

POWER MANAGEMENT

Absolute Maximum Ratings

Exceeding the specifications below may result in permanent damage to the device, or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not implied.

Parameter	Symbol	Maximum	Units
Cathode Voltage	V_Z	31	V
Continuous Cathode Current	I_Z	150	mA
Reference Input Current	I_{REF}	10	mA
Power Dissipation at $T_A = 25^\circ\text{C}$ SOT-23-3 SO-8	P_D	0.37 0.78	W
Thermal Resistance SOT-23-3 SO-8	θ_{JA}	336 163	$^\circ\text{C/W}$
Operating Ambient Temperature Range SC431Cx-.5, SC431Cx-1, SC431Cx-2 SC431CxQ	T_A	-40 to +85 -40 to +125	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-40 to +150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 to +150	$^\circ\text{C}$
Lead Temperature (Soldering) 10 seconds	T_{LEAD}	300	$^\circ\text{C}$
ESD Rating (Human Body Model)	V_{ESD}	2	kV

Electrical Characteristics

Unless specified: $T_A = 25^\circ\text{C}$. Values in **bold** apply over full operating ambient temperature range.

			SC431Cx-.5, SC431CxQ			SC431Cx-1			
Parameter	Symbol	Condition	Min	Typ	Max	Min	Typ	Max	Units
Reference Voltage	V_{REF}	$V_Z = V_{REF}, I_Z = 10\text{mA}^{(1)}$	2.482	2.495	2.507	2.470	2.495	2.520	V
V_{REF} Temp Deviation	V_{DEV}	$V_Z = V_{REF}, I_Z = 10\text{mA}^{(1)}$		8	17		8	25	mV
Ratio of Change in V_{REF} to Change in V_Z	$\frac{\Delta V_{REF}}{\Delta V_Z}$	$I_Z = 10\text{mA}, \Delta V_Z = 10\text{V to } V_{REF}$		-0.5	-2.7		-0.5	-2.7	mV/V
		$I_Z = 10\text{mA}, \Delta V_Z = 30\text{V to } 10\text{V}$		-1.0	-2.0		-1.0	-2.0	
Reference Input Current	I_{REF}	$R1 = 10\text{k}\Omega, R2 = \infty,$ $I_Z = 10\text{mA}^{(2)}$		0.5	4		0.5	4	μA
I_{REF} Temperature Deviation	$I_{REF(DEV)}$	$R1 = 10\text{k}\Omega, R2 = \infty,$ $I_Z = 10\text{mA}^{(2)}$		0.4	1.2		0.4	1.2	μA
Off-State Cathode Current	$I_{Z(OFF)}$	$V_{REF} = 0\text{V}, V_Z = 30\text{V}^{(3)}$		0.04	0.50		0.04	0.50	μA
Dynamic Output Impedance	r_Z	$f < 1\text{kHz}, V_Z = V_{REF}$ $I_Z = 130\mu\text{A to } 100\text{mA}^{(1)}$		0.25	0.50		0.25	0.50	Ω
Minimum Operating Current	$I_{Z(MIN)}$	$V_Z = V_{REF}^{(1)}$			130			130	μA

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Electrical Characteristics (Cont.)

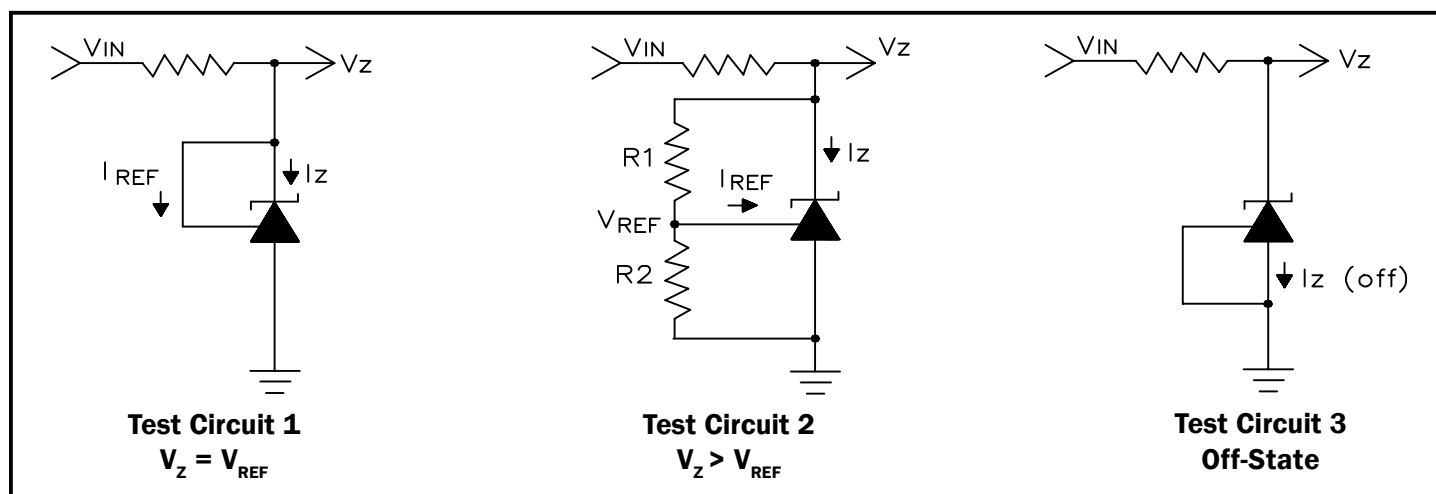
Unless specified: $T_A = 25^\circ\text{C}$. Values in **bold** apply over full operating ambient temperature range.

			SC431Cx-2			
Parameter	Symbol	Condition	Min	Typ	Max	Units
Reference Voltage	V_{REF}	$V_Z = V_{REF}$, $I_Z = 10\text{mA}^{(1)}$	2.445	2.495	2.545	V
V_{REF} Temp Deviation	V_{DEV}	$V_Z = V_{REF}$, $I_Z = 10\text{mA}^{(1)}$		15	30	mV
Ratio of Change in V_{REF} to Change in V_Z	$\frac{\Delta V_{REF}}{\Delta V_Z}$	$I_Z = 10\text{mA}$, $\Delta V_Z = 10\text{V to } V_{REF}$		-0.5	-2.7	mV/V
		$I_Z = 10\text{mA}$, $\Delta V_Z = 30\text{V to } 10\text{V}$		-1.0	-2.0	
Reference Input Current	I_{REF}	$R1 = 10\text{k}\Omega$, $R2 = \infty$, $I_Z = 10\text{mA}^{(2)}$		0.5	4	μA
I_{REF} Temperature Deviation	$I_{REF(DEV)}$	$R1 = 10\text{k}\Omega$, $R2 = \infty$, $I_Z = 10\text{mA}^{(2)}$		0.4	1.2	μA
Off-State Cathode Current	$I_{Z(OFF)}$	$V_{REF} = 0\text{V}$, $V_Z = 30\text{V}^{(3)}$		0.04	0.50	μA
Dynamic Output Impedance	r_z	$f < 1\text{kHz}$, $V_Z = V_{REF}$, $I_Z = 130\mu\text{A to } 100\text{mA}^{(1)}$		0.25	0.50	Ω
Minimum Operating Current	$I_{Z(MIN)}$	$V_Z = V_{REF}^{(1)}$			130	μA

Notes:

- (1) See Test Circuit 1 below.
- (2) See Test Circuit 2 below.
- (3) See Test Circuit 3 below.

Test Circuits



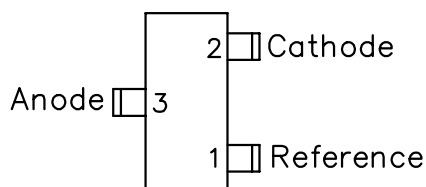
Recommended Operating Conditions

	Min	Max	Symbol
Cathode Voltage, V_Z	V_{REF}	30	V
Cathode Current, I_Z	0.130	150	mA

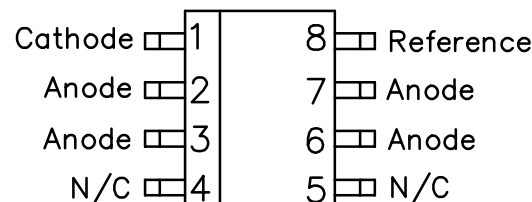
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Pin Configurations

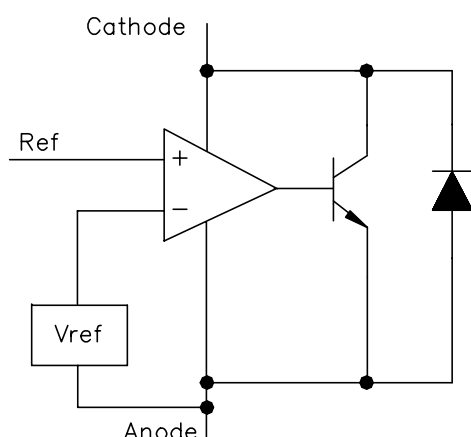
SOT-23-3 (Top View)



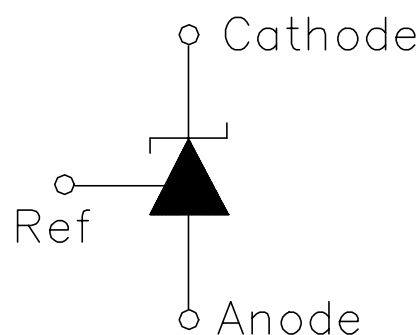
SO-8 (Top View)



Block Diagram



Symbol



Ordering Information

Tolerance	0.5%	0.5%	1.0%	2.0%
Ambient Temperature Range	-40°C to +85°C	-40°C to +125°C	-40°C to +85°C	-40°C to +85°C
SOT-23-3 ⁽¹⁾	SC431CSK-.5 TR	SC431CSKQTR	SC431CSK-1.TR	SC431CSK-2.TR
SOT-23-3 ^{(1),(3)}	SC431CSK-.5TRT	SC431CSKQTRT	SC431CSK-1TRT	SC431CSK-2TRT
SO-8 ⁽²⁾	SC431CS-.5 TR	SC431CSQTR	SC431CS-1.TR	SC431CS-2.TR
SO-8 ^{(2),(3)}	SC431CS-.5 TRT	SC431CSQTRT	SC431CS-1.TRT	SC431CS-2.TRT

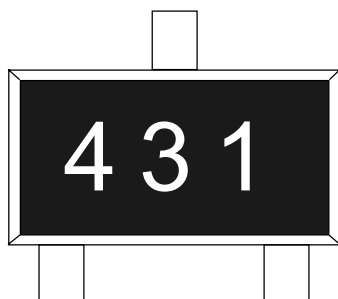
Notes:

- (1) Only available in tape and reel packaging. A reel contains 3000 devices.
- (2) Only available in tape and reel packaging. A reel contains 2500 devices.
- (3) "T" at end of part number indicates "lead free". This product is fully WEEE and RoHS compliant.

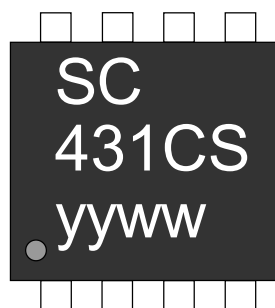
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Marking Information

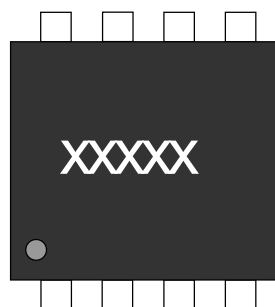
SOT-23-3 (Top View)



S0-8 (Top View)



S0-8 (Bottom View)

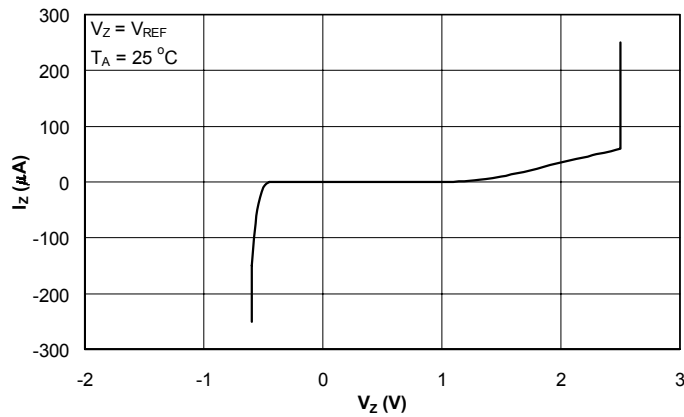


yyww = Datecode (Example: 0008)
xxxxx = Semtech Lot # (Example: 00101)

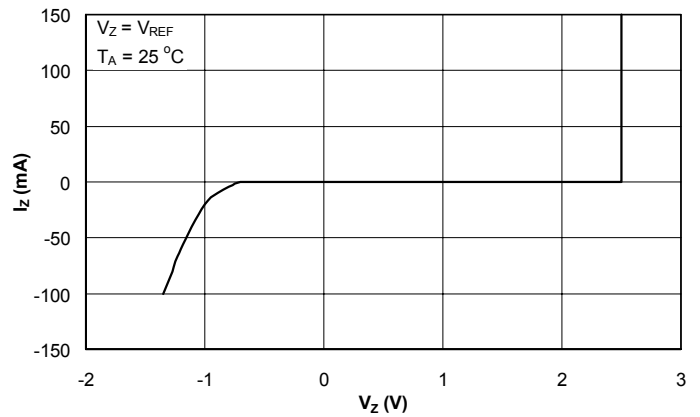
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Typical Characteristics

