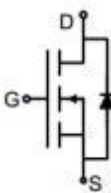
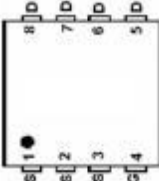



# N-Channel Enhancement Mode Power MOSFET

|   |                |   |                  |
|---|----------------|---|------------------|
| <p><b>Description</b></p> <p>The G50N03D5 uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math>, low gate charge. It can be used in a wide variety of applications.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS}</math> 30V</li> <li>● <math>I_D</math> (at <math>V_{GS} = 10V</math>) 50A</li> <li>● <math>R_{DS(ON)}</math> (at <math>V_{GS} = 10V</math>) &lt; 4.5mQ</li> <li>● <math>R_{DS(ON)}</math> (at <math>V_{GS} = 4.5V</math>) &lt; 8mQ</li> <li>● 100% Avalanche Tested</li> <li>● RoHS Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Power switch</li> <li>● DC/DC converters</li> </ul> |                |  <p>Schematic diagram</p>  <p>Marking and pin assignment</p>  <p>DFN5*6-8L</p> |                  |
| <b>Device</b>   | <b>Package</b> | <b>Marking</b>  | <b>Packaging</b> |
| G50N03D5  | DFN5*6-8L      | G50N03  | 5000 pcs/Reel    |

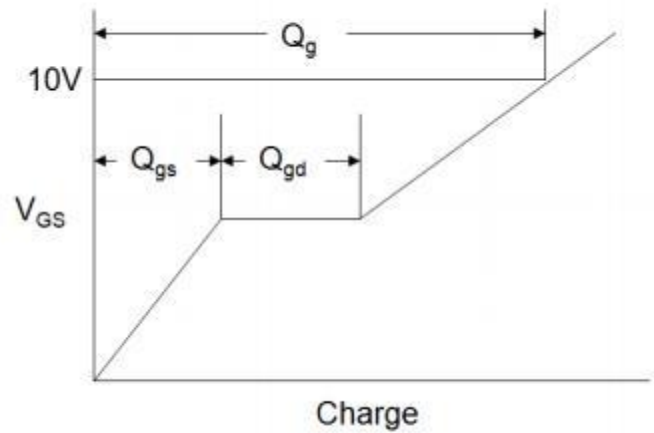
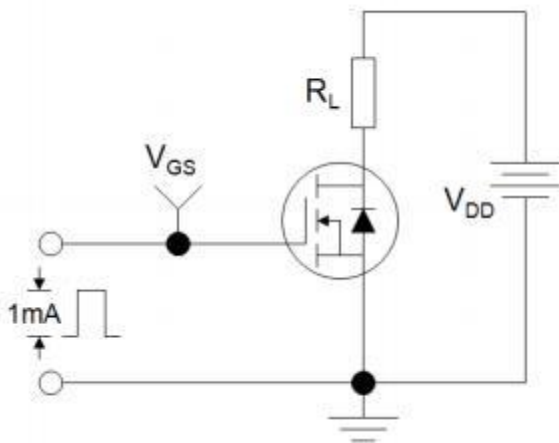
| <b>Absolute Maximum Ratings</b> $T_C = 25^\circ C$ , unless otherwise noted |                |            |              |
|---|----------------|------------|--------------|
| Parameter   | Symbol         | Value      | Unit         |
| Drain-Source Voltage  | $V_{DS}$       | 30         | V            |
| Continuous Drain Current  | $I_D$          | 50         | A            |
| Pulsed Drain Current (note1)  | $I_{DM}$       | 200        | A            |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V            |
| Power Dissipation   | $P_D$          | 20         | W            |
| Single pulse avalanche energy (note2)                                       | $E_{AS}$       | 81         | mJ           |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | -55 To 150 | $^\circ C$   |
| <b>Thermal Resistance</b>   |                |            |              |
| Parameter   | Symbol         | Value      | Unit         |
| Thermal Resistance, Junction-to-Ambient                                     | $R_{thJA}$     | 78         | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case  | $R_{thJC}$     | 6          | $^\circ C/W$ |

