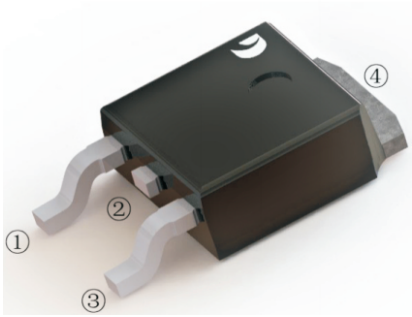
80A, 30V N-CHANNEL POWER MOSFET

TO-252W



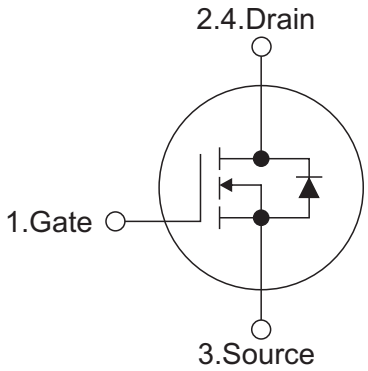
DESCRIPTION

D3R6N30 is an N-channel enhanced MOS field effect transistor
Advanced technology and cell structure make the product
It has low on resistance, excellent switching performance and
High avalanche breakdown withstand voltage.
The product can be widely used in uninterruptible power supply and
Power management field of inverter system

Features

- $R_{DS(ON)(TYP)}$ 3.6m Ω @ V_{GS}=10V, I_D=20A
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness
- Low gate drive voltage

SYMBOL



Mechanical data

- Case: TO-252W
- Approx. Weight: 0.315g (0.011oz)
- Lead free finish, RoHS compliant
- Case Material: “Green” molding compound, UL flammability classification 94V-0,“Halogen-free”.

ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER		Symbols	RATINGS	Units
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	Tc=25℃	I_D	80	A
	Tc=100℃		57	A
Pulsed Drain Current (Note 2)		I_{DM}	320	A
Avalanche Energy Single Pulsed (Note 3)		E_{AS}	144	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation		P_D	82	W
Operation Junction Temperature 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. L = 0.5mH, IAS = 24A, VDD = 50V, RG = 25 Ω, Starting TJ = 25°C
4. ISD ≤ 80A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ = 25°C

THERMAL DATA

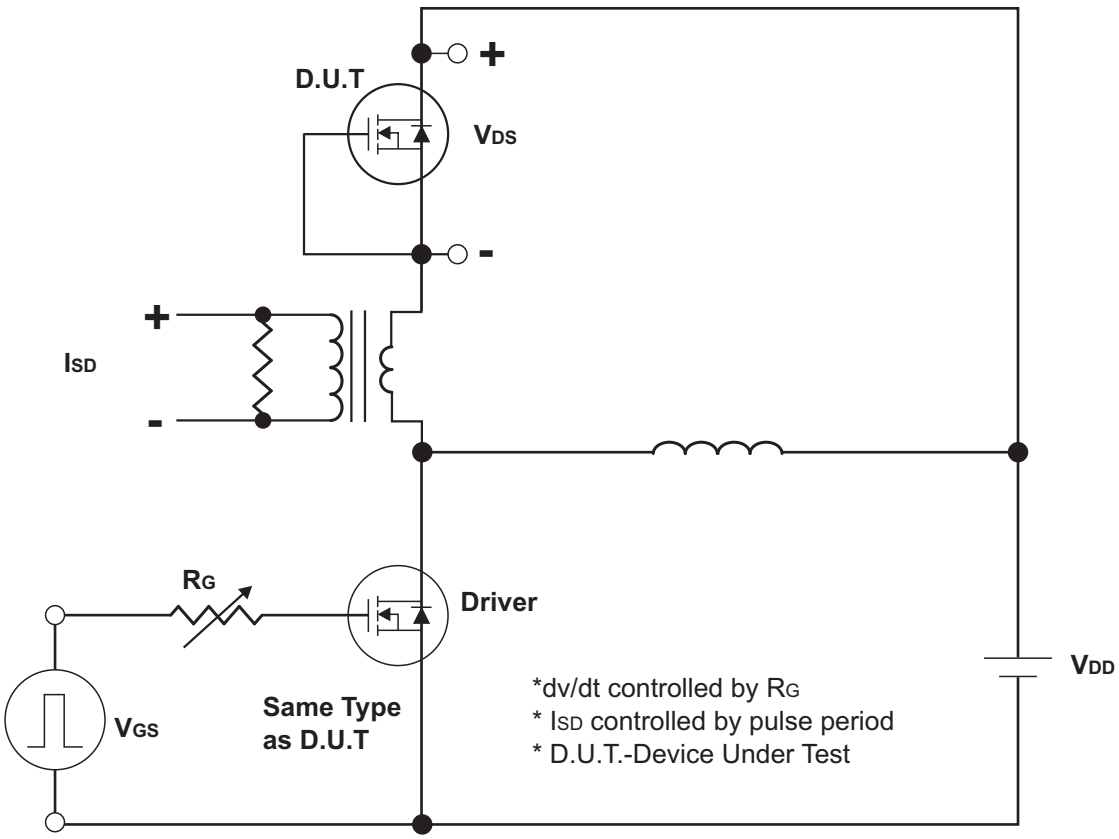
PARAMETER	Symbols	RATINGS	Units
Junction to Ambient	R_{thJA}	63	°C/W
Junction to Case	R_{thJC}	1.52	°C/W

