

P-Channel Enhancement Mode Power MOSFET

Description

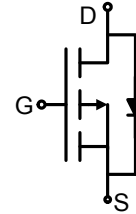
The TF3508 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

General Features

- $V_{DS} = -30V, I_D = -60A$
 $R_{DS(ON)} < 8.0m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 15 m\Omega @ V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- Battery Switch
- Load switch
- Power management



Schematic diagram



Pin assignment



PDFN5x6-8 top view

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|--|--------------------|----------------|------------|------------|
| Drain-Source Voltage | | V_{DS} | -30 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | V |
| Continuous Drain Current ($T_J = 150^\circ C$) | $T_A = 25^\circ C$ | I_D | -60 | A |
| | $T_A = 70^\circ C$ | | -35 | |
| Drain Current-Pulsed (Note 1) | | I_{DM} | -200 | A |
| Maximum Power Dissipation | | P_D | 40 | W |
| Operating Junction and Storage Temperature Range | | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 30 | $^\circ C/W$ |
|--|-----------------|----|--------------|



Electrical Characteristics (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|------|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =-250μA | -30 | -33 | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =-30V, V _{GS} =0V | - | - | -1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -1.0 | -1.6 | -2.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =-10V, I _D =-20A | - | 6.6 | 8.0 | mΩ |
| | | V _{GS} =-4.5V, I _D =-15A | - | 10 | 15 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =-15V, I _D =-20A | 10 | - | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =-15V, V _{GS} =0V, F=1.0MHz | - | 2900 | - | PF |
| Output Capacitance | C _{oss} | | - | 410 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 280 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =-15V, I _D =-20A, V _{GS} =-10V, R _{GEN} =3Ω | - | 15 | - | nS |
| Turn-on Rise Time | t _r | | - | 11 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 44 | - | nS |
| Turn-Off Fall Time | t _f | | - | 21 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-15V, I _D =-20A V _{GS} =-10V | - | 48 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 12 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 24 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =-20A | - | 0.88 | 1.2 | V |

Notes:

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

Typical Electrical and Thermal Characteristics

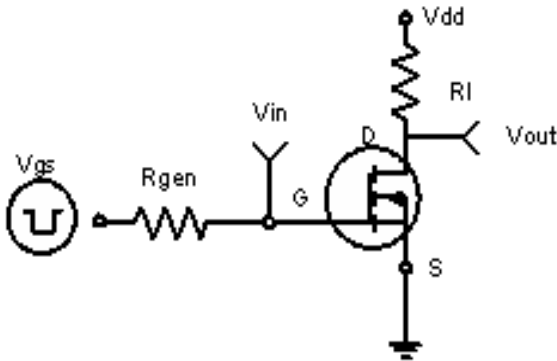


Figure 1 Switching Test Circuit

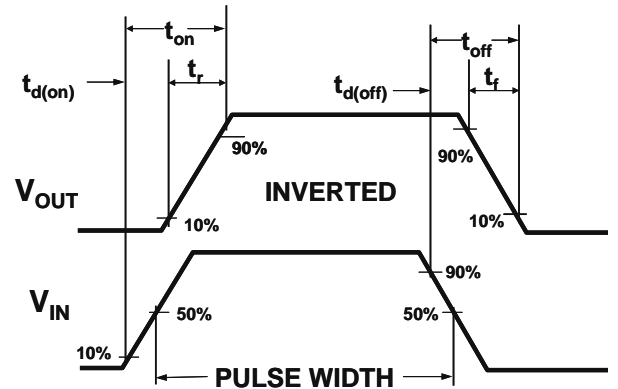


Figure 2 Switching Waveforms

