

## Features

- Split Gate Trench MOSFET Technology
- Low  $R_{DS(on)}$  & FOM
- Low  $C_{rss}$
- Extremely Low Switching Loss
- Excellent Stability and Uniformity
- 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

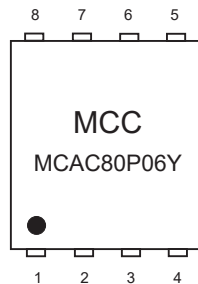
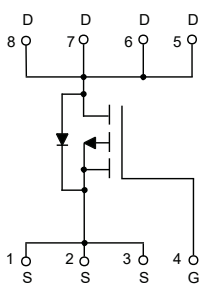
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 20°C/W Junction to Ambient( $t \leq 10S$ )<sup>(2)</sup>
- Thermal Resistance: 50°C/W Junction to Ambient(Steady-State)<sup>(2)</sup>
- Thermal Resistance: 1.04°C/W Junction to Case(Steady-State)<sup>(2)</sup>

| Parameter                                     | Symbol   | Rating   | Unit |
|---|----------|----------|------|
| Drain-Source Voltage                          | $V_{DS}$ | -60      | V    |
| Gate-Source Voltage                           | $V_{GS}$ | $\pm 18$ | V    |
| Continuous Drain Current                      | $I_D$    | -80      | A    |
| Pulsed Drain Current <sup>(3)</sup>           | $I_{DM}$ | -320     | A    |
| Total Power Dissipation <sup>(4)</sup>        | $P_D$    | 120      | W    |
| Single Pulsed Avalanche Energy <sup>(5)</sup> | $E_{AS}$ | 400      | mJ   |

Note:

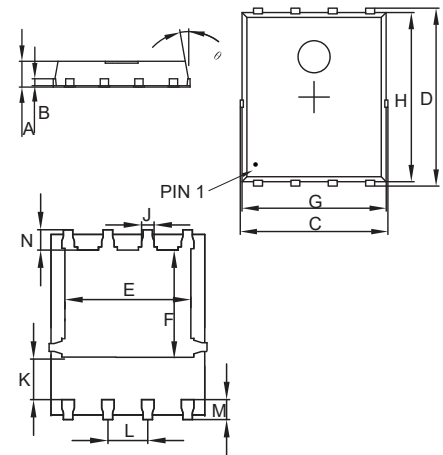
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment 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.  $V_{DD} = -60V$ ,  $R_G = 25\Omega$ ,  $L = 2mH$ ,  $I_{AS} = 20A$ .

## Internal Structure and Marking Code



# P-CHANNEL MOSFET

## DFN5060



| 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       |
|---------------------------------|---------------|---|-----|-------|-----------|------------|
| <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     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 18V$                         |     |       | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=-60V, V_{GS}=0V$                            |     |       | -1        | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                      | -2  | -2.7  | -4        | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=-10V, I_D=-20A$                             |     | 6.1   | 8         | m $\Omega$ |
| Gate Resistance                 | $R_g$         | Drain open, f=1Mhz                                  |     | 21    |           | $\Omega$   |
| <b>Diode Characteristics</b>    |               |   |     |       |           |            |
| Continuous Body Diode Current   | $I_S$         |   |     |       | -80       | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=-20A$                               |     |       | -1.3      | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_S=-20A, di/dt=500A/\mu s$                        |     | 46    |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |   |     | 153   |           | nC         |
| <b>Dynamic Characteristics</b>  |               |   |     |       |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=-30V, V_{GS}=0V, f=1MHz$                    |     | 5450  |           | pF         |
| Output Capacitance              | $C_{oss}$     |   |     | 900   |           |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |   |     | 65    |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=-30V, V_{GS}=-10V, I_D=-20A$                |     | 82    |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |   |     | 24    |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |   |     | 16.6  |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DS}=-30V, V_{GS}=-10V, R_G=1.6\Omega, I_D=-20A$ |     | 12.8  |           | ns         |
| Turn-On Rise Time               | $t_r$         |   |     | 48    |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |   |     | 134.1 |           |            |
| Turn-Off Fall Time              | $t_f$         |   |     | 155.6 |           |            |

Curve Characteristics

Fig. 1 - Typical Output Characteristics

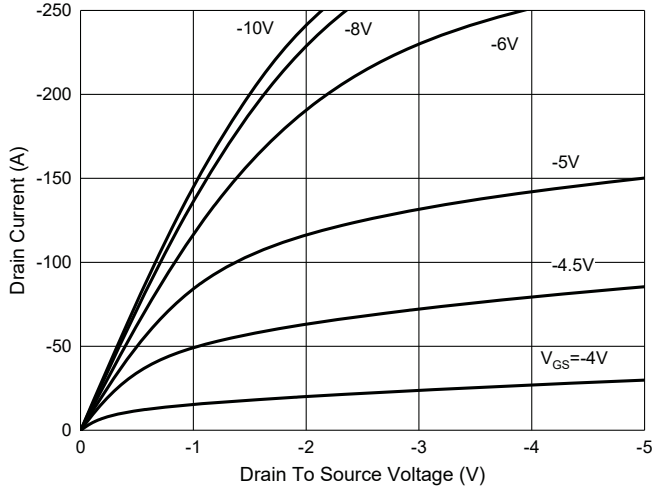


Fig. 2 - Transfer Characteristics

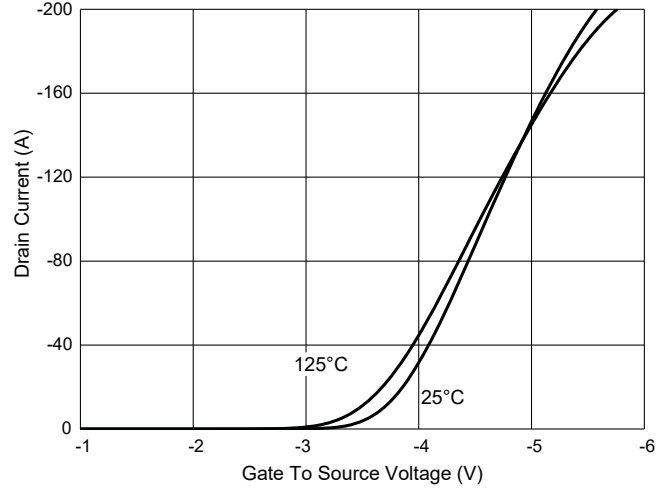


Fig. 3 -  $R_{DS(ON)} - I_D$

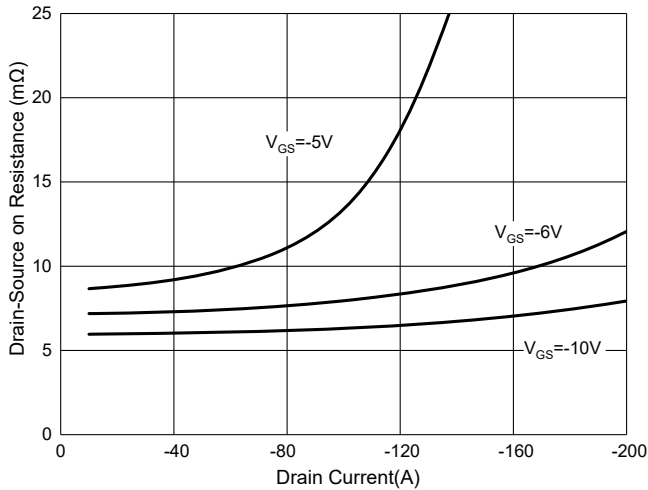


Fig. 4 - Normalized On Resistance Characteristics

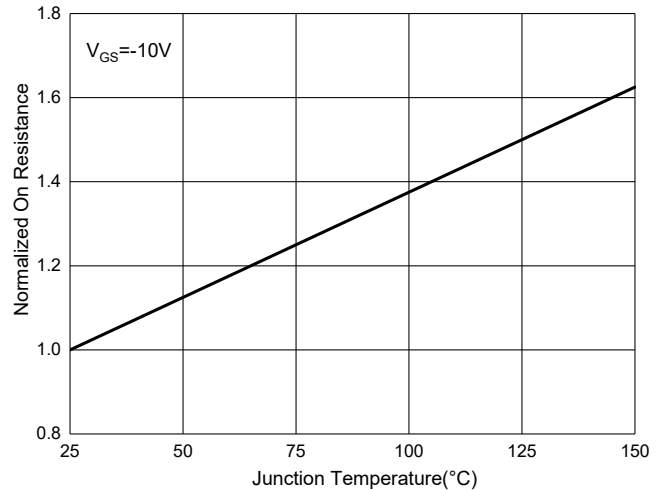


Fig. 5 - Capacitance Characteristics

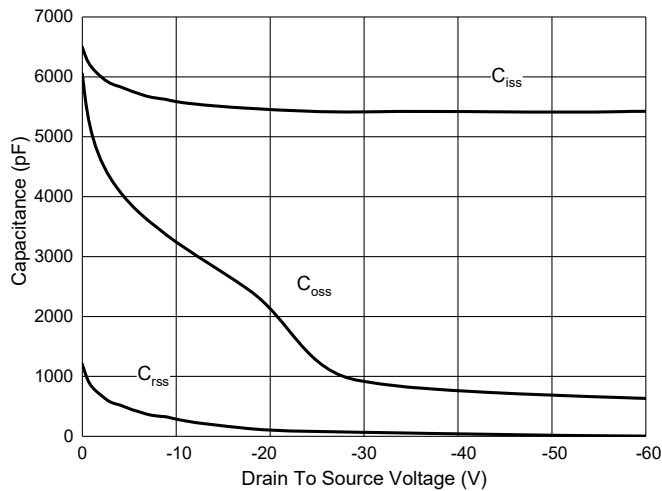
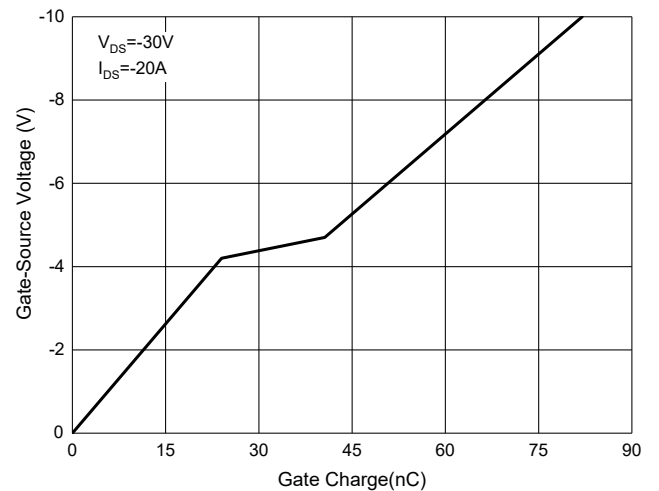


