

# N-Channel Enhancement Mode MOSFET

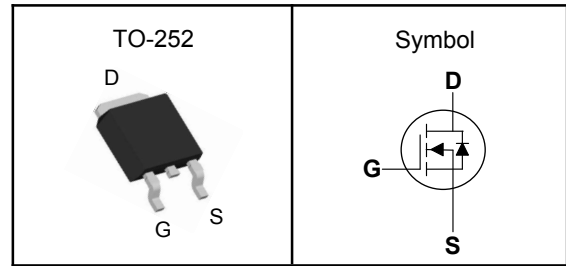
## Features

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant
- 100% UIS and Rg Tested

## Applications

- Power Management in Desktop Computer
- DC/DC Converters

## Pin Description



$V_{DSS}$	40	V
$R_{DS(ON)-Typ}$	2.5	m $\Omega$
$I_D$	150	A

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

Symbol	Parameter	N-Channel	Unit
$V_{DSS}$	Drain-Source Voltage	40	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	$^\circ\text{C}$
$E_{AS}$	Single Pulse Avalanche Energy <sub>3</sub> (L=0.3mH)	331	mJ
$I_{DM}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	A
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	A
$I_S$	Diode Continuous Forward Current	120	A
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	W
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	W

## Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sub>1</sub> (Steady State)	50	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sub>1</sub>	0.8	$^\circ\text{C}/\text{W}$

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

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

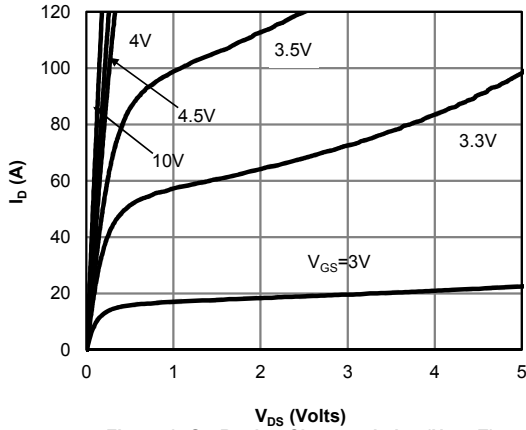
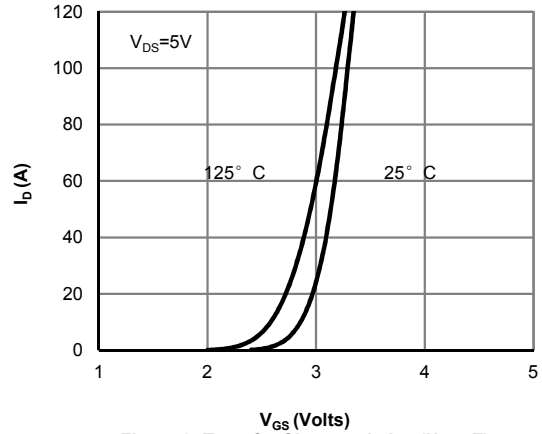
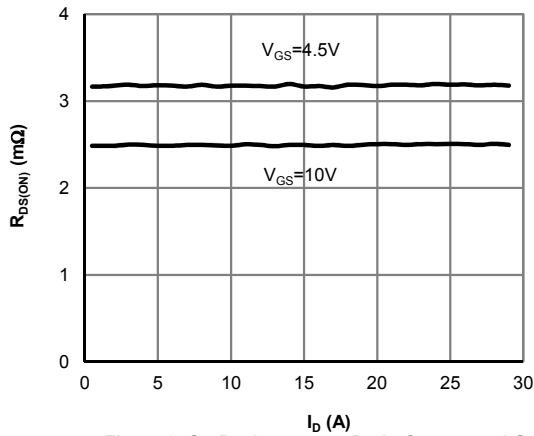
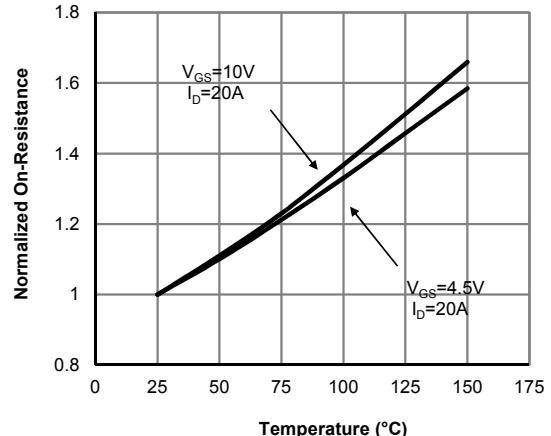
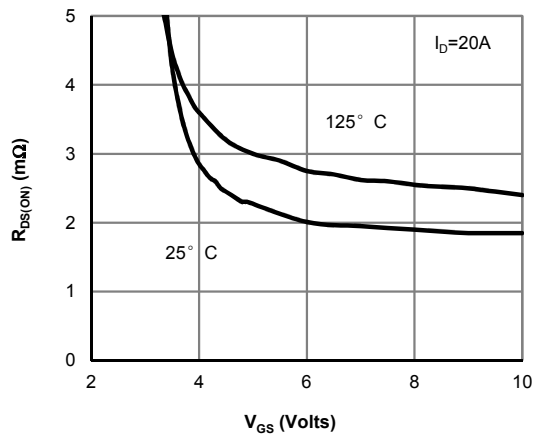
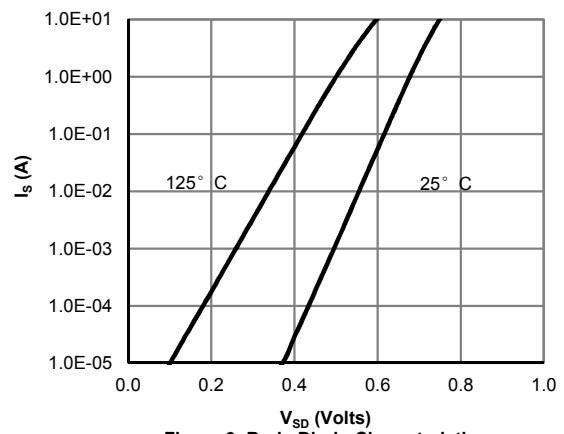
Note ③ : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

