ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES®

IPC-1710A
Last Update: 09/17/2023
OEM Standard for Printed Board Manufacturers' Qualification Profile

Developed by the OEM council of the IPC, the MQP sets the standard for assessing PWB manufacturer's capabilities and allows PWB manufacturers to more easily satisfy customer requirements.

IPC-1710A
Updated by FTG in September 2023

a standard developed by IPC

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The material in this standard was developed by the OEM Council of the Institute for Interconnecting and Packaging Electronic Circuits.

FOREWORD

It is not intended that this Manufacturers' Qualification Profile (MQP) satisfies all the requirements of the customer, however, conscientious maintenance of this document and or registration to ISO 9000 requirements should satisfy the major concerns. Thus, audits should be simpler, required less frequently, and facilitate less paper work as customers and suppliers work closer to meeting each others needs.

ACKNOWLEDGMENTS

The IPC is indebted to the members of the OEM council who participated in the development of this document. A note of thanks is also expressed to the members of the IPC Presidents Council for their review and critique and construction recommendations in finalizing the principles developed for the MQP.

Although the IPC is grateful for all the involvement and individual contributions made in completing the MQP a special acknowledgment is extended to the following individuals. It was their dedication and foresight that made this publication possible.

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CONTENTS

SECTION 1.1
COMPANY DESCRIPTION

DATE COMPLETED
SEPTEMBER 17, 2020

GENERAL INFORMATION			
LEGAL NAME The Firan Technology Group Corporation			
PHYSICAL ADDRESS 250 Finchdene Square			
CITY Scarborough		STATE N/A	ZIP M1X 1A5
PROVINCE Ontario		COUNTRY Canada	
TELEPHONE NUMBER 416-299-4000		FAX NUMBER 416-292-4308	TELEX NUMBER N/A
E-MAIL ADDRESS info@ftgcorp.com	MODEM NUMBER N/A	DATE FOUNDED 1982 ☒ PUBLIC ☐ PRIVATE	
INTERNET URL www.ftgcorp.com		FTP SITE ON FILE FOR CUSTOMERS WHEN REQUIRED	

MANAGEMENT
PRESIDENT Bradley Bourne
CHIEF OPERATING OFFICER Bradley Bourne
GENERAL MANAGER Hitesh Talati
DIRECTOR OF CORPORATE QUALITY Bryan Clark
VICE PRESIDENT OF MARKETING/SALES Peter Dimopoulos
CUSTOMER SERVICE LEAD Sharon Alexiou, Customer Service Supervisor, Toronto Site
WASTE TREATMENT MANAGER (POLLUTION PREVENTION) Lorie Llave, Lab Manager, Toronto Site

CORPORATE DESCRIPTION		NUMBER OF EMPLOYEES CORPORATE	SITE	COMMENTS
DESIGN AND DEVELOPMENT		N/A	N/A	FTG does not do design but does support customers in refining designs for manufacturability.
ENGINEERING		Site Specific	15	Process – 6, Product - 11
MANUFACTURING CONTROL		Site Specific	10	Includes shop floor supervisors and production control
MANUFACTURING	DIRECT	Site Specific	113	Working in five mfg. cells
	INDIRECT	Site Specific	7	Includes maintenance
QUALITY CONTROL	QUALITY ENGINEERS	Site Specific	4	Director and 3 engineers
	INTERNAL AUDITORS	Site Specific	4	Chosen from total plant population
	GENERAL MANAGEMENT	Site Specific	6	Executive Group

ADMINISTRATION	Site Specific	19	Includes executive, finance, customer service, IT, waste treat, Labs, HR
TOTAL	Site Specific	178	See above

SECTION 1.2
SITE DESCRIPTION

(TO BE COMPLETED FOR EACH SITE) DATE COMPLETED 09/17/2023 ATTACH APPROPRIATE CHARTS (OPTIONAL)

MANUFACTURING FACILITY

COMPANY NAME FTG Circuits, Toronto			
PHYSICAL ADDRESS 250 Finchdene Square			
CITY Scarborough	STATE N/A	ZIP M1X 1A5	
PROVINCE Ontario	COUNTRY Canada		
TELEPHONE NUMBER 416-299-4000	FAX NUMBER 416-292-4308	TELEX N/A	
E-MAIL ADDRESS info@ftgcorp.com	MODEM NUMBER N/A	YEARS IN BUSINESS 41	
INTERNET URL – www.ftgcorp.com	FTP - ON FILE FOR CUSTOMERS WHEN REQUIRED		

PRINCIPLE PRODUCTS/SERVICES/SPECIALTIES
Printed circuit boards for primarily military and aerospace applications. Some commercial. Offerings include blind and buried via (incl. laser drilled microvia), conductive and non-conductive via fill, laser imaged idents, heat sink and core products, several alternate surface finishes (ENIG, electro plated NiAu (hard and soft), Imm Ag, Imm Sn, OSP's as well as HASL.

BUSINESS CHARACTERIZATION (HIGH VOLUME, QUICK TURN-AROUND, ETC.)
Medium volume at 28 day leads plus quick turns (3, 5, 7, 10 day). HDMI parts, multiple laminations, blind and buried vias – 45 days

FACILITY MANAGEMENT	TITLE	REPORTS TO (Function/Job Title)
OVERALL OPERATION RESPONSIBILITY FOR THIS SITE Bradley Bourne	President and CEO	Board of Directors
MANUFACTURING Hitesh Talati	General Manager / V.P.	President
TECHNICAL/ENGINEERING Ryan Wong	Director of Engineering	General Manager
MATERIALS/PRODUCTION CONTROL Kamlesh Patel	Production Control Supervisor	Procurement Manager
PURCHASING Hayes Myers	Supply Chain Logistics Manager	General Manager
QUALITY Bryan Clark	V.P. of Corporate Quality	President
SALES REPRESENTATIVE Peter Dimopoulos	V.P. of Sales and Marketing	President
WASTE MANAGEMENT Lorie Llave	Lab Manager	Director of Engineering

BUILDINGS / SYSTEMS (INDICATE % COVERAGE)

	AGE	AREA (Sq. Ft.)	Construction (Wood/Brick)	Power Conditioning	Heating	Ventilation	Air Conditioning	Sprinklers	Waste Treatment	Other
Office	41 yrs	10,000	concrete/brick	100%	100%	100%	100%	100%	N/A	N/A
Manufacturing	41 yrs	70,000	concrete/brick	100%	100%	100%	100%	100%	90% internal	N/A
Storage	41 yrs	10,000	concrete/brick	100%	100%	100%	100%	100%	N/A	N/A
Planned additions	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

SAFETY AND REGULATORY AGENCY REQUIREMENTS

Are fire extinguishers functional and accessible to employees?	☒ YES	☐ NO	What is the distance to the nearest fire station? (in minutes)	2 Minutes
Do you conform to local/federal environment protection agency requirements?	☒ YES	☐ NO	Date of last OSHA visit Date of last EPA visit	Compliant to local, provincial, and federal Canadian requirements

Are you currently operating under a waiver or in violation of local government requirements?	☐ YES	☒ NO	Other Agency Audits, UL, ISO 9000, NECQ, CSA Approval and Number	☒ UL # E41953 ☒ ISO 9000# 0148080 ☐ CSA # _____ ☒ Other - MIL – L2665
Do you have a safety program? Describe below.	☒ YES	☐ NO	Hazardous Waste Number Trade Waste Account Number	N/A

PLANT PERSONNEL (TOTAL EMPLOYEES)

Regular	Contract	Office	Technical/ Engineering	Production	Full-Time QA	Part-Time QA	Union	Non-Union	Union Name	Contract Expires (Date)
178	0	19	15	113	20	NONE	113	65	UNIFOR	6/2025

COMMENTS

Our safety program is managed by a Joint Health and Safety Committee with members from the union, management, and Human Resources. The committee is responsible for the review and implementation of Health and safety policies and procedures. These are written in accordance with local, provincial, and federal requirements and third party audited by these bodies.

SECTION 2.1
PROCESS

DATE COMPLETED
09/17/2023

This section is intended to provide overview information on the processes used to fabricate printed board products.

Site Capability Snapshot (Please Check all that apply)

Designators			Remarks
A	Conductor Forming Processes	☒Subtractive	Internal layer print and etch
		☒Thin Foil Subtractive less than .5 oz.	Used for lines and spaces less than .003
		☐Semi-Additive	Not used
		☒Additive (Electro-less)	Panel and sub-assembly plating
		☐Black Hole	Not used
		☐Thick Film Paste and Fire	Not used
		☐Thin Film Semi-conductor Sputtering	Not used
		☐Other:	
B	PTH Materials and Processes	☒Acid Copper	Reverse pulse plate copper and tin
		☐Pyro-Phosphate Copper	Not used
		☐Full Built Electro-Less	Not used
		☐Gold Paste	Not used
		☐Copper Paste	Not used
		☒Gold Conductor Sputtering	
		☐Nickel Conductor Sputtering	Not used
		☒Other:	Manual cu plate for Plated shut Microvias and selected older technologies
C	Permanent Over-plating	☒Tin	Used in standard SMOBC processing
		☒Tin-Lead	Reflow and selectively plated products
		☐Tin-Nickel Alloy	Not used
		☒Nickel	Selectively plated products
		☒Nickel Gold (Hard)	Selective and full body
		☒Nickel Gold (Soft)	Selective and full body
		☐Nickel Rhodium	Not used
		☐Conductive Polymer	Not used
		☒Other: per remarks column	ENIG, ENEPIG, IMM ag, IMM sn

D	Permanent Selective Plating	☒Tin	Not used in selective process
		☒Tin-Lead	Selectively plated with other finishes
		☒Tin-Nickel Alloy	Not used in selective process
		☒Nickel	Selectively plated with other finishes
		☒Nickel Gold (Hard)	Selectively plated with other finishes
		☒Nickel Gold (Soft)	Selectively plated with other finishes
		☐Nickel Rhodium	N/A
		☐Other:	N/A
E	Permanent Mask or Coating	☒Photo Dry Film	Dupont 8130, Conformask
		☒Photo Liquid	LPI – Taiyo PSR400BN standard
		☐Image Transfer Screen Mask	N/A
		☐Conformal Coating Solder Mask	
		☒Cover Coat	Flex application
		☐Other: N/A	
F	Other Surface Finishes	☒Tin-Lead Fused	Standard and selective
		☒Immersion Tin	Standard offering
		☒Solder Leveled	Standard offering
		☐Roll Soldered	N/A
		☐Electro-less Solder Fused	N/A
		☐Solder Bumped Lands	N/A
		☐Solder Paste Fused	N/A
		☐Azole Organic Protective Covering	N/A
		☐Flux Protective Covering	Not available – OSP is Formic acid based
		☒Other	Immersion silver, OSP's, ENIG, electroplated NiAu (hard and soft), immersion tin, ENEPIG

SECTION 2.2
ELECTRICAL TEST EQUIPMENT

DATE COMPLETED
09/17/2023

This section is intended to provide overview information on the test equipment and testing capability of the manufacturer.

