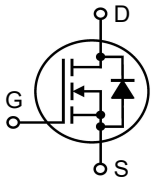
IXYS

X3-Class HiPerFET™ Power MOSFET

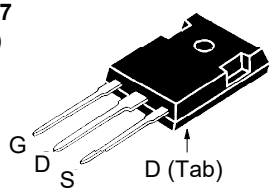
IXFH90N65X3

V_{DSS} = 650V
I_{D25} = 90A
$R_{DS(on)}$ ≤ 33mΩ

N-Channel Enhancement Mode
Avalanche Rated



TO-247 (IXFH)



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

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	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	90	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	150	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	3	J
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	50	V/ns
P_D	T_C = 25°C	960	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	°C
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		6	g

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	3.2		5.2	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			50	μA
	T_J = 125°C			6	mA
$R_{DS(on)}$	V_{GS} = 10V, $I_D = 0.5 \bullet I_{D25}$, Note 1			33	mΩ

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

©2021 Littelfuse, Inc.

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

Source-Drain Diode

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

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123B1 6,306,728B1 6,404,065B1 6,534,343 6,583,505 6,683,344 6,710,405B2 6,710,463 6,727,585 6,759,692 6,771,478B2 7,005,734B2 7,063,975B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25ºC

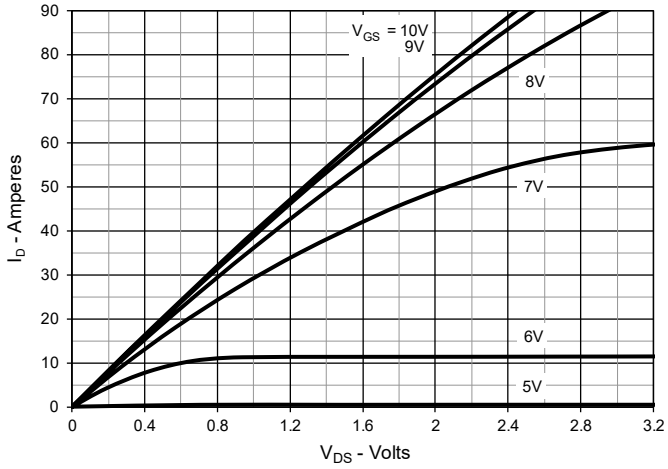


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

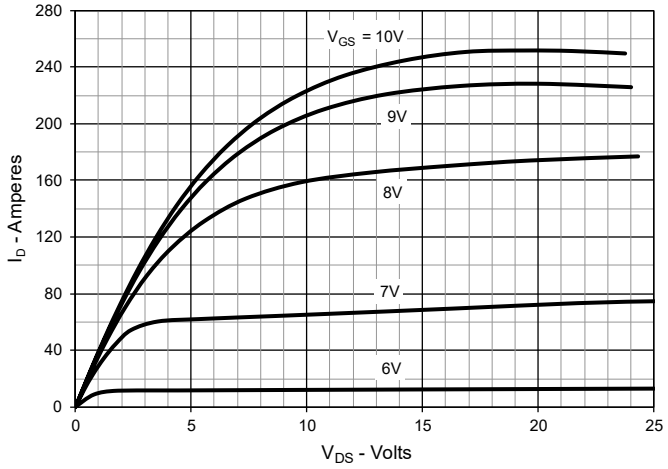


Fig. 3. Output Characteristics @ T_J = 125ºC

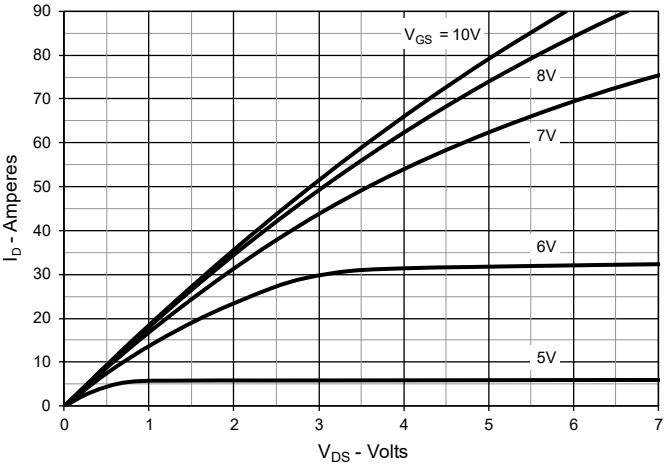


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 45A Value vs. Junction Temperature