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

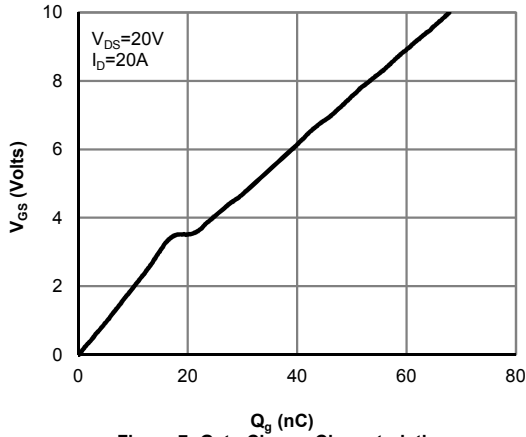
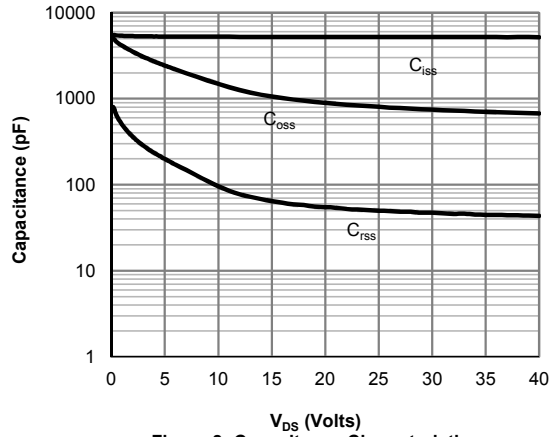
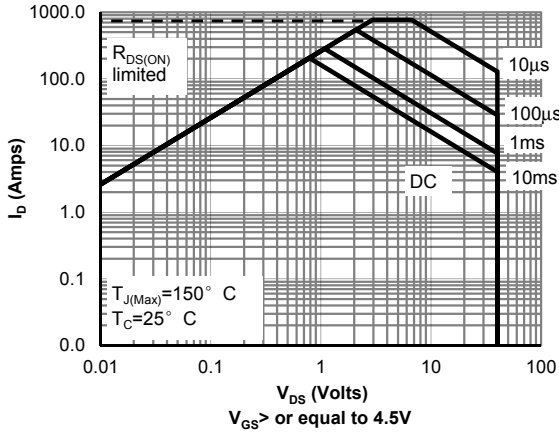
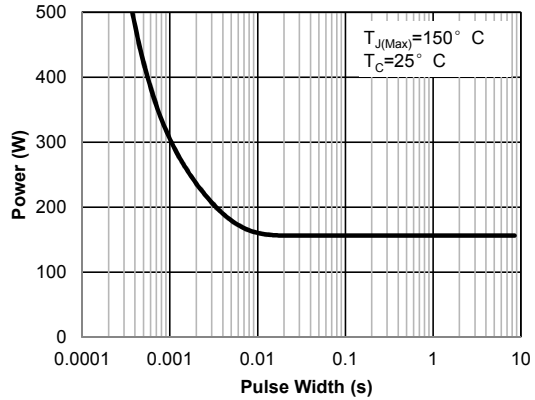
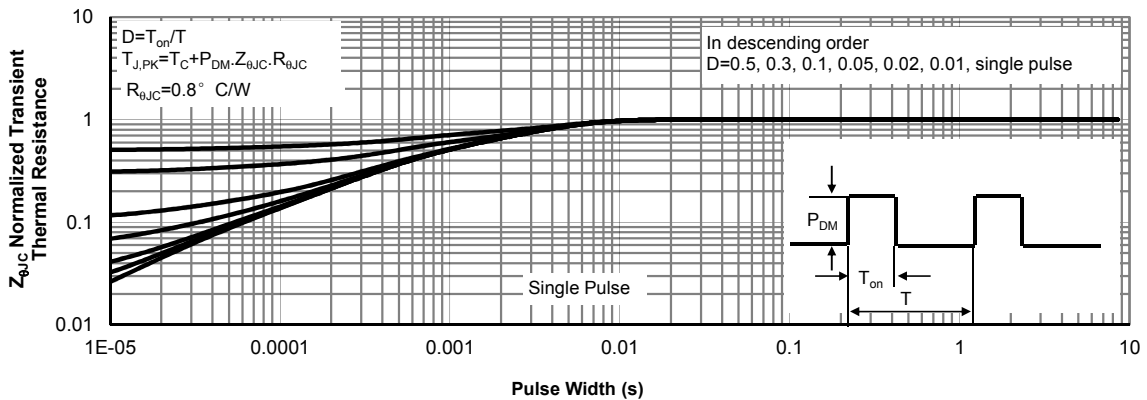
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250mA$	40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	---	---	1	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	---	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	$V_{GS}=10V, I_D=20A$	---	2.5	3.5	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$	---	3.1	4.5	$m\Omega$
gfs	Forward Transconductance	$V_{DS}=5V, I_{DS}=20A$	---	100	---	S
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Freq.=1MHz	---	5225	---	pF
$C_{oss}$	Output Capacitance		---	895	---	
$C_{rss}$	Reverse Transfer Capacitance		---	55	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{GS}=10V, R_L=1\Omega,$ $V_{DS}=20V, R_G=3\Omega$	---	12.5	---	nS
$T_r$	Turn-on Rise Time		---	9.5	---	
$T_{d(off)}$	Turn-off Delay Time		---	57.5	---	
$T_f$	Turn-off Fall Time		---	10.5	---	
$Q_g$	Total Gate Charge	$V_{DS}=20V,$ $V_{GS}=10V, I_{DS}=20A$	---	68	---	nC
$Q_{gs}$	Gate-Source Charge		---	16.5	---	
$Q_{gd}$	Gate-Drain Charge		---	4.5	---	
<b>Source-Drain Characteristics</b> ( $T_J=25^{\circ}\text{C}$ )						
$V_{SD}$	Diode Forward Voltage <sub>z</sub>	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	0.7	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_S=20A,$ $di/dt=500A/\mu s, T_J=25^{\circ}\text{C}$	---	20	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	60	---	nC