| <b>Specifications</b> $T_J = 25^\circ\text{C}$ , unless otherwise noted |               |  |       |      |           |               |
|---|---------------|--|-------|------|-----------|---------------|
| Parameter   | Symbol        | Test Conditions  | Value |      |           | Unit          |
|   |               |  | Min.  | Typ. | Max.      |               |
| <b>Static Parameters</b>  |               |  |       |      |           |               |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu\text{A}$                      | 30    | --   | --        | V             |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{DS} = 30V, V_{GS} = 0V, T_J = 25^\circ\text{C}$      | --    | --   | 1         | $\mu\text{A}$ |
| Gate-Source Leakage   | $I_{GSS}$     | $V_{GS} = \pm 20V$                                       | --    | --   | $\pm 100$ | nA            |
| Gate-Source Threshold Voltage   | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                  | 1.1   | 1.6  | 2.4       | V             |
| Drain-Source On-Resistance  | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 20A$                                | --    | 3.2  | 4.5       | m $\Omega$    |
|   |               | $V_{GS} = 4.5V, I_D = 20A$                               | --    | 5.9  | 8         |               |
| Forward Transconductance  | $g_{FS}$      | $V_{DS} = 5V, I_D = 20A$                                 | --    | 35   | --        | S             |
| <b>Dynamic Parameters</b>   |               |  |       |      |           |               |
| Input Capacitance   | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 15V,$<br>$f = 1.0\text{MHz}$ | --    | 1661 | --        | pF            |
| Output Capacitance  | $C_{oss}$     |  | --    | 338  | --        |               |
| Reverse Transfer Capacitance  | $C_{rss}$     |  | --    | 316  | --        |               |
| Total Gate Charge   | $Q_g$         | $V_{DD} = 15V,$<br>$I_D = 20A,$<br>$V_{GS} = 10V$        | --    | 38.4 | --        | nC            |
| Gate-Source Charge  | $Q_{gs}$      |  | --    | 5.8  | --        |               |
| Gate-Drain Charge   | $Q_{gd}$      |  | --    | 7.9  | --        |               |
| Turn-on Delay Time  | $t_{d(on)}$   | $V_{DD} = 5V,$<br>$I_D = 20A,$<br>$R_G = 6\Omega$        | --    | 7    | --        | ns            |
| Turn-on Rise Time   | $t_r$         |  | --    | 6    | --        |               |
| Turn-off Delay Time   | $t_{d(off)}$  |  | --    | 30   | --        |               |
| Turn-off Fall Time  | $t_f$         |  | --    | 8    | --        |               |
| <b>Drain-Source Body Diode Characteristics</b>                          |               |  |       |      |           |               |
| Continuous Body Diode Current   | $I_S$         | $T_C = 25^\circ\text{C}$                                 | --    | --   | 50        | A             |
| Body Diode Voltage  | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 20A, V_{GS} = 0V$      | --    | --   | 1.2       | V             |
| Reverse Recovery Charge   | $Q_{rr}$      | $I_F = 20A, V_{GS} = 0V$<br>$di/dt = 500A/\mu\text{s}$   | --    | 57   | --        | nC            |
| Reverse Recovery Time   | $T_{rr}$      |  | --    | 21   | --        | ns            |

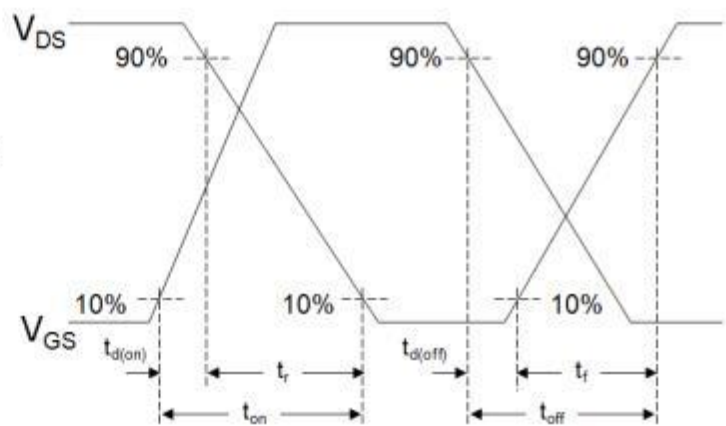
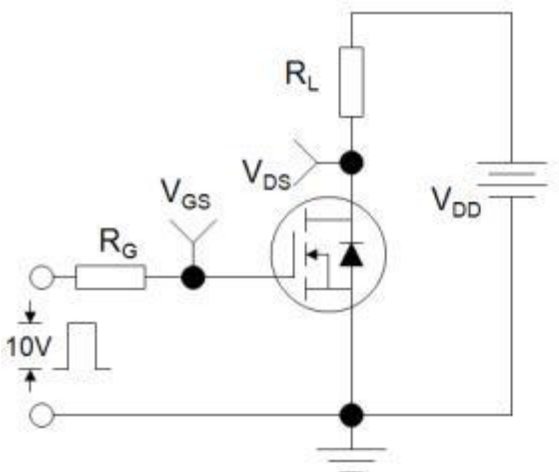
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

