## Features

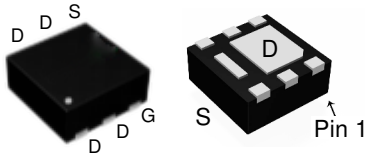
- -20V/-20A,
  $R_{DS(ON)}$ = 14mΩ(typ.) @ $V_{GS}$ =-4.5V
  $R_{DS(ON)}$ = 20mΩ(typ.) @ $V_{GS}$ =-2.5V
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

**Note :** The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

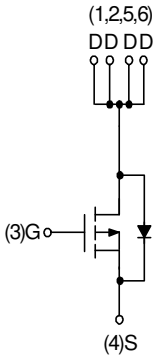
## Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

## Pin Description




DFN2x2-6




P-Channel MOSFET

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

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | -20 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±12 | |
| $I_D$ [a] | Continuous Drain Current ($V_{GS}$=-4.5V) | $T_A$=25°C | -20 | A |
| | | $T_A$=70°C | -15 | |
| $I_{DM}$ [a] | Pulsed Drain Current ($V_{GS}$=-4.5V) | | -60 | |
| $I_S$ [a] | Diode Continuous Forward Current | | -20 | |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $I_{AS}$ [b] | Avalanche Current, Single pulse | L=0.1mH | -18 | A |
| $E_{AS}$ [b] | Avalanche Energy, Single pulse | L=0.1mH | 16 | mJ |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | °C |
| $P_D$ [a] | Maximum Power Dissipation | $T_A$=25°C | 2.5 | W |
| | | $T_A$=70°C | 1.6 | |
| $R_{\theta JA}$ [a] | Thermal Resistance-Junction to Ambient | t ≤ 10s | 50 | °C/W |
| | | Steady State | 80 | |

Note * : Package limited.
Note a : Surface Mounted on 1in$^2$ pad area, t ≤ 10sec.
Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_j$=25°C).

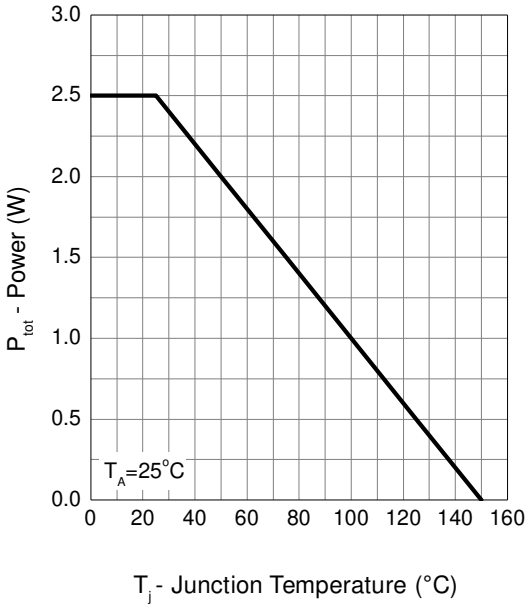
## Electrical Characteristics ($T_A$ = 25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=-250μA | -20 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-16V, $V_{GS}$=0V | - | - | -1 | μA |
| | | $T_J$=85°C | - | - | -30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=-250μA | -0.5 | - | -1 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0V | - | - | ±100 | nA |
| $R_{DS(ON)}$ [c] | Drain-Source On-state Resistance | $V_{GS}$=-4.5V, $I_{DS}$=-20A | - | 14 | 17 | mΩ |
| | | $V_{GS}$=-2.5V, $I_{DS}$=-16A | - | 20 | 25 | |
| | | $V_{GS}$=-1.8V, $I_{DS}$=-10A | - | 26 | 40 | |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ [c] | Diode Forward Voltage | $I_{SD}$=-1A, $V_{GS}$=0V | - | -0.7 | -1 | V |
| $t_{rr}$ [d] | Reverse Recovery Time | $I_{SD}$=-9.9A, $dI_{SD}/dt$=100A/μs | - | 34 | - | ns |
| $Q_{rr}$ [d] | Reverse Recovery Charge | | - | 15 | - | nC |
| **Dynamic Characteristics** [d] | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=-10V, Frequency=1.0MHz | - | 1608 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 294 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 257 | - | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=-10V, $R_L$=10Ω, $I_{DS}$=-1A, $V_{GEN}$=-4.5V, $R_G$=6Ω | - | 8 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 13 | - | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | - | 25 | - | |
| $t_f$ | Turn-off Fall Time | | - | 170 | - | |
| **Gate Charge Characteristics** [d] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-10V, $V_{GS}$=-4.5V, $I_{DS}$=-9.9A | - | 20 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 0.8 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 7.6 | - | |

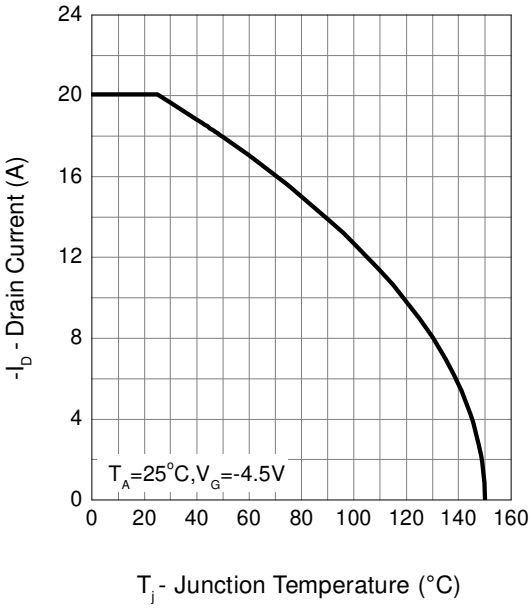
Note c：Pulse test; pulse width≤300μs, duty cycle≤2%.
Note d：Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

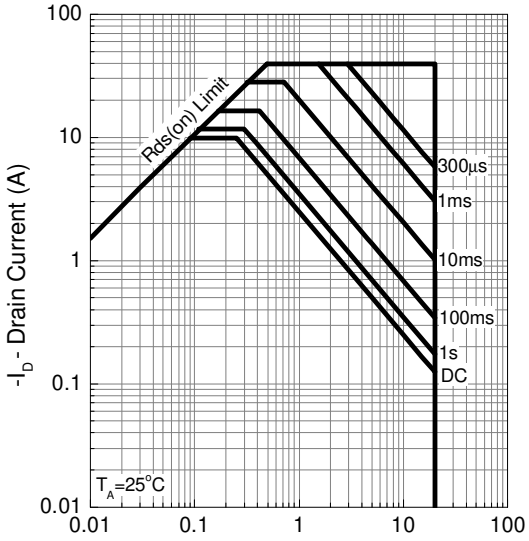
### Power Dissipation



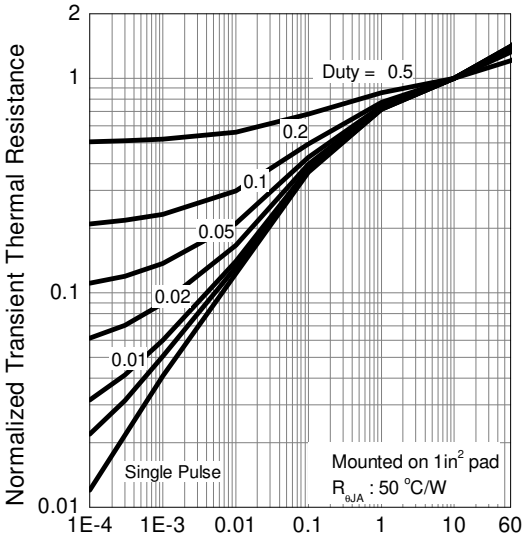

### Drain Current




### Safe Operation Area

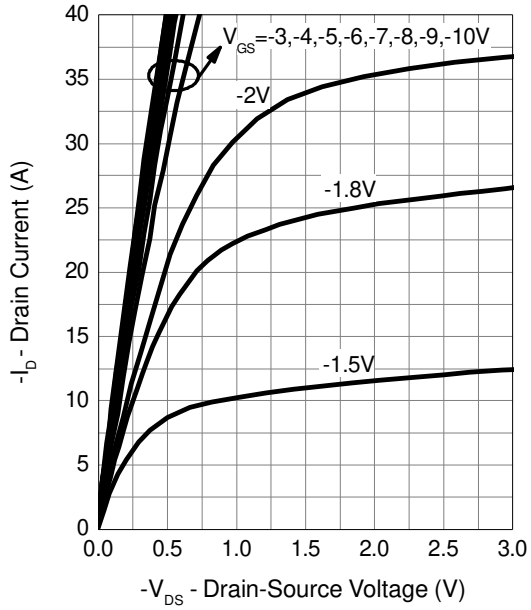



### Thermal Transient Impedance

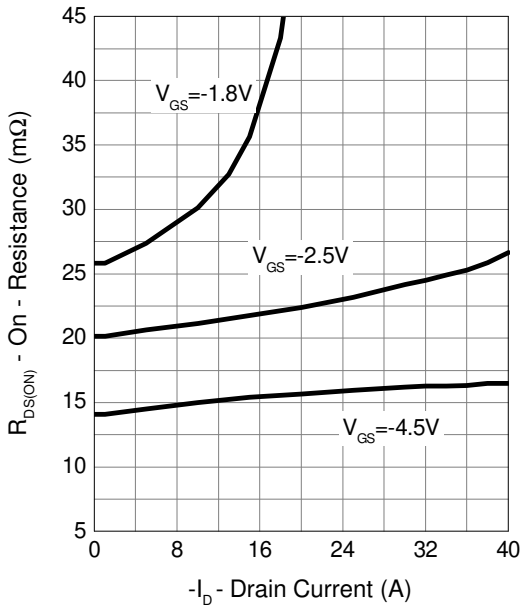


