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Thunderboard Sense 2

EFR32MG12P332F1024GL125

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Revision History

Rev.	Description
A00	Initial prototype version.

PCB1
PCB4166

RF Section

2.4 GHz matching network

U1B

RF Crystal
HFXTAL_P   L1
HFXTAL_N   K1

RF I/O
2G4RF_IOP   N7
2G4RF_ION   N6

L1 2N2   R110 0R   L2 1N8
C1 1P5   C20 1P5   C6 NM
GND   GND   GND

ANT1
IN GND 1 2
GND GND 4 3
2450AT18D0100
GND

X1 38.4 MHz
GND

RF Analog Power
RFVDD   J1
RFVDD   J2

PA Power
PAVDD   M8
PAVDD   N8

NC   N1
NC   N2
NC   N3
NC   N4

Low Frequency Crystal

LFXTAL_N
LFXTAL_P
X2 32.768 kHz

L3 CIM03U241
RFVDD   1 2
C2 100P   C3 10P
GND GND

L4 CIM03U241
PAVDD   1 2
C4 220N   C5 10P
GND GND

Ground
PAVSS   M6
PAVSS   M7
RFVSS   H5
RFVSS   H6
RFVSS   H7
RFVSS   H8
RFVSS   H9
RFVSS   J5
RFVSS   J6
RFVSS   J7
RFVSS   J8
RFVSS   J9
RFVSS   K2
RFVSS   L2
RFVSS   M2
RFVSS   M3
RFVSS   M4
RFVSS   M5

RFVSS   G9
RFVSS   G8
RFVSS   G7
RFVSS   G6
RFVSS   G5
RFVSS   F9
RFVSS   F8
RFVSS   F7
RFVSS   F6
RFVSS   F5
RFVSS   E9
RFVSS   E8
RFVSS   E7
RFVSS   E6
RFVSS   E5
RFVSS   N5

GND

EFR32MG12P332F1024GL125

GND

Reset button

Power & Decoupling

EFR32_RESET

R98 100R
SW3 PTS810
GND

U1C

Reset
RESETN   M1
BODEN   L10

DC/DC Regulator
VREGSW   A12

Digital Regulator
AREGVDD A10

L5 4U7
RFVDD PAVDD
C7 4U7
GND

VMCU
C8 10U   C9 1U
GND GND

Digital Supply
VREGVDD A11

Analog Supply
AVDD   B13

Digital Logic
DECOUPLE A9

C14 100N
GND

VMCU
R2 1R   L6 CIM03U241 1 2
C65 10U   C13 10N
GND GND

C12 1U

I/O Supply
IOVDD   M12
IOVDD   B10
IOVDD   F2
IOVDD   F11

Ground
VREGVSS A13
VREGVSS B11
VREGVSS B12
GND

EFR32MG12P332F1024GL125

GND

VMCU
C10 1U   C11 100N   C75 100N   C76 100N   C77 100N
GND GND GND GND GND

GPIO Pins

EFR32_PA[9..0]

U1A

EFR32_PA0   M13   PA0 / US0_TX #0
EFR32_PA1   L13   PA1 / US0_RX #0
EFR32_PA2   L12   PA2 / US0_CTS #30
EFR32_PA3   K13   PA3 / US0_RTS #30
EFR32_PA4   K12   PA4 / US1_CS #0
EFR32_PA5   J13   PA5
EFR32_PA6   J12   PA6 / US2_TX #1
EFR32_PA7   J11   PA7 / US2_RX #1
EFR32_PA8   H13   PA8
EFR32_PA9   H12   PA9

EFR32_PB[15..6]

EFR32_PB6   F12   PB6 / I2C1_SDA #6
EFR32_PB7   E13   PB7 / I2C1_SCL #6
EFR32_PB8   E12   PB8 / I2C1_SDA #8
EFR32_PB9   D13   PB9 / I2C1_SCL #8
EFR32_PB10   D12   PB10
EFR32_PB11   D11   PB11 / PCNT0_S0IN #6
EFR32_PB12   C13   PB12 / FRC_DOUT #6
EFR32_PB13   C12   PB13 / FRC_DFRAME #6
EFR32_PB14   C11   PB14 / LFXTAL_N
EFR32_PB15   C10   PB15 / LFXTAL_P

EFR32_PC[11..0]

EFR32_PC0   A5   PC0 / US3_TX #18
EFR32_PC1   B5   PC1 / US3_RX #18
EFR32_PC2   C5   PC2 / US3_CLK #18
EFR32_PC3   A4   PC3 / US3_CS #18
EFR32_PC4   B4   PC4 / I2C1_SDA #17
EFR32_PC5   A3   PC5 / I2C1_SCL #17
EFR32_PC6   B9   PC6 / US1_TX #11
EFR32_PC7   A8   PC7 / US1_RX #11
EFR32_PC8   B8   PC8 / US1_CLK #11
EFR32_PC9   A7   PC9 / US1_CS #11
EFR32_PC10   B7   PC10 / I2C0_SDA #15
EFR32_PC11   A6   PC11 / I2C0_SCL #15

