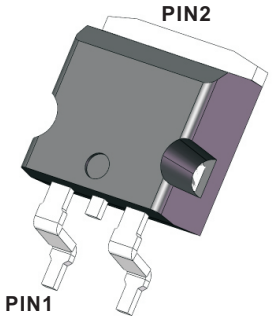
20A 650V N-CHANNEL POWER MOSFET

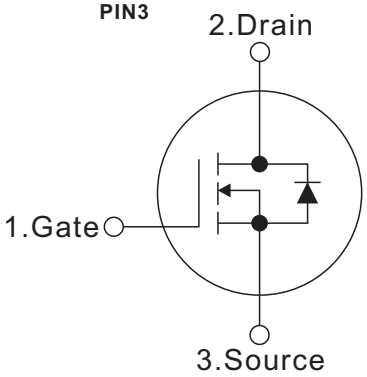
TO-263-2L(Prefix :G)

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.



RoHS COMPLIANT



Features

- $R_{DS(ON)} \leq 0.19\ \Omega$ @ V_{GS}=10V, I_D=10A
- Fast switching capability
- Low On-Resistance
- 100% Avalanche tested
- 100% $\triangle V_{DS}$ tested

Mechanical data

- Case: TO-263-2L
- Approx. Weight: 1.52g (0.049oz)
- 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 Tc=25°C Tc=100°C	I_D	20 14	A
Pulsed Drain Current (Note 2)	I_{DM}	80	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	210	mJ
Power Dissipation (Tc = 25°C)	P_D	62	W
Operating junction and storage temperature	T_J,T_{STG}	-55 ~+150	°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. I_{AS}=6.5A,L=10mH,V_{DD}=50V, R_G=25Ω,Starting TJ=25°C

Thermal Resistance

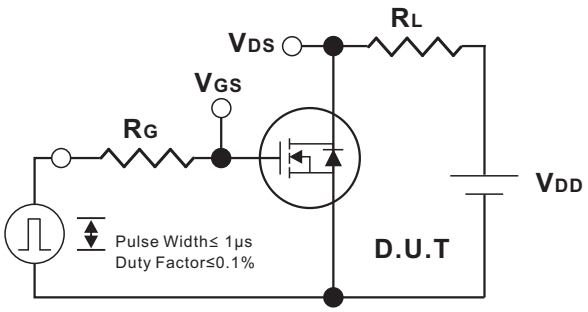
Parameter	Symbols	Ratings	Units
Thermal resistance, junction – case.	R_{thJC}	2	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	63	°C/W

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

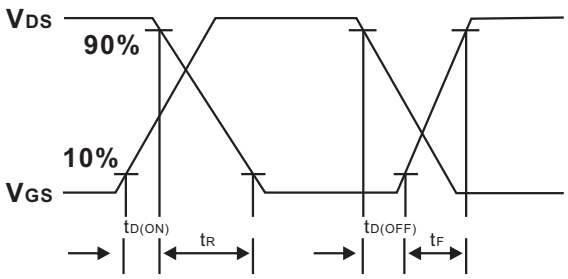
Parameter		Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250uA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V,V_{GS}=0V			1.0	uA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V			-100	
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250uA	3		5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=10A		0.14	0.19	Ω
Transconductance		g_{fs}	V_{DS}=20V,I_D=10A		4.8		S
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V,		1704		pF
Output Capacitance		C_{OSS}	V_{GS}=0V,		1270		pF
Reverse Transfer Capacitance		C_{RSS}	f=1.0MHz		45		pF
Gate resistance		R_G			6		Ω
Switching Characteristics							
Total Gate Charge (Note 1)		Q_G	V_{DS}=480V,V_{GS}=10V,		38		nC
Gate-Source Charge		Q_{GS}	I_D=20A		10		nC
Gate-Drain Charge		Q_{GD}	(NOTE1,2)		15		nC
Turn-On Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=400V,I_D=10A		38		ns
Turn-On Rise Time		t_R	R_G=25Ω,V_{GS}=10V		29		ns
Turn-Off Delay Time		$t_{D(OFF)}$	(NOTE1,2)		185		ns
Turn-Off Fall Time		t_F			24		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}=20A,V_{GS}=10V			1.2	V
Reverse Recovery Time (Note 1)		trr	I_F=20A		330		ns
Reverse Recovery Charge		Qrr	di/dt=100A/us		23		uC

