

Features

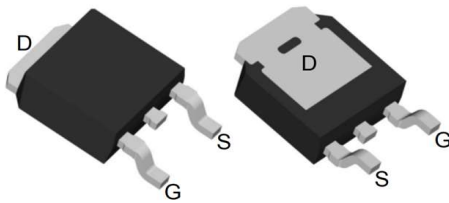
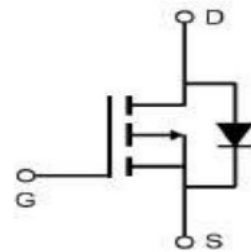
- Uses CRM(CQ) advanced Trench technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- AEC-Q101 Qualified
- MSL1 up to 260°C peak reflow

Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)

Product Summary

V_{DS}	-100V
$R_{DS(on)}@10V$ typ	72mΩ
I_D	-18A

100% DVDS Tested
100% Avalanche Tested

CRTD680P10LQ


Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTD680P10LQ	680P10LQ	TO-252	Tape&reel	N/A	N/A	2500pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-100	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	-18 -80 -11	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	-73	A
Avalanche energy, single pulse ($I_D = -17A$, $R_g = 25\Omega$) ^[1]	E_{AS}	72	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	60	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)	T_{sold}	260	°C

Notes:1.EAS was tested at $T_j = 25^\circ\text{C}$, $L = 0.5mH$, $I_{AS} = -17A$, $V_{gs} = -10V$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat-spreader)	R_{thJC}	2.1	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	
Thermal resistance, junction – plastic case	R_{thJ-pc}	36	

Electrical Characteristic (at T_j = 25 °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 =-250uA
		-100	-	-	V	V _{GS} =0V, I _D =-1mA
Gate threshold voltage	V _{GS(th)}	-1	-2	-3	V	V _{DS} =V _{GS} ,I _D =-250uA
Zero gate voltage drain current	I _{DSS}	-	-	-1	μA	V _{DS} =-100V,V _{GS} =0V
		-	-	-100		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)}	-	72	90	mΩ	V _{GS} =-10V, I _D =-10A
			80	120		VGS=-4.5V, ID=-5A
Transconductance	g _{fs}	11	22	44	S	V _{DS} =-5V,I _D =-10A

Dynamic Characteristic

Input Capacitance	C _{iss}	1246	2491	4982	pF	V _{GS} =0V, V _{DS} =-50V, f=1MHz
Output Capacitance	C _{oss}	17	86	431		
Reverse Transfer Capacitance	C _{rss}	13	63	315		
Gate Total Charge	Q _G	27	40	61	nC	V _{GS} =-10V, V _{DS} =-50V, I _D =-10A, f=1MHz
Gate-Source charge	Q _{gs}	2	7	21		
Gate-Drain charge	Q _{gd}	3	9	18		
Turn-on delay time	t _{d(on)}	4	8	16	ns	V _{GS} =-10V, V _{DD} =-50V, R _{G_ext} =2.7Ω, I _d =-10A
Rise time	t _r	10	20	40		
Turn-off delay time	t _{d(off)}	65	97	145		
Fall time	t _f	28	43	64		
Gate resistance	R _G	-	11	25	Ω	V _{GS} =0V, V _{DS} =0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Diode continuous forward current	I _S	-	-	-18	A	T _C = 25°C
Diode pulse current	I _S pulse	-	-	-72	A	T _C = 25°C
Body Diode Forward Voltage	V _{SD}	-	-0.9	-1.3	V	V _{GS} =0V, I _{SD} =-10A
Body Diode Reverse Recovery Time	t _{rr}	18	35	70	ns	I _F =-10A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q _{rr}	31	61	123	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

