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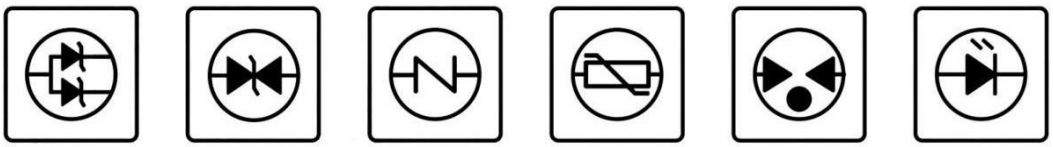
SEMICONDUCTOR



MSTPS7A20XXPDBVR

Product specification

Description

The MSTPS7A20XXPDBVR series is a three-terminal step-down regulator with high precision, low voltage drop and low quiescent.The input voltage range 10V,It can provide large current output capability under extremely under extremely small voltage difference conditions and has good regulation rate. It can provide large current output under small voltage difference and has good regulation rate.

The MSTPS7A20XXPDBVR is deliver up to 400mA of output current.high-PSRR linear regulator.The enable pin EN can control the chip to enter standby mode, which greatly reduces the static current consumption. It is particularly suitable for applications with strict requirements on battery life.

The device is protected from short circuit events by the current limit function and from over heating by means of thermal shutdown protection.windely used in audio,video,and communication appliances.

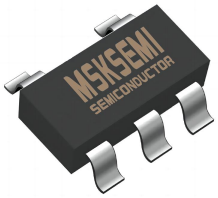
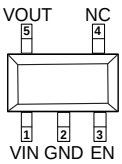
Features

- Maximum output current 400mA
- Low Voltage Drop75mV@50mA,V_{OUT} =3.3V
- Low Temperature Coefficient
- Withstanding Voltage 10V
- Quiescent Current 2.0μA@6V
- Output Voltage Accuracy: ±2%
- Output short circuit protection
- Output Current Limit
- High PRSS 76dB @ 1kHz
- Low Output Noise: 70μVRMS @10~100KHz

Typical Applications

- Battery-powered Equipments
- Communication Equipments
- Audio/Video Equipments
- Smart Battery Packs
- Smoke Detectors
- EV and HEV battery management systems

