

### Features

- Very Low FOM  $R_{DS(on)} \times Q_g$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

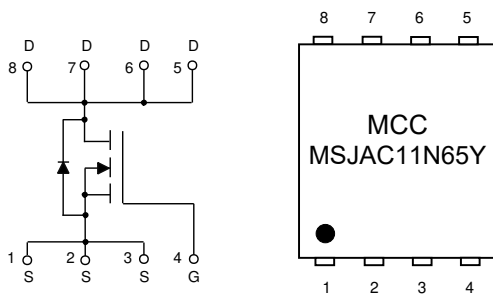
### Maximum Ratings

- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 62°C/W Junction to Ambient
- Thermal Resistance: 1.6°C/W Junction to Case

| Parameter                              | Symbol           | Rating | Unit |   |
|--|------------------|--------|------|---|
| Drain-Source Voltage                   | $V_{DS}$         | 650    | V    |   |
| Gate-Source Voltage                    | $V_{GS}$         | ±30    | V    |   |
| Continuous Drain Current               | $I_D$            | 11     | A    |   |
| Pulsed Drain Current (Note 2)          | $I_{DM}$         | 33     | A    |   |
| Single Pulse Avalanche Energy (Note 3) | $E_{AS}$         | 211    | mJ   |   |
| Avalanche Current (Note 2)             | $I_{AR}$         | 1.6    | A    |   |
| Repetitive Avalanche Energy (Note 2)   | $E_{AR}$         | 0.32   | mJ   |   |
| Total Power Dissipation                | $T_C=25^\circ C$ | $P_D$  | 78   | W |

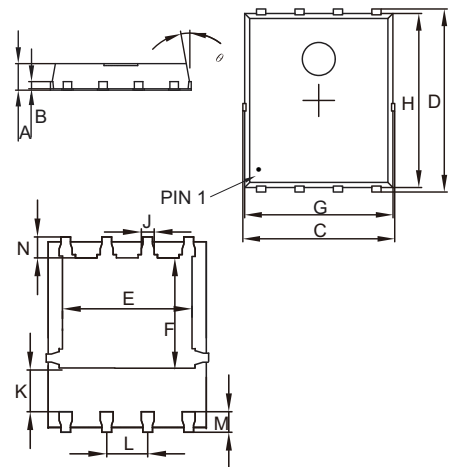
- Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.  
 2. Repetitive Rating, Pulse Width Limited by Maximum Junction Temperature.  
 3.  $I_{AS}=1.6A$ ,  $V_{DD}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$  .

### Internal Structure and Marking Code



# N-CHANNEL Super-Junction Power 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                    | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                 | 650 |      |           | V        |
| Gate-Source Leakage Current                       | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 30V$               |     |      | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current                   | $I_{DSS}$     | $V_{DS}=650V, V_{GS}=0V$                  |     |      | 1         | $\mu A$  |
|   |               | $V_{DS}=650V, V_{GS}=0V, T_J=150^\circ C$ |     |      | 100       |          |
| Gate-Threshold Voltage                            | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$             | 2.5 |      | 4         | V        |
| Drain-Source On-Resistance <sup>(Note 4)</sup>    | $R_{DS(on)}$  | $V_{GS}=10V, I_D=5.5A$                    |     | 0.34 | 0.38      | $\Omega$ |
| Forward transconductance <sup>(Note 4)</sup>      | $g_{FS}$      | $V_{DS}=10V, I_D=5.5A$                    |     | 7.8  |           | S        |
| <b>Dynamic Characteristics<sup>(Note 5)</sup></b> |               |   |     |      |           |          |
| Input Capacitance                                 | $C_{iss}$     | $V_{DS}=50V, V_{GS}=0V, f=1MHz$           |     | 901  |           | $\mu F$  |
| Output Capacitance                                | $C_{oss}$     |   |     | 50   |           |          |
| Reverse Transfer Capacitance                      | $C_{rss}$     |   |     | 5.5  |           |          |
| Total Gate Charge                                 | $Q_g$         | $V_{DD}=520V, V_{GS}=10V, I_D=11A$        |     | 21   |           | nC       |
| Gate-Source Charge                                | $Q_{gs}$      |   |     | 4.5  |           |          |
| Gate-Drain Charge                                 | $Q_{gd}$      |   |     | 7    |           |          |
| Turn-On Delay Time                                | $t_{d(on)}$   | $V_{DD}=400V, I_D=11A, R_G=25\Omega$      |     | 41   |           | ns       |
| Turn-On Rise Time                                 | $t_r$         |   |     | 20   |           |          |
| Turn-Off Delay Time                               | $t_{d(off)}$  |   |     | 123  |           |          |
| Turn-Off Fall Time                                | $t_f$         |   |     | 6.4  |           |          |
| <b>Drain-Source Body Diode Characteristics</b>    |               |   |     |      |           |          |
| Continuous Body Diode Current                     | $I_S$         | $T_C=25^\circ C$                          |     |      | 9.2       | A        |
| Pulsed Diode Forward Current                      | $I_{SM}$      |   |     |      | 29        |          |
| Body Diode Voltage                                | $V_{SD}$      | $I_{SD}=11A, V_{GS}=0V$                   |     | 0.9  | 1.2       | V        |
| Reverse Recovery Time                             | $t_{rr}$      | $V_R=520V, I_F=I_S, di_F/dt=100A/\mu s$   |     | 280  |           | ns       |
| Reverse Recovery Charge                           | $Q_{rr}$      |   |     |      | 2.8       | $\mu C$  |
| Peak Reverse Recovery Current                     | $I_{rrm}$     |   |     |      | 17        | A        |

