



Features:

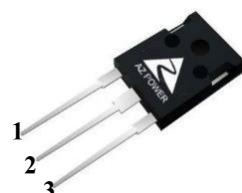
- 1200V High Blocking Voltage
- Low On-Resistance
- High Speed Switching
- Easy to Parallel

Benefits:

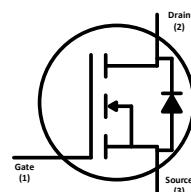
- Increased frequency
- Minimal switching loss
- Higher Efficiency
- Low cooling requirement

Symbol	Value	Unit
V_{DS}	1200	V
$I_{DS} (T_c = 25^\circ C)$	80	A
R_{DSon}	40	mΩ

Outline



Circuit



TO-247-3

Applications:

- Switch Mode Power Supply
- High Voltage DC/DC Converters
- Solar Inverters
- Motor Drivers

Maximum Ratings ($T_c = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain-Source Voltage	1200	V	$V_{GS} = 0V, I_{DS} = 100\mu A$
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute Maximum values
V_{GSop}	Gate-Source Voltage	-5/+20	V	Recommended operational values
I_{DS}	Continuous Drain Current	80 50	A	$V_{GS} = 20V, T_c = 25^\circ C$ $V_{GS} = 20V, T_c = 100^\circ C$
$I_{DS(pulse)}$	Pulsed Drain Current	160	A	Pulse width t_p limited by T_{Jmax}
P_D	Power Dissipation	312	W	$T_c = 25^\circ C, T_J = 150^\circ C$
$T_{J,max}$	Operating Junction Temperature	150	°C	
T_{stg}	Storage Temperature Range	-55 to 150	°C	

Thermal characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Thermal resistance		0.40		°C/W



Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions	
		Min.	Typ.	Max.			
$V_{(\text{BR})\text{DSS}}$	Drain-Source Breakdown Voltage	1200			V	$V_{\text{GS}}=0\text{V}, I_{\text{DS}}=100\mu\text{A}$	
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	1.2 1.5	2.2	3	V	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{DS}}=10\text{mA}, T_J=25^\circ\text{C}$ $V_{\text{DS}}=V_{\text{GS}}, I_{\text{DS}}=10\text{mA}, T_J=150^\circ\text{C}$	
I_{DS}	Zero Gate Voltage Drain Current		5	100	μA	$V_{\text{DS}}=1200\text{V}, V_{\text{GS}}=0\text{V}$	
I_{GSS}	Gate-Source Leakage Current			250	nA	$V_{\text{GS}}=20\text{V}, V_{\text{DS}}=0\text{V}$	
R_{DSon}	Drain-Source On-State Resistance		38 60	90	$\text{m}\Omega$	$V_{\text{GS}}=20\text{V}, I_{\text{DS}}=40\text{A}, T_J=25^\circ\text{C}$ $V_{\text{GS}}=20\text{V}, I_{\text{DS}}=40\text{A}, T_J=150^\circ\text{C}$	
g_{fs}	Transconductance		13.3		S	$V_{\text{DS}}=20\text{V}, I_{\text{DS}}=40\text{A}$	
$R_{\text{G,int}}$	Internal Gate Resistance		1.25		Ω	$f=1\text{ MHz}, V_{\text{AC}}=25\text{mV}$	
C_{ISS}	Input Capacitance		3012		pF	$V_{\text{DS}}=1000\text{V}, V_{\text{GS}}=0\text{V}$ $f=1\text{ MHz}, V_{\text{AC}}=25\text{mV}$	
C_{OSS}	Output Capacitance		196				
C_{RSS}	Reverse Transfer Capacitance		19				
E_{OSS}	C_{OSS} Stored Energy		120		μJ	$V_{\text{DD}}=800\text{V}, V_{\text{GS}}=-5/20\text{V}, I_{\text{DS}}=40\text{A},$ $R_{\text{G(EXT)}}=1\Omega, L=0.5\text{mH}$	
E_{on}	Turn-On Switching Energy		719		μJ		
E_{off}	Turn-off Switching Energy		79				
$t_{\text{d(on)}}$	Turn-On Delay Time		16		ns	$V_{\text{DD}}=800\text{V}, V_{\text{GS}}=-5/20\text{V}, I_{\text{DS}}=40\text{A},$ $R_{\text{G(EXT)}}=1\Omega, R_L=20\ \Omega,$ Timing relative to V_{DS}	
t_r	Rise Time		18				
$t_{\text{d(off)}}$	Turn-off Delay Time		30				
t_f	Fall Time		13				
Q_{GS}	Gate to Source Charge		52		nC	$V_{\text{GS}}=-5/20\text{V}, V_{\text{DS}}=800\text{V}, I_{\text{DS}}=40\text{A}$	
Q_{GD}	Gate to Drain Charge		86				
Q_{G}	Total Gate Charge		216				

