

Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

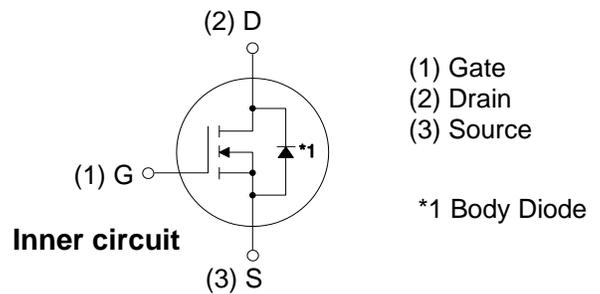
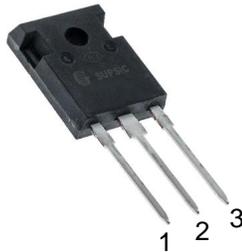
Parameter	Rating	Units
V_{DS}	1200	V
$I_D @ 25^\circ\text{C}$	117	A
$R_{DS(on)}$	16	m Ω



Applications

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating

TO-247-3
Package



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

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1200	V	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	
V_{GSmax}	Gate - Source Voltage (dynamic)	-8/+19	V	AC ($f > 1\text{ Hz}$)	
V_{GSop}	Gate - Source Voltage (static)	-4/+15	V	Static	
I_D	Continuous Drain Current	117	A	$V_{GS} = 15\text{ V}, T_c = 25^\circ\text{C}$	
		85		$V_{GS} = 15\text{ V}, T_c = 100^\circ\text{C}$	
$I_{D(pulse)}$	Pulsed Drain Current	250	A	Pulse width t_p limited by T_{jmax}	
P_D	Power Dissipation	556	W	$T_c = 25^\circ\text{C}, T_j = 175^\circ\text{C}$	
T_j, T_{stg}	Operating Junction and Storage Temperature	-40 to +175	$^\circ\text{C}$		
T_L	Solder Temperature	260	$^\circ\text{C}$	1.6mm (0.063") from case for 10s	
M_d	Mounting Torque	1	Nm lbf-in	M3 or 6-32 screw	
		8.8			

Note (1): When using MOSFET Body Diode $V_{GSmax} = -4\text{V}/+19\text{V}$

Note (2): MOSFET can also safely operate at 0/+15 V



Electrical Characteristics (T_c = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V _{(BR)DSS}	Drain-Source Breakdown Voltage	1200			V	V _{GS} = 0 V, I _D = 100 μA	
V _{GS(th)}	Gate Threshold Voltage	1.8	2.5	3.6	V	V _{DS} = V _{GS} , I _D = 23 mA	
			2.0		V	V _{DS} = V _{GS} , I _D = 23 mA, T _J = 175°C	
I _{DSS}	Zero Gate Voltage Drain Current		1	50	μA	V _{DS} = 1200 V, V _{GS} = 0 V	
I _{GSS}	Gate-Source Leakage Current		10	250	nA	V _{GS} = 15 V, V _{DS} = 0 V	
R _{DS(on)}	Drain-Source On-State Resistance	11.2	16	22.3	mΩ	V _{GS} = 15 V, I _D = 75 A	
			28.8			V _{GS} = 15 V, I _D = 75 A, T _J = 175°C	
g _{fs}	Transconductance		53		S	V _{DS} = 20 V, I _{DS} = 75 A	
			47			V _{DS} = 20 V, I _{DS} = 75 A, T _J = 175°C	
C _{iss}	Input Capacitance		6085		pF	V _{GS} = 0 V, V _{DS} = 1000 V f = 100 KHz V _{AC} = 25 mV	
C _{oss}	Output Capacitance		230				
C _{rss}	Reverse Transfer Capacitance		13				
E _{oss}	C _{oss} Stored Energy		130				μJ
E _{ON}	Turn-On Switching Energy (SiC Diode FWD)		4.64		mJ	V _{DS} = 800 V, V _{GS} = -4 V/+15 V, I _D = 75 A, R _{G(ext)} = 5Ω, L = 65.7 μH, T _J = 175°C	
E _{OFF}	Turn Off Switching Energy (SiC Diode FWD)		2.93				
E _{ON}	Turn-On Switching Energy (Body Diode FWD)		7.79		mJ	V _{DS} = 800 V, V _{GS} = -4 V/+15 V, I _D = 75 A, R _{G(ext)} = 5Ω, L = 65.7 μH, T _J = 175°C	
E _{OFF}	Turn Off Switching Energy (Body Diode FWD)		2.95				
t _{d(on)}	Turn-On Delay Time		174		ns	V _{DD} = 800 V, V _{GS} = -4 V/15 V R _{G(ext)} = 5 Ω, I _D = 75 A, L = 65.7 μH Timing relative to V _{DS} , Inductive load	
t _r	Rise Time		28				
t _{d(off)}	Turn-Off Delay Time		84				
t _f	Fall Time		27				
R _{G(int)}	Internal Gate Resistance		2.6		Ω	f = 1 MHz, V _{AC} = 25 mV	
Q _{gs}	Gate to Source Charge		70		nC	V _{DS} = 800 V, V _{GS} = -4 V/15 V I _D = 75 A Per IEC60747-8-4 pg 21	
Q _{gd}	Gate to Drain Charge		60				
Q _g	Total Gate Charge		207				



