IXYS

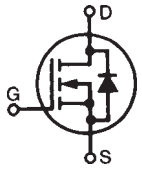
HiPerFET™ Power MOSFETs ISOPLUS247™

(Electrically Isolated Back Surface)

IXFR 32N50Q

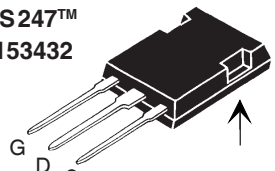
V_{DSS} = 500 V
I_{D25} = 30 A
$R_{DS(on)}$ = 0.16 Ω
t_{rr} = 250 ns

N-Channel Enhancement Mode
High dV/dt, Low t_{rr}, HDMOS™ Family



Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	500	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	500	V
V_{GS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	30	A
I_{DM}	T_C = 25°C, Pulse width limited by T_{JM}	120	A
I_{AR}	T_C = 25°C	30	A
E_{AS}	T_C = 25°C	1.5	J
E_{AR}	T_C = 25°C	45	mJ
dv/dt	$I_S \le I_{DM}$, di/dt ≤ 100 A/μs, $V_{DD} \le V_{DSS}$ $T_J \le$ 150°C, R_G = 2 Ω	5	V/ns
P_D	T_C = 25°C	310	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6 mm (0.062 in.) from case for 10 s	300	°C
V_{ISOL}	50/60 Hz, RMS t = 1 minute leads-to-tab	2500	V~
Weight		6	g

ISOPLUS247™
E 153432



Isolated back surface*

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(<50pF)
- Low $R_{DS\ (on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier

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°C, unless otherwise specified) min.	typ.	max.	
V_{DSS}	V_{GS} = 0 V, I_D = 1mA		500			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 4mA		2.5		4.5	V
I_{GSS}	V_{GS} = ±20 V_{DC}, V_{DS} = 0				±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$	T_J = 25°C			100	μA
	V_{GS} = 0 V	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 10 V, $I_D = I_T$ Notes 1, 2				0.16	Ω

Symbol	Test Conditions (T$_J$ = 25°C, unless otherwise specified)		Characteristic Values min.	typ.	max.	
g_{fs}	V_{DS} = 10 V; $I_D = I_T$	Note 2	18	28		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz			3950		pF
C_{oss}				640		pF
C_{rss}				210		pF
$t_{d(on)}$	V_{GS} = 10 V, $V_{DS} = 0.5 \bullet V_{DSS}$, $I_D = I_T$ R_G = 1 Ω (External),			35		ns
t_r				42		ns
$t_{d(off)}$				75		ns
t_f				20		ns
$Q_{g(on)}$	V_{GS} = 10 V, $V_{DS} = 0.5 \bullet V_{DSS}$, $I_D = I_T$			150		nC
Q_{gs}				26		nC
Q_{gd}				85		nC
R_{thJC}					0.40	K/W
R_{thCK}				0.15		K/W

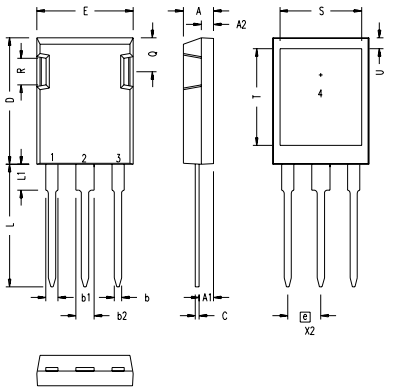
Source-Drain Diode

Symbol	Test Conditions (T$_J$ = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
I_S	V_{GS} = 0 V			32	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			128	A
V_{SD}	$I_F = I_S$, V_{GS} = 0 V, Note 1			1.5	V
t_{rr}	$I_F = I_s$, -di/dt = 100 A/ms, V_R = 100 V			250	ns
Q_{RM}			0.75		µC
I_{RM}			7.5		A

