

N-Channel Enhancement Mode MOSFET

TDM3452

**DESCRIPTION**

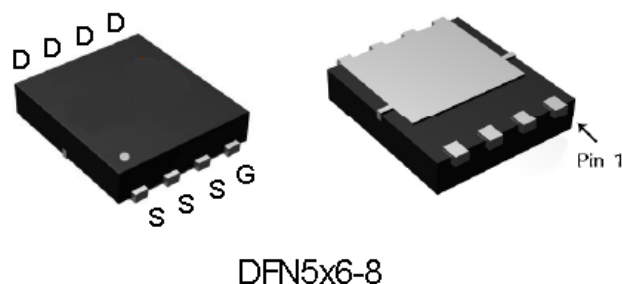
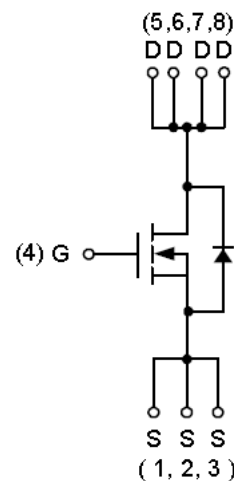
The TDM3452 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**GENERAL FEATURES**

- RDS(ON) < 5.1mΩ @ VGS=4.5V  
RDS(ON) < 3.1mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

**Application**

- PWM applications
- Load switch
- Power management



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

| Parameter  | Symbol                                 | Limit      | Unit |
|--|--|------------|------|
| Drain-Source Voltage                             | V <sub>DS</sub>                        | 30         | V    |
| Gate-Source Voltage                              | V <sub>GS</sub>                        | ±20        | V    |
| Drain Current @ Continuous(Note 1)               | I <sub>D</sub> (T <sub>C</sub> =25°C)  | 80         | A    |
|  | I <sub>D</sub> (T <sub>C</sub> =100°C) | 60         | A    |
| Drain Current @ Current-Pulsed (Note 2)          | I <sub>DM</sub> (T <sub>C</sub> =25°C) | 160        | A    |
| Drain Current @ Continuous(Note 1)               | I <sub>D</sub> (T <sub>A</sub> =25°C)  | 23.5       | A    |
|  | I <sub>D</sub> (T <sub>A</sub> =100°C) | 18.8       | A    |
| Maximum Power Dissipation (T <sub>A</sub> =25°C) | P <sub>D</sub>                         | 2.5        | W    |
| Maximum Operating Junction Temperature           | T <sub>J</sub>                         | 150        | °C   |
| Storage Temperature Range                        | T <sub>STG</sub>                       | -55 To 150 | °C   |

THERMAL CHARACTERISTICS

|   |                  |    |      |
|---|------------------|----|------|
| Thermal Resistance,Junction-to-Ambient (Note 2) | R <sub>θJA</sub> | 50 | °C/W |
|---|------------------|----|------|

