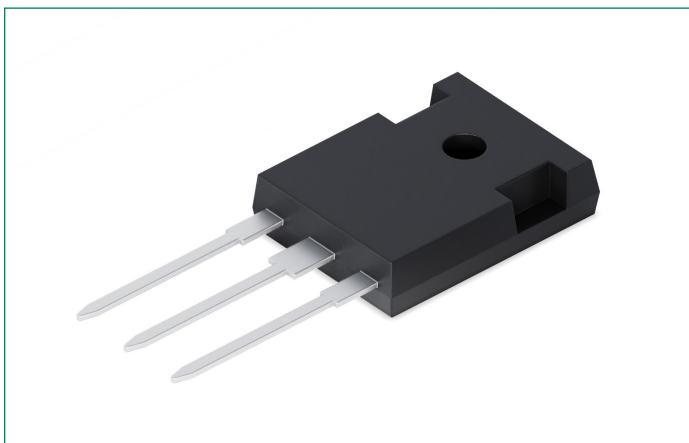


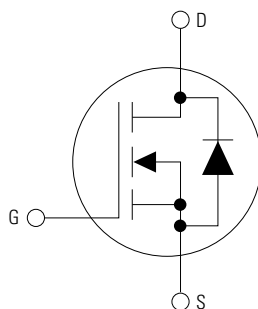
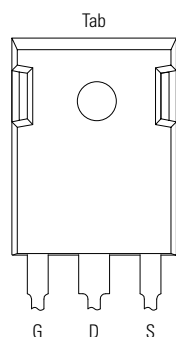
IXFH80N65X2W

650 V, 80 A, 38 mΩ, X2 Class HiPerFET™ Power MOSFET

N-Channel Enhancement Mode, Avalanche Rated, Fast Intrinsic Diode



Pinout Diagram TO-247 (IXFH)



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

Description

The IXFH80N65X2W (TO-247) is a X2-Class HiPerFET power MOSFETs rated at 650 V breakdown voltage with 80 A continuous drain current and 38 mΩ on-resistance. It is an avalanche-rated, N-channel enhancement-mode device featuring a fast intrinsic body diode, low gate charge, and low package inductance for high power density designs. This part targets switch-mode and resonant power supplies, DC-DC converters, PFC circuits, and AC/DC motor drives and robotics applications.

Features

- International Standard Packages
- Low $R_{DS(on)}$ and Q_G
- Avalanche Rated
- Low Package Inductance

Benefits

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

Product Summary

Characteristic	Value	Unit
V_{DSS}	650	V
$I_D @ 25\text{ }^{\circ}\text{C}$	80	A
$R_{DS(on)}$	≤ 38	mΩ

Maximum Ratings

Symbol	Characteristic	Conditions	Value	Unit
V_{DSS}	Drain-Source Voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$	650	V
V_{DGR}	Drain-Gate Voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$, $R_{GS} = 1\text{ M}\Omega$	650	V
V_{GSS}	Gate-Source Voltage	–	± 30	V
V_{GSM}	Maximum Gate-Source Voltage	–	± 40	
I_D	Drain Current	$T_c = 25\text{ }^{\circ}\text{C}$	80	A
I_{DM}	Peak Drain Current	$T_c = 25\text{ }^{\circ}\text{C}$, pulse width limited by $T_{vj(max)}$	160	
I_{AS}	Non-Repetitive Single Pulse Avalanche	$T_c = 25\text{ }^{\circ}\text{C}$	20	A
E_{AS}	Non-Repetitive Single Pulse Avalanche	$T_c = 25\text{ }^{\circ}\text{C}$	3	J
$dv/dt_{(diode)}$	Source-Drain Diode dv/dt Capability	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_{vj} \leq 150\text{ }^{\circ}\text{C}$	50	V/ns
P_{tot}	Total Power Dissipation	$T_c = 25\text{ }^{\circ}\text{C}$	890	W
T_{vj}	Virtual Junction Temperature Range	–	–55 to +150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	–	–55 to +150	
T_L	Maximum Lead Temperature For Soldering	Maximum lead temperature for soldering 1.6 mm (0.062in.) from Case for 10s	300	$^{\circ}\text{C}$
T_{sold}	Soldering Temperature		260	
M_d	Mounting Torque	–	1.13 / 10	Nm/lb.in

