

N-Channel Enhancement Mode MOSFET

TDM3646

**DESCRIPTION**

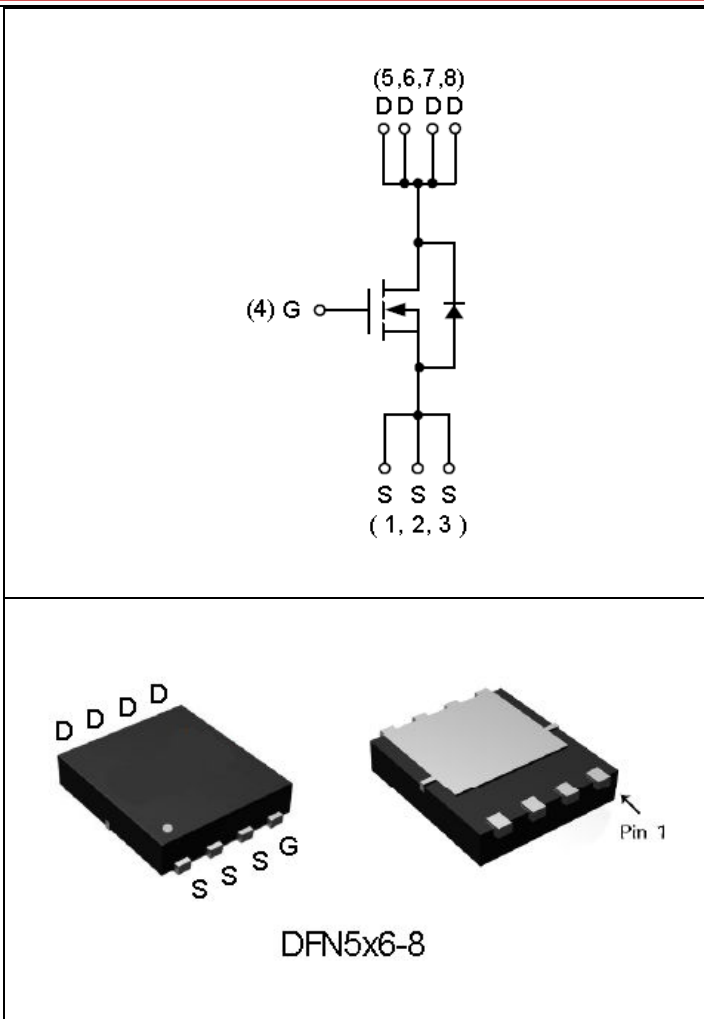
The TDM3646 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**GENERAL FEATURES**

- RDS(ON) < 7.2mΩ @ VGS=4.5V  
RDS(ON) < 5.9mΩ @ VGS=10V
- High Power and current handing capability
- Surface Mount Package
- Lead Free and Green Devices Available(RoHS Compliant)

**Application**

- PWM applications
- Load switch
- Power management
- Motor Control



泰德半导体--提供样品, 技术支持 手机13418601901 QQ409545144

ABSOLUTE MAXIMUM RATINGS(TA=25°C unless otherwise noted)

| Parameter                               | Symbol        | Limit      | Unit |
|---|---------------|------------|------|
| Drain-Source Voltage                    | VDS           | 60         | V    |
| Gate-Source Voltage                     | VGS           | ±20        | V    |
| Drain Current @ Continuous(Note 1)      | ID (TA=25°C)  | 13         | A    |
|   | ID (TA=70°C)  | 11         | A    |
| Drain Current @ Current-Pulsed (Note 2) | IDM (Tc=25°C) | 300        | A    |
| Maximum Power Dissipation (TA=25°C)     | PD            | 2          | W    |
| Maximum Operating Junction Temperature  | TJ            | 150        | °C   |
| Storage Temperature Range               | TSTG          | -55 To 150 | °C   |

THERMAL CHARACTERISTICS

|   |      |    |      |
|---|------|----|------|
| Thermal Resistance,Junction-to-Ambient (Note 2) | RθJA | 60 | °C/W |
|---|------|----|------|

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ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

