

# DFNAK3 Series

Surface Mount - DFN10\*8\*3 - 3 kA



## Maximum Ratings and Thermal Characteristics

( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Value	Unit
Operating Junction Temperature	$T_J$	-55 to 125	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$
Current Rating <sup>1</sup>	$I_{PP}$	3	kA
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	70	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Case	$R_{\theta JC}$	20	$^\circ\text{C}/\text{W}$

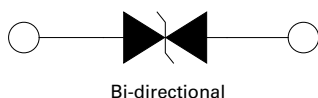
**Note:**

1. Rated  $I_{PP}$  measured with 8/20  $\mu\text{s}$  pulse.

## Agency Approvals

Agency	Agency File Number
	E230531

## Functional Diagram



## Description

The DFNAK3 series offers a clamping voltage lower than alternative technologies such as MOVs and GDTs. Rated to 3 kA (8/20  $\mu\text{s}$ ) surge current, DFNAK3 series offers a high level of protection for mission critical and high reliability applications. It aids compliance to surge requirements such as IEC 61000-4-5 (Level 4). The compact surface mount DFN10\*8\*3 package is compatible with automated PCBA processes and enables high power density designs.

## Features

- Compact surface mount DFN10\*8\*3package
- Ideal for automated PCBA processes with reduced manufacturing cost and increased soldering quality as compared to axial leaded packages
- Foldback technology for superior clamping factor
- $V_{BR} @ T_J = V_{BR} @ 25\text{ }^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ : Temperature Coefficient, typical value is 0.1 %)
- Glass passivated chip junction
- ESD protection of data lines in accordance with IEC 61000-4-2, 30 kV(Air), 30 kV (Contact)
- Low dynamic resistance enabling superior low clamping voltage
- UL recognized compound meeting flammability rating UL94 V-0
- Meets MSL level 1, per J-STD-020, LF maximum peak of 250  $^\circ\text{C}$
- Halogen free and RoHS compliant
- Pb-free E3 means 2<sup>nd</sup> level interconnect is Pb-free and the terminal finish material is tin (Sn) (IPC/JEDEC J-STD-609A.01)

## Applications


DFNAK3 series is ideal for the protection of I/O Interfaces,  $V_{CC}$  bus and other vulnerable circuits used in ICT, Industrial and Consumer electronic applications.

It aids compliance to surge requirements such as IEC 61000-4-5 (Level 4) for interfaces used in exposed PoE ports, Small Cells, Remote Radio Units (RRUs) and Baseband Units (BBUs), and other high power DC bus in harsh environments.

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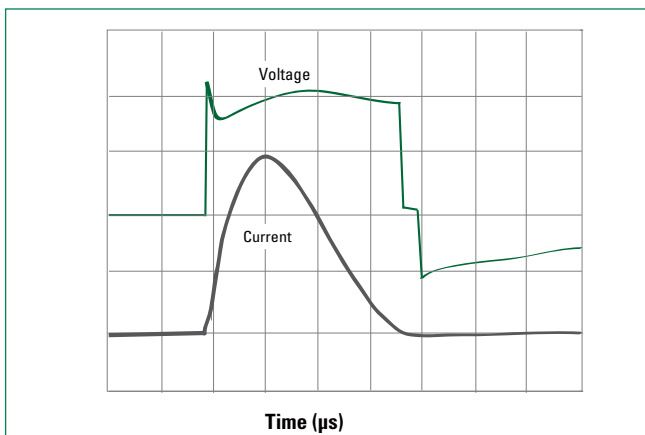
### Electrical Characteristics ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Part Numbers (Bi)	Marking	Standoff Voltage ( $V_R$ ) (V)	Max Reverse Leakage ( $I_R$ ) @ $V_R$ ( $\mu\text{A}$ )	Reverse Breakdown Voltage ( $V_{BR}$ ) @ $I_T$		Test Current $I_T$ (mA)	Max. Clamping Voltage $V_C$ @ Peak Pulse Current ( $I_{PP}$ ) (8/20 $\mu\text{s}$ )		Max. Capacitance 0 Bias 10 kHz (nF)	Agency Approval 
				Min (V)	Max (V)		$V_{CL}$ (V)	$I_{PP}$ (A)		
DFNAK3-058C-D1	58C3K	58	10	64	70	10	100	3000	3.1	X
DFNAK3-066C-D1	66C3K	66	10	72	80	10	110	3000	2.7	X
DFNAK3-072C-D1	72C3K	72	10	80	90	10	120	3000	2.4	X
DFNAK3-076C-D1	76C3K	76	10	85	95	10	125	3000	2.2	X
DFNAK3-080C-D1	80C3K	80	10	89	100	10	130	3000	2.1	X

**Note:** Using 8/20  $\mu\text{s}$  wave shaped defined in IEC 61000-4-5.

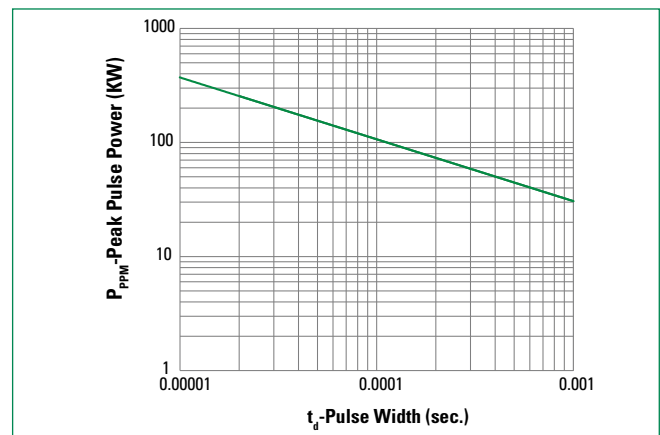
### Ratings and Characteristic Curves ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

**Figure 1 - Surge Response (8/20 Surge current waveform)**



**Note:**  
The power dissipation causes a change in avalanche voltage during the surge and the avalanche voltage eventually returns to the original value when the transient has passed.

**Figure 2 - Typical Peak Pulse Power Rating**



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Figure 3 - Pulse Waveform

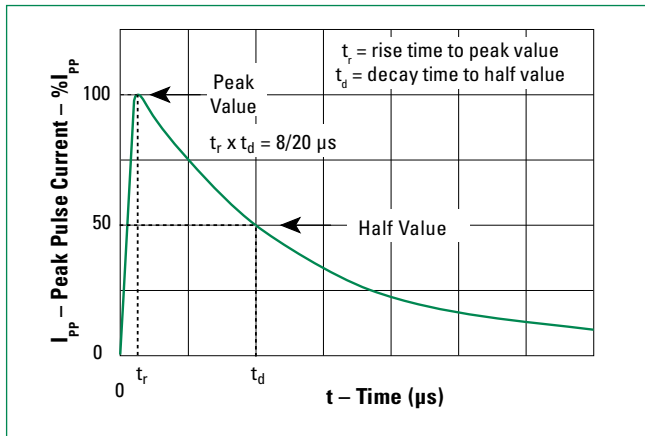
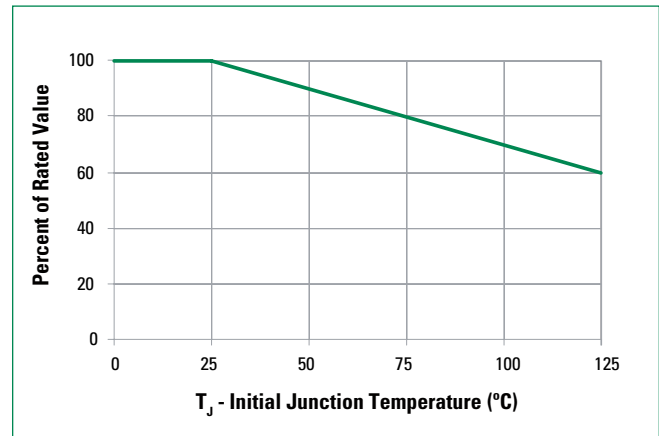


