CRMHXR13V06D

Dual N-Channel 60V, 13.5mΩ Typ. Power MOSFET

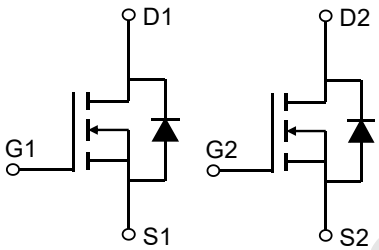
Description

Features

- 60V, 24A

  $R_{DS(ON)}$ Typ = 13.5mΩ @ V_{GS} = 10V

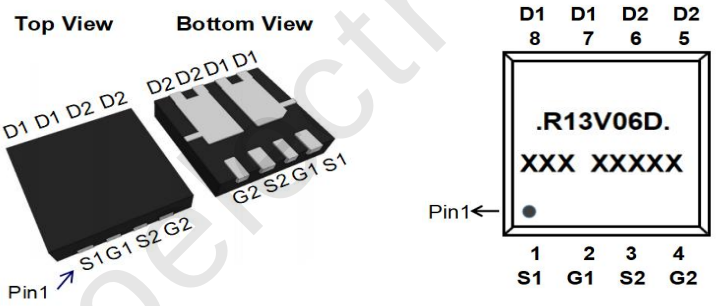
  $R_{DS(ON)}$ Typ = 17.5mΩ @ V_{GS} = 4.5V
- Advanced Split Gate Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free
- 100% UIS TESTED!
- 100% ΔVds TESTED!



Schematic Diagram

Application

- Load Switch
- PWM Application
- Power Management



Marking and Pin Assignment

Package Marking and Ordering Information

Device	Marking	Package	Outline	Reel Size	Reel (pcs)	Per Carton (pcs)
CRMHXR13V06D	R13V06D	DFN3.3x3.3-8L-D	TAPING	13"	5000	50000

Absolute Maximum Ratings (@ T_J = 25°C unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DS}	Drain-to-Source Voltage		60	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25°C	24	A
		T_C = 100°C	14.4	A
I_{DM}	Pulsed Drain Current (1)		96	A
E_{AS}	Single Pulsed Avalanche Energy (2)		27.5	mJ
P_D	Power Dissipation	T_C = 25°C	19.8	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		6.3	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.3	1.8	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 10V, I_D = 20A	-	13.5	18	mΩ
		V_{GS} = 4.5V, I_D = 10A	-	17.5	23	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 30V, f = 1MHz	-	593	-	pF
C_{oss}	Output Capacitance		-	183	-	pF
C_{rss}	Reverse Transfer Capacitance		-	4	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 30V, I_D = 20A	-	13.9	-	nC
Q_{gs}	Gate Source Charge		-	1.6	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	3.1	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 30V I_D= 20A, R_{GEN} = 6Ω	-	3.7	-	ns
t_r	Turn-On Rise Time		-	4.3	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	16.2	-	ns
t_f	Turn-Off Fall Time		-	6.5	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	24	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	96	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 20A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 15A, di/dt = 100A/us	-	24	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	9.3	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25°C, V_{DD}=30V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=10.5A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

