

Features

- Uses CRM(CQ) advanced SkyMOS2 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- AEC-Q101 Qualified

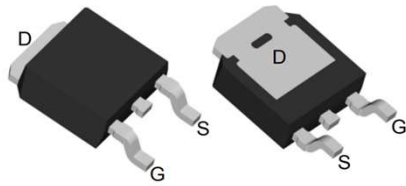
Product Summary

V_{DS}	40V
$R_{DS(on).typ}$	3.6mΩ
I_D	80A

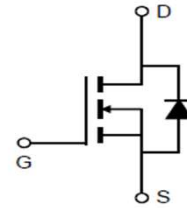
Applications

- DCDC Converter
- Switching applications
- UPS (Uninterruptible Power Supplies)

100% DVDS Tested
100% Avalanche Tested



CRSD041N04N2Z


Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSD041N04N2Z	041N04N2Z	TO-252	Tape&reel	N/A	N/A	2500pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	100 70	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\ pulse}$	320	A
Avalanche energy, single pulse ($I_{AS} = 21\text{A}$, $R_g = 50\Omega$) ^[1]	E_{AS}	66	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	75	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	°C

※. Notes:

EAS is tested at starting $T_j = 25^\circ\text{C}$, $L = 0.3\text{mH}$, $I_{AS} = 21\text{A}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat spreader)	R_{thJC}	2.0	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	130	

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}	40	-	-	V	$V_{GS}=0V, I_D=250\mu A$
		40	-	-	V	$V_{GS}=0V, I_D=1mA$
Gate threshold voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1 100	μA	$V_{DS}=40V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	3.6	4.5	mΩ	$V_{GS}=10V, I_D=40A$ $T_j=25^{\circ}\text{C}$
Transconductance	g_{fs}	-	85	-	S	$V_{DS}=5V, I_D=40A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	1850	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1MHz$
Output Capacitance	C_{oss}	-	600	-		
Reverse Transfer Capacitance	C_{rss}	-	24	-		
Gate Total Charge	Q_G	-	26	-	nC	$V_{GS}=10V, V_{DS}=20V, I_D=40A, f=1MHz$
Gate-Source charge	Q_{gs}	-	12	-		
Gate-Drain charge	Q_{gd}	-	3	-		
Turn-on delay time	$t_{d(on)}$	-	11	-	ns	$V_{GS}=10V, V_{DD}=20V, R_{G_ext}=3\Omega, I_D=40A$
Rise time	t_r	-	63	-		
Turn-off delay time	$t_{d(off)}$	-	24	-		
Fall time	t_f	-	10	-		
Gate resistance	R_G	-	2.7	-	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	-	-	80	A	$T_C = 25^{\circ}\text{C}$
Diode pulse current	I_S pulse	-	-	320	A	$T_C = 25^{\circ}\text{C}$
Body Diode Forward Voltage	V_{SD}	-	0.9	1.4	V	$V_{GS}=0\text{V}, I_{SD}=40\text{A}$
Body Diode Reverse Recovery Time	t_{rr}	-	30	-	ns	$I_F=40\text{A}, dI/dt=100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{rr}	-	13	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

