



24A 650V N-CHANNEL POWER MOSFET

TO-220-3L(*Prefix :C)

Description

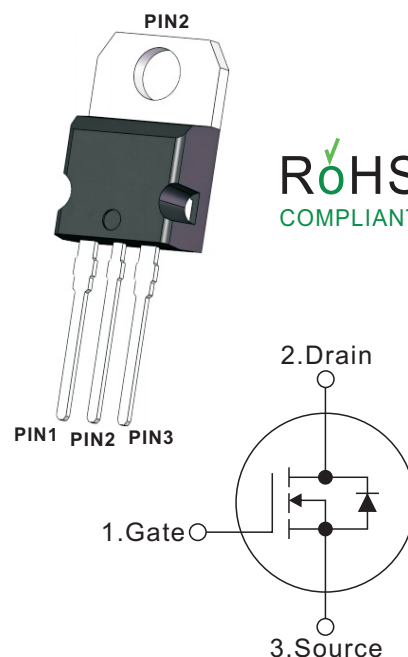
The power MOSFET using **super junction** technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

Features

- $R_{DS(ON)} \leq 125m\Omega @ V_{GS}=10V, I_D=12A$
- Fast switching capability
- Low On-Resistance
- 100% Avalanche tested
- 100% ΔV_{DS} tested

Mechanical data

- Case: TO-220-3L
- pprox. Weight: 2.04g (0.07oz)
- Lead free finish, RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".



Absolute Maximum Ratings (Ta=25°C, Unless Otherwise Specified)

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DSS}	650	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	I_D	24 14	A
		$T_c=25^\circ C$ $T_c=100^\circ C$	
Pulsed Drain Current (Note 2)	I_{DM}	67	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	720	mJ
Power Dissipation ($T_c = 25^\circ C$)	P_D	260	W
Operating junction and storage temperature	T_J, T_{STG}	-55 ~ +150	$^\circ C$

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. IAS=12.0A, L=10mH, VDD=50V, RG=25 Ω , Starting $T_J=25^\circ C$

Thermal Resistance

Parameter	Symbols	Ratings	Units
Thermal resistance, junction – case.	R_{thJC}	0.48	$^\circ C/W$
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	$^\circ C/W$



Electrical Characteristics (Ta=25°C, Unless Otherwise Specified)

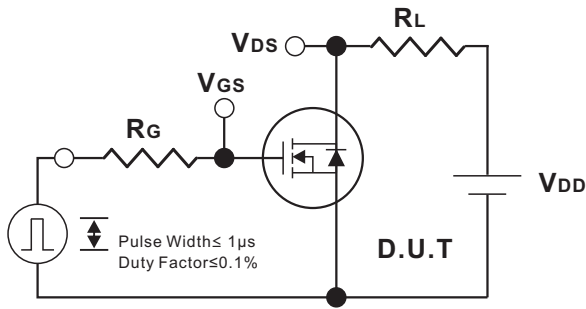
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=12A$		86	125	$m\Omega$
Transconductance	g_{fs}	$V_{DS}=20V, I_D=12A$		3.8		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$		2330		pF
Output Capacitance	C_{OSS}			1390		pF
Reverse Transfer Capacitance	C_{RSS}			70		pF
Gate resistance	R_G			5		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=480V, V_{GS}=10V,$ $I_D=20A$ (NOTE1,2)		38		nC
Gate-Source Charge	Q_{GS}			10		nC
Gate-Drain Charge	Q_{GD}			15		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=300V, I_D=20A$ $R_G=25\Omega, V_{GS}=10V$ (NOTE1,2)		24		ns
Turn-On Rise Time	t_R			85		ns
Turn-Off Delay Time	$t_{D(OFF)}$			210		ns
Turn-Off Fall Time	t_F			69		ns
Drain-Source Diode Characteristics And Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S				20	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=24A, V_{GS}=0V$			1.2	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_F=24A$ $di/dt=100A/\mu s$		436		ns
Reverse Recovery Charge	Q_{rr}			6		μC