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

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.6		V	$V_{GS} = -4\text{ V}, I_{SD} = 37.5\text{ A}, T_J = 25^\circ\text{C}$	
		4.2		V	$V_{GS} = -4\text{ V}, I_{SD} = 37.5\text{ A}, T_J = 175^\circ\text{C}$	
I_S	Continuous Diode Forward Current		112	A	$V_{GS} = -4\text{ V}, T_c = 25^\circ\text{C}$	
$I_{S, pulse}$	Diode pulse Current		250	A	$V_{GS} = -4\text{ V}$, pulse width t_p limited by T_{jmax}	
t_{rr}	Reverse Recover time	96		ns	$V_{GS} = -4\text{ V}, I_{SD} = 75\text{ A}, V_R = 800\text{ V}$ $dif/dt = 900\text{ A}/\mu\text{s}, T_J = 175^\circ\text{C}$	
Q_{rr}	Reverse Recovery Charge	604		nC		
I_{rrm}	Peak Reverse Recovery Current	15		A		
t_{rr}	Reverse Recover time	58		ns	$V_{GS} = -4\text{ V}, I_{SD} = 75\text{ A}, V_R = 800\text{ V}$ $dif/dt = 1400\text{ A}/\mu\text{s}, T_J = 175^\circ\text{C}$	
Q_{rr}	Reverse Recovery Charge	672		nC		
I_{rrm}	Peak Reverse Recovery Current	22		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.27	$^\circ\text{C}/\text{W}$		
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40			

