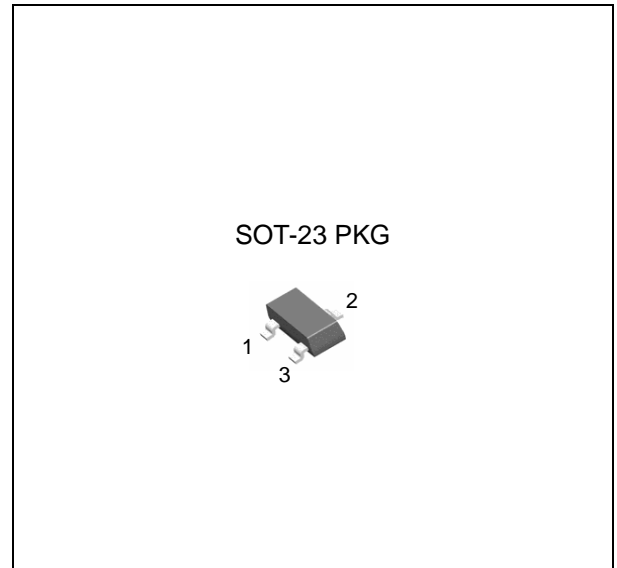# 300mA L.D.O VOLTAGE REGULATOR   TJ1117GSF

FEATURES

● Output Current up to 300mA
● Dropout Voltage is 1.3V at Full Output current
● MLCC, Aluminum electrolytic capacitor applicable
● Three Terminal Adjustable(ADJ) or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V
● Line Regulation typically at 0.1% max.
● Load Regulation typically at 0.2% max.
● Internal Current and Terminal Protection
● Surface Mount Package SOT-23
● Moisture Sensitivity Level 3

SOT-23 PKG

APPLICATION

● Active SCSI Terminators
● Portable/ Plan Top/ Notebook Computers
● High Efficiency Linear Regulators
● SMPS Post Regulators
● Mother B/D Clock Supplies
● Disk Drives
● Battery Chargers

ORDERING INFORMATION

Device	Package
TJ1117GSF-ADJ	SOT-23 3L
TJ1117GSF-X.X	

X.X = Output Voltage = 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V

DESCRIPSION

The TJ1117 is a low power positive-voltage regulator designed. This device is an excellent choice for use in battery-powered applications, as active terminators for the SCSI bus, and portable computers. The TJ1117 features low quiescent current and low dropout voltage of 1.2V at a full load and lower as output current decreases. TJ1117 is available as an adjustable or fixed 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. The TJ1117 is offered in a 3-pin surface mount package SOT-23. The output capacitor is needed for output stability of TJ1117 as required by most of the other regulator circuits.
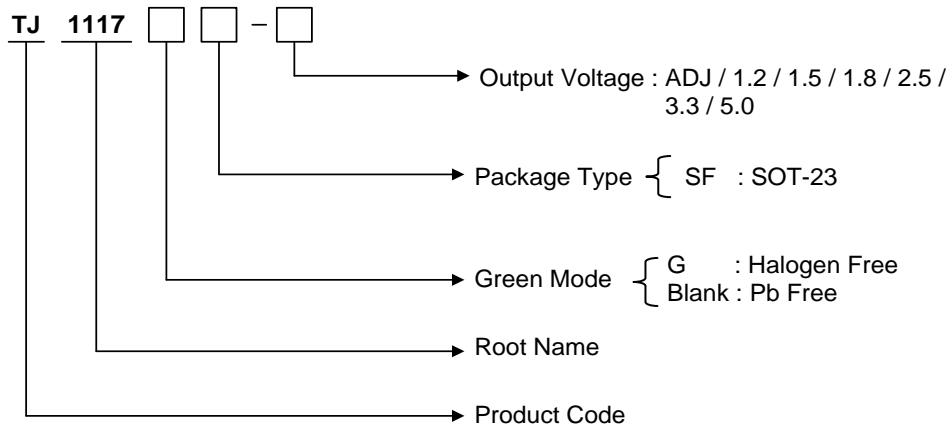
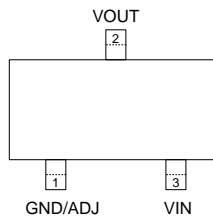## Absolute Maximum Ratings

