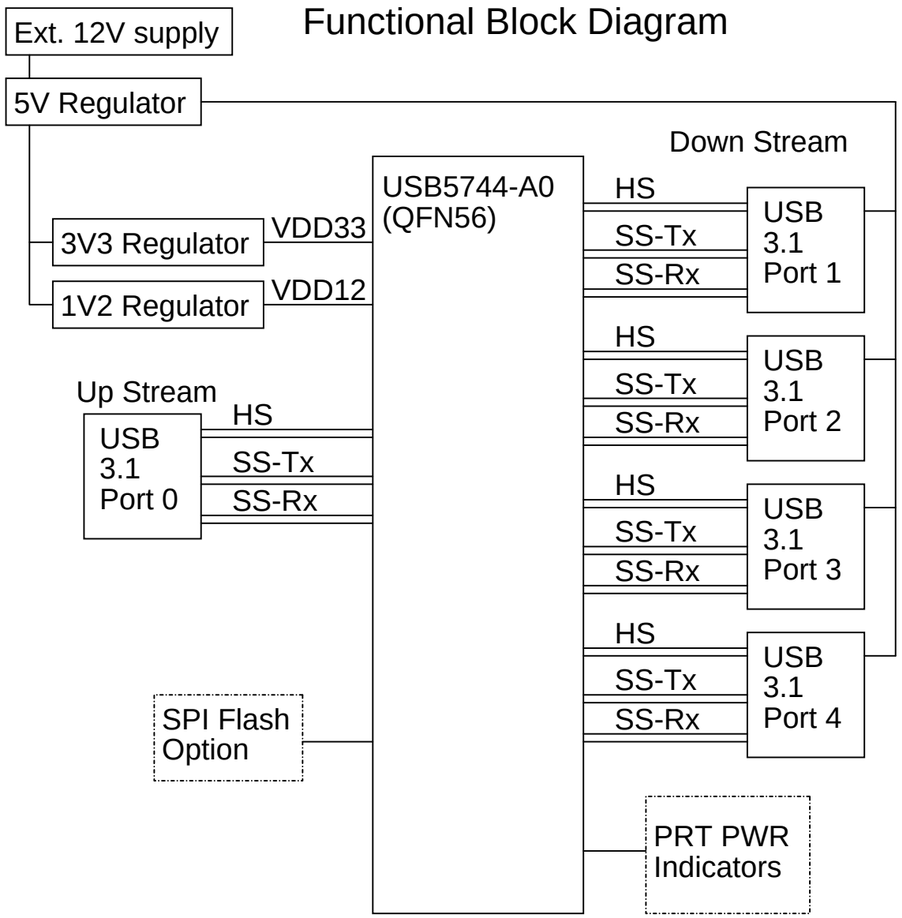
EVB-USB5744
Evaluation Board for USB5744-A0

Self-powered platform from 12 VDC
Can supply maximum USB current to all ports simultaneously
4 Down Stream USB 3.1 Gen 1 ports
Optional SPI programming and configuration
Battery Charging on all ports
- 2.1 A (max.) Port Power per any port.
- Over 5 A (total) Port Power down stream at any one time!

Functional Block Diagram



Revision History

Revision	Date	Revision Summary	Author
00A	20140604	Initial design	C. Johnson
01A	20140616	Revised per initial feedback.	C. Johnson
02A	20140701	Revised per final feedback.	C. Johnson
A	20140711	Released	C. Johnson
A0	20141022	Changed part number for MUX IC between the SPI and Strap Select switches.	J. Hancock
A1	20150924	Changed all PPCs with new Micrel part number. This also caused a change in ILIMIT resistor for each PPC.	J. Hancock

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Description:	*Evaluation Board for USB5744-A0, QFN56*		
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Project Name:	*Truffle*	PN:	*EVB-USB5744*
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Note:
Default selections are marked with an asterisk (*) .

Note: Population Option Defaults are:

DNP	**No**
Unmarked	**Yes**

Port 0

J12 — USB 3.1 Gen 1 u-B REC, SMT & TH tabs (TID#)

Vbus, D-, D+, id, GND1, SSTX+, SSTX-, GND2, SSRX+, SSRX-, ShL, ShP1, ShP2, ShP3, ShP4, ShR

R66 330, C67 0.1uF

R60 100K, C53 2.2uF, R62 100K, C65 0.01uF, C52 1.0nF, C50 0.1uF, C51 0.1uF

VBUS_UP, USB_DM_UP, USB_DP_UP, SSTXM_C_UP, SSTXP_C_UP, USB_SSTXM_UP, USB_SSTXP_UP, USB_SSRXM_UP, USB_SSRXP_UP

*Note that the SS signal pair Tx+/ are polarity swapped on the MicroB connector for improved routing. The same is true for the SS pair Rx+/-.

pg3 RESETn

*Note: The system should supply RESETn in an embedded hub implementation.

U0

VBUS_DET/GPIO16

Upstream
USBDM_UP, USBDP_UP, USBTXM_UP, USBTXP_UP, USBRXM_UP, USBRXP_UP

Reset
RESET

Bias/Test
RBIAS, TESTEN/ATEST

R11 12.0K 1%, R12 1K

Clock
XTALI/CLK_IN, XTALO

C29 16pF, TP9, Y1 25MHz, C33 16pF

SPI / Config
SPI_CLK/SMCLK, SPI_DO/SMDAT, SPI_DI/CFG_BC_EN, SPI_CE_N/CFG_NON_REM

Power
VDD12, VDD33

Port Power Control
PRT_CTL1, PRT_CTL2, PRT_CTL3, GANG_PWR/PRT_CTL4

(Fill the GND FLAG with at least 20 GND vias.)

GND(Flag)

USB5744-A0

Upstream: USBDM_DN1/Dis, USBDP_DN1/Dis, USBRXM_DN1, USBRXP_DN1, USBTXM_DN1, USBTXP_DN1

Downstream: USBDM_DN2/Dis, USBDP_DN2/Dis, USBRXM_DN2, USBRXP_DN2, USBTXM_DN2, USBTXP_DN2, USBDM_DN3/Dis, USBDP_DN3/Dis, USBRXM_DN3, USBRXP_DN3, USBTXM_DN3, USBTXP_DN3, USBDM_DN4/Dis, USBDP_DN4/Dis, USBRXM_DN4, USBRXP_DN4, USBTXM_DN4, USBTXP_DN4

USBDN_DM1 pg3, USBDN_DP1 pg3, USBDN_DM2 pg3, USBDN_DP2 pg3, USBDN_DM3 pg3, USBDN_DP3 pg3, USBDN_DM4 pg3, USBDN_DP4 pg3

USB_SSRXM_DN1, USB_SSRXP_DN1, USB_SSTXM_DN1, USB_SSTXP_DN1, USB_SSRXM_DN2, USB_SSRXP_DN2, USB_SSTXM_DN2, USB_SSTXP_DN2, USB_SSRXM_DN3, USB_SSRXP_DN3, USB_SSTXM_DN3, USB_SSTXP_DN3, USB_SSRXM_DN4, USB_SSRXP_DN4, USB_SSTXM_DN4, USB_SSTXP_DN4

Port 1 / Port 2 / Port 3 / Port 4

J1, J2, J3, J4 — USB 3.1 Gen 1 A-REC THRU

Vbus, D-, D+, GND1, SSRX-, SSRX+, GND2, SSTX-, SSTX+, Sh1, Sh2

PWR1, PWR2, PWR3, PWR4

C13 150uF, C14 150uF, C15 150uF, C16 150uF

C6 0.1uF, C5 0.1uF, C8 0.1uF, C7 0.1uF, C10 0.1uF, C9 0.1uF, C12 0.1uF, C11 0.1uF

SSTXM_C_DN1, SSTXP_C_DN1, SSTXM_C_DN2, SSTXP_C_DN2, SSTXM_C_DN3, SSTXP_C_DN3, SSTXM_C_DN4, SSTXP_C_DN4

R1 330, C1 0.1uF, R2 330, C2 0.1uF, R3 330, C3 0.1uF, R4 330, C4 0.1uF

SPI Option

U9 74LVC1G14, R57 1K, D11 "SPI Activity" Blue

U8 — VCC, SCK, SI, SO, CS, WP, HOLD, GND; >60 MHz

C44 0.1uF

R42 10K, R58 10K, R61 10K, R54 100K, R53 100K

WPn, HOLDn

*Note: For best functionality, use 60MHz SPI devices

J10 CE# EN (*short), SHUNT1

U11 — IA0 YA, IA1, IB0 YB, IB1, IC0 YC, IC1, ID0 YD, ID1, VCC, S, E, GND

PI3B3257

C68 0.1uF

SCK, DO, DI, CEn, CEn_F, rsv1, rsv2, SPI_SCK, SPI_DO, SPI_DI, SPI_CE_n

Strapping Option

Bat. Chg Select — SW5 — SW_SIP7 — CFG_BC

1 No BC
2 Prt1 BC
3 Prt1-2 BC
4 Prt1-3 BC
5 *Prt1-4 BC
6 reserved

R35 200K, R36 200K, R37 10K, R38 10K, R39 10, R40 10

Non-Rem Select — SW6 — SW_SIP7 — CFG_NON_REM

1 *All Removable
2 Prt1 Non-Rem
3 Prt1-2 Non-Rem
4 Prt1-3 Non-Rem
5 Prt1-4 Non-Rem
6 reserved

R41 200K, R43 200K, R44 10K, R45 10K, R46 10, R47 10

Config. Select

(*SPI=1-2, Strap=2-3)

Slide-Top SW7, R64 10K, U12 74LVC1G14, R67 1K

D31 MMBD914, "Strap Select" D13 Br_Grn, "SPI Select" D14 Blue

USB5744 Power Decoupling

C22 4.7uF DNP, C19 0.1uF, C20 0.1uF, C23 0.1uF, C31 0.1uF, C38 0.1uF, C42 0.1uF, C41 0.1uF, C34 0.1uF, C62 1.0nF, C25 1.0nF

C21 4.7uF DNP, C18 0.1uF, C43 0.1uF, C40 0.1uF, C30 0.1uF, C24 1.0nF, C26 1.0nF

Power Regulators

U4, U5, U6, U7 — MIC2009_MLF-6 — VIN, VOUT, ILIMIT, EN, GND, FAULT, EP — 2.1A

TP4, TP1, TP3, TP5

R24 ZERO, R25 ZERO, R26 ZERO, R27 ZERO

C58 0.1uF, C59 0.1uF, C60 0.1uF, C61 0.1uF

C17 150uF

R20 100 1%, R21 100 1%, R22 100 1%, R23 100 1%

C54 0.1uF, C55 0.1uF, C56 0.1uF, C57 0.1uF

*Note: MIC2009 device has an auto-discharge function.

R8 330, R7 330, R6 330, R5 330 — GRN — D4, D3, D2, D1 — Optional

"PPWR4", "PPWR3", "PPWR2", "PPWR1"

Test-DNP

XTALI TP7, XTALO TP13

J8: rsv1 (ss2/scl), rsv2 (ss3/sda), DI (miso), SCK (sclk), CEn (ss1), CEn_F R55 ZERO, R52 ZERO, Aardvark_I/F

(gnd), (nc/5V), (nc/5V), (mosi) DO, (gnd)

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Power Regulation & Reset

12V In

J9 2.5 mm

C66 0.1uF

R59 20

D30 MMBD914

J6 Ext. 12V DNP

5V25 Regulator, <6A

12V_EXT

U3 VIN ENABLE VOUT TRIM GND 6_Amp

C46 10uF 25V

TP2 TP6

5V

R56 255 1%

C39 10uF

C37 0.1uF

-RESET-

SW8

J11 Ext_Rst

R65 100K

3V3

U10 74LVC1G14

R63 1K

"Reset" D12 Red

C64 1.0nF

RESETn pg2

3V3 Regulator, >200 mA with PwrGood

5V

FB4 2A/0.05DCR

5V_REG_3V3

U2 MCP1725-ADJ_SOIC8 500mA VIN1 VIN2 Shdn Cdelay VOUT GND ADJ PWRGD

R13 47K

EN3

R16 1% 150K

R15 21.0K 1%

C36 4.7uF

C35 1.0uF

C48 1.0nF

C45 4.7uF

C47 0.1uF

C49 1.0nF

3V3

R9 ZERO

VDD33

TP11 TP10

R28 1K

LED_P

D5 Br_Grn "3V3 Present"

1V2 Regulator, 1A

*Note: VDD12 should come up before VDD33.

FB3 2A/0.05DCR

5V_REG_1V2

R14 ZERO

EN12

U1 VIN ENABLE VOUT TRIM GND 3_Amp

1V2_REG

R33 1.91K 1%

R34 29.4K 1% DNP

C63 10uF

C32 DNP 0.1uF

C28 10uF

C27 0.1uF

R10 ZERO

VDD12

TP12 TP8

Port Disable Strap Option

*Note: Pull up both DP and DM on a port to disable it.

(*1-2, Port Enabled, 2-3, Port Disabled)

3V3 R29 1K SW1 Slide-Top ON-ON **Port 1** "Port 1 Enabled" D7 Br_Grn

pg2 USBDN_DM1

pg2 USBDN_DP1

3V3 R30 1K SW2 Slide-Top ON-ON **Port 2** "Port 2 Enabled" D8 Br_Grn

pg2 USBDN_DM2

pg2 USBDN_DP2

3V3 R31 1K SW3 Slide-Top ON-ON **Port 3** "Port 3 Enabled" D9 Br_Grn

pg2 USBDN_DM3

pg2 USBDN_DP3

3V3 R32 1K SW4 Slide-Top ON-ON **Port 4** "Port 4 Enabled" D10 Br_Grn

pg2 USBDN_DM4

pg2 USBDN_DP4

LED_P D6 DNP RED

TP15

3V3 FB1 DNP VDD33 2A/0.05DCR

1V2_REG FB2 DNP VDD12 2A/0.05DCR

3V3 TP14

MT2 MT1

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