华润微电子(重庆)有限公司

CRJF360N60G2E

SJMOS N-MOSFET 600V, 315mΩ, 9A

Features

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

Product Summary

$V_{DS,min}$	600V
$R_{DS(on),typ}$	315mΩ
I_D	9A
ESD(HBM)	2000V

Applications

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

100% DVDS Tested

100% Avalanche Tested

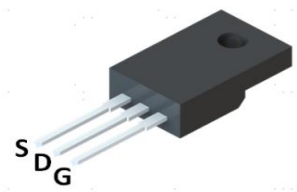
RoHS

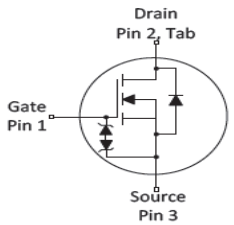
H F

Top view



Bottom view





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJF360N60G2E	CRJF360N60G2E	TO-220F	Tube	N/A	N/A	50pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	600	V
Continuous drain current [1)] T_C = 25°C T_C = 100°C	I_D	 9 6	A
Pulsed drain current [2)](T_C = 25°C, t_p limited by $T_{j,max}$)	$I_{D,pulse}$	38	A
Avalanche energy, single pulse (L=30mH)	E_{AS}	70	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}	23	W
Continuous diode forward current(T_C = 25°C)	I_S	9	A
Diode pulse current [2)] (T_C = 25°C)	$I_{S,pulse}$	38	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-252 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}	-	3.83	5.36	°C/W	
Thermal resistance, junction – ambient	R_{thJA}	-	-	62	°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}	600	-	-	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}=600V,V_{GS}=0V T_j=25°C
		-	1	-		T_j=150°C
Gate-source leakage current	I_{GSS}	-	-	±10	μA	V_{GS}=±30V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	315	360	mΩ	V_{GS}=10V,I_D=4.5A, T_j=25°C
		-	800	-		T_j=150°C
Transconductance	g_{fs}	-	6.2	-	S	V_{DS}=20V,I_D=4.5A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	500	-	pF	V_{GS}=0V, V_{DS}=100V, f=100KHz
Output Capacitance	C_{oss}	-	30	-		
Reverse Transfer Capacitance	C_{rss}	-	0.86	-		
Gate Total Charge	Q_g	-	17	-	nC	V_{GS}=10V, V_{DS}=480V, I_D=4.5A
Gate-Source charge	Q_{gs}	-	4.1	-		
Gate-Drain charge	Q_{gd}	-	8	-		
Gate plateau voltage	$V_{plateau}$	-	6.2	-	V	
Turn-on delay time	$t_{d(on)}$	-	11	-	ns	V_{GS}=10V, I_D=4.5A, V_{DS}=400V, R_g=10Ω
Rise time	t_r	-	24	-		
Turn-off delay time	$t_{d(off)}$	-	51	-		
Fall time	t_f	-	25	-		
Gate resistance	$R_{g,int}$	-	16	-	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}=4.5A
Body Diode Reverse Recovery Time	t_{rr}	-	206	-	ns	I_{SD}=4.5A di_F/dt=100A/μs V_{DS}=400V
Body Diode Reverse Recovery Charge	Q_{rr}	-	1.7	-	μC	
Body Diode Reverse Recovery Peak Current	I_{rrm}	-	17.5	-	A	

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Typical Performance Characteristics

Fig 1. Output Characteristics (T_j=25℃)

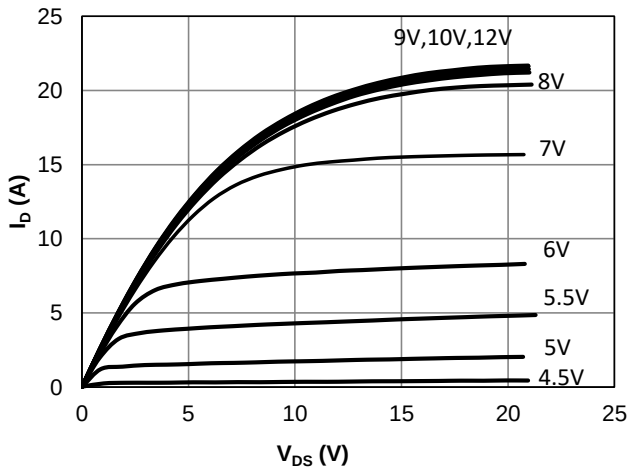


Fig 2. Output Characteristics (T_j=150℃)