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

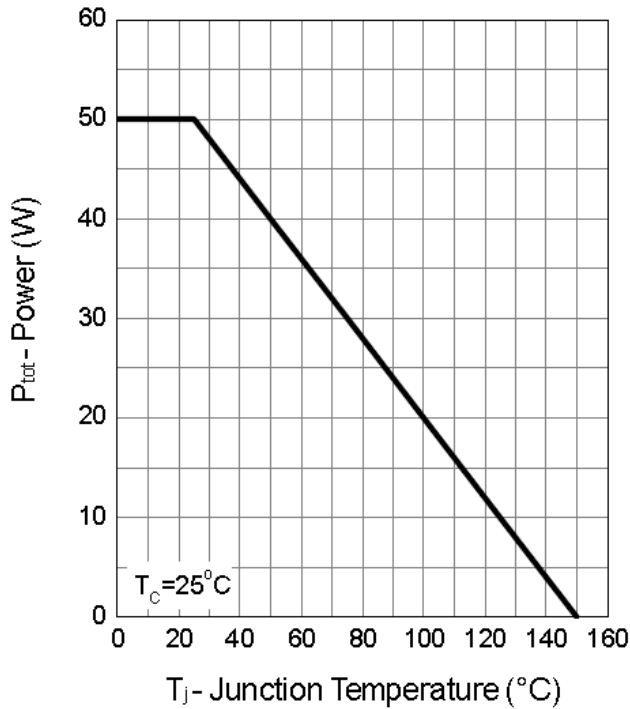
| Parameter                                 | Symbol       | Condition   | Min | Typ  | Max       | Unit       |
|---|--------------|---|-----|------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                |              |   |     |      |           |            |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$   | 30  | -    | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=24V, V_{GS}=0V$   | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                       | -   | -    | $\pm 100$ | nA         |
| <b>ON CHARACTERISTICS</b> (Note 3)        |              |   |     |      |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                     | 1.4 | 1.7  | 2.4       | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=15A$  | -   | 4.2  | 5.1       | m $\Omega$ |
|   |              | $V_{GS}=10V, I_D=20A$   | -   | 2.7  | 3.1       | m $\Omega$ |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 4)   |              |   |     |      |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V, F=1.0MHz$                                 | -   | 1345 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |   | -   | 908  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | -   | 60   | -         | PF         |
| <b>SWITCHING CHARACTERISTICS</b> (Note 4) |              |   |     |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DS}=12V, R_L=2.1\Omega, V_{GEN}=10V, R_G=2.9\Omega, I_D=5.7A$ | -   | 14.3 | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |   | -   | 26   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -   | 24   | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |   | -   | 4.4  | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=15V, I_D=20A, V_{GS}=4.5V$                                | -   | 9.2  | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |   | -   | 6    | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -   | 2    | -         | nC         |
| Body Diode Reverse Recovery Time          | $T_{rr}$     | $I_F=20A, di/dt=100A/\mu s$                                       | -   | 21   | -         | nS         |
| Body Diode Reverse Recovery Charge        | $Q_{rr}$     |   | -   | 6.3  | -         | nC         |
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS</b> |              |   |     |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=20A$  | -   | 0.81 | 1.1       | V          |

**NOTES:**

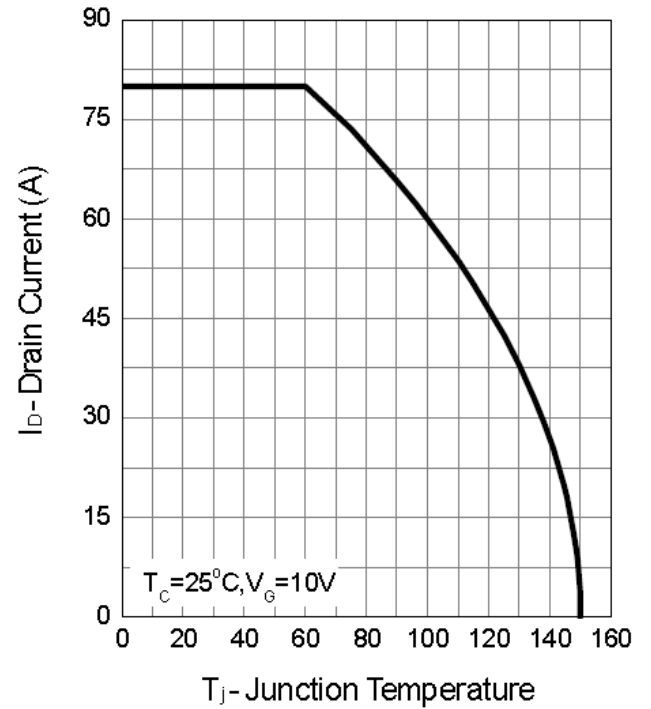
1. continue current is limited by bonding wire.
2. Pulse width limited by max. junction temperature.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

