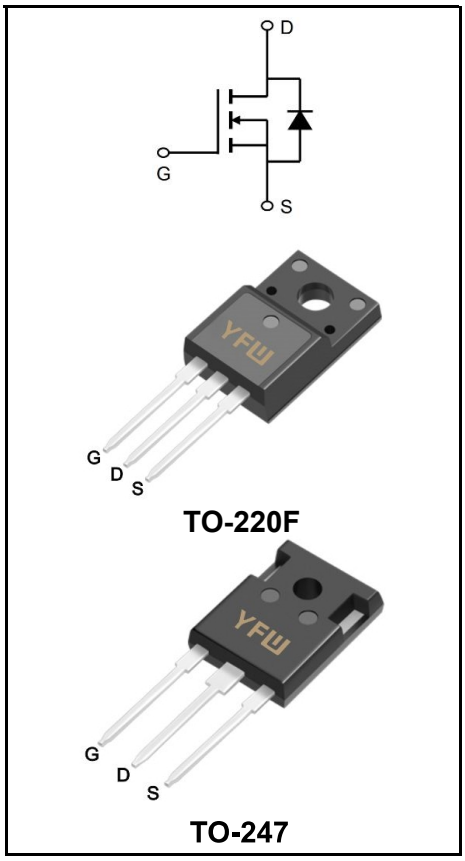
650V N-Channel Enhancement Mode Power MOSFET

MAIN CHARACTERISTICS

I_D	20A
V_{DS}	650V
R_{DSON}-typ(@V_{GS}=10V)	＜0.53Ω(Typ:0.39Ω)



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 Tc=25°C unless otherwise specified

Characteristics	Symbols	Value		Units
		TO-220F	TO-247	
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	69	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	$R_{\theta JC}$	2.78	1.80	°C/W
Thermal Resistance, Junction ambient	$R_{\theta JA}$	62.5	40	°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 V,I_D = 250 μA	BV_{DSS}	650	660	-	V
Drain-Source Leakage Current	V_{DS} = 650 V, V_{GS} = 0 V	I_{DSS}	-	-	1	μA
Gate Leakage Current	V_{GS} = ± 30 V, V_{DS} = 0 V	I_{GSS}	-	-	±100	nA
Gate-Source Threshold Voltage	V_{DS} = V_{GS} , I_D = 250 μA	$V_{GS(th)}$	2	3	4	V
Drain-Source On-State Resistance	V_{GS} = 10 V, I_D = 10 A	$R_{DS(ON)}$	-	0.39	0.53	Ω
Forward Transconductance	V_{DS} = 15 V, I_D = 10 A	gfs	-	18	-	S
Input Capacitance	V_{GS} = 0 V, V_{DS} = 25 V, f = 1MHz	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 A V_{DD} = 250 V R_G= 10 Ω	$t_{d(on)}$	-	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 A V_{DD} = 400 V V_{GS} = 10 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	Tj=25°C	I_S	-	-	20	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	80	A
Drain-Source Diode Forward Voltage	I_S= 20A, V_{GS} = 0 V	V_{SD}	-	-	1.4	V
Reverse Recovery Time(Note2)	I_{SD} = 20 A, V_{GS} = 0 V, dI_F / dt = 100 A/μs	t_{rr}	-	584	-	ns
Reverse Recovery Charge(Note2)		Q_{rr}	-	0.68	-	μC
Peak Reverse Recovery Current		Irrm	-	24	-	A

