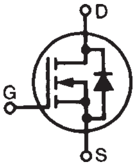
IXYS Advance Technical Information

High Voltage Power MOSFET w/ Extended FBSOA

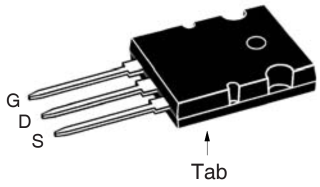
IXTK5N250
IXTX5N250

V_{DSS} = 2500V
I_{D25} = 5A
$R_{DS(on)}$ ≤ 8.8Ω

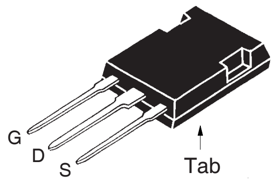
N-Channel Enhancement Mode
Avalanche Rated
Guaranteed FBSOA



TO-264 (IXTK)



PLUS247 (IXTX)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	2500	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	2500	V
V_{GSS}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	5	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	20	A
I_A	T_C = 25°C	2.5	A
E_{AS}	T_C = 25°C	2.5	J
P_D	T_C = 25°C	960	W
T_J		-55 to +150	°C
T_{JM}		150	°C
T_{stg}		-55 to +150	°C
T_L	1.6mm (0.062 in.) from Case for 10s	300	°C
T_{SOLD}	Plastic Body for 10s	260	°C
M_d	Mounting Torque (TO-264)	1.13/10	Nm/lb.in.
F_C	Mounting Force (PLUS247)	20..120 /4.5..27	N/lb.
Weight	TO-264	10	g
	PLUS247	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	2500			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	2.0		5.0	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±200	nA
I_{DSS}	V_{DS} = 2kV, V_{GS} = 0V			50	µA
	T_J = 125°C			4	mA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Note 1			8.8	Ω

Features

- Avalanche Rated
- Fast Intrinsic Diode
- Guaranteed FBSOA at 75°C
- Low Package Inductance

Advantages

- Easy to Mount
- Space Savings

Applications

- High Voltage Power Supplies
- Capacitor Discharge
- Pulse Circuits

Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$V_{DS} = 50V$, $I_D = 0.5 \bullet I_{D25}$, Note 1	3.0	4.5	6.0	S
C_{iss}	$V_{GS} = 0V$, $V_{DS} = 25V$, f = 1MHz		8560		pF
C_{oss}			315		pF
C_{rss}			90		pF
$t_{d(on)}$	**Resistive Switching Times** $V_{GS} = 10V$, $V_{DS} = 0.5 \bullet V_{DSS}$, $I_D = 0.5 \bullet I_{D25}$ $R_G = 1\Omega$ (External)		33		ns
t_r			20		ns
$t_{d(off)}$			90		ns
t_f			44		ns
$Q_{g(on)}$	$V_{GS} = 10V$, $V_{DS} = 1000V$, $I_D = 0.5 \bullet I_{D25}$		200		nC
Q_{gs}			28		nC
Q_{gd}			70		nC
R_{thJC}				0.13	°C/W
R_{thCS}			0.15		°C/W

Safe Operating Area Specification

Symbol	Test Conditions	Characteristic Values Min.	Typ.	Max.	
SOA	$V_{DS} = 2000V$, $I_D = 0.11A$, $T_C = 75°C$, tp = 3s	220			W

Source-Drain Diode

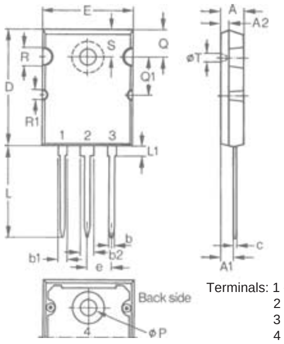
Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	$V_{GS} = 0V$			5	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			20	A
V_{SD}	$I_F = I_S$, $V_{GS} = 0V$, Note 1			1.5	V
t_{rr}	$I_F = 2.5A$, -di/dt = 100A/µs, $V_R = 100V$		1.2		µs

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

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

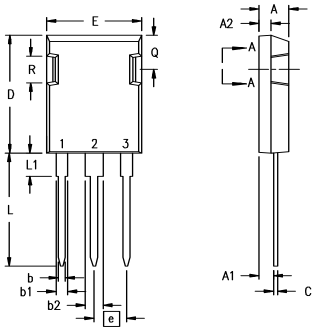
TO-264 Outline



Terminals: 1 - Gate
2 - Drain
3 - Source
4 - Drain

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

PLUS247™ Outline



Terminals: 1 - Gate
2 - Drain
3 - Source

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or moreof the following U.S. patents:									
4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics @ T_J = 25ºC