ELECTRICAL CHARACTERISTICS (TA=25°C, unless otherwise specified)

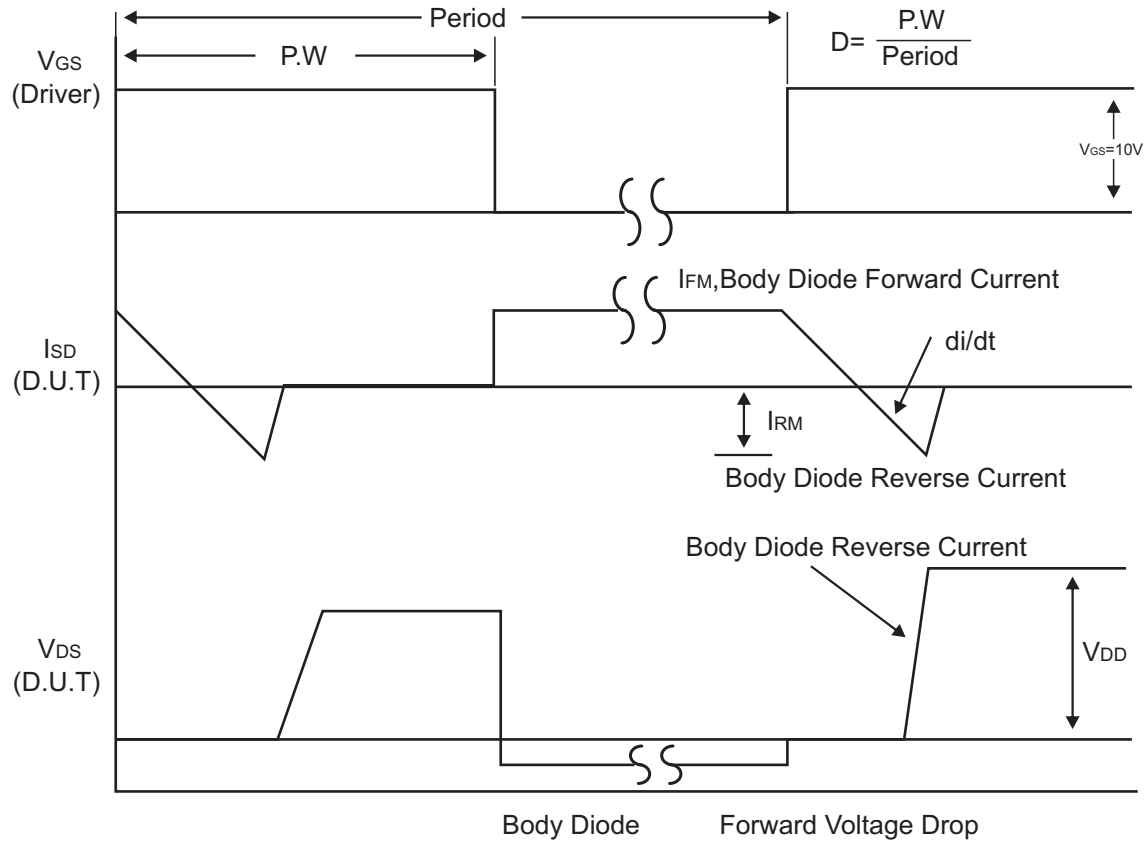
PARAMETER		Symbols	TEST CONDITIONS	Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250uA	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=30V,V_{GS}=0V			1	uA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V,V_{DS}=0V			100	nA
	Reverse		V_{GS}=-20V,V_{DS}=0V			-100	
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250uA	1.2	1.5	2.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=20A		3.6		mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V,		2414		pF
Output Capacitance		C_{OSS}	V_{GS}=0V,		268		pF
Reverse Transfer Capacitance		C_{RSS}	f=1.0MHz		206		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=24V,V_{GS}=10V,		13		nC
Gate-Source Charge		Q_{GS}	I_D=80A,I_G=1mA		4		nC
Gate-Drain Charge		Q_{GD}	(NOTE1,2)		2.2		nC
Turn-On Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=15V,V_{GS}=10V,		7		ns
Turn-On Rise Time		t_R	I_D=80A,R_G=25Ω		16		ns
Turn-Off Delay Time		$t_{D(OFF)}$	(NOTE1,2)		36		ns
Turn-Off Fall Time		t_F			22		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I_S				80	A
Maximum Body-Diode Pulsed Current		I_{SM}				320	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=40A,V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		trr	I_S=40A,V_{GS}=0V,		250		ns
Reverse Recovery Charge		Qrr	di/dt=100A/us		4.5		uC