Notes:

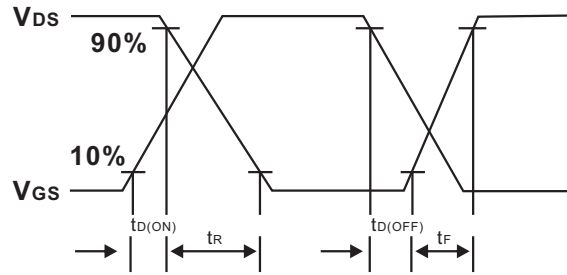
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



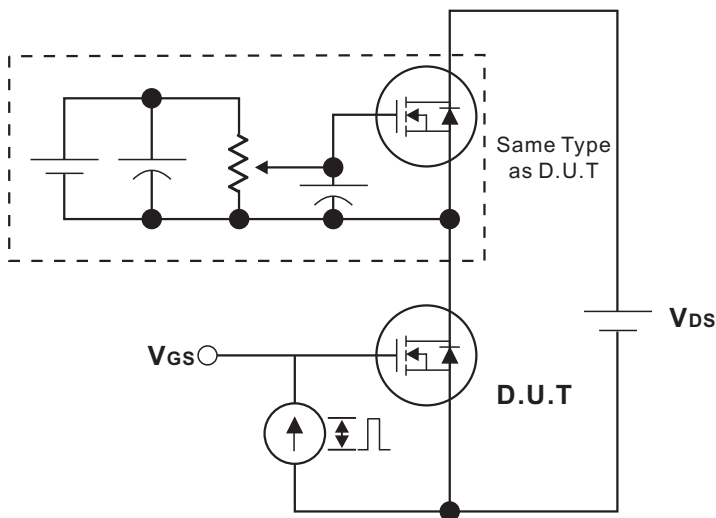
Test Circuits and waveforms



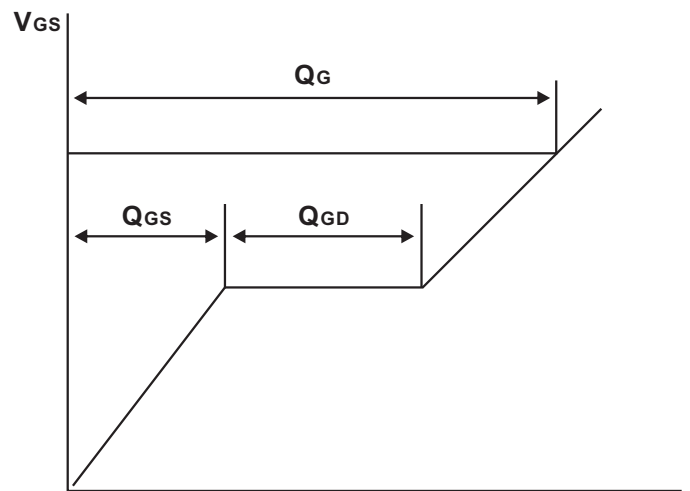
Switching Test Circuit



