

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Resistant to Latch-Up
- Halogen Free, RoHS Compliant

Benefits

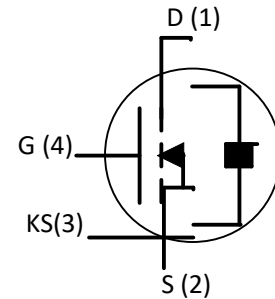
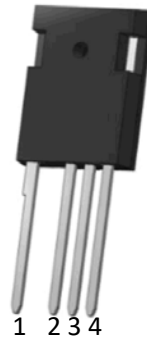
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC converters
- Battery Chargers
- Motor Drive
- Pulsed Power Applications

Package

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	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	90	A	$V_{GS} = 20\text{ V}, T_C = 25^\circ\text{C}$	Fig. 19
		60		$V_{GS} = 20\text{ V}, T_C = 100^\circ\text{C}$	
$I_{D(pulse)}$	Pulsed Drain Current	250	A	Pulse width t_p limited by T_{jmax}	Fig. 22
P_D	Power Dissipation	463	W	$T_c = 25^\circ\text{C}, T_J = 150^\circ\text{C}$	Fig. 20
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$		
T_L	Solder Temperature	260	$^\circ\text{C}$	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	1200			V	V _{GS} = 0 V, I _D = 100 μA	
V _{GS(th)}	Gate Threshold Voltage	2.0	2.5	4	V	V _{DS} = V _{GS} , I _D = 15mA	Fig. 11
			1.8		V	V _{DS} = V _{GS} , I _D = 15mA, T _J = 150 °C	
I _{DSS}	Zero Gate Voltage Drain Current		2	100	μA	V _{DS} = 1200 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		27	38	mΩ	V _{GS} = 20 V, I _D = 50 A	Fig. 4,5,6
			37			V _{GS} = 20 V, I _D = 50 A, T _J = 150 °C	
g _{fs}	Transconductance		15.6		S	V _{DS} = 20 V, I _{DS} = 50 A	Fig. 7
			14.3			V _{DS} = 20 V, I _{DS} = 50 A, T _J = 150 °C	
C _{iss}	Input Capacitance		4700		pF	V _{GS} = 0 V	Fig. 17,18
C _{oss}	Output Capacitance		231			V _{DS} = 1000 V	
C _{rss}	Reverse Transfer Capacitance		42.8			f = 1 MHz	
E _{oss}	C _{oss} Stored Energy		121		μJ	V _{AC} = 25 mV	Fig 16
E _{AS}	Avalanche Energy, Single Pluse		2.6		J	I _D = 50A, V _{DD} = 50V	Fig. 29
E _{ON}	Turn-On Switching Energy		2.2		mJ	V _{DS} = 800 V, V _{GS} = -5/20 V, I _D = 50A, R _{G(ext)} = 2.5Ω, L = 412 μH	Fig. 25
E _{OFF}	Turn Off Switching Energy		0.5				
t _{d(on)}	Turn-On Delay Time		62		ns	V _{DD} = 800 V, V _{GS} = -5/20 V I _D = 50 A, R _{G(ext)} = 2.5 Ω, R _L = 16 Ω Timing relative to V _{DS} Per IEC60747-8-4 pg 83	Fig. 27
t _r	Rise Time		93				
t _{d(off)}	Turn-Off Delay Time		60				
t _f	Fall Time		39				
R _{G(int)}	Internal Gate Resistance		0.8		Ω	f = 1 MHz, V _{AC} = 25 mV, ESR of C _{ISS}	
Q _{gs}	Gate to Source Charge		58		nC	V _{DS} = 800 V, V _{GS} = -5/20 V I _D = 50 A Per IEC60747-8-4 pg 83	Fig. 12
Q _{gd}	Gate to Drain Charge		90				
Q _g	Total Gate Charge		185				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V _{SD}	Diode Forward Voltage	3.6		V	V _{GS} = -5 V, I _{SD} = 25 A	Fig. 8, 9, 10
		3.4		V	V _{GS} = -5 V, I _{SD} = 25 A, T _J = 150 °C	
I _S	Continuous Diode Forward Current		90		T _C = 25 °C	Note 1
t _{rr}	Reverse Recovery Time	45		ns	V _{GS} = -5 V, I _{SD} = 50 A, T _J = 25 °C VR = 800 V dif/dt = 1000 A/μs	Note 1
Q _{rr}	Reverse Recovery Charge	406		nC		
I _{rrm}	Peak Reverse Recovery Current	13.5		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 _{θJC}	Thermal Resistance from Junction to Case	0.24	0.27	°C/W		Fig. 21
R _{θJA}	Thermal Resistance from Junction to Ambient		40			