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Safe Operation Area

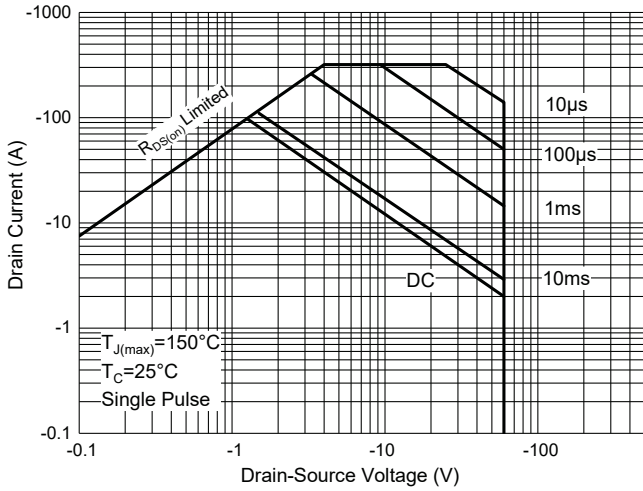


Fig. 8 - R<sub>DS(ON)</sub> - V<sub>GS</sub>

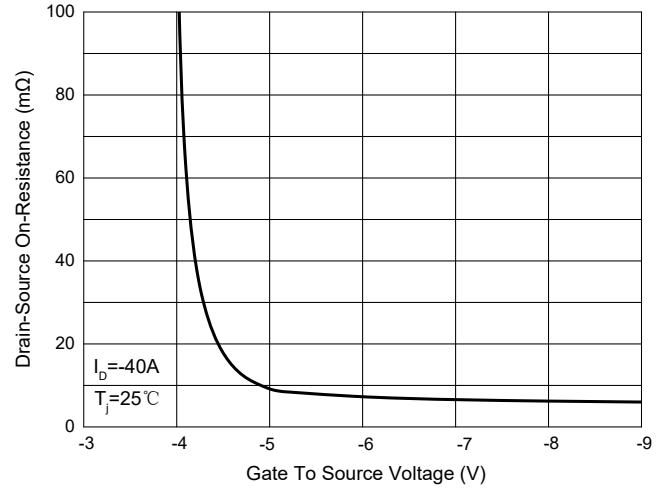
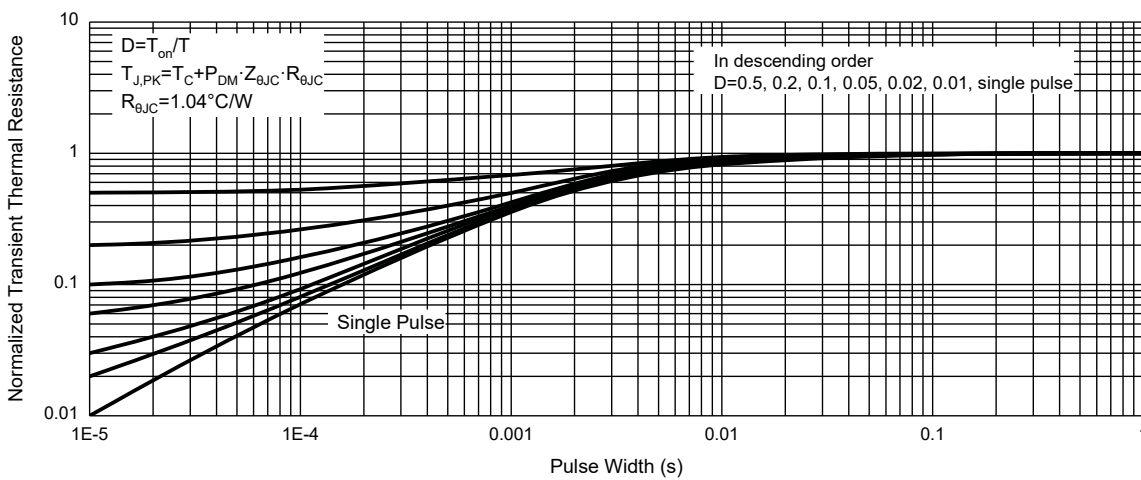


Fig. 9 - Normalized Transient Thermal Impedance



## Ordering Information

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

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