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TP172CADJS5

2uA 600mA Ultra-LowDropout Regulator

www.sot23.com.tw

Features

- 2μA Ground Current at no Load
- ±2% Output Accuracy
- 600mA Output Current
- 10nA Disable Current (by option)
- Wide Operating Input Voltage Range: 1.2V to 5.5V
- Dropout Voltage: 0.32V at 600mA / V_{OUT} 3.3V
- Adjustable Output Voltage
- Stable with Ceramic or Tantalum Capacitor
- Current Limit Protection
- Over-Temperature Protection
- SOT-23-5 Packages Available

Applications

- Portable, Battery Powered Equipment
- Low Power Microcontrollers
- Laptop, Palmtops and PDAs
- Wireless Communication Equipment
- Audio/Video Equipment
- Car Navigation Systems

General Description

The TP172CADJS5 are a group of low-dropout (LDO) voltage regulators offering the benefits of wide input voltage range from 1.2V to 5.5V, low dropout voltage, low power consumption, and miniaturized packaging. Quiescent current of only 2μA makes these devices ideal for powering the battery-powered, always-on systems that require very little idle-state power dissipation to a longer service life. There is an option of shutdown mode by selecting the parts with the EN pin and pulling it low. The shutdown current in this mode goes down to only 10nA (typical).

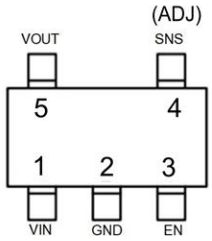
The TP172CADJS5 of linear regulators are stable with the ceramic output capacitor over its wide input range from 1.2V to 5.5V and the entire range of output load current (0mA to 600mA).

Ordering Information

TP172CADJS5

- S5:SOT23-5 Package
- Output voltage: ADJ (SNS)VFB=0.8V

PIN CONFIGURATION



Pin No	Pin Name	Pin Function
2	GND	Ground
5	VOUT	Output of the Regulator
1	VIN	Input of Supply Voltage.
3	EN	Enable Control Input.
4	SNS	Sense of Output Voltage.

TYPICAL APPLICATION

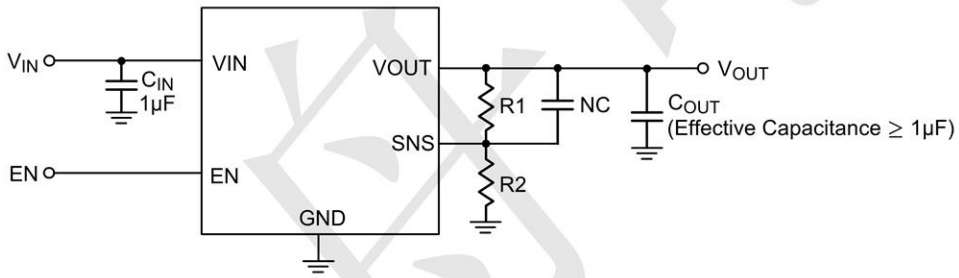
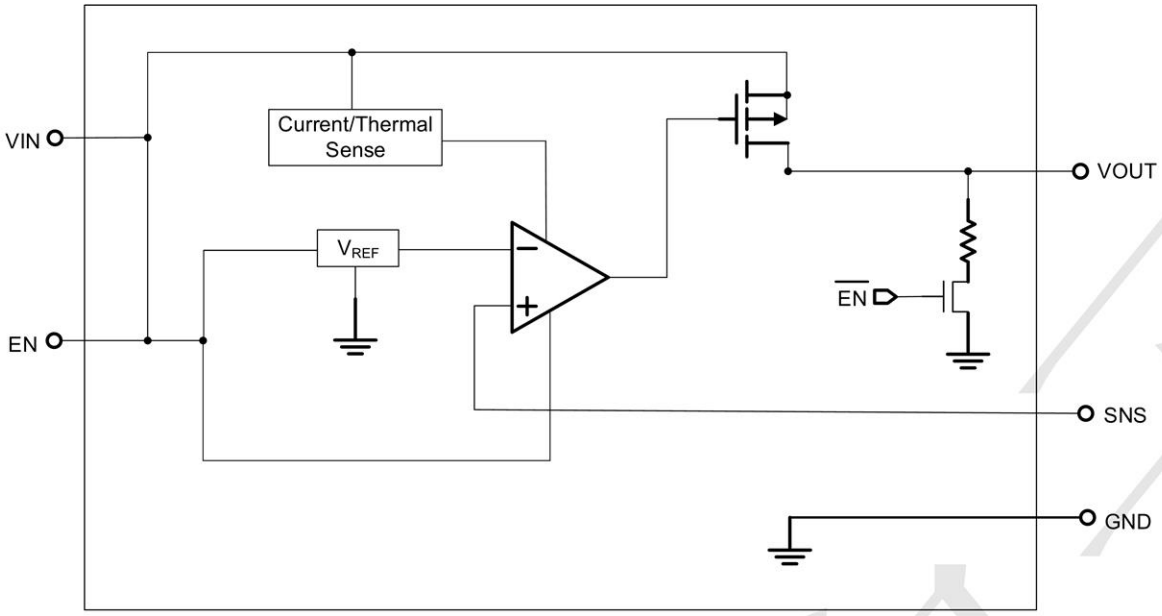