Notes:
1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

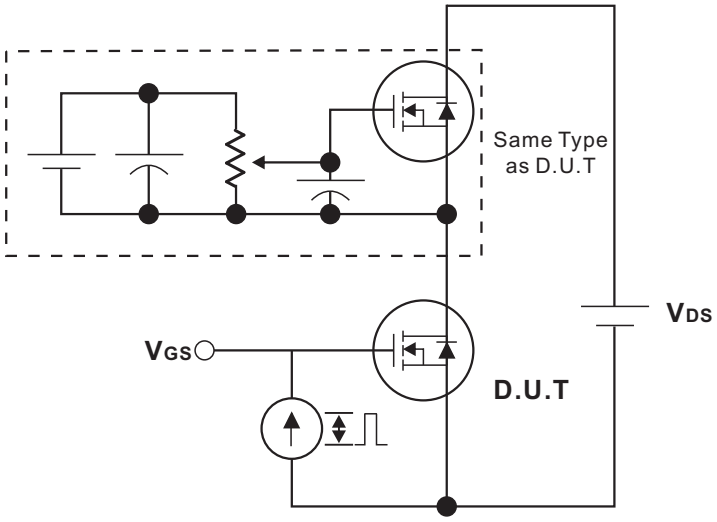
Test Circuits and waveforms



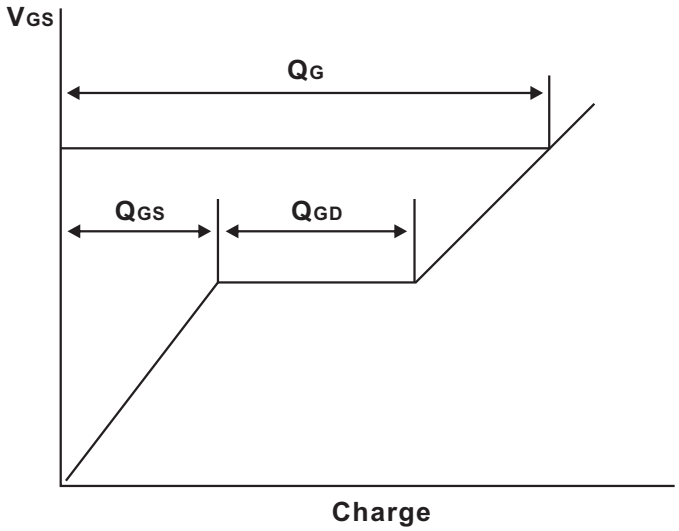
Switching Test Circuit



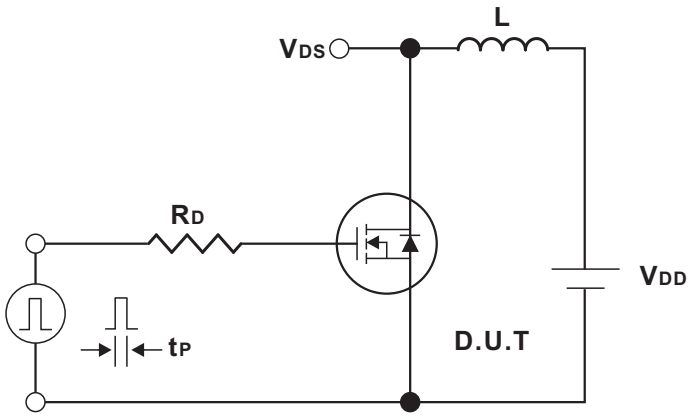
Switching Waveforms



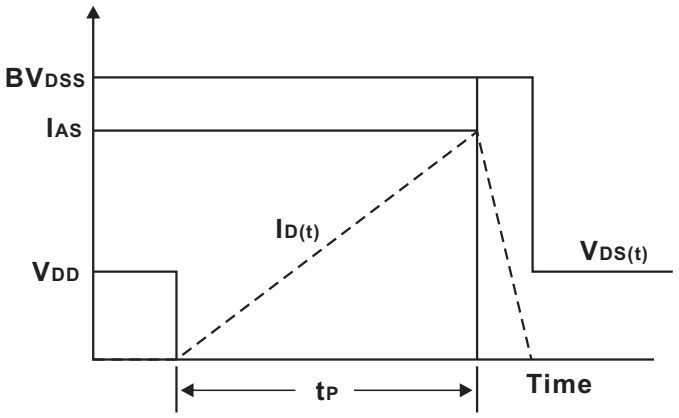
