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SEMICONDUCTOR



ESD



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PLED

AZ431AN-ATRG1-MS

Product specification

General description

The AZ431AN-ATRG1-MS is a three -terminal adjustable shunt regulator with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitute for Zener diode in applications such as switching power supply, charger and other adjustable regulators.

The output voltage of AZ431AN-ATRG1-MS can be set to any value between V_{REF} (2.5V) and the corresponding maximum cathode voltage (36V).

The AZ431AN-ATRG1-MS precision reference is offered in two voltage tolerance: 0.3% and 0.5%.

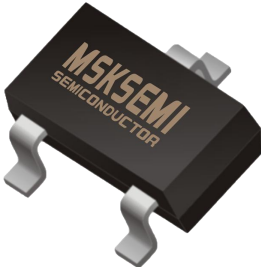
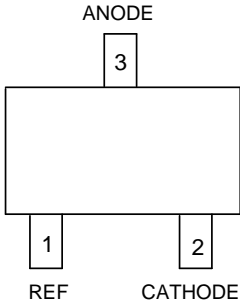

Features and benefits

- Programmable Precise Output Voltage from 2.5V to 36V
- High Stability under Capacitive Load
- Low Temperature Deviation: 4.5mV Typical
- Low Equivalent Full-range Temperature Coefficient with 20PPM/°C Typical
- Sink Current Capacity from 1mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to +125°C
- Lead-Free Packages
- Lead-Free Packages, Available in “Green” Molding Compound

