



Measurement System FM81 Product Brochure

Wireless Testing and Performance Assessment System

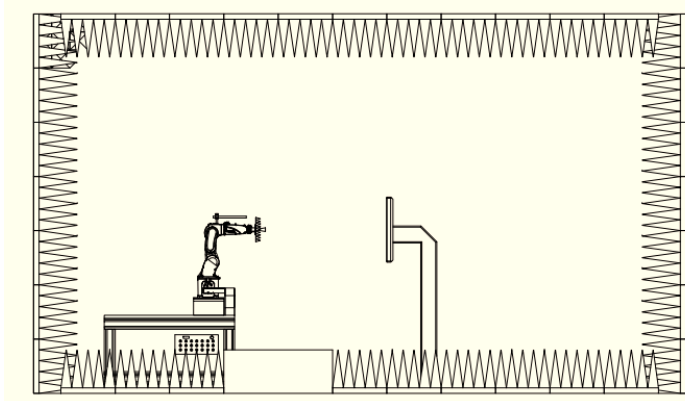
www.fragrant-mountain.com

Expand the Global Horizon of Innovation Invent the Future of Microwave Technology

Part 1 – FM81 Product Introduction

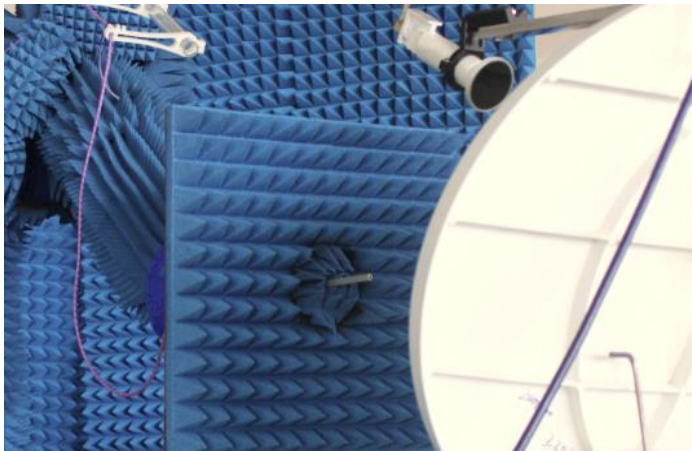
The product's primary function is to effectively and automatically perform electromagnetic testing, analysis and QC verification for either R&D or mass production purposes. It supports 0-220GHz wireless measurement using innovative nearfield and hybrid farfield technologies. Unlike traditional instrument, this product offers 6 degrees of coordinate calibration between the measurement system and device under test, benefiting from the robotic, laser, or machine vision technologies. Both nearfield and farfield experiment can be carried out in the same environment within relatively short period of time. This yields more accurate results and insight view of products than traditional methodologies.

● Example in Wireless Communications Industry



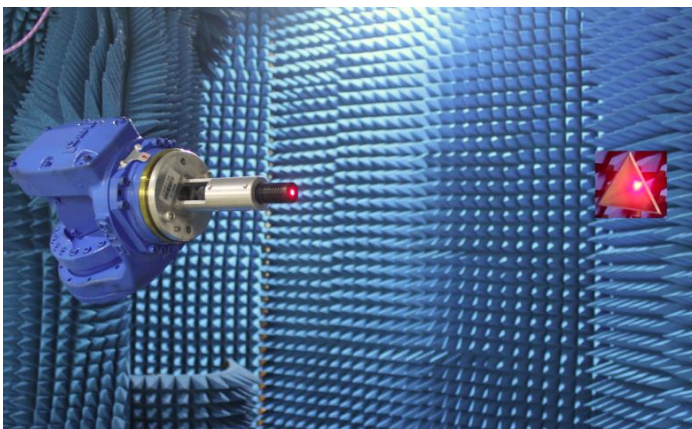
FM81 product could calibrate 5G antenna phase and amplitude distributions and perform multiple beams verification in production line. It could also be adopted in many R&D environment for studying either 4G & 5G antenna component or integrated full system performance. The applications in wireless industry include but not limited to Sub-6GHz and 28GHz mobile/base station antennas, microwave p2p, p2mp antennas, indoor antennas, and their associated components in this supply chain.

● Example in Aerospace and Satellite Communications



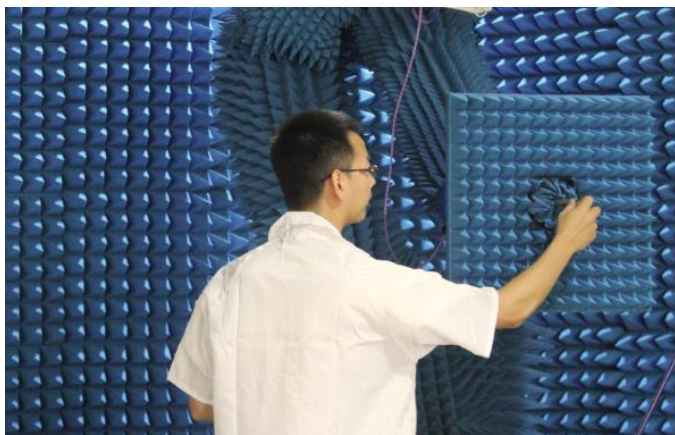
A satellite antenna was measured in door using planar nearfield measurement. Antenna gain and radiation pattern in both Co-pol and Cx-pol were studied according to customer requirement. With rapid development of commercial aerospace industry, FM81 product well suit for measurement and calibration jobs related to LEO earth station antenna, satellite antennas, LEO satellite, orbit tracking system, microwave link system, vehicular mount satellite communications unit, active TR modules for terminal or high throughput space 5G communications.

● Example in Vehicular Electronics Industry



FM81 could be used in measurement vehicular collision avoidance radar, passive and active antenna radiation patterns. For single radiation element, both spherical nearfield and farfield methods could be readily adapted in a concurrent measurement process. The robotic machine vision feature allows more accurate measurement for varieties of vehicular electronics like 24GHz, 77GHz, 90 GHz antennas as module, or antennas on chip (AOC), and antenna in package (AIP).

● **Example in Education and Research Institute**



FM81 could be used in measurement and metrology laboratories for educational and research purposes. For instance, our customer adopts FM81 in material characterization for 5G and commercial radar, and study the radiation parameters for 64GHz antennas on chip (AOC) in both farfield and nearfield configurations. Other research topics range but not limited to, radome insertion loss study, absorber model extraction, gain extrapolation measurement, PCB loss tangent study for mm-wave antennas, etc.

Part 2 – Product Competiveness

Many testing and measurement service providers focus on instrumentation technologies that fulfill their direct customer requirement. This is especially true for large corporations that demand a single product to meet all its direct customer needs, preferably aiming at volume production. For corporation like F&MM, we not only focus on markets of direct customer, but also we emphasize on our customer’ s customer’ s requirement. This brought us a lot of out of box thinking and imposed more interdisciplinary technologies in product development process. This product, which won fair appreciation from our loyal mobile communication and commercial radar manufacture customers, reflects the strength undertaken in existing passive antenna and emerging active radar testing market. The product itself is no longer an instrumentation for data acquisition, but rather an integrated turn-key platform that tells if product actually pass or fail, at the meantime, seemly establish data traceability from system integrator perspective. From our customer perspective, it is our product vision that possibly shortened the gap between R&D and massive production process of a newly demanded product.