EFR32_PD[15..8]

EFR32_PD8   N9   PD8
EFR32_PD9   M9   PD9
EFR32_PD10   N10   PD10
EFR32_PD11   M10   PD11 / TIM0_CC0 #19
EFR32_PD12   N11   PD12 / TIM0_CC1 #19
EFR32_PD13   M11   PD13 / TIM0_CC2 #19
EFR32_PD14   N12   PD14 / GPIO_EM4WU4
EFR32_PD15   N13   PD15

PI0   G13   EFR32_PI0
PI1   G12   EFR32_PI1
PI2   G11   EFR32_PI2
PI3   F13   EFR32_PI3

PJ14   B6   EFR32_PJ14
PJ15   C6   EFR32_PJ15

PK0   E2   EFR32_PK0
PK1   E1   EFR32_PK1
PK2   F1   EFR32_PK2

DBG_SWCLK / PF0   B3   EFR32_PF0
DBG_SWDIO / PF1   A2   EFR32_PF1
DBG_SWO #0 / PF2 A1   EFR32_PF2
PF3   G2   EFR32_PF3
PF4   G1   EFR32_PF4
PF5   H2   EFR32_PF5
PF6   H1   EFR32_PF6
PF7   B1   EFR32_PF7
PF8   C3   EFR32_PF8
PF9   C2   EFR32_PF9
PF10 C1   EFR32_PF10
PF11 D3   EFR32_PF11
PF12 N11 (M11) EFR32_PF12
PF13 D1   EFR32_PF13
PF14 D2   EFR32_PF14
PF15 E3   EFR32_PF15

EFR32_PI[3..0]
EFR32_PJ[15..14]
EFR32_PK[2..0]
EFR32_PF[15..0]

EFR32MG12P332F1024GL125

<Schematic Path>
SCHEMATIC1

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Schematic Title
Thunderboard Sense 2

Page Title
EFR32 - RF, power & IO

Designed: DDB
Approved: JNO

Document number
BRD4166A

Revision
A00

Size A3
BOM Doc No: <Cage Code>

Design Created Date:
Wednesday, November 30, 2016

Sheet Created Date
Wednesday, November 30, 2016

Sheet Modified Date
Wednesday, December 07, 2016

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EFR32 I/O Connections

R103 0R
SI_UART_TX
SI_UART_RX

EFR32_PA[9..0]
R104 0R
EFR32_PA0
EFR32_PA1
VCOM_TX
VCOM_RX

EFR32_PA2 — VCOM_CTS
EFR32_PA3 — VCOM_RTS
EFR32_PA4 — FLASH_SPI_CS
EFR32_PA5
EFR32_PA6
EFR32_PA7 — EXP12_UART_TX
EFR32_PA8 — EXP14_UART_RX
EFR32_PA9 — EXP3
EXP5

EFR32_PB[15..6]
EFR32_PB6 — CCS811_I2C_SDA
EFR32_PB7 — CCS811_I2C_SCL
EFR32_PB8 — HALL_I2C_SDA
EFR32_PB9 — HALL_I2C_SCL
EFR32_PB10 — HALL_ENABLE
EFR32_PB11 — HALL_OUT1
EFR32_PB12 — PTI_DATA
EFR32_PB13 — PTI_FRAME
EFR32_PB14 — LFXTAL_P
EFR32_PB15 — LFXTAL_N

EFR32_PC[11..0]
EFR32_PC0 — IMU_SPI_MOSI
EFR32_PC1 — IMU_SPI_MISO
EFR32_PC2 — IMU_SPI_SCLK
EFR32_PC3 — IMU_SPI_CS
EFR32_PC4 — ENV_I2C_SDA
EFR32_PC5 — ENV_I2C_SCL
EFR32_PC6 — EXP4_SPI_MOSI
EFR32_PC7 — EXP6_SPI_MISO
EFR32_PC8 — EXP8_SPI_SCLK
EFR32_PC9 — EXP10_SPI_CS
EFR32_PC10 — EXP16_I2C_SDA
EFR32_PC11 — EXP15_I2C_SCL

EFR32_PD[15..8]
EFR32_PD8 — LED_RED
EFR32_PD9 — LED_GREEN
EFR32_PD10
EFR32_PD11
EFR32_PD12 — LED_RGB_RED
EFR32_PD13 — LED_RGB_GREEN
EFR32_PD14 — LED_RGB_BLUE
EFR32_PD15 — PUSH_BUTTON0
PUSH_BUTTON1

