Manufacturing

Microwave and micro-electronic capability

We provide a trusted and innovative total manufacturing capability for highly complex electronic integrated systems, sub-systems, modules and printed electronic circuit assemblies where quality is paramount. Our ethos is to add value through our people, scale, capability and engineering know-how, allowing us to provide a vital advantage to our customers where it counts.

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BAE SYSTEMS

From rapid prototyping to high volume production, we work in close partnership with our customers. Our world-class microwave core capabilities and technologies include:

Thin-film machining facility

Positional accuracy
- General ± 0.025mm
  Achievable ± 0.010mm
  Max size - 104x104x1mm.

Surface grinding of alumina and other materials
- >0.25mm ± 0.025 mm thickness - max size 104x104mm
- <0.125mm ± 0.025 mm thickness - max size 50x50mm.

Precision lapping of materials
- Alumina and aluminium nitride
  minimum thickness - 0.125mm ± 0.010mm
  max size - 104x104mm.

Thin-film substrate processing facility

Substrate materials
- Alumina, aluminium nitride, amorphous and single crystal quartz. RT Duroid, FR4.

Metallisation
- Sputtered resistive layer Nichrome (NiCr) / range – 50 –100Ω/sq. +/- 15%
- Sputtered resistive layer Tantalum Nitride (TaN) / range – 50 –100Ω/sq. +/- 15%
- Sputtered conductive layers – gold or copper range – 1000 - 10000Å +/- 10%
- Sputtered barrier layers – Titanium Tungsten (TiW) range – 500 - 1500Å +/- 10%
- Electroplated layers – gold, copper and nickel - 0.5 - 15µ.

Minimum production feature sizes and alignment
- Track width - 0.020mm +/-0.003mm
- Gap width - 0.020mm +/-0.003mm
- Pattern to profile - 0.025mm. Front to back - 0.050mm.

Features include
- Integrated NiCr and TaN resistors – value to +/-15% general tolerance, < +/-5% achievable tolerance when trimmed
- Interconnection - through plated via, edge wraps, half via or half-slotted via wraps
- Selectively plated nickel barriers for mixed assembly technologies.

Laser processes

CO_2 laser cutting facility
- CO_2 laser profiling and drilling of alumina, aluminium nitride, RT duroid, kovar, ablefilm, titanium, steel and metal matrix materials
- Positional accuracy: general ± 0.025mm achievable ± 0.010mm
- Max size - 250x250mm (thickness dependent on material).

YAG laser cutting and marking facility
- Profiling of aluminium
  max size - 250x250x3mm
- Engraving / marking
  max size - 250x250x3mm.

YAG laser welding facility
- Hermetic laser package sealing of aluminium, kovar and various other materials. Max size - 300x300x250mm.

Assembly capabilities
- Connector / feed-through fitment using solder reflow and laser welding techniques
- Substrate to carrier attachment
- Ceramic, quartz and duroid substrate build, placing spiral inductors, chip components and silicon and GaAs MMICs using conductive and non-conductive adhesives / epoxies
- Substrate, module and full system build
- Fabrication and assembly of microwave spiral antennas
- Hermetic connections, packages to $1x10^{-8}$.

Dedicated bonding facility
- Gold tape 75µm x 6µm to 1.52mm x 25µm
- Gold wire 17µm to 125µm
- Micro-parallel / parallel gap and series welding
- Thermo-compression, ultrasonic and thermo-sonic wedge bonding
- Thermo-sonic ball bonding
- Destructive and non-destructive pull testing
- Shear testing.

High volume automated assembly facility

MRSI 175 automatic epoxy dispensing
- Conductive / non conductive epoxy dispense
- Grid formations
- Continuous line / pattern writing
- Dot size from 200µm, recommended 250µm.

MRSI 505 automatic pick and place facility
- Components sizes from 200µm x 200µm to 10mm x 10mm
- Placement accuracy ±12.5µm (±3d)
- Eutectic bonding
- Epoxy stamping - conductive / non-conductive
- Pattern recognition including component verification
- Material traceability for all components / placement positions.

Automatic bonding facility
- Hesse and Knipps 710M and 815
- Gold tape 75µm x 6µm to 250µm x 25µm
- Gold wire 17µm to 50µm
- Destructive and non-destructive pull testing.

Test facility

Microwave special to type and common core test sites
- Automated test sites with manual diagnostics.

Microwave test equipment
- Professional test team with experience of using a wide range of modern RF test equipment, spanning the frequency range from MHz to 94GHz.

Test skills
- Microwave substrate alignment capability to tune oscillators, amplifiers and filters. Component level diagnostics.

ESS capability
- Active / passive conditioning with climatic testing and temperature characterisation.

Microwave antenna testing
- Anechoic chambers for antenna relative gain measurement.

Engineering support
- Design for manufacture and test, as well as microwave diagnostic ability from system to component level.

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