Site Capability Snapshot (Please Check the column that applies furthest to the right.)

	Designators		Remarks
A	Number of Nets	☐<200 ☐200 ☐500 ☐1000 ☐2000 ☐3000 ☐4000 ☐5000 ☒>5000 ☐Other:	Testing is currently sub-contracted to Gardien Independent Testing. FTG in the process of adding an internal E.T. department.
B	Number of Nodes	☐<500 ☐500 ☐1000 ☐2000 ☐3000 ☐4000 ☐5000 ☐6000 ☒>6000 ☐Other:	Testing is sub-contracted to Gardien independent Testing FTG in the process of adding an internal E.T. department.

C	Probe Point Pitch	☐>1.0 [.040] ☐1.0 [.040] ☐0.8 [.032] ☐0.65 [.025] ☐0.50 [.020] ☐0.40 [.016] ☐0.30 [.012] ☐0.20 [.008] ☒<0.20 [.008] ☐Other:	Testing is sub-contracted to Gardien Independent Testing FTG in the process of adding an internal E.T. department.
D	Test % Single Pass	☐None ☐<60% ☐60% ☐70% ☐80% ☐90% ☐95% ☐99% ☒100% ☐Other:	Testing is sub-contracted to Gardien Independent Testing FTG in the process of adding an internal E.T. department.
E	Probe Accuracy (DTP)	☐>0.2 [.008] ☐0.2 [.008] ☐0.15 [.006] ☐0.125 [.005] ☐0.1 [.004] ☐0.075 [.003] ☒<0.075 [.003] ☐Other:	Testing is sub-contracted to Independent Testing house FTG in the process of adding an internal E.T. department.
F	Grid Density	☐Single Side Grid ☐Double Sided Grid ☐Double Density Grid ☒Double Density Double Sided ☐Quad Density ☐Double Sided Quad Density ☒Flying Probe ☐Other:	Checked to reflect largest percentage of products tested. Checked to reflect maximum capability

G	Net list Capability	☐Golden Board ☒IPC-D-356 ☒Net List Extraction ☒CAD/CAM Net List Compare ☐Other:	
H	Test Voltage	☐<20 VDC ☐20 VDC ☐40 VDC ☐60 VDC ☐80 VDC ☐100 VDC ☐500 VDC ☒1000 VDC ☐>1000 VDC ☐ Other:	On flying probe
J	Impedance Meas	☐Micro Section ☐Inboard Circuit ☐Coupon ☐Manual TDR ☒Automated TDR ☐Other:	Tektronics 11801C – In house
K	Impedance Tolerance	☐None ☐>20% ☐20% ☐15% ☐10% ☒7% ☒5% ☒2% ☐<2% ☐Other:	Rambus 2%

SECTION 2.3
PRODUCT TYPE

DATE COMPLETED
09/17/2023

This section is intended to provide overview information on the printed board product types being fabricated by the manufacturer.

Site Capability Snapshot (Please Check all that apply.)

	Designators		Remarks
A	Product Type	☒Rigid Printed Board	Standard offering
		☒Flex Printed Board	
		☒Rigid/Flex Board	
		☒Rigid Back Plane	.250 maximum thickness
		☐Molded Product	
		☒Ceramic Printed Board	
		☐Multichip Module	
		☐Laminated Multichip Module	
		☐Deposited Dielectric Multichip Modules	
		☒Other:	RF, Metal backed thermal management
B	Circuit Mounting Type	☒Single Sided	Including Teflon
		☒Double Sided	Including Teflon
		☒Multilayer	Maximum – 36 layers
		☒Single-sided Bonded to Substrate	
		☒Double-sided Bonded to Substrate	
		☒Multilayer Bonded to Substrate	
		☒Constrained Multilayer	
		☒Distributed Plane Multilayer	
		☒Other: heat sinks and metal cores	
C	Via Technology	☒No-Vias	Less than 1% of production
		☒Thru Hole Vias	Standard product
		☒Buried Vias	Sequentially laminated
		☒Blind Vias	Sequentially laminated and control depth drilled
		☒Thru Hole & Blind Vias]	In any combination
		☒Thru Hole & Buried Vias	In any combination
		☒Thru Hole Buried & Blind Vias	In any combination
		☒Buried & Blind Vias	In any combination
		☒Other: Laser drilled micro vias.	

D	Laminate Material	☒Phenolic	Limited release
		☐Epoxy Paper	N/A
		☒Epoxy Glass	Standard offering
		☒Modified Epoxy Composite	BT – standard offering
		☒Polyimide Film & Reinforce	Standard offering
		☒Cynanate Ester	Limited release
		☒Teflon	CLTE
		☒Ceramic Glass Types	For all of the above materials
		☒Various Combinations	
		☐Other:	
E	Core Material	☒No Core	Standard builds
		☐Polymer	
		☒Copper	Cores of various thicknesses
		☒Aluminum	Cores of various thicknesses
		☐Graphite	Limited production
		☐Copper Invar/Copper	
		☐Copper Moly/Copper	
		☐Other:	
F	Copper Thickness (Oz.)	☐1/8 Minimum	
		☒1/4 Minimum	Internal and external layers
		☒3/8 Minimum	
		☒1/2 Nominal	Standard material
		☒1 Nominal	Standard Material
		☒2 Nominal	Standard material
		☒3-5 Max	Standard material (can be in combination with plated copper)
		☒6-9 Max	
		☒>10	10 ounce external copper in combination with plated copper.
		☐Other:	
G	Construction	☒≤4 Planes	Standard
		☒>4 Planes	Up to 36 layers
		☒THK to TOL ≤0.2 mm	Standard
		☐THK to TOL >0.2 mm	
		☒Bow/Twist ≤1%	Standard
		☐Bow/Twist >1%	
		☒≤0.3 mm Profile Tolerance	Per standards
		☐0.3 mm Profile Tolerance	
		☐Other:	

H	Coatings and Markings	☒≤0.1 mm Mask Clearance	Standard
		☐>0.1 mm Mask Clearance	
		☐One Side (Legend)	
		☒Two Side (Legend)	Standard
		☐None (Legend)	
		☒UL Material Logo	94VO - standard
		☒U.L. V_0 Logo	
		☐U.L. V_1 Logo	
		☐U.L. V_2 Logo	
		☒ Other:	Military -L2665, Laser printing

SECTION 2.4
PRODUCT COMPLEXITY

DATE COMPLETED
09/17/2023

This section is intended to provide overview information on product complexity being fabricated by the manufacturer.

(Please check the column that applies farthest to the right)

Designators			Remarks
A	Board Size Diagonal	☐<250 [10.00] ☐250 [10.00] ☐350 [14.00] ☐450[17.50] ☐550 [21.50] ☐650 [25.50] ☐750 [29.50] ☒850 [33.50] ☐>850 [33.50] ☐Other:	
B	Total Board Thickness	☒<1,0 [.040] ☐1,0 [.040] ☐1,6 [.060] ☐2,0 [.080] ☐2,5 [.100] ☐3,5 [.135] ☐5,0 [.200] ☒6,5 [.250] ☐>6,5 [.250] ☐Other:	Minimum M/L thickness = .018 Maximum thickness = .240 (finished)
C	Number Conductive Layers	☐1-4 ☐5-6 ☐7-8 ☐9-12 ☐13-16 ☐17-20 ☐21-24 ☐25-28 ☒>28 ☐Other:	

D	Dia Drilled Holes	☐>0,5 [.020] ☐0,5 [.020] ☐0,4 [.016] ☐0,35 [.014] ☐0,30 [.012] ☐0,25 [.010] ☐0,20 [.008] ☒0,15 [.006] ☒<0,15 [.006] ☐Other:	Minimum mechanical drill size when board is <.040 thick Minimum laser drill size = .004
E	Total PTH TOL (Max-Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☒0,125 [.005] ☐0,100 [.004] ☐0,075 [.003] ☒0,050 [.002] ☐<0,050 [.002] ☐Other:	Maximum Minimum
F	Hole Location TOL DTP	☐>0,50 [.020] ☐0,50 [.020] ☐0,40 [.016] ☐0,30 [.012] ☐0,25 [.010] ☐0,20 [.008] ☐0,15 [.006] ☐0,10 [.004] ☒<0,10 [.004] ☒Other:	.0028 total Optical drill feature to hole - <0.0028
G	Internal Layer Clearance (Min)	☐>0,350 [.014] ☐0,350 [.014] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.005] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐<0,075 [.003] ☐Other:	Minimum line to line and line to pad spacing

H	Internal Layer Conductor Width (Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐0,050 [.002] ☐<0,050 [.002] ☐Other:	Minimum internal line width
J	Internal Layer Process Allowance	☐>0,100 [.004] ☐0,100 [.004] ☐0,075 [.003] ☐0,050 [.002] ☐0,040 [.0015] ☐0,030 [.0012] ☐0,025 [.001] ☐0,020 [.0008] ☒<0,020 [.0008] ☐Other:	.0005 oz copper
K	External Layer Clearance (Min)	☐>0,350 [.014] ☐0,350 [.014] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐<0,075 [.003] ☐Other:	.0035 minimum on artwork
L	External Layer Conductor Width (Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐0,050 [.002] ☐<0,050 [.002] ☐Other:	.0035 minimum

M	External Layer Process Allowance	☐>0,100 [.004] ☐0,100 [.004] ☐0,075 [.003] ☐0,050 [.002] ☐0,040 [.0015] ☐0,030 [.0012] ☒0,025 [.001] ☐0,020 [[.0008] ☐<0,020 [.0008] ☐Other:	.00075 per side / per ounce
N	Feature Location DTP	☐>0,50 [.020] ☐0,50 [.020] ☐0,40 [.016] ☐0,30 [.012] ☐0,25 [.010] ☐0,20 [.008] ☐0,15 [.006] ☐0,10 [.004] ☒<0,10 [.004] ☐Other:	.0028 total DTP

All Dimensions are in millimeters [inches shown in brackets]

SECTION 2.5
QUALITY DEVELOPMENT

DATE COMPLETED
09/17/2023

This section is intended to provide overview information on the quality systems in place in the manufacturing facility.

Site Capability Snapshot (Please Check all that apply.)

