

SUMMIT

INTERCONNECT

Company Overview

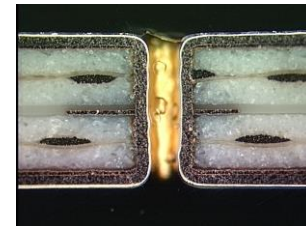
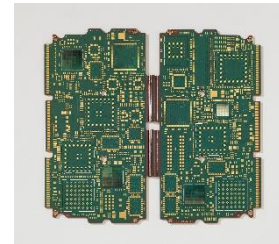
July 2020



- Summit is one of the largest PCB companies in North America – over \$130 million in revenue
- Total of 240,000 sq. ft. of manufacturing space and over 800 employees
- Four North American based plants: Anaheim, Orange, Santa Clara, and Toronto
- Additional scale available utilizing Mass-Lamination Partners (DDTC licensed for ITAR)
- Additional manufacturing through Summit Global provides competitive global pricing
 - Multi-Site, Multi-Country (Taiwan, China, Vietnam, Korea)
- Focused on advanced technology PCBs for domestic manufacturing
- Multiple sites with similar capabilities provides redundancy for customer risk mitigation
- ***Provides a total PCB solution from prototype & quick-turn to volume production***

Invest in Advancing Our Capabilities

- **Fund Well Capitalized Facilities**
 - Keep pace with advanced technology PCB designs
 - Provide a platform for additional growth
 - Ensure long-term stability and viability
- **Leverage Information Technology**
 - Proprietary shop management system
 - Shop loading & capacity planning
 - Engineering & Quality records
- **Focus on Advanced Technology**
 - Complex HDI
 - Complex rigid-flex
 - RF/Microwave
- **Provide a Total PCB Solution**
 - Prototype / QTA
 - High mix / low volume
 - Domestic & off-shore volume



End Markets

End Market	Application / Program	Key Customers
Aerospace & Defense	   	<p><u>Commercial Avionics</u>: aircraft controls, communications, radar systems, entertainment systems</p> <p><u>Military</u>: avionics, munitions, missiles, radar systems, secure communications, simulation, surveillance</p>
Commercial	 	<p><u>Health care</u>: imaging, diagnosis, surgical, patient monitoring, implantable devices</p> <p><u>Semiconductor</u>: ATE, reference boards, probe cards, burn-in boards</p> <p><u>Computing/Datacom</u>: wireline & wireless</p>
Space	  	<p><u>Flight and non-flight</u>: launch systems, communications/surveillance, payload</p>

PCB Products

Rigid

- High layer count
- Stacked microvias
- Blind/buried vias
- Back drilling
- Multiple sequential lam
- Via fill (copper, epoxy)
- Heat sinks
- Bonded and embedded coins
- Terminal & standoff assembly

Flexible

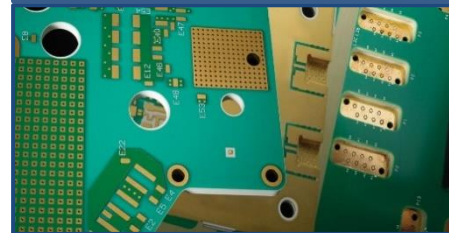
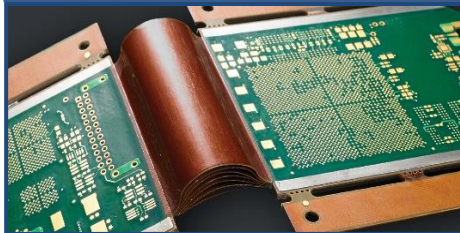
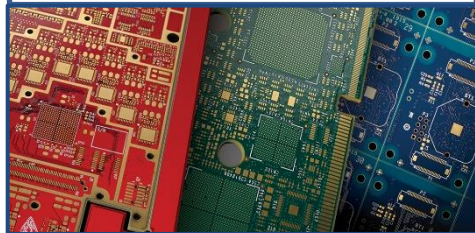
- Multilayer, Loose-leaf, Rigid-Flex, Bookbinder
- Adhesiveless & adhesive
- Stiffeners
- Laser ablation
- Thin flex laminates
- Oversized panel layouts
- Assembly options

RF/Microwave

- Wide range of PTFE materials
- RF/Digital hybrid designs
- Mixed material stackups
- Plated cavities, edge plating
- Mode suppression/stitching
- Buried resistors
- Edge launch features
- Rogers® strategic partner

