

Features

- Reference Voltage Tolerance at 25°C
 - 0.5% (Grade B)
 - 1% (Grade A)
- Operation Temperature Range: -40°C to 125°C
- 0.2-Ω Typical Output Impedance
- Sink Current Capability: 1 mA to 80 mA
- Adjustable Output Voltage: V_{REF} to 36 V
- Qualified for Automotive Applications with AEC-Q100 Reliability Test
- Package: SOT23G-3

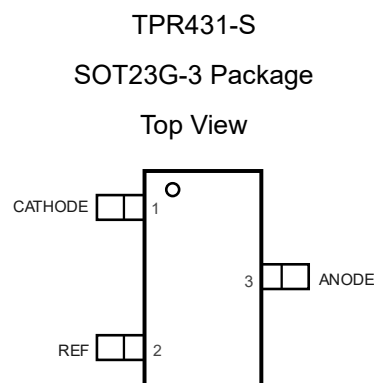
Applications

- Power
- Led Lighting
- Current Sensing
- Instrumentation
- Industry

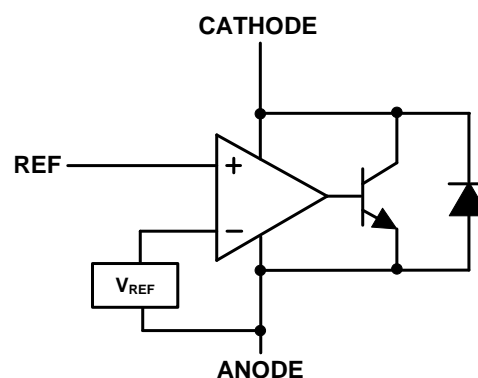
Description

The TPR431 is adjustable shunt voltage reference with guaranteed temperature stability over the operating temperature range. The device temperature range is extended from -40 °C up to +125 °C. The output voltage can be set to any value between 2.5 and 36 V with two external resistors. The TPR431 operates with a wide current range from 1 to 80 mA with a typical dynamic impedance of 0.2 Ω.

Pin Configuration



Functional Block Diagram



Product Family Table

Order Number	Grade	Voltage Tolerance	AEC-Q100 Reliability Test	Package
TPR431B-S3TR-S	B	0.5%	Pass	SOT23G-3

Table of Contents

Features	1
Applications	1
Description	1
Pin Configuration	1
Functional Block Diagram	1
Product Family Table	2
Revision History	4
Specifications	5
Absolute Maximum Ratings.....	5
ESD, Electrostatic Discharge Protection	5
Recommended Operating Conditions	5
Thermal Information	5
Electrical Characteristics	6
Typical Performance Characteristics.....	7
Tape and Reel Information	8
Package Outline Dimensions	9
SOT23G-3	9
Order Information	10
IMPORTANT NOTICE AND DISCLAIMER	11

Revision History

Revision	Notes
Rev.Pre.0	Pre-Release Datasheet.
Rev.Pre.1	Updated Spec and Figure.
Rev.A.0	Initial Releases.
Rev.A.1	1. Removed Grade A P/N. 2. Updated "Qualified for Automotive Applications with AEC-Q100 Reliability Test".

Specifications

Absolute Maximum Ratings

Parameter		Min	Max	Unit
Cathode Voltage			37	V
Continuous Cathode Current		-100	150	mA
Reference Input Current			10	mA
T _J	Maximum Junction Temperature	-40	150	°C
T _A	Operating Temperature Range	-40	125	°C
T _{STG}	Storage Temperature Range	-65	150	°C
T _L	Lead Temperature (Soldering 10 sec)		260	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

ESD, Electrostatic Discharge Protection

Parameter		Condition	Minimum Level	Unit
HBM	Human Body Model ESD	ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	2000	V
CDM	Charged Device Model ESD	ANSI/ESDA/JEDEC JS-002 ⁽²⁾	1000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions

Parameter		Min	Max	Unit
V _{KA}	Cathode Voltage	V _{REF}	36	V
I _{KA}	Cathode Current	1	80	mA

Thermal Information

Package Type	θ _{JA}	θ _{JC}	Unit
SOT23G-3	400	120	°C/W

Electrical Characteristics

 All test condition: $T_A = +25^{\circ}\text{C}$, unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, A grade, 1% Initial Accuracy	2.470	2.495	2.520	V
		$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, B grade, 0.5% Initial Accuracy	2.483	2.495	2.507	V
V_{DEV}	Reference Input Voltage Deviation over Temperature Range	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, $T_A = -40\text{ to }85^{\circ}\text{C}$		5	15	mV
		$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, $T_A = -40\text{ to }125^{\circ}\text{C}$		11	30	mV
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of the Change in Reference Voltage to the Change in Cathode Voltage	$I_{KA} = 10\text{ mA}$, $V_{KA} = 10\text{ V to }V_{REF}$	-1.5	0.3	1.5	mV/V
		$I_{KA} = 10\text{ mA}$, $V_{KA} = 36\text{ V to }10\text{ V}$	-1	0.1	1	mV/V
I_{REF}	Reference Input Current	$I_{KA} = 10\text{ mA}$, $R1 = 10\text{ K}$, $R2\text{ Open}$		1	4	μA
ΔI_{REF}	I_{REF} Deviation over Full Temperature Range	$I_{KA} = 10\text{ mA}$, $R1 = 10\text{ K}$, $R2\text{ Open}$, $T_A = -40\text{ to }125^{\circ}\text{C}$		0.1	1	μA
$I_{KA(MIN)}$	Minimum Cathode Current for Regulation	$V_{KA} = V_{REF}$		0.4	1	mA
$I_{KA(OFF)}$	Off-state Current	$V_{KA} = 36\text{ V}$, $V_{REF} = 0\text{ V}$		0.2		μA
$ Z_{KA} $	Dynamic Output Impedance	$V_{KA} = V_{REF}$, $f \leq 1\text{ kHz}$, $I_{KA} = 1\text{ mA to }80\text{ mA}$		0.2		Ω

Typical Performance Characteristics

All test condition: $T_A = +25^\circ\text{C}$, unless otherwise noted.

