

# N-Channel Enhancement Mode MOSFET

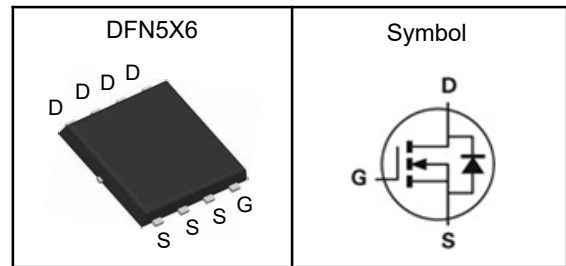
## Features

- High Speed Power Switching
- Reliable and Rugged
- ROHS Compliant
- 100% Avalanche Tested

## Applications

- Power Management in Desktop Computer
- DC/DC Converters

## Pin Description



$V_{DSS}$	60	V
$R_{DS(ON)-Typ}$	2.2	m $\Omega$
$I_D$	140	A

## Absolute Maximum Ratings ( $T_C=25^{\circ}C$ , Unless Otherwise Noted)

Symbol	Parameter	N-Channel	Unit
$V_{DSS}$	Drain-Source Voltage	60	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Maximum Junction Temperature	-55 to 150	$^{\circ}C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$
$I_{DM}^{①}$	Pulse Drain Current Tested	290	A
$I_D$	Continuous Drain Current	140	A
$P_D$	Maximum Power Dissipation	96	W
$E_{AS}$	Avalanche Energy, Single pulse	45	mJ

## Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	50	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.3	$^{\circ}C/W$

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150 $^{\circ}C$ .

Note ③ : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.



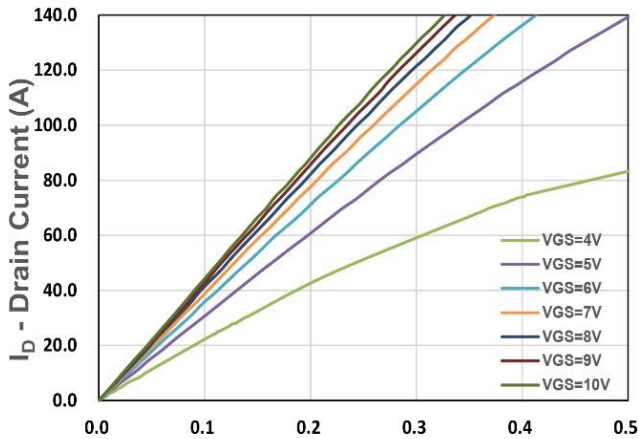
**N-Channel Enhancement Mode MOSFET**

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

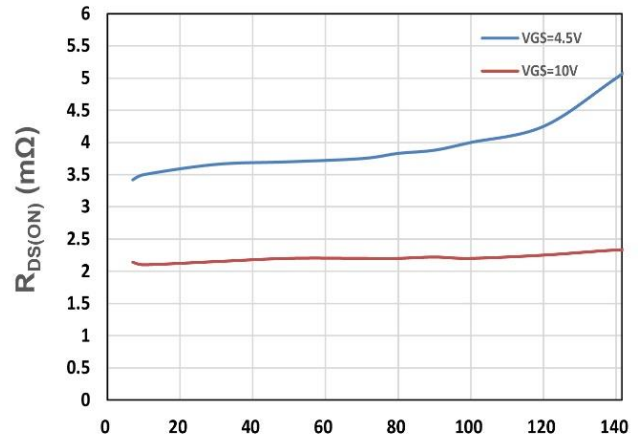
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=48V, V_{GS}=0V$	---	---	1	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.8	2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=20A$	---	2.2	2.8	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	3.5	4.8	$m\Omega$
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$C_{iss}$	Input Capacitance	$V_{DS}=50V, V_{GS}=0V, \text{Freq.}=1\text{MHz}$	---	4590	---	pF
$C_{oss}$	Output Capacitance		---	1680	---	
$C_{riss}$	Reverse Transfer Capacitance		---	80	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=50V, V_{GS}=10V, I_D=1A, R_G=6\Omega$	---	14	---	nS
$T_r$	Turn-on Rise Time		---	35	---	
$T_{d(off)}$	Turn-off Delay Time		---	70	---	
$T_f$	Turn-off Fall Time		---	45	---	
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V, I_D=20A$	---	75	---	nC
$Q_{gs}$	Gate-Source Charge		---	13	---	
$Q_{gd}$	Gate-Drain Charge		---	17	---	
<b>Source-Drain Characteristics</b>						
$V_{SD}$	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	---	---	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, dI_F/dt=100A/\mu s$	---	28	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	22	---	nC