(T_A = 25℃, unless otherwise specified)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
DC Input Voltage	V_{IN}	-	20	V
Lead Temperature (Soldering, 5 seconds)	T_{SOL}	-	260	℃
Operating Junction Temperature Range	T_{OPR}	-40	125	℃
Storage Temperature Range	T_{STG}	-65	150	℃

Ordering Information

V$_{OUT}$	Package	Order No.	Supplied As	Status
ADJ	SOT-23	TJ1117GSF-ADJ	Reel	Active
1.2V	SOT-23	TJ1117GSF-1.2	Reel	Contact us
1.5V	SOT-23	TJ1117GSF-1.5	Reel	Contact us
1.8V	SOT-23	TJ1117GSF-1.8	Reel	Contact us
2.5V	SOT-23	TJ1117GSF-2.5	Reel	Contact us
3.3V	SOT-23	TJ1117GSF-3.3	Reel	Active
5.0V	SOT-23	TJ1117GSF-5.0	Reel	Contact us

TJ **1117** ☐ ☐ − ☐

Output Voltage : ADJ / 1.2 / 1.5 / 1.8 / 2.5 / 3.3 / 5.0

Package Type ⎰ SF : SOT-23

Green Mode ⎰ G : Halogen Free
⎱ Blank : Pb Free

Root Name

Product Code

PIN CONFIGURATION

VOUT

| 2 |

| 1 | | 3 |

GND/ADJ   VIN

SOT-23

PIN DESCRIPTION

Pin No.	SOT-23	
	Name	Function
1	ADJ/GND	Adjustable / Ground
2	V_{OUT}	Output Voltage
3	V_{IN}	Input Voltage

Typical Application Circuit

TJ1117-3.3

Vin ○—— V_{IN} V_{OUT} ——○ Vout

C_{IN}
4.7uF

GND

C_{OUT}
4.7uF

300mA L.D.O VOLTAGE REGULATOR TJ1117GSF

ELECTRICAL CHARACTERISTICS

For ADJ Output Voltage (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_{REF}	Reference Voltage	V_{IN}=5V, I_O=10mA	1.238	1.250	1.262	V
V_{REF}	Reference Voltage	I_O = 10mA to 300mA, V_{IN} - V_{REF} = 1.5V to 13.75V (T_J = 0 ~ 125℃)	1.219		1.281	V
$\triangle V_{LINE}$	Line Regulation	I_O = 10mA , V_{IN} - V_{REF} = 1.5V to 12V		0.1	0.2	%
$\triangle V_{LOAD}$	Load Regulation	I_O = 10mA to 300mA, V_{IN} - V_{REF} = 2 V		0.2	0.4	%
V_{IN}	Operating Input Voltage				12	V
I_{ADJ}	Adjustment pin Current	V_{IN} - V_{REF} = 1.5V to 12V, I_O = 100mA		35	120	uA
$\triangle I_{ADJ}$	Adjustment Pin Current Change	V_{IN} - V_{REF} = 1.5V to 12V, I_O = 100mA to 300mA		0.5	5	uA
$I_{O(MIN)}$	Minimum Load Current	V_{IN}=5V, V_{REF}=0V		5	10	mA
I_O	Current Limit	V_{IN} - V_{REF} = 5V	1000	1250	1600	mA
$_EN$	Output Noise(%V_O)	B = 10Hz to 10kHz, T_J = 25℃		0.003		%
SVR	Supply Voltage Rejection	I_O = 300mA, f = 120Hz, V_{IN} - V_{REF} = 3V, V_{RIPPLE} = 1V_{PP}	60	75		dB

