MOTO MODS DEVELOPMENT KIT SCHEMATIC (PARTIAL)

REVISION HISTORY

V1.0	INITIAL RELEASE
V1.1	Change U1100 from STM32L476MEY6TR 512K Flash part to STM32L476MG 1M Flash part.

Development Connectors

MDK Internals

Phone Connector

P-card Conn

USB Micro-B

USB Type C #2

USB Type C #1

USB2.0

myDP

USB2.0

USB3.1

I2S

MPHY

CDSI0

CDSI1

I2S

SPI

SPI

I2C (Primary)

I2C (Secondary)

UART

GPIO x16

Debug UART

SWD

Debug UART

To MHB

SWD

To MHB

UART

USB2.0 myDP

MPHY USB3.1 I2S

3:1 Switch

4:6 Switch

MHB

EEPROM

2:1 switch

MuC

FTDI FT4232

High Speed Group A

High Speed Group B

Low Speed and Cmd/ Ctrl

B2B pFETs

System power

B2B pFETs

A

B2B pFETs

B

A

B

2:1 switch

Power Path Controller

Phone Battery

USB-C #1 VBUS

USB-C #2 VBUS

2:1 switch

2:1 switch

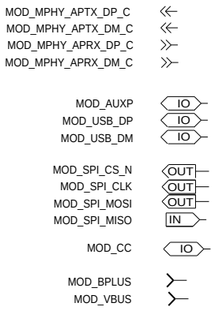
Li-Ion Battery Charger

5V

MDK MAIN PVT

APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: top
LAST MODIFIED BY: MMI Tue Aug 23 15:13:46 2016	
	B | PROJECT NAME: 84016537001_05.cpm | REV: 01
	CAD FILE NAME: | PAGE 1 OF 17

PHONE_CONN: MAIN



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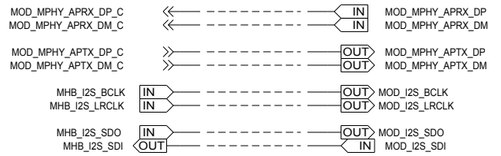
I/O IS SHOWN TO INCREASE SCHEMATIC READABILITY.

APPROVALS	MOTOROLA MOBILE DEVICES	
ENGINEER: MMI	BLOCK TITLE: phone_connector	
LAST MODIFIED BY: MMI Tue Aug 23 12:45:01 2016		
	B	PROJECT NAME: 84016537001_05.cpm — REV: 01
	CAD FILE NAME:	PAGE 2 OF 17

PHONE_CONN: IFACE CONFIG

"HIGH SPEED GROUP B" OPTION 1

COMPLETE THESE CONNECTIONS FOR MODS THAT
USE THE MHB/MPHY FOR DISPLAY AND/OR CAMERA SUPPORT

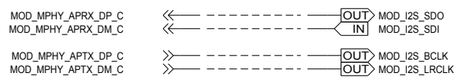


"HIGH SPEED GROUP B" OPTION 2

COMPLETE THESE CONNECTIONS FOR MODS THAT USE USB3.1

"HIGH SPEED GROUP B" OPTION 3

COMPLETE THESE CONNECTIONS FOR MODS THAT USE RAW I2S AUDIO



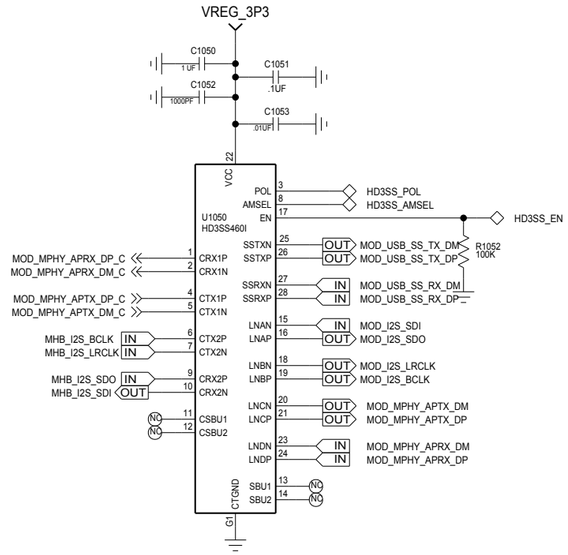
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: phone_connector
LAST MODIFIED BY: MMI Tue Aug 23 15:17:36 2016	
	B / PROJECT NAME: 84016537001_05.cpm / REV: 01
	CAD FILE NAME: / PAGE 3 OF 17

DEVELOPER NOTES (IFACE CONFIG):

1) CHOOSE *ONLY ONE* OF THE OPTIONS ON THIS PAGE FOR YOUR MOD DESIGN
2) FOR MODS THAT DO NOT REQUIRE ANY OF THE GROUP B INTERFACES, ALL CONNECTIONS CAN REMAIN OPEN.

PHONE_CONN: IFACE CONFIG (MDK ONLY)

"HIGH SPEED GROUP B" SWITCH

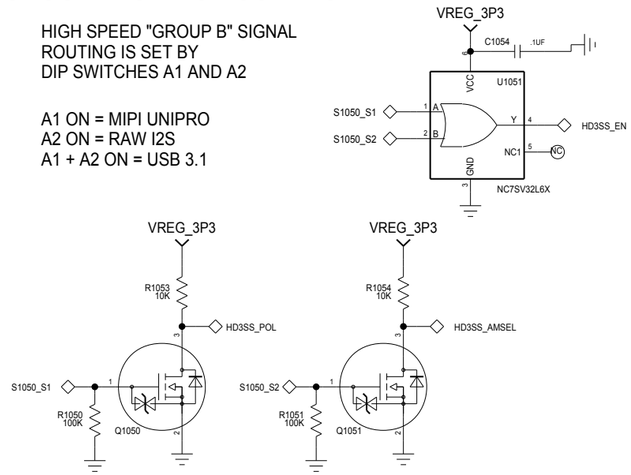


EN	POL	AMSEL	
L (DEFAULT)	X (DEFAULT)	X (DEFAULT)	ALL PORTS HIGH-Z
H	L	L	MHB GPIOS TO I2S (DON'T CARE)
H	L	H	MHB GPIOS TO I2S (CTX2<->LNB, CRX2<->LNA)
H	H	L	INTERFACE PINS TO I2S (CTX1<->LNB, CRX1<->LNA) MHB GPIOS TO USB SS (DON'T CARE)
H	H	H	INTERFACE PINS TO I2S (CTX1<->LNB, CRX1<->LNA) MHB GPIOS TO MHB MPHY (DON'T CARE)

