

650V N-Channel Enhancement Mode Power MOSFET

MAIN CHARACTERISTICS

I_D	4A
V_{DSS}	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$<2.55\Omega$ (Typ: 2.2Ω)

FEATURES

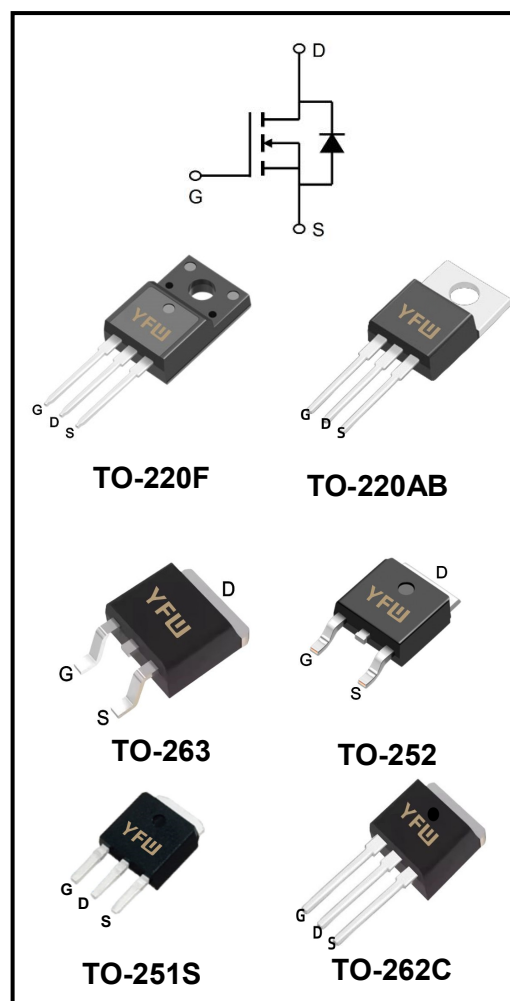
- ◆Fast Switching
- ◆Low ON Resistance
- ◆Low Gate Charge
- ◆100% Single Pulse avalanche energy Test

APPLICATIONS

- ◆Power switch circuit of adaptor and charger.

MECHANICAL DATA

- ◆Case: Molded plastic
- ◆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°C maximum, 10s per JESD 22-B106



Maximum Ratings at $T_c=25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbols	Value			Units
		220AB/263/262C	220F	251S-252	
Drain-Source Voltage	V_{DS}	650			V
Gate-Source Voltage	V_{GS}	± 30			V
Continuous Drain Current	I_D	4			A
Pulsed Drain Current (Note1)	I_{DM}	16			A
Power Dissipation	P_D	85	30	85	W
Single Pulse Avalanche Energy (Note1)	E_{AS}	150			mJ
Operating Temperature Range	T_J	150			$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to +150			$^\circ\text{C}$
Thermal Resistance, Junction-to-case	$R_{\theta JC}$	1.67	4.17	1.67	$^\circ\text{C/W}$
Thermal Resistance, Junction ambient	$R_{\theta JA}$	62.5	100	62.5	$^\circ\text{C/W}$

