



➤ INTERACTING WITH YOUR WORLD

ESV - EARTH STATIONS ON VESSELS

**RF PERFORMANCE CHARACTERIZATION
AND VALIDATION BY EUTELSAT**

9 January 2012

ESV - EARTH STATIONS ON VESSELS RF PERFORMANCE CHARACTERIZATION AND VALIDATION BY EUTELSAT

This handbook lists all the ESVs (Earth Stations on Vessels) type-approved or characterized by Eutelsat.

Eutelsat type-approval and standard M approval.

Eutelsat type-approval is granted to antennas that have demonstrated full compliance with the Eutelsat Earth Station Standard M (EESS 502 refers). The type-approval process includes successful witnessed RF tests on at least three units chosen at random during the production phase, a survey of the manufacturing, integration and QA/QC processes, and close follow up of antenna operations for Eutelsat satellites.

For maritime antennas, tracking performance and resistance to shock and vibration tests are essential for completion of the type-approval process.

Antennas that fully meet Eutelsat standards, but for which fewer than three units have undergone RF performance testing, will be considered as “characterized” and will normally be granted Eutelsat standard M approval. Additional verifications and tests, however, may be required on a case-by-case basis.

M-x Nomenclature

The M-x nomenclature applies when individual sidelobe peaks exceed the Eutelsat specified masks (EESS 502 refers) by more than 3 dB (or 6 dB, depending on the D/λ of the antenna) when the azimuth or elevation angle is equal to or smaller than 9.2° and/or by more than 6 dB when this angle is greater than 9.2° . In all cases, the cross-polarisation discrimination value must be at least > 20 dB at the -1 dB contour of the main lobe.

Very small (D/λ in the order of 30) antennas designed for maritime applications will not usually meet the Eutelsat EESS Standards due to physical constraints imposing special shapes, e.g. the need to limit the size of the radome for maritime antennas.

Application of the M-x nomenclature may be considered for such antennas on a case-by-case basis, subject, however, to determining a valid transmission plan where extra bandwidth generally needs to be allocated in order to cater for the deviations from the EESS 502 Standard M observed (usually in the main lobe/sidelobe patterns).

RF performance characterization

The characterization process consists in performing witnessed RF tests at accredited test ranges on at least one antenna subsystem (with radome) selected during the production phase.

Based on the results obtained, the characterization will specify the operating frequency bands, the measured Tx and Rx Gain, the Tx and Rx cross-polarisation discrimination and the value of the maximum allowed eirp density to be transmitted at the 0 dB/K reference contour of the Eutelsat satellites, based on either the highest measured sidelobe or the worst cross-polarisation discrimination, whichever applies.

Where applicable, a note has been added e.g. to specify the recommended type of modulation to be used.

In addition to the technical constraints which are specified in this book, the use of the transmit band from 13.75 GHz to 14.00 GHz for antennas which have a diameter <1.2m is subject to the authorization of the appropriate National Regulatory Agencies, according to laws in force.

The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.

Any change to the characterized configuration needs to be notified to Eutelsat and may be subject to further tests.

For additional information on type-approval and characterization of ESVs as M or M-x, please send an e-mail to esapproval@eutelsat.fr.

**Manufacturer:**

C2SAT communications AB
 Dalvägen 16, 3rd floor
 SE-169 56 SOLNA
 SWEDEN

Tel: + 46 (0) 8 705 95 00
 Fax: + 46 (0) 8 705 95 81
<mailto:janotterling@C2SAT.se>
www.C2SAT.com

Antenna model:

1.2m Ku II

Antenna aperture dimensions:

1.2 m

Standard:

M

Characterization date:

09-01-2012

Validity period:

See remark 4

System Description:

Stabilized maritime carbon fiber antenna – prime focus configuration – sandwich composite radome. Four axis stabilization platform with conical RF tracking.

BUC: Codan 6908 EX 8W rating

LNB: SMW Q-PLL type C or B.

Restricted to the use of modem from iDirect Infinity/Evolution versions 3000/5000/X5

Models Characterized:

Standard configuration: dual linear orthogonal polarization

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):

41.3 dBW / 40 kHz for an orbital separation of the adjacent satellite $\geq 2.5^\circ$

40.2 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^\circ$

36.6 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 1.5^\circ$

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.7-12.75 GHz

Tx Gain:

42.2 dBi (typical at 14.25 GHz)

Rx Gain:

40.5 dBi (typical at 11.7 GHz)

Tx XPD:

>30.5 dB within -1 dB contour

Rx XPD:

>28.2 dB within -1 dB contour

G/T (measured with radome)

19.4 dB/K @ 20 ° elevation

Remarks:

1-The characterization uniquely refers to the RF electrical performance.