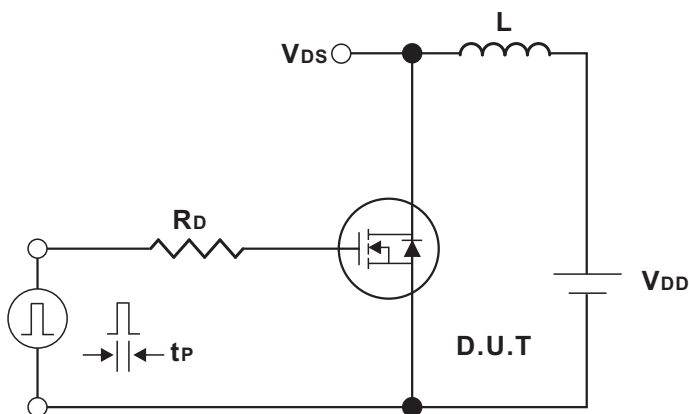
Switching Waveforms



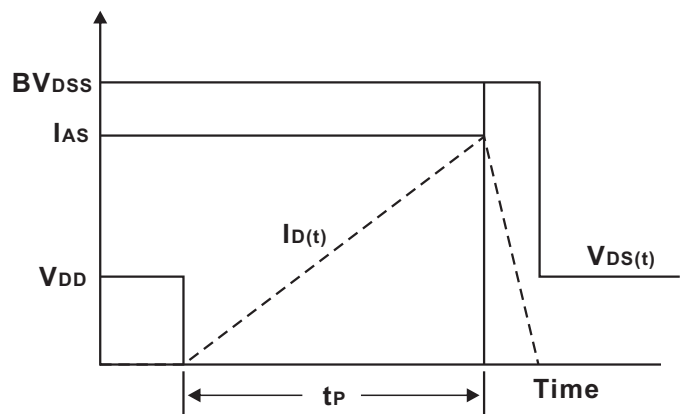
Gate Charge Test Circuit



Charge
Gate Charge Waveform



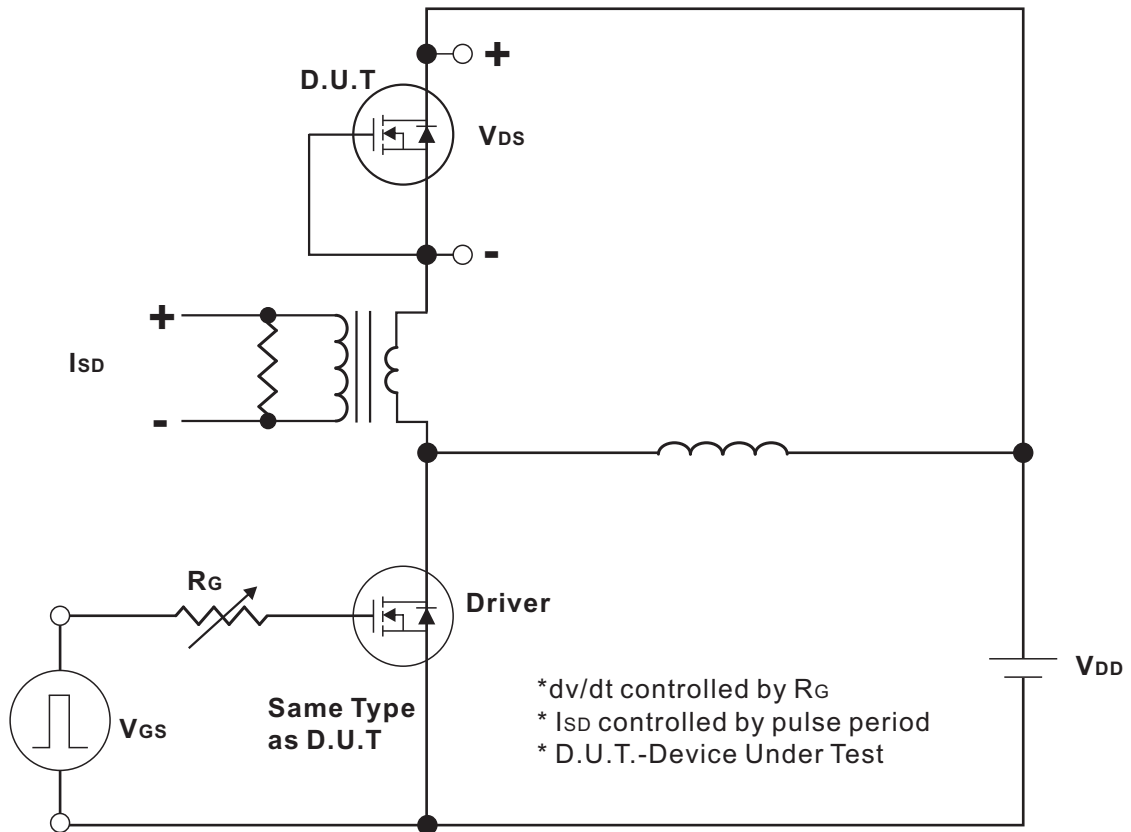
Unclamped Inductive Switching Test Circuit



