

# HiPerFET™ Power MOSFETs Q-CLASS

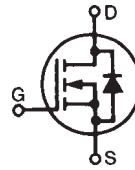
Single MOSFET Die

N-Channel Enhancement Mode  
Avalanche Rated, Low Q<sub>g</sub>,  
High dV/dt, Low t<sub>rr</sub>

**IXFK 21N100Q**  
**IXFX 21N100Q**

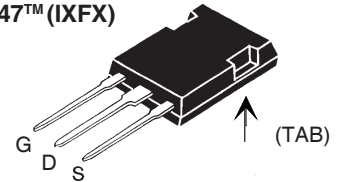
**V<sub>DSS</sub> = 1000 V**  
**I<sub>D25</sub> = 21 A**  
**R<sub>DS(on)</sub> = 0.50 Ω**

**t<sub>rr</sub> ≤ 250 ns**

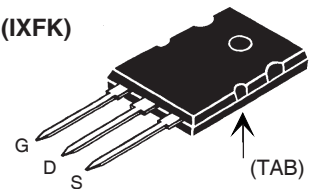


Symbol	Test Conditions	Maximum Ratings	
V <sub>DSS</sub>	T <sub>J</sub> = 25°C to 150°C	1000	V
V <sub>DGR</sub>	T <sub>J</sub> = 25°C to 150°C; R <sub>GS</sub> = 1 MΩ	1000	V
V <sub>GS</sub>	Continuous	±20	V
V <sub>GSM</sub>	Transient	±30	V
I <sub>D25</sub>	T <sub>C</sub> = 25°C	21	A
I <sub>DM</sub>	T <sub>C</sub> = 25°C, pulse width limited by T <sub>JM</sub>	84	A
I <sub>AR</sub>	T <sub>C</sub> = 25°C	21	A
E <sub>AR</sub>	T <sub>C</sub> = 25°C	60	mJ
E <sub>AS</sub>	T <sub>C</sub> = 25°C	2.5	J
dv/dt	I <sub>S</sub> ≤ I <sub>DM</sub> , di/dt ≤ 100 A/μs, V <sub>DD</sub> ≤ V <sub>DSS</sub> T <sub>J</sub> ≤ 150°C, R <sub>G</sub> = 2 Ω	10	V/ns
P <sub>D</sub>	T <sub>C</sub> = 25°C	500	W
T <sub>J</sub>		-55 ... +150	°C
T <sub>JM</sub>		150	°C
T <sub>stg</sub>		-55 ... +150	°C
T <sub>L</sub>	1.6 mm (0.063 in.) from case for 10 s	300	°C
M <sub>d</sub>	Mounting torque	TO-264	0.4/6 Nm/lb.in.
Weight		PLUS 247	6 g
		TO-264	10 g

PLUS247™ (IXFX)



TO-264 AA (IXFK)



G = Gate  
S = Source

D = Drain  
TAB = Drain

### Features

- IXYS advanced low Q<sub>g</sub> process
- Low gate charge and capacitances
  - easier to drive
  - faster switching
- International standard packages
- Low R<sub>DS(on)</sub>
- Rated for unclamped Inductive load switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

### Applications

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

### Advantages

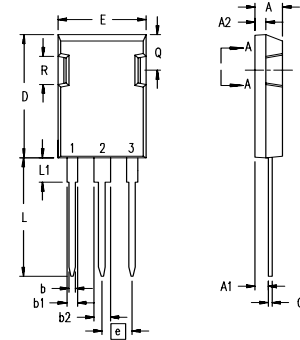
- PLUS 247™ package for clip or spring mounting
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values (T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
V <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA	1000		V
V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 4 mA	3		V
I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0			±100 nA
I <sub>DSS</sub>	V <sub>DS</sub> = V <sub>DSS</sub> V <sub>GS</sub> = 0 V T <sub>J</sub> = 125°C			100 μA
				2 mA
R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 • I <sub>D25</sub> Note 1			0.50 Ω

Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		min.	typ.	max.
$g_{fs}$	$V_{DS} = 20\text{ V}; I_D = 0.5 \cdot I_{D25}$ Note 1	16	22	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		6900	pF
$C_{oss}$			550	pF
$C_{rss}$			90	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\ \Omega$ (External),		21	ns
$t_r$			18	ns
$t_{d(off)}$			60	ns
$t_f$			12	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		170	nC
$Q_{gs}$			38	nC
$Q_{gd}$			75	nC
$R_{thJC}$			0.26	K/W
$R_{thCK}$		0.15		K/W