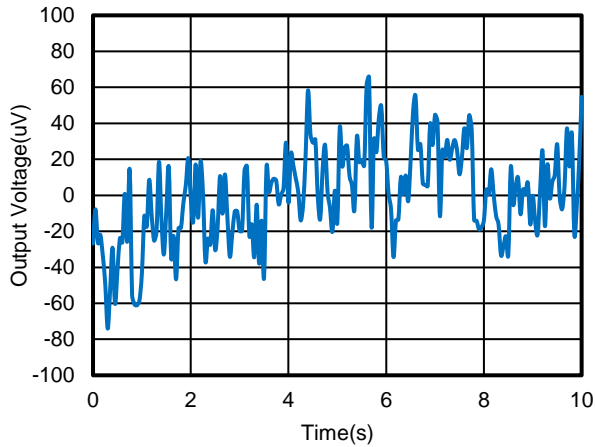


Figure 1. 0.1 to 10Hz Output Voltage Noise

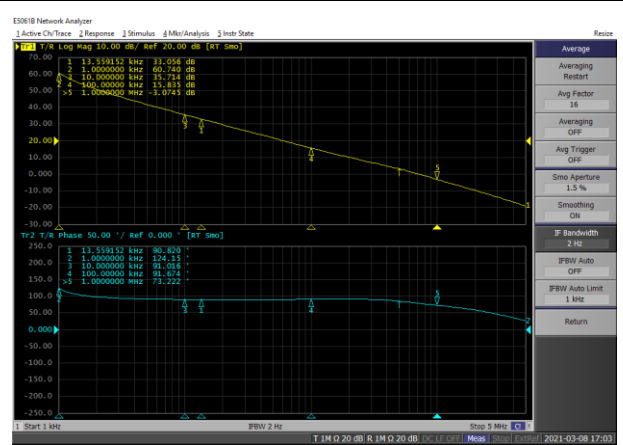


Figure 2. Gain and Phase vs. Frequency

