

SENSISTORS®

Positive – Temperature – Coefficient Silicon Thermistors

TG1/8
TM1/8
RTH42
RTH22
TM1/4

FEATURES

- Qualified to MIL-T-23648A
- TG1/8 – Similar to RTH42 (MIL-T-23648A/19)
- TM1/8 – Similar to RTH22 (MIL-T-23648A/9)
- Large Positive Temperature Coefficient $\approx 0.7\%/^{\circ}\text{C}$
- Wide Resistance Value Ranges Available in 5% or 10% Tolerances

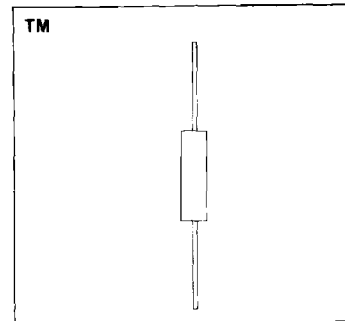
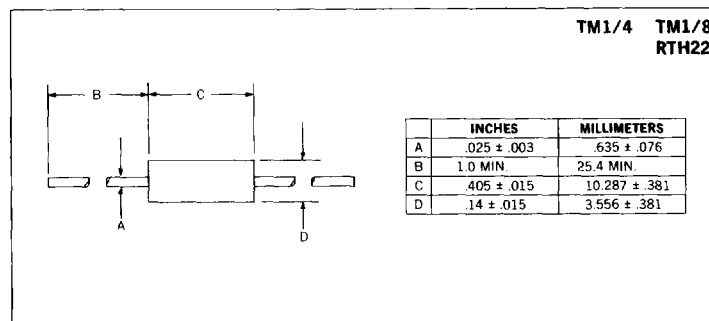
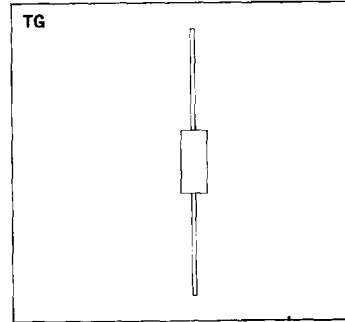
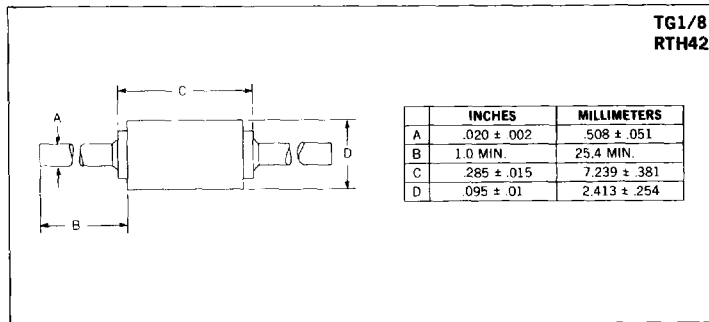
DESCRIPTION

The TG1/8 thermistor is encapsulated in a glass, hermetically sealed package. The TM1/8 and TM1/4 thermistors are encapsulated in a molded package. Both have hot solder-dipped leads and are used in temperature sensing and compensation circuits. They meet or exceed all of the requirements of MIL-T-23648A.

ABSOLUTE MAXIMUM RATINGS

| | TG1/8 RTH42 | TM1/8 RTH22 | TM1/4 |
|--|-----------------|-----------------|-----------------|
| Power Dissipation at (or below) 25°C Free-Air Temperature (See Figure 1) | 300mW | 500mW | 500mW |
| Power Dissipation at (or below) 100°C Free Air Temperature (See Figure 1) | 125mW | 250mW | 250mW |
| Operating Free-Air Temperature Range | -55°C to +125°C | -55°C to +125°C | -55°C to +125°C |
| Storage Temperature Range | -65°C to +150°C | -65°C to +150°C | -65°C to +150°C |

