

650V N-Channel Enhancement Mode Power MOSFET

MAIN CHARACTERISTICS

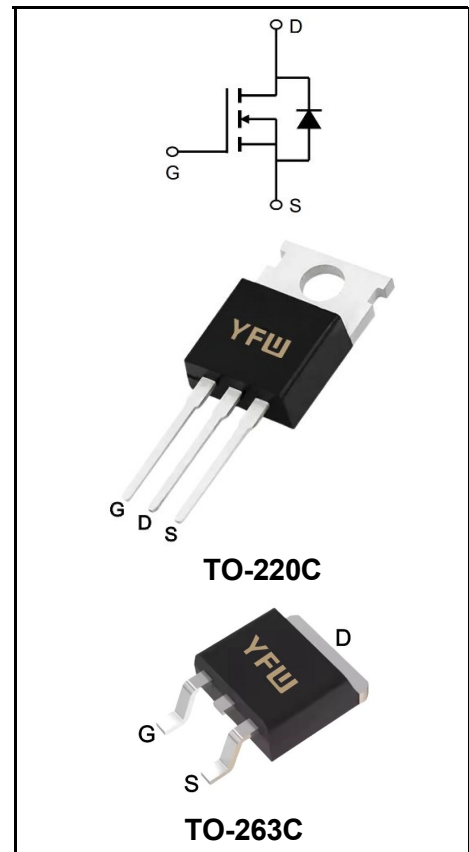
I_D	20A
V_{DS}	650V
R_{DS(on)-typ(@V_{GS}=10V)}	< 0.5Ω (Typ:0.39 Ω)

FEATURES

- ◆ Unclamped Inductive Switching (UIS) rated
- ◆ International standard packages
- ◆ Low package inductance
- ◆ easy to drive and to protect

APPLICATION

- ◆ Easy to mount
- ◆ Space savings
- ◆ High power density



Maximum Ratings at T_c=25°C unless otherwise specified

Characteristics	Symbols	Value	Units
Drain-Source Voltage	V_{DS}	650	V
Gate - Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	20	A
Pulsed Drain Current(note1)	I_{DM}	80	A
Power Dissipation	P_D	45	W
Single Pulse Avalanche Energy(note1)	E_{AS}	1.19	J
Peak Diode Recovery dv/dt	dv/dt	5	V/ns
Operating Temperature Range	T_J	150	°C
Operating Temperature Range	T_{STG}	-55 to +150	°C
Thermal Resistance, Junction-to-case	R_{θJC}	3.15	°C/W
Thermal Resistance, Junction ambient	R_{θJA}	58	°C/W

Note1:Pulse test: 300 μs 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	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	BV_{DSS}	650	-	-	V
Drain-Source Leakage Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	2	3	4	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	$R_{DS(ON)}$	-	0.39	0.50	Ω
Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$	g_{fs}	-	18	-	S
Input Capacitance	$V_{GS} = 0\text{ V},$ $V_{DS} = 25\text{ V},$ $f = 1\text{ MHz}$	C_{iss}	-	4030	-	pF
Output Capacitance		C_{oss}	-	258	-	pF
Reverse Transfer Capacitance		C_{rss}	-	17	-	pF
Turn-on Delay Time(Note2)	$I_D = 20\text{ A}$ $V_{DS} = 250\text{ V}$ $R_G = 10\ \Omega$	$t_{d(on)}$	-	36	-	ns
Rise Time(Note2)		t_r	-	74.7	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	78.7	-	ns
Fall Time(Note2)		t_f	-	58.7	-	ns
Total Gate Charge(Note2)	$I_D = 20\text{ A}$ $V_{DS} = 400\text{ V}$ $V_{GS} = 10\text{ V}$	Q_g	-	58	-	nC
Gate to Source Charge(Note2)		Q_{gs}	-	13.3	-	nC
Gate to Drain Charge(Note2)		Q_{gd}	-	22.9	-	nC
Maximun Body-Diode Continuous Current	$T_j = 25^\circ\text{C}$	I_S	-	-	20	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	80	A
Drain-Source Diode Forward Voltage	$I_{SD} = 20\text{ A}, V_{GS} = 0\text{ V}$	V_{SD}	-	-	1.4	V
Reverse Recovery Time(Note2)	$I_{SD} = 20\text{ A}, V_{GS} = 0\text{ V},$ $dI_F / dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	584	-	ns
Reverse Recovery Charge(Note2)		Q_{rr}	-	0.68	-	μC
Peak Reverse Recovery Current		I_{rrm}	-	24	-	A

