

**Features**

- Uses CRM(CQ) advanced SkyMOS2 technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Qualified according to JEDEC criteria

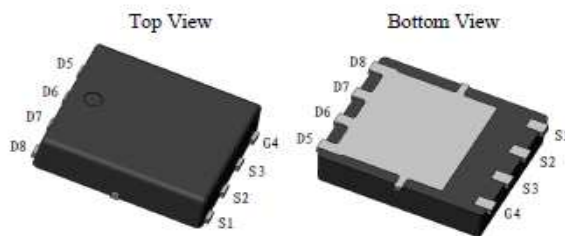
**Applications**

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

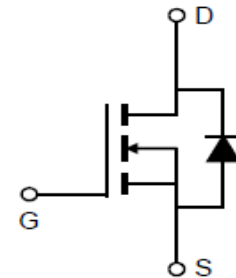
**Product Summary**

$V_{DS}$	100V
$R_{DS(on)@10V}$ typ	11mΩ
$R_{DS(on)@4.5V}$ typ	13.5mΩ
$I_D$	58A

**100% Avalanche Tested**



**CRSM120N10L2**


**Package Marking and Ordering Information**

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSM120N10L2	SM120N10L2	DFN5X6	Tape&Reel	N/A	N/A	5000pcs

**Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	100	V
Continuous drain current	$I_D$	60	A
$T_C = 25^\circ\text{C}$ (Package limit)		58	
$T_C = 25^\circ\text{C}$ (Silicon limit)		36	
$T_C = 100^\circ\text{C}$ (Silicon limit)			
Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	232	A
Avalanche energy, single pulse ( $L=0.5\text{mH}$ , $R_g=25\Omega$ ) <sup>[1]</sup>	$E_{AS}$	64	mJ
Gate-Source voltage	$V_{GS}$	±20	V
Power dissipation ( $T_C = 25^\circ\text{C}$ )	$P_{tot}$	78.1	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	°C

Notes:1.EAS was tested at  $T_j = 25^\circ\text{C}$ ,  $I_D = 16\text{A}$ .

**Thermal Resistance**

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case	$R_{thJL}$	1.60	°C/W
Thermal resistance, junction – ambient	$R_{thJA}$	47.0	

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

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

**Static Characteristic**

Drain-source breakdown voltage	$BV_{DSS}$	100	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.4	1.8	2.2	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	0.02	1	$\mu A$	$V_{DS}=100V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=125^\circ C$
Gate-source leakage current	$I_{GSS}$	-	10	100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	11.0	13.2	mΩ	$V_{GS}=10V, I_D=30A$
		-	13.5	16.9		$V_{GS}=4.5V, I_D=24A$
Transconductance	$g_{fs}$	-	70	-	S	$V_{DS}=5V, I_D=30A$

**Dynamic Characteristic**

Input Capacitance	$C_{iss}$	-	1618	2266	pF	$V_{GS}=0V, V_{DS}=50V,$ $f=1MHz$
Output Capacitance	$C_{oss}$	-	277	388		
Reverse Transfer Capacitance	$C_{rss}$	-	22	44		
Gate Total Charge	$Q_G$	-	28.2	40	nC	$V_{GS}=10V, V_{DS}=50V,$ $I_D=30A, f=1MHz$
Gate-Source charge	$Q_{gs}$	-	6.5	-		
Gate-Drain charge	$Q_{gd}$	-	4.5	-		
Turn-on delay time	$t_{d(on)}$	-	30	-	ns	$V_{GS}=10V, V_{DD}=50V,$ $R_{G\_ext}=2.7\Omega$
Rise time	$t_r$	-	81	-		
Turn-off delay time	$t_{d(off)}$	-	24	-		
Fall time	$t_f$	-	7	-		
Gate resistance	$R_G$	-	1.62	-	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	$V_{SD}$	-	0.87	1	V	$V_{GS}=0V, I_{SD}=30A$
Body Diode Reverse Recovery Time	$t_{rr}$	-	45	-	ns	$I_F=30A, dI/dt=300A/\mu$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	240	-	nC	s