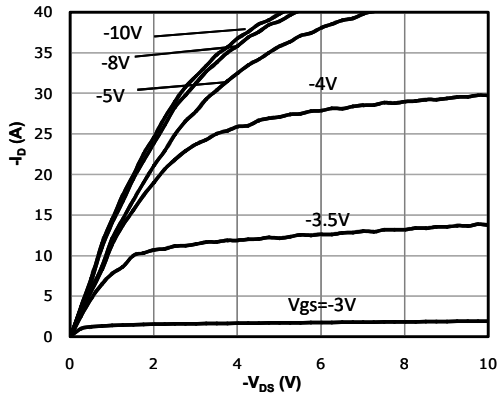


Fig 2: Transfer Characteristics

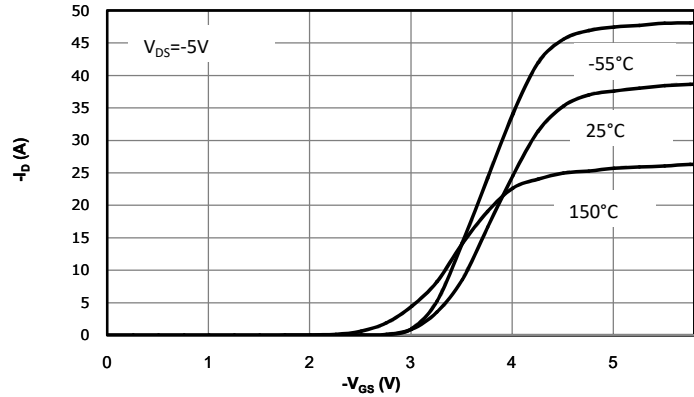


Fig 3: Rds(on) vs Drain Current and Gate Voltage

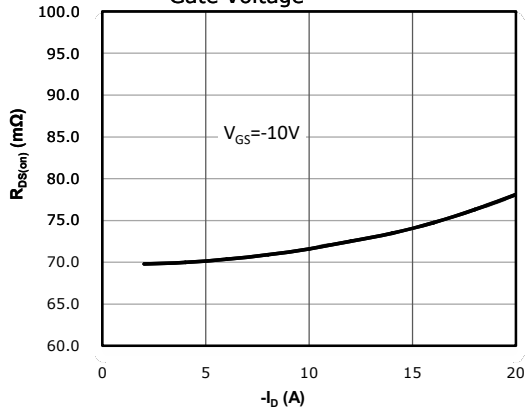


Fig 4: Rds(on) vs Gate Voltage

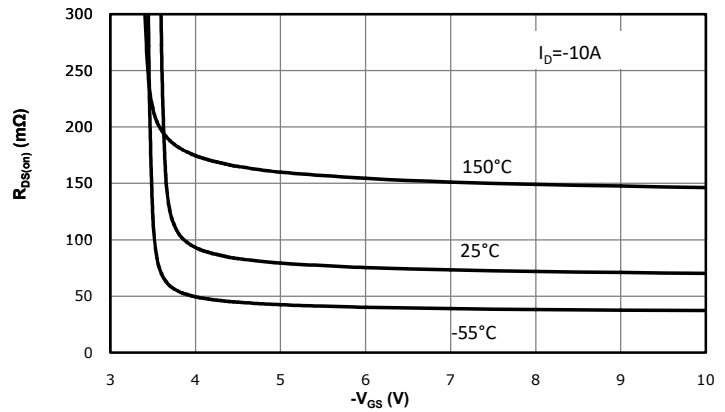


Fig 5: Rds(on) vs. Temperature

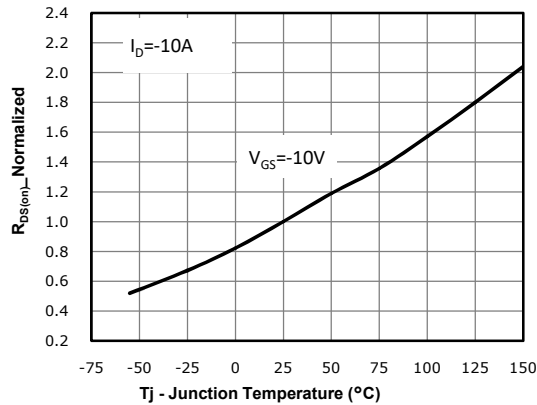