Note ④: Pulse test (pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ ).

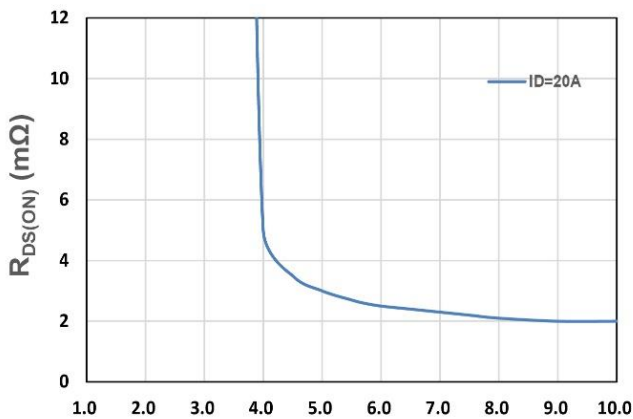
Note ⑤: Guaranteed by design, not subject to production testing.

**N-Channel Enhancement Mode MOSFET**
**Typical Characteristics**


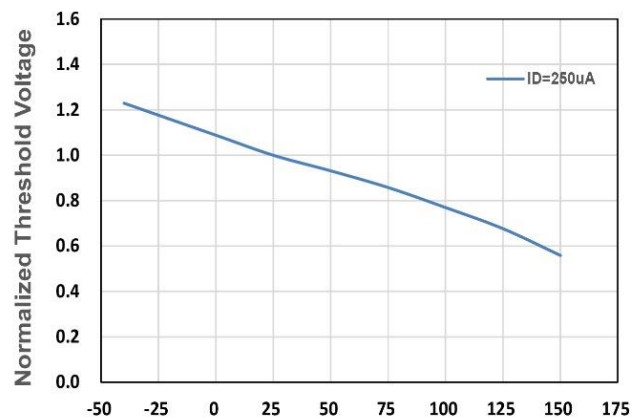
$V_{DS}$  - Drain - Source Voltage (V)  
Figure 1. Output Characteristics



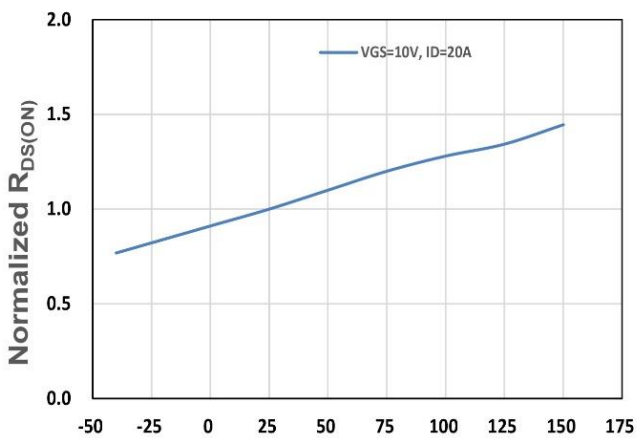
$I_D$ - Drain Current (A)  
Figure 2. On-Resistance vs.  $I_D$



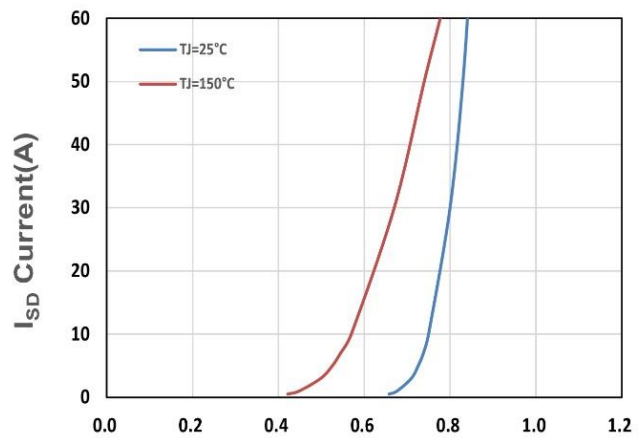
$V_{GS}$  - Gate - Source Voltage (V)  
Figure 3. On-Resistance vs.  $V_{GS}$



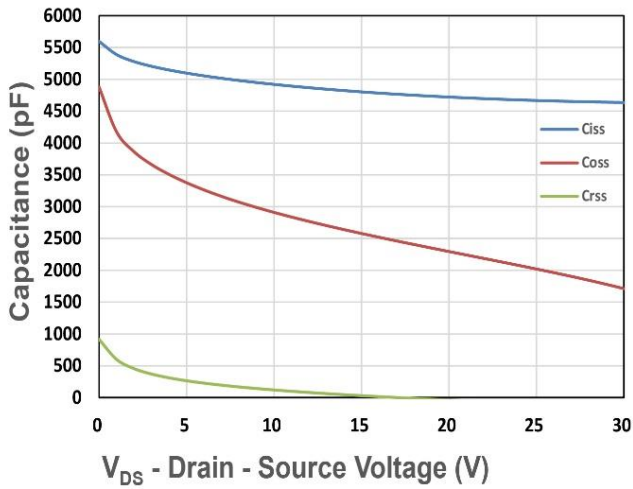
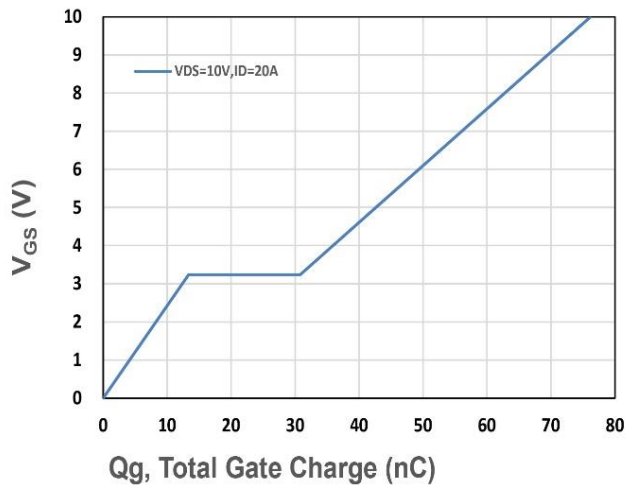
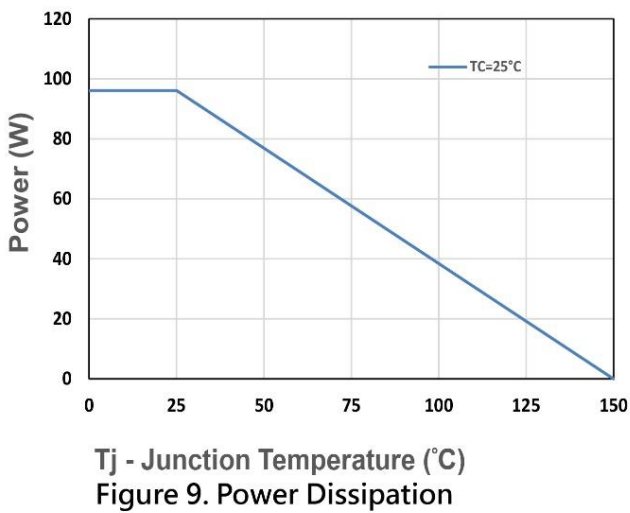
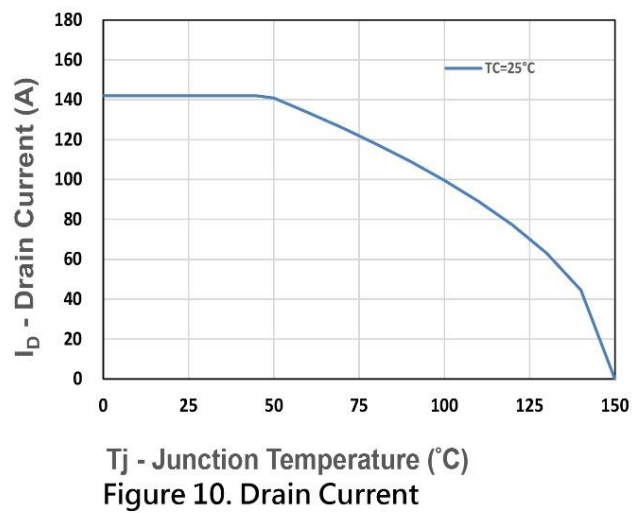
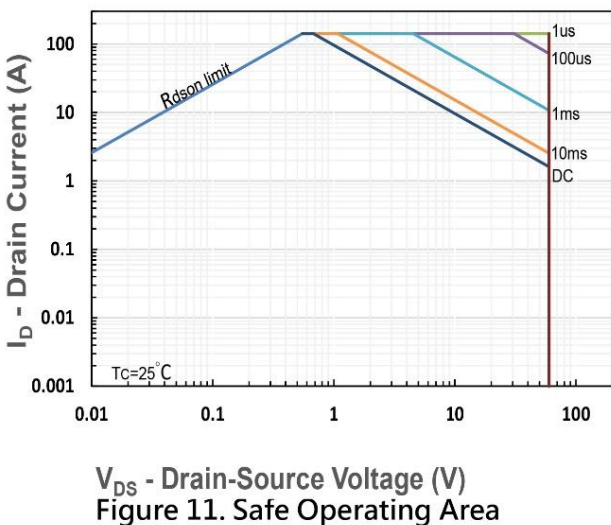
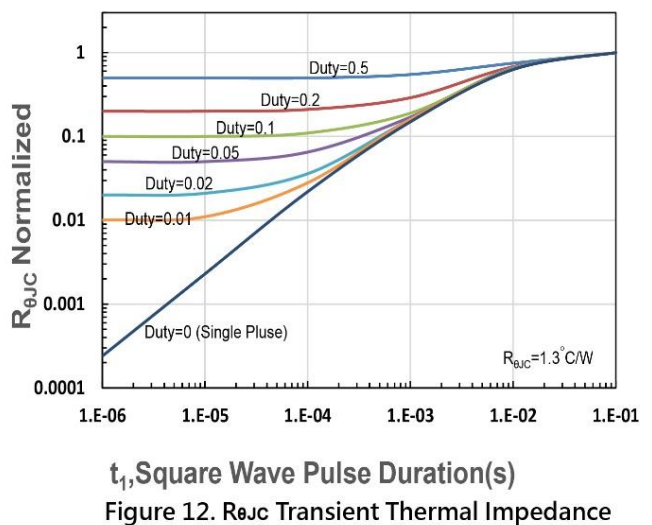
$T_j$ , Junction Temperature(°C)  
Figure 4. Gate Threshold Voltage

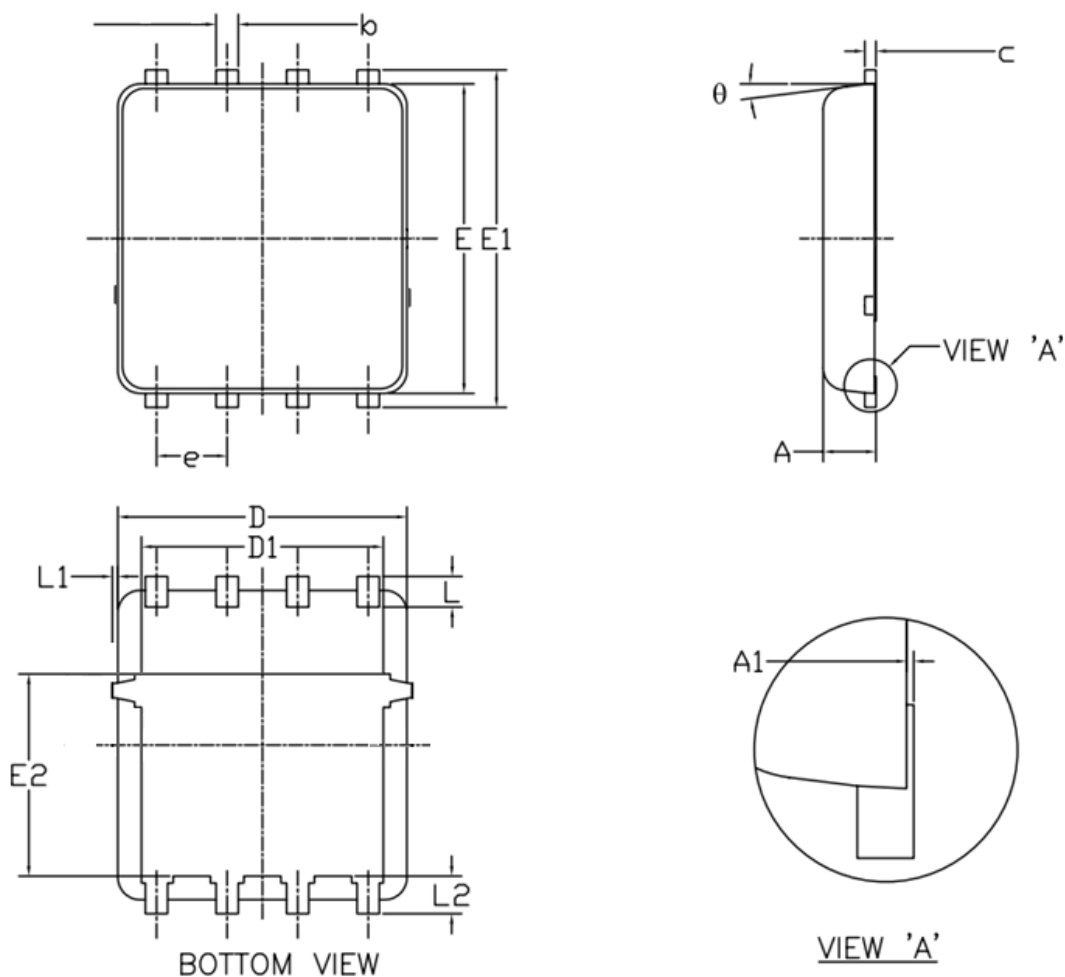


$T_j$ , Junction Temperature(°C)  
Figure 5. Drain-Source On Resistance



$V_{SD}$ , Source-Drain Voltage(V)  
Figure 6. Source-Drain Diode Forward

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**Figure 7. Capacitance**

**Figure 8. Gate Charge Characteristics**

**Figure 9. Power Dissipation**

**Figure 10. Drain Current**

**Figure 11. Safe Operating Area**

**Figure 12.  $R_{\theta JC}$  Transient Thermal Impedance**

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**DFN5X6-8L Package Outline Dimensions**


Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
<b>A</b>	0.90	1.00	1.20	<b>E1</b>	5.90	6.10	6.35
<b>A1</b>	0.00	--	0.05	<b>E2</b>	3.38	3.58	3.92
<b>b</b>	0.30	0.40	0.51	<b>e</b>	1.27 BSC		
<b>c</b>	0.20	0.25	0.33	<b>L</b>	0.51	0.61	0.71
<b>D</b>	4.80	4.90	5.40	<b>L1</b>	--	--	0.15
<b>D1</b>	3.61	4.00	4.25	<b>L2</b>	0.41	0.51	0.61
<b>E</b>	5.65	5.80	6.06	<b>θ</b>	0°	--	12°