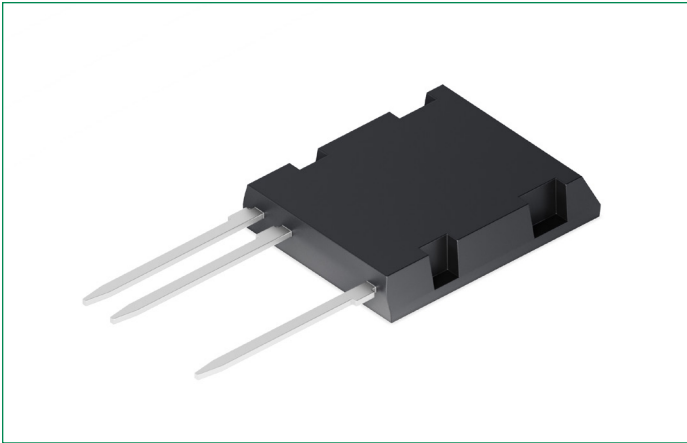
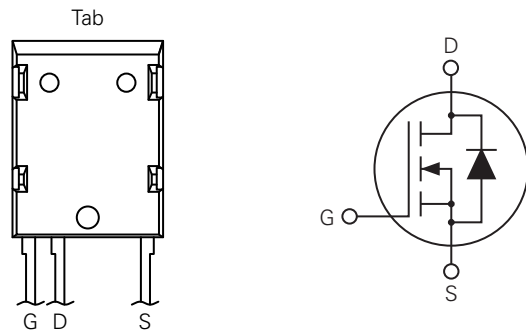


# IXFL44N100P

## 1000 V, 240 mΩ Polar™ HiPerFET™ Power MOSFET



### Pinout Diagram (ISOPLUS i5-Pak™ (HV))



**G:** Gate; **D:** Drain; **S:** Source; **Tab:** Electrically Isolated

### Features

- Silicon Chip on Direct-Copper-Bond Substrate
  - High Power Dissipation
  - Isolated Mounting Surface
  - 2500 V Electrical Isolation
- Low Drain to Tab Capacitance (<30pF)
- Rugged Polysilicon Gate Cell Structure
- Unclamped Inductive Switching (UIS) Rated
- Low Package Inductance
- Fast Intrinsic Rectifier
- Low  $R_{DS(on)}$  and  $Q_G$

### Advantages

- Easy Assembly
- Space Savings
- High Power Density

### Applications

- Switched-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Controls
- Robotics and Servo Controls

### Product Summary

Characteristics	Value	Unit
$V_{DSS}$	1000	V
$I_{D25}$	22	A
$R_{DS(on),max}$	≤ 240	mΩ
$t_{rr}$	≤ 300	ns

## Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units
$V_{DSS}$	Drain-Source Voltage	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1000	V
$V_{DGR}$	Drain-Gate Voltage	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1\text{ M}\Omega$	1000	V
$V_{GSS}$	Gate-Source Voltage	Continuous	$\pm 30$	V
$V_{GSM}$		Transient	$\pm 40$	
$I_{D25}$	Drain Current	$T_C = 25^\circ\text{C}$	22	A
$I_{DM}$		$T_C = 25^\circ\text{C}$ , Pulse width limited by $T_{JM}$	110	
$I_{AR}$	Repetitive Avalanche Current	$T_C = 25^\circ\text{C}$	22	A
$E_{AS}$	Avalanche Energy	$T_C = 25^\circ\text{C}$	2	J
dV/dt	Reverse Diode dV/dt	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$	15	V/ns
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	357	W
$T_J$	Operating Junction Temperature	–	–55 to +150	°C
$T_{JM}$	Maximum Junction Temperature	–	150	
$T_{stg}$	Storage Temperature	–	–55 to +150	
$T_L$	Maximum Lead Temperature for Soldering	1.6 mm (0.062 in.) from case for 10 s	300	°C
$V_{ISOL}$	Isolation Voltage	50/60 Hz, $I_{ISOL} \leq 1\text{ mA}$ , $t = 1\text{ min}$	2500	V~
		50/60 Hz, $I_{ISOL} \leq 1\text{ mA}$ , $t = 1\text{ s}$	3000	
$F_C$	Mounting Force	–	40..120/4.5..27	N/lb.
W	Weight	–	8	g

