

# N-Channel Enhancement Mode MOSFET

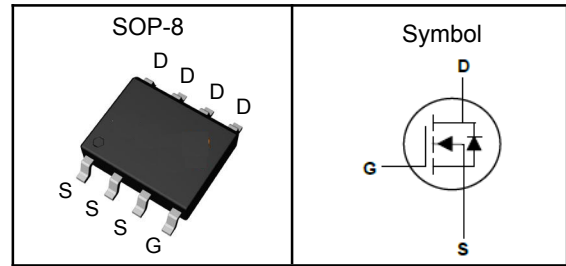
## Features

- 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
$R_{DS(ON)-Typ}$	23	m $\Omega$
$I_D$	7.5	A

## Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ , 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 <sup>③</sup>	12	mJ	
$I_{DM}^{①}$	Pulse Drain Current Tested	30	A	
$I_D$	Continuous Drain Current	$T_A=25^\circ\text{C}$	7.5	A
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.5	W

## Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>①</sup> (Max)	85	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>①</sup>	50	$^\circ\text{C}/\text{W}$

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.



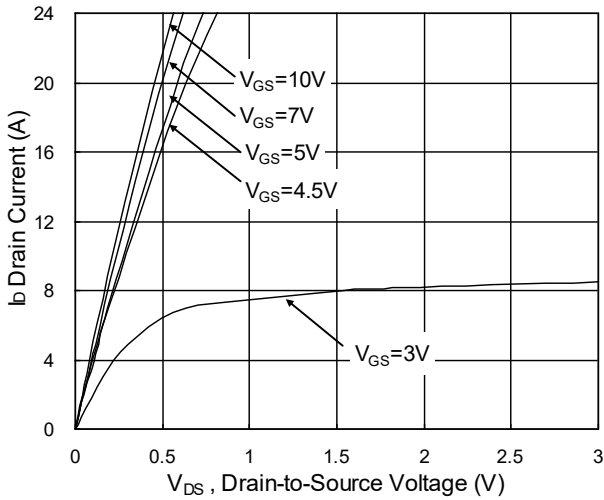
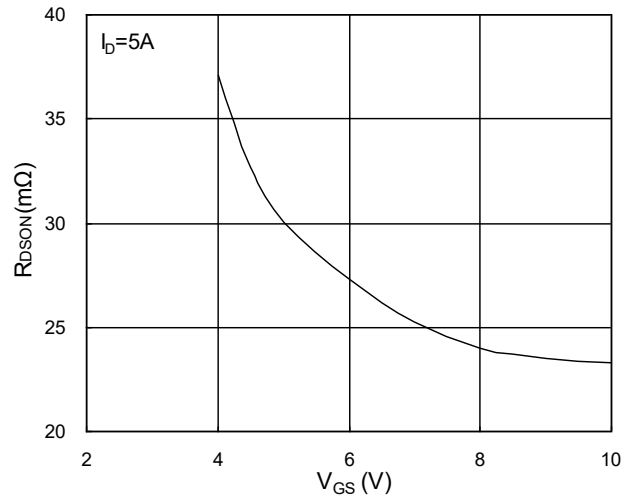
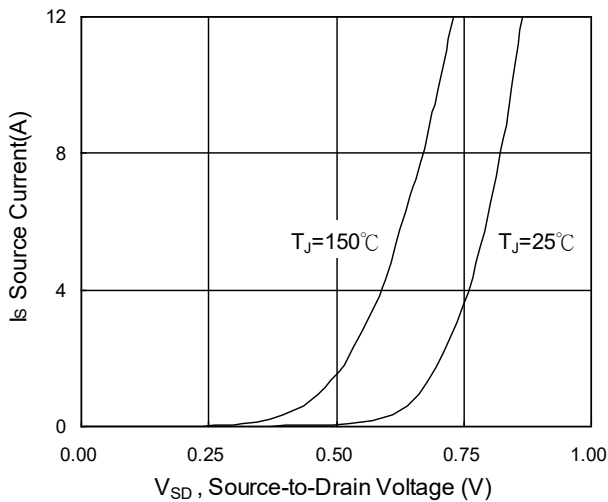
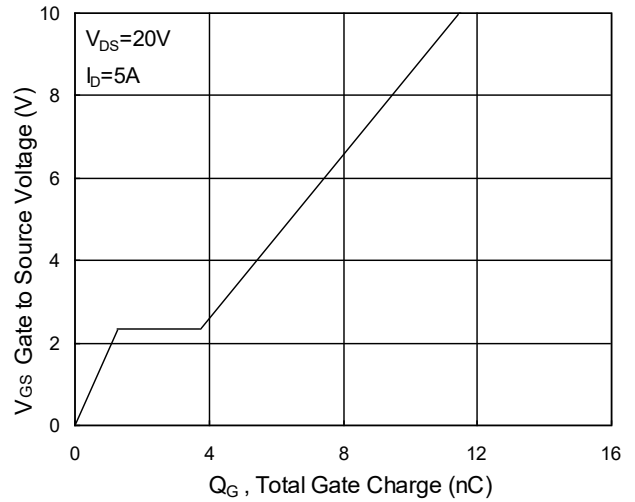
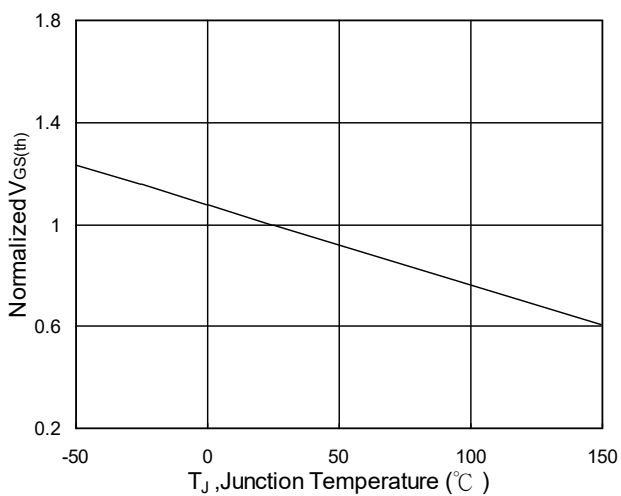
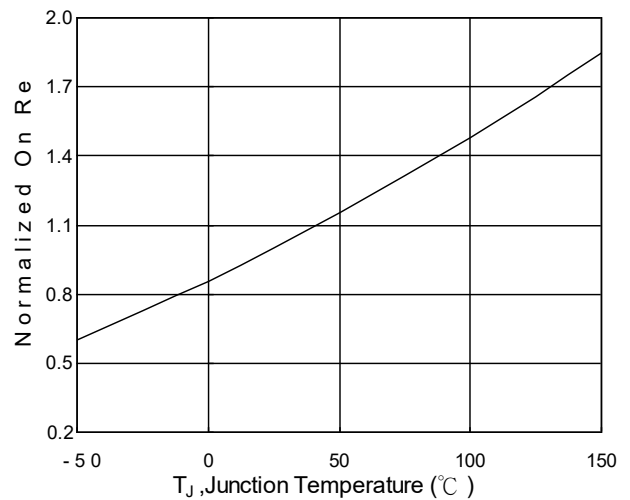
**N-Channel Enhancement Mode MOSFET**

