Smart LiB Gauge Automatic Support Tool

ON Semiconductor®

STR-SMARTLIBGAUGE-GEVK

Comment Legend

Description
Description of circuit that is intended to be evaluated with this PCB.

Optional
Circuits that customer could optionally implement yet do not affect PCB purpose.

Not Required
Circuits that support the Strata ecosystem that customer would not implement.

ON Semiconductor		
Title Smart LiB Gauge Automatic Support Tool	Orderable Part Number STR-SMARTLIBGAUGE-GEVK	
Variant Name Core Design	Document Number ONSEC-20-021	Rev REV0
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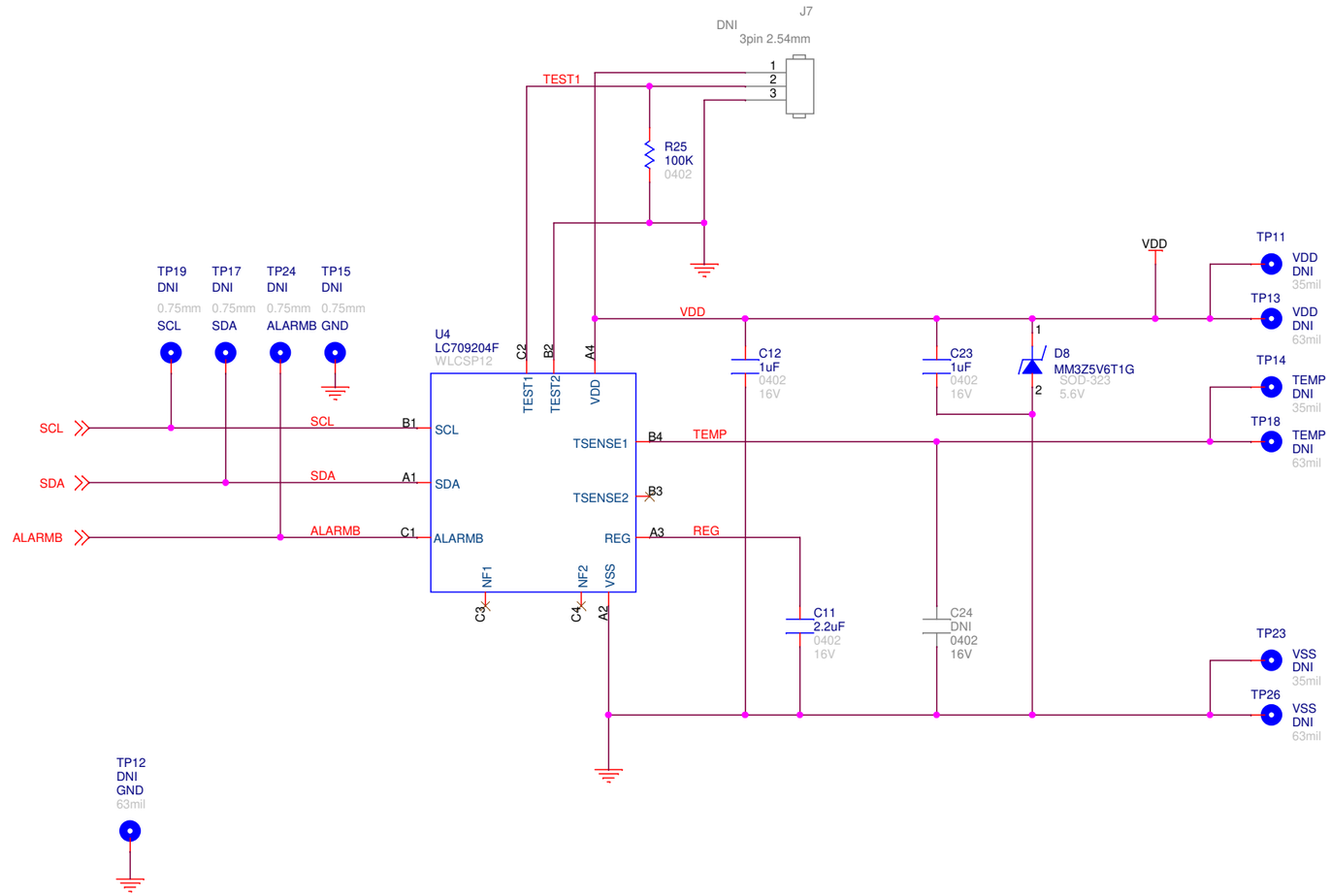
LC709204F



