

Features

- Uses CRM(CQ) advanced SkyMOS4 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

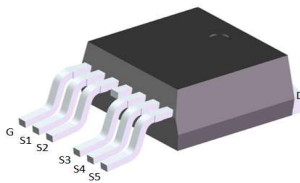
Applications

- DCDC Converter
- Switching applications

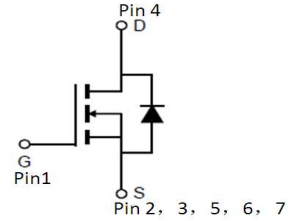
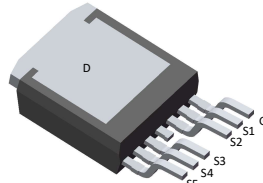
Product Summary

V_{DS}	100V
$R_{DS(on).typ}$	1.6mΩ
I_D	250A

100% DVDS Tested
100% Avalanche Tested



CRSG022N10N4Q



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRSG022N10N4Q	CRSG022N10N4Q	TO-263-6L	Tape	N/A	N/A	800pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	100	V
Continuous drain current	I_D	270	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		250	
$T_C = 25^\circ\text{C}$ (Package limit)		194	
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\ pulse}$	1000	A
Avalanche energy, single pulse ($I_D = 66\text{A}$, $R_g = 25\Omega$) ^[1]	E_{AS}	1089	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	321	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 $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $I_{AS} = 66\text{A}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case (junction-heat spreader)	R_{thJC}	0.47	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	
Thermal resistance, junction – plastic case	R_{thJ-pc}	26	

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	$V_{GS}=0V, I_D=250\mu A$
		100	-	-	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	μA	$V_{DS}=100V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$ $T_j=125^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.6	2.2	mΩ	$V_{GS}=10V, I_D=100A$
Transconductance	g_{fs}	148	295	590	S	$V_{DS}=5V, I_D=100A$

Dynamic Characteristic

Input Capacitance	C_{iss}	5538	11075	22150	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
Output Capacitance	C_{oss}	785	1569	3138		
Reverse Transfer Capacitance	C_{rss}	-	20	100		
Gate Total Charge	Q_G	100	150	225	nC	$V_{GS}=10V, V_{DS}=50V, I_D=100A, f=1MHz$
Gate-Source charge	Q_{gs}	23	45	90		
Gate-Drain charge	Q_{gd}	13	25	51		
Turn-on delay time	$t_{d(on)}$	13	26	51	ns	$V_{GS}=10V, V_{DD}=50V, R_{G_ext}=3\Omega$
Rise time	t_r	75	112	169		
Turn-off delay time	$t_{d(off)}$	54	81	122		
Fall time	t_f	75	112	169		
Gate resistance	R_G	-	1.8	3	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}	-	0.95	1.4	V	$V_{GS}=0V, I_{SD}=100A$
Body Diode Reverse Recovery Time	t_{rr}	49	98	196	ns	$I_F=100A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	125	249	498	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

