Features

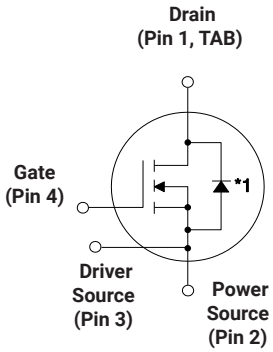
1) Low on-resistance
2) Fast switching speed
3) Fast reverse recovery
4) Easy to parallel
5) Simple to drive
6) Pb-free lead plating ; RoHS compliant

Parameter	Rating	Units
V_{DS}	**1700**	V
$I_{D\ @\ 25^{\circ}C}$	**74**	A
$R_{DS(on)}$	**45**	m Ω

Applications

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

TO-247-4
Package



(1) Drain
(2) Power Source
(3) Driver Source
(4) Gate

*1 Body Diode

Inner circuit

Maximum Ratings (T_C = 25 ˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1700	V	V_{GS} = 0 V, I_D = 100 µA	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values, AC (f >1 Hz)	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	74	A	V_{GS} =20 V, T_C = 25˚C	
		48		V_{GS} =20 V, T_C = 100˚C	
$I_{D(pulse)}$	Pulsed Drain Current	160	A	Pulse width t_P limited by T_{jmax}	
P_D	Power Dissipation	520	W	T_C=25˚C, T_J = 150 ˚C	
T_J , T_{stg}	Operating Junction and Storage Temperature	-40 to +150	˚C		
T_L	Solder Temperature	260	˚C	1.6mm (0.063") from case for 10s	
M_d	Mounting Torque	1 8.8	Nm lbf-in	M3 or 6-32 screw	

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	1700			V	V_{GS} = 0 V, I_D = 100 µA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.6	4	V	V_{DS} = V_{GS}, I_D = 18mA	
			1.8		V	V_{DS} = V_{GS}, I_D = 18mA, T_J = 150 °C	
I_{DSS}	Zero Gate Voltage Drain Current		2	100	µA	V_{DS} = 1700 V, V_{GS} = 0 V	
I_{GSS}	Gate-Source Leakage Current			600	nA	V_{GS} = 20 V, V_{DS} = 0 V	
$R_{DS(on)}$	Drain-Source On-State Resistance		45	70	mΩ	V_{GS} = 20 V, I_D = 50 A	
			90			V_{GS} = 20 V, I_D = 50 A, T_J = 150 °C	
g_{fs}	Transconductance		21.7		S	V_{DS}= 20 V, I_{DS}= 50 A	
			24.4			V_{DS}= 20 V, I_{DS}= 50 A, T_J = 150 °C	
C_{iss}	Input Capacitance		3672		pF	V_{GS} = 0 V V_{DS} = 1000 V f = 1 MHz V_{AC} = 25 mV	
C_{oss}	Output Capacitance		171				
C_{rss}	Reverse Transfer Capacitance		6.7				
E_{oss}	C_{oss} Stored Energy		105		µJ		
E_{ON}	Turn-On Switching Energy (SiC Diode FWD)		2.1		mJ	V_{DS} = 1200 V, V_{GS} = -5/20 V, I_D = 50A, $R_{G(ext)}$ = 2.5Ω, L= 105 µH, T_J = 150 °C, using SiC Diode as FWD	
E_{OFF}	Turn Off Switching Energy (SiC Diode FWD)		0.86				
E_{ON}	Turn-On Switching Energy (Body Diode FWD)		4.7		mJ	V_{DS} = 1200 V, V_{GS} = -5/20 V, I_D = 50A, $R_{G(ext)}$ = 2.5Ω, L= 105 µH, T_J = 150 °C, using MOSFET as FWD	
E_{OFF}	Turn Off Switching Energy (Body Diode FWD)		0.93				
$t_{d(on)}$	Turn-On Delay Time		65		ns	V_{DD} = 1200 V, V_{GS} = -5/20 V I_D = 50 A, $R_{G(ext)}$ = 2.5 Ω, Timing relative to V_{DS} Inductive load	
t_r	Rise Time		20				
$t_{d(off)}$	Turn-Off Delay Time		48				
t_f	Fall Time		18				
$R_{G(int)}$	Internal Gate Resistance		1.3		Ω	f = 1 MHz, V_{AC} = 25 mV	
Q_{gs}	Gate to Source Charge		44		nC	V_{DS} = 1200 V, V_{GS} = -5/20 V I_D = 50 A Per IEC60747-8-4 pg 21	
Q_{gd}	Gate to Drain Charge		57				
Q_g	Total Gate Charge		188				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.1		V	V_{GS} = - 5 V, I_{SD} = 25 A	
		3.6		V	V_{GS} = - 5 V, I_{SD} = 25 A, T_J = 150 °C	
I_S	Continuous Diode Forward Current		72	A	T_C= 25 °C, V_{GS} = - 5 V	
t_{rr}	Reverse Recovery Time	70		ns	V_{GS} = - 5 V, I_{SD} = 50 A , V_R = 1200 V dif/dt = 1400 A/µs	
Q_{rr}	Reverse Recovery Charge	530		nC		
I_{rrm}	Peak Reverse Recovery Current	14		A		

Note (1): When using SiC Body Diode the maximum recommended V_{GS} = -5V

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.22	0.24	°C/W		
$R_{\theta JC}$	Thermal Resistance from Junction to Ambient		40			

