CRXMH40P120EMG2BQ

SiC MOSFET 1200V, 60mΩ, 40A

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

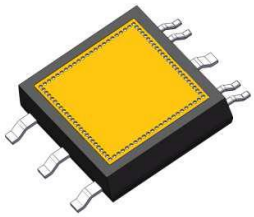
VDS	1200V
$R_{DS(on)_typ}$	60mΩ
I_D	40A

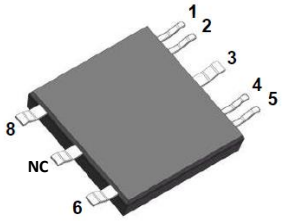
Applications

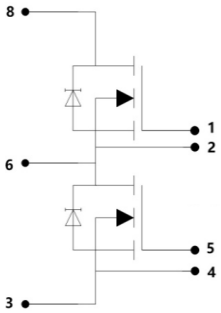
- Solar Inverters
- High Voltage DC/DC Converters
- On Board Charger(OBC)
- EV Charger

100% Avalanche Tested

RoHS HF







Package Marking and Ordering Information

Part #	Marking	Package	Packing	Qty
CRXMH40P120EMG2BQ	CRXMH40P120EMG2BQ	MSOP8	Reel	200pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DSmax}	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})	$I_{D(pulse)}$	88	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	476	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	146	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

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Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	1.03	°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	$V_{GS(th)}$	2.2	-	4.2	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	$R_{DS(on)}$	- -	60 102	79 -	mΩ	V_{GS}=18V, I_D=12A, T_j=25°C T_j=175°C
Transconductance	g_{fs}	-	16.8	-	S	V_{DS}=20V,I_{DS}=20A
Dynamic Characteristic						
Internal Gate resistance	$R_{G(int)}$	-	2.2	-	Ω	f=1MHz
Input Capacitance	C_{iss}	-	1373	-	pF	V_{GS}=0V, V_{DS}=1000V, f=1MHz
Output Capacitance	C_{oss}	-	65.6	-		
Reverse Transfer Capacitance	C_{rss}	-	5.1	-		
Coss Stored Energy	E_{oss}	-	36.5	-	uJ	
Gate Total Charge	Q_g	-	65	-	nC	VGS=-5/18V VDS=800V ID=20A
Gate-Source charge	Q_{gs}	-	16.5	-		
Gate-Drain charge	Q_{gd}	-	22	-		
Turn-on delay time	$t_{d(on)}$	-	28.2	-	ns	VDD=800V,ID=20A VGS=-5V/18V, RG=2.5Ω
Rise time	t_r	-	4.0	-		
Turn-off delay time	$t_{d(off)}$	-	19.3	-		
Fall time	t_f	-	7.7	-		
Turn-On Switching Energy	$E_{(on)}$	-	109	-	uJ	
Turn Off Switching Energy	$E_{(off)}$	-	66.5	-		

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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	$I_{S,max}$	-	-	88	A	pulse width t_P limited by Tjmax
Body Diode Reverse Recovery Time	t_{rr}	-	15.5	-	ns	di/dt=810A/us IF=20A Vdd=800V Tj=25℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	70	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	8	-	A	
Body Diode Reverse Recovery Time	t_{rr}	-	42	-	ns	di/dt=862A/us IF=20A Vdd=800V, Tj=175℃
Body Diode Reverse Recovery Charge	Q_{rr}	-	248	-	nC	
Body Diode Peak Reverse Recovery Current	I_{rrm}	-	10	-	A	

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Typical Performance Characteristics

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

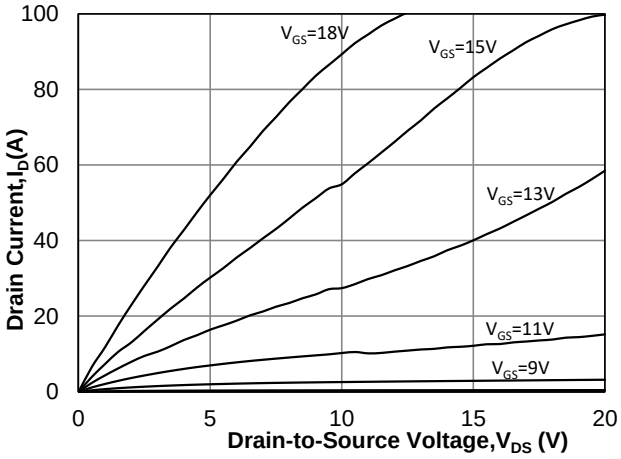


Fig 2. Output Characteristics (Tj=25℃)