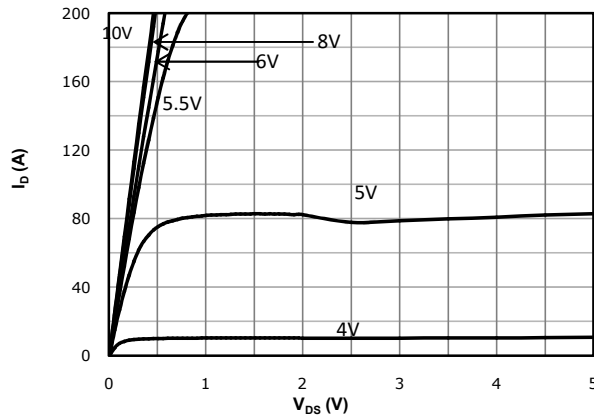


Fig 2: Transfer Characteristics

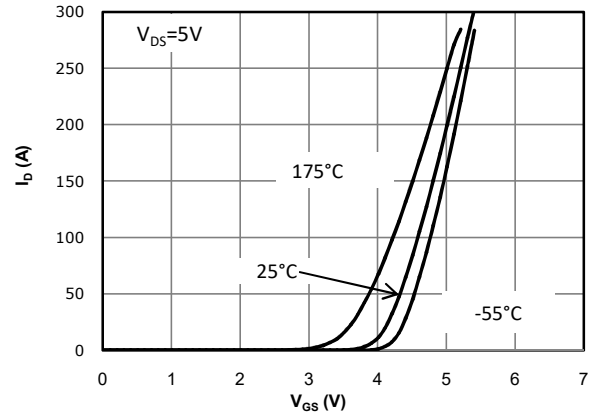


Fig 3: Rds(on) vs Drain Current and Gate Voltage

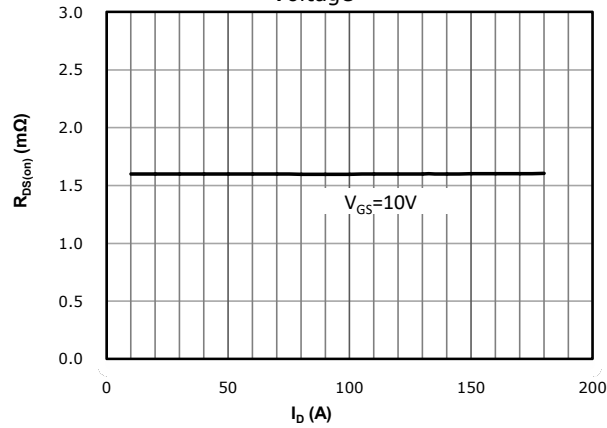


Fig 4: Rds(on) vs Gate Voltage

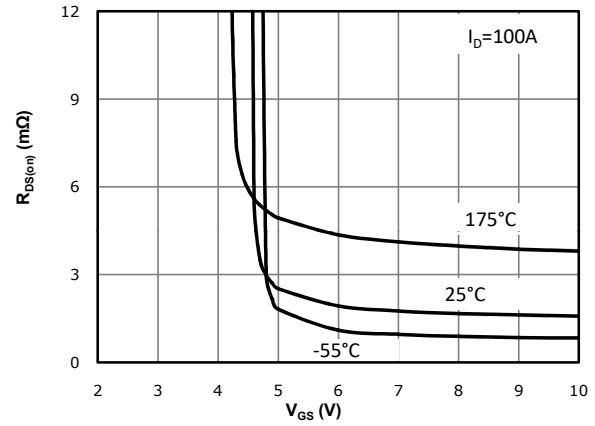


Fig 5: Rds(on) vs. Temperature

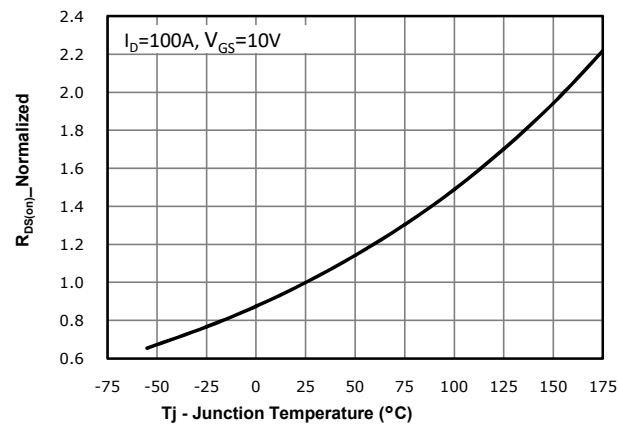


