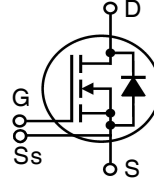


**X2-Class
HiPerFET™
Power MOSFET**

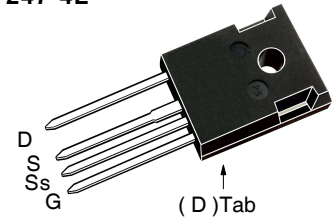
IXFH60N65X2-4

V_{DSS} = 650V
I_{D25} = 60A
R_{DS(on)} ≤ 52mΩ

N-Channel Enhancement Mode
 Avalanche Rated
 Fast Intrinsic Diode



TO-247-4L



S = Source G = Gate
 D = Drain Ss = Source Sense

Symbol	Test Conditions	Maximum Ratings	
V _{DSS}	T _J = 25°C to 150°C	650	V
V _{DGR}	T _J = 25°C to 150°C, R _{GS} = 1MΩ	650	V
V _{GSS}	Continuous	±30	V
V _{GSM}	Transient	±40	V
I _{D25}	T _C = 25°C	60	A
I _{DM}	T _C = 25°C, Pulse Width Limited by T _{JM}	120	A
I _A	T _C = 25°C	15	A
E _{AS}	T _C = 25°C	2.5	J
dv/dt	I _S ≤ I _{DM} , V _{DD} ≤ V _{DSS} , T _J ≤ 150°C	50	V/ns
P _D	T _C = 25°C	780	W
T _J		-55 ... +150	°C
T _{JM}		150	°C
T _{stg}		-55 ... +150	°C
T _L	Maximum Lead Temperature for Soldering	300	°C
T _{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°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°C, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV _{DSS}	V _{GS} = 0V, I _D = 1mA	650		V
V _{GS(th)}	V _{DS} = V _{GS} , I _D = 4mA	3.5		5.0 V
I _{GSS}	V _{GS} = ±30V, V _{DS} = 0V			±100 nA
I _{DSS}	V _{DS} = V _{DSS} , V _{GS} = 0V T _J = 125°C			25 μA 2.5 mA
R _{DS(on)}	V _{GS} = 10V, I _D = 0.5 • I _{D25} , Note 1			52 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	23	38	S
R_{Gi}	Gate Input Resistance		0.8	Ω
C_{iss}	} $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$		6300	pF
C_{oss}			3540	pF
C_{rss}			1.7	pF
Effective Output Capacitance				
$C_{o(er)}$	Energy related	} $V_{GS} = 0\text{V}$ $V_{DS} = 0.8 \cdot V_{DSS}$	207	pF
$C_{o(tr)}$	Time related		855	pF
Resistive Switching Times				
$t_{d(on)}$	} $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 3\Omega$ (External)		30	ns
t_r			23	ns
$t_{d(off)}$			63	ns
t_f			12	ns
$Q_{g(on)}$	} $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$		108	nC
Q_{gs}			40	nC
Q_{gd}			34	nC
R_{thJC}				0.16 $^\circ\text{C/W}$
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	$V_{GS} = 0\text{V}$			60 A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			240 A
V_{SD}	$I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1			1.4 V
t_{rr}	} $I_F = 30\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		180	ns
Q_{RM}			1.4	μC
I_{RM}			16.0	A

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

IXYS 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	

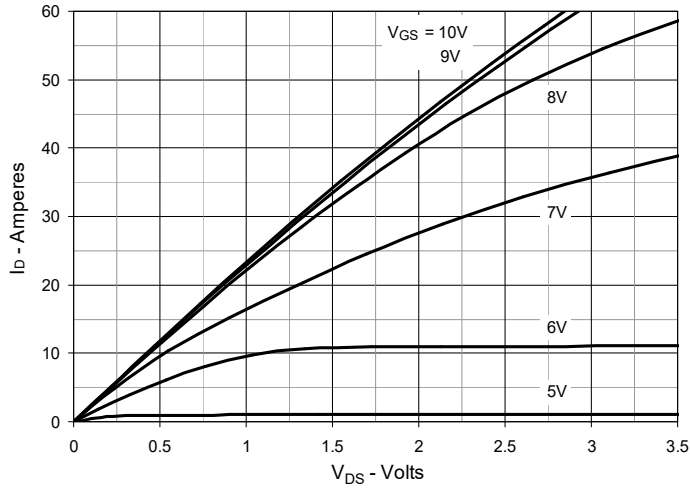
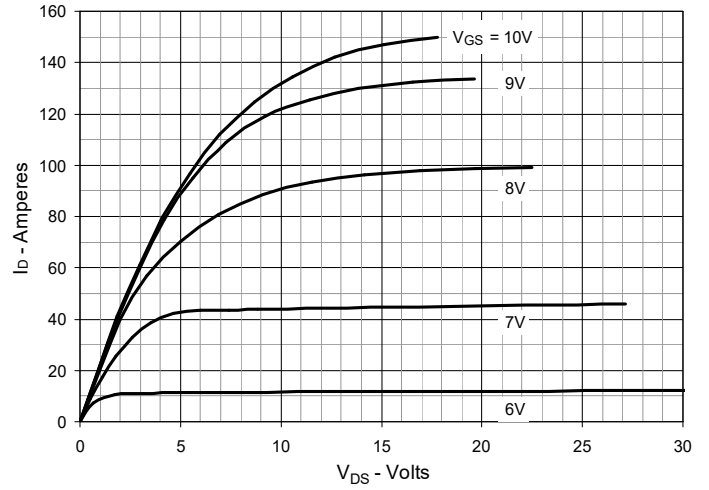
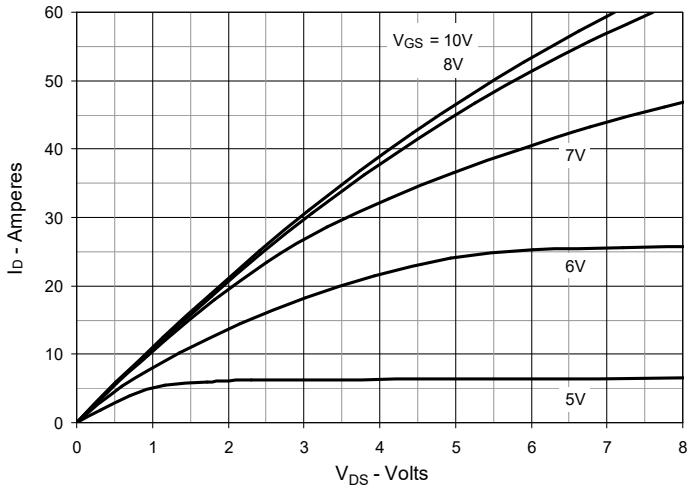
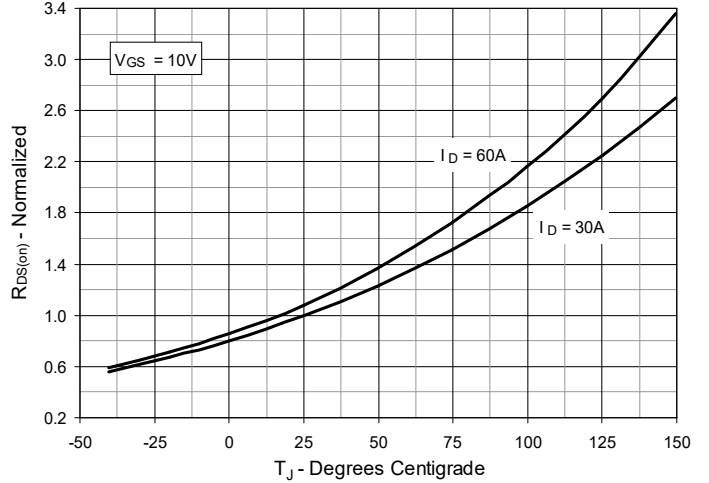
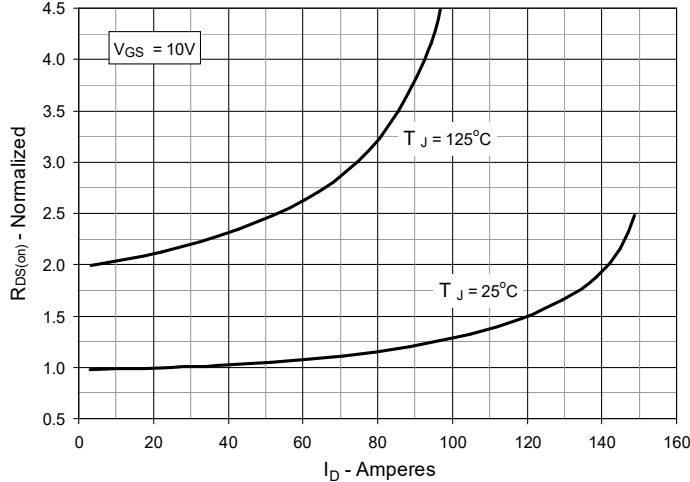
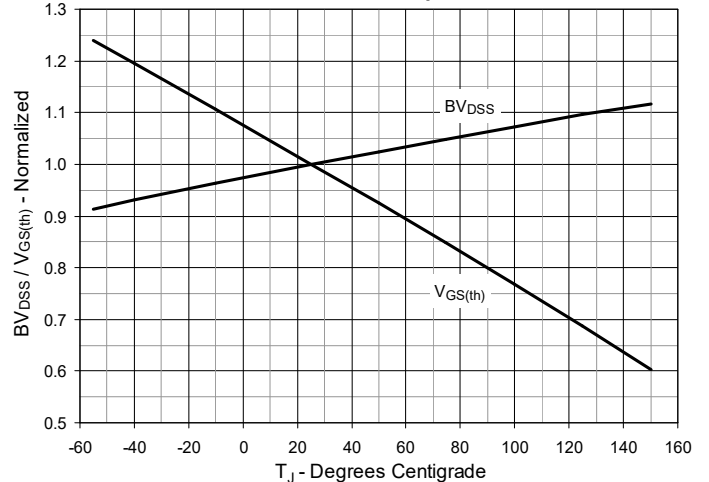
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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 $I_D = 30\text{A}$ Value vs. Junction Temperature

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 30\text{A}$ Value vs. Drain Current

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


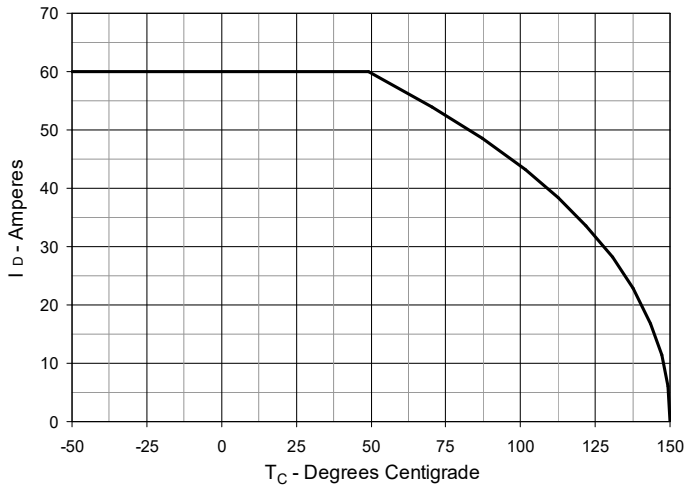
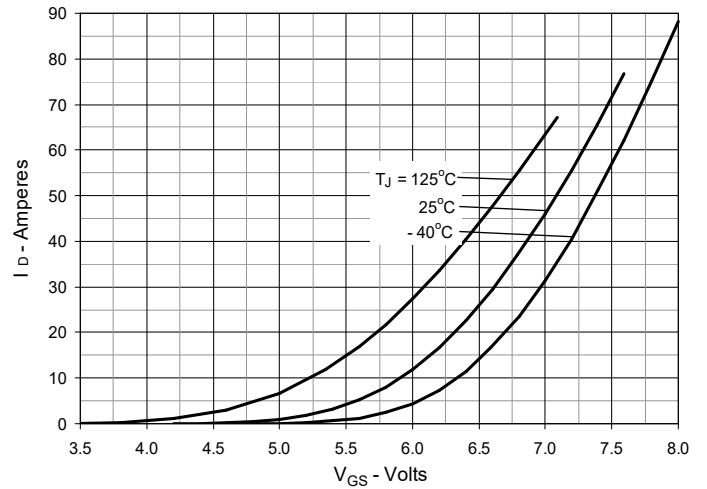
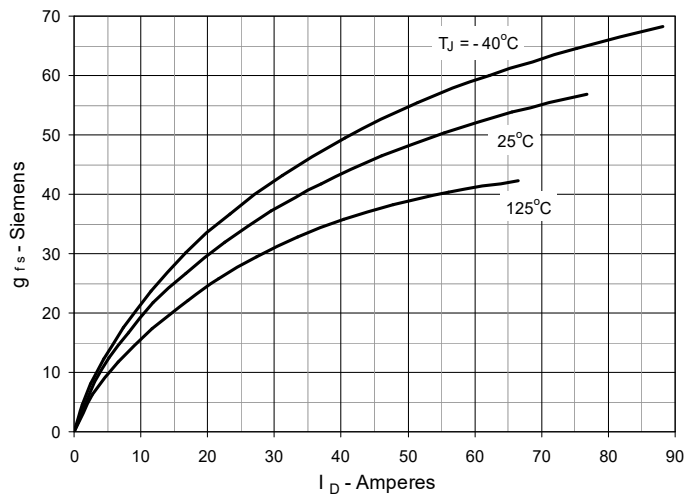
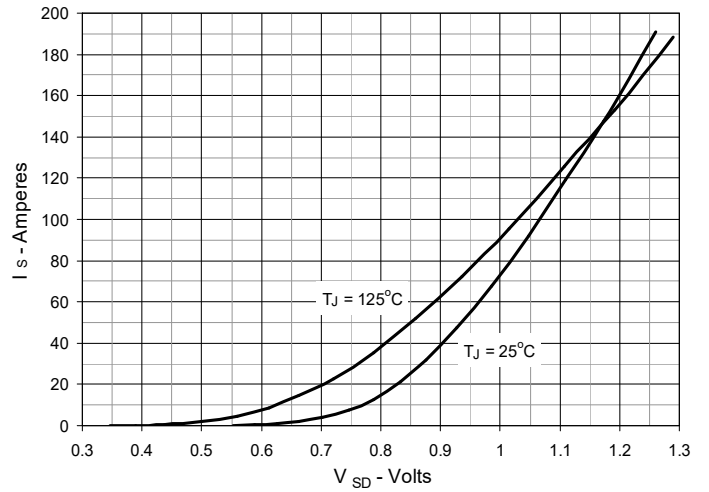
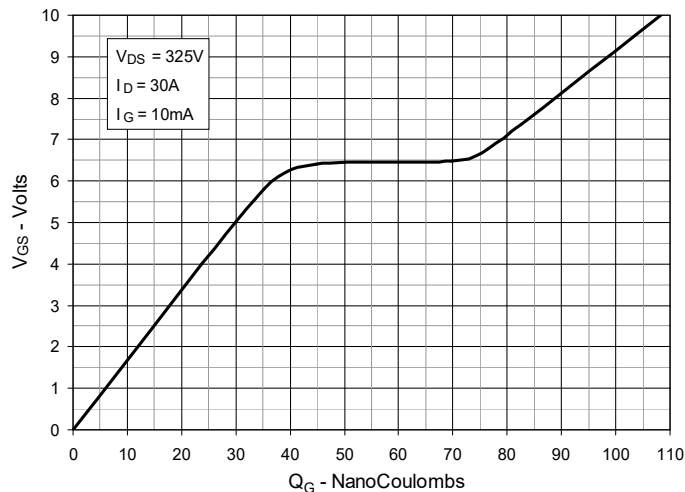
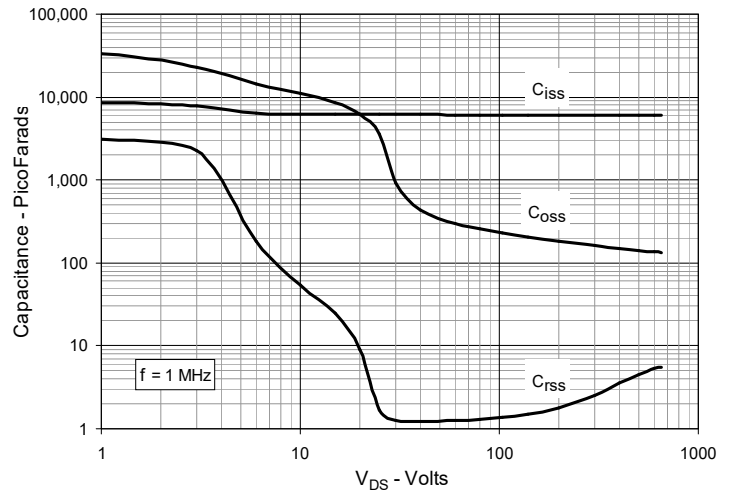
Fig. 7. Maxing Drain Current vs. Case Temperature

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

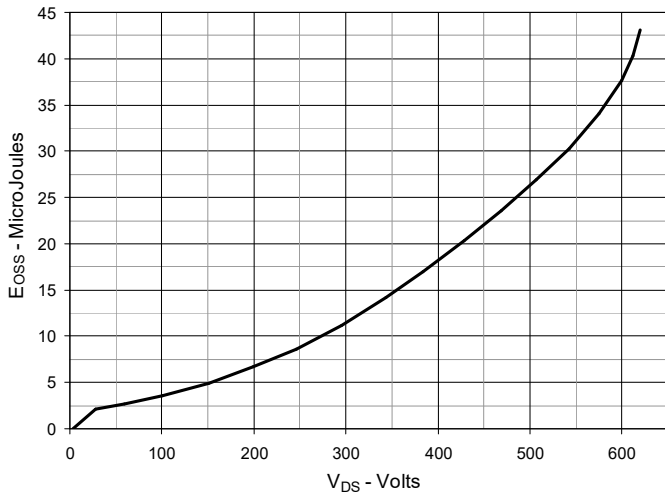


Fig. 14. Forward-Bias Safe Operating Area

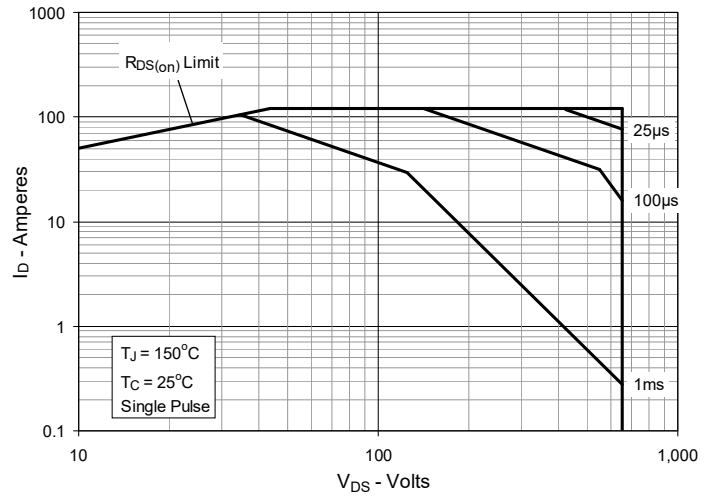
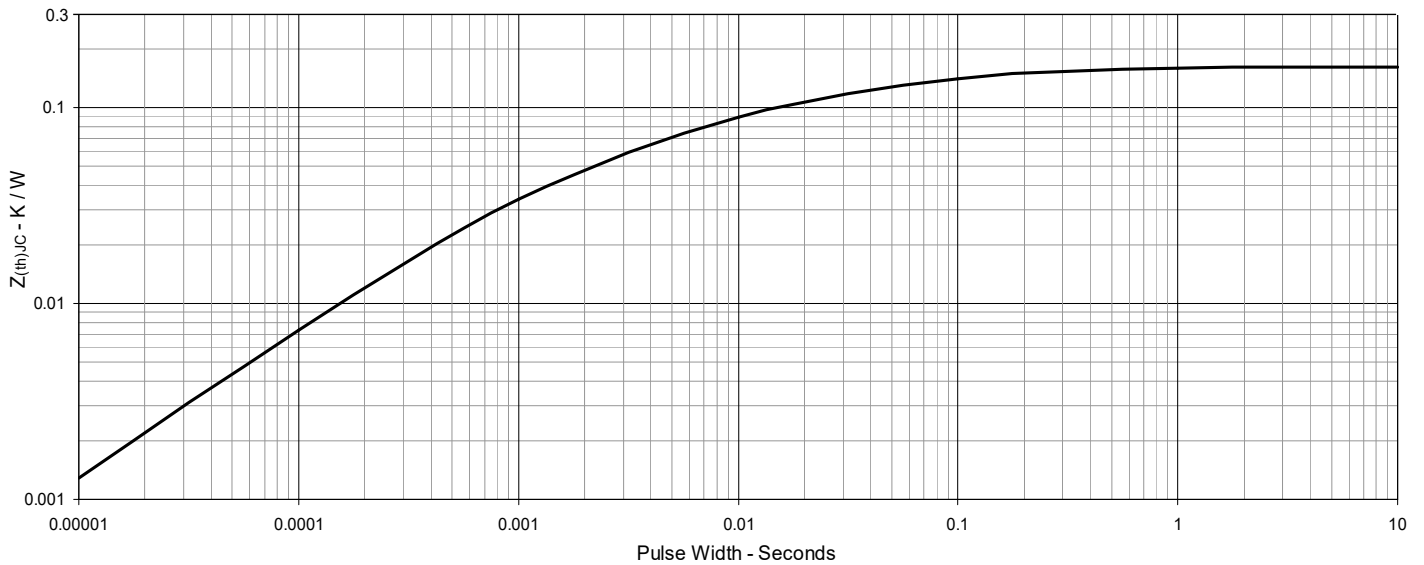
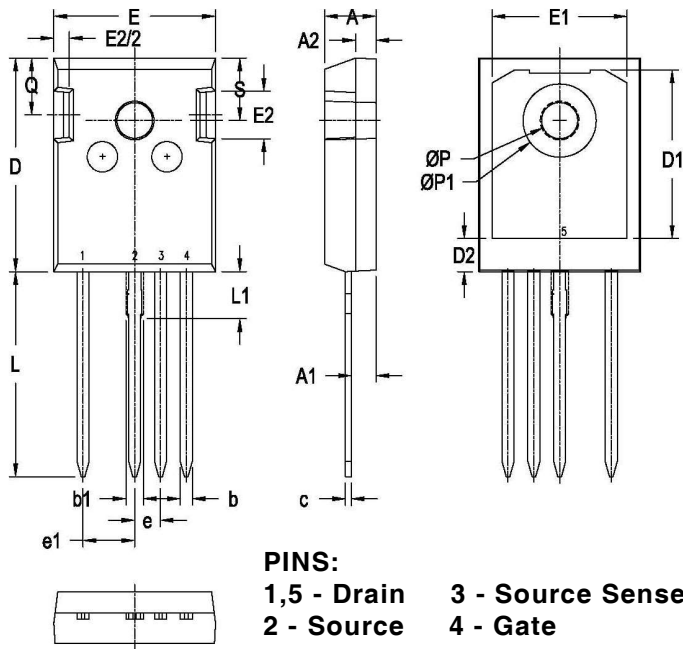


Fig. 15. Maximum Transient Thermal Impedance



TO-247 - 4L Outline


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.189	.205	4.80	5.20
A1	.090	.098	2.30	2.50
A2	.075	.083	1.90	2.10
b	.043	.055	1.10	1.40
b1	.063	.071	1.60	1.80
c	.020	.031	0.50	0.80
D	.819	.839	20.80	21.30
D1	.630	.670	16.00	17.00
D2	.118	.138	3.00	3.50
E	.620	.636	15.75	16.15
E1	.531	.559	13.50	14.20
E2	.169	.193	4.30	4.90
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
L	.780	.799	19.80	20.30
L1	.157	.177	4.00	4.50
ØP	.140	.144	3.55	3.65
ØP1	.280	.287	7.10	7.30
Q	.213	.236	5.40	6.00
S	.242 BSC		6.15 BSC	



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