

TL431

Rev.G Jan.-2022

/ Descriptions

TO-92

Precision adjustable shunt regulator in a TO-92 Plastic Package.

/ Features

2.495V; 0.5%,1% 2%; 1.0mA 100mA; ;
 $V_O=V_{ref}$ 36V; (:50 μ A); (:0.15 Ω)

Precise reference voltage to 2.495V;guaranteed 0.5%,1% or 2% reference voltage Tolerance; sink current capability,1.0mA ~ 100mA;quick turn-on; adjustable Output voltage, $V_O=V_{ref} \sim 36V$;low operational cathode current,50 μ A typical; 0.15 Ω typical output impedance.

/ Applications

Linear regulators, adjustable power supply, switching power supply.

/ Equivalent Circuit



/ Pinning



PIN1 K PIN 2 A PIN 3 R

/ Marking

See Marking Instructions

/ Absolute Maximum Ratings(Ta=25)

Parameter	Symbol	Rating	Unit
Cathode to Anode Voltage	V_{KA}	37	V
Cathode Current Range, Continuous	I_K	-100~+100	mA
Reference Input Current Range, Continuous	I_{REF}	0.05~+10	mA
Power Dissipation	P_D	770	mW
Operating Ambient Temperature	T_{amb}	-40~125	°C
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	-65~150	°C

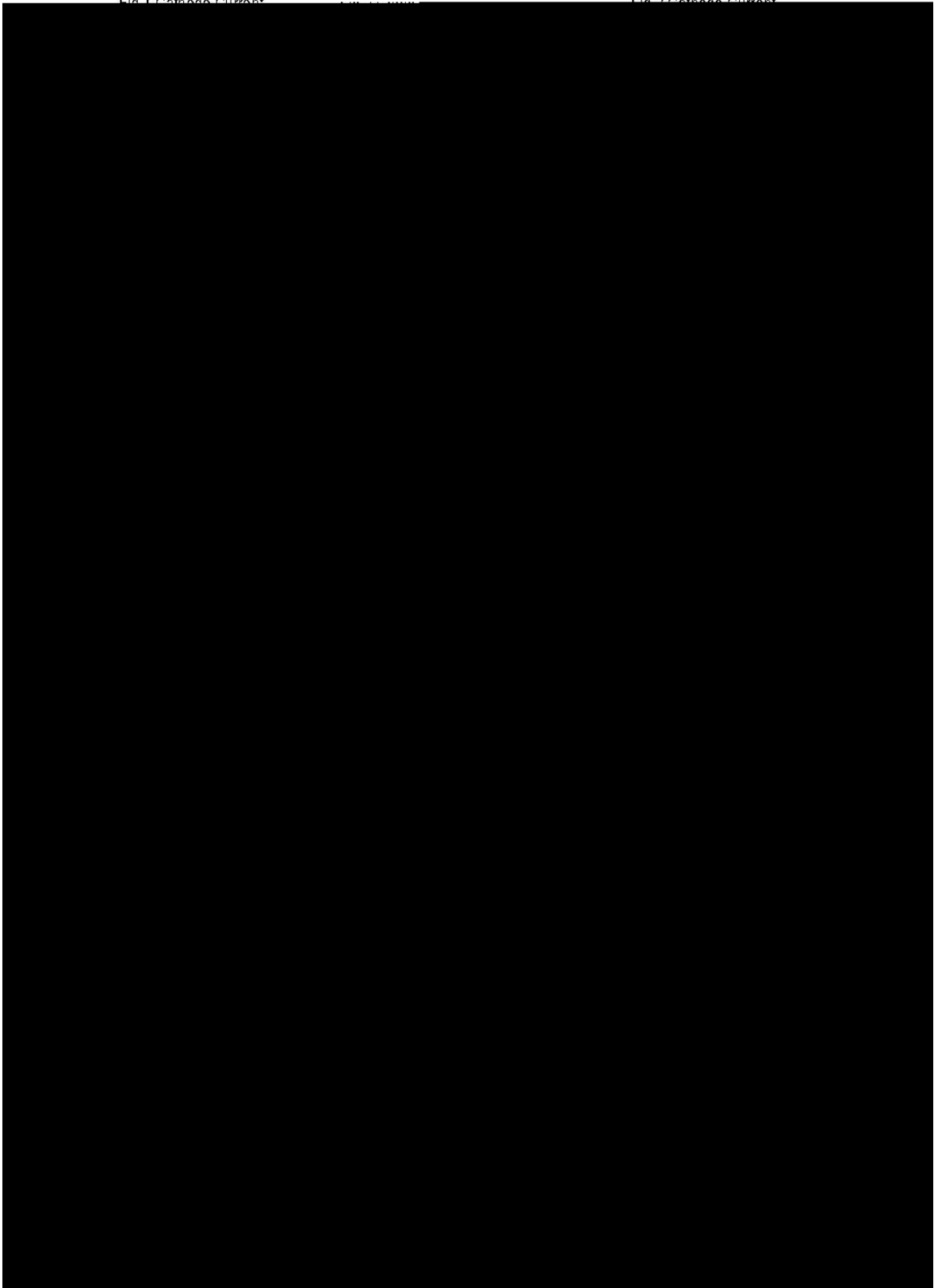
