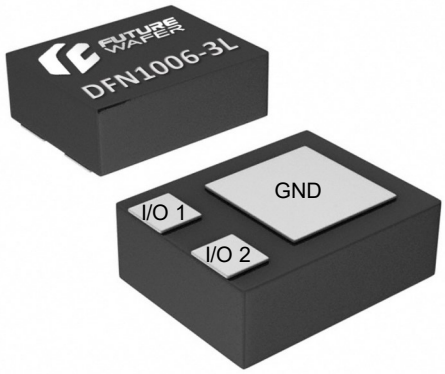
FutureWafer Evolution

FDA0533D/TS

Extra Low Capacitance
2 Channel ESD Protection Device

1. General Description

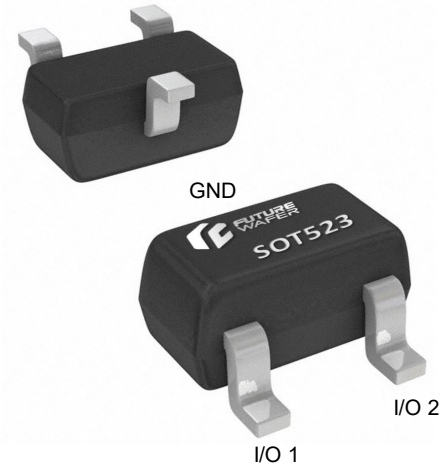
The FDA0533 Family is Designed to Protect High Speed Data Lines From ESD.
Ultra−Low Capacitance and Low ESD Clamping Voltage Make This Device an Ideal Solution For Protecting Voltage Sensitive High Speed Data Lines.
The Standard Package Allows For Easy PCB Layout And Matched Trace Lengths Necessary to Maintain Consistent Impedance Between High Speed Differential Lines Such as USB 3.0/3.1.



DFN1006-3L

2. Potential Applications

- End Equipment
  - Mobile and Tablets
  - Laptops and Desktops
  - Set Top Boxes
  - TV and Monitors
  - Servers
- Interfaces
  - USB 3.0/3.1/Type-C Data Line Protection
  - HDMI 2.0/1.4
  - Display Port 1.3
  - PCI Express 3.0
  - SATA



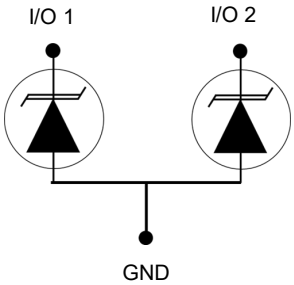
SOT-523

3. Feature List

- Low Line-Capacitance : C_L = 0.25 pF at f = 1MHz
- Low Clamping Voltage : V_{CL} >11.5V at I_{PP} = 1A with R_{DYN} = 0.45 Ω
- Very Low Leakage Current : I_L= 0.1 uA
- Max Operating Voltage : V_{RWM}: 5.0 V

4. IEC Compatibility

- ESD / Transient Protection According to:
  - IEC61000-4-2(ESD) : ±22KV(Contact) / ±22KV(Air)
  - IEC61000-4-4(EFT) : 40A (5/50ns)
  - IEC61000-4-5(Surge) : 3A (8/20us)



5. Mechanical Characteristics

- Molded JEDEC Package
  - DFN 1006-3L
  - SOT 523
- Packing: Tape and Reel
- Flammability rating UL 94V-0
- Halogen Free
- JEDEC MSL Classification :Level 1

6. Absolute Maximum Ratings

Maximum Ratings@ TA = 25°C Unless Otherwise Specified

Parameter	Symbol	Test Condition	Value			Units
			Min.	Typ.	Max.	
Working Voltage	V_{RWM}	-	-	-	5.0	V
Peak Pulse Power	P_{PP}	8/20 us,	-	-	40	Watts
Peak Pulse Current	I_{PP}	Current Waveform		-	3	A
Electrostatic Discharge	$V_{ESD (Contact)}$	R = 330Ω,C = 150pF	-22	-	+22	KV
	$V_{ESD (Air)}$					
Operating Temperature	T_{OP}		-55	-	+150	°C
Storage Temperature	T_{STG}		-65	-	+150	

7. Electrical Characteristics

DC Characteristics

Parameter	Symbol	Test Condition	Value			Units
			Min.	Typ.	Max.	
Breakdown Voltage	V_{BR}	I_t = 1mA , I/O to GND	6/0	7.0	8.5	V
Leakage Current	I_L	V = 5.0V , I/O to GND	-	-	0.1	uA

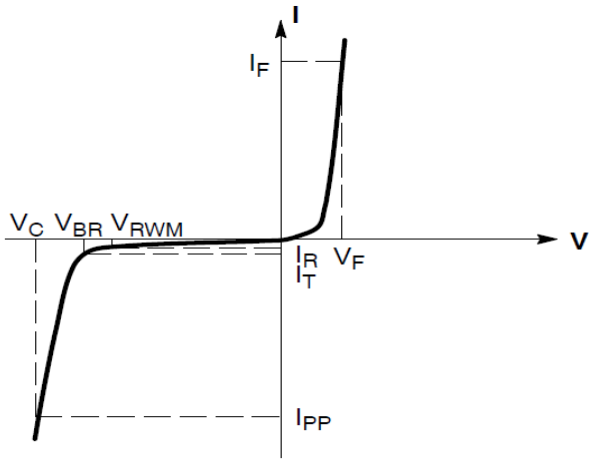
AC Characteristics

Parameter	Symbol	Test Condition	Value			Units
			Min.	Typ.	Max.	
Line Capacitance	C_L	V = 0V,f = 1MHz, I/O to I/O	-	0.25	0.40	pF
		V = 0V,f =1MHz, I/O to GND	-	0.60	0.80	

Protection Characteristics

Parameter	Symbol	Test Condition	Value			Units
			Min.	Typ.	Max.	
Clamping Voltage	$V_{CL,SURGE}$	I_{PP} = 1A,8/20us, I/O to GND	-	-	11.5	V
		I_{PP} = 3A,8/20us, I/O to GND	-	-	14.0	

8. I-V Curve Characteristics



Uni–Directional TVS

P_{PPM} **Peak Pulse Power Dissipation**-Max Power Dissipation
V_R **Stand-off Voltage**-Maximum Voltage That Can be Applied to The TVS Without Operation
I_R **Reverse Leakage Current**-Current Measured at V_R
V_F **Forward Voltage Drop for Uni-directional**
V_{BR} **Breakdown Voltage**-Maximum Voltage that Flows Though the TVS at a Specified Test Current(I_T)
V_C **Clamping Voltage**-Peak Voltage Measured Across the Suppressor at a Specified Ippm (Peak Impulse Current)

