

**Features**

- Split Gate Trench MOSFET Technology
- Excellent Package for Heat Dissipation
- High Density Cell Design for Low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

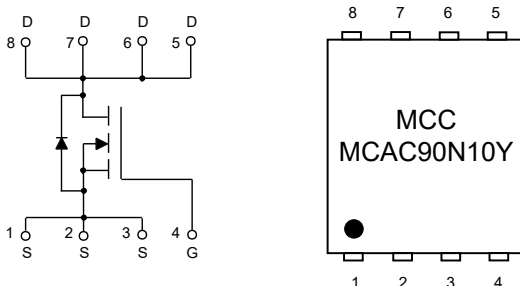
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 50°C/W Junction to Ambient(Steady-State)<sup>(Note 2)</sup>
- Thermal Resistance: 1.04°C/W Junction to Case

| Parameter  | Symbol   | Rating            | Unit |
|--|----------|-------------------|------|
| Drain-Source Voltage                               | $V_{DS}$ | 100               | V    |
| Gate-Source Voltage                                | $V_{GS}$ | ±20               | V    |
| Continuous Drain Current                           | $I_D$    | $T_C=25^\circ C$  | 90   |
|  |          | $T_C=100^\circ C$ | 57   |
| Pulsed Drain Current <sup>(Note 3)</sup>           | $I_{DM}$ | 360               | A    |
| Total Power Dissipation <sup>(Note 4)</sup>        | $P_D$    | 120               | W    |
| Single Pulsed Avalanche Energy <sup>(Note 5)</sup> | $E_{AS}$ | 400               | mJ   |

Note:

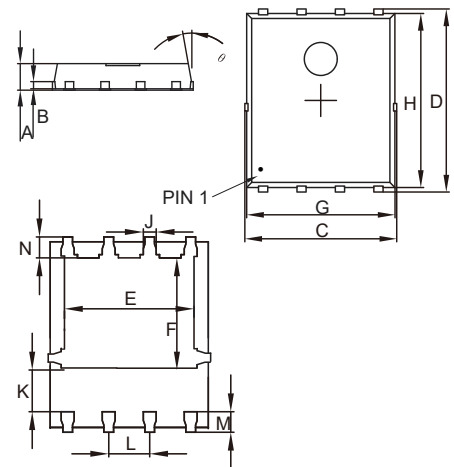
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ C$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA} t \leq 10s$  and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $T_J=25^\circ C$ ,  $V_{DD}=50V$ ,  $V_G=10V$ ,  $L=2mH$ .

**Internal Structure and Marking Code**



**N-CHANNEL MOSFET**

**DFN5060**



| DIM | DIMENSIONS |       |       |      | NOTE |
|-----|------------|-------|-------|------|------|
|     | INCHES     |       | MM    |      |      |
|     | MIN        | MAX   | MIN   | MAX  |      |
| A   | 0.031      | 0.047 | 0.80  | 1.20 |      |
| B   | 0.010      |       | 0.254 |      | TYP. |
| C   | 0.193      | 0.222 | 4.90  | 5.64 |      |
| D   | 0.232      | 0.250 | 5.90  | 6.35 |      |
| E   | 0.148      | 0.167 | 3.75  | 4.25 |      |
| F   | 0.126      | 0.154 | 3.20  | 3.92 |      |
| G   | 0.189      | 0.213 | 4.80  | 5.40 |      |
| H   | 0.222      | 0.239 | 5.65  | 6.06 |      |
| K   | 0.045      | 0.059 | 1.15  | 1.50 |      |
| J   | 0.012      | 0.020 | 0.30  | 0.50 |      |
| L   | 0.046      | 0.054 | 1.17  | 1.37 |      |
| M   | 0.012      | 0.028 | 0.30  | 0.71 |      |
| N   | 0.016      | 0.028 | 0.40  | 0.71 |      |