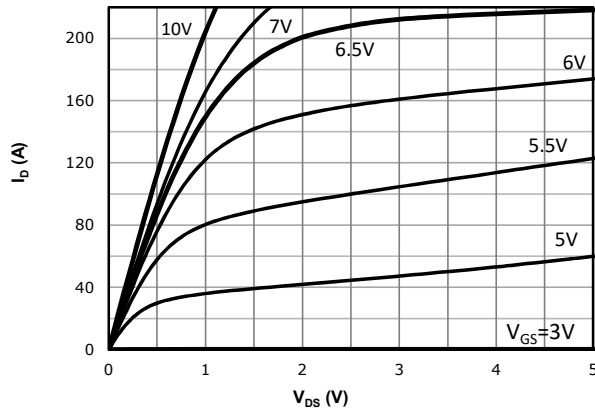


Fig 2: Transfer Characteristics

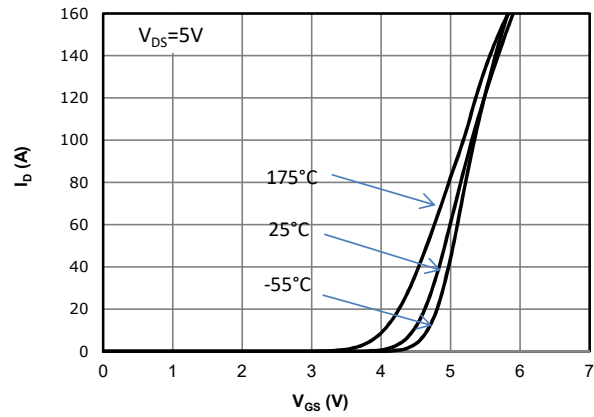


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

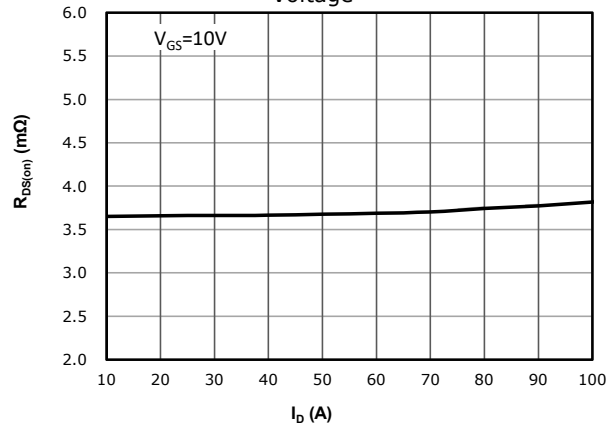


Fig 4: $R_{DS(on)}$ vs Gate Voltage

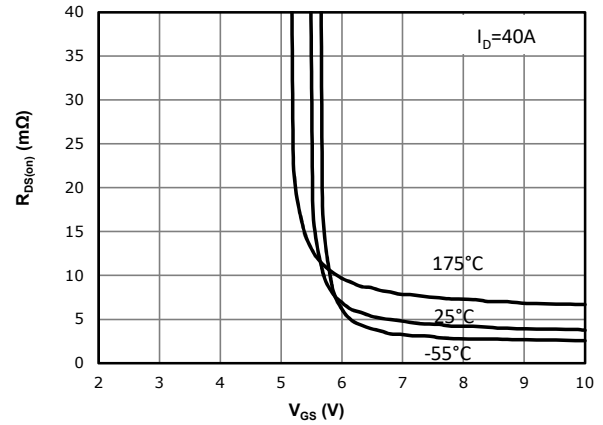


Fig 5: $R_{DS(on)}$ vs. Temperature

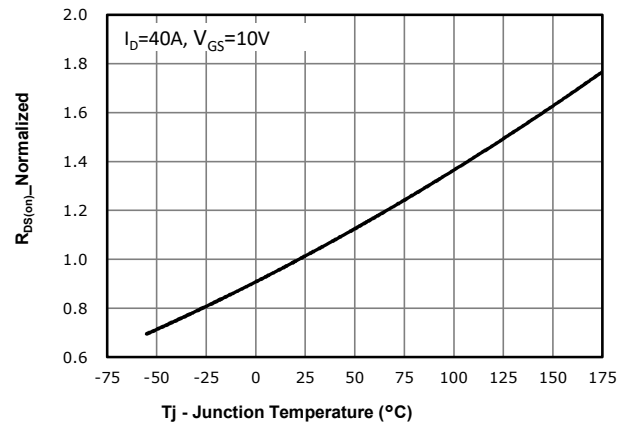


Fig 6: $V_{GS(th)}$ vs. Temperature

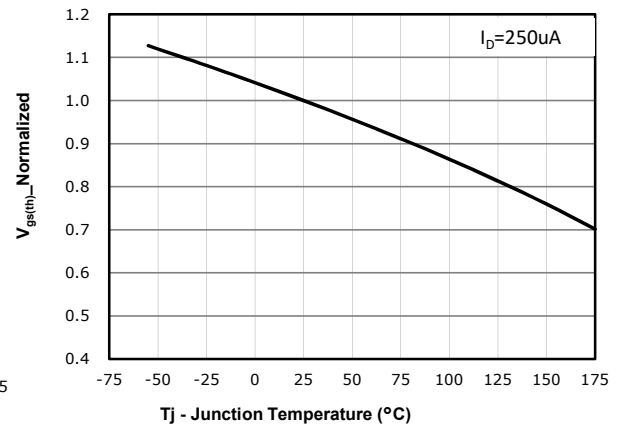


Fig 7: BVdss vs. Temperature

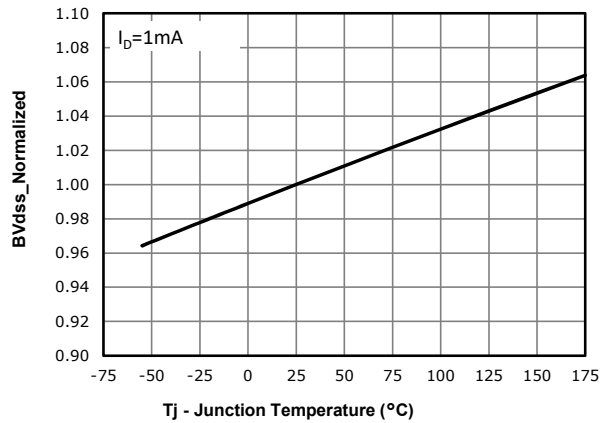


Fig 8: Capacitance Characteristics

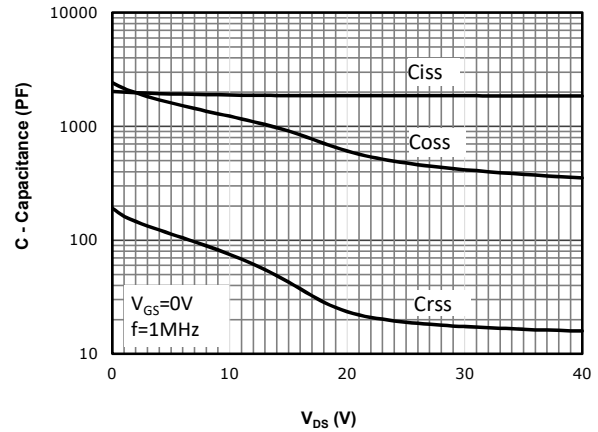


