

# LM385M3X-2.5-TP

## Precision Micro power Shunt Voltage Reference

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### Features

- Low Output Noise
- No Output Capacitor Required
- Tolerates Capacitive Loads
- Low Temperature Deviation: 4mV(typ)
- Low Temperature Coefficient of 100 ppm/°C (max)
- Fixed Reverse-Breakdown Voltages 2.5V
- Output Voltage Tolerance ( $\pm 0.3\%$ )
- Package appearance SOT23

### Applications

- Battery-Powered Equipment
- Data Acquisition Systems
- Precision Audio Components
- Instrumentation
- Process Control
- Energy Management
- Product Testing

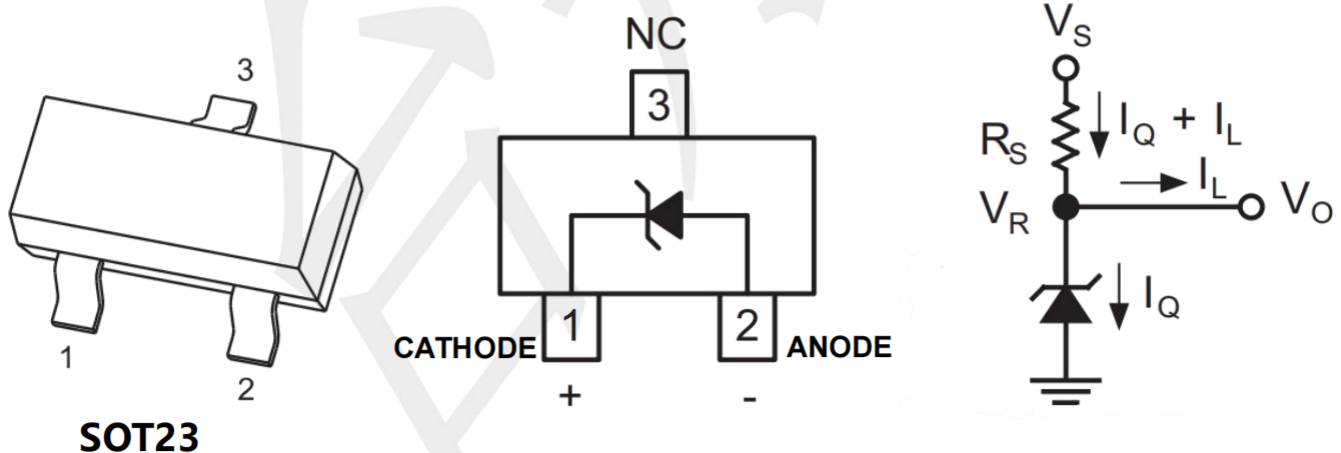
### General Description

This is a parallel voltage reference with diverse functions, easy to use, and suitable for Various applications. The pin fixed output device does not require external capacitors Operable and stable when working with all capacitive loads. Here Moreover, this benchmark has low dynamic impedance, low noise, and low temperature coefficient, which can Ensure stable output voltage within a wide range of operating currents and temperatures.

This is packaged in SOT23, which saves space,

The minimum current is 25  $\mu$  A (typical value), making it suitable for portable applications The ideal choice. Its rated operating temperature range is - 40 ° C to +125 ° C.

### Circuit diagram and pin information



Note : Pin NC is attached to substrate and must be connected to ANODE or open.

### Absolute Maximum Ratings

Within the range of  $T_A=25\text{ }^{\circ}\text{C}$  (unless otherwise specified)