Note: 1. I_T test condition: I_T = 16A

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

ISOPLUS 247 OUTLINE



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

Figure 1. Output Characteristics at 25°C

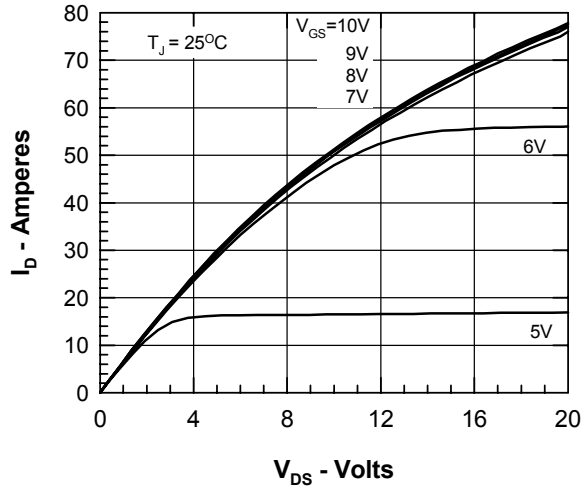


Figure 2. Output Characteristics at 125°C

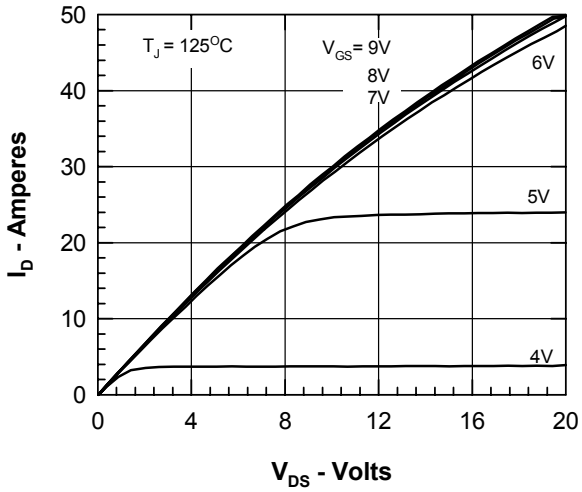