Body Diode Characteristics

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage		4.3 3.8		V	$V_{\text{GS}}=-5\text{V}, I_{\text{SD}}=10\text{A}, T_J=25^\circ\text{C}$ $V_{\text{GS}}=-5\text{V}, I_{\text{SD}}=10\text{A}, T_J=150^\circ\text{C}$
I_{SD}	Continuous Diode Current		57		A	
t_{rr}	Reverse Recovery Time		68		ns	$V_{\text{GS}}=-5\text{V}, I_{\text{SD}}=40\text{A}, VR=800\text{V},$ $di/dt=1250\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge		408		nC	
I_{rrm}	Peak Reverse Recovery Current		14		A	



Typical Performance

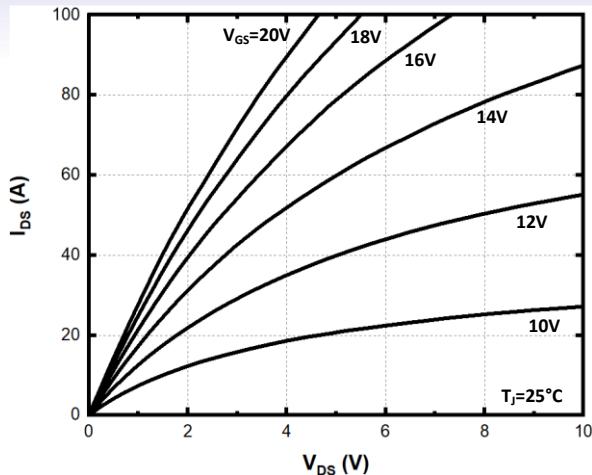