Designators			Remarks
A	Strategic Plan	☒Functional Steering Committee Formed ☒TQM Plan & Philosophy Established & Published ☒Documented Quality Progress Review ☒Implementation & review of Project Team Recommendations ☒TQM Communicated throughout organization ☒Controlled New process Start-up ☒Management Participates in TQM Audits ☒Employee Recognition Program ☒Total TQM Plan/Involvement Customer Training ☒Other:	Technical Review Board Reference the Quality Manual Under Monthly Mgmnt Review Under TRB Team Staff mtgs/performance postings Control by Process eng. Regularly Years of Service Customer assisted 5S and Lean Mfg
B	Employee Involvement	☒Certified Training Available ☒Training of Employee Base ☒TQM Team Trained ☒Design of Experiment Training and Use ☒New Process Implementation Training ☒Support Personnel Training ☒Advanced Statistical Training ☒Quality Functional Deployment ☒Ongoing Improvement Program for Employees ☒Other:	Mentor program + biennial re-cert. Across the board Quality Teams in place Under Process Eng. As required Same as manufacturing Covered by Truechem/Lab control Under TRB Team For new processes and procedures
C	Quality Manual	☐Quality Manual Started ☐Generic Quality Manual for Facility ☐10% of manufacturing depts. have process specifications ☐25% of manufacturing depts. have process specifications ☒100% of manufacturing depts. have process specifications ☐Non-manufacturing Manuals Developed ☐25% of all departments have quality manuals ☐50% of all departments have quality manuals ☒All Manufacturing and support depts. have controlled quality manual ☐Other:	Process specifications on site for all processes. Quality Manual available to all departments on line.

D	Instructions	☐Work Instructions Started ☐Quality Instructions Started ☐10% Work Instructions Completed ☐10% Quality Instructions Completed ☒25% Work Instructions Competed, Controlled ☐25% Quality Instructions Completed, Controlled ☐50% Work Instructions Completed, Controlled ☒100% Quality Instructions Completed, Controlled ☒Quality and work Instruct. Completed, Controlled ☐Other:	New pictorial work instructions in support of procedures being rolled out. All dept. have work instructions and quality instructions posted Procedures are controlled by revision level.
E	SPC Implementation IPC-PC-90	☒Plan Exists ☐ Training Started ☒Process Data Collected & Analyzed ☒All Employees Trained ☒First Process Stable & Capable ☒Several Major Processes Stable & Capable ☒Continued Improvement of Stable Processes ☒Additional Mfg Processes under Control ☒All Processes Under Control ☐Other:	Process capability monitored using Truechem process control software. All processes are under either SPC or Lab control depending on usage.
F	Supplier Programs/Controls	☒Supplier Rating Program ☒Monthly Analysis Program ☒Key Problems Identified ☒Supplier Reviews Performance Data provided ☒TQM Acceptance by suppliers ☐10% of Suppliers Using SPC ☐25% of Suppliers Using SPC ☒50% of Suppliers Using SPC ☒All Key Suppliers using Certified parts program ☐Other:	Supplier data is collected monthly with report Cards issued Quarterly. Issues that require immediate attention are addressed under out CAR program. Most of our direct suppliers are distributors and as such as held accountable for the performance of the manufacturers they represent.
G	Third Party IPC-QS-95	☒Instrument Controls in Place ☒Measurement System in Control IPC-PC-90 ☒Document Controls in Place ☒Reduced Lot Sampling ☐10% of Processes Under Audit Control ☒50% or Greater of Processes Under Audit Control ☐ISO-9003 Certified ☐ISO-9002 Certified ☒ISO-9001 ☒Other: see comment	In house controls to cover all requirements. Third party and OEM calibration where required. In process sampling. All processes are audited. NADCAP ISO 9001:2015 and AS 9100D MIL-PRF-55110 and MIL-PRF-31032,

SECTION 3

EQUIPMENT PROFILE (Pre-Site Audit)

DATE COMPLETED
09/17/2023

* Examples of equipment limitations include: min/max board size & min/max working area

3.1 PHOTOTOOL CAPABILITY	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS*
A) AOI of photo tool	☒	☐	Orbotech Fusion 20	3	24x30 image size 24x30 image size
B) AOI CAD reference (CAM)	☒	☐	Orbotech X-pert 1700 Valor Genesis	2 6	24x30 24x30
C) Photo plotting	☒	☐	Orbotech LP 9008	1	24x30
D) Photo reductions	☐	☒	Outside service used when needed	0	No limitations
E) Film scan and conversion	☐	☒	Outside service used for digitization	0	Quality of supplied data
F) Film processing ☐ air-dried ☐ force-dried ☒ processed in automatic processor	☒	☐	Carnfeld-Hope EC901	1	24x30
G) Media types ☒ silver halide film ☐ glass ☒ diazo	☒	☐	Media used depends on product type and density	2	Ref. above photo processors

3.2 DRILLING EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Manual	☐	☒	N/A	0	N/A
B) Optical (single spindle)	☒	☒	Excellon Uniline 2000 Driller / Routers	1	18 x 24 panel size
C) N.C. drill	☒	☐	Excellon Century and System 2000 Excellon Uniline and Mark VI Via-Mech Hitachi	4 4 1	24x30 panel size
D) Laser drill	X		Excellon Cobra	2	24 x 30 panel size

3.3 ROUTING EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Edge beveller	☒	☐	Excelon Mark V	1	Used to trim all panels prior to drill
B) Hand router (pin router)	☒	☐	Built by FTG Maintenance	1	Used to cut in process cross sections
C) N.C. router	☒	☐	Excellon Mark V, Excellon Mark VI Excellon Concept 4	1+2+ 1	24x30 24x30
D) N.C. driller/router	☐	☒	All routers are profile specific	0	Not applicable
E) Scoring (profile)	☐	☒	Not applicable	0	
F) Scoring (straight line)	☐	☒	Outside service used – Independent Supplier	2	24x30, Sub-contracted to Gardien Independent Testing

3.4 MECHANICAL EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Punch press	☐	☒	N/A	0	N/A
B) Shear	☒	☐	Mechanical shear for raw material only	1	Rarely used – buy pre-cut panels
C) Milling machine	☒	☐	Internal machine shop including 2 Bridgeport CNC Milling Machines programmed with customer's original data	2	Internal machine shop

3.5 HOLE PREPARATION (DESMEAR)	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Permagnate	☒	☐	Automated PAL Electroless copper line	1	Includes glass etch
B) Plasma	☒	☐	Advanced Plasma B-6 March M-28	1 1	6 18x24 panels per load 28 18x24 pnls, 14 21x24 pnls.
C) Mechanical	☒	☐	IS Scrubbex 2000	1	Used for post drill / pre-etchback surface and hole wall preparation.
D) Etchback	☐	☐	See items A & B in this section	0	See items A & B in this section.

3.6 PRIMARY IMAGE APPLICATION	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Dry film	☒	☐	Hakuto MACH 6630NP Shipley 1600SPC	1 1	21x24 layer size 21x24 layer size
B) Hand screening	☐	☒	N/A	0	N/A
C) Machine screening	☐	☒	N/A	0	N/A
D) Wet film	☐	☒	N/A	0	N/A
E) Liquid photo imageable	☐	☒	N/A	0	N/A

3.7 TYPE OF TREATMENT FOR MULTILAYER INNERLAYERS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Black oxide	☐	☒	N/A	0	N/A
B) Red oxide	☐	☒	N/A	0	N/A
C) Copper scrub	☐	☒	N/A	0	N/A
D) Durabond	☐	☒	N/A	0	N/A
E) Other	☒	☐	Atotech BondFilm automated horizontal conveyorized line	1	No limits within our standard process.

3.8 LAMINATION	YES	NO	MATERIAL	QTY	APPLICATION TECHNIQUE
A) High pressure	☒	☐	TMP Presses Lauffer Presses	2 2	Maximum pressure = 750 psi Maximum pressure = 600 psi
B) High temperature	☒	☐	TMP Presses Lauffer Presses	2 2	Max temp. on TMP = 650F Max. Temp. On Lauffer = 450F
C) Vacuum	☒	☐	TMP Presses Lauffer Presses	2 2	All presses are Vacuum presses
D) Vacuum assist	☐	☒	N/A	0	N/A
E) Foil heat assist	☐	☒	N/A	0	N/A
F) Separate cool-down	☒	☐	Tmp Cool Press	1	Ties to TMP presses and autoloader

3.9 ELECTROLESS COPPER PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Fully additive application	☒	☐	Automated PAL Electroless copper line	1	21x24 panel size in standard production
B) Electroless deposition (semi additive)	☐	☐	N/A	0	N/A
C) Through-hole and via	☒	☐	Automated PAL Electroless copper line	1	21x24 panel size in standard production

3.10 COPPER ELECTROPLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Copper sulfate	☒	☐	PAL fully automated reverse pulse plating line (includes tin plate)	1	24x30 panel size
B) Pyrophosphate	☐	☒	N/A	0	N/A
C) Copper fluoborate	☐	☒	N/A	0	N/A
D) Other	☒	☐	Custom manual DC plating tank	1	Used for custom and selective finish work.

3.11 TIN/LEAD SURFACE PLATINGS/COATINGS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Tin/lead electroplated	☒	☐	Custom manual tin lead plate line	1	Used for reflow and selective plate product.
B) Immersion tin or tin/lead (electroless)	☒	☐	ME Baker fully automated vertical dip line for immersion tin only.	1	21x24 panel size
C) Hot air solder leveled (HASL)	☒	☐	Argus vertical HAL5124 hot air leveling machine	1	In line with pre-clean, flux, and post clean lines.

3.12 FUSING PROCESSES	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) I.R. reflow	☐	☒	N/A	0	N/A
B) Hot oil reflow	☒	☐	Custom installation with pre-clean and post clean applications	1	21x24 panel size
C) Horizontal (hot air level)	☐	☒	N/A	0	N/A
D) Vertical (hot air level)	☒	☐	Argus vertical HAL5124 hot air leveling machine	1	In line with pre-clean, flux, and post clean lines.

3.13 NICKEL SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless nickel	☒	☐	ME Baker automated vertical line	1	21x24 panel size
B) Electroplated nickel	☒	☐	Custom installation	1	21x24 panel size

3.14 GOLD SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless gold	☒	☐	ME Baker automated vertical line	1	21x24 panel size
B) Electroplated gold	☒	☐	Custom installation Custom installation	1	Hard gold application Soft gold application

3.15 PALLADIUM SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless palladium	☒	☐	ME Baker automated vertical line	1	21x24 panel size
B) Electroplated palladium	☐	☒	N/A	0	N/A

3.16 SOLDERMASK	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Screened deposited image	☐	☒	N/A	0	N/A
B) Dry film photo imageable	☒	☐	Dynachem Vacuumex Vacuum Laminator	1	21x24 panel size
C) Liquid photo imageable	☒	☐	Circuit Automation DP1500	1	21X24 panel size
D) Dry film/liquid combination	☒	☐	Equipment listed in this section	1	DFSM via tents with overall LPI part coverage.

