CL9703

1.0uA Supply Current Low Dropout Linear Regulator

Description

The CL9703 is a 1.0uA supply current and fast response low dropout voltage regulator which designed for applications requiring low quiescent current, low dropout voltage and high power supply ripple rejection. It guarantees delivery of 300mA output current, and supports preset output voltage versions range include 1.1V, 1.2V, 1.3V, 1.5V, 1.7V, 1.8V, 1.9V, 2.0V, 2.3V, 2.5V, 2.6V, 2.7V, 2.8V, 2.9V, 3.0V, 3.3V, 3.6V.

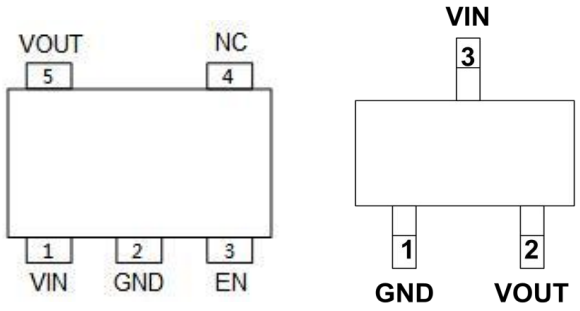
The CL9703 features a precise ±2% output regulation over load and line variations, also the CL9703 integrates many functions. The function of thermal shutdown and over current limit protect the device against thermal and current over-loads. Based on its low quiescent current consumption and its less than 0.1uA (typical) shutdown mode current, Besides with high power supply rejection ratio make the device holds well for low input voltages typically encountered in battery operation systems. The regulator is stable with small ceramic capacitor (typical 1.0uF).

Feature

- Input Voltage Range: 2.3V~5.5V
- Low Quiescent Current: 1.0uA (Typical)
- Low Dropout Voltage: 380mV@300mA
- ±2% Initial voltage reference accuracy
- Output Current Typical: 300mA
- Low Shutdown Current: 0.1uA
- High Power Supply Rejection Rate 78dB at 1KHz
- Fast Transient Response Over Line and Load Transient
- Built In Internal Soft Start
- Over Current Protection and Short-circuit Protection
- Over-temperature Protection
- Stable with 1μF minimum ceramic output capacitor
- SOT-23-5L
- Green Product RoHS Compliant and Halogen Free

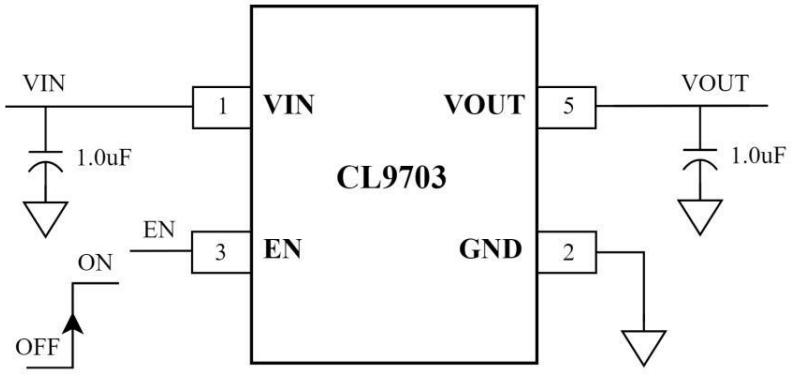
Applications

- Smart Phones and Tablets
- Portable&Battery-Powered Applications
- Ultra Low Power Micro-Controller
- Real Time Clock Backup Power
- Micro-Controller Power Supply
- Electronic sensors