Fig. 1 Output Characteristics, $T_J = 25^\circ\text{C}$

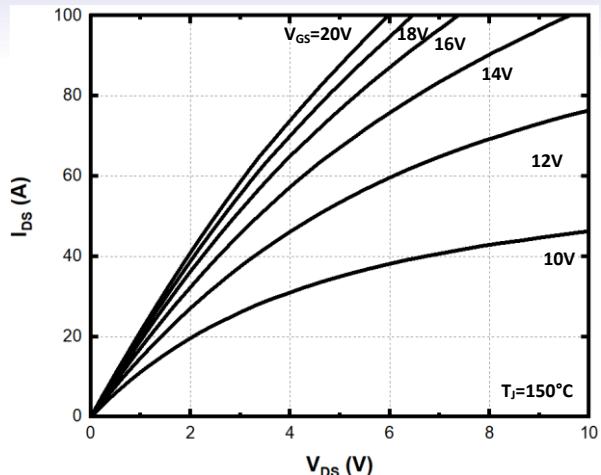


Fig. 2 Output Characteristics, $T_J = 150^\circ\text{C}$

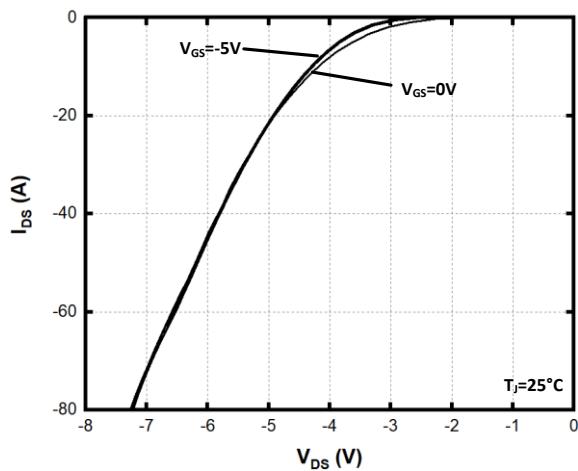


Fig. 3 Body Diode Characteristics, $T_J = 25^\circ\text{C}$

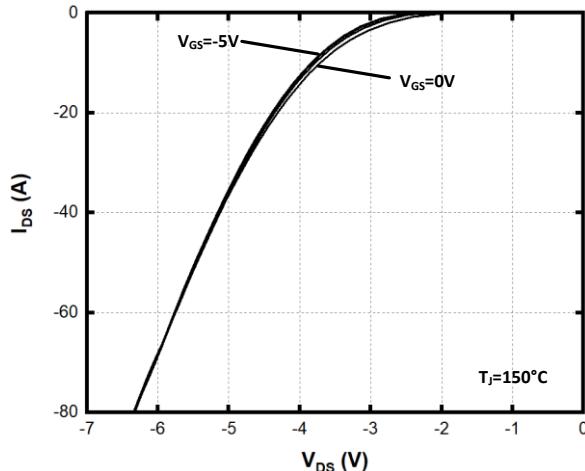


Fig. 4 Body Diode Characteristics, $T_J = 150^\circ\text{C}$

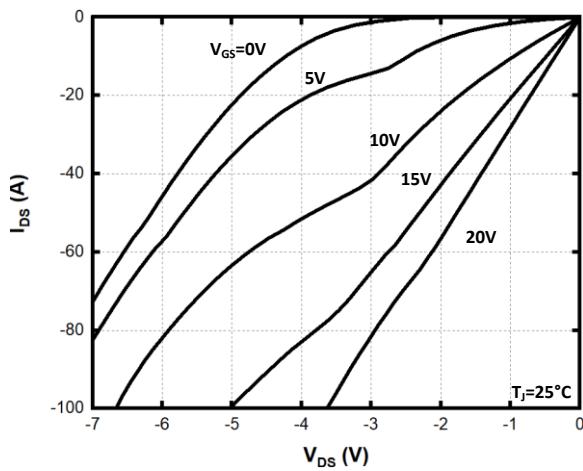


Fig. 5 3rd Quadrant Characteristics, $T_J = 25^\circ\text{C}$

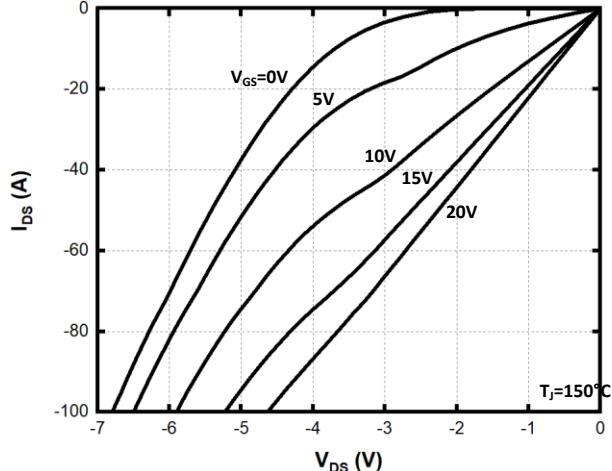


Fig. 6 3rd Quadrant Characteristics, $T_J = 150^\circ\text{C}$



Typical Performance

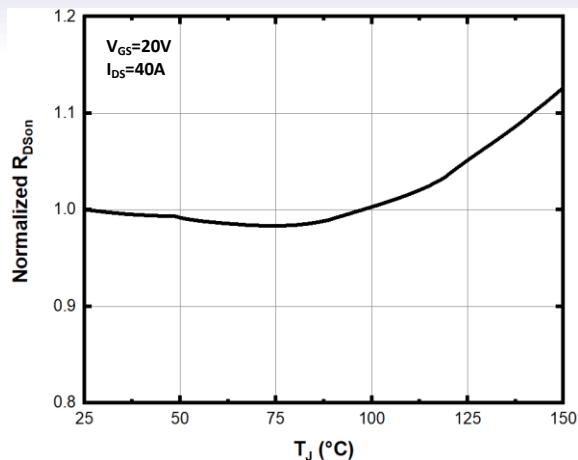


Fig. 7 Normalized On-Resistance vs Temperature

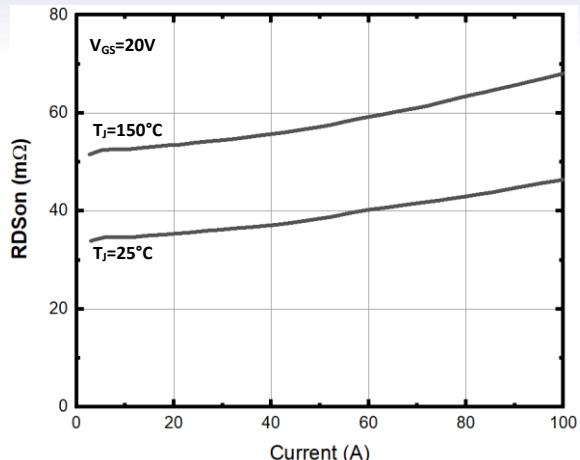


Fig. 8 On-Resistance vs Drain Current

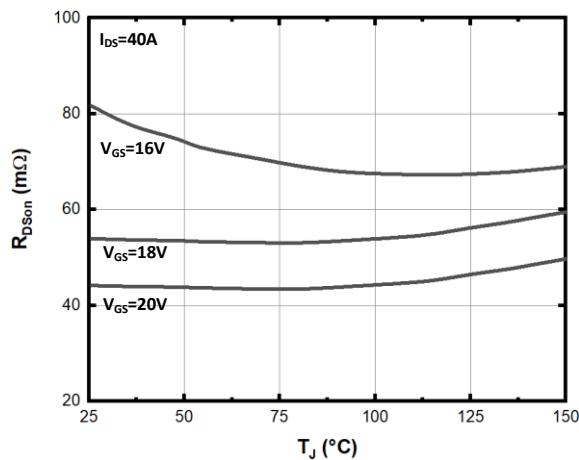


Fig. 9 On-Resistance vs Temperature

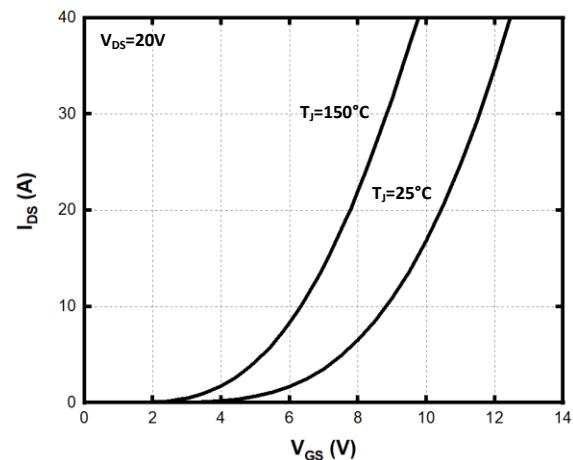


Fig. 10 Transfer Characteristics

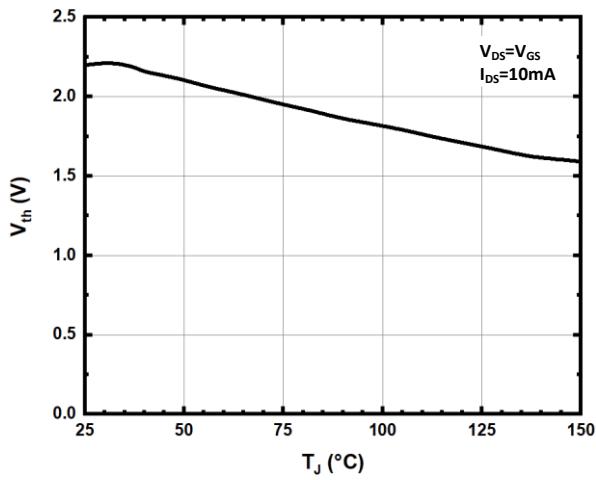


Fig. 11 Threshold Voltage vs. Temperature

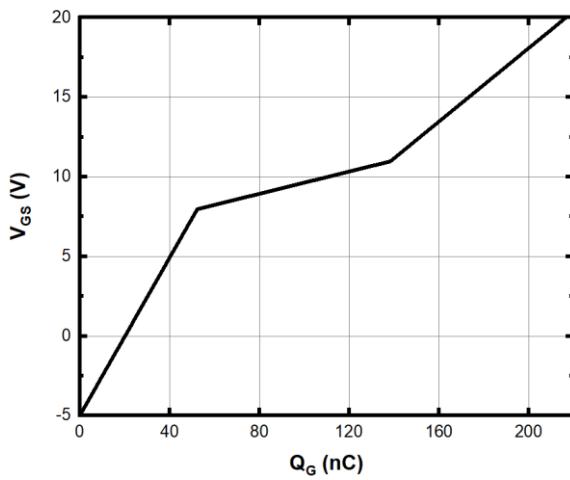


Fig. 12 Gate Charge Characteristics



Typical Performance

