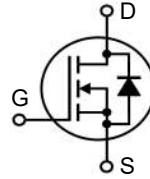


X4-Class Power MOSFET™

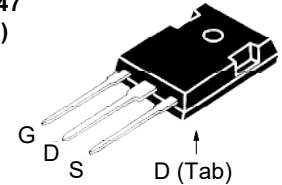
IXTH220N20X4

$V_{DSS} = 200V$
 $I_{D25} = 220A$
 $R_{DS(on)} \leq 5.5m\Omega$

N-Channel Enhancement Mode
Avalanche Rated



TO-247
(IXTH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ C$ to $175^\circ C$	200	V
V_{DGR}	$T_J = 25^\circ C$ to $175^\circ C$, $R_{GS} = 1M\Omega$	200	V
V_{GSS}	Continuous	± 20	V
V_{GSM}	Transient	± 30	V
I_{D25}	$T_C = 25^\circ C$	220	A
$I_{L(RMS)}$	External Lead Current Limit	160	A
I_{DM}	$T_C = 25^\circ C$, Pulse Width Limited by T_{JM}	400	A
I_A	$T_C = 25^\circ C$	110	A
E_{AS}	$T_C = 25^\circ C$	900	mJ
dv/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ C$	50	V/ns
P_D	$T_C = 25^\circ C$	800	W
T_J		-55 ... +175	$^\circ C$
T_{JM}		175	$^\circ C$
T_{stg}		-55 ... +175	$^\circ C$
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	$^\circ C$
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		6	g

Features

- International Standard Package
- Low $R_{DS(ON)}$ and Q_G
- 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 ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 250\mu A$	200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	2.5		4.5 V
I_{GSS}	$V_{GS} = \pm 20V$, $V_{DS} = 0V$			± 100 nA
I_{DSS}	$V_{DS} = V_{DSS}$, $V_{GS} = 0V$ $T_J = 150^\circ C$			10 μA 1.5 mA
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1	4.1		5.5 m Ω

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
g_{fs}	$V_{DS} = 10\text{V}, I_D = 60\text{A}$, Note 1	90	150	S
R_{Gi}	Gate Input Resistance		1.6	Ω
C_{iss}	} $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		12.3	nF
C_{oss}			1650	pF
C_{rss}			5.4	pF
Effective Output Capacitance				
$C_{o(er)}$	Energy related } $V_{GS} = 0\text{V}$		900	pF
$C_{o(tr)}$	Time related } $V_{DS} = 0.8 \cdot V_{DSS}$		3400	pF
Resistive Switching Times				
$t_{d(on)}$	} $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 2\Omega$ (External)		30	ns
t_r			15	ns
$t_{d(off)}$			87	ns
t_f			6	ns
$Q_{g(on)}$	} $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		157	nC
Q_{gs}			50	nC
Q_{gd}			46	nC
R_{thJC}				0.19 $^\circ\text{C/W}$
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	$V_{GS} = 0\text{V}$			220 A
I_{SM}	Repetitive, pulse Width Limited by T_{JM}			880 A
V_{SD}	$I_F = 100\text{A}, V_{GS} = 0\text{V}$, Note 1			1.4 V
t_{rr}	} $I_F = 110\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		140	ns
Q_{RM}			770	nC
I_{RM}			11	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	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
by one or more of the following U.S. patents:	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	

