

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

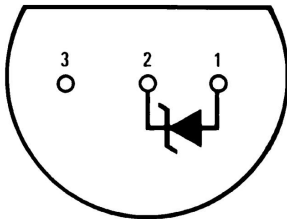


Figure 1. T0-92

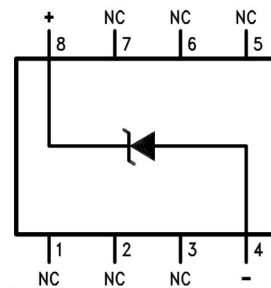
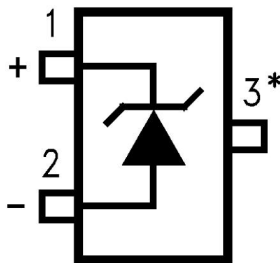


Figure 3. SOP8



* 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°C, 10μA ≤ I _R ≤ 20mA	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	10μA ≤ I _R ≤ 1mA		1	1.5	1	1.5	1	1.5	mV (Max)
	1mA ≤ I _R ≤ 20mA		10	20	20	25	20	25	mV (Max)
Reverse Dynamic Impedance	I _R = 100μA, f = 20Hz	1							Ω
Wideband Noise (rms)	I _R = 100μA, 10Hz ≤ f ≤ 10kHz	60							μV
Long Term Stability	I _R = 100μA, T = 1000 Hr, T _A = 25°C ±0.1°C	20							ppm
Average Temperature Coefficient ⁽⁵⁾	I _R = 100μA								
	X Suffix		30		30				ppm/°C
	Y Suffix		50		50				ppm/°C
	All Others			150		150		150	ppm/°C (Max)

- (1) Parameters identified with boldface type apply at temperature extremes. All other numbers apply at T_A = T_J = 25°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_{MAX} - T_{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°C/W (0.4" leads) 170°C/W (0.125" leads)	165°C/W	283°C/W
θ _{JC} (junction to case)	N/A	N/A	N/A

6. TYPICAL PERFORMANCE CHARACTERISTICS

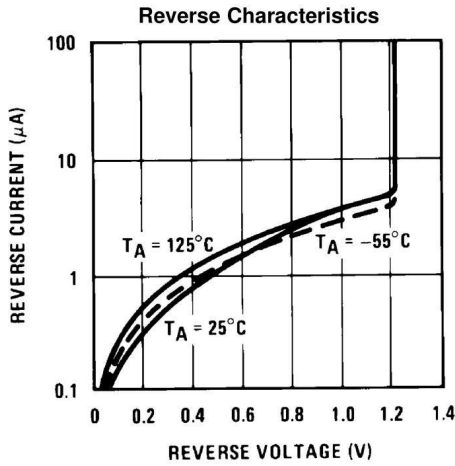


Figure 4.

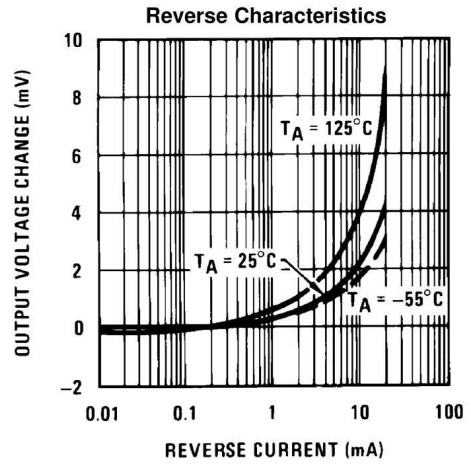


Figure 5.

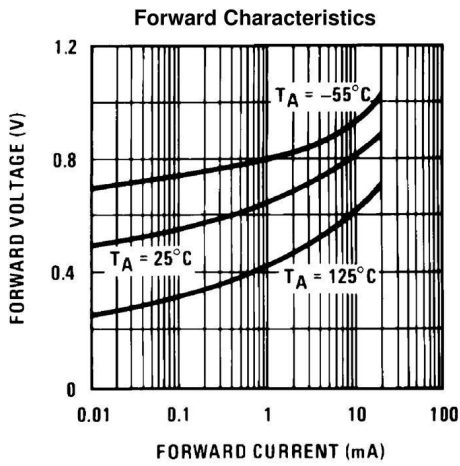


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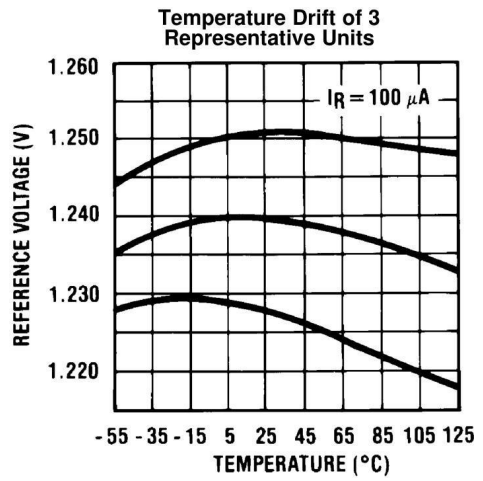


Figure 7.

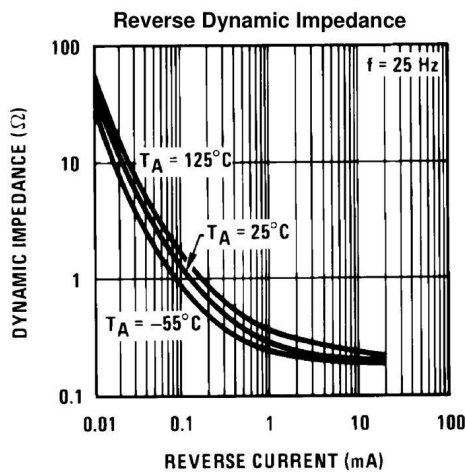


Figure 8.

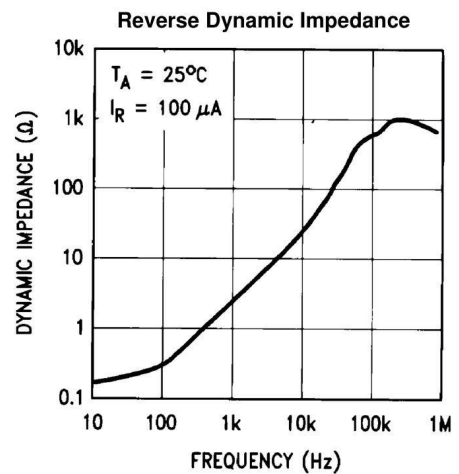


Figure 9.

TYPICAL PERFORMANCE CHARACTERISTICS(continued)

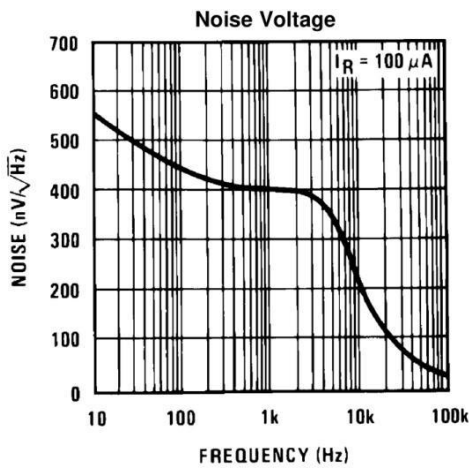


Figure 10.

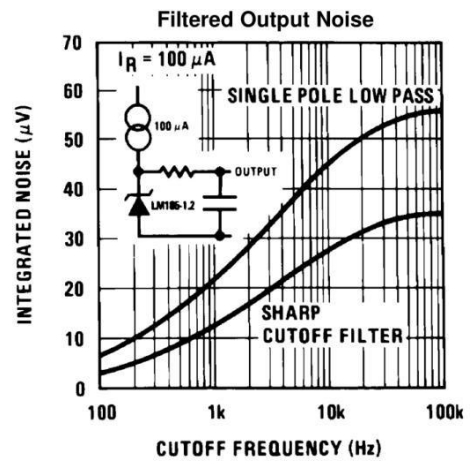


Figure 11.

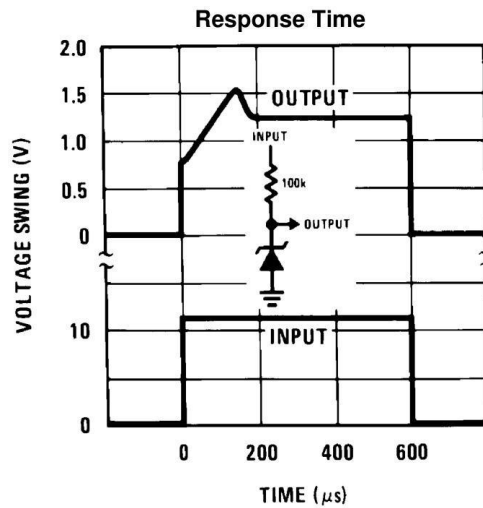


Figure 12.

7. TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = 2.3V \text{ TO } 30V$

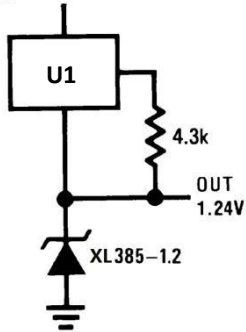


Figure 13. Wide Input Range Reference

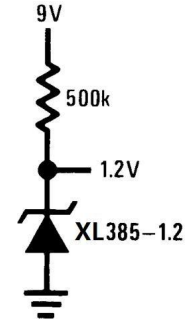


Figure 14. Micropower Reference from 9V Battery

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

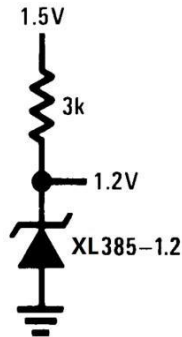
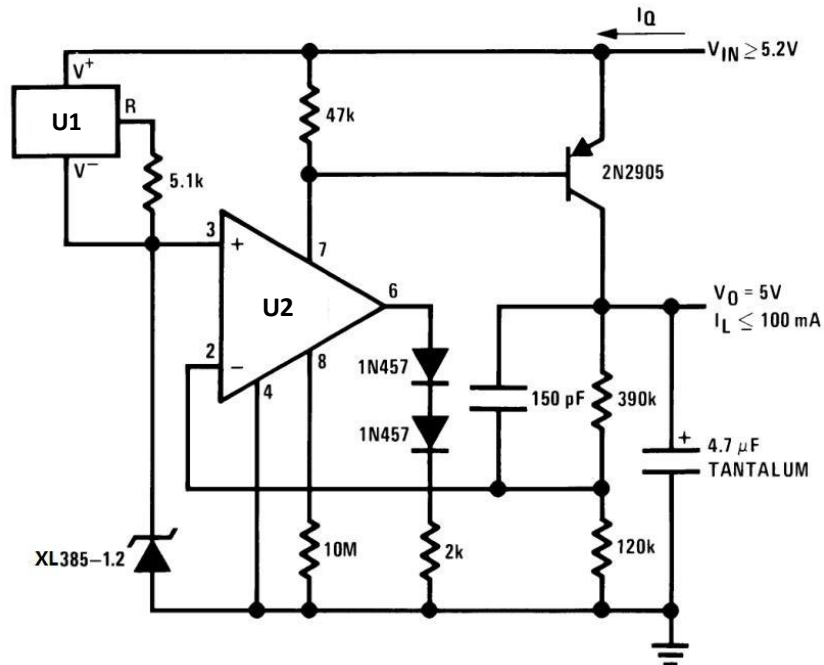


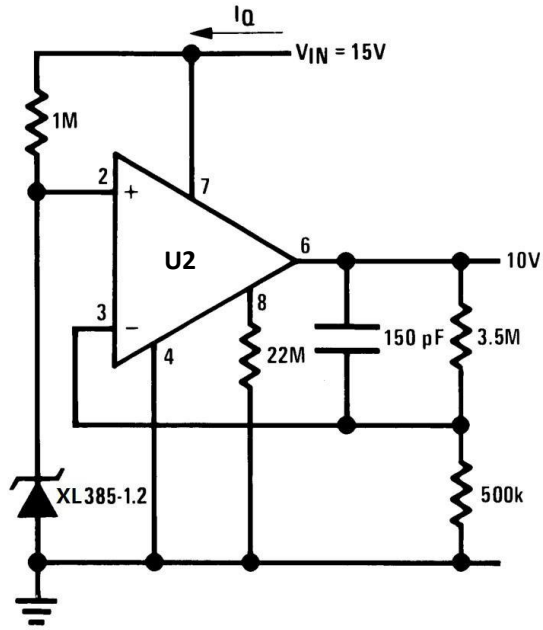
Figure 15. Reference from 1.5V Battery



* $I_Q = 30\mu A$

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

Figure 16. Micropower*5V Regulator



* $I_Q \approx 20\mu A$ standby current

Figure 17. Micropower* 10V Reference

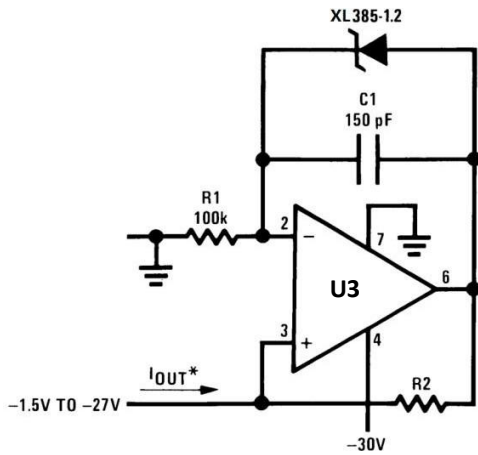


Figure 18.

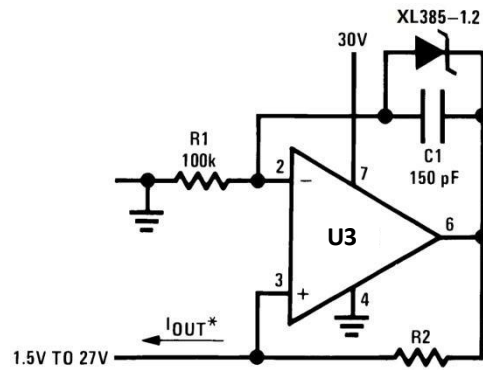


Figure 19. Precision $1\mu A$ to 1mA Current Sources

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

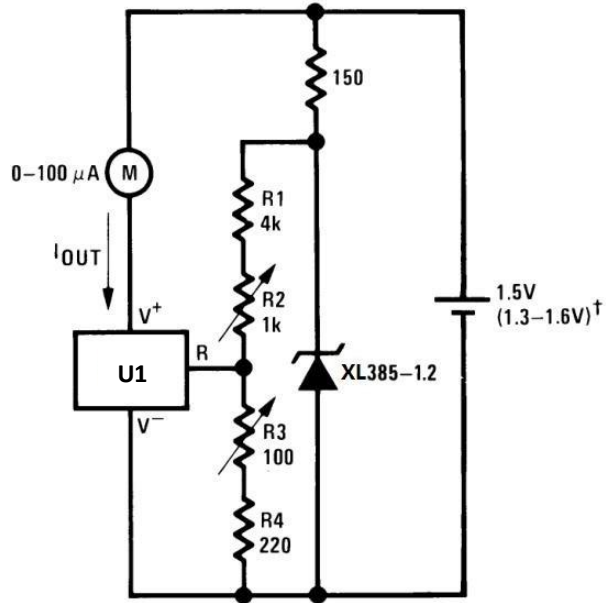


Figure 20.0°C-100°C Thermometer

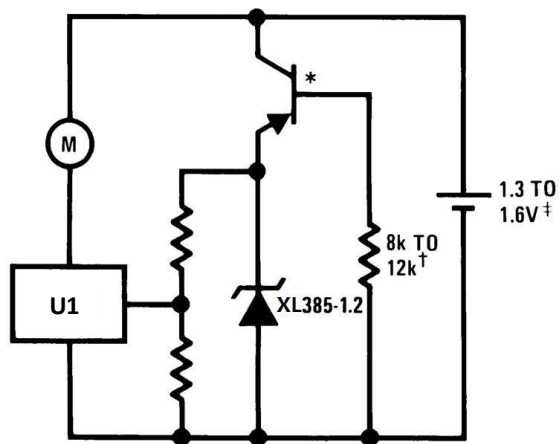


Figure 21. Lower Power Thermometer

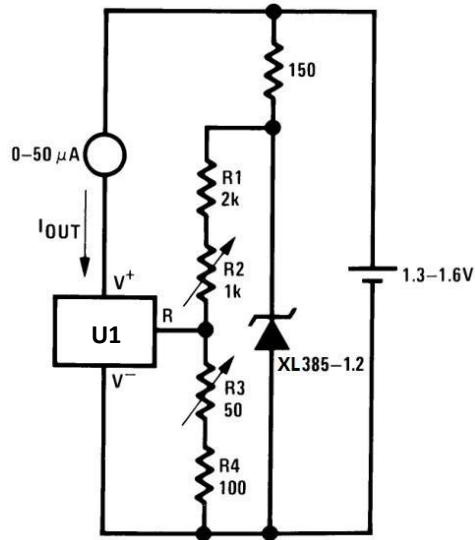


Figure 22. 0°F-50°F Thermometer

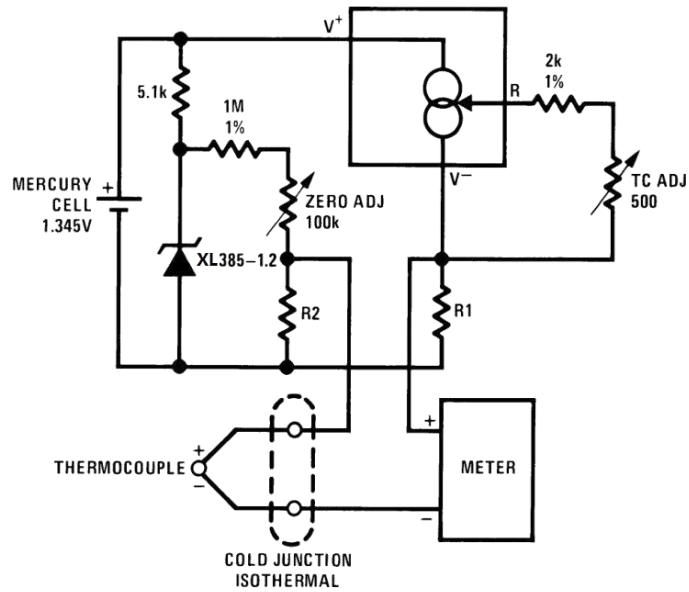


Figure 23. Micropower Thermocouple Cold Junction Compensator

Thermocouple Type	Seebeck Coefficient ($\mu\text{V}/^\circ\text{C}$)	R1 (Ω)	R2 (Ω)	Voltage Across R1 @ 25°C (mV)	Voltage Across R2 (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

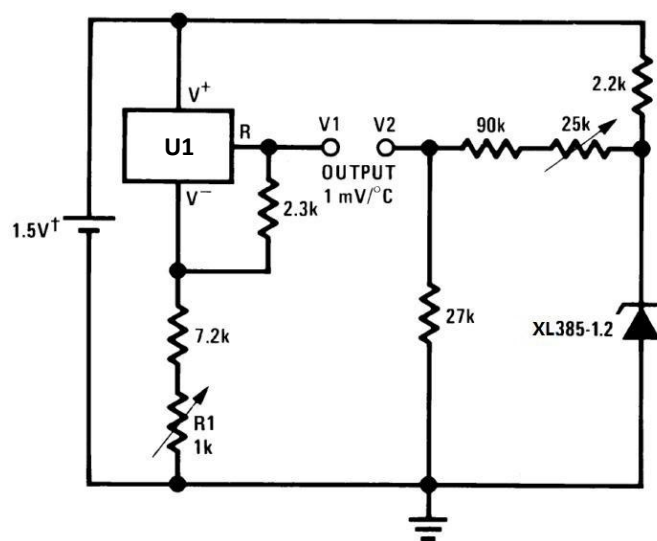
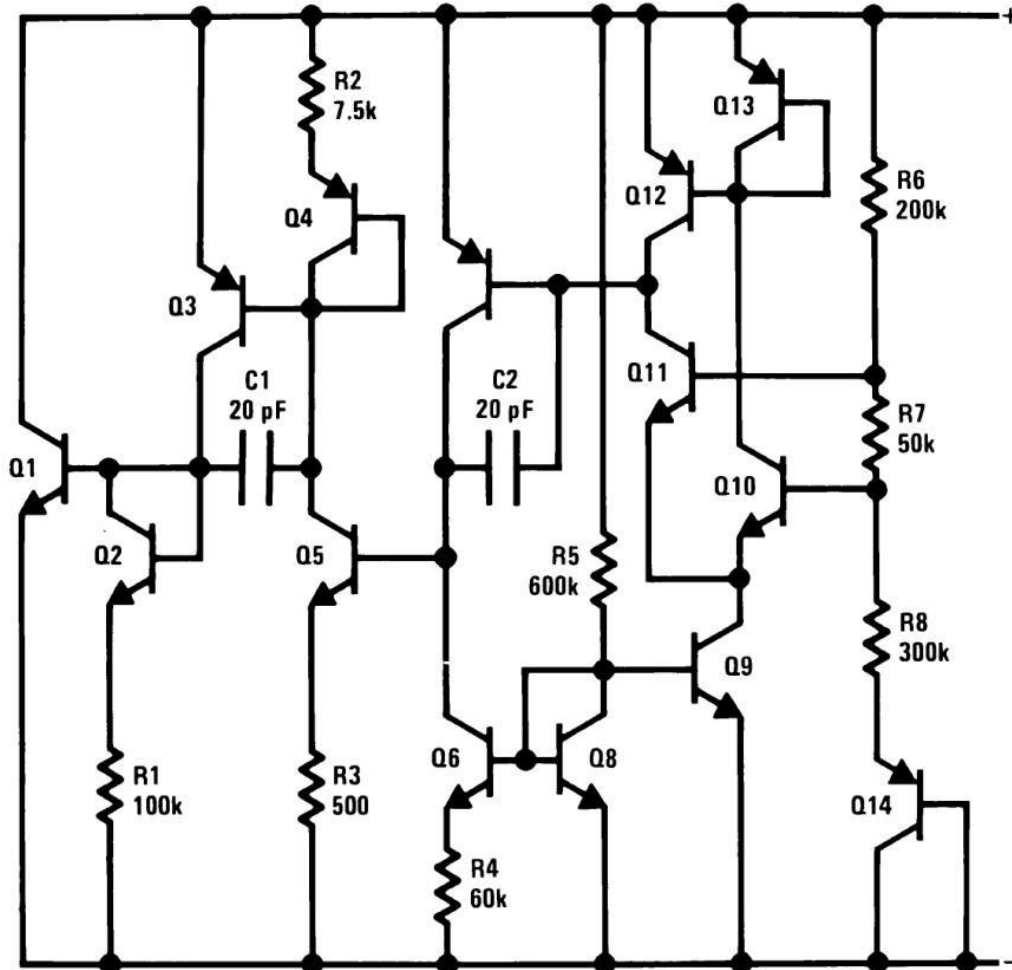


Figure 24. Centigrade Thermometer

8. SCHEMATIC DIAGRAM

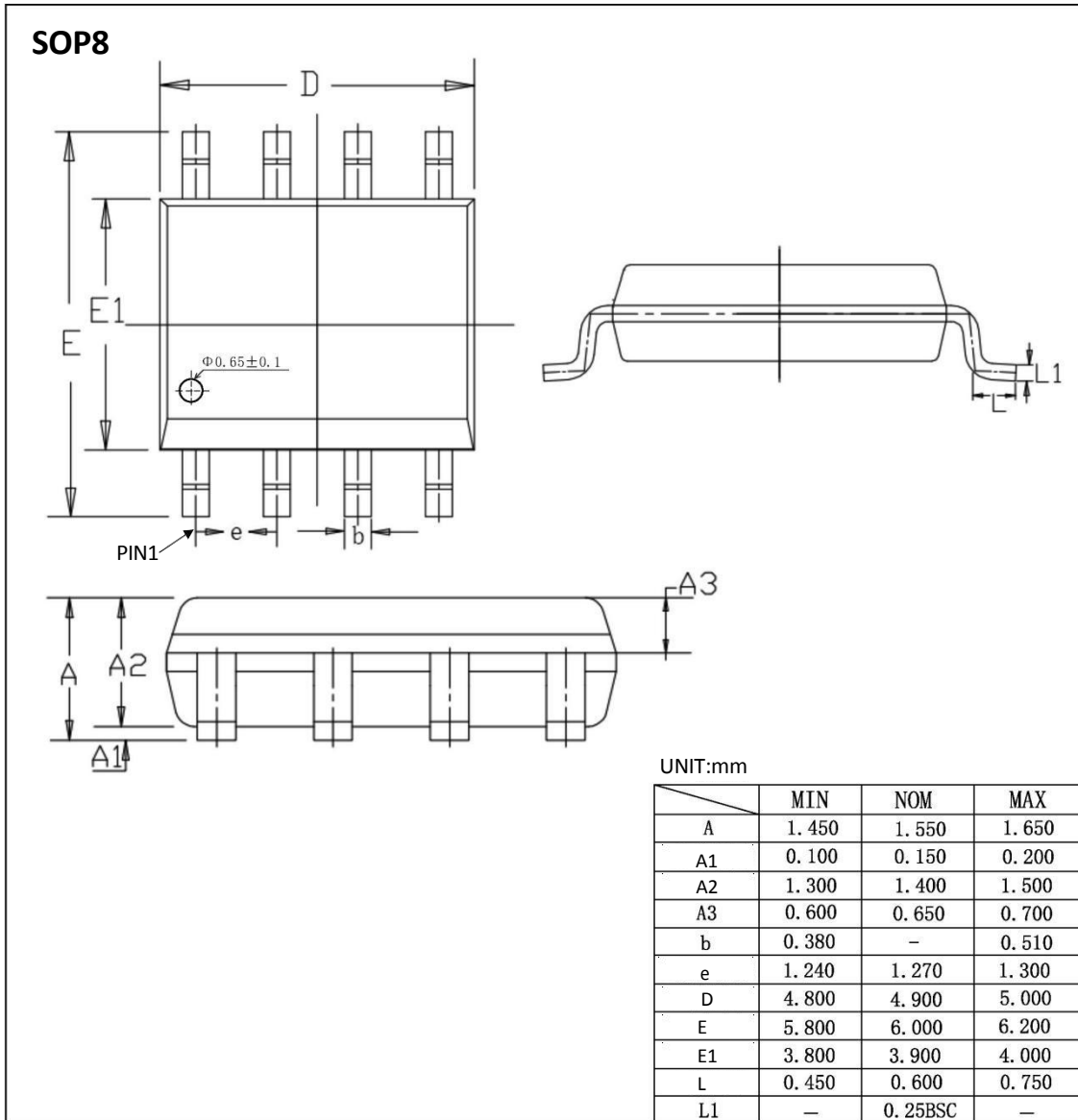


9. ORDERING INFORMATION

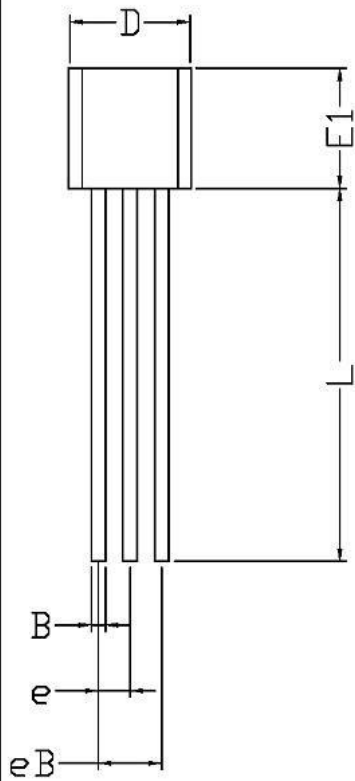
Ordering Information

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	XB385M3-1.2	SOT23-3	4.58 * 4.58	- 40 to 85	MSL3	T&R	3000

10. DIMENSIONAL DRAWINGS

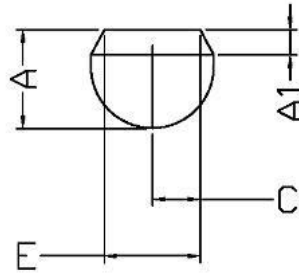


T0-92

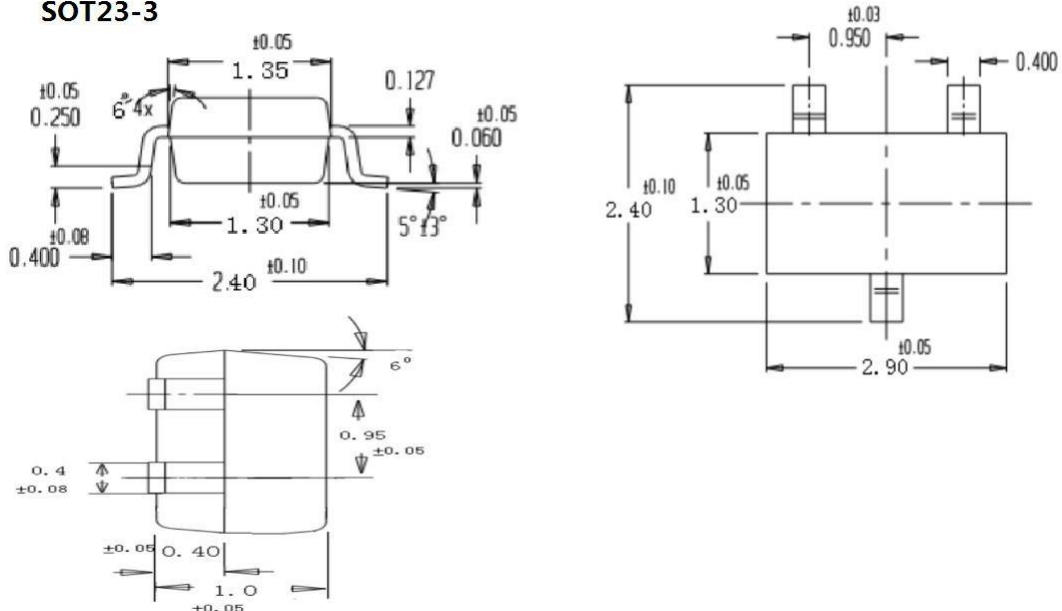


SYMBOL	MIN	MAX
A	3.46	3.96
A1	1.02 TYP	
B	0.36	0.56
C	1.80 TYP	
D	4.33	4.83
E1	4.33	4.83
E	3.35	3.85
eB	2.54 TYP	
e	1.27 TYP	
L	13.97	14.97

UNIT: mm



SOT23-3



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