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

| Parameter                       | Symbol        | Test Conditions                                      | Min | Typ  | Max       | Unit       |
|---------------------------------|---------------|--|-----|------|-----------|------------|
| <b>Static Characteristics</b>   |               |  |     |      |           |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                            | 100 |      |           | V          |
| Gate-Source Leakage Current     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                          |     |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=100V, V_{GS}=0V$                             |     |      | 1         | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                        | 2   | 2.8  | 4         | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                                |     | 4.1  | 4.8       | m $\Omega$ |
|                                 |               | $V_{GS}=6V, I_D=20A$                                 |     | 5.6  | 6.5       |            |
| Gate Resistance                 | $R_G$         | f=1MHz, Open drain                                   |     | 0.9  |           | $\Omega$   |
| <b>Diode Characteristics</b>    |               |  |     |      |           |            |
| Continuous Body Diode Current   | $I_S$         |  |     |      | 90        | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=20A$                                 |     |      | 1.3       | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=20A, di_F/dt=100A/\mu s$                        |     | 63   |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |  |     | 77   |           | nC         |
| <b>Dynamic Characteristics</b>  |               |  |     |      |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=50V, V_{GS}=0V, f=1MHz$                      |     | 4458 |           | pF         |
| Output Capacitance              | $C_{oss}$     |  |     | 1921 |           |            |
| Reverse Transfer Capacitance    | $C_{riss}$    |  |     | 20   |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=50V, V_{GS}=10V, I_D=55A$                    |     | 60   |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |  |     | 17   |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |  |     | 10   |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DS}=50V, V_{GEN}=10V, R_G=2.2\Omega, I_{DS}=55A$ |     | 18.7 |           | ns         |
| Turn-On Rise Time               | $t_r$         |  |     | 10.6 |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |  |     | 33   |           |            |
| Turn-Off Fall Time              | $t_f$         |  |     | 11   |           |            |