Description

Optional

Not Required

ON Semiconductor		
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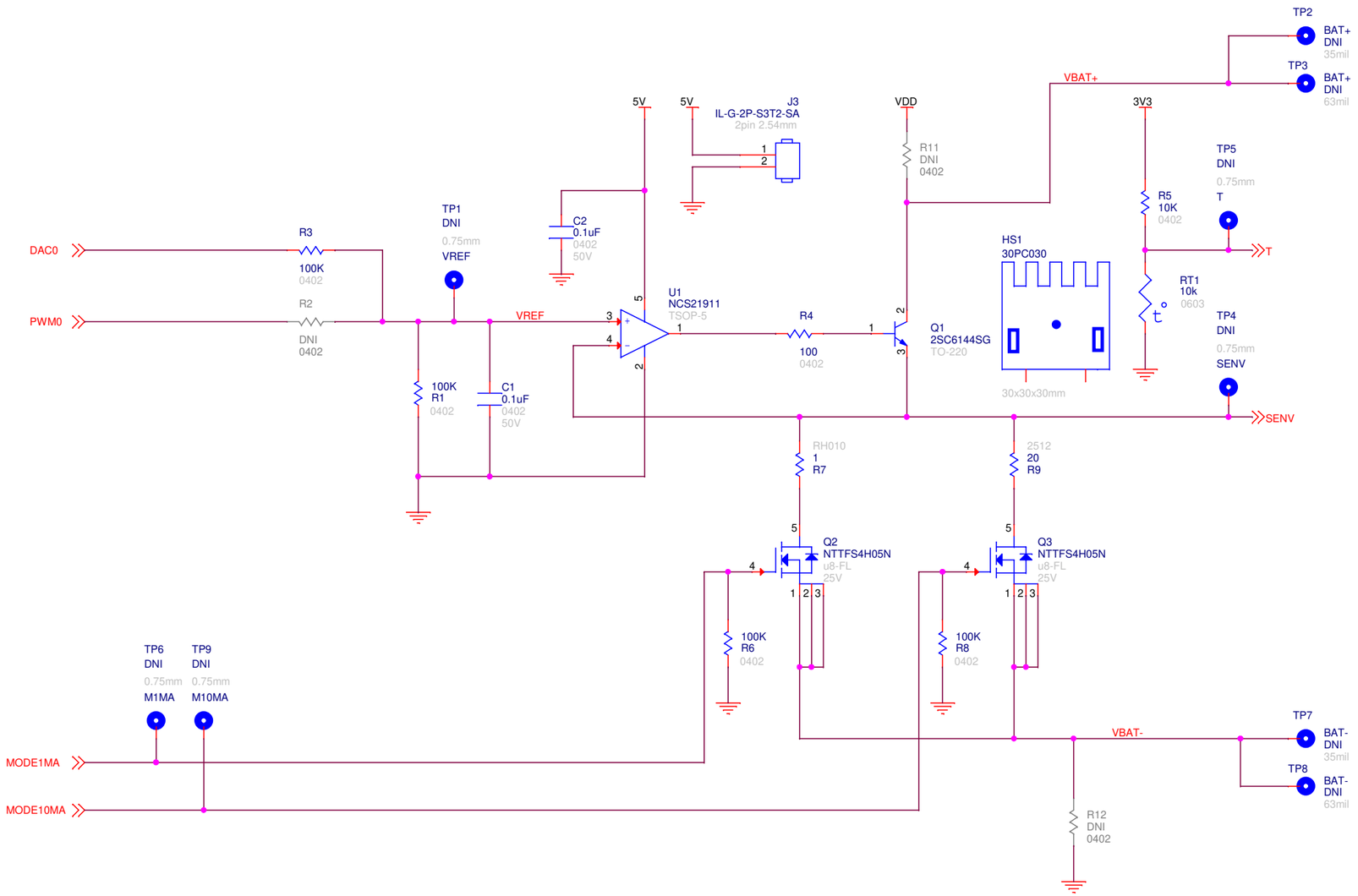
Electrical Load Circuit



