Laird™

Smart Technology. Delivered.

High-Frequency Absorber Solutions

Laird designs and manufactures customized, performance-critical products for wireless and other advanced electronics applications.

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About Laird

Laird is a global technology business focused on enabling wireless communication and smart systems, and providing components and systems that protect electronics. Laird operates through two divisions, Wireless Systems and Performance Materials. Wireless Systems solutions include antenna systems, embedded wireless modules, telematics products and wireless automation and control solutions. Performance Materials solutions include electromagnetic interference shielding, thermal management and signal integrity products. As a leader in the design, supply and support of innovative technology, our products allow people, organisations, machines and applications to connect effectively, helping to build a world where smart technology transforms the way of life. Custom products are supplied to major sectors of the electronics industry including the handset, telecommunications, IT, automotive, public safety, consumer, medical, rail, mining and industrial markets. Providing value and differentiation to our customers through innovation, reliable fulfilment and speed, Laird PLC is listed and headquartered in London, and employs over 9,000 people in more than 58 facilities located in 18 countries.

High Frequency Absorbers

As more applications move to the higher frequency band, there is a clear demand for high frequency absorbers to meet electromagnetic capability requirements. Laird offers several microwave absorbers that are effective in the millimeter range.

ECCOSORB®
High Loss Microwave Absorbers

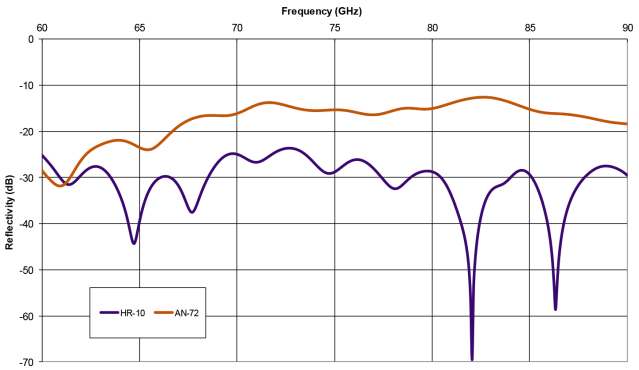
ECCOSORB® High Loss Microwave Absorbers are designed to attenuate electromagnetic interference by converting RF energy to heat.

ECCOSORB® absorber products are available spanning a wide frequency range from 800 MHz well up into millimeter wave with proven applications up to 100 GHz.

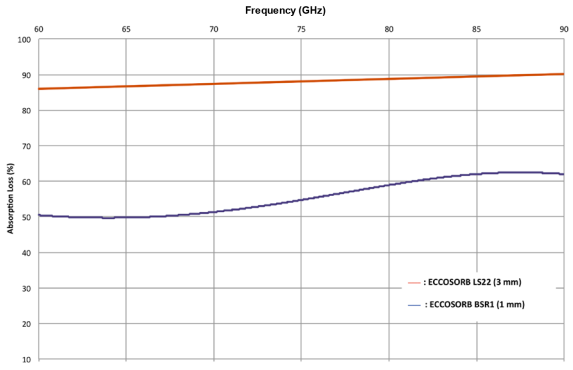
Traditional free space absorbers such as Eccosorb HR and AN have been measured at high frequencies and reflectivity performance is very good in the millimeter range. For EMI problems in closed housings some of our regular cavity resonance absorbers are also very suitable above 40 GHz.

Application	Product	Matrix	Frequency
Free space	Eccosorb AN	foam	> 600 MHz
	Eccosorb HR	foam	> 5 GHz
Cavity resonance	Eccosorb LS	foam	> 1 GHz
	Eccosorb BSR	silicone	> 6 GHz

Reflectivity Broadband Absorbers



Attenuation Cavity Resonance Absorbers



New Products

Recently, Laird has been working to develop dielectric loaded absorbers especially designed for operation above 40 GHz to meet the demand of applications operating at higher frequencies. In general, absorbers with dielectric loss perform better on higher frequencies. Dielectric fillers exhibit better attenuation performance at high frequency over traditional magnetic absorbers. These absorbers work also well in isolation applications due to their insertion loss properties.

ECCOSORB® JCS

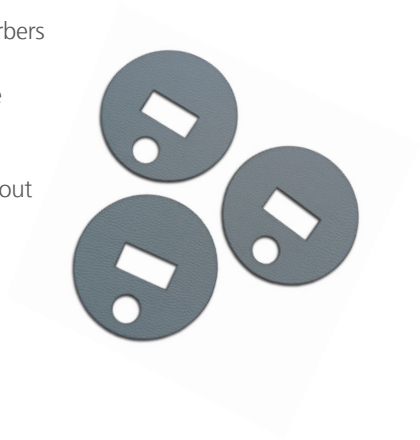
ECCOSORB® JCS is a high loss, flexible, carbon-loaded silicone rubber sheet. It is used to lower cavity Q's and also reduce surface currents on radiating elements and outer ground-plane type surfaces.

The JCS product line is available in four different grades, JCS-3, JCS-5, JCS-7 and JCS-9 where grade indicates volume loading level of the filler.

ECCOSORB® MMI and ECCOSORB® MMI-U

ECCOSORB® MMI and ECCOSORB® MMI-U are thin broadband millimeter wave absorbers which have been used successfully in several applications including automotive, radio, antennas for macro and microcell networks, imaging and probing equipment that use electromagnetic energy.

All of these materials are available in customized shapes and thicknesses, with or without self-adhesive backing. Eccosorb MMI-(U) is also available with wedged profile for reflectivity applications, designated as 'Eccosorb MMI-(U)-W.



Physical Properties

RoHS

	ECCOSORB JCS	ECCOSORB MMI	ECCOSORB MMI-U	ECCOSORB MMI-(U)-W
Color	black	light blue	light blue	light blue
Thickness	0,5 mm to 3,175 mm	0,5 mm or 1 mm	0,5 mm or 1 mm	3,3 mm
Function	cavity resonance/ insertion loss	cavity resonance/ insertion loss	cavity resonance/ insertion loss	Reflectivity
Grades	Different loadings	-	-	-
Elastomer system	silicone	silicone	polyurethane	polyurethane
Service t° (C°)	177	160	120	120
Outdoor exposure	excellent	excellent	excellent	excellent
Adhesive version	available	available	available	available

Applications

TELECOM

In the telecom infrastructure market, high frequency radios and microwave antennas for macro and small microcell networks are starting to be more prevalent. High capacity networks and small cell backhaul are benefiting from operating in frequencies on and above 60 GHz in order to cope with enhanced user experience expectation and traffic congestion. E-band wireless systems (71-76 Ghz and 81-86 Ghz) are the preferred technology for future point to point communications as it enables mobile operators to operate in a licensed band but at much higher data rates than traditional frequencies. High frequency absorbers are being applied in microwave dish antenna, outdoor microwave radio unit and other subsystems of the mobile wireless infrastructure.

AUTOMOTIVE

The automotive industry is the most established market for high frequency absorbers. These absorbers are used in long-range radar for adaptive cruise control at 76-79 GHz.

Higher frequency radar tends to be more reliable with better performance and higher accuracy than some of the lower frequency radar systems. This is why, for safety critical applications more OEMs are developing high frequency radars. Also frequency allocation problems have been driving the automotive industry towards these high frequencies.

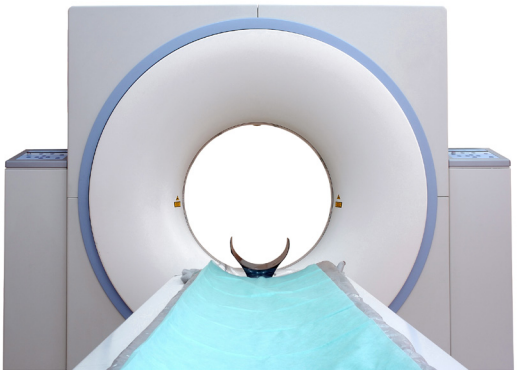
Radar modules with high frequency absorbers are used for adaptive cruise control (ACC) and blind spot detection (BSD)

- ACC long range radar (76-79 GHz)
- BSD (mostly 24 GHz but new applications at 76-79 GHz)

OTHER INDUSTRIES

As components for deployment on and above 60 GHz are becoming more readily available, other industries are developing new devices at these frequencies. Potentially our absorbers become an inevitable building block in these devices for interference suppression and enhanced functioning. These new miniature designs evoke more interference problems and more high frequency absorbers are required in:

- Security Industry: High frequency imaging systems for persons and luggage screening.
- Medical Industry: High frequency scanners and tomography systems for diagnostics. Telehealth wireless systems for monitoring.
- Measurement Technique Industry: New tank measurement systems and smart meters are being developed at 80 GHz.



Measurement and Design Capabilities

The mechanism for absorbing electromagnetic radiation in closed cavities in high frequency applications is quite complex to understand and to model. A good absorber performance may be the result of a combination of cavity resonance and reflectivity reduction due to the short wavelength of the energy relative to the enclosure dimensions. In order to better understand these phenomena Laird has invested in a wide capability of measurement and modeling techniques.

This wide range of measurement and design capabilities for high frequency absorbers includes:

- Ability to measure EM parameters up to 90 GHz to verify design concepts
- Reflectivity and insertion loss properties
- Real-time access to modeling/simulation tool to optimize product performance
- The opportunity for collaboration with customers on custom solutions
- The ability to modify designs to mitigate undesirable effects of PSA on reflectivity performance
- Design possibility for specific high frequency absorbers
- In general, comparison between design and measurement

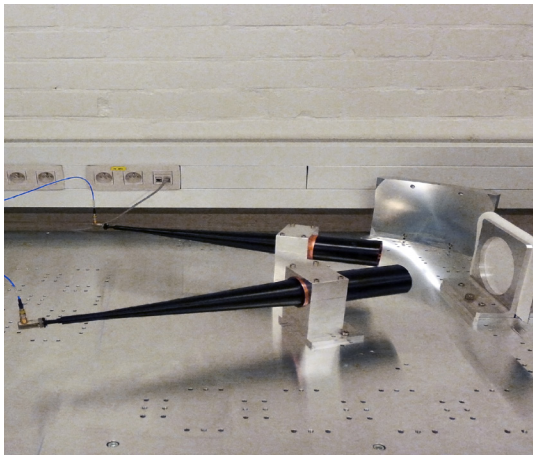
The quasi optical measurement system that we developed is operated in 2 configurations:

Picture 1 shows how Laird accurately can measure complex material properties (epsilon, mu.)

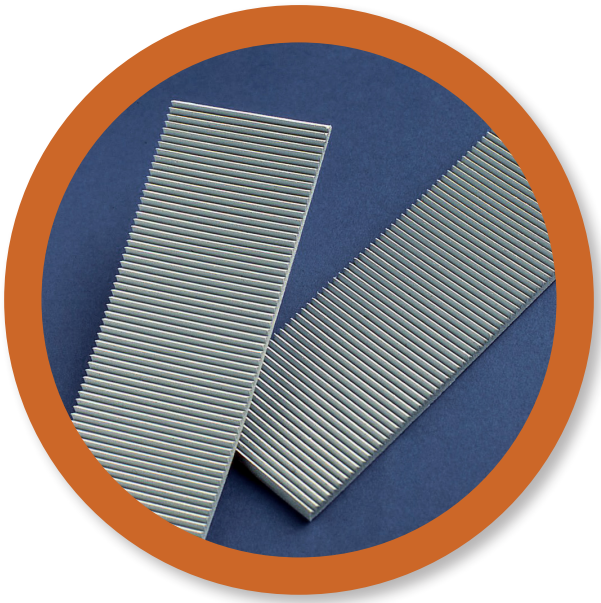
- A set of feed horn antennas are used to transmit and receive signals between 30 – 90 GHz
- A vector network analyzer (VNA) is used to feed the signal to the horn antenna which produces a beam
- The beam illuminates a mirror which refocuses the beam and directs it at the sample position
- The signal passes to the receiving antenna using a second mirror
- Epsilon and mu are calculated from S-parameter measurements

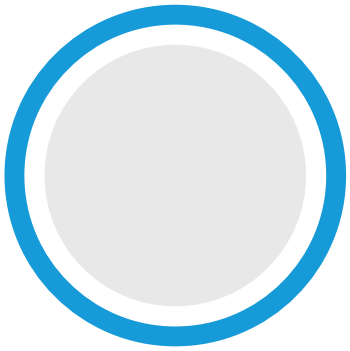
For reflectivity measurements Laird uses a bistatic configuration as in picture 2. With this set up we can measure between 15 and 40 degrees.

Picture 1



Picture 2





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