RP1
EFR32_RESET
1 8 SI_DBG_RESET
2 7 SI_DBG_SWCLK
3 6 SI_DBG_SWDIO
4 5 SI_DBG_SWO
0R

EFR32_PF[15..0]
EFR32_PF0 — DBG_RESET
EFR32_PF1 — DBG_SWCLK
EFR32_PF2 — DBG_SWDIO
EFR32_PF3 — DBG_SWO
EFR32_PF4 — EXP7
EFR32_PF5 — EXP9
EFR32_PF6 — EXP11
EFR32_PF7 — EXP13
EFR32_PF8 — MIC
EFR32_PF9 — IMU_ENABLE
EFR32_PF10 — ENV_SENSE_ENABLE
EFR32_PF11 — MIC_ENABLE
EFR32_PF12 — UV_ALS_INT
EFR32_PF13 — IMU_INT
EFR32_PF14 — CCS811_INT
EFR32_PF15 — CCS811_ENABLE
CCS811_#WAKE

EFR32_PI[3..0]
EFR32_PI0 — LED_COM0
EFR32_PI1 — LED_COM1
EFR32_PI2 — LED_COM2
EFR32_PI3 — LED_COM3
LED_COM[3..0]

EFR32_PJ[15..14]
EFR32_PJ14 — RGB_LED_ENABLE
EFR32_PJ15

EFR32_PK[2..0]
EFR32_PK0
EFR32_PK1
EFR32_PK2

Breakout Pads – EXP Header

VMCU 5V 3V3

EXPA
EXP3 — EFR32_PA8 — 1
EXP5 — EFR32_PA9 — 3
EXP7 — EFR32_PF3 — 5 7
EXP9 — EFR32_PF4 — 9
EXP11 — EFR32_PF5 — 11
EXP13 — EFR32_PF6 — 13
EXP15_I2C_SCL — EFR32_PC11 — 15
BOARD_ID_SCL — 17
BOARD_ID_SDA — 19
GND

EXPB
2 — EFR32_PC6 — EXP4_SPI_MOSI
4 — EFR32_PC7
6 — EFR32_PC8 — EXP6_SPI_MISO
8 — EFR32_PC9 — EXP8_SPI_SCLK
10 — EFR32_PC10 — EXP10_SPI_CS
12 — EFR32_PA6 — EXP12_UART_TX
14 — EFR32_PA7 — EXP14_UART_RX
16 — EFR32_PC10 — EXP16_I2C_SDA
18
20

Mini Simplicity Connector

VMCU

P2
1 2
SI_DBG_RESET — 3 4 — SI_UART_RX
SI_UART_TX — 5 6 — SI_DBG_SWO
SI_DBG_SWDIO — 7 8 — SI_DBG_SWCLK
PTI_FRAME — 9 10 — PTI_DATA

MINI-SIMPLICITY
GND

Push Buttons & LEDs

VMCU
R15 1M
SW1 PTS810
1 2   3 4
R16 100R
PUSH_BUTTON0
C46 1N
GND
GND

VMCU
R17 1M
SW2 PTS810
1 2   3 4
R18 100R
PUSH_BUTTON1
C47 1N
GND
GND

LED_GREEN
LED_RED
R42 2K
R43 2K
LED1 SML-P24
R   G
GND GND

SPI Flash

VMCU   VMCU
U3A
EXP4_SPI_MOSI — D2 — SI / SIO0   SO / SIO1 — C3 — EXP6_SPI_MISO
EXP8_SPI_SCLK — E1 — SCLK
A3 — CS#
R50 330K
E3 — WP# / SIO2
FLASH_SPI_CS — C1 — RESET# / SIO3
MX25R8035F

U3B
VCC — A1 — VMCU
B2 — GND
MX25R8035F
C15 100N
GND   GND

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Schematic Title
Thunderboard Sense 2

Page Title
EFR32 connections & interfaces

Designed:	Approved:		
DDB	JNO		
Size	BOM Doc No:	Document number	Revision
A3	<Cage Code>	**BRD4166A**	A00
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MEMS Microphone

Gain stage:
$G = -40.24$ V/V (32.09 dB)

Filter stage:
$f0 = 10$ KHz
$G = 1$ V/V (0 dB)

1V8_MIC
L10 CIM03U601
1V8_MIC_F
C49 1U
C50 150P
GND GND

U14 SPV1840LR5H-B
VDD
OUT
GND
GND

C51 100N
R25 8K2
R26 43K
1V8_MIC_F
R27 100K
C53 1U
GND GND GND

R24 330K
C67 10P
U15A TLV342S
R76 8K2
R77 12K
C71 1N5
C72 1N
GND
U15B TLV342S
R91 0R
R92 NM
GND
GND
L11 CIM03U601
C52 150P
MIC
GND