Fig 9: Gate Charge Characteristics

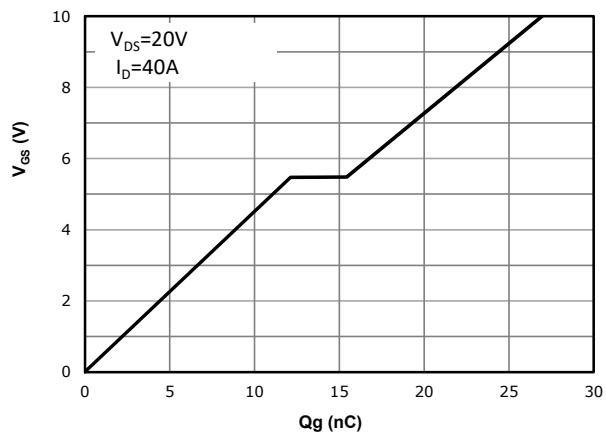


Fig 10: Body-diode Forward Characteristics

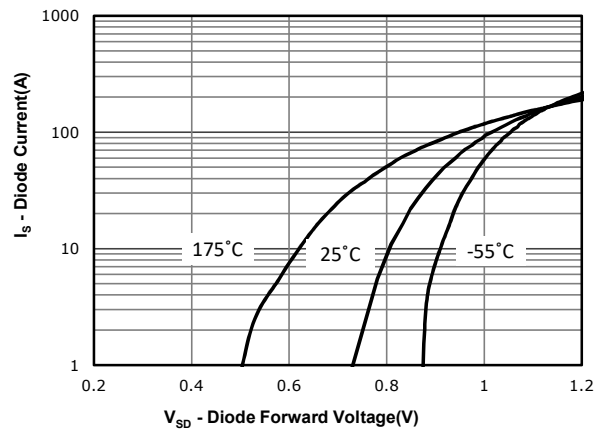


Fig 11: Power Dissipation

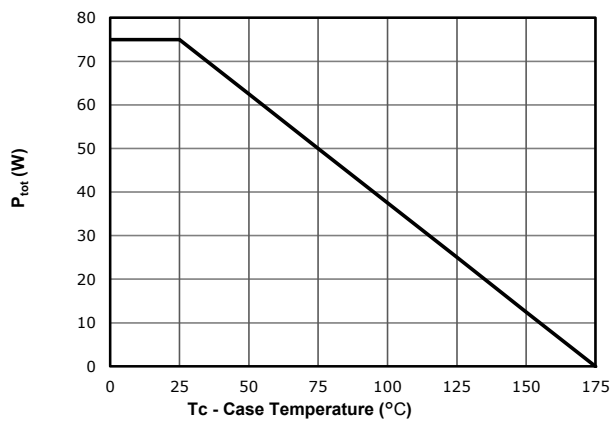


Fig 12: Drain Current Derating

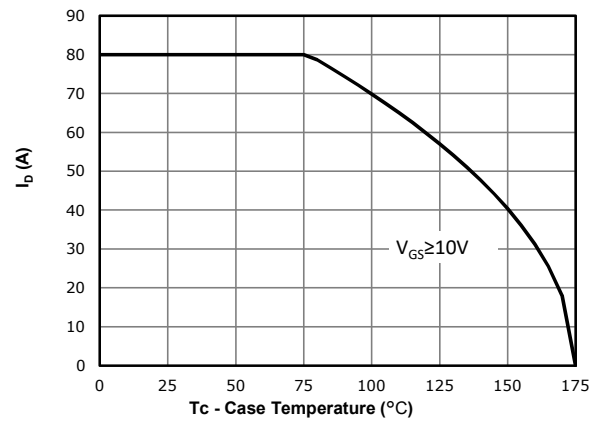


