



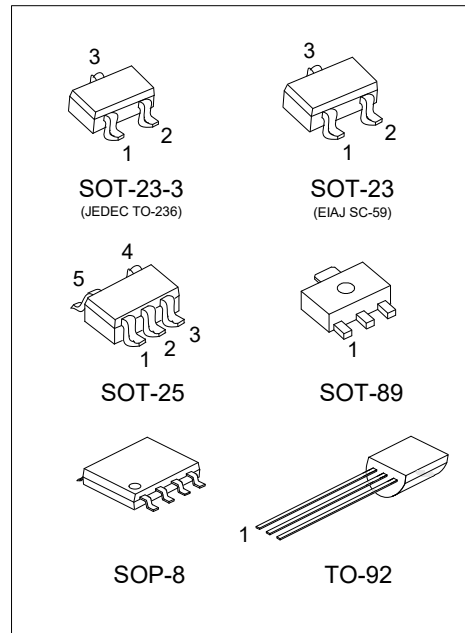
TL432

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	
TL432L-AE2-R	TL432G-AE2-R	SOT-23-3	R	K	A	-	-	-	-	-	Tape Reel
TL432L-AE3-R	TL432G-AE3-R	SOT-23	R	K	A	-	-	-	-	-	Tape Reel
TL432L-AB3-R	TL432G-AB3-R	SOT-89	R	A	K	-	-	-	-	-	Tape Reel
TL432L-AF5-R	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
TL432L-S08-R	TL432G-S08-R	SOP-8	K	A	A	X	X	A	A	R	Tape Reel

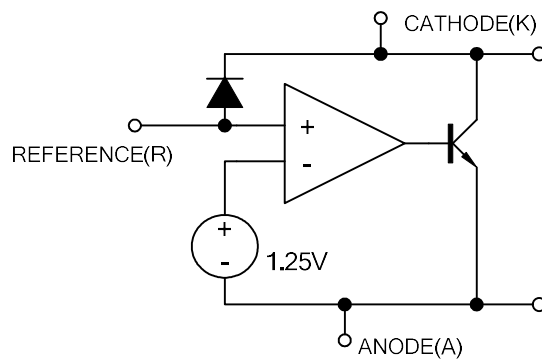
Note: Pin Code: R: Reference K: Cathode A: Anode X: No Connection

<p>TL432G-AE2-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel, B: Tape Box, K: Bulk</p> <p>(2) AE2: SOT-23-3, 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	<p>TL432 □ → Date Code □ → L: Lead Free □ → G: Halogen Free</p>
SOT-23-3 SOT-23	<p>432 □ → L: Lead Free □ → G: Halogen Free</p>
SOT-25	<p>432 □ → L: Lead Free □ → G: Halogen Free</p>
SOP-8	<p>UTC □ □ □ □ □ → Date Code TL432 □ → L: Lead Free □ → G: Halogen Free □ → Lot Code</p>
TO-92	<p>UTC TL432 □ → L: Lead Free □ → G: Halogen Free □ □ □ → Date Code</p>

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 ~ +125	°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	SOT-23-3/SOT-23 SOT-25	θ_{JA}	416	°C/W
	TO-92		162	°C/W
	SOP-8		208	°C/W
	SOT-89		156	°C/W

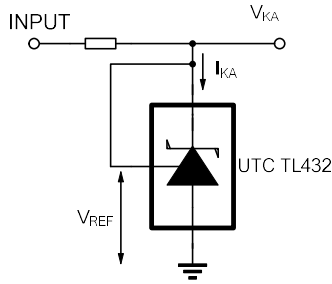
■ RECOMMENDED OPERATING CONDITIONS

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

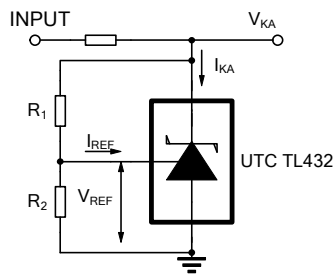
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, $V_{KA}=V_{REF}$, $I_K=10\text{mA}$, unless otherwise specified.)

