

# X3-Class **Power MOSFET™**

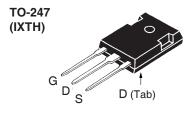
# **IXTP90N20X3 IXTH90N20X3**

= 200V90A ≤  $12m\Omega$ 

N-Channel Enhancement Mode Avalanche Rated



S S	TO-220 (IXTP)		
		G <sub>DS</sub>	D (Tab)



G = Gate	D	=	Drain
S = Source	Tab	=	Drain

Symbol	Test Conditions	Maximum Ratings		
V <sub>DSS</sub>	$T_J = 25^{\circ}C$ to 175°C	200	V	
$\mathbf{V}_{DGR}$	$T_{_{\rm J}}$ = 25°C to 175°C, $R_{_{\rm GS}}$ = 1M $\Omega$	200	V	
V <sub>GSS</sub>	Continuous	±20	V	
$V_{\rm GSM}$	Transient	±30	V	
I <sub>D25</sub>	T <sub>C</sub> = 25°C	90	Α	
I <sub>DM</sub>	$T_{\rm C} = 25^{\circ}$ C, Pulse Width Limited by $T_{\rm JM}$	220	Α	
I <sub>A</sub>	T <sub>C</sub> = 25°C	45	Α	
<b>E</b> <sub>AS</sub>	$T_{c} = 25^{\circ}C$	1	J	
dv/dt	$I_{_{S}} \le I_{_{DM}}, V_{_{DD}} \le V_{_{DSS}}, T_{_{J}} \le 150^{\circ}C$	20	V/ns	
P <sub>D</sub>	T <sub>C</sub> = 25°C	390	W	
T <sub>J</sub>		-55 +175	°C	
T <sub>JM</sub>		175	°C	
T <sub>stg</sub>		-55 +175	°C	
T <sub>L</sub>	Maximum Lead Temperature for Soldering	300	°C	
T <sub>SOLD</sub>	1.6 mm (0.062in.) from Case for 10s	260	°C	
M <sub>d</sub>	Mounting Torque	1.13 / 10	Nm/lb.in	
Weight	TO-220 TO-247	3 6	g g	

## **Features**

- International Standard Packages
- Low R<sub>DS(ON)</sub> and Q<sub>G</sub>
   Avalanche Rated
- Low Package Inductance

#### **Advantages**

- High Power Density
- Easy to Mount
- Space Savings

# **Applications**

- Switch-Mode and Resonant-Mode **Power Supplies**
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

Symbol $(T_J = 25^{\circ}C,$	Test Conditions Unless Otherwise Specified)	Charac Min.	teristic Typ.	eristic Values Typ. Max.	
BV <sub>DSS</sub>	$V_{GS} = 0V, I_D = 250\mu A$	200			V
V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	2.5		4.5	V
I <sub>GSS</sub>	$V_{GS} = \pm 20V, V_{DS} = 0V$			±100	nA
I <sub>DSS</sub>	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_{J} = 125^{\circ}C$			5 100	μ <b>Α</b> μ <b>Α</b>
R <sub>DS(on)</sub>	$V_{GS} = 10V, I_{D} = 0.5 \cdot I_{D25}, Note 1$		10	12	mΩ



Symbol	Test Conditions	<b>Characteristic Values</b>		
$(T_J = 25^{\circ}C, Unless Otherwise Specified)$ Min.		Тур.	Max	
g <sub>fs</sub>	$V_{DS} = 10V, I_{D} = 0.5 \bullet I_{D25}, Note 1$	60	100	S
R <sub>Gi</sub>	Gate Input Resistance		1.4	Ω
C <sub>iss</sub>			5420	pF
C <sub>oss</sub>	$V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$		930	pF
C <sub>rss</sub>			4	pF
	Effective Output Capacitance			
$C_{o(er)}$	Energy related $\int V_{GS} = 0V$		420	pF
$C_{o(tr)}$	Time related $\int_{DS} V_{DS}^{GS} = 0.8 \cdot V_{DSS}$		1300	pF
t <sub>d(on)</sub>	Resistive Switching Times		22	ns
t, (	$V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_{D} = 0.5 \cdot I_{D25}$		26	ns
t <sub>d(off)</sub>			62	ns
t <sub>f</sub>	$R_{_{G}} = 5\Omega$ (External)		13	ns
$Q_{g(on)}$			78	nC
Q <sub>gs</sub>	$V_{GS} = 10V$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_{D} = 0.5 \cdot I_{D25}$		23	nC
$\mathbf{Q}_{gd}$			22	nC
R <sub>thJC</sub>				0.32 °C/W
R <sub>thCS</sub>	TO-220		0.50	°C/W
	TO-247		0.21	°C/W

#### Source-Drain Diode

Symbol	Test Conditions	Characteristic Values			
$(T_J = 25^{\circ}C, T_{IJ})$	Unless Otherwise Specified)	Min.	Тур.	Max	
I <sub>s</sub>	$V_{GS} = 0V$			90	Α
SM	Repetitive, pulse Width Limited by $\mathrm{T}_{_{\mathrm{JM}}}$			360	Α
V <sub>SD</sub>	$I_F = I_S$ , $V_{GS} = 0V$ , Note 1			1.4	V
$\left. egin{array}{l} \mathbf{t}_{rr} & \\ \mathbf{Q}_{RM} & \\ \mathbf{I}_{RM} & \end{array}  ight.  ight.$	$I_F = 45A$ , -di/dt = 100A/ $\mu$ s $V_R = 100V$		124 650 10.5		ns nC A

Note 1. Pulse test,  $t \le 300\mu s$ , duty cycle,  $d \le 2\%$ .

## **ADVANCE TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.