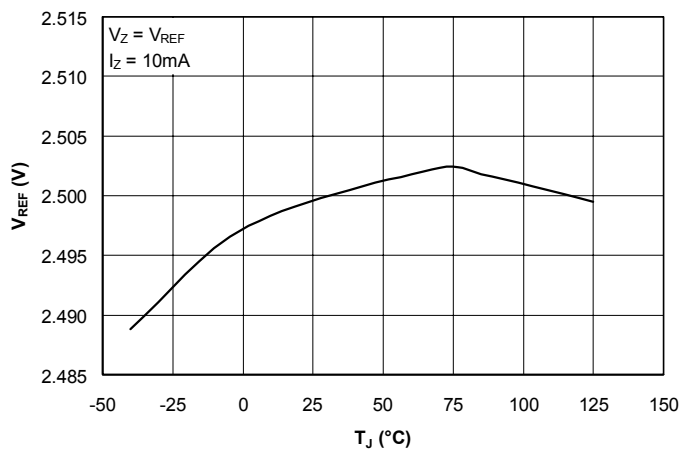
**Cathode Current vs.
Cathode Voltage**



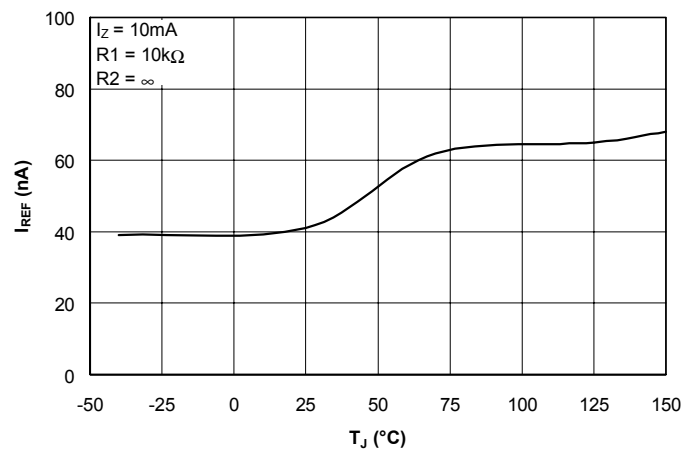
**Cathode Current vs.
Cathode Voltage**



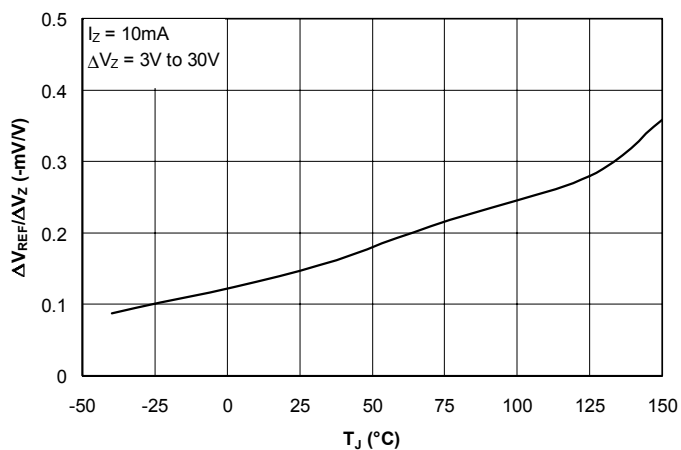
**Reference Voltage vs.
Junction Temperature**



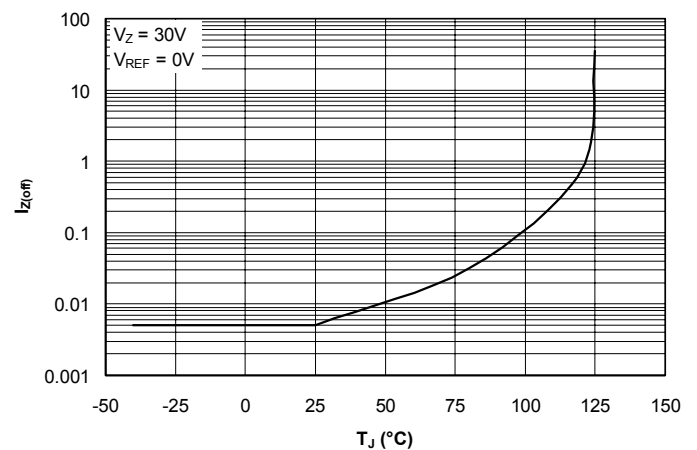
**Reference Input Current vs.
Junction Temperature**



**Ratio of Delta Reference Voltage to Delta Cathode
Voltage vs. Junction Temperature**



**Off-State Cathode Current
vs. Junction Temperature**

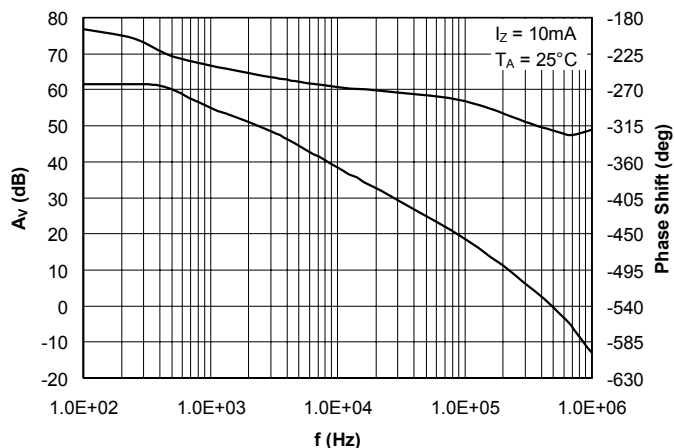


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Typical Characteristics (Cont.)

