

Features

- CRM(CQ) Super_Junction technology
- Much lower $R_{on} \cdot A$ performance for On-state efficiency
- Much lower FOM for fast switching efficiency

Applications

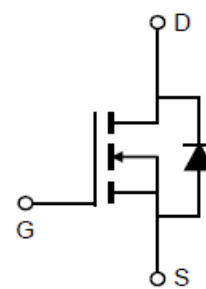
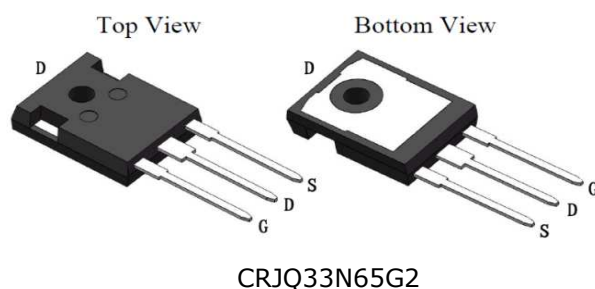
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

Product Summary

V_{DS}	650V
$R_{DS(on)}_{typ}$	28mΩ
I_D	83A

100% DVDS Tested

100% Avalanche Tested



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJQ33N65G2	-	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 $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	83 64	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	332	A
Avalanche energy, single pulse ($L=30\text{mH}$, $R_g=30\Omega$)	E_{AS}	1200	mJ
Gate-Source voltage	V_{GS}	± 30	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	671	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case. Max	RthJC	-	0.133	0.19	°C/W	
Thermal resistance, junction – ambient. Max	RthJA	-	-	47	°C/W	

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}	650	-	-	V	V _{GS} =0V, I _D =250uA
Gate threshold voltage	V _{GS(th)}	3	-	4	V	V _{DS} =V _{GS} , I _D =250uA
Zero gate voltage drain current	I _{DSS}	-	-	1	μA	V _{DS} =650V, V _{GS} =0V T _C =25°C
		-	30	-		T _C =150°C
Gate-source leakage current	I _{GSS}	-	-	±100	nA	V _{GS} =±30V, V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	-	28	33	mΩ	V _{GS} =10V, I _D =42A, T _C =25°C
		-	75	-		T _C =150°C
Transconductance	g _{fs}	-	77	-	S	V _{DS} =20V, I _D =42A

Dynamic Characteristic

Input Capacitance	C _{iss}	-	6740	10110	pF	V _{GS} =0V, V _{DS} =100V, f=1MHz
Output Capacitance	C _{oss}	-	367	551		
Reverse Transfer Capacitance	C _{rss}	-	33	66		
Gate Total Charge	Q _G	-	200	300	nC	V _{GS} =10V, V _{DS} =480V, I _D =42A, f=1MHz
Gate-Source charge	Q _{gs}	-	41	61.5		
Gate-Drain charge	Q _{gd}	-	83	166		
Turn-on delay time	t _{d(on)}	-	110	-	ns	T _J =25°C, V _{GS} =10V, I _D =42A, V _{DS} =400V, R _g =27Ω
Rise time	t _r	-	95	-		
Turn-off delay time	t _{d(off)}	-	713	-		
Fall time	t _f	-	126	-		
Gate resistance	R _G	-	0.95	1.9	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	0.86	1.2	V	$V_{GS}=0V, I_{SD}=42A$
Body Diode Reverse Recovery Time	t_{rr}	-	575	1150	ns	$I_{SD}=41A$ $dI/dt=100A/\mu s, V_{DS}=400V$
Body Diode Reverse Recovery Charge	Q_{rr}	-	13.5	27	μC	

Typical Performance Characteristics

Fig 1: Output Characteristics ($T_j=25^\circ\text{C}$)

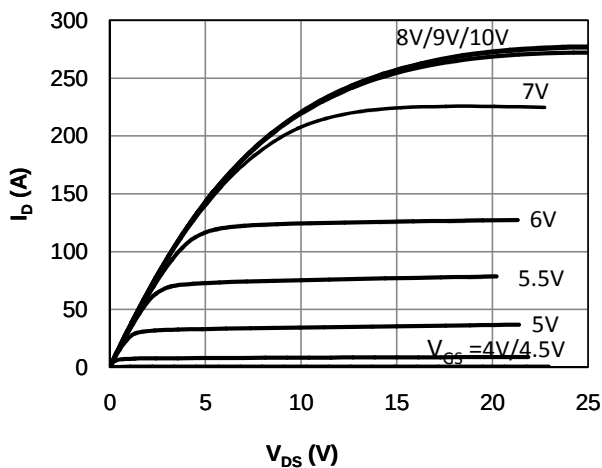


Fig 2: Output Characteristics ($T_j=150^\circ\text{C}$)