VMCU
U16 TPS78218DRV
IN OUT
EN
N/C
GND GND EP
C54 1U
C55 4U7
1V8_MIC
GND GND GND

MIC_ENABLE
U15C TLV342S
SHDN
V+
GND
VMCU
C56 100N
GND GND

RGB LEDs

3V5_LED0
LED3
Red Green Blue
RGB
R28 140R
R29
120R
R30 120R

3V5_LED1
LED4
Red Green Blue
RGB
R31 140R
R32
120R
R33 120R

3V5_LED2
LED5
Red Green Blue
RGB
R34 140R
R35
120R
R36 120R

3V5_LED3
LED6
Red Green Blue
RGB
R37 140R
R38
120R
R39 120R

RED
GREEN
BLUE

RBG LED power supply

R95 1K
RGB_LED_CURRENT
VMCU
R66 1R
L12 4U7
U17 TPS61260
L VOUT
VIN FB
EN RI
GND
C58 10U
3V5_LED
R40 1M2
C57 10U
GND
R54 2K5
R41 200K
GND GND
RGB_LED_VSENSE
RGB_LED_ENABLE
GND

RGB LED Drivers

3V5_LED
R73 330K
Q5B DMC2400UV
3V5_LED0
Q5A DMC2400UV
GND

3V5_LED
R74 330K
Q6B DMC2400UV
3V5_LED1
Q6A DMC2400UV
GND

3V5_LED
R75 330K
Q7B DMC2400UV
3V5_LED2
Q7A DMC2400UV
GND

3V5_LED
R78 330K
Q10B DMC2400UV
3V5_LED3
Q10A DMC2400UV
GND

LED_COM[3..0]
LED_COM0
LED_COM1
LED_COM2
LED_COM3

R79 100R
Q8A EM6K34
RED
LED_RGB_RED
R82 47K
GND

R80 100R
Q8B EM6K34
GREEN
LED_RGB_GREEN
R83 47K
GND

R81 100R
Q9A EM6K34
BLUE
LED_RGB_BLUE
R84 47K
GND

Q9B EM6K34
GND

Environmental Sensors

Pressure

VDD_ENV_SENSE
VDD_ENV_SENSE
U6
SCK
SDI
SDO
CSB
VDD
VDDIO
GND
GND
BMP280
C19
100N
GND
GND

RH/Temp

U4
SCL
SDA
GND
VDD
DNC
DNC
Si7021
VDD_ENV_SENSE
C16
100N
GND
GND

UV/Ambient Light

VDD_ENV_SENSE
U7
SCL
SDA
DNC
DNC
GND
VDD
Rup
Rup
AD
INT
Si1133
VDD_ENV_SENSE
R61 10K
R64 100K
C18 100N
GND
GND
UV_ALS_INT

VDD_ENV_SENSE
R62 4K7
R63 4K7
ENV_I2C_SCL
ENV_I2C_SDA

Hall-effect Sensor

VDD_HALL
R101 4K7
R102 4K7
U5
SCL
SDA
GND
VDD
VOUT
Si7210
VDD_HALL
HALL_I2C_SCL
HALL_I2C_SDA
GND
C17 100N
GND
R96 100K NM
HALL_OUT1

Air Quality/Gas Sensor

VDD_CCS811
R69 4K7
R70 4K7
R65 10K
U12
SCL
SDA
nRESET
nWAKE
I2C_ADDR
EP
GND
VDD
AUX
PWM
SENSE
nINT
CCS811
VDD_CCS811
VDD_CCS811
VDD_CCS811
C45 100N
GND
CCS811_I2C_SCL
CCS811_I2C_SDA
CCS811_#WAKE
GND
R71 100K
CCS811_INT

6-axis inertial sensor

VDD_IMU
R59 100K
VDD_IMU
R49 100K
U2A
SDA/SDI
SCL/SCLK
nCS
FSYNC
NC
NC
NC
NC
NC
NC
AD0/SDO
INT1
INT2
AUX_DA
AUX_CL
RESV
NC
NC
NC
NC
ICM-20648
IMU_SPI_MOSI
IMU_SPI_SCLK
IMU_SPI_CS
VDD_IMU
IMU_SPI_MISO
IMU_INT
GND
GND

VDD_IMU
C42 100N
C43 10N
U2B
VDD
VDDIO
GND
REGOUT
ICM-20648
C44 100N
GND
GND
GND
GND

Sensor Power Control

VMCU
C81 4U7
GND
U20A
COM1
COM2
COM3
COM4
IN1
IN2
IN3
IN4
NO1
NO2
NO3
NO4
TS3A4751
VDD_CCS811
VDD_HALL
VDD_ENV_SENSE
VDD_IMU
C82 1U
C83 1U
C84 1U
C85 1U
GND
GND
GND
GND
CCS811_ENABLE
HALL_ENABLE
ENV_SENSE_ENABLE
IMU_ENABLE

VMCU
U20B
V+
GND
TS3A4751
C61 10N
GND
GND

<Schematic Path>
SCHEMATIC1

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Schematic Title		
Thunderboard Sense 2		
Page Title		
I2C & SPI Sensors		

Designed: DDB	Approved: JNO	
Size A3	BOM Doc No: <Cage Code>	
Document number **BRD4166A**		Revision A00
Design Created Date: Wednesday, November 30, 2016	Sheet Created Date Wednesday, November 30, 2016	Sheet Modified Date Wednesday, December 07, 2016