Typical Performance

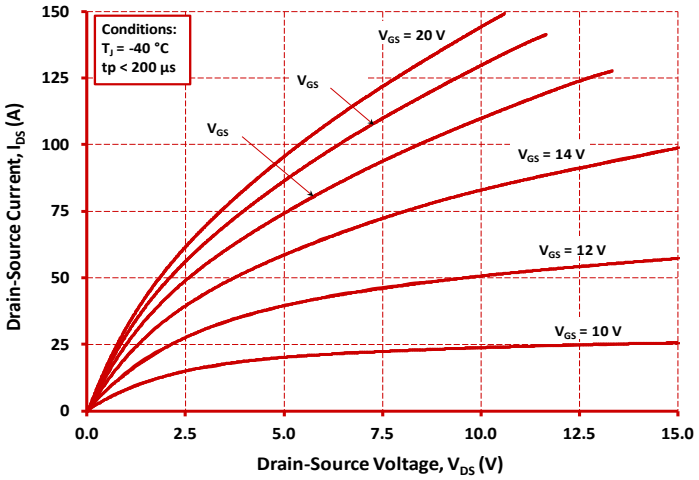


Figure 1. Output Characteristics T_J = -40 °C

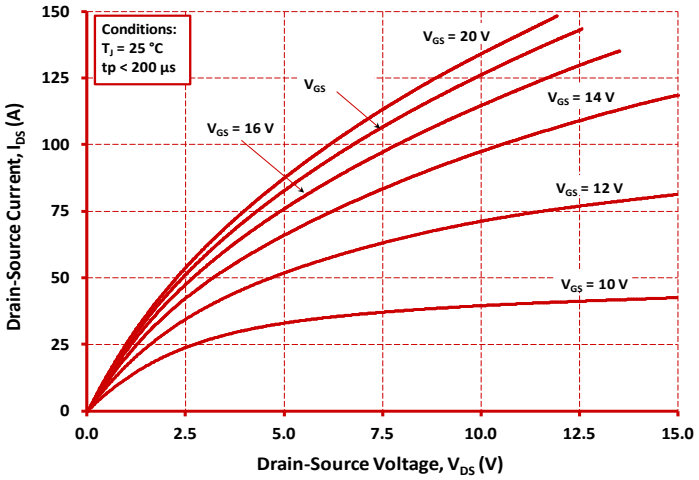


Figure 2. Output Characteristics T_J = 25 °C

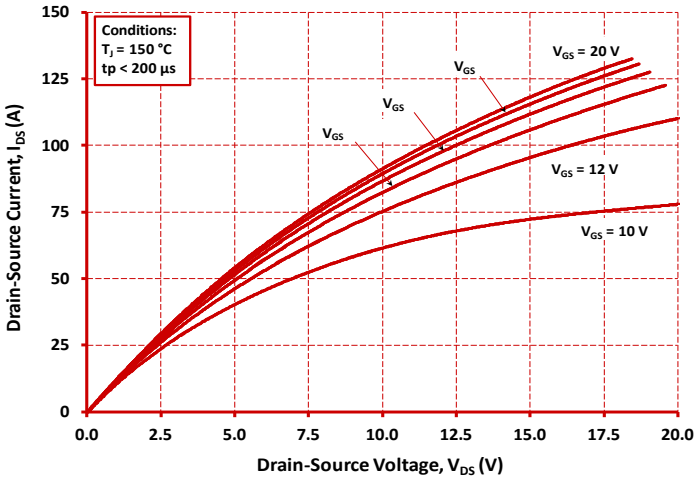


Figure 3. Output Characteristics T_J = 150 °C

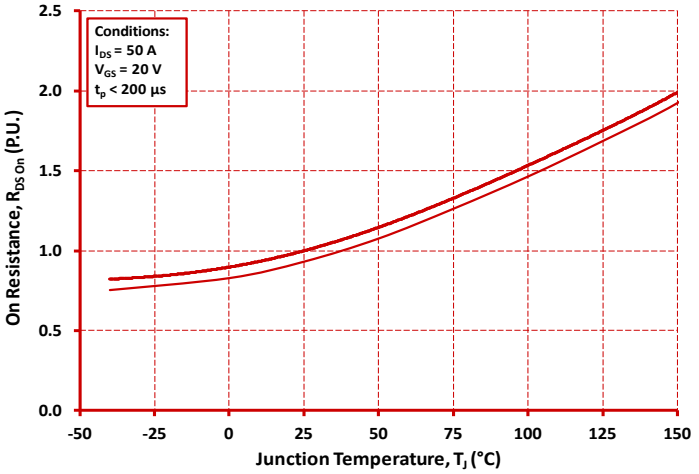


Figure 4. Normalized On-Resistance vs. Temperature

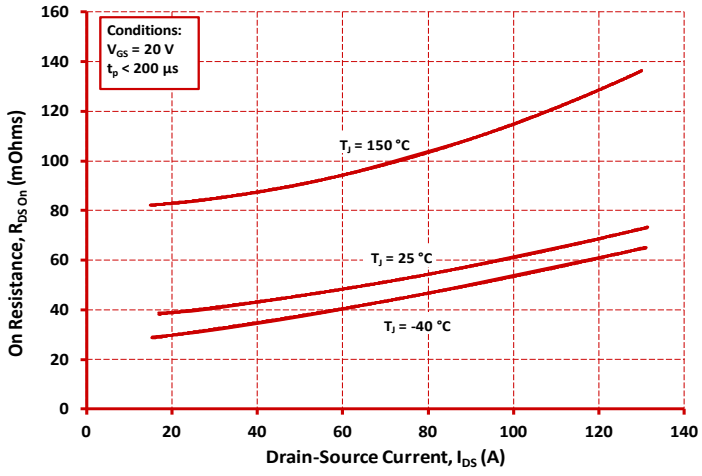


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

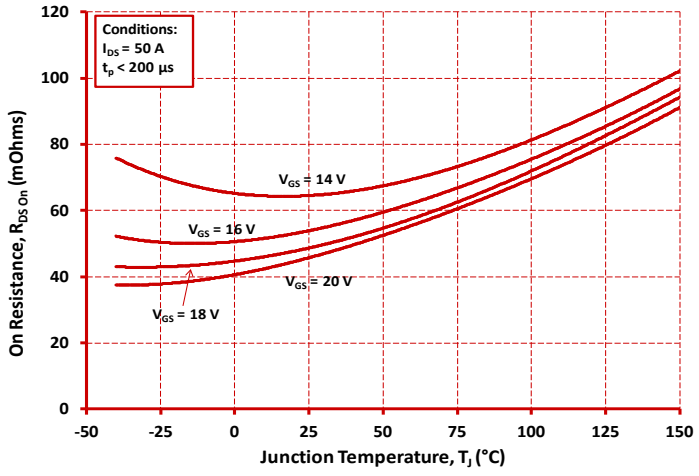


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Performance

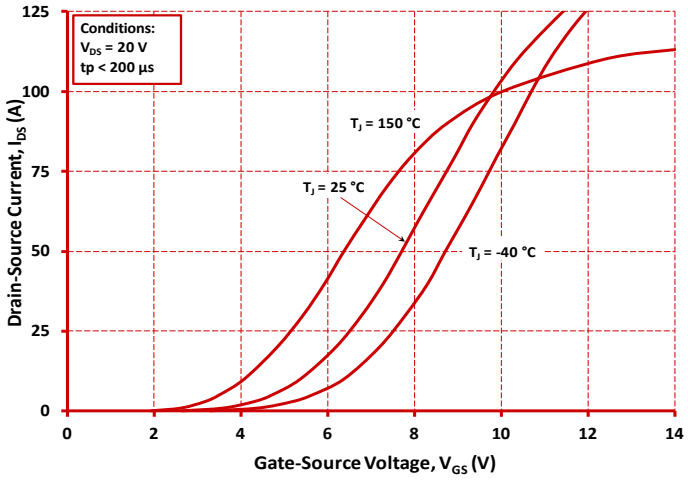


Figure 7. Transfer Characteristic For Various Junction Temperatures

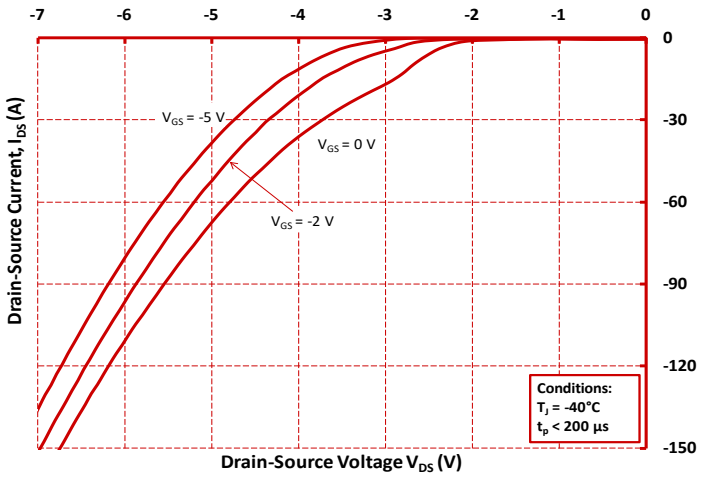


Figure 8. Body Diode Characteristic at -40 °C

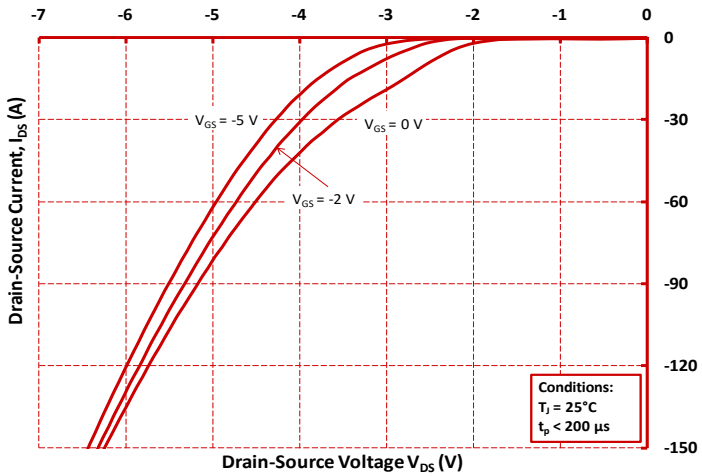


Figure 9. Body Diode Characteristic at 25 °C

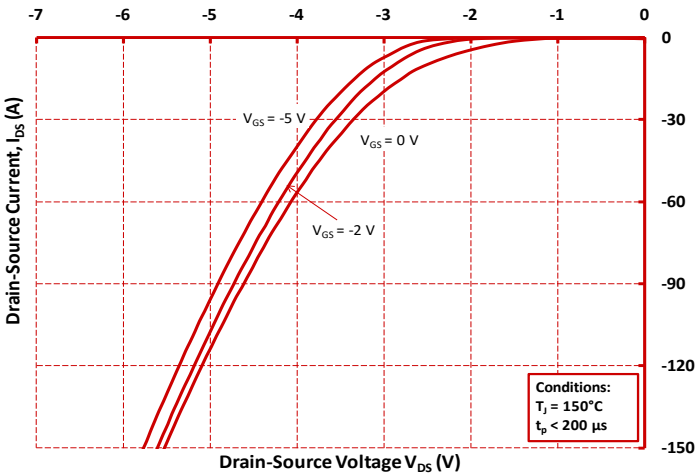


Figure 10. Body Diode Characteristic at 150 °C

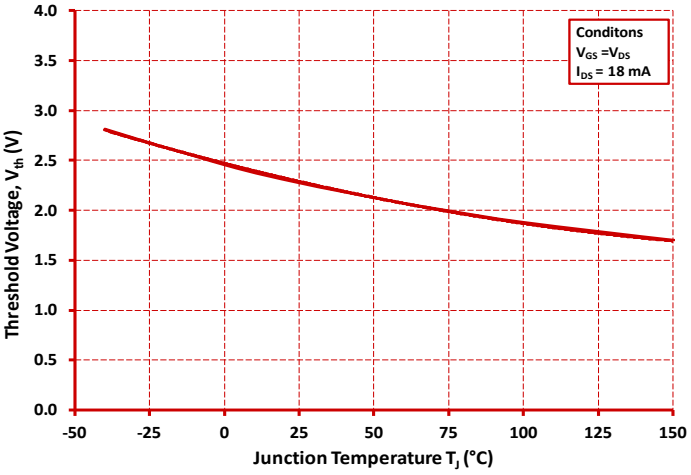