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

Ratings and Characteristic Curves

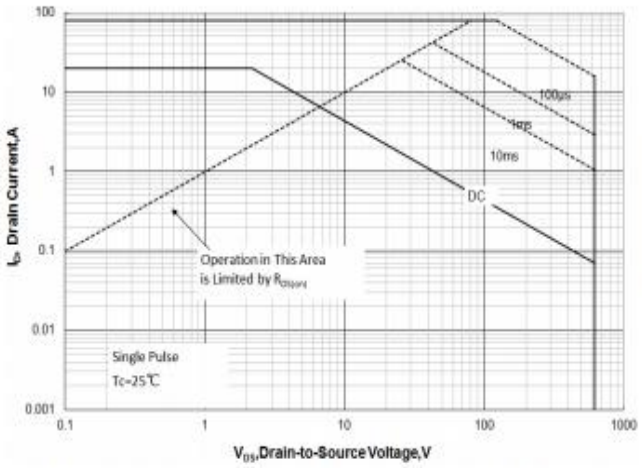


Figure 1 Maximum Forward Bias Safe Operating Area

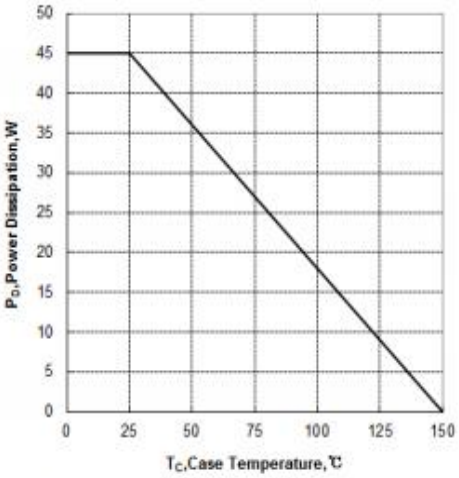


Figure 2 Maximum Power dissipation vs Case Temperature

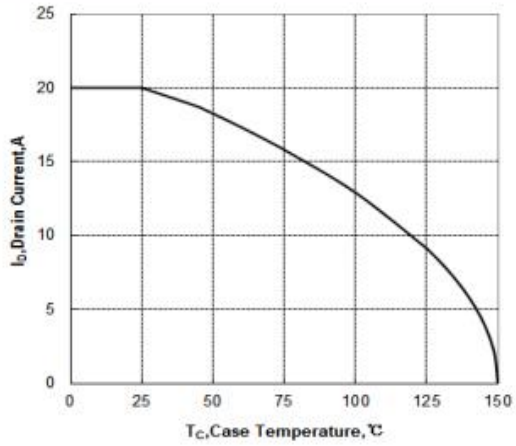


Figure 3 Maximum Continuous Drain Current vs Case Temperature

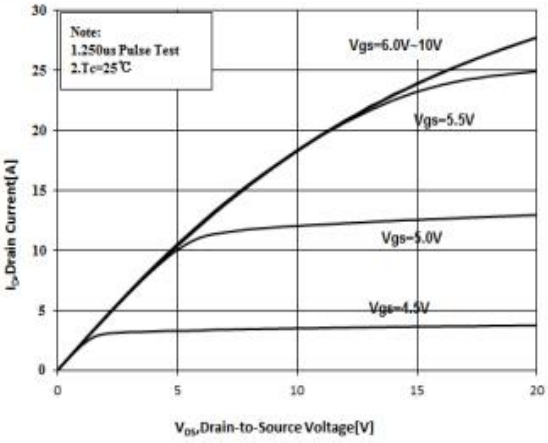


Figure 4 Typical Output Characteristics

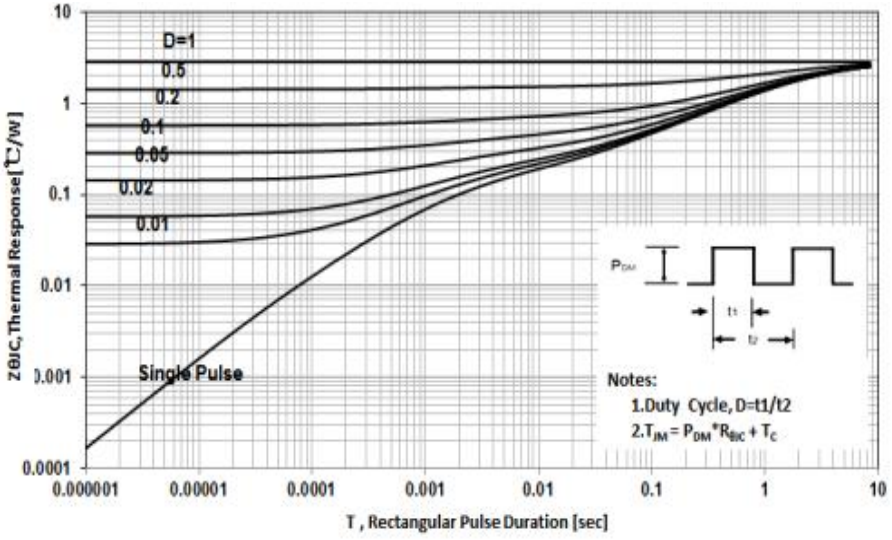


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Ratings and Characteristic Curves