Fig 13: Safe Operating Area

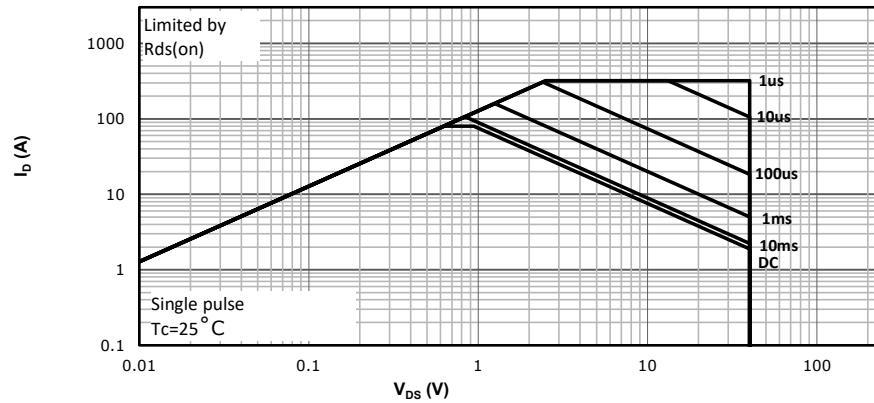
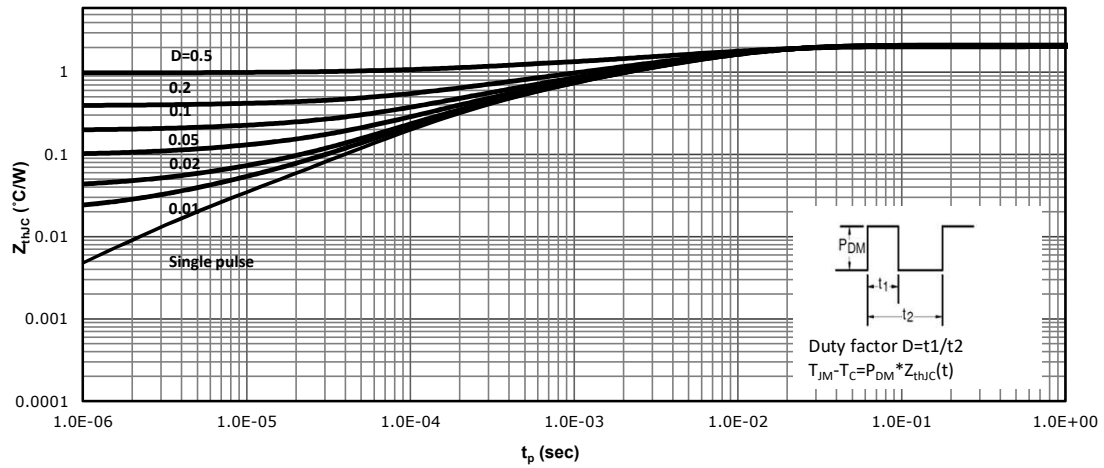
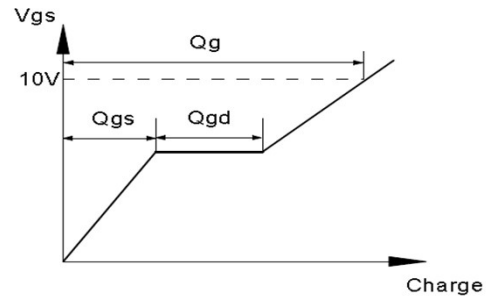
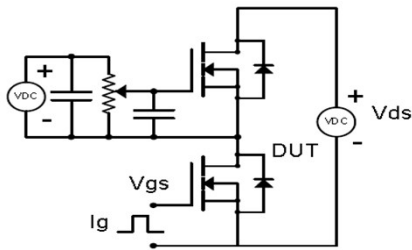


Fig 14: Max. Transient Thermal Impedance

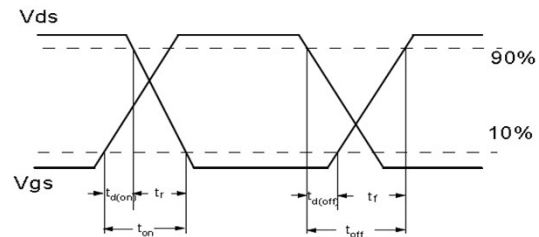
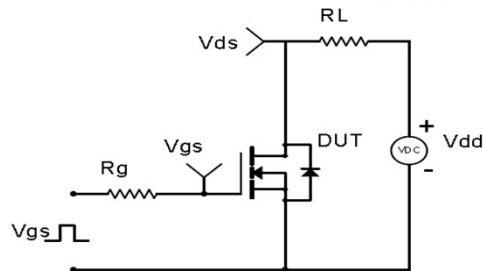


