CRPQ090NE5NZ-G

Planar N-MOSFET 55V, 7.6mΩ, 135A

Features

- Uses CRM advanced Planar technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- AEC-Q101 Qualified

Applications

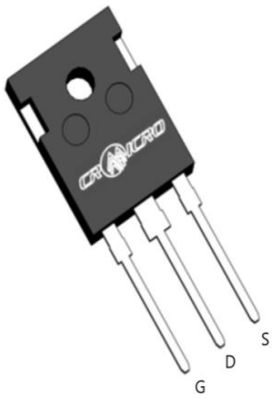
- Motor control and drive
- Power switch circuit of adaptor and charger

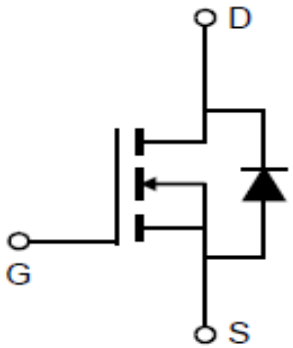
Product Summary

V_{DS}	55V
$R_{DS(on)}$ typ.	7.6mΩ
I_D (Silicon limit)	135A

100% DVDS Tested

100% Avalanche Tested





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRPQ090NE5NZ-G	CRPQ090NE5NZ	TO-247	Tube	N/A	N/A	25pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	55	V
Continuous drain current T_C = 25°C (Silicon limit)[a1] T_C = 25°C (Package limit)[a1] T_C = 100°C (Silicon limit)	I_D	 135 120 96	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	480	A
Avalanche energy, single pulse (L=0.5mH)	E_{AS}	1806	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation (T_C = 25°C)	P_{tot}	272.7	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

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Thermal Resistance

Parameter	Symbol	Typ	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	-	0.55	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}[a2]	-	62.5	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	55	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2.2	2.7	3.2	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=55V, V_{GS}=0V T_j=25°C
		-	-	100		T_j=125°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$				mΩ	T_j=25°C
		-	7.6	9.5		V_{GS}=10V, I_D=62A
Transconductance	g_{fs}	-	67.9	-	S	V_{DS}=5V, I_D=62A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	3342	-	pF	VGS=0V, VDS=30V f=1MHz
Output Capacitance	C_{oss}	-	808	-		
Reverse Transfer Capacitance	C_{rss}	-	48	-		
Gate Total Charge	Q_G	-	63.2	-	nC	VGS=10V, VDS=30V ID=75A
Gate-Source charge	Q_{gs}	-	16.7	-		
Gate-Drain charge	Q_{gd}	-	19.4	-		
Turn-on delay time	$t_{d(on)}$	-	25.2	-	ns	V_{GS}=10V, VDS=30V RG=4.7Ω, ID=75A
Rise time	t_r	-	9.0	-		
Turn-off delay time	$t_{d(off)}$	-	51.6	-		
Fall time	t_f	-	23.8	-		
Gate resistance	R_G	-	2.7	-	Ω	V_{GS}=0V, V_{DS}=0V f=1MHz

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Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-	1.2	V	V_{GS}=0V, I_{SD}=62A
Body Diode Continuous Forward Current	I_S	-	-	120	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	71.9	-	ns	I_F=75A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	180.3	-	nC	

a1：Calculated continuous current based on maximum allowable junction temperature. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.
a2：The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

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Typical Performance Characteristics