For 1.2V Output Voltage (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_O	Output Voltage	V_{IN} = 2.7V, I_O = 10mA	1.176	1.200	1.224	V
V_O	Output Voltage	V_{IN} = 2.7V to 12V, I_O = 0mA to 300mA (T_J = 0 ~ 125℃)	1.152		1.248	V
$\triangle V_{LINE}$	Line Regulation	I_O = 0mA , V_{IN} = 2.7V to 12V		0.1	0.2	%
$\triangle V_{LOAD}$	Load Regulation	I_O = 10mA to 300mA, V_{IN} = 3.2V		0.2	0.4	%
V_{IN}	Operating Input Voltage				12	V
I_D	Quiescent Current	V_{IN} - V_O = 5V		5	10	mA
I_O	Current Limit	V_{IN} - V_O = 5V	1000	1250	1600	mA
$_EN$	Output Noise(%V_O)	B = 10Hz to 10kHz, T_J = 25℃		0.003		%
SVR	Supply Voltage Rejection	I_O = 300mA, f = 120Hz, V_{IN} - V_O = 1.5V, V_{RIPPLE} = 1V_{PP}	60	75		dB

300mA L.D.O VOLTAGE REGULATOR

TJ1117GSF

For 1.5V Output Voltage   (T$_A$=25℃, C$_O$ = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V$_O$	Output Voltage	V$_{IN}$ = 3.0V , I$_O$ = 10mA	1.485	1.5	1.515	V
V$_O$	Output Voltage	V$_{IN}$ = 3.0V to 12V, I$_O$ = 0mA to 300mA (T$_J$ = 0 ~ 125℃)	1.470		1.530	V
△V$_{LINE}$	Line Regulation	I$_O$ = 0mA , V$_{IN}$ = 3.0V to 12V		0.1	0.2	%
△V$_{LOAD}$	Load Regulation	I$_O$ = 0mA to 300mA, V$_{IN}$ = 3.5 V		0.2	0.4	%
V$_{IN}$	Operating Input Voltage	I$_O$ = 100mA			12	V
I$_D$	Quiescent Current	V$_{IN}$ - V$_O$ = 5V		5	10	mA
I$_O$	Current Limit	V$_{IN}$ - V$_O$ = 5V	1000	1250	1600	mA
$_E$N	Output Noise(%V$_O$)	B = 10Hz to 10kHz, T$_J$ = 25℃		100		uV
SVR	Supply Voltage Rejection	I$_O$ = 300mA, f = 120Hz, V$_{IN}$ - V$_O$ = 3V, V$_{RIPPLE}$ = 1V$_{PP}$	60	75		dB

For 1.8V Output Voltage   (T$_A$=25℃, C$_O$ = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V$_O$	Output Voltage	V$_{IN}$ = 3.3V, I$_O$ = 10mA	1.782	1.8	1.818	V
V$_O$	Output Voltage	V$_{IN}$ = 3.3V to 12V, I$_O$ = 0mA to 300mA (T$_J$ = 0 ~ 125℃)	1.764		1.836	V
△V$_{LINE}$	Line Regulation	I$_O$ = 0mA , V$_{IN}$ = 3.3V to 12V		0.1	0.2	%
△V$_{LOAD}$	Load Regulation	I$_O$ = 0mA to 300mA, V$_{IN}$ = 3.8 V		0.2	0.4	%
V$_{IN}$	Operating Input Voltage	I$_O$ = 100mA			12	V
I$_D$	Quiescent Current	V$_{IN}$ - V$_O$ = 5V		5	10	mA
I$_O$	Current Limit	V$_{IN}$ - V$_O$ = 5V	1000	1250	1600	mA
$_E$N	Output Noise(%V$_O$)	B = 10Hz to 10kHz, T$_J$ = 25℃		100		uV
SVR	Supply Voltage Rejection	I$_O$ = 300mA, f = 120Hz, V$_{IN}$ - V$_O$ = 3V, V$_{RIPPLE}$ = 1V$_{PP}$	60	75		dB

300mA L.D.O VOLTAGE REGULATOR

For 2.5V Output Voltage (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_O	Output Voltage	V_{IN} = 4.0V, I_O = 10mA	2.475	2.5	2.525	V
V_O	Output Voltage	V_{IN} = 4.0V to 12V, I_O = 0mA to 300mA (T_J = 0 ~ 125℃)	2.450		2.550	V
$\triangle V_{LINE}$	Line Regulation	I_O = 0mA , V_{IN} = 4.0V to 12V		0.1	0.2	%
$\triangle V_{LOAD}$	Load Regulation	I_O = 0mA to 300mA, V_{IN} = 4.5 V		0.2	0.4	%
V_{IN}	Operating Input Voltage	I_O = 100mA			12	V
I_D	Quiescent Current	V_{IN} - V_O = 5V		5	10	mA
I_O	Current Limit	V_{IN} - V_O = 5V	1000	1250	1600	mA
$_EN$	Output Noise(%V_O)	B = 10Hz to 10kHz, T_J = 25℃		100		uV
SVR	Supply Voltage Rejection	I_O = 300mA, f = 120Hz, V_{IN} - V_O = 3V, V_{RIPPLE} = 1V_{PP}	60	75		dB

For 3.3V Output Voltage (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_O	Output Voltage	V_{IN} = 4.8V, I_O = 10mA	3.267	3.3	3.333	V
V_O	Output Voltage	V_{IN} = 4.8V to 12V, I_O = 0mA to 300mA (T_J = 0 ~ 125℃)	3.234		3.366	V
$\triangle V_{LINE}$	Line Regulation	I_O = 0mA , V_{IN} = 4.8V to 12V		0.1	0.2	%
$\triangle V_{LOAD}$	Load Regulation	I_O = 0mA to 300mA, V_{IN} = 5.3 V		0.2	0.4	%
V_{IN}	Operating Input Voltage	I_O = 100mA			12	V
I_D	Quiescent Current	V_{IN} - V_O = 5V		5	10	mA
I_O	Current Limit	V_{IN} - V_O = 5V	1000	1250	1600	mA
$_EN$	Output Noise(%V_O)	B = 10Hz to 10kHz, T_J = 25℃		100		uV
SVR	Supply Voltage Rejection	I_O = 300mA, f = 120Hz, V_{IN} - V_O = 3V, V_{RIPPLE} = 1V_{PP}	60	75		dB

300mA L.D.O VOLTAGE REGULATOR   TJ1117GSF

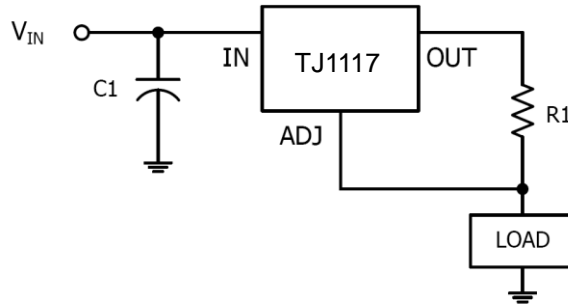**For 5.0V Output Voltage**   (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_O	Output Voltage	V_{IN} = 6.5V, I_O = 10mA	4.950	5.0	5.050	V
V_O	Output Voltage	V_{IN} = 6.5V to 15V, I_O = 0mA to 300mA (T_J = 0 ~ 125℃)	4.900		5.100	V
$\triangle V_{LINE}$	Line Regulation	I_O = 0mA , V_{IN} = 6.5V to 15V		0.1	0.2	%
$\triangle V_{LOAD}$	Load Regulation	I_O = 0mA to 300mA, V_{IN} = 7.0 V		0.2	0.4	%
V_{IN}	Operating Input Voltage	I_O = 100mA			12	V
I_D	Quiescent Current	V_{IN} - V_O = 5V		5	10	mA
I_O	Current Limit	V_{IN} - V_O = 5V	1000	1250	1600	mA
$_EN$	Output Noise(%V_O)	B = 10Hz to 10kHz, T_J = 25℃		100		uV
SVR	Supply Voltage Rejection	I_O = 300mA, f = 120Hz, V_{IN} - V_O = 3V, V_{RIPPLE} = 1V_{PP}	60	75		dB