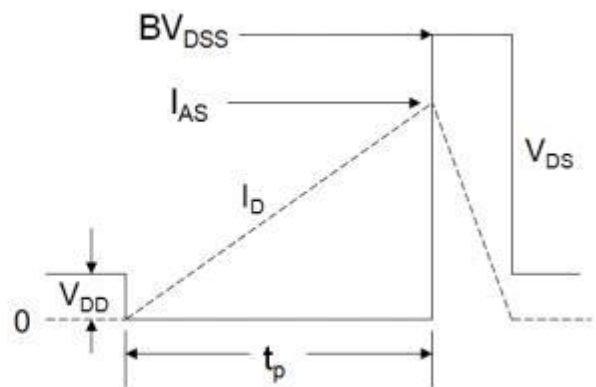
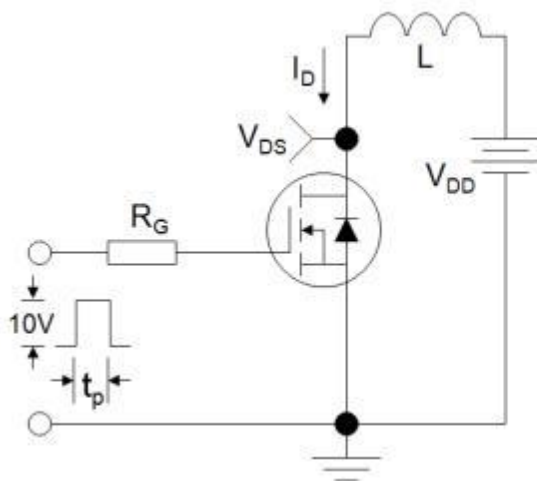
**Gate Charge Test Circuit**