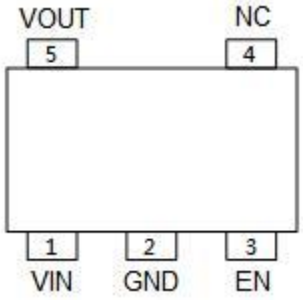


Package Type : SOT23-3L / SOT23-5L

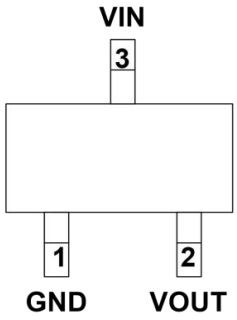
Application Circuit



Pin Description



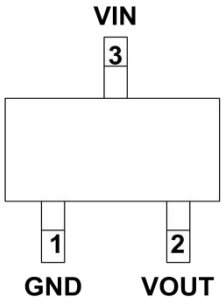
SOT23-5L



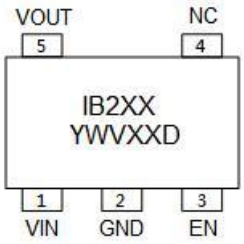
SOT23-3L

NO		NAME	DESCRIPTION
SOT23-3L	SOT23-5L		
3	1	VIN	Power supply voltage input. A 1.0uF ceramic capacitor is recommended at this pin.
1	2	GND	IC Ground.
	3	EN	EN: Pulling this pin to high/low will enable/disable the device. EN Floating is not recommend allowed.
	4	NC	Not connected.
2	5	VOUT	Regulated Output Voltage. The power output of the device. A 1.0uF ceramic capacitor is recommended at this pin.

Marking Information



As shown in the left figure:
First row:
IB1: Model code
XX: Output voltage（33: VOUT=3.3V)



As shown in the left figure:
First row:
IB2: Model code
XX: Output voltage (33: VOUT=3.3V)
Second row:
Y: Age code
W: Week Code
VXX: Batch code
D: Environmental code

PART NUMBER	PACKAGE TYPE	MARKING
CL9703A12L3M	SOT23-3L	IB112
CL9703A15L3M	SOT23-3L	IB115
CL9703A18L3M	SOT23-3L	IB118
CL9703A28L3M	SOT23-3L	IB128
CL9703A30L3M	SOT23-3L	IB130
CL9703A33L3M	SOT23-3L	IB133
CL9703A12L5M	SOT23-5L	IB212
CL9703A15L5M	SOT23-5L	IB215
CL9703A18L5M	SOT23-5L	IB218
CL9703A25L5M	SOT23-5L	IB225
CL9703A28L5M	SOT23-5L	IB228
CL9703A30L5M	SOT23-5L	IB230
CL9703A33L5M	SOT23-5L	IB233

Absolute Maximum Ratings (note 1)

SYMBOL	PARAMETER	LIMIT	UNIT
V_{IN}	Power Supply Operation Voltage	-0.3<VIN<6	V
V_{OUT}	Output Voltage	-0.3V<VOUT<VIN+0.3	V
V_{EN}	Enable Input Voltage	-0.3<VIN<6	V
I_{OUT}	Output Operation Current	300	mA
P_{D_SOT23}	Package Power Dissipation at TA≦25°C	420	mW
T_J	Junction Temperature	-40~150	℃
T_{STG}	Storage Temperature	-65~150	℃
T_{LEAD}	Lead Temperature Soldering Time	260(10S)	℃
V_{ESD_HBM}	ESD (Human Body Mode) (Note 2)	2K	V
V_{ESD_MM}	ESD (Machine Mode) (Note 2)	200	V

