Features

- Qualified according to AEC Q101
- CRM G2 SIC MOSFET Technology
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Fast Reverse Recovery

Product Summary

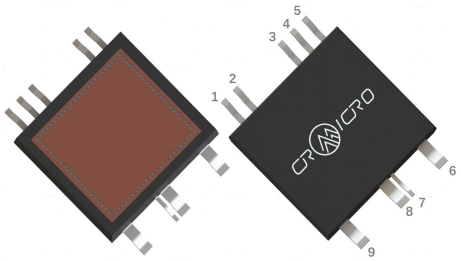
VDS	1200V
$R_{DS(on)_typ}$	60mΩ
I_D	40A

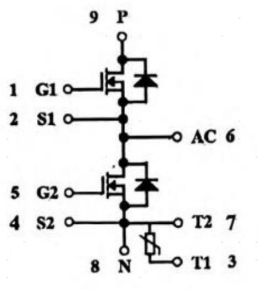
Applications

- 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
CRXMH40P120NMG2AQ	CRXMH40P120NMG2AQ	MSOP-9	Reel	200pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current V_{GS}=15V，T_C = 25°C V_{GS}=15V，T_C = 100°C	I_D	 40 28	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D(pulse)}$	100	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	664	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	177	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/+18 V

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.85	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	35	

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	$V_{GS(th)}$	1.8	-	3.6	V	V_{DS}=V_{GS},I_D=7mA
Zero gate voltage drain current	I_{DSS}	- -	1 10	100 -	μA	V_{DS}=1200V,V_{GS}=0V T_j=25°C T_j=175°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=-10/+22V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	60 89	78 -	mΩ	V_{GS}=15V, I_D=20A, T_j=25°C T_j=175°C
Drain-source on-state resistance	$R_{DS(on)}$	- -	48 85	72 -	mΩ	V_{GS}=18V, I_D=20A, T_j=25°C T_j=175°C
Transconductance	g_{fs}	-	17.5	-	S	V_{DS}=20V,I_{DS}=20A
Dynamic Characteristic						
Internal Gate resistance	$R_{G(int)}$	-	2.1	-	Ω	f=1MHz
Input Capacitance	C_{iss}	-	1730	-	pF	V_{GS}=0V, V_{DS}=1000V, f=1MHz
Output Capacitance	C_{oss}	-	77.5	-		
Reverse Transfer Capacitance	C_{rss}	-	7.3	-		
Coss Stored Energy	E_{oss}	-	43.8	-	uJ	
Gate Total Charge	Q_g	-	87.3	-	nC	VGS=-5/18V VDS=800V ID=20A
Gate-Source charge	Q_{gs}	-	18.7	-		
Gate-Drain charge	Q_{gd}	-	33.2	-		
Turn-on delay time	$t_{d(on)}$	-	32.4	-	ns	VDD=800V,ID=20A VGS=-5V/15V, RG=2.5Ω
Rise time	t_r	-	6.5	-		
Turn-off delay time	$t_{d(off)}$	-	25.3	-		
Fall time	t_f	-	8.8	-		
Turn-On Switching Energy	$E_{(on)}$	-	170	-	uJ	
Turn Off Switching Energy	$E_{(off)}$	-	75.7	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.1	-	V	V_{GS}=0V,I_F=10A
		-	2.9	-	V	V_{GS}=0V,I_F=10A, T_j=175℃
Continuous Diode Forward Current	I_S	-	-	40	A	V_{GS}=0V
Maximum Pulsed Current	$I_{S,max}$	-	-	100	A	pulse width t_p limited by Tjmax
Body Diode Reverse Recovery Time	t_{rr}	-	15.2	-	ns	di/dt=1020A/us IF=20A Vdd=800V Tj=25℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	93.3	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	10.4	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	40.2	-	ns	di/dt=1059A/us IF=20A Vdd=800V, Tj=175℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	228	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	12.4	-	A	

Typical Performance Characteristics

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

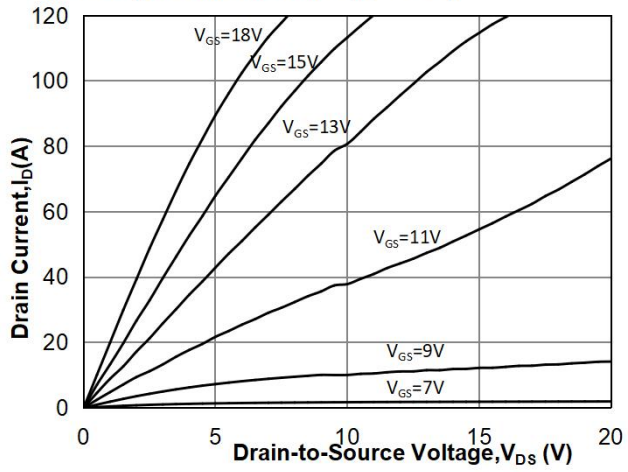


Fig 2. Output Characteristics (Tj=25℃)