### Typical Performance Characteristics

Fig 1: Output Characteristics

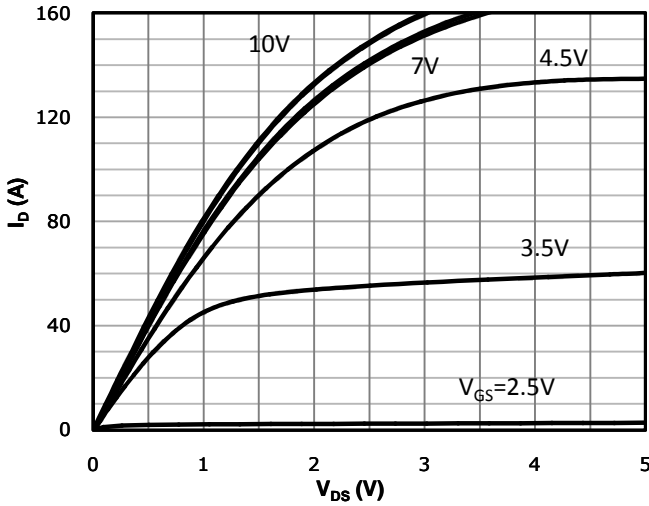


Fig 2: Transfer Characteristics

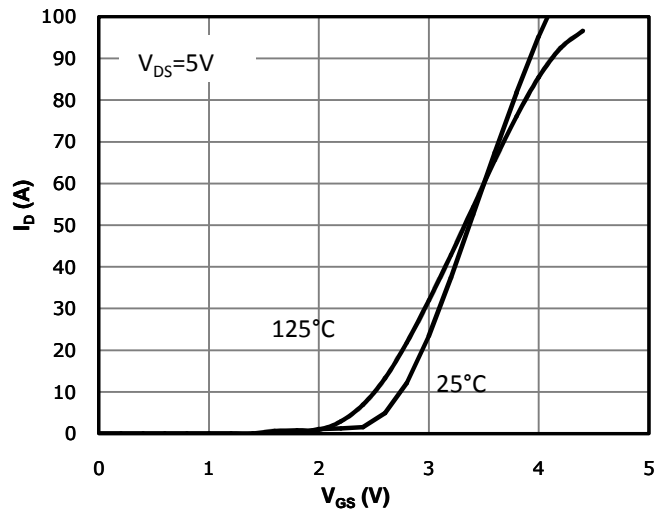


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

