

**描述 / Descriptions**

TO-92 塑封封装精密可调基准电源。

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

**特征 / Features**

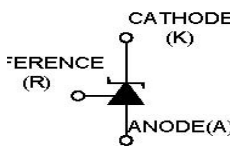
精确参考电压 2.495V;允许电压误差为 0.5%,1%或 2%;阴极电流能力为 1.0mA ~ 100mA;快速导通;可调节输出电压为  $V_O = V_{ref} \sim 36V$ ;阴极工作电流低(典型值:50 $\mu$ A);动态输出阻抗低(典型值:0.15 $\Omega$ )。

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 $\mu$ A typical; 0.15 $\Omega$  typical output impedance.

**用途 / Applications**

用于线性调整器, 可调节电源和开关电源。

Linear regulators, adjustable power supply, switching power supply.

**内部等效电路 / Equivalent Circuit****引脚排列 / Pinning**

PIN 1 : K

PIN 2 : A

PIN 3 : R

**印章代码 / Marking**

见印章说明。 See Marking Instructions

**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

参数 Parameter	符号 Symbol	数值 Rating	单位 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

**电性能参数 / Electrical Characteristics(Ta=25°C)**

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 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	$\mu A$
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	$\mu A$
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	$\mu A$
Dynamic impedance	$ Z_{KA} $	$V_{KA}=V_{REF}$ $f \leq 1.0KHz$ $I_K=1mA$ to $100mA$		0.15	0.5	$\Omega$

