华润微电子(重庆)有限公司

CRJF190N65G2

SJMOS N-MOSFET 650V, 150mΩ, 20A

Features

- CRM(CQ) Super_Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM
- Qualified for industrial grade applications according to JEDEC

Product Summary

$V_{DS,min}$	650V
$R_{DS(on),typ}$	150mΩ
I_D	20A

Applications

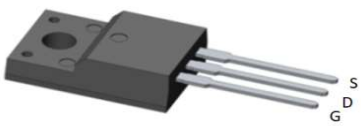
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

100% DVDS Tested

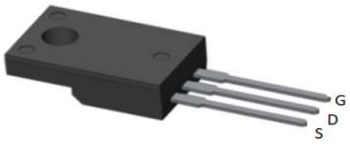
100% Avalanche Tested

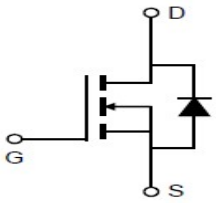
RoHS HF

Top view



Bottom view





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJF190N65G2	CRJF190N65G2	TO-220F	Tube	N/A	N/A	50pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current [1)] T_C = 25°C T_C = 100°C	I_D	 20 12	A
Pulsed drain current [2)](T_C = 25°C, t_p limited by $T_{j,max}$)	$I_{D,pulse}$	80	A
Avalanche energy, single pulse (L=30mH)	E_{AS}	210	mJ
MOSFET dv/dt ruggedness	dv/dt	50	V/ns
Gate-Source voltage	V_{GS}	±30	V
Power dissipation (T_C = 25°C)	P_{tot}	24	W
Continuous diode forward current(T_C = 25°C)	I_S	20	A
Diode pulse current [2)] (T_C = 25°C)	$I_{S,pulse}$	80	A
Recovery diode dv/dt [3)]	dv/dt	50	V/ns
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

1) Limited by $T_{j,max}$. Maximum Duty Cycle D = 0.50;TO-220 equivalent

2) Pulse width t_p limited by $T_{j,max}$

3) Identical low side and high side switch with identical R_g

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Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case	R_{thJC}	-	3.77	5.27	°C/W	
Thermal resistance, junction – ambient	R_{thJA}	-	-	65	°C/W	

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}	650	-	-	V	V_{GS}=0V,I_D=250μA
Gate threshold voltage	$V_{GS(th)}$	3	-	4	V	V_{DS}=V_{GS},I_D=250μA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=650V,V_{GS}=0V T_j=25°C
		-	1	-		T_j=150°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±30V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	150	190	mΩ	V_{GS}=10V,I_D=10A, T_j=25°C
		-	330	-		T_j=150°C
Transconductance	g_{fs}	-	17	-	S	V_{DS}=20V,I_D=10A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1377	-	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	-	67	-		
Reverse Transfer Capacitance	C_{rss}	-	1.5	-		
Gate Total Charge	Q_g	-	40.5	-	nC	V_{GS}=10V, V_{DS}=480V, I_D=10A
Gate-Source charge	Q_{gs}	-	8.5	-		
Gate-Drain charge	Q_{gd}	-	17	-		
Gate plateau voltage	$V_{plateau}$	-	5.5	-	V	
Turn-on delay time	$t_{d(on)}$	-	38	-	ns	V_{GS}=10V, I_D=10A, V_{DS}=400V, R_g=27Ω
Rise time	t_r	-	29	-		
Turn-off delay time	$t_{d(off)}$	-	185	-		
Fall time	t_f	-	24	-		
Gate resistance	$R_{g,int}$	-	7	-	Ω	f=1MHz

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Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.6	0.85	1.1	V	V_{GS}=0V,I_{SD}=10A
Body Diode Reverse Recovery Time	t_{rr}	-	295	-	ns	I_{SD}=10A di_F/dt=100A/μs V_{DS}=400V
Body Diode Reverse Recovery Charge	Q_{rr}	-	4.32	-	μC	

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Typical Performance Characteristics

Fig 1. Output Characteristics (T_j=25℃)

