Features

- 300mA Output Current
- Low Quiescent Current: 60μA
- Shut-down Current: < 0.1μA
- Input Voltage: 1.8V ～ 5.5V
- 0.47μF～10μF Ceramic Capacitors Ensure the Stability
- Overload/Over Temperature Protection
- Package: SOT-23-5 / SC70-5 (lead-free packaging is now available)
- Specified from: -40℃ ～ +85℃

Applications

- MP3/MP4 Players
- Cellular phones, radiophone, digital cameras, and portable electronics
- Laptop/notebook/palmtop computers
- Portable devices
- Disk driver
- Battery chargers
- Bluetooth and other radio products

Description

The HX2001 is 300mA low dropout linear regulator optimized to provide a high performance solution to low power system.

The device offers a new level of cost-effective performance in cellular phones, laptop and notebook computers, and other portable devices. Proprietary design techniques ensure high performance.

The HX2001 is designed to make use of low cost ceramic capacitors which ensure the stability of the output current, and enhance the efficiency in order to prolong the battery life of those portable devices.

The HX2001 regulators are available in the industry standard SOT-23-5/SC70-5 power packages (or upon request).

Order Information

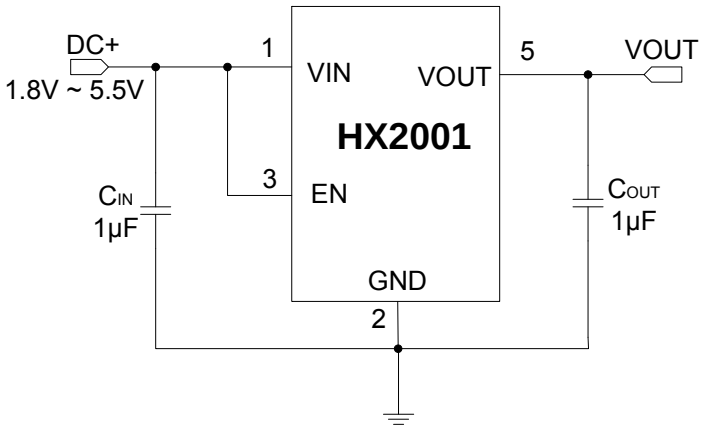
HX2001-□□□

- Internal Definition
- Package Type:
  - E: SOT-23-5L
  - B: SOT-353-5(SC70-5)
- Fixed Output Voltage:
  - K: 1.2V
  - I: 1.3V
  - B: 1.5 V
  - C: 1.8V
  - H: 2.5V
  - E: 2.8V
  - F: 3.0V
  - G: 3.3V

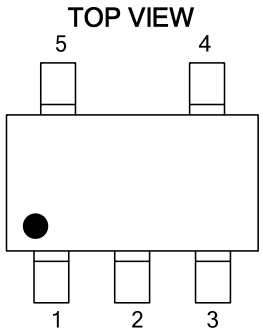
Example: HX2001-CEC

- Internal Definition
- Package Type: SOT-23-5L
- Fixed Output Voltage: 1.8V

Typical Application Circuit



Pin Assignment and Description



PIN	NAME	FUNCTION
1	VIN	Power Input
2	GND	Ground
3	EN	ON/OFF Control (High Enable)
4	NC	Not Connect
5	VOUT	Output Pin

Absolute Maximum Ratings (Note 1)

- Supply Input Voltage ……-0.3V ～ 6V
- EN Input Voltage ……-0.3V ～ 6V
- Operating Temperature Range(Note 2)……-40°C ～ +85℃
- Junction Temperature Range …… -40°C ～ +125℃
- Storage Temperature Range ……-65℃ ～ +150℃
- Lead Temperature (Soldering, 10 sec.) ……+265℃

Note 1: Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2: The HX2001 is guaranteed to meet performance specifications from 0°C to 70°C. Specifications over the –40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.

