

EUROPEAN SPACE AGENCY CONTRACT REPORT
The work described in this report was done under ESA contract. Responsibility for the contents resides in the author or organisation that prepared it.


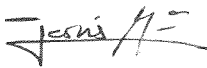

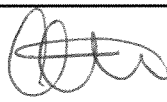
Nº DOC.: GSTP-RP-0192-RYM

TITULO / Title:

EXECUTIVE SUMMARY REPORT FOR GSTP X BAND
DOWNLINK ANTENNA EQM S/N 001

ED. / Iss.: 1

FECHA / Date: DEC. 13

NOMBRE / Name		FECHA / Date	FIRMA / Signat.
AUTOR / Written by: A. GARCÍA / J. GARCÍA		7/01/14	 
C O M P R O B . / A P R O B A D O	C h e c k e d / A p p r o v e d	M. I. SANTOS	08/01/2014 
		C. GUERRA Project Manager	08/01/2014 



GSTP X BAND ANTENNA

DOC.Nº: GSTP-RP-0192-RYM

ED./ Iss.: 1

F./ Date: DEC. 13

PAG.: ii

REGISTRO DE CAMBIOS EN EL DOCUMENTO Document Change Record

ESTE DOCUMENTO CONSTA: DE i A iv Y DE 1 A 6 PAGS.
This document contains: From i to iv and 1 to 6 pages.

EDIC. Issue	FECHA Date	CAUSA O N° DOCUMENTO Document Changes
1	DEC. 13	



GSTP X BAND ANTENNA

DOC.Nº: GSTP-RP-0192-RYM

ED./ Iss.: 1

F./ Date: DEC. 13

PAG.: iii

REGISTRO DE EDICIONES DE PAGINAS Page Issue Record

PAGINA/S Page/s	EDIC. Issue	PAGINA/S Page/s	EDIC. Issue	PAGINA/S Page/s	EDIC. Issue	PAGINA/S Page/s	EDIC. Issue
i	1						
ii	1						
iii	1						
iv	1						
1 to 6	1						

	GSTP X BAND ANTENNA	DOC.Nº: GSTP-RP-0192-RYM	
		ED./ Iss.: 1	
		F./ Date: DEC. 13	PAG.: iv

INDICE / Contents

PAG.

1.- SCOPE	1
2.- X BAND DOWNLINK ANTENNA DESCRIPTION	2
3.- X BAND DOWNLINK ANTENNA PERFORMANCES	3
4.- COMPLIANCE OF TEST RESULTS	4
5.- CONCLUSIONS	6