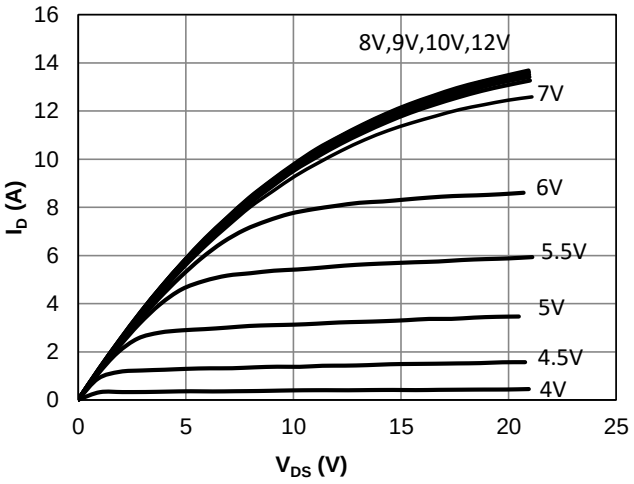


Fig 3: Transfer Characteristics

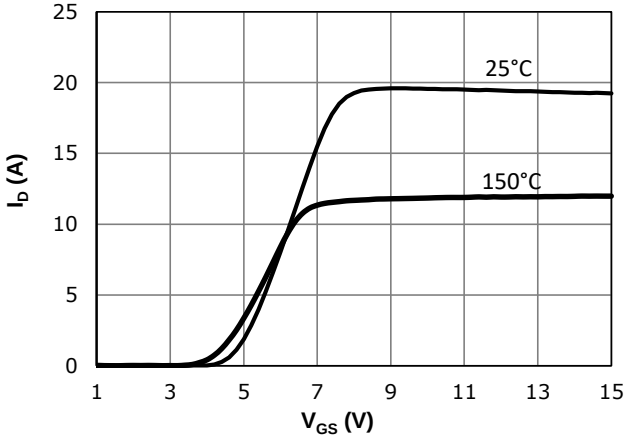


Fig 4: V_{TH} vs. T_j Temperature Characteristics

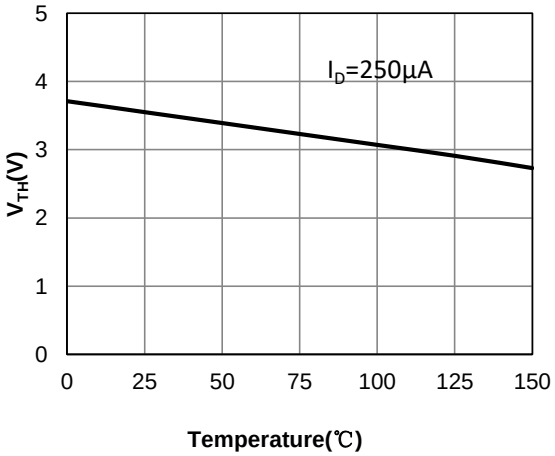


Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics(T_j=25℃)

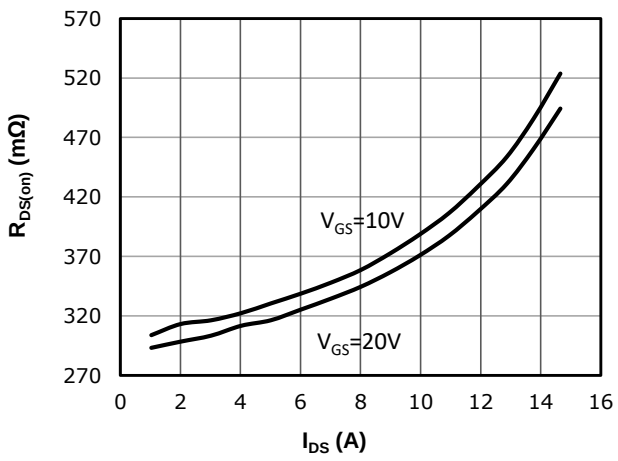
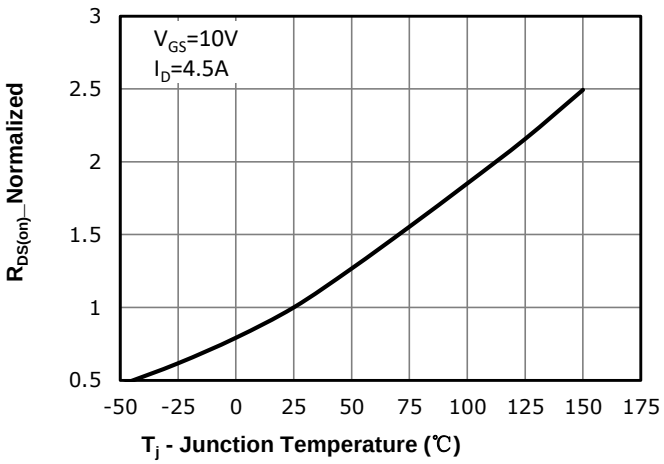