Figure 3. Adjustable Output Voltage Application Circuit

$$R_1 = R_2 \times \left(\frac{V_{OUT}}{0.8V} - 1 \right) \quad \text{where } R_2 < 24K\Omega$$

BLOCK DIAGRAM



Absolute Maximum Rating (T_A=25°C unless otherwise noted)

VIN to GND	-0.3V to 6.5V
VOUT, EN, SNS to GND	-0.3V to 6V
VOUT to VIN	-6V to 0.3V
Package Thermal Resistance (Note 2)	
SOT-23-5, θ_{JA}	200 °C /W
Lead Temperature (Soldering, 10 sec.)	260 °C
Junction Temperature	150 °C
Storage Temperature Range	-60 °C to 150 °C
ESD Susceptibility	
HBM	2KV
MM	200V
CDM	2KV

Recommended Operating Conditions

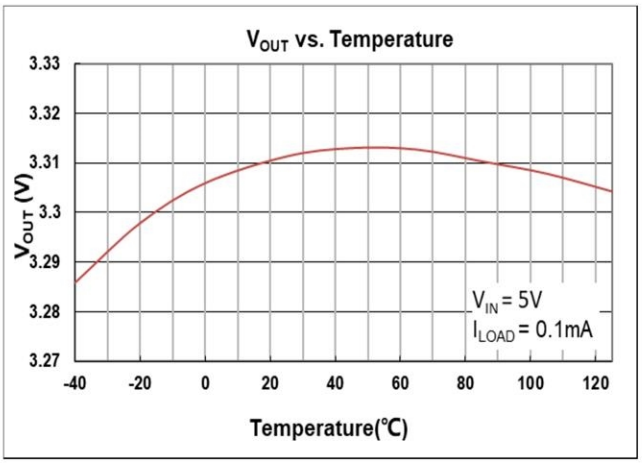
Input Voltage VIN	1.2V to 5.5V
Junction Temperature Range	-40 °C to 125 °C
Ambient Temperature Range	-40 °C to 85 °C

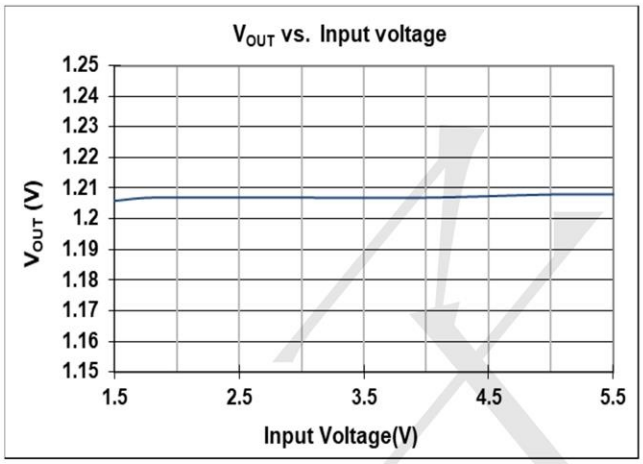
Electrical Characteristics

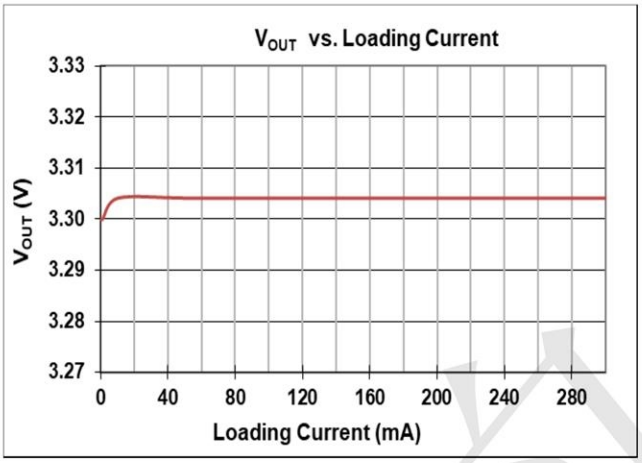
(V_{IN} =5V, V_{EN} = 5V T_A=25°C unless otherwise specified)

