ABS-ESD7

Electrostatic-Dissipative FDM Thermoplastic Filament

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.

Contents:

Ordering Information

Table 1. Printer and Support Material Compatibility

Printer	Model Tip (Slice)	Support Material	Support Tip
F370™	F123 Head (7 slice) F123 Head (10 slice)	QSR Support™ (soluble)	F123 Head (all slices)
F370®CR	F123 Head (7 slice) F123 Head (10 slice)	QSR Support (soluble)	F123 Head (all slices)
Fortus 450mc™	T12 (7 slice) T16 (10 slice)	SR30/35 (soluble)	T12SR30 (all slices)
Fortus 900mc™/F900™	T12 (7 slice) T16 (10 slice)	SR30/35 (soluble)	T12SR30 (all slices)

Build Sheets

Low temperature

- 0.02 x 26 x 38 in. (0.51 x 660 x 965 mm)
- 0.02 x 16 x 18.5 in. (0.51 x 406 x 470 mm)
- 0.03 x 16 x 18.5 in (0.76 x 406 x 470 mm)
- 0.02 x 14 x 16.5 in. (0.51 x 355 x 417 mm)

F370 and F370CR build trays

Table 2. ABS-ESD7 Ordering Information

Part Number	Description
Filament Canisters [1][2]	
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™
Printer Consumables	
511-10301[3]	T12 tip, 0.007 in. (0.178 mm) layer height
511-10401[3]	T16 tip, 0.010 in. (0.254 mm) layer height
511-10900[3]	T12SR30 support tip, all layer heights
325-00300[4]	Low Temperature build sheet, 0.02x26x38 in. (0.51x660x965 mm)
325-00100[5]	Low Temperature build sheet, 0.02x16x18.5 in. (0.51x406x470 mm)
123-00402-S	F123 Standard Head (All Layer Heights)
123-00304	F370/F370CR Build Tray, Standard

(1) Classic canisters are compatible with all 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 450mc, Stratasys F900 and Fortus 900mc
(4) Compatible with Stratasys F900 and Fortus 900mc
(5) Compatible with Fortus 450mc, Stratasys F900 and Fortus 900mc

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.

DSC and TMA curves can be found in the Appendix.

Table 3. ABS-ESD7 Physical Properties

Property	Test Method	Typical Values	
		XY	XZ/ZX
HDT @ 66 psi	ASTM D648 Method B	104.6 C (220.2 F)	
HDT @ 264 psi	ASTM D648 Method B	101.4 C (214.6 F)	
Tg	ASTM D7426 Inflection Point	105.46 C (221.83 F)	
Mean CTE	ASTM E831 (-50 °C to 100 °C)	63.26 µm/[m*°C] (35.14 µin/[in*°F])	56.15 µm/[m*°C] (31.19 µin/[in*°F])
Volume Resistance	ASTM D257	10^4-10^9* Ω *cm	
Thermal Conductivity	ASTM E1952 @0°C	0.3131 W/m*K 0.1809 BTU/(hr*ft*F)	
Thermal Conductivity	ASTM E1952 @30°C	0.3141 W/m*K 0.1815 BTU/(hr*ft*F)	
Thermal Conductivity	ASTM E1952 @60°C	0.3171 W/m*K 0.1833 BTU/(hr*ft*F)	
Thermal Conductivity	ASTM E1952 @90°C	0.3176 W/m*K 0.1835 BTU/(hr*ft*F)	
Thermal Diffusivity	ASTM E1952 @0°C	0.227 mm^2/s 3.52*10^-4 in^2/s	
Thermal Diffusivity	ASTM E1952 @30°C	0.205 mm^2/s 3.18*10^-4 in^2/s	
Thermal Diffusivity	ASTM E1952 @60°C	0.189 mm^2/s 2.93*10^-4 in^2/s	
Thermal Diffusivity	ASTM E1952 @90C	0.174 mm^2/s 2.70*10^-4 in^2/s	
Specific Gravity	ASTM D257 @23 °C	1.07	

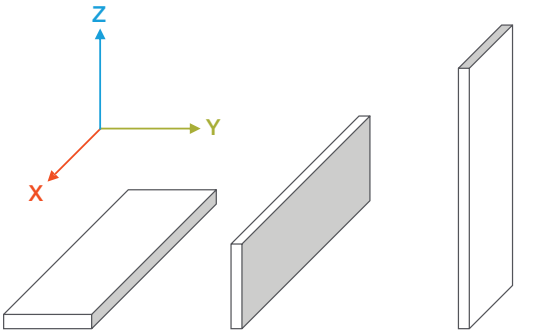
* See ESD section for details

Mechanical Properties

Samples were printed with 0.010 in. (0.254 mm) layer height on a F370 and on a F900.
For the full test procedure, please see the Stratasys Materials Test Procedure on stratasys.com.

