■ GENERAL DESCRIPTION

The PT5102 is designed for portable and wireless applications with demanding performance and space requirements. It comprises of a Band-gap voltage reference, a current source and current limit, an amplifier, a quick start circuit, the power MOSFET, the resistor network, and a thermal shutdown circuit. The PT5102 is stable with a small 1μF±30% ceramic or high-quality tantalum output capacitor. Its performance is optimized for battery powered systems to deliver ultra low noise, extremely low dropout voltage and low quiescent current. Regulator ground current increases only slightly in dropout, further prolonging the battery life. An optional external bypass capacitor reduces the output noise. Power supply rejection is better than 80dB at 1KHz with 0.5V dropout voltage.

The device is ideal for mobile phone and similar battery powered wireless applications. It provides up to 300 mA from a 2.5V to 5.5V input. The PT5102 consumes less than 0.1μA in disable mode and has fast turn-on time less than 150μs. The PT5102 is available in a 5 pin SOT-23 and SC70 package. Performance is specified for −40°C to +125°C temperature range and is available in the range of 1.5V to 5.0V.

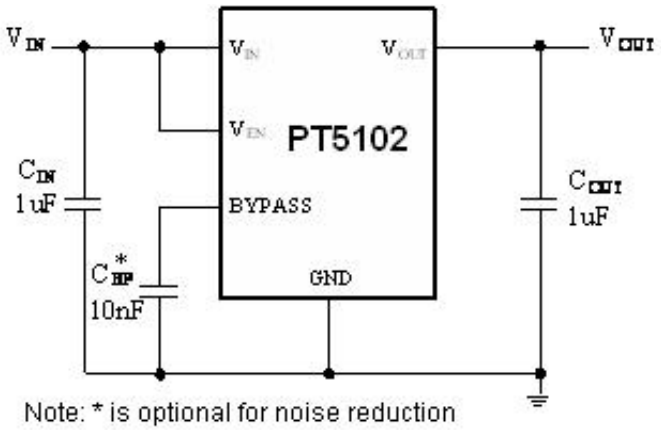
■ FEATURES

- Input Voltage Range: 2.5V to 5.5V
- High Output Capacity: up to 300mA
- High PSRR: >80dB at 1KHz @ $V_{IN} = V_{OUT} + 0.5V$
- Ultra low quiescent current at disable mode: < 1uA
- Fast turn on time: 150us
- Ultra low Dropout Voltage: <100mV with 150mA Load;
  <200mV with 300mA Load
- Ultra Low Output Noise over 10Hz to 100KHz: <30uVrms
- -40℃ to +125℃ junction temperature for operation
- 1.5V, 1.6V, 1.8V, 2.0V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.1V, 3.2V, 3.3V, 4.7V, 4.8V, 4.9V and 5.0V output voltage
- Package: SOT-23-5 and SC70-5

■ APPLICATIONS

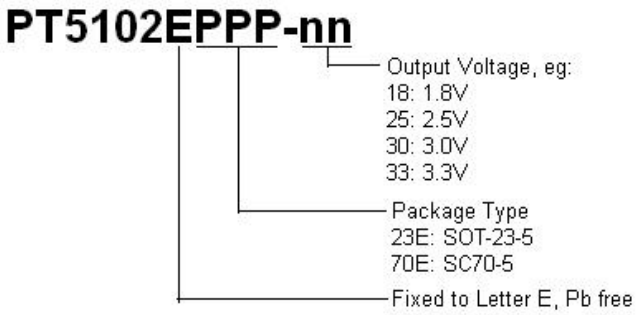
- Mobile phone
- WLAN and Bluetooth appliances
- PDAs
- MP3 handsets

■ TYPICAL APPLICATION

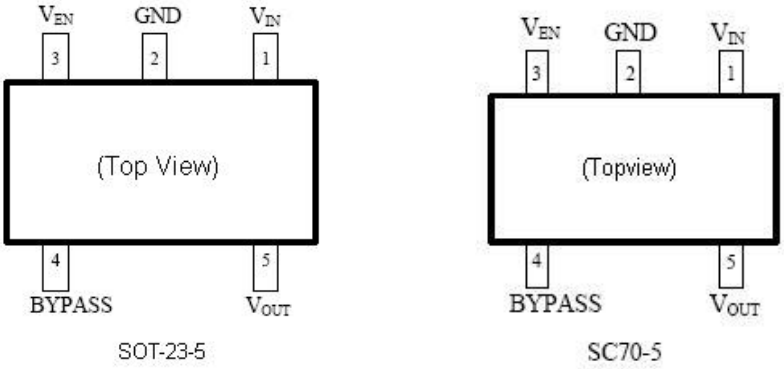


Note: * is optional for noise reduction

■ ORDERING INFORMATION



■ PIN CONFIGURATION



■ PIN DESCRIPTIONS

Pin No.	Symbol	Description
1	V_{IN}	Input of LDO
2	GND	Ground
3	V_{EN}	Enable Input Logic, Enable High
4	BYPASS	Optional bypass capacitor for noise reduction
5	V_{OUT}	Output of LDO

■ ABSOLUTE MAXIMUM RATINGS

Symbol	PARAMETER	VALUE
V_{IN}	V_{IN} Supply Voltage	-0.3~6.0V
V_{OUT}	V_{OUT} Output Voltage	-0.3~ V_{IN} +0.3V
V_{EN}	V_{EN} Pin Input Voltage	-0.3~6.0V
P_{D1}	Maximum Power Dissipation, SOT-23-5	364mW
P_{D2}	Maximum Power Dissipation, SC70-5	212mW
T_{jun}	Junction Temperature	150℃
T_{STG}	Storage Temperature	-50~150℃
T_{SOLDER}	Soldering Temperature	260℃, 10s

■ RECOMMANDED OPERATING RANGE

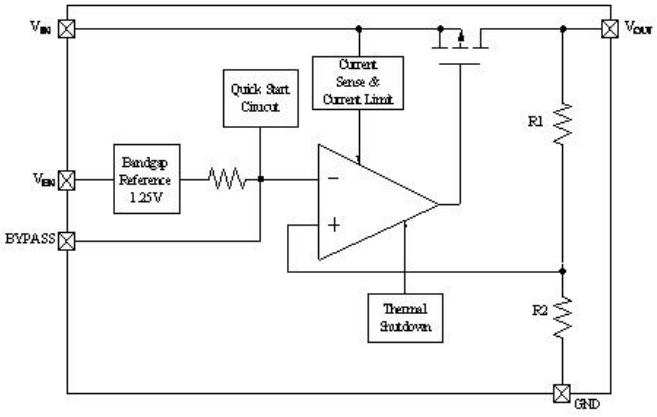
Symbol	PARAMETER	VALUE
V_{IN}	V_{IN} Range	-0.3~5.5V
V_{EN}	V_{EN} Range	-0.3~(V_{IN}+0.3)<5.5V
	Thermal Resistance, θ_{JA}	220°C/W
P_{D1}	Maximum Power Dissipation, SOT-23-5	250 mW
P_{D2}	Maximum Power Dissipation, SC70-5	180 mW
T_{OPT}	Operation Temp.	-40~125°C

