

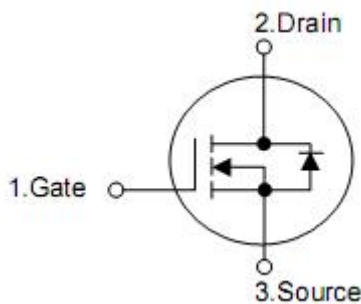
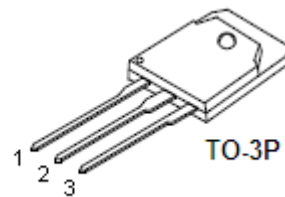
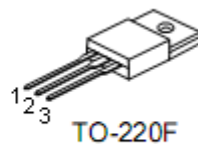
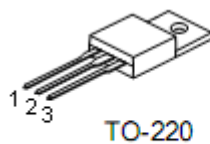
## 1. Description

This Power MOSFET is produced using XXW's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

## 2. Features

- n  $R_{DS(on)}=0.20\Omega @ V_{GS}=10V$
- n Low gate charge ( typical 50nC)
- n Fast switching capability
- n Avalanche energy specified
- n Improved dv/dt capability

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

## 4. Absolute maximum ratings

(T<sub>c</sub>= 25 °C , unless otherwise specified)

Parameter	Symbol	Ratings			Units	
		TO220	TO220F	TO3P		
Drain-source voltage	V <sub>DSS</sub>	400			V	
Gate-source voltage	V <sub>GSS</sub>	±30			V	
Drain current continuous	I <sub>D</sub>	T <sub>C</sub> =25°C	20	20*	20	A
		T <sub>C</sub> =100°C	10.8	10.8*	10.8	A
Drain current pulsed (note1)	I <sub>DP</sub>	72	72	72	A	
Avalanche energy	Repetitive (note1)	E <sub>AR</sub>			20.25	mJ
	Single pulse (note2)	E <sub>AS</sub>			711	mJ
Peak diode recovery dv/dt (note 3)	dv/dt	4.5			V/ns	
Total power dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	202.5	40	202.5	W
		derate above 25°C	1.62	0.32	1.62	W/°C
Junction temperature	T <sub>J</sub>	+150			°C	
Storage temperature	T <sub>STG</sub>	-55~+150			°C	

\*Drain current limited by maximum junction temperature.

## 5. Thermal characteristics

Parameter	Symbol	Ratings			Units
		TO220	TO220F	TO3P	
Thermal resistance,junction-ambient	R <sub>thJA</sub>	62.5	62.5	62.5	°C/W
Thermal resistance,case-to-sink typ.	R <sub>thCS</sub>	0.5	-	0.5	
Thermal resistance,Junction-case	R <sub>thJC</sub>	0.61	3.11	0.61	

## 6. Electrical characteristics

 (T<sub>J</sub>=25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off characteristics						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	400	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =320V, T <sub>C</sub> =125 °C	-	-	10	μA
Gate-body leakage current	Forward	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V	-	-	100	nA
	Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	nA
Breakdown voltage temperature coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA	-	0.5	-	V/°C
On characteristics						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0	-	5.0	V
Static drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =9.0A	-	0.20	0.25	Ω
Dynamic characteristics						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	2135	-	pF
Output capacitance	C <sub>oss</sub>		-	255	-	pF
Reverse transfer capacitance	C <sub>rss</sub>		-	35	-	pF
Switching characteristics						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =200V, I <sub>D</sub> =20.0A, R <sub>G</sub> =25Ω (note4,5)	-	50	-	ns
Rise time	t <sub>r</sub>		-	170	-	ns
Turn-off delay time	t <sub>d(off)</sub>		-	90	-	ns
Fall time	t <sub>f</sub>		-	80	-	ns
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =320V, I <sub>D</sub> =20.0A , V <sub>GS</sub> =10V (note4,5)	-	50	-	nC
Gate-source charge	Q <sub>gs</sub>		-	10.5	-	nC
Gate-drain charge	Q <sub>gd</sub>		-	24	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =20.0A	-	-	1.4	V
Continuous drain-source current	I <sub>SD</sub>		-	-	20.0	A
Pulsed drain-source current	I <sub>SM</sub>		-	-	72	A
Reverse recovery time	t <sub>rr</sub>	I <sub>SD</sub> =20.0A di <sub>SD</sub> /dt=100A/μs (note4)	-	450	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	5.5	-	μC

Note:1. Repetitive rating: pulse width limited by maximum junction temperature

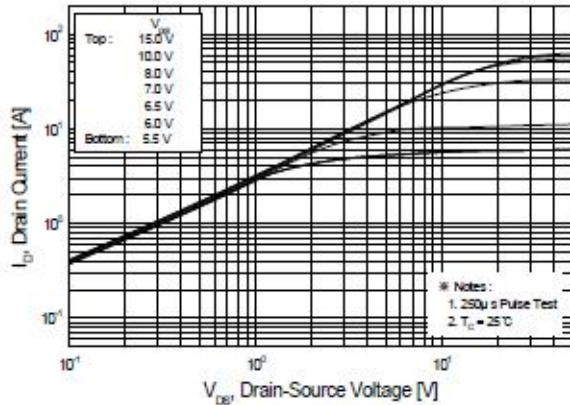
 2. L=4.0mH, I<sub>AS</sub>=20.0A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C

 3. I<sub>SD</sub>≤20.0A, di/dt≤200A/μs, V<sub>DD</sub>≤BV<sub>DSS</sub>, starting T<sub>J</sub>=25 °C

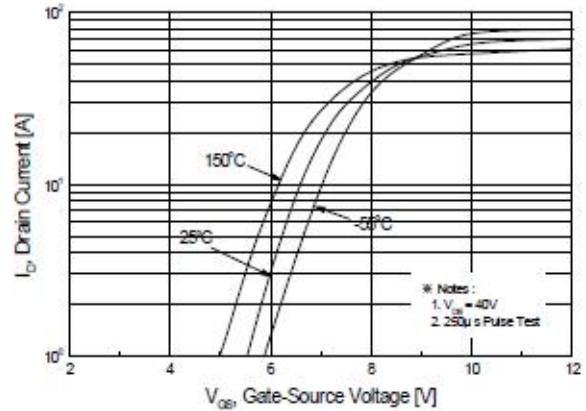
4. Pulse test: pulse width≤300μs, duty cycle≤2%

5. Essentially independent of operating temperature

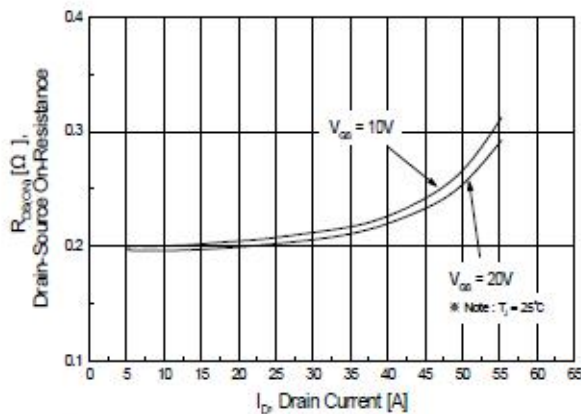
## 7. Test circuits and waveforms



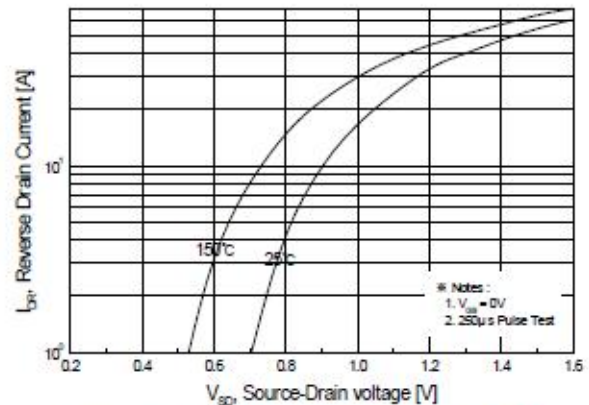
**Figure 1. On-Region Characteristics**



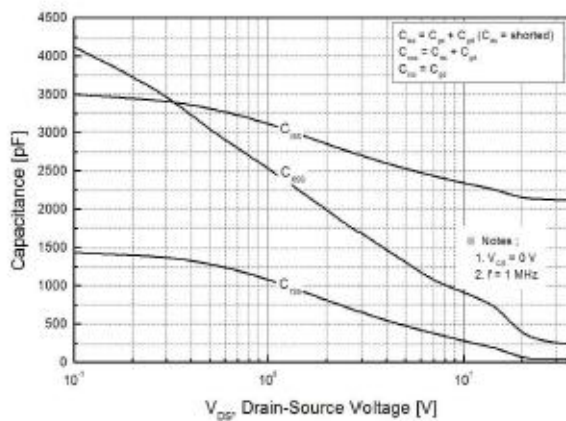
**Figure 2. Transfer Characteristics**



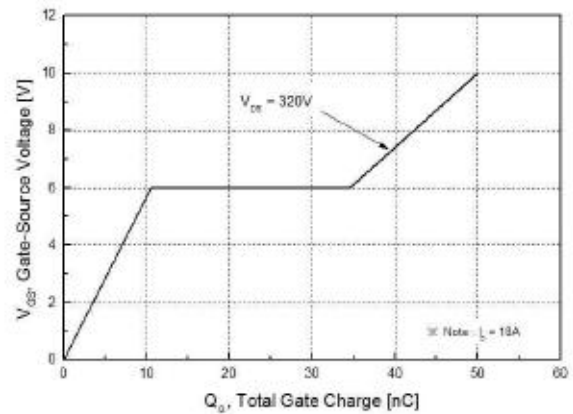
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



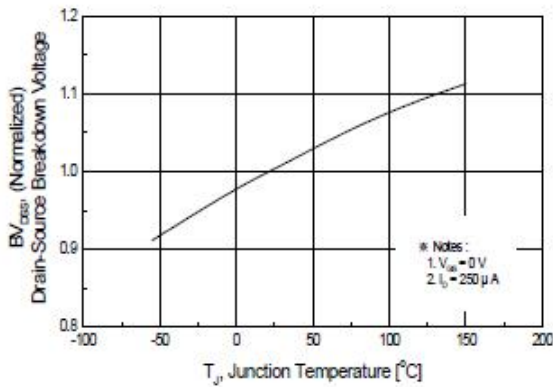
**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**



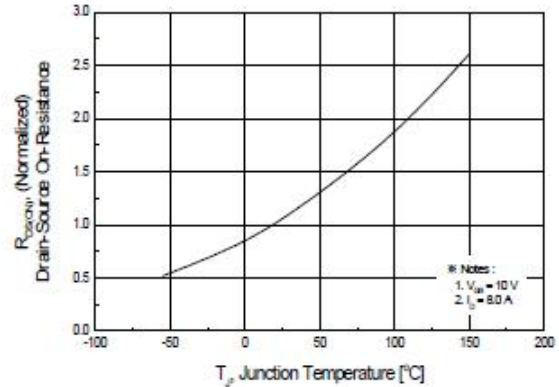
**Figure 5. Capacitance Characteristics**



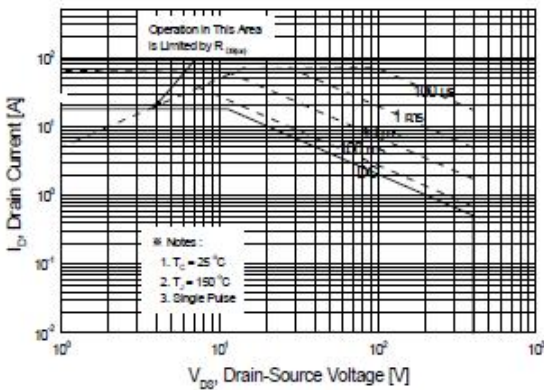
**Figure 6. Gate Charge Characteristics**



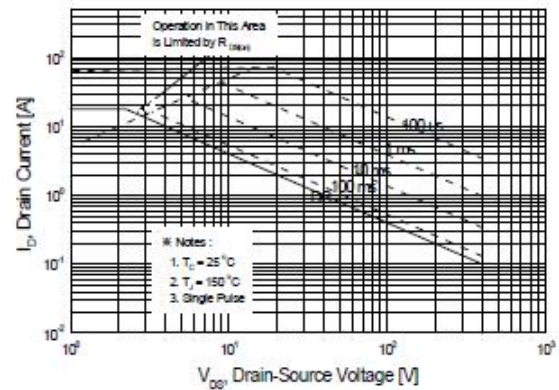
**Figure 7. Breakdown Voltage Variation vs Temperature**



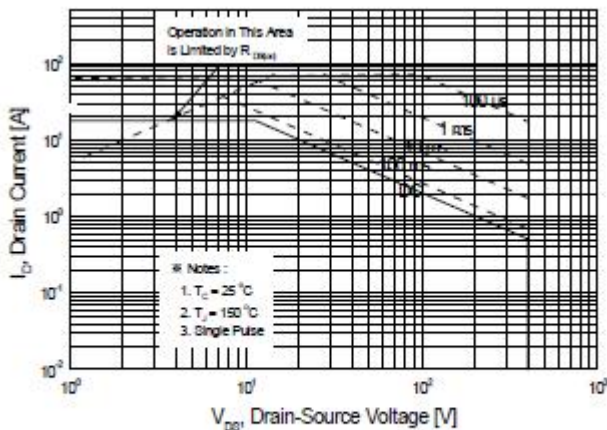
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9-1. Maximum Safe Operating Area for TO-220**

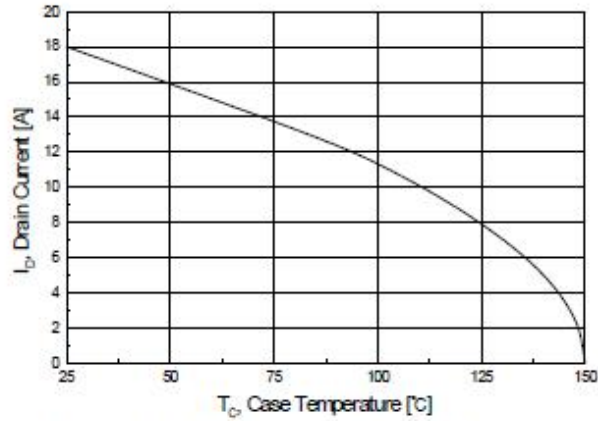


**Figure 9-2. Maximum Safe Operating Area for TO-220F**

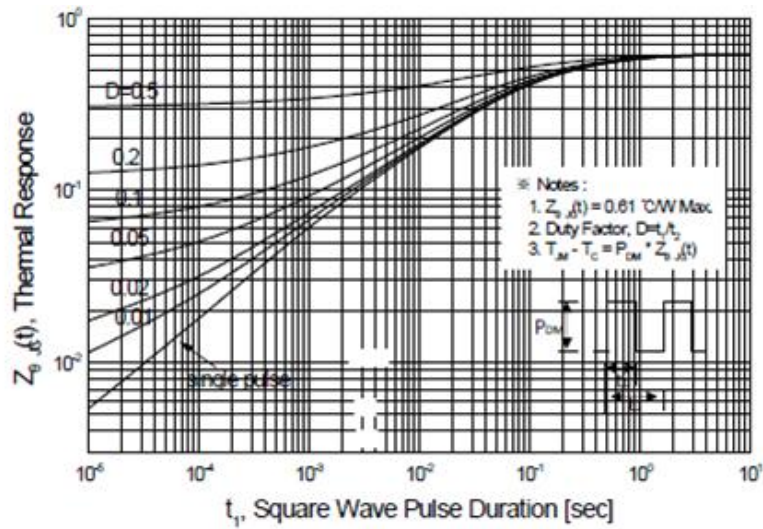


**Figure 9-3 Maximum Safe Operating Area for TO-3P**

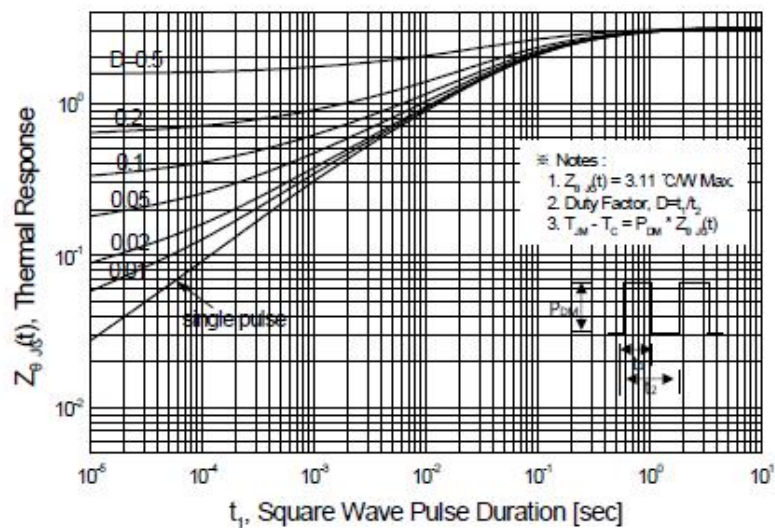




**Figure 10. Maximum Drain Current vs Case Temperature**



**Figure 11-1. Transient Thermal Response Curve for TO-220**



**Figure 11-2. Transient Thermal Response Curve for TO-220F**

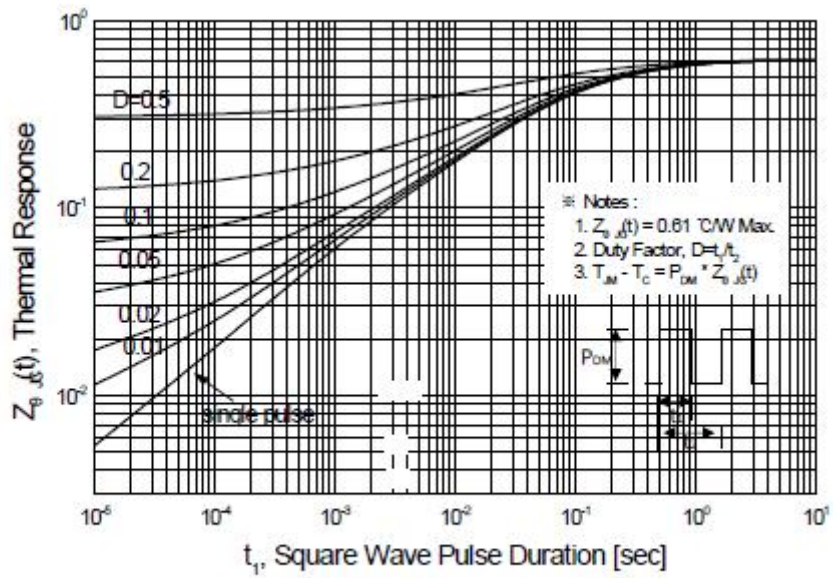


Figure 11-3 Transient Thermal Response Curve for TO-3P