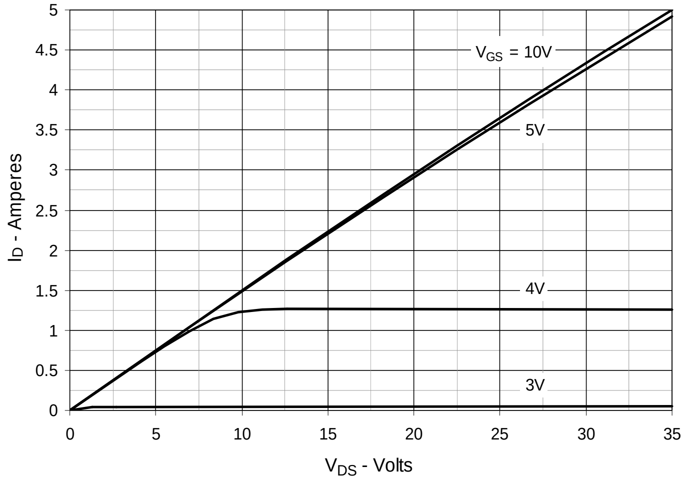


Fig. 2. Output Characteristics @ T_J = 125ºC

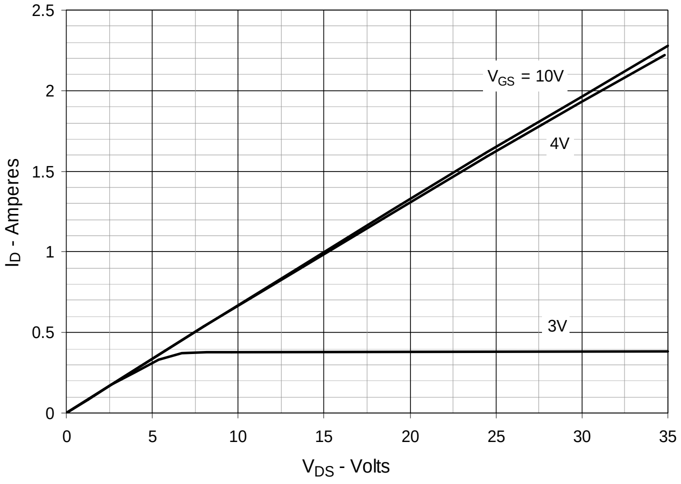


Fig. 3. $R_{DS(on)}$ Normalized to I_D = 2.5A Value vs. Junction Temperature

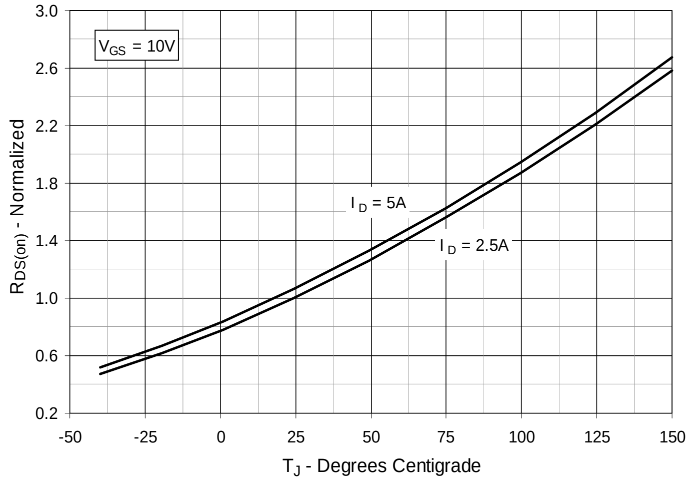


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 2.5A Value vs. Drain Current

