

**ZGFM305V6B-BS THRU ZGFM30200B-BS****List**

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**ZGFM305V6B-BS THRU ZGFM30200B-BS**

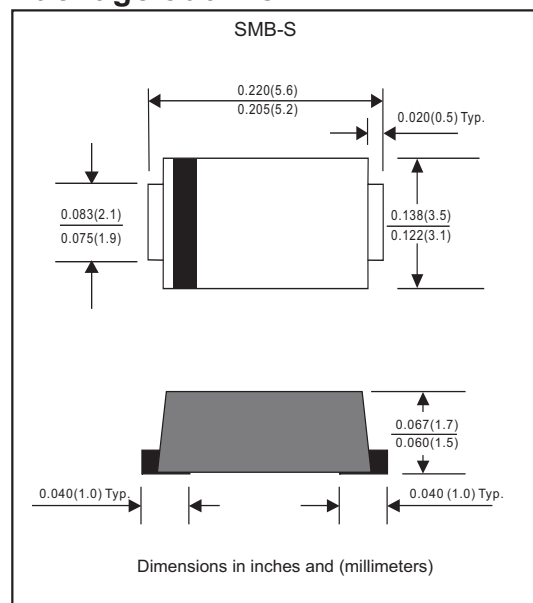
**3.0W Surface Mount Zener  
Diodes 5.6V-200V**

**Features**

- Batch process design, excellent power dissipation offers better reverse leakage current and thermal resistance
- Glass passivated chip junction
- Standard zener voltage tolerance  $\pm 5\%$
- Low inductance
- Low profile package
- Built-in strain relief
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex. ZGFM305V6B-BS-H

**Mechanical data**

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SMB-S
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.072 gram

**Package outline****Maximum ratings** (at  $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                            | Conditions               | Symbol    | MIN. | TYP. | MAX. | Unit             |
|--------------------------------------|--------------------------|-----------|------|------|------|------------------|
| Forward voltage                      | $I_F = 200\text{mA}$     | $V_F$     |      |      | 1.20 | V                |
| Power dissipation                    | $T_L = 75^\circ\text{C}$ | $P_D$     |      |      | 3.0  | W                |
| Operating junction temperature range |                          | $T_J$     | -55  |      | +150 | $^\circ\text{C}$ |
| Storage temperature range            |                          | $T_{STG}$ | -65  |      | +175 | $^\circ\text{C}$ |

**Thermal characteristics**

| Parameter                                      | Symbol          | Limit | Unit               |
|------------------------------------------------|-----------------|-------|--------------------|
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 80    | $^\circ\text{C/W}$ |
| Typical thermal resistance junction to case    | $R_{\theta JC}$ | 20    | $^\circ\text{C/W}$ |
| Typical thermal resistance junction to lead    | $R_{\theta JL}$ | 10    | $^\circ\text{C/W}$ |

Note 1: Mounted on FR-4 PCB

## ZGFM305V6B-BS THRU ZGFM30200B-BS

Electrical characteristics (at  $T_A=25^{\circ}\text{C}$  unless otherwise noted)

