



24A 650V N-CHANNEL POWER MOSFET

TO-263-2L(Prefix :G)

**Description**

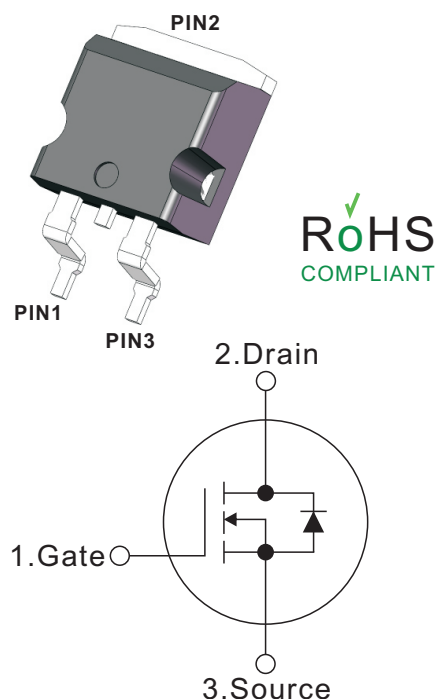
The power MOSFET using **super junction** technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

**Features**

- $R_{DS(ON)} \leq 125m\Omega @ V_{GS}=10V, I_D=12A$
- Fast switching capability
- Low On-Resistance
- 100% Avalanche tested
- 100%  $\Delta V_{DS}$  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	$V_{GSS}$	$\pm 30$	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. $I_{AS}=12.0A, L=10mH, V_{DD}=50V, R_G=25\Omega, Starting T_J=25^\circ C$

**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)

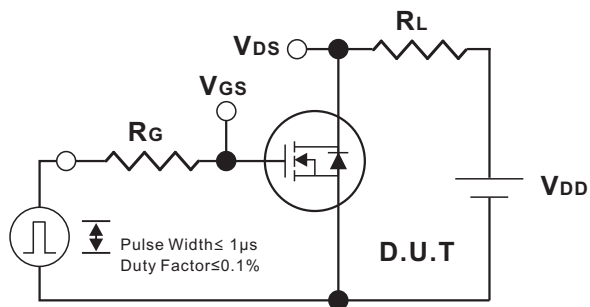
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$			1.0	$\mu A$
Gate- Source Leakage Current	Forward	$I_{GSS}$			100	nA
	Reverse				-100	
<b>On Characteristics</b>						
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
<b>Dynamic Characteristics</b>						
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		$\Omega$
<b>Switching Characteristics</b>						
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
<b>Drain-Source Diode Characteristics And Maximum Ratings</b>						
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		$\mu C$

Notes:

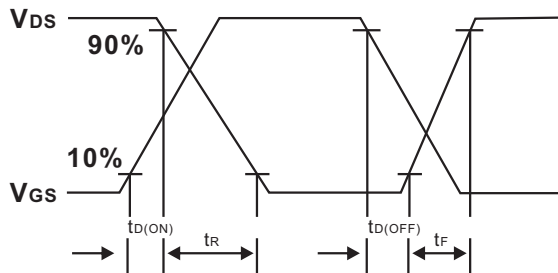
1. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .
2. Essentially independent of operating temperature.



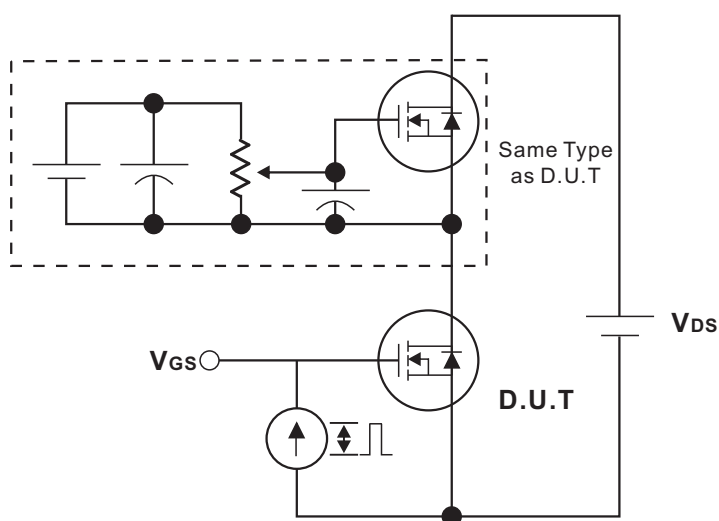
### Test Circuits and waveforms



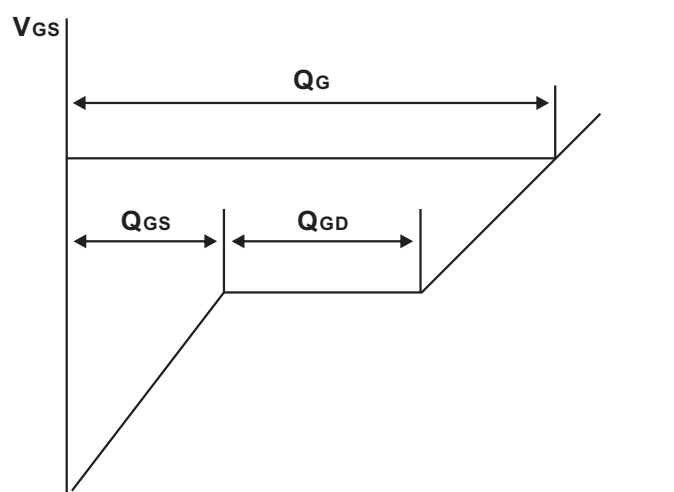
Switching Test Circuit



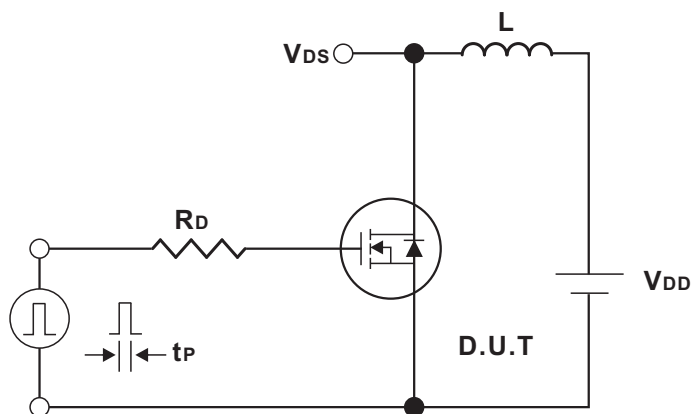
Switching Waveforms



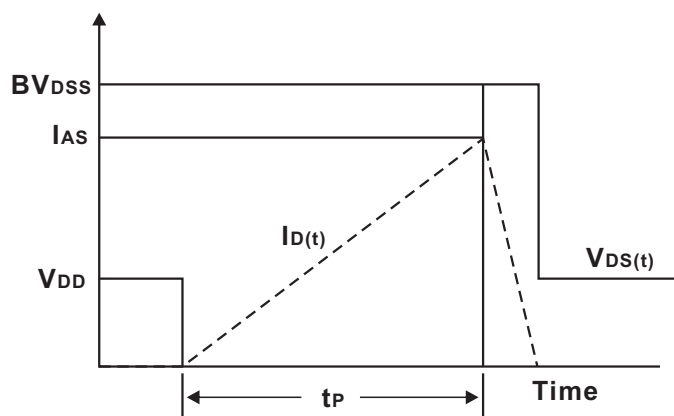
Gate Charge Test Circuit



Charge  
Gate Charge Waveform



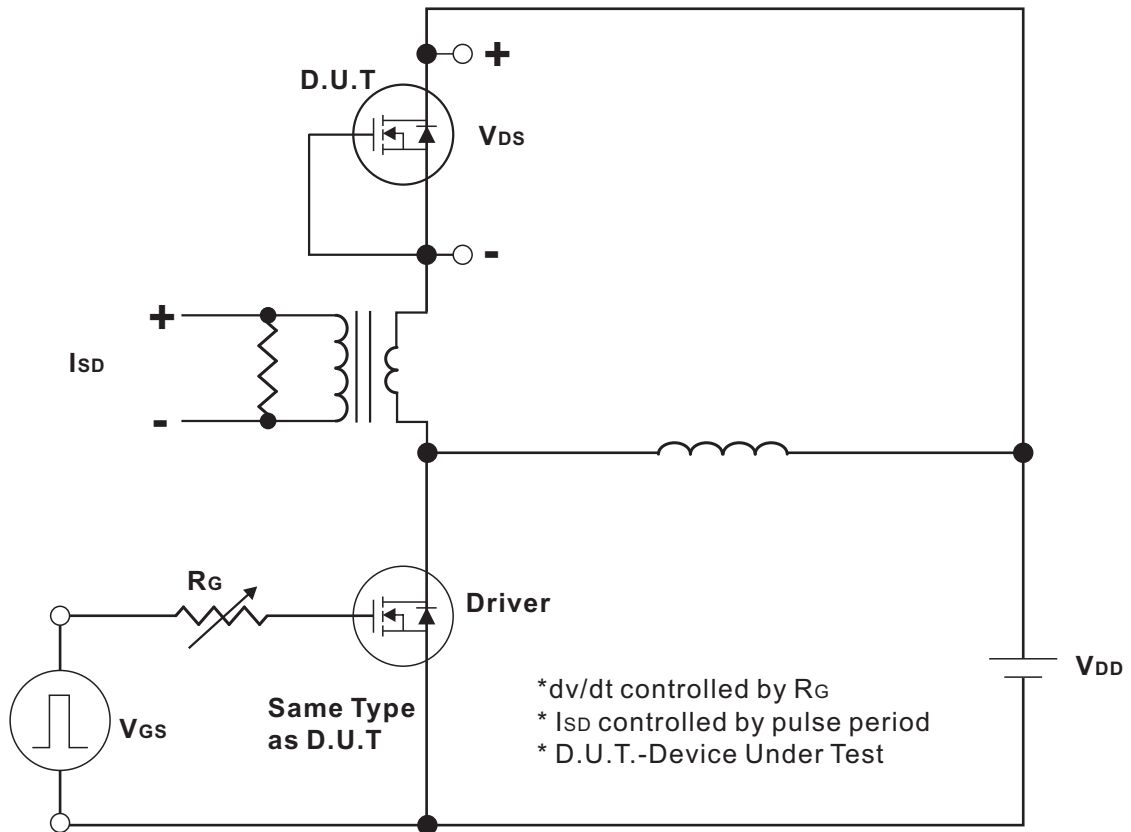
Unclamped Inductive Switching Test Circuit



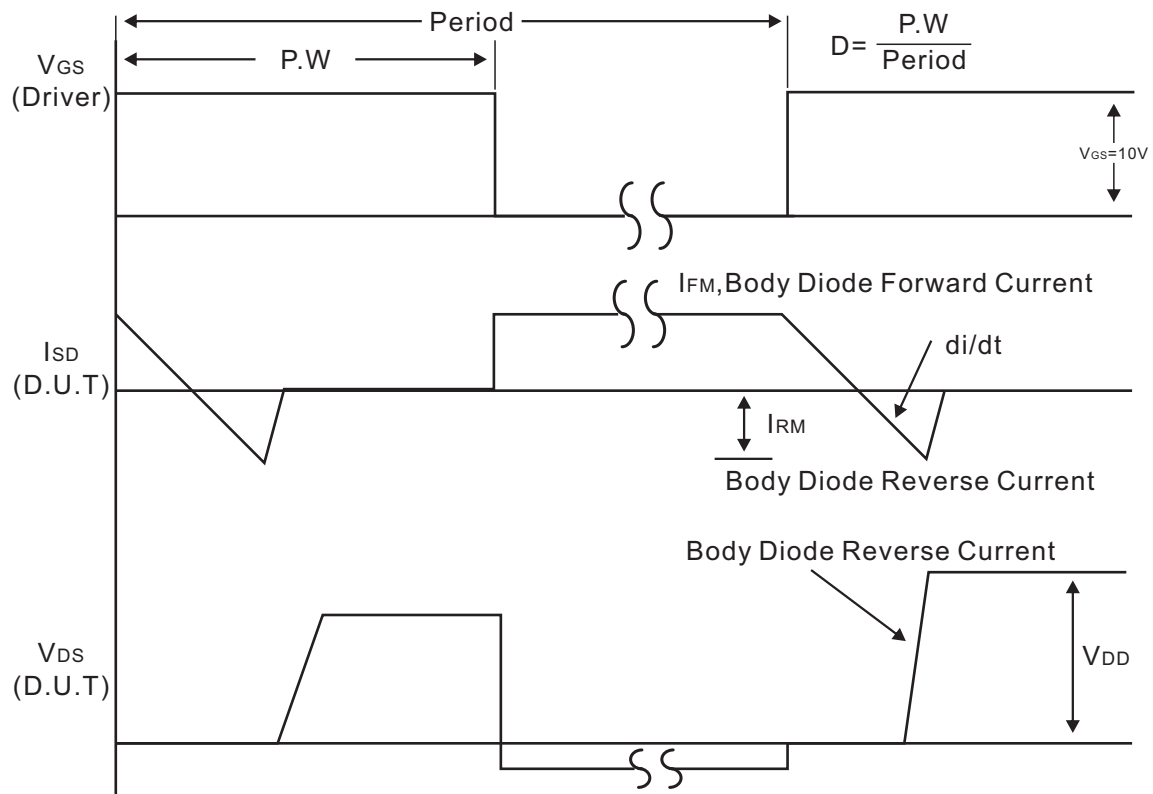
Unclamped Inductive Switching Waveforms



Test Circuits and waveforms



Peak Diode Recovery dv/dt Test Circuit



Body Diode Forward Voltage Drop  
Peak Diode Recovery dv/dt Waveforms



### Typical Characteristics

Fig.1 Output characteristics

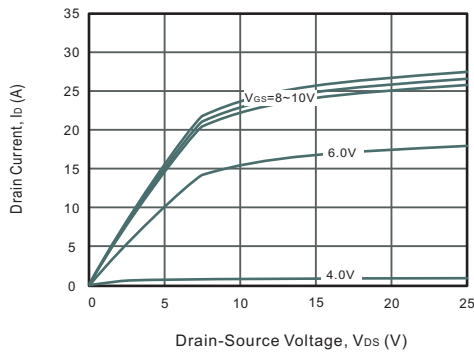


Fig.2 Power Dissipation

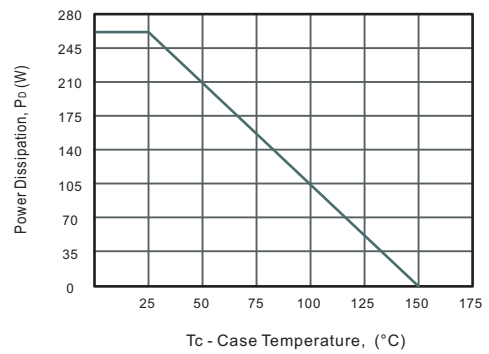


Fig.3 Drain Current Derating

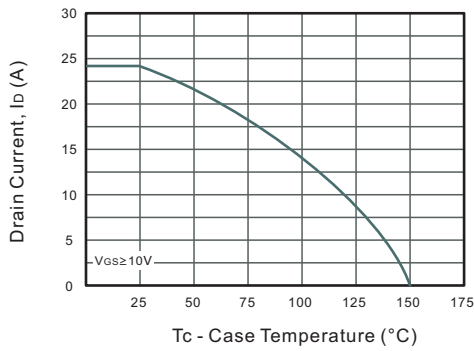


Fig.4 Drain-Source On-Resistance vs. Drain Current

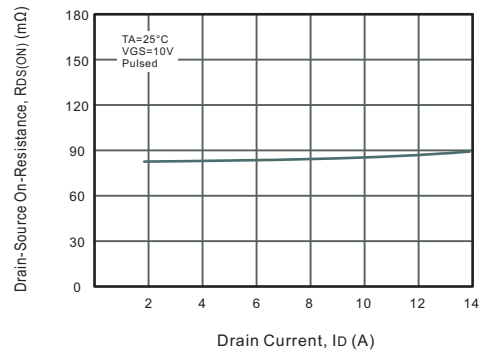


Fig.5 Gate Threshold Voltage vs. Junction Temperature

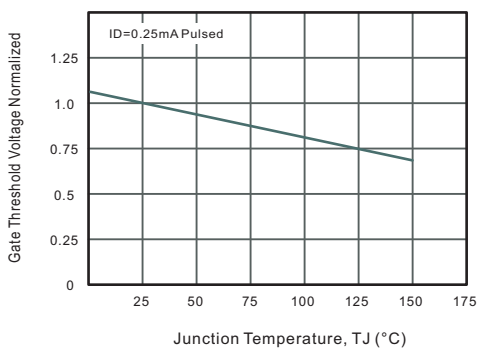


Fig.6 Body-diode Forward Characteristics

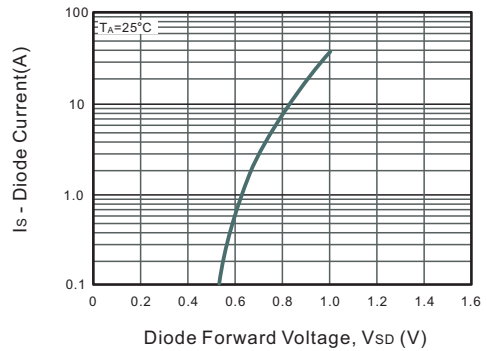


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

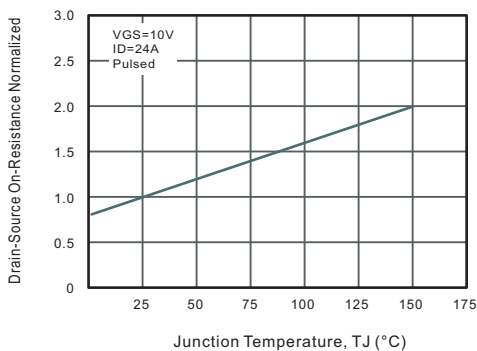
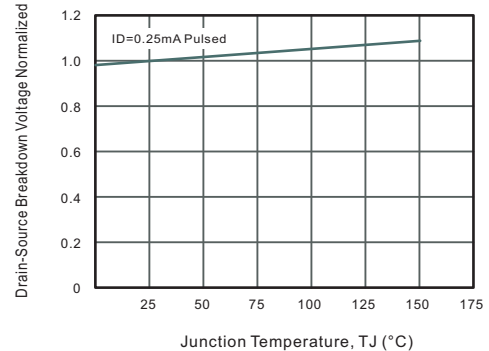


Fig.8 Breakdown Voltage vs. Junction Temperature





### Typical Characteristics

Fig.9 Capacitance Characteristics

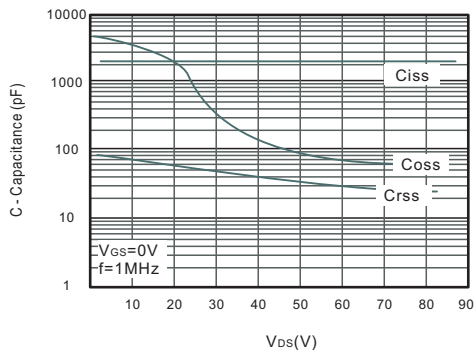


Fig.10 Gate Charge Characteristics

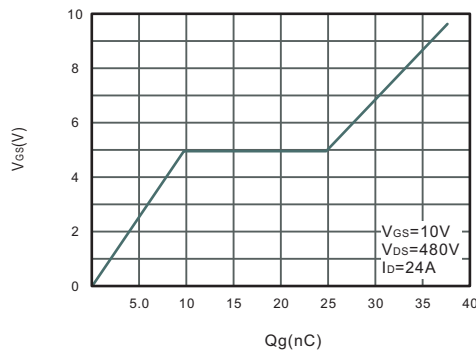


Fig.11 Safe Operating Area

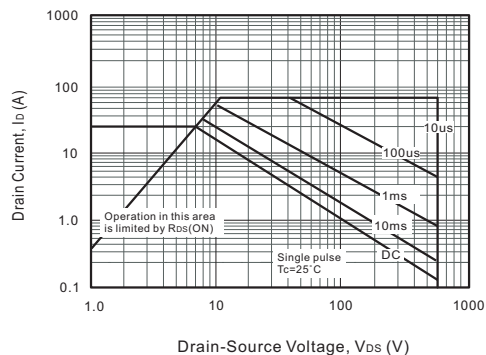
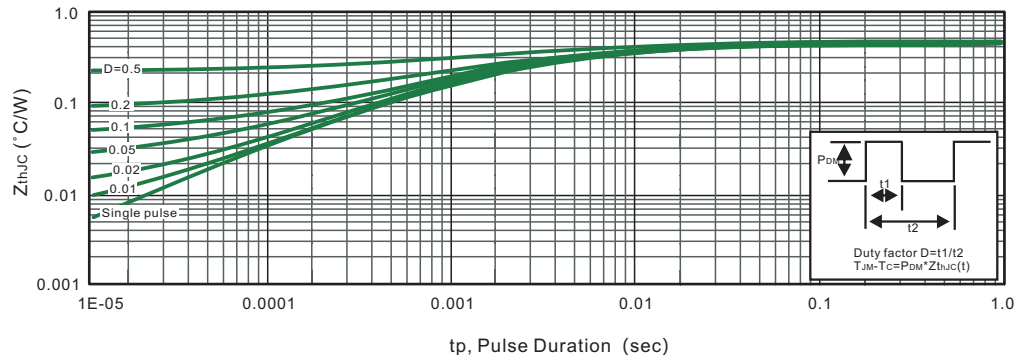


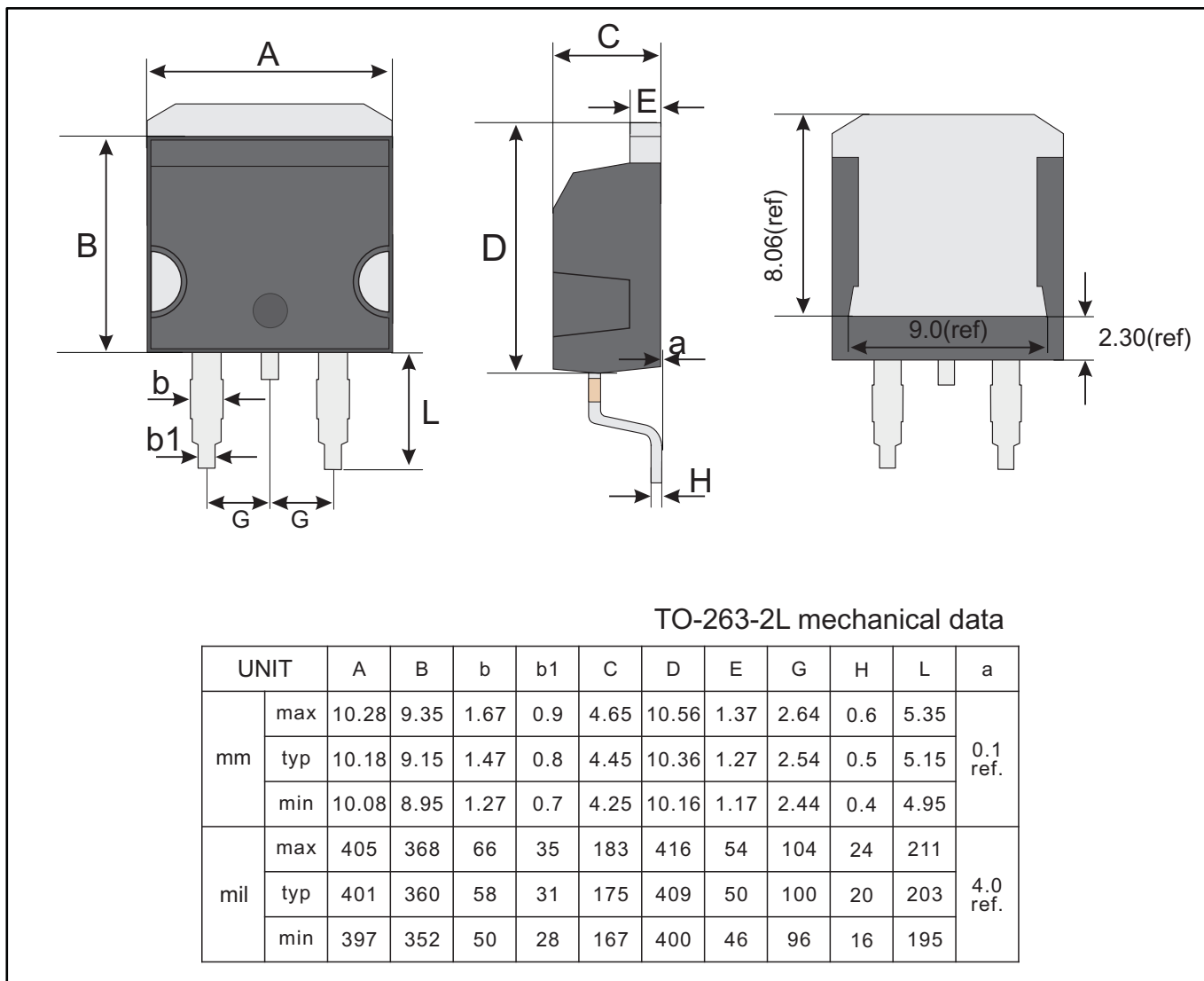
Fig.12 Max. Transient Thermal Impedance





Package Outline  
Plastic surface mounted package; 2 leads

TO-263-2L



**Marking**

Type number	Marking code
G65R125ET	G65R125ET



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