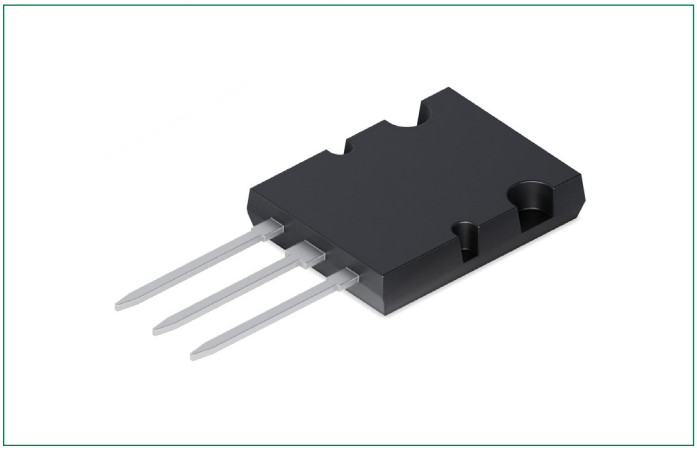
IXFB44N100P

1000 V, 220 mΩ Polar™ HiPerFET™ Power MOSFET

N-Channel Enhancement Mode



Features:

- Unclamped Inductive Switching (UIS) Rated
- Low Package Inductance
  - Easy to Drive and to Protect
- N-Channel Enhancement Mode
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low $R_{DS(on)}$ and Q_G

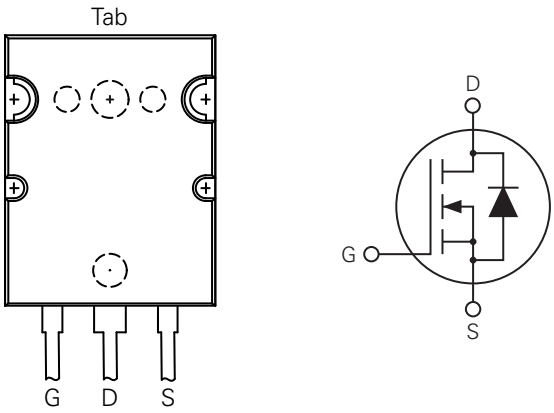
Advantages:

- Plus 264™ Package for Clip or Spring Mounting
- 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

Pinout Diagram (PLUS TO-264)



G: Gate; **D:** Drain; **S:** Emitter; **Tab:** Drain

Product Summary

Characteristic	Value	Unit
V_{DSS}	1000	V
I_{D25}	44	A
$R_{DS(on)}$	220	Ω
t_{rr}	300	ns

Revised: XZ 06/08/2023

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	44	A
I_{DM}		T_C = 25°C, Pulse width limited by T_{JM}	110	
I_{AR}	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	1250	W
T_J	Operating Junction Temperature	–	-55 to +150	°C
T_{JM}	Maximum Junction Temperature	–	150	
T_{stg}	Storage Temperature	–	-55 to +150	
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	
T_L	Lead Temperature for Soldering	1.6 mm (0.062 in.) from case for 10 s	300	°C
F_C	Mounting Force	–	30..120 / 6.7..27	N/lb
W	Weight	–	10	g

Thermal Characteristics

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th, JC}$	Thermal Resistance, junction-to-case	–	–	0.10	°C/W
$R_{th, CS}$	Thermal Resistance, case-to-sink	–	0.13	–	°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 = 1 mA, $V_{DS} = V_{GS}$	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 = 0.5 x I_{D25}	–	–	220	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 @ T_J = 25ºC

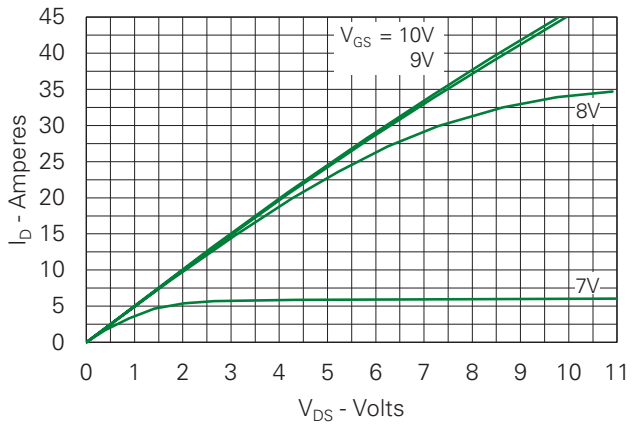


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

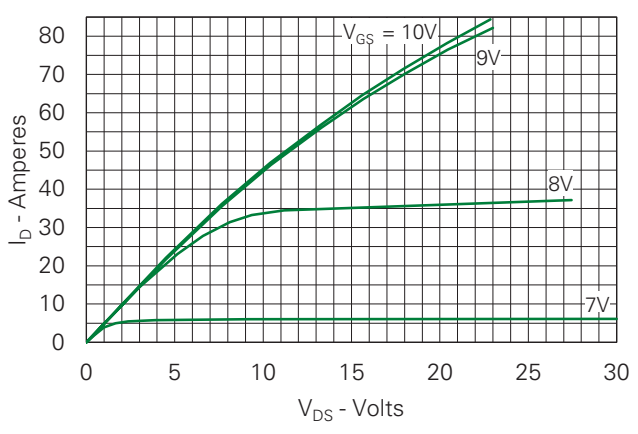


Fig. 3. Output Characteristics @ T_J = 125ºC

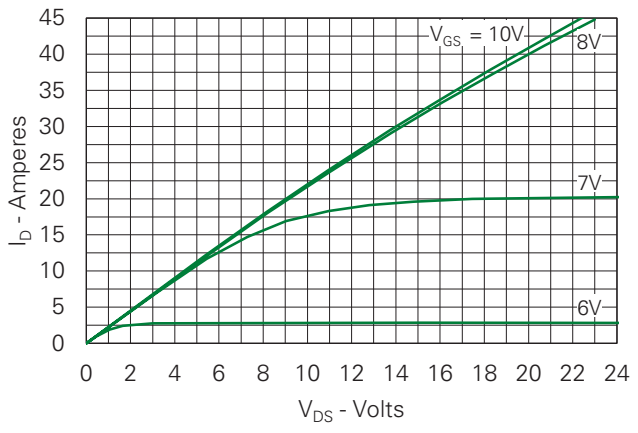


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 22A Value vs. Junction Temperature

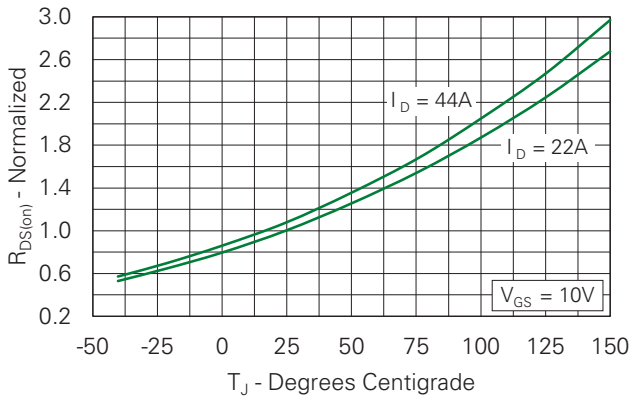


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 22A Value vs. Drain Current

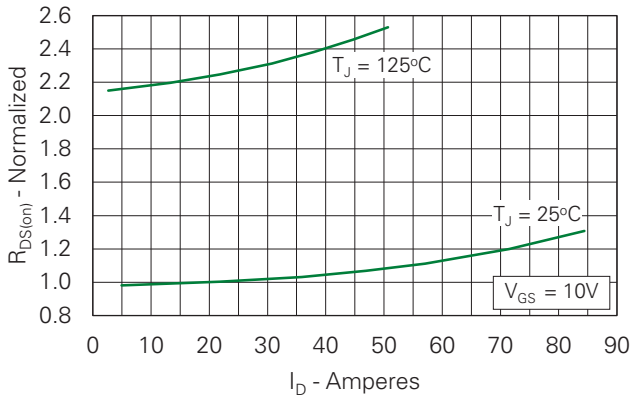


Fig. 6. Maximum Drain Current vs. Case Temperature

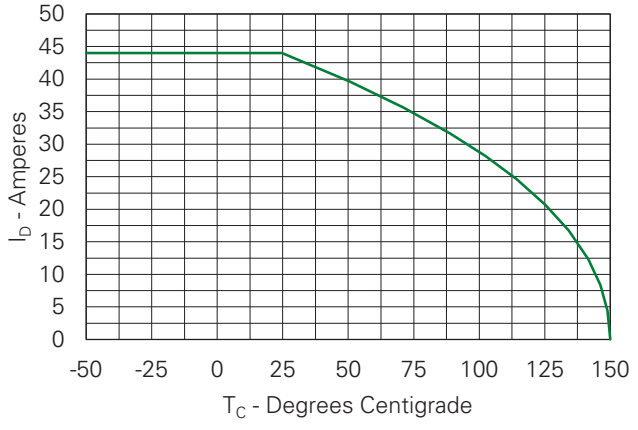


Fig. 7. Input Admittance

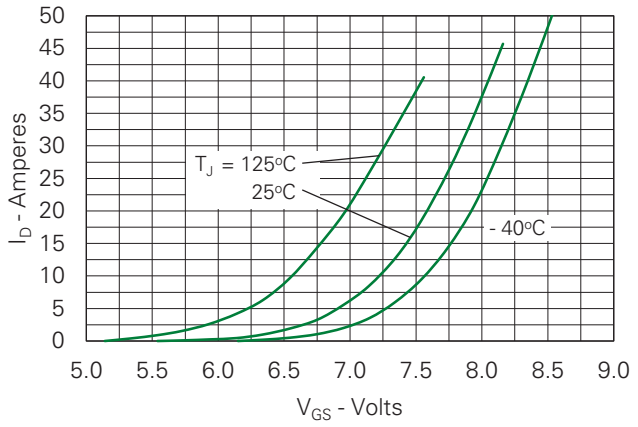


Fig. 8. Transconductance

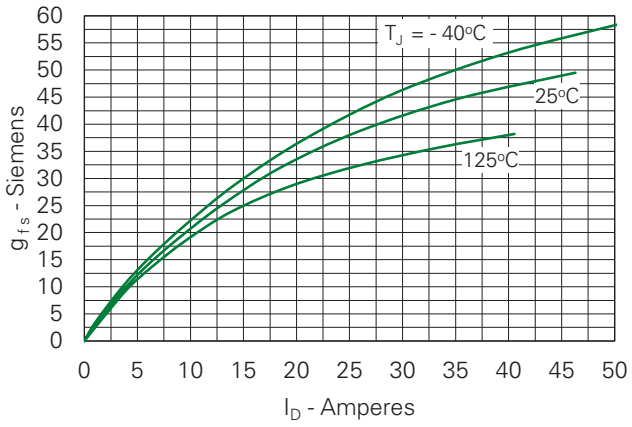


Fig. 9. Forward Voltage Drop of Intrinsic Diode

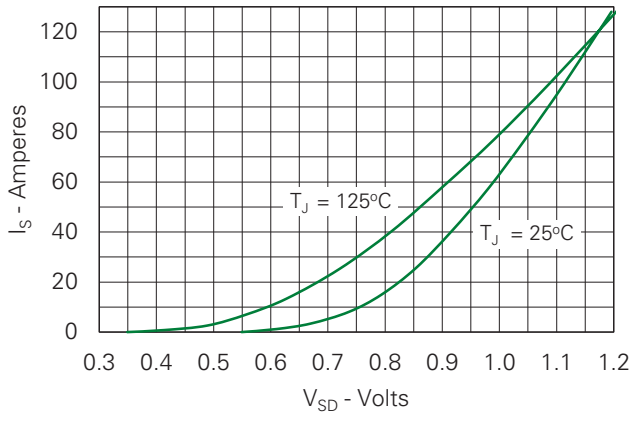


Fig. 10. Gate Charge

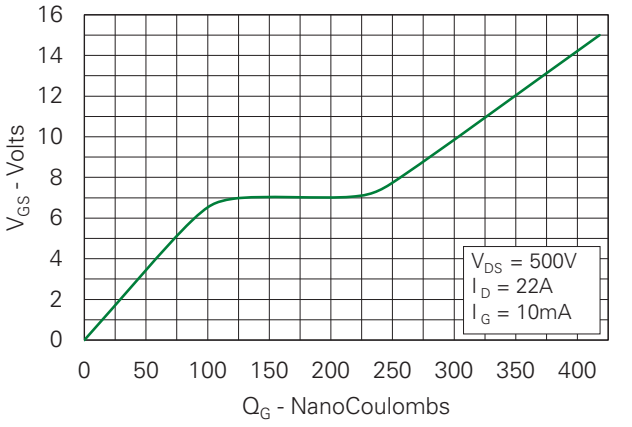


Fig. 11. Capacitance

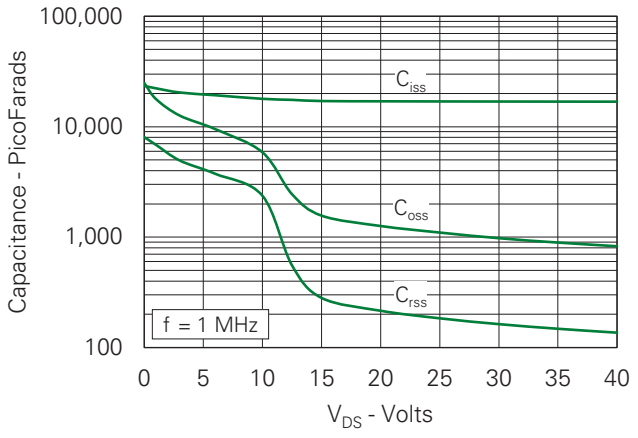
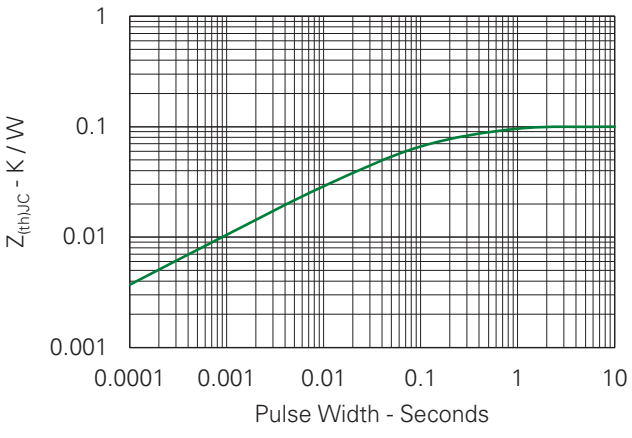
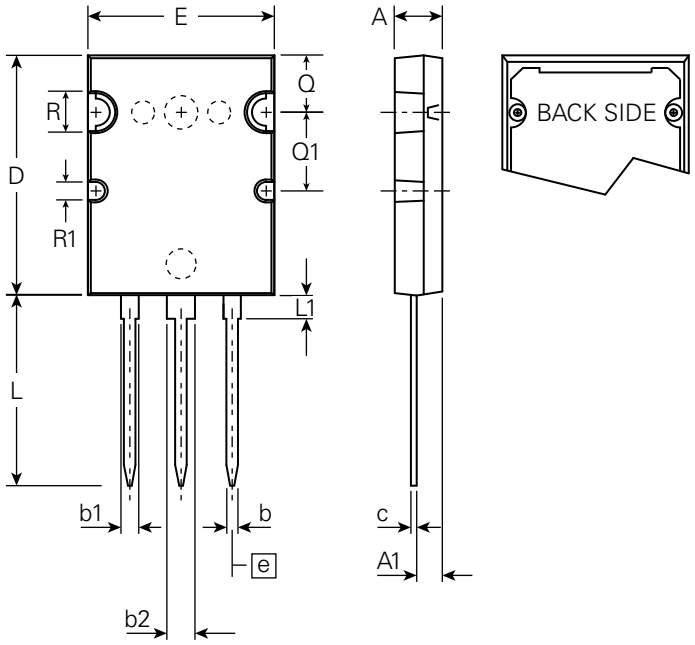


Fig. 12. Maximum Transient Thermal Impedance



Part Outline Drawing (PLUS TO-264)



Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.185	–	0.209	4.70	–	5.31
A1	0.102	–	0.118	2.59	–	3.00
b	0.037	–	0.055	0.94	–	1.40
b1	0.087	–	0.102	2.21	–	2.59
b2	0.110	–	0.126	2.79	–	3.20
c	0.017	–	0.029	0.43	–	0.74
D	1.007	–	1.047	25.58	–	26.59
E	0.760	–	0.799	19.30	–	20.29
e	0.215 BSC			5.46 BSC		
L	0.779	–	0.842	19.79	–	21.39
L1	0.087	–	0.102	2.21	–	2.59
Q	0.240	–	0.256	6.10	–	6.50
Q1	0.330	–	0.346	8.38	–	8.79
ØR	0.155	–	0.187	3.94	–	4.75
ØR1	0.085	–	0.093	2.16	–	2.36