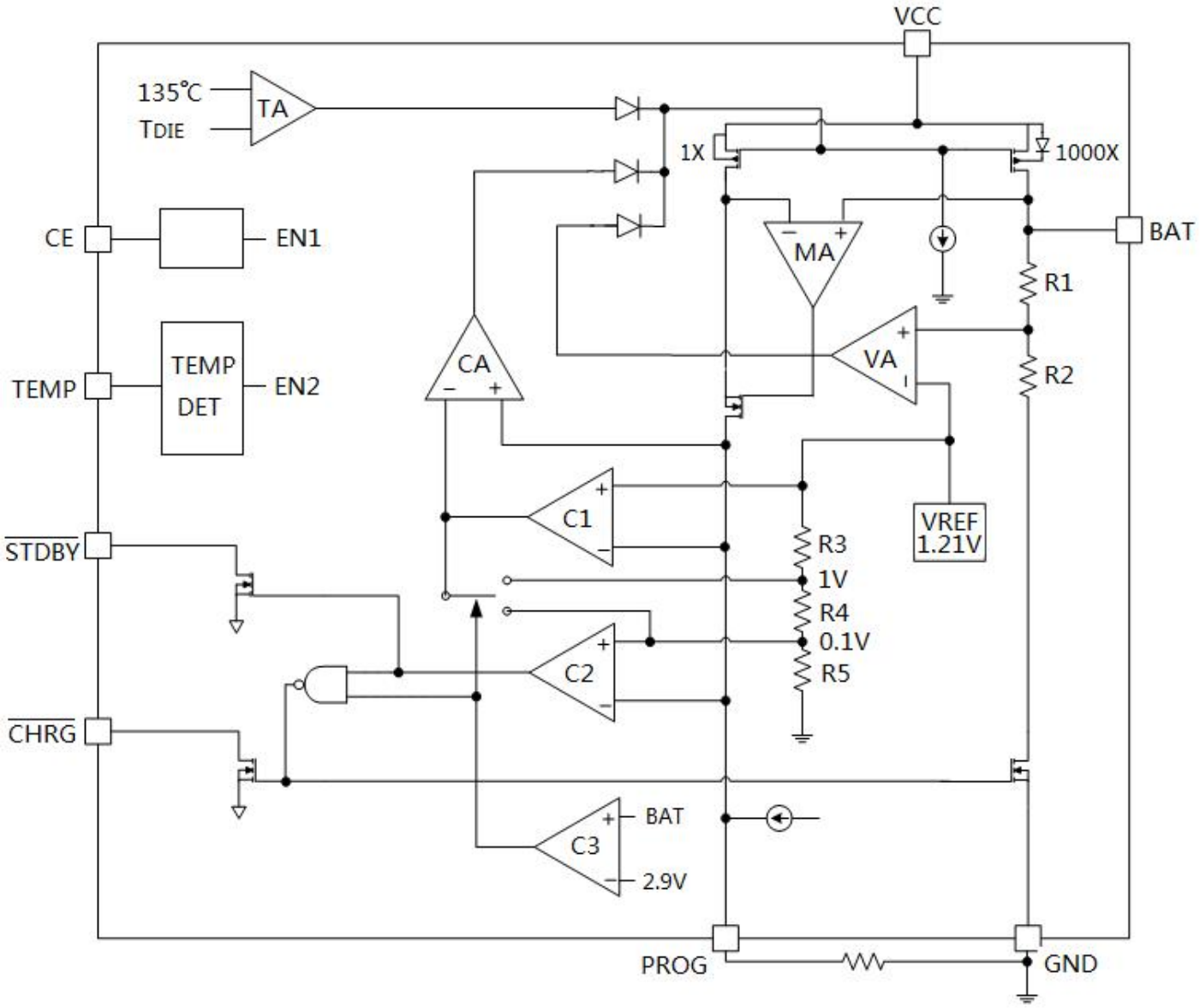
Thermal Information (Note 3)

SYMBOL	PARAMETER	LIMIT	UNIT
$\theta_{JA\_SOT23-5}$	Thermal Resistance Junction to Ambient	238	°C/W

Recommended Operating Condition (Note 4)

SYMBOL	PARAMETER	LIMIT	UNIT
VIN	Power Supply Operation Voltage	2.3 to 5.5	V
T_J	Junction Temperature	-40~125	℃
T_A	Operating Temperature Range	-40~85	℃

Functional Block Diagram



Functional Block Diagram

Electrical Characteristics

(V_{IN}=V_{OUT} (NOM)+1V or 2.3V (Whichever is greater) C_{IN}=1.0uF, C_{OUT}=1.0μF, T_A = 25 °C for typical specifications, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage Section						
V_{IN}	VIN Operation Voltage Range	VIN Input Range	2.3		5.5	V
V_{OUT}	VOUT Output Regulated Voltage	VOUT Output Range	1.1		3.6	V
I_{VIN}	VIN Supply Current	VIN=EN=5V, Unload		1.0		uA
I_{SHDN}	Input Current At IC Shutdown	VIN=5V, EN=0V		0.1	1.0	uA
I_{OUT}	Output Current (Note 5)	Normal Operation Output Current	300			mA
Enable						
V_{ENH}	EN Input Voltage High	VIN=5V, IOUT=1mA	1.2			V
V_{ENL}	EN Input Voltage Low	VIN=5V, IOUT=1mA			0.3	V
Output Voltage Section						
V_{OUT}	Output Voltage Accuracy	IOUT=1mA	-2.0		+2.0	%
$\triangle V_{LNR}$	Line Regulation For VIN	VIN=(VOUT+1V, 2.3V) to 5.5V IOUT=1mA		0.5		%/V
$\triangle V_{LDR}$	Load Regulation For VOUT	VIN=VOUT+1V IOUT=1mA to 100mA		12.0		mV
RDischg	Auto-Discharge Resistance	VIN=5V, VEN=0V		2.3		KΩ
V_{DROP}	Dropout Voltage (Note 6)	VOUT=3.3V, IOUT=300mA		380		mV
		VOUT=3.3V, IOUT=150mA		190		mV
PSRR						
PSRR	Power Supple Ripple Rejection Rate	VIN=Max{VOUT+1.0V,2.3V}, F=1KHz, Ripple=0.2Vpp, IOUT=50mA		78.0		dB
		VIN=Max{VOUT+1.0V,2.3V}, F=10KHz, Ripple=0.2Vpp, IOUT=50mA		40.0		dB
Over Current Protection						
I_{LIM}	Limit Current	VIN=VEN=5V	350			mA
I_{SHORT}	Short Current	VOUT < 0.2V		500		mA
Thermal Shutdown						
T_{SD}	Thermal Shutdown Temperature	TJ Rising		150		℃
	Thermal Shutdown Returned Temperature			130		℃

