

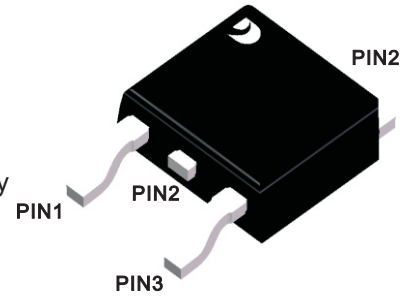


10A, 450V N-CHANNEL POWER MOSFET

TO-252W(Prefix :D)

Description

The D10N45 is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.



ROHS
COMPLIANT

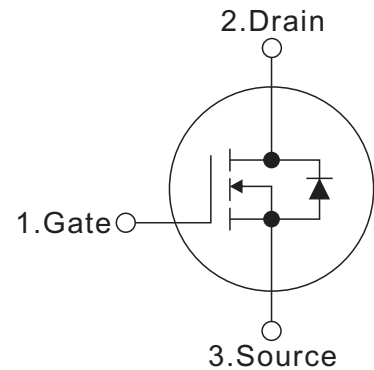
Features

- $R_{DS(ON)} < 0.65 \Omega @ V_{GS}=10V, I_D=5.0A$
- Fast switching capability
- 100% Avalanche tested
- 100% ΔV_{DS} tested

Mechanical data

- Case: TO-252W
- Approx. Weight: 0.329g (0.012oz)
- RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".

SYMBOL



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

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DS}	450	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current $T_c=25^\circ C$ $T_c=100^\circ C$	I_D	10 6	A
Pulsed Drain Current (Note 2)	I_{DM}	40	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	500	mJ
Power Dissipation ($T_c = 25^\circ C$)	P_D	50	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. L = 10mH, VDD = 50V, RG = 25 Ω , Starting TJ = 25 $^\circ C$

Thermal Resistance

Parameter	Symbols	Ratings	Units
Thermal resistance, junction – case.	R_{thJC}	2.5	$^\circ C/W$
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	63	$^\circ C/W$



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

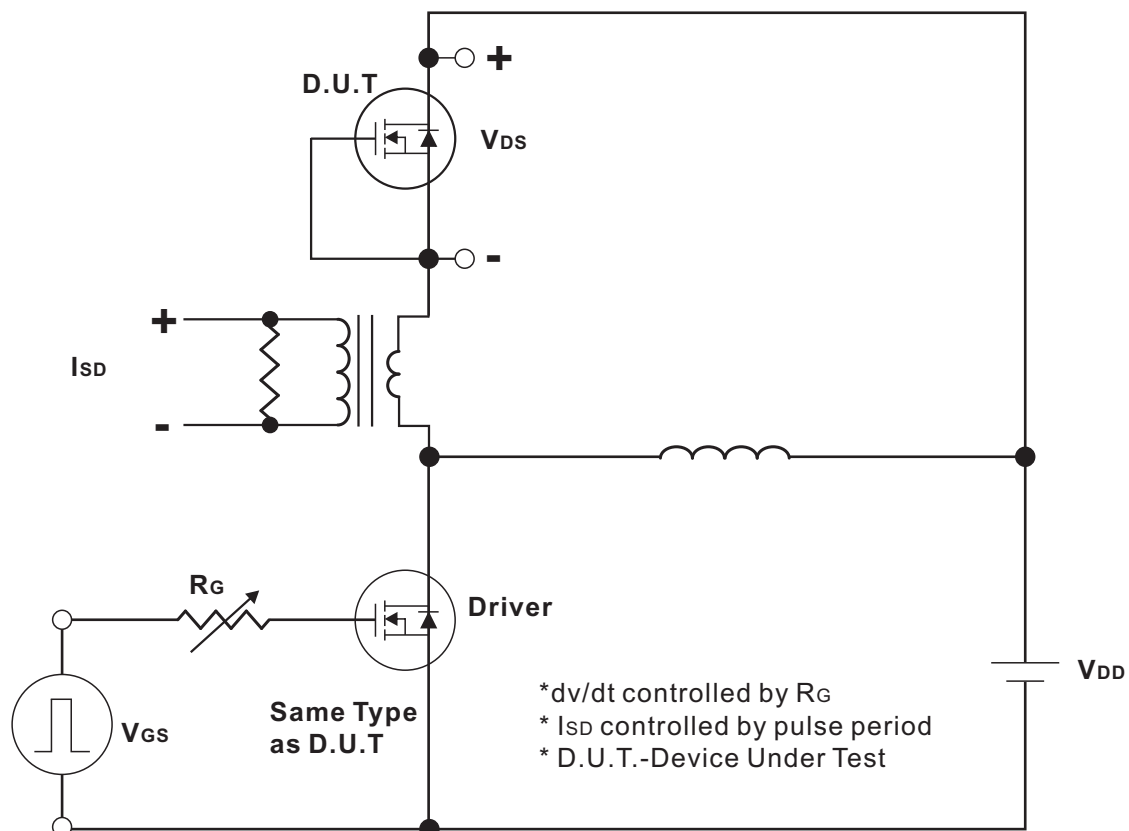
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	450			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=450V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.0A$		0.48	0.65	Ω
Transconductance	g_{fs}	$V_{DS}=15V, I_D=5.0A$		7.6		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$		1286		pF
Output Capacitance	C_{OSS}			127		pF
Reverse Transfer Capacitance	C_{RSS}			15		pF
Gate resistance	R_G	$V_{DS}=0V, FREQ=1.00MHz$		3.1		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=320V, V_{GS}=10V,$ $I_D=10A, R_G=10\Omega$ (NOTE1,2)		28		nC
Gate-Source Charge	Q_{GS}			4		nC
Gate-Drain Charge	Q_{GD}			15		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=200V, I_D=10A$ $R_G=10\Omega$ (NOTE1,2)		14		ns
Turn-On Rise Time	t_R			89		ns
Turn-Off Delay Time	$t_{D(OFF)}$			51		ns
Turn-Off Fall Time	t_F			81		ns
Drain-Source Diode Characteristics And Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S				10	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=10A, V_{GS}=0V$			1.3	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_F=10A$ $di/dt=100A/\mu s$		190		ns
Reverse Recovery Charge	Q_{rr}			2.4		μC

Notes:

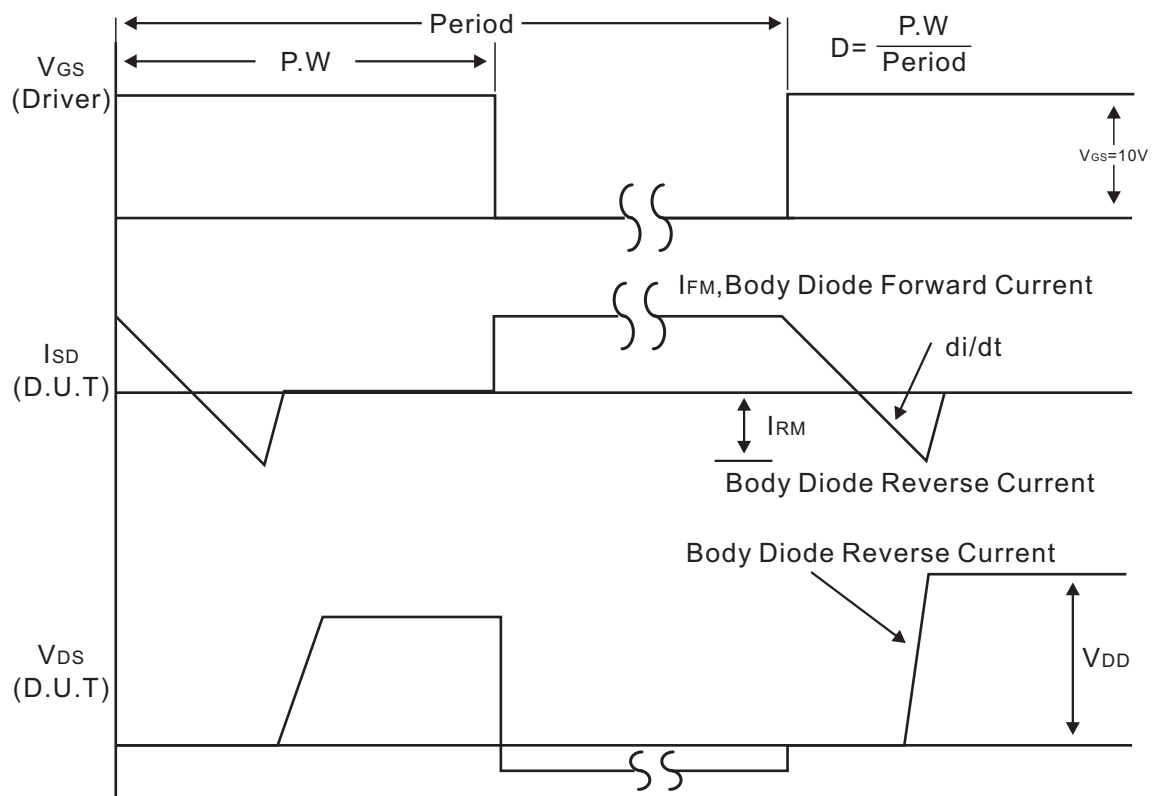
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