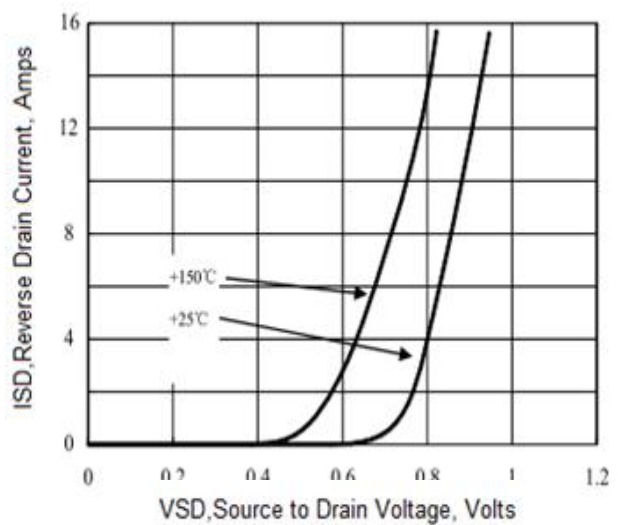
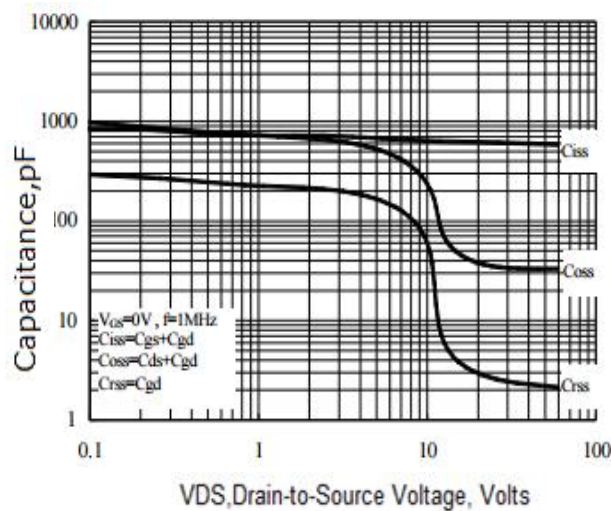
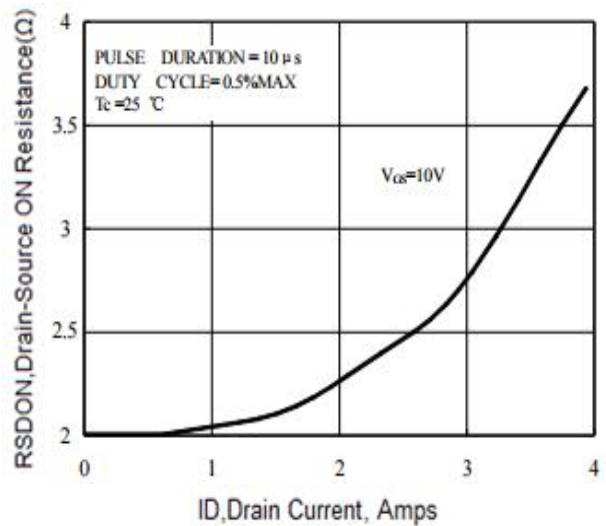
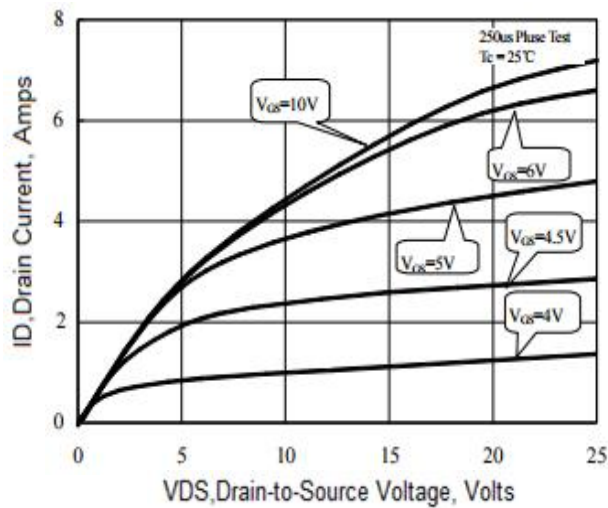
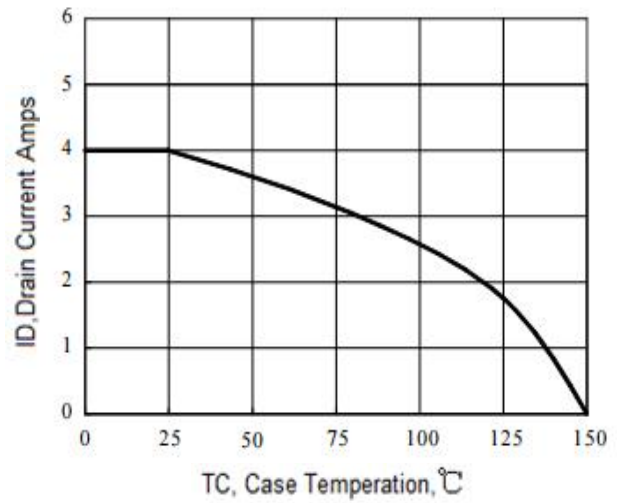
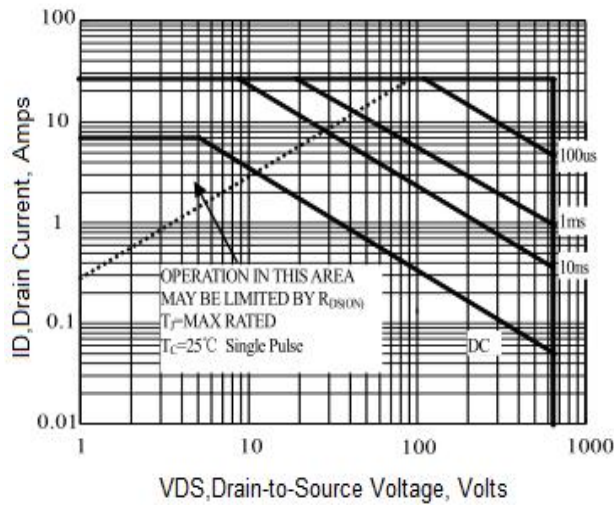
Note1: Pulse test: 300 μs pulse width, 2 % duty cycle

