

Adjustable shunt voltage reference IC

1 Features

- Wide programmable precise output voltage: 1.25V to 22V
- 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 100 mA
- Low output noise
- Available in SOT23-3 package

2 Applications

- Graphic Card
- PC Motherboard
- Voltage Adapter
- Switching Power Supply
- Quick Charger, PD

3 Description

The GD30VR432 series ICs are three-terminal adjustable shunt 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, and other adjustable regulators.

The output voltage can be set to any value between 1.25V and 22V with two external resistors.

The GD30VR432 precision reference is offered in two band- gap tolerance: 0.5% and 1%.

The GD30VR432 are characterized for operation from -40°C to 125°C.

Device Information¹

PART NUMBER	PACKAGE	BODY SIZE (NOM)
GD30VR432	SOT23-3	2.90mm × 1.30mm

1. For packaging details, see [Package Information](#) section.

Simplified Application Schematic

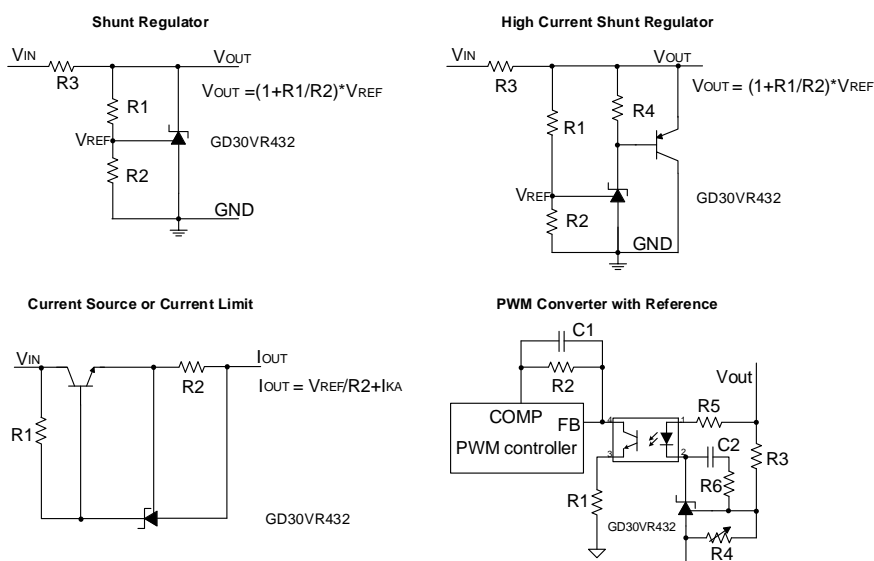
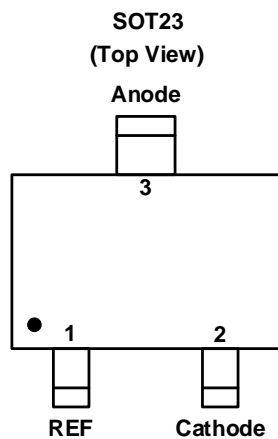


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4 Device Overview

4.1 Pinout and Pin Assignment



4.2 Pin Description

PINS		PIN TYPE ¹	FUNCTION
NAME	SOT23		
REF	1	I	Threshold relative to common anode
Cathode	2	I/O	Shunt Current/Voltage input
Anode	3	O	Common pin, normally connected to ground

1. I = Input, O = Output, P = Power, G = Ground.

5 Parameter Information

5.1 Absolute Maximum Ratings

Exceeding the operating temperature range(unless otherwise noted)¹

SYMBOL	PARAMETER	MIN	MAX	UNIT
V _{KA}	Cathode voltage		22	V
I _{KA}	Continuous cathode current	-100	100	mA
I _{REF}	Reference input current range		10	mA
T _{JMAX}	Maximum junction temperature		150	°C
T _{LEAD}	Maximum lead temperature		260	°C
T _{STG}	Storage temperature	-65	150	°C

1. The maximum ratings are the limits to which the device can be subjected without permanently damaging the device. Note that the device is not guaranteed to operate properly at the maximum ratings. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

5.2 Recommended Operation Conditions

SYMBOL ^{1,2}	PARAMETER	MIN	TYP	MAX	UNIT
V _{KA}	Cathode Voltage	V _{REF}		20	V
I _{KA}	Cathode Current	0.1		100	mA
T _A	Operating Ambient Temperature Range	-40		125	°C

1. The device is not guaranteed to function outside of its operating conditions.
2. Refer to the [Application Information](#) section for further information.

