



11A 700V N-CHANNEL POWER MOSFET

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.

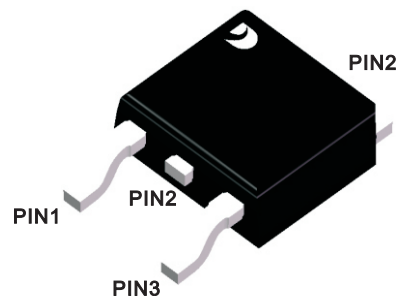
Features

- $R_{DS(ON)} \leq 0.38 \Omega$ @ $V_{GS}=10V, I_D=5.5A$
- Fast switching capability
- Low On-Resistance
- 100% Avalanche tested
- 100% ΔV_{DS} tested

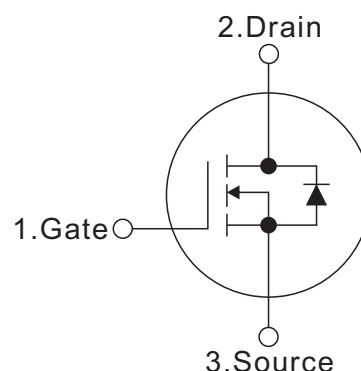
Mechanical data

- Case: TO-252W
- Approx. Weight: 0.33g (0.012oz)
- RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".

TO-252W(Prefix :D)



SYMBOL



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

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DS}	700	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	11 7	A
		$T_c=25^\circ C$ $T_c=100^\circ C$	
Pulsed Drain Current (Note 2)	I_{DM}	42	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	125	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. $L=10mH, V_{DD}=50V, R_G=25\Omega, \text{Starting } T_J=25^\circ C$

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)

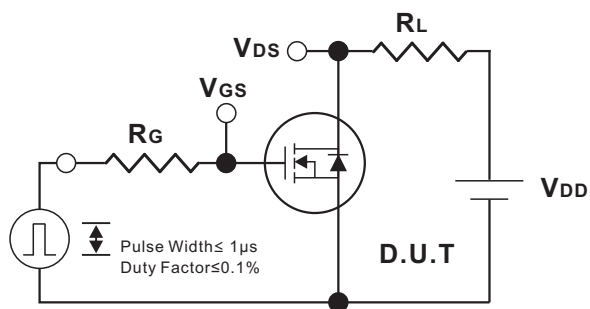
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$		0.32	0.38	Ω
Transconductance	g_{fs}	$V_{DS}=20V, I_D=5.5A$		5		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$		1580		pF
Output Capacitance	C_{OSS}			454		pF
Reverse Transfer Capacitance	C_{RSS}			19		pF
Gate resistance	R_G	$V_{DS}=0V, FREQ=1.00MHz$		5		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=480V, V_{GS}=10V,$ $I_D=5.5A$ (NOTE1,2)		26		nC
Gate-Source Charge	Q_{GS}			6.8		nC
Gate-Drain Charge	Q_{GD}			8.4		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=400V, I_D=5.5A$ $R_G=25\Omega, V_{GS}=10V$ (NOTE1,2)		20		ns
Turn-On Rise Time	t_R			28		ns
Turn-Off Delay Time	$t_{D(OFF)}$			76		ns
Turn-Off Fall Time	t_F			15		ns
Drain-Source Diode Characteristics And Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S				11	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=11A, V_{GS}=0V$			1.2	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_F=5.5A$ $di/dt=100A/\mu s$		290		ns
Reverse Recovery Charge	Q_{rr}			4.5		μC

Notes:

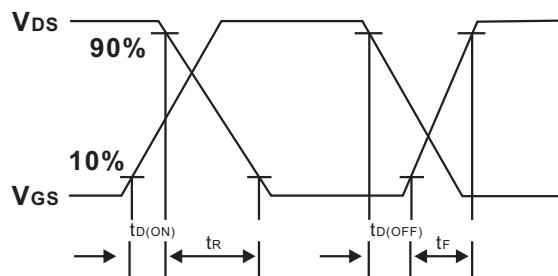
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



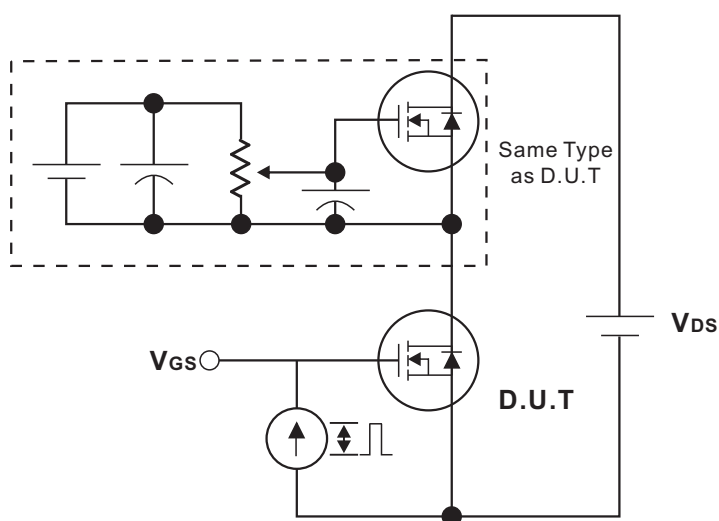
Test Circuits and waveforms



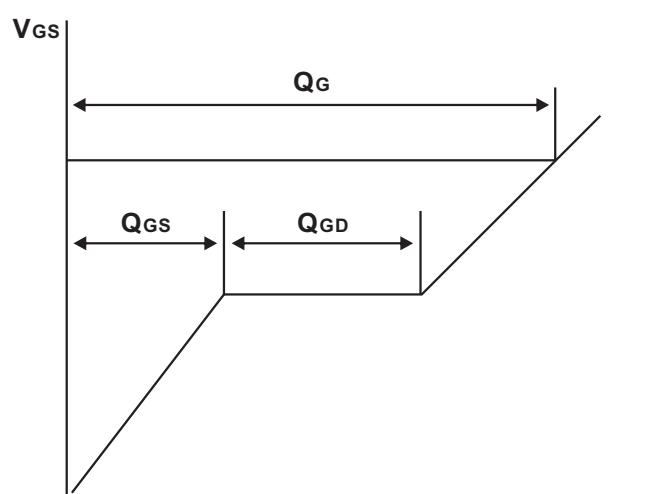
Switching Test Circuit



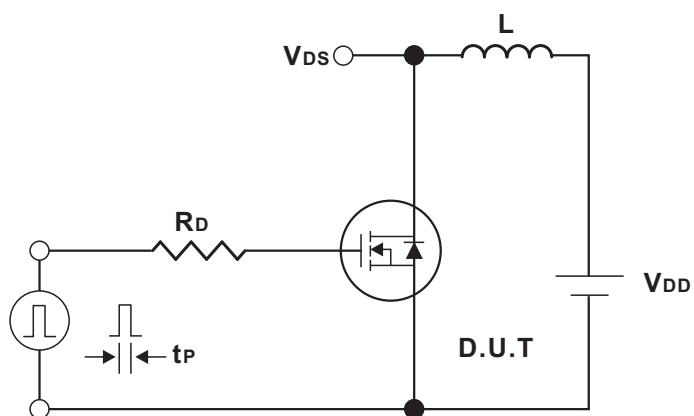
Switching Waveforms



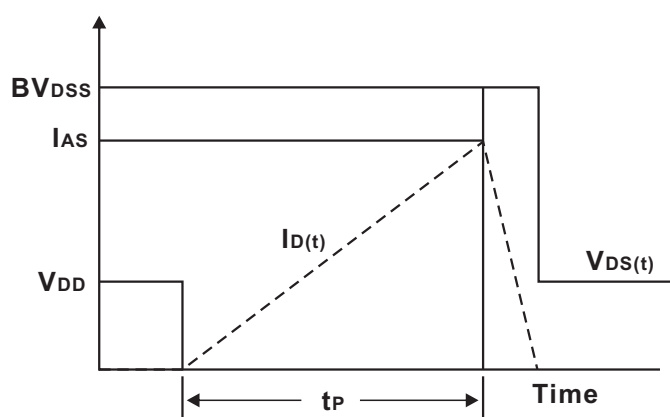
Gate Charge Test Circuit



Charge
Gate Charge Waveform



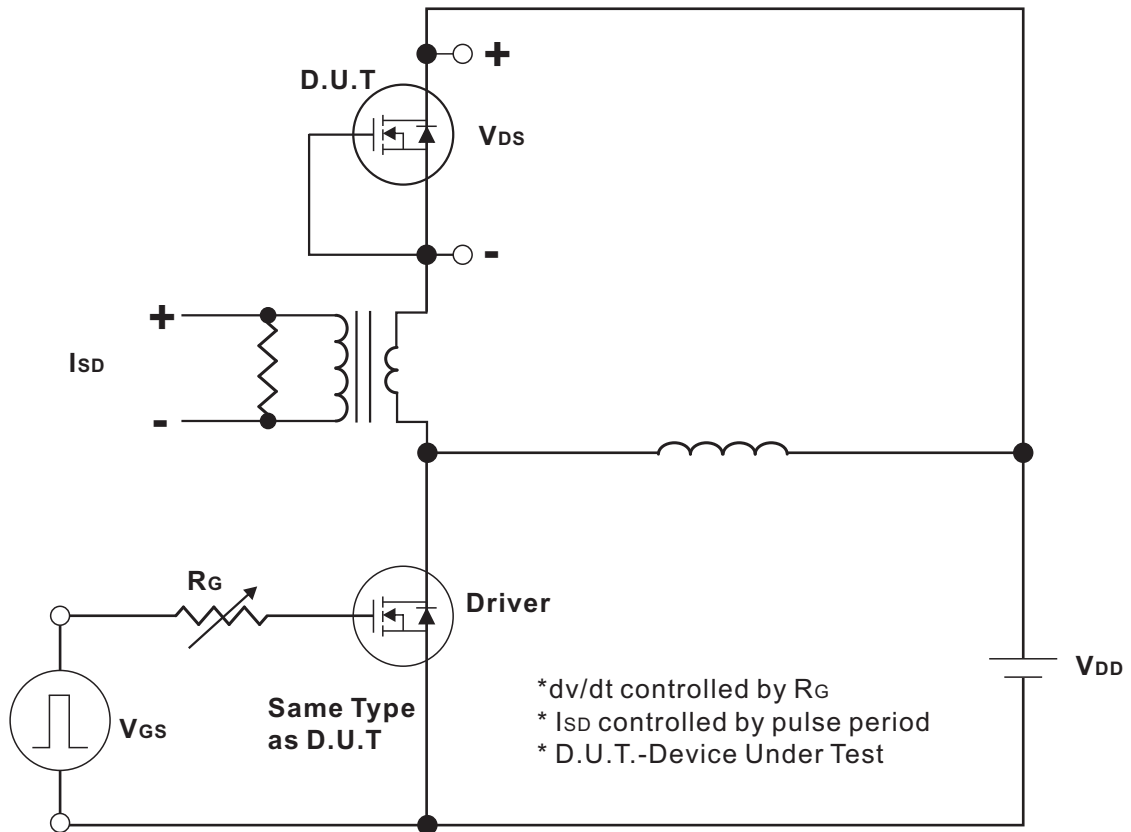
Unclamped Inductive Switching Test Circuit



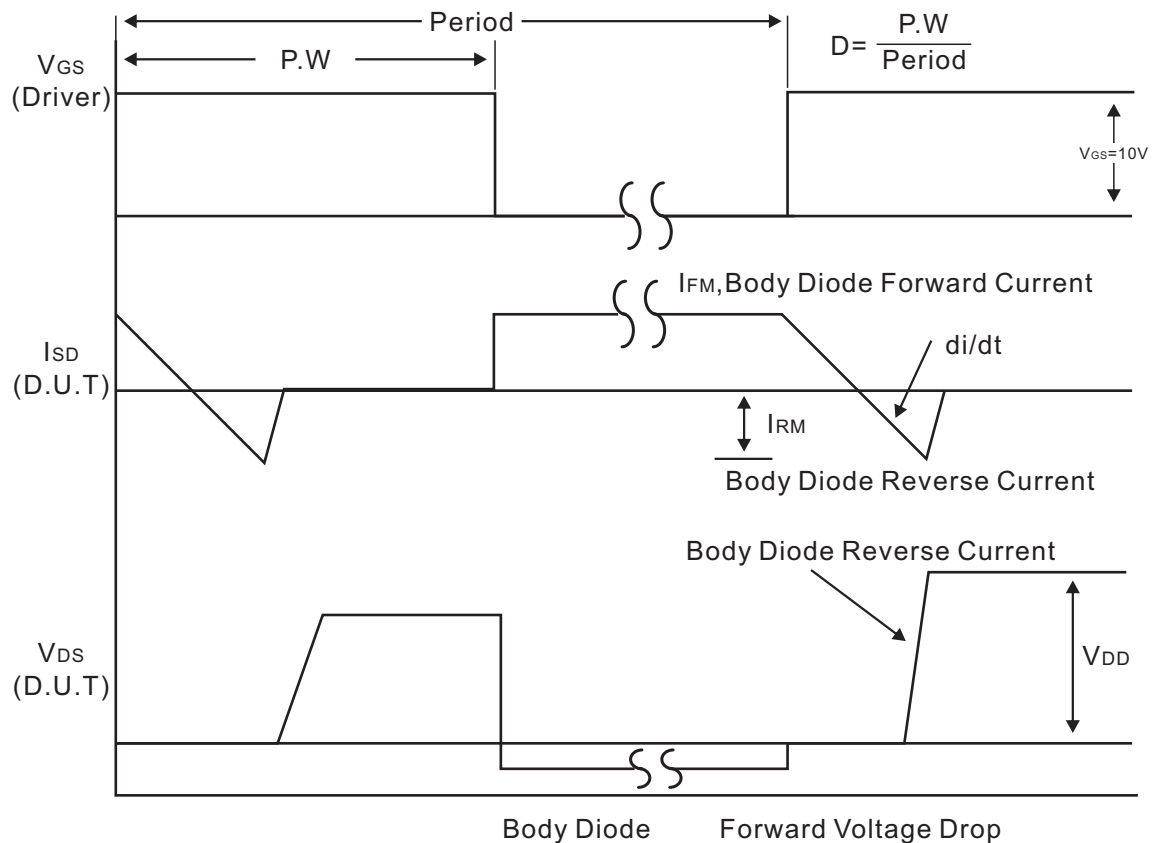
Unclamped Inductive Switching Waveforms



Test Circuits and waveforms



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms



Typical Characteristics

Fig.1 Output characteristics

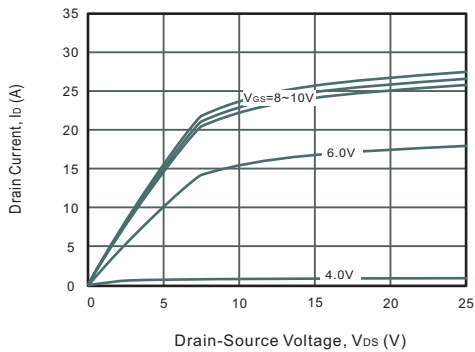


Fig.2 Power Dissipation

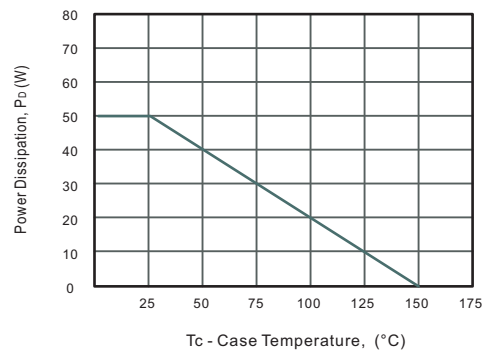


Fig.3 Drain Current Derating

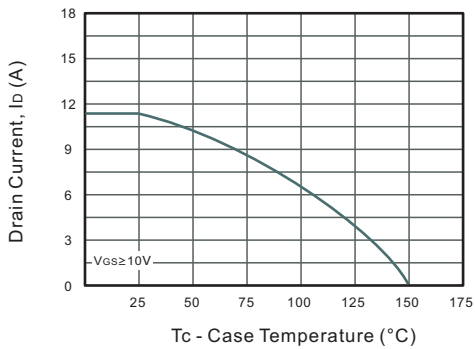


Fig.4 Drain-Source On-Resistance vs. Drain Current

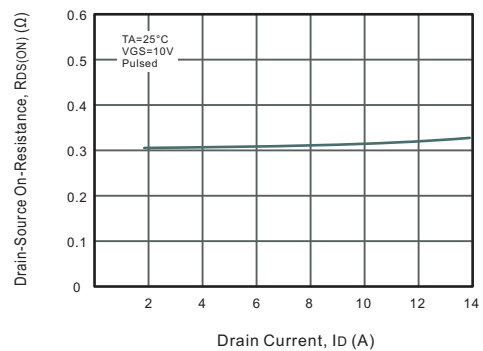


Fig.5 Gate Threshold Voltage vs. Junction Temperature

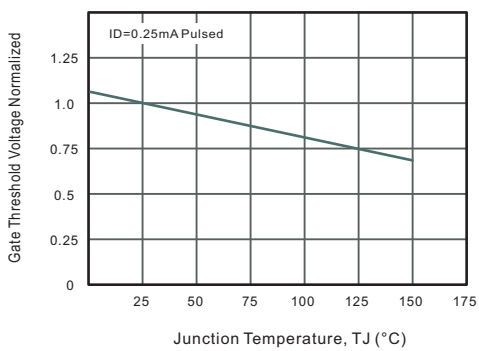


Fig.6 Body-diode Forward Characteristics

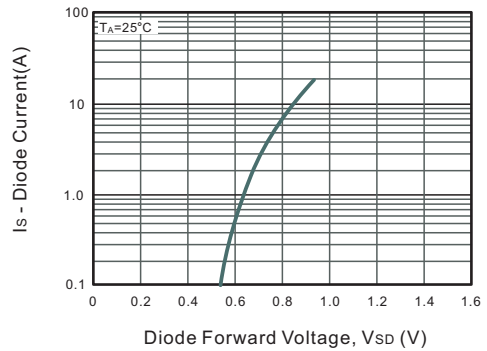


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

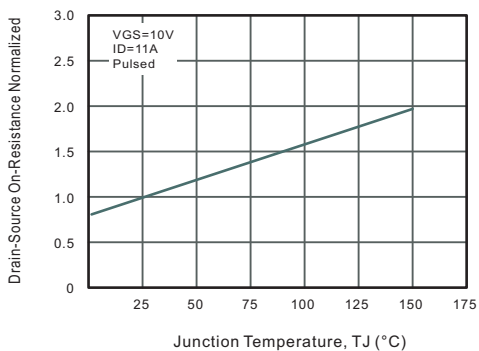
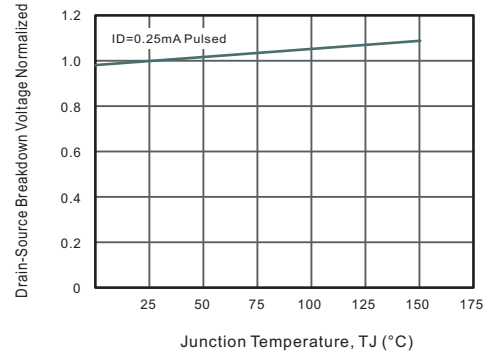


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

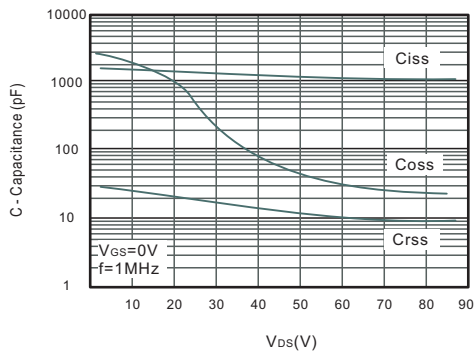


Fig.10 Gate Charge Characteristics

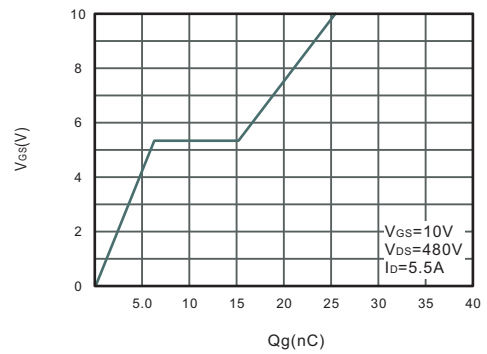


Fig.11 Safe Operating Area

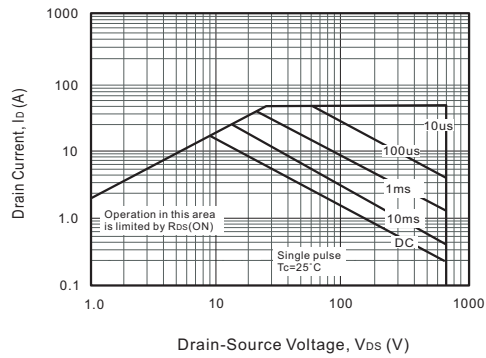
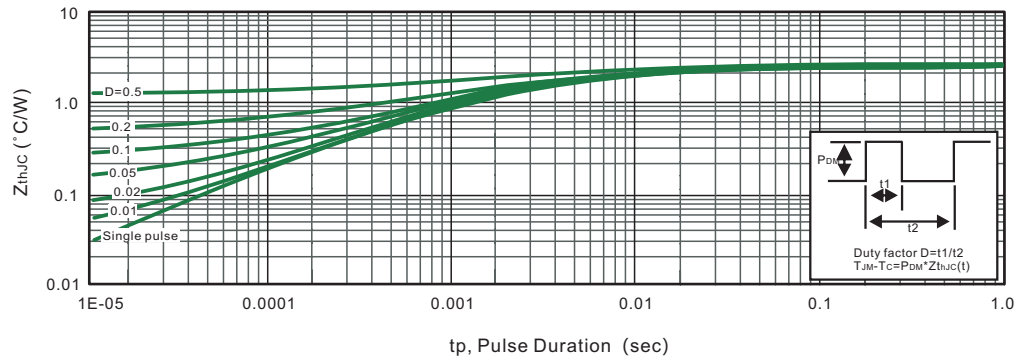
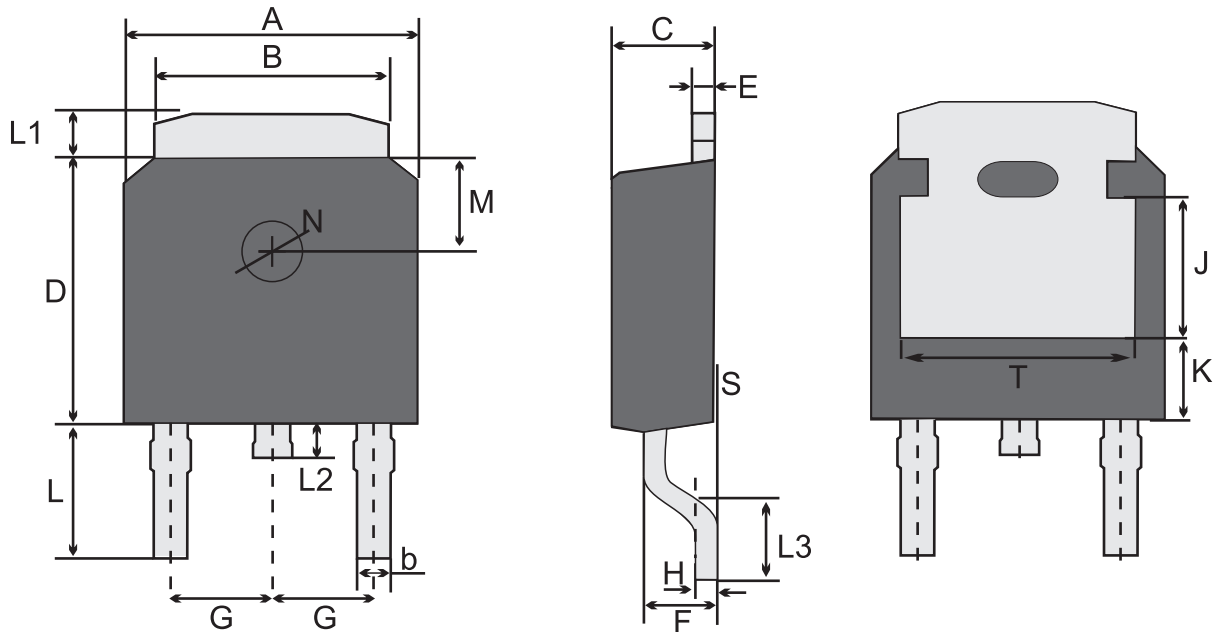


Fig.12 Max. Transient Thermal Impedance





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

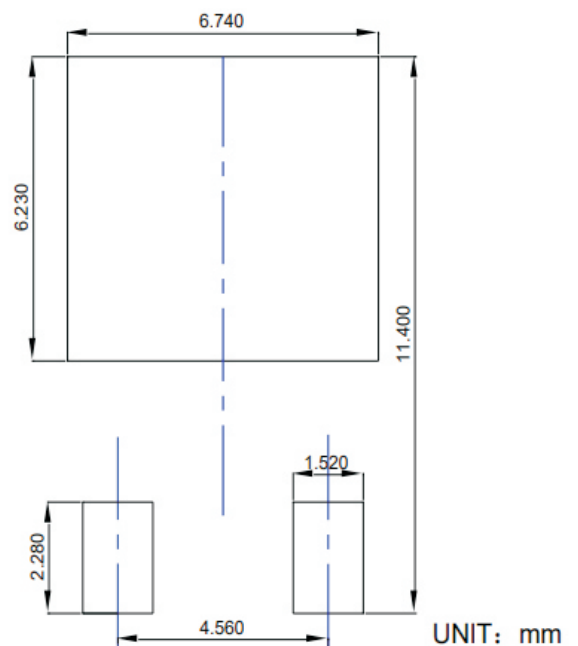


TO-252W(D-PAK) Mechanical data

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
D70R380TP1	D70R380TP1



SUGGESTED SOLDER PAD LAYOUT



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