/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Input Voltage	V_{REF}	$V_{KA}=V_{REF}$ $I_K=10mA(A=0.5\%)$	2.483	2.495	2.507	V
		$V_{KA}=V_{REF}$ $I_K=10mA(B=1\%)$	2.470	2.495	2.520	V
		$V_{KA}=V_{REF}$ $I_K=10mA(2\%)$	2.445	2.495	2.545	V
Deviation of Reference Input Voltage Over-Temperature	$\Delta V_{REF} / \Delta T$	$V_{KA}=V_{REF}$ $I_K=10mA$ $T_A=-40\sim 125^\circ C$		4.5	25	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{REF} / \Delta V_{KA}$	$I_K=10mA$, $\Delta V_{KA}=10V$ to V_{REF}		-1	-2.7	mV/V
		$I_K=10mA$, $\Delta V_{KA}=36V$ to $10V$		-0.5	-2.0	mV/V
Reference Input current	I_{REF}	$I_K=10mA$ $R_1=10K\Omega$ $R_2=open$		0.8	1.0	μA
Deviation of Reference Input Current Over Full Temperature Range	$\Delta I_{REF} / \Delta T$	$I_K=10mA$ $R_1=10K\Omega$, $R_2=open$ $T_A=-40\sim 125^\circ C$		0.4	1.2	μA
Minimum Cathode Current for Regulation	$I_{K(min)}$	$V_{KA}=V_{REF}$		0.05	0.08	mA
Off-state cathode current	$I_{K(off)}$	$V_{KA}=36V$ $V_{REF}=0V$		0.05	1.0	μA
Dynamic impedance	$ Z_{KA} $	$V_{KA}=V_{REF}$ $f \leq 1.0KHz$ $I_K=1mA$ to $100mA$		0.15	0.5	Ω