Semiconductor

- Reference Cards, Probe, DUT, Burn-in-Boards
- High Aspect Ratio
- Low Loss Materials
- Bondable Gold
- Tight Tolerance Drilling
- Sintering
- Oversized Panel Options





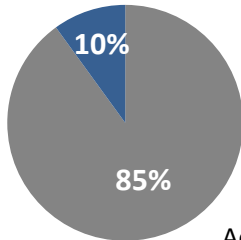
Facility Profile – Anaheim



Facility size: 60,000 sq ft
Employees: 190
Annual revenue: ≈ \$40 million
Technology focus: Rigid-flex, bookbinder, oversized flex
Service focus: Mid to high volume, standard lead time

Business Mix

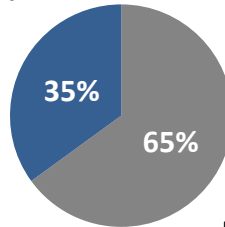
Medical,
Other



Aerospace &
Defense

Product Mix

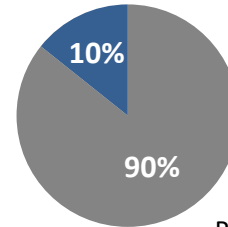
Rigid



Rigid-Flex

Production Mix

Evaluation,
Proto, QTA



Production

Certifications

ISO9001, AS9100, MIL-31032, MIL-55110, MIL-50884, NADCAP, ITAR registered, RoHS compliant



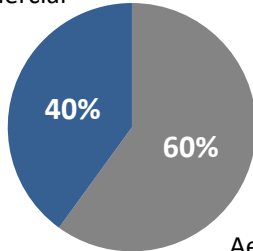
Facility Profile – Orange



Facility size: 40,000 sq ft
Employees: 170
Annual revenue: ≈ \$35 million
Technology focus: HDI, Sequential lam, RF/microwave
Service focus: High mix / low volume

Business Mix

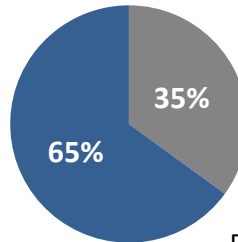
Commercial



Aerospace,
Defense & Space

Product Mix

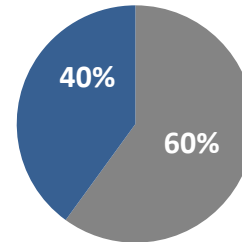
High-speed Digital



RF / Microwave

Production Mix

QTA, Evaluation,
Prototype



Production

Certifications

ISO9001, AS9100, ITAR registered, RoHS compliant

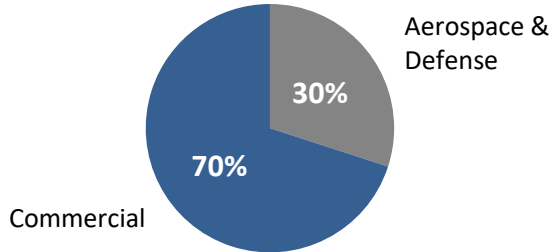


Facility Profile – Santa Clara

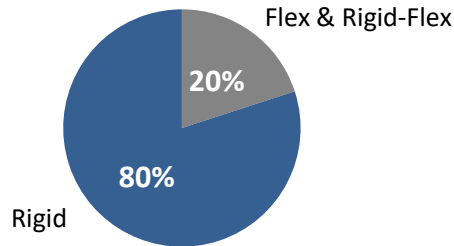


Facility size: 75,000 sq ft
Employees: 310
Annual revenue: ≈ \$55 million
Technology focus: Sequential Lam, Complex HDI, Flex & Rigid-Flex
Service focus: Quick turn, new product development, pre-production volume