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

Ratings and Characteristic Curves

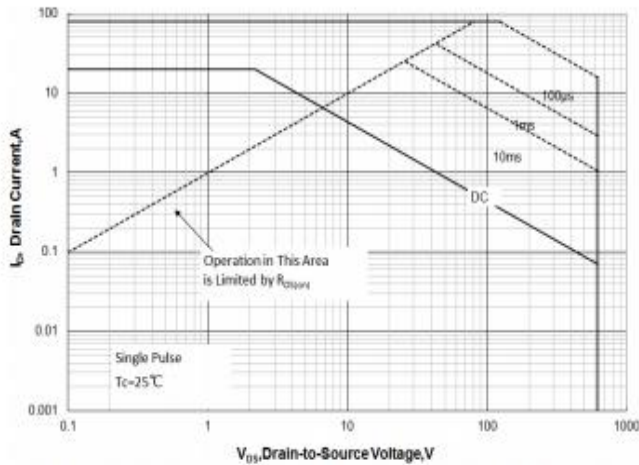


Figure 1 Maximum Forward Bias Safe Operating Area

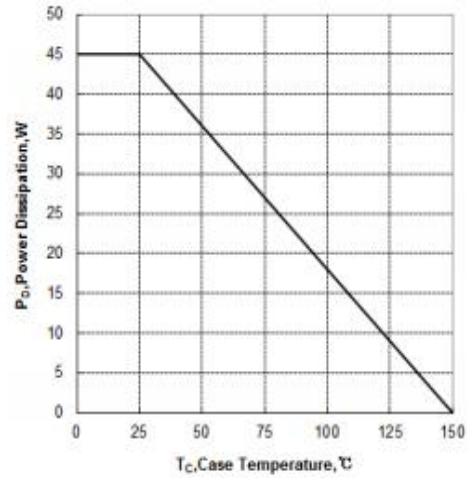


Figure 2 Maximum Power dissipation vs Case Temperature

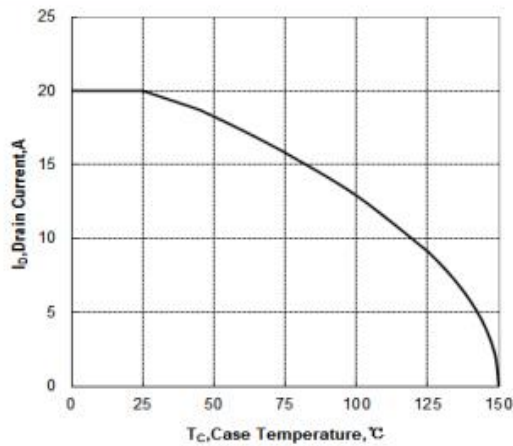


Figure 3 Maximum Continuous Drain Current vs Case Temperature

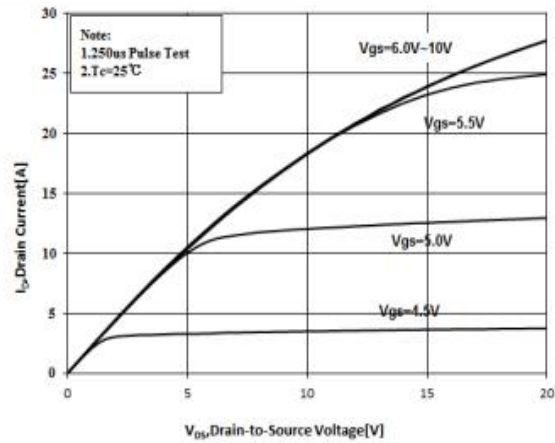


Figure 4 Typical Output Characteristics

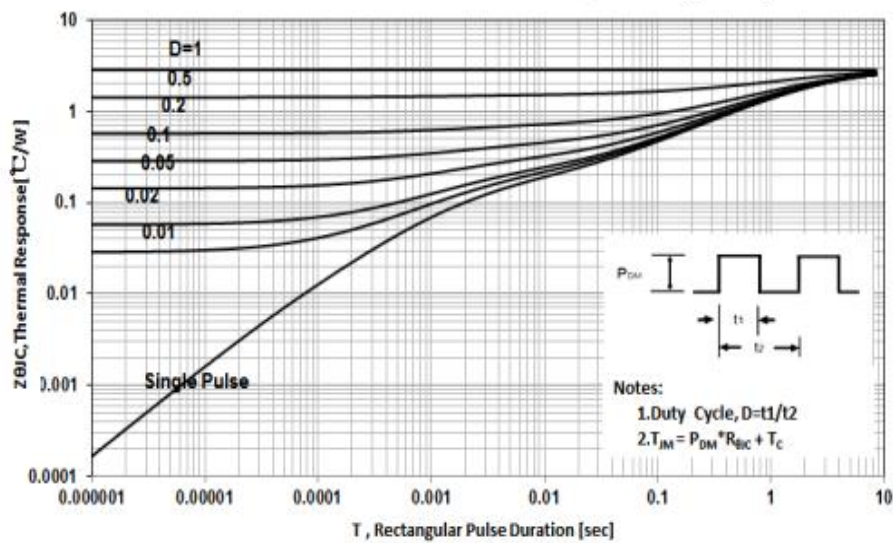


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Ratings and Characteristic Curves