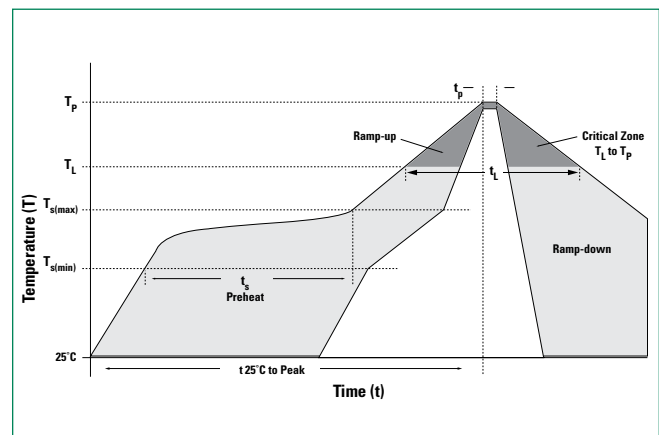
Figure 4 - Peak Power Derating



Please contact Littelfuse for reliability or FIT/MTBF data, the performance is subject to vary and depends on the end customers' application condition.

### Soldering Parameters

<b>Reflow Condition</b>	Lead-free assembly	
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150 $^{\circ}$ C
	- Temperature Max ( $T_{s(max)}$ )	200 $^{\circ}$ C
	- Time (min to max) ( $t_s$ )	60 – 120 seconds
<b>Average Ramp Up Rate (Liquidus Temp (<math>T_L</math>) to Peak</b>	3 $^{\circ}$ C/second max	
<b><math>T_{s(max)}</math> to <math>T_A</math> - Ramp-up Rate</b>	3 $^{\circ}$ C/second max	
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217 $^{\circ}$ C
	- Time (min to max) ( $T_s$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>	250 $^{+0/-5}$ $^{\circ}$ C	
<b>Time within 5 <math>^{\circ}</math>C of Actual Peak Temperature (<math>t_p</math>)</b>	30 seconds	
<b>Ramp-down Rate</b>	6 $^{\circ}$ C/second max	
<b>Time 25 <math>^{\circ}</math>C to Peak Temperature (<math>T_p</math>)</b>	8 minutes max	
<b>Do Not Exceed</b>	250 $^{\circ}$ C	



### Physical Specifications

<b>Weight</b>	0.0282 ounce, 0.7998 grams
<b>Case</b>	UL recognized compound meeting flammability rating UL94 V-0
<b>Terminal</b>	Matte tin-plated leads, solderable per JESD22-B102

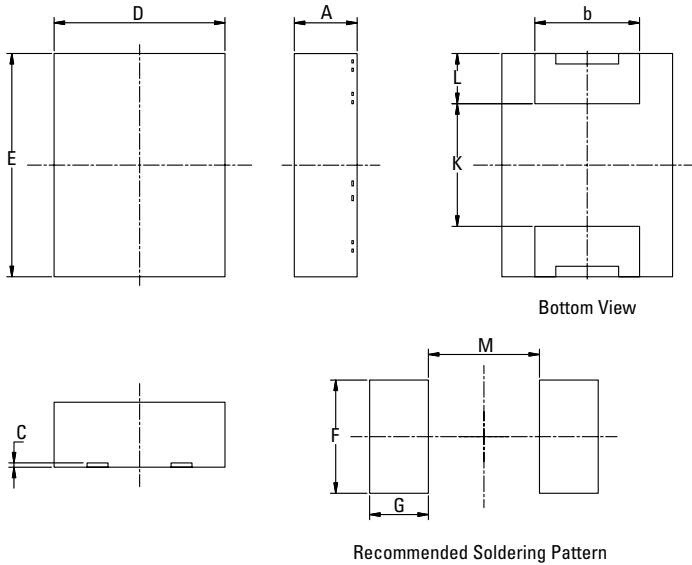
### Environmental Specifications

<b>High Temp Voltage Blocking (HTRB)</b>	100 % DC reverse voltage rated 125 $^{\circ}$ C, 1008 hours JEDEC, JESD22-A-108 80 % breakdown voltage (+85 $^{\circ}$ C)
<b>Biased Temp &amp; Humidity (H3TRB)</b>	85 %RH, 1008 hours JEDEC, JESD22-A-101
<b>Unbiased Highly Accelerated Stress Test (UHAST)</b>	96 hours at $T_A = 130$ $^{\circ}$ C/85 %RH. JEDEC, JESD22-A-118
<b>Temp Cycling (TC)</b>	-55 $^{\circ}$ C to +125 $^{\circ}$ C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A104
<b>Moisture Sensitivity Level (MSL)</b>	85 %RH, +85 $^{\circ}$ C, 168 hours, 3 reflow cycles (+250 $^{\circ}$ C Peak). JEDEC, JEDEC-J-STD-020, Level 1
<b>Resistance to Solder Heat (RSH)</b>	+260 $^{\circ}$ C, 30 seconds JEDEC, JEDEC JESD22-A-111

