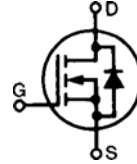


## High Voltage Power MOSFETs

### IXTH3N120

N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt

Preliminary Data Sheet



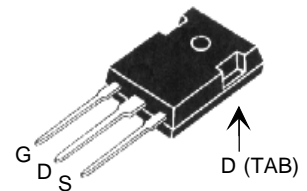
$$V_{DSS} = 1200 \text{ V}$$

$$I_{D25} = 3 \text{ A}$$

$$V_{DS(on)} = 4.5 \text{ } \Omega$$

Symbol	Test Conditions	Maximum Ratings		
$V_{DSS}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	3N120	1200	V
		3N110	1100	V
$V_{DGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$	3N120	1200	V
		3N110	1100	V
$V_{GS}$	Continuous		$\pm 20$	V
$V_{GSM}$	Transient		$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$		3	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$		12	A
$I_{AR}$	$T_C = 25^\circ\text{C}$		3	A
$E_{AR}$	$T_C = 25^\circ\text{C}$		20	mJ
$E_{AS}$			700	mJ
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2 \text{ } \Omega$		5	V/ns
$P_D$	$T_C = 25^\circ\text{C}$		150	W
$T_J$			-55 to +150	$^\circ\text{C}$
$T_{JM}$			150	$^\circ\text{C}$
$T_{stg}$			-55 to +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.063 in) from case for 10 s		300	$^\circ\text{C}$
$M_d$	Mounting torque		1.13/10	Nm/lb.in.
<b>Weight</b>			6	g

TO-247



G = Gate      D = Drain  
S = Source    TAB = Drain

#### Features

- International standard packages
- Low  $R_{DS(on)}$
- Rated for unclamped Inductive load Switching (UIS)
- Molding epoxies meet UL 94 V-0 flammability classification

#### Advantages

- Easy to mount
- Space savings
- High power density

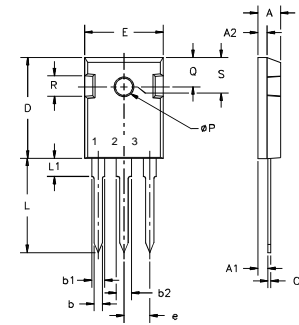
Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$	1200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \text{ } \mu\text{A}$	2.5		4.5 V
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = 0.8 V_{DSS}$		$T_J = 25^\circ\text{C}$	25 $\mu\text{A}$
	$V_{GS} = 0 \text{ V}$		$T_J = 125^\circ\text{C}$	1 mA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ Note 1			4.5 $\Omega$

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
<b>g<sub>fs</sub></b>	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1	1.5	2.2	S
<b>C<sub>iss</sub></b>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1050	1300 pF
<b>C<sub>oss</sub></b>			100	125 pF
<b>C<sub>rss</sub></b>			25	50 pF
<b>t<sub>d(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub> R <sub>G</sub> = 4.7 Ω (External),		17	ns
<b>t<sub>r</sub></b>			15	ns
<b>t<sub>d(off)</sub></b>			32	ns
<b>t<sub>f</sub></b>			18	ns
<b>Q<sub>g(on)</sub></b>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 0.5 • I <sub>D25</sub>		39	nC
<b>Q<sub>gs</sub></b>			9	nC
<b>Q<sub>gd</sub></b>			22	nC
<b>R<sub>thJC</sub></b>			0.8	K/W
<b>R<sub>thCK</sub></b>		0.25		K/W

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
<b>I<sub>S</sub></b>	V <sub>GS</sub> = 0 V			3 A
<b>I<sub>SM</sub></b>	Repetitive; pulse width limited by T <sub>JM</sub>			12 A
<b>V<sub>SD</sub></b>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V, Note 1			1.5 V
<b>t<sub>rr</sub></b>	I <sub>F</sub> = I <sub>S</sub> , -di/dt = 100 A/μs, V <sub>R</sub> = 100 V		700	ns

Notes: 1. Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %

### TO-247 AD Outline



Terminals: 1 - Gate 2 - Drain  
3 - Source Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	.242	BSC

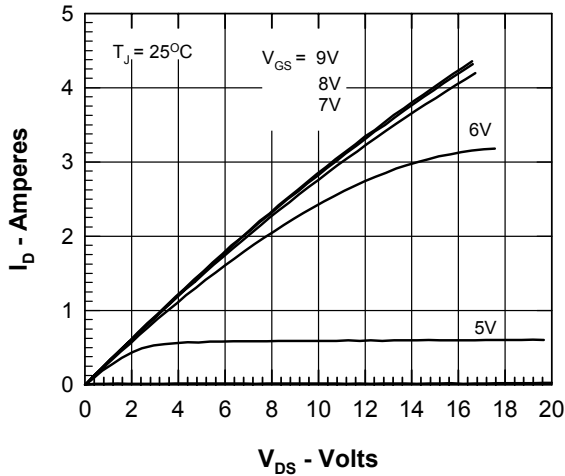


Fig. 1 Output Characteristics @  $T_j = 25^\circ\text{C}$

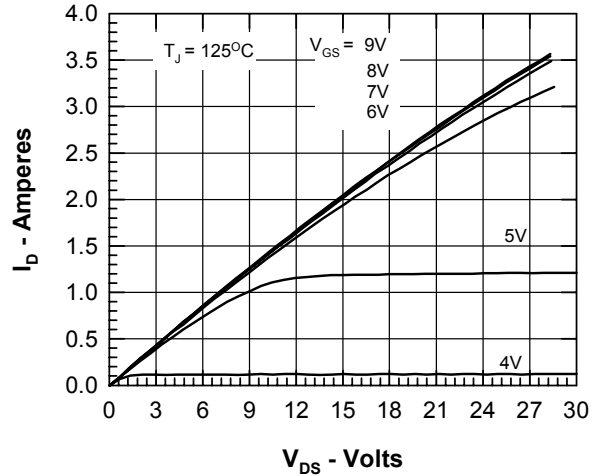


Fig. 2 Output Characteristics @  $T_j = 125^\circ\text{C}$