电参数曲线图 / Electrical Characteristic Curve

Fig 1 Cathode Current Vs Cathode Voltage

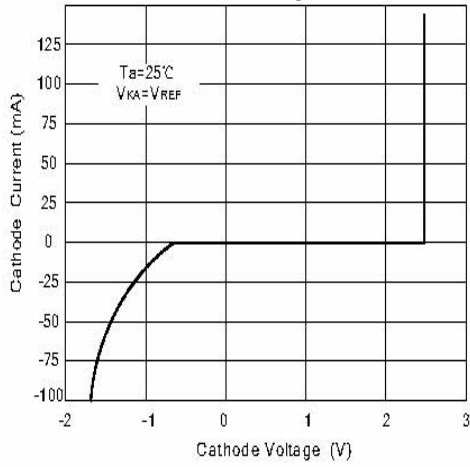


Fig 2 Cathode Current Vs Cathode Voltage

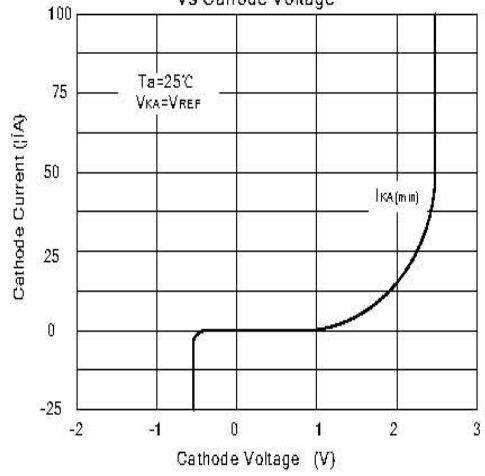


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

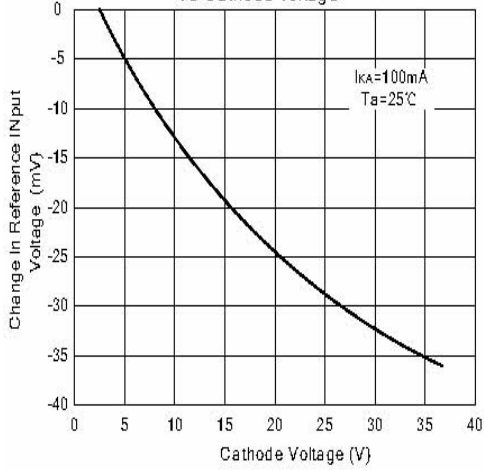


Fig 4 Pulse Response

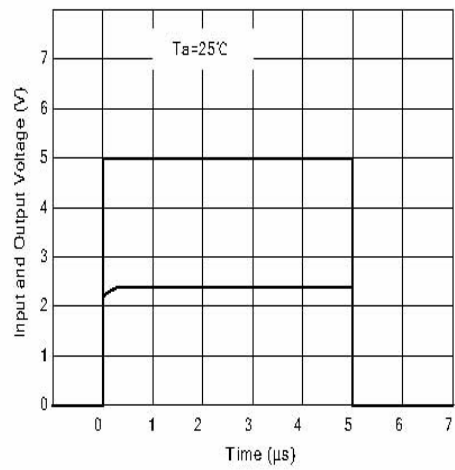


Fig 5 Dynamic Impedance Vs Frequency

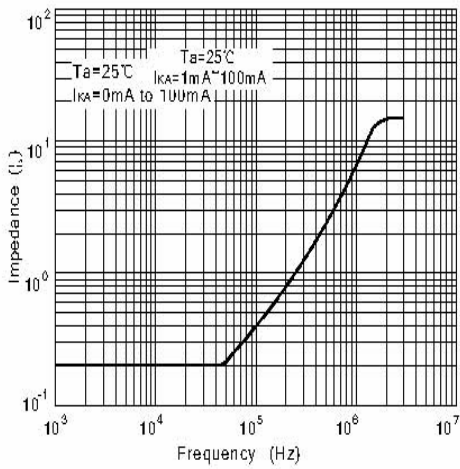
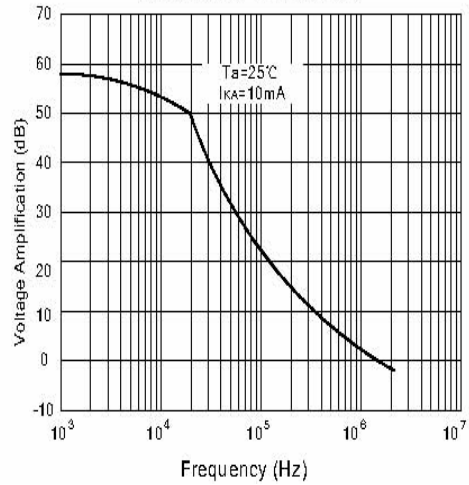
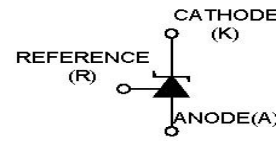
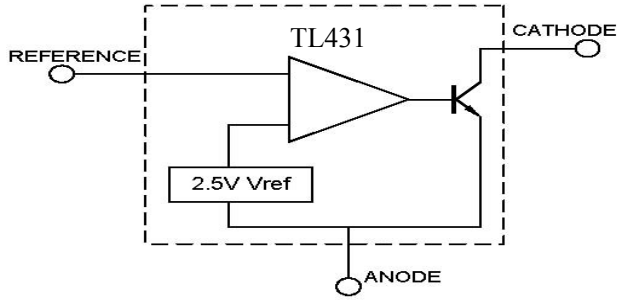


Fig 6 Small Signal Voltage Amplification Vs Frequency

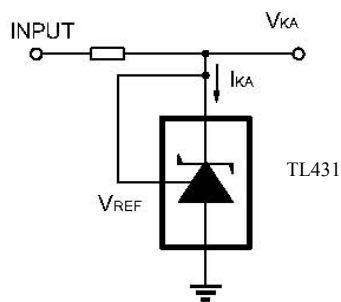


**测试电路图&典型应用图 Test circuits&Typical Application**

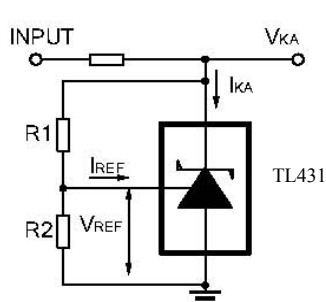
BLOCK DIAGRAM:



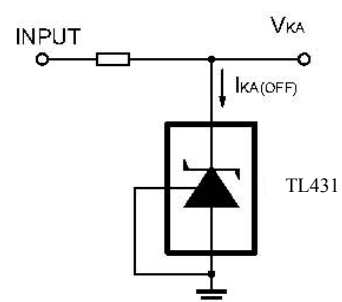
TEST CIRCUITS:



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

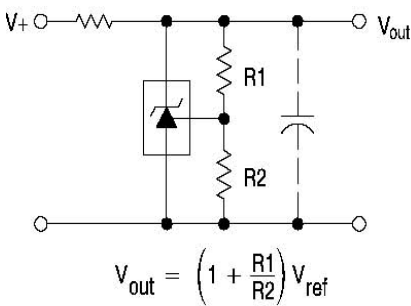


$V_{KA} = V_{REF} * (1 + R1/R2) + I_{REF} * R1$   
Test Circuit for  $V_{KA} \geq V_{REF}$

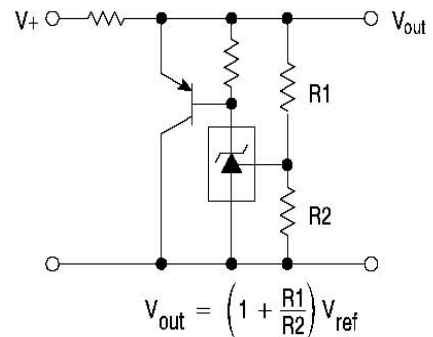


Test Circuit For  $I_{KA(OFF)}$

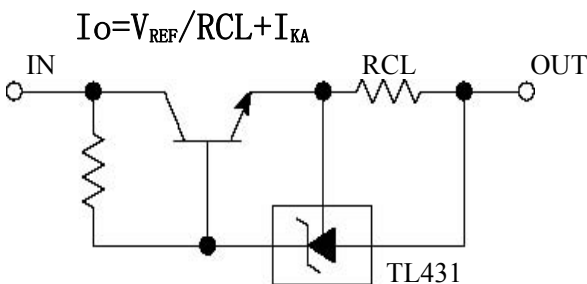
TYPICAL APPLICATION:



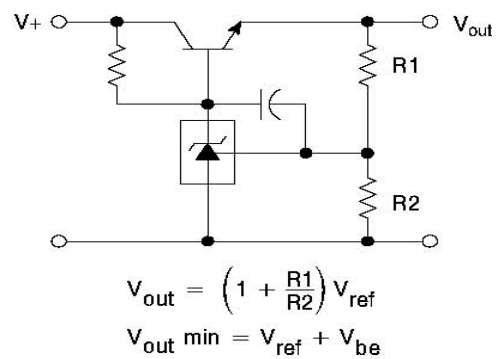
Shutdown Regulator



Higher-current Shunt



Constant Current Source

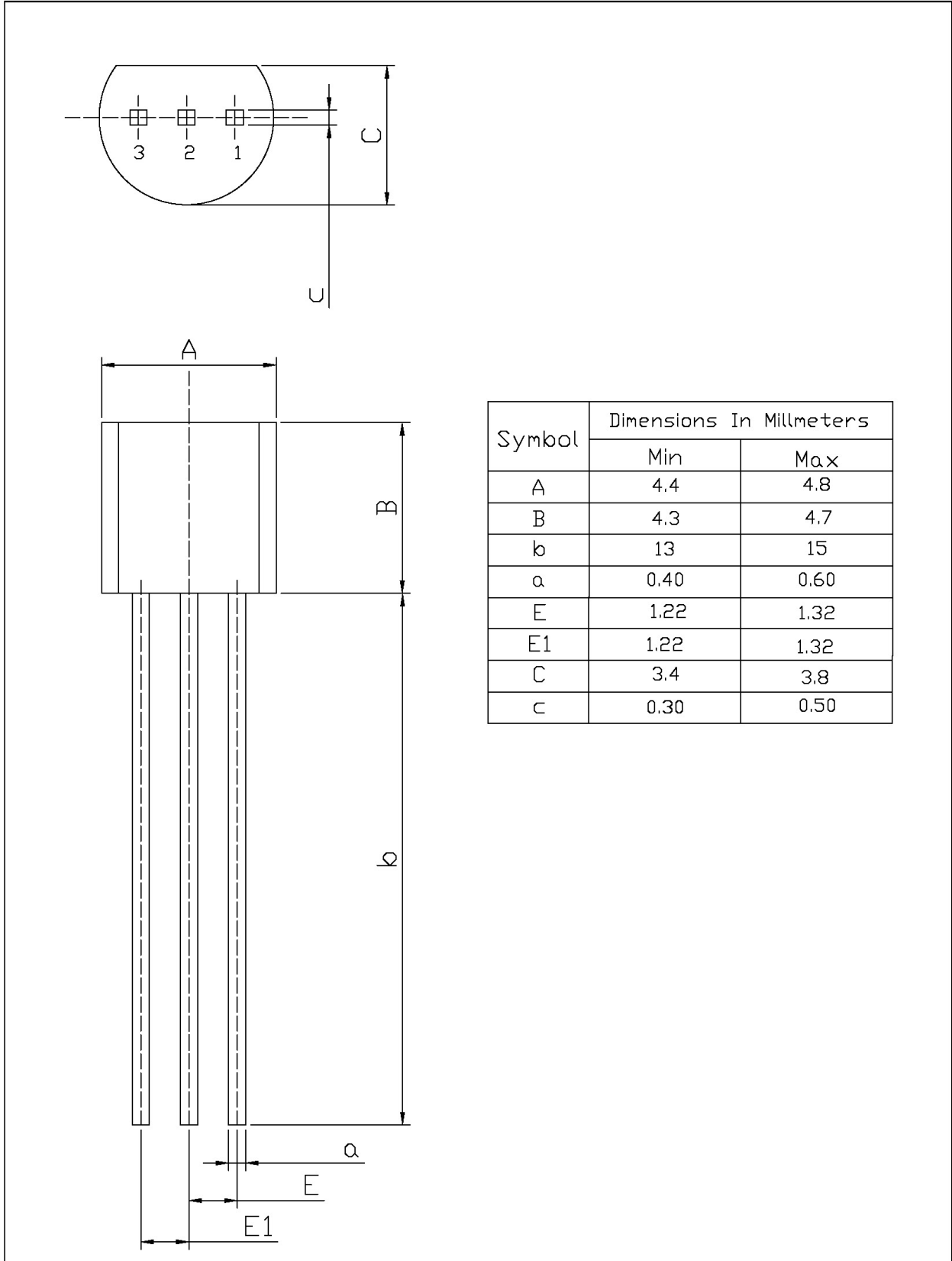


Series Pass Regulator

外形尺寸图 / Package Dimensions

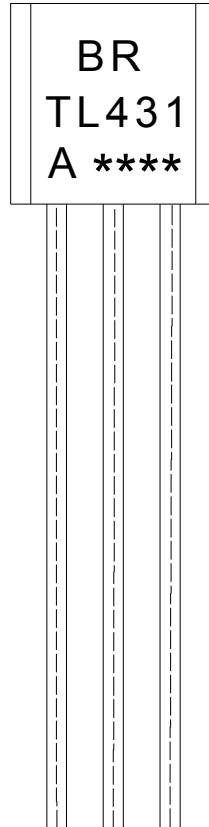
TO-92

Unit: mm



Symbol	Dimensions In Millimeters	
	Min	Max
A	4.4	4.8
B	4.3	4.7
b	13	15
a	0.40	0.60
E	1.22	1.32
E1	1.22	1.32
C	3.4	3.8
c	0.30	0.50