Description

Optional

Not Required

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Title Electrical Load Circuit	Orderable Part Number STR-SMARTLIBGAUGE-GEVK	
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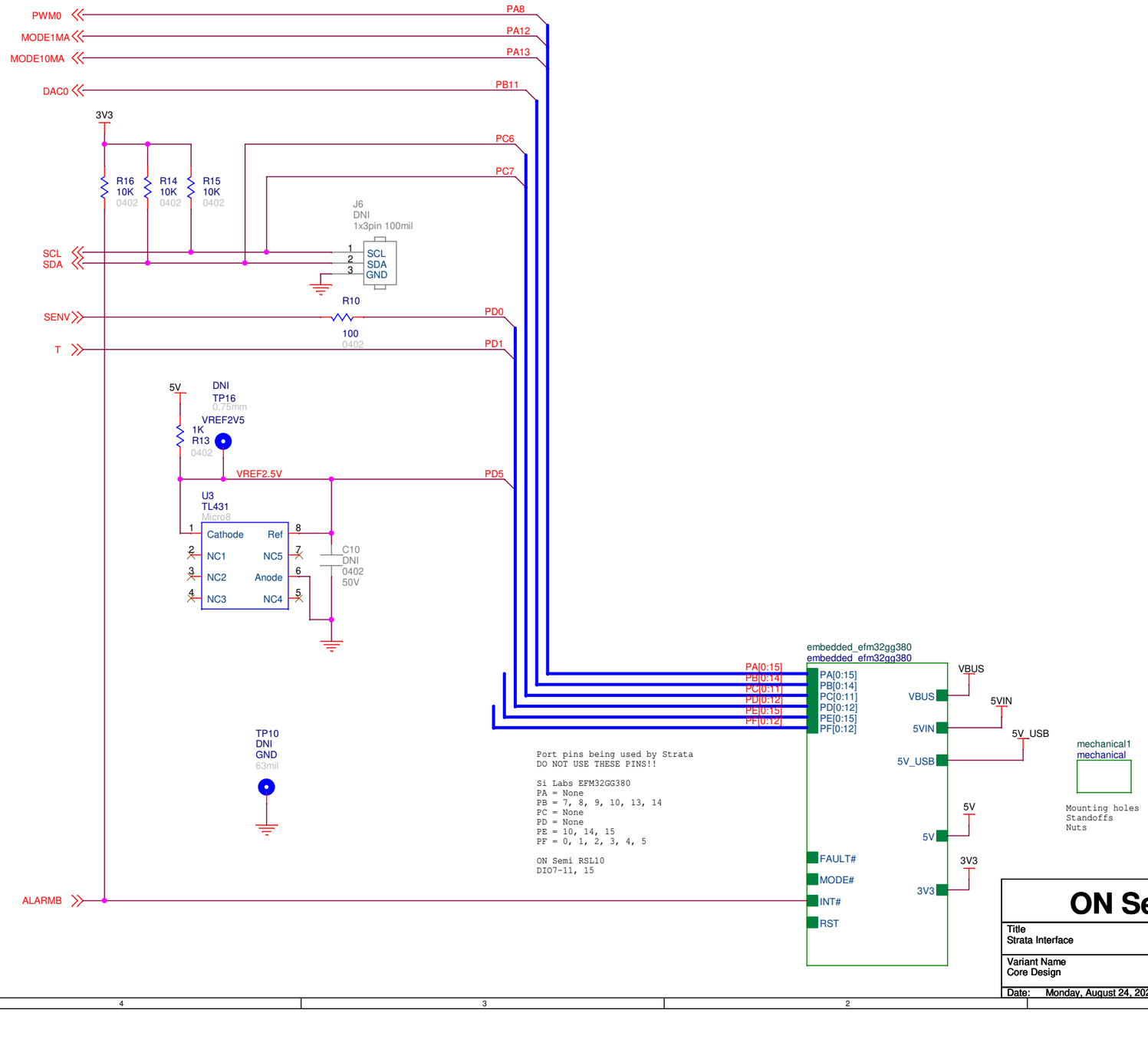
Embedded Interface



ON Semiconductor	
Title Strata Interface	Orderable Part Number STR-SMARTLIBGAUGE-GEVK
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Embedded