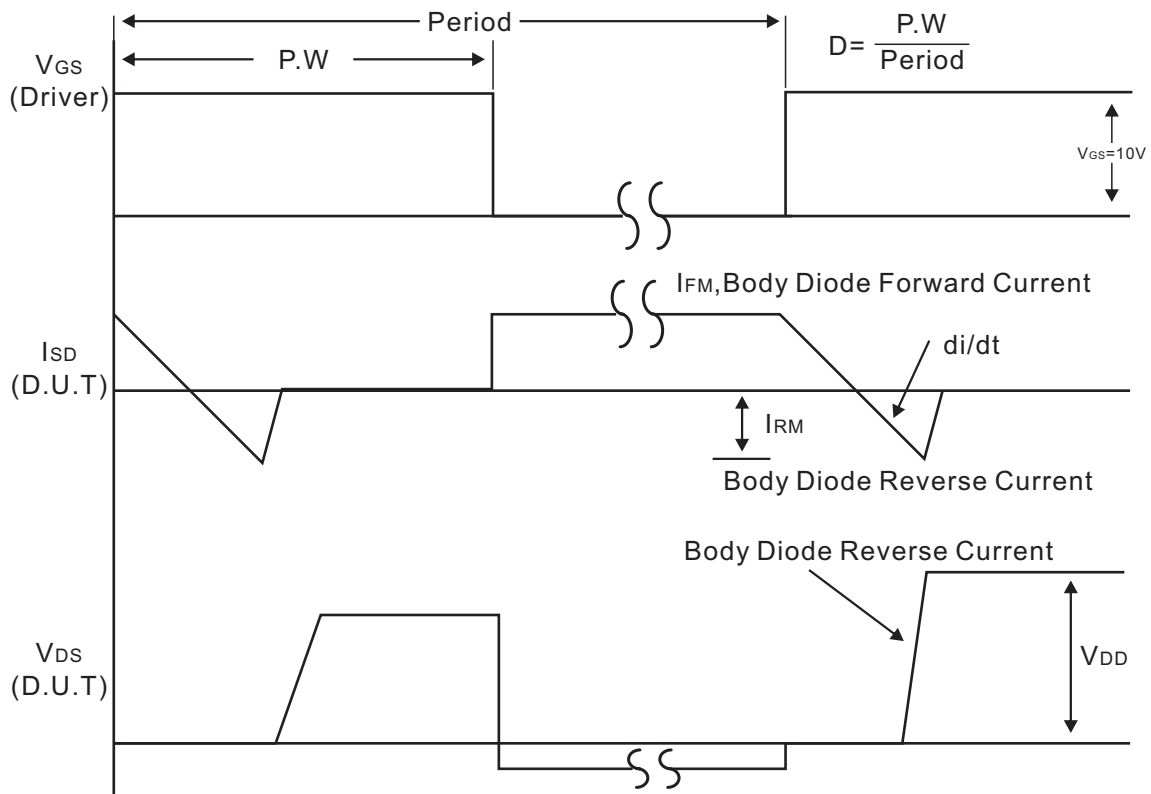
Unclamped Inductive Switching Waveforms



Test Circuits and waveforms



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms



Typical Characteristics

Fig.1 Output characteristics

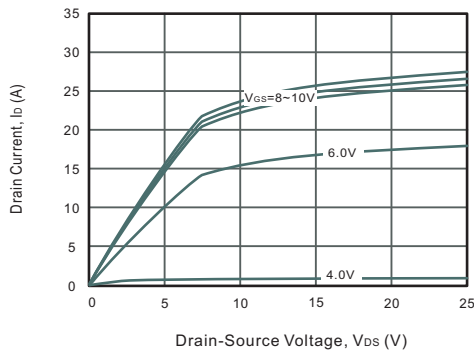


Fig.2 Power Dissipation

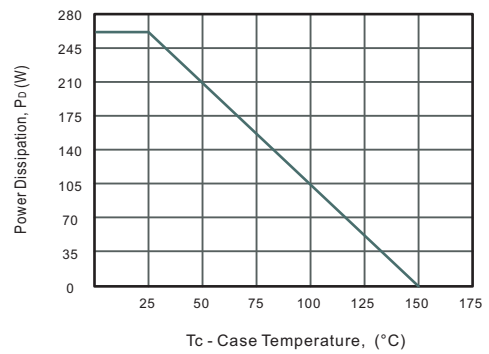


Fig.3 Drain Current Derating

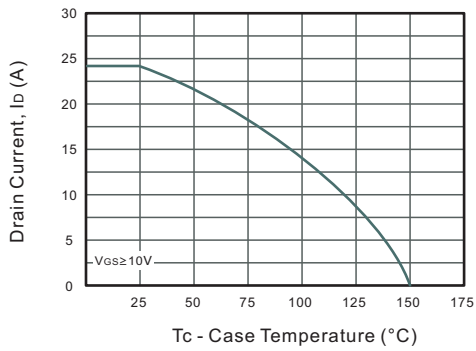