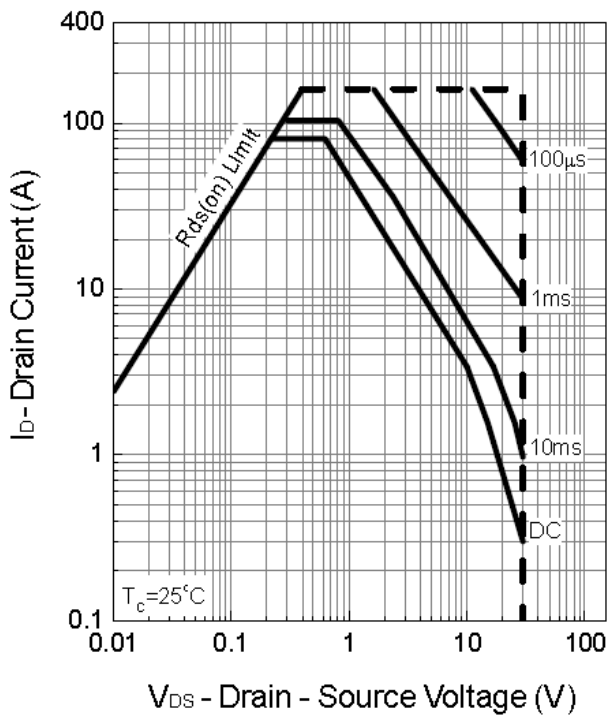
Power Dissipation



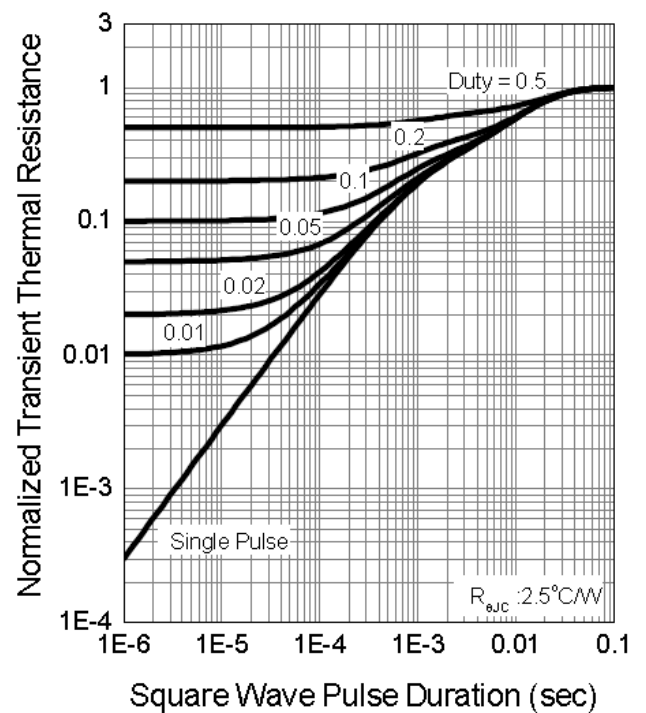
Drain Current



Safe Operation Area

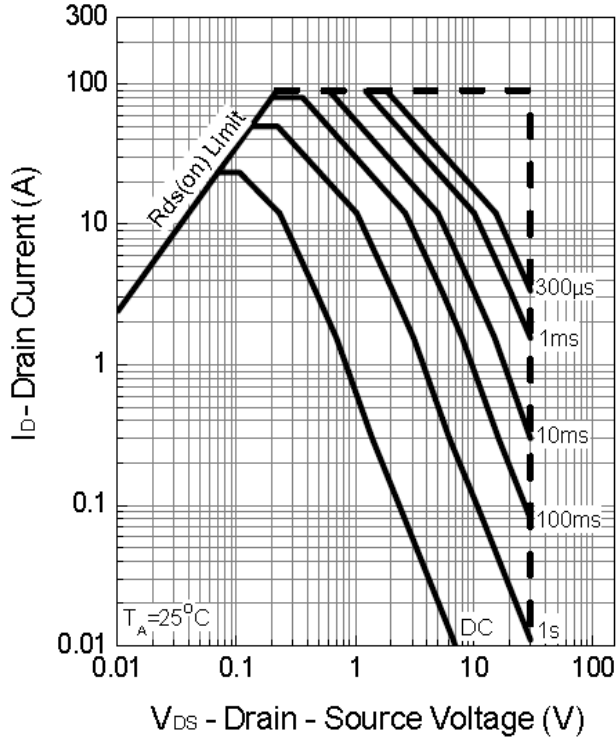


Thermal Transient Impedance

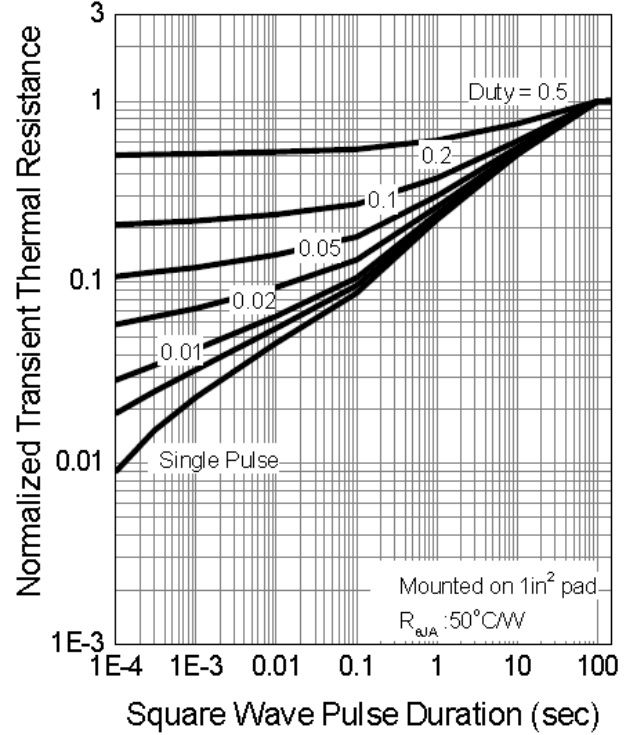


Typical Operating Characteristics(Cont.)