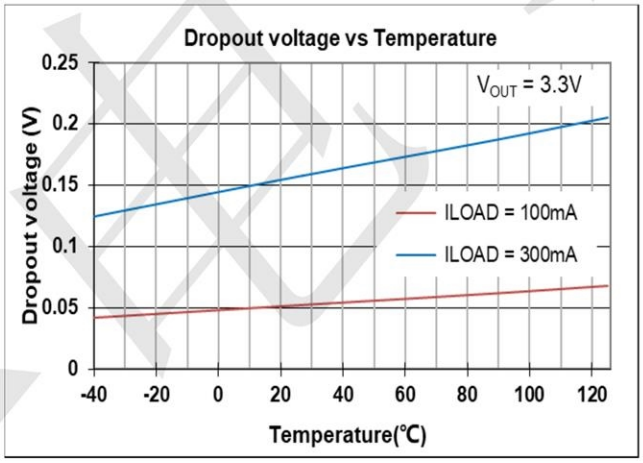
Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Supply Voltage	V_{IN}			1.2	--	5.5	V
DC Output Voltage Accuracy	V_{SNS}	I_{LOAD} =0.1mA			0.8		V
SNS Input Current	I_{SNS}	SNS = V_{OUT}			0.7		μA
Dropout Voltage (I_{LOAD} =600mA) (Note 3)	V_{DROP_3V}	V_{OUT} ≥ 3V			0.32		V
	$V_{DROP\_2.8V}$	V_{OUT} = 2.8V			0.36		
	$V_{DROP\_2.5V}$	V_{OUT} = 2.5V			0.36		
	$V_{DROP\_1.8V}$	V_{OUT} = 1.8V			0.57		
	$V_{DROP\_1.5V}$	V_{OUT} = 1.5V			0.71		
	$V_{DROP\_1.2V}$	V_{OUT} = 1.2V			0.8		
Ground Current	I_Q	I_{LOAD} = 0mA			2		μA
Shutdown Ground Current	I_{SD}	V_{EN} = 0V, V_{OUT} = 0V			0.01	0.5	μA
V_{OUT} Shutdown Leakage Current	I_{LEAK}				0.01	0.5	
Enable Threshold Voltage	V_{IH}	EN Rising				2	V
	V_{IL}	EN Falling		0.6			
EN Input Current	I_{EN}	V_{EN} = 5V			10	100	nA
Line Regulation	ΔLINE	I_{LOAD} =30mA, 1.5V ≤ V_{IN} ≤ 5.5V or (V_{OUT} + 0.2V) ≤ V_{IN} ≤ 5.5V			0.2		%
Load Regulation	ΔLOAD	10mA ≤ I_{LOAD} ≤ 0.3A			0.2		%
Output Current Limit	I_{LIM}	V_{OUT} =0		600	1100		mA
Power Supply Rejection Ratio (I_{LOAD} =5mA)	PSRR	V_{OUT} =1.2V, V_{IN} = 2V	f = 100Hz	--	80	--	dB
			f = 1kHz	--	75	--	
Output Voltage Noise (BW = 10Hz to 100kHz, C_{OUT} =1μF,)	Noise	V_{IN} = 3.5V I_{LOAD} =0.1A	V_{OUT} =0.9V	--	40	--	μV_{RMS}
			V_{OUT} =2.8V	--	50	--	
Thermal Shutdown Temperature	T_{SD}	I_{LOAD} =10mA		--	155	--	°C
Thermal Shutdown Hysteresis	ΔT_{SD}			--	15	--	°C
Discharge Resistance		EN = 0V , V_{OUT} = 0.1V		--	100	--	Ω

