

500V N-Channel Enhancement Mode Power MOSFET

MAIN CHARACTERISTICS

I_D	13A
V_{DS}	500V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$<0.46\Omega$ (Typ:0.37 Ω)

FEATURES

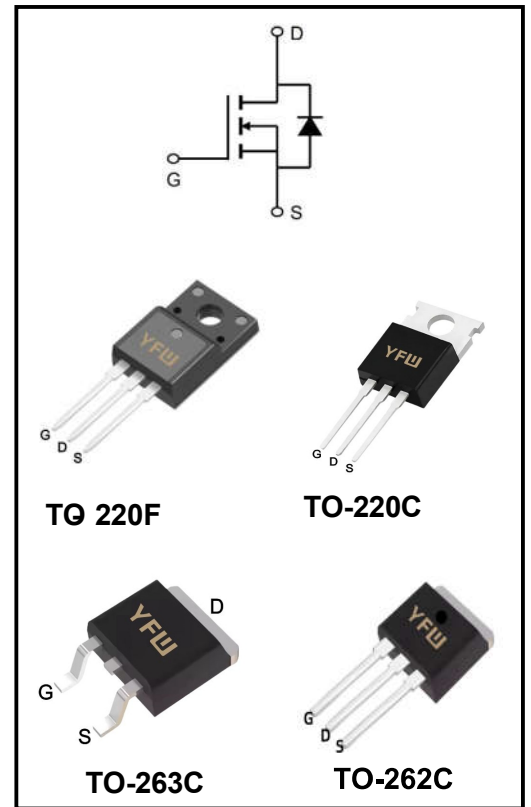
- ◆Fast Switching
- ◆Low ON Resistance
- ◆Low Gate Charge
- ◆100% Single Pulse avalanche energy Test

APPLICATION

- ◆Power switch circuit of adaptor and charge

MECHANICAL DATA

- ◆Case: TO-220F/AF TO-220C/AC TO-263C/ASC TO-262C/TC
- ◆Mounting Position: Any
- ◆Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆Lead free in compliance with EU RoHS 2011/65/EU directive
- ◆Solder bath temperature 275℃ maximum,10s per JESD 22-B106



Maximum Ratings at Tc=25℃ unless otherwise specified

Characteristics	Symbols	Value		Units
		TO-220F	TO-220C/TO-263C/262C	
Drain-Source Voltage	V_{DS}	500		V
Gate - Source Voltage	V_{GS}	± 30		V
Continuous Drain Current	I_D	13		A
Pulsed Drain Current(note1)	I_{DM}	52		A
Power Dissipation	P_D	50	210	W
Single Pulse Avalanche Energy(note1)	E_{AS}	840		mJ
Operating Temperature Range	T_J	150		℃
Operating Temperature Range	T_{STG}	-55 to +150		℃
Thermal Resistance, Junction-to-case	$R_{\theta JC}$	2.5	0.59	℃/W
Thermal Resistance, Junction ambient	$R_{\theta JA}$	62.5	62.5	℃/W

Note1:Pulse test: 300 μ s pulse width, 2 % duty cycle

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	BV_{DSS}	500		-	V
Drain-Source Leakage Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{ V}, I_D = 6.5\text{ A}$	$R_{DS(ON)}$	-	0.37	0.46	Ω
Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 6.5\text{ A}$	g_{fs}	-	13	-	S
Input Capacitance	$V_{GS} = 0\text{ V}$ $V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$	C_{iss}	-	1960	-	pF
Output Capacitance		C_{oss}	-	185	-	pF
Reverse Transfer Capacitance		C_{rss}	-	3	-	pF
Turn-on Delay Time(Note2)	$I_D = 13\text{ A}$ $V_{DD} = 250\text{ V}$ $R_G = 10\text{ }\Omega$	$t_{d(on)}$	-	13	-	ns
Rise Time(Note2)		t_r	-	35	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	61	-	ns
Fall Time(Note2)		t_f	-	13	-	ns
Total Gate Charge(Note2)	$I_D = 13\text{ A}$ $V_{DD} = 400\text{ V}$ $V_{GS} = 10\text{ V}$	Q_g	-	35	-	nC
Gate to Source Charge(Note2)		Q_{gs}	-	8.5	-	nC
Gate to Drain Charge(Note2)		Q_{gd}	-	10.3	-	nC
Maximun Body-Diode Continuous Current		I_S	-	-	13	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	52	A
Drain-Source Diode Forward Voltage	$I_{SD} = 13\text{ A}$	V_{SD}	-	-	1.4	V
Reverse Recovery Time(Note2)	$I_{SD} = 13\text{ A}, V_{GS} = 0\text{ V},$ $dI_F / dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	305	-	ns
Reverse Recovery Charge(Note2)		Q_{rr}	-	3.4	-	μC