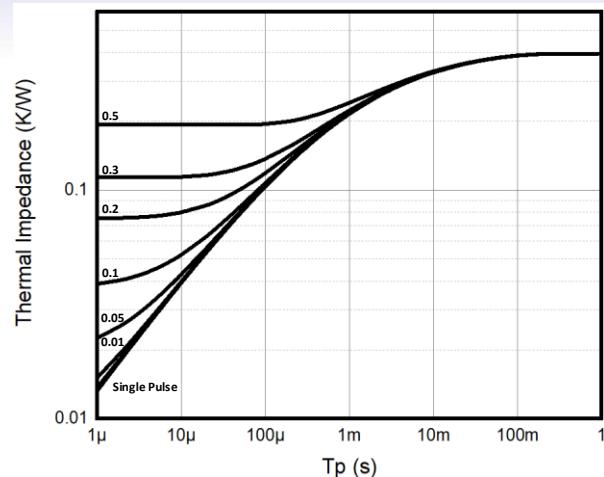


Fig. 13 Transient Thermal Impedance

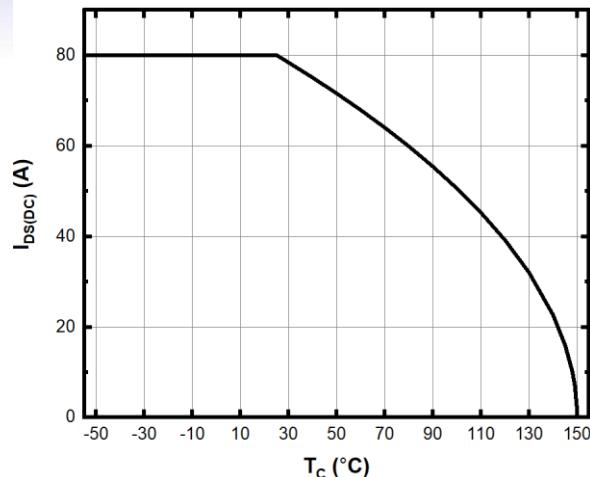


Fig. 14 Continuous Drain Current Derating

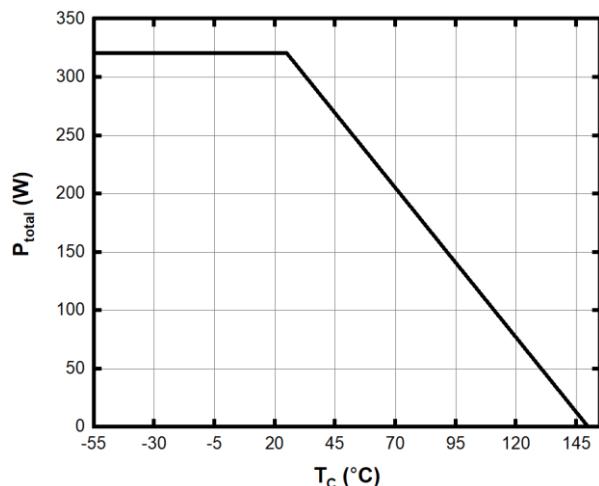


Fig. 15 Power Derating

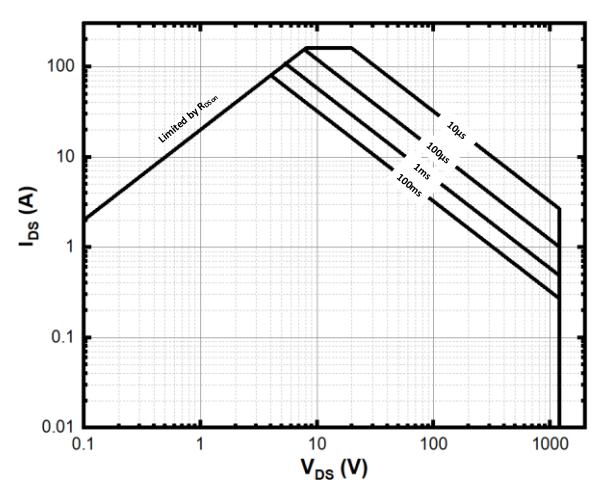


Fig. 16 Safe Operating Area

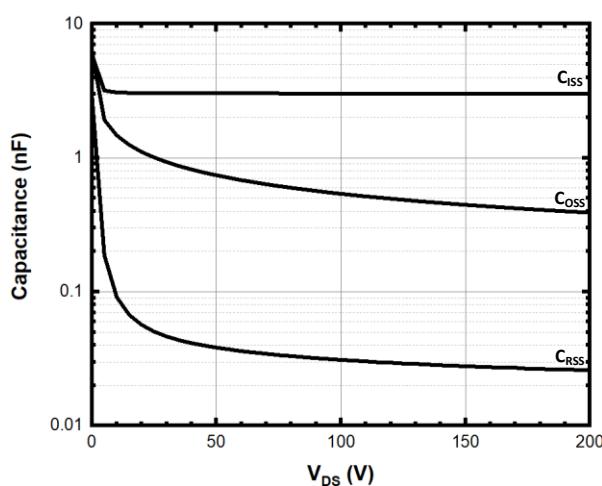


Fig. 17 Capacitances vs V_{DS} (200V)

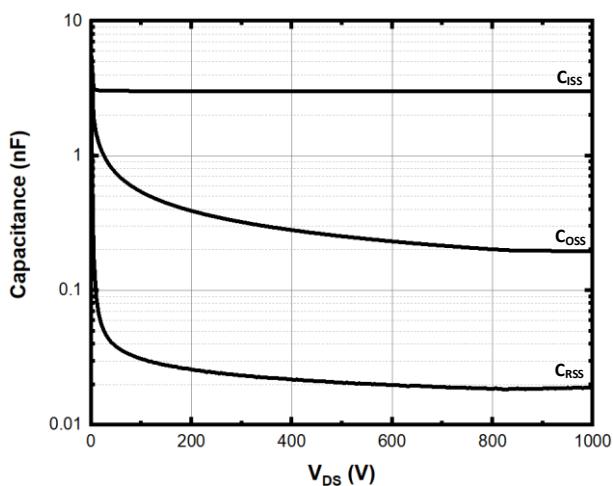


Fig. 18 Capacitances vs V_{DS} (800V)



Typical Performance

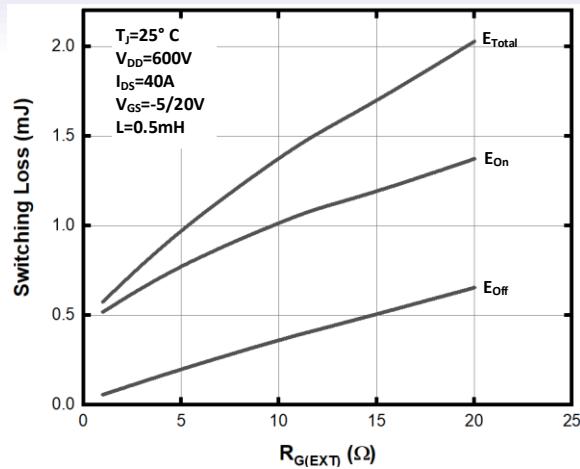


Fig. 19 Switching Loss vs $R_{G(EXT)}$ (600V)