| Part No.      | Marking code | Zener voltage                            |      |       | Test current    | Zener impedance                   |                                   |                 | Leakage current |                |
|---------------|--------------|------------------------------------------|------|-------|-----------------|-----------------------------------|-----------------------------------|-----------------|-----------------|----------------|
|               |              | V <sub>Z</sub> (Volts) @ I <sub>ZT</sub> |      |       | I <sub>ZT</sub> | Z <sub>ZT</sub> @ I <sub>ZT</sub> | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>ZK</sub> | I <sub>R</sub>  | V <sub>R</sub> |
|               |              | Min.                                     | Nom. | Max.  | mA              | Max. (Ω)                          | Max. (Ω)                          | mA              | Max.(μA)        | Volts          |
| ZGFM305V6B-BS | 3Z5V6        | 5.32                                     | 5.6  | 5.88  | 134             | 2.5                               | 600                               | 1.00            | 5.0             | 2.0            |
| ZGFM306V2B-BS | 3Z6V2        | 5.89                                     | 6.2  | 6.51  | 121             | 1.5                               | 700                               | 1.00            | 5.0             | 3.0            |
| ZGFM306V8B-BS | 3Z6V8        | 6.46                                     | 6.8  | 7.14  | 110             | 2.0                               | 700                               | 1.00            | 5.0             | 4.0            |
| ZGFM307V5B-BS | 3Z7V5        | 7.13                                     | 7.5  | 7.88  | 100             | 2.0                               | 700                               | 0.50            | 5.0             | 5.0            |
| ZGFM308V2B-BS | 3Z8V2        | 7.79                                     | 8.2  | 8.61  | 91              | 2.0                               | 700                               | 0.50            | 5.0             | 6.0            |
| ZGFM308V7B-BS | 3Z8V7        | 8.27                                     | 8.7  | 9.14  | 85              | 2.0                               | 700                               | 0.50            | 4.0             | 6.6            |
| ZGFM309V1B-BS | 3Z9V1        | 8.65                                     | 9.1  | 9.56  | 82              | 3.0                               | 700                               | 0.50            | 3.0             | 7.0            |
| ZGFM3010B-BS  | 3Z10         | 9.50                                     | 10   | 10.50 | 75              | 4.0                               | 700                               | 0.50            | 3.0             | 7.6            |
| ZGFM3011B-BS  | 3Z11         | 10.45                                    | 11   | 11.55 | 68              | 4.0                               | 700                               | 0.25            | 1.0             | 8.4            |
| ZGFM3012B-BS  | 3Z12         | 11.40                                    | 12   | 12.60 | 63              | 4.5                               | 700                               | 0.25            | 1.0             | 9.1            |
| ZGFM3013B-BS  | 3Z13         | 12.35                                    | 13   | 13.65 | 58              | 5.0                               | 700                               | 0.25            | 0.5             | 9.9            |
| ZGFM3015B-BS  | 3Z15         | 14.25                                    | 15   | 15.75 | 50              | 7.0                               | 700                               | 0.25            | 0.5             | 11.4           |
| ZGFM3016B-BS  | 3Z16         | 15.20                                    | 16   | 16.80 | 47              | 8.0                               | 700                               | 0.25            | 0.5             | 12.2           |
| ZGFM3018B-BS  | 3Z18         | 17.10                                    | 18   | 18.90 | 42              | 10.0                              | 750                               | 0.25            | 0.5             | 13.7           |
| ZGFM3020B-BS  | 3Z20         | 19.00                                    | 20   | 21.00 | 37              | 11.0                              | 750                               | 0.25            | 0.5             | 15.2           |
| ZGFM3022B-BS  | 3Z22         | 20.90                                    | 22   | 23.10 | 34              | 12.0                              | 750                               | 0.25            | 0.5             | 16.7           |
| ZGFM3024B-BS  | 3Z24         | 22.80                                    | 24   | 25.20 | 31              | 13.0                              | 750                               | 0.25            | 0.5             | 18.2           |
