

## N-Channel 30-V (D-S) MOSFET

### FEATURES

$R_{DS(ON)} \leq 6m\Omega @ V_{GS}=10V$

$R_{DS(ON)} \leq 8m\Omega @ V_{GS}=4.5V$

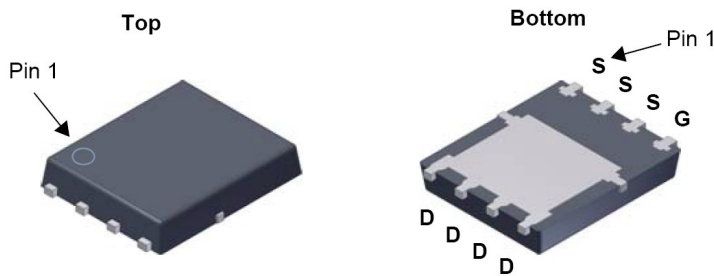
high density cell design for extremely low  $R_{DS(ON)}$

Exceptional on-resistance and maximum DC current capability

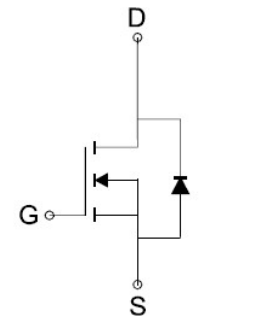
### GENERAL DESCRIPTION

The FS4478 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

### PIN CONFIGURATION



PDFN3×3-8L



N-Channel MOSFET

### Absolute Maximum Ratings (TA=25°C Unless Otherwise Noted)

| Parameter                               | Symbol | Limit      | Unit |
|---|--------|------------|------|
| Drain-Source Voltage                    | VDSS   | 30         | V    |
| Gate-Source Voltage                     | VGSS   | ±20        | V    |
| Continuous Drain Current( TJ =150°C)*   | ID     | TA=25°C    | 30   |
|   |        | TA=70°C    | 23.5 |
| Pulsed Drain Current                    | IDM    | 120        | A    |
| Maximum Power Dissipation*              | PD     | TA=25°C    | 3.1  |
|   |        | TA=70°C    | 2.0  |
| Operating Junction Temperature          | TJ     | -55 to 150 | °C   |
| Thermal Resistance-Junction to Ambient* | RθJA   | 50         | °C/W |
| Thermal Resistance-Junction to Lead*    | RθJL   | 24         |      |

