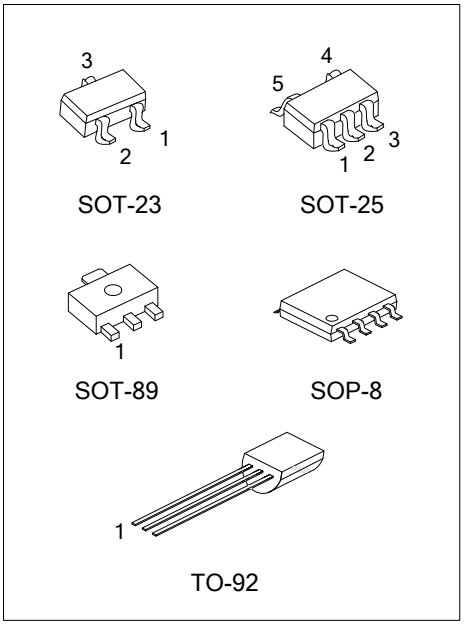
TL432

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

TL432G-AE3-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) B: Tape Box, K: Bulk, R: Tape Reel
(2) AE3: SOT-23, AB3: SOT-89, AF5: SOT-25, T92: TO-92, S08: SOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

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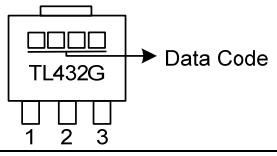
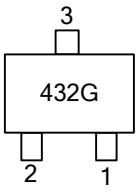
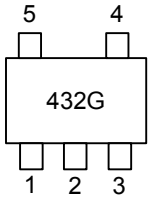
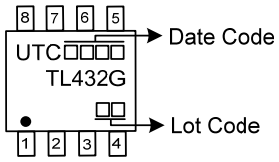
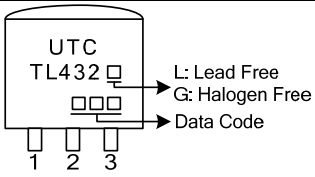
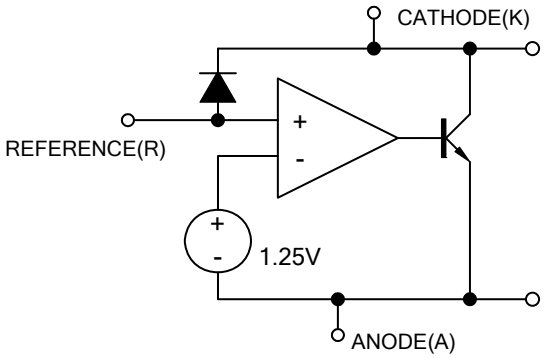
■ MARKING

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	θ_{JA}	350	°C/W
	TO-92		100	°C/W
	SOP-8		150	°C/W
	SOT-89		220	°C/W

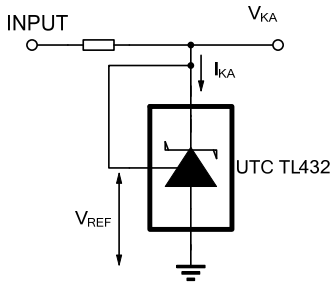
■ RECOMMENDED OPERATING CONDITIONS

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

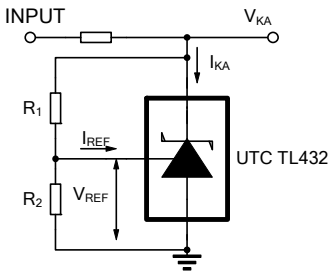
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, V_{KA}=V_{REF}, I_K=10mA, unless otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Refer Input Voltage	TL432-A	V_{REF}	I_K=10mA, V_K=V_{REF}	1.243	1.250	1.256	V
	TL432-1			1.237	1.250	1.263	V
	TL432-2			1.263		1.275	V
	TL432-3			1.225		1.237	V
Line Regulation		ΔV_{REF}	V_K=1.25 ~ 15V		10	26	mV
Load Regulation		ΔV_{REF}	I_K=5 ~ 50mA		6	15	mV
Temperature Deviation		ΔV_{REF}	0<T_J<85°C		2	6	mV
Reference Input Current		I_{REF}			3	6	μA
Reference Input Current Temperature Coefficient		ΔI_{REF}	0<T_J<85°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}=0V, V_{KA}=15V			500	nA

