

## Features

- AEC-Q101 Qualified
- Split Gate Trench MOSFET Technology
- Moisture Sensitivity Level 1
- Halogen Free."Green" Device<sup>(Note1)</sup>
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

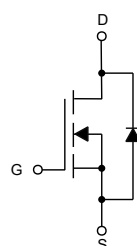
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance:40°C/W Junction to Ambient<sup>(Note2)</sup>
- Thermal Resistance:1.6°C/W Junction to Case

| Parameter                                        | Symbol   | Rating | Unit |
|--------------------------------------------------|----------|--------|------|
| Drain-Source Voltage                             | $V_{DS}$ | 60     | V    |
| Gate-Source Voltage                              | $V_{GS}$ | ±20    | V    |
| Continuous Drain Current                         | $I_D$    | 90     | A    |
|                                                  |          | 63     |      |
| Pulsed Drain Current <sup>(Note3)</sup>          | $I_{DM}$ | 360    | A    |
| Total Power Dissipation <sup>(Note4)</sup>       | $P_D$    | 93     | W    |
| Single Pulse Avalanche Energy <sup>(Note5)</sup> | $E_{AS}$ | 132    | mJ   |

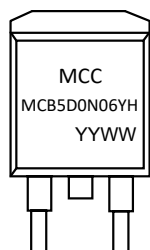
Note:

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  $T_A = 25^\circ\text{C}$ .
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.  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 40\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $R_g = 25\Omega$ ,  $L = 0.5\text{mH}$ .

## Internal Structure and Marking Code



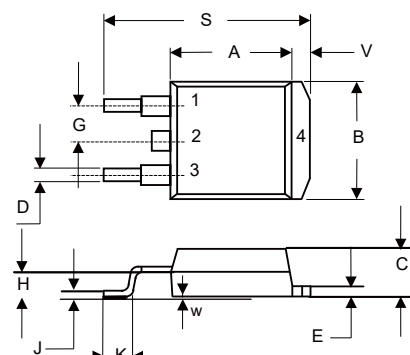
- 1.GATE
- 2.DRAIN
- 3.SOURCE
- 4.DRAIN



YYWW: 4 codes in total  
YY is the year  
WW is the week

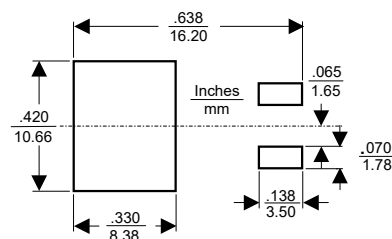
# N-CHANNEL MOSFET

## D2-PAK



| 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 |
|---------------------------------|----------------------|---------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics          |                      |                                                                                       |     |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                            | 60  |      |      | V    |
| Gate-Source Leakage Current     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                            |     |      | ±100 | nA   |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                             |     |      | 1    | μA   |
| Gate-Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                              | 2   | 3    | 4    | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =40A                                             |     | 3.9  | 5.0  | mΩ   |
| Gate Resistance                 | R <sub>g</sub>       | f=1 MHz, Open drain                                                                   |     | 1.5  |      | Ω    |
| Diode Characteristics           |                      |                                                                                       |     |      |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                       |     |      | 90   | A    |
| Body Diode Voltage              | V <sub>SD</sub>      | I <sub>S</sub> =40A, V <sub>GS</sub> =0V                                              |     |      | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =37.5A, di/dt=270A/μs                                                  |     | 28.1 |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                       |     | 37.2 |      | nC   |
| Dynamic Characteristics         |                      |                                                                                       |     |      |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz                                     |     | 1550 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                       |     | 460  |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                       |     | 16   |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A                       |     | 31   |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                       |     | 4.5  |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                       |     | 7.7  |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>DD</sub> =30V, I <sub>D</sub> =30A<br>V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω |     | 8.8  |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                       |     | 57.6 |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                       |     | 24.7 |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                       |     | 10.7 |      |      |

