

# Radial Leaded Glass Encapsulated Style



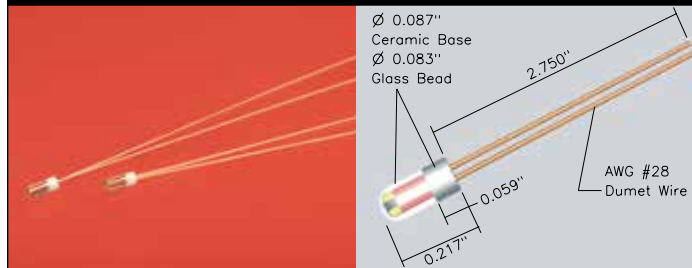
## Features:

- Rugged, low cost, very high reliability
- Operation from -50°C up to 300°C
- Values from 2186Ω to 1.38MΩ at 25°C
- Standard tolerance of ±3% at rated temp
- Temperature measurement and control
- Fast response time
- High temperature stability
- Glass encapsulation provides resistance to moisture and other environmental factors
- Available in ceramic reinforced glass bead or glass bead configurations

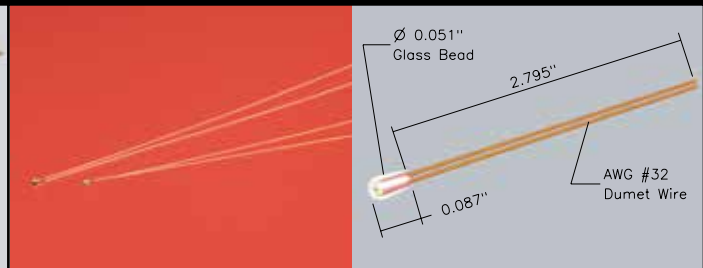
## Description:

MS radial leaded glass encapsulated thermistors provide a low cost option for applications that require superior stability and high temperature operation. The thermistors are glass encapsulated to allow for operation in a wide array of environments including high humidity and rapid thermal cycling. The small size allows the sensor to react quickly to small temperature changes. Contact the factory for specific design or application information or the availability of options.

### CERAMIC REINFORCED GLASS BEAD THERMISTOR



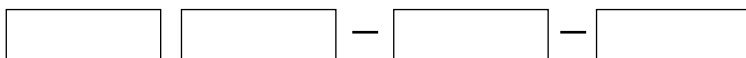
### GLASS BEAD THERMISTOR



| MS Part Number                                                                                                    | Resistance @25°C (Ohms) | Resistance Specification (±3%) | MS Matl | $\beta_{25/85}$ (Kelvin) | MS Part Number                                                                                                    | Resistance @25°C (Ohms) | Resistance Specification (±3%) | MS Matl | $\beta_{25/85}$ (Kelvin) |
|-------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------|---------|--------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------|---------|--------------------------|
| GC2183T-3-0                                                                                                       | 2186                    | 6,000Ω @ 0°C                   | T       | 3420 ± 2%                | GB2183T-3-0                                                                                                       | 2186                    | 6,000Ω @ 0°C                   | T       | 3420 ± 2%                |
| GC5373U-3-0                                                                                                       | 5369                    | 15,000Ω @ 0°C                  | U       | 3480 ± 2%                | GB5373U-3-0                                                                                                       | 5369                    | 15,000Ω @ 0°C                  | U       | 3480 ± 2%                |
| GC1074U-3-0                                                                                                       | 10,739                  | 30,000Ω @ 0°C                  | U       | 3480 ± 2%                | GB1074U-3-0                                                                                                       | 10,739                  | 30,000Ω @ 0°C                  | U       | 3480 ± 2%                |
| GC4914A-3-100                                                                                                     | 49,120                  | 3,300Ω @ 100°C                 | A       | 3992 ± 2%                | GB4914A-3-100                                                                                                     | 49,120                  | 3,300Ω @ 100°C                 | A       | 3992 ± 2%                |
| GC9864N-3-200                                                                                                     | 98,633                  | 550Ω @ 200°C                   | N       | 4066 ± 3%                | GB9864N-3-200                                                                                                     | 98,633                  | 550Ω @ 200°C                   | N       | 4066 ± 3%                |
| GC2315R-3-200                                                                                                     | 231,440                 | 1,000Ω @ 200°C                 | R       | 4240 ± 3%                | GB2315R-3-200                                                                                                     | 231,440                 | 1,000Ω @ 200°C                 | R       | 4240 ± 3%                |
| GC1396V-3-200                                                                                                     | 1,388,100               | 4,000Ω @ 200°C                 | V       | 4557 ± 3%                | GB1396V-3-200                                                                                                     | 1,388,100               | 4,000Ω @ 200°C                 | V       | 4557 ± 3%                |
| Dissipation factor (δ) is 1.5mW/°C<br>Time constant (τ) is 18 sec nominally<br>Max operating temperature is 300°C |                         |                                |         |                          | Dissipation factor (δ) is 0.75mW/°C<br>Time constant (τ) is 6 sec nominally<br>Max operating temperature is 300°C |                         |                                |         |                          |

Standard resistance tolerance is ±3% at rated temperature

\*See R/T tables on page 63.