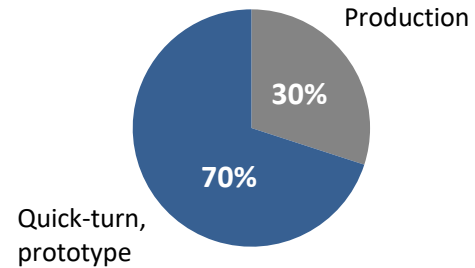
Business Mix



Product Mix



Production Mix



Certifications

ISO9001, AS9100, NADCAP, ITAR registered, RoHS compliant

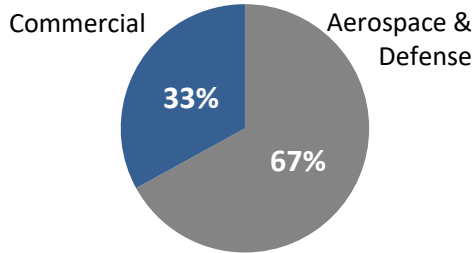


Facility Profile – Toronto

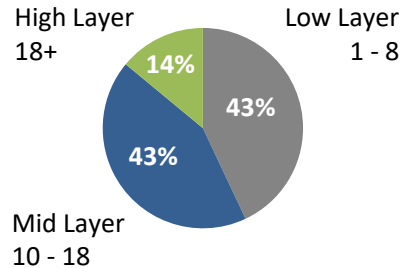


Facility size: 65,000 sq ft
Employees: 145
Annual revenue: ≈ \$22 million USD
Technology focus: Rigid PCBs up to 30+ layers, BBV, microvia, sequential lam, RF/Microwave, thermal management
Service focus: Mid volume production, pilot builds to support production

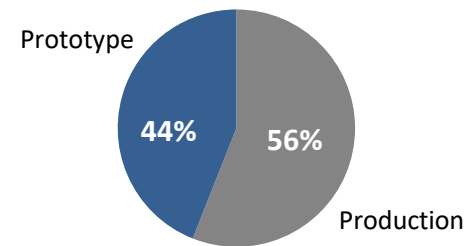
Business Mix



Product Mix



Production Mix



Certifications

ISO9001, AS9100, NADCAP, MIL-PRF-55110, MIL-PRF-31032, CGP/JCP registered, RoHS compliant



Profile – Summit Global



Partner locations:	China, Korea, Taiwan, Vietnam
Approved suppliers:	9
Revenue profile:	Medium to Large companies (\$150M - \$1B)
Product Range:	Rigid, Flex, Rigid-Flex, High-Speed Digital, RF/Microwave & Assembly
DFM & Quality Support:	Summit employees in US and China

Standard & Advanced Technology

- Low to high layer count
- Wide range of material options
- Any layer HDI
- Back drilling
- Sequential lamination
- Epoxy Via Fill
- Fine line & space

Specialized Capabilities

- Embedded Coin
- Cavity and edge plating
- Heavy Copper
- Metal backed – aluminum, copper
- Hybrid constructions
- RF materials
- Substrate / chip carrier designs

Quality Standards

- IPC 6012/6013, Class 2, Class 3
- TS/IATF 16949 (automotive)
- ISO 13485 (medical)
- AS 9100 (aerospace)
- ISO 9001
- ISO 14000 (environmental)
- NADCAP

End to End Support to Ensure Your PCB is Manufactured Exactly to Specifications



Domestic Manufacturing Profile

Production Capability	Santa Clara	Orange	Anaheim	Toronto
Quick turn / Evaluation	24 hours – 25 days	5 – 20 days	15 – 25 days	5 – 20 days
Typical standard lead time	20 – 30 days	25 - 35 days	30+ days	15 – 25 days
Typical production lot volume	4 - 24 panels	5 – 10 panels	25 – 50 panels	12 to 50 panels Multiples of 12 panel lots
Panel size options	12x18, 18x24, 21x24, 21x26, 24x30	12x18, 18x24, 21x24, 20x26, 24x28	12x18, 18x24, 21x24, 24x36	12x18, 18x24, 21x24
Shifts	3 + weekend	2.5 + Saturday	2.5 + Saturday	2.5 + Saturday
Common Materials				
Lead Free FR4	ITEQ 180A, I-185HR, I-370HR, EM-827, TUC622/722/748	ITEQ 180A, I-185HR, I-370HR, EM-827, TUC622/722/748	I-185HR, I-370HR, EM-827	I-370HR, I-185HR, VT-47, R-1755V, ITEQ 180A
Low loss	FR408, I-Speed, N4000-13EP/SI, Meg4, EM370D/528/888	FR408, I-Speed, N4000-13EP/SI, Meg4, EM370D/528/888	FR408, I-Speed, N4000-13EP & EPSI, Meg4	FR408, I-Speed, N4000-13EP & EPSI, Meg4
High speed digital	I-Terra MT40, Tachyon 100G, Meg6 & 6N, Meg7 & 7N, RO4000 series, EM890/891, TUC Thunderclad 1/2/3	I-Terra MT40, Tachyon 100G, Meg6 & 6N, Meg7 & 7N, RO4000 series, EM890/891, TUC Thunderclad 1/2/3	I-Terra MT40, Tachyon 100G, Meg6, & 6N, Meg7 and 7N, RO4000 series	Tachyon, Meg6, Meg6N, Meg7, I-Terra MT40, RO 4000 series
RF/Microwave	Rogers (all materials), Taconic (all materials), Astra MT77	Rogers (all materials), Taconic (all materials), Astra MT77	N/A	Rogers (all materials), Taconic (all materials)
Polyimide / High Temp	I-P95, I-P96, VT-901, Arlon 85N, BT	I-P95, I-P96, VT-901, Arlon 85N, BT	I-P95, I-P96, VT-901, Arlon 85N, BT	I-P95, I-P96, VT-901, Arlon 85N, BT
Thin core capacitance	Dupont HK04, Farad Flex	Dupont HK04, Farad Flex	Dupont HK04	3M ECM (embedded capacitance)
Flex	Dupont Pyralux AP, Panasonic	N/A	Dupont Pyralux AP, Panasonic	Dupont Pyralux AP (limited)
Surface Finishes				
In-House	ENIG, ENEPIG, hard Au, soft Au, Au over Cu, OSP, SnPB reflow, selective SnPb, Immersion Ag	ENIG, full body & selective Au, Immersion Ag, selective SnPb, SnPB reflow	ENIG, full body & selective Au, selective SnPb, SnPB reflow	HASL, LF HASL, ENIG, immersion Ag, immersion Sn, hard Au, soft Au, selective Au, carbon ink
Qualified outside service	HASL, immersion Sn	ENEPIG, immersion Sn, OSP	ENEPIG, immersion Sn, OSP	