## Thermal Characteristics

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th, JC}$	Thermal Resistance, junction-to-case	–	–	0.35	°C/W
$R_{th, CS}$	Thermal Resistance, case-to-heat sink	–	0.15	–	°C/W

## Electrical Characteristics – Static ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = 3\text{ mA}$ , $V_{GS} = 0\text{ V}$	1000	–	–	V
$V_{GS(th)}$	Gate Threshold Voltage	$I_D = 1\text{ mA}$ , $V_{DS} = V_{GS}$	3.5	–	6.5	V
$I_{GSS}$	Gate-Source Leakage Current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 30\text{ V}$	–	–	$\pm 200$	nA
$I_{DSS}$	Drain-Source Current	$V_{DS} = V_{DSS}$ , $V_{GS} = 0\text{ V}$	–	–	50	$\mu\text{A}$
		$V_{DS} = V_{DSS}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$	–	–	3	mA
$R_{DS(on)}$	Drain-Source On-Resistance <sup>1</sup>	$V_{GS} = 10\text{ V}$ , $I_D = 22\text{ A}$	–	–	240	m $\Omega$

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

**Electrical Characteristics – Dynamic** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$g_{fs}$	Transconductance <sup>1</sup>	$V_{DS} = 20\text{ V}, I_D = 0.5 \times I_{D25}$	20	35	–	S
$R_{GI}$	Gate Input Resistance	–	–	1.4	–	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	–	16.9	–	nF
$C_{oss}$	Output Capacitance		–	1100	–	pF
$C_{rss}$	Reverse Transfer Capacitance		–	184	–	pF
$Q_{g(on)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \times V_{DSS},$ $I_D = 0.5 \times I_{D25}$	–	305	–	nC
$Q_{gs}$	Gate-Source Charge		–	104	–	
$Q_{gd}$	Gate-Drain Charge		–	126	–	
$t_{d(on)}$	Turn-on Delay Time	<b>Resistive Switching</b> $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \times V_{DSS},$ $I_D = 0.5 \times I_{D25}, R_{G(ext)} = 1\ \Omega$	–	60	–	ns
$t_r$	Rise Time		–	68	–	
$t_{d(off)}$	Turn-off Delay Time		–	90	–	
$t_f$	Fall Time		–	56	–	

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

**Source-Drain Diode Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$I_S$	Continuous Diode Forward Current	$V_{GS} = 0\text{ V}$	–	–	44	A
$I_{SM}$	Diode Pulse Current	Repetitive, Pulse width limited by $T_{JM}$	–	–	176	A
$V_{SD}$	Diode Forward Voltage <sup>1</sup>	$I_F = I_S, V_{GS} = 0\text{ V}$	–	–	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_F = 22\text{ A}, -di/dt = 100\text{ A}/\mu\text{s},$ $V_r = 100\text{ V}$	–	–	300	ns
$Q_{rm}$	Reverse Recovery Charge		–	2.5	–	$\mu\text{C}$
$I_{rm}$	Reverse Recovery Current		–	17.0	–	A

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

Characteristic Curves

Fig. 1. Output Characteristics @ 25°C

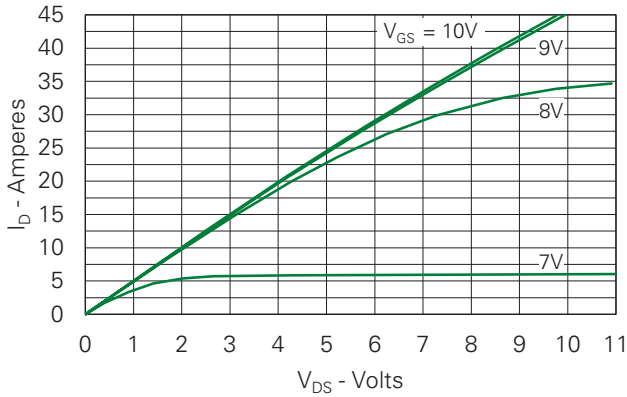


Fig. 2. Extended Output Characteristics @ 25°C

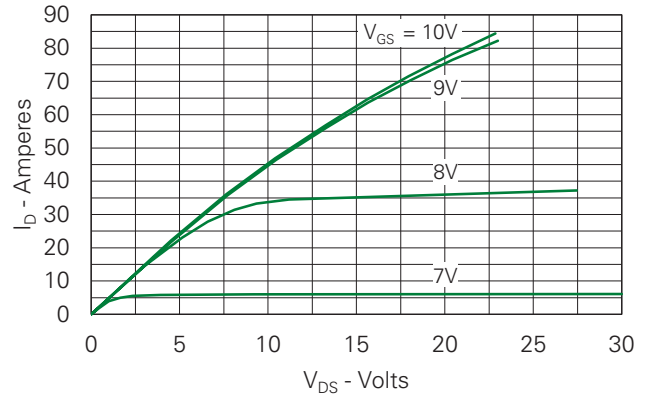


Fig. 3. Output Characteristics @ 125°C

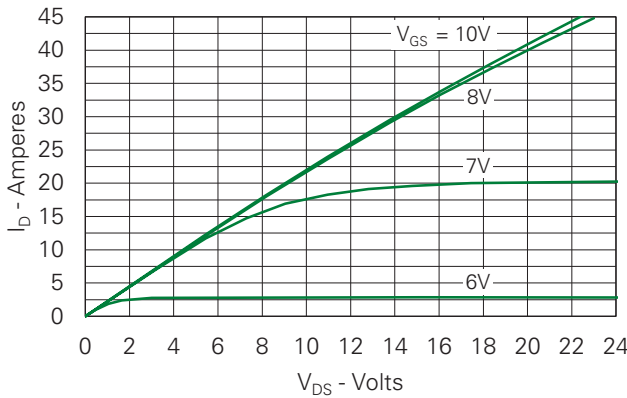


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 22A$  Value vs. Junction Temperature

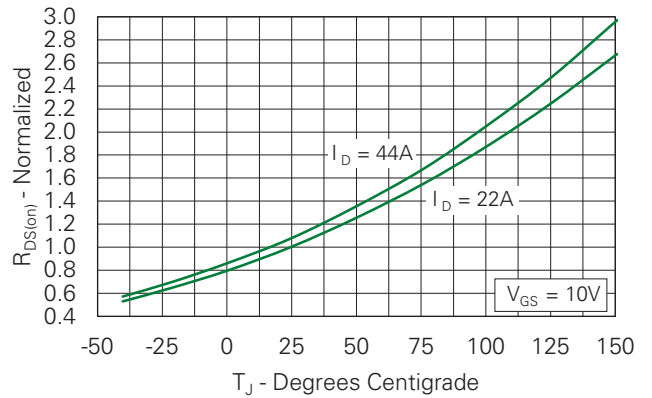


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 22A$  Value vs. Drain Current

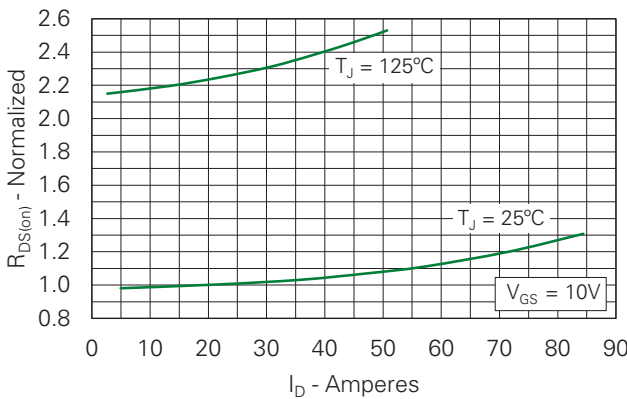
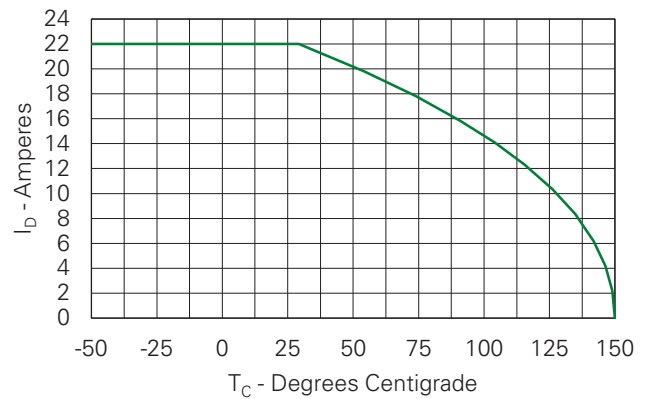
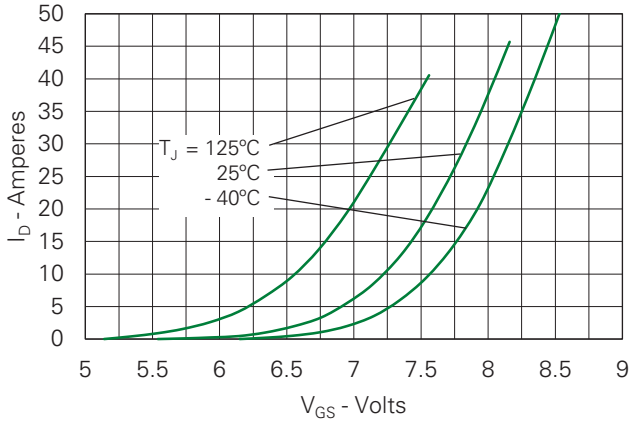