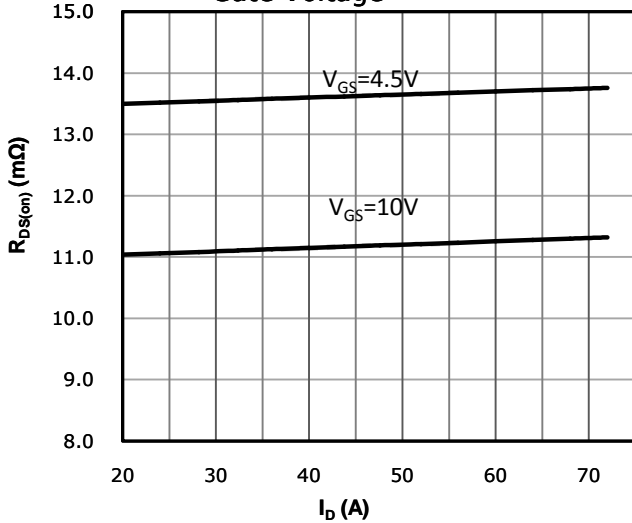


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

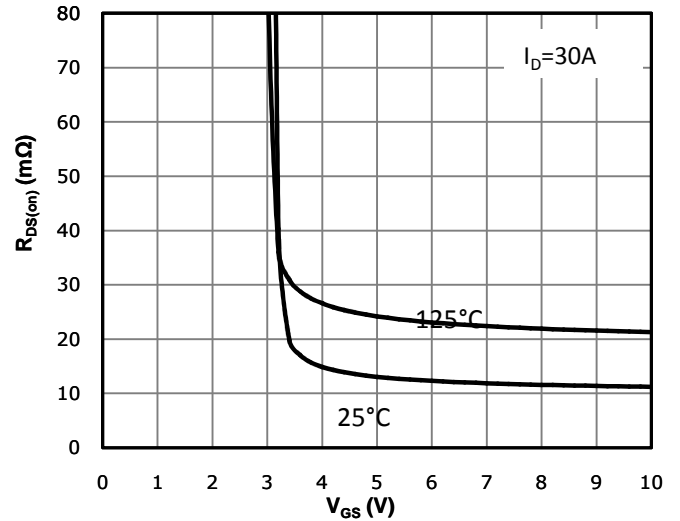


Fig 5:  $R_{DS(on)}$  vs. Temperature

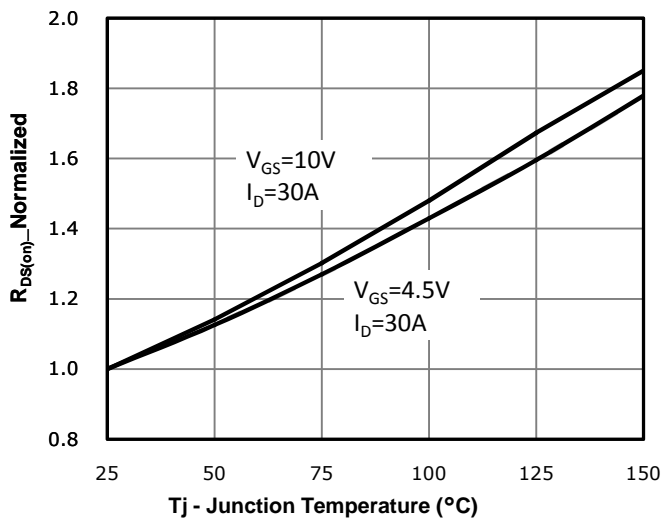


Fig 6: Capacitance Characteristics