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

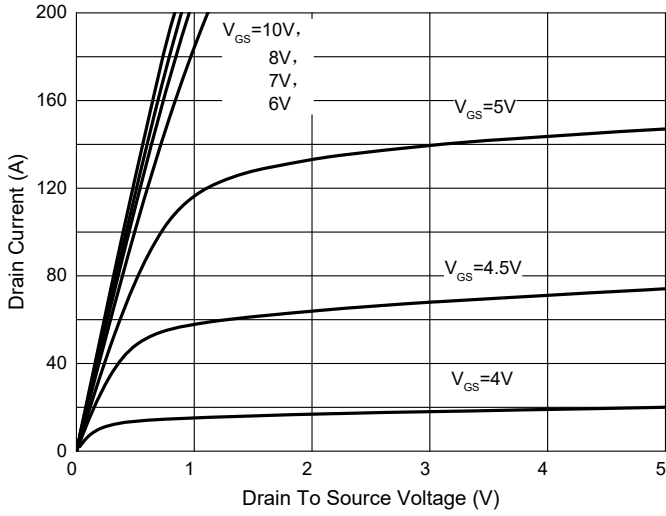


Fig. 2 - Transfer Characteristics

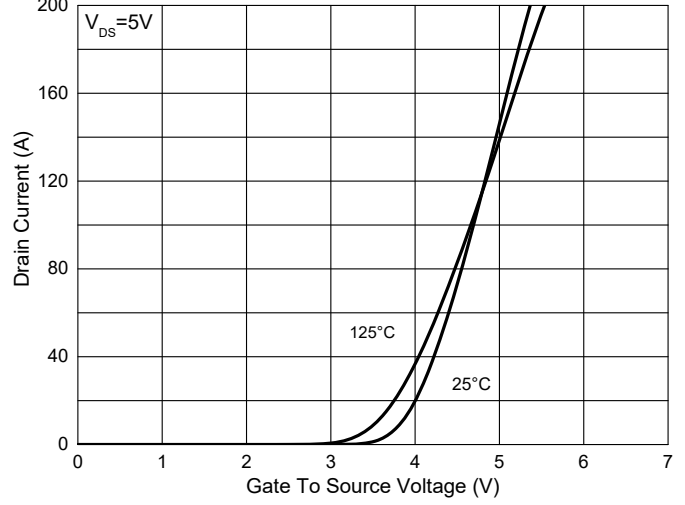


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

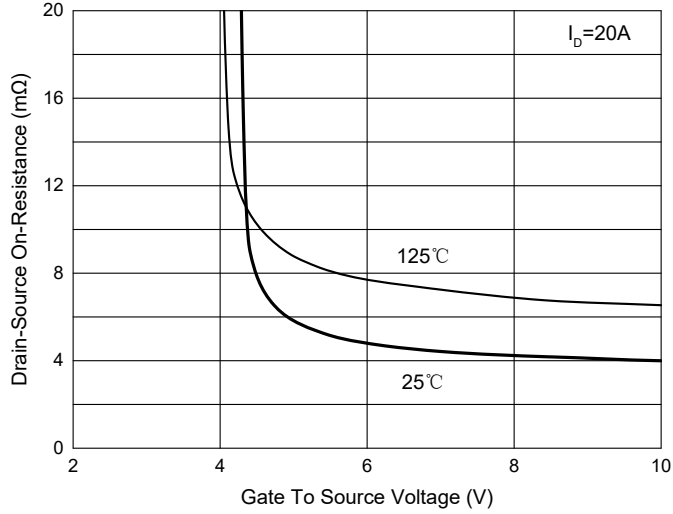


