



General Description

The TPS7A03xxDBVR is a high accuracy, low noise, high speed CMOS Linear regulator with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small. The devices offer a new level of cost effective performance in cellular phones, laptop and ebook computers, and other portable devices.

The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin.

The TPS7A03xxDBVR regulators are available in standard SOT-23-5L package. Standard products are Pb-free and Halogen-free.

Features

- Input voltage: 1.5V~6.5V
- Output range: 1.2V~5.0V
- Maximum output current: 400mA@VOUT=3.3V
- PSRR: 60dB@1KHz
- Dropout voltage: 180mV @ IOU=100mA
- Quiescent current: 0.5uA Typ
- Shut-down current: < 1uA
- Recommend capacitor: 1uF
- Built-in Short-Circuit Protection, Current Limiter

Application

- Radio control systems
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable consumer equipments

Pin Configuration And Descriptions

SOT-23-5L (Top View)

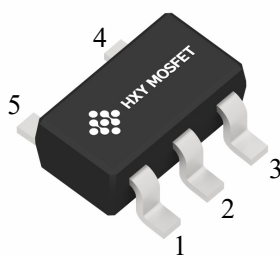


Table2: TPS7A03xxDBVR series (SOT-23-5L PKG)

PIN NO	PIN NAME	FUNCTION
1	VIN	Input
2	GND	Ground
3	EN	Enable(Active high, not floating)
4	NC	Not connected
5	VOUT	Output

Order Information

Orderable Device	Package	Temperature	Packing Option
TPS7A03xxDBVR	SOT-23-5L	1.2V-5.0V	3000/Reel

xx: From 12-50



Absolute Maximum Ratings

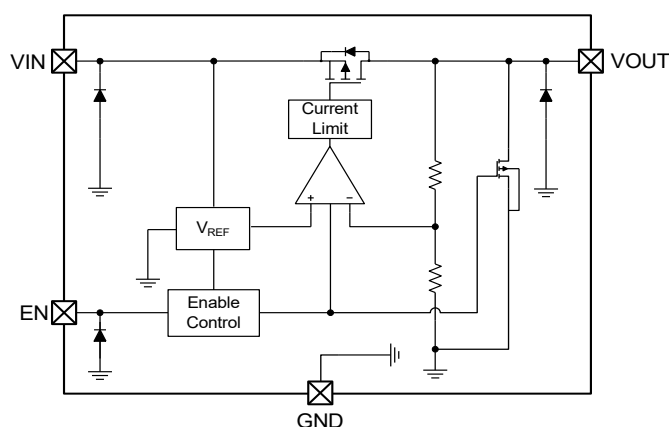
Description	Symbol	Value Range	Unit
Input Voltage	V_{IN}	-0.3~+8	V
Storage Temperature Range	T_{STG}	-55~+150	°C
Operating Free-air Temperature Range	T_A	-40~+125	°C
Output Current		450	mA
Package Lead Soldering Temperature		260	°C

Note: Stresses greater than those listed under “Absolute Maximum Ratings” cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Heat Dissipation

Description	Symbol	Package	Value Range	Unit
Thermal resistance	θ_{JA}	SOT-23-5L	260	°C/W
Power dissipation	P_W	SOT-23-5L	0.4	W

Block Diagram



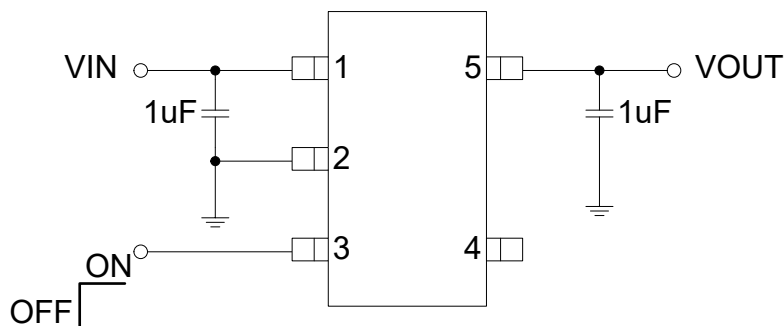


DC Characteristics (unless otherwise noted $T_A = 25^\circ\text{C}$)