2-The validation of the performance of the tracking system and operations of the antenna when installed on a vessel is out of the scope of this summary. More information about this can be found on the manufacturer web site <http://www.C2SAT.com>

3-The RF performance characterization was performed on two antenna units with radome, at the Combitech test range of Arboga, Sweden, on the 8 and 15 June 2011.

4-The characterization's validity is subject to that further validation regarding TX mute functionality is performed before 31 July 2012

Restriction:

The isolation at 1.5° of the level of the Rx sidelobes from the level of the boresight is 7.8 dB (worst case at 10.7 GHz, 6.9 dB excess to the EESS Gain mask). The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired. Nevertheless, these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.

**Manufacturer:**

Intellian Technologies, Inc.
7th Floor, Dongik Building,
98 Nonhyun-Dong Gangnam-Gu,
Seoul, 135-010
Korea

Tel: +82-2-511-2244
Fax: +82-2-511-2235
[mailto: wendy@intelliantech.com](mailto:wendy@intelliantech.com)

Antenna model:
V60

Diameter:
60 cm

Standard:
Nomenclature M-x

Characterisation date:
06-04-10

System Description:

Stabilised maritime antenna – splash feed cassegrain – composite foam radome. Three axis stabilization platform with conical scanning tracking.
BUC NJRC or Codan 4-6-8 W with integrated LNB.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarization.

Maximum Allowed EIRP:

31.5 dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502, Issue 12 - Rev.1, § 6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
38.1 dBi (typical at 14.25 GHz)

Rx Gain:
35.8 dBi (typical at 12.50 GHz)

Tx XPD:
>26 dB within -1 dB contour

Rx XPD:
>28 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance.
The validation of the performance of the tracking system and the operations of the antenna when installed on a vessel is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.intelliantech.com>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc.) and BPSK modulation for the ship-to-shore carrier.

3

The characterization was performed on one antenna unit with radome, at the LACE test range of Politecnico di Torino, Italy, on the 15th March 2010.

**Manufacturer:**

Intellian Technologies, Inc.
7th Floor, Dongik Building,
98 Nonhyun-Dong Gangnam-Gu,
Seoul, 135-010
Korea

Tel: +82-2-511-2244
Fax: +82-2-511-2235
[mailto: wendy@intelliantech.com](mailto:wendy@intelliantech.com)

Antenna model:
V80G

Diameter:
83 cm

Standard:
Nomenclature M-x

Characterization date:
16-12-2011

System Description:

Stabilised maritime antenna – ring focus ADE with shaped reflector – honeycomb radome. Three axis stabilization platform with conical scanning tracking.
BUC NJRC 8W NJT5218NM or Codan 4-6-8 W with integrated LNB SMW, Type H.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarisation

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers):
34.8 dBW / 40 kHz for an orbital separation of the adjacent satellite $\geq 2.5^\circ$
33.5 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^\circ$
32.5 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 1.5^\circ$

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain:

39.5 dBi (typical at 14.25 GHz)

Tx XPD:

≥ 24.9 dB within -1 dB contour

Rx Frequency:

10.95 - 12.75 GHz

See restrictions below

Rx Gain:

36.5 dBi (typical at 11.70 GHz)

Rx XPD:

≥ 22.1 dB within -1 dB contour

G/T

16 dB/K @30° Elevation

Remarks:

1

The characterization uniquely refers to the RF electrical performance.

The validation of the performance of the tracking system and operations of the antenna when installed on a vessel is out of the scope of this summary. More information about this can be found on the manufacturer web site <http://www.intelliantech.com>

2

The RF performance characterization was performed on one antenna unit with radome, at the Politecnico di Torino test range, Italy, on the 27-28 October 2011.

Restriction:

The worst excess to the EESS Gain mask at 1.5° is 5.7 dB; the worst excess to the EESS Gain mask at 3° is 1.0 dB at 10.95 GHz, both in Azimuth V Polarization.

The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired. Nevertheless, these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.

**Manufacturer:**

Intellian Technologies, Inc.
7th Floor, Dongik Building,
98 Nonhyun-Dong Gangnam-Gu,
Seoul, 135-010
Korea

Tel: +82-2-511-2244
Fax: +82-2-511-2235
[mailto: wendy@intelliantech.com](mailto:wendy@intelliantech.com)

Antenna model:

V110

Diameter:

105 cm

Standard:

M

Characterization date:

05-07-2010

System Description:

Stabilised maritime antenna – splash feed cassegrain – composite foam radome. Three axis stabilization platform with conical scanning tracking.
BUC NJRC or Codan 4-6-8 W with integrated LNB.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarization.

