

20V 300mA Low Quiescent Current Linear Regulator

Features

- Input Voltage Range: 2.5V to 20V
- Output Voltage Range:
 - Fixed: 1.8V, 3.3V, 5V
- Very Low Dropout Voltage: 152mV at 300mA
- Low Quiescent Current: 69µA Typical
- Output Voltage Accuracy: 2%
- Excellent Load and Line Transient Responses
- Thermal Shutdown and Over-Current Protection
- Stable with 1µF or Larger Ceramic Capacitor
- Operating Junction Temperature: -40°C to +125°C
- Available package: SOT23-5

Description

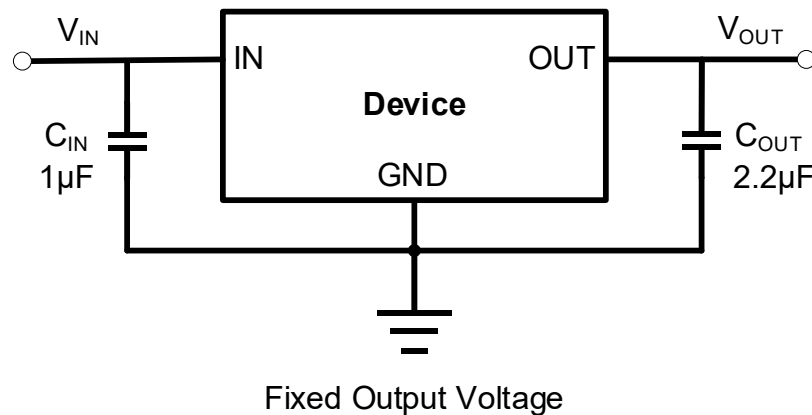
The TLV704 is a low quiescent current device that offers the benefits of a wide input voltage range and low power operation in miniaturized packaging.

The TLV704 LDO supports a very low dropout of typically 80mV at 150mA load current. The TLV704 also features an internal soft-start to lower the inrush current, over current limit, thermal shutdown protection, as well as automatic discharge function to quickly discharge V_{OUT} in the disabled states.

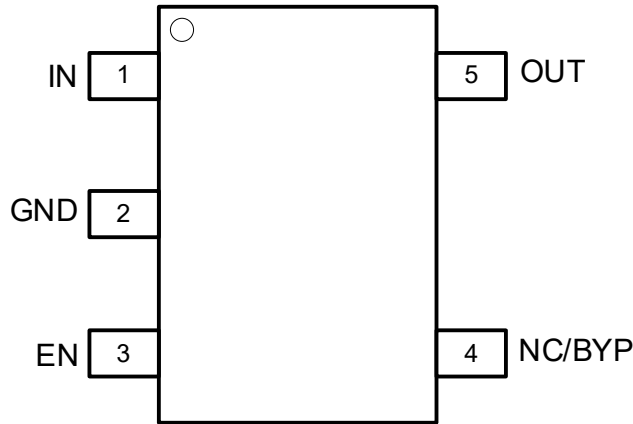
Applications

- Home and Building Automation
- Medical Applications
- Portable Equipment
- Battery-Powered Systems
- High-Efficiency Linear Power Supplies

Typical Application Circuits



Pin Configuration and Functions



5-Pin SOT-23 (Top View)

Pin Descriptions

PIN Number	PIN Name	I/O	Function
1	IN	I	Input supply voltage pin. It is recommended to use a 1 μ F or larger ceramic capacitor from IN pin to ground to get a good power supply decoupling.
2	GND	-	Ground.
3	EN	I	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.
4	NC/BYP	I	Do not connect (NC) or Connect a 10nF to ground to reduce output noise (BYP).
5	OUT	O	Regulator output voltage pin. A 1 μ F or larger ceramic capacitor from OUT to ground is required to ensure regulator stability. The capacitor should be placed as close to the output as possible. Minimize the impedance from the OUT pin to the load.

Package/Ordering Information

DEVICE	PACKAGE TYPE	MARKING	OUTPUT Voltage	PACKING OPTION
TLV70418DBVR	SOT23-5	1NG	1.8V	Tape and Reel, 3000
TLV70433DBVR	SOT23-5	PAO	3.3V	Tape and Reel, 3000
TLV70450DBVR	SOT23-5	PAX	5.0V	Tape and Reel, 3000

Electrical Specifications

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
IN and OUT Pins	IN and OUT	-0.3 to 22	V
Storage temperature range	T _{STG}	-65 to +150	°C
Output current	I _{OUT}	Internally Limited	A

Notes:

1. Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

ESD Ratings

		Value	Unit
V _{ESD}	Electrostatic Discharge	HBM (Human Body Model)	3000
		CDM (Charge Device Model)	1000

Recommended Operation Conditions

Over operating temperature range unless otherwise noted

Parameter	Symbol	Min	Max	Unit
Input Supply Voltage	V _{IN}	2.5	20	V
Output Voltage	V _{OUT}	1.8	5	V
Output Capacitance	C _{OUT}	2.2	220	μF
Output Current	I _{OUT}	0	300	mA
Operating Junction Temperature	T _J	-40	125	°C

Thermal Information

Package	R _{θJA}	Unit
SOT23-5	205	°C/W

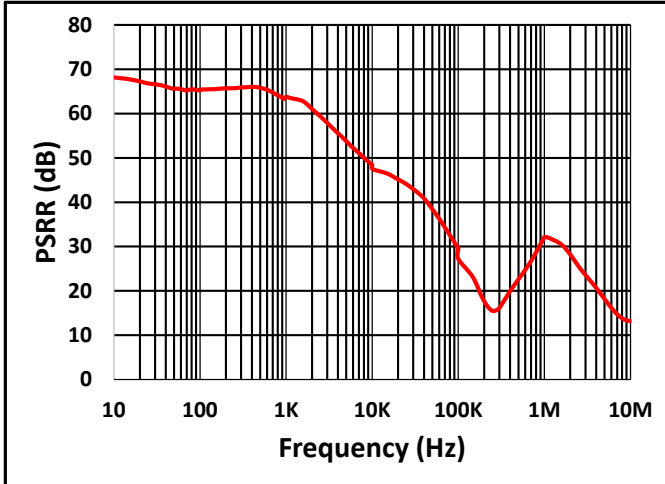
Electrical Characteristics

$V_{IN} = 2.5V$ or $V_{IN} = V_{OUT} + 1V$ (whichever is greater), $I_{OUT} = 1mA$, $C_{OUT} = 2.2\mu F$, typical values are at $T_A = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Voltage	V_{IN}		2.5	-	20	V
Output Voltage Accuracy		$0.1mA \leq I_{OUT} \leq 300mA$	-2.0	0	2.0	%
GND Pin Current	I_{GND}	$V_{IN} = 2.5V$, No Load		69		μA
		$V_{IN} = 20V$, $I_{OUT} = 300mA$		220		μA
Dropout Voltage	V_{DO}	$V_{OUT} = 3.3V$, $I_{OUT} = 300mA$		152		mV
Output Current Limit	I_{LIM}	$V_{OUT} = 0$	300			mA
Line Regulation	$\Delta V_{OUT(LINE)}$	$V_{IN} = (V_{OUT} + 1V)$ to 20V		0.05		mV/V
Load Regulation	$\frac{\Delta V_{OUT}}{(V_{OUT} \Delta I_{OUT})}$	$V_{IN} = 6V$, $I_{OUT} = 1mA$ to 300mA		0.3		%/A
EN pin low-level input voltage (device disabled)	$V_{IL(EN)}$				0.5	V
EN pin high-level input voltage (device enabled)	$V_{IH(EN)}$		1.6			V
EN PIN Leakage Current	I_{EN}	$V_{EN} = 20V$		0.8		μA
Power Supply Ripple Rejection	PSRR	$f = 1kHz$, $V_{OUT} = 5V$, $I_{OUT} = 300mA$		64		dB
Output Noise Voltage	V_N	BW = 100Hz to 100kHz, $C_{BYP} = 10nF$, $C_{OUT} = 2.2\mu F$, $V_{OUT} = 1.8V$, $I_{OUT} = 300mA$		45		μV_{RMS}
Thermal Shutdown Temperature	TSD			160		$^\circ C$
Thermal Shutdown Hysteresis	T_{HYS}			20		$^\circ C$