Print Orientation

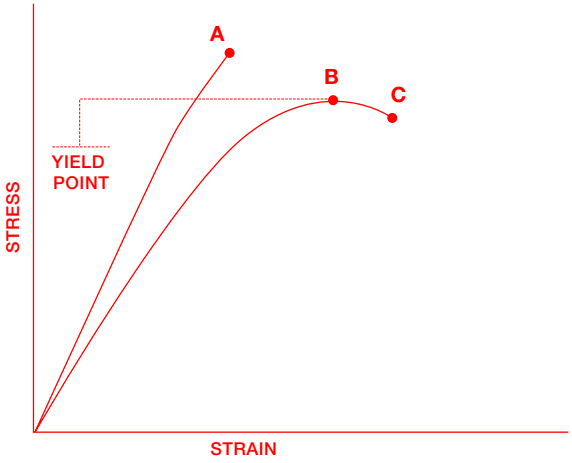
Parts created using FDM are anisotropic as a result of the printing process. Below is a reference of the different orientations used to characterize the material.



Flat (XY) On Edge (XZ) Upright (ZX)

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 4. ABS-ESD7 Mechanical Properties (F900 – T16 Tip)

		XZ Orientation[1]	ZX Orientation[1]
Tensile Properties: ASTM D638			
Yield Strength	MPa	35.4 (1.3)	No yield
	psi	5130 (190)	No yield
Elongation @ Yield	%	2.1 (0.050)	No yield
Strength @ Break	MPa	33.9 (1.0)	27.0 (2.3)
	psi	4920 (150)	3920 (330)
Elongation @ Break	%	3.4 (0.52)	1.59 (0.29)
Modulus (Elastic)	GPa	2.69 (0.10)	2.28 (0.21)
	ksi	391 (15)	330 (31)
Flexural Properties: ASTM D790, Procedure A			
Strength @ Break	MPa	No break	44.3 (2.6)
	psi	No break	6440 (370)
Strength @ 5% Strain	MPa	67.5 (1.2)	-
	psi	9800 (170)	-
Strain @ Break	%	No break	2.67 (0.14)
Modulus	GPa	2.41 (0.073)	2.04 (0.084)
	ksi	350 (11)	296 (12)
Compression Properties: ASTM D695			
Yield Strength	MPa	95.3 (2.5)	202 (11)
	psi	13800 (370)	29300 (1500)
Modulus	GPa	2.39 (0.090)	2.40 (0.33)
	ksi	346 (13)	348 (48)
Impact Properties: ASTM D256, ASTM D4812			
Notched	J/m	36.2 (3.0)	20.5 (1.6)
	ft*lb/in	0.678 (0.057)	0.384 (0.029)
Unnotched	J/m	198 (36)	85.4 (18)
	ft*lb/in	3.72 (0.67)	1.60 (0.35)

(1) Values in parentheses are standard deviations.

Table 5. ABS-ESD7 Mechanical Properties (F370)

		XZ Orientation[1]	ZX Orientation[1]
Tensile Properties: ASTM D638			
Yield Strength	MPa	33.3 (0.70)	No yield
	psi	4830 (100)	No yield
Elongation @ Yield	%	2.1 (0.035)	No yield
Strength @ Break	MPa	31.8 (0.77)	23.2 (0.34)
	psi	4610 (110)	3370 (49)
Elongation @ Break	%	2.4 (0.21)	1.8 (0.071)
Modulus (Elastic)	GPa	2.12 (0.029)	1.73 (0.020)
	ksi	308 (4.3)	252 (2.9)
Flexural Properties: ASTM D790, Procedure A			
Strength @ Break	MPa	60.4 (2.5)	29.8 (3.4)
	psi	8770 (360)	4320 (490)
Strain @ Break	%	3.81 (0.26)	2.00 (0.29)
Modulus	GPa	2.25 (0.026)	1.65 (0.036)
	ksi	326 (3.8)	240 (5.2)
Compression Properties: ASTM D695			
Yield Strength	MPa	52.8 (2.2)	59.6 (1.4)
	psi	7660 (320)	865 (200)
Peak Strength	MPa	-	150 (17)
	psi	-	21800 (2500)
Modulus	GPa	1.74 (0.062)	1.73 (0.025)
	ksi	252 (9.0)	251 (3.7)
Impact Properties: ASTM D256, ASTM D4812			
Notched	J/m	41.4 (3.0)	18 (2.7)
	ft*lb/in	0.776 (0.056)	0.337 (0.051)
Unnotched	J/m	343 (41)	69.1 (6.6)
	ft*lb/in	6.42 (0.77)	1.30 (0.12)