Figure 11. Threshold Voltage vs. Temperature

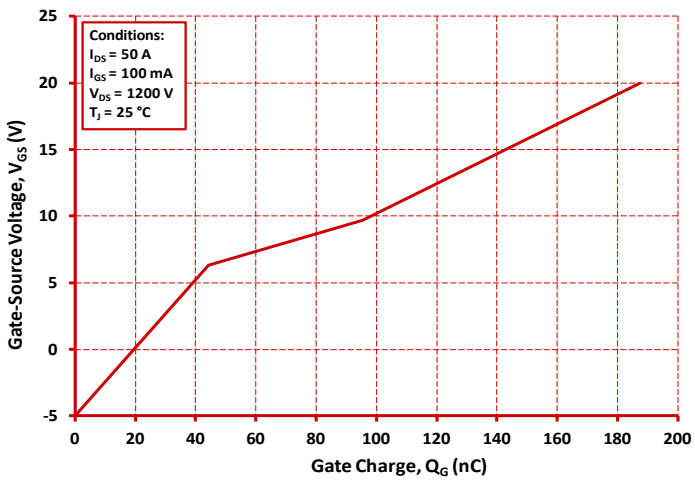


Figure 12. Gate Charge Characteristic

Typical Performance

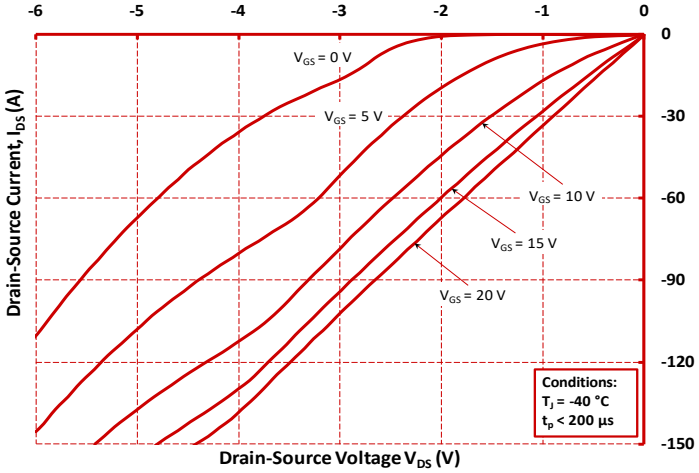


Figure 13. 3rd Quadrant Characteristic at -40 °C

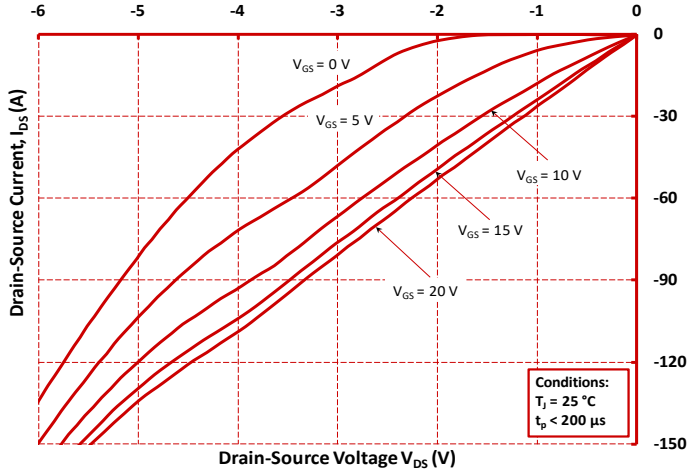


Figure 14. 3rd Quadrant Characteristic at 25 °C

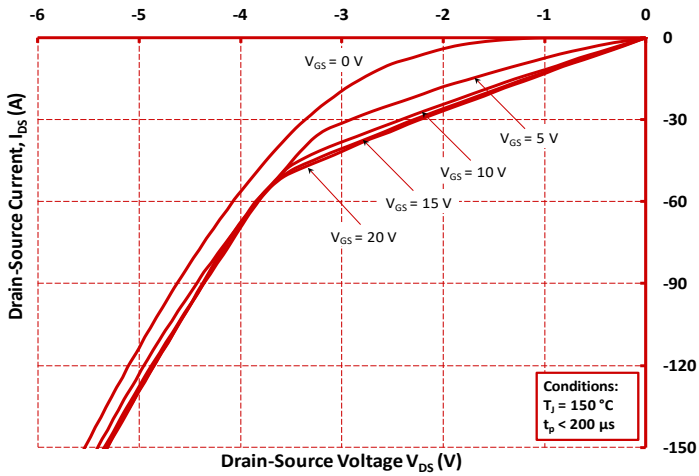


Figure 15. 3rd Quadrant Characteristic at 150 °C

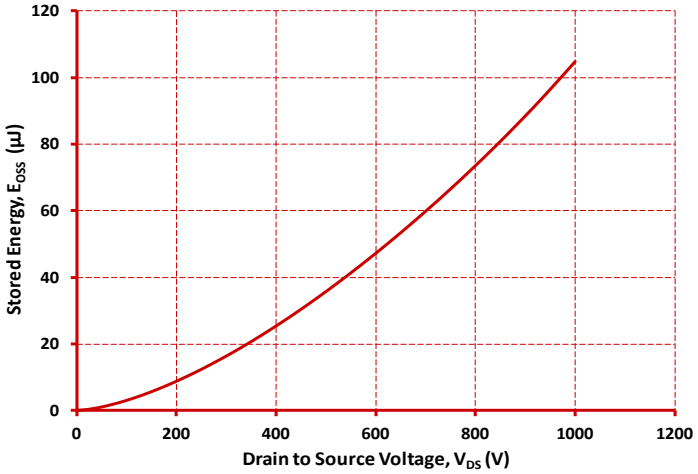


Figure 16. Output Capacitor Stored Energy

