



## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

$V_{DS}$	60V
$I_D$	10A
$R_{DS(ON)}$ ( at $V_{GS}=10V$ )	< 11m
$R_{DS(ON)}$ ( at $V_{GS}=4.5V$ )	< 15m
100% EAS Tested	

### General Description

Split gate trench MOSFET technology  
 Low  $R_{DS(on)}$  & FOM  
 Extremely low switching loss  
 Excellent stability and uniformity  
 Moisture Sensitivity Level 3  
 Epoxy Meets UL 94 V-0 Flammability Rating  
 Halogen Free

### Applications

Power switching application  
 Uninterruptible power supply  
 DC-DC convertor

### Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	60	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_A=25^\circ C$	$I_D$	10	A
	$T_A=100^\circ C$		6	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	100	A
Avalanche energy <sup>B</sup>		EAS	84	mJ
Total Power Dissipation <sup>C</sup>	$T_A=25^\circ C$	$P_D$	2.5	W
	$T_A=100^\circ C$		1	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ C$

### Thermal resistance

Parameter	Symbol
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## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	60	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.85	3	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	8.5	11	m
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	-	11	15	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =10A, V <sub>GS</sub> =0V	-	0.85	1.2	V
Gate resistance	R <sub>G</sub>	f=1MHz, Open drain	-	1.8	-	
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	10	A
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	-	1390	-	pF
Output Capacitance	C <sub>oss</sub>		-	315	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	25	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =5A	-	26	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	6	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	5	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =5A, di/dt=100A/us	-	22	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	30	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =5A R <sub>GEN</sub> =3	-	11	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	24	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	28	-	
Turn-off fall Time	t <sub>f</sub>		-	25	-	

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Typical Power Dissipation (T<sub>case</sub>=25°C, V<sub>in</sub>=10V, V<sub>out</sub>=1.0V, I<sub>out</sub>=100mA, f<sub>sw</sub>=500kHz, η=80%, I<sub>quiescent</sub>=10mA)  
Typical Power Dissipation (T<sub>case</sub>=25°C, V<sub>in</sub>=10V, V<sub>out</sub>=1.0V, I<sub>out</sub>=100mA, f<sub>sw</sub>=500kHz, η=80%, I<sub>quiescent</sub>=10mA)  
Typical Power Dissipation (T<sub>case</sub>=25°C, V<sub>in</sub>=10V, V<sub>out</sub>=1.0V, I<sub>out</sub>=100mA, f<sub>sw</sub>=500kHz, η=80%, I<sub>quiescent</sub>=10mA)  
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Typical Power Dissipation (T<sub>case</sub>=25°C, V<sub>in</sub>=10V, V<sub>out</sub>=1.0V, I<sub>out</sub>=100mA, f<sub>sw</sub>=500kHz, η=80%, I<sub>quiescent</sub>=10mA)



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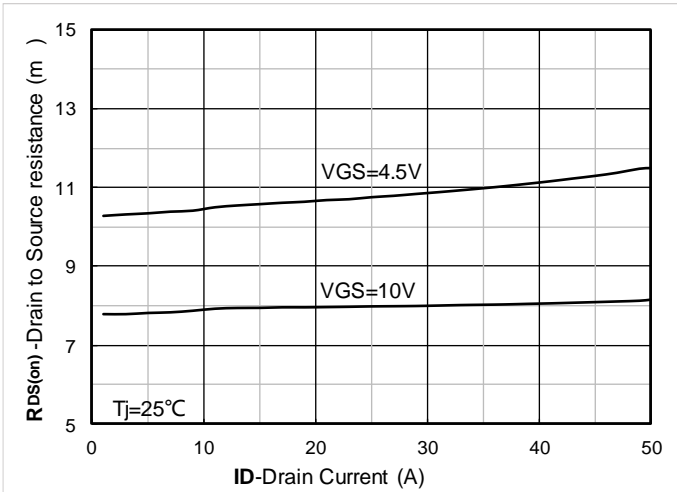