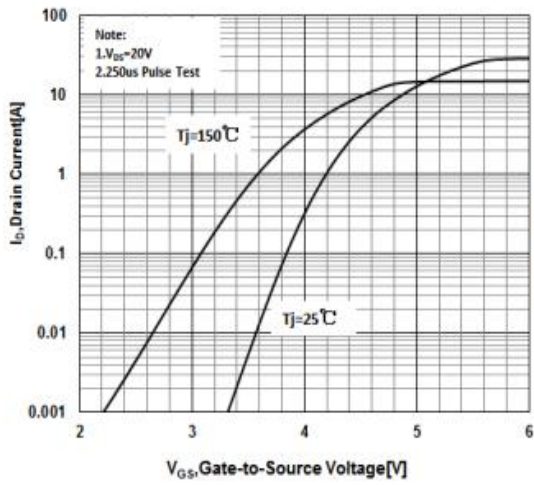


Figure 6 Typical Transfer Characteristics

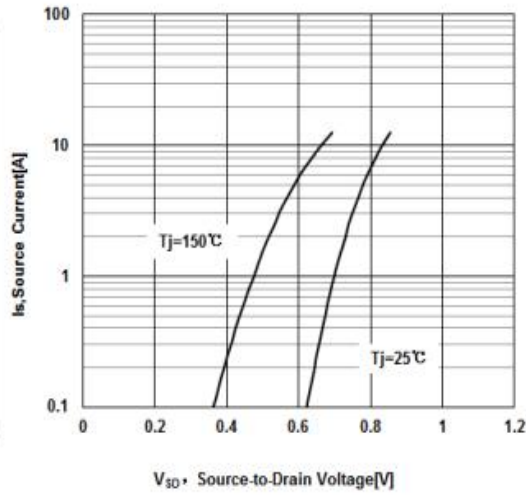


Figure 7 Typical Body Diode Transfer Characteristics

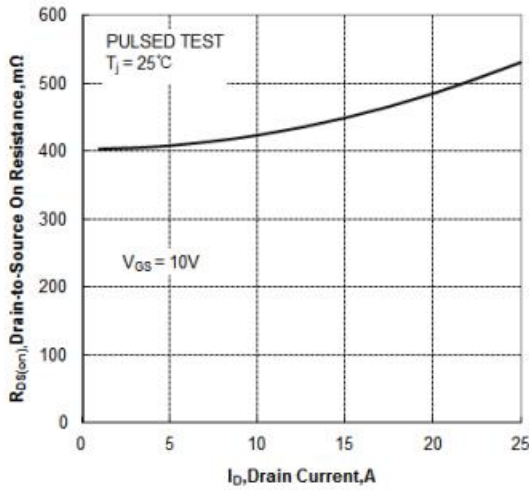


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

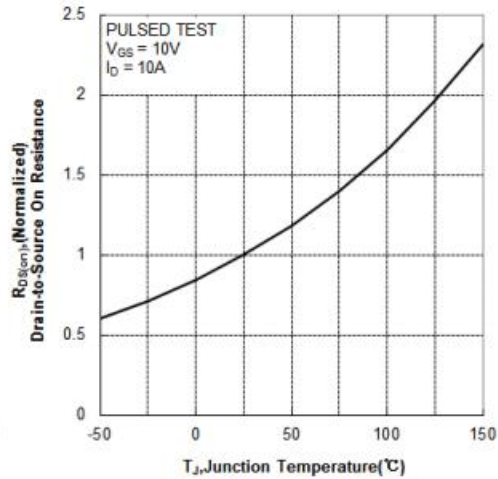


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

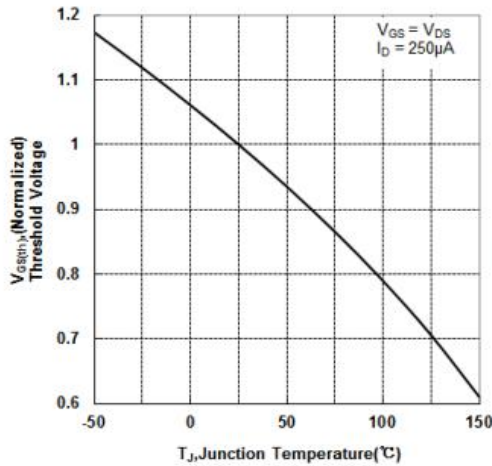


Figure 10 Typical Threshold Voltage vs Junction Temperature

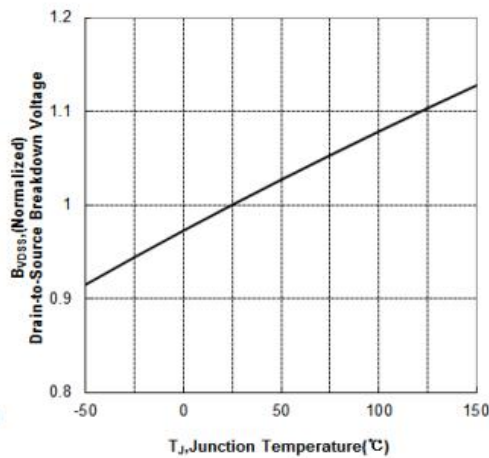