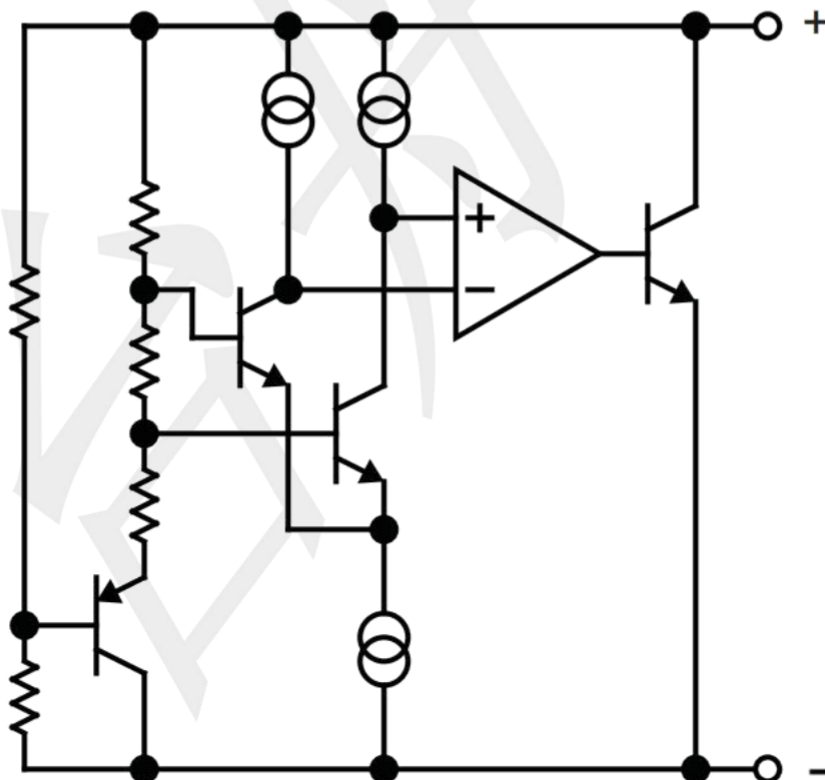
Parameter		Value	UNIT
$P_M$	Power Rating	0.25	W
$R_C$	Reverse Current	20	mA
$F_C$	Forward Current	10	mA
$T_{OA}$	Operating Ambient Temperature Range	$-40 \sim +125$	$^{\circ}\text{C}$
$T_J$	Operating virtual junction temperature	+150	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	$-55 \sim +150$	$^{\circ}\text{C}$
ESD	Human Body Model	6	KV
ESD	Machine Model	0.4	KV

(1) Exceeding the absolute maximum rated pressure listed may result in permanent damage to the equipment. These are only rated stresses and do not imply any of them or any of them

The functional operation of the equipment under his conditions (beyond the conditions indicated under the 'recommended working conditions'). Long term exposure to absolute maximum rated conditions can It can affect the reliability of the equipment.

(2) Unless otherwise specified, all voltage values are related to the anode.

### BLOCK DIAGRAM



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### Electrical Characteristics

( $I_R = 100\mu A$ ,  $T_A = T_{MIN}$  to  $T_{MAX}$ , unless otherwise noted. Typical values are at  $T_A = +25^\circ C$ .) (Note 1)

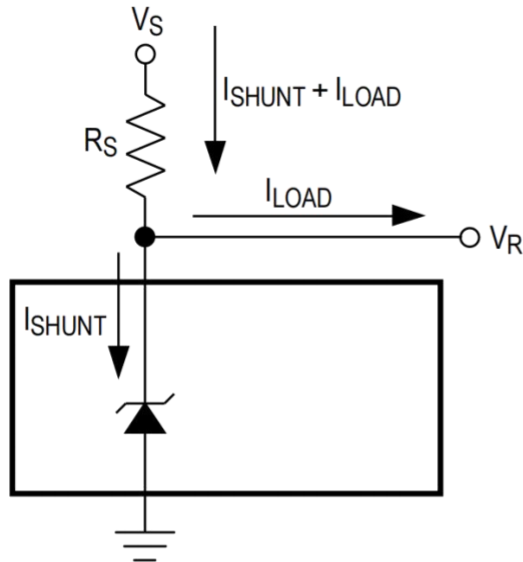
PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Reverse Breakdown Voltage	V <sub>R</sub>	T <sub>A</sub> = +25°C	(±0.3%)	2.4925	2.5000	2.5075	V
Reverse Breakdown Voltage Tolerance (Note 2)	V <sub>R</sub>			--	±4.0	±19	mV
Minimum Operating Current	I <sub>RMIN</sub>			--	25	65	μA
Average Reverse Voltage Temperature Coefficient (Notes 2 and 3)	ΔV <sub>R</sub> /ΔT	I <sub>R</sub> = 10mA		±20			ppm/°C
		I <sub>R</sub> = 1mA		--	±15	±100	
		I <sub>R</sub> = 100μA		±15			
Reverse Breakdown Voltage Change with Operating Current Change		I <sub>RMIN</sub> ≤ I <sub>R</sub> ≤ 1mA		--	0.3	1.0	mV
		1mA ≤ I <sub>R</sub> ≤ 15mA		--	2.5	8.0	
Reverse Dynamic Impedance (Note 3)	Z <sub>R</sub>	I <sub>R</sub> = 1mA, f = 120Hz, I <sub>AC</sub> = 0.1I <sub>R</sub>		--	0.3	0.8	Ω
Wide band Noise	e <sub>N</sub>	I <sub>R</sub> = 100μA, 10Hz ≤ f ≤ 10kHz		35			μV <sub>RMS</sub>
Reverse Breakdown Voltage Long-Term Stability	ΔV <sub>R</sub>	T = 1000h		120			ppm