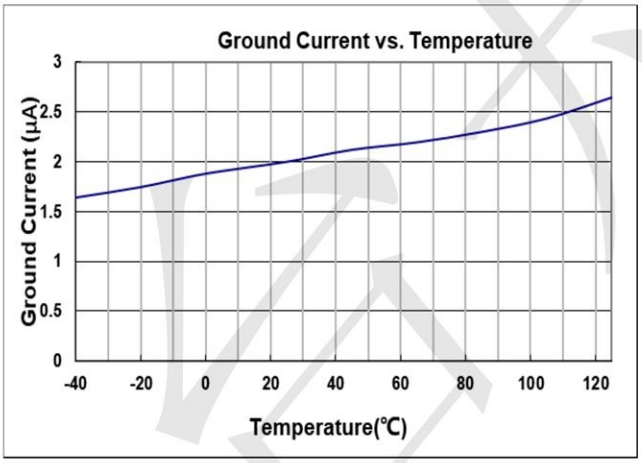
Typical Characteristics

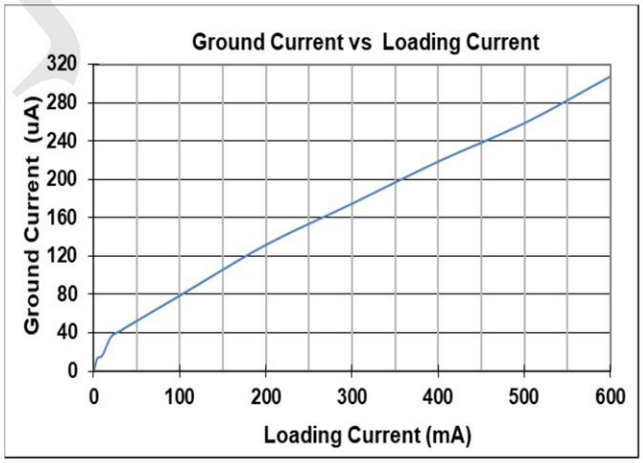












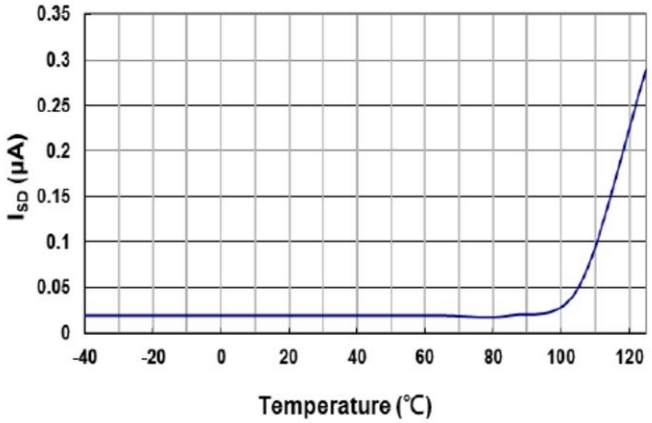


Fig. 11 Shutdown Ground Current vs. Temperature

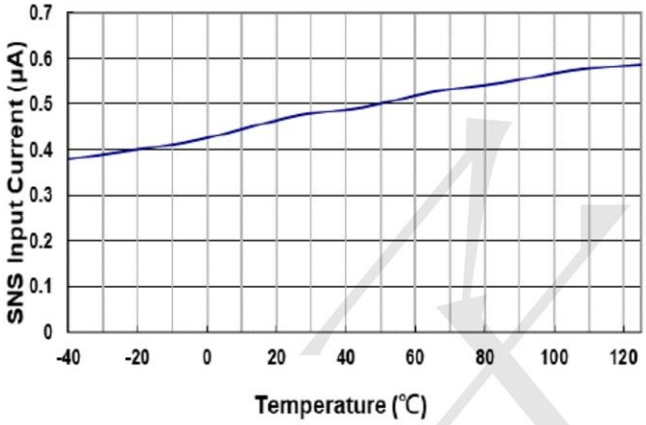


Fig. 12 SNS Input Current vs. Temperature

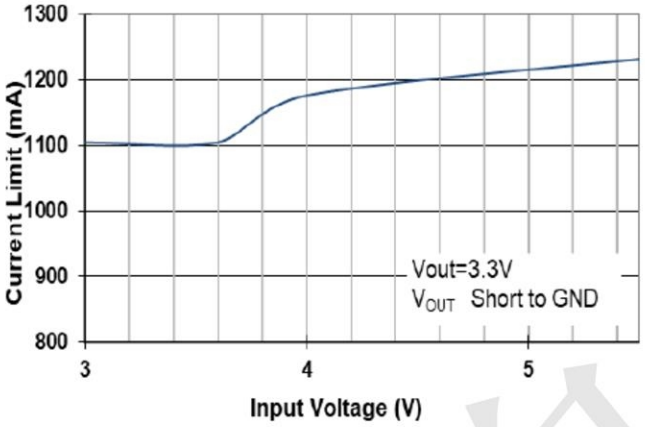