5.3 Electrical Sensitivity

SYMBOL	CONDITIONS	VALUE	UNIT
V _{ESD(HBM)}	Human-body model (HBM), ANSI/ESDA/JEDEC JS-001-2017 ¹	±5000	V
V _{ESD(CDM)}	Charge-device model (CDM), ANSI/ESDA/JEDEC JS-002-2022 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.

5.4 Thermal Resistance

SYMBOL ¹	CONDITIONS	PACKAGE	VALUE	UNIT
Θ _{JA}	Junction-to-ambient thermal resistance	SOT23-3	206	°C/W
Θ _{JC}	Junction-to-case thermal resistance	SOT23-3	76	°C/W

1. Thermal characteristics are based on simulation, and meet JEDEC document JESD51-7.

5.5 Electrical Characteristics

$T_J = 25^{\circ}\text{C}$, unless otherwise noted.

SYMBOL	PARAMETER		CONDITIONS	TEST CIRCUIT	MIN	TYP	MAX	UNIT
V_{REF}	Reference Voltage	0.5%	$V_{KA}=V_{REF}$, $I_{KA}=10\text{mA}$	Figure 1	1.244	1.250	1.256	V
		1%			1.238	1.250	1.263	
ΔV_{REF}	Deviation of Reference Voltage Over-Temperature	$V_{KA}=V_{REF}$ $I_{KA}=10\text{mA}$	-40 to 85°C -40 to 125°C	Figure 1		3	10	mV
						4	15	
$\Delta V_{REF} / \Delta V_{KA}$	Ratio of Change in Reference Voltage to the Change in Cathode Voltage	$I_{KA}=10\text{mA}$	$\Delta V_Z=V_{REF}$ to 16V	Figure 2		-0.5	-1.5	mV/V
I_{REF}	Reference Current	$I_{KA}=10\text{mA}$, $R1=10\text{k}\Omega$, $R2=\infty$		Figure 2		0.15	0.4	μA
ΔI_{REF}	Deviation of Reference Current Over Full Temperature Range	$I_{KA}=10\text{mA}$, $R1=10\text{k}\Omega$, $R2=\infty$, $T_A=-40$ to 125°C		Figure 2		0.1	0.4	μA
$I_{KA}(\text{MIN})$	Minimum Cathode Current for Regulation	$V_{KA}=V_{REF}$		Figure 1		55	80	μA
$I_{KA}(\text{OFF})$	Off-State Cathode Current	$V_{KA}=18\text{V}$, $V_{REF}=0$		Figure 3		0.04	0.1	μA
		$V_{KA}=6\text{V}$, $V_{REF}=0$				0.01	0.05	
$ Z_{KA} $	Dynamic Impedance	$V_{KA}=V_{REF}$, $I_{KA}=1$ to 100mA , $f \leq 1.0\text{kHz}$		Figure 1		0.05	0.15	Ω

5.6 Parameter Measurement Information

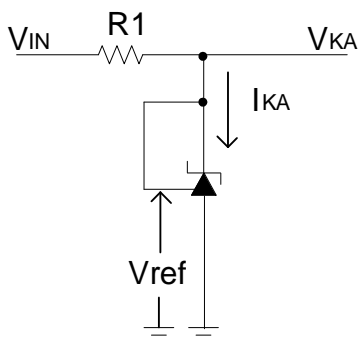


Figure 1. Test Circuit for $V_{KA}=V_{ref}$

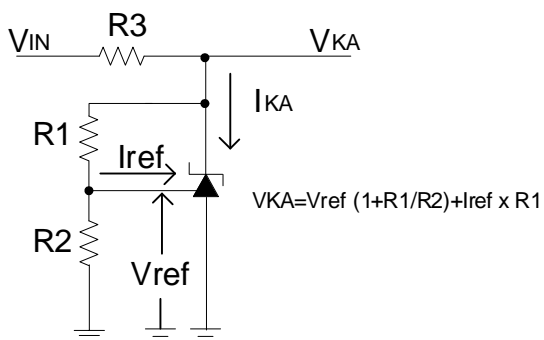


Figure 2. Test Circuit for $V_{KA}>V_{ref}$

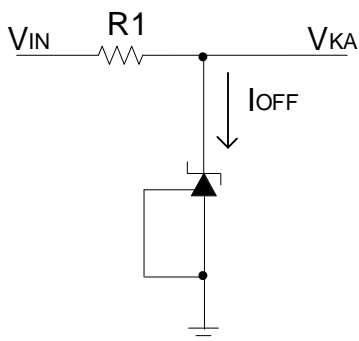


Figure 3. Test Circuit for I_{OFF}

5.7 Typical Characteristics

$T_A = 25^\circ\text{C}$, unless otherwise noted.