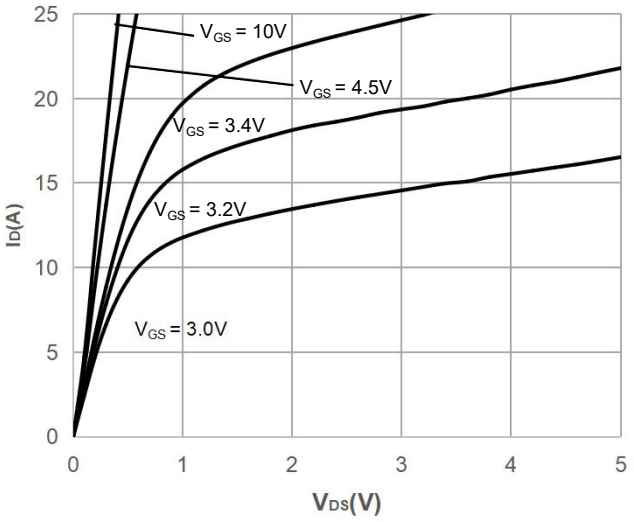


Figure 2: Typical Transfer Characteristics

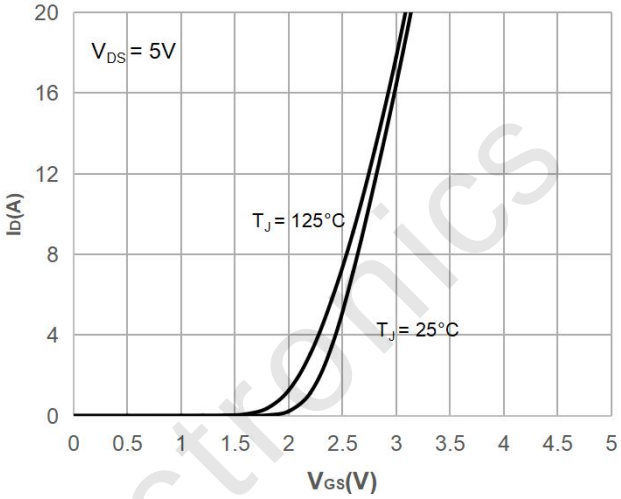


Figure 3: On-resistance vs. Drain Current

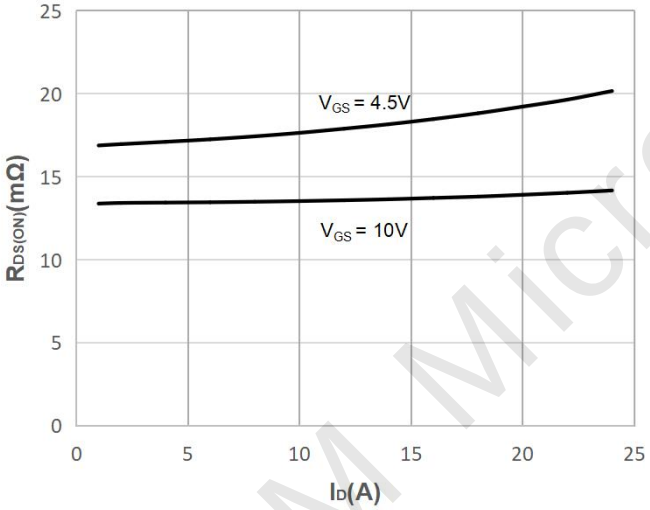


