bloomice™

GLOBAL COMMUNICATION HARDWARE

ANTENNA DESIGN SERVICES 2025

BESPOKE CABLE ASSEMBLY AND ANTENNA SOLUTIONS

DESIGN SERVICES

Our products have been Integrated, installed and utilised in all four corners of the globe since 2001 and our Bespoke Product Development Team work closely with our customers to produce millions of precision engineered, bespoke antenna and cable solutions for use in communication systems of all kinds.

Each year thousands of new concepts utilising existing and developing technologies come to fruition.

Our product development team are leading edge innovators in the manipulation of antenna and cable forms and technologies that result in optimised communications which are cnitical for the efficient operation of all wireless devices. Bloomice have decades of experience designing industry leading embedded antennas on many globally based signal frequency platforms.

This brochure provides some detailed commentary on the skills and services available from Bloomice.

Please contact us at **enquiry@bloomice.com** for more information or to discuss your project needs.

The infomation detaliled within his publication merely contains a general description of performance factors that when appliedin a real world environment / application, may exhibit a differentiation from a simulated form, which may then beamended by way of further development. Stipulated performance factors shall only be deemed binding if they are expressly agreed upon as part of the formalisation of any subsequent contract.

Note: Some of the services detailed are available within other teritories subjeci to local network considerations and conditions.

OUR PRODUCT DEVELOPEMENT CYCLE

Definition and Feasibility Study

- Evaluation of wireless protocols to be utiised
- Product and project performance targets
- Agreed measurement criteria
- Agreed project timescales

Concept

- Board design and layout
- Antenna topology
- Placement and operational environment considerations
- Required Electrical & Mechanical characteristics

Design

- CAD Design / Layout
- Simulated Performance Data
- GND Connections / Layout
- Antenna Structure & Trace
- Patterns

Prototyping, Testing and Measurement

- Passive Measurement Analysis
- Active Measurement Analysis
- Tuning
- Matching Circuitry
- Debugging and troubleshooting

Tooling and Secondary Testing

- Phase 1 tooling
- Primary manufacture run
- Secondary electrical testing and reporting
- Mechanical evaluation report
- Pre-certification analysis and reporting

Final Production

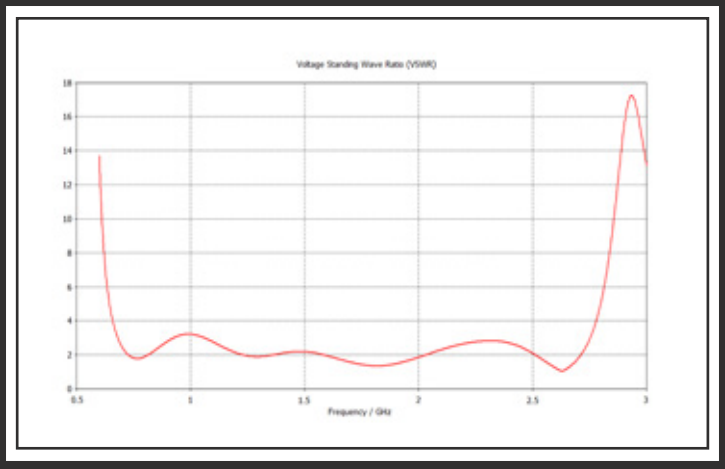
- Secondary production run
- Production line auditing
- Commercial and logistical agreements finalised

PRODUCT DEFINITION AND CONCEPT

Our design & development team are on hand to meet and discuss your project aims and ambitions.
The antenna and its performance is a critical element in the performance and form of the finished product, and so early stage discussions regarding the concept are essential.

