

VOLTAGE REGULATOR WITH ON/OFF SWITCH

FEATURES

- Low Dropout Voltage
- Electronic ON/OFF Switch
- Very Low Standby Current (ON, No Load)
- Internal Thermal Shutdown
- Short Circuit Protection
- Very Low (<100 nA) Current in OFF Mode
- Available on Tape and Reel
- Customized Versions Are Available

APPLICATIONS

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

GENERAL DESCRIPTION

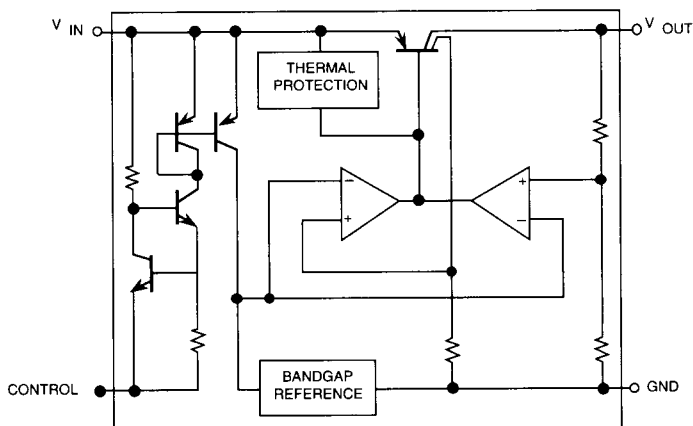
The SPT114 series of devices are low power, linear regulators. Each regulator can be turned ON and OFF by an internal electronic switch which is controlled by an external control signal.

The internal PNP pass-transistor is used in order to achieve low dropout voltage (typically 200 mV at 50 mA load current). The device has very low quiescent current (500 μ A) in the ON mode with no load and 2 mA with 30 mA load. The quiescent current is typically 4 mA at 60 mA load. 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 (no load current) in the presence of a short circuit at the output. The regulated output voltage may be specified in 0.5 V increments between 2.0 to 6.0 V. Additionally, 3.25 V and 8.0 V versions are also available.

The device is available in a plastic SOT-23L package. Tape and reel mounted devices are also available.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (BEYOND WHICH DAMAGE MAY OCCUR) 25°C

Supply Voltage 14 V
 Output Voltage $V_{OUT} \times 1.15$ V
 Load Current 180 mA
 Power Dissipation (Note 2) 200 mW

Storage Temperature Range -55 to +150 °C
 Operating Temperature Range -40 to +85 °C
 Lead Soldering Temp (10 sec) +240 °C
 Junction Temperature +150 °C

ELECTRICAL SPECIFICATIONS

$T_A = T_{MIN} - T_{MAX}$ unless otherwise specified.

PARAMETERS	TEST CONDITIONS	SYMBOL	MIN	TYP	MAX	UNITS
Supply Voltage Range		V_{IN}	2.5		14	V
Supply Current 1	$V_{IN} = V_{OUT} + 1$ V, $I_O = 0$ mA	I_{IN1}		500	900	μA
Supply Current 2	$V_{IN} = V_{OUT} - (1$ V to 0.1 V), $I_O = 0$ mA	I_{IN2}		1.0	2.5	mA
Supply Current 3	$V_{IN} = 10$ V, $V_{OUT} =$ OFF Mode $T_A = -20$ °C to +70 °C $T_A = -40$ °C to +85 °C	I_{IN3}		0.1	2.0	mA
				0.1	3.0	mA
Regulated Output Voltage	$V_{IN} = V_{OUT} + 1$ V, $I_{OUT} = 30$ mA $T_A = 25$ °C $T_A = -20$ °C to +70 °C $T_A = -40$ °C to +85 °C	V_O	-3.5		+3.5	%
			-100		+100	mV
			-4.5		+4.5	%
			-130		+130	mV
			-5.0		+5.0	%
Dropout Voltage 1	$V_O = 30$ mV	V_{DROP}		0.12	0.3	V
Output Current	$T_A = -20$ °C to +70 °C	I_O		110		mA
	$T_A = -40$ °C to +85 °C			100		mA
Recommended Output Current		I_{OR}			70	mA
Line Regulation	$V_{OUT} + 1$ V $\leq V_{IN} \leq V_{OUT} + 6.0$ V	Line Reg		2	20	mV
Load Regulation	$V_{IN} = V_O + 1$ V, $I_O = 0$ -60 mA	Load Reg		35	110	mV
Control Pin Current		I_{CONT}		35	120	μA
Control Pin Voltage	Off Mode	V_{COFF}	$V_{IN} - 0.2$ V		V_{IN}	V
Control Pin Voltage	On Mode	V_{CON}	0		$V_{IN} - 1.0$ V	V
Ripple Rejection	100 mVRMS, $f = 400$ Hz $V_{IN} = V_O + 1.5$ V, $I_O = 10$ mA	RR		55		dB
V_O Temperature Coefficient	$V_{IN} = V_O + 1.5$ V, $I_{OUT} = 10$ mA	$\Delta V / \Delta T$		0.6		mV/°C
Output Noise Voltage	$V_{IN} = V_O + 1.5$ V, $I_O = 10$ mA $CL = 10$ μF	V_N		180		mV _{RMS}