Fig 6: Vgs(th) vs. Temperature

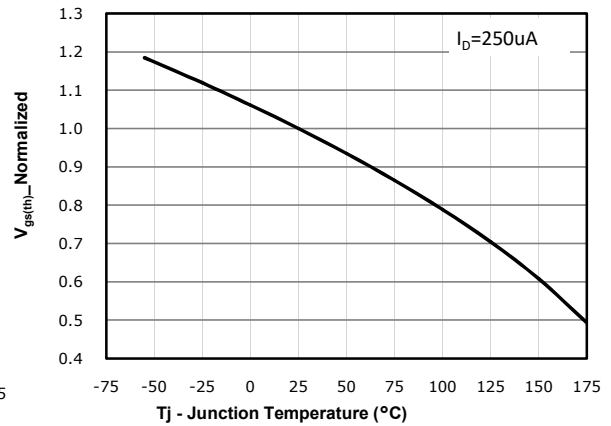


Fig 7: BVdss vs. Temperature

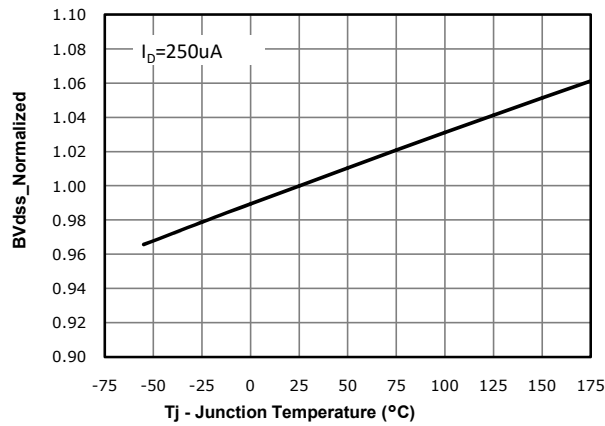


Fig 8: Capacitance Characteristics

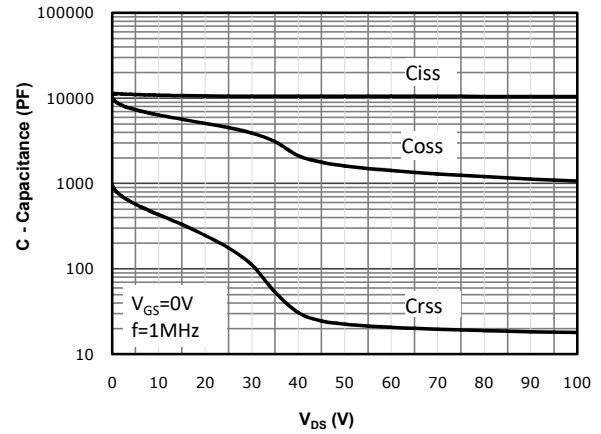


Fig 9: Gate Charge Characteristics

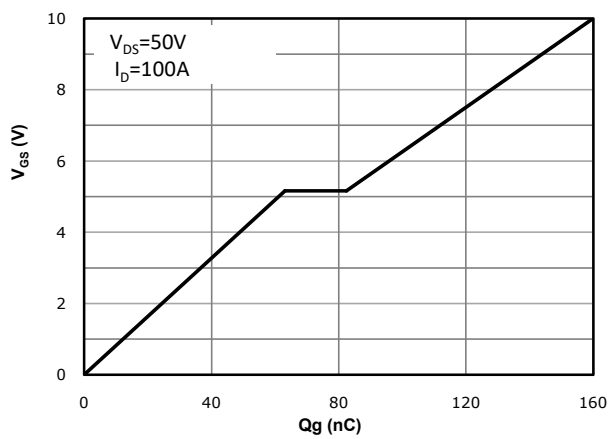