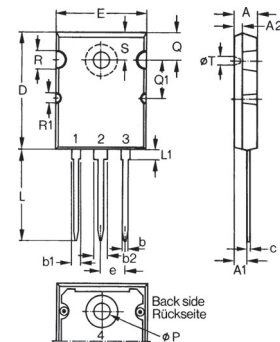
Source-Drain Diode		Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
Symbol	Test Conditions	min.	typ.	max.
$I_S$	$V_{GS} = 0\text{ V}$			21 A
$I_{SM}$	Repetitive; pulse width limited by $T_{JM}$			84 A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}, \text{ Note 1}$			1.5 V
$t_{rr}$	$I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$			250 ns
$Q_{RM}$			1.4	$\mu\text{C}$
$I_{RM}$			8	A

Note: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

**PLUS 247™ Outline**


Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

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	0.244
R	4.32	4.83	.170	.190

**TO-264 AA Outline**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

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

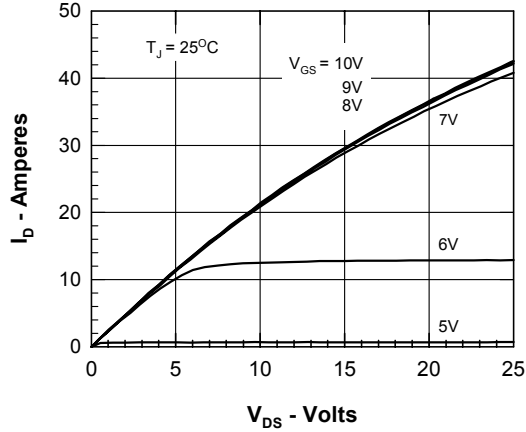
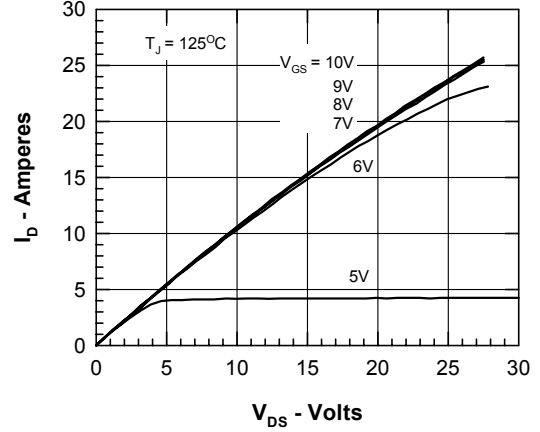
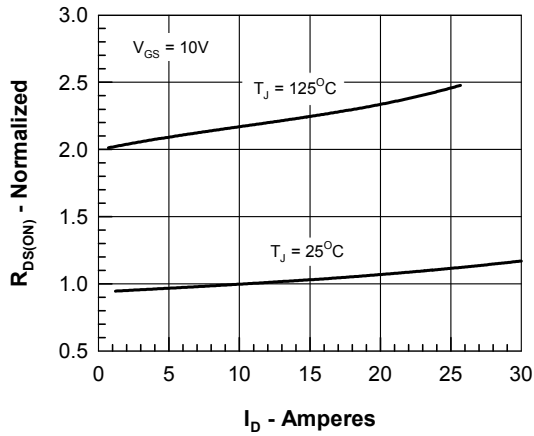
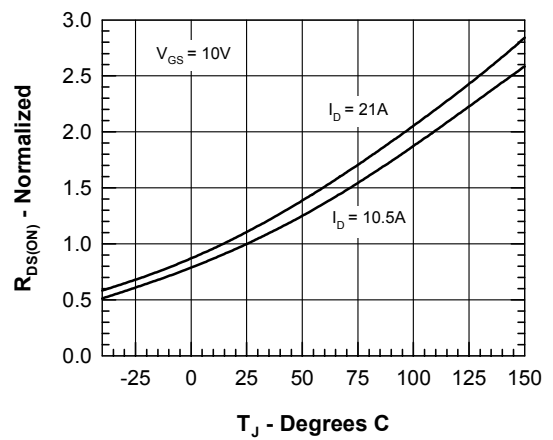
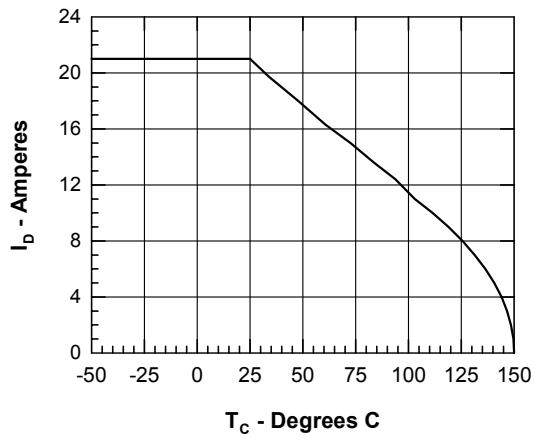
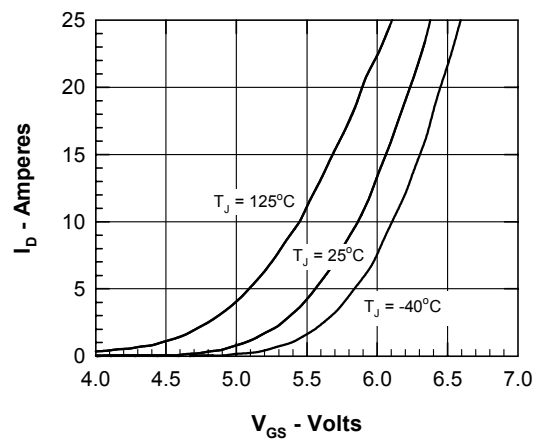
**Fig. 1. Output Characteristics at 25°C**