3.17 ORGANIC SURFACE PROTECTION	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Benzotriazole	☐	☒		1	Entek OSP's are sub-contracted if required. Limited use.
B) Imidazole	☐	☒			
C) Benzimidazole	☐	☒			

3.18 MICROSECTION CAPABILITY	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Manual	☒	☐	Manual “as is’ one up sectioning	4	Operator performed by hand for “in process” x-sections
B) Single cavity automated	☐	☒	N/A	0	N/A
C) Multiple cavity automated	☒	☐	Struers automated Tegramin 30 automated system	3	No restriction
D) Plating thickness analysis	☒	☐	Bowman BA100 XRF unit CMI PTX-200 unit	1 1	Used for all final finishes Used for in process reference only.

3.19 CHEMICAL ANALYSIS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Etching chemistry	☒	☐	Lab analysis	3	Lab analysis by technician – data stored in Truechem
B) Plating chemistry	☒	☐	Lab analysis	3	Lab analysis by technician – data stored in Truechem
C) Effluent (PPM) analysis	☒	☐	Lab analysis	3	Lab analysis by technician – data stored in Truechem

3.20 ELECTRICAL TEST EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Continuity and shorts	☒	☐	Sub-contracted to Gardien Independent	10	100% net list to supplied data
B) Fixture development	☒	☐	Sub-contracted to Gardien Independent	10	100% net list to supplied data
C) Flying probe test	☒	☐	Sub-contracted to Gardien Independent	4	100% net list to supplied data
D) Impedance control	☒	☐	Polar CITS880s	1	+/- 2% value measurement

MASTER EQUIPMENT LISTING

DATE COMPLETED
09/17/2023

FORM MQP 10

Please complete a Master Equipment List. You may use your own form or the MQP Form 10.

Major Equipment List

Phototooling / Engineering

1	Direct Logix	Control Centre	Engineering Server
6	Direct Logix	Control Centre	Workstations
1	Orbotech	LP9008	Laser Photoplotter
1	Orbotech	Image Manager	Workstation
1	Digitizer	ScanCat	Scan Pro
1	Carnfeld - Hope	EC901	Film Processor
1	Multiline	API	Automatic Artwork Punch
1	Ledco	Film Guard	Protective Film Laminator (PPF)
6	Valor	Genesis	Linux CAM Stations
1	HP Server	Raid	Network Attached Data Storage

Dry Film Coating

2	Hakuto	MACH 6630NP	Automatic Laminator w /Auto Loader & Unloader
1	Shipley	1600 SPC	Automatic Laminator w/ Auto Loader & Unloader

Inner and Outer Layer Imagin

1	Orbotech	Outer Layer	Laser Direct Imager
1	Orbotech	Paragon 8000i	Laser Direct Imager (Inner Layer
1	Orbotech	Nuvogo 1000	Laser Direct Imager w/ Auto Loader (Inner Layer)

Inner Layer Etching

1	UCE GL221545	Develop - Etch - Strip	Equipped for thin layer handling
1	MacDermid	Develop - Etch - Strip	Equipped for standard layer handling

Major Equipment List (cont'd)

Lamination				
	2	TMP	6 Gap	Hot Presses with Loader
	1	TMP	6 Gap	Cool Press with Loader
	2	Lauffer	Oil cooled	Lamination Presses
	1	JJA	Double-sided	Tooling Hole Spot Facer
	1	Multiline	Offset	Lamination Depinner
	1	Pola E Masa	Stand Alone	Plate Cleaner / Scrubber
Drilling				
	3	Excellon	Uniline 2000	Auto Load / Unload
	1	Excellon	Uniline 2000	Optical Driller / Router
	1	Excellon	Century	6 Spindle Drillers
	1	Excellon	System 2000	4 Spindle / (24 x 30)
	2	Excellon	System 2000-CNC 7	5 Spindle / 600 Bit Magazine
	3	Excellon	Mark V-CNC 6	4 Spindle / Air Bearing
	1	Hitachi	Via-Mech Hitachi	6 Spindle / 160k spindles
	1	Barnaby	802F	2 spindle D/S tooling hole driller
	1	Glenbrook	RTX-113	X-Ray Machine
	1	DNC Link	Highland Technologies	8-Port Connections
	1	Pluretec	Smart Drill	
	2	Excellon	Cobra	Laser drill
	1	Excellon	Century 2001	6 Spindle
	3	Excellon	Mark VI	4 Spindle Marking
Hole Cleaning				
	1	Plasma	March 28	Hole Cleaning (28 Panels)
	1	Plasma	B-6	Hole Cleaning (6 Panels)

MajorEquipment List (cont'd)

Plating

1	Fully Automated PAL	Custom	Electroless Copper Plating Line
1	Cu Plating Tank	Custom	High Throw (Manual)
1	Auto Plating Line	PAL	Reverse Pulse
1	Tin-Lead Plating Tank	Custom	F

Outerlayer Developer and Etching

1	IS Developer		Outer Layer Developer
1	MacDermid		Strip-Etch-Strip Line

Surface Finishes

1	Immersion Tin Line	ME Baker	Vertical Dip - Auto
1	ENIG / ENEPIG Line	ME Baker	Vertical Dip
1	IMM AG Line	ME Baker	Vertical Dip
1	Argus	HAL 5124	Vertical HASL Machine
1	International Supplies	Post-HASL	Wash-Off Machine
1	Gold Tab Plater	MP-80	SFT
1	Deep Ni / Au Plating Line	Custom	Vertical Dip (Hard and Medium Soft Gold)
1	Hot Oil Fusing	Custom	Dip Oil Fusing Process

Surface Preparation

1	MacDermid	Innerlayer	Auto Chem Clean Line c/w Robotic loader
2	Int'l. Supplies	Pumiflex	Mechanical Scrubber w / Filtrex
1	Atotech	BondFilm	Horizontal Conveyorised Oxide Line
1	Universal C/B Equip	GL182327/328	Deburr Machine c/w auto load / unload
1	Pola Massa	PLZ-650	Surface Planarizer

Major Equipment List (cont'd)

Soldermask

1	DFSM Developer	IS	Aqueous Developer (DFSM S/M Developer)
1	LPISM Developer	IS	Aqueous Developer (LPI S/M Developer)
1	Circuit Automation, Inc.	DP1500	2-Sided Screening System
1	Accuprint	AP30	Exposing Machine
2	Circuit Automation, Inc.	TC-120 and TC-150	Convection Oven Continuous
1	Dynachem	Vacuumex	Vacuum Laminator
1	Mass	VCP5000-1	Via Hole Fill Machine
1	Orbotech	Sprint 200	Direct Image Ident Screener
1	Argus	7125	UV Processor
1	Miva	2230L	LDI Soldermask Imager

Routing

2	Excellon	Mark VI -CNC 6	4 Spindle / Mechanical Bearing
1	Excellon	Concept 4	4 Spindle / Mechanical Bearing
1	Schmoll	LRM4-125	4 Spindle / Mechanical Bearing
1	ASI	Horizontal Spray	Post Rout Wash-Off
1	DNC Links	Highland Technologies	4-Port Connections

Machining

1	Optek	SG-3V	Co-ordinate Measuring Machine
1	Bridgeport	VMC 760-22	Vertical Milling machine
1	Excellon	Uniline 2000	Optical Driller Router
1	Schmoll	IVS600	Multi axis drill and rout machine

Quality Control & Test

1	Polar	CITS880s	Impedance Tester
1	Omegameter	600R	Ionic Contamination Tester
1	Nikon	Epiphot200	Digital Microscope
1	Leica	MZ6	Microscope
3	Struers	Tegramin 30	Automatic Microsection System
1	Unitron	7290	Microsection Scope
1	Unitron	8168	Microsection Scope
1	Assoc. Research	4040A	Hy-Pot Dielectric Tester

1	Ametek	FTG	Force gauge / Peel Strength Tester
1	Bowman	BA100	XRF Thickness Measuring Unit
1	Gw INSTEK	CIPT9803	HiPot / IR Tester
1	Keyence	VHX-9505	Microscope c/w on-screen visuals
1	Mitutoyo	500-150	Surface Profilometer c/w SPC Download
1	AEI	Marc plus plus	Automatic Line Width Measurement Tool (Cell3)
3	Orbotech	Fusion 20	AOI Scan and Verification Machines
1	Lynx	80X Stereo Vision	Inspection Scope

Analytical Lab Equipment

1	Quali Lab	ECI 10-EX	CVS analyzer with computerized database
1	HACH	6000	U.V. Visible Spectrophotometer
1	Perkin Elmer	PinnAAcle 500	Atomic Absorption Unit
1	HACH	DR / 2000	Visual Spectrophotometer

DATE COMPLETED
09/17/2023

SECTION 4
TECHNOLOGY PROFILE SPECIFICS

4.1 ADMINISTRATION

4.1.1 CAPACITY PROFILE	EST %	COMMENTS
A) Total annual capacity in square meters (surface area) per month	950,000	Capacity measured in square feet based on 250 calendar days of production
B) Presently running at 65 % of capacity	72%	Based on total projected daily throughput

4.1.2 PERCENTAGE OF DOLLAR VOLUME	EST %	COMMENTS
A) Single sided (rigid)	<1%	Not a core business
B) Double sided (rigid)	2%	Not a core business
C) Multilayer (rigid)	97%	Core business – includes up to 44 layer count, blind and buried vias, micro vias, hybrid constructions, core and heatsink parts.
D) Single side (unreinforced-flex)	0	No comment
E) Double sided (unreinforced-flex)	0	To fill existing contracts / support other FTG sites
F) Multilayer (unreinforced-flex)	0	No comment
G) Multilayer (rigid/flex)	0	To fill existing contracts / support other FTG sites

4.1.3 PANEL PRODUCTION PROFILE	UNITS PER MONTH
A) Size of a production lot in panels	
1) Normal	24 panels maximum to assist in panel movement. Based on machine loading at bottlenecks.
2) Smallest	1 panel minimum for QTA's, low technologies, and small production lots.
B) Number of panels per month	
1) High Production	48 panels per day times 20 days for a single part number
2) Medium Production	36 panels per day times 20 days for a single part number
3) Low Production	24 panels per week times 4 weeks per part number.
3) Short run	One 24 panel lot per part number.
4) Prototype	50 panels per day.