U2
EFM32GG380F1024
QFP100 14x14

PA[0:15]
PA0 1
PA1 2
PA2 3
PA3 4
PA4 5
PA5 6
PA6 7
PA7 26
PA8 27
PA9 28
PA10 29
PA11 30
PA12 33
PA13 34
PA14 35
PA15 100

PA0 * EBI_AD09 #0/1/2 * TIM0_CC0 #0/1/4 * I2C0_SDA #0 * LEU0_RX #4 * PRS_CH0 #0 * GPIO_EM4WU0
PA1 * EBI_AD10 #0/1/2 * TIM0_CC1 #0/1 * I2C0_SCL #0 * CMU_CLK1 #0 * PRS_CH1 #0
PA2 * EBI_AD11 #0/1/2 * TIM0_CC2 #0/1 * CMU_CLK0 #0 * ETM_TDO #3
PA3 * EBI_AD12 #0/1/2 * TIM0_CDTI0 #0 * U0_TX #2 * LES_ALTEX2 #0 * ETM_TD1 #3
PA4 * EBI_AD13 #0/1/2 * TIM0_CDTI1 #0 * U0_RX #2 * LES_ALTEX3 #0 * ETM_TD2 #3
PA5 * EBI_AD14 #0/1/2 * TIM0_CDTI2 #0 * LEU1_TX #1 * LES_ALTEX4 #0 * ETM_TD3 #3
PA6 * EBI_AD15 #0/1/2 * LEU1_RX #1 * ETM_TCLK #3 * GPIO_EM4WU1
PA7 * EBI_CSTFT #0/1/2
PA8 * EBI_DCLK #0/1/2 * TIM2_CC0 #0
PA9 * EBI_DTEN #0/1/2 * TIM2_CC1 #0
PA10 * EBI_VSNC #0/1/2 * TIM2_CC2 #0
PA11 * EBI_HSNC #0/1/2
PA12 * EBI_A00 #0/1/2 * TIM2_CC0 #1
PA13 * EBI_A01 #0/1/2 * TIM2_CC1 #1
PA14 * EBI_A02 #0/1/2 * TIM2_CC2 #1
PA15 * EBI_AD08 #0/1/2 * TIM3_CC2 #0

PB[0:14]
PB0 9
PB1 10
PB2 11
PB3 12
PB4 13
PB5 14
PB6 15
LFXTAL_P 24
LFXTAL_N 25
MCU_U1_TX 37
MCU_U1_RX 38
PB11 39
PB12 40
HFXTAL_P 42
HFXTAL_N 43

PB0 * EBI_A16 #0/1/2 * TIM1_CC0 #2
PB1 * EBI_A17 #0/1/2 * TIM1_CC1 #2
PB2 * EBI_A18 #0/1/2 * TIM1_CC2 #2
PB3 * EBI_A19 #0/1/2 * PCNT1_S0IN #1 * US2_TX #1
PB4 * EBI_A20 #0/1/2 * PCNT1_S1IN #1 * US2_RX #1
PB5 * EBI_A21 #0/1/2 * US2_CLK #1
PB6 * EBI_A22 #0/1/2 * US2_CS #1
PB7 * LFXTAL_P * TIM1_CC0 #3 * US0_TX #4 * US1_CLK #0
PB8 * LFXTAL_N * TIM1_CC1 #3 * US0_RX #4 * US1_CS #0
PB9 * EBI_A03 #0/1/2 * U1_TX #2
PB10 * EBI_A04 #0/1/2 * U1_RX #2
PB11 * DAC0_OUT0 * OPAMP_OUT0 * LETIM0_OUT0 #1 * TIM1_CC2 # * I2C1_SDA #1
PB12 * DAC0_OUT1 * OPAMP_OUT1 * LETIM0_OUT1 #1 * I2C1_SCL #1
PB13 * HFXTAL_P * US0_CLK #4/5 * LEU0_TX #1
PB14 * HFXTAL_N * US0_CS #4/5 * LEU0_RX #1

