## 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: 20°C/W Junction to Ambient(t≤10S)(2)
- Thermal Resistance: 50°C/W Junction to Ambient(Steady-State)(2)
- Thermal Resistance: 1.04°C/W Junction to Case(Steady-State)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 120 | V |
| Gate-Source Volltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $I_D$ | 88 | A |
| Pulsed Drain Current(3) | $I_{DM}$ | 352 | A |
| Total Power Dissipation | $P_D$ | 120 | W |
| Single Pulsed Avalanche Energy(4) | $E_{AS}$ | 400 | mJ |

Note:

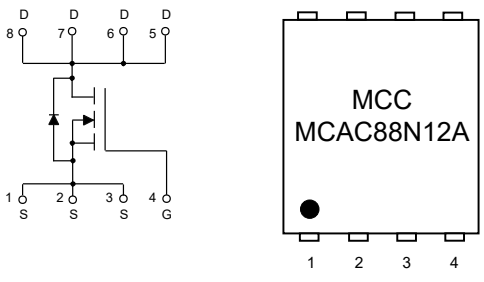
1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

2. The value of $R_{\theta JA}$ is measured with the device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C. The Power dissipation $P_{DSM}$ is based on $R_{\theta JA}$ t≤ 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.

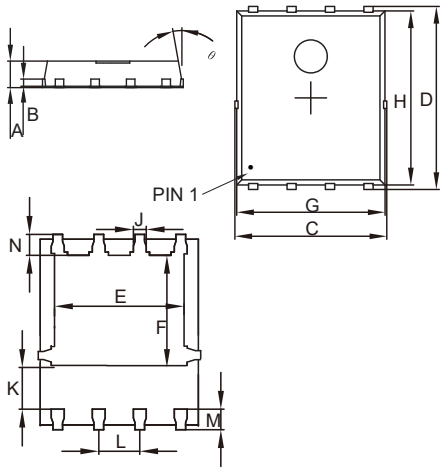
4. $T_J$=25°C, $V_{DD}$=50V, $R_G$=25Ω, L=2mH.

## Internal Structure and Marking Code




# N-CHANNEL MOSFET

DFN5060




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | 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 |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 120 | | | V |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$ =±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=120V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1 | 2 | 3 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=20A | | 6.4 | 7.6 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | 7.6 | 9.6 | |
| Gate Resistance | $R_G$ | f=1MHz, Open drain | | 0.9 | | Ω |
| **Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | | | | 88 | 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/μs | | 77 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 151 | | nC |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V,f=1MHz | | 4249 | | pF |
| Output Capacitance | $C_{oss}$ | | | 1381 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 34 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V,$V_{GS}$=10V,$I_D$=20A | | 71 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 17.4 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 10.6 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=50V, $V_{GEN}$=10V, $R_G$=2.2Ω, $I_{DS}$=20A | | 17.3 | | ns |
| Turn-On Rise Time | $t_r$ | | | 35.9 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 43.9 | | |
| Turn-Off Fall Time | $t_f$ | | | 69.6 | | |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