C) Average lead time (delivery) as defined in B)				
1) High Production	25 working days			
2) Medium Production	25 working days			
3) Low Production	25 working days			
3) Short run	25 working days			
4) Prototype Quick turn - No. of days: see comments.	3, 5, 7, and 10 day turns offered.			
D) Product delivered in full panel or array sub-panel format				
1) Total in panel or array format	18% of product shipped in array format routed from master production panel.			
2) Scored format	6% on the above in scored arrays			
3) Tab breakaway format	10% in tab breakaway arrays			
4) Other	2% shipped in partially routed or scored production master panels			
5) Total to customer layout	100% of product shipped in arrays are to a customer pre-approved format. Some are supplied in advance, others are developed by FTG product engineering and approved by the customer prior to release to manufacturing.			
6) Total to manufacturing layout	100% of all manufactured panels are run to a panel optimization program.			
E) Product delivered in board format				
1) Total in board format	82% of existing parts are shipped in single up format.			
2) Extracted: scored to size	<1%			
3) Extracted: sheared to size	0%			
4) Extracted: routed to size	>81%			
4.1.4 APPROVAL AND CERTIFICATION		**YES**	**NO**	**COMMENTS**
A) Company approvals				
1) UL approval		☒	☐	94V Level 0. File number E41953/
2) Canadian standards		☒	☐	CSA approved through QMI Canada.
3) MIL-P-55110		☒	☐	CAGE Code = L2665, Also MIL-PRF-31032 .
4) MIL-P-50884		☐	☒	Flex built to 50884 and MIL-PRF-31032.
5) ISO-9002		☐	☒	

6) ISO-9001	☒	☐	ISO 9001:2015 and AS9100D registered with INTERTEK under file # 0148080.
7) ISO-14000	☐	☒	Emissions controlled to local, provincial, and federal requirements.
8) BABT	☐	☒	N/A
9) EEC	☐	☒	N/A
10) Customer satisfaction	☒	☐	Use customer generated report cards and third party surveys to monitor and control our business planning and processes.
B) Other certification information			
1)Laminate	☒	☐	IPC-4101, latest revision
2)Quality standards	☒	☐	ISO 9001:2015, AS9100D, MIL-PRF-31032, NADCAP
3)Equipment calibration	☒	☐	ANSI/NCSL/Z540.

4.1.5 CUSTOMER INTERFACE PROFILE	**YES**	**NO**	**COMMENTS**
A) Modem capability	☐	☒	Replaced by FTP and E-mail
B) Baud rate			N/A
C) Data verification technique	☒	☐	On screen inspection and net list compare
D) Engineering change order process	☒	☐	Numbered and controlled as part of controlled documents process (Direct Logix)
E) Job status reporting to customers	☒	☐	E-mail and Paradigm based status reports

4.1.6 OTHER CAPABILITIES	**YES**	**NO**	**COMMENTS**
A) Facility research and development	☒	☐	R&D done on new product types and managed under tax exemption program with Canadian Government
B) (Automated) On-line shop floor control/MRP system	☒	☐	Paradigm by Cimnet with real time on screen scheduling by priority.
C) Process control system	☒	☐	Truechem SPC based process monitoring and control
D) Operator training system	☒	☐	Mentoring program for new employees with process engineering and certified operator support. Re-certification every two years on anniversary of hire.

4.2 PROCESS ORIENTATION

4.2.1 LAMINATE MATERIAL	EST %	COMMENTS
A) Most commonly used laminates (G10, FR4, etc.)	50% 20% 14% 6%	Brand name Panasonic 1755V Type FR-4 Brand name Isola 370HR Type FR-4 Brand name Neltec Type 013 FR4 Brand name Neltec Type BT Brand name Arlon Type Polyimide Brand Name Rogers Type – Teflon Brand Name Taconic (Neltec) Type – Teflon Brand Name Itech Type FR-4 Brand Name Oak Mitsui Type – Farad Flex
B) Other laminate material	See below	
1) Planar resistor layers	<1%	UL approved ☐
2) BT epoxy	See above	UL approved ☒
3) Kevlar	<.1%	UL approved ☐
4) Teflon	6%	UL approved ☐
5) Polyimide	See above	UL approved ☒
6) Cyanate ester	<.1%	UL approved ☐
7) Other	CLTE <.1%	UL approved ☐
C) Specification to which laminate is purchased (check all that apply) ☐MIL-P-13949 ☒IPC-4204 ☒IPC-4101 ☒UL Approved ☒IPC-4103 ☐Other ☒IPC-4202 ☒IPC-4203		
D) Laminate storage ☐ Uncontrolled ☒ Humidity controlled ☒ Temperature controlled ☐ Dry box ☒ JIT inventory		"C" stage controlled by lock and key. "B" stage stored under temperature and humidity controls. Weekly JIT inventory pulled from local distributor.
E) Panel size configurations in X, Y dimensions maximum X 24 Y 30in minimum X 18 Y 24in other X 12 Y 18in		Panel sizes below 18x24 are used for exotic materials and in cases where material availability limits raw material panel size.

4.2.2 PROCESS PRECISION SPECIFICS	YES	NO	VALUE	COMMENTS
A) Maximum printed board thickness built in volume				
1) Single sided			.125”	Based on stock material availability
2) Double sided			.125”	Based on stock material availability
3) Multilayer			.250”	Based on conveyorized line capability
4) Rigid flex			N/A	
B) Printed board electrical performance capability				
1) Impedance control	☒	☐	+/-10% +/-2%	Standard offering Rambus products if required
2) Capacitance control	☒	☐		ZBC licensed
3) Micro strip boards	☒	☐		To customers’ supplied specifications
C) Tooling system description				
1) Same holes in panels used for all processes	☒	☐		Post etch punch holes used for lamination
2) Optical registration	☒	☐		Process: Laser Direct Imaging to drilled and plated panels
3) Other	☒	☐	+/- .003”	Smart drill holes used for drill and external alignment optimization

4.2.3 OTHER PROCESS ORIENTATION SPECIFICS	YES	NO	SYSTEM	COMMENTS
A) Solder mask over bare copper	☒	☐	Circuit Automation DP 1500 used to coat panels	Tack cured, exposed, developed, and final cured in LPI specific line.
B) Plating/coating information				
1) Tin/lead reflow	☒	☐	Custom built line	New installation, enclosed and self contained for safety reasons.
2) Hot air leveling	☒	☐	Argus HAL 5124 Vertical leveler	In line with bake, pre-clean, flux, and post wash equipment.
3) Azole organic	☐	☒		Sub-contracted when required – currently one active part.
4) Conductive	☐	☒		
C) Hole formation				
1) Hole cleaning	☒	☐	IS Scrubbex 2000	High pressure rinse, brushes, ultrasonic clean
2) Hole cleanliness verified	☒	☐	Visual Inspection	Backlighting used

4.3 PRODUCT DESCRIPTION

***CONSISTENCY IMPLIES YIELDS IN EXCESS OF 90%**

4.3.1. THROUGH HOLE INSERTION	EST %	SIZE (MM) +/- TOL	COMMENTS
A) Smallest conductor width and tolerance produced with consistency			
1) Outer layers (print and etch)	95%	Size .0035 inches Tol ± .0005 inches	
2) Inner layers (print and etch)	85%	Size .003 inches Tol ± .00025 inches	
3) Outer layers (plated)	80%	Size .004 inches Tol ± .0005 inches	
4) Inner layers (plated)	80%	Size .004 inches Tol ± .0005 inches	
5) Outer layers (additive plating)	95%	Size .005 inches Tol ± .0005 inches	
6) Inner layers (additive plating)	95%	Size .005 inches Tol ± .0005 inches	
B) Smallest plated-through hole (PTH) and tolerance consistently produced in 1.5mm thickness material or multilayer board			
1) Minimum PTH diameter	75%	Size .008 inches Tol ± +.000/-.008 inches	
2) Largest panel where this hole can be controlled (across diagonal)	85%	Size 24x30 inches	
C) Largest hole size that can be drilled and plated through in a 1.25mm diameter land while maintaining an annular ring of 0.125mm in large/small boards			
1) Largest board size (across diagonal)		Size 38.5 inches	24x30 panel. Cannot be applied to some technologies
2) Largest hole diameter		Size .250 inches	Holes larger that .250” are routed before plating.
3) Smallest board size (across diagonal)		Size 0.5 inches	12x18 panels used for exotic applications
4) Largest hole diameter		Size .250 inches	Holes larger that .250” are routed before plating.
D) Surface mount land pattern pitch (check all that apply) ☒1.27mm [.050] ☒0.63mm [.025] ☒0.5mm [.020] ☒0.4mm [.016] ☒0.3mm [.012] ☒0.25mm [.010] ☐Other _____ .			In some cases, holding minimum soldermask dams on fine pitch product will have to be evaluated upon receipt of data.

E) Solder mask dam between lands (check all that apply) ☒1.27mm [.050] ☒0.63mm [.025] ☒0.5mm [.020] ☒0.4mm [.016] ☒0.3mm [.012] ☒0.25mm [.010] ☒Other _____ .				Smallest dam being held in place consistently is .003”
F) Flatness tolerance (bow & twist) after reflow or solder coating ☐1.5% ☐1.0% ☒0.5% ☐Other ____				Based on receipt of a balance build.

4.3.2 PRODUCT QUALITATIVE AND QUANTITATIVE INFORMATION	YES	NO	QUANTITY OF PANELS	NUMBER or DIMENSION	COMMENTS
A) Multilayer layer count					
1) Maximum layers fabricated in volume (Maximum Lot)			24	44 layers 18x24	Maximum panel size may be reduced based on density and design requirements.
2) Maximum layers fabricated in prototype (Minimum Lot)			3	44 18x24	Maximum panel size may be reduced based on density and design requirements.
B) Buried vias produced consistently in volume	☒	☐			
1) Size			24 panels	18x24	Minimum mechanically drilled buried via hole size is .008” and may be restricted by design aspect ratio.
2) Number of layers			24 panels	18x24	Maximum number of layers for this product type is currently 28.
B) Blind vias produced consistently in volume	☒	☐			
1) Size			24 panels	18x24	Minimum mechanically drilled blind via hole size is .008” and may be restricted by design aspect ratio. Laser drilled blind vias may be as small as .004”.
2) Number of layers			24 panels	18x24	Maximum number of layers for this product type is currently 28.
1) Controlled depth drilling	☒	☐			
2) Total number of layers			24 panels	18x24	Maximum number of layers for this product type is currently 28. High aspect ratio holes may limit depth of drilling.

4.4. TESTING CAPABILITY

4.4.1 TEST AND TEST EQUIPMENT CAPABILITY	YES	NO	COMMENTS
A) SMT centerline pitch that can be electrically tested ☒ 0.63mm [.025] ☒ 0.5mm [.020] ☒ 0.4mm [.016] ☒ 0.3mm [.012] ☒ 0.25mm [.010] ☐ Other			Centerline pitch below .016” tested on flying probe testers.
B) Double sided simultaneous electrical testing	☒	☐	100% net list tested to original data on dual density machines.
1) Equipment type	☒	☐	Gardien Independent Testing equipment. All testing sub-contracted to OEM for testing.
2) X-ray fluorescence inspection equipment	☒	☐	Bowman BA100 X-ray fluorescence equipment with standards for all internal surface finishes.

