

**Features:**

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

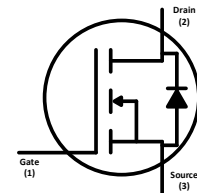
**Benefits:**

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

Symbol	Value	Unit
$V_{DS}$	1200	V
$I_{DS} (T_c=25^\circ\text{C})$	49	A
$R_{DSon}$	65	m $\Omega$

**Outline**
**Circuit**
**Applications:**

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


**TO-247-3**
**Maximum Ratings (T<sub>c</sub> = 25°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	49	A	$V_{GS} = 20V, T_c = 25^\circ\text{C}$
		31		$V_{GS} = 20V, T_c = 100^\circ\text{C}$
$I_{DS(pulse)}$	Pulsed Drain Current	80	A	Pulse width $t_p$ limited by $T_{Jmax}$
$P_D$	Power Dissipation	227	W	$T_c = 25^\circ\text{C}, T_J = 150^\circ\text{C}$
$T_{J,max}$	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		0.55		°C/W

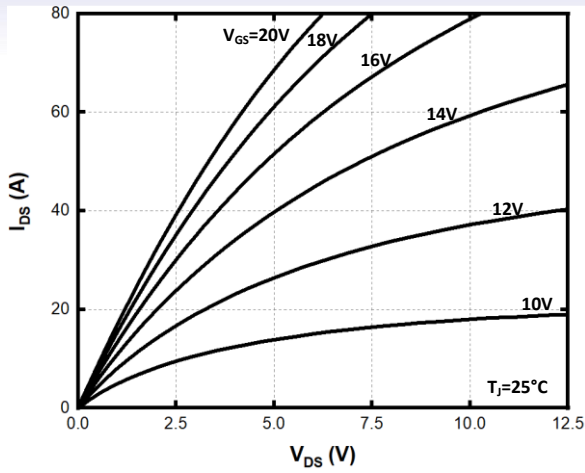
**Electrical Characteristics (T<sub>c</sub> = 25°C unless otherwise specified)**

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	1200			V	V <sub>GS</sub> = 0V, I <sub>DS</sub> = 100μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.2	2.0 1.5	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 5mA, T <sub>J</sub> = 25°C V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 5mA, T <sub>J</sub> = 150°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current		1	100	μA	V <sub>DS</sub> = 1200V, V <sub>GS</sub> = 0V
I <sub>GSS</sub>	Gate-Source Leakage Current			250	nA	V <sub>GS</sub> = 20V, V <sub>DS</sub> = 0V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance		65 95	80	mΩ	V <sub>GS</sub> = 20V, I <sub>DS</sub> = 25A, T <sub>J</sub> = 25°C V <sub>GS</sub> = 20V, I <sub>DS</sub> = 25A, T <sub>J</sub> = 150°C
g <sub>fs</sub>	Transconductance		9.8		S	V <sub>DS</sub> = 20V, I <sub>DS</sub> = 25A
R <sub>G,int</sub>	Internal Gate Resistance		1.4		Ω	f = 1 MHz, V <sub>AC</sub> = 25mV
C <sub>ISS</sub>	Input Capacitance		2075		pF	V <sub>DS</sub> = 1000V, V <sub>GS</sub> = 0V f = 1 MHz, V <sub>AC</sub> = 25mV
C <sub>OSS</sub>	Output Capacitance		127			
C <sub>RSS</sub>	Reverse Transfer Capacitance		17			
E <sub>OSS</sub>	C <sub>OSS</sub> Stored Energy		144			
E <sub>on</sub>	Turn-On Switching Energy		353		μJ	V <sub>DD</sub> = 800V, V <sub>GS</sub> = -5/20V, I <sub>DS</sub> = 25A, R <sub>G(EXT)</sub> = 2Ω, L = 0.5mH
E <sub>off</sub>	Turn-off Switching Energy		58			
t <sub>d(on)</sub>	Turn-On Delay Time		14		ns	V <sub>DD</sub> = 800V, V <sub>GS</sub> = -5/20V, I <sub>DS</sub> = 25A, R <sub>G(EXT)</sub> = 2Ω, R <sub>L</sub> = 32Ω, Timing relative to V <sub>DS</sub>
t <sub>r</sub>	Rise Time		14			
t <sub>d(off)</sub>	Turn-off Delay Time		24			
t <sub>f</sub>	Fall Time		13			
Q <sub>GS</sub>	Gate to Source Charge		37		nC	V <sub>GS</sub> = -5/20V, V <sub>DS</sub> = 800V, I <sub>DS</sub> = 25A
Q <sub>GD</sub>	Gate to Drain Charge		63			
Q <sub>G</sub>	Total Gate Charge		146			