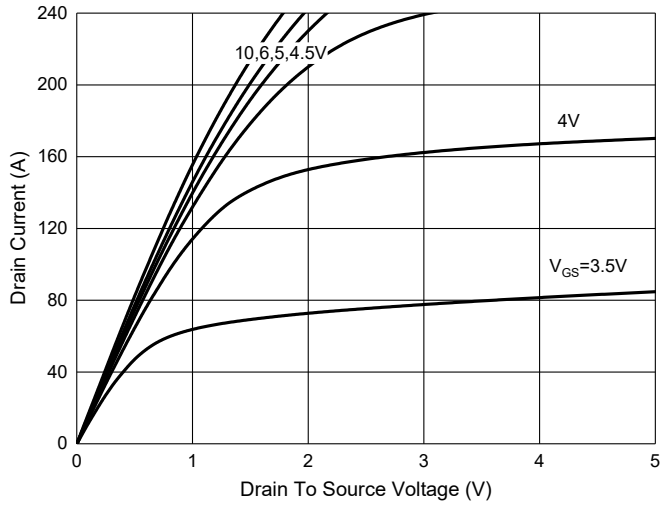



Fig. 2 - Transfer Characteristics

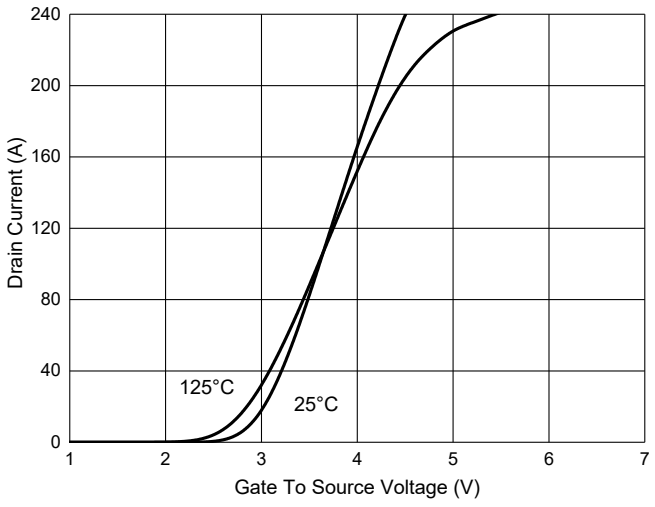



Fig. 3 - $R_{DS(ON)}$—$V_{GS}$

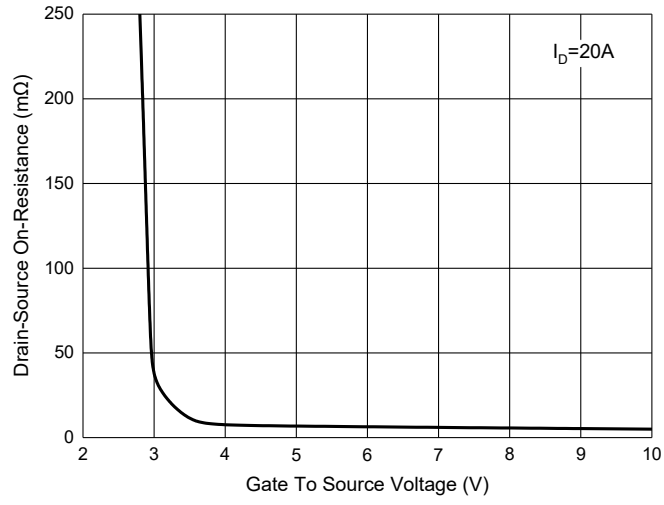



Fig. 4 - Normalized On Resistance Characteristics

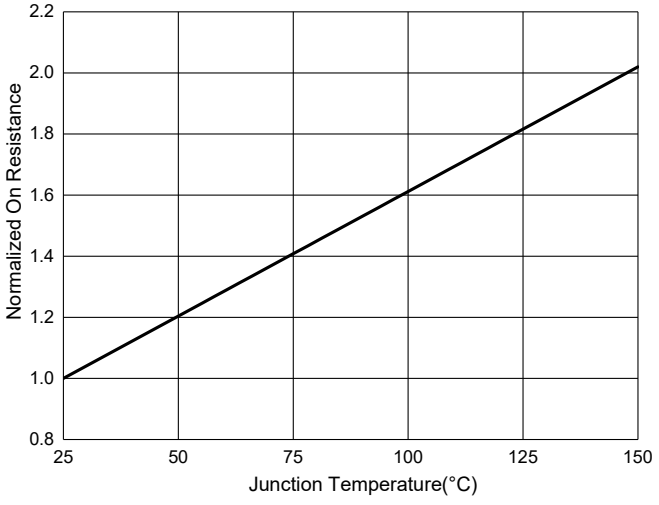



Fig. 5 - Capacitance Characteristics

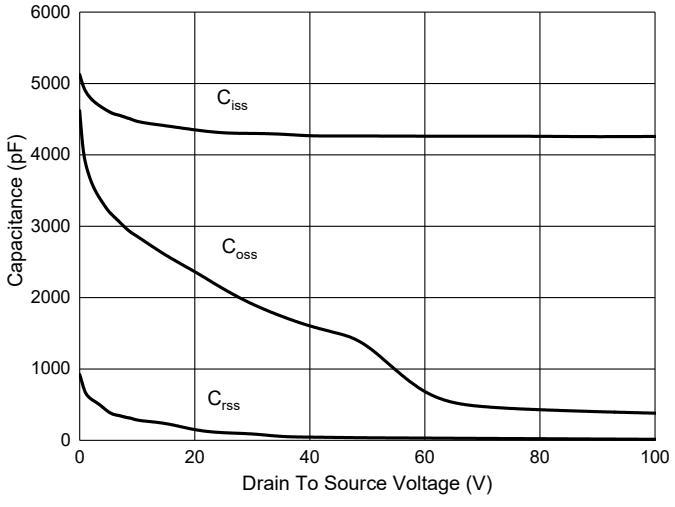
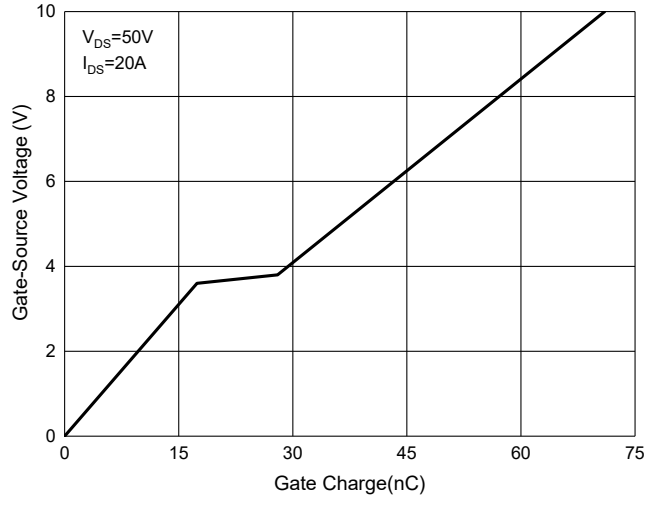
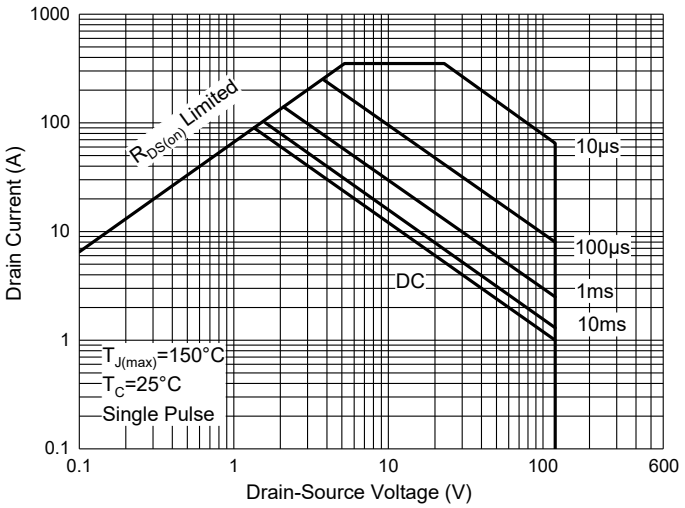



Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Safe Operation Area



## Ordering Information

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