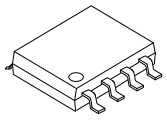
MICROPOWER VOLTAGE REFERENCE



SOP-8

■ DESCRIPTION

The UTC **M385** is a micropower voltage reference. This device features good temperature stability and extreme low dynamic impedance when it is operated over a 10μA to 20mA current. Low noise and good long-term stability are achieved because the UTC **M385** bandgap reference applies only bipolar transistors and resistors.

The UTC **M385** can be used in almost any reference application due to the exceptional tolerance of capacitive loading. This voltage reference can be applied in portable meters, regulators, or general-purpose analog circuitry with battery life approaching shelf life. The wide dynamic operating range contributes to its use with widely varying supplies with excellent regulation. The low power drain of the UTC **M385** is useful for micropower circuitry. On-chip trimming gives it the tight voltage tolerance. Furthermore, the wide operating current can replace older references with a tighter tolerance.

The UTC **M385** can be used in such applications, for example, portable and battery-powered equipment, instrumentation, process control, energy management, product testing, automotive, precision audio components, and so on.

■ FEATURES

* Initial tolerance: 1%
* Operating current range:10μA~20mA
* Low temperature coefficient
* Low voltage reference
* Halogen free

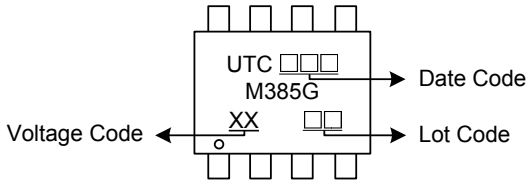
■ ORDERING INFORMATION

Ordering Number	Package	Packing
M385G-xx-S08-R	SOP-8	Tape Reel

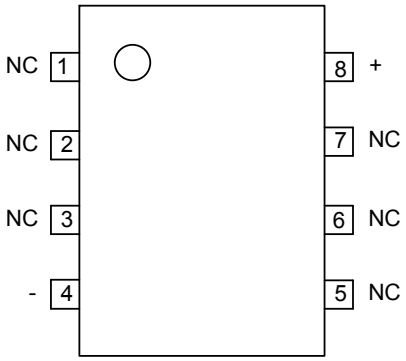
Note: xx: Output Voltage, refer to Marking Information.

M385G-xx-S08-R (1)Packing Type (2)Package Type (3)Output Voltage Code (4)Halogen Free	(1) R: Tape Reel (2) S08: SOP-8 (3) xx: Refer to Marking Information (4) G: Halogen Free

■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOP-8	12: 1.2V 25: 2.5V	

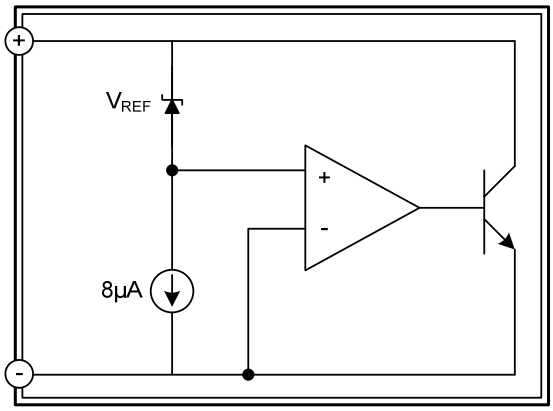
■ PIN CONNECTIONS



■ PIN DESCRIPTIONS

PIN NO.	PIN NAME	PIN FUNCTION
1	NC	Not connected
2	NC	Not connected
3	NC	Not connected
4	-	Pin-sources current for normal application, the current value is the same as Pin+
5	NC	Not connected
6	NC	Not connected
7	NC	Not connected
8	+	Sinks current with a range from 20μA to 20mA for normal applications, a stable positive voltage, relative to Pin-, occurs on Pin-

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Reverse Current	I_R	30	mA
Forward Current	I_F	10	mA
Junction Temperature	T_J	125	°C
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +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.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

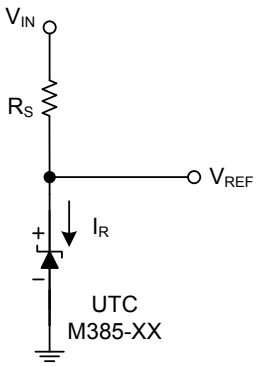
LM385-1.2V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Reverse Breakdown Voltage	V_R	I_R=100μA	1.222	1.235	1.248	V
Reverse Breakdown Voltage Charge with Current	ΔV_R	10μA<I_R<1mA			1	mV
		1mA <I_R<20mA			20	mV
Reverse Dynamic Impedance	Z_R	I_R =100μA ,f=20Hz			1	Ω
Minimum Operating Current	$I_{R(MIN)}$			8	15	μA
Wideband Noise	e_N	I_R =100μA,10Hz≤f≤10KHz		60		μVrms
Average Temperature Coefficient	αV_R	I_R =100μA		100		ppm/°C
Long Term Stability	$\frac{\Delta V_R}{\Delta t}$	I_R =100μA, T=1000Hrs, Ta=25°C		20		ppm

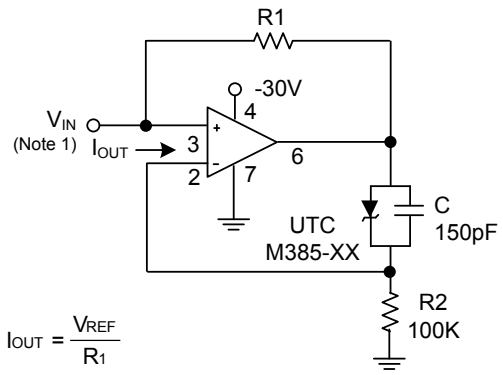
LM385-2.5V

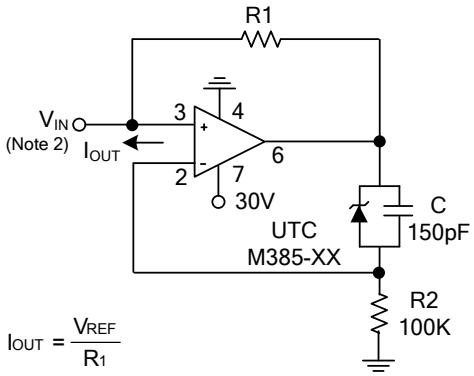
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Reverse Breakdown Voltage	V_R	I_R=100μA	2.475	2.5	2.525	V
Reverse Breakdown Voltage Charge with Current	ΔV_R	10μA<I_R<1mA			1	mV
		1mA <I_R<20mA			20	mV
Reverse Dynamic Impedance	Z_R	I_R =100μA ,f=20Hz			1	Ω
Minimum Operating Current	$I_{R(MIN)}$			8	15	μA
Wideband Noise	e_N	I_R =100μA,10Hz≤f≤10KHz		60		μVrms
Average Temperature Coefficient	αV_R	I_R =100μA		100		ppm/°C
Long Term Stability	$\frac{\Delta V_R}{\Delta t}$	I_R =100μA, T=1000Hrs, Ta=25°C		20		ppm

■ TEST CIRCUIT

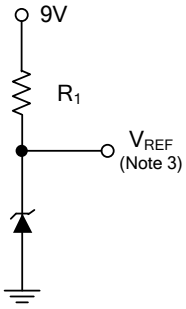


■ APPLICATION CIRCUITS

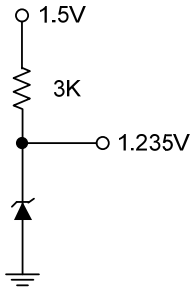




Precision 1μA to 1mA Current Source



Micropower Reference from 9V Battery



Reference from 1.5V Battery (Only for M385-1.2V)

Notes: 1. V_{REF}=1.235V, -2.3V≤V+≤-27V, V_{REF}=2.5V, -3.7≤V+≤-27V
2. V_{REF}=1.235V, 2.3V≤V+≤27V, V_{REF}=2.5V, 3.7≤V+≤27V
3. V_{REF}=1.235V, R1=900KΩ, V_{REF}=2.5V, R1=220KΩ