

Programmable Voltage Reference

General Description

The GGA431 is three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output Voltage may be set to any value between V_{ref} (approximately 2.5V) and 36V with two external resistors. These devices provide a very sharp turn-on characteristic, making them an excellent replacement for zener diodes in many applications.

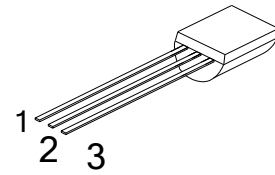
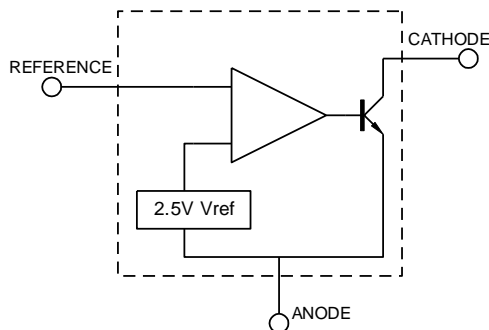
Features

- Programmable output Voltage to 36V
- Low dynamic output impedance 0.2Ω
- Sink current capability of 0.5 to 100mA
- Equivalent full-range temperature coefficient of 50ppm/°C typical
- Temperature compensated for operation over full rated operating temperature range
- Low output noise voltage
- Fast turn on response

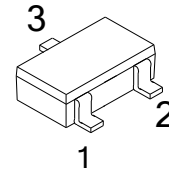
Applications

- Set-top box
- Flat panel Monitors / TVs
- PC / Note book

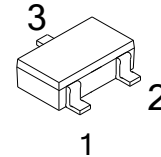
Block Diagram



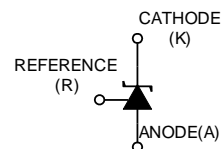
1:Ref; 2: Anode; 3:Cathode TO-92



1:Ref; 2:Cathode; 3:Anode SOT-23-3L



1:Ref; 2:Cathode; 3:Anode SOT-23



Absolute Maximum Ratings (Operating Temperature Range Applies Unless Otherwise Specified)

Characteristic	Symbol	Value		Units
Cathode Voltage	V_{KA}	37		V
Cathode Current Range(Continuous)	I_{KA}	-100~+150		mA
Reference Input Current Range	I_{ref}	-0.05~+10		mA
Power Dissipation	PD	TO-92	770	mW
		SOT-23-3	370	
Operating Temperature	T_{opr}	-40~+85		°C
Storage Temperature	T_{stg}	-65~+150		°C

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ	Max	Units
Cathode Voltage	V_{KA}	V_{REF}		36	V
Cathode Current	I_{KA}	0.5		100	mA

Electrical Characteristics ($T_A=25^{\circ}\text{C}$, Unless Otherwise Specified)

Characteristic		Symbol	Test conditions	MIN	TYP	MAX	UNIT
Reference Input Voltage 1	0.5%	V_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.488	2.50	2.512	V
	1%			2.475	2.50	2.525	
	2%			2.450	2.50	2.550	
Reference Input Voltage 2*	0.5%	V_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.483	2.495	2.507	V
	1%			2.470	2.495	2.520	
	2%			2.445	2.495	2.545	
Deviation of reference Input Voltage Over temperature		ΔV_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$ $T_{MIN} \leq T_A \leq T_{MAX}$		4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		$\Delta V_{REF}/\Delta V_{KA}$	$I_{KA}=10\text{mA}$ $\Delta V_{KA}=10\text{V} \sim V_{REF}$		-1.0	-2.7	mV/V
				$\Delta V_{KA}=36\text{V} \sim 10\text{V}$		-0.5	
Reference Input Current		I_{REF}	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty$		1	2	μA
Deviation of Reference Input Current Over Full Temperature Range		$\Delta I_{REF}/\Delta T$	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty, T_A=\text{full Temperature}$		0.2	0.4	μA
Minimum cathode current for regulation		$I_{KA}(\text{min})$	$V_{KA}=V_{REF}$		0.3	0.5	mA
Off-state cathode Current		$I_{KA}(\text{OFF})$	$V_{KA}=36\text{V}, V_{REF}=0$		0.05	0.5	μA
Dynamic Impedance		Z_{KA}	$V_{KA}=V_{REF}, I_{KA}=1 \text{ to } 100\text{mA}$ $f \leq 1.0\text{kHz}$		0.15	0.5	Ω