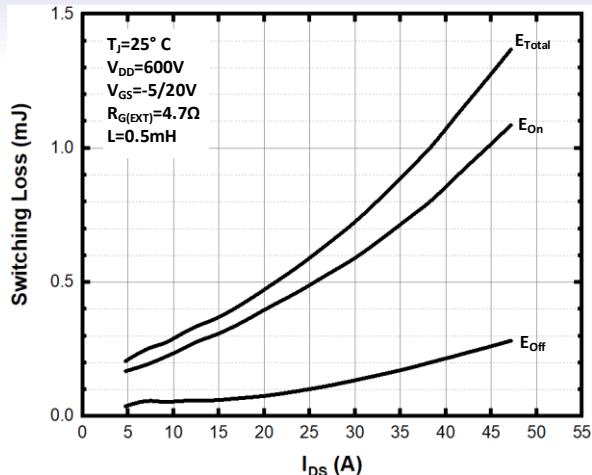


Fig. 20 Switching Loss vs Drain Current (600V)

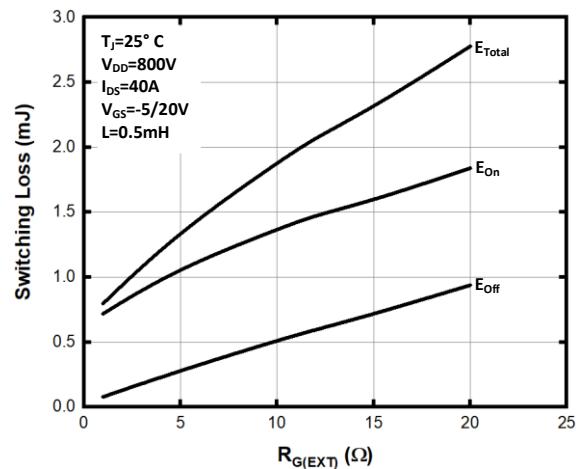


Fig. 21 Switching Loss vs $R_{G(EXT)}$ (800V)

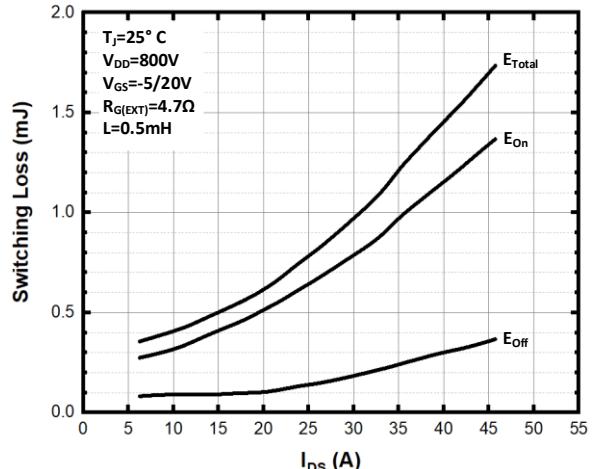


Fig. 22 Switching Loss vs Drain Current (800V)

