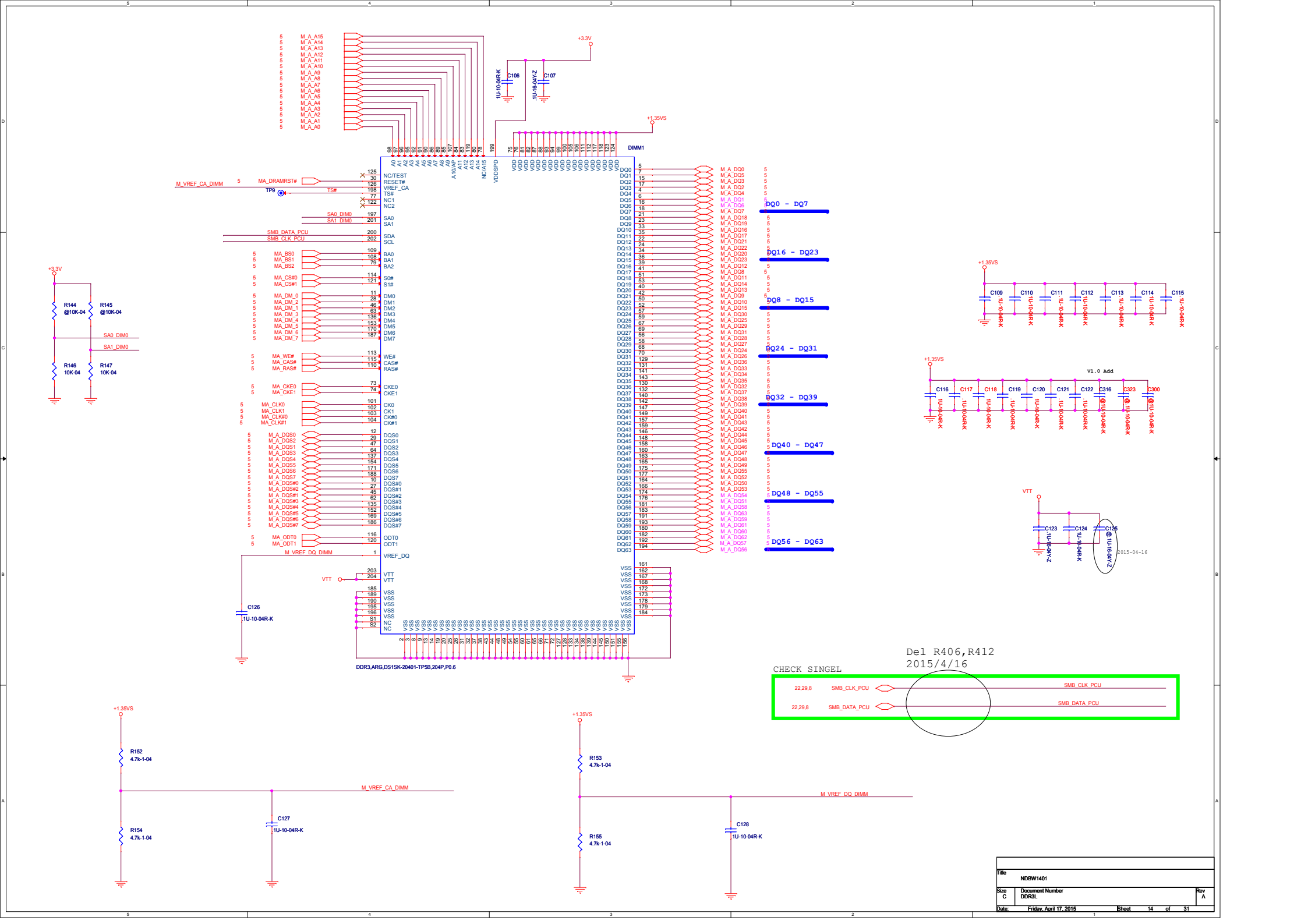
+VGFX_CORE MAX=1.5A

+1.15VA MAX=0.5A

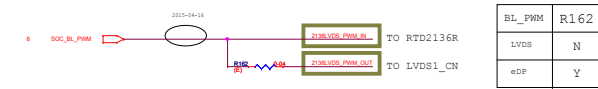








BL PWM



BL_PWM	R162
LVDS	N
eDP	Y

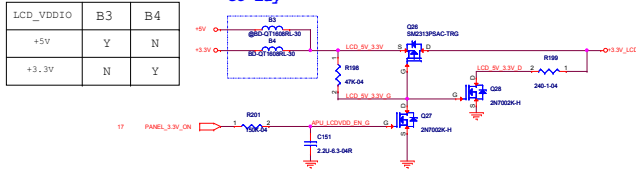
COLAY1	R22	R23	R12	R13	R14	R15	C9	C10	C5	C6	C7	C8
eDP	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
LVDS	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y

COLAY2	C129	C130	C131	C132	C133	C134	R166	R165	R161	R160	R164	R163
eDP	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
LVDS	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y

