

## FEATURES

- Input Operating Voltage Range up to 30V
- 1.0 $\mu$ A Typical Quiescent Current
- 2% Output Voltage Accuracy
- Stable with 1.0 $\mu$ F MLCC
- Output Current up to 100mA
- Over Current Protection
- Available in SOT-23-5 and SOT-89 Packages
- Moisture Sensitivity Level 3

## APPLICATIONS

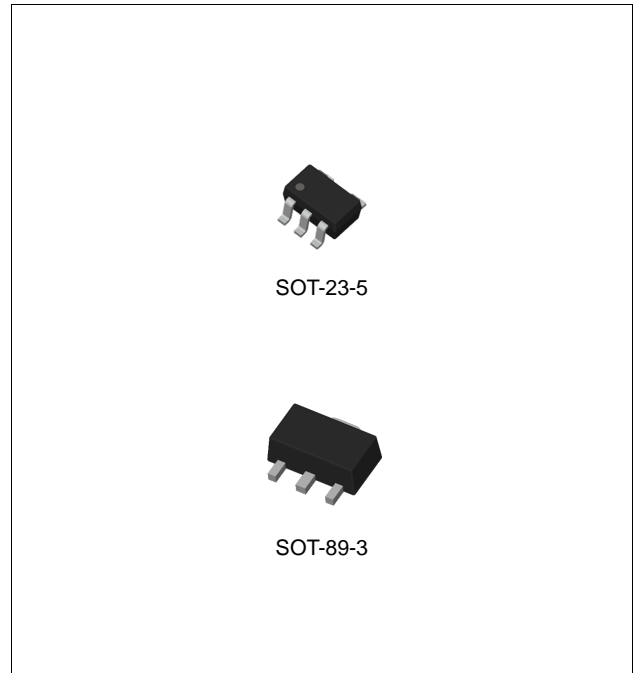
- Battery Powered Equipment
- Battery-Powered Alarm Circuits
- Portable Cameras and Video Recorders
- Microcontroller Power
- PDAs
- Reference Voltage Sources
- Consumer Products

## DESCRIPTION

The TJ75xxA is family of CMOS low dropout Regulator with high input voltage maximum 30V.

The load current is up to 100mA. The typical quiescent current is only 1 $\mu$ A.

The TJ75xxA can operate with low cost ceramic capacitors, 1 $\mu$ F MLCCs.



## ORDERING INFORMATION

Device	Package
TJ75xxAGSF5	SOT-23-5L
TJ75xxAGF	SOT-89-3L

xx: Output Voltage

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Input Supply Voltage	$V_{IN}$	-0.3	33	V
Operating Junction Temperature	$T_J$	-40	125	°C
Operating Ambient Temperature Range	$T_A$	-40	85	°C
Lead Temperature (Soldering, 10 seconds)	$T_{SOL}$	-	260	°C
Storage Temperature Range	$T_{STG}$	-65	150	°C

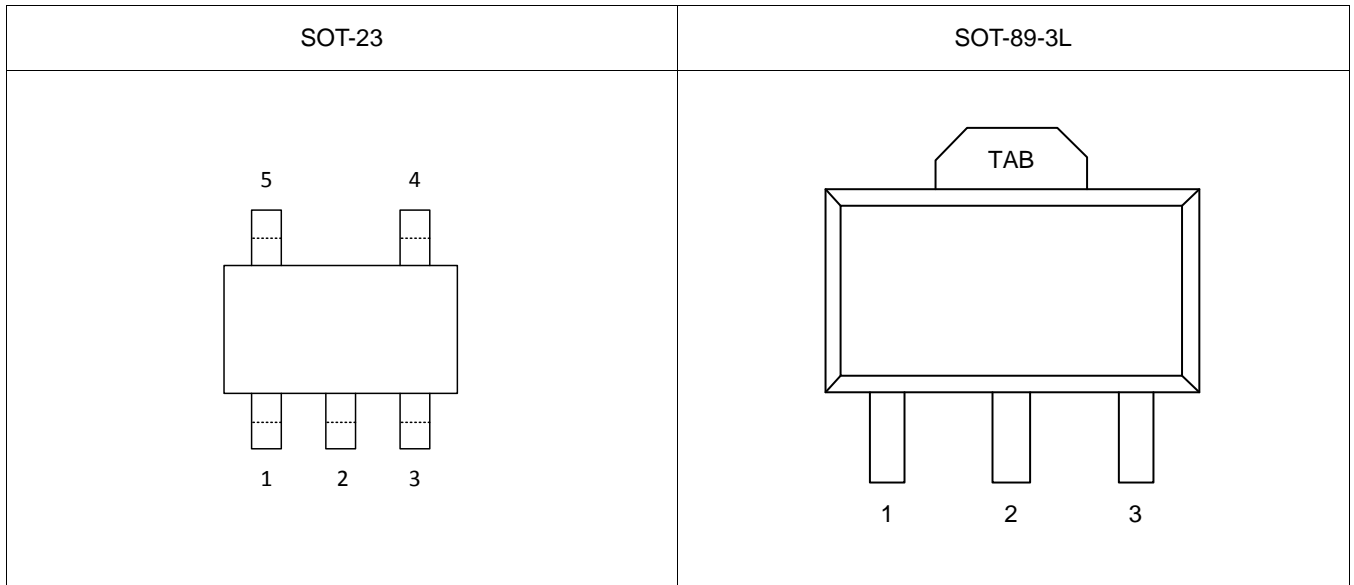
**RECOMMENDED OPERATING RATINGS** (Note 2)

CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Input Supply Voltage	$V_{IN}$	-	30	V
Output Current	$I_{OUT}$	-	100	mA

**ORDERING INFORMATION**

V <sub>OUT</sub>	Package	Order No.	Description	Supplied As	Status
3.3V	SOT-23-5L	TJ7533AGSF5	100mA, Fixed	Tape & Reel	Active
	SOT-89-3L	TJ7533AGF	100mA, Fixed	Tape & Reel	Active
5.0V	SOT-23-5L	TJ7550AGSF5	100mA, Fixed	Tape & Reel	Active
	SOT-89-3L	TJ7550AGF	100mA, Fixed	Tape & Reel	Active

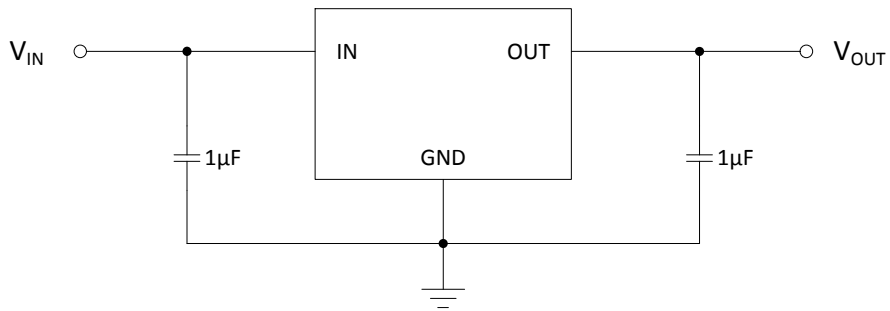
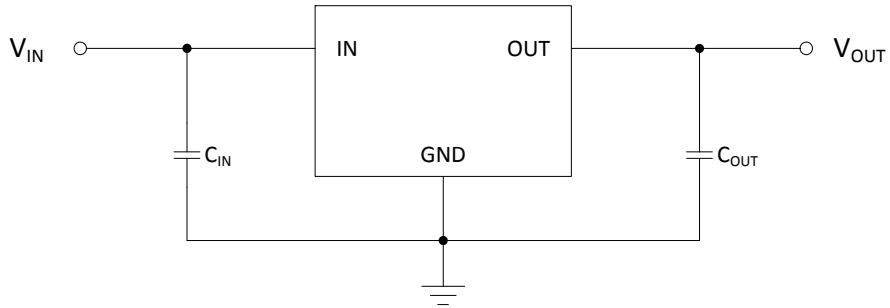
## PIN CONFIGURATION



## PIN DESCRIPTION

Pin No.		Pin Name	Pin Function
SOT-23-5L	SOT-89-3L		
1	1	GND	Ground.
2	2	IN	Input Voltage.
3	3	OUT	Output Voltage.
4	-	N.C.	No Connection.
5	-	N.C.	No Connection.
-	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:  $T_J = 25^\circ\text{C}$ ,  $V_{IN} = V_{OUT} + 1.0\text{ V}$ ,  $C_{IN} = C_{OUT} = 1.0\ \mu\text{F}$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT} = 1.0\text{ mA}$	-2.0	-	2.0	%
Quiescent Current <sup>(Note 3)</sup>	$I_Q$	$1.0\text{ mA} \leq I_{OUT} \leq 50\text{ mA}$	-	1.0	3.0	$\mu\text{A}$
Line Regulation	$\Delta V_{LINE}$	$V_{OUT} + 1.0\text{ V} \leq V_{IN} \leq 30\text{ V}$ , $I_{OUT} = 1.0\text{ mA}$	-	0.02	0.2	%/V
Load Regulation <sup>(Note 4)</sup>	$\Delta V_{LOAD}$	$V_{IN} = V_{OUT} + 2.0\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 50\text{ mA}$	-	25	60	mV
Dropout Voltage <sup>(Note 5)</sup>	$V_{DROP}$	$I_{OUT} = 50\text{ mA}$ , $V_{OUT} = 3.3\text{ V}$	-	600	-	mV
Power Supply Ripple Rejection	PSRR	$V_{IN} = 6.0\text{ V}$ , $V_{OUT} = 5.0\text{ V}$ , $I_{OUT} = 1.0\text{ mA}$ , $f = 100\text{ Hz}$	-	34	-	dB
OCP Threshold Level	$I_{OCP}$		-	200	-	mA
VOU Temperature Coefficient	$TC_{VOUT}$		-	100	-	ppm/ $^\circ\text{C}$

Note 1. Stresses listed as the absolute maximum ratings may cause permanent damage to the device. These are for stress ratings. Functional operating of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibly to affect device reliability.

