




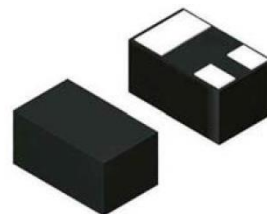
<b>SPECIFICATION SHEET NO.</b>	S0417- ESD0502L00S52L	
<b>ORIGINAL MFG/PART NO.</b>	MDD Diodes/ESD0502L/DFN10063L0S52L	
<b>NEXTGEN PART CODE</b>	ESD0502L00S52L	Indicate This Code For <a href="#">RFQ</a> /Order
<b>DATE</b>	Apr. 17, 2025	
<b>REVISION</b>	A3	Updated With Most Recent Data
<b>DESCRIPTION AND MAIN PARAMETRICS</b>	<p>SMD Plastic-Encapsulate TVS/ESD Protection Diodes, ESD05 Series, 3 Pads  Case DFN1006-3L, Ultra -Low Capacitance, Unidirectional Type  Reverse Working Voltage: 5.0V  Clamping Voltage 10VC Max.@1.0A  Operating Junction Temp. Range -55°C ~+125°C  Package in Tape/Reel, 10,000pcs/Reel  RoHS/RoHS III compliant, RoHS Annex III lead Exemption (Exempt per RoHS EU 2015/863) and Halogen Free (HF)</p>	
<b>CUSTOMER</b>		
<b>CUSTOMER PART NUMBER</b>		
<b>CROSS REF. PART NUMBER</b>		
<b>MEMO</b>		

<b>VENDOR APPROVE</b>
<div> <div>Issued/Checked/Approved</div> <div>    </div> </div>
Effective Date: Apr. 17, 2025

<b>CUSTOMER APPROVE</b>
Date:

## DESCRIPTION

ESD0502L is an ultra-low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection For high-speed data interfaces. With typical capacitance of 0.2pF (I/O to I/O) only, ESD0502L is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc. ESD0502L uses ultra-small DFN1006-3L package. Each ESD0502L device can protect two high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make ESD0502L ideal for high-speed data port and high-frequency line applications, The low clamping voltage of the ESD0502L guarantees a minimum stress on the protected IC.



*Image shown is a representation only. Exact specifications should be obtained from the product dimension.*



## MAIN FEATURE

- Peak Power Dissipation 60W (8/20 $\mu\text{s}$ )
- Transient Protection For High-Speed Data Lines
- IEC61000-4-2 (ESD)  $\pm 15\text{kV}$  (Air),  $\pm 8\text{kV}$  (Contact)
- IEC61000-4-4 (EFT) 40A (5/50ns) Cable Discharge Event (CDE)
- Protects two Data Line
- Small package (1.0mm\*0.6mm\*0.5mm)
- Low Clamping Voltage
- Low Leakage Current
- Low Capacitance 0.2pF Typical (I/O - I/O)
- Meet MSL 1 Requirement
- Cross Competitors Parts and More.
- RoHS/RoHS III compliant, RoHS Annex III lead Exemption (Exempt per RoHS EU 2015/863) and Halogen Free (HF)

## APPLICATION

- Serial ATA
- Desktops, Servers and Notebooks
- PCI Express
- MDDI Ports / USB Data Line Protection
- Display Port
- Digital Visual Interfaces (DVI)

## ELECTRICAL CHARACTERISTICS

- See Page 5 ~Page 6.
- All Parameters are Subject To NextGen Components' Final Confirmation

## HOW TO ORDER

- Please Follow Up Part Code Guide And Indicate NextGen Part Code ESD0502L00S52L For RFQ and Order.

## PART CODE GUIDE

**RFQ**  
Request For Quotation

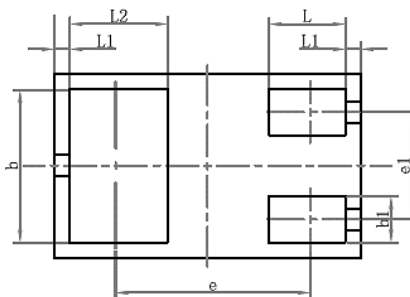
CODE	NAME	KEY SPECIFICATION OPTION
ESD05	Product Series Code	SMD Plastic-Encapsulate ESD Protection Diode, 3 Pads Case DFN1006-3L, Ultra Low Capacitance
02L	Parameters Code	Letter or Digits (A~Z, a~z or 1~9)
00S	Internal Control Code	Letter or Digits (A~Z, a~z or 1~9)
52L	Marking Code	Marking "52L"
XX	Special/Custom Parameters Code	Letter or Digits (A~Z, a~z or 1~9) for Special Parametric; Blank: N/A

**DIMENSION**- Unit: mm (Inch), Case DFN1006-3L Outline

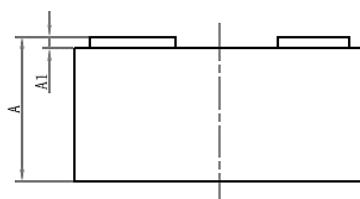
Top View



Bottom View

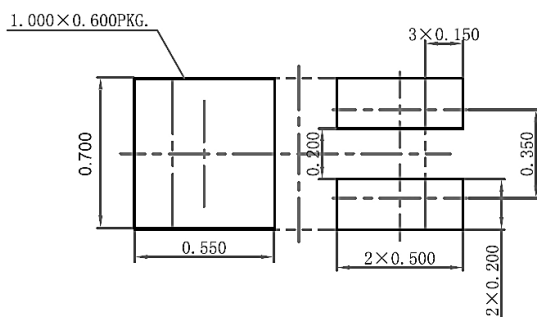


Side View

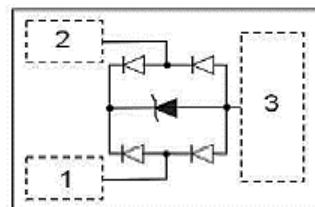


SYMBOL	DIMENSION (MM)		DIMENSION (INCH)	
	MIN.	MAX.	MIN.	MAX.
A	0.45	0.55	0.018	0.022
A1	0.01	0.1	0	0.004
D	0.95	1.05	0.037	0.041
E	0.55	0.65	0.022	0.026
b	0.45 Ref.		0.018 Ref	
b1	0.1	0.2	0.004	0.008
e	0.635 Ref.		0.025 Ref.	
e1	0.3	0.4	0.012	0.016
L	0.2	0.3	0.008	0.012
L1	0.05 Ref.		0.002 Ref.	
L2	0.2	0.3	0.008	0.012
A	0.45	0.55	0.018	0.022

### Recommend Pad Layout (unit : mm)



### Circuit Diagram



## MECHANICAL CHARACTERISTICS

CASE	FLAMMABILITY RATING	TERMINALS	MARKING
JEDEC DFN1006-3L molded plastic body	UL 94V-0	Gold plated, solderable per MIL-STD-750, method 2026	52L

## ABSOLUTE MAX. RATING & CHARACTERISTICS - TA=25°C unless otherwise specified, For Reference Only

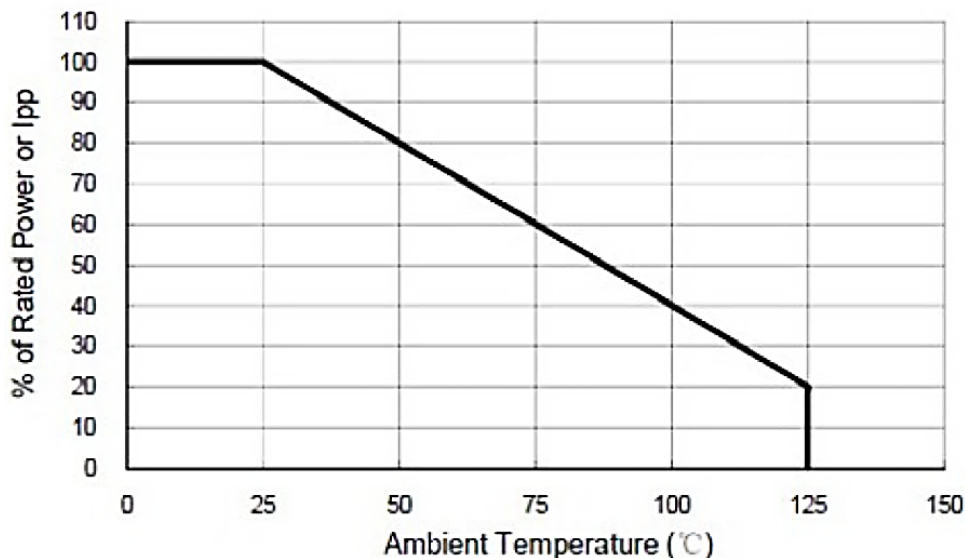
PARAMETER	SYMBOLS	VALUE	UNITS
ESD per IEC 61000-4-2 (Air)	VESD	±20	KV
ESD per IEC 61000-4-2 (Contact)	VESD	±20	KV
Peak Pulse Power @8/20μs	PPP	60	W
Operating Temperature Range	TOPT	-55 ~+ 125	°C
Storage Temperature Range	TSTG	-55 ~ +150	°C
Lead Solder Temperature- Max. (10 s Duration)	TL	260 /10s	°C

**ELECTRICAL CHARACTERISTICS** - TA=25°C unless otherwise specified, For Reference Only

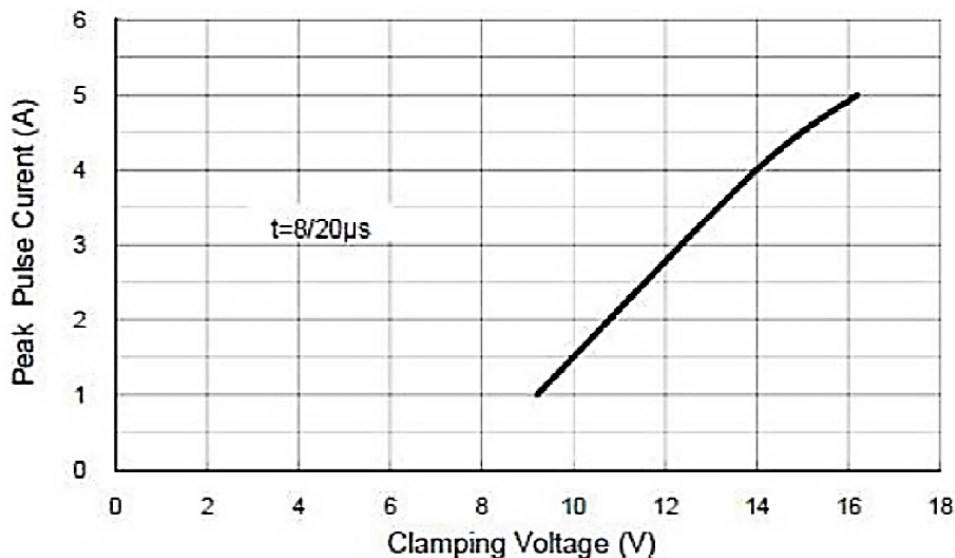
PARAMETER	TEST CONDITION	SYMBOLS	VALUE			UNITS
			MIN.	TYP.	MAX.	
Reverse Working Voltage	I/O to Ground	VRWM			3.3	V
Reverse Breakdown Voltage	IT = 1.0mA Between I/O and GND	VBR	6.0			V
Reverse Leakage Current	VRWM = 5.0V Between I/O and GND	IR			100	nA
Clamping Voltage	IPP = 1A, tp = 8/20μs Between I/O and GND	VC			10	V
	IPP = 4A, tp = 8/20μs Between I/O and GND				15	V
Forward Voltage	IT = 10mA, tp = 8/20μs Between I/O and GND	VF			1.2	V
Total Capacitance	VR = 0 V, f = 1.0MHz Between I/O and GND	CT		0.4	0.6	pF
	VR = 0 V, f = 1.0MHz Between I/O and I/O			0.2	0.3	