(1) Values in parentheses are standard deviations.

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.

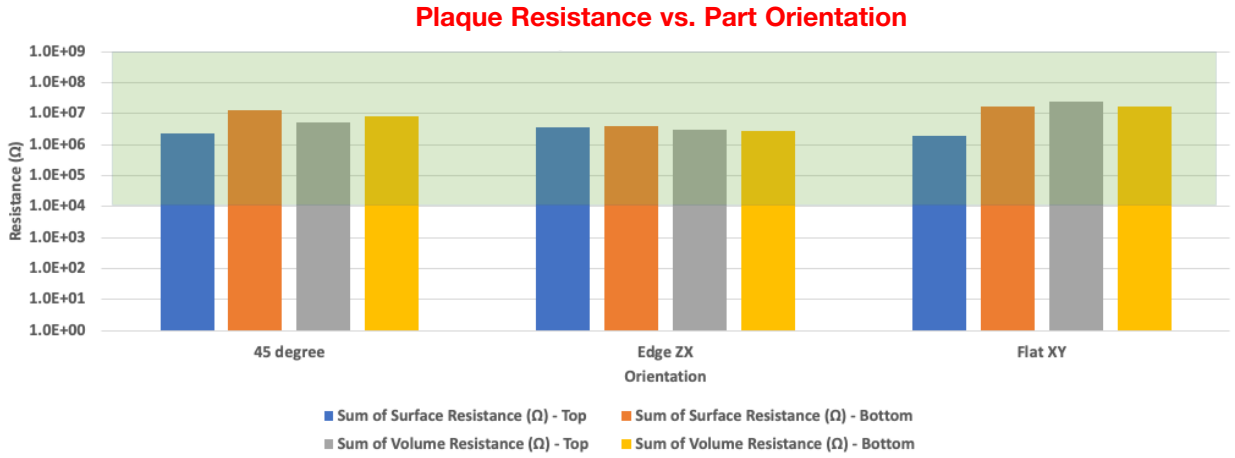
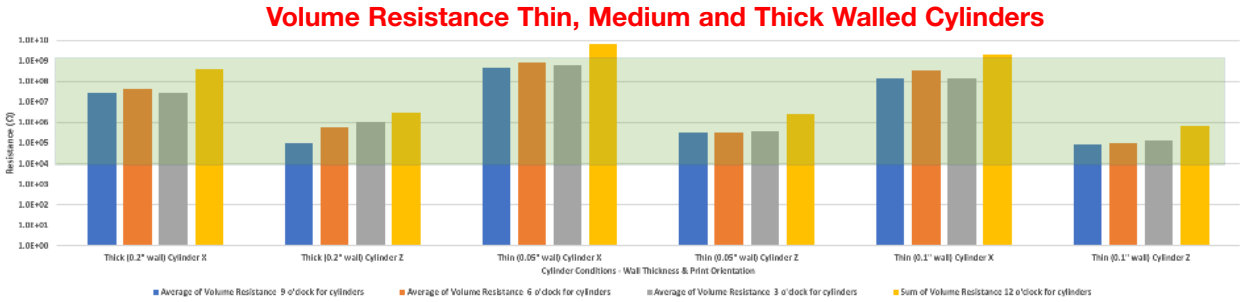


Figure 2. Volume resistance of hollow cylinders with respect to wall thickness, build orientation, and location on the cylinder.



