CRJQ41N65GCFQ

SJMOS N-MOSFET 650V, 42mΩ, 70A

华润微电子(重庆)有限公司

Features

• Qualified according to AEC Q101

• Much lower Ron*A performance for On-state efficiency

• Better efficiency due to very low FOM

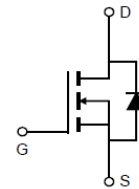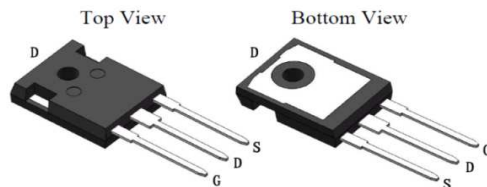• Ultra-fast body diode

• Easy to use/drive

Applications

Suitable for PFC and DC-DC stages for:

• Unidirectional and bidirectional DC-DC converters,

• On-Board battery Chargers

Product Summary

VDS	650V
$R_{DS(on)\_typ}$	42mΩ
I_D	70A

100% DVDS Tested

100% Avalanche Tested

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJQ41N65GCFQ	CRJQ41N65GCFQ	TO-247-3L	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°C
  T_C = 100°C
	I_D	70
		44
			A

Pulsed drain current [2] (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	209	A
Avalanche energy, single pulse (L=30mH, Rg=30Ω)	E_{AS}	1500	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}	687	W
Continuous diode forward current(T_C = 25°C)	I_S	70	A
Diode pulse current [2] (T_C = 25°C)	$I_{S\ pulse}$	209	A
Recovery diode dv/dt [3]	dv/dt	50	V/ns
Maximum diode commutation speed	di_F/dt	900	A/µs
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

1) Limited by Tj,max. Maximum Duty Cycle D = 0.50;
2) Pulse width tp limited by Tj,max
3) Identical low side and high side switch with identical RG

Thermal Resistance

Parameter	Symbol	Value min.	Value typ.	Value max.	Unit	Test Condition
Thermal resistance, junction – case	R_{thJC}	-	0.13	0.18	°C/W	
Thermal resistance, junction – ambient	R_{thJA}	-	-	45	°C/W	

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

Parameter	Symbol	Value min.	Value typ.	Value max.	Unit	Test Condition

Static Characteristic

Parameter	Symbol	Value min.	Value typ.	Value max.	Unit	Test Condition
Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2.9	-	4.9	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	10	μA	V_{DS}=650V,V_{GS}=0V T_j=25°C
		-	1000	-		T_j=150°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±30V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	42	51	mΩ	V_{GS}=10V, I_D=35A, T_j=25°C
		-	110	-		T_j=150°C
Transconductance	g_{fs}	-	44	-	S	V_{DS}=20V,I_D=35A

Dynamic Characteristic

Parameter	Symbol	Value min.	Value typ.	Value max.	Unit	Test Condition
Input Capacitance	C_{iss}		6470		pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}		240			
Reverse Transfer Capacitance	C_{rss}		2.4			
Gate Total Charge	Q_G		176		nC	V_{GS}=10V, V_{DS}=480V, I_D=35A
Gate-Source charge	Q_{gs}		57			
Gate plateau voltage	Q_{gd}		91			
Gate-Drain charge	$V_{plateau}$	-	8	-	V	
Turn-on delay time	$t_{d(on)}$	-	31	-	ns	V_{GS}=10V, I_D=35A, V_{DS}=400V, R_g=1.8Ω
Rise time	t_r	-	14	-		
Turn-off delay time	$t_{d(off)}$	-	63	-		
Fall time	t_f	-	9	-		
Gate resistance	R_G		1		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}	0.7	0.9	1.2	V	V_{GS}=0V,I_{SD}=35A
Body Diode Reverse Recovery Time	t_{rr}		176		ns	Isd=35A dI/dt=100A/us, Vds=400V
Body Diode Reverse Recovery Charge	Q_{rr}		1.2		uC	
Body Diode Reverse Recovery Peak Current	I_{rrm}		12		A	