PC[0:11]
PC0 18
PC1 19
PC2 20
PC3 21
PC4 22
PC5 23
PC6 55
PC7 56
PC8 68
PC9 69
PC10 70
PC11 71

PC0 * ACMP0_CH0 * DAC0_OUT0ALT #0 * OPAMP_OUT0ALT * EBI_A23 #0/1/2 * TIM0_CC1 #4 * PCNT0_S0IN #2 * US0_TX #5 * US1_TX #0 * I2C0_SDA #4 * LES_CH0 #0 * PRS_CH2 #0
PC1 * ACMP0_CH1 * DAC0_OUT0ALT #1 * OPAMP_OUT0ALT * EBI_A24 #0/1/2 * TIM0_CC2 #4 * PCNT0_S1IN #2 * US0_RX #5 * US1_RX #0 * I2C0_SCL #4 * LES_CH1 #0 * PRS_CH3 #0
PC2 * ACMP0_CH2 * DAC0_OUT0ALT #2 * OPAMP_OUT0ALT * EBI_A25 #0/1/2 * TIM0_CDTI0 #4 * US2_TX #0 * LES_CH2 #0
PC3 * ACMP0_CH3 * DAC0_OUT0ALT #3 * OPAMP_OUT0ALT * EBI_NANDREn #0/1/2 * TIM0_CDTI1 #4 * US2_RX #0 * LES_CH3 #0
PC4 * ACMP0_CH4 * OPAMP_P0 * EBI_A26 #0/1/2 * TIM0_CDTI2 #4 * LETIM0_OUT0 #3 * PCNT1_S0IN #0 * US2_CLK #0 * I2C1_SDA #0 * LES_CH4 #0
PC5 * ACMP0_CH5 * OPAMP_N0 * EBI_NANDWEn #0/1/2 * LETIM0_OUT1 #3 * PCNT1_S1IN #0 * US2_CS #0 * I2C1_SCL #0 * LES_CH5 #0
PC6 * ACMP0_CH6 * EBI_A05 #0/1/2 * I2C0_SDA #2 * LEU1_TX #0 * LES_CH6 #0 * ETM_TCLK #2
PC7 * ACMP0_CH7 * EBI_A06 #0/1/2 * I2C0_SCL #2 * LEU1_RX #0 * LES_CH7 #0 * ETM_TDO #2
PC8 * ACMP1_CH0 * EBI_A15 #0/1/2 * TIM2_CC0 #2 * US0_CS #2 * LES_CH8 #0
PC9 * ACMP1_CH1 * EBI_A09 #1/2 * TIM2_CC1 #2 * US0_CLK #2 * LES_CH9 #0 * GPIO_EM4WU2
PC10 * ACMP1_CH2 * EBI_A10 #1/2 * TIM2_CC2 #2 * US0_RX #2 * LES_CH10 #0
PC11 * ACMP1_CH3 * EBI_ALE #1/2 * US0_TX #2 * LES_CH11 #0

PD[0:12]
PD0 46
PD1 47
PD2 48
PD3 49
PD4 50
PD5 51
PD6 52
PD7 53
PD8 54
PD9 88
PD10 89
PD11 90
PD12 91

PD0 * ADC0_CH0 * DAC0_OUT0ALT #4 * OPAMP_OUT0ALT * OPAMP_OUT2 #1 * PCNT2_S0IN #0 * US1_TX #1
PD1 * ADC0_CH1 * DAC0_OUT1ALT #4 * OPAMP_OUT1ALT * TIM0_CC0 #3 * PCNT2_S1IN #0 * US1_RX #1 * DBG_SWO #2
PD2 * ADC0_CH2 * EBI_A27 #0/1/2 * TIM0_CC1 #3 * USB_DMPU #0 * US1_CLK #1 * DBG_SWO #3
PD3 * ADC0_CH3 * OPAMP_N2 * TIM0_CC2 #3 * US1_CS #1 * ETM_TD1 #0/2
PD4 * ADC0_CH4 * OPAMP_P2 * LEU0_TX #0 * ETM_TD2 #0/2
PD5 * ADC0_CH5 * OPAMP_OUT2 #0 * LEU0_RX #0 * ETM_TD3 #0/2
PD6 * ADC0_CH6 * OPAMP_P1 * LETIM0_OUT0 #0 * TIM1_CC0 #4 * PCNT0_S0IN #3 * US1_RX #2 * I2C0_SDA #1 * LES_ALTEX0 #0 * ACMP0_O #2 * ETM_TD0 #0
PD7 * ADC0_CH7 * OPAMP_N1 * LETIM0_OUT1 #0 * TIM1_CC1 #4 * PCNT0_S1IN #3 * US1_TX #2 * I2C0_SCL #1 * CMU_CLK0 #2 * LES_ALTEX1 #0 * ACMP1_O #2 * ETM_TCLK #0
PD8 * BU_VIN * CMU_CLK1 #1
PD9 * EBI_CS0 #0/1/2
PD10 * EBI_CS1 #0/1/2
PD11 * EBI_CS2 #0/1/2
PD12 * EBI_CS3 #0/1/2

