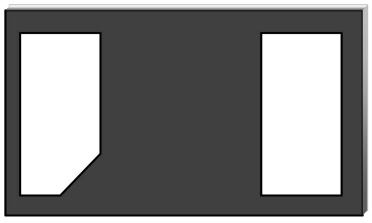
ETEK Microelectronics

ES45DPX

Transient Voltage Suppressor

Features

- Small Body Outline Dimensions: 0.063″ x 0.040″ (1.6 mm x 1. 0 mm)
- Protects one I/O or power line
- Low Clamping Voltage
- Working Voltage: 4.85V
- Low Leakage Current
- Response Time is Typically < 1 ns



DFN1610-2L

IEC COMPATIBILITY (EN61000-4)

- **IEC 61000-4-2 (ESD) ±30kV (air), ±30kV (contact)**
- **IEC 61000-4-4 (EFT) 40A (5/50ns)**
- **IEC 61000-4-5 (Lightning) 170A (8/20μs)**

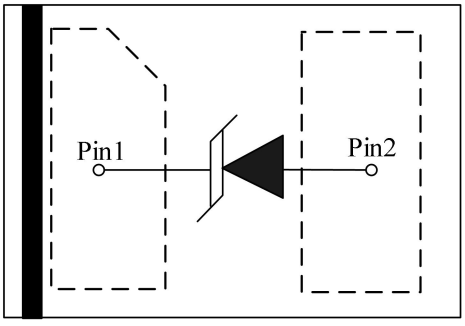
Mechanical Characteristics

- DFN1610-2L package
- Molding compound flammability rating: UL 94V-0
- Marking: Marking Code
- Packaging: Tape and Reel per EIA 481
- RoHS Compliant
- MSL1

Applications

- Laptop Computers
- Cellular Phones
- Digital Cameras
- Personal Digital Assistants (PDAs)

Schematic & PIN Configuration



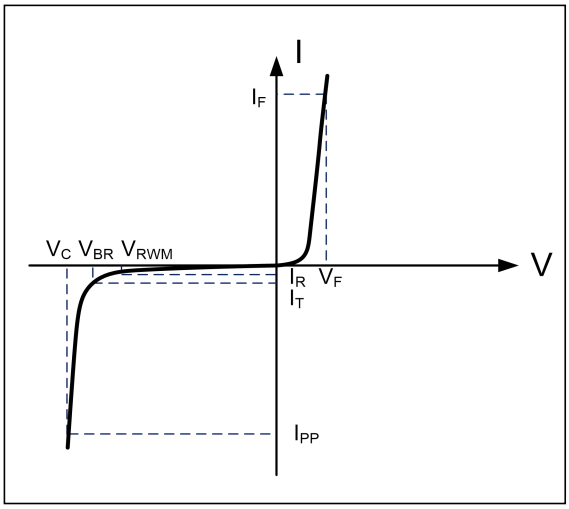
（TOP VIEW）

Rating	Symbol	Value	Units
Peak Pulse Power（t_p =8/20μs）	P_{PP}	2550	Watts
Peak Pulse Current（t_p =8/20μs）	I_{PP}	170	A
Operating Temperature	T_J	-55 to + 125	℃
Storage Temperature	T_{STG}	-55 to +150	℃

Absolute Maximum Rating

Electrical Parameters (T=25℃)

Symbol	Parameter
I_{PP}	Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ I_F



Electrical Characteristics

ES45DPX						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				4.85	V
Reverse Breakdown Voltage	V_{BR}	I_T=1mA	5.0		6.5	V
Forward Voltage	V_F	I_F=10mA	0.6		1.0	V
Reverse Leakage Current	I_R	V_{RWM}=4.85V,T=25℃			500	nA
Clamping Voltage	V_C	I_{PP}=170A,t_p=8/20μs		13	15	V
Dynamic Resistance[1,2]	R_{DYN}	TLP=0.2/100ns		0.05		Ω
Junction Capacitance	C_j	V_R=0V, f=1MHz		500	700	pF

Notes：1、TLP Setting：t_p=100ns, t_r=0.2ns, I_{TLP} and V_{TLP} sample window:t_1=70ns to t_2=90ns.
2、Dynamic resistance calculated from I_{PP}=4A to I_{PP}=16A using “Best Fit”.

Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

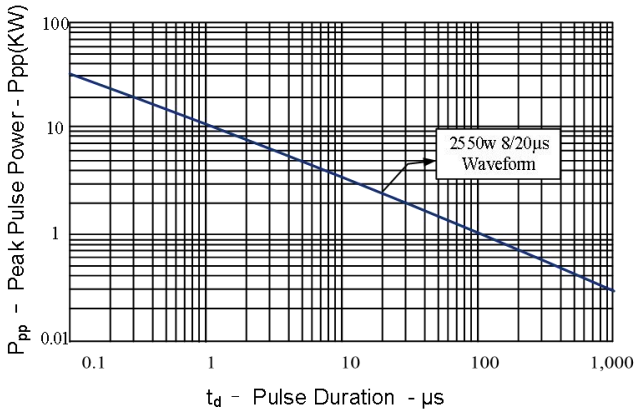


Figure 2: Power Derating Curve

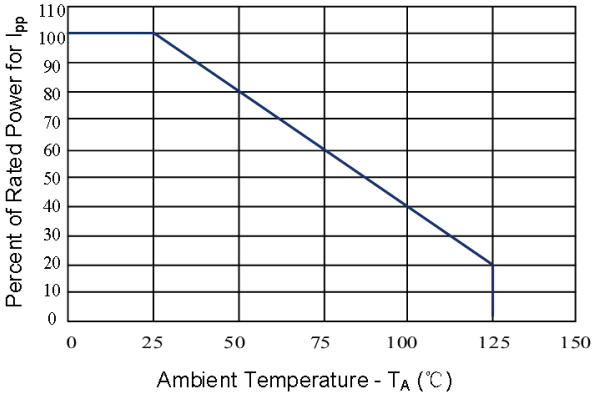


Figure 3: Clamping Voltage vs. Peak Pulse Current

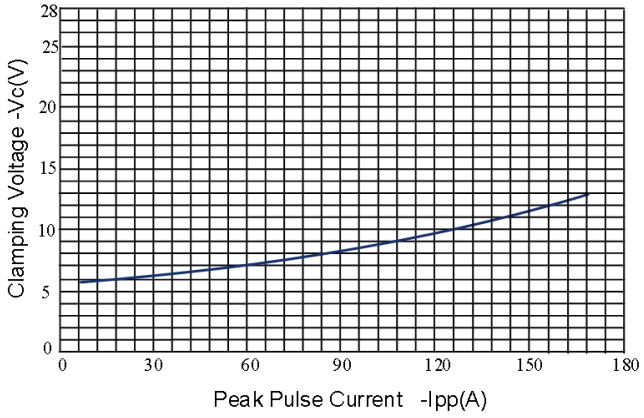


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

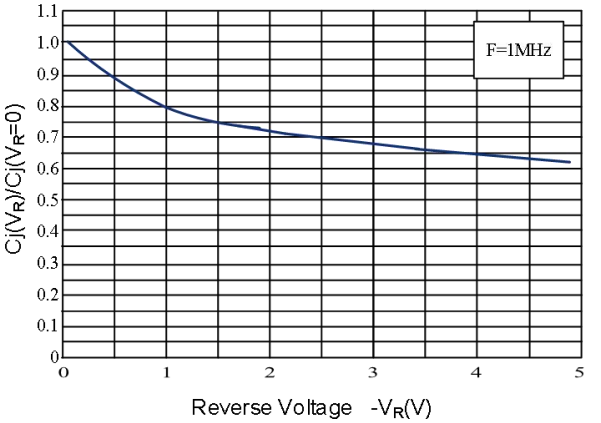


Figure 5: Pulse Waveform

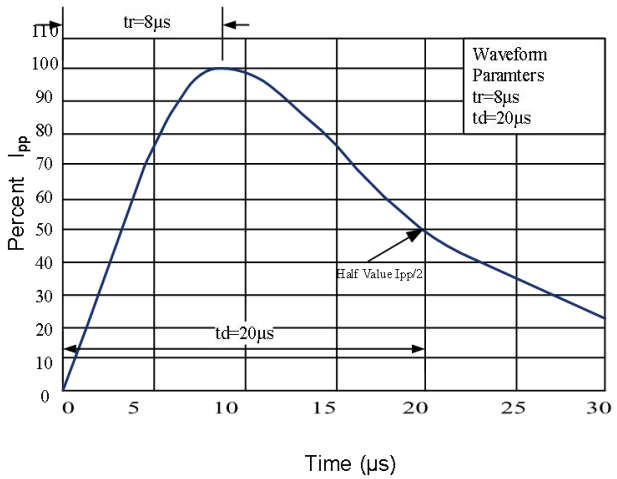
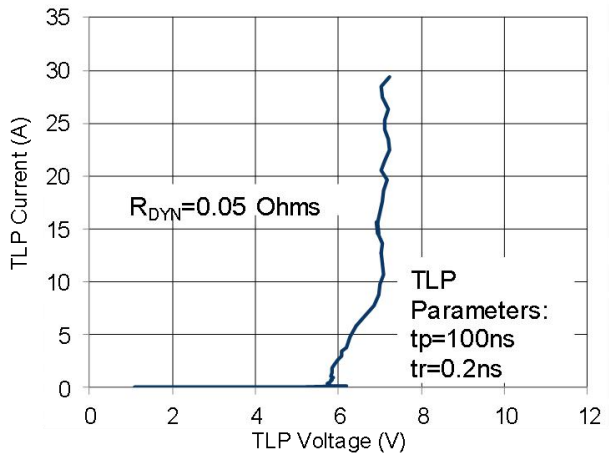
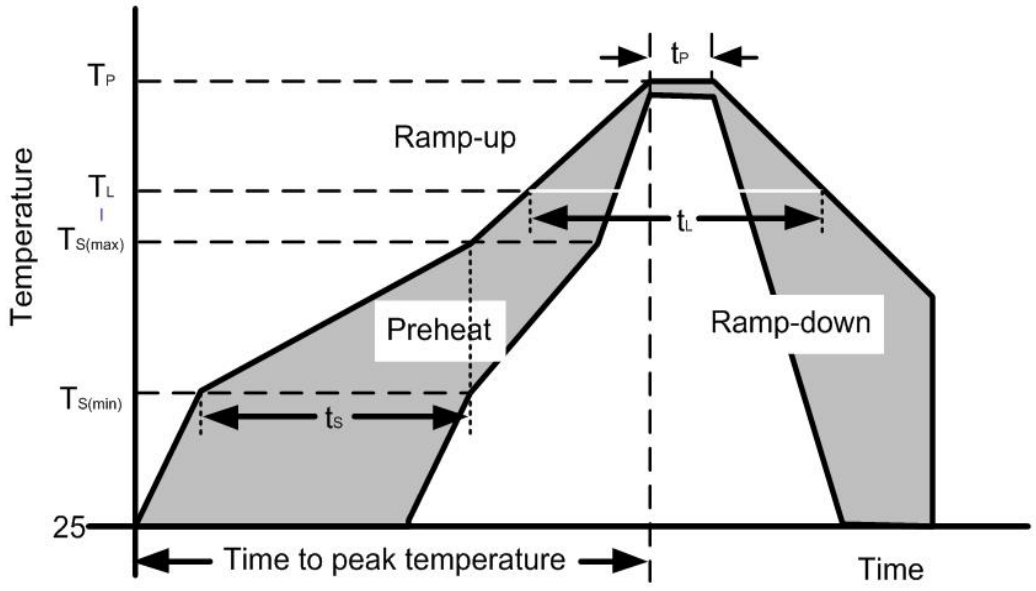


Figure 6: TLP Curve



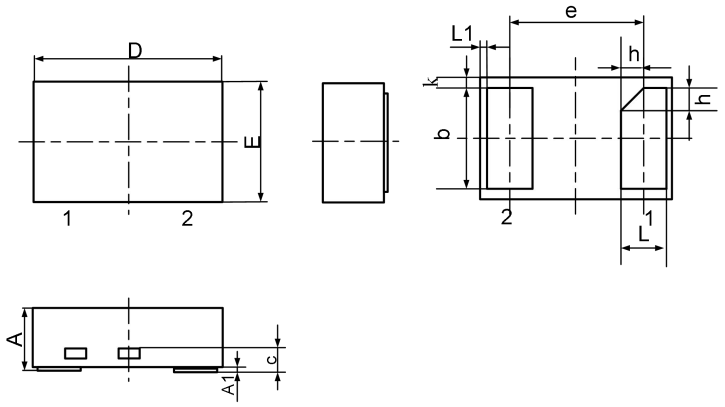
Soldering Parameters

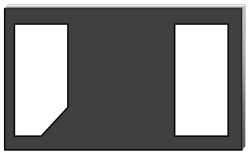
Reflow Condition		Pb – Free assembly
Pre Heat	Temperature Min ($T_{s(min)}$)	150°C
	Temperature Max ($T_{s(max)}$)	200°C
	Time (min to max) (ts)	60 – 190 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L——Ramp-up Rate		5°C/second max
Reflow	Temperature (T_L) (Liquidus)	217°C
	Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260+0/-5 °C
Time within actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C



Outline Drawing –DFN1610-2L

PACKAGE OUTLINE

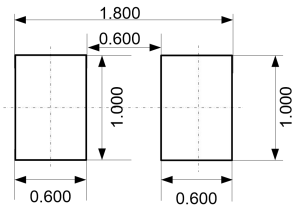




DFN1610-2L

SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.450	0.500	0.550
A1	0.000	0.020	0.050
b	0.750	0.800	0.850
c		0.152REF	
D	1.550	1.600	1.650
e		1.100BSC	
E	0.950	1.000	1.050
L	0.350	0.400	0.450
L1		0.05REF	
h	0.150	0.200	0.250
k	0.050	0.100	0.150