**Switch Time Test Circuit**

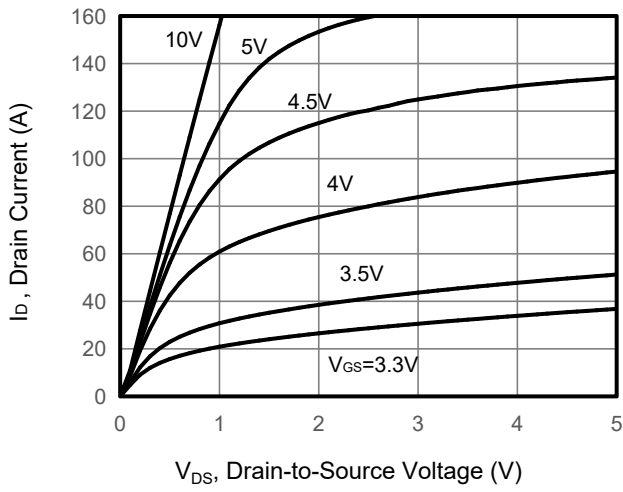


**EAS Test Circuit**

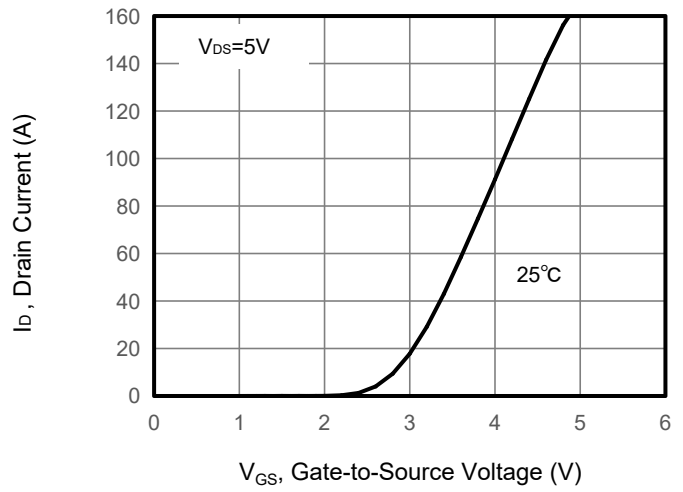


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

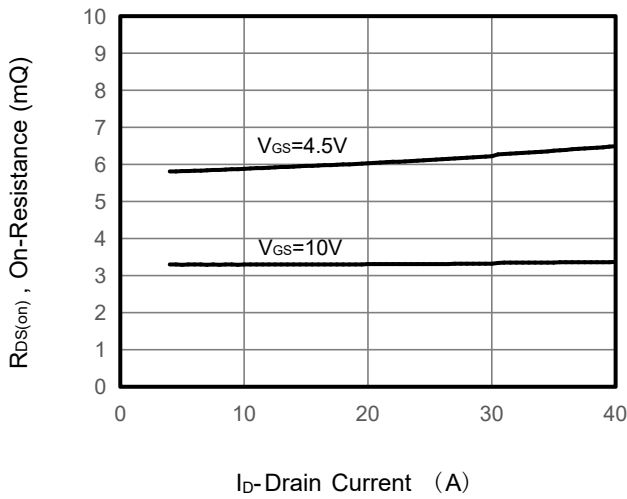
**Figure 1. Output Characteristics**



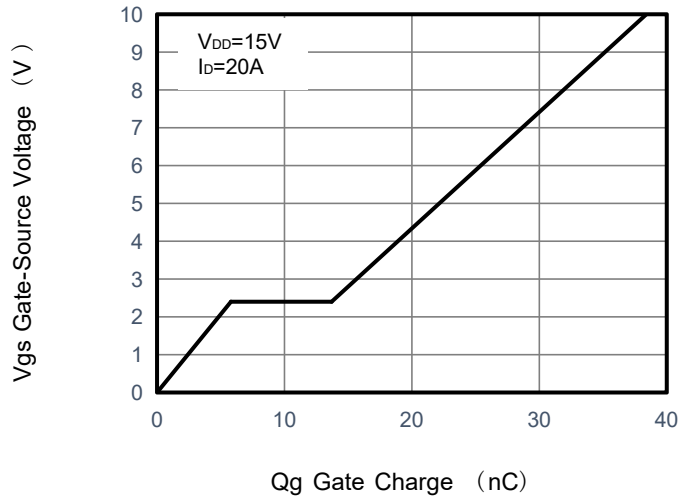
**Figure 2. Transfer Characteristics**



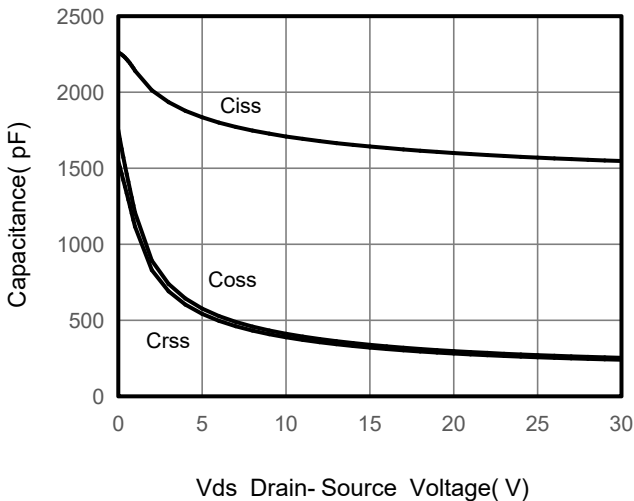
**Figure 3. Drain Source On Resistance**



