

General Description

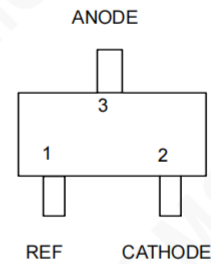
The TLV431BQDBZR ICs are low voltage three-terminal adjustable regulators with guaranteed thermal stability over a full operation range. These ICs feature sharp turn on characteristics, low temperature coefficient and low output impedance, which make them ideal substitutes for Zener diodes in applications such as switching power supply, charger, motherboard and other adjustable regulators. The output voltage can be set to any value between 1.24V and 18V with two external resistors.

The TLV431BQDBZR precision reference is offered in two bandgap tolerance: 0.5%.

These ICs are available packages: SOT-23-3



SOT-23-3



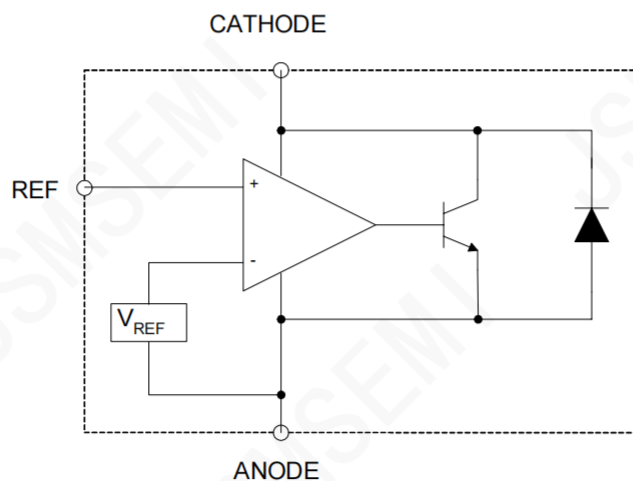
Features

- Wide Programmable Precise Output Voltage from 1.24V to 18V
- High Stability under Capacitive Load
- Low Temperature Deviation: 3mV Typical
- Low Equivalent Full-Range Temperature Coefficient: 20PPM/°C Typical
- Low Dynamic Output Resistance: 0.05Ω Typical
- High Sink Current Capacity from 55μA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to 125°C

Applications

- Graphic Card
- PC Motherboard
- Voltage Adapter
- Switching Power Supply
- Charger

Functional Block Diagram



Functional Block Diagram of TLV431BQDBZR

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	20	V
Cathode Current Range (Continuous)	I_{KA}	-100 to 100	mA
Reference Input Current Range	I_{REF}	10	mA
Power Dissipation	P_D	370	mW
Storage Temperature Range	T_{STG}	-65 to 150	°C
Package Thermal Impedance	Q_{JA}	330	°C/W

Note 1: 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

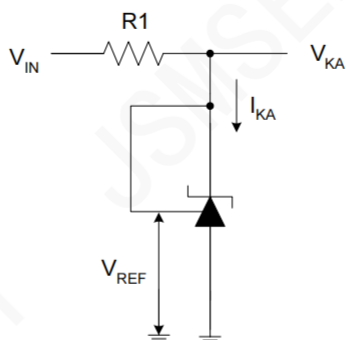
Parameter	Symbol	Min	Max	Unit
Cathode Voltage	V_{KA}	V_{REF}	18	V
Cathode Current	I_{KA}	0.1	100	mA
Operating Ambient Temperature Range		-40	125	°C

Electrical Characteristics

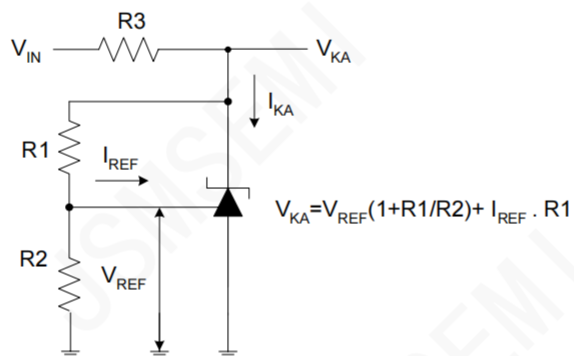
(Typical and limits apply for $T_J=25^{\circ}\text{C}$ unless otherwise noted.)

Parameter	Test Circuit	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	0.5%	V_{REF}	$V_{KA}=V_{REF}$, $I_{KA}=10\text{mA}$	1.234	1.240	1.246	V
	1%			1.228	1.240	1.252	
Deviation of Reference Voltage Over-Temperature	4	ΔV_{REF}	$V_{KA}=V_{REF}$, $I_{KA}=10\text{mA}$, 0°C to 70°C		2	10	mV
			$I_{KA}=10\text{mA}$, -40°C to 85°C		3	10	
Ratio of Change in V_{REF} to the Change in Cathode Voltage	5	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_{KA}=10\text{mA}$, $\Delta V_{KA}:V_{REF}$ to 16V		-0.5	-1.5	mV/V
Reference Input Current	5	I_{REF}	$I_{KA}=10\text{mA}$, $R1=10\text{K}\Omega$, $R2=\infty$		0.15	0.4	μA
Deviation of Reference Current Over Full Temperature Range	5	ΔI_{REF}	$I_{KA}=10\text{mA}$, $R1=10\text{K}\Omega$, $R2=\infty$, $T_A=-40$ to 85°C		0.1	0.4	μA
Minimum Cathode Current for Regulation	4	$I_{KA}(\text{MIN})$	$V_{KA}=V_{REF}$		55	80	μA
Off-State Cathode Current	6	$I_{KA}(\text{OFF})$	$V_{REF}=0$, $V_{KA}=18\text{V}$		0.04	0.10	μA
			$V_{KA}=6$, $V_{REF}=0$		0.01	0.05	
Dynamic Impedance	4	Z_{KA}	$V_{KA}=V_{REF}$, $I_{KA}=1$ to 100mA , $f \leq 1.0\text{kHz}$		0.05	0.15	Ω

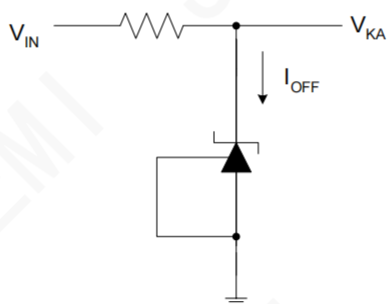
Electrical Characteristics (Continued)