Maximum Allowed EIRP:

40.3 dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502, Issue 12 - Rev.1, § 6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain:

41.7 dBi (typical at 14.25 GHz)

Tx XPD:

>28 dB within -1 dB contour

Rx Frequency:

12.50 - 12.75 GHz

See restrictions below (*)**Rx Gain:**

39.8 dBi (typical at 12.50 GHz)

Rx XPD:

>30 dB (*) within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance.

The validation of the performance of the tracking system and the operations of the antenna when installed on a vessel is out of the scope of this summary. The manufacturer states that operations of the tracking is such that the pointing error is less than +/-0.2° for the following ship motions:

Roll = +/-20° at 8-12 sec periods

Pitch = +/-10° at 6-12 sec periods

2

The characterization was performed on one antenna unit with radome, at the France Telecom test range of La Turbie, France, on the 15-18 June 2010.

Restrictions:

(*) The service quality, in conjunction with operations in Rx bands other than 12.50 – 12.75 GHz, may be significantly impaired. Nevertheless, these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.

**Manufacturer:**

KNS Inc.
1314 Gwanpyeong-dong, Yuseong-gu,
Daejeon, 305-509

S. KOREA

Tel: +82 42 932 0351
Fax: +82 42 932 0353
mailto :bwjin@kns-kr.com

Antenna model:
Supertrack Z6Mk2

Diameter:
60 cm

Standard:
Nomenclature M-x

Characterization date:
24-04-09

System Description:

Interactive maritime antenna -splash feed cassegrain – composite foam radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

30.4 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

36.4 dBi (typical at 14.25 GHz)

Rx Gain:

35.0 dBi (typical at 12.50 GHz)

Tx XPD:

>27 dB within -1 dB contour

Rx XPD:

>27 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer's web site: <http://www.kns-kr.com>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

KNS Inc.
1314 Gwanpyeong-dong, Yuseong-gu,
Daejeon, 305-509

S. KOREA

Tel: +82 42 932 0351
Fax: +82 42 932 0353
mailto: bwjin@kns-kr.com

Antenna model:
Supertrack Z8

Diameter:
85 cm

Standard:
Nomenclature M-x

Characterization date:
27-03-08

System Description:

Interactive maritime antenna -splash feed cassegrain – composite foam radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

32.3 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Tx Gain:
38.3 dBi (typical at 14.25 GHz)

Tx XPD:
>35 dB within -1 dB contour

Rx Frequency:
10.95 - 12.75 GHz

Rx Gain:
38 dBi (typical at 12.50 GHz)

Rx XPD:
>32 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer's web site: <http://www.kns-kr.com>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

KVH Industries, Inc.
50 Enterprise Center
Middletown, RI 02842
USA

Tel: +1 401-847-3327
Fax: +1 401-849-0045
[mailto: info@kvh.com](mailto:info@kvh.com)

Antenna model:
V3

Diameter:
37 cm

Standard:
Nomenclature M-x

Characterization date:
10-08-2011

Validity period:
See remark 3

System Description:

Stabilized maritime antenna – ring focus dual reflector antenna – ABS, single layer radome (∅: 39.4 cm, H: 44.7 cm) . Three axis stabilization platform with conical scanning tracking.
3 Watt BUC NJRC NJT5116F and Invacom VSAT PLL LNB with Tx reject filter SPV-65SM.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarization

Maximum Allowed EIRP:

20.7 dBW / 40 kHz $-10 \cdot \log N$ (where N is the number of carriers transmitted in the same 40 KHz band) for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers) for any satellite adjacent separation (**).

Tx Frequency:

13.75 - 14.50 GHz
See restrictions below (*)

Rx Frequency:

11.70 - 12.75 GHz
See restrictions below (*)

Tx Gain:

33.2 dBi (typical at 14.25 GHz)

Rx Gain:

30.4 dBi (typical at 11.70 GHz)

Tx XPD:

>32.8 dB within -1 dB contour

Rx XPD:

>27.1 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance.

The validation of the performance of the tracking system and the operations of the antenna when installed on a vessel is out of the scope of this summary. The manufacturer states that operations of the tracking are such that the pointing error is less than $\pm 1.5^\circ$ for the following ship motions:

+/- 25 degrees Roll @ 8 second period,
+/- 15 degrees Pitch @ 5 second period,
+/- 8 degrees Yaw @ 50 second period.