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
			1.263		1.275	V
			1.225		1.237	V
Line Regulation	ΔV_{REF}	$V_K=1.25 \sim 15\text{V}$		10	26	mV
Load Regulation	ΔV_{REF}	$I_K=5 \sim 50\text{mA}$		6	15	mV
Temperature Deviation	ΔV_{REF}	$0 < T_J < 85^\circ\text{C}$		2	6	mV
Reference Input Current	I_{REF}			3	6	μA
Reference Input Current Temperature Coefficient	ΔI_{REF}	$0 < T_J < 85^\circ\text{C}$		0.3	0.6	μA
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

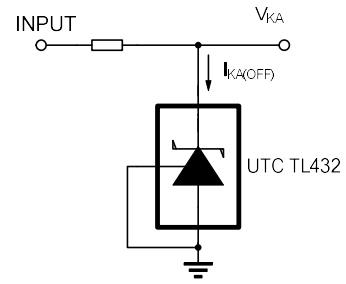
TEST CIRCUIT



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

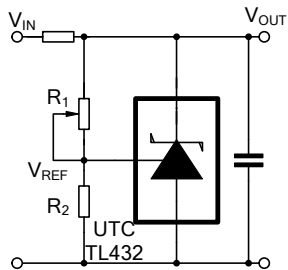


$V_{KA} = V_{REF} \times (1 + R_1/R_2) + I_{REF} \times R_1$
For $V_{KA} \geq V_{REF}$



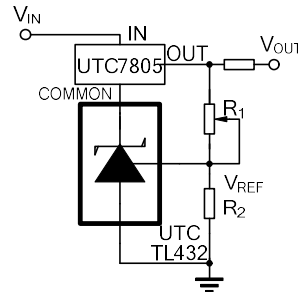
For $I_{KA(OFF)}$

APPLICATION CIRCUIT



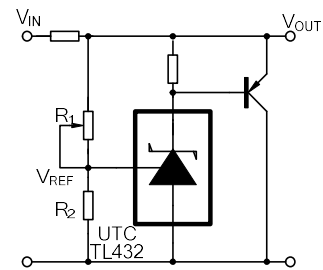
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

Shutdown Regulator



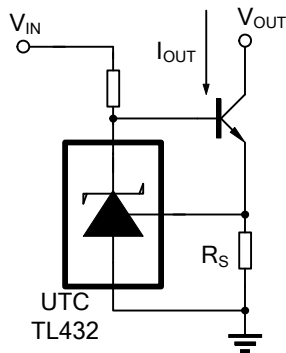
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

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



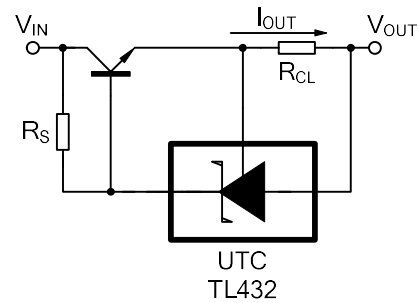
$$V_{OUT} = (1 + R_1/R_2) \times V_{REF}$$

