

LWH300G1201
LWH300G1201Z^{*(1)}

SUSPMTM

1200V 300A 2-Pack IGBT Module

Features

- Soft Punch Through (SPT⁺) Technology
 - Low Loss
 - Highly rugged SPT⁺ design
- Free Wheeling Diodes with soft reverse recovery
- Industrial standard package with copper base plate
- Included ESD protection function ^{*(1)}

Applications

- Welder / Power Supply
- UPS / Inverter
- Industrial Motor Drive

Preliminary data

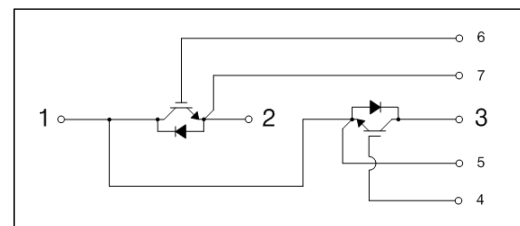


Absolute Maximum Ratings T_C = 25°C unless otherwise noted

| Item | Symbol | Conditions | Value | Units |
|----------------|--|---|---------|-------|
| IGBT | V _{CES} | | 1200 | V |
| | V _{GES} | | ± 20 | V |
| | I _C | @T _J = 150 °C, T _C = 25 °C, Continuous | 550 | A |
| | | @T _J = 150 °C, T _C = 80 °C, Continuous | 300 | A |
| | I _{CM} | @T _C = 80 °C, tp=1ms | 600 | A |
| | T _{SC} | Chip Level, @T _J = 150 °C, V _{GE} = 15V, V _{CES} < 1200V | 10 | µs |
| | T _J | Operating Junction Temperature ^{*(2)} | -40~125 | °C |
| P _D | @T _J = 150 °C, T _C = 25 °C | 1785 | W | |
| | @T _J = 150 °C, T _C = 80 °C | 1000 | W | |
| Diode | V _R RM | | 1200 | V |
| | I _F | | 300 | A |
| | I _{FRM} | tp=1ms | 600 | A |
| | T _J | Operating Junction Temperature ^{*(2)} | -40~125 | °C |
| Module | T _{stg} | Storage Temperature | -40~125 | °C |
| | V _{iso} | @AC 1minute | 2500 | V |
| | M _t | Main Terminal Mounting torque(M6) | 2.5~6.0 | Nm |
| | M _S | Heat sink Mounting torque(M6) | 3.0~6.0 | Nm |
| | W | Weight | 350 | g |

Internal Circuit & Pin Description

| Pin Number | Pin Name | Pin Description |
|------------|----------|-----------------------------|
| 1 | C2E1 | Output |
| 2 | E2 | Negative DC Link Output |
| 3 | C1 | Positive DC Link Output |
| 4 | G1 | Gate Input for High-side |
| 5 | E1 | Emitter Input for High-side |
| 6 | G2 | Gate Input for Low-side |
| 7 | E2 | Emitter Input for Low-side |



(Note *1) Option : Included ± 28V Zener Diode between Gate and Emitter
 (Note *2) The Maximum junction temperature of chip is 150°C

Electrical Characteristics of IGBT $T_C = 25^\circ\text{C}$ unless otherwise noted

Static Characteristics

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---------------|---|---|------|------|-----|-------|
| BV_{CES} | C-E Breakdown Voltage | $V_{GE} = 0V, I_C = 1mA$ | 1200 | - | - | V |
| I_{CES} | C-E Cut-Off Current | $V_{CE} = V_{CES}, V_{GE} = 0V$ | - | - | 1 | mA |
| I_{GES} | G-E Leakage Current | $V_{GE} = V_{GES}, V_{CE} = 0V$ | - | - | - | nA |
| $V_{GE(th)}$ | G-E Threshold Voltage | $V_{GE} = V_{CE}, I_C = 300mA$ | - | 6.98 | - | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C = 300A, V_{GE} = 15V, T_C = 25^\circ\text{C}$ | - | 2.3 | - | V |
| | | $I_C = 300A, V_{GE} = 15V, T_C = 125^\circ\text{C}$ | - | 2.7 | - | V |

Dynamic Characteristics

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|------------|------------------------------|--|-----|------|-----|---------------|
| C_{ies} | Input Capacitance | $V_{CE} = 25V, V_{GE} = 0V$ $f = 1MHz, T_C = 25^\circ\text{C}$ | - | - | - | nF |
| C_{oes} | Output Capacitance | | - | - | - | nF |
| C_{res} | Reverse Transfer Capacitance | | - | - | - | nF |
| $t_d(on)$ | Turn-On Delay Time | $T_C = 125^\circ\text{C}, R_G = 2.4 \Omega$ $L = 50 \mu H, V_{DC} = 600V$ $V_{GE} = 15V \sim -15V$ $I_C = 300A$ | - | 131 | - | ns |
| t_r | Rise Time | | - | 57 | - | ns |
| $t_d(off)$ | Turn-Off Delay Time | | - | 703 | - | ns |
| t_f | Fall Time | | - | 257 | - | ns |
| E_{on} | Turn-On Switching Loss | | - | 28.6 | - | mJ |
| E_{off} | Turn-Off Switching Loss | | - | 32.2 | - | mJ |
| E_{is} | Total Switching Loss | | - | 60.8 | - | mJ |
| Q_g | Total Gate Charge | $V_{GE} = 0V \sim +15V$ | - | 1.85 | - | μC |
| Q_{ge} | Gate-Emitter Charge | | - | 0.94 | - | μC |
| Q_{gc} | Gate-Collector Charge | | - | 0.46 | - | μC |

Electrical Characteristics of Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units | |
|-----------|-------------------------------------|---|---------------------------|------|------|-------|---------------|
| V_F | Diode Forward Voltage | $I_F = 300A, V_{GE} = 0V$ | $T_C = 25^\circ\text{C}$ | - | 1.9 | - | V |
| | | | $T_C = 125^\circ\text{C}$ | - | 2.0 | - | |
| t_{rr} | Diode Reverse Recovery Time | $R_G = 2.4 \Omega$ $L = 50 \mu H$ $V_{DC} = 600V$ $V_{GE} = 15V \sim -15V$ $I_C = 300A$ | $T_C = 25^\circ\text{C}$ | - | 409 | - | ns |
| | | | $T_C = 125^\circ\text{C}$ | - | 674 | - | |
| I_{RRM} | Diode Peak Reverse Recovery Current | | $T_C = 25^\circ\text{C}$ | - | 327 | - | A |
| | | | $T_C = 125^\circ\text{C}$ | - | 447 | - | |
| Q_{rr} | Diode Reverse Recovery Charge | | $T_C = 25^\circ\text{C}$ | - | 41.2 | - | μC |
| | | | $T_C = 125^\circ\text{C}$ | - | 97.3 | - | |
| E_{rr} | Diode Reverse Recovery Energy | $T_C = 25^\circ\text{C}$ | - | 15.1 | - | mJ | |
| | | $T_C = 125^\circ\text{C}$ | - | 38.7 | - | | |

Thermal Characteristics

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|----------------|---------------------------------|------------------|-----|------|-----|--------------------|
| $R_{th(J-C)}$ | Thermal Resistance (IGBT Part) | Junction-to-Case | - | 0.07 | - | $^\circ\text{C/W}$ |
| $R_{th(J-C)D}$ | Thermal Resistance (Diode Part) | Junction-to-Case | - | - | - | $^\circ\text{C/W}$ |

* This specifications may not be considered as an assurance of characteristics and may not have same characteristics in case of using different test systems. from@LSIS. We therefore strongly recommend prior consultation of our engineers.