Basic P/N      Material      Tol. Code      Point-match Temperature (°C) (only used if other than 25°C)

Examples:      GC1074U-3-0 ..... Curve U material, ±3% at 0°C  
                   GB1396V-3-200 ..... Curve V material, ±3% at 200°C

**Resistance vs. Temperature Conversion Table  
Radial Leaded Glass Encapsulated NTC Thermistor**

| MS Type                                | G_2183  | G_5373  | G_1074  | G_4914  | G_9864    | G_2315  | G_1396    |
|----------------------------------------|---------|---------|---------|---------|-----------|---------|-----------|
| Material                               | T       | U       | U       | A       | N         | R       | V         |
| Beta ( $\beta_{25/85}$ )               | 3420    | 3480    | 3480    | 3992    | 4066      | 4240    | 4557      |
| Temp. Coef.<br>@25°C ( $\alpha_{25}$ ) | -3.75   | -3.82   | -3.82   | -4.42   | -4.46     | -4.64   | -4.99     |
| Resistance Ratio<br>$R_0/R_{50}$       | 6.59    | 6.81    | 6.81    | 9.22    | 9.47      | 10.30   | 12.34     |
| Temperature<br>(°C)                    | Res (Ω) | Res (Ω) | Res (Ω) | Res (Ω) | Res (Ω)   | Res (Ω) | Res (Ω)   |
| -50                                    | 77,582  | 203,980 | 407,960 |         |           |         |           |
| -40                                    | 43,340  | 112,540 | 225,090 |         |           |         |           |
| -30                                    | 25,166  | 64,632  | 129,260 |         |           |         |           |
| -25                                    | 19,433  | 49,658  | 99,316  | 657,350 | 1,317,400 |         |           |
| -20                                    | 15,132  | 38,481  | 76,963  | 487,370 | 980,540   |         |           |
| -10                                    | 9,392   | 23,672  | 47,344  | 276,060 | 558,640   |         |           |
| 0                                      | 6,000   | 15,000  | 30,000  | 162,210 | 329,400   | 806,460 |           |
| 10                                     | 3,935   | 9,765   | 19,531  | 98,322  | 198,900   | 478,760 |           |
| 20                                     | 2,644   | 6,516   | 13,033  | 61,465  | 123,750   | 292,850 |           |
| 25                                     | 2,186   | 5,369   | 10,739  | 49,120  | 98,633    | 231,440 | 1,388,100 |
| 30                                     | 1,817   | 4,448   | 8,896   | 39,517  | 79,126    | 184,110 | 1,085,000 |
| 40                                     | 1,274   | 3,100   | 6,201   | 26,065  | 51,870    | 118,680 | 676,470   |
| 50                                     | 910.6   | 2,203   | 4,406   | 17,599  | 34,790    | 78,291  | 432,530   |
| 60                                     | 662.2   | 1,593   | 3,187   | 12,140  | 23,831    | 52,757  | 283,030   |
| 70                                     | 489.5   | 1,171   | 2,343   | 8,641   | 16,643    | 36,258  | 189,200   |
| 80                                     | 367.4   | 874.6   | 1,749   | 6,120   | 11,834    | 25,376  | 129,000   |
| 85                                     | 319.9   | 759.8   | 1,520   | 5,213   | 10,042    | 21,366  | 107,250   |
| 90                                     | 279.6   | 662.3   | 1,325   | 4,459   | 8,556     | 18,064  | 89,570    |
| 100                                    | 215.6   | 508.3   | 1,016   | 3,300   | 6,282     | 13,062  | 63,256    |
| 110                                    | 168.4   | 394.9   | 789.8   | 2,478   | 4,679     | 9,585   | 45,382    |
| 120                                    | 133.0   | 310.4   | 620.8   | 1,886   | 3,532     | 7,131   | 33,041    |
| 125                                    | 118.6   | 276.3   | 552.7   | 1,653   | 3,083     | 6,181   | 28,339    |
| 130                                    | 106.1   | 246.7   | 493.3   | 1,453   | 2,700     | 5,373   | 24,387    |
| 140                                    | 85.61   | 198.0   | 396.0   | 1,133   | 2,088     | 4,098   | 18,232    |
| 150                                    | 69.71   | 160.5   | 320.9   | 892.8   | 1,632     | 3,161   | 13,796    |
| 160                                    | 57.27   | 131.2   | 262.5   | 710.9   | 1,289     | 2,464   | 10,557    |
| 170                                    | 47.46   | 108.3   | 216.5   | 571.6   | 1,028     | 1,940   | 8,164     |
| 180                                    | 39.64   | 90.01   | 180.0   | 463.7   | 827.8     | 1,542   | 6,377     |
| 190                                    | 33.36   | 75.40   | 150.8   | 379.3   | 672.0     | 1,237   | 5,028     |
| 200                                    | 28.28   | 63.62   | 127.3   | 312.8   | 550.0     | 1,000   | 4,000     |
| 225                                    |         |         |         | 199.5   | 344.3     | 608.3   | 2,339     |
| 250                                    |         |         |         | 132.6   | 224.7     | 386.5   | 1,432     |
| 275                                    |         |         |         | 91.29   | 152.1     | 255.2   | 912.7     |
| 300                                    |         |         |         | 64.87   | 106.4     | 174.3   | 602.6     |

This R/T Conversion Table is provided for reference only. MS uses the Steinhart-Hart equation to calculate the nominal  $R_t/R_{25}$  value. 1°C tables are available upon request.

- $\alpha_{25}$  - Negative Temperature Coefficient of Resistance at 25°C expressed in %/°C. This is the percentage change in thermistor resistance for a 1°C change in its body temperature at 25°C.  $\alpha$  is particularly useful in calculating the required resistance tolerance necessary to guarantee sensor accuracy.  $\alpha$  at temperatures other than 25°C is available upon request as tables in 1°C increments.