

Features

- CRM G4 SiC MOSFET Technology
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Fast Reverse Recovery
- Qualified according to JEDEC criteria

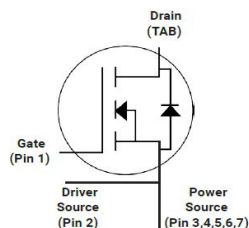
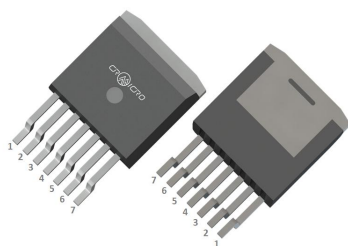
Applications

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

Product Summary

V _{DS}	1200V
R _{DS(on)_typ}	13.5m Ω
I _D	145A

100% Avalanche Tested



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Qty
CRXSP13M120G4Z	X13M120G4Z	TO-263-7	Reel	800pcs

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, R _g =25 Ω)	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	555	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}	0.27	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction – ambient. Max	R_{thJA}	50	

Electrical Characteristic (at $T_j = 25^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	1200	-	-	V	$V_{GS}=0V, I_D=250\mu A$
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	$V_{DS}=1200V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$
		-	3.6	-		$T_j=175^{\circ}\text{C}$
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	m Ω	$V_{GS}=15V, I_D=70A,$ $T_j=25^{\circ}\text{C}$
		-	27	-		$T_j=175^{\circ}\text{C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	13.5	17	m Ω	$V_{GS}=18V, I_D=70A,$ $T_j=25^{\circ}\text{C}$
		-	26	-		$T_j=175^{\circ}\text{C}$
Transconductance	g_{fs}	-	55	-	S	$V_{DS}=20V, I_{DS}=70A$

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	-	μJ	
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)}	-	9.3	-	ns	VDD=800V,ID=70A VGS=-5V/18V, RG=2.5Ω, L=120uH
Rise time	t _r	-	22	-		
Turn-off delay time	t _{d(off)}	-	42	-		
Fall time	t _f	-	12.2	-		
Turn-On Switching Energy	E _(on)	-	417	-	μJ	
Turn Off Switching Energy	E _(off)	-	408	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.5	-	V	$V_{GS}=0V, I_F=35A$
		-	4	-	V	$V_{GS}=0V, I_F=35A, T_j=175^\circ C$
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 T_{jmax}
Body Diode Reverse Recovery Time	t_{rr}	-	25.3	-	ns	$di/dt=1000A/us$ $I_F=70A$ $V_{dd}=800V$ $T_j=25^\circ C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	330	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	22.5	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	110	-	ns	$di/dt=1000A/us$ $I_F=70A$ $V_{dd}=800V, T_j=175^\circ C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	1060	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	24.7	-	A	