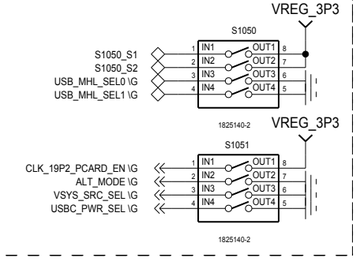
"GROUP B" SWITCH CONTROL

HIGH SPEED "GROUP B" SIGNAL
ROUTING IS SET BY
DIP SWITCHES A1 AND A2

A1 ON = MIPI UNIPRO
A2 ON = RAW I2S
A1 + A2 ON = USB 3.1



USER DIP SWITCHES



APPROVALS	MOTOROLA MOBILE DEVICES	
ENGINEER: MMI	BLOCK TITLE: phone_connector	
LAST MODIFIED BY: MMI Tue Aug 23 15:18:00 2016		
	B	PROJECT NAME: 84016537001_05.cpm — REV: 01
	CAD FILE NAME:	PAGE 4 OF 17

DEVELOPER NOTE (MDK CONVERSION):

1) DELETE THIS PAGE ENTIRELY WHEN DESIGNING YOUR OWN MOD

ROOT: IFACE SUPPORT

MOD_CC IO

MOD_BPLUS_EN_N

MOD_VSYS_EN_N

MOD_BPLUS_DISCHG

MUC_RESET_N

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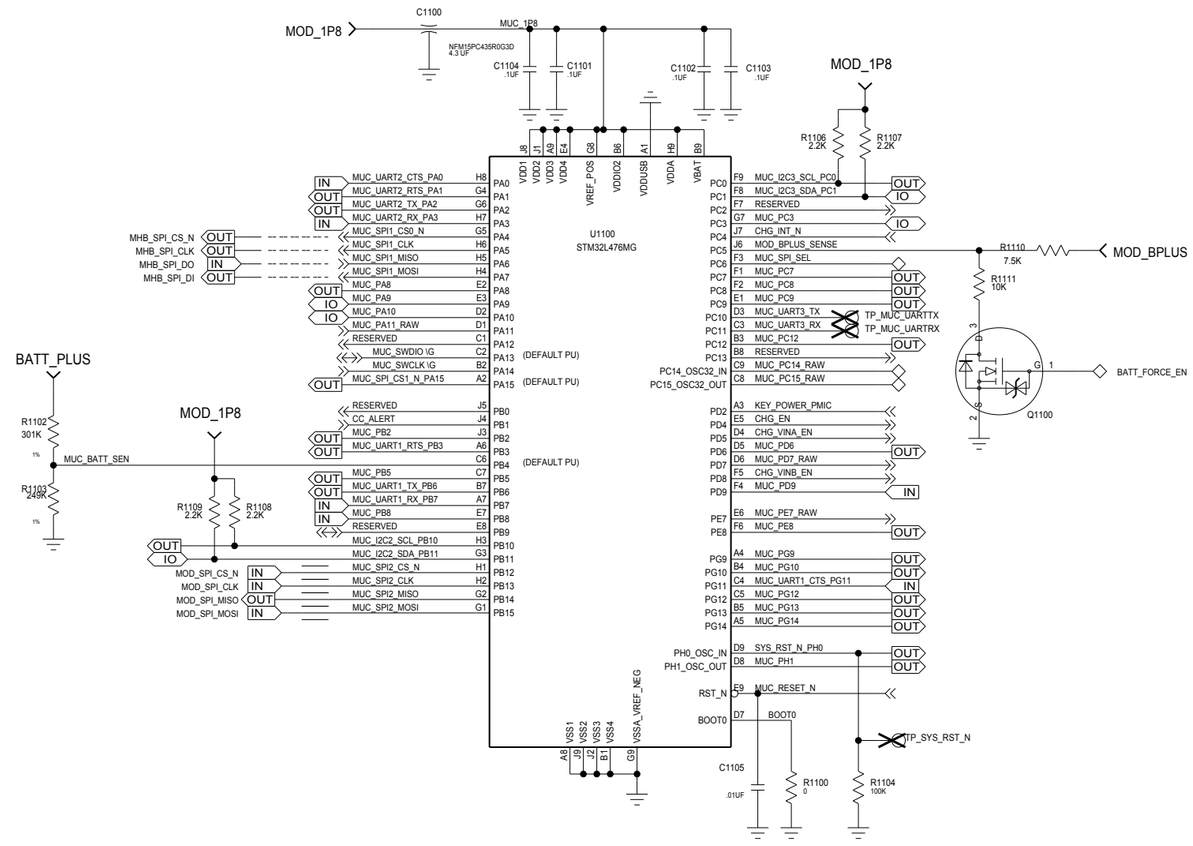
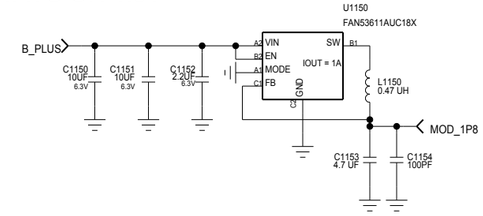
I/O IS SHOWN TO INCREASE SCHEMATIC READABILITY.

APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 12:12:36 2016	
	B | PROJECT NAME 84016537001_05.cpm | REV 01
	CAD FILE NAME: | PAGE 5 OF 17

ROOT: MUC

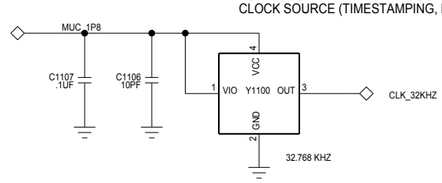


ALWAYS ON 1.8V



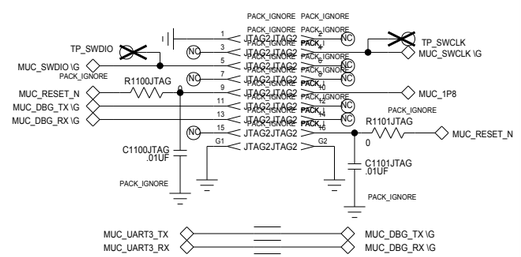
32KHZ CLOCK SOURCE

THIS OSCILLATOR IS ONLY REQUIRED FOR MODS THAT NEED AN ACCURATE CLOCK SOURCE (TIMESTAMPING, ETC)



JTAG / CONSOLE

VENDOR-SPECIFIC ACCESS FOR SWD AND SERIAL CONSOLE



APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 15:02:01 2016	
	B | PROJECT NAME: 84016537001_05.cpm | REV: 01
	CAD FILE NAME: | PAGE 6 OF 17

DEVELOPER NOTE (MDK CONVERSION):

1) COMPLETE THE CONNECTIONS BETWEEN MUC_SPI1_x AND MHB_SPI_x FOR USE BY MHB AND/OR EXTERNAL PERIPERHALS

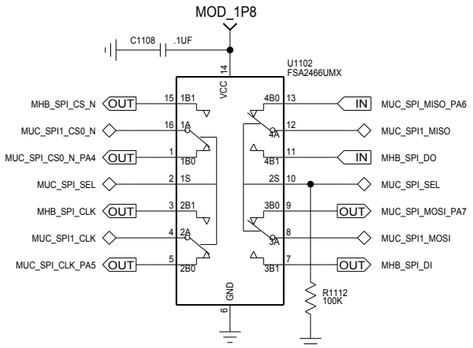
ROOT: MUC (MDK ONLY)

MUC DOWNSTREAM SPI SWITCH

MUC SPI1 IS SWITCHED BETWEEN
MHB SPI FLASH (FOR F/W UPGRADE)
AND ALL OTHER PERIPHERALS FOR
GENERIC DEVELOPMENT

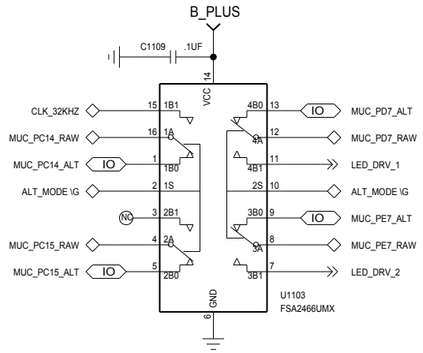
THIS IS NOT A PLATFORM REQUIREMENT
BUT WAS REQUIRED ON THE MDK
TO CONSERVE MUC GPIOS

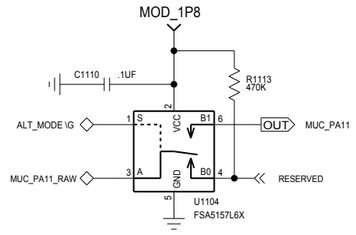
FOR MOD DESIGNS THAT USE THE MHB,
IT IS RECOMMENDED TO USE MUC SPI1
EXCLUSIVELY FOR MHB ACCESS



GPIO ALT MODE SWITCHES

THESE SWITCHES ARE NOT A PLATFORM
REQUIREMENT BUT WERE REQUIRED ON THE MDK
TO CONSERVE MUC GPIOS





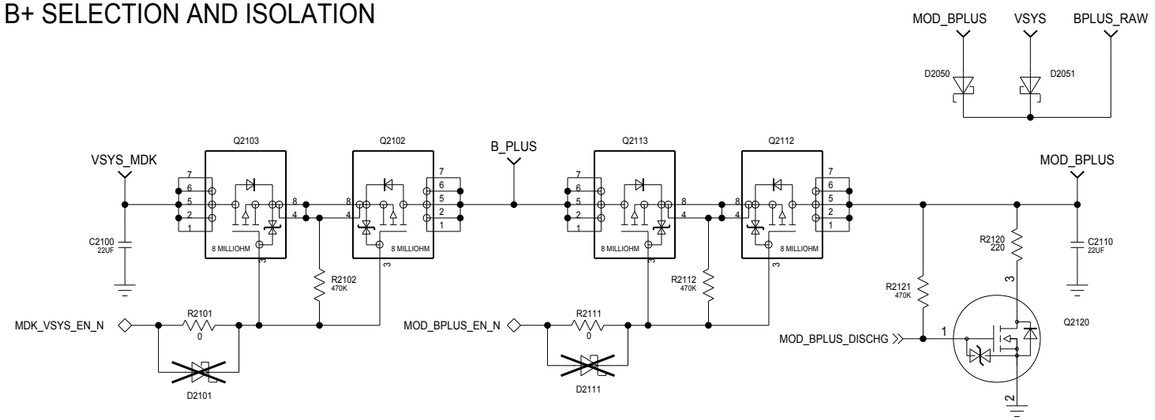
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 15:19:30 2016	
	B | PROJECT NAME 84016537001_05.cpm | REV 01
	CAD FILE NAME: | PAGE 7 OF 17

DEVELOPER NOTE (MDK CONVERSION):

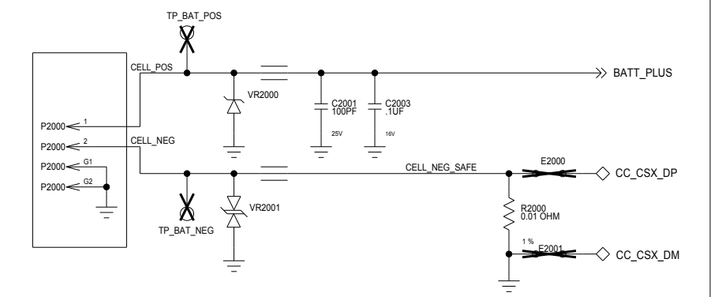
1) DELETE THIS PAGE ENTIRELY WHEN DESIGNING YOUR OWN MOD

ROOT: BATTERY

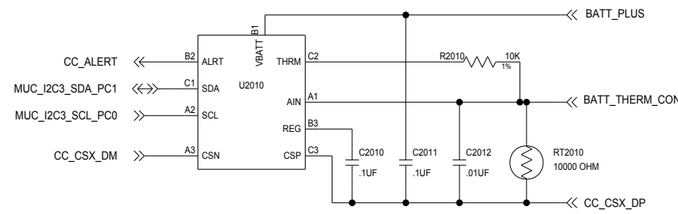
B+ SELECTION AND ISOLATION



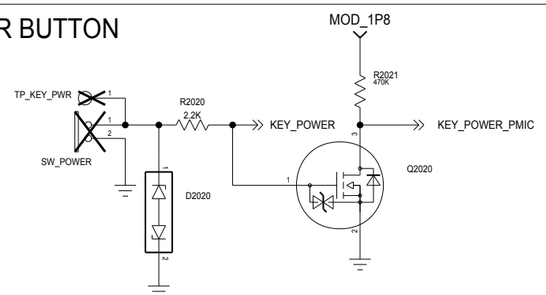
BATTERY CONNECTOR



GAS GAUGE



USER BUTTON



APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 12:12:37 2016	B | PROJECT NAME 84016537001_05.cpm | REV 01
	CAD FILE NAME: | PAGE 8 OF 17

DEVELOPER NOTE (BATTERY CONFIG):

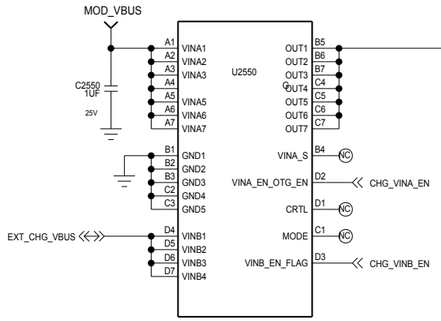
1) MODS THAT DO NOT HAVE A BATTERY CAN REMOVE ALL COMPONENTS ON THIS PAGE AND CONNECT MOD_BPLUS DIRECTLY TO B_PLUS