Global Manufacturing Capabilities

Item	Technical Capability
Layers	1 - 68L
Maximum Board Size	Rigid: 49.21"x22.44" (Backplane) / Flex: 19.68"x26.37"
Maximum Board Thickness	394mil
Outline Tolerance	± 4mil
Minimum Trace Width / Space	2mil / 2mil
Maximum (finished) Copper Thickness	Inner Layer: 12oz / Outer Layer: 12oz
Minimum Drill Hole Diameter	6mil (Mechanical) / 4mil (Laser)
PTH / NPTH Tolerance	± 2mil
Registration Tolerance	± 2mil
Aspect Ratio	20 : 1
Solder mask Dams	3mil
Impedance Control Tolerance	± 8%
Rigid-flex Multilayer (max. # of layers)	2 - 40L
Flex Multilayer (max. # of layers)	1 - 12L
HDI Feature	Stacked Microvias (Any Layer) , Blind and Buried Vias
Material Types	FR4 (Shengyi, ITEQ, EMC); High Speed (Meg 4, Meg 6, FR408HR); High Frequency (Ro3003, Ro4350B); Polyimide (DuPont; Thinflex); Ceramic
Surface Finishes	HASL/LF, HASL, ENIG, Immersion Tin, OSP, Immersion Silver, Hard Gold/Soft Gold, Flash Gold, Gold Finger, Selective OSP, ENEPIG
Certifications	ISO9001, ISO14001, IATF/TS16949, AS9100, NADCAP, ISO13485, ISO27001



Completed & Planned Capex

- **Anaheim**

- DP-1500 soldermask coater
- Copper Via-Fill expansion
- (2) AOI/AVI system (Camtek)
- Pre-clean line / Auto loader (Wise)
- Planerizer (Polla Massa)
- Plating rectifiers (Baker)
- LDI system (Orbotech Nuvogo)
- Lab equipment (Struers)
- Vision Router (Pluratech)
- ERP System (ProCIM)

- **Orange**

- 4 opening lam press - (OEM)
- Vision Router - (Schmoll)
- ENIG/ENIPEG line
- AOI/AVI system (Camtek)
- (2) HS Mechanical drills (Schmoll)
- UV/CO2 laser drill (Schmoll)
- Epoxy via fill system (Mass)
- LDI system (Orbotech Nuvogo)
- LDI soldermask (Limata X1000)
- Automated tester (ATG a7)
- Network infrastructure upgrade

- **Santa Clara**

- ENIG/ENIPEG, Im Silver line
- (3) HS Mechanical drills (Schmoll)
- (2) Laser drills (ESI, Hitachi)
- Epoxy via fill system (Mass)
- LDI system (Orbotech Nuvogo)
- High speed TDR - 7Gb (Zymetrix)
- Strip/Etch/Strip (Chemcut)
- Planerizer (ITC)
- Wet Sander (Mass)
- (2) 6 opening presses - OEM

Over \$10 million invested



SUMMIT
INTERCONNECT



THANK YOU