For All Output Voltage   (T_A=25℃, C_O = 10uF unless otherwise specified)

Symbol	Parameters	Condition	Min.	Typ.	Max.	Unit
V_D	Dropout Voltage	I_O = 300mA		1.2		V
	Temperature Stability			0.5		%
	Long Term Stability	1000 hrs, T_J = 125℃		0.3		%
	Thermal Regulation	T_A = 25℃ 30ms Pulse		0.003		%/W

APPLICATION CIRCUIT

Fig.1 300mA Current Output

Fig.2 Typical Adjustable Regulator

$$V_{OUT} = V_{REF}(1+R2/R1) + I_{ADJ}R2$$
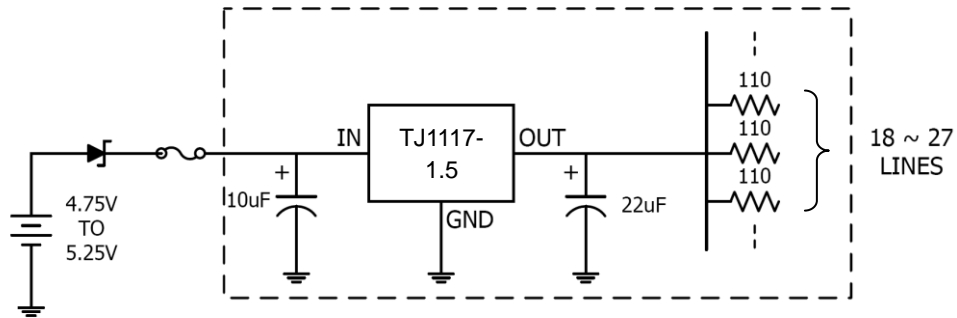
Fig.3 Negative Supply

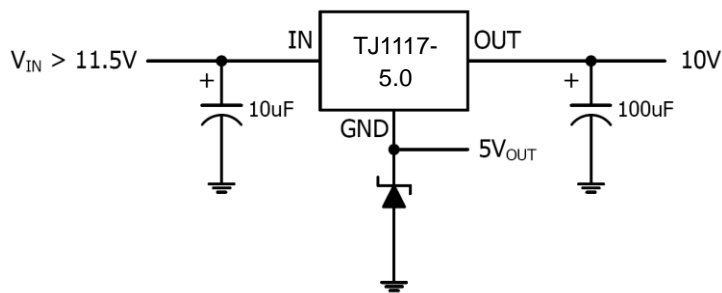**Fig.4 Active Terminator for SCSI-2BUS**

