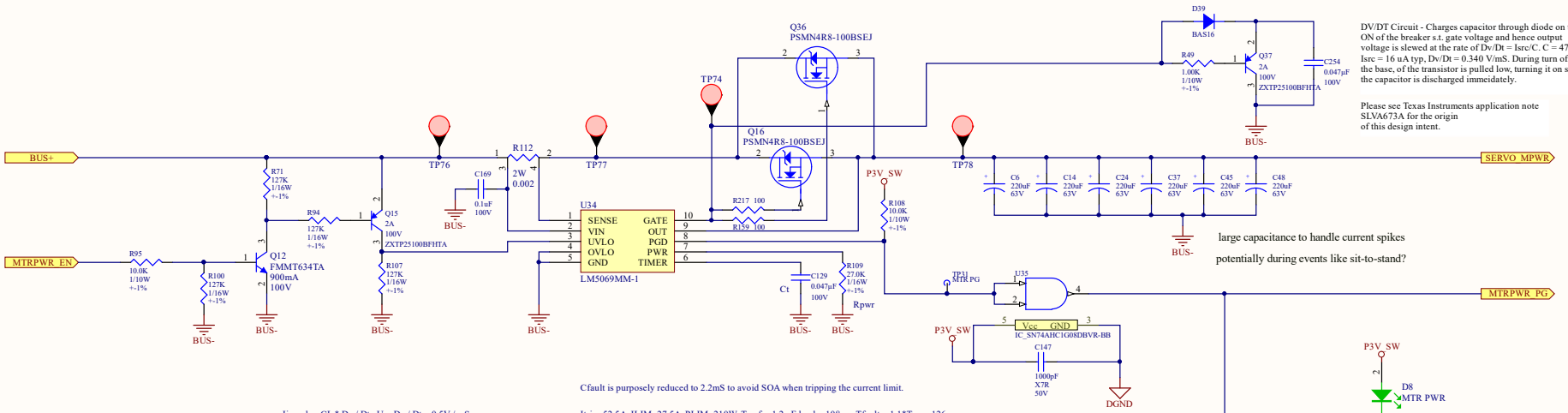

DV/DT Circuit - Charges capacitor through diode on turn ON of the breaker s.t. gate voltage and hence output voltage is slewed at the rate of Dv/Dt = Isrc/C. C = 47 nF, Isrc = 16 uA typ, Dv/Dt = 0.340 V/mS. During turn off the base, of the transistor is pulled low, turning it on s.t. the capacitor is discharged immediately.

Please see Texas Instruments application note SLVA673A for the origin of this design intent.

large capacitance to handle current spikes potentially during events like sit-to-stand?

Iinrush = CL * Dv / Dt Use Dv / Dt = 0.5V / mS

Iinrush = 1.2mF * 0.5V / mS = 0.6A

tON = 54V / 0.5V / mS = 108 mS

Use factor of x 1.1, Tfault = 1.1 * 108 mS = 126 mS

PLIM = max (Vsnsmin * VinMAX / Rsns , 2 * VinMAX * Iinrushmax)

Vinmax = 54V, Iinrushmax = 0.8A, Vsnsmin = 55mV, Rsns = 2mOhm

PLIM = max (210W, 75.6W) = 210W

Cfault is purposely reduced to 2.2mS to avoid SOA when tripping the current limit.

Itrip=52.5A, ILIM=27.5A, PLIM=210W, Ton for 1.2mF load = 108ms, Tfault = 1.1*Ton = 126ms

$$R_{PWR} = 1.25 \times 10^5 \times R_S \times P_{FET(LIM)}$$ 1.25E5*.002*210=26.7k

$$C_T = \frac{t_{FAULT} \times 85\ \mu A}{4V} = t_{FAULT} \times 2.13 \times 10^{-5}$$ 126e-3*2.13e-5 = 2.7uF

© Ekso Bionics Inc.
The Information contained in this drawing is the sole property of Ekso Bionics. Any use or reproduction in part or as a whole without written permission from Ekso Bionics is prohibited.

Sheet Title: MOTOR POWER CIRCUIT BREAKER

Project Name: 104536-AMPLIFIER.PRJPCB

Size: TABLOID | Fab: 104536 | Rev: J

Date: 9/21/2017 | Time: 11:59:15 AM | Sheet 10 of 18

Engineer: DANIEL BROWN

Ekso Bionics Inc.
1414 Harbour Way S
Suite 1201
Richmond, CA 94804
USA