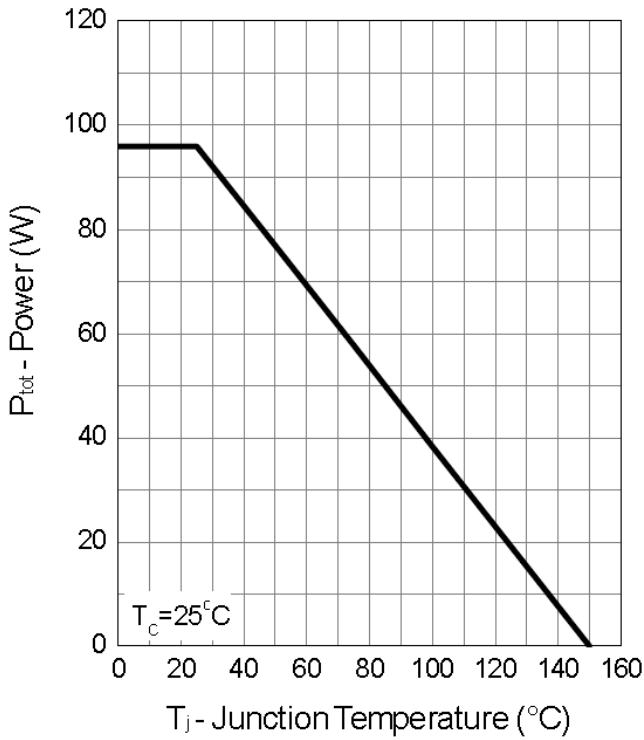
| Parameter                                 | Symbol       | Condition  | Min | Typ  | Max       | Unit      |
|---|--------------|--|-----|------|-----------|-----------|
| <b>OFF CHARACTERISTICS</b>                |              |  |     |      |           |           |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$  | 60  |      |           | V         |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=48V, V_{GS}=0V$  |     |      | 1         | $\mu A$   |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                      |     |      | $\pm 100$ | nA        |
| <b>ON CHARACTERISTICS (Note 3)</b>        |              |  |     |      |           |           |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                    | 1   | 2    | 3         | V         |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=25A$   |     | 5.6  | 7.2       | $m\Omega$ |
|   |              | $V_{GS}=10V, I_D=25A$  |     | 4.9  | 5.9       | $m\Omega$ |
| <b>DYNAMIC CHARACTERISTICS (Note 4)</b>   |              |  |     |      |           |           |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=30V, V_{GS}=0V, F=1.0MHz$                                |     | 4350 | 6100      | PF        |
| Output Capacitance                        | $C_{oss}$    |  |     | 425  |           | PF        |
| Reverse Transfer Capacitance              | $C_{rss}$    |  |     | 215  |           | PF        |
| <b>SWITCHING CHARACTERISTICS (Note 4)</b> |              |  |     |      |           |           |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DS}=30V, R_L=30\Omega, V_{GEN}=10V, R_G=6\Omega$<br>$I_D=1A$ |     | 25   | 45        | nS        |
| Turn-on Rise Time                         | $t_r$        |  |     | 12   | 22        | nS        |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  |     | 90   | 162       | nS        |
| Turn-Off Fall Time                        | $t_f$        |  |     | 38   | 69        | nS        |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=30V, I_D=30A, V_{GS}=10V$                                |     | 83   | 117       | nC        |
| Gate-Source Charge                        | $Q_{gs}$     |  |     | 17   |           | nC        |
| Gate-Drain Charge                         | $Q_{gd}$     |  |     | 15   |           | nC        |
| Body Diode Reverse Recovery Time          | $T_{rr}$     | $I_F=30A, di/dt=100A/\mu s$                                      |     | 33   |           | nS        |
| Body Diode Reverse Recovery Charge        | $Q_{rr}$     |  |     | 41   |           | nC        |
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS</b> |              |  |     |      |           |           |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=20A$   |     | 0.8  | 1.3       | V         |

