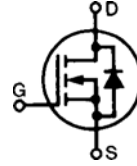


# High Voltage Power MOSFETs

## IXTH3N120

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

Preliminary Data Sheet



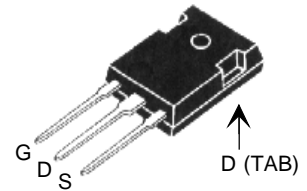
$$V_{DSS} = 1200 \text{ V}$$

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

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

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

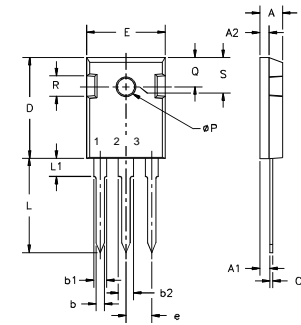
Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$	1200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	2.5		4.5 V
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}_{DC}$ ,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

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

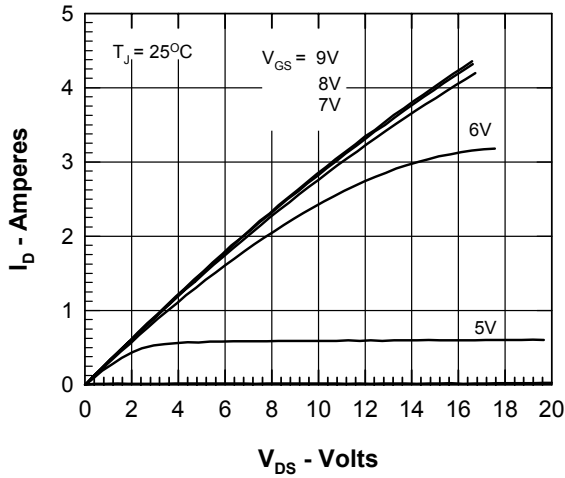


Fig.1 Output Characteristics @  $T_j = 25^\circ\text{C}$

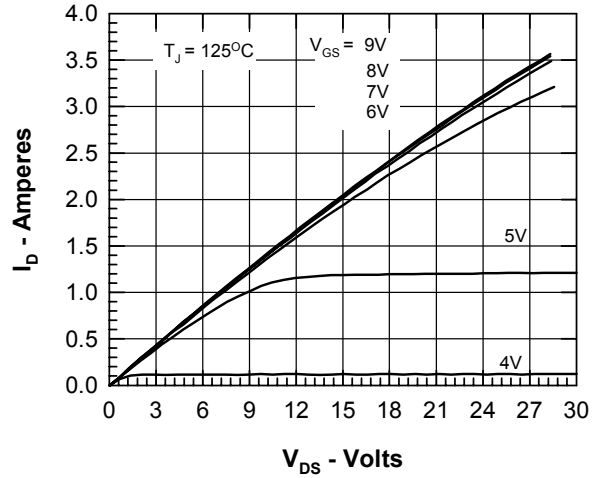


Fig. 2 Output Characteristics @  $T_j = 125^\circ\text{C}$

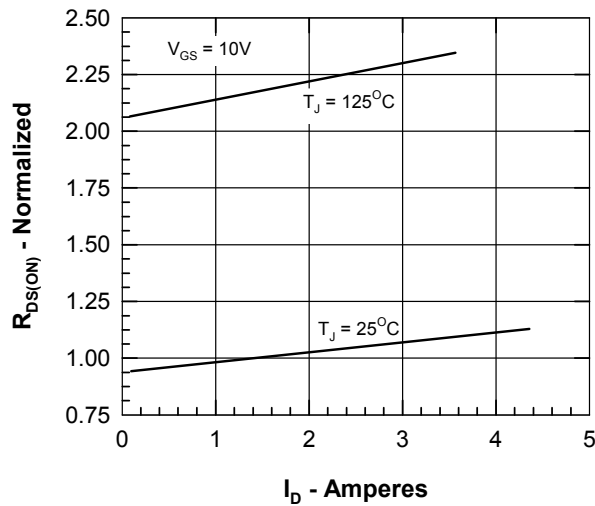


Fig. 3  $R_{DS(on)}$  vs. Drain Current

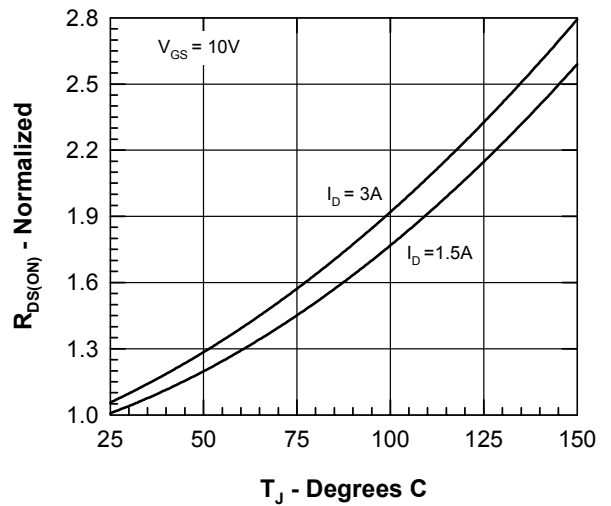


Fig. 4 Temperature Dependence of Drain to Source Resistance

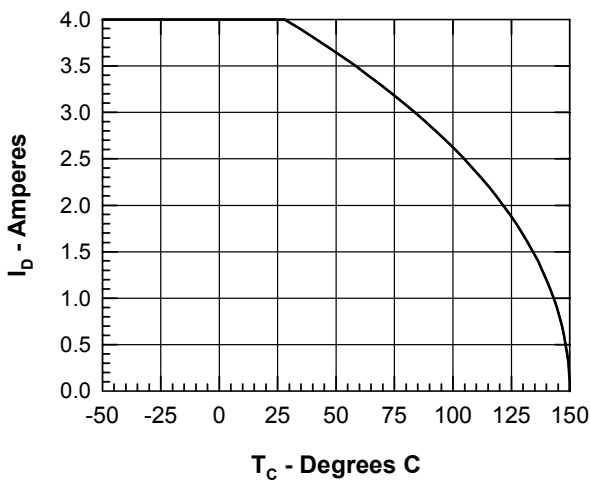


Fig.5 Drain Current vs. Case Temperature

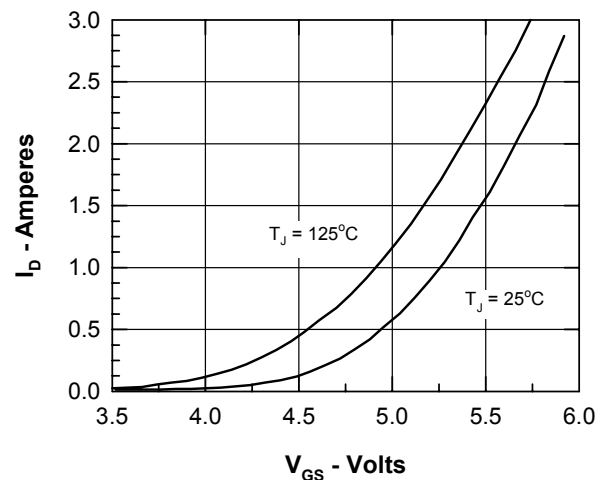


Fig. 6 Drain Current vs Gate Source Voltage

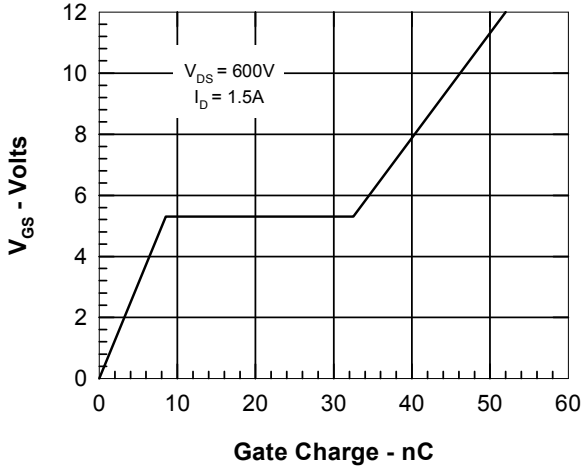


Fig. 7 Gate Charge Characteristic Curve

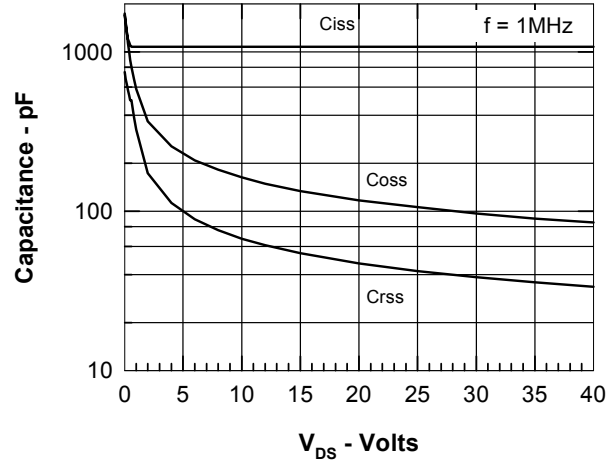


Fig. 8 Capacitance Curves

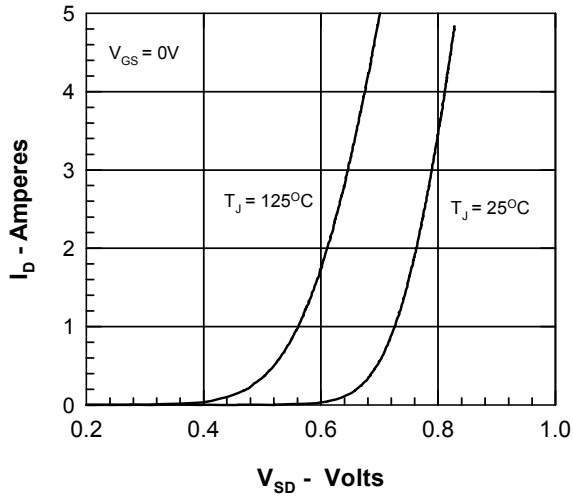


Fig. 9 Drain Current vs Drain to Source Voltage

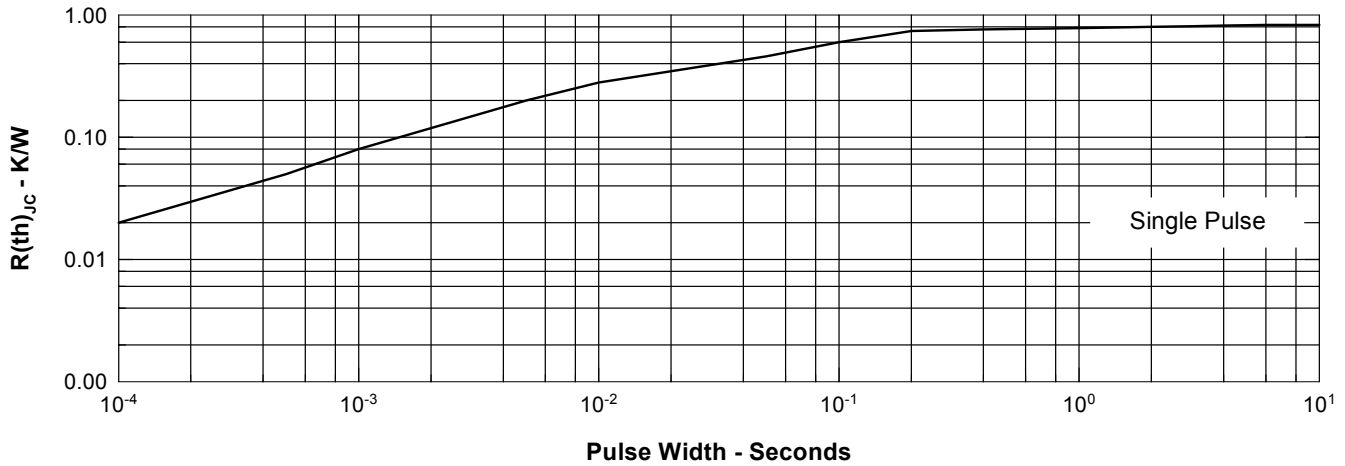


Fig.10 Transient Thermal Impedance

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