Fig 6: Vgs(th) vs. Temperature

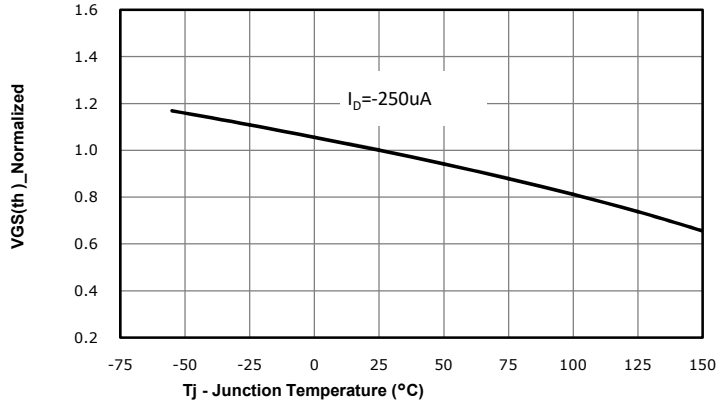


Fig 7: BVds vs. Temperature

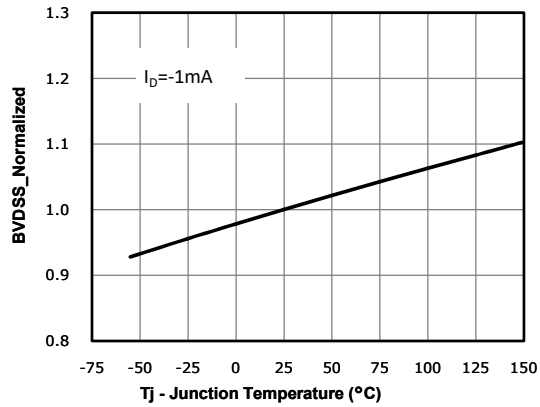


Fig 8: Capacitance Characteristics

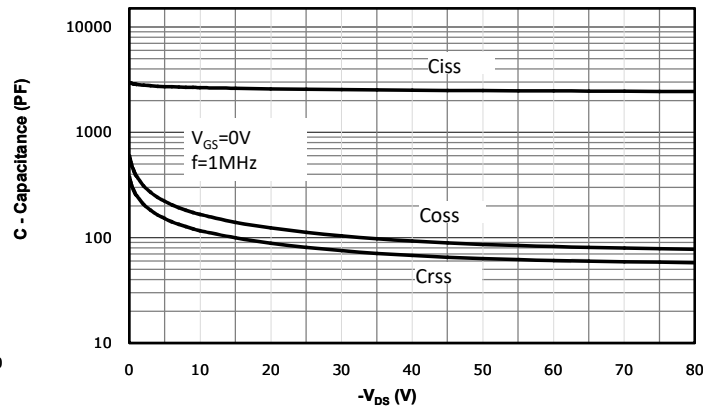


Fig 9: Gate Charge Characteristics

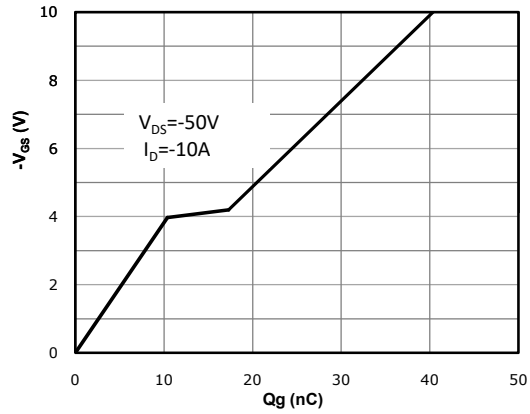


Fig 10: Body-diode Forward Characteristics