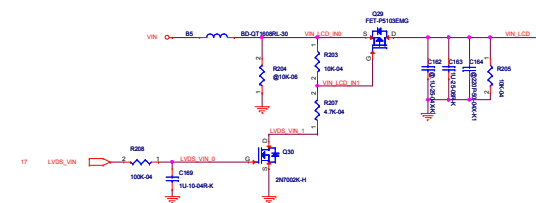
BL EN



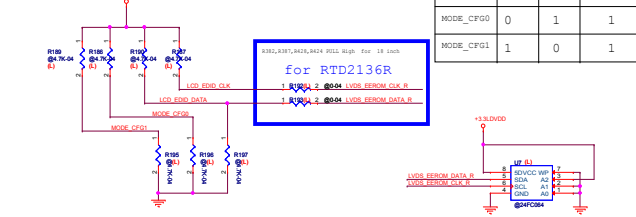
LCD 3.3V/5V



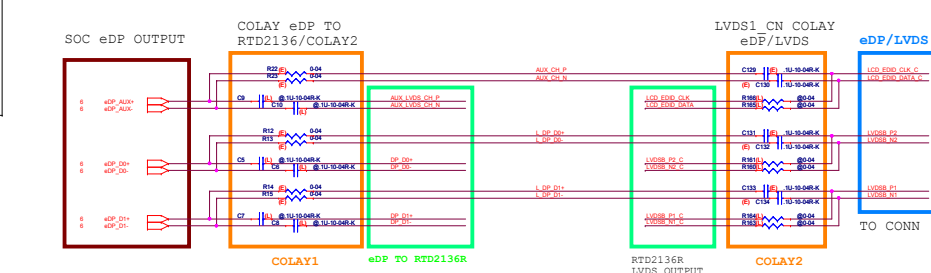
LCD 19V/BAT1+



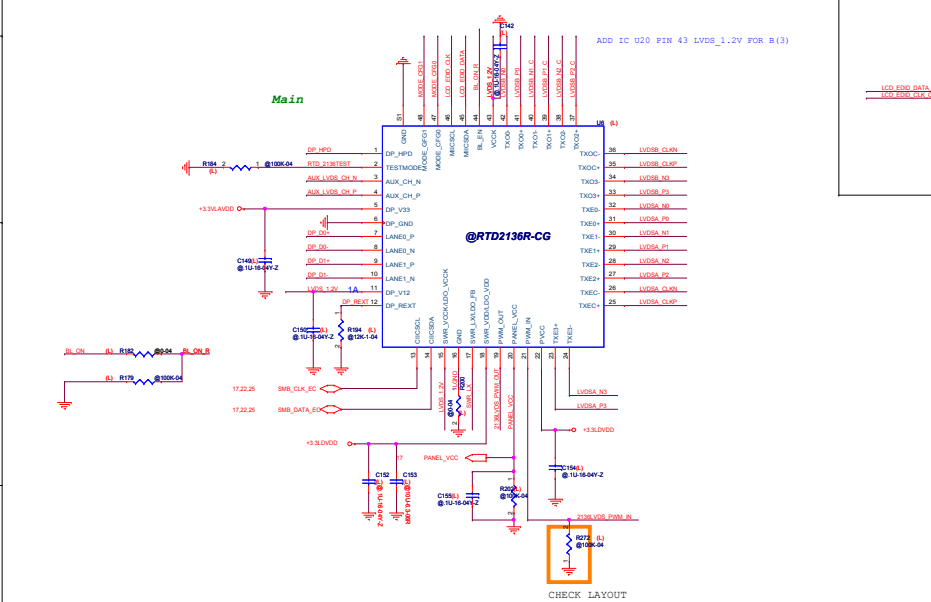
LCD EDID



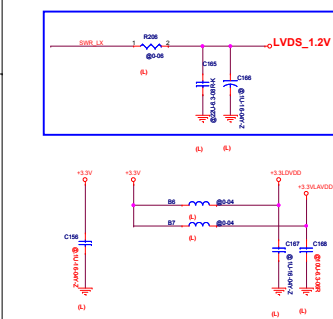
eDP/LVDS COLAY CHECKLAYOUT



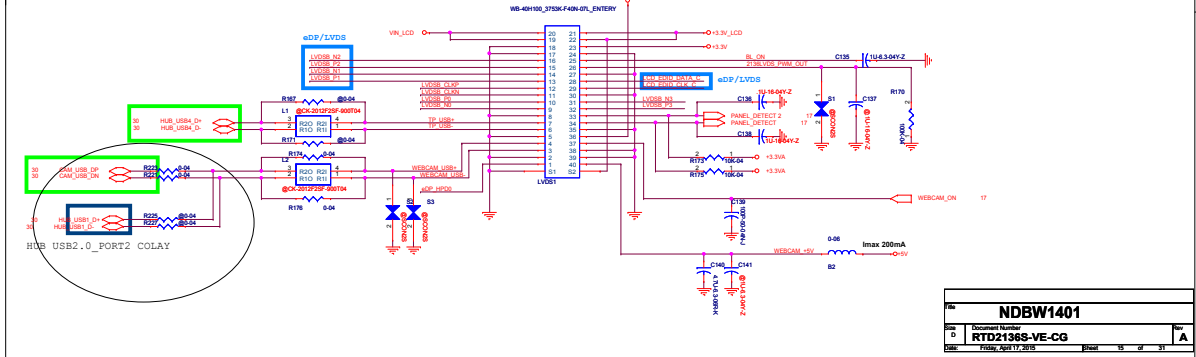
RTD2136R



RTD2136R POWER



LVDS1



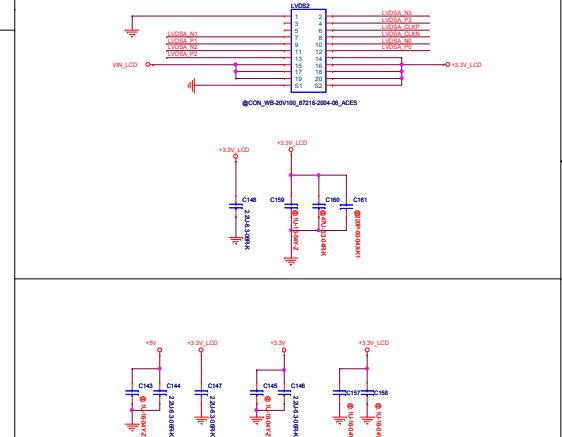
LCD TABLE

Panel_det	14"	15"	18"	23"
PANEL_DETECT	1	0	1	0
PANEL_DETECT2	1	1	0	0

LCD HPD

LCD HPD	R183	R177
LVDS	Y	N
eDP	N	Y

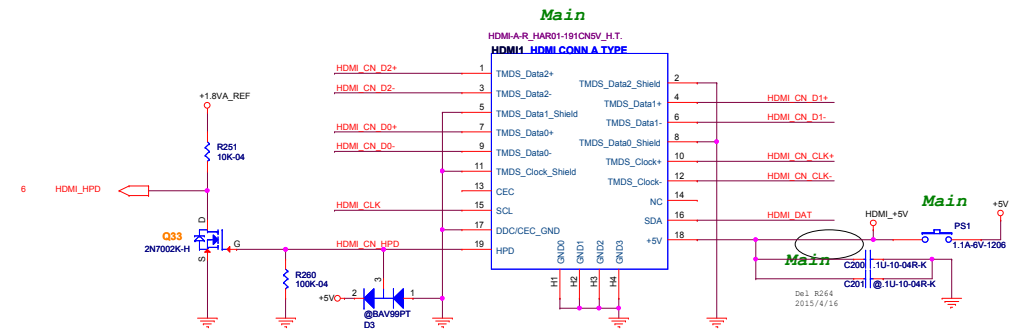
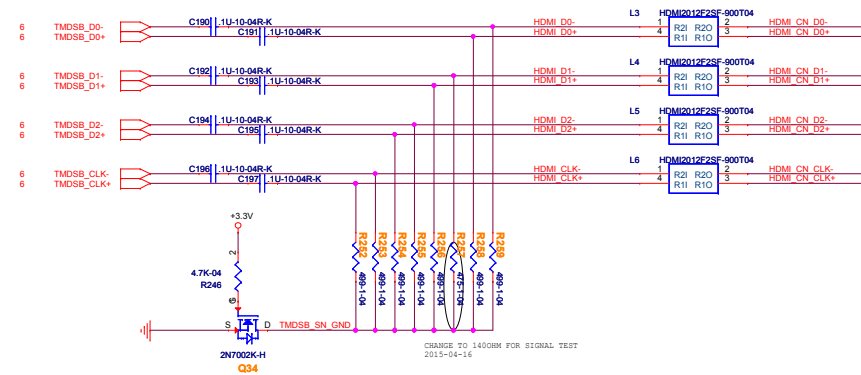
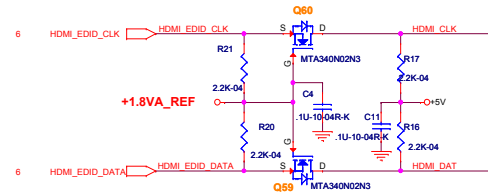
LVDS2



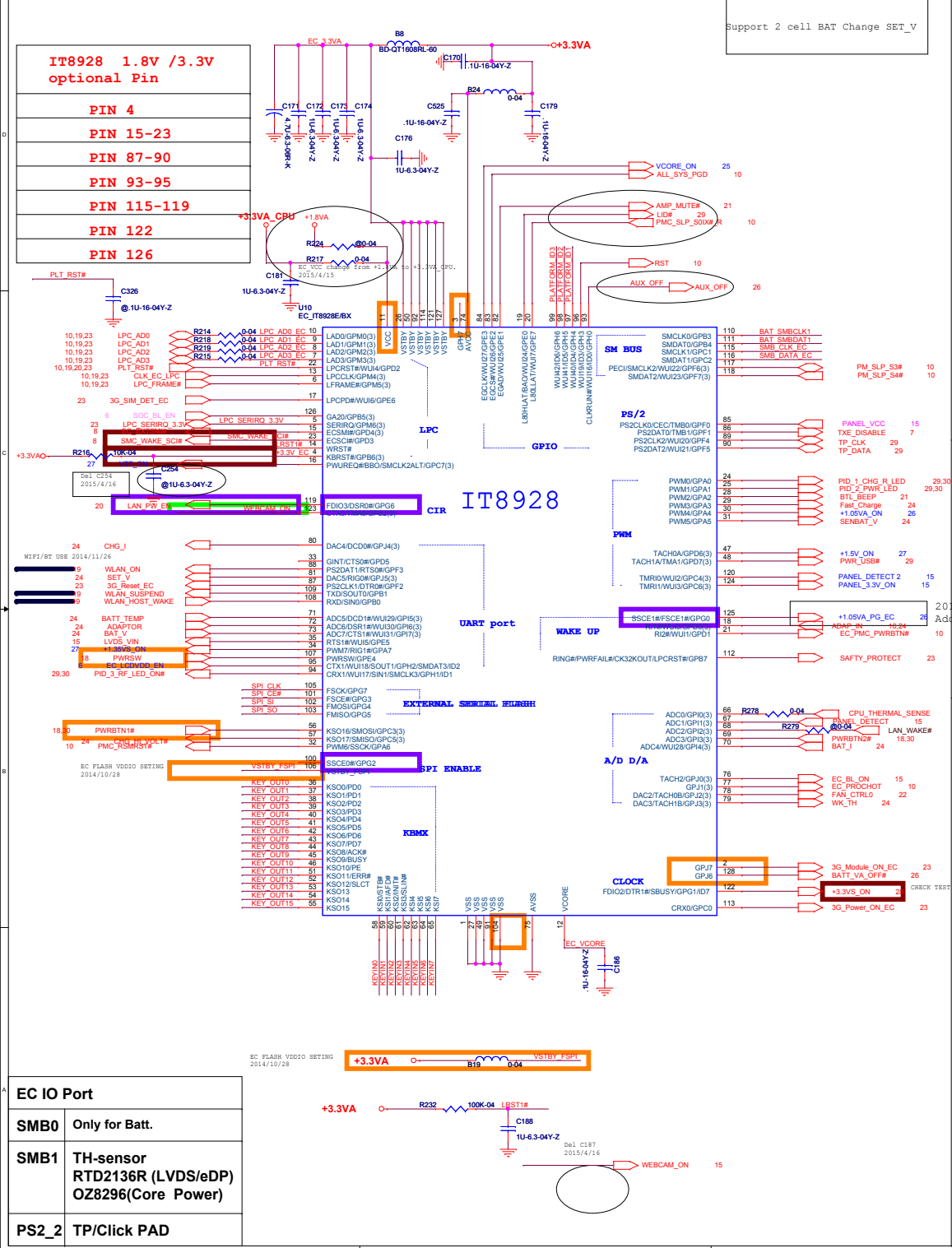
Doc No	Doc Name	Doc Rev	Doc Date
NBW1401	RTD2136S-VE-CG	1.0	2023-10-10