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		1.5	--	6.5	V
V_{OUT}	Output Range	$V_{OUT} \leq 2.5\text{V}$, $I_{OUT} = 1\text{mA}$	$V_{OUT} - 50$	V_{OUT}	$V_{OUT} + 50$	mV
		$2.5\text{V} \leq V_{OUT} \leq 5\text{V}$, $I_{OUT} = 1\text{mA}$	-2	V_{OUT}	2	%
I_Q	Quiescent Current	$V_{OUT} = 3.3\text{V}$, $I_{OUT} = 0$	--	0.5	--	μA
I_{LIMIT}	Current Limit	$V_{IN} = V_{EN} = 4.5\text{V}$	--	400	--	mA
V_{DROP}	Dropout Voltage	$V_{OUT} = 3.3\text{V}$, $I_{OUT} = 100\text{mA}$	--	180	--	mV
		$V_{OUT} = 3.3\text{V}$, $I_{OUT} = 200\text{mA}$	--	400	--	
ΔV_{LINE}	Line Regulation	$V_{IN} = 2.7 \sim 5.5\text{V}$, $I_{OUT} = 1\text{mA}$	--	0.01	0.15	%/V
ΔV_{LOAD}	Load Regulation	$V_{OUT} = 3.3\text{V}$, $I_{OUT} = 1 \sim 300\text{mA}$	--	40	--	mV
I_{SHORT}	Short Current	$V_{EN} = V_{IN}$, V_{OUT} Short to GND with 1Ω	--	35	--	mA
I_{SHDN}	Shut-down Current	$V_{EN} = 0\text{V}$	--	--	1	μA
PSRR	Power Supply Rejection Rate	$V_{IN} = 5V_{DC} + 0.5V_{P-P}$ $F = 1\text{KHz}$, $I_{OUT} = 10\text{mA}$		60		dB
V_{ENH}	EN logic high voltage	$V_{IN} = 5.5\text{V}$, $I_{OUT} = 1\text{mA}$	1.2	--	V_{IN}	V
V_{ENL}	EN logic low voltage	$V_{IN} = 5.5\text{V}$, $V_{OUT} = 0\text{V}$	--	--	0.4	V
I_{EN}	EN Input Current	$V_{EN} = 0$ to 5.5V	--	--	1	μA

Application Circuit

Basic Circuits





Function Description

In general, all the capacitors need to be low leakage. Any leakage the capacitors have will reduce efficiency, will reduce efficiency, increase the quiescent current.

A recent trend in the design of portable devices has been to use ceramic capacitors to filter DC-DC converter inputs. Ceramic capacitors are often chosen because of their small size, low equivalent series resistance (ESR) and high RMS current capability. Also, recently, designers have been looking to ceramic capacitors due to shortages of tantalum capacitors.

Unfortunately, using ceramic capacitors for input filtering can cause problems. Applying a voltage step to a ceramic capacitor causes a large current surge that stores energy in the inductance of the power leads. A large voltage spike is created when the stored energy is transferred from these inductance into the ceramic capacitor. These voltage spikes can easily be twice the amplitude of the input voltage step.

Many types of capacitors can be used for input by-pass, however, caution must be exercised when using multi layer ceramic capacitors (MLCC). Because of the self-resonant frequency generated under some start-up conditions, such as connecting the LDO input to a live power source.

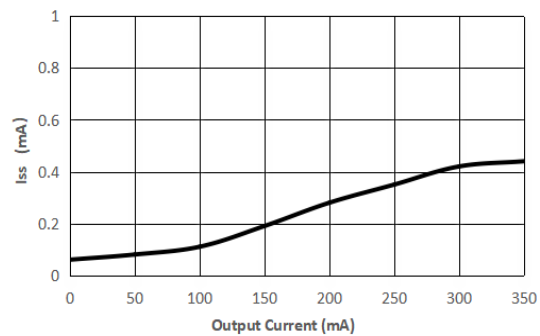
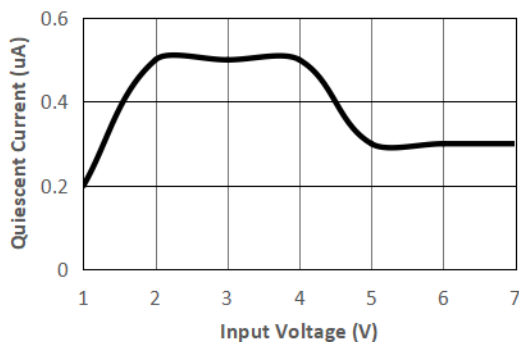
The LDO also requires an output capacitor for loop stability. Connect a 1 μ F tantalum capacitor from OUT to GND close to the pins. For improved transient response, this output capacitor may be ceramic.