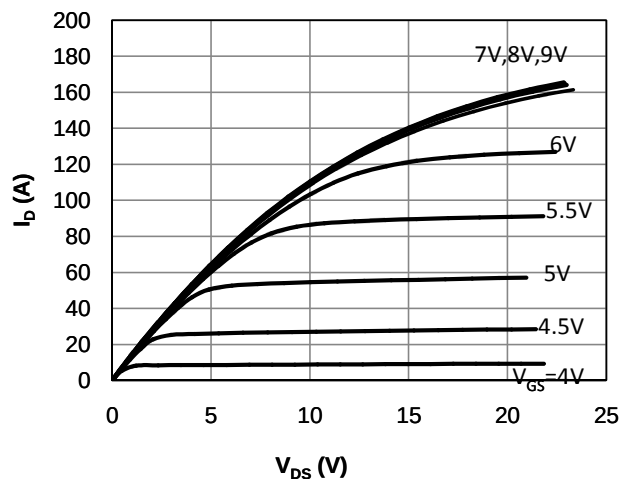


Fig 3: Transfer Characteristics

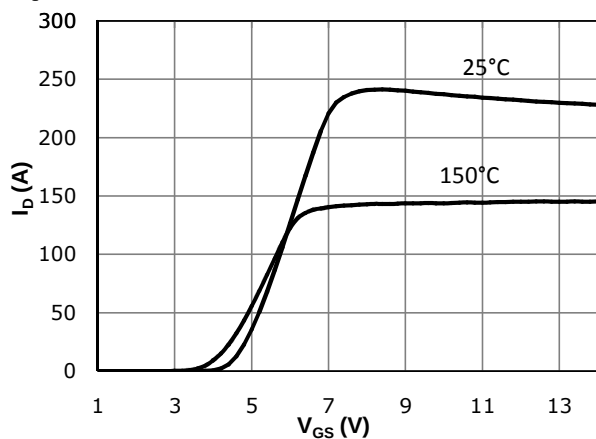


Fig 4: V_{TH} Vs T_j Temperature Characteristics

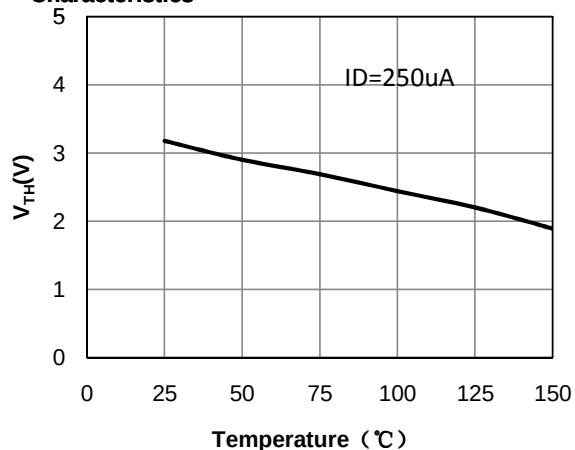


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics ($T_c=25^\circ\text{C}$)