## NOTES:

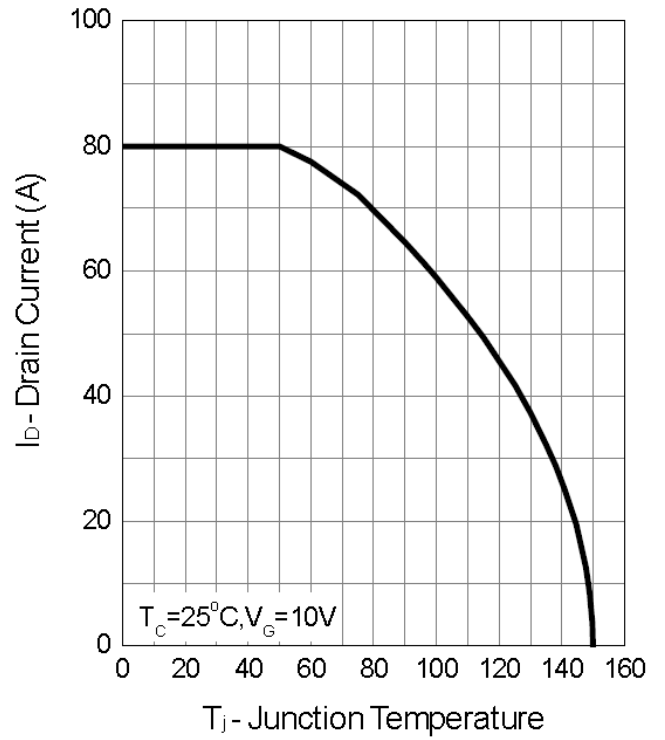
1. Current limited by bond wire
2. Pulse width limited by max. junction temperature.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