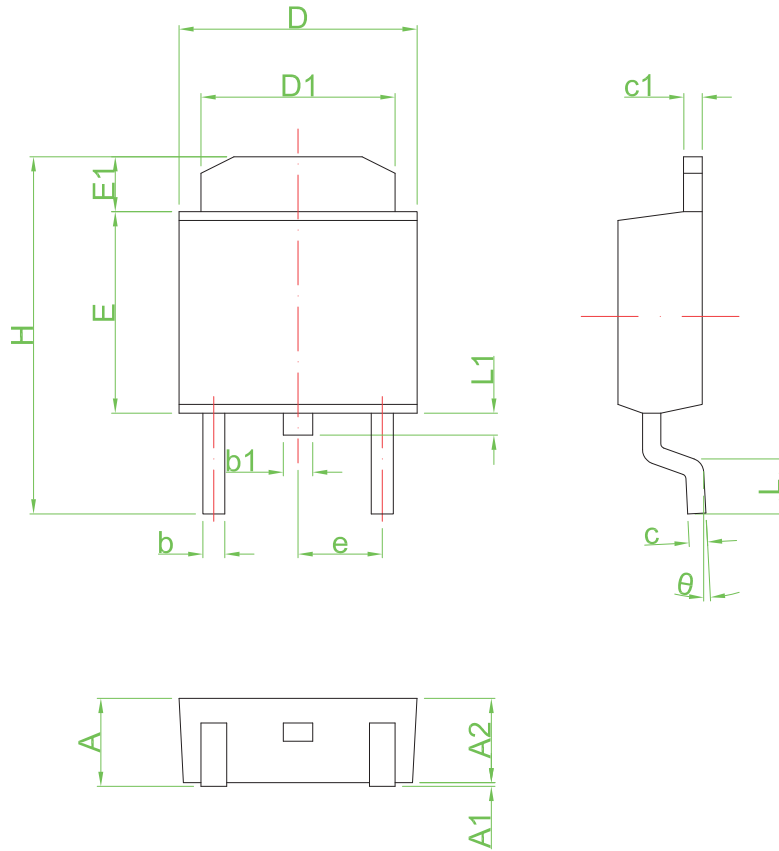
Note ④ : Pulse test (pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ ).

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

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

**Figure 1: On-Region Characteristics (Note E)**

**Figure 2: Transfer Characteristics (Note E)**

**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**

**Figure 4: On-Resistance vs. Junction Temperature (Note E)**

**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

**Figure 6: Body-Diode Characteristics (Note E)**

# N-Channel Enhancement Mode MOSFET


**Figure 7: Gate-Charge Characteristics**

**Figure 8: Capacitance Characteristics**

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

**Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)**

**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

**N-Channel Enhancement Mode MOSFET**
**TO-252 Package Outline Dimensions**


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.25	2.65	0.089	0.104
A1	0.00	0.15	0.000	0.006
A2	2.20	2.40	0.087	0.094
b	0.50	0.70	0.020	0.028
b1	0.70	0.90	0.028	0.035
c	0.46	0.66	0.018	0.026
c1	0.46	0.66	0.018	0.026
D	6.30	6.70	0.248	0.264
D1	5.20	5.40	0.205	0.213
E	5.30	5.70	0.209	0.224
E1	1.40	1.60	0.055	0.063
H	9.40	9.90	0.370	0.390
e	2.30 TYP		0.09 TYP	
L	1.40	1.77	0.055	0.070
L1	0.50	0.70	0.020	0.028
theta	0°	8°	0°	8°