Maximum Ratings at Tc=25°C unless otherwise specified

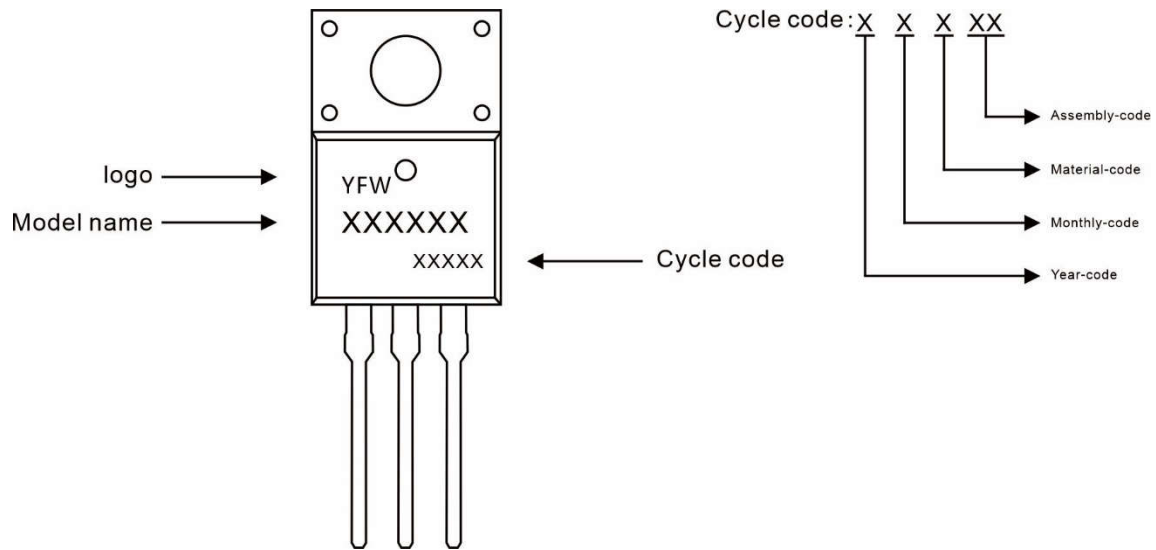
Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	BV_{DSS}	650	680	-	V
Drain-Source Leakage Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 32\text{ V}, V_{DS} = 0\text{ V}$	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	$V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	$R_{DS(ON)}$	-	2.2	2.55	Ω
Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 2\text{ A}$	g_{fs}	-	3.5	-	S
Input Capacitance	$V_{GS} = 0\text{ V}$ $V_{DS} = 2\text{ V}$ $f = 200\text{ KHz}$	C_{iss}	-	715	-	pF
Output Capacitance		C_{oss}	-	65	-	
Reverse Transfer Capacitance		C_{rss}	-	10	-	
Turn-on Delay Time(Note2)	$I_D = 4\text{ A}$ $V_{DD} = 400\text{ V}$ $R_G = 25\text{ }\Omega$	$t_{d(on)}$	-	12	-	nS
Rise Time(Note2)		T_r	-	22	-	
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	50	-	
Fall Time(Note2)		t_f	-	48	-	
Total Gate Charge(Note2)	$I_D = 4\text{ A}$ $V_{DD} = 520\text{ V}$ $V_{GS} = 10\text{ V}$	Q_g	-	15	-	nC
Gate to Source Charge(Note2)		Q_{gs}	-	2.5	-	
Gate to Drain Charge(Note2)		Q_{gd}	-	7.5	-	
Maximun Body-Diode Continuous Current		I_S	-	-	4	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	16	A
Drain-Source Diode Forward Voltage	$I_{SD} = 1\text{ A}$	V_{SD}	-		0.9	V
Reverse Recovery Time(Note2)	$I_{SD} = 4\text{ A}, V_{GS} = 0\text{ V}, dI_F / dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	430	-	nS
Reverse Recovery Charge(Note2)		Q_{rr}	-	1.27	-	uC