Note 1: Operation at any Absolute Maximum Rating is not implied. See Operating Conditions for proper nominal applied conditions in typical applications.

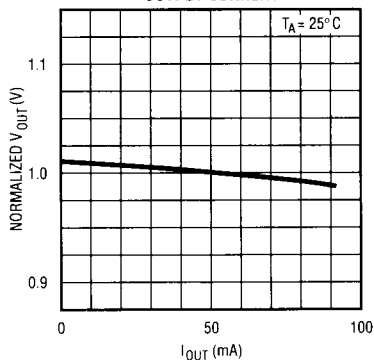
Note 2: Derates above $T_A = 25$ °C at 1.6 mW/°C.

TYPICAL PERFORMANCE CHARACTERISTICS

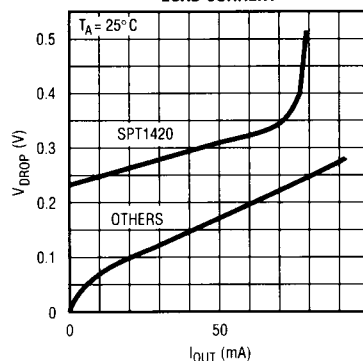
PART NUMBER OUTPUT VOLTAGE(V)

SPT11420	2.0
SPT11425	2.5
SPT11430	3.0
SPT11432	3.2
SPT11435	3.5
SPT11440	4.0
SPT11445	4.5
SPT11450	5.0
SPT11455	5.5
SPT11460	6.0
SPT11480	8.0

