



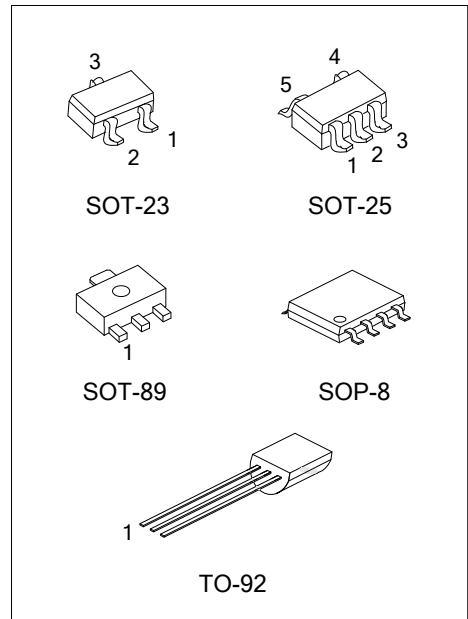
# TL432

## LINEAR INTEGRATED CIRCUIT

### 1.25V PRECISION ADJUSTABLE SHUNT REFERENCE REGULATORS

■ DESCRIPTION

The UTC **TL432** is a three-terminal adjustable shunt regulator highly accurate 1.25V band gap reference with 0.5%, 1% tolerance. The device offers thermal stability, wide operating current (50mA) and an extended temperature range of 0° to 85°C for operation in power supply applications. The UTC **TL432** offers a wide operating voltage range of up to 12V and is an excellent choice for voltage reference requirements in an isolated feedback circuit for 3.0V ~ 3.3V switching mode power supplies. The tight tolerance guarantees a lower design cost for the power supply manufacturer by virtually eliminating the need for an extra power supply manufacturing process of the power supply.



■ FEATURES

- \*Temperature-Compensated:50ppm/°C
- \*Internal amplifier with 50mA capability
- \*Nominal temperature range extended to 85°C
- \*Low frequency dynamic output impedance: <150Ω
- \*Low output noise

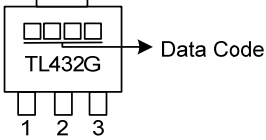
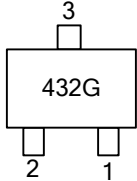
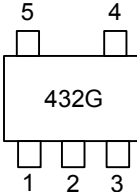
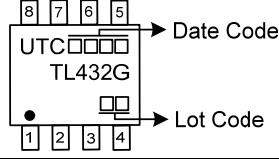
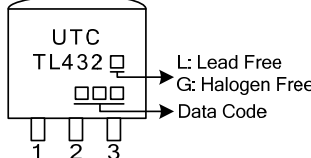
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing	
Lead Free	Halogen Free		1	2	3	4	5	6	7	8		
-	TL432G-AE3-R	SOT-23	K	R	A	-	-	-	-	-	-	Tape Reel
-	TL432G-AB3-R	SOT-89	R	A	K	-	-	-	-	-	-	Tape Reel
-	TL432G-AF5-R	SOT-25	X	X	K	R	A	-	-	-	-	Tape Reel
TL432L-T92-B	TL432G-T92-B	TO-92	R	A	K	-	-	-	-	-	-	Tape Box
TL432L-T92-K	TL432G-T92-K	TO-92	R	A	K	-	-	-	-	-	-	Bulk
-	TL432G-S08-R	SOP-8	K	A	A	X	X	A	A	R	-	Tape Reel

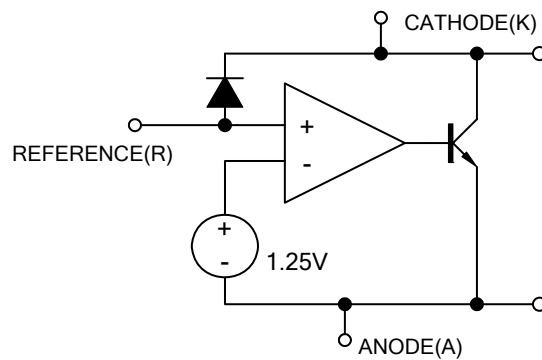
Note: Pin Code: K: Cathode A: Anode R: Reference X: No Connection

<p>TL432G-AE3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel</p> <p>(2) AE3: SOT-23, AB3: SOT-89, AF5: SOT-25, T92: TO-92, S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING

PACKAGE	MARKING
SOT-89	
SOT-23	
SOT-25	
SOP-8	
TO-92	

### BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Cathode-Anode Reverse Breakdown	$V_{KA}$	15	V
Operating Cathode Current	$I_{KA}$	50	mA
Reference Input Current	$I_{REF}$	1	mA
Junction Temperature	$T_J$	+125	°C
Operating Temperature	$T_{OPR}$	-40 ~ +85	°C
Storage Temperature	$T_{STG}$	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	SC-59/SOT-25	350	°C/W
	TO-92	100	°C/W
	SOP-8	150	°C/W
	SOT-89	220	°C/W