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Debug MCU Connections

U9A

3V3_USB

R114 470R
DBG_SWDIO
DBG_SWCLK

R115 470R
DBG_SWO
DBG_RESET
DBG_C2CK
DBG_C2D

R100 10K NM

USB_PGOOD

WAKEUP

DBG_C2D_PS

PUSH_BUTTON0

PUSH_BUTTON1

Pin	Signal
C2	PA0 / EBI_AD09 #0,1,2 / GPIO_EM4WU0 / I2C0_SDA #0 / LEU0_RX #4 / PRS_CH0 #0 / TIM0_CC0 #0,1,4
C1	PA1 / CMU_CLK1 #0 / EBI_AD10 #0,1,2 / I2C0_SCL #0 / PRS_CH1 #0 / TIM0_CC1 #0,1
D2	PA2 / CMU_CLK0 #0 / EBI_AD11 #0,1,2 / ETM_TD0 #3 / TIM0_CC2 #0,1
E3	PA3 / EBI_AD12 #0,1,2 / ETM_TD1 #3 / LES_ALTEX2 / TIM0_CDTI0 #0 / U0_TX #2
E2	PA4 / EBI_AD13 #0,1,2 / ETM_TD2 #3 / LES_ALTEX3 / TIM0_CDTI1 #0 / U0_RX #2
E1	PA5 / EBI_AD14 #0,1,2 / ETM_TD3 #3 / LES_ALTEX4 / LEU1_TX #1 / TIM0_CDTI2 #1
L3	PA6 / EBI_AD15 #0,1,2 / ETM_TCLK #3 / GPIO_EM4WU1 / LEU1_RX #1
M3	PA7 / EBI_CSTFT #0,1,2
N3	PA8 / EBI_DCLK #0,1,2 / TIM2_CC0 #0
M4	PA9 / EBI_DTEN #0,1,2 / TIM2_CC1 #0
N4	PA10 / EBI_VSNC #0,1,2 / TIM2_CC2 #0
N5	PA11 / EBI_HSNC #0,1,2
M5	PA12 / EBI_A00 #0,1,2 / TIM2_CC0 #1
M6	PA13 / EBI_A01 #0,1,2 / TIM2_CC1 #1
B1	PA14 / EBI_A02 #0,1,2 / TIM2_CC2 #1
	PA15 / EBI_AD08 #0,1,2 / TIM3_CC2 #0
F1	PB0 / EBI_A16 #0,1,2 / TIM1_CC0 #2
F2	PB1 / EBI_A17 #0,1,2 / TIM1_CC1 #2
F3	PB2 / EBI_A18 #0,1,2 / TIM1_CC2 #2
G1	PB3 / EBI_A19 #0,1,2 / PCNT1_S0IN #1 / US2_TX #1
H1	PB4 / EBI_A20 #0,1,2 / PCNT1_S1IN #1 / US2_RX #1
H2	PB5 / EBI_A21 #0,1,2 / US2_CLK #1
M1	PB6 / EBI_A22 #0,1,2 / US2_CS #1
N1	PB7 / LFXTAL_P / TIM1_CC0 #3 / US0_TX #4 / US1_CLK #0
L8	PB8 / LFXTAL_N / TIM1_CC1 #3 / US0_RX #4 / US1_CS #0
L9	PB9 / EBI_A03 #0,1,2 / U1_TX #2
N6	PB10 / EBI_A04 #0,1,2 / U1_RX #2
N7	PB11 / DAC0_OUT0/OPAMP_OUT0 / I2C1_SDA #1 / LETIM0_OUT0 #1 / TIM1_CC2 #3
N9	PB12 / DAC0_OUT1/OPAMP_OUT1 / I2C1_SCL #1 / LETIM0_OUT1 #1
N10	PB13 / HFXTAL_P / LEU0_TX #1 / US0_CLK #4,5
D3	PB14 / HFXTAL_N / LEU0_RX #1 / US0_CS #4,5
	PB15 / ETM_TD2 #1

