



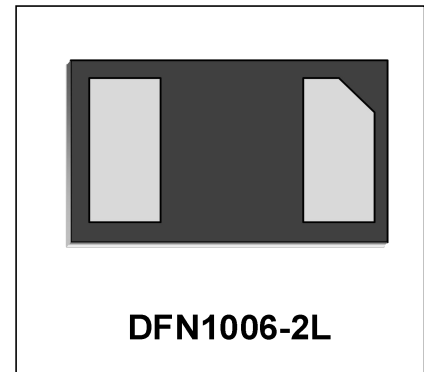
Etek
Microelectronics

ES45DPF-BHX

Transient Voltage Suppressor

Features

- 585 Watts Peak Pulse Power per Line ($t_p = 8/20\mu s$)
- Protects one I/O or Power Line
- Low Clamping Voltage
- Working Voltage: 4.5V
- Low Leakage Current
- Response Time is Typically $< 1\text{ ns}$



IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 30\text{kV}$ (air), $\pm 30\text{kV}$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 45A (8/20 μs)

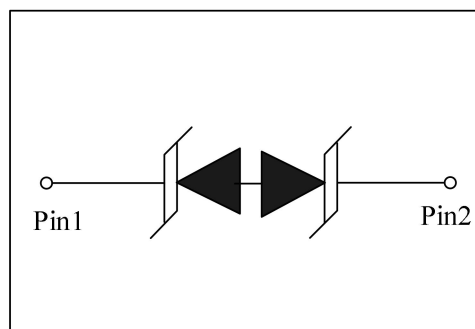
Mechanical Characteristics

- DFN1006-2L package
- Marking : Marking Code
- RoHS Compliant
- MSL1

Applications

- Cellular Handsets & Accessories
- Personal Digital Assistants (PDAs)
- Notebooks & Handhelds
- Portable Instrumentation
- Digital Cameras
- MP3 Players

Schematic & PIN Configuration

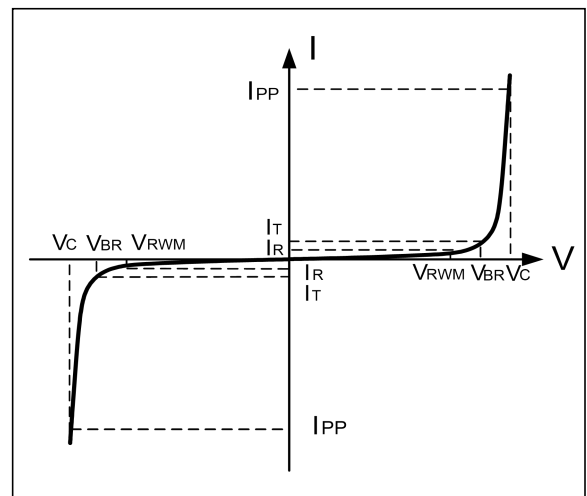


Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PP}	585	Watts
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	45	A
Operating Temperature	T_J	-55 to + 125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Parameters (T=25°C)

Symbol	Parameter
I_{PP}	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



Electrical Characteristics

ES45DPF-BHX						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				4.5	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1mA$	4.6			V
Reverse Leakage Current	I_R	$V_{RWM} = 4.5V$, $T = 25^\circ C$			500	nA
Clamping Voltage	V_C	$I_{PP} = 45A$, $t_p = 8/20\mu s$		10	13	V
Dynamic Resistance ^{1,2}	R_{DYN}	$TLP = 0.2/100ns$		0.2		Ω
ESD Clamping Voltage ¹	V_C	$I_{PP} = 4A$, $t_p = 0.2/100ns$ (TLP)		6.1		V
ESD Clamping Voltage ¹	V_C	$I_{PP} = 16A$, $t_p = 0.2/100ns$ (TLP)		8.4		V
Junction Capacitance	C_j	$V_R = 0V$, $f = 1MHz$		100	150	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

