CRXQF13M120G4Q

SiC MOSFET 1200V, 13.5mΩ, 145A

Features

- CRM G4 SIC MOSFET Technology
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Fast Reverse Recovery
- AEC-Q101 Qualified

Product Summary

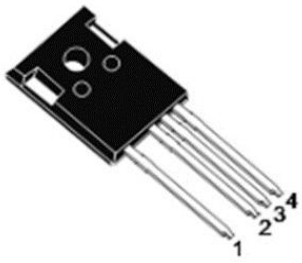
VDS	1200V
$R_{DS(on)_typ}$	13.5mΩ
I_D	145A

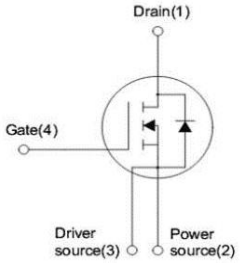
Applications

- Solar Inverters
- High Voltage DC/DC Converters
- On Board Charger(OBC)
- EV Charger

100% Avalanche Tested

RoHS HF





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Qty
CRXQF13M120G4Q	CRXQF13M120G4Q	TO-247-4	Tube	25pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current V_{GS}=18V，T_C = 25°C V_{GS}=18V，T_C = 100°C	I_D	 145 103	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D(pulse)}$	290	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	2160	mJ
Gate-Source voltage (dynamic)[a1]	V_{GSmax}	-10/+22	V
Gate-Source voltage (static)[a2]	V_{GSop}	-5/+18	V
Power dissipation (T_C=25°C,T_J=175°C)	P_D	500	W
Operating Junction and Storage Temperature	T_j,T_{stg}	-55...175	°C

a1: When using MOSFET Body Diode V_{GSmax} = -5V/+22V

a2: MOSFET can also safely operate at 0/+18V

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.3	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	1200	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	-	4	V	V_{DS}=V_{GS},I_D=25mA
Zero gate voltage drain current	I_{DSS}	-	0.1	100	μA	V_{DS}=1200V,V_{GS}=0V T_j=25°C
		-	3.6	-		T_j=175°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=-10/+22V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	17	22	mΩ	V_{GS}=15V, I_D=70A, T_j=25°C
		-	27	-		T_j=175°C
Drain-source on-state resistance	$R_{DS(on)}$	-	13.5	17	mΩ	V_{GS}=18V, I_D=70A, T_j=25°C
		-	26	-		T_j=175°C
Transconductance	g_{fs}	-	55	-	S	VDS=20V,IDS=70A
Dynamic Characteristic						
Internal Gate resistance	$R_{G(int)}$	-	2.7	-	Ω	f=1MHz
Input Capacitance	C_{iss}	-	4659	-	pF	V_{GS}=0V, V_{DS}=1000V, f=1MHz
Output Capacitance	C_{oss}	-	190	-		
Reverse Transfer Capacitance	C_{rss}	-	14	-		
Coss Stored Energy	E_{oss}	-	120	-	uJ	
Gate Total Charge	Q_g	-	202	-	nC	VGS=-5/18V VDS=800V ID=70A
Gate-Source charge	Q_{gs}	-	77	-		
Gate-Drain charge	Q_{gd}	-	42	-		
Turn-on delay time	$t_{d(on)}$	-	14.7	-	ns	VDD=800V,ID=70A VGS=-5V/18V， RG=2.5Ω，L=120uH
Rise time	t_r	-	19	-		
Turn-off delay time	$t_{d(off)}$	-	39	-		
Fall time	t_f	-	11.8	-		
Turn-On Switching Energy	$E_{(on)}$	-	673	-	uJ	
Turn Off Switching Energy	$E_{(off)}$	-	163	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.7	-	V	V_{GS}=0V,I_F=35A
		-	3	-	V	V_{GS}=0V,I_F=35A, T_j=175℃
Continuous Diode Forward Current	I_S	-	-	145	A	V_{GS}=0V
Diode pulse Current	$I_{S,pulse}$	-	-	290	A	pulse width t_p limited by Tjmax
Body Diode Reverse Recovery Time	t_{rr}	-	26	-	ns	di/dt=1000A/us IF=70A Vdd=800V Tj=25℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	320	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	22	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	97	-	ns	di/dt=1000A/us IF=70A Vdd=800V, Tj=175℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	1460	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	26	-	A	

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=-55℃)

