

650V N-channel Super Junction MOSFET

MAIN CHARACTERISTICS

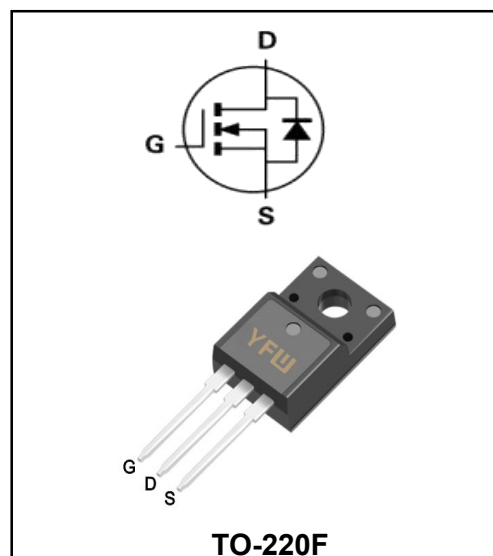
I_D	20A
V_{DSS}	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	<190mΩ (Type:150mΩ)

APPLICATIONS

- ♦ Solar inverters
- ♦ LCD/LED/PDP TV
- ♦ Telecom/Server Power supplies
- ♦ AC-DC Power Supply

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



TO-220F

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbol	Value	Unit
		220F	
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continue Drain Current	I_D	20	A
Pulsed Drain Current (Note1)	I_{DM}	60	A
Power Dissipation	P_D	34	W
Single Pulse Avalanche Energy (Note1)	E_{AS}	650	mJ
Operating Temperature Range	T_J	-50 to +150	°C
Storage Temperature Range	T_{STG}	-50 to +150	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.7	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	80	°C/W