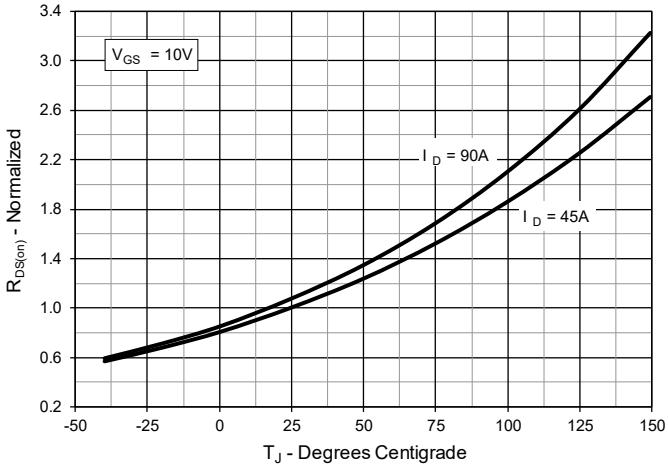


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 45A Value vs. Drain Current

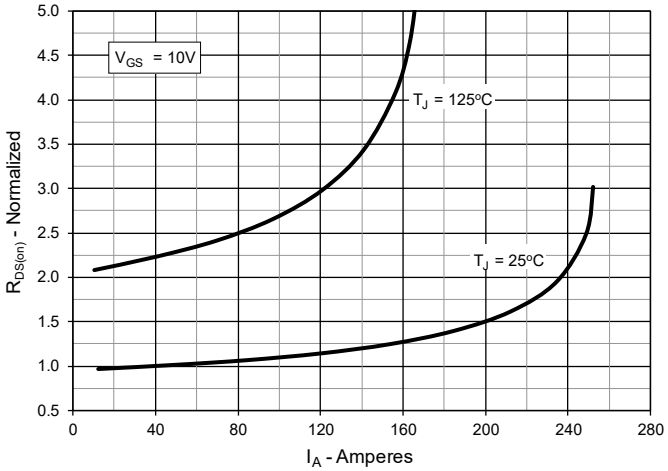
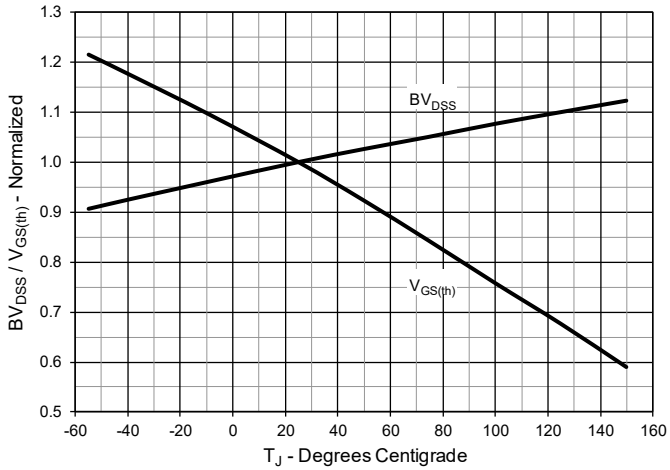


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature



©2021 Littelfuse, Inc.