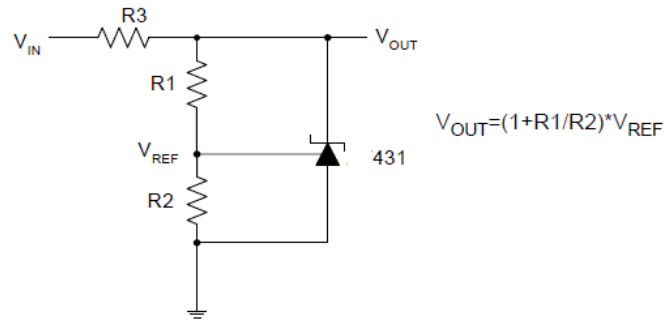
Applications

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference

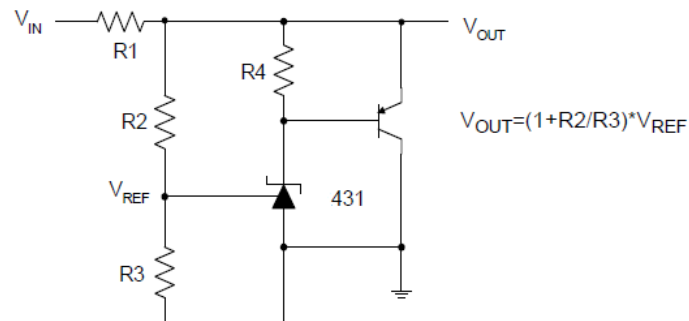
Reference News

SOT-23	Pin Assignments	Marking
		

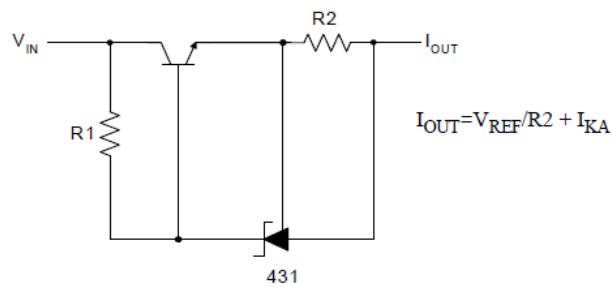
Typical Applications Circuit



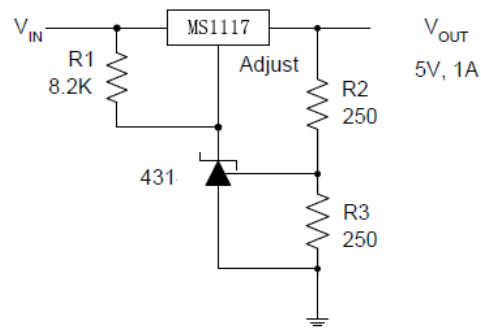
Shunt Regulator



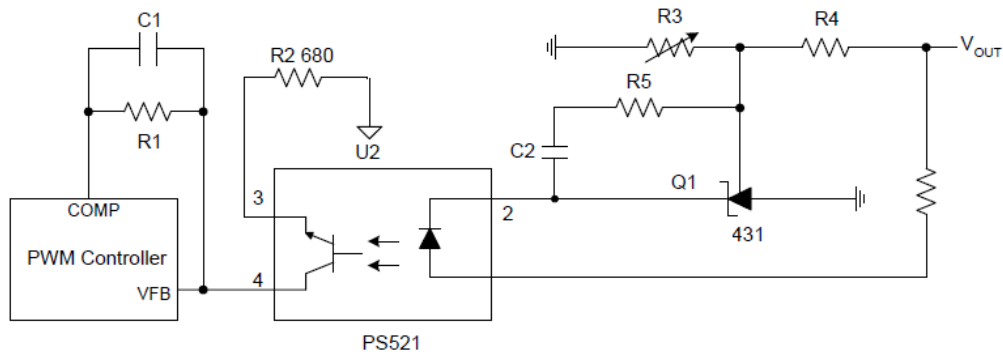
High Current Shunt Regulator



Current Source or Current Limit

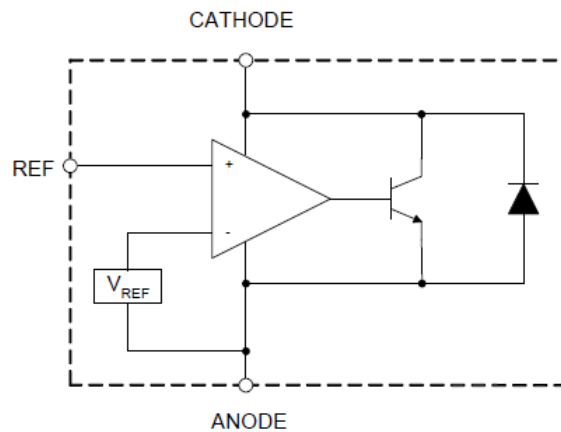


Precision 5V 1A Regulator



PWM Converter with Reference

Functional Block Diagram



Absolute Maximum Ratings (Note 5)

Symbol	Parameter	Rating	Unit
V _{KA}	Cathode Voltage	40	V
I _{KA}	Cathode Current Range (Continuous)	-100 to 150	mA
I _{REF}	Reference Input Current Range	10	mA
P _D	Power Dissipation	770	mW
T _J	Junction Temperature	+150	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
ESD	ESD (Human Body Model)	2000	V

Note: 5. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

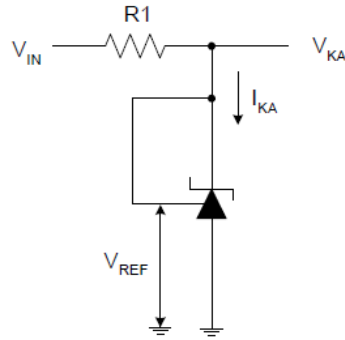
Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{KA}	Cathode Voltage	V _{REF}	36	V
I _{KA}	Cathode Current	1.0	100	mA
T _A	Operating Ambient Temperature Range	-40	+125	°C