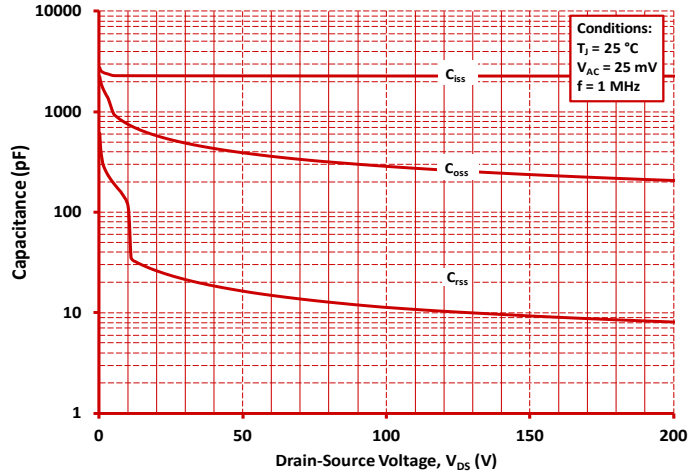


Figure 17. Capacitances vs. Drain-Source Voltage (0-200 V)

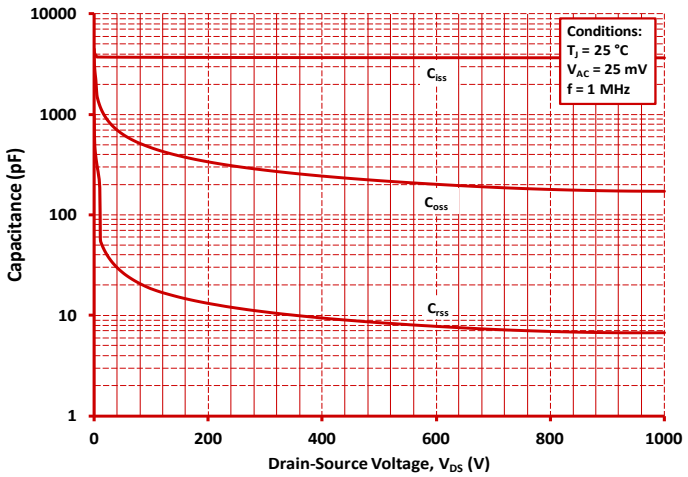


Figure 18. Capacitances vs. Drain-Source Voltage (0-1000 V)

Typical Performance

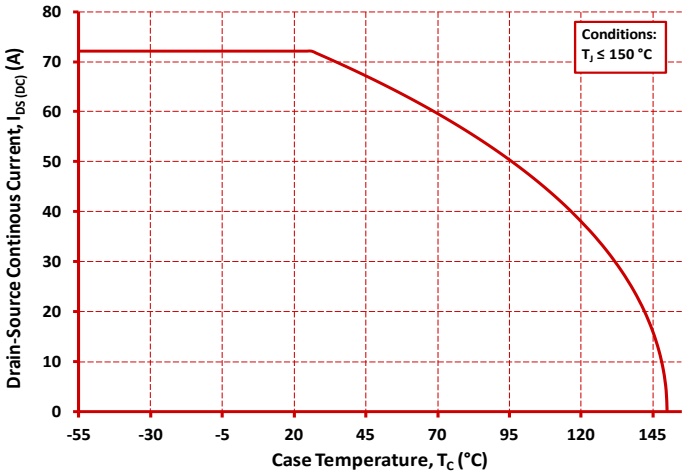


Figure 19. Continuous Drain Current Derating vs. Case Temperature

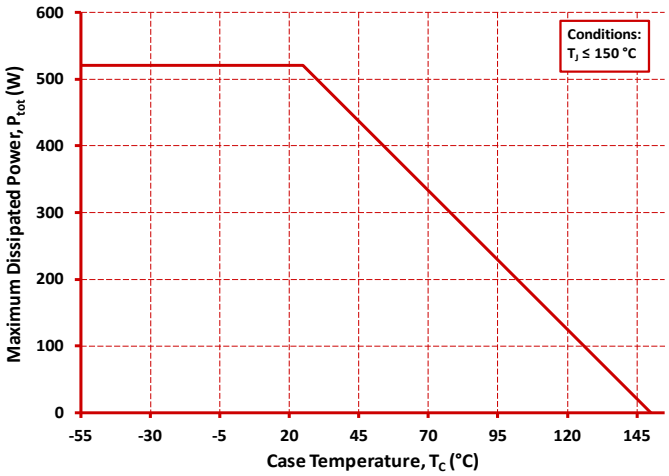


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

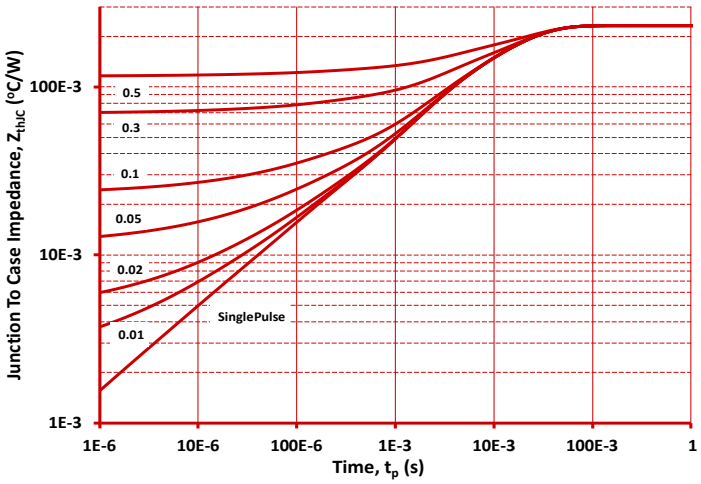


Figure 21. Transient Thermal Impedance (Junction - Case)