Typical Performance

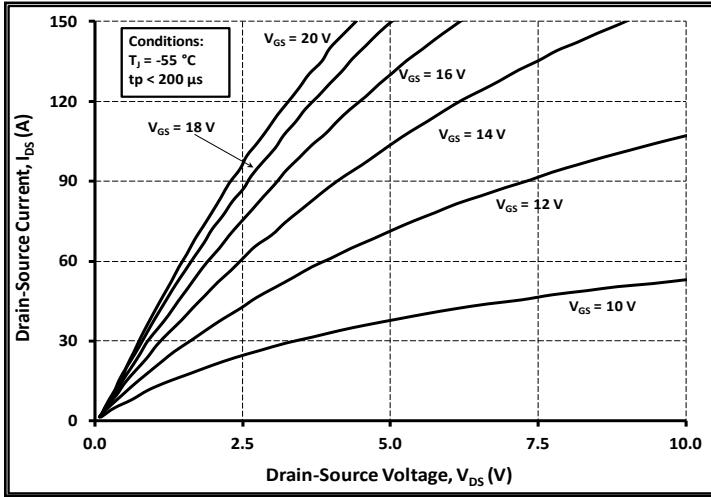


Figure 1. Output Characteristics $T_J = -55\text{ }^\circ\text{C}$

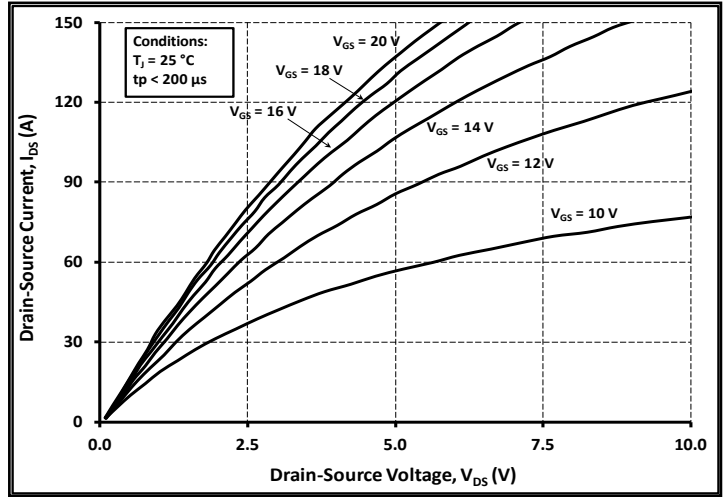


Figure 2. Output Characteristics $T_J = 25\text{ }^\circ\text{C}$

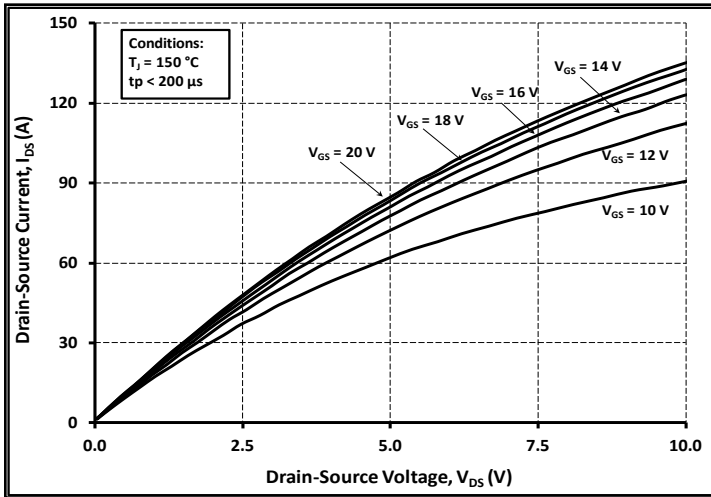


Figure 3. Output Characteristics $T_J = 150\text{ }^\circ\text{C}$

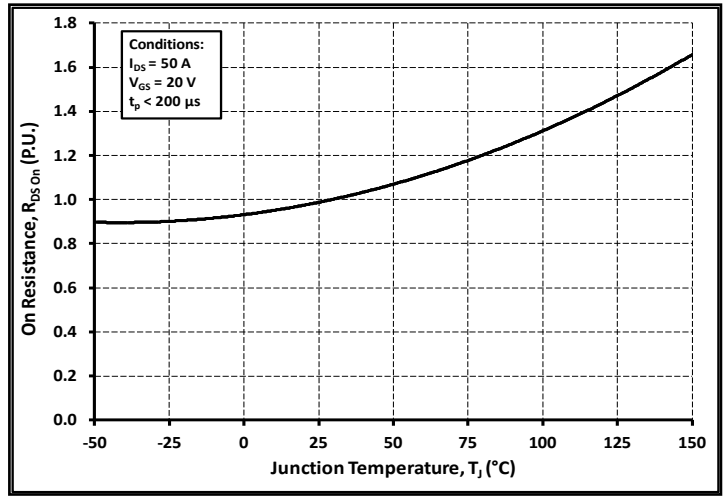


Figure 4. Normalized On-Resistance vs. Temperature

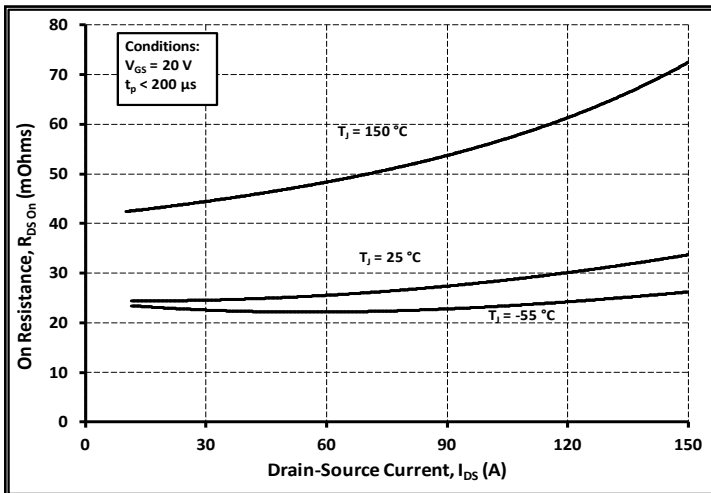


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