Note 4. Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$ .

5. Guaranteed by Design, Not Subject to Production Testing.

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

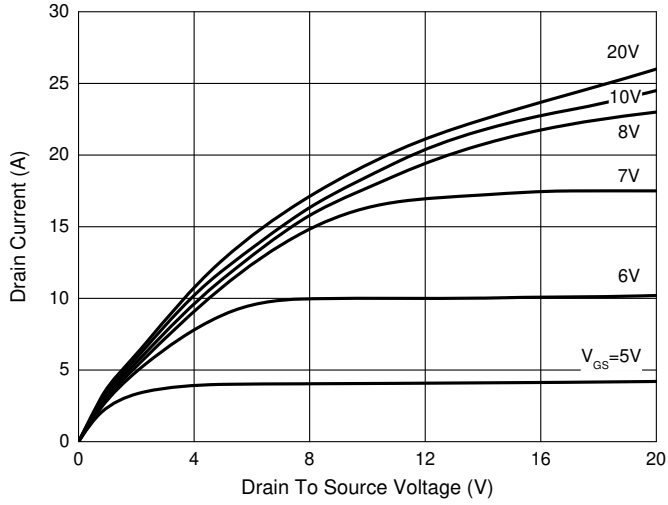


Fig. 2 - Transfer Characteristics

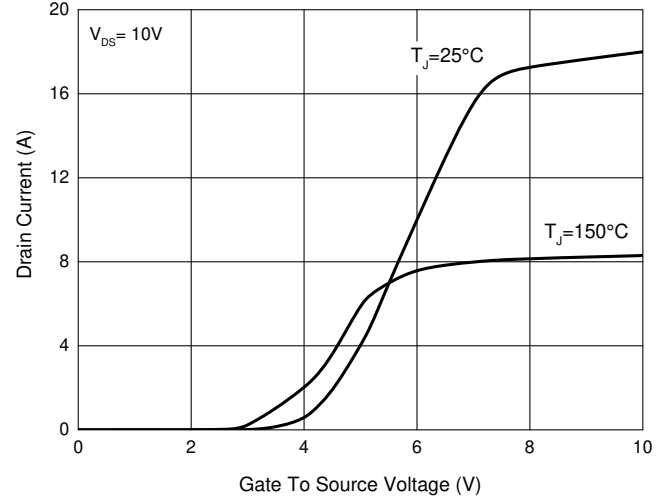


Fig. 3 -  $R_{DS(ON)} - I_D$

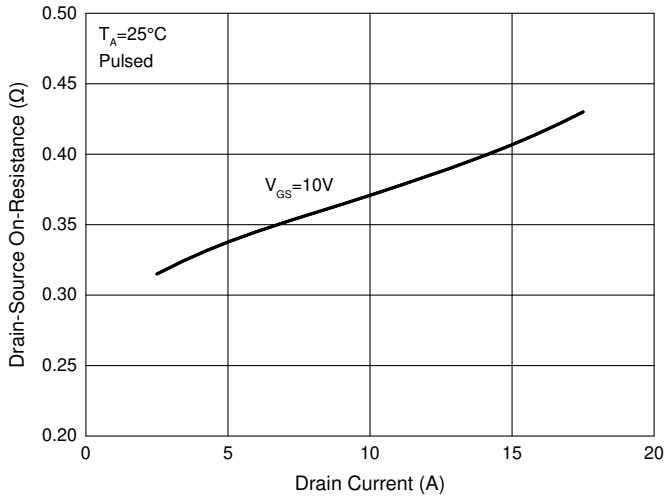


Fig. 4 - Capacitance Characteristics

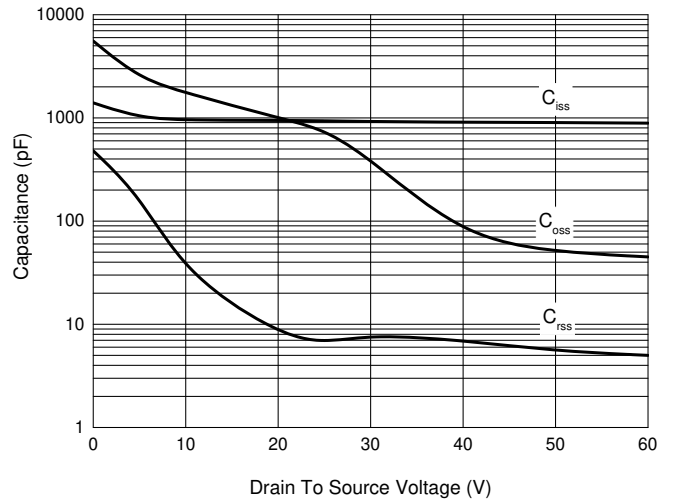


Fig. 5 - Total Gate Charge Characteristics

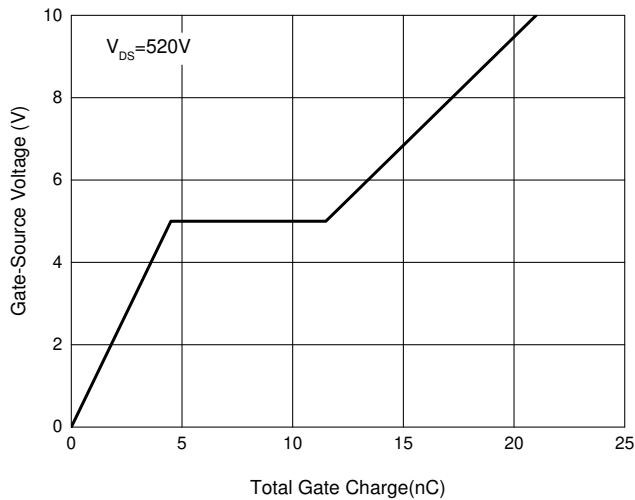
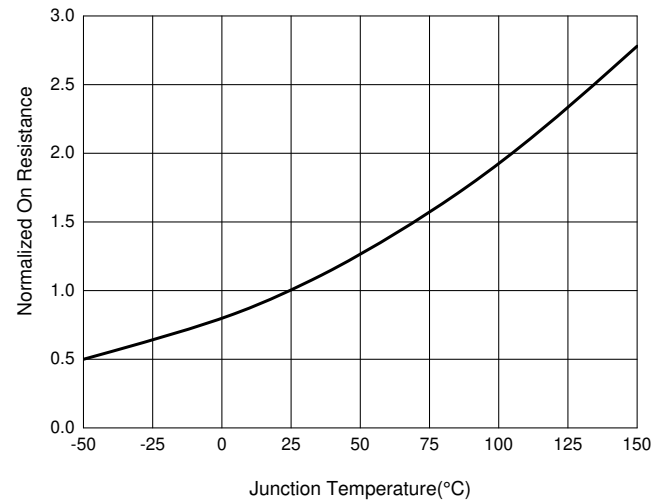


Fig. 6 - Normalized On Resistance Characteristics



## Ordering Information

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

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