HDMI CONN

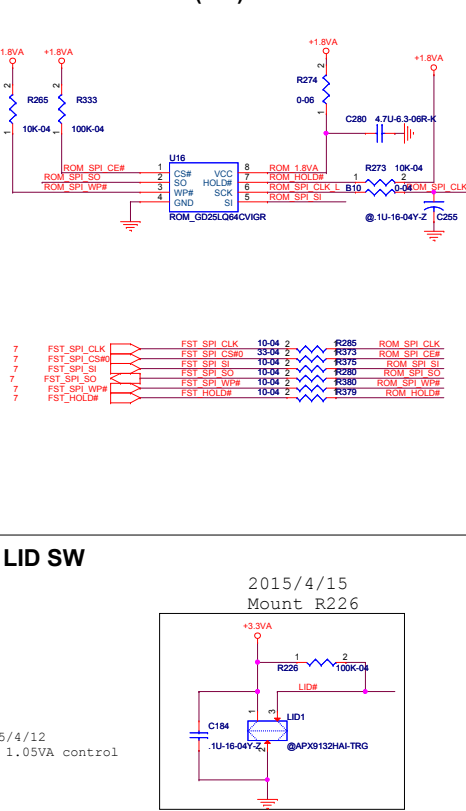
HDMI EDID



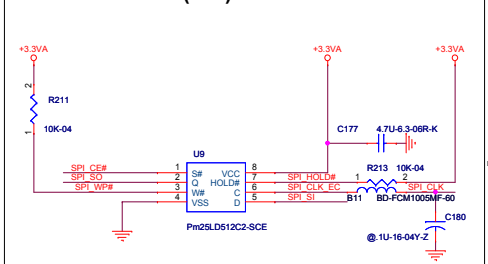
Title NDBW1401			
Size Custom	Document Number HDMI		Rev A
Date:	Friday, April 17, 2015	Sheet	16 of 31



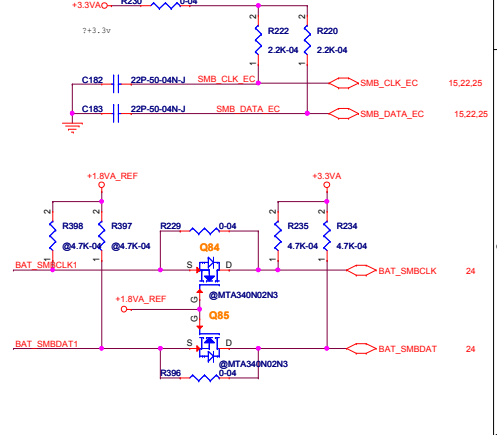
BIOS FLASH ROM(SPI)



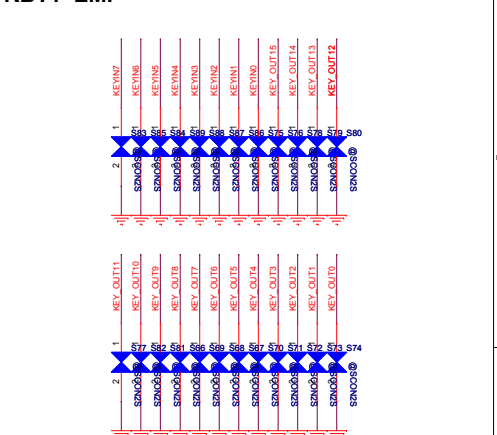
EC FLASH ROM(SPI)



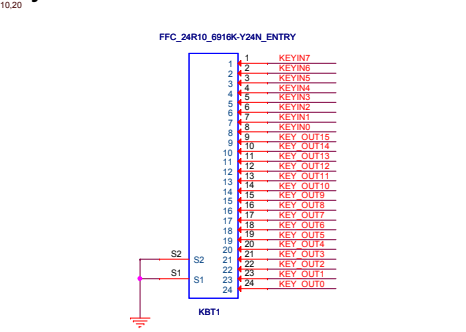
EC SMBUS LEVEL SHIFT



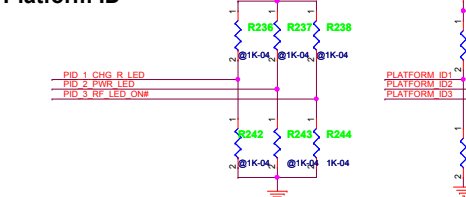
KBT1 EMI



22 Keyboard



Platform ID

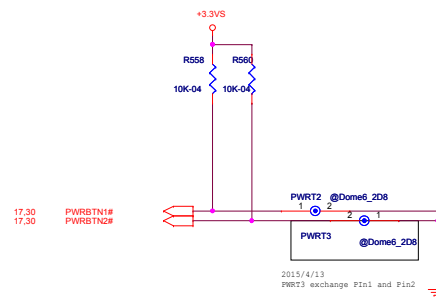
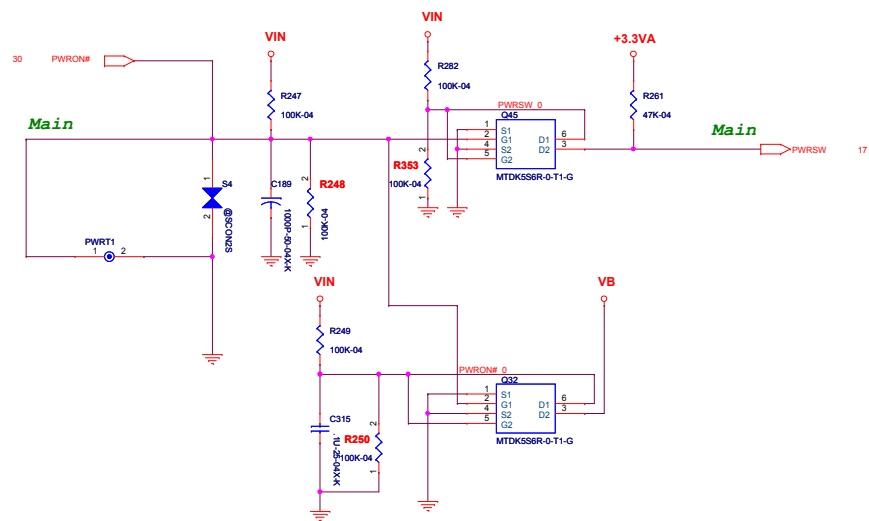


```
PLATFORM_ID1 : H--EDP Panel--LVDS Panel
PLATFORM_ID2 : H--LED DB,L--LED on board
PLATFORM_ID3 : H----65W,L-----40W
```

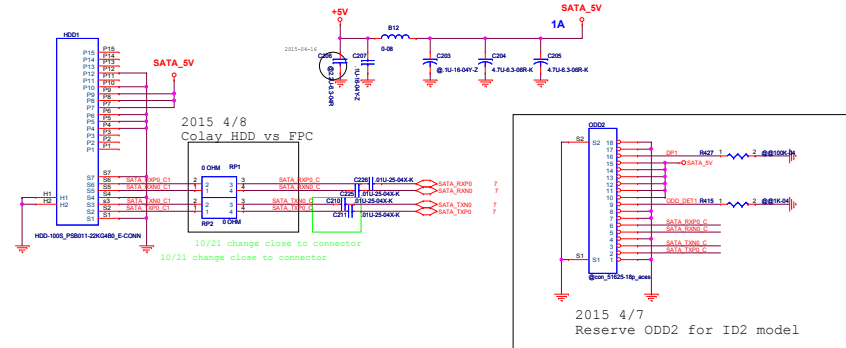
TongFang Inc
NDBW1401

Size	Document Number
Custom	EC ITIT8518/BIOS/KB CONN
Date:	Friday, April 17, 2015
	Sheet 17 of 17