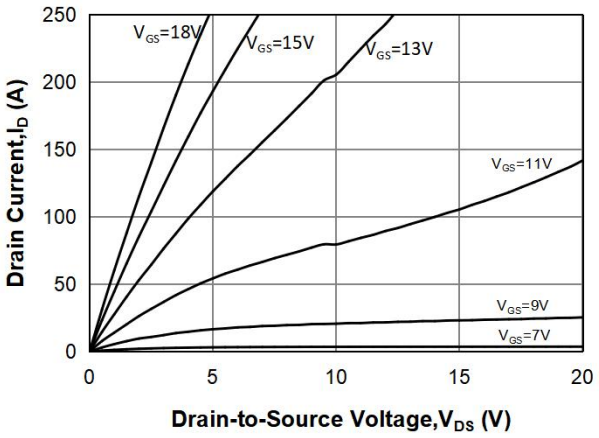


Fig 2. Output Characteristics (Tj=25℃)

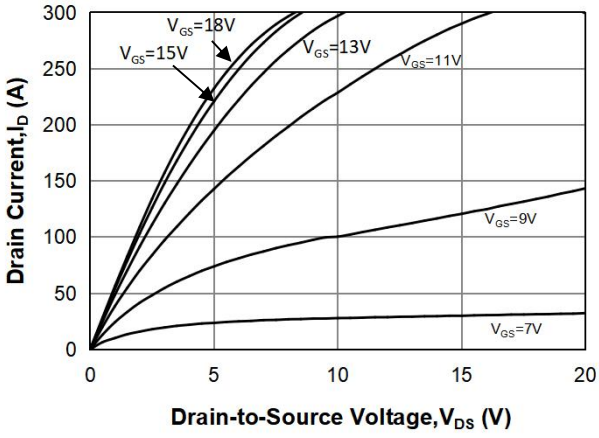


Fig 3. Output Characteristics (Tj=175℃)