## Typical Operating Characteristics (Cont.)

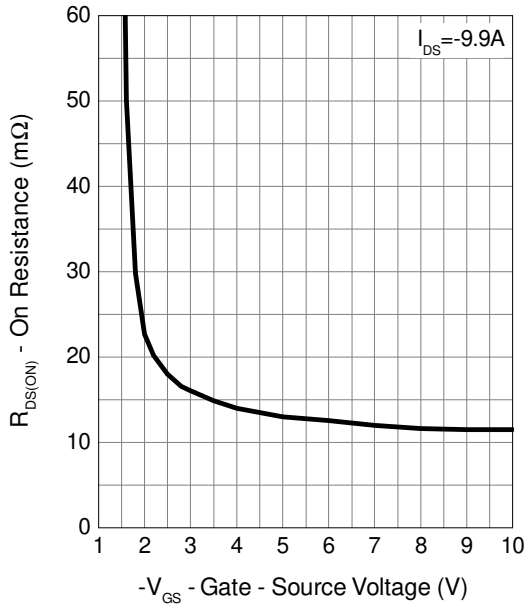
**Output Characteristics**



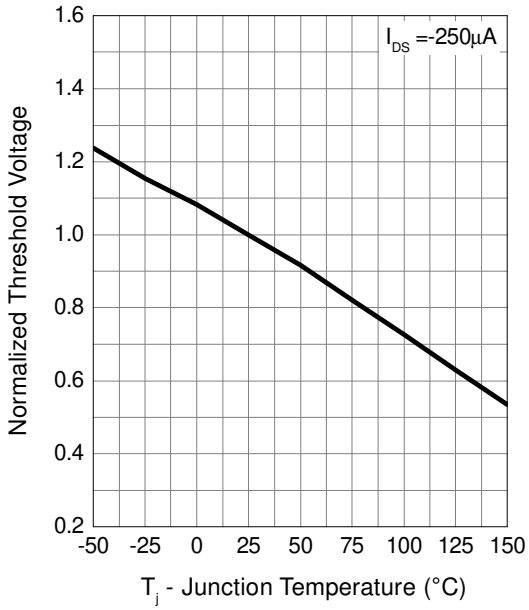

**Drain-Source On Resistance**




**Gate-Source On Resistance**

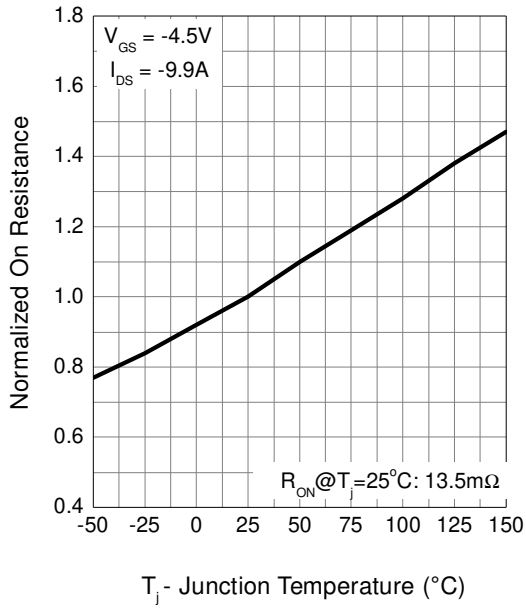



**Gate Threshold Voltage**

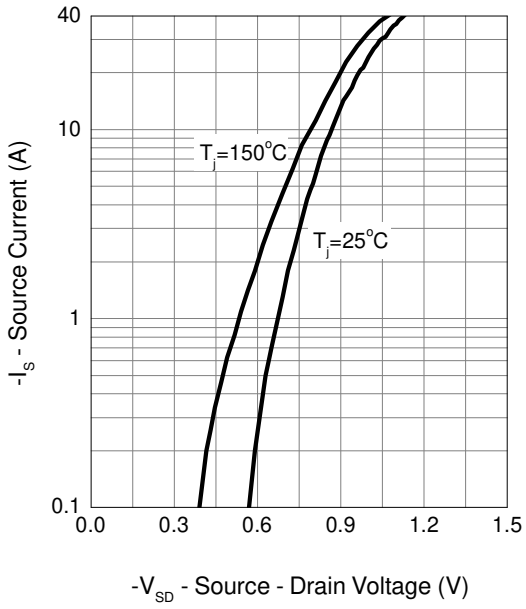


## Typical Operating Characteristics (Cont.)

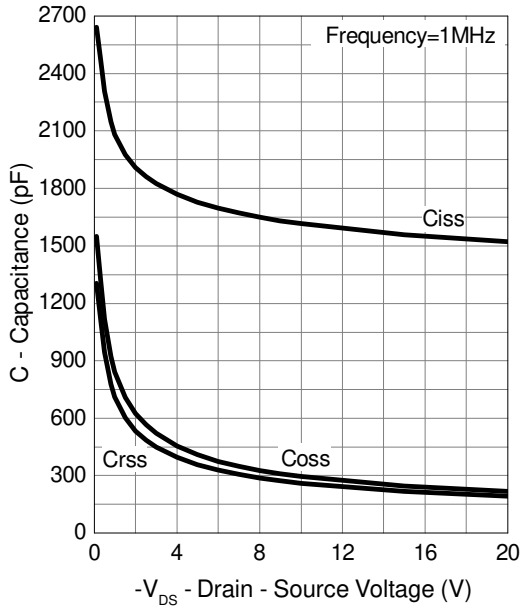