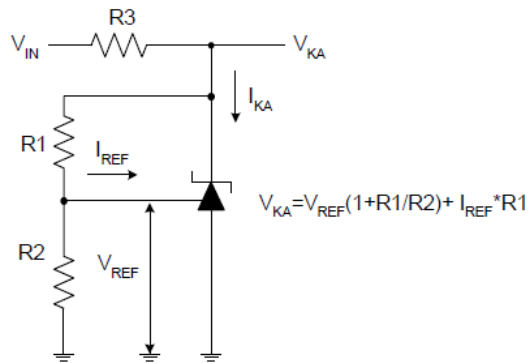
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Test Circuit	Parameter	Conditions	Min	Typ	Max	Unit
V _{REF}	4	Reference Voltage	0.3% 0.5% V _{KA} = V _{REF} , I _{KA} = 10mA	2.4925 2.4875	2.500	2.5075 2.5125	V
ΔV _{REF}	4	Deviation of Reference Voltage Over Full Temperature Range	V _{KA} = V _{REF} I _{KA} = 10mA 0 to +70°C -40 to +85°C -40 to +125°C	— — —	4.5 4.5 4.5	8 10 16	mV
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	5	Ratio of Change in Reference Voltage to the Change in Cathode Voltage	I _{KA} = 10mA ΔV _{KA} = 10V to V _{REF} ΔV _{KA} = 36V to 10V	— —	-1.0 -0.5	-2.7 -2.0	mV/V
I _{REF}	5	Reference Current	I _{KA} = 10mA, R1 = 10KΩ, R2 = ∞	—	0.7	4	μA
ΔI _{REF}	5	Deviation of Reference Current Over Full Temperature Range	I _{KA} = 10mA, R1 = 10KΩ R2 = ∞, T _A = -40 to +125°C	—	0.4	1.2	μA
I _{KA} (Min)	4	Minimum Cathode Current for Regulation	V _{KA} = V _{REF}	—	0.4	1.0	mA
I _{KA} (Off)	6	Off-state Cathode Current	V _{KA} = 36V, V _{REF} = 0	—	0.05	1.0	μA
Z _{KA}	4	Dynamic Impedance	V _{KA} = V _{REF} , I _{KA} = 1 to 100mA, f ≤ 1.0KHz	—	0.15	0.5	Ω
θ _{JC}	—	Thermal Resistance	SOT23	—	135.48	—	°C/W

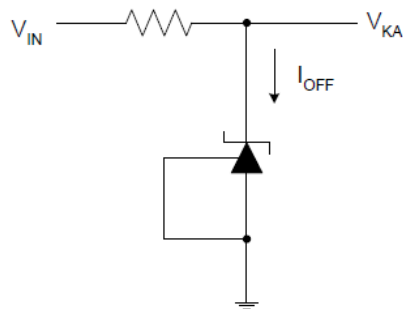
Electrical Characteristics (Cont.)



