

Features

- CRM(CQ) Super_Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM

Applications

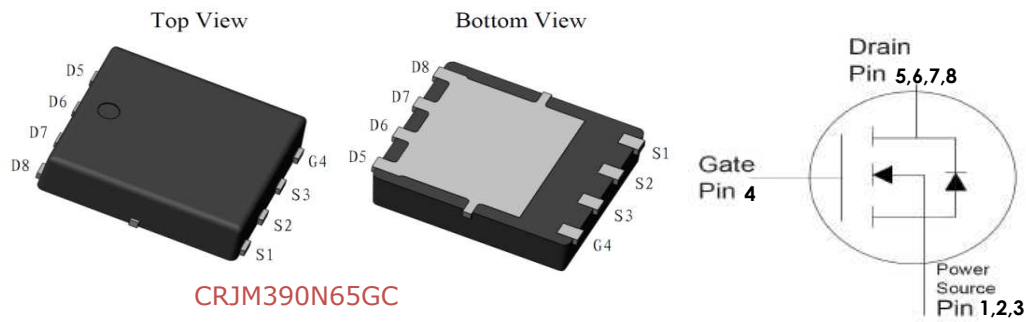
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

Product Summary

VDS	650V
R _{DS(on)_typ}	0.39Ω
I _D	9A

100% DVDS Tested

100% Avalanche Tested



CRJM390N65GC

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJM390N65GC	390N65GC	PDFN5*6	Tape&Reel	N/A	N/A	4000/5000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	650	V
Continuous drain current ¹⁾ T _C = 25°C T _C = 100°C	I _D	9 6	A
Pulsed drain current (T _C = 25°C, t _p limited by T _{jmax})	I _{D pulse}	36	A
Avalanche energy, single pulse (L=60mH, R _g =30Ω)	E _{AS}	120	mJ
MOSFET dv/dt ruggedness(V _{DS} ≤400V)	dv/dt	50	V/ns
Gate-Source voltage	V _{GS}	±30	V
Power dissipation (T _C = 25°C)	P _{tot}	68	W
Continuous diode forward current(T _C = 25°C)	I _S	6	A
Diode pulse current ²⁾ (T _C = 25°C)	I _{S pulse}	120	A
Peak Diode recovery dv/dt ³⁾ (I _{SD} ≤5.5A,V _{DS} ≤400V,T _j = 25°C)	dv/dt	50	V/ns
Operating junction and storage temperature	T _j , T _{stg}	-55...+150	°C

1) Limited by T_{j,max}. Maximum Duty Cycle D = 0.50

2) Pulse width t_p limited by T_{j,max}

3) Identical low side and high side switch with identical R_G

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case. Max	RthJC	-	1.32	1.85	°C/W	
Thermal resistance, junction – ambient. Max	RthJA	-	-	82	°C/W	

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

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

Static Characteristic

Drain-source breakdown voltage	BV _{DSS}	650	-	-	V	V _{GS} =0V, I _D =250uA
Gate threshold voltage	V _{GS(th)}	3.5	-	4.5	V	V _{DS} =V _{GS} , I _D =250uA
Zero gate voltage drain current	I _{DSS}	-	-	1	μA	V _{DS} =650V, V _{GS} =0V
		-	3	-		T _C =25°C T _C =150°C
Gate-source leakage current	I _{GSS}	-	-	±100	nA	V _{GS} =±30V, V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	-	0.39	0.45	Ω	V _{GS} =10V, I _D =5.5A,
		-	1	-		T _C =25°C T _C =150°C
Transconductance	g _{fs}	-	13	-	S	V _{DS} =20V, I _D =5.5A