■ ELECTRICAL CHARACTERISTICS

($V_{IN} = V_{OUT(nom)} + 0.5V$, $V_{EN} = V_{IN}$, $C_{IN} = 1$ uF, $I_{OUT} = 1$mA, $C_{OUT} = 1$ uF, $C_{BYPASS} = 0.01$ uF， $T_A = +25°C$, Unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
ΔV_{OUT}	Output Voltage Tolerance	I_{OUT} = 1mA	-2		2	%
	Line Regulation Error	$V_{IN}=(V_{OUT(nom)}+0.5V)$ to 5.5V	-0.07	0.02	0.07	%/V
	Load Regulation Error	I_{OUT} = 1mA to 300 mA		0.0023	0.005	%/mA
Tco	Output Temperature Coefficient	Temperature from -40~+125℃		50		ppm/℃
PSRR	Power Supply Rejection Ratio	$V_{IN} = V_{OUT(nom)} + 0.5V$, f = 1 kHz, I_{OUT} <= 150mA		80		
		$V_{IN} = V_{OUT(nom)} + 0.5V$, f = 1 kHz, I_{OUT} = 300mA		70		dB
		$V_{IN} = V_{OUT(nom)} + 0.5V$, f = 10 kHz, I_{OUT} = 50~300mA		65		
		$V_{IN} = V_{OUT(nom)} + 0.2V$, f = 1 kHz, I_{OUT} = 50mA		75		
		$V_{IN} = V_{OUT(nom)} + 0.2V$, f = 10 kHz, I_{OUT} = 50mA		55		
I_Q	Quiescent Current	I_{OUT} = 0 mA		90	165	uA
		I_{OUT} = 0 to 300 mA		120	250	
		V_{EN} = 0V		0.1	1.0	
V_{DO}	Dropout Voltage	I_{OUT} = 1 mA		0.4	1	mV
		I_{OUT} = 50 mA		26	35	
		I_{OUT} = 100 mA		53	70	
		I_{OUT} = 150 mA		80	106	
		I_{OUT} = 300 mA		160	200	
I_{SC}	Output Short Current Limit	Output Grounded		600		mA
$I_{OUT(PK)}$	Peak Output Current	$V_{OUT} \geqslant V_{OUT(nom)} - 5\%$	300	550		mA
T_{ON}	Turn-On Time	C_{BYPASS} = 0.01 uF		150		us
e_n	Output Noise Voltage	BW=10Hz~100kHz, C_{OUT} =1uF, I_{OUT} =150mA		30		uV_{rms}
	Output Noise Density	C_{BP} = 0, f = 100 kHz		80		nV/√Hz
I_{EN}	Input Current at V_{EN}	V_{EN} = 0.4V and V_{IN} = 5.5V		±1		nA
V_{IL}	V_{EN} Pin Input Low Level	V_{IN} = 2.5 to 5.5			0.4	V
V_{IH}	V_{EN} Pin InputHigh Level	V_{IN} = 2.5 to 5.5	1.4			V
T_{SD}	Thermal Shutdown Temperature			160		°C
	Thermal Shutdown Hysteresis			20		°C

■ BLOCK DIAGRAM



■ APPLICATION INFORMATION

- **Input Capacitor**

An input capacitor of at least 1uF is required for the PT5102. Ceramic capacitors are recommended although other types are acceptable. Please be noted that Tantalum capacitors may cause damage to the IC due to surge current when connected to a low-impedance source of power, such as battery or a very large capacitor.

- **Output Capacitor**

Proper type output capacitor is important to ensure stable operation of the PT5102. A dielectric type X7R ceramic capacitor of at least 1uF with ESR between 5~500mΩ is suitable for most PT5102 applications. X5R may be used with narrowed operating temperature.

- **Noise Bypass Capacitor**

A 10nF capacity connected to the BYPASS pin of the PT5102 can significantly reduce output noise. Ceramic capacitors are most recommended in order to achieve low leakage. The addition of this capacitor does not affect the load transient response of the IC.

- **On/Off input operation**

The PT5102 is turned off by setting its V_{EN} pin to low, and turned on by pulling it high. The pin V_{EN} shall be tied to V_{IN} when not used. Leaving it floating is not allowed.

- **No Load Stability**

The PT5102 remains stable and in regulation with no external load.