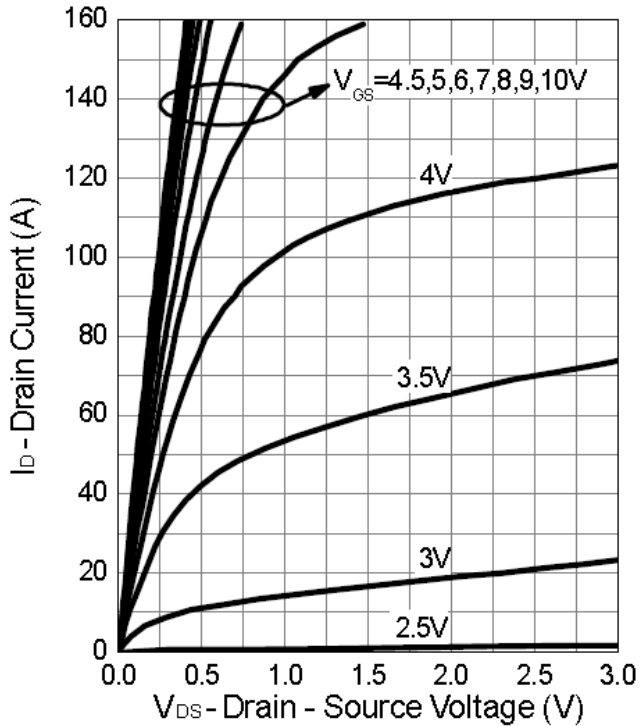
Safe Operation Area



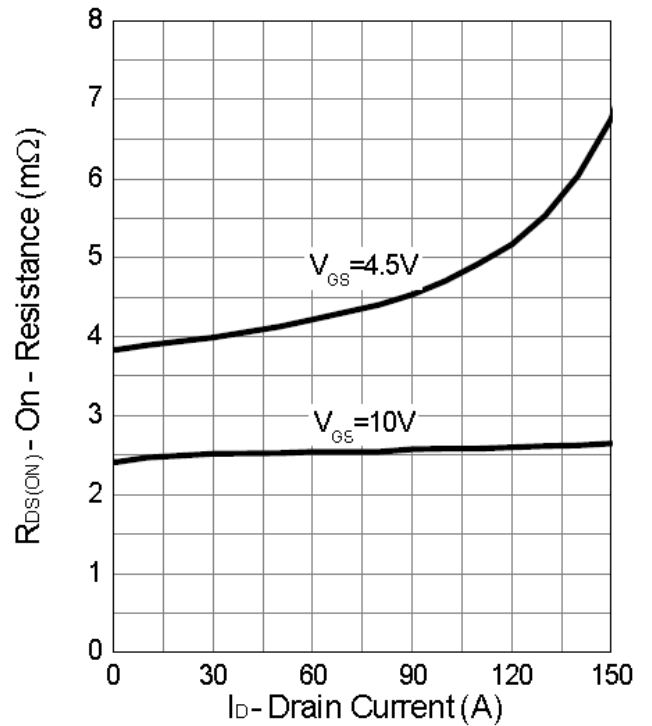
Thermal Transient Impedance



Output Characteristics