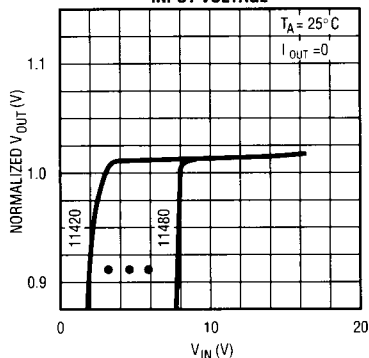
**OUTPUT VOLTAGE vs
OUTPUT CURRENT**



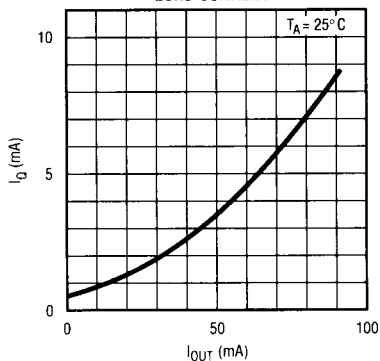
**DROPOUT VOLTAGE vs
LOAD CURRENT**



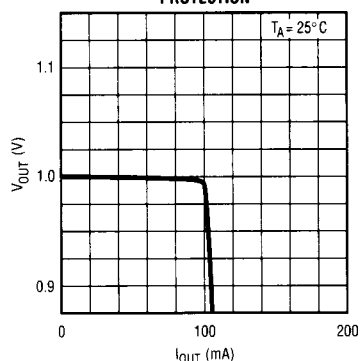
**OUTPUT VOLTAGE vs
INPUT VOLTAGE**



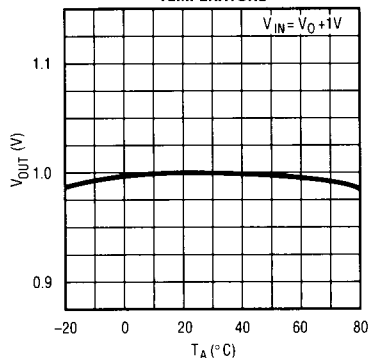
**QUIESCENT CURRENT vs
LOAD CURRENT**



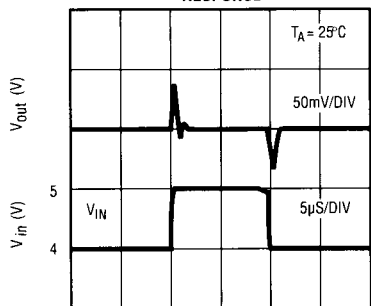
**SHORT CIRCUIT
PROTECTION**



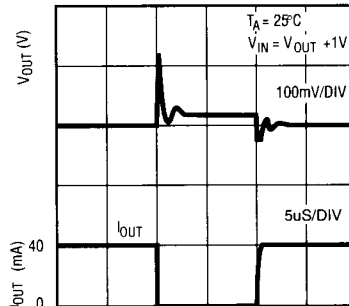
**OUTPUT VOLTAGE vs
TEMPERATURE**

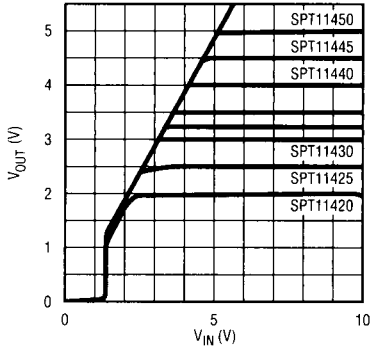
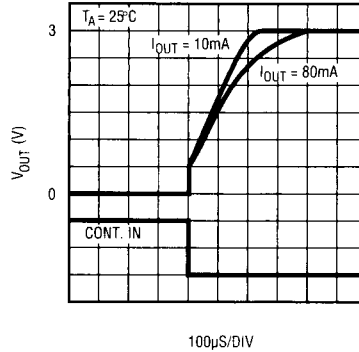
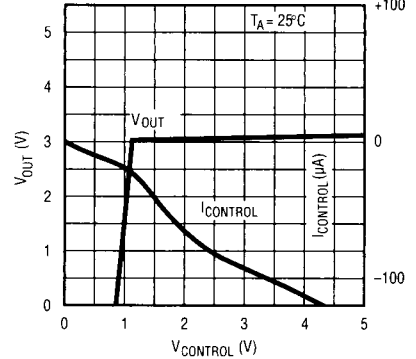
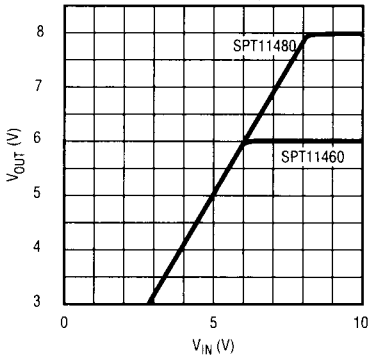
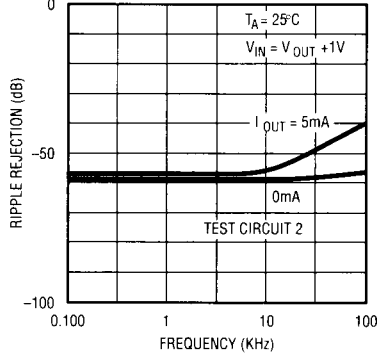


**LINE TRANSIENT
RESPONSE**

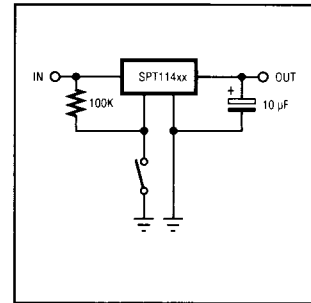


**LOAD TRANSIENT
RESPONSE**

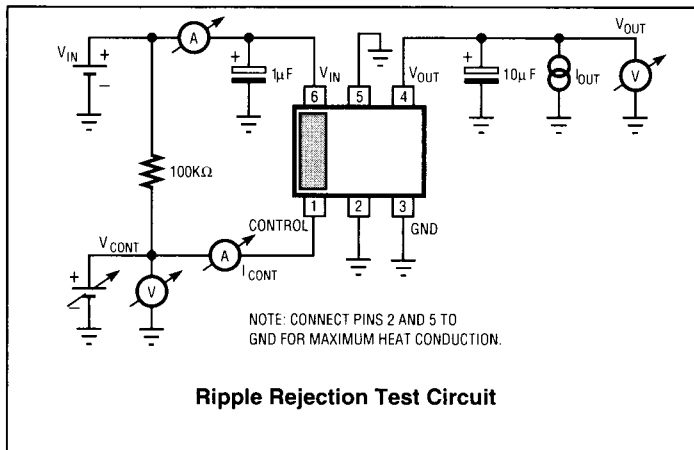


INPUT OUTPUT CHARACTERISTICS
(SWITCH ON)TURN ON
TRANSIENT RESPONSECONTROL PIN
CHARACTERISTICSINPUT OUTPUT CHARACTERISTICS
(SWITCH ON)RIPPLE REJECTION vs
FREQUENCY

Test Circuit 1

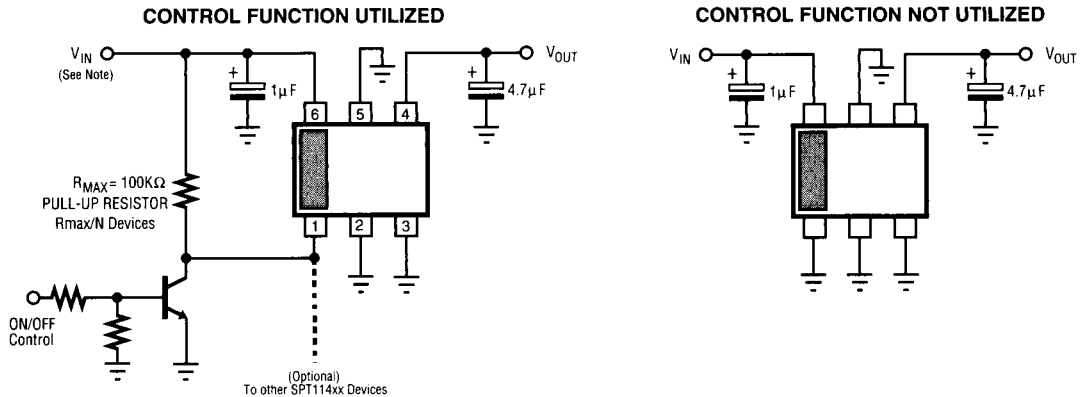


Test Circuit 2



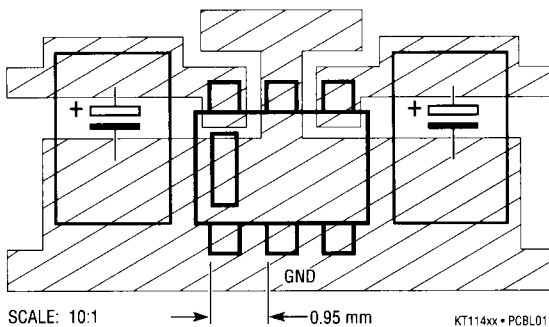
Ripple Rejection Test Circuit

TYPICAL APPLICATIONS



Note: Parallel connection of control pins is allowed if all devices use identical input voltage.

PRINTED CIRCUIT BOARD LAYOUT



APPLICATION HINTS

Maximize copper foil area connecting to all IC pins for optimum performance. Place input and output bypass capacitors close to the GND pin. For best transient behavior and lowest output impedance, use as large of a capacitor value as possible. The temperature coefficient of the capacitance and Equivalent Series Resistance (ESR) should be taken into account. These parameters can influence power supply noise and ripple rejection. In extreme cases, oscillation may occur. In order to maintain stability, the output bypass capacitor value should be minimum 2.2 μF in case of Tantalum electrolytic or 4.7 μF in case of Aluminium electrolytic.

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HANDLING MOLDED RESIN PACKAGES

All plastic molded packages absorb some moisture from the air. If moisture absorption occurs prior to soldering the device into the printed circuit board, increased separation of the lead from the plastic molding may occur, degrading the moisture barrier characteristics of the device. Do not overlook this property of plastic molding compounds, particularly with small packages in which 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

