华润微电子(重庆)有限公司

CRSM650N20N3

SkyMOS3 N-MOSFET 200V, 57.0mΩ, 19A

Features

- Uses CRM(CQ) advanced SkyMOS3 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- UPS (Uninterrupible Power Supplies)

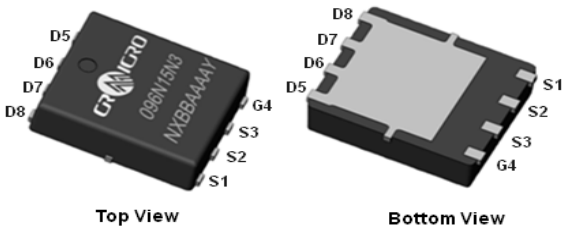
Product Summary

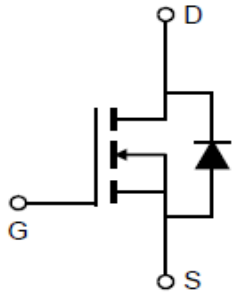
V_{DS}	200V
$R_{DS(on)@10V\ typ}$	57.0mΩ
I_D	19A

100% Avalanche Tested
100% DVDS Tested

RoHS HF

DFN5X6 Cu Clip Bond





CRSM650N20N3

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM650N20N3	650N20N3	DFN5x6	Tape&Reel	N/A	N/A	5000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	200	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 100°C (Silicon limit)	I_D	 19 12	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	76	A
Avalanche energy, single pulse (Ias=13A, Rg=25Ω)	E_{AS}	42.2	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	54	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	Tsold	260	°C

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Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	1.55	2.30	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	RthJA	-	-	55	°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}	200	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	0.1 10	1 100	μA	V_{DS}=160V,V_{GS}=0V T_j=25°C T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	57.0	65.0	mΩ	V_{GS}=10V, I_D=9.5A
		-	59.0	67.0		V_{GS}=8V, I_D=9.5A
Transconductance	g_{fs}	-	14	-	S	V_{DS}=5V,I_D=9.5A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	834.0	1251	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	-	80.0	120		
Reverse Transfer Capacitance	C_{rss}	-	22.7	45.4		
Gate Total Charge	Q_G	-	13	19.5	nC	V_{GS}=10V, V_{DS}=100V, I_D=9.5A, f=1MHz
Gate-Source charge	Q_{gs}	-	5.6	-		
Gate-Drain charge	Q_{gd}	-	2.5	5.0		
Turn-on delay time	$t_{d(on)}$	-	9.5	-	ns	V_{GS}=10V, V_{DD}=100V, ID=9.5A, R_{G_ext}=2.7Ω
Rise time	t_r	-	10.8	-		
Turn-off delay time	$t_{d(off)}$	-	15.1	-		
Fall time	t_f	-	11.1	-		
Gate resistance	R_G	-	1.8	2.7	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.82	1.2	V	V_{GS}=0V,I_{SD}=9.5A
Body Diode Continuous Forward Current	Is	-	-	19	A	TC = 25°C
Body Diode Pulsed Current	Is pulse	-	-	76	A	TC = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	81.1	162.2	ns	I_F=9.5A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	297.5	595	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