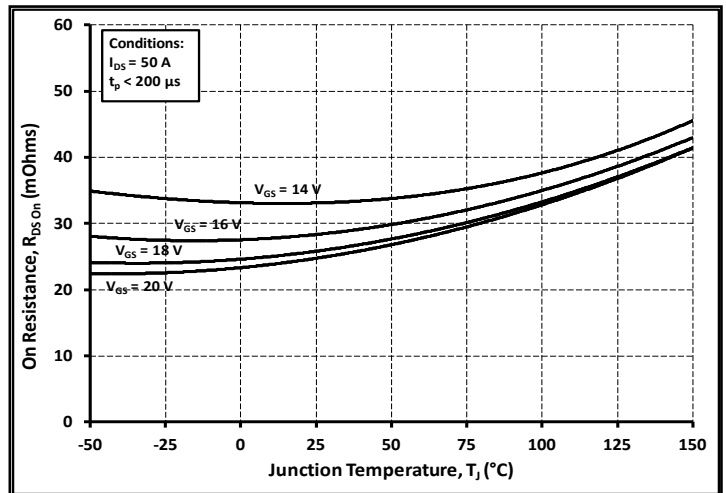


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

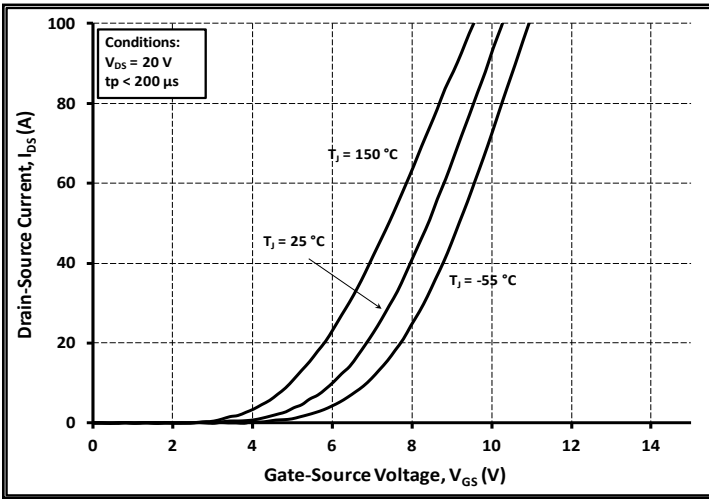


Figure 7. Transfer Characteristic For Various Junction Temperatures

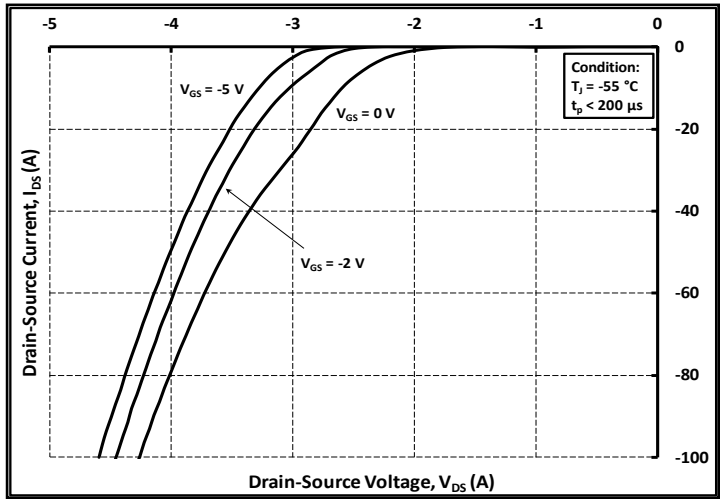


Figure 8. Body Diode Characteristic at -55 °C

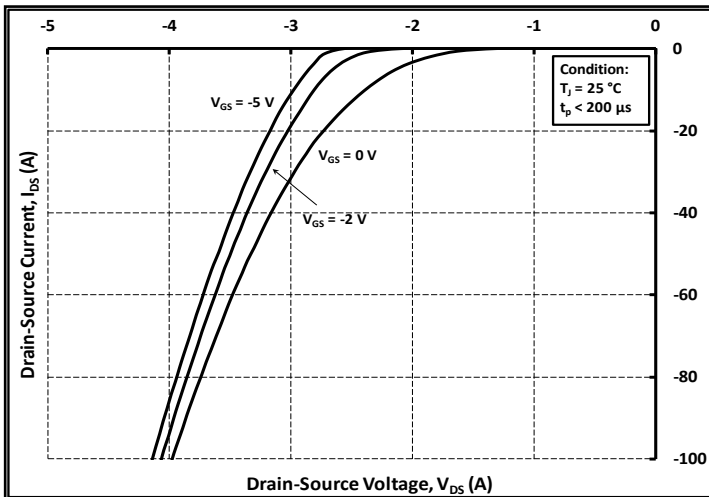


Figure 9. Body Diode Characteristic at 25 °C

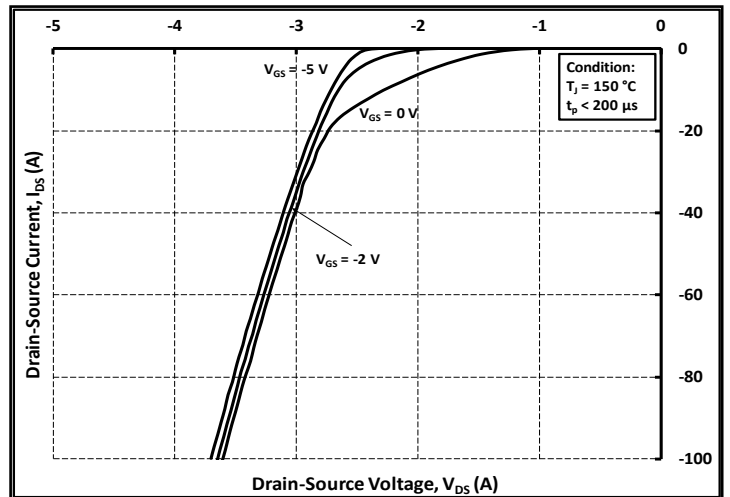


Figure 10. Body Diode Characteristic at 150 °C

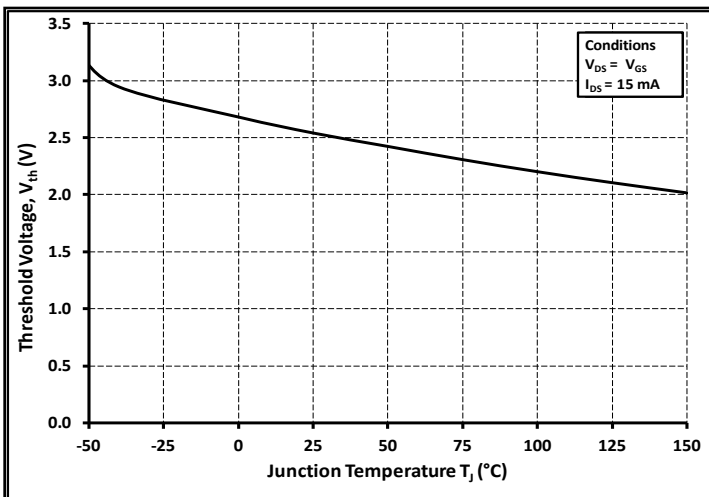