Applications Circuits

TEST CIRCUITS

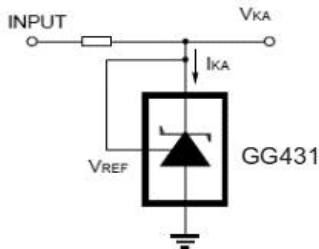


Fig 7 Test Circuit For $V_{KA}=V_{REF}$

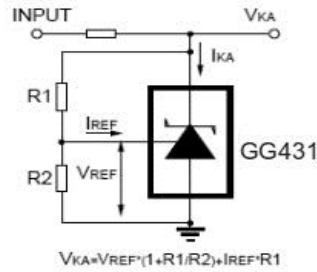


Fig 8 Test Circuit for $V_{KA} \geq V_{REF}$

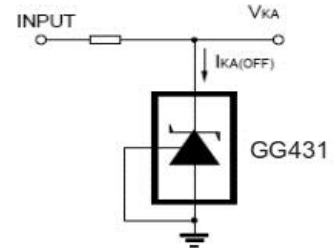


Fig 9 Test Circuit For $I_{KA(OFF)}$

Typical Application

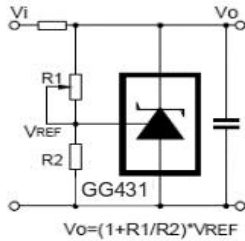


Fig 10 Shutdown Regulator

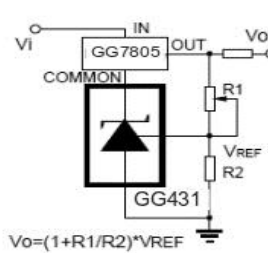


Fig 11 Output Control of a Three-Terminal Fixed Regulator

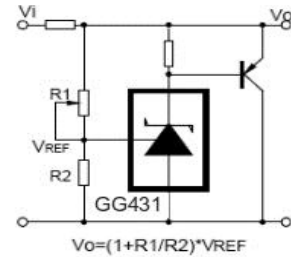


Fig 12 Higher-current Shunt Regulator

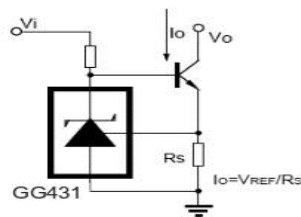


Fig 13 Constant-current Sink

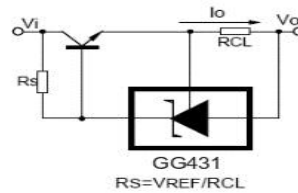


Fig 14 Current Limiting or Current Source

Typical Characteristics

Fig 1 Cathode Current Vs Cathode Voltage

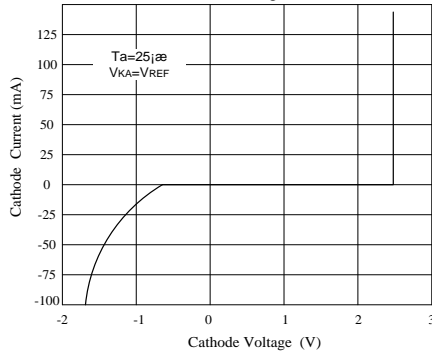


Fig 2 Cathode Current Vs Cathode Voltage

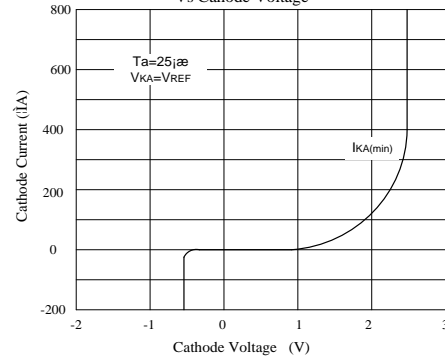


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

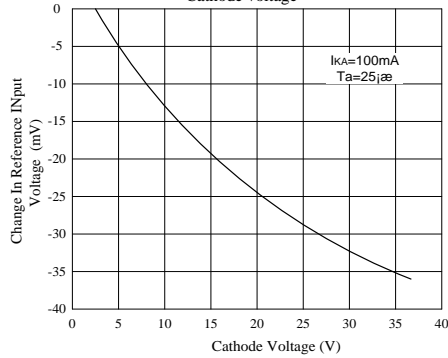


Fig 4 Pulse Response

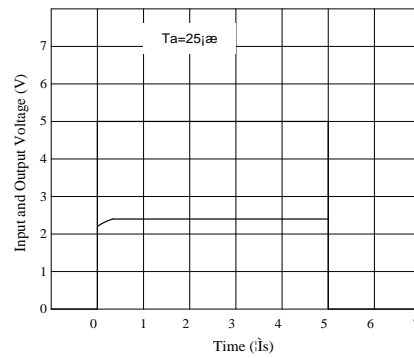


Fig 5 Dynamic Impedance Vs Frequency

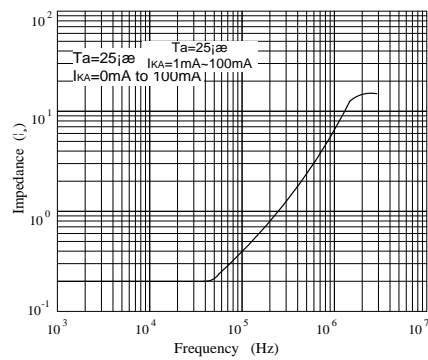


Fig 6 Small Signal Voltage Amplification Vs Frequency

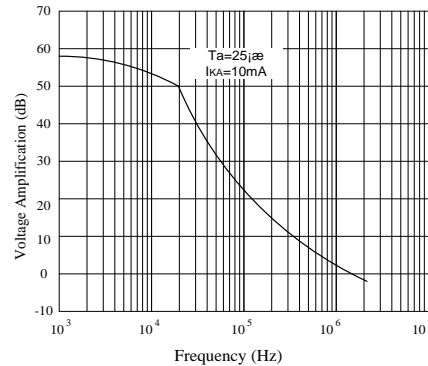
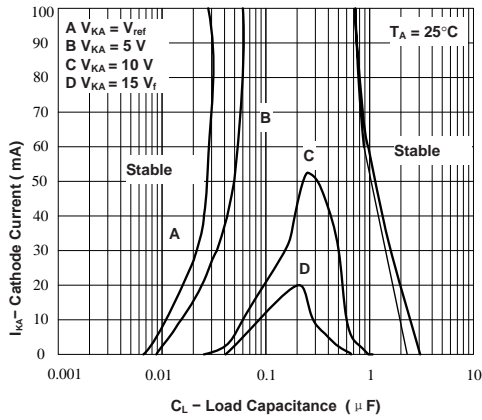


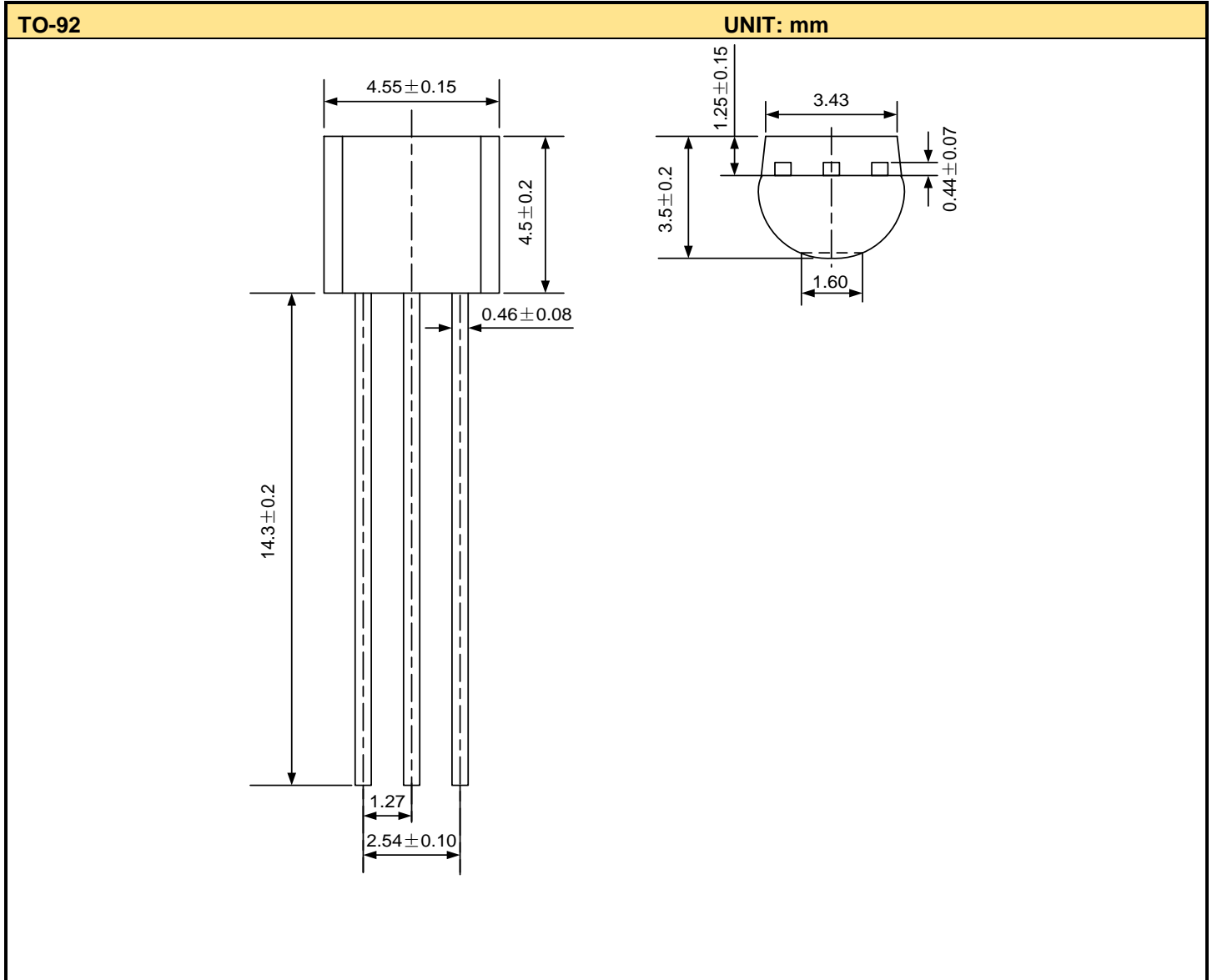
Fig 7 Cathode Current Vs Load Capacitance



Ordering Information

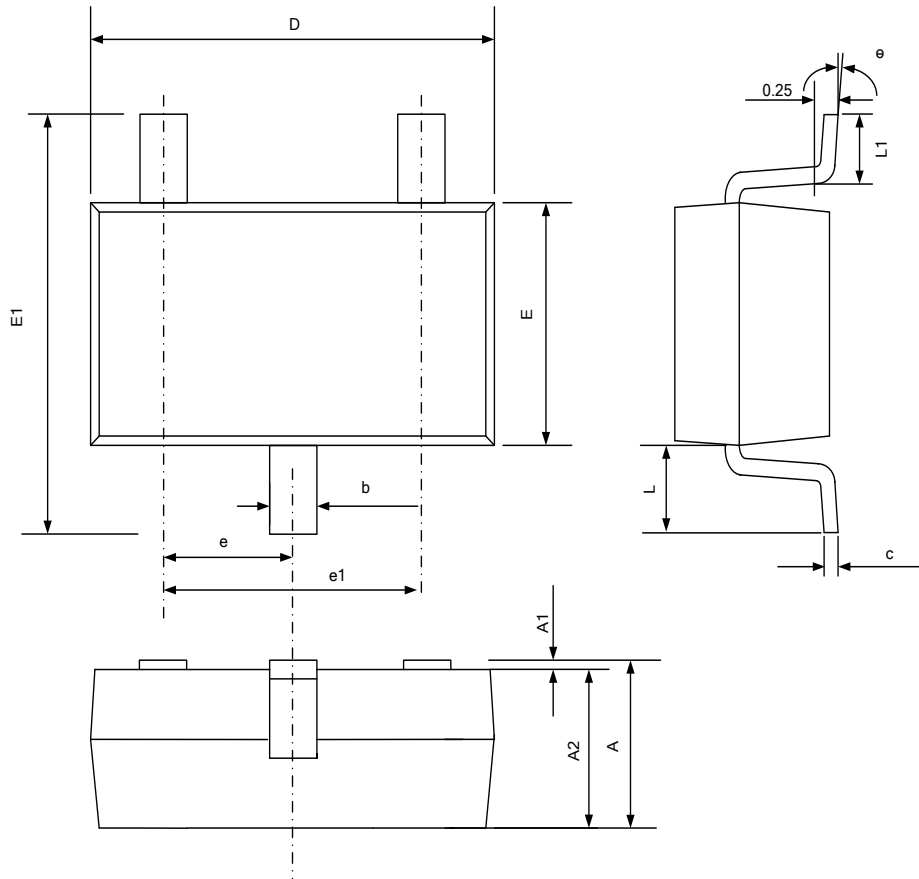
Part No	Package	Marking	Material	Packing
GGA431AZG	TO-92	GGA431AZG	Halogen free	Tape&Reel
GGA431BZG	TO-92	GGA431BZG	Halogen free	Tape&Reel
GGA431ANG	SOT23-3L	GGA431ANG	Halogen free	Tape&Reel
GGA431BNG	SOT23	GGA431BNG	Halogen free	Tape&Reel

