SPT112

VOLTAGE REGULATOR WITH RESET OUTPUT

SIGNAL PROCESSING TECHNOLOGIES

FEATURES

- Low Dropout Voltage
- CMOS/TTL Compatible ON/OFF Switch
- Very Low Standby Current 180 µA (ON, No Load)
- Internal Thermal Shutdown
- Short Circuit Protection
- Very Low (0.1 µA) Current in OFF Mode
- Low Noise with External Bypass Capacitor
- 130 mA Current Capability

APPLICATIONS

- Battery Powered Systems
- Cellular Telephones
- Pagers
- Personal Communications Equipment
- Portable Instrumentation
- Portable Consumer Equipment
- Radio Control Systems
- Toys
- Low Voltage Systems

GENERAL DESCRIPTION

The SPT112XX is a low power, linear regulator with a built-in electronic switch. The internal electronic switch can be controlled by TTL or CMOS logic levels. The device is in the ON state when the control pin is pulled to a high logic level. A pin for a bypass capacitor is provided, which connects to the internal circuitry, to lower the overall output noise level.

An internal PNP pass-transistor is used in order to achieve low dropout voltage (typically 100 mV at 30 mA load current). The device has very low quiescent current (180 µA) in the ON mode with no load and 1 mA with 30 mA load. The quiescent current is typically 2.5 mA at 60 mA load. When the device is in standby mode (V_{CONT} = 0) , the quiescent current is typically 100 nA. An internal thermal shutdown circuit limits the junction temperature to below 150 °C. The load current is internally monitored and the device will shut down in the presence of a short circuit at the output.

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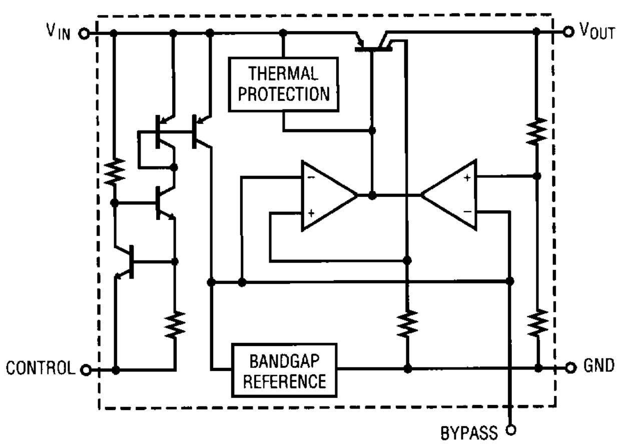
BLOCK DIAGRAM



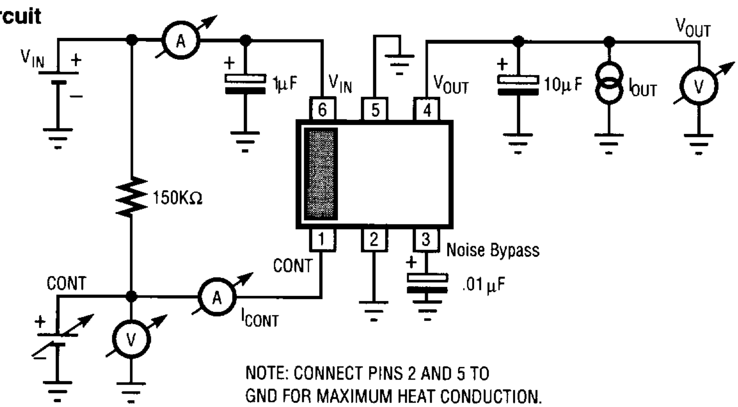
ELECTRICAL SPECIFICATIONS

T_A=+25 °C, unless otherwise specified.