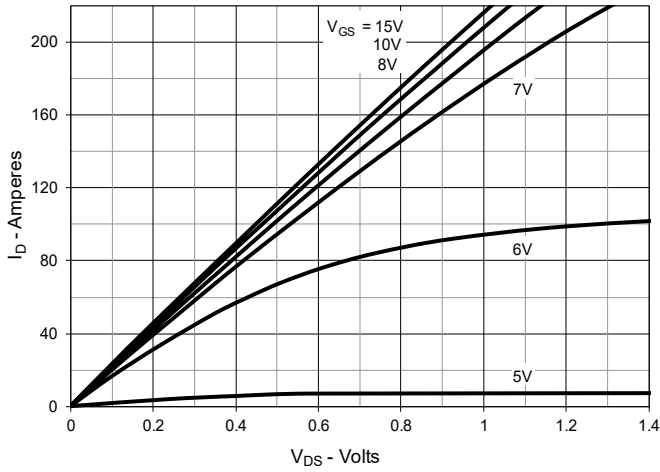
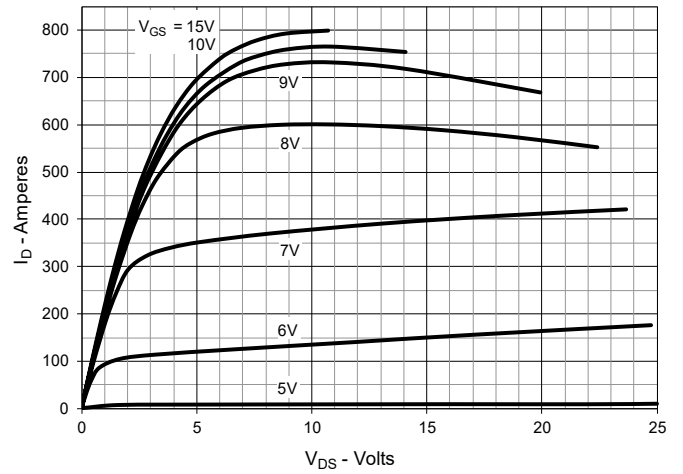
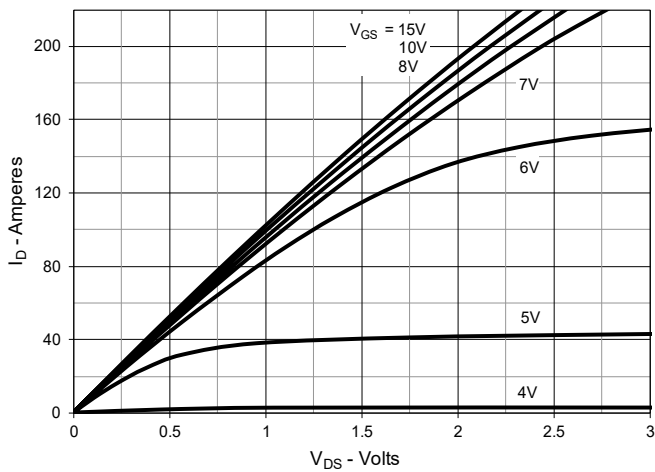
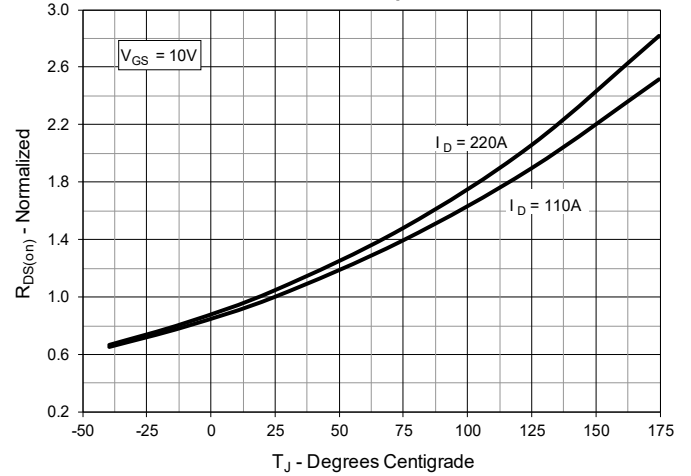
