

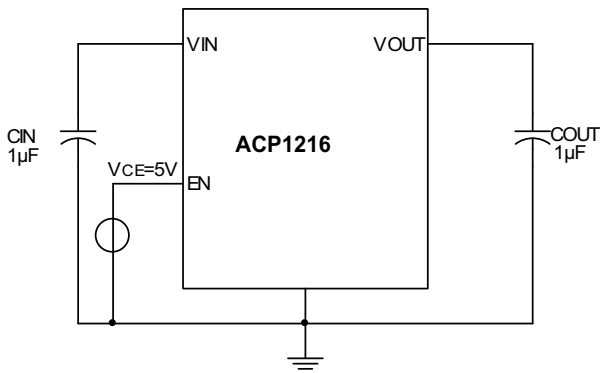
### ■ GENERAL DESCRIPTION

The ACP1216 series are positive voltage regulator ICs fabricated by CMOS process. Each of these ICs consists of a voltage reference, an error amplifier, a resistor network for setting output voltage, a current limit circuit for current protection and a chip-enable circuit. The ACP1216 series feature high supply voltage ripple rejection, low dropout voltage, low noise, high output voltage accuracy, and low current consumption which make them ideal for use in various battery-powered devices. The ACP1216 series have 1.2V, 1.3V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.2V and 3.3V versions. The chips are available in standard SOT23-5L package.

### ■ FEATURES

- Maximum Output Current: 300mA
- Dropout Voltage: 160mV at 100mA (5.0V type)
- Maximum Operating Voltage: 2~6.0V
- Output Voltage Range: 1.2V to 5.0V
- Highly Accurate:  $\pm 2\%$
- Low Standby Current: 0.1 $\mu$ A (TYP.)
- Low Quiescent Current: 25 $\mu$ A (TYP.)
- Operational Temperature Range: -40 $^{\circ}$ C~85 $^{\circ}$ C
- Excellent Load Regulation: 12mV Typical
- High Ripple Rejection: 70dB Typical (f=1kHz)
- Extremely Low Noise: 30 $\mu$ Vrms (10Hz to 100kHz)
- Excellent Line Regulation: 4mV Typical
- Compatible with Low ESR Ceramic Capacitor (as Low as 1 $\mu$ F)

### ■ APPLICATION CIRCUIT



### ■ APPLICATION

- Battery powered equipment
- GPS, DSC, MP4, PDA, DVD
- Camera
- Notebook
- Data communication
- Portable Games

### ■ PIN CONFIGURATION

SOT23-5L	Symbol	Name	Descriptions
	1	VIN	Input voltage
	2	GND	Ground
	3	CE	Active high enable input pin. Logic high=enable, logic low=shutdown
	4	NC	No connection
	5	VOUT	Regulated output voltage



### ■ ORDERING AND MARKING INFORMATION

Standard Part NO.	Vout	Package	Packing	Min. Quantity	RoHS
ACP1216-12BTRAL	1.2V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-13BTRAL	1.3V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-15BTRAL	1.5V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-18BTRAL	1.8V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-25BTRAL	2.5V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-28BTRAL	2.8V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-30BTRAL	3.0V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-32BTRAL	3.2V	SOT23-5	Tape&Reel	3000PCS	Lead Free
ACP1216-33BTRAL	3.3V	SOT23-5	Tape&Reel	3000PCS	Lead Free

### ■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Input Voltage	$V_{IN}$	6.5	V
Enable Input Voltage	$V_{CE}$	-0.3 to $V_{IN}+0.3$	V
Output Current	$I_{OUT}$	300	mA
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	260	°C
Thermal Resistance (Note 2)	$\theta_{JA}$	250	°C /W
ESD (Human Body Model)	ESD	2000	V
ESD (Machine Model)	ESD	200	V

### ■ RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Input Voltage	$V_{IN}$	2	6	V
Operating Junction Temperature Range	$T_J$	-40	85	°C

### ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}=2.2V$ ,  $T_J=25^\circ C$ ,  $C_{IN}=1\mu F$ ,  $C_{OUT}=1\mu F$ , **Bold** typeface applies over  $-40^\circ C \leq T_J \leq 85^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	VOUT	$V_{IN}=2.2V$ $1mA \leq I_{OUT} \leq 30mA$	1.176	1.2	1.224	V
Input Voltage	VIN				6	V
Output Current	IOUT	$V_{IN}-V_{OUT}=1V$	200			mA
Load Regulation	VRLOAD	$V_{IN}=2.2V$ $1mA \leq I_{OUT} \leq 80mA$		12	40	mV
Line Regulation	VRLINE	$2.2V \leq V_{IN} \leq 6V$ $I_{OUT}=30mA$		4	16	mV
Dropout Voltage	VDROP	$I_{OUT}=10mA$		700	900	mV
		$I_{OUT}=100mA$		700	900	
		$I_{OUT}=150mA$		700	900	
		$I_{OUT}=200mA$		700	900	
Quiescent Current	IQ	$V_{IN}=2.2V$ , $I_{OUT}=0mA$		25	50	$\mu A$
Standby Current	ISTD	$V_{IN}=2.2V$ VCE in OFF mode		0.1	1	$\mu A$
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, $f=1kHz$ $V_{IN}=2.2V$		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=30mA$		<b><math>\pm 120</math></b>		$\mu V/^\circ C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			<b><math>\pm 100</math></b>		ppm/ $^\circ C$
Short Current Limit	ILIMIT	$V_{OUT}=0V$		50		mA
RMS Output Noise	VNOISE	$T_A=25^\circ C$ $10Hz \leq f \leq 100kHz$		30		$\mu V_{rms}$
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	RPD		2.5	5	10	$M\Omega$

### ■ ELECTRICAL CHARACTERISTICS (continued)

( $V_{IN}=2.8V$ ,  $T_J=25^{\circ}C$ ,  $C_{IN}=1\mu F$ ,  $C_{OUT}=1\mu F$ , **Bold** typeface applies over  $-40^{\circ}C \leq T_J \leq 85^{\circ}C$ , unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	VOUT	$V_{IN}=2.8V$ $1mA \leq I_{OUT} \leq 30mA$	1.764	1.8	1.836	V
Input Voltage	VIN				6	V
Output Current	IOUT	$V_{IN}-V_{OUT}=1V$	200			mA
Load Regulation	VRLOAD	$V_{IN}=2.8V$ $1mA \leq I_{OUT} \leq 80mA$		12	40	mV
Line Regulation	VRLINE	$2.3V \leq V_{IN} \leq 6V$ $I_{OUT}=30mA$		4	16	mV
Dropout Voltage	VDROP	$I_{OUT}=10mA$		20	40	mV
		$I_{OUT}=100mA$		150	300	
		$I_{OUT}=150mA$		200	400	
		$I_{OUT}=200mA$		250	500	
Quiescent Current	IQ	$V_{IN}=2.8V$ , $I_{OUT}=0mA$		25	50	$\mu A$
Standby Current	ISTD	$V_{IN}=2.8V$ VCE in OFF mode		0.1	1	$\mu A$
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, $f=1kHz$ $V_{IN}=2.8V$		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=30mA$		<b><math>\pm 180</math></b>		$\mu V/^{\circ}C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			<b><math>\pm 100</math></b>		ppm/ $^{\circ}C$
Short Current Limit	ILIMIT	$V_{OUT}=0V$		50		mA
RMS Output Noise	VNOISE	$T_A=25^{\circ}C$ $10Hz \leq f \leq 100kHz$		30		$\mu V_{rms}$
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	RPD		2.5	5	10	$M\Omega$

### ■ ELECTRICAL CHARACTERISTICS (continued)

( $V_{IN}=4.3V$ ,  $T_J=25^\circ C$ ,  $C_{IN}=1\mu F$ ,  $C_{OUT}=1\mu F$ , **Bold** typeface applies over  $-40^\circ C \leq T_J \leq 85^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	VOUT	$V_{IN}=4.3V$ $1mA \leq I_{OUT} \leq 30mA$	3.23 4	3.3	3.36 6	V
Input Voltage	VIN				6	V
Output Current	IOUT	$V_{IN}-V_{OUT}=1V$	200			mA
Load Regulation	VRLOAD	$V_{IN}=4.3V$ $1mA \leq I_{OUT} \leq 80mA$		12	40	mV
Line Regulation	VRLINE	$3.8V \leq V_{IN} \leq 6V$ $I_{OUT}=30mA$		4	16	mV
Dropout Voltage	VDROP	$I_{OUT}=10mA$		20	40	mV
		$I_{OUT}=100mA$		150	300	
		$I_{OUT}=150mA$		200	400	
		$I_{OUT}=200mA$		250	500	
Quiescent Current	IQ	$V_{IN}=4.3V$ , $I_{OUT}=0mA$		25	50	$\mu A$
Standby Current	ISTD	$V_{IN}=4.3V$ VCE in OFF mode		0.1	1	$\mu A$
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, $f=1kHz$ $V_{IN}=4.3V$		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=30mA$		<b><math>\pm 330</math></b>		$\mu V/^\circ C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			<b><math>\pm 100</math></b>		ppm/ $^\circ C$
Short Current Limit	ILIMIT	$V_{OUT}=0V$		50		mA
RMS Output Noise	VNOISE	$T_A=25^\circ C$ $10Hz \leq f \leq 100kHz$		30		$\mu V_{rms}$
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	RPD		2.5	5	10	M $\Omega$