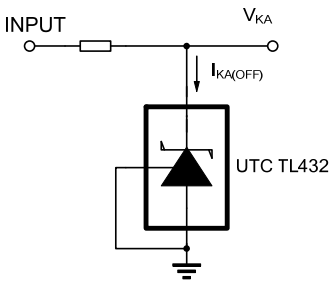
■ TEST CIRCUIT



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

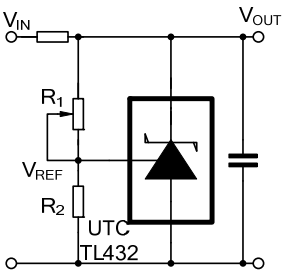


$V_{KA}=V_{REF}\times(1+R_1/R_2)+I_{REF}\times R_1$
For $V_{KA}\geq V_{REF}$



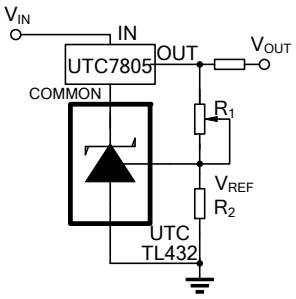
For $I_{KA(OFF)}$

■ APPLICATION CIRCUIT

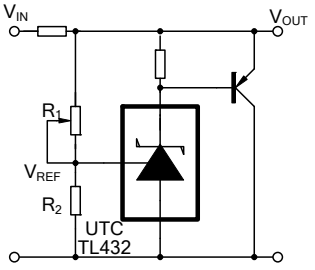


$V_{OUT}=(1+R_1/R_2)\times V_{REF}$

Shutdown Regulator

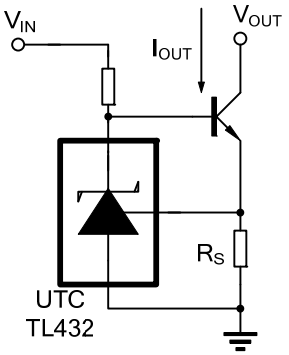


$V_{OUT}=(1+R_1/R_2)\times V_{REF}$
Minimum $V_{OUT}=V_{REF}+5V$
Output Control of a Three -Terminal Fixed Regulator

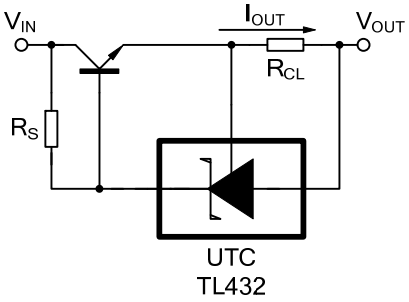


$V_{OUT}=(1+R_1/R_2)\times V_{REF}$

Higher-current Shunt Regulator



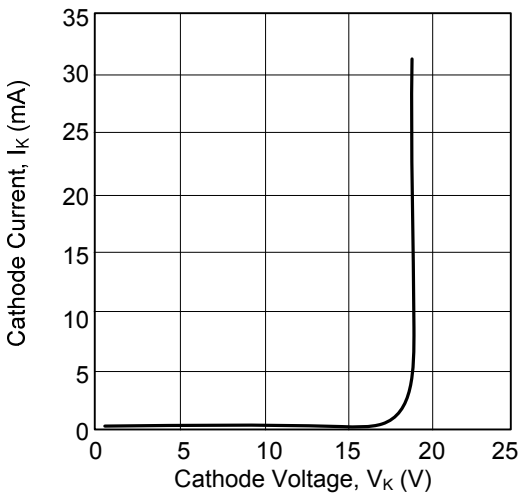
$I_{OUT}=V_{REF}/R_S$
Constant-current Sink



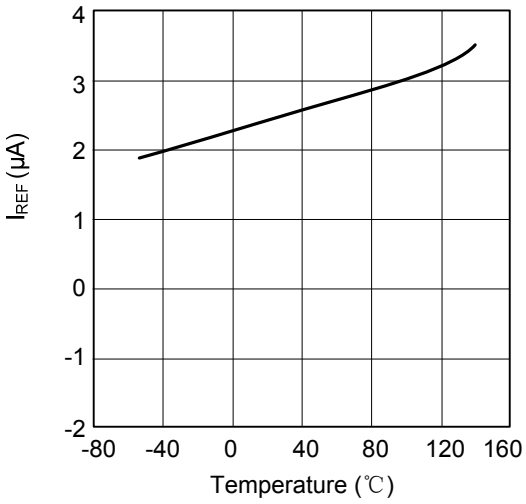
$I_{OUT}=V_{REF}/R_{CL}$
Current Limiting or Current Source

■ TYPICAL CHARACTERISTICS

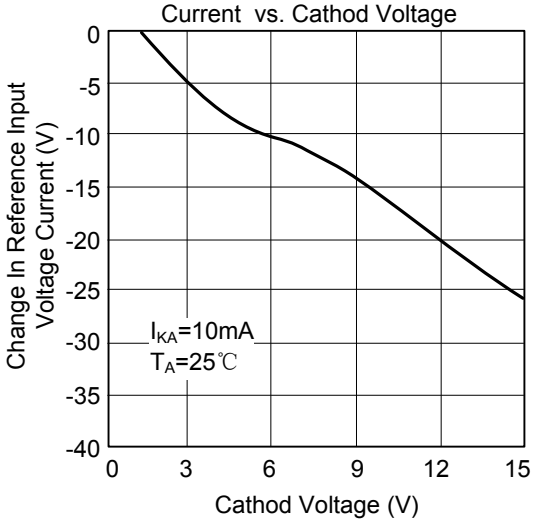
Cathode Current vs. Cathode Voltage



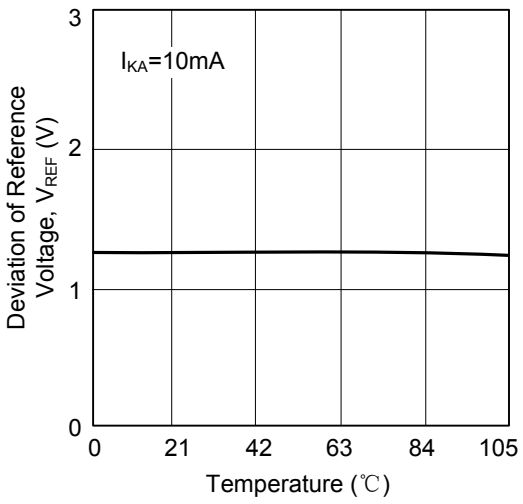
I_{REF} vs. Temperature

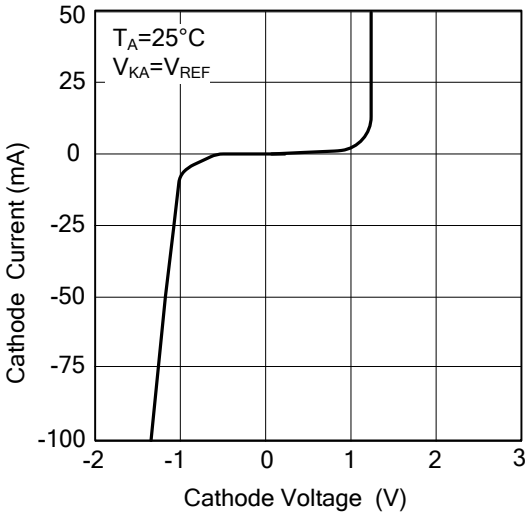


Change In Reference Input Voltage Current vs. Cathod Voltage



Temperature vs. I_{REF}





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