Dynamic Characteristic

Input Capacitance	C _{iss}	-	790	-	pF	V _{GS} =0V, V _{DS} =100V, f=1MHz
Output Capacitance	C _{oss}	-	32	-		
Reverse Transfer Capacitance	C _{rss}	-	2	-		
Gate Total Charge	Q _G	-	22	-	nC	V _{GS} =10V, V _{DS} =480V, I _D =5.5A
Gate-Source charge	Q _{gs}	-	5.4	-		
Gate-Drain charge	Q _{gd}	-	9.1	-		
Gate-Drain charge	V _{plateau}	-	6	-	V	
Turn-on delay time	t _{d(on)}	-	20	-	ns	T _j =25°C, V _{GS} =10V, I _D =5.5A, V _{DS} =400V, R _g =27Ω
Rise time	t _r	-	15	-		
Turn-off delay time	t _{d(off)}	-	74	-		
Fall time	t _f	-	43	-		
Gate resistance	R _G	-	2.0	-	Ω	f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.5	0.84	1	V	$V_{GS}=0V, I_{SD}=5.5A$
Body Diode Reverse Recovery Time	t_{rr}	-	218	-	ns	$I_{sd}=5.5A$ $dI/dt=100A/us, V_{ds}=400V$
Body Diode Reverse Recovery Charge	Q_{rr}	-	2.35	-	uC	

Typical Performance Characteristics

Fig 1. Output Characteristics ($T_j=25^\circ\text{C}$)

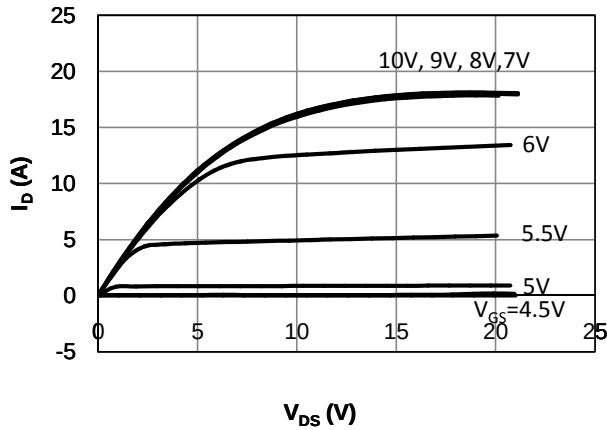


Fig 2. Output Characteristics ($T_j=150^\circ\text{C}$)