Fig. 7. Maximum Drain Current vs. Case Temperature

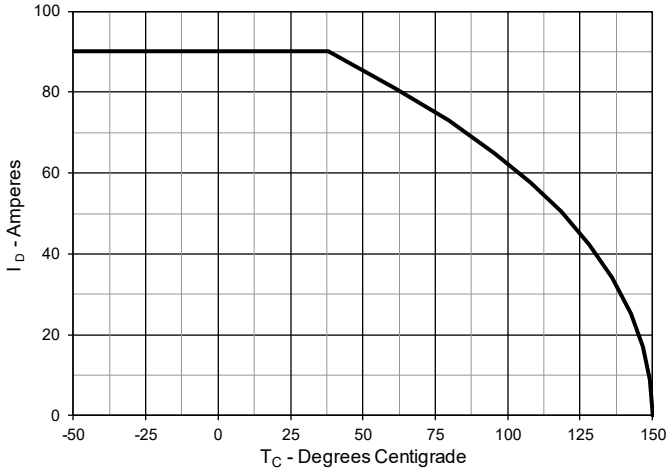


Fig. 8. Input Admittance

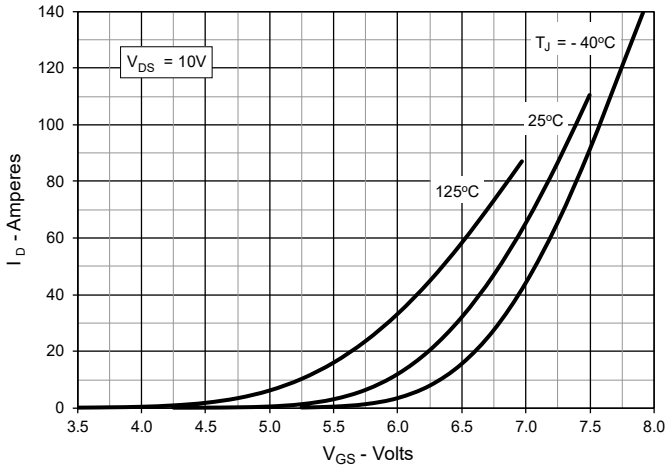


Fig. 9. Transconductance

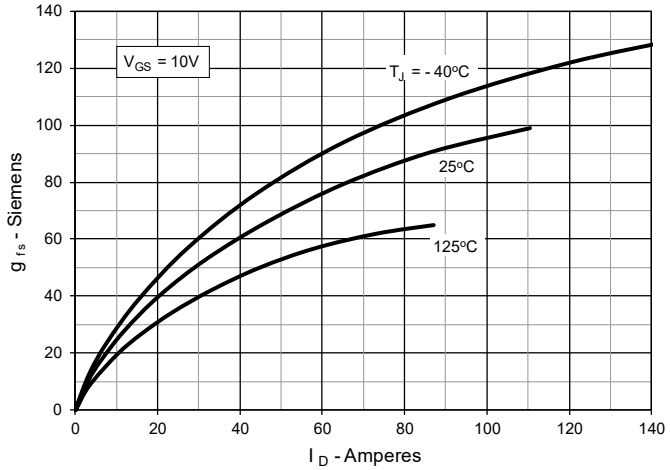