EFM32GG395F1024

R85 2K
DBGMCU_LED

LED7 BLUE

X3 48 MHz

C26 10P   C27 10P

GND

U9C

Pin	Signal
G11	PE0 / EBI_A07 #0,1,2 / I2C1_SDA #2 / PCNT0_S0IN #1 / TIM3_CC0 #1 / U0_TX #1
G12	PE1 / EBI_A08 #0,1,2 / I2C1_SCL #2 / PCNT0_S1IN #1 / TIM3_CC1 #1 / U0_RX #1
H12	PE2 / ACMP0_O #1 / BU_VOUT / EBI_A09 #0 / TIM3_CC2 #1 / U1_TX #3
G13	PE3 / ACMP1_O #1 / BU_STAT / EBI_A10 #0 / U1_RX #3
C11	PE4 / EBI_A11 #0,1,2 / US0_CS #1
D11	PE5 / EBI_A12 #0,1,2 / US0_CLK #1
E11	PE6 / EBI_A13 #0,1,2 / US0_RX #1
F11	PE7 / EBI_A14 #0,1,2 / US0_TX #1
B4	PE8 / EBI_AD00 #0,1,2 / PCNT2_S0IN #1 / PRS_CH3 #1
A4	PE9 / EBI_AD01 #0,1,2 / PCNT2_S1IN #1
C3	PE10 / BOOTLOADER_TX / EBI_AD02 #0,1,2 / TIM1_CC0 #1 / US0_TX #0
B3	PE11 / BOOTLOADER_RX / EBI_AD03 #0,1,2 / LES_ALTEX5 / TIM1_CC1 #1 / US0_RX #0
A3	PE12 / CMU_CLK1 #2 / EBI_AD04 #0,1,2 / LES_CH2 / TIM0_CDTI0 #4 / US1_TX #0 / US0_CLK #0 / US0_RX #3
B2	PE13 / ACMP0_O #0 / EBI_AD05 #0,1,2 / GPIO_EM4WU5 / I2C0_SCL #6 / LES_ALTEX7 / US0_CS #0 / US0_TX #3
A2	PE14 / EBI_AD06 #0,1,2 / LEU0_TX #2 / TIM3_CC2 #0
A1	PE15 / EBI_AD07 #0,1,2 / LEU0_RX #2 / TIM3_CC1 #0

VDD_CCS811
VDD_IMU

DBGMCU_SPI_MOSI   USART0_TX
DBGMCU_SPI_MISO   USART0_RX
DBGMCU_SPI_SCLK   USART0_CLK
DBGMCU_SPI_CS   USART0_CS
DBGMCU_TXD   LEUART0_TX
DBGMCU_RXD   LEUART0_RX

Pin	Signal
C10	PF0 / DBG_SWCLK #0,1,2,3 / I2C0_SDA #5 / LETIM0_OUT0 #2 / LEU0_TX #3 / TIM0_CC0 #5 / US1_CLK #2
B10	PF1 / DBG_SWDIO #0,1,2,3 / GPIO_EM4WU3 / I2C0_SCL #5 / LETIM0_OUT1 #2 / LEU0_RX #3 / TIM0_CC1 #5 / US1_CS #2
A10	PF2 / ACMP1_O #0 / DBG_SWO #0 / EBI_ARDY #0,1,2 / GPIO_EM4WU4 / LEU0_TX #4 / TIM0_CC2 #5
B9	PF3 / EBI_ALE #0 / ETM_TD3 #1 / PRS_CH0 #1 / TIM0_CDTI0 #2,5
A9	PF4 / EBI_WEn #0,2 / PRS_CH1 #1 / TIM0_CDTI1 #2,5
A8	PF5 / EBI_REn #0,2 / PRS_CH2 #1 / TIM0_CDTI2 #2,5 / USB_VBUSEN
B8	PF6 / EBI_BL0 #0,1,2 / TIM0_CC0 #2 / U0_TX #0
A7	PF7 / EBI_BL1 #0,1,2 / TIM0_CC1 #2 / U0_RX #0
C7	PF8 / EBI_WEn #1 / ETM_TCLK #1 / TIM0_CC2 #2
B13	PF9 / EBI_REn #1 / ETM_TD0 #1
A13	PF10 / U1_TX #1 / USB_DM
B11	PF11 / U1_RX #1 / USB_DP
	PF12 / USB_ID

DBGMCU_SWCLK
DBGMCU_SWDIO
DBGMCU_SWO

R7 15R
DBGMCU_USB_DM
DBGMCU_USB_DP
R9 15R

VDD_ENV_SENSE

TP999
Bootloader Halt pin

EFM32GG395F1024

Debug MCU Decoupling

U9D

DBGMCU_RESET   M7 RESETn   DECOUPLE J13

VBUS 3V3_USB
B12 USB_VBUS
A11 USB_VREGI
A12 USB_VREGO   VDD_DREG H11

C28 1U
GND

C30 100N   C31 1U
GND GND

VMCU
L8 CIM03U241

N11 AVDD_0   IOVDD_0 C6
M10 AVDD_1   IOVDD_1 C9
M9   AVDD_2   IOVDD_2 J11
                IOVDD_3 K3
                IOVDD_4 L4
                IOVDD_5 L7
                IOVDD_6