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. θJA is measured in the natural convection at TA=25°C on a high effective thermal conductivity test board of JEDEC 51-7 thermal measurement standard.

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

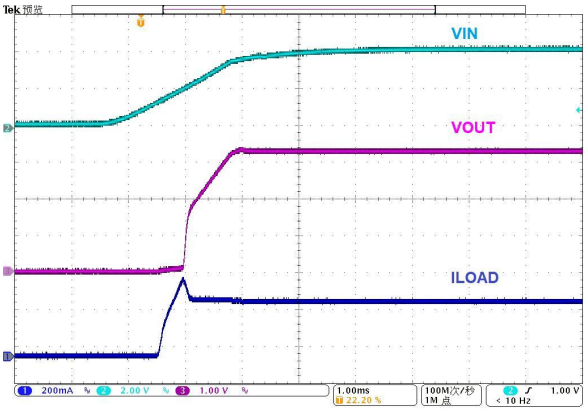
Note 5. The output current at which the output voltage becomes 95% of VOUT after gradually increasing the output current. Also The output current can be at least this value. Due to restrictions on the package power dissipation, this value may not be satisfied. Attention should be paid to the power dissipation of the package when the output current is large.The specification is guaranteed by design.

Note 6. The dropout voltage is defined as VIN - VOUT, which is measured when VOUT is 98%*VOUT.

Typical Performance Characteristics

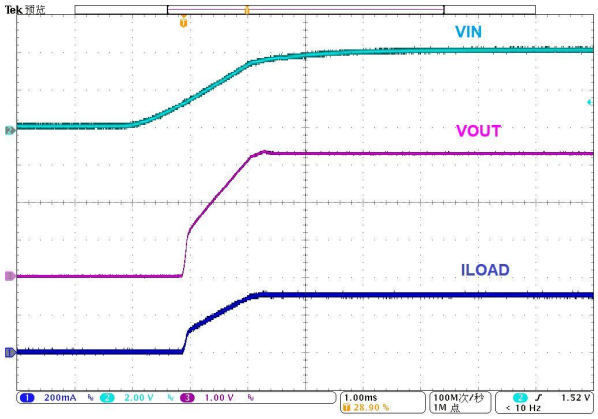
(T_A = 25°C, C_{IN}=1uF, C_{OUT}=1uF, unless otherwise specified)