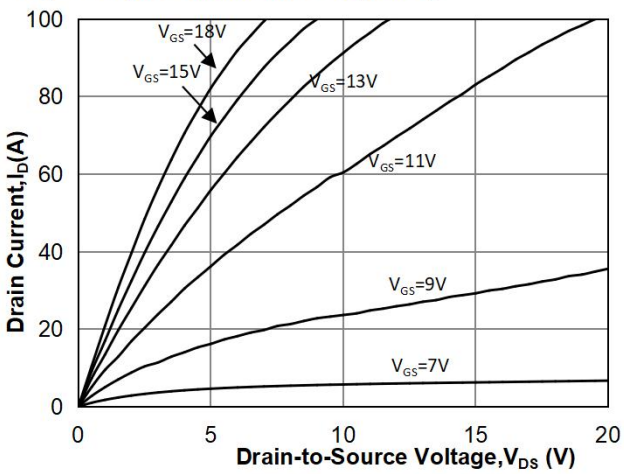


Fig 3. Output Characteristics (Tj=175℃)

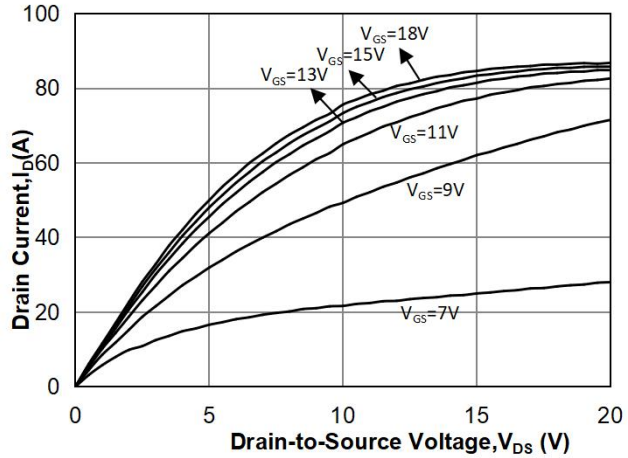


Fig 4: Rds(on) vs. Temperature

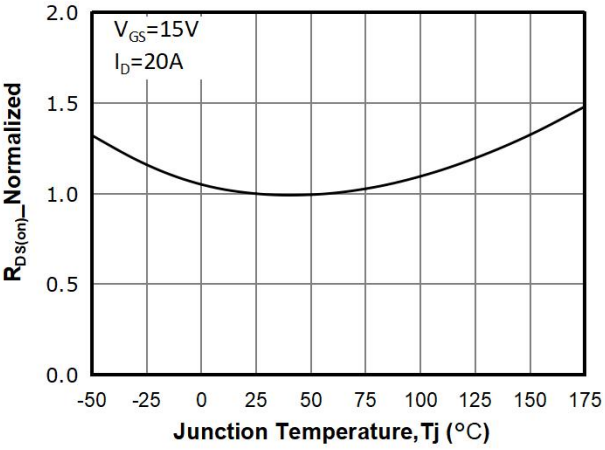


Fig 5: On-Resistance vs. Drain Current For Various Temperatures

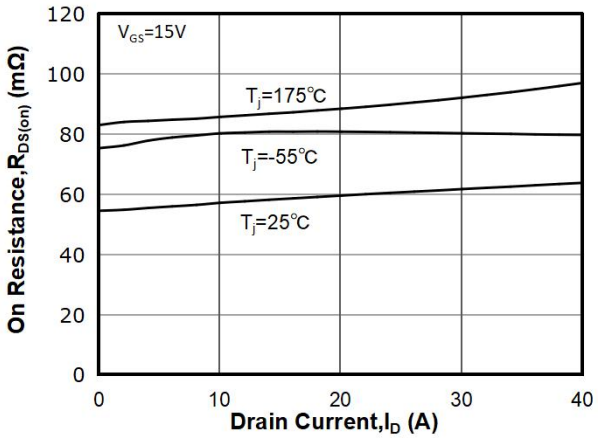


Fig 6: Rds(on) vs. Temperature For Various Gate Voltage