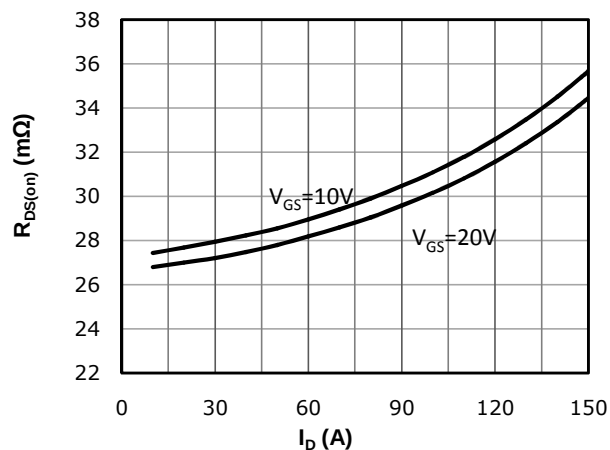


Fig 6: $R_{DS(on)}$ vs. Temperature

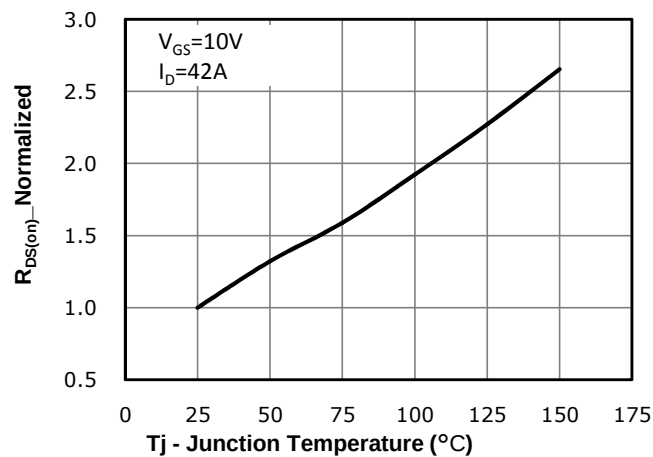


Fig 7: BVDSS vs. Temperature

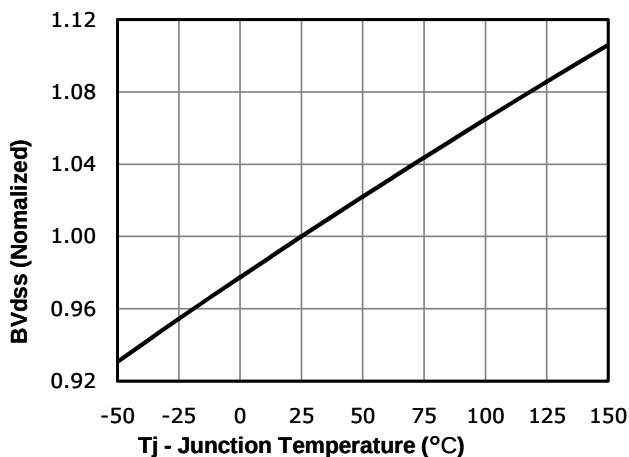


Fig 8: Rds(on) vs Gate Voltage

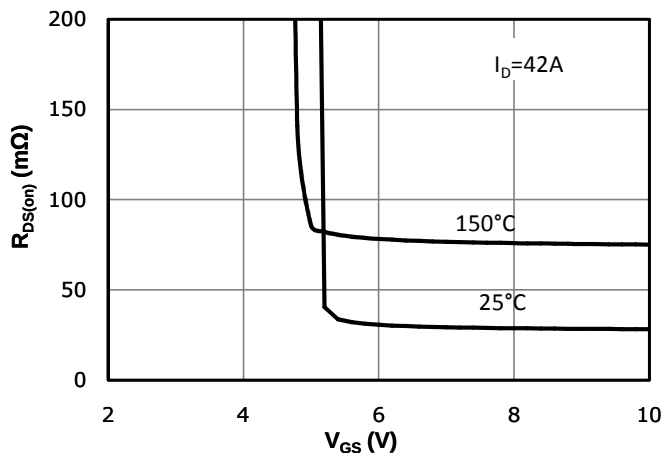


Fig 9: Body-diode Forward Characteristics

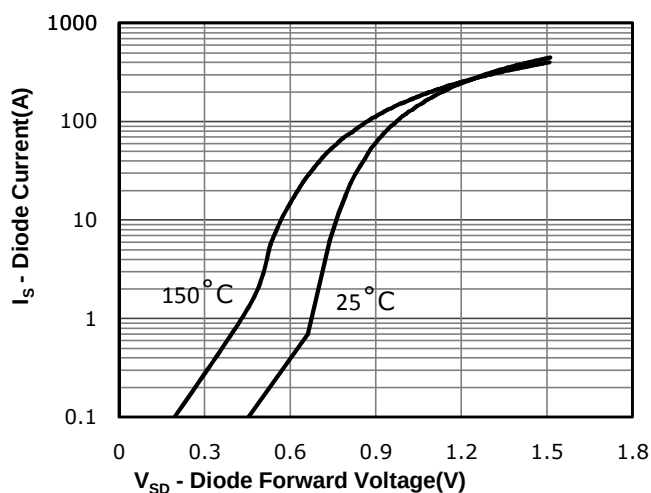