Appendix

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

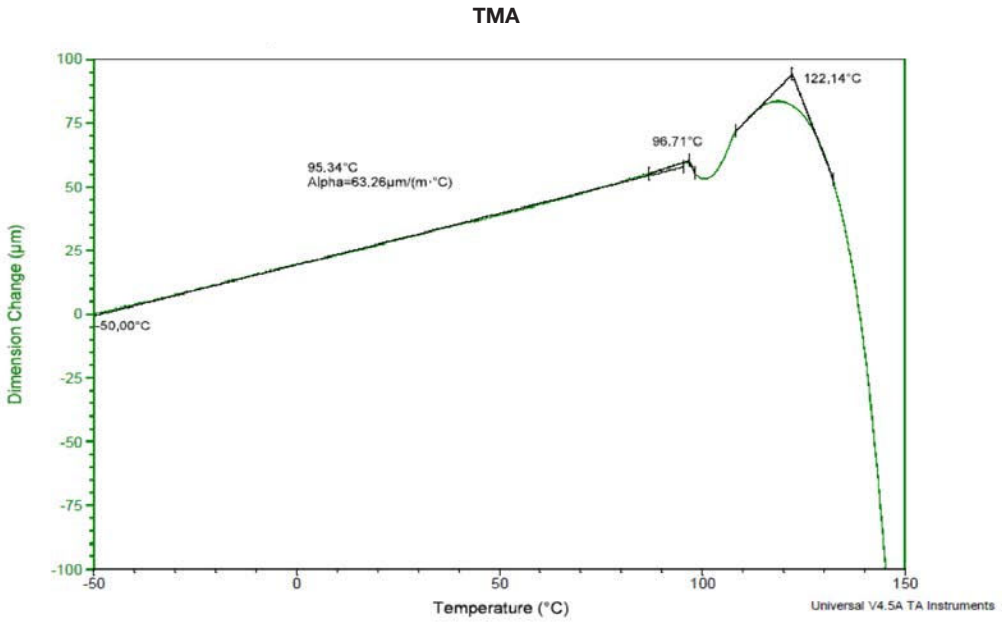


Figure 4. Dimension change data as a function of temperature for the ABS-ESD7 On Edge (XZ) sample.

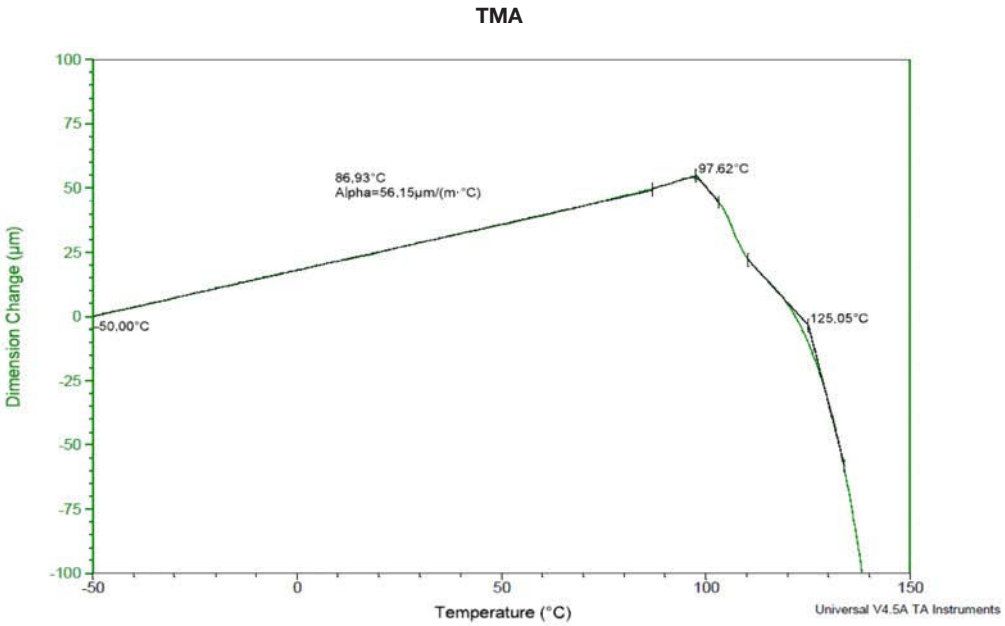


Figure 5. Overlay of the dimension change data for the Flat (XY) and On Edge (XZ) ABS-ESD7 samples.

