Lens Horn Antennas

Lens Horns offer many significant microwave and mechanical performance advantages over alternative designs.

Reduced aperture size

The nominal aperture size of a parabola is 25% larger than a lens horn antenna (LHA) for the same gain/bandwidth. The advantageous reduction in size is due to the high illumination efficiency of the lens.

No back spill

Since energy is not directed rearward the edge spill-over does not occur in a LHA as is the case with parabolas. To direct all the radiated energy forward with the same efficiency a parabola would need to be larger. Achievement of equivalent back spill performance by a parabola requires side skirts and absorbing materials.

Superior boresight cross polarization

The axial symmetry of a LHA, together with the lack of beam distortions due to feed waveguides or supports, ensure superior cross polar characteristics.

More suited to compact integrated packages

The conical shape of a LHA permits circuit boards etc to be built around the flare. The microwave TX/RX assembly is then very accessible for servicing.

Superior sidelobe performance

Energy from a parabola that is scattered due to reflective surface imperfections, feed supports, feed structure and back scatter, manifest themselves in increased sidelobe levels. In a LHA performance is primarily controlled by the accuracy of a precision, computer controlled, machined component made to an exacting microwave design. Flann's "Standard" LHAs have the inherent improved sidelobe performance compared to parabolas. For more demanding applications our range of "High Performance" antennas have a further 6 dB improvement in sidelobe levels.

More resistant to accidental damage

The parabola has three critical areas of damage susceptibility - the reflector dish, the feed structure and the precise positioning of the feed structure relative to the dish. The reflective surface is exposed to the environment and the mounting supports are frequently attached to the dish contour. Careless or accidental damage caused during mounting can ruin the parabolic antenna's performance. A LHA has that enormous structural rigidity inherent in a cone, furthermore denting of this cone will have minimal effect on performance, except close to the neck, since it is not a critical reflective surface. The cone function is to give a highly stable support for the lens and to contain any minor internal reflected energy.

Less wind resistance

When compared to a parabola, with its typical skirt, a LHA has a silhouette one third smaller, its conical shape is naturally more aerodynamic.

Reduces tower costs

With lower wind resistance an obvious economy to tower costs is easily apparent. The smaller size and absence of back spill permit dense packing of antenna clusters with clear advantages.

Environmentally more acceptable

The smaller silhouette, for a given gain, means that a LHA is less obtrusive: an obvious advantage in environmentally sensitive applications. In some cases, the use of smaller antennas may obviate the requirement for planning consent prior to installation, a significant factor smoothing speed of application.

Less expensive

Lens Horn Antennas are significantly less expensive than parabolas of similar performance and are ideally suited to both low and high volume applications.

Improved weather protection

Unlike parabolas the radio element of a Lens Horn Antenna is located behind both a focusing lens and a weatherproofing membrane. As a result the LHA does not suffer from the effects of condensation that may occur in the feed horn of parabolas. The outer membrane is constructed from material with a low thermal mass which combats the effects of ice and snow. These two factors alone mean that the LHA will outperform the parabola in the most harsh of climatic conditions.

In accordance with our company policy, manufacturing techniques are constantly being reviewed and refined in order to bring about operational improvements and cost savings. No matter whether your requirement is for one, ten, 1,000 or 10,000 - Flann can supply.

Lens Horn Antennas

Features

- **Compliant to ETSI and FCC Specifications**
- **Radiocommunications Agency Approved Models**
- **"High" and Standard" Performance Categories**

In addition to standard models detailed below Flann also offers special and customised antennas - in any quantity!

The listed antennas, on pages 82 to 85, are examples of Flann's Lens Horn Antenna design and manufacturing capability. We are able to design models to a higher or lesser performance to suit most applications and will be pleased to discuss your special Lens Horn Antenna requirements in frequency bands up to 112 GHz.

Lens Horn Antennas, designed and manufactured by Flann, have been approved to the Department of Trade and Industry MPT specifications set by the Radio-communications Agency (RA) - the UK's leading authority. Microwave radio manufacturers have incorporated Flann LHAs in their systems with great success by fully utilising the many advantages inherent in lens horns over parabolic alternatives.

The MPT specifications are among the most stringent of those anywhere in the world communications market - Flann LHAs surpass these exacting standards by a considerable margin.

Flann offers models of LHA which conform to the new UK-MPT Performance Specifications

Note: the MPT specifications form the basis of the standards adopted by the European Telecommunications Standard Institute (ETSI).

The radiation patterns for two models of Flann LHA are shown below.

Figure 1 below shows a typical radiation pattern for High and Standard Performance antenna operating in the 21.2 to 23.6 GHz , MPT1409 band.