PARAMETERS	TEST CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Supply Current 1	I_O=0 mA, Except I_{CONT}	I_{cc1}		180		µA
Supply Current 2	V_{IN}=8 V, Output OFF	I_{CC2}			100	nA
Output Voltage	V_{IN}=V_O+1 V, I_O=30 mA	V_O	-3	V_O	+3	%
Output Voltage			-100	V_O	+100	%
Dropout Voltage	I_O=30 mA	V_{DROP}		0.1		V
Output Current	Note 3	I_O	150	180		mA
Recommended I_O					130	mA
Line Regulation	V_{IN}=V_O+ (1~6 V)	Line Reg			0.12	%/V
Load Regulation	I_O=0~60 mA, Note 4	Load Reg			0.03	%/mA
Ripple Rejection	100 mVRMS, f=400 Hz, I_O=10 mA	RR		60		dB
Temperature Coefficient	V_O+1.5 V					
V_O Temperature Dependency	V_O=+1.5 V, T_A=-25 to +75 °C			0.2		mV/°C
Output Noise Voltage	10 Hz<80 kHz, I_O=10 mA	V_{NO}		0.2		µV(rms)
CONTROL TERMINAL SPECIFICATIONS						
Control Terminal Current	Output ON, V_{CONT} =2.4 V	I_{CONT1}		15	40	µA
Control Terminal Volt. I	Output ON	V_{CONT1}	2.4			V
Control Terminal Volt. I	Output OFF	V_{CONT2}			0.6	V
Output Rise Time	I_O=60 mA, V_{CONT} =0~2.4 V	T_R		0.2	1.0	msec
Bypass Terminal Voltage				1.25		V

Note 1: Power dissipation must be derated at rate of 1.6 mW/°C for operation at 25 °C and over. Power dissipation = 400 mW (When mounted as recommended.)
Note 2: Output side capacitor should have low ESR at low temperatures if used below 0 °C.
Note 3: I_O (Load Current) is the measured current when V_O drops 0.3 V with respect to (V_O at I_O = 30 mA).
Note 4: This measurement (pulse measurement) is with a constant T_J. The output change due to temperature change is not included.

Figure 1 - Test Circuit



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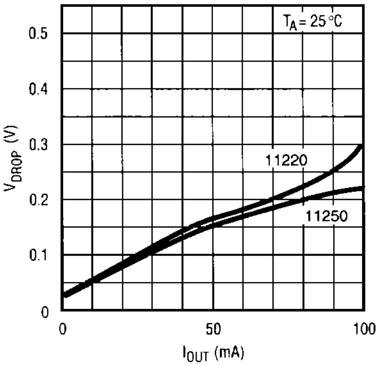
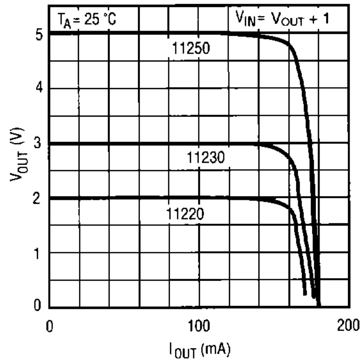
TYPICAL PERFORMANCE CHARACTERISTICS

SPT112XX

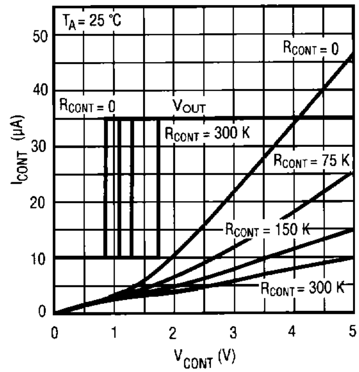
DROPOUT VOLTAGE vs LOAD CURRENT



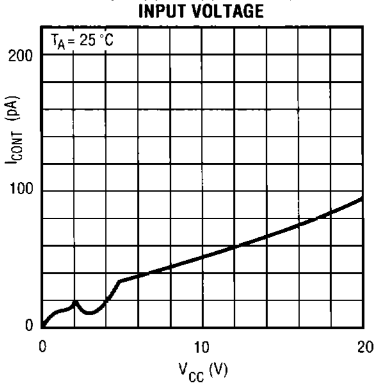
OUTPUT VOLTAGE vs SHORT CIRCUIT CURRENT



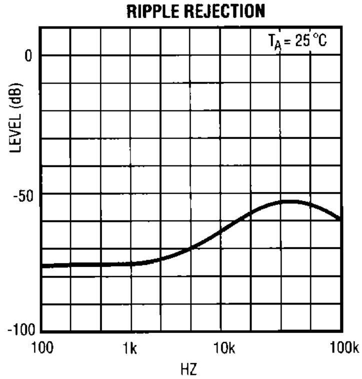
CONTROL TERMINAL CIRCUIT CURRENT vs CONTROL TERMINAL VOLTAGE