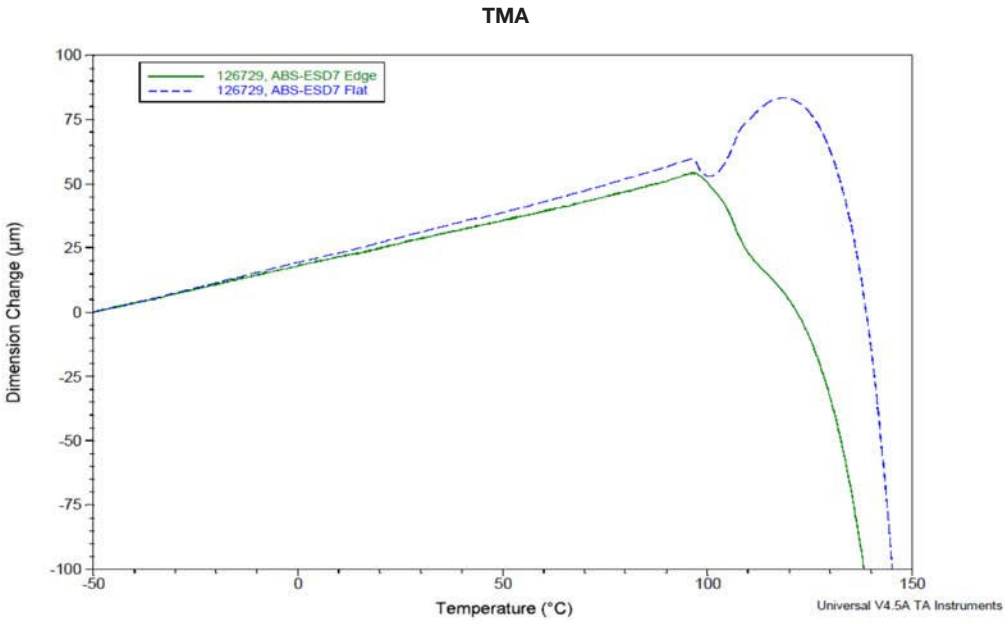
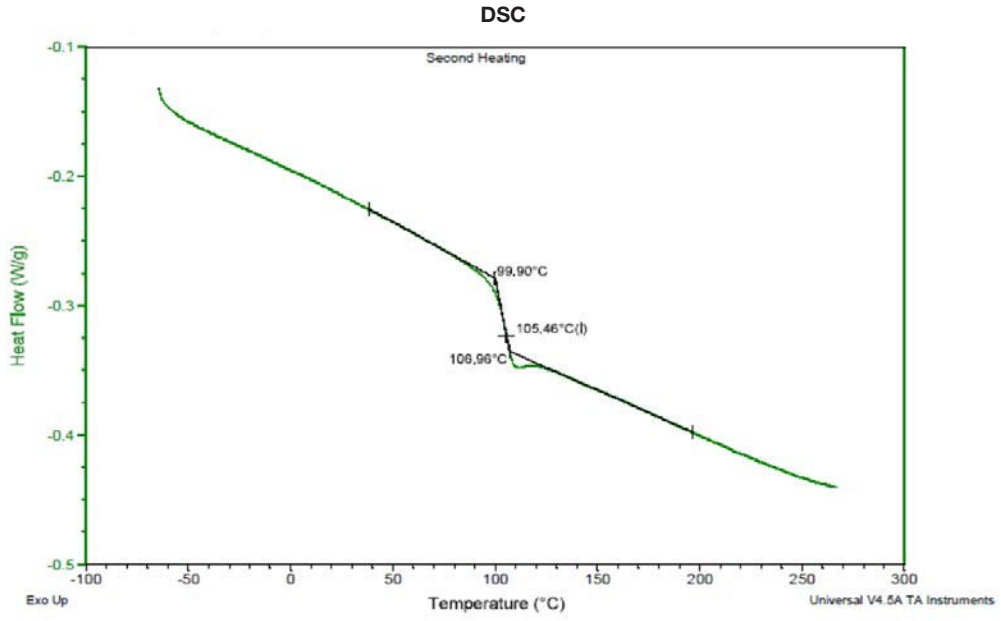


Figure 6. 2nd heating scan DSC data for the ABS-ESD7 Flat (XY) sample.



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