

A6061-RAM2 bracket image courtesy of NASA Goddard Space Flight Center

Certified A6061-RAM2 (A)

Certified A6061-RAM2 (A) is an aluminum alloy offering improved strength, ductility, and as-built surface finish compared to traditional casting alloys such as AISi10Mg in laser powder bed fusion (PBF-LB).

3D Systems offers application development and part production using the integrated additive manufacturing (AM) workflow software, 3DXpert®, the DMP Flex 350 and DMP Flex 350 Triple metal printer. 3D Systems' A6061-RAM2 parameters were developed, tested, and optimized on real applications in our AS9100/ISO9001 part production facilities, which have the unique distinction of printing more than 1,000,000 challenging metal production parts in various materials, year over year. The properties listed below provide high confidence to the user in terms of job-to-job and machine-to-machine repeatability.

For companies looking to develop new applications and processes with A6061-RAM2 please contact the 3D Systems Application Innovation Group (AIG).

Material Description

Elementum 3D's reactive additive manufacturing (RAM) process inoculates solidification and protects alloys against hot tearing and produces equiaxed fine-grained microstructure with exceptional properties. The RAM process takes advantage of chemical reactions in the melt pool to form dispersion-strengthened metal matrix composite (MMC) aluminum alloys.

A6061-RAM2 is a scandium-free aluminum alloy with chemical composition optimized for laser powder bed fusion. This general-purpose AM aluminum alloy results in properties comparable to wrought 6061-T6 with excellent strength-to-weight ratio, ductility, corrosion resistance, and electrical conductivity. On the DMP Flex 350, A6061-RAM2 parts exhibit better as-built surface finish and anodization capability than AISi10Mg.

With proven applications in aerospace, semiconductor, and motorsports industries, A6061-RAM2 is suitable for passive radio frequency, thermal management, fluid flow, and lightweight structural components.

Mechanical Properties

DMP FLEX 350 – LT 30 ^{1,2}	TEST METHOD	METRIC	U.S.
Ultimate tensile strength (MPa ksi) Horizontal direction - XY	ASTM E8	295	43
Yield strength Rp0.2% (MPa ksi) Horizontal direction - XY		260	38
Plastic elongation (%) Horizontal direction - XY		16	16

Physical Properties

MEASUREMENT	TEST METHOD	METRIC	U.S.
Electrical conductivity ³ (S/μm)	ASTM B193 at 20°C / 68°F	13	-
Thermal conductivity ¹ (w/(m-k))	Supplier test data	162	-

¹ Modified T6 Heat Treatment.

² Tested according to ASTM E8 using round tensile test specimen type 4. Typical values, averaged over 10 coupons each.

³ Typical value measured on LT30 sample in as-printed condition.

Printed Part Properties

DENSITY ⁴	TEST METHOD	METRIC	U.S.
Relative density (%)	Archimedes + Optical Evaluation	> 99.6	

SURFACE ROUGHNESS ⁵	TEST METHOD	METRIC	U.S.
Vertical side surface (μm μin) Layer thickness 30 μm	ISO 25178	8	315

⁴ Parts manufactured with standard parameters and protocols on DMP Flex 350, Config B using layer thickness 30 μm . May deviate depending on specific part geometry.

⁵ Vertical side surface measurement along the building direction, as-built condition, typical values.

Typical Applications

- Lightweight structural parts for aerospace and automotive
- Passive radio frequency (RF) parts for satellites
- Advanced thermal management in semiconductor capital equipment
- Parts which require anodization for corrosion resistance

Application Focus: Semiconductor Wafer Table

COMPLEX CHANNEL DESIGN

Excellent as-built surface finish enables high quality internal channels not accessible to finish machining

THIN WALLS

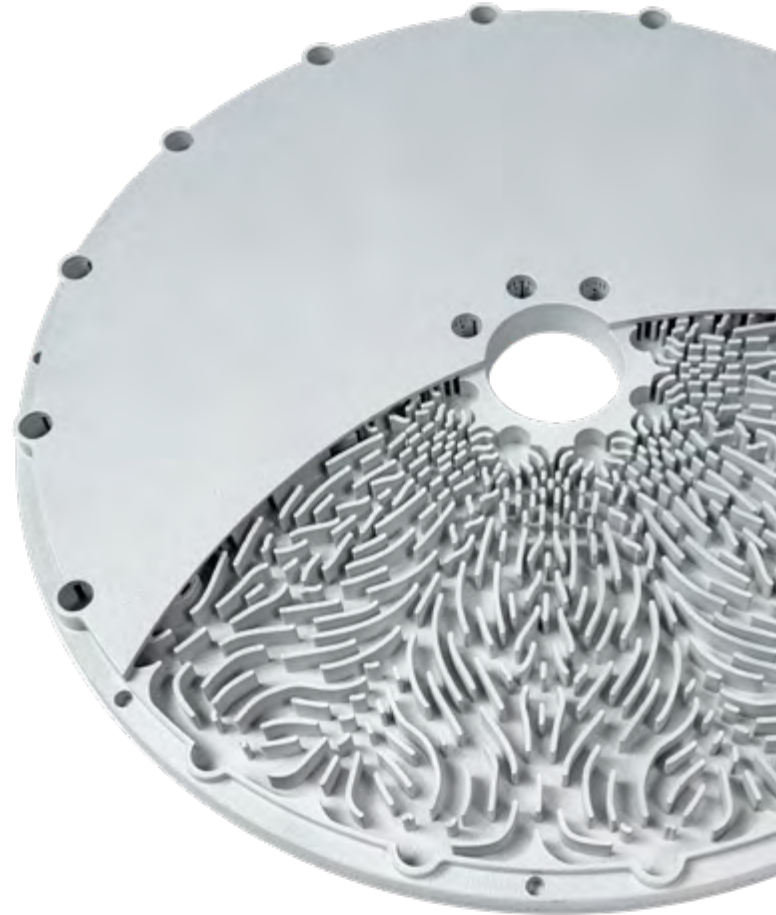
Wall thicknesses as low as 0.3 mm

ORGANIC SHAPES

Reduce turbulence and pressure drops inside the cooling system

PART COUNT REDUCTION AND IMPROVED LEAK-TIGHTNESS

Remove points of failure; simplify supply chain



To confirm the suitability of this material for your specific application, please contact the 3D Systems Application Innovation Group (AIG): <https://www.3dsystems.com/consulting/application-innovation-group>



A6061-RAM2 powder can be purchased directly from Elementum 3D: <https://www.elementum3d.com/contact/>