Fig. 13 Current Limit vs. Input Voltage

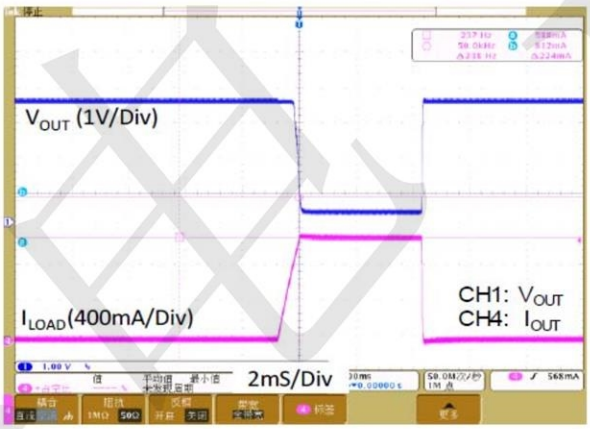


Fig. 14 Current Limit Response

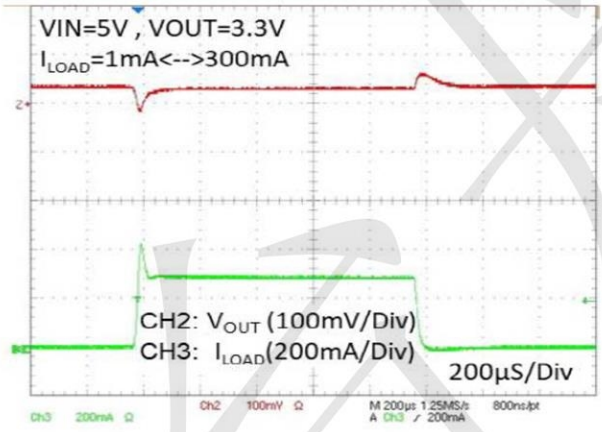


Fig. 15 Load Transient Response

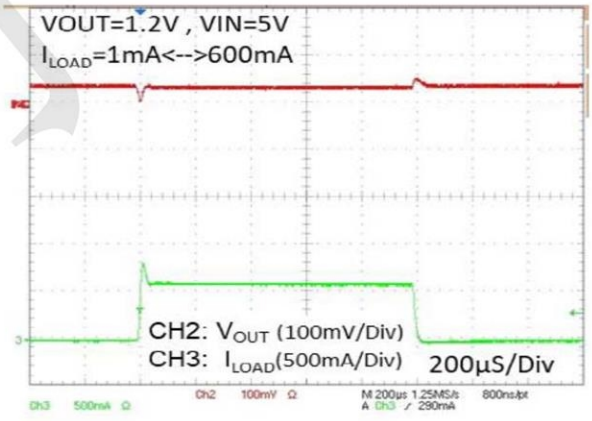
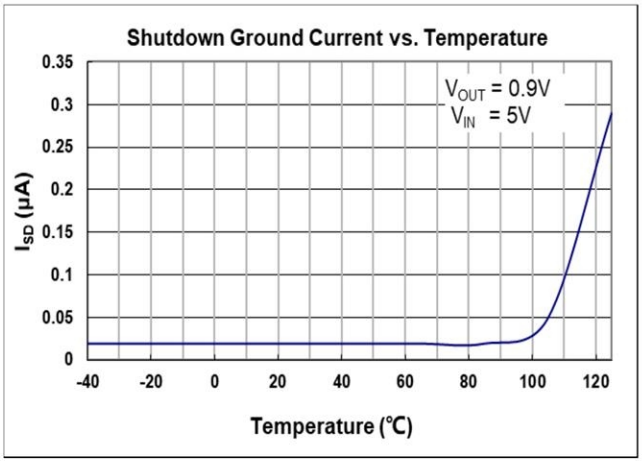
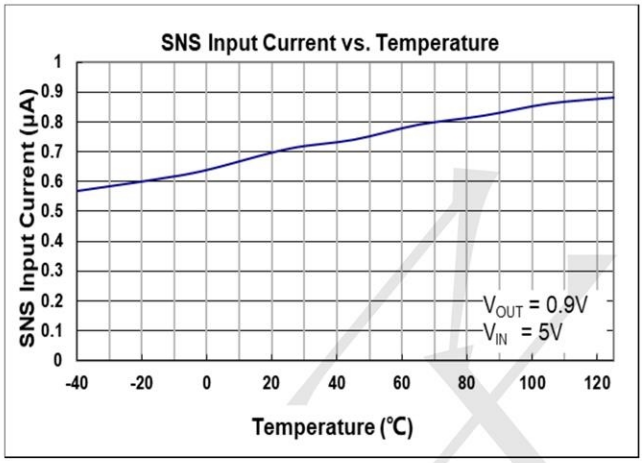
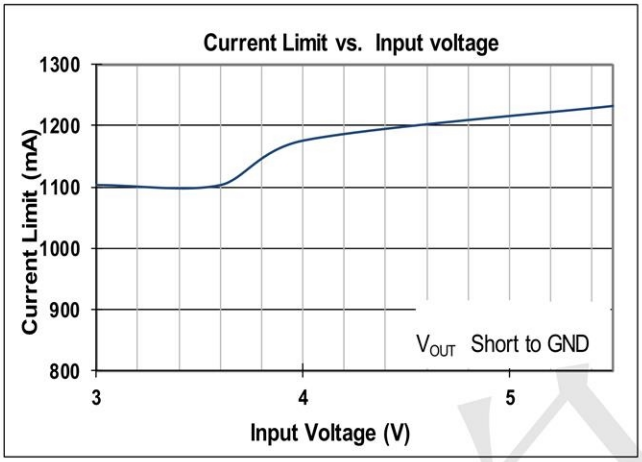


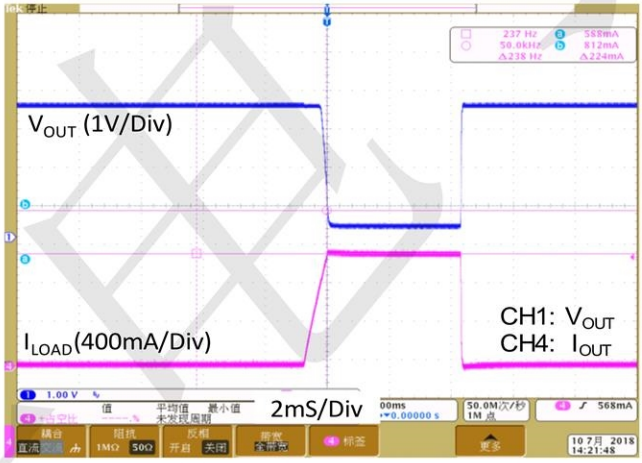
Fig. 16 Load Transient Response



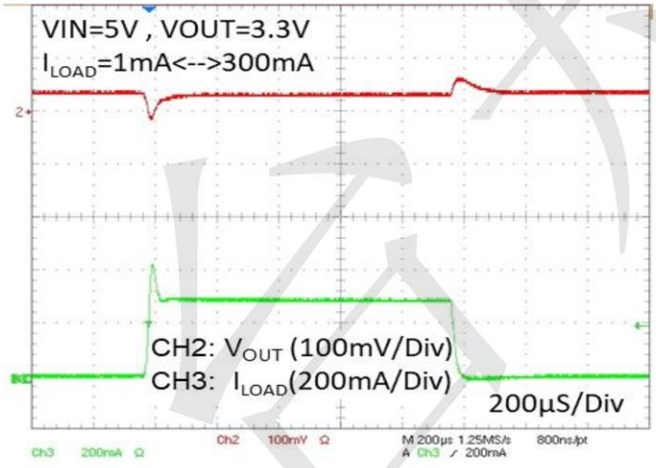




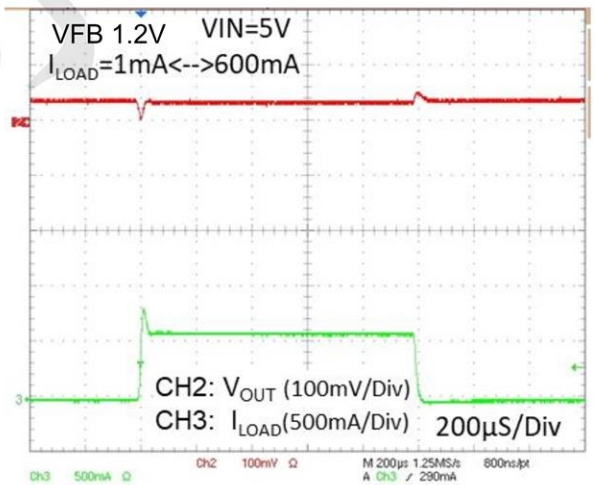
Current Limit Response



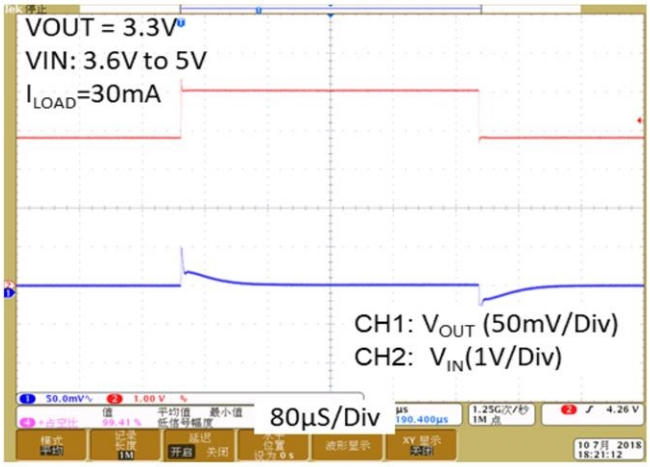
Load Transient Response I



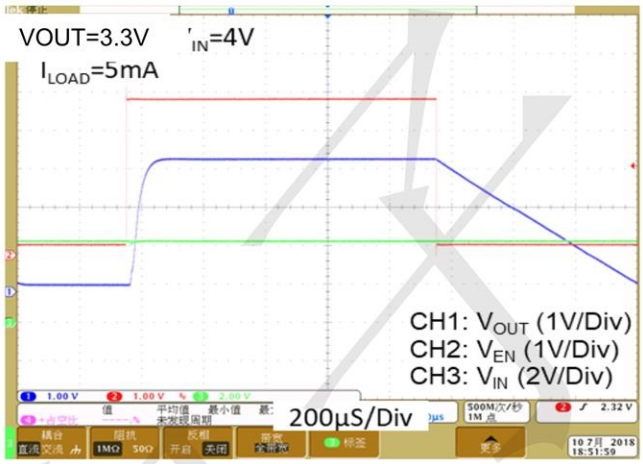
Load Transient Response II



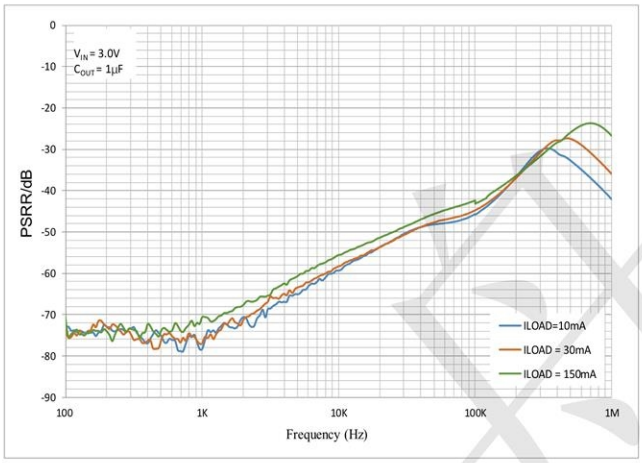
Line Transient Response



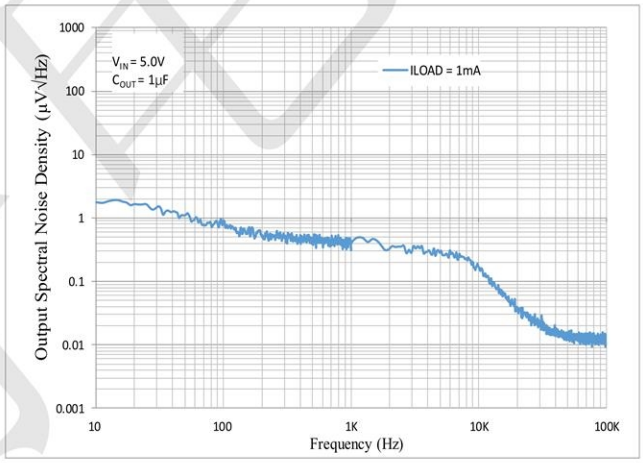
V_{OUT} Turn On/Off by EN



PSRR vs. Frequency

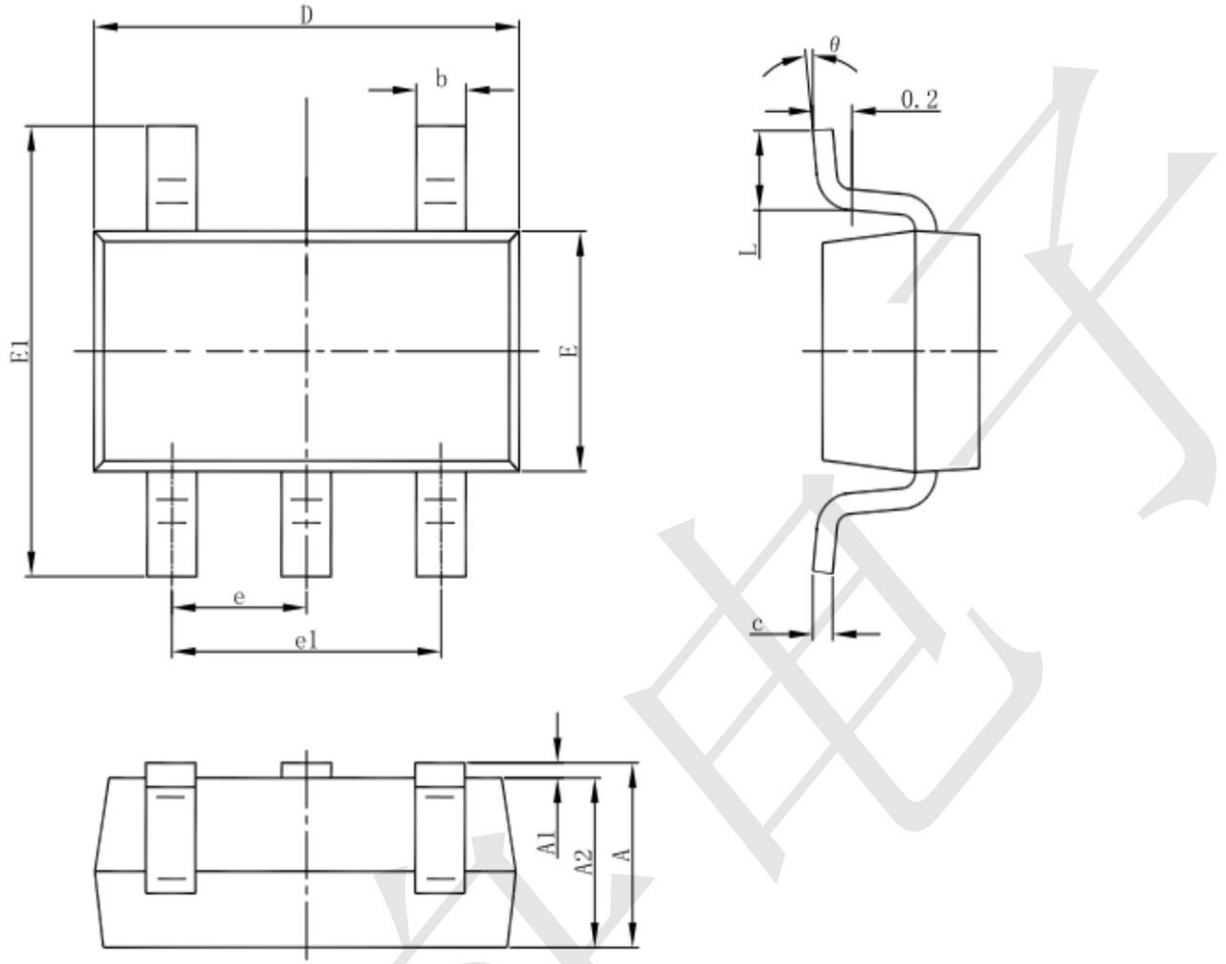


Noise Density Spectrum



Package informantion

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
θ	0°	8°	0°	8°

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