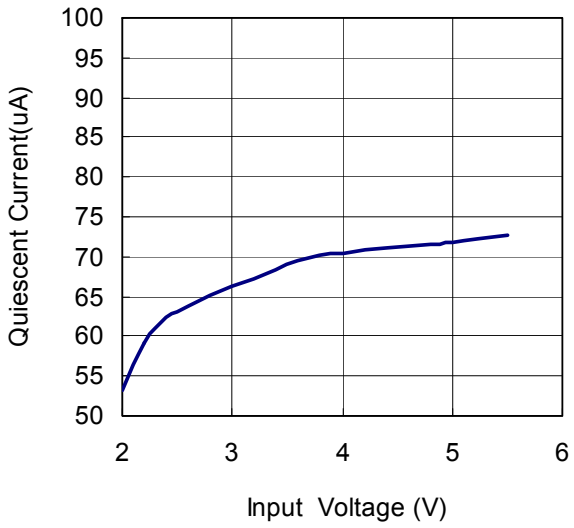
Electrical Characteristics

Operating Conditions: T_A=25℃, V_{IN}= V_{OUT} + 0.5V, C_{IN} = C_{OUT} =1μF, unless otherwise specified.

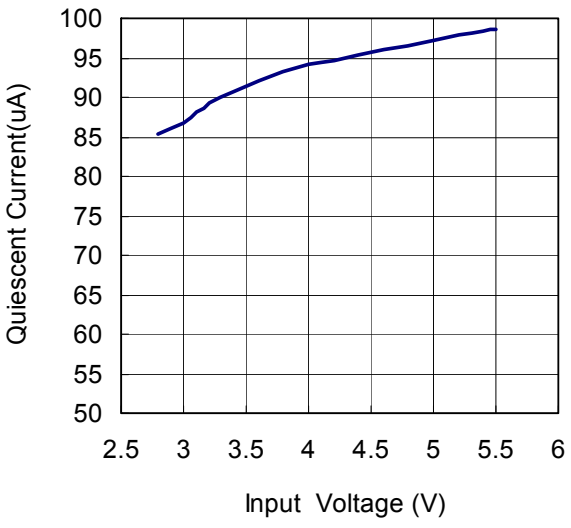
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Voltage Range		1.8		5.5	V
ΔV_{OUT}	Output Voltage Accuracy (Fixed Output Voltage)	I_{OUT} = 10mA	-2		+2	%
I_Q	Quiescent Current	2.2V ≤ V_{IN} ≤ 5.5V		60		μA
I_{OFF}	Shutdown Current	V_{EN} = 0V, V_{IN} = 5V		0.02		μA
V_{DROP}	Dropout Voltage: V_{IN} -V_{OUT}	I_{OUT} =150mA, V_{OUT} ≤1.8V I_{OUT} =150mA, V_{OUT} ≥2.8V		150		mV
V_{ENH}	EN Threshold Voltage(High)		1.2			V
V_{ENL}	EN Threshold Voltage(Low)				0.7	V
I_{EN}	Enable Pin Current			0.1		μA
$I_{OVERLOAD}$	Overload Limited (Fixed Output Voltage)	R_{LOAD} = 0Ω, V_{IN} = V_{OUT}+1V	330	400	560	mA
PRSS	Power Supply Rejection Rate	f = 1kHz, I_{OUT} = 100mA		-65		dB
ΔV_{LINE}	Line Regulation	V_{IN} = (V_{OUT}+0.5) to 5.5V, I_{OUT} = 0mA		5		mV
ΔV_{LOAD}	Load Regulation	0mA ≤ I_{OUT} ≤ 100mA		10		mV
T_{SD}	Thermal Shutdown Temperature			160		℃
ΔT_{SD}	Thermal Shutdown Hysteresis			20		℃