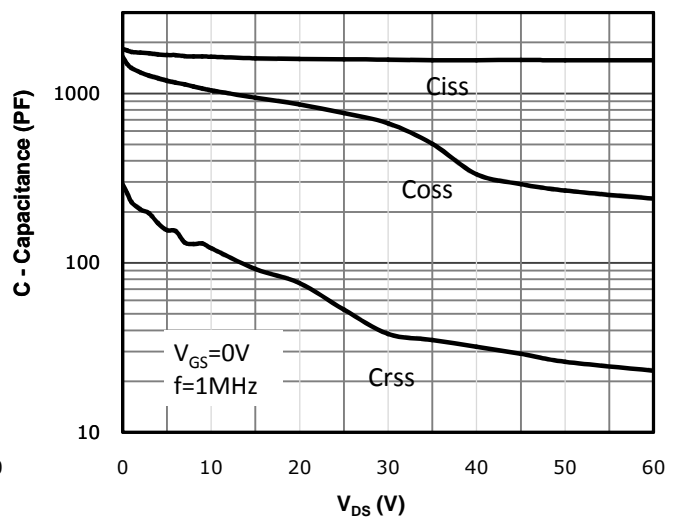


Fig 7: Gate Charge Characteristics

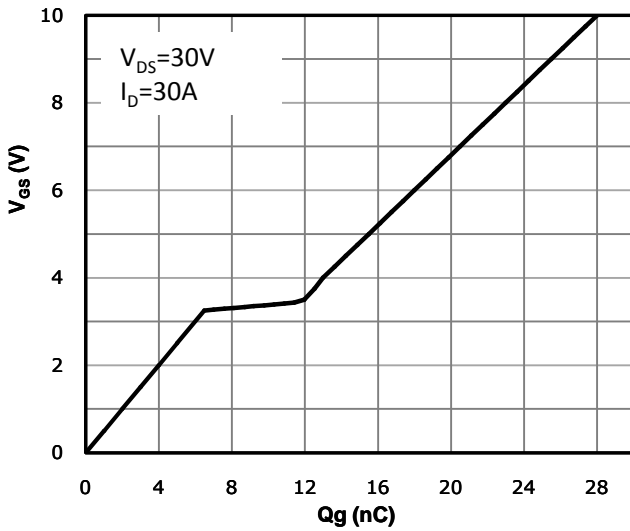


Fig 8: Body-diode Forward Characteristics

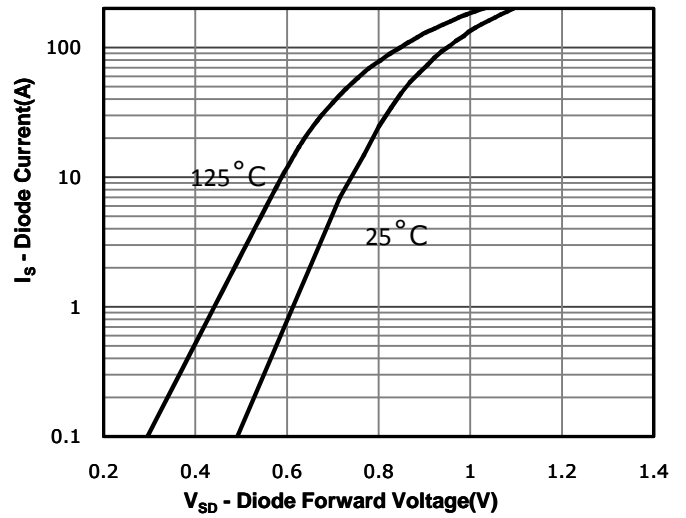


Fig 9: Power Dissipation

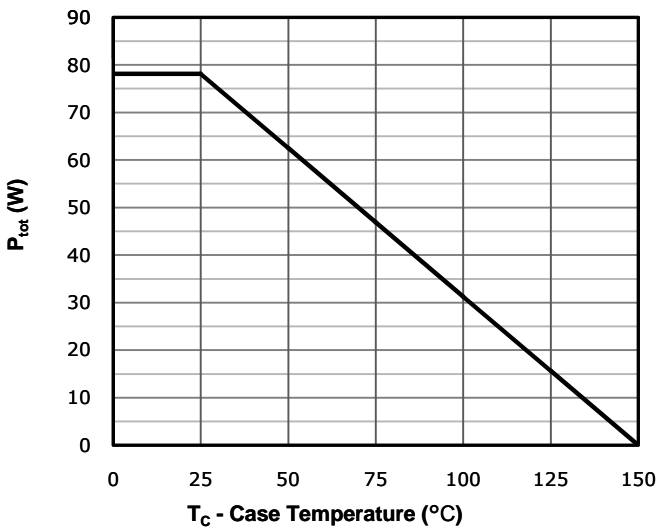