**Note 1:** All devices are 100% production tested at  $T_A = +25^\circ C$  and are guaranteed by design for  $T_A = T_{MIN}$  to  $T_{MAX}$ , as specified.

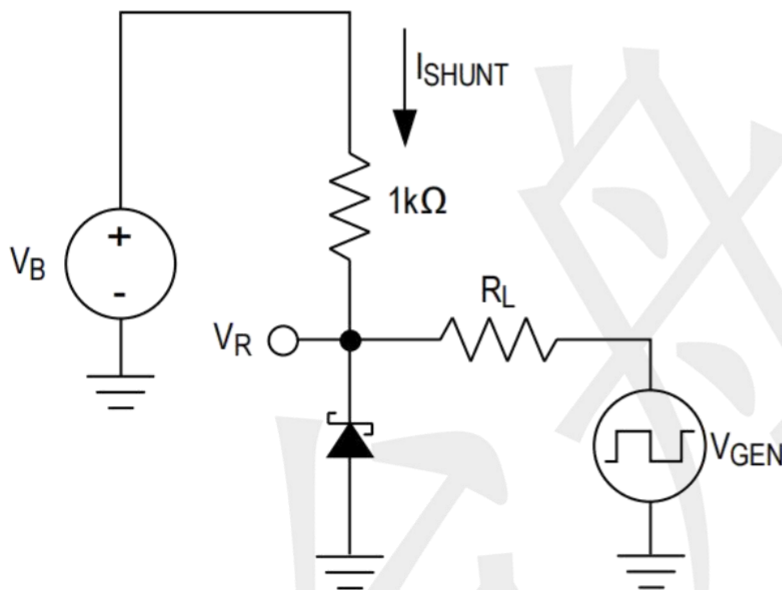
**Note 2:** The over temperature limit for Reverse Breakdown Voltage Tolerance is defined as the room-temperature Reverse Breakdown Voltage Tolerance  $\pm[(\Delta V_R / \Delta T)(\max \Delta T)(V_R)]$ , where  $\Delta V_R / \Delta T$  is the VR temperature coefficient,  $\max \Delta T$  is the maximum difference in temperature from the reference point of  $+25^\circ C$  to  $T_{MIN}$  or  $T_{MAX}$ , and  $V_R$  is the reverse breakdown voltage.

