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Revisions

Rev	Description	Date	Approved
	Initial draft	May 15th, 2020	Lucie Hernandez
X1	A055, PPL Released	May 18th, 2020	Lucie Hernandez
	A070 Released	May 29th, 2020	Lucie Hernandez
X2	R157 & D20 Added J26 Net names swapped and Default jumpers added J15 Default jumper changed from 1-2 to 2-3 SW4 & SW5 Mfg. part numbers changed. J28 All shorted.	Jun 10th, 2020	Lucie Hernandez
X3	FS0b_MCU signal to FRDM K25Z J1-10 pin (instead of J2-1).	Jun 15th, 2020	Lucie Hernandez
A	A085 (Final SCH, BOM) Prototype Release	July 16th, 2020	Lucie Hernandez
AX1	-R32 changed from 5.1K to 10K -R40 changed from 5.1K to 10K -R36 changed from 1.1K to 0 Ohm -10nF(C66) Added between BAT_SW and GND -10nF(C67) Added between Q7-2 and VSUP -2K(R158) Added between Q7-2 and GND	July 27th, 2020	Lucie Hernandez
B	- In Page3 VSUP net position changed. And Near Q1 Two more nets added before Q1 is VPI net name and after Q1 is VPRE_IN net name's updated. - J29 Removed from the design. - TP7, TP9 & TP11 Test points removed from the design - R2 & R3 Resistor value changed from 6.57k to 6.65k - J28 Jumper removed from the design A085 (Final SCH, BOM) Prototype Release	Sep 10th, 2020	Lucie Hernandez
BX1	As per shared file, Design updated	Jan 5th, 2021	Lucie Hernandez
C	A085 (Final SCH, BOM) Release	Jan 19th, 2021	Lucie Hernandez
D	LBO1 Changed from180-79539 to 180-79136 A085 (Final SCH, BOM) Release	Feb 23rd, 2021	Lucie Hernandez

KITFS86TRKFRDMEM
Truck Soldered Board

Analog Sensor Product Group
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Austin, TX 78735-8598

ICAP Classification: CP: IUO: X PUBL

Designer: Lucie Hernandez	Drawing Title: KITFS86TRKFRDMEM	
Drawn by: Ramakrishna	Page Title: TITLE, TOC & REV	
Approved: Didier Pagnoux	Size C / Document Number SCH-47408 PDF: SPF-47408	Rev D
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Board Configuration

This board is meant to be fully configurable. However, we propose bellow a configuration exemple :

REG	Switching frequency	Output voltage	Max output current	Input	Monitoring
Vpre	455 kHz	4.1V	10A	Vsup	VMON8_RES
Buck	2.22 MHz	3.3V	2.5A	Vpre	VMON7_RES
Boost	2.22 MHz	6V	1A	Vpre	VMON9_RES
LDO1	-	3.3V	400mA	Vpre	VMON5_RES
LDO2	-	5V	400mA	Vboost	VMON6_RES

Vpre & Pi Filter Coil Selection :

For Vpre 15 Amps :
- PiFilter : SPM7054VT-1R0M-D Isat 19.3A / Itemp@40°C 14.9A (7.5 x 7mm)
- Vpre 455kHz : SPM12565VT-4R7M-D Isat 22.2 / Itemp@40°C 14A (13 x 12.5mm) / DCR 7.1 mOhm

Alternate Parts for Vpre 10 Amps :
- PiFilter : SPM6545VT-1R0M-D Isat 17.9A / Itemp@40°C 13.3A (7 x 6.5mm)
- Vpre 455kHz : SPM10065VT-4R7M-D Isat 19.3A / Itemp 11.7A (10 x 10.5mm) / DCR 9.2 mOhm

Alternate Parts for Vpre 6 Amps :
- PiFilter : SPM6545VT-1R0M-D Isat 17.9A / Itemp@40°C 13.3A (7 x 6.5mm)
- Vpre 455kHz : SPM7054VT-4R7M-D Isat 11.2A / Itemp 7.8A (7.5 x 7mm) / DCR 16.6 mOhm