\* The device mounted on 1in<sup>2</sup> FR4 board with 2 oz copper

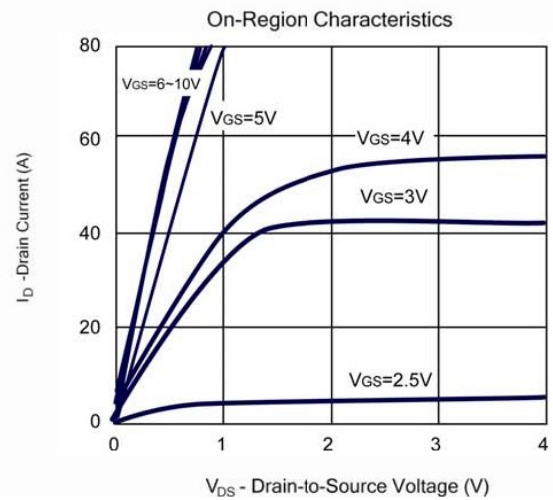
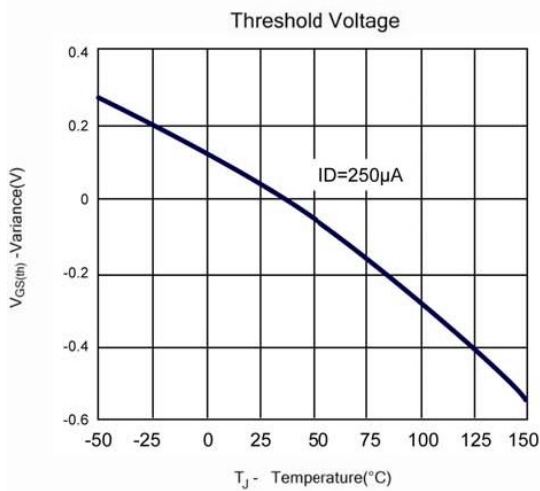
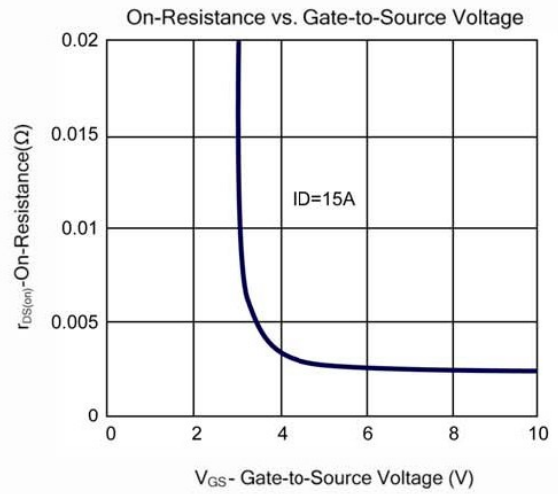
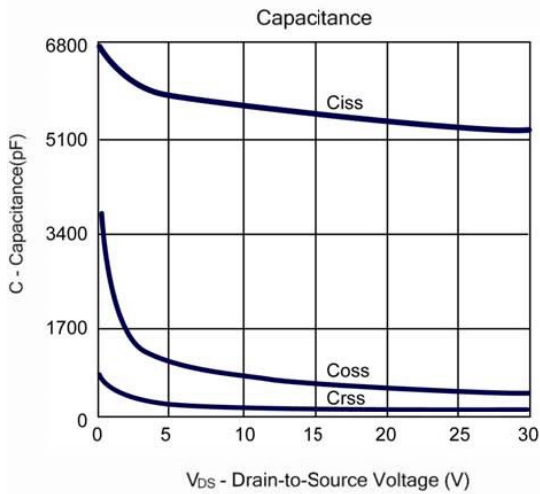
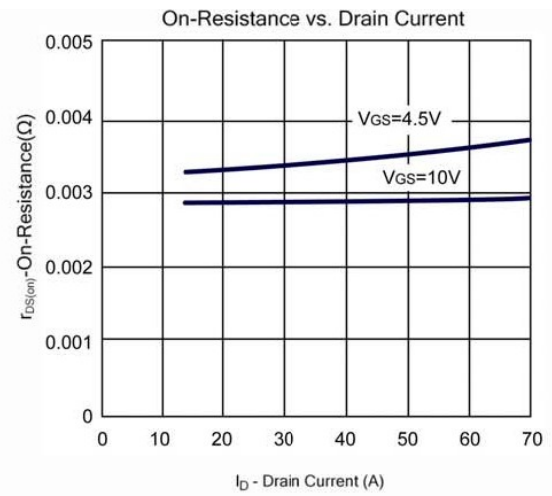
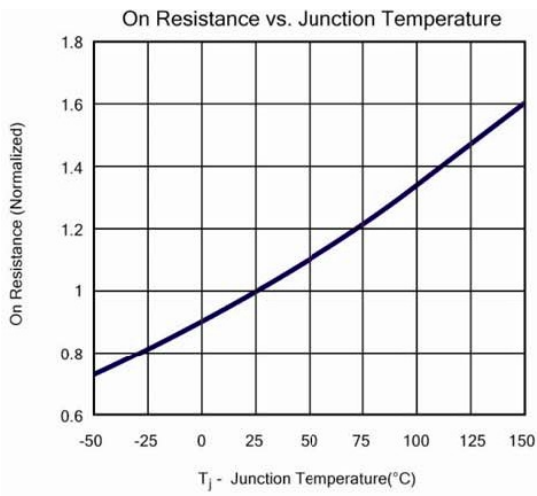
● **Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise noted)