VMCU

C32 100N C33 100N C78 100N C79 100N C36 4U7
GND GND GND GND GND

C37 1U   C38 10N C80 10N
GND GND GND

        VSS C5
        VSS C8
        VSS H3
        VSS J3
        VSS K11
        VSS K12
        VSS L5
        VSS L6

M11 AVSS_0
M8   AVSS_1
N8   AVSS_2

GND

EFM32GG395F1024 GND

U9B   EFM32GG395F1024

DBG_SWO

R116 470R
VCOM_RX   USART1_RX
VCOM_TX   USART12_TX
VCOM_CTS   USART12_RX
VCOM_RTS

R117 470R
I2C0_SDA
I2C0_SCL

BOARD_ID_SDA
BOARD_ID_SCL
BOARD_ID_WP

PTI_DATA
PTI_FRAME

1V8_MIC VMCU

R93 1K
RGB_LED_CURRENT
RGB_LED_VSENSE

DBGMCU_USB_SENSE

DBGMCU_TEST_MODE

Pin	Signal
K1	PC0 / ACMP0_CH0 / DAC0_OUT0ALT/OPAMP_OUT0ALT #0 / EBI_A23 #0,1,2 / I2C0_SDA #4 / LES_CH0 / PCNT0_S0IN #2 / PRS_CH2 #0 / TIM0_CC1 #4 / US0_TX #5 / US1_TX
K2	PC1 / ACMP0_CH1 / DAC0_OUT0ALT/OPAMP_OUT0ALT #1 / EBI_A24 #0,1,2 / I2C0_SCL #4 / LES_CH1 / PCNT0_S1IN #2 / PRS_CH3 #0 / TIM0_CC2 #4 / US0_RX #5 / US1_RX
L1	PC2 / ACMP0_CH2 / DAC0_OUT0ALT/OPAMP_OUT0ALT #2 / EBI_A25 #0,1,2 / LES_CH2 / TIM0_CDTI0 #4 / US2_TX #0
L2	PC3 / ACMP0_CH3 / DAC0_OUT0ALT/OPAMP_OUT0ALT #3 / EBI_NANDREn #0,1,2 / LES_CH3 / TIM0_CDTI1 #4 / US2_RX #0
M2	PC4 / ACMP0_CH4 / DAC0_P0/OPAMP_P0 #2 / EBI_A26 #0,1,2 / I2C1_SDA #0 / LES_CH4 / LETIM0_OUT0 #3 / PCNT1_S0IN #0 / TIM0_CDTI2 #4 / US2_CLK #0
N2	PC5 / ACMP0_CH5 / DAC0_N0/OPAMP_N0 / EBI_NANDWEn #0,1,2 / I2C1_SCL #0 / LES_CH5 / LETIM0_OUT1 #3 / PCNT1_S1IN #0 / US2_CS #0
J12	PC6 / EBI_A05 #0,1,2 / ETM_TCLK #2 / I2C0_SDA #2 / LES_CH6 / LEU1_TX #0
H13	PC7 / ACMP0_CH7 / EBI_A06 #0,1,2 / ETM_TD0 #2 / I2C0_SCL #2 / LES_CH7 / LEU1_RX #0
F12	PC8 / ACMP1_CH0 / EBI_A15 #0,1,2 / LES_CH8 / TIM2_CC0 #2 / US0_CS #2
F13	PC9 / ACMP1_CH1 / EBI_A09 #1,2 / GPIO_EM4WU2 / LES_CH9 / TIM2_CC1 #2 / US0_CLK #2
E12	PC10 / ACMP1_CH2 / EBI_A10 #1,2 / LES_CH10 / TIM2_CC2 #2 / US0_RX #2
E13	PC11 / ACMP1_CH3 / EBI_ALE #1,2 / LES_CH11 / US0_TX #2
D12	PC12 / ACMP1_CH4 / CMU_CLK0 #1 / DAC0_OUT1ALT/OPAMP_OUT1ALT #0 / LES_CH12 / U1_TX #0
D13	PC13 / ACMP1_CH5 / DAC0_OUT1ALT/OPAMP_OUT1ALT #1 / LES_CH13 / PCNT0_S0IN #0 / TIM0_CDTI0 #1,3 / TIM1_CC0 #0 / TIM1_CC2 #4 / U1_RX #0
C12	PC14 / ACMP1_CH6 / DAC0_OUT1ALT/OPAMP_OUT1ALT #2 / LES_CH14 / PCNT0_S1IN #0 / TIM0_CDTI1 #1,3 / TIM1_CC1 #0 / U0_TX #3 / US0_CS #3
C13	PC15 / ACMP1_CH7 / DAC0_OUT1ALT/OPAMP_OUT1ALT #3 / DBG_SWO #1 / LES_CH15 / TIM0_CDTI2 #1,3 / TIM1_CC2 #0 / U0_RX #3 / US0_CLK #3
L10	PD0 / ADC0_CH0 / DAC0_OUT0ALT/OPAMP_OUT0ALT #4 / DAC0_OUT2/OPAMP_OUT2 #1 / PCNT2_S0IN #0 / US1_TX #1
L11	PD1 / ADC0_CH1 / DAC0_OUT0ALT/OPAMP_OUT0ALT #4 / DBG_SWO #2 / PCNT2_S1IN #0 / TIM0_CC0 #3 / US1_RX #1
N12	PD2 / ADC0_CH2 / DBG_SWO #3 / EBI_A27 #0,1,2 / TIM0_CC1 #3 / US1_CLK #1 / USB_DMPU
M12	PD3 / ADC0_CH3 / DAC0_N2/OPAMP_N2 / ETM_TD1 #0,2 / TIM0_CC2 #3 / US1_CS #1
L12	PD4 / ADC0_CH4 / DAC0_P2/OPAMP_P2 / ETM_TD2 #0,2 / LEU0_TX #0
M13	PD5 / ADC0_CH5 / DAC0_OUT2/OPAMP_OUT2 #0 / ETM_TD3 #0,2 / LEU0_RX #0
N13	PD6 / ACMP0_O #2 / ADC0_CH6 / DAC0_P1/OPAMP_P1 / ETM_TD0 #0 / I2C0_SDA #1 / LES_ALTEX0 / LETIM0_OUT0 #0 / PCNT0_S0IN #3 / TIM1_CC0 #4 / US1_RX #4
L13	PD7 / ACMP1_O #2 / ADC0_CH7 / CMU_CLK0 #2 / DAC0_N1/OPAMP_N1 / ETM_TCLK #0 / I2C0_SCL #1 / LES_ALTEX1 / LETIM0_OUT1 #0 / PCNT0_S1IN #3 / TIM1_CC1 #4
K13	PD8 / BU_VIN / CMU_CLK1 #1
A6	PD9 / EBI_CS0 #0,1,2
B6	PD10 / EBI_CS1 #0,1,2
A5	PD11 / EBI_CS2 #0,1,2
B5	PD12 / EBI_CS3 #0,1,2
C4	PD13 / ETM_TD1 #1
J1	PD14 / I2C0_SDA #3
J2	PD15 / I2C0_SCL #3