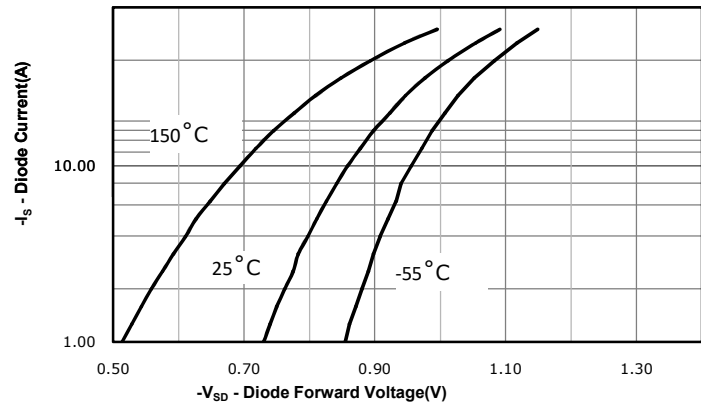


Fig 11: Power Dissipation

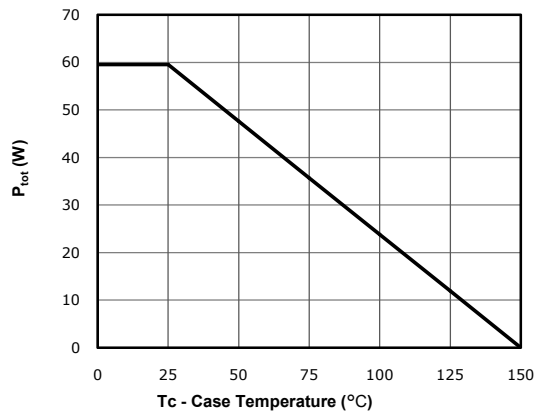


Fig 12: Drain Current Derating

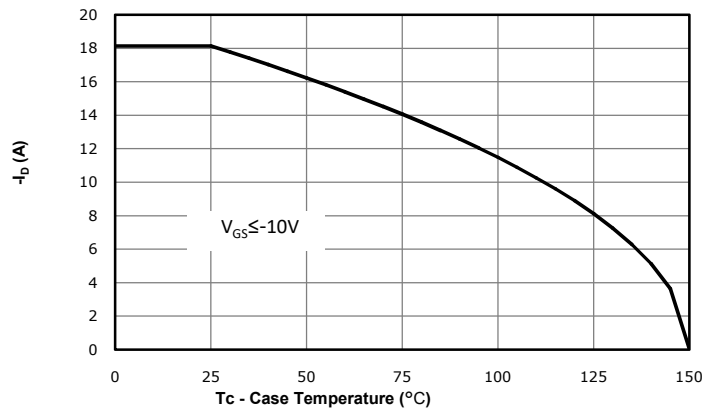


Fig 13: Safe Operating Area

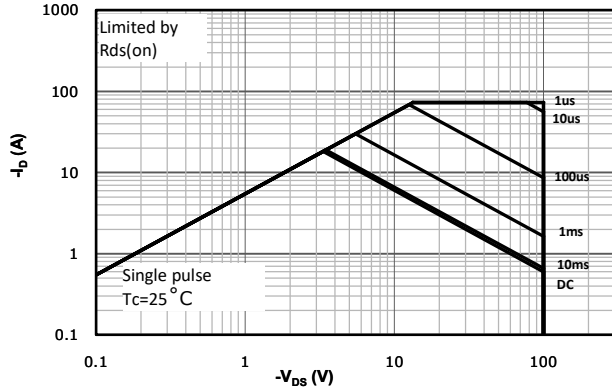
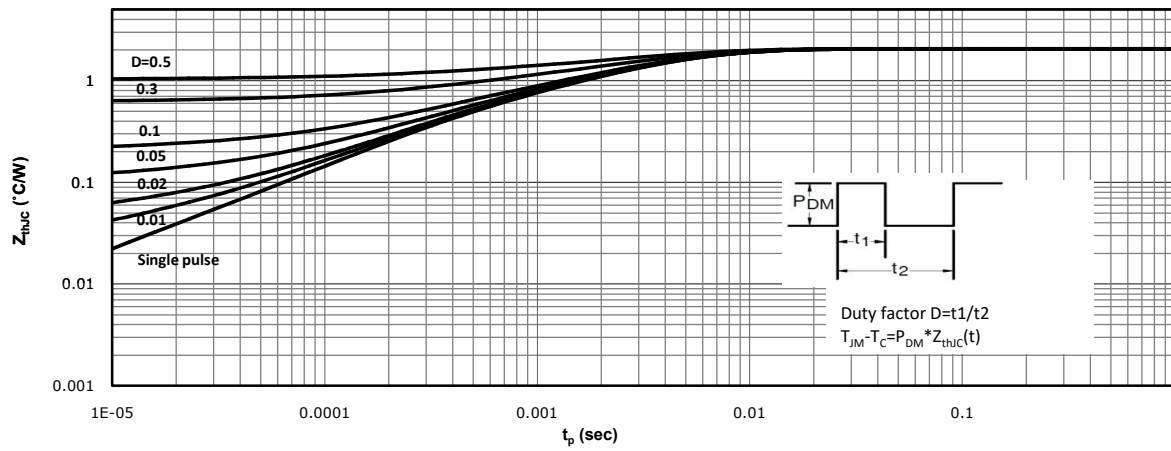
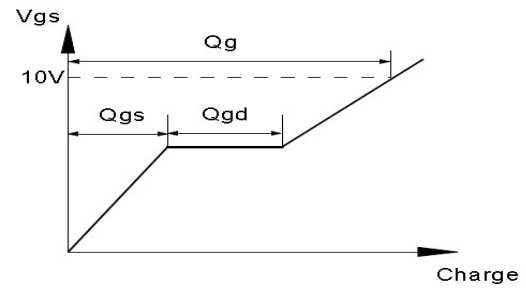
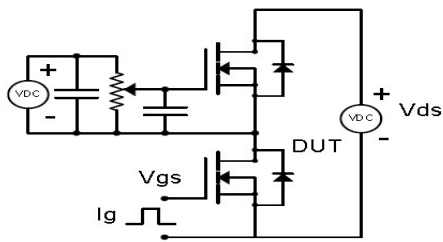