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

Electrical Characteristics at Tc=25°C unless otherwise specified

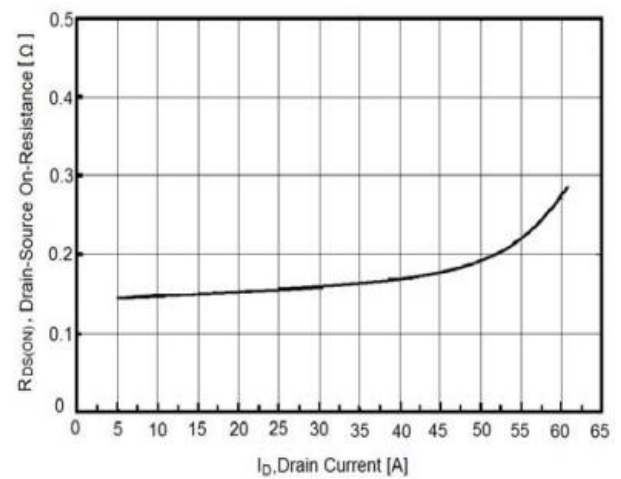
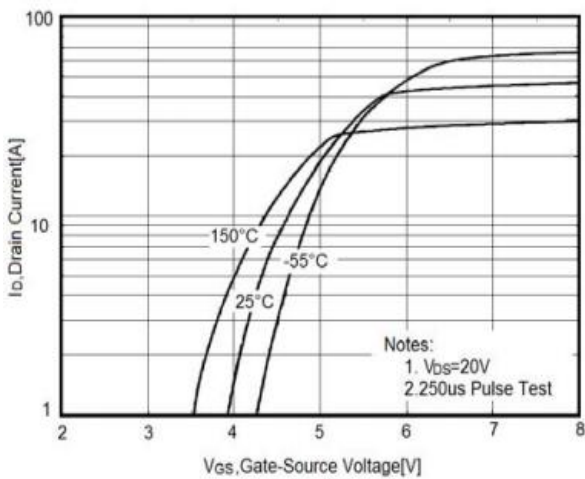
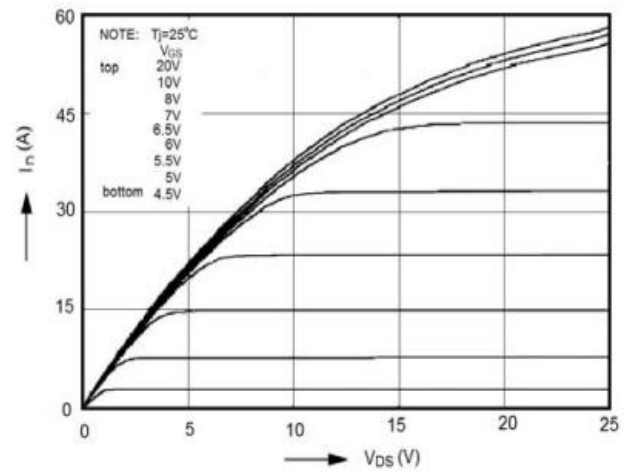
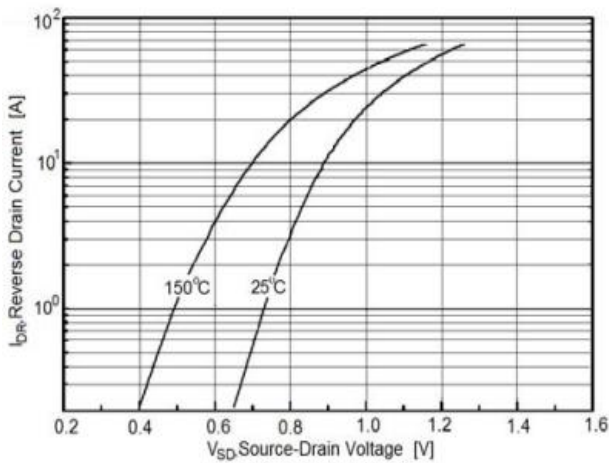
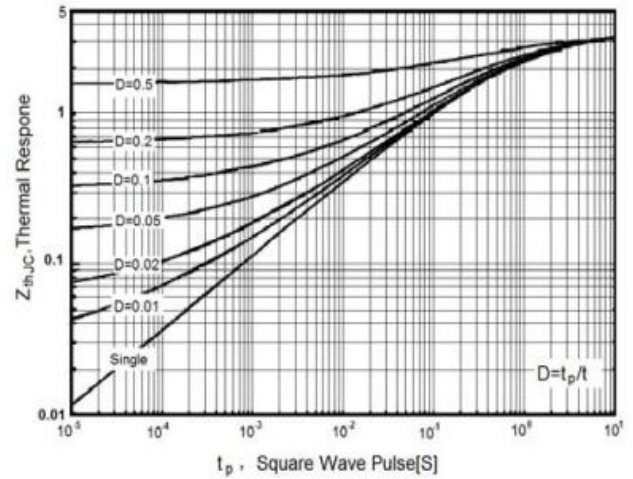
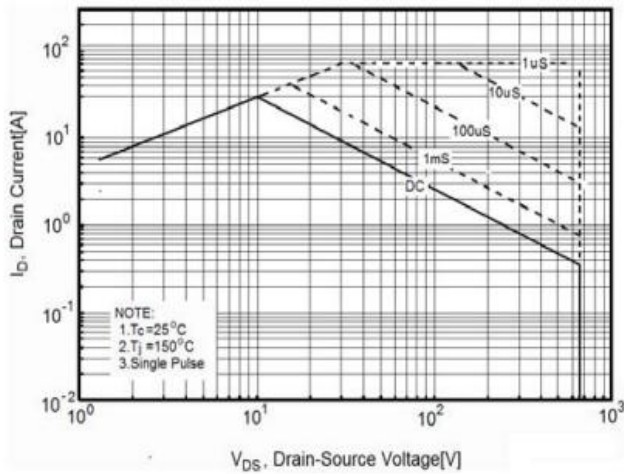
Characteristics	Test Condition	Symbo	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	BV_{DSS}	650	-	-	V
Drain-Source Leakage Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	$R_{DS(on)}$	-	150	190	m Ω
Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 10\text{ A}$	g_{fs}	-	17	-	S
Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	C_{iss}	-	1960	-	pF
Output Capacitance		C_{oss}	-	150	-	pF
Reverse Transfer Capacitance		C_{rss}	-	5.2	-	pF
Turn-on Delay Time(Note2)	$V_{DD} = 380\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_G = 4\text{ }\Omega$	$t_{d(ON)}$	-	12	-	ns
Rise Time(Note2)		t_r	-	5.5	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	60	-	ns
Fall Time(Note2)		t_f	-	4.5	-	ns
Total Gate Charge(Note2)	$V_{DS} = 480\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	Q_G	-	45	-	nC
Gate to Source Charge(Note2)		Q_{GS}	-	8.6	-	nC
Gate to Drain Charge(Note2)		Q_{GD}	-	18	-	nC

