

**•General Description**

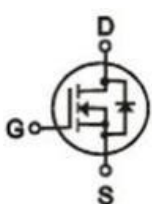
The SGT MOSFET LH008N04GA has the low  $R_{DS(on)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for fast charge and lighting.

**•Features**

- Fast switching
- Low  $R_{DS(on)}$  & FOM
- Low Gate Charge

**•Application**

- LED/LCD/PDP TV and monitor Lighting
- Power Supplies
- DC/DC Converters

|                                                                                                      |                                                                                                                           |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|                    | <b><math>V_{DS} = 40V</math></b><br><br><b><math>R_{DS(ON)} = 0.8m\Omega</math></b><br><br><b><math>I_D = 400A</math></b> |
| <br><b>TO-263</b> | <b>■ RoHS COMPLIANT</b>                                                                                                   |

**•Ordering Information:**

|                                       |                            |
|---------------------------------------|----------------------------|
| Part Number                           | LH008N04GA                 |
| Package                               | TO-263                     |
| Basic Ordering Unit (pcs)             | 800                        |
| Normal Package Material Ordering Code | LH008N04GAT63-TO263-TAP    |
| Halogen Free Ordering Code            | LH008N04GAT63-TO263-TAP-HF |

**•Absolute Maximum Ratings (TC =25°C)**

| PARAMETER                                                                              | SYMBOL      | Value    | UNIT |
|----------------------------------------------------------------------------------------|-------------|----------|------|
| Drain-Source Breakdown Voltage                                                         | $BV_{DSS}$  | 40       | V    |
| Gate-Source Voltage                                                                    | $V_{GS}$    | ±20      | V    |
| Continuous Drain Current , $T_C = 25^\circ C$                                          | $I_D$       | 400      | A    |
| Pulsed drain current<br>( $T_C = 25^\circ C$ , tp limited by $T_{jmax}$ ) <sup>1</sup> | $I_D$ pulse | 1600     | A    |
| Single Pulse Avalanche Energy <sup>2</sup>                                             | $E_{AS}$    | 1300     | mJ   |
| Power Dissipation( $T_C=25^\circ C$ )                                                  | $P_D$       | 300      | W    |
| Operating Temperature                                                                  | $T_J$       | -55~+175 | °C   |
| Storage Temperature                                                                    | $T_{STG}$   | -55~+175 | °C   |

### ●Electronic Characteristics

| PARAMETER                               | SYMBOL       | TEST CONDITION                                  | MIN | TYP  | MAX  | UNIT |
|-----------------------------------------|--------------|-------------------------------------------------|-----|------|------|------|
| Drain-Source Breakdown Voltage          | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                       | 40  | --   | --   | V    |
| Gate Threshold Voltage                  | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                   | 2.0 | 3.0  | 4.0  | V    |
| Drain-source On Resistance <sup>3</sup> | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=50A$                           | --  | 0.8  | 1.1  | mΩ   |
|                                         |              | $V_{GS}=4.5V, I_D=20A$                          | --  | 1.1  | 1.3  |      |
| Drain-Source Leakage Current            | $I_{DSS}$    | $V_{DS}=32V, V_{GS}=0V, T_J=25^\circ C$         | --  | --   | 1    | μA   |
|                                         |              | $V_{DS}=32V, V_{GS}=0V, T_J=85^\circ C$         | --  | --   | 5    |      |
| Gate-Source Leakage Current             | $I_{GSS}$    | $V_{GS}=\pm 20, V_{DS}=0V$                      | --  | --   | ±100 | nA   |
| Input Capacitance                       | $C_{iss}$    | $V_{GS}=0V,$<br>$V_{DS}=20V$<br>$f=1.0MHz$      | --  | 8296 | --   | pF   |
| Output Capacitance                      | $C_{oss}$    |                                                 | --  | 3294 | --   |      |
| Reverse transfer Capacitance            | $C_{rss}$    |                                                 | --  | 55   | --   |      |
| Turn -Off Delay Time                    | $T_d(off)$   | $V_{GS}=10V,$<br>$I_D=50.0A$<br>$R_G=4.5\Omega$ | --  | 153  | --   | ns   |
| Turn-on delay time                      | $T_d(on)$    |                                                 | --  | 19   | --   |      |
| Rise time                               | $T_r$        |                                                 | --  | 84   | --   |      |
| Fall time                               | $T_f$        |                                                 | --  | 126  | --   |      |
| Total Gate Charge                       | $Q_g$        | $I_D=20A,$<br>$V_{DS}=20V$<br>$V_{GS}=50V$      | --  | 148  | ---  | nC   |
| Gate-to-Source Charge                   | $Q_{gs}$     |                                                 | --  | 26   | --   |      |
| Gate-to-Drain Charge                    | $Q_{gd}$     |                                                 | --  | 25   | ---  |      |

