250mA Low Dropout Voltage Regulator

FEATURES

- Output Current up to 250mA
- 1.0μA Typical Quiescent Current
- 2% Output Voltage Accuracy
- Stable with 1.0μF MLCC
- Over Current Protection
- Good Line and Load Regulation
- Available in SOT-23 and SOT-89 Package
- Moisture Sensitivity Level 3

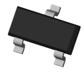
APPLICATIONS

- Battery Powered Equipment
- Portable Cameras and Video Recorders
- Reference Voltage Sources

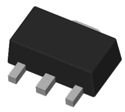
DESCRIPTION

The TJ62FPxx series is a group of positive voltage output, three-pin regulators that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy are achieved through CMOS and programmable fuse technologies. The output voltage is 1.0V to 6.0V in 0.1V increments.

The TJ62FPxx consists of a high-precision voltage reference, an error correction circuit, and a current-limited output driver. The transient response to load variations has improved in comparison to the existing series of positive voltage regulators.



SOT-23



SOT-89

ORDERING INFORMATION

Device	Package
TJ62FPxxGSF	SOT-23-3L
TJ62FPxxGF	SOT-89-3L

xx: Output Voltage

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Input Supply Voltage	V_{IN}	−0.3	14.5	V
Output Voltage	V_{OUT}	−0.3	V_{IN} + 0.3	V
Storage Temperature Range	T_{STG}	−65	150	°C
Maximum Operating Junction Temperature	T_J	−40	125	°C
Operating Ambient Temperature Range	T_{AOPR}	−40	85	°C

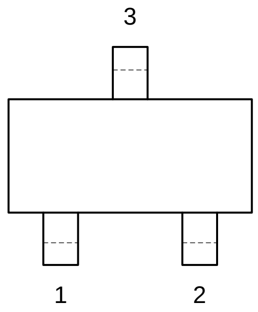
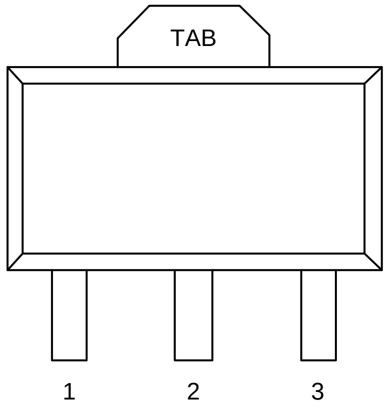
RECOMMENDED OPERATING RATINGS (Note 2)

CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Input Supply Voltage	V_{IN}	2.5	12	V
Output Current	I_{OUT}	-	250	mA
Operating Ambient Temperature Range	T_{AOPR}	0	70	°C

ORDERING INFORMATION

VOUT	Package	Order No.	Description	Supplied As	Status
2.8V	SOT-23-3L	TJ62FP28GSF	250mA, Fixed	Tape & Reel	Active
	SOT-89-3L	TJ62FP28GF	250mA, Fixed	Tape & Reel	Active
3.0V	SOT-23-3L	TJ62FP30GSF	250mA, Fixed	Tape & Reel	Active
	SOT-89-3L	TJ62FP30GF	250mA, Fixed	Tape & Reel	Active
3.3V	SOT-23-3L	TJ62FP33GSF	250mA, Fixed	Tape & Reel	Active
	SOT-89-3L	TJ62FP33GF	250mA, Fixed	Tape & Reel	Active

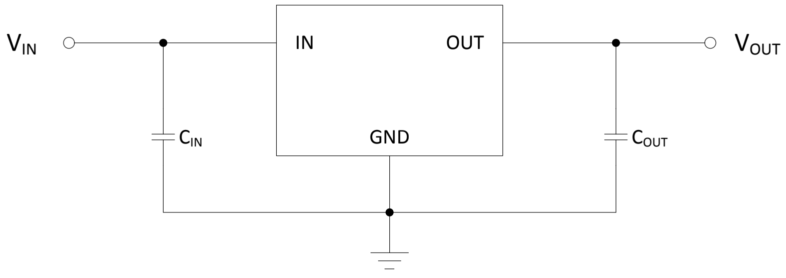
PIN CONFIGURATION

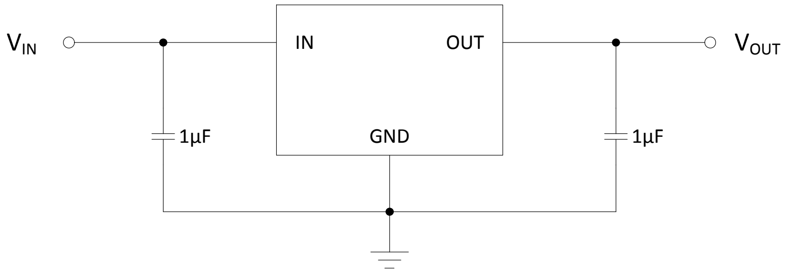
SOT-23	SOT-89-3L
	

PIN DESCRIPTION

Pin No.		Pin Name	Pin Function
SOT-23	SOT-89-3L		
1	1	GND	Ground.
3	2	IN	Input Voltage.
2	3	OUT	Output Voltage.
-	TAB	TAB	Connect to IN. Put a copper plane connected to this pin as a thermal relief.