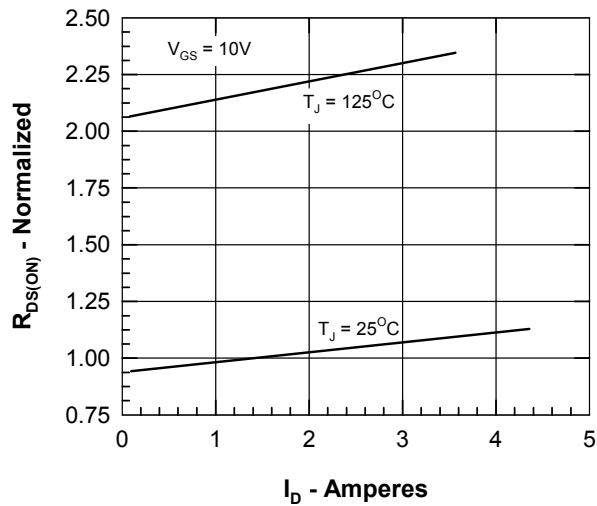


Fig. 3  $R_{DS(on)}$  vs. Drain Current

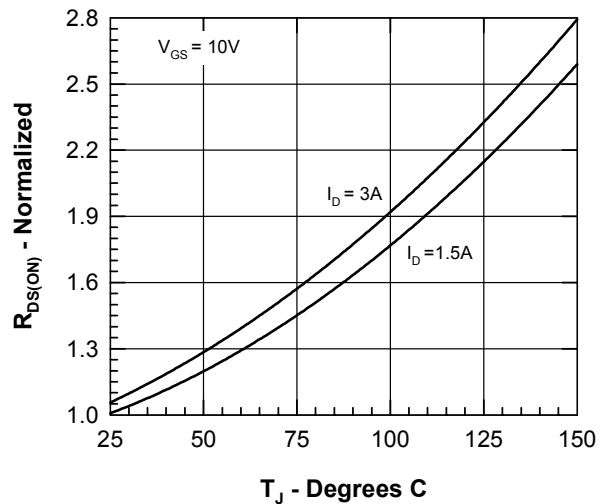


Fig. 4 Temperature Dependence of Drain to Source Resistance

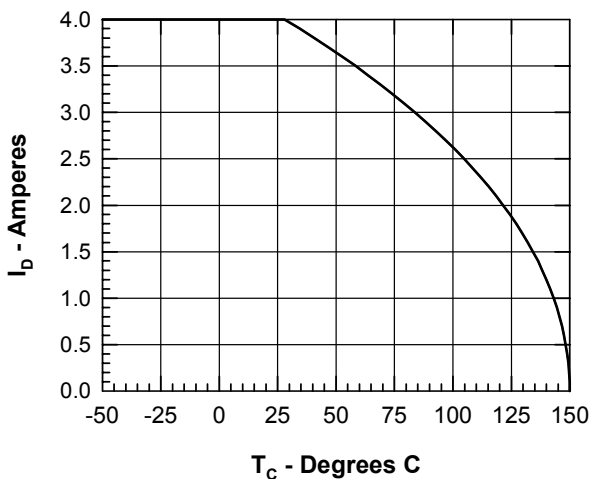


Fig. 5 Drain Current vs. Case Temperature

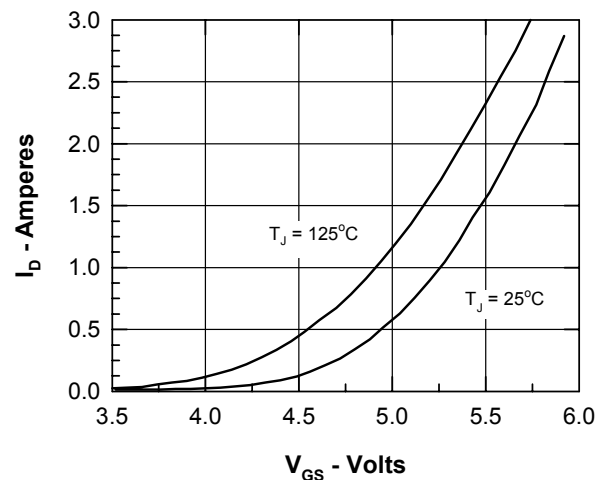


Fig. 6 Drain Current vs. Gate Source Voltage

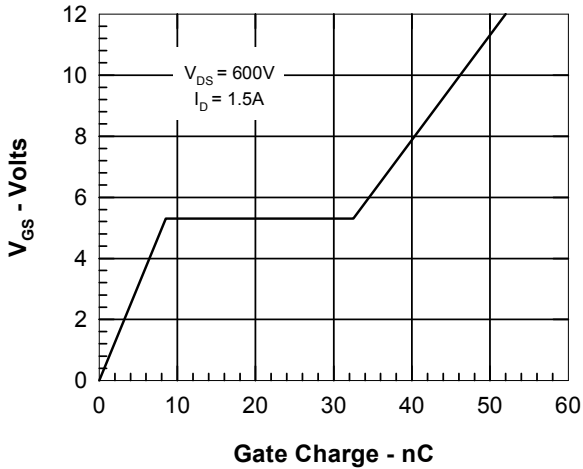


Fig. 7 Gate Charge Characteristic Curve

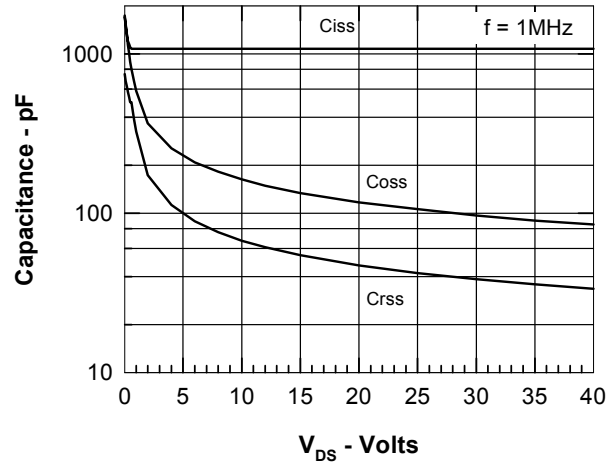


Fig. 8 Capacitance Curves

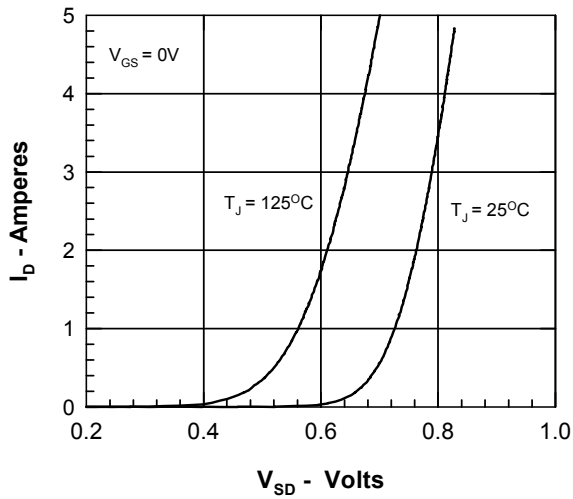


Fig. 9 Drain Current vs Drain to Source Voltage

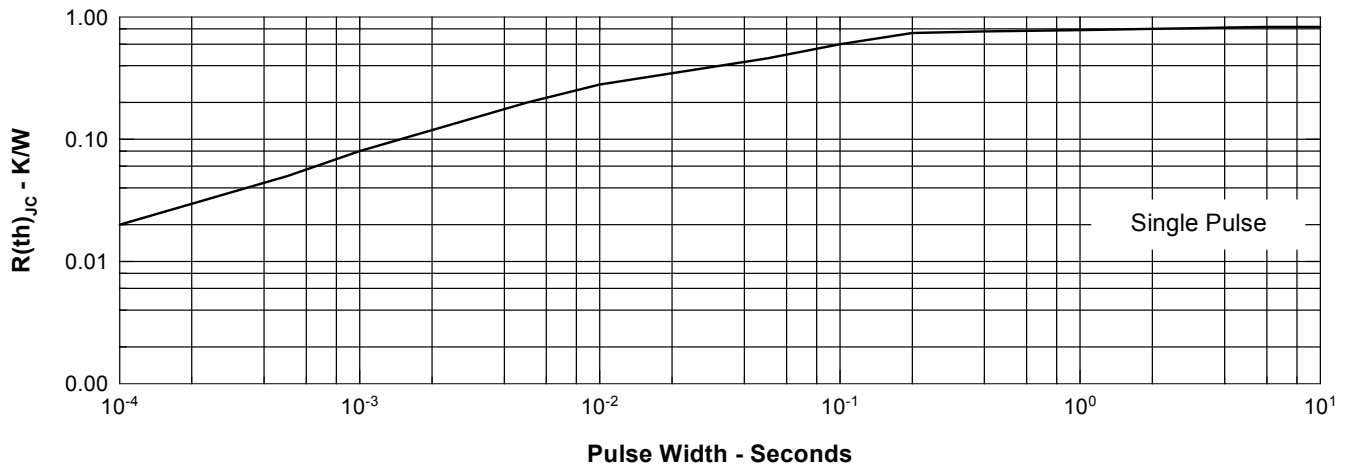


Fig.10 Transient Thermal Impedance

IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343