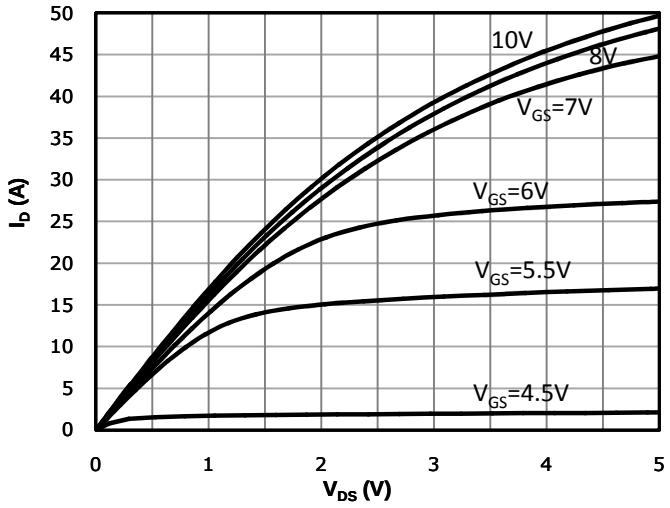


Fig 2: Transfer Characteristics

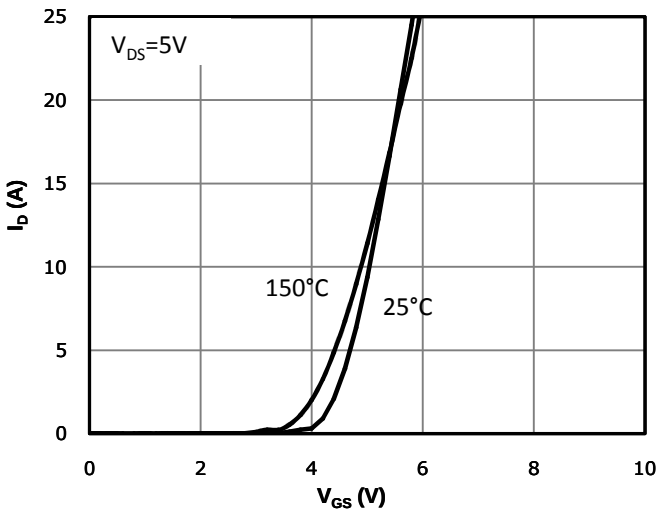


Fig 3: Rds(on) vs Drain Current and Gate Voltage

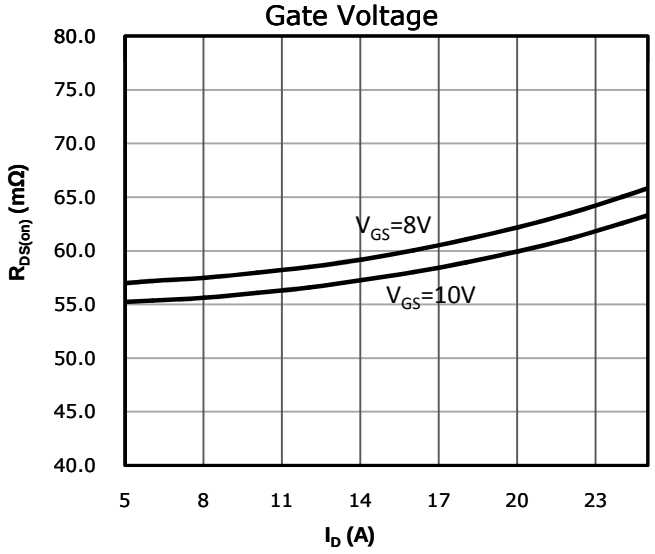