Typical H Plane Radiation Pattern, 21.2 to 23.6 GHz

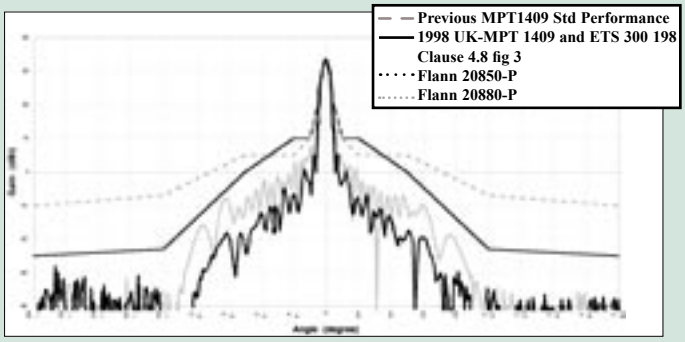

Figure 1 shows the typical H Plane radiation pattern envelopes for Flann "Standard Performance" Lens Horn Antenna Model 20850-P, 34 dBi gain, and "High Performance" Lens Horn Antenna 20880-P, 34 dBi gain. Also indicated are the new Radiocommunications Agency UK-MPT1409 and ETS 300 198 Clause 4.8 fig 3 specification limits together with the previous MPT1409 "Standard Performance" specification. Models 20850-P and 20880-P are certified by the Radiocommunications Agency as complying with the previous MPT1409 Standard and High Performance specification.

Figure 2 below shows the radiation pattern of a High Performance Antenna operating in the 37.5 to 40 GHz MPT1414 band.

Typical H Plane Radiation Pattern, 37.5 to 40 GHz

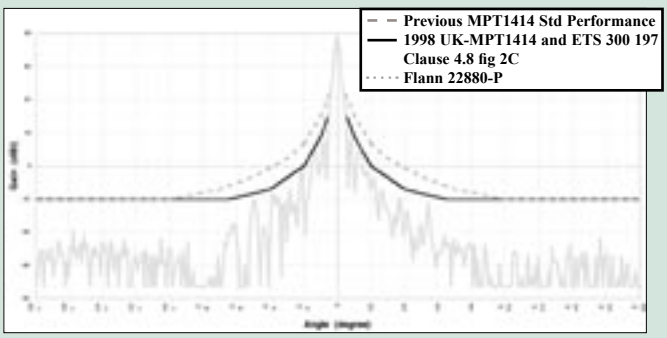

Figure 2 shows the typical radiation envelope for a Flann "High Performance" Lens Horn Antenna Model 22880-P operating in the frequency band 37.5 to 40 GHz, UK-MPT1414 and ETS 300 197 Clause 4.8 fig 2C specification limits together with the previous MPT1414 "Standard Performance" specification. Model 22880-P is certified by the Radiocommunications Agency as complying with the previous MPT1414 "High Performance" specification.

Lens Horn Antennas

Listed below and continued on pages 84 and 85 are the performance specifications of currently available Lens Horn Antennas

FREQUENCY RANGE 7.9 - 8.5 GHZ WG15 R84 WR112						**Regulatory Specifications**
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
15820-F	150	20.5	14.9	17.4	<1.5	N/A
15820-P	250	25.0	9.0	10.5	<1.5	N/A

FREQUENCY RANGE 8.0 - 8.5 GHZ WG16 R100 WR90						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
16810-F	150	20.5	15.0	17.4	<1.5	N/A
16820-F	150	20.5	15.0	17.4	<1.5	N/A

FREQUENCY RANGE 8.0 - 10.5 GHZ WG16 R100 WR90						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
16810-F	150	21.5	13.3	15.5	<1.5	N/A

FREQUENCY RANGE 10.0 - 10.5 GHZ WG16 R100 WR90						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
16810-F	150	22.5	12.0	14.0	<1.5	N/A
16820-F	150	22.5	12.0	14.0	<1.5	N/A

FREQUENCY RANGE 12.4 - 12.8 GHZ WG17 R120 WR75						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
17820-F	150	24.5	9.7	11.3	<1.5	N/A

FREQUENCY RANGE 15.2 - 16.0 GHZ WG18 R140 WR62						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
18820-F	150	26.0	7.9	9.2	<1.5	N/A

FREQUENCY RANGE 16.4 - 17.6 GHZ WG18 140 WR62						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
18820- F	150	27.0	7.2	8.4	<1.5	N/A

Continued on pages 84/85

Lens Horn Antennas

Continued from page 83

FREQUENCY RANGE 17.7 - 19.7 GHZ WG20 R220 WR42						Regulatory Specifications
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
20880-T	100	24.5	9.1	10.7	<1.2	N/A
20820-R	175	29.0	5.2	6.1	<1.5	N/A
20820-P	250	32.4	3.7	4.3	<1.5	N/A

FREQUENCY RANGE 21.2 - 23.6 GHZ WG20 R220 WR42						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
20820-T	100	26.0	7.8	9.1	<1.5	N/A
20820-W	125	27.5	6.2	7.2	<1.5	N/A
20820-F	150	29.3	5.3	6.1	<1.5	N/A
20850-P	250	33.5	3.1	3.6	<1.5	MP 1409 PT3 Fig 3.1[1]
20880-P	250	34.0	3.1	3.6	<1.2	MPT1409 PT3 Fig 3.2[2]

FREQUENCY RANGE 21.2 - 26.5 GHZ WG20 R220 WR42						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
20880-P	250	34.5	3.0	3.5	<1.2	MPT1409 PT3 Fig 3.2[2] & MPT1420 PT3 Fig 3[2]

FREQUENCY RANGE 27.5 - 29.5 GHZ WG22 R320 WR28						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
22850-F	150	31.5	4.1	4.7	<1.5	N/A
22850-P	250	36.0	2.4	2.8	<1.5	N/A
22880-P	250	36.0	2.4	2.8	<1.2	N/A

FREQUENCY RANGE 31.0 - 31.8 GHZ WG22 R320 WR28						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
22880-F	150	32.0	3.9	4.6	<1.2	N/A

FREQUENCY RANGE 37.5 - 39.5 GHZ WG22 R320 WR28						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
22850-F	150	34.0	3.1	3.7	<1.5	MPT1414 PT3 Fig 3.2[1]
22880-F	150	34.0	3.0	3.5	<1.2	MPT1414 PT2 Fig 3.1[2]
22880-P	250	38.5	1.8	2.1	<1.2	MPT1414 PT3 Fig 3.1[2]

[1] Flann Antennas type approved to previous MPT1409 and 1414 Standard Performance specification
[2] Flann Antennas which have previously been type approved to High Performance specification MPT1409 and 1414 also meet the new UK-MPT1409 and 1414 specification. Furthermore, antennas which meet UK-MPT1409 and UK-MPT1414 also meet the requirements of ETS 300-198 clause 4.8 Fig 3 and ETS 300-197 Fig 2C respectively.

Representative designs Illustrating Flann Capabilties

Lens Horn Antennas

FREQUENCY RANGE 40.5 - 42.5 GHZ WG24 R500 WR19						Regulatory Specifications
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
24880-F	150	34.5	2.8	3.2	<1.2	N/A

FREQUENCY RANGE 54.2 - 57.2 GHZ WG25 R620 WR15						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
25850-L	130	36.0	2.4	2.8	<1.2	MPT1416 PT3 Fig 3.1
25880-L	130	36.0	2.4	2.8	<1.2	MPT1416 PT3 Fig 3.2
25880-R	175	38.5	1.8	2.1	<1.2	N/A

FREQUENCY RANGE 57.2 - 58.2 GHZ WG25 R620 WR15						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
25820-L	130	36.5	2.4	2.9	<1.5	MPT1415 PT3 Fig 3.1
25850-L	130	36.5	2.4	2.9	<1.2	MPT1415 PT3 Fig 3.1
25850-F	150	37.5	2.1	2.5	<1.2	MPT1415 PT3 Fig 3.1
25850-P	250	42.0	1.2	1.4	<1.2	MPT1415 PT3 Fig 3.1

FREQUENCY RANGE 59.0 - 64.0 GHZ WG25 R620 WR15						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
25810-T	100	34.5	2.9	3.4	<1.5	N/A

FREQUENCY RANGE 75.0 - 80.0 GHZ WG26 R740 WR12						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
26810-F	150	40.0	1.6	1.8	<1.5	N/A
26820-F	150	40.0	1.6	1.8	<1.5	N/A
26810-M	200	42.5	1.2	1.4	<1.2	N/A

FREQUENCY RANGE 93.0 - 95.0 GHZ WG27 R900 WR10						
Model	Diameter (mm)	Nominal Mid Band Gain (dBi)	Nominal 3dB Beamwidth		VSWR	
			E (Deg)	H (Deg)		
27820-P	250	46.5	0.8	0.9	<1.5	N/A

Customised models in alternative frequency bands are also available, please contact our Sales Office for further information

ORDERING INFORMATION

Flann Antennas are identified through a basic numbering system as outlined below:

**810 is a basic low cost applications antenna
**820 is an economy grade antenna
**850 is a standard performance antenna
**880 is a high performance antenna

22	880
WG Size	series

Example: 22880 is a high performance antenna in WG 22; R 320; WR28.