| ZGFM3027B-BS  | 3Z27         | 25.65                                    | 27   | 28.35 | 28              | 18.0                              | 750                               | 0.25            | 0.5             | 20.6           |
| ZGFM3030B-BS  | 3Z30         | 28.50                                    | 30   | 31.50 | 25              | 20.0                              | 1000                              | 0.25            | 0.5             | 22.8           |
| ZGFM3033B-BS  | 3Z33         | 31.35                                    | 33   | 34.65 | 23              | 23.0                              | 1000                              | 0.25            | 0.5             | 25.4           |
| ZGFM3036B-BS  | 3Z36         | 34.20                                    | 36   | 37.80 | 21              | 25.0                              | 1000                              | 0.25            | 0.5             | 27.4           |
| ZGFM3039B-BS  | 3Z39         | 37.05                                    | 39   | 40.95 | 19              | 30.0                              | 1500                              | 0.25            | 0.5             | 29.7           |
| ZGFM3043B-BS  | 3Z43         | 40.85                                    | 43   | 45.15 | 17              | 35.0                              | 1500                              | 0.25            | 0.5             | 32.7           |
| ZGFM3047B-BS  | 3Z47         | 44.65                                    | 47   | 49.35 | 16              | 40.0                              | 1500                              | 0.25            | 0.5             | 35.8           |
| ZGFM3051B-BS  | 3Z51         | 48.45                                    | 51   | 53.55 | 15              | 48.0                              | 1500                              | 0.25            | 0.5             | 38.8           |
| ZGFM3056B-BS  | 3Z56         | 53.20                                    | 56   | 58.80 | 13              | 55.0                              | 2000                              | 0.25            | 0.5             | 42.6           |
| ZGFM3062B-BS  | 3Z62         | 58.90                                    | 62   | 65.10 | 12              | 60.0                              | 2000                              | 0.25            | 0.5             | 47.1           |
| ZGFM3068B-BS  | 3Z68         | 64.60                                    | 68   | 71.40 | 11              | 75.0                              | 2000                              | 0.25            | 0.5             | 51.7           |
| ZGFM3075B-BS  | 3Z75         | 71.25                                    | 75   | 78.75 | 10              | 90.0                              | 2000                              | 0.25            | 0.5             | 56.0           |
| ZGFM3082B-BS  | 3Z82         | 77.90                                    | 82   | 86.10 | 9.1             | 100                               | 3000                              | 0.25            | 0.5             | 62.2           |
| ZGFM3091B-BS  | 3Z91         | 86.45                                    | 91   | 95.55 | 8.2             | 125                               | 3000                              | 0.25            | 0.5             | 69.2           |
| ZGFM30100B-BS | 3Z100        | 95.00                                    | 100  | 105.0 | 7.5             | 175                               | 3000                              | 0.25            | 0.5             | 76.0           |
| ZGFM30110B-BS | 3Z110        | 104.50                                   | 110  | 115.5 | 6.8             | 250                               | 4000                              | 0.25            | 0.5             | 83.6           |
| ZGFM30120B-BS | 3Z120        | 114.00                                   | 120  | 126.0 | 6.3             | 325                               | 4500                              | 0.25            | 0.5             | 91.2           |
| ZGFM30130B-BS | 3Z130        | 123.50                                   | 130  | 136.5 | 5.8             | 400                               | 5000                              | 0.25            | 0.5             | 98.8           |
| ZGFM30150B-BS | 3Z150        | 142.50                                   | 150  | 157.5 | 5.0             | 575                               | 6000                              | 0.25            | 0.5             | 114.0          |
| ZGFM30160B-BS | 3Z160        | 152.00                                   | 160  | 168.0 | 4.7             | 650                               | 6500                              | 0.25            | 0.5             | 121.6          |
| ZGFM30180B-BS | 3Z180        | 171.00                                   | 180  | 189.0 | 4.2             | 725                               | 7000                              | 0.25            | 0.5             | 136.8          |
| ZGFM30200B-BS | 3Z200        | 190.00                                   | 200  | 210.0 | 3.7             | 900                               | 8000                              | 0.25            | 0.5             | 152.0          |

Note : 5% tolerance of Zener voltage for suffix "B" ex: ZGFM305V6B-BS is 5.6V 5%

## Rating and characteristic curves (ZGFM305V6B-BS THRU ZGFM30200B-BS)

FIG.1 Typical Thermal Response L

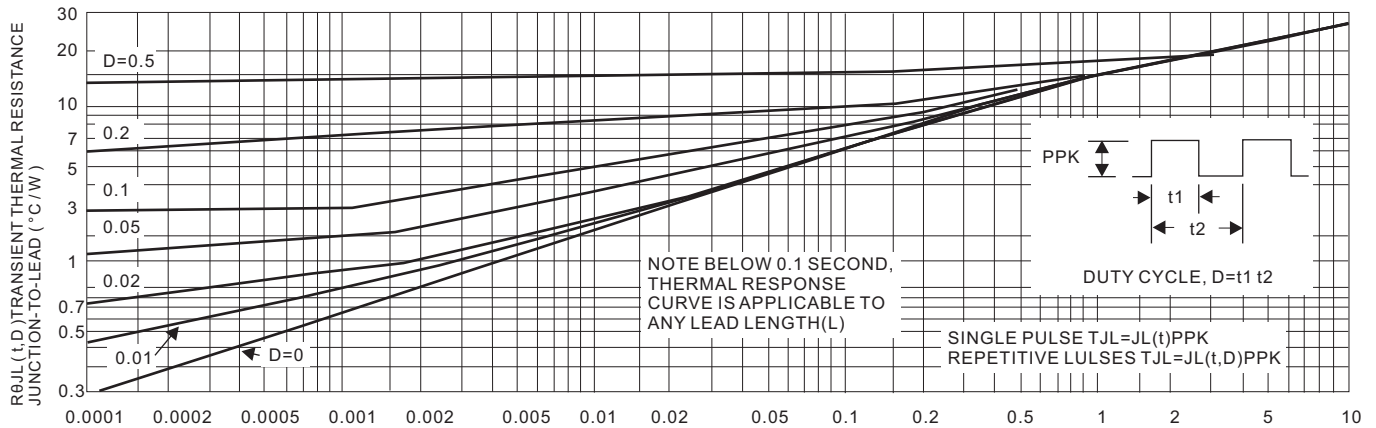


FIG. 2 Maximum Surge Power

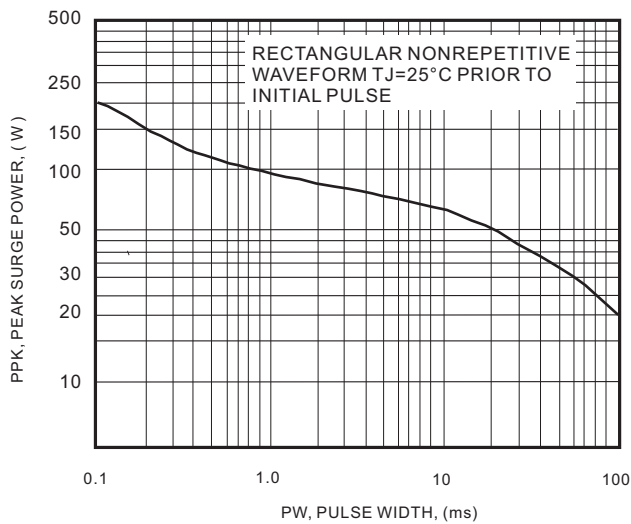


FIG. 3 Maximum Surge Power

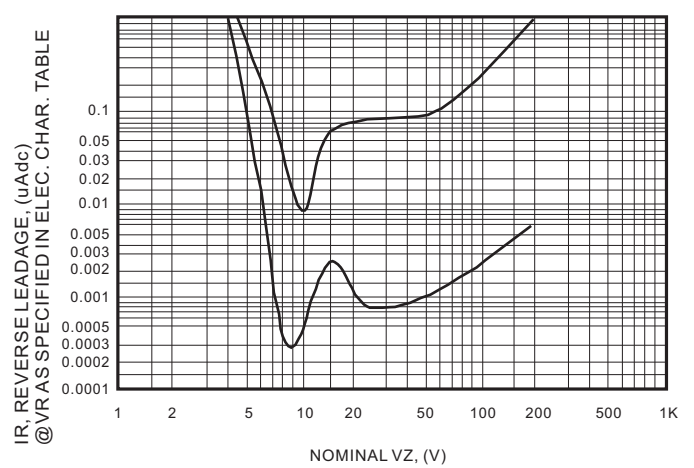


FIG.4 Units To 12 Volts

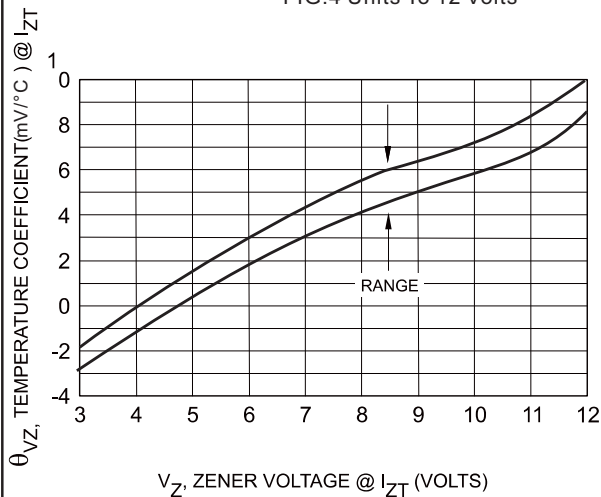
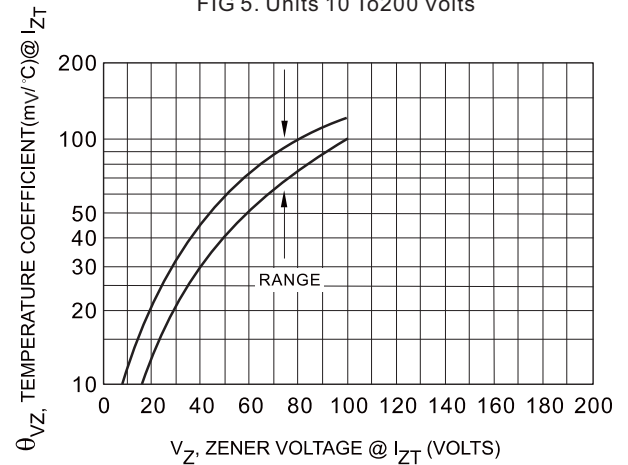


FIG 5. Units 10 To200 Volts



## Rating and characteristic curves (ZGFM305V6B-BS THRU ZGFM30200B-BS)

FIG.6 To 10 Volts

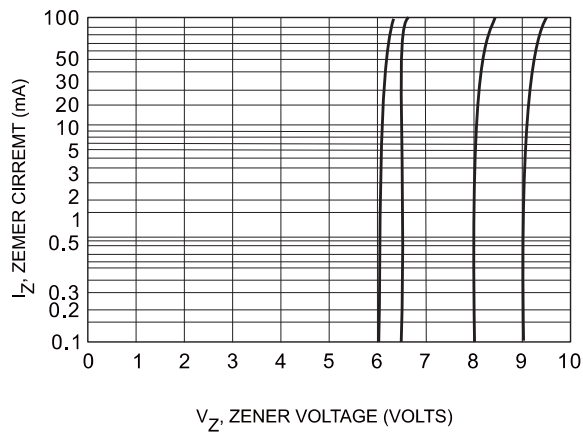


FIG.7  $V_Z = 12$  Thru 82 Volts

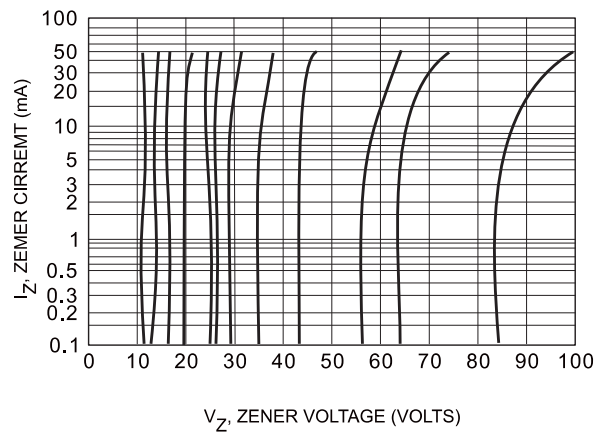


FIG. 8 Typical Thermal Resistance

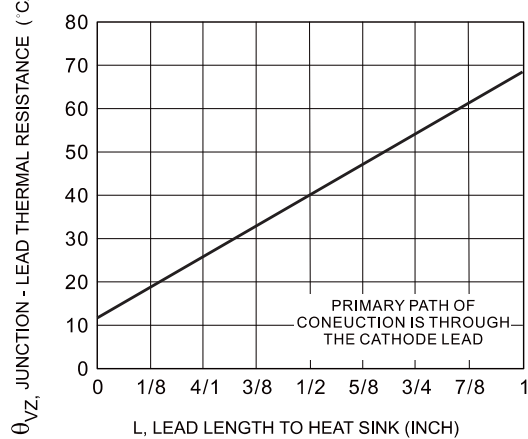
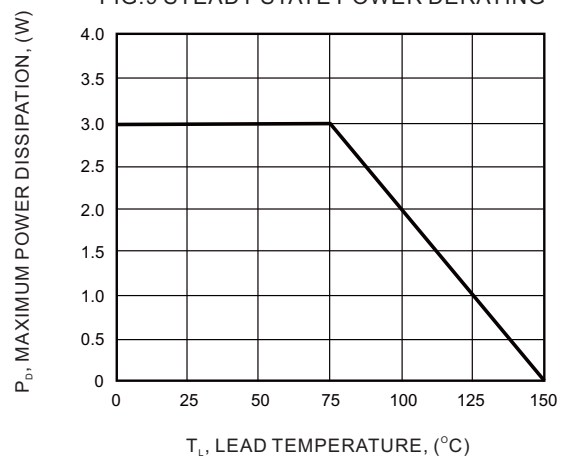


FIG.9 STEADY STATE POWER DERATING



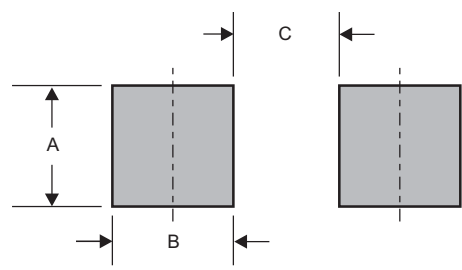
# Formosa MS

## ZGFM305V6B-BS THRU ZGFM30200B-BS

### Pinning information

| Pin                        | Simplified outline                                                                | Symbol                                                                              |
|----------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin1 cathode<br>Pin2 anode |  |  |

### Suggested solder pad layout

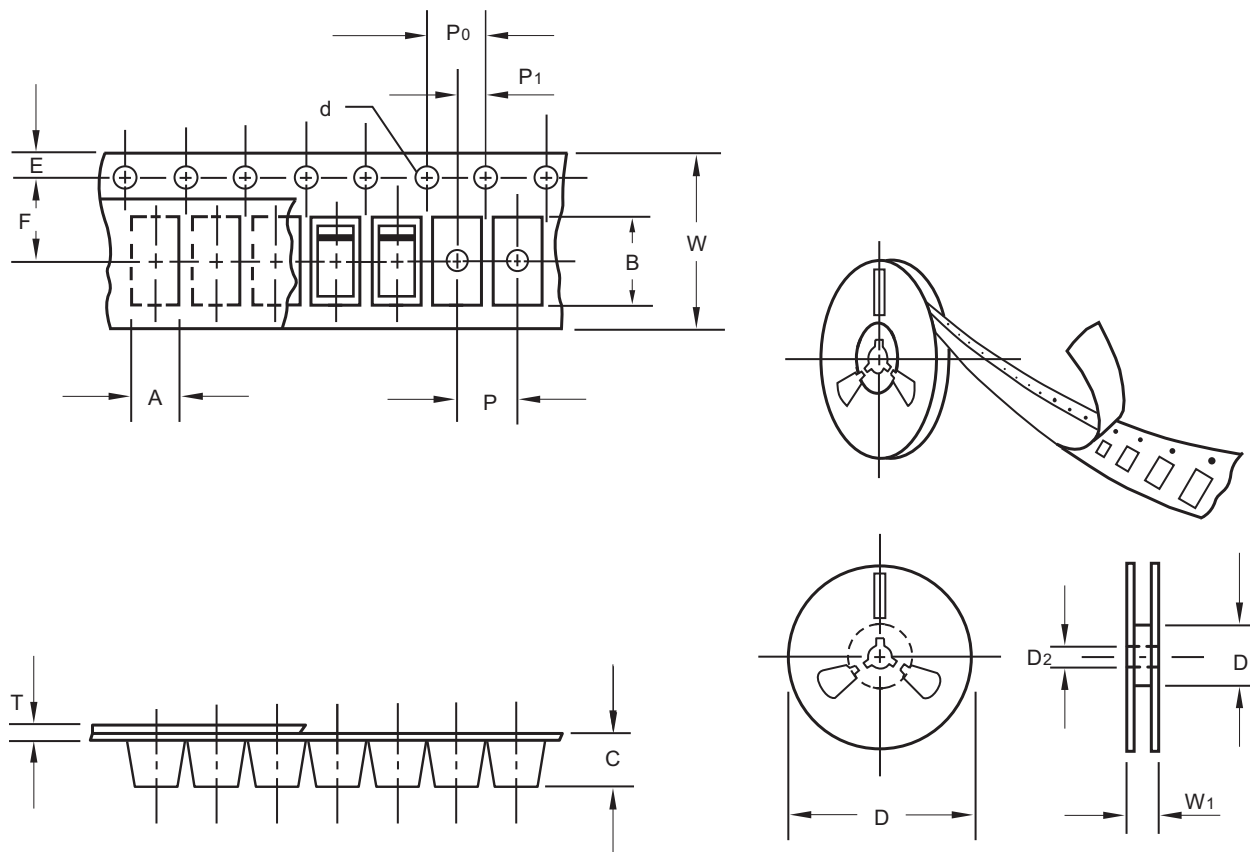


Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMB-S   | 0.096 (2.45) | 0.063 (1.60) | 0.130 (3.30) |

## ZGFM305V6B-BS THRU ZGFM30200B-BS

## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SMB-S  |
|---------------------------|--------|-----------|--------|
| Carrier width             | A      | 0.1       | 3.81   |
| Carrier length            | B      | 0.1       | 5.74   |
| Carrier depth             | C      | 0.1       | 2.24   |
| Sprocket hole             | d      | 0.1       | 1.50   |
| 13" Reel outside diameter | D      | 2.0       | 330.00 |
| 13" Reel inner diameter   | D1     | min       | 50.00  |
| 7" Reel outside diameter  | D      | 2.0       | 178.00 |
| 7" Reel inner diameter    | D1     | min       | 62.00  |
| Feed hole diameter        | D2     | 0.5       | 13.00  |
| Sprocket hole position    | E      | 0.1       | 1.75   |
| Punch hole position       | F      | 0.1       | 5.50   |
| Punch hole pitch          | P      | 0.1       | 8.00   |
| Sprocket hole pitch       | P0     | 0.1       | 4.00   |
| Embossment center         | P1     | 0.1       | 2.00   |
| Overall tape thickness    | T      | 0.1       | 0.23   |
| Tape width                | W      | 0.3       | 12.00  |
| Reel width                | W1     | 1.0       | 18.00  |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

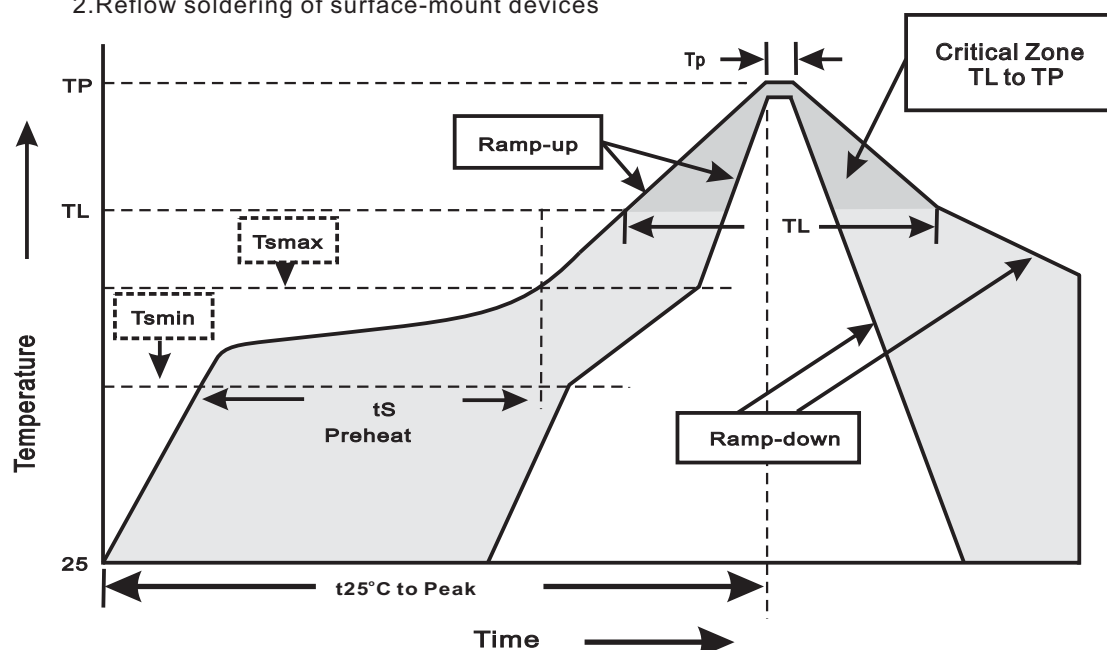
## ZGFM305V6B-BS THRU ZGFM30200B-BS

## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMB-S   | 13"       | 4,000      | 8.0                     | 8,000     | 335*335*38      | 330             | 350*330*360       | 64,000       | 13.0                      |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile Feature                                                                                             | Soldering Condition         |
|-------------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate( $T_L$ to $T_P$ )                                                                      | <3°C/sec                    |
| Preheat<br>-Temperature Min( $T_{smmin}$ )<br>-Temperature Max( $T_{smmax}$ )<br>-Time(min to max)( $t_S$ ) | 150°C<br>200°C<br>60~120sec |
| $T_{smmax}$ to $T_L$<br>-Ramp-upRate                                                                        | <3°C/sec                    |
| Time maintained above:<br>-Temperature( $T_L$ )<br>-Time( $t_L$ )                                           | 217°C<br>60~260sec          |
| Peak Temperature( $T_P$ )                                                                                   | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature( $t_P$ )                                                         | 10~30sec                    |
| Ramp-down Rate                                                                                              | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                                               | <6minutes                   |

**ZGFM305V6B-BS THRU ZGFM30200B-BS****High reliability test capabilities**

| Item Test                        | Conditions                                                                                                        | Reference                   |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Solder Resistance             | at $260 \pm 5^{\circ}\text{C}$ for $10 \pm 2\text{sec.}$                                                          | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability                 | at $245 \pm 5^{\circ}\text{C}$ for 5 sec.                                                                         | MIL-STD-202F<br>METHOD-208  |
| 3. High Temperature Reverse Bias | $V_z = V_{z, \text{Nom}} * 80\%$ at $T_J = 150^{\circ}\text{C}$ for 168 hrs.                                      | MIL-STD-750D<br>METHOD-1038 |
| 4. Pressure Cooker               | $15P_{\text{SIG}}$ at $T_A = 121^{\circ}\text{C}$ for 4 hrs.                                                      | JESD22-A102                 |
| 5. Temperature Cycling           | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 6. Humidity                      | at $T_A = 85^{\circ}\text{C}$ , RH=85% for 1000hrs.                                                               | MIL-STD-750D<br>METHOD-1021 |
| 7. High Temperature Storage Life | at $175^{\circ}\text{C}$ for 1000 hrs.                                                                            | MIL-STD-750D<br>METHOD-1031 |