PE[0:15]
PE0 60
PE1 61
PE2 62
PE3 63
PE4 64
PE5 65
PE6 66
PE7 67
PE8 92
PE9 93
INT# INT# 94
PE11 95
PE12 96
PE13 97
FAULT# FAULT# 98
MODE# MODE# 99

PE0 * EBI_A07 #0/1/2 * TIM3_CC0 #1 * PCNT0_S0IN #1 * U0_TX #1 * I2C1_SDA #2
PE1 * EBI_A08 #0/1/2 * TIM3_CC1 #1 * U0_RX #1 * PCNT0_S1IN #1 * I2C1_SCL #2
PE2 * BU_VOUT * EBI_A09 #0 * TIM3_CC2 #1 * U1_TX #3 * ACMP0_O #1
PE3 * BU_STAT * EBI_A10 #0 * U1_RX #3 * ACMP1_O #1
PE4 * EBI_A11 #0/1/2 * US0_CS #1
PE5 * EBI_A12 #0/1/2 * US0_CLK #1
PE6 * EBI_A13 #0/1/2 * US0_RX #1
PE7 * EBI_A14 #0/1/2 * US0_TX #1
PE8 * EBI_AD00 #0/1/2 * PCNT2_S0IN #1 * PRS_CH3 #1
PE9 * EBI_AD01 #0/1/2 * PCNT2_S1IN #1
PE10 * EBI_AD02 #0/1/2 * TIM1_CC0 #1 * US0_TX #0 * BOOT_TX
PE11 * EBI_AD03 #0/1/2 * TIM1_CC1 #1 * US0_RX #0 * LES_ALTEX5 #0 * BOOT_RX
PE12 * EBI_AD04 #0/1/2 * TIM1_CC2 #1 * US0_RX #3 * US0_CLK #0 * I2C0_SDA #6 * CMU_CLK1 #2 * LES_ALTEX6 #0
PE13 * EBI_AD05 #0/1/2 * US0_TX #3 * US0_CS #0 * I2C0_SCL #6 * LES_ALTEX7 #0 * ACMP0_O #0 * GPIO_EM4WU5
PE14 * EBI_AD06 #0/1/2 * TIM3_CC0 #0 * LEU0_TX #2
PE15 * EBI_AD07 #0/1/2 * TIM3_CC1 #0 * LEU0_RX #2

PF[0:12]
DBG_SWCLK 76
DBG_SWDIO 77
DBG_SWO 78
LINK 81
PF6 84
PF7 85
PF8 86
PF9 87
PF10 74
PF11 75
PF12 80

PF0 * TIM0_CC0 #5 * LETIM0_OUT0 #2 * US1_CLK #2 * I2C0_SDA #5 * LEU0_TX #3 * DBG_SWCLK #0/1/2/3
PF1 * TIM0_CC1 #5 * LETIM0_OUT1 #2 * US1_CS #2 * I2C0_SCL #5 * LEU0_RX #3 * DBG_SWDIO #0/1/2/3 * GPIO_EM4WU3
PF2 * EBI_ARDY #0/1/2 * TIM0_CC2 #5 * LEU0_TX #4 * ACMP1_O #0 * DBG_SWO #0 * GPIO_EM4WU4
PF5 * EBI_REn #0/2 * TIM0_CDTI2 #2/5 * USB_VBUSEN #0 * PRS_CH2 #1
PF6 * EBI_BL0 #0/1/2 * TIM0_CC0 #2 * U0_TX #0
PF7 * EBI_BL1 #0/1/2 * TIM0_CC1 #2 * U0_RX #0
PF8 * EBI_WEn #1 * TIM0_CC2 #2 * ETM_TCLK #1
PF9 * EBI_REn #1 * ETM_TD0 #1
PF10 * U1_TX #1 * USB_DM
PF11 * U1_RX #1 * USB_DP
PF12 * USB_ID

RESETn 36
USB_VBUS 79
USB_VREGI 72
USB_VREGO 73
AVDD_0 45
AVDD_1 41
VDD_DREG 57
IOVDD_0 8
IOVDD_1 17
IOVDD_2 31
IOVDD_3 44
IOVDD_5 82
DECOUPLE 59
GND0 16
GND1 32
GND2 58
GND3 83

