Voltage regulator (MCP1702) power dissipation calculations

Under worst possible conditions :

Delta V max = (Vin max – Vout min)
= 5.25 (USB spec) – 2.31(from MCP1702 datasheet)
=2.94 V

Max case temperature = 150 degrees C (from datasheet)
Thermal resistance junction to ambient (JA) for TO-92= 131.9 degrees C/W (from datasheet)
Thermal resistance junction to ambient (JA) for SOT23A = 336 degrees C/W (from datasheet)
Thermal resistance junction to ambient (JA) for SOT-89 JA=52 degrees C/W (from datasheet)

T ambient max = 50 degrees C

Junction T max = (Thermal resistance (JA) x Power Dissipation (max)) + T ambient max)
P dissipation max = (T case max – T ambient max)/thermal resistance (JA)

I max (SOT23A) = PD max / delta V max

I max (T0-92) = ((150-50)/131.9)/2.94 = 258 mA
I max (SOT23A) = ((150-50)/336)/2.94 = 101mA (for SOT23A)
I max (SOT-89) = ((150-50)/52)/2.94 = 654mA

12V supply – spec for up to 13V
Delta B = 13-2.31 = 10.7V
I max (SOT-89) = ((150-50)/52)/10.7V = 17.97mA

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