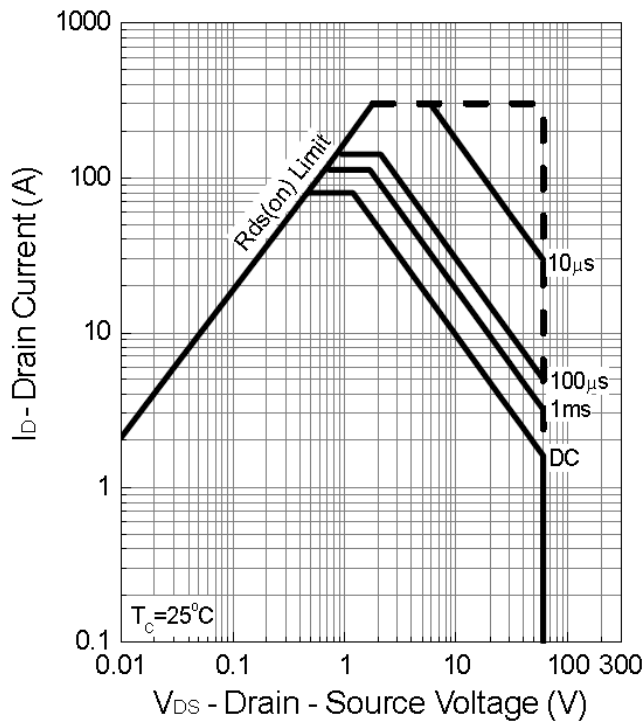
Power Dissipation



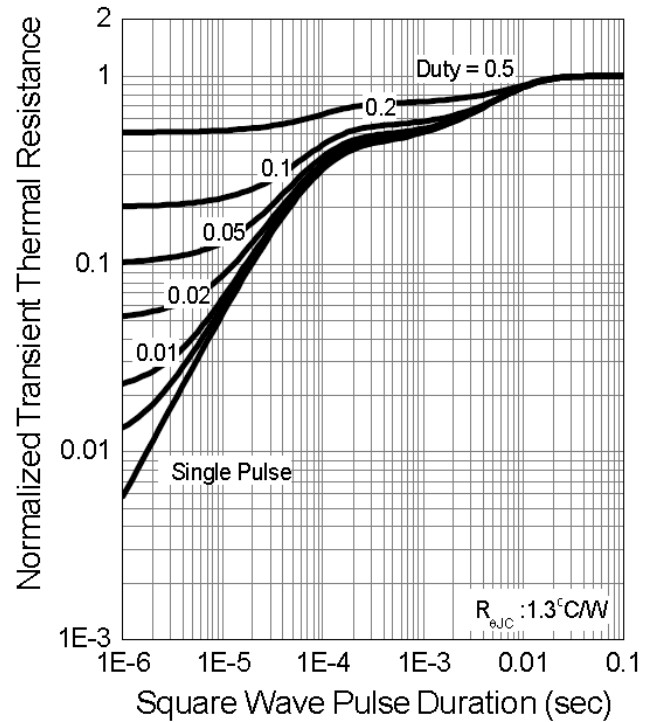
Drain Current



Safe Operation Area

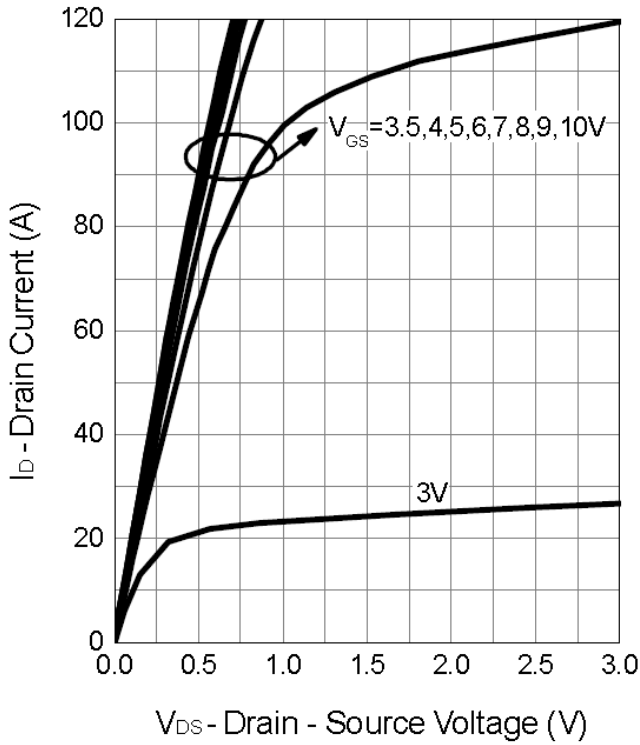


Thermal Transient Impedance

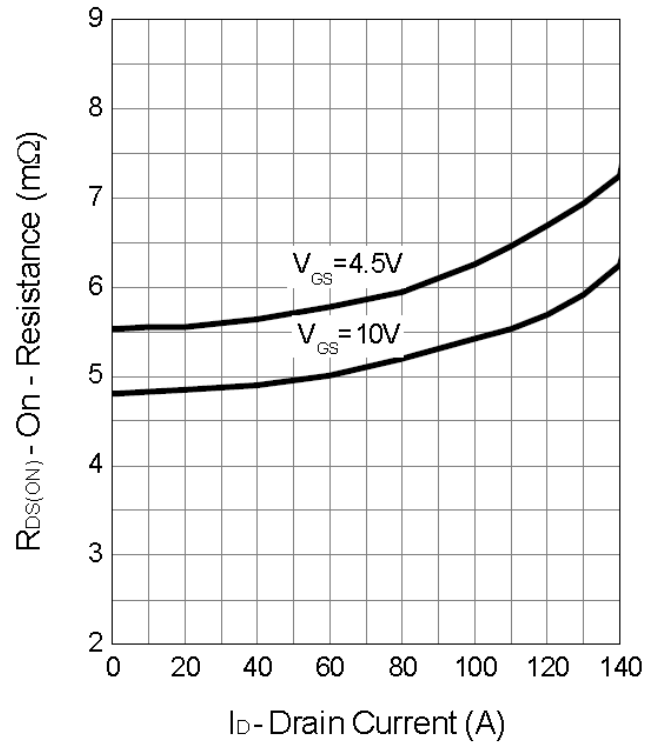


Typical Operating Characteristics(Cont.)