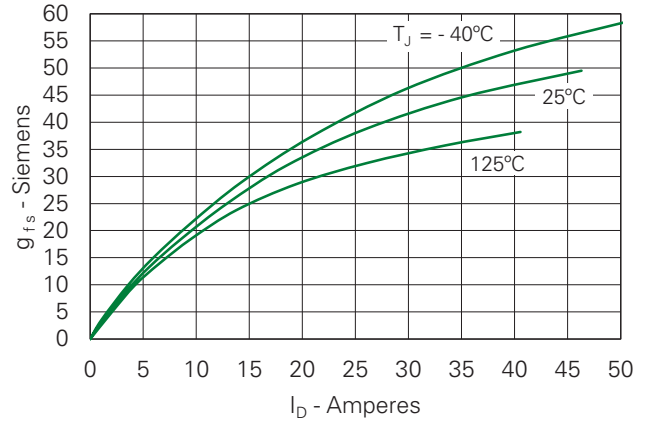
Fig. 6. Maximum Drain Current vs. Case Temperature



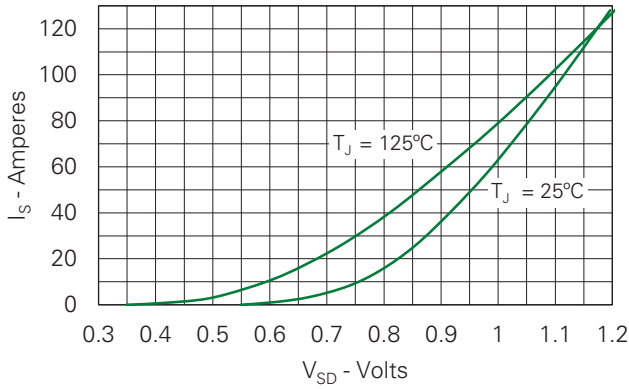
**Fig. 7. Input Admittance**



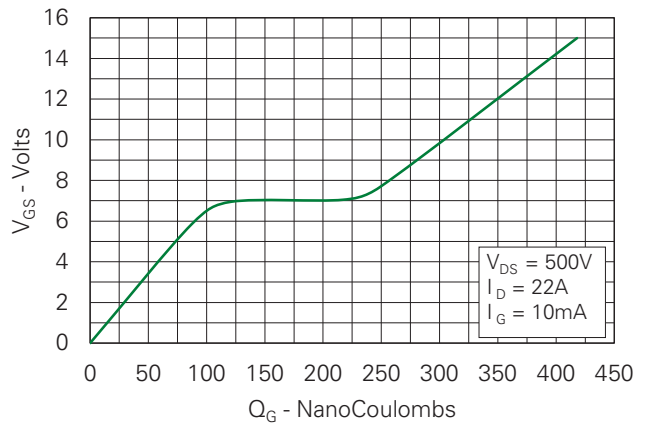
**Fig. 8. Transconductance**



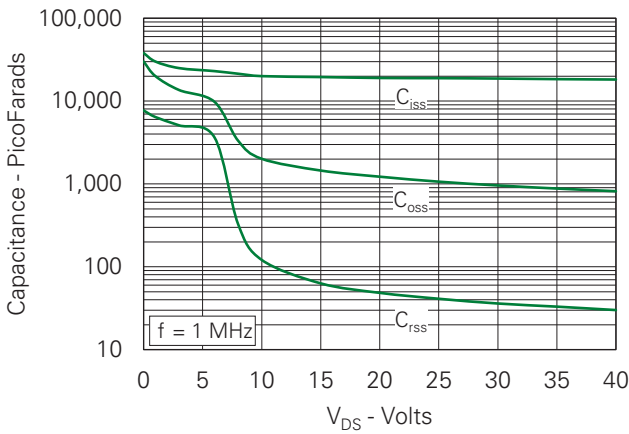
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



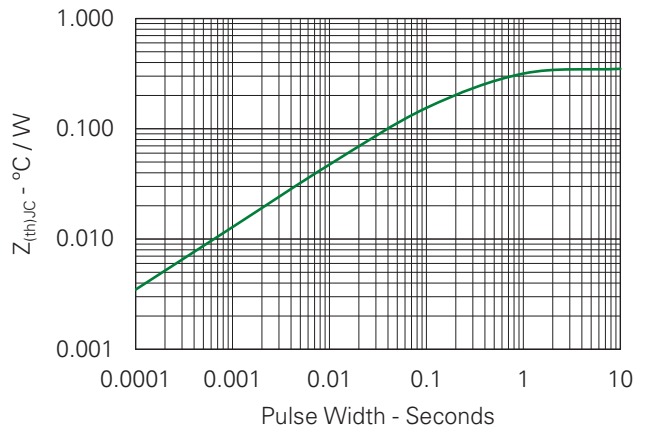
**Fig. 10. Gate Charge**



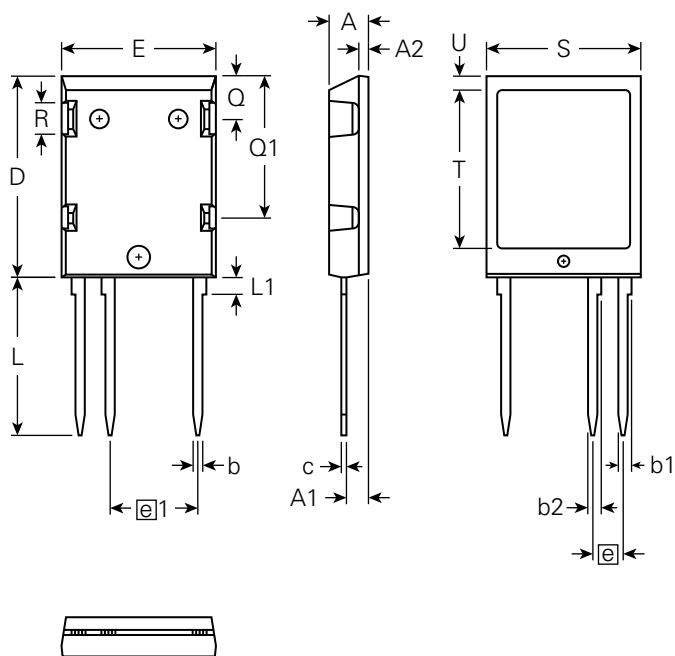
**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**



## Part Outline Drawing (ISOPLUS i5-Pak™ (HV))



Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.190	–	0.205	4.83	–	5.21
A1	0.102	–	0.118	2.59	–	3.00
A2	0.046	–	0.055	1.17	–	1.40
b	0.045	–	0.055	1.14	–	1.40
b1	0.063	–	0.072	1.60	–	1.83
b2	0.058	–	0.068	1.47	–	1.73
c	0.020	–	0.029	0.51	–	0.74
D	1.020	–	1.040	25.91	–	26.42
E	0.770	–	0.799	19.56	–	20.29
e	0.150 BSC			3.81 BSC		
e1	0.450 BSC			11.43 BSC		
L	0.780	–	0.820	19.81	–	20.83
L1	0.080	–	0.102	2.03	–	2.59
Q	0.210	–	0.235	5.33	–	5.97
Q1	0.490	–	0.513	12.45	–	13.03
R	0.150	–	0.180	3.81	–	4.57
R1	0.100	–	0.130	2.54	–	3.30
S	0.668	–	0.690	16.97	–	17.53
T	0.801	–	0.821	20.34	–	20.85
U	0.065	–	0.080	1.65	–	2.03

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