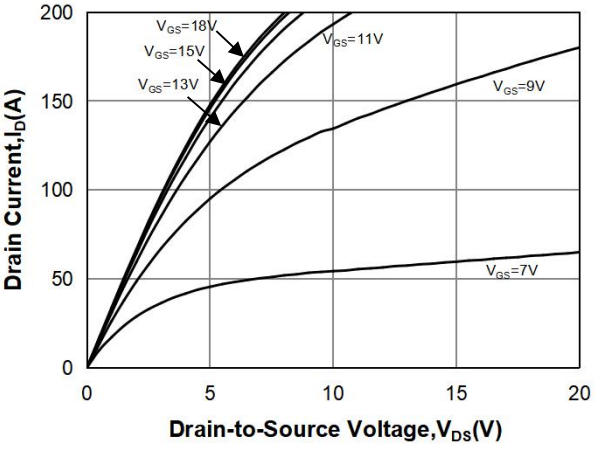


Fig 4: Rds(on) vs. Temperature

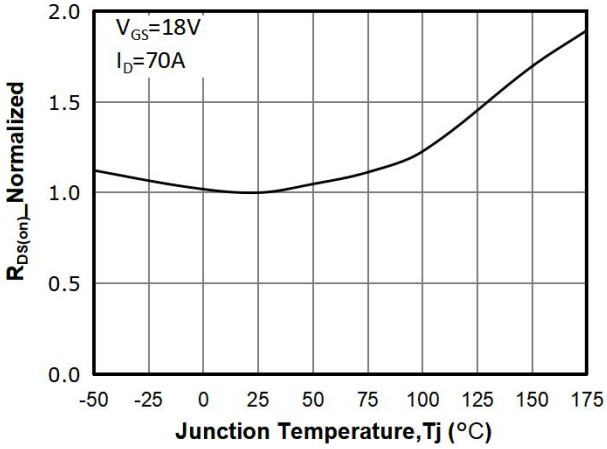


Fig 5: On-Resistance vs. Drain Current For Various Temperatures

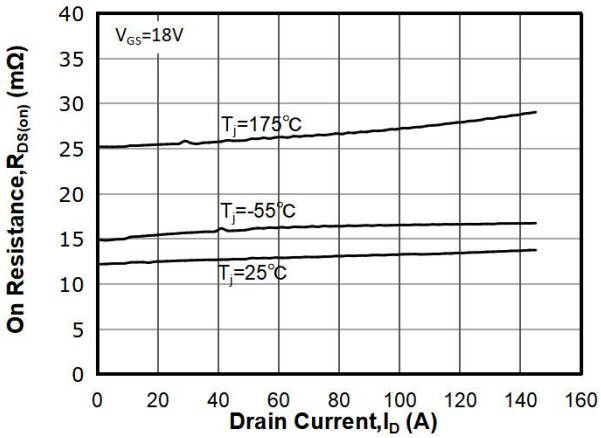


Fig 6: Rds(on) vs. Temperature For Various Gate Voltage

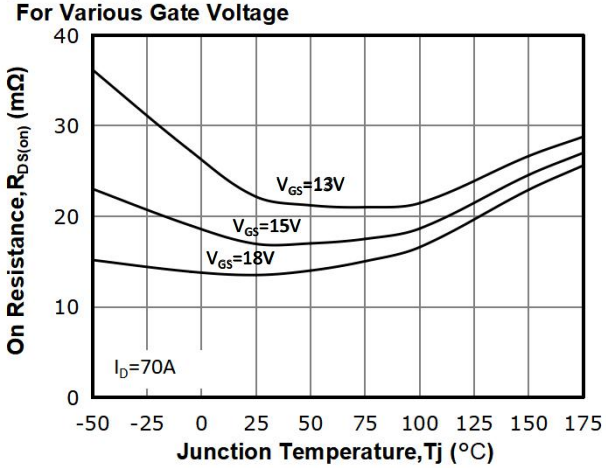


Fig 7: Transfer Characteristics

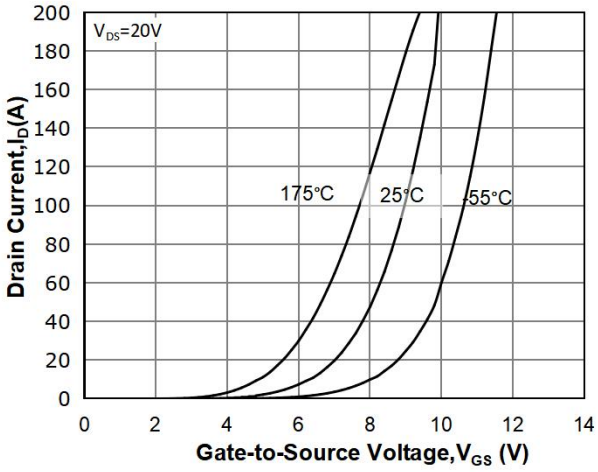


Fig 8: Body-diode Forward Characteristics For Various Temperatures

