

500 mA Peak Output LDO Regulator

Description

The TK5219 is an efficient linear voltage regulator with high peak output current capability, very low dropout voltage, and better than 1% output voltage accuracy. Dropout is typically 10 mV at light loads and less than 500 mV at full load.

The TK5219 is designed to provide a peak output current for start-up conditions where higher inrush current is demanded. It features a 500 mA peak output rating. Continuous output current is limited only by package and layout.

The TK5219 can be enabled or shut down by a CMOS- or TTL-compatible signal. When disabled, power consumption drops nearly to zero. Dropout ground current is minimized to help prolong battery life. Other key features include reversed-battery protection, current limiting, overtemperature shutdown, and low noise performance with an ultra-low noise option.

Features

- 500 mA Output Current Capability
- Low 500 mV Maximum Dropout Voltage at Full Load
- Extremely Tight Load and Line Regulation
- Tiny SOT-23-5 and Power MSOP-8 Package
- Ultra-Low Noise Output
- Low Temperature Coefficient
- Current and Thermal Limiting
- Reversed-Battery Protection
- CMOS/TTL-Compatible Enable/Shutdown Control
- Near-Zero Shutdown Current

Applications

- Laptop, Notebook, and Palmtop Computers
- Cellular Telephones and Battery-Powered Equipment
- Consumer and Personal Electronics
- PC Card V_{CC} and V_{PP} Regulation and Switching
- SMPS Post-Regulator/DC-to-DC Modules
- High-Efficiency Linear Power Supplies

Ordering information

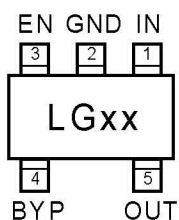
Part Number	Package	Packing	Temperature(TA)	Package Qty	V _{OUT}
TK5219-3.3YM5	SOT-23-5	Reel	-40°C ~ 85°C	2500	3.3V
TK5219-5.0YM5	SOT-23-5	Reel	-40°C ~ 85°C	2500	5V

PIN DESCRIPTIONS

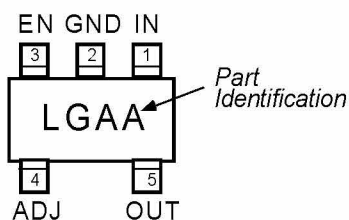
Pin Number VDFN-6 TDFN-6	Pin Number MSOP-8	Pin Number SOT23-5	Pin Name	Description
3	2	1	IN	Supply input.
2	5 - 8	2	GND	Ground: MSOP-8 pins 5 through 8 are internally connected.
4	3	5	OUT	Regulator output.
1	1	3	EN	Enable (input): CMOS-compatible control input. Logic-high = enable; logic-low or open = shutdown.
6	4 (FIXED)	4 (FIXED)	BYP	Reference bypass: Connect an external 470 pF capacitor to GND to reduce output noise. May be left open.
5 (NC)	4 (ADJ)	4 (ADJ)	ADJ	Adjust (input): Feedback input. Connect to resistive voltage-divider network.
EP	—	—	GND	Ground: Internally connected to the exposed pad. Connect externally to GND pin.