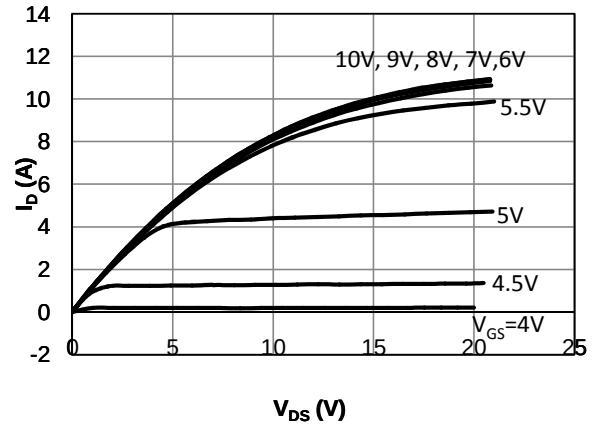


Fig 3: Transfer Characteristics

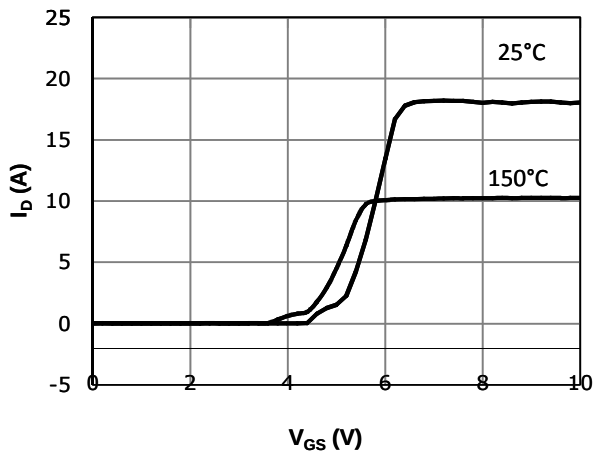


Fig 4: V_{TH} Vs T_j Temperature Characteristics

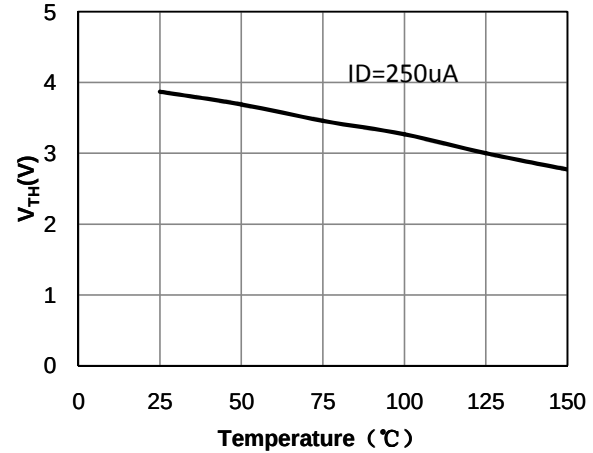


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics ($T_c=25^\circ\text{C}$)