Fig. 4 -  $R_{DS(ON)} - I_D$

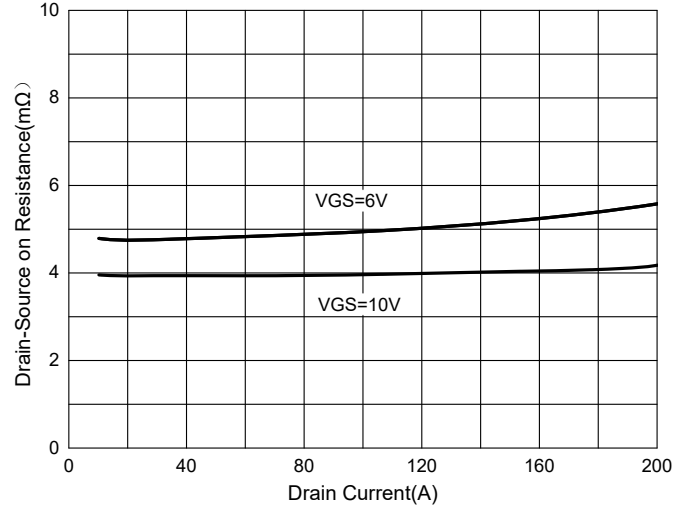


Fig. 5 - Capacitance Characteristics

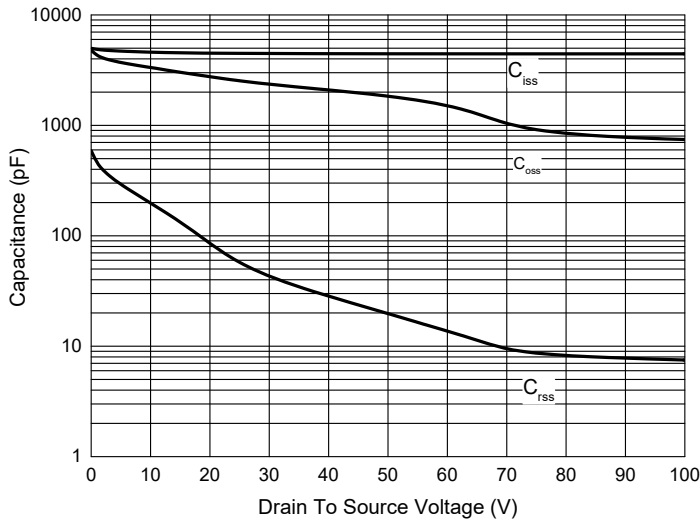
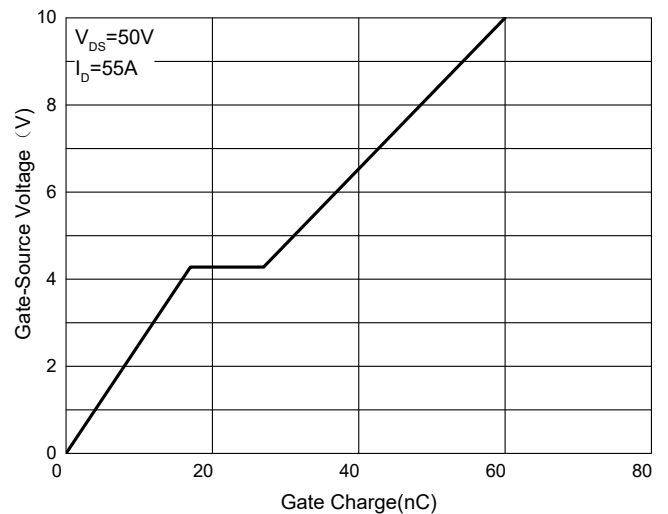


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Normalized Threshold voltage