## Curve Characteristics

Fig.1 - Typical Output Characteristics

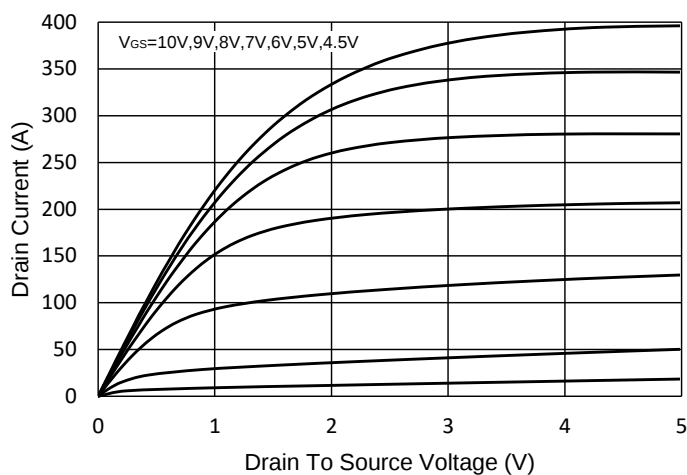


Fig.2 - Transfer Characteristics

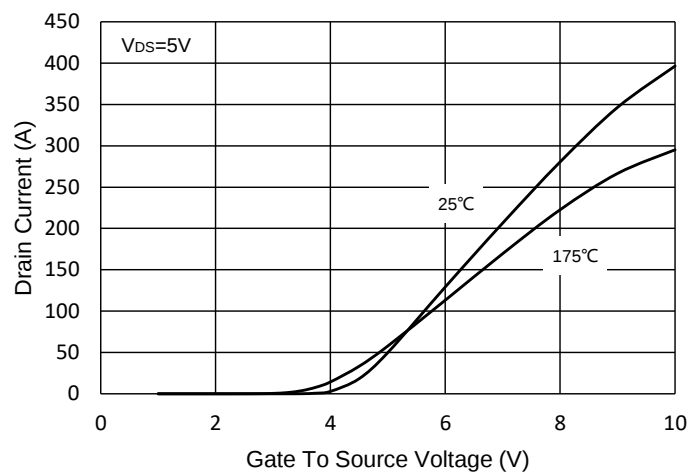


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

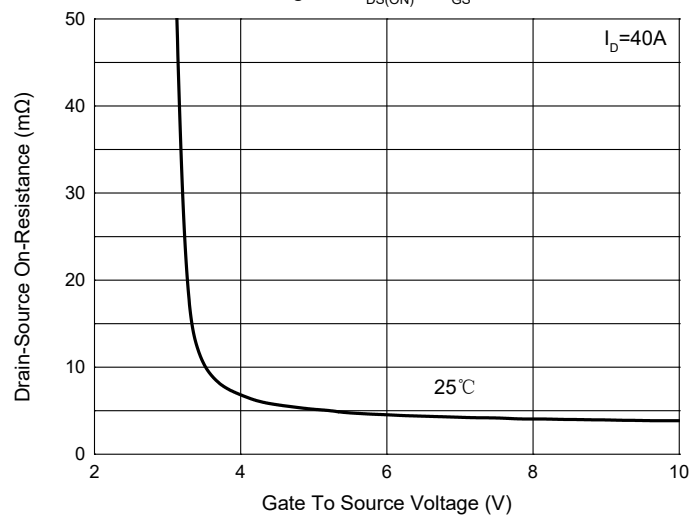


Fig. 4 -  $R_{DS(ON)} - I_D$

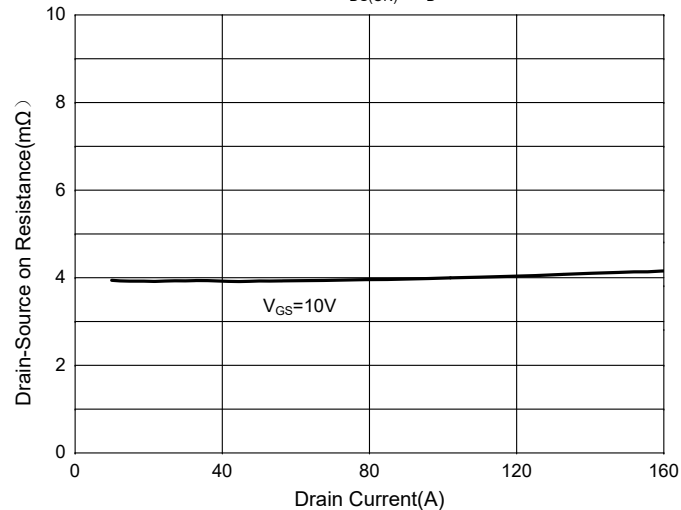


Fig.5 - Capacitance Characteristics

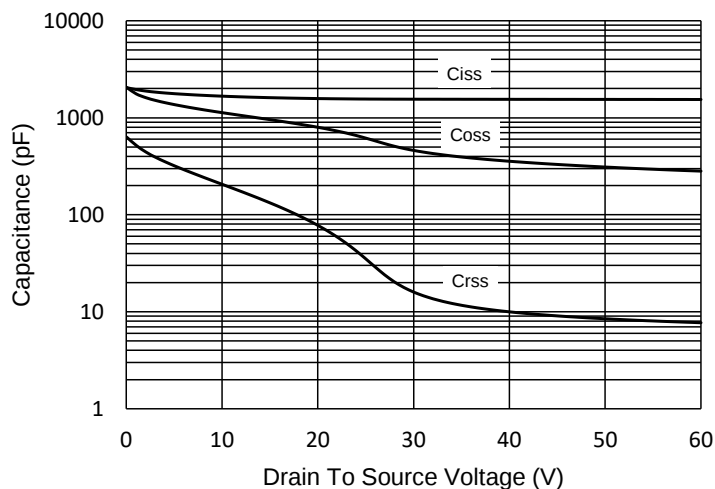
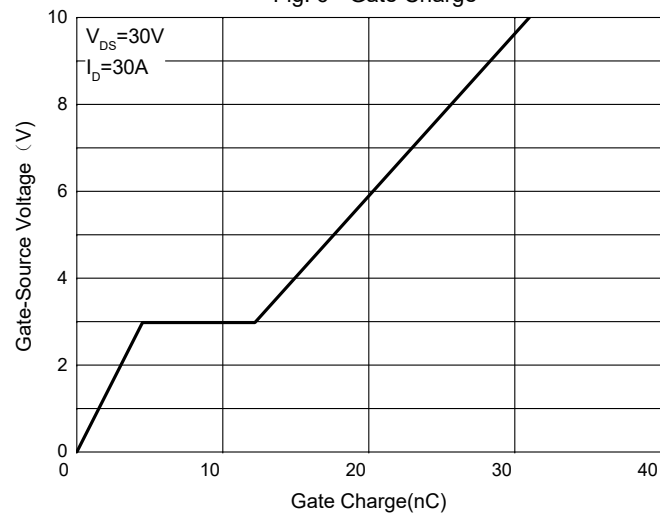


Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Nomalized Threshold Voltage

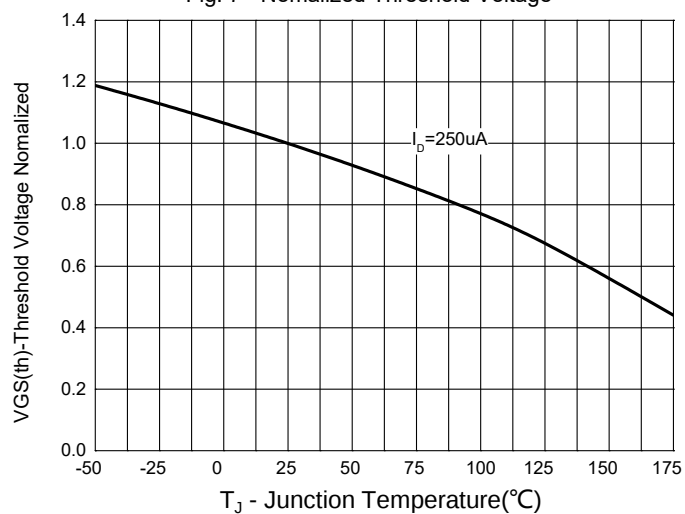


Fig.8 - Normalized On Resistance Characteristics

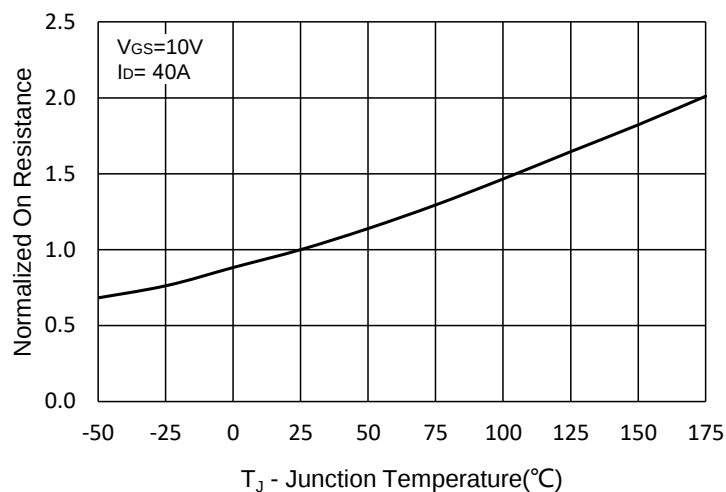


Fig.9 -  $I_S - V_{SD}$

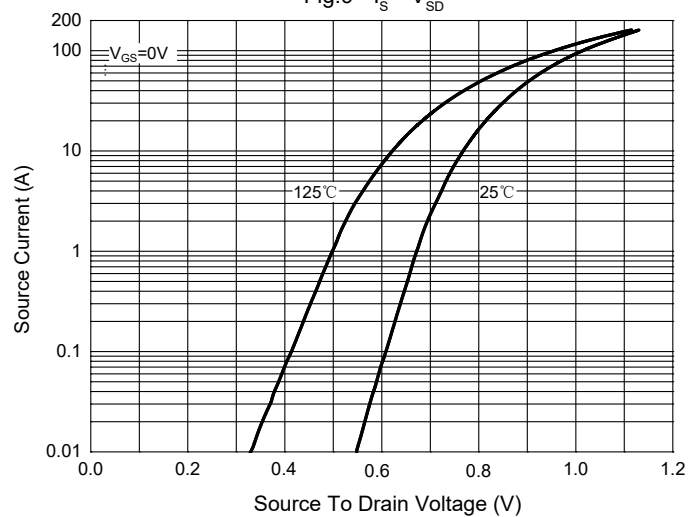


Fig.10 - Drain Current

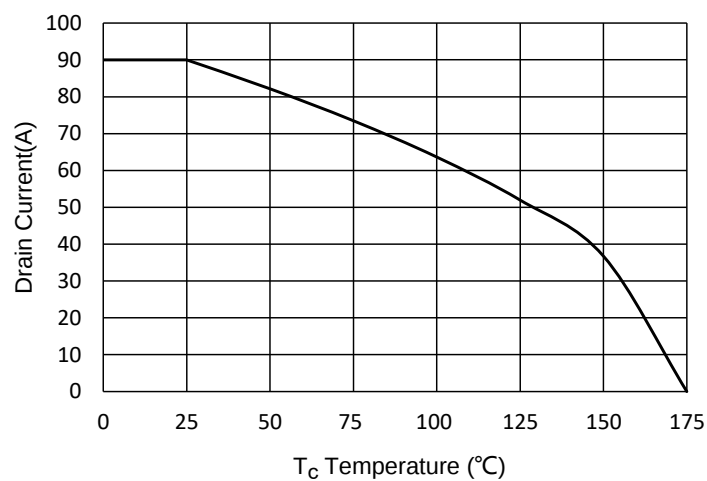
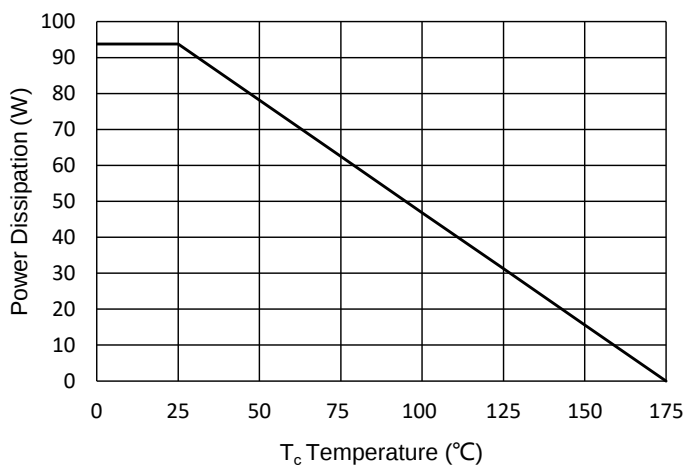


