

## Features

- Split Gate Trench MOSFET Technology
- Excellent Package for Heat Dissipation
- High Density Cell Design for Low  $R_{DS(ON)}$
- 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)
- Moisture Sensitivity Level 1

## Maximum Ratings

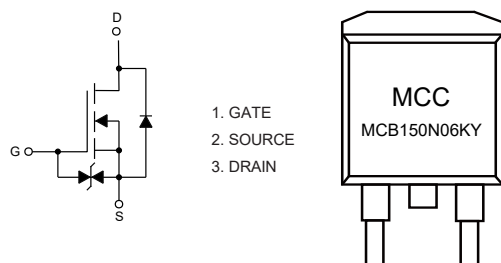
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 15°C/W Junction to Ambient( $t \leq 10S$ )<sup>(2)</sup>
- Thermal Resistance: 60°C/W Junction to Ambient(Steady-State)<sup>(2)</sup>
- Thermal Resistance: 0.85°C/W Junction to Case(Steady-State)

| Parameter                                     | Symbol   | Rating | Unit |
|---|----------|--------|------|
| Drain-Source Voltage                          | $V_{DS}$ | 60     | V    |
| Gate-Source Voltage                           | $V_{GS}$ | ±20    | V    |
| Continuous Drain Current                      | $I_D$    | 150    | A    |
| Pulsed Drain Current <sup>(3)</sup>           | $I_{DM}$ | 450    | A    |
| Total Power Dissipation                       | $P_D$    | 147    | W    |
| Single Pulsed Avalanche Energy <sup>(4)</sup> | $E_{AS}$ | 441    | mJ   |

Note:

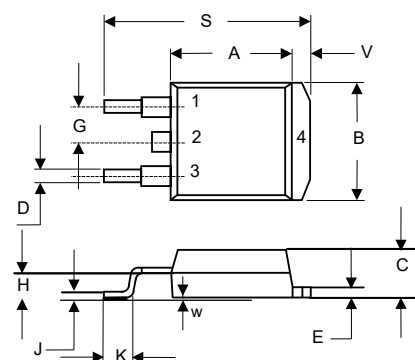
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment 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.  $T_J = 25^\circ C$ ,  $V_{DD} = 50V$ ,  $L = 0.5mH$ ,  $I_{AS} = 42A$

## Internal Structure and Marking Code



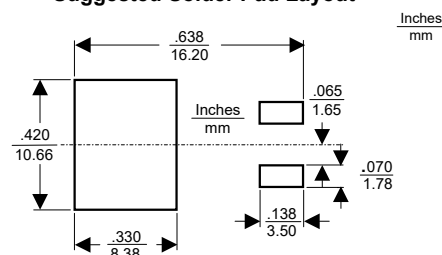
# N-CHANNEL MOSFET

## D<sup>2</sup>-PAK(TO-263)



| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.331  | 0.370 | 8.40  | 9.40  |      |
| B   | 0.378  | 0.417 | 9.60  | 10.60 |      |
| C   | 0.165  | 0.189 | 4.20  | 4.80  |      |
| D   | 0.027  | 0.037 | 0.68  | 0.94  |      |
| E   | 0.045  | 0.055 | 1.14  | 1.40  |      |
| G   | 0.010  |       | 2.54  |       | TYP. |
| H   | 0.096  | 0.134 | 2.43  | 3.40  |      |
| J   | 0.011  | 0.025 | 0.28  | 0.64  |      |
| K   | 0.071  | 0.131 | 1.80  | 3.32  |      |
| S   | 0.575  | 0.625 | 14.60 | 15.87 |      |
| V   | 0.042  | 0.058 | 1.07  | 1.47  |      |
| W   | 0.000  | 0.010 | 0.00  | 0.25  |      |