Debug MCU Connections to Mini Simplicity Header

RP2

DBGMCU_SWDIO   1   8   SI_DBG_SWDIO
DBGMCU_SWCLK   2   7   SI_DBG_SWCLK
DBGMCU_SWO   3   6   SI_DBG_SWO
DBGMCU_RESET   4   5   SI_DBG_RESET

0R NM

R105 0R NM
DBGMCU_TXD   SI_UART_TX
DBGMCU_RXD   SI_UART_RX
R106 0R NM

USB Connector

P3
USB MICRO-B

L7
BLM15AG221SN1D

D1
SP1001-04

D2
SS3P3

VBUS
5V
3V3

GND

DBGMCU_USB_DP
DBGMCU_USB_DM

User can supply 3.6 - 5.5 on "5V" pin instead of using the USB cable

3.3 V Regulator

U10
LP3982ILD-ADJ
IN
OUT1
OUT2
SET
SHDN
FAULT
GND
GND_HEAT
CC

R6 10K
R8 180K
R10 110K
C25 4U7
C22 100N
C23 10U
C24 33N

GND

U23B
n.c. VCC
VEE
NCX2200
3V3
C74 100N
GND

USB Cable Detect

R112 470K
R113 470K
R107 15K
R109 12K
R111 100K
R108 100K

U23A
NCX2200

USB_PGOOD
DBGMCU_USB_SENSE

3V3
GND

Positive threshold: 3.96 V
Negative threshold: 3.47 V

Board power select circuit

3V3
5V

Q1A SiA527DJ
Q1B SiA527DJ

R88 470K
C73 1U
C68 47U

VMCU

P6 DF13C-2P-1.25V
P5 CR2032

GND

Q1 switches from battery power to USB when USB is plugged in.

Additionally, the Mini Simplicity Debug connector can supply power directly to the target voltage domain.

Board ID EEPROM

3V3_USB

R12 4K7
R13 4K7
R20 10K

U13A
24AA024
SDA
SCL
A0
A1
A2
WP

BOARD_ID_SDA
BOARD_ID_SCL
BOARD_ID_WP

GND

U13B
24AA024
VCC
VSS
C48 100N
3V3_USB
GND

SPI Flash

U11A
MX25R8035F
SI / SIO0
SCLK
CS#
WP# / SIO2
RESET# / SIO3
SO / SIO1

DBGMCU_SPI_MOSI
DBGMCU_SPI_SCLK
DBGMCU_SPI_CS
DBGMCU_SPI_MISO

R94 330K

3V3_USB

U11B
MX25R8035F
VCC
GND
C41 100N
3V3_USB
GND

Note: The SPI flash is only available to the debug mcu when the USB cable is plugged in!

Test Points

TPJ1 DBGMCU_SWDIO
TPJ2 DBGMCU_SWCLK
TPJ3 DBGMCU_SWO
TPJ4
TPJ17 DBGMCU_RESET
TPJ5 DBGMCU_TXD
TPJ6 DBGMCU_RXD
TPJ7
TPJ8
TPJ11 DBGMCU_TEST_MODE
TPJ9
TPJ10 VBUS
TPJ12
TPJ13 GND
TPJ14 BOARD_ID_SCL
TPJ15 BOARD_ID_SDA
TPJ16 BOARD_ID_WP
TPJ18 DBGMCU_USB_DP
TPJ19 DBGMCU_USB_DM
TPJ20