

300mA Low IQ Small-Size Low-Dropout Regulator

Features

- Input Voltage Range: 2.5V to 6.5V
- Output Voltage Range:
 - Fixed Operation: 1.2V, 1.8V, 2.5V, 3.0V, 3.3V
- Maximum output current: 300mA
- Low Dropout Voltage: 152mV at 300mA
- Output Voltage Accuracy: 2%
- Low Quiescent Current
- Excellent Load and Line Transient Responses
- Thermal Shutdown and Over-Current Protection
- Stable with 1 μ F or Larger Ceramic Capacitor
- Operating Junction Temperature: -40°C to +125°C
- Available package: SOT23-5

Description

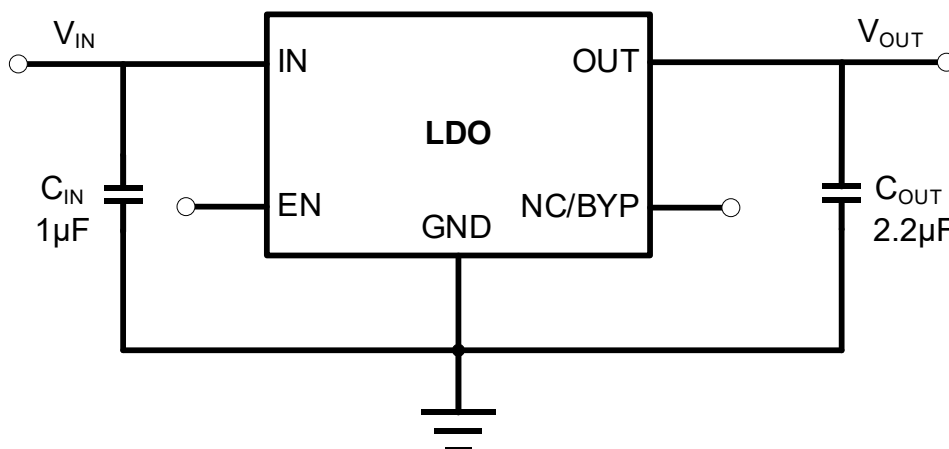
The device is an ultra-small, low quiescent current, low-dropout regulator that sources 300mA with fast line and load transient performance. The output voltage is fixed and spans from 1.2V to 3.3V.

The device also features short-circuit current limit and thermal shutdown protection, as well as automatic discharge function to quickly discharge V_{OUT} in the disabled states.

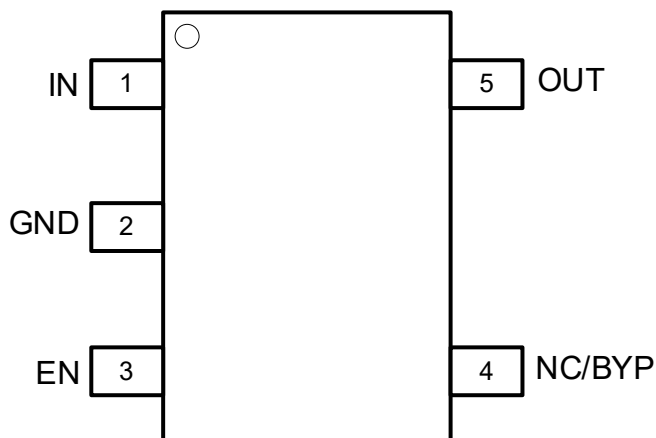
Applications

- Set-Top Boxes, TV, and Gaming Consoles
- Portable and Battery-Powered Equipment
- Desktops, Notebooks, and Ultrabooks
- Tablets and Remote Controls
- White Goods and Appliances
- Grid Infrastructure and Protection Relays
- Camera Modules and Image Sensors

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	-	Do not connect (NC) or Connect a 10nF to ground to reduce output noise (BYP).
5	OUT	O	Regulator output voltage pin. A 2.2 μ F or larger ceramic capacitor from OUT to ground is required to ensure regulator stability.

Package/Ordering Information

DEVICE	PACKAGE TYPE	MARKING	OUTPUT VOLTAGE	PACKING OPTION
TLV70012DDCR	SOT23-5	ODO	1.2V	Tape and Reel, 3000
TLV70018DDCR	SOT23-5	ODK	1.8V	Tape and Reel, 3000
TLV70025DDCR	SOT23-5	DAU	2.5V	Tape and Reel, 3000
TLV70030DDCR	SOT23-5	ODM	3.0V	Tape and Reel, 3000
TLV70033DDCR	SOT23-5	ODN	3.3V	Tape and Reel, 3000

Electrical Specifications

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
IN, OUT and EN Pins	IN, OUT and EN	-0.3 to 7	V
Storage temperature range	T _{STG}	-65 to +150	°C
Output current	I _{OUT}	300	mA

