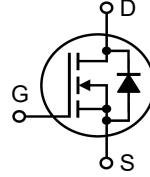


**X3-Class  
HiPerFET™  
Power MOSFET**

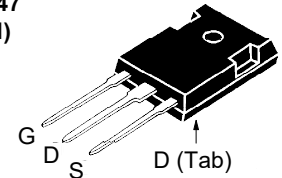
**IXFH90N65X3**

**V<sub>DSS</sub> = 650V**  
**I<sub>D25</sub> = 90A**  
**R<sub>DS(on)</sub> ≤ 33mΩ**

N-Channel Enhancement Mode  
Avalanche Rated



TO-247  
(IXFH)



G = Gate      D = Drain  
S = Source    Tab = Drain

Symbol	Test Conditions	Maximum Ratings	
V <sub>DSS</sub>	T <sub>J</sub> = 25°C to 150°C	650	V
V <sub>DGR</sub>	T <sub>J</sub> = 25°C to 150°C, R <sub>GS</sub> = 1MΩ	650	V
V <sub>GSS</sub>	Continuous	±20	V
V <sub>GSM</sub>	Transient	±30	V
I <sub>D25</sub>	T <sub>C</sub> = 25°C	90	A
I <sub>DM</sub>	T <sub>C</sub> = 25°C, Pulse Width Limited by T <sub>JM</sub>	150	A
I <sub>A</sub>	T <sub>C</sub> = 25°C	20	A
E <sub>AS</sub>	T <sub>C</sub> = 25°C	3	J
dv/dt	I <sub>S</sub> ≤ I <sub>DM</sub> , V <sub>DD</sub> ≤ V <sub>DSS</sub> , T <sub>J</sub> ≤ 150°C	50	V/ns
P <sub>D</sub>	T <sub>C</sub> = 25°C	960	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>	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	°C
M <sub>d</sub>	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		6	g

**Features**

- International Standard Package
- Low R<sub>DS(ON)</sub> and Q<sub>G</sub>
- Avalanche Rated
- Low Package Inductance

**Advantages**

- 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

Symbol	Test Conditions (T <sub>J</sub> = 25°C, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA	650		V
V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 4mA	3.2		5.2 V
I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100 nA
I <sub>DSS</sub>	V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0V T <sub>J</sub> = 125°C			50 μA 6 mA
R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5 • I <sub>D25</sub> , Note 1			33 mΩ

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$g_{fs}$	$V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	38	65	S
$R_{Gi}$	Gate Input Resistance		1.5	$\Omega$
$C_{iss}$	} $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		6080	pF
$C_{oss}$			8020	pF
$C_{rss}$			40	pF
<b>Effective Output Capacitance</b>				
$C_{o(er)}$	Energy related } $V_{GS} = 0\text{V}$		270	pF
$C_{o(tr)}$	Time related } $V_{DS} = 0.8 \cdot V_{DSS}$		1300	pF
$t_{d(on)}$	} <b>Resistive Switching Times</b> $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 2\Omega$ (External)		28	ns
$t_r$			11	ns
$t_{d(off)}$			63	ns
$t_f$			10	ns
$Q_{g(on)}$	} $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		95	nC
$Q_{gs}$			31	nC
$Q_{gd}$			31	nC
$R_{thJC}$				0.13 $^\circ\text{C/W}$
$R_{thCS}$		0.21		$^\circ\text{C/W}$

**Source-Drain Diode**

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$I_S$	$V_{GS} = 0\text{V}$		90	A
$I_{SM}$	Repetitive, Pulse Width Limited by $T_{JM}$		360	A
$V_{SD}$	$I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1		1.4	V
$t_{rr}$	} $I_F = 45\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		175	ns
$Q_{RM}$			1.3	$\mu\text{C}$
$I_{RM}$			15.0	A