Reference News

SOT-23-5	Pin Configuration
	

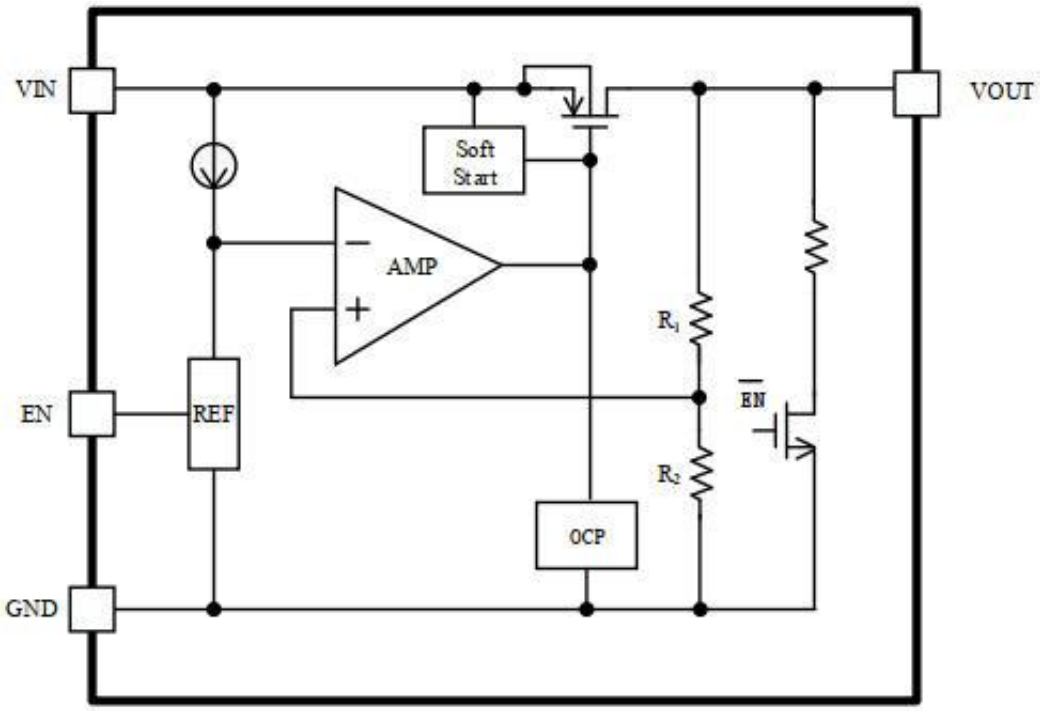
Marking

MSTPS7A2018PDBVR	MSTPS7A2030PDBVR	MSTPS7A2033PDBVR	MSTPS7A2050PDBVR
2AUF	2AXF	2AZF	2B1F

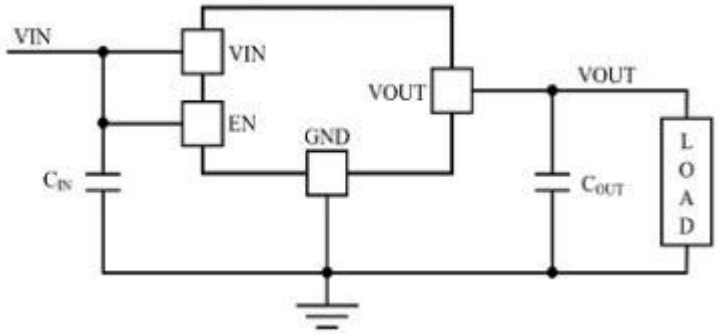
Pin Description

Pin Number	Name	Functions Description
SOT-23-5		
2	GND	Ground
1	V_{IN}	Input
5	V_{OUT}	Output
4	NC	No Connect
3	EN	ON/OFF Connect

Functional Block Diagramf



Typical Application circuit



Note. The input capacitor C_{IN} is recommended to be at least 1μF; to ensure the output voltage stability, the output capacitor COUT should be a ceramic capacitor of at least 1μF, or an electrolytic capacitor of at least 2.2uF.

Absolute Maximum Ratings

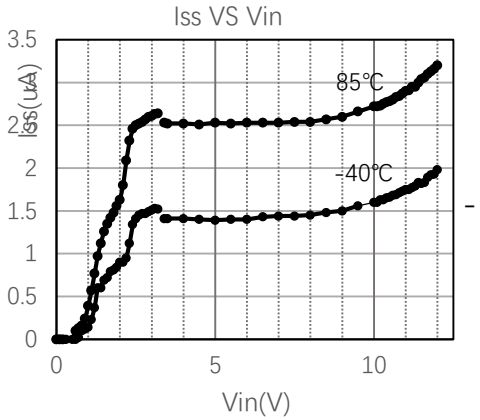
Symbol	Parameter	Value range	Unit
V_{IN}	Supply Input Voltage	-0.3～+12	V
I_{OUT}	Maximum Output Current	450	mA
T_A	Operating Free-air Temperature Range	-40～+85	℃
TJ	Maximum Junction Temperature	150	℃
T_{STG}	Storage Temperature Range	-55～+150	℃
P_d	Power Dissipation	400	mW

Note : Stresses greater than those listed under “Absolute Maximum Ratings” may 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.

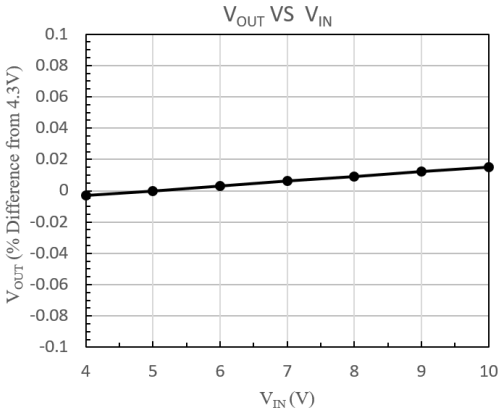
Electrical Characteristics (unless otherwise noted T_A =＋25°C,C_{IN}=C_{OUT} =1μA)