Figure 11. Threshold Voltage vs. Temperature

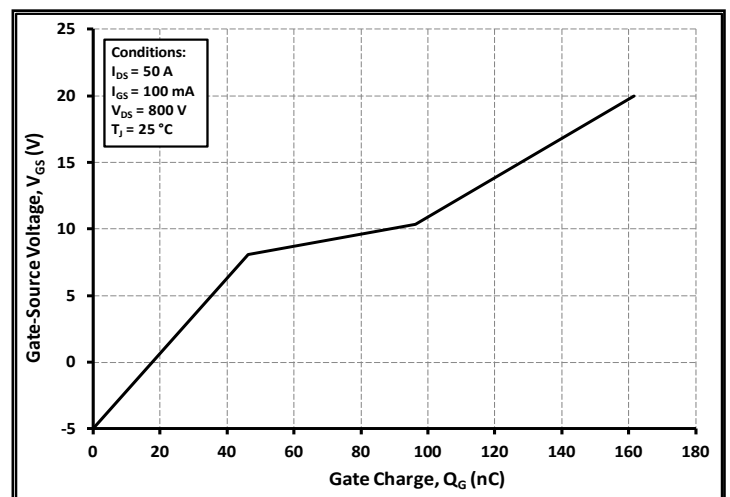


Figure 12. Gate Charge Characteristic

Typical Performance

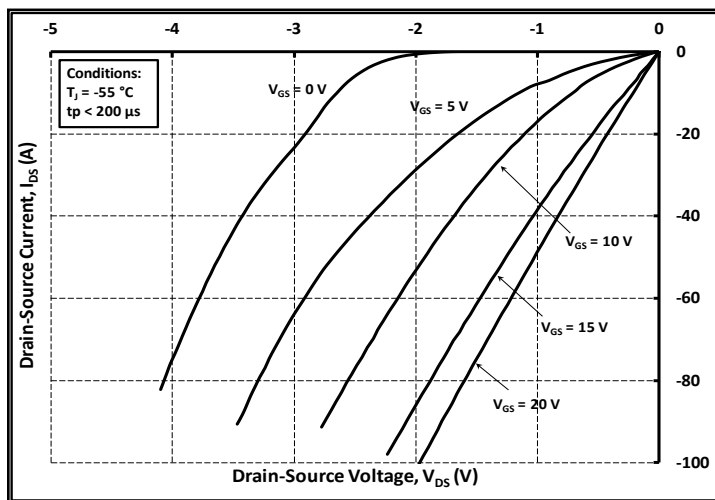


Figure 13. 3rd Quadrant Characteristic at -55 °C

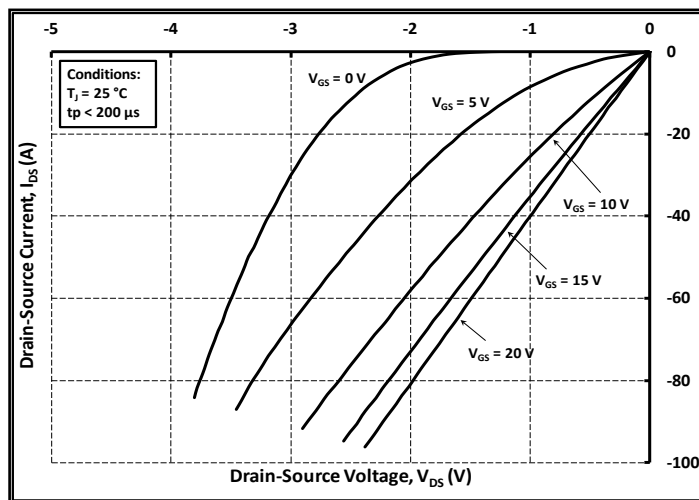


Figure 14. 3rd Quadrant Characteristic at 25 °C

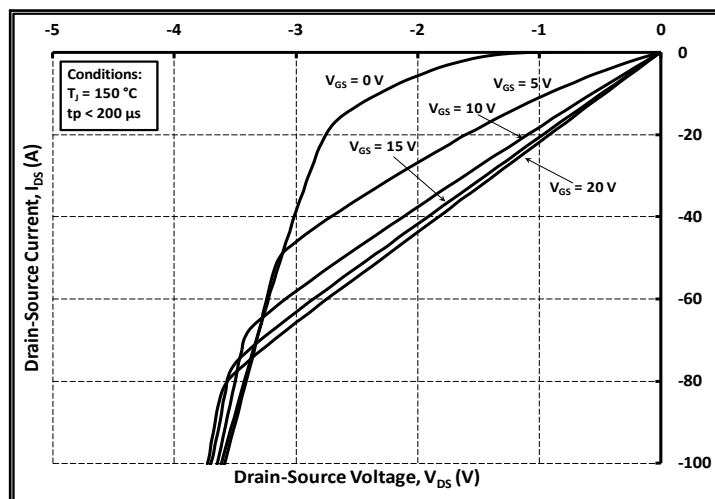


Figure 15. 3rd Quadrant Characteristic at 150 °C

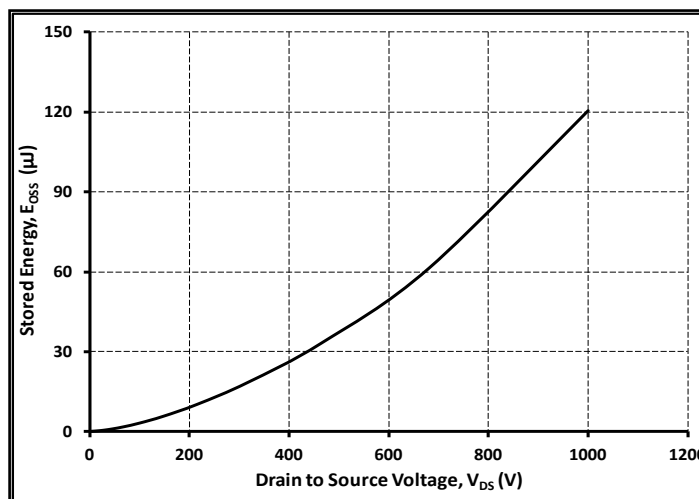


Figure 16. Output Capacitor Stored Energy