Fig 1: Output Characteristics

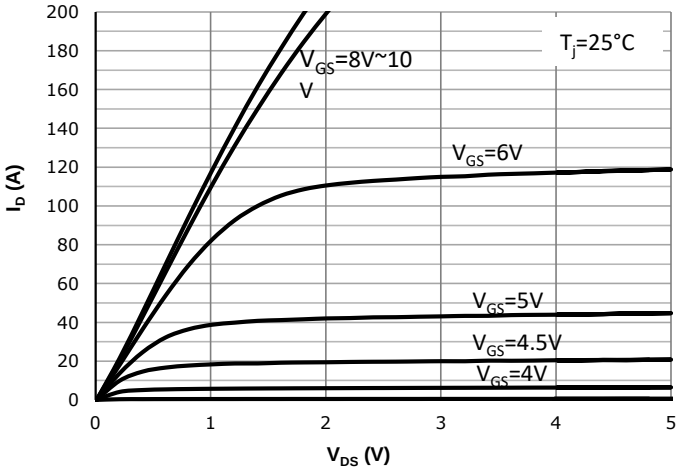

Fig 2: Transfer Characteristics

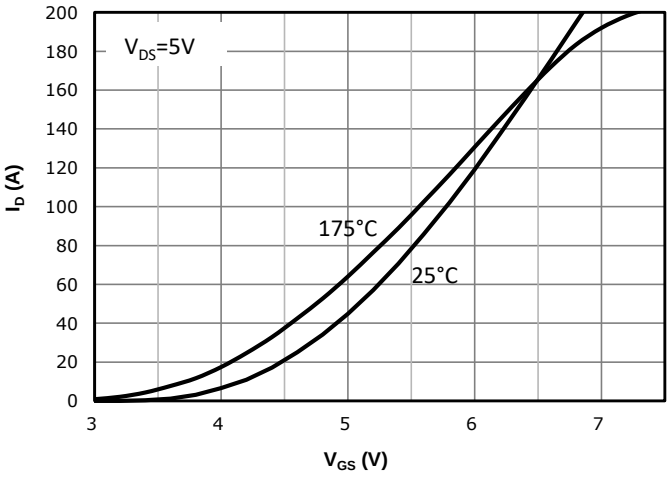

Fig 3: Rds(on) vs Drain Current and Gate Voltage

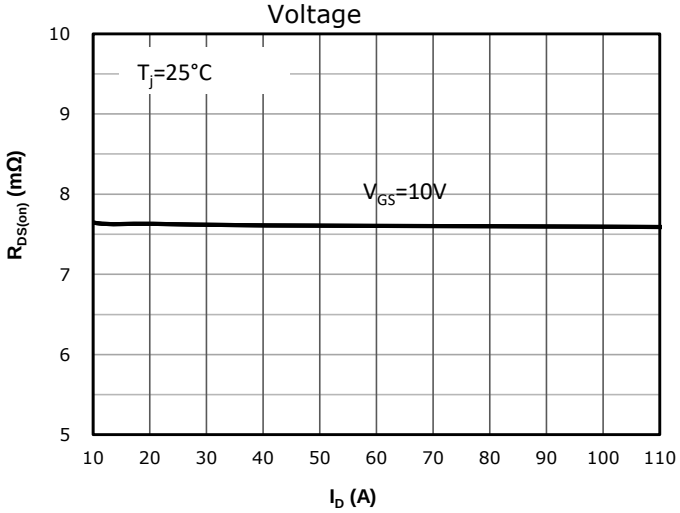

Fig 4: Rds(on) vs Gate Voltage