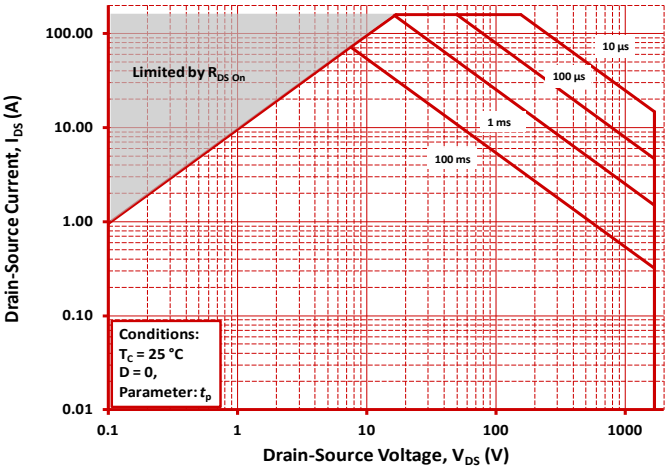


Figure 22. Safe Operating Area

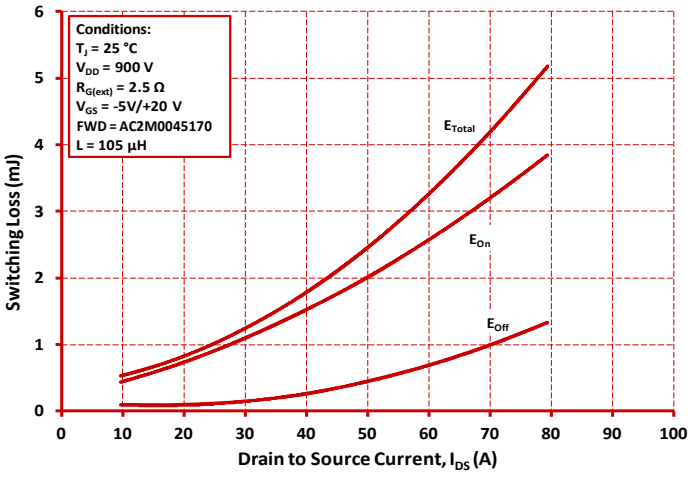


Figure 23. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 900V)

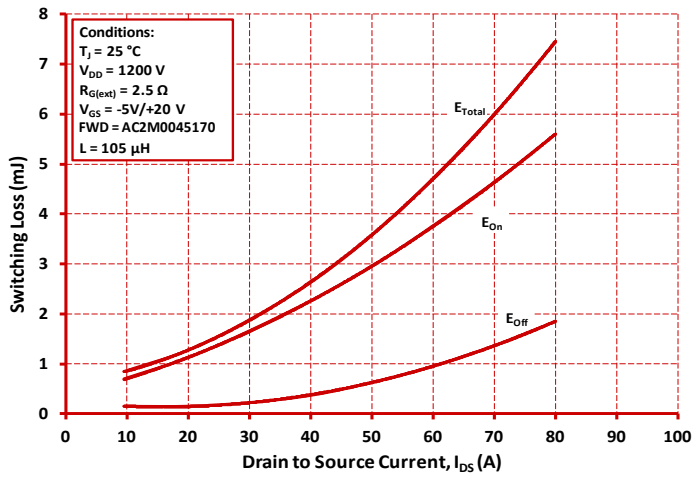


Figure 24. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 1200V)

