

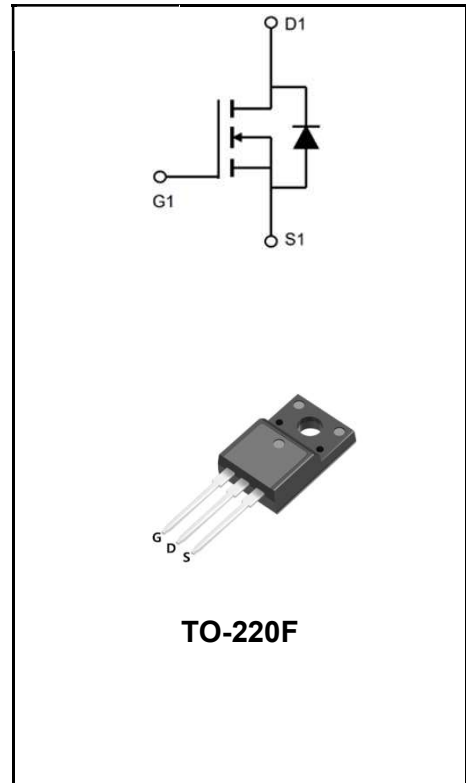
**650V N-CHANNEL ENHANCEMENT MODE MOSFET**

**MAIN CHARACTERISTICS**

$I_D$	13A
$V_{DSS}$	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	<0.65Ω (Type:0.52 Ω)

**Features**

- ◆Fast Switching
- ◆Low ON Resistance
- ◆Low Gate Charge
- ◆100% Single Pulse avalanche energy Test
- ◆LeadfreeincomplywithEUroHS2011/65/EUdirectives



**Mechanical Data**

- ◆Case: Molded plastic
- ◆Mounting Position: Any
- ◆Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆Solder bath temperature275°C maximum,10s per JESD22-106

**Product Specification Classification**

Part Number	Package	Marking	Pack
YFW13N65AF	TO-220F	YFW 13N65AF XXXXX	50PCS/Tube

**Maximum Ratings at Tc=25°C unless otherwise specified**

Characteristics	Symbols	Value	Units
Drain-Source Voltage	<b>V<sub>DS</sub></b>	650	<b>V</b>
Gate-Source Voltage	<b>V<sub>GS</sub></b>	±30	<b>V</b>
Continue Drain Current	<b>I<sub>D</sub></b>	13	<b>A</b>
-Continuous (TC = 100°C)		8	
Pulsed Drain Current (Note1)	<b>I<sub>DM</sub></b>	52	<b>A</b>
Power Dissipation	<b>P<sub>D</sub></b>	42	<b>W</b>
-Derate above 25°C		0.4   1.14	
Single Pulse Avalanche Energy (Note2)	<b>E<sub>AS</sub></b>	550	<b>mJ</b>
Avalanche Current (Note 1)	<b>I<sub>AR</sub></b>	10	<b>A</b>
Repetitive Avalanche Energy (Note 1)	<b>E<sub>AS</sub></b>	17	<b>mJ</b>
Operating Temperature Range	<b>T<sub>J</sub></b>	150	<b>°C</b>
Storage Temperature Range	<b>T<sub>STG</sub></b>	-55 to +150	<b>°C</b>
Thermal Resistance, Junction to Case	<b>R<sub>θJC</sub></b>	2.65	<b>°C/W</b>
Thermal Resistance, Junction to Ambient	<b>R<sub>θJA</sub></b>	62.5	<b>°C/W</b>

**Maximum Ratings at Tc=25°C unless otherwise specified**

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	<b>BV<sub>DSS</sub></b>	650	-	-	<b>V</b>
Drain-Source Leakage Current	V <sub>DS</sub> = 650 V, V <sub>GS</sub> = 0 V	<b>I<sub>DSS</sub></b>	-	-	1	<b>uA</b>
	V <sub>DS</sub> = 400 V, T <sub>c</sub> = 125°C		-	-	10	
Gate Leakage Current	V <sub>GS</sub> = ± 30 V, V <sub>DS</sub> = 0 V	<b>I<sub>GSS</sub></b>	-	-	±100	<b>nA</b>
Gate-Source Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	<b>V<sub>GS(th)</sub></b>	2	-	4	<b>V</b>
Drain-Source On-State Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.5 A	<b>R<sub>DS(on)</sub></b>	-	0.52	0.65	<b>Ω</b>
Forward Transconductance	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 6.5 A	<b>g<sub>fs</sub></b>	-	12	-	<b>S</b>
Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1MHz	<b>C<sub>iss</sub></b>	-	1700	-	<b>pF</b>
Output Capacitance		<b>C<sub>oss</sub></b>	-	170	-	
Reverse Transfer Capacitance		<b>C<sub>rss</sub></b>	-	7	-	
Turn-on Delay Time	I <sub>D</sub> = 13 A, V <sub>DD</sub> = 325 V, R <sub>G</sub> = 10Ω(Note3,4)	<b>td(ON)</b>	-	29	-	<b>nS</b>
Rise Time		<b>tr</b>	-	27	-	
Turn-Off Delay Time		<b>td(OFF)</b>	-	65	-	
Fall Time		<b>tf</b>	-	46	-	
Total Gate Charge	I <sub>D</sub> = 13 A, V <sub>DD</sub> = 520V, V <sub>GS</sub> = 10 V(Note3,4)	<b>Q<sub>G</sub></b>	-	50	-	<b>nC</b>
Gate to Source Charge		<b>Q<sub>GS</sub></b>	-	10	-	
Gate to Drain Charge		<b>Q<sub>GD</sub></b>	-	14	-	

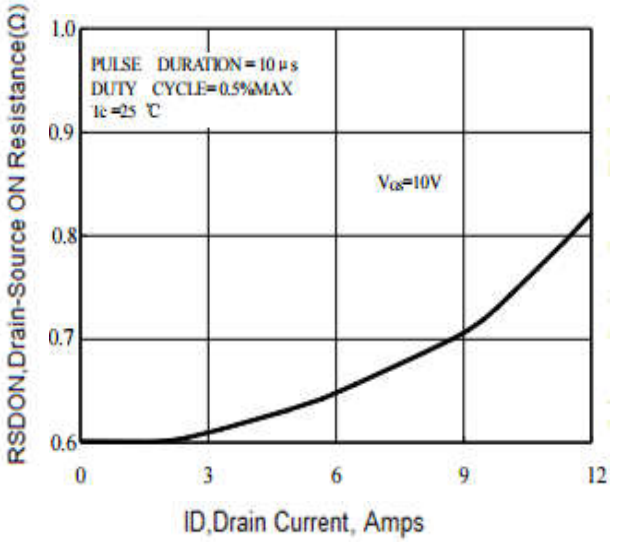
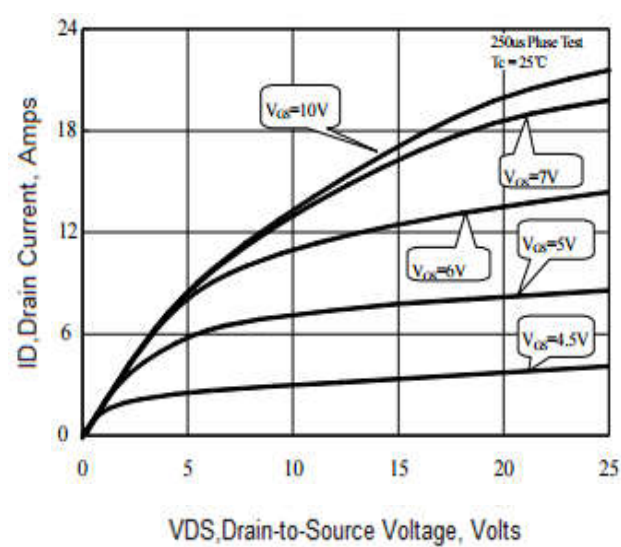
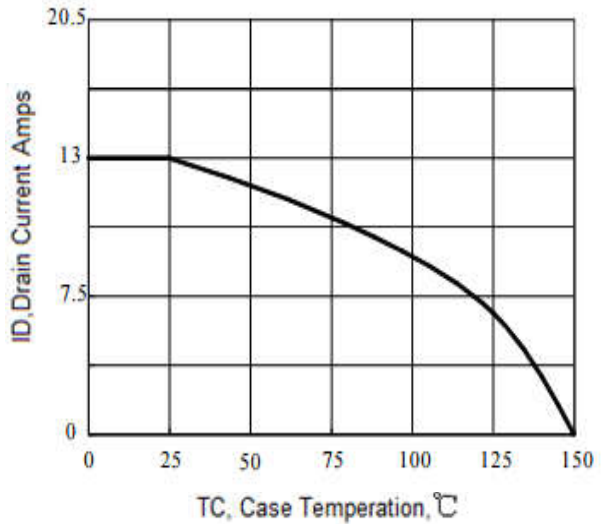
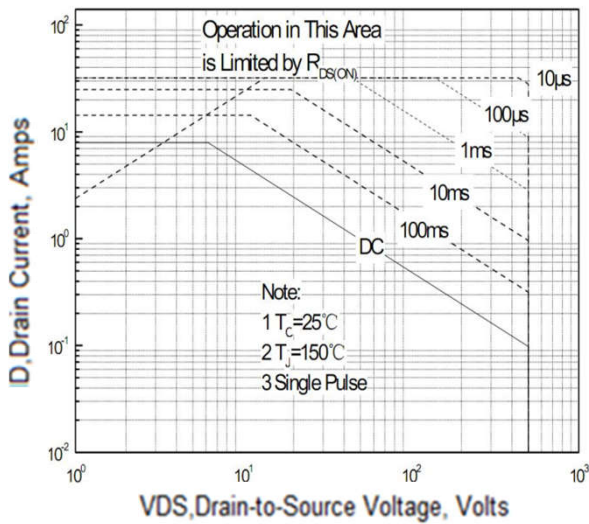
Source-Drain Diode Characteristics at Ta=25°C unless otherwise specified

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Maximum Body-Diode Continuous Current		$I_S$	-	-	13	A
Maximum Body-Diode Pulsed Current		$I_{SM}$	-	-	48	A
Drain-Source Diode Forward Voltage	$I_{SD} = 13\text{ A}$	$V_{SD}$	-	-	1.4	V
Reverse Recovery Time	$I_{SD} = 13\text{ A}, V_{GS} = 0\text{ V},$ $di_f / dt = 100\text{ A}/\mu\text{s}$	$trr$	-	670	-	nS
Reverse Recovery Charge		$Q_{rr}$	-	4.4	-	uC

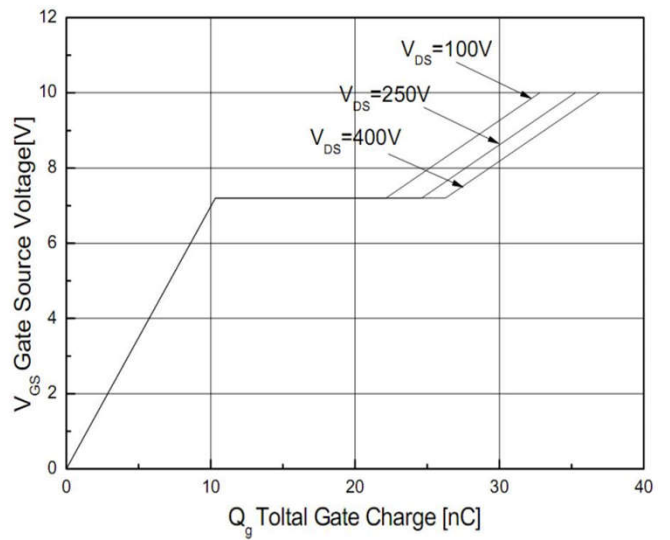
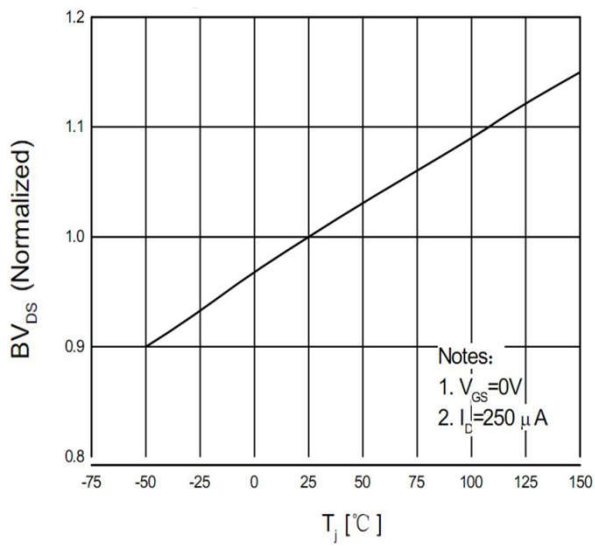
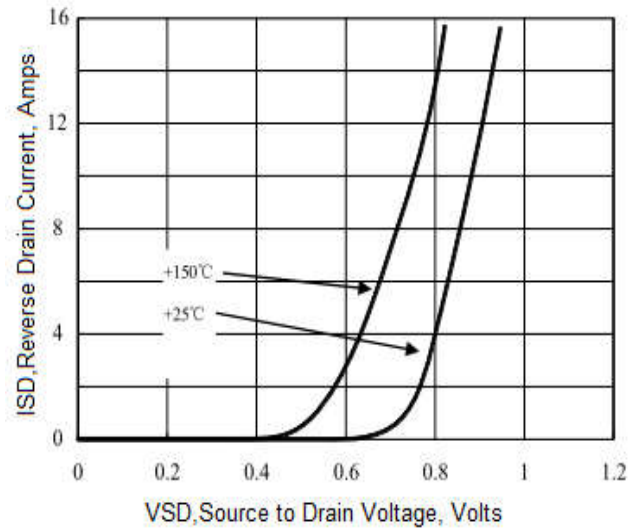
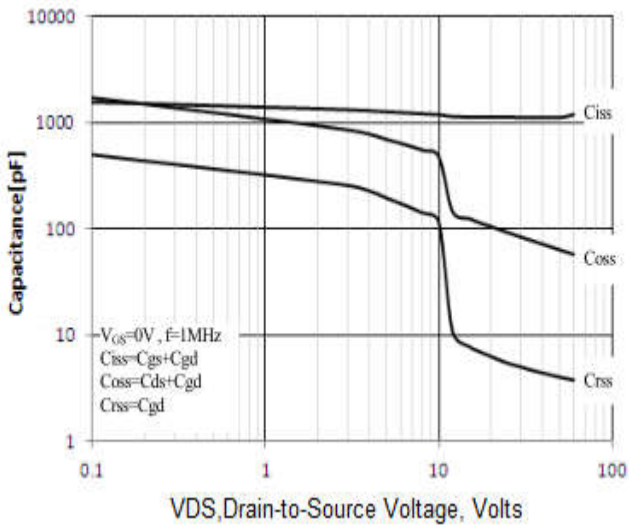
Note:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $I_{AS} = 13\text{ A}, V_{DD} = 50\text{ V}, L = 10\text{mH}, R_G = 25\Omega$ , starting  $T_J = 25^\circ\text{C}$ .
3. ulse test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Essentially Independent of Operating Temperature.

Ratings and Characteristic Curves



**Ratings and Characteristic Curves**



Package Outline Dimensions Millimeters

TO-220F

<p>The image shows a technical drawing of a TO-220F package. The left view is a front view showing dimensions A (width), B (height of the top section), C (height of the top section), D (height of the body), F (height of the lead), G (width of the lead), H (width of the lead), and I (width of the lead). The right view is a side view showing dimensions J (height of the top section), K (height of the top section), L (height of the body), M (height of the body), N (height of the lead), O (height of the lead), and Q (height of the lead).</p>	Dim.	Min.	Max.
	A	9.95	10.25
	B	2.95	3.25
	C	1.25	1.45
	D	12.95	13.25
	E	0.50	0.65
	F	3.1	3.3
	G	1.30	1.45
	H	Typ 2.54	
	I	Typ 5.08	
	J	4.60	4.75
	K	2.50	2.65
	L	6.35	6.55
	M	15.4	16.0
	N	2.75	3.05
O	0.48	0.52	
P	0.76	0.84	
All Dimensions in millimeter			

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