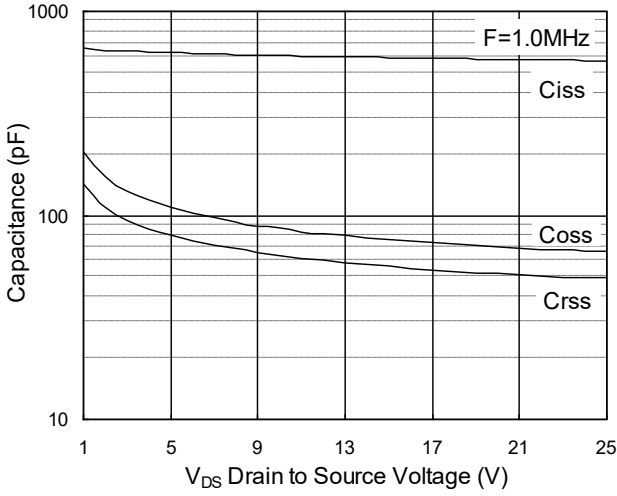
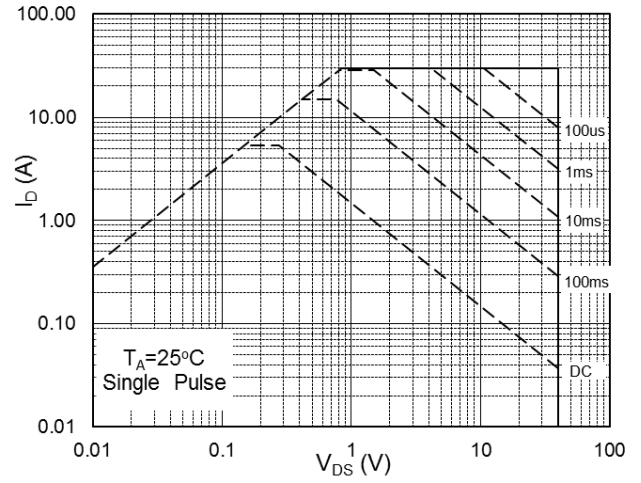
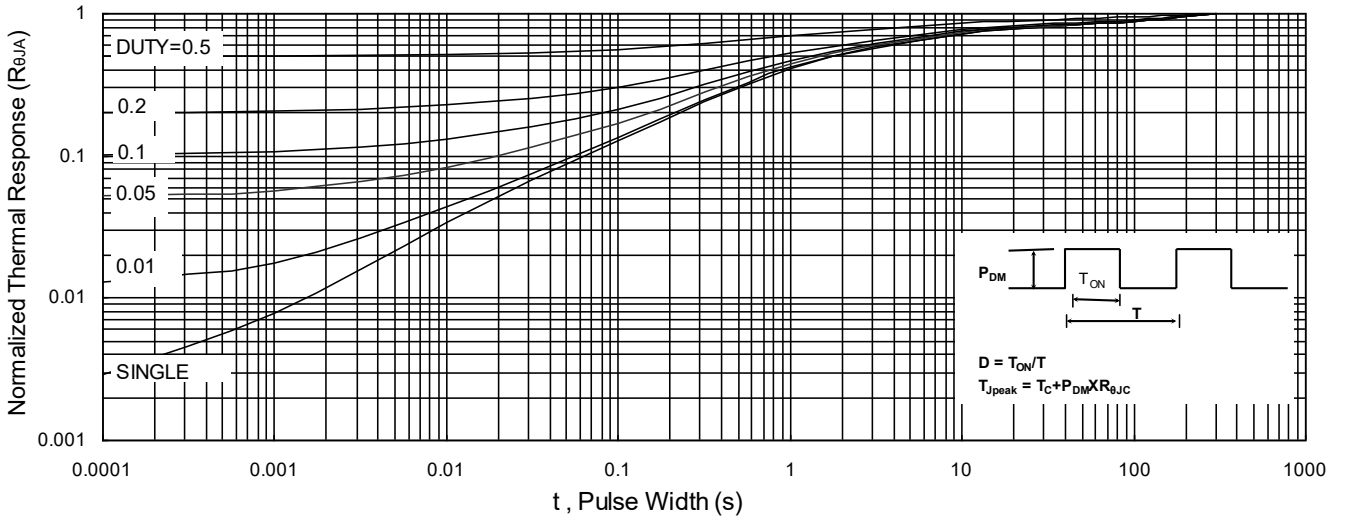
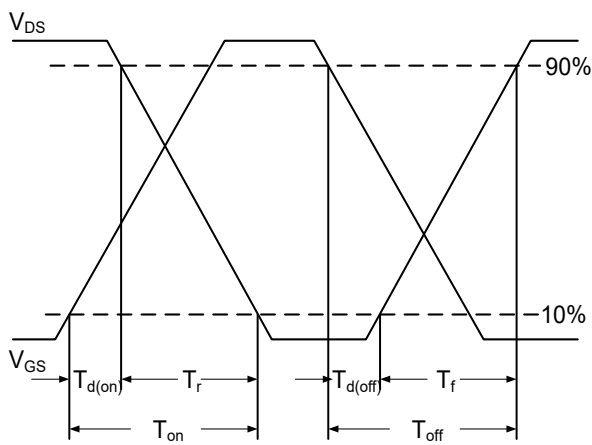
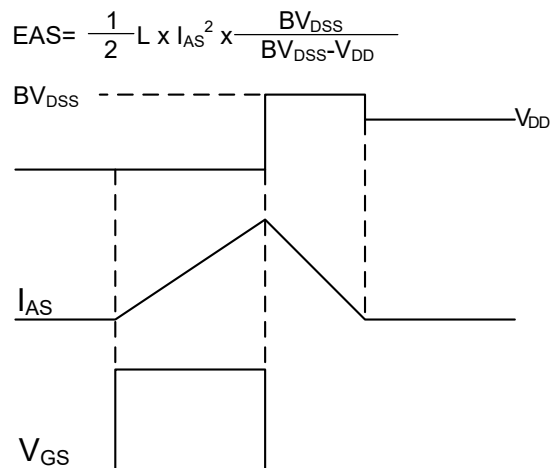
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=32V, V_{GS}=0V$	---	---	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	$V_{GS}=10V, I_D=5A$	---	23	28	m $\Omega$
		$V_{GS}=4.5V, I_D=4A$	---	31	38	
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V, \text{Freq.}=1\text{MHz}$	---	593	---	pF
$C_{oss}$	Output Capacitance		---	76	---	
$C_{rss}$	Reverse Transfer Capacitance		---	56	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	8.9	---	nS
$T_r$	Turn-on Rise Time		---	2.2	---	
$T_{d(off)}$	Turn-off Delay Time		---	41	---	
$T_f$	Turn-off Fall Time		---	2.7	---	
$Q_g$	Total Gate Charge	$V_{DD}=20V, V_{GS}=4.5V, I_D=5A$	---	5.5	---	nC
$Q_{gs}$	Gate-Source Charge		---	1.25	---	
$Q_{gd}$	Gate-Drain Charge		---	2.5	---	
<b>Source-Drain Characteristics</b> ( $T_J=25^{\circ}\text{C}$ )						
$V_{SD}$	Diode Forward Voltage <sub>z</sub>	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1.2	V