Test Circuit 4 for $V_{KA} = V_{REF}$



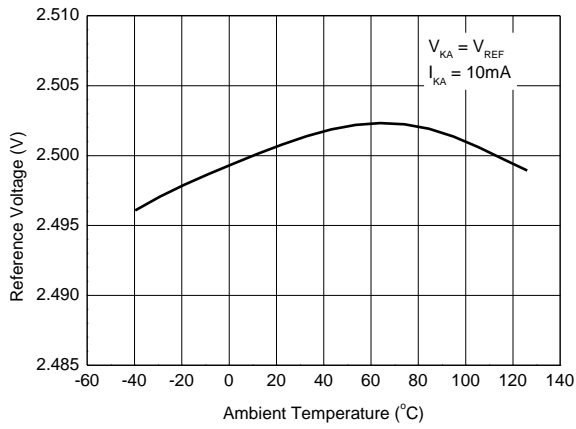
Test Circuit 5 for $V_{KA} > V_{REF}$



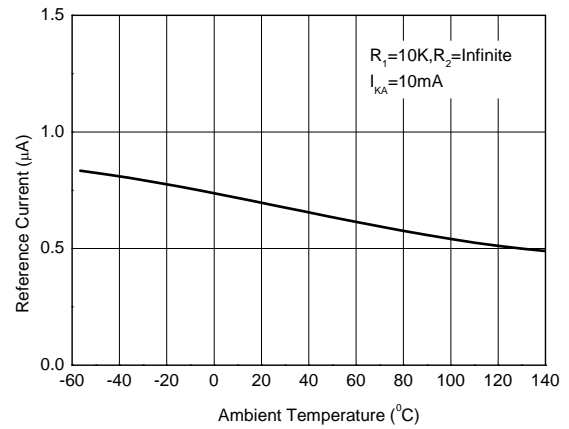
Test Circuit 6 for I_{OFF}

Performance Characteristics

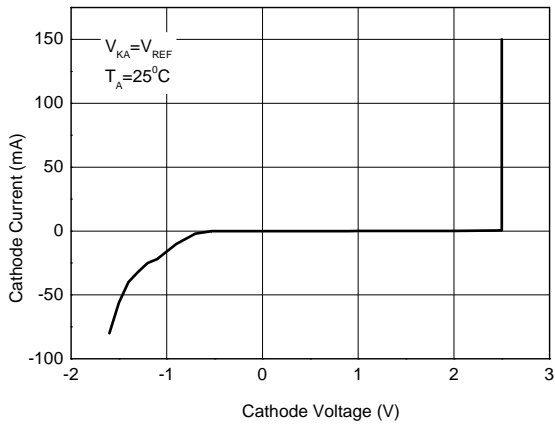
Reference Voltage vs. Ambient Temperature



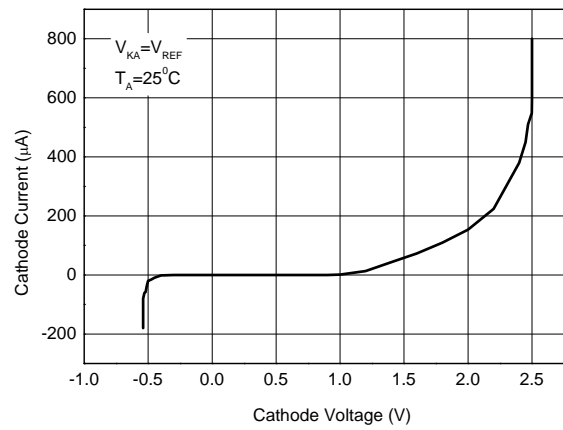
Reference Current vs. Ambient Temperature



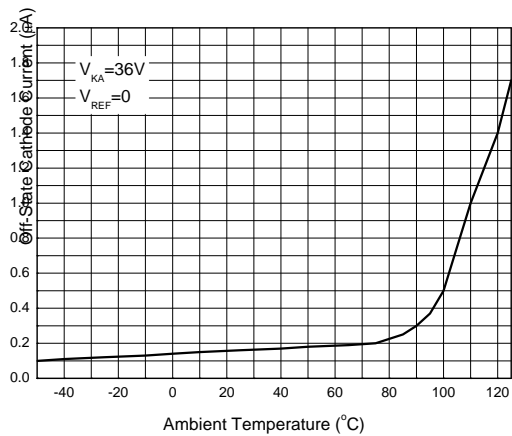
Cathode Current vs. Cathode Voltage



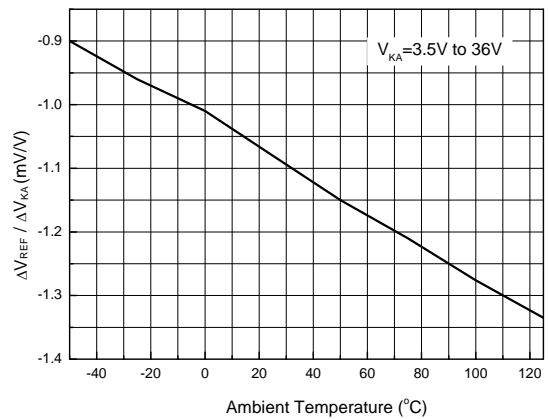
Cathode Current vs. Cathode Voltage



Off-State Cathode Current vs. Ambient Temperature

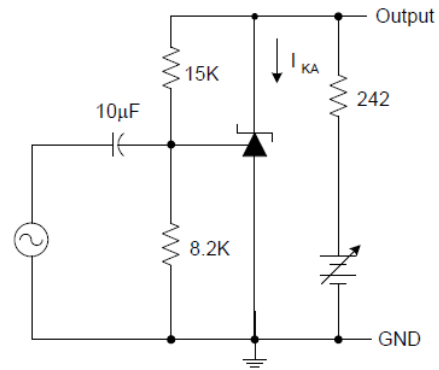
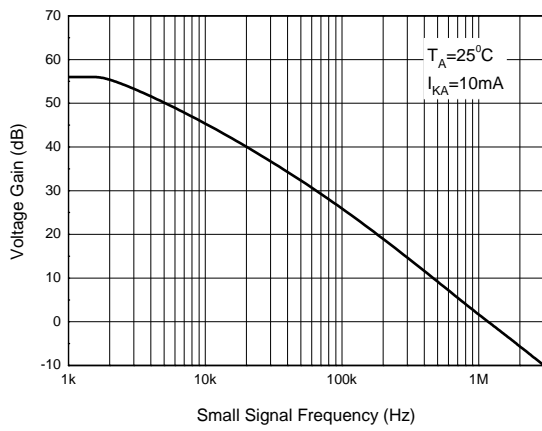


Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage

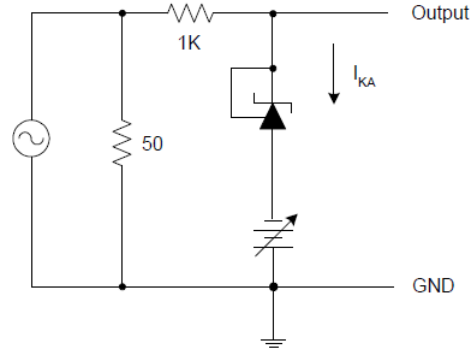
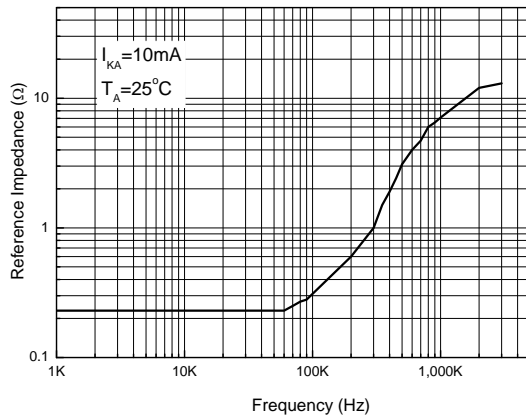


Performance Characteristics (Cont.)

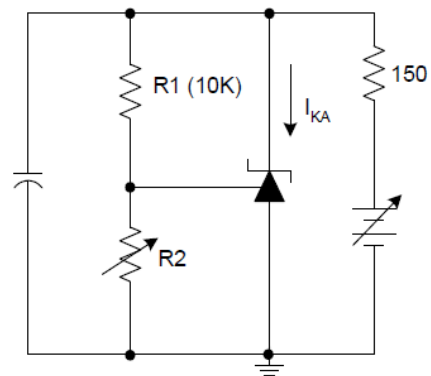
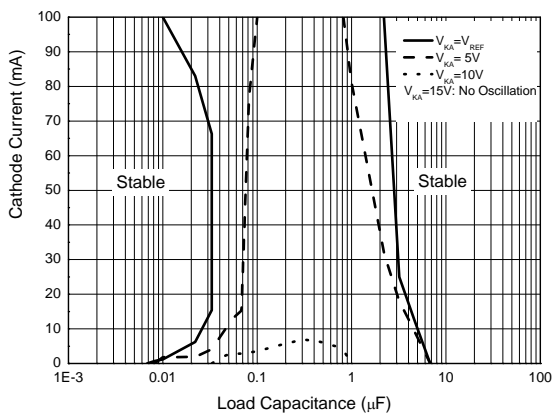
Small Signal Voltage Gain vs. Frequency



Reference Impedance vs. Frequency

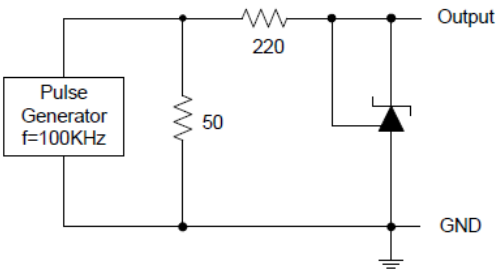
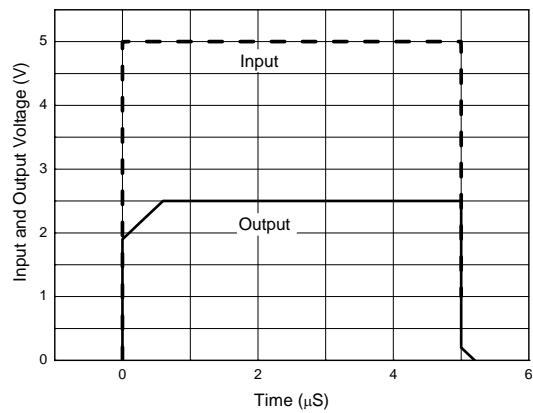


