AS2431L

Micropower SOT-23, 2.5V Precision Adjustable Shunt Regulator

FEATURES

- **Extremely Low I_{MIN}** **100µA**
- **Voltage Tolerance Trimmed** ..... **± 0.5%**
- **Wide Operating Current** ..... **100µA to 100mA**
- **Extended Temperature Range** ..... **0°C to 105°C**
- Low Temperature Coefficient ..... 30 ppm/°C
- Offered in Small Low Power SOT-23 Package
- Alternative Source TL431

APPLICATIONS

- **Battery Operating Equipment**
- Notebook/ PDA
- Adjustable Supplies
- Power Supply Adapter
- Switching Power Supplies
- Error Amplifiers
- Single Supply Amplifier

PRODUCT DESCRIPTION

The AS2431L is a 3-terminal Adjustable Shunt Voltage Regulator providing extremely low operating current of 100µA with a highly accurate 0.5% bandgap reference. AS2431L acts as an open-loop error amplifier with a 2.5V temperature compensation reference. The AS2431L thermal stability, wide operating current (100mA) and temperature range (105°C) makes it suitable for a broad range of applications. **AS2431L tolerance of 0.5% is proven to be sufficient to overcome all of the other errors in the system to virtually eliminate the need for trimming in the power supply manufactures assembly line and contribute a significant cost savings.**

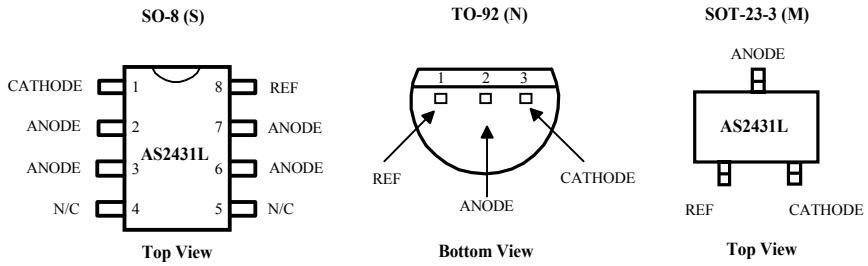
In the standard shunt configuration, the combination of low temperature coefficient (T.C.), sharp turn-on characteristics, low output impedance and programmable output voltage makes this precision reference an excellent error amplifier.

ORDERING INFORMATION

SO-8	TO-92	SOT-23 3-PIN
AS2431LYS	AS2431LYN	AS2431LYM

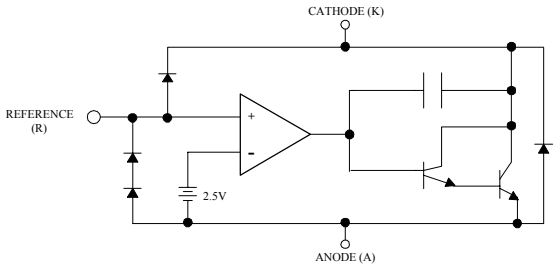
Y = Output Accuracy: Y= A (0.5%) or Blank (1%)

PIN CONNECTIONS



MARKING INFORMATION

Part Number	Tolerance	Marking
AS2431L	1.0%	BOXX (XX Subjected To Lot Number)
AS2431LA	0.5%	B1XX (XX Subjected To Lot Number)



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Units
Cathode-Anode Reverse Breakdown	V_{KA}	30	V
Anode-Cathode Forward Current	I_{AK}	1	A
Operating Cathode Current	I_{KA}	100	mA
Reference Input Current	I_{REF}	1	mA
Continuous Power Dissipation at 25°C, SO-8	P_D	710	mW
TO-92	P_D	780	mW
SOT-23	P_D	300	mW
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	- 65 to 150	°C
Lead Temperature (Soldering 10 sec.)	T_L	260	°C

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

RECOMMENDED CONDITIONS

Parameter	Symbol	Rating	Unit
Cathode Voltage	V_{KA}	V_{REF} to 20	V
Cathode Current	I_K	10	mA