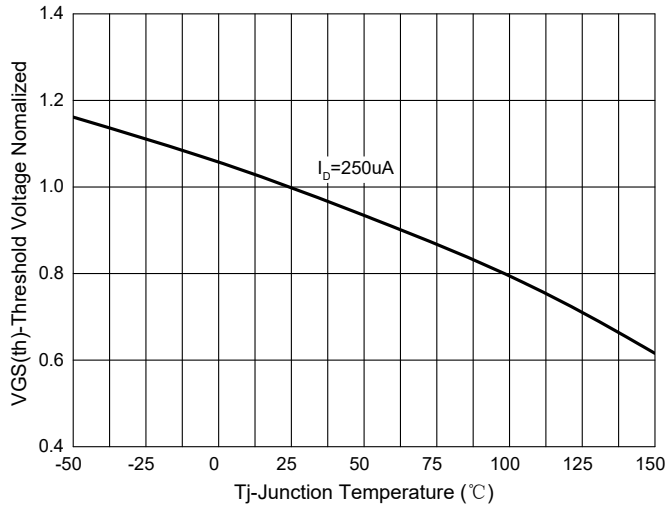


Fig.8-Normalized On Resistance Characteristics

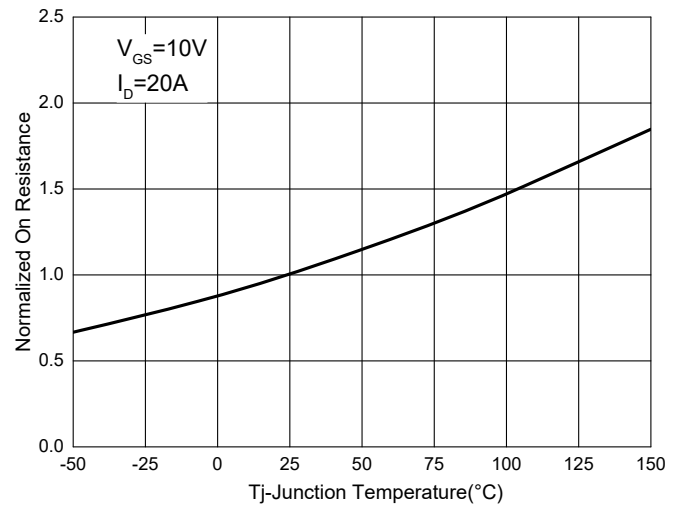


Fig.9 -  $I_S - V_{SD}$

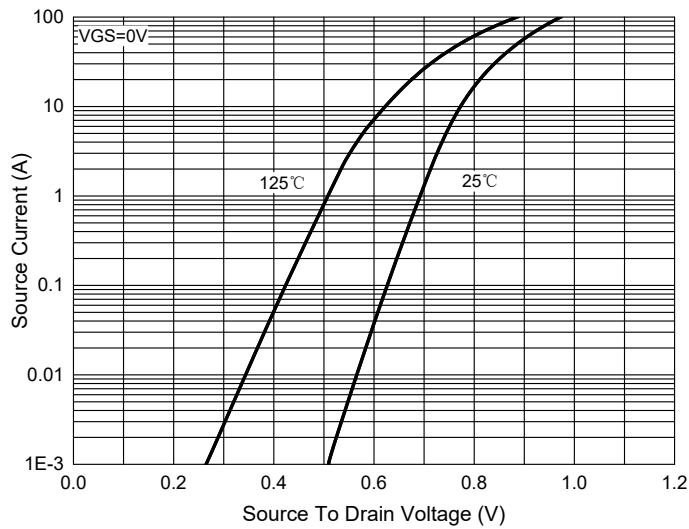


Fig. 10 - Drain Current

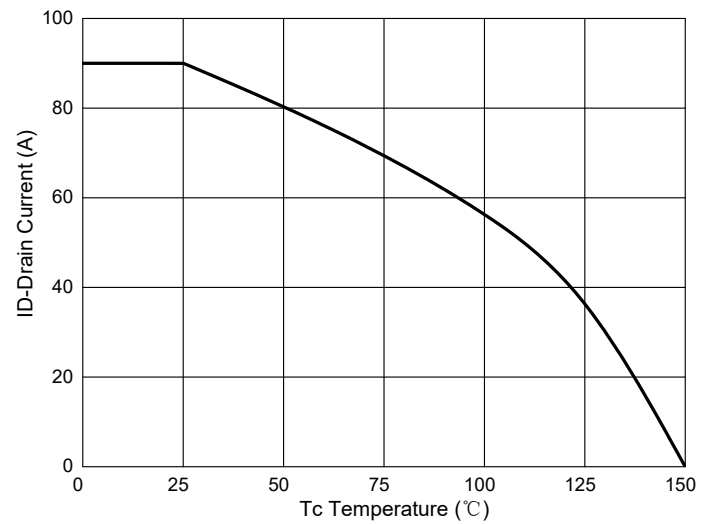
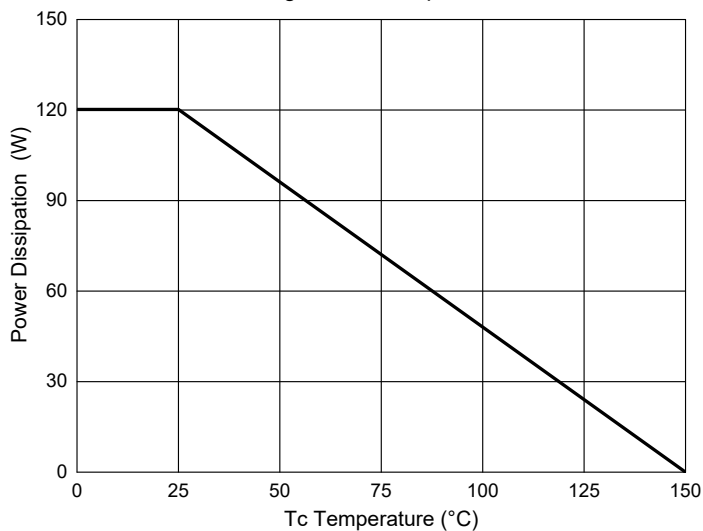