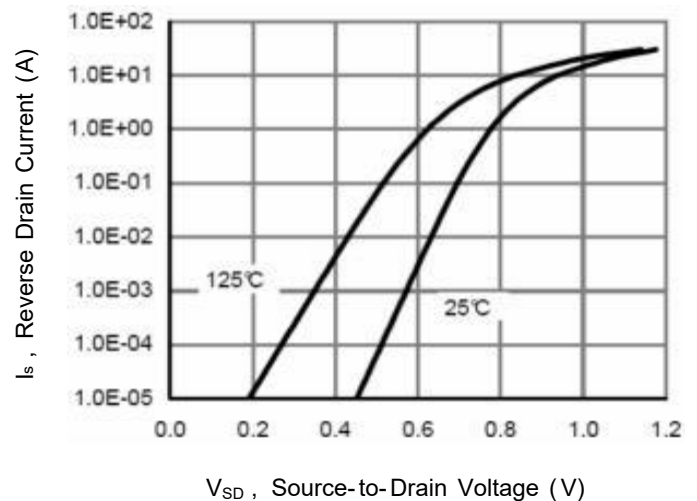
**Figure 4. Gate Charge**



**Figure 5. Capacitance**

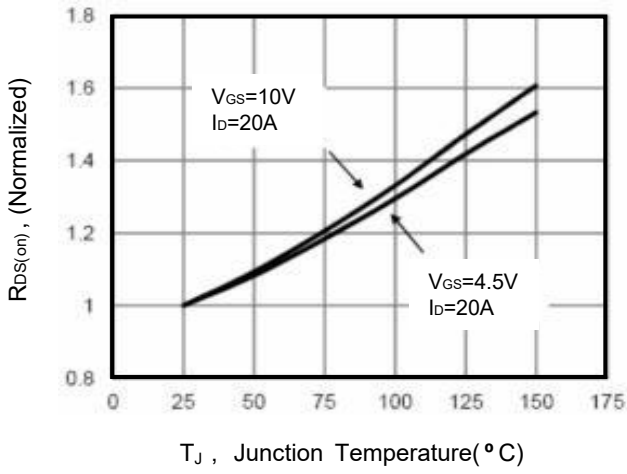


**Figure 6. Source-Drain Diode Forward**

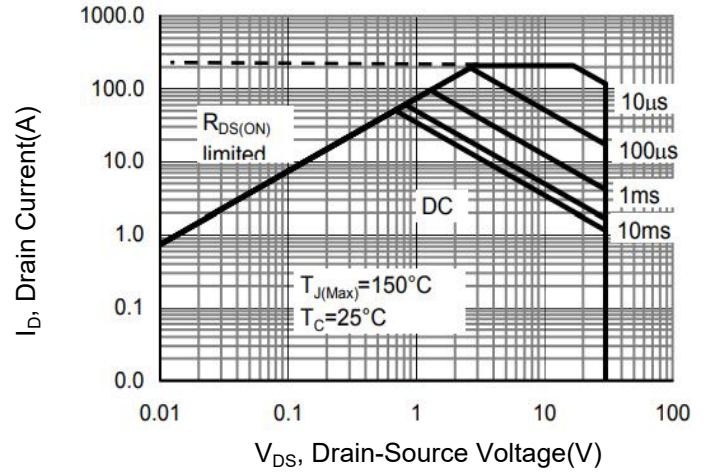


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

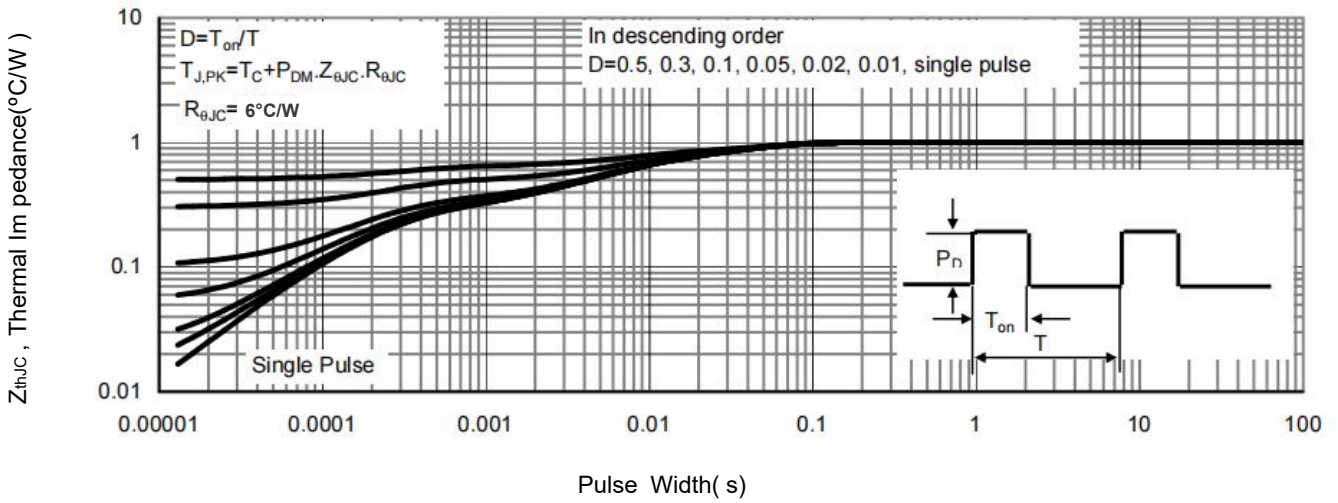
**Figure 7. Drain-Source On-Resistance**