| Symbol         | Parameter                          | Limit  | Min  | Typ  | Max       | Unit       |
|----------------|------------------------------------|--|------|------|-----------|------------|
| <b>STATIC</b>  |                                    |  |      |      |           |            |
| BVDSS          | Drain-Source Breakdown Voltage     | VGS=0V, ID=250 $\mu$ A                                       | 30   |      |           | V          |
| VGS(th)        | Gate Threshold Voltage             | VDS=VGS, ID=250 $\mu$ A                                      | 1.55 |      | 2.7       | V          |
| IGSS           | Gate Leakage Current               | VDS=0V, VGS= $\pm$ 20V                                       |      |      | $\pm$ 100 | nA         |
| IDSS           | Zero Gate Voltage Drain Current    | VDS=30V, VGS=0V  |      |      | 1         | $\mu$ A    |
| RDS(ON)        | Drain-Source On-State Resistance a | VGS=10V, ID= 10A   |      | 4.6  | 6.0       | m $\Omega$ |
|                |                                    | VGS=4.5V, ID= 7.5A   |      | 6.7  | 8.0       |            |
| VSD            | Diode Forward Voltage              | IS=2.7A, VGS=0V  |      | 0.72 | 1.1       | V          |
| <b>DYNAMIC</b> |                                    |  |      |      |           |            |
| Qg             | Total Gate Charge(10V)             | VDS=15V, VGS=10V, ID=17A                                     |      | 55   |           | nC         |
| Qg             | Total Gate Charge(4.5V)            | VDS=15V, VGS=4.5V, ID=17A                                    |      | 29   |           |            |
| Qgs            | Gate-Source Charge                 |  |      | 10   |           |            |
| Qgd            | Gate-Drain Charge                  |  |      | 15   |           |            |
| Ciss           | Input capacitance                  | VDS=15V, VGS=0V, f=1.0MHz                                    |      | 3200 |           | pF         |
| Coss           | Output Capacitance                 |  |      | 550  |           |            |
| Crss           | Reverse Transfer Capacitance       |  |      | 210  |           |            |
| Rg             | Gate-Resistance                    | VDS=0V, VGS=0V, f=1MHz                                       |      | 1.2  |           | $\Omega$   |
| td(on)         | Turn-On Delay Time                 | VDD=15V, RL =15 $\Omega$<br>ID=1A, VGEN=10V<br>RG=6 $\Omega$ |      | 23   |           | ns         |
| tr             | Turn-On Rise Time                  |  |      | 12   |           |            |
| td(off)        | Turn-Off Delay Time                |  |      | 86   |           |            |
| tf             | Turn-Off Fall Time                 |  |      | 12   |           |            |

Note:

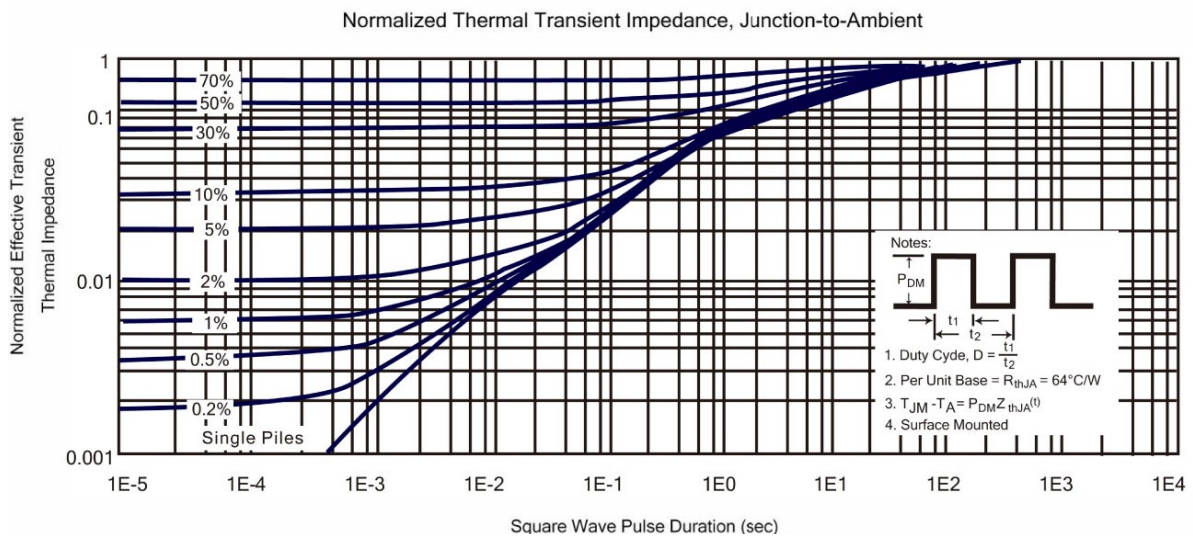
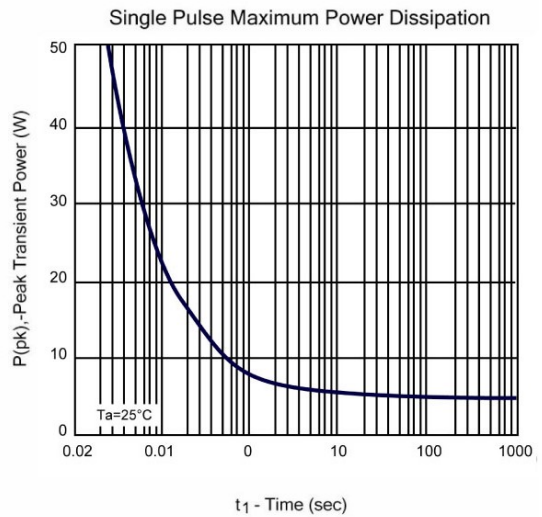
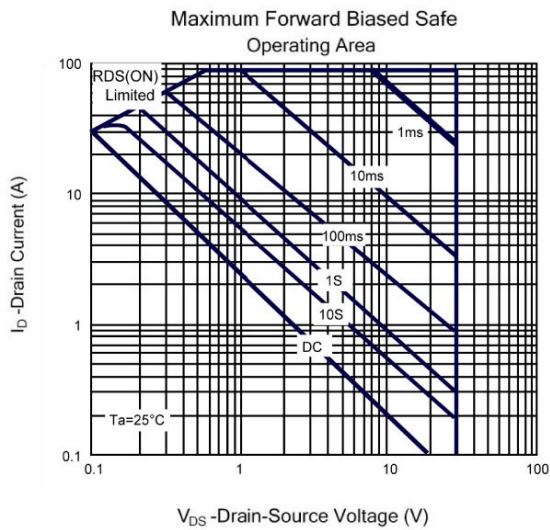
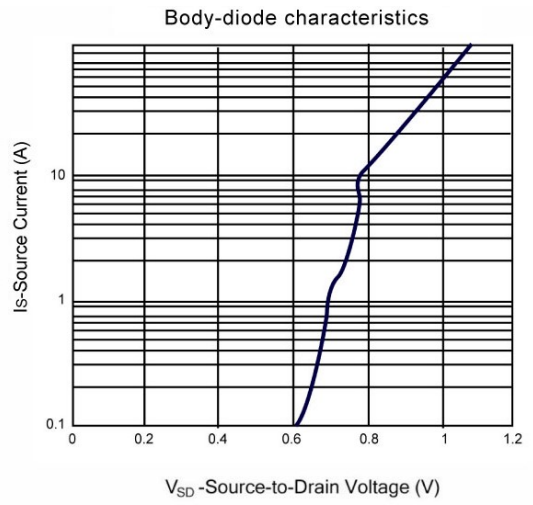
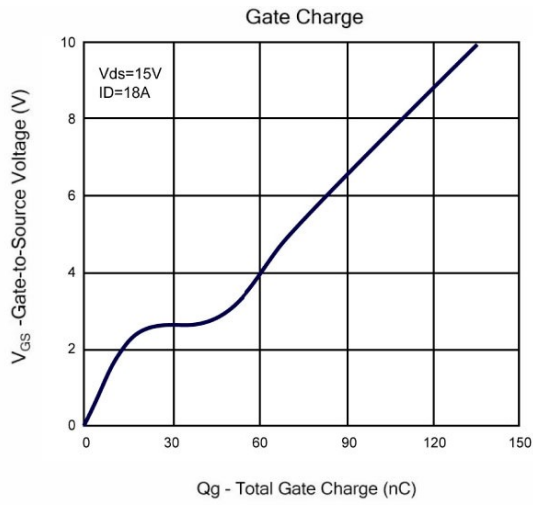
- The value of RqJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25° C. The Power dissipation PDSM is based on R qJA t $\leq$  10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
- The power dissipation PD is based on TJ(MAX)=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- Single pulse width limited by junction temperature TJ(MAX)=150° C.
- The RqJA is the sum of the thermal impedance from junction to case RqJC and case to ambient.
- The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
- These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=150° C. The SOA curve provides a single pulse rating.
- The maximum current rating is package limited.
- These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with TA=25° C.