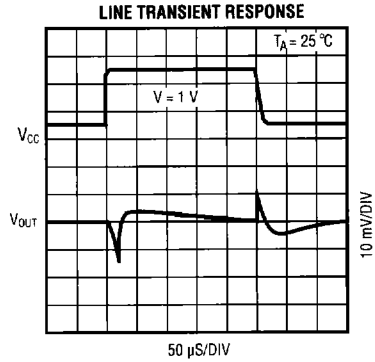
QUIESCENT CURRENT vs INPUT VOLTAGE



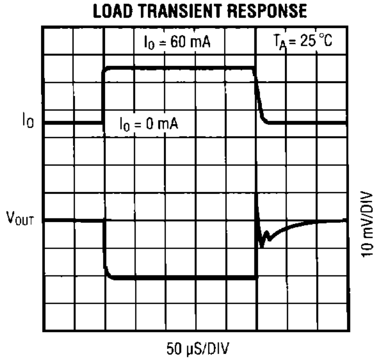
RIPPLE REJECTION



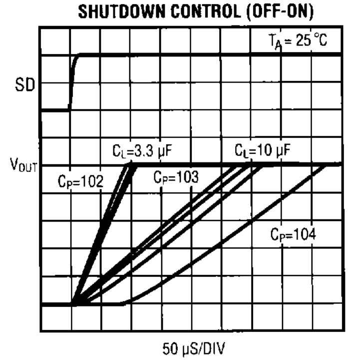
LINE TRANSIENT RESPONSE



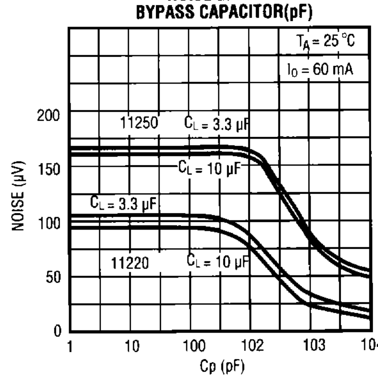
LOAD TRANSIENT RESPONSE



SHUTDOWN CONTROL (OFF-ON)



NOISE LEVEL vs BYPASS CAPACITOR(pF)



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TYPICAL PERFORMANCE CHARACTERISTICS

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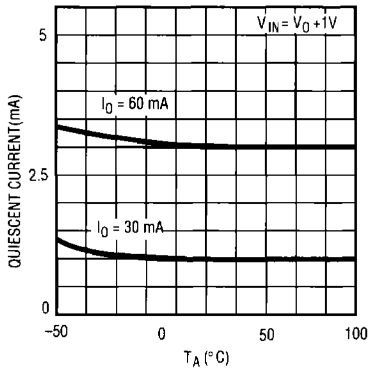
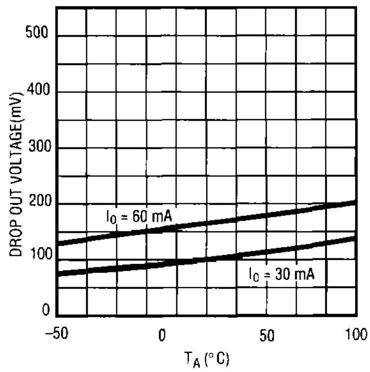
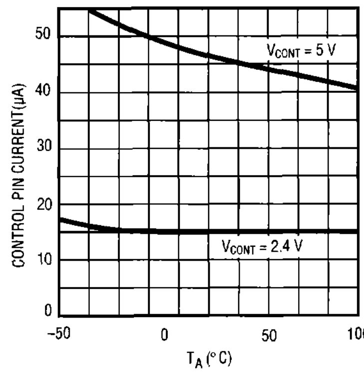
QUIESCENT CURRENT vs TEMPERATURE