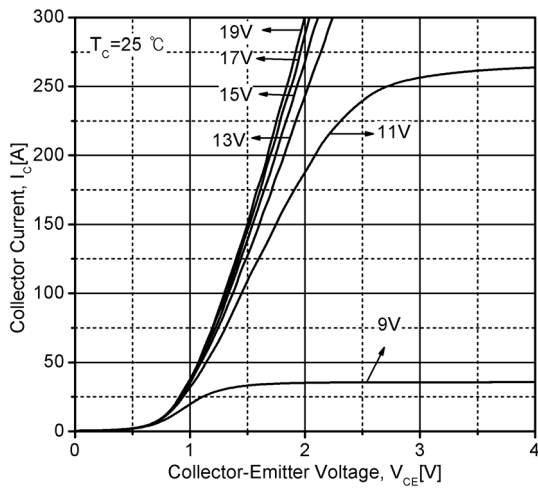


Fig 1. Typical IGBT Output Characteristics

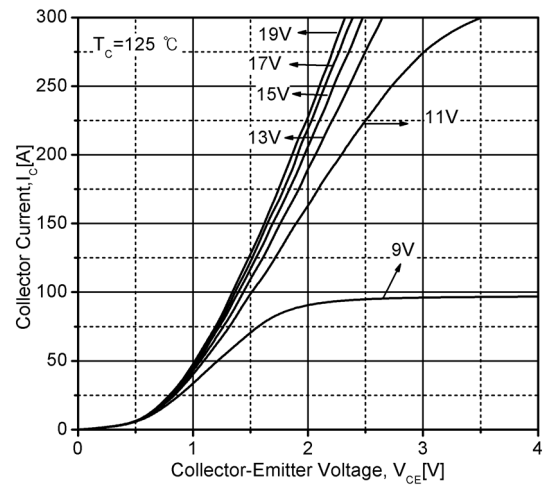


Fig 2. Typical IGBT Output Characteristics

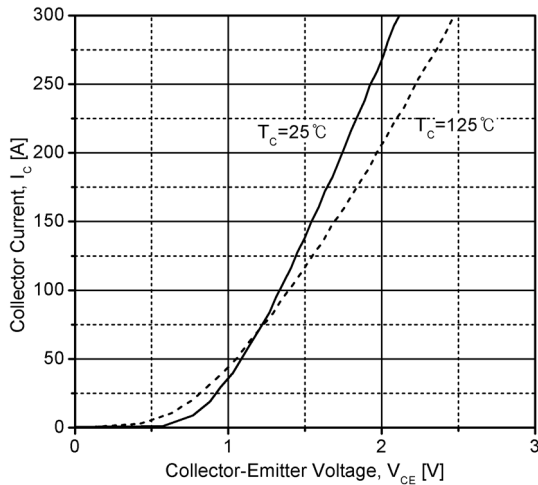


Fig 3. Typical IGBT Output Characteristics

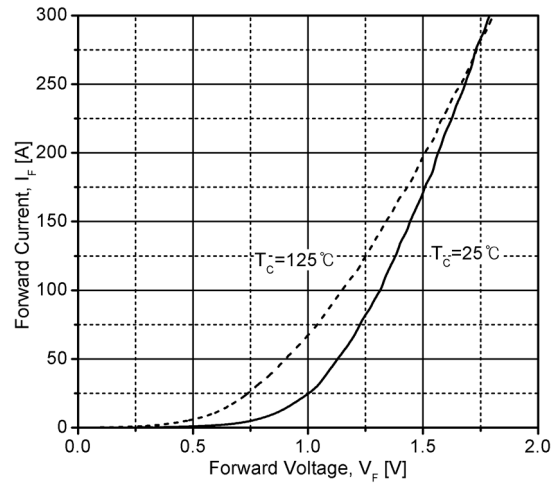


Fig 4. Typical Diode Forward Characteristics