DEVELOPER NOTE (MDK CONVERSION):

1) REPLACE "VSYS_MDK" WITH "VSYS"
2) REPLACE "MDK_VSYS_EN_N" WITH "MOD_VSYS_EN_N"

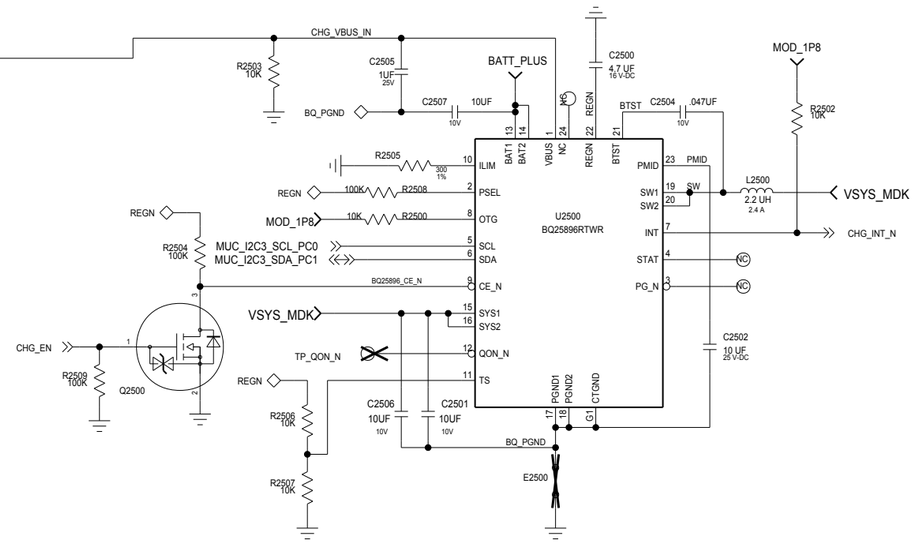
ROOT: CHARGING

DUAL-INPUT SWITCH



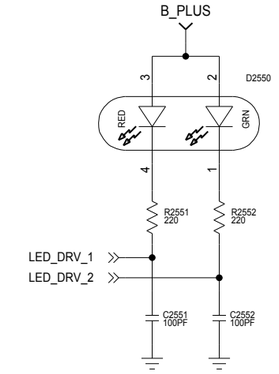
VINA_EN	VINB_EN	
L	L	OPEN
L (DEFAULT)	H (DEFAULT)	VINB CONDUCTING
H	L	VINA CONDUCTING
H	H	VINB AND VINA CONDUCTING

EXTERNAL CHARGER



STATE OF CHARGE LEDS

REAR-FIRING RED/GREEN LED



APPROVALS	MOTOROLA MOBILE DEVICES	
ENGINEER: MMI	BLOCK TITLE: root	
LAST MODIFIED BY: MMI Tue Aug 23 15:12:36 2016		
	B	PROJECT NAME: 84016537001_05.cpm — REV: 01
	CAD FILE NAME:	PAGE 9 OF 17

DEVELOPER NOTE (CHARGER CONFIG):

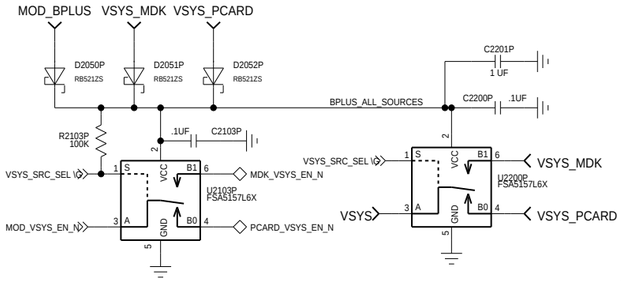
1) MODS THAT DO NOT HAVE A BATTERY CAN REMOVE ALL COMPONENTS ON THIS PAGE
2) MODS THAT DO NOT HAVE AN EXTERNAL CHARGING PORT CAN REMOVE U2550 AND CONNECT MOD_VBUS DIRECTLY TO CHG_VBUS_IN
3) MODS THAT DO HAVE AN EXTERNAL CHARGING PORT, CONNECT EXT_CHG_VBUS TO THE CHARGING PORT POWER INPUT (E.G. USBC_VBUS)

DEVELOPER NOTE (MDK CONVERSION):

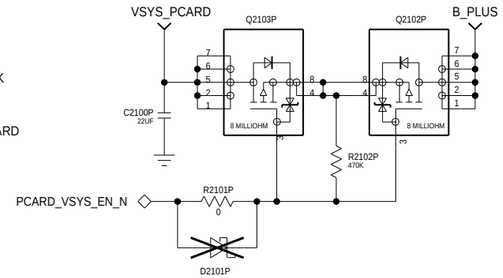
1) REPLACE "VSYS_MDK" WITH "VSYS"

ROOT: BATTERY / CHARGING (MDK ONLY)