Fig 10: Body-diode Forward Characteristics

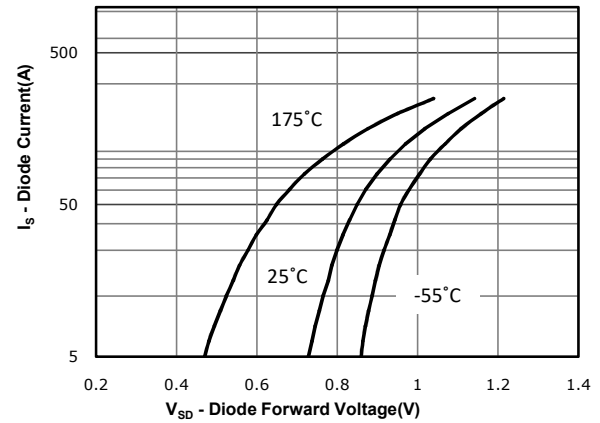


Fig 11: Power Dissipation

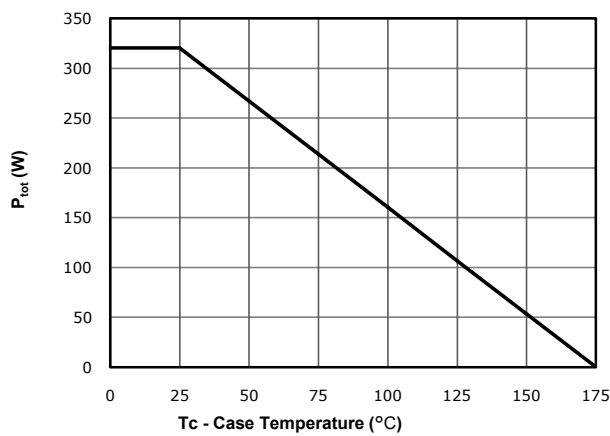


Fig 12: Drain Current Derating

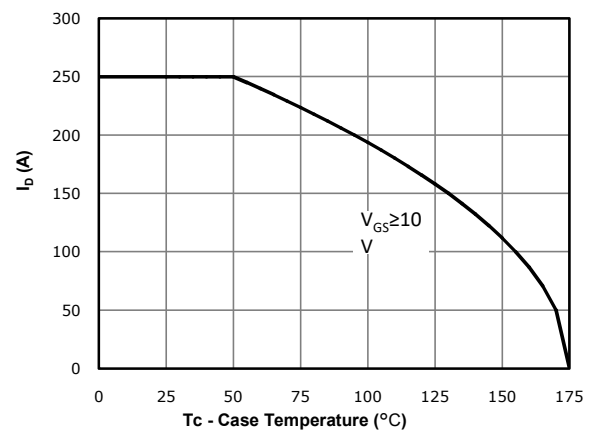


Fig 13: Safe Operating Area

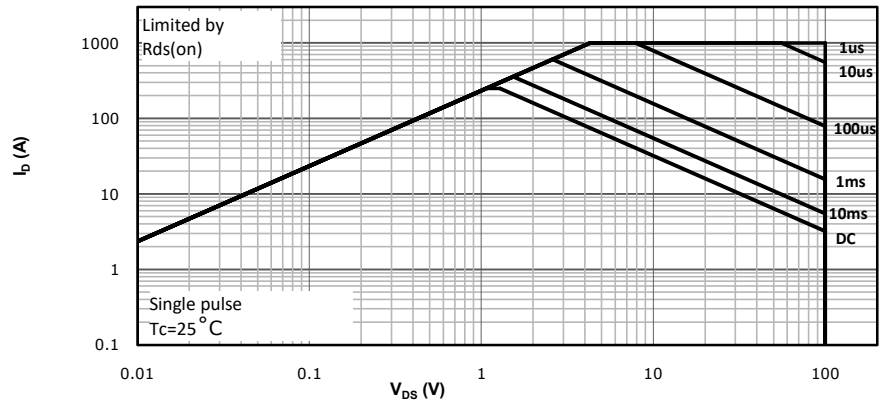
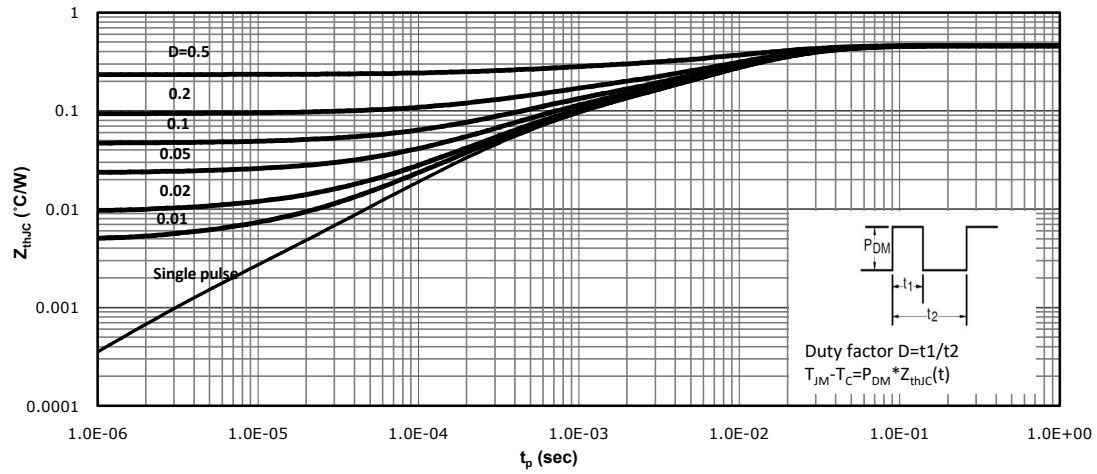