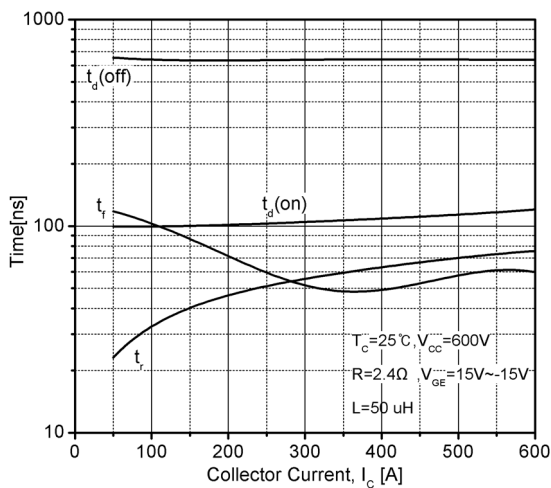


Fig 5. Typical Switching Time vs. Collector Current

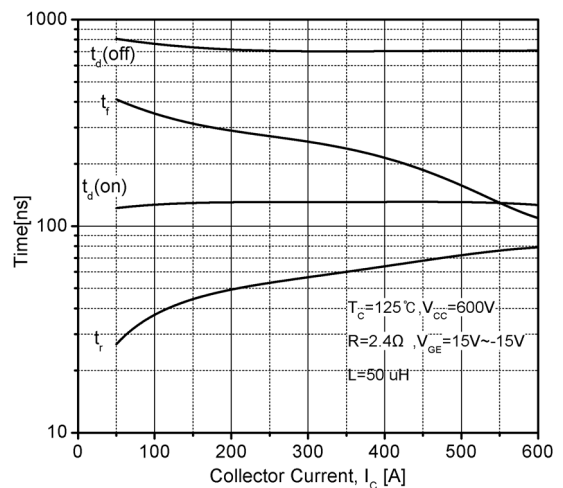


Fig 6. Typical Switching Time vs. Collector Current

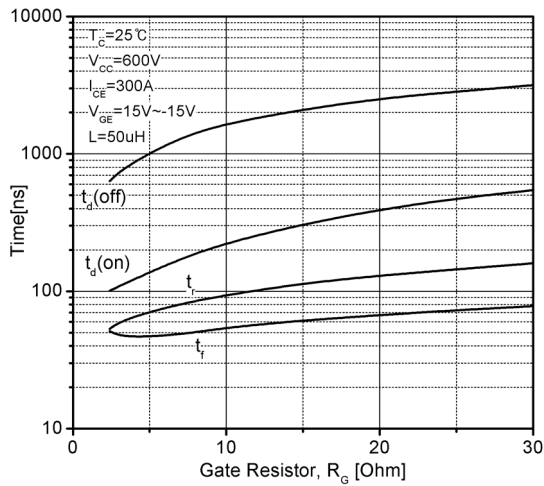


Fig 7. Typical Switching Time vs. Gate Resistor

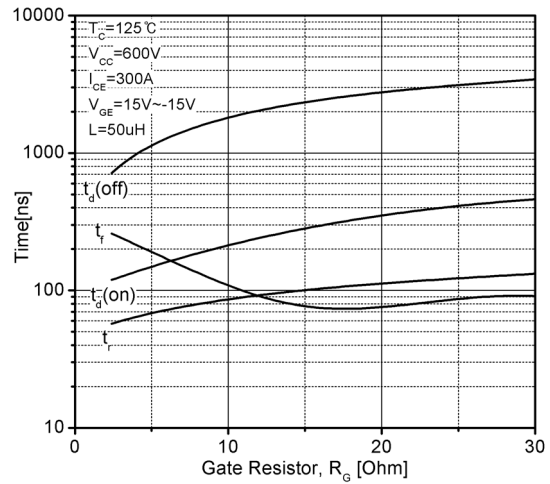


Fig 8. Typical Switching Time vs. Gate Resistor

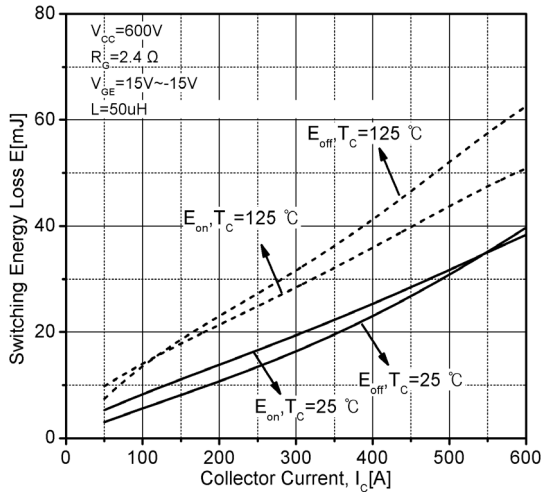


Fig 9. Typical IGBT Switching Loss

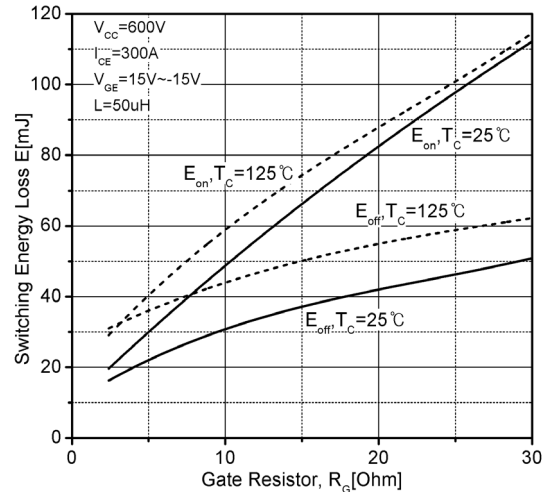


Fig 10. Typical IGBT Switching Loss

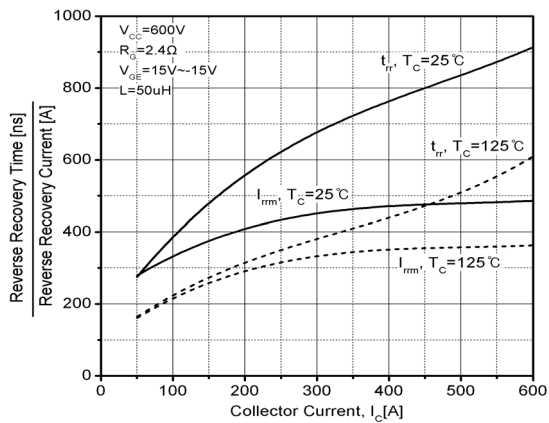


Fig 11. Typical Recovery Characteristics of Diode

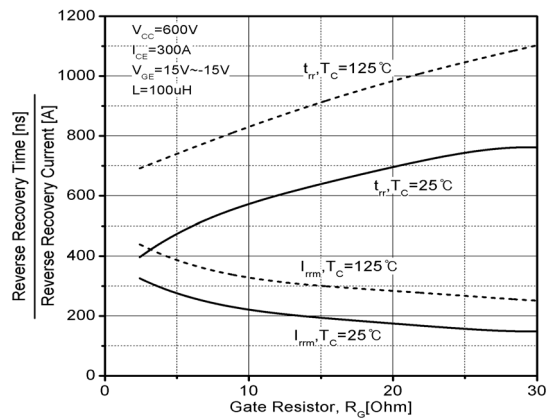


Fig 12. Typical Recovery Characteristics of Diode

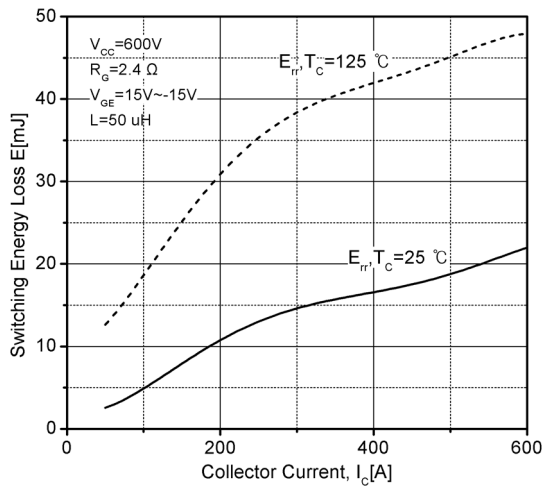


Fig 13. Typical Diode Switching Loss

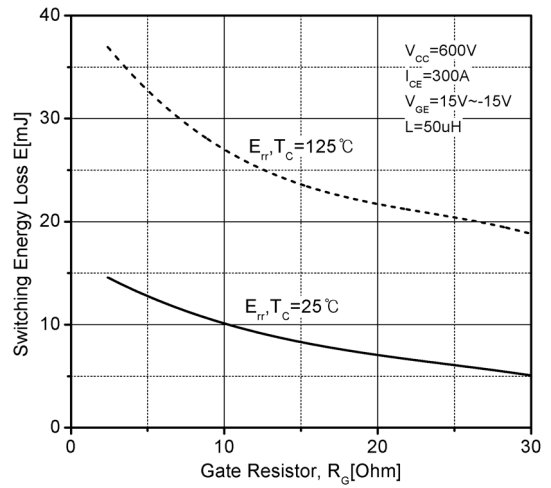


Fig 14. Typical Diode Switching Loss

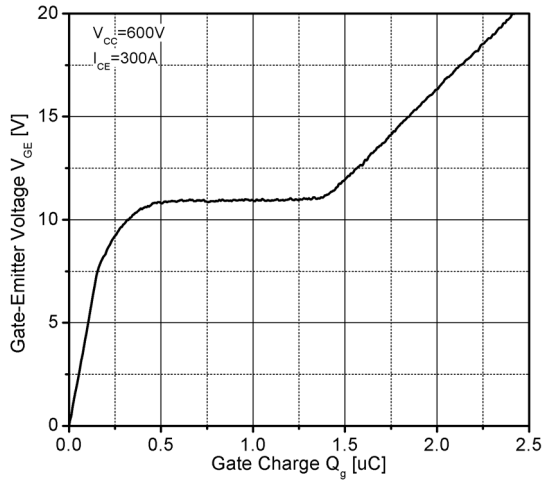


Fig 15. Typical Gate Charge Characteristics

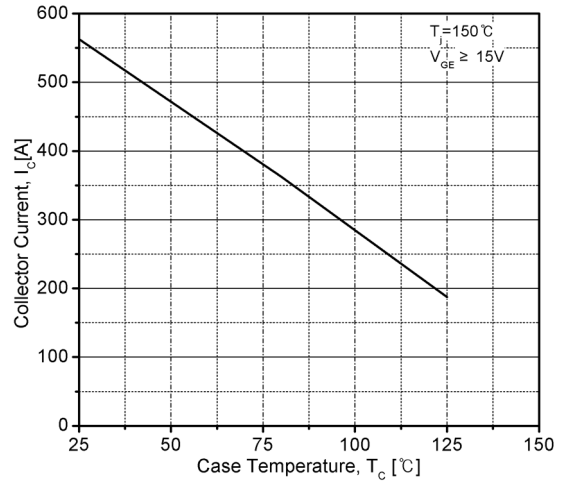


Fig 16. Case Temperature vs. Collector Current

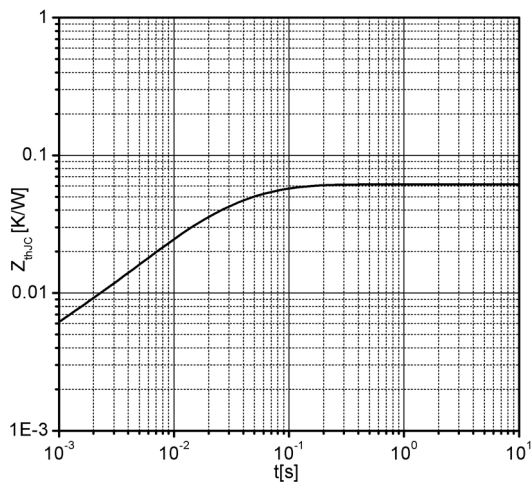
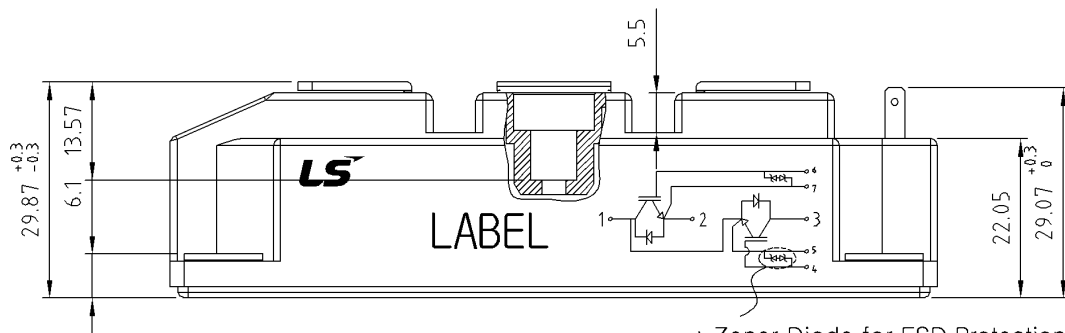
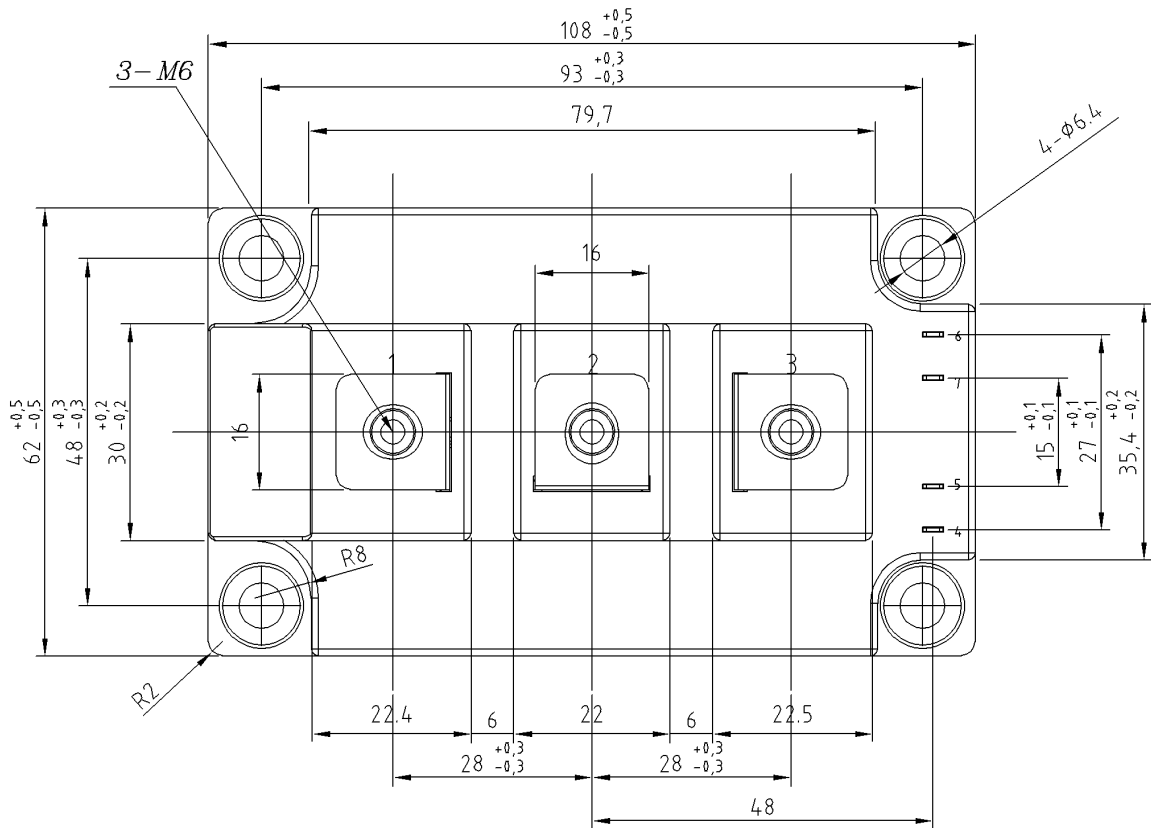


Fig 17. Typical Transient Thermal Impedance

Package Dimension(Dimension in mm)



* Zener Diode for ESD Protection.