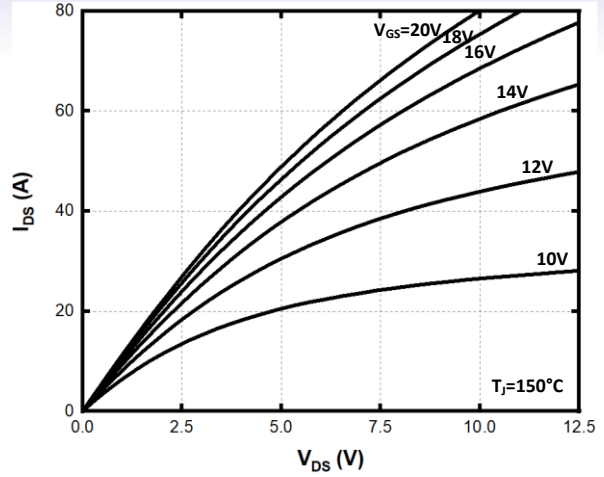
**Body Diode Characteristics**

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V <sub>SD</sub>	Diode Forward Voltage		4.6 4.1		V	V <sub>GS</sub> = -5V, I <sub>SD</sub> = 10A, T <sub>J</sub> = 25°C V <sub>GS</sub> = -5V, I <sub>SD</sub> = 10A, T <sub>J</sub> = 150°C
I <sub>SD</sub>	Continuous Diode Current		40		A	
t <sub>rr</sub>	Reverse Recovery Time		33		ns	V <sub>GS</sub> = -5V, I <sub>SD</sub> = 25A, V <sub>R</sub> = 800V, di/dt = 1400A/μs
Q <sub>rr</sub>	Reverse Recovery Charge		321		nC	
I <sub>rrm</sub>	Peak Reverse Recovery Current		14		A	

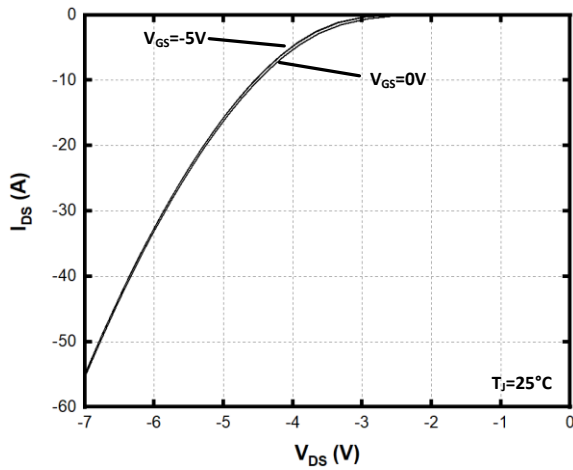
**Typical Performance**



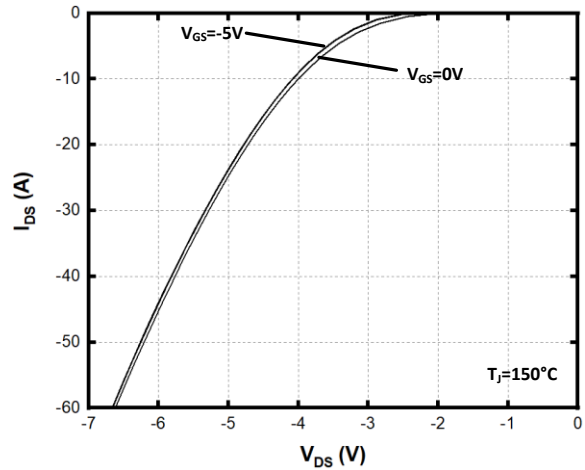
**Fig. 1 Output Characteristics,  $T_J = 25^\circ\text{C}$**



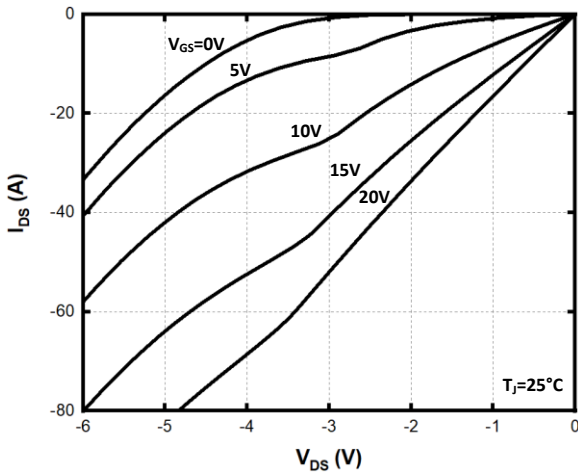
**Fig. 2 Output Characteristics,  $T_J = 150^\circ\text{C}$**