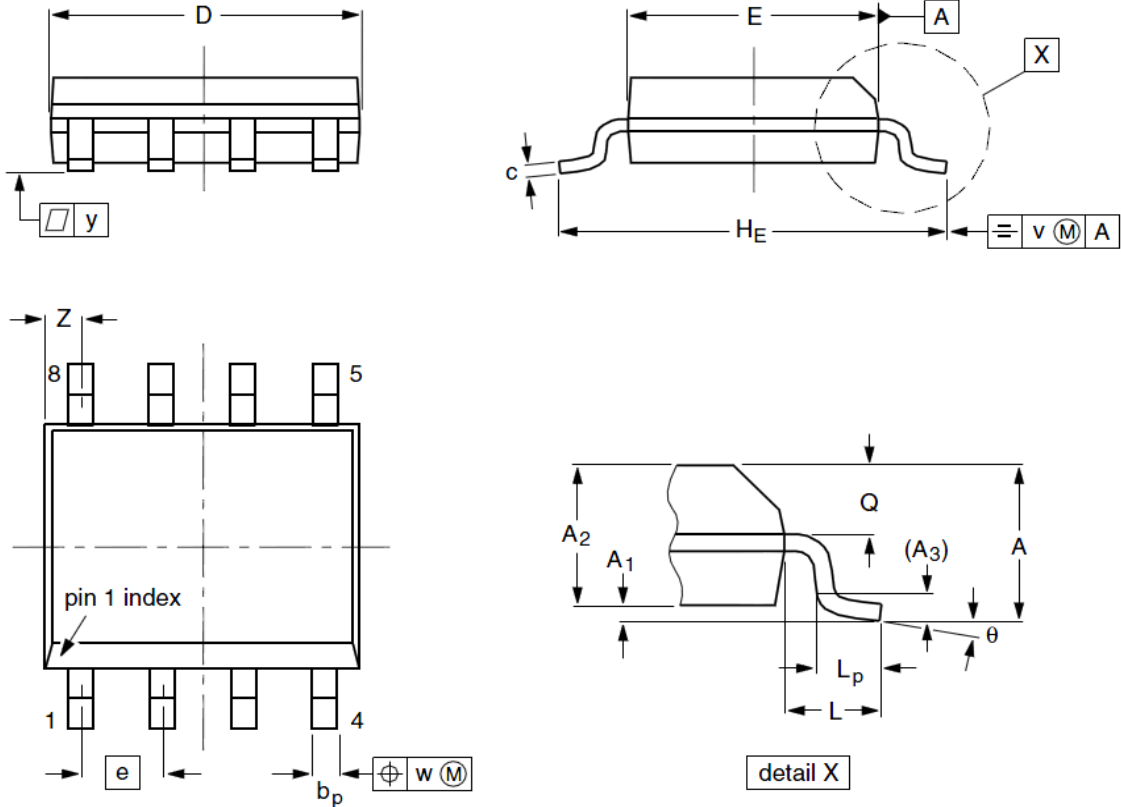
Note ④ : Pulse test (pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ ).