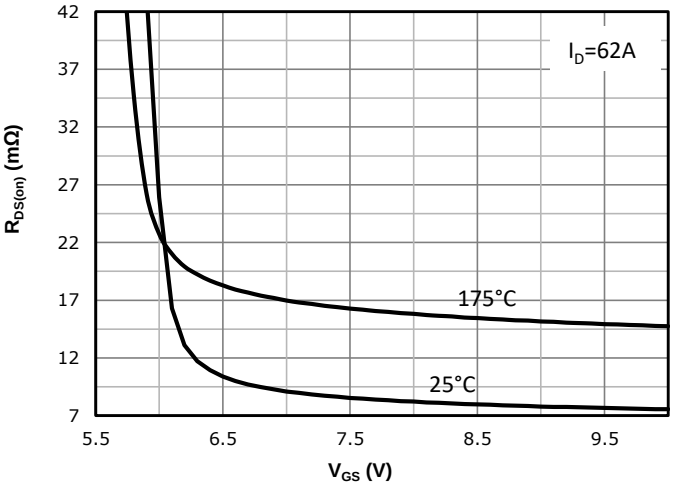

Fig 5: Rds(on) vs. Temperature

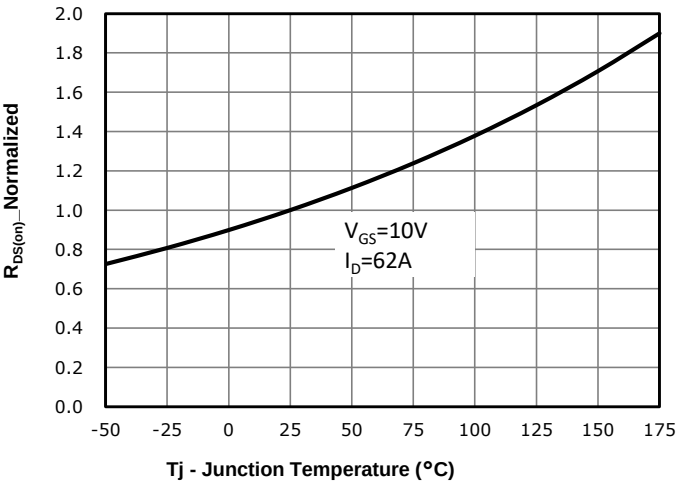

Fig 6: Vgs(th) vs. Temperature

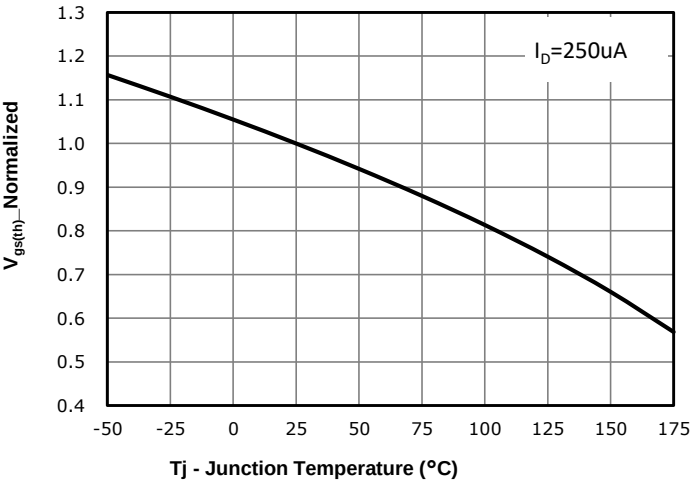

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Fig 7: BVdss vs. Temperature

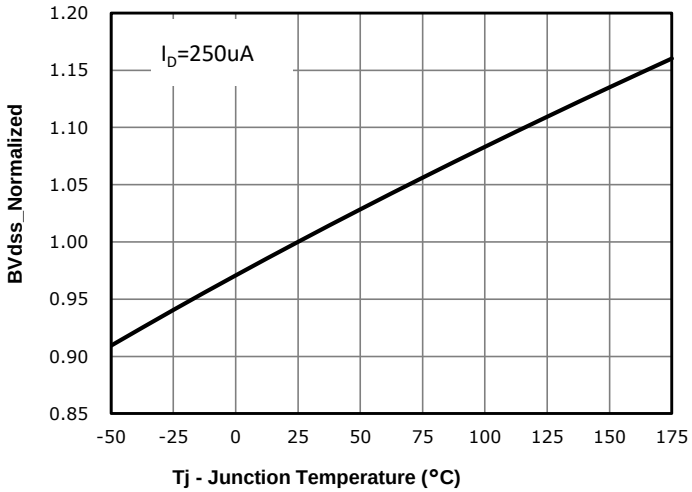

Fig 8: Body-diode Forward Characteristics

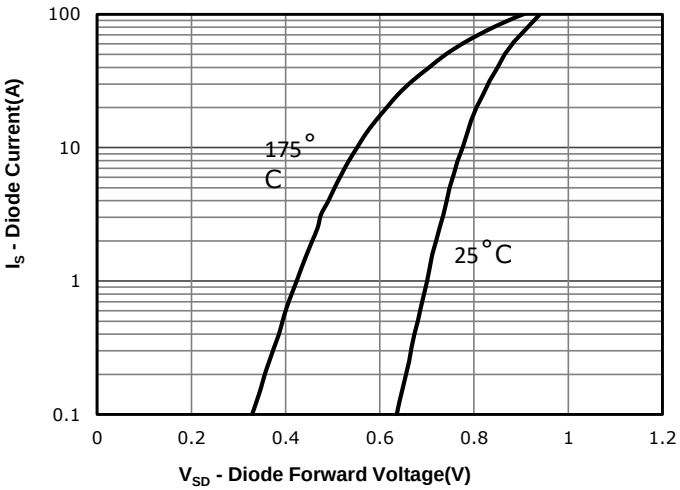

Fig 9: Gate Charge Characteristics

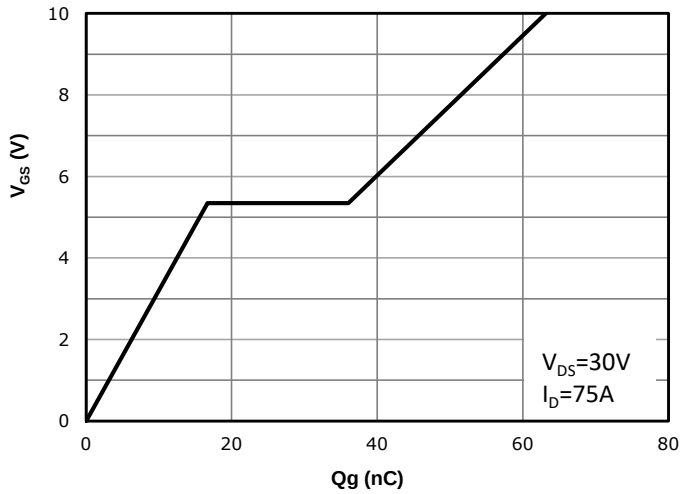

Fig 10: Capacitance Characteristics

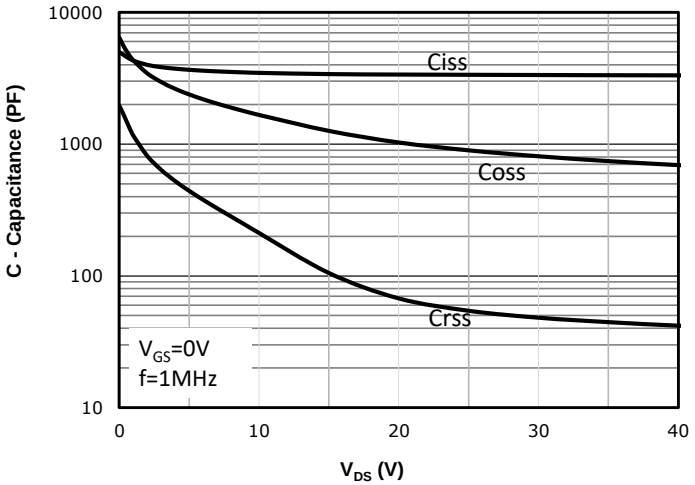

Fig 11: Drain Current Derating

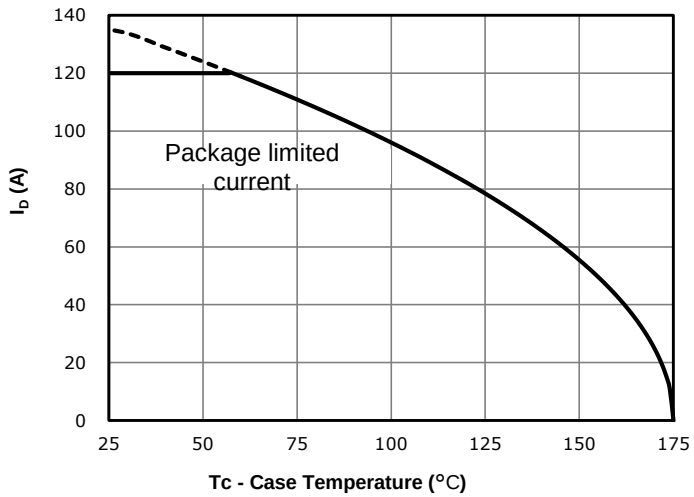

Fig 12: Power Dissipation

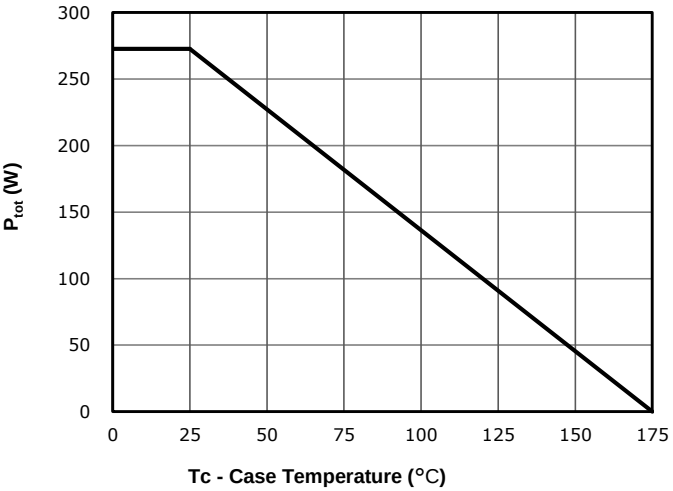

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Fig 13: Safe Operating Area

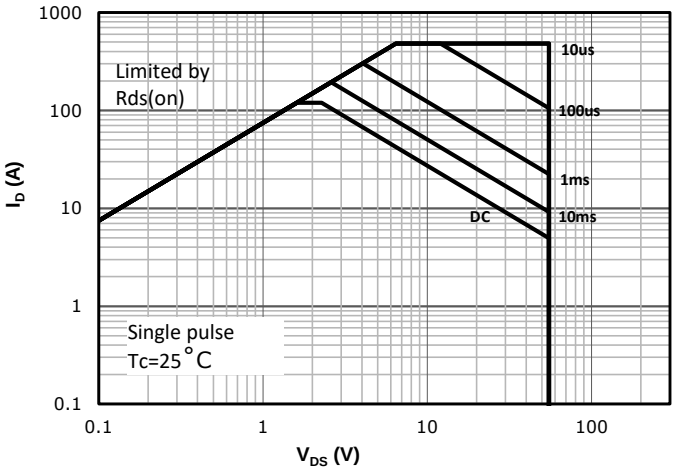
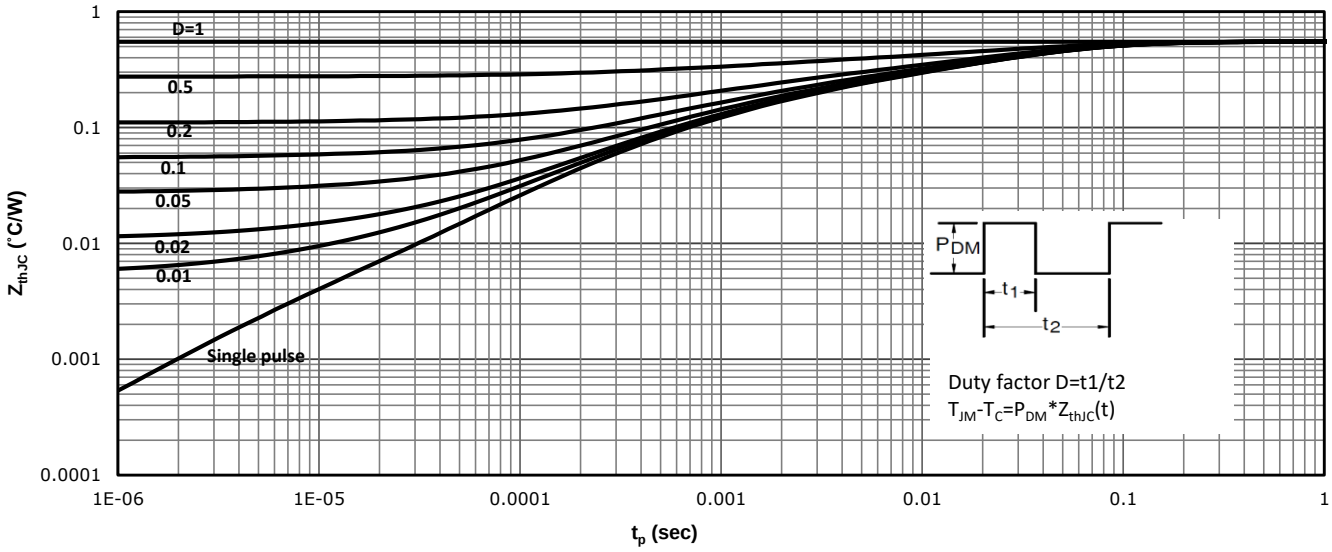


Fig 14: Max. Transient Thermal Impedance



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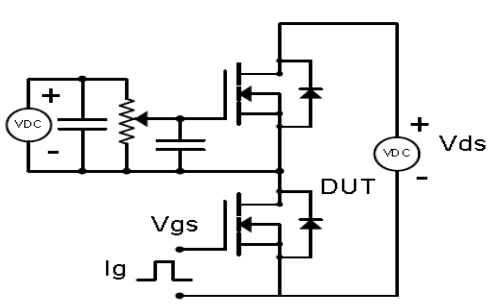
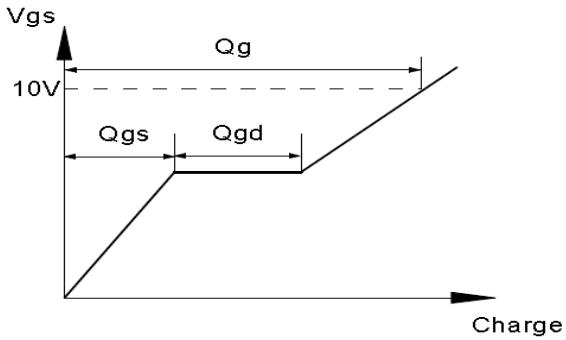
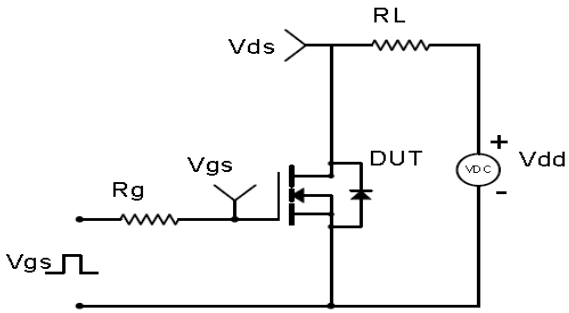
Test Circuit & Waveform

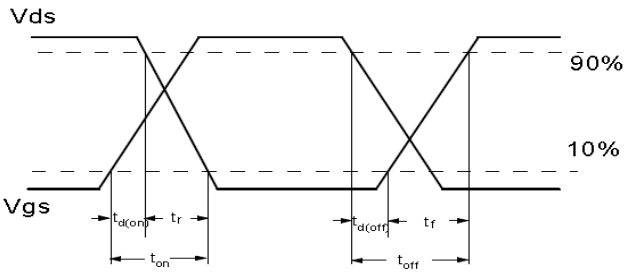
Gate Charge Test Circuit & Waveform



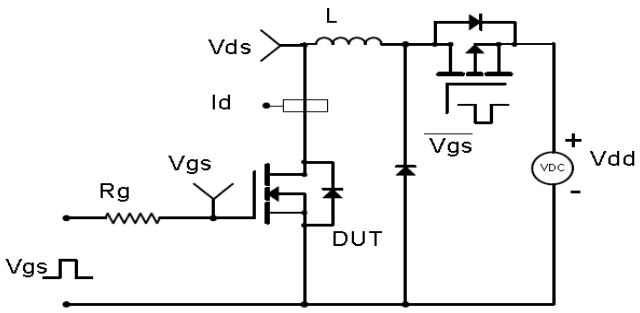


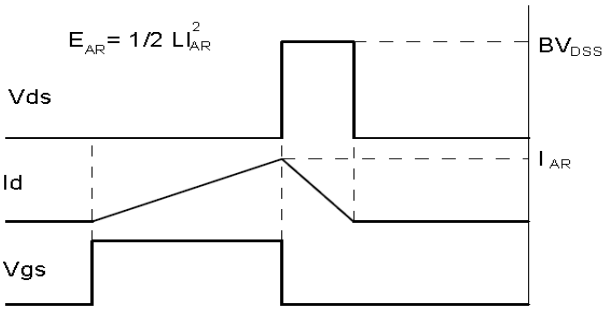
Resistive Switching Test Circuit & Waveforms



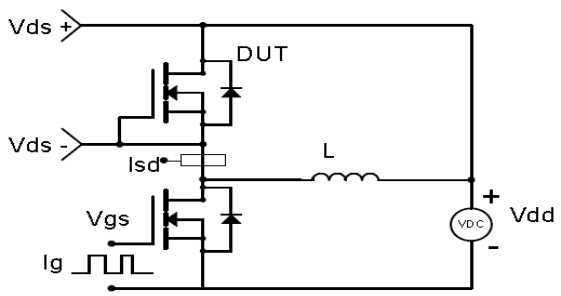


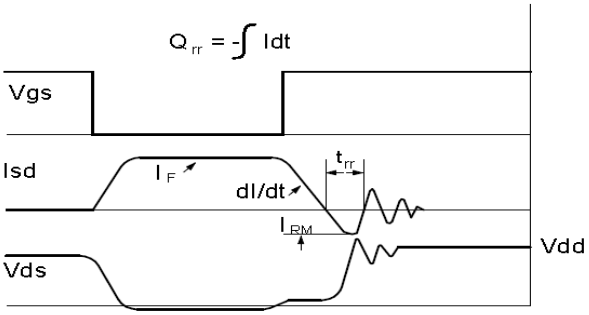
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





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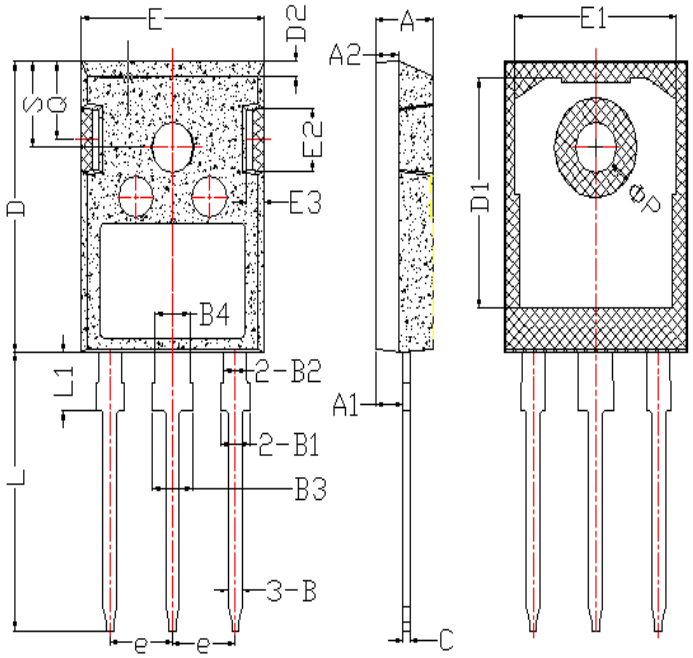
Package Outline: TO-247



Symbol	Values(mm)	
	Min.	Max.
A	4.60	5.20
A1	2.20	2.60
B	0.90	1.40
B1	1.75	2.35
B2	1.75	2.15
B3	2.80	3.35
B4	2.80	3.15
C	0.50	0.70
D	20.60	21.30
D1	16.00	18.00
E	15.50	16.10
E1	13.00	14.70
E2	3.80	5.30
E3	0.80	2.60
e	5.20	5.70
L	19.00	20.50
L1	3.90	4.60
ΦP	3.30	3.70
Q	5.20	6.00
S	5.80	6.60

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Revision History

Revison	Date	Major changes
1.0	2022/11/1	Release of Preliminary version
2.0	2023/5/5	Relaease of formal version
3.0	2023/10/17	Modify Feature

Disclaimer

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 semicondutor 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.

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