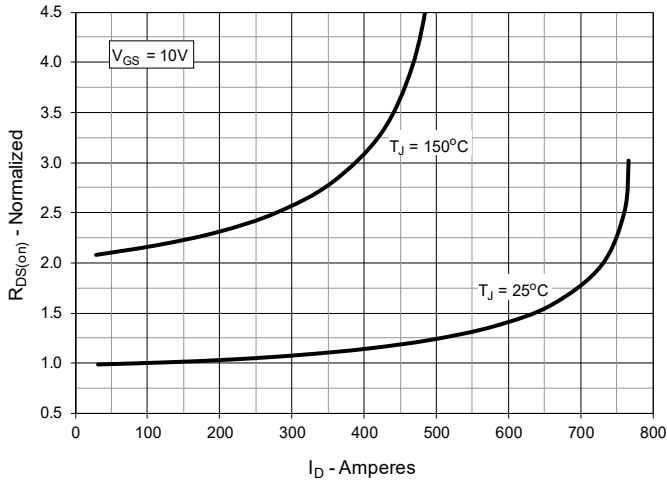
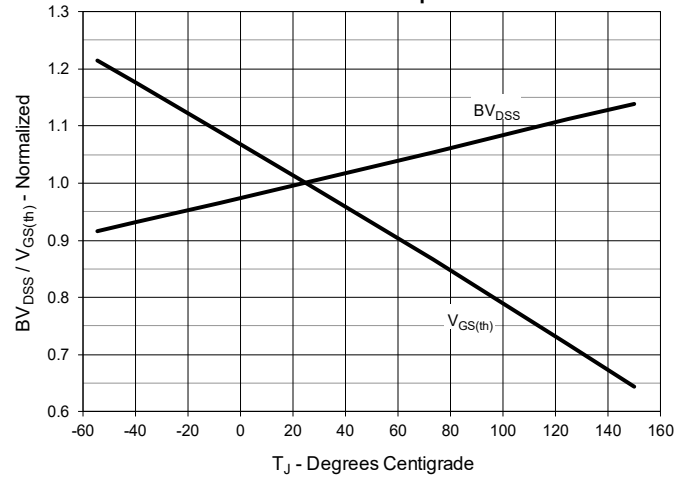
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 110\text{A}$ Value vs. Junction Temperature

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 110\text{A}$ Value vs. Drain Current

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


Fig. 7. Maximum Drain Current vs. Case Temperature

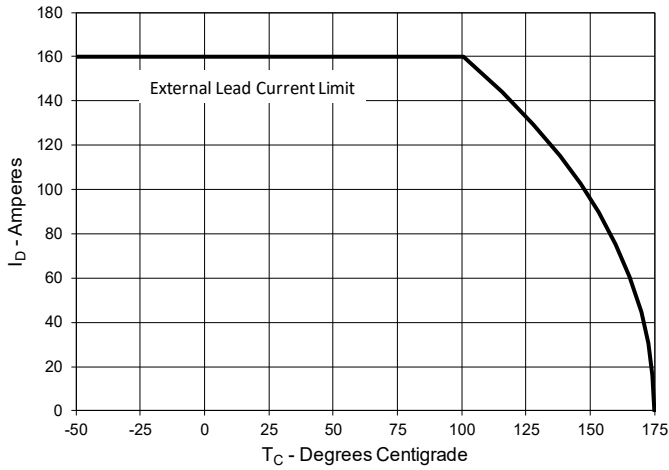


Fig. 8. Input Admittance

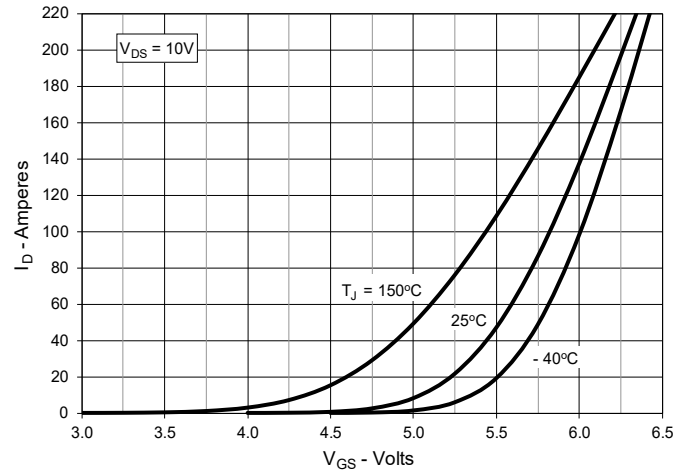


Fig. 9. Transconductance

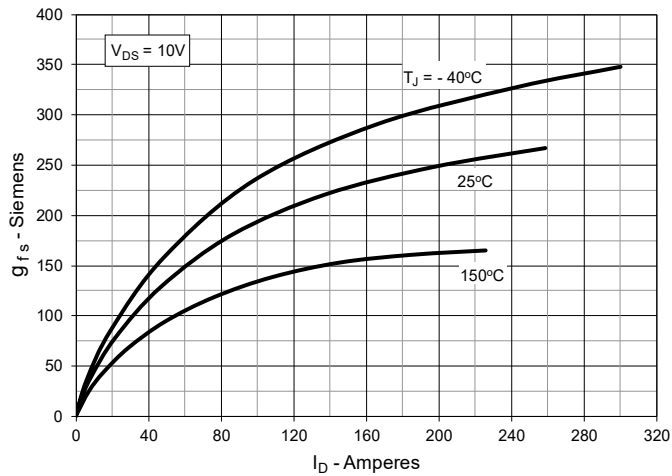


Fig. 10. Forward Voltage Drop of Intrinsic Diode

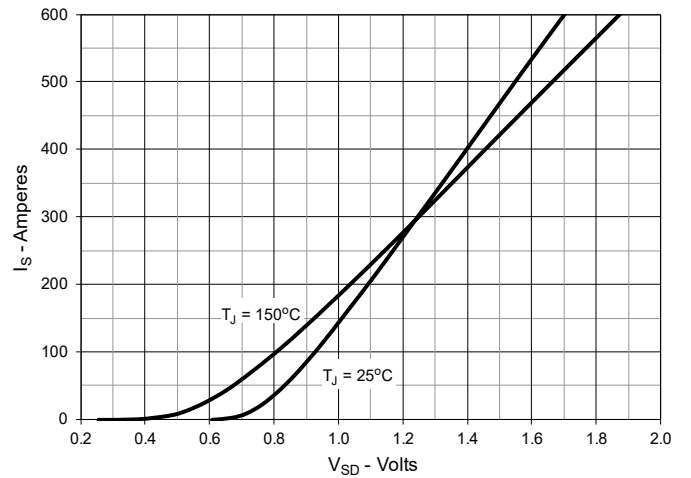


Fig. 11. Gate Charge