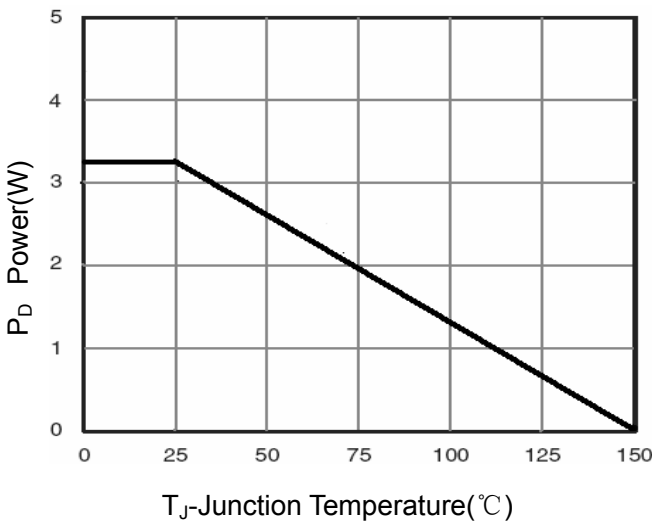


Figure 3 Power Dissipation

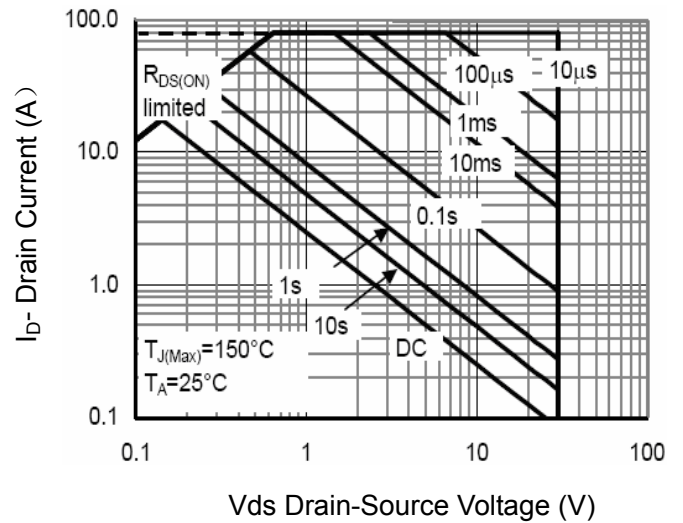


Figure 4 Safe Operation Area

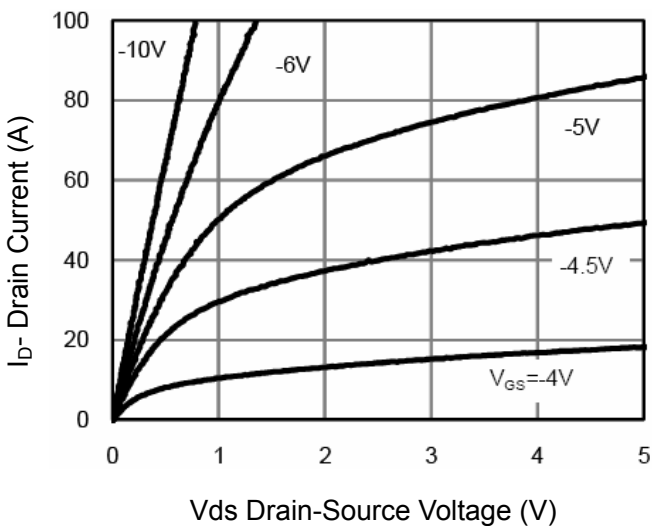


Figure 5 Output Characteristics

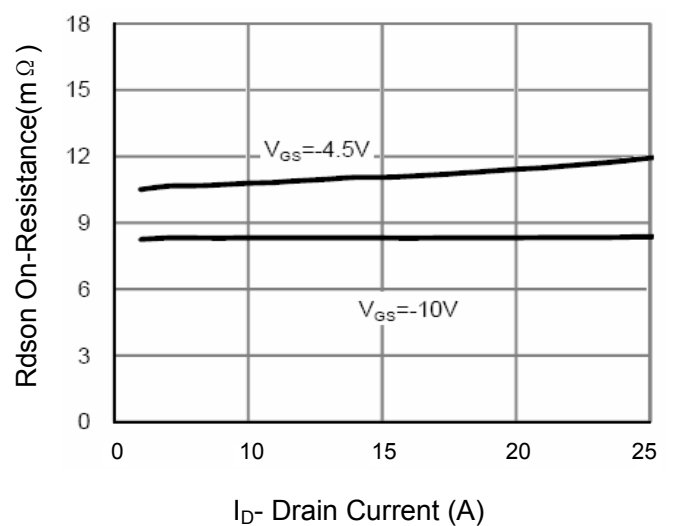
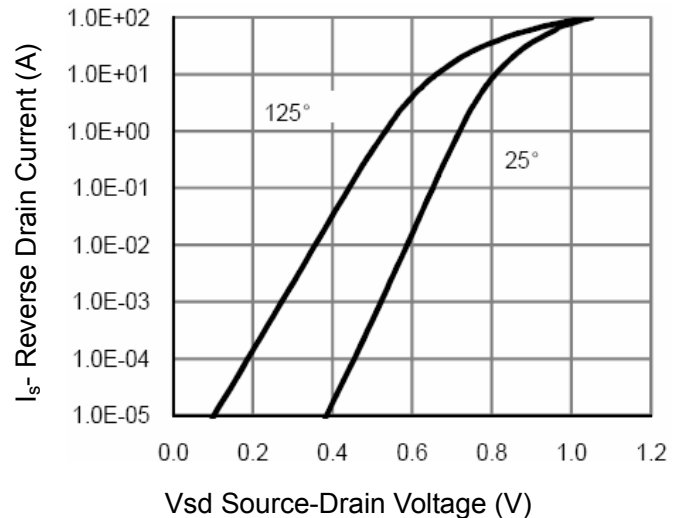
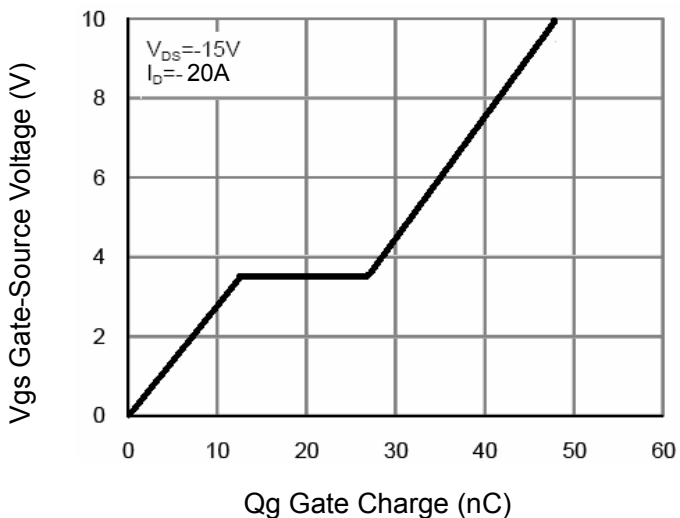
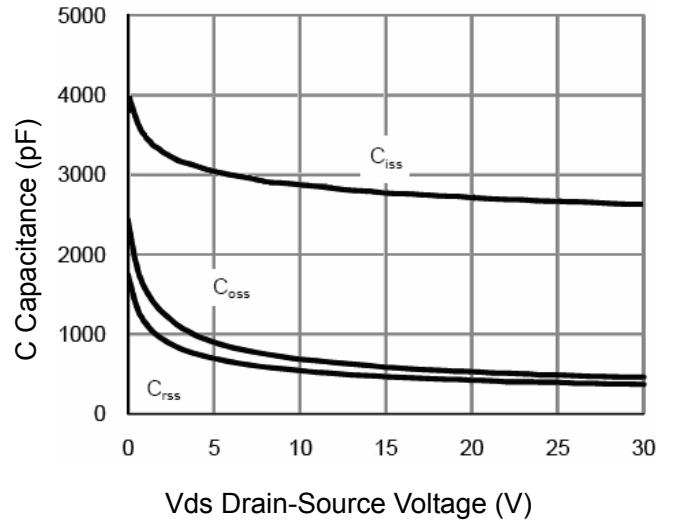
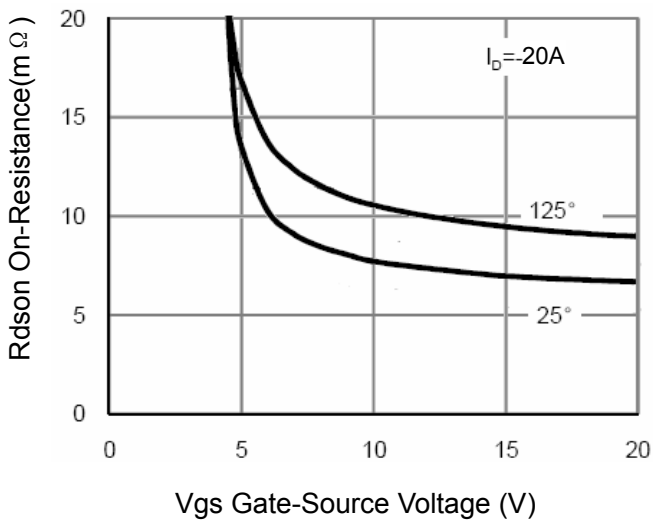
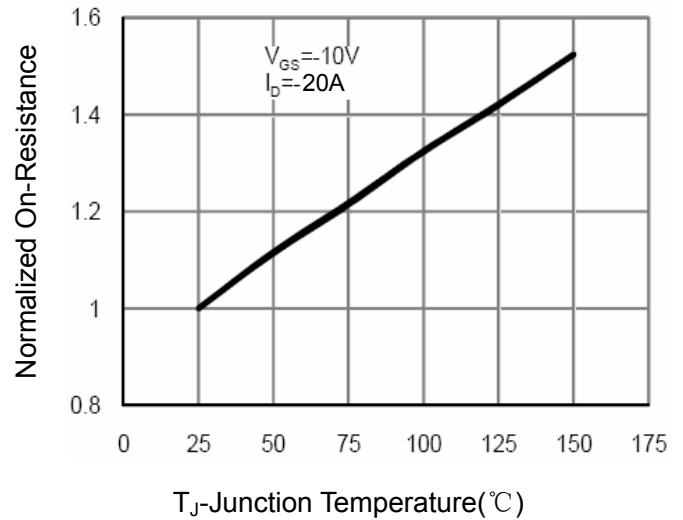
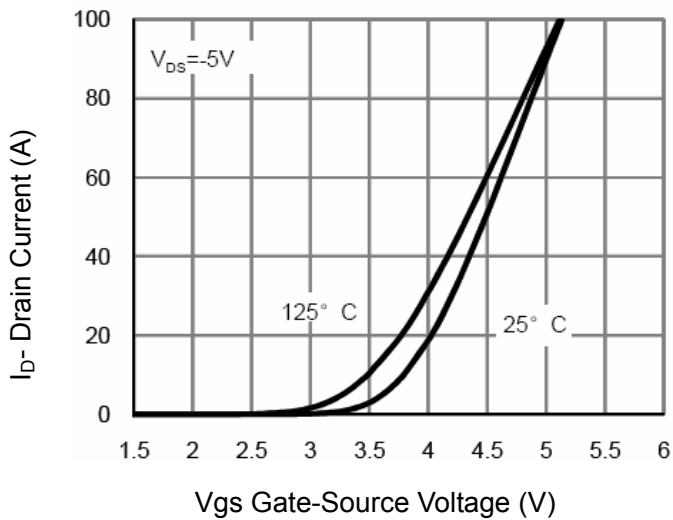


Figure 6 Drain-Source On-Resistance



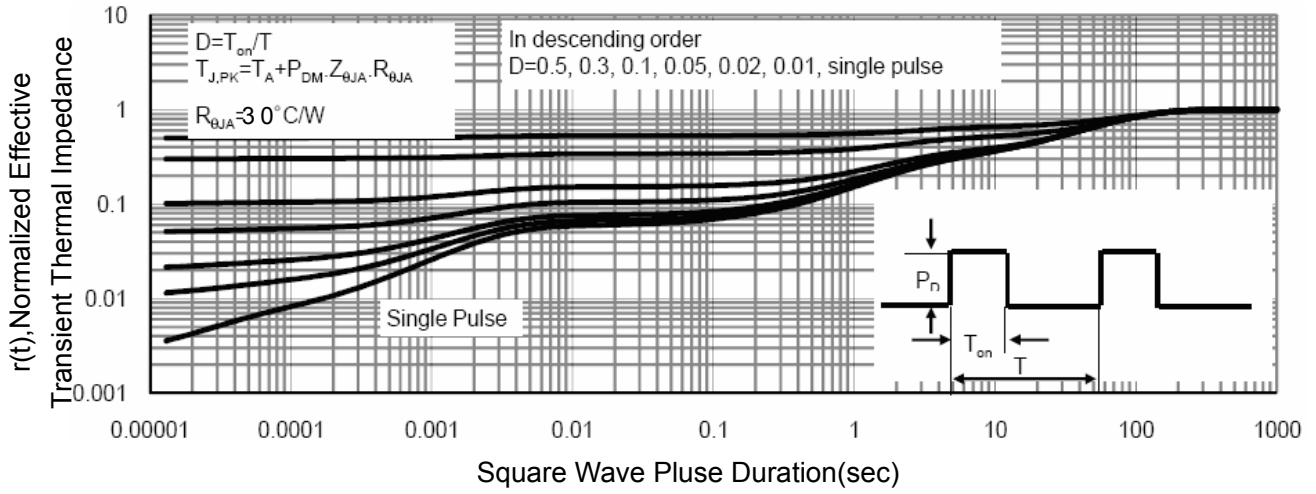
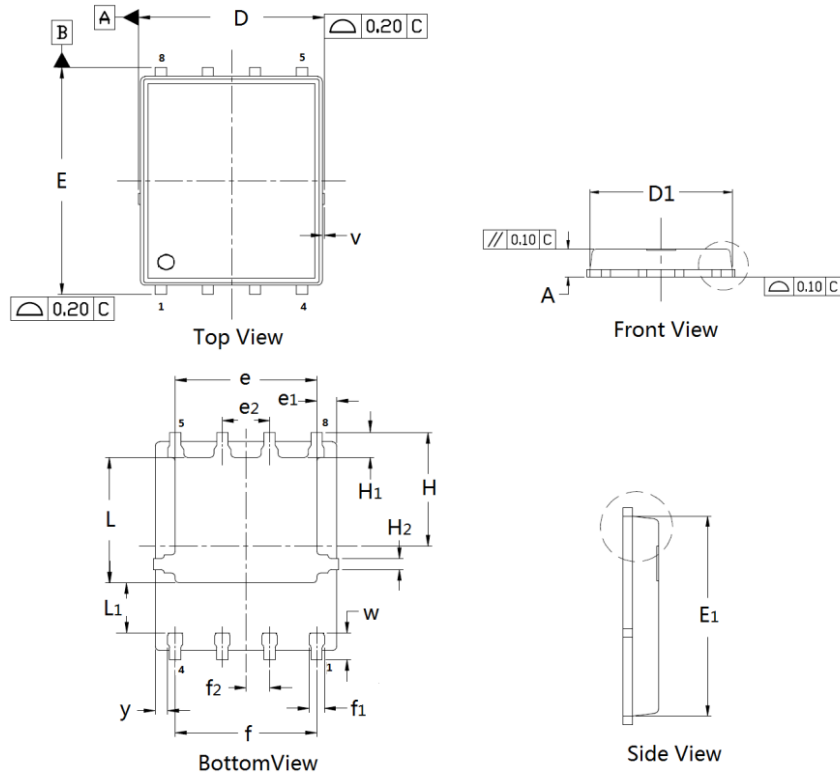


Figure 13 Normalized Maximum Transient Thermal Impedance

PDFN5×6 Package Outline Data



DIMENSIONS (unit : mm)

| Symbol | Min | Typ | Max | Symbol | Min | Typ | Max |
|----------------|------|------|------|----------------|------|------|------|
| A | 0.90 | 1.02 | 1.10 | D | 4.90 | 4.98 | 5.10 |
| D ₁ | 4.80 | 4.89 | 5.00 | E | 6.00 | 6.11 | 6.20 |
| E ₁ | 5.65 | 5.74 | 5.85 | e | 3.72 | 3.80 | 3.92 |
| e ₁ | -- | 0.54 | -- | e ₂ | -- | 1.27 | -- |
| f | -- | 3.82 | -- | f ₁ | 0.31 | 0.37 | 0.51 |
| f ₂ | -- | 0.64 | -- | H | -- | 3.15 | -- |
| H ₁ | 0.59 | 0.63 | 0.79 | H ₂ | 0.26 | 0.28 | 0.32 |
| L | 3.38 | 3.45 | 3.58 | L ₁ | -- | 1.39 | -- |
| v | -- | 0.13 | -- | w | 0.64 | 0.68 | 0.84 |
| y | -- | 0.34 | -- | | -- | | -- |