Gate Charge Test Circuit



Gate Charge Waveform

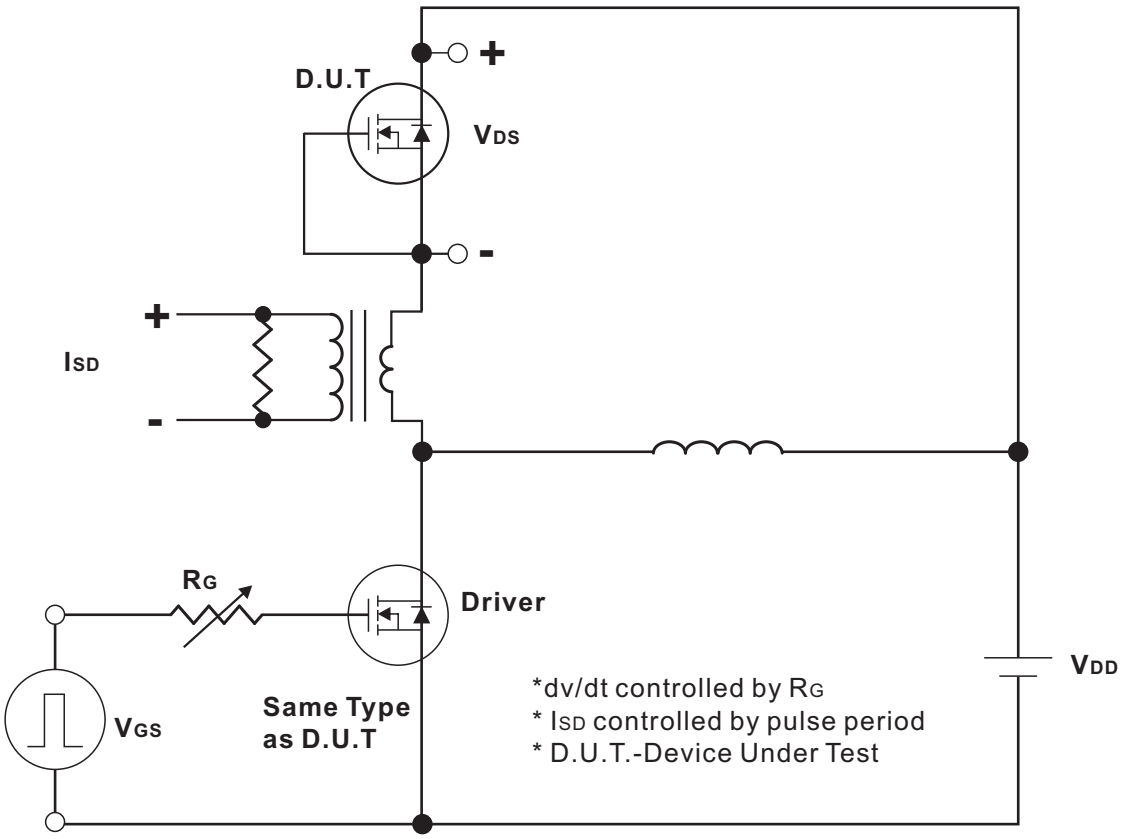


Unclamped Inductive Switching Test Circuit

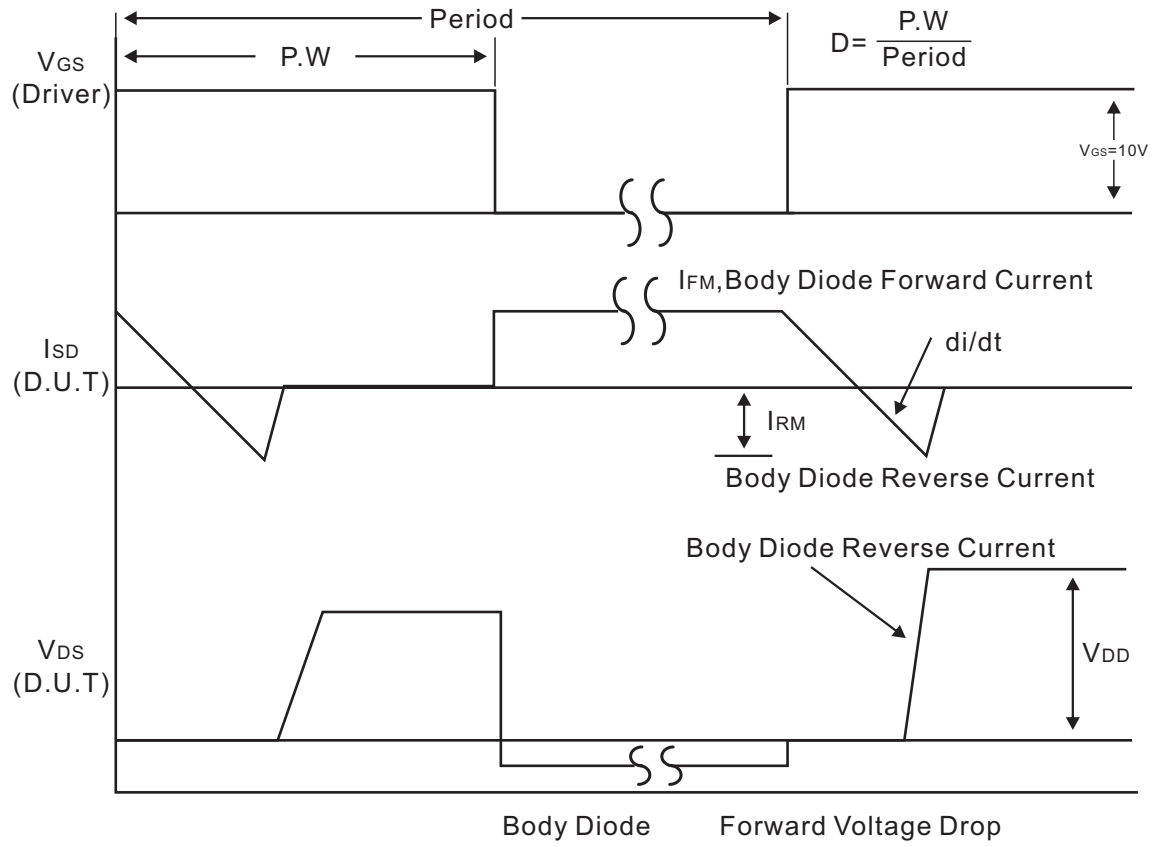


Unclamped Inductive Switching Waveforms

Test Circuits and waveforms



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

Typical Characteristics