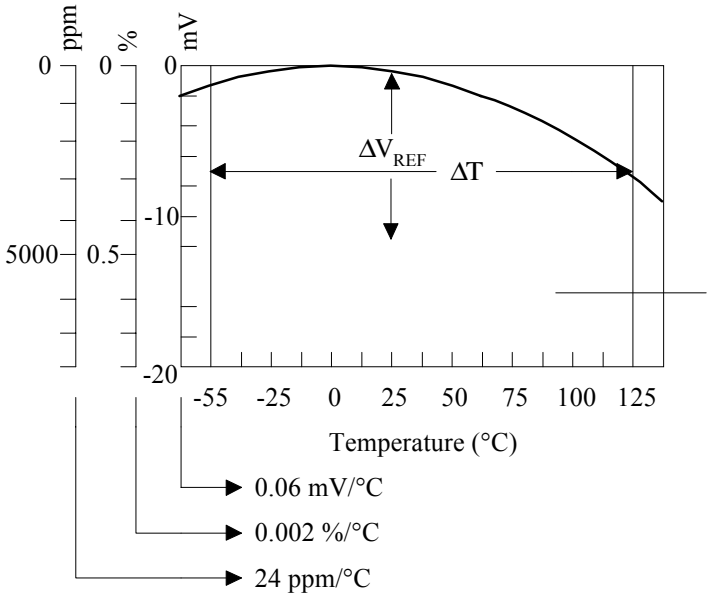
TYPICAL THERMAL RESISTANCES

Package	θ_{JA}	θ_{JC}	Typical Derating
SO-8	175° C/W	45° C/W	5.7 mW/°C
TO-92	160° C/W	80° C/W	6.3 mW/°C
SOT-23	575° C/W	150° C/W	1.7 mW/°C

ELECTRICAL CHARACTERISTICS are guaranteed over full junction temperature range (0°C to 105°C). Ambient temperature must be derated based on power dissipation and package thermal characteristics. The conditions are: $V_{KA} = V_{REF}$ and $I_K = 10mA$, unless otherwise specified.

Parameter	Symbol	Test Condition	Test Circuit	AS2431LA Min	AS2431LA Typ	AS2431LA Max	AS2431L Min	AS2431L Typ	AS2431L Max	Unit
Reference Voltage	V_{REF}	T_A = 25° C	1	2.490	2.503	2.515	2.470	2.495	2.520	V
		Over Temp.	1	2.469		2.536	2.449		2.541	V
ΔV_{REF} with Temp*	TC		1		0.07	0.20		0.07	0.20	mV/°C
Ratio of Change in V_{REF} to Cathode Voltage	ΔV_{REF}	V_{REF} to 10V		-2.7	-1.01		-2.7	-1.01		mV/v
	ΔV_K	10V to 20V	2	-2	-0.4	0.3	-2	-0.4	0.3	
Reference Input Current	I_{REF}		2		0.7	4		0.7	4	µA
I_{REF} Temp Deviation	ΔI_{REF}		2		0.4	1.2		0.4	1.2	µA
Min I_K for Regulation	$I_{K\ (MIN)}$		1		100			100		µA
Off State Leakage	$I_{K\ (OFF)}$	V_{REF} = 0V V_{KA} = 18V	3		0.04	500		0.04	500	nA
Dynamic Output Impedance	Z_{KA}	f ≤ 1 kHz I_K = 0.1 to 100mA	1		0.15	0.5		0.15	0.5	Ω
Minimum Operating Current	I_{MIN}	$V_Z = V_{REF}$	1			100			100	µA

Calculating Average Temperature Coefficient (TC)



- TC in mV/°C = $\frac{\Delta V_{REF}\ (mV)}{\Delta T_A}$
- TC in %/°C = $\frac{\left(\frac{\Delta V_{REF}}{V_{REF}\text{ at }25°C}\right)}{\Delta T_A}$ x 100
- TC in ppm/°C = $\frac{\left(\frac{\Delta V_{REF}}{V_{REF}\text{ at }25°C}\right)}{\Delta T_A}$ x 10^6

TEST CIRCUITS

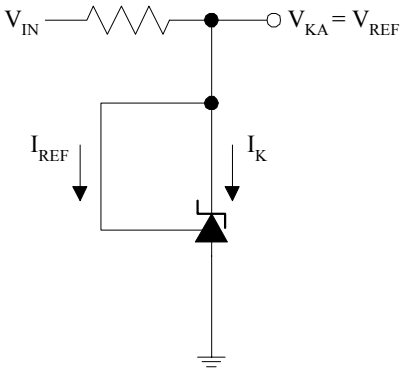


Figure 1a. Test Circuit 1

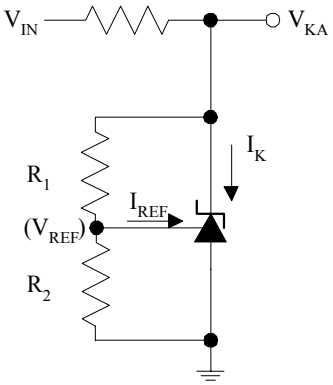


Figure 1b. Test Circuit 2

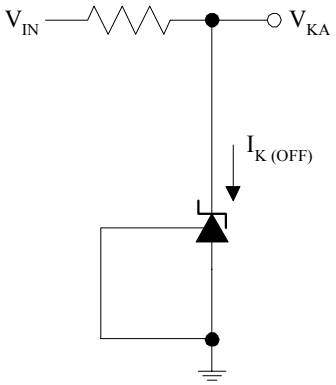


Figure 1c. Test Circuit 3

TYPICAL PERFORMANCE CURVES

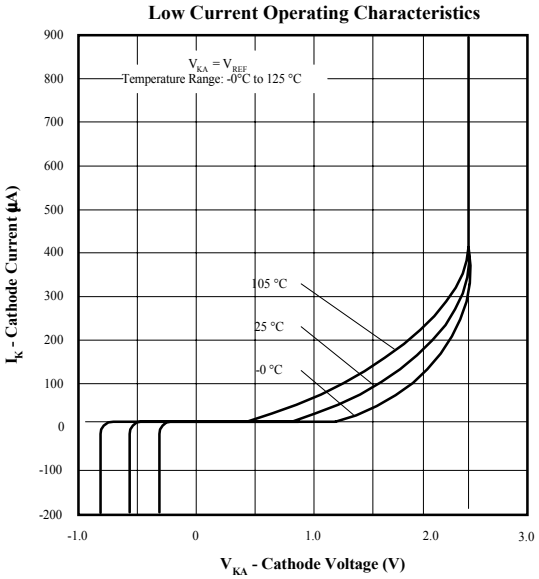


Figure 2