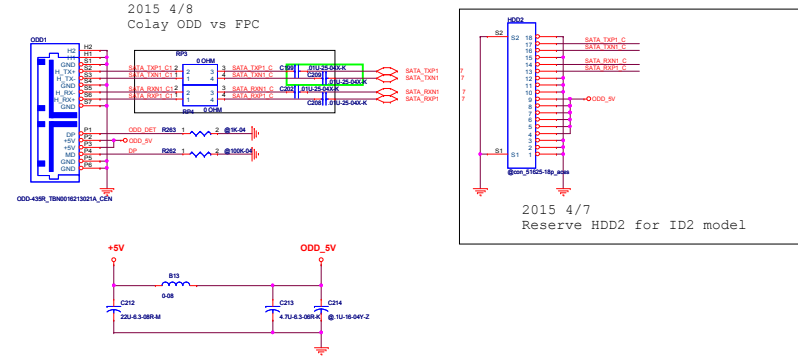
PWR SW



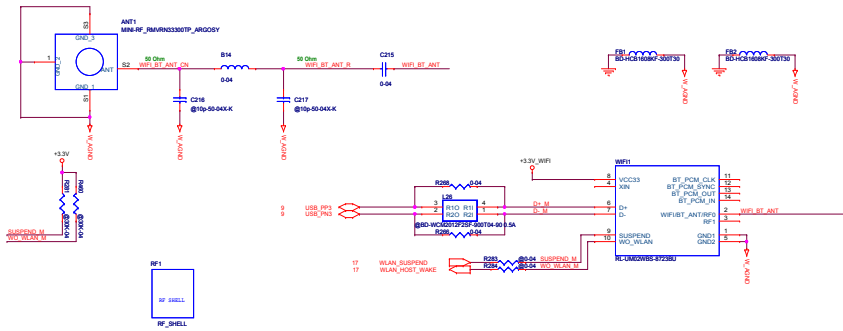
SATA-HDD



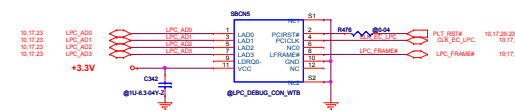
CD-ROM



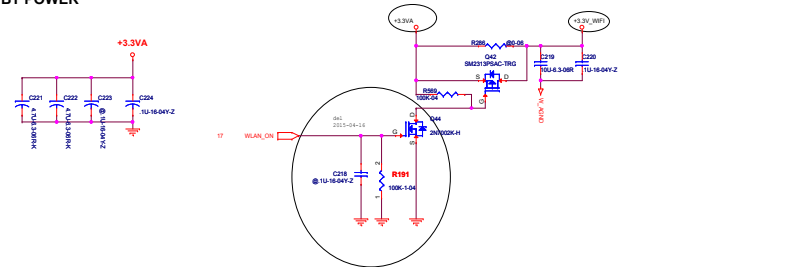
WIFI/BT 2014/11/26



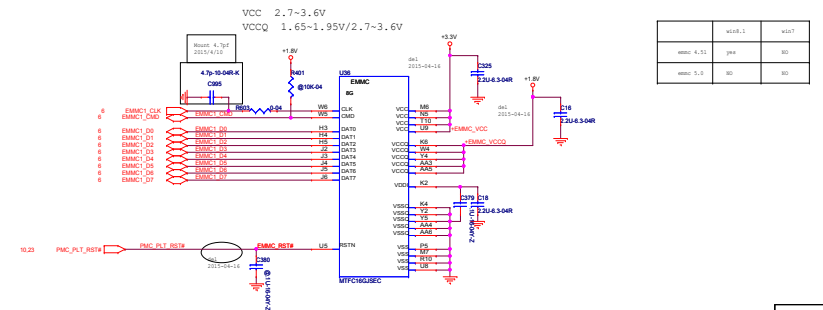
DEBUG CN



WIFI/BT POWER

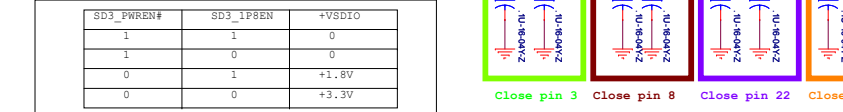
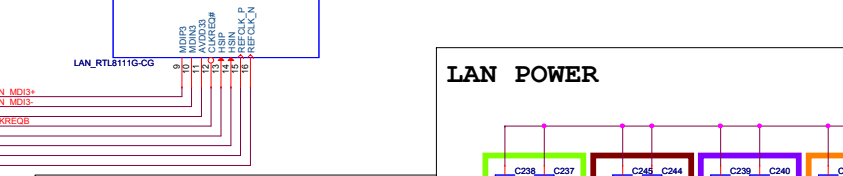
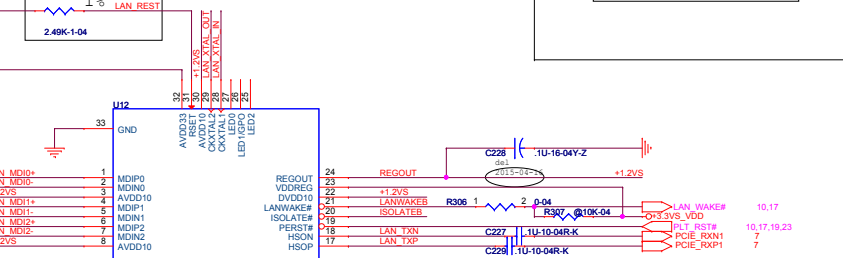
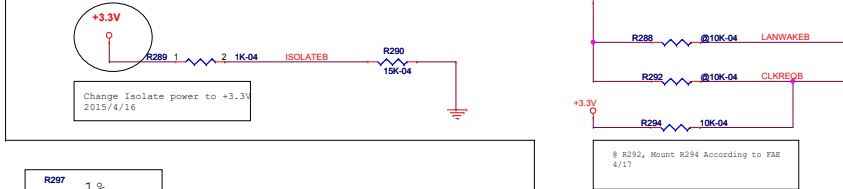


EMMC

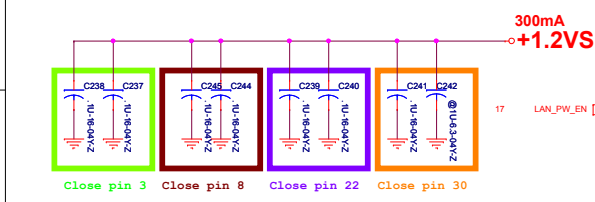


LAN

LAN SETING CHECK

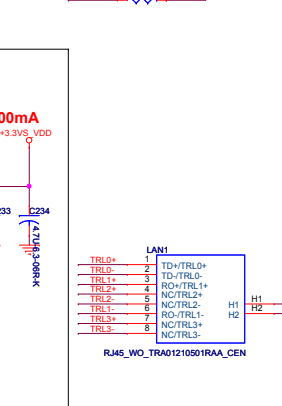
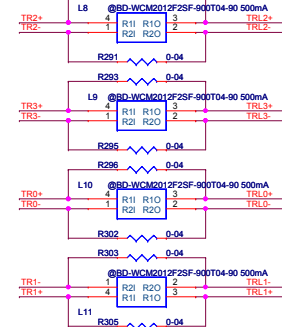
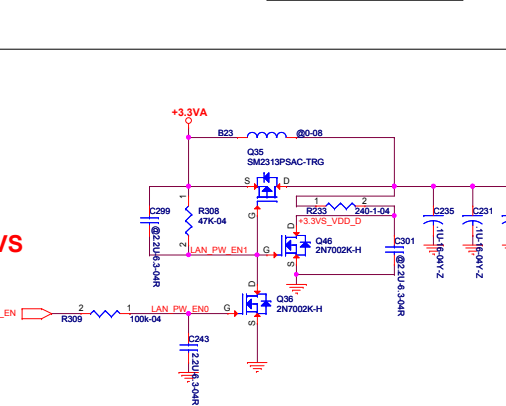
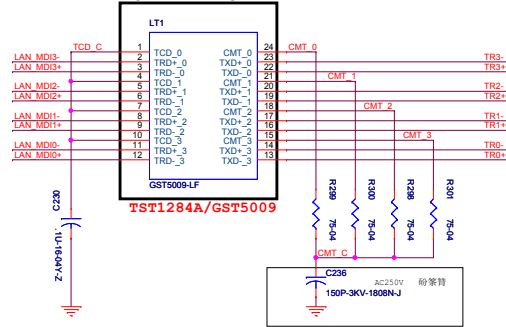