Test Circuit & Waveform

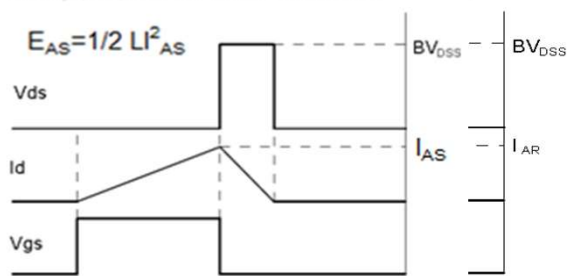
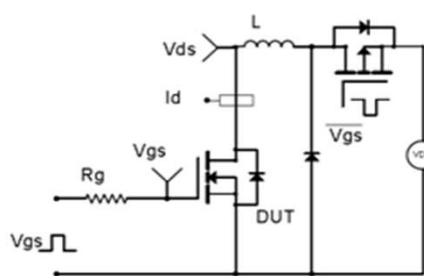
Gate Charge Test Circuit & Waveform



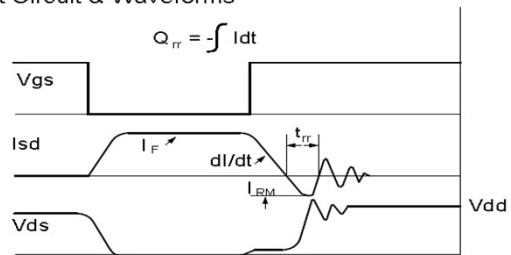
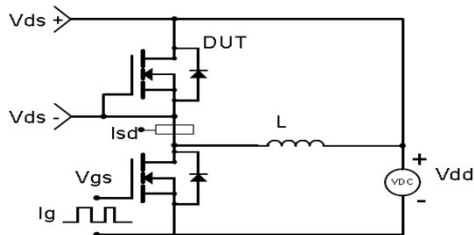
Resistive Switching Test Circuit & Waveforms



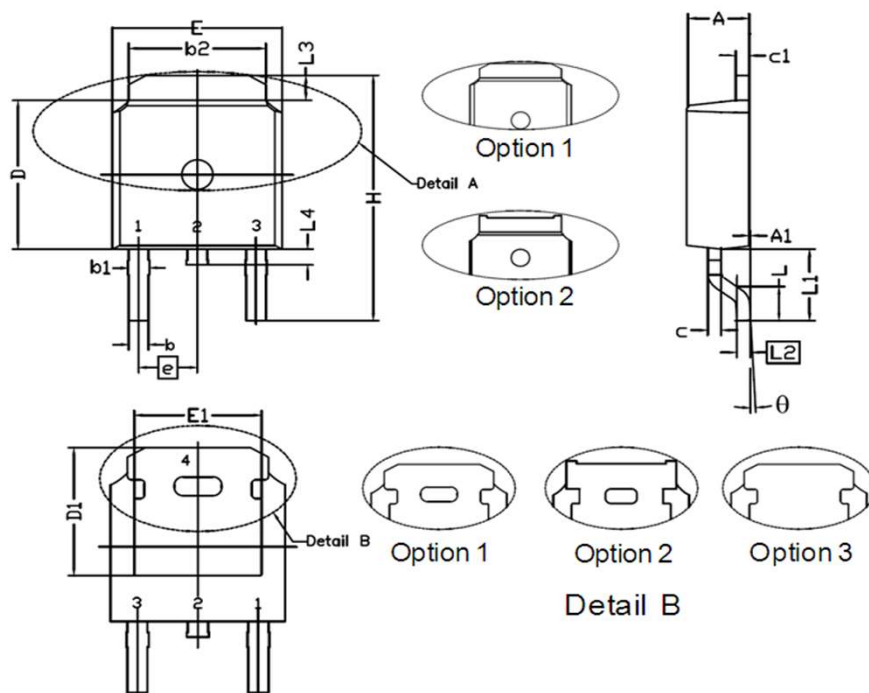
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



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	5.57	5.92
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-Y

X

—Assembly location code

AAAAAAA

—Assembly lot NO. last 7digits

Y

—Bin code

Revision History

Revision	Date	Major changes
1.0	2023/8/22	Release of preliminary version.
1.1	2024/9/11	Update Rdson SPEC.
2.0	2025/3/7	1.Update Package name. 2.Delete Dynamic Characteristic parameters spec. 3.Update Fig5.

Disclaimer

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

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