

# N-Channel Enhancement Mode MOSFET

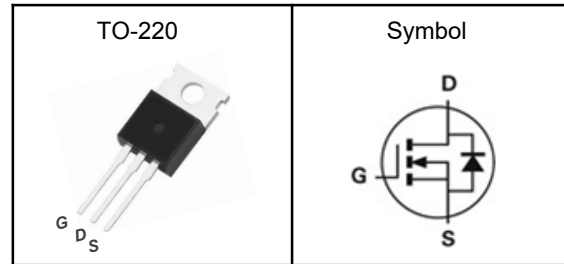
## Features

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

## Applications

- Power Management in Desktop Computer
- DC/DC Converters

## Pin Description



$V_{DSS}$	120	V
$R_{DS(ON)-Typ}$	5.8	m $\Omega$
$I_D$	103	A

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

Symbol	Parameter	N-Channel	Unit
$V_{DSS}$	Drain-Source Voltage	120	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Maximum Junction Temperature	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_{DM}^{①}$	Pulse Drain Current Tested	142	A
$I_D$	Continuous Drain Current	103	A
$P_D$	Maximum Power Dissipation	125	W
$E_{AS}$	Avalanche Energy, Single pulse	115	mJ

## Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.5	$^\circ\text{C}/\text{W}$

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

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

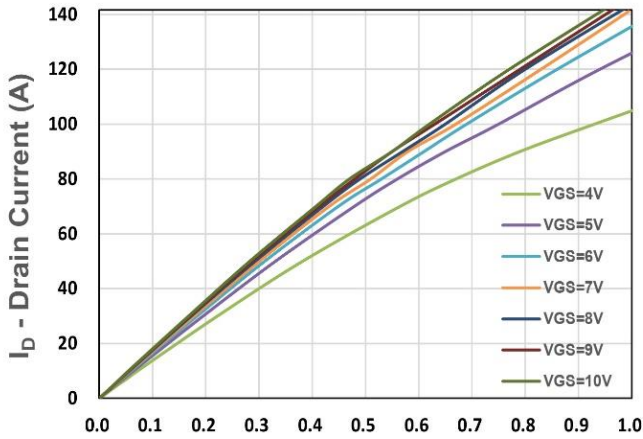
Note ③ : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

**N-Channel Enhancement Mode MOSFET****Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

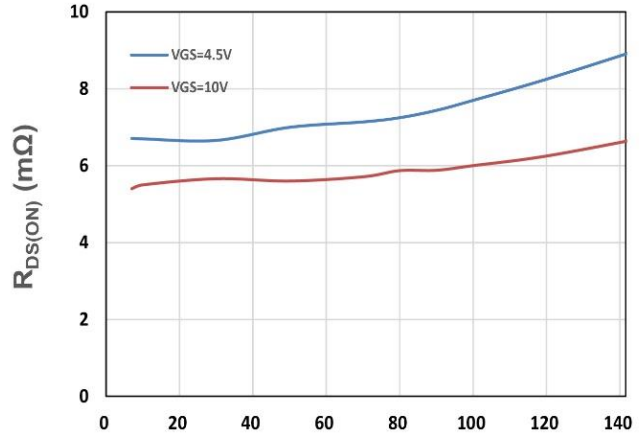
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	120	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=96V, V_{GS}=0V$	---	---	1	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	---	3	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=20A$	---	5.8	7.5	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	7.5	10	$m\Omega$
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	46	---	S
$C_{iss}$	Input Capacitance	$V_{DS}=60V, V_{GS}=0V,$ Freq.=1MHz	---	3300	---	pF
$C_{oss}$	Output Capacitance		---	380	---	
$C_{rss}$	Reverse Transfer Capacitance		---	7.5	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DS}=60V, V_{GS}=10V,$ $I_D=1A, R_G=6\Omega$	---	11	---	nS
$T_r$	Turn-on Rise Time		---	17	---	
$T_{d(off)}$	Turn-off Delay Time		---	56	---	
$T_f$	Turn-off Fall Time		---	96	---	
$Q_g$	Total Gate Charge	$V_{DS}=60V, V_{GS}=10V,$ $I_D=20A$	---	54.7	---	nC
$Q_{gs}$	Gate-Source Charge		---	14	---	
$Q_{gd}$	Gate-Drain Charge		---	6	---	
<b>Source-Drain Characteristics</b>						
$V_{SD}$	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	---	---	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_F=10A, V_R=50V,$ $di_F/dt=100A/\mu s$	---	64	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	100	---	nC

