

## Dual N-Ch 20V MOSFETs

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent  $CdV/dt$  effect decline
- ★ Advanced high cell density Trench technology

## Product Summary

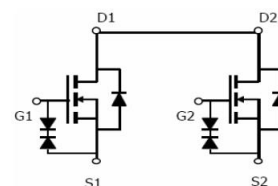
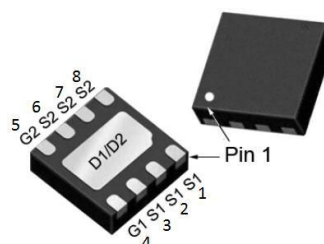


| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 20V   | 4.4mΩ | 50A |

## DFN3030-8L Pin Configurations

## FEATURE

- TrenchFET Power MOSFET
- Excellent  $R_{DS(on)}$
- Low Gate Charge
- High Power and Current Handling Capability
- Surface Mount Package
- ESD Rating: 2000V HBM



## Absolute Maximum Ratings

| Symbol                    | Parameter                                      | Rating     | Units      |
|---------------------------|------------------------------------------------|------------|------------|
| $V_{DS}$                  | Drain-Source Voltage                           | 20         | V          |
| $V_{GS}$                  | Gate-Source Voltage                            | $\pm 12$   | V          |
| $I_D @ T_C = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 50         | A          |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 31         | A          |
| $I_{DM}$                  | Pulsed Drain Current <sup>2</sup>              | 100        | A          |
| EAS                       | Single Pulse Avalanche Energy <sup>3</sup>     | ---        | mJ         |
| $I_{AS}$                  | Avalanche Current                              | ---        | A          |
| $P_D @ T_C = 25^\circ C$  | Total Power Dissipation <sup>4</sup>           | ---        | W          |
| $T_{STG}$                 | Storage Temperature Range                      | -55 to 150 | $^\circ C$ |
| $T_J$                     | Operating Junction Temperature Range           | -55 to 150 | $^\circ C$ |

## Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit         |
|-----------------|--------------------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 38   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | ---  | $^\circ C/W$ |

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

| Symbol                       | Parameter                                      | Conditions                                                 | Min. | Typ. | Max.    | Unit                |
|------------------------------|------------------------------------------------|------------------------------------------------------------|------|------|---------|---------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                               | 20   | ---  | ---     | V                   |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient             | Reference to $25^\circ\text{C}$ , $I_D=1mA$                | ---  | ---  | ---     | $V/^\circ\text{C}$  |
| $R_{DS(on)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=4.5V$ , $I_D=8A$                                   | ---  | 4.4  | 5.2     | $m\Omega$           |
|                              |                                                | $V_{GS}=2.5V$ , $I_D=6A$                                   | ---  | 5.3  | 6       |                     |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 0.5  | 0.6  | 1       | V                   |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                            | ---  | ---  | ---     | $mV/^\circ\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=20V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$        | ---  | ---  | 1       | $\mu A$             |
|                              |                                                | $V_{DS}=20V$ , $V_{GS}=0V$ , $T_J=100^\circ\text{C}$       | ---  | ---  | 100     |                     |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 12V$ , $V_{DS}=0V$                             | ---  | ---  | $\pm 7$ | $\mu A$             |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=5V$ , $I_D=4A$                                     | ---  | 10   | ---     | S                   |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                       | ---  | ---  | ---     | $\Omega$            |
| $Q_g$                        | Total Gate Charge                              | $V_{DS}=10V$ , $V_{GS}=4.5V$ , $I_D=6A$                    | ---  | 36   | ---     | $nC$                |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                            | ---  | 3.2  | ---     |                     |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                            | ---  | 13   | ---     |                     |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=10V$ , $I_D=6A$ ,<br>$R_G=3\Omega$ , $V_{GS}=4.5V$ | ---  | 8.2  | ---     | $ns$                |
| $T_r$                        | Rise Time                                      |                                                            | ---  | 35   | ---     |                     |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                            | ---  | 372  | ---     |                     |
| $T_f$                        | Fall Time                                      |                                                            | ---  | 213  | ---     |                     |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=10V$ , $V_{GS}=0V$ , $f=1KHz$                      | ---  | 2610 | ---     | $pF$                |
| $C_{oss}$                    | Output Capacitance                             |                                                            | ---  | 345  | ---     |                     |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                            | ---  | 322  | ---     |                     |