MECHANICAL SPECIFICATIONS



Microsemi Corp.
Watertown
The diode experts

ELECTRICAL AND THERMAL CHARACTERISTICS

TG1/8 TM1/8 TM1/4
RTH42 RTH22

Zero Power Resistance Ratio ($R_{25^{\circ}\text{C}}/R_{125^{\circ}\text{C}}$) 0.55 ± 15%
 Thermal Time Constant – Typical 35s
 Thermal Time Constant – Maximum 60s

NOMINAL RESISTANCE AT VARIOUS TEMPERATURES

| Standard Zero Power Resistance Value (Ω) at 25°C Free-Air Temperature | Type No. | | | | | Resistance (Ω) of Sensistor® at Temperature other than 25°C | | | | | | |
|--|----------|-------|-------|-------|-------|--|--------|--------|-------|--------|----------|---------|
| | | | | | | -55° | -15°C | 0°C | 50°C | 75° | 100°C | 125°C |
| | 10 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 6.15 | 7.9 | 8.63 | 11.6 | 13.5 | 15.45 |
| 12 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 7.38 | 9.48 | 10.356 | 13.92 | 16.2 | 18.54 | 21 |
| 15 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 9.225 | 11.85 | 12.945 | 17.4 | 20.25 | 23.175 | 26.25 |
| 18 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 11.07 | 14.22 | 15.534 | 20.88 | 24.3 | 27.81 | 31.5 |
| 22 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 13.53 | 17.38 | 18.986 | 25.52 | 29.7 | 33.99 | 38.5 |
| 27 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 16.605 | 21.33 | 23.301 | 31.32 | 36.45 | 41.715 | 47.25 |
| 33 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 20.295 | 26.07 | 28.479 | 38.28 | 44.55 | 50.985 | 57.75 |
| 39 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 23.985 | 30.81 | 33.657 | 45.24 | 52.65 | 60.255 | 68.25 |
| 47 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 28.905 | 37.13 | 40.561 | 54.52 | 63.45 | 72.615 | 82.25 |
| 50 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 30.75 | 39.5 | 43.15 | 58 | 67.5 | 77.25 | 87.5 |
| 56 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 34.44 | 44.24 | 48.328 | 64.96 | 75.6 | 86.52 | 98 |
| 68 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 41.82 | 53.72 | 58.684 | 78.88 | 91.8 | 105.06 | 119 |
| 82 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 47.724 | 63.14 | 69.454 | 95.94 | 112.34 | 129.888 | 147.6 |
| 100 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 58.2 | 77 | 84.7 | 117 | 137 | 158.4 | 180 |
| 120 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 69.84 | 92.4 | 101.64 | 140.4 | 164.4 | 190.08 | 216 |
| 150 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 87.3 | 115.5 | 127.05 | 175.5 | 205.5 | 237.6 | 270 |
| 180 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 100.8 | 135.9 | 150.84 | 212.4 | 252 | 292.14 | 334.8 |
| 220 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 123.2 | 166.1 | 184.36 | 259.6 | 308 | 357.06 | 409.2 |
| 270 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 151.2 | 203.85 | 226.26 | 318.6 | 378 | 438.21 | 502.2 |
| 330 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 184.8 | 249.15 | 276.54 | 389.4 | 462 | 535.59 | 613.8 |
| 390 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 218.4 | 294.45 | 326.82 | 460.2 | 546 | 632.97 | 725.4 |
| 470 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 263.2 | 354.85 | 393.86 | 554.2 | 658 | 762.81 | 874.2 |
| 500 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 280 | 377.5 | 419 | 590 | 700 | 811.5 | 930 |
| 560 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 308 | 414.4 | 467.6 | 672 | 795.2 | 927.36 | 1,075.2 |
| 680 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 374 | 503.2 | 567.8 | 816 | 965.6 | 1,126.08 | 1,305.6 |