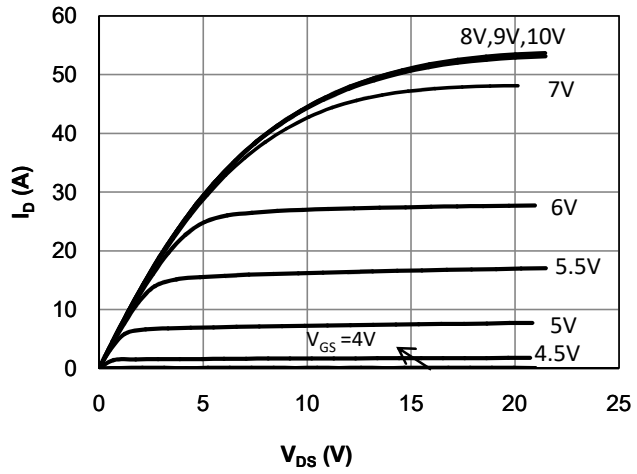


Fig 2. Output Characteristics (T_j=150℃)

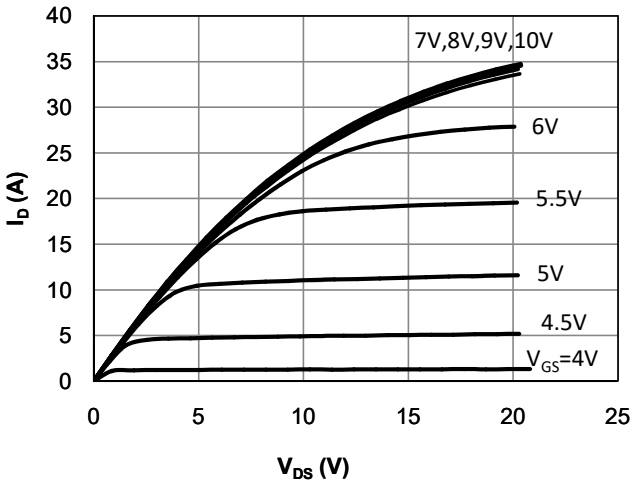


Fig 3: Transfer Characteristics

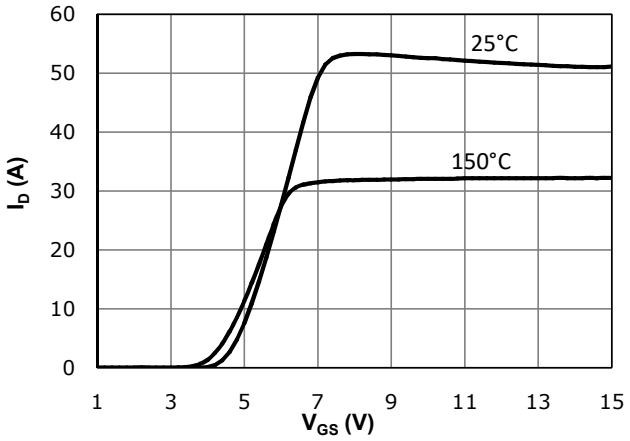


Fig 4: V_{TH} vs. T_j Temperature Characteristics

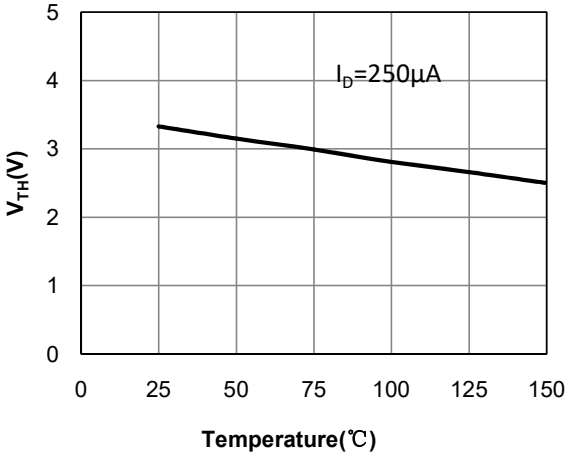


Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics(T_j=25℃)

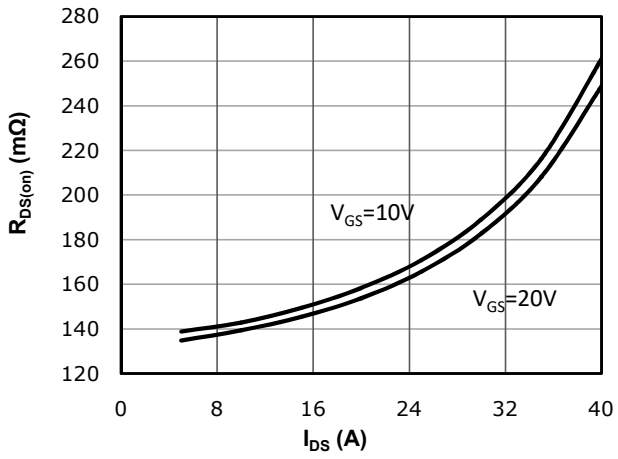
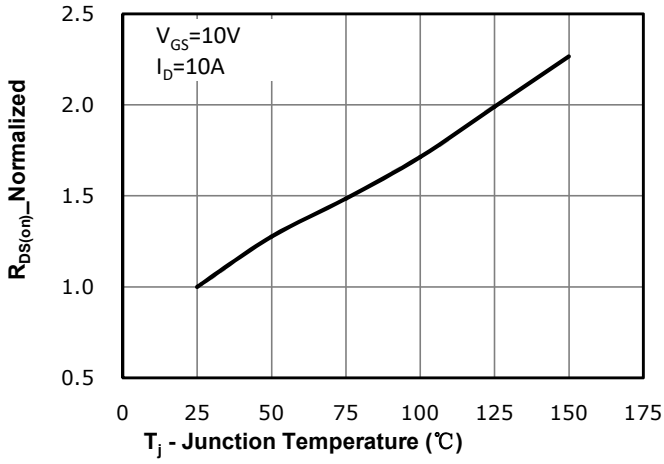


Fig 6: $R_{DS(on)}$ vs. Temperature



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Fig 7: BV_{DSS} vs. Temperature