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

Ratings and Characteristic Curves



Marking Diagram



Ordering information

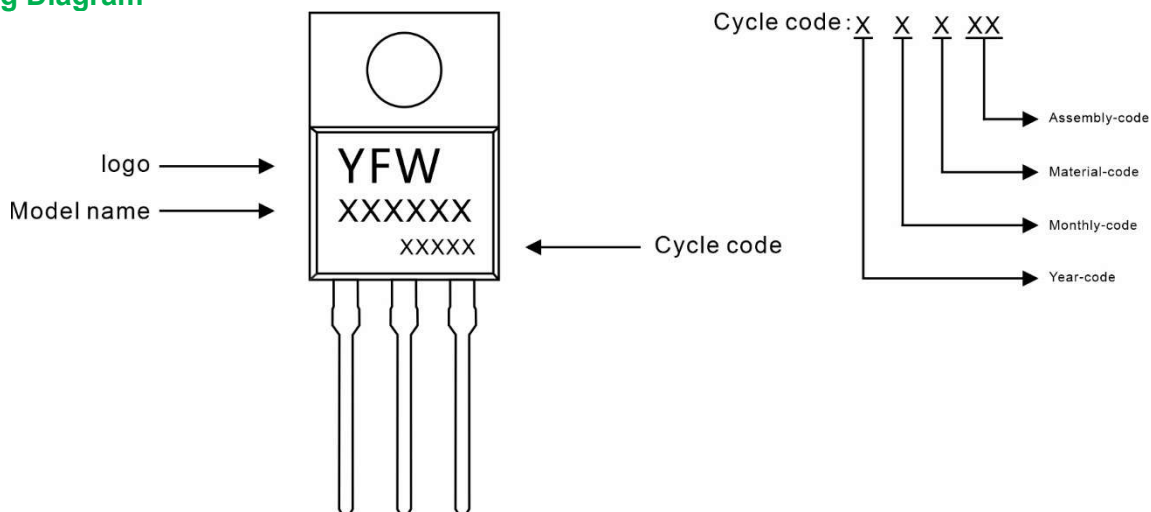
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65AF	TO-220F	0.06oz(1.74g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

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

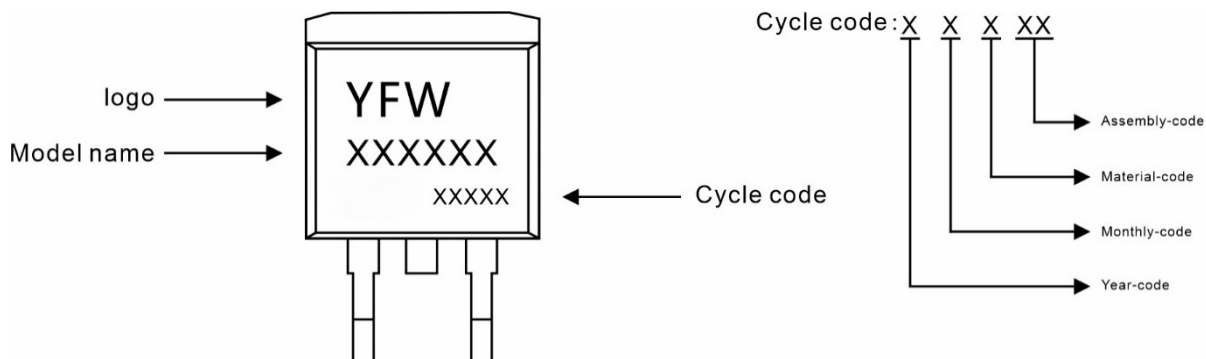
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65AT	TO-220AB	0.07oz(1.96g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

Package Dimensions

TO-220AB

Symbol	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.70	0.169	0.185
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

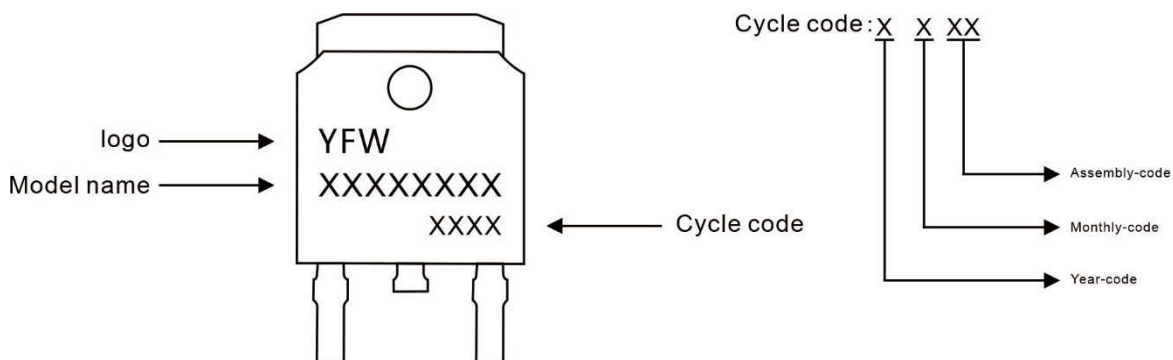
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65AS	TO-263	0.04oz(1.16g)	800pcs/reel	1600pcs/box 8000pcs/Carton