## Diode Characteristics

| Symbol   | Parameter                                | Conditions                                                | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-----------------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,4</sup> | $V_G=V_D=0V$ , Force Current                              | ---  | ---  | 50   | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=1.5A$ , $T_J=25^\circ\text{C}$         | ---  | ---  | 1    | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=5A$ , $di/dt=100A/\mu s$ ,<br>$T_J=25^\circ\text{C}$ | ---  | ---  | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                           | ---  | ---  | ---  | nC   |

## Notes :

- 1.Repetitive rating: Pluse width limited by maximum junction temperature
- 2.Surface Mounted on 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.

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTIC

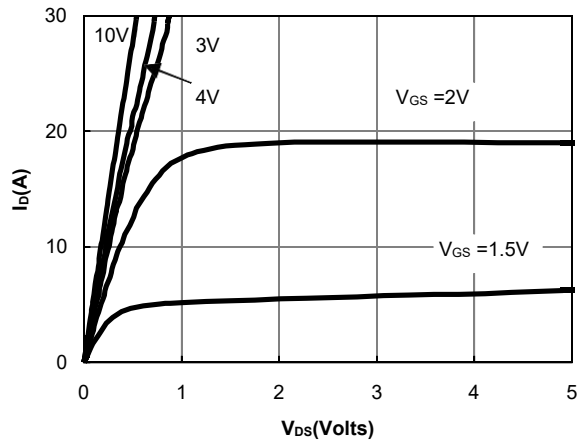


Figure 1: On-Regions Characteristic CS

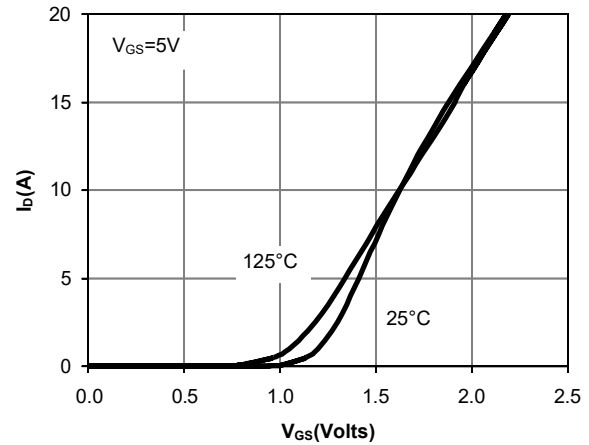


Figure 2: Transfer Characteristics

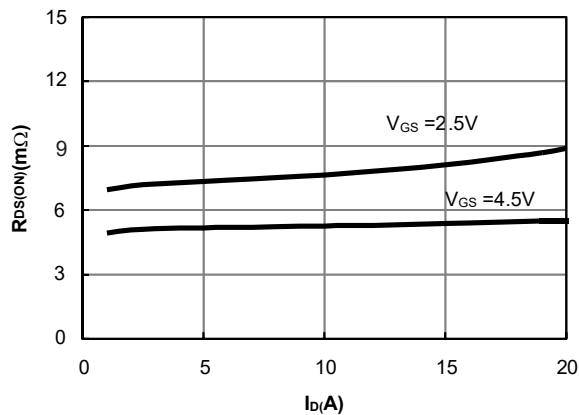


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

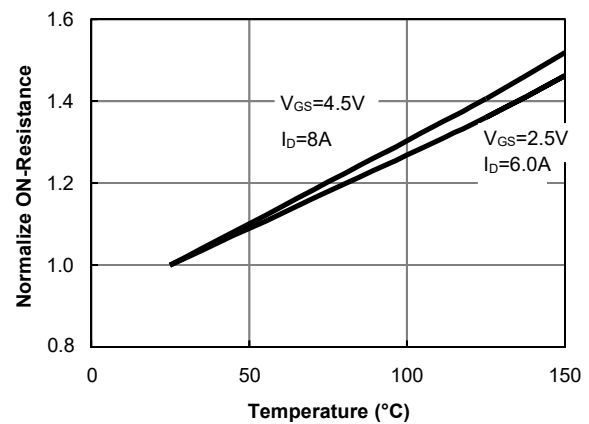


Figure 4: On-Resistance vs. Junction Temperature

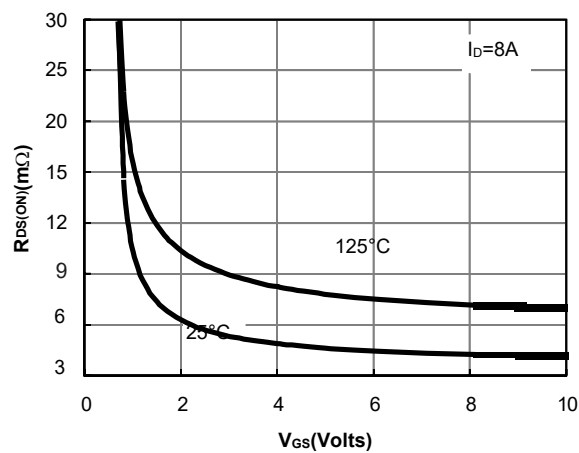


Figure 5: On-Resistance vs. Gate-Source Voltage

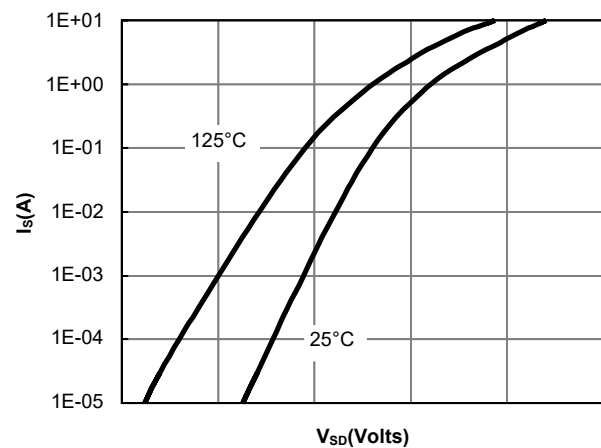