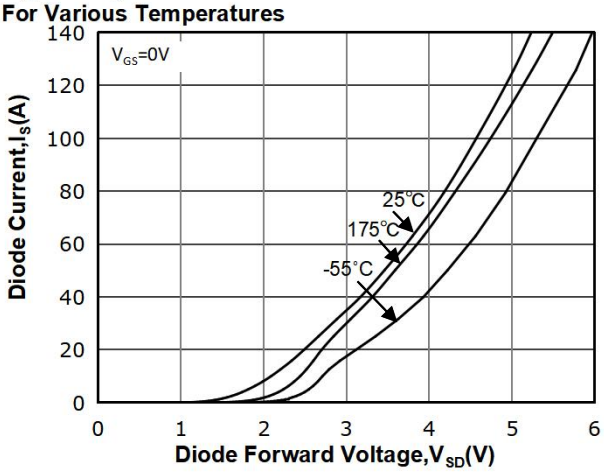


Fig 9: VGS(th) Vs Tj Characteristics

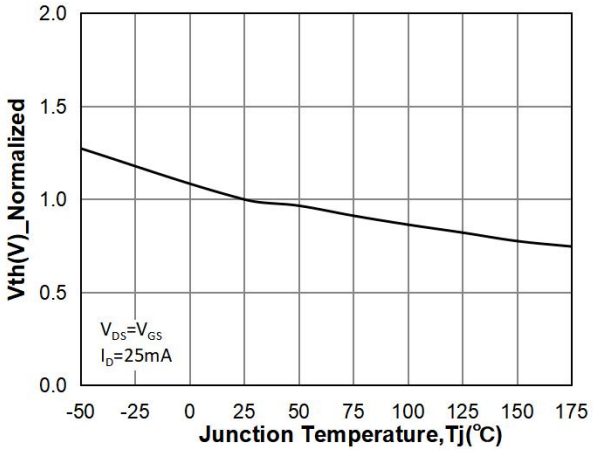


Fig 10: 3rd Quadrant Characteristic at 25°C

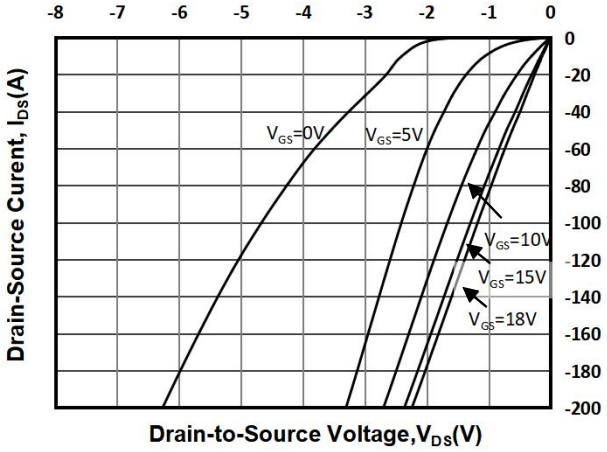


Fig 11：Gtate Charge Characteristics

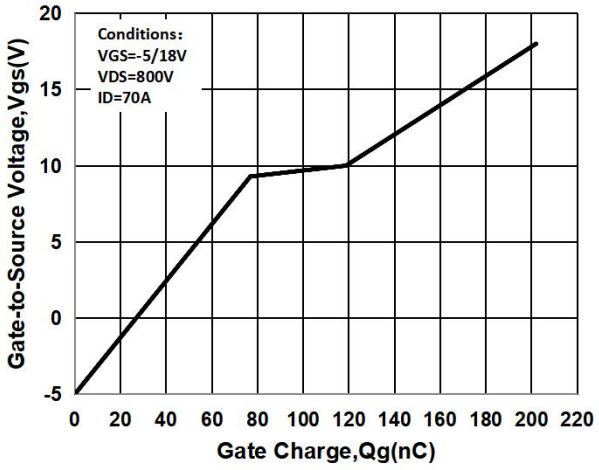


Fig 12: Capacitance Characteristics

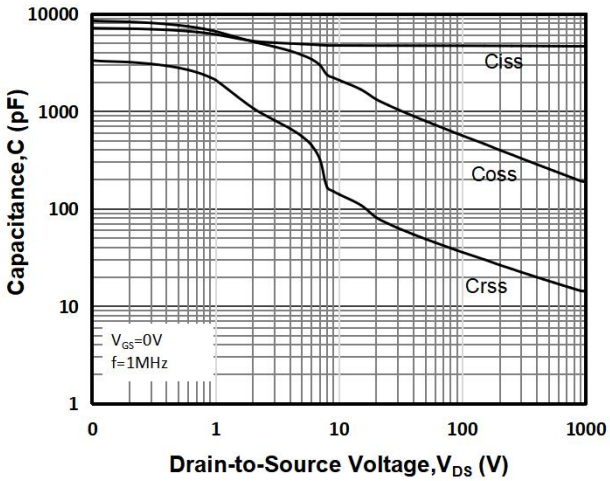


Fig 13: Continuous Drain Current vs. Case Temperature