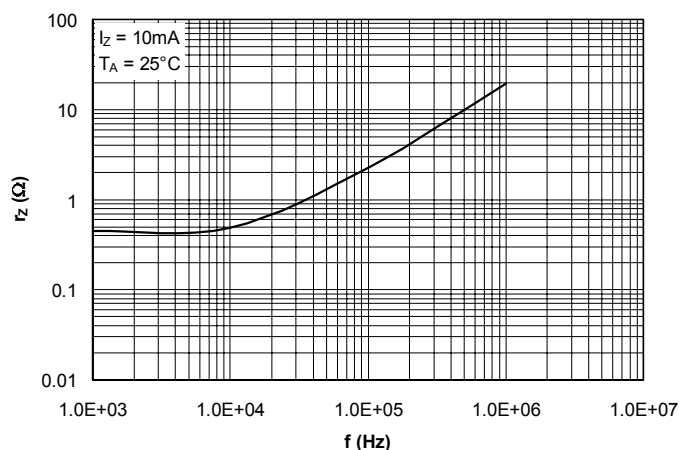
Small-Signal Gain and Phase Shift

vs. Frequency



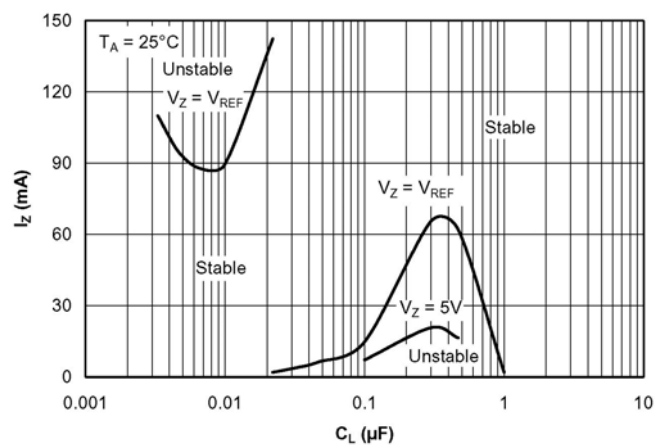
Reference Impedance

vs. Frequency

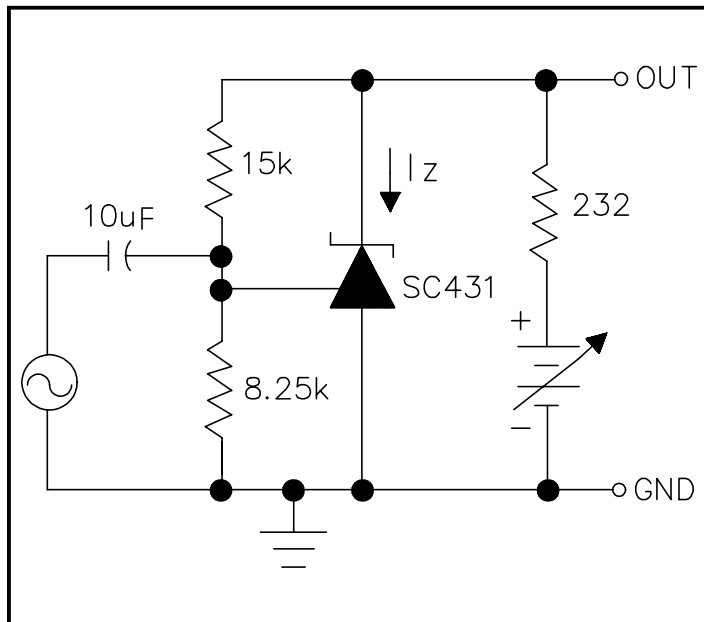


Stability Boundary Condition For Shunt Regulation

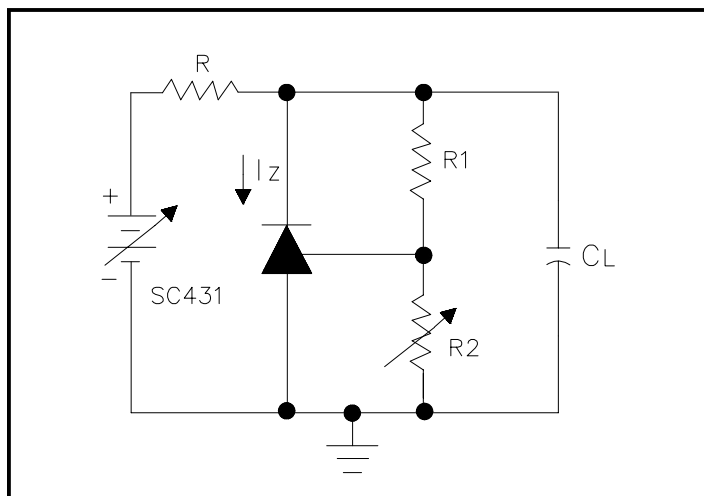
vs. Cathode Current and Load Capacitance



Test Circuit - Small-Signal Gain and Phase

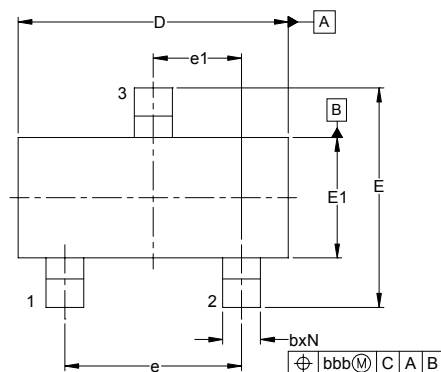


Test Circuit - Stability

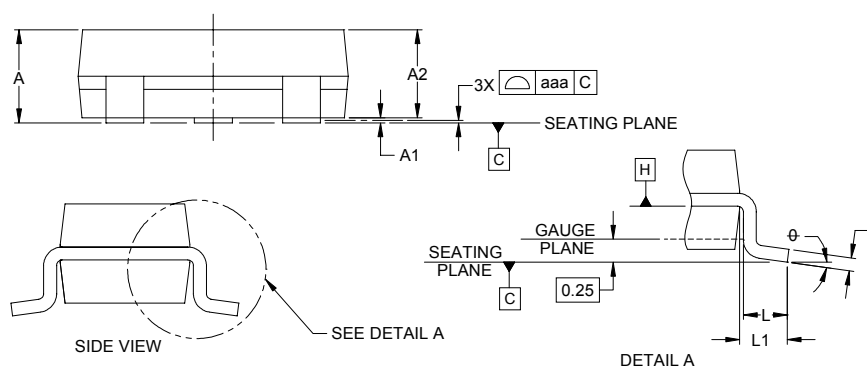


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Outline Drawing - SOT-23-3



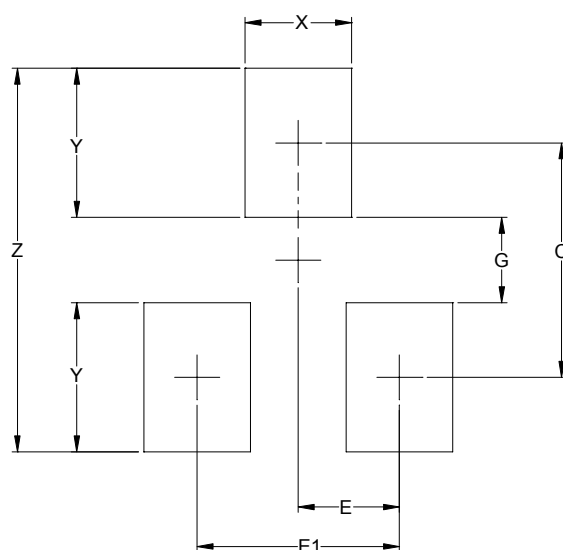
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.035	-	.044	0.89	-	1.12
A1	.000	-	.004	0.01	-	0.10
A2	.035	.037	.040	0.88	0.95	1.02
b	.012	-	.020	0.30	-	0.51
c	.003	-	.007	0.08	-	0.18
D	.110	.114	.120	2.80	2.90	3.04
E	.082	.093	.104	2.10	2.37	2.64
E1	.047	.051	.055	1.20	1.30	1.40
e	.075	-	-	1.90	BSC	-
e1	.037	-	-	0.95	BSC	-
L	.015	.020	.024	0.40	0.50	0.60
L1	.022	-	-	(0.55)	-	-
N	3	-	-	3	-	-
Φ	0°	-	8°	0°	-	8°
aaa	.004	-	-	0.10	-	-
bbb	.008	-	-	0.20	-	-



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**.