Fig.11-PD Dissipation



**Curve Characteristics**

Fig. 12 - Safe Operation Area

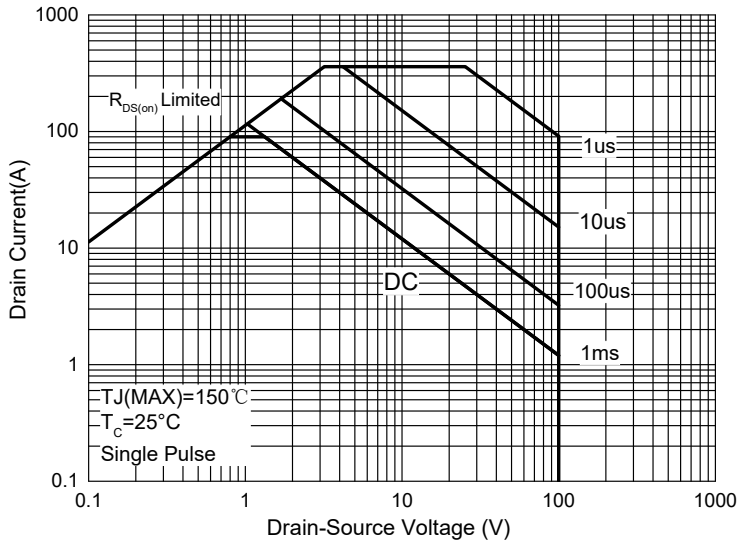
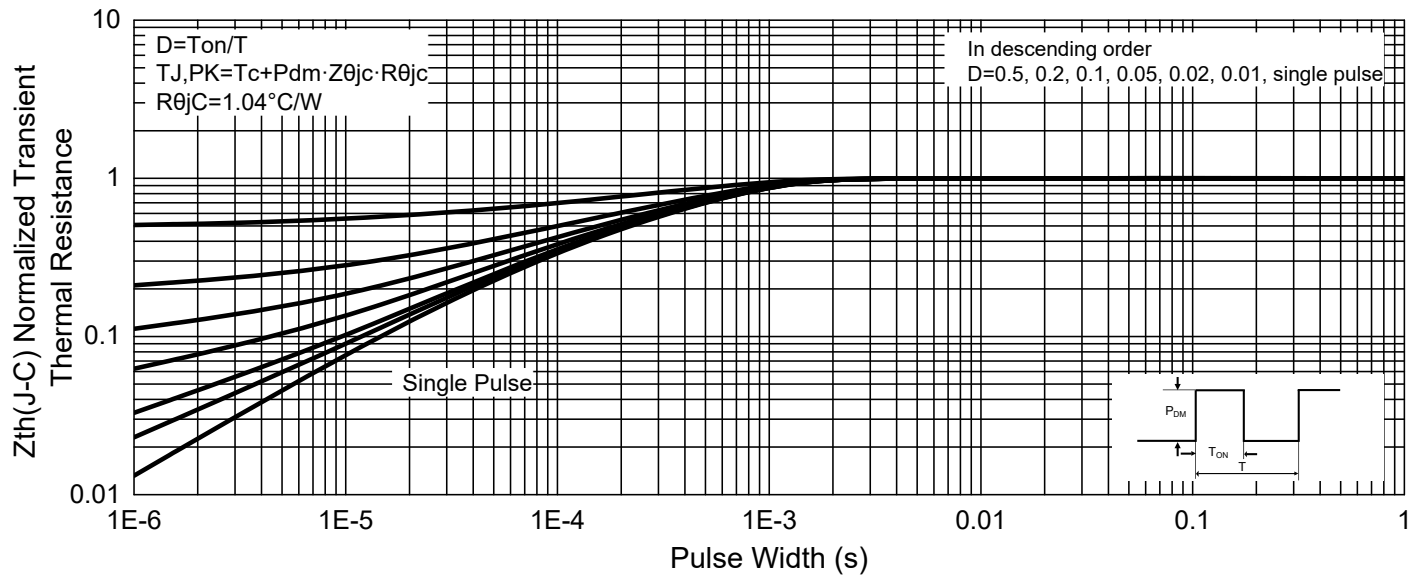


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 5Kpcs/Reel |

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