## Suggested Solder Pad Layout



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

| Parameter                       | Symbol        | Test Conditions                                    | Min | Typ  | Max      | Unit       |
|---------------------------------|---------------|--|-----|------|----------|------------|
| <b>Static Characteristics</b>   |               |  |     |      |          |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                          | 60  |      |          | V          |
| Gate-Source Leakage Current     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                        |     |      | $\pm 10$ | $\mu A$    |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=60V, V_{GS}=0V$                            |     |      | 1        | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                      | 1.0 | 1.7  | 2.5      | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                              |     | 2.7  | 3.5      | m $\Omega$ |
|                                 |               | $V_{GS}=4.5V, I_D=20A$                             |     | 3.5  | 4.8      | m $\Omega$ |
| Gate Resistance                 | $R_G$         | f=1MHz, Open drain                                 |     | 2    |          | $\Omega$   |
| <b>Diode Characteristics</b>    |               |  |     |      |          |            |
| Continuous Body Diode Current   | $I_S$         |  |     |      | 150      | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=20A$                               |     | 0.8  | 1.3      | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=20A, dI_F/dt=500A/\mu s$                      |     | 41.6 |          | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |  |     | 39.8 |          | nC         |
| <b>Dynamic Characteristics</b>  |               |  |     |      |          |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=30V, V_{GS}=0V, f=1MHz$                    |     | 4650 |          | pF         |
| Output Capacitance              | $C_{oss}$     |  |     | 850  |          |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |  |     | 65   |          |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=30V, V_{GS}=10V, I_D=25A$                  |     | 71   |          | nC         |
| Gate-Source Charge              | $Q_{gs}$      |  |     | 17   |          |            |
| Gate-Drain Charge               | $Q_{gd}$      |  |     | 10.5 |          |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DS}=30V, V_{GEN}=10V, R_G=2\Omega, I_{DS}=25A$ |     | 15.9 |          | ns         |
| Turn-On Rise Time               | $t_r$         |  |     | 55.2 |          |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |  |     | 57.5 |          |            |
| Turn-Off Fall Time              | $t_f$         |  |     | 91.3 |          |            |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

