

25A,500V N-CHANNEL POWER MOSFET

DESCRIPTION

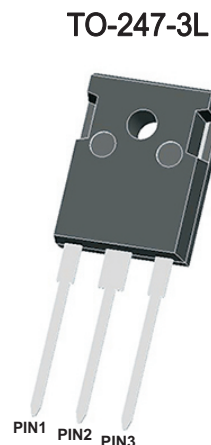
The W25N50 is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

Features

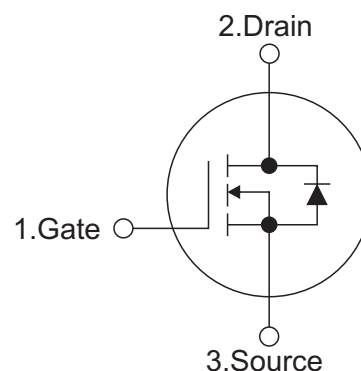
- $R_{DS(ON)} \leq 0.27\Omega$ @ $V_{GS}=10V$, $I_D=12.5A$
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

Mechanical data

- Case: TO-247-3L
- Approx. Weight: 6.3g (0.22oz)
- Lead free finish, 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_{DSS}	500	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	I_D	$T_c=25^\circ C$	25
		$T_c=100^\circ C$	17.6
Pulsed Drain Current (Note 2)	I_{DM}	100	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	780	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	50	V/ns
Power Dissipation	P_D	219	W
Operation Junction Temperature 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. $L = 6.1mH$, $I_{AS} = 16A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

4. $ISD \leq 16A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$

THERMAL DATA

PARAMETER	Symbols	RATINGS	Units
Junction to Ambient	R_{thJA}	62.5	$^\circ C/W$
Junction to Case	R_{thJC}	0.57	$^\circ C/W$



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

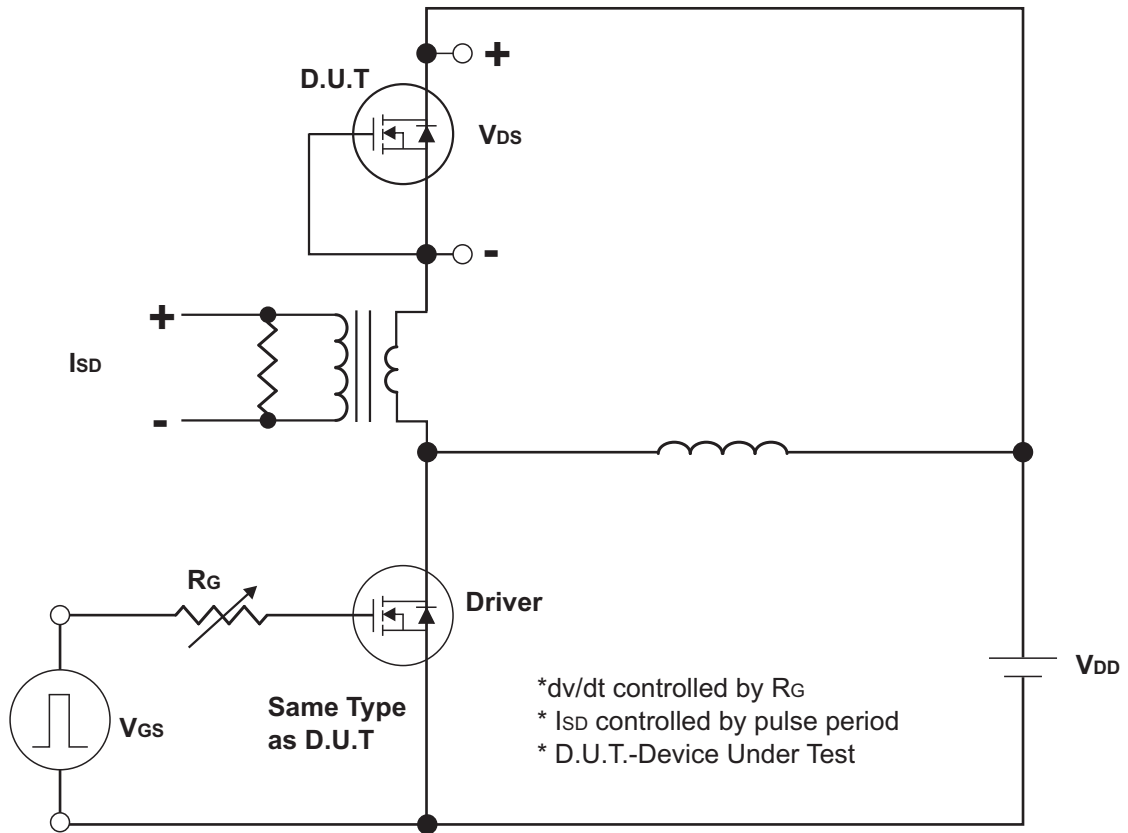
PARAMETER		Symbols	TEST CONDITIONS	Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=500V, V_{GS}=0V$			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30V, V_{DS}=0V$			100	nA
	Reverse		$V_{GS}=-30V, V_{DS}=0V$			-100	
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.2	4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D=12.5A$		0.16	0.27	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$		2660		pF
Output Capacitance		C_{OSS}			220		pF
Reverse Transfer Capacitance		C_{RSS}			10.4		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	$V_{DS}=400V, V_{GS}=10V,$ $I_D=25A, I_G=1mA$ (NOTE1,2)		30		nC
Gate-Source Charge		Q_{GS}			8.0		nC
Gate-Drain Charge		Q_{GD}			12		nC
Turn-On Delay Time (Note 1)		$t_{D(ON)}$	$V_{DS}=250V, V_{GS}=10V,$ $I_D=25A, R_G=25\Omega$ (NOTE1,2)		26		ns
Turn-On Rise Time		t_R			49		ns
Turn-Off Delay Time		$t_{D(OFF)}$			72		ns
Turn-Off Fall Time		t_F			40		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I_S				16	A
Maximum Body-Diode Pulsed Current		I_{SM}				64	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	$I_S=25A, V_{GS}=0V$			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	$I_S=25A, V_{GS}=0V,$		470		ns
Reverse Recovery Charge		Q_{rr}	$di/dt=100A/\mu s$		5.0		μC

Notes:

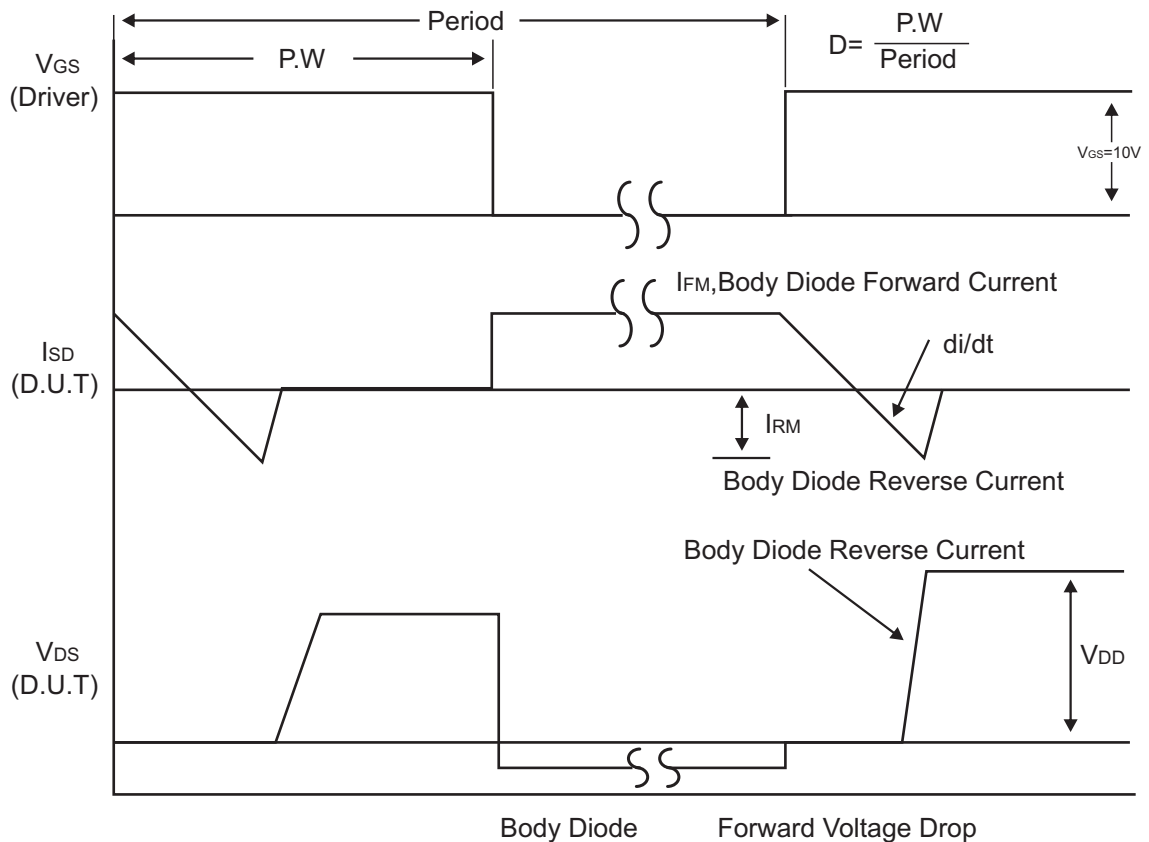
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



Test Circuits and waveforms



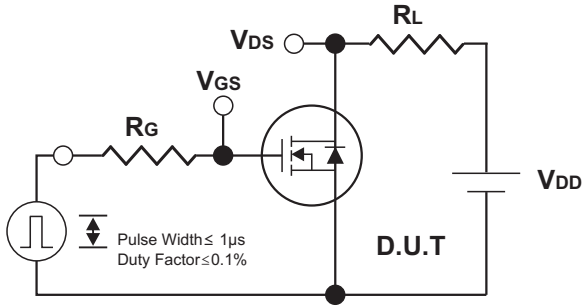
Peak Diode Recovery dv/dt Test Circuit



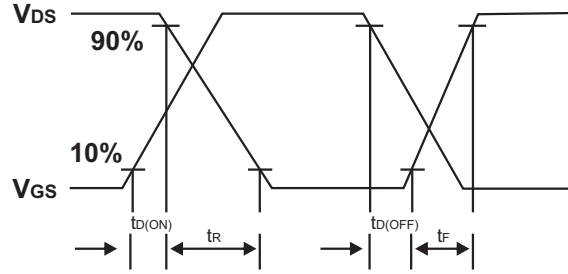
Peak Diode Recovery dv/dt Waveforms



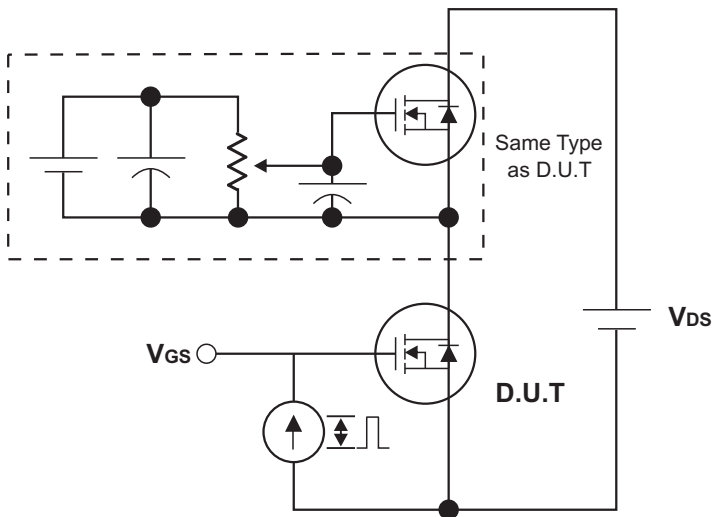
Test Circuits and waveforms



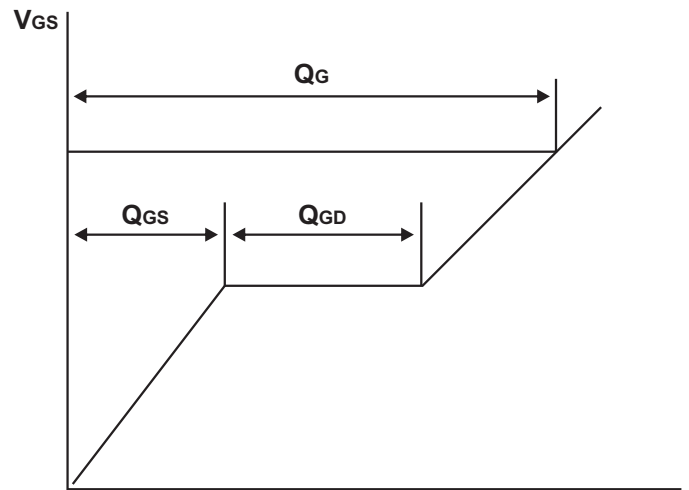
Switching Test Circuit



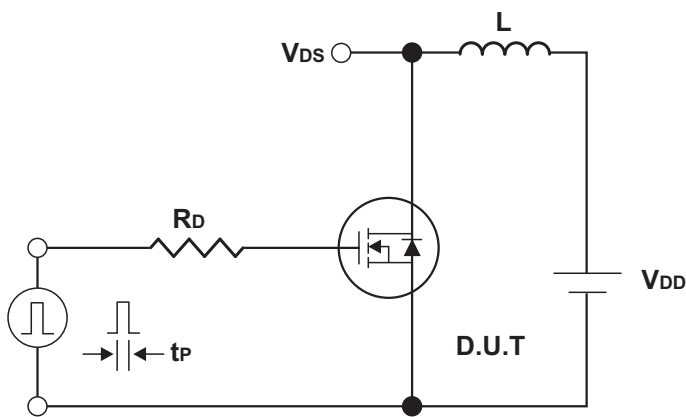
Switching Waveforms



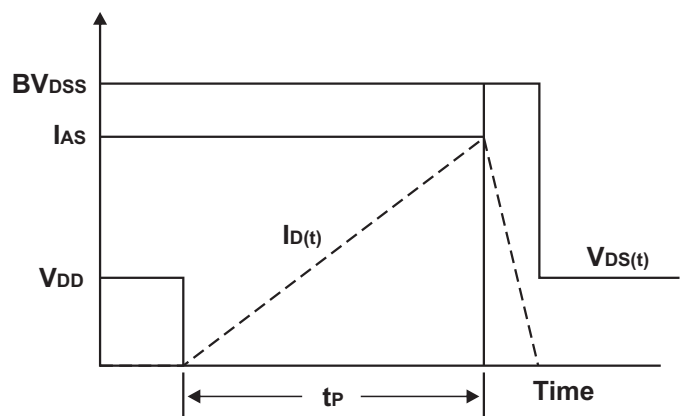
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Typical Characteristics

Fig.1 Drain Current vs. Gate-Source Voltage

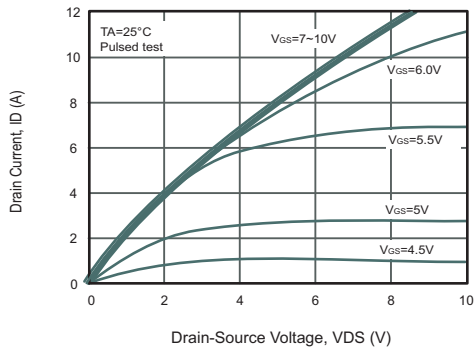


Fig.2 Drain-Source On-Resistance vs. Gate-Source Voltage

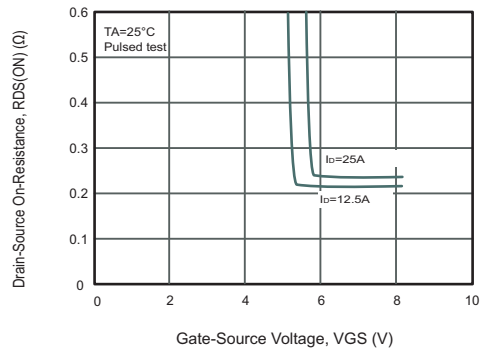


Fig.3 Gate Charge Characteristics

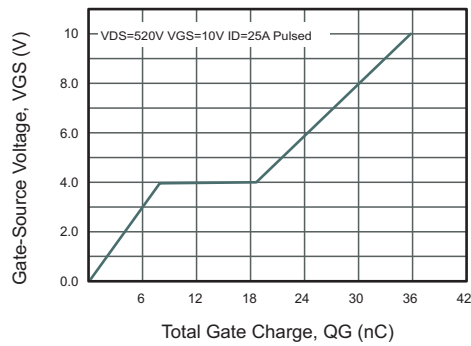


Fig.4 Capacitance Characteristics

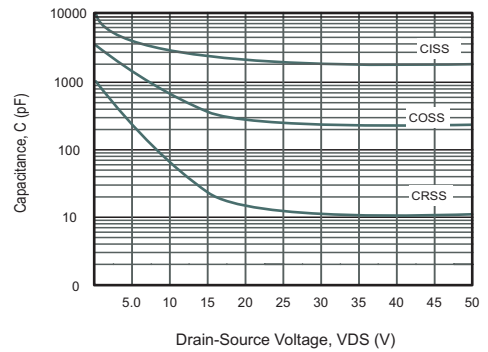


Fig.5 Drain-Source On-Resistance vs. Junction Temperature

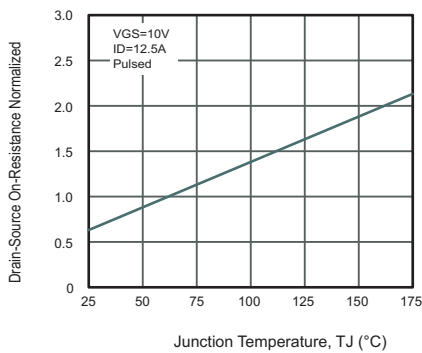


Fig.6 Breakdown Voltage vs. Junction Temperature

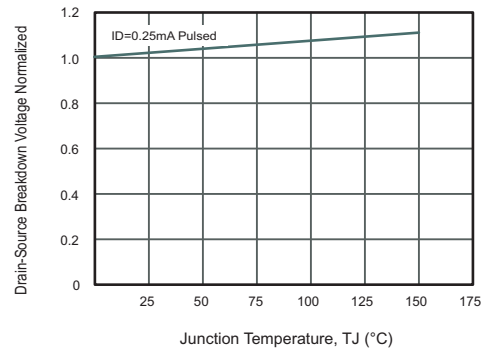


Fig.7 Gate Threshold Voltage vs. Junction Temperature

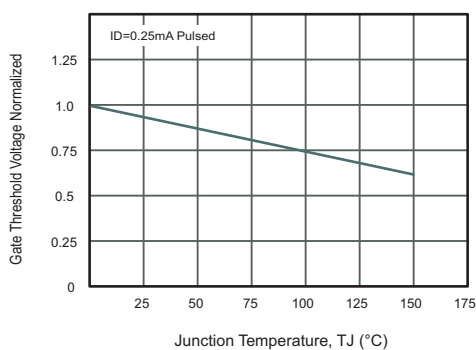
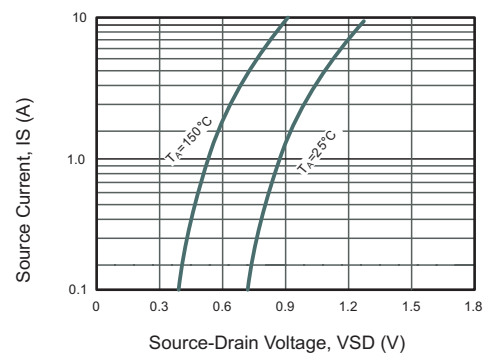


Fig.8 Source Current vs. Source-Drain Voltage





Typical Characteristics

Fig.9 Drain Current vs. Gate-Source Voltage

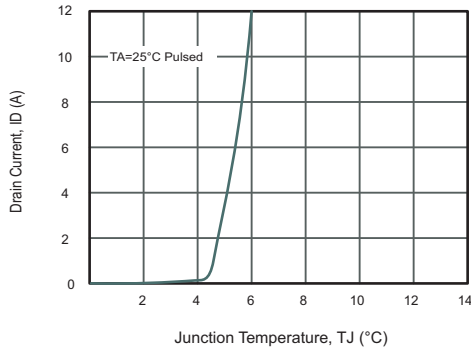


Fig.10 Drain-Source On-Resistance vs. Drain Current

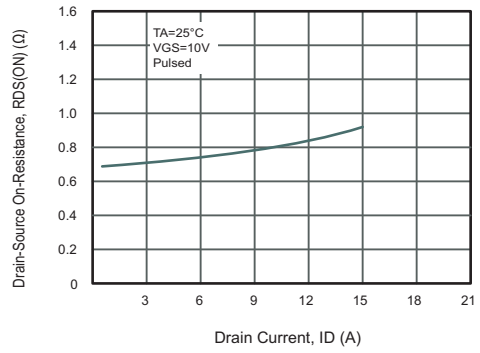


Fig.11 Power Dissipation vs. Junction Temperature

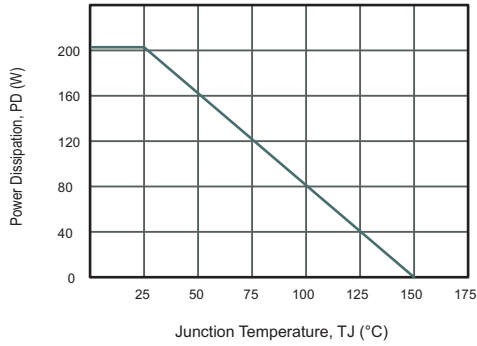


Fig.12 Drain Current vs. Junction Temperature

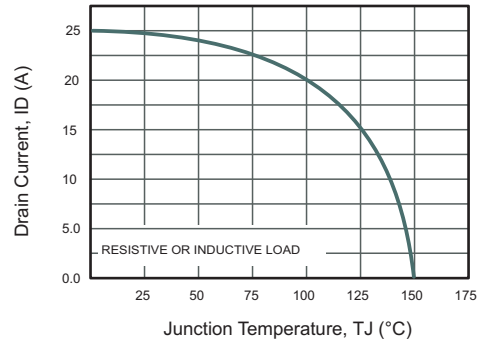
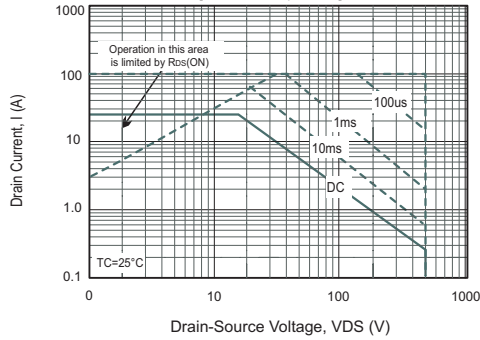


Fig.13 Safe Operating Area

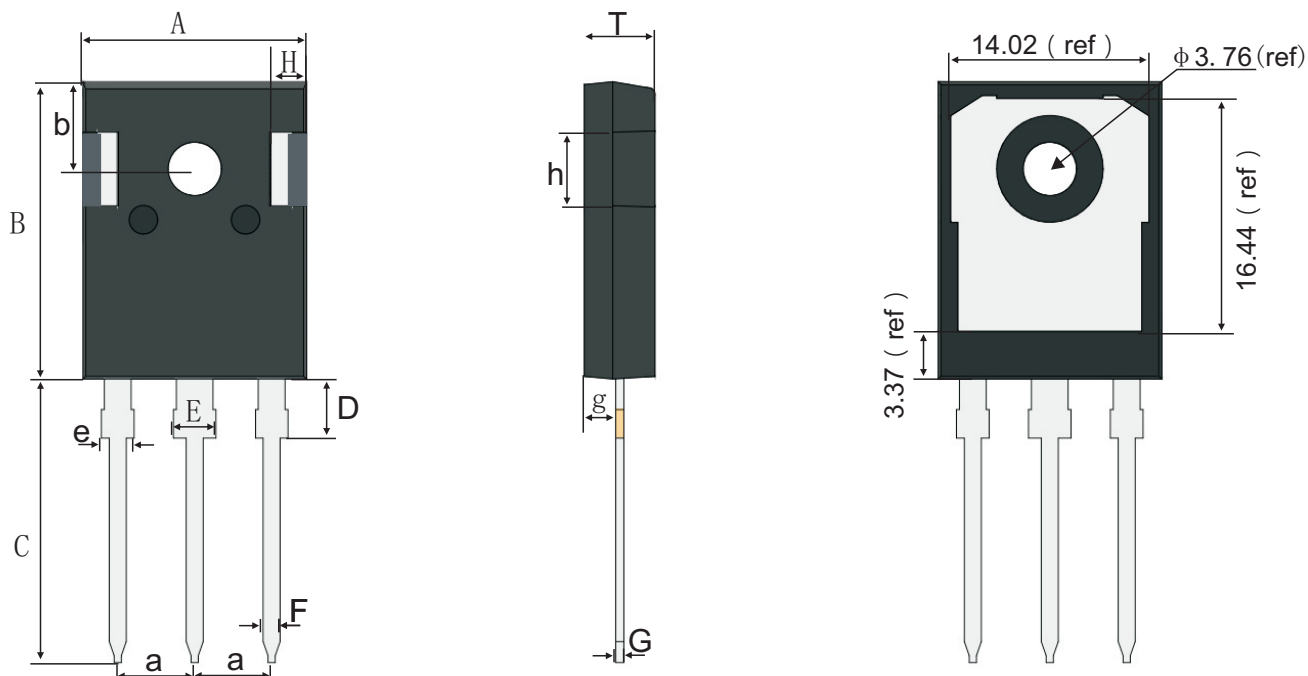




PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

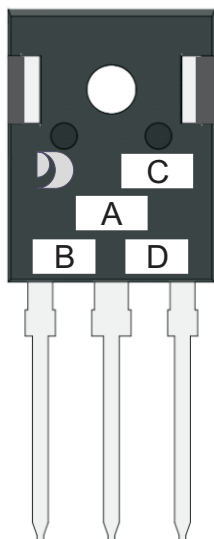
TO-247-3L



TO-247-3L mechanical data

UNIT		A	B	b	C	D	E	e	F	g	G	T	t	a	H	h
mm	max	16.01	21.18	6.26	20.2	4.25	3.15	2.20	1.30	2.49	0.70	5.20	2.21	5.54	2.71	5.37
	typ	15.81	20.98	6.16	20.0	4.15	3.00	2.05	1.20	2.39	0.60	5.00	2.01	5.44	2.51	5.17
	min	15.61	20.78	6.06	19.8	4.05	2.85	1.90	1.10	2.29	0.50	4.80	1.81	5.34	2.31	4.97
mil	max	630	834	246	795	167	124	87	51	98	28	205	87	218	107	211
	typ	622	826	243	787	163	118	81	47	94	24	197	79	214	99	204
	min	615	818	239	780	159	112	75	43	90	20	189	71	210	91	196

MARKING DIAGRAM



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



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