CRTT095N12N

Trench N-MOSFET 120V, 7.3mΩ, 112A

华润微电子(重庆)有限公司

Features

- Uses CRM(CQ) advanced Trench technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
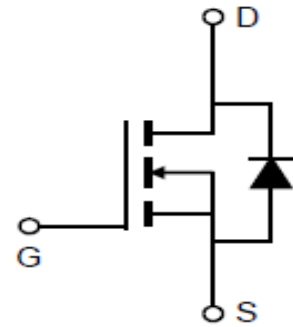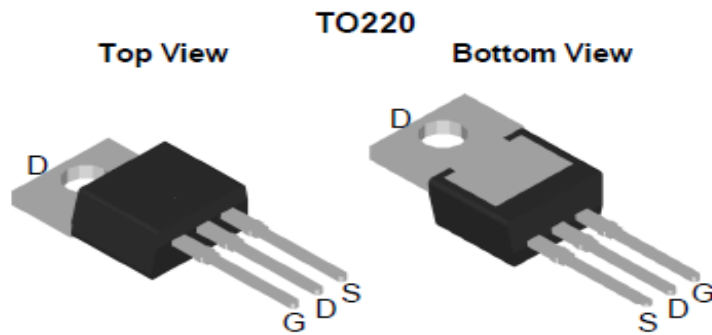- Qualified according to JEDEC criteria

Applications

- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

Product Summary

V_{DS}	120V
$R_{DS(on)}$ typ.	7.3mΩ
I_D	112A

100% DVDS Tested

100% Avalanche Tested

RoHS   H F

TO220

Top View   Bottom View

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTT095N12N	CRTT095N12N	TO-220	Tube	N/A	N/A	50pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	120	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	112 160 71	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	448	A
Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)	E_{AS}	256	mJ
Gate-Source voltage	V_{GS}	±25	V
Power dissipation (T_C = 25°C)	P_{tot}	254	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	°C

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.49	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}*	84	

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

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

Static Characteristic

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
Drain-source breakdown voltage	BV_{DSS}	120	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	0.08	1	µA	V_{DS}=120V,V_{GS}=0V T_j=25°C
		-	-	200		T_j=150°C
Gate-source leakage current	I_{GSS}	-	±10	±100	nA	V_{GS}=±25V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	7.3	9.5	mΩ	V_{GS}=10V, I_D=75A, T_j=25°C
		-	16.2	20		T_j=150°C
Transconductance	g_{fs}	-	156	-	S	V_{DS}=5V,I_D=75A

Dynamic Characteristic

Parameter	Symbol	min.	typ.	max.	Unit	Test Condition
Input Capacitance	C_{iss}	-	5996	-	pF	V_{GS}=0V, V_{DS}=60V, f=1MHz
Output Capacitance	C_{oss}	-	410	-		
Reverse Transfer Capacitance	C_{rss}	-	133	-		
Gate Total Charge	Q_G	-	127	-	nC	V_{GS}=10V, V_{DS}=60V, I_D=75A, f=1MHz
Gate-Source charge	Q_{gs}	-	32	-		
Gate-Drain charge	Q_{gd}	-	45	-		
Turn-on delay time	$t_{d(on)}$	-	20	-	ns	V_{GS}=10V, V_{DD}=60V, R_{G_ext}=2.7Ω,I_D=75A
Rise time	t_r	-	103	-		
Turn-off delay time	$t_{d(off)}$	-	62	-		
Fall time	t_f	-	110	-		
Gate resistance	R_G	-	1.7	-	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}	-	0.9	1.3	V	V_{GS}=0V,I_{SD}=75A
Body Diode Continuous Forward Current	I_S			112	A	T_C = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	58	-	ns	I_F=75A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	154	-	nC	

*The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Typical Performance Characteristics

Fig 1: Output Characteristics
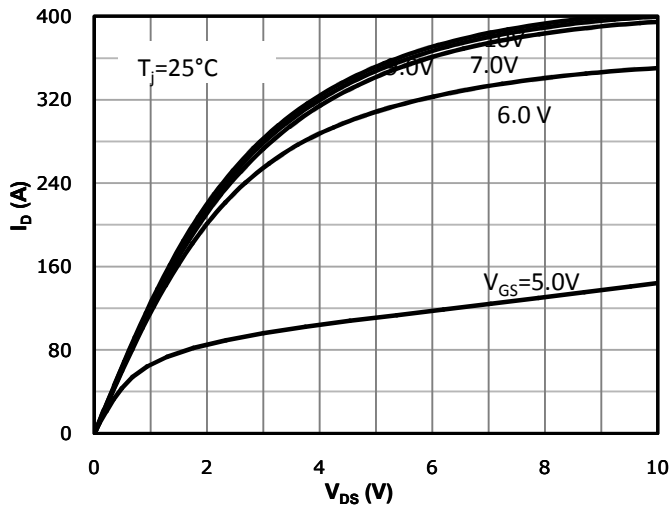
Fig 2: Transfer Characteristics
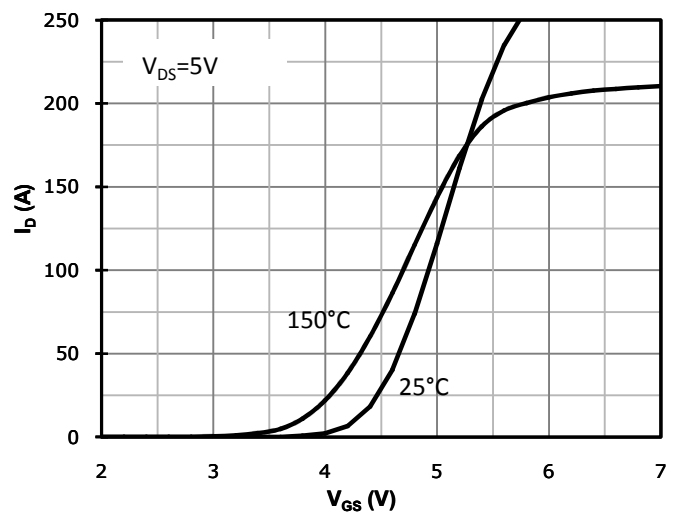
Fig 3: Rds(on) vs Drain Current and Gate Voltage
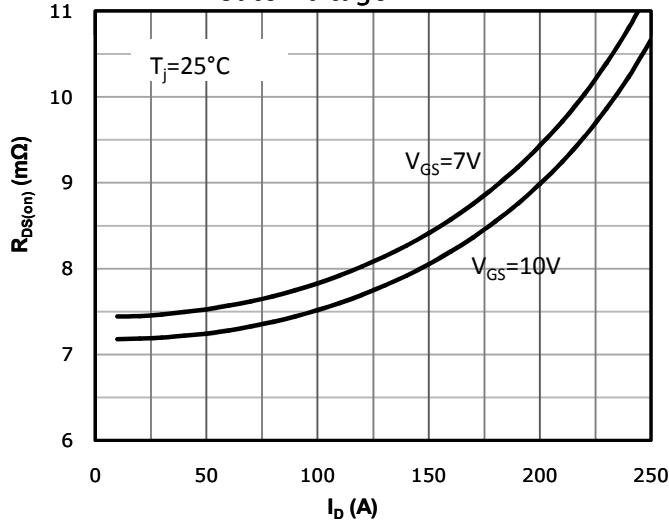
Fig 4: Rds(on) vs Gate Voltage
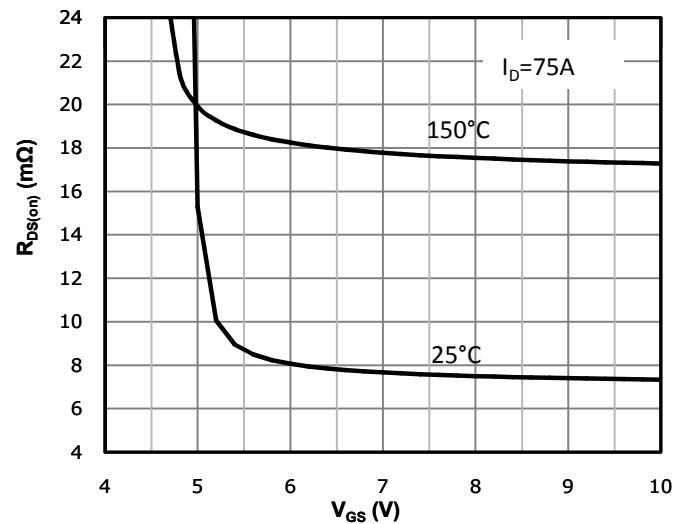
Fig 5: Rds(on) vs. Temperature
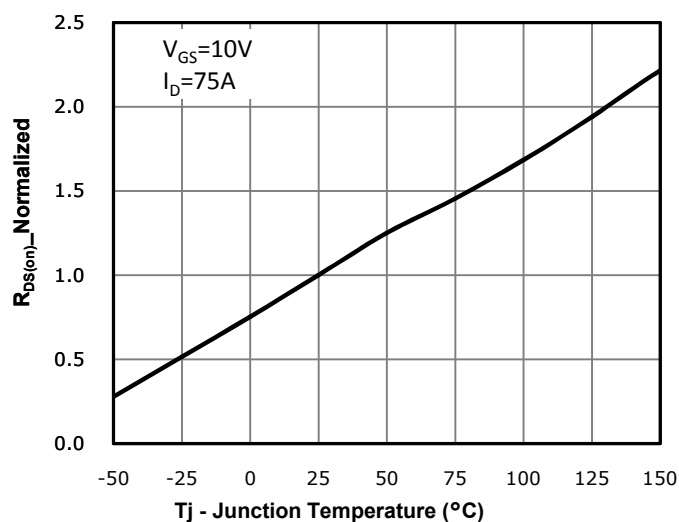
Fig 6: Capacitance Characteristics
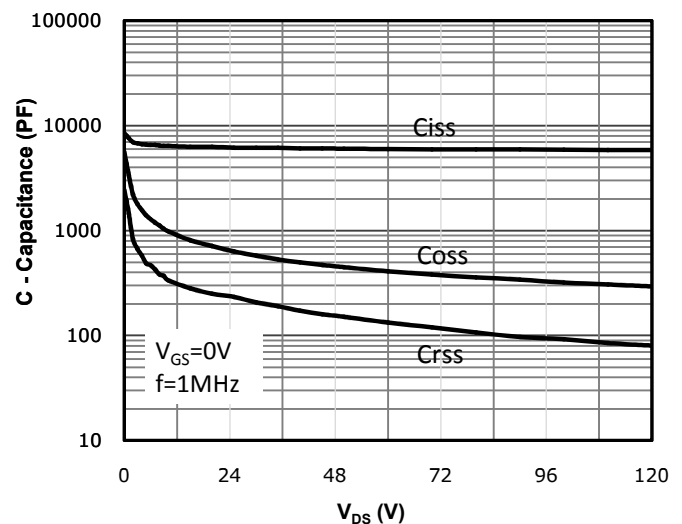
Fig 7: Gate Charge Characteristics

V_{DS}=60V
I_D=75A
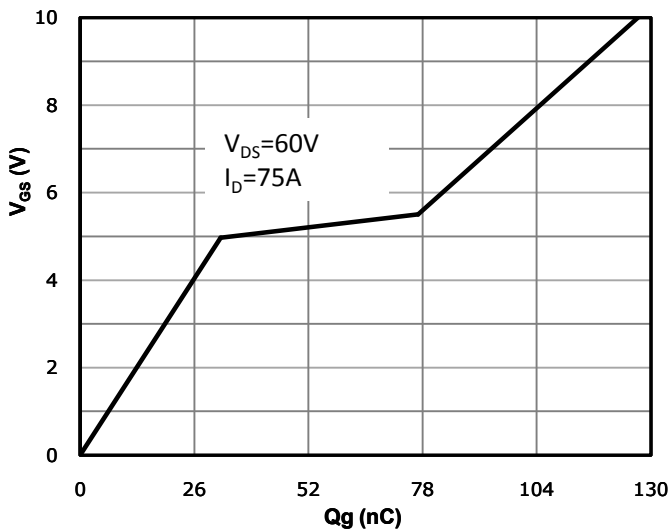
Fig 8: Body-diode Forward Characteristics

150°C   25°C
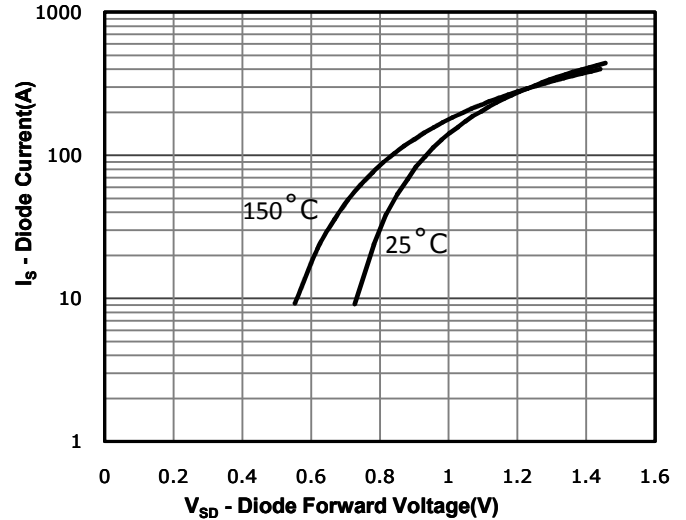
Fig 9: Power Dissipation
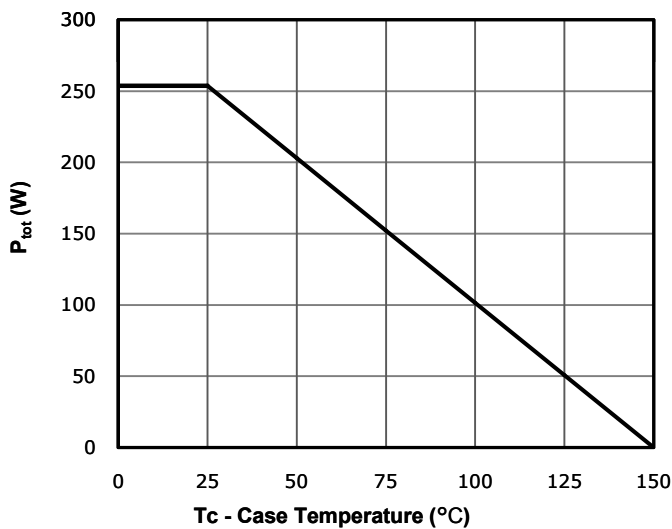
Fig 10: Drain Current Derating

$V_{GS} \geq 10V$
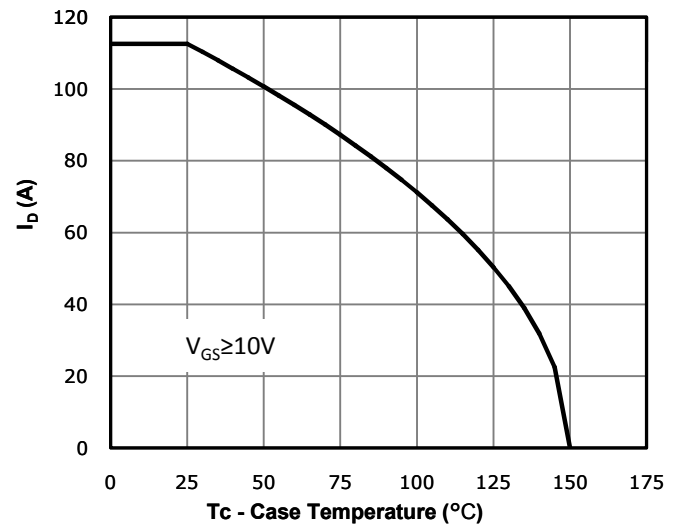
Fig 11: Safe Operating Area

Limited by Rds(on)
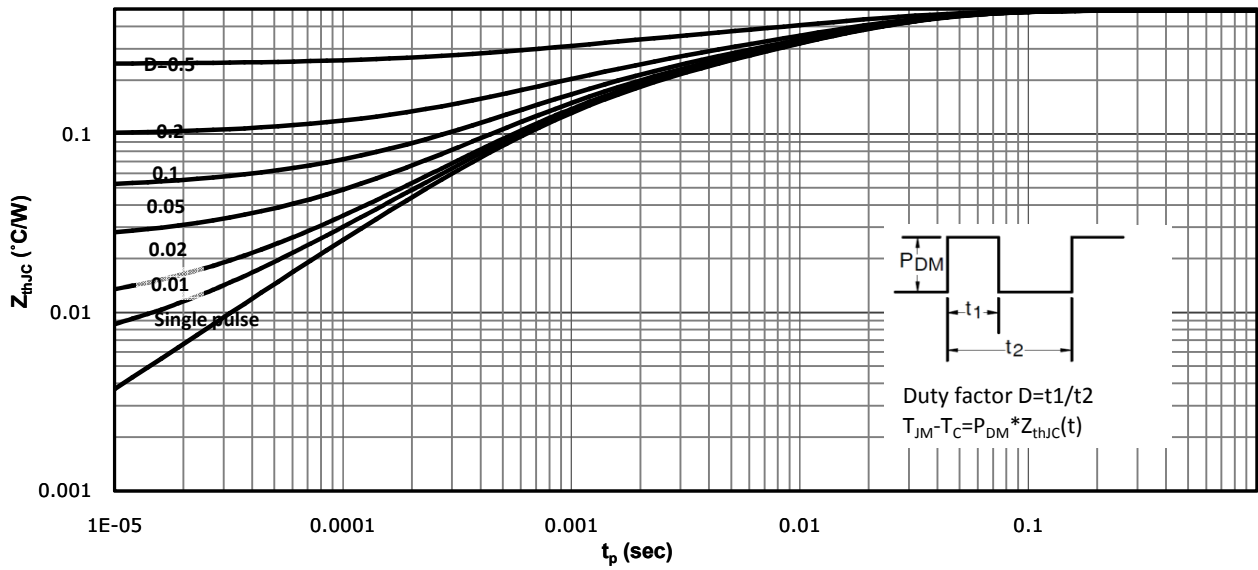
1us
10us
100us
1ms
10ms
DC

Single pulse
Tc=25°C

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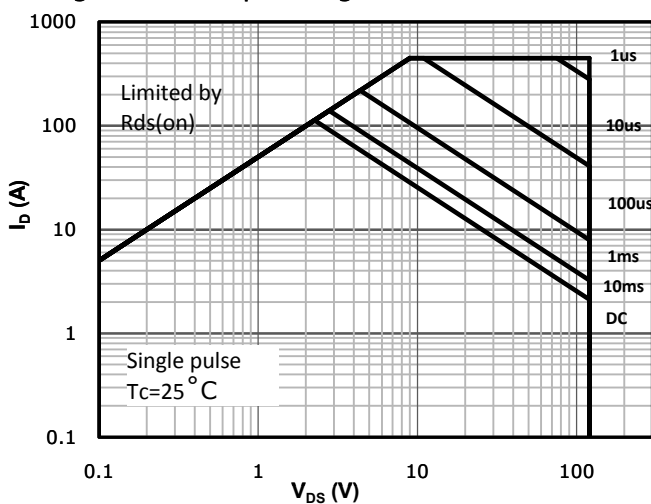
Fig 12: Max. Transient Thermal Impedance

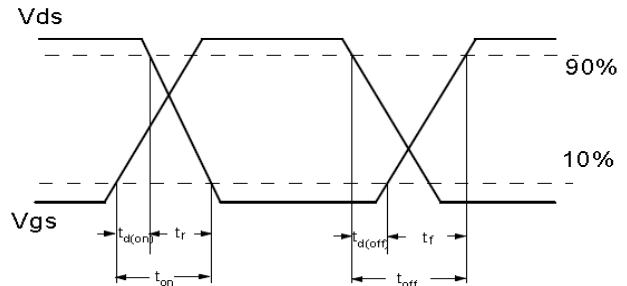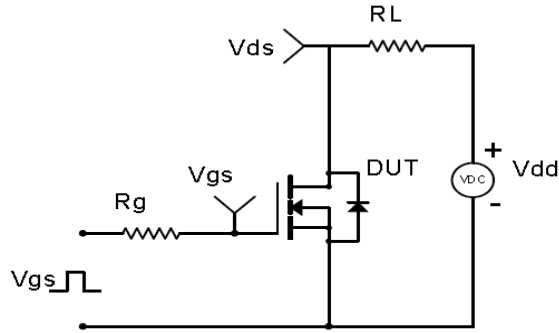

Duty factor D=t1/t2
$T_{JM}-T_C=P_{DM}*Z_{thJC}(t)$
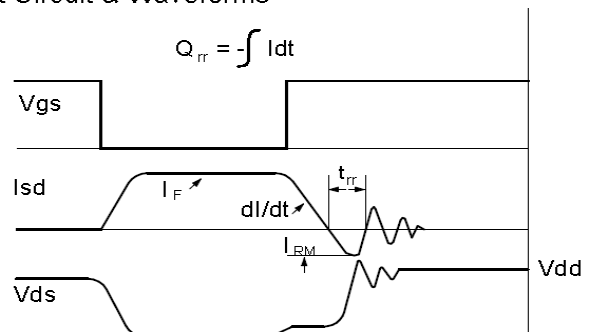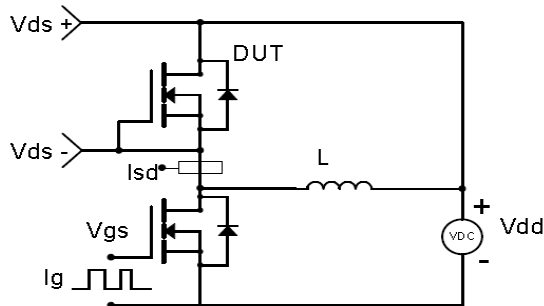
Test Circuit & Waveform

Gate Charge Test Circuit & Waveform

Vgs

Q_g

10V

Q_{gs} Q_{gd}

Charge
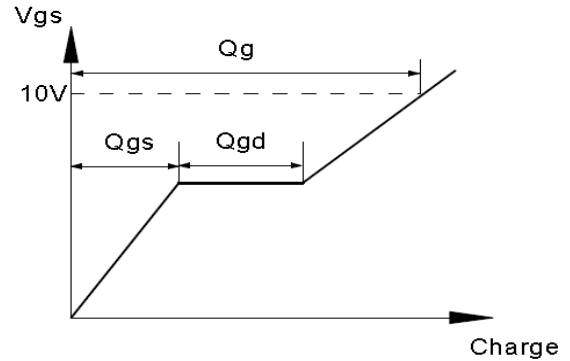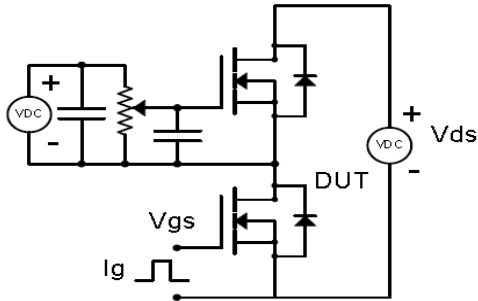
Resistive Switching Test Circuit & Waveforms

Vds

90%

10%

Vgs

$t_{d(on)}$ t_r $t_{d(off)}$ t_f

t_{on} t_{off}

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

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

BV_{DSS}

Vds

Id I_{AR}

Vgs
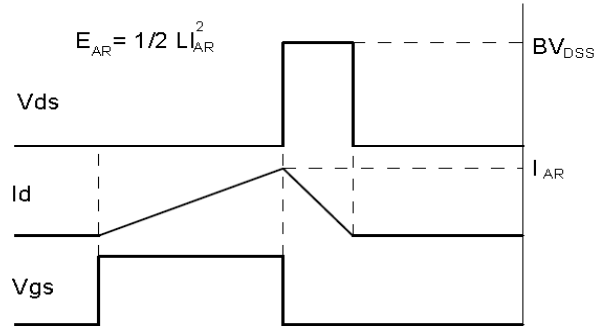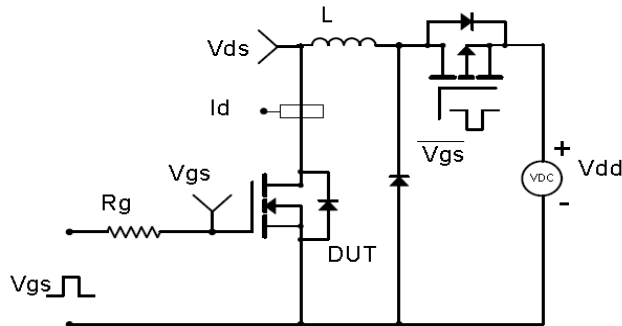
Diode Recovery Test Circuit & Waveforms

$Q_{rr} = -\int Idt$

Vgs

Isd I_F t_{rr}

dI/dt

I_{RM}

Vds Vdd

Package Outline: TO-220-3L

Detail 'A'

Detail 'B'
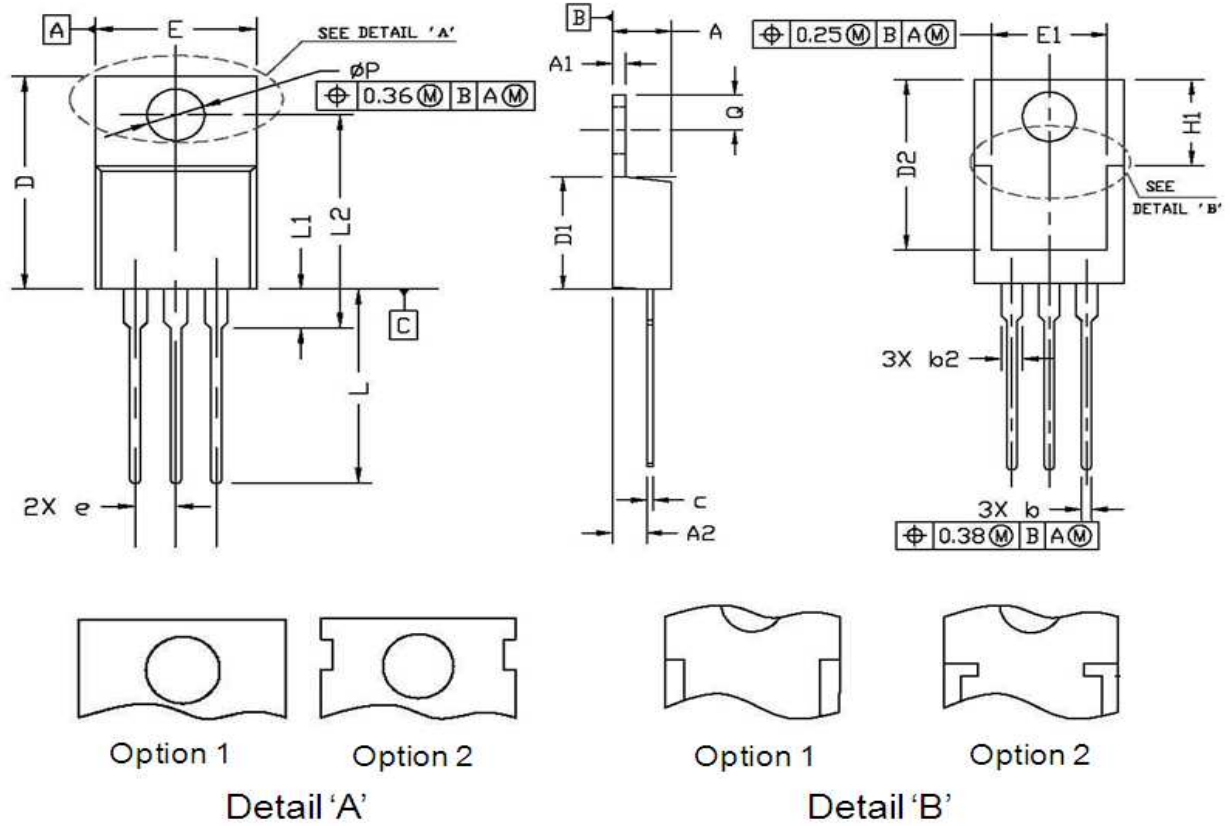
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.80	0.169	0.189
A1	1.20	1.45	0.047	0.057
A2	2.20	2.90	0.087	0.114
b	0.69	0.95	0.027	0.037
b2	1.00	1.60	0.039	0.063
c	0.33	0.65	0.013	0.026
D	14.70	16.20	0.579	0.638
D1	8.59	9.65	0.338	0.380
D2	11.75	13.60	0.463	0.535
e	2.54 BSC.		0.100 BSC.	
E	9.60	10.60	0.378	0.417
E1	7.00	8.46	0.276	0.333
H1	6.20	7.00	0.244	0.276
L	12.60	14.80	0.496	0.583
L1	2.70	3.80	0.106	0.150
L2	12.13	16.50	0.478	0.650
Q	2.40	3.10	0.094	0.122
P	3.50	3.90	0.138	0.154

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Revision History

Revison	Date	Major changes
1.0	2018/10/30	Release of formal version
2.0	2019/7/22	Increase the environmental labeling, I_S, T_{sold}, I_{GSS} test value at V_{GS}=-25V;Update $R_{DS(on)}$,Q_G/Q_{gs}/Q_{gd},g_{fs},V_{SD},$t_{d(on)}$/t_r/$t_{d(off)}$/t_f and t_{rr}/Q_{rr} test current from 50A to 75A;Update Fig3/Fig4/Fig7 of Typical Performance Characteristics;Update Package Outline.

Disclaimer

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