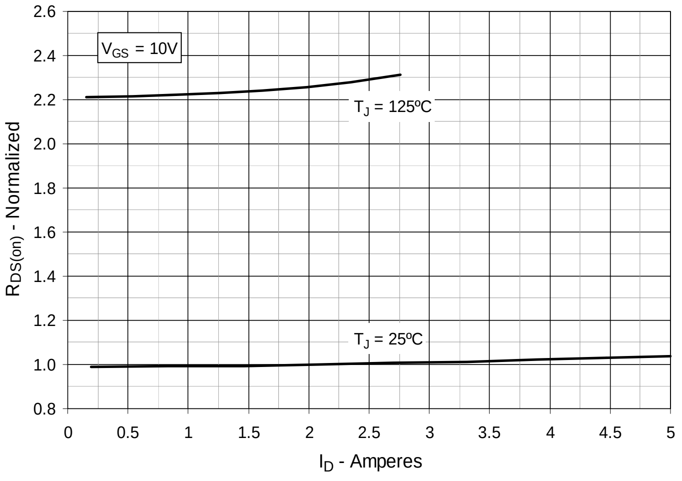


Fig. 5. Maximum Drain Current vs. Case Temperature

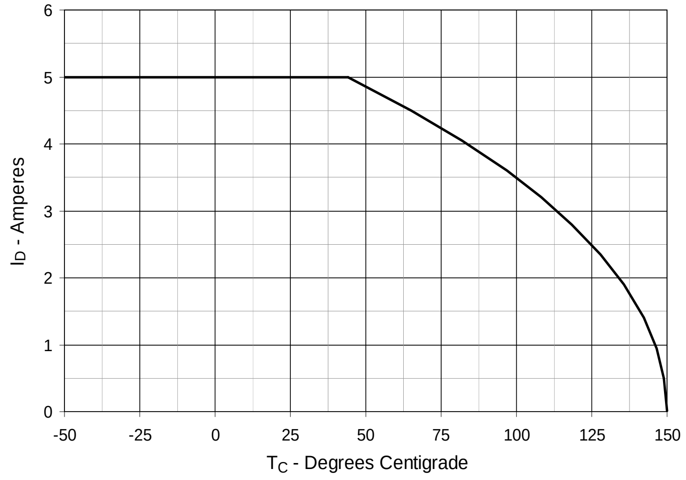


Fig. 6. Input Admittance

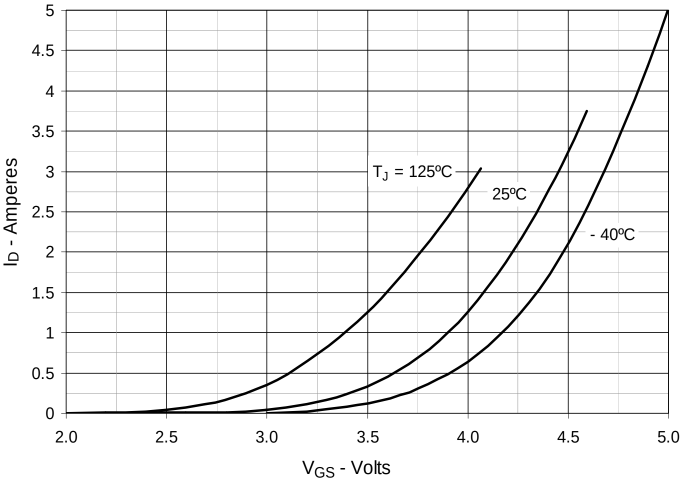


Fig. 7. Transconductance

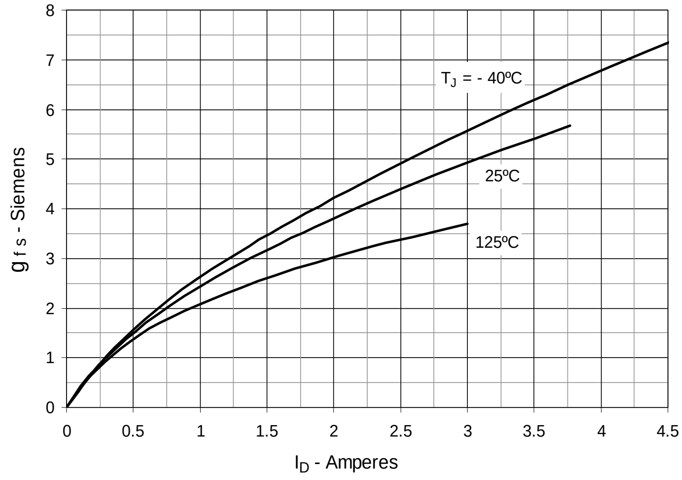