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	6.5	V
Enable Input Voltage	EN	0	V _{IN}	V
Output Voltage	V _{OUT}	1.2	5.0	V
Output Capacitance	C _{OUT}	1	47	μF
Output Current	I _{OUT}	0	300	mA
Operating Junction Temperature	T _J	-40	125	°C

Thermal Information

Package	R _{θJA}	Unit
SOT23-5	195	°C/W

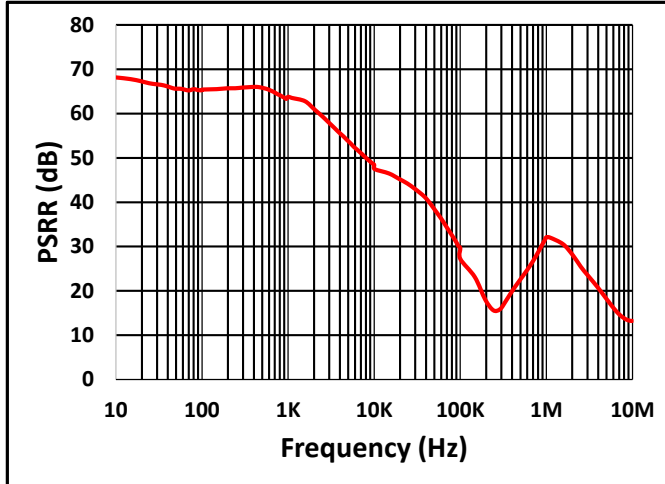
Electrical Characteristics

$V_{IN} = 2.5V$ 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	Test Conditions	Min	Typ	Max	Unit
Input Voltage	V_{IN}		2.5	-	6.5	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
		$V_{IN} = 2.5V$, $I_{OUT} = 300mA$		128		μA
Shutdown Current	I_{SHDN}	$V_{IN} = 2.5V$, $V_{EN} = 0V$		2.3		μA
Dropout Voltage	V_{DO}	$V_{OUT} = 3.3V$, $I_{OUT} = 300mA$		152		mV
Output Current Limit	I_{LIM}	$V_{OUT} = 0V$	300			mA
Line Regulation	$\Delta V_{OUT(LINE)}$	$V_{IN} = V_{OUT} + 1V$ to 6.5V		0.15		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}	$V_{EN} = 6.5V$		0.8		μA
Power Supply Ripple Rejection	PSRR	$f = 1kHz$, $V_{OUT} = 3.3V$, $I_{OUT} = 300mA$		64		dB
Thermal Shutdown Temperature	TSD			160		$^\circ C$
Thermal Shutdown Hysteresis	T_{HYS}			20		$^\circ C$

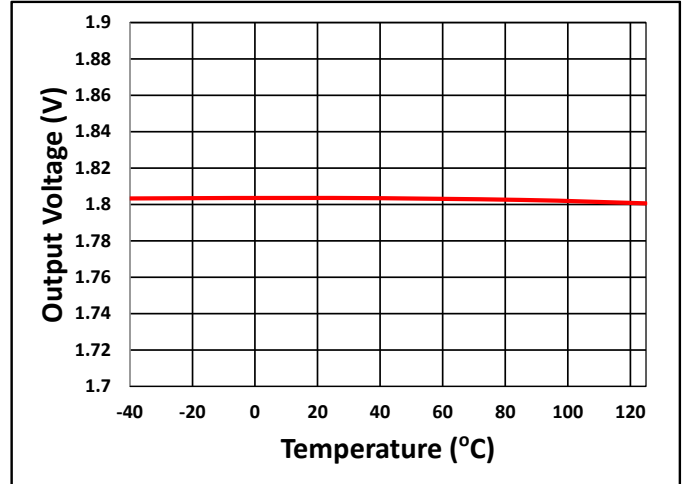
Typical Characteristics

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



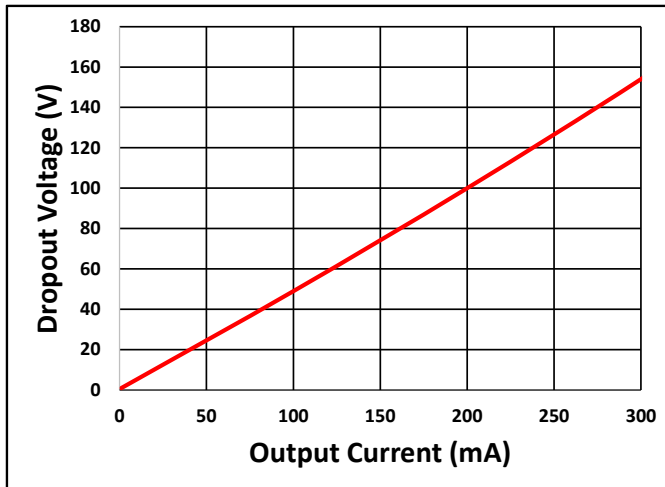
$V_{IN} = 6V$, $V_{OUT} = 3.3V$, $I_{OUT} = 300mA$, $C_{OUT} = 2.2\mu F$