Typical Performance

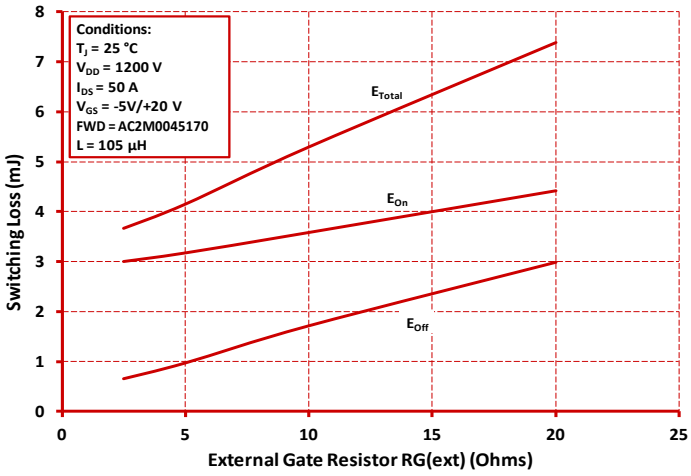


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

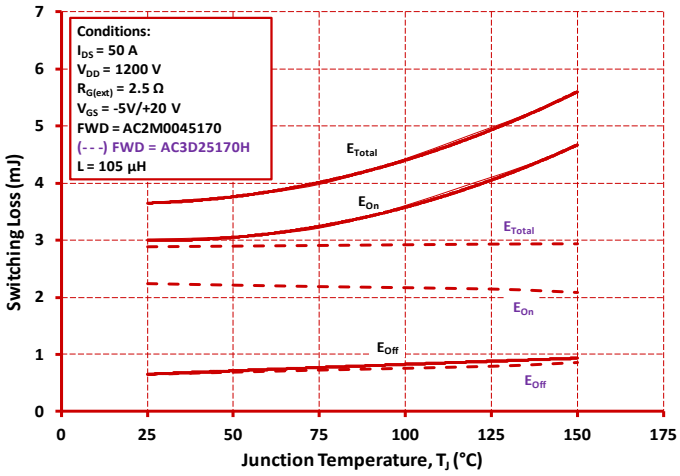


Figure 26. Clamped Inductive Switching Energy vs. Temperature

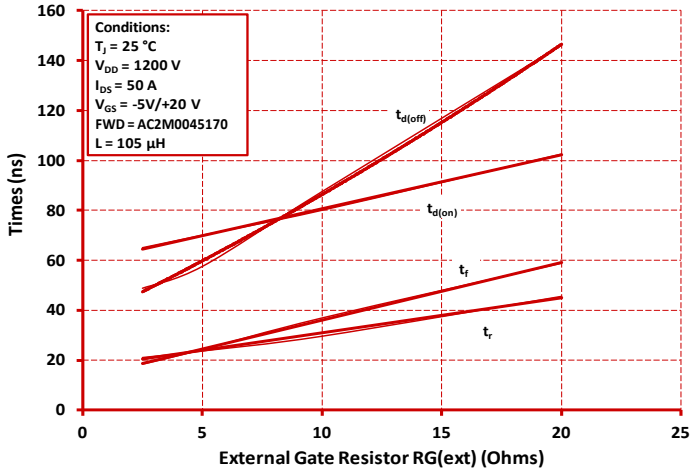


Figure 27. Switching Times vs. $R_{G(ext)}$

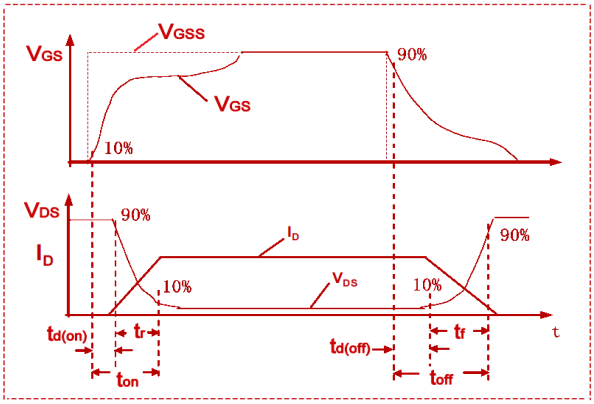


Figure 28. Switching Times Definition

Test Circuit Schematic

Fig.29 Switching Time Measurement Circuit

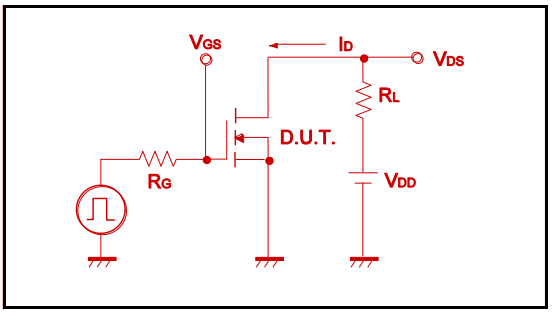


Fig.30 Switching Waveforms

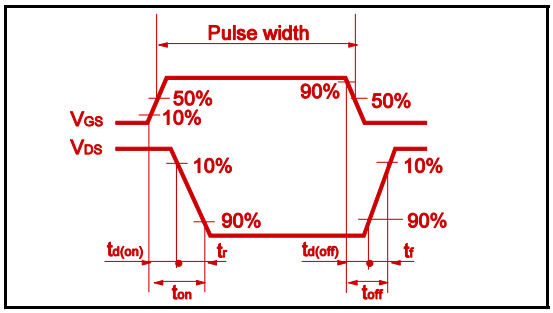


Fig.30-1 Gate Charge Measurement Circuit