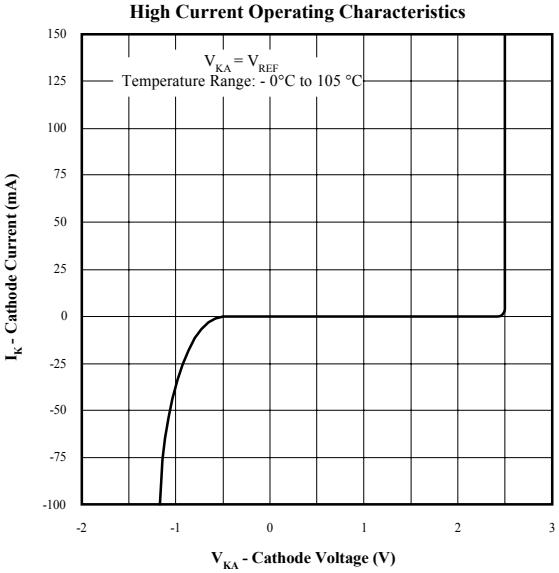


Figure 3

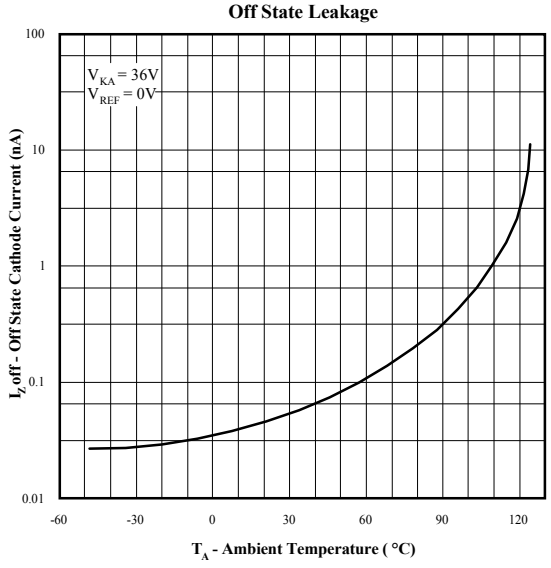


Figure 4

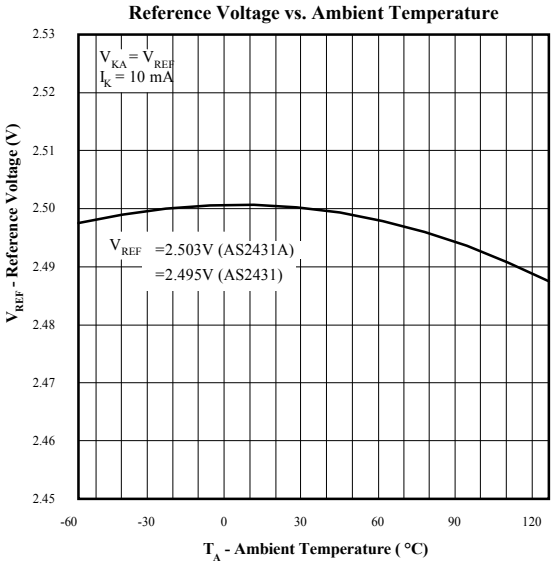
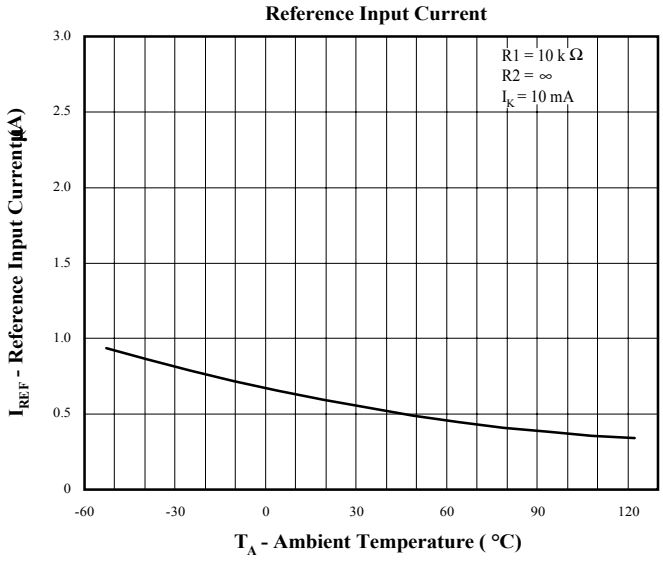


Figure 5

TYPICAL PERFORMANCE CURVES



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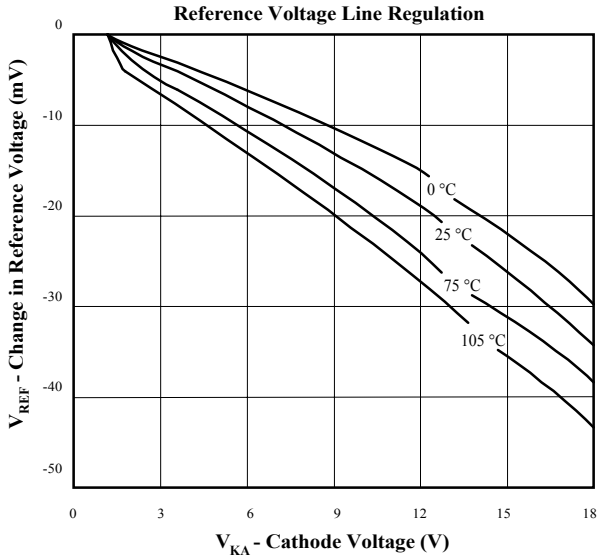