Fig 14: Max. Transient Thermal Impedance

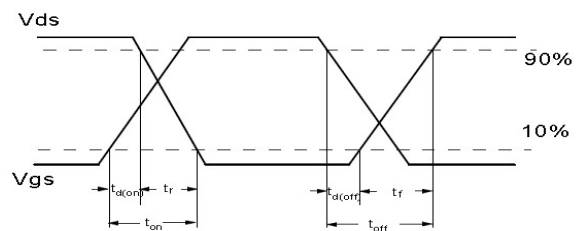
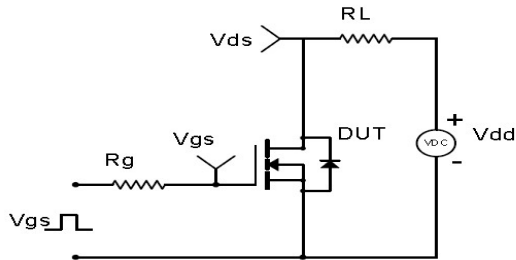


Test Circuit & Waveform

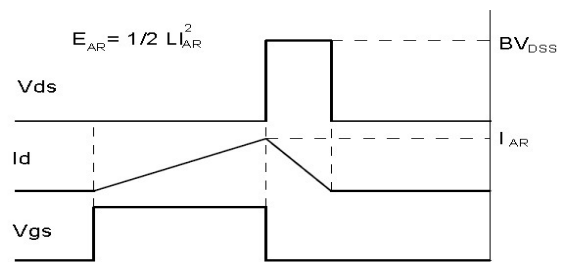
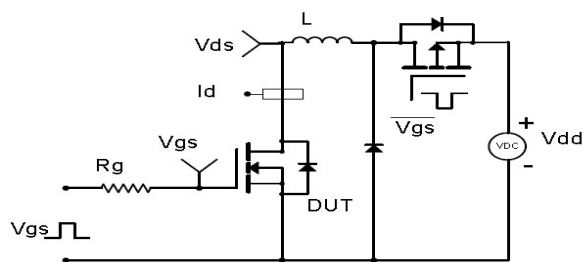
Gate Charge Test Circuit & Waveform



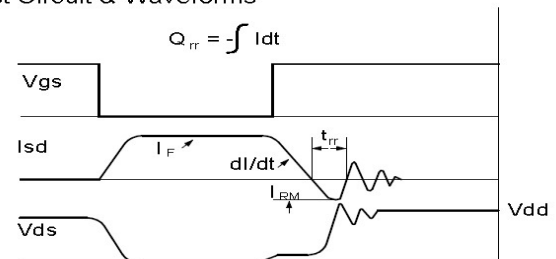
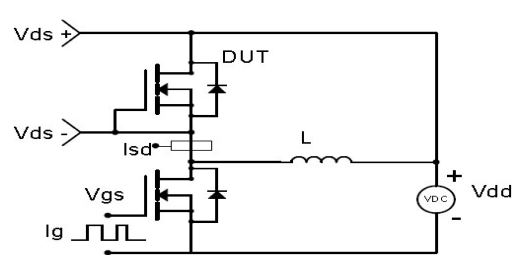
Resistive Switching Test Circuit & Waveforms