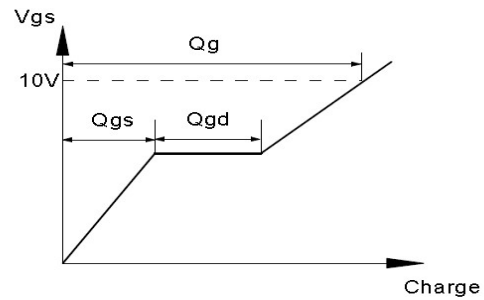
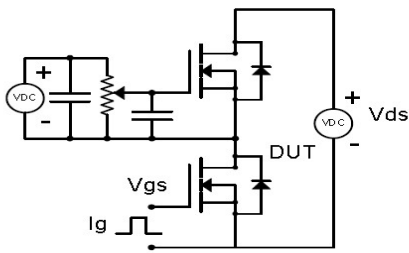


Fig 14: Max. Transient Thermal Impedance

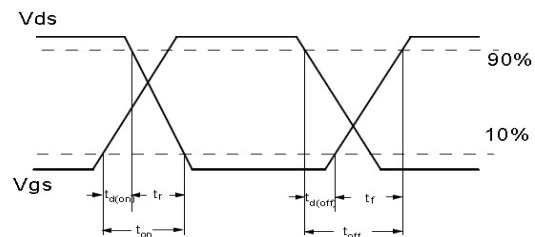
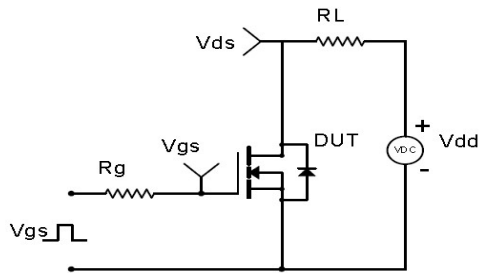


Test Circuit & Waveform

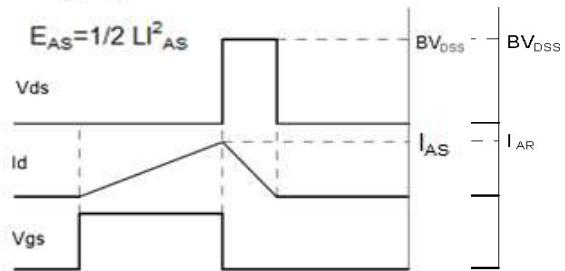
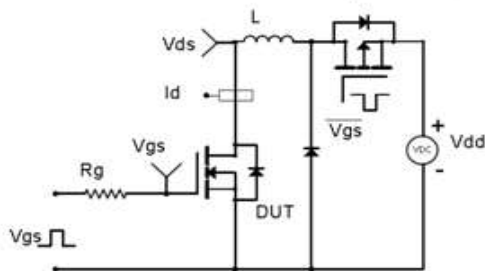
Gate Charge Test Circuit & Waveform



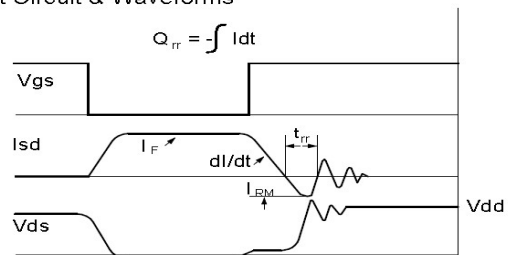
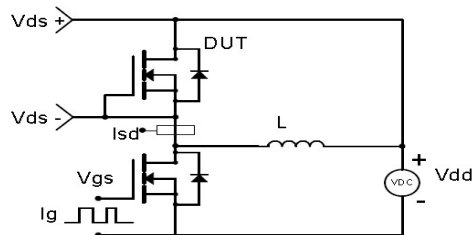
Resistive Switching Test Circuit & Waveforms

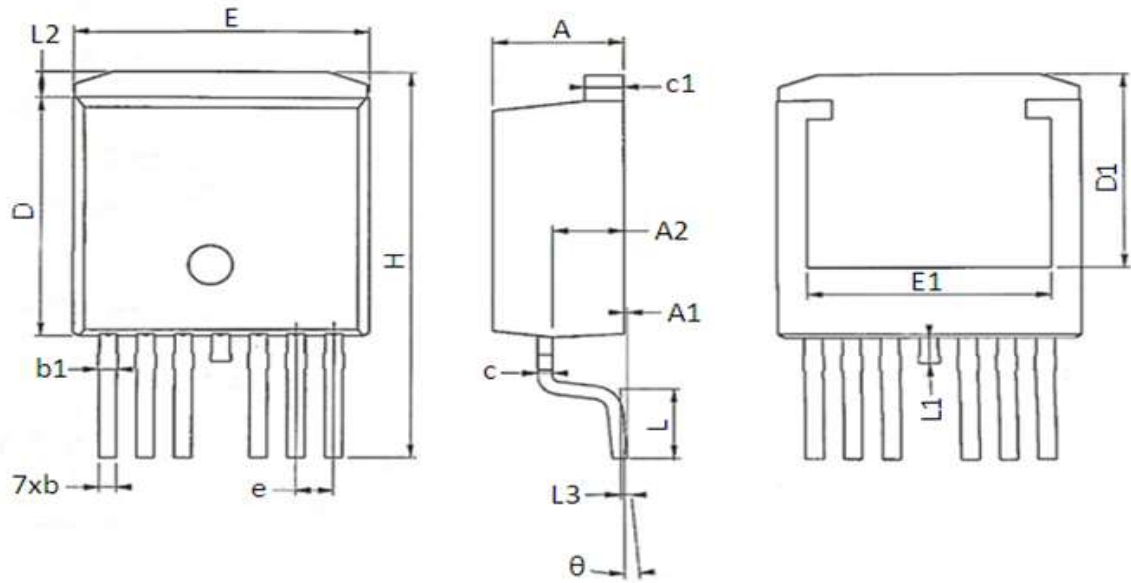


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO263-6L


Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
A2	2.25	--	2.70
b	0.50	0.60	0.70
b1	0.50	--	0.90
c	0.40	0.50	0.60
c1	1.15	1.27	1.40
D	8.82	8.92	9.45
D1	7.10	7.65	7.95
e	1.27 BSC		
E	9.80	10.18	10.36
E1	7.95	8.35	8.65
H	14.61	15.00	15.25
L	1.78	2.32	3.00
L1	0.85	1.20	1.60
L2	0.80	1.36	1.60
L3	0.254 BSC		
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	2023/4/18	draft version.
1.1	2023/5/22	Release of preliminary version.
1.2	2023/6/25	Update Ciss/Coss /Crss/RthJA spec.
2.0	2023/8/25	Update MARKING
2.1	2023/8/31	Update MARKING

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