Fig 4: Rds(on) vs Gate Voltage

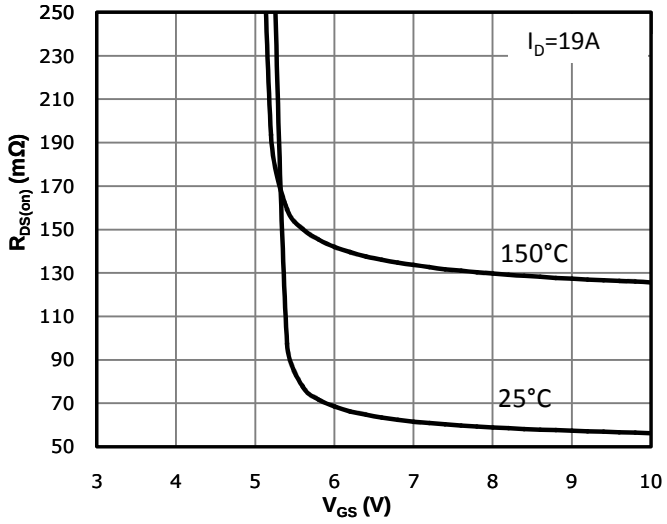


Fig 5: Rds(on) vs. Temperature

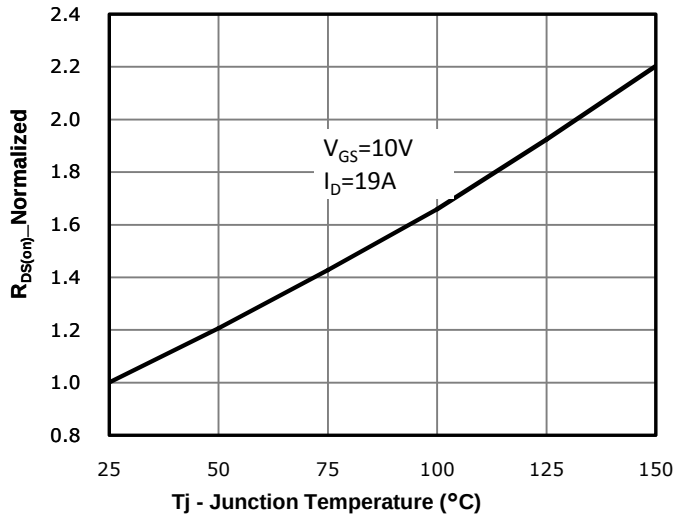


Fig 6: Capacitance Characteristics

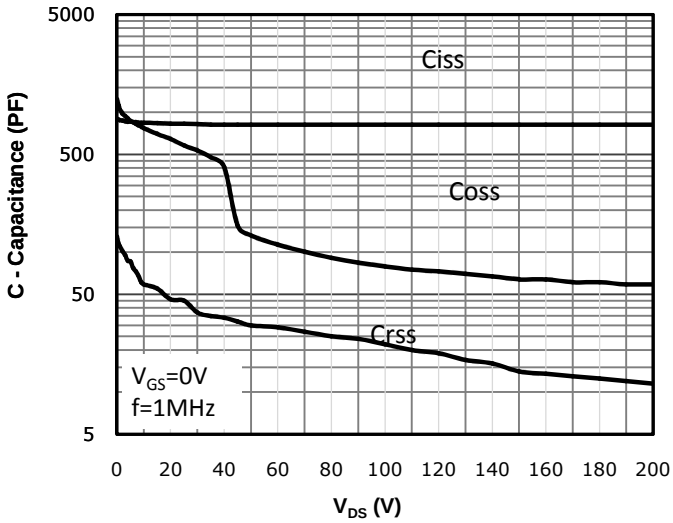