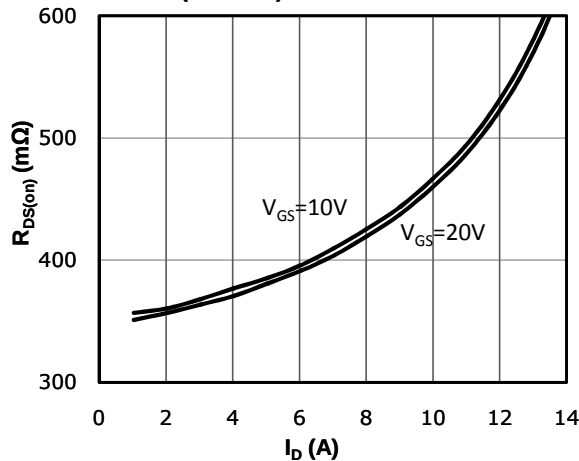


Fig 6: $R_{DS(on)}$ vs. Temperature

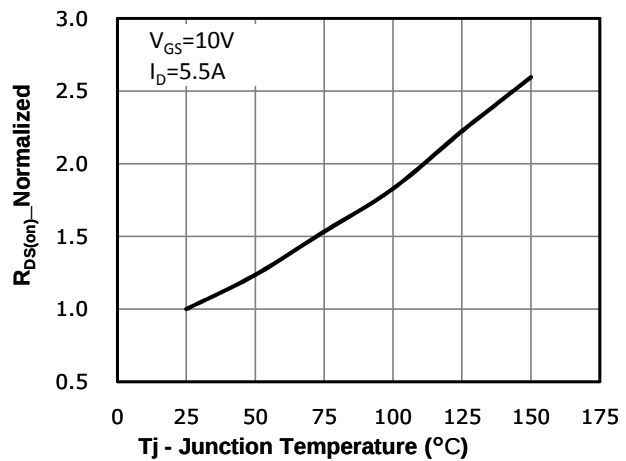


Fig 7: BVDSS vs. Temperature

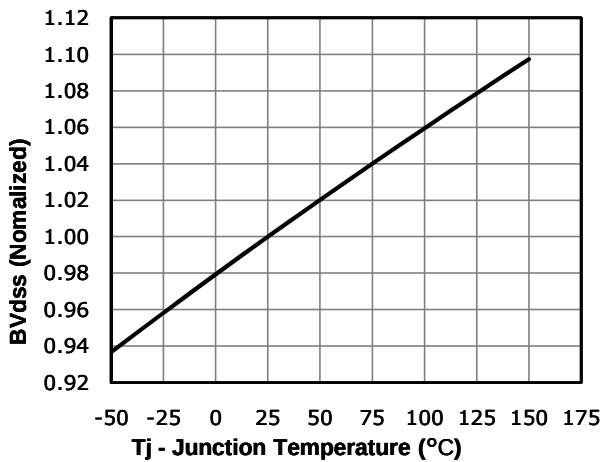


Fig 8: Rds(on) vs Gate Voltage

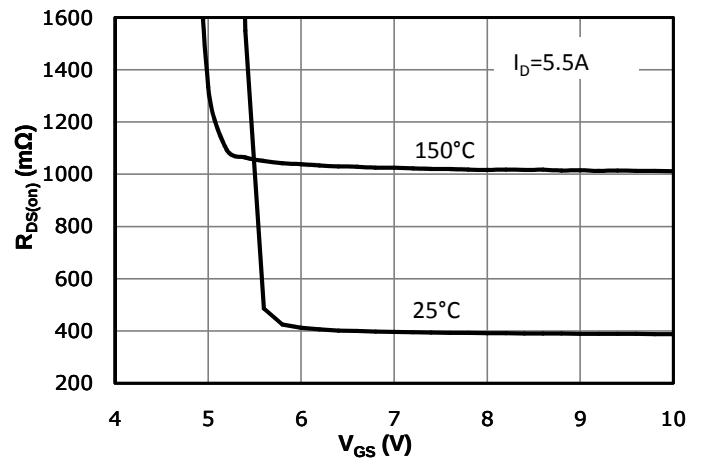


Fig 9: Body-diode Forward Characteristics

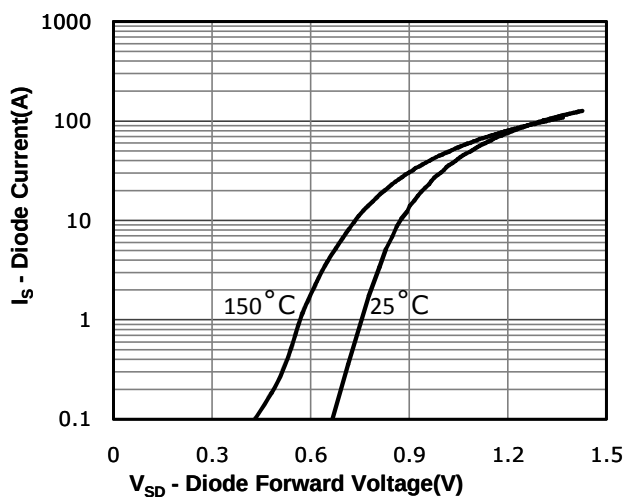