9. Ratings and Characteristics Curve (TA=25°C unless otherwise noted)

Fig.1 Non-Repetitive Peak Pulse Power V.S Pulse Time

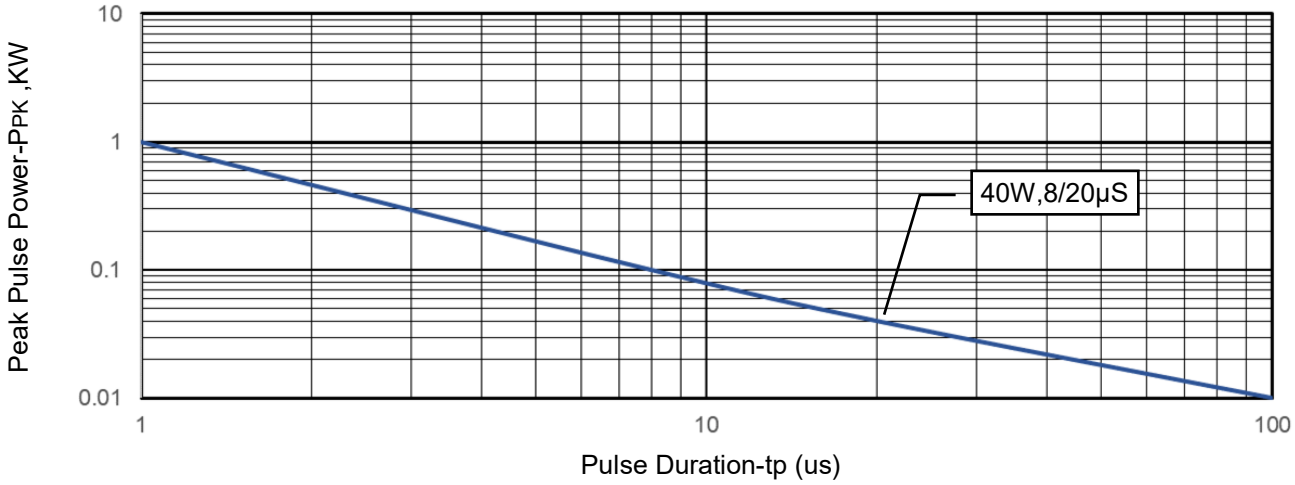


Fig. 2 Power Derating Curve

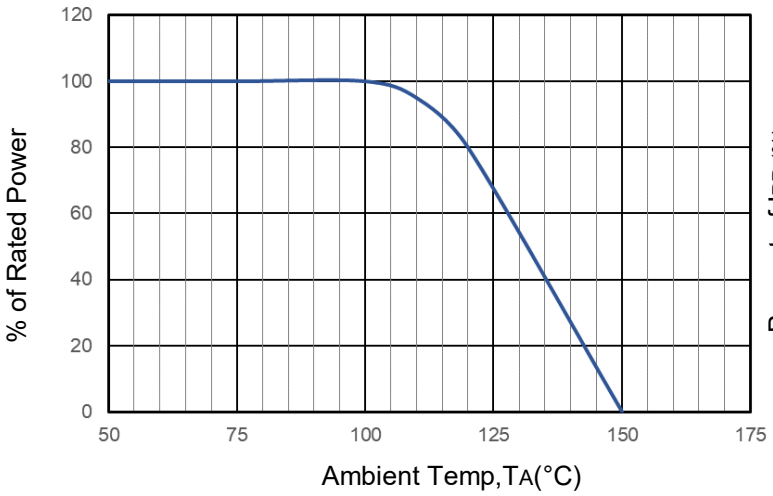


Fig. 3 Pulse Waveform

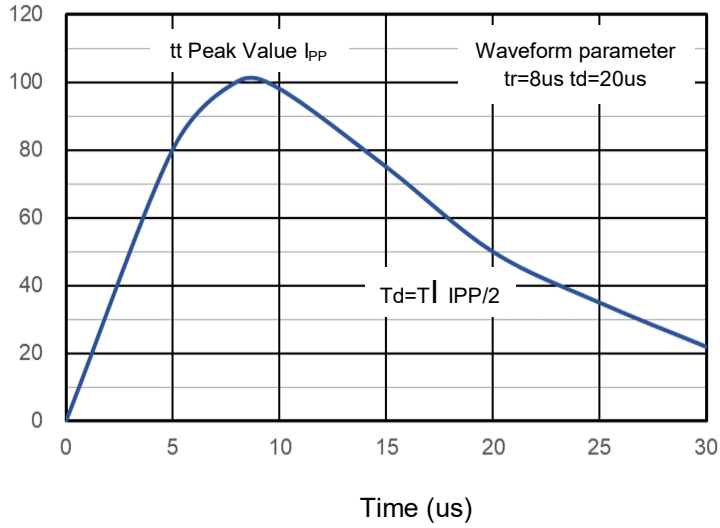


Fig. 4 Clamping Voltage VC Map

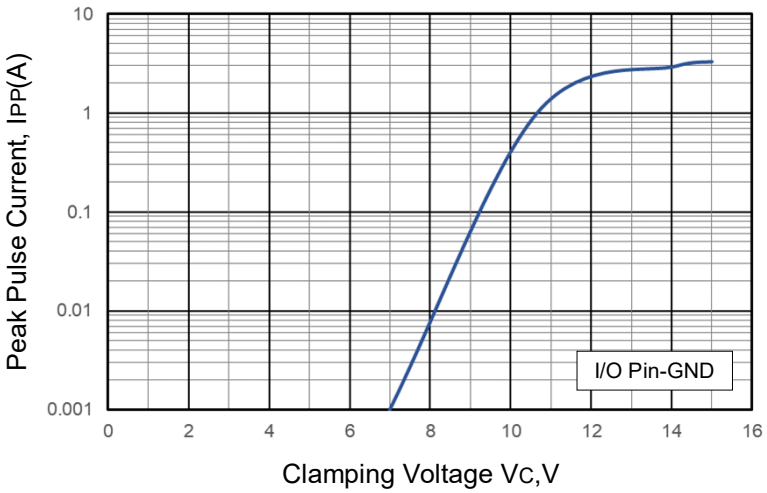
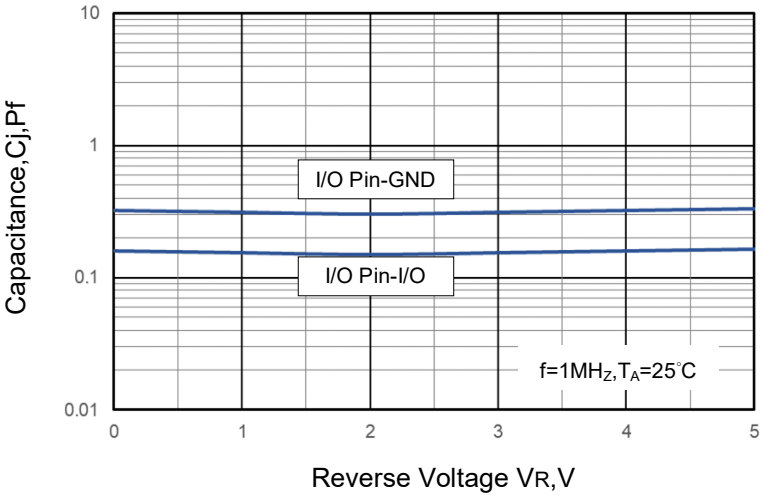
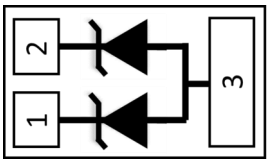
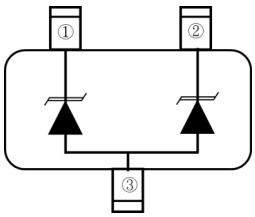


Fig. 5 Normalized Capacitance vs.Reverse Voltage

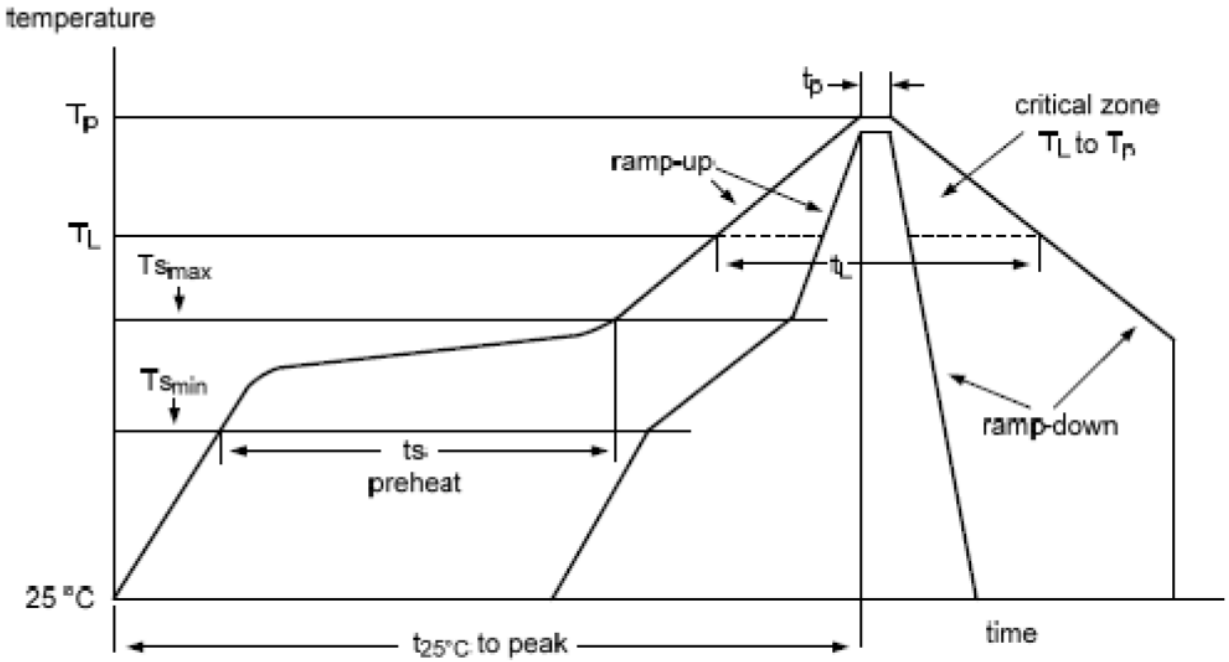


10. Pin Out

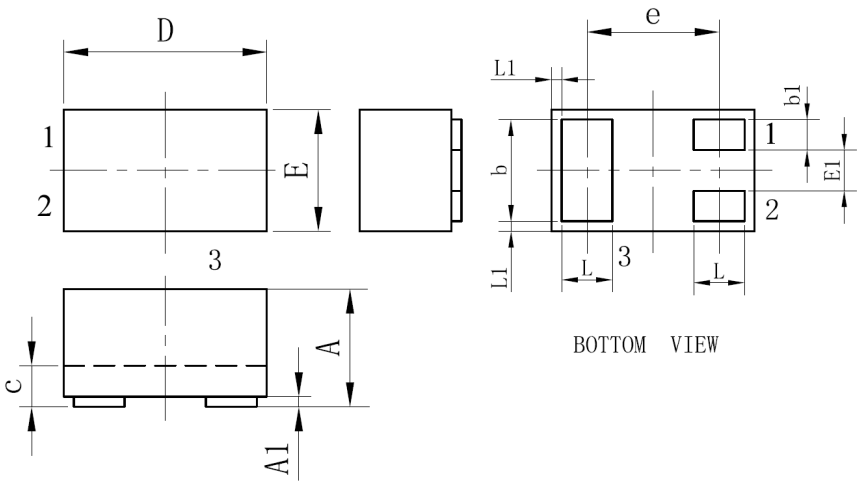
Part No.	Schematic	Package
FDA0533D		DFN1006-3L
FDA0533TS		SOT-523

11. Soldering Parameters

Profile Feature	SnPb eutectic assembly	Pb-free assembly
Average ramp-up rate (Tsmax to Tp)	3 °C/s maximum	3 °C/s maximum
Preheat		
Temperature minimum (Tsmin)	100 °C	150 °C
Temperature maximum (Tsmax)	150 °C	200 °C
Time (tsmin to tsmax)	60 s to 120 s	60 s to 180 s
Time maintained above		
Temperature (TL)	183 °C	217 °C
Time (tL)	60 s to 150 s	60 s to 150 s
Peak/classificationtemperature(T)	235 °C	260 °C
Number of allowed reflow cycles	3	3
Time within 5 °C of actual peak temperature (tp)	10 s to 30 s	20 s to 40 s
Ramp-down rate	6 °C/s maximum	6 °C/s maximum
Time 25 °C to peak temperature	6 minutes maximum	8 minutes maximum



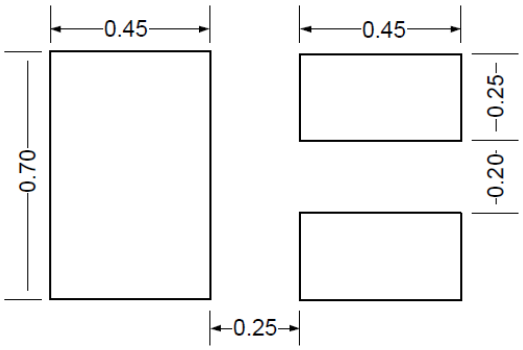
12. Package Information-DFN1006-3L



Symbol	Millimeters		
	Min	Nom	Max
A	0.45	0.50	0.55
A1	0.00	0.02	0.05
b	0.45	0.50	0.55
b1	0.10	0.15	0.20
c	0.12	0.15	0.18
D	0.95	1.00	1.05
e	0.65 BSC		
E	0.55	0.60	0.65
E1	0.15	0.20	0.25
L	0.20	0.25	0.30
L1	0.05 REF		

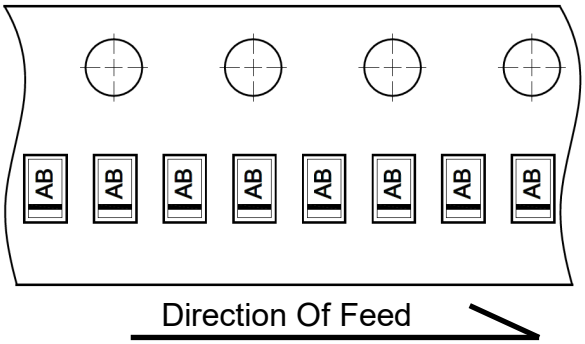
unit: mm

13. Suggest Pad Layout-DFN1006-3L

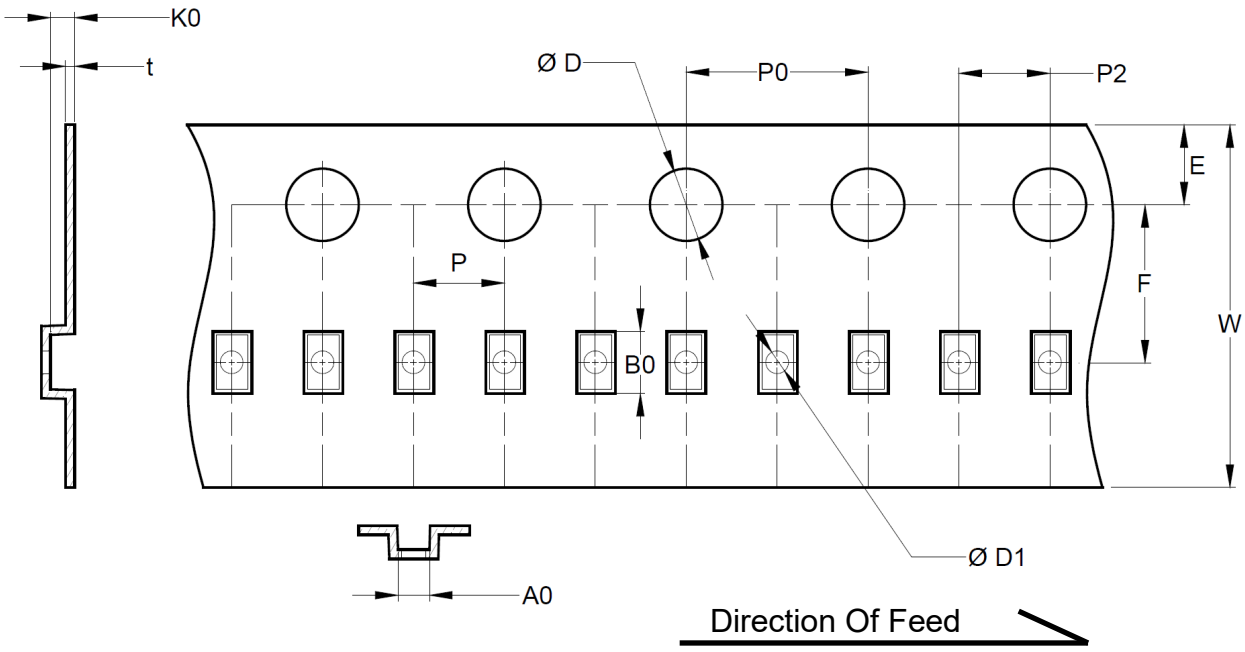


Unit:mm

14.Taping and Reel Specification-DFN1006-3L

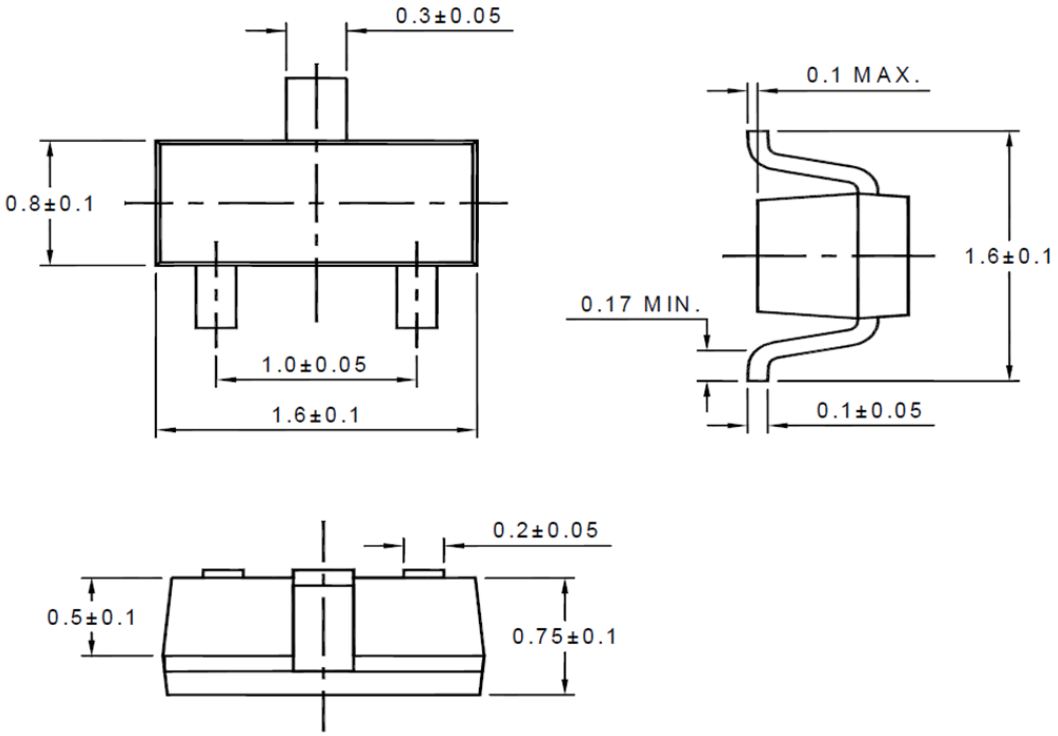
Taping Width	Tape Orientation
8mm	

15. Embossed Carrier Tape Specifications-DFN1006-3L



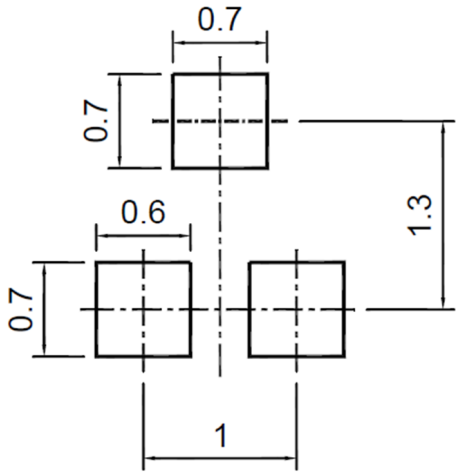
Dimension	W	A0	B0	D	D1	E	F	K0	P	P0	P2	t	W
Value	8 mm	0.69 ±0.05	1.19 ±0.05	160 +0.05	0.50 ±0.1	1.75 ±0.10	3.50 ±0.10	0.53 ±0.05	4.0 ±0.10	4.0 ±0.05	2.0 ±0.05	0.2 ±0.03	8.0 ±0.20
Ao / Bo / Ko	Determined by Component Size. The Clearance Between The Component And The Cavity Must Comply to The Rotational and Lateral Movement Requirement Provided in Figures in The “Maximum Component Movement in Tape Pocket” Section.												