Power On from VIN With 300mA LOAD



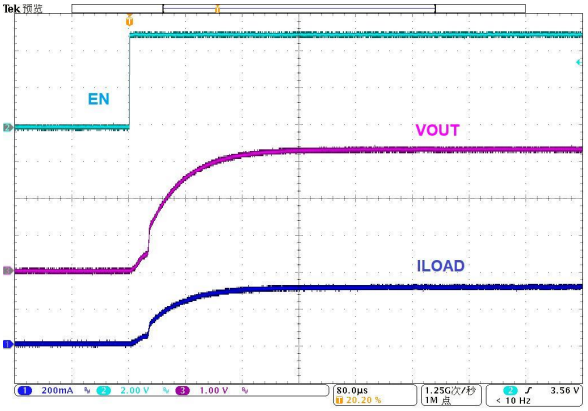
VIN=4.3V, VOUT=3.3V, ILOAD=300mA

Power On from VIN With 11ohm LOAD



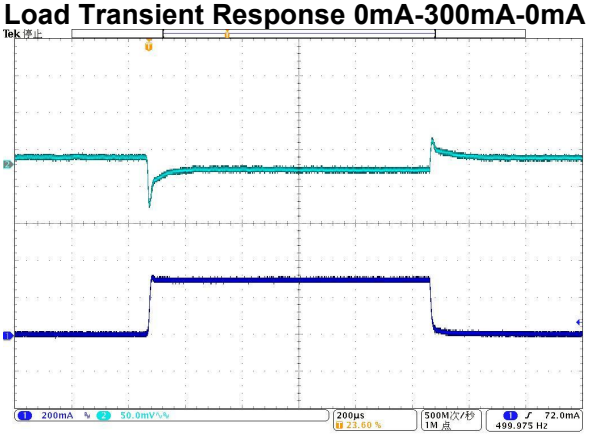
EN=5.0V, VIN=4.3V, VOUT=3.3V, RLOAD=11ohm

Power On from EN With 11ohm LOAD



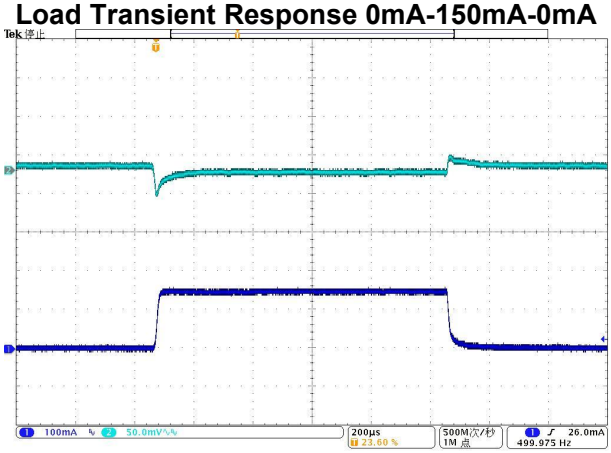
VIN=4.3V, VOUT=3.3V, RLOAD=11ohm

Load Transient Response 0mA-300mA-0mA



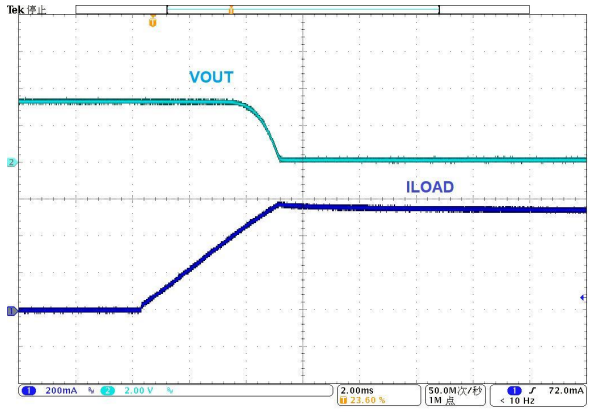
VIN=4.3V, VOUT=3.3V, ILOAD=0mA-300mA-0mA

Load Transient Response 0mA-150mA-0mA



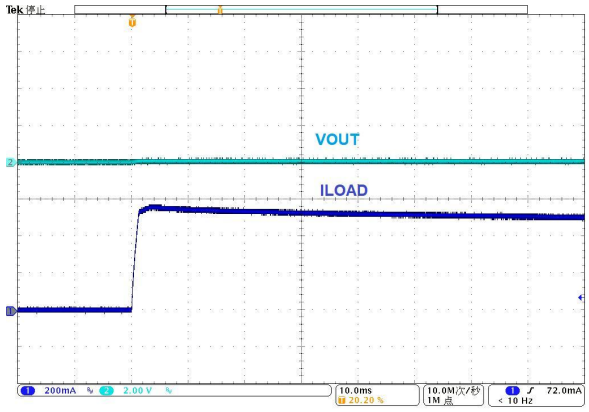
VIN=4.3V, VOUT=3.3V, ILOAD=0mA-150mA-0mA