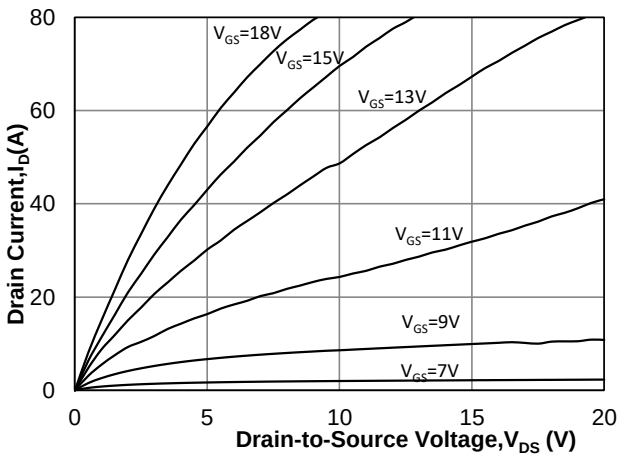


Fig 3. Output Characteristics (Tj=175℃)

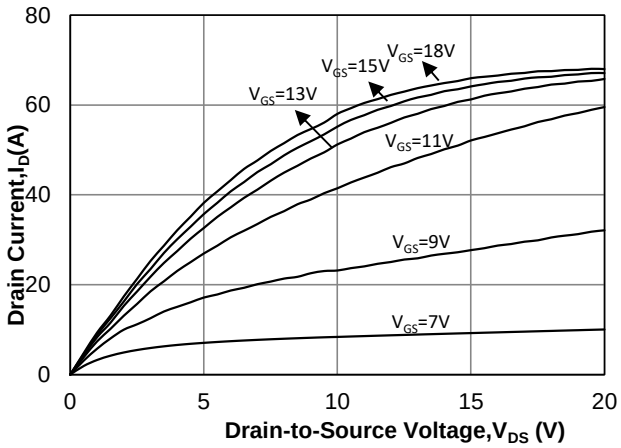


Fig 4: Rds(on) vs. Temperature

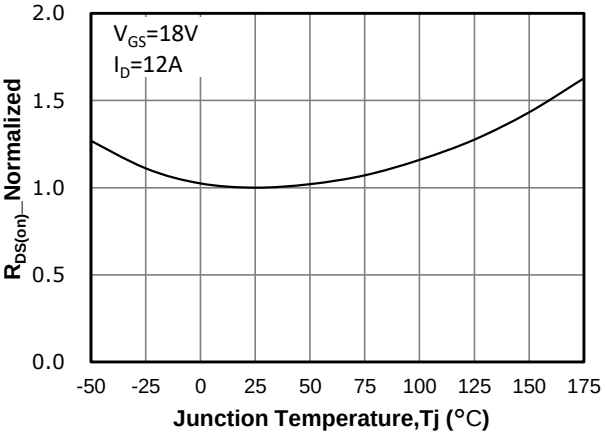


Fig 5: On-Resistance vs. Drain Current For Various Temperatures

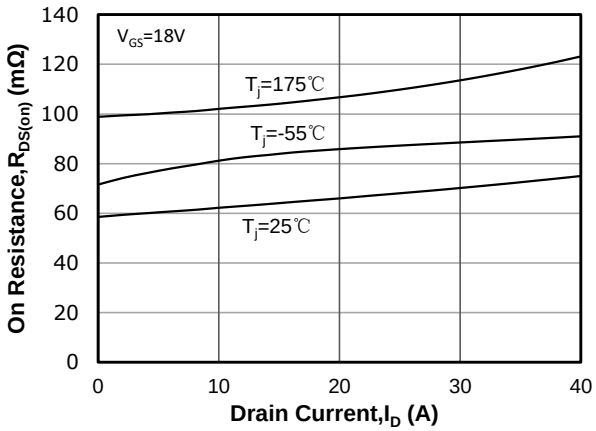
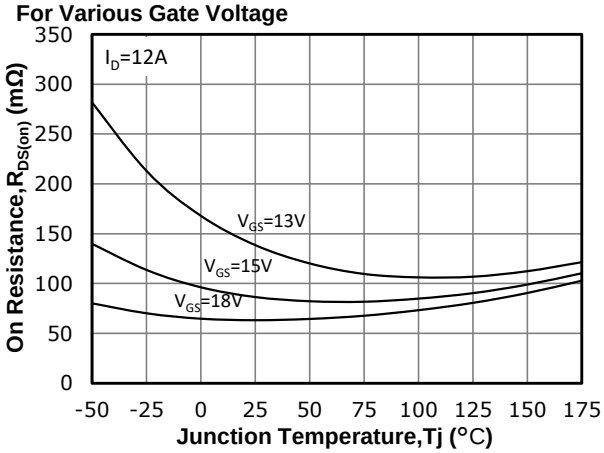


