Precision Adjustable Shunt Regulator
Monolithic IC MM1530 AT/AN

Outline

The MM1530AT/AN is 3-termial adjustable shunt regulator, which provides a highly accurate 0.8% bandgap reference voltage. The output voltage can be adjusted to any value between reference voltage V_{REF} and 12 volts with two external resistors. Moreover, there are a lot of ranges of the application as a zener diode besides the replacement is possible because it has steep turn-on characteristics.

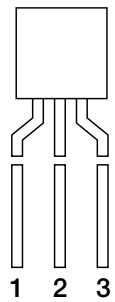
Features

1. Reference voltage tolerance	V_{REF}=1.260V±0.8%
2. Output voltage can be adjusted	$V_{REF} \leq Vo \leq 12V$
3. Low Dynamic Output Impedance	$\|Z_{KA}\|$=0.13Ω typ.

Package

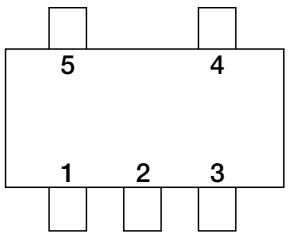
TO-92 (TAPING)
SOT-25A

Pin Assignment



TO-92
(TAPING)

1	Reference
2	Anode
3	Cathode

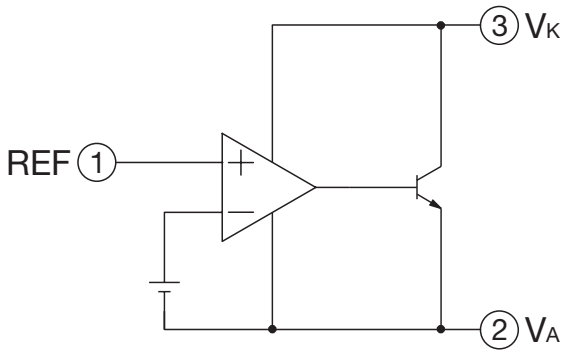


SOT-25A
(TOP VIEW)

1	NC
2	SUB
3	Cathode
4	Reference
5	Anode

note:The second terminal is SUB, so connect the terminal to GND.

Equivalent Circuit Diagram



* TO-92 Package

Absolute Maximum Ratings (Ambient Temperature, Ta=25°C)

Item	Symbol	Ratings	Unit
Operating Temperature	T_{OPR}	–30~+85	°C
Storage Temperature	T_{STG}	–40~+125	°C
Cathode to Anode voltage	V_{KA}	12	V
Cathode current	I_K	50	mA
Reference input current	I_{REF}	50	µA
Allowable loss	Pd	500 (TO-92) 150 (SOT-25A)	mW

Recommended Operating Conditions (Ambient Temperature, Ta=25°C)

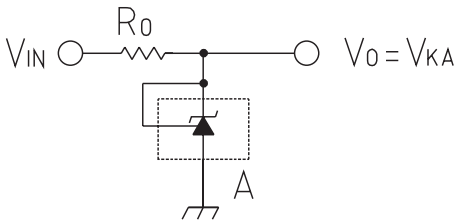
Cathode to Anode voltage	V_{KA}	V_{REF}~12	V
Cathode current	I_K	1~30	mA

Electrical Characteristics (Ambient Temperature, Ta=25°C)

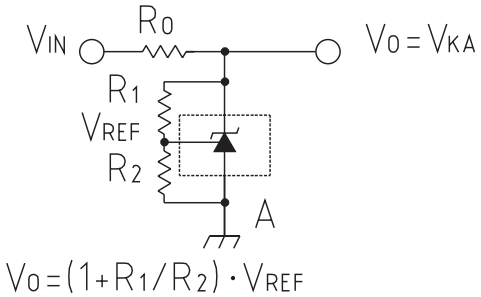
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Reference voltage	V_{REF}	$V_{KA}=V_{REF}$	1.250	1.260	1.270	V
Reference voltage deviation over temperature range	$\Delta V_{REF}/\Delta Ta$	$V_{KA}=V_{REF}$ Ta=0~+70°C		3	12	mV
Lord regulation	ΔV_{REF} / ΔV_{KA}	$\Delta V_{KA}=V_{REF}$, $\lvert V_{REF}\rvert \leqq V_{KA} \leqq 5V$		1.0	2.7	mV/V
		$5V \leqq V_{KA} \leqq 12V$		1.0	2.0	mV/V
Reference input current	I_{REF}	$V_{KA}=V_{REF}$ R_1=10K, $R_2=\infty$		2	4	µA
Reference input current deviation over temperature range	$\Delta I_{REF}/\Delta Ta$	$V_{KA}=V_{REF}$, R_1=10K, $R_2=\infty$ Ta=0~+70°C		0.3	1.2	µA
Minimum Cathode Current	$I_{Kmin.}$	$V_{KA}=V_{REF}$, ΔV_{REF}=2%		0.15	0.3	mA
Off-state Cathode Current	I_{OFF}	V_{KA}=12V, V_{REF}=0V		0.1	1.0	µA
Dynamic Impedance	$\lvert Z_{KA}\rvert$	$V_{KA}=V_{REF}$, f ≦ 1kHz I_K=1~30mA		0.13	0.5	Ω