Note 2. The device is not guaranteed to function outside its operating ratings.

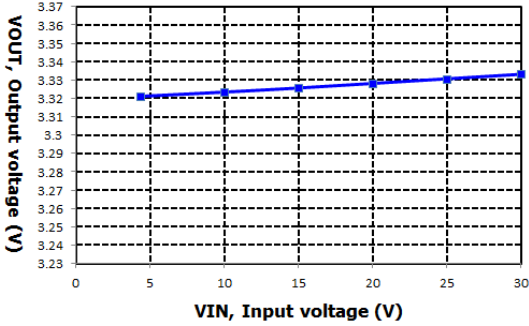
Note 3. Ground current, or quiescent current, is the difference between input and output currents. It's defined by  $I_{GND} = I_{IN} - I_{OUT}$  under the given loading condition. The total current drawn from the supply is the sum of the load current plus the ground pin current.

Note 4. Load regulation is measured using pulse techniques with 5% duty cycle.

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  $V_{IN}$ .

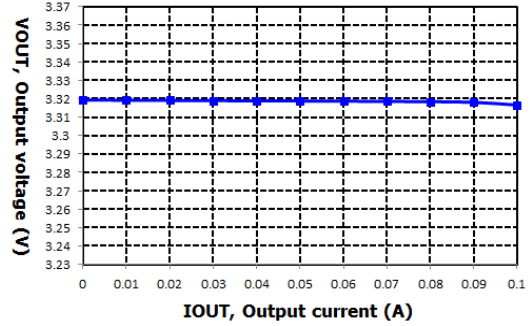
TYPICAL OPERATING CHARACTERISTICS

< VOUT = 3.3V >



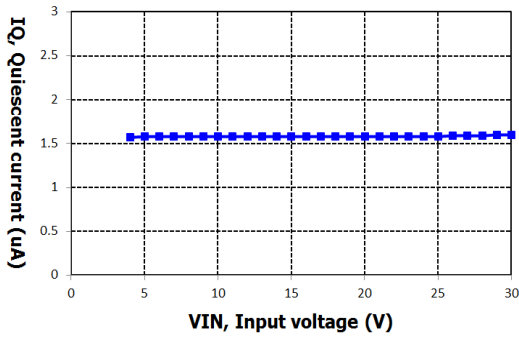
VIN=4.3V to 30V, VOUT=3.3V @ IOU=10mA

VIN vs. VOUT



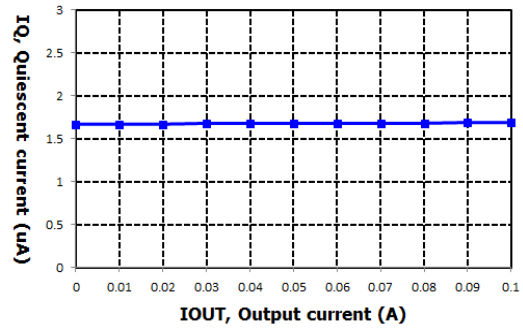
VIN=4.3V, VOUT=3.3V @ IOU=100mA per 10mA step

IOU vs. VOUT



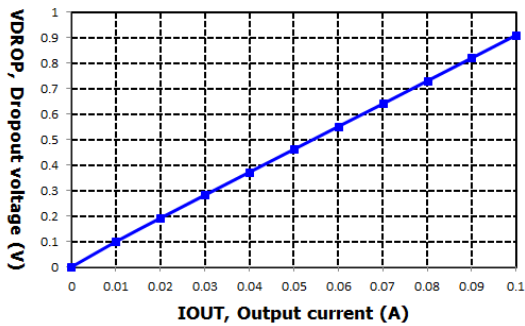
VIN=4.3V to 30V, VOUT=3.3V

VIN vs. IQ



VIN=4.3V, VOUT=3.3V @ IOU=100mA per 10mA step

IOU vs. IQ



VIN=5.0V, VOUT=3.3V @ IOU=100mA per 10mA step

IOU vs. VDROP

## APPLICATION INFORMATION

### MAXIMUM OUPUT CURRENT CAPABILITY

The TJ75xxA can deliver a continuous current of 100mA 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 100mA may be still undeliverable due to the restriction of the power dissipation of TJ75xxA. 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,  $\theta_{CA}$  is the thermal resistance of case-to-ambient,  $\theta_{JC}$  is the thermal resistance of junction-to-case, and  $\theta_{JA}$  is the thermal resistance of junction to ambient.

The total power dissipation of the device is given by:

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

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,  $\theta_{JA}$ , can be calculated using the formula:

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

TJ75xxA is available in SOT-23-5L and SOT-89-3L packages. The thermal resistance depends on amount of copper area or heat sink, and on air flow. 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.



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