Typical Performance

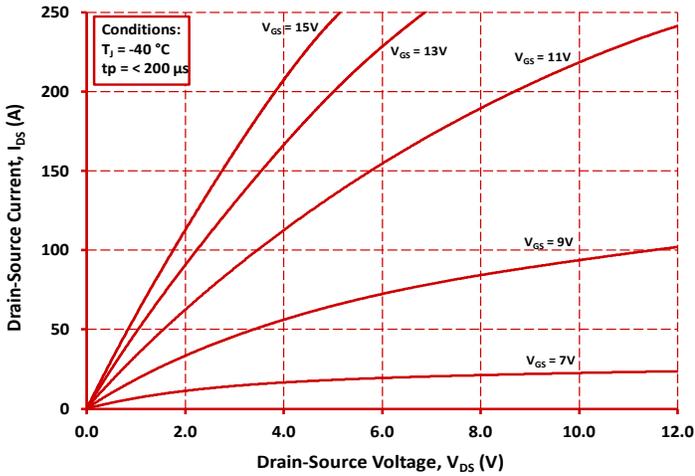


Figure 1. Output Characteristics $T_j = -40\text{ }^\circ\text{C}$

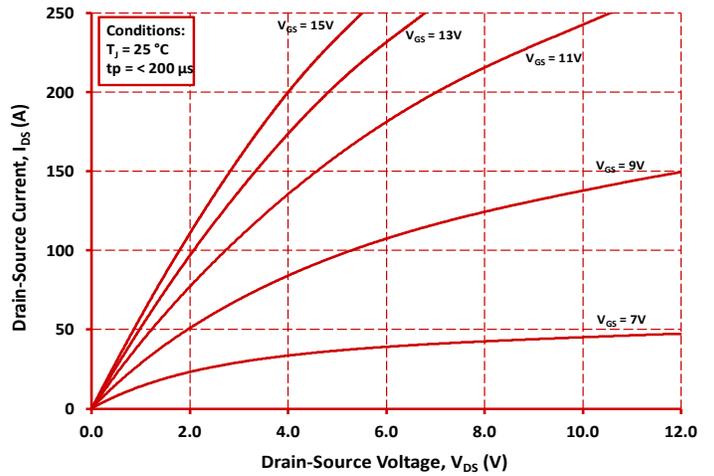


Figure 2. Output Characteristics $T_j = 25\text{ }^\circ\text{C}$

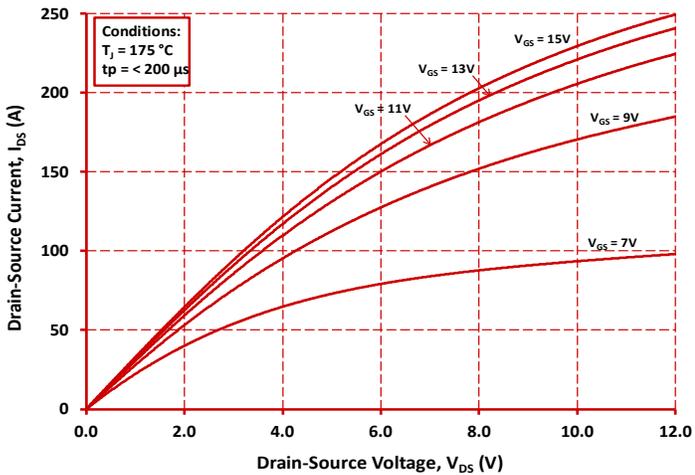


Figure 3. Output Characteristics $T_j = 175\text{ }^\circ\text{C}$

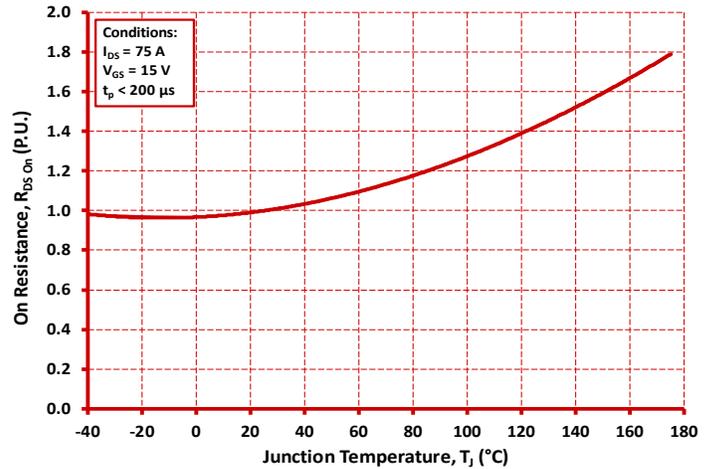


Figure 4. Normalized On-Resistance vs. Temperature

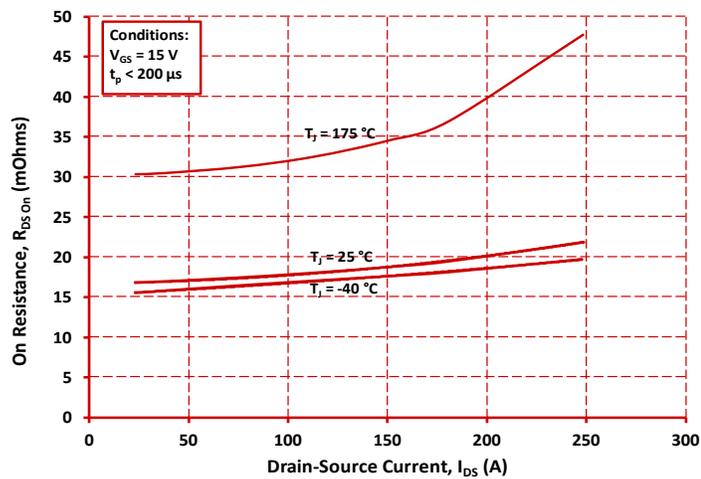


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

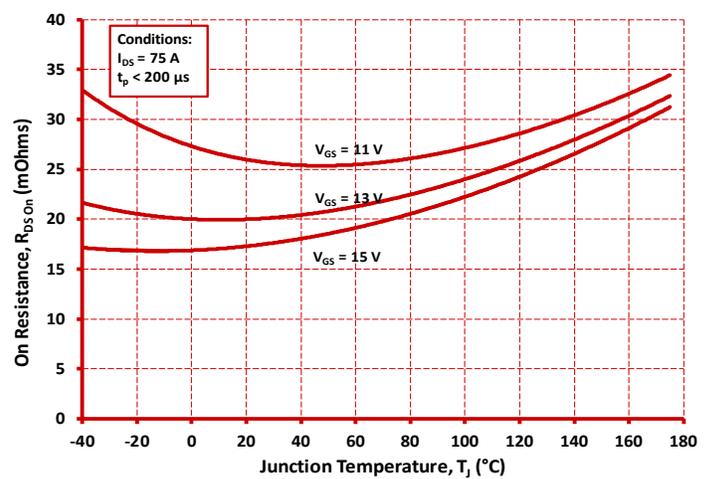