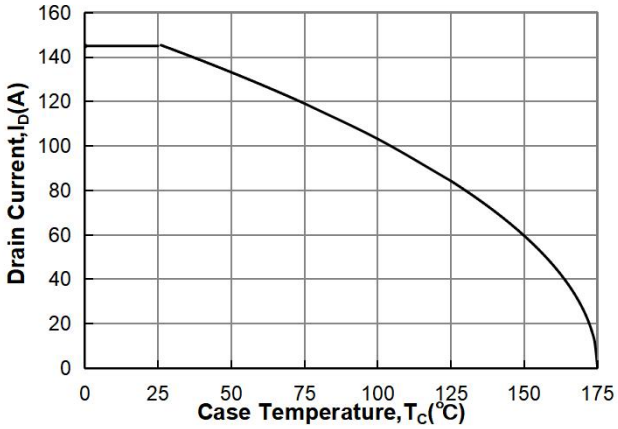


Fig 14: Maximum Power Dissipation vs. Case Temperature

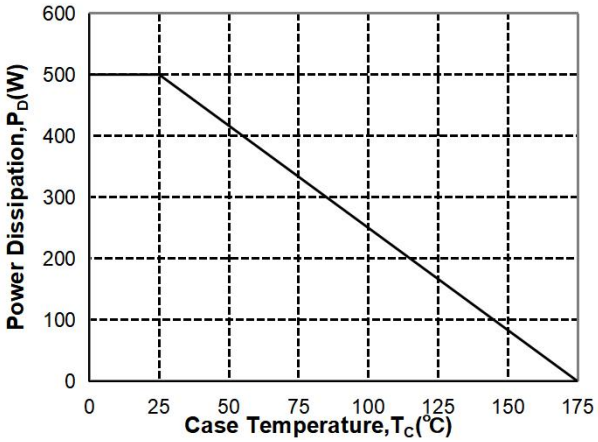


Fig 15: Safe Operating Area

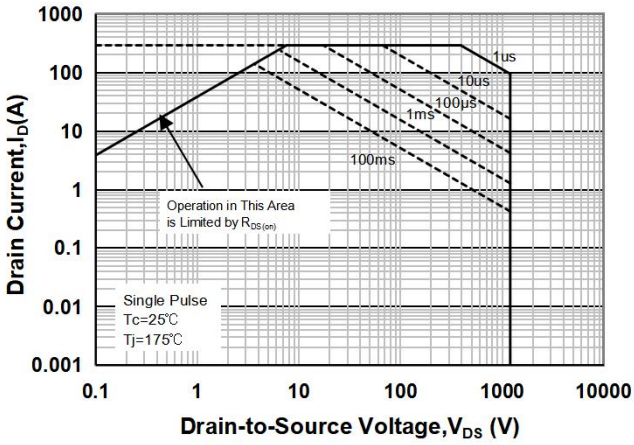


Fig 16:Output Capacitor Stored Energy

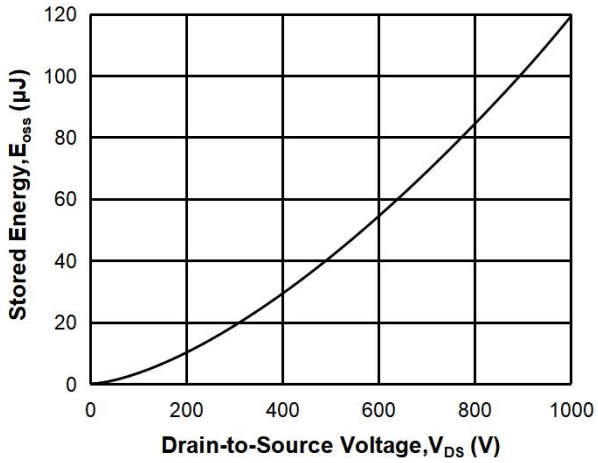


Fig 17: Max. Transient Thermal Impedance

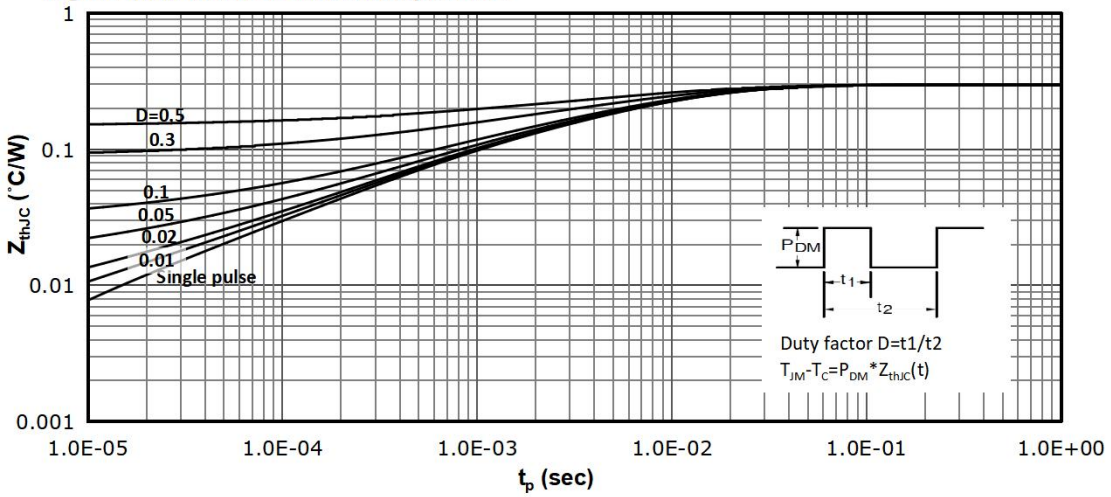


Fig 18: Rg(Ω) vs. Switching Times(us)