Alternative parts for 2.22MHz (fit with 455KHz inductors footprint for evaluation purpose) :
- Vpre 2.22MHz : SPM10040T-2R2M-HZ Isat 13A / Itemp@40°C 16.7A (10.7 x 10mm) / DCR 6.8 mOhm
- Vpre 2.22MHz : SPM7054VT-2R2M-D Isat 14.1A / Itemp 12A (7.5 x 7mm) / DCR 7.4 mOhm

Alternate Parts for Vpre 10 Amps :
- Vpre 455KHz : XAL1010-682 Isat 21.8A / Itemp 14A (10x11.3mm)
- Vpre 2.22MHz : XAL6030-182ME Isat 18.2A / Itemp@20C 10A

For Vpre 6 Amps :
- Vpre : XAL6060-682ME

Vpre MOS Optimization :

Vpre 455kHz :

For Vpre 15 A (40V max):
- HS : BUK9M9R5-40H
- LS : BUK9M3R3-40H

For Vpre 10 Amps (60V max):
- HS : BUK9M42-60E
- LS : BUK9M12-60E

Vpre 2.22MHz :

For Vpre 6A and 40V max:
- HS : BUK9M20-40H
- LS : BUK9M20-40H

Table 1.
Jumper Settings

REF DES	*JUMPER*	*PAGE NAME*
J11,J8,J9,J7	DEFAULT(1-2)	03-FS86TRK
J32,J15	DEFAULT(2-3)	03-FS86TRK
J13	DEFAULT(7-8)	03-FS86TRK
J4	DEFAULT(OPEN)	03-FS86TRK
J31,J12,J3	OPEN	03-FS86TRK
J26	DEFAULT(1-2) (3-4) (5-6) (7-8)	04-VMON, DEBUG
J19,J20,J18,J17,J27	DEFAULT(1-2)	04-VMON, DEBUG
J24	DEFAULT(2-3)	04-VMON, DEBUG
J25	OPEN	04-VMON, DEBUG

Table 2.
DNP Components

REF DES	*ASSY_OPT*	*PAGE NAME*
R159,C68,R11,CPRE2,CSUP5,R6, C18,C17,C4,R7,CSUP6,D3,D21, R2,C69,C19,CPI3,CPRE3,R42, C20,R13	DNP	03-FS86TRK
R151,R149	DNP	04-VMON, DEBUG
C70	DNP	05-FRDM MCU

Table 3.
SWITCH DEFAULT Settings

REF DES	*SWITCH*	*PAGE NAME*
SW2	DEFAULT(OPEN)	03-FS86TRK
SW3	OFF	03-FS86TRK
SW1	ON	03-FS86TRK
SW5,SW4	DEFAULT ALL ON	03-FS86TRK