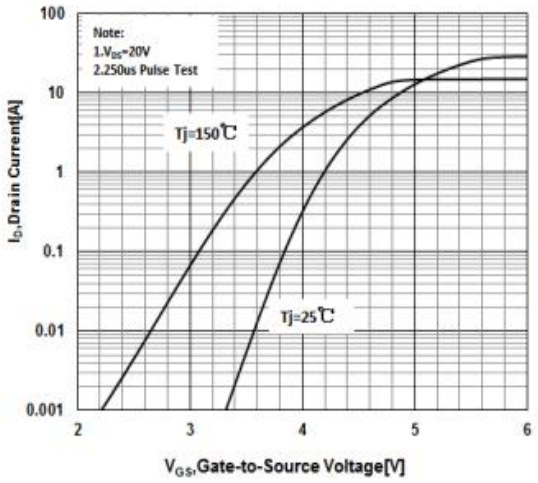


Figure 6 Typical Transfer Characteristics

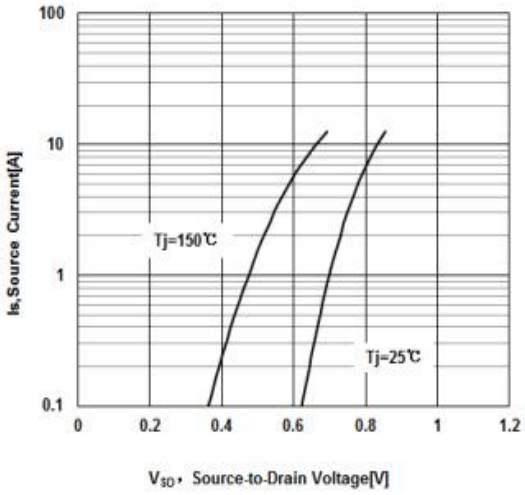


Figure 7 Typical Body Diode Transfer Characteristics

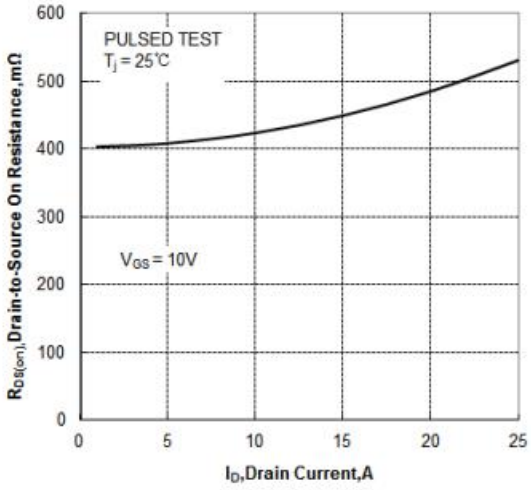


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

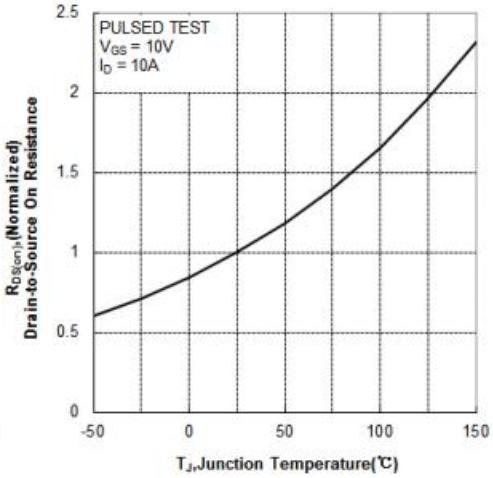


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

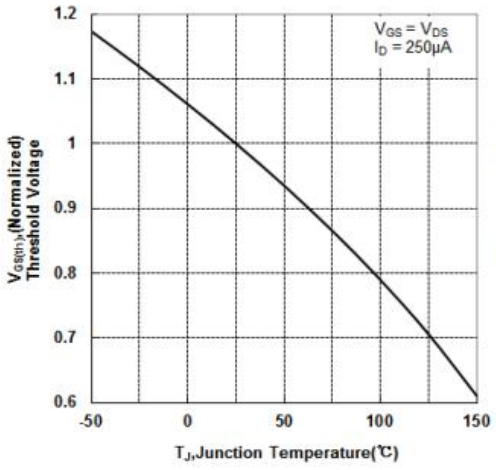