Source-Drain Diode Characteristics at Ta=25°C unless otherwise specified

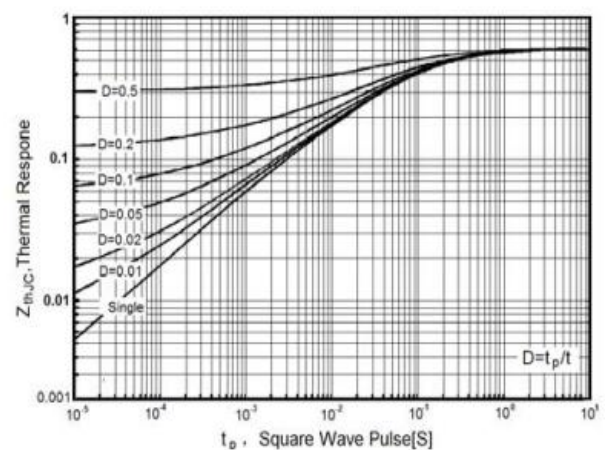
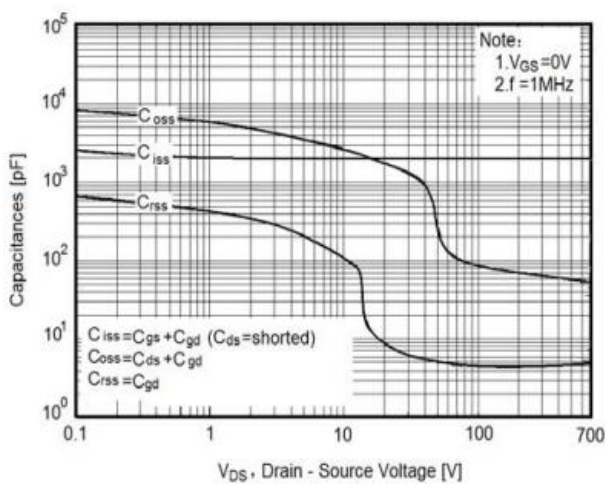
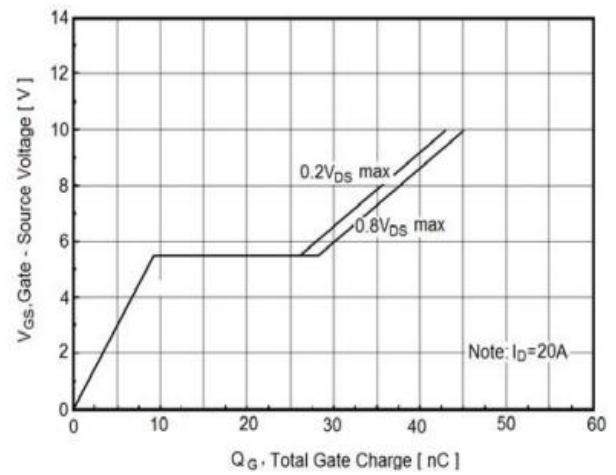
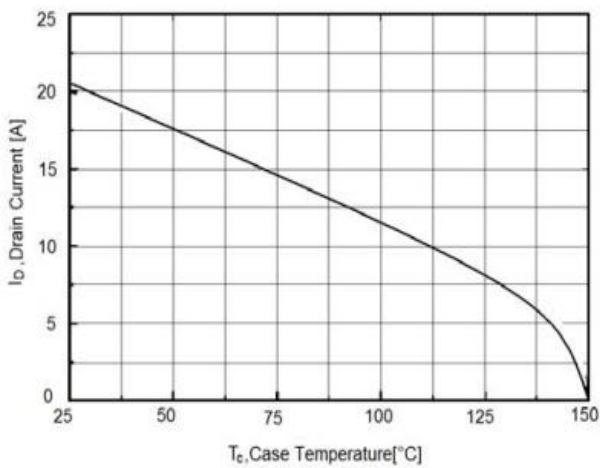
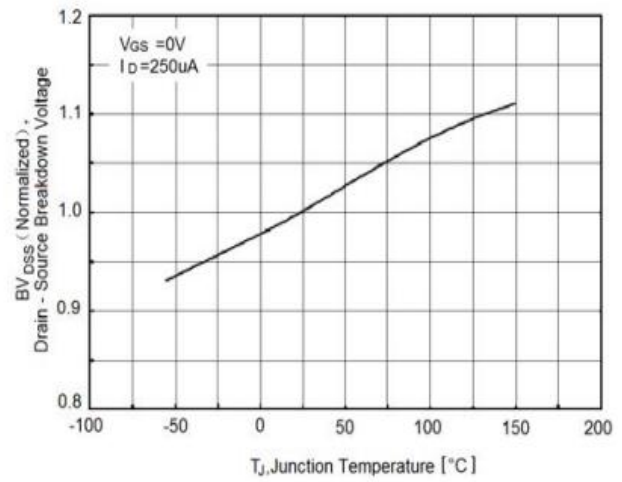
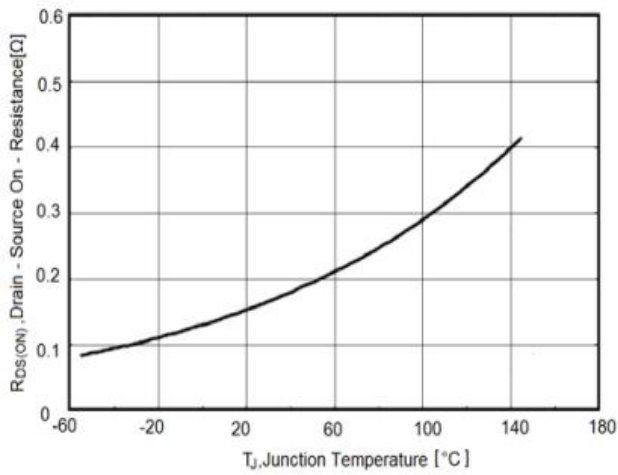
Characteristics	Test Condition	Symbo	Min.	Typ.	Max.	Unit
Maximum Continuous Drain -Source Diode Forward Current		I_S	-	-	20	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}	-	-	60	A
Reverse recovery time	$T_J = 25^\circ\text{C}, I_F = 21\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	300	-	ns
Reverse recovery charge		Q_{rr}		5		μC
Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 20\text{ A}, T_J = 25^\circ\text{C}$	V_{SD}	-	-	1.3	V