3) TDR equipment	☒	☐	Polar CITS880s
4) Hi-pot test equipment	☒	☐	Gw INSTEK CIPT9803 HiPot / IR Tester
5) Four-wire kelvin tester	☒	☐	Agilent 34401A 6 ½ Digit Multimeter
6) Capacitance meter	☐	☐	N/A
7) Cleanliness testing	☒	☐	Alpha Metals Omegameter 600R
8) Dimensional Check	☒	☐	Keyence VHX950F Digital Microscope
9) IST Testing	☒	☐	PWB IST Tester
10) Capacitance Testing	☒	☐	PWB Capacitance Tester
11) Bare Board Testing	☒	☐	ATG A9a/DPSD2 Flying Probe (in acceptance phase0
12) Copper Adhesion	☒	☐	Diventco Pull Tester

4.4.2 AUTOMATED OPTICAL INSPECTION USAGE	**EST %**	**COMMENTS**
A) Before etching	25%	A) and B) done in an 'either / or' manner for a total of 25%
B) After etching	25%	All impedance jobs, sub-assemblies and jobs with less than .005/.005 technology.
C) Internal layers	100%	All internal layers are scanned.
D) Final inspection	0%	Microscopes are used for final inspection of high density product (BGA's, fine pitch, etc.).
E) Other	N/A	
F) Conductor/clearance normally inspected by AOI equipment		
1) ☐ 0.05mm [.002]	Not applicable	Not produced at this facility
2) ☒ 0.05-.10mm [.002-.004]	100%	Internal and external images
3) ☒ >.10mm [.004]	100% plus as req'd.	100% of all inner layers As required by design limitations stated above for external images
4) ☒ Planes	100%	All internal planes External planes visually inspected.
G) CAD download to AOI	100%	Direct download of customer based data.

SECTION 5
QUALITY PROFILE

DATE COMPLETED
09/17/2023

GENERAL INFORMATION	
COMPANY NAME FTG Circuits	
CONTACT Bryan Clark, V.P. - Corporate Quality	
TELEPHONE NUMBER 416-299-4000, ext. 222	FAX NUMBER 416-292-4308

This section of the Manufacturer's Qualification Profile is intended to describe the Total Quality Management (TQM) activity in place of being implemented at the manufacturing facility identified in the site description of this MQP.

To ease in the task of identifying the TQM program being planned or underway at the manufacturing site, the activities have been divided into twenty sections which when completed, provide the total picture of the posture toward managing quality issues. Each section contains a number of questions with regard to the topic under review.

It is not the intent to have the questions be all encompassing, nor is every question applicable to all manufacturers. However, identification of the status, related to each questions, when considered as a whole will convey an impression of the progress that the company has achieved in adopting the principles of total quality management.

The twenty sections, in order of the occurrence are:

5.1 General Quality Programs
5.2 New Products/Technical Services
5.3 Customer Satisfaction
5.4 Computer Integrated Manufacturing
5.5 Process Documentation
5.6 Quality Records
5.7 Skill, Training & Certification
5.8 Subcontractor Control
5.9 Calibration Control
5.10 Internal Audits
5.11 Statistical Process Control
5.12 Problem Solving
5.13 In-Process Control
5.14 Receiving Inspection
5.15 Material Handling
5.16 Non-Conforming Material Control
5.17 Inspection and Test Plan
5.18 Product Inspection/Final Audit
5.19 Tooling Inspection, Handling, & Storage
5.20 Corrective Action

Each section provides a status report related to each question. The question may not be applicable, no activity has started as yet, or the company may have developed an approach to the issues raised by the questions. An (X) is indicated in the appropriate column. If deployment/implementation has started, the status is reported as percent deployment; this is indicated in column 4. The percentage number closely approximates the status of deployment. If deployment exists, the percentage results that have been achieved is indicated in column 5. Results are based on expected goals. Not providing percent information in either the deployment or results column implies a lack of activity in the particular area.

The quality descriptions requested are completed on the following pages by checking (X) the appropriate column to reflect the status of the manufacturing facility TQM program. Additional information may be provided as comments shown below, or on individual sections, or additional sheets as necessary.

COMMENTS
FTG Circuits is a military certified and ISO / AS registered facility.
MIL-PRF-55110, mil-prf-50884, and MIL-PRF-31032 certified under CAGE code L2665
ISO 9001:2015 and AS 9100D registered by INTERTEK Global under file number 0148080.
NADCAP

5.1 GENERAL QUALITY PROGRAMS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are quality objectives and responsibilities clearly stated, widely distributed and understood through the company?				100%	100%
2.	Is there a quality function or well defined organization which provides customer advocate guidance to the total organization and is this position fully supported by management?				100%	100%
3.	Does a quality measurement system exist with clearly defined metrics and is it utilized as a management tool?				100%	100%
4.	Are work instructions approved and controlled; and are they under revision control?				100%	100%
5.	Are the quality procedures and policies current and available at the point of application; and are they under revision control?				100%	100%
6.	Are benchmark and customer satisfaction studies done to determine best in class for all products, services, and administrative functions; and are quality goals set?				100%	100%
7.	Are Statistical Process Control (SPC) principles understood by all levels of management?				100%	100%
8.	Are there programs with sufficient resources assigned to support corrective actions and prevention?				100%	100%
9.	Does management solicit and accept feedback from the work force?				100%	100%
10.	Is there management support of ongoing training (including quality training), and is it documented by an organizational training plan?				100%	100%
11.	Are there regular management reviews of elements of the quality improvement process, including feedback for corrective action, and are the results acted upon?				100%	100%
12.	Are the quality and reliability goals aggressive relative to customer expectations and targeted at continuous improvement?				100%	100%
13.	Are the people who are responsible for administering the quality assurance function technically informed?				100%	100%
14.	Does Management have a “defect prevention” attitude to achieve continuous improvement?				100%	100%

5.2 NEW PRODUCTS/TECHNICAL SERVICES		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Do new product/technology/service development policies and procedures exist, and do they result in clearly defined project plans with appropriate measureables and approvals?				100%	100%
2.	Is quantitative benchmarking used to evaluate all new products/technologies/services in comparison to best-in-class offerings?				100%	100%
3.	Does a roadmap exist to ensure continued development of leading edge, best-in-class products/technology/services?				100%	100%
4.	Is the capability of each operation which controls critical-to-function characteristics for new products, fully certified?				100%	100%
5.	Are statistical tools used in the development of robust (high yield) new processes, products, and services?				100%	100%
6.	When new product/technology/service requires a new process, is it developed jointly and concurrently with the customer and/or suppliers?				100%	100%
7.	Are design reviews conducted on a scheduled basis which properly address the process capability indices of critical-to-function and product/service characteristics?				100%	100%
8.	Is the new product/technology/service, as produced by the process, verified to meet all customer satisfaction requirements?				100%	100%

COMMENTS
New Process Introduction procedures New Customer / Technology Introduction procedures

5.3 CUSTOMER SATISFACTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Is there a measurement system in place to assess the customer's perception of complete performance?				100%	100%
2.	Is an independent (unbiased) customer survey routinely conducted?				100%	100%
3.	Is there an internal measurement system within the organization which correlates to the level of customer satisfaction?				100%	100%
4.	Are there specific goals for achieving Total Customer Satisfaction, both internal and external?				100%	100%
5.	To what extent are customer satisfaction goals disseminated and understood by everyone in the organization?				100%	100%
6.	Does management regularly review and assess all operating systems to determine if barriers to customer satisfaction exist and are appropriate action plans then implemented?				100%	100%
7.	Is there a method in place to obtain future customer requirements?				100%	100%
8.	Are all findings of customer dissatisfaction reported back to the proper organization for analysis and corrective action?				100%	100%
9.	Are customer satisfaction requirements formally defined and documented, and are they based on customer input?				100%	100%
10.	Do all support organizations understand their role in achieving total customer satisfaction?				100%	100%

5.4 COMPUTER INTEGRATED MANUFACTURING		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are systems integrated to allow electronic transfer of information between multiple systems to eliminate redundant data entry?				100%	100%
2.	Can customers electronically transfer CAD/CAM directly into manufacturing?	N/A				
3.	Can customers electronically transfer order information directly into the business system?				100%	100%
4.	Is data electronically shared between shop floor control and process control systems (i.e., CNC, SPC, Electrical Test, AOI, etc.)?				100%	100%
5.	Are planning systems (MRP, forecasting, capacity planning, financial planning, etc.) electronically integrated with operation systems (order processing, purchasing, inventory management, shop floor control, financial/cost control, etc.)?				100%	100%
6.	Is information available from system processes in real time (vs. batch processing)?				100%	100%
7.	Are processes and procedures documented and available on-line?				100%	100%
8.	Do all functional departments have system access to key financial, manufacturing, sales, and operational data, as it relates to their functional objectives?				100%	100%
9.	Are computer simulation and design tools used to the maximum extent practicable in the design of new products/technologies/services	N/A				

COMMENTS

MRP system is Paradigm by Cimnet
Several internal programs written in support of and linked to paradigm.

5.5 PROCESS DOCUMENTATION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are manufacturing product, process, and configuration documents under issue control?				100%	100%
2.	Are “preliminary” and “special product” specifications controlled?				100%	100%
3.	Does the system ensure that the most current customer specifications are available to the manufacturing personnel?				100%	100%
4.	Does the system ensure that the most current material specifications are available to the procurement function?				100%	100%
5.	Are incoming orders reviewed for revisions and issue changes?				100%	100%
6.	Is conformance to customer specifications assured before an order is accepted?				100%	100%
7.	Is customer feedback provided when designs do not meet manufacturability requirements?				100%	100%
8.	Are critical characteristics classified, relative to impact on product performance?				100%	100%
9.	Are customers informed of changes made to products controlled by customer drawings or specifications?				100%	100%
10.	Is there an effective internal deviation control procedure and, are customer requested deviations documented and followed?				100%	100%
11.	Do new product development procedures exist, and are they followed in the design development process?				100%	100%

5.6 QUALITY RECORDS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are records of inspection and process control maintained and available for review?				100%	100%
2.	Are records of equipment and equipment maintenance kept?				100%	100%
3.	Is the record and sample retention program defined?				100%	100%
4.	Are quality data used as a basis for corrective action?				100%	100%
5.	Are quality data used in reporting performance and trends to management?				100%	100%
6.	Are quality data used in supporting certifications of quality furnished to customers?				100%	100%
7.	Is field information used for corrective action?				100%	100%
8.	Does a cost of quality measurement system exist?				100%	100%
9.	Are customer reported quality problems responded to, and resolved in the time period requested?				100%	100%
10.	Is quality information on production material rejects provided to sub-suppliers with required corrective action?				100%	100%
11.	Are computers used to collect and analyze quality data?				100%	100%

COMMENTS

Quality data is directly linked to the manufacturing data by work order and operator through a bar coding system.