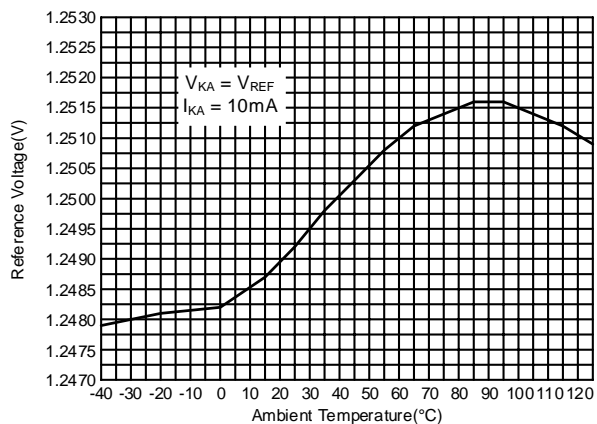


Figure 4. Reference Voltage vs. Ambient Temperature

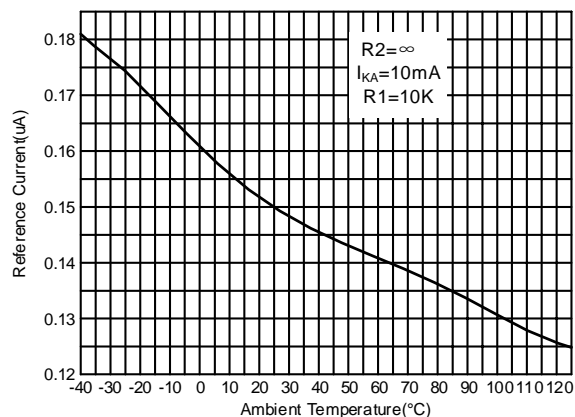


Figure 5. Reference Current vs. Ambient Temperature

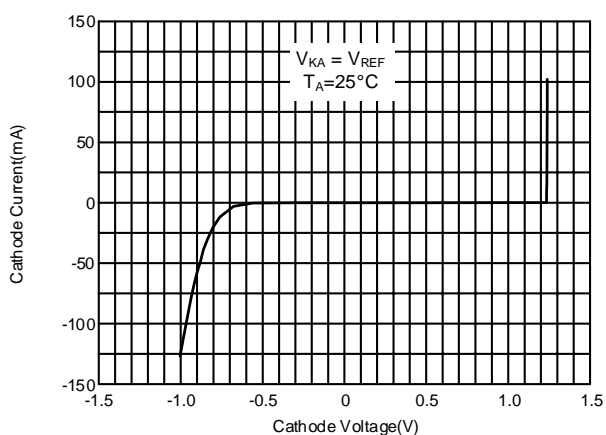


Figure 6. Cathode Current vs. Cathode voltage

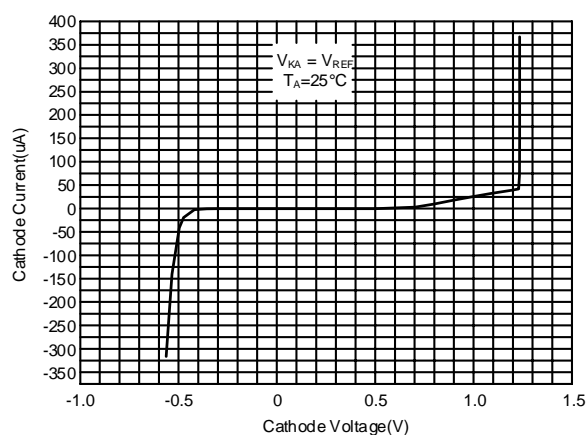


Figure 7. Cathode Current vs. Cathode voltage

6 Functional Description

6.1 Block Diagram

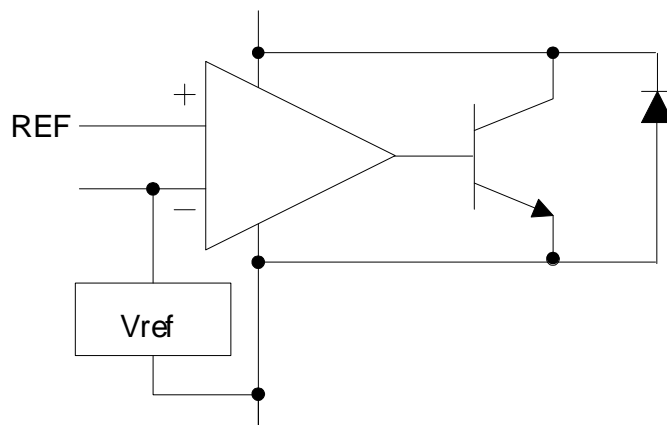


Figure 8. Functional Block Diagram of GD30VR432

7 Application Information

7.1 Typical Application Circuit

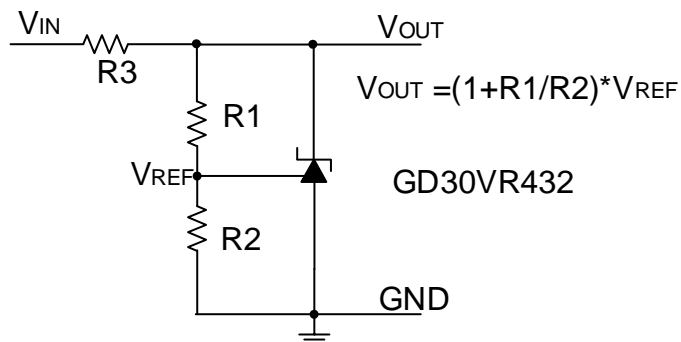


Figure 9.Shunt Regulator