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

Test Circuits and waveforms

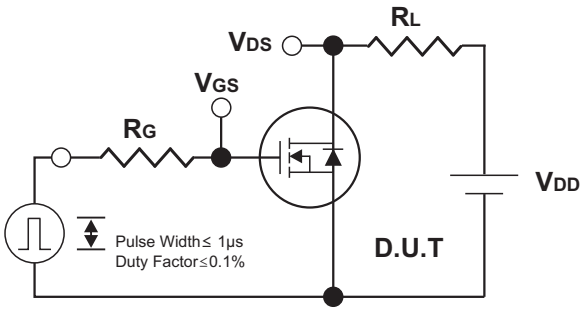


Peak Diode Recovery dv/dt Test Circuit

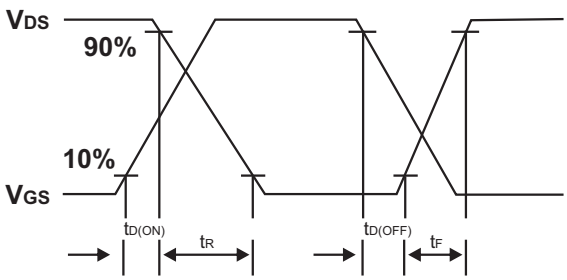


Peak Diode Recovery dv/dt Waveforms

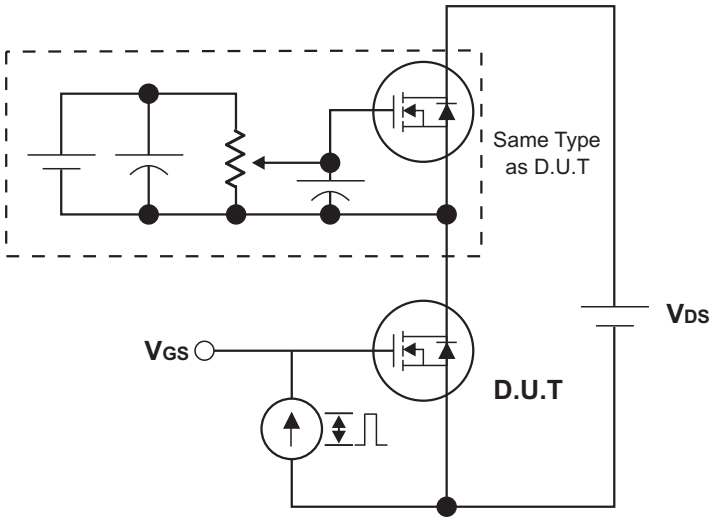