/ Electrical Characteristic Curve

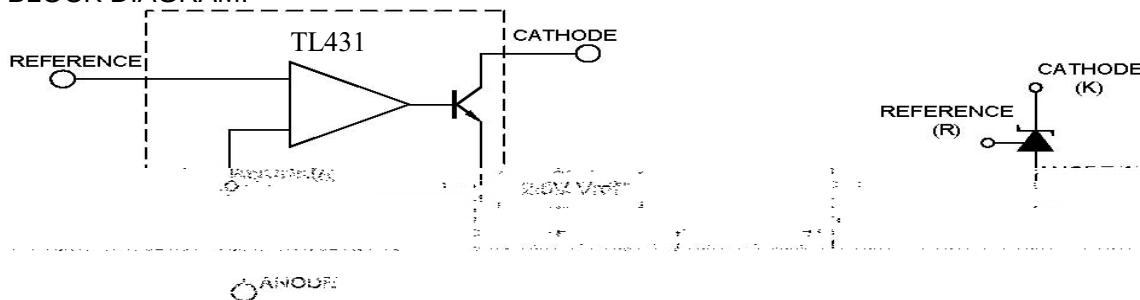
Fig.1 Cathode Current

Fig.2 Cathode Current

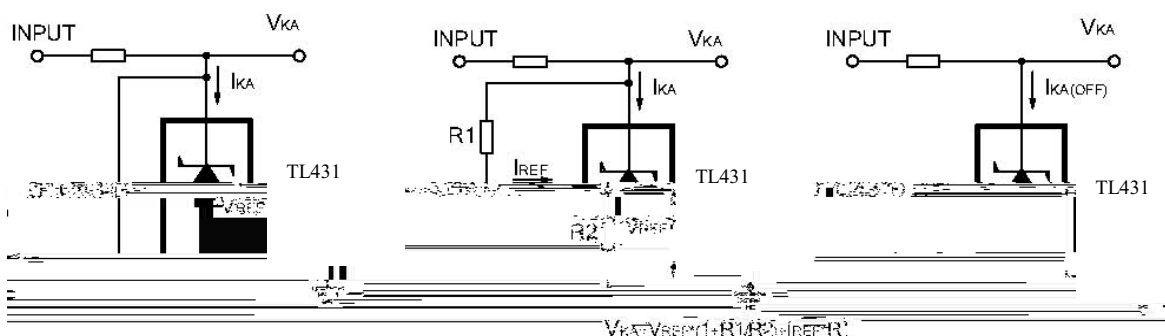


& Test circuits&Typical Application

BLOCK DIAGRAM:



TEST CIRCUITS:

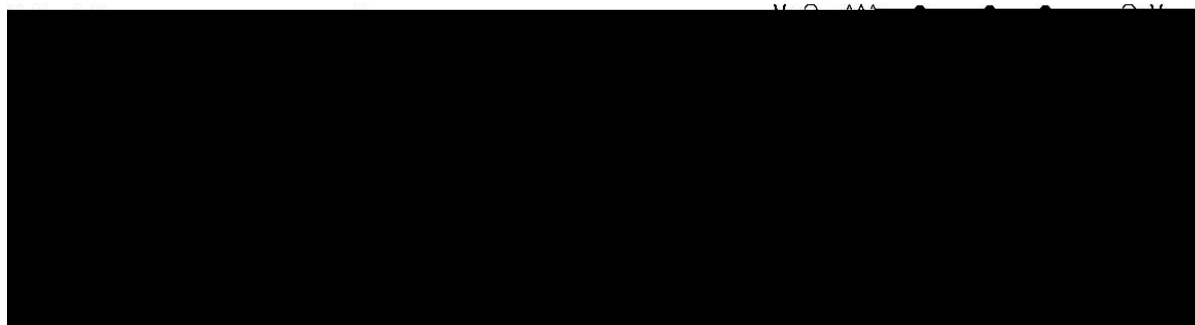


Test Circuit For $V_{KA}=V_{REF}$

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

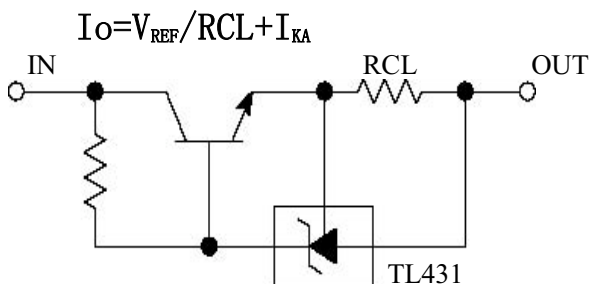
Test Circuit For $I_{KA(OFF)}$

TYPICAL APPLICATION:

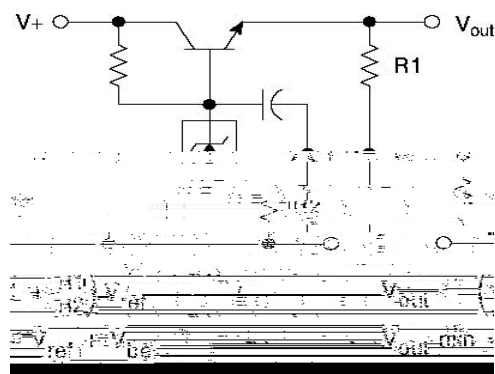


Shutdown Regulator

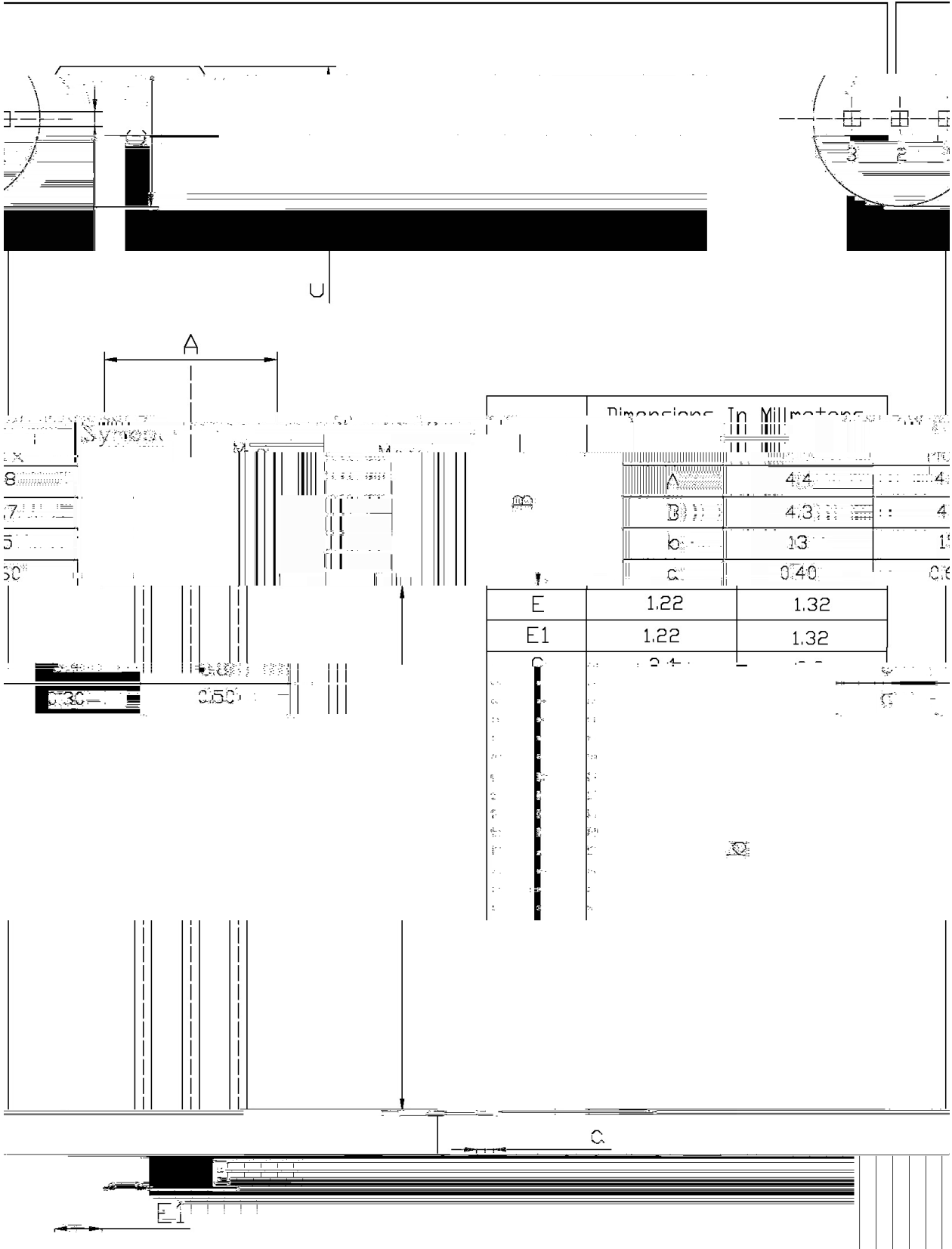
Higher-current Shunt



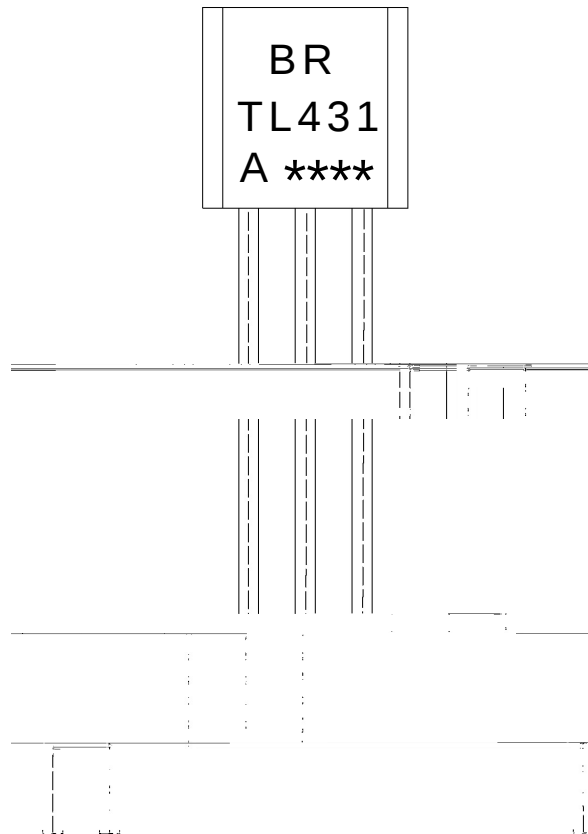
Constant Current Source



Series Pass Regulator



/ Marking Instructions



BR

TL431

A: V_{REF}

Note:

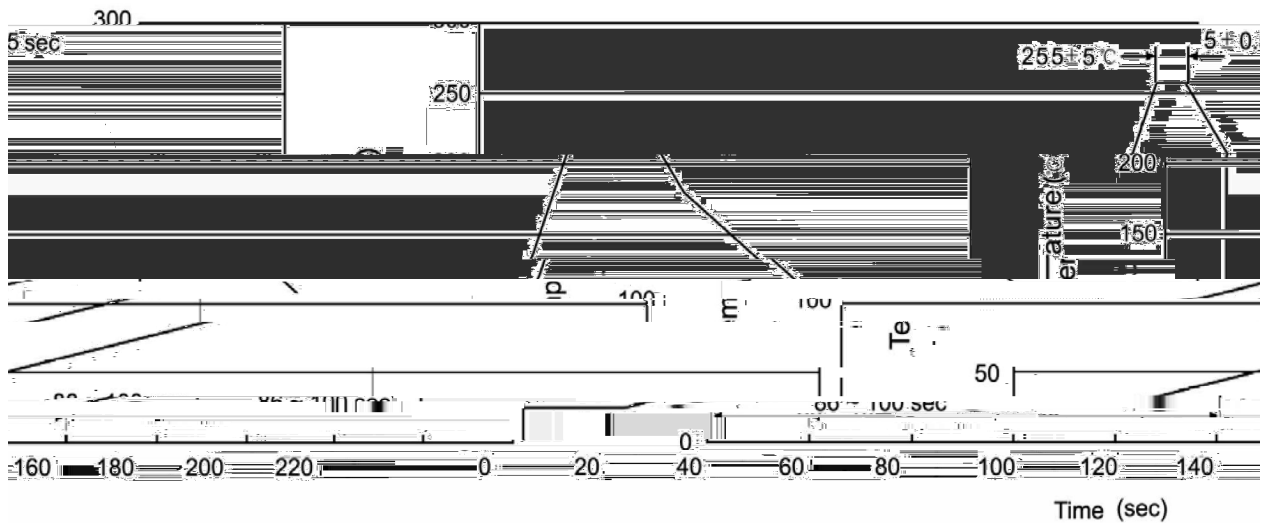
BR: Company Code.

TL431: Product Type.

A: V_{REF} Classifications Symbol

****: Lot No. Code, code change with Lot No.

() / Temperature Profile for Dip Soldering(Pb-Free)



Note:

- | | | | | | |
|---|-------|-----|-----------|--|---------------------------------------|
| 1 | 25 | 150 | 60 | 90sec; | 1.Preheating:25~150°C, Time:60~90sec. |
| 2 | 255±5 | | 5±0.5sec; | 2.Peak Temp.:255±5°C, Duration:5±0.5sec. | |
| 3 | | 2 | 10°C/sec. | 3. Cooling Speed: 2~10°C/sec. | |

/ Resistance to Soldering Heat Test Conditions

270±5°C 10±1 sec. Temp:270±5°C Time:10±1 sec

/ Packaging SPEC.

/ BULK

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm3)		
	Units/Bag 只/袋	Bags/Inner Box 袋/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Bag 袋	Inner Box 盒	Outer Box 箱
TO-92	1,000	10	10,000	5	50,000	135×190	237×172×102	560×245×195
	1,000	10	10,000	10	100,000	135×190	237×172×102	560×245×375

/ AMMO

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm3)	
	Units/tape 只/纸带	Tape/Inner Box 纸带/盒	Rows/Inner Box 纸带层/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Inner Box 盒	Outer Box 箱
TO-92	3,000	1	120	10	30,000	328×230×42	小箱 480×346×235, 大箱 547×407×268