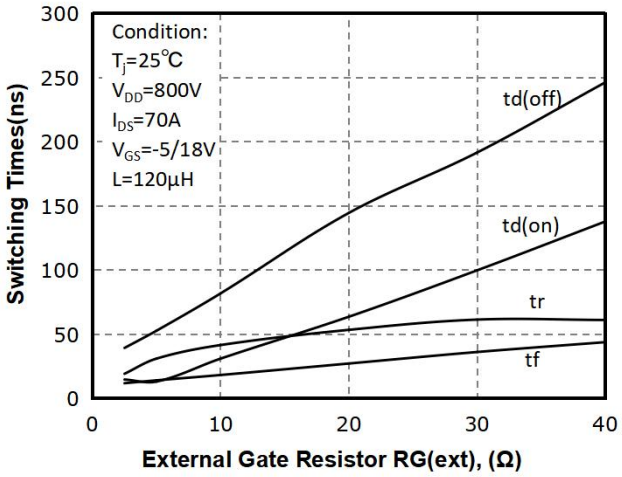


Fig 19: Rg(Ω) vs. Switching Loss(uJ)

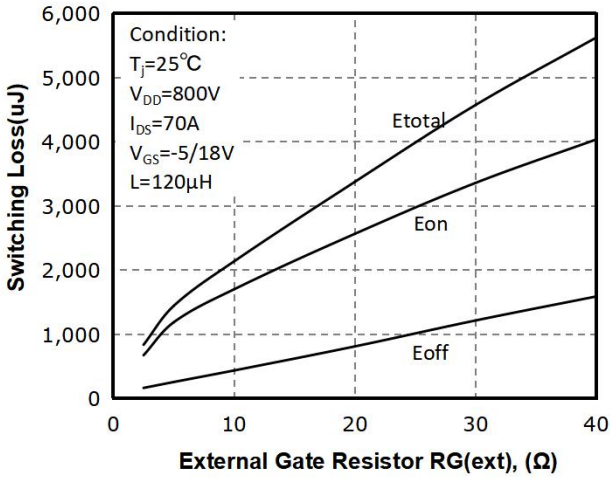


Fig 20: Temperature(°C) vs. Switching Loss(uJ)

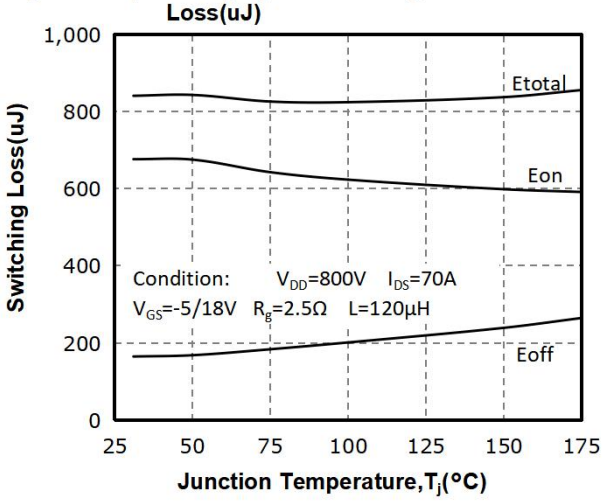
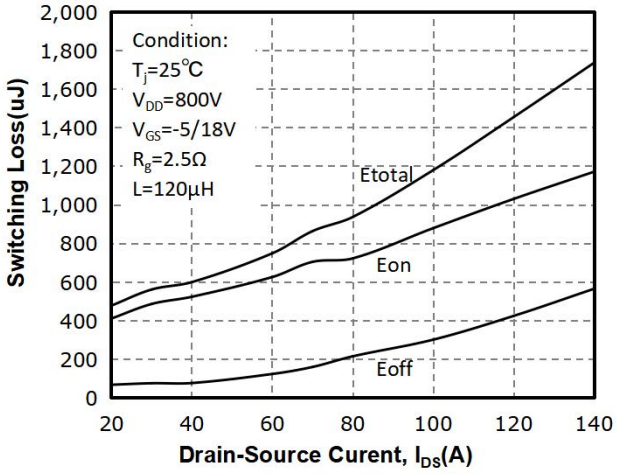
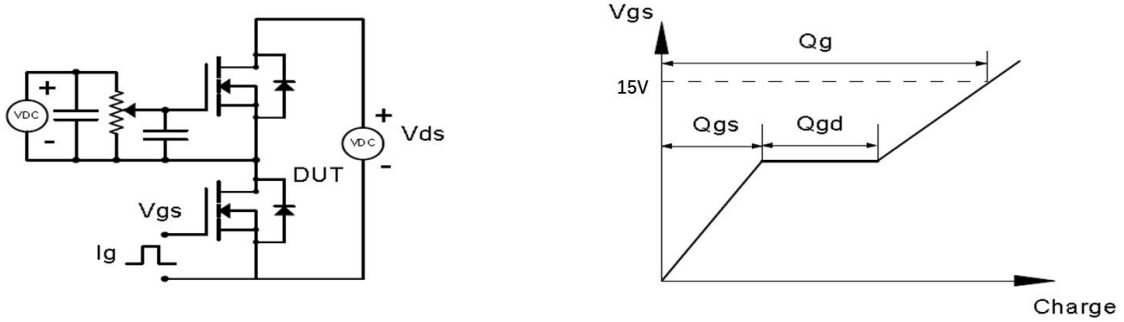