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

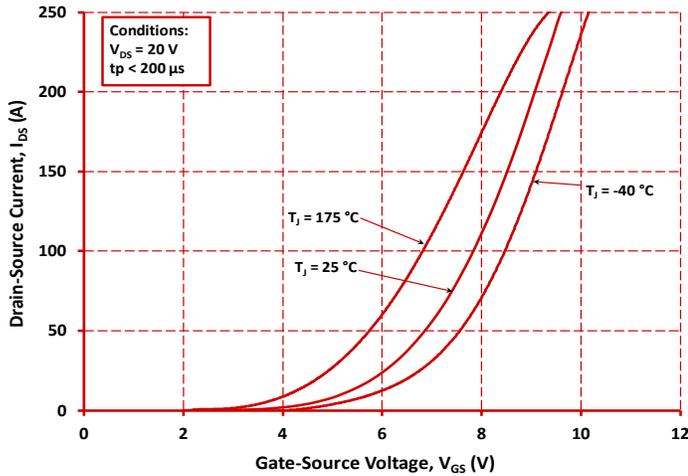


Figure 7. Transfer Characteristic for Various Junction Temperatures

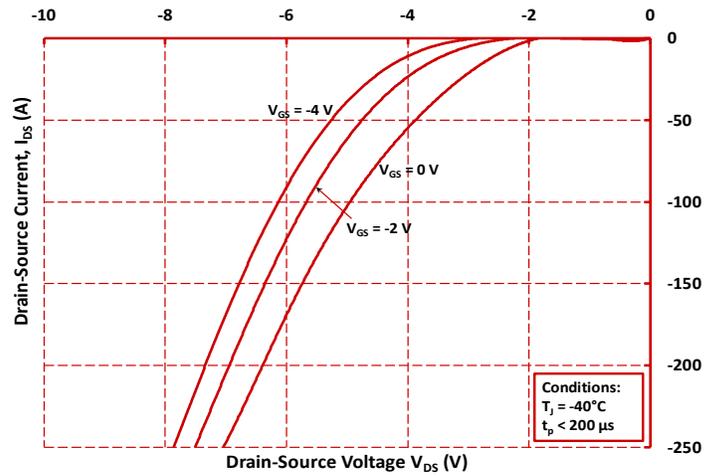


Figure 8. Body Diode Characteristic at -40 °C

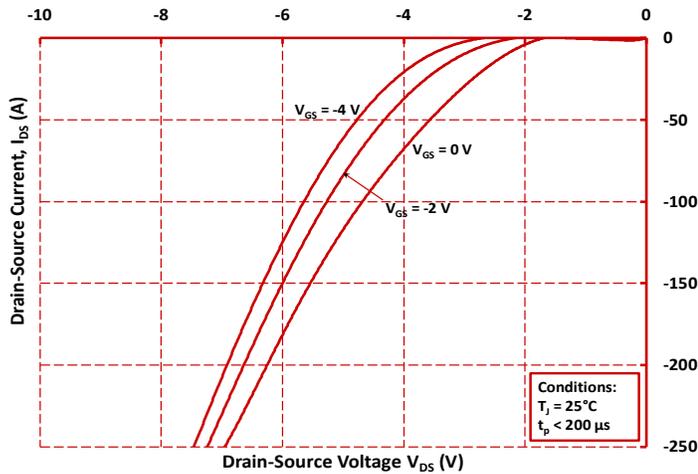


Figure 9. Body Diode Characteristic at 25 °C

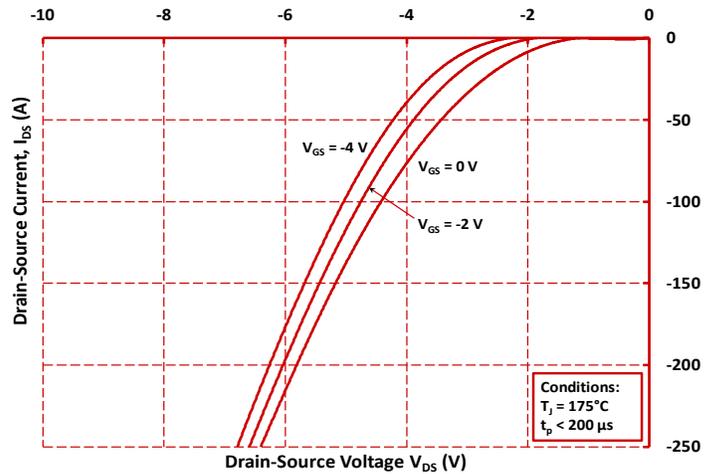


Figure 10. Body Diode Characteristic at 175 °C

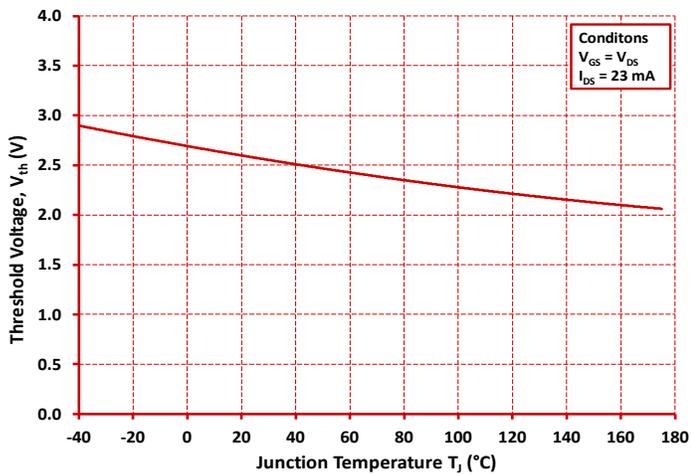


Figure 11. Threshold Voltage vs. Temperature

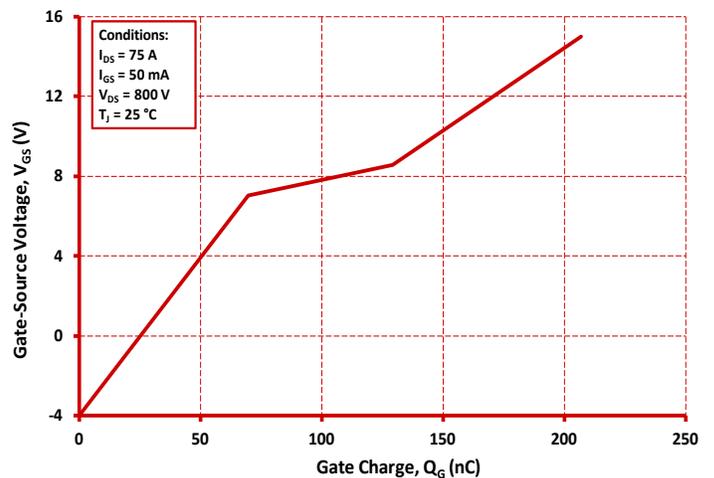


Figure 12. Gate Charge Characteristics