Fig 6: Rds(on) vs. Temperature For Various Gate Voltage



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Fig 7: Transfer Characteristics

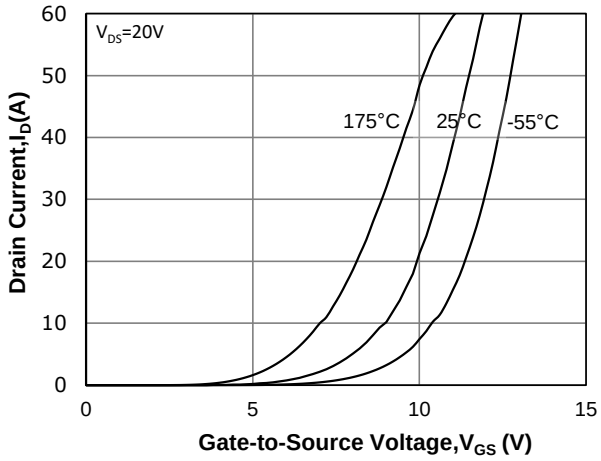


Fig 8: Body-diode Forward Characteristics For Various Temperatures

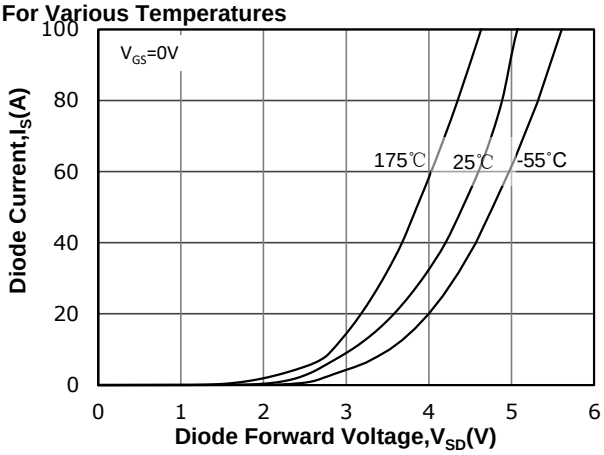


Fig 9: VGS(th) Vs Tj Characteristics

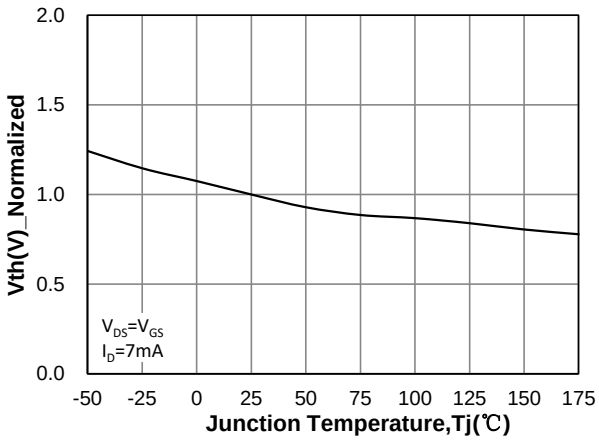