Figure 6: Body-Diode Characteristics

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTIC

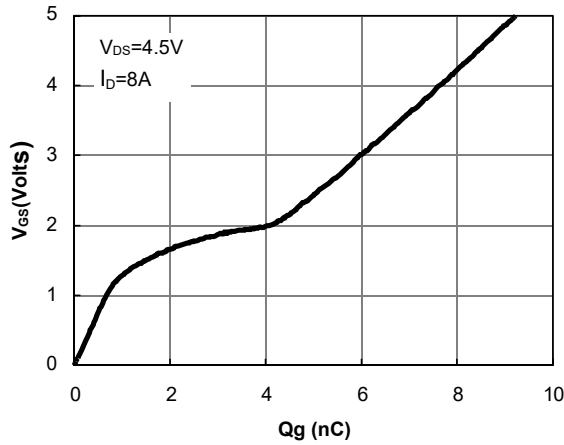


Figure 7: Gate-Charge Characteristics

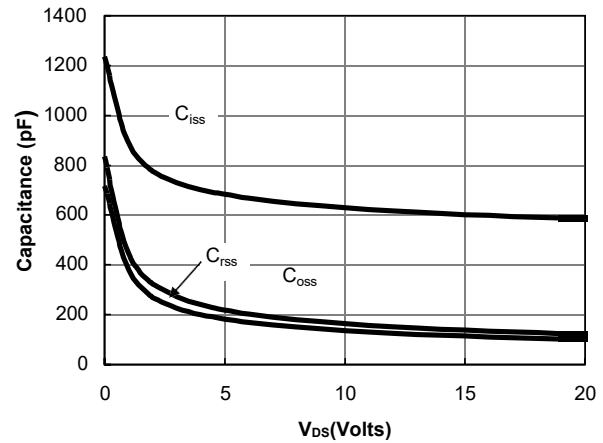


Figure 8: Capacitance Characteristics

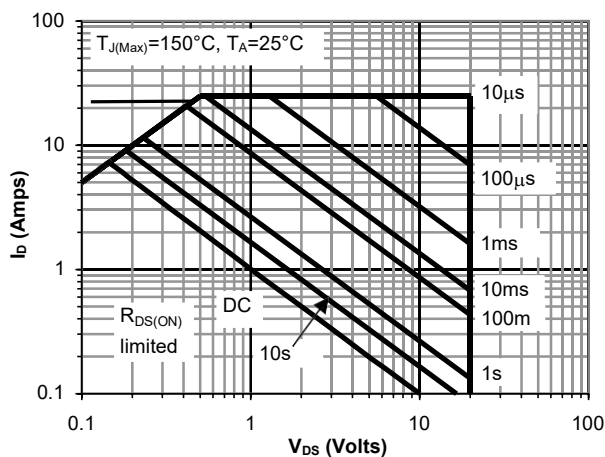


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

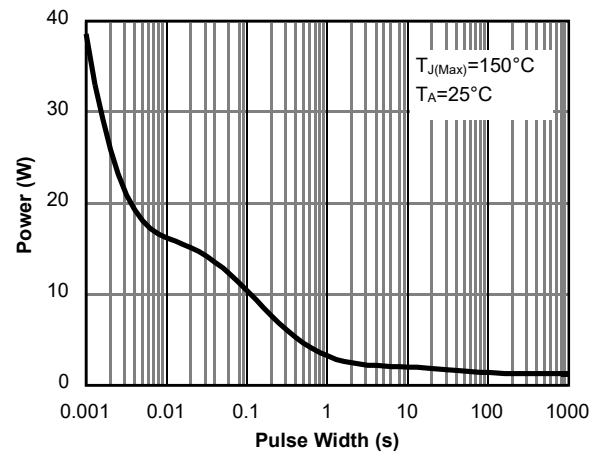


Figure 10: Single Pulse Power Rating Junction-to-Ambient

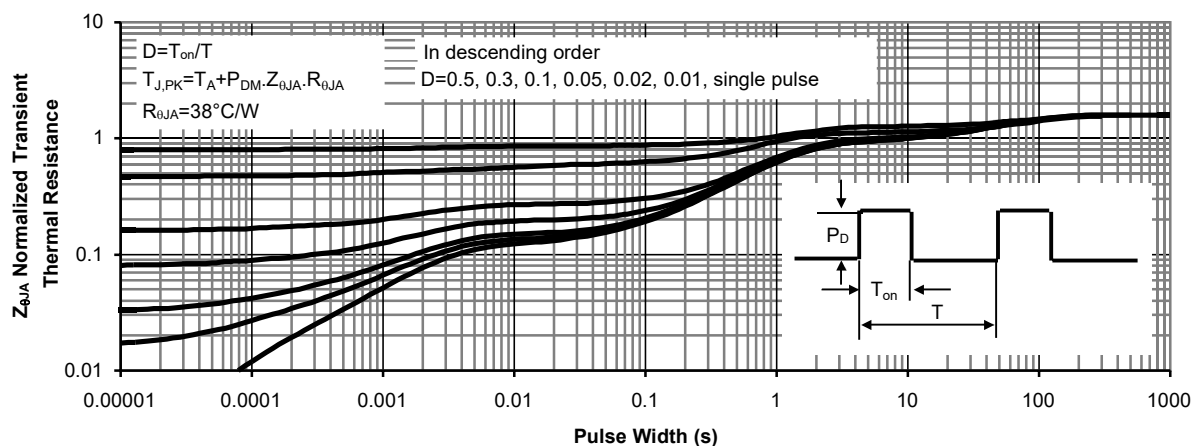
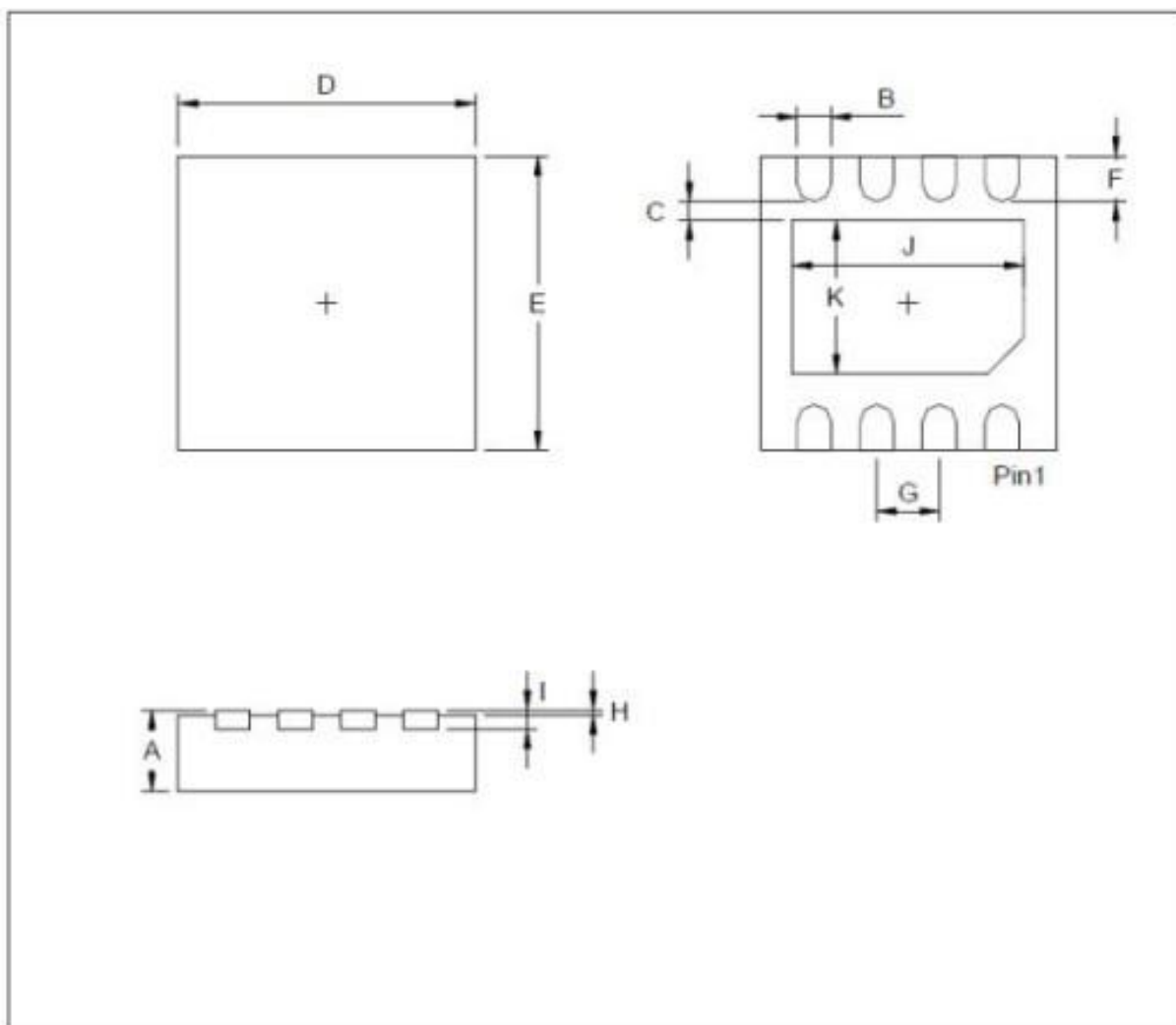


Figure 11: Normalized Maximum Transient Thermal Impedance

#### DFN3030-8L Package Outline Data



| Dimension | mm    |      |       | Dimension | mm   |       |      |
|-----------|-------|------|-------|-----------|------|-------|------|
|           | Min.  | Typ. | Max.  |           | Min. | Typ.  | Max. |
| A         | 0.7   |      | 0.8   | I         |      | 0.203 |      |
| B         | 0.25  |      | 0.35  | J         | 2.2  |       | 2.4  |
| C         | 0.2   |      |       | K         | 1.4  |       | 1.6  |
| D         | 2.924 |      | 3.076 |           |      |       |      |
| E         | 2.924 |      | 3.076 |           |      |       |      |
| F         | 0.324 |      | 0.476 |           |      |       |      |
| G         |       | 0.65 |       |           |      |       |      |
| H         | 0     |      | 0.05  |           |      |       |      |