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

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 1\text{ mA}$, $V_{GS} = 0\text{ V}$	650	–	–	V
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D = 4\text{ mA}$, $V_{GS} = V_{DS}$	3.5	–	5.0	V
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 30\text{ V}$	–	–	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = V_{DSS}$, $V_{GS} = 0\text{ V}$	–	–	50	μA
		$V_{DS} = V_{DSS}$, $V_{GS} = 0\text{ V}$, $T_{vj} = 125\text{ }^{\circ}\text{C}$	–	–	3	mA
$R_{DS(on)}$	Drain-Source On-Resistance ¹	$V_{GS} = 10\text{ V}$, $I_D = 0.5 \times I_{D25}$	–	–	38	m Ω

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

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

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
g_{fs}	Transconductance ¹	$V_{DS} = 10\text{ V}, I_D = 0.5 \times I_D$	33	55	–	S
$R_{g(int)}$	Gate Input Resistance	–	–	0.6	–	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	–	8300	–	pF
C_{oss}	Output Capacitance		–	5010	–	
C_{rss}	Reverse Transfer Capacitance		–	1.6	–	
$C_{o(er)}$	Effective Output Capacitance – Energy	Effective Output Capacitance $V_{GS} = 0\text{ V}, V_{DS} = 0.8 \times V_{DSS}$	–	280	–	pF
$C_{o(tr)}$	Effective Output Capacitance – Time		–	1160	–	
Q_G	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \times V_{DSS},$ $I_D = 0.5 \times I_D$	–	140	–	nC
Q_{GS}	Gate-Source Charge		–	50	–	
Q_{GD}	Gate-Drain Charge		–	40	–	
$t_{d(on)}$	Turn-On Delay Time	Resistive Switching Times $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \times V_{DSS},$ $I_D = 0.5 \times I_D, R_{G(ext)} = 3\ \Omega$	–	32	–	ns
t_r	Rise Time		–	24	–	
$t_{d(off)}$	Turn-Off Delay Time		–	70	–	
t_f	Fall Time		–	11	–	

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

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

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
I_S	Continuous Diode Forward Current	$V_{GS} = 0\text{ V}$	–	–	80	A
I_{SM}	Diode Pulse Current	Repetitive, pulse width limited by	–	–	320	A
V_{SD}	Diode Forward Voltage ¹	$I_F = I_S, V_{GS} = 0\text{ V}$	–	–	1.4	V
t_{rr}	Reverse Recovery Time	$I_F = 40\text{ A}, -di/dt = 100\text{ A}/\mu\text{s},$ $V_R = 100\text{ V}$	–	200	–	ns
Q_{rr}	Reverse Recovery Charge		–	1.7	–	μC
I_{rm}	Peak Reverse Recovery Current		–	16.7	–	A

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

Thermal Characteristics

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance Junction To Case	–	–	0.14	K/W
$R_{th(c-h)}$	Thermal Resistance Case To Heat Sink	–	0.21	–	K/W

Package

Symbol	Characteristic	Conditions	Value	Unit
G	Weight	–	6	g

Characteristic Curves

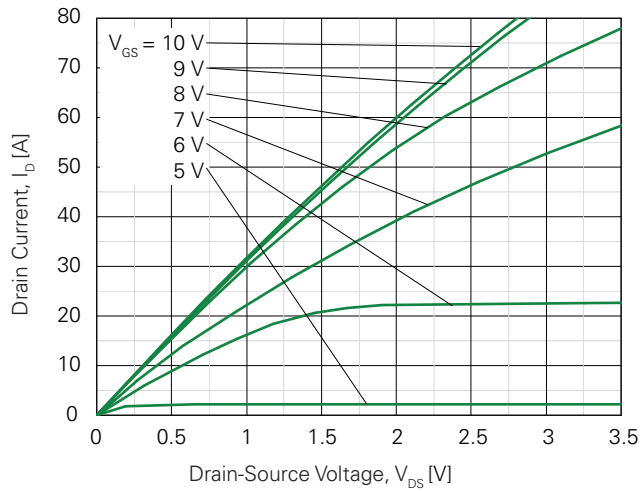
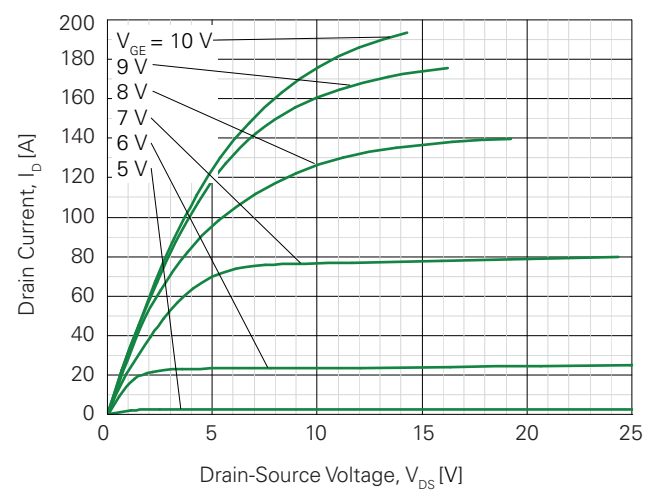
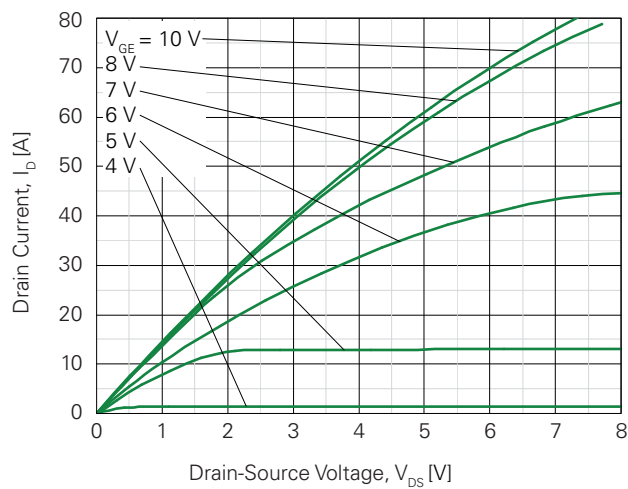
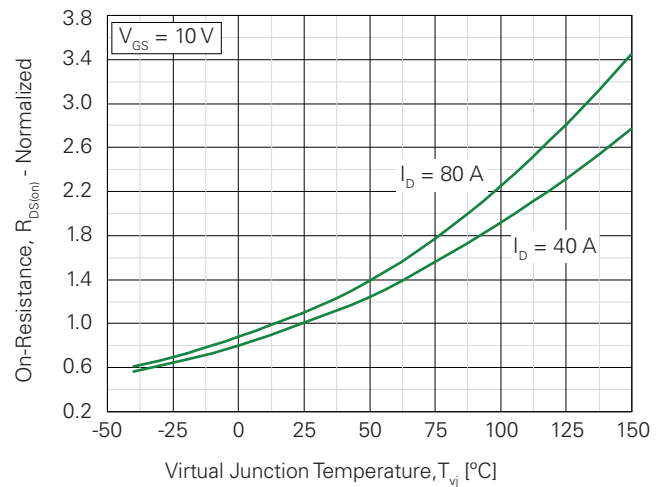
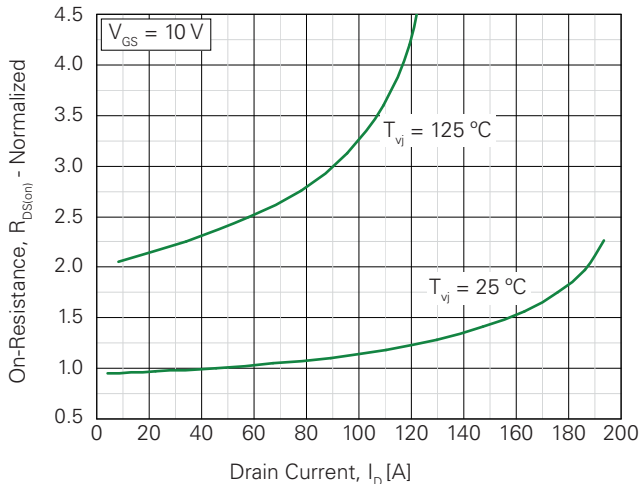
Fig. 1. Typical Output Characteristics @ $T_{vj} = 25^\circ\text{C}$ Fig. 2. Typical Extended Output Characteristics @ $T_{vj} = 25^\circ\text{C}$ Fig. 3. Typical Output Characteristics @ $T_{vj} = 125^\circ\text{C}$ Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 40\text{ A}$ Value vs. Junction TemperatureFig. 5. $R_{DS(on)}$ Normalized to $I_D = 40\text{ A}$ Value vs. Drain Current

Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

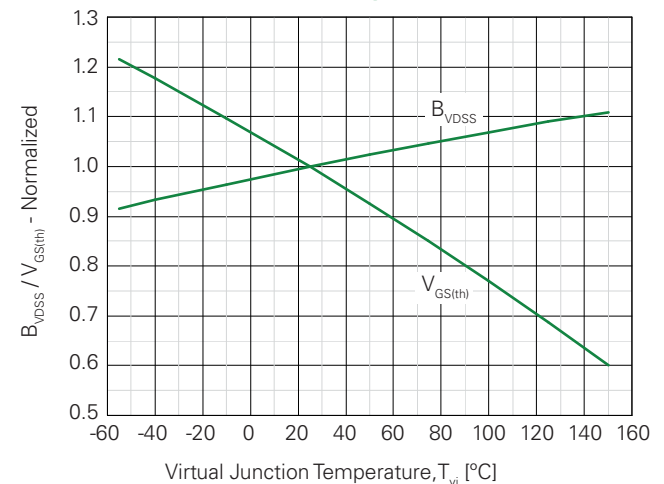


Fig. 7. Maximum Drain Current vs. Case Temperature

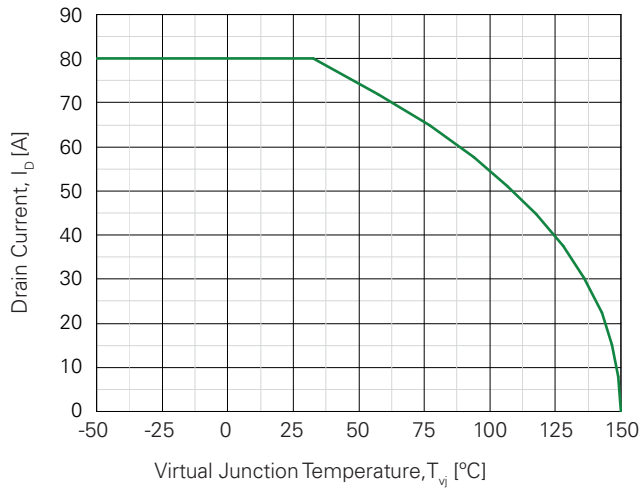


Fig. 8. Typical Transfer Characteristics

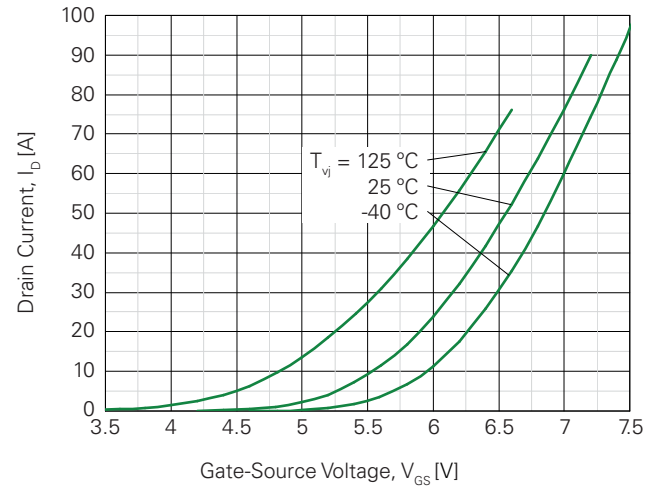


Fig. 9. Typical Transconductance

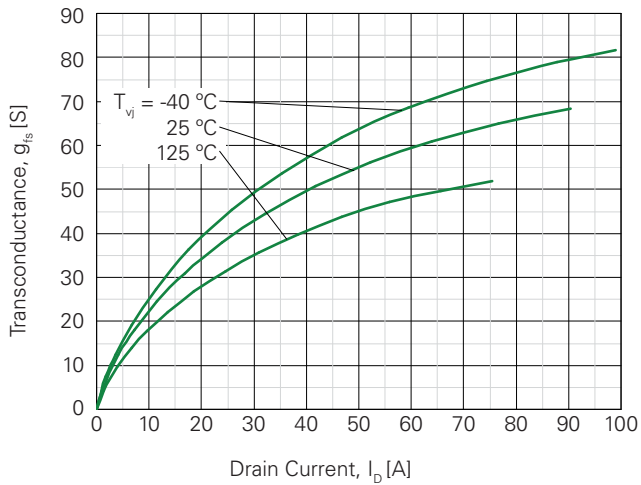


Fig. 10. Forward Voltage Drop of Intrinsic Diode

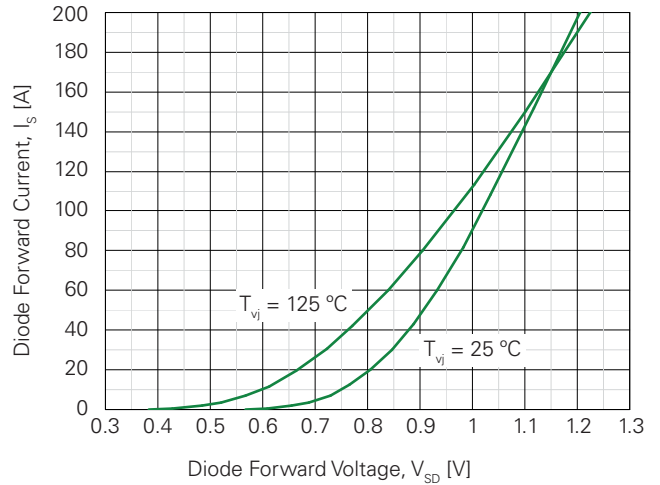


Fig. 11. Typical Gate Charge Characteristics

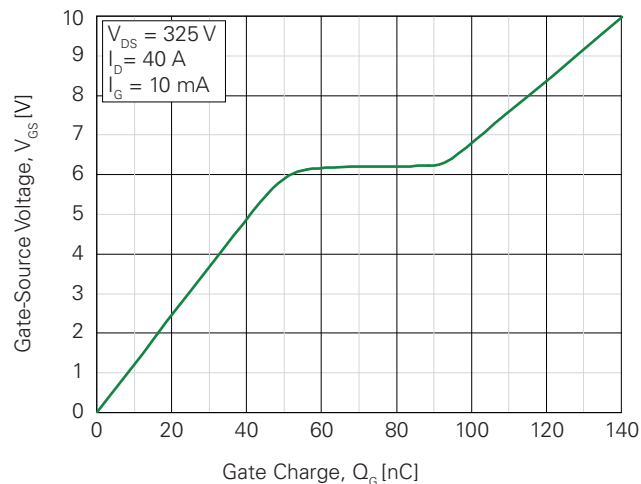


Fig. 12. Typical Junction Capacitance Characteristics

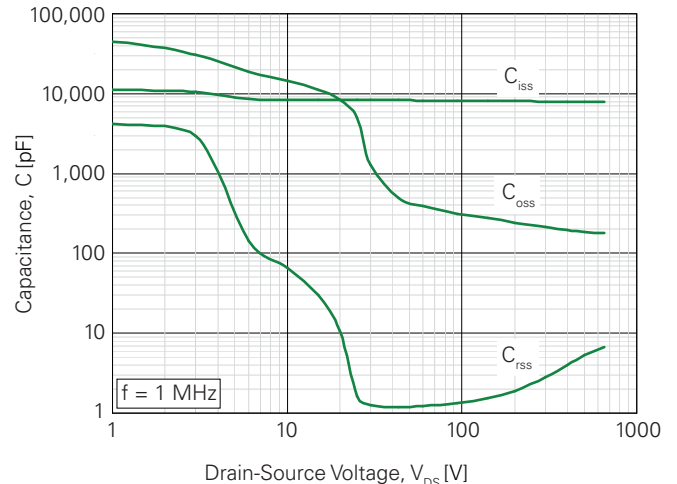


Fig. 13. Typical Output Charge Capacitance Energy vs. Drain-Source Voltage

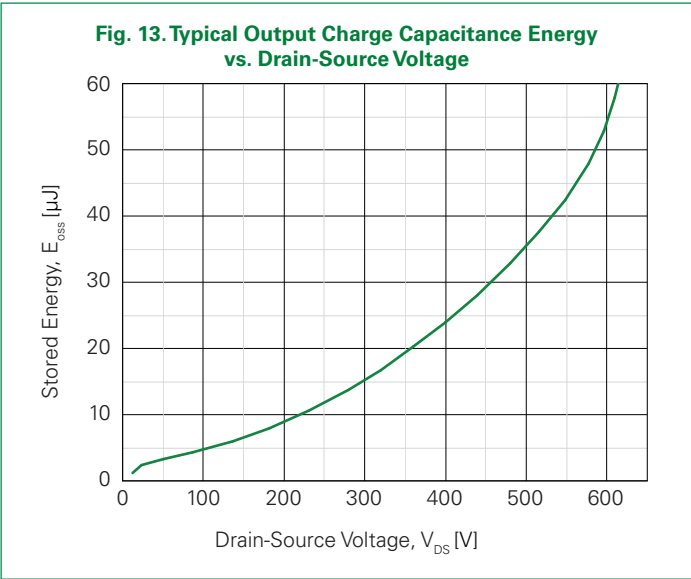


Fig. 14. Forward-Bias Safe Operating Area (FBSOA)

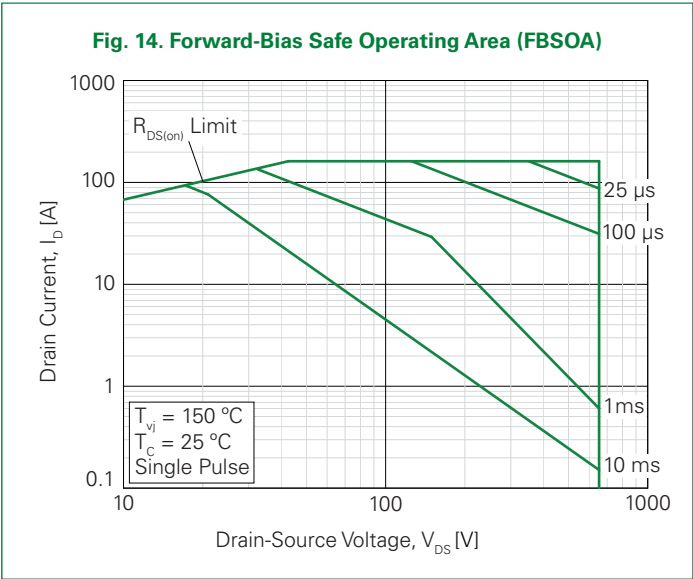
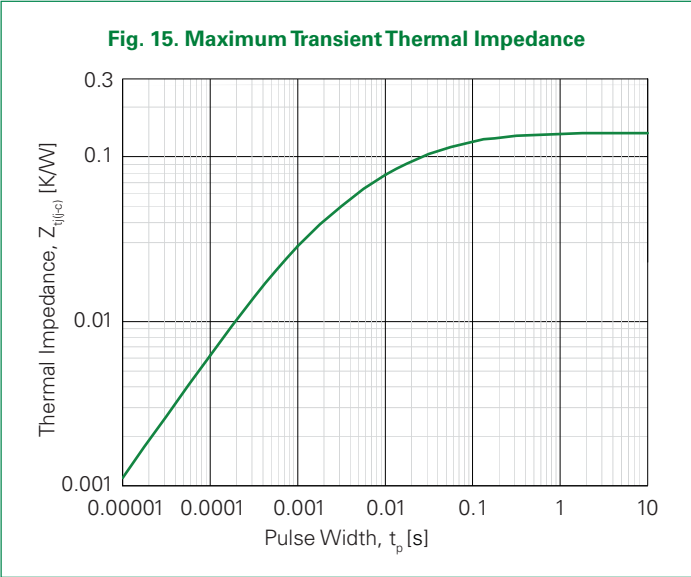
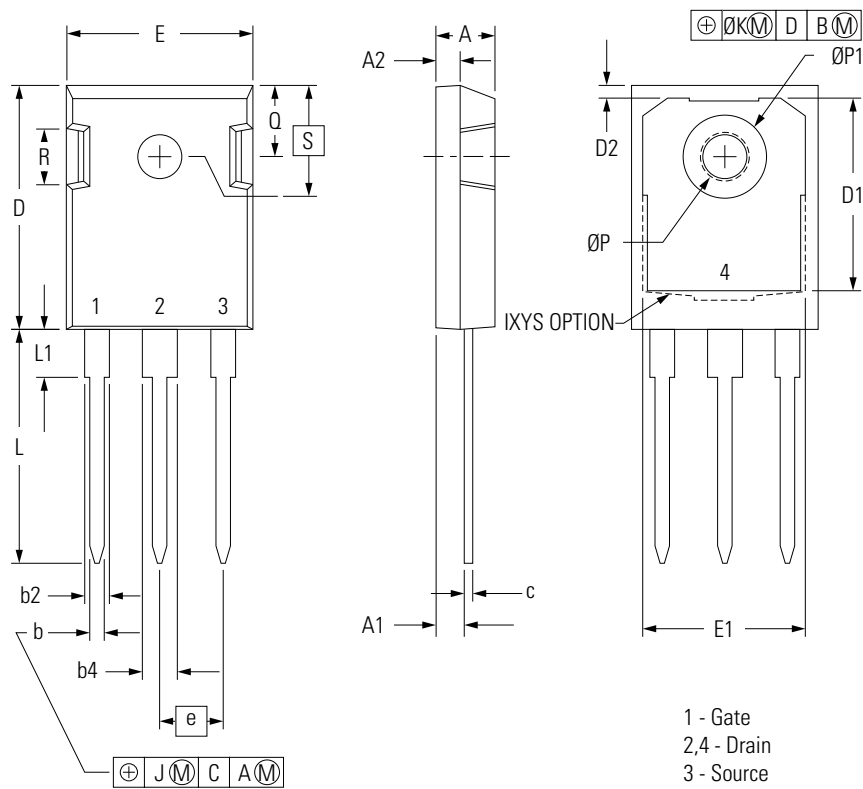


Fig. 15. Maximum Transient Thermal Impedance



Part Outline Drawing TO-247 (IXFH)



Symbol	Inches		Millimeters	
	Min.	Max.	Min.	Max
A	0.190	0.205	4.83	5.21
A1	0.090	0.100	2.29	2.54
A2	0.075	0.085	1.91	2.16
b	0.045	0.055	1.14	1.40
b2	0.075	0.087	1.91	2.20
b4	0.115	0.126	2.92	3.20
c	0.024	0.031	0.61	0.80
D	0.819	0.840	20.80	21.34
D1	0.650	0.690	16.51	17.53
D2	0.035	0.050	0.89	1.27
E	0.620	0.635	15.57	16.13
E1	0.545	0.565	13.84	14.35
e	0.215 BSC		5.45 BSC	
J	-	0.010	-	0.25
K	-	0.025	-	0.64
L	0.780	0.810	19.81	20.57
L1	0.150	0.170	3.81	4.32
ØP	0.140	0.144	3.55	3.65
ØP1	0.275	0.290	6.99	7.37
Q	0.220	0.244	5.59	6.20
R	0.170	0.190	4.32	4.83
S	0.242 BSC		6.15 BSC	

Ordering Information

Orderable Part Number	Package Type	Shipping Form	Shipping Quantity
IXFH80N65X2W	TO-247-3	Tube	30

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