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

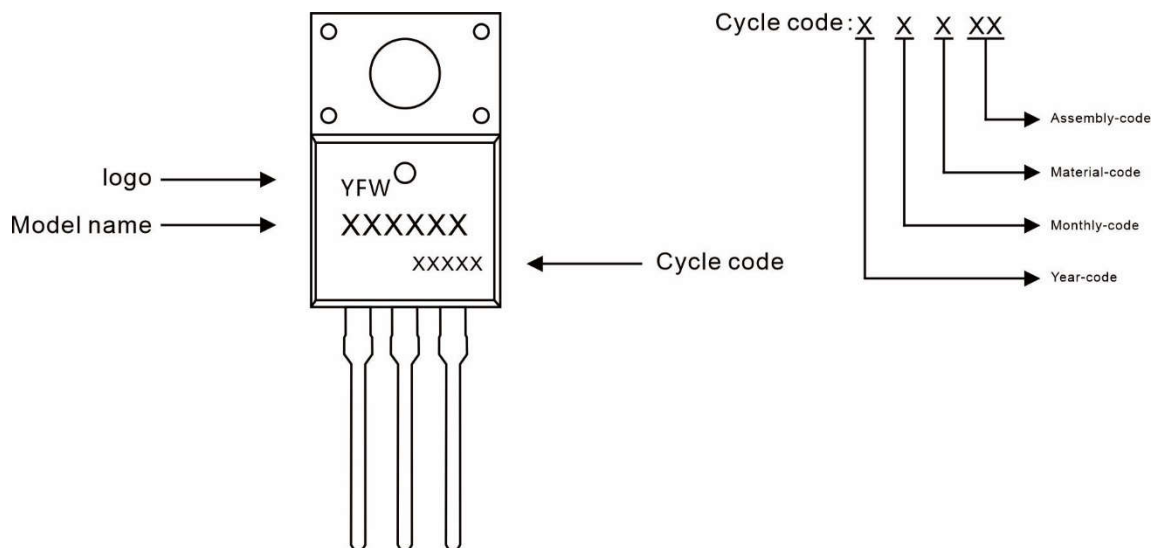
RATINGS AND CHARACTERISTIC CURVES



RATINGS AND CHARACTERISTIC CURVES



Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW65R190AF	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

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