Typical Performance Characteristics

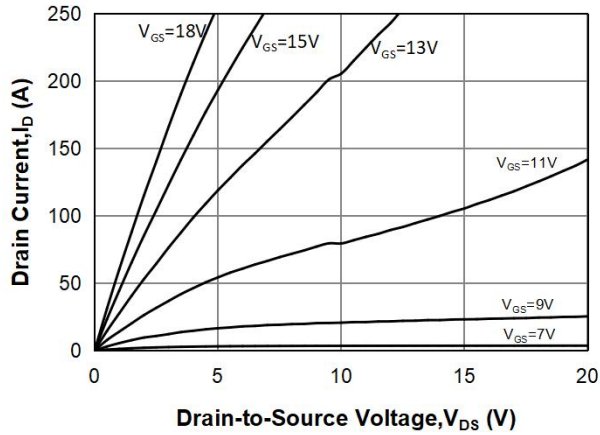
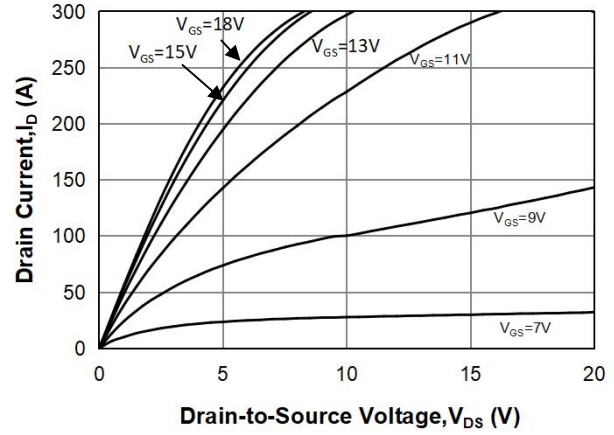
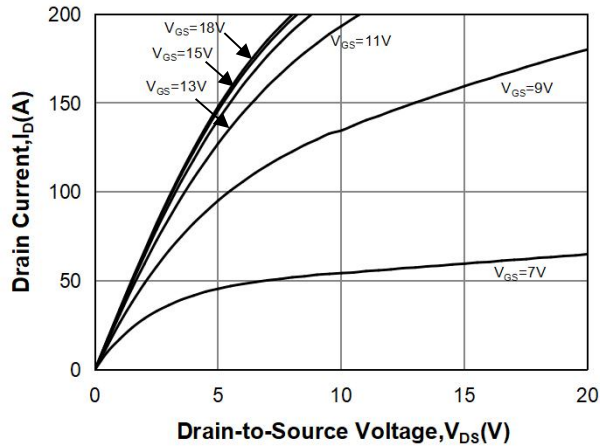
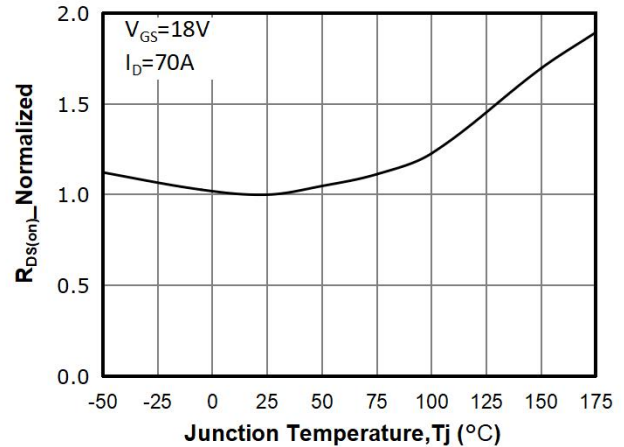
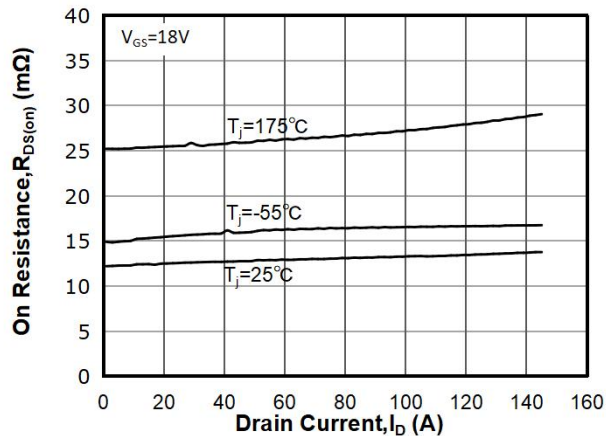
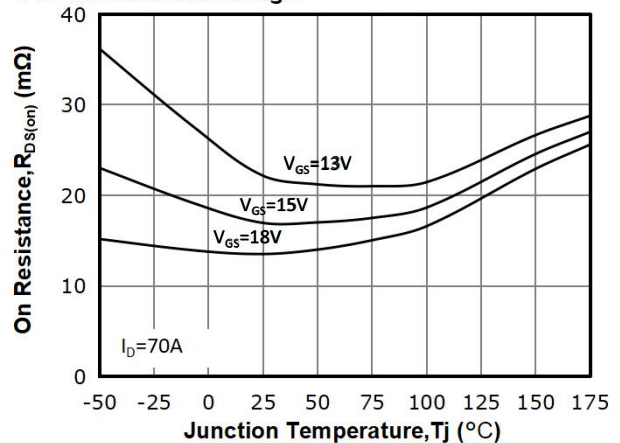
Fig 1. Output Characteristics ($T_j = -55^\circ\text{C}$)