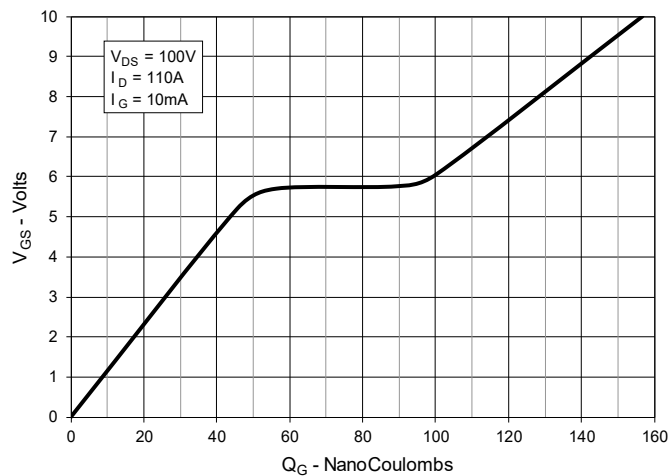


Fig. 12. Capacitance

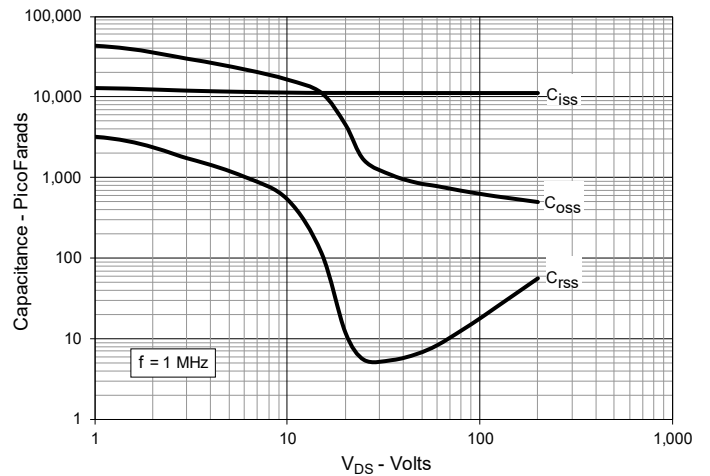


Fig. 13. Output Capacitance Stored Energy

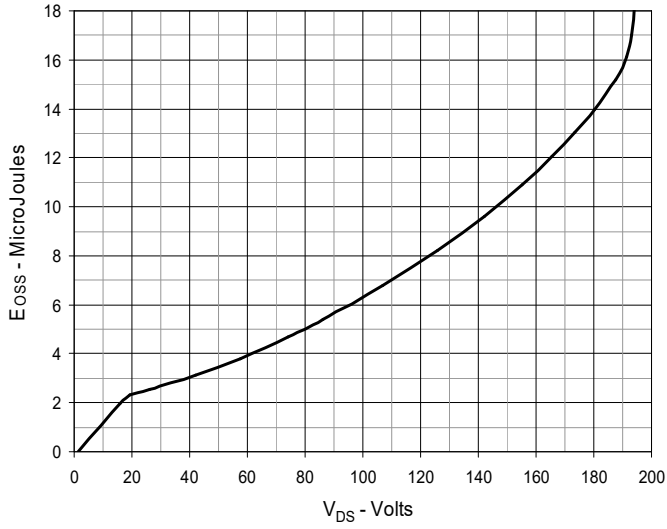


Fig. 14. Forward-Bias Safe Operating Area

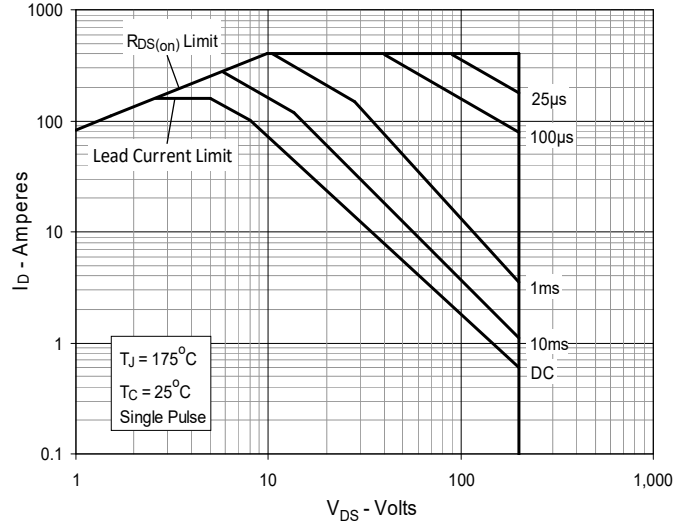
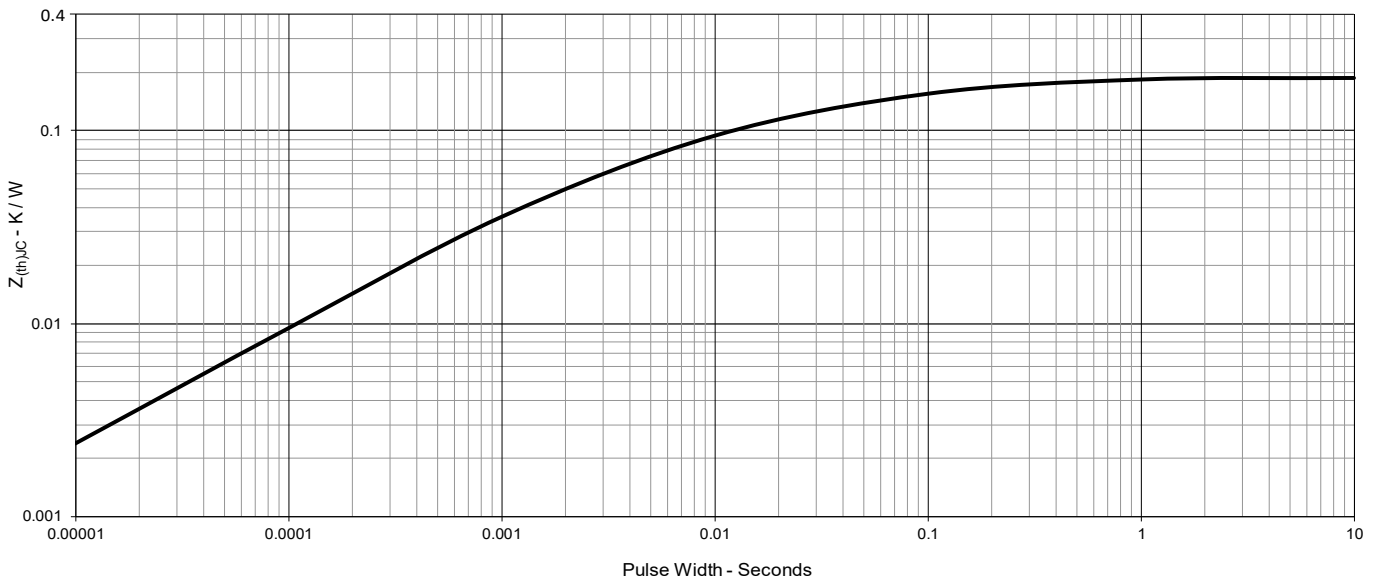
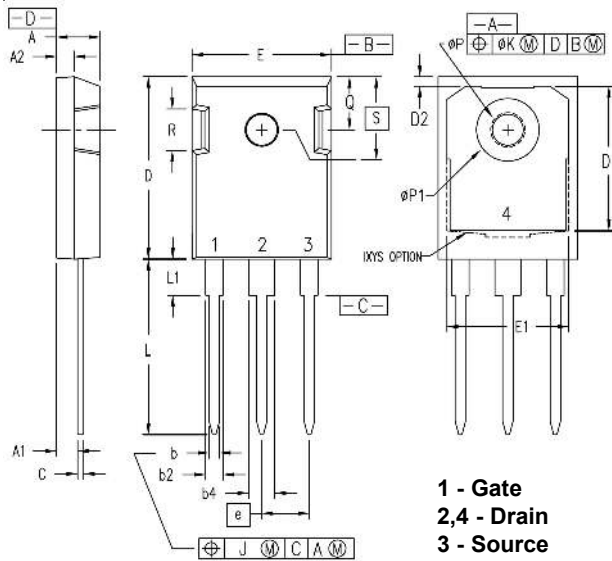


Fig. 15. Maximum Transient Thermal Impedance



TO-247 Outline


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b2	.075	.087	1.91	2.20
b4	.115	.126	2.92	3.20
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
D1	.650	.690	16.51	17.53
D2	.035	.050	0.89	1.27
E	.620	.635	15.75	16.13
E1	.545	.565	13.84	14.35
e	.215 BSC		5.45 BSC	
J	--	.010	--	0.25
K	--	.025	--	0.64
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
øP	.140	.144	3.55	3.65
øP1	.275	.290	6.99	7.37
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.242 BSC		6.15 BSC	



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