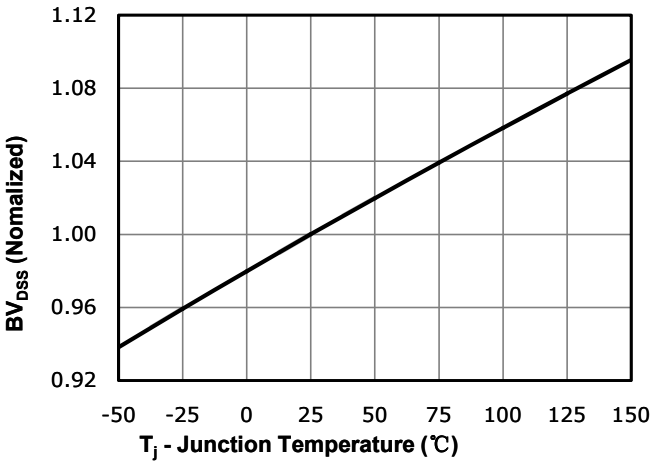


Fig 8: $R_{DS(on)}$ vs. Gate Voltage

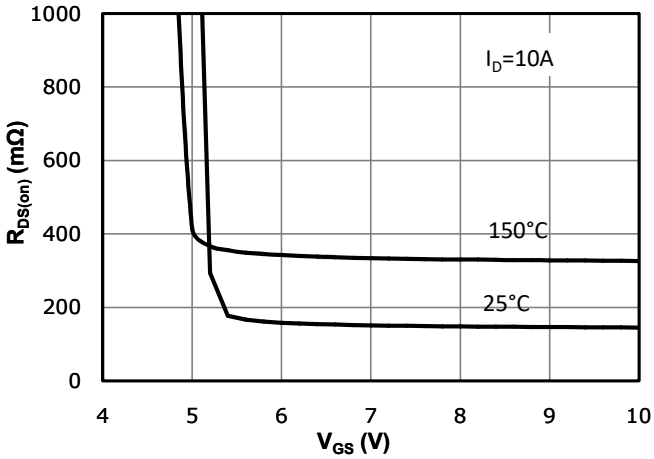


Fig 9: Body-diode Forward Characteristics

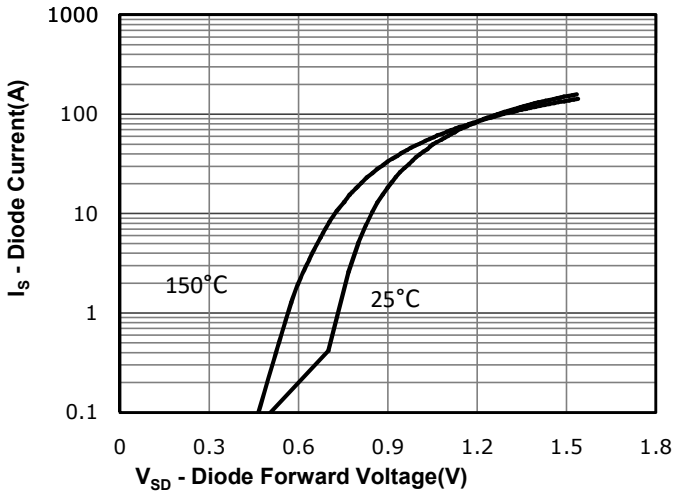


Fig 10: Gate Charge Characteristics

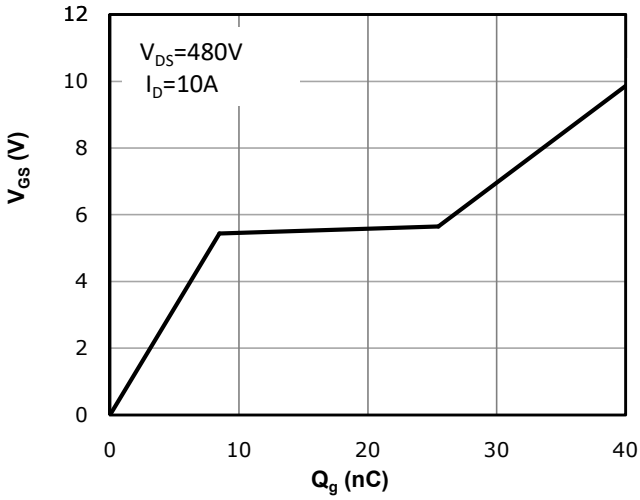


Fig 11: Capacitance Characteristics