Typical Characteristics

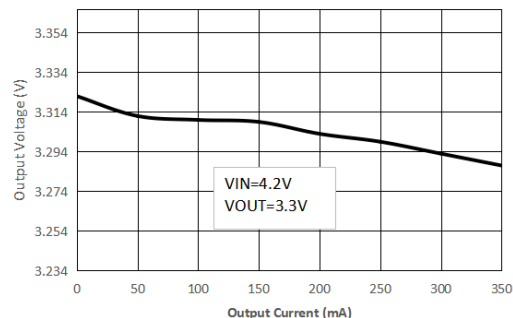
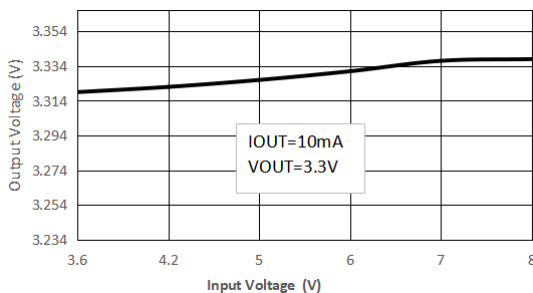
$C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $V_{IN}=4.5V$, $V_{OUT}=3.3V$, SOT-23-5L, $T_A=25^\circ C$

(Unless specified otherwise. Package: SOT-23-5L)

(1) Quiescent current vs Input voltage

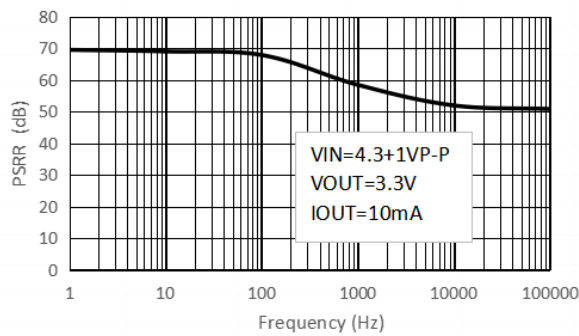


(2) Output Voltage vs Input voltage

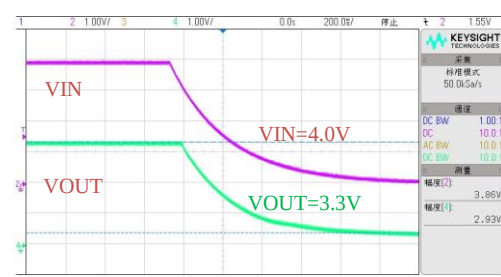
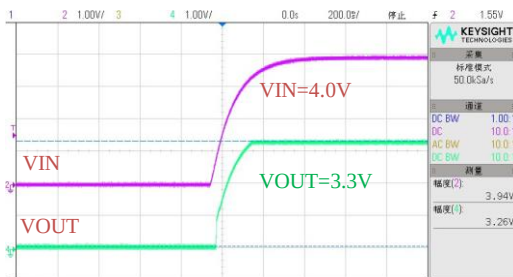




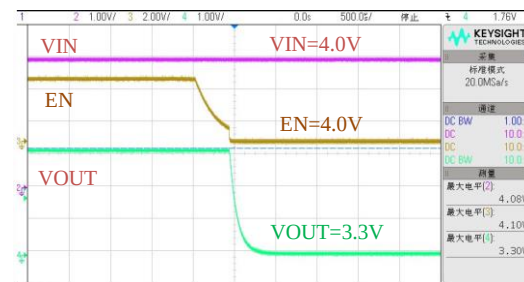
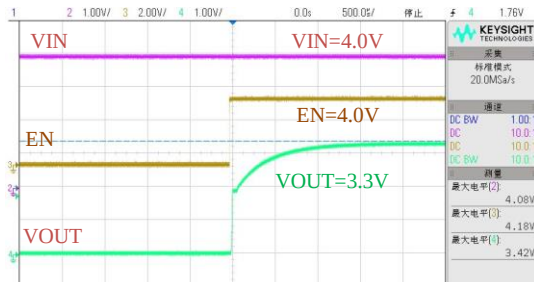
(3) PSRR vs Frequency