Fig 21: I_{DS}(A) vs. Switching Loss(uJ)

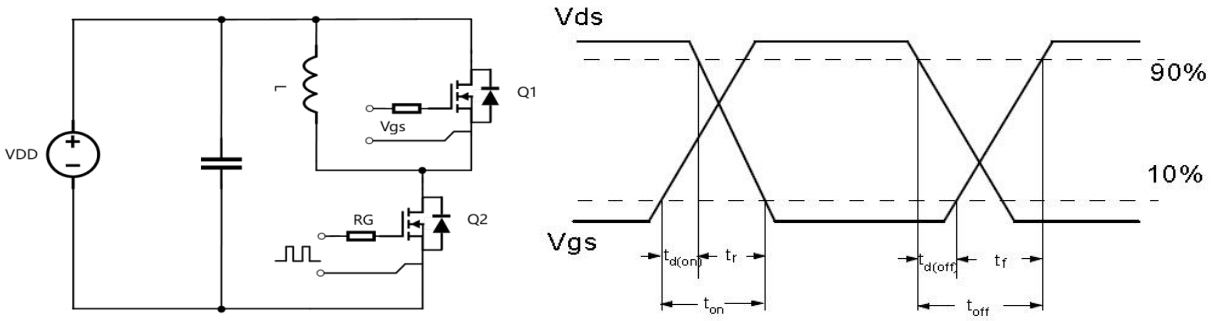


Test Circuit & Waveform

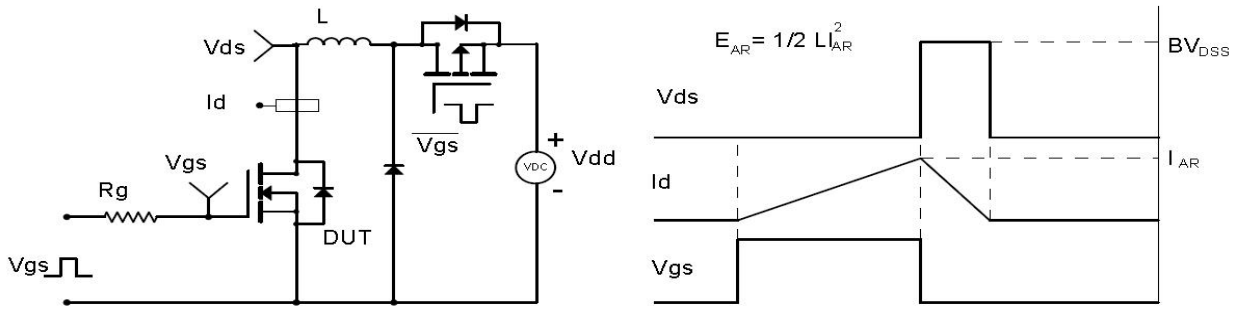
Gate Charge Test Circuit & Waveform



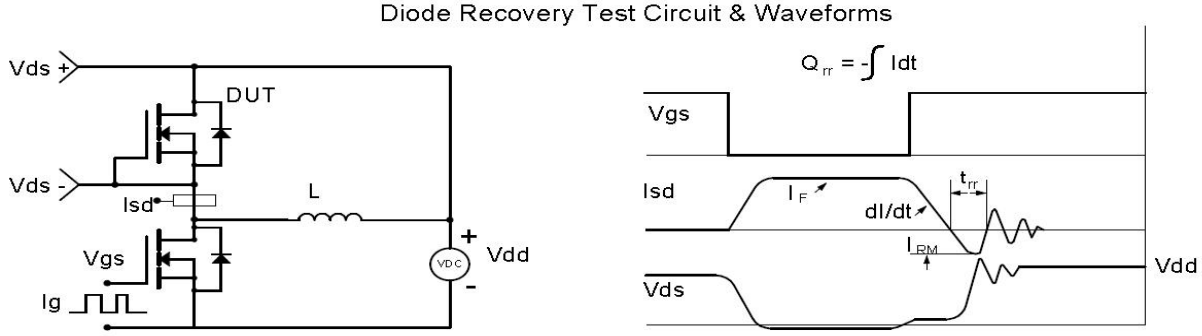
Resistive Switching Test Circuit & Waveforms



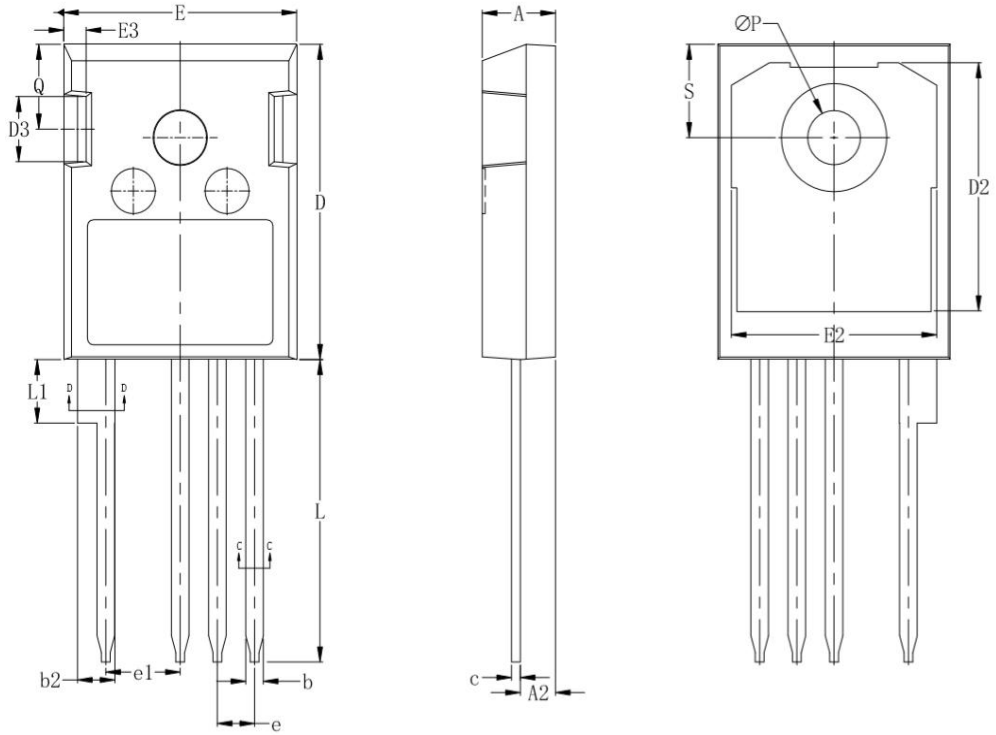
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-247-4



Items	Values(mm)	
	MIN	MAX
A	4.8	5.2
A2	2.2	2.6
b	1.05	1.4
b2	2.4	2.75
c	0.5	0.75
D	20.7	21.1
D2	15.5	17.2
D3	4	5
E	15.5	16.1
E2	13	15
E3	1	2
e	2.54 BSC.	
e1	5.08 BSC.	
L	19	21
L1	4	4.45
ΦP	3.5	3.7
Q	5.4	5.9
S	6.04	6.3

Revision History

Revison	Date	Major changes
1.0	2025/8/29	Release of formal version
2.0	2026/5/24	Update Switching data

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