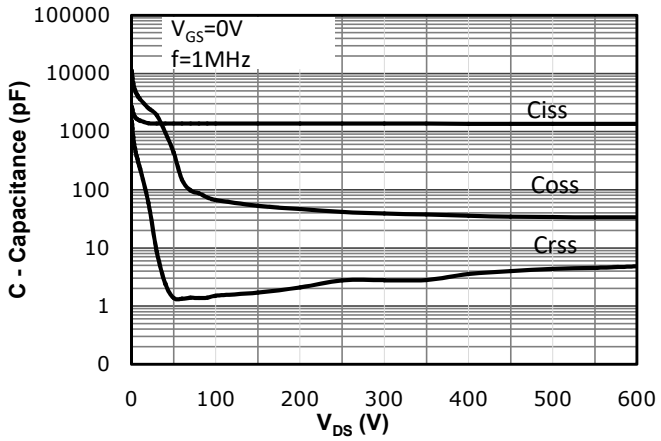
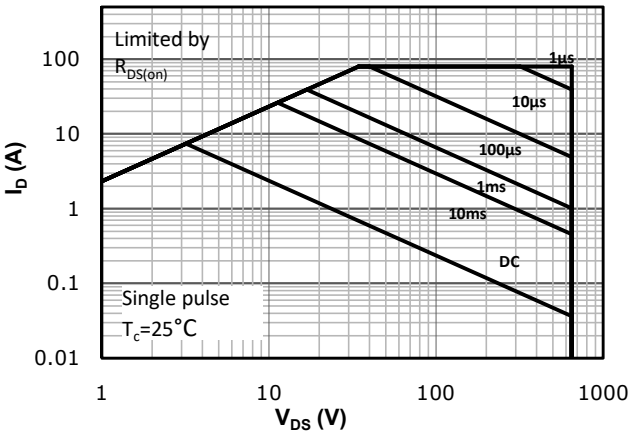
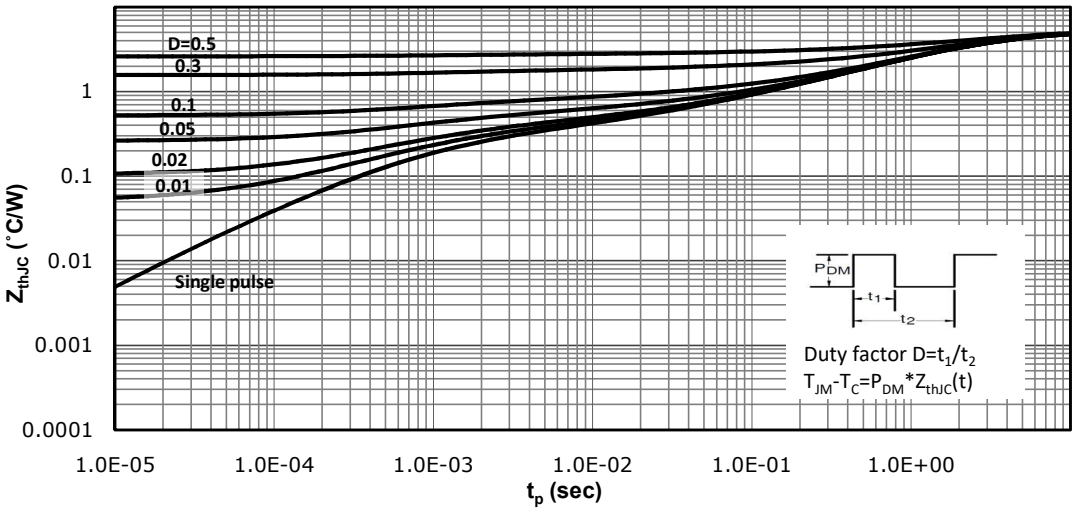


Fig 12: Safe Operating Area



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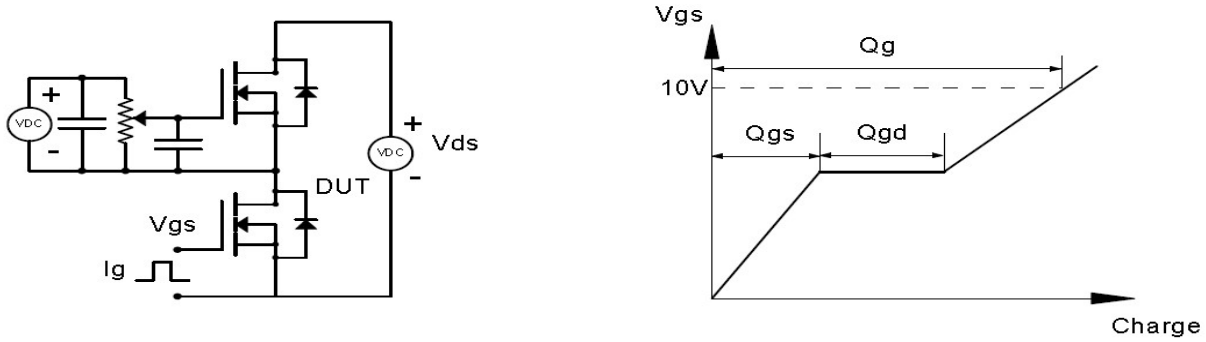
Fig 13: Max. Transient Thermal Impedance