2

The characterization was performed on one antenna unit with radome, at the LACE Outdoor Test Range of Politecnico of Torino, on the 18-20 May 2011.

3

The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.

4

Any change to the characterized configuration needs to be notified to Eutelsat and may be subject to further tests.

Restrictions:

(*) The antenna can only operate in conjunction with spread spectrum systems, e.g. the Viasat ArcLight CDMA.

(**) The Rx isolation from boresight at 3° is 1.2 dB: to ensure the downlink quality of service, the outroute carrier shall use spread spectrum techniques.

**Manufacturer:**

KVH Industries, Inc.
50 Enterprise Center
Middletown, RI 02842
USA

Tel: +1 401-847-3327
Fax: +1 401-849-0045
mailto: info@kvh.com

Antenna model:
KVH-60 cm

Diameter:
60 cm

Standard:
Nomenclature M-x

Characterization date:
25-07-08

System Description:

Interactive maritime antenna -splash feed cassegrain - plastic radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

31.1 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

14.00 - 14.50 GHz

Rx Frequency:

11.70 - 12.75 GHz

Tx Gain:

36.6 dBi (typical at 14.25 GHz)

Rx Gain:

35.4 dBi (typical at 12.50 GHz)

Tx XPD:

>35 dB within -1 dB contour

Rx XPD:

>35 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer's web site: <http://www.kvh.com>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

MAC
MICRO ADVANCED COMMUNICATIONS S.R.L.
Via B. Spinoza, 5
20131 MILANO
ITALY

Tel: +39 02 706411
Fax: +39 02 70641120
mailto : carlo.muzio@mac.fastwebnet.it

Antenna model:
ISA 75

Diameter:
75 cm

Standard:
M

Characterization date:
10-02-09

System Description:

Interactive maritime antenna –Axisymmetric circular front fed – General Dynamics OMT - Fiberglass/Honeycomb 100 cm radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

35.7 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

36.5 dBi (typical at 14.25 GHz)

Rx Gain:

35.6 dBi (typical at 12.50 GHz)

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>30 dB within -1 dB contour

Remarks:

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on this web site: <http://www.sitmar.it>

Eutelsat s.A. Type Approval Summary Sheet

**Applicant:**

MITSUBISHI ELECTRIC CORPORATION
2-7-3, Marunouchi Chiyoda-ku
Tokyo 100-8310
Japan

Tel : +81 3 3218 3346
Fax : +81 3 3218 9492
Website : <http://global.mitsubishielectric.com>

Certificate:
EA-V056**Antenna:**
Ku Mate**Diameter:**
1 m**Standard:**
M**Approval date:**
21-12-2009**Revision 1 date:**
17-05-2011**System Description:**

Stabilised maritime antenna consisting of 1 m ring focus Gregorian aluminum antenna with fiberglass radome, with three axis stabilization platform and polarization axis and a conical scanning tracking. BUC 8 W NJRC model NJT5118NT, LNA Mitsubishi RB256718.

Models Available:

Standard configuration: 14.00-14.50 GHz linear orthogonal polarisation
Option 1 : Tx and Rx parallel.
Option 2 : 13.75 GHz extended band
Option 3 : Tx and Rx parallel and 13.75 GHz extended band

Maximum Allowed EIRP:

39.7 dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 § 6.1 refers)

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.70 - 12.75 GHz

Tx Gain:

40.9 dBi (typical at 14.25 GHz)

Rx Gain:

39.8 dBi (typical at 12.75 GHz)

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>30 dB within -1 dB contour

Remarks:

1

Operations of the tracking has been tested on a Sea Simulator, with rms pointing error <0.2°.

Roll = +/-30°/7sec and 24.2°/sec²

Pitch = +/-10°/5sec and 15.8°/sec²

Yaw = +/-4°/14sec and 0.8°/sec²

2

Measured G/T= 18.4 dB/K @ 12.5 GHz, 30° Elevation

Eutelsat s.A. Type Approval Summary Sheet

**Applicant:**

mitsubishi electric corporation
2-7-3, Marunouchi Chiyoda-ku, Tokyo
100-8310, Japan
Tel : +81-3-3218-3346
Fax : +81-3-3218-9492
[Website : http://global.mitsubishielectric.com](http://global.mitsubishielectric.com)

Contact point:
Sato.Hiroyuki@ea.mitsubishielectric.co.jp

Certificate:
EA-V059**Antenna:**
SX 5410 Ku Mate**Diameter:**
1.2 m**Standard:**
M**Approval date:**
16-12-2011**System Description:**

Stabilised maritime antenna equipped with three ports feed (one Tx and two Rx) for the standard configuration and option 3; two ports feed for options 1 and 2, consisting of 1.2 m ring focus aluminum antenna with backfire feedhorn, with 1.57 m sandwich foam radome, with three axis stabilization platform and polarization axis and a conical scanning tracking. BUC 8 W NJRC model NJT5118NTME (Standard) and model NJT5218NTME (Option 2 and 3), LNA Mitsubishi Electric RB256718-G01.