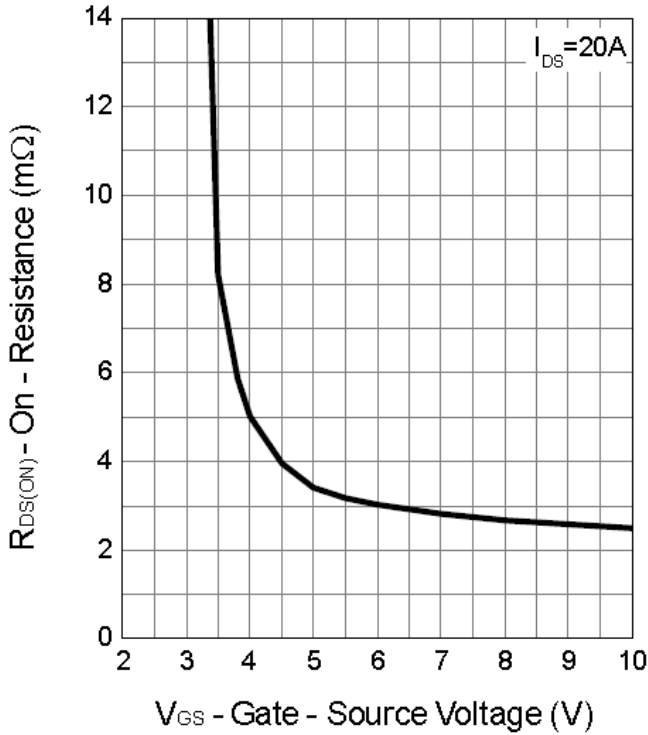


Drain-Source On Resistance

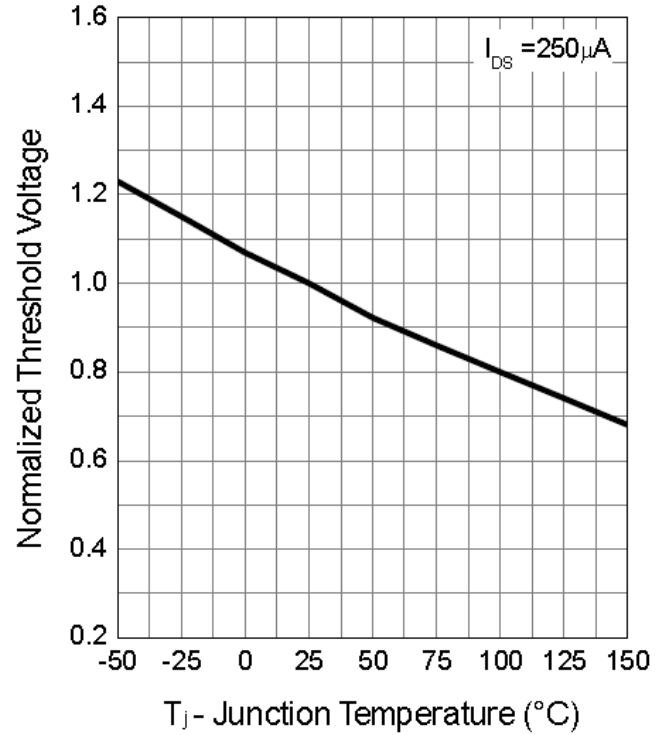


Typical Operating Characteristics (Cont.)