Package Dimensions

TO-263

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

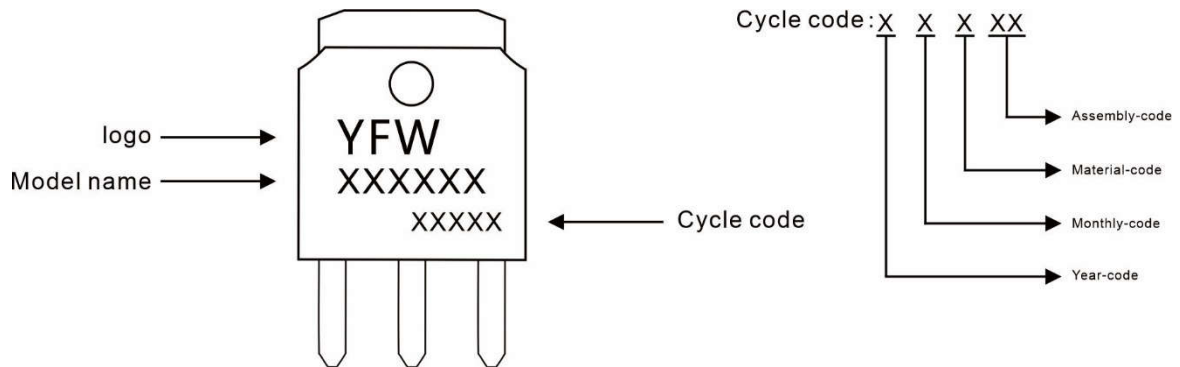
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65AD	TO-252	0.011oz(0.32g)	2500pcs/reel	5000pcs/box 25000pcs/Carton

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

Marking Diagram



Ordering information

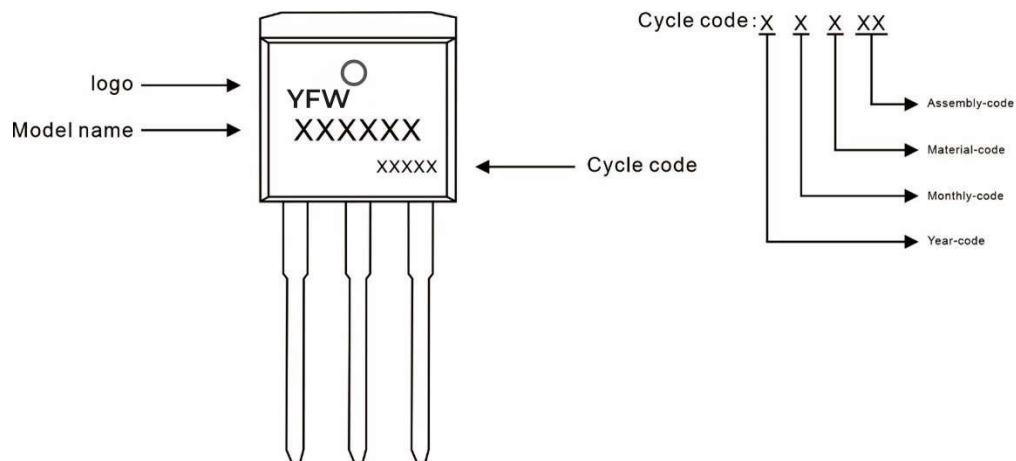
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65AMJ	TO-251S	0.011oz(0.32g)	80pcs/tube	4000pcs/box 24000pcs/Carton

Package Dimensions

TO-251S

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	2.1	2.5	0.083	0.098
A1	6.3	6.9	0.248	0.271
A2	0.9	1.1	0.035	0.043
A3	TYP0.5		TYP0.019	
b	0.6	0.8	0.024	0.031
c	0.4	0.5	0.015	0.020
D	5.3	5.5	0.209	0.217
D2	3.65	4.05	0.144	0.159
E	5.8	6.4	0.228	0.252
E2	0.9	1.4	0.035	0.055
e	TYP2.29		TYP0.090	
e1	TYP4.58		TYP0.180	
L	3.7	4.3	0.146	0.169

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW4N65TC	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

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