Test Circuits and waveforms



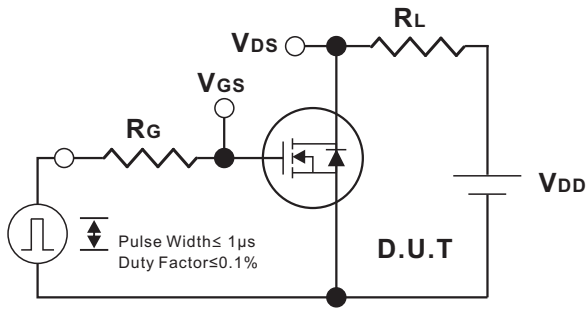
Peak Diode Recovery dv/dt Test Circuit



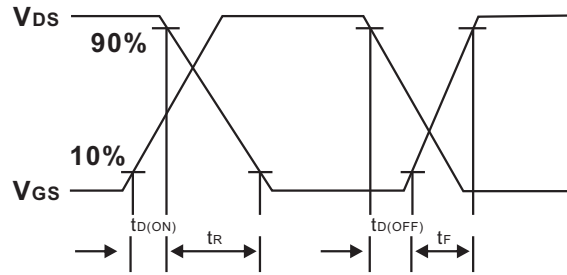
Body Diode Forward Voltage Drop
Peak Diode Recovery dv/dt Waveforms