Fig 2. Output Characteristics ($T_j = 25^\circ\text{C}$)

Fig 3. Output Characteristics ($T_j = 175^\circ\text{C}$)

Fig 4: $R_{DS(on)}$ vs. Temperature

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

Fig 6: $R_{DS(on)}$ vs. Temperature For Various Gate Voltage


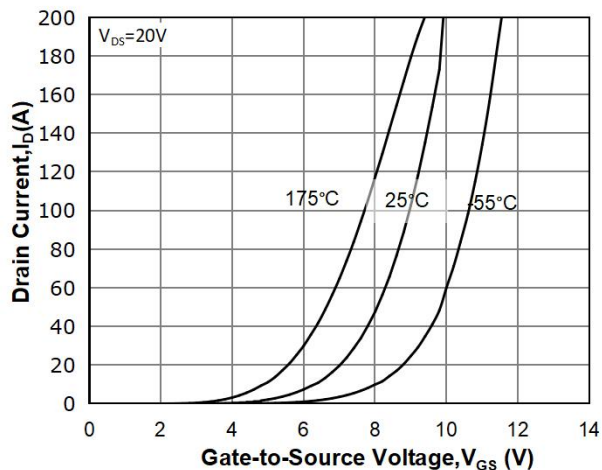
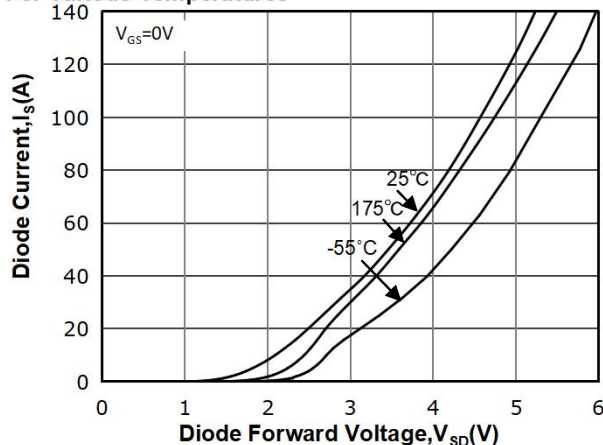
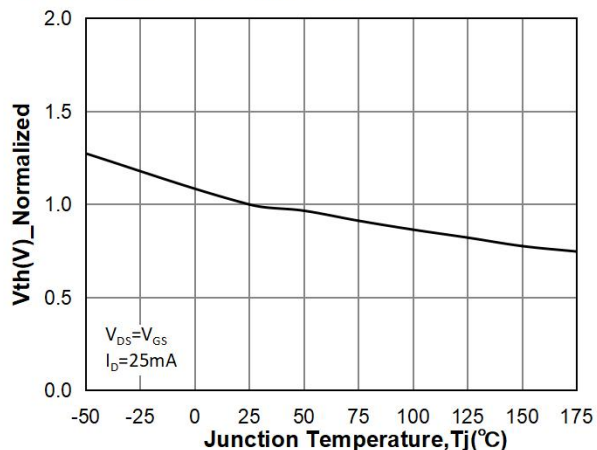
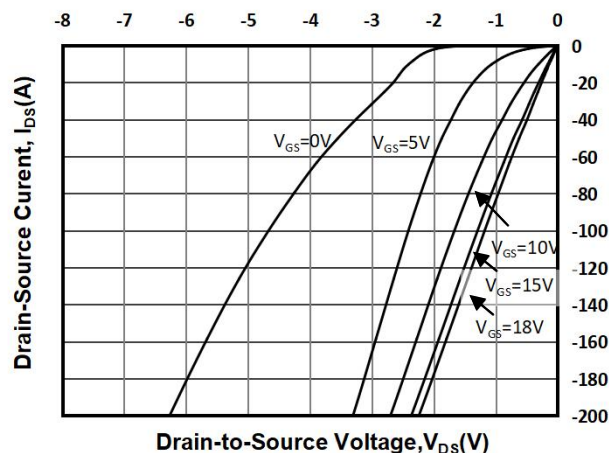
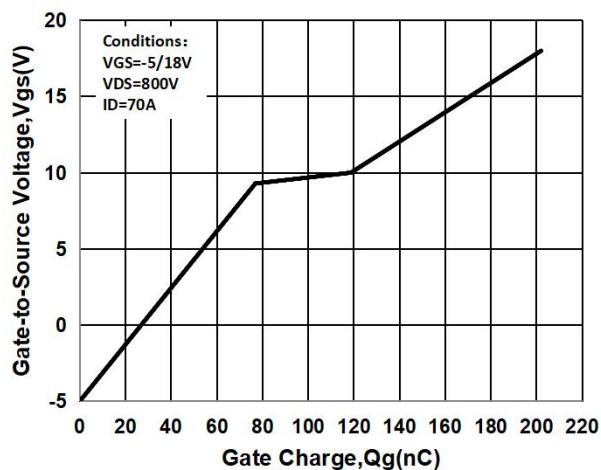
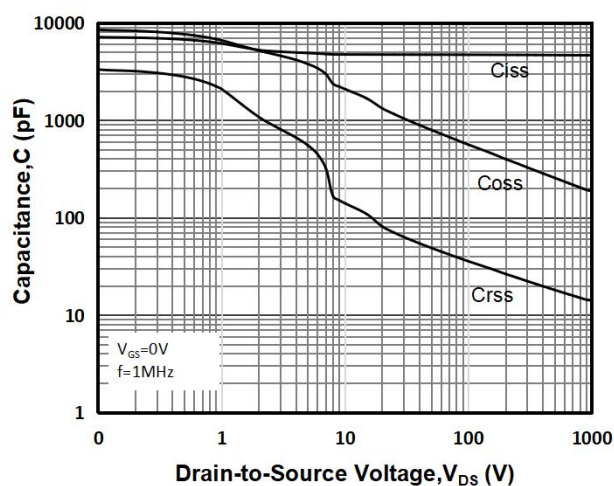
Fig 7: Transfer Characteristics

Fig 8: Body-diode Forward Characteristics For Various Temperatures

Fig 9: V_GS(th) Vs T_J Characteristics

Fig 10: 3rd Quadrant Characteristic at 25°C

Fig 11: Gate Charge Characteristics

Fig 12: Capacitance Characteristics


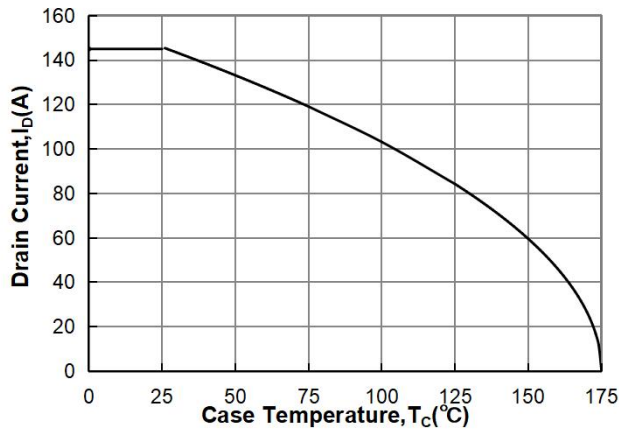
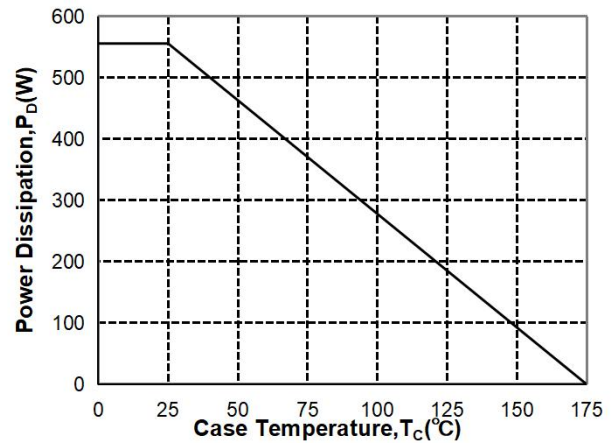
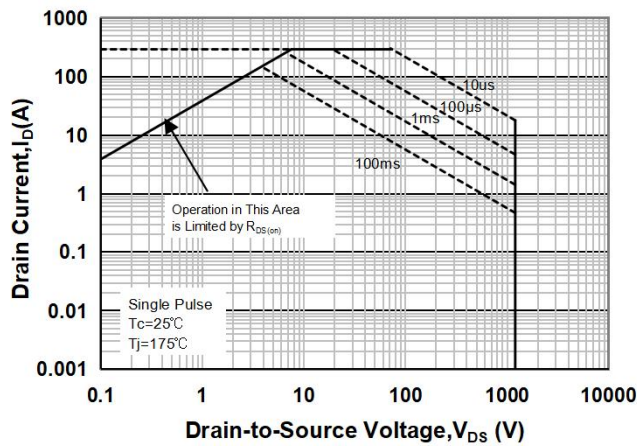
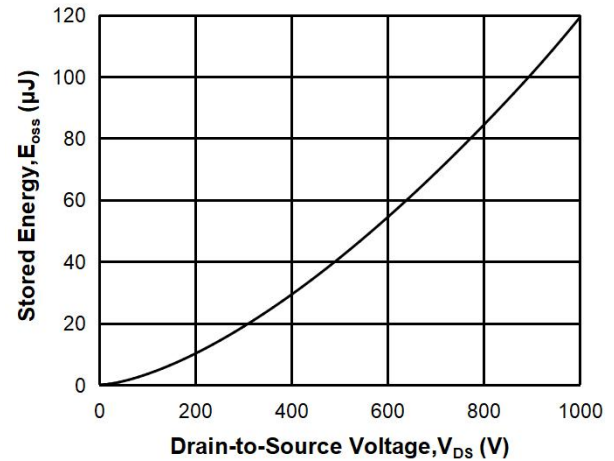
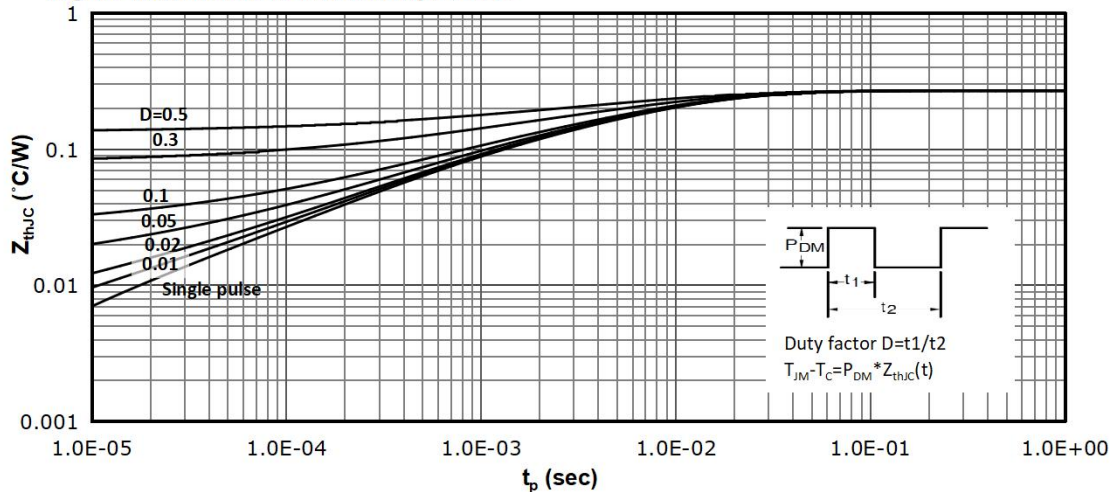
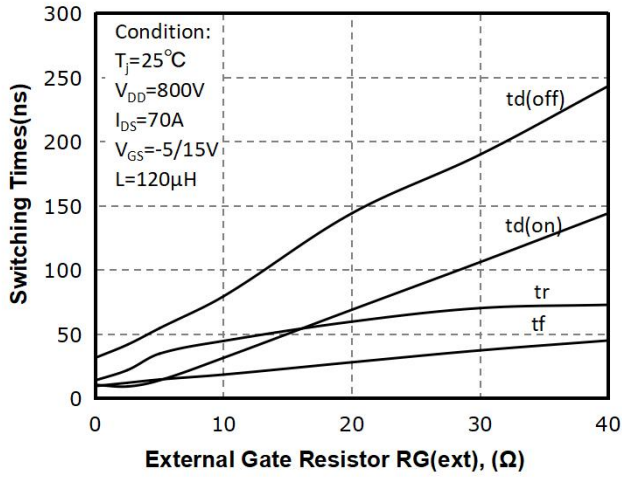
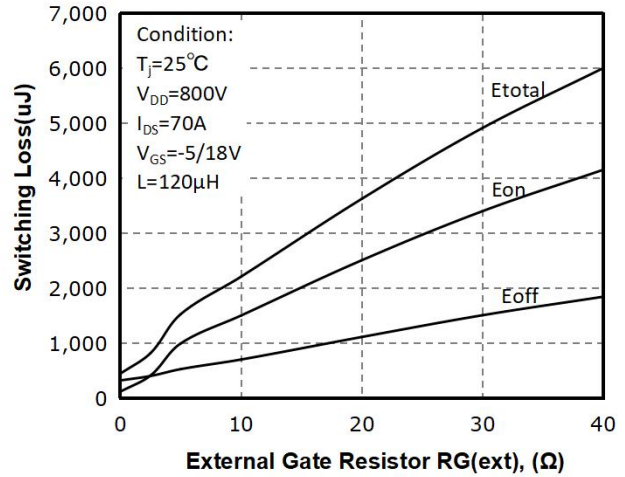
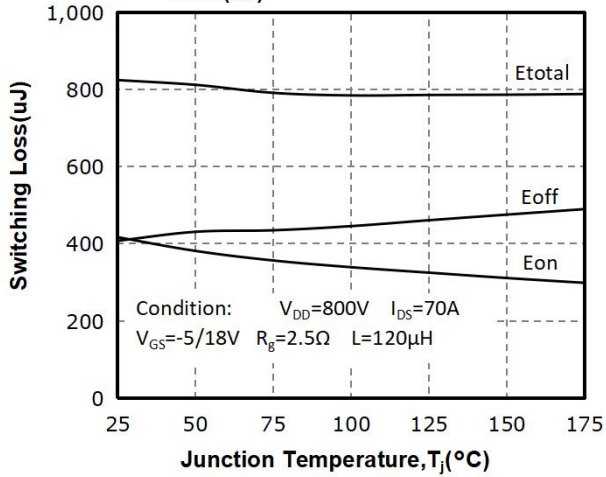
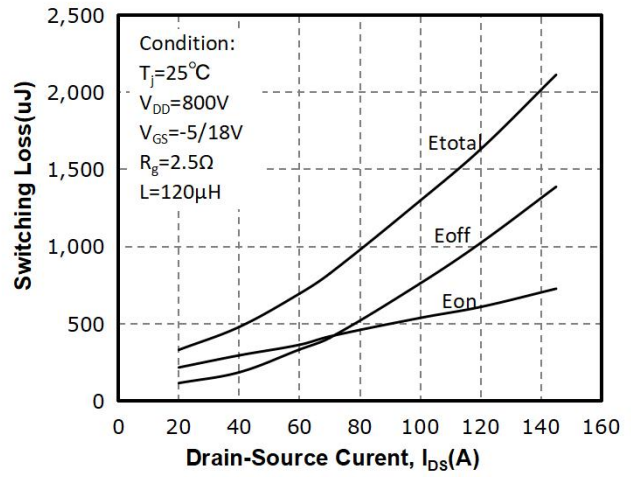
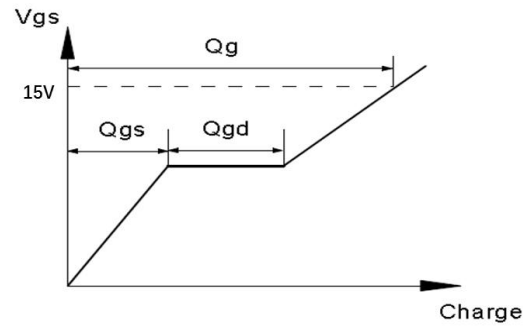
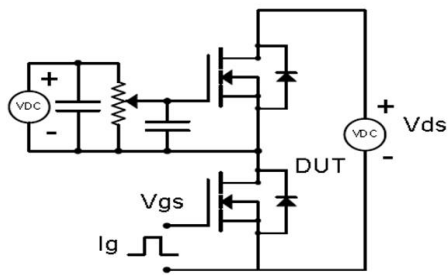
Fig 13: Continuous Drain Current vs. Case Temperature