- **Fast On-Time**

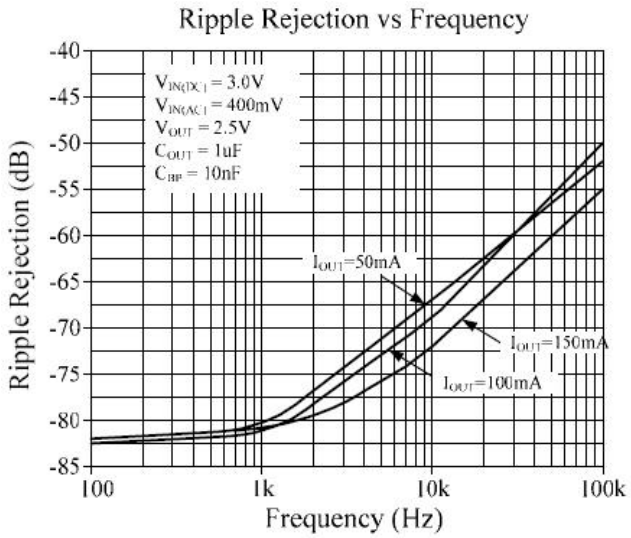
The PT5102 output is turned on after its reference voltage source reaches its final value (1.23V nominal). To speed up this process, the noise bypass capacitor on the BYPASS pin is charged with an internal 70uA current source. The current source is turned of f when the band-gap voltage source reaches approximately 95% of its final value. The turn on time is determined by the time constant of the bypass capacitor. The smaller the capacitor value, the shorter the turn on time, but the worse the output noise level.

- **PCB Layout Guidance**

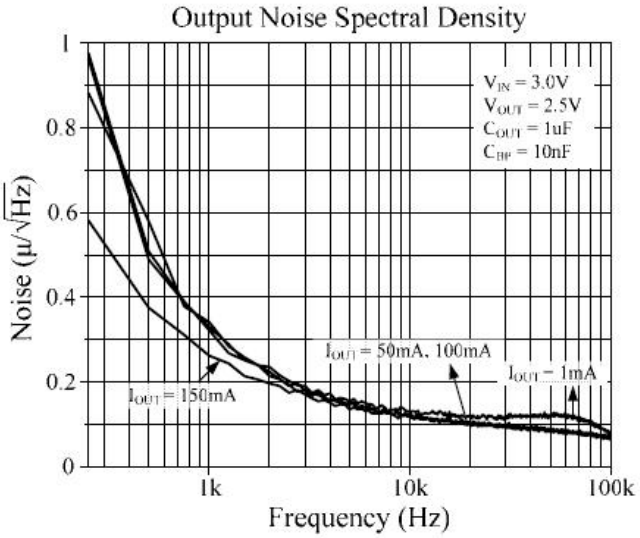
The input and output capacitors shall be placed as close as possible to their respective pins of the PT5102 and clean grounded.