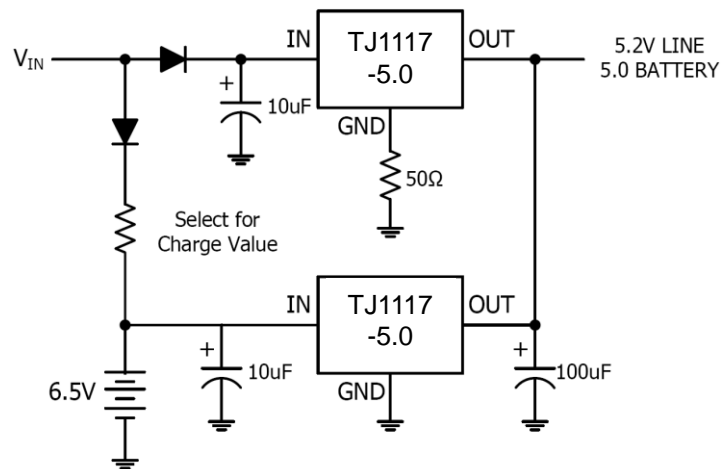
Fig.5 Voltage Regulator with Reference

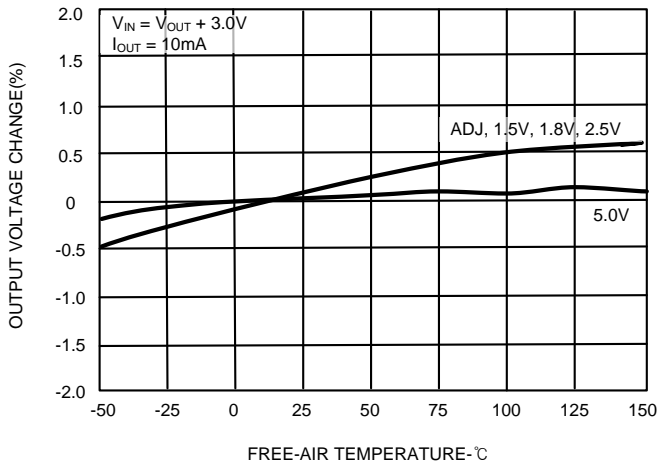**Fig.6 Battery Backed-up Regulated Supply**

TYPICAL OPERATING CHARACTERISTICS
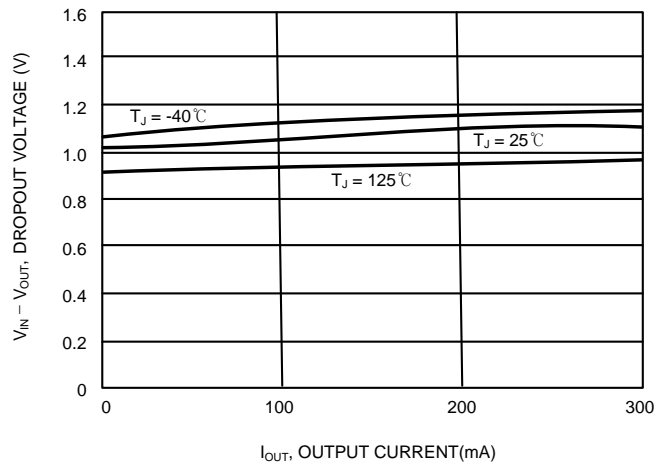
Fig.7 OUTPUT VOLTAGE CHANGE VS TEMPERATURE
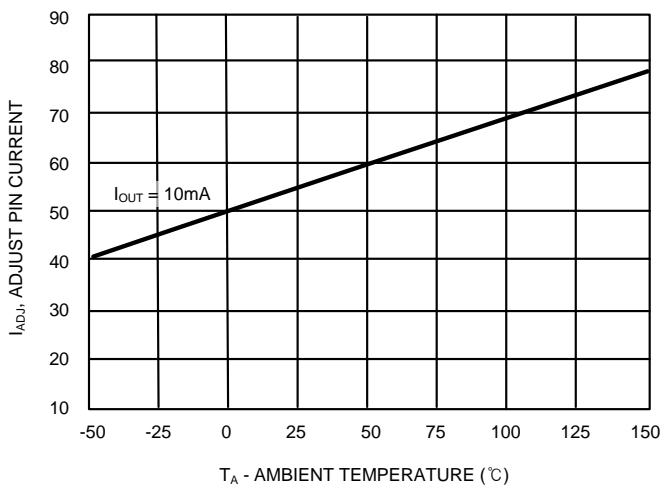
Fig.8 DROPOUT VOLTAGE VS OUTPUT CURRENT
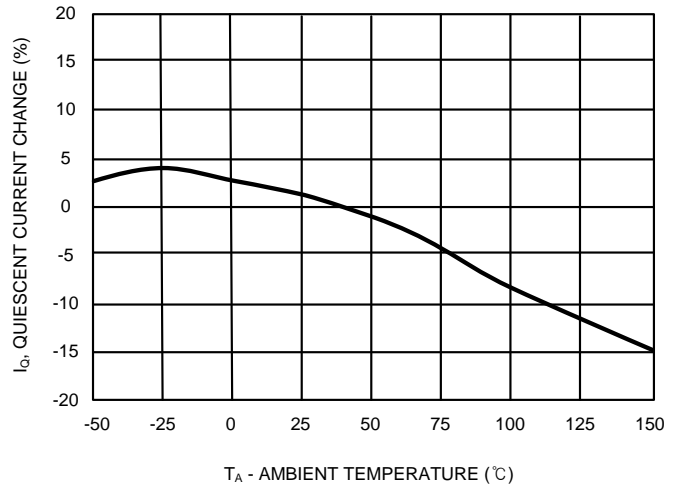
Fig.9 ADJ PIN CURRENT VS TEMPERATURE