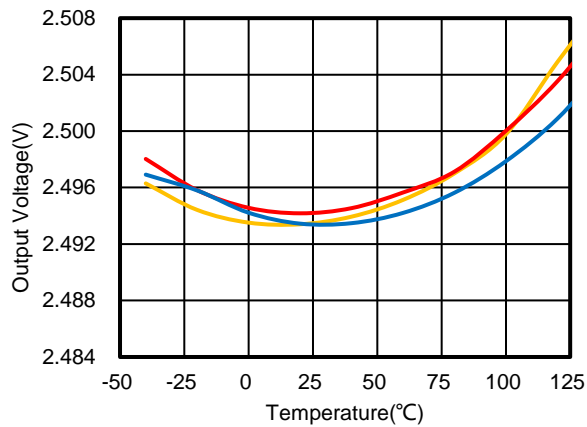


Figure 3. Reference Voltage vs. Temperature

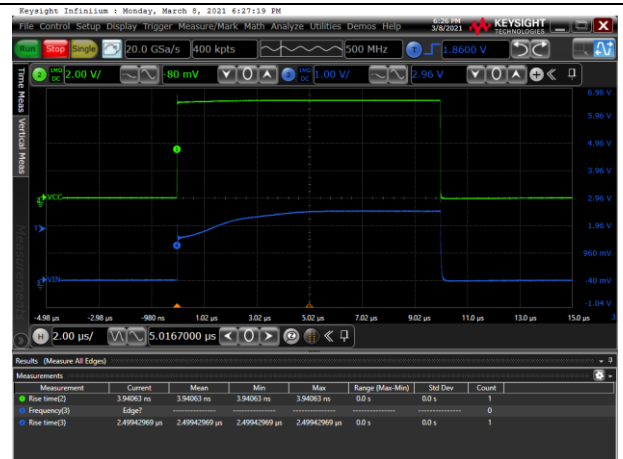
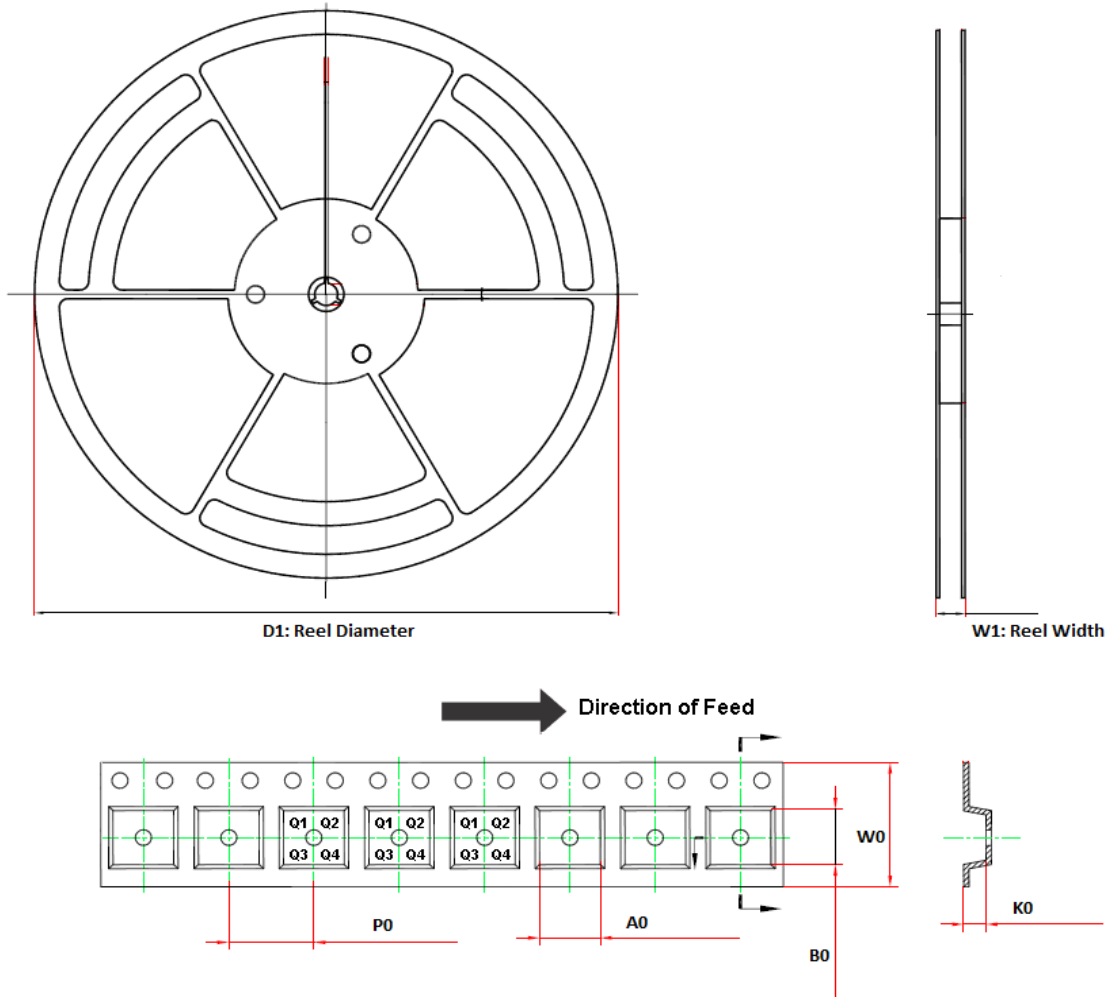