Figure 7.  $R_{DS(on)}$  VS Drain Current

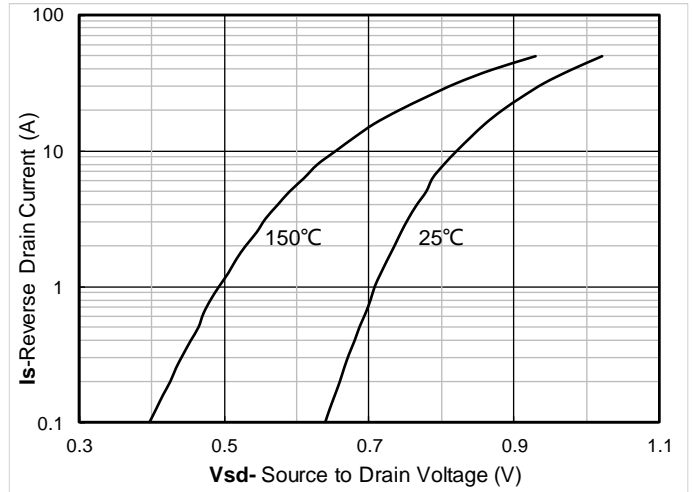


Figure 8. Forward characteristics of reverse diode

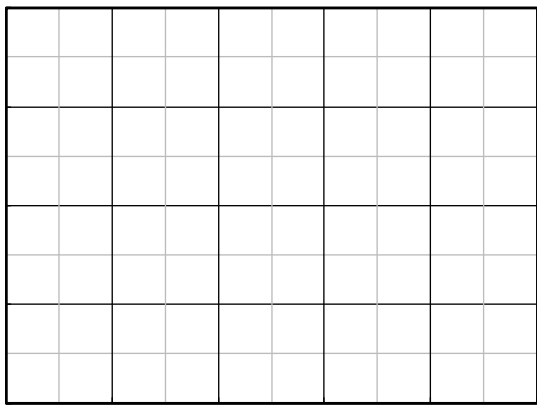


Figure 9. Normalized breakdown voltage

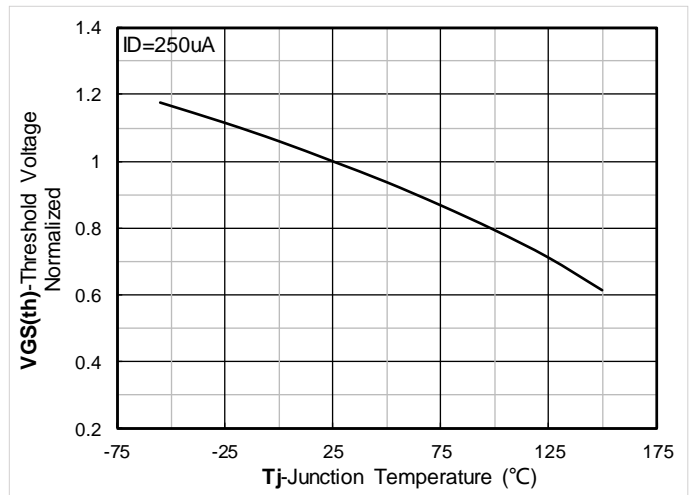


Figure 10. Normalized Threshold voltage

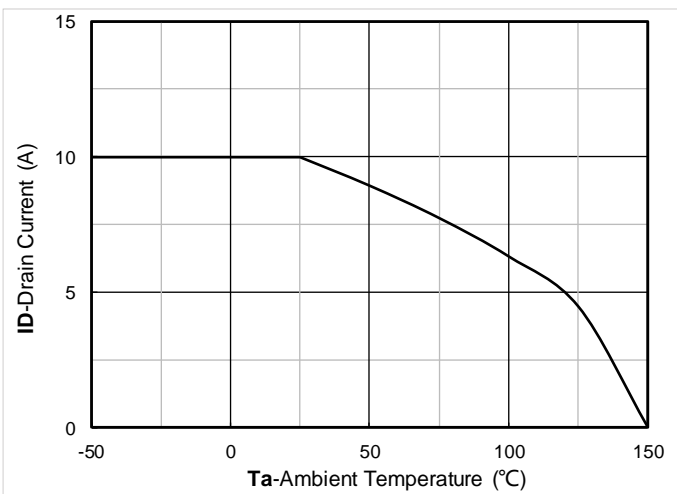


Figure 11. Current dissipation

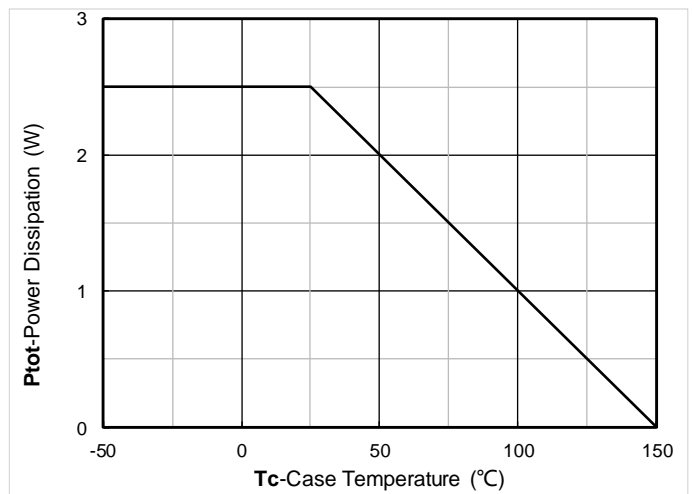


Figure 12. Power dissipation