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT-23-3



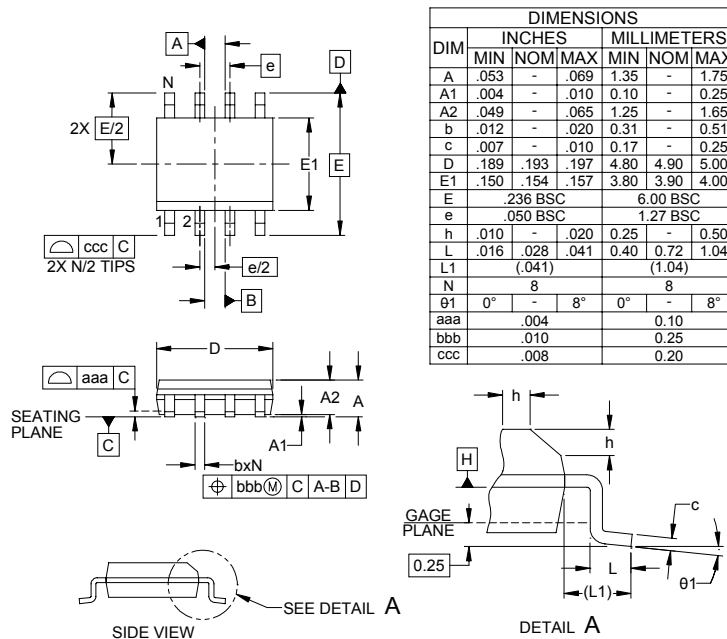
DIM	DIMENSIONS	
	INCHES	MILLIMETERS
C	(.087)	(2.20)
E	.037	0.95
E1	.075	1.90
G	.031	0.80
X	.039	1.00
Y	.055	1.40
Z	.141	3.60

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY
CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR
COMPANY'S MANUFACTURING GUIDELINES ARE MET.
2. REFERENCE IPC-SM-782A.

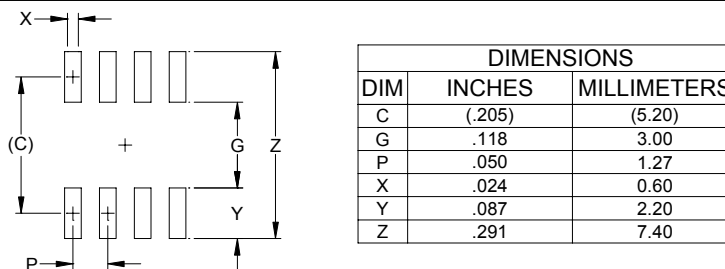
POWER MANAGEMENT

Outline Drawing - SO-8



- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
 3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
 4. REFERENCE JEDEC STD MS-012, VARIATION AA.

Land Pattern - SO-8



- NOTES:
1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
 2. REFERENCE IPC-SM-782A, RLP NO. 300A.

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