16. Package Information-SOT-523



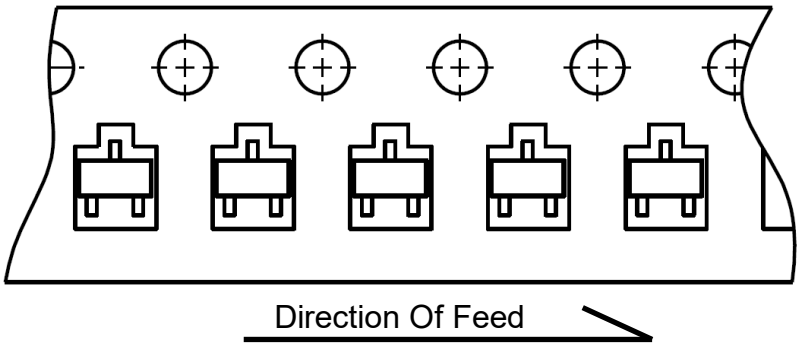
Unit:mm

17. Suggest Pad Layout-SOT-523

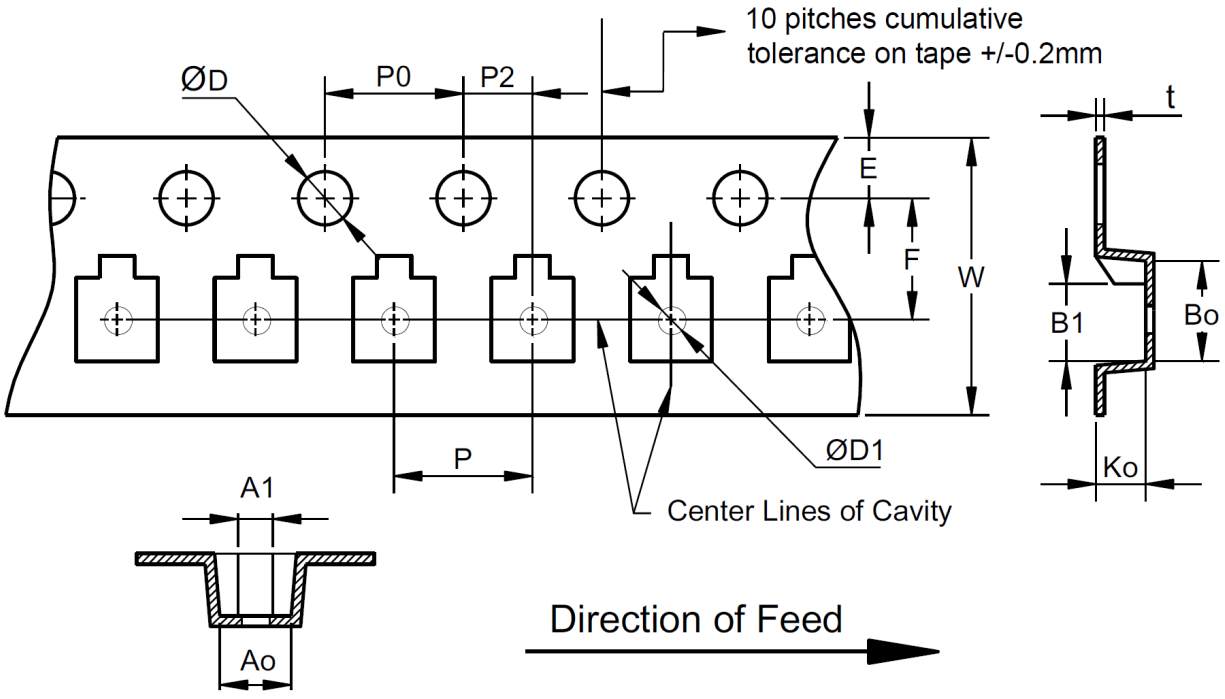


Unit:mm

18.Taping and Reel Specification-SOT-523

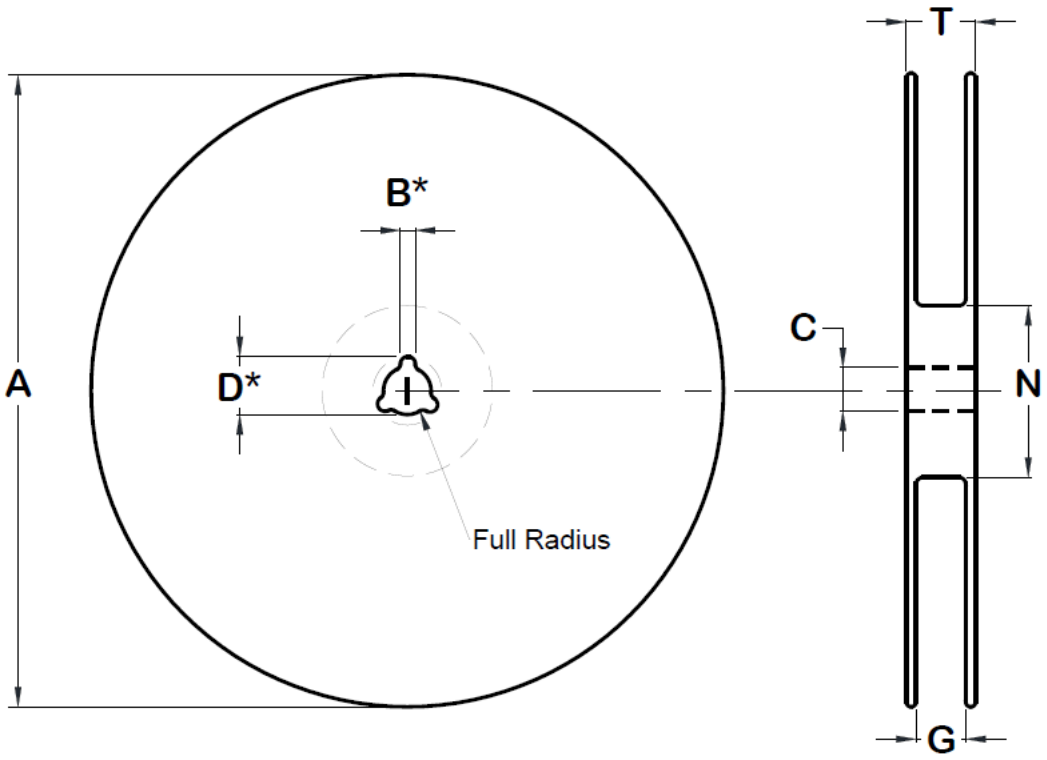
Taping Width	Tape Orientation
8mm	

19. Embossed Carrier Tape Specifications-SOT-523



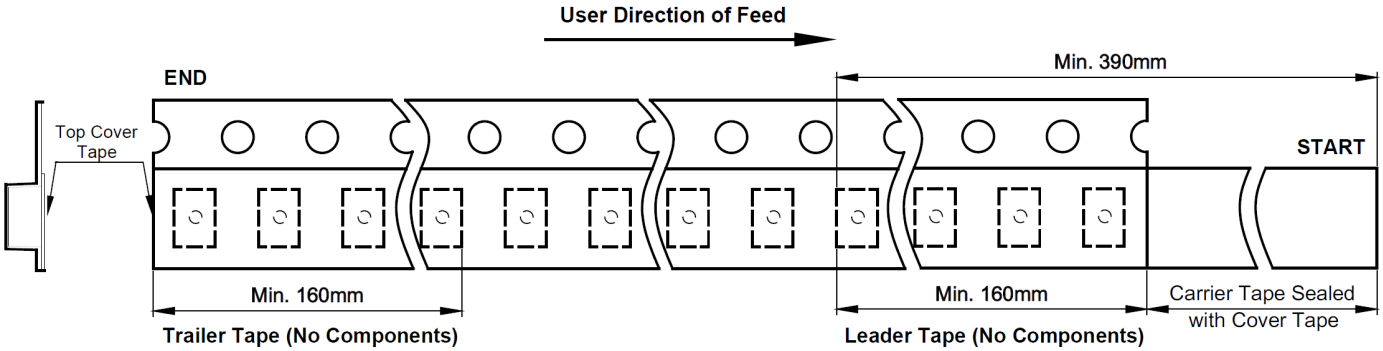
Dimension	W	A1	B1	D	D1	E	F	P	P0	P2	t	W
Value	8 mm	0.55 ±0.05	1.40 ±0.05	1.50 +0.10	0.50 ±0.05	1.75 ±0.10	3.5 ±0.10	4.0 ±0.10	4.0 ±0.10	2.0 ±0.05	0.25 Max.	8 +0.3/ -0.1
Ao / Bo / Ko	Determined by Component Size. The Clearance Between The Component And The Cavity Must Comply to The Rotational and Lateral Movement Requirement Provided in Figures in The “Maximum Component Movement in Tape Pocket” Section.											

20. Surface Mount Reel Specification



Dimension	Tape Width	Reel Size	A	B	C	D	N	G	T
Value	8 mm	7”	178 ±2	2.0 +0.5-0	13 +0.5-0.2	20.5 ±0.2	55 ±5	8.4 +1.5/ -0.0	14.4

21. Tape Leader and Trailer Specification



22. Ordering Information

Part Number	Component Package	Marking	Quantity	Packaging Option
FDA0533D	DFN1006-3L	LF	10,000PCS	Tape&reel-8mm tape/7”reel
FDA0533TS	SOT-523		8,000PCS	

23. History

Version	Date	File No.	Recording	Basis
A	20-Sep-2019	F11938A	New Create	Market
2.0	20-Mar-2021	F11938A	Update Version	System

24. Contents

FUTURE WAFER

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