Measuring Circuit

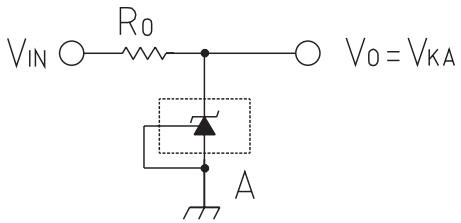
(1) $V_{KA}=V_{REF}$



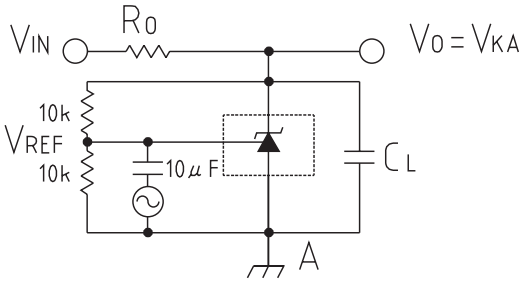
(2) $V_{KA} \geqq V_{REF}$ $V_O=V_{KA}=V_{REF}$



(3) I_{OFF}

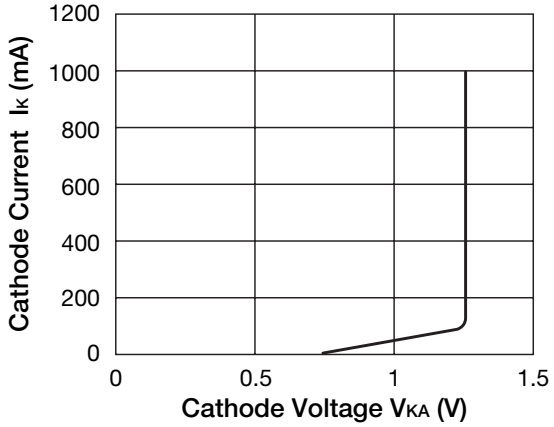


(4) Open Loop Voltage Gain

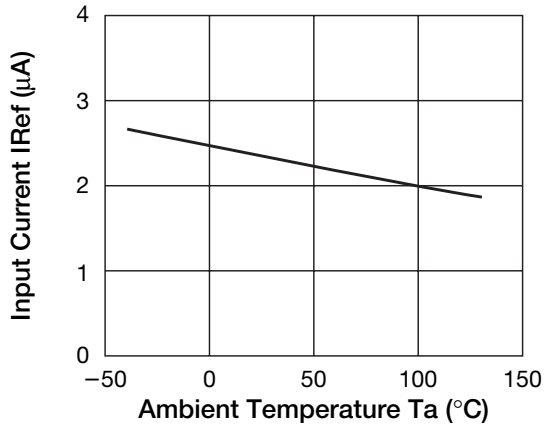


Characteristics

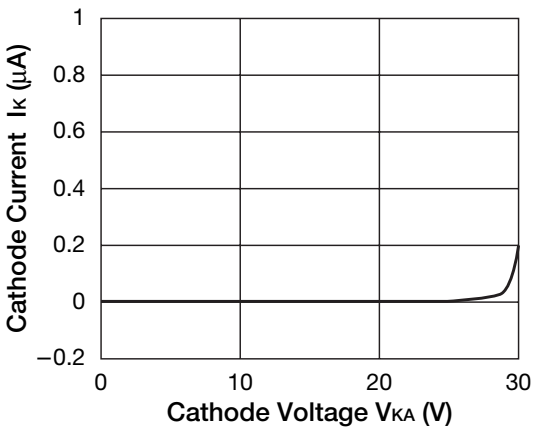
High Voltage Operating Characteristics



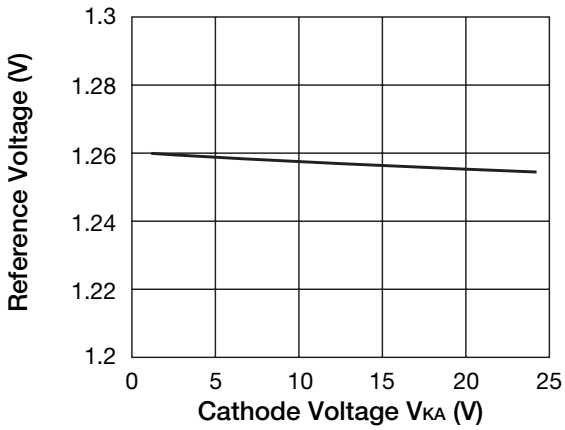
Input Current



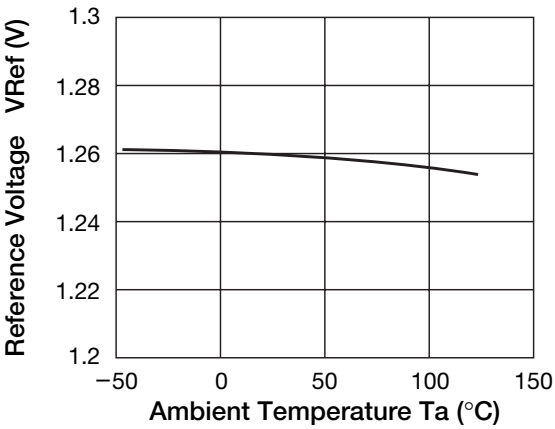
Low Current Operating Characteristics