Table 4.
Solder Jumper Setting

REF DES	*SHORT*	*PAGE NAME*
SJ2	OPEN	03-FS86TRK
SJ3,SJ4,SJ6,SJ1,SJ5	SHORT	03-FS86TRK

ICAP Classification: CP: IUO: PUBI:
Drawing Title: KITFS86TRKFRDMEM
Page Title: NOTES
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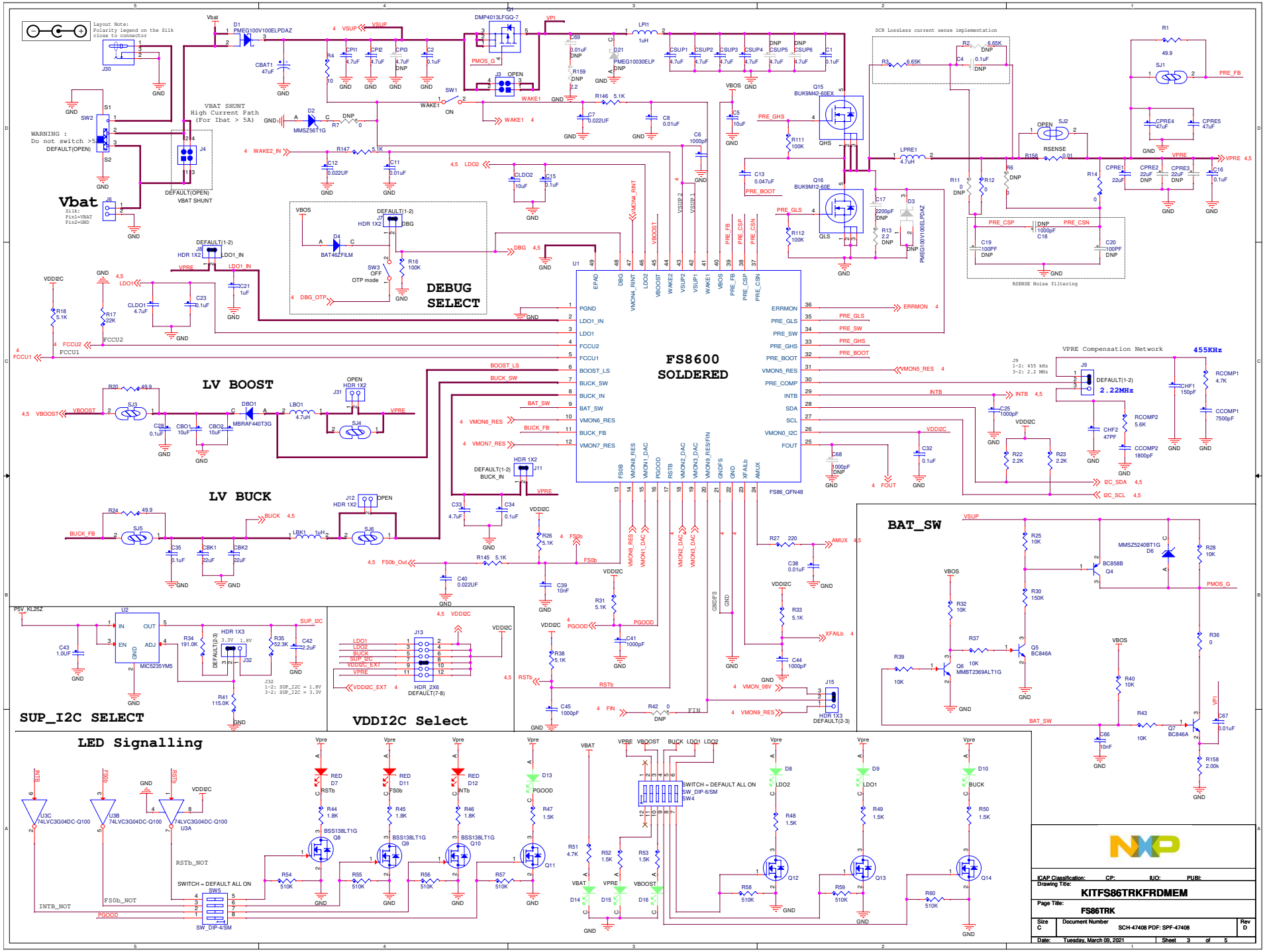
Vbat
DEBUG SELECT
FS8600 SOLDERED
LV BOOST
LV BUCK
BAT_SW
SUP_I2C SELECT
VDDI2C Select
LED Signalling
VPRE Compensation Network
455KHz
2.22MHz
DCR LossLess current sense implementation
RSENSE Noise filtering
VBAT SHUNT
High Current Path
(For Ibat > 5A)
WARNING :
Do not switch >5
DEFAULT(OPEN)
FS86_QFN48
KITFS86TRKFRDMEM
FS86TRK
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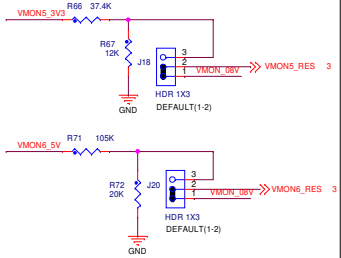
Fixed Voltage Monitoring

VMONs Fixed Resistor Bridges

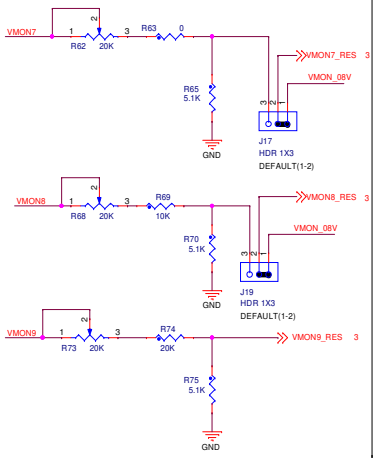
Monitoring		
	VMON_3V3	VMON_5V
Voltage	3.3V	5V
RH	37.4K	105K
RL	12K	20K