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


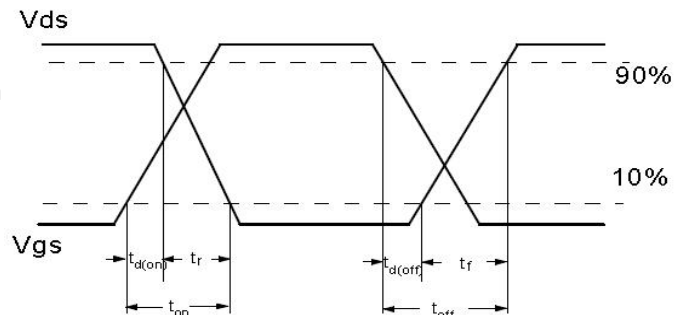
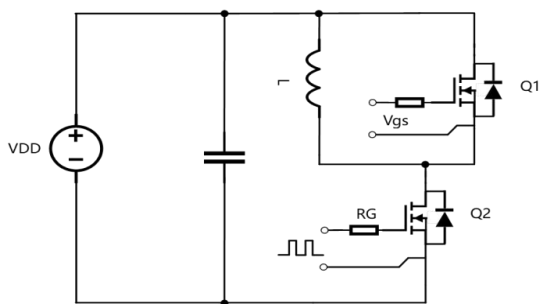
Fig 18: $R_g(\Omega)$ vs. Switching Times(us)

Fig 19: $R_g(\Omega)$ vs. Switching Loss(uJ)

Fig 20: Temperature($^\circ\text{C}$) vs. Switching Loss(uJ)

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


Test Circuit & Waveform

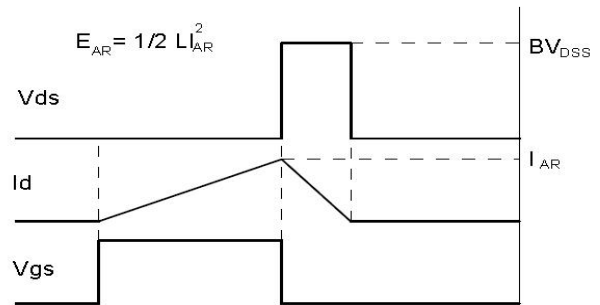
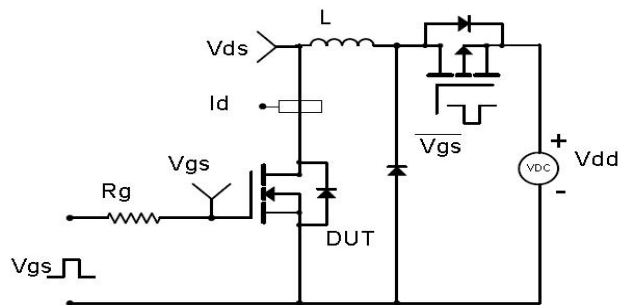
Gate Charge Test Circuit & Waveform