### ●Diode Characteristics

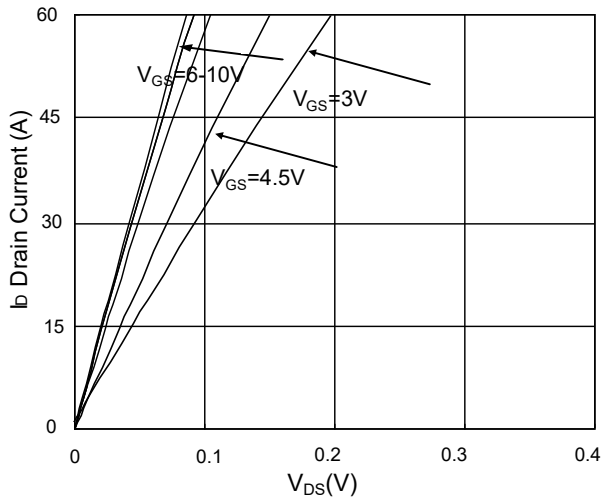
|                         |          |                                             |    |     |     |    |
|-------------------------|----------|---------------------------------------------|----|-----|-----|----|
| Reverse Recovery Time   | $T_{RR}$ | $V_{GS}=10V, I_D=50A$<br>$di/dt=100A/\mu S$ | -- | 97  | --  | nS |
| Reverse Recovery Charge | $Q_{RR}$ |                                             | -- | 162 | --  | nC |
| Diode Forward Voltage   | $V_{SD}$ | $T_J=25^\circ C, I_S=50A$<br>$V_{GS}=0V$    | -- | 1.1 | 1.3 | V  |

Notes:

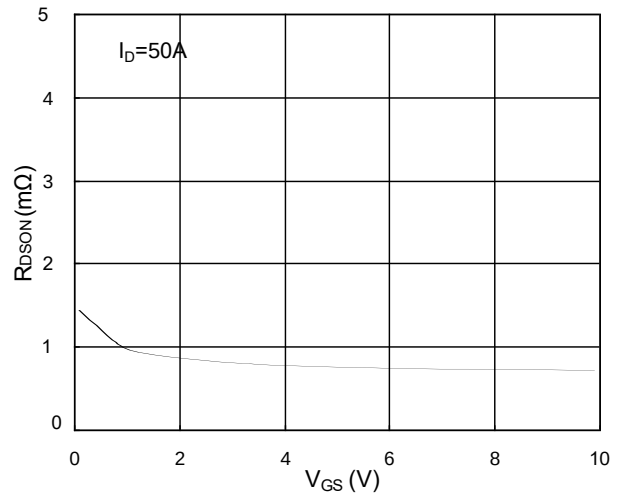
- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $I_{AS}=40A, V_{DD}=25V, R_G=25\Omega$ , Starting  $T_J=25^\circ C$
3. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

● **Typical Characteristics**

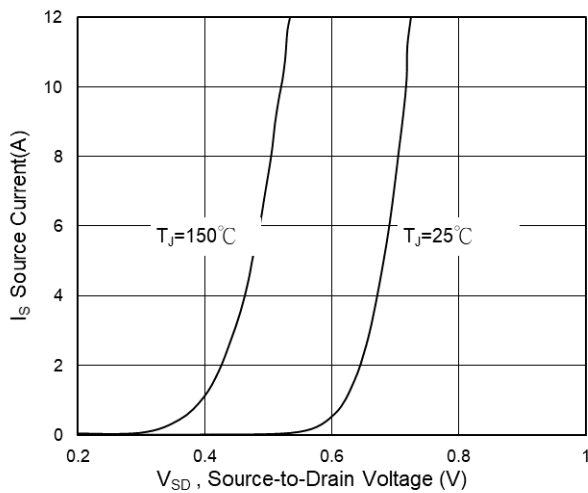
**Fig.1 Typical Output Characteristics**



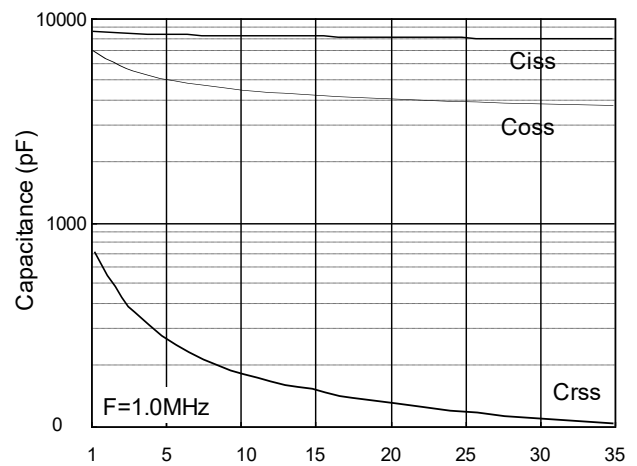
**Fig.2 On-Resistance vs G-S Voltage**



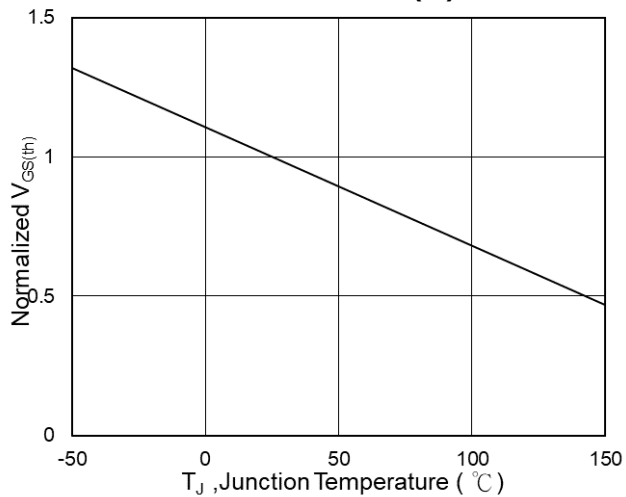
**Fig.3 Source Drain Forward Characteristics**



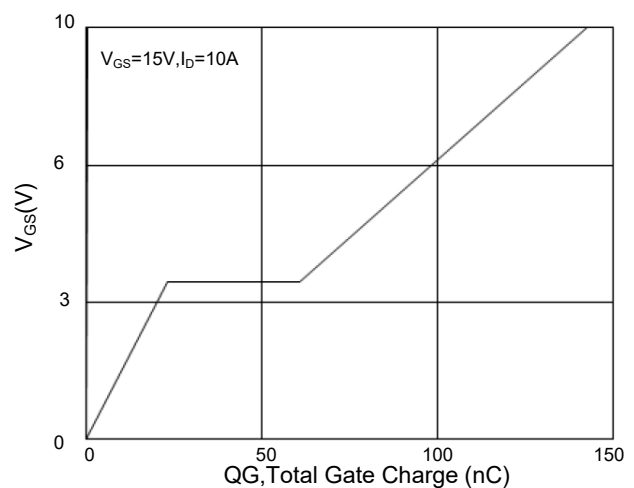
**Fig.4 Capacitance**



**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**

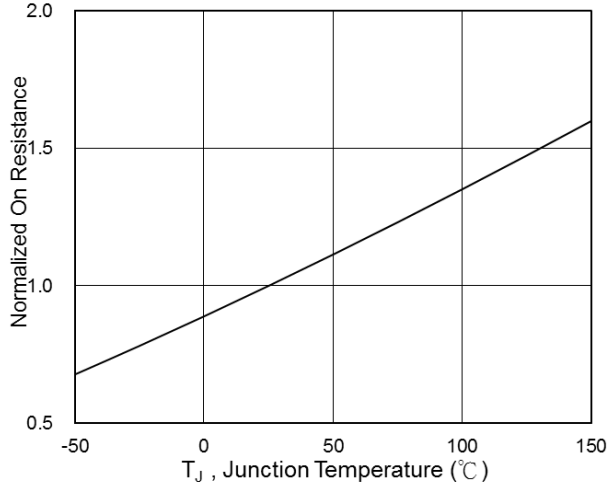


**Fig.6 Gate-Charge Characteristics**

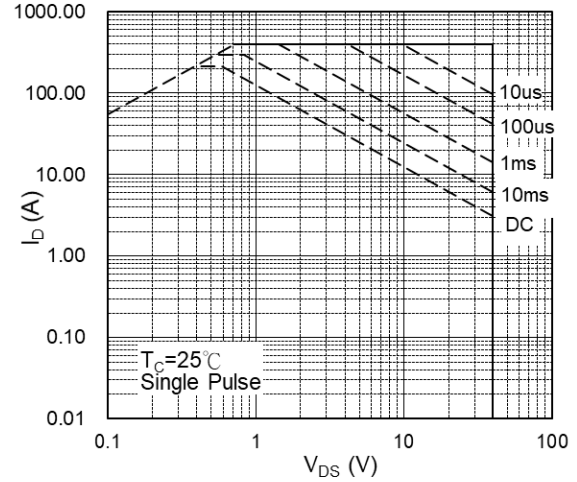


• **Typical Characteristics**(cont.)

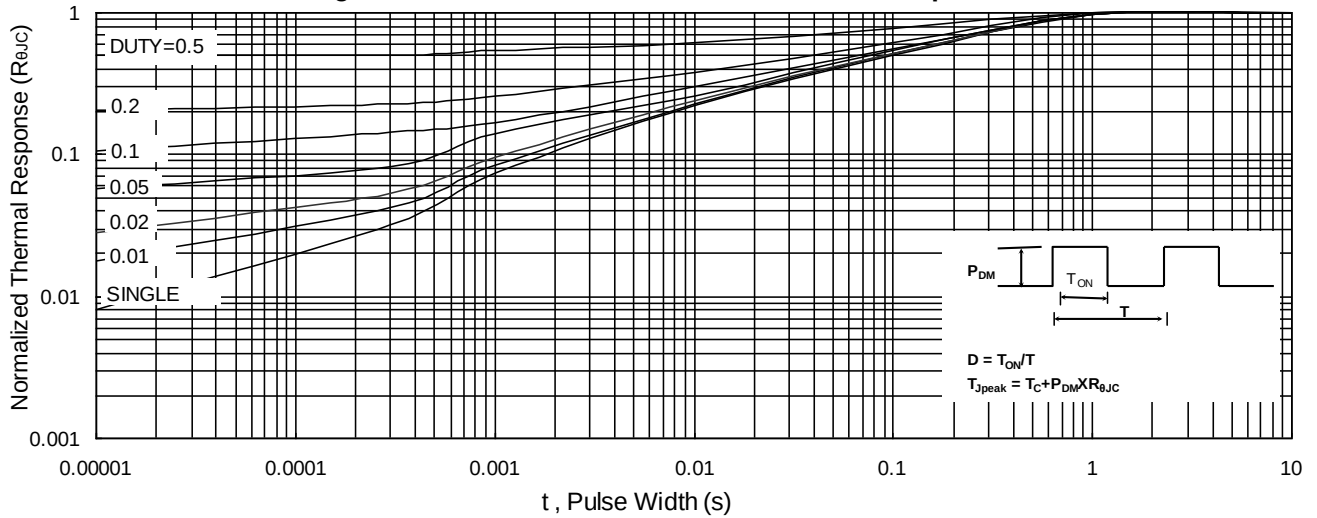
**Fig.7 Normalized  $R_{DS(on)}$  vs  $T_J$**



**Fig.8 Safe Operating Area**

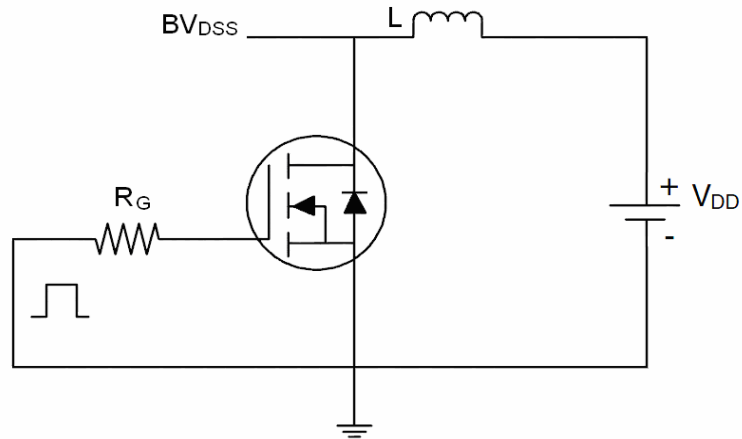


**Fig.9 Normalized Maximum Transient Thermal Impedance**

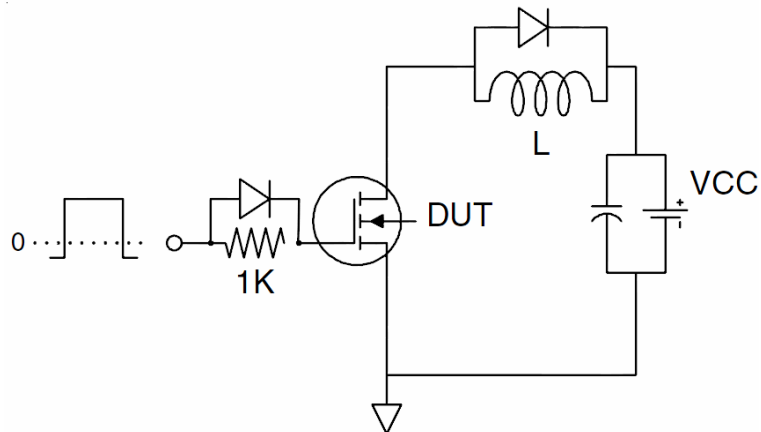


• Test Circuits & Waveforms

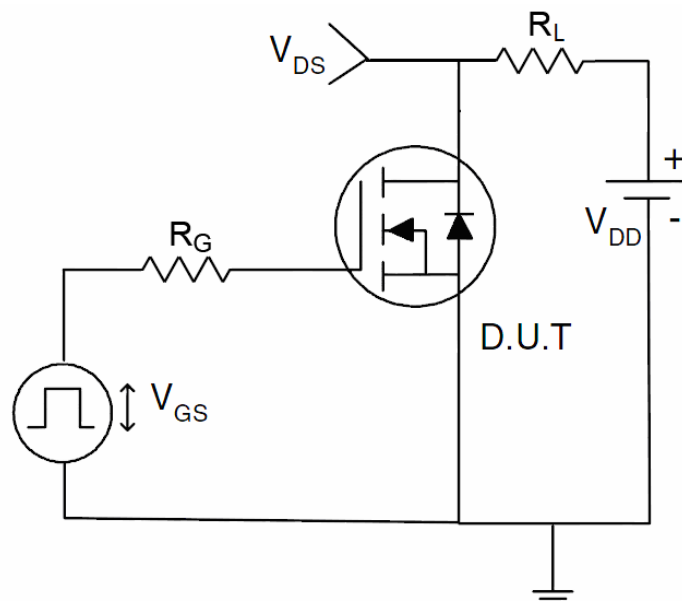
**Fig1.EAS test Circuits**



**Fig2.Gate charge test Circuit**



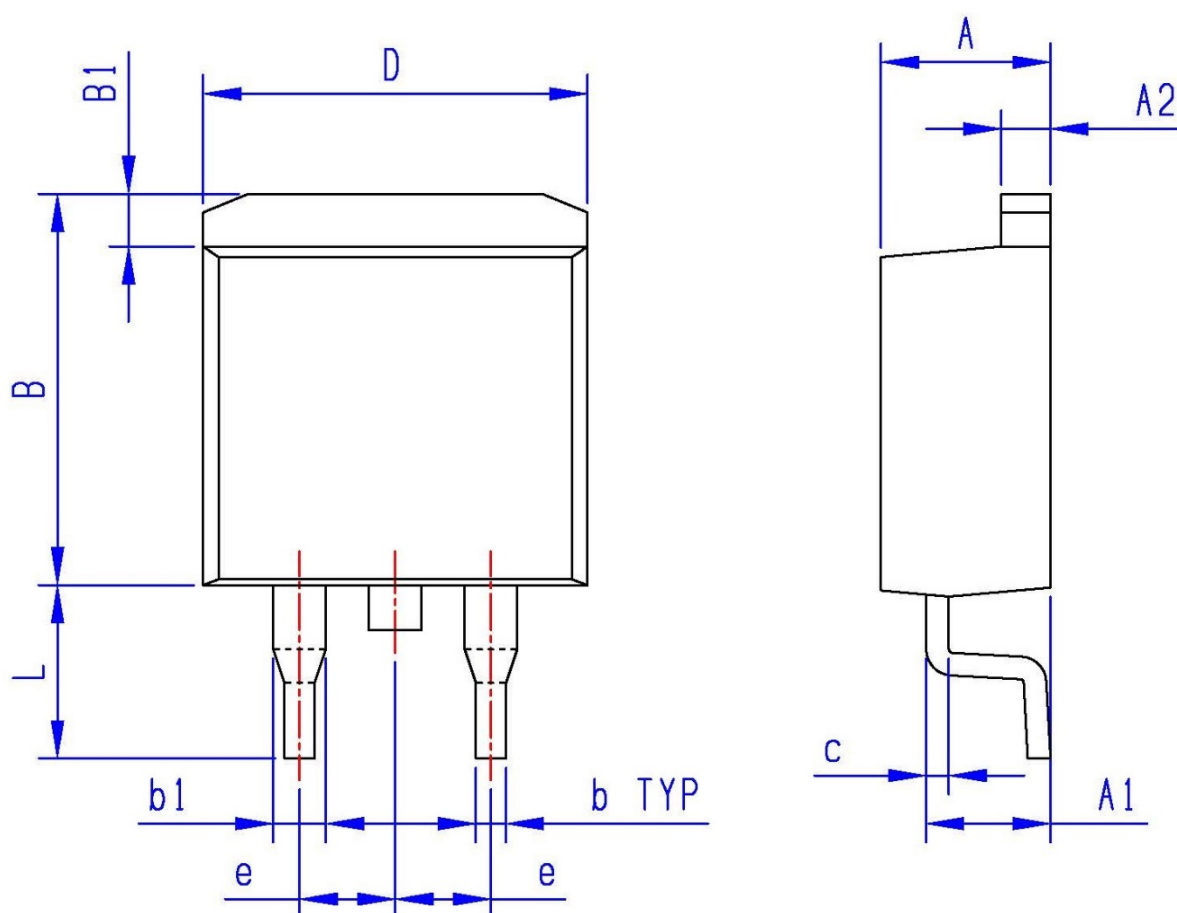
**Fig3.Switch Time Test Circuit**



• **Dimensions (TO-263)**

Unit: mm

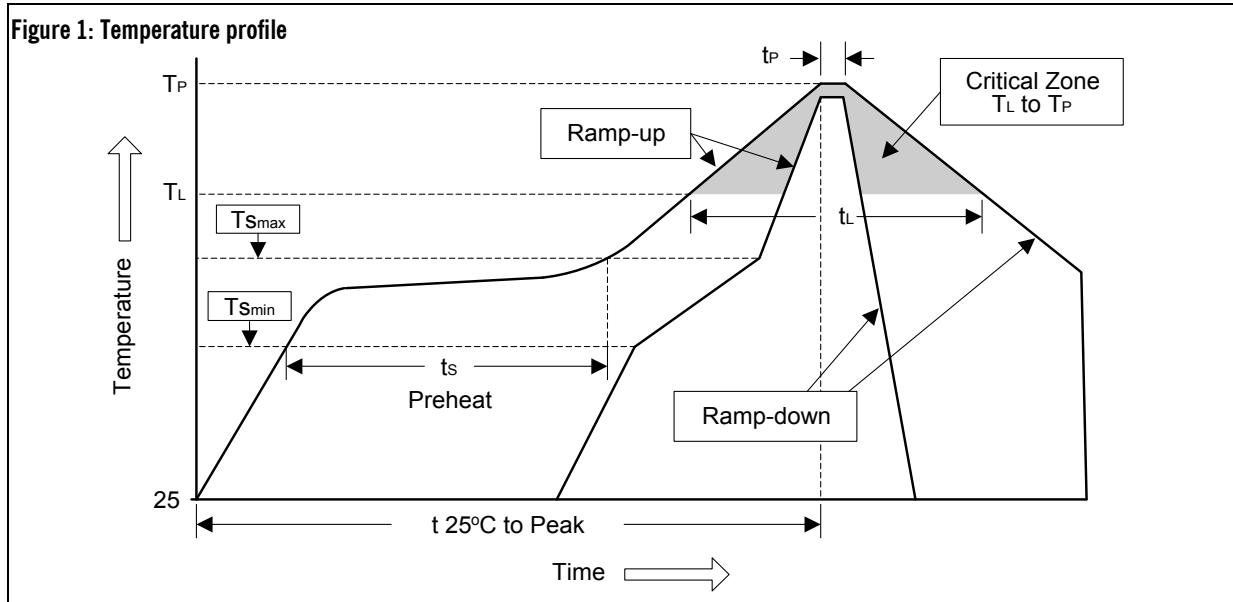
| SYMBOL | min   | max   | SYMBOL | min  | max  |
|--------|-------|-------|--------|------|------|
| A      | 4.25  | 4.85  | B1     | 1.20 | 1.80 |
| A1     | 2.30  | 3.00  | e      | 2.40 | 2.70 |
| A2     | 1.20  | 1.40  | L      | 4.80 | 5.60 |
| b      | 0.60  | 0.90  |        |      |      |
| b1     | 1.10  | 1.70  |        |      |      |
| c      | 0.40  | 0.70  |        |      |      |
| D      | 9.80  | 10.60 |        |      |      |
| B      | 10.40 | 11.40 |        |      |      |



### • Soldering Methods for Silicongear's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

**Figure 1: Temperature profile**



| Profile Feature                                      | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|------------------------------------------------------|-------------------------|------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )              | <3°C/sec                | <3°C/sec         |
| Preheat                                              |                         |                  |
| - Temperature Min ( $T_{smin}$ )                     | 100°C                   | 150°C            |
| - Temperature Max ( $T_{smax}$ )                     | 150°C                   | 200°C            |
| - Time (min to max) ( $t_s$ )                        | 60 to 120 sec           | 60 to 180 sec    |
| $T_{smax}$ to $T_L$                                  |                         |                  |
| - Ramp-up Rate                                       | <3°C/sec                | <3°C/sec         |
| Time maintained above:                               |                         |                  |
| - Temperature ( $T_L$ )                              | 183°C                   | 217°C            |
| - Time ( $t_l$ )                                     | 60 to 150 sec           | 60 to 150 sec    |
| Peak Temperature ( $T_P$ )                           | 240°C +0/-5°C           | 260°C +0/-5°C    |
| Time within 5°C of actual Peak Temperature ( $t_p$ ) | 10 to 30 sec            | 20 to 40 sec     |
| Ramp-down Rate                                       | <6°C/sec                | <6°C/sec         |
| Time 25°C to Peak Temperature                        | <6 minutes              | <8 minutes       |

### 3. Flow (wave) soldering (solder dipping)

| Products         | Peak Temperature | Dipping Time |
|------------------|------------------|--------------|
| Pb devices.      | 245°C ±5°C       | 5sec ±1sec   |
| Pb-Free devices. | 260°C +0/-5°C    | 5sec ±1sec   |