

1. DESCRIPTION

The XL285-1.2,XT285-1.2,XL385-1.2,XT385-1.2,XB385M3-1.2 are micropower 2-terminal band-gap voltage regulator diodes. Operating over a 10 μ A to 20mA current range, they feature exceptionally low dynamic impedance and good temperature stability. On-chip trimming is used to provide tight voltage tolerance.

2. FEATURES

- $\pm 1\%$ and 2% Initial Tolerance
- Operating Current of 10 μ A to 20mA
- 1 Ω Dynamic Impedance
- Low Temperature Coefficient
- Low Voltage Reference—1.235V

3. CONNECTION DIAGRAM

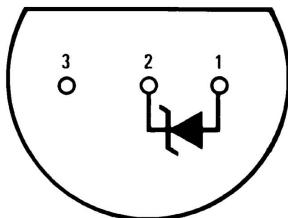


Figure 1.T0-92

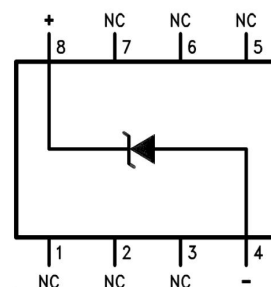
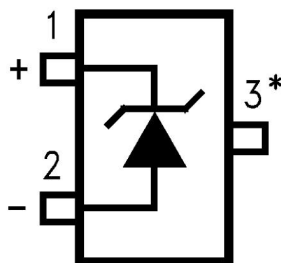


Figure 3. SOP8



* Pin 3 is attached to the Die Attach Pad (DAP) and should be connected to Pin 2 or left floating.

Figure 2. SOT23-3

4. ELECTRICAL CHARACTERISTICS

Parameter	Conditions	Typ	XL385-1.2		XL385-1.2		XL385-1.2		Units (Limit)
			Tested Limit (2) (3)	Design Limit (4)	Tested Limit (2)	Design Limit (4)	Tested Limit (2)	Design Limit (4)	
Reverse Breakdown Voltage	$T_A = 25^{\circ}\text{C}$, $10\mu\text{A} \leq I_R \leq 20\text{mA}$	1.23 5	1.223		1.223		1.205		V(Min)
			1.247		1.247		1.260		V(Max)
Minimum Operating Current		8	10	20	15	20	15	20	μA
	XL385-1.2						10	15	(Max)
Reverse Breakdown Voltage Change with Current	$10\mu\text{A} \leq I_R \leq 1\text{mA}$		1	1.5	1	1.5	1	1.5	mV (Max)
	$1\text{mA} \leq I_R \leq 20\text{mA}$		10	20	20	25	20	25	mV (Max)
Reverse Dynamic Impedance	$I_R = 100\mu\text{A}$, $f = 20\text{Hz}$	1							Ω
Wideband Noise (rms)	$I_R = 100\mu\text{A}$, $10\text{Hz} \leq f \leq 10\text{kHz}$	60							μV
Long Term Stability	$I_R = 100\mu\text{A}$, $T = 1000\text{Hr}$, $T_A = 25^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$	20							ppm
Average Temperature Coefficient (5)	$I_R = 100\mu\text{A}$								
	X Suffix		30		30				ppm/ $^{\circ}\text{C}$
	Y Suffix		50		50				ppm/ $^{\circ}\text{C}$
	All Others			150		150		150	ppm/ $^{\circ}\text{C}$ (Max)

- (1) Parameters identified with boldface type apply at temperature extremes. All other numbers apply at $T_A = T_J = 25^{\circ}\text{C}$.
(2) Production tested.
(3) Specified by design. Not production tested. These limits are not used to calculate average outgoing quality levels.
(4) The average temperature coefficient is defined as the maximum deviation of reference voltage at all measured temperatures between the operating T_{MAX} and T_{MIN} , divided by $T_{\text{MAX}} - T_{\text{MIN}}$. The measured temperatures are -55°C , -40°C , 0°C , 25°C , 70°C , 85°C , 125°C .

5. THERMAL CHARACTERISTICS

Thermal Resistance	TO-92	SOP	SOT-23
θ_{JA} (junction to ambient)	180 $^{\circ}\text{C/W}$ (0.4" leads) 170 $^{\circ}\text{C/W}$ (0.125" leads)	165 $^{\circ}\text{C/W}$	283 $^{\circ}\text{C/W}$
θ_{JC} (junction to case)	N/A	N/A	N/A

6. TYPICAL PERFORMANCE CHARACTERISTICS

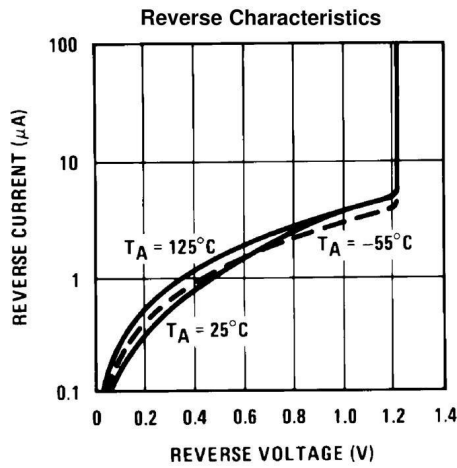


Figure 4.

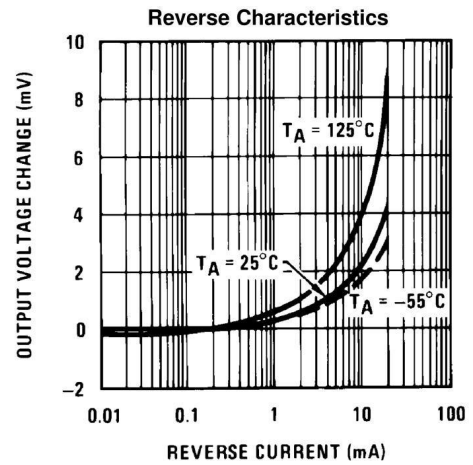


Figure 5.

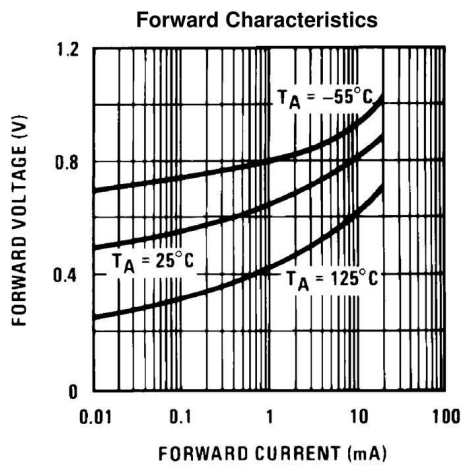


Figure 6.

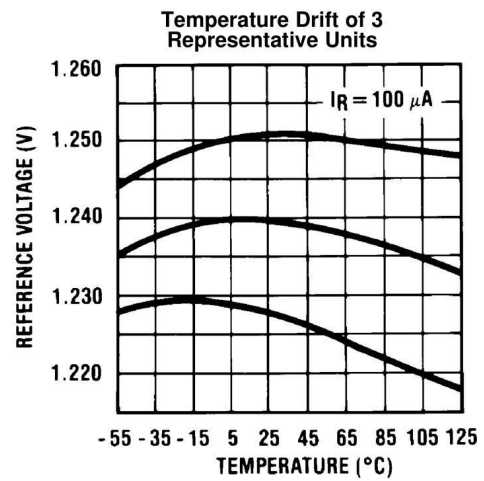


Figure 7.

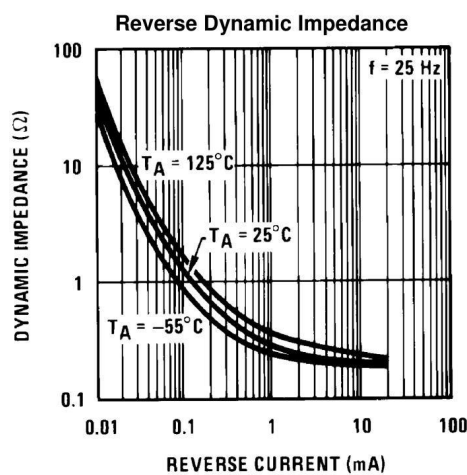


Figure 8.

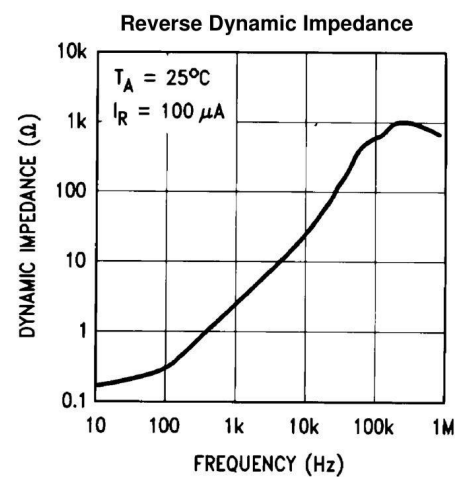


Figure 9.

TYPICAL PERFORMANCE CHARACTERISTICS(continued)

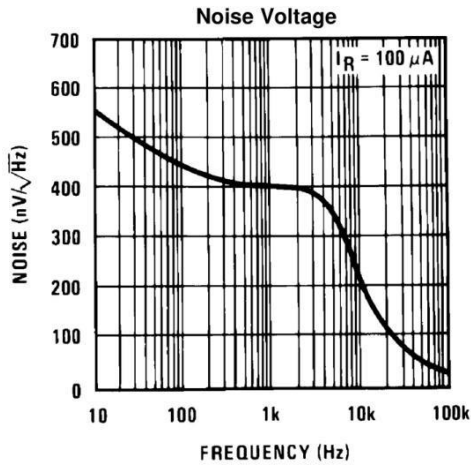


Figure 10.

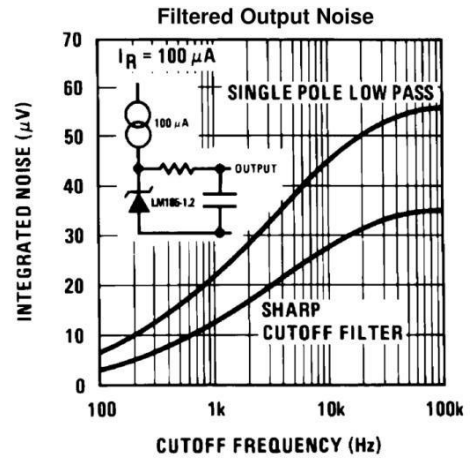


Figure 11.

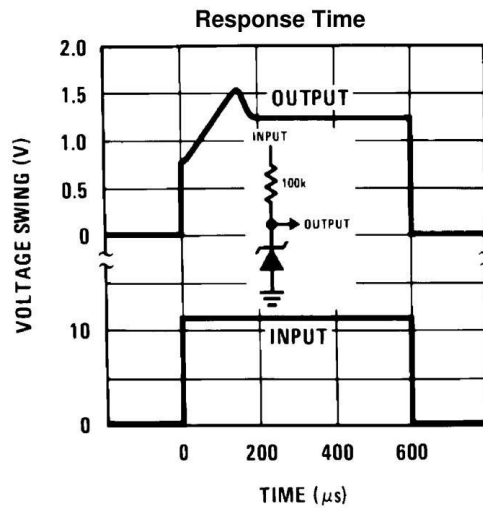


Figure 12.

7. TYPICAL PERFORMANCE CHARACTERISTICS

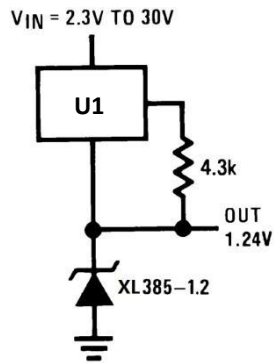


Figure 13. Wide Input Range Reference

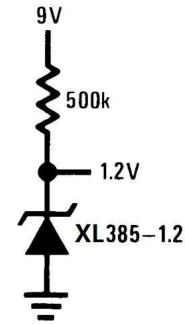


Figure 14. Micropower Reference from 9V Battery

Note 1: U1 uses a constant current source IC, such as an LM334 or equivalent.

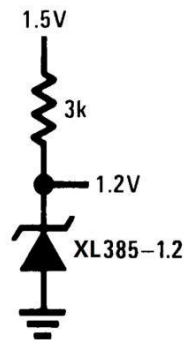
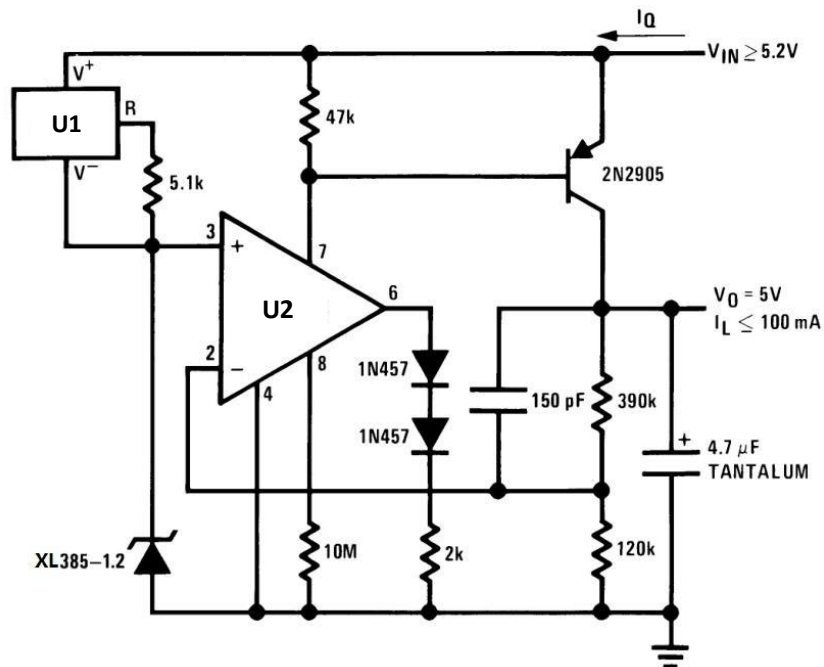


Figure 15. Reference from 1.5V Battery



* $I_Q = 30 \mu A$

Note 2: U2 uses a constant current source IC, such as an LM4250C or equivalent.

Figure 16. Micropower*5V Regulator

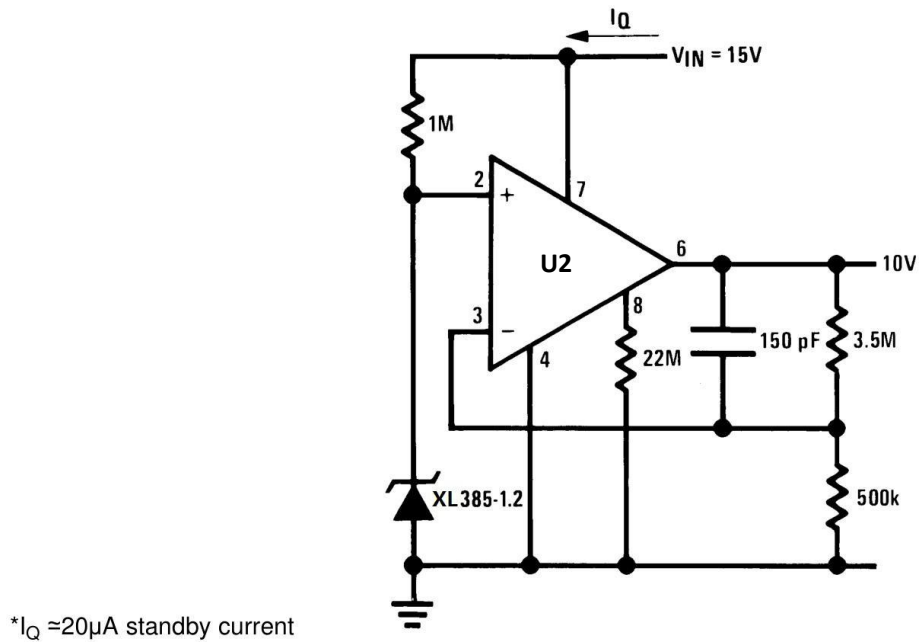


Figure 17. Micropower* 10V Reference

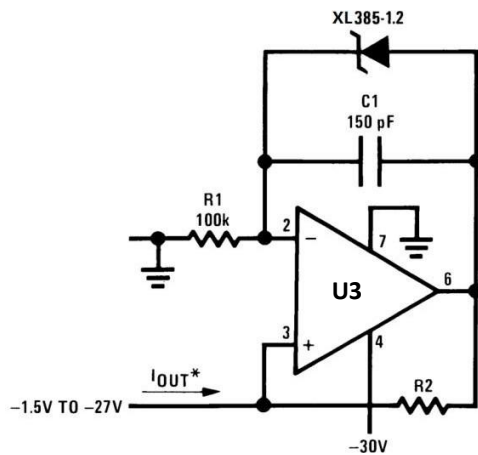


Figure 18.

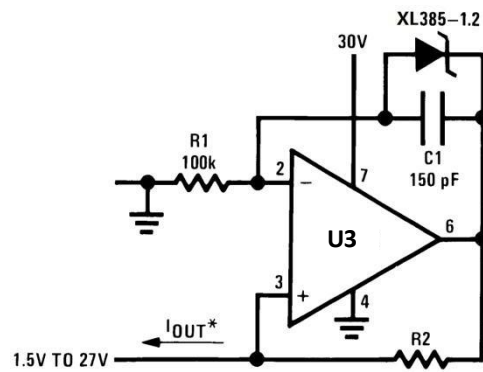


Figure 19. Precision $1\mu A$ to $1mA$ Current Sources

Note 3: U3 uses a constant current source IC, such as an LM312 or equivalent.

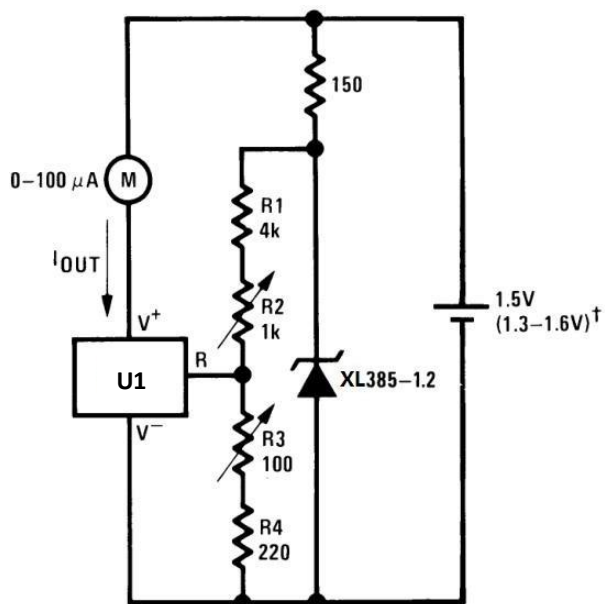


Figure 20.0°C-100°C Thermometer

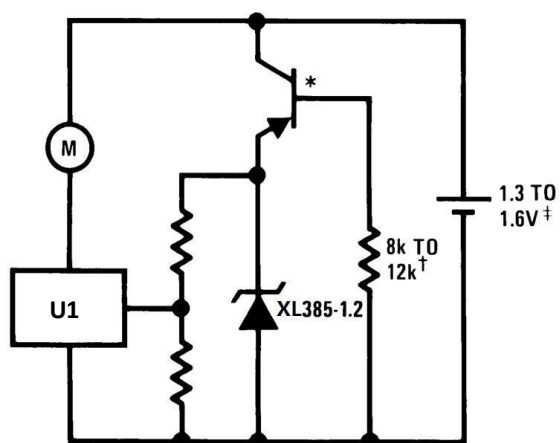


Figure 21. Lower Power Thermometer

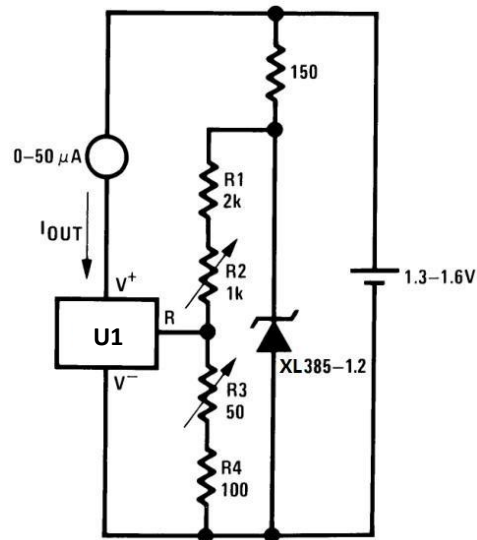


Figure 22. 0°F–50°F Thermometer

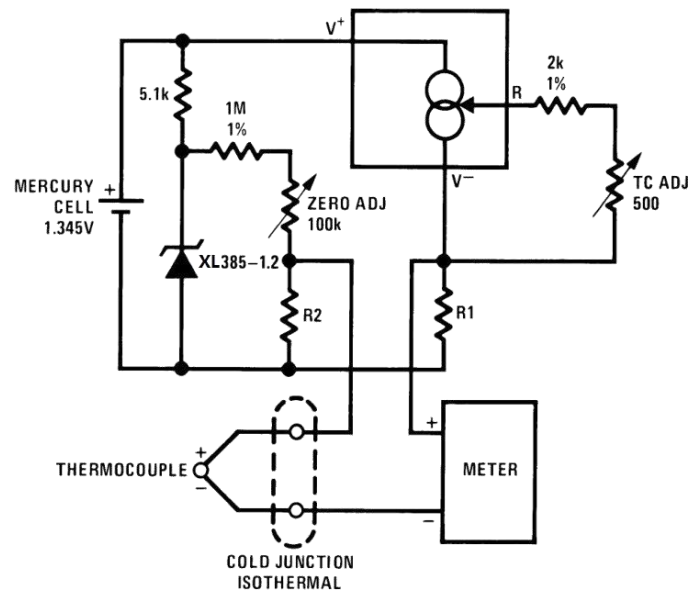


Figure 23. Micropower Thermocouple Cold Junction Compensator

Thermocouple	Seebeck	R1	R2	Voltage	Voltage
Type	Coefficient	(Ω)	(Ω)	Across R1	Across R2
	($\mu\text{V}/^\circ\text{C}$)			@ 25 $^\circ\text{C}$	(mV)
				(mV)	
J	52.3	523	1.24k	15.60	14.32
T	42.8	432	1k	12.77	11.78
K	40.8	412	953 Ω	12.17	11.17
S	6.4	63.4	150 Ω	1.908	1.766

Typical supply current 50 μA

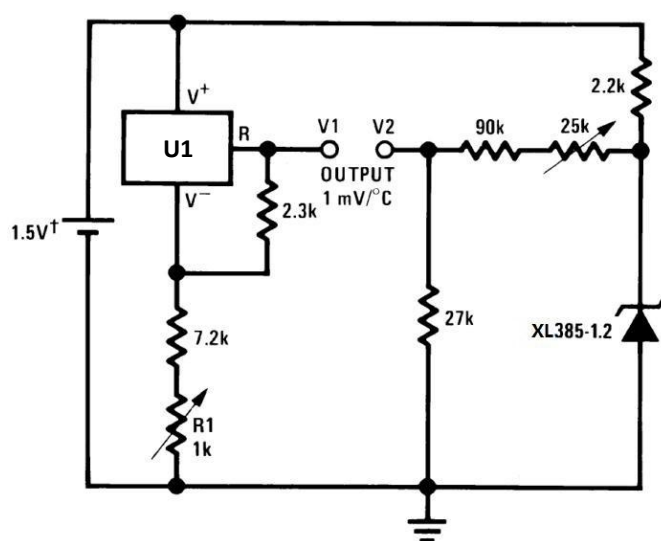
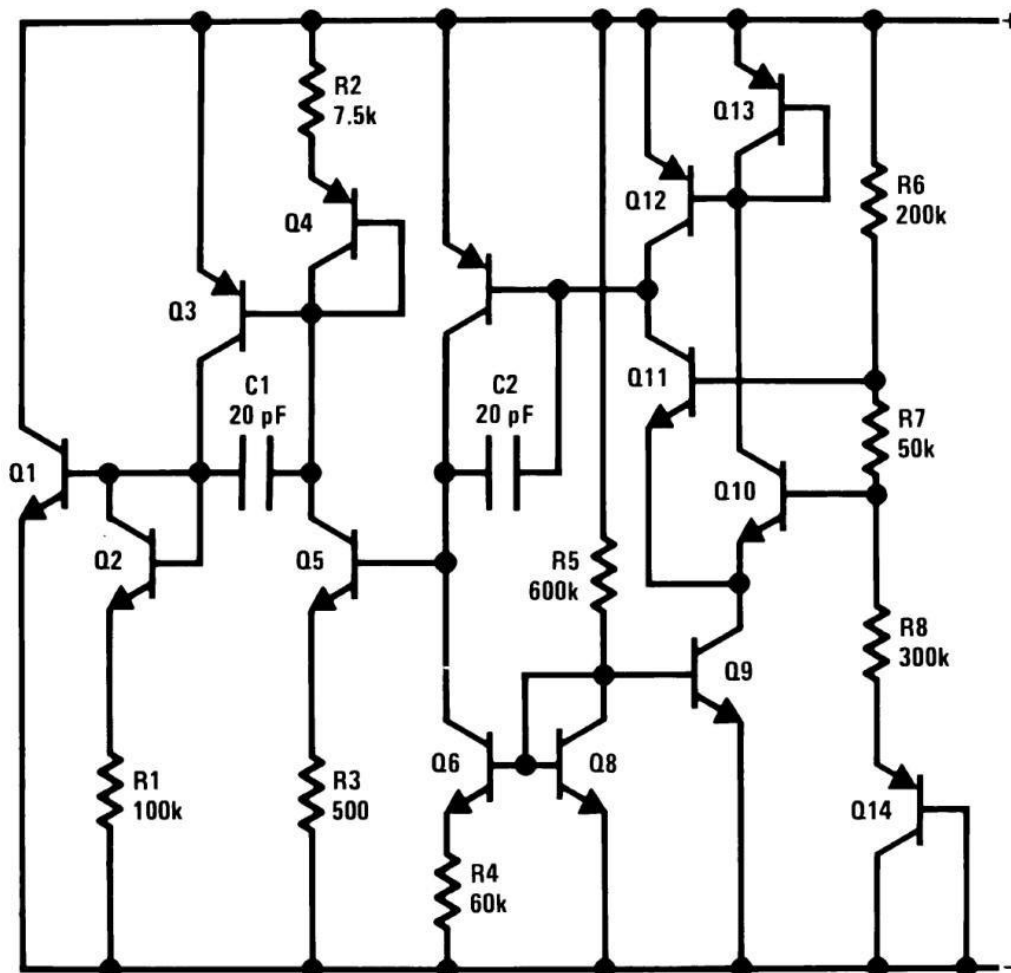


Figure 24. Centigrade Thermometer

8. SCHEMATIC DIAGRAM

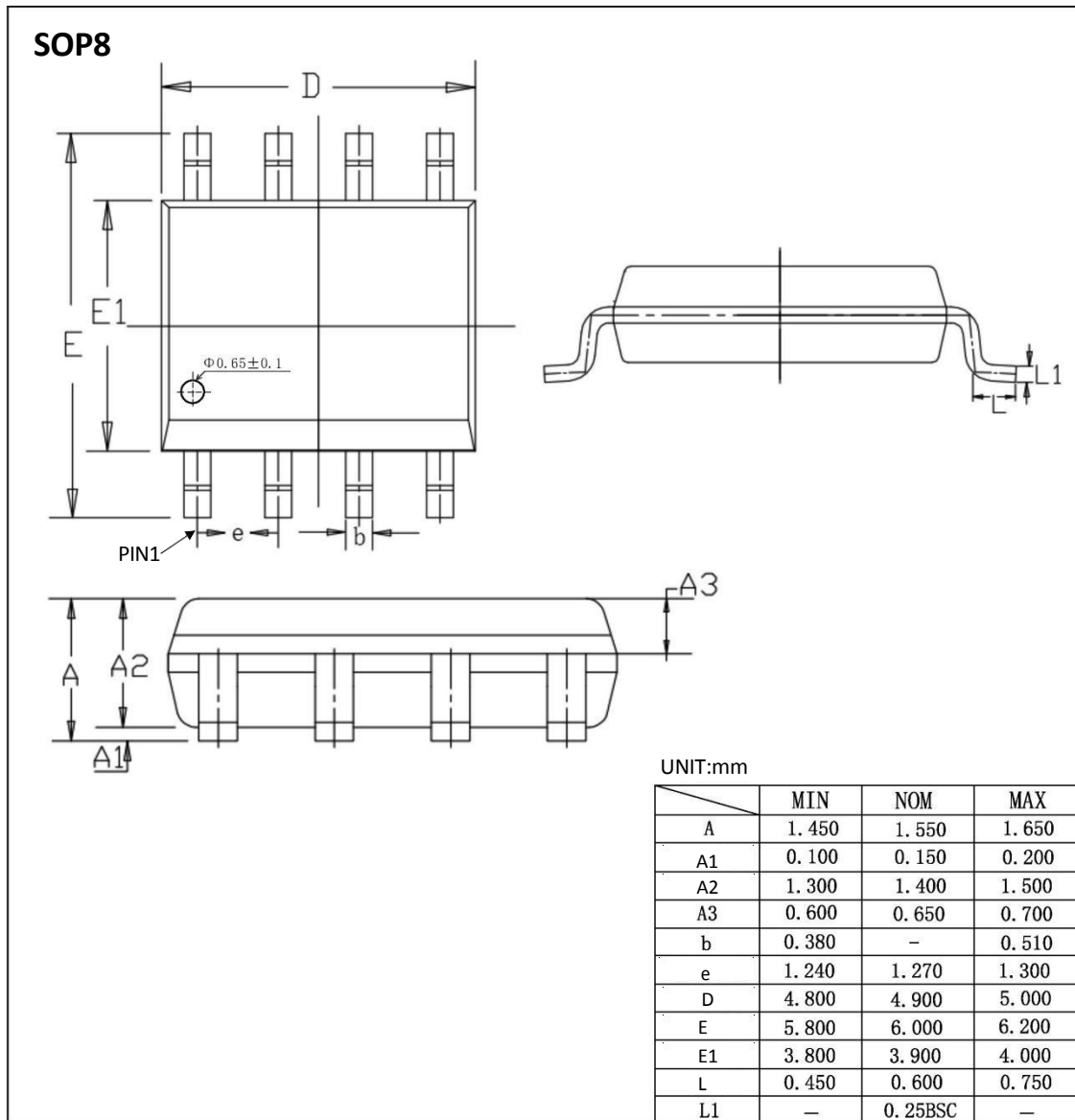


9. ORDERING INFORMATION

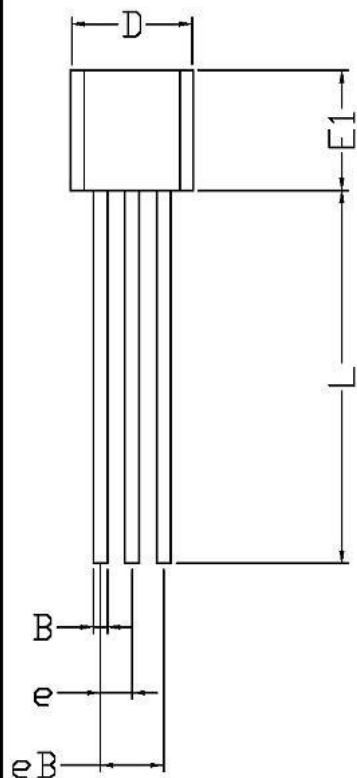
Ordering Information

Part Number	Device Marking	Package Type	Body size (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XL285-1.2	XL285-1.2	SOP8	4.90 * 3.90	- 40 to 85	MSL3	T&R	2500
XT285-1.2	XT285-1.2	TO-92	4.58 * 4.58	- 40 to 85	MSL3	T&R	1000
XL385-1.2	XL385-1.2	SOP8	4.90 * 3.90	- 40 to 85	MSL3	T&R	2500
XT385-1.2	XT385-1.2	TO-92	4.58 * 4.58	- 40 to 85	MSL3	T&R	1000
XB385M3-1.2	R11	SOT23-3	2.90 * 1.30	- 40 to 85	MSL3	T&R	3000

10. DIMENSIONAL DRAWINGS

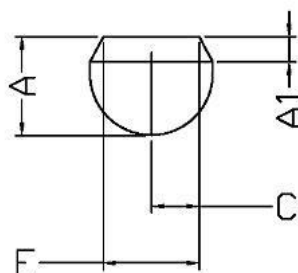


T0-92

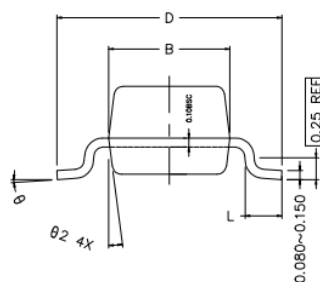
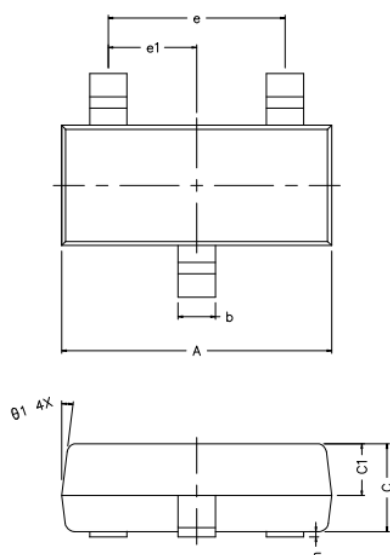


SYMBOL	MIN	MAX
A	3.46	3.96
A1	1.02 TYP	
B	0.36	0.56
C	1.80 TYP	
D	4.33	4.83
E1	4.33	4.83
E	3.35	3.85
eB	2.54 TYP	
e	1.27 TYP	
L	13.97	14.97

UNIT: mm



SOT-233



COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A	2.800	2.900	3.100
B	1.200	1.300	1.400
C	0.800	0.900	1.000
C1	0.500	0.550	0.600
D	2.250	2.400	2.550
L	0.300	0.400	0.500
h	0.005	0.050	0.100
b	0.300	0.400	0.500
e	1.90 TYPE		
e1	0.95 TYPE		
θ ₁	7° TYPE		
θ ₂	7° TYPE		
θ	0° ~ 7°		

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