CRJQF22N65G4BFQ

SJMOS N-MOSFET 650V, 19mΩ, 95A

Features

- Qualified according to AEC Q101
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM
- Ultra-fast body diode
- Easy to use/drive

Product Summary

$V_{DS,min}$	650V
$R_{DS(on),typ}$	19mΩ
I_D	95A

Applications

Suitable for PFC and DC-DC stages for:

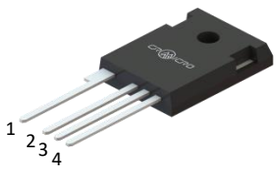
- Unidirectional and bidirectional DC-DC converters,
- On-Board battery Chargers

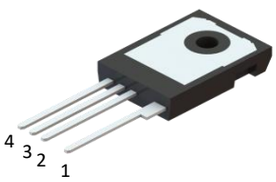
100% DVDS Tested

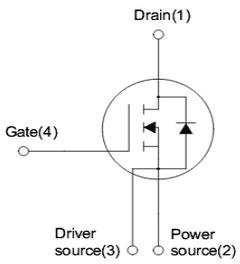
100% Avalanche Tested

RoHS

HF







Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJQF22N65G4BFQ	CRJQF22N65G4BFQ	TO-247-4L	Tube	N/A	N/A	25pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current [1)] T_C = 25℃ T_C = 100℃	I_D	 95 60	A
Pulsed drain current [2)](T_C = 25℃, t_p limited by $T_{j,max}$)	$I_{D,pulse}$	284	A
Avalanche energy, single pulse (L=30mH)	E_{AS}	1200	mJ
MOSFET dv/dt ruggedness	dv/dt	120	V/ns
Gate-Source voltage	V_{GS}	±30	V
Power dissipation (T_C = 25℃)	P_{tot}	517	W
Continuous diode forward current(T_C = 25℃)	I_S	95	A
Diode pulse current [2)] (T_C = 25℃)	$I_{S,pulse}$	284	A
Recovery diode dv/dt [3)]	dv/dt	70	V/ns
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	℃
Short-circuit withstand time(V_{DD}≤400 V, $V_{DS,peak}$<650 V, $V_{GS,on}$=8 V,$T_{j,start}$ = 125℃)	t_{SC}	100	ns

1) Limited by $T_{j,max}$. Maximum Duty Cycle D = 0.50

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}	-	0.17	0.24	℃/W	
Thermal resistance, junction – ambient	R_{thJA}	-	-	44	℃/W	

Electrical Characteristic (at T_j = 25℃, 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=1mA
Gate threshold voltage	$V_{GS(th)}$	3	-	5	V	V_{DS}=V_{GS},I_D=250μA
Zero gate voltage drain current	I_{DSS}	- -	- 1500	10 -	μA	V_{DS}=650V,V_{GS}=0V T_j=25℃ T_j=150℃
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±30V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	19 47	22 -	mΩ	V_{GS}=10V,I_D=58.2A, T_j=25℃ T_j=150℃
Transconductance	g_{fs}	-	90	-	S	V_{DS}=20V,I_D=58.2A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	8900	-	pF	V_{GS}=0V, V_{DS}=400V, f=250KHz
Output Capacitance	C_{oss}	-	155	-		
Reverse Transfer Capacitance	C_{rss}	-	10	-		
Gate Total Charge	Q_g	-	200	-	nC	V_{GS}=10V, V_{DS}=400V, I_D=58.2A
Gate-Source charge	Q_{gs}	-	70	-		
Gate-Drain charge	Q_{gd}	-	76	-		
Gate plateau voltage	$V_{plateau}$	-	7	-	V	
Turn-on delay time	$t_{d(on)}$	-	39	-	ns	V_{GS}=13V, I_D=58.2A, V_{DS}=400V, R_g=1.8Ω
Rise time	t_r	-	55	-		
Turn-off delay time	$t_{d(off)}$	-	120	-		
Fall time	t_f	-	40	-		
Gate resistance	$R_{g,int}$	-	2.0	-	Ω	f=1MHz