TYPICAL APPLICATION CIRCUIT





ELECTRICAL CHARACTERISTICS

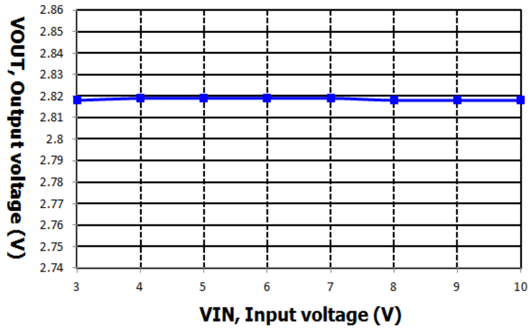
Unless otherwise specified: T_A = 25ºC, V_{IN} = V_{OUT} + 1.0 V (Note 3), C_{IN} = C_{OUT} = 1.0 μF

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{IN}		2.5	-	12	V
Output Voltage	V_{OUT}	I_{OUT} = 40 mA	–2.0	-	2.0	%
Line Regulation	LNR	I_{OUT} = 40 mA, V_{OUT} +1.0 V ≤ V_{IN} ≤ 10 V	-	0.2	0.3	%/V
Load Regulation	LDR	1.0 mA ≤ I_{OUT} ≤ 80 mA	-	0.02	0.03	%/mA
Quiescent Current (Note 4)	I_Q	I_{OUT} = 0A	-	1.0	2.9	μA
Dropout Voltage (Note 5)	V_{DROP}	I_{OUT} = 160 mA, V_{OUT} > 2.5 V	-	0.4	0.7	V
		I_{OUT} = 160 mA, 2.0 V < V_{OUT} < 2.5 V	-	0.55	0.85	
		I_{OUT} = 160 mA, V_{OUT} ≤ 2.0 V	-	0.9	1.3	
Current Limit	I_{CL}	V_{OUT} = 0 V	-	700	-	mA

Note 1. Exceeding the Absolute Maximum Ratings may damage the device.
Note 2. The device is not guaranteed to function outside its operating ratings.
Note 3. The input voltage is equal to either (VOUT +1.0V) or 2.5V, whichever is greater.
Note 4. Ground current, or quiescent current, is the difference between input and output currents. It's defined by $I_{GND} = I_{IN} - I_{OUT}$ under the given loading condition.
Note 5. The dropout voltage is defined as the input-to-output differential when the output voltage drops to 98% of its nominal value with V_{OUT} to V_{IN}.

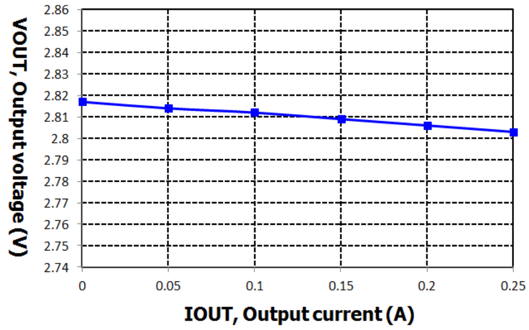
TYPICAL OPERATING CHARACTERISTICS

< VOUT = 2.8V >



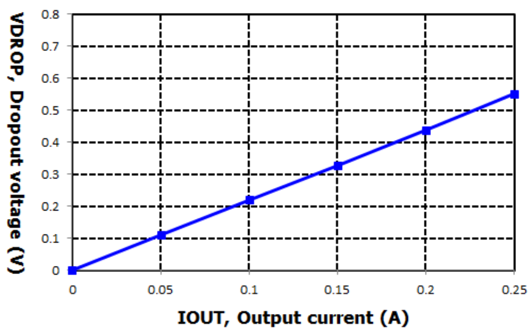
VIN=3V to 10V, VOUT=2.8V @ IOUT=10mA

VIN vs. VOUT



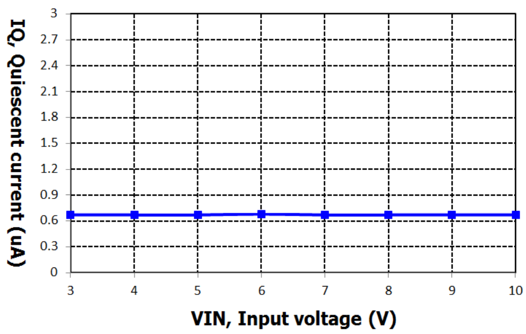
VIN=3.8V, VOUT=2.8V @ IOUT=250mA per 50mA step