Stability Boundary Conditions vs. Load Capacitance

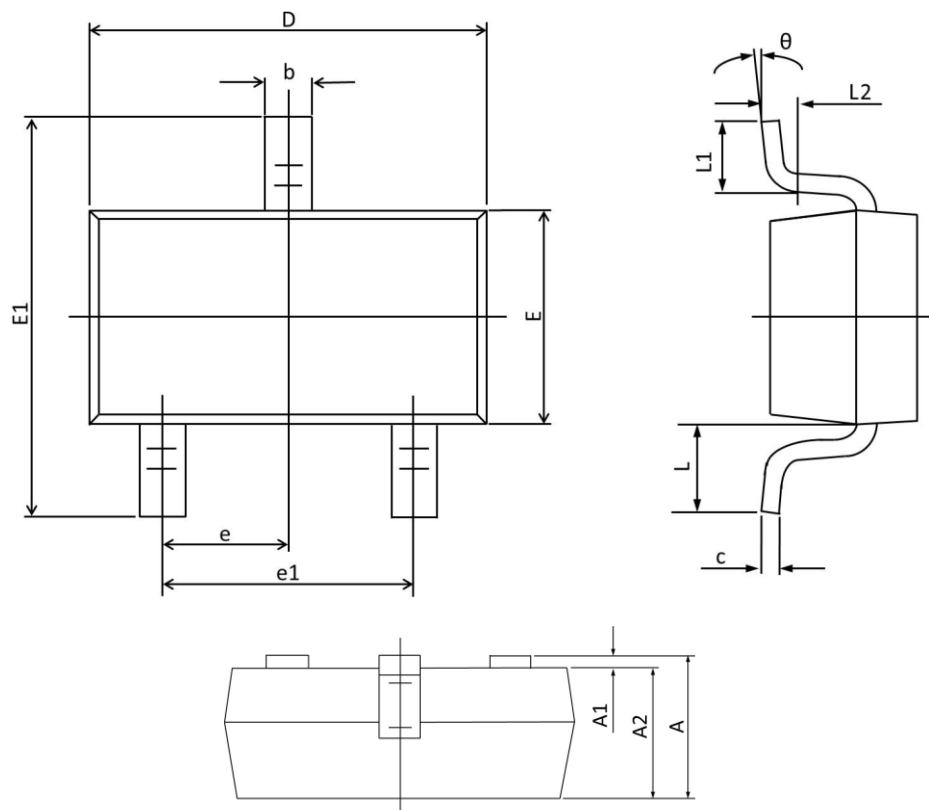


Performance Characteristics (Cont.)

Pulse Response of Input and Output Voltage



SOT-23 PACKAGE INFORMATION



Symbol	DimensionsIn Millimeters		Dimensions In Inches	
	Max	Min	Max	Min
A	1.150	0.900	0.045	0.035
A1	0.100	0.000	0.004	0.000
A2	1.050	0.900	0.041	0.035
b	0.500	0.300	0.020	0.012
c	0.150	0.080	0.006	0.003
D	3.000	2.800	0.118	0.110
E	1.400	1.200	0.055	0.047
E1	2.550	2.250	0.100	0.089
e	0.95 TYP.		0.037 TYP.	
e1	2.000	1.800	0.079	0.071
L	0.55 REF.		0.022 REF.	
L1	0.500	0.300	0.020	0.012
L2	0.25 TYP.		0.01 TYP.	
θ	8°	0°	8°	0°

REELSPECIFICATION

P/N	PKG	QTY
AZ431AN-ATRG1-MS	SOT-23	3000

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