Over Current Limit



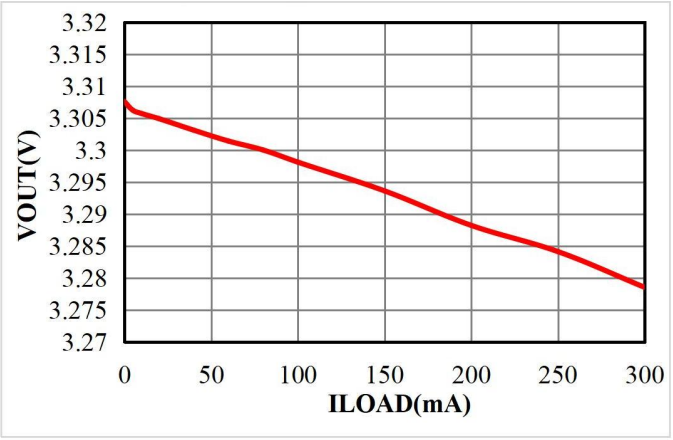
VIN=4.3V, VOUT=3.3V

Short Before Start



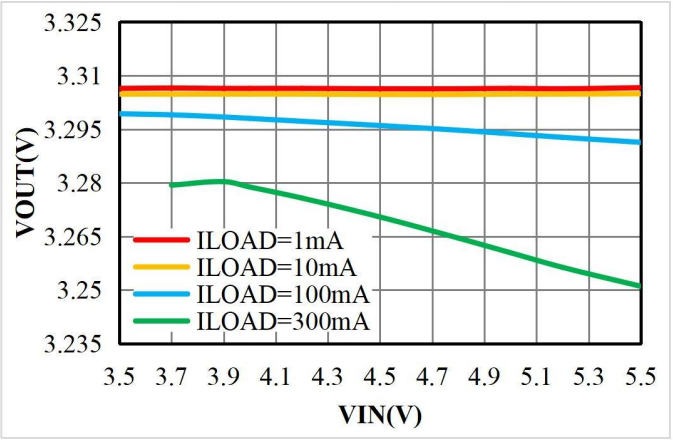
VIN=4.3V, VOUT=0V

Output Voltage vs. Load Current



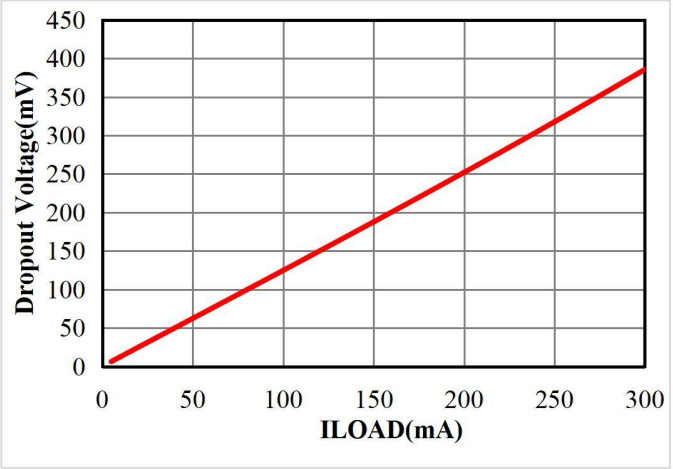
VIN=4.3V, VOUT=3.3V, ILOAD=0mA-300mA

Output Voltage vs. Input Voltage



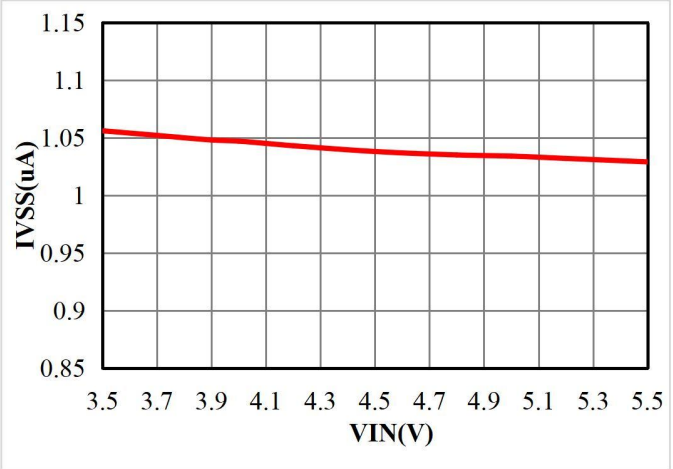
VIN=3.5-5.5V, VOUT=3.3V, ILOAD=1mA-300mA