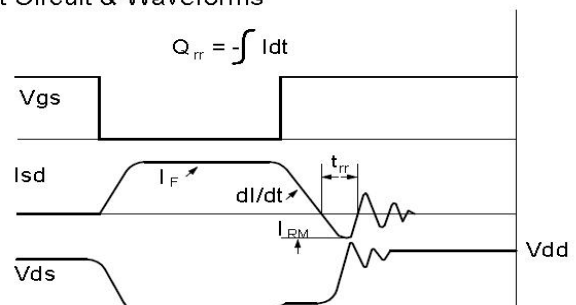
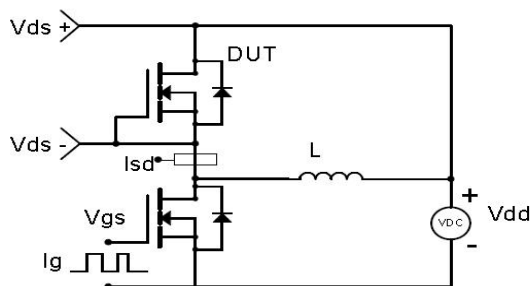
Resistive Switching Test Circuit & Waveforms

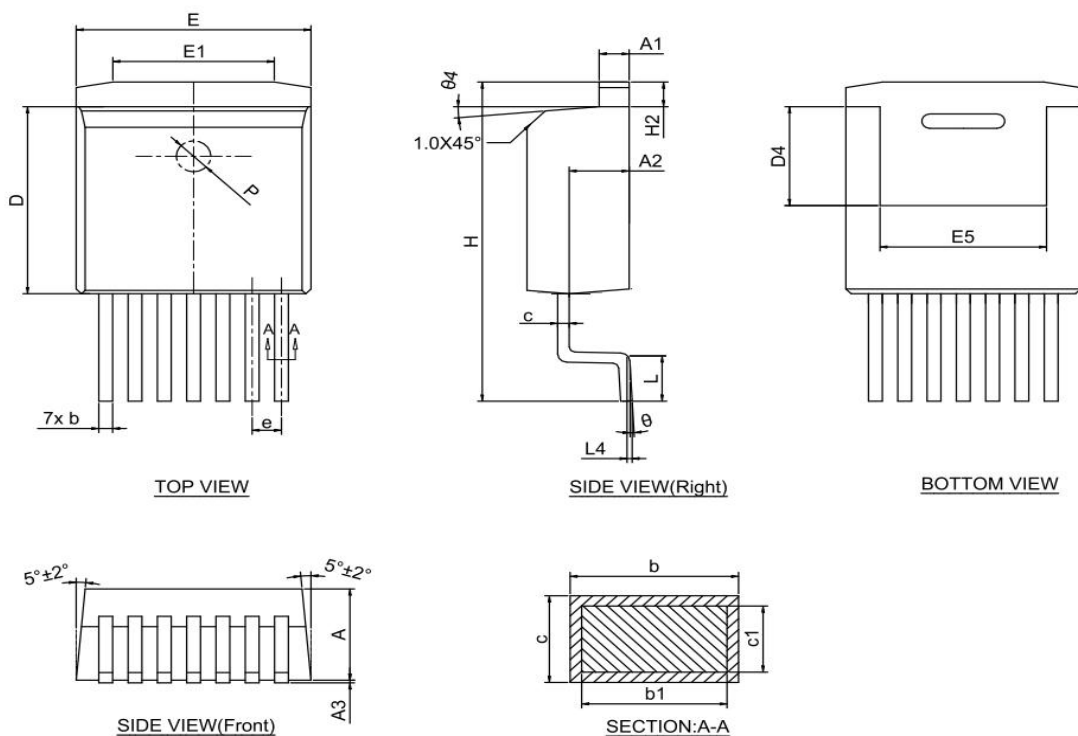


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-263-7


Items	Values(mm)	
	MIN	MAX
A	4.2	4.66
A1	1.15	1.45
A2	2.35	2.85
A3	0	0.3
b	0.5	0.78
b1	0.45	0.75
c	0.49	0.64
c1	0.4	0.6
D	8.83	9.33
D4	4.6	5
e	1.27 BSC.	
E	9.08	10.38
E1	6.4	7.6
E5	6.72	7.72
H	14.9	16.1
H2	0.9	1.45
L	1.8	2.6
L4	0.25 BCS.	
P	1.4	1.6
θ	0°	7°

Revision History

Revision	Date	Major changes
1.0	2025/11/11	Release of formal version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

CRM reserves the right to improve product design, function and reliability without notice.