IOUT vs. VOUT



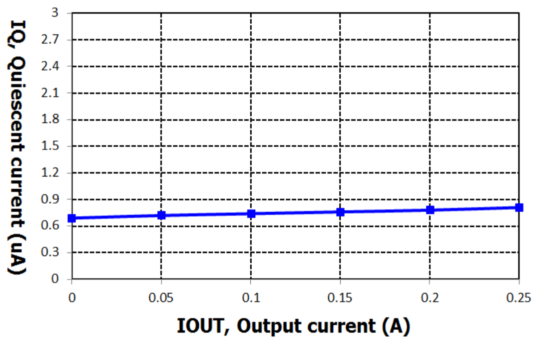
VIN=3.8V, VOUT=2.8V @ IOUT=250mA per 50mA step

IOUT vs. VDROP



VIN=3V to 10V, VOUT=2.8V

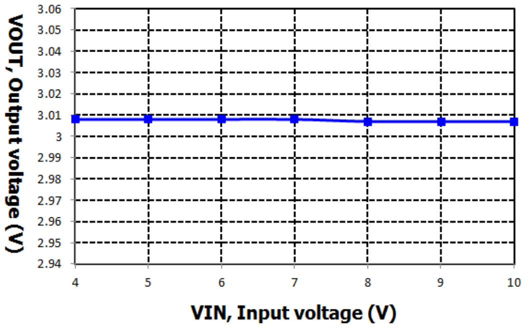
VIN vs. IQ



VIN=3.8V, VOUT=2.8V @ IOUT=250mA per 50mA step

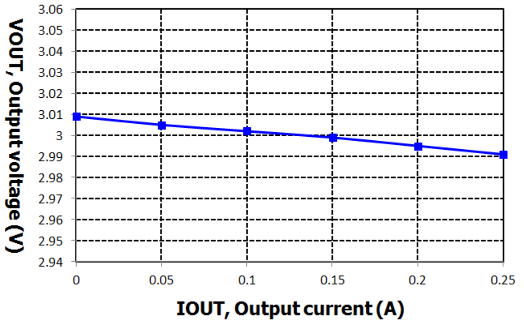
IOUT vs. IQ

< VOUT = 3.0V >



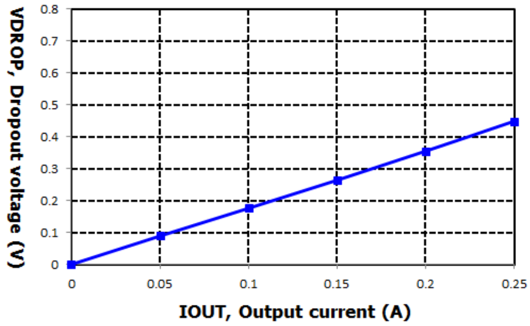
VIN=4.0V to 10V, VOUT=3.0V @ IOUT=10mA

VIN vs. VOUT



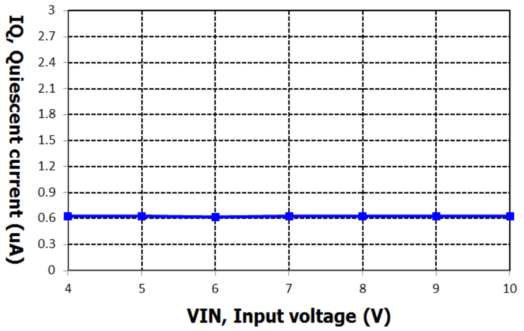
VIN=4.0V, VOUT=3.0V @ IOUT=250mA per 50mA step

IOUT vs. VOUT



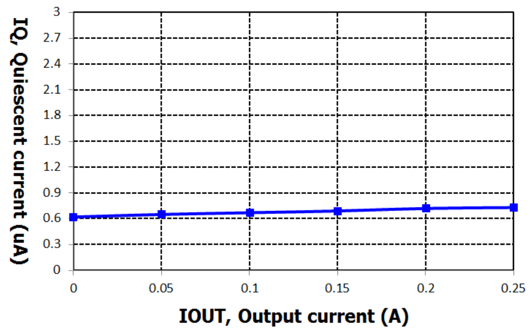
VIN=4.0V, VOUT=3.0V @ IOUT=250mA per 50mA step