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Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=25℃)
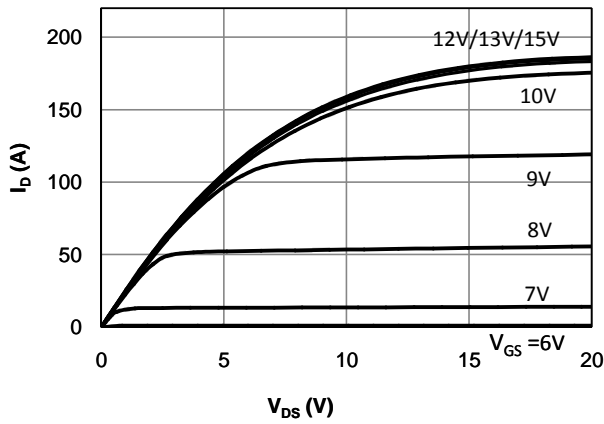
Fig 2. Output Characteristics (Tj=150℃)
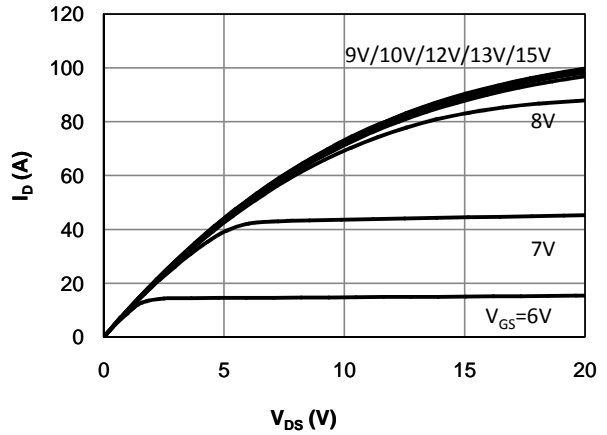
Fig 3: Transfer Characteristics
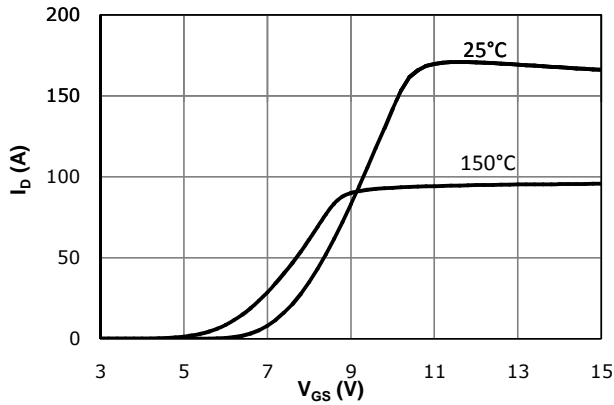
Fig 4: V_{TH} Vs Tj Temperature Characteristics
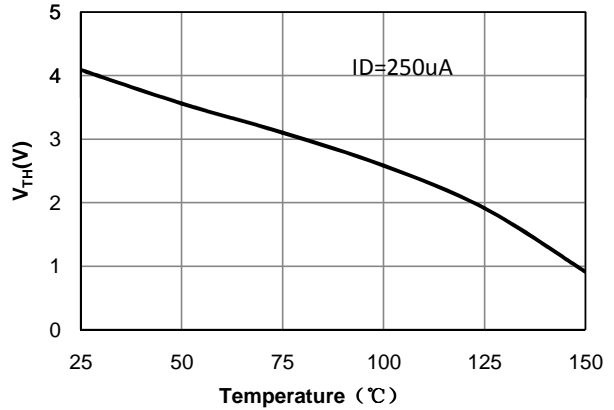
Fig 5: Rdson Vs Ids Characteristics(Tj=25℃)
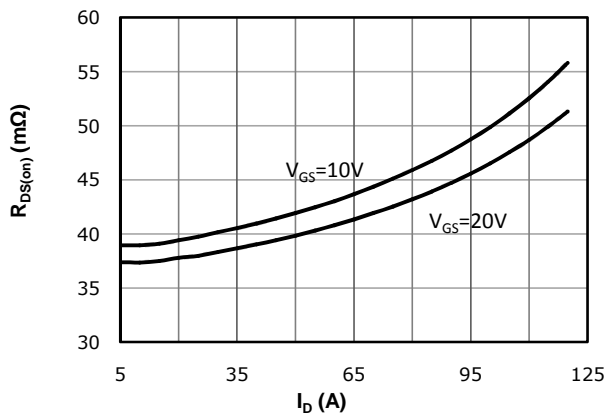
Fig 6: Rds(on) vs. Temperature
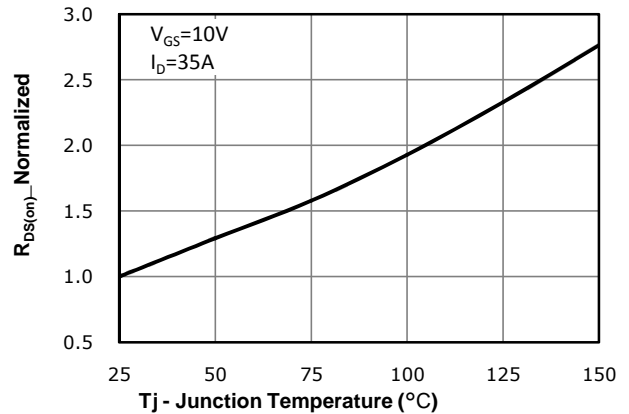
Fig 7: BVDSS vs. Temperature
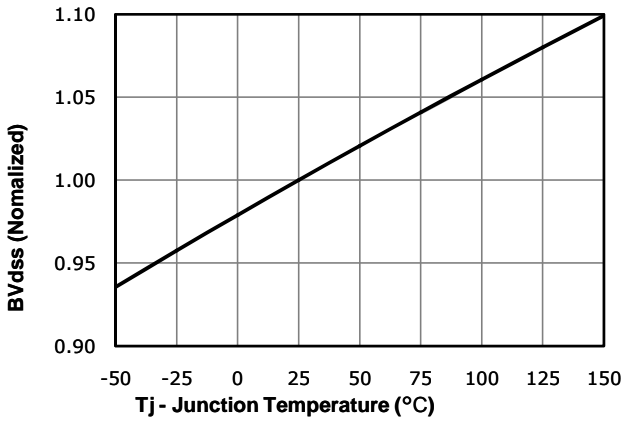
Fig 8: Rds(on) vs Gate Voltage
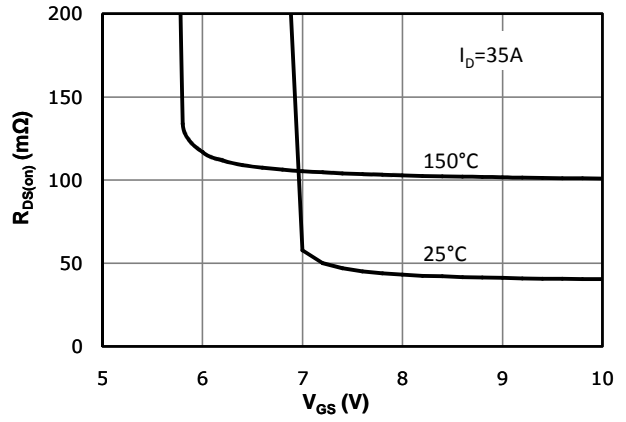
Fig 9: Body-diode Forward Characteristics
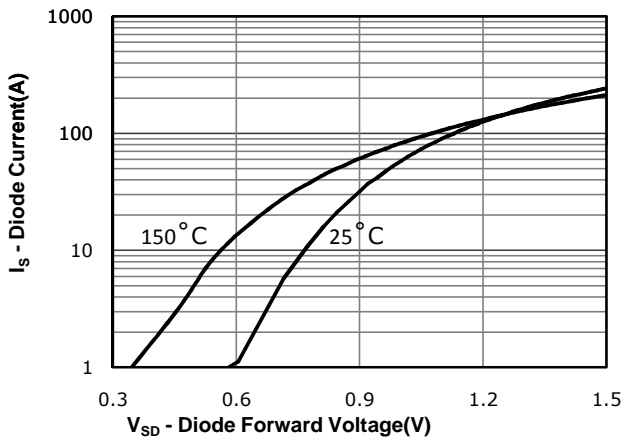
Fig 10: Gate Charge Characteristics
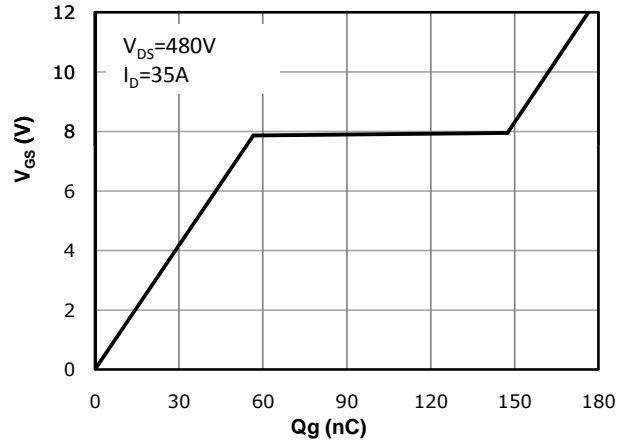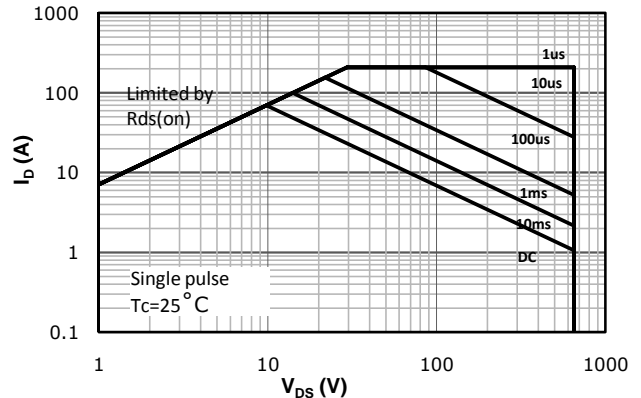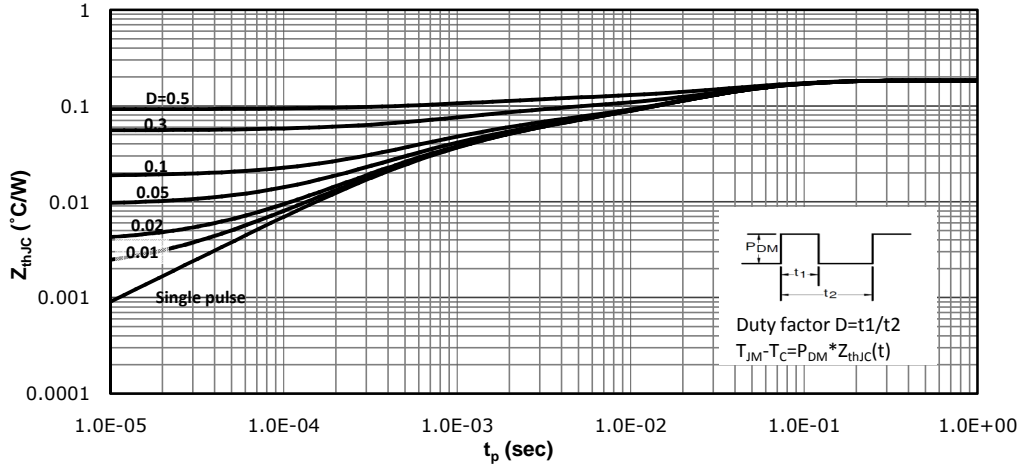
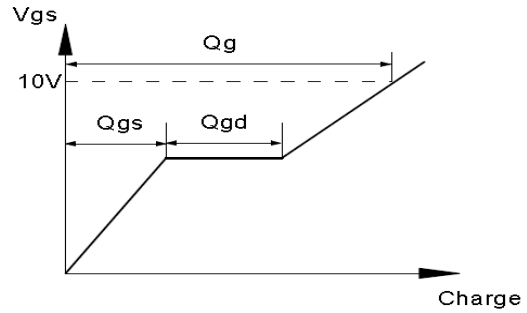**Fig 11: Capacitance Characteristics**
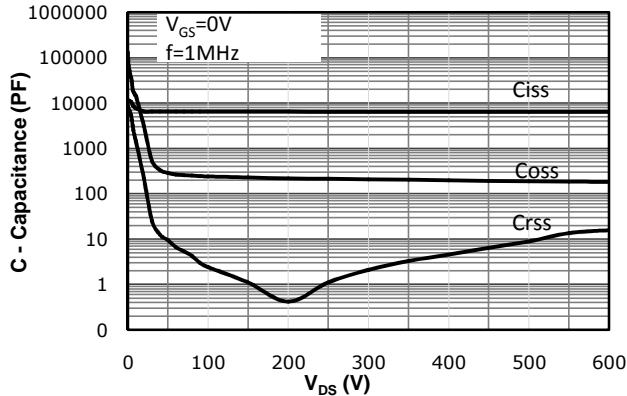
Fig 12: Safe Operating Area

Fig 13: Max. Transient Thermal Impedance
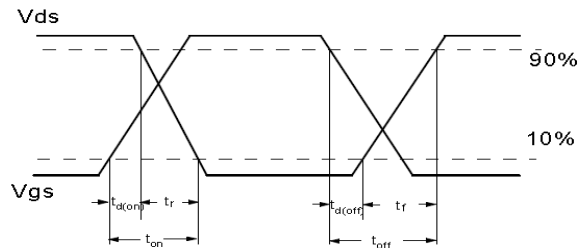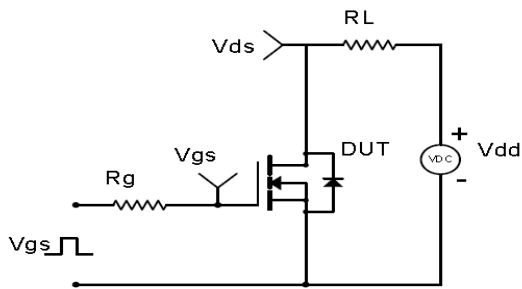

Duty factor D=t1/t2
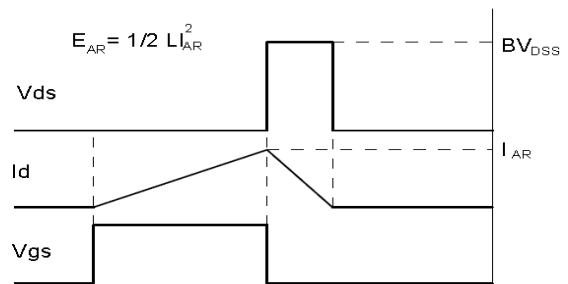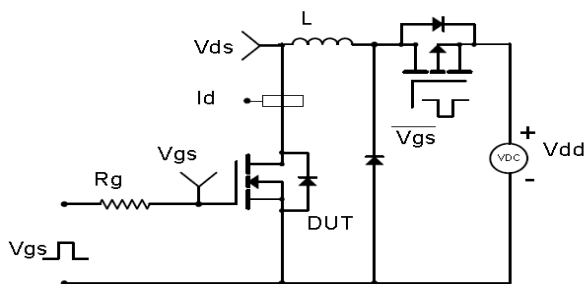$T_{JM}-T_C=P_{DM}*Z_{thJC}(t)$

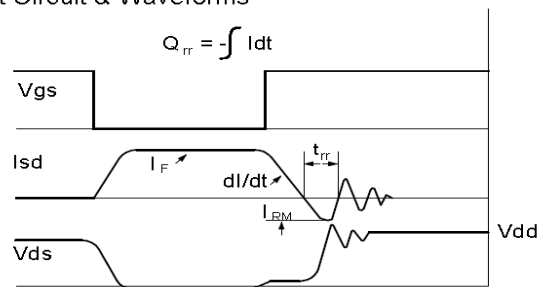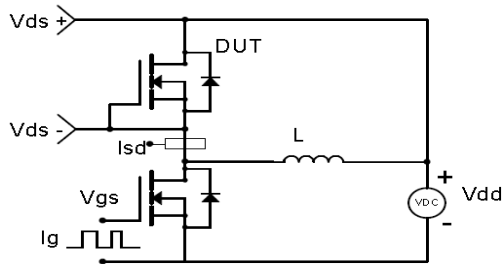## Test Circuit & Waveform

Gate Charge Test Circuit & Waveform
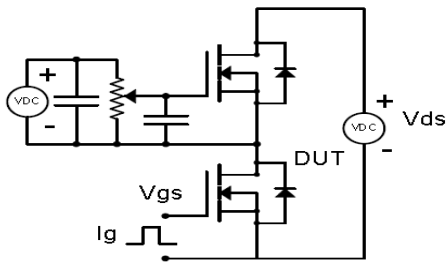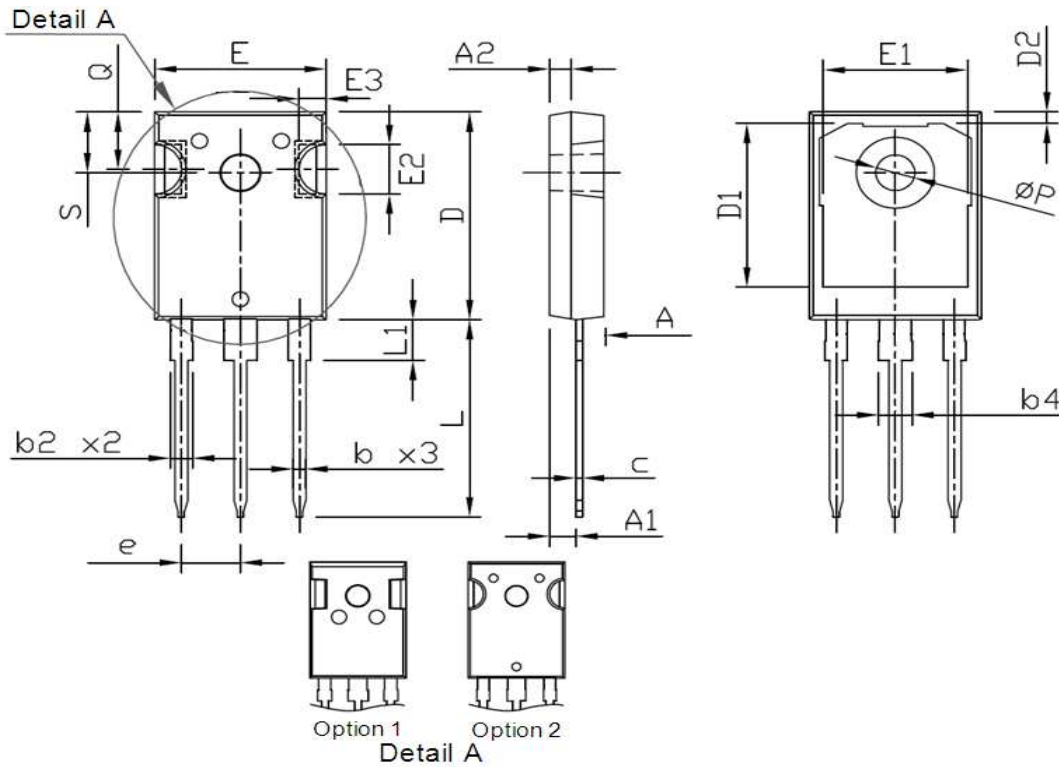

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \ LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = \int Idt$$

Package Outline: TO-247-3L

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.70	5.30	0.185	0.209
A1	2.20	2.60	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	1.04	1.33	0.041	0.052
b2	1.90	2.41	0.075	0.095
b4	2.87	3.43	0.113	0.135
c	0.55	0.70	0.022	0.028
D	20.70	21.30	0.815	0.839
D1	16.25	17.65	0.640	0.695
D2	0.51	1.40	0.020	0.055
e	5.44 BSC.		0.214 BSC.	
E	15.50	16.30	0.610	0.642
E1	13.08	14.16	0.515	0.557
E2	3.80	5.49	0.150	0.216
E3	1.00	2.75	0.039	0.108
L	19.72	20.32	0.776	0.800
L1	3.85	4.50	0.152	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	6.04	6.30	0.238	0.248

Marking

CRJQ41N65GCFQ

XBBAAAAY

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NOTE:
NXBBAAAAY
X        —Assembly location code
BB       —Fab code
AAAA     —Lot code
Y        —Bin code
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Revision History

Revison	Date	Major changes
1.0	2023-3-3	First version

Disclaimer

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