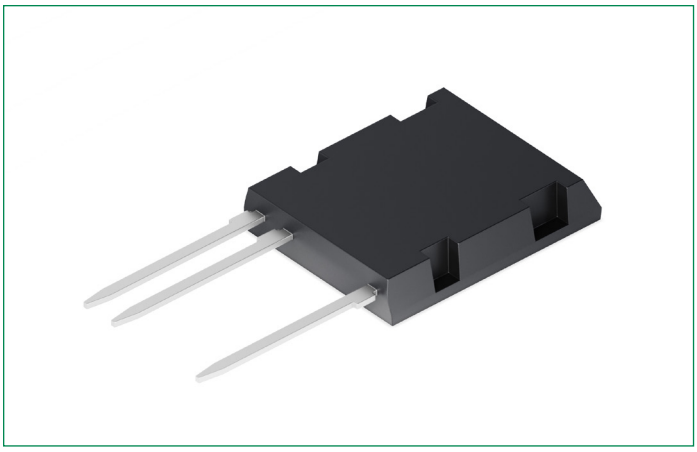
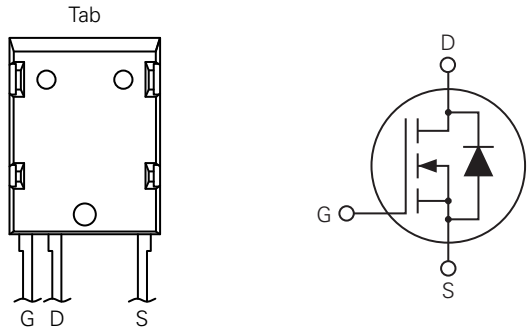
IXFL44N100P

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

Revised: XZ 05/01/2023

Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units
V_{DSS}	Drain-Source Voltage	T_J = 25°C to 150°C	1000	V
V_{DGR}	Drain-Gate Voltage	T_J = 25°C to 150°C, R_{GS} = 1 MΩ	1000	V
V_{GSS}	Gate-Source Voltage	Continuous	±30	V
V_{GSM}		Transient	±40	
I_{D25}	Drain Current	T_C = 25°C	22	A
I_{DM}		T_C = 25°C, Pulse width limited by T_{JM}	110	
I_{AR}	Repetitive Avalanche Current	T_C = 25°C	22	A
E_{AS}	Avalanche Energy	T_C = 25°C	2	J
dV/dt	Reverse Diode dV/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	15	V/ns
P_D	Power Dissipation	T_C = 25°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, $I_{ISOL} \le$ 1 mA, t = 1 min	2500	V~
		50/60 Hz, $I_{ISOL} \le$ 1 mA, t = 1 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°C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	I_D = 3 mA, V_{GS} = 0 V	1000	–	–	V
$V_{GS(th)}$	Gate Threshold Voltage	I_D = 1mA, $V_{DS} = V_{GS}$	3.5	–	6.5	V
I_{GSS}	Gate-Source Leakage Current	V_{DS} = 0 V, V_{GS} = ±30 V	–	–	±200	nA
I_{DSS}	Drain-Source Current	$V_{DS} = V_{DSS}$, V_{GS} = 0 V	–	–	50	µA
		$V_{DS} = V_{DSS}$, V_{GS} = 0 V, T_J = 125°C	–	–	3	mA
$R_{DS(on)}$	Drain-Source On-Resistance[1]	V_{GS} = 10 V, I_D = 22 A	–	–	240	mΩ

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Electrical Characteristics – Dynamic (T_J = 25°C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
g_{fs}	Transconductance[1]	V_{DS} = 20 V, I_D = 0.5 x I_{D25}	20	35	–	S
R_{Gi}	Gate Input Resistance	–	–	1.4	–	Ω
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 25 V, f = 1MHz	–	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 V, V_{DS} = 0.5 x V_{DSS}, I_D = 0.5 x I_{D25}	–	305	–	nC
Q_{gs}	Gate-Source Charge		–	104	–	
Q_{gd}	Gate-Drain Charge		–	126	–	
$t_{d(on)}$	Turn-on Delay Time	**Resistive Switching** V_{GS} = 10 V, V_{DS} = 0.5 x V_{DSS}, I_D = 0.5 x I_{D25}, $R_{G(ext)}$ = 1 Ω	–	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 ≤ 300 µs, duty cycle, d ≤ 2%