Figure 4. Pulse Response

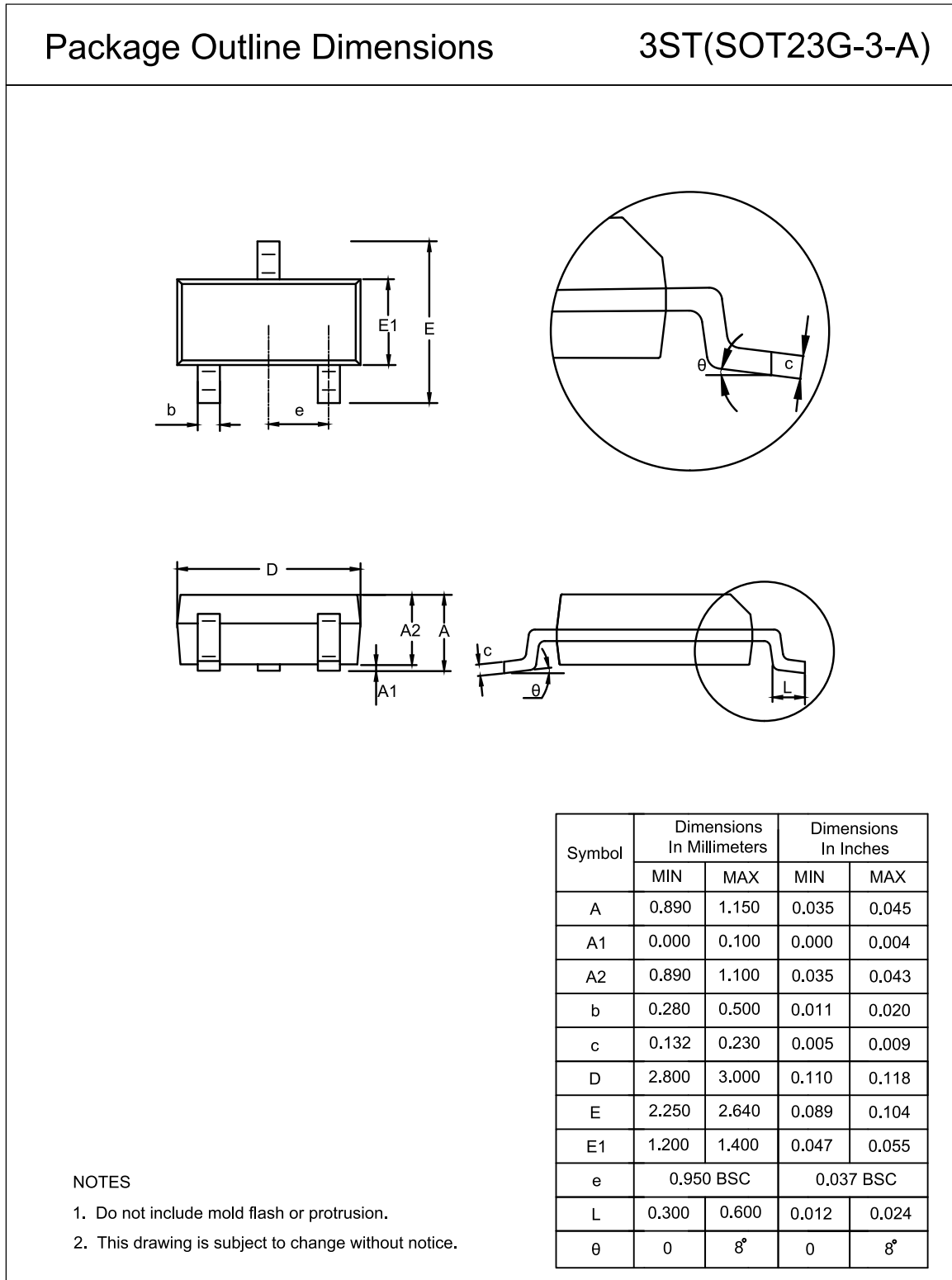
Tape and Reel Information



Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPR431B-S3TR-S	SOT23G-3	178	12.1	3.15	2.77	1.22	4.0	8.0	Q3

Package Outline Dimensions

SOT23G-3



Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
TPR431B-S3TR-S	-40 to 125°C	SOT23G-3	R31	MSL3	Tape and Reel, 3000	Green

(1) Green: 3PEAK defines "Green" to mean RoHS compatible and free of halogen substances.

IMPORTANT NOTICE AND DISCLAIMER

Copyright© 3PEAK 2012-2023. All rights reserved.

Trademarks. Any of the 思瑞浦 or 3PEAK trade names, trademarks, graphic marks, and domain names contained in this document /material are the property of 3PEAK. You may NOT reproduce, modify, publish, transmit or distribute any Trademark without the prior written consent of 3PEAK.

Performance Information. Performance tests or performance range contained in this document/material are either results of design simulation or actual tests conducted under designated testing environment. Any variation in testing environment or simulation environment, including but not limited to testing method, testing process or testing temperature, may affect actual performance of the product.

Disclaimer. 3PEAK provides technical and reliability data (including data sheets), design resources (including reference designs), application or other design recommendations, networking tools, security information and other resources "As Is". 3PEAK makes no warranty as to the absence of defects, and makes no warranties of any kind, express or implied, including without limitation, implied warranties as to merchantability, fitness for a particular purpose or non-infringement of any third-party's intellectual property rights. Unless otherwise specified in writing, products supplied by 3PEAK are not designed to be used in any life-threatening scenarios, including critical medical applications, automotive safety-critical systems, aviation, aerospace, or any situations where failure could result in bodily harm, loss of life, or significant property damage. 3PEAK disclaims all liability for any such unauthorized use.