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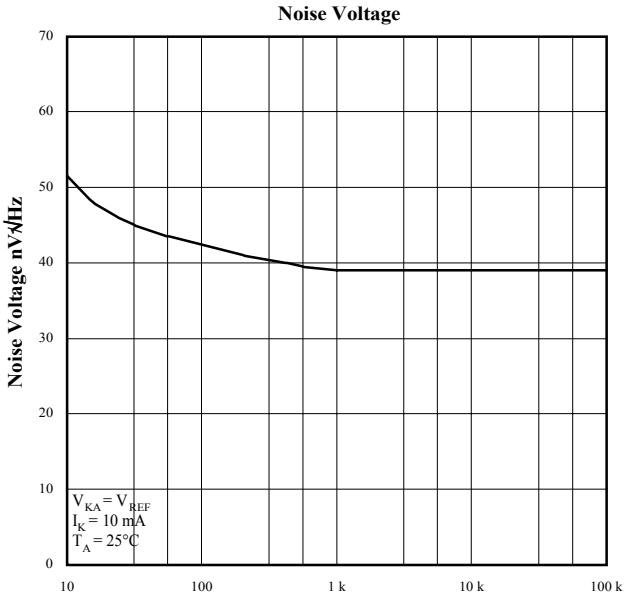

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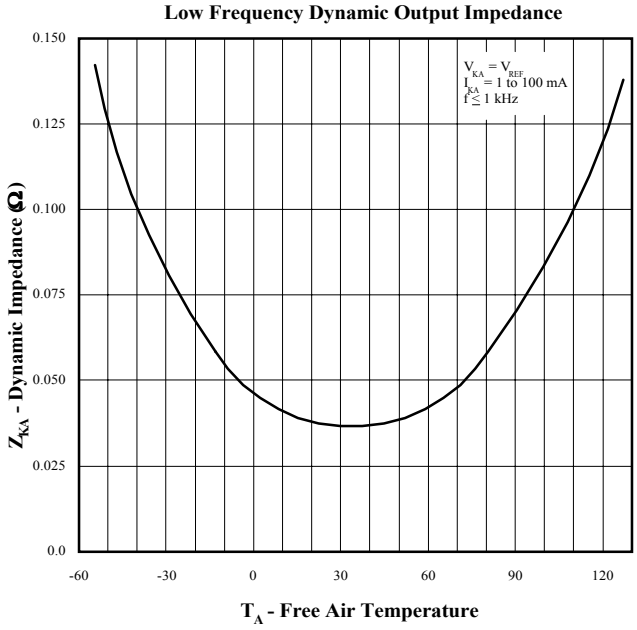