Characteristic	Symbol	Test Conditions		Min.	Typ.	Max.	Units
Input Voltage	V_{IN}			2.2		10	V
Quiescent Current	I_{SS}	V_{IN}=6V， I_{OUT}=0mA			2.0	3	μA
		V_{IN}=10V， I_{OUT}=0mA			2.5	6	
Standby Current	I_{STB}	V_{EN}=0V				0.1	μA
Voltage Accuracy	V_{OUT}	V_{IN}=V_{OUT}+1V I_{OUT}=1mA		-2		+2	%
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	V_{OUT}+1V≤V_{IN}≤6V I_{OUT}=10mA			0.02	0.1	%/V
Load Regulation	ΔV_{OUT}	V_{IN}=V_{OUT}+1V 1mA≤I_{OUT}≤200mA			0.2	1	%
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	I_{OUT}=10mA -25℃≤T_a≤85℃			±100		ppm/℃
Output Current	I_{OUT}	V_{IN}=V_{OUT}+1V			400		mA
Voltage Drop	V_{Drop}	I_O=50mA	V_{OUT}≤2.0V		160		mV
			2.0<V_{OUT}≤3.0V		120		
			3.0<V_{OUT}≤5.0V		75		
Ripple Rejection Rate	PSRR	V_{IN}=5V+1V_{p-p}(AC) , f=1KHz V_{OUT}=3.3V,I_{OUT}=50mA			76		dB
Output noise	E_n	BW=10Hz to 100KHz			70		μVrms
EN “High” Voltage	V_{IH}	V_{IN}=5V		1.2			V
EN “Low” Voltage	V_{IL}	V_{IN}=5V				0.4	V
Discharge Resistor	R_D	EN=0V， V_{OUT}=0.5V			500		Ω

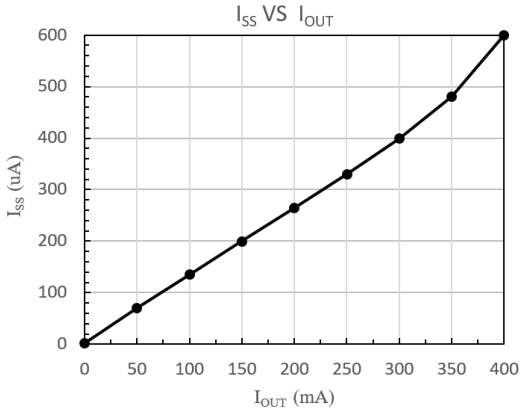
Performance Characteristics



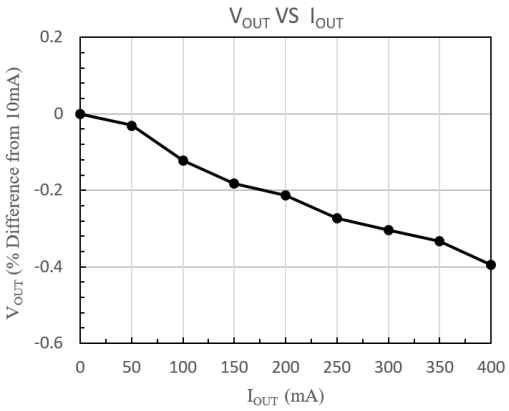
(Vout=3.3V，0mA)



(I_{OUT}=10mA)



(V_{IN}=4.3V)



(V_{IN}=4.3V)

Application Information

Output Capacitor

An outputcapacitor is required for the stability of the LDO. The recommended minimum outputcapacitance is 1.0μF. A ceramic capacitor is recommended with thetemperature characteristics ofX7R orX5R. Higher capacitance values help to improve load/line transient response. The output capacitancemay be increased to keeplow undershoot/overshoot. Place the output capacitor as close as possible toOUT and GND pins.

Input Capacitor

A 1μF ceramic capacitor is recommended to connect between VIN and GND pins to decouple inputpower supply glitch and noise. The amount of the capacitance may be increased without limit. Thisinput capacitor must be located as close as possible to the device to assure input stability and lessnoise. For PCB layout, a wide copper trace is requiredfor both VIN and GND.

Current-Limit and Short-Circuit Protection

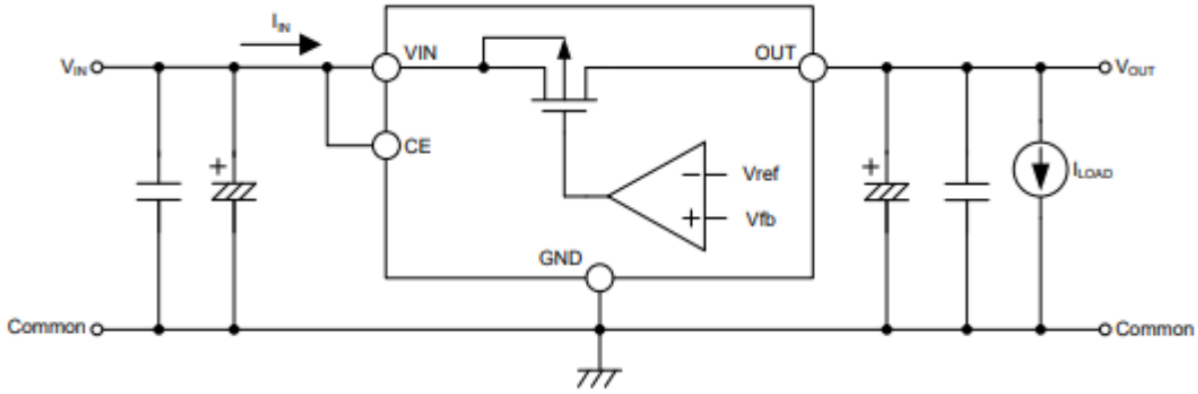
When the output current at VOUT pin is higher than the current-limit threshold or the VOUT pin is directly shorted to GND, current-limit protection will trigger and clamp the output current at a pre-designed level to prevent overcurrent and thermal damage.

Layout Considerations

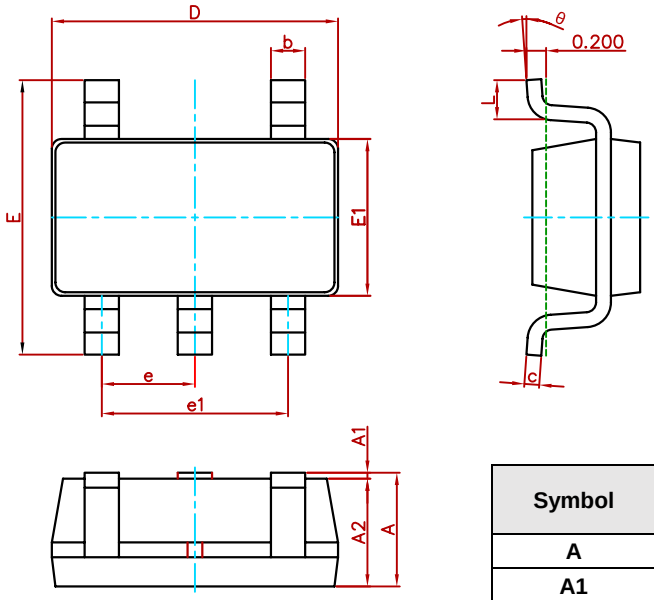
For good ground loop and stability, the input and output capacitors should be located close to the input, output, and groundpins of the device. The regulator ground pin should be connected to the external circuit ground to reduce voltage drop caused by trace impedance. Ground plane is generally used to reduce trace impedance. Wide trace should be used for large current paths from $V_{IN}$to V_{OUT}, and load circuit.

Power Estimation

In order to make the chip work within the limit range and maintain a stable output voltage, the power consumption PD of the chip must not exceed the maximum power consumption PD(MAX), that is, PD≤PD(MAX). As can be seen from the figure below, almost all power is generated by the transmission transistor, which is equivalent to connecting a variable resistor in series with the load to keep the output voltage constant. It will generate power consumption in the form of heat energy, and it must be ensured that the chip does not exceed the maximum junction temperature.

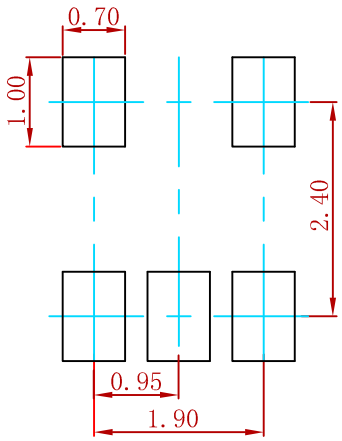


Package Outline Dimensions



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	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
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°	8°	0°	8°

Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.

Order information

P/N	PKG	QTY
MSTPS7A20XXPDBVR	SOT-23-5	3000

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