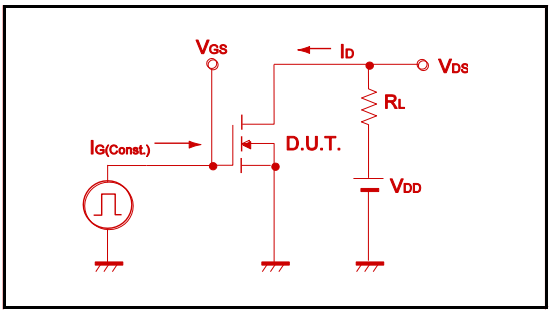


Fig.30-2 Gate Charge Waveform

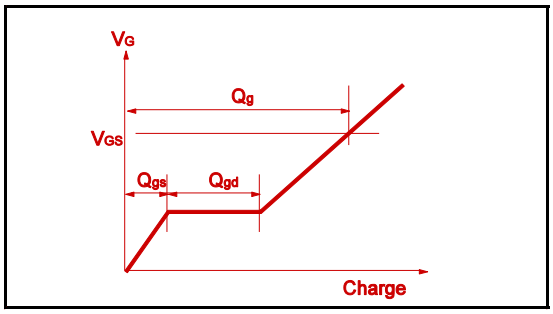


Fig.31-1 Switching Energy Measurement Circuit

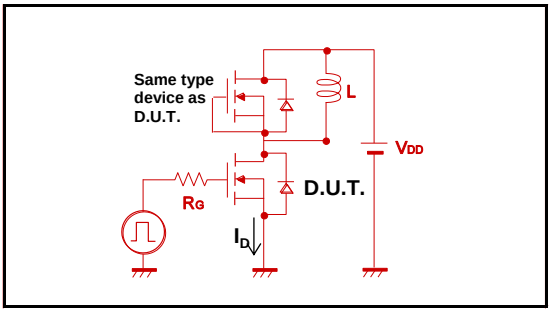


Fig.31-2 Switching Waveforms

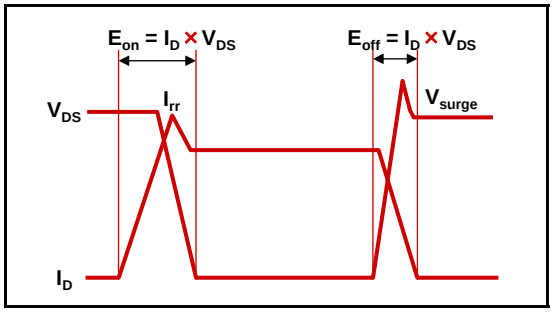


Fig.32-1 Reverse Recovery Time Measurement Circuit

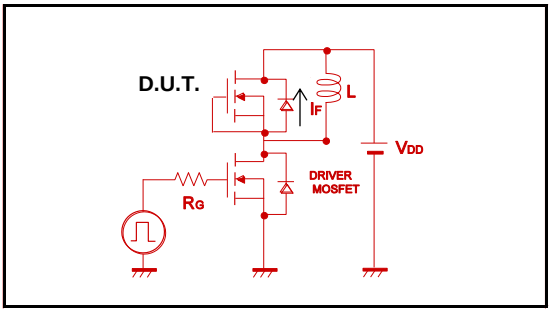
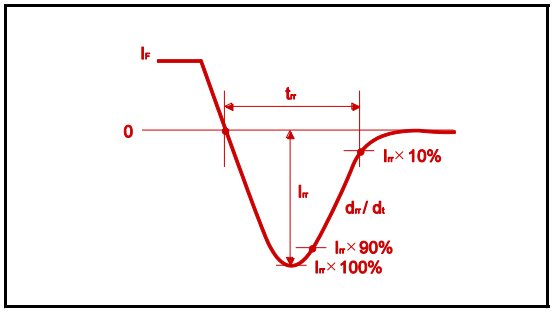
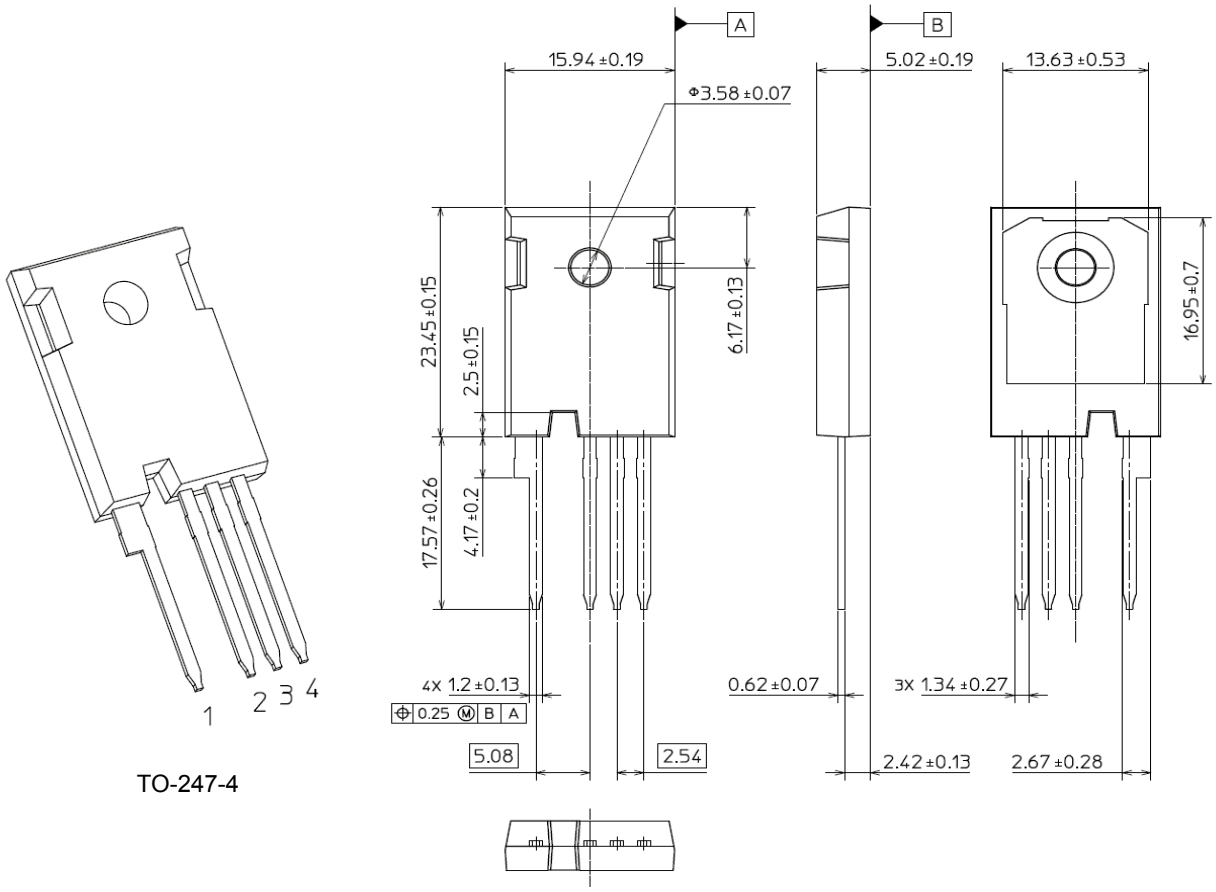


Fig.32-2 Reverse Recovery Waveform



Package Dimensions

Unit: mm



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