Fig 10: 3rd Quadrant Characteristic at 25℃

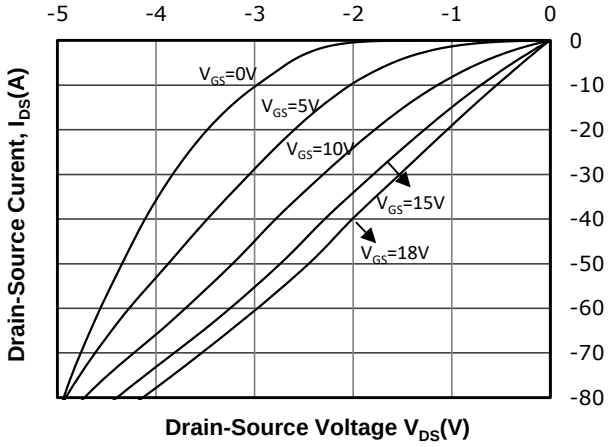


Fig 11：Gtate Charge Characteristics

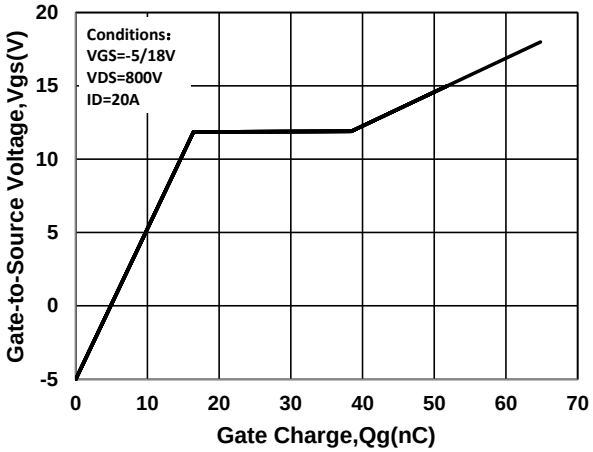


Fig 12: Capacitance Characteristics

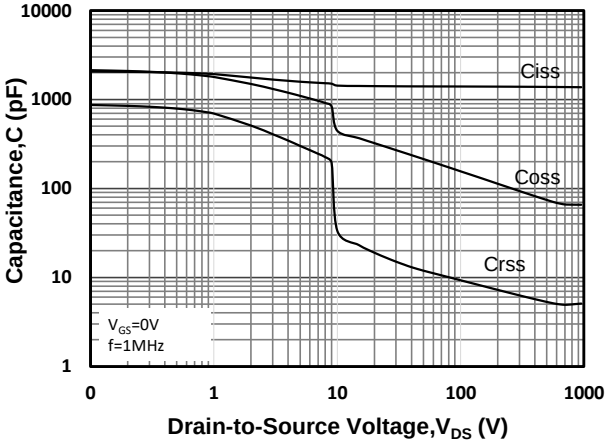


Fig 13: Continuous Drain Current vs. Case Temperature

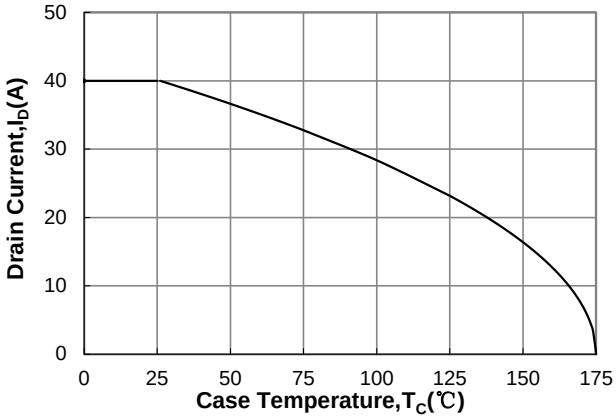


Fig 14: Maximum Power Dissipation vs. Case Temperature

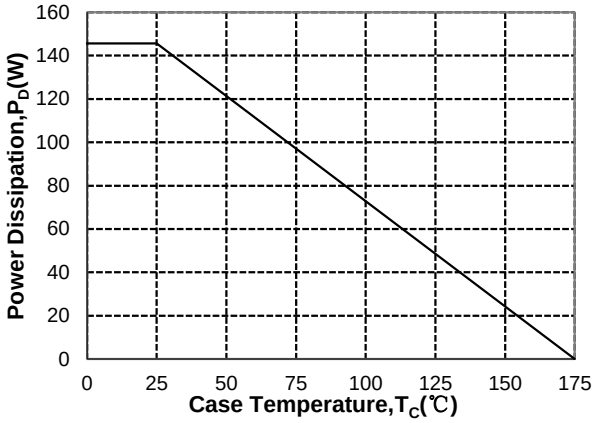


Fig 15: Safe Operating Area

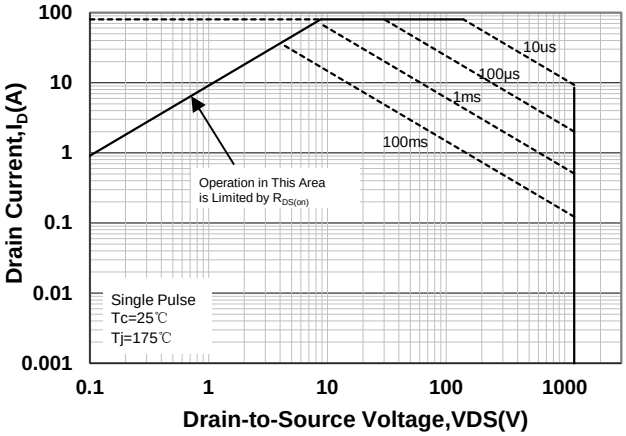


Fig 16:Output Capacitor Stored Energy

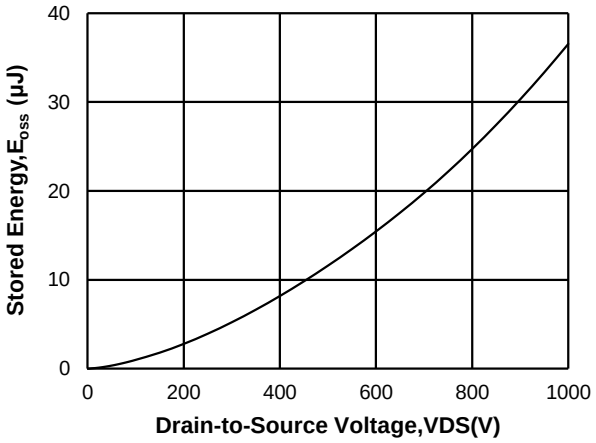
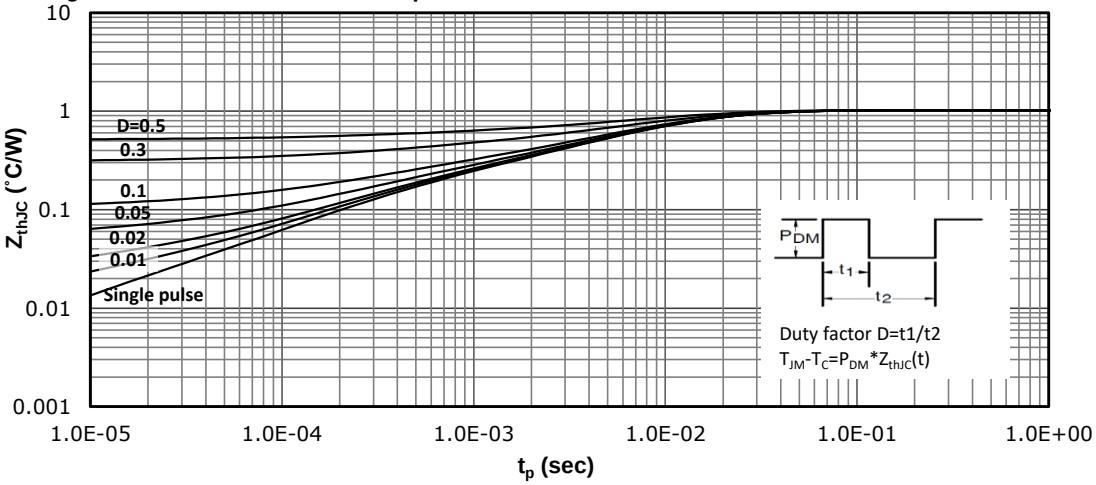


Fig 17: Max. Transient Thermal Impedance



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Fig 18: Rg(Ω) vs. Switching Times(us)