Package Outline



SOT-23

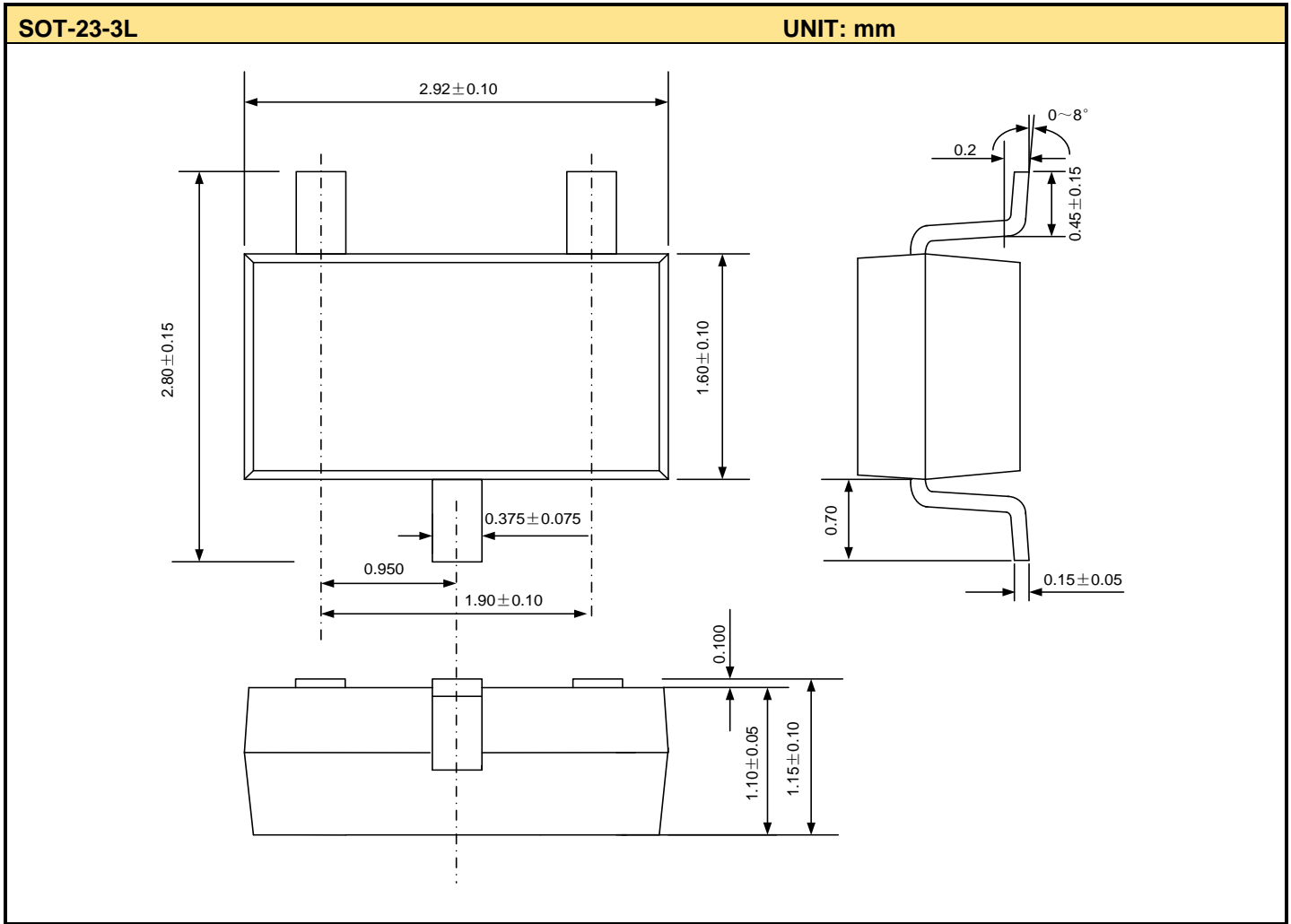
UNIT: mm



SOT-23

UNIT: mm

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.11h8
E	1.200	1.400	0.047	0.055
E1	2.250	2.2550	0.089	0.100
e	0.950TYP		0.037TYP	
E1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°



Disclaimer:

The information furnished in this data sheet is believed to be accurate and reliable. However, no responsibility is assumed by Golden Gate Integrated Circuits (GGIC) for its use. GGIC reserves the right to change circuitry and specifications at any time without notification to the customer.

- Golden Gate Integrated Circuits reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Golden Gate Integrated Circuits products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Golden Gate Integrated Circuits products could cause loss of body injury or damage to property.
- Golden Gate Integrated Circuits (GGIC) Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of GGIC Products for use in life support appliances, devices, or systems is a Purchaser's own risk and Purchaser agrees to fully indemnify GGIC for any damages resulting from such use or sale.