Figure 10 Typical Theshold Voltage vs Junction Temperature

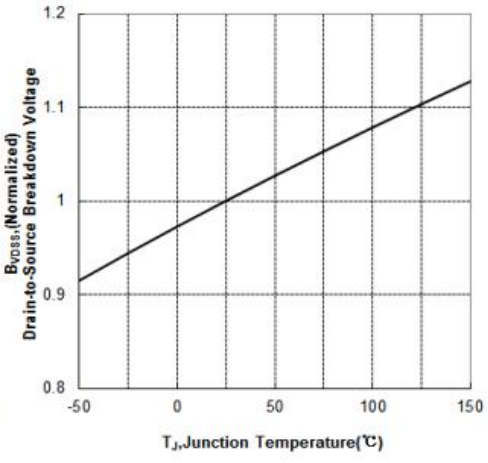
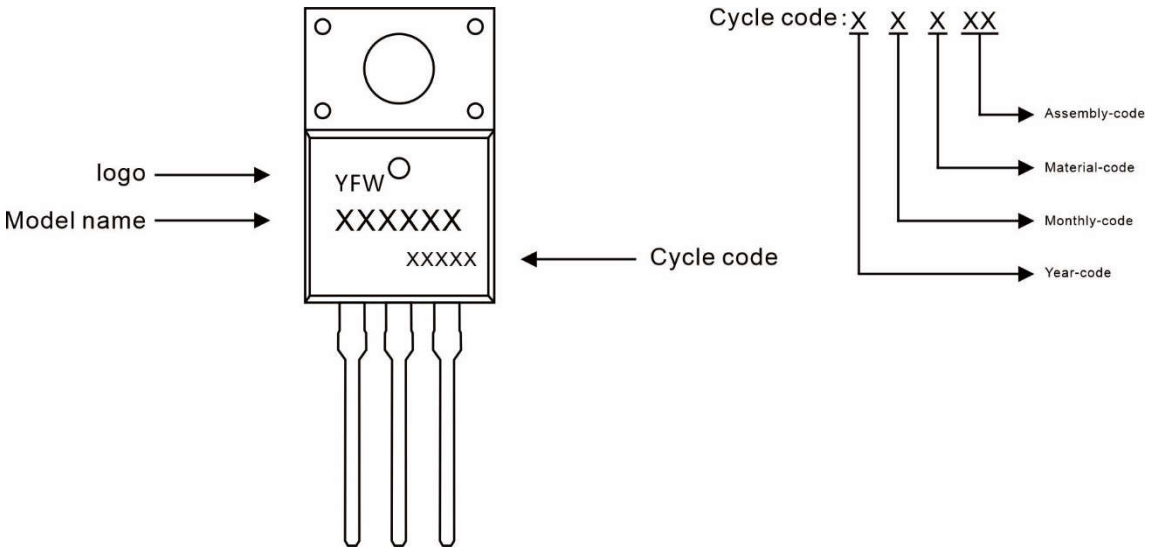


Figure 11 Typical Breakdown Voltage vs Junction Temperature

Marking Diagram

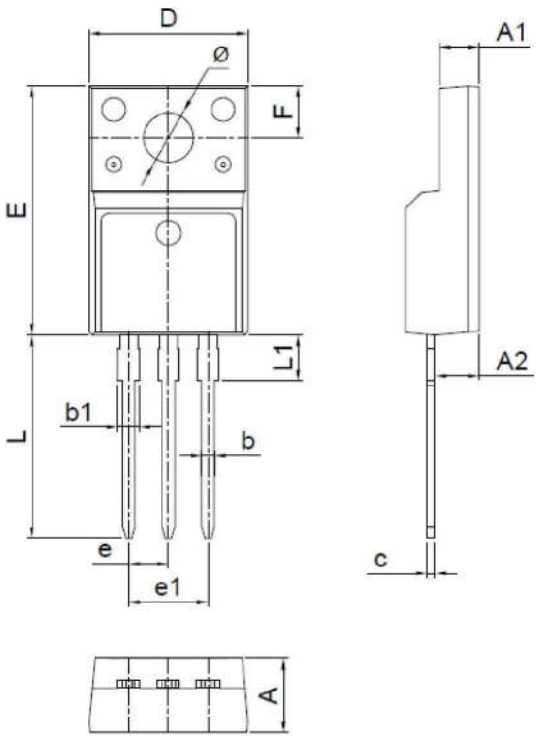


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW20N65AF	TO-220F	0.06oz(1.74g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