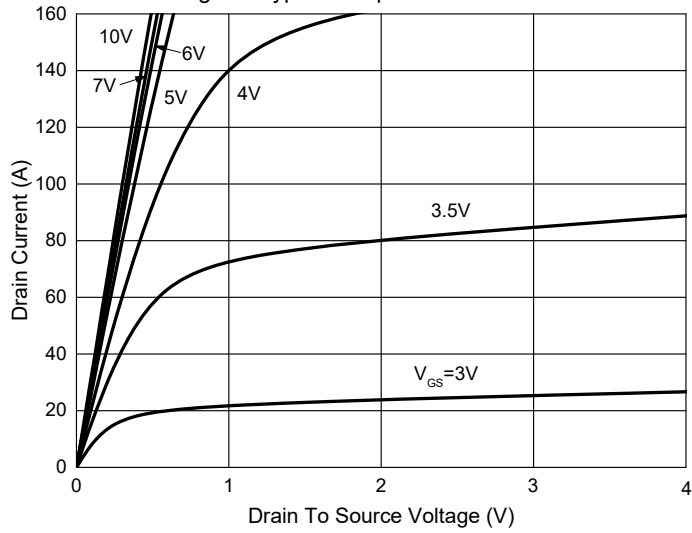


Fig. 2 - Transfer Characteristics

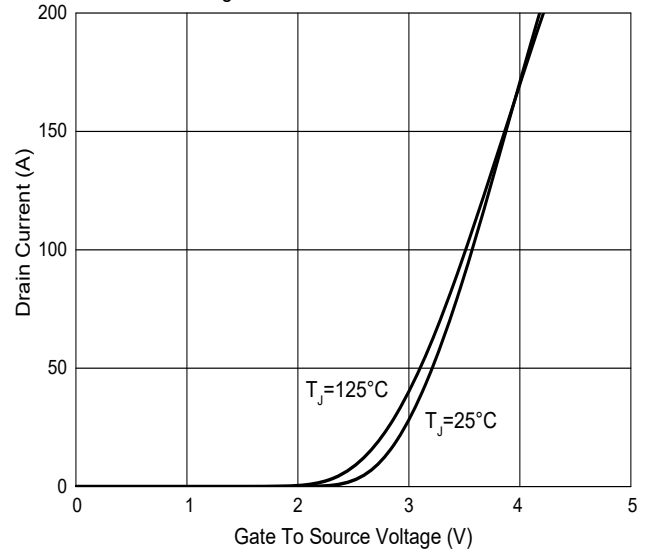


Fig. 3 -  $R_{DS(ON)} - I_D$

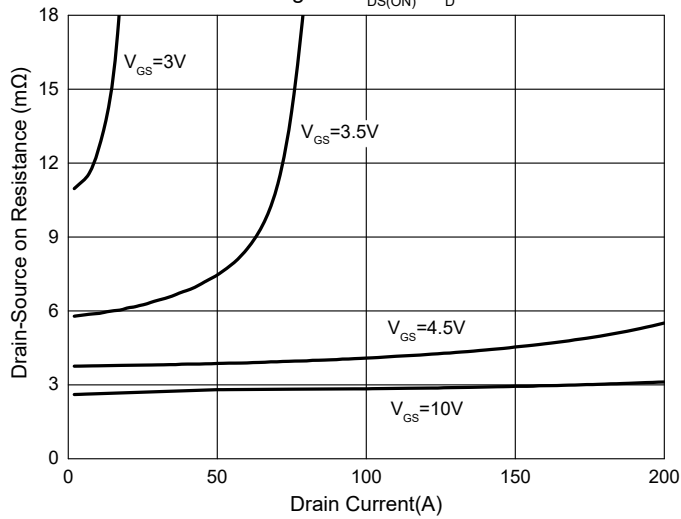


Fig. 4 - Drain-Source on Resistance

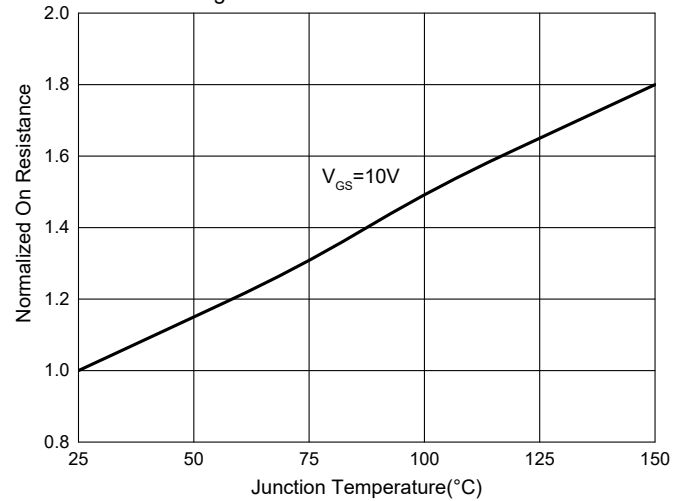


Fig. 5 - Capacitance Characteristics

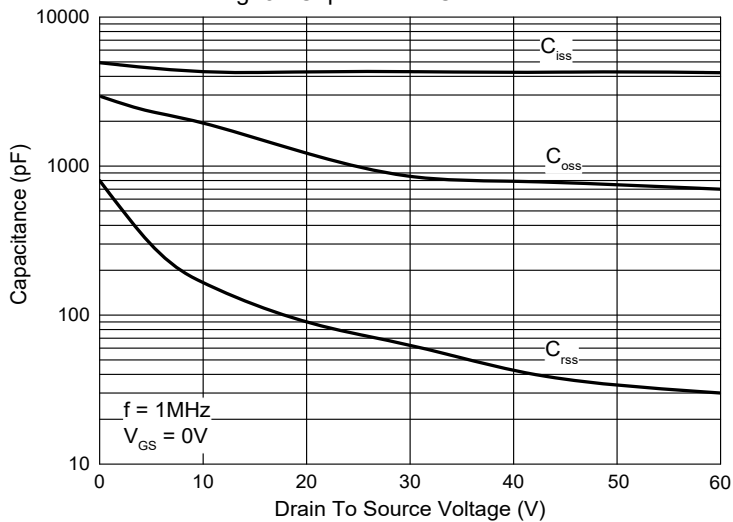
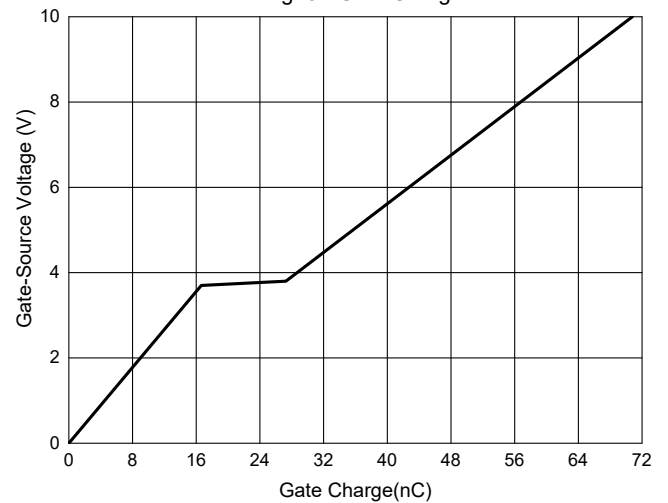