# FS4478



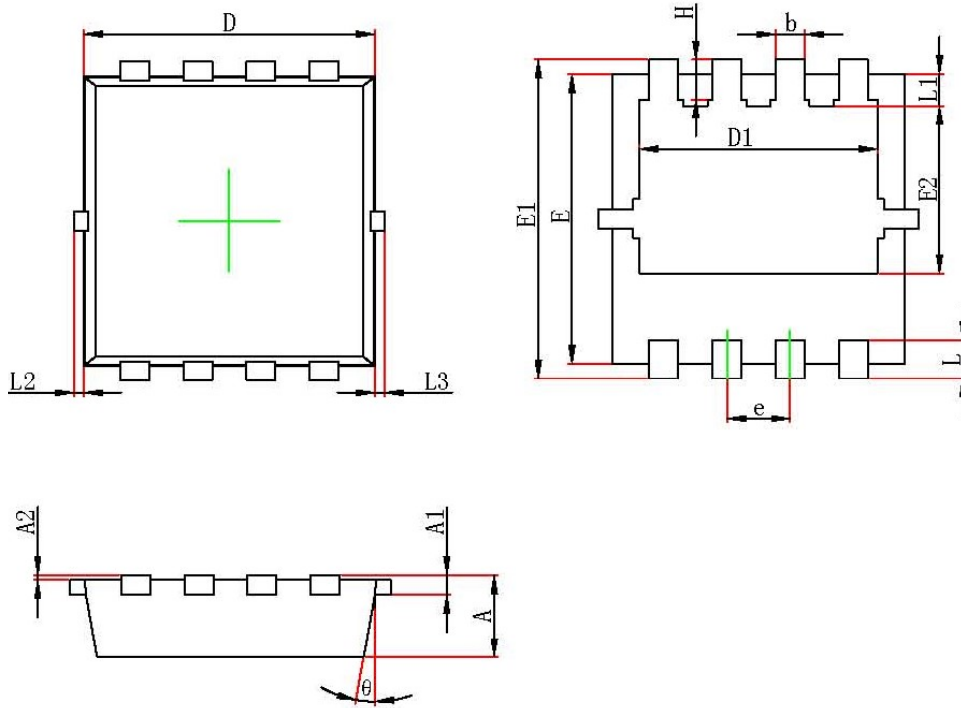
# FS4478

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



# FS4478

● PACKAGE PDFN3×3-8L



| DFN3030-8L: mm |           |      |      |
|----------------|-----------|------|------|
| Dim            | Min       | Max  | Typ  |
| A              | 0.65      | 0.85 | 0.75 |
| A1             | 0.152Ref. |      |      |
| A2             | 0         | 0.05 | 0.03 |
| D              | 2.90      | 3.10 | 3.00 |
| D1             | 2.24      | 2.54 | 2.39 |
| E              | 2.90      | 3.10 | 3.00 |
| E1             | 3.15      | 3.45 | 3.30 |
| E2             | 1.23      | 1.64 | 1.43 |
| e              | 0.55      | 0.75 | 0.65 |
| b              | 0.20      | 0.40 | 0.30 |
| L              | 0.30      | 0.50 | 0.40 |
| L1             | 0.18      | 0.48 | 0.33 |
| L2             | 0         | 0.10 | 0.05 |
| L3             | 0         | 0.10 | 0.05 |
| H              | 0.31      | 0.52 | 0.42 |
| $\theta$       | 9°        | 13°  | 11°  |