Note2:Pulse test: 300 μs pulse width, 2 % duty cycle

Ratings and Characteristic Curves

Figure 1. Typical Output Characteristics

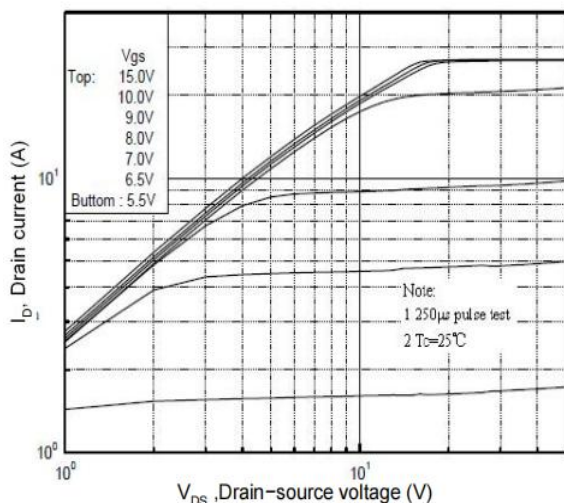


Figure 2. Transfer Characteristics

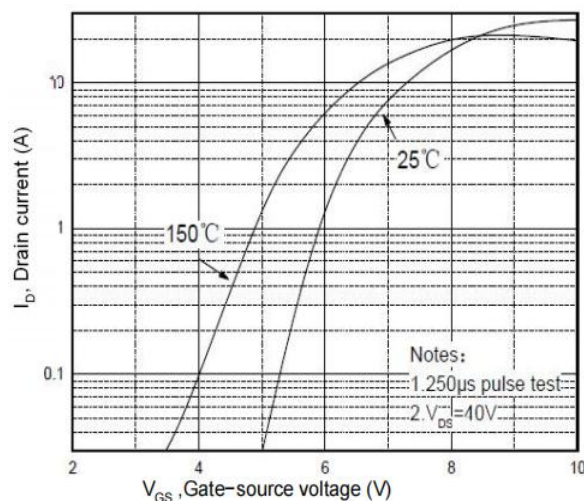


Figure 3. On-Resistance Variation vs. Drain Current

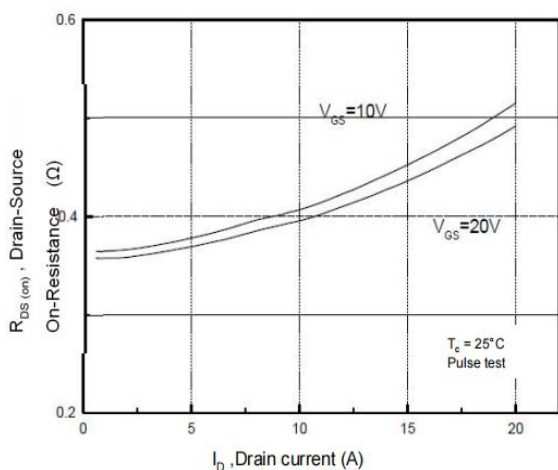


Figure 4. Threshold Voltage vs. Temperature

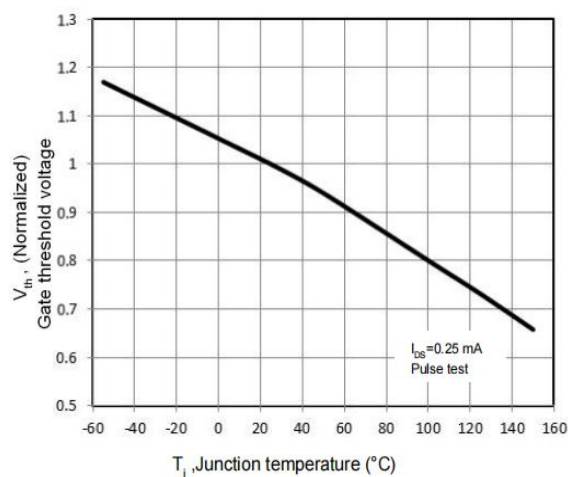


Figure 5. Breakdown Voltage vs. Temperature

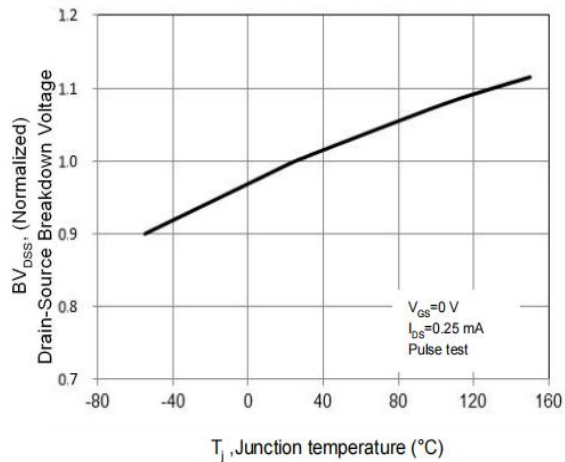
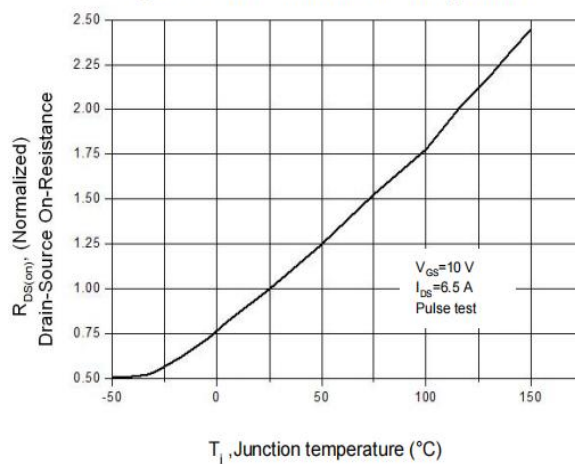