Fig.4 Drain-Source On-Resistance vs. Drain Current

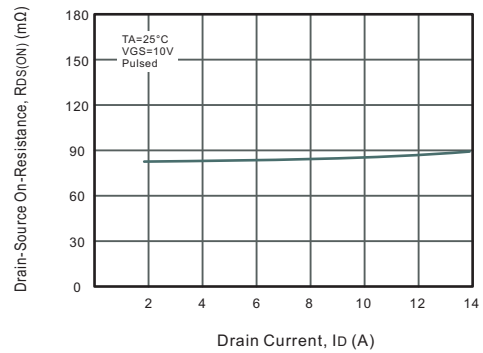


Fig.5 Gate Threshold Voltage vs. Junction Temperature

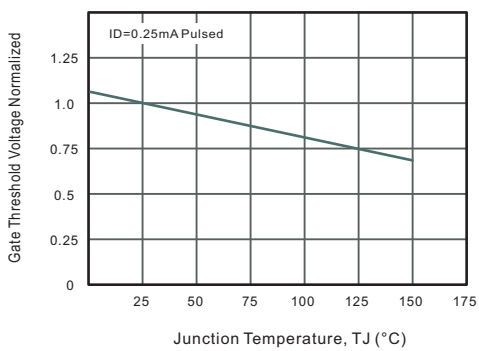


Fig.6 Body-diode Forward Characteristics

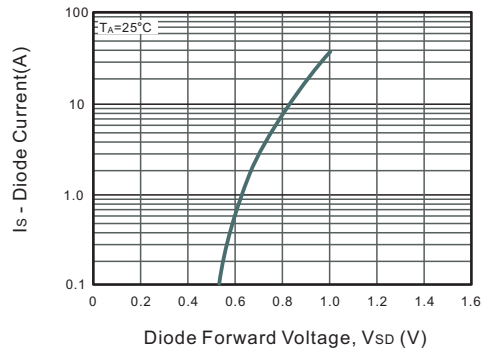


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

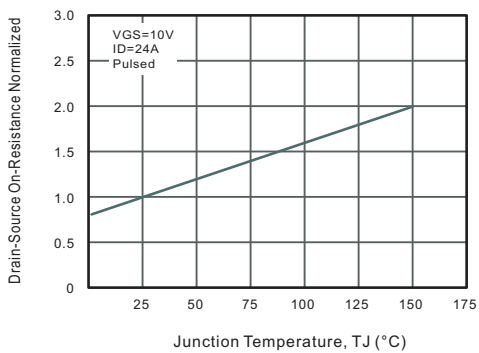
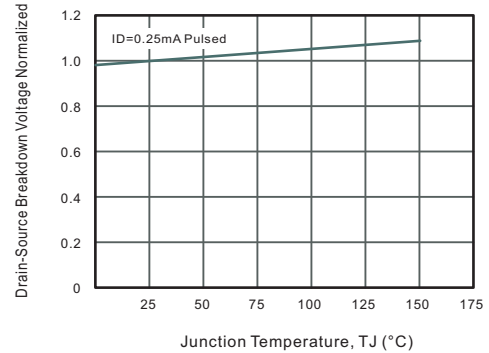


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

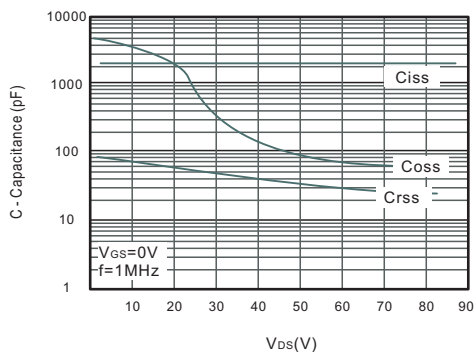


Fig.10 Gate Charge Characteristics

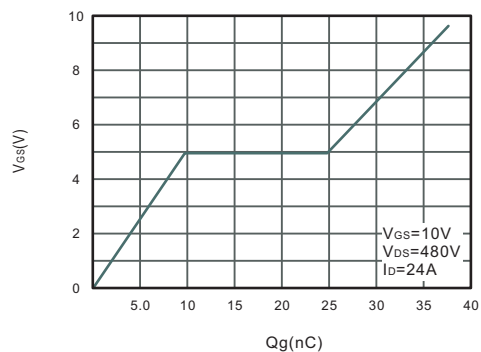


Fig.11 Safe Operating Area

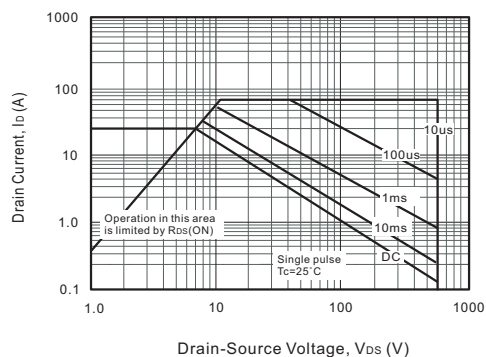
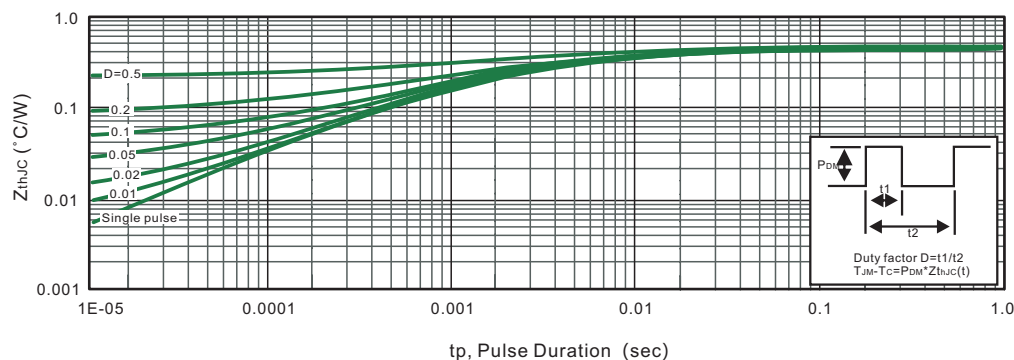


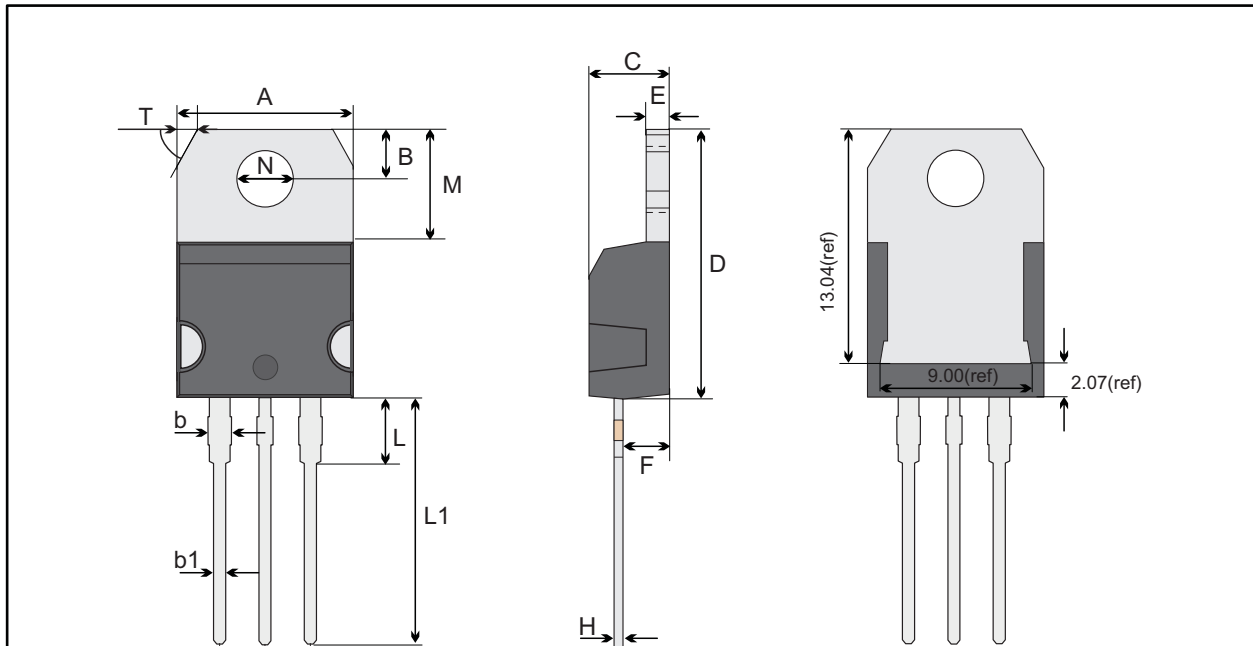
Fig.12 Max. Transient Thermal Impedance





Package Outline
Through Hole Package ; 3 leads

TO-220-3L



TO-220-3L mechanical data

UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N	T
mm	max	10.28	2.84	1.67	0.9	4.65	15.54	1.37	2.79	2.64	0.6	3.88	13.13	6.39	3.82 typ.	1.19 58° ref.
	typ	10.18	2.74	1.47	0.8	4.45	15.34	1.27	2.59	2.54	0.5	3.68	12.93	6.19		
	min	10.08	2.64	1.27	0.7	4.25	15.14	1.17	2.39	2.44	0.4	3.48	12.73	5.99		
mil	max	405	112	66	35	183	612	54	110	104	24	153	517	252	150 typ.	47 58° ref.
	typ	401	108	58	31	175	604	50	102	100	20	145	509	244		
	min	397	104	50	28	167	596	46	94	92	16	137	501	236		

Marking

Type number	Marking code
C65R125ET	C65R125ET



Important Notice and Disclaimer

Jingdao Microelectronics reserves the right to make changes to this document and its products and specifications at any without notice.

Customers should obtain and confirm the latest product information and specifications before final, purchase or use.

Jingdao Microelectronics makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, not does Jingdao Microelectronics assume any liability for application assistance or customer product design.

Jingdao Microelectronics does not warrant or accept any liability with products which are purchased or used for any unintended or unauthorized application.

No license is granted by implication or otherwise under any intellectual property rights of Jingdao Microelectronics.

Jingdao Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of Jingdao Microelectronics.