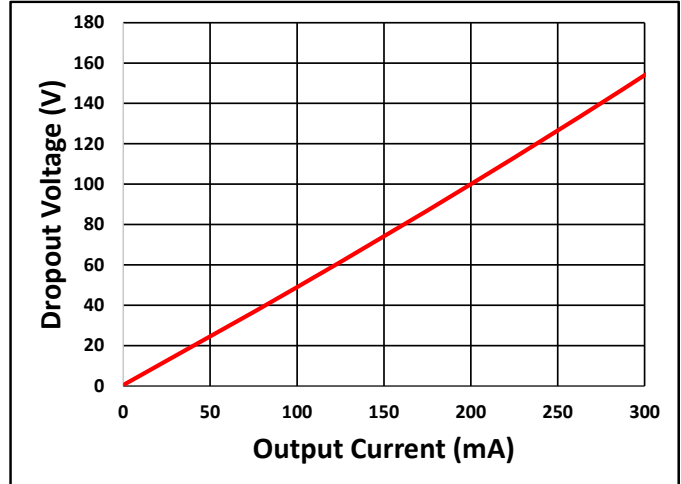
Typical Characteristics

$C_{IN} = 1\mu F$, $C_{OUT} = 2.2\mu F$, $I_{OUT} = 300mA$, $T_A = 25^\circ C$ unless otherwise noted



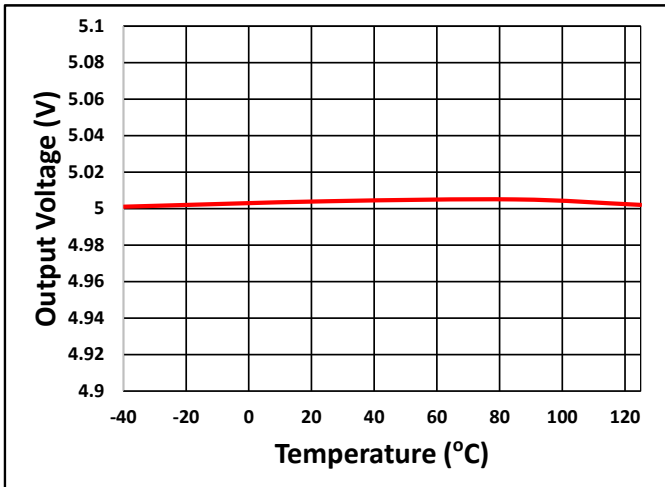
$V_{IN} = 6V$, $V_{OUT} = 5V$, $I_{OUT} = 300mA$, $C_{OUT} = 2.2\mu F$

