

# ABS-ESD7



## Electrostatic-Dissipative FDM Thermoplastic Filament for Electrostatic-Sensitive Applications

The information presented are typical values intended for reference and comparison purposes only.  
They should not be used for design specifications or quality control purposes.

## Overview

ABS-ESD7™ (acrylonitrile butadiene styrene-electrostatic dissipative) is an ABS thermoplastic with static dissipative properties suited for static discharge-sensitive applications. ABS-ESD7 prevents static electricity buildup so it will not produce a discharge or attract other materials like powders, dust and fine particles.

The material is ideal for jigs and fixtures used to fabricate and assemble electronic components and associated production line and conveyor parts. It is also useful for producing functional prototypes, enclosures and packaging.

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## Ordering Information

### 3D Printer Compatibility

F370™

Fortus 380mc™

Fortus 450mc™

Fortus 900mc™

F900™

### Support Material

QSR Soluble Support

SR-30 Soluble Support

SR-35 Soluble Support

### Build Sheets

Low temperature

0.02 x 26 x 38 in. (0.76 x 660 x 965 mm)

0.02 x 16 x 18.5 in. (0.76 x 406 x 470 mm)

0.02 x 14 x 16.5 in. (0.76 x 355 x 417 mm)

F370 Standard build tray

**Table 1. ABS-ESD7 Thermoplastic Filament Ordering Information**

Part Number	Description
<b>Filament Canisters</b> <sup>(1)(2)</sup>	
355-02130	ABS-ESD7, 92.3 cu. in. – Plus
311-20800	ABS-ESD7, 92.3 cu. in. – Classic
333-90230	ABS-ESD7, 90 cu. in. – F123
355-03110	SR-30™ Soluble Support, 92.3 cu. in. – Plus
360-53110	XTEND™ SR-30 Soluble Support, 500 cu. in. – Plus
311-30200	SR-30 Soluble Support, 92.3 cu. in. – Classic
355-03135	SR-35™ Soluble Support, 92.3 cu. in. – Plus
311-30235	SR-35 Soluble Support, 92.3 cu. in. – Classic
333-63500	QSR Support™, 60 cu. in. – F123™
<b>Printer Consumables</b>	
123-00401-S	F370 extrusion head, 0.007 in. (0.178 mm) and 0.010 in. (0.254 mm) layer height
511-10301 <sup>(3)</sup>	T12 tip, 0.007 in. (0.178 mm) layer height
511-10401 <sup>(3)</sup>	T16 tip, 0.010 in. (0.254 mm) layer height
511-10900 <sup>(3)</sup>	T12SR30 support tip, all layer heights
123-00304	F370 Build Tray, Standard
325-00300 <sup>(4)</sup>	Low-temperature build sheet, 0.02 x 26 x 38 in. (0.76 x 660 x 965 mm)
325-00100 <sup>(5)</sup>	Low-temperature build sheet, 0.02 x 16 x 18.5 in. (0.76 x 406 x 470 mm)
355-00100 <sup>(6)</sup>	Low-temperature build sheet, 0.02 x 14 x 16.5 in. (0.76 x 355 x 417 mm)

(1) Classic canisters are compatible with all Fortus 400mc and Fortus 900mc printers prior to s/n L502

(2) Plus canisters are compatible with all Fortus 450mc, all Stratasys F900, and Fortus 900mc printers s/n L502 and up

(3) Compatible with Fortus 380mc, Fortus 450mc, Stratasys F900 and Fortus 900mc

(4) Compatible with Stratasys F900 and Fortus 900mc

(5) Compatible with Fortus 450mc, Stratasys F900 and Fortus 900mc

(6) Compatible with Fortus 380mc

## Physical Properties

Values are measured as printed. XY and XZ/ZX orientations were tested.

For full details, refer to the [Stratasys Materials Test Procedure on stratasys.com](https://www.stratasys.com/materials-test-procedure).

DSC and TMA curves can be found in the Appendix.

**Table 2. ABS-ESD7 Thermoplastic Filament Physical Properties**

Property	Test Method	Units	Typical Values	
			XY	XZ/ZX
HDT @ 66 psi	ASTM D648	C	105	
	Method B	F	221	
HDT @ 264 psi	ASTM D648	C	100	
	Method B	F	212	
Tg	ASTM D7426	C	105	
	Inflection Point	F	221	
Mean CTE	ASTM E831	$\mu\text{m}/[\text{in}\cdot\text{m}\cdot^{\circ}\text{C}]$	55	65
	(-50 °C to 100 °C)	$\mu\text{in}/[\text{in}\cdot\text{m}\cdot^{\circ}\text{F}]$	30	36
Volume Resistance	ASTM D257	$\Omega$	$10^3$ - $10^9$ *	
Specific Gravity	ASTM D257 @23 °C	N/A	1.07	

\* See ESD section for details

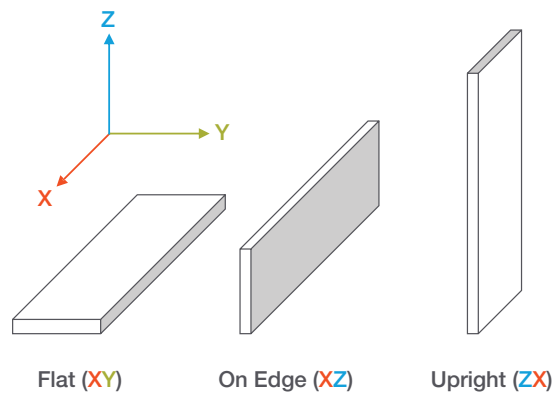
## Mechanical Properties

Samples were printed with 0.010 in. (0.254 mm) layer height.

For the full test procedure, please see the [Stratasys Materials Test Procedure on stratasys.com](https://www.stratasys.com/resources/materials-test-procedure).

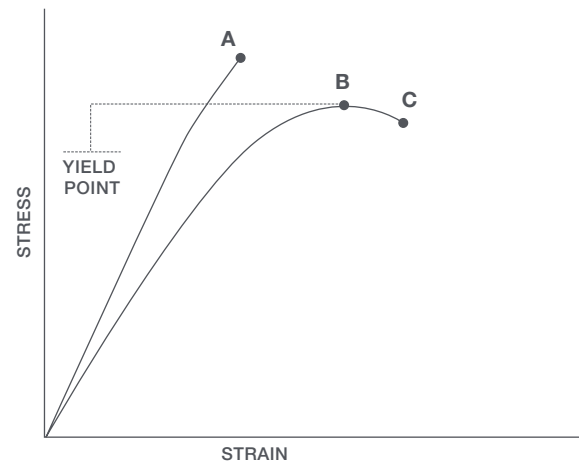
### Print Orientation

Parts created using FDM are anisotropic as a result of the printing process. Below is a reference of the different orientations used to characterize the material.



### Tensile Curves

Due to the anisotropic nature of FDM, tensile curves look different depending on orientation. Below is a guide of the two types of curves seen when printing tensile samples and what reported values mean.



**A** = Tensile at break, elongation at break (no yield point)

**B** = Tensile at yield, elongation at yield

**C** = Tensile at break, elongation at break

**Table 3. ABS-ESD7 Thermoplastic Filament Mechanical Properties (F900 – T16 Tip)**

		XZ Orientation	ZX Orientation
<b>Tensile Properties: ASTM D638</b>			
Yield Strength	MPa	35 (1)	No yield
	psi	5,130 (195)	No yield
Elongation @ Yield	%	2.06 (0.05)	No yield
Strength @ Break	MPa	35 (1)	27 (2)
	psi	4,920 (150)	3,920 (330)
Elongation @ Break	%	3.4 (0.5)	1.6 (0.3)
Modulus (Elastic)	GPa	2.7 (0.1)	2.3 (0.2)
	ksi	390 (15)	330 (30)
<b>Flexural Properties: ASTM D790, Procedure A</b>			
Strength @ Break	MPa	No break	45 (3)
	psi	No break	6,435 (370)
Strength @ 5% Strain	MPa	67 (1)	N/A
	psi	9,795 (170)	N/A
Strain @ Break	%	No break	2.7 (0.1)
Modulus	GPa	2.4 (0.1)	2.0 (0.1)
	ksi	350 (10)	295 (12)
<b>Compression Properties: ASTM D695</b>			
Yield Strength	MPa	95 (3)	200 (10)
	psi	13,830 (365)	29,280 (1,530)
Modulus	GPa	2.4 (0.1)	2.4 (0.3)
	ksi	350 (15)	350 (50)
<b>Impact Properties: ASTM D256, ASTM D4812</b>			
Notched	J/m	35 (3)	20 (2)
	ft*lb/in	0.68 (0.03)	0.38 (0.03)
Unnotched	J/m	200 (35)	85 (20)
	ft*lb/in	3.7 (0.6)	1.6 (0.3)

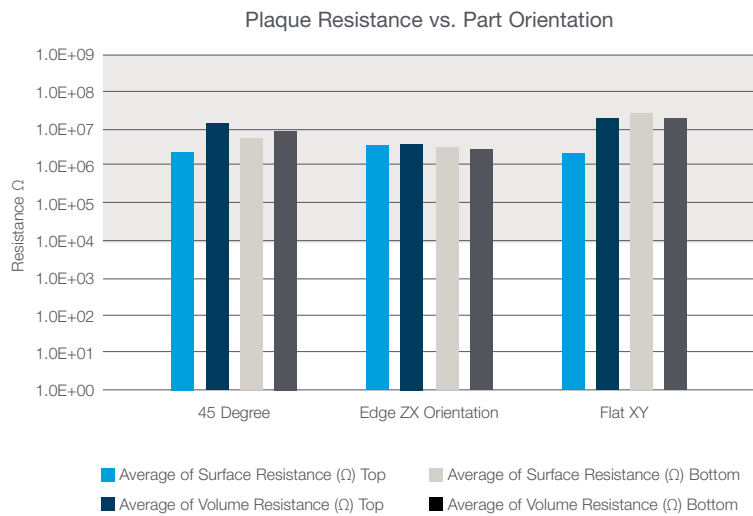
**Table 4. ABS-ESD7 Thermoplastic Filament Mechanical Properties (F370)**

		XZ Orientation	ZX Orientation
<b>Tensile Properties: ASTM D638</b>			
Yield Strength	MPa	33 (1)	No yield
	psi	4,830 (100)	No yield
Elongation @ Yield	%	2.06 (0.03)	No yield
Strength @ Break	MPa	30 (1)	24 (1)
	psi	4,610 (110)	3,370 (40)
Elongation @ Break	%	2.4 (0.2)	1.77 (0.06)
Modulus (Elastic)	GPa	2.12 (0.03)	1.73 (0.02)
	ksi	310 (5)	250 (3)
<b>Flexural Properties: ASTM D790, Procedure A</b>			
Strength @ Break	MPa	60 (2)	30 (3)
	psi	8,770 (355)	4,320 (490)
Strain @ Break	%	3.8 (0.3)	2.0 (0.3)
Modulus	GPa	2.25 (0.03)	1.65 (0.04)
	ksi	325 (4)	240 (5)
<b>Compression Properties: ASTM D695</b>			
Yield Strength	MPa	50 (2)	60 (2)
	psi	7,660 (320)	8,650 (200)
Peak Strength	MPa	N/A	150 (20)
	psi	N/A	21,840 (2500)
Modulus	GPa	1.73 (0.03)	1.73 (0.03)
	ksi	250 (4)	250 (4)
<b>Impact Properties: ASTM D256, ASTM D4812</b>			
Notched	J/m	40 (3)	18 (3)
	ft*lb/in	0.78 (0.05)	0.34 (0.05)
Unnotched	J/m	70 (7)	340 (40)
	ft*lb/in	1.3 (0.1)	6.4 (0.8)