Figure 9

TYPICAL PERFORMANCE CURVE

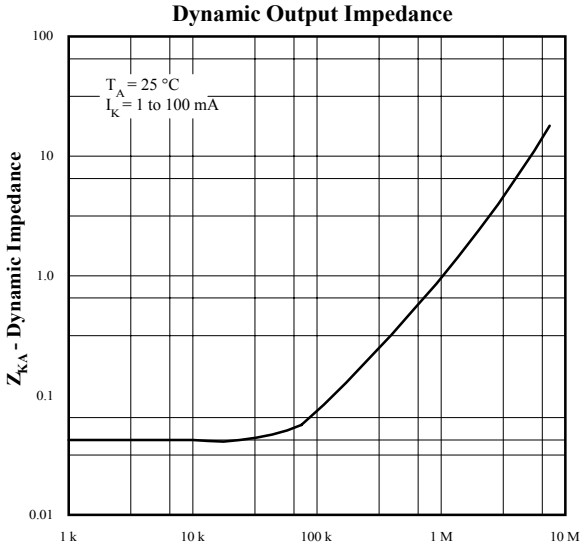


Figure 10

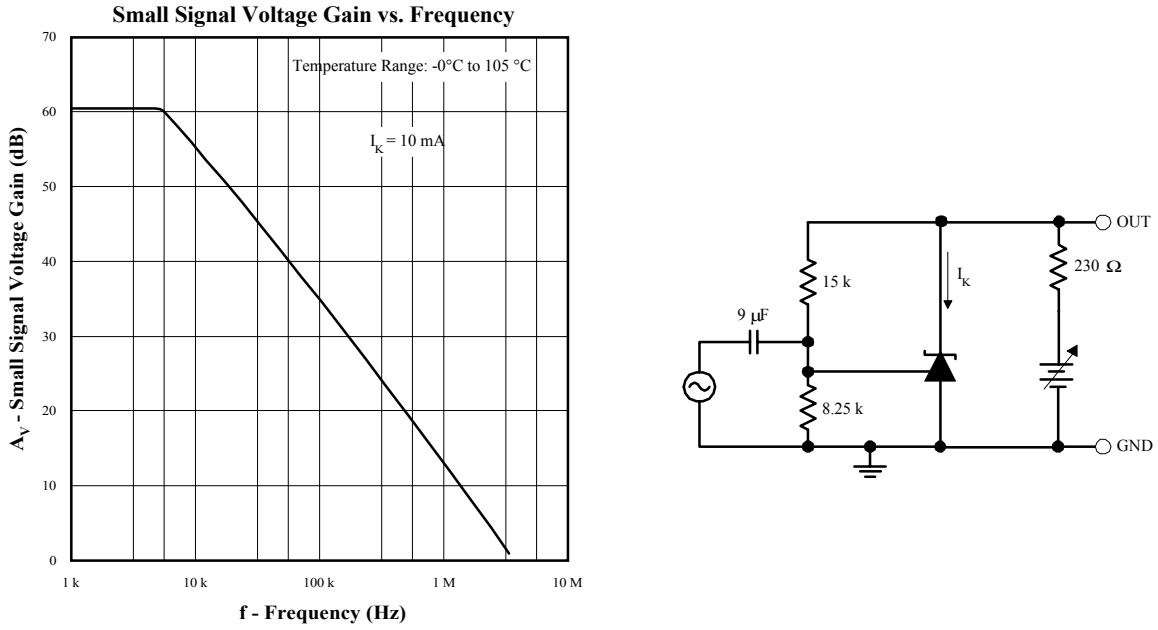
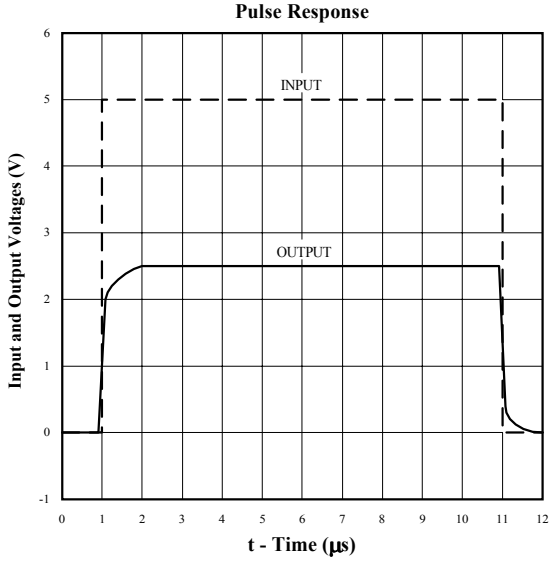
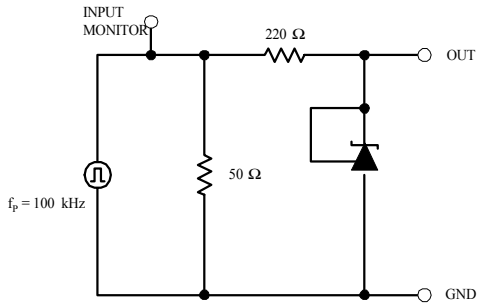


Figure 11

TYPICAL PERFORMANCE CURVES





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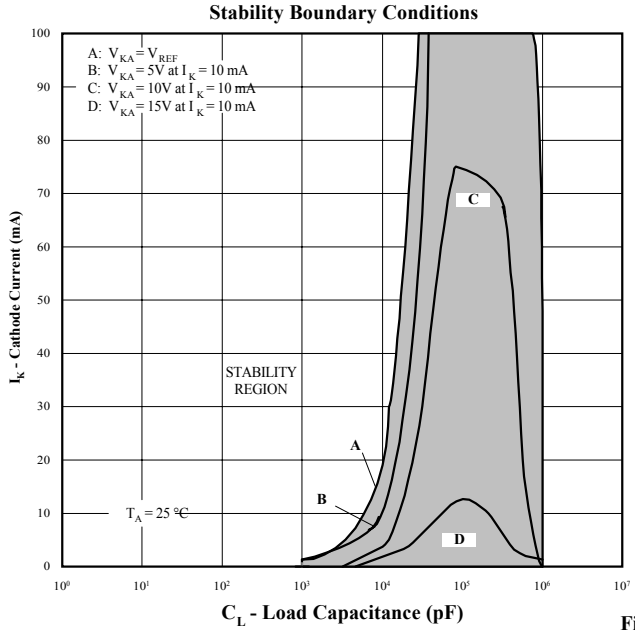