Typical Performance Characteristics

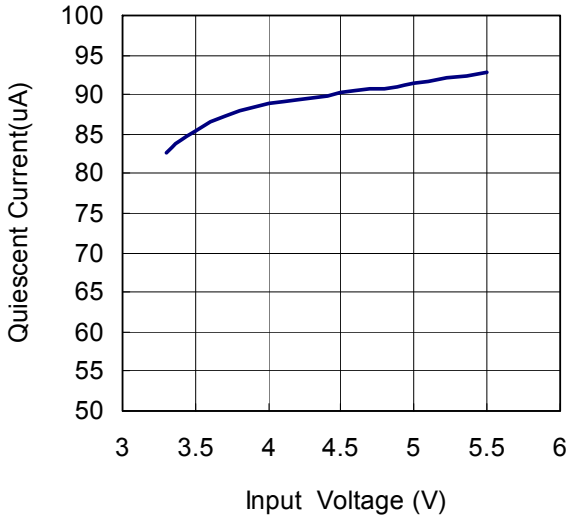
Quiescent Current vs. Input Voltage
(Vout=1.8V Io=0A)



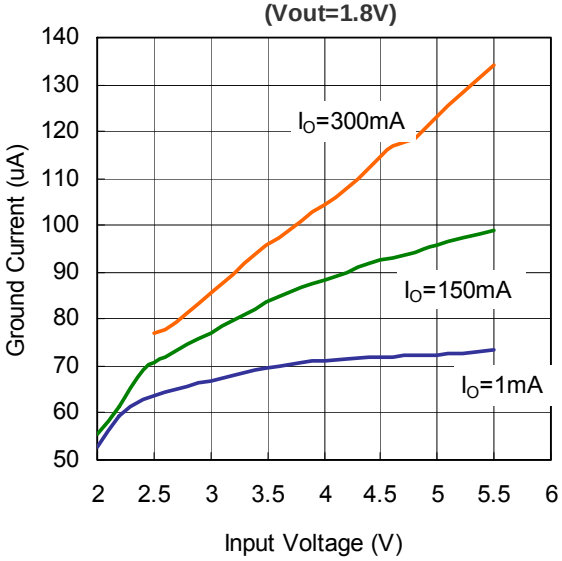
Quiescent Current vs. Input Voltage
(Vout=2.8V Io=0A)



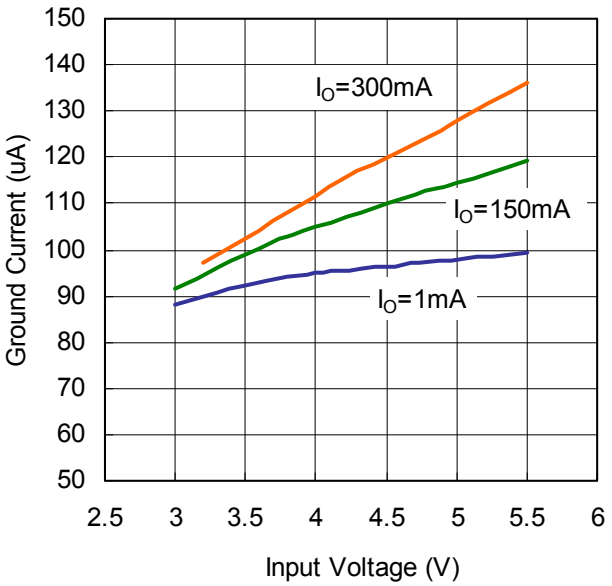
Quiescent Current vs. Input Voltage
(Vout=3.3V Io=0A)



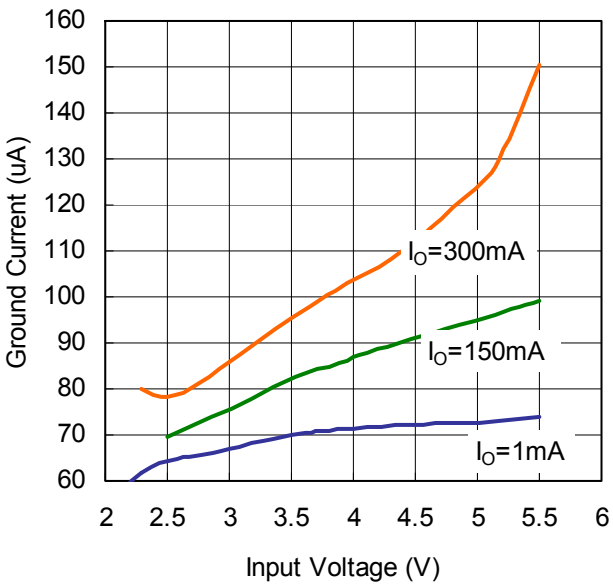
Ground Current vs. Input Voltage
(Vout=1.8V)