Fig 10: Gate Charge Characteristics

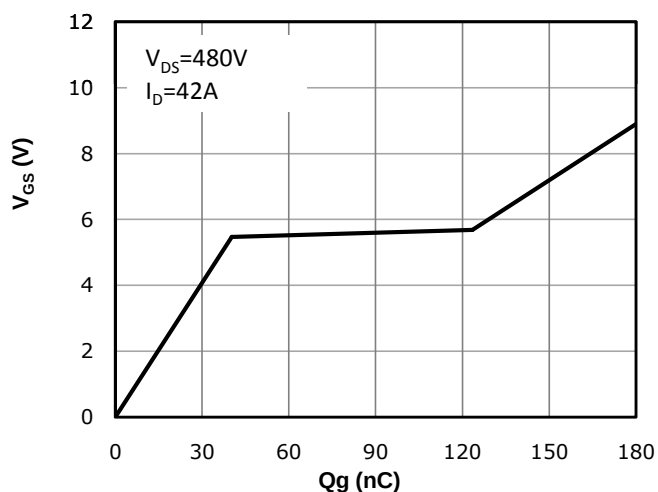


Fig 11: Capacitance Characteristics

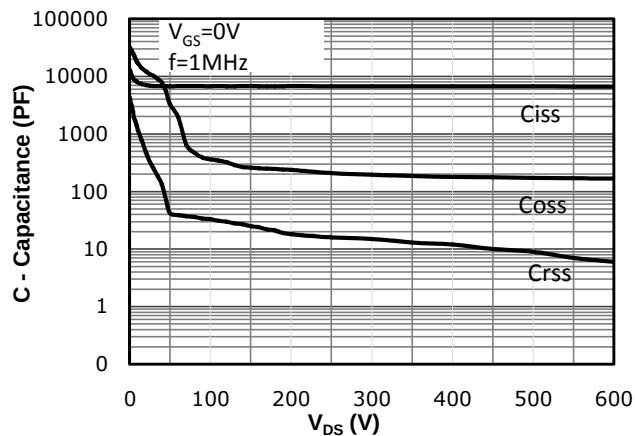


Fig 12: Safe Operating Area

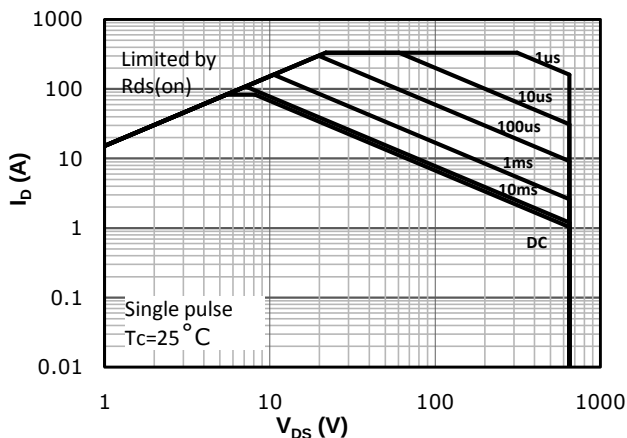
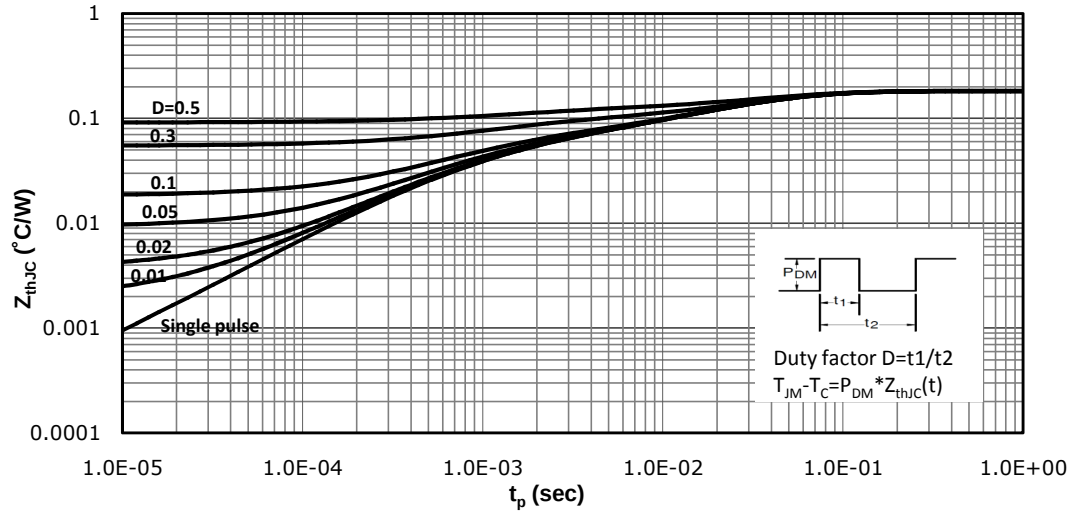
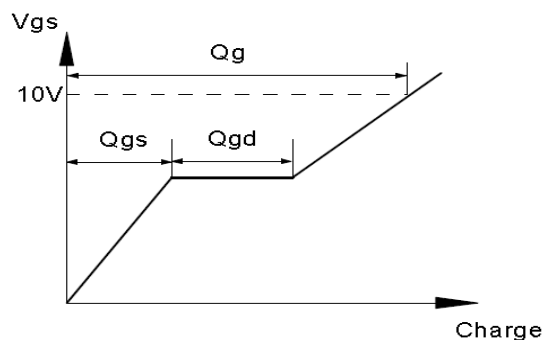
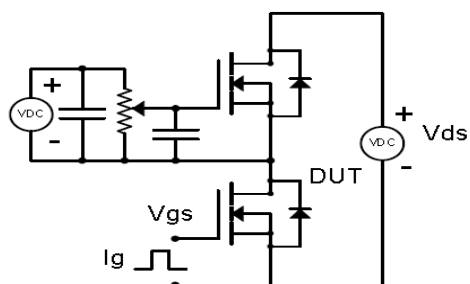