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

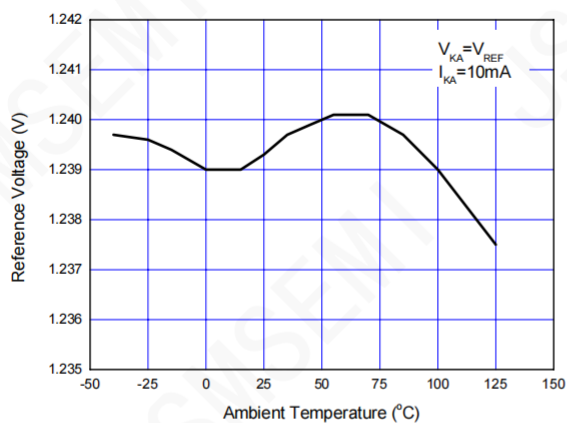


Test Circuit 5 for $V_{KA}>V_{REF}$

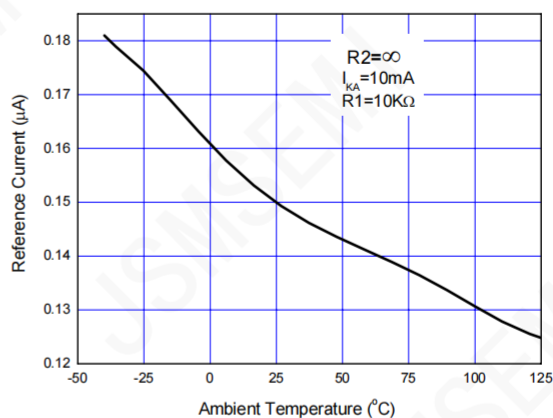


Test Circuit 6 for I_{OFF}

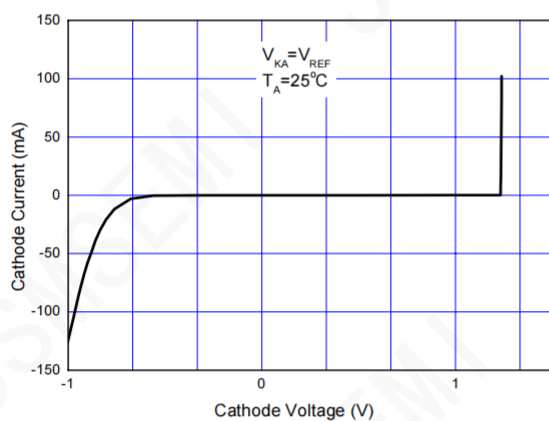
Typical Performance Characteristics



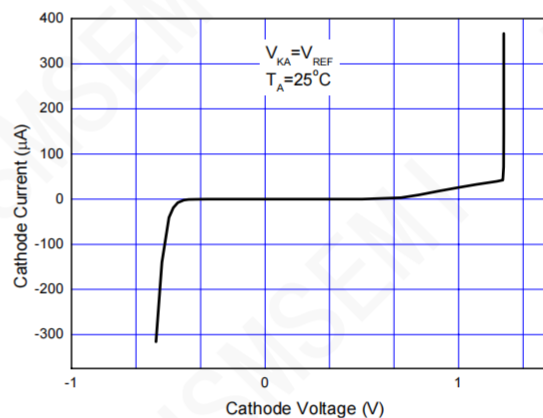
Reference Voltage vs. Ambient Temperature



Reference Current vs. Ambient Temperature

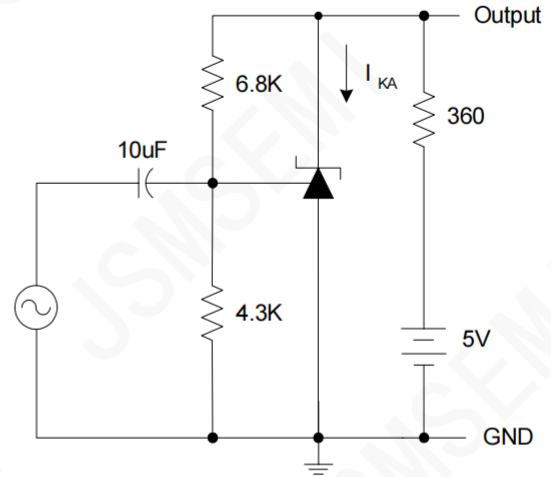
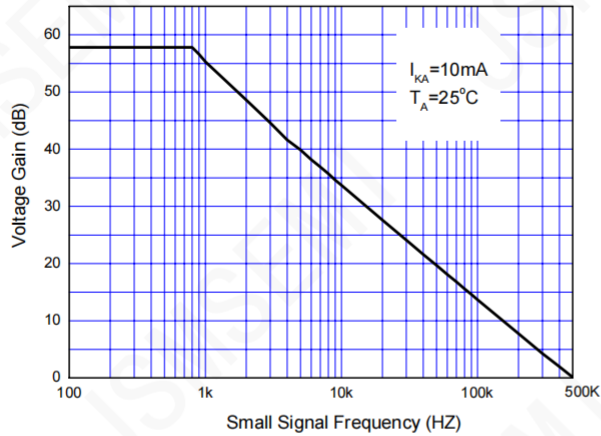


Cathode Current vs. Cathode Voltage

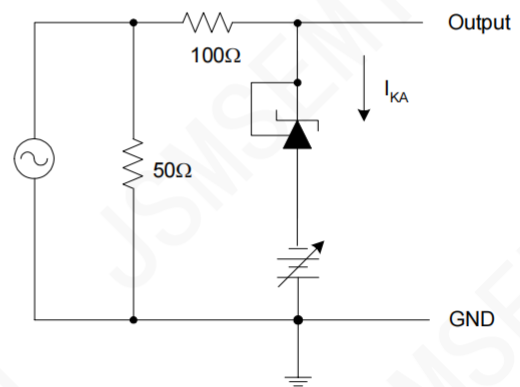
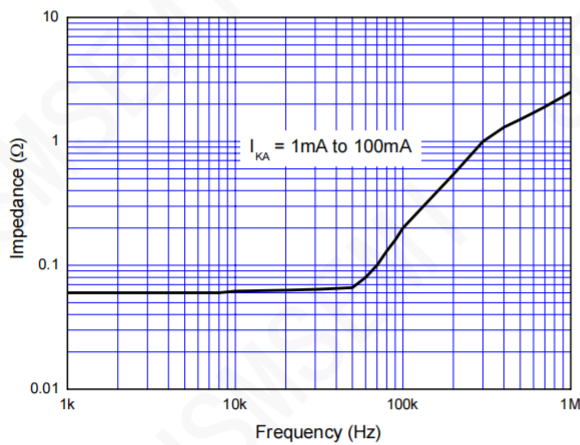


Current vs. Cathode Voltage

Typical Performance Characteristics (Continued)

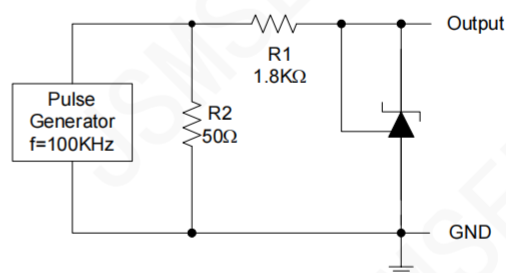
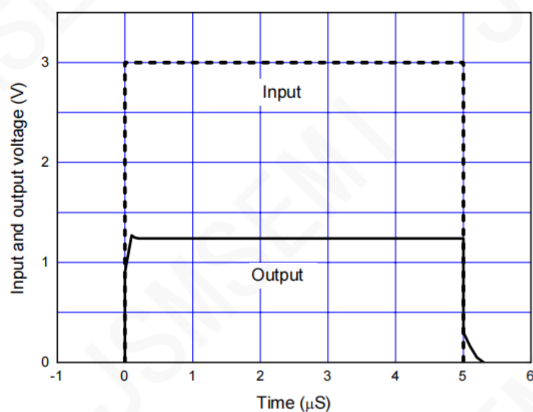


Small Signal Voltage Gain vs. Frequency

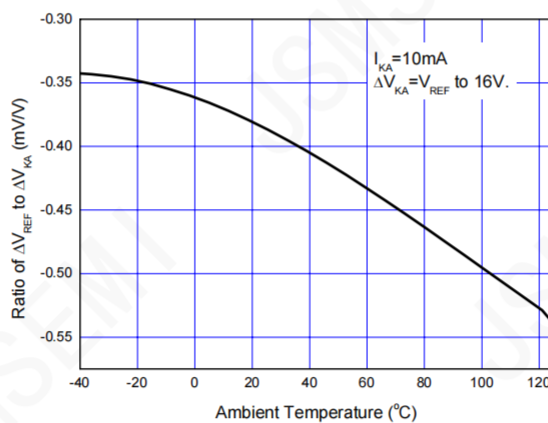


Dynamic Impedance vs. Frequency

Typical Performance Characteristics (Continued)



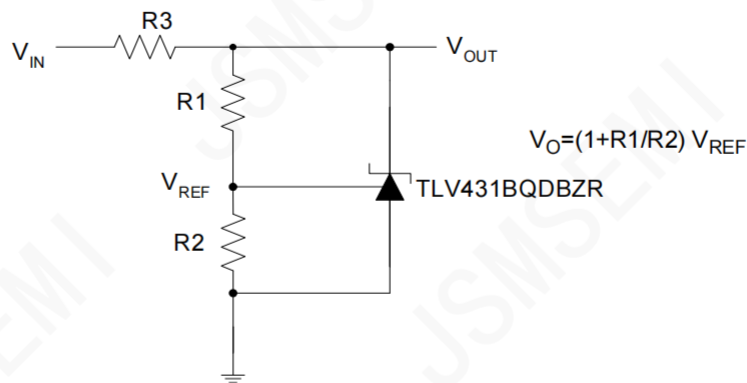
Pulse Response of Input and Output Voltage



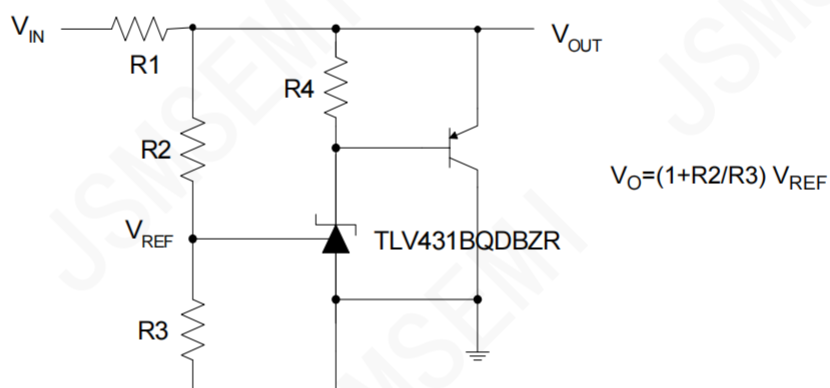
Ratio of Delta Reference Voltage to the Ratio of Cathode Voltage vs. Ambient Temperature

Typical Application

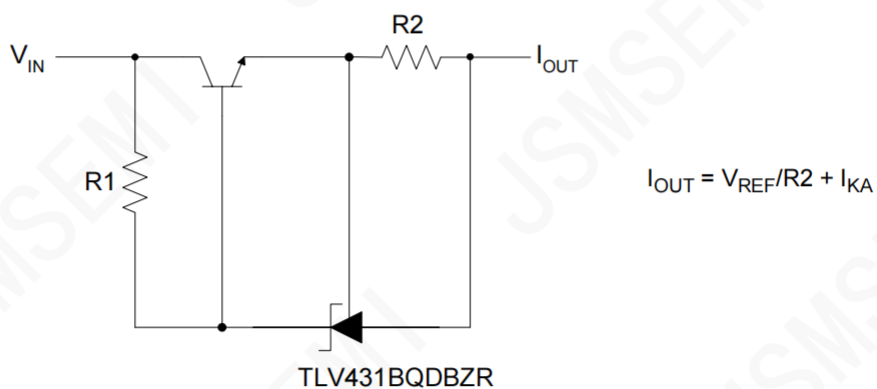
S



Shunt Regulator

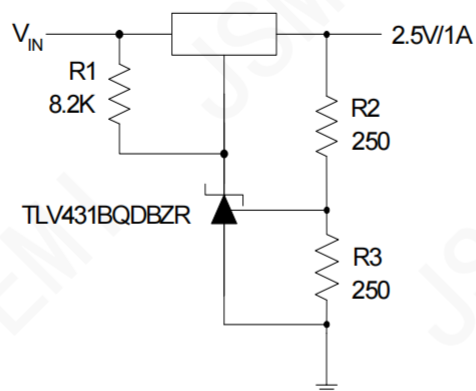


High Current Shunt Regulator

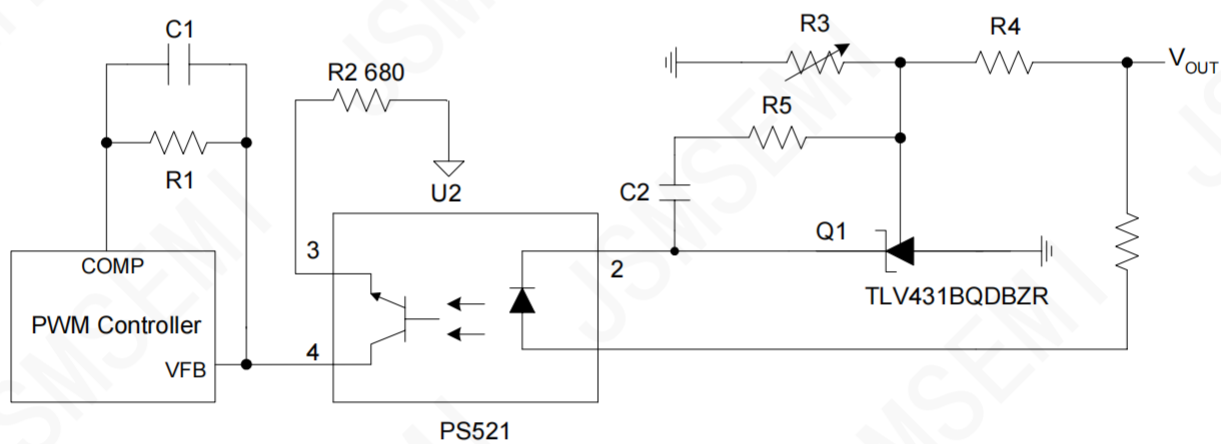


Current Source or Current Limit

Typical Application (Continued)



Precision 5-V 1.5A Regulator



PWM Converter with Reference

SOT-23-3

