



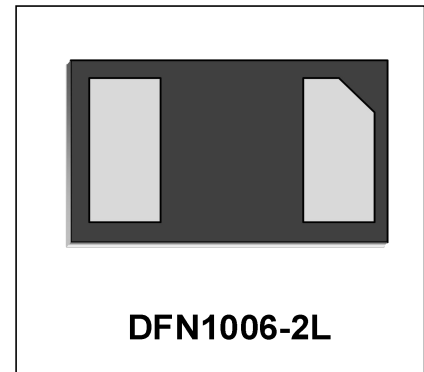
Etek
Microelectronics

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)

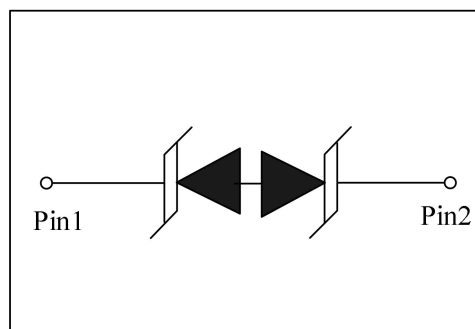
Mechanical Characteristics

- 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

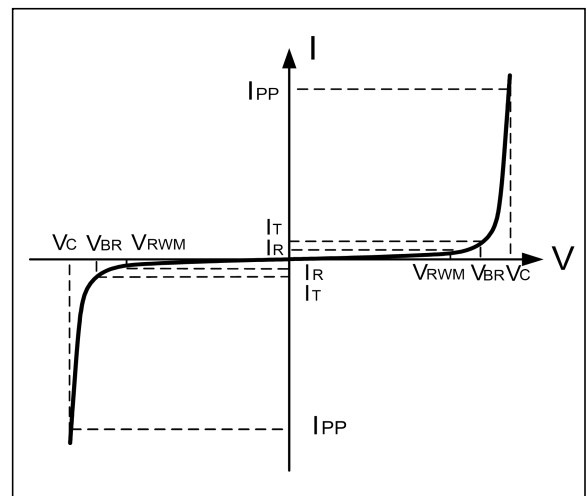


Absolute Maximum Rating

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

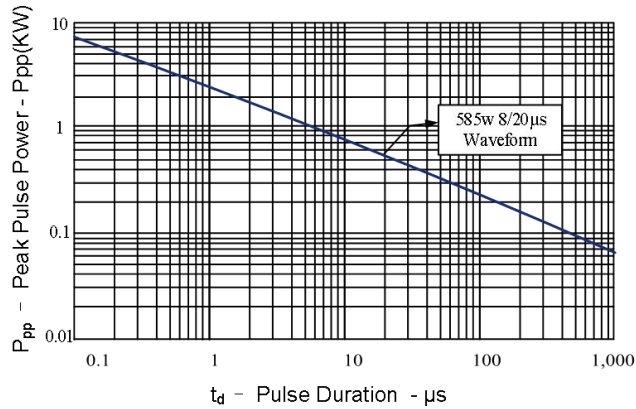