Land Pattern



Marking Codes

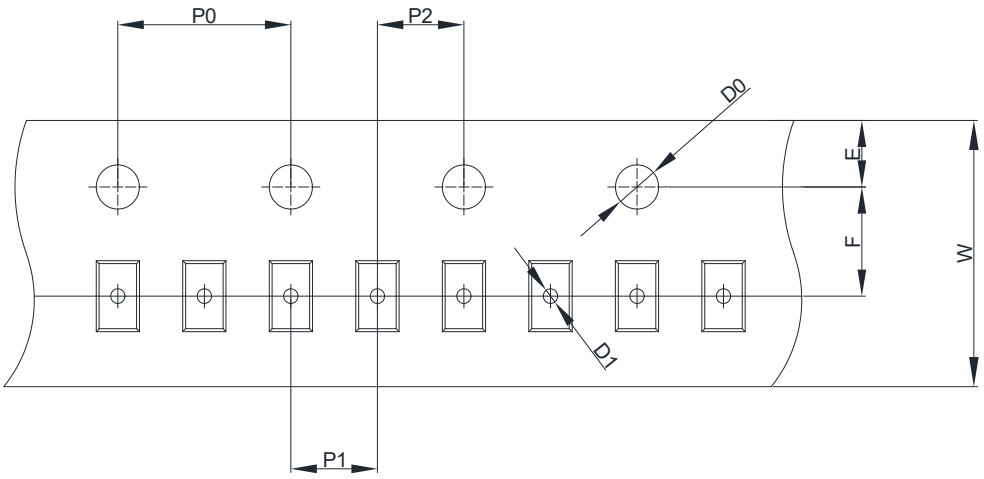
Part Number	Marking Code
ES45DPX	Pin1 MX Pin2 M=Specific Device Code X=Tracking Number

Package Information

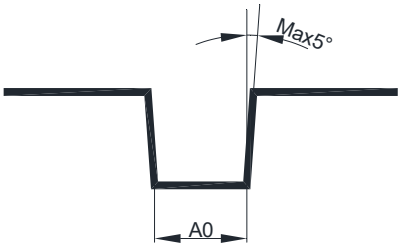
Qty：10k/Reel

Tape Information

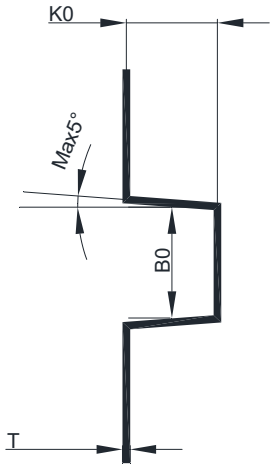
Tape Dimensions



top view

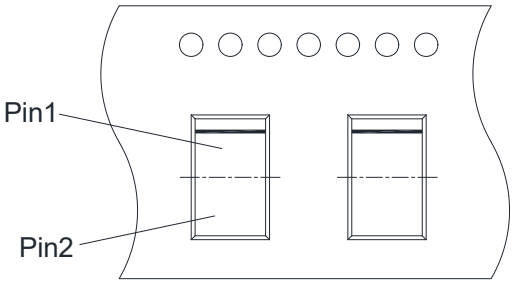


front view



end view

Quadrant Assignments For PIN1 Orientation In Tape



User Direction of Feed

SYMBOL	A0	B0	K0	P0	P1	P2
SPEC	1.15±0.05	1.78±0.05	0.63±0.05	4.00±0.10	2.00±0.05	2.00±0.05
SYMBOL	T	E	F	D0	D1	W
SPEC	0.20±0.02	1.75±0.10	3.50±0.05	$1.50^{+0.1}_{0}$	$0.50^{+0.05}_{0}$	$8.00\pm^{0.3}_{0.1}$

Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2018-09-28	Released Version 2019.01.03 Double check	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Liu Jia Ying
2	1.1	2019-02-25	1.Change the V_{RWM} from 4.5V to 4.85V 2.Change the Min value of V_{BR} from 4.8V to 5V.	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Liu Jia Ying
3	1.2	2019-08-20	Add tape information	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Liu Jia Ying
4	1.3	2020-03-17	Add MSL level	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
5	1.4	2020-07-07	Update tape information	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
6	1.5	2020-11-10	Update Marking Information	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
7	1.6	2022-02-17	Update Tape Information	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying