SEMTECH

PRELIMINARY DATA
PNP Power Transistor

StP8

TEL: 805-498-2111 FAX: 805-498-3804

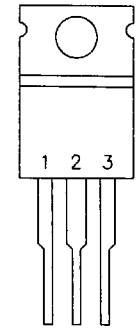
APPLICATIONS

- **Pentium Processor™ supplies**
- **PowerPC™ supplies**
- **Other 2.5 V to 3.6 V microprocessor supplies**
- **Low voltage logic supplies**
- **Post regulator for switching supplies**

DESCRIPTION

The StP8 is a passivated epitaxial planar silicon device intended for use in high power applications

PIN CONFIGURATION



StP8	
PIN	FUNCTION
1	BASE
2	COLLECTOR
3	EMITTER

TAB IS CONNECTED TO COLLECTOR

ORDERING INFORMATION	
DEVICE	**PACKAGE**
StP8	TO-220

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CEO}	I_C = 100 mA, t_p = 300 µs	10	V
Emitter-Base Voltage	V_{EBO}	I_E = 1 mA	5	V
Collector Current - Continuous	I_C		10	A
Total Power Dissipation @ T_C = 25 °C	P_D		60	W
Derate Above 25 °C			0.48	°C/W
Operating and Storage Junction Temperature Range	T_j, T_{stg}		-65 to 150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{thj\text{-}c}$	2.0	°C/W
Maximum Lead Temperature For Soldering Purposes: 1/8" From Body For 5 Seconds	T_L	275	°C

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Conditions	Min	Typ	Max	Unit
Inverse Collector-Emitter Current	I_{CES}	V_{CE} = 10 V			5	µA
Inverse Emitter-Base Current	I_{EBO}	V_{EB} = 5 V			5	µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 10 A, I_B = 1 A, Note 1		0.6	1.0	V
Collector-Base Saturation Voltage	$V_{BE(SAT)}$	I_C = 10 A, I_B = 1 A, Note 1		1.3	1.5	V
DC Current Gain	h_{FE}	I_C = 10 A, V_{CE} = 5 V, Note 1	100	130		
		I_C = 10 A, V_{CE} = 1.47 V, Note 1	90	100		

Note 1: t_p = 300 µs

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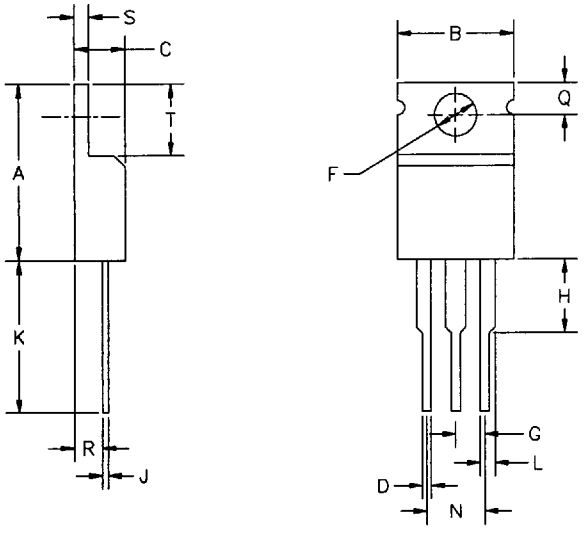
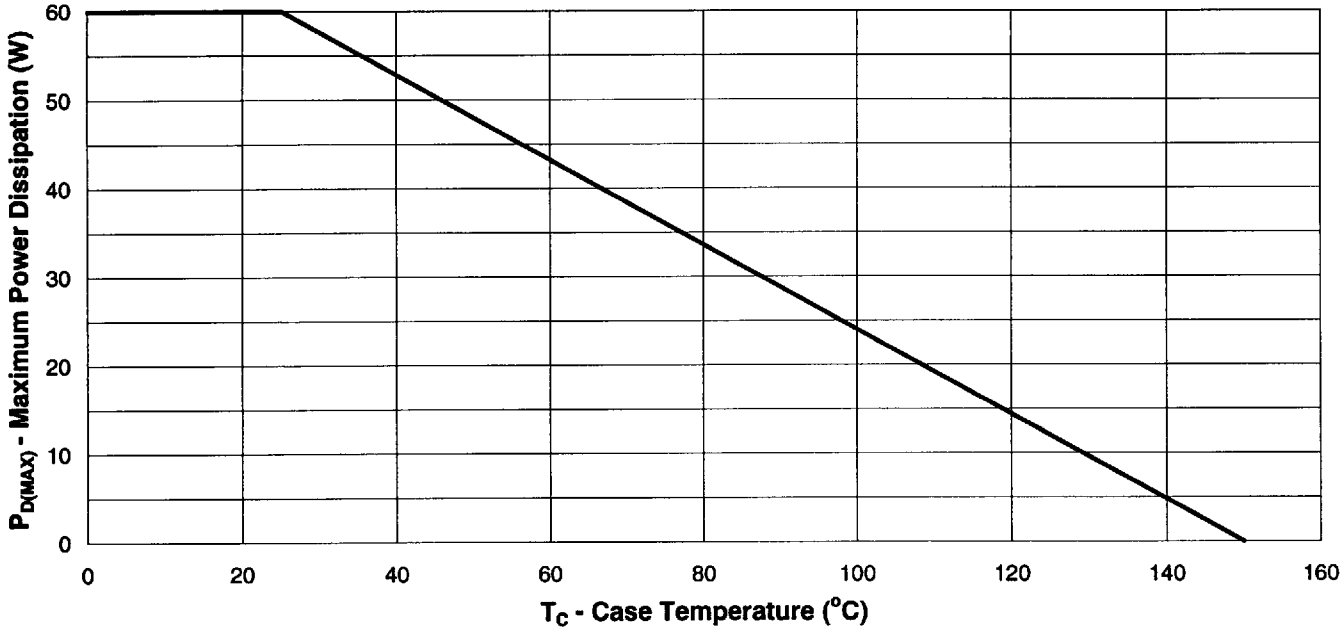
OUTLINE AND DIMENSIONS- TO-220 PACKAGE



DIMENSIONS					
DIM[N]	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.560	.650	14.23	16.51	
B	.380	.420	9.66	10.66	
C	.140	.190	3.56	4.82	
D	.020	.045	0.51	1.14	
F	.139	.161	3.54	4.08	
G	.090	.110	2.29	2.79	
H	–	.250	–	6.35	
J	.012	.045	.31	1.14	
K	.500	.580	12.70	14.73	
L	.045	.070	1.15	1.77	
N	.190	.210	4.83	5.33	
Q	.100	.135	2.54	3.42	
R	.080	.115	2.04	2.92	
S	.020	.055	.51	1.39	
T	.230	.270	5.85	6.85	

Maximum Power Dissipation vs. Case Temperature



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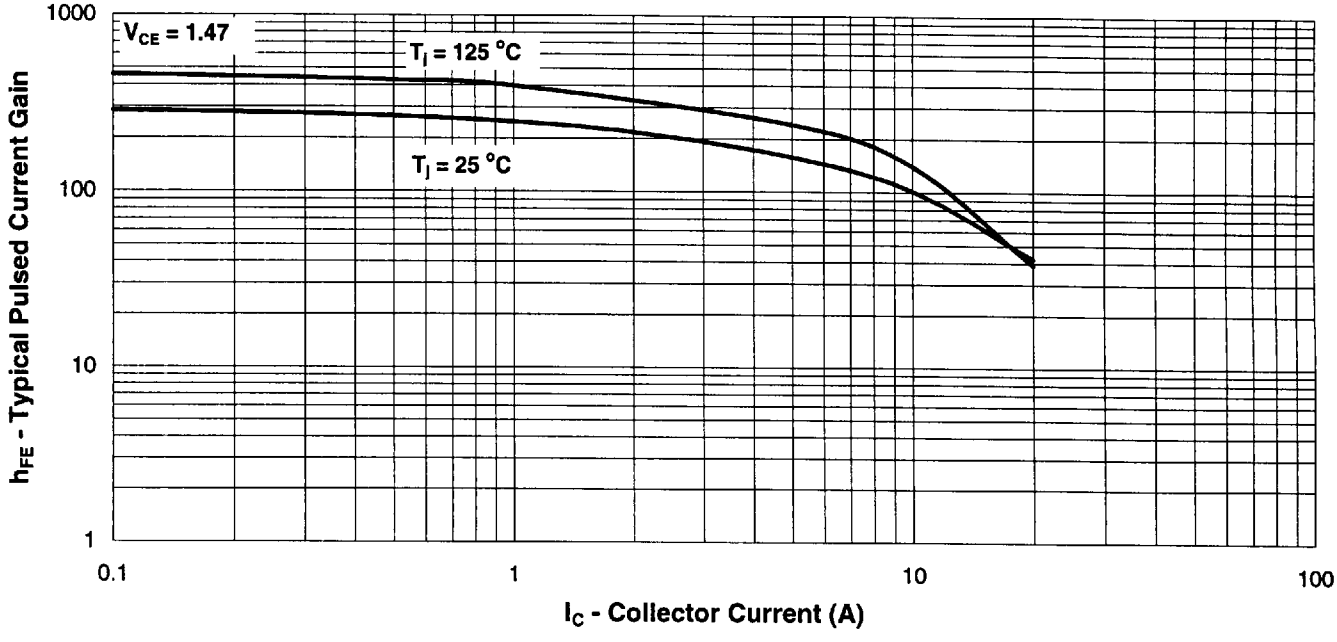
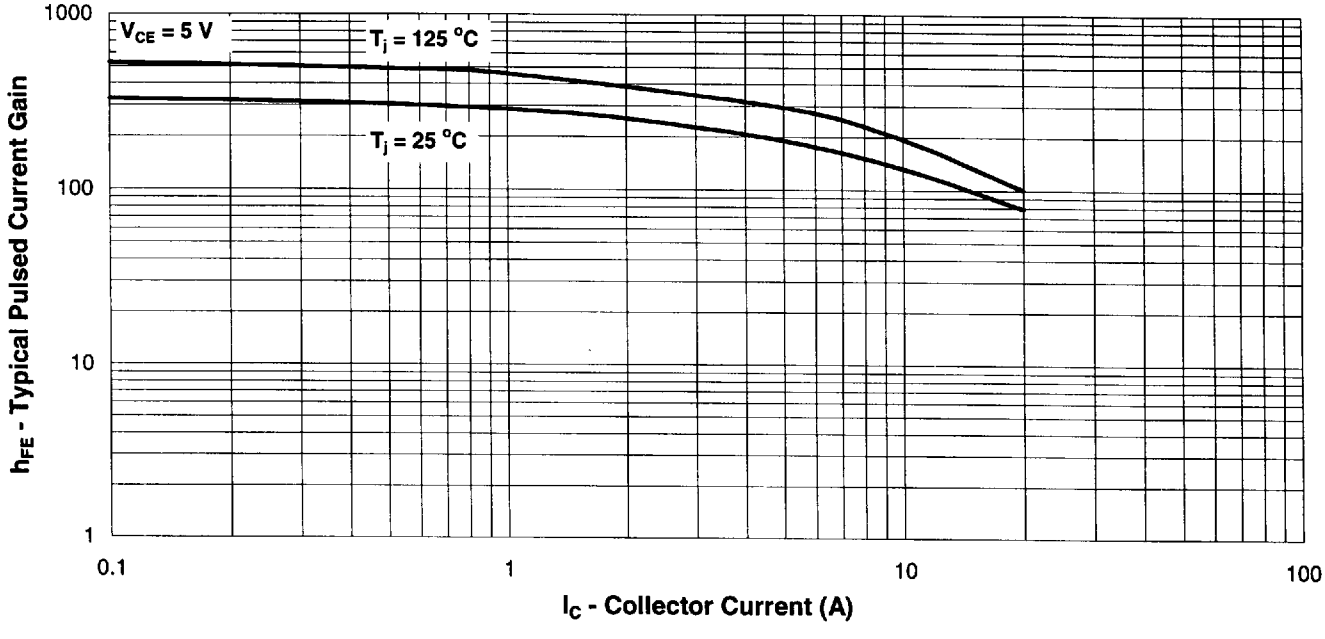
Typical Pulsed Current Gain vs. Collector Current



Typical Pulsed Current Gain vs. Collector Current



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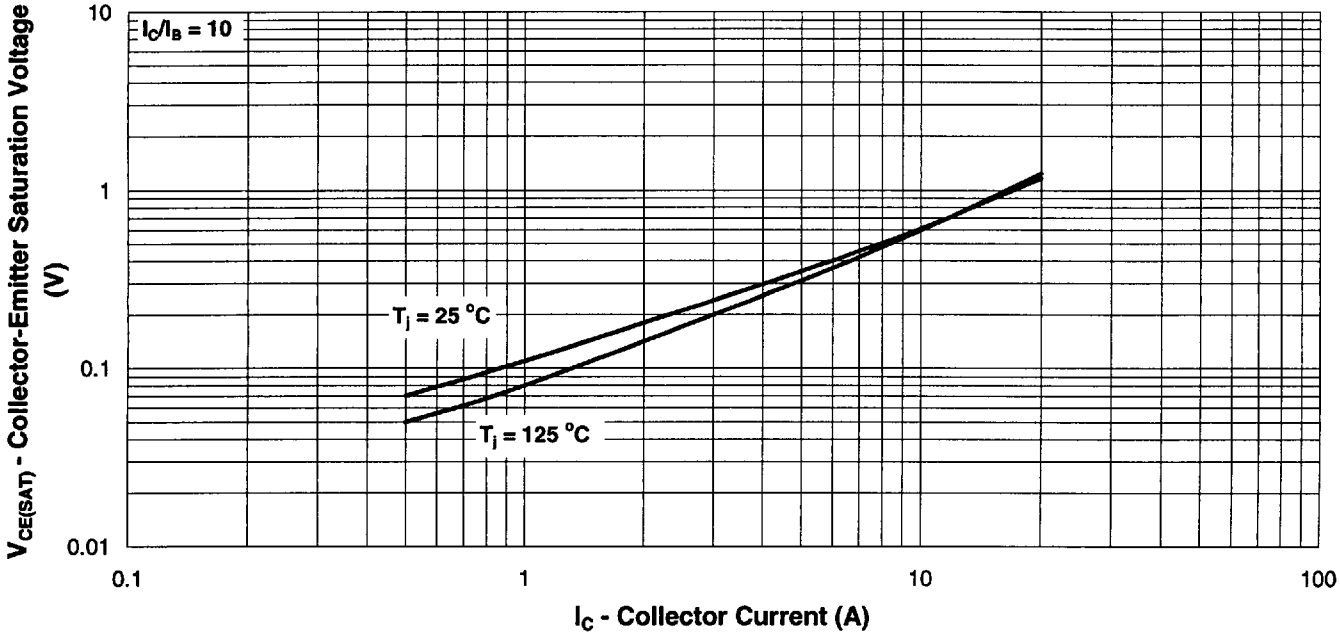
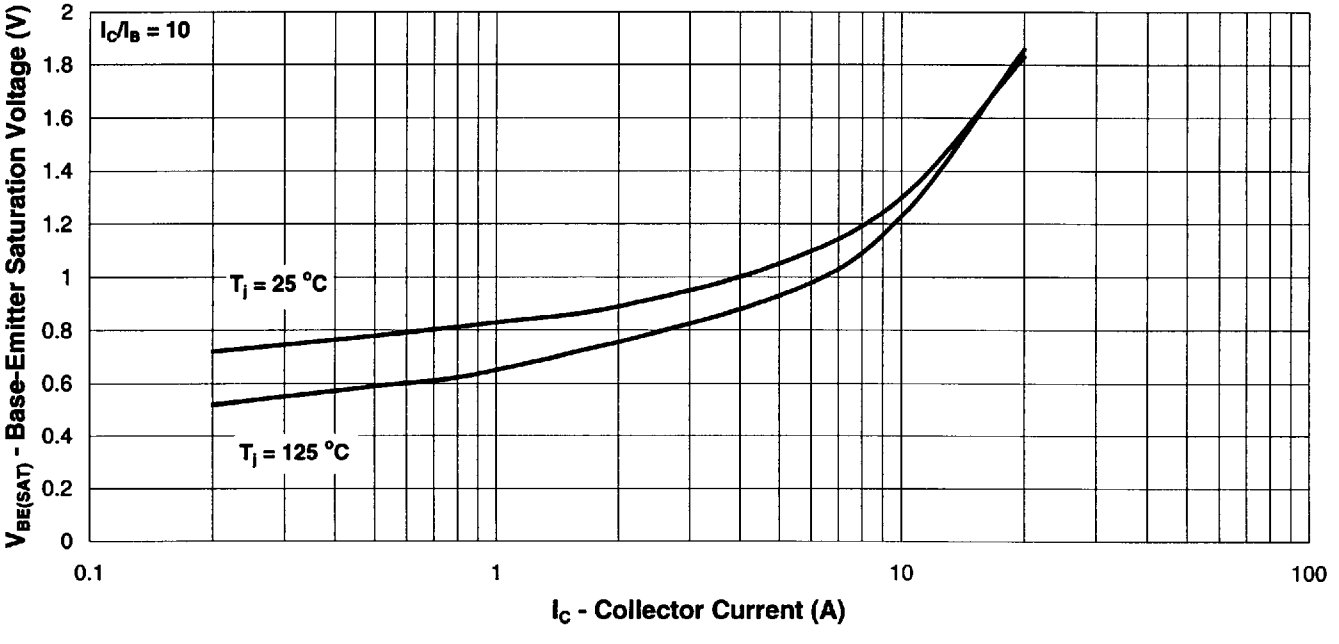
Typical Collector-Emitter Saturation Voltage vs. Collector Current



Typical Base-Emitter Saturation Voltage vs. Collector Current



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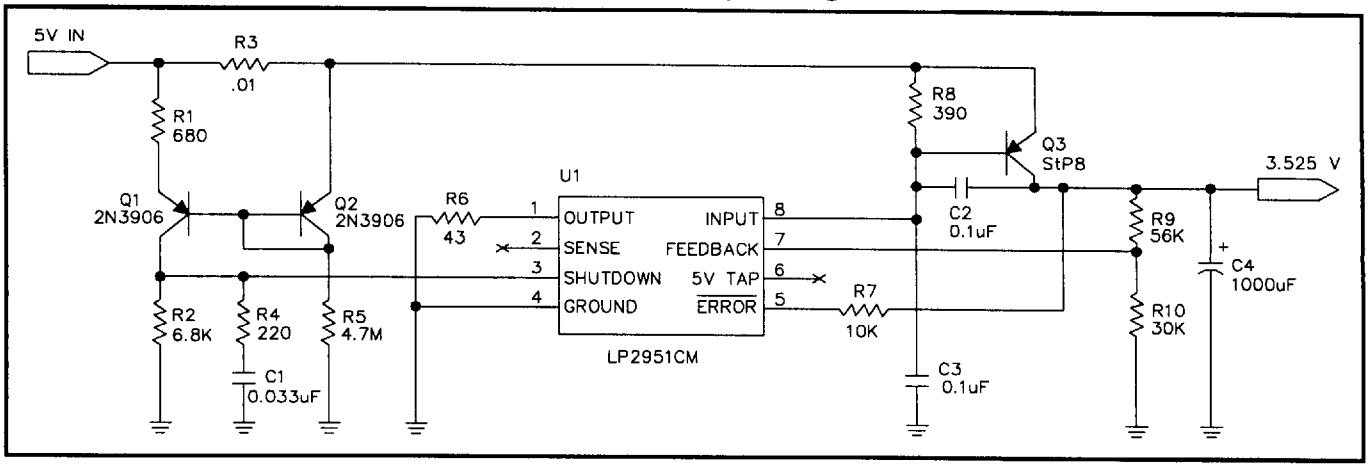
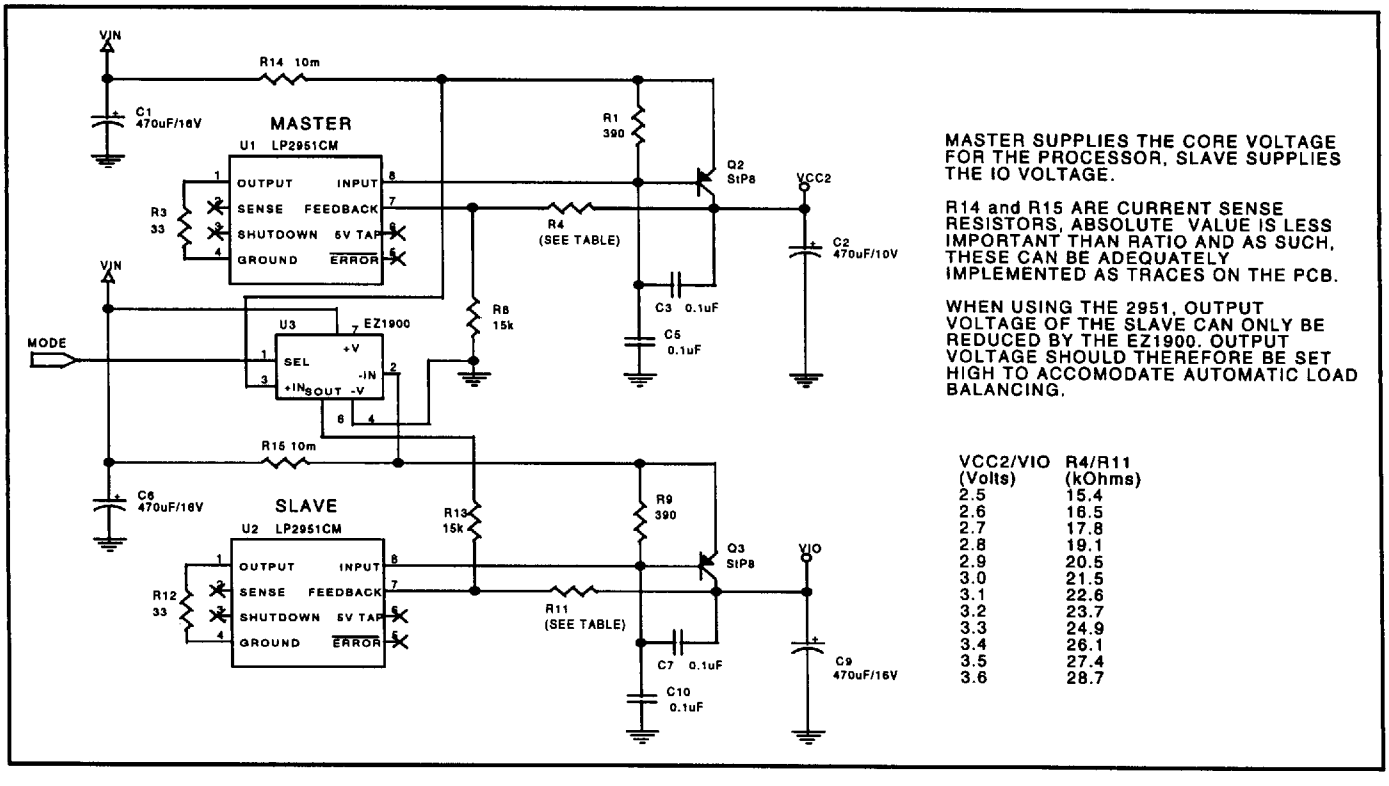
TYPICAL APPLICATIONS

3.525V, 8 Amp Low Dropout Regulator



General Load Balance Circuit



MASTER SUPPLIES THE CORE VOLTAGE FOR THE PROCESSOR, SLAVE SUPPLIES THE IO VOLTAGE.

R14 and R15 ARE CURRENT SENSE RESISTORS, ABSOLUTE VALUE IS LESS IMPORTANT THAN RATIO AND AS SUCH, THESE CAN BE ADEQUATELY IMPLEMENTED AS TRACES ON THE PCB.

WHEN USING THE 2951, OUTPUT VOLTAGE OF THE SLAVE CAN ONLY BE REDUCED BY THE EZ1900. OUTPUT VOLTAGE SHOULD THEREFORE BE SET HIGH TO ACCOMODATE AUTOMATIC LOAD BALANCING.

VCC2/VIO (Volts)	R4/R11 (kOhms)
2.5	15.4
2.6	16.5
2.7	17.8
2.8	19.1
2.9	20.5
3.0	21.5
3.1	22.6
3.2	23.7
3.3	24.9
3.4	26.1
3.5	27.4
3.6	28.7

EZ1900 and LP2951CM are available from Semtech
Please contact your Semtech Sales Representative

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Thermal Considerations

A heatsink is required for the transistor when used in either of the application circuits given. The following precalculated values are based on an output voltage of 3V and assume the transistor is mounted directly to the heatsink with thermal grease (uninsulated).

Output Current (Amps)	R_{THS-A} for T_A=25°C (°C/W)	R_{THS-A} for T_A=70°C (°C/W)
2A	20.0	12.5
4A	10.0	5.0
6A	5.0	2.5
8A	2.5	1.0

Heatsink Calculation

The following equation may be used to calculate heatsink needs for applications not specified above.

$$R_{THS-A} = (150\text{-}T_{A(MAX)})/((V_{in(MAX)}\text{-}V_{o(MIN)})I_O)\text{-}R_{THJ-C}\text{-}R_{THC-S}$$

Where:

R_{THS-A} = Heatsink thermal impedance case to sink (°C/W)
$T_{A(MAX)}$ = Maximum ambient temperature (°C)
$V_{in(MAX)}$ = Maximum Input Voltage (V)
$V_{o(MIN)}$ = Minimum Output Voltage (V)
I_O = Maximum continuous output current (A)
R_{THJ-C} = Transistor thermal impedance junction-to-case = 2°C/W
R_{THC-S} = Thermal impedance case-to-sink = 0.5°C/W.

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