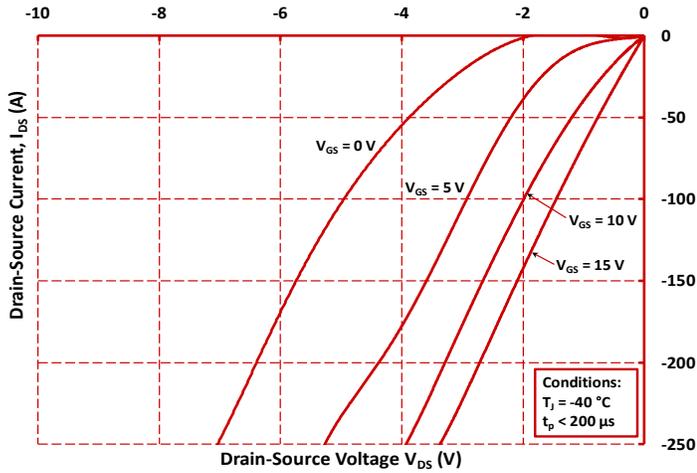
Typical Performance


Figure 13. 3rd Quadrant Characteristic at -40 °C

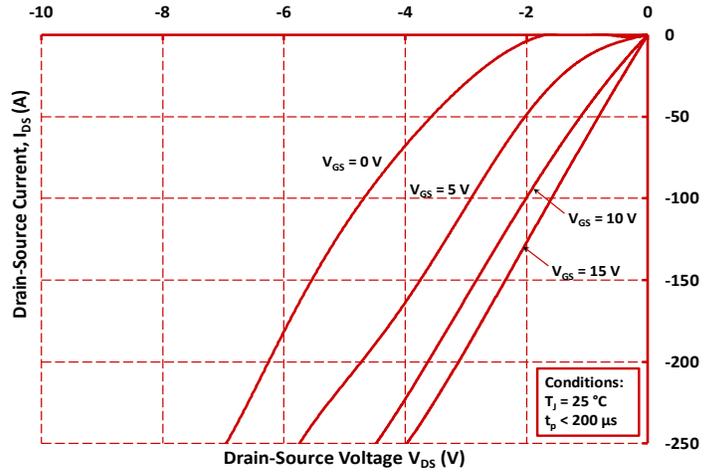


Figure 14. 3rd Quadrant Characteristic at 25 °C

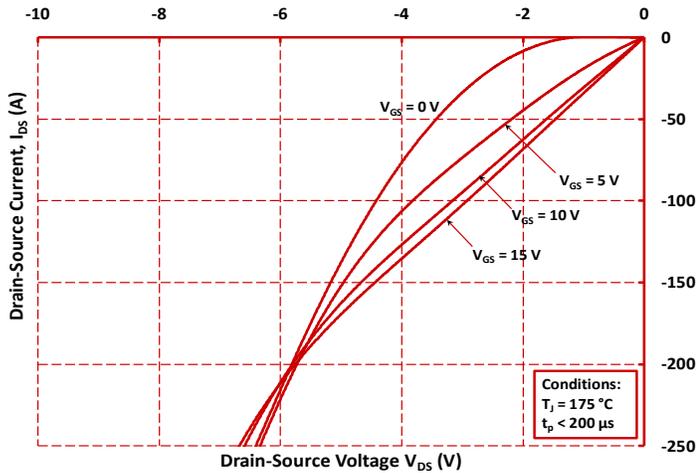


Figure 15. 3rd Quadrant Characteristic at 175 °C

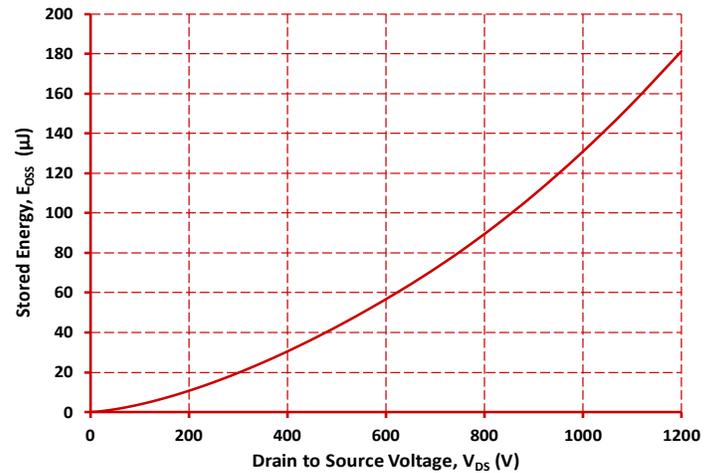


Figure 16. Output Capacitor Stored Energy

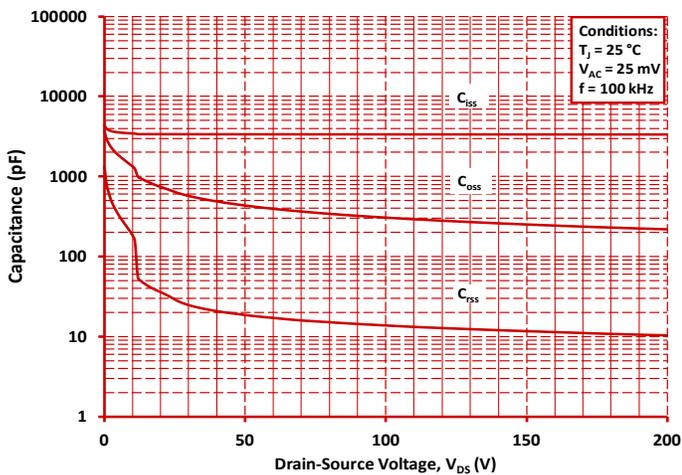


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

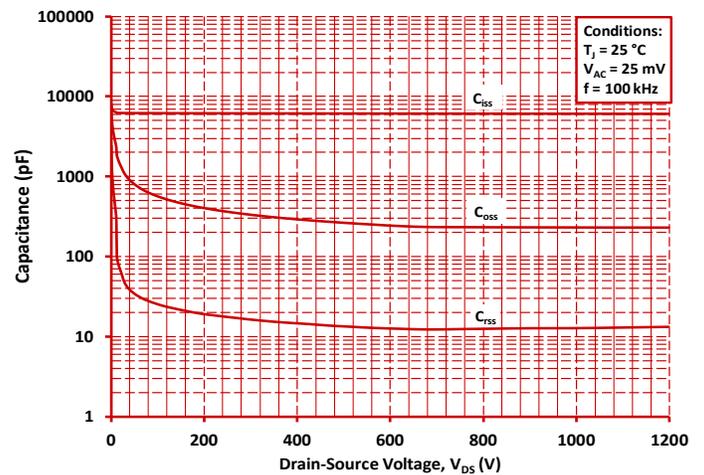


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1200V)