Figure 4: Body Diode Characteristics

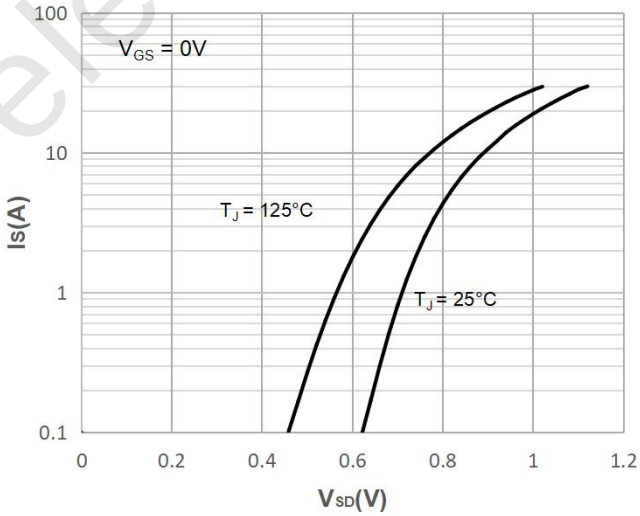


Figure 5: Gate Charge Characteristics

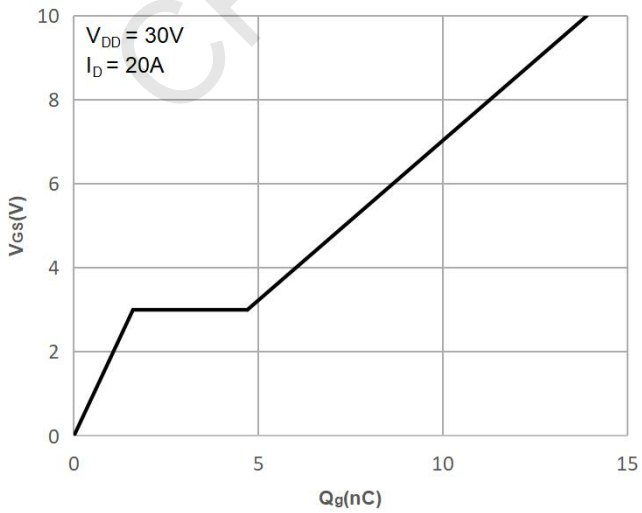
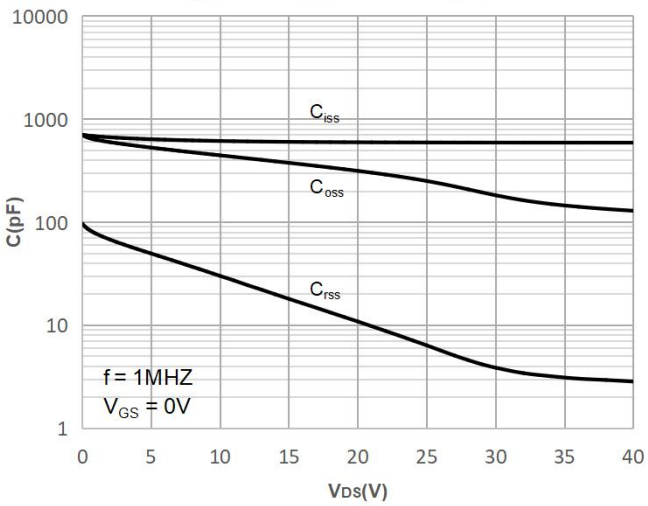