**Fig. 2. Output Characteristics at 125°C**

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

**Fig. 4.  $R_{DS(ON)}$  vs.  $T_J$** 

**Fig. 5. Drain Current vs. Case Temperature**

**Fig. 6. Admittance Curves**


Fig. 7. Gate Charge Characteristic Curve

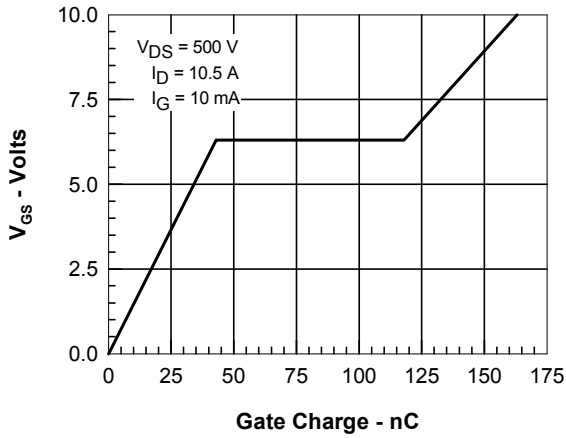


Fig. 8. Capacitance Curves

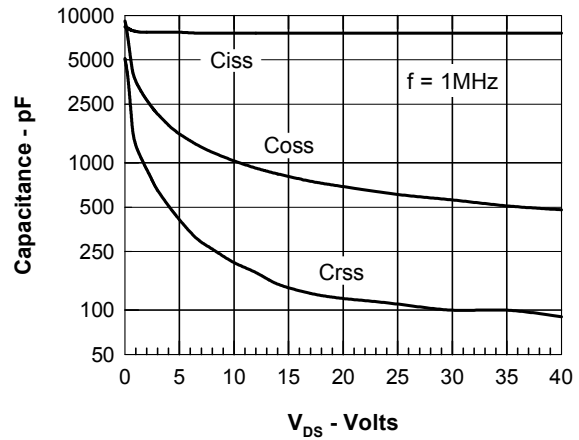


Fig. 9. Source Current vs. Source to Drain Voltage

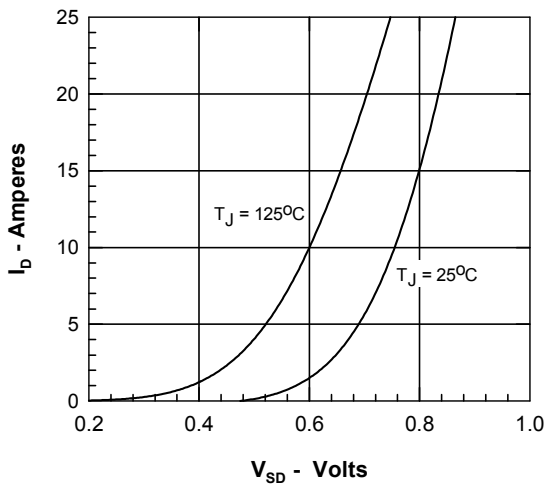


Fig. 10. Thermal Impedance