Figure 13. Maximum Transient Thermal Impedance

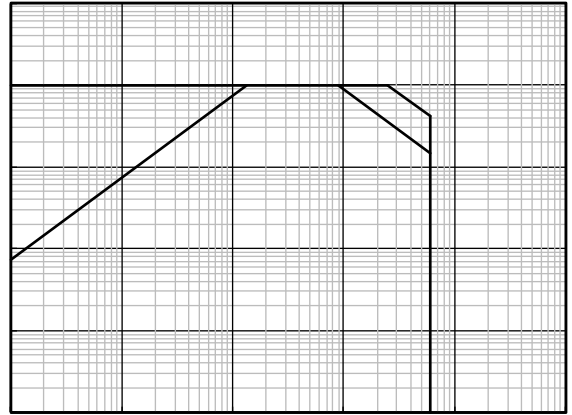


Figure 14. Safe Operation Area

## Test Circuits & Waveforms

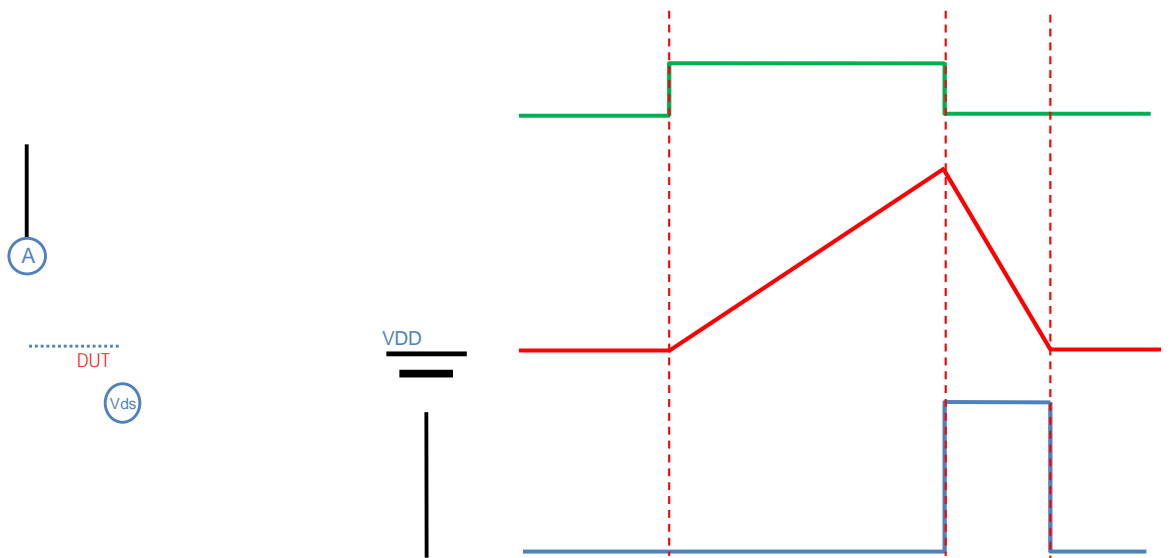


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

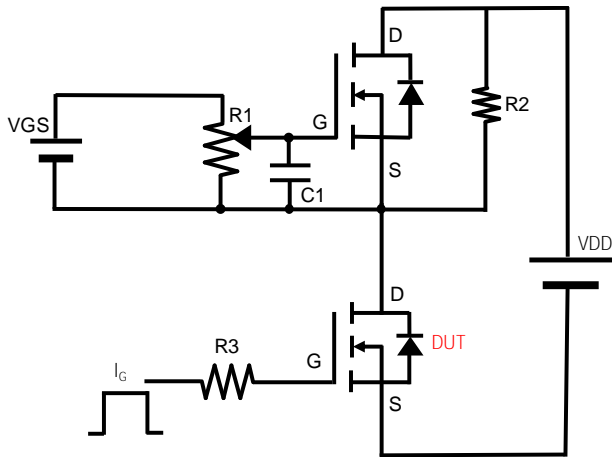


Figure B. Gate Charge Test Circuit & Waveform

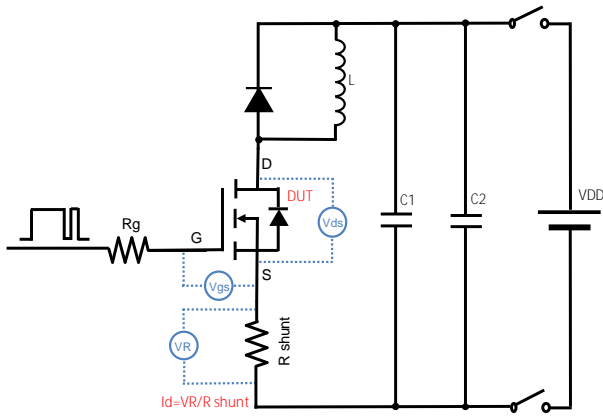


Figure C. Resistive Switching Test Circuit & Waveform

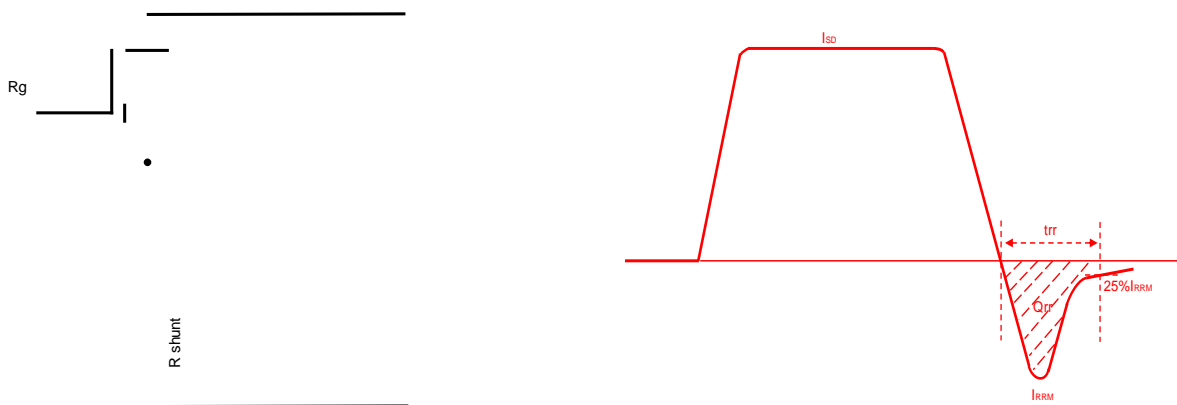


Figure D. Diode Recovery Test Circuit & Waveform



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## SOP-8 Package information

SYMBOL	MIN.
B	
D	0.020
E	
F	0.050BSC
H	
J	
K	



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## Disclaimer

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The product listed herein is designed to be used with ordinary electronic equipment or devices, and not-3(t)11(90 g060 g060f1 0 0 1 32.64