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Safe Operation Area

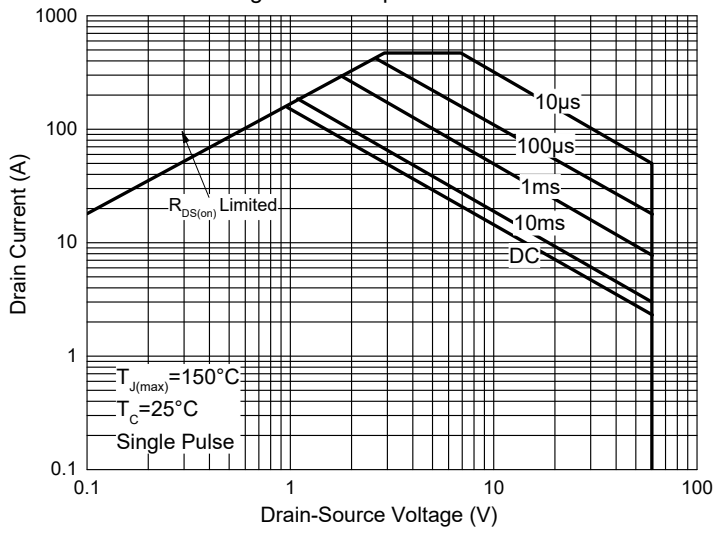
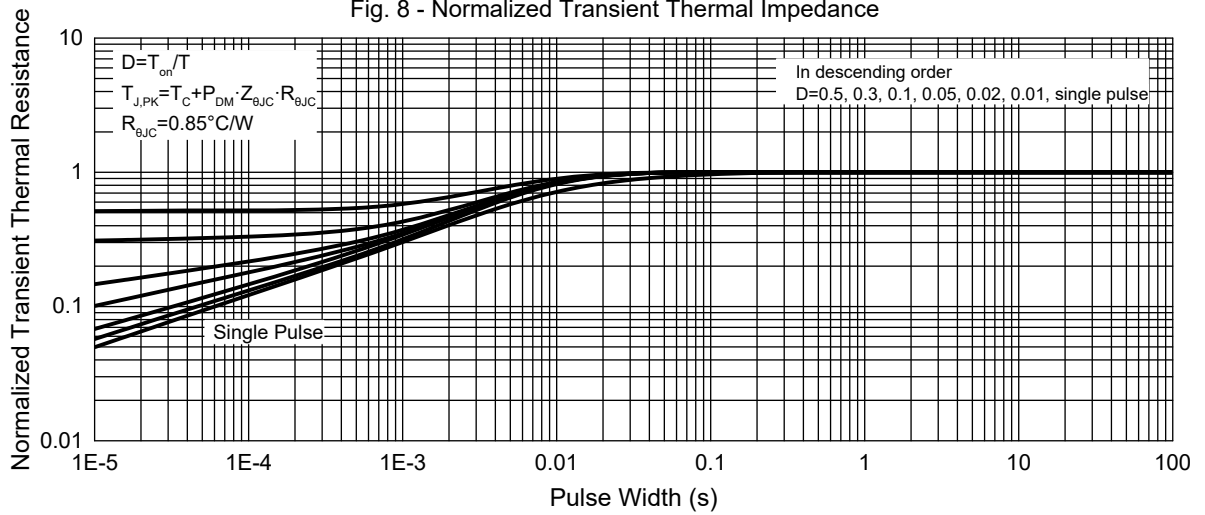


Fig. 8 - Normalized Transient Thermal Impedance



## Ordering Information

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

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