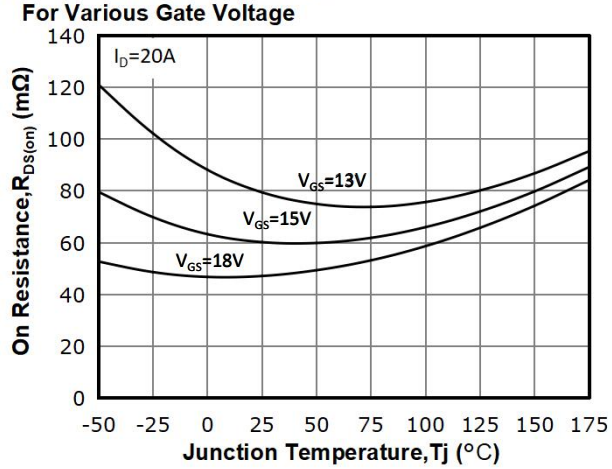


Fig 7: Transfer Characteristics

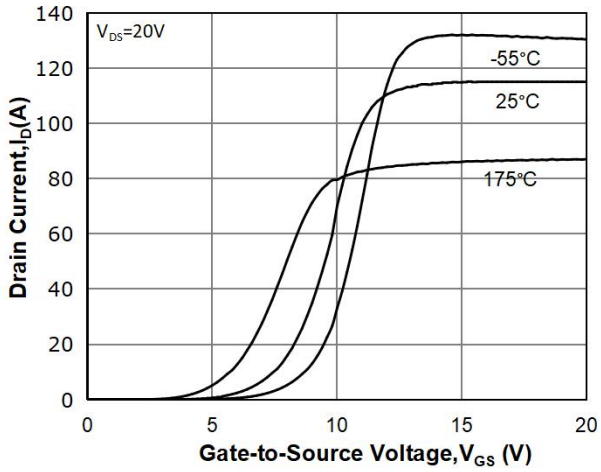


Fig 8: Body-diode Forward Characteristics For Various Temperatures

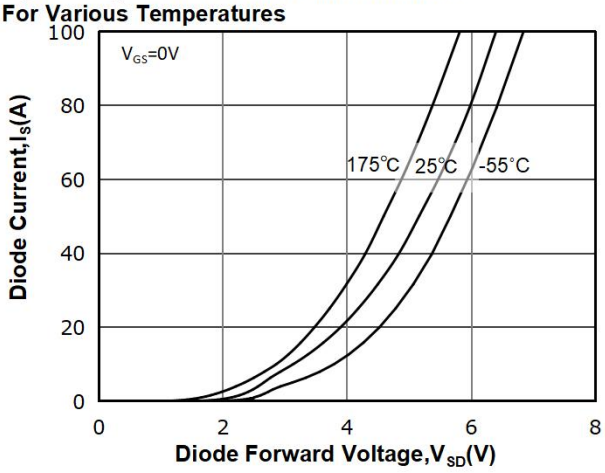


Fig 9: VGS(th) Vs Tj Characteristics

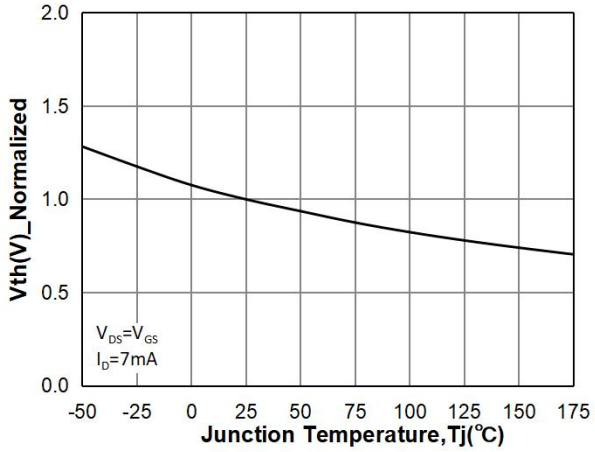