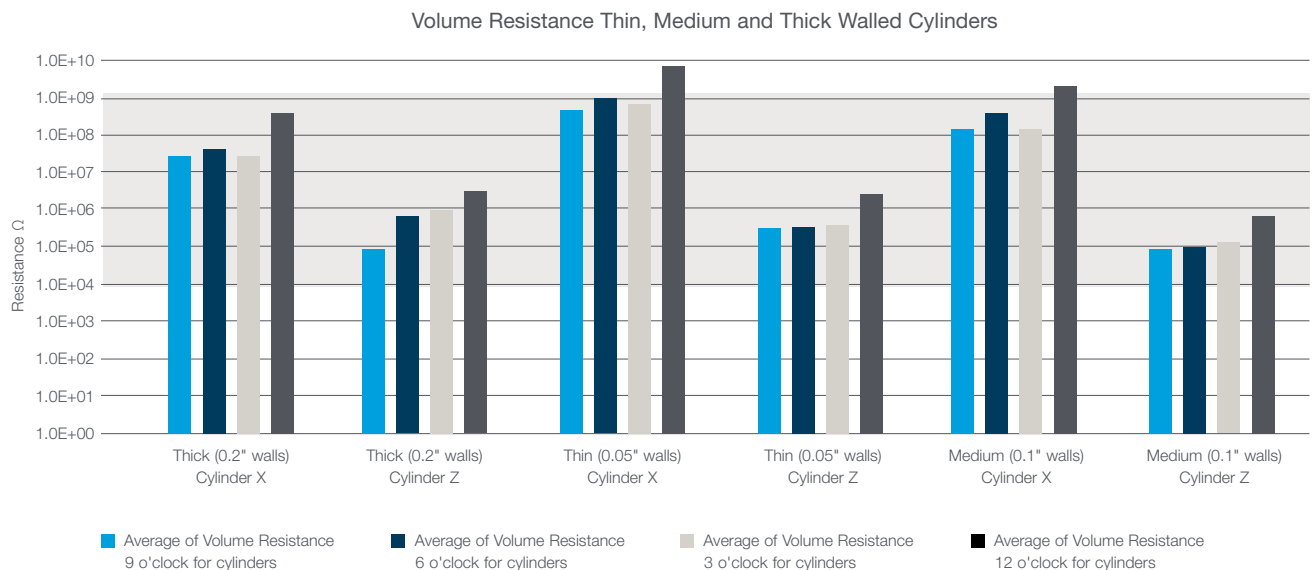
## ESD Properties

ABS-ESD7 was tested per ANSI ESD S20.20, S11.11, STM11.12 to determine the effect that build parameters and part geometries have on ESD properties. Different geometries printed in different orientations fall into the ESD safe range ( $10^4$  to  $10^9$  ohms), with some variability in thin-walled cylinders. For full details, [see the ABS-ESD7 ESD White Paper](#).

**Figure 1. 4 x 4 x 0.1 in. plaque resistance in various build orientations.**



**Figure 2. Volume resistance of hollow cylinders with respect to wall thickness, build orientation, and location on the cylinder.**





# Appendix

Figure 3. Dimension change data as a function of temperature for the ABS-ESD7 Flat (XY) sample.

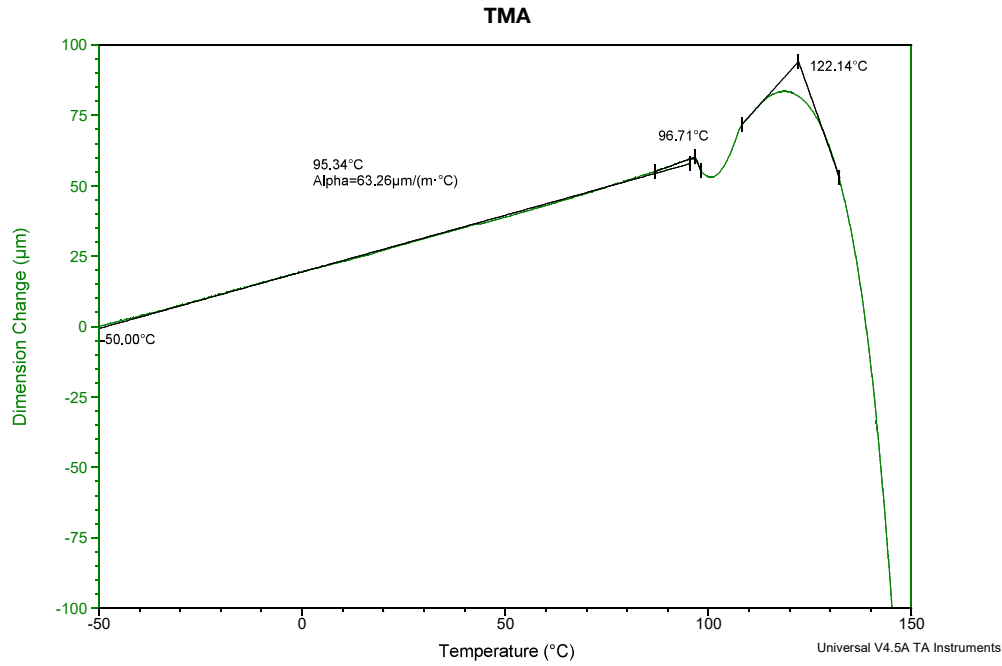


Figure 4. Dimension change data as a function of temperature for the ABS-ESD7 On Edge (XZ) sample.

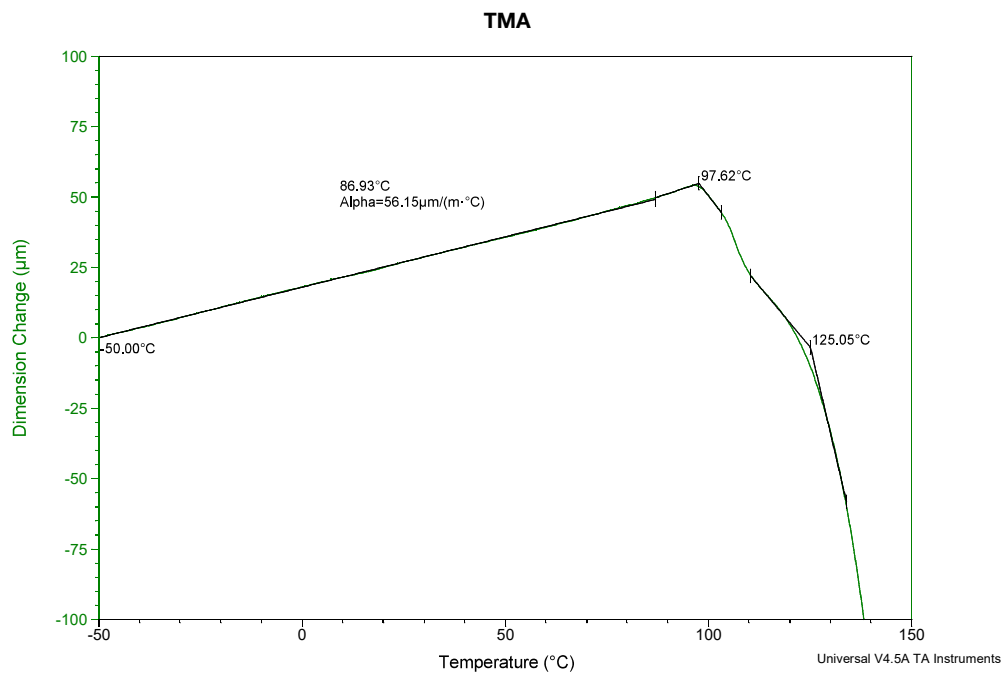


Figure 5. Overlay of the dimension change data for the Flat (XY) and On Edge (XZ) ABS-ESD7 samples.