Fig. 1 PSRR



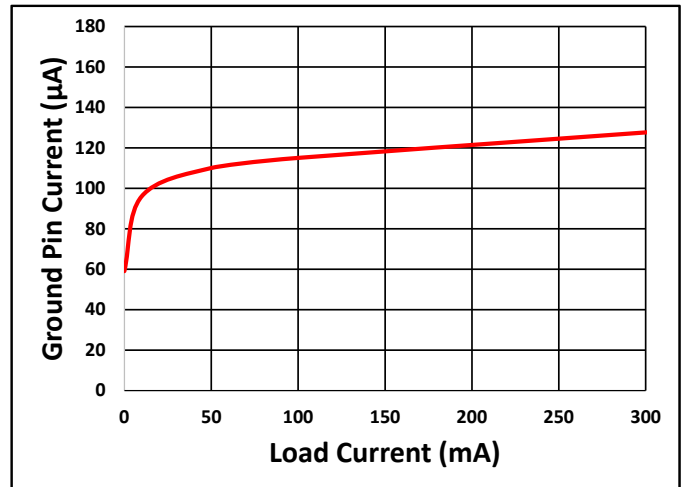
$V_{IN} = 6V$, $V_{OUT} = 3.3V$, $I_{OUT} = 0.1mA$

Fig. 2 Output Voltage vs Temperature



$V_{IN} = 6V$

Fig. 3 Dropout Voltage



$V_{IN} = 2.5V$

Fig. 4 Ground Current vs Load Current

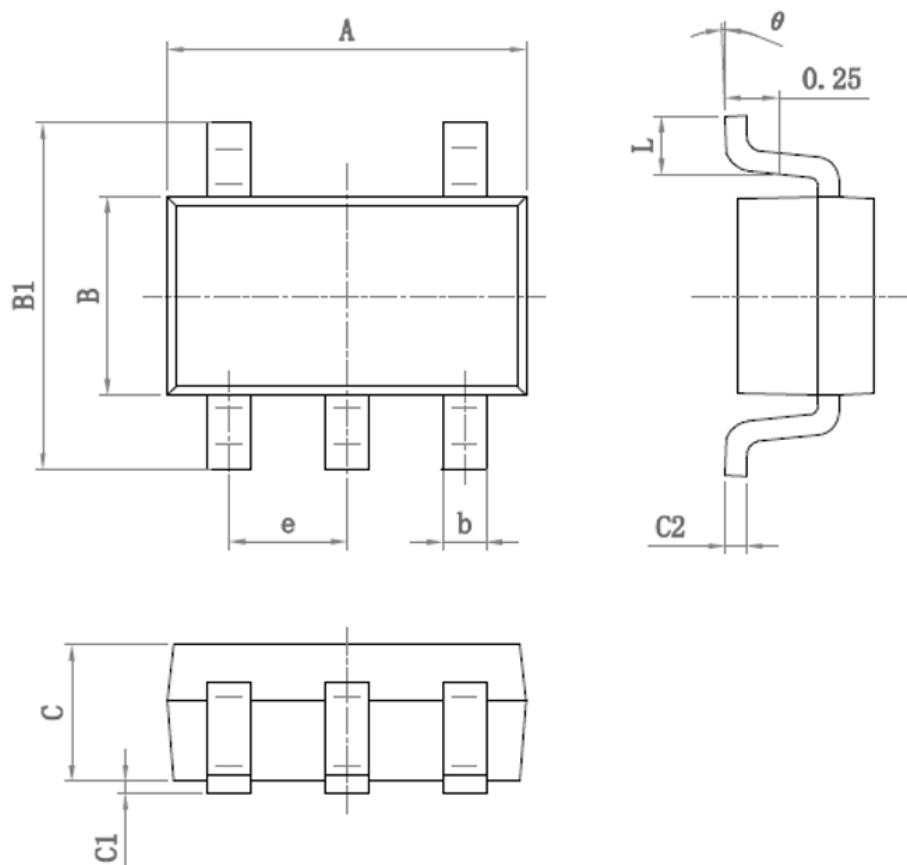
The diagram illustrates a voltage regulator system with the following components and connections:

- Inputs:** VIN (Input Voltage) and EN (Enable).
- Internal Blocks:**
 - Internal Regulator:** Receives VIN and EN, and provides the output VOUT.
 - Bias and TSD (Thermal Shutdown):** Receives VIN and EN, and provides a feedback signal to the Current Limit block.
 - Current Limit:** Receives the feedback signal from the Bias and TSD block and provides a current limit signal to the Internal Regulator.
- Output:** VOUT (Output Voltage).
- Resistors:** R1 and R2 are connected in series between VOUT and GND (Ground).
- Capacitor:** A capacitor is connected between VOUT and GND.

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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	θ	0°	8°