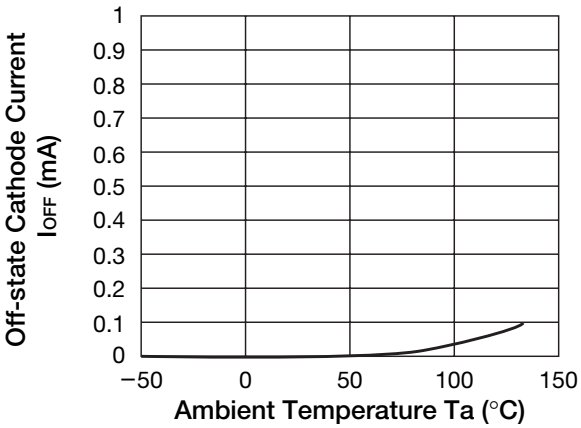
Reference Voltage



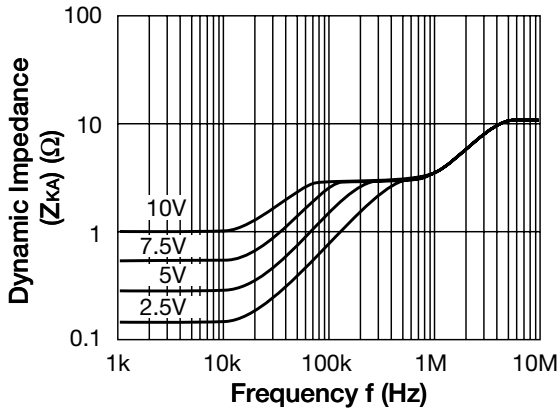
Detection Voltage Character



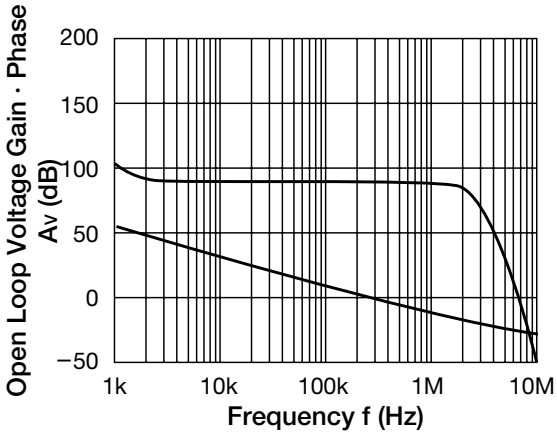
Off State Leakage



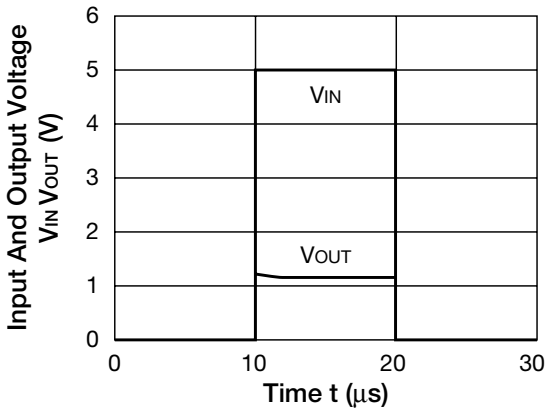
Dynamic Output Impedance



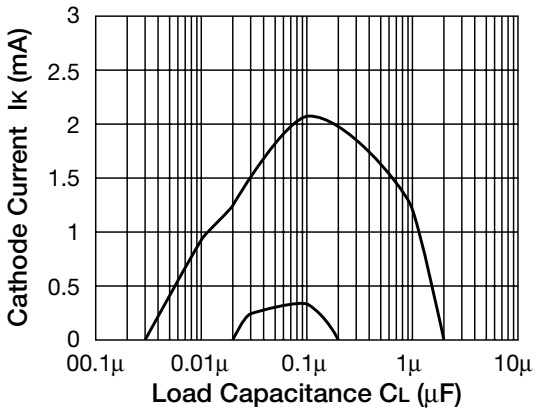
Open loop Voltage Gain · Phase



Pulse Response



Stability Boundary Conditions



Notes concerning stability operation region

The MM1431AT/AN requires external capasitors for regulator stability. These capacitors must be correctly selected for good performance.