Fig 10: 3rd Quadrant Characteristic at 25℃

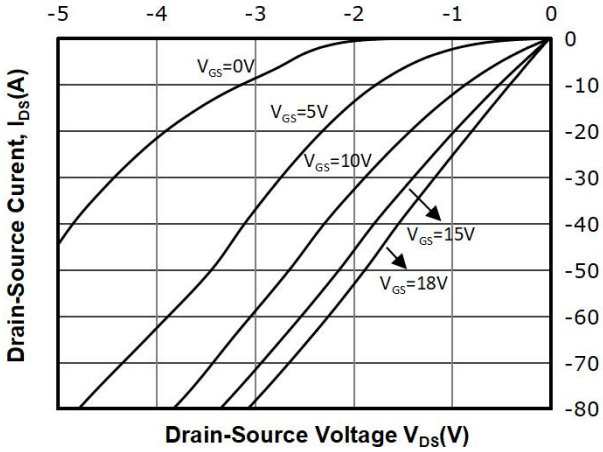


Fig 11：Gtate Charge Characteristics

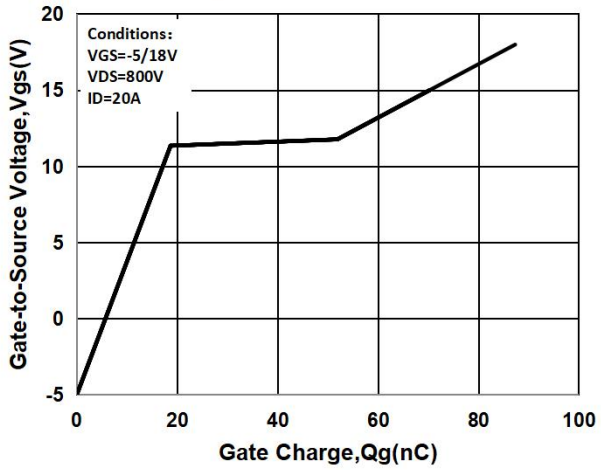


Fig 12: Capacitance Characteristics

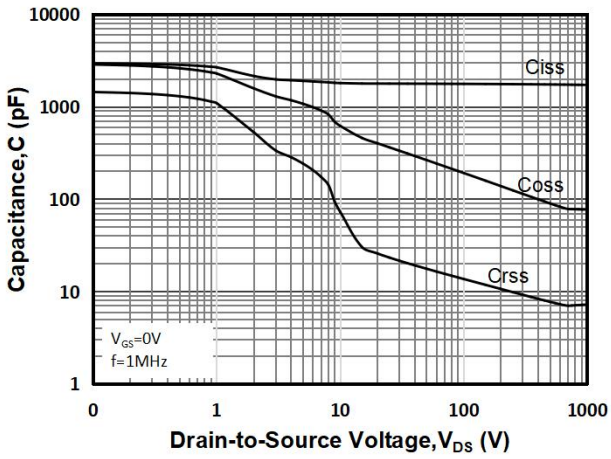


Fig 13: Continuous Drain Current vs. Case Temperature

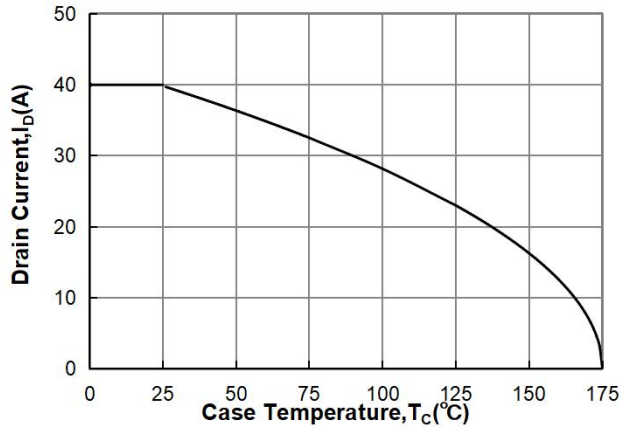