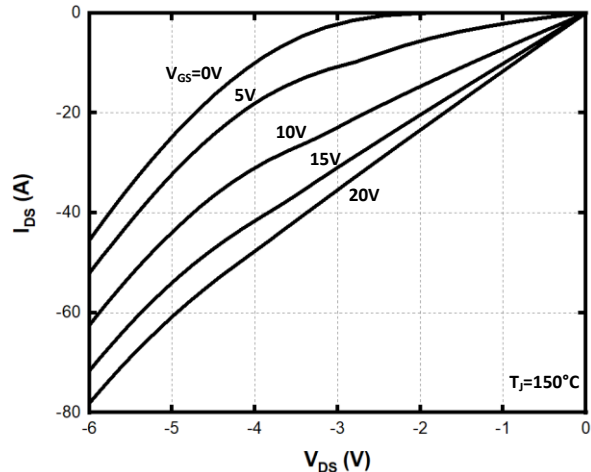
**Fig. 3 Body Diode Characteristics,  $T_J = 25^\circ\text{C}$**



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

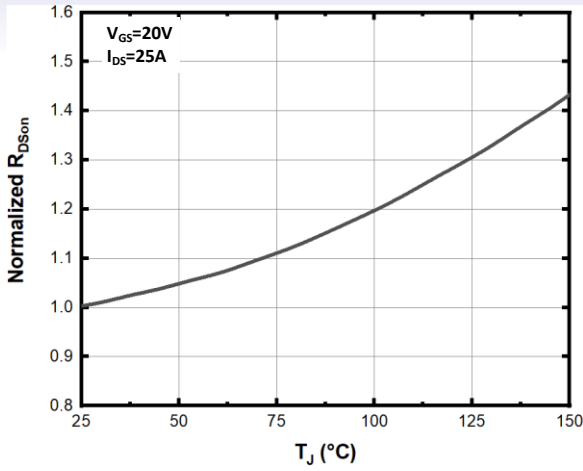


**Fig. 5 3<sup>rd</sup> Quadrant Characteristics,  $T_J = 25^\circ\text{C}$**

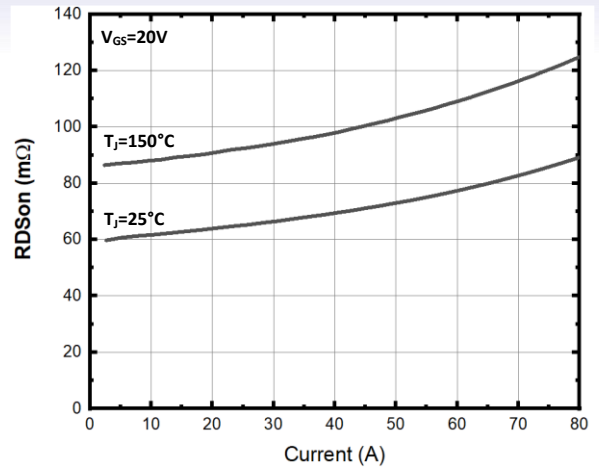


**Fig. 6 3<sup>rd</sup> Quadrant Characteristics,  $T_J = 150^\circ\text{C}$**

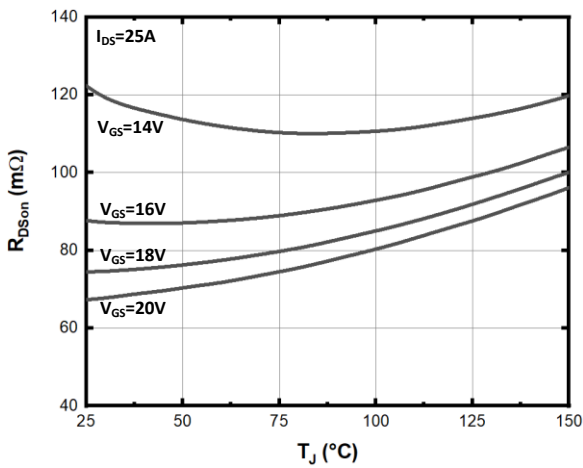
**Typical Performance**



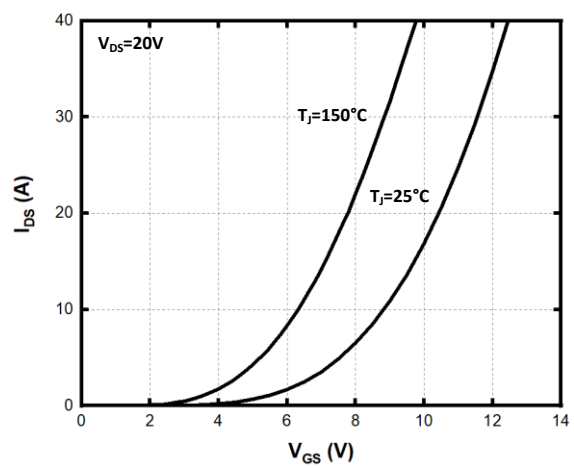
**Fig. 7 Normalized On-Resistance vs Temperature**