Typical Performance

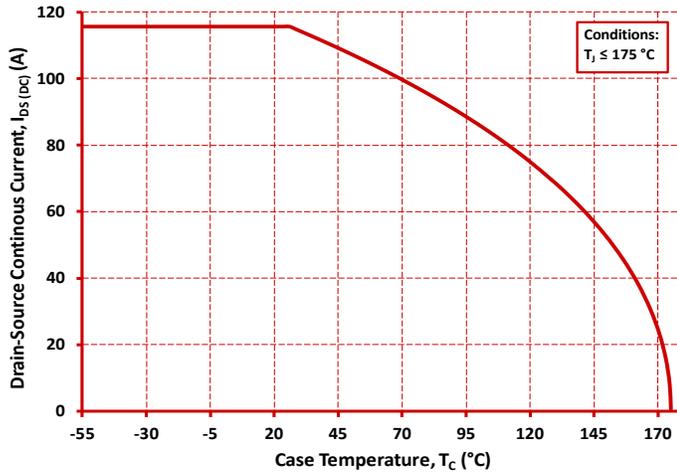


Figure 19. Continuous Drain Current Derating vs. Case Temperature

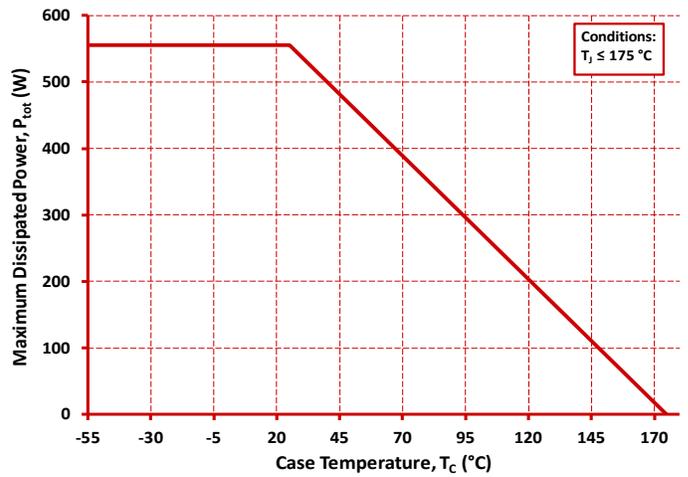


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

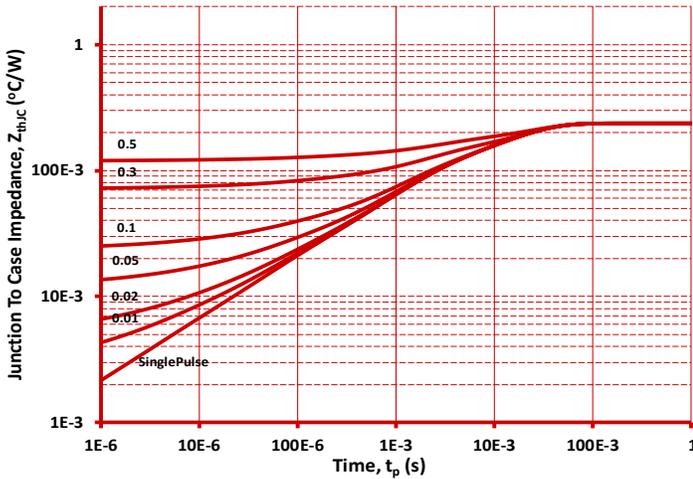


Figure 21. Transient Thermal Impedance (Junction - Case)

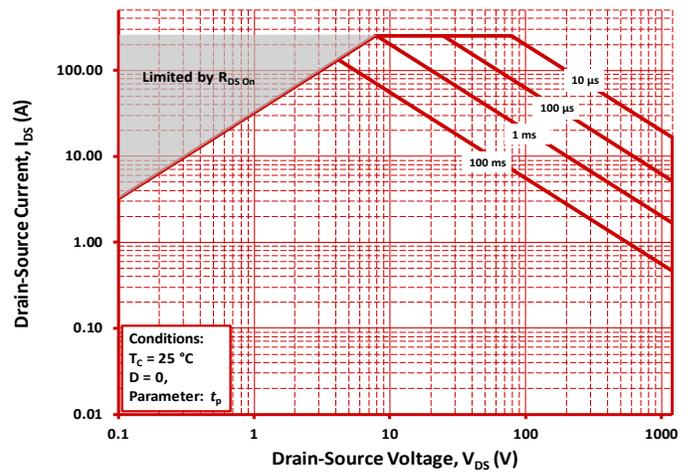


Figure 22. Safe Operating Area

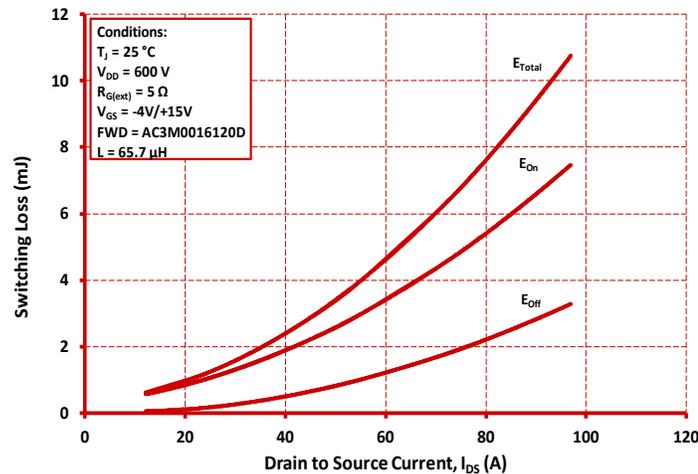


Figure 23. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600V$)

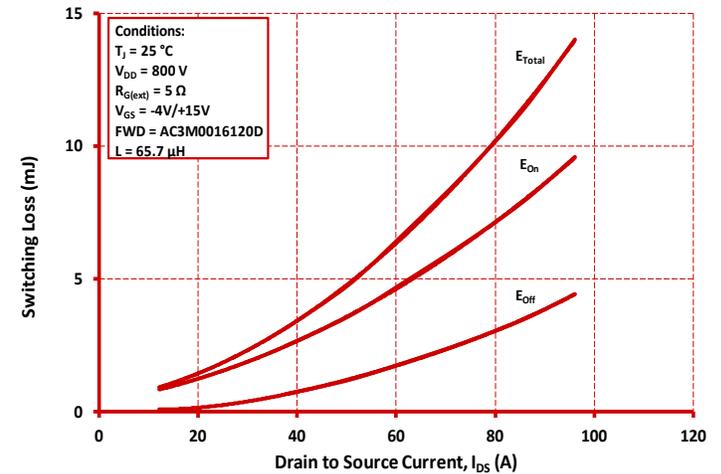


Figure 24. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 800V$)