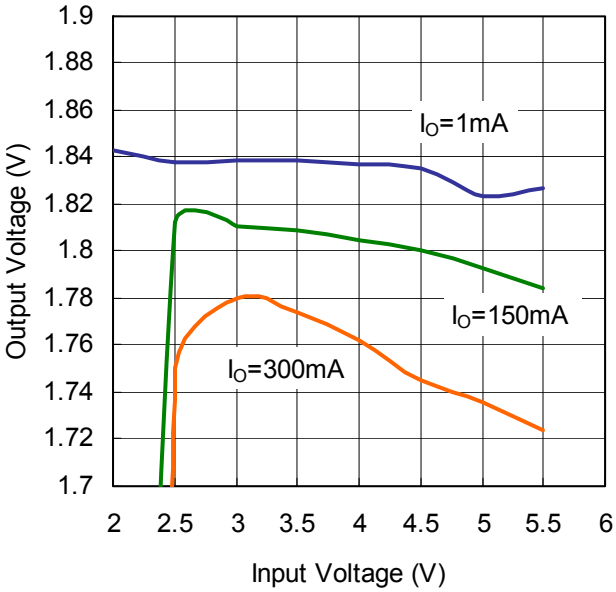
Ground Current vs. Input Voltage
(Vout=2.8V)



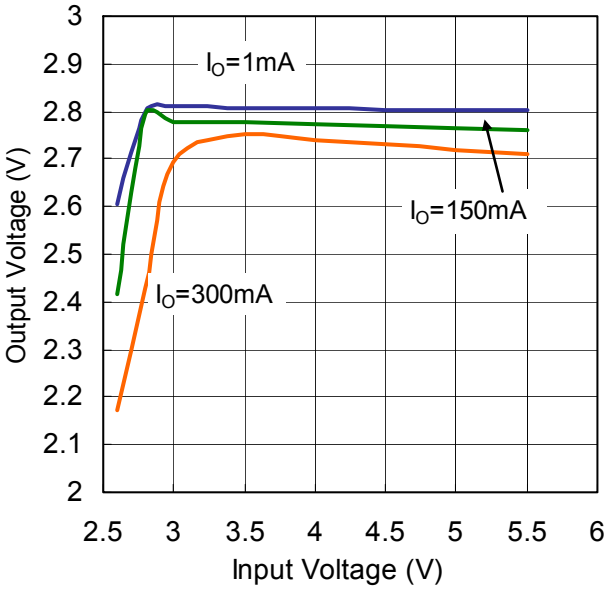
Ground Current vs. Input Voltage
(Vout=3.3V)



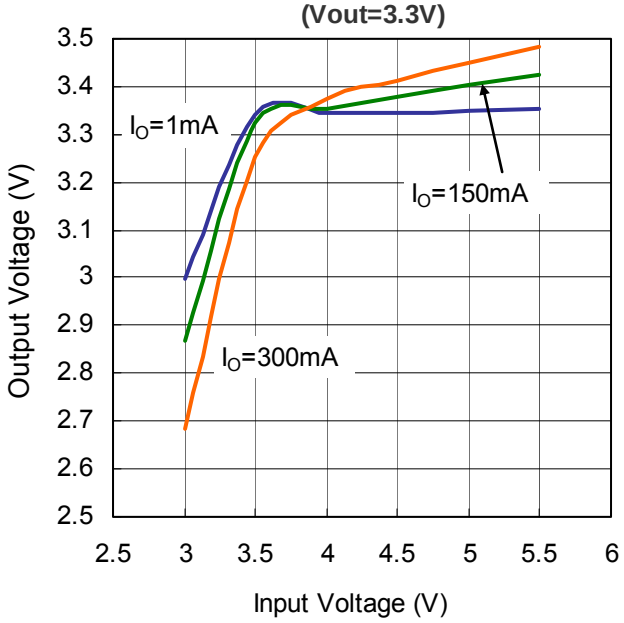
Output Voltage vs. Input Voltage
(Vout=1.8V)



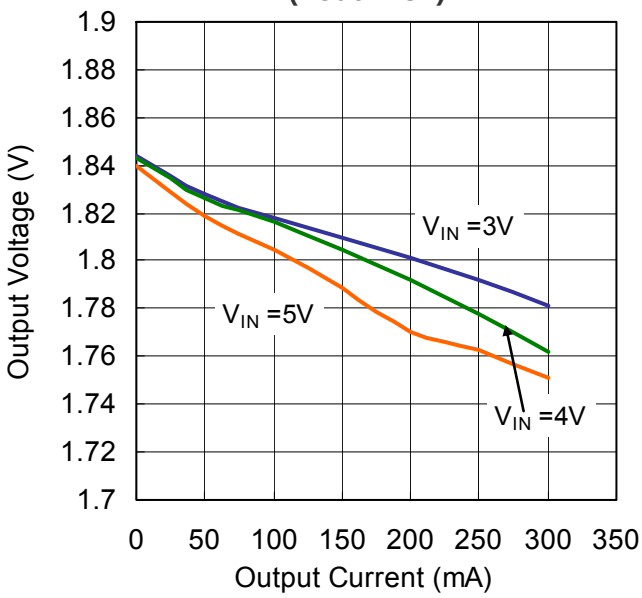
Output Voltage vs. Input Voltage
(Vout=2.8V)



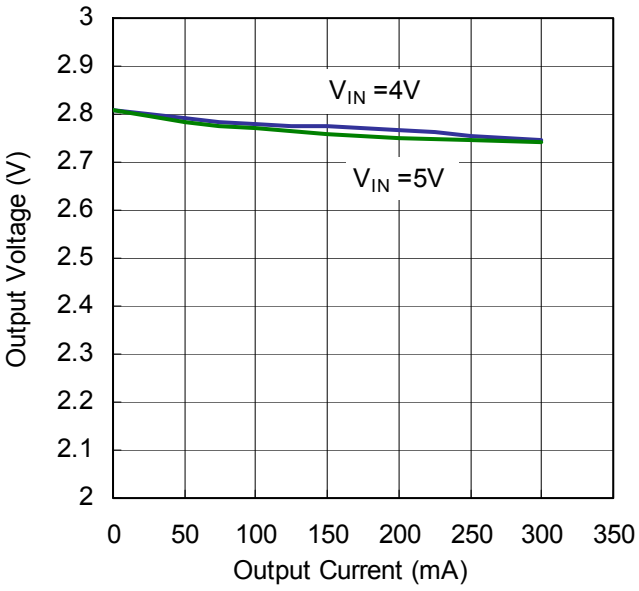
Output Voltage vs. Input Voltage
(Vout=3.3V)



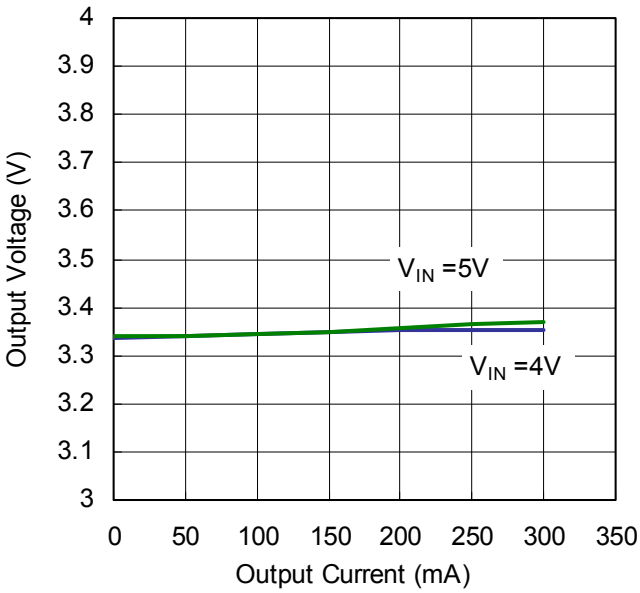
Output Voltage vs. Output Current
(Vout=1.8V)



Output Voltage vs. Output Current
(Vout=2.8V)



Output Voltage vs. Output Current
(Vout=3.3V)



Pin Functions

VIN (Pin 1): Power Input Voltage. Must be locally bypassed.

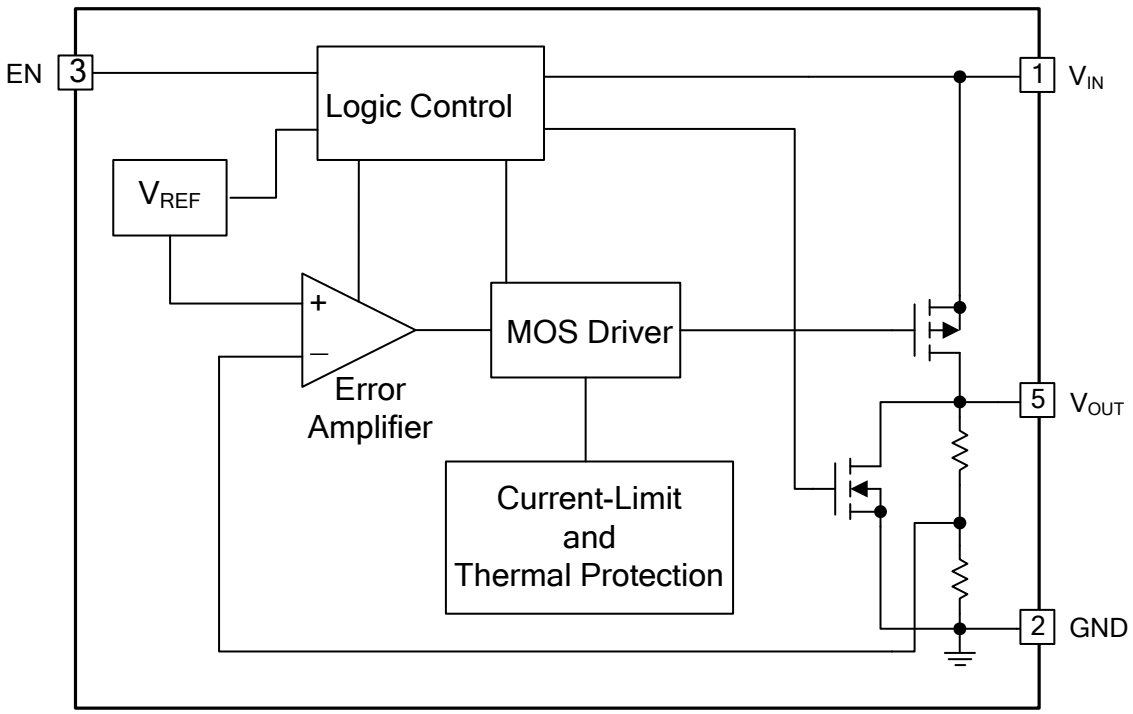
GND (Pin 2): Signal and Power Ground. Provide a short direct PCB path between GND and the (–) side of the output capacitor(s).

EN (Pin 3): ON/OFF Control (High Enable). Forcing this pin above 1.2V enables the part. Forcing this pin below 0.7V can shuts down the device. In shutdown, all functions are disabled drawing <1μA supply current. Do not leave EN floating.

NC (Pin 4): No Connect.

VOUT (Pin 5): Output Voltage. It is a fixed output voltage (3.1V) for the Micropower LDO Regulator.

Block Diagram



Application Information

Input and Output Capacitor

Like any low dropout regulator, the external capacitors used with the HX2001 must be carefully selected for regulator stability and performance. Using a capacitor whose value is >1μF on the HX2001 input and the amount of capacitance can be increased without limit. The input capacitor must be located a distance of not more than 0.5 inch from the input pin of the IC and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response. The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application.

The HX2001 is designed specifically to work with low ESR ceramic output capacitor in space-saving and performance consideration. Using a ceramic capacitor whose value is at least 1μF with ESR is > 25mΩ on the HX2001 output ensures stability. The HX2001 still works well with output capacitor of other types due to the wide stable ESR range.

Enable Function

The HX2001 features an LDO regulator enable/disable function. To assure the LDO regulator will switch on, the EN turn on control level must be greater than 1volts.

For to protecting the system, the HX2001 have a quick-discharge function. If the enable function is not needed in a specific application, it may be tied to VIN to keep the LDO regulator in a continuously on state.

PSRR

The power supply rejection ratio (PSRR) is defined as the gain from the input to output divided by the gain from the supply to the output. The PSRR is found to be

$$PSRR = 20 \times \log\left(\frac{\Delta \text{Gain Error}}{\Delta \text{Supply}}\right)$$

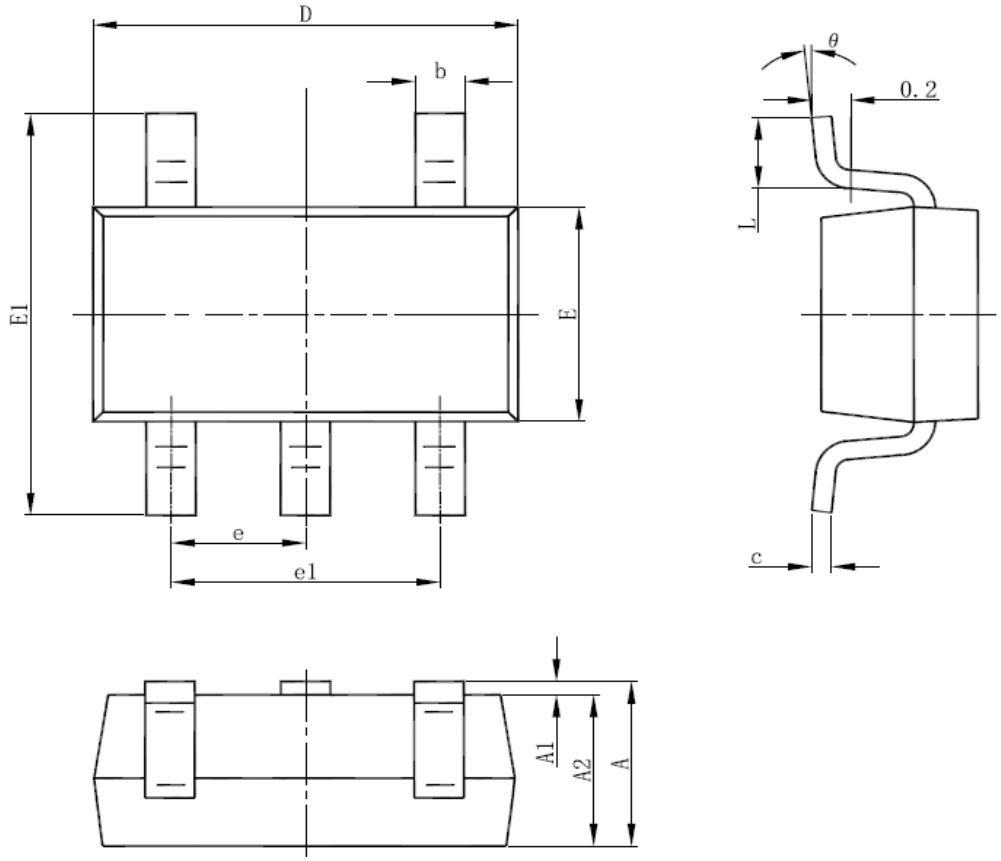
Note that when heavy load measuring, Δsupply will cause Δtemperature. And Δtemperature will cause Δoutput voltage. So the heavy load PSRR measuring must include temperature effect.

Current Limit

The HX2001 contains an independent current limiter, which monitors and controls the pass transistor's gate voltage, limiting the output current to 0.3A (typ.). The output can be shorted to ground indefinitely without damaging the part.

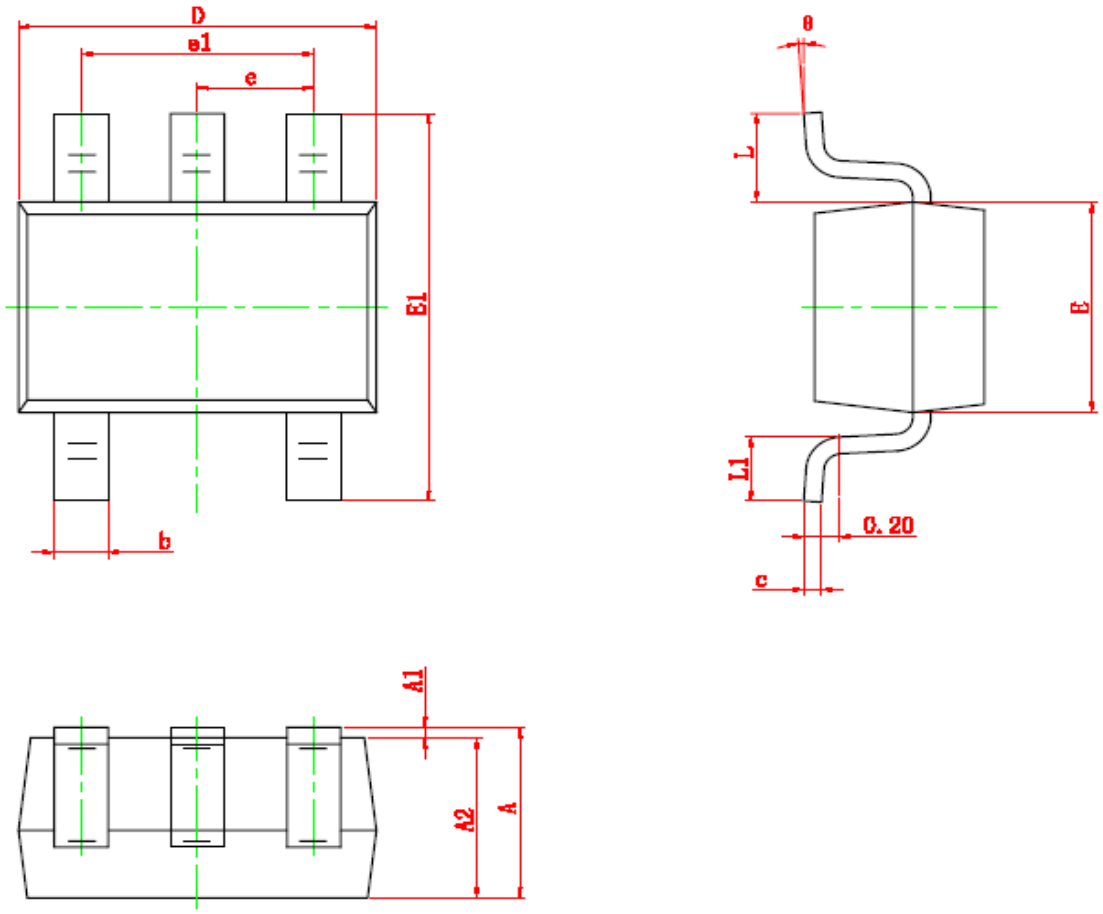
Packaging Information

SOT-23-5 Package Outline Dimension



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°

SC70-5 Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Subject changes without notice