Test Circuits and waveforms



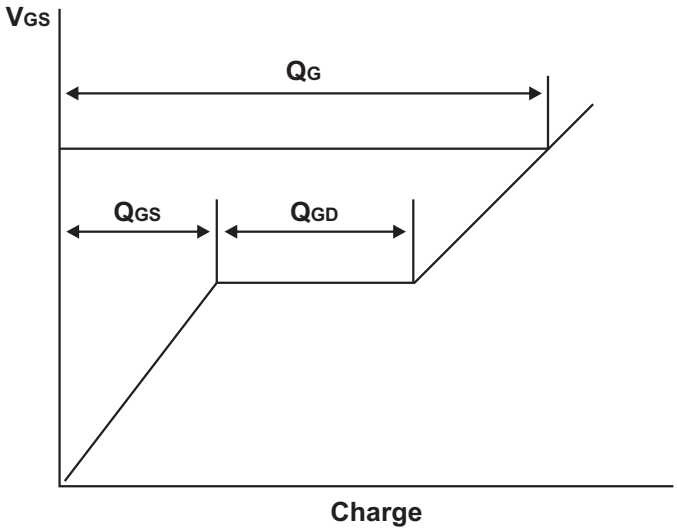
Switching Test Circuit



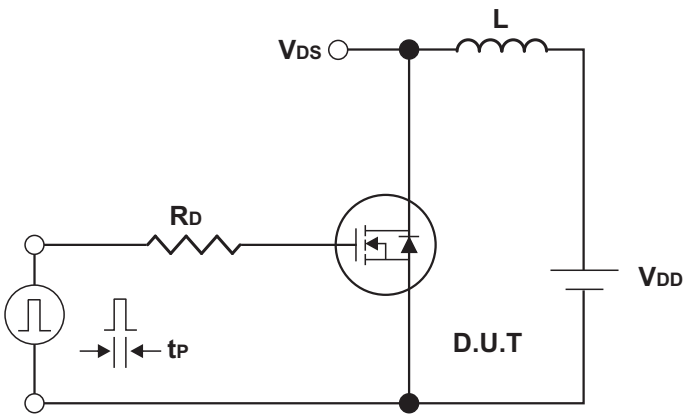
Switching Waveforms



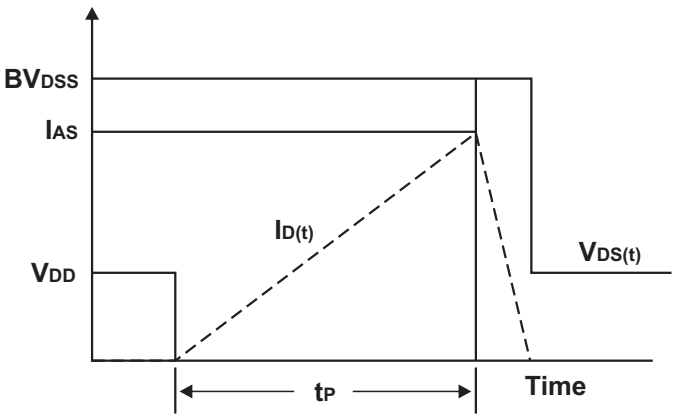
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Typical Characteristics

Fig.1 Drain Current vs. Gate-Source Voltage

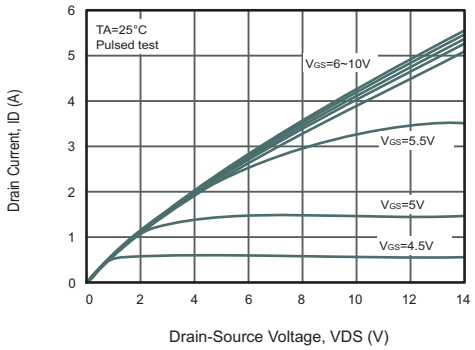


Fig.2 Drain-Source On-Resistance vs. Gate-Source Voltage

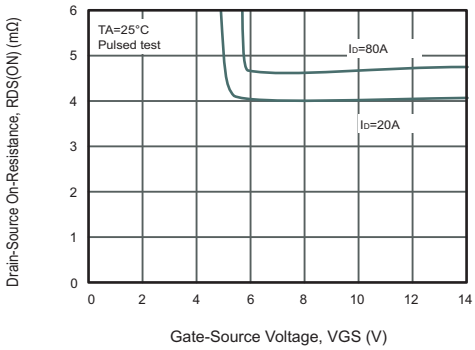


Fig.3 Gate Charge Characteristics

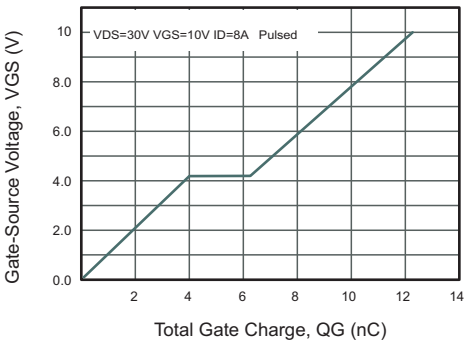


Fig.4 Capacitance Characteristics

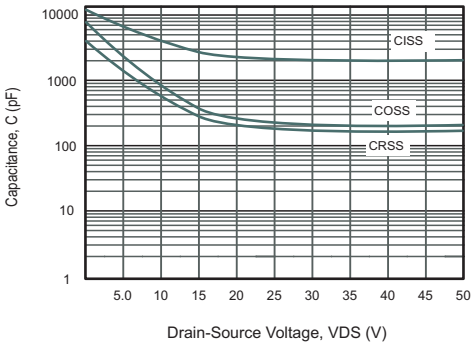


Fig.5 Drain-Source On-Resistance vs. Junction Temperature

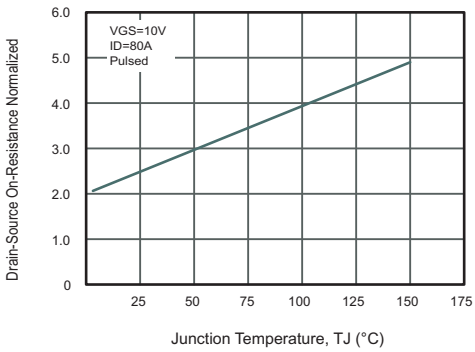


Fig.6 Breakdown Voltage vs. Junction Temperature

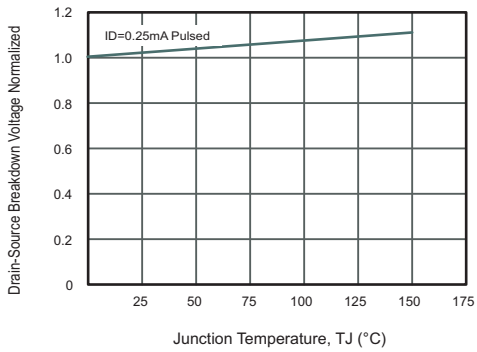


Fig.7 Gate Threshold Voltage vs. Junction Temperature

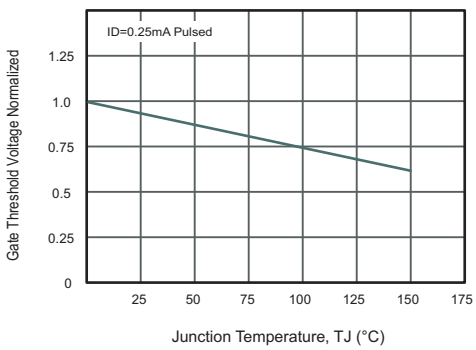
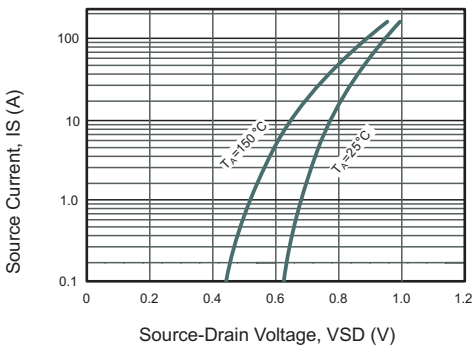


Fig.8 Source Current vs. Source-Drain Voltage



Typical Characteristics

Fig.9 Drain Current vs. Gate-Source Voltage

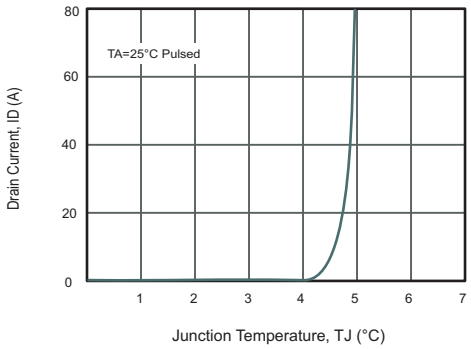


Fig.10 Drain-Source On-Resistance vs. Drain Current

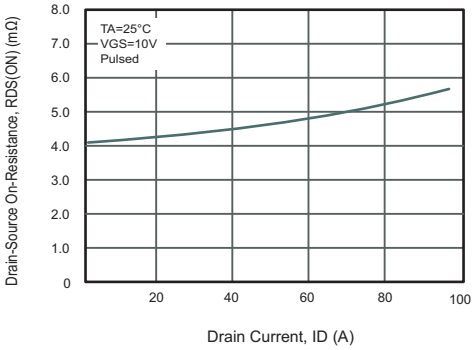


Fig.11 Drain Current vs. Junction Temperature

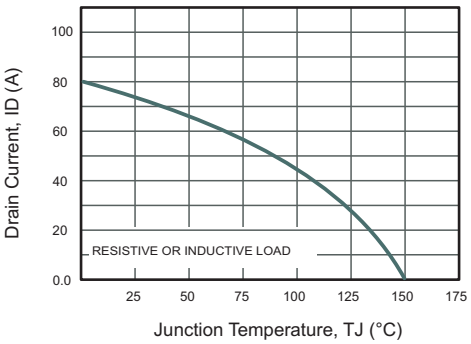


Fig.12 Power Dissipation vs. Junction Temperature

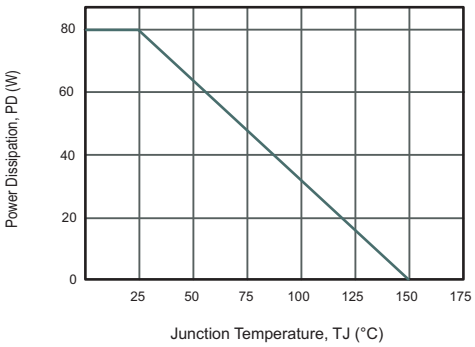
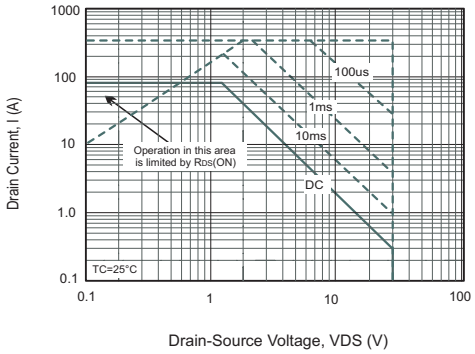
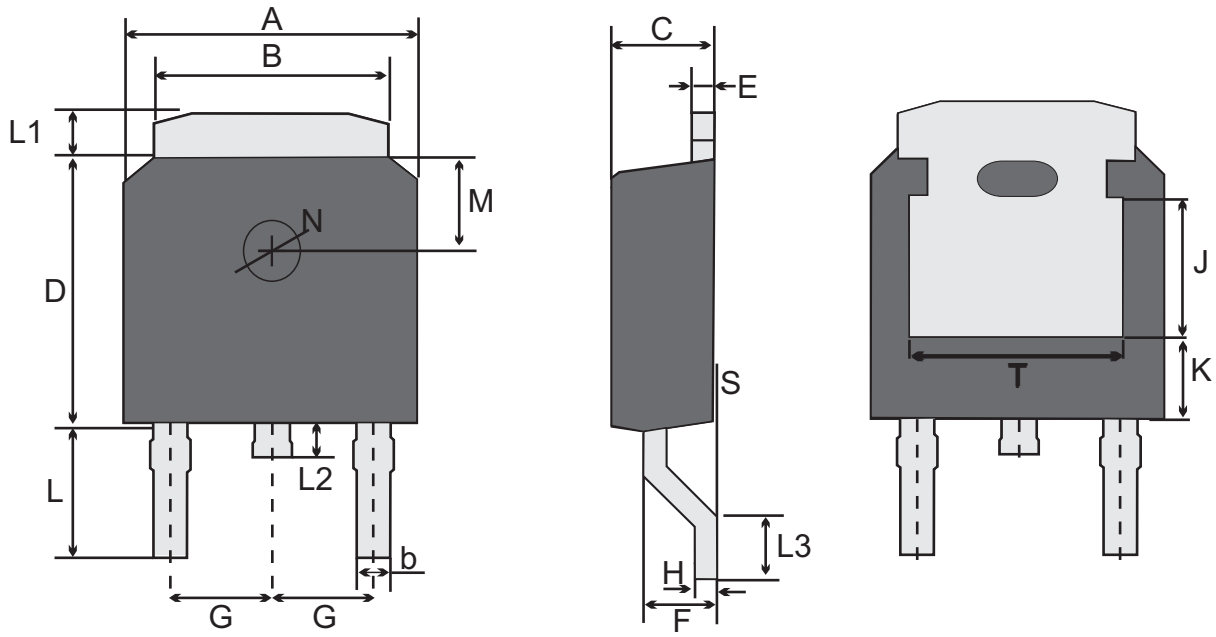


Fig.13 Safe Operating Area



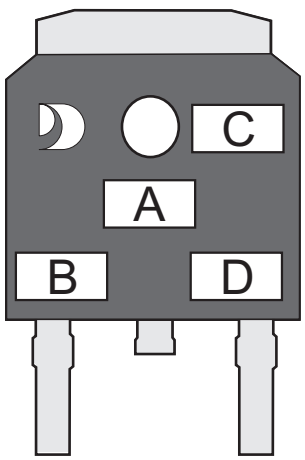
TO-252W(D-PAK) Package Outline Dimensions



TO-252W(D-PAK) mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.23	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	typ	6.6	5.3	0.7	2.3	6.1	0.5	1.5		0.50	2.5	1.0	0.6	1.30	0.15					
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.00	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	9	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	typ	260	209	28	90	240	20	59		20	98	39	24	51	6					
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

MARKING DIAGRAM



Unmarkable Surfacea
Marking Composition Field
A: Marking Area
B: Lot Code
C: Additional Information
D:Date Code (YWW)
Y:Years(0~9)
WW: Week

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