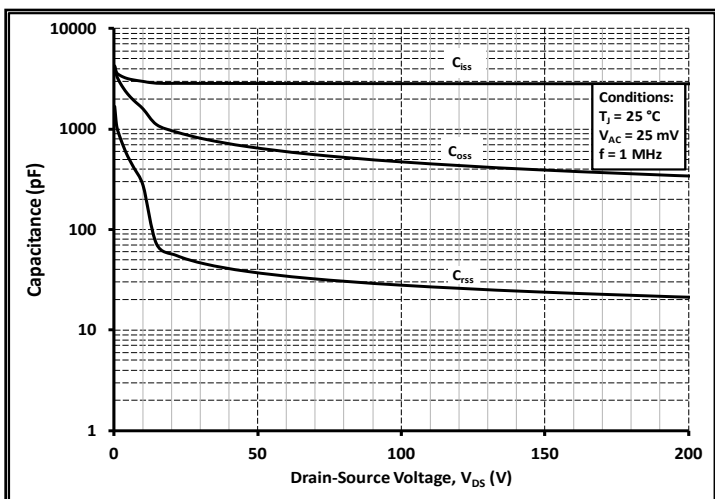


Figure 17. Capacitances vs. Drain-Source Voltage (0-200 V)

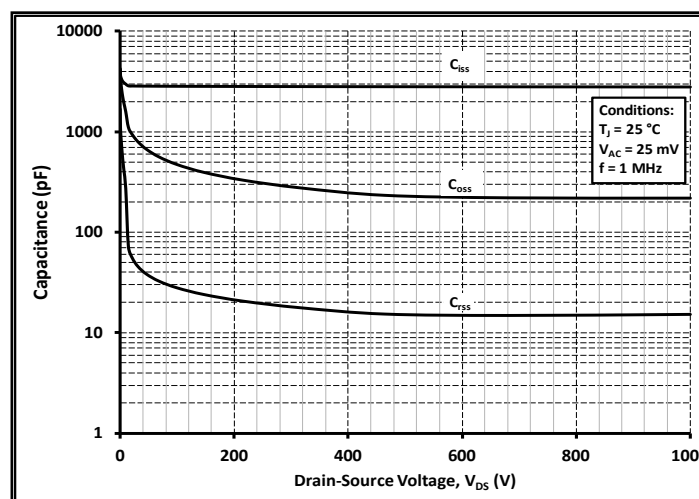


Figure 18. Capacitances vs. Drain-Source Voltage (0-1000 V)

Typical Performance

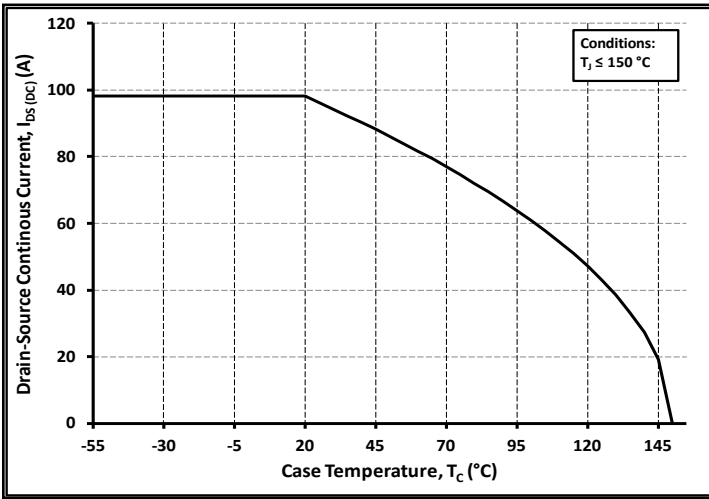


Figure 19. Continuous Drain Current Derating vs. Case Temperature

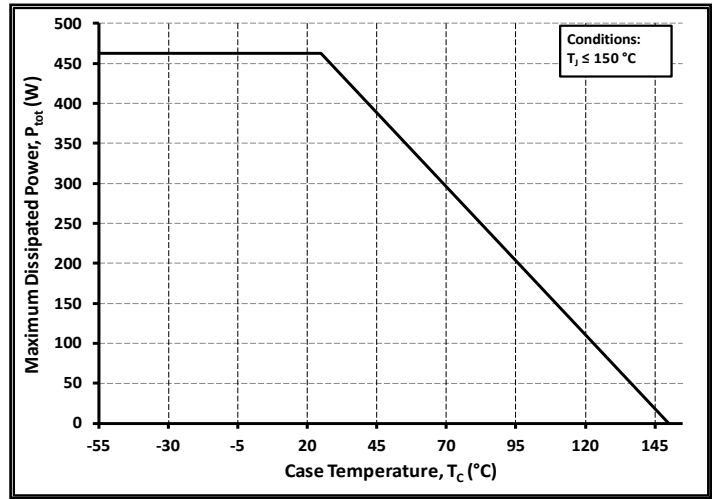


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

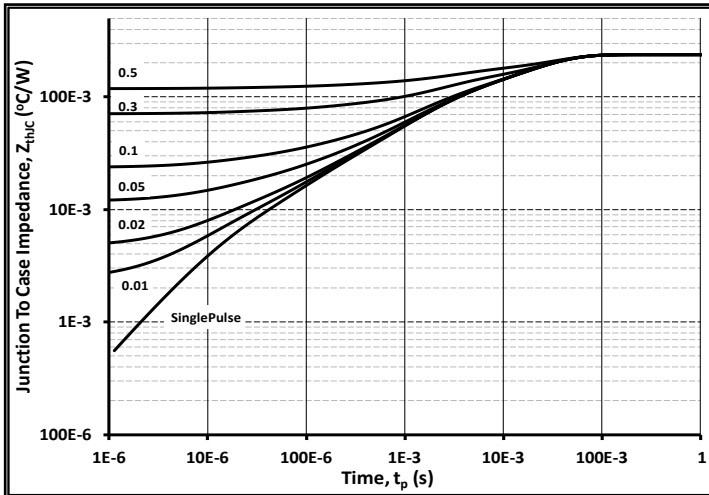


Figure 21. Transient Thermal Impedance (Junction - Case)