	GSTP X BAND ANTENNA	DOC.Nº: GSTP-RP-0192-RYM	
		ED./ Iss.: 1	
		F./ Date: DEC. 13	PAG.: 1

1.- SCOPE

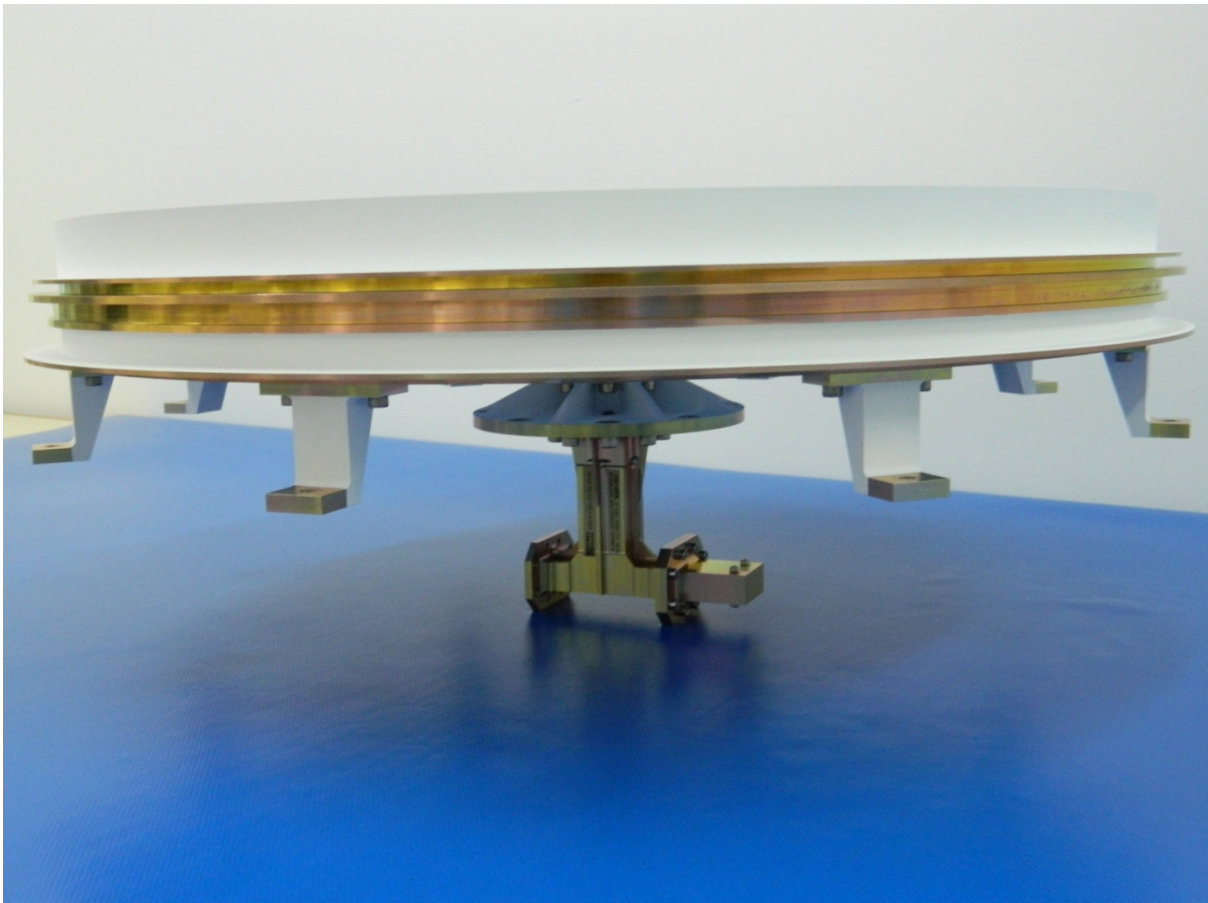
This document presents the summary report for the X Band downlink antenna including all the requested topics following the ESA requirements, which are: objective of the activity, key issues, results of the work and main benefits

This activity has been developed under GSTP Contract No ESTEC Contract No. 40001025558/10/NL/CBi.

2.- X BAND DOWNLINK ANTENNA DESCRIPTION

The equipment developed under this contract is X band downlink antenna for satellite applications.

Next photograph shows the antenna manufactured under present project.



3.- X BAND DOWNLINK ANTENNA PERFORMANCES

The X band antenna has been submitted to the following test plan:

X-Band Downlink Antenna MODEL: QM TEST MATRIX	Nº	1	2	3	4	5	6	7	8					
	REQUIREMENTS	FREQUENCY	POLARIZATION		XPD	GAIN & GAIN VARIATION		VSWR	ESD PROTECTION	MASS & DIMENSIONAL VERIFICATION		VISUAL INSPECTION	OPERATION	NON OPERATING
TEST														
INITIAL INSPECTION										X	X			X
INITIAL FUNCTIONAL		X	X	X	X	X							X	
SHOCK TEST														X
POST SHOCK TEST		X		X	X	X							X	
LOW LEVEL SINE SURVEY														X
SINE VIBRATION														X
LOW LEVEL SINE SURVEY														X
RANDOM VIBRATION														X
LOW LEVEL SINE SURVEY														X
POST VIBRATION TEST		X				X							X	
THERMAL CYCLES (1)		X				X								X
POST THERMAL CYCLES		X				X							X	
FINAL FUNCTIONAL		X		X	X	X	X						X	
FINAL INSPECTION										X				X

(1) 3 hot & cold cycles at vacuum pressure.