Figure 6. On-Resistance vs. Temperature



Ratings and Characteristic Curves

Figure 7. Capacitance Characteristics

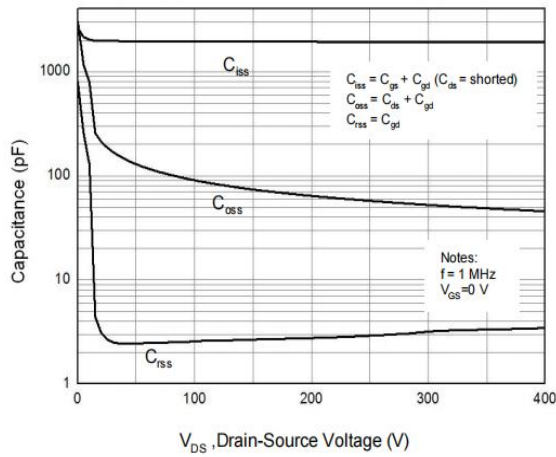


Figure 8. Gate Charge Characteristics

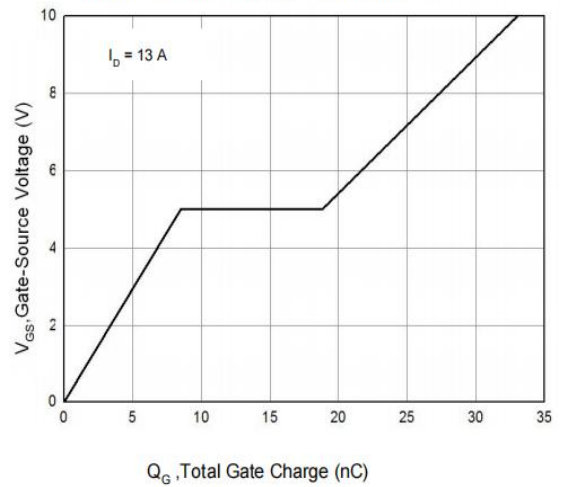


Figure 9. Maximum Safe Operating Area

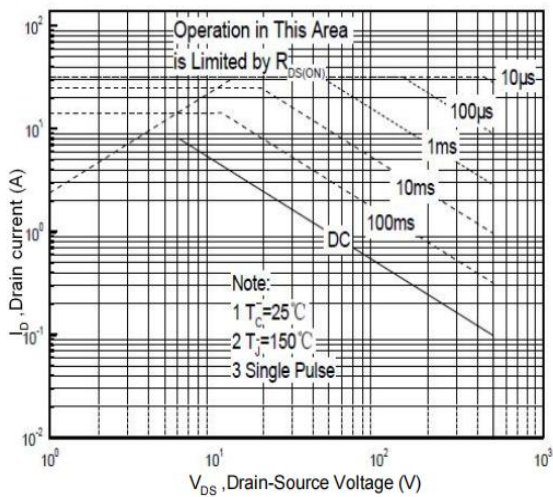


Figure 10. Power Dissipation vs. Temperature

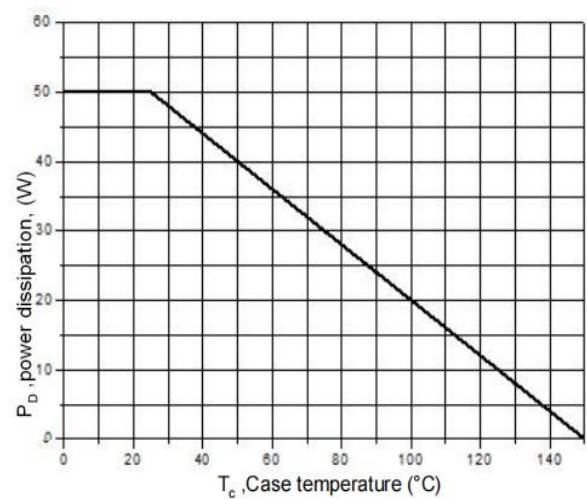
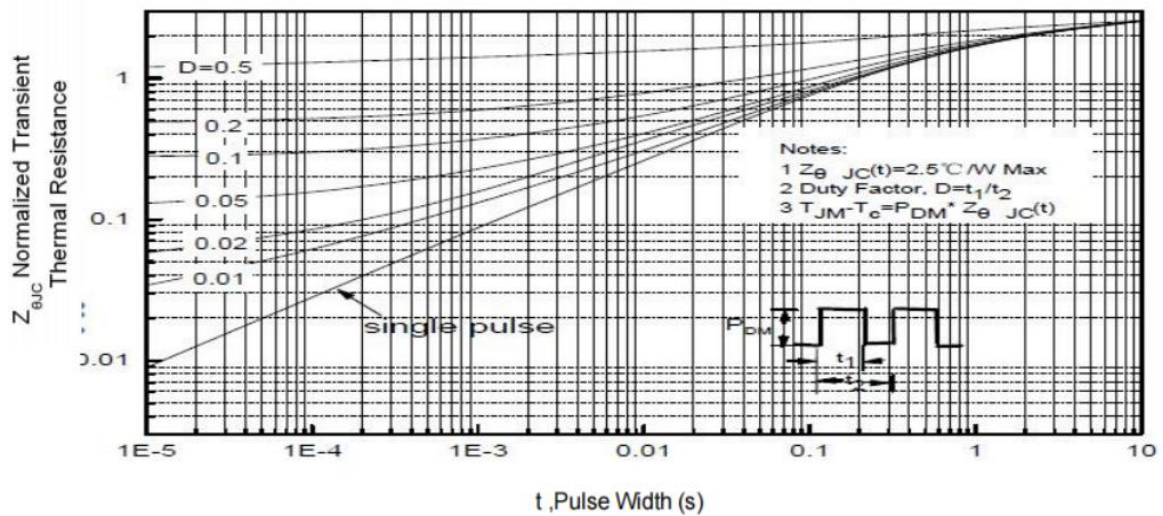
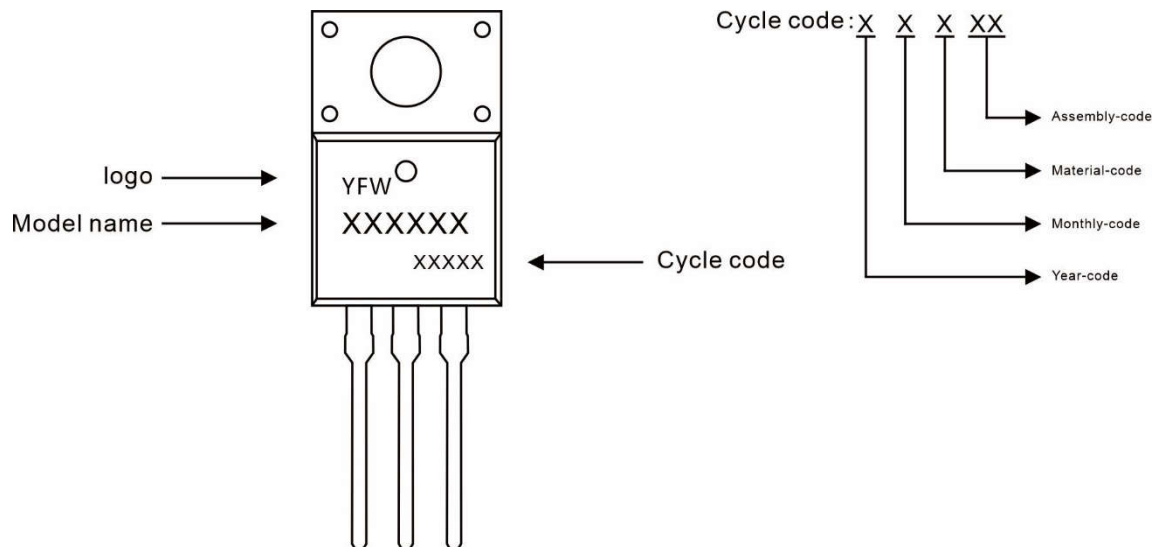


Figure 11 Transient Thermal Impedance, Junction to Case



Marking Diagram



Ordering information

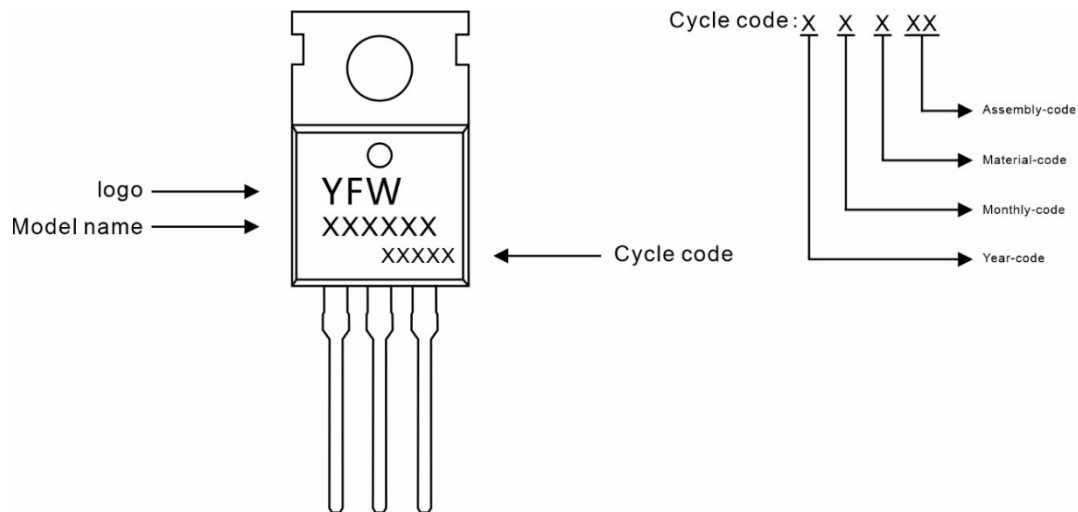
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW13N50AF	TO-220F	0.06oz(1.74g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

Package Dimensions

TO-220F

Symbol	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.66	2.86	0.105	0.113
b	0.75	0.85	0.030	0.033
b1	1.24	1.44	0.049	0.057
c	0.40	0.60	0.016	0.024
D	10.00	10.32	0.394	0.406
E	15.75	16.05	0.620	0.632
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	3.10	3.5	0.122	0.138
L	13.50	13.90	0.531	0.547
L1	2.90	3.30	0.114	0.130
Φ	3.10	3.30	0.122	0.130

Marking Diagram



Ordering information

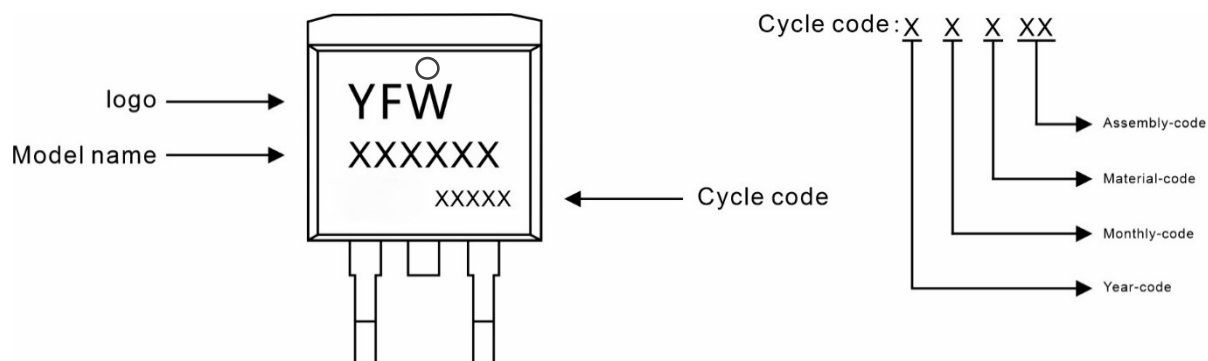
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW13N50AC	TO-220C	0.07oz(1.96g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

Package Dimensions

TO-220C

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.34	4.67	0.171	0.184
A1	2.52	2.82	0.099	0.111
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.30	0.50	0.012	0.020
c1	1.17	1.37	0.046	0.054
D	9.90	10.20	0.390	0.402
E	8.50	8.90	0.335	0.350
E1	12.00	12.50	0.472	0.492
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	2.60	2.80	0.102	0.110
L	13.20	13.80	0.520	0.543
L1	3.80	4.20	0.150	0.165
Φ	3.60	3.96	0.142	0.156

Marking Diagram



Ordering information

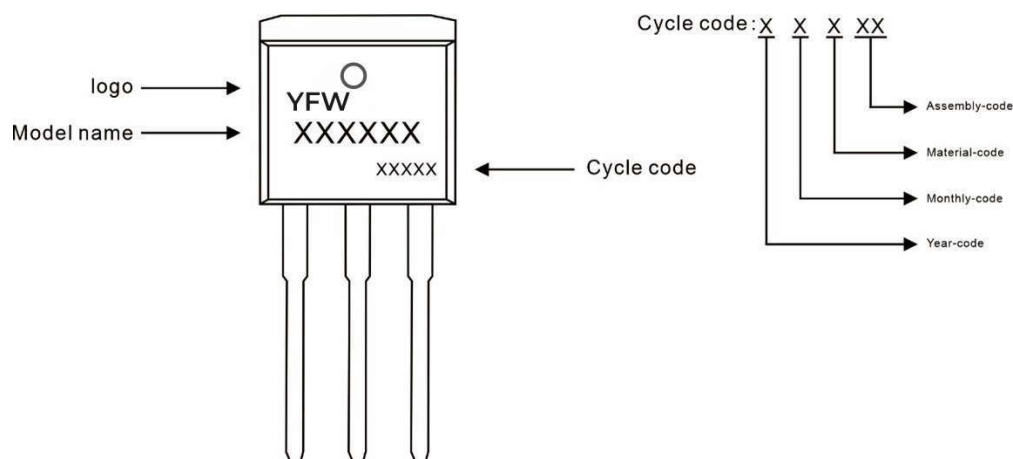
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW13N50ASC	TO-263C	0.04oz(1.16g)	800pcs/reel	1600pcs/box 8000pcs/Carton

Package Dimensions

TO-263C

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.70	0.169	0.185
A1	0.00	0.15	0.000	0.006
A2	4.30	4.55	0.169	0.179
B	1.10	1.50	0.043	0.059
b	0.70	0.90	0.028	0.035
b1	1.20	1.50	0.047	0.059
c	0.30	0.60	0.012	0.024
c1	1.17	1.37	0.046	0.054
D	9.90	10.20	0.390	0.402
E	8.50	8.90	0.335	0.350
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
L	15.00	15.30	0.591	0.602
L1	5.20	5.40	0.205	0.213
L2	2.40	2.60	0.094	0.102
L3	1.60	1.80	0.063	0.071

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW13N50TC	TO-262C	0.07oz(1.96g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

Package Dimensions

TO-262C

Symbol	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.60	0.095	0.102
B	0.75	0.85	0.030	0.034
B1	1.20	1.40	0.047	0.055
C	0.35	0.42	0.014	0.017
C1	1.25	1.35	0.049	0.053
D	8.50	9.50	0.335	0.374
E	10.15	10.35	0.400	0.407
H	23.00	25.00	0.906	0.984
L	13.00	14.00	0.512	0.551
L1	2.80	3.50	0.110	0.138
L2	1.20	1.50	0.047	0.060

Disclaimer

The information presented in this document is for reference only. GuangDong Youfeng Microelectronics Co.,Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise. The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), YFW or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale. This publication supersedes & replaces all information previously supplied. For additional information, please visit our website <https://www.yfwdiode.com>, or consult YFW sales office for further assistance.