MDK ONLY -- VSYS POWER PATH SELECTION

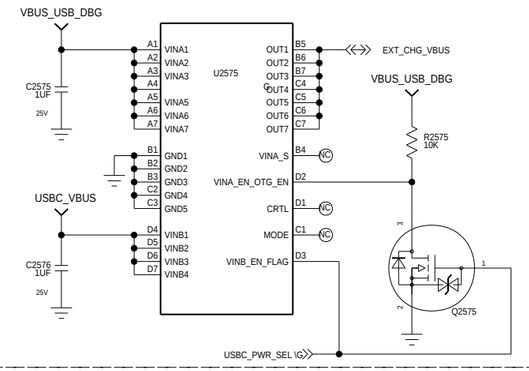


SELECT BETWEEN :
1) ONBOARD BATT / CHG SYSTEM (DEFAULT)
2) P-CARD BATT / CHG SYSTEM



MDK ONLY -- USBC VBUS PATH SELECTION

SELECT BETWEEN :
1) "GROUP B" USB-C CONNECTOR (DEFAULT)
2) DEBUG USB-C CONNECTOR

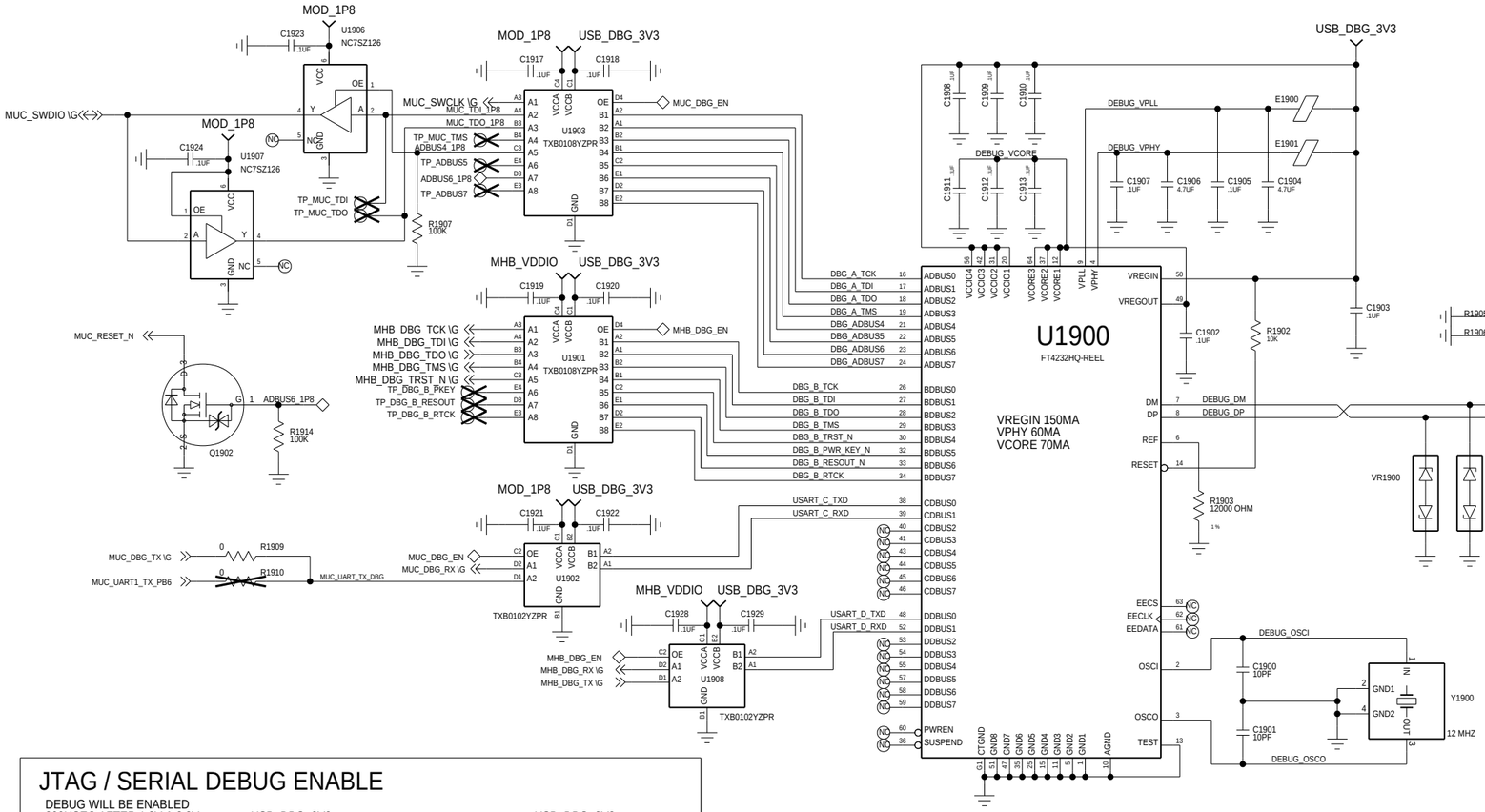


APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 15:03:39 2016	
	B | PROJECT NAME: 84016537001_05.cpm | REV: 01
	CAD FILE NAME: | PAGE 10 OF 17

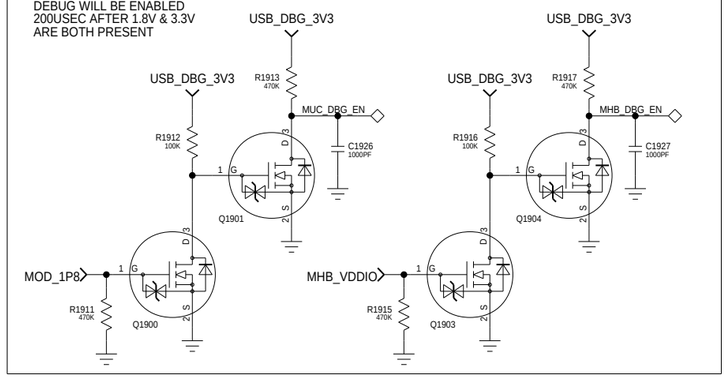
DEVELOPER NOTE (MDK CONVERSION):

1) DELETE THIS PAGE ENTIRELY WHEN DESIGNING YOUR OWN MOD

ROOT: MDK DEBUG ACCESS



JTAG / SERIAL DEBUG ENABLE



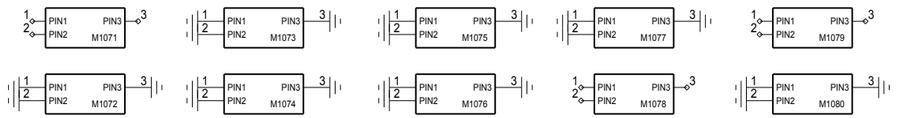
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 12:12:38 2016	B / PROJECT NAME: 84016537001_05.cpm / REV: 01
	CAD FILE NAME: / PAGE 11 OF 17

DEVELOPER NOTE (MDK CONVERSION):

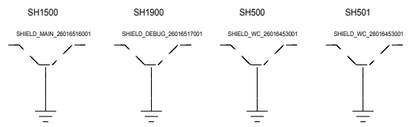
1) DELETE THIS PAGE ENTIRELY WHEN DESIGNING YOUR OWN MOD