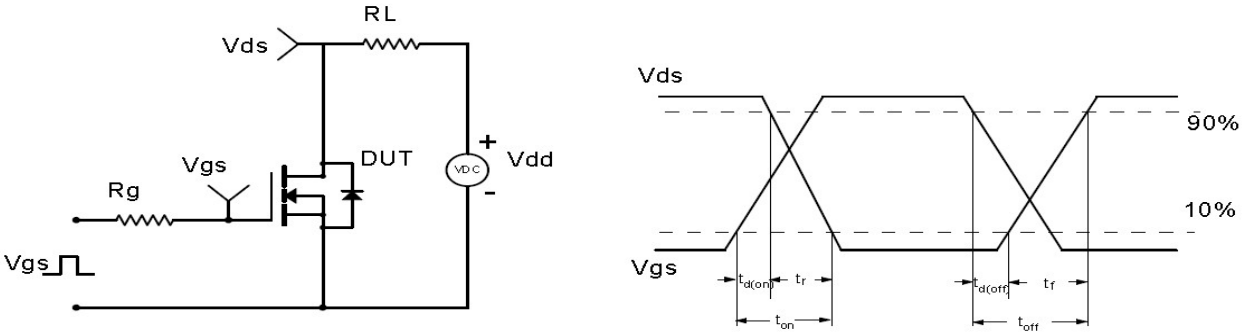
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Test Circuit & Waveform

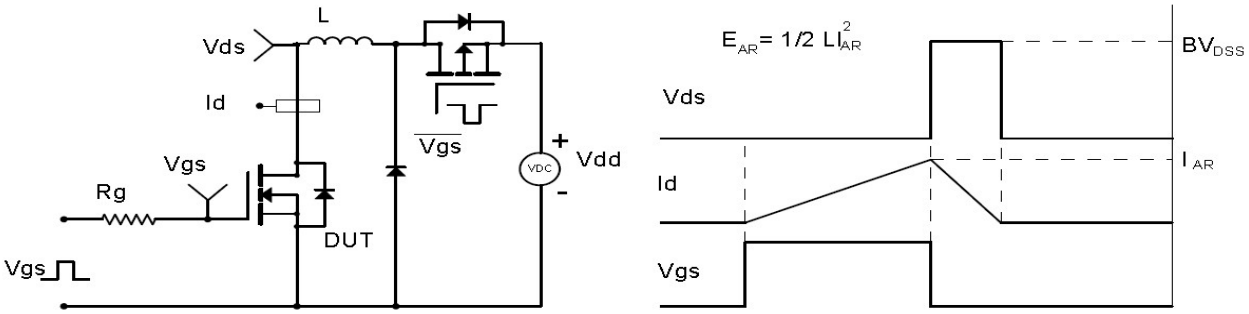
Gate Charge Test Circuit & Waveform



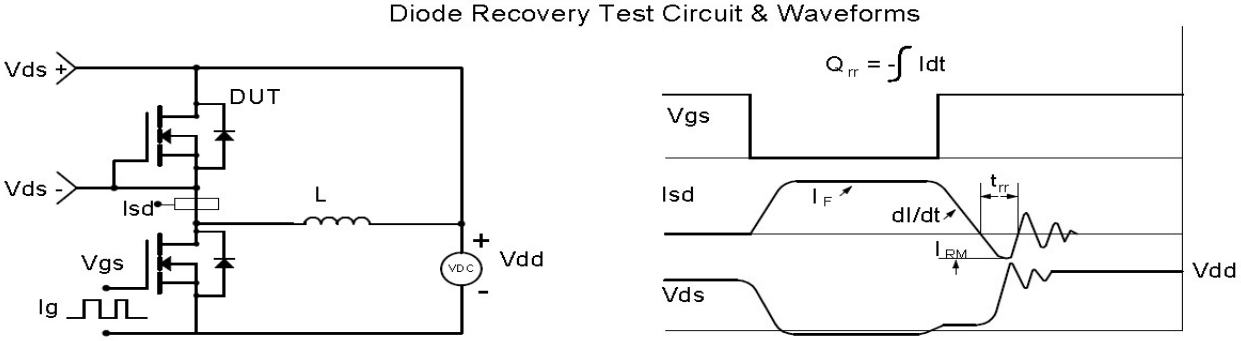
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

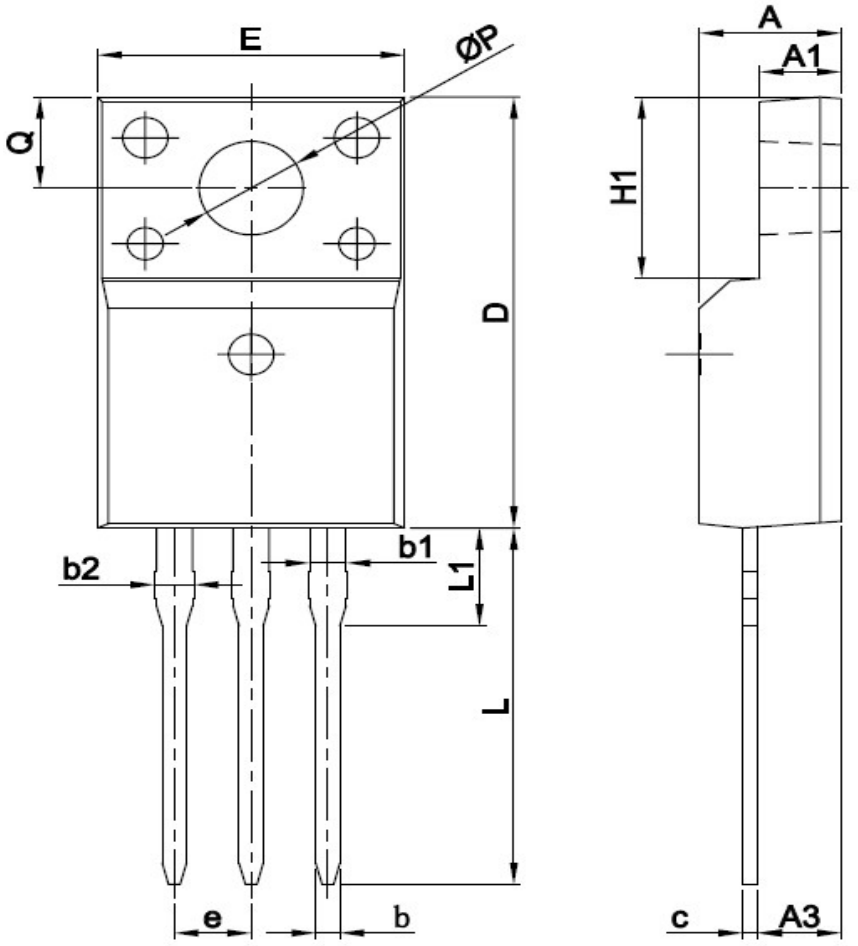


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-220F



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.90	0.169	0.193
A1	2.34	2.87	0.092	0.113
A3	2.20	2.96	0.087	0.117
b	0.60	0.90	0.024	0.035
b1	0.95	1.45	0.037	0.057
b2	1.15	1.55	0.045	0.061
c	0.40	0.70	0.016	0.028
D	15.50	16.17	0.610	0.637
e	2.54 BSC		0.100 BSC	
E	9.70	10.66	0.382	0.420
H1	6.70 REF		0.264 REF	
L	12.46	13.75	0.491	0.541
L1	2.80	3.80	0.110	0.150
Q	3.05	3.55	0.120	0.140
P	2.98	3.38	0.117	0.133

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Marking



NOTE:
NXBBAAAA

N	—WB code (Usually omitted)
X	—Assembly location code
BB	—Fab code
AAAA	—Lot code

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Revision History

Revison	Date	Major changes
2.0	2023/7/9	Update top&bottom view and POD

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, 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.

CRM(CQ) reserves the right to improve product design, function and reliability without notice.

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