Fig 6: $R_{DS(on)}$ vs. Temperature



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Fig 7: BV_{DSS} vs. Temperature

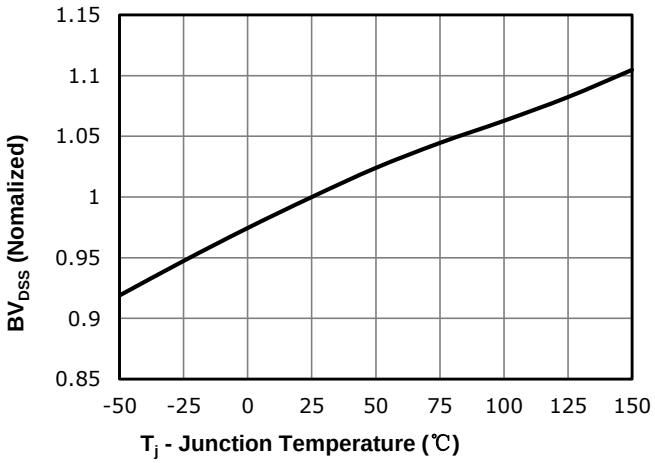


Fig 8: $R_{DS(on)}$ vs. Gate Voltage

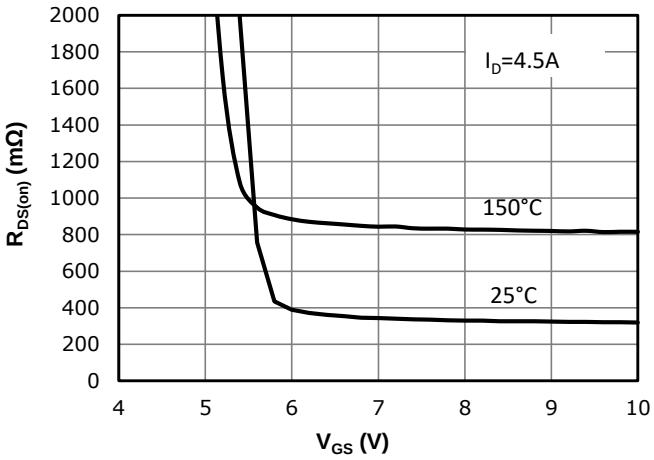


Fig 9: Body-diode Forward Characteristics

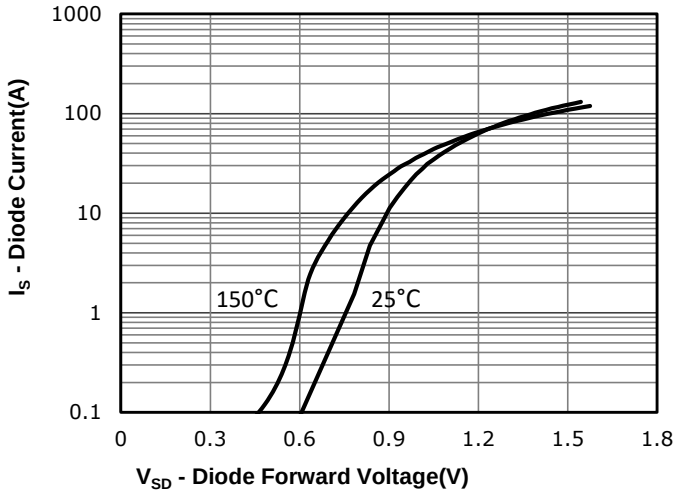


Fig 10: Gate Charge Characteristics

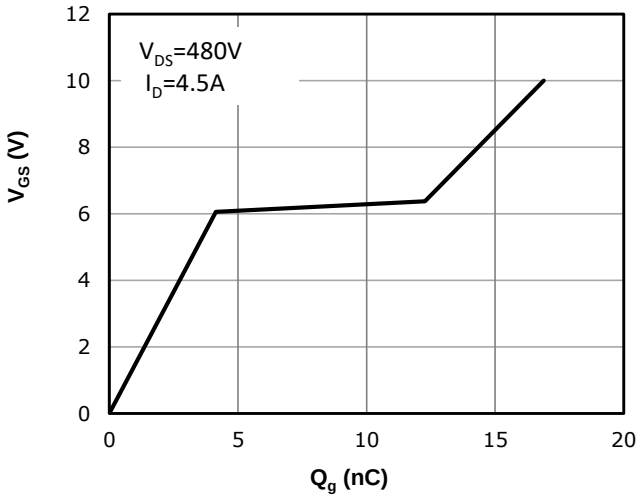


Fig 11: Capacitance Characteristics

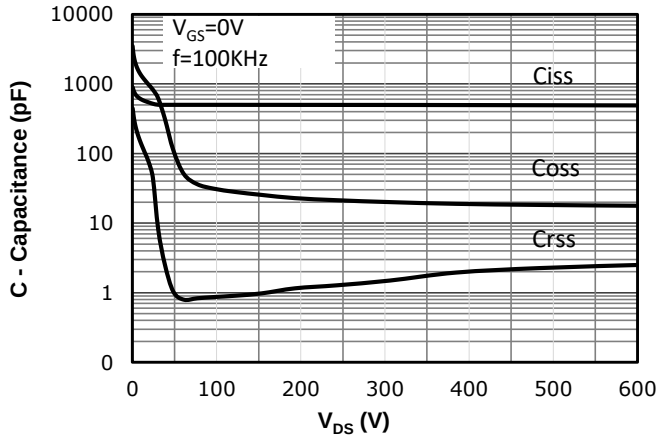
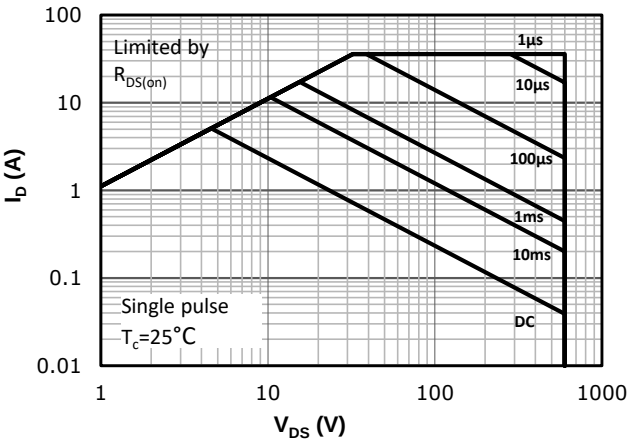
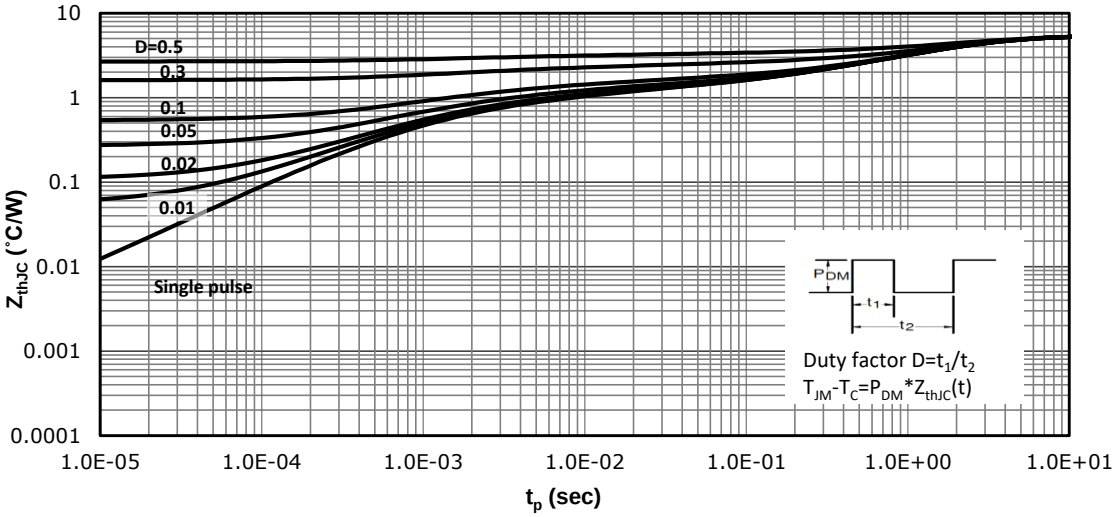


Fig 12: Safe Operating Area



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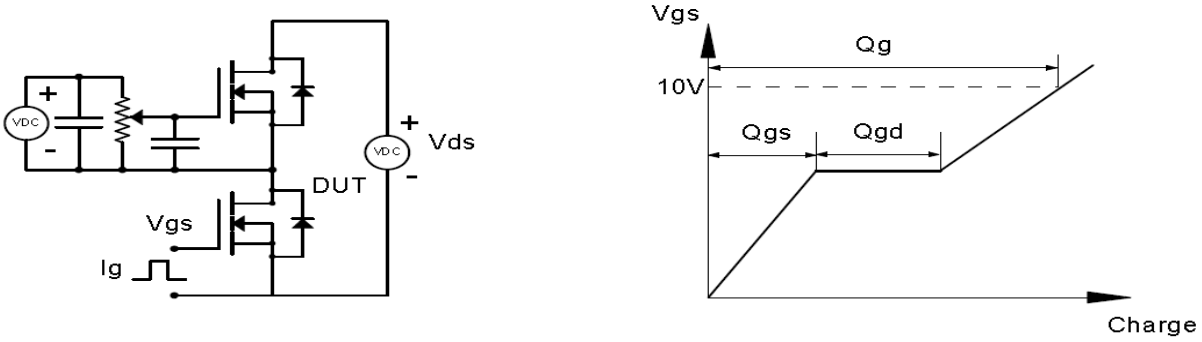
Fig 13: Max. Transient Thermal Impedance



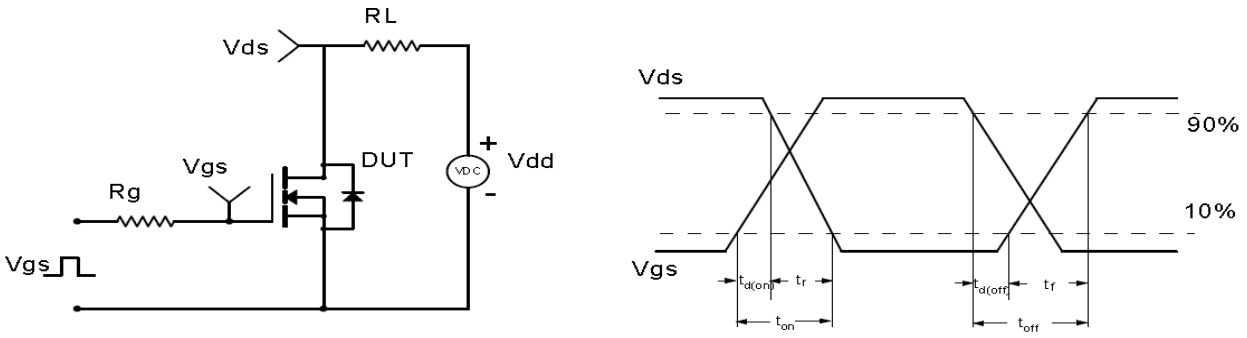
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Test Circuit & Waveform

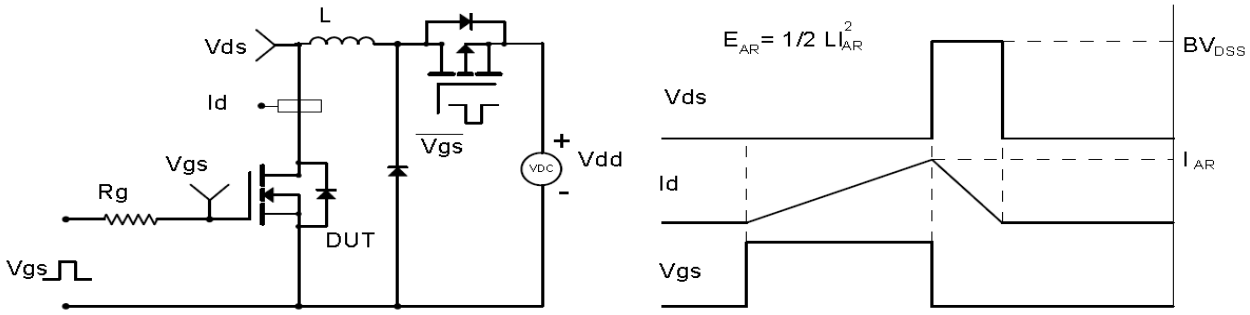
Gate Charge Test Circuit & Waveform



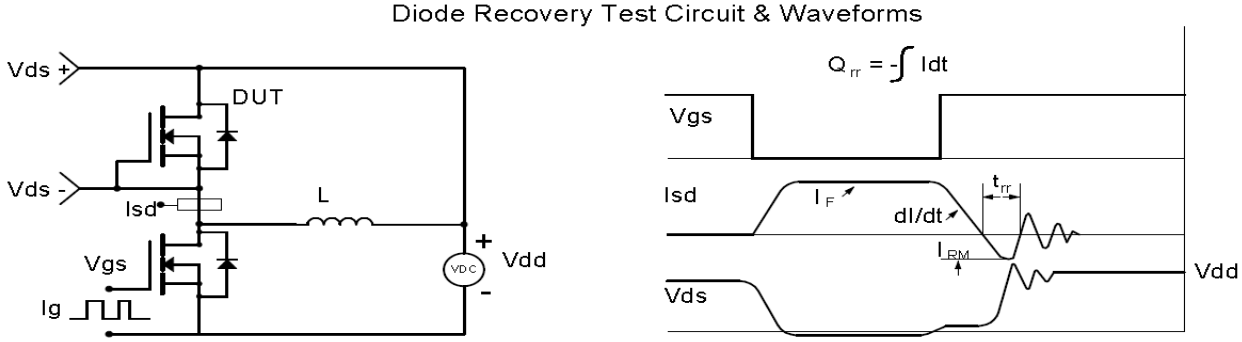
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

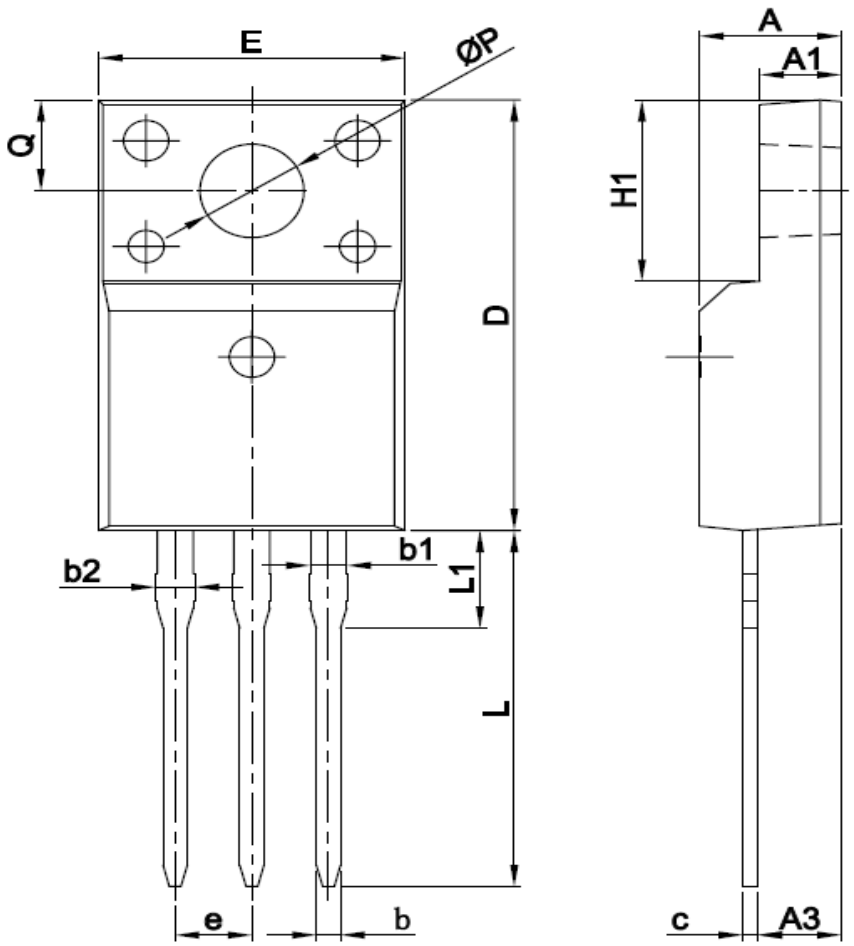


Diode Recovery Test Circuit & Waveforms



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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	Major changes
1.0	First version
1.1	Update static characteristic
2.0	Final version

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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