

## DESCRIPTION

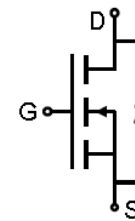
The TDM3428 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

## GENERAL FEATURES

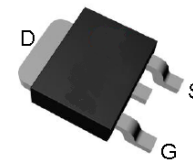
- RDS(ON) < 9.8mΩ @ VGS=4.5V  
RDS(ON) < 7.2mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

## Application

- PWM applications
- Load switch
- Power management



Schematic diagram



Top View of TO-252-3

### ABSOLUTE MAXIMUM RATINGS(T<sub>A</sub>=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)   | 50         | A    |
|  | I <sub>D</sub> (T <sub>C</sub> =100°C)  | 40         | A    |
| Drain Current @ Current-Pulsed                   | I <sub>DP</sub> (T <sub>C</sub> =25°C)  | 120        | A    |
|  | I <sub>DP</sub> (T <sub>C</sub> =100°C) | 85         | A    |
| Maximum Power Dissipation                        | P <sub>D</sub> (T <sub>C</sub> =25°C)   | 50         | W    |
|  | P <sub>D</sub> (T <sub>C</sub> =100°C)  | 20         |      |
| Operating Junction and Storage Temperature Range | T <sub>J</sub> ,T <sub>STG</sub>        | -55 To 150 | °C   |

### THERMAL CHARACTERISTICS

|   |                                 |     |      |
|---|---------------------------------|-----|------|
| Thermal Resistance, Junction-to-Ambient(Note 2) | R <sub>θJA</sub> (t≤10s)        | 20  | °C/W |
|   | R <sub>θJA</sub> (Steady State) | 60  |      |
| Thermal Resistance, Junction-to-Case            | R <sub>θJC</sub> (Steady State) | 2.5 | °C/W |

**N-Channel Enhancement Mode MOSFET**
**TDM3428**
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

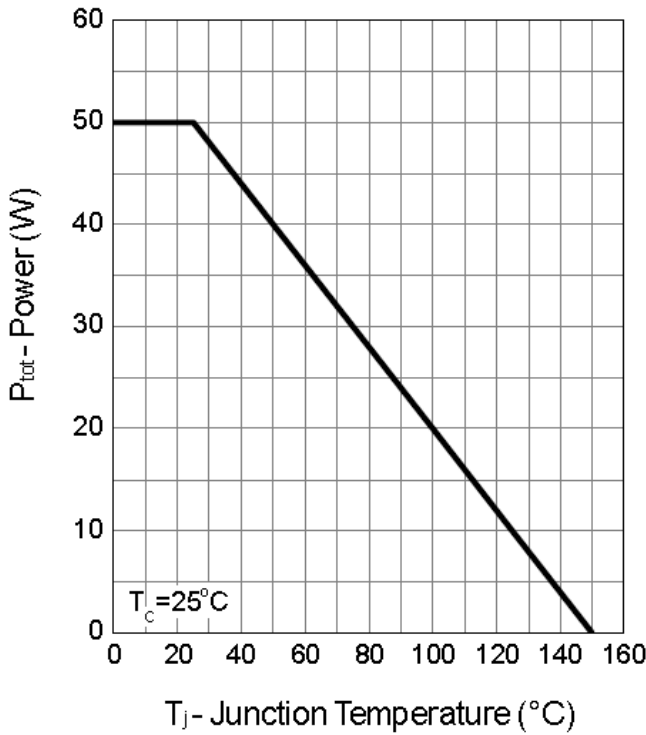
| Parameter                                 | Symbol       | Condition   | Min | Typ  | Max       | Unit       |
|---|--------------|---|-----|------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                |              |   |     |      |           |            |
| Drain-Source Breakdown 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                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                       | 1.5 | 1.8  | 2.5       | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=15A$  | -   | 7.6  | 9.8       | m $\Omega$ |
|   |              | $V_{GS}=10V, I_D=30A$   | -   | 5.9  | 7.2       |            |
|   |              | $T_J=125^{\circ}\text{C}$   | -   | 8.9  | -         |            |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 4)   |              |   |     |      |           |            |
| Gate Resistance                           | $R_G$        | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$                               | 0.7 | 1    | 1.5       | $\Omega$   |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V, F=1.0\text{MHz}$                            | 980 | 1180 | 1400      | PF         |
| Output Capacitance                        | $C_{oss}$    |   | 158 | 190  | 228       | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | 90  | 115  | 140       | PF         |
| <b>SWITCHING CHARACTERISTICS</b> (Note 4) |              |   |     |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DS}=15V, R_L=15\Omega, V_{GS}=10V, R_{GEN}=6\Omega$<br>$I_D=1A$ | -   | 11   | 20        | nS         |
| Turn-on Rise Time                         | $t_r$        |   | -   | 12   | 22        | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -   | 36   | 60        | nS         |
| Turn-Off Fall Time                        | $t_f$        |   | -   | 10   | 19        | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=15V, I_D=30A, V_{GS}=10V$                                   | -   | 20   | 24        | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |   | -   | 2.2  | 2.7       | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -   | 3.5  | 4.1       | nC         |
| Body Diode Reverse Recovery Time          | $T_{rr}$     | $I_F=5A, di/dt=100A/\mu s$  | -   | 20   | -         | nS         |
| Body Diode Reverse Recovery Charge        | $Q_{rr}$     |   | -   | 10   | -         | nC         |
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS</b> |              |   |     |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=15A$  | -   | 0.85 | 1.1       | V          |