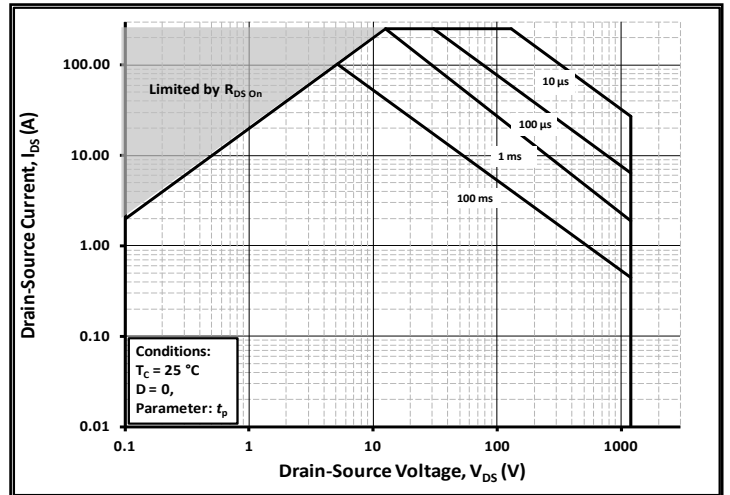


Figure 22. Safe Operating Area

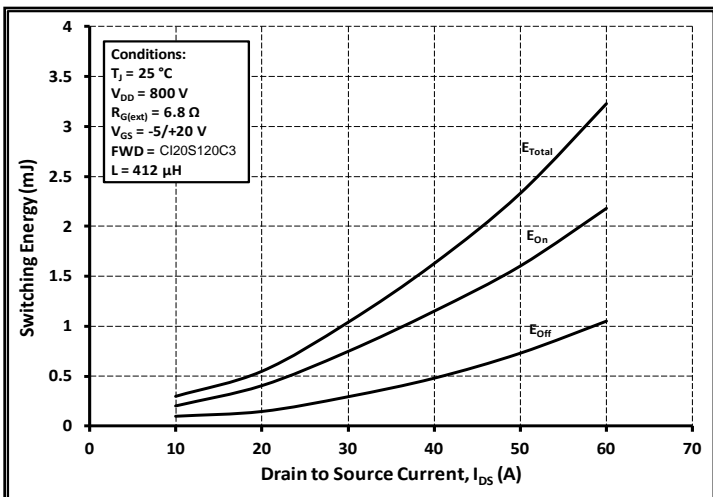


Figure 23. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 800V$)

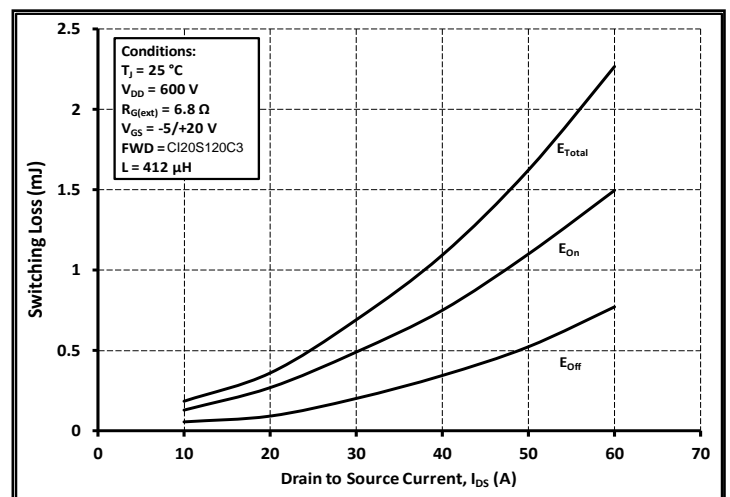


Figure 24. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600V$)