5.7 SKILLS, TRAINING, & CERTIFICATION	STATUS

DESCRIPTION OF PROGRAM		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Does management ensure that all personnel are trained in their role for achieving Total Customer Satisfaction?				100%	100%
2.	Do all personnel understand how their performance impacts internal and external customer satisfaction?				100%	100%
3.	Do all personnel who contact external customers reflect quality improvement programs?				100%	100%
4.	Do personnel participate in professional societies and growth programs?				100%	100%
5.	Are all personnel trained in sufficient detail to support key initiatives?				100%	100%
6.	Are the results of training evaluated and indicated program changes made?				100%	100%
7.	Does a policy exist which encourages the cross training and rotation of personnel, and is this policy used as the basis of job progression?				100%	100%
8.	Are performance standards participatively developed, and regularly applied for all personnel?				100%	100%
9.	Are Total Customer Satisfaction programs and resulting successes publicized to all personnel?				100%	100%
10.	Do goal setting and reward/incentive programs support the quality improvement process?				100%	100%

5.8 SUBCONTRACTOR CONTROL

DESCRIPTION OF PROGRAM		STATUS				
		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are requirements defined, communicated, and updated to ensure that the supplier understands expectations?				100%	100%
2.	Does a system exist which measures the performance of the supplier and communicates such information to the supplier? (i.e., supplier rating system)				100%	100%
3.	Have the organization's processes been characterized to identify the critical requirements for the suppliers products?				100%	100%
4.	Have the capabilities of the supplier's processes been assessed and considered in the establishment of the requirements?				100%	100%
5.	Have partnerships been established with suppliers, and is assistance provided to ensure that each supplier has the capability to consistently supply conforming products?				100%	100%
6.	Have quality and cycle time metrics and improvement goals been established participatively with the supplier?				100%	100%
7.	Has a system been established with the supplier for identification and verification of corrective action?				100%	100%
8.	Have the requirements for supplier materials been properly characterized and specified to ensure conformance of the product/service to the customer satisfaction requirements?				100%	100%
9.	Is there a supplier certification program or equivalent procured material/service continuous quality improvement program?				100%	100%
10.	Can all personnel who contract suppliers properly reflect appropriate quality improvement programs and status to them?				100%	100%

COMMENTS

Report cards are issued quarterly to key suppliers on the AVL.

The Quality Improvement Process is supported through profit sharing.

5.9 CALIBRATION CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are calibration and preventative maintenance programs in place and documented?				100%	100%
2.	Are calibration and maintenance personnel trained?				100%	100%
3.	Is traceability to NIST maintained?				100%	100%
4.	Is quality measurement and control equipment current, effective, and sufficiently integrated with production equipment?				100%	100%
5.	Is the history of quality measurement and control equipment documented?				100%	100%
6.	Has repeatability of measuring devices and inspection or testing processes been established and monitored; are gauge capability studies conducted and GR&R ratios acceptable(<10%)?				100%	100%
7.	Are calibration and preventative maintenance cycles on schedule?				100%	100%
8.	Is the use of non-calibrated equipment for design and production purposes prohibited?				100%	100%
9.	Are tools and fixtures used as criteria or acceptability of product/work fully qualified and identified?				100%	100%
10.	Are calibration intervals defined in accordance with industry standards or manufacturer's recommendations and the calibration history of the equipment?				100%	100%

5.10 INTERNAL AUDITS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are regular reviews of the product/process conducted and are goals/plans established to continually improve?				100%	100%
2.	Are the processes/products properly documented and controlled? Do they include appropriate customer requirements and are they executed in conformance to the documentation?				100%	100%
3.	Are the required quality checks built into the operations within the manufacturing, field installation, and service process, and is the resulting data maintained and promptly acted upon?				100%	100%
4.	Are all pertinent methods of statistical quality control properly, effectively and efficiently used?				100%	100%
5.	Does a process change control system exist, and are customers informed of changes made to products and processes with customer approval prior to the change, when required?				100%	100%
6.	Are the operators within the process provided with written work instructions and are they trained?				100%	100%
7.	Is the receipt, handling, storage, packaging and release of all material, including customer provided items, at all stages, specified and controlled to prevent damage or deterioration, and to address obsolete material?				100%	100%
8.	Is there a first in/first out (FIFO) system in place, and is it followed?				100%	100%

COMMENTS
Specific procedures in place for all elements of above sections at point of impact.

5.11 STATISTICAL PROCESS CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Have the personnel who will be responsible for guiding the implementation of SPC been designated?				100%	100%
2.	Are statistical techniques used to reduce variation in the engineering process before the start of production?				100%	100%
3.	Is the quality system dependent upon process rather than product controls?				100%	100%
4.	Is the capability of critical processes and machines measured and monitored with CPK's >1.5, and targeted with CP of 2.0?				100%	100%
5.	Are incapable processes or machines targeted for improvement or replacement?				100%	100%
6.	Is SPC implemented for all critical processes?				100%	100%
7.	Are procedures that control the reaction to out-of-control situations adequate and effective?				100%	100%
8.	Are operators trained in the use of appropriate statistical techniques, and are they properly applying them?				100%	100%
9.	Are advanced problem solving techniques used by engineers to solve problems? (Design of Experiments, planned experimentation, advanced diagnostic tools, etc.)				100%	100%
10.	Are control charts and other process controls properly implemented?				100%	100%
11.	Is statistical process control being practiced in work centers and are yields being recorded and plotted on a scheduled basis, with respect to upper and lower control limits?				100%	100%

5.12 PROBLEM SOLVING		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are employees trained in problem solving techniques, in comparison to the needs of the organization?				100%	100%
2.	Does the organization utilize participative problem solving techniques to identify, measure and resolve internal and external problems?				100%	100%
3.	Are problem solving efforts timely and effective?				100%	90%
4.	Are applied resources sufficient to remove problem solving constraints?				90%	90%
5.	Are statistical techniques used for problem solving?				100%	100%
6.	Are quality data used to identify barriers, and to determine the priority of problems?				100%	100%
7.	Is there a policy/procedure that includes the use of problem solving techniques to systematically drive reduction in variability?				100%	100%

COMMENTS

Truechem based SPC.
Cell Managers and Process Engineers fully trained in Truechem use. Operators trained where deemed necessary.
Truechem will provide a better tool for all employees.
Product yields are measured in DPPM's. SPC is applied to process data only.
Process capability final targets are set at 1.5 and 2.0. Interim targets are set at 1.0 and 1.33

5.13 IN-PROCESS CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are process capabilities established and maintained on all major processes? (critical parameters)				100%	100%
2.	Are in-process inspections, test operations, and processes properly specified and performed?				100%	100%
3.	Are in-process inspection facilities and equipment adequate?				100%	100%
4.	Are the results of in-process inspections used in the promotion of effective preventative action and corrective action?				100%	100%
5.	Is preventative maintenance performed on the equipment and facilities?				100%	100%
6.	Are housekeeping procedures adequate and how well are they followed?				100%	100%
7.	Are process management plans established, and are critical parameters followed?				100%	100%
8.	Are work areas uncluttered and free of excess work-in-process, supplies, debris, etc? Is the environment conductive to producing quality work? Is proprietary information adequately protected?				100%	100%
9.	Are certifications and in-process inspection results used in making final acceptance decisions?				100%	100%
10.	Are methods and procedures for the control of metallurgical, chemical, and other special processes established and followed?				100%	100%

5.14 RECEIVING INSPECTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are receiving inspection facilities and equipment adequately and properly maintained?				100%	100%
2.	Are receiving inspection procedures documented and followed?				100%	100%
3.	Are receiving inspection results used for corrective and preventive action?				100%	100%
4.	Are the procedures for storage and timely disposition of discrepant material in place and followed?				100%	100%

COMMENTS

Receiving inspection requirements geared to meet current supplier dock to stock status.
Receiving inspection supported by third party Group “B” Lab analysis for raw materials.

5.15 MATERIAL HANDLING		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are procured material releases from receiving inspection clearly identified, as to acceptance status?				100%	100%
2.	Are procedures to facilitate limited life materials, such as prepreg, in place, properly controlled, and monitored?				100%	100%
3.	Are procured items identified with some means of traceability (serial number, lot number, date code, etc.)?				100%	100%
4.	Are procedures and facilities adequate for storage, release and control of materials?				100%	100%
5.	Are in-store and in-process materials properly identified and controlled?				100%	100%
6.	Is in-process material protected from corrosion, deteriorization, and damage?				100%	100%

5.16 NON-CONFORMING MATERIAL CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Is non-conforming material identified, segregated from regular production material, and properly dispositioned?				100%	100%
2.	Are non-conforming materials properly identified and controlled to prevent inadvertent use?				100%	100%
3.	Is the review and disposition of non-conforming materials defined, and are provisions made for inclusion of the customer in disposition decision?				100%	100%
4.	Are procedures for controlling non-conforming materials, and for ensuing corrective action, in place and followed?				100%	100%
5.	Do procedures provide for material review by a committee consisting of Quality and Engineering (as a minimum), to determine the disposition of non-conforming materials? (deviating from drawings or specification)				100%	100%
6.	Do supplier's procedures and controls for corrective action prevent recurrence of non-conformances?				100%	100%
7.	Is there a system for coordinating necessary corrective action with purchasing personnel?				100%	100%
8.	Does the corrective action extend to all applicable causes of non-conformance (e.g., design, workmanship, procedures, equipment, etc.)?				100%	100%

COMMENTS

5.15 question 1 – our system requires that defective material be tagged. Acceptance is identified by lack of tag and the addition of an acceptance stamp.

5.17 INSPECTION AND TEST PLAN		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are statistical techniques used in determining the acceptability of finished goods to customer requirements?				100%	100%
2.	Are periodic tests conducted to audit reliability and environmental performance of the final product?				100%	100%
3.	Is CPK tracking performed for critical characteristics, with plans to achieve CPK = 1.5 with a target of CP of 2.0?				100%	100%
4.	Is root cause failure analysis performed for internal and external failures, and is appropriate corrective action implemented?				100%	100%
5.	Are test and inspection personnel trained in the procedures of their operations, and are those procedures being followed?				100%	100%
6.	Is the new product/technology/service, as produced by the processes, verified to meet all customer satisfaction requirements?				100%	100%

5.18 PRODUCT INSPECTION/FINAL AUDIT		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are final product acceptance procedures documented and followed?				100%	100%
2.	Are all specific customer product audits conducted, as required?				100%	100%
3.	Are inspectors trained for the tasks performed?				100%	100%
4.	Are flow charts or milestones developed with checkpoints readily available?				100%	100%
5.	Is a system in place which denotes inspection performed; e.g., use of initials, stamps, labels, bar codes, etc., affixed to production documentation?				100%	100%
6.	Is a quality system established and maintained for control of product/production documentation?				100%	100%
7.	Is “accept/reject” criteria defined and available for use?				100%	100%
8.	Is a final audit performed to ensure that all required verifications and tests, from receipt of materials through point of product completion, have been accomplished?				100%	100%
9.	Are packing and order checking procedures documented and followed?				100%	100%

COMMENTS

Parts are inspected to customer drawings and specifications.
Critical characteristics are defined by the customer. When they are identified, we submit the data to the customer for analysis
Root cause failure analysis is performed on jobs with a yield of less that 90%.
Inspectors are trained to internal proedures and are IPC-A-600 certified.