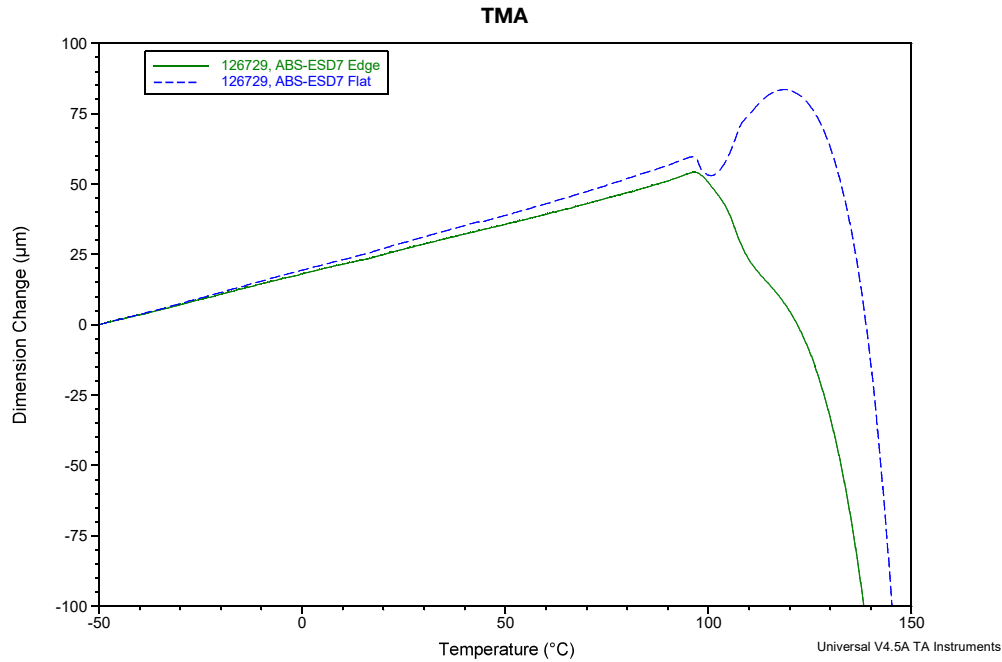
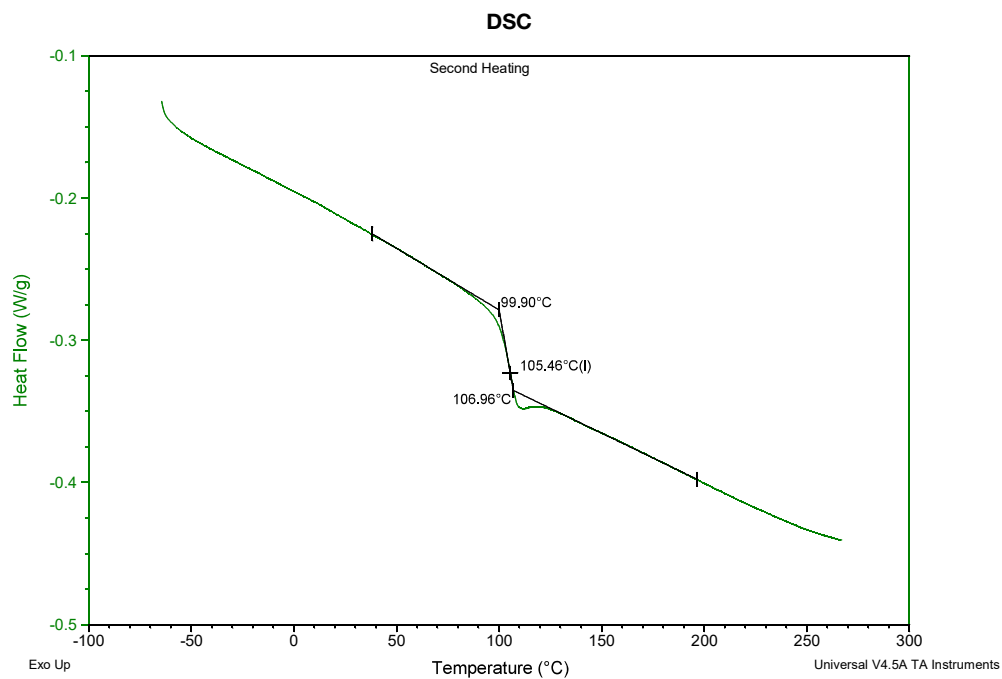


Figure 6. 2nd heating scan DSC data for the ABS-ESD7 Flat (XY) sample.



### Stratasys Headquarters

7665 Commerce Way,  
Eden Prairie, MN 55344  
+1 800 801 6491 (US Toll Free)  
+1 952 937-3000 (Intl)  
+1 952 937-0070 (Fax)

[stratasys.com](http://stratasys.com)

ISO 9001:2015 Certified

1 Holtzman St., Science Park,  
PO Box 2496  
Rehovot 76124, Israel  
+972 74 745 4000  
+972 74 745 5000 (Fax)