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

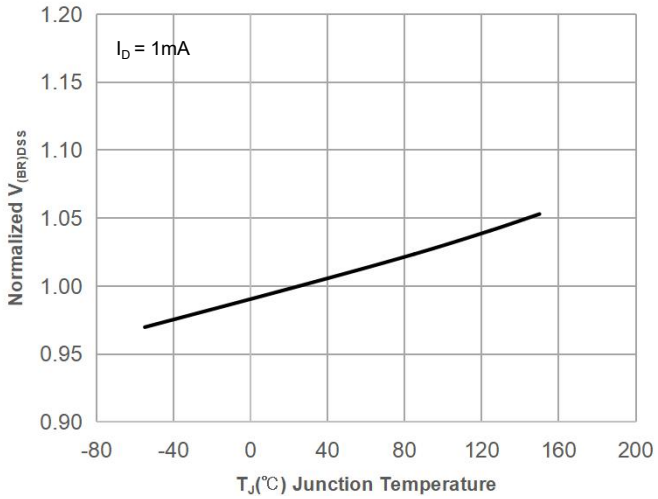


Figure 8: Normalized on Resistance vs. Junction Temperature

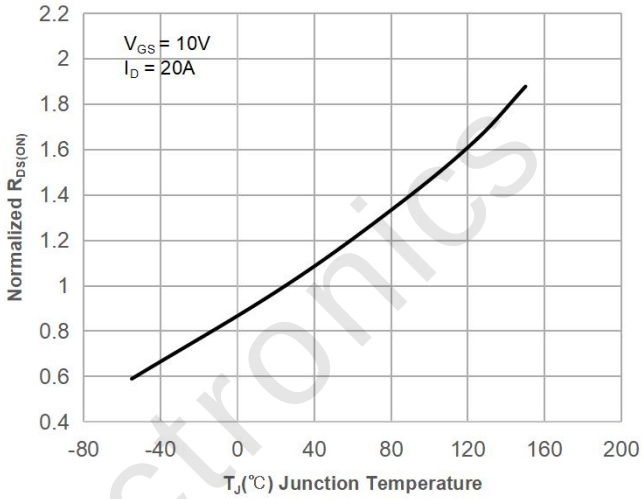


Figure 9: Maximum Safe Operating Area

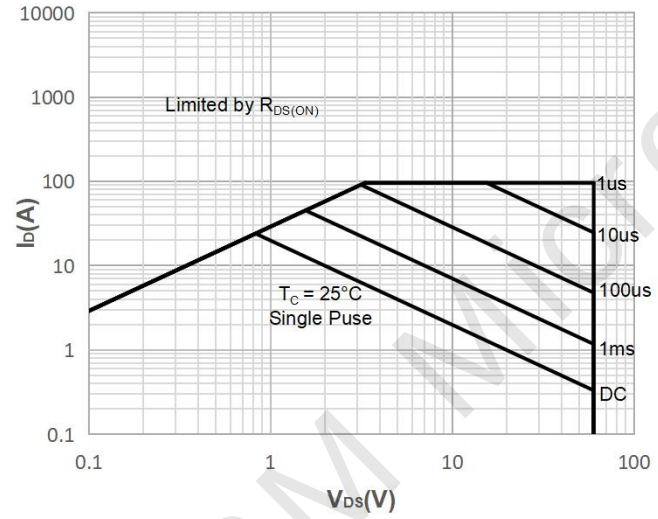


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

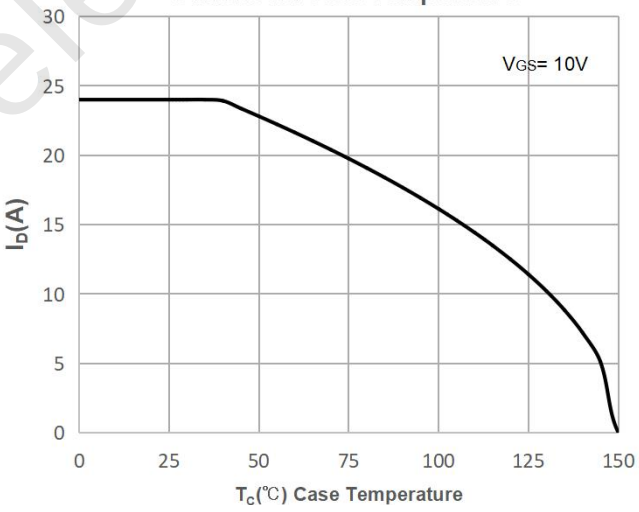


Figure 11: Normalized Maximum Transient Thermal Impedance

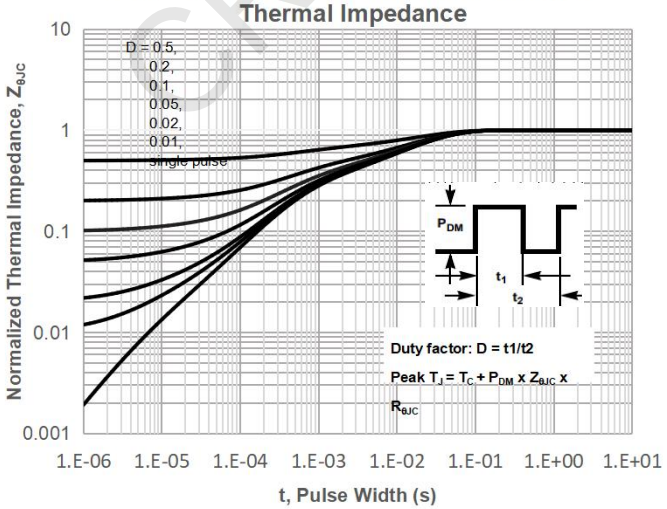
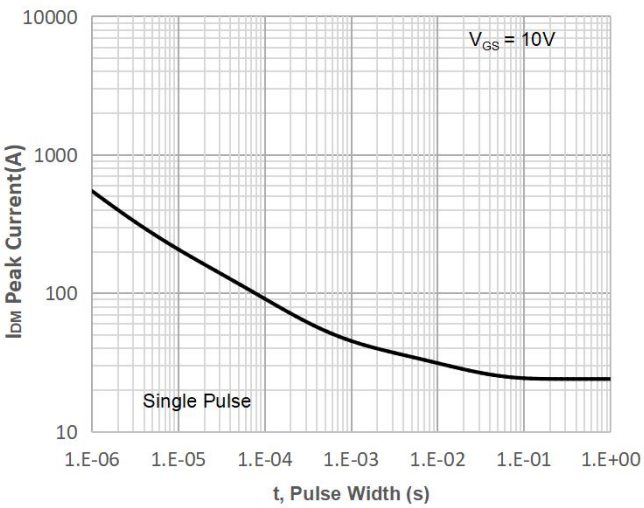