Fig. 10. Forward Voltage Drop of Intrinsic Diode

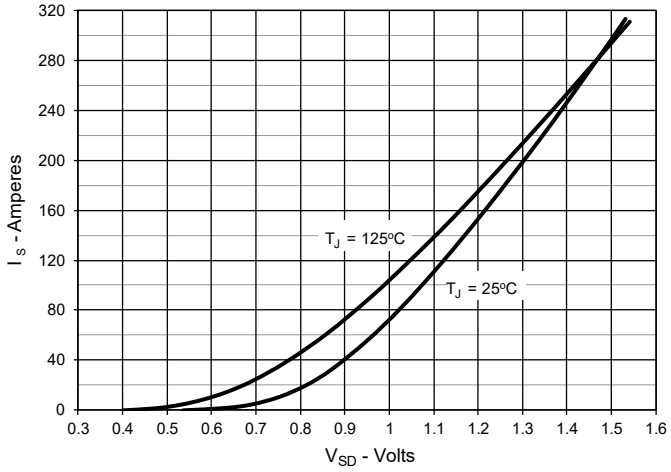


Fig. 11. Gate Charge

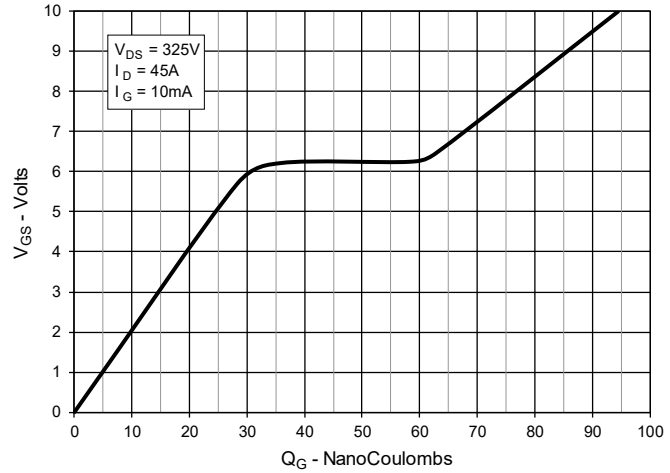
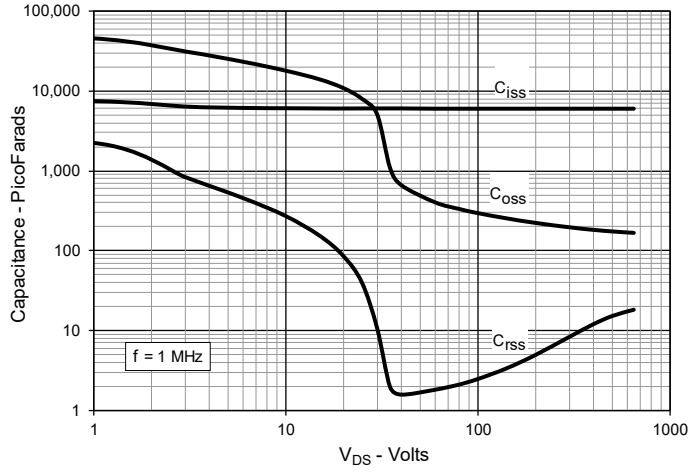