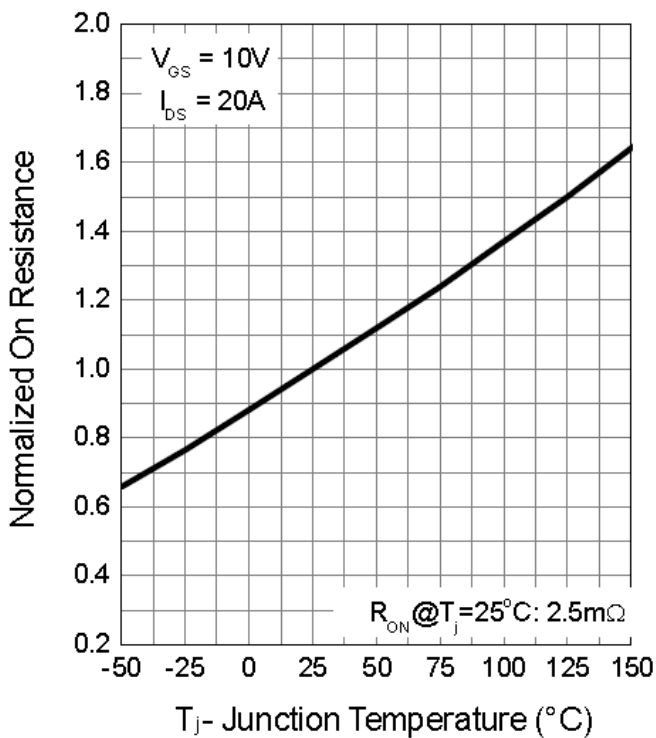
Gate-Source On Resistance



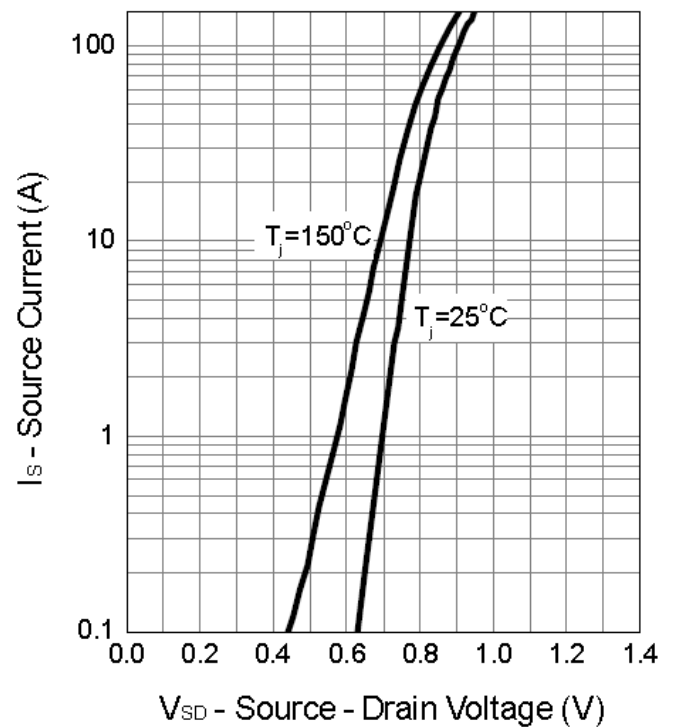
Gate Threshold Voltage



Drain-Source On Resistance

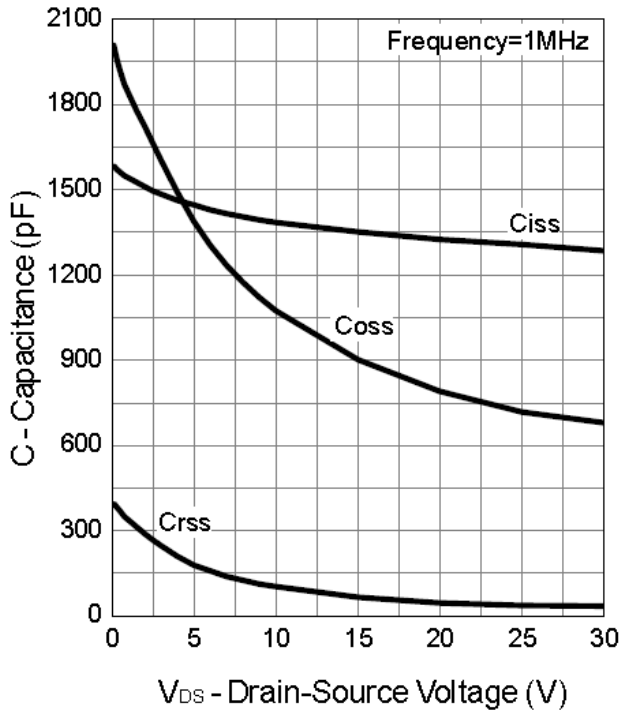


Source-Drain Diode Forward

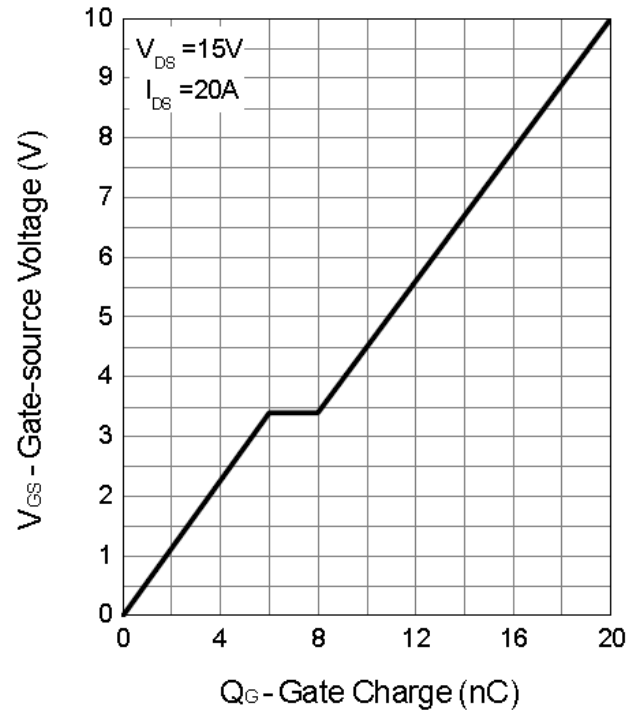


Typical Operating Characteristics (Cont.)