Fig. 8. Forward Voltage Drop of Intrinsic Diode

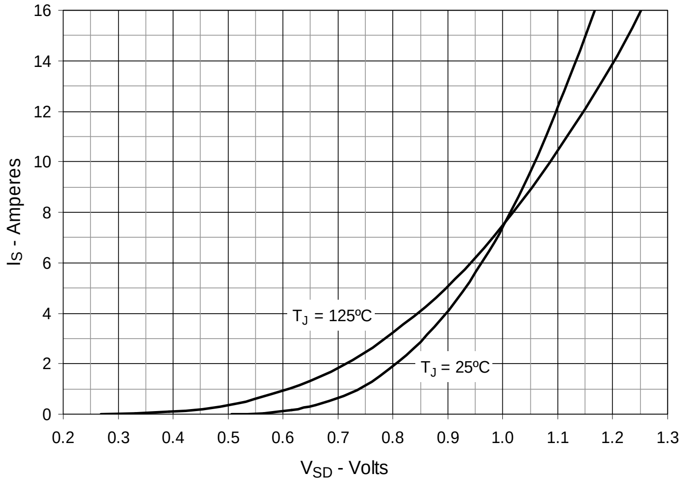


Fig. 9. Gate Charge

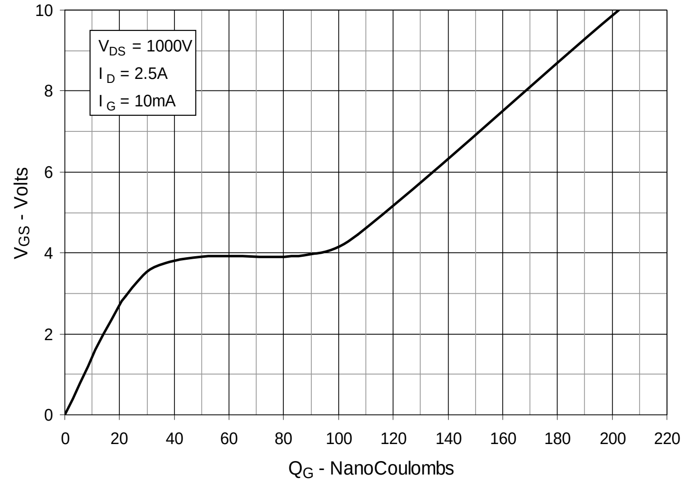


Fig. 10. Capacitance

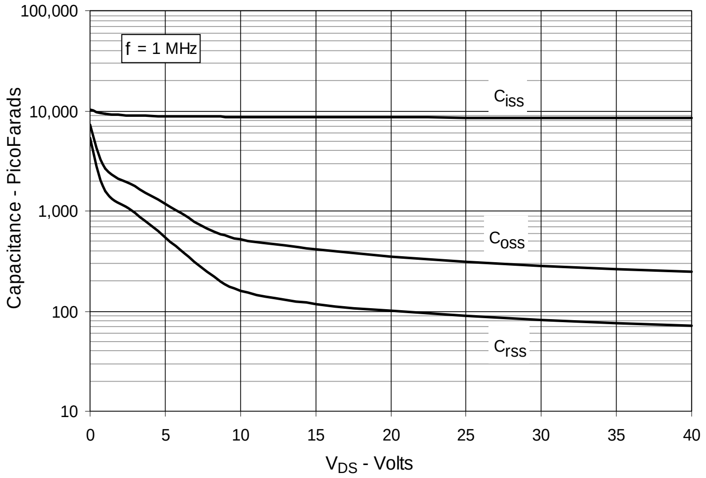


Fig. 11. Forward-Bias Safe Operating Area
@ T_C = 25ºC