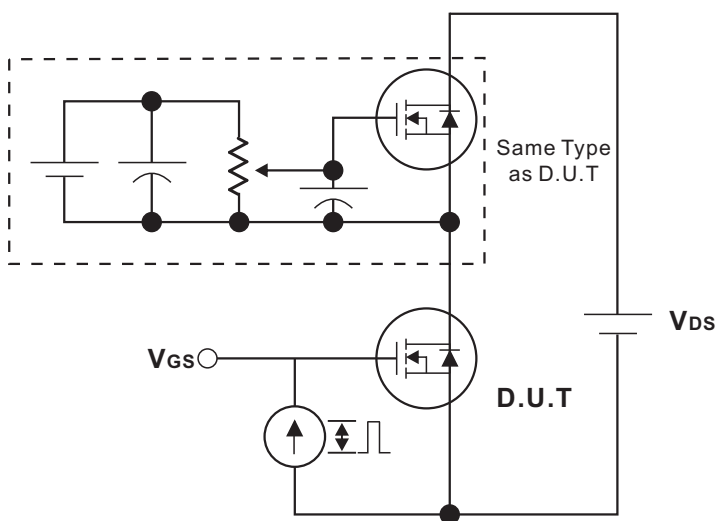
Test Circuits and waveforms



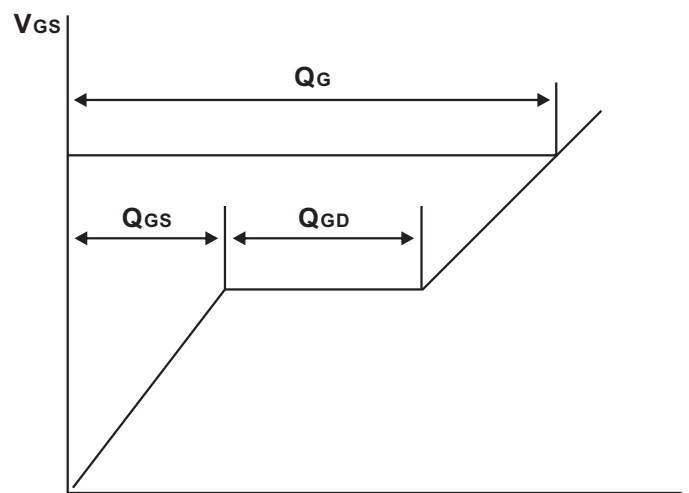
Switching Test Circuit



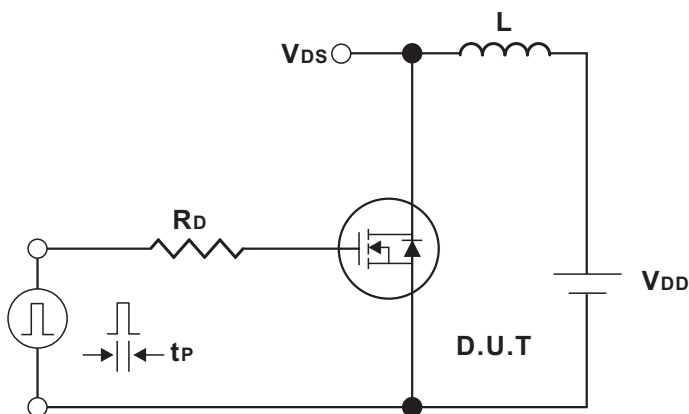
Switching Waveforms



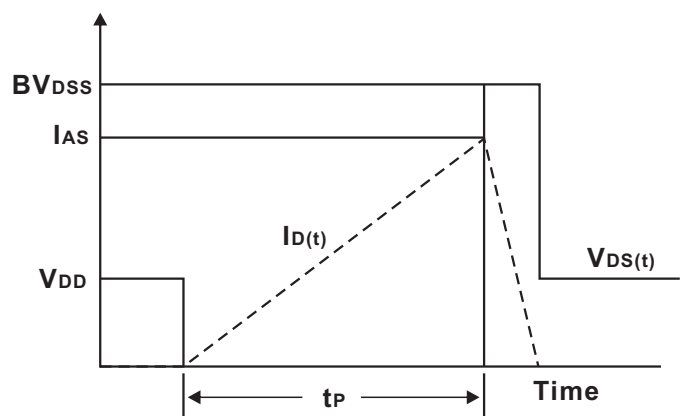
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Typical Characteristics

Fig.1 Output characteristics

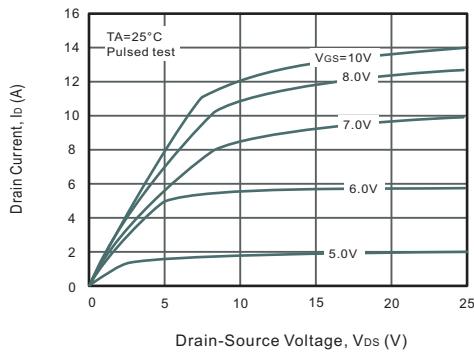


Fig.2 Power Dissipation

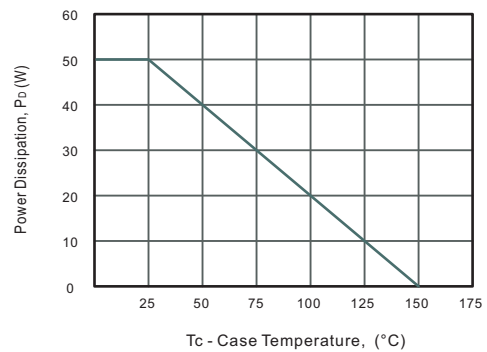


Fig.3 Drain Current Derating

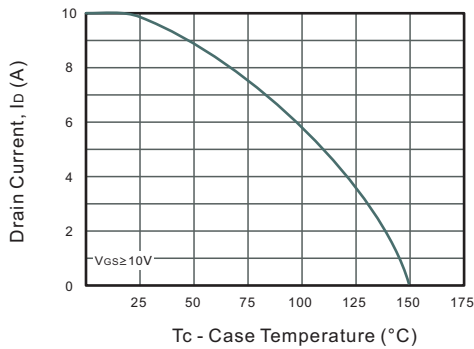


Fig.4 Drain-Source On-Resistance vs. Drain Current

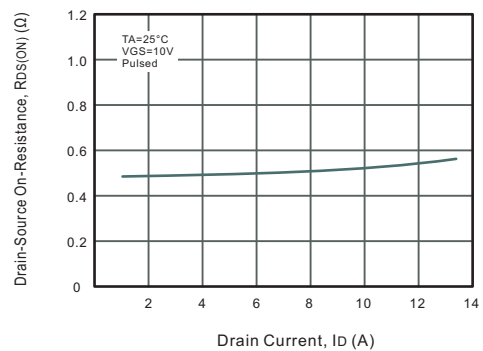


Fig.5 Gate Threshold Voltage vs. Junction Temperature

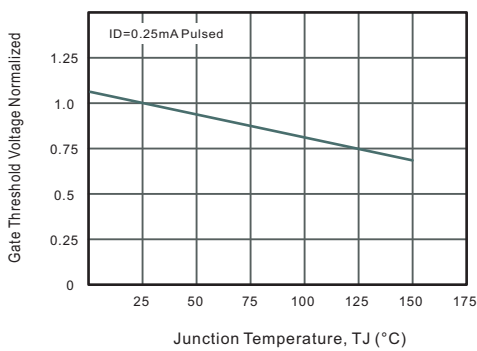


Fig.6 Body-diode Forward Characteristics

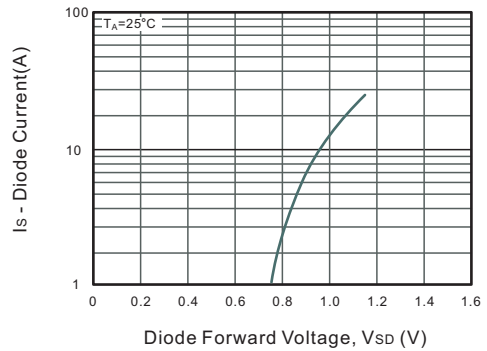


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

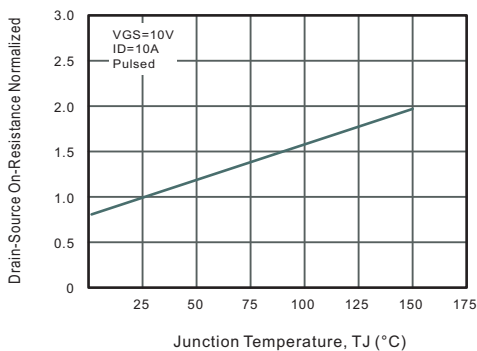
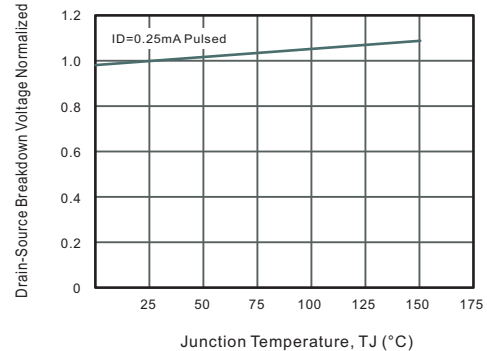


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

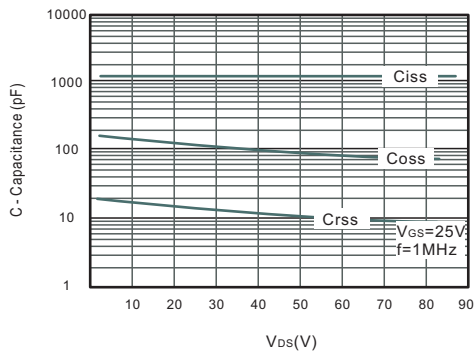


Fig.10 Gate Charge Characteristics

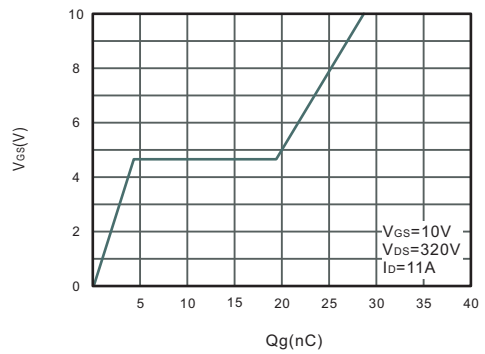


Fig.11 Safe Operating Area

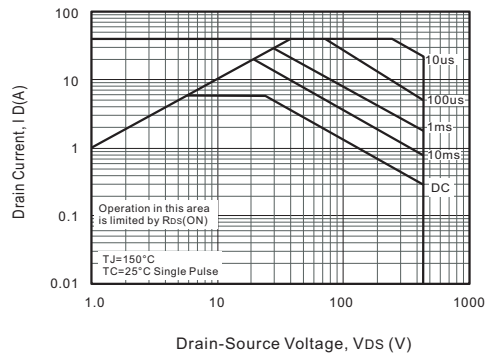
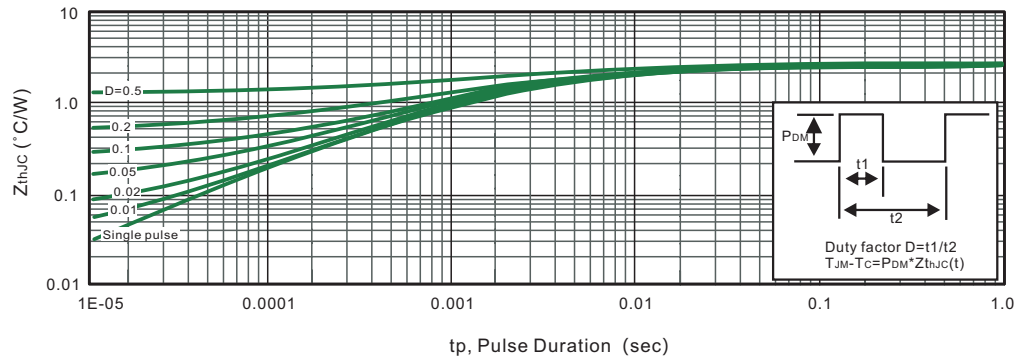
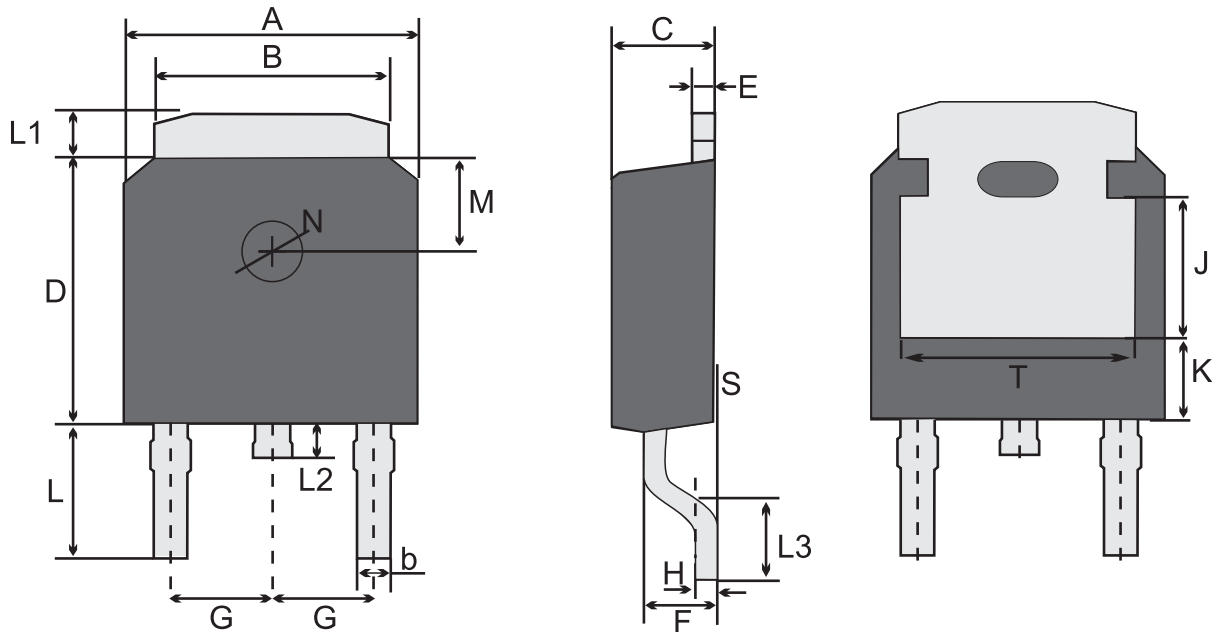


Fig.12 Max. Transient Thermal Impedance





TO-252W(D-PAK) Package Outline Dimensions

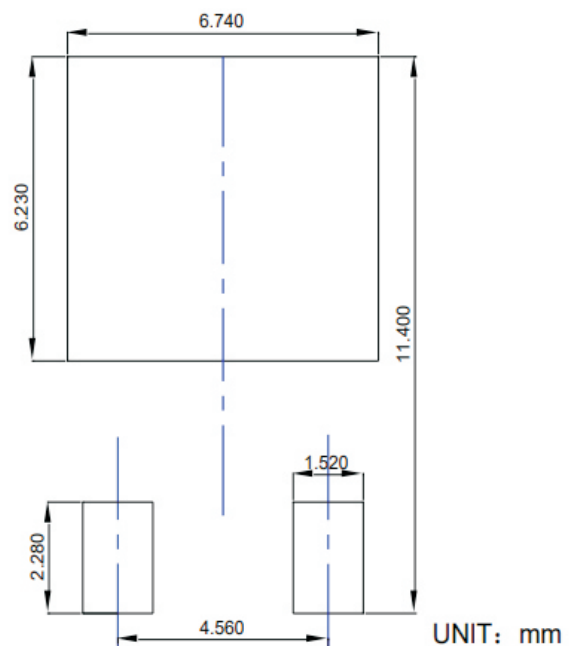


TO-252W(D-PAK) Mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	T	K
mm	max	6.7	5.53	0.86	2.5	6.3	0.61	1.87	2.3 typ.	0.55	3.1	1.2	1.0	1.90	0.1	1.8 typ.	1.3 typ.	3.2 ref.	5.23 ref.	1.8 ref.
	typ	6.6	5.33	0.76	2.3	6.1	0.51	1.57		0.50	2.95	1.0	0.8	1.45	0.05					
	min	6.3	5.13	0.66	2.1	5.9	0.41	1.27		0.45	2.7	0.8	0.6	1.00	/					
mil	max	264	218	34	98	248	24	74	91 typ.	22	121	47	39	75	3.9	71 typ.	51 typ.	126 ref.	206 ref.	71 ref.
	typ	260	210	30	91	240	20	62		20	116	39	31	57	2					
	min	248	202	26	83	232	16	50		18	106	31	24	39	/					

Marking

Type number	Marking code
D10N45	D10N45



SUGGESTED SOLDER PAD LAYOUT



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