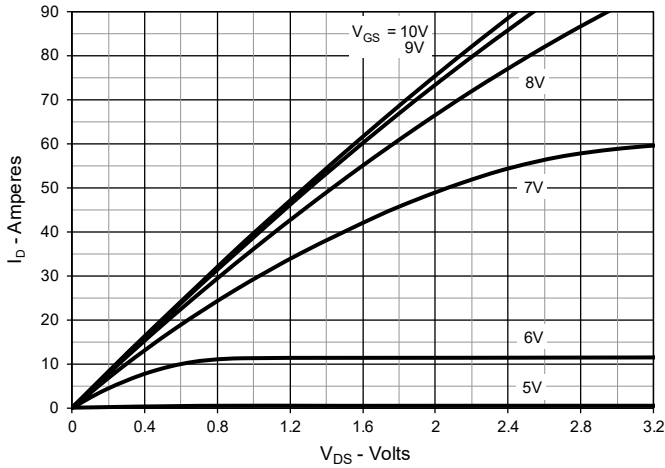
Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

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

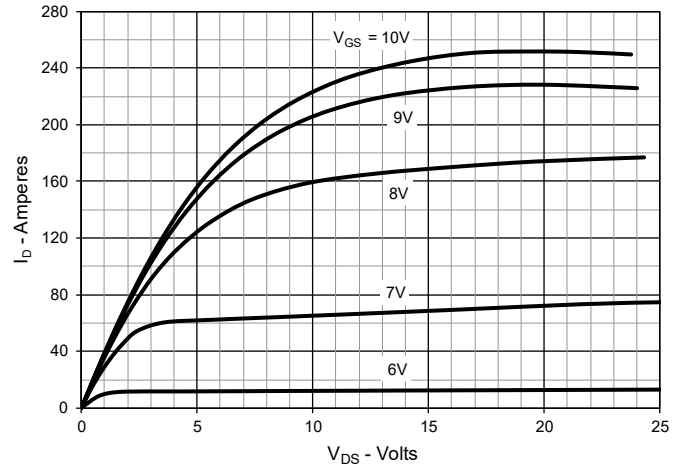
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065B1	6,683,344	6,727,585	7,005,734B2	7,157,338B2
4,860,072	5,017,508	5,063,307	5,381,025	6,259,123B1	6,534,343	6,710,405B2	6,759,692	7,063,975B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728B1	6,583,505	6,710,463	6,771,478B2	7,071,537	

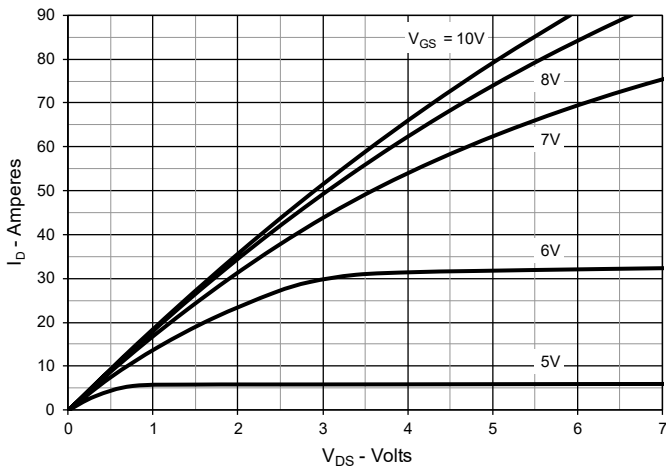
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



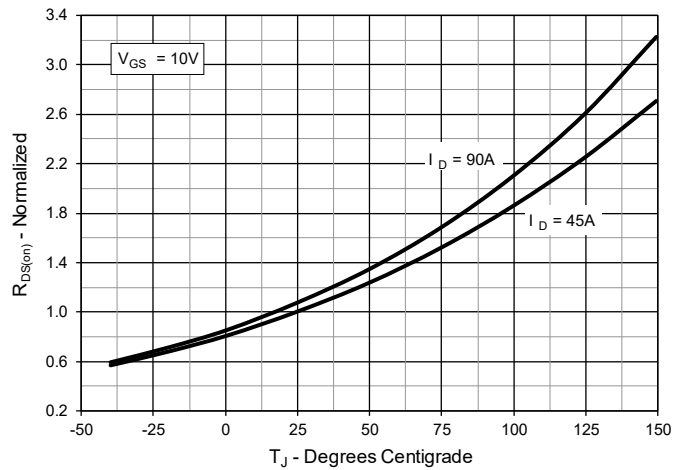
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