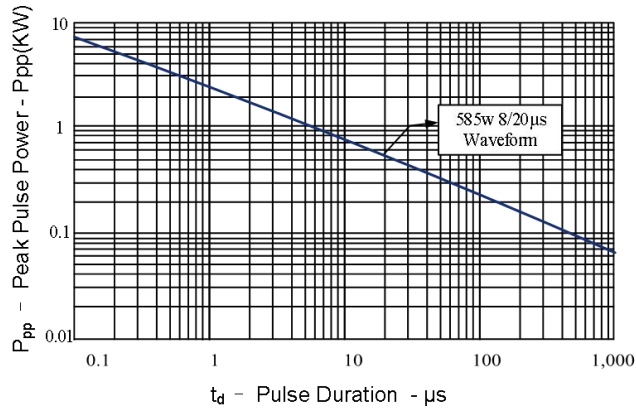


Figure 2: Power Derating Curve

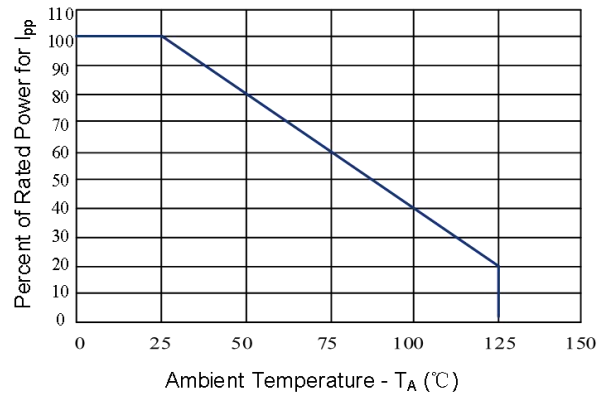


Figure 3: Clamping Voltage vs. Peak Pulse Current

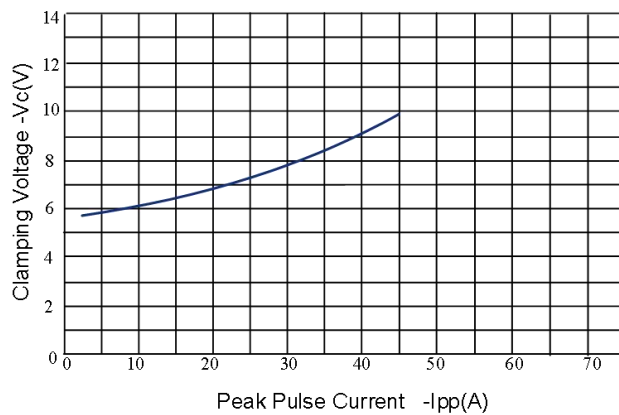


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

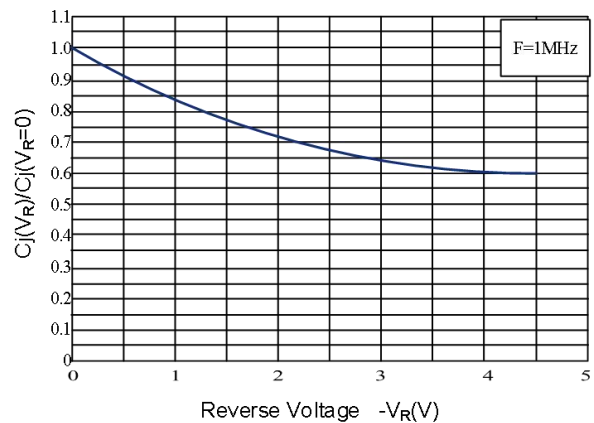


Figure 5: TLP Positive I-V Curve

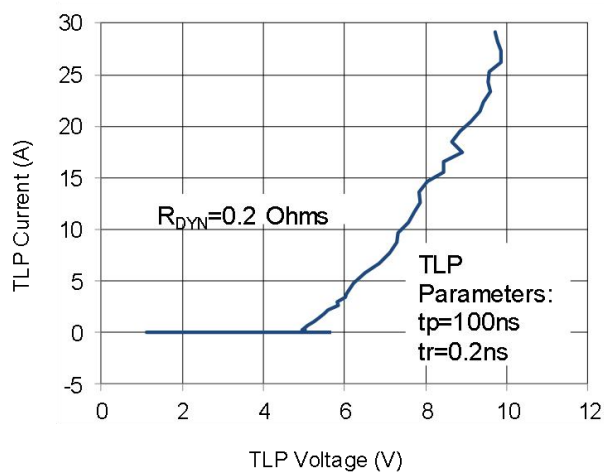
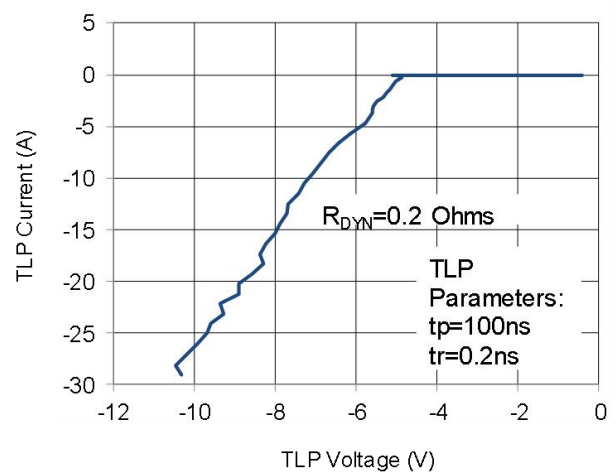
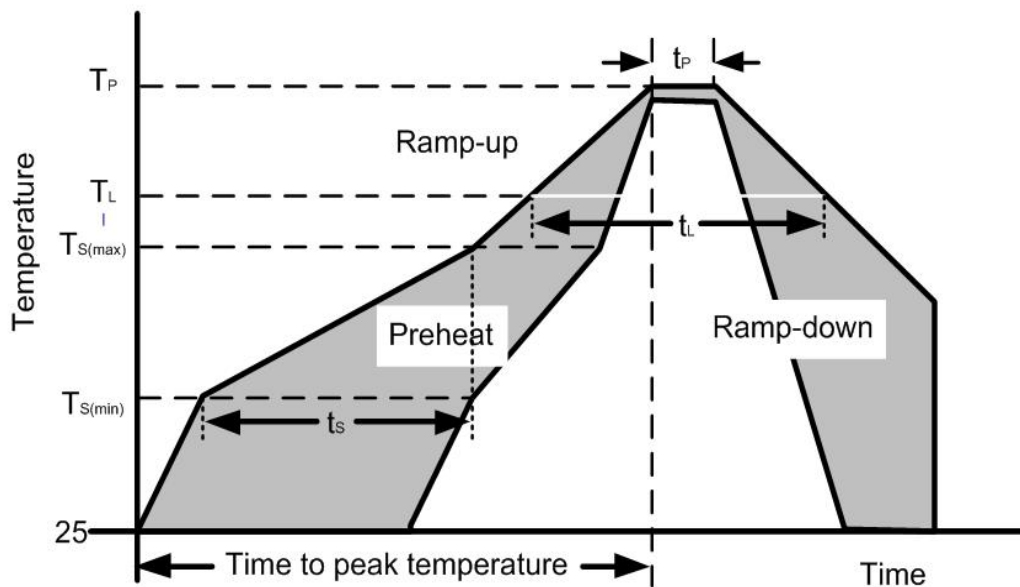


Figure 6: TLP Negative I-V Curve



