

500V N-CHANNEL POWER MOSFET

MAIN CHARACTERISTICS

I_D	2.0A
V_{DSS}	500V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$<7\Omega$ (Type: 5Ω)

DESCRIPTION

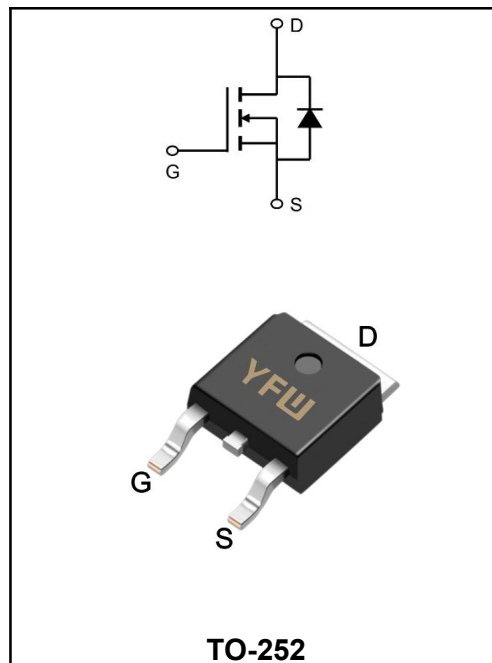
The YFW2N50AD is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

Features

- ♦Fast switching capability
- ♦Avalanche energy tested
- ♦Improved dv/dt capability, high ruggedness

Mechanical data

- ♦Case: TO-252
- ♦pprox. 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 ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		Symbols	RATINGS	Units
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	2	A
	$T_C=100^{\circ}\text{C}$		1.3	A
Pulsed Drain Current (Note 2)		I_{DM}	8	A
Avalanche Energy Single Pulsed (Note 3)		E_{AR}	35	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation		P_D	54	W
Operation Junction Temperature and Storage Temperature		T_J, T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$
Junction to Ambient		$R_{\theta JA}$	63	$^{\circ}\text{C/W}$
Junction to Case		$R_{\theta JC}$	2.31	$^{\circ}\text{C/W}$

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. $L = 10\text{mH}$, $I_{AS} = 2.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 10\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $ISD \leq 2\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

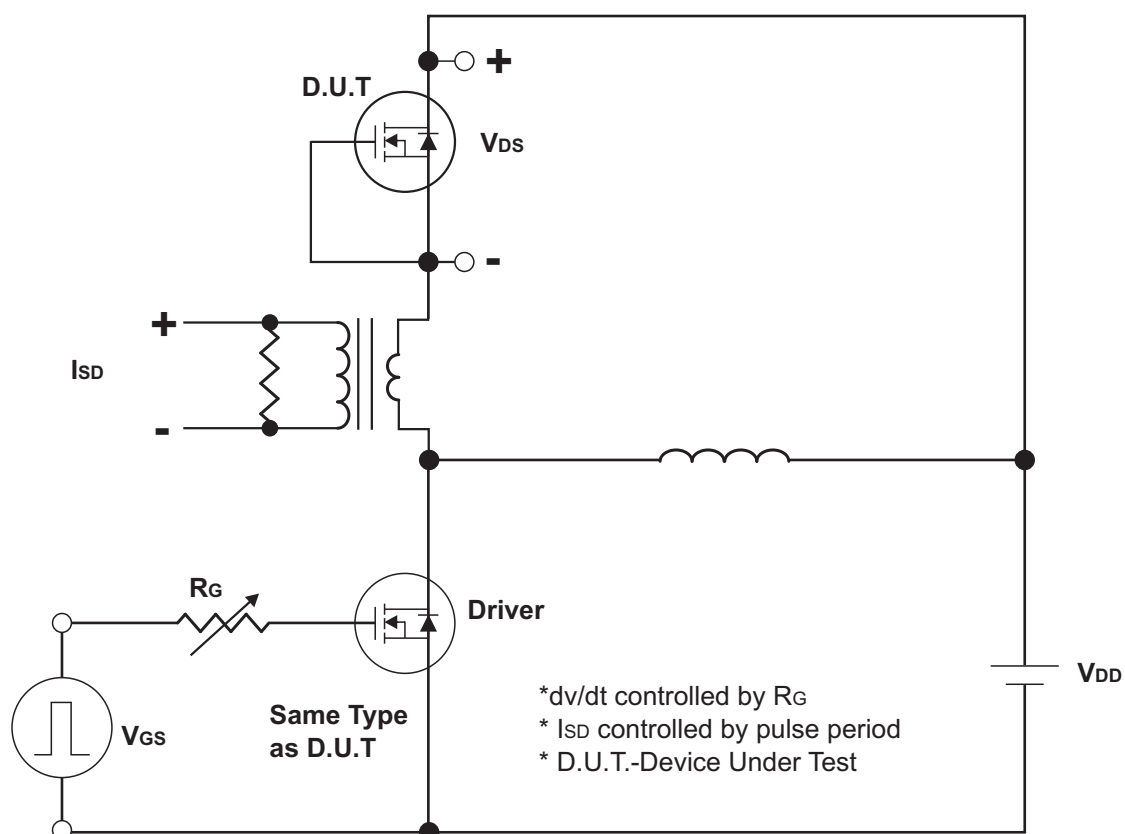
ELECTRICAL CHARACTERISTICS (TA=25°C, unless otherwise specified)

PARAMETER		TEST CONDITIONS	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage		$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	500			V
Drain-Source Leakage Current		$V_{DS}=500V, V_{GS}=0V$	I_{DSS}			1	μA
Gate- Source Leakage Current	Forward	$V_{GS}=30V, V_{DS}=0V$	I_{GSS}			100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$				-100	
Gate Threshold Voltage		$V_{DS}=V_{GS}, I_D=250\mu A$	$V_{GS(TH)}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$V_{GS}=10V, I_D=1.0A$	$R_{DS(ON)}$		5	7	Ω
Input Capacitance		$V_{DS}=25V,$	C_{ISS}		156		pF
Output Capacitance		$V_{GS}=0V,$	C_{OSS}		24		pF
Reverse Transfer Capacitance		$f=1.0MHz$	C_{RSS}		2.2		pF
Total Gate Charge (Note 1)		$V_{DS}=400V, V_{GS}=10V,$	QG		7.9		nC
Gate-Source Charge		$I_D=2A, I_G=1mA$	QGS		0.9		nC
Gate-Drain Charge		(NOTE1,2)	QGD		5.4		nC
Turn-On Delay Time (Note 1)		$V_{DS}=250V, V_{GS}=10V,$	$t_{D(ON)}$		2.7		ns
Turn-On Rise Time		$I_D=2A, R_G=10\Omega$	t_R		12.1		ns
Turn-Off Delay Time		(NOTE1,2)	$t_{D(OFF)}$		16.7		ns
Turn-Off Fall Time			t_F		7.2		ns
Maximum Body-Diode Continuous Current			I_S			2	A
Maximum Body-Diode Pulsed Current			I_{SM}			8	A
Drain-Source Diode Forward Voltage (Note 1)		$I_S=2A, V_{GS}=0V$	V_{SD}			1.5	V
Reverse Recovery Time (Note 1)		$I_S=2A, V_{GS}=0V,$	t_{rr}		309		ns
Reverse Recovery Charge		$di/dt=100A/\mu s$	Q_{rr}		720		μC

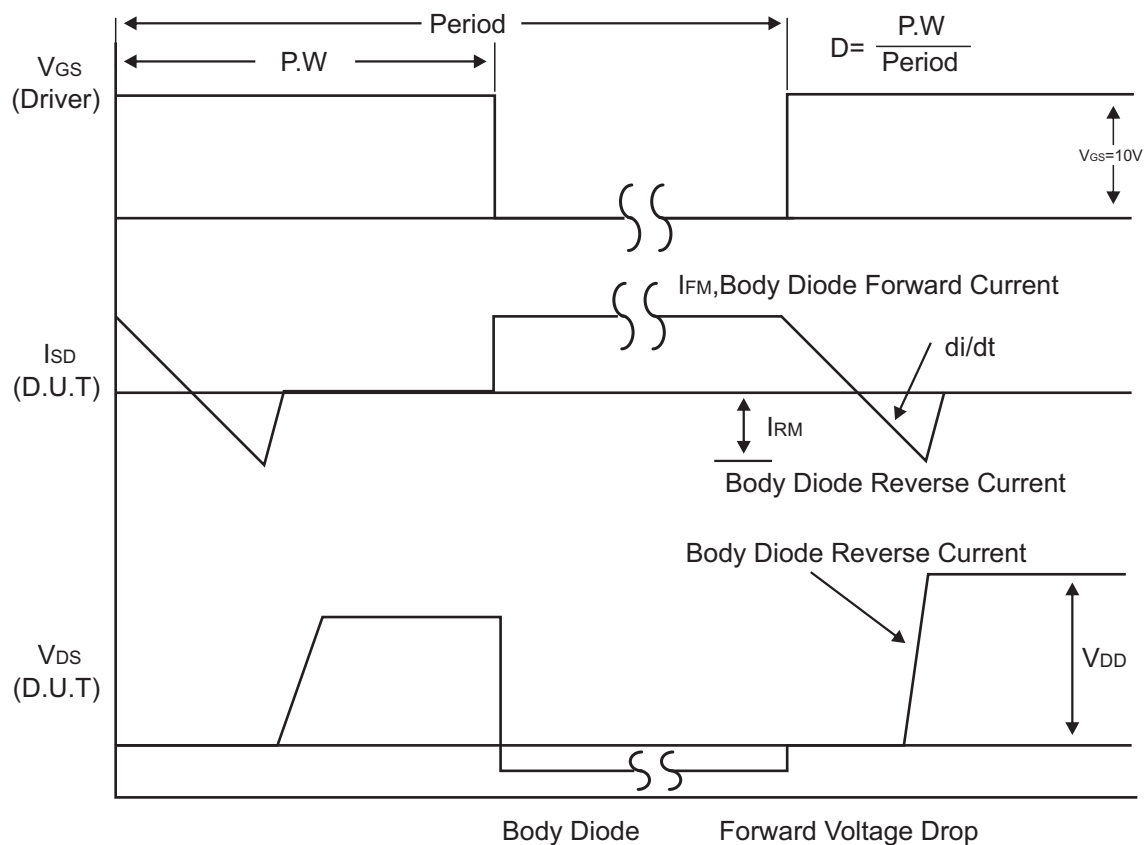
Notes:

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

Test Circuits and waveforms

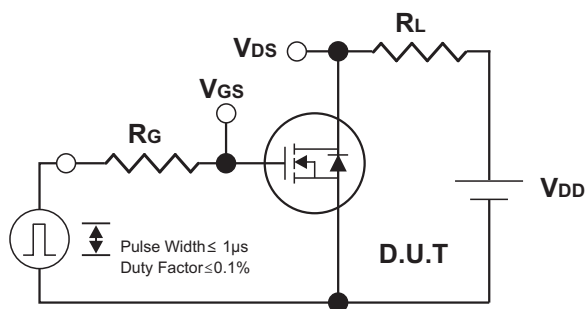


Peak Diode Recovery dv/dt Test Circuit

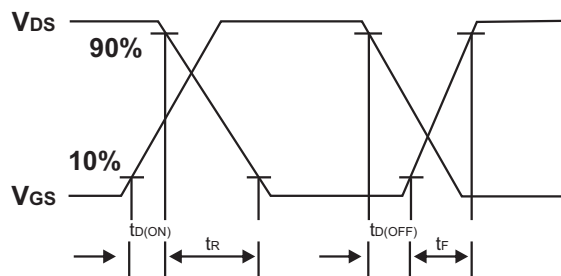


Peak Diode Recovery dv/dt W

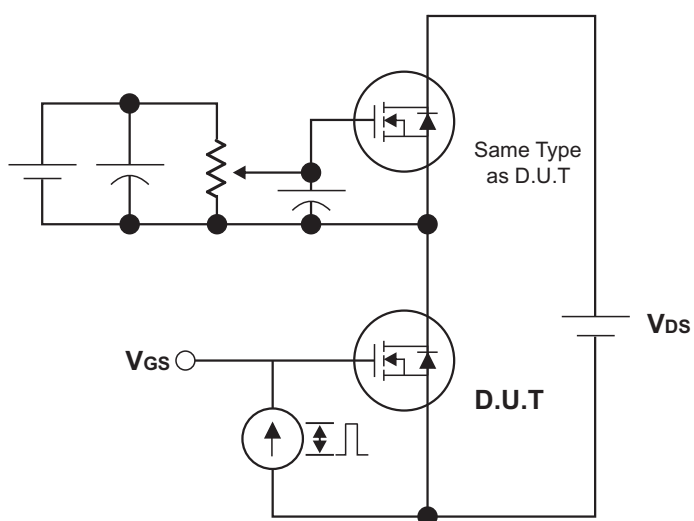
Test Circuits and waveforms



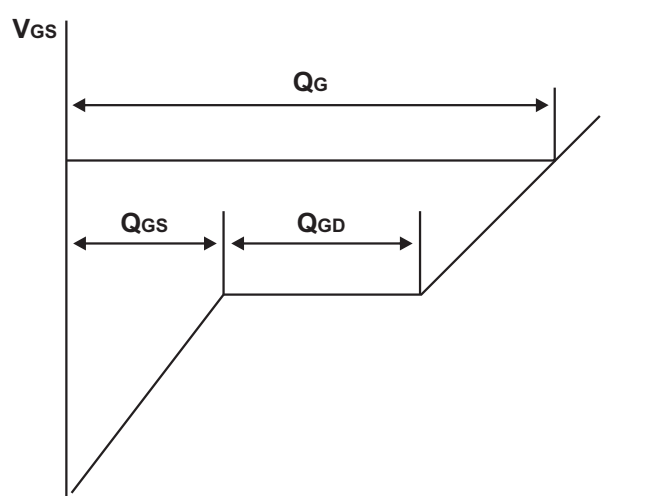
Switching Test Circuit



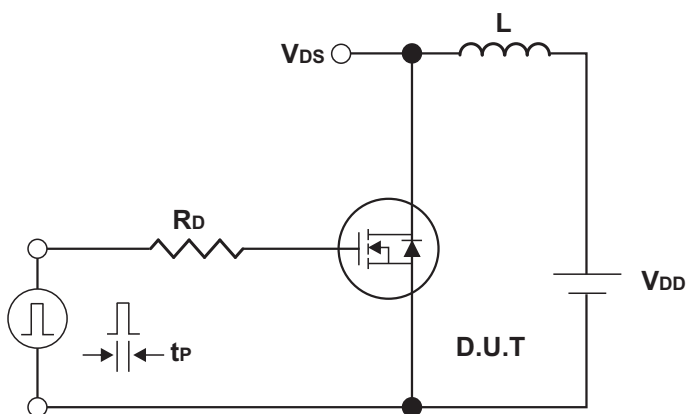
Switching Waveforms



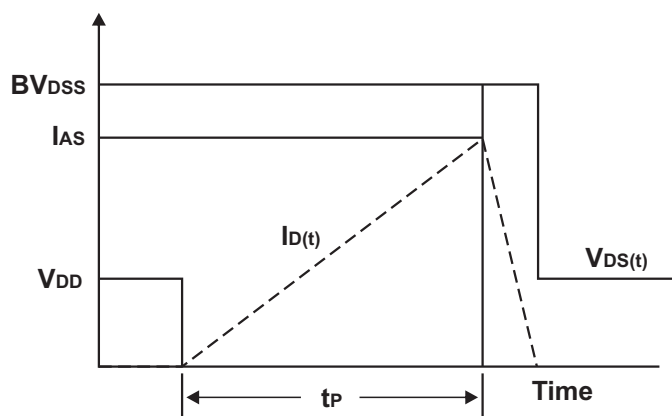
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Ratings and Characteristic Curves

Fig.1 Drain Current vs. Gate-Source Voltage

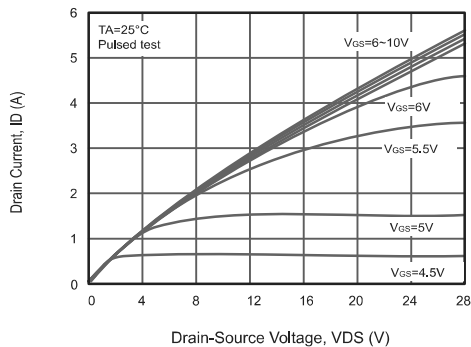


Fig.2 Drain-Source On-Resistance vs. Gate-Source Voltage

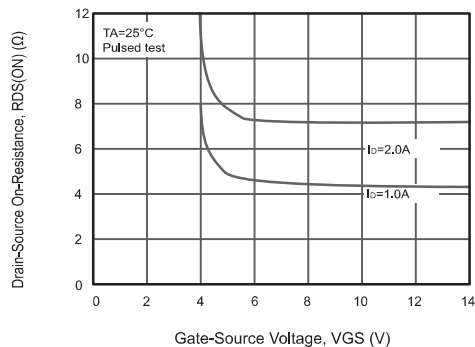


Fig.3 Gate Charge Characteristics

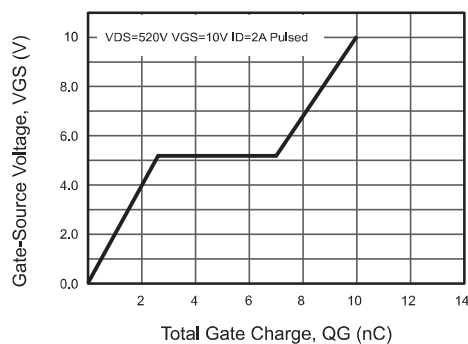


Fig.4 Capacitance Characteristics

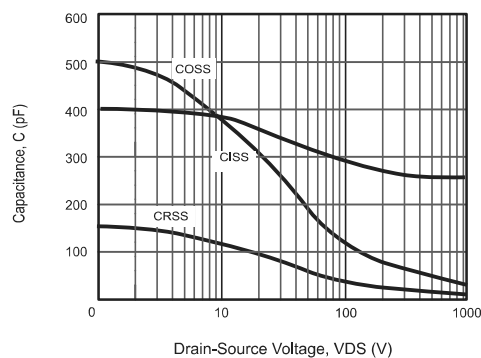


Fig.5 Drain-Source On-Resistance vs. Junction Temperature

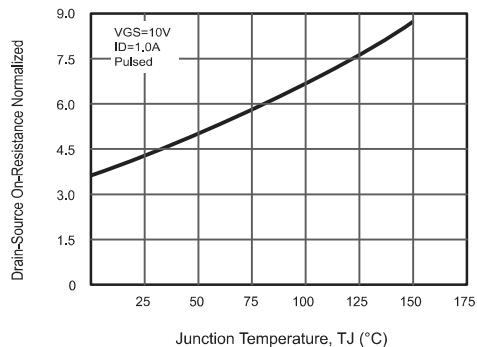


Fig.6 Breakdown Voltage vs. Junction Temperature

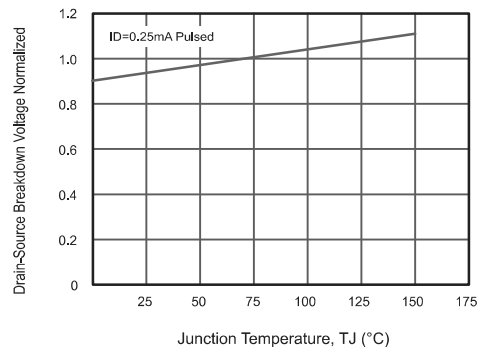


Fig.7 Gate Threshold Voltage vs. Junction Temperature

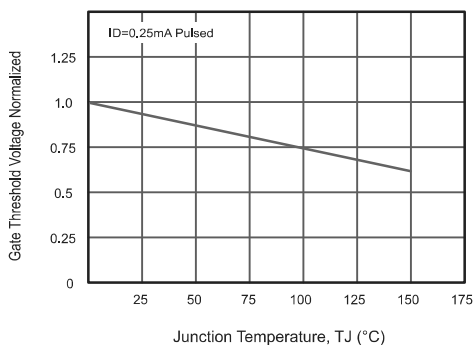
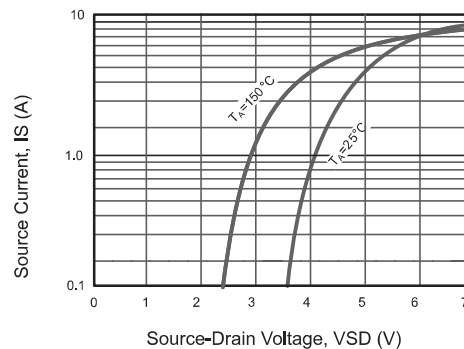


Fig.8 Source Current vs. Source-Drain Voltage



Ratings and Characteristic Curves

Fig.9 Drain Current vs. Gate-Source Voltage

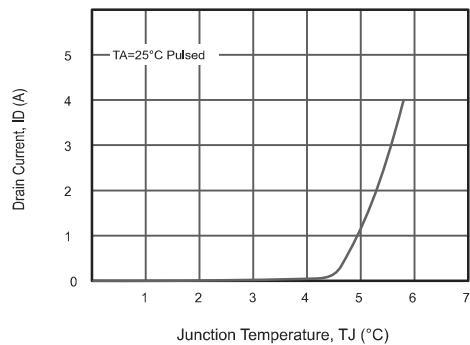


Fig.10 Drain-Source On-Resistance vs. Drain Current

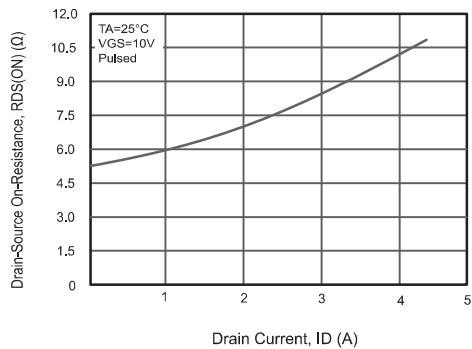


Fig.11 Drain Current vs. Junction Temperature

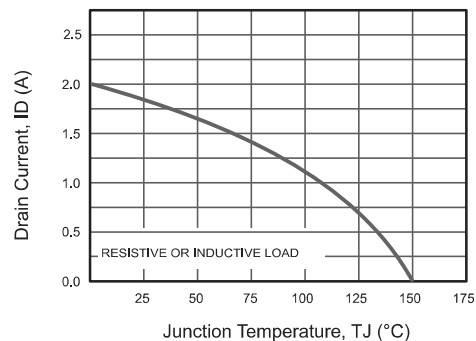


Fig.12 Power Dissipation vs. Junction Temperature

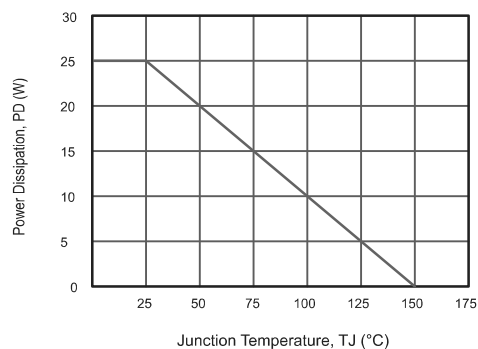
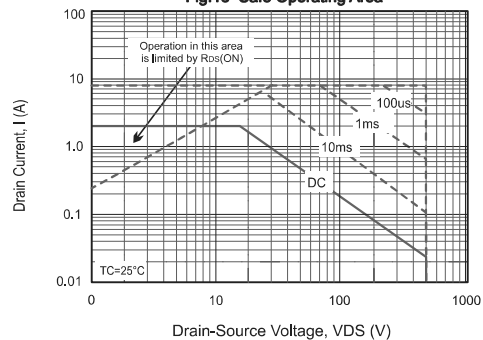
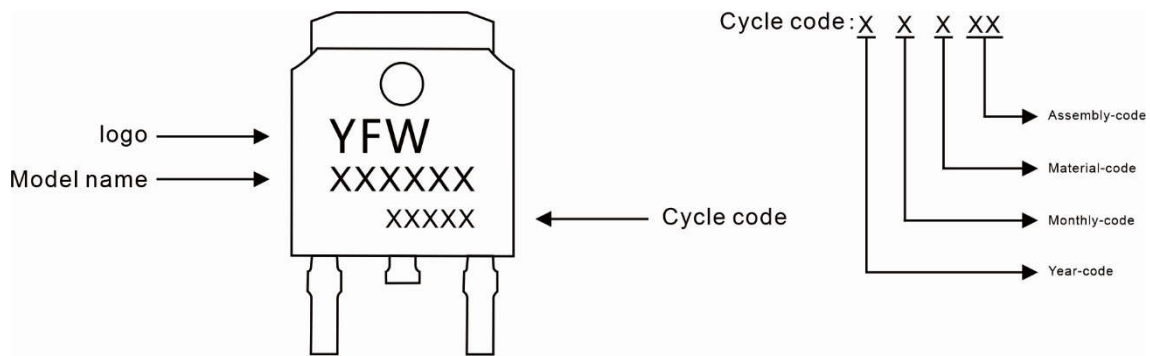


Fig.13 Safe Operating Area



Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW2N50AD	TO-252	0.011oz(0.32g)	2500pcs/reel	5000pcs/box 25000pcs/Carton

Package Dimensions

TO-252

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.50	0.087	0.098
A1	0.00	0.12	0.000	0.005
A2	2.20	2.40	0.087	0.094
B	1.20	1.60	0.047	0.063
b	0.50	0.70	0.020	0.028
b1	0.70	0.90	0.028	0.035
c	0.40	0.60	0.016	0.024
c1	0.40	0.60	0.016	0.024
D	6.35	6.65	0.250	0.262
D1	5.20	5.40	0.205	0.213
E	5.40	5.70	0.213	0.224
e	2.20	2.40	0.087	0.094
e1	4.40	4.80	0.173	0.189
L	10.00	11.00	0.393	0.433
L1	2.70	3.10	0.106	0.122
L2	1.40	1.80	0.055	0.071
L3	0.90	1.50	0.035	0.059

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