Fig 10: Drain Current Derating

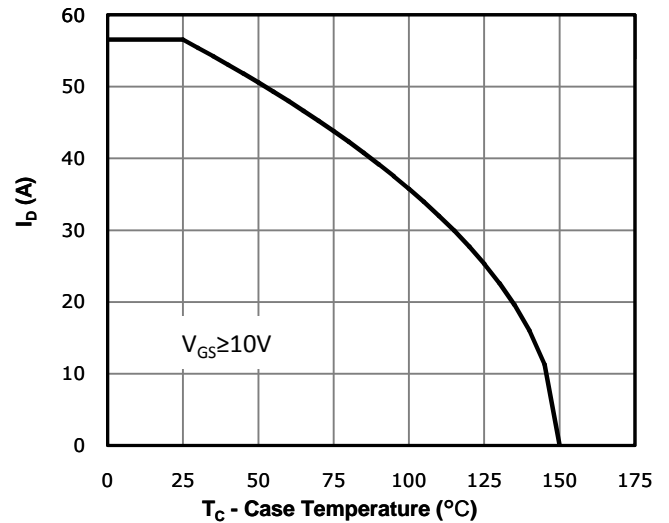


Fig 11: Safe Operating Area

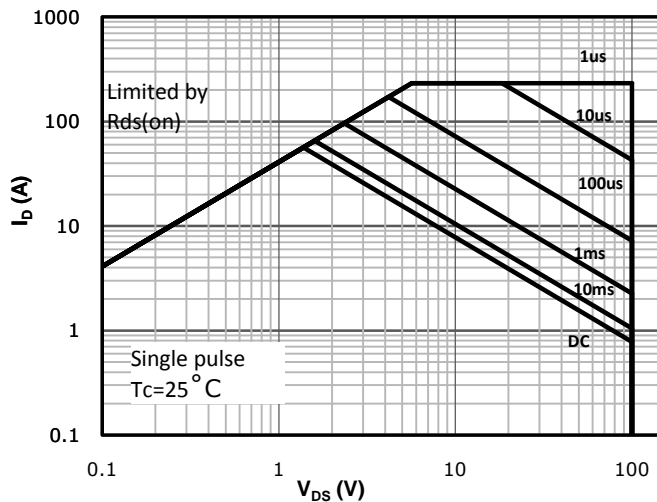
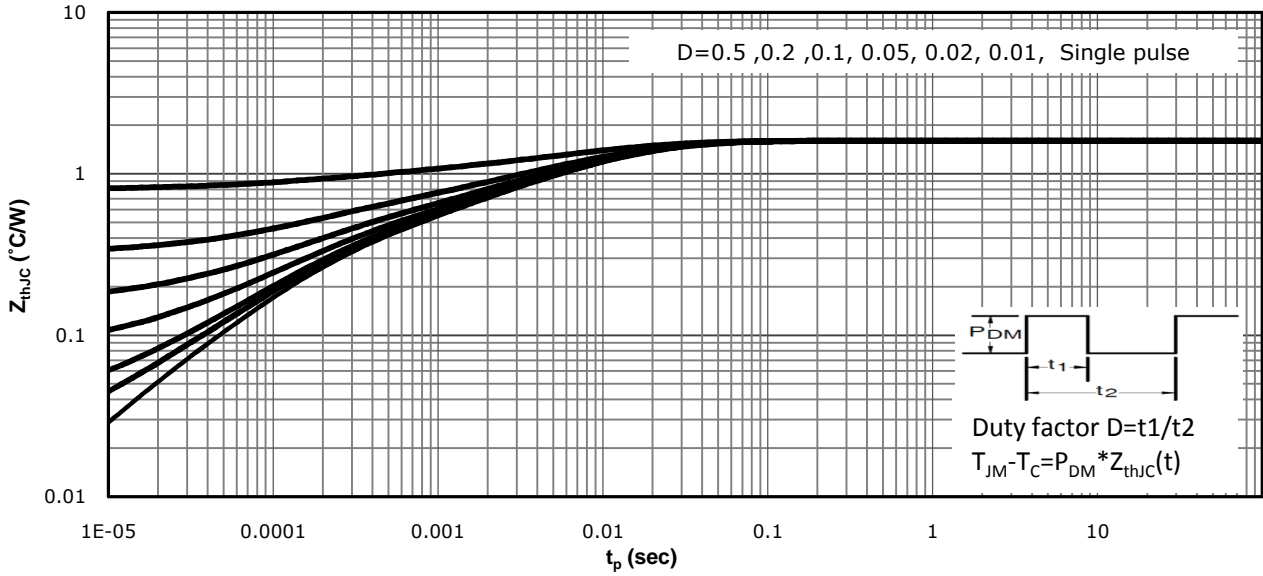
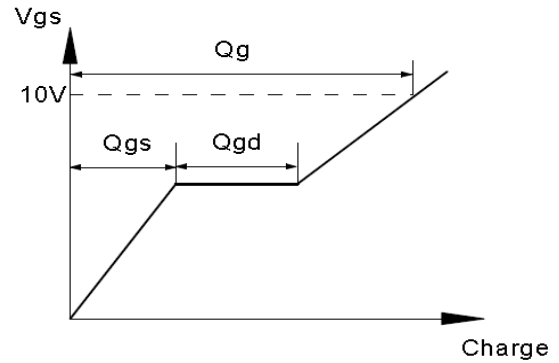
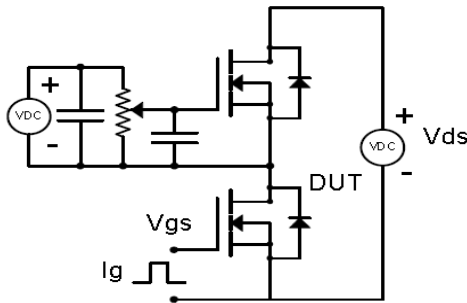