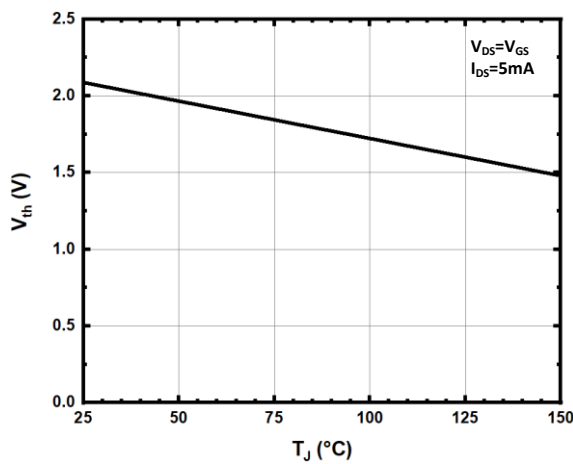
**Fig. 8 On-Resistance vs Drain Current**



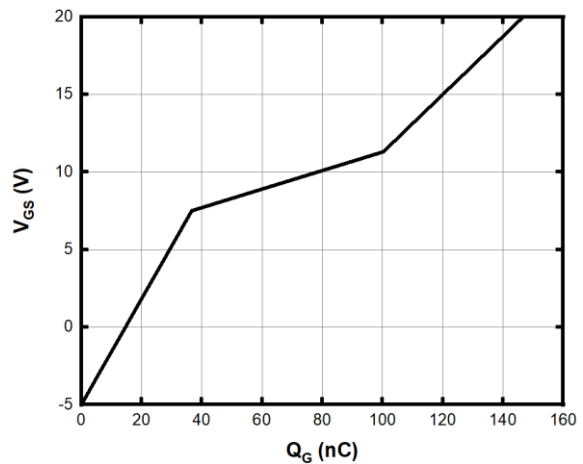
**Fig. 9 On-Resistance vs Temperature**



**Fig. 10 Transfer Characteristics**

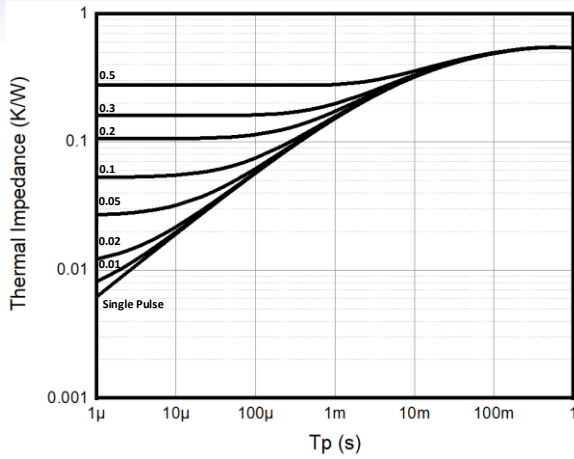


**Fig. 11 Threshold Voltage vs. Temperature**

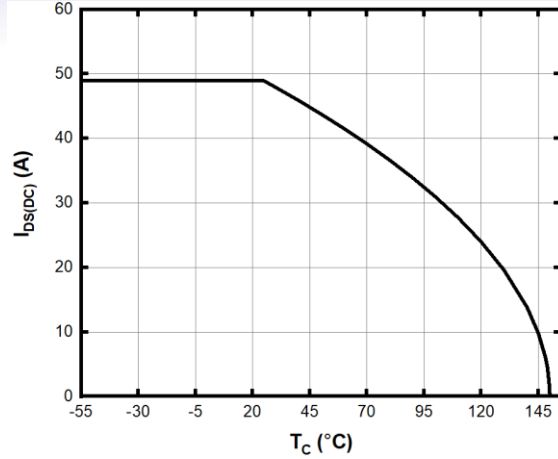


**Fig. 12 Gate Charge Characteristics**

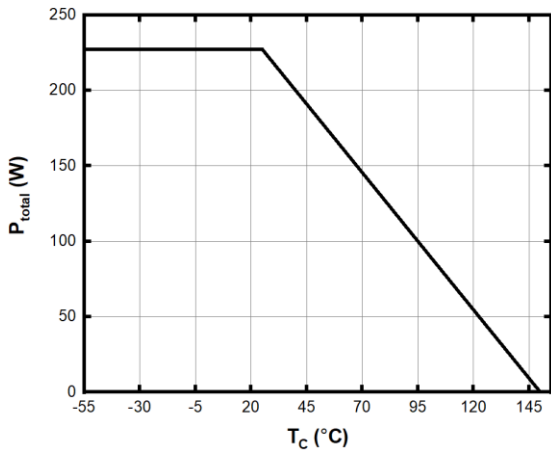
**Typical Performance**



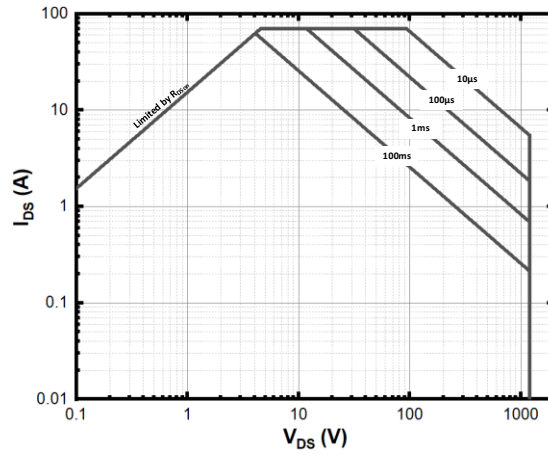
**Fig. 13 Transient Thermal Impedance**



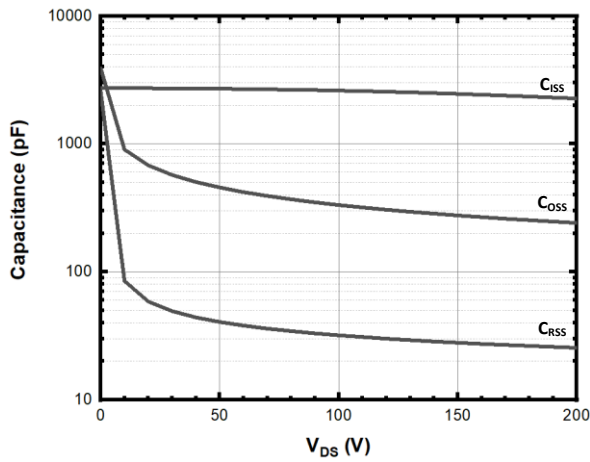
**Fig. 14 Continuous Drain Current Derating**



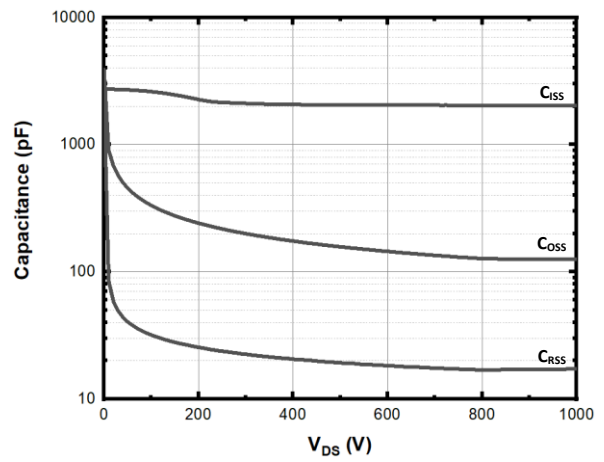
**Fig. 15 Power Derating**



**Fig. 16 Safe Operating Area**

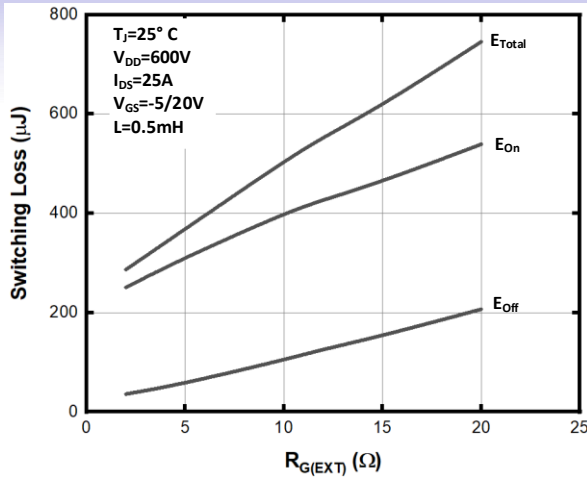


**Fig. 17 Capacitances vs  $V_{DS}$  (200V)**

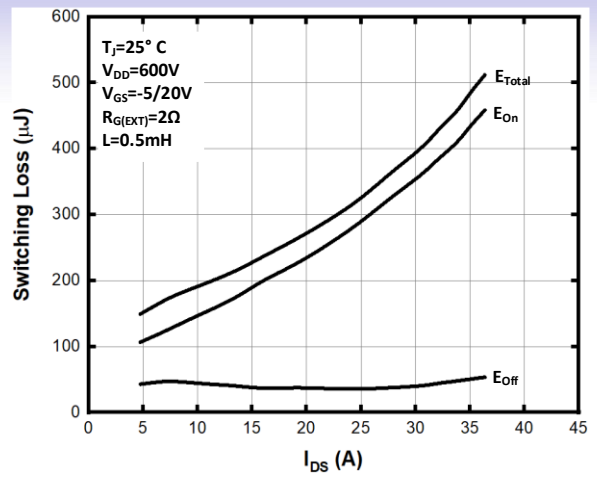


**Fig. 18 Capacitances vs  $V_{DS}$  (800V)**

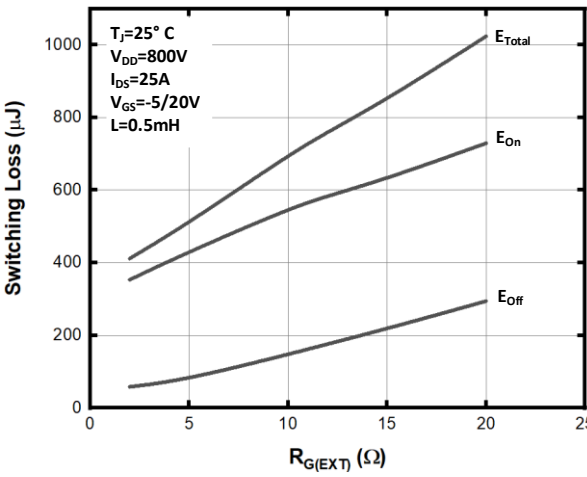
**Typical Performance**



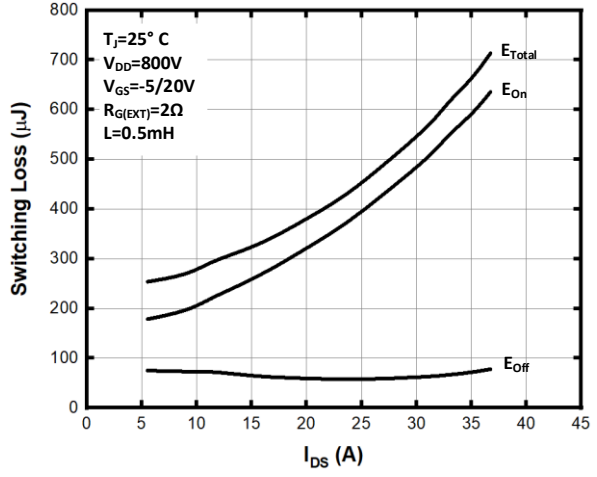
**Fig. 19 Switching Loss vs R<sub>G(EXT)</sub> (600V)**



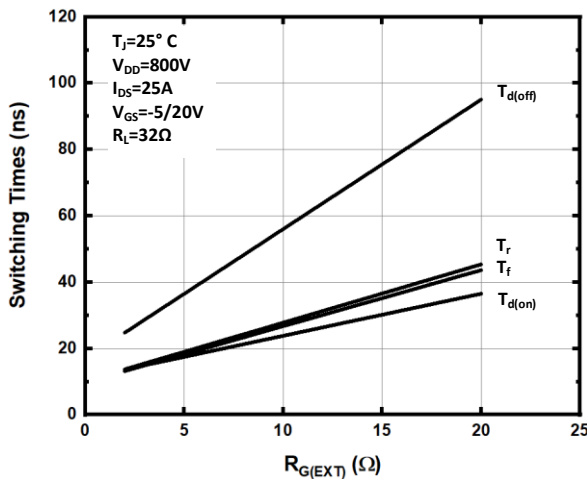
**Fig. 20 Switching Loss vs Drain Current (600V)**



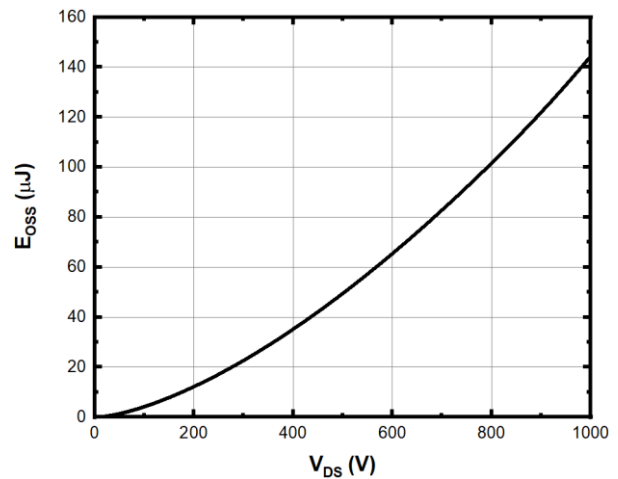
**Fig. 21 Switching Loss vs R<sub>G(EXT)</sub> (800V)**



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

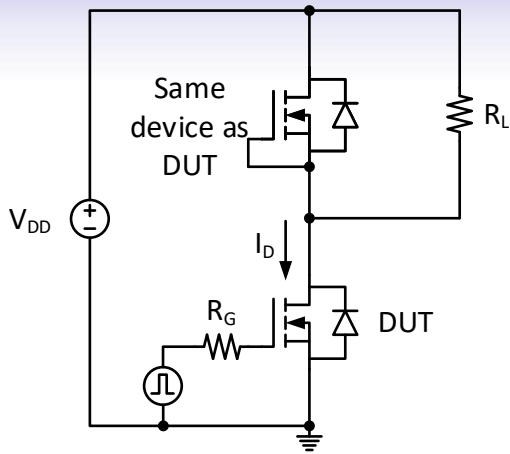


**Fig. 23 Switching Time vs R<sub>G(EXT)</sub>**

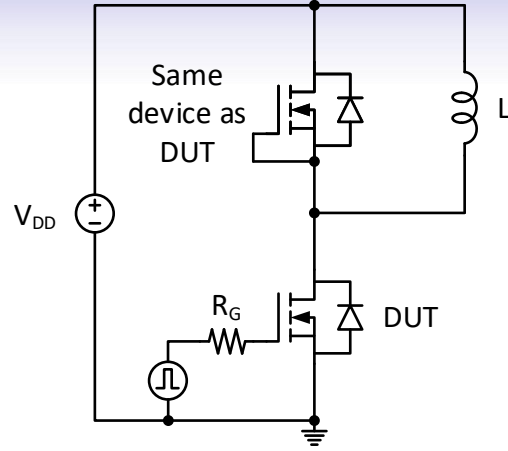


**Fig. 24 Output Capacitor Stored Energy**

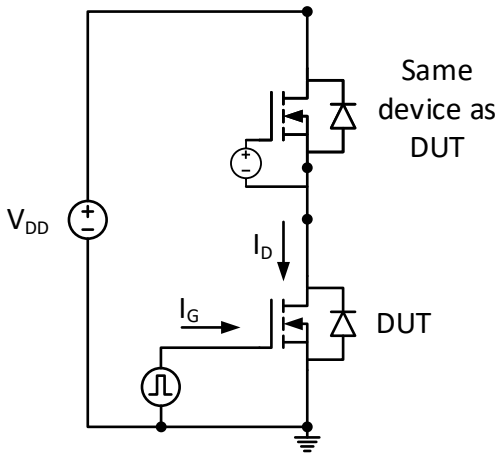
**Methodologies**



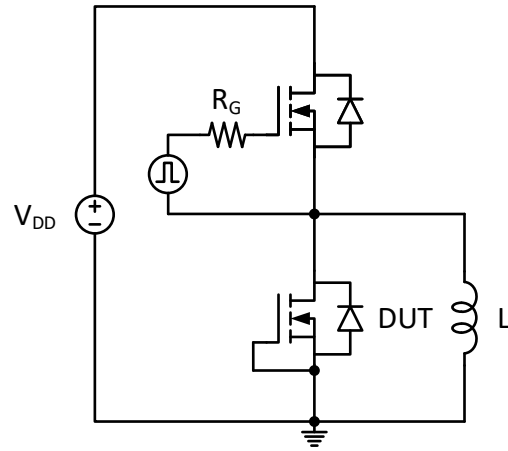
**Fig. 25 Resistive Load Switching**



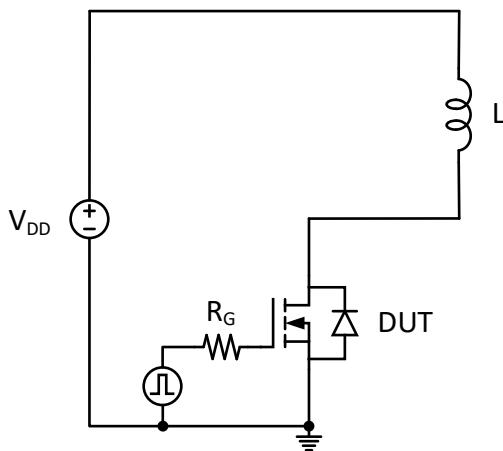
**Fig. 26 Clamped Inductive Switching**



**Fig. 27 Gate Charge**

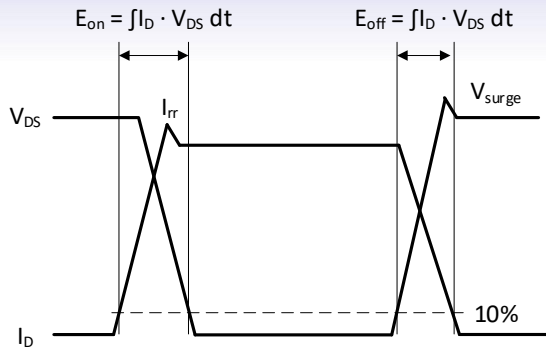


**Fig. 28 Body Diode Reverse Recovery**

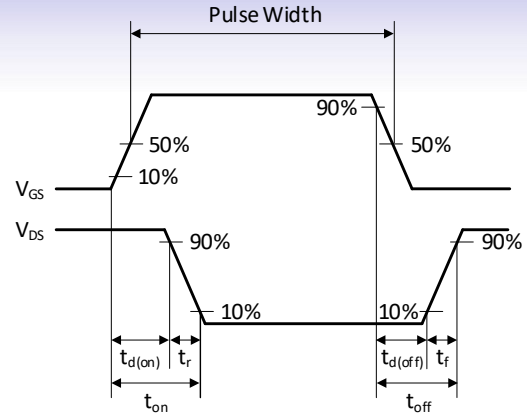


**Fig. 29 Unclamped Inductive Switching**

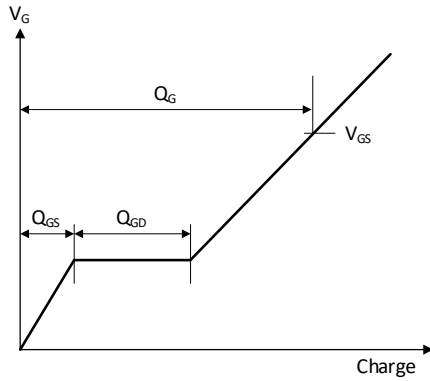
**Definitions**



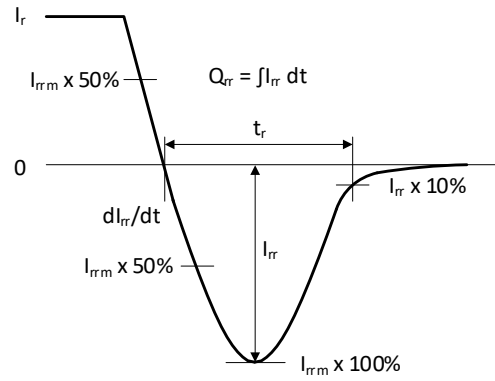
**Fig. 30 Switching Losses**



**Fig. 31 Switching Times**



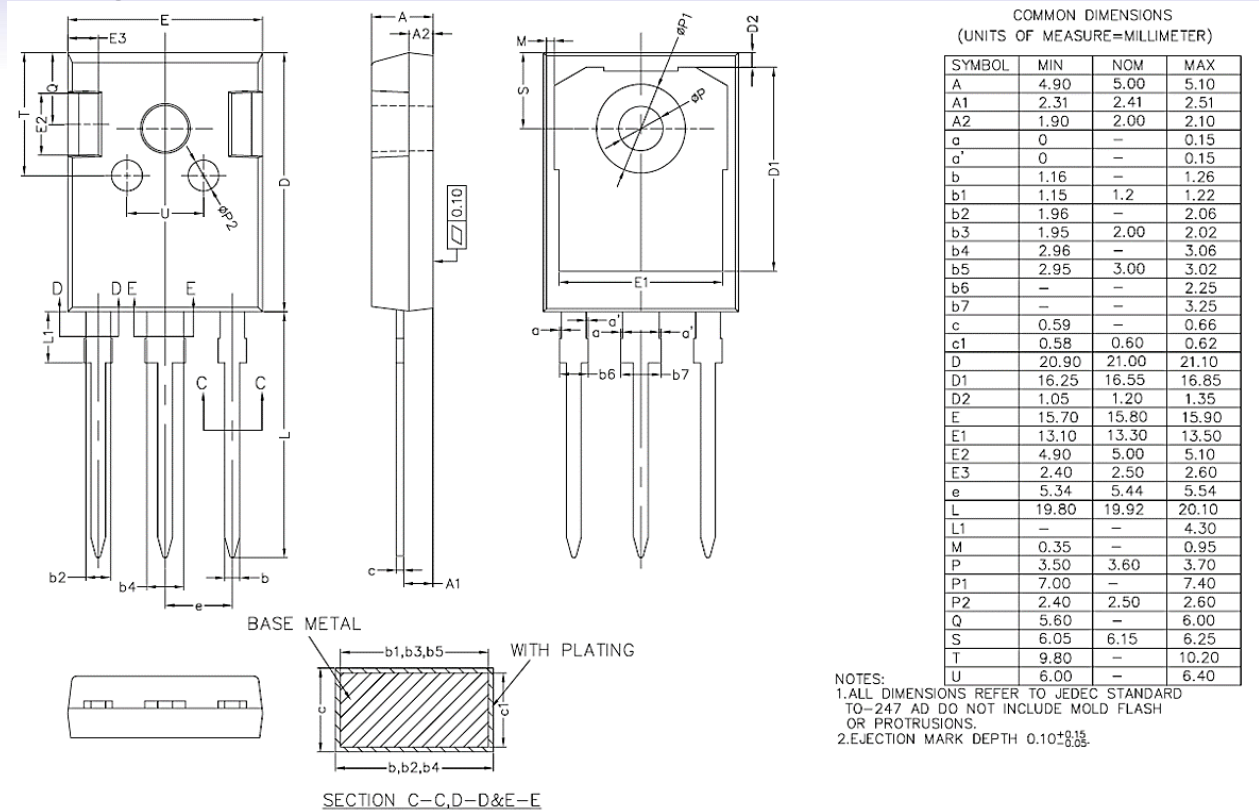
**Fig. 32 Gate Charges**



**Fig. 33 Body Diode Reverse Recovery**



**Package TO-247-3 (Unit: mm)**



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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