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

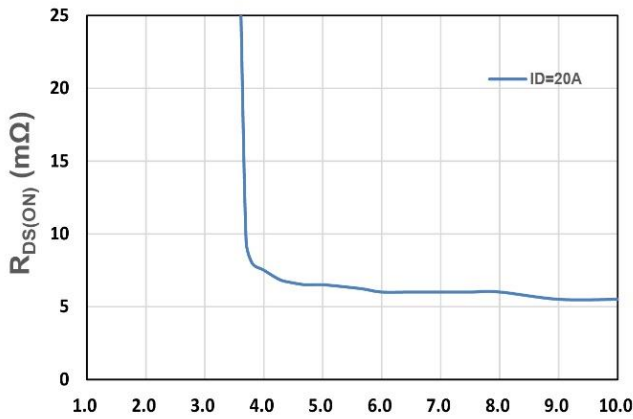
Note ⑤: Guaranteed by design, not subject to production testing.

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


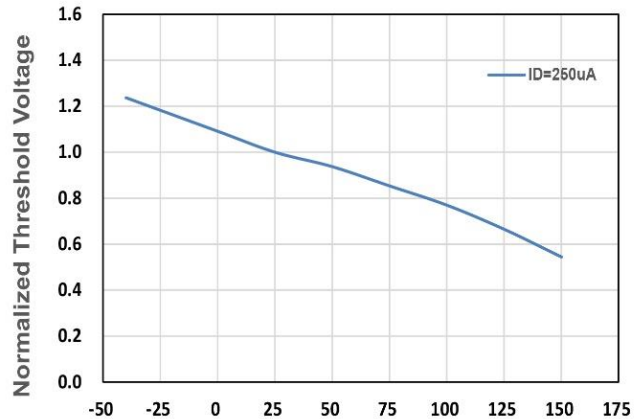
**V<sub>DS</sub> - Drain - Source Voltage (V)**  
**Figure 1. Output Characteristics**



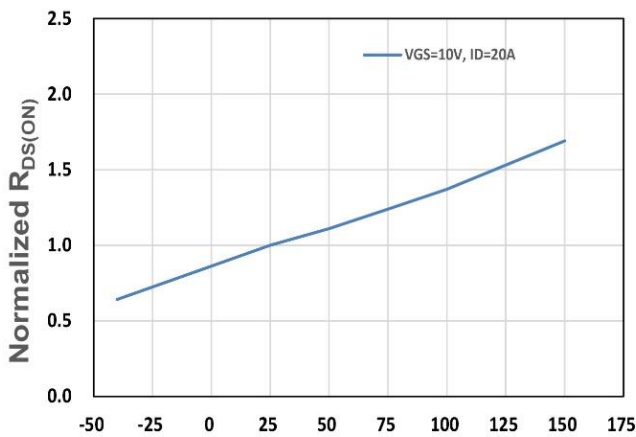
**ID - Drain Current (A)**  
**Figure 2. On-Resistance vs. ID**



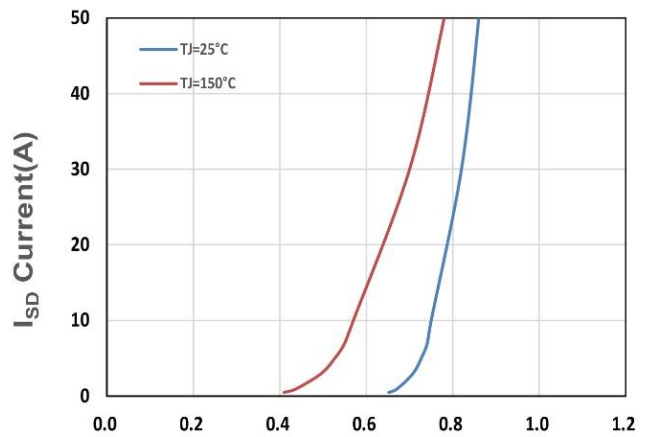
**V<sub>GS</sub> - Gate - Source Voltage (V)**  
**Figure 3. On-Resistance vs. VGS**