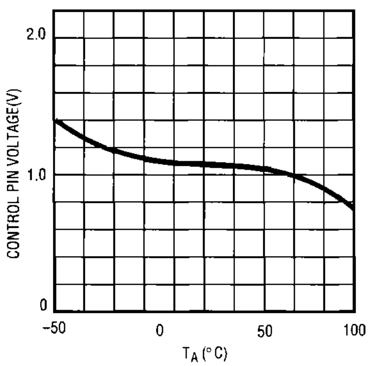
DROPOUT VOLTAGE vs TEMPERATURE



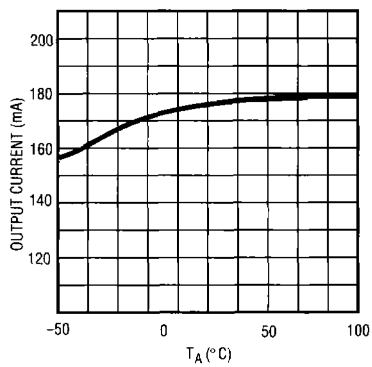
CONTROL PIN CURRENT vs TEMPERATURE



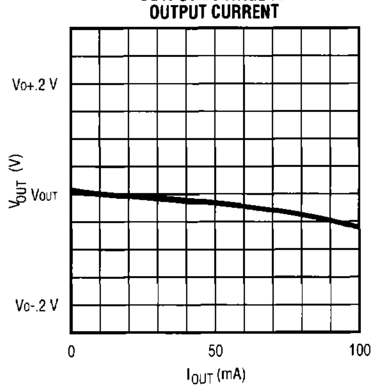
CONTROL PIN VOLTAGE vs TEMPERATURE



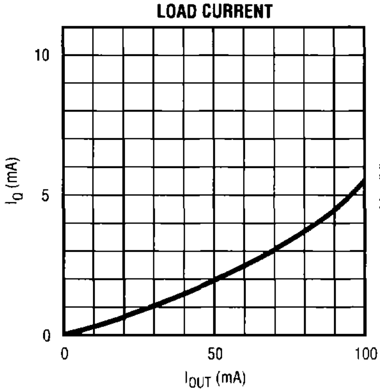
OUTPUT CURRENT vs TEMPERATURE



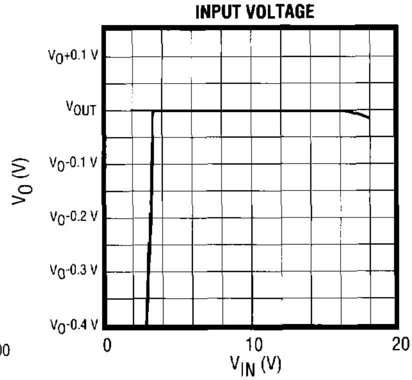
OUTPUT VOLTAGE vs OUTPUT CURRENT



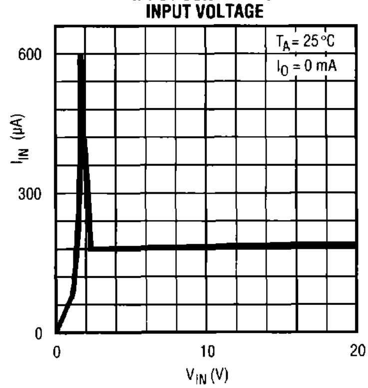
QUIESCENT CURRENT vs LOAD CURRENT



OUTPUT VOLTAGE vs INPUT VOLTAGE



INPUT CURRENT vs INPUT VOLTAGE



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TYPICAL PERFORMANCE CHARACTERISTICS

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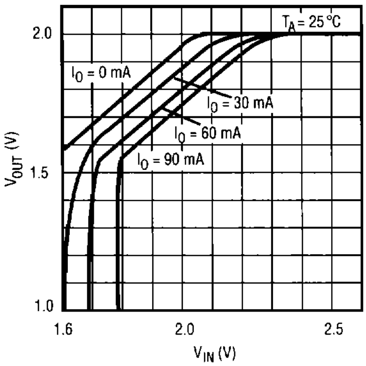
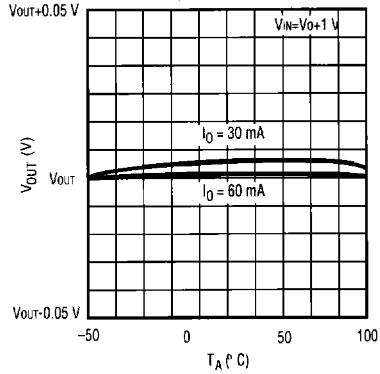
OUTPUT VOLTAGE vs INPUT VOLTAGE