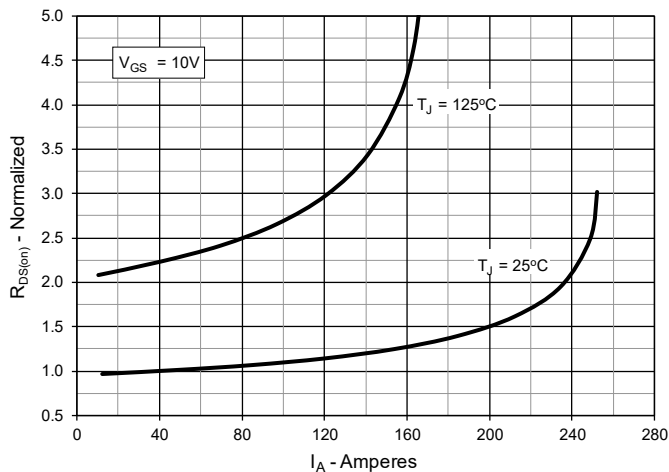
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



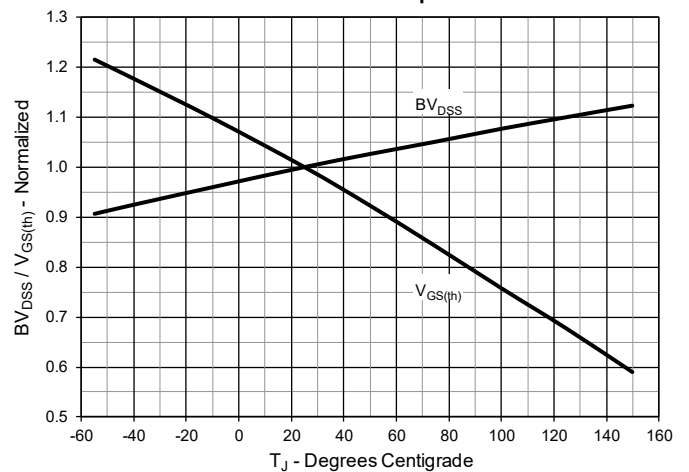
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 45\text{A}$  Value vs. Junction Temperature**