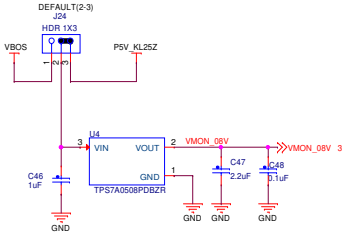
Flexible Voltage Monitoring

VMONs Flexible Resistor Bridges

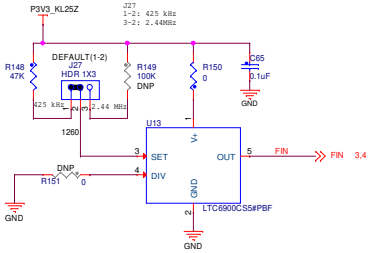
Monitoring			
	VMON7	VMON8	VMON9
Voltage	0.8V -> 3.9V	2.4V -> 5.5V	3.9V -> 7V
RH	POT 20K	10K + POT 20K	20K + POT 20K
RL	5.1K	5.1K	5.1K



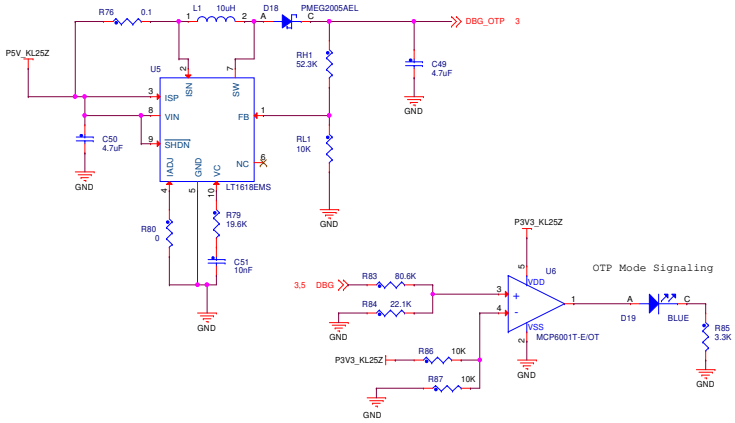
VMON_08V



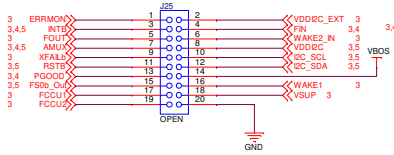
IC External clock generation



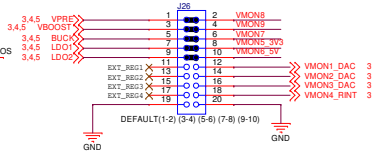
OTP Mode entry (Using USB 5V Power Supply)



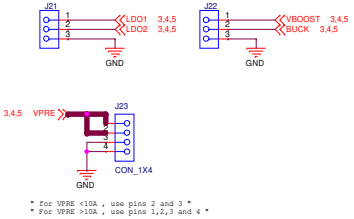
FS8600 Signals



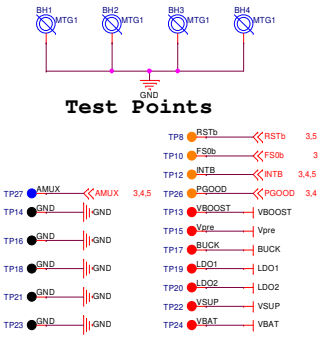
FS8600 Monitored Signals



POWER



Test Points



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Drawing Title: **KITFS86TRKFRDMEM**