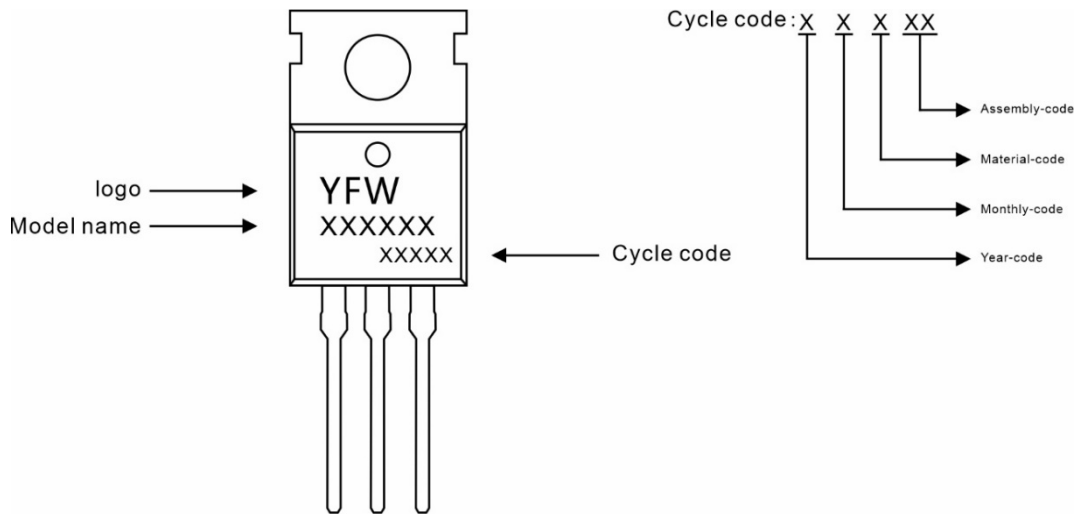


Figure 11 Typical Breakdown Voltage vs Junction Temperature

Marking Diagram



Ordering information

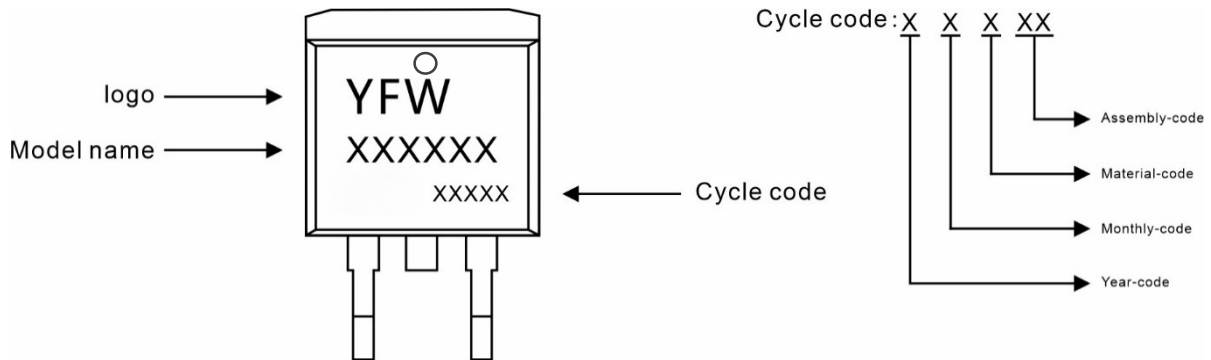
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW20N65AC	TO-220C	0.07oz(1.96g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

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
YFW20N65ASC	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

Disclaimer

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