Fig.10 QUIESCENT CURRENT CHANGE VS TEMPERATURE

APPLICATION INFORMATION

Maximum Output Current Capability

The TJ1117 can deliver a continuous current of 300mA over the full operating junction temperature range. However, the output current is limited by the restriction of power dissipation which differs from packages. A heat sink may be required depending on the maximum power dissipation and maximum ambient temperature of application. With respect to the applied package, the maximum output current of 300mA may be still undeliverable due to the restriction of the power dissipation of TJ1117. Under all possible conditions, the junction temperature must be within the range specified under operating conditions. The temperatures over the device are given by:

$$T_C = T_A + P_D \times \theta_{CA} \ / \quad T_J = T_C + P_D \times \theta_{JC} \ / \quad T_J = T_A + P_D \times \theta_{JA}$$

where T_J is the junction temperature, T_C is the case temperature, T_A is the ambient temperature, P_D is the total power dissipation of the device, θ_{CA} is the thermal resistance of case-to-ambient, θ_{JC} is the thermal resistance of junction-to-case, and θ_{JA} is the thermal resistance of junction to ambient. The total power dissipation of the device is given by:

$$P_D = P_{IN} - P_{OUT} = (V_{IN} \times I_{IN}) - (V_{OUT} \times I_{OUT})$$
$$= (V_{IN} \times (I_{OUT} + I_{GND})) - (V_{OUT} \times I_{OUT}) = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_{GND}$$

where I_{GND} is the operating ground current of the device which is specified at the Electrical Characteristics. The maximum allowable temperature rise (T_{Rmax}) depends on the maximum ambient temperature (T_{Amax}) of the application, and the maximum allowable junction temperature (T_{Jmax}):

$$T_{Rmax} = T_{Jmax} - T_{Amax}$$

The maximum allowable value for junction-to-ambient thermal resistance, θ_{JA}, can be calculated using the formula:

$$\theta_{JA} = T_{Rmax} \ / \ P_D = (T_{Jmax} - T_{Amax}) \ / \ P_D$$

TJ1117 is available in SOT23 package. The thermal resistance depends on amount of copper area or heat sink, and on air flow. If the maximum allowable value of θ_{JA} calculated above is over 300°C/W for SOT-23 package, no heat sink is needed since the package can dissipate enough heat to satisfy these requirements. If the value for allowable θ_{JA} falls near or below these limits, a heat sink or proper area of copper plane is required. In summary, the absolute maximum ratings of thermal resistances are as follow:

Absolute Maximum Ratings of Thermal Resistance

Characteristic	Symbol	Rating	Unit
Thermal Resistance Junction-To-Ambient / SOT-23	$\theta_{JA\text{-}SOT\text{-}23}$	300	°C/W

No heat sink / No air flow / No adjacent heat source / 0.066 inch^2 copper area. (T_A=25°C)