**NOTES:**

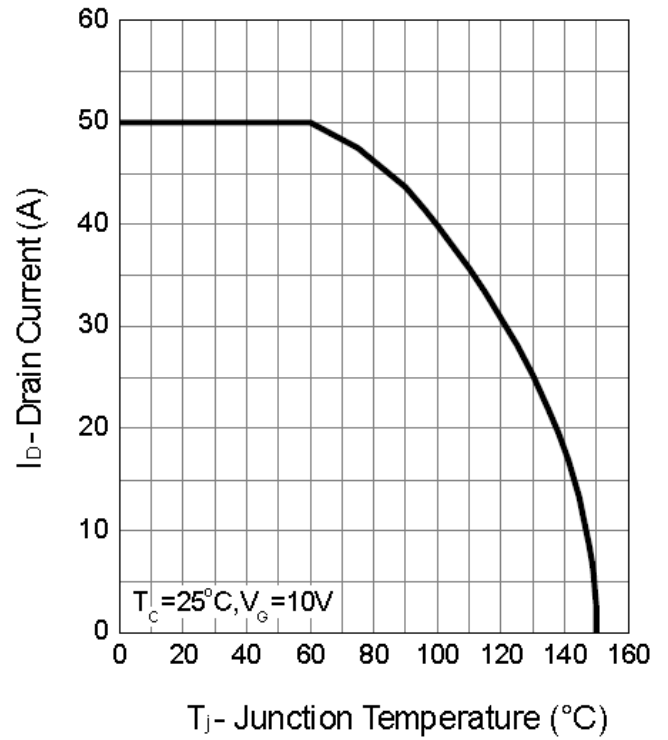
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on 1in2 FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

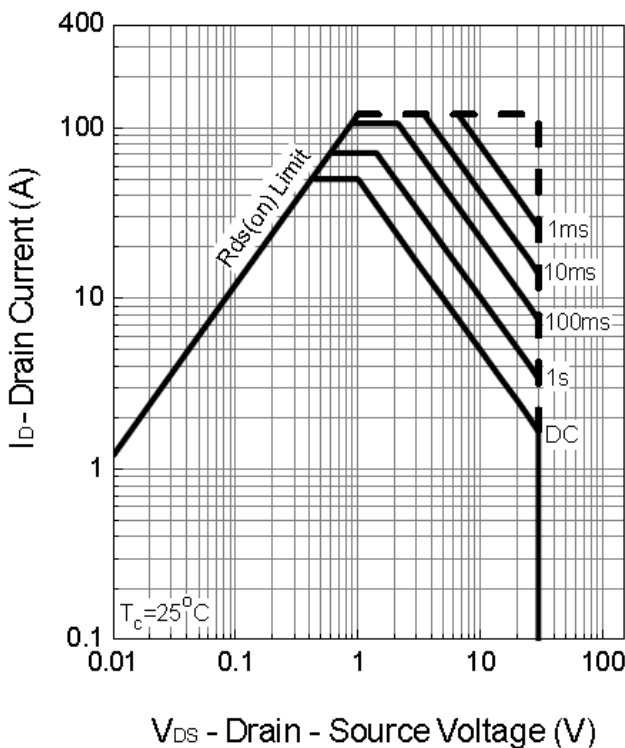
Power Dissipation



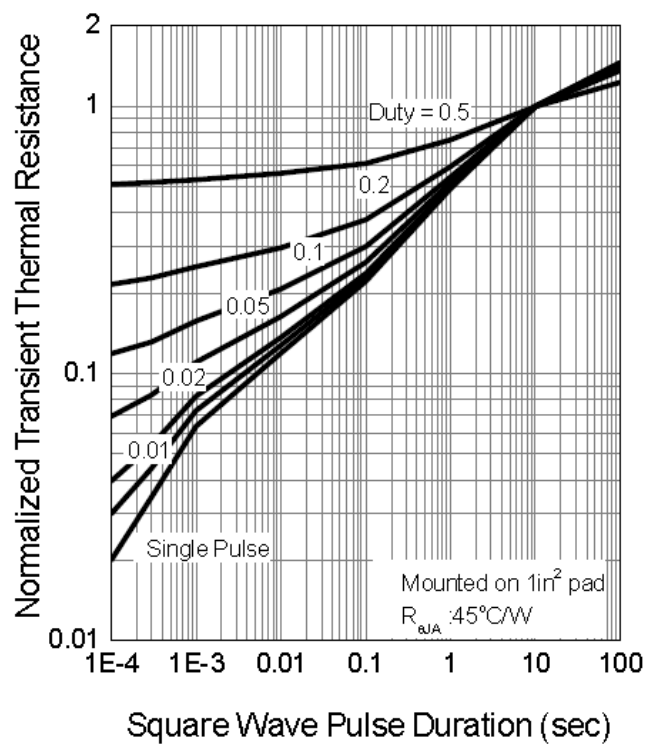
Drain Current



Safe Operation Area

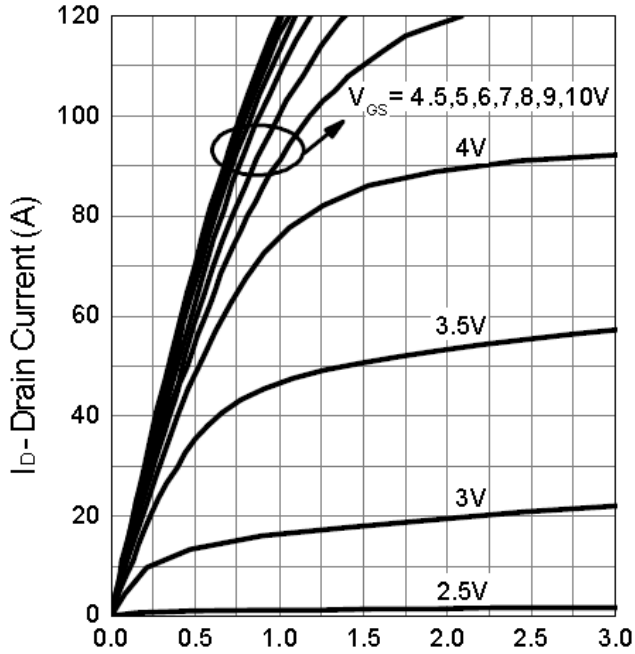


Thermal Transient Impedance



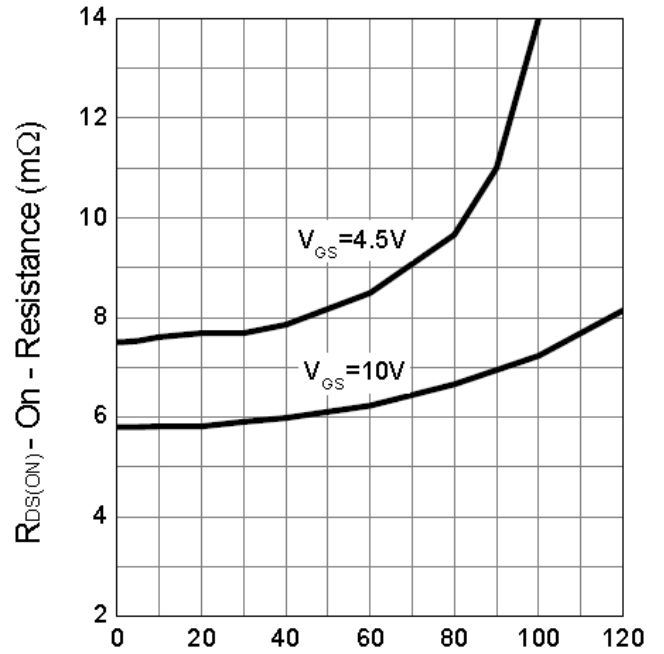
Typical Operating Characteristics(Cont.)

Output Characteristics



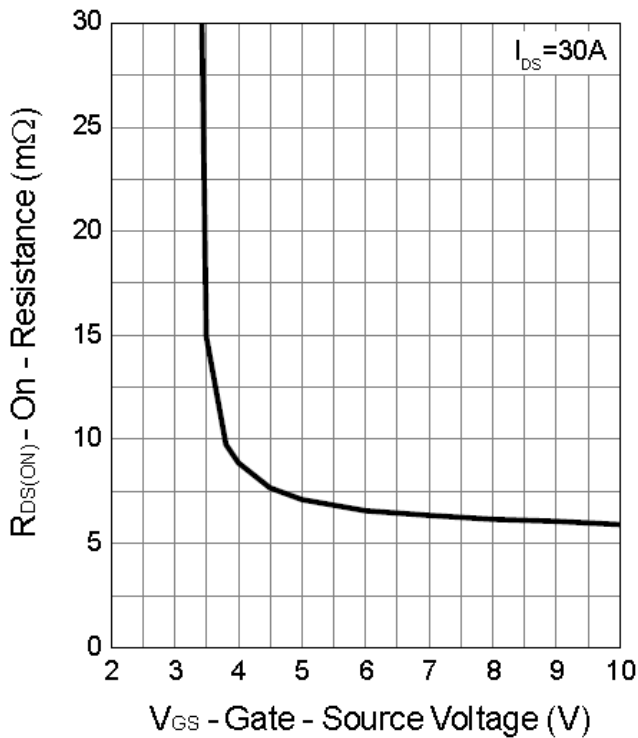
$V_{DS}$ - Drain - Source Voltage (V)

Drain-Source On Resistance

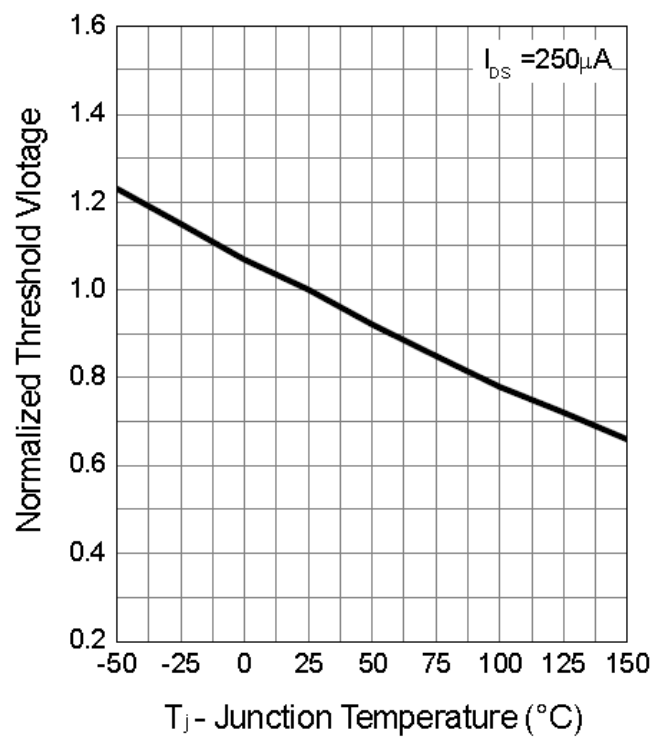


$I_D$ - Drain Current (A)

Gate-Source On Resistance

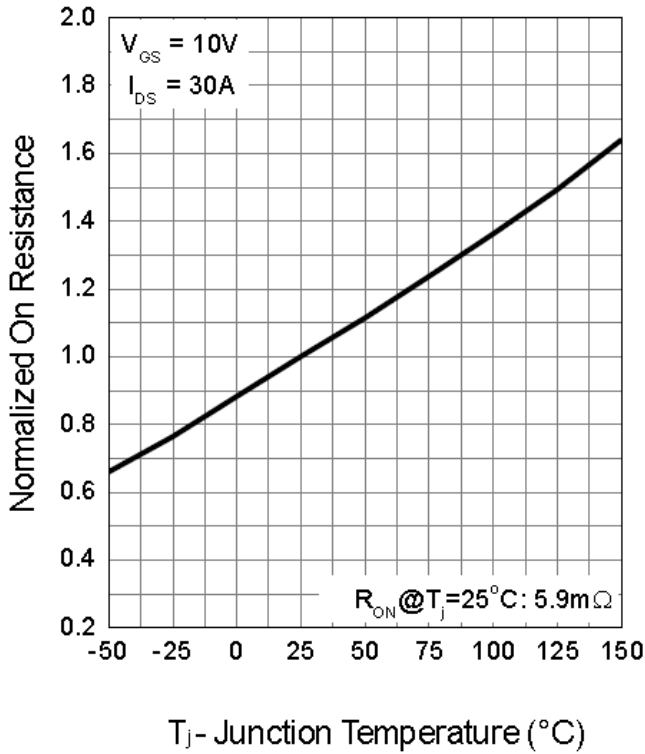


Gate Threshold Voltage

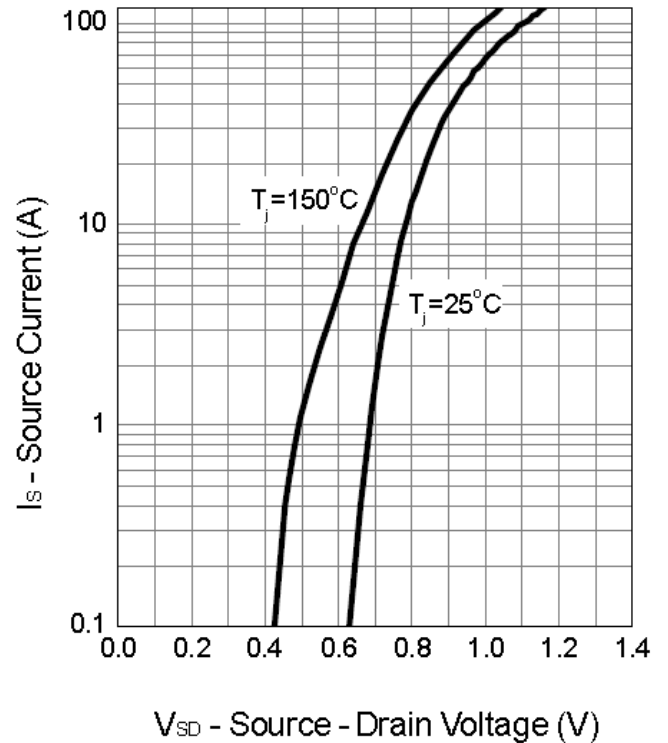


Typical Operating Characteristics (Cont.)

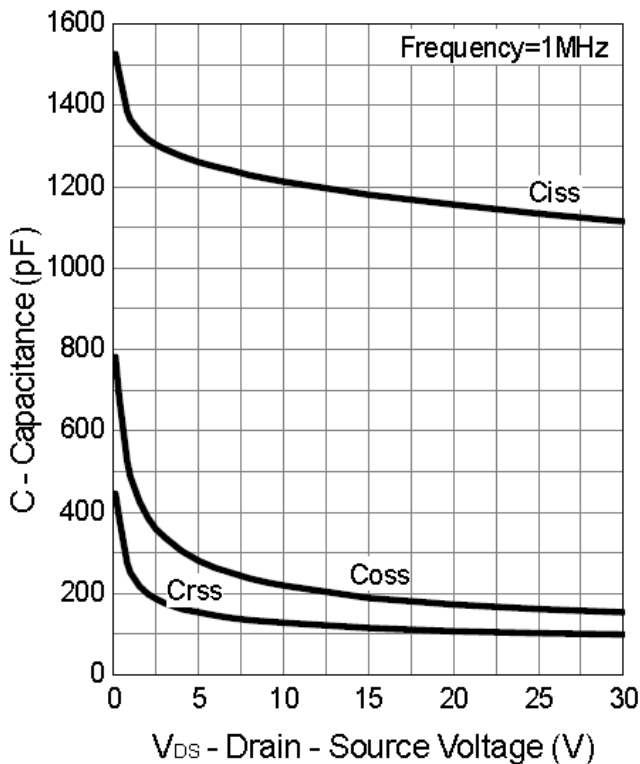
Drain-Source On Resistance



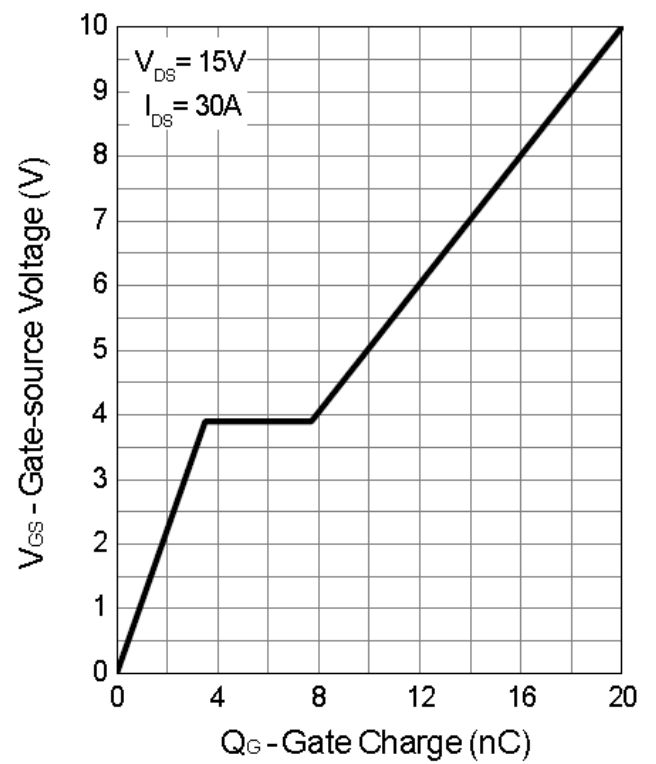
Source-Drain Diode Forward



Capacitance

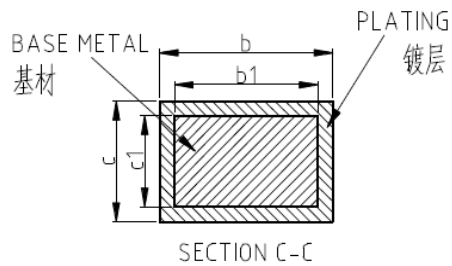
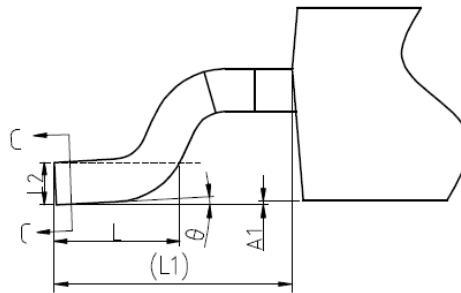
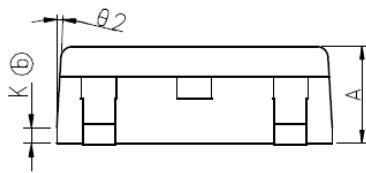
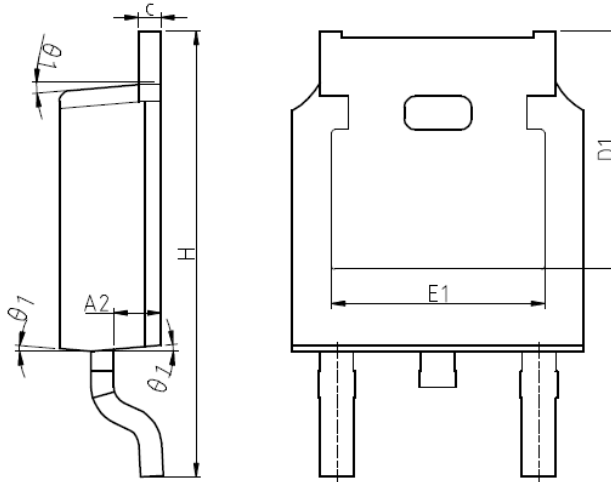
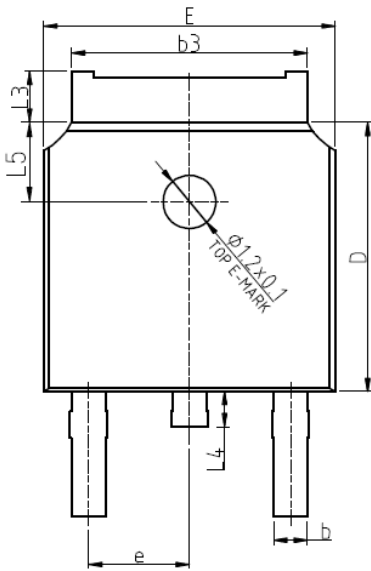


Gate Charge



Package Information

TO252-3 Package



| SYMBOL     | mm       |       |       |
|------------|----------|-------|-------|
|            | MIN      | NOM   | MAX   |
| A          | 2.20     | 2.30  | 2.40  |
| A1         | 0.00     | -     | 0.20  |
| A2         | 0.97     | 1.07  | 1.17  |
| b          | 0.68     | 0.78  | 0.90  |
| b1         | 0.66     | 0.76  | 0.88  |
| b3         | 5.20     | 5.33  | 5.50  |
| c          | 0.43     | 0.53  | 0.63  |
| c1         | 0.41     | 0.51  | 0.61  |
| D          | 5.98     | 6.10  | 6.22  |
| D1         | 5.30REF  |       |       |
| E          | 6.40     | 6.60  | 6.80  |
| E1         | 4.63     | 4.83  | 5.03  |
| e          | 2.286BSC |       |       |
| H          | 9.40     | 10.10 | 10.50 |
| L          | 1.38     | 1.50  | 1.75  |
| L1         | 2.90REF  |       |       |
| L2         | 0.51BSC  |       |       |
| L3         | 0.88     | -     | 1.28  |
| L4         | -        | -     | 1.00  |
| L5         | 1.65     | 1.80  | 1.95  |
| $\theta$   | 0°       | -     | 8°    |
| $\theta 1$ | 5°       | 7°    | 9°    |
| $\theta 2$ | 5°       | 7°    | 9°    |
| K          | 0.40REF  |       |       |

Design Notes