Power ON / OFF

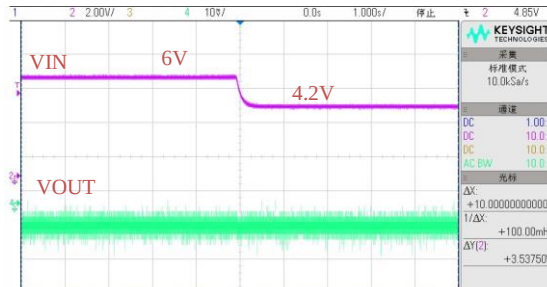
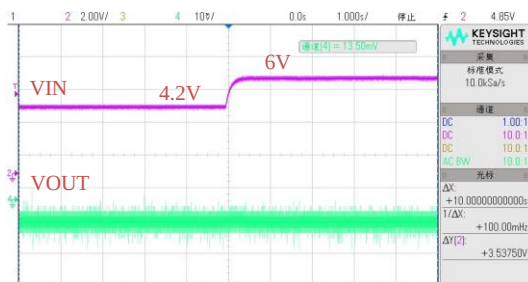


EN ON/OFF

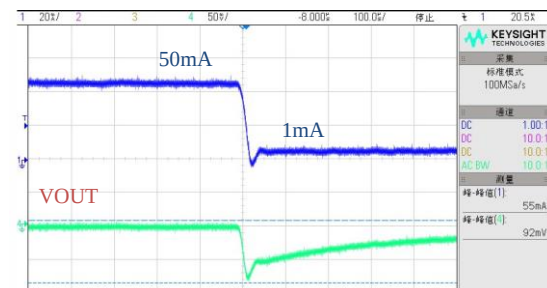
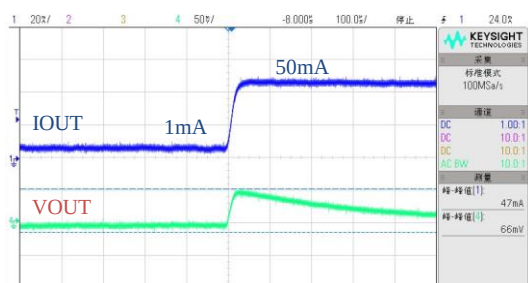




Line Transient

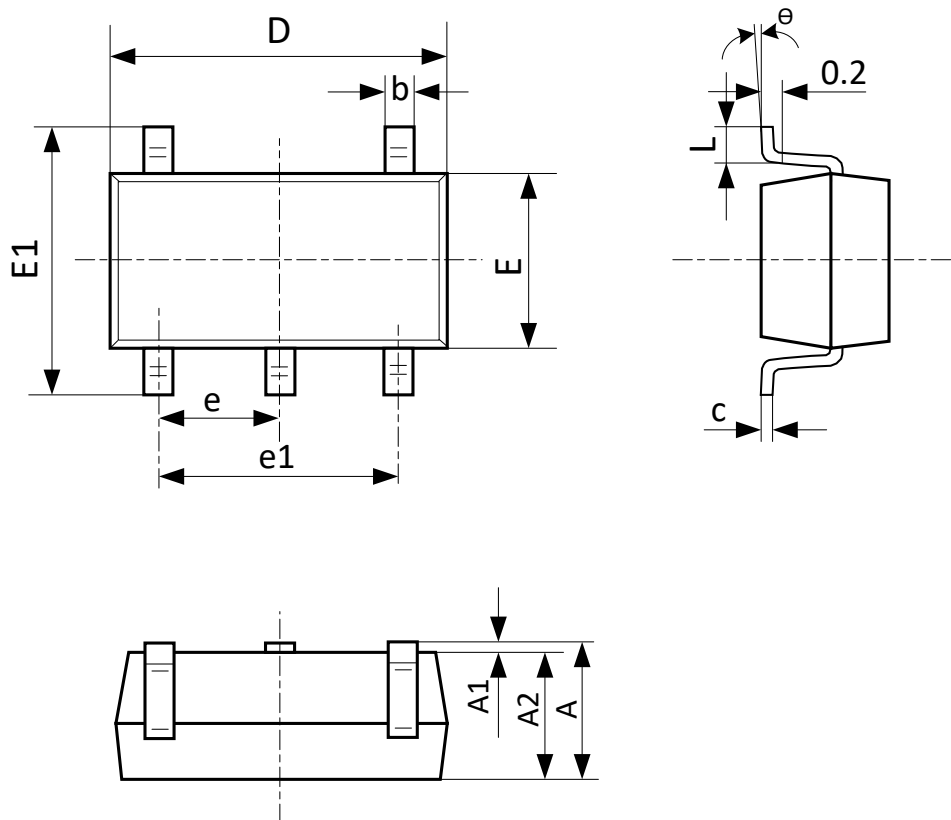


Load Transient





Package Outline Dimensions SOT-23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°C	8°C	0°C	8°C



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