ROOT: MECHANICAL

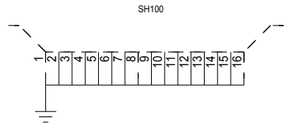
HOUSING SCREW BOSSES



SHIELDS



BATTERY TRAY

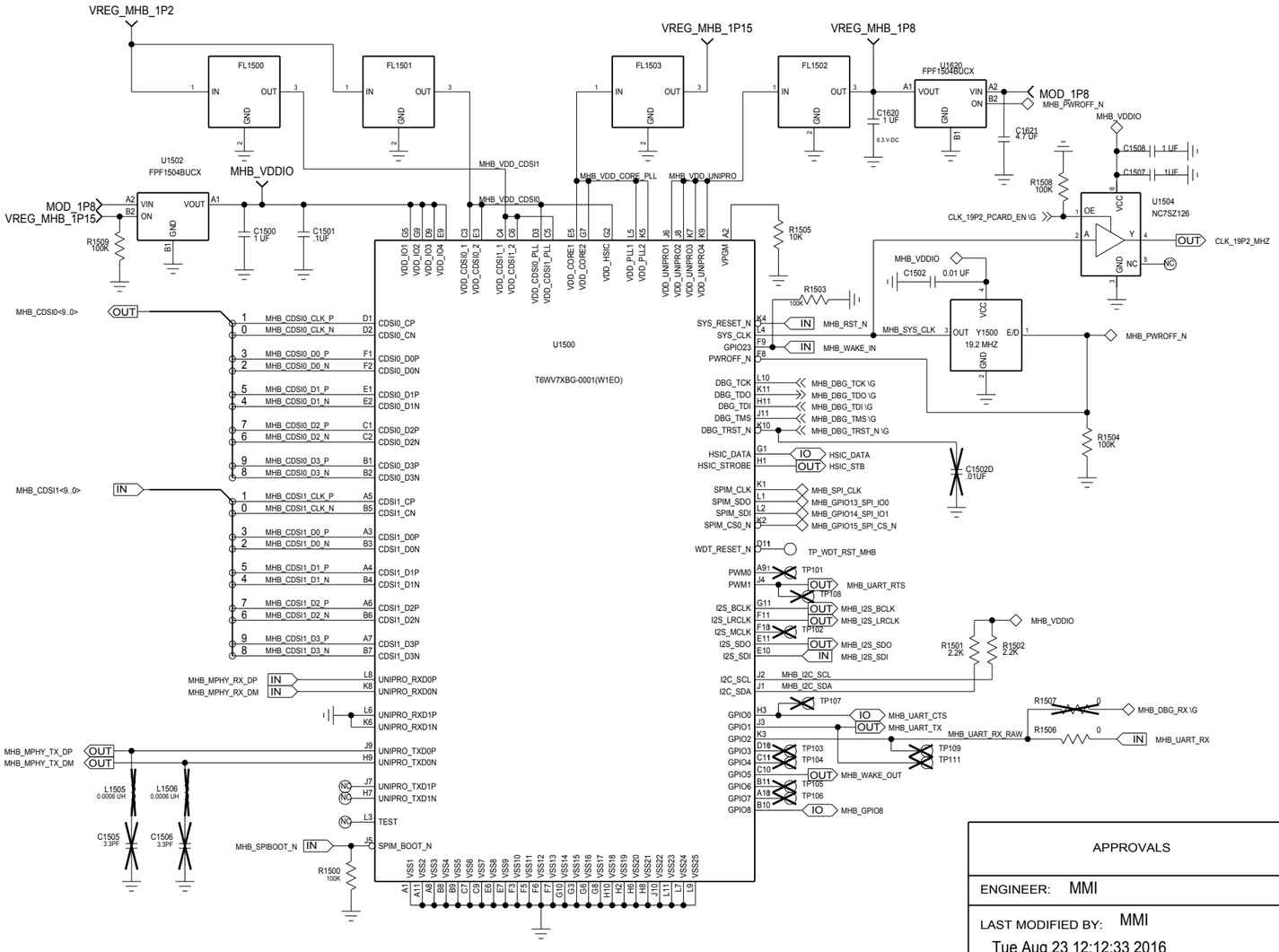


APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: root
LAST MODIFIED BY: MMI Tue Aug 23 12:12:39 2016	B · PROJECT NAME: 84016537001_05.cpm · REV: 01
	CAD FILE NAME: · PAGE 12 OF 17

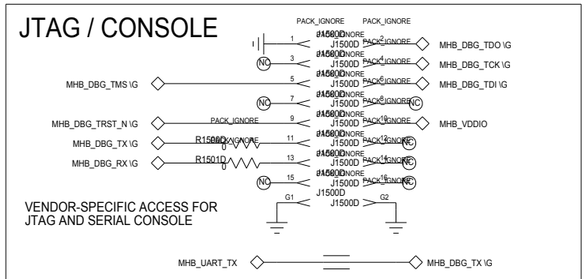
DEVELOPER NOTE (MDK CONVERSION):

1) REPLACE MECHANICAL PARTS ON THIS PAGE WITH MECHANICAL PARTS SPECIFIC TO YOUR MOD

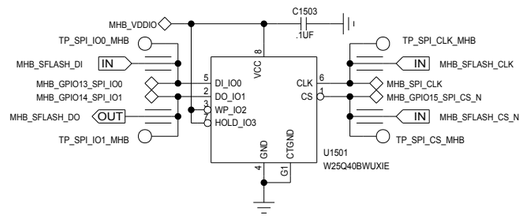
MHB



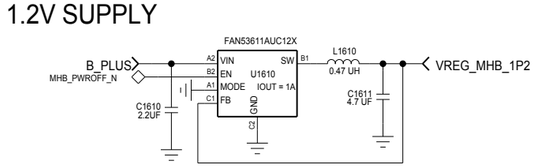
JTAG / CONSOLE



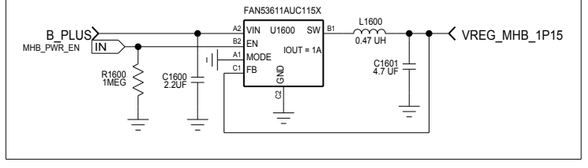
SPI FLASH FOR CODE STORAGE



1.2V SUPPLY



1.15V SUPPLY



APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: mhb
LAST MODIFIED BY: MMI Tue Aug 23 12:12:33 2016	B / PROJECT NAME: 84016537001_05.cpm / REV: 01
	CAD FILE NAME: / PAGE 13 OF 17

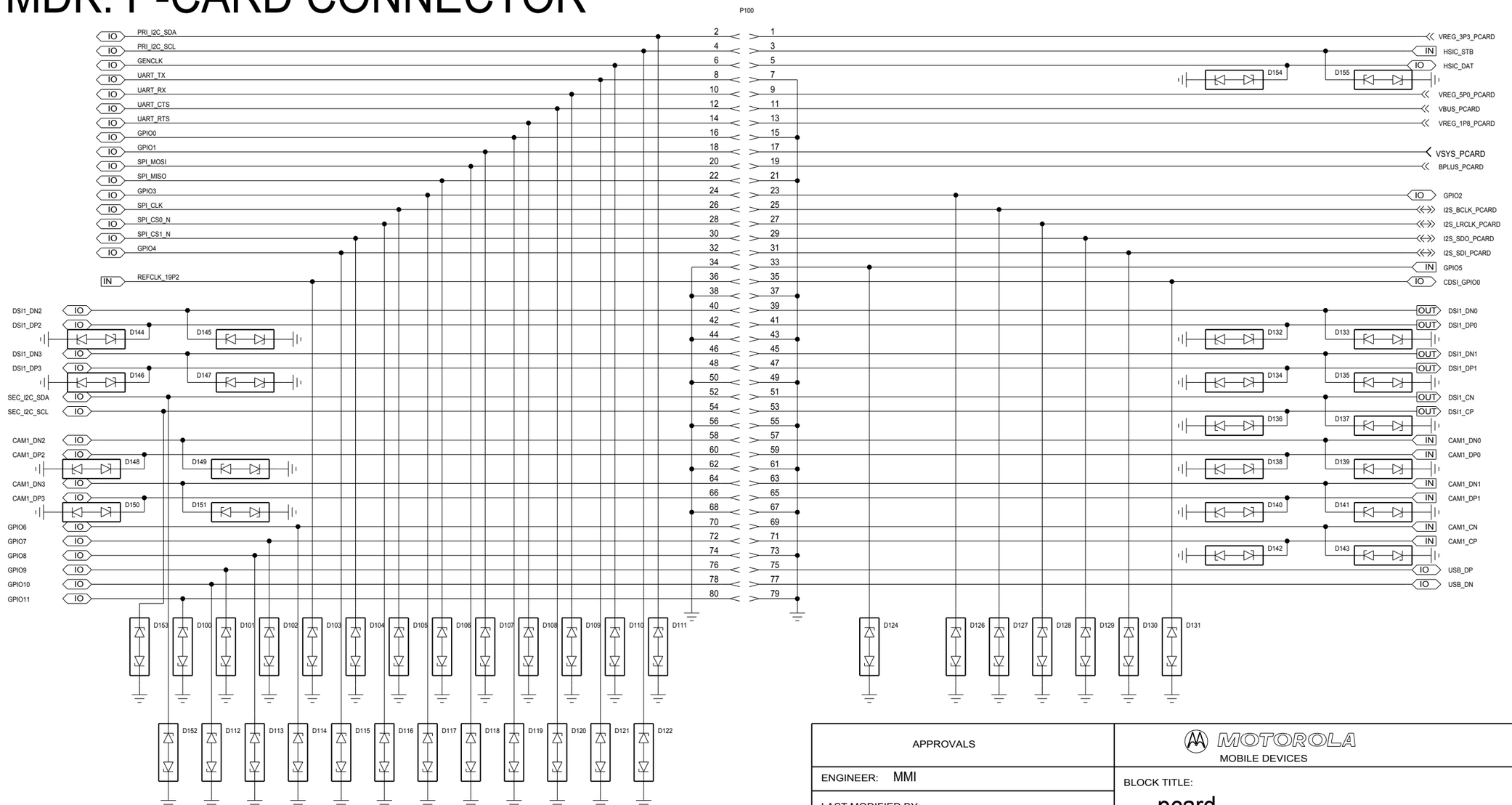
DEVELOPER NOTE (IFACE CONFIG):

1) MODS THAT DO NOT NEED THE MHB CAN REMOVE ALL COMPONENTS ON THIS PAGE

DEVELOPER NOTE (MDK CONVERSION):

1) DELETE U1504, R1508, C1507, C1508

MDK: P-CARD CONNECTOR



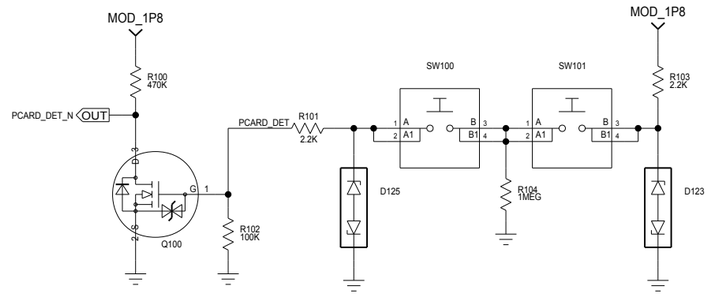
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: pcard
LAST MODIFIED BY: Tue Aug 23 12:12:34 2016	
	B | PROJECT NAME: 84016537001_05.cpm | REV: 01
	CAD FILE NAME: | PAGE 14 OF 17

DEVELOPER NOTE (MDK CONVERSION):

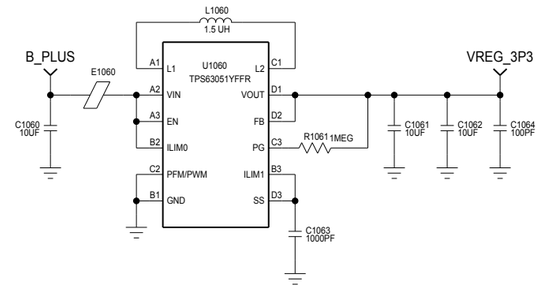
1) REPLACE THIS PAGE WITH PARTS SPECIFIC TO YOUR MOD