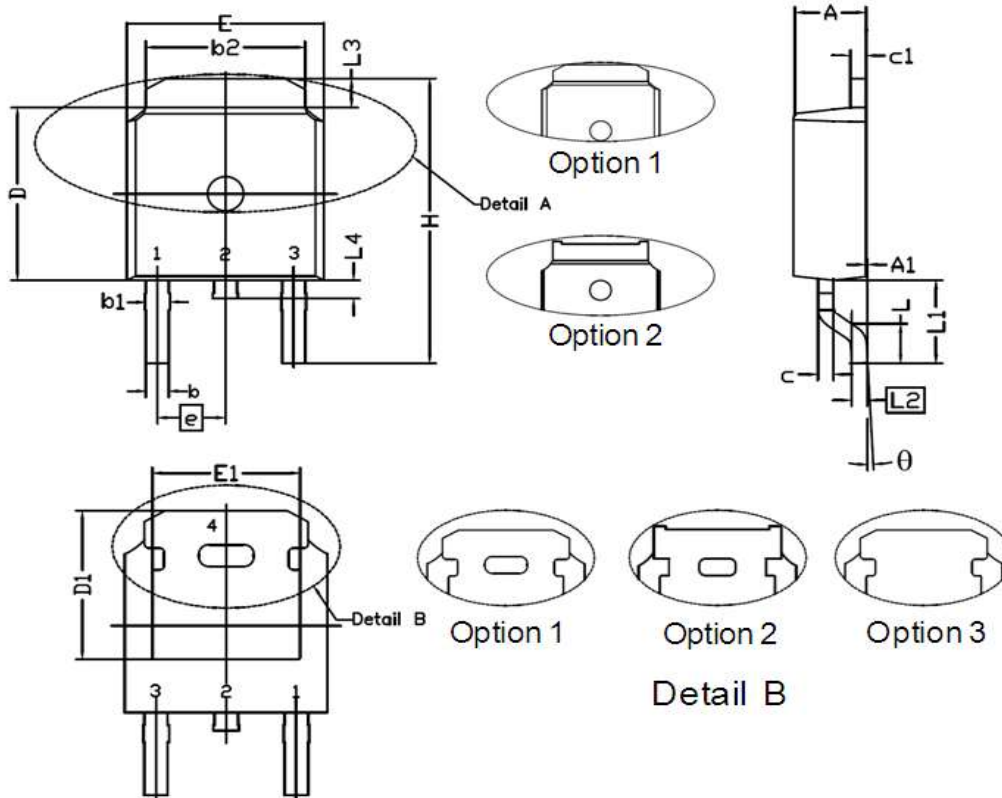
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-252



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	2.15	2.30	2.45
A1	0.00	0.07	0.15
b	0.60	0.76	0.91
b1	0.65	--	1.15
b2	5.00	5.33	5.50
c	0.45	0.50	0.61
c1	0.36	0.50	0.66
D	5.80	6.10	6.22
D1	5.21	5.572	5.922
e	2.29 BSC.		
E	6.30	6.50	6.73
E1	4.75	5.10	5.45
H	9.40	9.90	10.48
L	1.38	1.52	1.78
L1	2.92 REF		
L2	0.508 BSC.		
L3	0.72	1.01	1.35
L4	0.60	0.75	1.20
θ	0°	--	8°

Marking



NOTE:

XAAAAAAAA

X

—Assembly location code

AAAAAAA

—Assembly lot NO. last 7digits

Y

—Bin code

Revision History

Revision	Date	Major changes
1.0	2023/5/22	Release of preliminary 1.0 version
1.1	2023/6/25	Update Ciss/Coss/Crss spec
1.1	2023/7/25	Update POD 尺寸
2.0	2023/8/25	Update Marking
2.1	2023/9/21	Update Marking
2.2	2024/4/23	Update POD D1尺寸
2.3	2024/4/24	Add Is /Is pulse

Disclaimer

CRM reserves the right to change any product or information in this Specification at any time without prior notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics .The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as 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.