Fig 14: Maximum Power Dissipation vs. Case Temperature

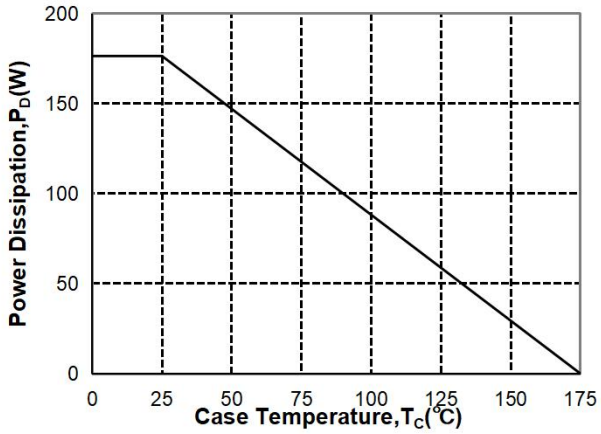


Fig 15: Safe Operating Area

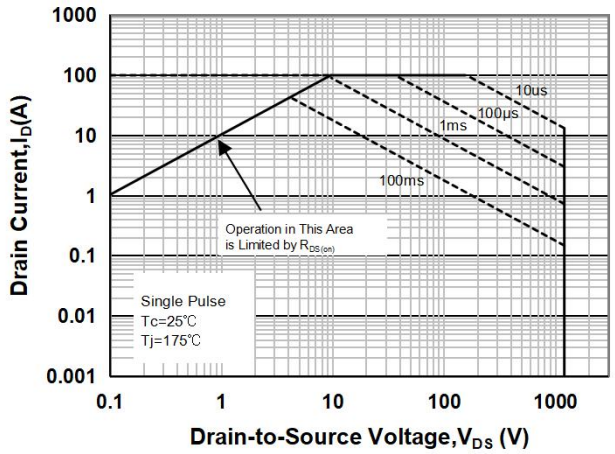


Fig 16:Output Capacitor Stored Energy

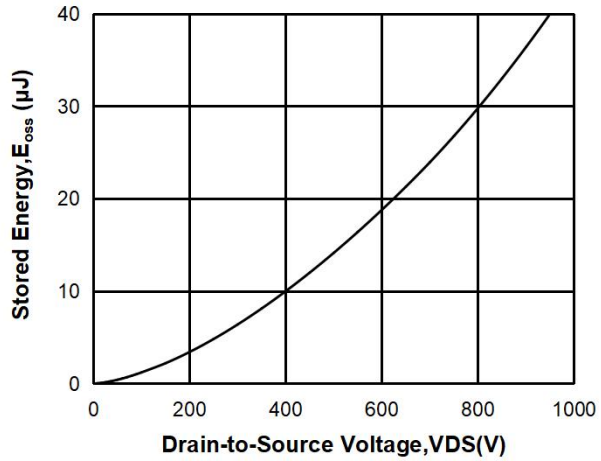


Fig 17: Max. Transient Thermal Impedance

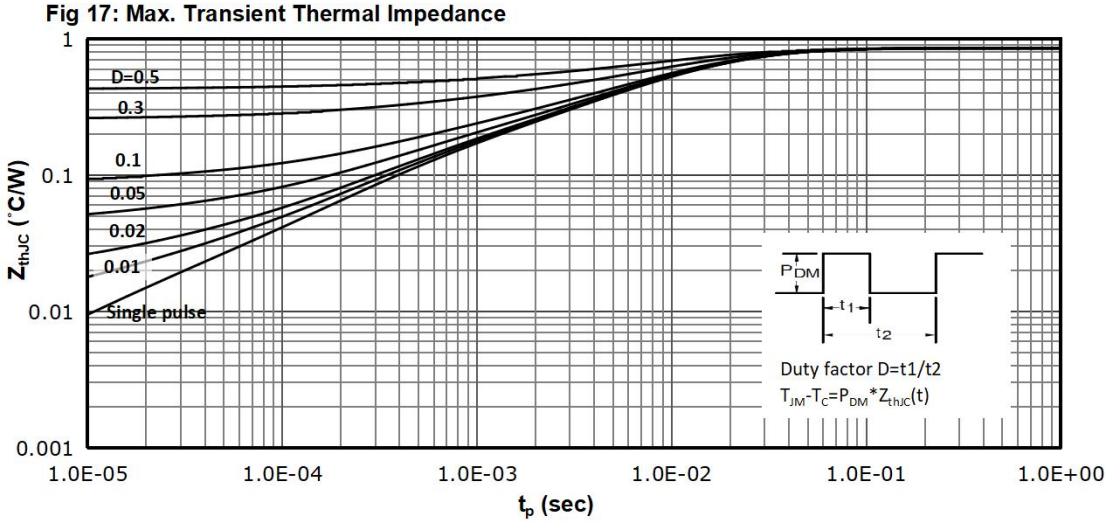


Fig 18: Rg(Ω) vs. Switching Times(us)