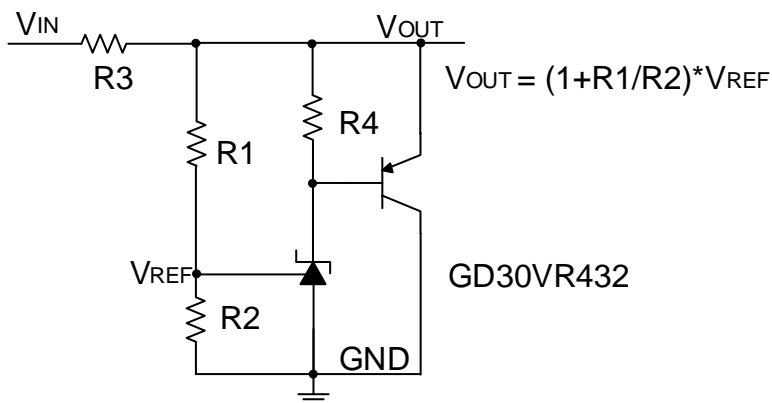


Figure 10.High Current Shunt Regulator

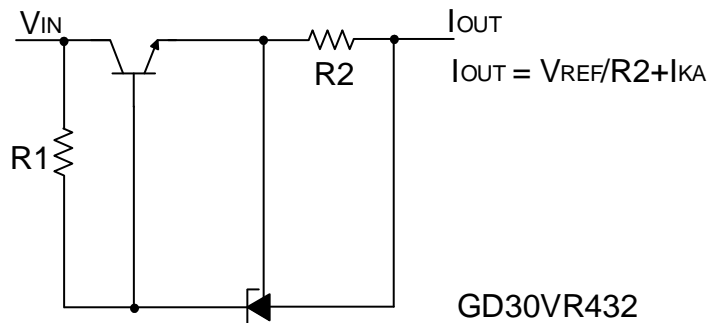


Figure 11.Current Source or Current Limit

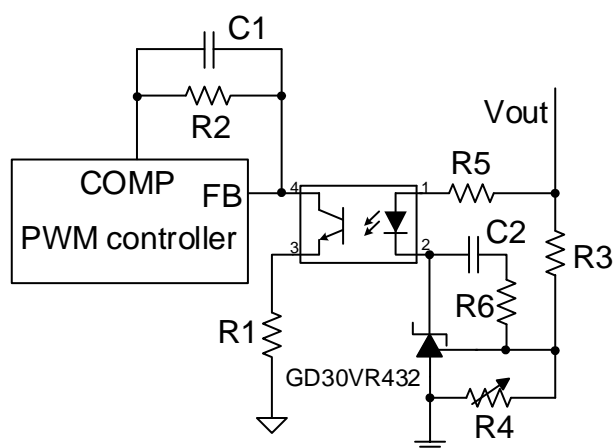
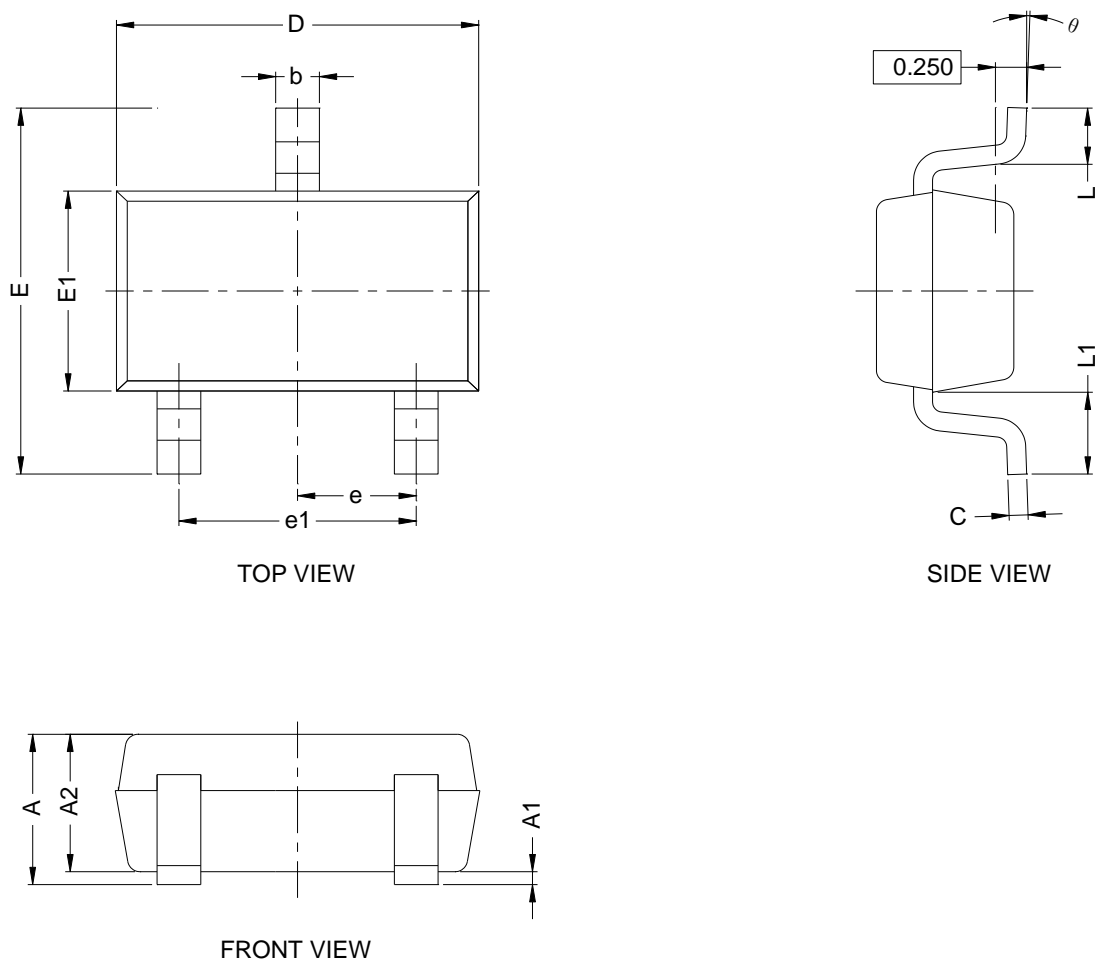


Figure 12. PWM Converter with Reference

8 Package Information

8.1 Outline Dimensions

SOT23 Package Outline



NOTES:

1. All dimensions are in millimeters.
2. Package dimensions does not include mold flash, protrusions, or gate burrs.
3. Refer to the [Table 1 SOT23-3 dimensions\(mm\)](#).

Table 1. SOT23-3 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.05 REF		
A1	0.01		0.10
A2	0.90		1.10
b	0.3		0.51
c	0.08		0.18
D	2.80	2.90	3.00
E	2.30	2.40	2.50
E1	1.20	1.30	1.40
e	0.89		1.03
e1	1.90 REF		
L	0.20		
L1	0.55 REF		
θ	0°		10°

9 Ordering Information

Ordering Code	Package Type	ECO Plan	Packing Type	MOQ	OP Temp(°C)
GD30VR432ABSTR-I	SOT23-3	Green	Tape & Reel	3000	-40°C to +125°C
GD30VR432BBSTR-I	SOT23-3	Green	Tape & Reel	3000	-40°C to +125°C

1. GD30VR432ABSTR-I 0.5% voltage tolerance.
2. GD30VR432NBSTR-I 1% voltage tolerance.

10 Revision History

REVISION NUMBER	DESCRIPTION	DATE
1.0	Initial release and device details	2024

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