Typical Performance

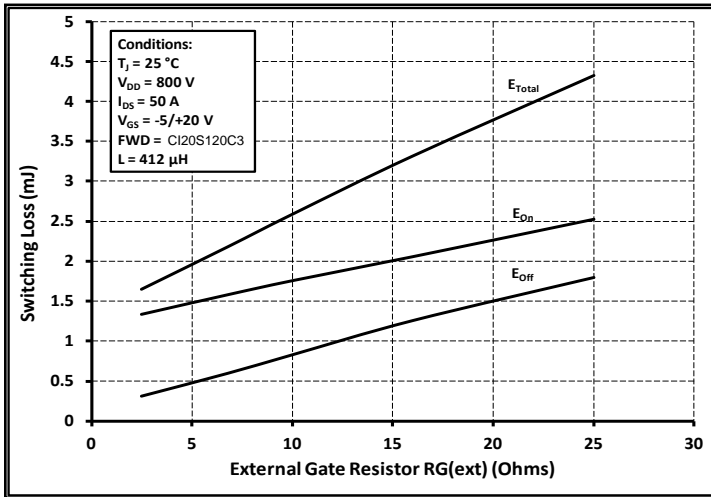


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

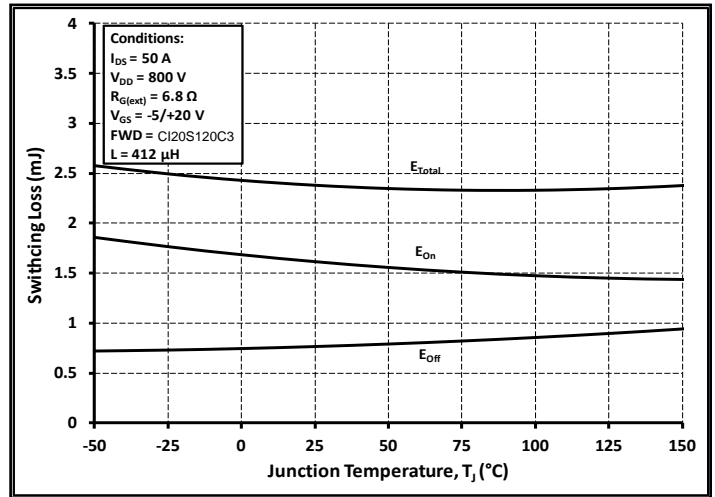


Figure 26. Clamped Inductive Switching Energy vs. Temperature

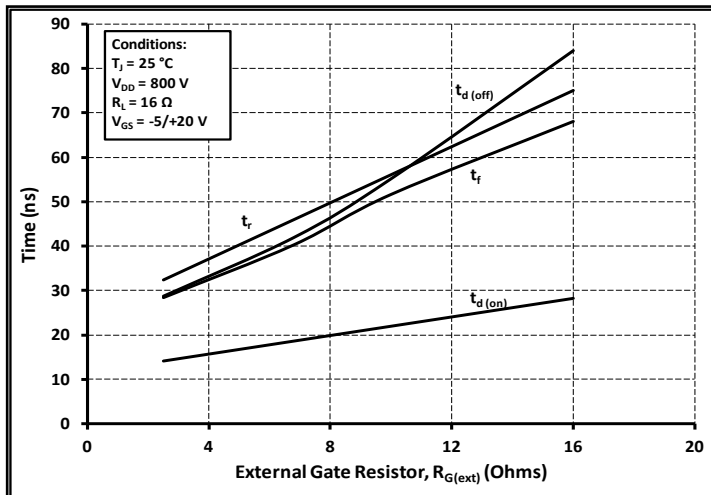


Figure 27. Switching Times vs. $R_{G(ext)}$

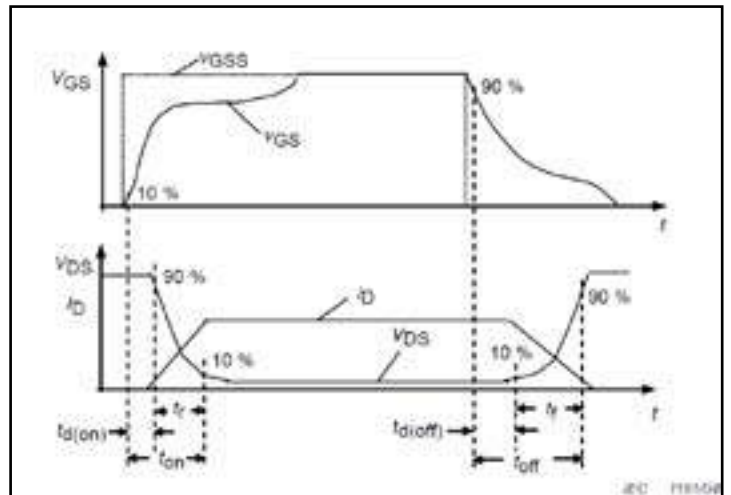


Figure 28. Switching Times Definition

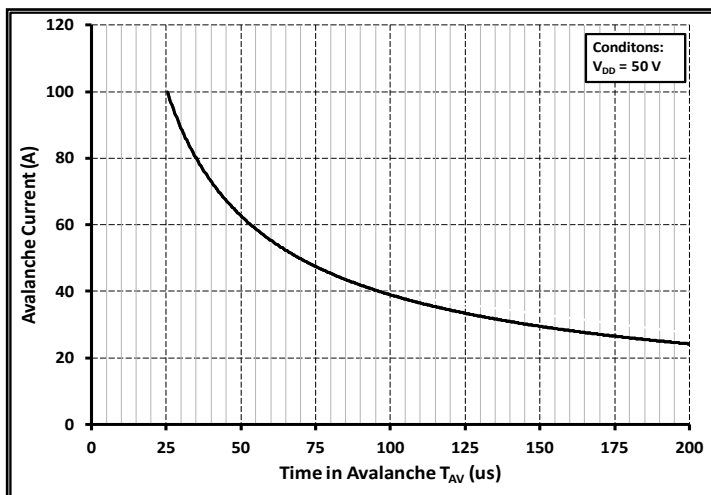


Figure 29. Single Avalanche SOA curve

Test Circuit Schematic

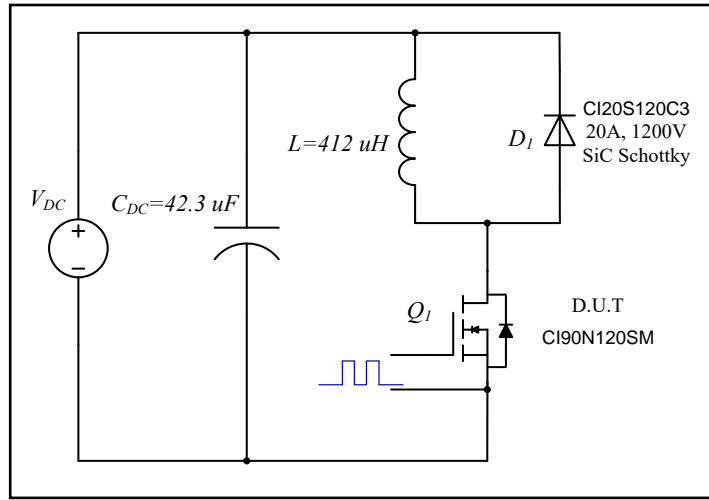


Figure 30. Clamped Inductive Switching Waveform Test Circuit

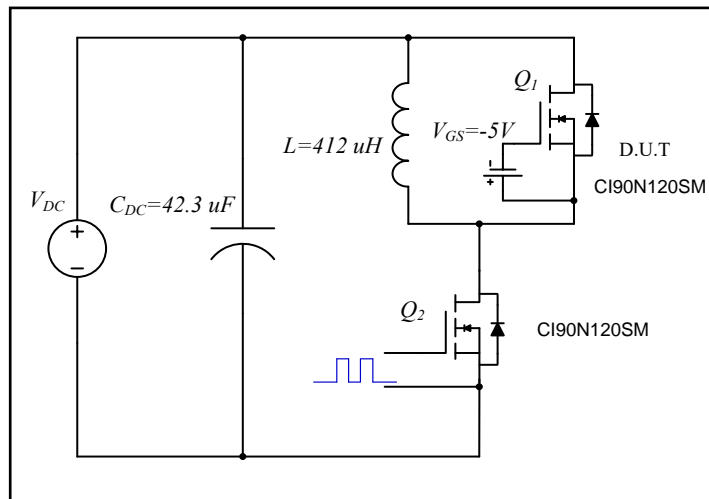
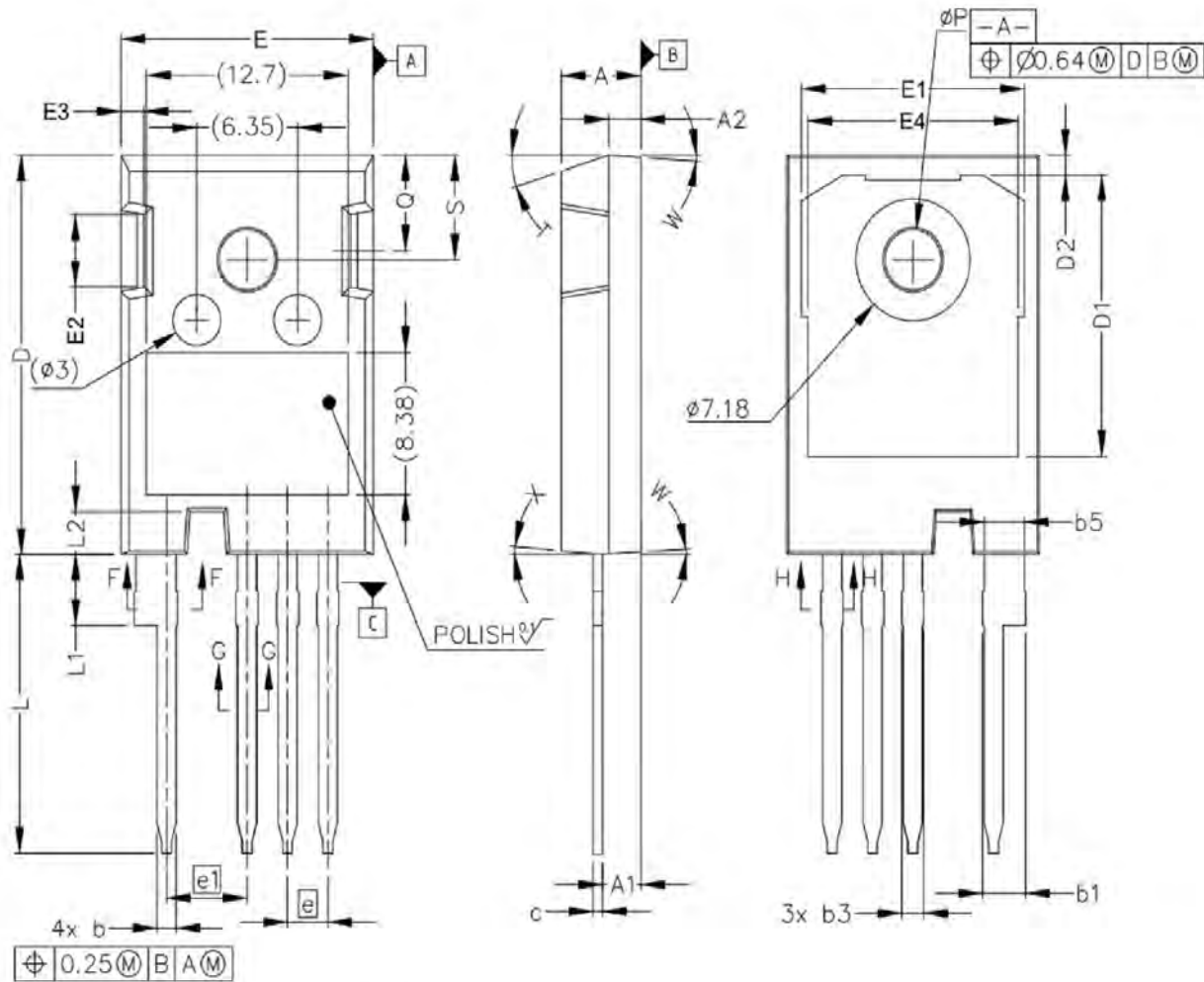


Figure 31. Body Diode Recovery Test Circuit

Package Dimensions: TO-247-4L



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX						MIN	NOM	MAX
A	4.83	5.00	5.21	D	23.30	23.45	23.60	L1	3.97	4.13	4.37
A1	2.29	2.41	2.54	D1	16.25	16.55	17.65	e P	3.51	3.6	3.65
A2	1.91	2.00	2.16	E	15.75	15.90	16.13	W	-	3.5	-
b	1.07	1.20	1.33	E1	13.10	13.65	14.15	X	-	4	-
b1	2.39	2.60	2.94	E2	3.68	5.0	5.1	Q	5.49	5.8	6.0
b2	2.39	-	2.84	e	2.54			S	6.04	6.15	6.30
c	0.55	0.60	0.68	L	17.31	17.45	17.82	T	-	17.5	-

NOTE:

1.The plastic package is not marked as smooth surfaceRa=0.1;Subglossy surfaceRa=0.8

2.Undeclared tolerance ± 0.15 , Unmarked filletRmax=0.25

NAME	TO-247-4L OUTLINE	UNIT	mm	DESIGNED	Shawn	THIRD ANGLE SYSTEM
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver1.0	ISSUE DATE		APPROVED		