Fig.1 Output characteristics

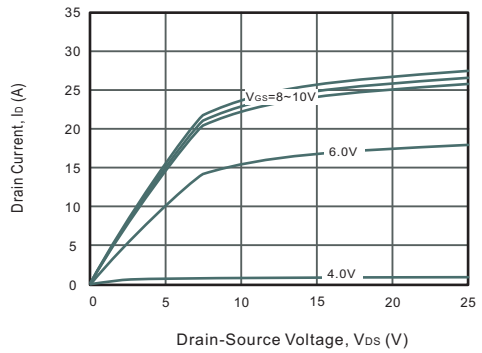


Fig.2 Power Dissipation

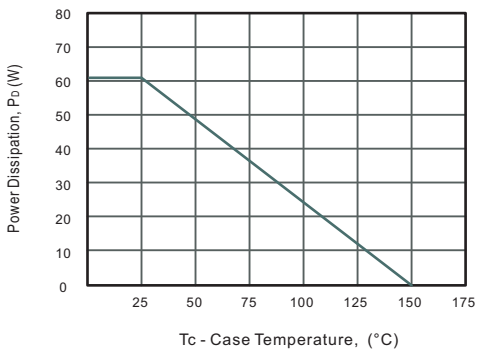


Fig.3 Drain Current Derating

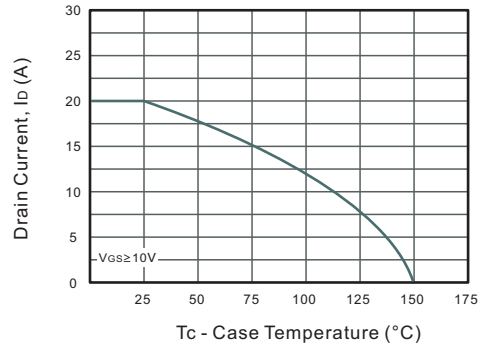


Fig.4 Drain-Source On-Resistance vs. Drain Current

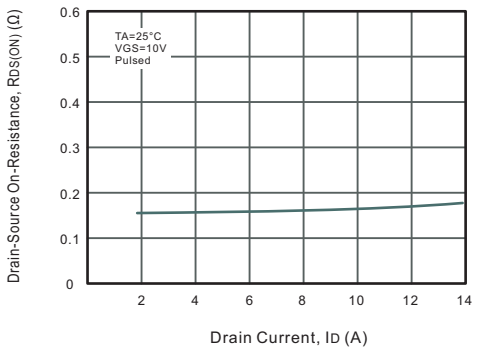


Fig.5 Gate Threshold Voltage vs. Junction Temperature

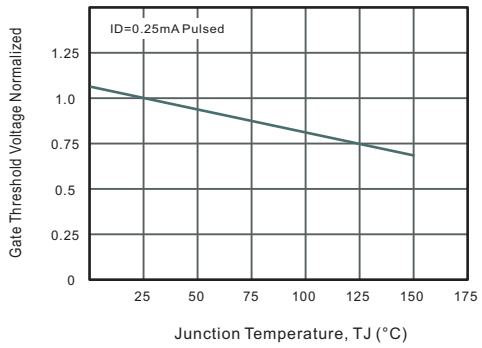


Fig.6 Body-diode Forward Characteristics

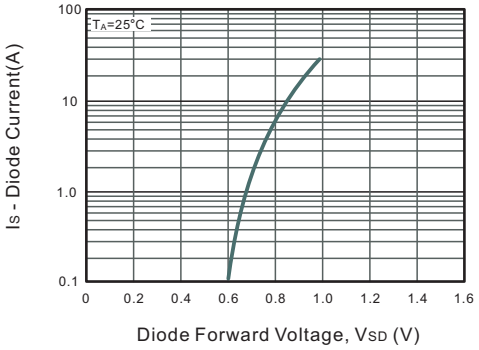


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

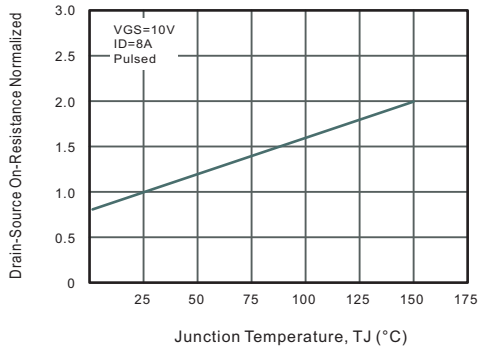
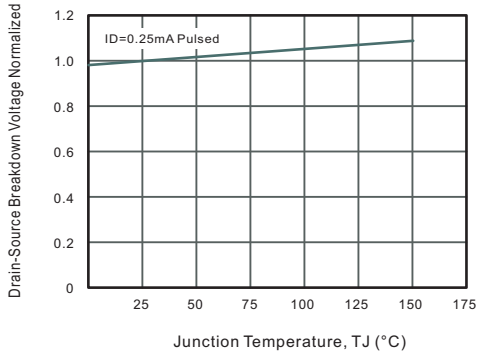


Fig.8 Breakdown Voltage vs. Junction Temperature



Typical Characteristics

Fig.9 Capacitance Characteristics

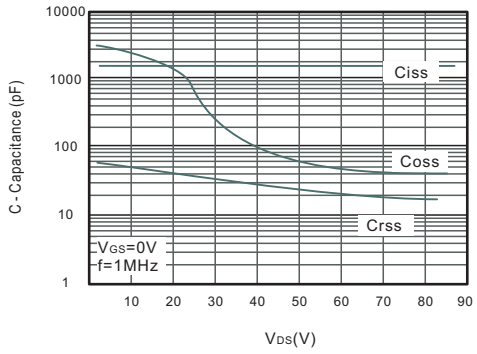


Fig.10 Gate Charge Characteristics

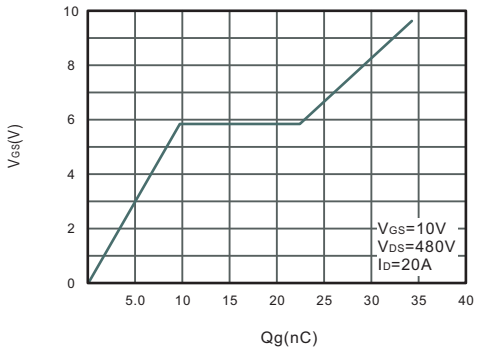


Fig.11 Safe Operating Area

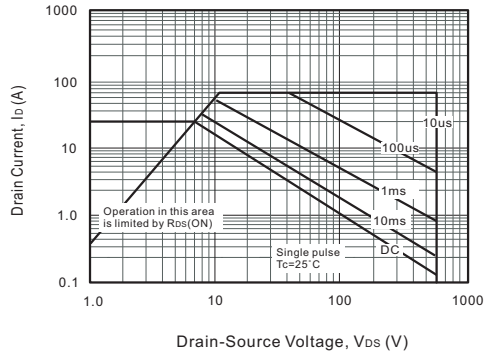
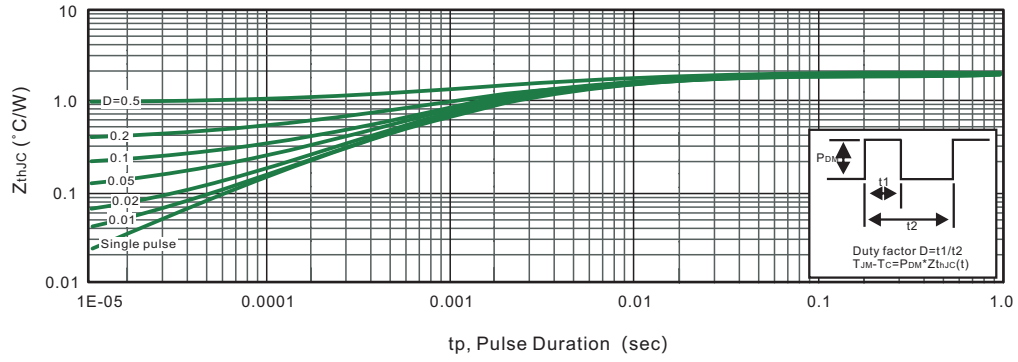
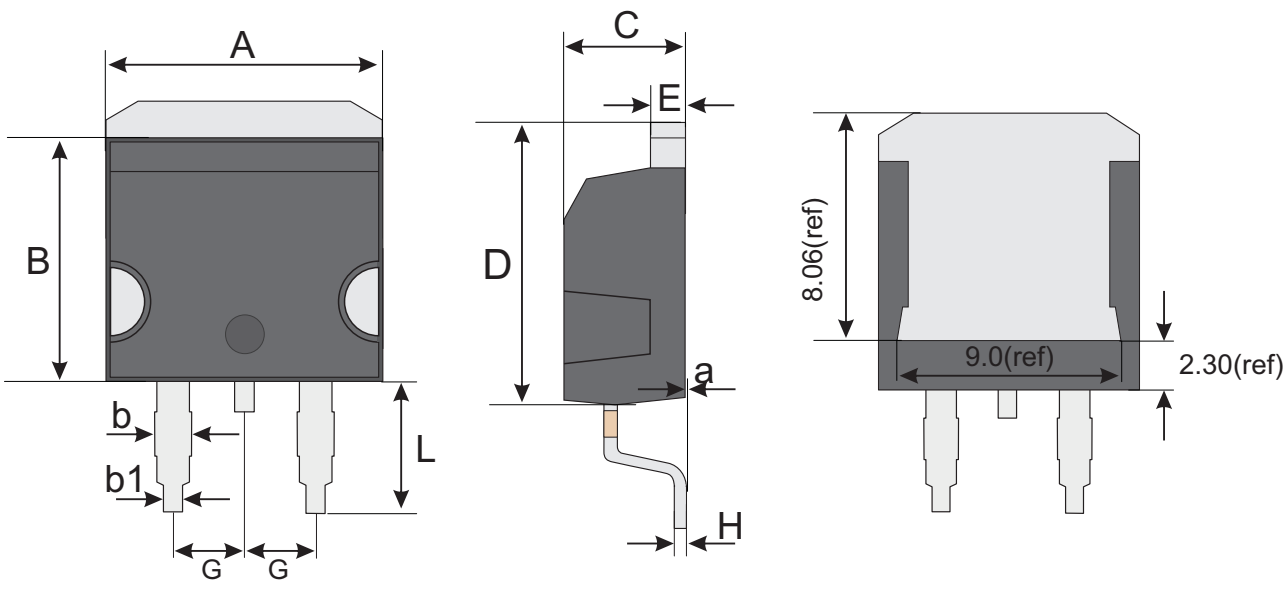


Fig.12 Max. Transient Thermal Impedance



Package Outline
Plastic surface mounted package; 2 leads

TO-263-2L



TO-263-2L mechanical data

UNIT		A	B	b	b1	C	D	E	G	H	L	a
mm	max	10.28	9.35	1.67	0.9	4.65	10.56	1.37	2.64	0.6	5.35	0.1 ref.
	typ	10.18	9.15	1.47	0.8	4.45	10.36	1.27	2.54	0.5	5.15	
	min	10.08	8.95	1.27	0.7	4.25	10.16	1.17	2.44	0.4	4.95	
mil	max	405	368	66	35	183	416	54	104	24	211	4.0 ref.
	typ	401	360	58	31	175	409	50	100	20	203	
	min	397	352	50	28	167	400	46	96	16	195	

Marking

Type number	Marking code
G65R190ET	G65R190ET

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