IOUT vs. VDROP



VIN=4.0V to 10V, VOUT=3.0V

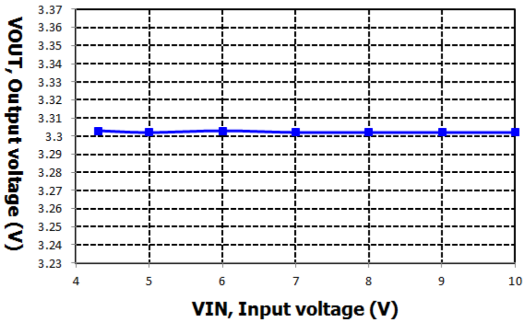
VIN vs. IQ



VIN=4.0V, VOUT=3.0V @ IOUT=250mA per 50mA step

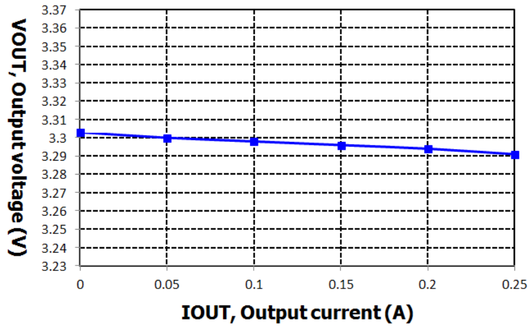
IOUT vs. IQ

< VOUT = 3.3V >



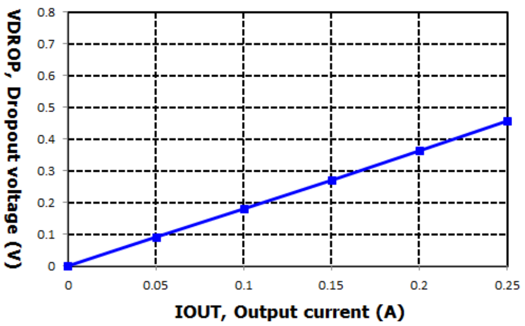
VIN=4.3V to 10V, VOUT=3.3V @ IOUT=10mA

VIN vs. VOUT



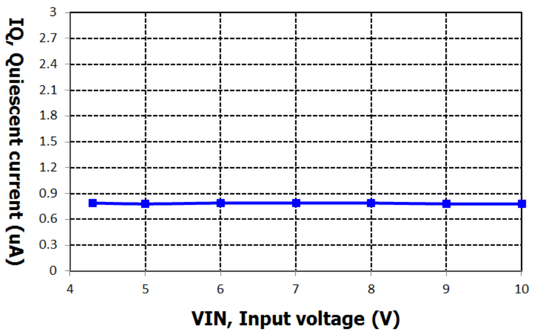
VIN=4.3V, VOUT=3.3V @ IOUT=250mA per 50mA step

IOUT vs. VOUT



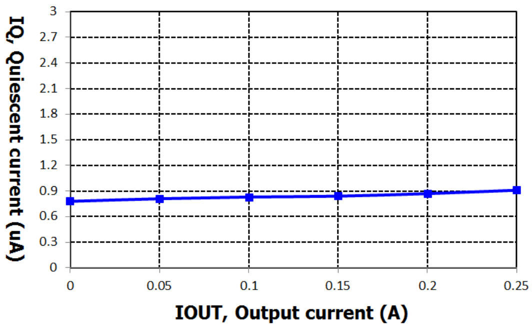
VIN=4.3V, VOUT=3.3V @ IOUT=250mA per 50mA step

IOUT vs. VDROP



VIN=4.3V to 10V, VOUT=3.3V

VIN vs. IQ



VIN=4.3V, VOUT=3.3V @ IOUT=250mA per 50mA step

IOUT vs. IQ

APPLICATION INFORMATION

MAXIMUM OUPUT CURRENT CAPABILITY

The TJ62FPxx can deliver a continuous current of 250mA over the full operating junction temperature range. However, the output current is limited by the restriction of power dissipation of package. 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 250mA may be still undeliverable due to the restriction of the power dissipation of TJ62FPxx. Under all possible conditions, the junction temperature must be within the range specified under operating conditions.
The temperatures over the device are given by:

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

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:

$$\theta_{JA} = T_{Rmax} / P_D$$

If proper cooling solution such as copper plane area, heat sink or air flow is applied, the maximum allowable power dissipation could be increased. However, if the ambient temperature is increased, the allowable power dissipation would be decreased.

REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.