**T<sub>j</sub>, Junction Temperature(°C)**  
**Figure 4. Gate Threshold Voltage**



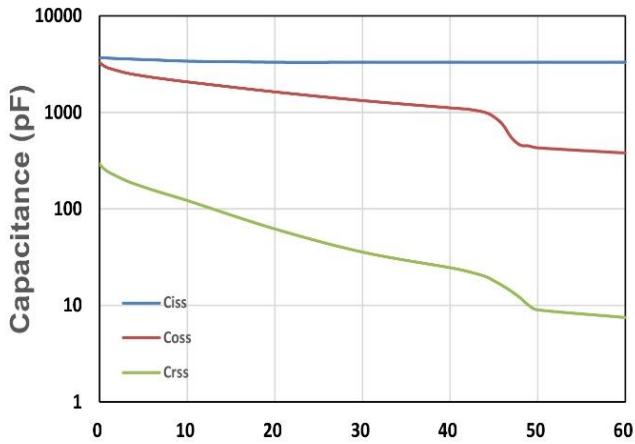
**T<sub>j</sub>, Junction Temperature(°C)**  
**Figure 5. Drain-Source On Resistance**



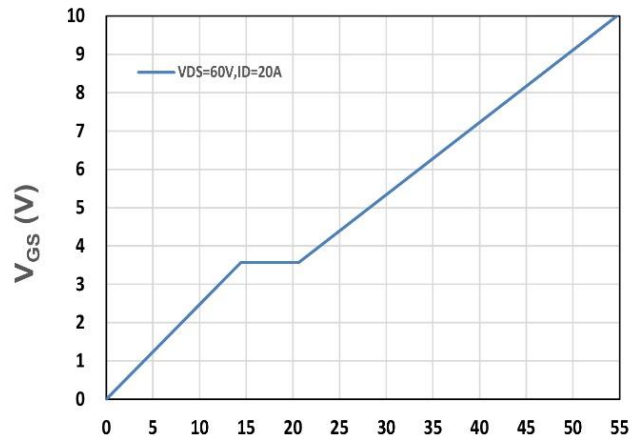
**V<sub>SD</sub>, Source-Drain Voltage(V)**  
**Figure 6. Source-Drain Diode Forward**



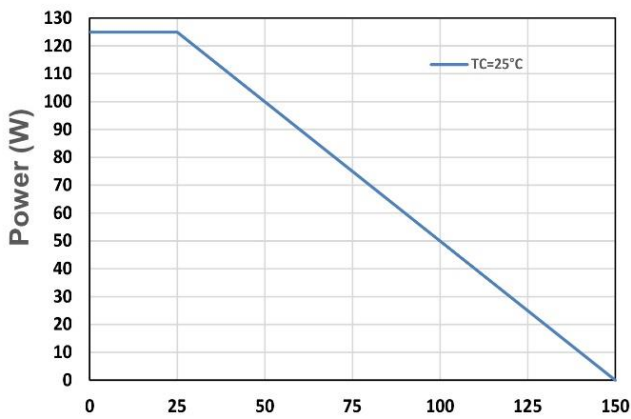
N-Channel Enhancement Mode MOSFET



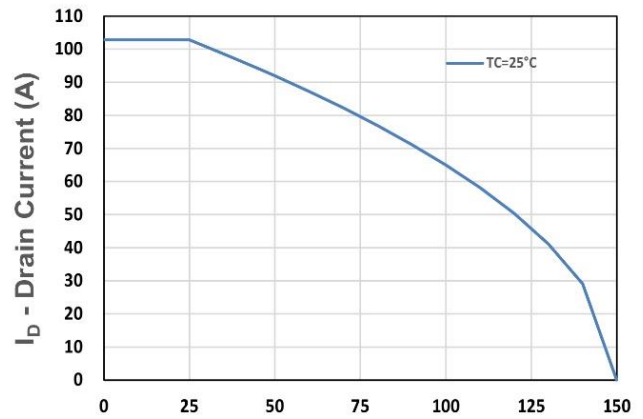
$V_{DS}$  - Drain - Source Voltage (V)  
Figure 7. Capacitance



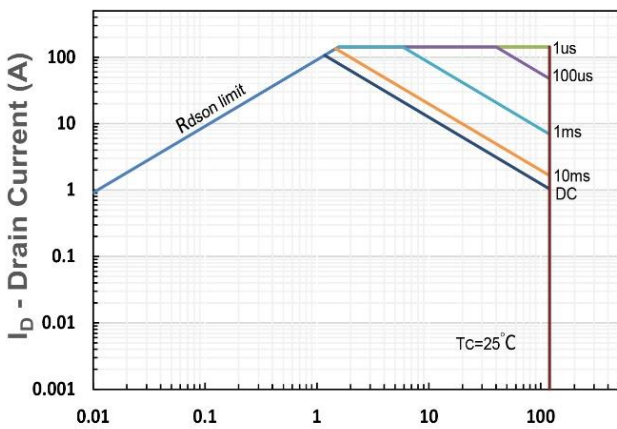
$Q_g$ , Total Gate Charge (nC)  
Figure 8. Gate Charge Characteristics



