

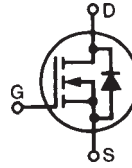
# PolarHT™ HiPerFET IXFR 140N20P

## Power MOSFET

### ISOPLUS247™

(Electrically Isolated Back Surface)

N-Channel Enhancement Mode  
Fast Intrinsic Diode  
Avalanche Rated



$$V_{DSS} = 200 \text{ V}$$

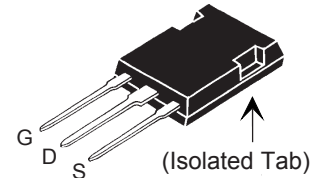
$$I_{D25} = 90 \text{ A}$$

$$R_{DS(on)} \leq 22 \text{ m}\Omega$$

$$t_{rr} \leq 200 \text{ ns}$$

Symbol	Test Conditions	Maximum Ratings		
$V_{DSS}$	$T_J = 25^\circ\text{C to } 175^\circ\text{C}$	200	V	
$V_{DGR}$	$T_J = 25^\circ\text{C to } 175^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$	200	V	
$V_{GS}$	Continuous	$\pm 20$	V	
$V_{GSM}$	Transient	$\pm 30$	V	
$I_{D25}$	$T_C = 25^\circ\text{C}$	90	A	
$I_{D(RMS)}$	External lead current limit	75	A	
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	280	A	
$I_{AR}$	$T_C = 25^\circ\text{C}$	60	A	
$E_{AR}$	$T_C = 25^\circ\text{C}$	100	mJ	
$E_{AS}$	$T_C = 25^\circ\text{C}$	4	J	
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 4 \Omega$	10	V/ns	
$P_D$	$T_C = 25^\circ\text{C}$	300	W	
$T_J$		-55 ... +175	$^\circ\text{C}$	
$T_{JM}$		175	$^\circ\text{C}$	
$T_{stg}$		-55 ... +150	$^\circ\text{C}$	
$T_L$	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$	
$V_{ISOL}$	50/60 Hz, RMS, 1 minute	2500	V~	
$M_d$	Terminal torque Mounting torque	1.13/10 1.13/10	Nm/lb.in. Nm/lb.in.	
<b>Weight</b>		5	g	
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$	2.5		5.0 V
$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 200 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 150^\circ\text{C}$			25 $\mu\text{A}$
				250 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ $V_{GS} = 15 \text{ V}$ , $I_D = 140 \text{ A}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$	17		22 $\text{m}\Omega$
				$\text{m}\Omega$

ISOPLUS247 (IXFR)  
E153432



G = Gate      D = Drain  
S = Source

#### Features

- † International standard isolated package
- † UL recognized package
- † Unclamped Inductive Switching (UIS) rated
- † Low package inductance  
- easy to drive and to protect
- † Fast intrinsic diode

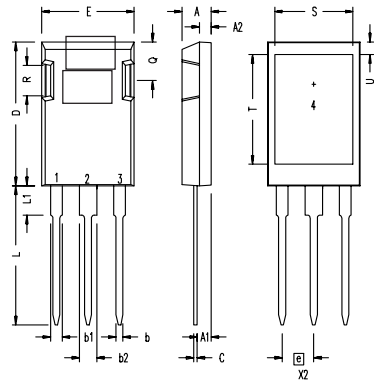
#### Advantages

- † Easy to mount
- † Space savings
- † High power density

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> , pulse test	50	84	S
<b>C<sub>iss</sub></b>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		7500	pF
<b>C<sub>oss</sub></b>			1800	pF
<b>C<sub>rss</sub></b>			280	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> = 60 A R <sub>G</sub> = 3.3 Ω (External)		30	ns
<b>t<sub>r</sub></b>			35	ns
<b>t<sub>d(off)</sub></b>			150	ns
<b>t<sub>f</sub></b>			90	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>		240	nC
<b>Q<sub>gs</sub></b>			50	nC
<b>Q<sub>gd</sub></b>			100	nC
<b>R<sub>thJC</sub></b>	ISOPLUS247			0.5 °C/W
<b>R<sub>thCS</sub></b>		0.15		°C/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			90 A
<b>I<sub>SM</sub></b>	Repetitive			280 A
<b>V<sub>SD</sub></b>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			1.5 V
<b>t<sub>rr</sub></b>	I <sub>F</sub> = 25 A, -di/dt = 100 A/μs V <sub>R</sub> = 100 V, V <sub>GS</sub> = 0 V			200 ns
<b>Q<sub>RM</sub></b>			0.6	μC
<b>I<sub>RM</sub></b>			6	A

### ISOPLUS 247 OUTLINE

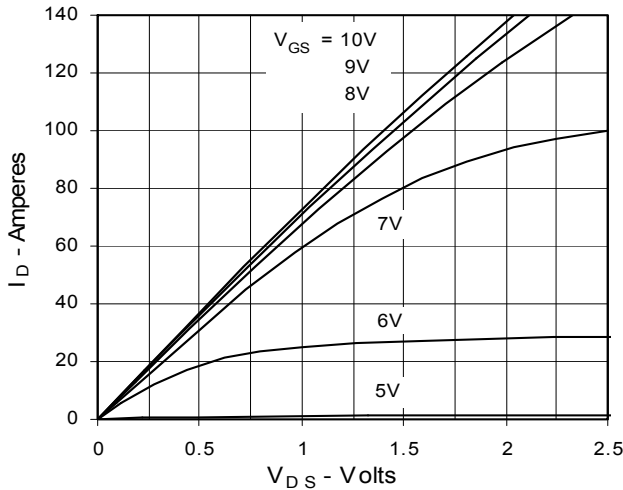
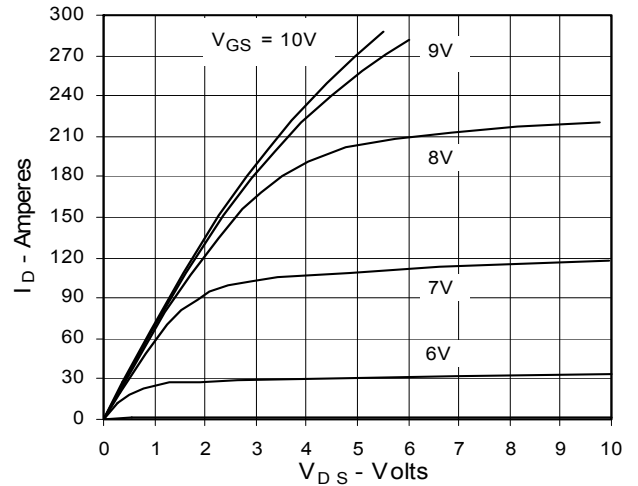
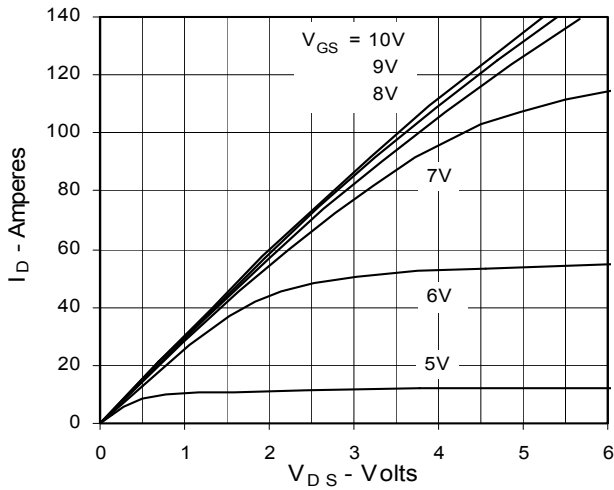
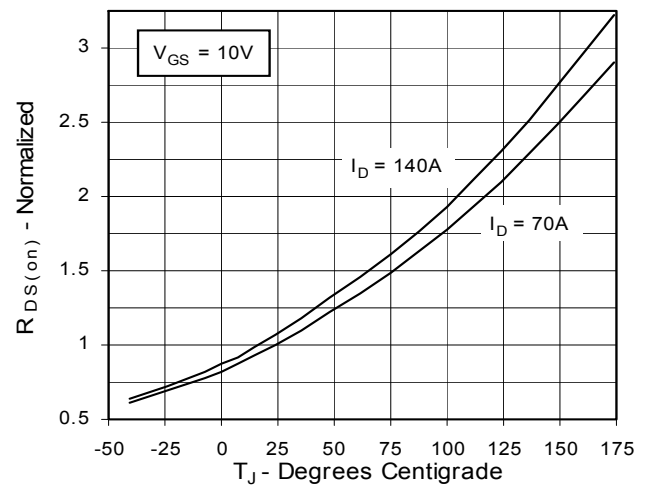
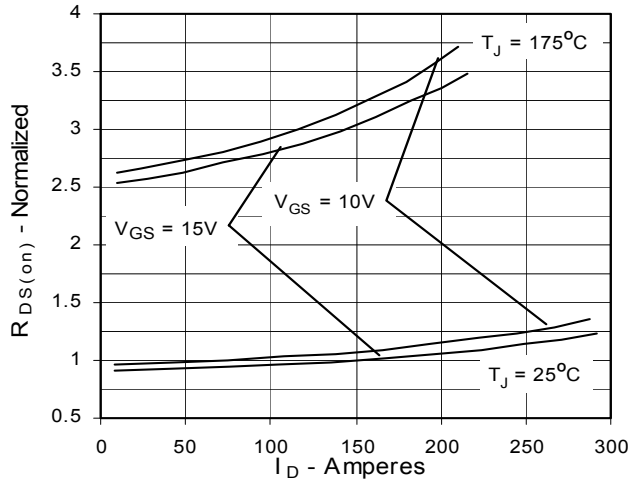
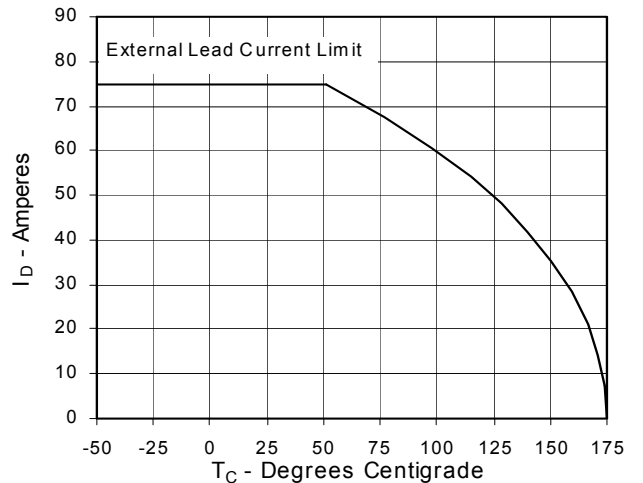


1 Gate, 2 Drain (Collector)  
3 Source (Emitter)  
4 no connection

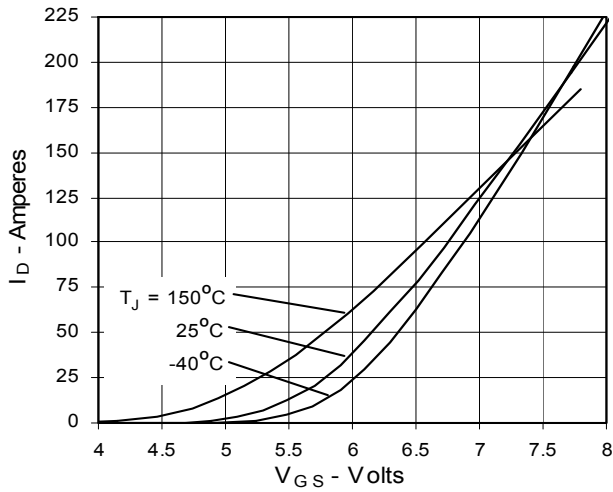
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190

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

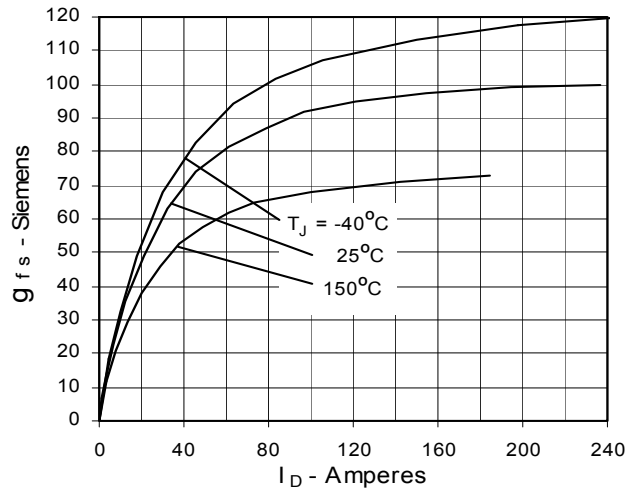
IXYS MOSFETs and IGBTs are covered by 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585  
one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405B2 6,759,692  
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2

**Fig. 1. Output Characteristics  
@ 25°C**

**Fig. 2. Extended Output Characteristics  
@ 25°C**

**Fig. 3. Output Characteristics  
@ 150°C**

**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 70A$   
Value vs. Junction Temperature**

**Fig. 5.  $R_{DS(on)}$  Normalized to  
 $I_D = 70A$  Value vs. Drain Current**

**Fig. 6. Drain Current vs. Case  
Temperature**


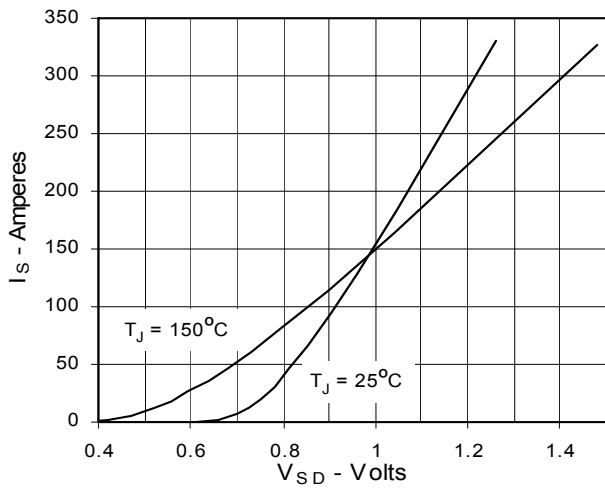
**Fig. 7. Input Admittance**



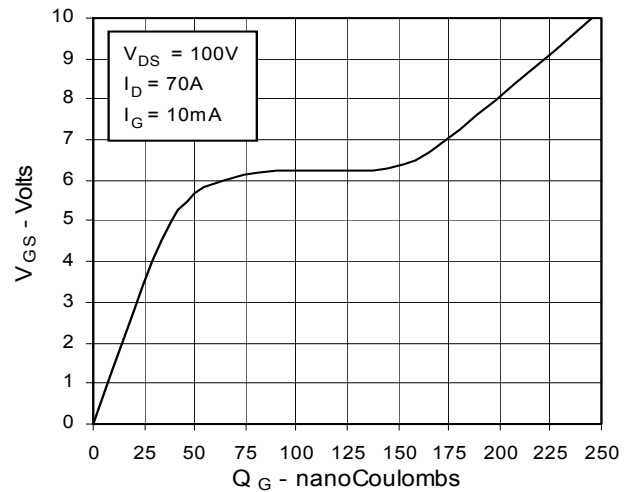
**Fig. 8. Transconductance**



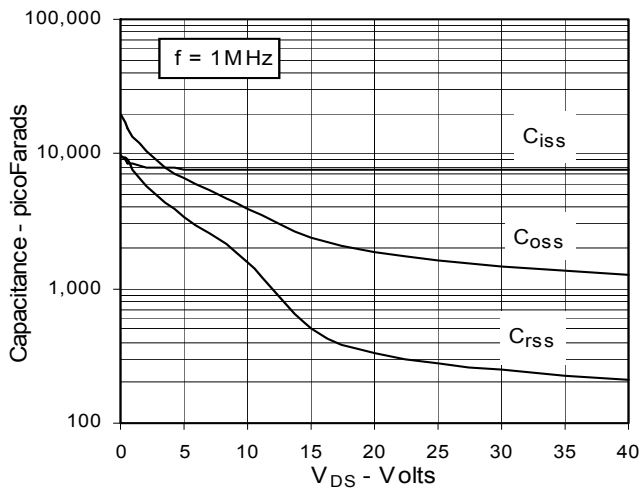
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

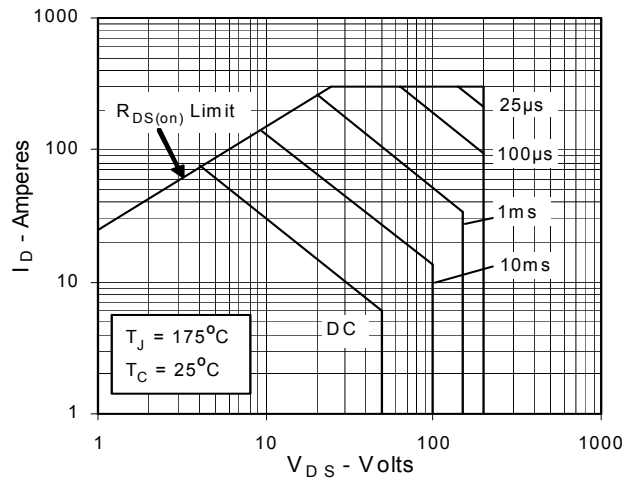
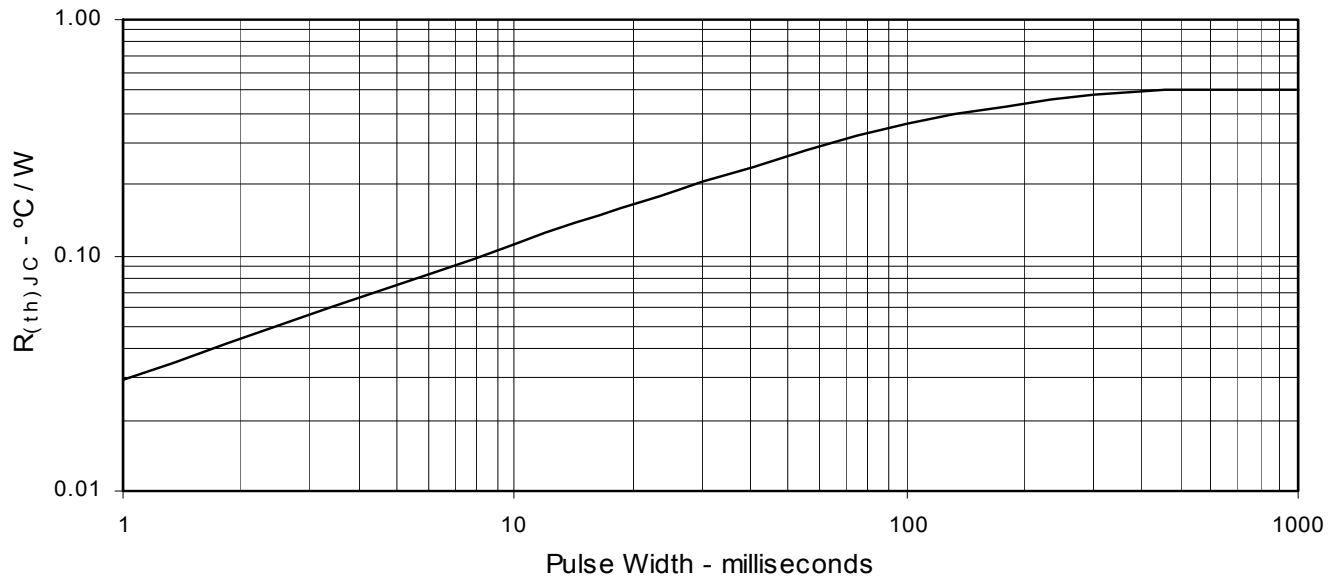


Fig. 13. Maximum Transient Thermal Resistance





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