Fig 7: Gate ChargeCharacteristics

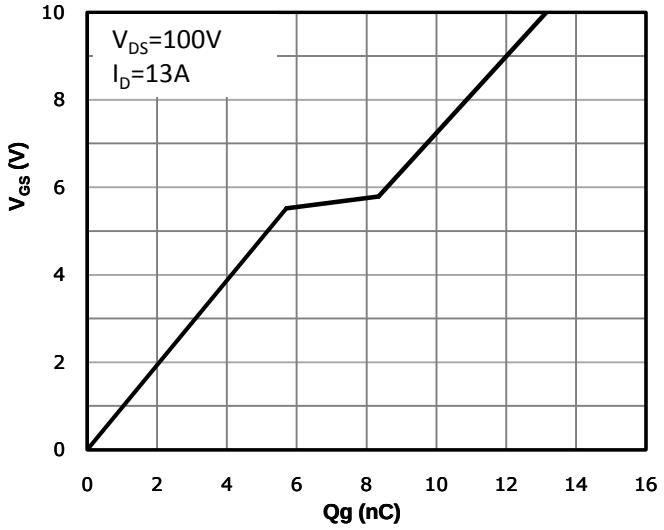


Fig 8: Body-diode Forward Characteristics

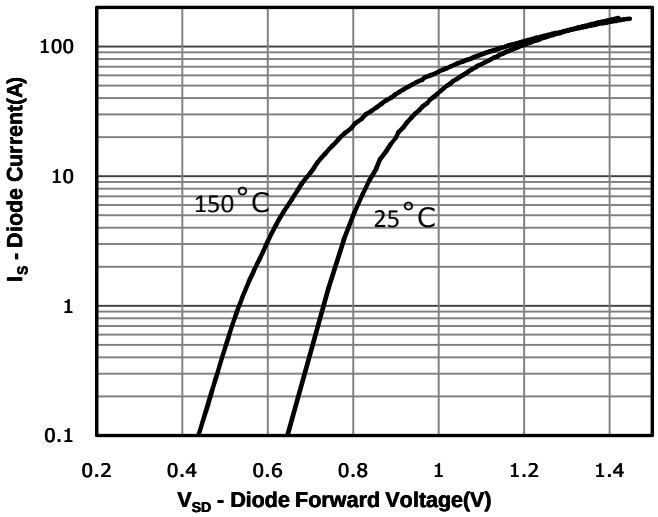


Fig 9: Power Dissipation

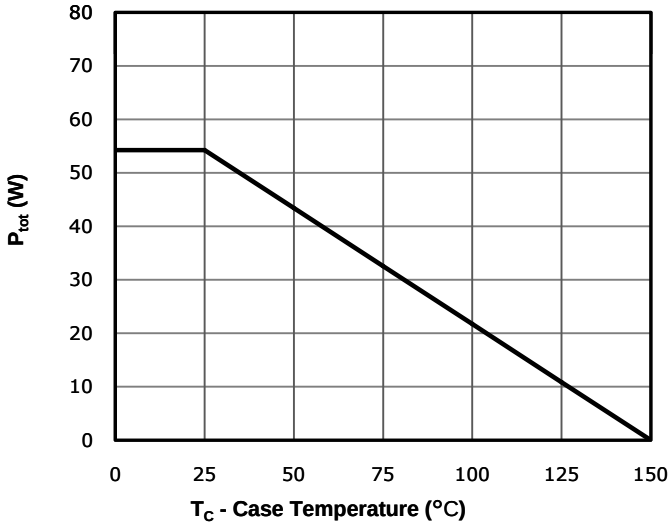