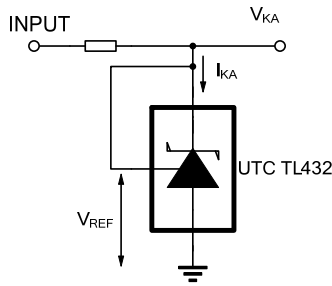
### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Cathode Voltage	$V_{KA}$	$V_{REF}$		15	V
Cathode Current	$I_K$	5	10		mA

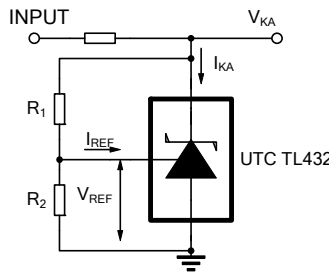
### ■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , $V_{KA}=V_{REF}$ , $I_K=10\text{mA}$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Refer Input Voltage	$V_{REF}$	$I_K=10\text{mA}$ , $V_K=V_{REF}$	1.243	1.250	1.256	V
			1.237	1.250	1.263	V
			1.225	1.250	1.275	V
Line Regulation	$\Delta V_{REF}$	$V_K=1.25 \sim 15\text{V}$		10	26	mV
Load Regulation	$\Delta V_{REF}$	$I_K=5 \sim 50\text{mA}$		6	15	mV
Temperature Deviation	$\Delta V_{REF}$	$0 < T_J < 85^\circ\text{C}$		2	6	mV
Reference Input Current	$I_{REF}$			3	6	$\mu\text{A}$
Reference Input Current Temperature Coefficient	$\Delta I_{REF}$	$0 < T_J < 85^\circ\text{C}$		0.3	0.6	$\mu\text{A}$
Minimum Cathode Current for Regulation	$I_{K(MIN)}$			0.6	1	mA
Off State Leakage	$I_{KA(OFF)}$	$V_{REF}=0\text{V}$ , $V_{KA}=15\text{V}$			500	nA

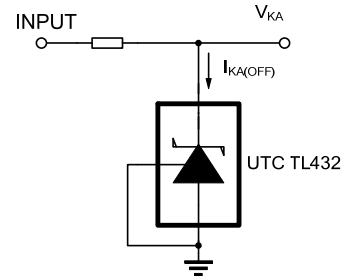
## TEST CIRCUIT



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

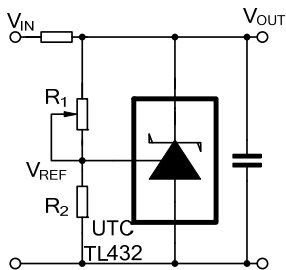


$V_{KA} = V_{REF} \times (1 + R_1/R_2) + I_{REF} \times R_1$   
For  $V_{KA} \geq V_{REF}$



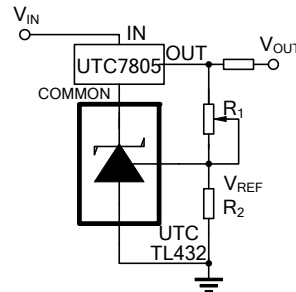
For  $I_{KA(OFF)}$

## APPLICATION CIRCUIT



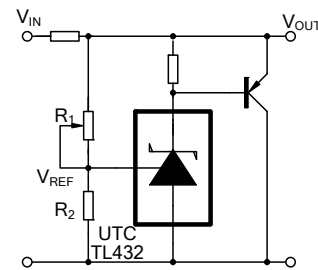
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

Shutdown Regulator



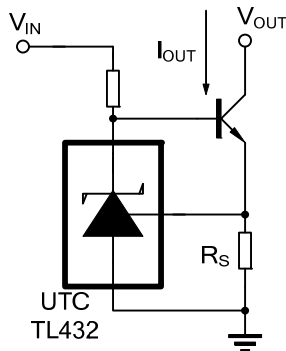
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

Minimum  $V_{OUT} = V_{REF} + 5V$   
Output Control of a Three-Terminal Fixed Regulator



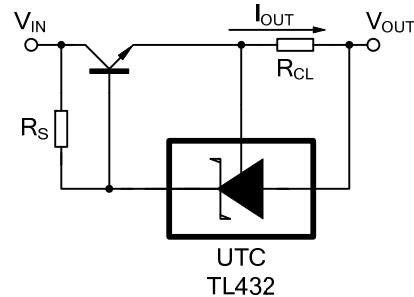
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