■ TYPICAL PERFORMANCE CHARACTERISTICS

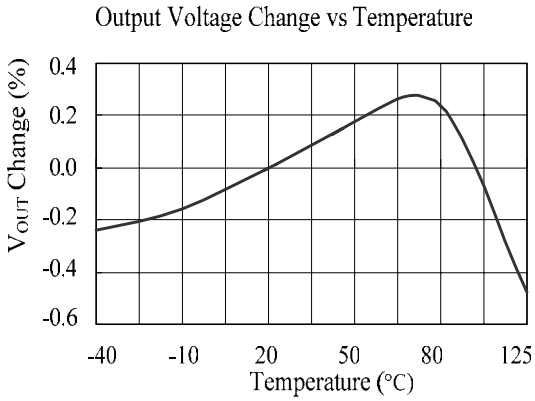
1. PSRR



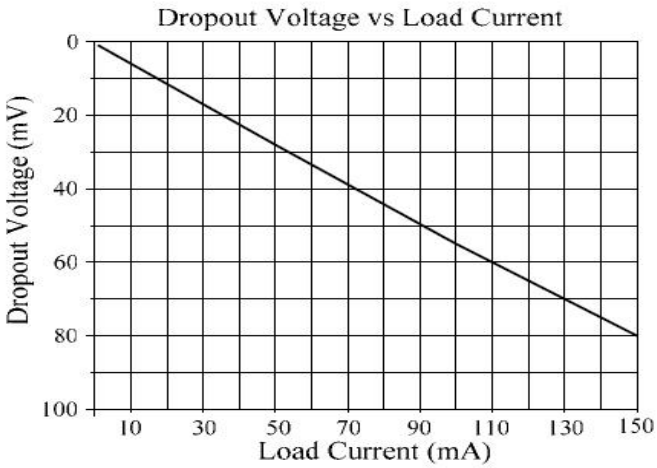
2. Output Noise Spectrum



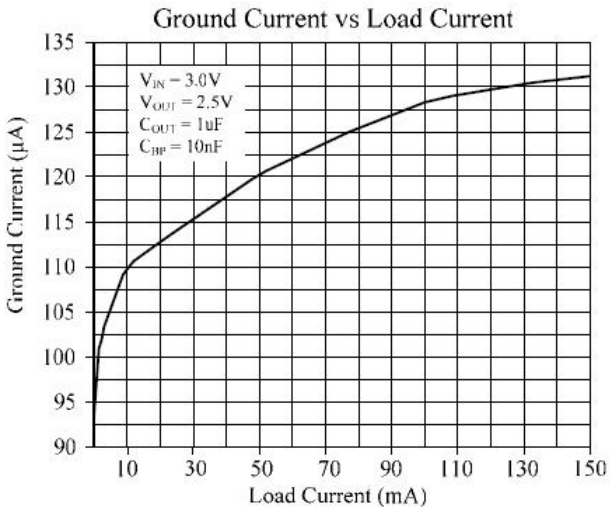
3. Temperature Characteristics



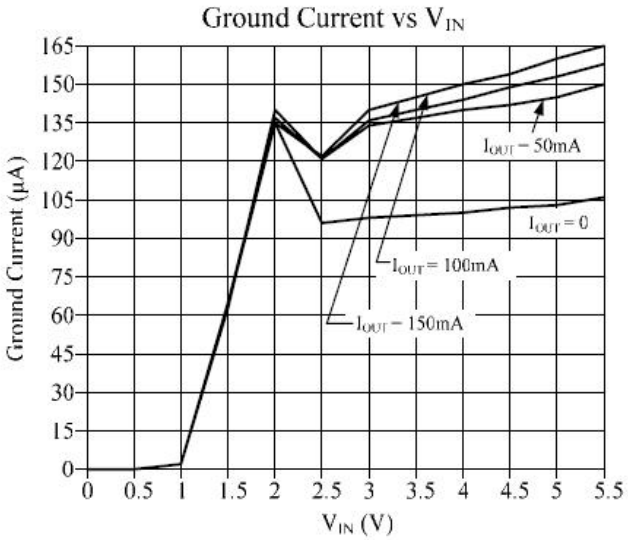