印章说明 / Marking Instructions



说明：

BR： 为公司代码

TL431： 为产品型号

A： 为  $h_{FE}$  分档代码

\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

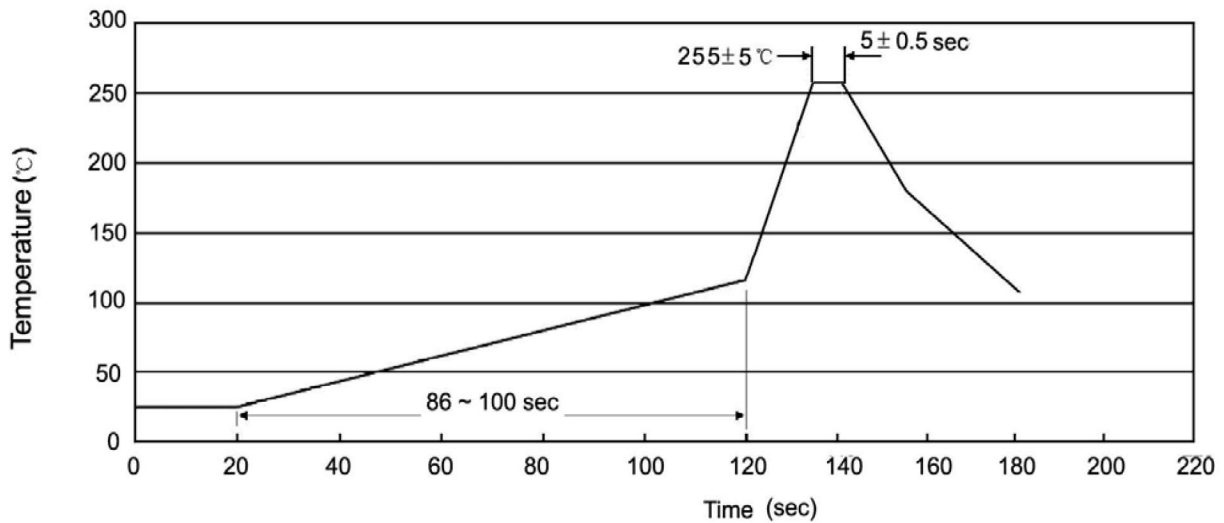
BR: Company Code.

TL431: Product Type.

A:  $h_{FE}$  Classifications Symbol

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

**波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)**



说明：

- 1、预热温度 25~150°C，时间 60~90sec;
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2~10°C/sec.

Note:

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

**耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions**

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

**包装规格 / Packaging SPEC.**

散件包装 / 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

编带包装 / 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

**使用说明 / Notices**

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Voltage References](#) category:*

*Click to view products by [Blue Rocket](#) manufacturer:*

Other Similar products are found below :

[AS431ARTR-E1](#) [AZ431BR-ATRE1](#) [5962-8686103XC](#) [NCV431BVDMR2G](#) [REF01J/883](#) [SC431ILPRAG](#) [AP432AQG-7](#) [LM4040B25QFTA](#)  
[TL431BL3T](#) [TL431ACZ](#) [KA431SLMF2TF](#) [KA431SMF2TF](#) [KA431SMFTF](#) [LM4040QCEM3-3.0/NOPB](#) [LM4041C12ILPR](#)  
[LM4050AIM3X-5.0/NOPB](#) [LM4120AIM5-2.5/NOP](#) [LM431SCCMFX](#) [ZXRE250BSA-7](#) [ZXRE125DN8TA](#) [TS3330AQPR](#) [ZXRE250ASA-7](#)  
[ZTL431ASE5TA](#) [ADR3512WCRMZ-R7](#) [REF3012AIDBZR](#) [LM385BM-2.5/NOPB](#) [LM385D-2.5R2G](#) [LM4040AIM3-10.0](#) [LM4040CIM3-10.0](#) [LM4040CIM3X-2.0/NOPB](#) [LM4041DH5TA](#) [LM4041QDIM3-ADJ/NO](#) [LM4051BIM3-ADJ/NOPB](#) [LM4051CIM3X-1.2/NOPB](#)  
[LM4128CMF-1.8/NOPB](#) [LM4132DMF-1.8/NOPB](#) [LM4132EMF-1.8/NOPB](#) [LM4132EMF-2.0/NOPB](#) [LM431CIM](#) [LM385BD-2.5R2G](#)  
[LM385M-2.5/NOPB](#) [LM4030AMF-4.096/NOPB](#) [LM4040D30ILPR](#) [AP432YG-13](#) [AP431IANTR-G1](#) [AP431AWG-7](#) [AS431ANTR-G1](#)  
[AS431AZTR-G1](#) [AS431BZTR-E1](#) [AN431BN-ATRG1](#)