Page Title: **VMON, DEBUG**

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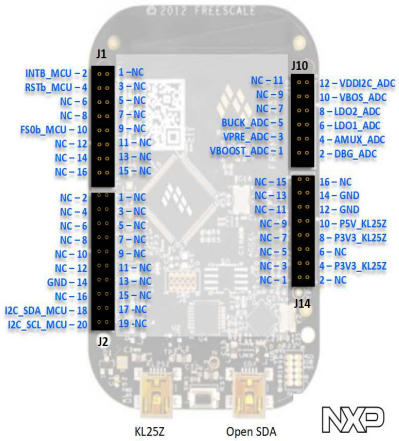
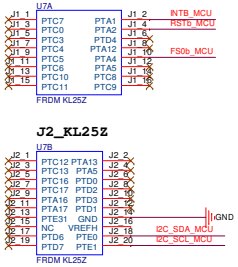
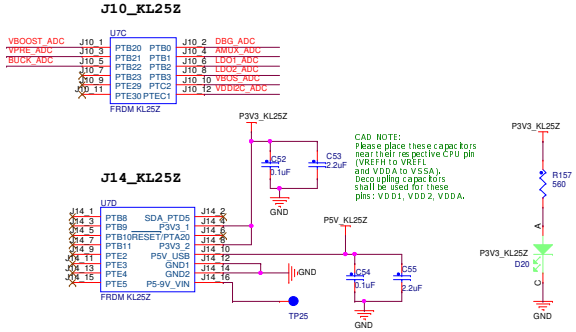
FRDM KL25Z – pinout

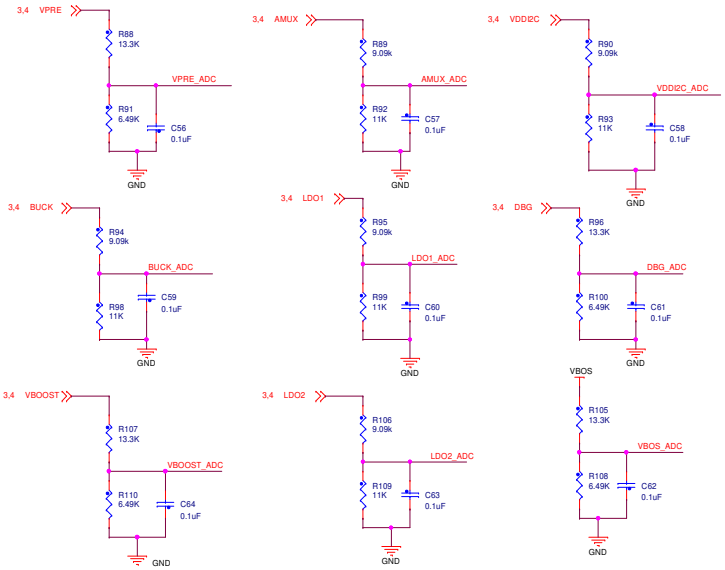






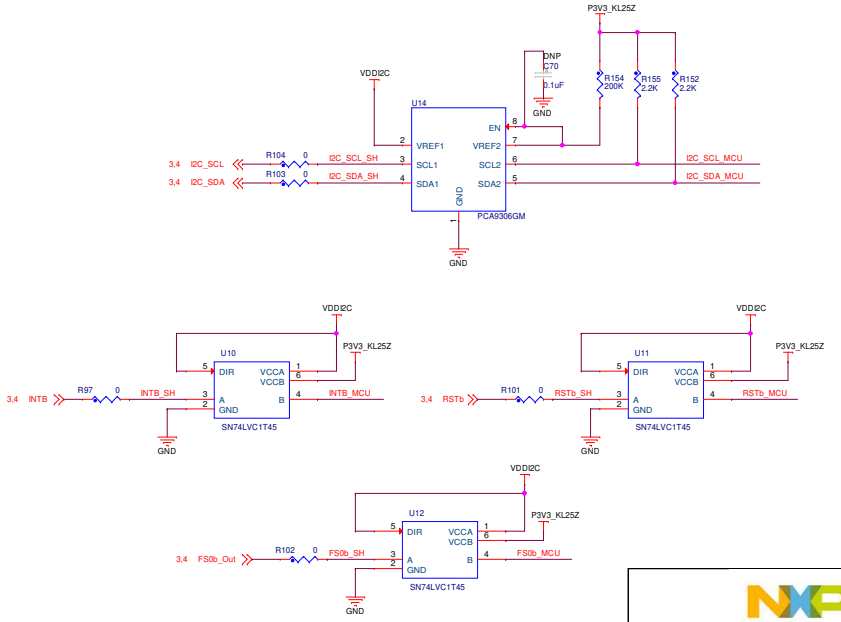
KL25Z Decoupling Caps

Analog Inputs



Level Shifter (1.65V / 5.5V)

Fail Safe Outputs / I2C



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