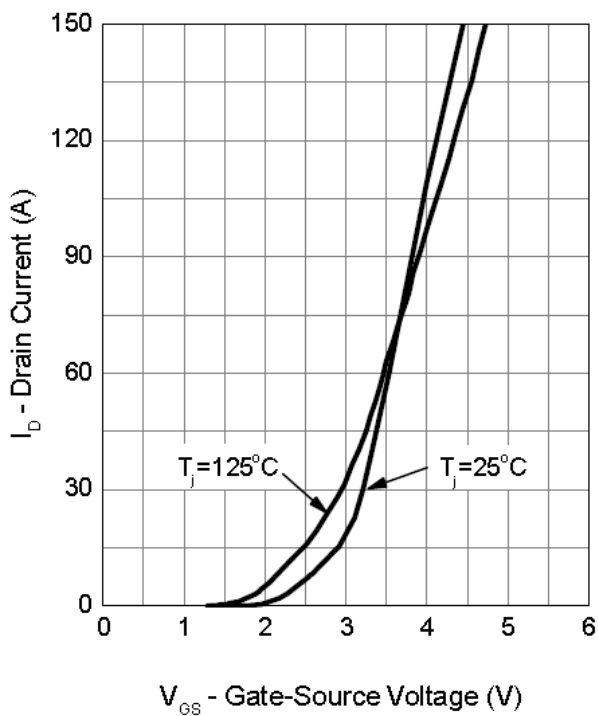
Capacitance



Gate Charge

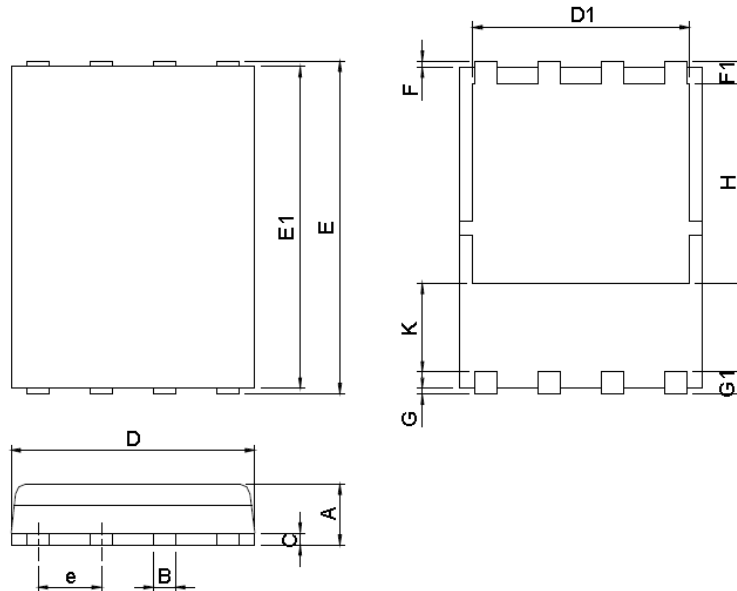


Transfer Characteristics



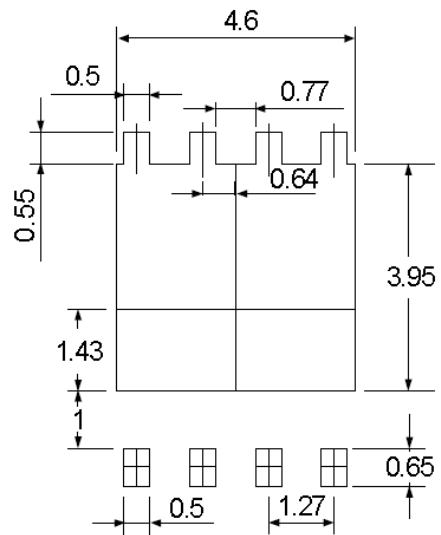
Package Information

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