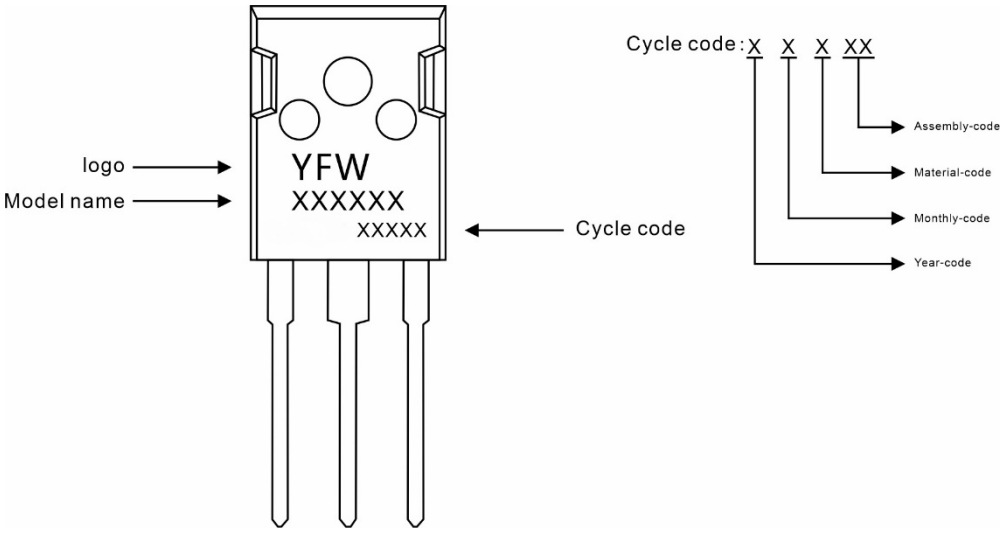
Package Dimensions

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

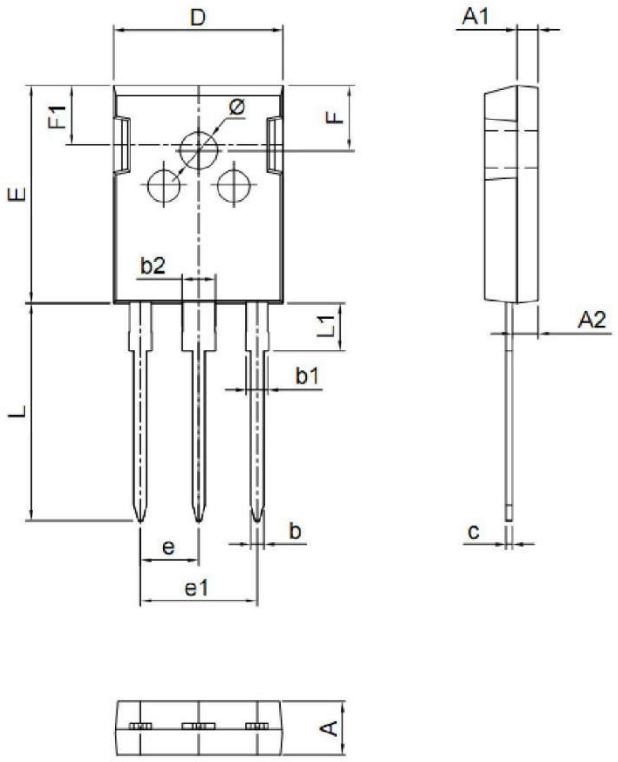


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW20N65AP	TO-247	0.209oz(5.93g)	30pcs/tube	600PCS/Box 2400PCS/Carton

Package Dimensions

TO-247



Symbol	Dimensions in mm		Dimensions in Inch	
	Min.	Max.	Min.	Max.
A	4.90	5.10	0.193	0.201
A1	1.90	2.10	0.075	0.083
A2	2.29	2.54	0.090	0.100
b	1.00	1.40	0.039	0.055
b1	2.00	2.20	0.079	0.087
b2	3.00	3.20	0.118	0.126
c	0.50	0.70	0.020	0.028
D	15.75	16.05	0.620	0.632
E	20.20	20.80	0.795	0.819
e	5.45 (BSC)		0.215 (BSC)	
e1	10.90 (BSC)		0.429 (BSC)	
F	6.05	6.25	0.238	0.246
F1	5.80	6.00	0.228	0.236
L	20.10	20.40	0.791	0.803
L1	4.05	4.35	0.159	0.171
Φ	3.50	3.70	0.138	0.146

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