Table 1: FM81 Product Compared with Existing Technologies According our Empirical Experience

	View Perspectives	Outdoor Farfield	Indoor Farfield	Compact Range	Planar Nearfield	FM81 Product
1	High Gain Antenna	Superior	Good	Superior	Superior	Superior
2	Low Gain Antenna	Inferior	Superior	Superior	Inferior	Superior
3	Large Angle Pointing Beams	Superior	Inferior	Fair	Inferior	Superior
4	Ease of Installation	Inferior	Fair	Inferior	Fair	Superior
5	Multiple Beams Measurement	Inferior	Inferior	Inferior	Fair	Superior
6	Portability	Inferior	Inferior	Inferior	Fair	Superior
7	Confidentiality	Inferior	Superior	Superior	Superior	Superior
8	Online Interaction with DUT	Inferior	Inferior	Inferior	Fair	Superior
9	Single Beam Test Efficiency	Fair	Superior	Superior	Fair	Fair
10	Multi-beam Test Efficiency	Inferior	Inferior	Inferior	Fair	Fair
11	Requirement for Environment	Inferior	Inferior	Inferior	Fair	Fair
12	Weather Matters	Inferior	Superior	Superior	Superior	Superior
13	Production Adaptability	Inferior	Inferior	Inferior	Fair	Fair
14	Cost Wise	Superior	Fair	Inferior	Fair	Fair
15	DUT Damage Possibility	Inferior	Fair	Fair	Fair	Superior
16	DUT Coordinate Alignment	Inferior	Inferior	Fair	Fair	Superior

Table 1 is a general comparison reference table with existing technologies according our empirical experience. Note this meant for casting the perspectives our R&D engineers have considered. The assessment rating results meant for extracting some highlight characteristics between FM81 and existing methodologies. For detailed rating philosophy, please feel free to reach us for further discussion.

Table 2 is a general comparison reference table with one domestic and one oversea competitors. Please note F&MM possess over 7 patents on FM81 related technologies. This table only meant for casting the perspectives we considered during product innovation. The assessment rating results meant for extracting some highlight characteristics between FM81 and existing players. For detailed rating philosophy, please feel free to reach us for further discussion.

Part 3 – Product Selection

FM81 has three categories of products to ease of product selection for various customer segmentations: Educational, Industrial and Aero types; and three standard sizes in S-Model, M-Model, and L-Model. Please refer to [Product Selection Guide](#) for detailed specifications.

Part 4 – How to Buy

Contact our regional sale representatives or reach us directly.

www.fragrant-mountain.com

Table 2: Most Similar Product Competitiveness with Domestic and Oversea Players

#	Product Aspects	One Domestic Player	One Oversea Player	F&MM
1	Proven robotic measurement technologies adopted in Chinese industries	Fair	Good	Good
2	Ease of upgrading from Sub6Ghz, Ku, Ka, to E-band and 220GHz applications	Fair	Fair	Good
3	Compliance to ETSI/FCC/ANETEL/IC/APMC/IEEE/etc International Standards	Fair	Fair	Good
4	Full Documentation/Toolkit/Service in both Chinese and English	Fair	Fair	Good
5	Typical Business Model Competitiveness	Subsystem	Subsystem, Turn key	Subsystem, Turn key
6	Designers Background	System Integrator, Servo systems, Software	System Integrator, Embedded System, Software, Component Designer	System Integrator, Embedded System, Software, Component Designer
7	Algorithms, Level of Research Capability	Fair	Good	Good
8	Field and RF Simulation Capability	Fair	Good	Good
9	RF Quality Diagnosis and Error Correction Efficiency	Fair	Fair	Good
10	Quality Control Process	Fair	Good	Good
11	Motion, Motor Systems	Low/mid Hybrid Brand	Top Brand	Top Brand
12	Servo, Encoder System, Drivers	Low/mid Hybrid Brand	Top Brand	Top Brand
13	Precision Parts Requiring Years of Stability	Commercial Grade	Industrial/Mil Grade	Industrial/Mil Grade
14	Surface Treatment	Fair	Good	Good
15	Electronic System Environmental Stability	Fair	Good	Good
16	Process Control during Design/Manufacture	Fair	Good	Good
17	Customer Core Value Orientation	Deliver @minimum cost	Deliver what specs require	Deliver what specs and what exceeds customer expectation
18	Life Cycle Support Orientation	Short	Long	Long
19	Cost	Low	High	Mid
20	Local Support Capability	Fair	Fair	Good