**RATINGS AND CHARACTERISTICS CURVES**- For Reference Only, Ta=25°C Unless Otherwise Specified.

**Fig 1 Power Derating Curve**

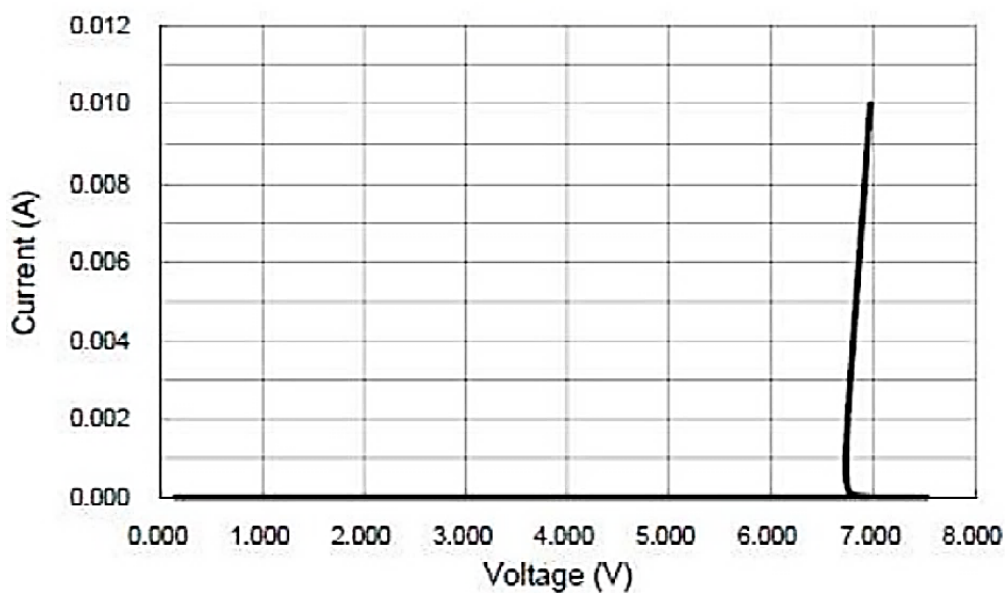


**Fig 2 Clamping Voltage vs Peak Pulse Current**

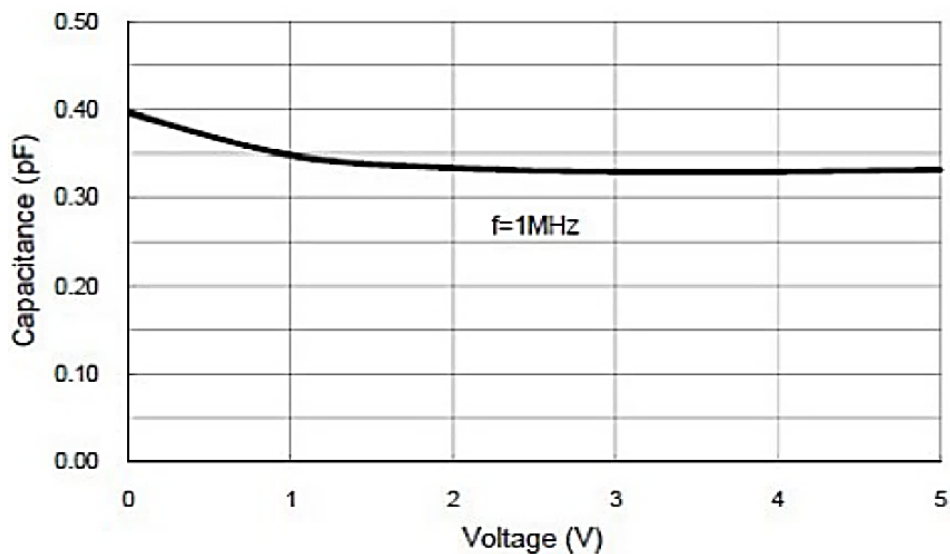


**RATINGS AND CHARACTERISTICS CURVES**- For Reference Only, Ta=25°C Unless Otherwise Specified.

**Fig 3 Voltage Sweeping**



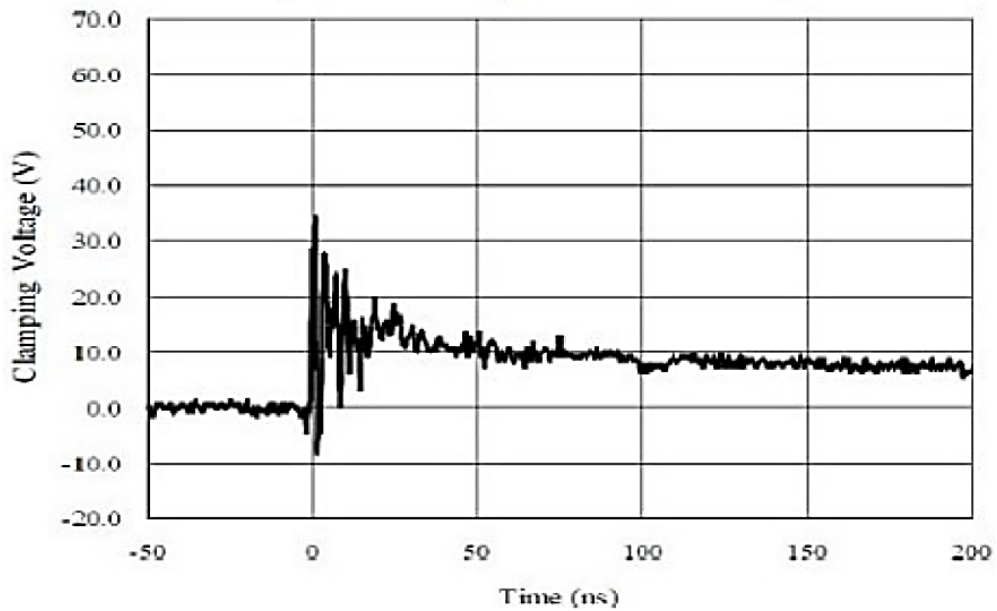
**Fig 4 Voltage vs Capacitance**



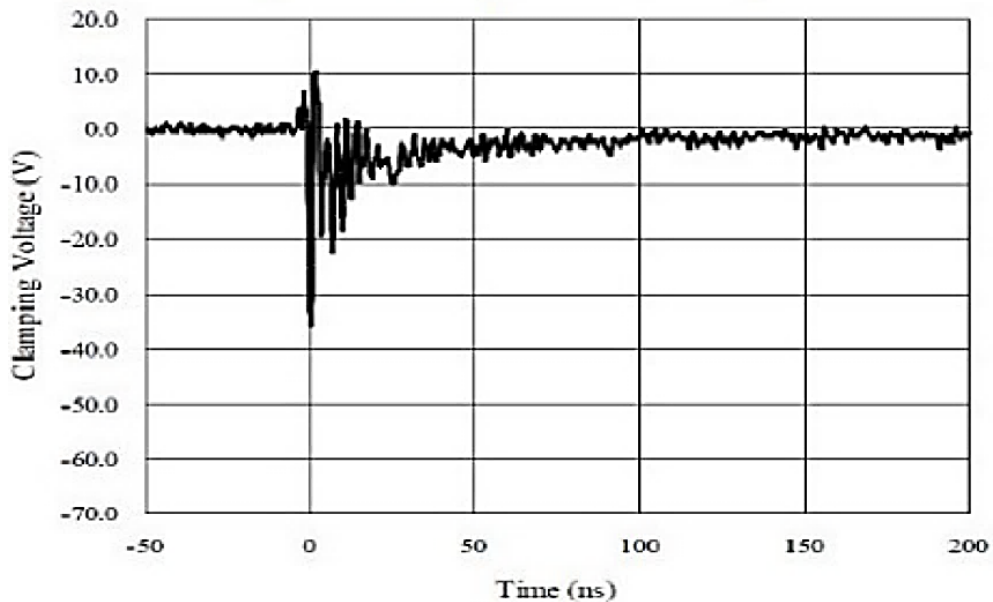


**RATINGS AND CHARACTERISTICS CURVES-** For Reference Only,  $T_a=25^{\circ}\text{C}$  Unless Otherwise Specified.

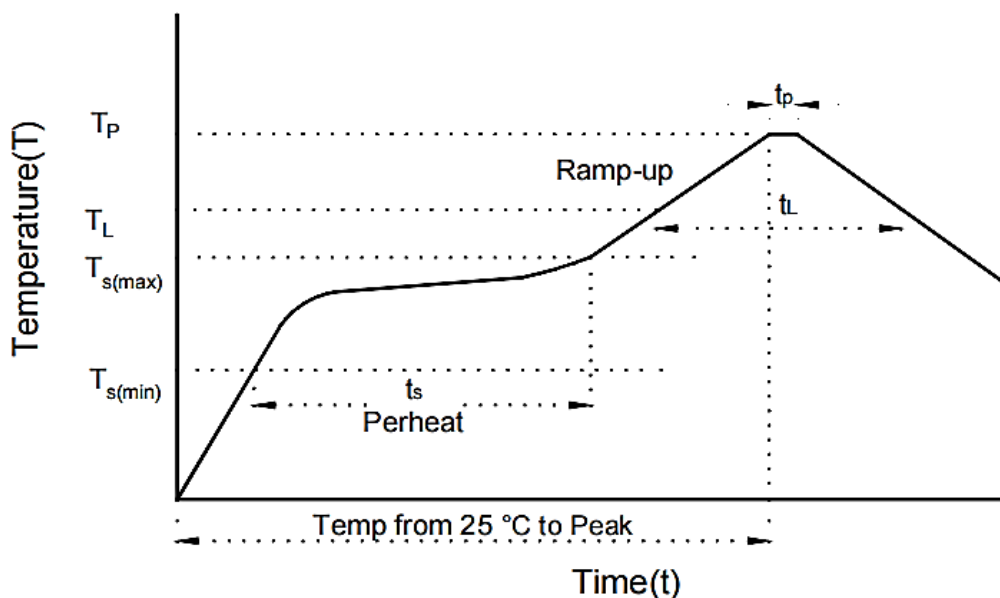
**Fig 5 ESD Clamping**  
(+8kV Contact per IEC 61000-4-2)