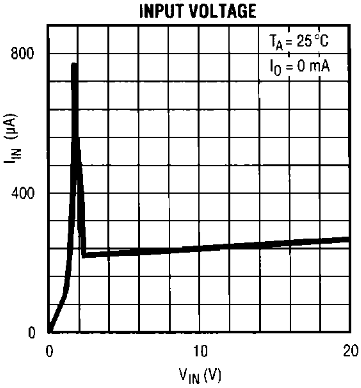


OUTPUT VOLTAGE vsTEMPERATURE SPT1120, SPT11221, SPT11230

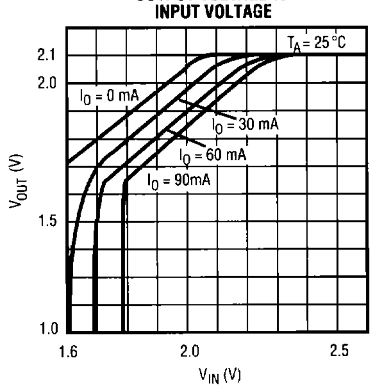


SPT11221

INPUT CURRENT vs INPUT VOLTAGE

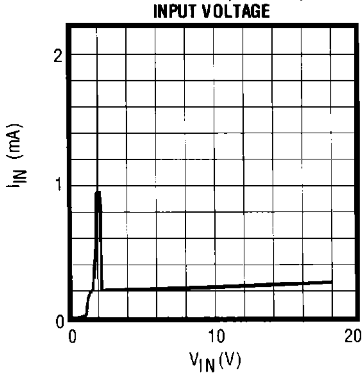


OUTPUT VOLTAGE vs INPUT VOLTAGE

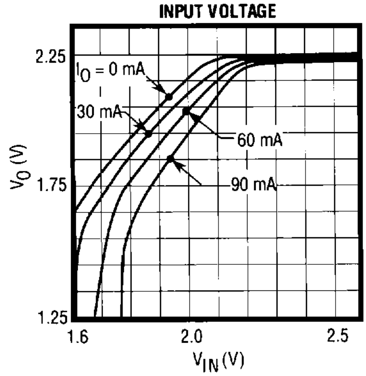


SPT11222

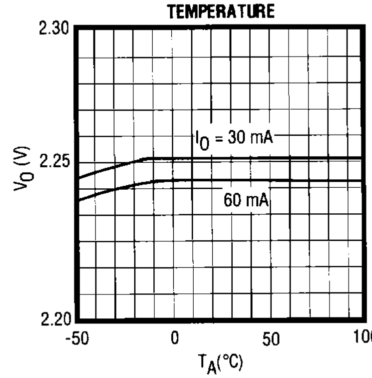
INPUT CURRENT (NO LOAD) vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE



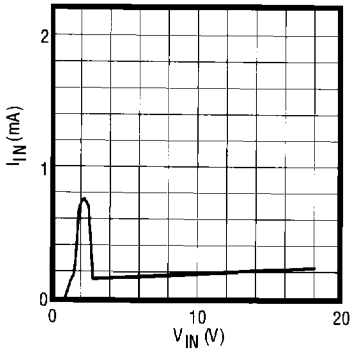
OUTPUT VOLTAGEvs TEMPERATURE



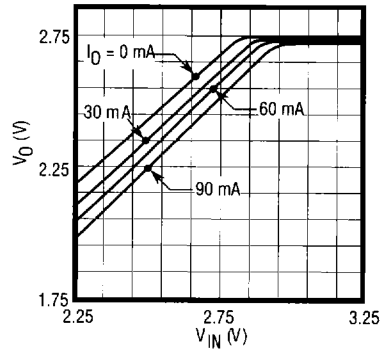
TYPICAL PERFORMANCE CHARACTERISTICS

SPT11227

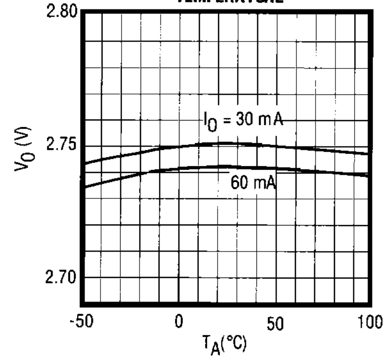
INPUT CURRENT (NO LOAD) vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE

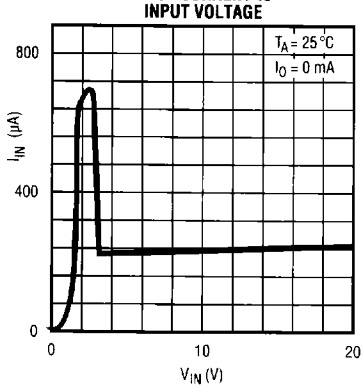


OUTPUT VOLTAGE vs TEMPERATURE

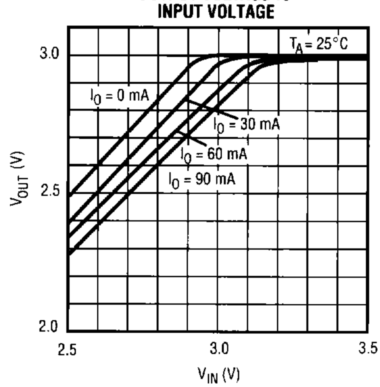


SPT11230

INPUT CURRENT vs INPUT VOLTAGE

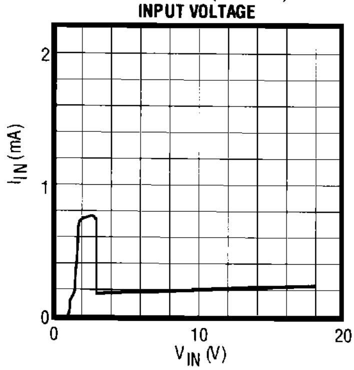


OUTPUT VOLTAGE vs INPUT VOLTAGE

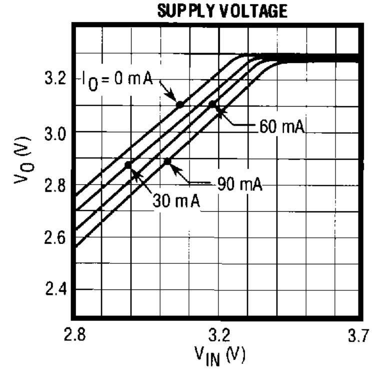


SPT11232

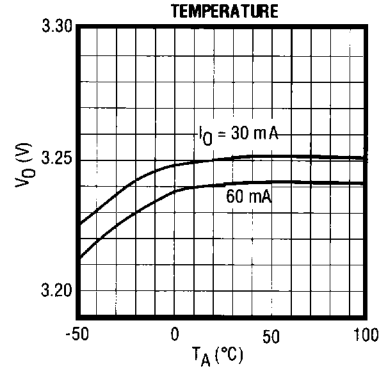
INPUT CURRENT (NO LOAD) vs INPUT VOLTAGE



OUTPUT VOLTAGE vs SUPPLY VOLTAGE



OUTPUT VOLTAGE vs TEMPERATURE



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TYPICAL PERFORMANCE CHARACTERISTICS

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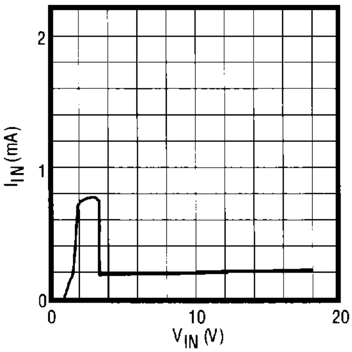
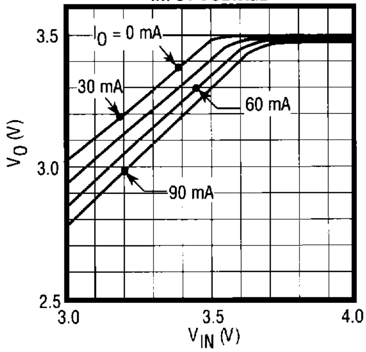
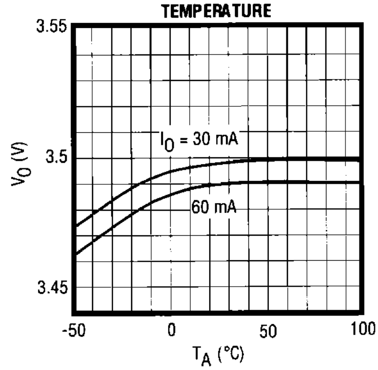
INPUT CURRENT (NO LOAD) vs SUPPLY VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE

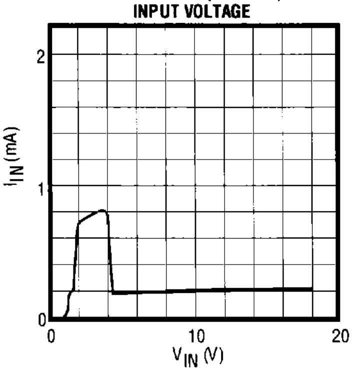


OUTPUT VOLTAGE vs TEMPERATURE

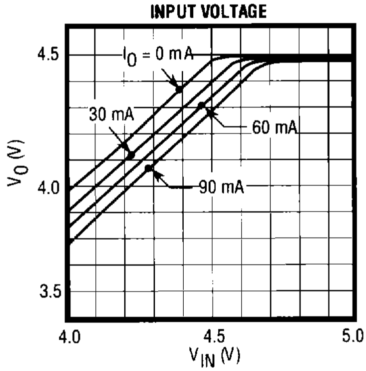


SPT11245

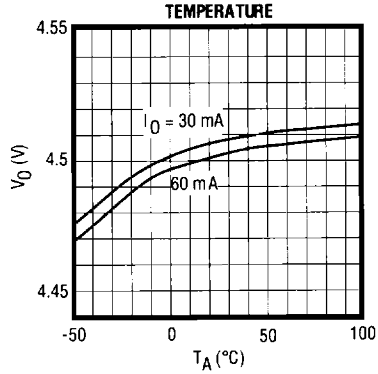
INPUT CURRENT (NO LOAD) vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE

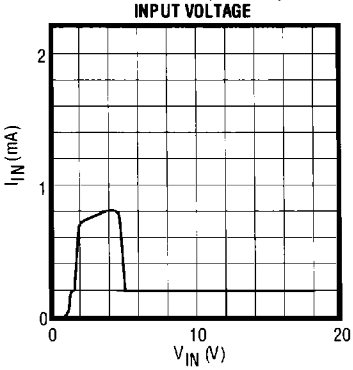


OUTPUT VOLTAGE vs TEMPERATURE

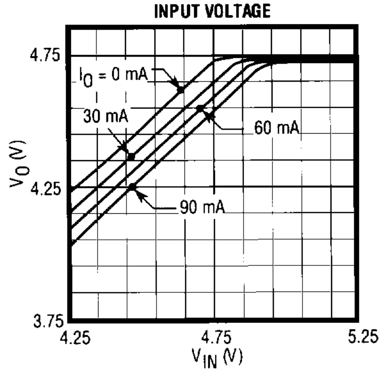


SPT11247

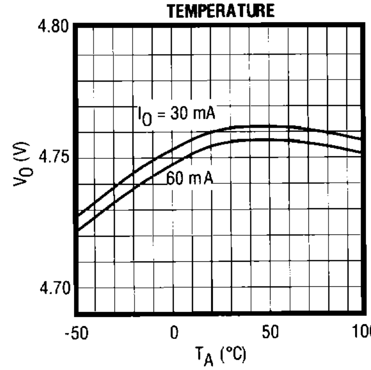
INPUT CURRENT (NO LOAD) vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE

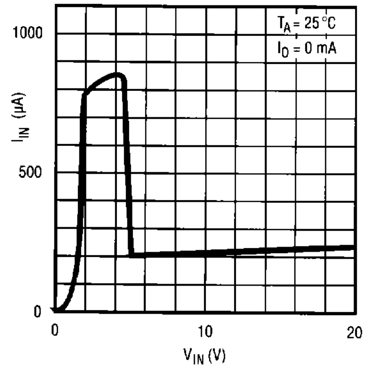


OUTPUT VOLTAGE vs TEMPERATURE

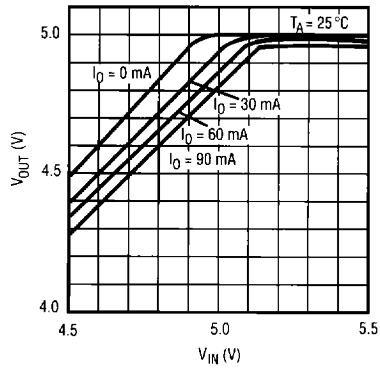


SPT11250

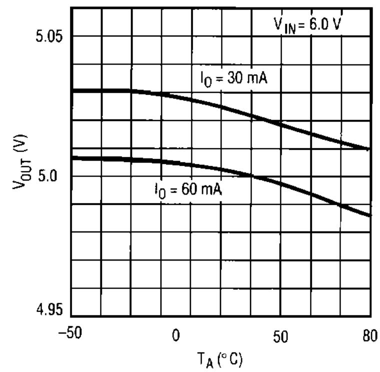
INPUT CURRENT vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE

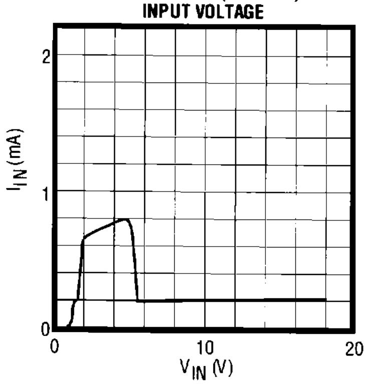


OUTPUT VOLTAGE vs TEMPERATURE

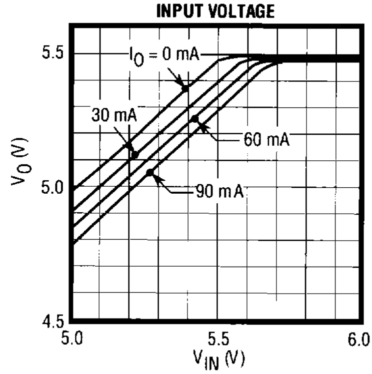


SPT11255

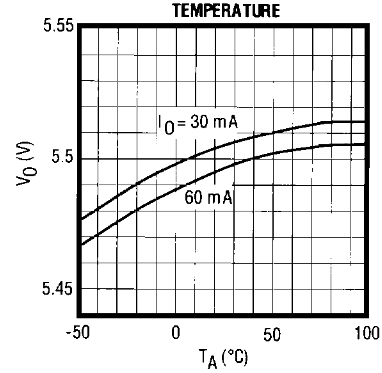
INPUT CURRENT (NO LOAD)vs INPUT VOLTAGE



OUTPUT VOLTAGE vs INPUT VOLTAGE



OUTPUT VOLTAGE vs TEMPERATURE



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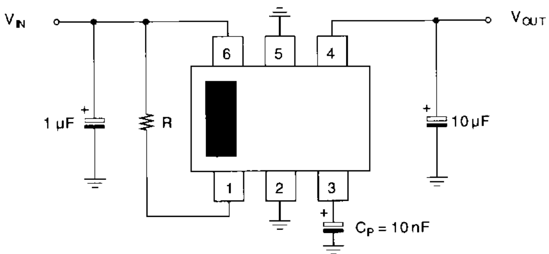
APPLICATIONS INFORMATION

DISABLING THE CONTROL PIN

Connect control terminal to V_{CC} through R. Higher resistance values are good for reducing quiescent current but can cause the regulator to drop out at a higher voltage. (0 Ω <R< 300 kΩ.) See figure 2.

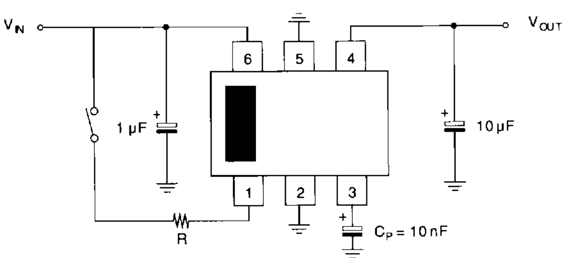
Figure 2



USING THE CONTROL FUNCTION

Turn on the regulator by setting the control pin voltage to the same level as V_{IN}. Turn off the regulator by grounding the control pin. See figure 3.

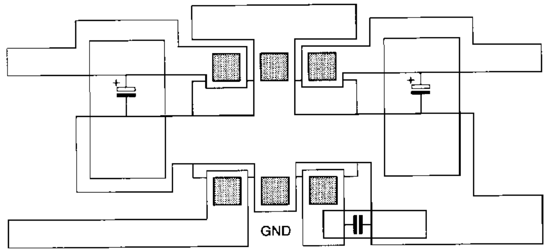
Figure 3



HEAT DISSIPATION

Make the copper pattern as large as possible to provide good heat dissipation (pin 5 is the heatsink).
P_D = 400 mW (When mounted as recommended)
See figure 4.

Figure 4



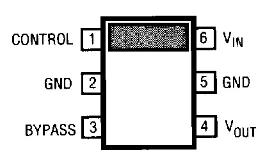
BYPASS CAPACITOR

Connect the bypass capacitor as close as possible to the GND terminal of IC (Pin 5,2), otherwise oscillation may occur. Use a 3.3 µF tantalum capacitor, or 5.6 µF electrolytic to ensure stability. (T_A = 25 C) For low temperatures, select a capacitor with low ESR at the desired temperature range. Use as large a capacitor as needed to meet transient, output impedance, and noise requirements. The noise bypass pin has high impedance, and it is sensitive to external noise if C_P is not used.

HANDLING MOLDED RESIN PACKAGES

All Plastic molded packages absorb some moisture from the air. If moisture absorption occurs prior to soldering the devise into the printed circuit board, increased separation of the lead from the plastic molding may occur, degrading the moisture barrier characteristics of the device.
This property of plastic molding compounds should not be overlooked, particularly in the case of very small packages, where the plastic is very thin.
In order to preserve the original moisture barrier properties of the package, devices are stored and shipped in moisture proof bags, filled with dry air. The bags should not be opened or damaged prior to the actual use of the devices. If this is unavoidable, the devices should be stored in a low relative humidity environment (40 to 65%) or in an enclosed environment with desiccant.

PIN ASSIGNMENT



SIGNAL PROCESSING TECHNOLOGIES

LEADERSHIP IN DATA CONVERSION AND SIGNAL PROCESSING

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