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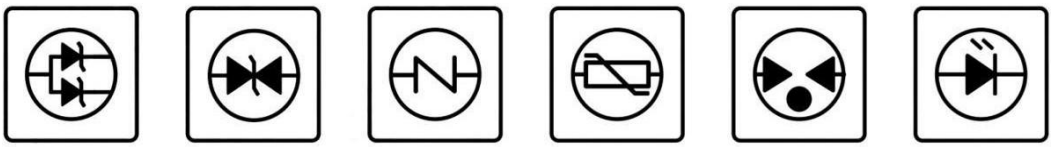

TLV75801PDBVR-MS

Product specification

General Description

The TLV75801PDBVR-MS is a CMOS linear regulator. It is featuring low quiescent current, low output voltage noise,low dropout voltage and fast transient response. It guarantees delivery of 500mA output current,and it is available in adjustable output voltage from 0.8V~4.6V.

Based on its low quiescent current consumption and its less than 1uA shutdown mode, the TLV75801PDBVR-MS is ideal for battery- powered applications. The high power supply rejection ratio of the TLV75801PDBVR-MS holds well for low input voltages typically encountered in battery-operated systems. The regulator is stable with small ceramiccaptive loads (1μF typical).

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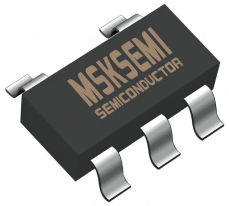
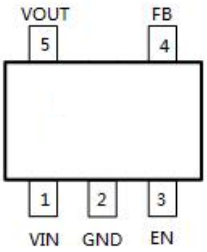
Features

- 500mA output current
- Adjustable output voltage range：0.8V to 4.6V
- ±2% Initial voltage accuracy
- Operating input voltage range: 2V to 6V
- Ultra low dropout voltage 320mV @ 500mA
- Low quiescent current 40uA
- <1uA shutdown current
- Short-circuit protection
- Over-temperature protection

Applications

- CDMA / GSM
- Portable communication equipment
- Camera modules
- Battery Powered Systems
- Portable Device

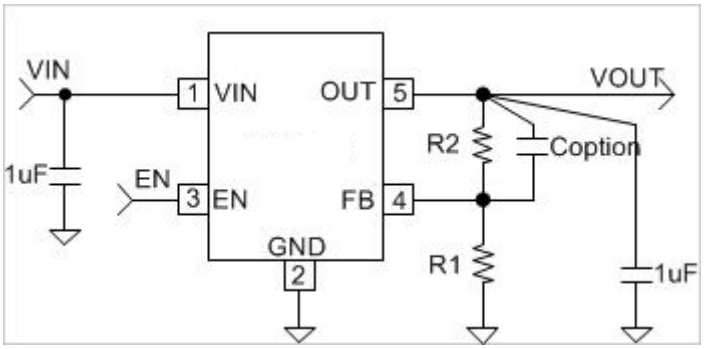
Reference News

SOT-23-5	PIN CONFIGURATION	MARKING
		

Pin Description

Pin No	Name	Description
1	VIN	Supply Input Voltage
2	GND	Ground
3	EN	Chip Enable
4	FB	$V_{FB} \times \frac{R1+R2}{R1}$ =Vout
5	VOUT	Output Voltage

Typical Application



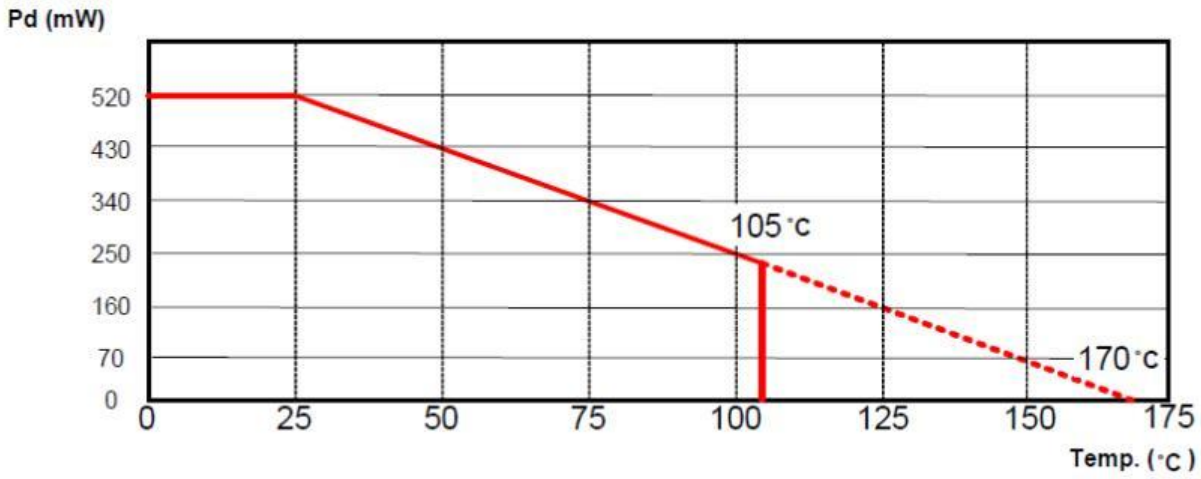
PACKAGE/ORDER INFORMATION

P/N	PKG	QTY
TLV75801PDBVR-MS	SOT-23-5	3000

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{IN}	-0.3 < V_{IN}< 6	V
Output Current	I_{out}	500	mA
Output Voltage	V_{out}	-0.3 < V_{OUT}<V_{IN}+0.3	V
EN to GND	V_{EN}	-0.3 < V_{EN}< 6	V
Package Power Dissipation at TA≦25°C	$P_{D\_SOT23-5}$	455	mW
Operating Temperature	T_{Opr}	-40 ~ +85	℃
Storage Temperature	T_{stg}	-55 ~ +125	℃
Soldering Temperature Soldering Time	T_{solder}	260℃, 10s	℃
ESD (Human Body Mode) (Note 2)	V_{ESD_HBM}	2000	V
ESD (Machine Mode) (Note 2)	V_{ESD_MM}	200	V

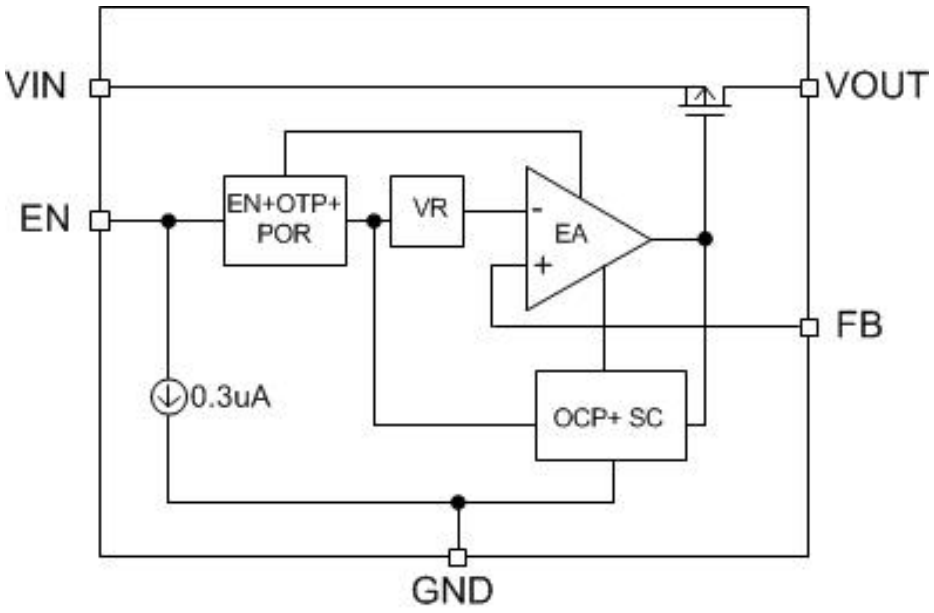
Note :
Stresses beyond those listed “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions may affect device reliability



Recommend Operating Condition

Parameter	Symbol	Limits	Unit
VIN to GND	V_{IN}	2.0 to 6.0	V
Junction Temperature	T_J	- 40 ~ 125	°C
Operating Temperature Range	T_A	-40 ~ 85	°C

Block Diagram



Electrical Characteristics

(Vin=Vout+1V,Cin=Cout=10uF,Ta=25℃. unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Feedback Voltage (V_{FB})	V_{FB}	T_A = 25°C	0.784	0.8	0.816	V
FB Input Current	I_{FB}			0	1	uA
Supply Voltage	V_{IN}		2.0		6	V
Supply Current	I_{VIN}	Unload		40		uA
Standby Current	I_{STBY}	V_{EN}=0V		0	1.0	uA
Output Current(Note 5)	I_{OUT}		500 (Note 6)			mA
Soft-start time	T_{SS}			50		us
EN Input Voltage High	V_{ENH}	V_{IN}=5V	1.0			V
EN Input Voltage Low	V_{ENL}	V_{IN}=5V			0.4	V
EN Input Current	I_{EN}	V_{EN}=V_{IN}=5V		0.3		uA
Dropout Voltage (Note 7)	V_{DROP}	V_{OUT}=3.3V, I_{OUT}=300mA		180		mV
		V_{OUT}=3.3V, I_{OUT}=500mA		320		mV
Limit Current	I_{lim}			0.85		A
Short Current	I_{short}	V_{OUT}<0.2V		0.3		A
Line Regulation	$\triangle V_{LNR}$	V_{IN}=V_{OUT}+1V to 5.5V, I_{OUT}=1mA		0.03	0.20	%/V
Load Regulation	$\triangle V_{LDR}$	V_{IN}=V_{OUT}+1V, I_{OUT}=1mAto 300mA		2	15	mV
Power Supply Rejection Ratio	PSRR	Freq=1kHz, I_{OUT}=30mA		70		dB
Thermal Shutdown Temperature	T_{SD}	T_J Rising		155		°C
Thermal Shutdown Returned Temperature				125		°C

Note 1. Stresses listed as the above “Absolute Maximum Ratings” may cause permanent damage to the device. These are for stress ratings. Functional operation 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 possibility to affect device reliability.

Note 2. Devices are ESD sensitive. Handling precaution recommended.

Note 3. θ_{JA} is measured in the natural convection at T_A=25°C on a high effective thermal conductivity test board (40mm x 40mm x 1.6mm double sided board with 2oz, copper ratio: approx. 50%) of JEDEC 51-7 thermal measurement standard.

Note 4. The device is not guaranteed to function outside its operating conditions.

Note 5. The output current at which the output voltage becomes 95% of V_{OUT} after gradually increasing the output current.

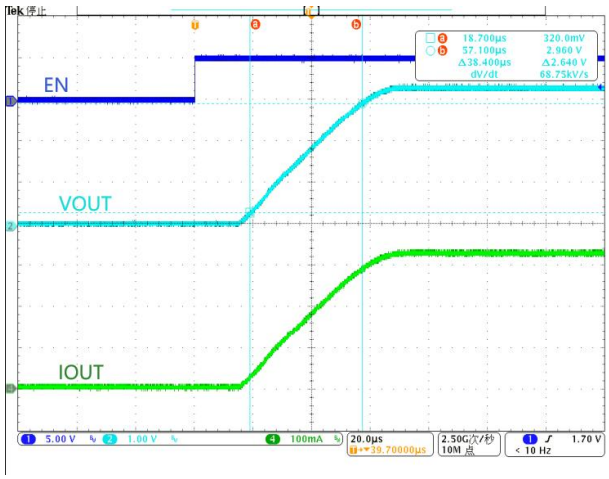
Note 6. The output current can be at least this value. Due to restrictions on the package power dissipation, this value may not be satisfied. Attention should be paid to the power dissipation of the package when the output current is large.

The specification is guaranteed by design.

Note 7. The dropout voltage is defined as V_{IN} - V_{OUT}, which is measured when V_{OUT} is 98%*V_{OUT}.

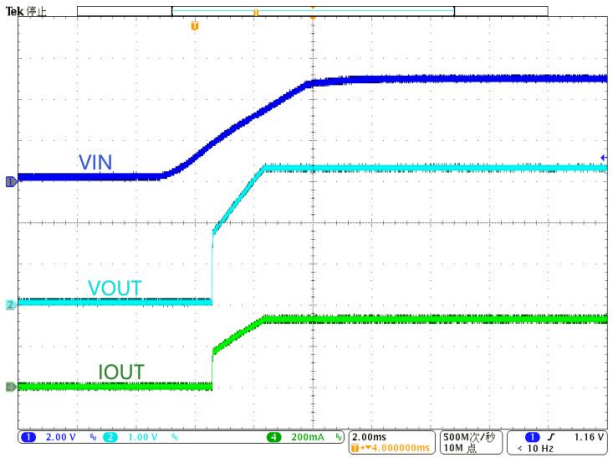
Typical Characteristics

(T_A = 25°C, C_{IN}=1uF, C_{OUT}=2.2uF, unless otherwise specified)



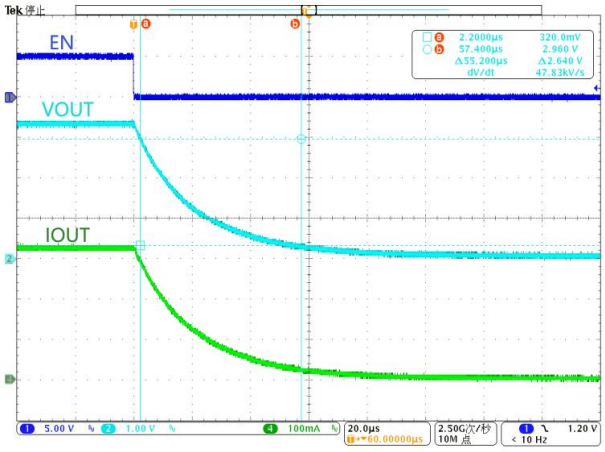
EN Turn On

VOUT=3.3V, ROUT=10ohm



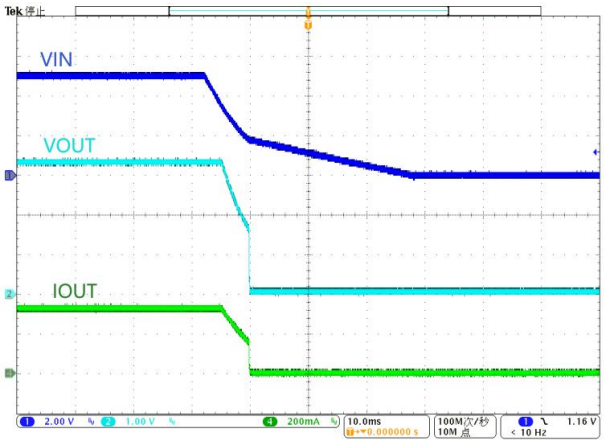
VIN Power On

VOUT=3.3V, ROUT=10ohm



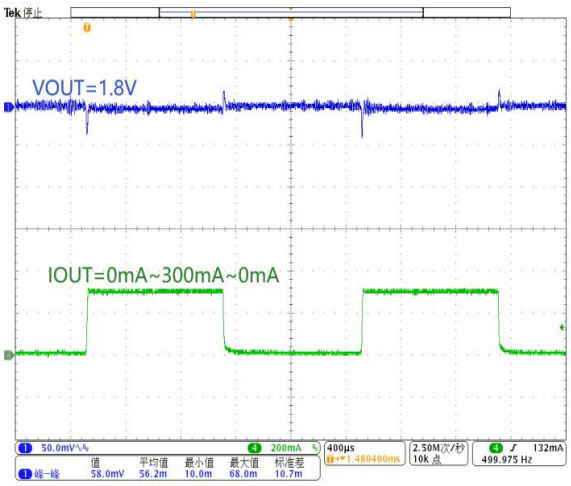
EN Turn Off

VOUT=3.3V, ROUT=10ohm



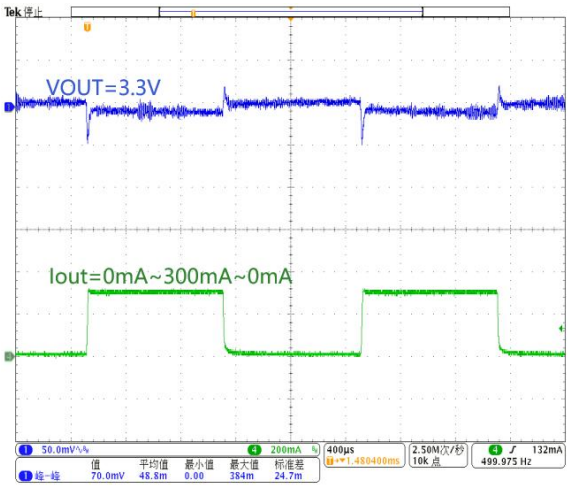
VIN Power Off

VOUT=3.3V, ROUT=10ohm



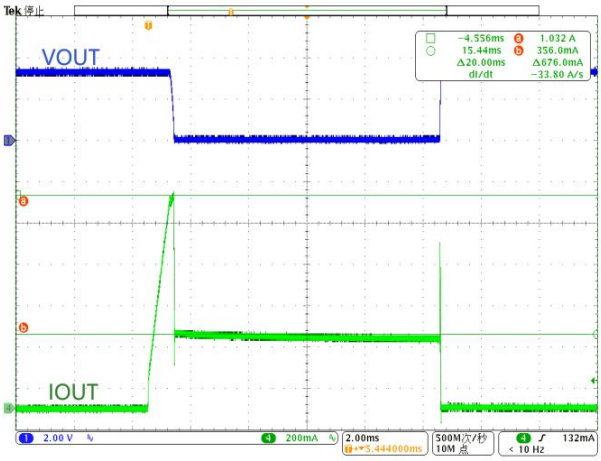
Load Transient Response

IOUT Rise=0.5us,Fall=0.5us, Coption=0



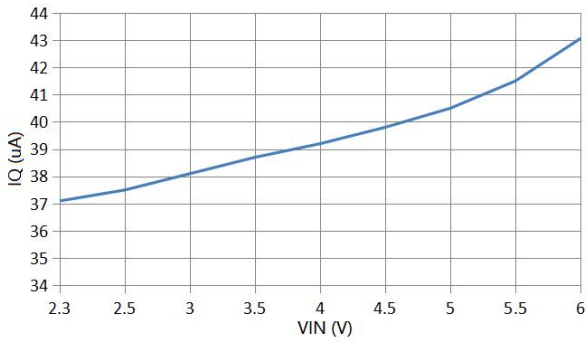
Load Transient Response

IOUT Rise=0.5us,Fall=0.5us, Coption=820pF

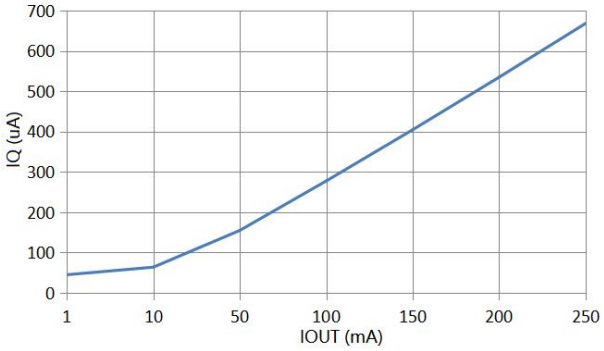


OCP

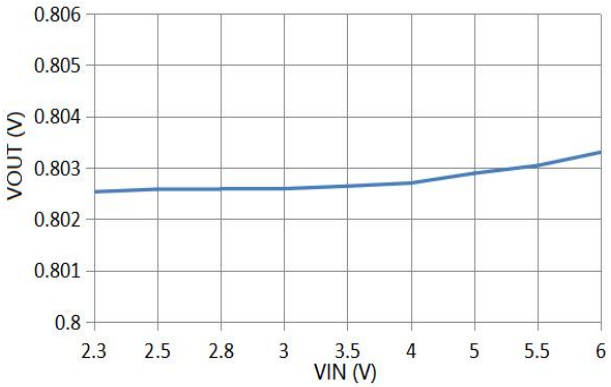
VIN=4.3V,VOUT=3.3V



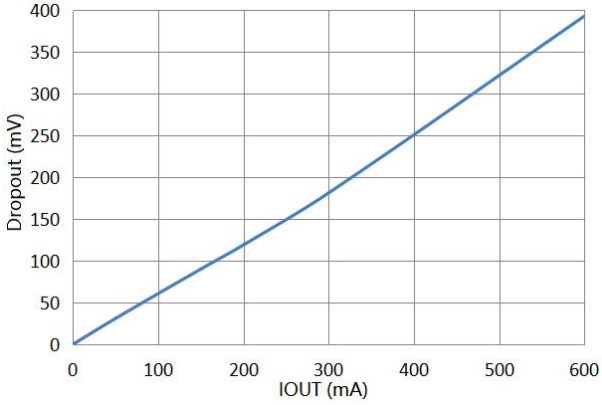
Quiescent Current vs. Input Voltage



Quiescent Current vs. Output Current



Output Voltage vs. Input Voltage



Dropout Voltage VS. Output Current

Application Information

Input Capacitor

A 1uF input capacitor or greater located as close as possible to the IC is necessary to ensure device stability. This capacitor will provide a low impedance path for unwanted AC signals or noise modulated onto the input voltage. The X7R or X5R capacitor should be used for reliable performance over temperature range.

Place the capacitors physically as close as possible to the device with wide and direct PCB traces.A good input capacitor will limit the influence of input trace inductance and source resistance during load current changes.

Output Capacitor

The TLV75801PDBVR-MS is specifically designed to employ ceramic output capacitors as low as 1uF, ceramic X7R or X5R type due to its low capacitance variations over the specified temperature range.

The ceramic output capacitors connected as close as possible to the output and ground pins.

Foldback Current Limit

The device has an internal current limit circuit that protects the regulator during transient high-load current faults or shorting events. Output current is internally limited to 850 mA typically.

The TLV75801PDBVR-MS will source this current when the output voltage drops down from the nominal outputvoltage. If the output voltage is less than 0.2V, the short circuit current protection starts and maintains the loading current to 300mA. The current limit and short circuit protection will work properly over the whole temperature and input voltage ranges. There is no limitation for the short circuit duration.

OTP Protection

A Thermal shutdown protection circuit disables the TLV75801PDBVR-MS when the junction temperature of the pass transistor rises to 155°C (typical). Thermal shutdown hysteresis assures that the device resets (turns on) when the temperature falls to 125°C (typical).

The thermal shutdown feature provides the protection against overheating due to some application failure and it is not intended to be used as a normal working function.

Enable

The LDO uses the EN pin to enable its operation. If the EN pin voltage is < 0.4 V the regulator will be turned off, reducing the supply current to less than 1uA. If the EN pin voltage is > 1.0 V the regulator will be turned on. The EN pin has internal pull−down current source with value of 0.3uA (typical). which assures the device is turned off when the EN pin is unconnected.

Power Dissipation

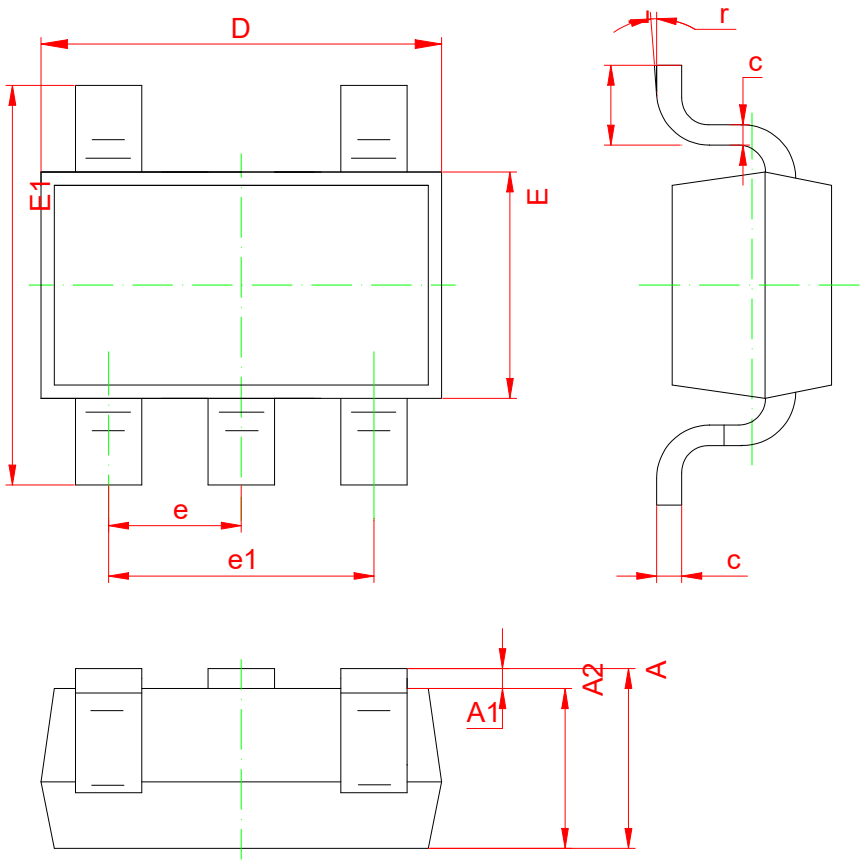
Power dissipation caused by voltage drop across the LDO and by the output current flowing through the device needs to be dissipated out from the chip. The maximum power dissipation is dependent on the PCB layout, number of used Cu layers, Cu layers thickness and the ambient temperature.

power dissipation in the regulator depends on the input-to-output voltage difference and load conditions.

$$PD = (V_{IN} - V_{OUT}) \times I_{OUT}$$

Power dissipation can be minimized, and thus greater efficiency achieved, by proper selection of the system voltage rails.To avoid thermally overloading the TLV75801PDBVR-MS, refrain from exceeding the absolute maximum junction temperature rating of 155°C under continuous operating condition. Over-stressing the regulator with high loading currents and elevated input-to-output differential voltages can increase the IC die temperature significantly.

Package Outline:SOT23-5



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
r	0°	8°	0°	8°

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