Fig. 12. Capacitance



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

Fig. 13. Output Capacitance Stored Energy

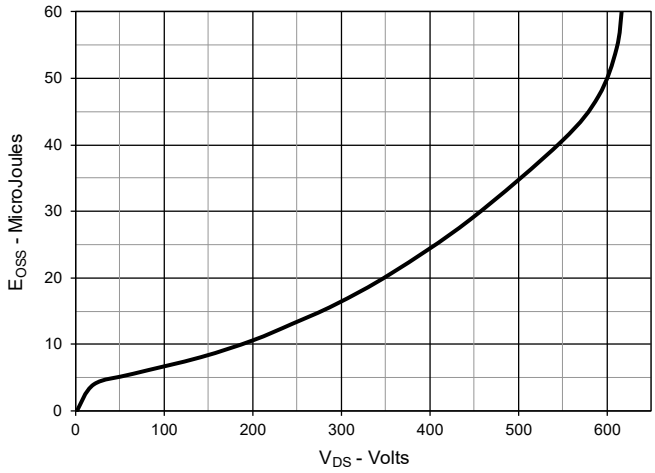


Fig. 14. Forward-Bias Safe Operating Area

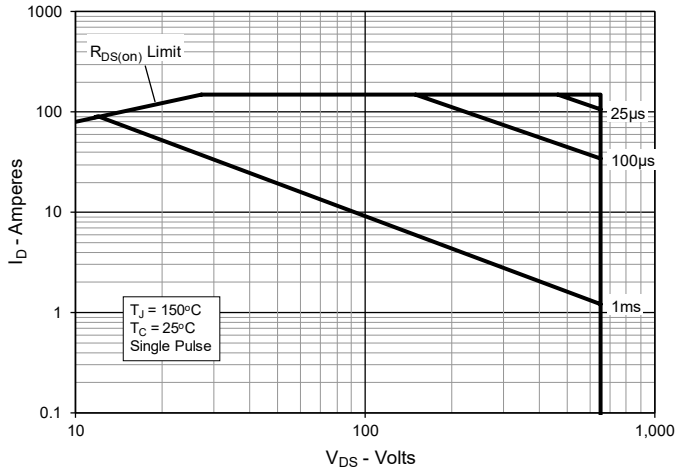
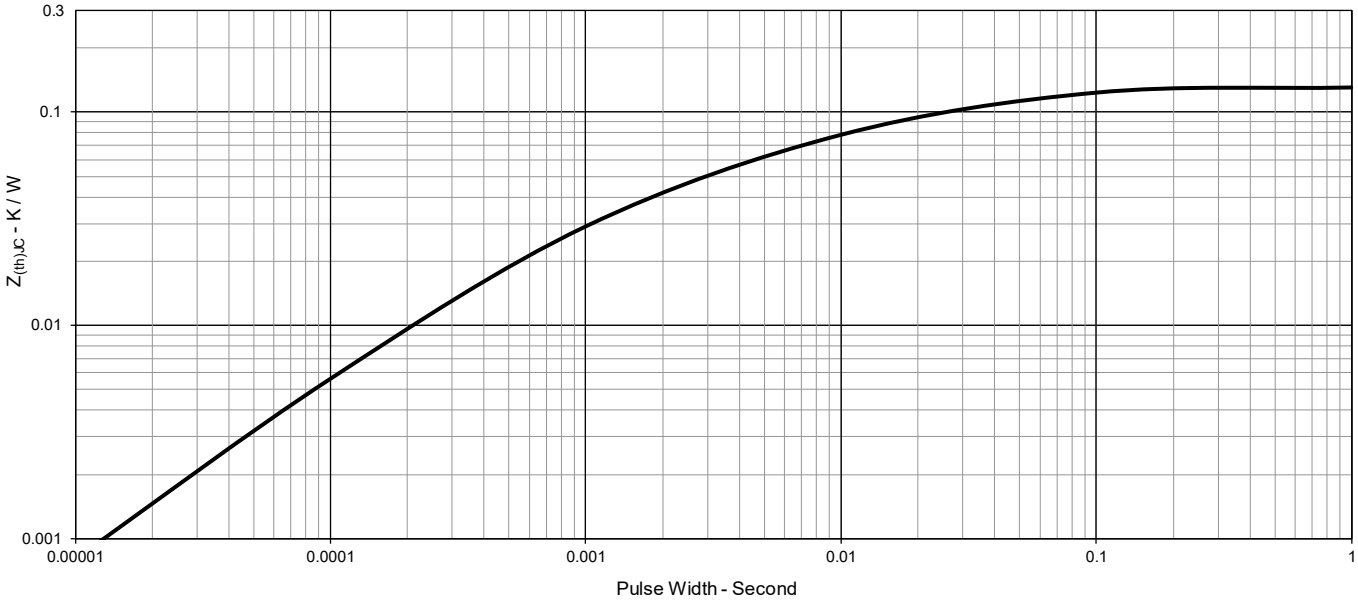
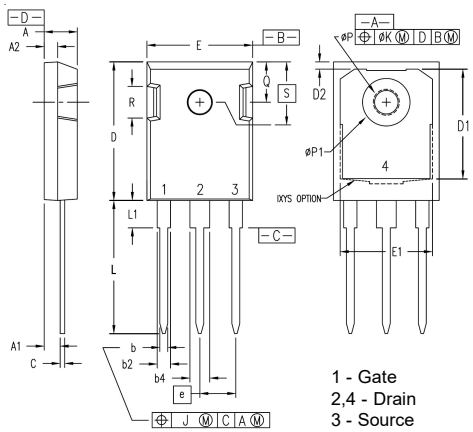


Fig. 15. Maximum Transient Thermal Impedance



©2021 Littelfuse, Inc.

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	

IXYS
A Littelfuse Technology

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

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