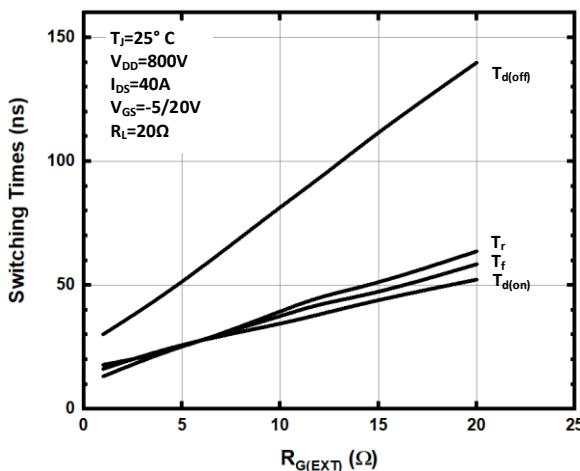


Fig. 23 Switching Time vs $R_{G(EXT)}$

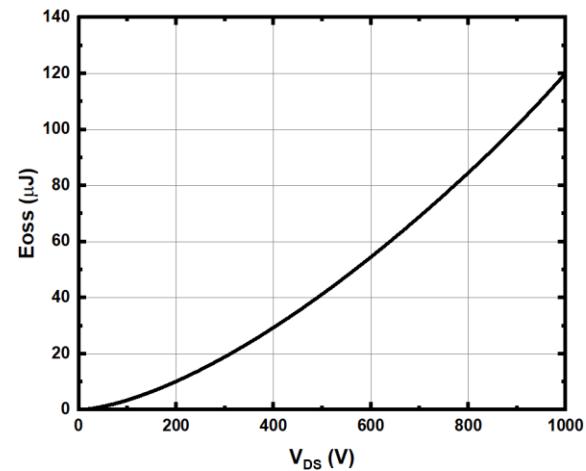


Fig. 24 Output Capacitor Stored Energy



Methodologies

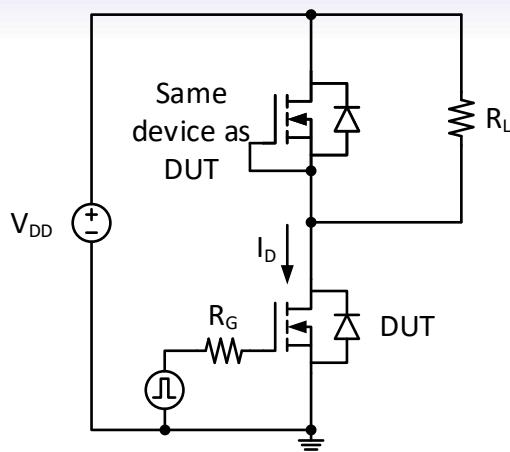


Fig. 25 Resistive Load Switching

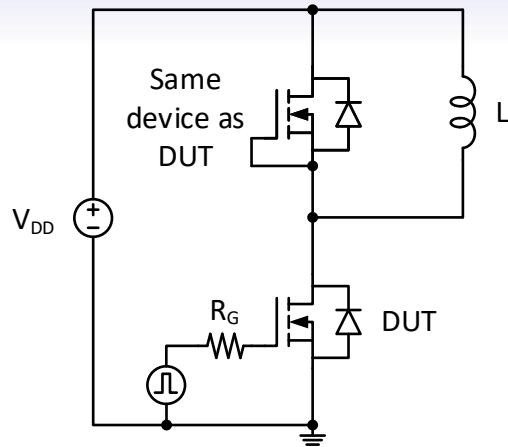


Fig. 26 Clamped Inductive Switching

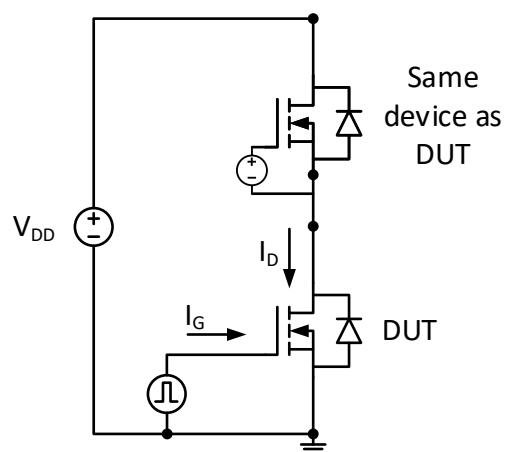


Fig. 27 Gate Charge

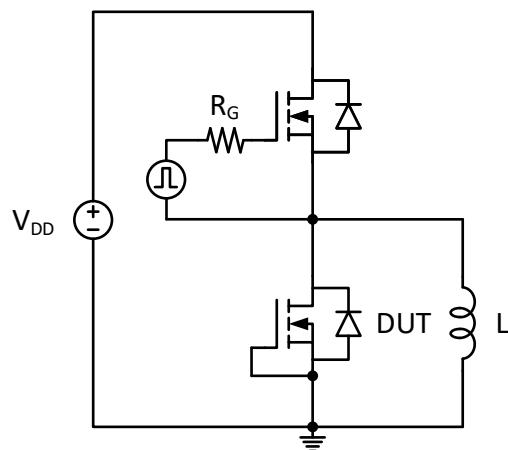


Fig. 28 Body Diode Reverse Recovery

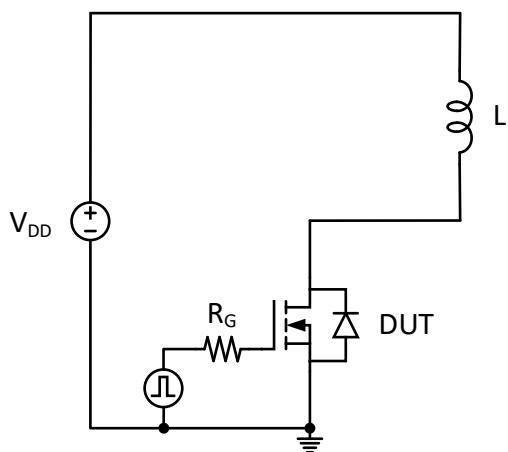


Fig. 29 Unclamped Inductive Switching



Definitions

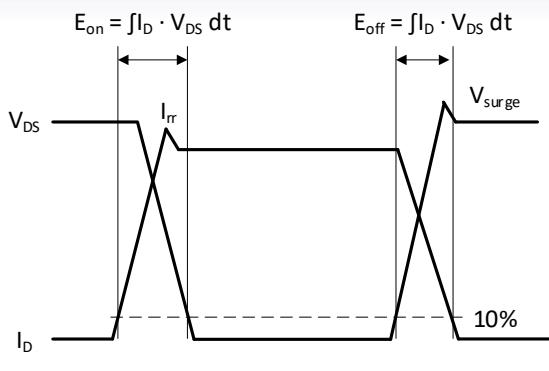


Fig. 30 Switching Losses

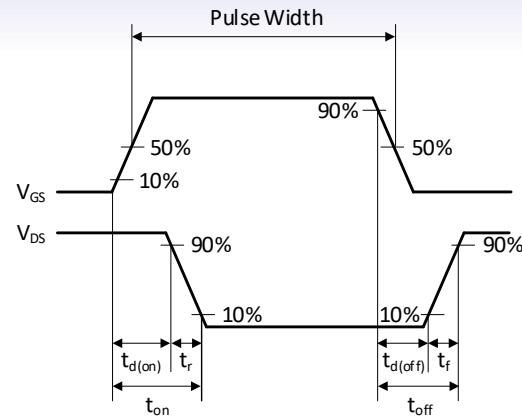


Fig. 31 Switching Times

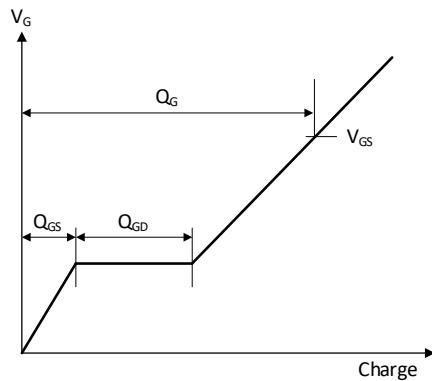


Fig. 32 Gate Charges

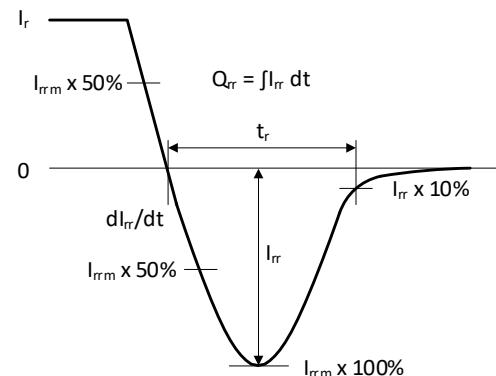
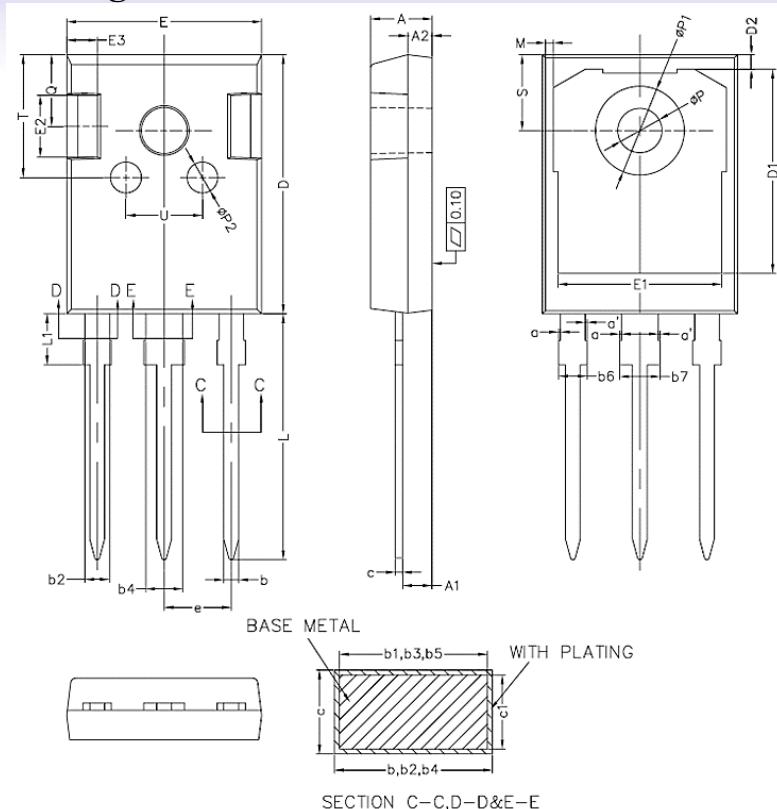


Fig. 33 Body Diode Reverse Recovery



Package TO-247-3 (Unit: mm)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	—	0.15
a'	0	—	0.15
b	1.16	—	1.26
b1	1.15	1.2	1.22
b2	1.96	—	2.06
b3	1.95	2.00	2.02
b4	2.96	—	3.06
b5	2.95	3.00	3.02
b6	—	—	2.25
b7	—	—	3.25
c	0.59	—	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.34	5.44	5.54
L	19.80	19.92	20.10
L1	—	—	4.30
M	0.35	—	0.95
P	3.50	3.60	3.70
P1	7.00	—	7.40
P2	2.40	2.50	2.60
Q	5.60	—	6.00
S	6.05	6.15	6.25
T	9.80	—	10.20
U	6.00	—	6.40

NOTES:

1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

2. EJECTION MARK DEPTH 0.10±0.05

This Product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, systems, or air-traffic control systems.

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