

# HiPerFET™

## Power MOSFETs ISOPLUS247™, Q-Class

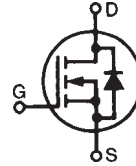
IXFR 44N50Q

IXFR 48N50Q

$V_{DSS}$	$I_{D25}$	$R_{DS(on)}$
500 V	34 A	120 mΩ
500 V	40 A	110 mΩ

(Electrically Isolated Backside)

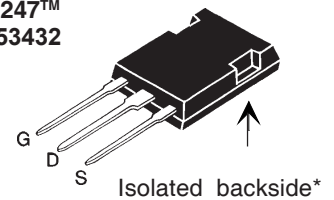
N-Channel Enhancement Mode  
Avalanche Rated, Low  $Q_g$ , High  $dv/dt$



$t_{rr} \leq 250$  ns

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	500	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$	500	V
$V_{GS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	44N50Q 34 48N50Q 40	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , Note 1	44N50Q 176 48N50Q 192	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	44N50Q 44 48N50Q 48	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	60	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	2.5	J
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ $T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$	15	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	310	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.063 in.) from case for 10 s	300	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz, RMS $t = 1$ min	2500	V~
Weight		5	g

ISOPLUS247™  
E153432



G = Gate      D = Drain  
S = Source

\* Patent pending

### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance (<30pF)
- IXYS advanced low  $Q_g$  process
- Rugged polysilicon gate cell structure
- Rated for Unclamped Inductive Load Switching (UIS)
- Fast intrinsic diode

### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

### Advantages

- Easy assembly
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\mu\text{A}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4\text{ mA}$	2.0		4.0 V
$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0\text{ V}$			100 $\mu\text{A}$ 2 mA
$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = I_T$ Notes 2, 3	44N50Q 48N50Q		120 mΩ 110 mΩ

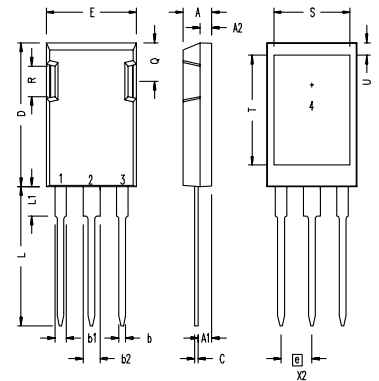
Symbol	Test Conditions	Notes	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
			min.	typ.	max.
$g_{fs}$	$V_{DS} = 10\text{ V}; I_D = I_T$	Notes 2, 3	30	42	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$			7000	pF
$C_{oss}$				960	pF
$C_{rss}$				230	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$ $R_G = 1\ \Omega$ (External), Notes 2, 3			33	ns
$t_r$				22	ns
$t_{d(off)}$				75	ns
$t_f$				10	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$ Notes 2, 3			190	nC
$Q_{gs}$				40	nC
$Q_{gd}$				86	nC
$R_{thJC}$				0.40	K/W
$R_{thCK}$				0.15	K/W

### Source-Drain Diode

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_S$	$V_{GS} = 0\text{ V}$			48 A
$I_{SM}$	Repetitive; Note 1			192 A
$V_{SD}$	$I_F = I_T, V_{GS} = 0\text{ V}$ , Notes 2, 3			1.5 V
$t_{rr}$	$I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$			250 ns
$Q_{RM}$				1.0 $\mu\text{C}$
$I_{RM}$				10 A

- Note: 1. Pulse width limited by  $T_{JM}$   
 2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$   
 3. IXFR44N50Q:  $I_T = 22\text{ A}$   
 IXFR48N50Q:  $I_T = 24\text{ A}$

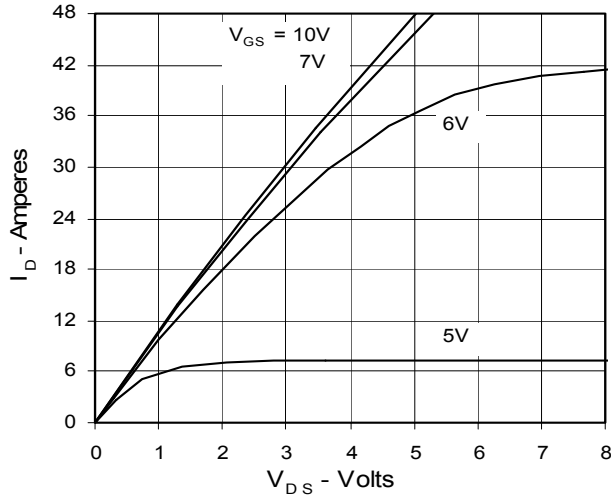
### ISOPLUS 247 OUTLINE



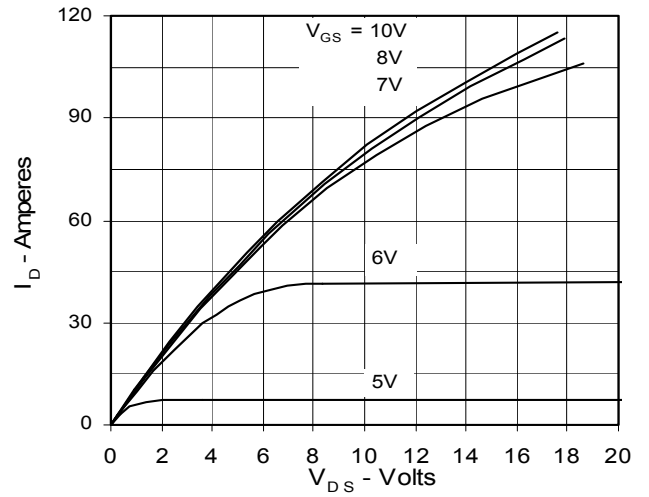
- 1 Gate, 2 Drain (Collector)  
 3 Source (Emitter)  
 4 no connection

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

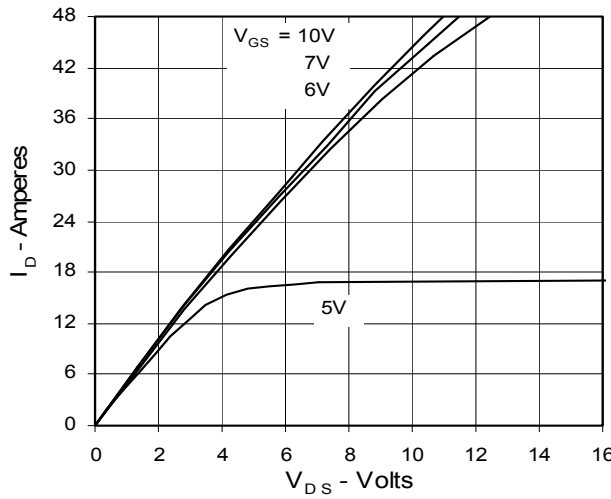
**Fig. 1. Output Characteristics  
@ 25 Deg. C**



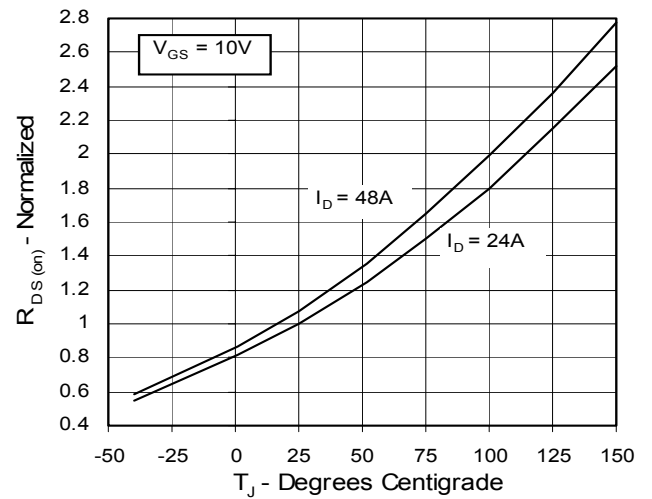
**Fig. 2. Extended Output Characteristics  
@ 25 deg. C**



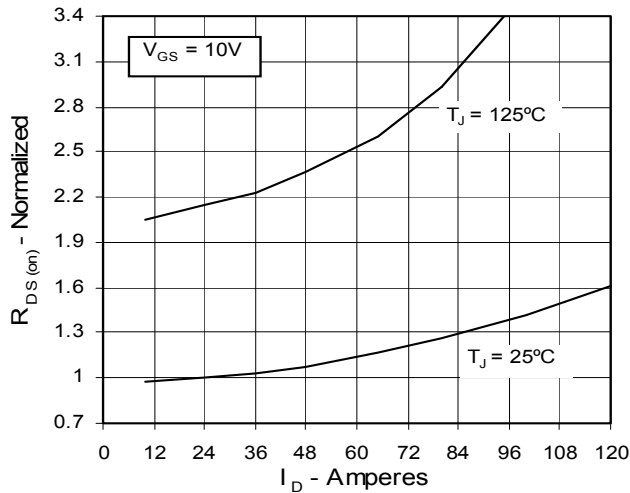
**Fig. 3. Output Characteristics  
@ 125 Deg. C**



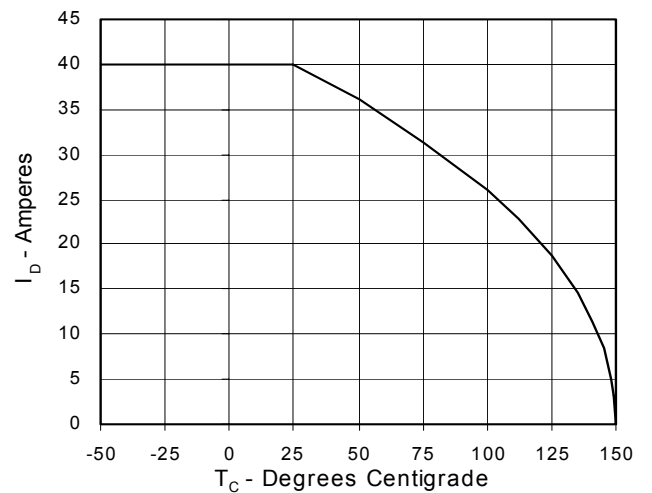
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_{D25}$  Value vs. Junction Temperature**



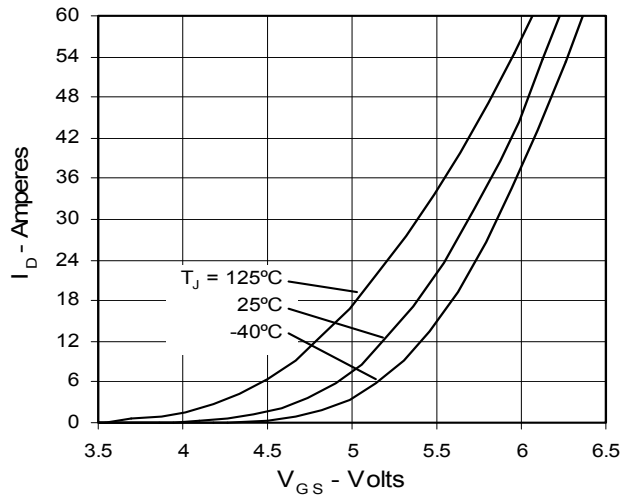
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_{D25}$  Value vs.  $I_D$**



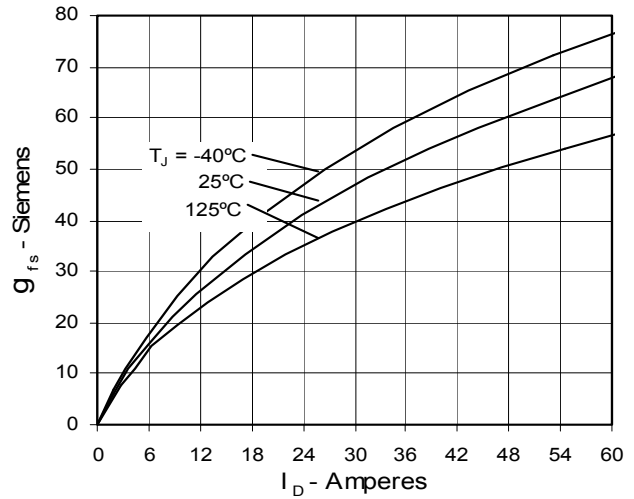
**Fig. 6. Drain Current vs. Case Temperature**



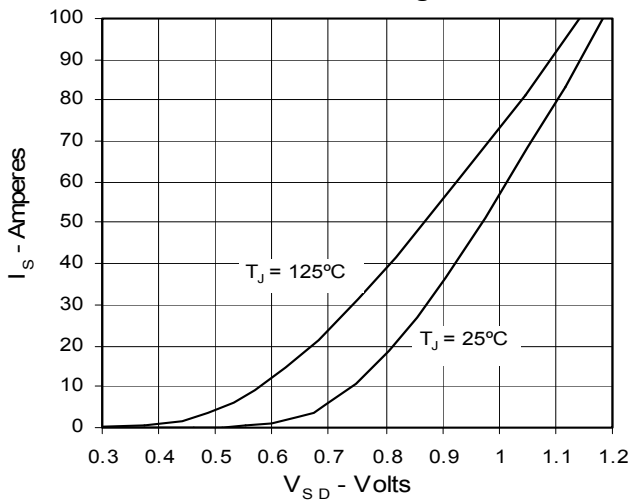
**Fig. 7. Input Admittance**



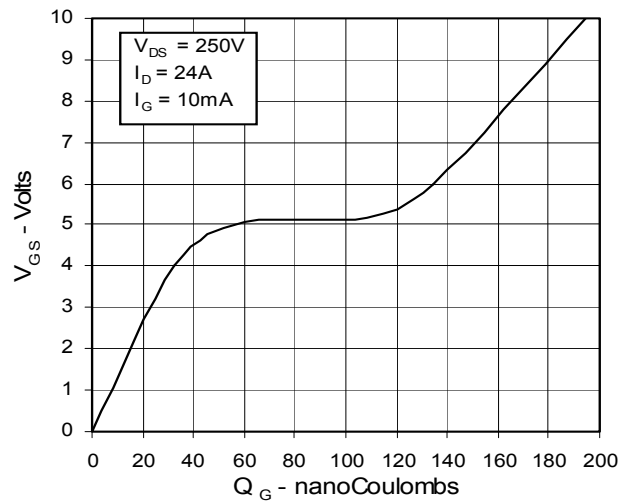
**Fig. 8. Transconductance**



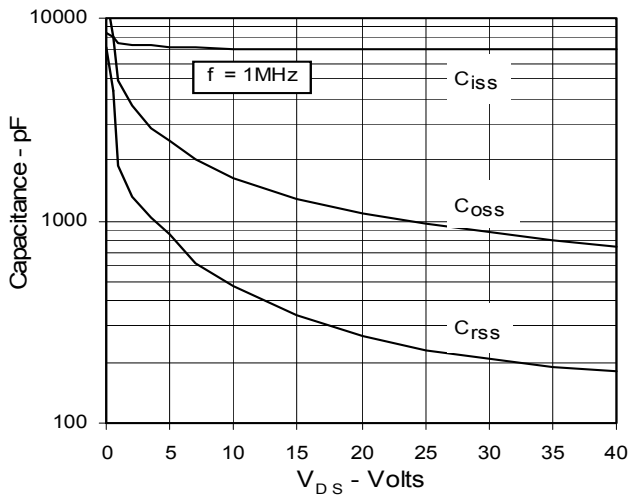
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



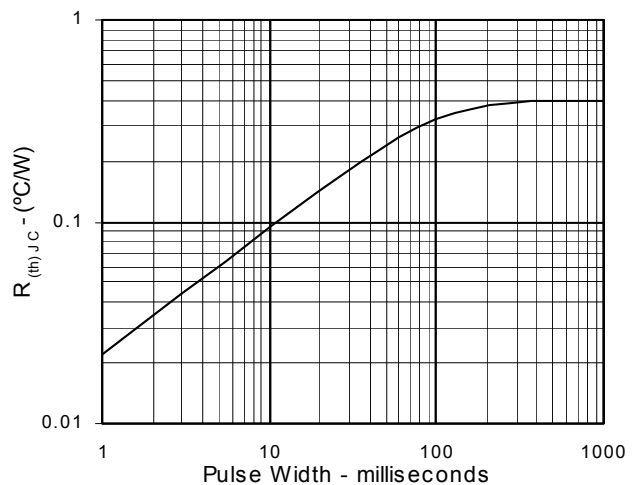
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Resistance**



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