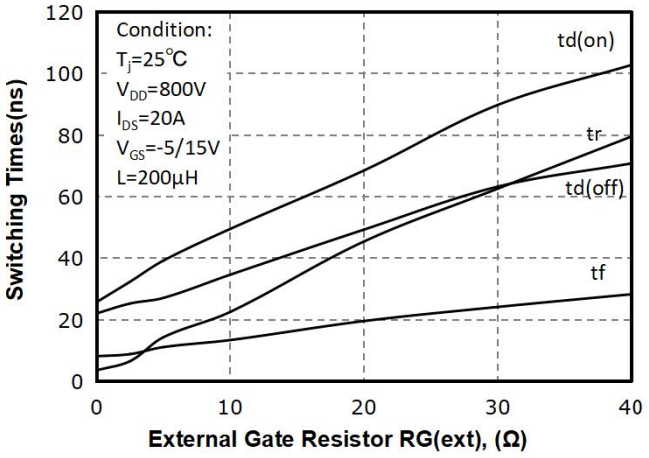


Fig 19: Rg(Ω) vs. Switching Loss(uJ)

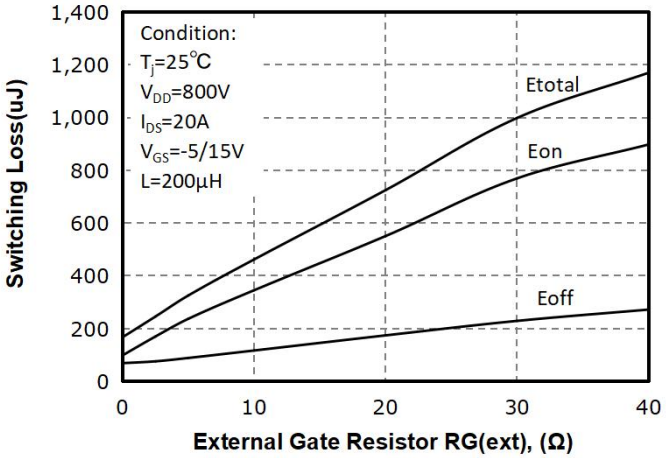


Fig 20: Temperature(°C) vs. Switching Loss(uJ)

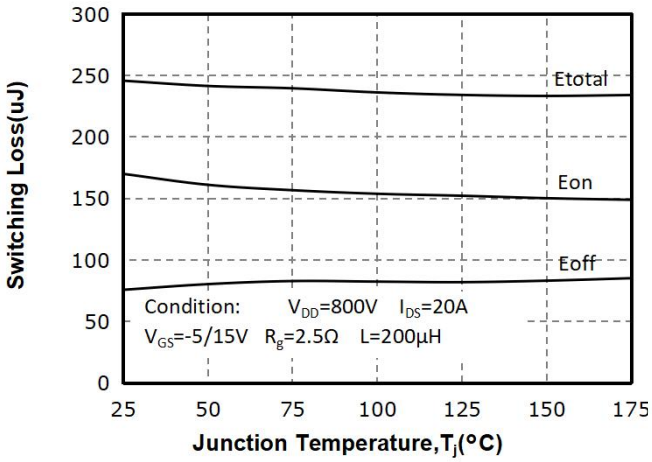
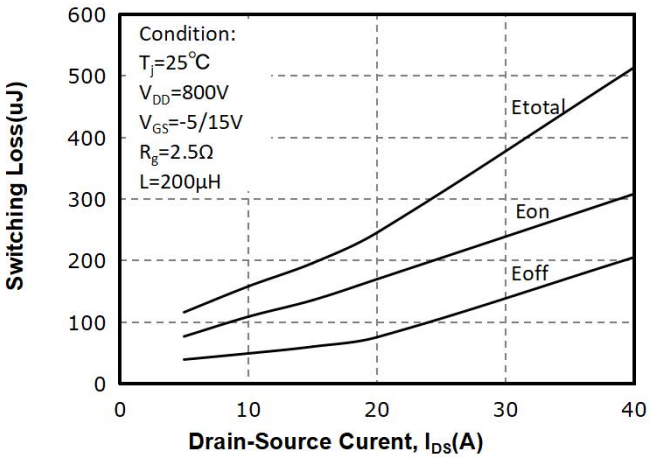
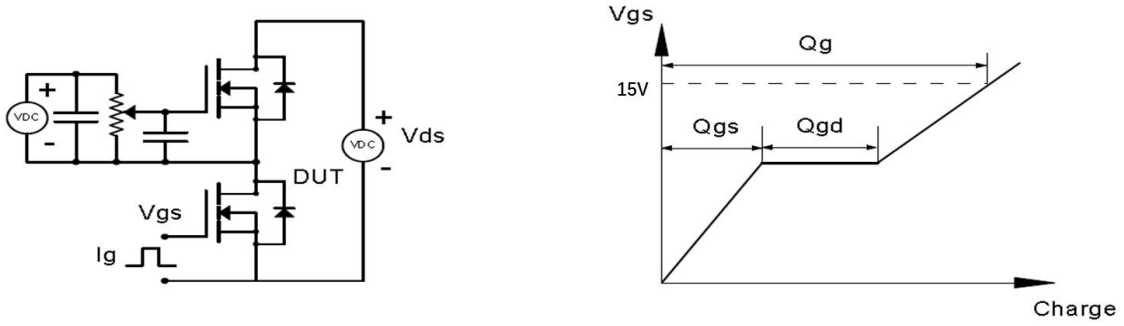


