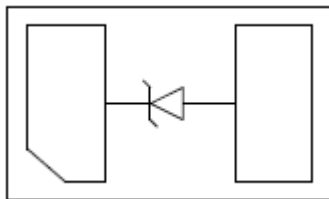
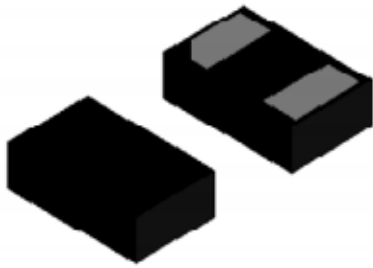


1-Line, Uni-directional, Transient Voltage Suppressor



DFN1610-2L

Features

- Stand-off voltage: 5V~36V Max
- Transient protection for each line according to IEC61000-4-2(ESD): $\pm 30\text{kV}$ (contact)
- IEC61000-4-5(surge): 125A~25A (8/20 μs)
- Low leakage current
- Low clamping voltage
- Low clamping voltage:
- RoHS Compliant

Applications

- Mobile Phones and Accessories
- Battery Protection
- USB VBus
- Power Line Protection
- Hand Held Portable Applications

Mechanical Data

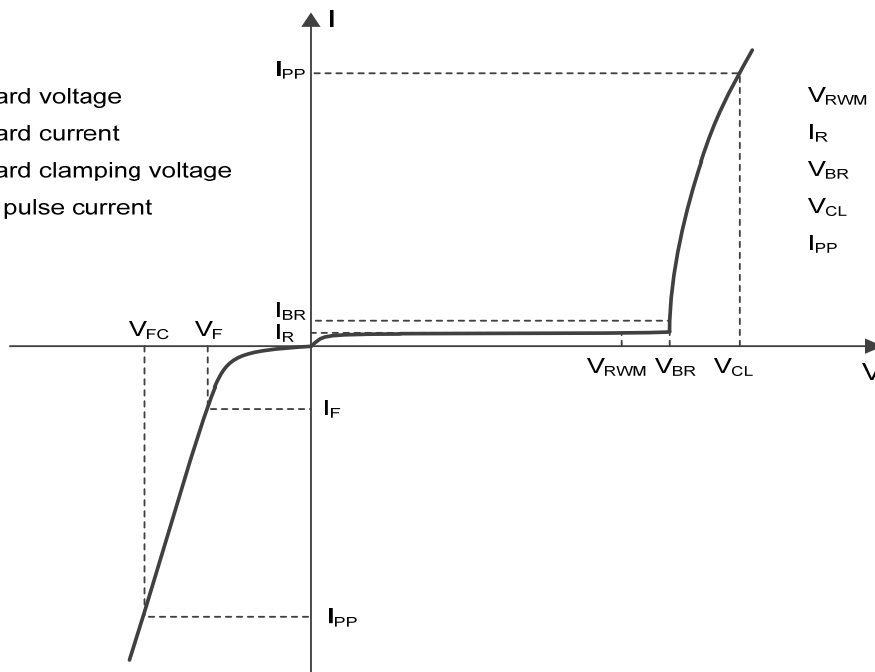
- Package: DFN1610-2L
- Case Material: "Green" Molding Compound
- Marking Information: See Below



PREFERRED P/N	Marking
ESD5V0P6A2	91
ESD7V0P6A2	76
ESD9V0P6A2	96
ESD12VP6A2	72
ESD15VP6A2	75
ESD18VP6A2	78
ESD24VP6A2	74
ESD36VP6A2	79

■Definitions of electrical characteristics

V_F Forward voltage
 I_F Forward current
 V_{FC} Forward clamping voltage
 I_{PP} Peak pulse current



V_{RWM} Reverse stand-off voltage
 I_R Reverse leakage current
 V_{BR} Reverse breakdown voltage
 V_{CL} Clamping voltage
 I_{PP} Peak pulse current



ESD5V0P6A2~ESD36VP6A2

■Maximum Ratings

PARAMETER	SYMBOL	LIMITS	UNIT
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	1875	W
ESD according to IEC61000-4-2 air discharge	V_{ESD}	± 30	kV
ESD according to IEC61000-4-2 contact discharge		± 30	
Junction temperature	T_J	-55~125	°C
Storage temperature	T_{STG}	-55~150	°C

■Electrical Characteristics ($T_a=25^\circ C$ Unless otherwise specified)

ESD5V0P6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				5
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	6		
Reverse leakage current	I_R	μA	$V_{RWM} = 5V$			1
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 90A, t_p = 8/20\mu s$			15
		V	$I_{PP} = 125A, t_p = 8/20\mu s$			17
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$		960	