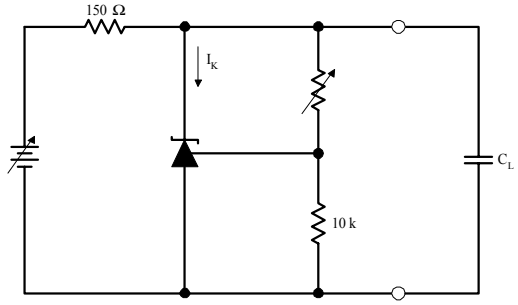
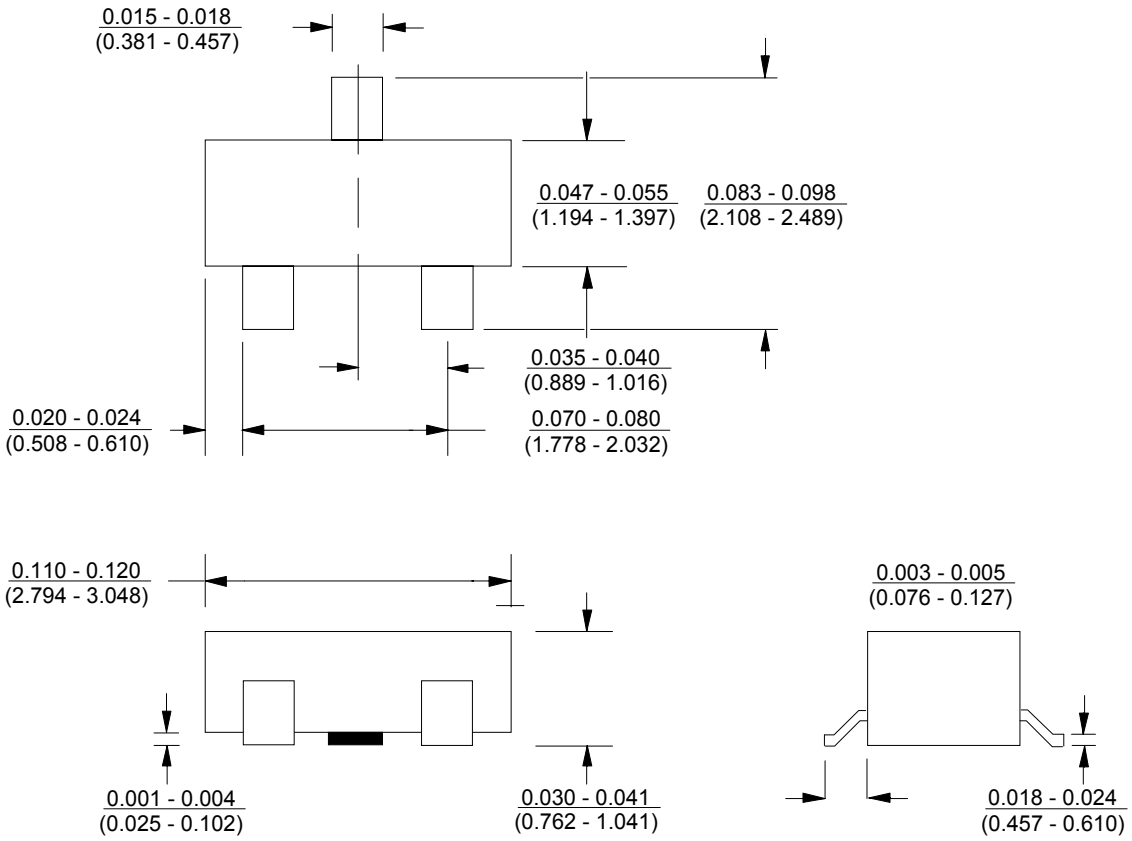
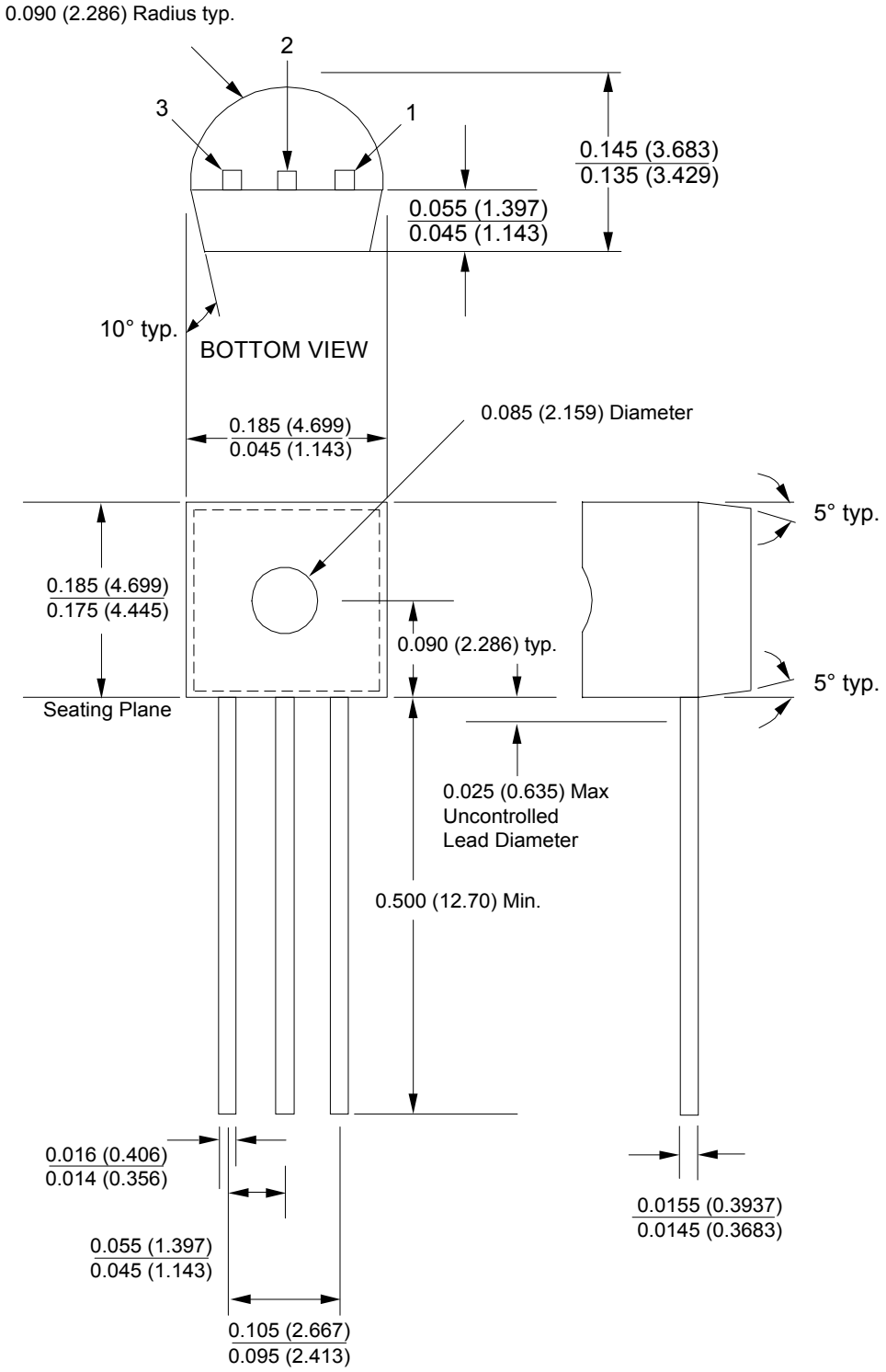


Figure 13

PACKAGE DRAWING
SOT-23-3L (M)



PACKAGE DRAWING
TO-92 (N)



PACKAGE DRAWING
SOIC-8 (S)