Fig 10: Gate Charge Characteristics

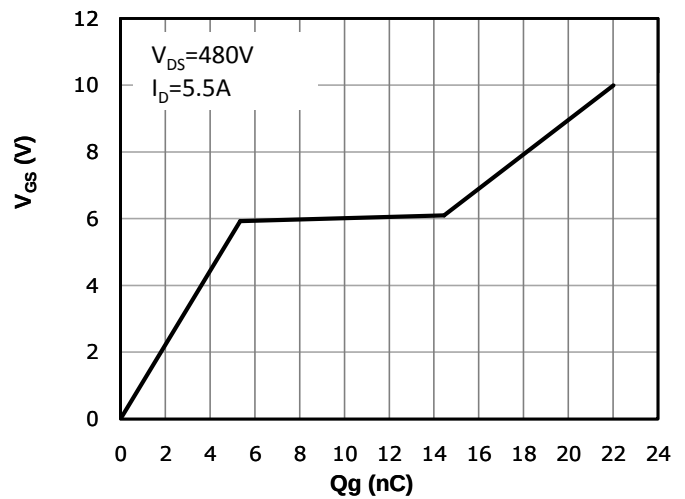


Fig 11: Capacitance Characteristics

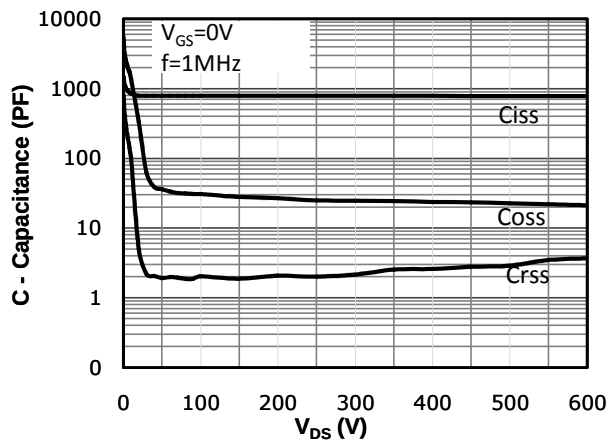


Fig 12: Safe Operating Area

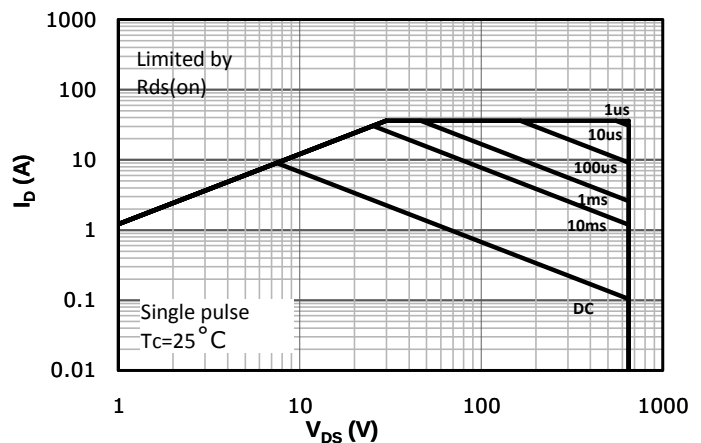
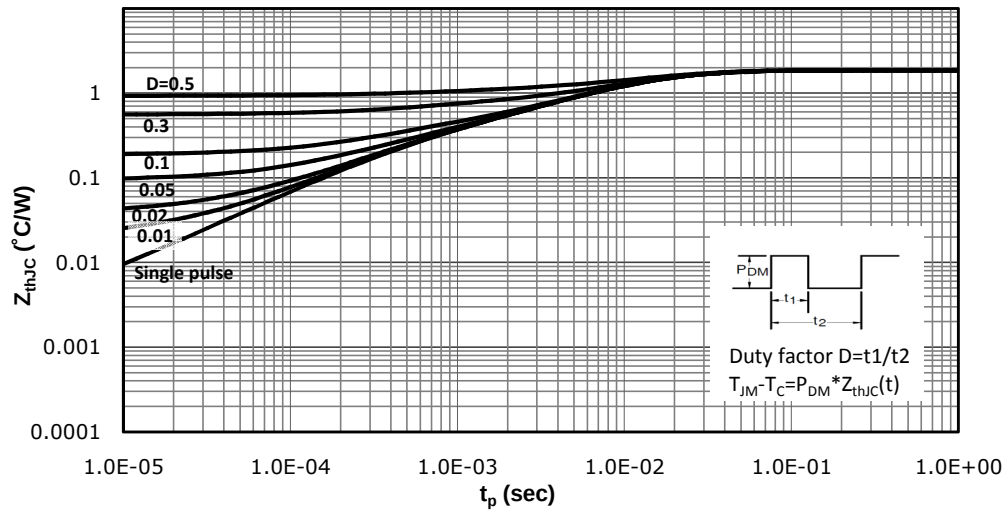
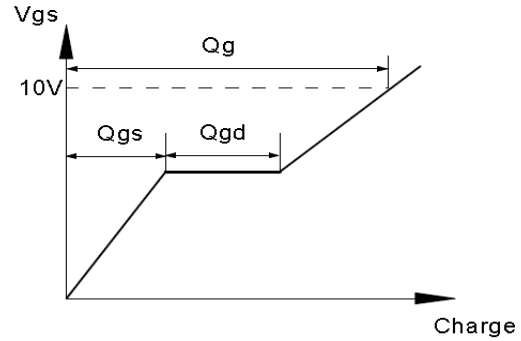
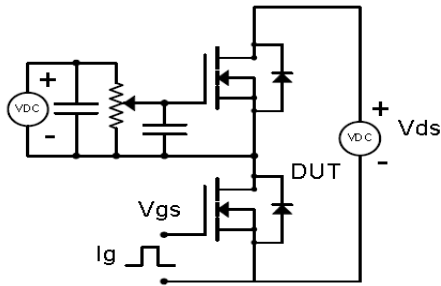