Fig 10: Drain Current Derating

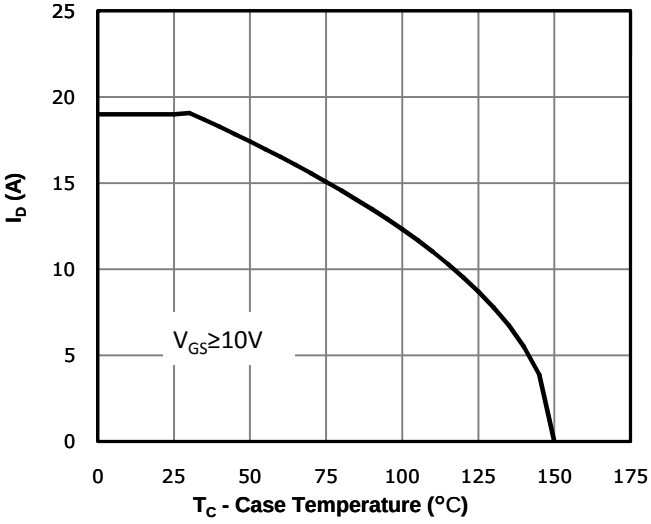


Fig 11: Safe Operating Area

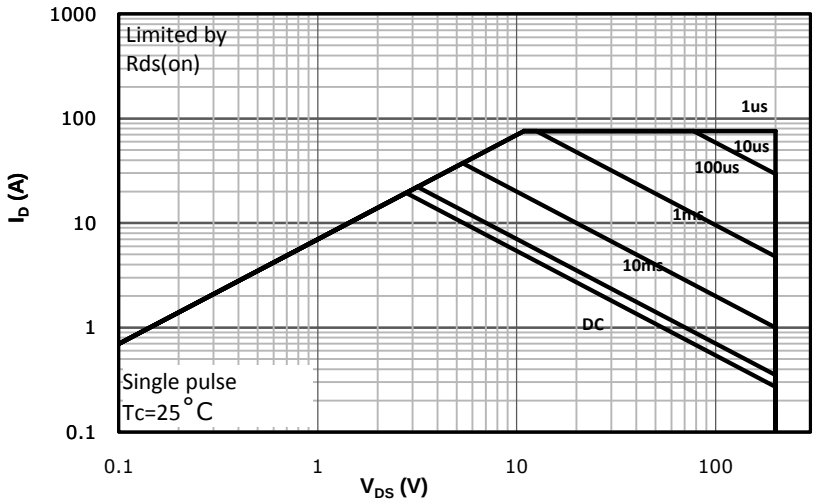
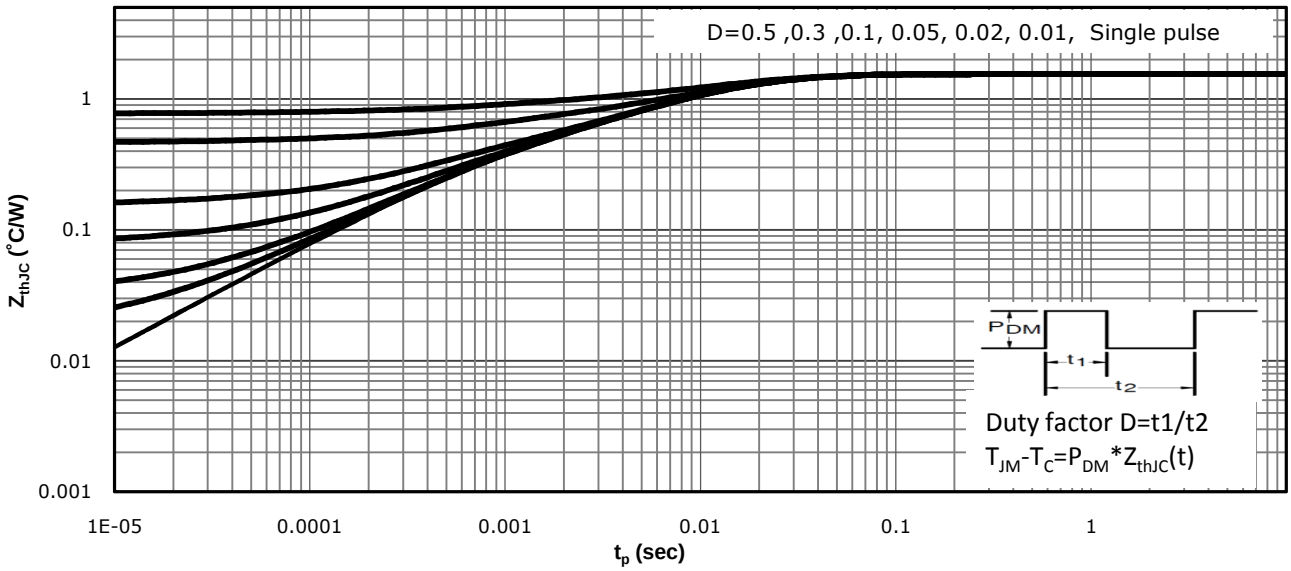
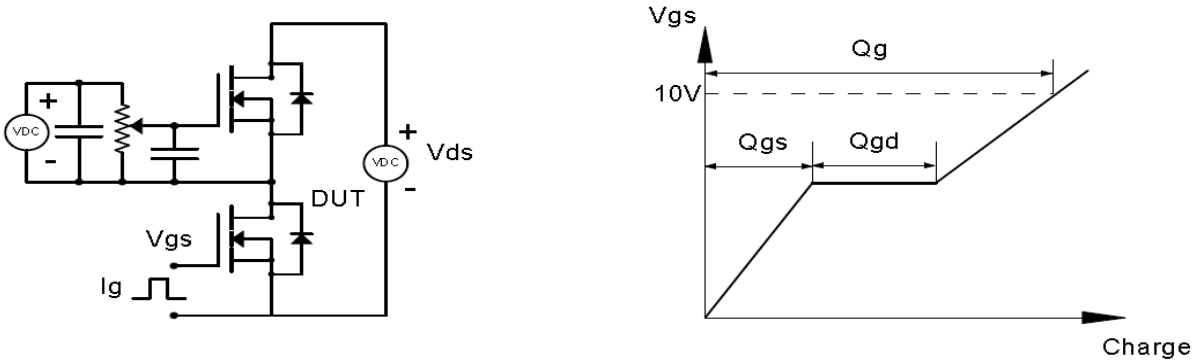