Higher-current Shunt Regulator



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

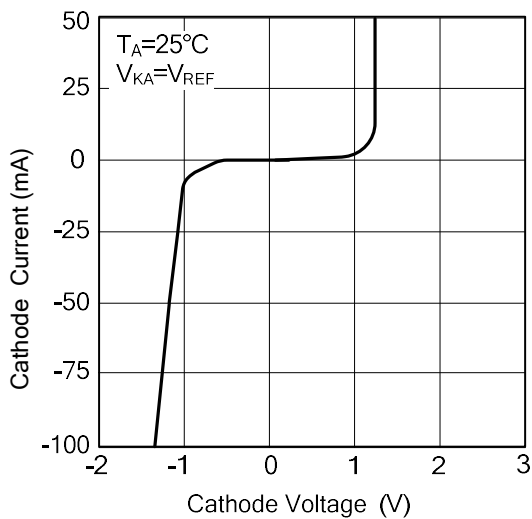
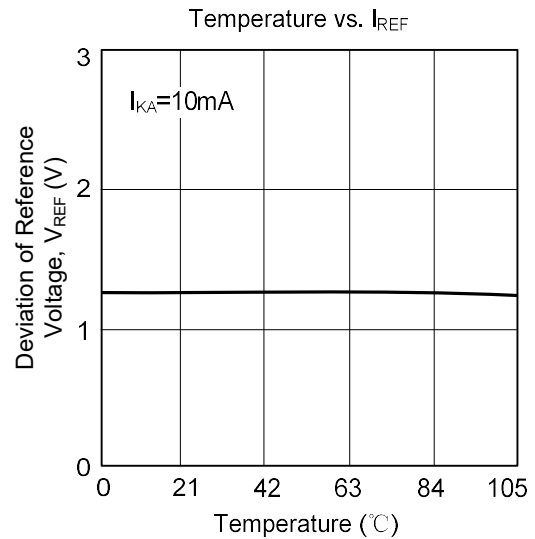
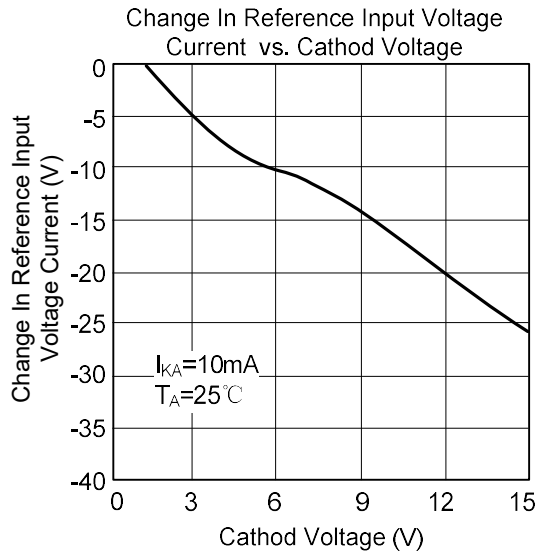
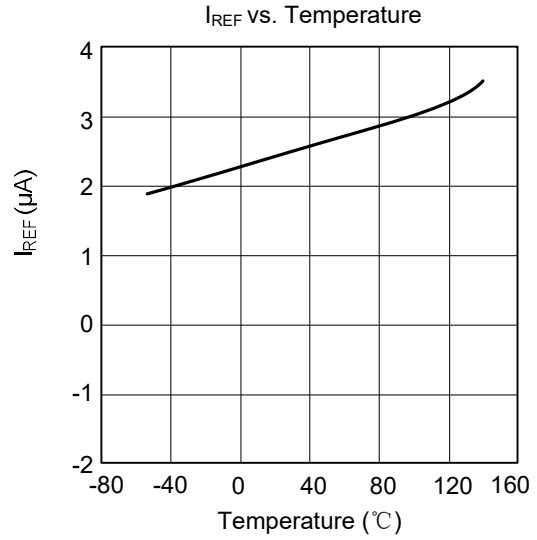
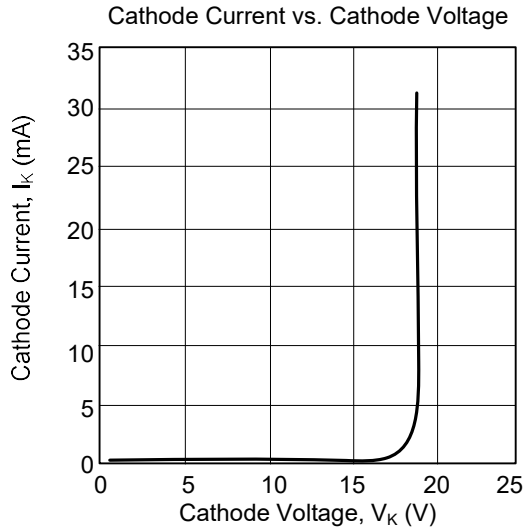
Constant-current Sink



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

Current Limiting or Current Source

■ TYPICAL CHARACTERISTICS



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