Key criteria to be considered at this early phase include:

- Physical requirements and restrictions
- Electrical & Mechanical specification
- Construction materials available
- Proposed mounting method
- Proposed layout structure
- Frequency / Bandwidth requirements
- Desired efficiency criteria
- Power consumption
- Deployment (geography / target markets)
- Targeted Approvals and Certification
- Development timescales
- Commercial targets & constraints

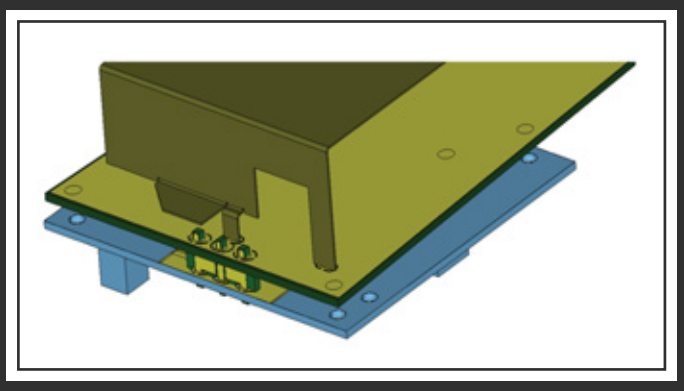


SIMULATED VSWR CHART

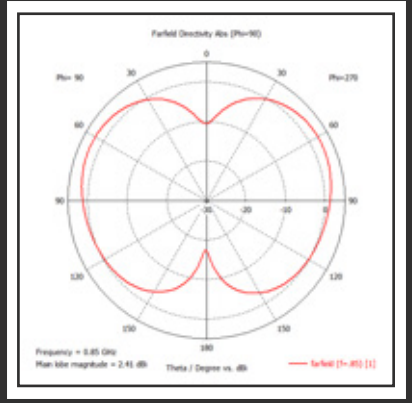
Our strong engineering pedigree means that we are perfectly placed to develop product from initial concept through to final production.

Following initial discussions around key criteria, we provide physical detailed design data underwritten by a simulated performance report outlining expected VSWR, Return Loss, Efficiency values and Radiating Pattern.

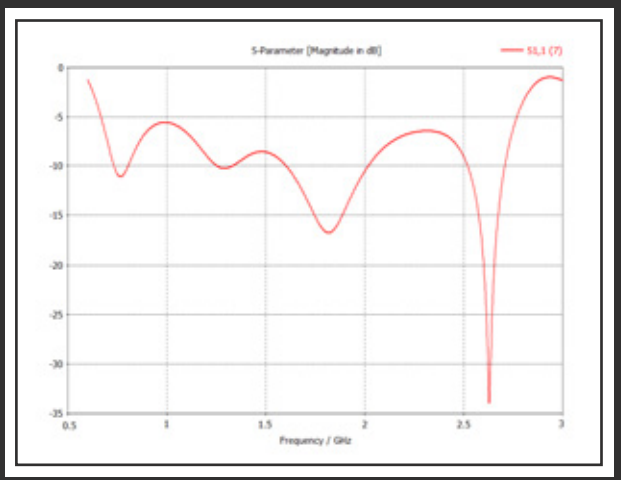
Our prototyping capabilities include semi-functional and fully functional prototypes with 3D printed material and Printed Circuit Boards.



SIMULATED CAD DRAWING



FAR FIELD 2D PLOT



RETURN LOSS

PRODUCT DEFINITION AND CONCEPT

To fully understand the performance of an antenna, it is firstly important to measure the radiated performance.

This is best achieved using a fully anechoic chamber, which eradicates unwanted reflections which would otherwise impede the measurement.

We provide a full 'Antenna Test Service' in order to characterise the radiated performance.

Key performance parameters that we measure include:

- Peak Gain
- Gain v Angle
- Efficiency
- Directivity
- Polarisation (2D or 3D far field radiation patterns)

Our Anechoic test chamber and associated measurement equipment operate within the 0.4GHz to 8GHz frequency range and are therefore suitable for measuring antenna performance designed for a huge range of wireless technologies.