Fig 12: Max. Transient Thermal Impedance

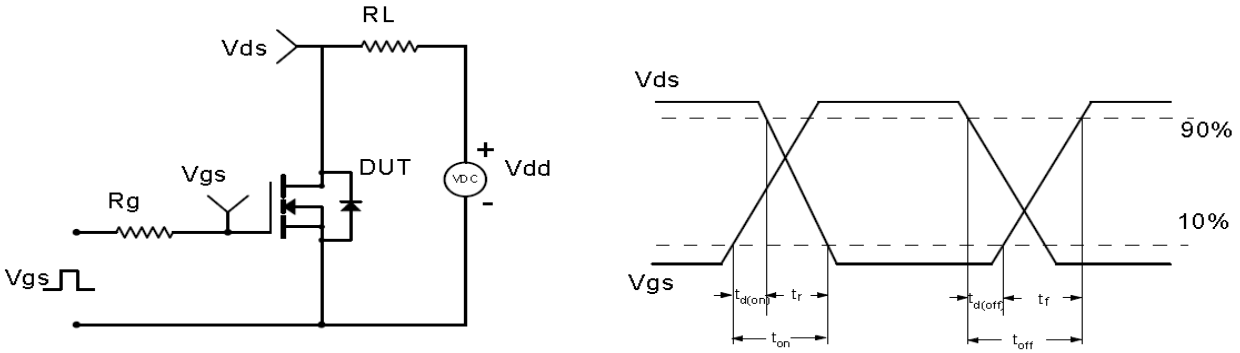


Test Circuit & Waveform

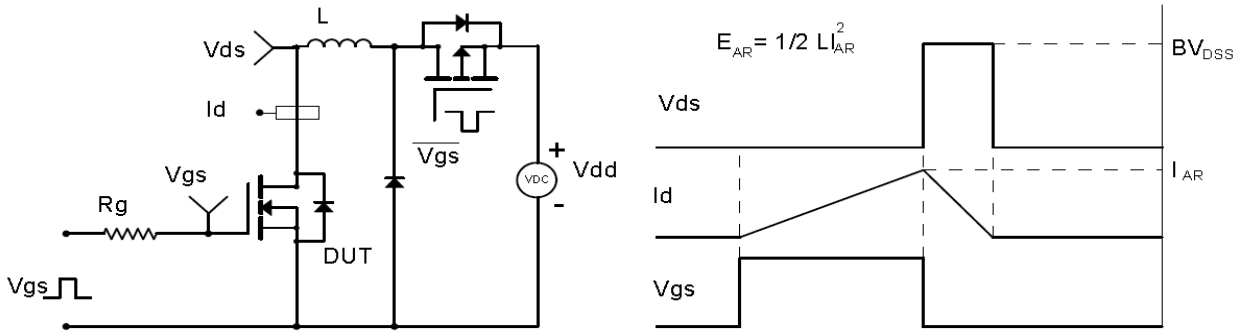
Gate Charge Test Circuit & Waveform



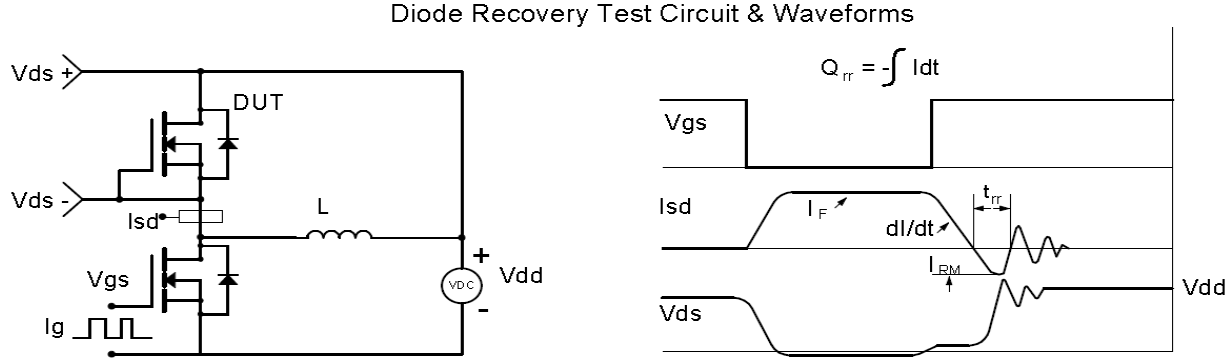
Resistive Switching Test Circuit & Waveforms