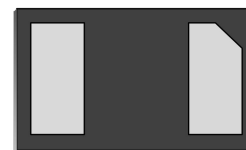
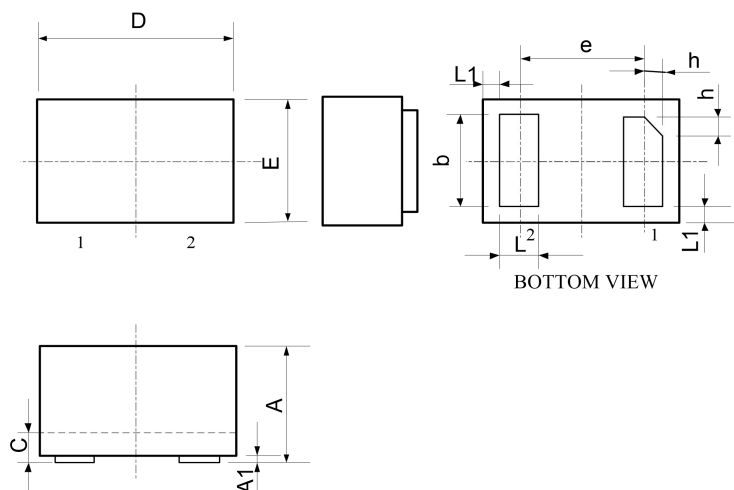
Soldering Parameters

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) (t_s)	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 –DFN1006-2L

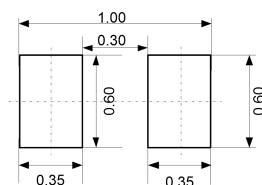
PACKAGE OUTLINE



DFN1006-2L

SYMBOL	MILIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0	0.02	0.05
b	0.45	0.50	0.55
C	0.12	0.15	0.18
D	0.95	1.00	1.05
e	0.65BSC		
E	0.55	0.60	0.65
L	0.20	0.25	0.30
L1	0.05REF		
h	0.07	0.12	0.17