Source-Drain Diode Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
I_S	Continuous Diode Forward Current	V_{GS} = 0 V	–	–	44	A
I_{SM}	Diode Pulse Current	Repetitive, Pusle width limited by T_{JM}	–	–	176	A
V_{SD}	Diode Forward Voltage[1]	I_F = I_S, V_{GS} = 0 V	–	–	1.5	V
t_{rr}	Reverse Recovery Time	I_F = 22 A, –di/dt = 100 A/µs, V_r = 100 V	–	–	300	ns
Q_{rm}	Reverse Recovery Charge		–	2.5	–	µC
I_{rm}	Reverse Recovery Current		–	17.0	–	A

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Characteristic Curves

Fig. 1. Output Characteristics @ 25ºC

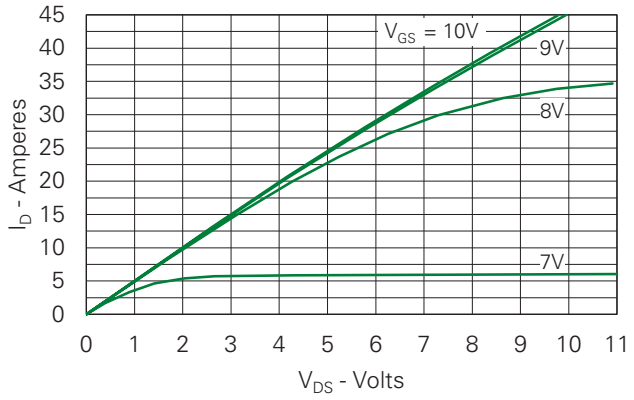


Fig. 2. Extended Output Characteristics @ 25ºC

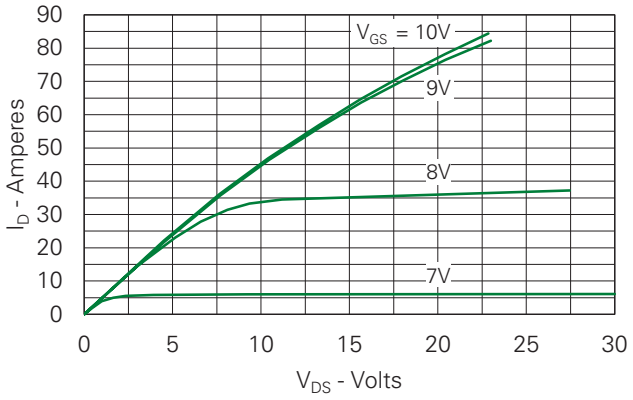


Fig. 3. Output Characteristics @ 125ºC

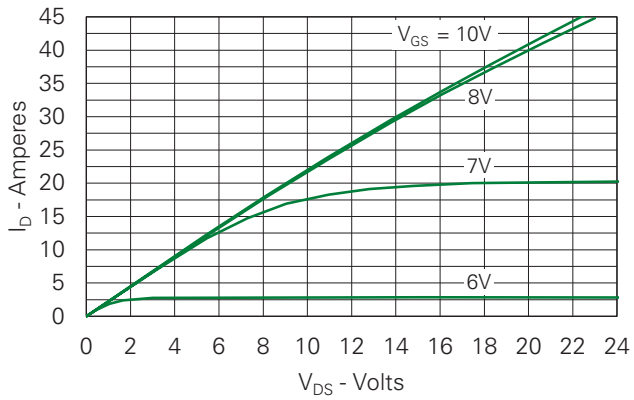


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 22A Value vs. Junction Temperature

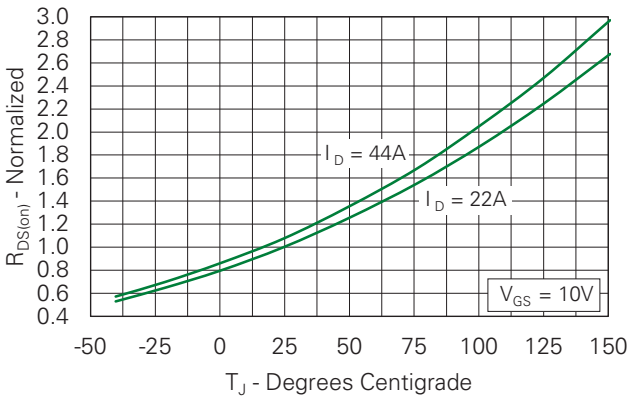


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 22A Value vs. Drain Current

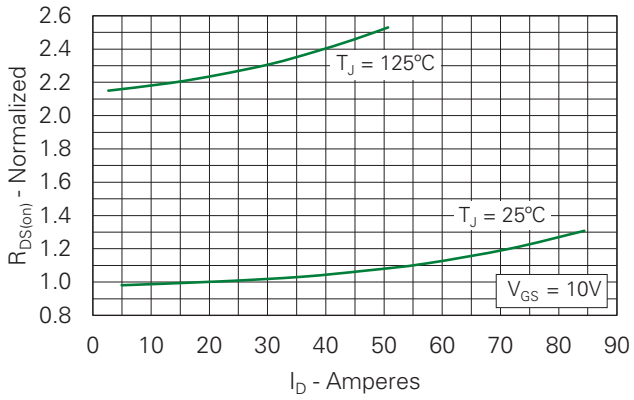


Fig. 6. Maximum Drain Current vs. Case Temperature

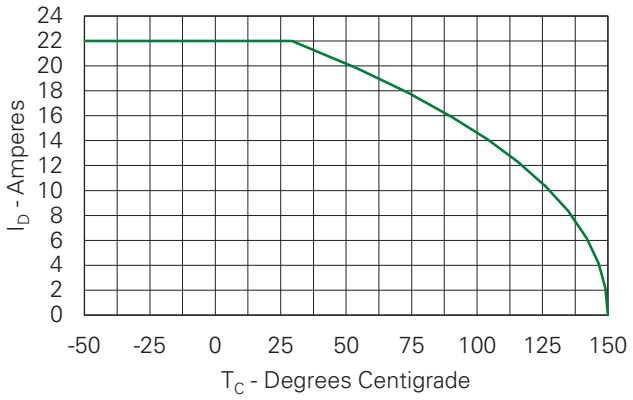


Fig. 7. Input Admittance

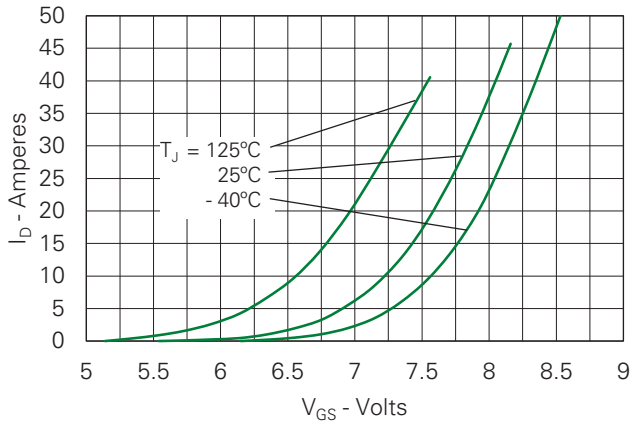


Fig. 8. Transconductance

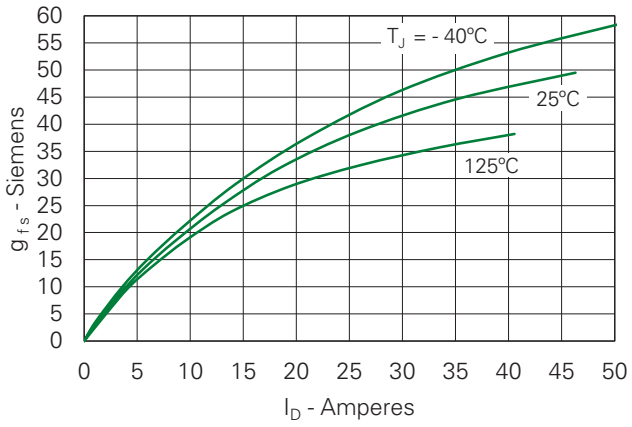


Fig. 9. Forward Voltage Drop of Intrinsic Diode

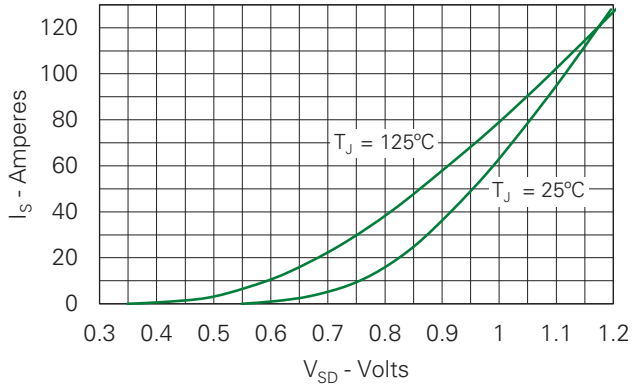


Fig. 10. Gate Charge

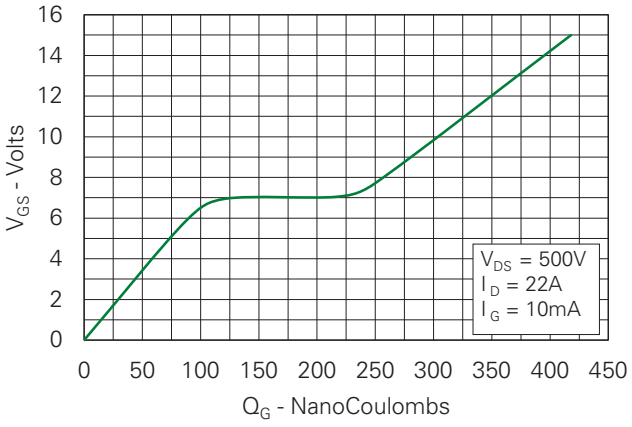


Fig. 11. Capacitance

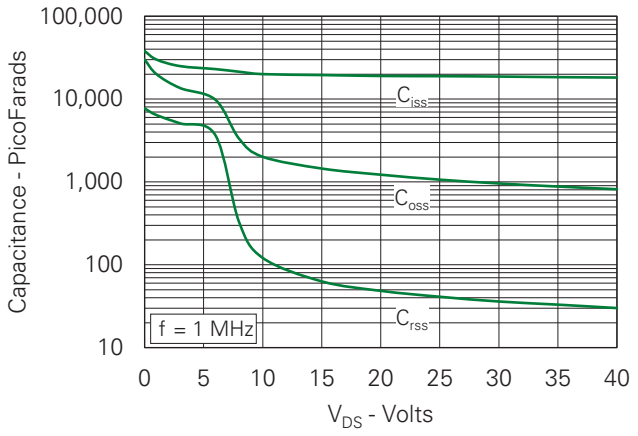
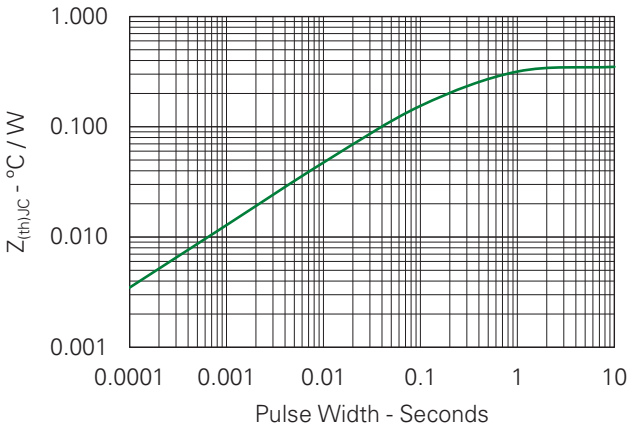
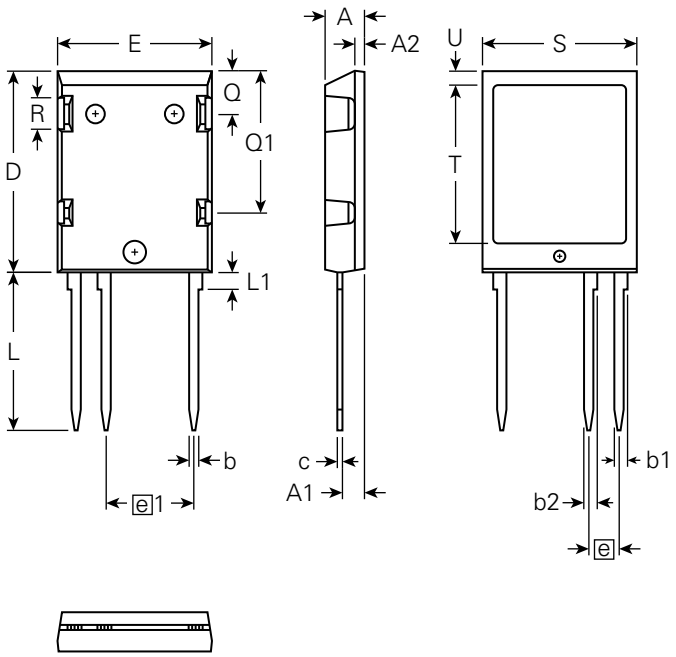


Fig. 12. Maximum Transient Thermal Impedance



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