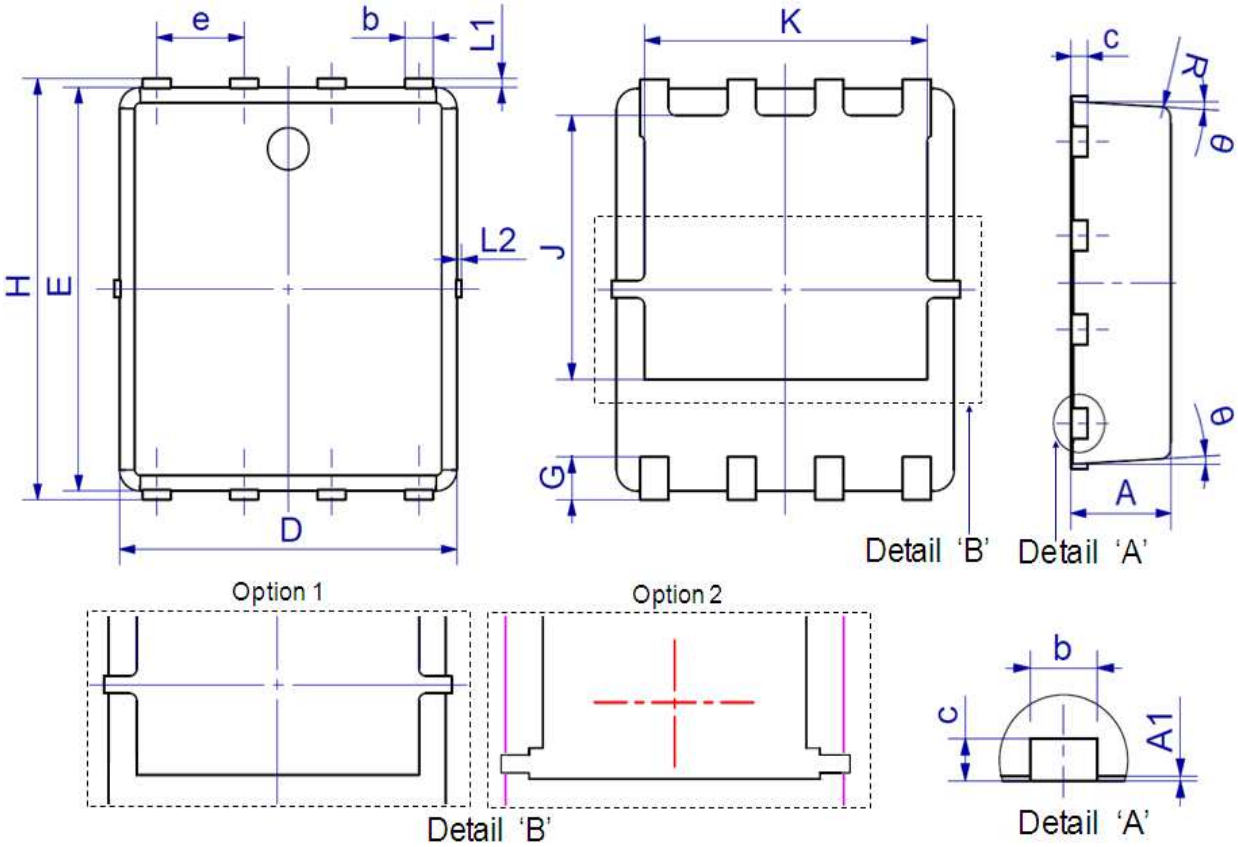
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: DFN5X6 Cu Clip



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:
NXBBAAAAY

N	—Wire Bond code
X	—Assembly location code
BB	—Fab code
AAAA	—Lot code
Y	—Bin code

Revision History

Revison	Date	Major changes
1.0	2020-02-18	Release of Preliminary Version.

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified 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 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.

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