ESD7V0P6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				7
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	7.5		
Reverse leakage current	I_R	μA	$V_{RWM} = 7V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			12
		V	$I_{PP} = 115A, t_p = 8/20\mu s$			18
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$		750	

ESD9V0P6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				9
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	10		
Reverse leakage current	I_R	μA	$V_{RWM} = 9V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			15
		V	$I_{PP} = 90A, t_p = 8/20\mu s$			23
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			525



ESD5V0P6A2~ESD36VP6A2

ESD12VP6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				12
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	12.6		
Reverse leakage current	I_R	μA	$V_{RWM} = 12V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			18
		V	$I_{PP} = 75A, t_p = 8/20\mu s$			25
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			500

ESD15VP6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				15
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	16.5		
Reverse leakage current	I_R	μA	$V_{RWM} = 15V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			22
		V	$I_{PP} = 60A, t_p = 8/20\mu s$			34
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			450

ESD18VP6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				18
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	19.6		
Reverse leakage current	I_R	μA	$V_{RWM} = 18V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			26
		V	$I_{PP} = 50A, t_p = 8/20\mu s$			37.5
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			350

ESD24VP6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				24
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	26.7		
Reverse leakage current	I_R	μA	$V_{RWM} = 24V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			42
		V	$I_{PP} = 35A, t_p = 8/20\mu s$			53.5
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			200



ESD5V0P6A2~ESD36VP6A2

ESD36VP6A2

PARAMETER	Symbol	UNIT	Conditions	Min	Typ	Max
Reverse maximum working voltage	V_{RWM}	V				36
Reverse breakdown voltage	V_{BR}	V	$I_{BR} = 1mA$	37		
Reverse leakage current	I_R	μA	$V_{RWM} = 36V$			0.5
Forward Voltage	V_F		$I_F = 10mA$			1.2
Clamping voltage ¹⁾	V_{CL}	V	$I_{PP} = 10A, t_p = 8/20\mu s$			60
		V	$I_{PP} = 25A, t_p = 8/20\mu s$			75
Junction capacitance	C_J	pF	$V_R = 0V, f = 1MHz$			150

Notes:

(1). Non-repetitive current pulse, according to IEC61000-4-5.

■ Ordering Information (Example)

PREFERED P/N	PACKING CODE	UNIT WEIGHT(mg)	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
ESD5V0P6A2~ESD36VP6A2	F1	Approximate 010	3000	30000	120000	7" reel



■ Characteristics (Typical)

Fig1. 8/20 μ s waveform per IEC61000-4-5

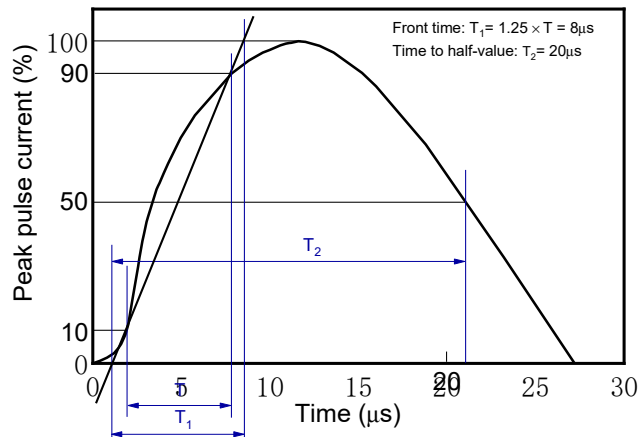


Fig2. Contact discharge current waveform per IEC61000-4-2

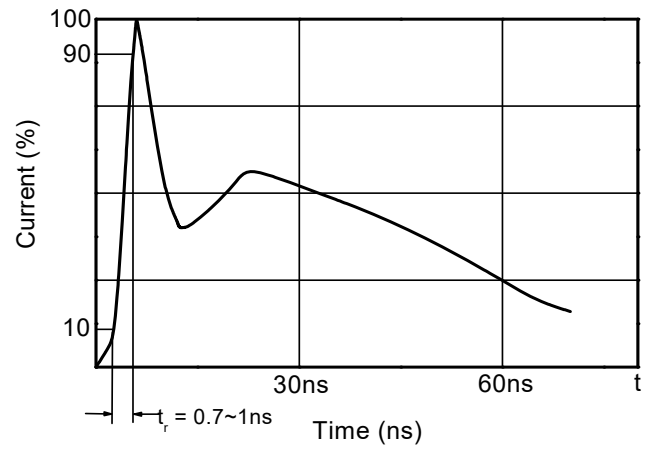


Fig3. Clamping voltage vs. Peak pulse current

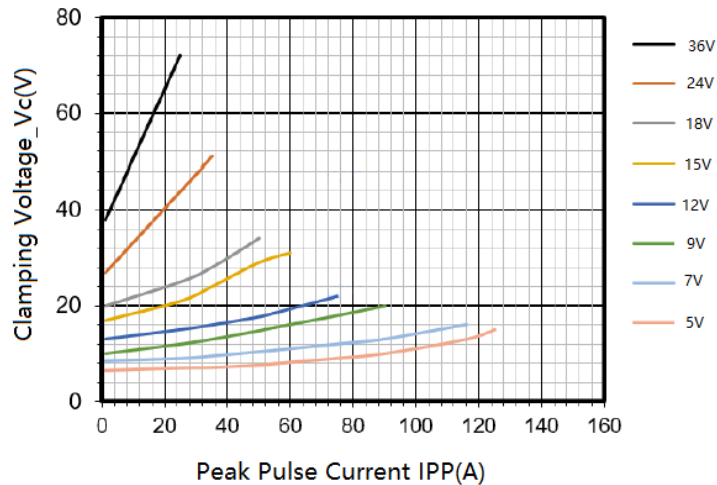
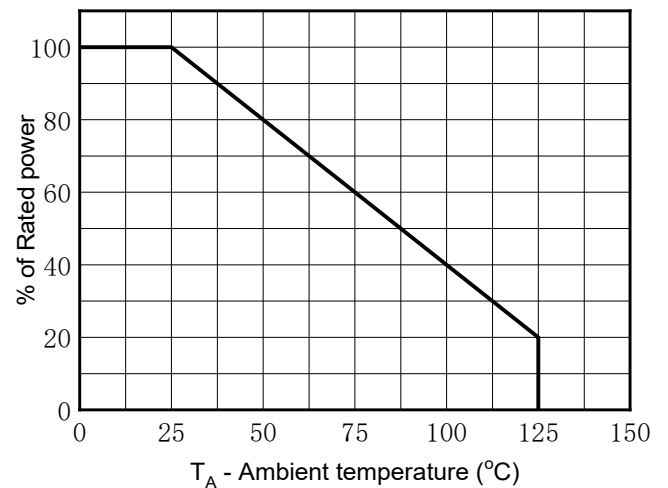


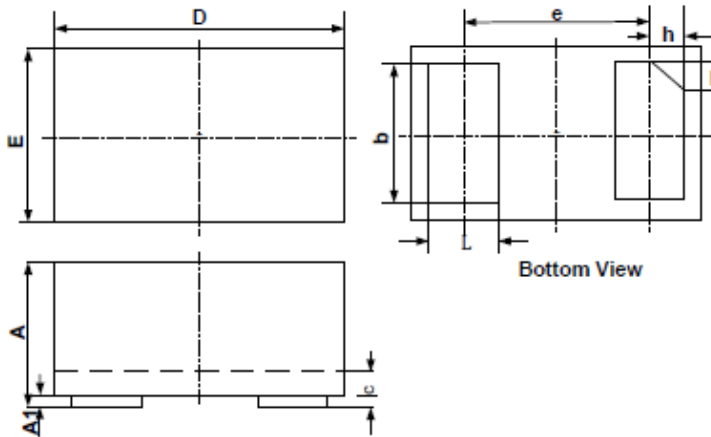
Fig4. Power derating vs. Ambient temperature





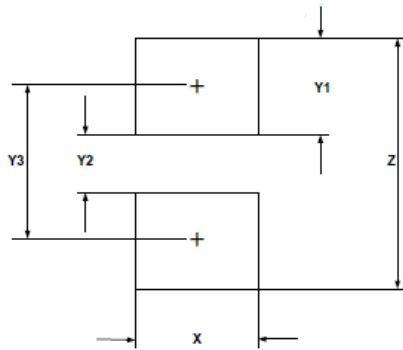
ESD5V0P6A2~ESD36VP6A2

■ Outline Dimensions



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.75	0.80	0.85	0.030	0.032	0.034
c	0.10	0.15	0.20	0.004	0.006	0.008
D	1.55	1.60	1.65	0.062	0.064	0.066
e	1.10 BSC			0.044 BSC		
E	0.95	1.00	1.05	0.038	0.040	0.042
L	0.35	0.40	0.45	0.014	0.016	0.018
h	0.15	0.20	0.25	0.006	0.008	0.010

■ Recommended PCB Layout



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
X	1.00	0.040
Y1	0.62	0.025
Y2	0.60	0.024
Y3	1.22	0.049
Z	1.85	0.074

Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met



ESD5V0P6A2~ESD36VP6A2

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