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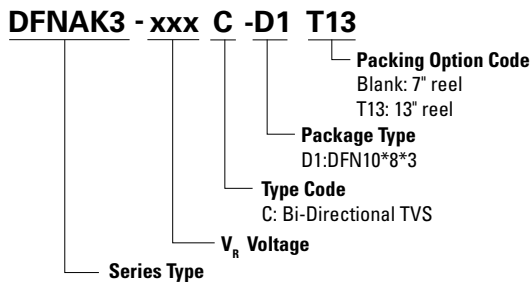
### Dimensions - DFN10\*8\*3



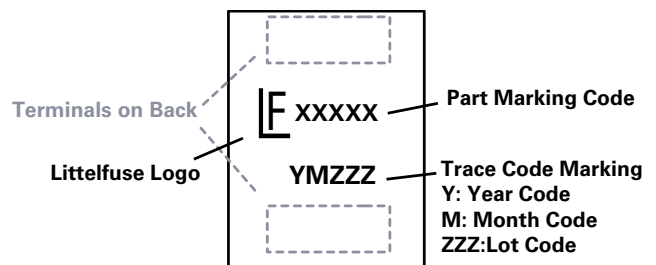
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	2.90	3.10	0.114	0.122
<b>b</b>	4.80	5.20	0.189	0.205
<b>C</b>	0.22	0.28	0.009	0.011
<b>D</b>	8.00	8.20	0.315	0.323
<b>E</b>	10.50	10.70	0.413	0.421
<b>F</b>	5.40 REF		0.213 REF	
<b>G</b>	2.80 REF		0.110 REF	
<b>K</b>	5.85 TYP		0.230 TYP	
<b>L</b>	2.20	2.60	0.087	0.102
<b>M</b>	5.30 REF		0.209 REF	

Dimensions are only for reference and might be changed later on. But the soldering pattern is fixed.

### Part Numbering System



### Part Marking System



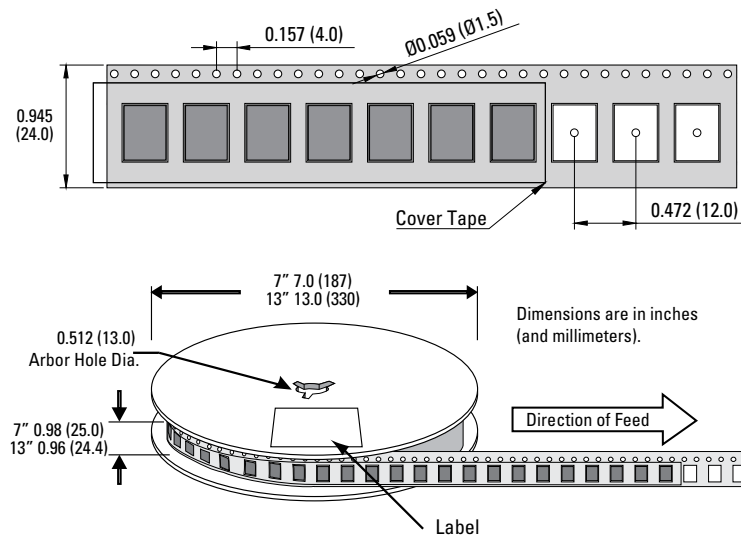
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### Packing Option

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
DFNAK3-xxxX-D1	DFN10*8*3	400	Tape & Reel - 24 mm tape/7" reel	EIA STD RS-481
DFNAK3-xxxX-D1T13	DFN10*8*3	1500	Tape & Reel - 24 mm tape/13" reel	EIA STD RS-481

### Tape and Reel Specification



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