# N-Channel Enhancement Mode MOSFET
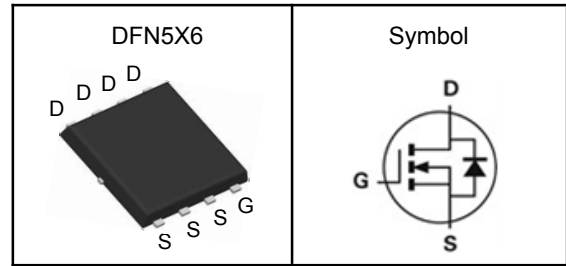
## Features

- Low Rdson for low conduction loss
- Reliable and Rugged
- ROHS Compliant & Halogen-Free

## Applications

- Power Management in Desktop Computer
- DC/DC Converters

## Pin Description

| DFN5X6 | Symbol |
|---|---|

| $V_{DSS}$ | 120 | V |
|---|---|---|
| $R_{DS(ON)-Typ}$ | 5.0 | mΩ |
| $I_D$ | 110 | A |

## Absolute Maximum Ratings($T_C$=25℃, Unless Otherwise Noted)

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 120 | V |
| $V_{GSS}$ | Gate-Source Voltage | ±20 | V |
| $T_J$ | Maximum Junction Temperature | -55 to 150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $I_{DM}$ [1] | Pulse Drain Current Tested | 440 | A |
| $I_D$ | Continuous Drain Current | 110 | A |
| $P_D$ | Maximum Power Dissipation | 142 | W |
| $E_{AS}$ [2] | Avalanche Energy, Single pulse L=0.5mH | 480 | mJ |

## Thermal Characteristics

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $R_{θJA}$ [3] | Thermal Resistance-Junction to Ambient （Max） | 62 | ℃/W |
| $R_{θJC}$ | Thermal Resistance-Junction to Case | 0.88 | ℃/W |

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150℃.
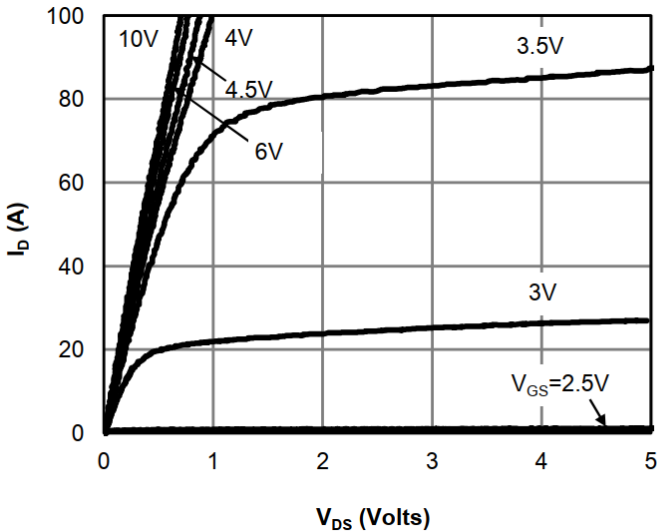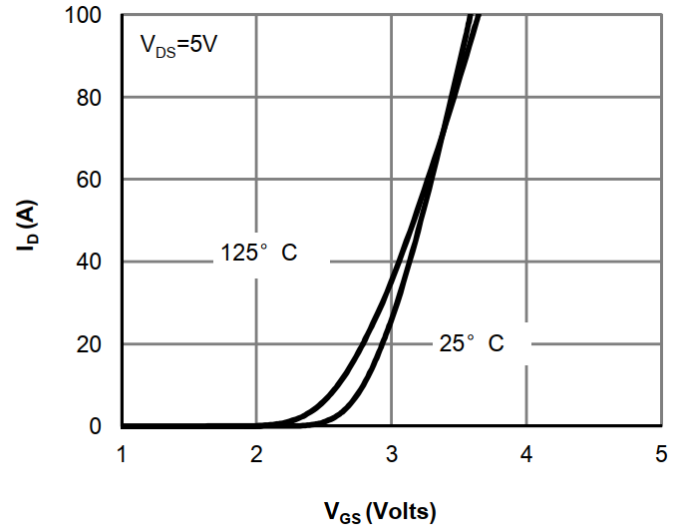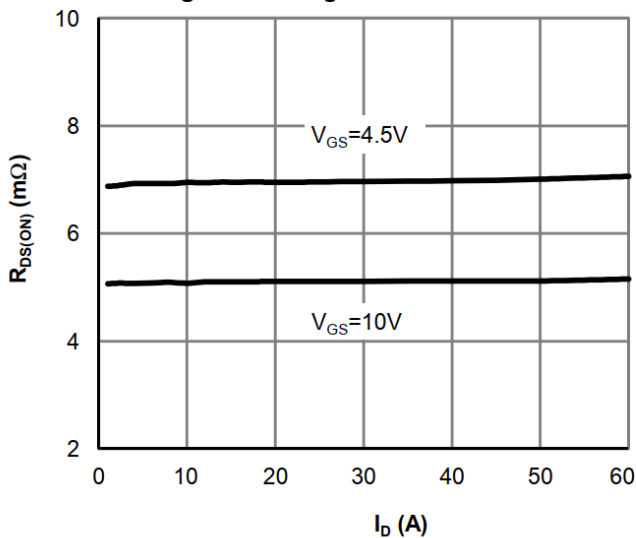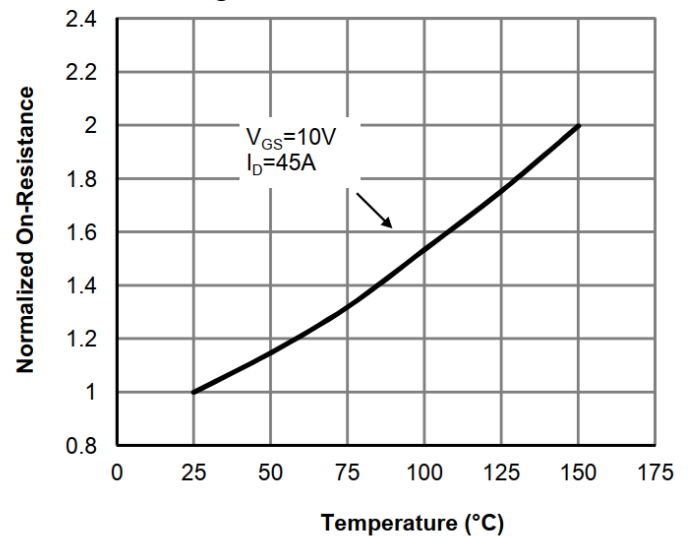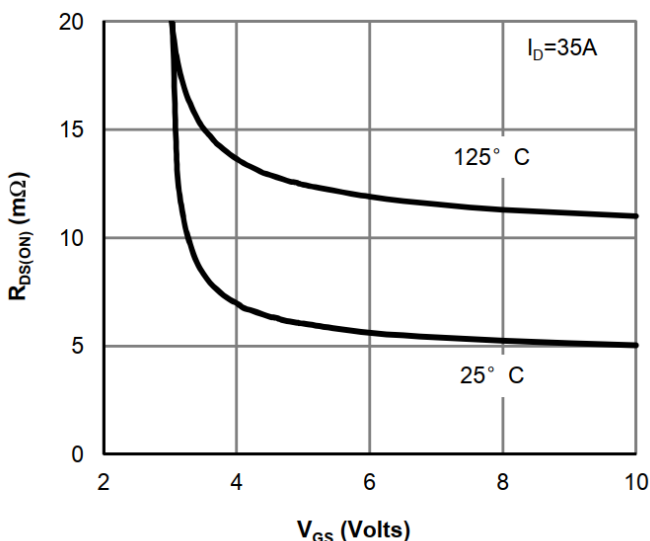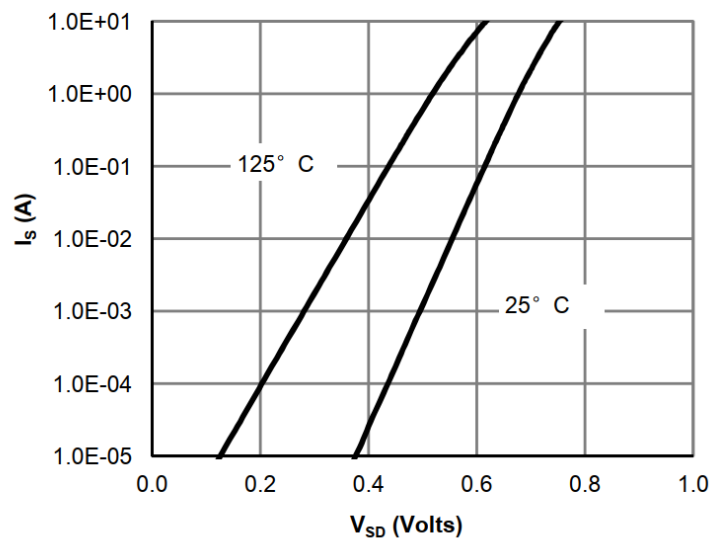
Note ③ : Surface Mounted on 1in² FR-4 board with 1oz.

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### Electrical Characteristics ($T_J$=25℃, Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | 120 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=120V, $V_{GS}$=0V | --- | --- | 1 | uA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1.0 | --- | 2.5 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | --- | --- | ±100 | nA |
| $R_{DS(ON)}$ | Drain-Source On-state Resistance | $V_{GS}$=10V, $I_D$=45A | --- | 5.0 | 6.1 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=45A | --- | 6.7 | 8.0 | |
| **Dynamic Characteristics**[5] | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=60V, Freq.=1MHz | --- | 3295 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 754 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 11.7 | --- | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=60V , $V_{GS}$=10V , $R_G$=3Ω, $R_L$=1Ω, $I_D$=55A | --- | 20 | --- | nS |
| $T_r$ | Turn-on Rise Time | | --- | 12 | --- | |
| $T_{d(off)}$ | Turn-off Delay Time | | --- | 45 | --- | |
| $T_f$ | Turn-off Fall Time | | --- | 115 | --- | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=60V,$V_{GS}$=10V , $I_D$=55A | --- | 45 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 11 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 7 | --- | |
| **Source-Drain Characteristics** | | | | | | |
| $V_{SD}$[4] | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=90A , $T_J$=25℃ | --- | --- | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=20A , di/dt=100A/μs，$T_J$=25℃ | --- | 80 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 180 | --- | nC |

Note ④： Pulse test (pulse width 300us, duty cycle 2%).

Note ⑤：Guaranteed by design, not subject to production testing.

## N-Channel Enhancement Mode MOSFET

### Typical Characteristics



Figure 1: On-Region Characteristics



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

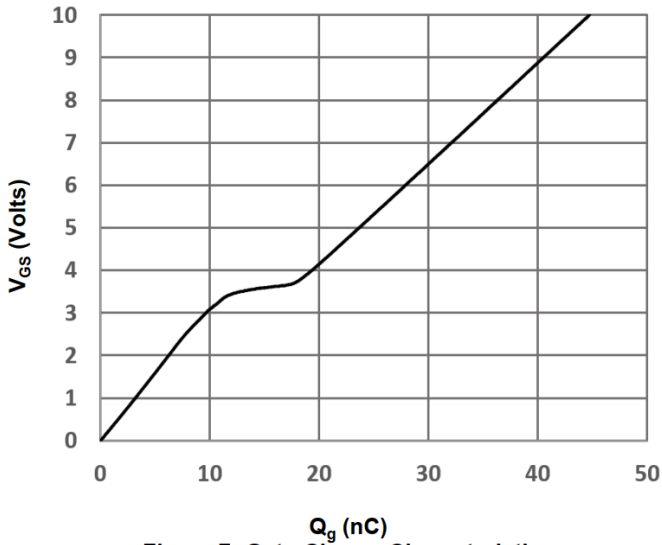# N-Channel Enhancement Mode MOSFET
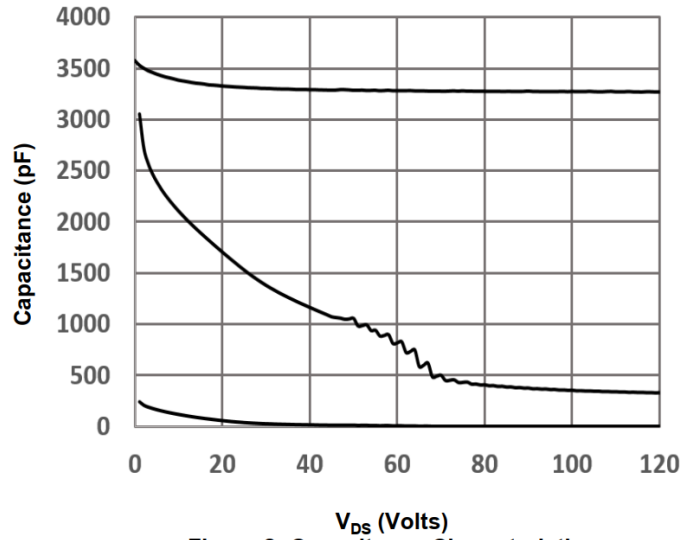


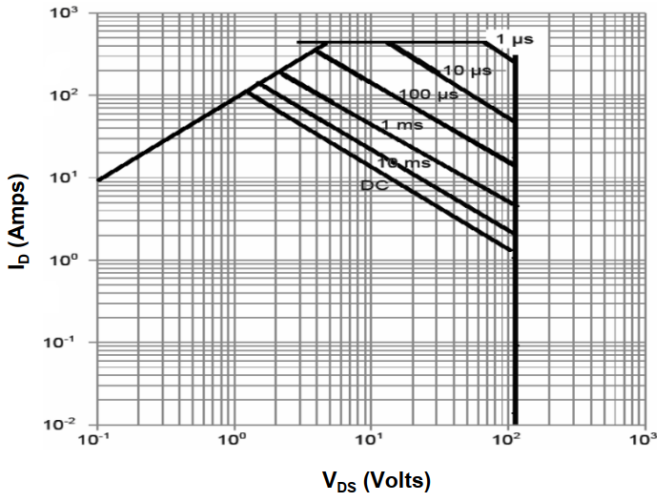**Figure 7: Gate-Charge Characteristics**
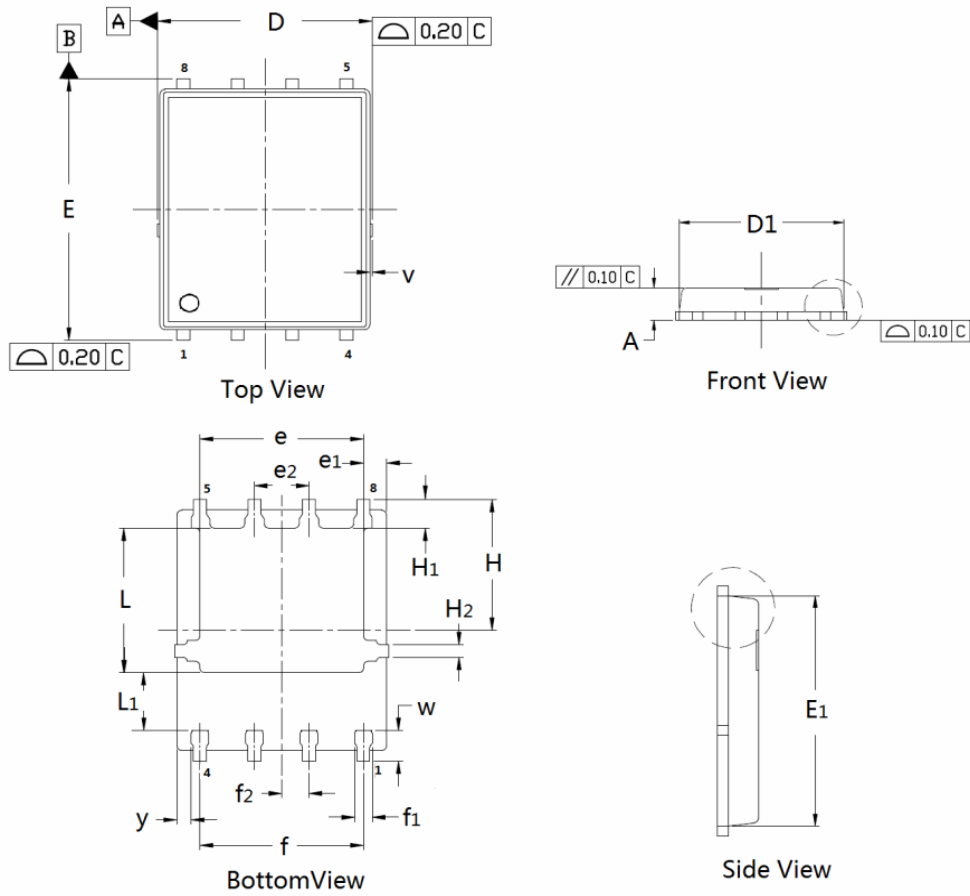


**Figure 8: Capacitance Characteristics**



**Figure 9: Maximum Forward Biased Safe Operating Area**

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### DFN5×6 Package Outline Data



Top View

Front View

Bottom View

Side View

**DIMENSIONS** ( unit : mm )

| Symbol | | 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 | 5.10 | E | 5.90 | 6.11 | 6.25 |
| E$_1$ | 5.65 | 5.74 | 5.95 | e | 3.72 | 3.80 | 3.92 |
| e$_1$ | -- | 0.5 | -- | e$_2$ | -- | 1. | -- |
| f | -- | 3.8 | -- | f$_1$ | 0.31 | 0.37 | 0.51 |
| f$_2$ | -- | 0.6 | -- | H | -- | 3. | -- |
| H$_1$ | 0.59 | 0.63 | 0.79 | H$_2$ | 0.26 | 0.28 | 0.32 |
| L | 3.35 | 3.45 | 3.65 | L$_1$ | -- | 1. | -- |
| v | -- | 0.1 | -- | w | 0.64 | 0.68 | 0.84 |
| y | -- | 0.3 | -- | | -- | | -- |