## Features

- Split Gate Trench MOSFET Technology
- High Density Cell Design for Low $R_{DS(on)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free. “Green” Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

# N-CHANNEL MOSFET

## Maximum Ratings

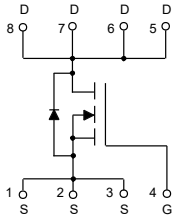
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 50°C/W Junction to Ambient(Note 2)
- Thermal Resistance: 1.08°C/W Junction to Case

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 40 | V |
| Gate-Source Volltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current(Note 3) | $I_D$ | 130 | A |
| Pulsed Drain Current (Note 4) | $I_{DM}$ | 390 | A |
| Single Pulse Avalanche Energy (Note 5) | $E_{AS}$ | 720 | mJ |
| Total Power Dissipation (Note 6) | $P_D$ | 115 | W |

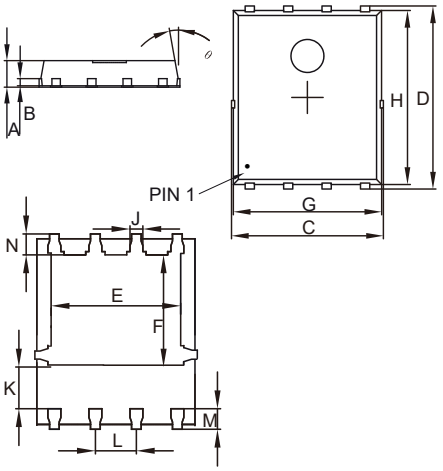
Notes:

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 1 $in^2$ FR-4 Board with 2oz. Copper, in a Still Air Environment with $T_A$=25°C.
3. Calculated Continuous Current Based on Maximum Allowable Junction Temperature.
4. Repetitive Rating; Pulse Width Limited by Max. Junction Temperature.
5. $V_{DD}$=25V, $R_G$=25Ω, L=3mH, Starting $T_J$=25°C.
6. Pd is Based on Max. Junction Temperature, Using Junction-Case Thermal Resistance.

## Internal Structure




## 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 | 40 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$ =±20V | | | ±100 | nA |
| Gate-Threshold Voltage(Note7) | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.0 | 1.8 | 2.5 | V |
| Drain-Source On-Resistance(Note7) | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=20A | | 1.45 | 1.75 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | 1.9 | 2.5 | |
| Diode Forward Voltage(Note7) | $V_{SD}$ | $V_{GS}$=0V, $I_S$=20A | | | 1.2 | V |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | 130 | A |
| Gate Resistance | $R_G$ | f=1MHz, Open Drain | | 2.6 | | Ω |
| **Dynamic Characteristics(Note8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V,$V_{GS}$=0V,f=1MHz | | 7140 | | pF |
| Output Capacitance | $C_{oss}$ | | | 1909 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 53 | | |
| **Switching Characteristics(Note8)** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=10V,$V_{DS}$=20V,$I_D$=20A | | 135 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 26.8 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 24.5 | | |
| Reverse Recovery Charge | $Q_{rr}$ | $I_F$=20A,di/dt=100A/μs | | 65.7 | | |
| Reverse Recovery Time | $t_{rr}$ | | | 59 | | ns |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$=10V,$V_{DS}$=20V, $I_{DS}$=20A,$R_{GEN}$=2.2Ω | | 22.5 | | |
| Turn-On Rise Time | $t_r$ | | | 86 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 114.2 | | |
| Turn-Off Fall Time | $t_f$ | | | 97 | | |

Notes:

7. Pulse Test: Pulse Width≤300μs,Duty Cycle≤2%.
8. Guaranteed by Design,Not Subject to Production Testing.

## Curve Characteristics

Fig. 1 - Output Characteristics

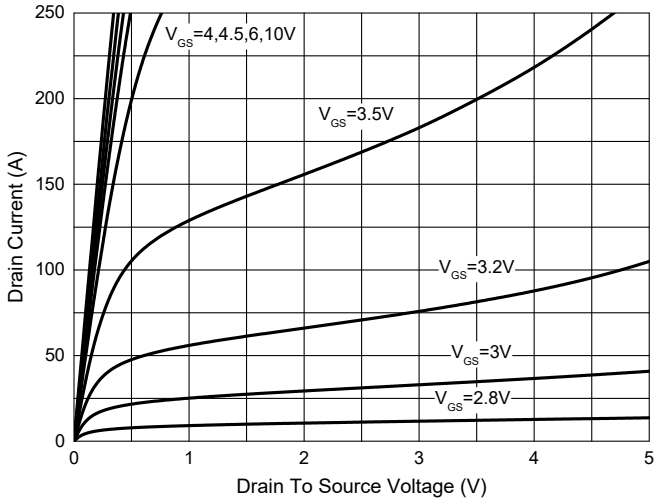



Fig. 2 - Transfer Characteristics

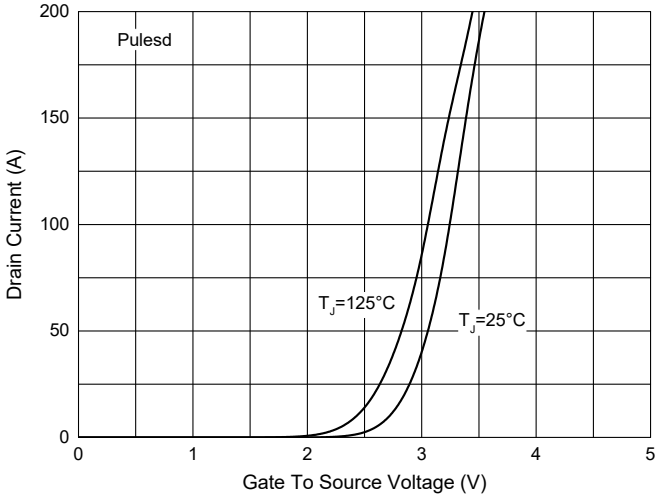



Fig. 3 - $R_{DS(ON)}$—$V_{GS}$

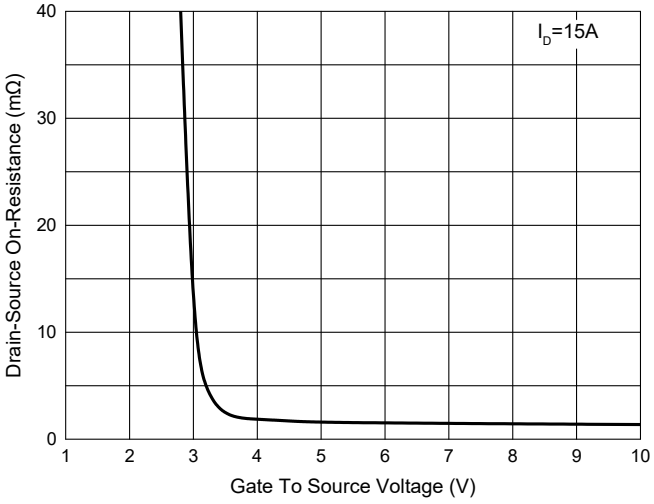



Fig. 4 - Capacitance Characteristics

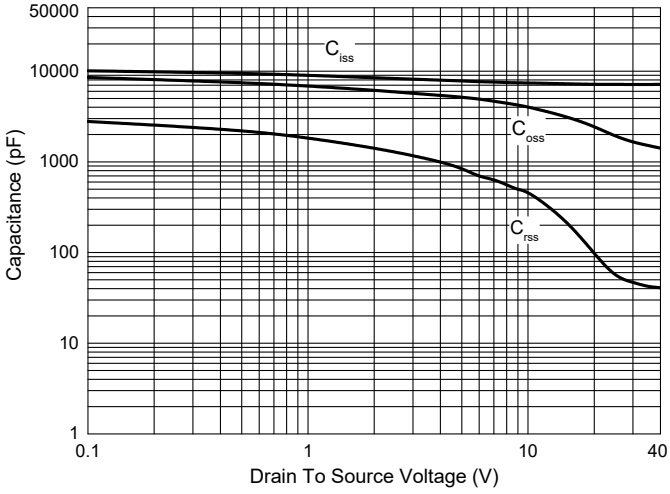



Fig. 5 - Gate Charge

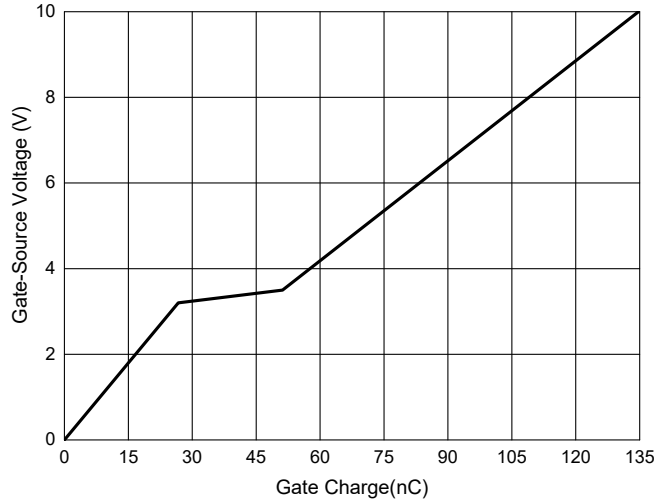
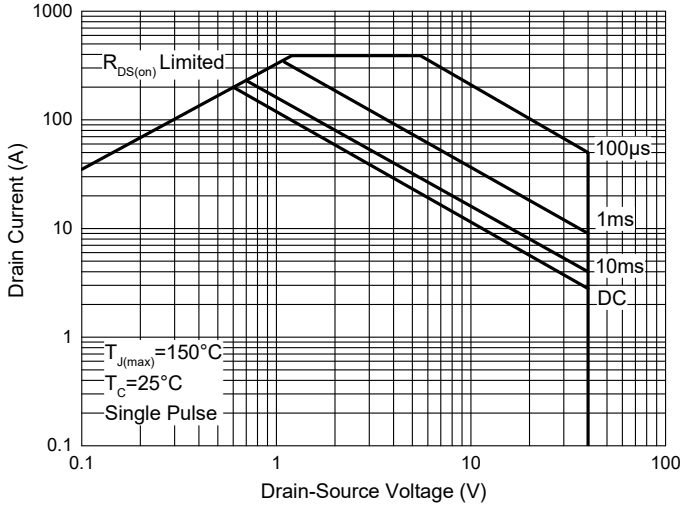



Fig. 6 - Safe Operation Area



## Ordering Information

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


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