**Note 3:** Guaranteed by design.

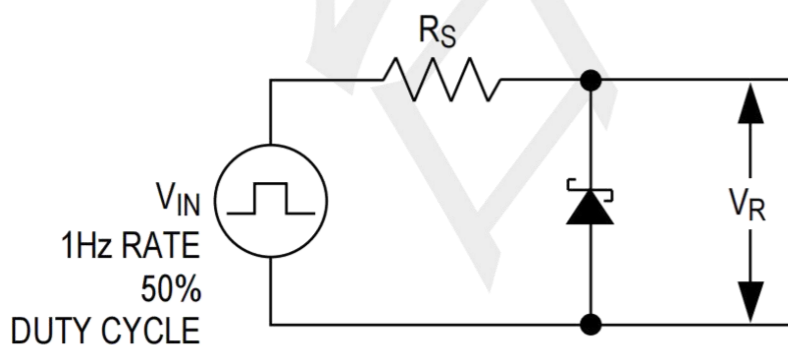
### Typical Application Circuits



Typical Operating Circuit



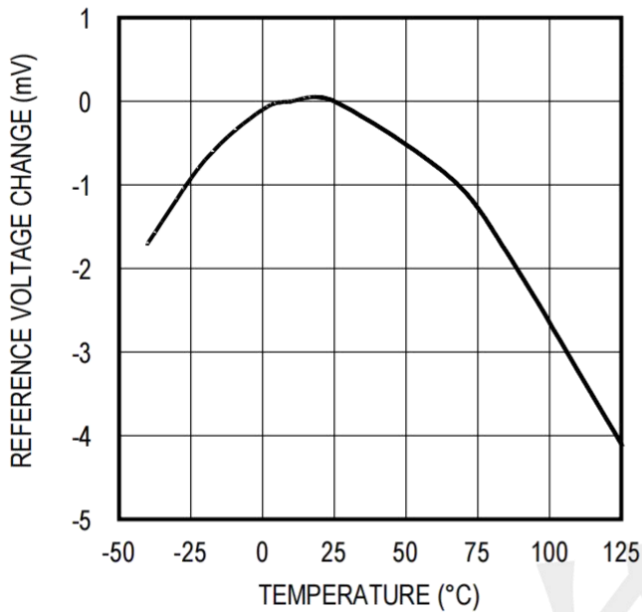
Load-Transient Test Circuit



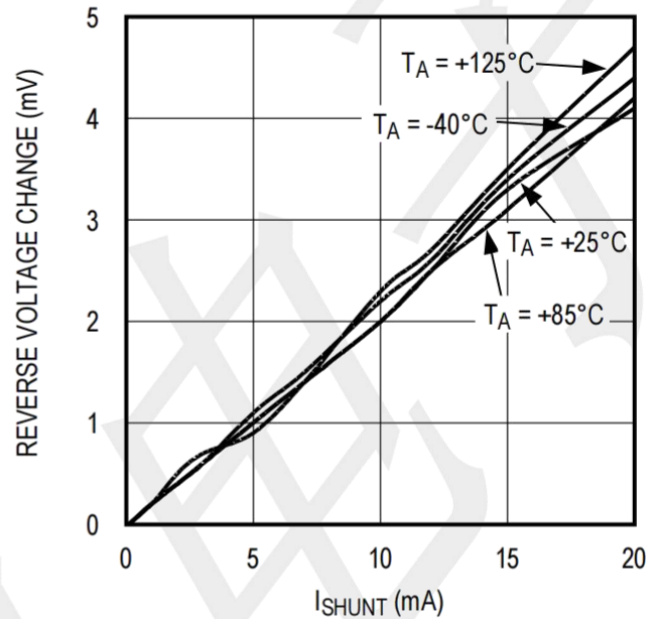
Startup Characteristics Test Circuit

### Typical Operating Characteristics

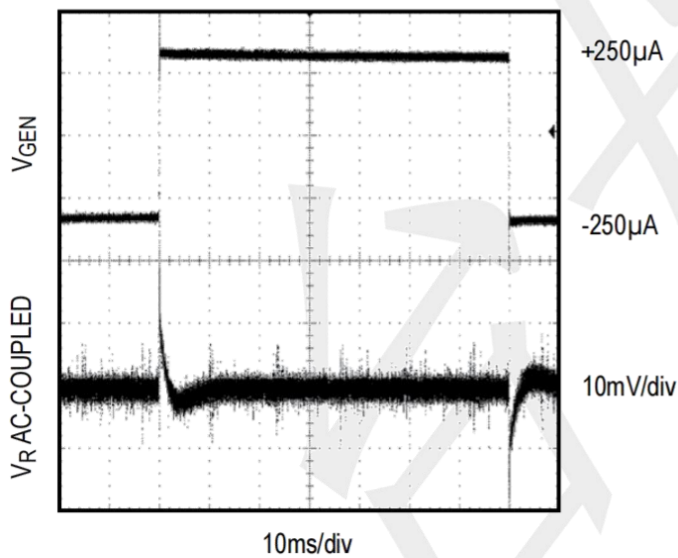
TEMPERATURE DRIFT



REVERSE VOLTAGE vs.  $I_{SHUNT}$

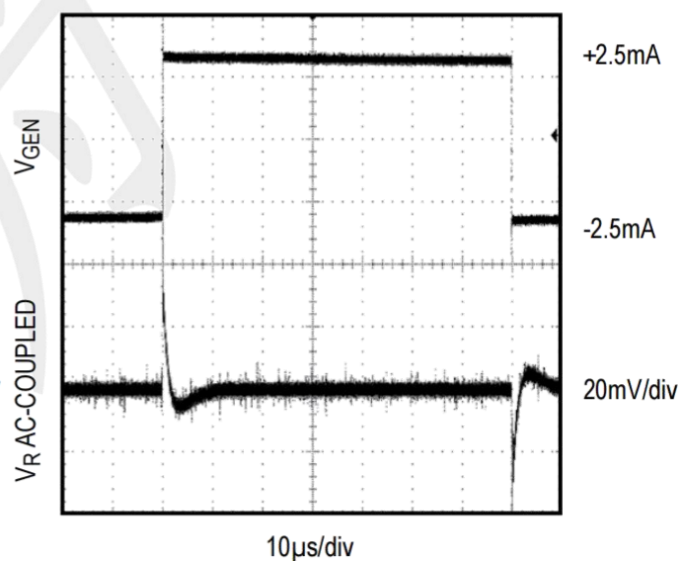


LOAD-TRANSIENT RESPONSE



$I_{SHUNT} = 1\text{mA} \pm 250\mu\text{A}$   
 $R_L = 10\text{k}\Omega$ , SEE FIGURE 1

LOAD-TRANSIENT RESPONSE

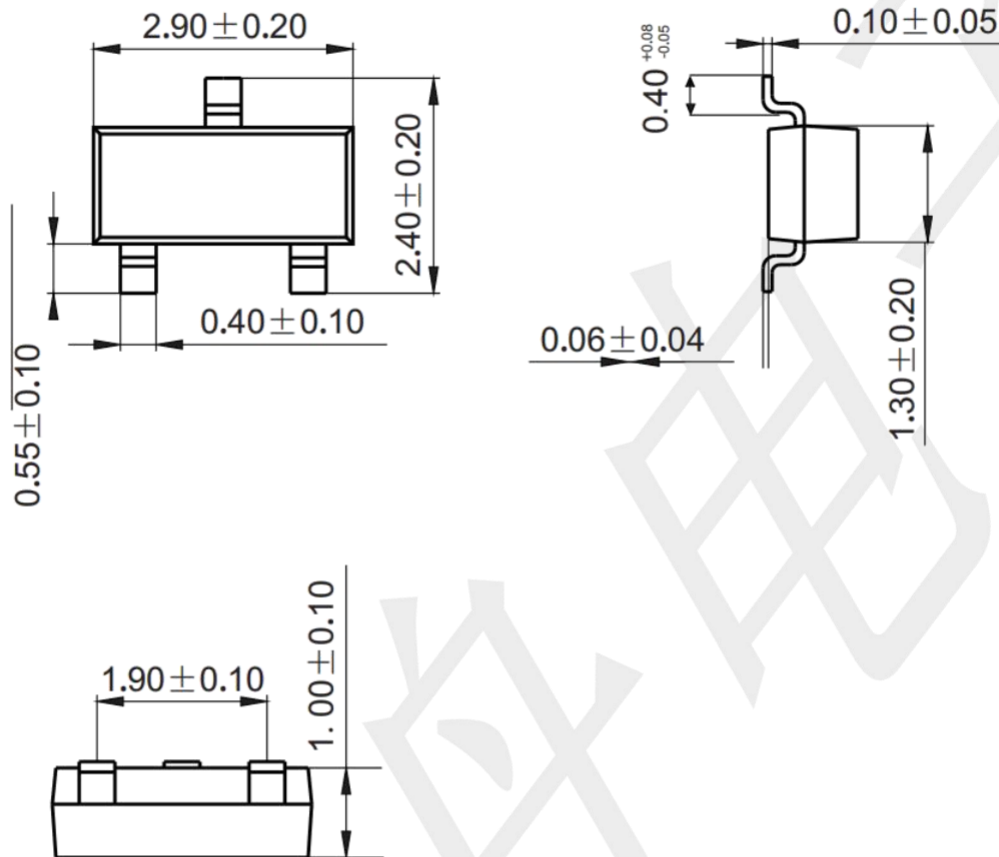


$I_{SHUNT} = 10\text{mA} \pm 2.5\text{mA}$   
 $R_L = 1\text{k}\Omega$ , SEE FIGURE 1



**Package Outline Dimensions (unit: mm)**

SOT23



**Mounting Pad Layout (unit: mm)**

