

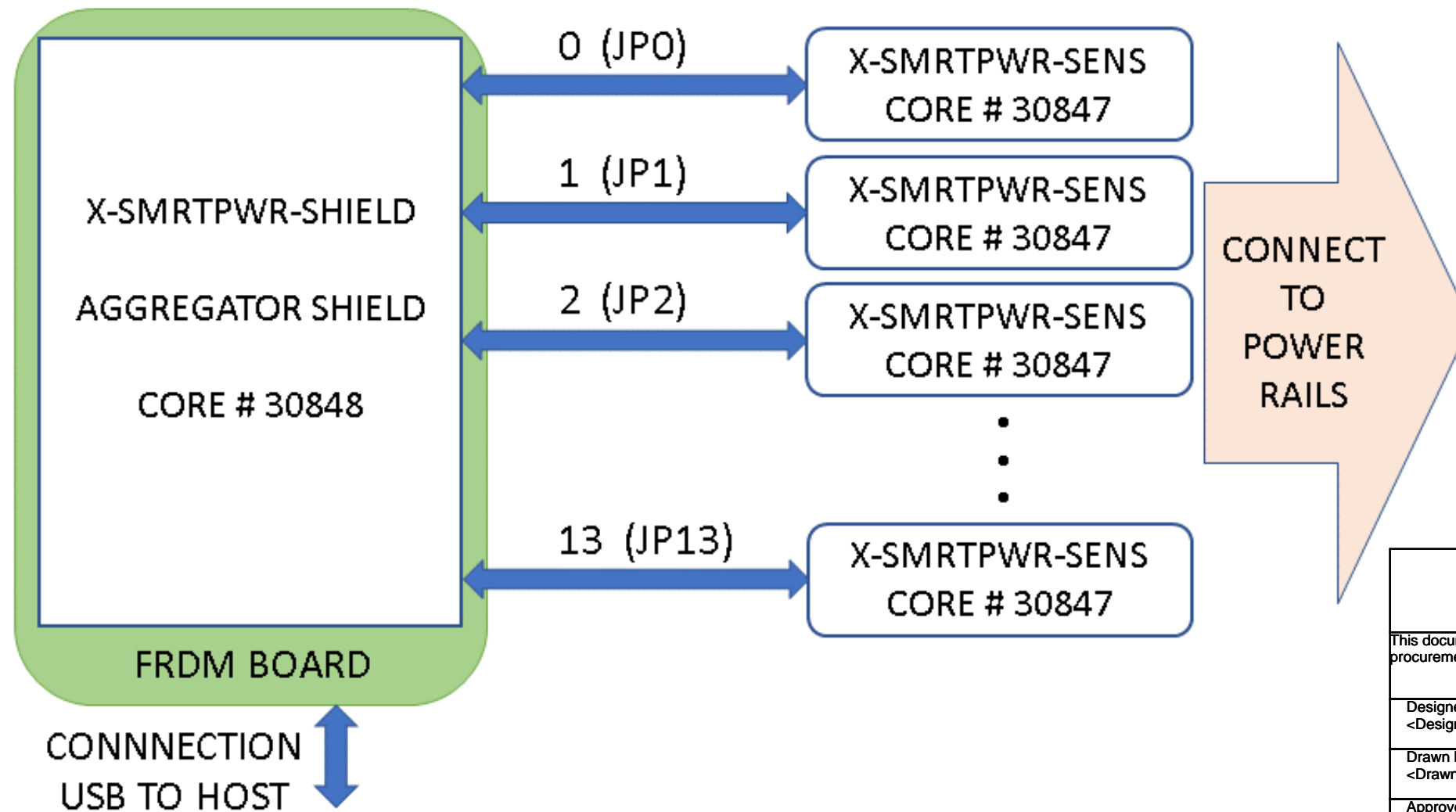
i.MX PROFILER: X-SM RTPWR-SENS


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