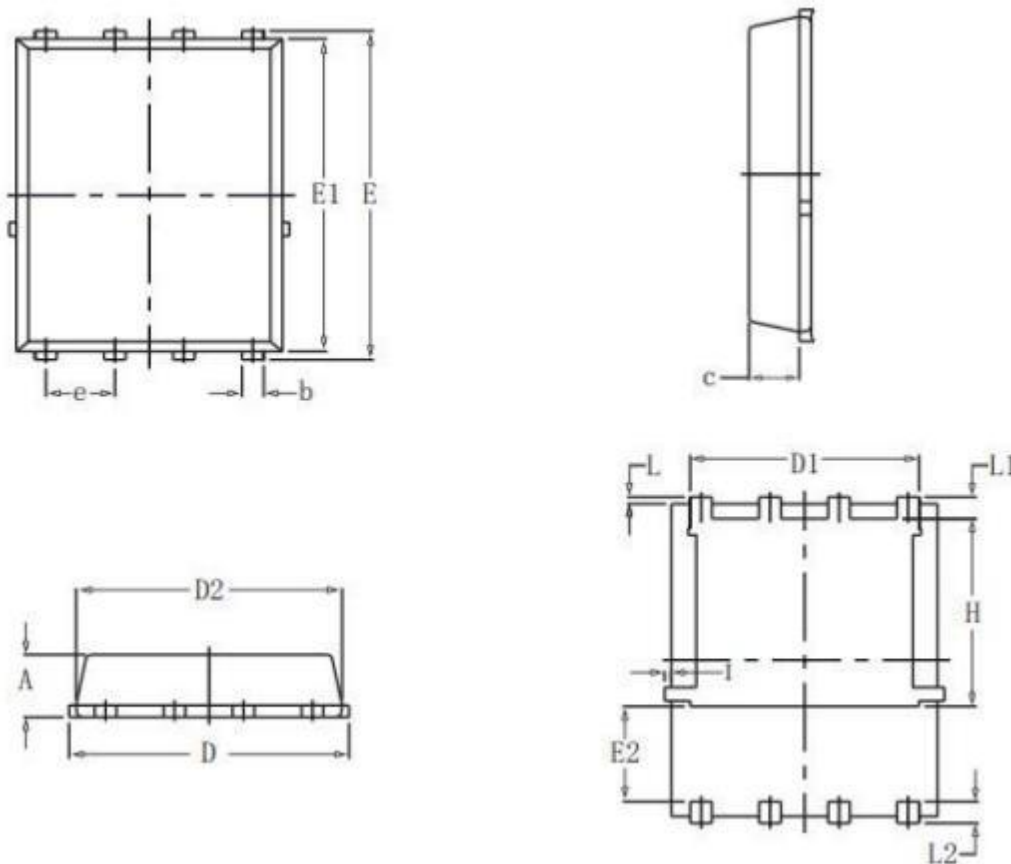
**Figure 8. Safe Operation Area**



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



**DFN5×6-8L Package Information**



| SYMBOL | COMMON   |       |          |        |
|--------|----------|-------|----------|--------|
|        | MM       |       | INCH     |        |
|        | MIN      | MAX   | MIN      | MAX    |
| A      | 1.03     | 1.17  | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48  | 0.0134   | 0.0189 |
| c      | 0.824    | 0.970 | 0.0324   | 0.0382 |
| D      | 4.80     | 5.40  | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31  | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00  | 0.1890   | 0.1969 |
| E      | 5.59     | 6.15  | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85  | 0.2224   | 0.2303 |
| E2     | 1.60     | -     | 0.0630   | -      |
| e      | 1.27 BSC |       | 0.05 BSC |        |
| L      | 0.05     | 0.25  | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50  | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50  | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50  | 0.1299   | 0.1378 |
| I      | -        | 0.18  | -        | 0.0070 |