4. Drop-out Voltage



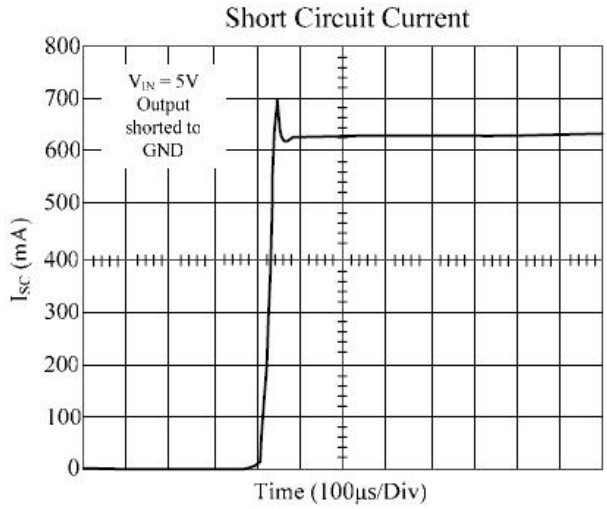
5. Ground Current vs. Load Current



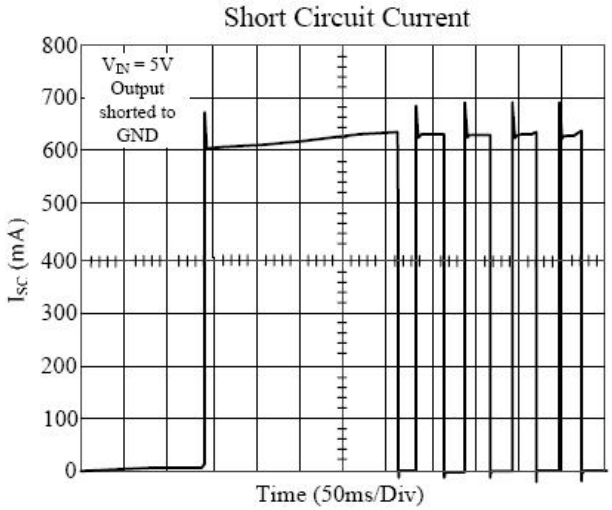
6. Ground Current vs. V_{IN}



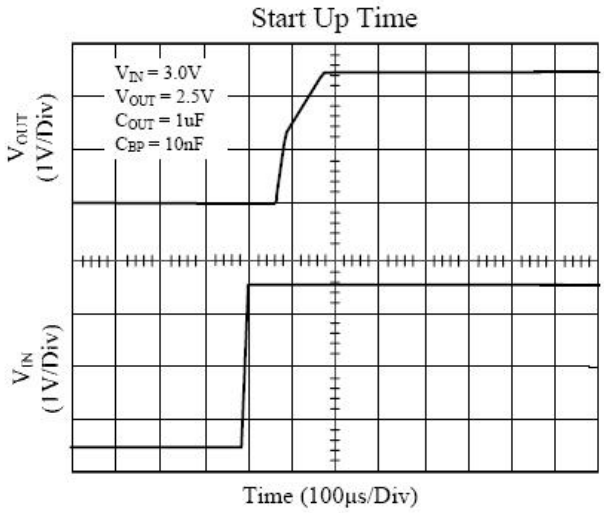
7. Short-circuit Current



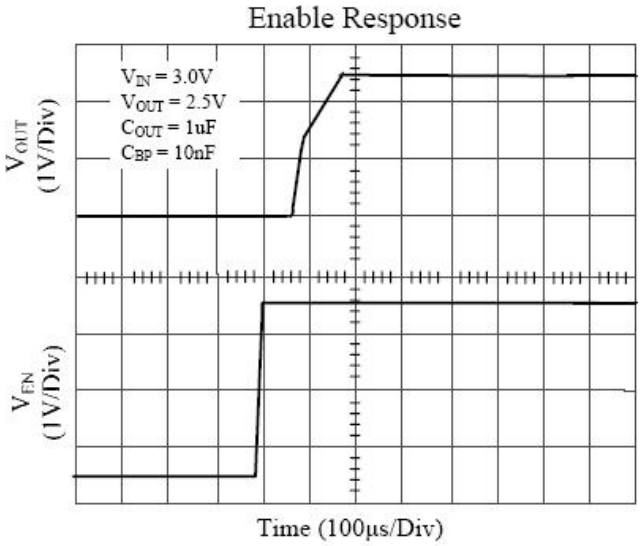
8. Short-circuit Current



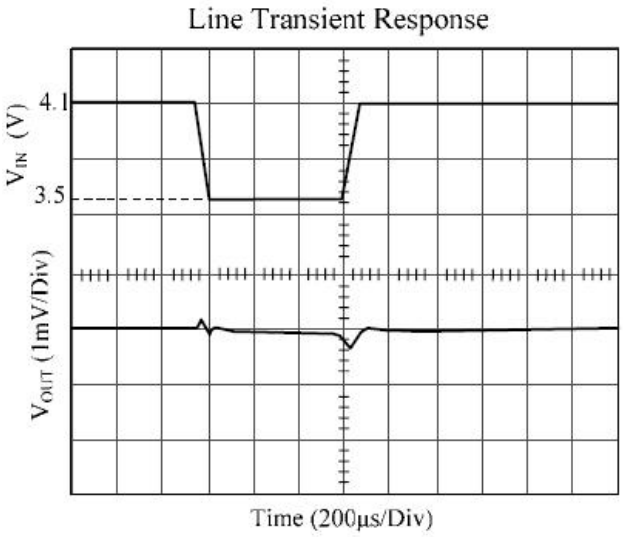
9. Start-up Time



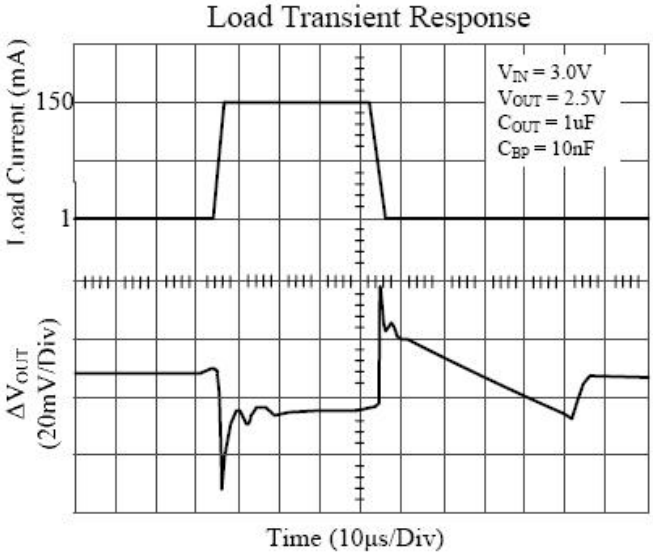
10. Enable Response



11. Line Transient Response

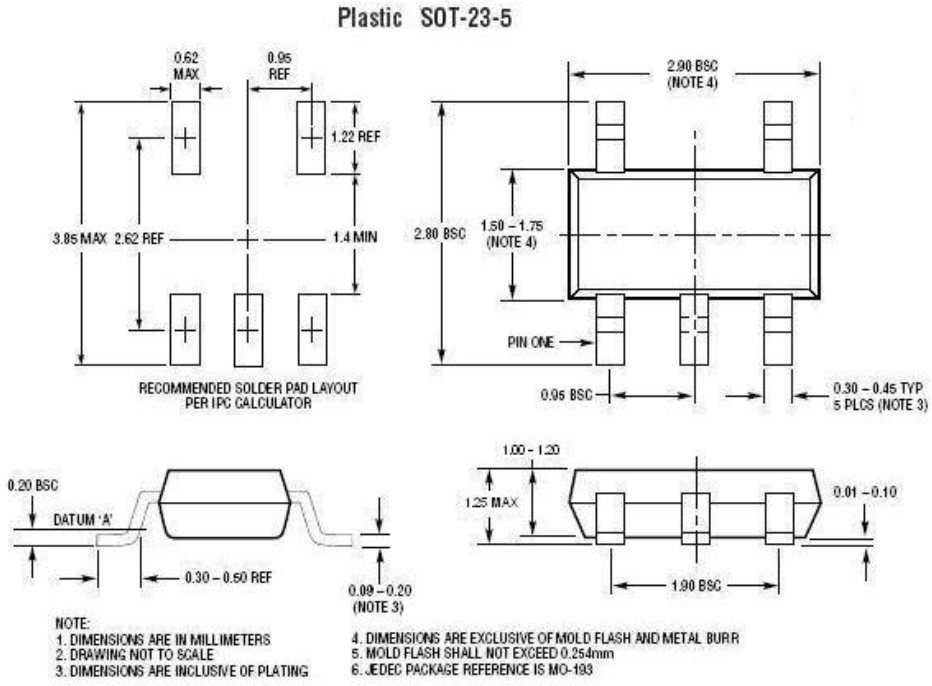


12. Load Transient Response



PACKAGE INFORMATION

1. SOT-23-5



2. SC70-5