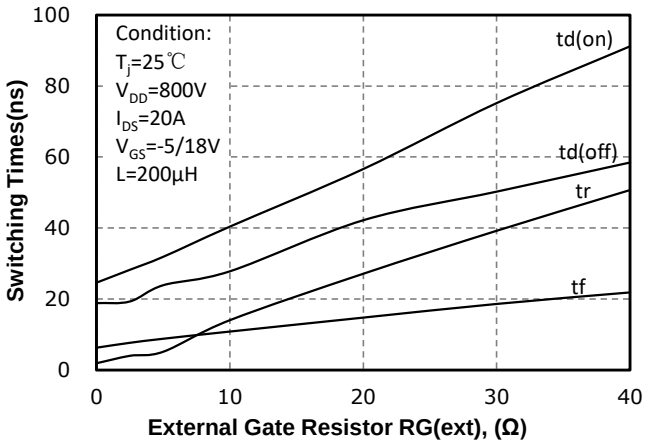


Fig 19: Rg(Ω) vs. Switching Loss(uJ)

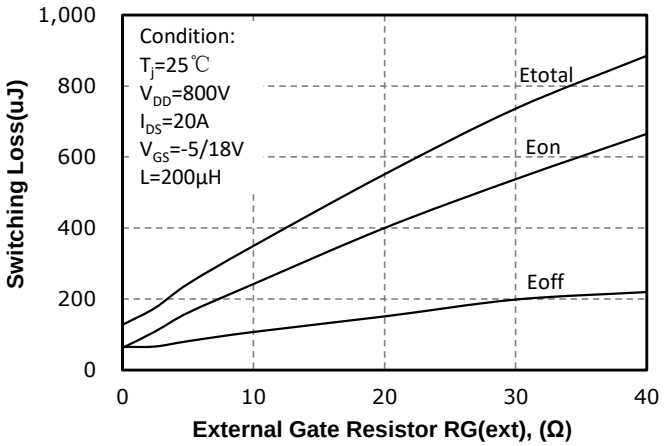


Fig 20: Temperature(°C) vs. Switching Loss(uJ)

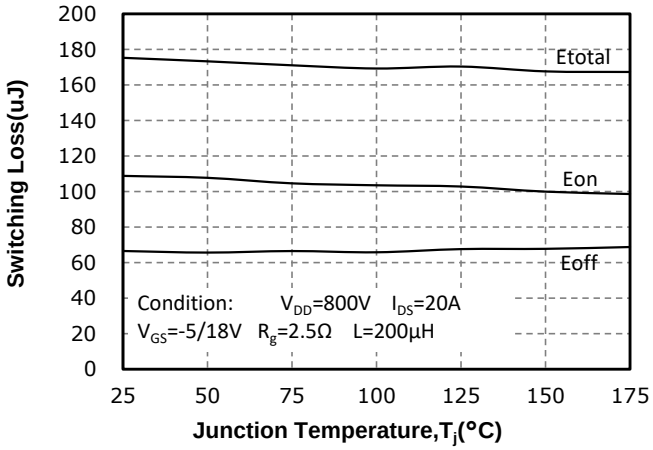
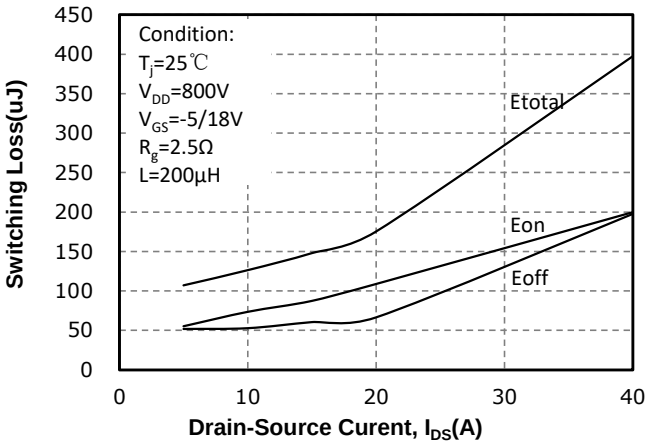
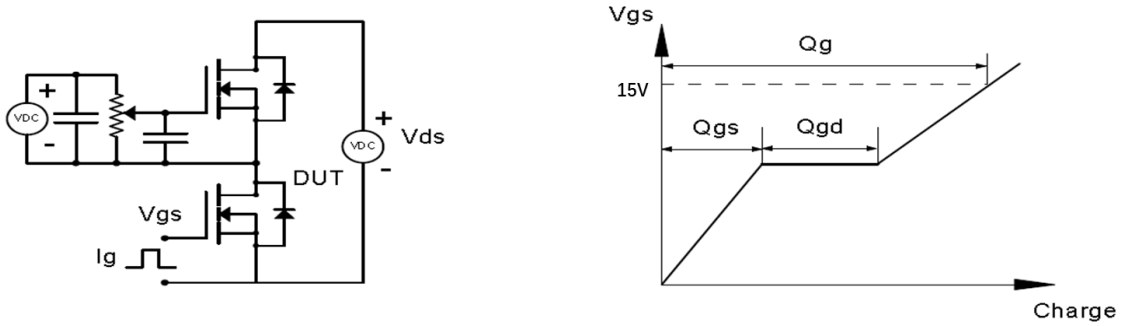


Fig 21: I_{DS}(A) vs. Switching Loss(uJ)

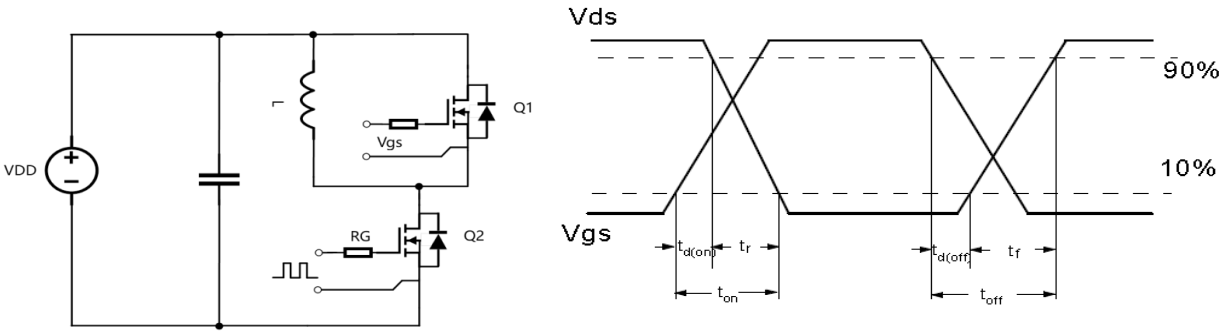


Test Circuit & Waveform

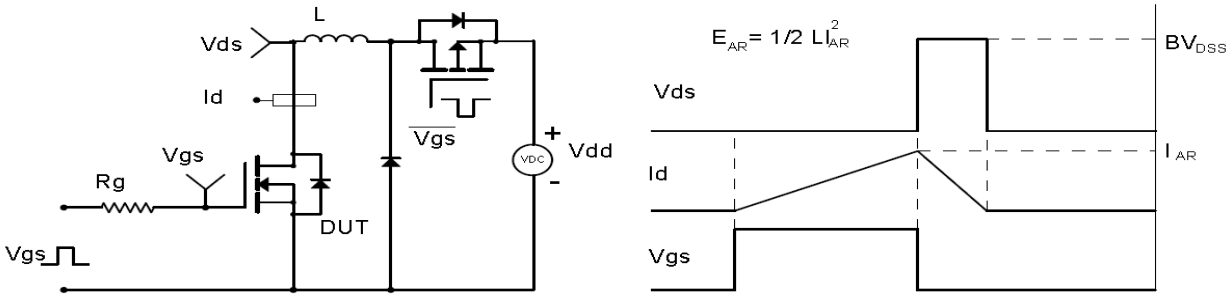
Gate Charge Test Circuit & Waveform



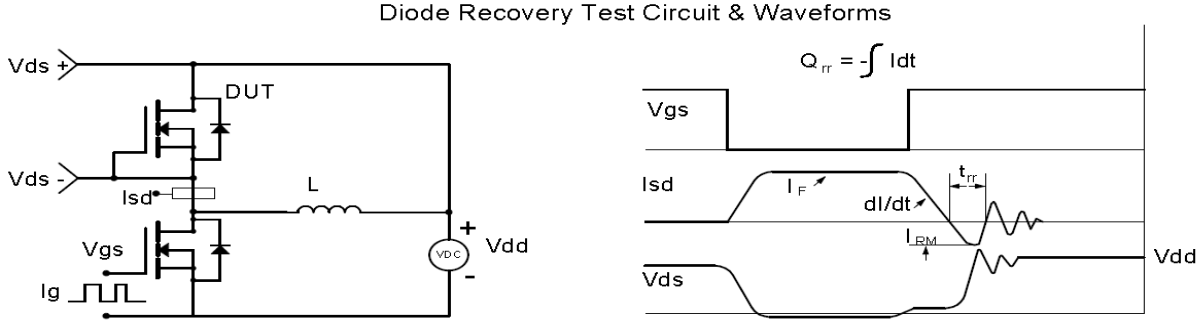
Resistive Switching Test Circuit & Waveforms



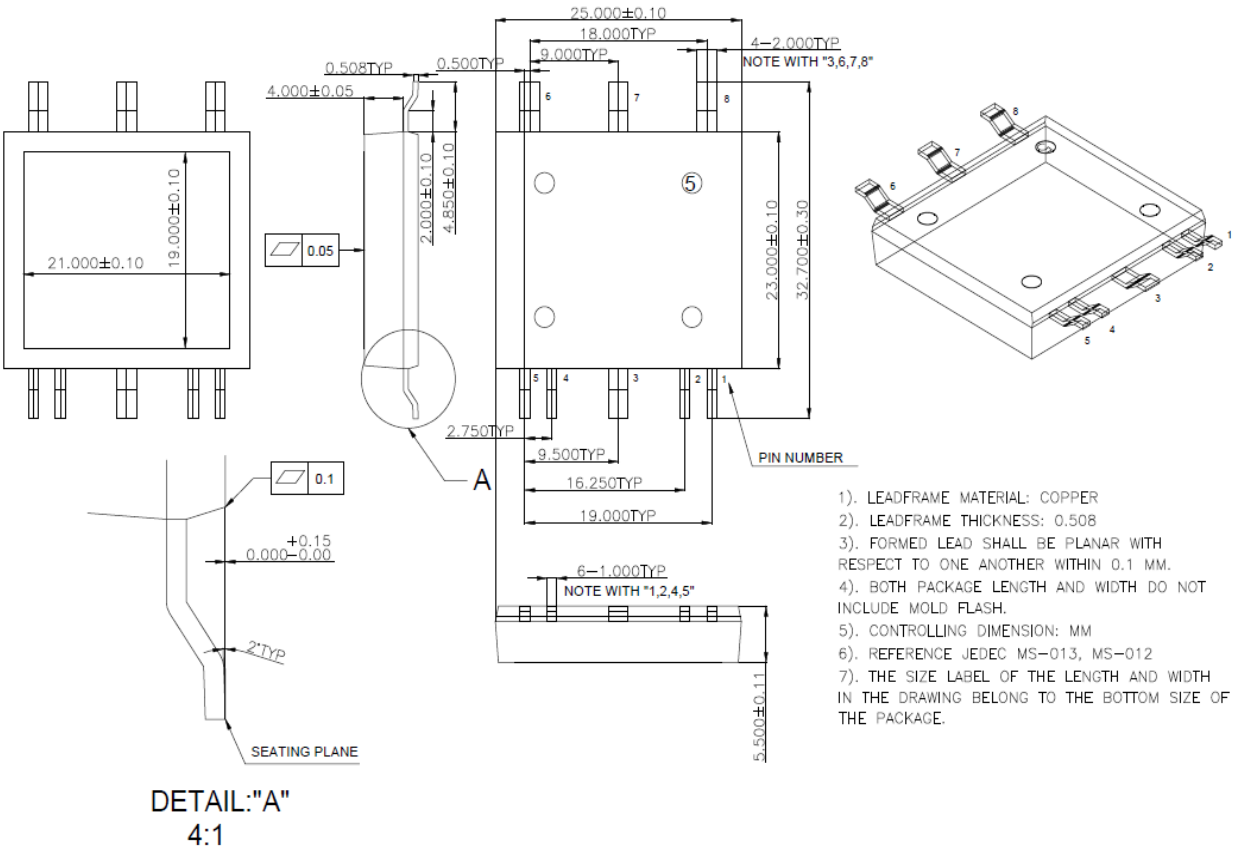
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: IPM-MSOP8



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.

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Revision History

Revison	Date	Major changes
1.0	2025/3/11	Release of formal version

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