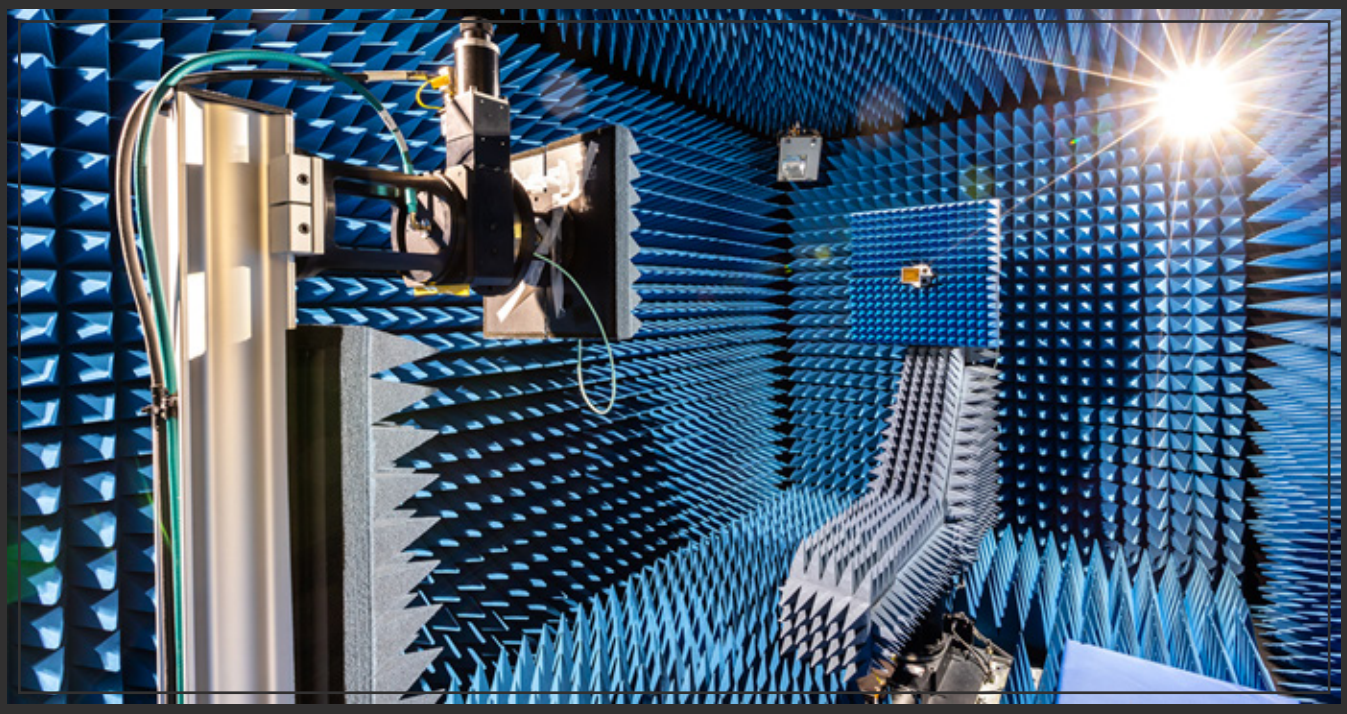
Our indoor test range is a far field measurement system installed in a fully anechoic chamber. Our chamber is fully lined on all surfaces (walls, floor and ceiling) with carbon embedded absorber materials from Soliani which simulate a free space environment.

Our equipment list comprises:

- Chamber @ 1.5m x 2.5m lined with Soliani HPP30 ultra broadband carbon loaded polyurethane foam absorbers providing 25db attenuation @ 500MHz and 40dB attenuation @ 3GHZ
- Test Antenna 1 - Hyperlog 4060 (400MHZ to 6GHZ Logarithmic-periodic)
- Test Antenna 2 - Compower AH-118 700MHz to 18GHZ Horn Antenna
- Test antenna 3 - RF Echo OBH-690 600MHz to 9GHz Horn Antenna
- Positioner - Dams 6000 DC- 18GHZ Antenna measurement systems with Full Spherical Mount (FSM)
- DAMS Antenna Measurement Software Studio

Inside the chamber is a standard measurement antenna and a "Positioner" upon which the Device Under Test (DUT) is placed. Two measurement positions are available using either a DAMS 6000/FSM system from Dimond Engineering, which is suitable for the measurement of small and medium sized antennas or a turntable which can be used to test larger antenna systems.

Our measurement facility can also be configured for measurement of externally driven antennas or for self-driven embedded systems.



EMBEDDED ANTENNA DESIGN

An embedded antenna is a critical component of any wireless system, therefore planning for the antenna at the early stage is essential to maximise performance whilst reducing delays and additional costs in later stages of the project.

There are a myriad of embedded antenna configurations available, including:

- Etched Antenna
- Metal formed antenna
- LDS (Laser Direct Structured)
- Ceramic Patch

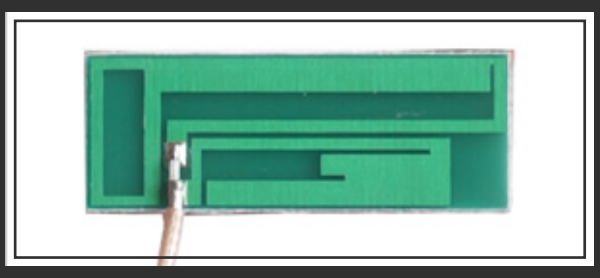
Whatever the choice, the optimum size for an antenna is defined by the laws of physics, and although there are several techniques available which enable the reduction in the overall size of the antenna system, these generally result in a compromise in performance. In short, the smaller the antenna for a given operational frequency and bandwidth the less efficient it will be.

To ensure any wireless product exhibits a good range performance, an efficient antenna system is essential and so sufficient space must be allocated in order to accomodate it.
It is therefore essential that the antenna is considered at the earliest possible stage of the product development cycle, so that the design options and any potential compromises can be highlighted and the design modified if necessary.

Location

It is generally the case that an embedded antenna will be usually be sited at the extremities of a board. As a consequence it will be sensitive to its location in relation the external environment. Therefore consideration should be given to how the product is going to be used and utilised, and where it is is likely to be positioned. For example, with a hand held device, we must ensure that the antenna is not masked by the user's hand when held in its natural state.

For a body or panel mounted device is it likely to be positioned on a metallic surface? If so, this will significantly impact performance if not catered for during the design process.



Materials

Whether the antenna structure is to be etched on to the PCB, Metalised on to plastic or formed by a stamped metal element, it is essential that materials In contact with, or adjacent to the antenna have known and stable dialectic properties.

The dielectric of FR4 PCB material can vary significantly from vendor to vendor and even from batch to batch, it is therefore important that the PCB material characteristics are identified at an early stage. For Laser Direct Structured Antenna's (LDS), where the antenna is metalized on to a plastic substrate, the RF characteristics of the plastics must be fully quantified.

Castings & Coatings

To ensure best antenna performance, it is imperitive that the antenna is not metallically encapsulated. That is to say that the housing / enclosure is not of a metallic substance, any external coating is not metallic.

Internal Structures

The position of internal metallic structures relative to the antenna can also impact performance. For example, with handheld or wearable devices, the product's battery is likely to be a major component part of the overall assembly and as such, it's position and role within the antenna system should be be defined. In some circumstances, the battery may be grounded, either directly or capacitively by virtue of its position relative to the main PCBA, however, it may also be isolated or even designed to be part of the main antenna structure

In both circumstances the position and / or potential impact on the performance of the antenna should be carefully considered.

EMBEDDED ANTENNA DESIGN

Antenna Counterpoise

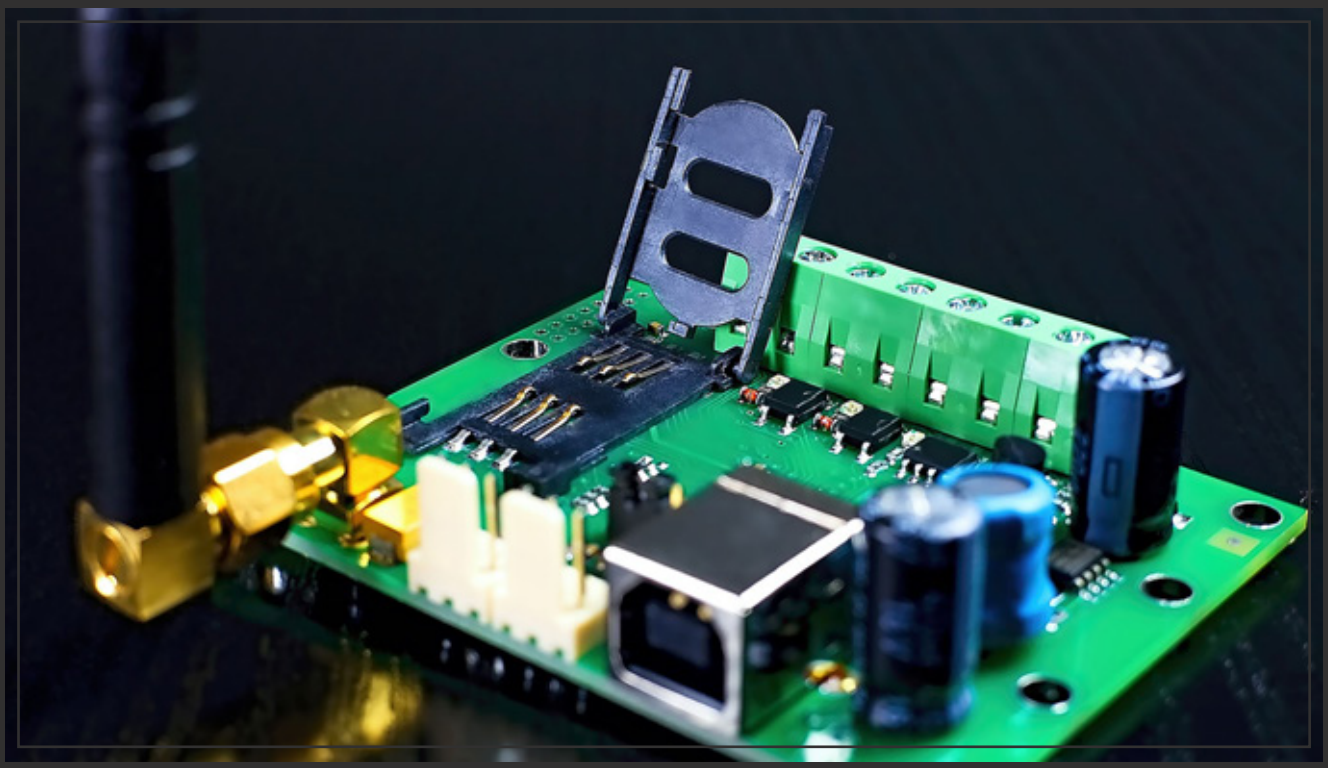
The general referencing of an antenna within a system usually refers to its physical structure, i.e. an etched section of the PCB or a metalised area of the case plastics, however in many cases, this is just one half of the equation.

The other part of the antenna (the counterpoise), is usually formed by the primary ground of the system. This would typically be a main PCB ground or product chassis. The design must therefore ensure that there is a sufficient counterpoise to allow the antenna to resonate at desired frequencies whilst simultaneously ensuring that the antennas radiation pattern does not become distorted.

Circuit Sensitivities - EMI / RFI

Wireless communication systems consist of at least one transmitter and one receiver. A transmitter has potential to generate interference to nearby circuitry and the receiver may be susceptible to interference from the same local circuits.

Positioning of the antenna relative to sensitive or electrically noisy circuitry is therefore critical to maintaining good wireless system performance. It is therefore important that the effects of EMI (Electro Magnetic Interference) and RFI (Radio Frequency Interference) are considered at an early stage in order to identify susceptible circuitry, potential interference sources and mitigate their effects.

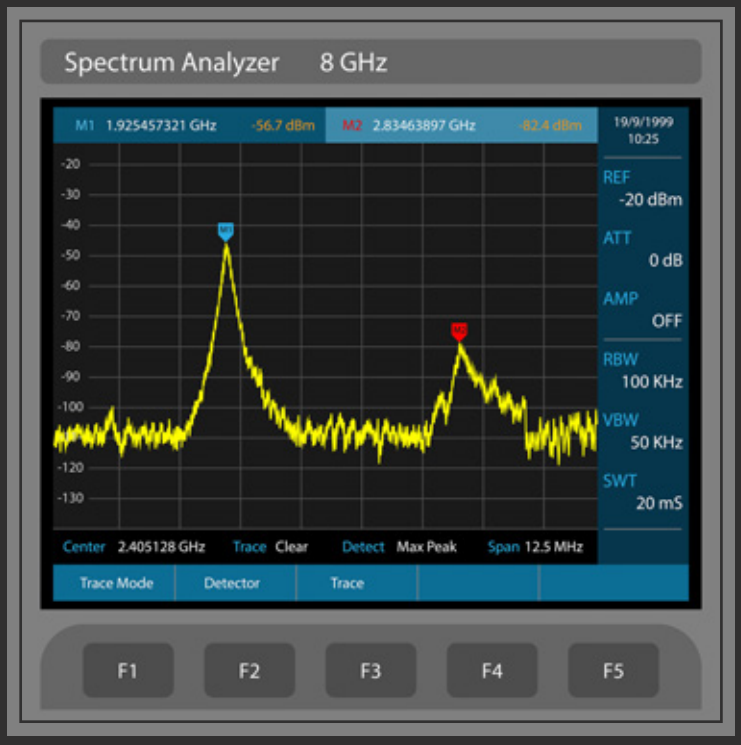


RF CIRCUIT TEST AND DESIGN

Bloomice have an enviable track record in the development of Bluetooth, Bluetooth LE, DECT, Wi-Fi and UWB consumer electronics, from initial concept, prototype, pilot production and through to the provision of a full support package at post production stage.

We are leaders in the provision of the design, development and support stages that are essential elements in the project design cycle of a product. Our specific areas of expertise include:

- Design of RF Analogue / Digital circuits
- Productisation of compact consumer IoT Devices
- Development of IoT based wearables
- Firmware development
- Mechanical design
- PCB layout & design
- Assembly & Manufacturing



Noise Debugging

Any unwanted signal can be detected as 'noise'. Unwanted noise is a critical issue in any wireless communication system and if not managed via an effective design, has the capability to negatively impact upon overall end user experience.

Bloomice provide specialised and sophisticated techniques and services designed to identify. analyse, and rectify issues caused by unwanted noise.

RF CONSULTANCY SERVICES

Some of our strongest long term customer relationships have been founded on our commitment to providing commentary and analysis on incumbent antenna systems, whether it be in order to commend and compliment a design, to provide some commentary on potential minor amendments that may be considered in order to further improve performance or to highlight potential design flaws.

In all cases, any investigative analysis that we undertake is always entirely objective and underwritten with a complete, consistent and detailed reporting mechanism.

With projects that are still to come to fruition, we are equally as delighted to provide some initial cost and risk free analysis with regards to the potential and possible design's of antenna that may be suitable for use within or alongside your concept.

Additional consultancy services we provide include:

- Board level component testing
- Antenna ground layout
- Efficiency measurement
- VSWR & Return Loss analysis
- Tuning & Matching circuitry
- Specification & documentation services
- Pre Certification testing & advice
- Component procurement advice

Our areas of experience and expertise are within RF protocol range to 8GHz.

This includes, but is not limited to the following:

- BeiDou
- Bluetooth
- DAB/DVB-t
- ESN (Emergency Services Network)
- GPS L1/L2/L5/ GLONASS/ GALILIEO
- GSM, 2G, 3G, IoT, 4G/LTE/5G
- IRIDIUM
- ISM
- LoRa
- NFC
- RFID
- Sigfox
- Wi-Fi (to 5.8GH2) / WLAN
- Z-Wave
- Zigbee

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