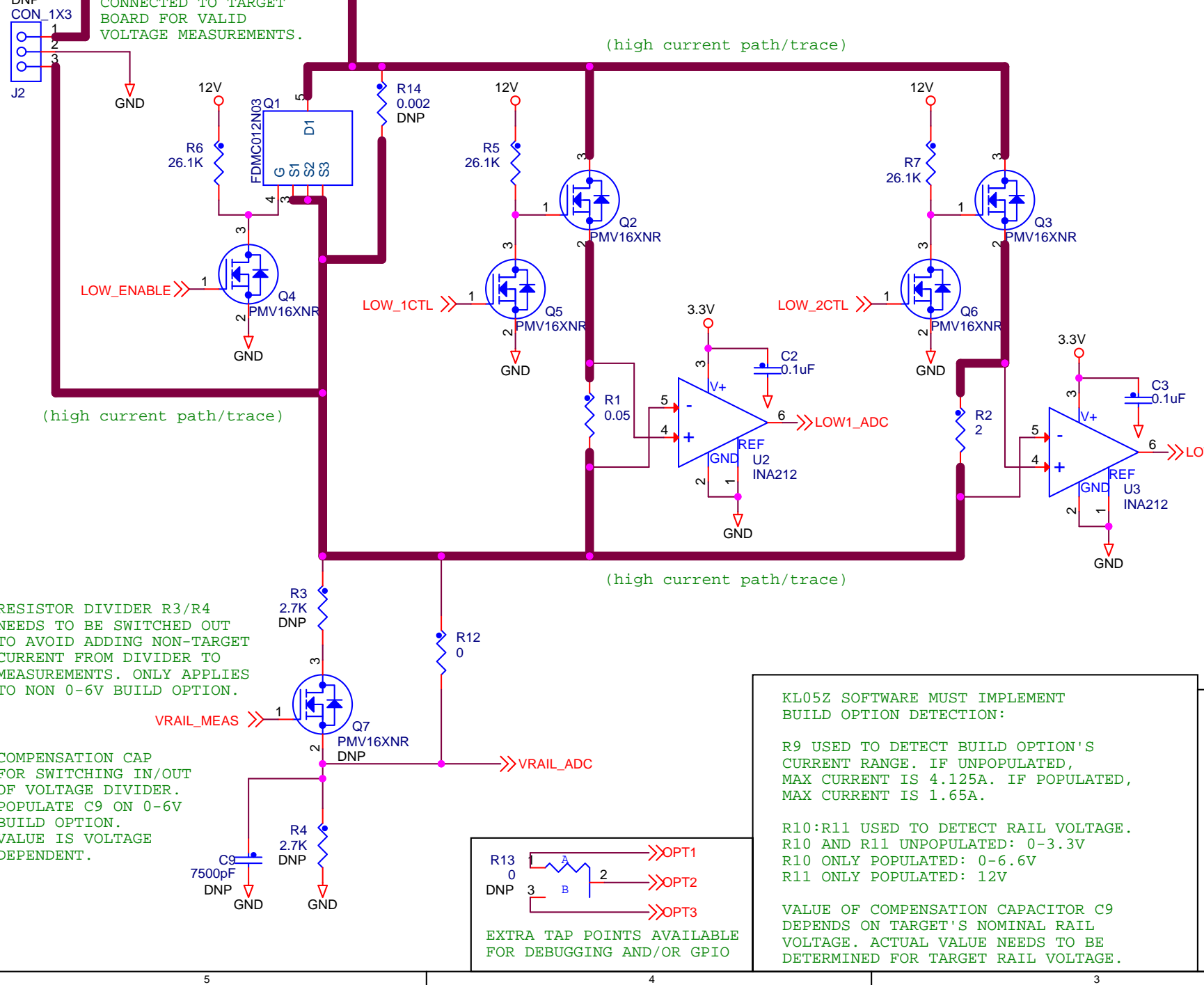
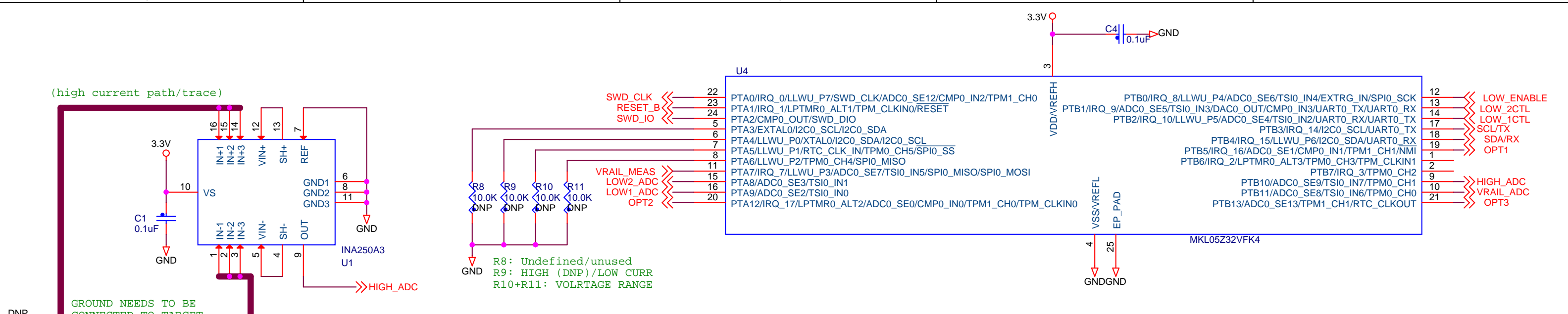
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Revision History

| Rev. Code | Date | Description |
|-----------|------------|--------------------------|
| A | 2018/05/10 | First Release, (david d) |
| | | |
| | | |



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|--|---|---|----------|
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| Approved: <Approver> | Size B | Document Number SCH-30847 PDF: SPF-30847 | Rev A |
| Date: Thursday, May 10, 2018 | | Sheet 1 of 3 | |



PROGRAMMING/USAGE INFO FOR LOCAL KL05Z:

SWITCHING FET CONTROL SIGNAL TRUTH TABLE:

| | HIGH (DEFAULT) | LOW1 | LOW2 | VRAIL |
|------------|----------------|------|------|-------|
| LOW_ENABLE | 0 | 1 | 1 | X |
| LOW1_CTL | 0 | 0 | 1 | X |
| LOW2_CTL | 0 | 1 | 0 | X |
| VRAIL_MEAS | 0 | 0 | 0 | 1 |

IT SHOULD BE NOTED THAT VRAIL_MEAS=1 WILL ADD MEASUREABLE CURRENT TO LOW1 AND LOW2. IT SHOULD NOT BE ACTIVE WHEN MEASURING CURRENT.

ADC CALCULATIONS FOR GAINS/SHUNTS AS DRAWN:

VRAIL_ADC(V) = (3.3V or 6.6V)*(NORMALIZED ADC READING)

HIGH(A) = (NORMALIZED ADC READING)*(3.3V)/(0.8V/A)

LOW1(A) = (NORMALIZED ADC READING)*(3.3V)/(0.05 OHM)/(1000)

LOW2(A) = (NORMALIZED ADC READING)*(3.3V)/(2 OHM)/(1000)

MAXIMUM MEASURABLE CURRENT FOR EACH RANGE OF HIGH CURRENT BUILD OPTION:

IC1 4.125A
 IC2+R1 0.066A
 IC3+R2 0.00166A

ALTERNATE EQUIV GAIN/SHUNT COMBOS FOR IC2+R1:

INA214 (X100) + 0.5 OHM
 INA213 (X50) + 1.0 OHM
 INA212 (X1000) + 0.05 OHM

MAXIMUM MEASURABLE CURRENT FOR EACH RANGE OF LOW CURRENT BUILD OPTION:

IC1 1.65A
 IC2+R1 0.022A
 IC3+R2 0.000220A

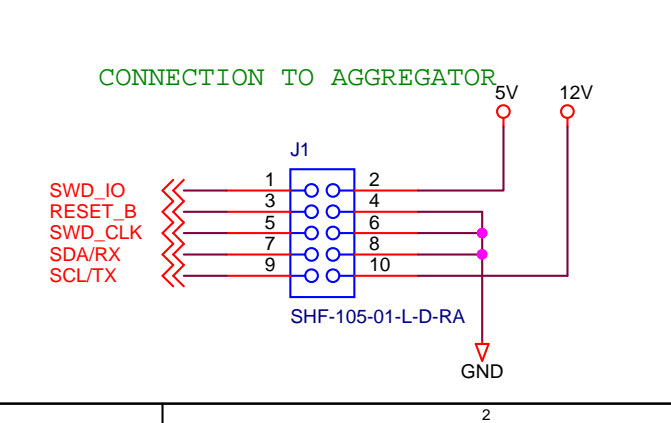
LOW OPTION ASSY OPTION:

IC1 INA250A4
 IC2 INA212 AND R1=0.15 OHM
 IC3 INA212 AND R2=15 OHM

AP2210N-3.3TRG1 IS A 1% REGULATOR. (ON-BOARD REGULATOR PROVIDES BETTER ADC ACCURACY.)

5V VIN → AP2210N → 3.3V VOUT

Capacitors: C6 (2.2uF, 25V) at VIN, C5 (2.2uF, 25V) at VOUT.



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Drawing Title: i.MX PROFILER: X-SM RTPWR-SENS

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GROUND NEEDS TO BE CONNECTED TO TARGET BOARD FOR VALID VOLTAGE MEASUREMENTS.

RESISTOR DIVIDER R3/R4 NEEDS TO BE SWITCHED OUT TO AVOID ADDING NON-TARGET CURRENT FROM DIVIDER TO MEASUREMENTS. ONLY APPLIES TO NON 0-6V BUILD OPTION.

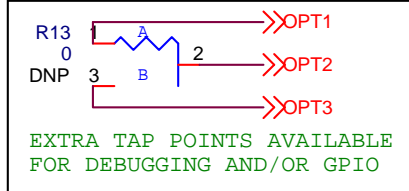
COMPENSATION CAP FOR SWITCHING IN/OUT OF VOLTAGE DIVIDER. POPULATE C9 ON 0-6V BUILD OPTION. VALUE IS VOLTAGE DEPENDENT.

KL05Z SOFTWARE MUST IMPLEMENT BUILD OPTION DETECTION:

R9 USED TO DETECT BUILD OPTION'S CURRENT RANGE. IF UNPOPULATED, MAX CURRENT IS 4.125A. IF POPULATED, MAX CURRENT IS 1.65A.

R10:R11 USED TO DETECT RAIL VOLTAGE. R10 AND R11 UNPOPULATED: 0-3.3V
 R10 ONLY POPULATED: 0-6.6V
 R11 ONLY POPULATED: 12V

VALUE OF COMPENSATION CAPACITOR C9 DEPENDS ON TARGET'S NOMINAL RAIL VOLTAGE. ACTUAL VALUE NEEDS TO BE DETERMINED FOR TARGET RAIL VOLTAGE.



**Default Build Option:
0-3.3V and 0-4.125A
X-SM RTPWR-SENS / 30847**

| | |
|----|-----------------|
| 1. | Build as drawn. |
|----|-----------------|

**Build Option:
0-6.6V and 0-4.125A
X-SM RTPWR-SN6H**

| | |
|----|--|
| 1. | Build as drawn, with exceptions below. |
| 2. | Do not populate R12 |
| 3. | Populate R3, R4, R11, and Q7. |

**Build Option:
12V and 0-4.125A
X-SM RTPWR-SNCH**

| | |
|----|---|
| 1. | Build as drawn, with exceptions below. |
| 2. | Populate R4, R10, R14. |
| 3. | Populate R12 with value 8.2k 1%. |
| 3. | Do not populate Q1-Q7, R1, R2, R5-R7, C2, and C3. |

**Build Option:
0-3.3V and 0-1.65A
X-SM RTPWR-SN3L**

| | |
|----|--|
| 1. | Build as drawn, with exceptions below. |
| 2. | Populate R9. |
| 3. | Populate U1 with INA250A4 |
| 4. | Populate R1 with 0.15 Ohm 1% 0805. Populate R2 with 15 Ohm 1% 0805. |



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