Fig 13: Max. Transient Thermal Impedance

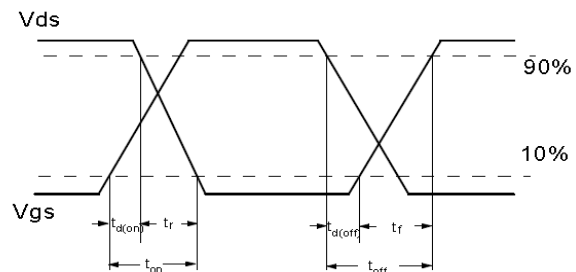
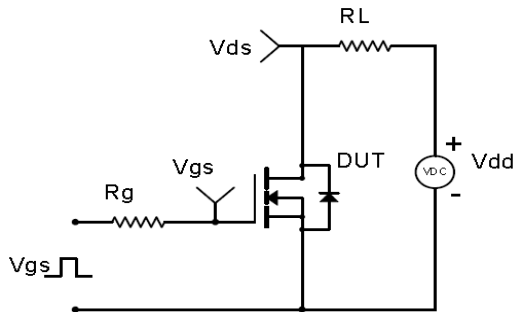


Test Circuit & Waveform

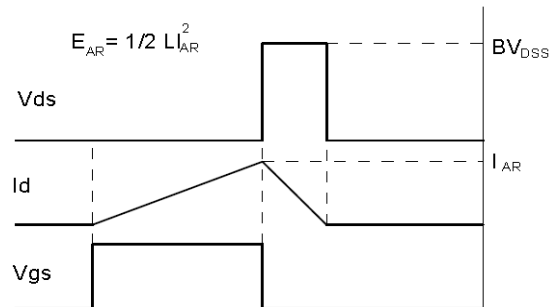
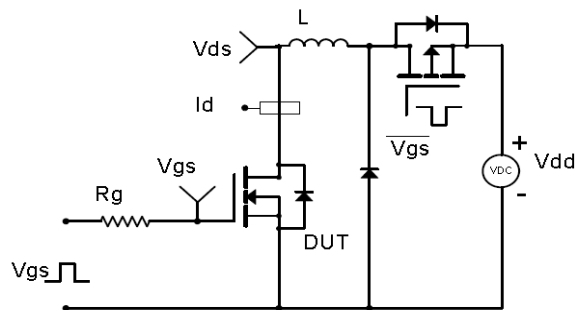
Gate Charge Test Circuit & Waveform



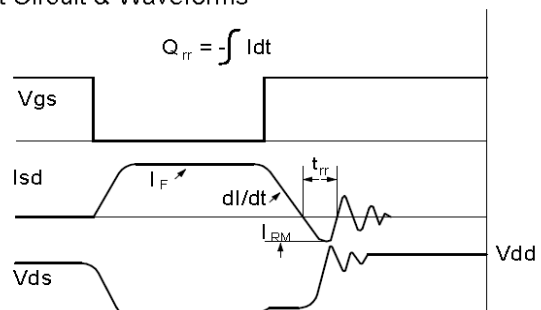
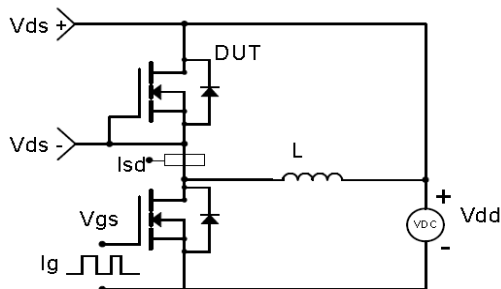
Resistive Switching Test Circuit & Waveforms



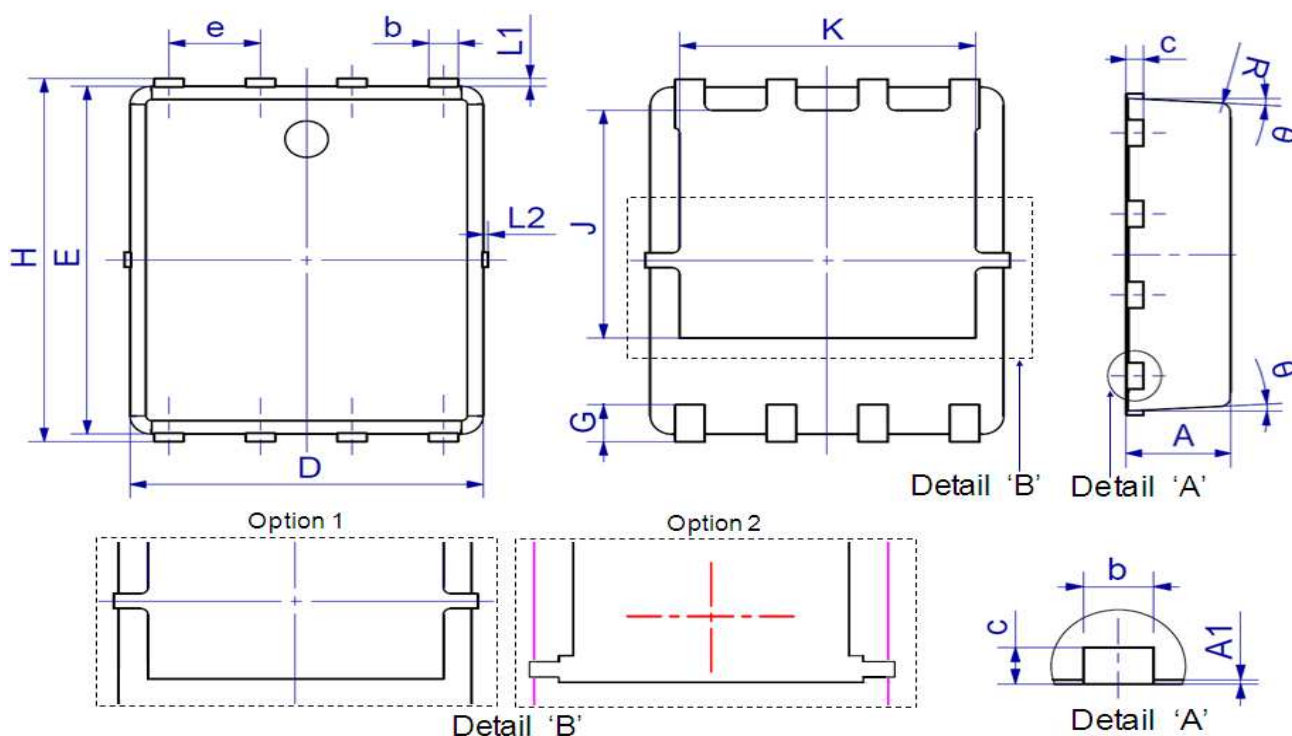
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: PDFN5*6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.80	1.20	0.031	0.047
A1	0.00	0.05	0.000	0.002
b	0.30	0.51	0.012	0.020
c	0.15	0.35	0.006	0.014
D	4.80	5.40	0.189	0.213
e	1.27 BSC		0.050 BSC	
E	5.66	6.06	0.223	0.239
G	0.30	0.71	0.012	0.028
H	5.90	6.35	0.232	0.250
J	3.32	3.92	0.131	0.154
K	3.61	4.25	0.142	0.167
L1	0.05	0.25	0.002	0.010
L2	0.00	0.15	0.000	0.006
R	0.25 REF		0.010 REF	
θ	0°	12°	0°	12°

Marking



NOTE:
XBBAAAAY
X —Assembly location code
BB —Fab code
AAAA —Lot code
Y —Bin code

Revision History

Revision	Date	Major changes
1.0	2020-8-13	Release of formal version
2.0	2021-11-11	Add dv/dt items
3.0	2023-5-26	Update format and Cxss

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(CQ) reserves the right to improve product design, function and reliability without notice.