Figure 2: Power Derating Curve

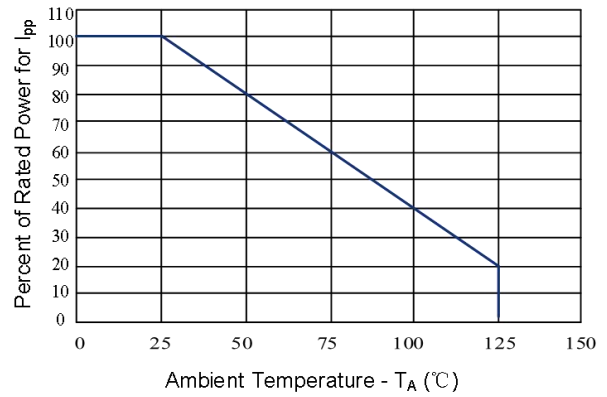


Figure 3: Clamping Voltage vs. Peak Pulse Current

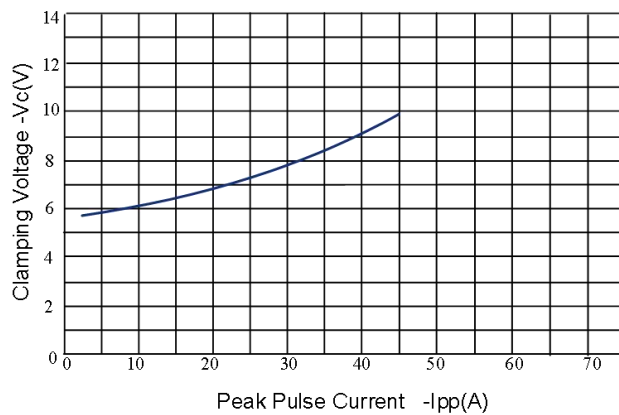


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

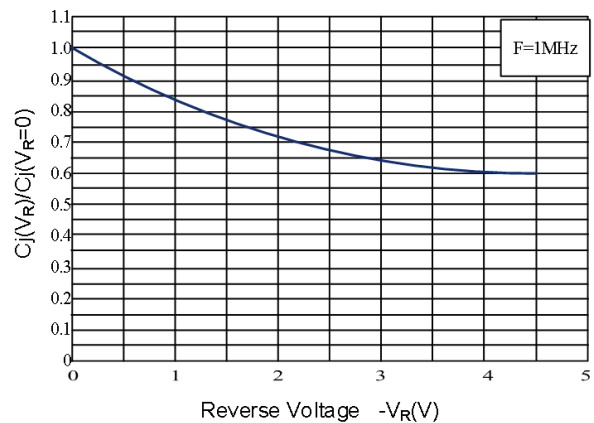


Figure 5: TLP Positive I-V Curve

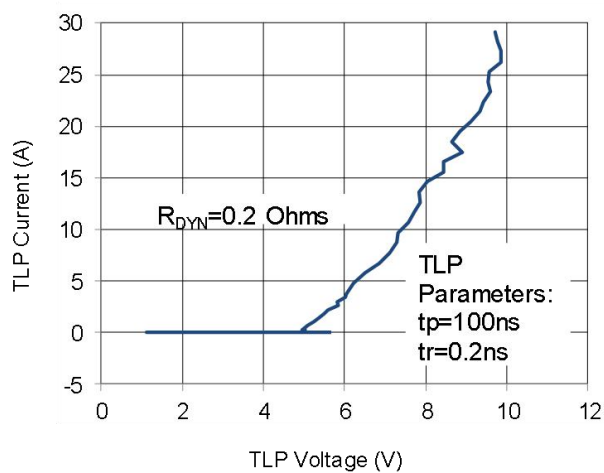
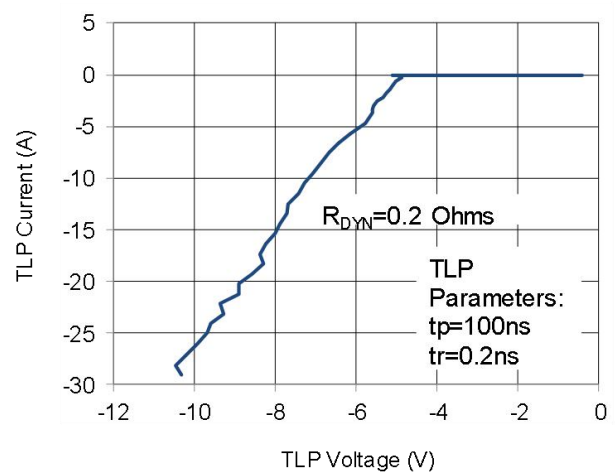
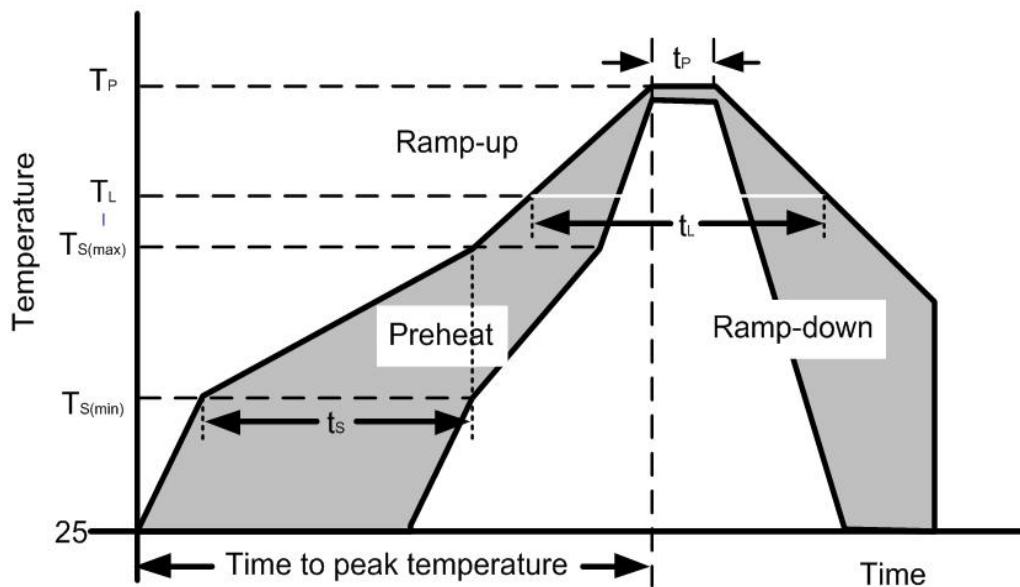


Figure 6: TLP Negative I-V Curve

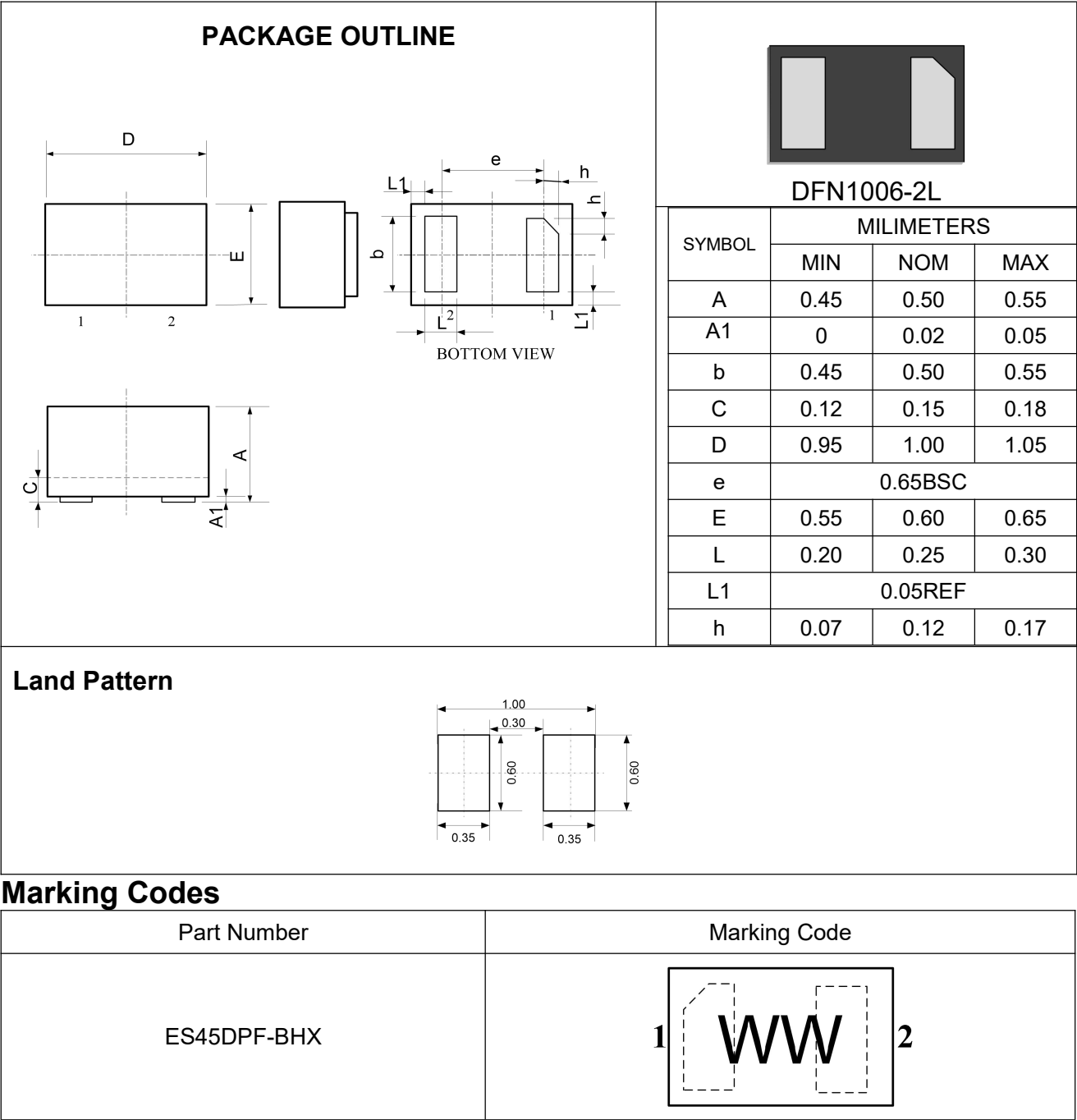


Soldering Parameters

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

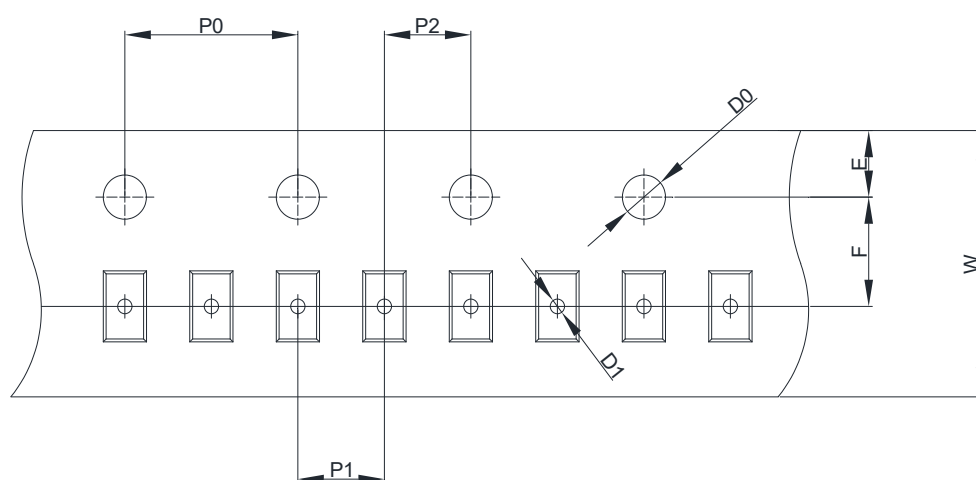


Package Information

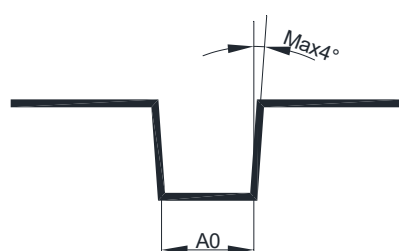
Qty: 10k/Reel

Tape Information

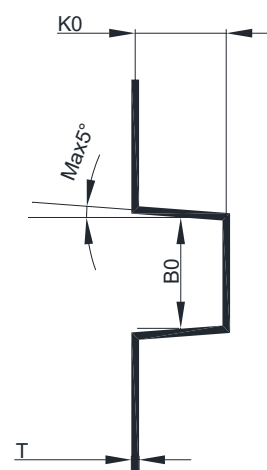
Tape Dimensions



top view

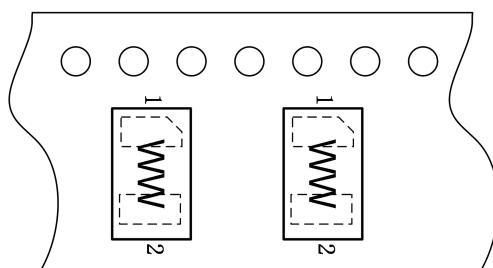


front view



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 Cj 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