Package Types

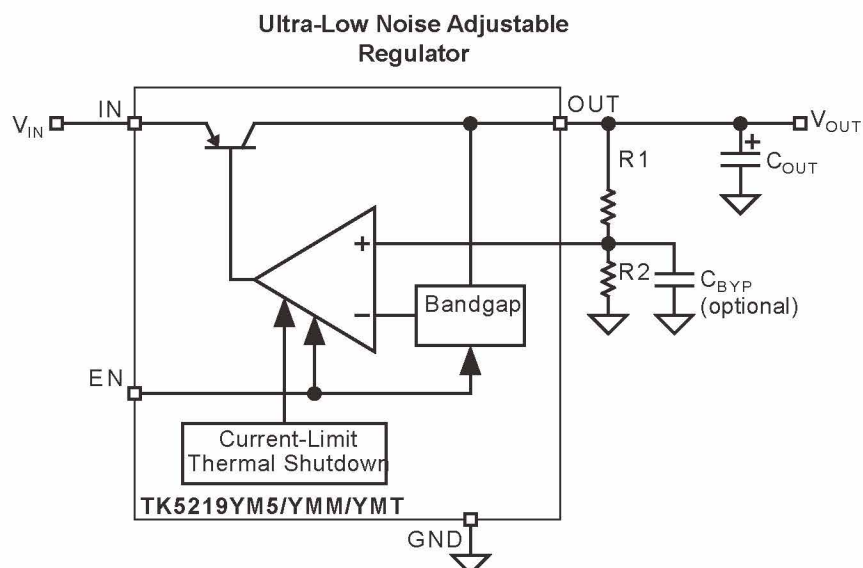
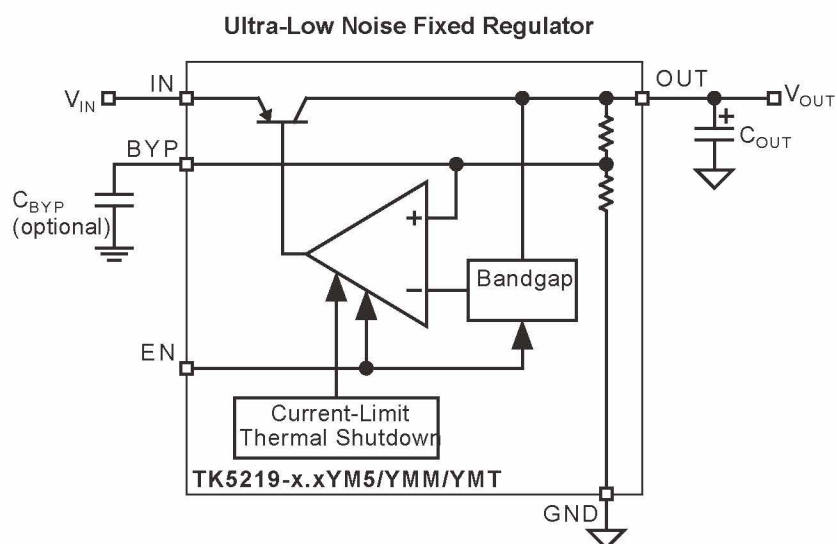
TK5219-x.xYM5
 SOT23-5 (M5).
 Fixed Voltages
 (Top View)



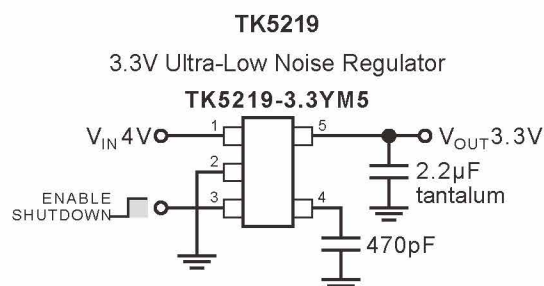
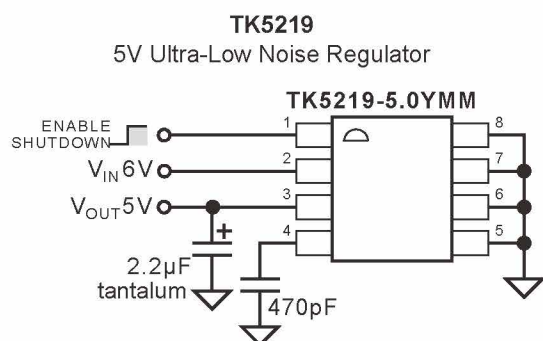
TK5219YM5
 SOT23-5 (M5)
 Adjustable Voltage
 (Top View)



Functional Block Diagrams



Typical Application Circuits



ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Supply Input Voltage (V_{IN}) -20V to +20V
 Power Dissipation (P_D) Internally Limited

Operating Ratings

Enable Input Voltage (V_{EN}) 0V to V_{IN}

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: Unless otherwise indicated, $V_{IN} = V_{OUT} + 1.0V$; $C_{OUT} = 4.7 \mu F$, $I_{OUT} = 100 \mu A$;
 $T_J = +25^\circ C$, **bold** values indicate $-40^\circ C \leq T_J \leq +125^\circ C$.

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Voltage	V_{OUT}	-1	—	1	%	Variation from Nominal V_{OUT}
		-2	—	2	%	
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	—	40	—	ppm/ $^\circ C$	Note 1
Line Regulation	$\Delta V_{OUT}/V_{OUT}$	—	0.009	0.05	%/ V	$V_{IN} = V_{OUT} + 1V$ to 12V
		—	—	0.1		
Load Regulation	$\Delta V_{OUT}/V_{OUT}$	—	0.05	0.5	%	$I_{OUT} = 100 \mu A$ to 500 mA, Note 2
		—	—	0.7		
Dropout Voltage (Note 3)	$V_{IN} - V_{OUT}$	—	10	60	mV	$I_{OUT} = 100 \mu A$
		—	—	80		
		—	115	175	mV	$I_{OUT} = 50 mA$
		—	—	250		
		—	175	300	mV	$I_{OUT} = 150 mA$
		—	—	400		
		—	350	500	mV	$I_{OUT} = 500 mA$
		—	—	600		
Ground Pin Current (Note 4, 5)	I_{GND}	—	80	130	μA	$V_{EN} \geq 3.0V$, $I_{OUT} = 100 \mu A$
		—	—	170		
		—	350	650	μA	$V_{EN} \geq 3.0V$, $I_{OUT} = 50 mA$
		—	—	900		
		—	1.8	2.5	mA	$V_{EN} \geq 3.0V$, $I_{OUT} = 150 mA$
		—	—	3.0		
		—	12	20	mA	$V_{EN} \geq 3.0V$, $I_{OUT} = 500 mA$
		—	—	25		
Ground Pin Quiescent Current (Note 4)		—	0.05	3	μA	$V_{EN} \leq 0.4V$
		—	0.10	8	μA	$V_{EN} \leq 0.18V$
Ripple Rejection	PSRR	—	75	—	dB	$f = 120 Hz$
Current Limit	I_{LIMIT}	—	700	1000	mA	$V_{OUT} = 0V$
Thermal Regulation (Note 3)	$\Delta V_{OUT}/\Delta P_D$	—	0.05	—	%/W	Note 6

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Noise (Note 7)	e_{no}	—	500	—	nV/ $\sqrt{\text{Hz}}$	$I_{OUT} = 50 \text{ mA}$, $C_{OUT} = 2.2 \mu\text{F}$, $C_{BYP} = 0$
		—	300	—	nV/ $\sqrt{\text{Hz}}$	$I_{OUT} = 50 \text{ mA}$, $C_{OUT} = 2.2 \mu\text{F}$, $C_{BYP} = 470 \text{ pF}$

- Note 1:** Output voltage temperature coefficient is defined as the worst case voltage change divided by the total temperature range.
- 2:** Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 100 μA to 500 mA. Changes in output voltage due to heating effects are covered by the thermal regulation specification.
- 3:** Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential.
- 4:** Ground pin current is the regulator quiescent current plus pass transistor base current. The total current drawn from the supply is the sum of the load current plus the ground pin current.
- 5:** V_{EN} is the voltage externally applied to devices with the EN (enable) input pin.
- 6:** Thermal regulation is defined as the change in output voltage at a time “t” after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a 500 mA load pulse at $V_{IN} = 12\text{V}$ for $t = 10 \text{ ms}$.
- 7:** C_{BYP} is an optional, external bypass capacitor connected to devices with a BYP (bypass) or ADJ (adjust) pin.

TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Ambient Temperature Range	T_A	-40	—	+125	$^{\circ}\text{C}$	—
Maximum Junction Temperature Range	T_J	-40	—	+125	$^{\circ}\text{C}$	—
Storage Temperature Range	T_S	-65	—	+150	$^{\circ}\text{C}$	—
Lead Temperature	—	—	260	—	$^{\circ}\text{C}$	Soldering, 5 sec.
Package Thermal Resistances						
Thermal Resistance, SOT23-5Ld	θ_{JA}	—	220	—	$^{\circ}\text{C/W}$	Minimum footprint area.

- Note 1:** The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A , T_J , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125 $^{\circ}\text{C}$ rating. Sustained junction temperatures above +125 $^{\circ}\text{C}$ can impact the device reliability.

TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

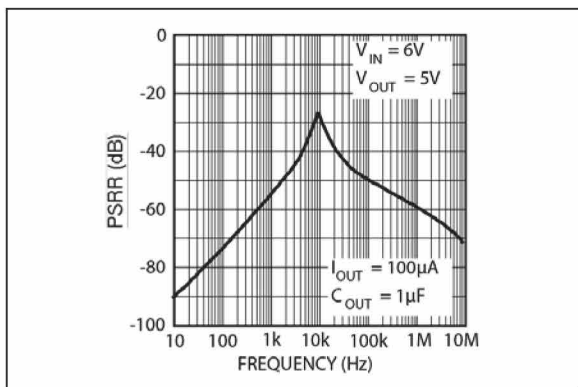


FIGURE 1: Power Supply Rejection Ratio.

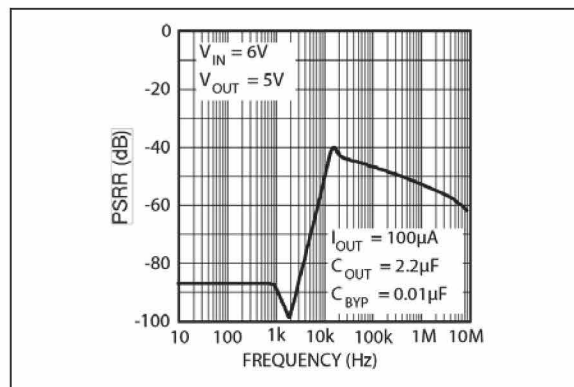


FIGURE 4: Power Supply Rejection Ratio.

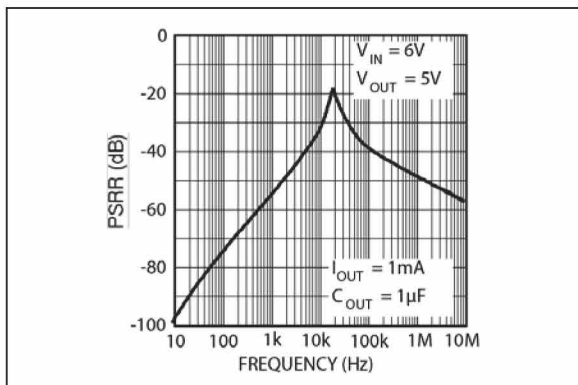


FIGURE 2: Power Supply Rejection Ratio.

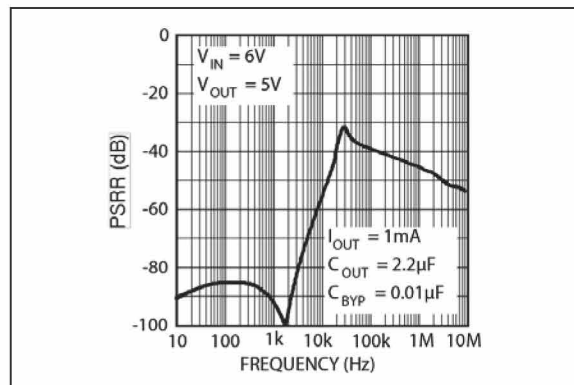


FIGURE 5: Power Supply Rejection Ratio.

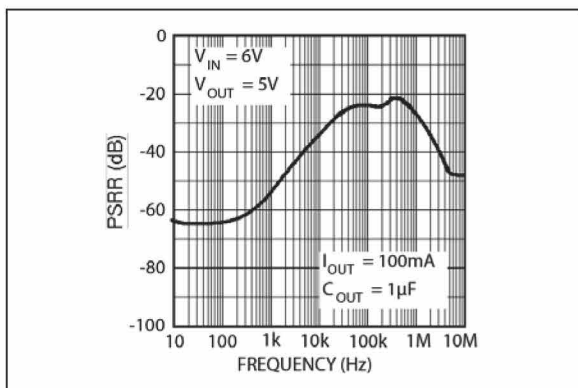


FIGURE 3: Power Supply Rejection Ratio.

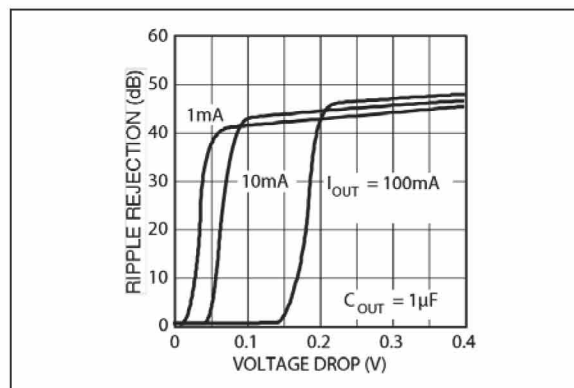


FIGURE 6: Power Supply Ripple Rejection vs. Voltage Drop.

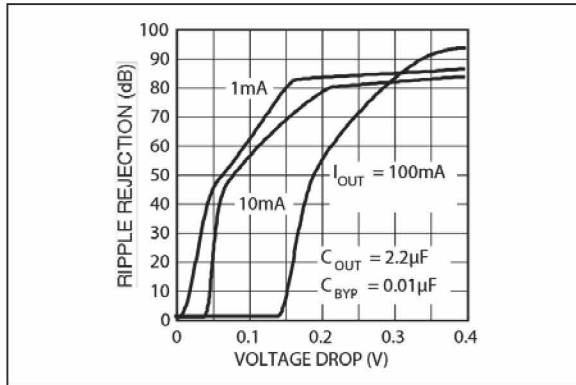


FIGURE 7: Power Supply Ripple Rejection vs. Voltage Drop.

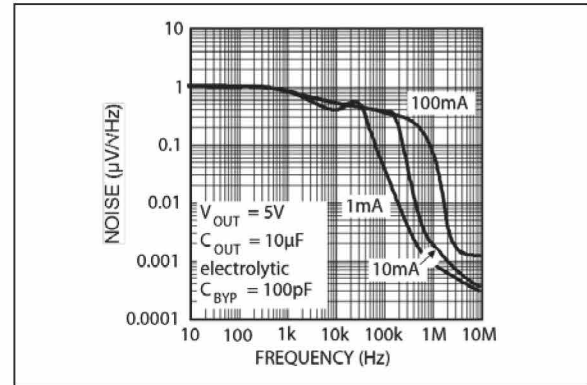


FIGURE 10: Noise Performance.

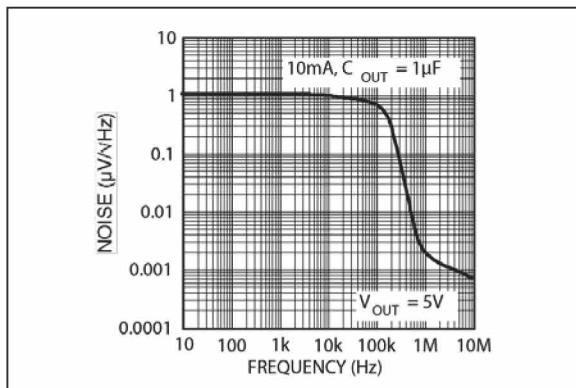


FIGURE 8: Noise Performance.

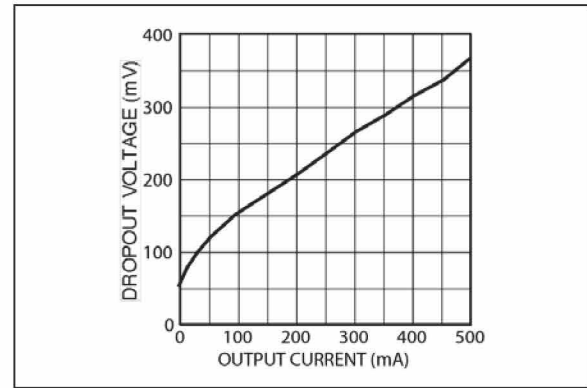


FIGURE 11: Dropout Voltage vs. Output Current.

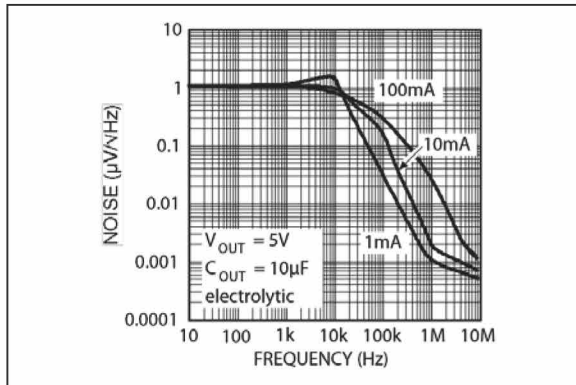


FIGURE 9: Noise Performance.

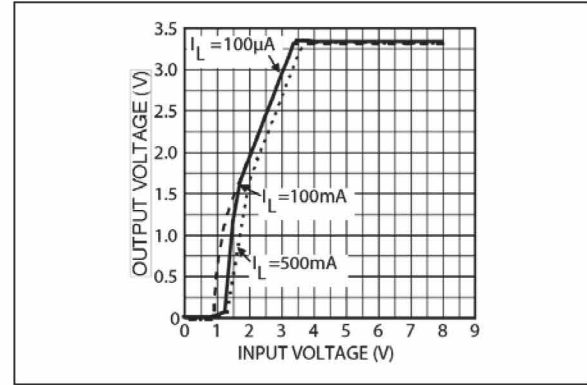


FIGURE 12: Dropout Characteristics.

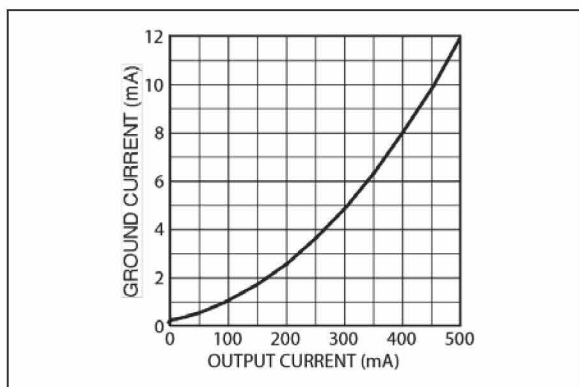


FIGURE 13: Ground Current vs. Output Current.

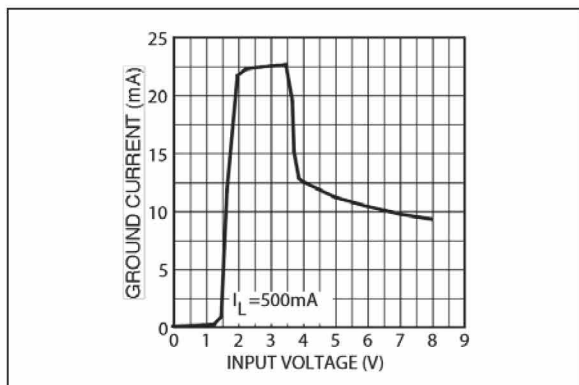


FIGURE 24: Ground Current vs. Supply Voltage.