Fig. 1 PSRR



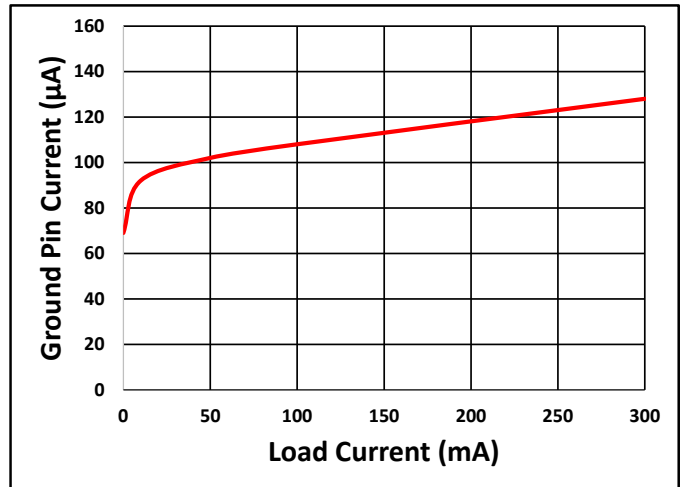
$V_{IN} = 6V$

Fig. 2 Dropout Voltage



$V_{IN} = 6V$, $I_{OUT} = 0.1mA$

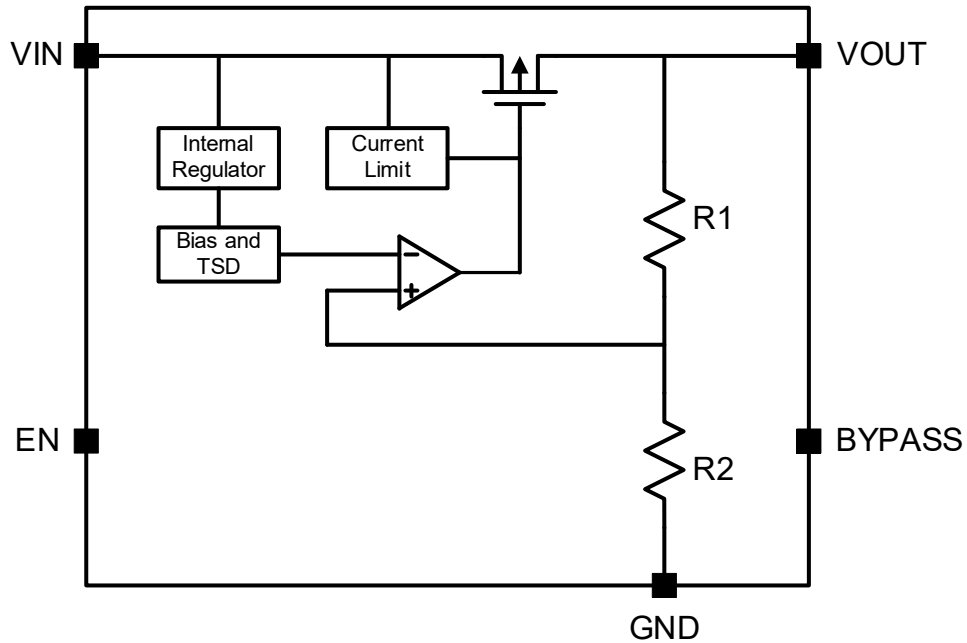
Fig. 3 Output Voltage vs Temperature



$V_{IN} = 2.5V$, $I_{OUT} = 0.1mA$

Fig. 4 Ground Current vs Load Current

Functional Block Diagram



Block Diagram of Fixed Output Voltage

Feature Description

Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited.

Undervoltage Lockout (UVLO)

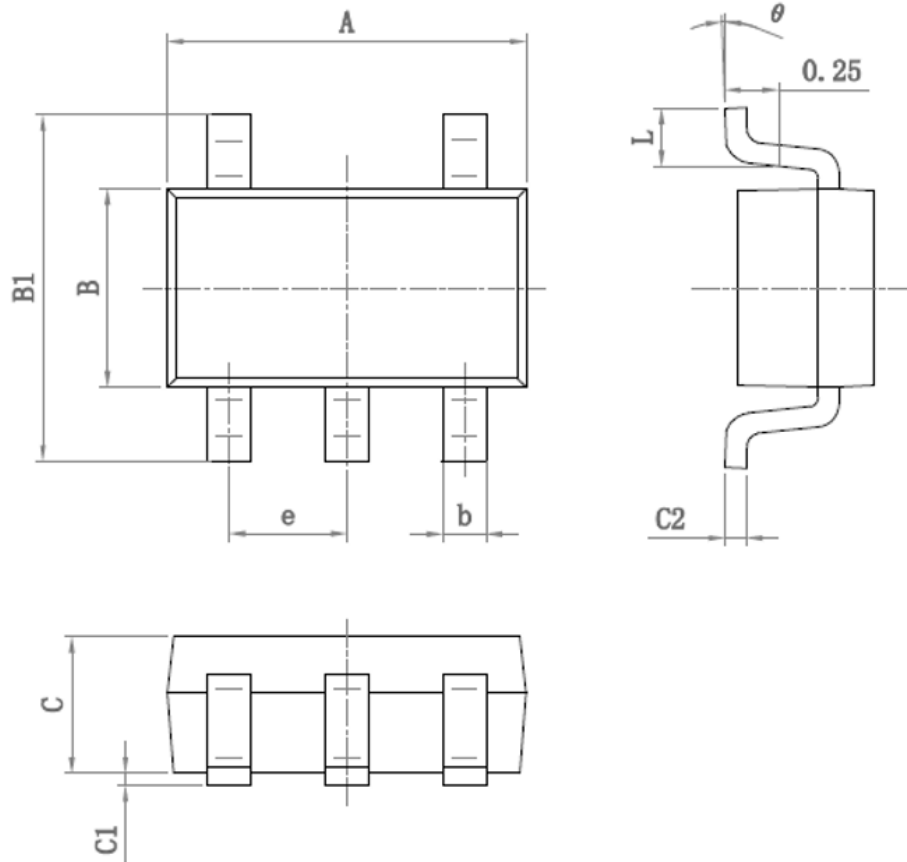
The device uses an undervoltage lockout circuit to keep the output shut off until the internal circuitry is operating properly.

Thermal Protection

The device contains a thermal shutdown protection circuit to turn off the output current when excessive heat is dissipated in the LDO.

PACKAGE OUTLINE DIMENSIONS

SOT23-5



Symbol	Dimensions (mm)		Symbol	Dimensions (mm)	
	Min	Max		Min	Max
A	2.82	3.02	C	1.05	1.15
e	0.95 (BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.60	3.00	theta	0°	8°