Fig 12: Max. Transient Thermal Impedance

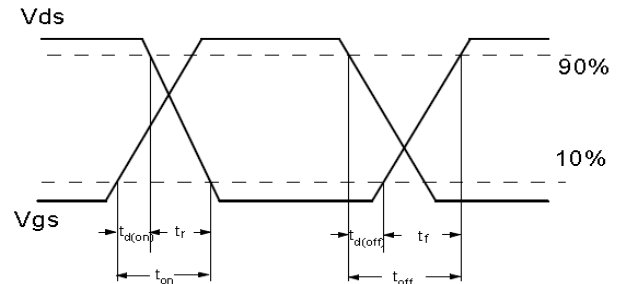
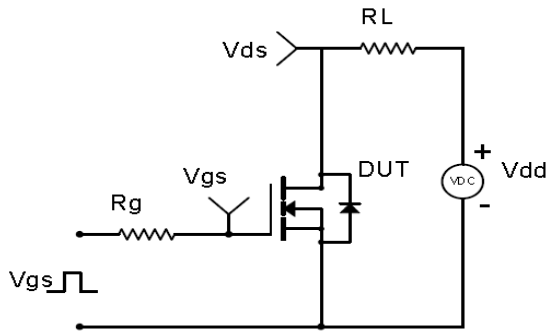


### Test Circuit & Waveform

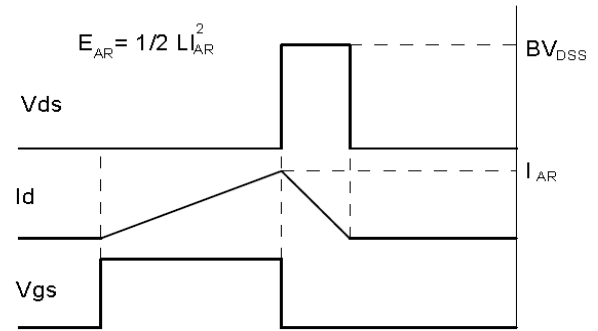
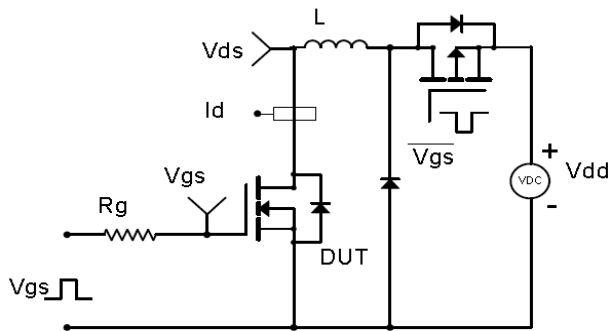
Gate Charge Test Circuit & Waveform



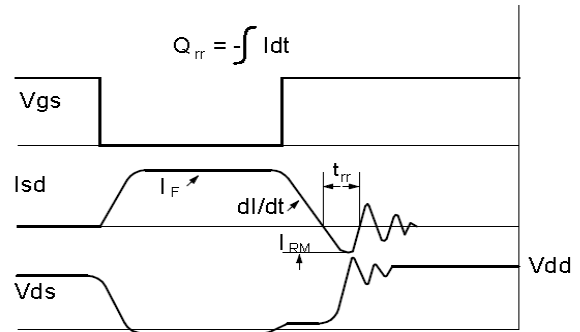
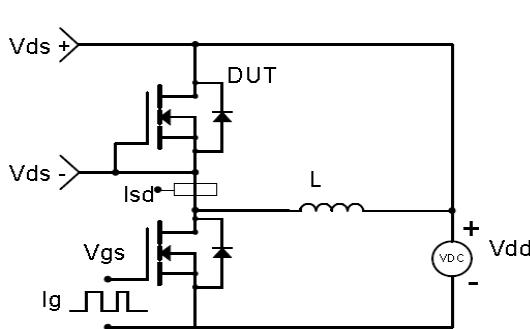
Resistive Switching Test Circuit & Waveforms