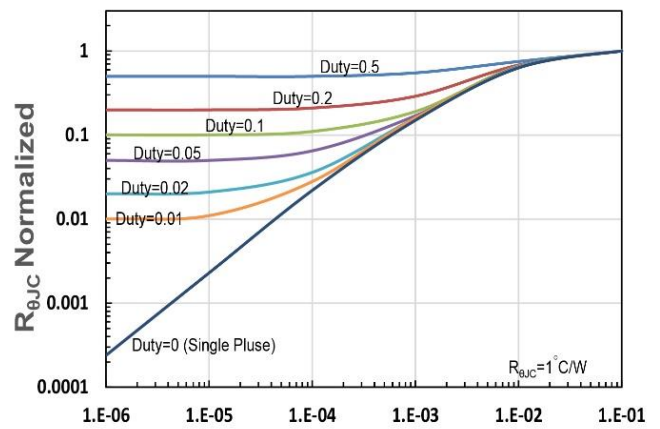
$T_j$  - Junction Temperature (°C)  
Figure 9. Power Dissipation



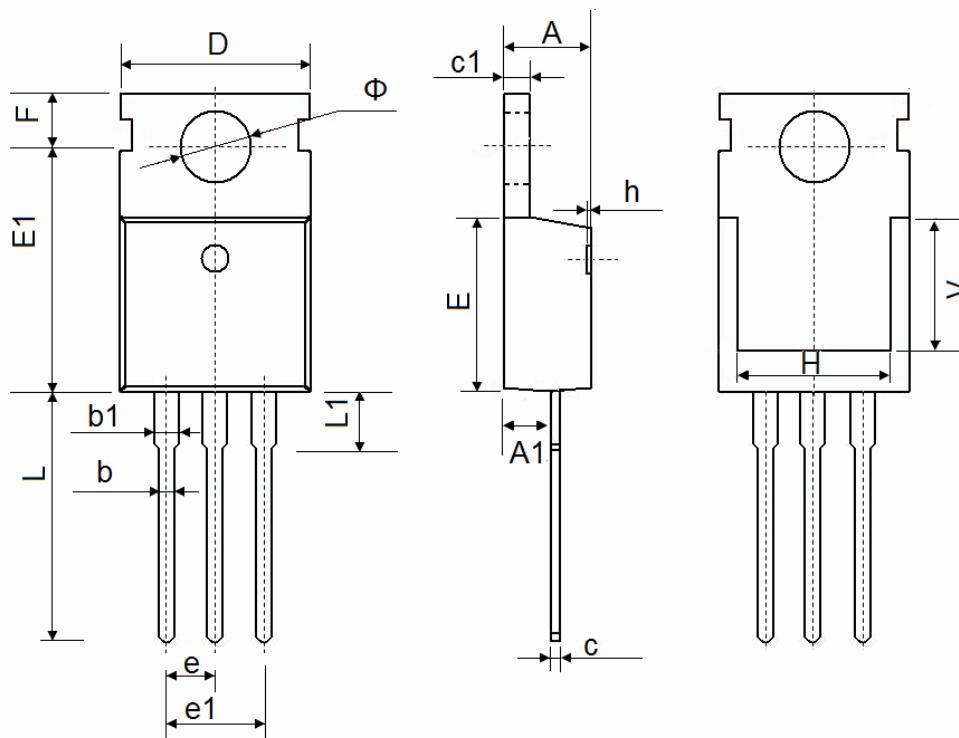
$T_j$  - Junction Temperature (°C)  
Figure 10. Drain Current



$V_{DS}$  - Drain-Source Voltage (V)  
Figure 11. Safe Operating Area



$t_1$ , Square Wave Pulse Duration(s)  
Figure 12.  $R_{\theta JC}$  Transient Thermal Impedance

**N-Channel Enhancement Mode MOSFET**
**TO-220 Package Outline Data**


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.350	4.650
A1	2.250	2.550
b	0.710	0.910
b1	1.170	1.400
c	0.330	0.650
c1	1.200	1.400
D	9.910	10.250
E	8.9500	9.750
E1	12.650	12.950
e	2.540 TYP.	
e1	4.980	5.180
F	2.650	2.950
H	7.900	8.100
h	0.000	0.300
L	12.700	13.500
L1	2.850	3.250
V	7.500 REF.	
Φ	3.400	3.800