■ PERFORMANCE CHARACTERISTICS

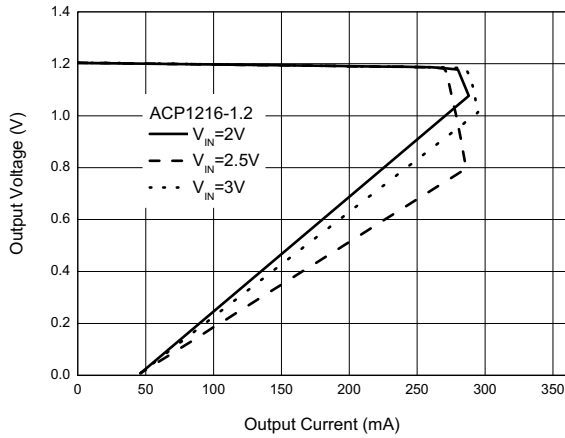


Figure 1. Output Voltage vs. Output Current

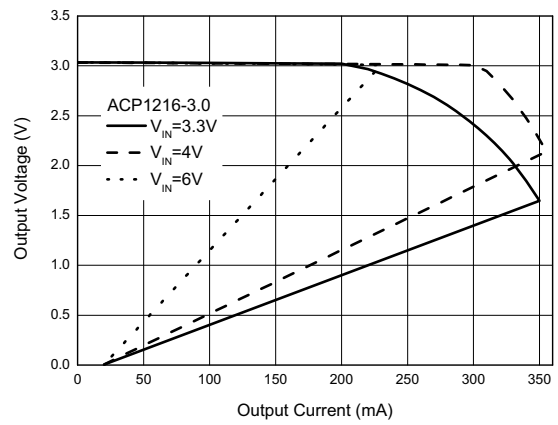


Figure 2. Output Voltage vs. Output Current

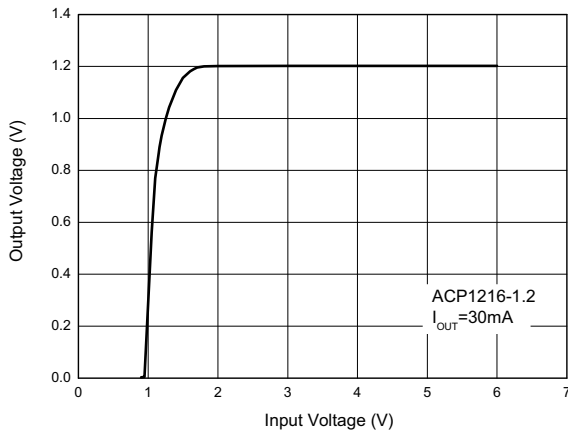


Figure 3. Output Voltage vs. Input Voltage

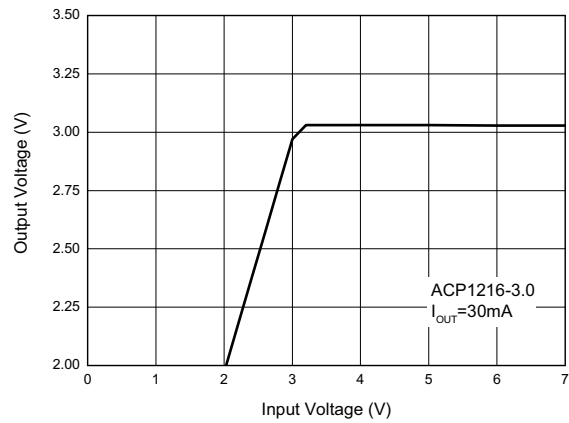


Figure 4. Output Voltage vs. Input Voltage

■ PERFORMANCE CHARACTERISTICS

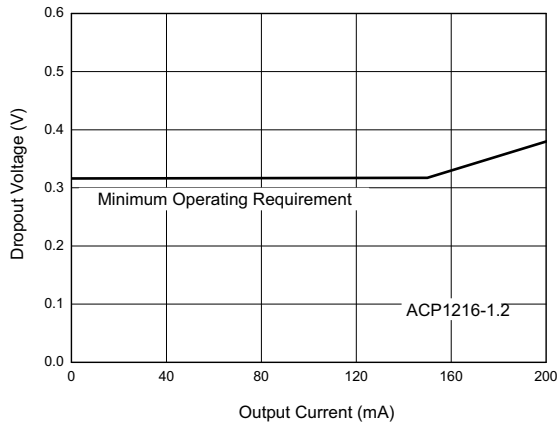


Figure 5. Dropout Voltage vs. Output Current

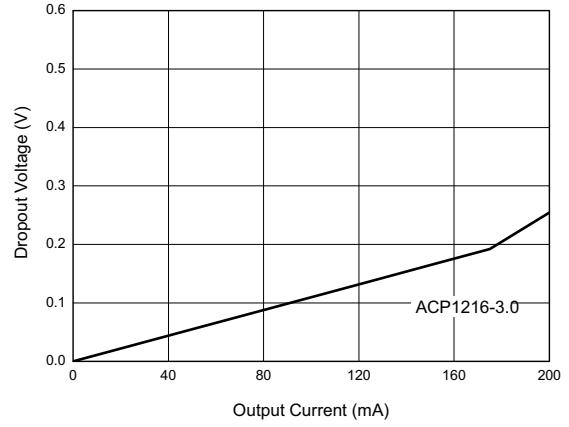


Figure 6. Dropout Voltage vs. Output Current

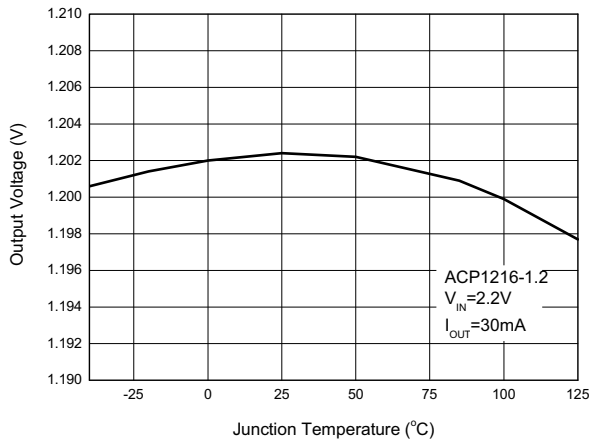


Figure 7. Output Voltage vs. Junction Temperature

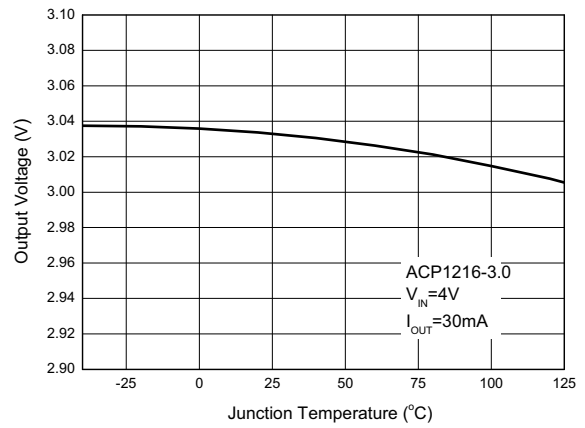


Figure 8. Output Voltage vs. Junction Temperature

**■ PERFORMANCE CHARACTERISTICS**

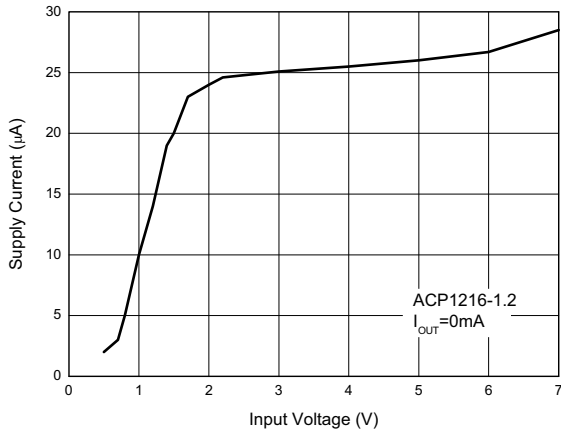


Figure 9. Supply Current vs. Input Voltage

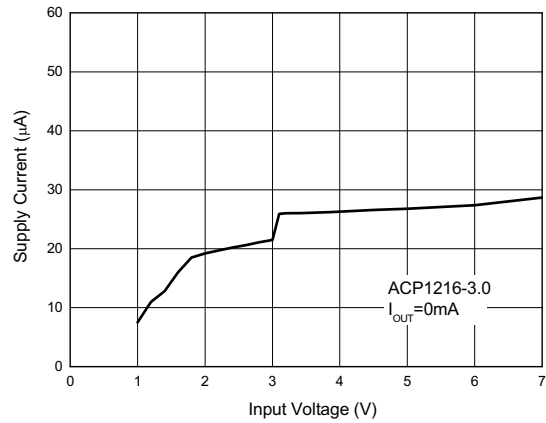


Figure 10. Supply Current vs. Input Voltage

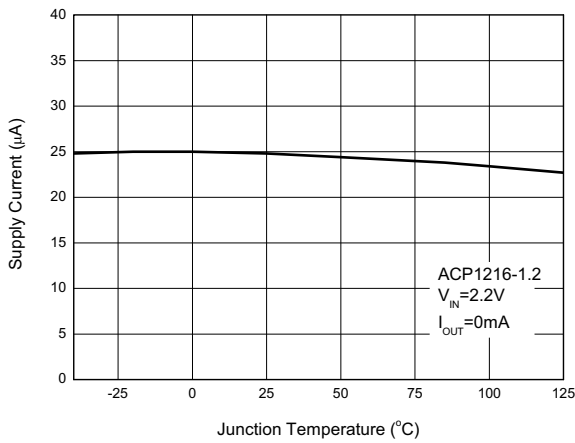


Figure 11. Supply Current vs. Junction Temperature

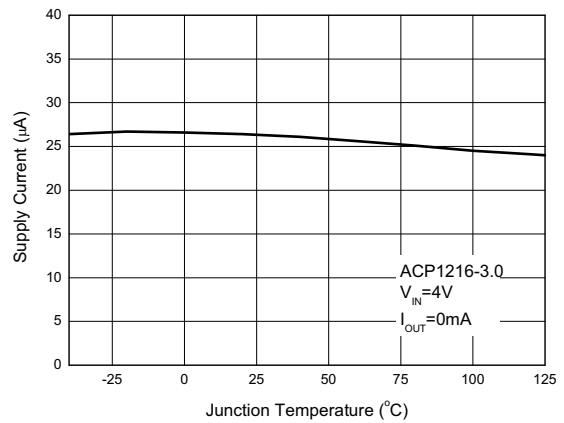
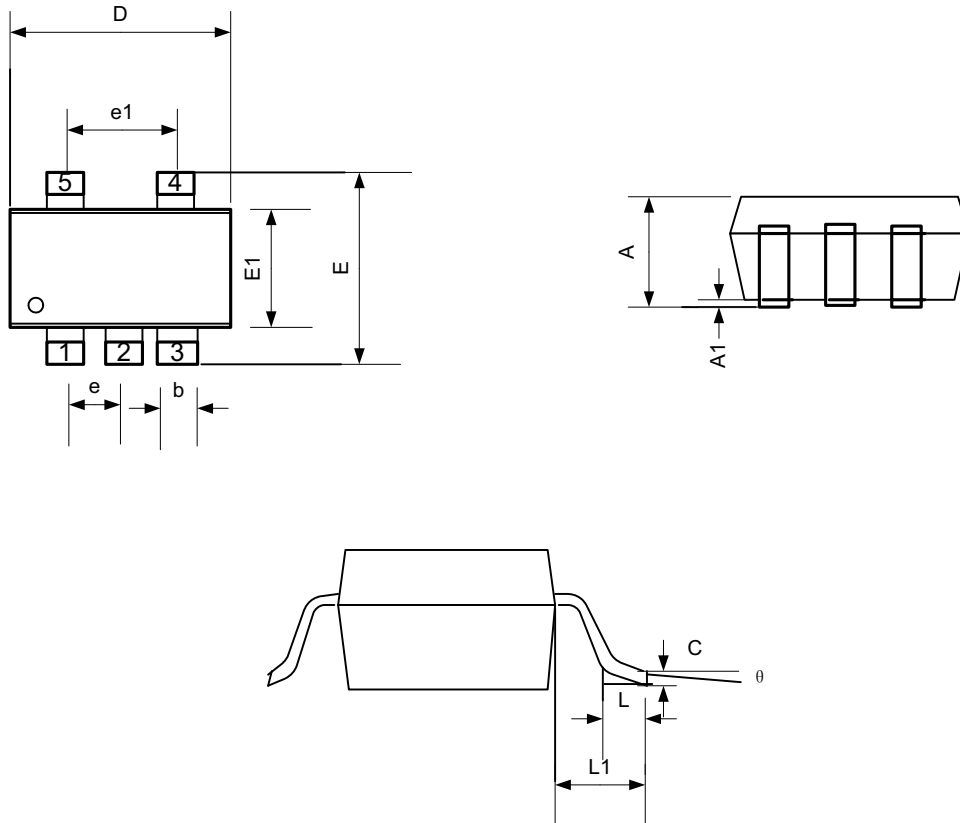


Figure 12. Supply Current vs. Junction Temperature



### ■ PACKAGE INFORMATION

#### ◆ SOT23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.10	0.036	0.044
A1	0.01	0.13	0.0004	0.0052
b	0.30	0.50	0.012	0.020
C	0.09	0.20	0.0036	0.008
D	2.80	3.00	0.112	0.120
E	2.50	3.10	0.100	0.124
E1	1.50	1.70	0.060	0.068
L	0.20	0.55	0.008	0.022
L1	0.35	0.80	0.014	0.032
e	0.95 Bsc.		0.038 Bsc.	
e1	1.90 Bsc.		0.076 Bsc.	
θ	0°	10°	0°	10°