Fig.11 - PD Dissipation



## Curve Characteristics

Fig.12 - Safe Operation Area

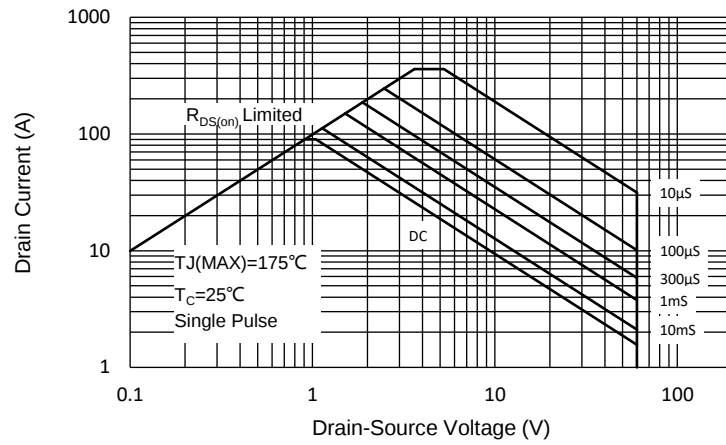
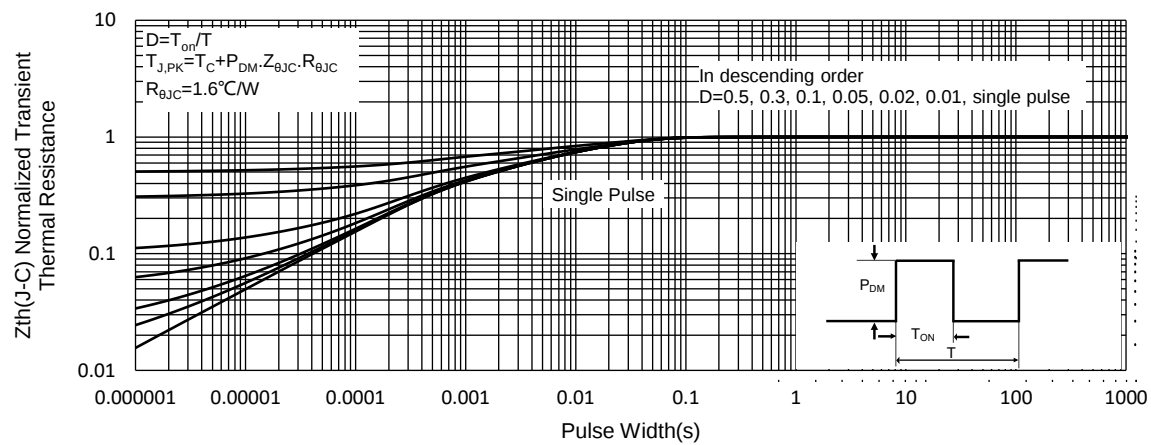


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing                |
|----------------|------------------------|
| Part Number-TP | Tape&Reel: 800pcs/Reel |

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