**Fig 6 ESD Clamping**  
(-8kV Contact per IEC 61000-4-2)

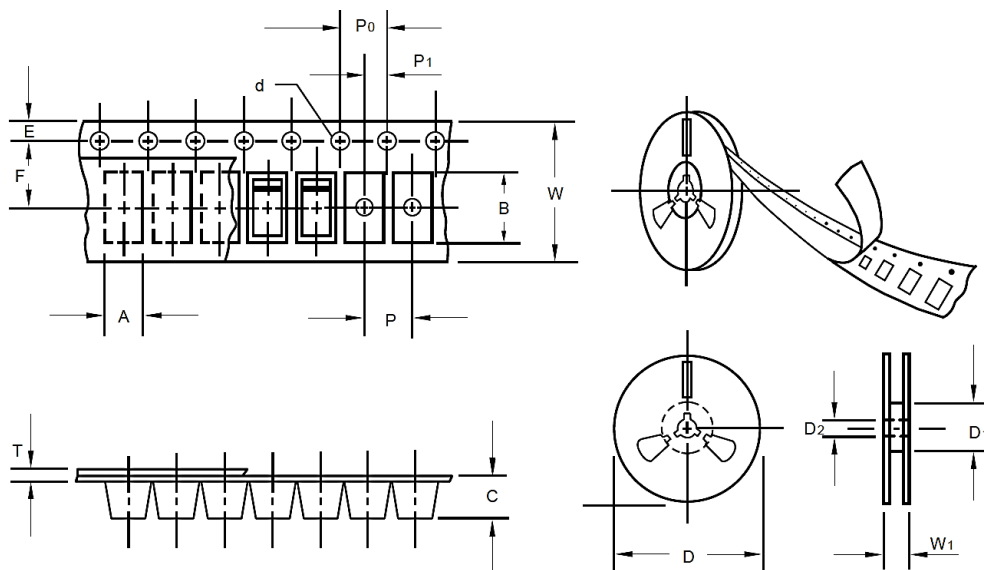


**RECOMMENDED SOLDERING PARAMETERS – FOR REFERENCE ONLY**



PROFILE FEATURE		PB-FREE ASSEMBLY
Average Ramp-up Rate ( $T_L$ Max to $T_p$ )		3°C/second Max
Preheat	Temperature Min ( $T_s$ Min.)	150°C
	Temperature Max ( $T_s$ Max.)	200°C
	Time ( $t_s$ Min. to $t_s$ Max.)	60 ~ 180 seconds
Time maintained above	Temperature ( $T_L$ )	217°C
	Time ( $t_L$ )	60 ~ 150 seconds
Peak/Classification Temperature ( $T_p$ )		260 °C
Time within 5°C of actual Peak Temperature ( $t_p$ )		10 seconds Max.
Ramp-down Rate		6 °C /Second Max.
Time 25 °C to Peak Temperature		8 Minutes Max.
Suggest reflow times		3 Times Max.

**TAPE/REEL** - Unit: mm, All Devices are packed in accordance with EIA standard RS-481-A and specifications



ITEM	SYMBOL	TOLERANCE	DFN1006
Carrier width	A	0.1	2.10
Carrier Length	B	0.1	4.00
Carrier Depth	C	0.1	1.60
Sprocket hole	d	0.05	1.55
7"Reel outside diameter	D	2	178.00
7"Reel inner diameter	D1	Min.	50.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.25
Tape width	W	0.3	8.15
Reel width	W1	1	10.50
Qty. Per Reel (pcs)	10,000		

## IMPORTANT NOTES AND DISCLAIMER

1. **ROHS COMPLIANCE:** The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained at Download Center.
2. **REACH COMPLIANCE:** REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained at Download Center.
3. All Product parametric performance is indicated in the Electrical Characteristics for the listed herein test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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8. *NextGen* requires that customers first obtain an RMA (Returned Merchandise Authorization) number prior to returning any products. Returns must be made within 30 days of the date of invoice, be in the original packaging, unused and like-new condition. At the time of quoting or purchasing, a product may say that it is Non-Cancelable/ Non-Returnable (NCNR). These products are not returnable and not refundable.