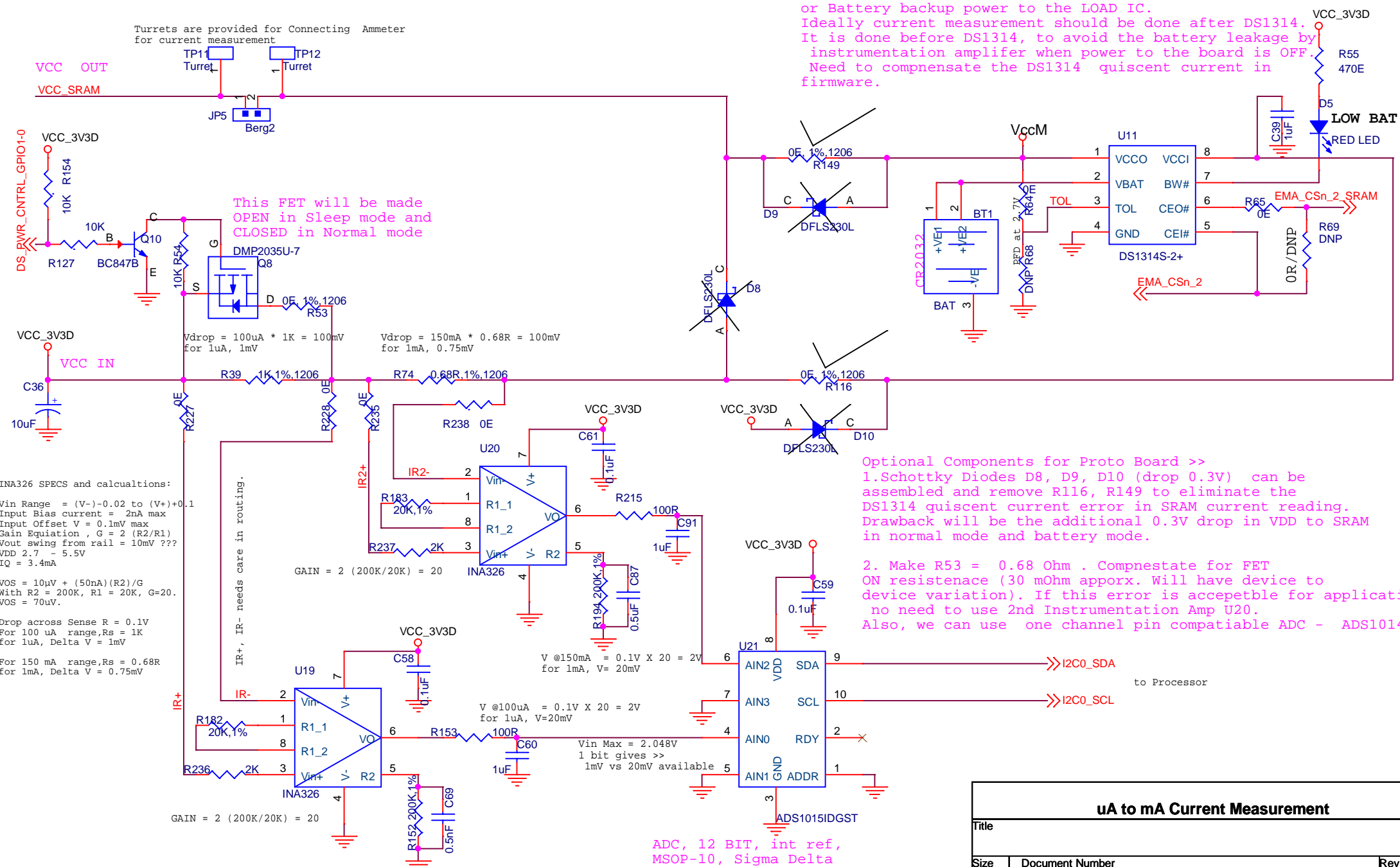


- Requirement :**
1. Normal mode, $I_{DD} \gg 1\text{mA}$ to 150mA
 2. Sleep mode $I_{DD} \gg 1\mu\text{A}$ to $100\mu\text{A}$



DS1314 selects on board power or Battery backup power to the LOAD IC. Ideally current measurement should be done after DS1314. It is done before DS1314, to avoid the battery leakage by instrumentation amplifier when power to the board is OFF. Need to compensate the DS1314 quiescent current in firmware.

This FET will be made OPEN in Sleep mode and CLOSED in Normal mode

$V_{drop} = 100\mu\text{A} * 1\text{K} = 100\text{mV}$ for $1\mu\text{A}$, 1mV

$V_{drop} = 150\text{mA} * 0.68\text{R} = 100\text{mV}$ for 1mA , 0.75mV

INA326 SPECS and calculations:

V_{in} Range = $(V_-) - 0.02$ to $(V_+) + 0.1$

Input Bias current = 2nA max

Input Offset $V = 0.1\text{mV}$ max

Gain Equation, $G = 2 (R_2/R_1)$

V_{out} swing from rail = 10mV ???

$V_{DD} = 2.7 - 5.5\text{V}$

$I_Q = 3.4\text{mA}$

$V_{OS} = 10\mu\text{V} + (50\text{nA})(R_2)/G$

With $R_2 = 200\text{K}$, $R_1 = 20\text{K}$, $G = 20$.

$V_{OS} = 70\mu\text{V}$.

Drop across Sense $R = 0.1\text{V}$

For $100\mu\text{A}$ range, $R_s = 1\text{K}$ for $1\mu\text{A}$, $\Delta V = 1\text{mV}$

For 150mA range, $R_s = 0.68\text{R}$ for 1mA , $\Delta V = 0.75\text{mV}$

IR+, IR- needs care in routing.

$GAIN = 2 (200\text{K}/20\text{K}) = 20$

$V @ 150\text{mA} = 0.1\text{V} * 20 = 2\text{V}$ for 1mA , $V = 20\text{mV}$

$V @ 100\mu\text{A} = 0.1\text{V} * 20 = 2\text{V}$ for $1\mu\text{A}$, $V = 20\text{mV}$

V_{in} Max = 2.048V

1 bit gives $\gg 1\text{mV}$ vs 20mV available

ADC, 12 BIT, int ref, MSOP-10, Sigma Delta

Optional Components for Proto Board >>

1. Schottky Diodes D8, D9, D10 (drop 0.3V) can be assembled and remove R116, R149 to eliminate the DS1314 quiescent current error in SRAM. Drawback will be the additional 0.3V drop in V_{DD} to SRAM in normal mode and battery mode.

2. Make R53 = 0.68 Ohm . Compnstate for FET ON resistance (30 mOhm approx. Will have device to device variation). If this error is acceptable for application no need to use 2nd instrumentation Amp U20. Also, we can use one channel pin compatiible ADC - ADS1014

uA to mA Current Measurement		
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