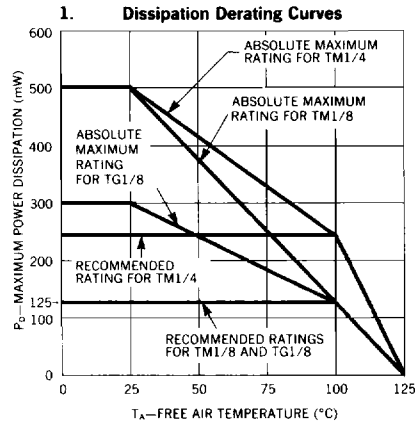
NOMINAL RESISTANCE AT VARIOUS TEMPERATURES

| Standard Zero Power Resistance Value (Ω) at 25°C Free-Air Temperature | Type No. | | | | | Resistance (Ω) of Sensistor® at Temperature other than 25°C | | | | | | |
|---|----------|-------|-------|-------|-------|---|--------|---------|--------|---------|----------|---------|
| | | | | | | -55° | -15°C | 0°C | 50°C | 75° | 100°C | 125°C |
| 820 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 451 | 606.8 | 684.7 | 984 | 1,164.4 | 1,357.92 | 1,574.4 |
| 1,000 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 550 | 740 | 835 | 1,200 | 1,420 | 1,656 | 1,920 |
| 1,200 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 660 | 888 | 1,002 | 1,440 | 1,704 | 1,987.2 | 2,304 |
| 1,500 | TG1/8 | RTH42 | — | — | TM1/4 | 772.5 | 1,095 | 1,237.5 | 1,845 | 2,175 | 2,505 | 2,940 |
| | — | — | TM1/8 | RTH22 | TM1/4 | 825 | 1,110 | 1,252.5 | 1,800 | 2,130 | 2,484 | 2,880 |
| 1,800 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 927 | 1,314 | 1,485 | 2,214 | 2,610 | 3,006 | 3,528 |
| 2,200 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 1,133 | 1,606 | 1,815 | 2,706 | 3,190 | 3,674 | 4,312 |
| 2,700 | TG1/8 | RTH42 | TM1/8 | RTH22 | TM1/4 | 1,390.5 | 1,971 | 2,27.5 | 3,321 | 3,915 | 4,509 | 5,292 |
| 3,300 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 1,699.5 | 2,409 | 2,722.5 | 4,059 | 4,785 | 5,511 | 6,468 |
| 3,900 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 2,008.5 | 2,847 | 3,217.5 | 4,797 | 5,655 | 6,513 | 7,644 |
| 4,700 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 2,420.5 | 3,431 | 3,877.5 | 5,781 | 6,815 | 7,849 | 9,212 |
| 5,000 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 2,575 | 3,650 | 4,125 | 6,150 | 7,250 | 8,350 | 9,800 |
| 5,600 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 2,884 | 4,088 | 4,620 | 6,888 | 8,120 | 9,352 | 10,976 |
| 6,800 | TG1/8 | — | — | — | TM1/4 | 3,468 | 4,964 | 5,610 | 8,092 | 9,520 | 10,948 | 12,444 |
| | — | — | TM1/8 | RTH22 | TM1/4 | 3,502 | 4,964 | 5,610 | 8,364 | 9,860 | 11,356 | 13,328 |
| 8,200 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 4,182 | 5,986 | 6,765 | 9,758 | 11,480 | 13,202 | 15,006 |
| | — | — | TM1/8 | RTH22 | TM1/4 | 4,223 | 5,986 | 6,765 | 10,086 | 11,890 | 13,694 | 16,072 |
| 10,000 | TG1/8 | — | TM1/8 | RTH22 | TM1/4 | 5,100 | 7,300 | 8,250 | 11,900 | 14,000 | 16,100 | 18,300 |
| | — | — | TM1/8 | RTH22 | TM1/4 | 5,150 | 7,300 | 8,250 | 12,300 | 14,500 | 16,700 | 19,600 |
| 12,000 | — | — | TM1/8 | — | — | 6,180 | 8,760 | 9,900 | 14,760 | 17,400 | 20,040 | 23,520 |
| 15,000 | — | — | TM1/8 | — | — | 7,215 | 10,680 | 12,210 | 18,150 | 21,450 | 20,050 | 28,500 |
| 18,000 | — | — | TM1/8 | — | — | 8,658 | 12,816 | 14,652 | 21,780 | 25,740 | 30,060 | 34,200 |
| 22,000 | — | — | TM1/8 | — | — | 10,582 | 15,664 | 17,908 | 26,620 | 31,460 | 36,740 | 41,800 |
| 27,000 | — | — | TM1/8 | — | — | 12,987 | 19,224 | 21,978 | 32,670 | 38,610 | 45,090 | 51,300 |
| 33,000 | — | — | TM1/8 | — | — | 15,873 | 23,496 | 26,862 | 39,930 | 47,190 | 55,110 | 62,700 |
| 39,000 | — | — | TM1/8 | — | — | 18,759 | 27,768 | 31,746 | 47,190 | 55,770 | 65,130 | 74,100 |

DEVICE TOLERANCE

The actual resistance of the thermistor at T/°C may vary from the calculated value by an amount not exceeding the tolerances tabulated below.

| Temperature (°C) | ±5% (J) | ±10% (K) |
|------------------|---------|----------|
| -55 | ±15% | ±20% |
| -15 | ±9% | ±14% |
| 0 | ±7% | ±12% |
| 25 | ±5% | ±10% |
| 50 | ±7% | ±12% |
| 75 | ±9% | ±14% |
| 100 | ±12% | ±17% |
| 125 | ±15% | ±20% |

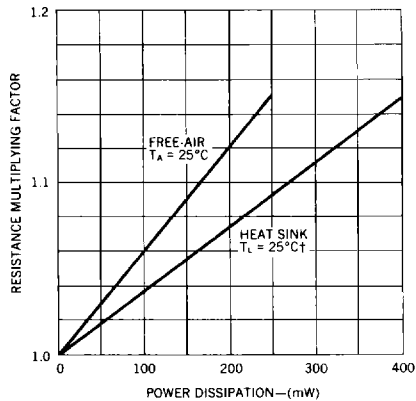


TYPICAL CHARACTERISTICS WITH POWER APPLIED

To determine resistance value with power applied, obtain a multiplying factor from the applicable curve below. The free-air curve is for the condition of heat removal by free-air convection only. The heat sink curve is for the maximum cooling rate condition of a heat sink strap, with leads attached to an infinite heat sink. Actual conditions encountered will be between these two extremes. After selecting an applicable multiplying factor from figure 2 or 3, multiply this by the 25°C zero power resistance. This product is then corrected for the actual ambient temperature by use of the appropriate temperature column in the Nominal Resistance at Various Temperatures table.

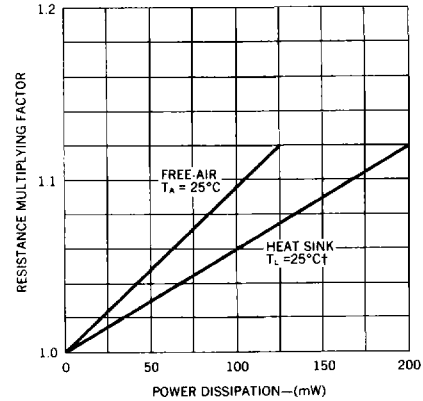
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2. Percent Resistance Change vs Power Dissipation TM1/8 / RTH22 / TM1/4



†T_L is lead temperature measured 1/16 inch from the body

3. Percent Resistance Change vs Power Dissipation TM1/8 / RTH42 / TM1/4



†T_L is lead temperature measured 1/16 inch from the body.

PART NUMBER DESIGNATION (EXAMPLE)

TM1/8272K