Dropout Voltage vs. Load Current



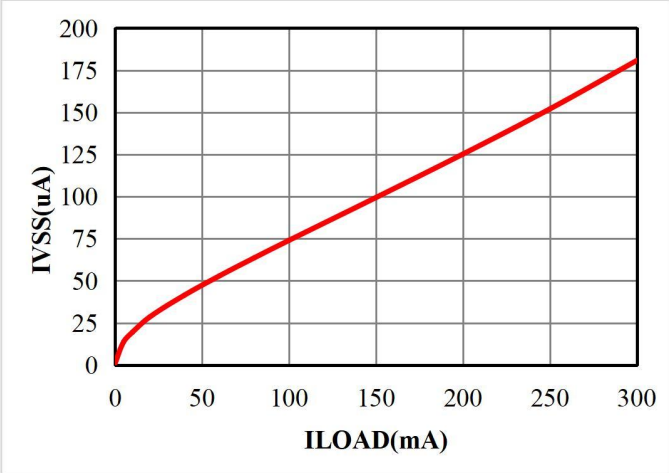
VOUT=3.3V, ILOAD=0mA-300mA

Ground Current vs. Input Voltage



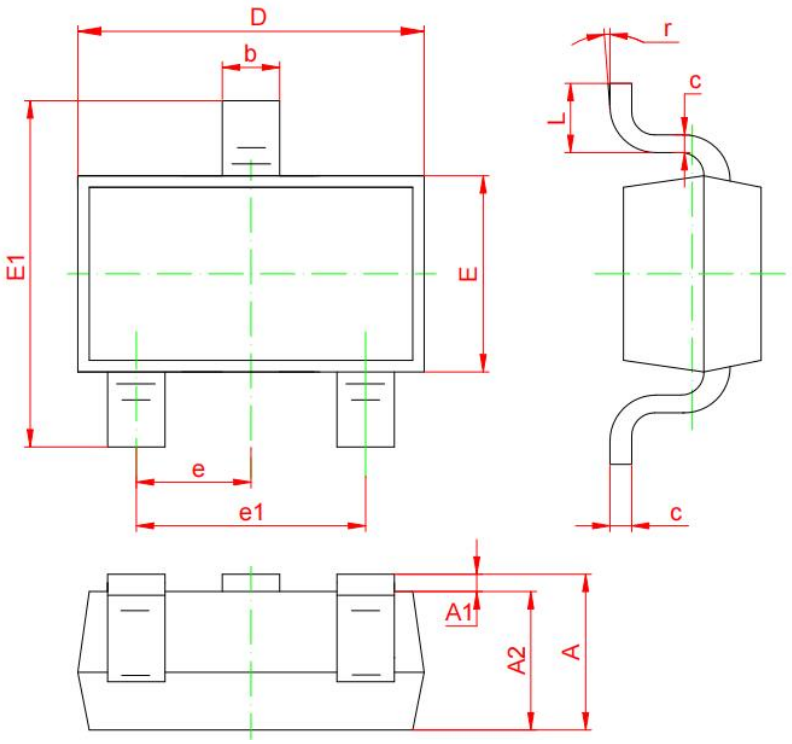
VIN=3.5-5.5V, VOUT=3.3V, ILOAD=0mA

Ground Current vs. Load Current



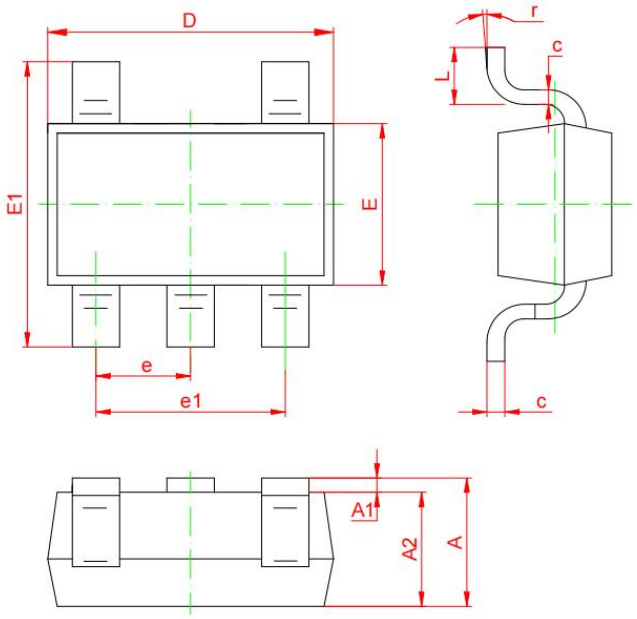
VIN=4.3V, VOUT=3.3V, ILOAD=0-300mA

Package Outline: SOT-23-3L



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°

Package Outline: SOT-23-5L



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L	0.300	0.600	0.012	0.024
r	0°	8°	0°	8°

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