Land Pattern



Marking Codes

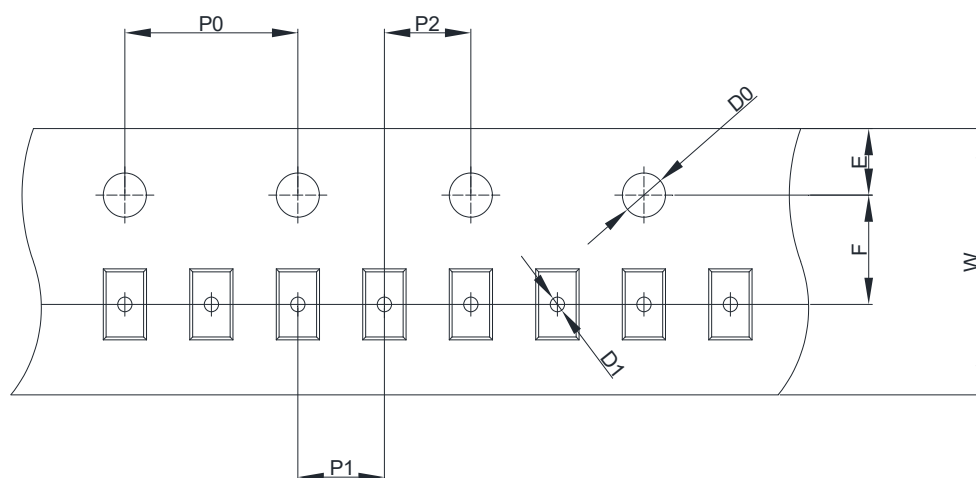
Part Number	Marking Code
ES45DPF-BHX	WW

Package Information

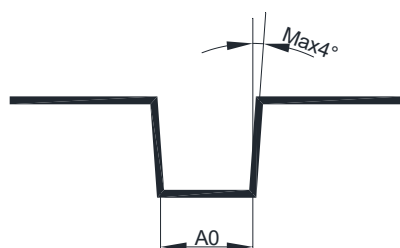
Qty: 10k/Reel

Tape Information

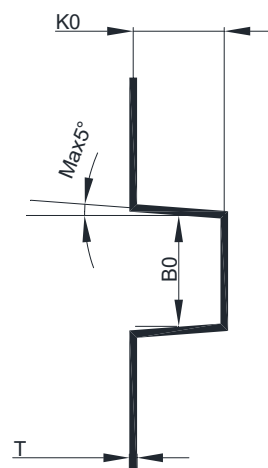
Tape Dimensions



top view

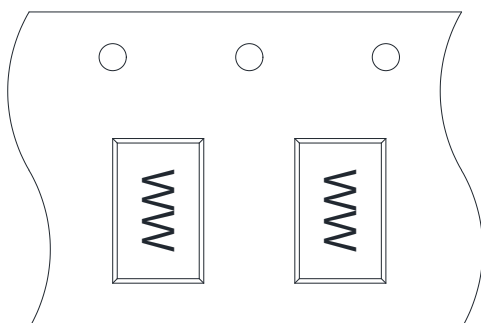


front view



end view

Quadrant Assignments For PIN1 Orientation In Tape



User Direction of Feed

SYMBOL	A0	B0	K0	P0	P1	P2
SPEC	0.70±0.05	1.15±0.05	0.57±0.03	4.00±0.10	2.00±0.10	2.00±0.05
SYMBOL	T	E	F	D0	D1	W
SPEC	0.20±0.05	1.75±0.10	3.5±0.05	1.55±0.05	0.40±0.05	8.00±0.10

Revision History and Checking Table

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2018-03-12	Released Version	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Zhu Jun Li
2	1.1	2018-03-19	Add the typical value of C _j in Electrical Characteristics.	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Zhu Jun Li
3	1.2	2018-12-26	1. Update the Figure 3, 5, 6. 2. Update the typical value of RDYN, VC@ (IPP = 4A, tp = 0.2/100ns (TLP)) and VC@ (IPP = 16A, tp = 0.2/100ns (TLP)) in Electrical Characteristics. 3. 2019.01.03 Double check	Qi Shu Kun	Yin Peng	Ge Zheng Bing	Zhu Jun Li
4	1.3	2020-03-17	Add MSL level	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
5	1.4	2022-02-18	Update Tape Information	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying