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PRODUCT DATASHEET

Electro-Static Discharge

JEN1610-xxV ESD

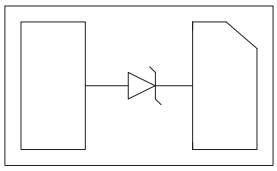
Features

- Small package: 1.6x1.0x0.5mm(DFN1610)
- Protects one data or power line
- Operating Voltage: 3.3V, 5V, 7V, 9V, 12V, 15V, 18V, 24V, 36V
- High peak pulse current capability
- Ultra low clamping voltage
- 2-pin leadless package
- Complies with following standards:
- – IEC 61000-4-2 (ESD) immunity test
  Air discharge: ±30kV
  Contact discharge: ±30kV
- RoHS compliant

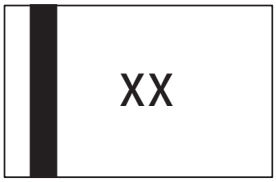
Applications

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

Schematic Diagram



Pin Description



Limiting Values(T_A = 25 °C, unless otherwise specified)

Symbol	Parameter	Conditions	Value	Unit
V_{ESD}	Electrostatic Discharge Voltage	IEC 61000-4-2;Contact Discharge	±30	kV
		IEC 61000-4-2;Air Discharge	±30	kV
P_{Pk}	Peak Pulse Power	t_P=8/20μs	1875	W
T_J	Operating Temperature Range	-	-55 to +125	°C
T_{stg}	Storage Temperature Range	-	-55 to +150	°C

Electrical Characteristics(T_A = 25 °C, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	3.3	V
V_{BR}	Breakdown Voltage	I_T=1mA	3.5	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=3.3V	-	-	1.0	μA
V_F	Forward Voltage	I_F=10mA,	-	1.0	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	150	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	5.5	V
V_C	Clamping Voltage	I_{PP}=150A(8x20μs pulse)	-	-	12.5	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	750	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	5	V
V_{BR}	Breakdown Voltage	I_T=1mA	6.0	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=5V	-	-	1.0	μA
V_F	Forward Voltage	I_F=10mA,	-	1.0	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	125	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	9.0	V
V_C	Clamping Voltage	I_{PP}=125A(8x20μs pulse)	-	-	15.0	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	550	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	7	V
V_{BR}	Breakdown Voltage	I_T=1mA	7.5	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=7V	-	-	0.5	μA
V_F	Forward Voltage	I_F=10mA,	-	1.0	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	115	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	12	V
V_C	Clamping Voltage	I_{PP}=115A(8x20μs pulse)	-	-	16.5	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	550	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	9	V
V_{BR}	Breakdown Voltage	I_T=1mA	10	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=9V	-	-	0.5	μA
V_F	Forward Voltage	I_F=10mA,	-	1.0	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	90	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	15	V
V_C	Clamping Voltage	I_{PP}=90A(8x20μs pulse)	-	-	23	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	525	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	12	V
V_{BR}	Breakdown Voltage	I_T=1mA	12.6	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=12V	-	-	0.1	μA
V_F	Forward Voltage	I_F=10mA,	-	-	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	75	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	18	V
V_C	Clamping Voltage	I_{PP}=75A(8x20μs pulse)	-	-	25	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ			500	pF

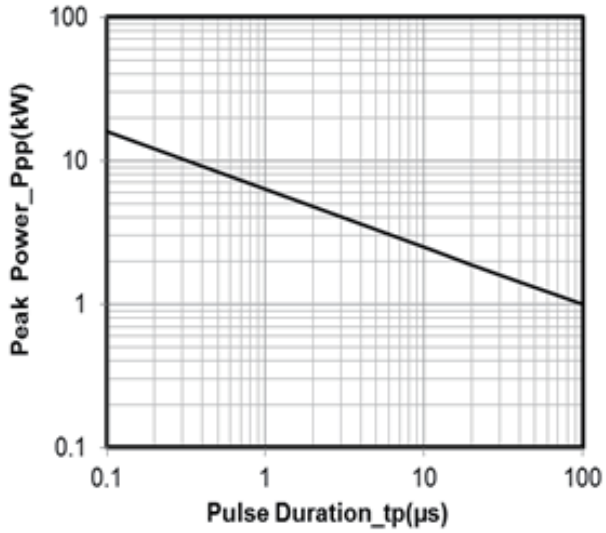
Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	15	V
V_{BR}	Breakdown Voltage	I_T=1mA	16.5	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=15V	-	-	0.1	μA
V_F	Forward Voltage	I_F=10mA,	-	-	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	60	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	22	V
V_C	Clamping Voltage	I_{PP}=60A(8x20μs pulse)	-	-	31.25	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	450	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	18	V
V_{BR}	Breakdown Voltage	I_T=1mA	19.6	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=18V	-	-	0.1	μA
V_F	Forward Voltage	I_F=10mA,	-	1.0	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	50	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	26	V
V_C	Clamping Voltage	I_{PP}=50A(8x20μs pulse)	-	-	37.5	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ			350	pF

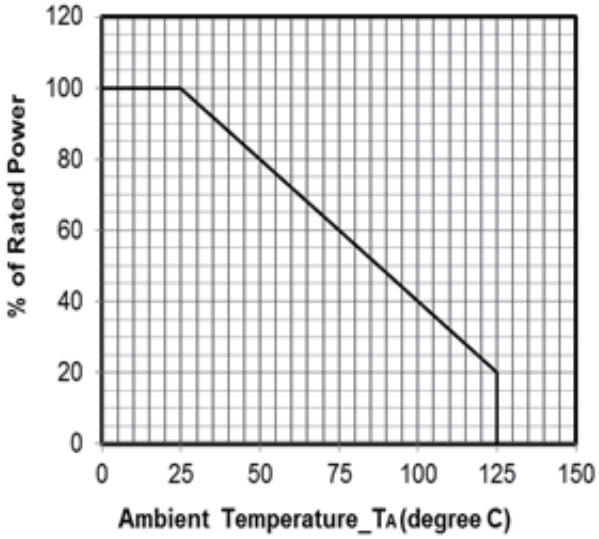
Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	24	V
V_{BR}	Breakdown Voltage	I_T=1mA	26.7	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=24V	-	-	0.1	μA
V_F	Forward Voltage	I_F=10mA,	-	-	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	35	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	42	V
V_C	Clamping Voltage	I_{PP}=35A(8x20μs pulse)	-	-	53.5	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	200	pF

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{RWM}	Reverse Working Voltage	T_A=25°C	-	-	36	V
V_{BR}	Breakdown Voltage	I_T=1mA	37	-	-	V
I_R	Reverse Leakage Current	V_{RWM}=36V	-	-	0.1	μA
V_F	Forward Voltage	I_F=10mA,	-	-	1.2	V
I_{PP}	Peak Pulse Current	t_P=8/20μs	-	-	25	A
V_C	Clamping Voltage	I_{PP}=10A(8x20μs pulse)	-	-	60	V
V_C	Clamping Voltage	I_{PP}=25A(8x20μs pulse)	-	-	75	V
C_J	Junction Capacitance	V_R=0V,f=1 MHZ	-	-	150	pF

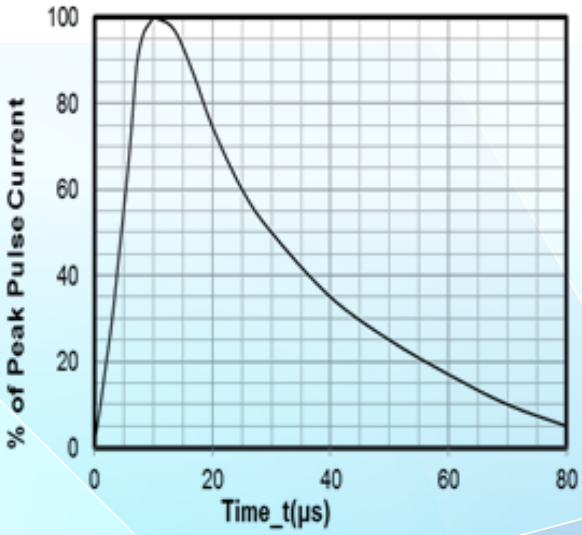
Typical Characteristics



Junction Capacitance vs. Reverse Voltage

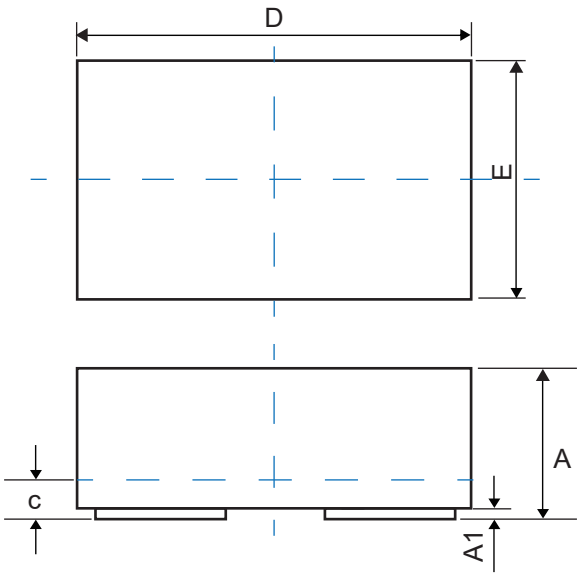


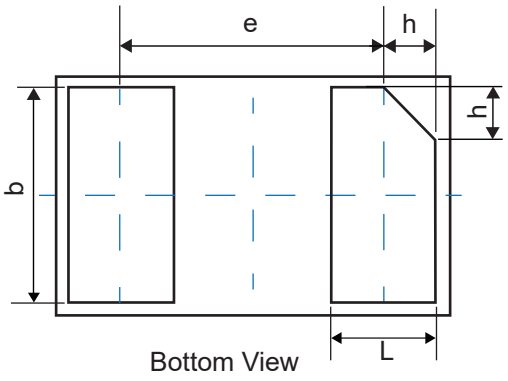
Peak Pulse Power vs. Pulse Time



Clamping Voltage vs. Peak Pulse Current (tp = 8/20 μ s)

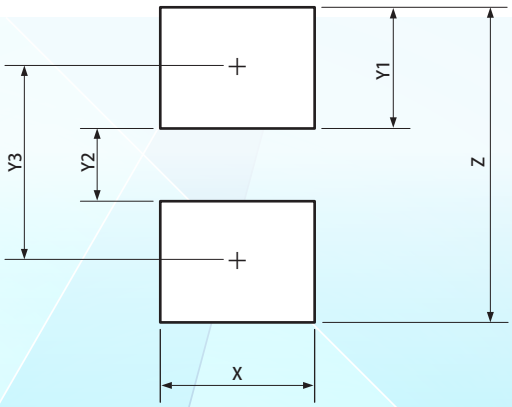
Physical Dimensions(mm.)





Symbol	Dimensions In Millimeters			Dimensions In 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

Suggested Land Pattern

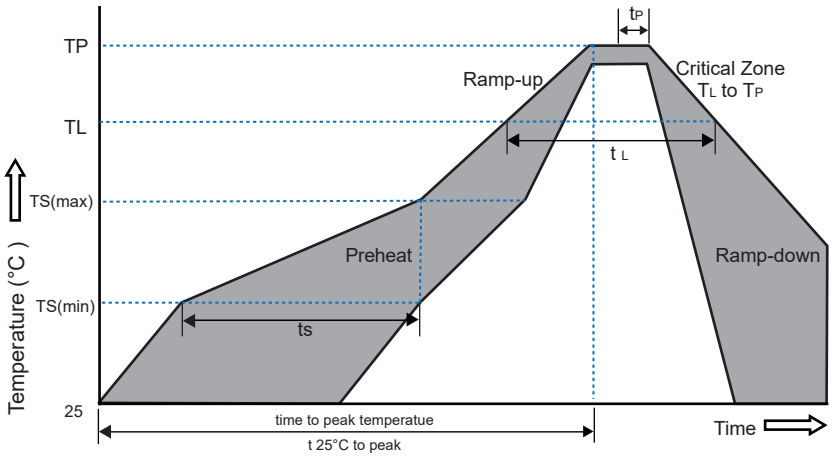


Symbol	Dimensions	
	Millimeters	Inches
X	1.00	0.040
Y1	0.62	0.025
Y2	0.60	0.024
Y3	1.22	0.049
Z	1.85	0.074

Packaging Quantity

Part Number	Delivery Form	Delivery Quantity
JEN1610-xxV	7"T&R	3,000

Soldering Parameters



Reflow Condition		Pb-Free Assembly
Pre-heat	-Temperature Min($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time(Min to Max)(ts)	60~180 secs.
Average ramp up rate (Liquid us Temp(T_L) to peak)		3°C/sec. Max
Ts(max) to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217°C
	-Temperature (t_L)	60~150 secs.
Peak Temp (T_P)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
xTime 25°C to Peak Temp (TP)		8 min. Max
Do not exceed		+260°C

Part Number System

JE N1610 - xxV

- JE — JDT ESD
- N1610 — DFN1610
- xxV — Working Voltage: xxV