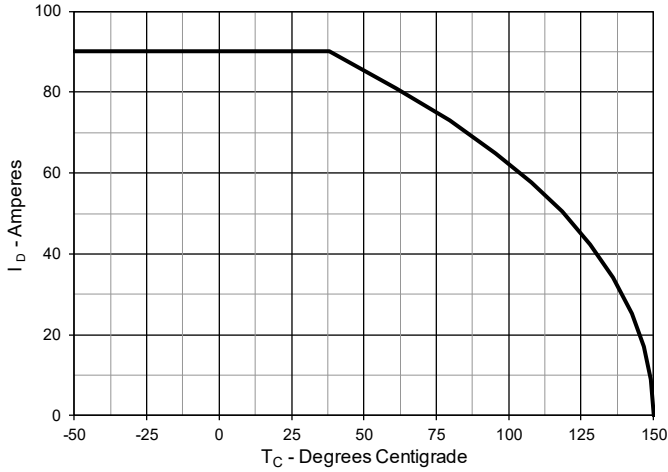
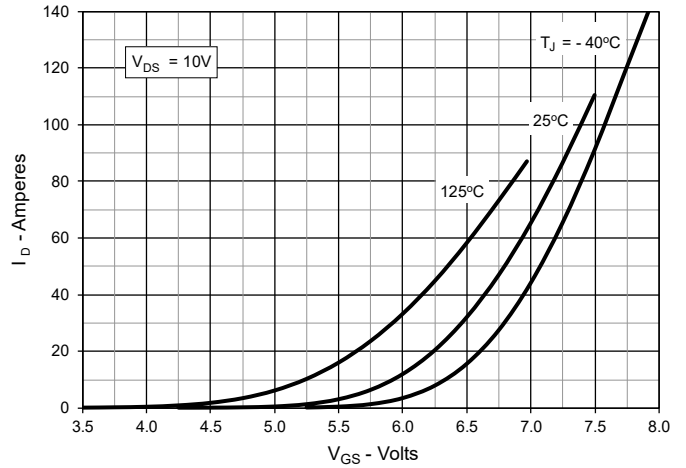
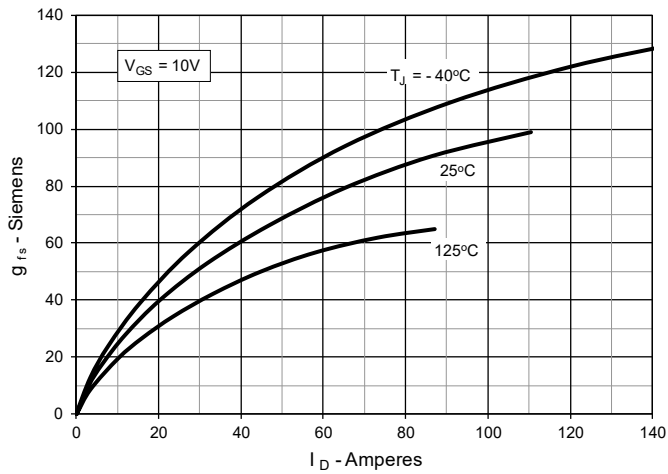
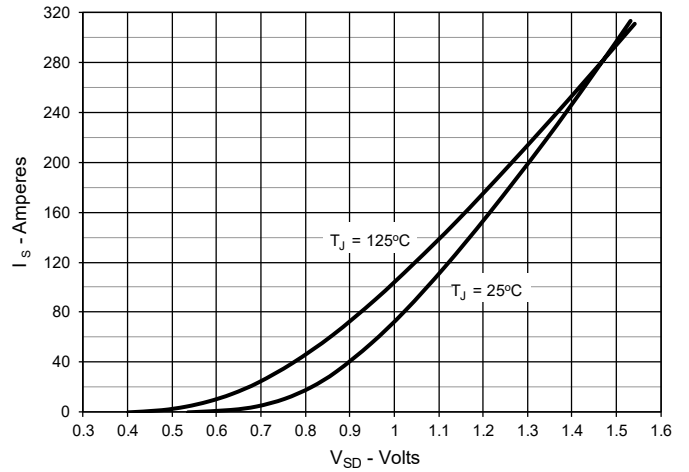
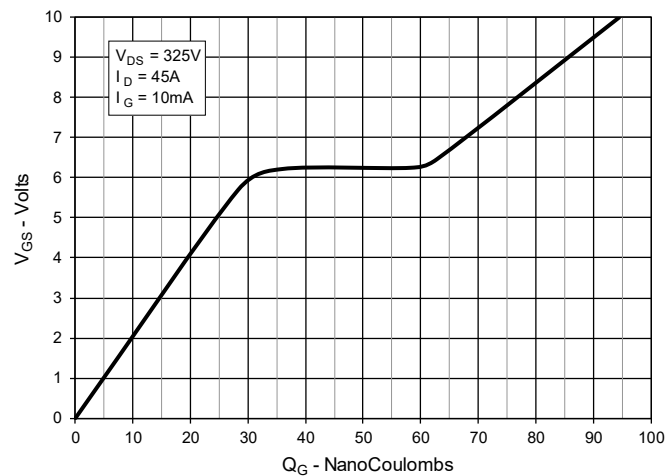
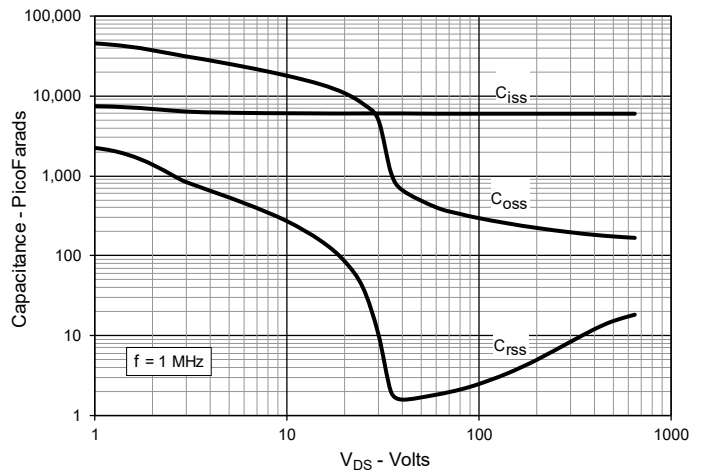


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 45\text{A}$  Value vs. Drain Current**



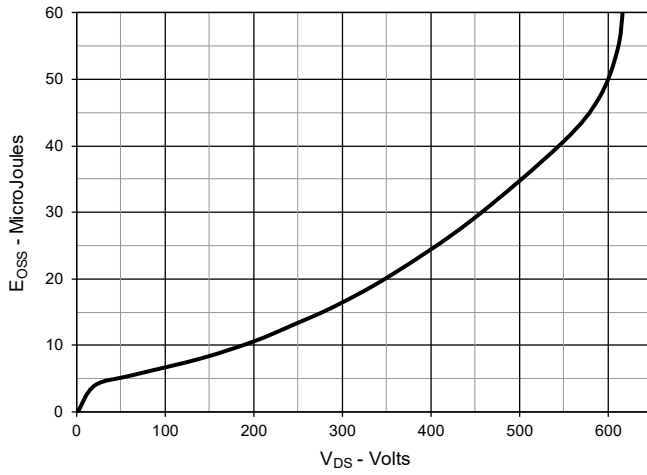
**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**



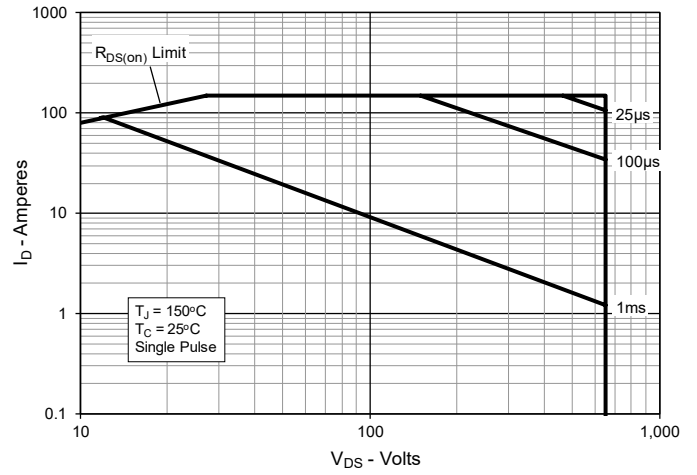
**Fig. 7. Maximum Drain Current vs. Case Temperature**

**Fig. 8. Input Admittance**

**Fig. 9. Transconductance**

**Fig. 10. Forward Voltage Drop of Intrinsic Diode**

**Fig. 11. Gate Charge**

**Fig. 12. Capacitance**


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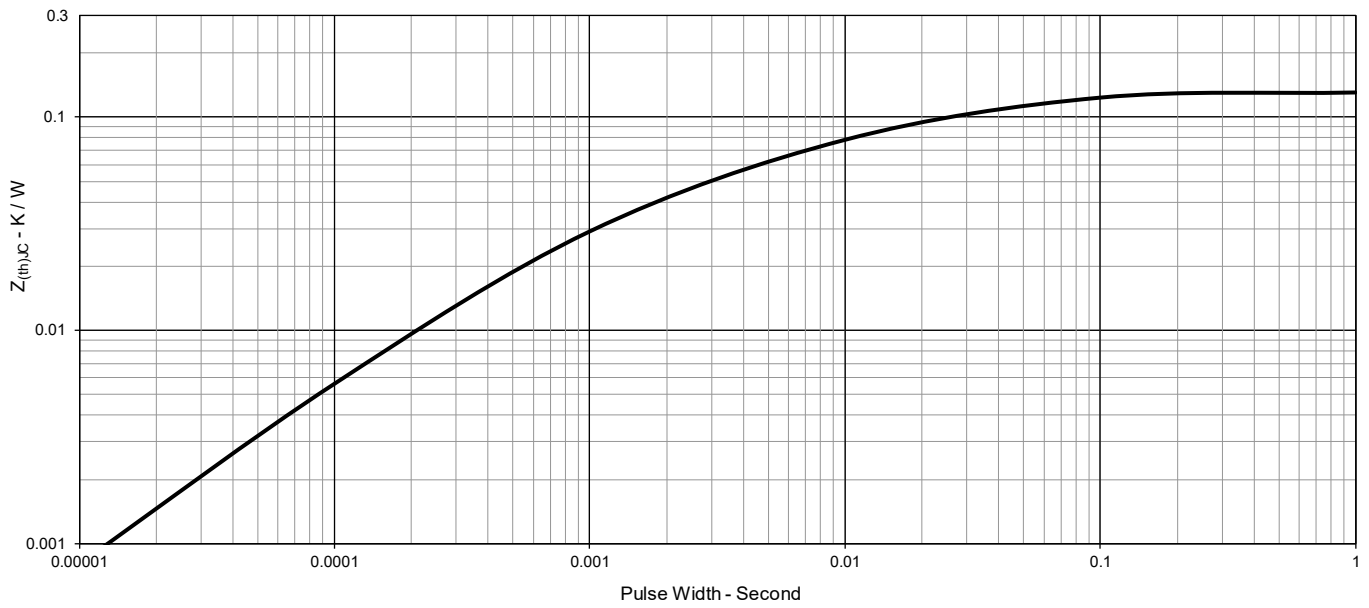
**Fig. 13. Output Capacitance Stored Energy**

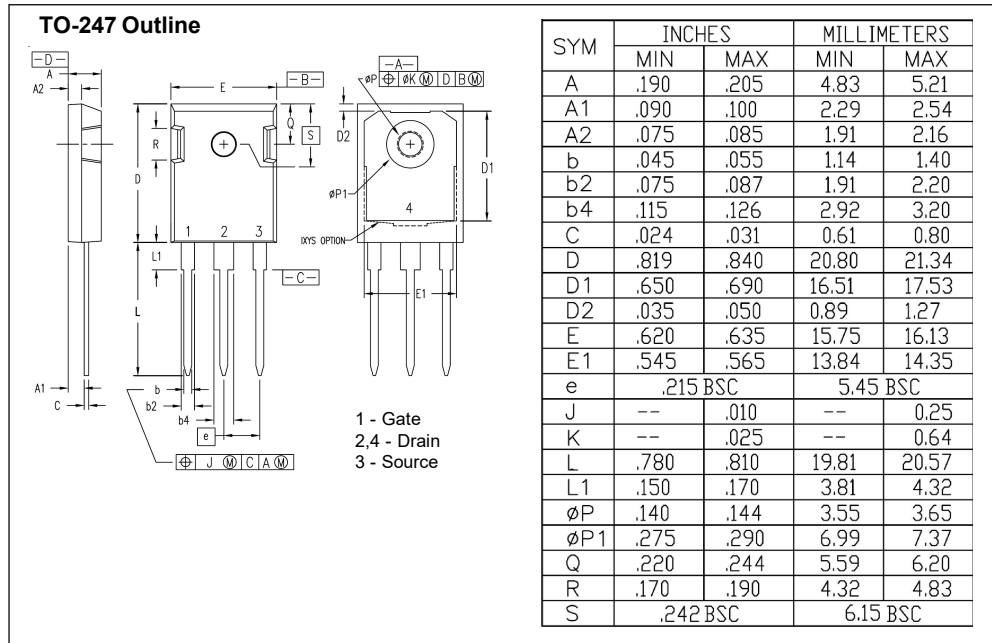


**Fig. 14. Forward-Bias Safe Operating Area**



**Fig. 15. Maximum Transient Thermal Impedance**





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