Typical Performance

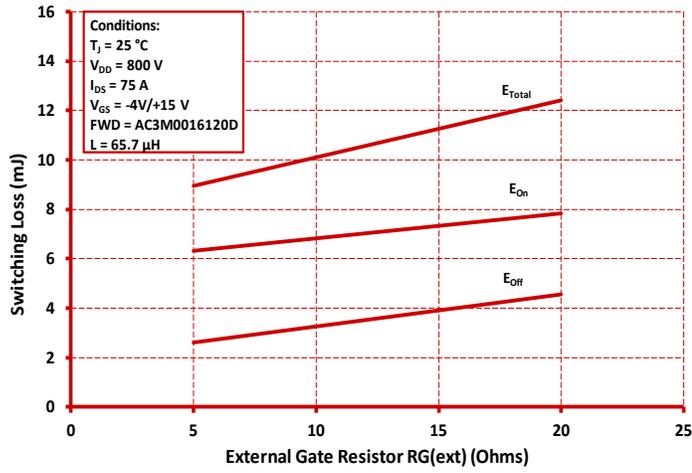


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

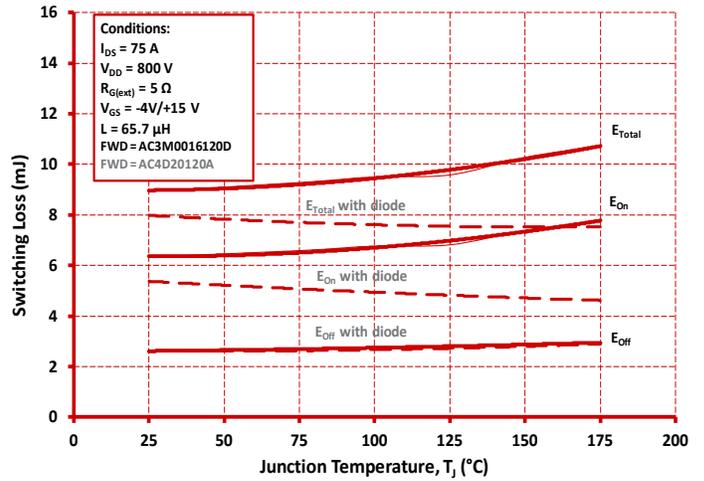


Figure 26. Clamped Inductive Switching Energy vs. Temperature

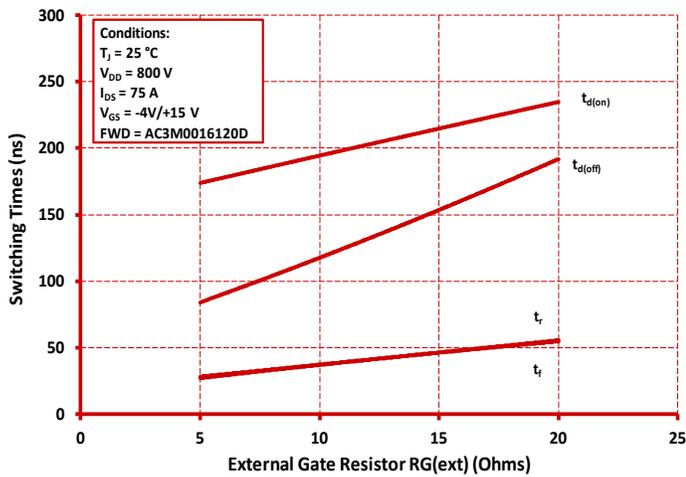


Figure 27. Switching Times vs. $R_{G(ext)}$

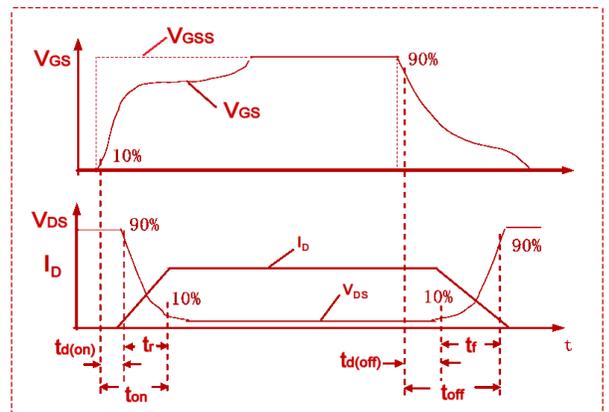


Figure 28. Switching Times Definition

Test Circuit Schematic

Fig.29 Switching Time Measurement Circuit

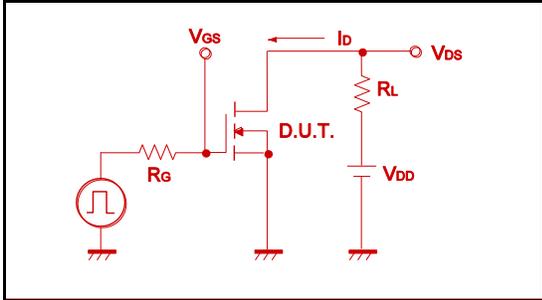


Fig.30 Switching Waveforms

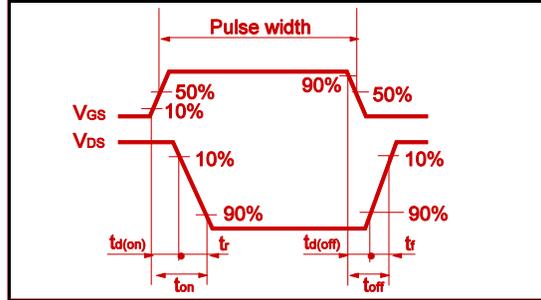


Fig.30-1 Gate Charge Measurement Circuit