LAN POWER




LAN CN

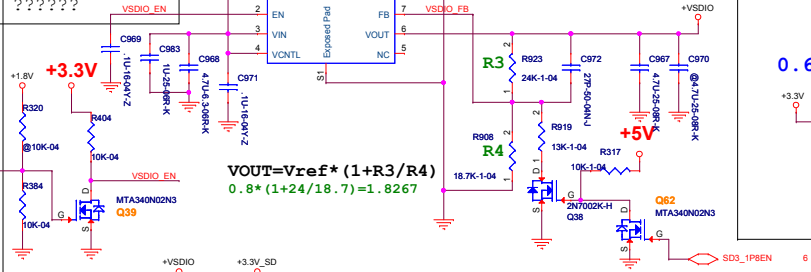
BODY REF AGND



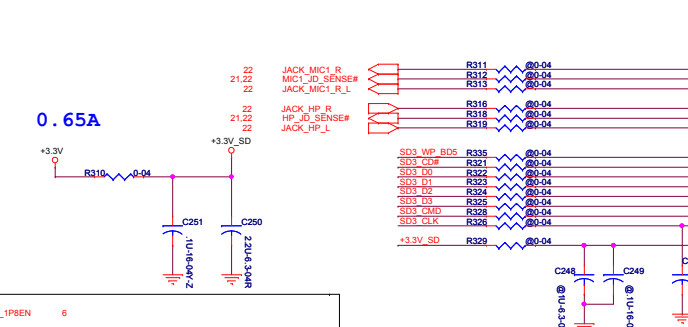
SD POWER

+5V	Delete SD Card Power Control circuit
	Add VSDIO Power control circuit

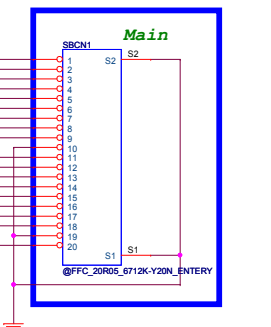
Power sequence
000000



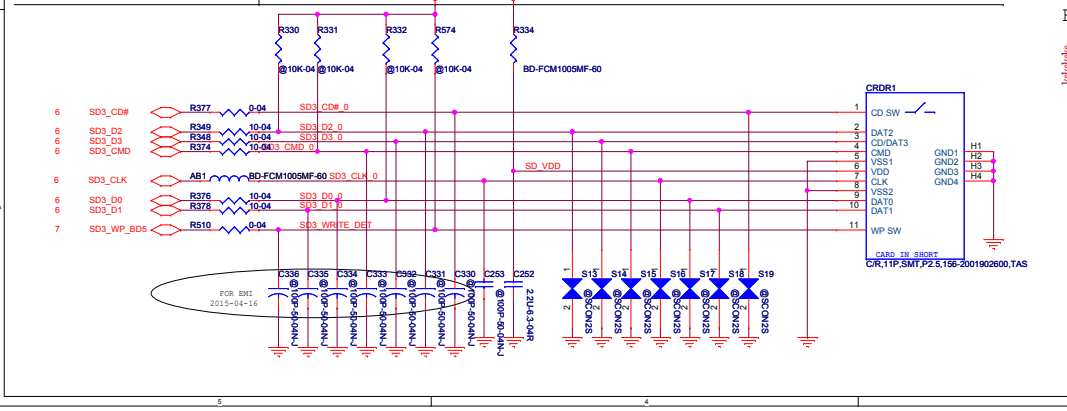
Cardreader/USB & HP BD SBCN1/SBCN6 COLAY



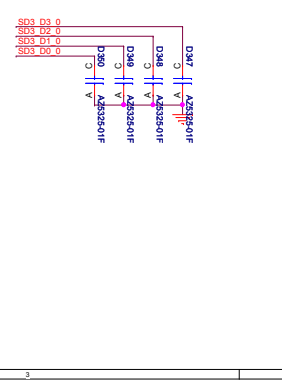
CHECK FOOTPRINT



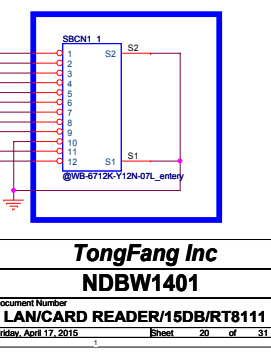
SD MB CN



ESD

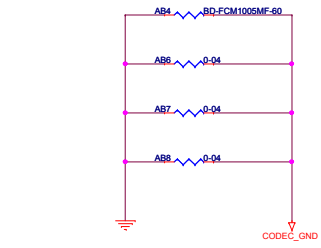
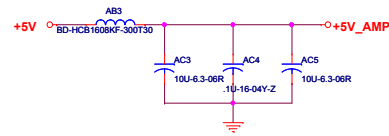
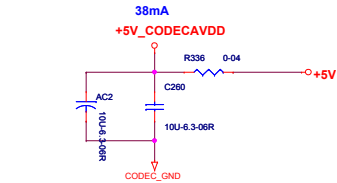


CHECK FOOTPRINT

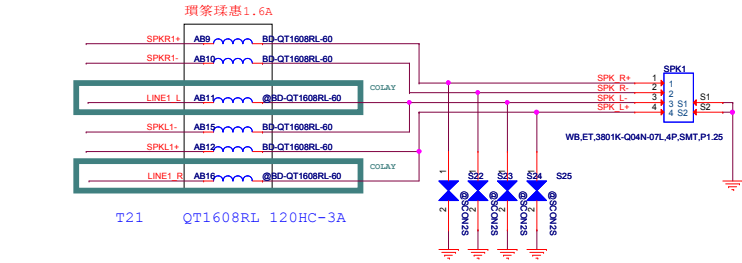


CODEC ALC269Q-VC/VB

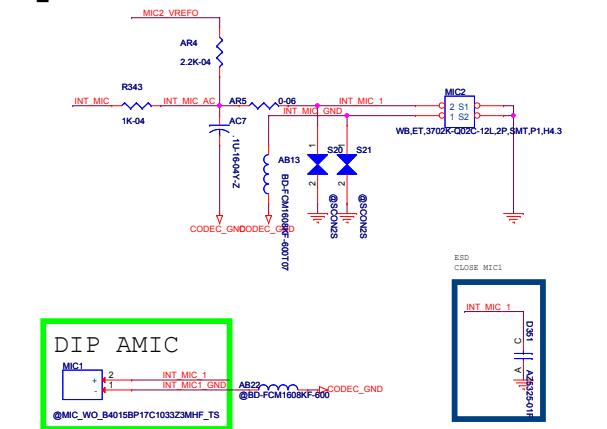
AMP VDD



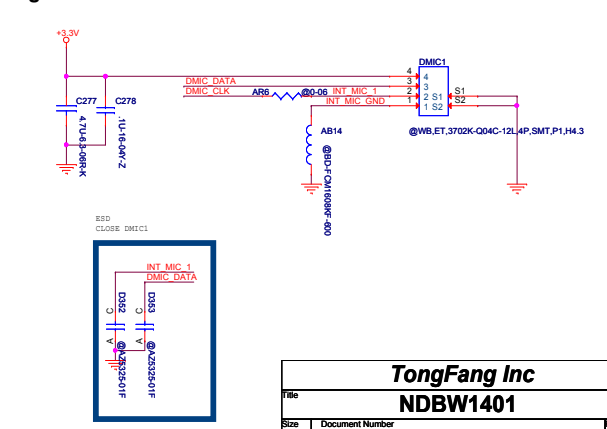
INT_SPEAKER



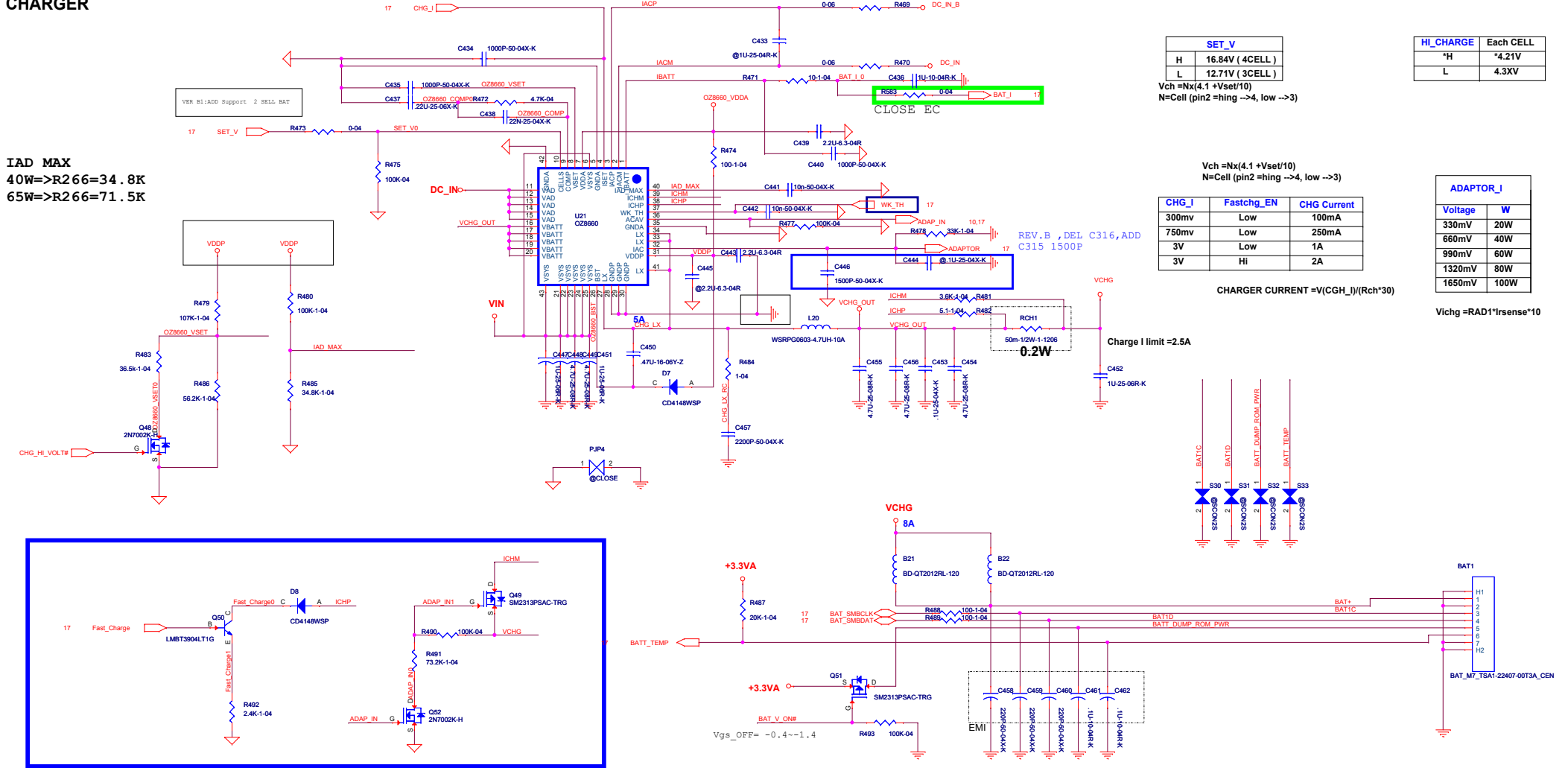
INT_MIC



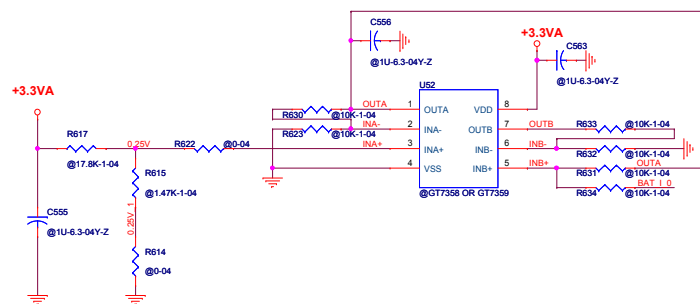
Digital Mic



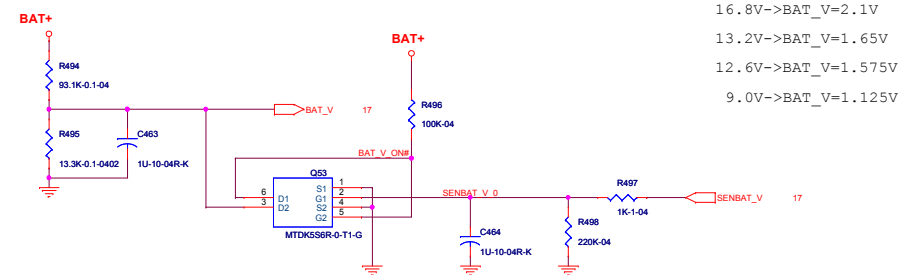
IAD MAX
40W=>R266=34.8K
65W=>R266=71.5K



EC 0.25V AD/DA



Battery Voltage Detect

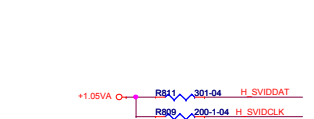


```
17.6V->BAT_V=2.2V
16.8V->BAT_V=2.1V
13.2V->BAT_V=1.65V
12.6V->BAT_V=1.575V
9.0V->BAT_V=1.125V
```


+CPU_CORE

SEL1	SEL0	SVID rail addr	I2C write addr
0	0	00H(VCC0+VCC1)	20H
1	1	05H(VGG)	26H

Note: Place RT1 close to inductor on the same side



$$V_{OCpTh} = \frac{2R_0 \cdot DCR \cdot (OCpTh + 0.5 \cdot \Delta I)}{R_G}$$

$$R_{0\text{typically}} = 30k \Omega$$

$$OCpTh = 1.3 \cdot I_{cc_max} \quad \Delta I = 0.3 \cdot I_{cc_max}$$

$$I_{cc_max} = 6.4A \quad (\text{Need to be written in EC})$$

$$V_{IMON} = I_{load} \cdot DCR \cdot \frac{R_{802}}{R_G}$$

+VGFX_CORE

Note: Place RT3 close to inductor on the same side

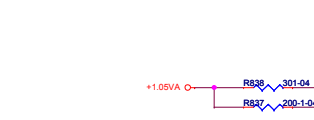
$$V_{OCpTh} = \frac{2R_0 \cdot DCR \cdot (OCpTh + 0.5 \cdot \Delta I)}{R_G}$$

$$R_{0\text{typically}} = 30k \Omega$$

$$OCpTh = 1.3 \cdot I_{cc_max} \quad \Delta I = 0.3 \cdot I_{cc_max}$$

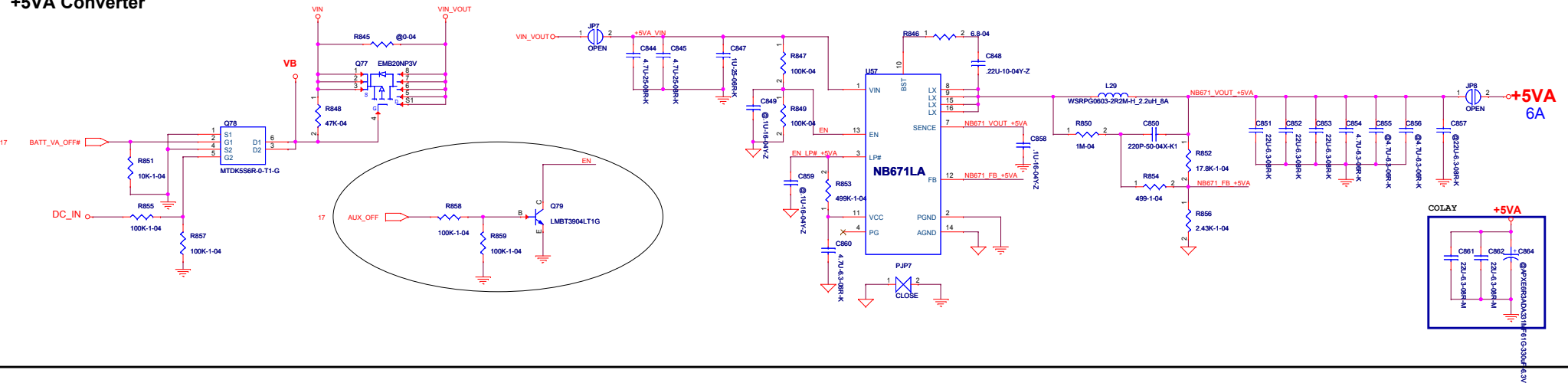
$$I_{cc_max} = 13A \quad (\text{Need to be written in EC})$$

$$V_{IMON} = I_{load} \cdot DCR \cdot \frac{R_{824}}{R_G}$$

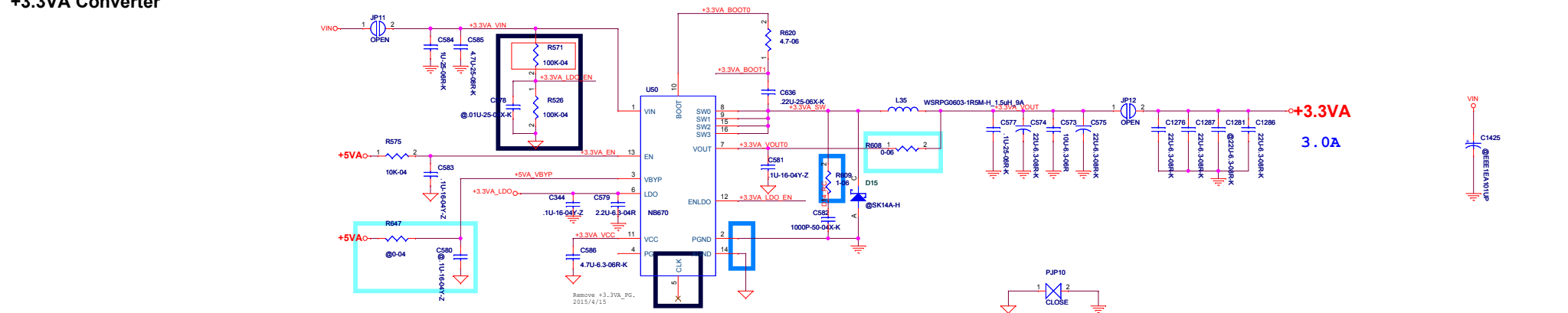


Title				NDBW1401			
Size				Document Number			
Custom				+CPU_VCORE/+VGFX_CORE			
Date				Friday, April 17, 2015			
Sheet				25 of 31			

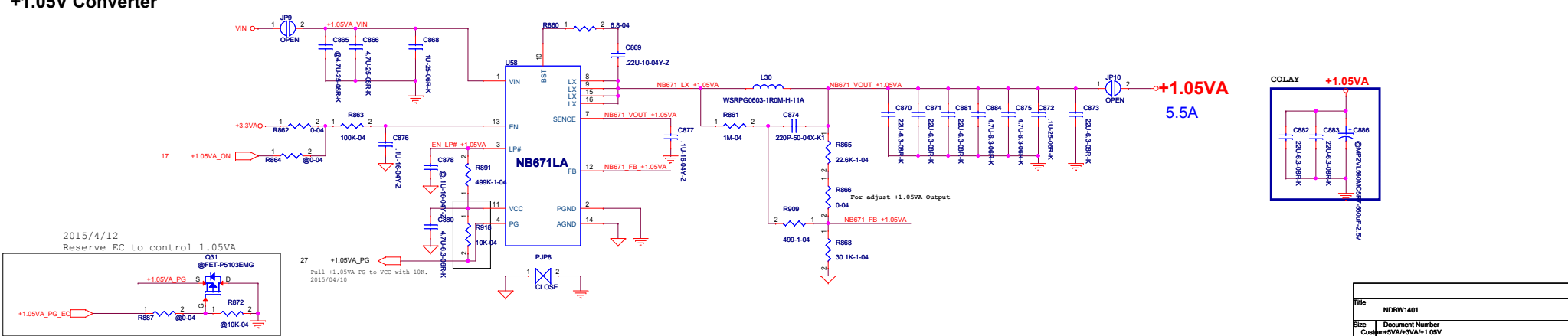
+5VA Converter



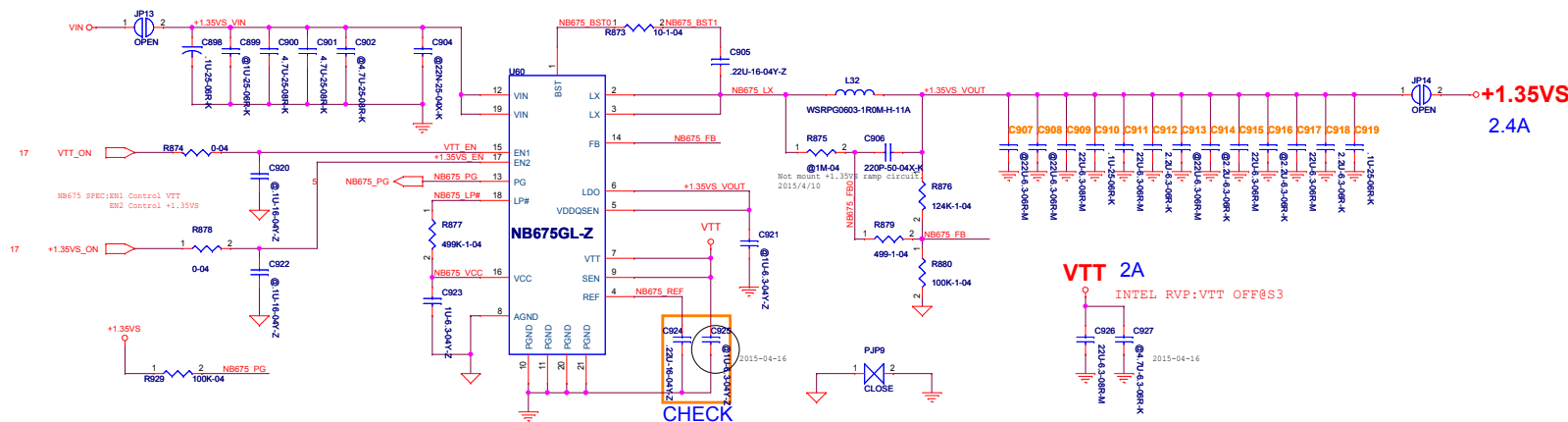
+3.3VA Converter



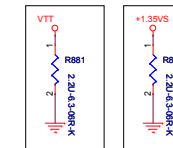
+1.05V Converter



+1.35VS



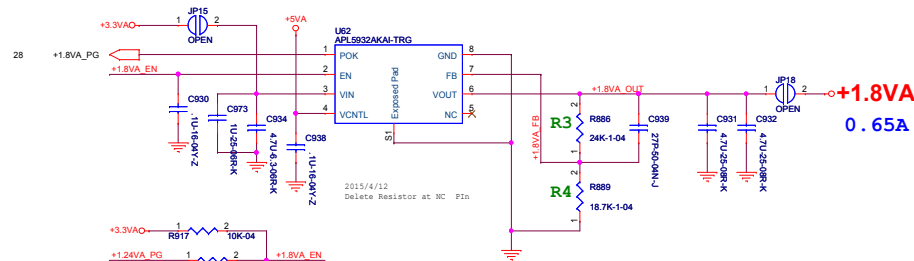
Discharge



+1.8VA

$$V_{OUT} = V_{ref} * (1 + R_3/R_4)$$

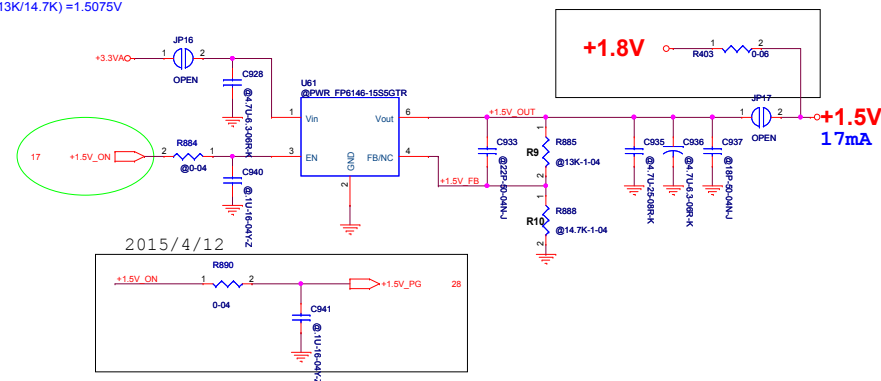
$$0.8 * (1 + 24/18.7) = 1.8267$$



+1.5V

$$V_{out} = 0.8V * (1 + R9/R10)$$
$$0.8V * (1 + 13K/14.7K) = 1.5075V$$

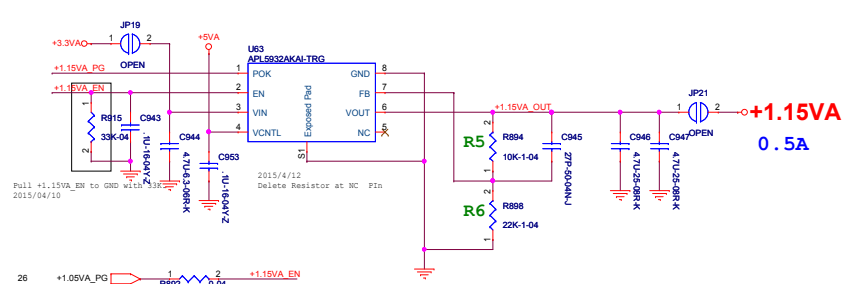
2015 4/10
+1.8V replace +1.5V



+1.15VA

$$V_{OUT} = V_{ref} * (1 + R_5/R_6)$$

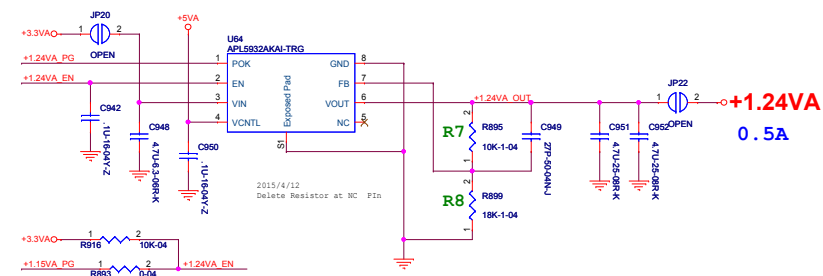
$$0.8 * (1 + 10/22) = 1.164$$



+1.24VA

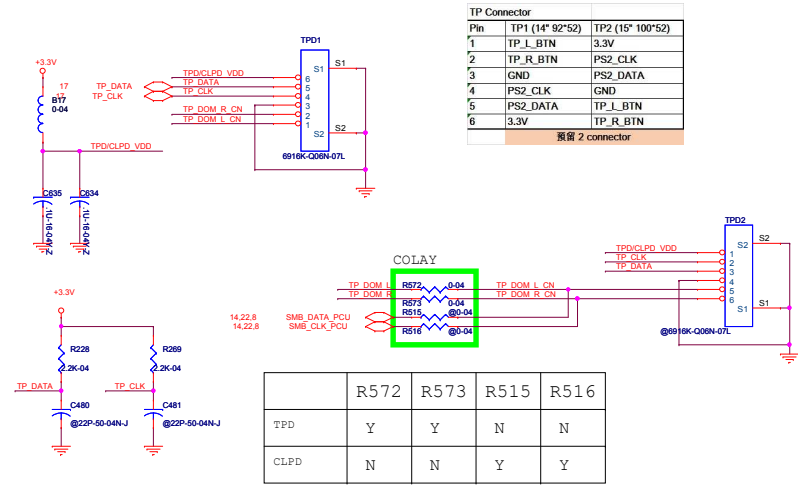
$$V_{OUT} = V_{ref} * (1 + R_7/R_8)$$

$$0.8 * (1 + 10/18) = 1.244$$

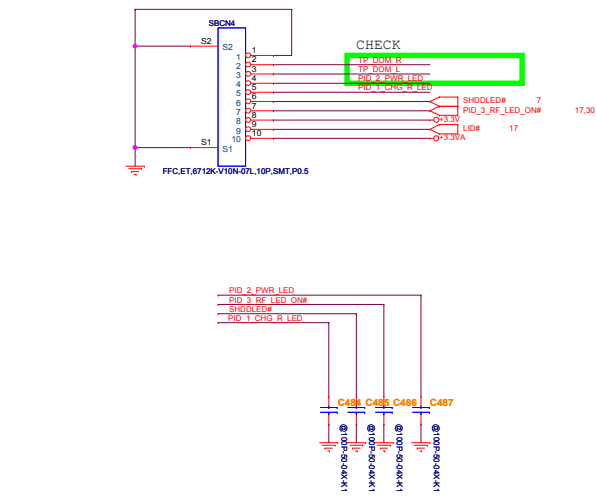


Title			
NDBW1401			
Size	Document Number		Rev
Custom	+1.35V/+1.8VA/+1.5VS		A
Date:	Friday, April 17, 2015	Sheet	27 of 31

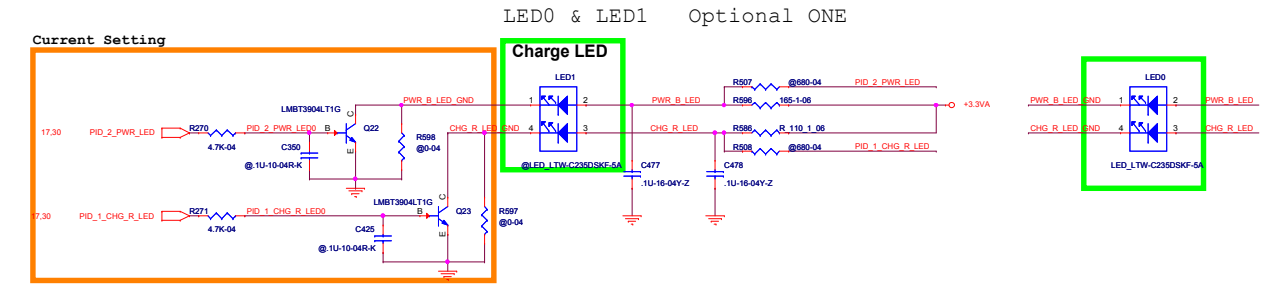
Touch Pad Charles Modify 0930



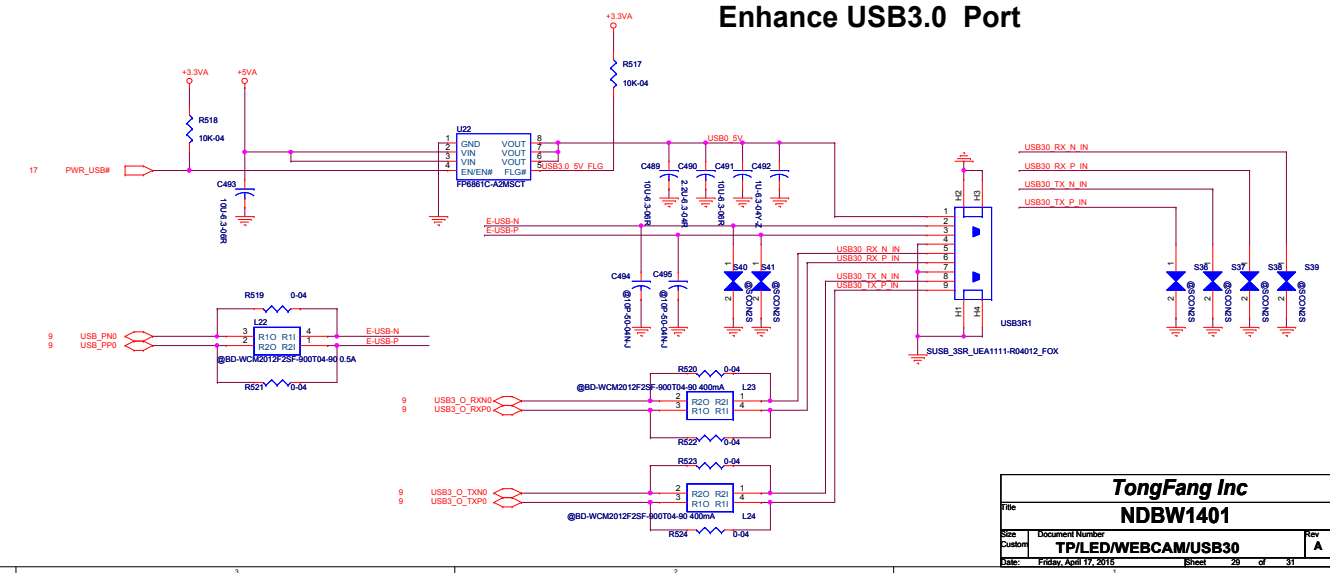
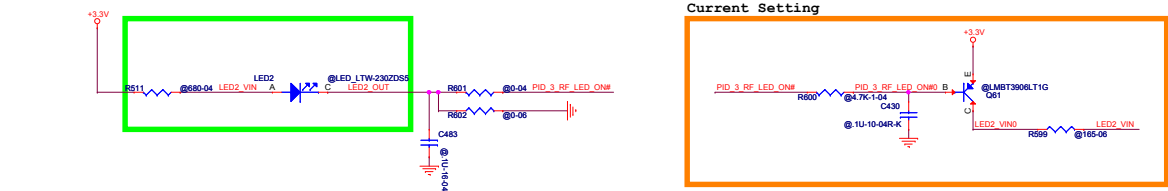
TP DOME /LED CONN



LED



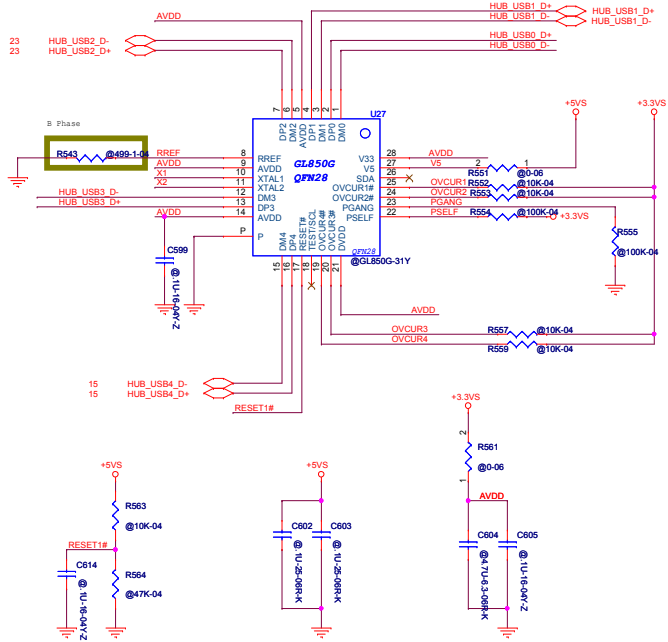
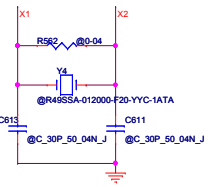
WLAN LED



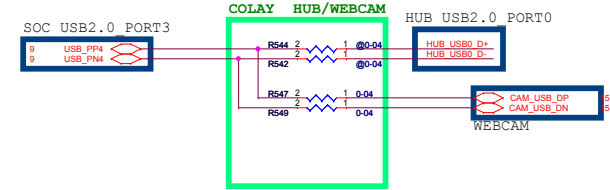
USB HUB

R466 Value:
14''' -->604ohm
15''' -->464ohm
18''' -->464ohm

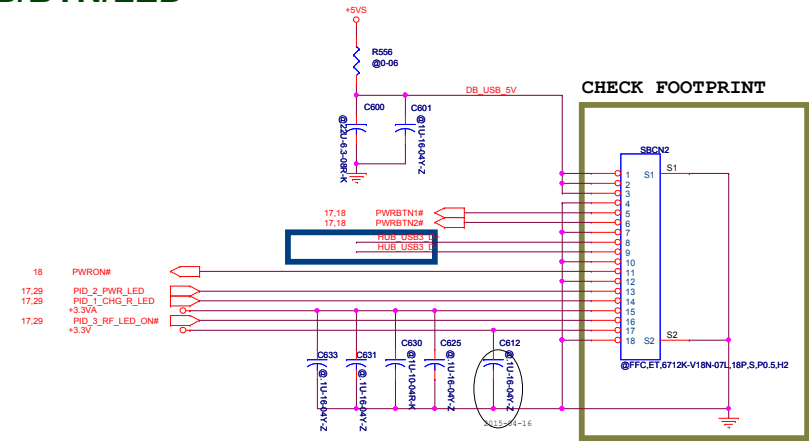
HUB1 COLAY WEBCAM
HUB2 TV/3G
HUB3 DB USB PORT2/TSP
HUB4 WIFI/BT



USB HUB COLAY



LEFT DB USB/BTN/LED



EMI