Fig 13: Max. Transient Thermal Impedance

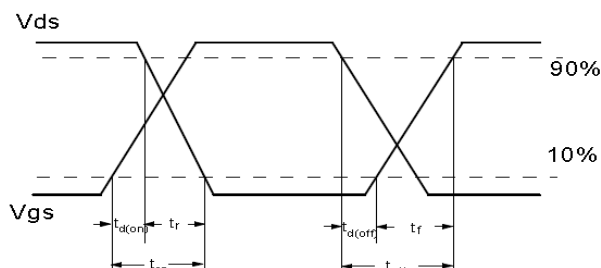
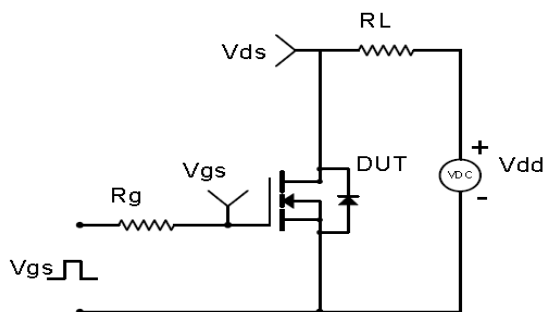


Test Circuit & Waveform

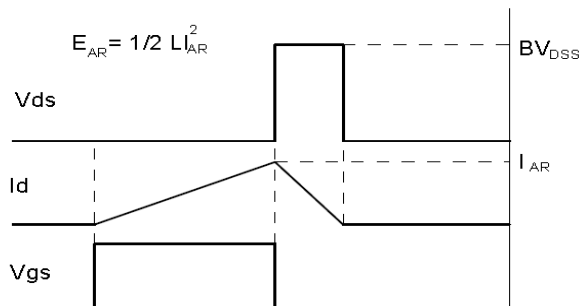
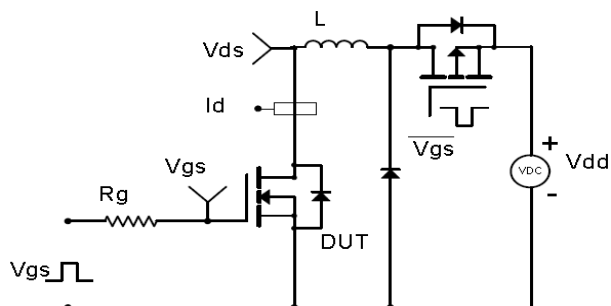
Gate Charge Test Circuit & Waveform



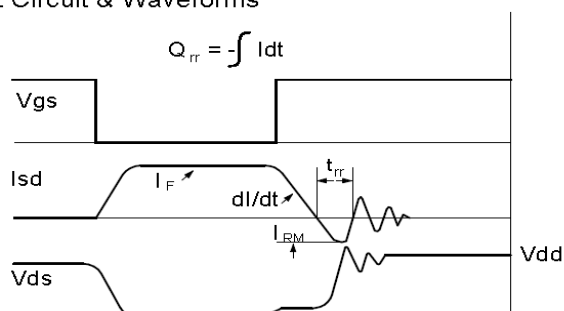
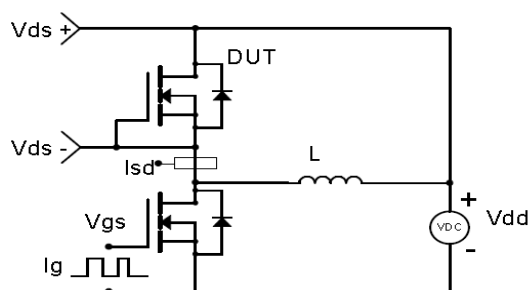
Resistive Switching Test Circuit & Waveforms



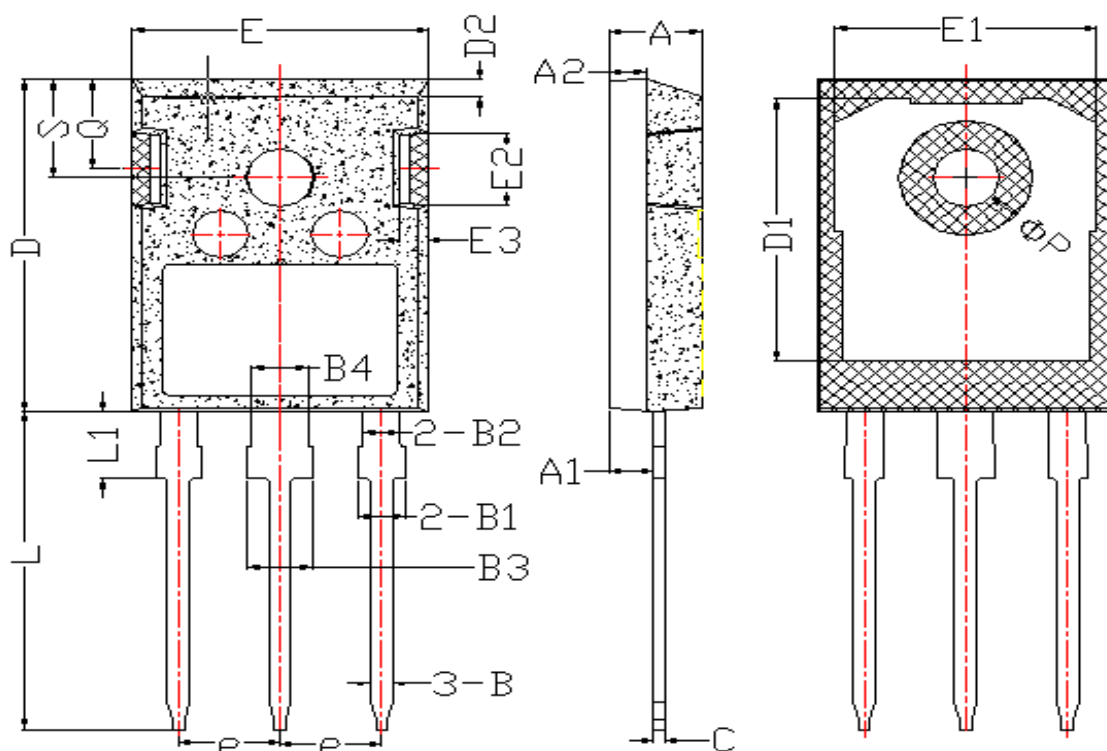
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-247-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.60	5.20	0.181	0.205
A1	2.20	2.60	0.087	0.102
A2	1.80	2.20	0.071	0.087
B	0.90	1.40	0.035	0.055
B1	1.75	2.35	0.069	0.093
B2	1.75	2.15	0.069	0.085
B3	2.80	3.35	0.110	0.132
B4	2.80	3.15	0.110	0.124
C	0.50	0.70	0.020	0.028
D	20.60	21.30	0.811	0.839
D1	16.00	18.00	0.630	0.709
D2	0.90	1.40	0.035	0.055
E	15.50	16.10	0.610	0.634
E1	13.00	14.70	0.512	0.579
E2	3.80	5.30	0.150	0.209
E3	0.80	2.60	0.031	0.102
e	5.20	5.70	0.205	0.224
L	19.00	20.50	0.748	0.807
L1	3.90	4.60	0.154	0.181
ΦP	3.30	3.70	0.130	0.146
Q	5.20	6.00	0.205	0.236
S	5.80	6.60	0.228	0.260

Marking



NOTE:

NXBBAAAAAY

X —Assembly location code

BB —Fab code

AAAA —Lot code

Y —Bin code

Revision History

Revision	Date	Major changes
1.0	2020-8-18	First version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified 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 semiconductor 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.