4.- COMPLIANCE OF TEST RESULTS

Half Cone Angle wrt Nadir	Minimum Antenna Gain (dBi)	Maximum Antenna Gain (dBi)*	Worst case Simulation (dBi)	Worst case Measurement (dBi)
90°	≥-40	≤ -15	≥-11.8	≥-11.8
80°	≥-30	≤ -15	≥-4.9	≥-4.9
75°	≥-15	≤ -1	≥-0.9	≥-0.9
72°	≥-15	≤ 3	≥1.1	≥1.1
70°	≥-15	≤ 4	≥3.0	≥3.0
68°	≥1	≤ 7	≥4.1	≥4.1
66°	≥3.5	≤ 9	≥5.7	≥5.7
65°	≥5	≤ 9	≥6.1	≥6.1
64.2-62.9	≥6	≤ 9	≥6.3	≥6.7
62.9-61.6	≥6.6	≤ 9	≥6.75	≥6.9
61°	≥5.77	≤ 9	≥6.6	≥7.2
60°	≥4.87	≤ 8.85	≥6.5	≥6.9
55°	≥2.31	≤ 6.78	≥4.3	≥3.6
50°	≥0.74	≤ 5.35	≥-0.6	≥-0.8
45°	≥-0.42	≤ 4.26	≥-0.6	≥ 1.6
40°	≥-1.32	≤ 3.39	≥-0.4	≥-0.06
30°	≥-2.63	≤ 2.12	≥3.0	≥2.4
20°	≥-3.47	≤ 1.30	≥0.6	≥1.5
10°	≥-3.95	≤ 0.85	≥-0.3	≥1.4
0°	≥-4.10	≤ 0.69	≥-4.0	≥2.2

The antenna return losses is <-21dB over the complete frequency band (8.04-8.34GHz)

Parameters	Specified value	Comments
Operating frequency	8025 MHz- 8340MHz	C
Coverage	63.97° half cone± 0.2° BPE	C
Antenna Gain	See table above	C See: GSTP-RFD-006-RYM
Polarization	RHCP	C
XPD (over coverage zone)	≥ 7.0 dB	Worst case > 7.7 dB
Gain variation vs frequency (in any 145 MHz within frequency range in any given direction of coverage)	2.0 dBpp	
Phase ripple vs frequency (in any 145 MHz within frequency range in any given direction of coverage)	3°pp	By analysis
VSWR	≤ 1.2:1 dB	C
Power handling	2 carriers of 80W	By analysis
Multipaction	Margin > 3dB by analysis	By analysis
Out of band rejection	f<6.3GHz gain<-20dB 8.4GHz<f<10.0GHz gain<9dB 10.0GHz<f<18.0GHz gain<-20dB	By analysis
Electrical interface	WR112	C

	GSTP X BAND ANTENNA	DOC.Nº: GSTP-RP-0192-RYM	
		ED./ Iss.: 1	
		F./ Date: DEC. 13	PAG.: 6

5.- CONCLUSIONS

The X BAND DOWNLINK ANTENNA EQM S/N: 001 has been designed, manufactured and tested at EQM levels.

From the initial to the final RF electrical tests, the performances do not suffer any degradation (neither shock test nor random test).

No damage has been detected during the overall vibration test sequence:

Vibration test:

- On axes X and Y no significant frequency shifting (higher than 10%) and response amplitude variation (higher than 50%) are measured between each sine survey.
- On axis Z, there is a variation in amplitude higher than 50% before and after the random.
See: GSTP-NC-0013-RYM.

Vibration test and shock test:

- Visual inspection performed along the test has not shown any damage.

After performing the thermal chamber test, no damage or degradation has been detected in the equipment.

All dimensions presented on the ICD had been measured obtaining always values within their tolerances