Figure 12: Peak Current Capacity



Test Circuit

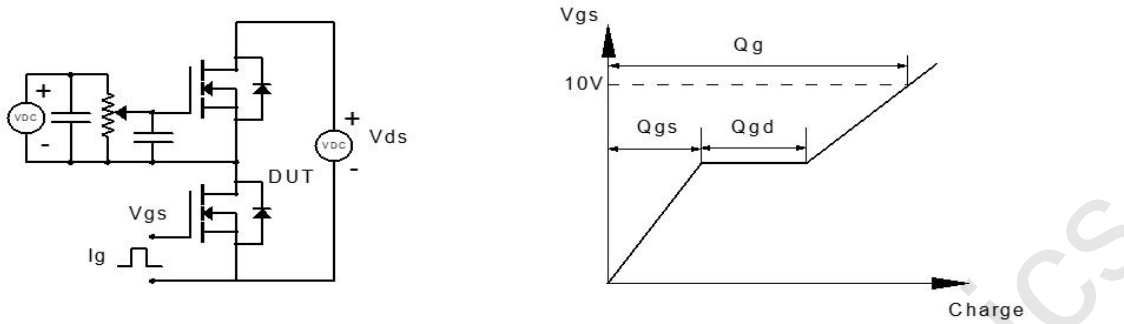


Figure 1: Gate Charge Test Circuit & Waveform

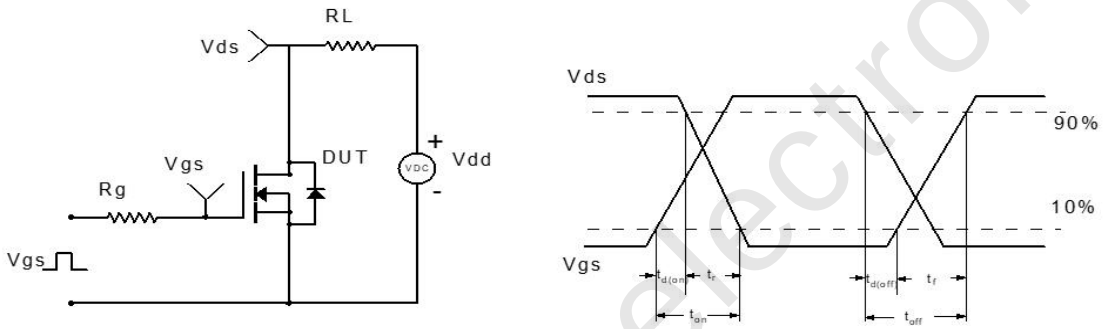


Figure 2: Resistive Switching Test Circuit & Waveform

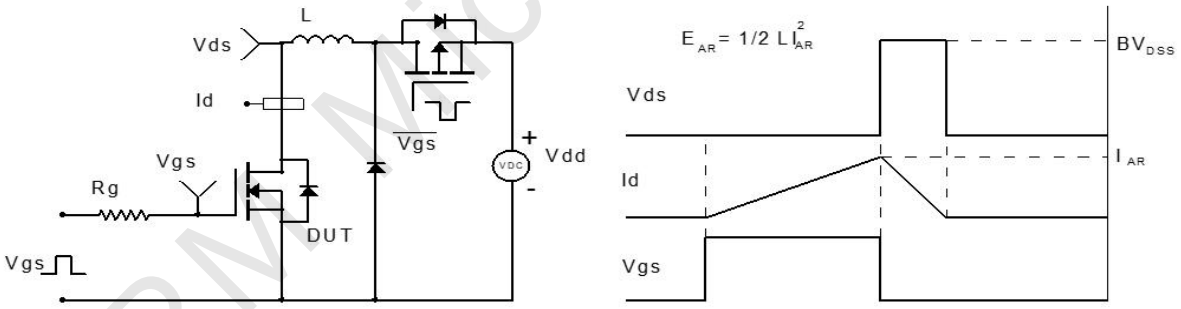


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

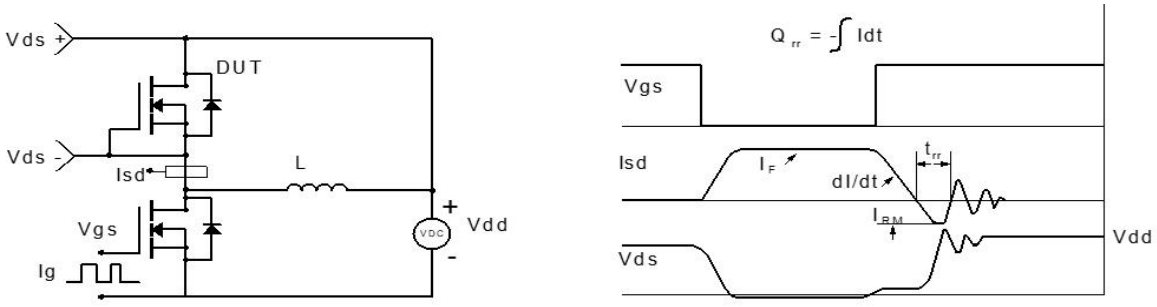
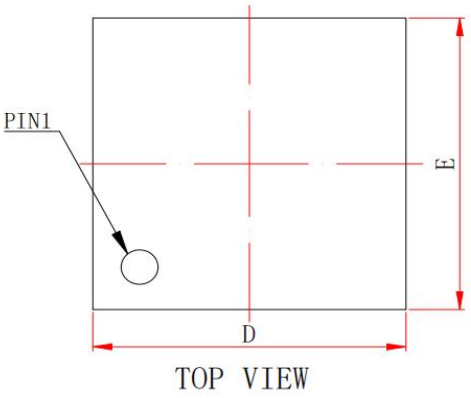
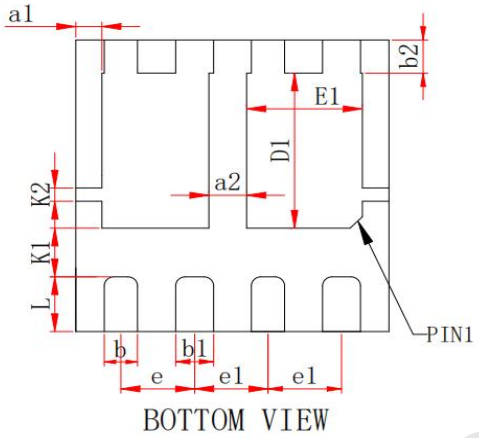
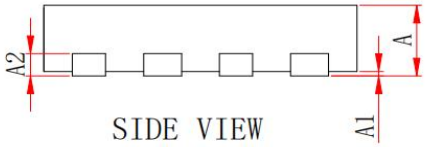


Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(PDFN3.3x3.3-8L-D)







STMBOL	MIN	NOM	MAX
D	3.20	3.30	3.40
E	3.20	3.30	3.40
A	0.70	0.75	0.80
A1	0.00	-	0.05
A2		0.203REF	
L	0.50	0.60	0.70
b	0.30	0.35	0.40
b1	0.35	0.40	0.45
e		0.775BSC	
e1		0.725BSC	
K1		0.500BSC	
K2		0.200BSC	
b2	0.30	0.35	0.40
E1	0.10	1.15	1.20
D1	1.70	1.75	1.80
a1	0.30	0.35	0.40
a2	0.30	0.35	0.40

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