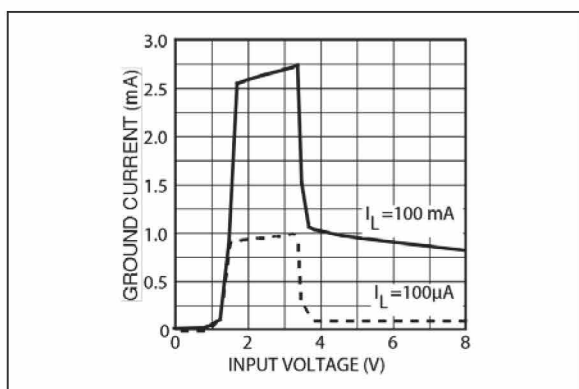
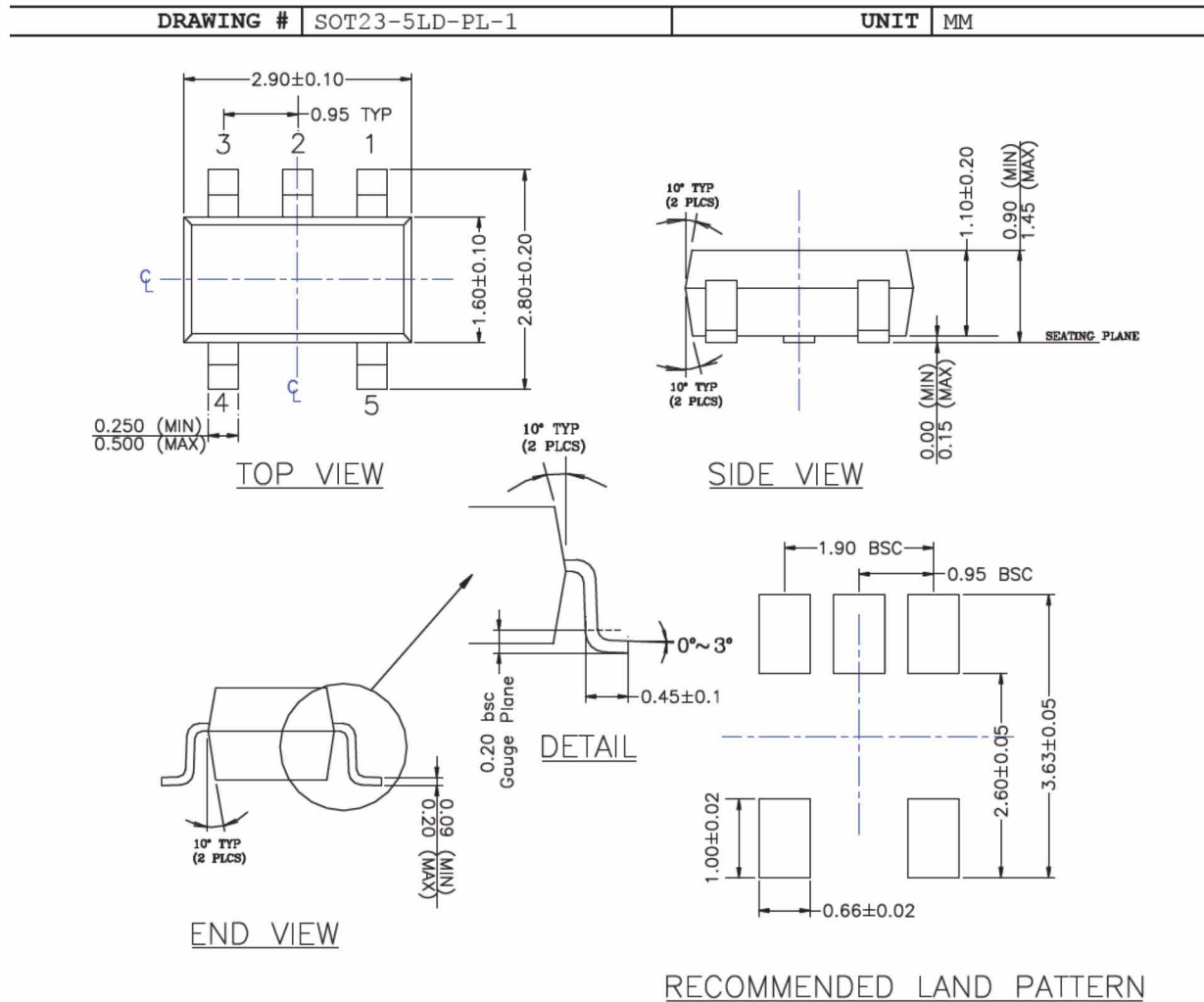


FIGURE 15: Ground Current vs. Supply Voltage.

5-Lead SOT23 Package Outline and Recommended Land Pattern

TITLE

5 LEAD SOT23 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN



NOTE:

1. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & BURR.
2. PACKAGE OUTLINE INCLUSIVE OF SOLER PLATING.
3. DIMENSION AND TOLERANCE PER ANSI Y14.5M, 1982.
4. FOOT LENGTH MEASUREMENT BASED ON GAUGE PLANE METHOD.
5. DIE FACES UP FOR MOLD, AND FACES DOWN FOR TRIM/FORM.
6. ALL DIMENSIONS ARE IN MILLIMETERS.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at [Official website](#)