Figure 3. $R_{DS(on)}$ normalized to 15A/25°C vs. I_D

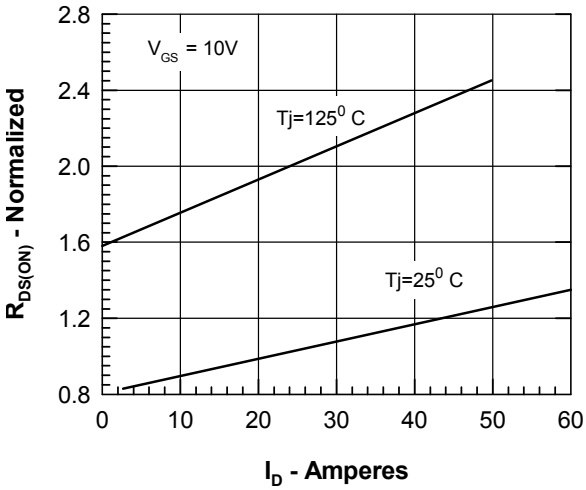


Figure 4. $R_{DS(on)}$ normalized to 15A/25°C vs. T_J

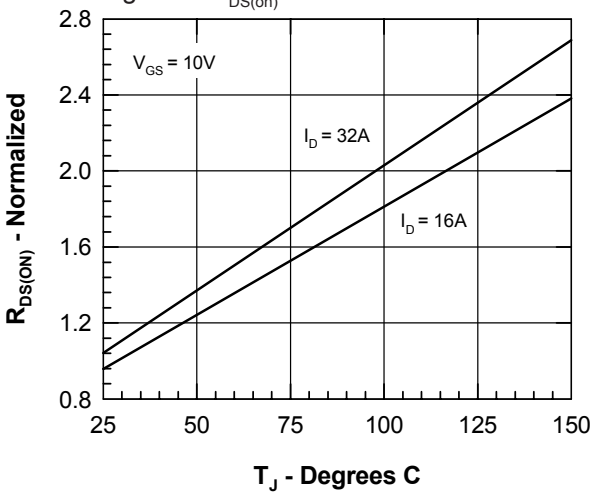


Figure 5. Drain Current vs. Case Temperature

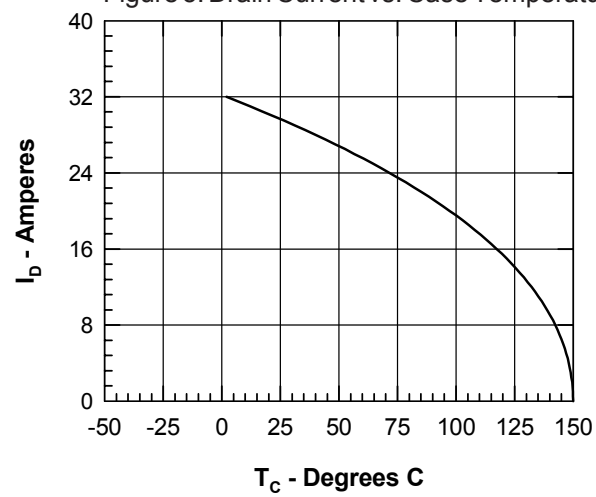


Figure 6. Admittance Curves

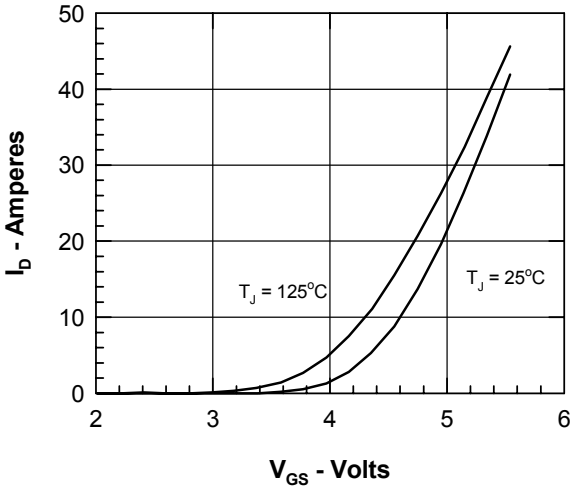


Figure 7. Gate Charge

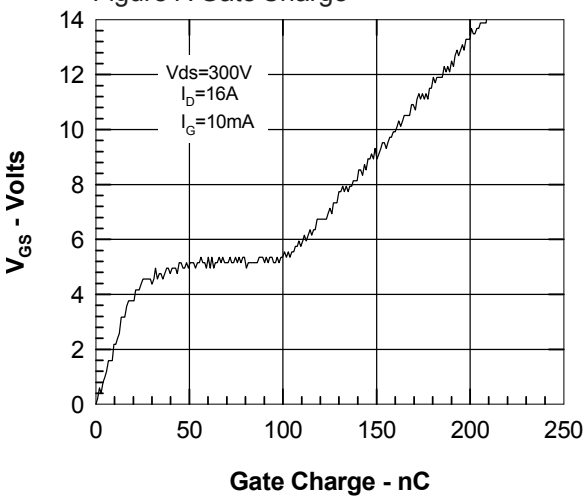


Figure 8. Capacitance Curves

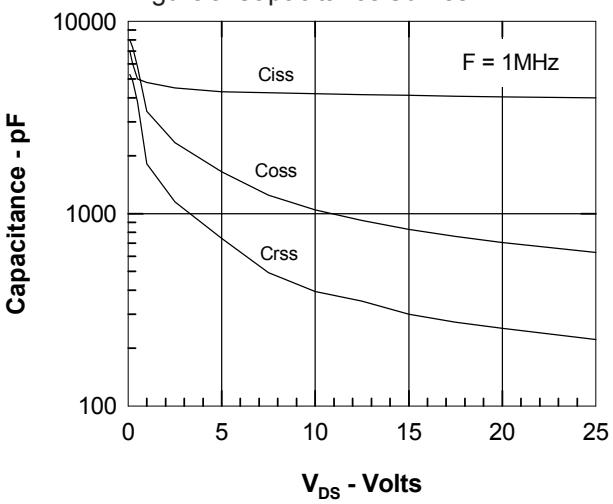


Figure 9. Forward Voltage Drop of the Intrinsic Diode

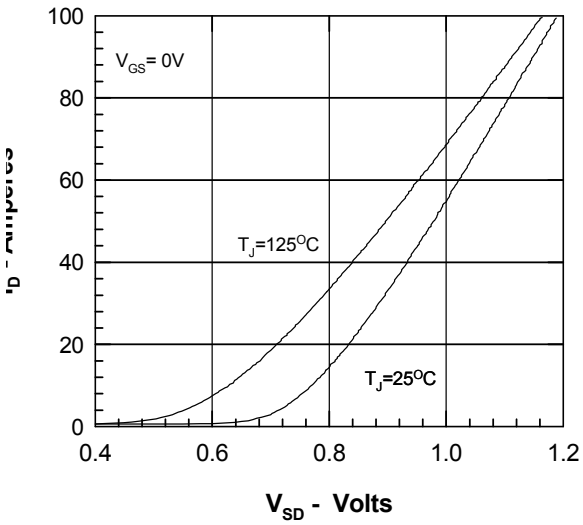
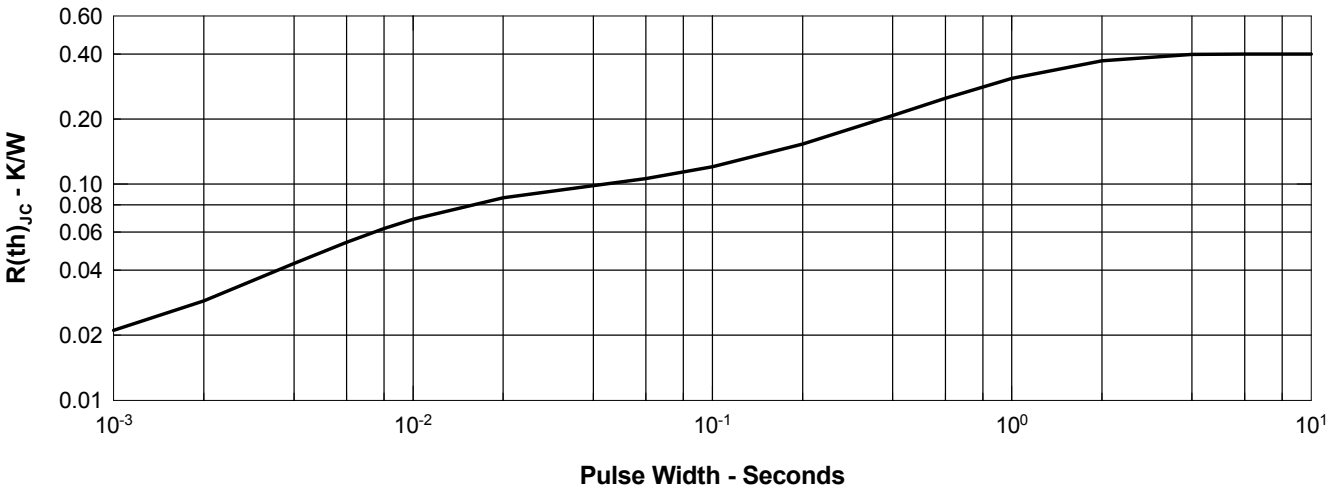


Figure 10. Transient Thermal Resistance



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 6,583,505