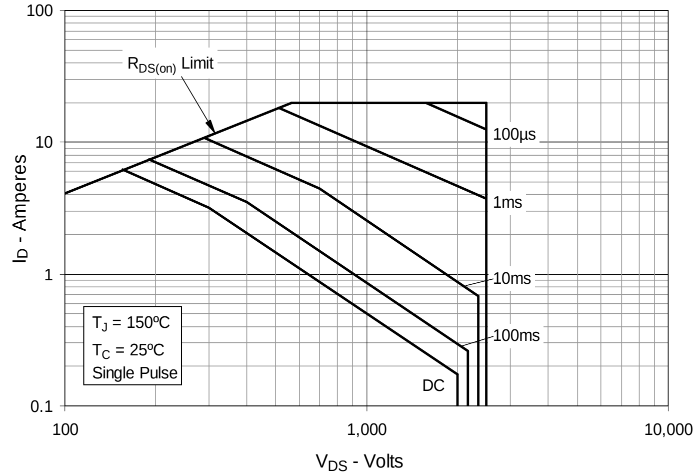


Fig. 12. Forward-Bias Safe Operating Area
@ T_C = 75ºC

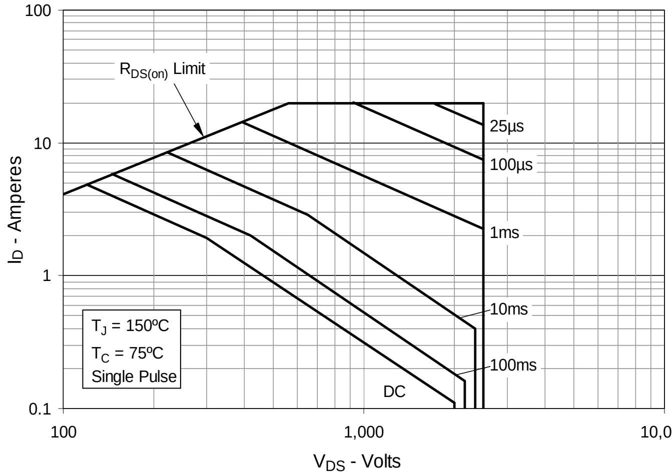
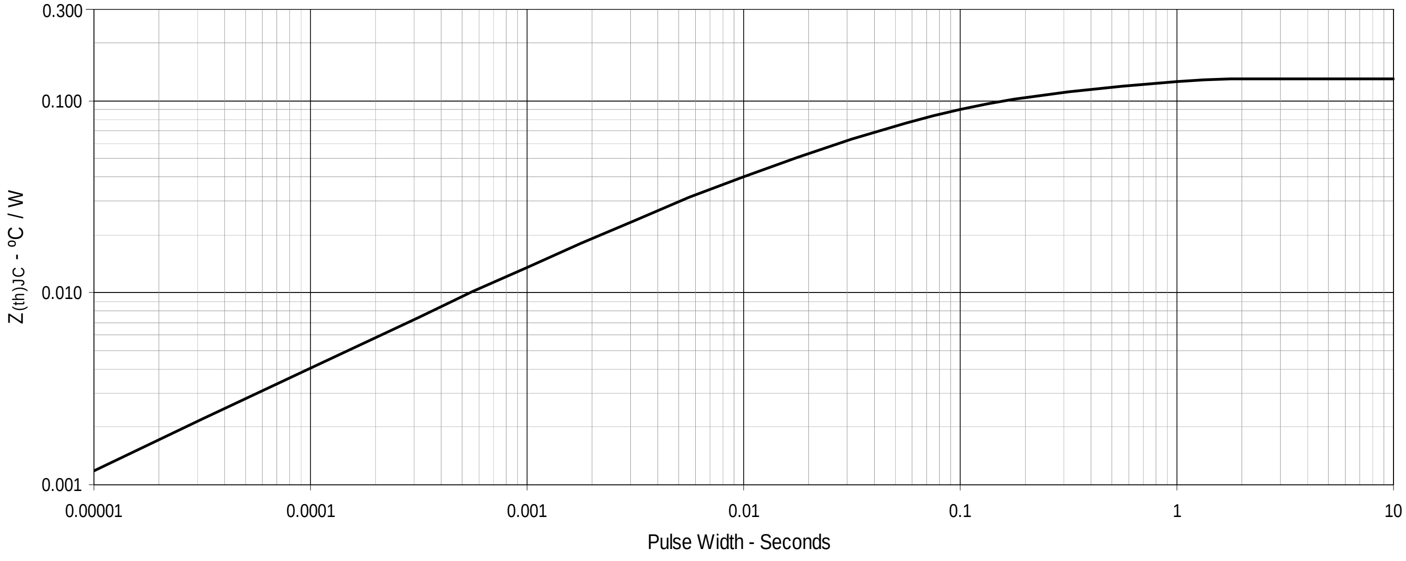


Fig. 13. Maximum Transient Thermal Impedance



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A Littelfuse Technology