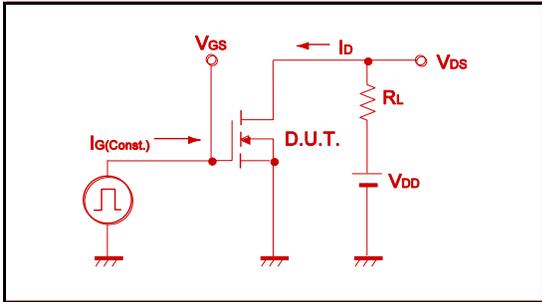


Fig.30-2 Gate Charge Waveform

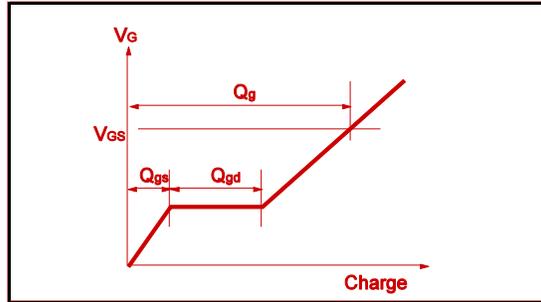


Fig.31-1 Switching Energy Measurement Circuit

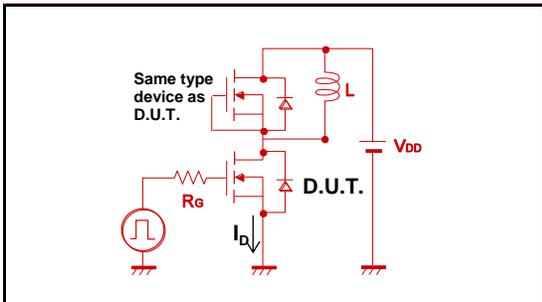


Fig.31-2 Switching Waveforms

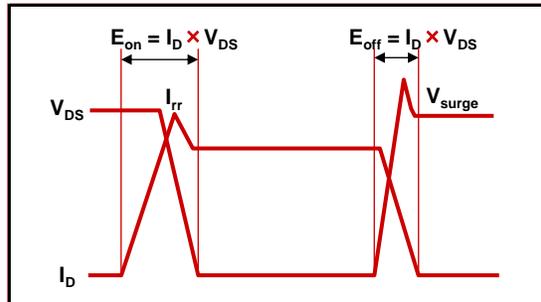
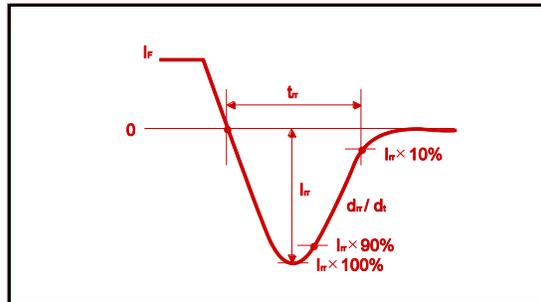
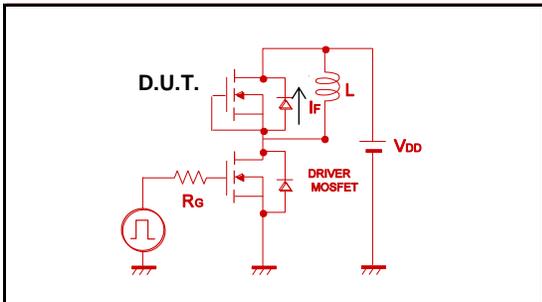
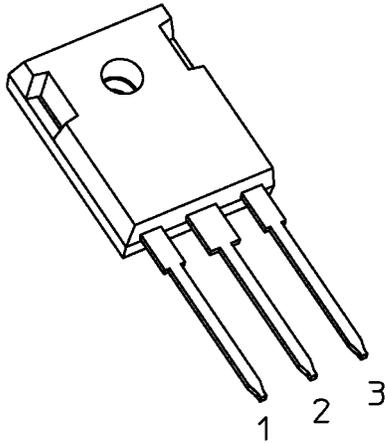


Fig.32-1 Reverse Recovery Time Measurement Circuit Fig.32-2 Reverse Recovery Waveform

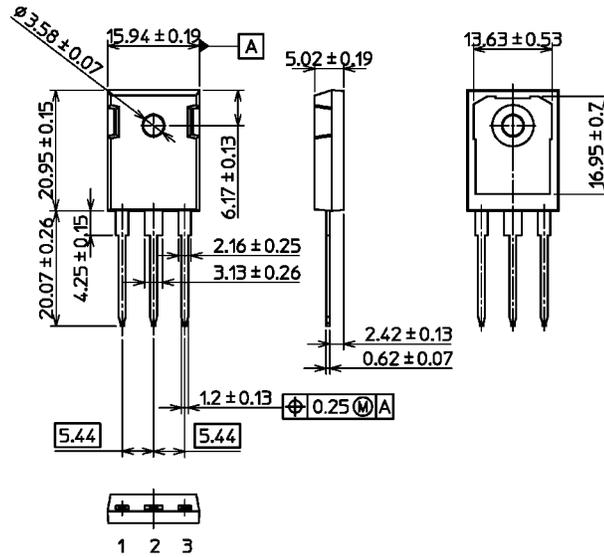
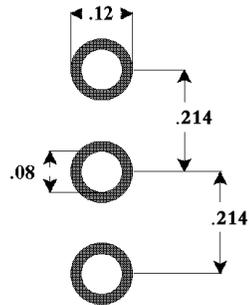


Package Dimensions

Unit: mm



TO-247-3


Recommended Solder Pad Layout


TO-247-3