Fig 21: I_{DS}(A) vs. Switching Loss(uJ)

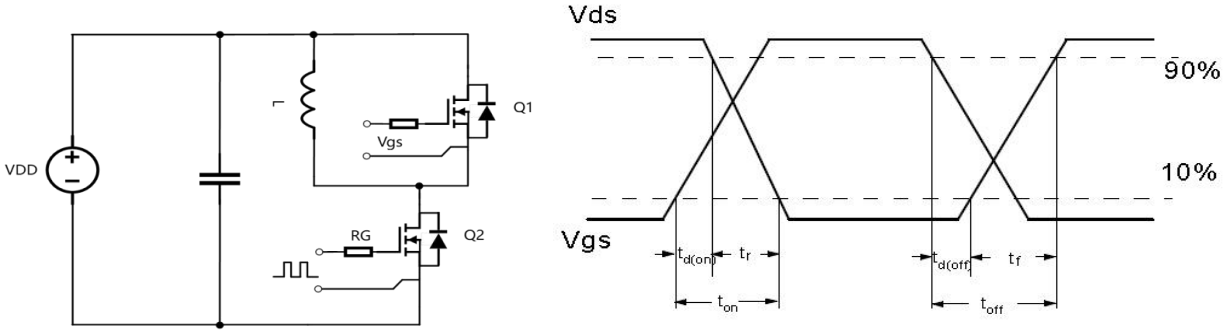


Test Circuit & Waveform

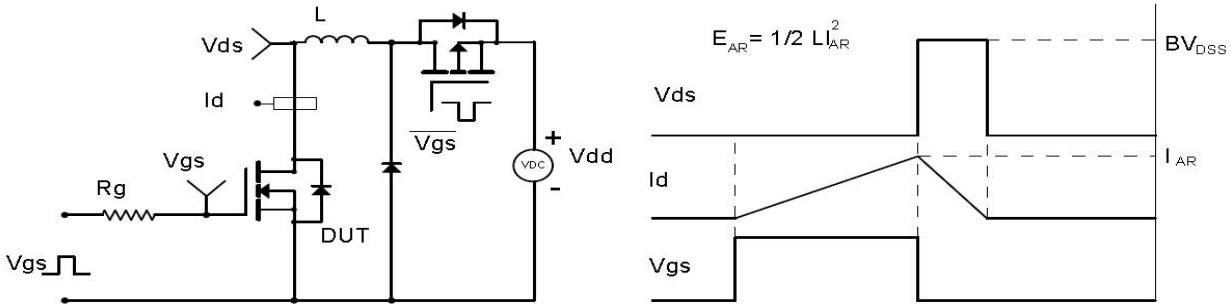
Gate Charge Test Circuit & Waveform



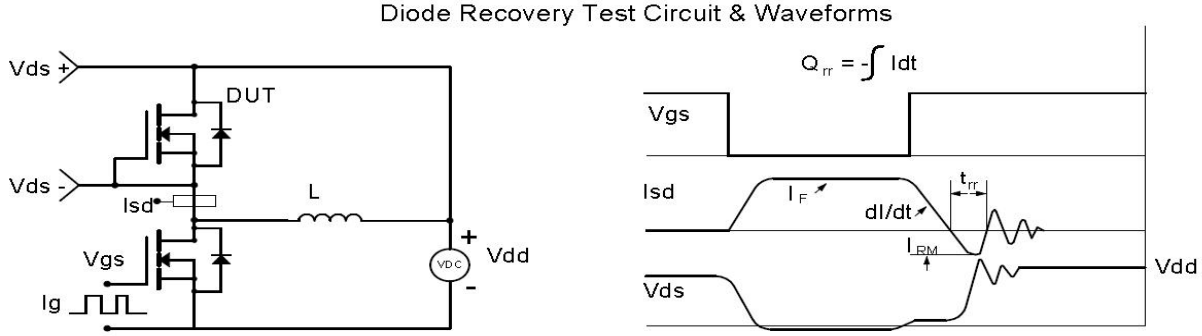
Resistive Switching Test Circuit & Waveforms



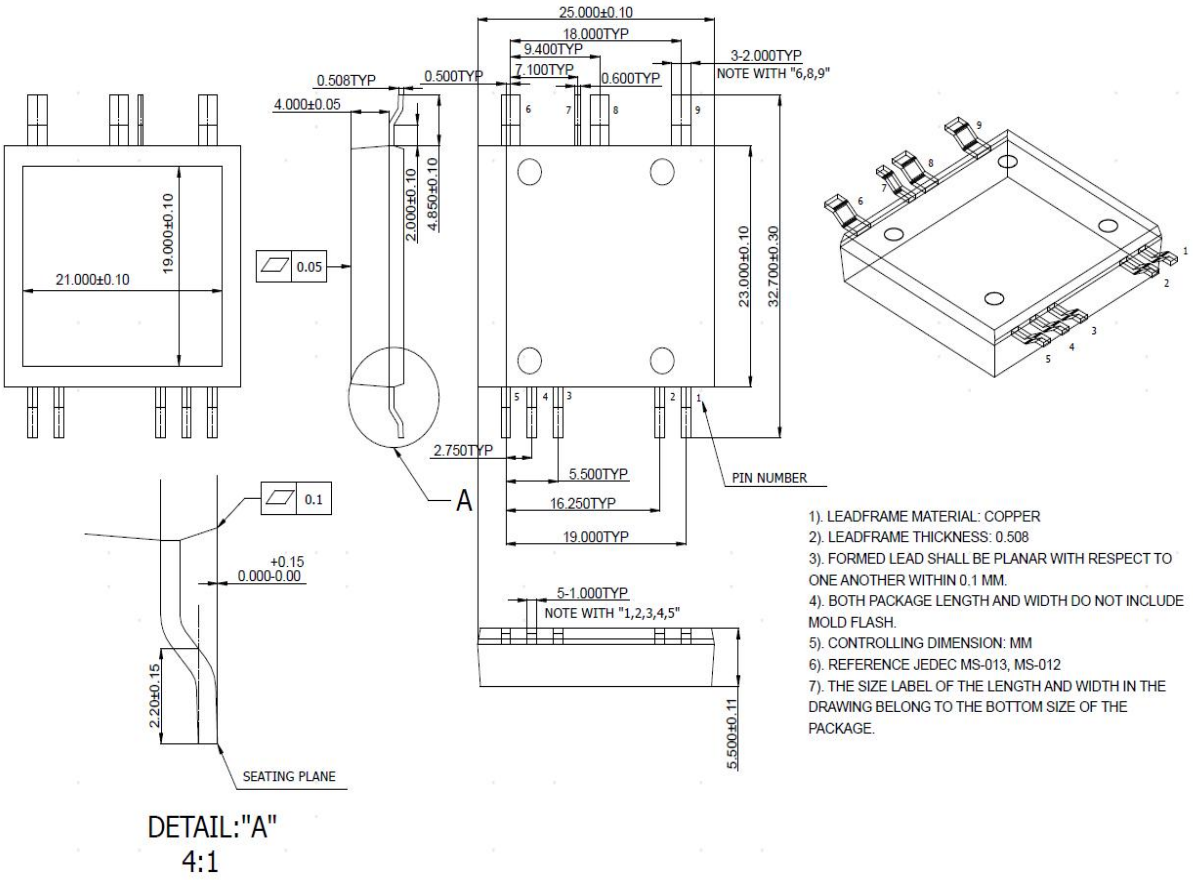
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: MSOP-9



1). LEADFRAME MATERIAL: COPPER
2). LEADFRAME THICKNESS: 0.508
3). FORMED LEAD SHALL BE PLANAR WITH RESPECT TO ONE ANOTHER WITHIN 0.1 MM.
4). BOTH PACKAGE LENGTH AND WIDTH DO NOT INCLUDE MOLD FLASH.
5). CONTROLLING DIMENSION: MM
6). REFERENCE JEDEC MS-013, MS-012
7). THE SIZE LABEL OF THE LENGTH AND WIDTH IN THE DRAWING BELONG TO THE BOTTOM SIZE OF THE PACKAGE.

Revision History

Revison	Date	Major changes
1.0	2025/3/15	Release of formal version
2.0	2025/5/8	Update VTH Spec and Rdson data

Disclaimer

• CRM reserves the right to change any product or information in this Specification at any time without prior notice.

• The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics .The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

• The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation/aerospace and life-support devices or systems.
• Any and all semicondutor 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.