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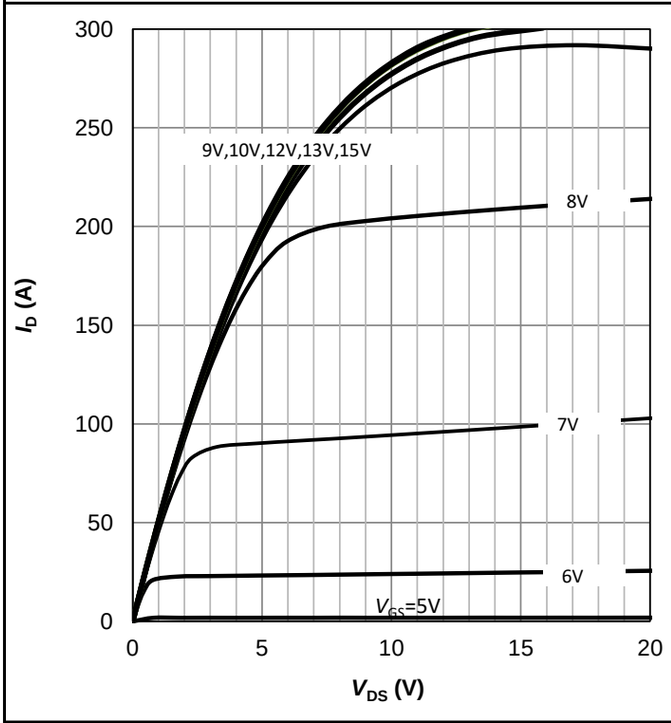
Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.7	0.9	1.2	V	V_{GS}=0V,I_{SD}=58.2A
Body Diode Reverse Recovery Time	t_{rr}	-	205	-	ns	I_{SD}=58.2A 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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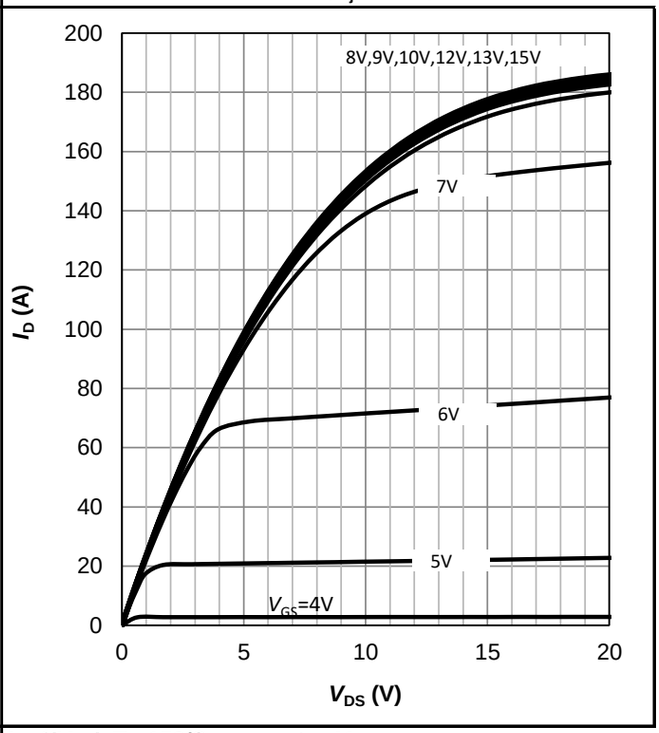
Typical Performance Characteristics

Fig 1. Output Characteristics (T_j=25℃)



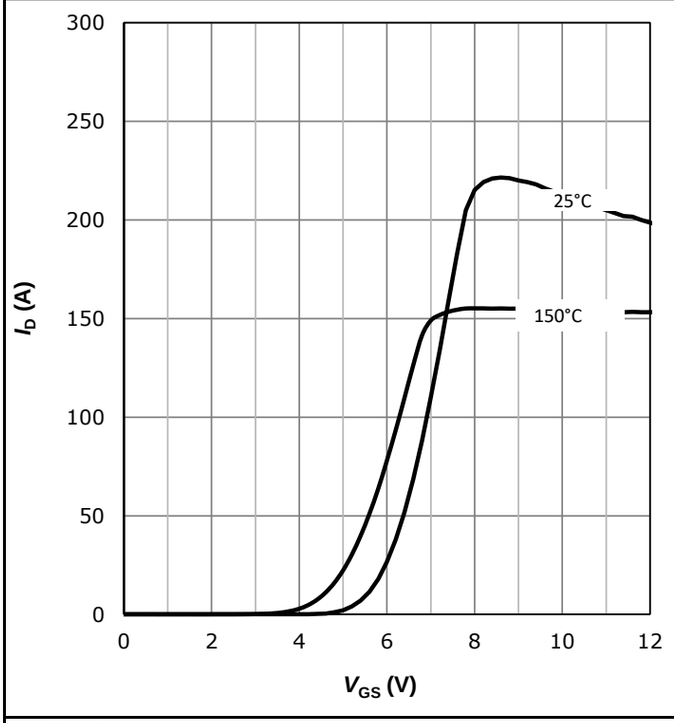
I_D=f(V_{DS});T_j=25℃;parameter:V_{GS}

Fig 2. Output Characteristics (T_j=150℃)



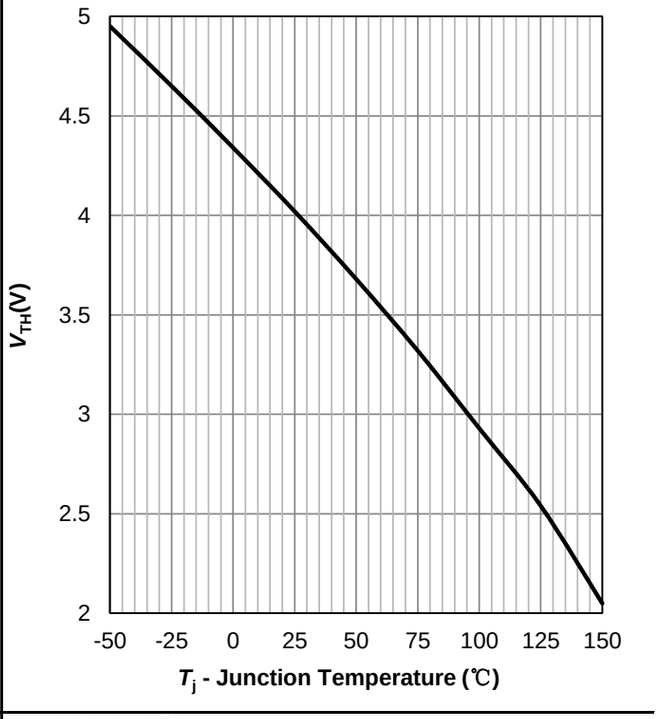
I_D=f(V_{DS});T_j=150℃;parameter:V_{GS}

Fig 3: Transfer Characteristics



I_D=f(V_{GS});V_{DS}=15V;parameter:T_j

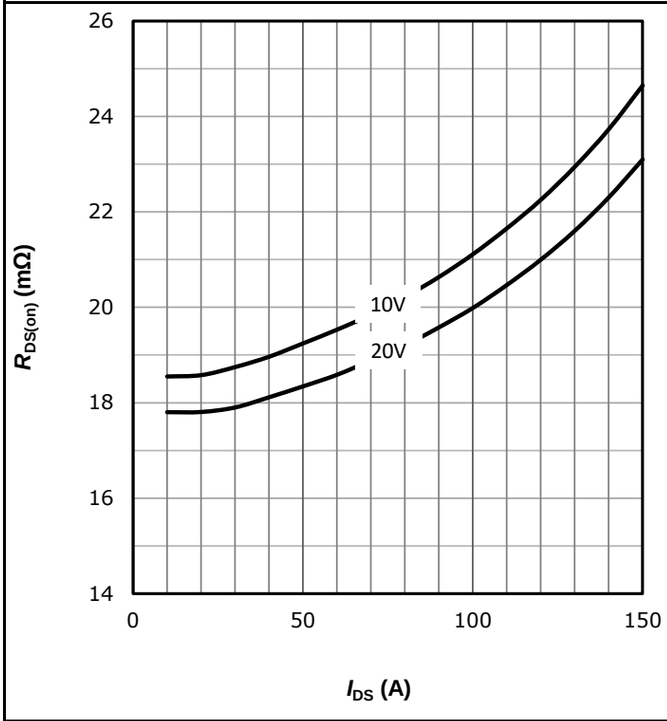
Fig 4: V_{TH} vs. T_j Temperature Characteristics



V_{TH}=f(T_j);I_D=250μA

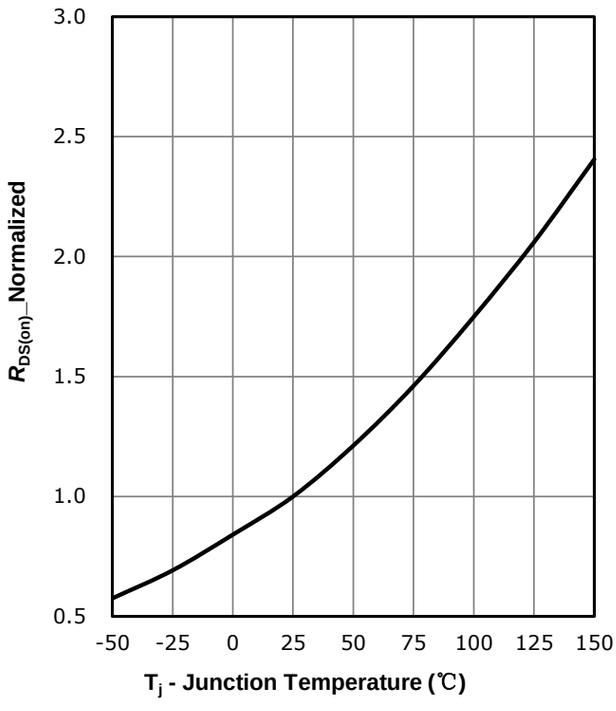
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Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics(T_j=25℃)



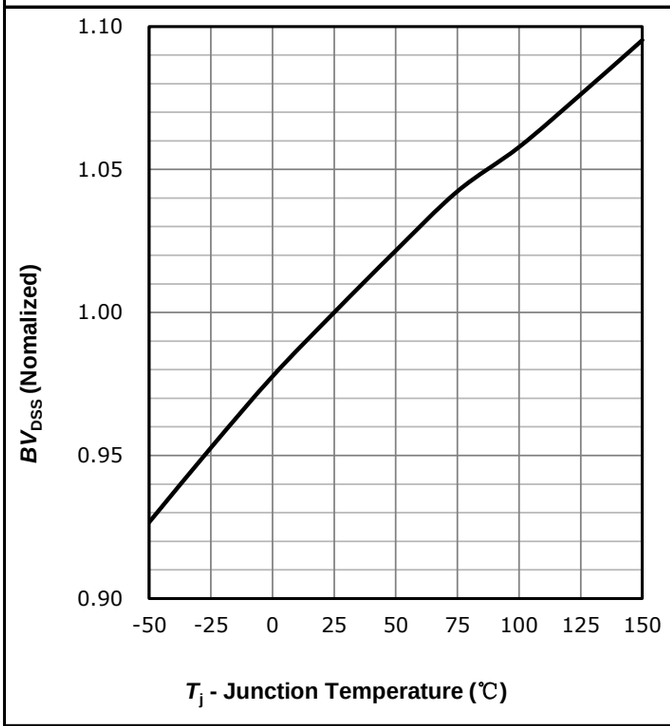
$R_{DS(on)}$=f(I_D);T_j=25℃;parameter:V_{GS}

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



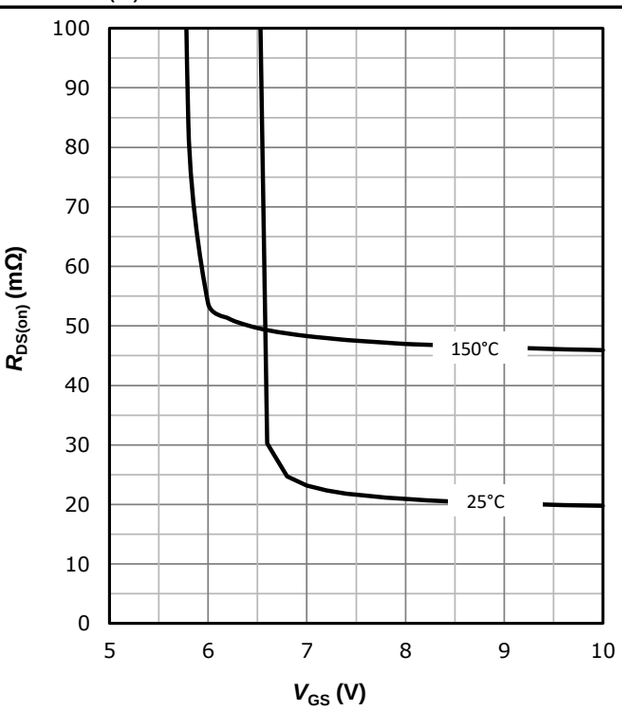
$R_{DS(on)}$=f(T_j);I_D=58.2A;V_{GS}=10V

Fig 7: BV_{DSS} vs. Temperature



BV_{DSS}=f(T_j)

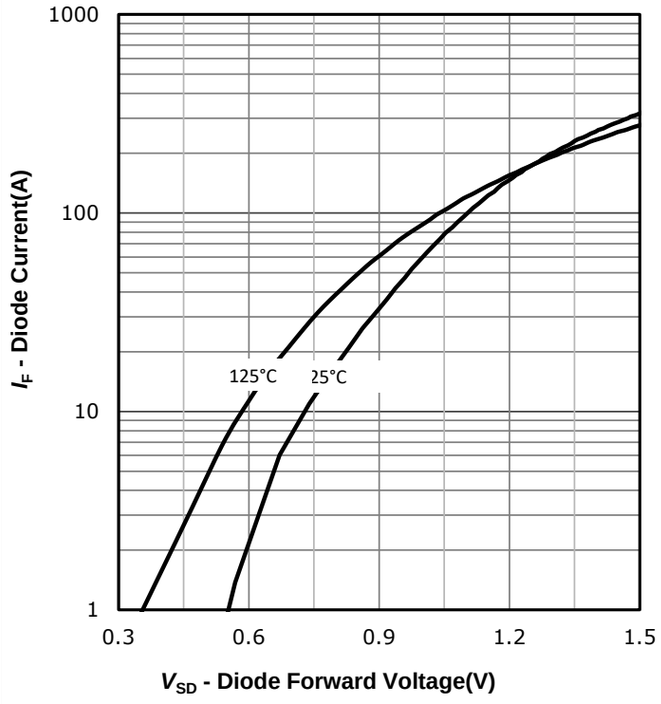
Fig 8: $R_{DS(on)}$ vs. Gate Voltage



$R_{DS(on)}$=f(V_{GS});I_D=58.2A;parameter:T_j

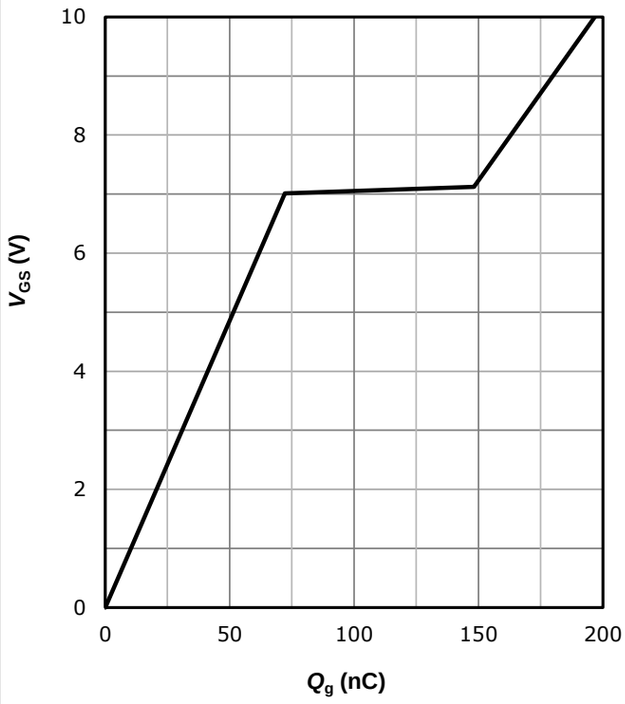
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Fig 9: Body-diode Forward Characteristics



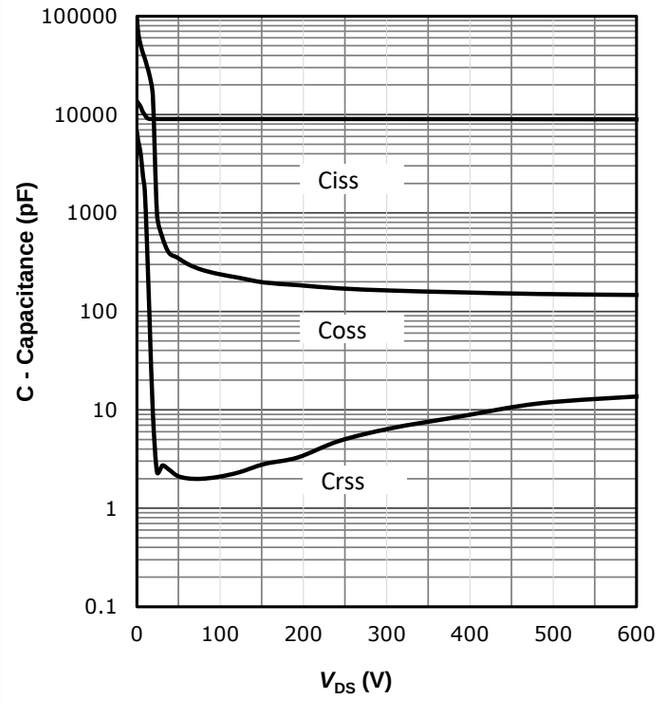
$I_F=f(V_{SD})$;parameter:T_j

Fig 10: Gate Charge Characteristics



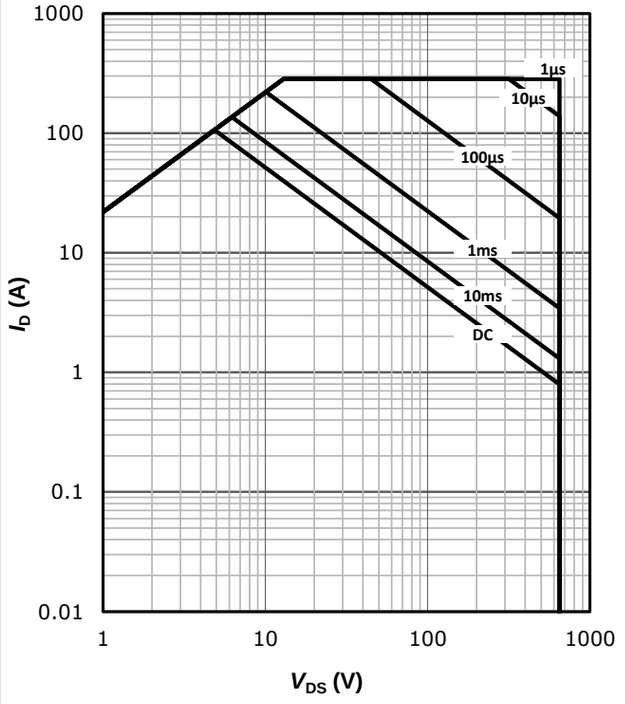
$V_{GS}=f(Q_g)$;V_{DD}=400V;I_D=58.2A

Fig 11: Capacitance Characteristics



$C=f(V_{DS})$;V_{GS}=0V;f=250kHZ

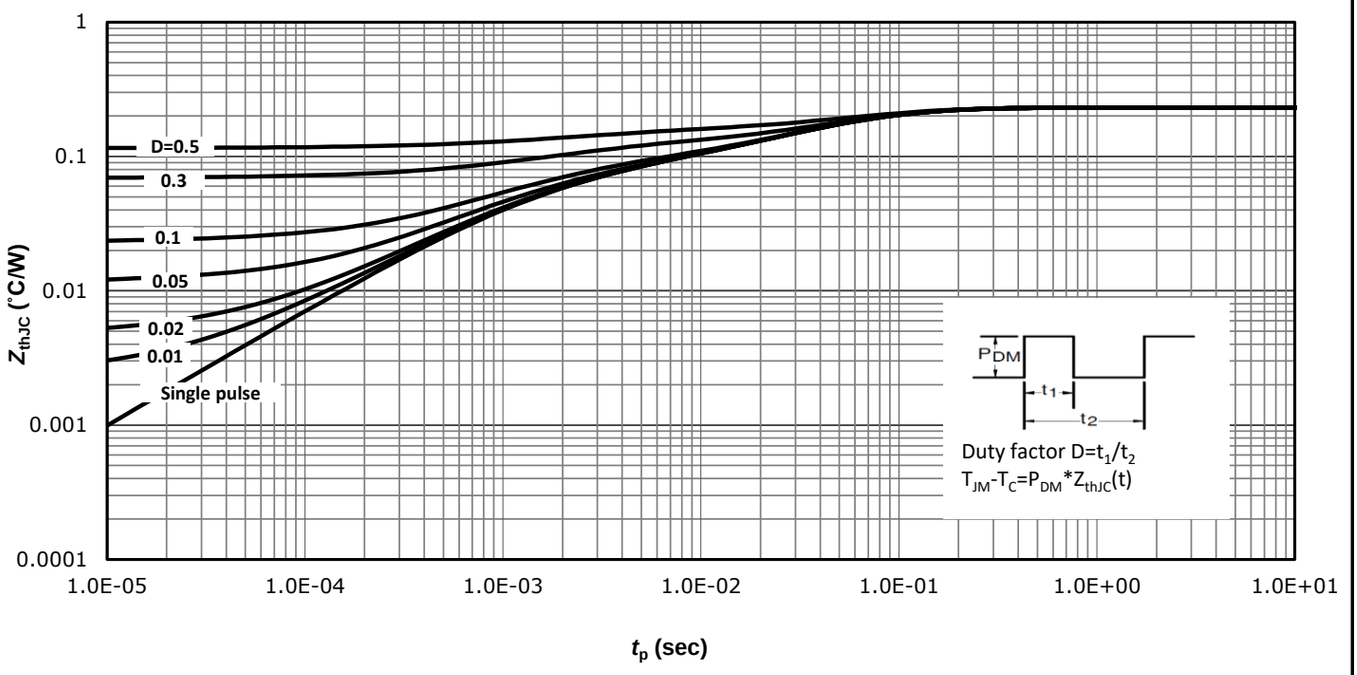
Fig 12: Safe Operating Area



$I_D=f(V_{DS})$;T_C=25°C;D=0;parameter:t_p

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Fig 13: Max. Transient Thermal Impedance

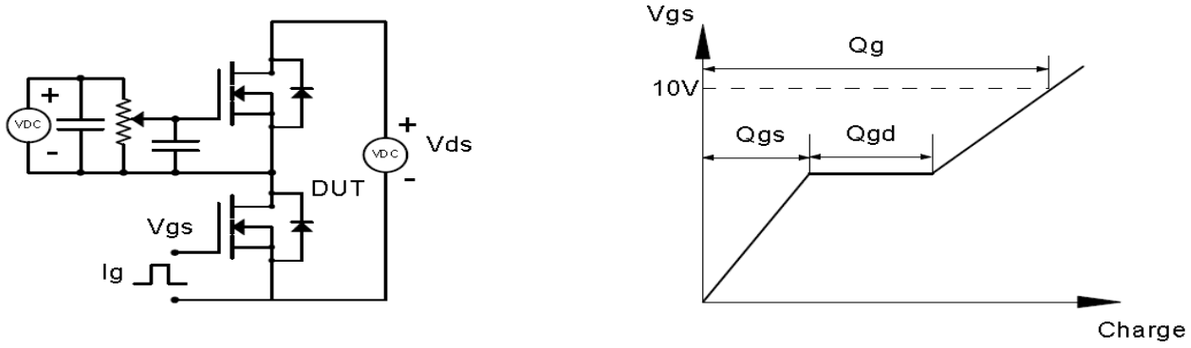


Z_{thJC}=f(t_p);parameter:D=t_1/t_2

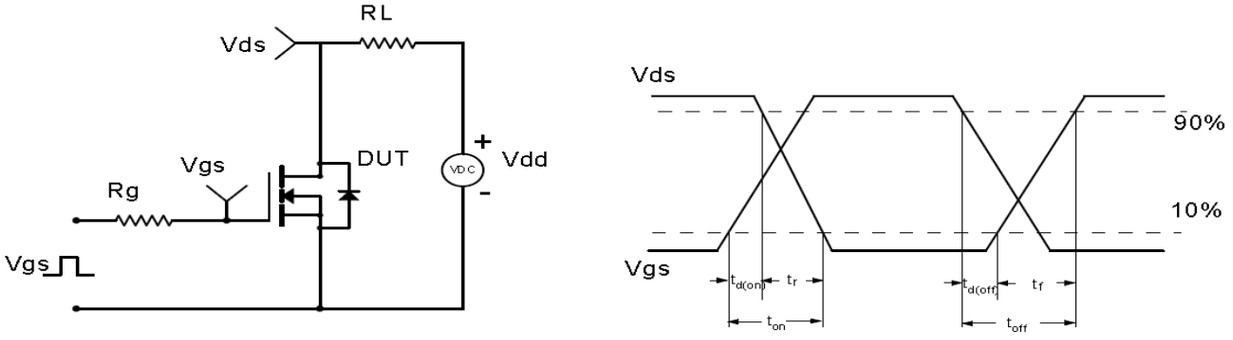
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Test Circuit & Waveform

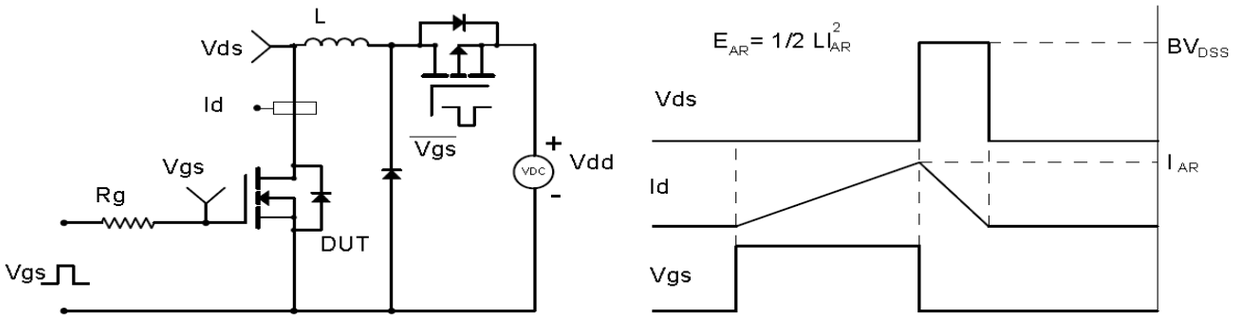
Gate Charge Test Circuit & Waveform



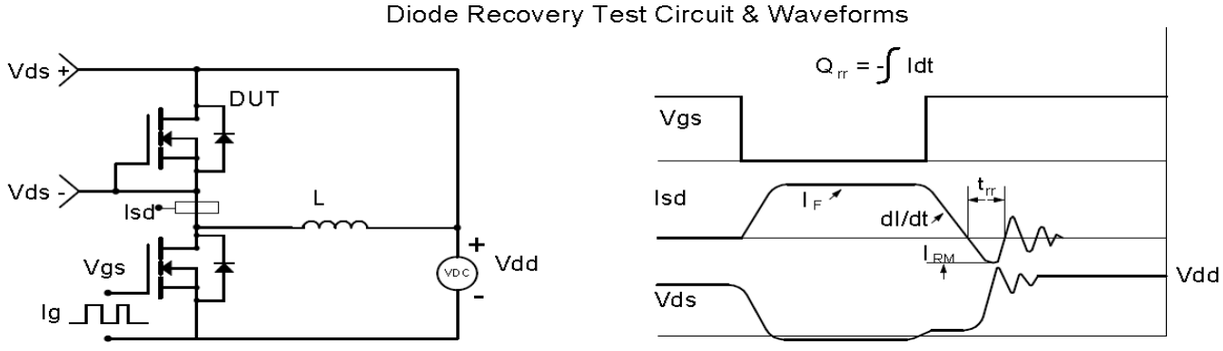
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

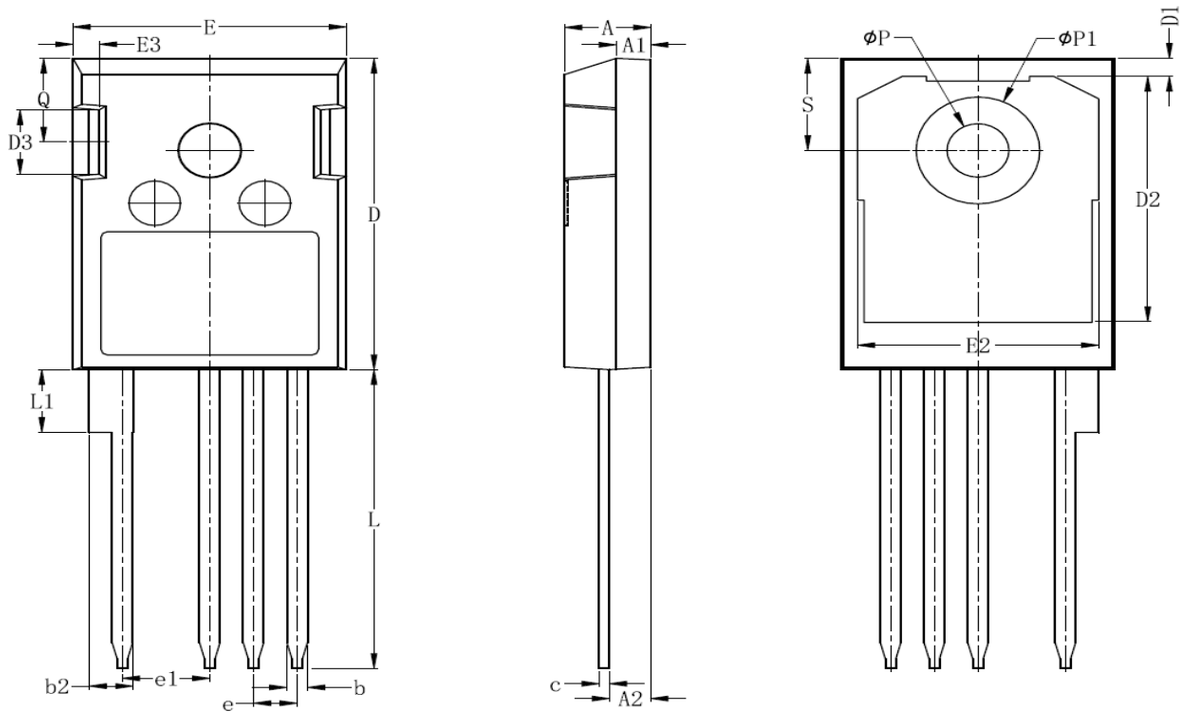


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-247-4L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	0.190	0.205
A1	1.90	2.16	0.075	0.085
A2	2.20	2.60	0.087	0.102
b	1.07	1.34	0.042	0.053
b2	2.39	2.94	0.094	0.116
c	0.50	0.74	0.020	0.029
D	20.80	23.60	0.819	0.929
D1	0.95	1.43	0.037	0.056
D2	16.25	17.65	0.640	0.695
D3	3.68	5.10	0.145	0.201
e	2.54 BSC.		0.100 BSC.	
e1	5.08 BSC.		0.200 BSC.	
E	15.70	16.13	0.618	0.635
E2	13.10	14.23	0.516	0.560
E3	1.00	2.60	0.039	0.102
L	17.25	22.22	0.679	0.875
L1	3.94	4.43	0.155	0.174
P	3.50	3.70	0.138	0.146
P1	7.00	7.40	0.276	0.291
Q	5.33	6.00	0.210	0.236
S	6.00	6.40	0.236	0.252

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Marking



NOTE:
NXBBAAAA

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

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Revision History

Revison	Major changes
2.0	Final version

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

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