5.19 TOOLING INSPECTION, HANDLING, & STORAGE		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are temperature, humidity, laminar flow controls in place to prevent contamination, and to assure dimensional stability?				100%	100%
2.	Do operators use hairnets, gloves & lab coats in all photo lab and photo exposure areas?				100%	100%
3.	Are work instructions and related forms in place to control all applicable tooling requirements, as stated in the customer's purchase order?				100%	100%
4.	Are customer provided artworks controlled with regard to handling, storage, revision control and relationship to converted production photo tools (working films)?				100%	100%
5.	Are production photo tools (working films) controlled with regard to handling, storage, use life, and relationship to customer purchase order?				100%	100%
6.	Are customer provided artworks and production photo tools (working films) inspected, including dimensional checks?				100%	100%
7.	Are all tools, fixtures, and other devices, used for tooling inspection and control, maintained under the calibration control procedure?				100%	100%
8.	Are records showing initial acceptance, periodic checks, and any needs for rework and/or modification available?				100%	100%

5.20 CORRECTIVE ACTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are final acceptance inspection results used for corrective and preventative action?				100%	100%
2.	Is root-cause analysis performed for non-conformances? This includes, but is not limited to, non-conformances (problems) caused by suppliers, found/caused "in-house" during processing, or those reported by the customer.				100%	100%
3.	Is positive action taken to prevent recurrence of problems, and are there documented reports/records of each occasion?				100%	100%
4.	Do procedures and systems provide for ensuring that replies are made to customer requests for correction action within the time limit specified?				100%	100%
5.	Is corrective action controlled and documented for all applicable work centers?				100%	100%
6.	When corrections are made, is their effectiveness subsequently reviewed and monitored?				100%	100%

COMMENTS

No additional comments

DATE COMPLETED
09/17/2023

SECTION 6 (CHECK ONE IN EACH LINE THAT APPLIES)
MANUFACTURING HISTORY *(See Section 2 Site Capability)*

Please complete as many history profiles so that the total descriptions of products you manufacture account for production orders that reflect 70% of your business. History profiles are for board or board family (board types may be grounded together if they are similar).

BOARD TYPE	DATE OF ORDER	MATERIAL	HISTORY #
M/L	02/24/2023	FR-4	39686
VIA TYPE	PRODUCTION QUANTITY	TOTAL YEARLY PRODUCTION %	
BLIND/BURIED	72	TBD	

Dimensions in millimeters (inches in brackets)

BOARD			HOLES		
BOARD SIZE DIAGONAL	TOTAL BOARD THICKNESS	NUMBER CONDUCTIVE LAYERS	DIA DRILLED HOLES	TOTAL PTH TOL (MAX-MIN)	LOCATION TOL DTP
☒<250 [<10.00]	☐<1,0 [<.040]	☐1-4 [1-4]	☐>0,5 [>.020]	☐>0,250 [> .010]	☐**>0,50 [>.020]**
☐250 [10.00]	☐1,0 [.040]	☐5-6 [5-6]	☐0,5 [.020]	☐0,250 [.010]	☐**0,50 [.020]**
☐350 [14.00]	☐1,6 [.060]	☐7-8 [7-8]	☐0,4 [.016]	☐0,200 [.008]	☐**0,40 [.016]**
☐450[17.50]	☐2,0 [.080]	☐9-12 [9-12]	☐0,35 [.014]	☒0,150 [.006]	☐**0,30 [.012]**
☐550 [21.50]	☐2,5 [.100]	☒13-16 [13-16]	☒0,30 [.012]	☐0,125 [.005]	☐**0,25 [.010]**
☐650 [25.50]	☒3,5 [.135]	☐17-20 [17-20]	☐0,25 [.010]	☐0,100 [.004]	☐**0,20 [.008]**
☐750 [29.50]	☐5,0 [.200]	☐21-24 [21-24]	☐0,20 [.008]	☐0,075 [.003]	☐**0,15 [.006]**
☐850 [33.50]	☐6,5 [.250]	☐25-28 [25-28]	☐0,15 [.006]	☐0,050 [.002]	☐**0,10 [.004]**
☐>850 [>33.50]	☐>6,5 [>.250]	☐>28 [>28]	☐<0,15 [.006]	☐<0,050 [<.002]	☒**<0,10 [<.004]**
☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐**Other:**

CONDUCTORS						
INTERNAL ELEC CLEARANCE (MIN)	INTERNAL COND WIDTH (MIN)	INTERNAL PROCESS ALLOWANCE	EXTERNAL ELEC CLEARANCE (MIN)	EXTERNAL COND WIDTH (MIN)	EXTERNAL PROCESS ALLOWANCE	FEATURE LOCATION DTP
☐>0,350 [>.014]	☐>0,250 [>.010]	☐>0,100 [>.004]	☐>0,350 [>.014]	☐>0,250 [>.010]	☐>0,100 [>.004]	☐>0,50 [>.020]
☐0,350 [.014]	☐0,250 [.010]	☐0,100 [.004]	☐0,350 [.014]	☐0,250 [.010]	☐0,100 [.004]	☐0,50 [.020]
☐0,250 [.010]	☐0,200 [.008]	☐0,075 [.003]	☐0,250 [.010]	☐0,200 [.008]	☐0,075 [.003]	☐0,40 [.016]
☐0,200 [.008]	☐0,150 [.006]	☐0,050 [.002]	☐0,200 [.008]	☐0,150 [.006]	☐0,050 [.002]	☐0,30 [.012]
☐0,150 [.005]	☐0,125 [.005]	☐0,040 [.0015]	☐0,150 [.006]	☒0,125 [.005]	☐0,040 [.0015]	☐0,25 [.010]
☐0,125 [.005]	☒0,100 [.004]	☐0,030 [.0012]	☐0,125 [.005]	☐0,100 [.004]	☐0,030 [.0012]	☐0,20 [.008]
☒0,100 [.004]	☐0,075 [.003]	☐0,025 [.001]	☐0,100 [.004]	☐0,075 [.003]	☐0,025 [.001]	☐0,15 [.006]
☐0,075 [.003]	☐0,050 [.002]	☐0,020 [.0008]	☒0,075 [.003]	☐0,050 [.002]	☒0,020 [.0008]	☐0,10 [.004]
☐<0,075 [<.003]	☐<0,050 [<.002]	☒<0,020 [<.0008]	☐<0,075 [<.003]	☐<0,050 [<.002]	☐<0,020 [<.008]	☒<0,10 [<.004]
☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐Other:

SECTION 7

DATE COMPLETED
09/17/2023

IDENTIFICATION OF PREVIOUS AUDITS (Optional)

Please complete as many forms as you feel reflect the intensity of your customer visits.

COMPANY AUDITORS **CUSTOMER & INTERNAL AUDIT RESULTS ARE MADE AVAILABLE AT TIME OF ANY CUSTOMER OR REGULATORY AUDIT**	DATE OF AUDIT – Reference "in-house" files
AUDIT TEAM MEMBERS – FTG TECHNICAL REVIEW BOARD [TRB] – Wayne Haskins, Seb Latino, Hayes Myers	AUDITOR REMARKS - None
	SPECIFICATIONS USED IN AUDIT – IPC STANDARDS, AS9100D STANDARD, INTERNAL PROCEDURES
LENGTH OF AUDIT – time available over 4 days	
TEAM MEMBERS MAY BE CONTACTED AT – waynehaskins@ftgcorp.com	

COMPANY AUDITORS **CUSTOMER & INTERNAL AUDIT RESULTS ARE MADE AVAILABLE AT TIME OF AUDIT**	DATE OF AUDIT
AUDIT TEAM MEMBERS	AUDITOR REMARKS
	SPECIFICATIONS USED IN AUDIT
LENGTH OF AUDIT	
TEAM MEMBERS MAY BE CONTACTED AT	

COMPANY AUDITORS **CUSTOMER & INTERNAL AUDIT RESULTS ARE MADE AVAILABLE AT TIME OF AUDIT**	DATE OF AUDIT
AUDIT TEAM MEMBERS	AUDITOR REMARKS
	SPECIFICATIONS USED IN AUDIT
LENGTH OF AUDIT	
TEAM MEMBERS MAY BE CONTACT AT	

*REPEAT THIS FORM AS NECESSARY

SECTION 8

DATE COMPLETED
09/17/2023 – internal use only

FINANCIAL REVIEW (OPTIONAL)

Please complete the following financial information that coincides with the company description and site information provided in section 1.

COMPANY FINANCIAL DESCRIPTION

LEGAL NAME Firan Technology Group Corporation		
TAXPAYER ID NUMBER 102320512 (Canadian)	DUNS NUMBER 24-324-0876	TRADING SYMBOL TSX: FTG
ANNUAL SALES $48,000,000	PRIOR YEAR $45,000,000	YEAR-TO-DATE
FISCAL YEAR Nov.30th		
BANK HSBC Bank of Canada	ACCOUNT NUMBER 10002-2F	
BANK ADDRESS 70 York Street, 4th floor	STATE Ontario	ZIP M5J 1S9
PROVINCE Ontario	COUNTRY Canada	
BANK TELEPHONE NUMBER 416-947-2863	FAX NUMBER 416-868-9065	

COMMENTS

FINANCIAL DATA CAN BE REVIEWED BY ANY CUSTOMER OR REGULATORY BODY WHEN THEY VISIT OR AUDIT OUR FACILITY.
PUBLICALLY TRADED ON THE TORONTO STOCK EXCHANGE UNDER SYMBOL "FTG".

SITE FINANCIAL DESCRIPTION

SITE NAME FTG CIRCUITS, TORONTO		
TAXPAYER ID NUMBER	DUNS NUMBER 243240876	TRADING SYMBOL FTG
ANNUAL SALES	PRIOR YEAR	YEAR-TO-DATE
FISCAL YEAR		
BANK	ACCOUNT NUMBER	
BANK ADDRESS	STATE	ZIP
PROVINCE	COUNTRY	
BANK TELEPHONE NUMBER	FAX NUMBER	

COMMENTS

FINANCIAL DATA CAN BE REVIEWED AT TIME OF AUDIT

SECTION 9
MQP ELECTRONIC EDITING

This MS Word template comes with editable fields. IPC has made this electronic document available for ease of completing, updating, and filing the MQP, as well as to give the laminate manufacturer and customer a common interface. Using the template enables laminate manufacturers to maintain several customer specific files without the endless stream of paperwork.

Editable fields are highlighted in gray. To complete the fields in the template, use the TAB key to toggle from field to field, entering the information as instructed in the introductory text for each section.

The developers of this MQP strongly suggest the person at the laminate manufacturing facility responsible for creating and maintaining the MQP write protect the file to be sent.