



PRINTED CIRCUIT BOARD

PRODUCT GUIDE

PRINTED CIRCUIT BOARDS

OVERVIEW

Over 70 years ago, Moog was established by entrepreneur William C. Moog. Moog had only one location in 1951, but with continuous innovation and cutting edge technology, Moog now operates in over 26 different countries. The Galax facility, located in Galax, Virginia, is a part of Moog and in the business of building reliable rigid, flex, and rigid flex PCBs. With a wide customer base consisting of world leaders in the electronics, communications, military, and education sectors, customer satisfaction is paramount. Our goal is to provide our customers with quality product and on-time delivery. Our facility addresses prototype to mid-volume order quantities. We also have offshore options that allow us to address mid to large volume production quantities.



Our facility is qualified to manufacture product to both commercial and military standards. We build to IPC Class 2 and 3 as specified by our customer. While the Galax facility manufactures standard product, we also have an excellent industry reputation for building more intricate product up to 24 layers. Our team of dedicated engineers and manufacturing personnel successfully produce specialty product on a daily basis. Some specialties that we address are controlled impedance requirements, blind and buried vias with sequential lamination, edge plating, epoxy hole fill, heavy copper up to 10 oz, and we are currently honing in on our micro-via capabilities through the use of our Excellon UV/CO₂® laser. We also process higher end materials for today's high speed technology requirements. We supply our customers with answers to complex printed circuit board application requirements.

PRE-ENGINEERING AND CUSTOMER SUPPORT

Moog is well known for our up front engineering and customer support efforts. We work with our customers to meet their requirements and help them continually improve their designs for manufacturability. Our sales and engineering staff unite as a team to ensure a great working relationship with each of our customers. Customer satisfaction is of upmost importance to the success of our business.

Our experienced staff prides itself in providing fast and accurate quotes. In most cases, a quote will be provided to the customer within a few hours, but not more than 24 hours after request for quote. Sales works with each customer to determine quantity and delivery needs. We constantly strive to improve our service and to exceed customer expectations.

A team of dedicated engineers review customer data using frontline Genesis 2000[®] software. This software assists in identifying potential manufacturing obstacles and data issues. The engineering department communicates with the customer to then resolve those issues. This open communication is key to ensuring that our customer's needs are met prior to release to our production staff. Our engineering group will work with your engineering team to develop custom processes as required for your rigid, flex, and rigid flex designs. This is one of many aspects that sets us apart from our competitors.

CONTINUOUS QUALITY

Moog has complete in-house process capabilities which allow us to customize our processes to your design. Our staff carefully builds each board to meet customer specifications. Process engineers work to resolve any problems throughout each step to make sure the board is manufactured properly. As part of our quality assurance, our inspection staff also reviews the boards at various points throughout the process to ensure that we are meeting and exceeding customer quality requirements. Quality is everyone's job at our facility.

We constantly invest in new equipment to maintain our competitive advantage in an ever changing industry. We purchase equipment that also supports our quality initiatives.



- Micro-section lab with fully trained lab technicians
- OEM enclosed vacuum press with recipe generation
- Laser ablation, skiving, and routing technology through the use of Excellon Cobra V1000 UV / CO₂® Laser
- Polar instruments, impedance calculators and equipment, and circuit resistance / insulation resistance testing
- Net list electrical testing
- Automated optical inspection

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MANUFACTURING CAPABILITIES

Description	Standard		Review
Layer Count	16		24
Board Thickness	.004-.125 inch		Up to .450 inch
Copper Foil Thickness (Min.)	.5 oz. / ft ²		.25 oz. / ft ²
Copper Foil Thickness (Max.) External / Internal Layer	2 oz. / ft ²		10 oz. / ft ² (Special projects)
Hole Size (Min. Drilled)	.008 inch		.006 inch
Hole Size, Plated (Dia. Tolerance)	+/- .002 inch		+/- .001 inch
Trace / Space Width	.004 inch / .004 inch		.003 inch / .003 inch
SMT Pitch	.015 inch		Below .015 inch
Aspect Ratio	10:1		Above 10:1
Materials	*FR4 (Isola)	- ED130 / UV - FR402 / FR404 / FR405 - FR406 / BC / N / HR	Other materials as requested by the customer
	*Nelco® 4000-2 / 4000-7		
	Dupont®	- LF and AP series material (flex applications) - *Coolam LX / LA (aluminum backed)	
	High temperature materials	- FR408 (Isola - 180 Tg) - *Polyimide (P95-260 Tg / 35 N - 250 Tg) - *370 HR (Isola - 180 Tg)	
	High speed application materials	- Rogers® *4350 / 4003 - Teflon® (Rogers® Duroid™) - IS680 (Isola) - Arlon 25 N / *25 FR - Ceramic (TMM series, etc.) - BT - *Nelco® 4000-6 / -6 FC	
	RoHS compliant materials	All Isola / Nelco materials listed above are RoHS compliant. (Not intended to indicate lead free assembly compliance)	
Final Finish	HASL (Hot-Air-Solder-Level) Immersion silver ENIG Selective gold Wirebondable gold		Other finishes as requested by the customer
Manufacturing minimum turn times by layer for prototypes	2 - 4 layer - 1 - 2 days 6 - 12 layer - 2 - 3 days 14 - 24 layer - 3 - 5 days		Special process and flex applications
Manufacturing turn times by volume	Mid volume - 3 - 5 weeks Low production - 1 week		High production

* Denotes UL certification for specified material

ADDITIONAL MANUFACTURING INFORMATION AND CERTIFICATIONS

- AS9100D certification
- Build to IPC-6012 and IPC-6013 Class 2 and 3 specifications
- Controlled impedance
- Blind and buried vias with sequential lamination
- Edge plating
- BGA SMT and micro via design .006
- Conductive epoxy hole fill
- ITAR registered



MOOG
SPACE AND DEFENSE GROUP

115 Jack Guynn Drive, Virginia 24333
+1 (276) 236 4921 poweranddata@moog.com
www.moog.com



Moog Space and Defense



@MoogSDG



@MoogSDG



@MoogSDG



@MoogInc

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500-1400 1223