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

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

**Fig.1 Typical Output Characteristics**

**Fig.2 On-Resistance vs. G-S Voltage**

**Fig.3 Forward Characteristics of Reverse**

**Fig.4 Gate-Charge Characteristics**

**Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>**

**Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**

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**Fig.7 Capacitance**

**Fig.8 Safe Operating Area**

**Fig.9 Normalized Maximum Transient Thermal Impedance**

**Fig.10 Switching Time Waveform**

**Fig.11 Unclamped Inductive Switching Waveform**

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

**N-Channel Enhancement Mode MOSFET**
**SOP-8 Package Outline Data**


Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
<b>A</b>	1.35	1.55	1.75	<b>A<sub>1</sub></b>	0.10	0.18	0.25
<b>A<sub>2</sub></b>	1.25	1.45	1.65	<b>A<sub>3</sub></b>	--	0.25	--
<b>b<sub>p</sub></b>	0.36	0.42	0.51	<b>c</b>	0.19	0.22	0.25
<b>D</b>	4.70	4.92	5.10	<b>E</b>	3.80	3.90	4.00
<b>e</b>	--	1.27	--	<b>H<sub>E</sub></b>	5.80	6.00	6.20
<b>L</b>	--	1.05	--	<b>L<sub>p</sub></b>	0.40	0.68	1.00
<b>Q</b>	0.60	0.65	0.73	<b>v</b>	--	0.25	--
<b>w</b>	--	0.25	--	<b>y</b>	--	0.10	--
<b>Z</b>	0.30	0.50	0.70	<b>θ</b>	0°		8°