# P-Channel Enhancement Mode MOSFET TDM3307

## DESCRIPTION

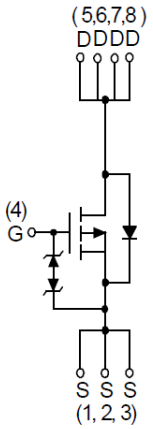
The TDM3307 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

## GENERAL FEATURES

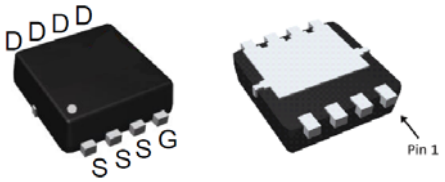
- -30V/-50A
- RDS(ON) < 16mΩ @ VGS=-4.5V
  RDS(ON) < 9.5mΩ @ VGS=-10V
- Reliable and Rugged
- HBM ESD capability level of 8KV typical
- Lead free product is available
- DFN3*3-8 Package

## Application

- PWM applications
- Load switch
- Power management




P-Channel MOSFET




PPAK-3*3-8

## ABSOLUTE MAXIMUM RATINGS(TA=25℃unless otherwise noted)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±25 | V |
| Diode Continuous Forward Current | $I_S$(TC=25℃) | -20 | A |
| Continuous Drain Current | $I_D$ (TC=25℃) | -50 | A |
| | $I_D$ (TC=100℃) | -31 | A |
| Pulsed Drain Current | $I_{DM}$ TC=25℃) | -200 | A |
| Maximum Power Dissipation (note1) | $P_D$ (TC=25℃) | 35.7 | W |
| | $P_D$ (TC=100℃) | 14.3 | W |
| Continuous Drain Current | $I_D$ (TA=25℃) | -17.1 | A |
| | $I_D$ (TA=70℃) | -13.7 | A |
| Maximum Power Dissipation (note1) | $P_D$(TA=25℃) | 4.2 | W |
| | $P_D$(TA=70℃) | 2.7 | W |
| Maximum Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature Range | $T_{STG}$ | -55 to 150 | ℃ |
| Thermal Resistance-Junction to Ambient (note1) | $R_{\theta JA}$(t≤10s) | 30 | ℃/W |
| | $R_{\theta JA}$(Steady State) | 75 | ℃/W |
| Thermal Resistance-Junction to Case (note2) | $R_{\theta JC}$(Steady State) | 3.5 | ℃/W |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃unless otherwise noted)

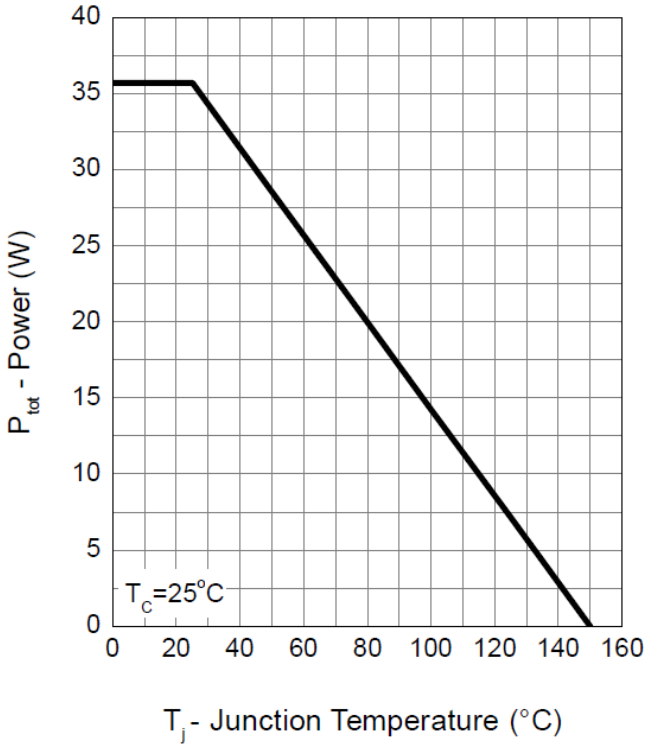
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| STATIC CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250μA | -30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-24, $V_{GS}$=0V | - | - | -1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±10 | μA |
| ON CHARACTERISTICS (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=VGS,$I_D$=-250μA | -1.3 | -1.8 | -2.3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-4.5V,$I_{DS}$=-10A | - | 12 | 16 | mΩ |
| | | $V_{GS}$=-10V, $I_{DS}$=-17.6A | - | 7.5 | 9.5 | mΩ |
| DYNAMIC CHARACTERISTICS (Note4) | | | | | | |
| Gate Resistance | $R_g$ | $V_{GS}$=0V, $V_{DS}$=0V,F=1MHz | - | 8 | - | Ω |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-15V,$V_{GS}$=0V, F=1.0MHz | - | 2110 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 450 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 330 | - | PF |
| SWITCHING CHARACTERISTICS (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-15V, $R_L$=15Ω, $V_{GEN}$=-10V, | - | 12 | - | nS |
| Turn-on Rise Time | $t_r$ | $R_G$=6Ω $I_{DS}$=-1A | - | 14 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 98 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 60 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V,$I_{DS}$=-17.1A,$V_{GS}$=-10V | - | 45 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 5 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 12.7 | - | nC |
| Body Diode Reverse Recovery Time | $T_{rr}$ | $I_{DS}$=-17.6A, dI/dt=100A/μs | - | 24 | - | nS |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | - | 16 | - | nC |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=-1A | - | -0.7 | -1 | V |

NOTES:

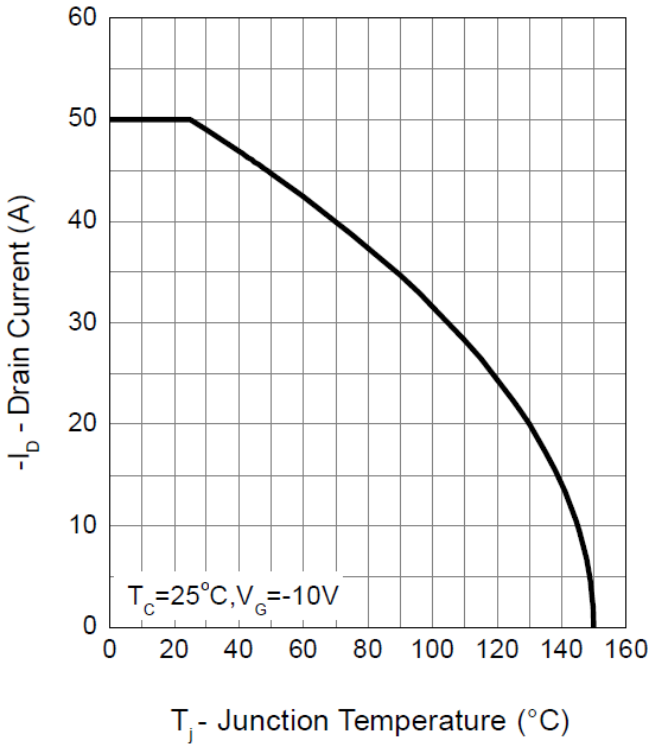
1. Surface Mounted on 1in$^2$ pad area, t≤ 10sec. $R_{\theta JA}$ steady state t = 999s.
2. The power dissipation $P_D$ is based on $T_{J(MAX)}$ = 150°C, and it is useful for reducing junction-to-case thermal resistance ($R_{\theta JC}$) when additional heat sink is used.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing

## Typical Operating Characteristics

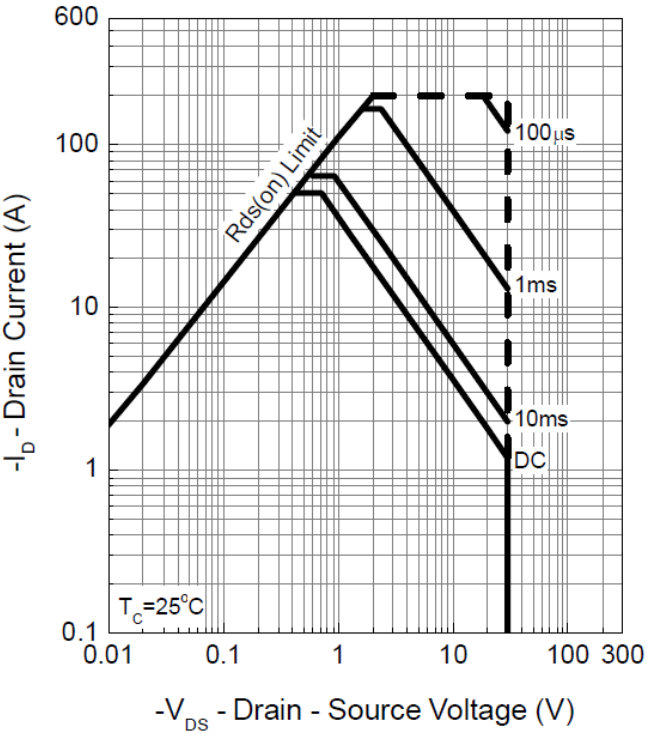
### Power Dissipation



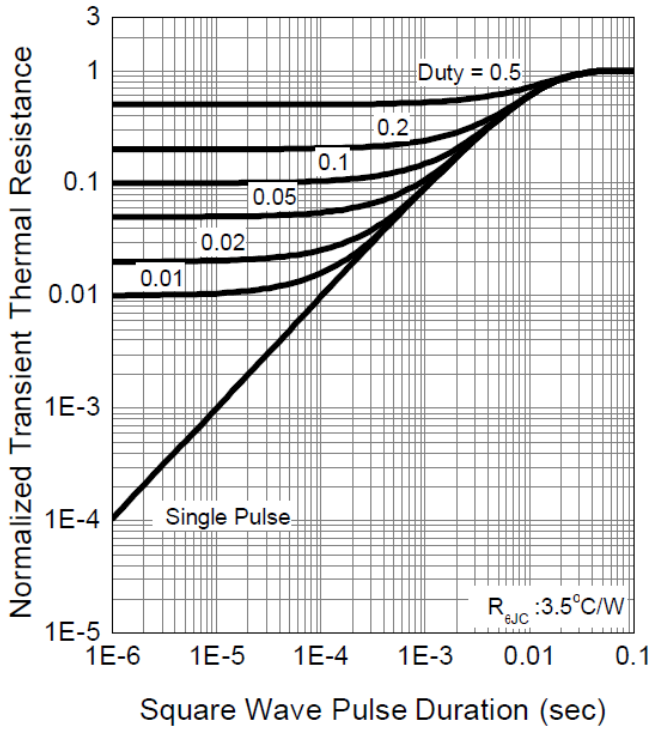

### Drain Current




### Safe Operation Area

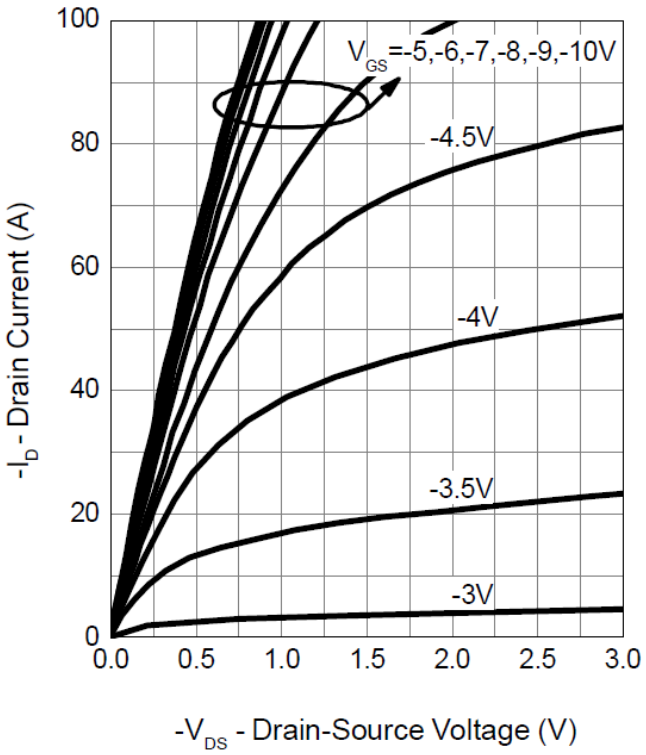



### Thermal Transient Impedance

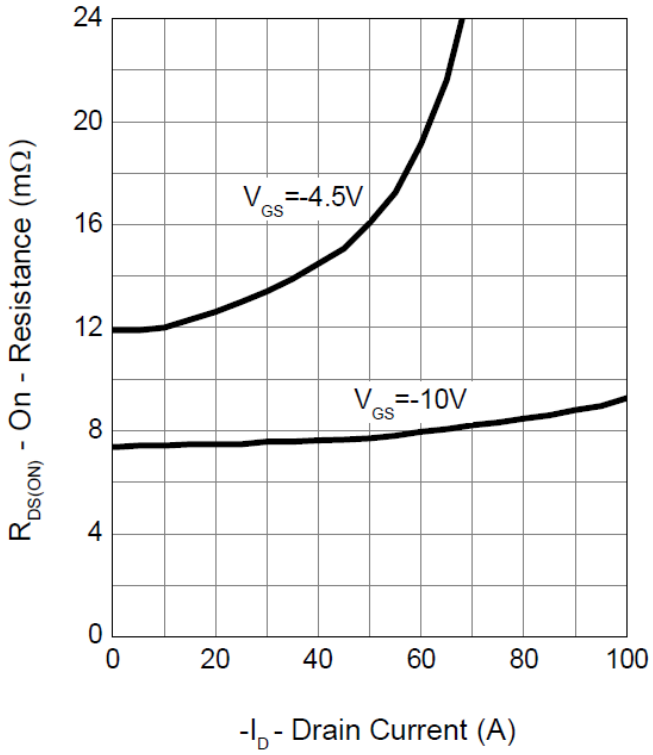


## Typical Operating Characteristics(Cont.)

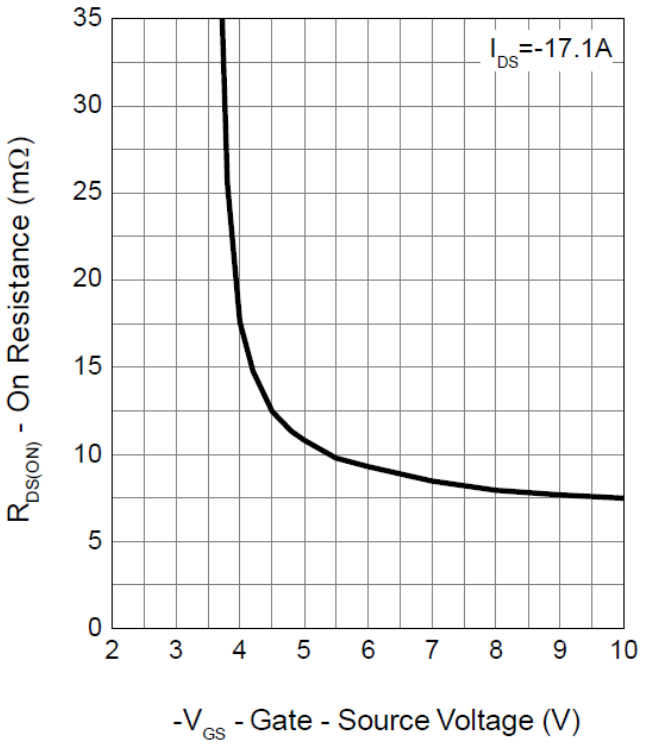
### Output Characteristics



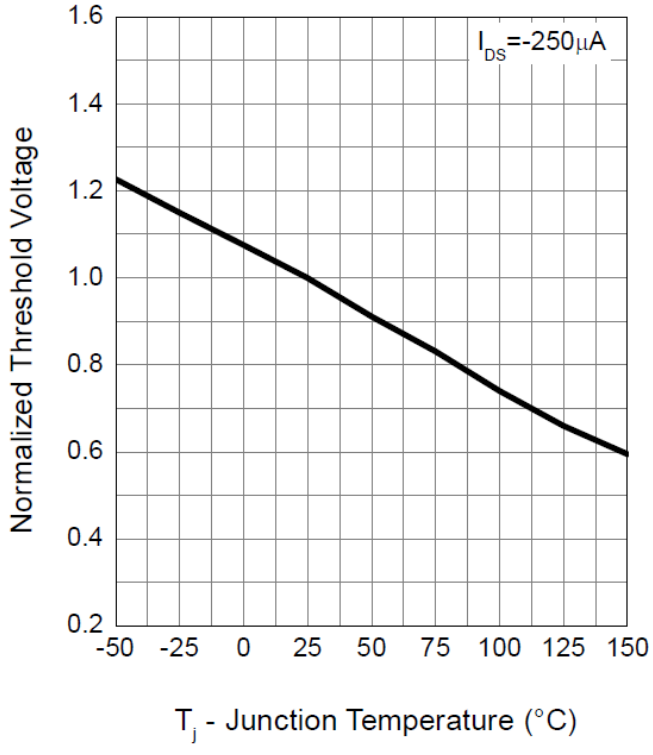

### Drain-Source On Resistance




### Gate-Source On Resistance

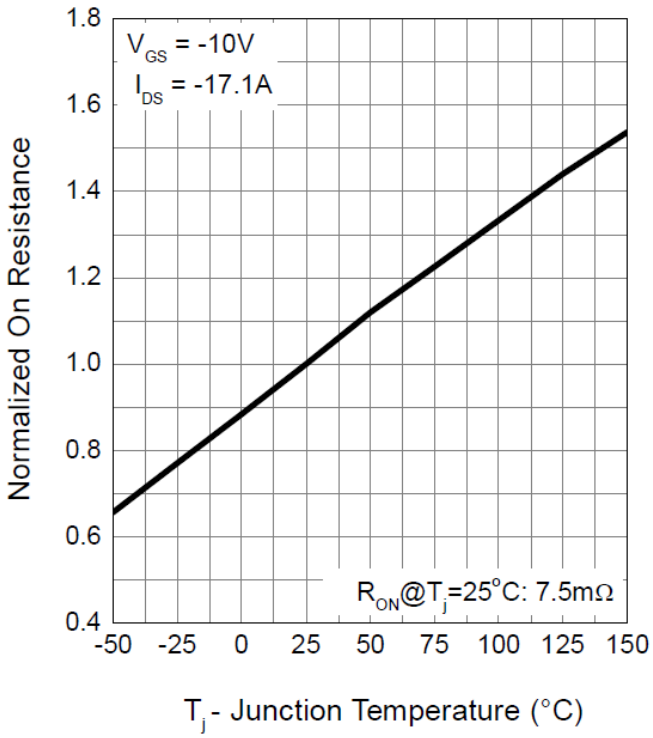



### Gate Threshold Voltage

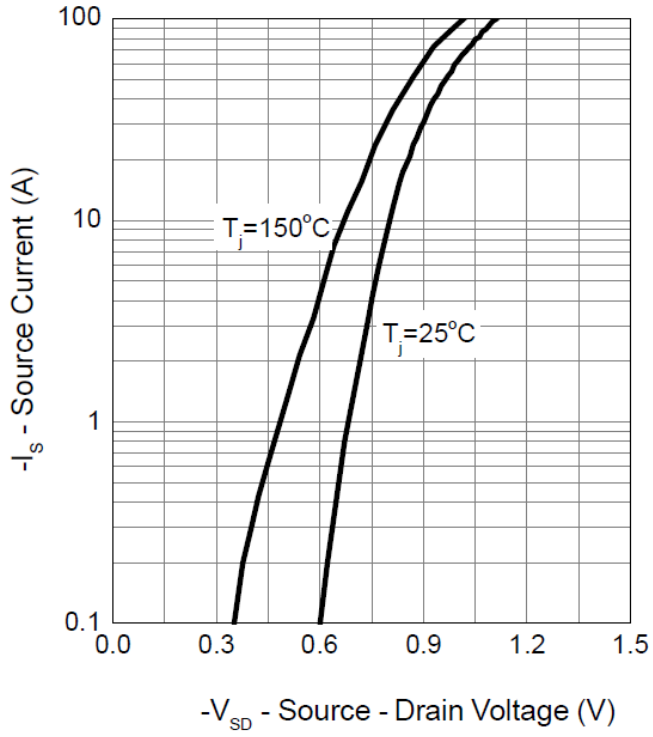


## Typical Operating Characteristics (Cont.)

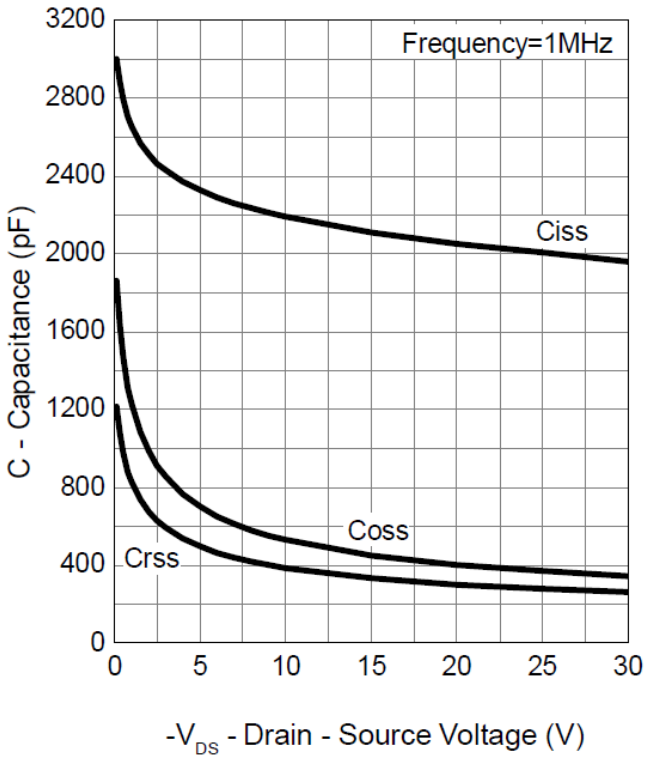
### Drain-Source On Resistance



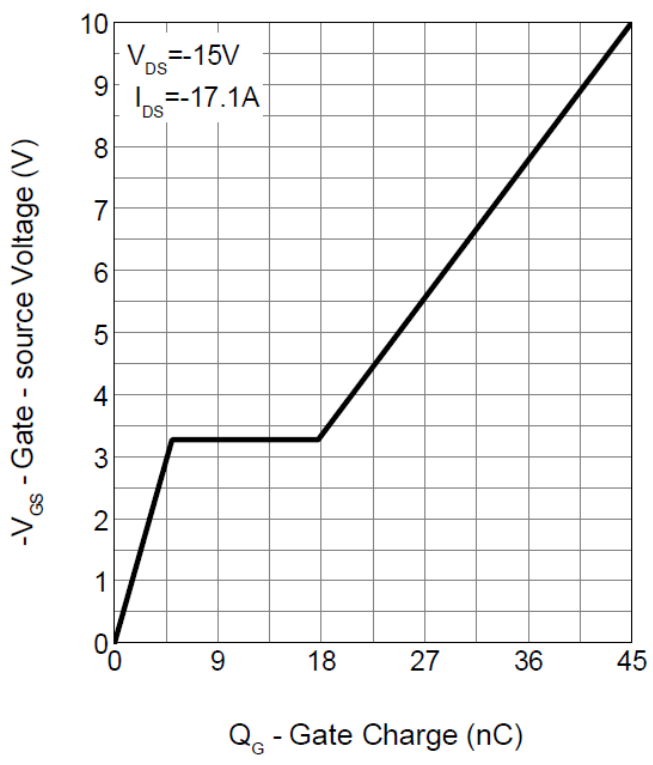

### Source-Drain Diode Forward




### Capacitance

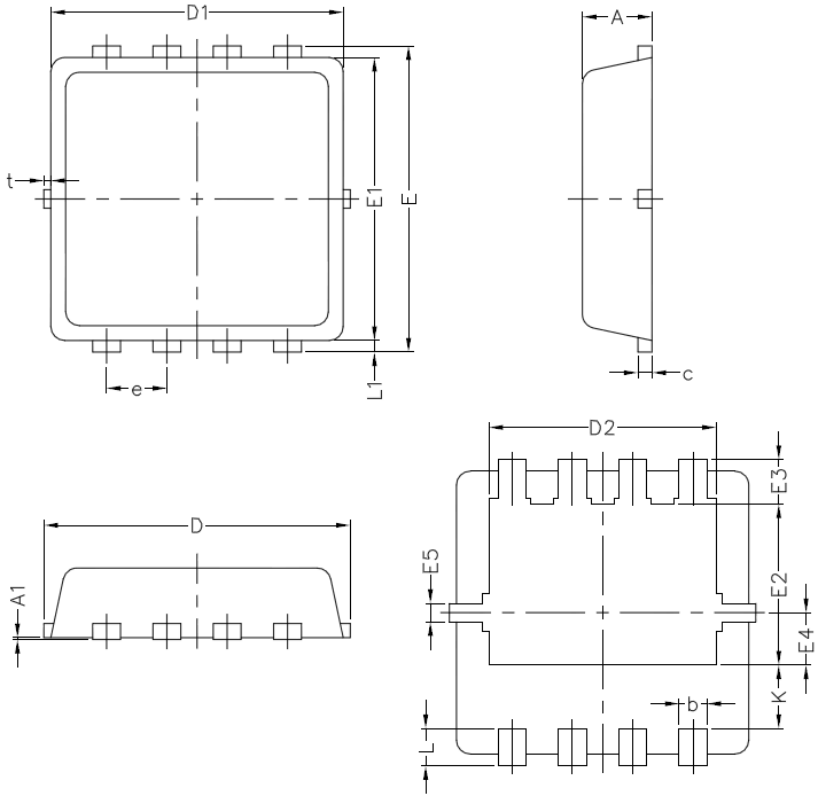



### Gate Charge



## Package Information

PPAK-3*3-8 Package




| Symbol | PPAK-3*3-8(mm) | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 0.70 | 0.75 | 0.85 |
| A1 | / | / | 0.05 |
| b | 0.20 | 0.30 | 0.40 |
| c | 0.10 | 0.152 | 0.25 |
| D | 3.15 | 3.3 | 3.45 |
| D1 | 3.00 | 3.15 | 3.30 |
| D2 | 2.25 | 2.45 | 2.65 |
| E | 3.15 | 3.30 | 3.45 |
| E1 | 2.90 | 3.05 | 3.20 |
| E2 | 1.54 | 1.74 | 1.94 |
| E3 | 0.28 | 0.48 | 0.68 |
| E4 | 0.37 | 0.57 | 0.77 |
| E5 | 0.10 | 0.20 | 0.30 |
| e | 0.60 | 0.65 | 0.70 |
| K | 0.49 | 0.69 | 0.89 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.06 | 0.125 | 0.20 |
| t | / | / | 0.13 |

## Design Notes