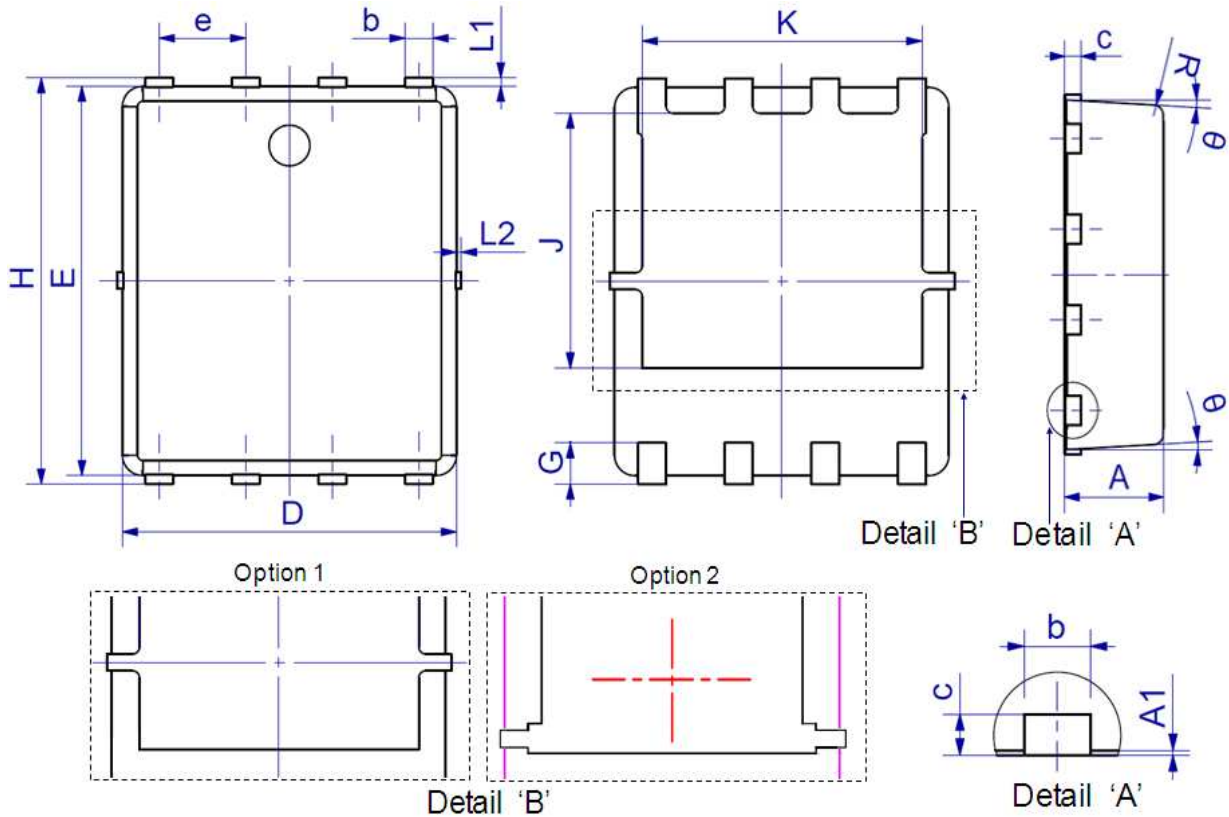
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## Package Outline: DFN5X6



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	
$\theta$	0°	12°	0°	12°



**Revision History**

Revision	Date	Major changes
1.0	2019-1-3	Release of formal version.
2.0	2019-6-25	Supplement package outline info.

**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.