**Drain-Source On Resistance**



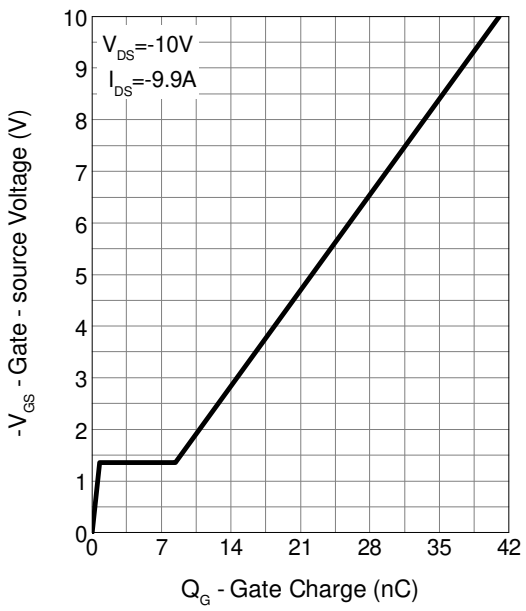

**Source-Drain Diode Forward**



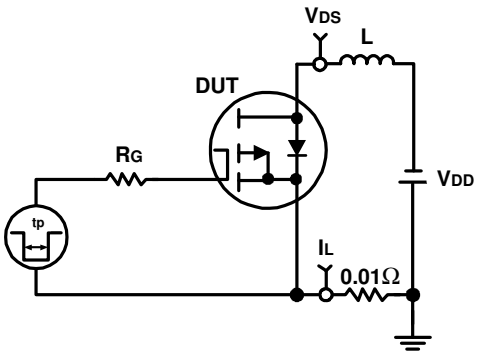

**Capacitance**

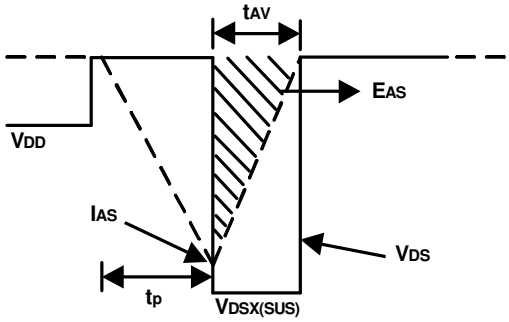



**Gate Charge**

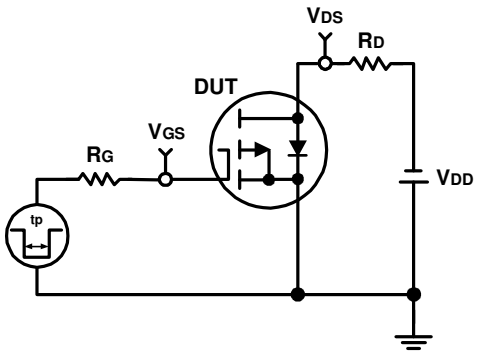


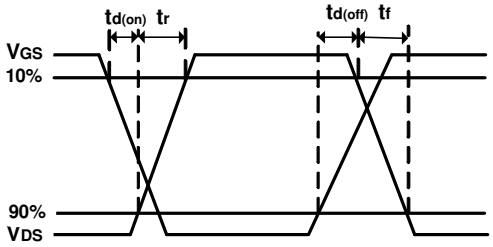
## Avalanche Test Circuit and Waveforms



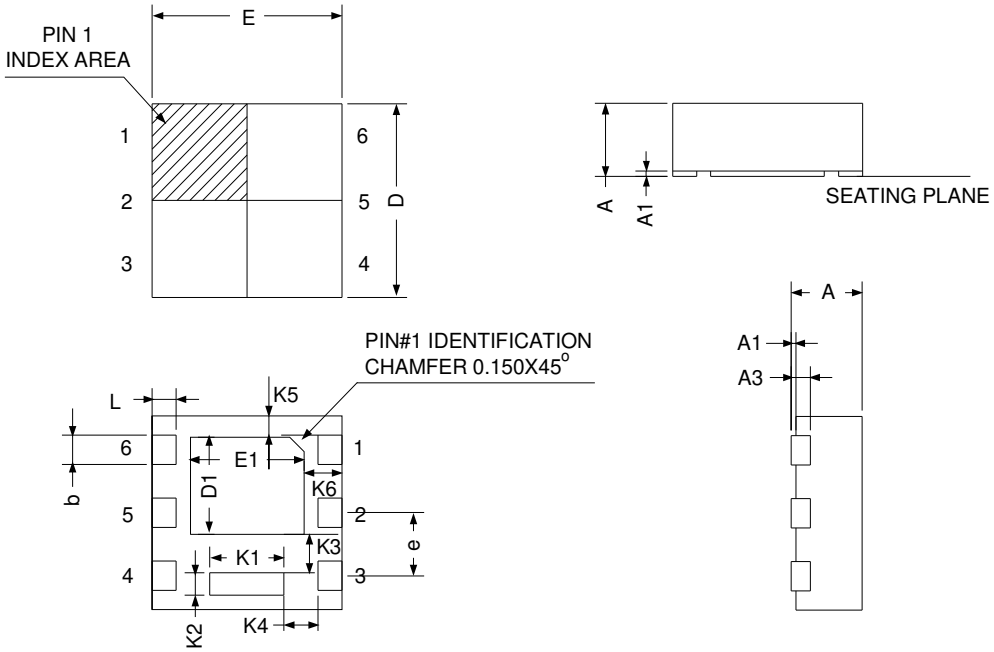

## Switching Time Test Circuit and Waveforms



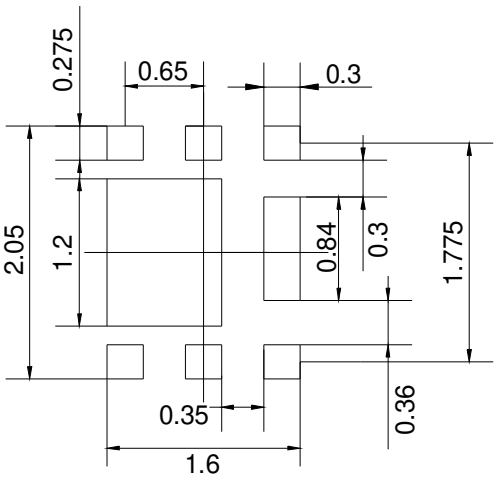
## Package Information

**DFN2x2-6**




| SYMBOL | DFN2x2-6 | | | |
|---|---|---|---|---|
| | MILLIMETERS | | INCHES | |
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.70 | 0.80 | 0.028 | 0.031 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| A3 | 0.200 REF | | 0.008 REF | |
| b | 0.25 | 0.35 | 0.010 | 0.014 |
| D | 1.90 | 2.10 | 0.075 | 0.083 |
| E | 1.90 | 2.10 | 0.075 | 0.083 |
| D1 | 0.90 | 1.10 | 0.035 | 0.043 |
| E1 | 0.90 | 1.10 | 0.035 | 0.043 |
| e | 0.65 BSC | | 0.026 BSC | |
| L | 0.20 | 0.30 | 0.008 | 0.012 |
| K1 | 0.65 | 0.85 | 0.026 | 0.033 |
| K2 | 0.20 | - | 0.008 | - |
| K3 | 0.20 | - | 0.008 | - |
| K4 | 0.32 | - | 0.013 | - |
| K5 | 0.20 | 0.26 | 0.008 | 0.010 |
| K6 | 0.45 | 0.55 | 0.018 | 0.022 |

**RECOMMENDED LAND PATTERN**




UNIT: mm