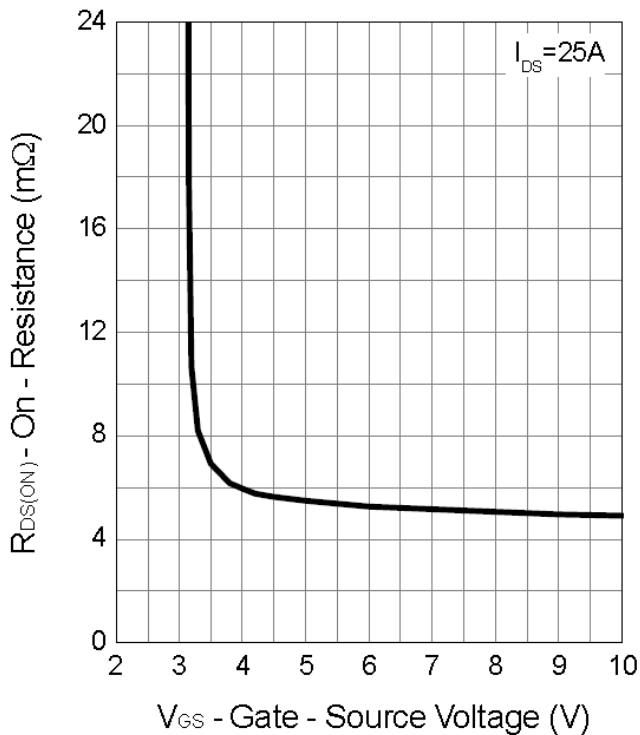
Output Characteristics



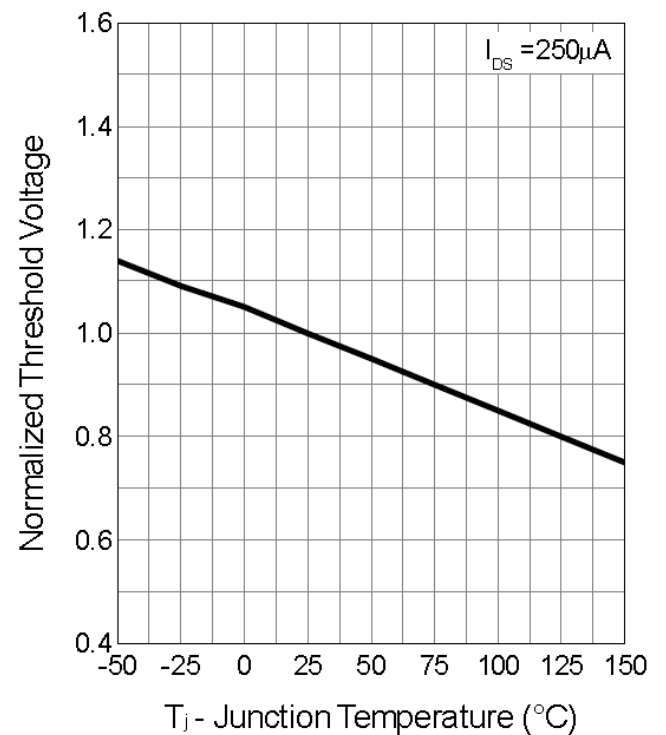
Drain-Source On Resistance



Gate-Source On Resistance

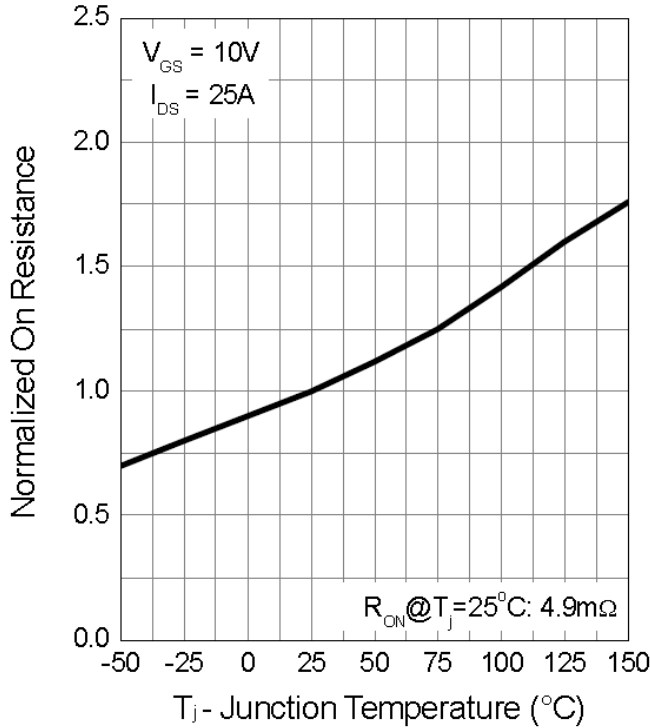


Gate Threshold Voltage

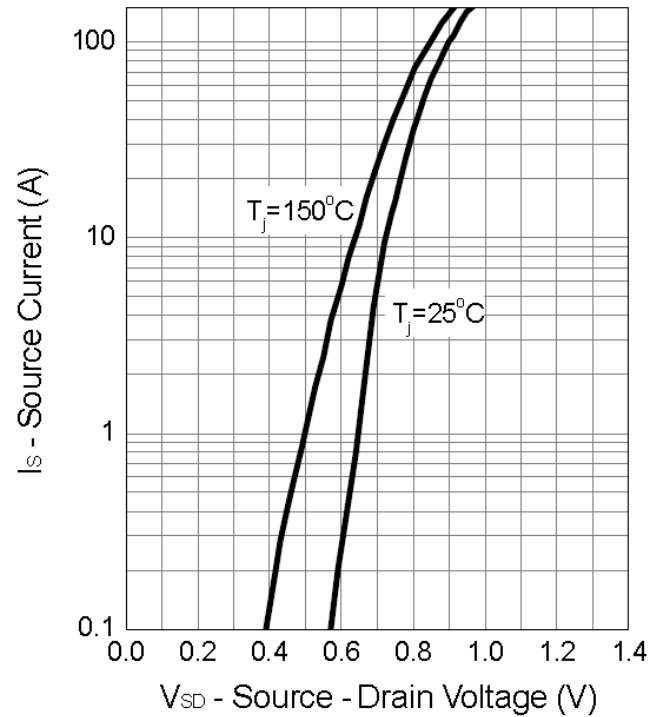


Typical Operating Characteristics (Cont.)

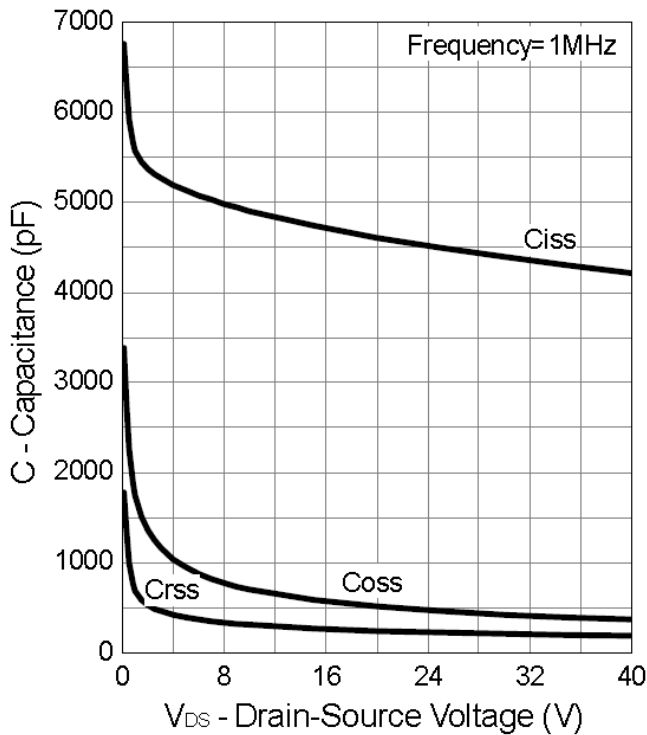
Drain-Source On Resistance



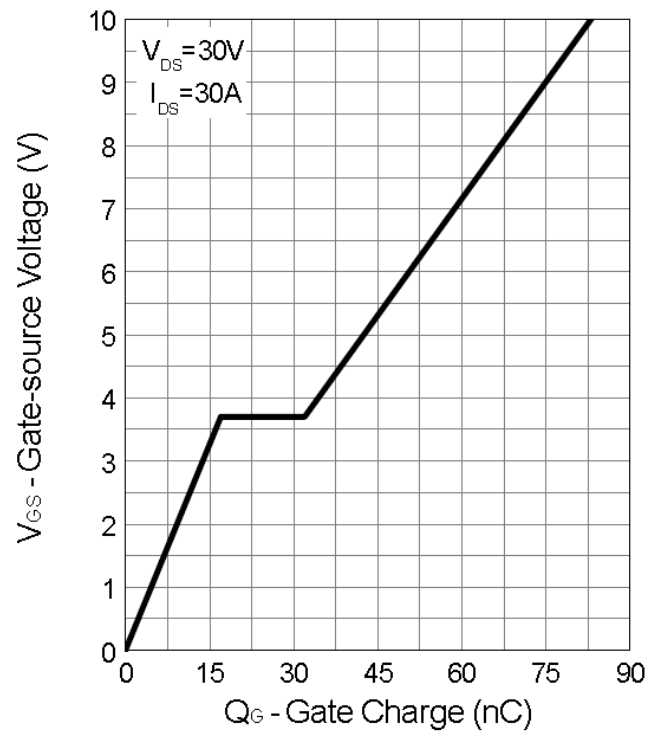
Source-Drain Diode Forward



Capacitance

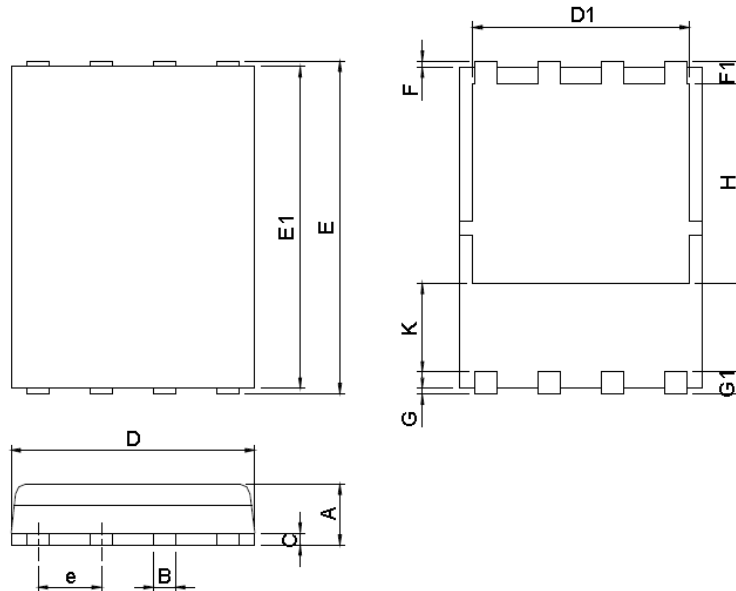


Gate Charge



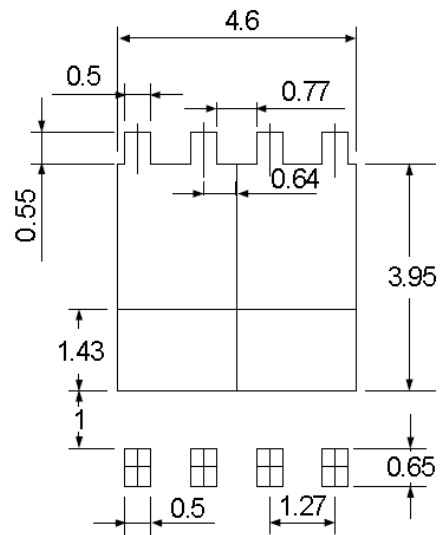
Package Information

DFN5\*6-8 Package



| DIMENSIONS | DFN5x6-8    |      |           |       |
|------------|-------------|------|-----------|-------|
|            | MILLIMETERS |      | INCHES    |       |
|            | MIN.        | MAX. | MIN.      | MAX.  |
| A          | 0.90        | 1.20 | 0.035     | 0.047 |
| B          | 0.3         | 0.51 | 0.012     | 0.020 |
| C          | 0.19        | 0.25 | 0.007     | 0.010 |
| D          | 4.80        | 5.30 | 0.189     | 0.209 |
| D1         | 4.00        | 4.40 | 0.157     | 0.173 |
| E          | 5.90        | 6.20 | 0.232     | 0.244 |
| E1         | 5.50        | 5.80 | 0.217     | 0.228 |
| e          | 1.27 BSC    |      | 0.050 BSC |       |
| F          | 0.05        | 0.30 | 0.002     | 0.012 |
| F1         | 0.35        | 0.75 | 0.014     | 0.030 |
| G          | 0.05        | 0.30 | 0.002     | 0.012 |
| G1         | 0.35        | 0.75 | 0.014     | 0.030 |
| H          | 3.34        | 3.9  | 0.131     | 0.154 |
| K          | 0.762       | -    | 0.03      | -     |

RECOMMENDED LAND PATTERN



UNIT: mm

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.  
Mold flash or protrusions shall not exceed 10 mil.

Design Notes