MDK: P-CARD SUPPORT

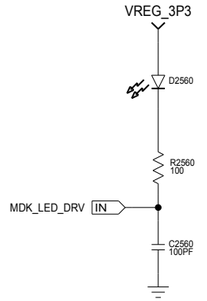
PERSONALITY CARD DETECT SWITCHES



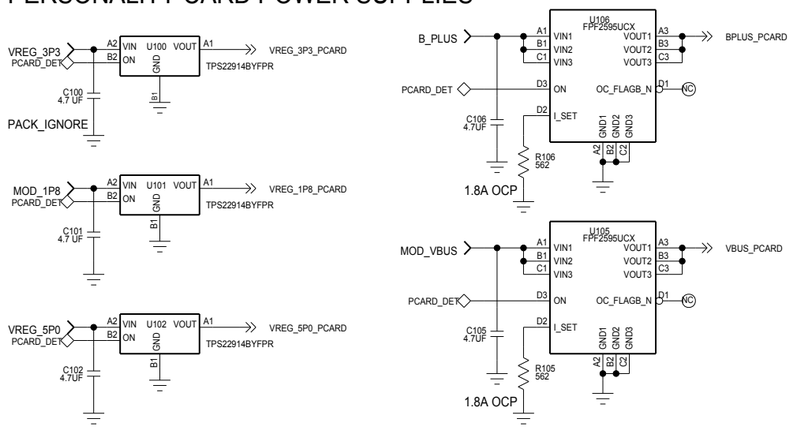
3.3V SUPPLY
500MA



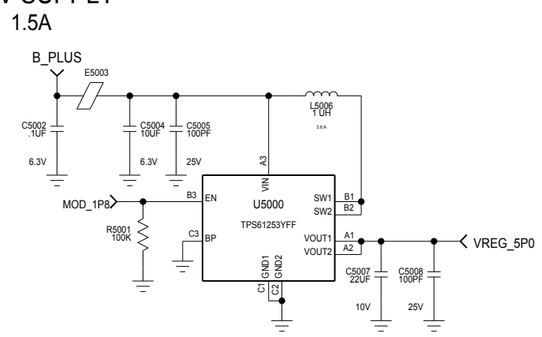
USER DEFINABLE LED
TOP-FIRING WHITE LED



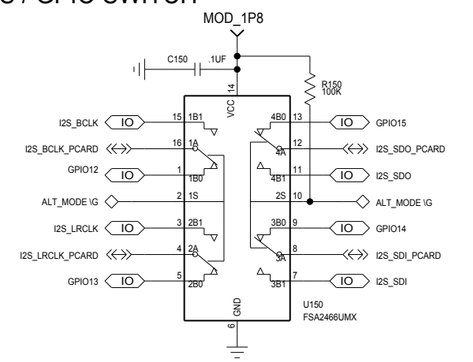
PERSONALITY CARD POWER SUPPLIES



5V SUPPLY
1.5A



I2S / GPIO SWITCH



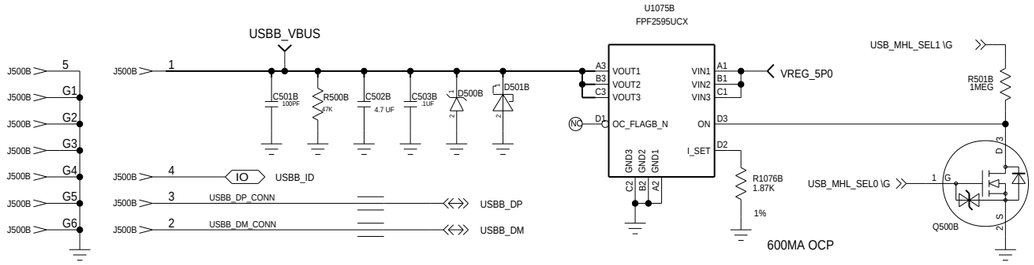
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: pcard
LAST MODIFIED BY: MMI Tue Aug 23 15:13:28 2016	
	PROJECT NAME: B 84016537001_05.cpm — REV: 01
	CAD FILE NAME: — PAGE 15 OF 17

DEVELOPER NOTE (MDK CONVERSION):

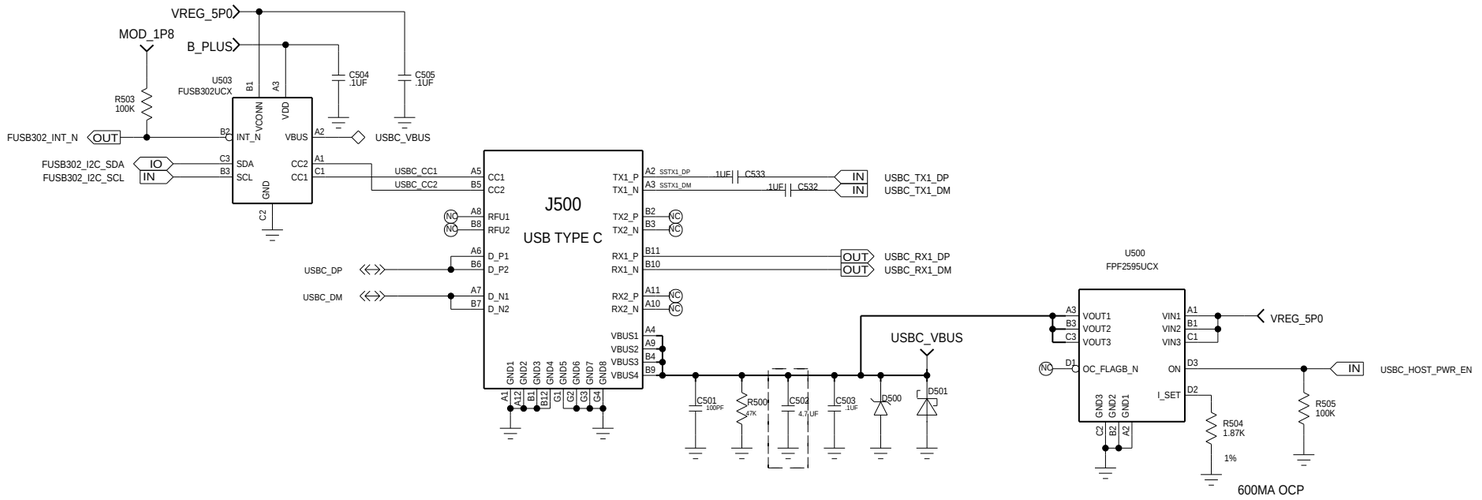
1) REPLACE THIS PAGE WITH PARTS SPECIFIC TO YOUR MOD

USB: MDK CONNECTORS

USB MICRO-B



USB TYPE C



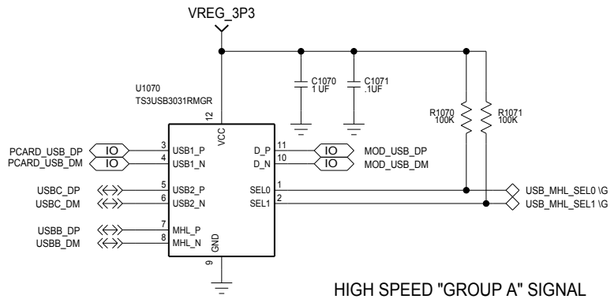
APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: usb
LAST MODIFIED BY: MMI Tue Aug 23 12:12:40 2016	
	B | PROJECT NAME: 84016537001_05.cpm | REV: 01
	CAD FILE NAME: | PAGE 17 OF 17

DEVELOPER NOTE (MDK CONVERSION):

1) REPLACE THIS PAGE WITH PARTS SPECIFIC TO YOUR MOD

USB: 3:1 SWITCH (MDK ONLY)

"HIGH SPEED GROUP A" SWITCH



HIGH SPEED "GROUP A" SIGNAL
ROUTING IS SET BY
DIP SWITCHES A3 AND A4

A3 ON = USB MICRO B
A4 ON = USB TYPE C
A3 + A4 ON = P-CARD

SEL1	SEL0	
L	L	D+/D- CONNECTED TO BREAKOUT
L	H	D+/D- CONNECTED TO USB TYPE C
H	L	D+/D- CONNECTED TO USB MICRO B
H (DEFAULT)	H (DEFAULT)	D+/D- HIGH-Z

APPROVALS	MOTOROLA MOBILE DEVICES
ENGINEER: MMI	BLOCK TITLE: usb
LAST MODIFIED BY: MMI Tue Aug 23 12:12:40 2016	B / PROJECT NAME: 84016537001_05.cpm / REV: 01
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DEVELOPER NOTE (MDK CONVERSION):

1) DELETE THIS PAGE ENTIRELY WHEN DESIGNING YOUR OWN MOD