Higher-current Shunt Regulator



$$I_{OUT} = V_{REF}/R_S$$

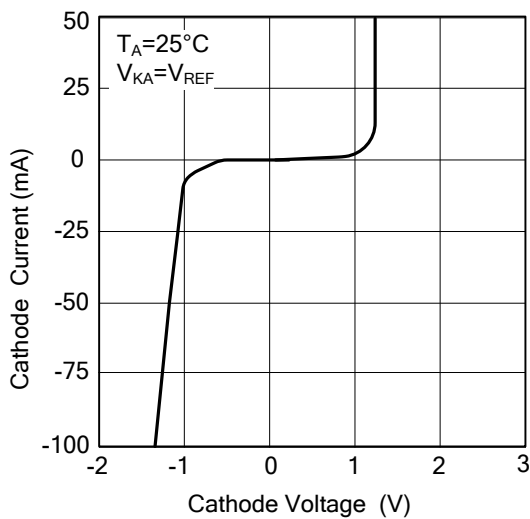
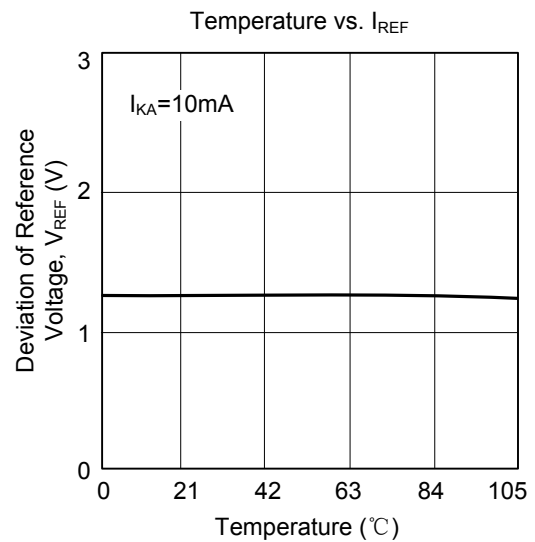
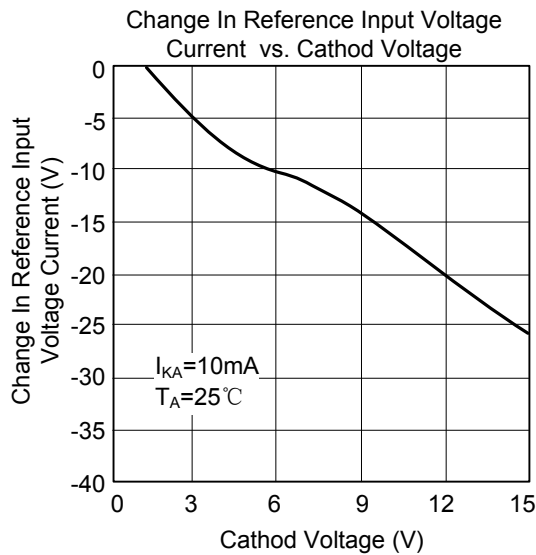
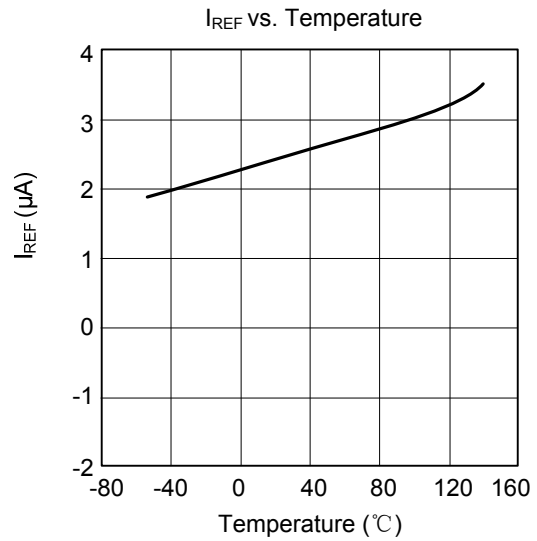
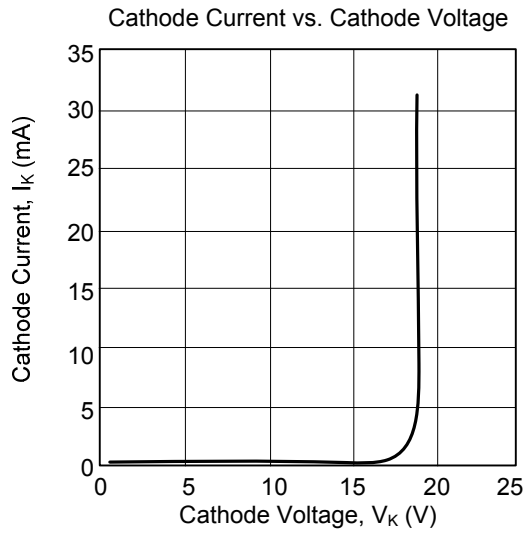
Constant-current Sink



$$I_{OUT} = V_{REF}/R_{CL}$$

Current Limiting or Current Source

## TYPICAL CHARACTERISTICS



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