RST_MCU#
C22 0.1uF 0402 50V
3V3
C15 4.7uF 0402 6.3V
C13 4.7uF 0402 6.3V
C3 4.7uF 0402 6.3V
C6 4.7uF 0402 6.3V
C14 1uF 0402 16V

MCU debug and programming header
J4 FTSH-105-01-F-DV-K 2x5pin 50mil Cortex Debug
DBG_SWDIO
DBG_SWCLK
DBG_SWO

5V
50mA max in switch
SW1 434153017835 MOM1 SMD
TP32 DNI RST 1mm Circle
RST
3V3_FT
R22 100 0402
RST_FT#
~10ms switch debounce
R26 2.32K 0402
Q4 2N7002W SOT-323 60V
R24 100 0603
R27 100 0402
RST_MCU#
Q6 2N7002W SOT-323 60V
C20 10uF 0603 25V
Master reset, use RST (active high) with FET/pull up for all other circuits that should be reset with MCU and FT

5V_USB
VBUS
FB1 220@100M 0805
Route USB_DX 45 ohm single ended
J5 65100516121 Mini USB1/2 B
Optionally short 5VIN and 5V_USB when no external supplies are being used, only 5V_USB
USB_DM
USB_DP
5VIN
JP1 DNI 0402
D7 ESD7L SOT-723 5.5V
C19 1uF 0402 16V
Maximum 10uF on VBUS
D5 NSR20F20NX DSN2 0603 20V
D6 NSR20F20NX DSN2 0603 20V

5V
U5 NCP705 <Voltage> WDFN6
IN OUT NC ADJ/NC EN GND EPAD
C18 1uF 0402 16V
R21 10K 0402
C8 4.7uF 0402 6.3V
MCU power domain only!! Connect only MCU and devices/signals that need to communicate to MCU on 3.3V!

3V3
R23 10K 0402
MODE#
Detects VBUS disconnect to disable serial communication
Q5 2N7002W SOT-323 60V
TP28 DNI TX 1mm Circle
TP21 DNI RX 1mm Circle
FT230X is powered down during loss of VBUS
3V3_FT
5V_USB
U6 FT230X QFN16 4x4
3V3OUT VCCIO VCC
USBDm USBDp
TXD RXD RTS CTS
RESET
CBUS0 CBUS1 CBUS2 CBUS3
GND1 GND2 EPAD
MCU_U1_RX
MCU_U1_TX
RTS
CTS
RST_FT#
C16 4.7uF 0402 6.3V
C17 0.1uF 0402 50V
C21 1uF 0402 16V
R17 5.11K 0402
R18 8.87K 0402
R19 9.76K 0402
R20 665 0402
D1 RX 150060RS75000 0603
D2 TX 150060GS75000 0603
D3 5V 150060BS75000 0603
D4 LINK 150060YS75000 0603
LINK

Y1 32.768 kHz 2 pin w/ shell
LFXTAL_P LFXTAL_N
C4 12pF 0402 50V
C5 12pF 0402 50V
Y2 48MHz 5x3.2mm
HFXTAL_P HFXTAL_N
C7 7.5pF 0402 50V
C9 7.5pF 0402 50V

TP29 DNI 0.75mm 5V
TP20 DNI 0.75mm 3V3
TP31 DNI 0.75mm 5V_USB
TP27 DNI 0.75mm 5VIN
TP22 DNI 0.75mm 3V3_FT
TP25 DNI 1mm Circle RTS
TP30 DNI 1mm Circle CTS

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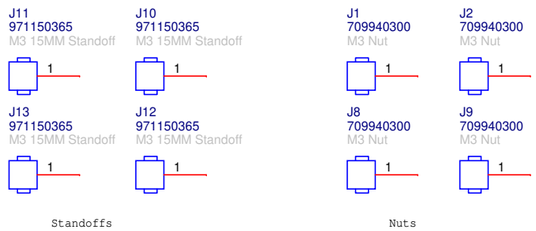
Mounting Holes, Standoffs, and Nuts



ON Semiconductor		
Title Mechanical	Orderable Part Number STR-SMARTLIBGAUGE-GEVK	
Variant Name Core Design	Document Number ONSEC-20-021	Rev REV0
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