Models Available:

Standard configuration (SX 5410): 14.00-14.50 GHz linear orthogonal and parallel polarization.

Option 1 (SX 5400) : Tx and Rx orthogonal.

Option 2 (SX 5420) : 13.75 GHz extended band orthogonal.

Option 3 (SX 5430) : Tx and Rx orthogonal and parallel pol. and 13.75 GHz ext. band.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502, § 6.1 refers):

38.3 dBW / 40 kHz for satellite orbital separations $\geq 1.5^\circ$.

41.4 dBW / 40 kHz for satellite orbital separations $\geq 2^\circ$.

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.70 - 12.75 GHz

Tx Gain:

41.9 dBi (typical at 14.25 GHz)

Rx Gain:

41.6 dBi (typical at 11.70 GHz)

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>28 dB within -1 dB contour

G/T: 20.5 dB/K at 11.70 GHz

Remarks:

1

Operations of the tracking has been tested on a Sea Simulator, with pointing error <0.2°.

Roll = $\pm 30^\circ/7$ sec.

Pitch = $\pm 10^\circ/5$ sec.

Yaw = $\pm 4^\circ/20$ sec.

In case of tracking error >0.2°, the ACU will directly inhibit transmission of the BUC.

2

The type approval tests were performed on three units with radome at the test range of Ofuna, Japan between the 26 September and the 1 October 2011.

3

The worst excess of the EESS masks in the Rx side is equal to 7.2 dB at 1.5°, 10.70 GHz in Elevation V polarization. The service quality in the receive side may be impaired for operations on satellites with less than 2.5° orbital separation from the adjacent one. Nevertheless, these operations may be exceptionally authorized according to a valid transmission plan.

**Manufacturer:**

NAVISYSTEM
V. Fondacci 269
Z.I. Montramito
55054 MASSAROSA (Lu)
ITALY

Tel: +39 0584-425454
Fax: +39 0584 434386
mailto : b.locatori@navisystem.com

Antenna model:
Navisystem 75

Diameter:
70 cm

Standard:
Nomenclature M-x

Characterization date:
29-07-08

System Description:

Interactive maritime antenna -splash feed cassegrain - VTR radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

29.6 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
36 dBi (typical at 14.25 GHz)

Rx Gain:
35.2 dBi (typical at 12.75 GHz)

Tx XPD:
>35 dB within -1 dB contour

Rx XPD:
>32 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.navisystem.com>.

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

NAVISYSTEM
V. Fondacci 269
Z.I. Montramito
55054 MASSAROSA (Lu)
ITALY

Tel: +39 0584-425454
Fax: +39 0584 434386
mailto : b.locatori@navisystem.com

Antenna model:
Navisystem 85

Diameter:
81 cm

Standard:
Nomenclature M-x

Characterization date:
30-07-08

System Description:

Interactive maritime antenna -splash feed cassegrain - VTR radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

33.8 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
37.8 dBi (typical at 14.25 GHz)

Rx Gain:
37.5 dBi (typical at 12.50 GHz)

Tx XPD:
>30 dB within -1 dB contour

Rx XPD:
>26 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.navisystem.com>.

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

NAVISYSTEM
V. Fondacci 269
Z.I. Montramito
55054 MASSAROSA (Lu)
ITALY

Tel: +39 0584-425454
Fax: +39 0584 434386
mailto : b.locatori@navisystem.com

Antenna model:
Navisystem 95

Diameter:
95 cm

Standard:
Nomenclature M-x

Characterization date:
04-08-08

System Description:

Interactive maritime antenna -splash feed cassegrain - VTR radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

34.3 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

39.3 dBi (typical at 14.25 GHz)

Rx Gain:

Not measured

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>30 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer's web site: <http://www.navisystem.com>.

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

Eutelsat s.A. Type Approval Summary Sheet

**Applicant:**

ORBIT
5b Hatzoran St.
P.O. Box 8657 NETANYA
42504 ISRAEL

Tel: +972 9 89262739
Fax: +972 9 892 2820
mailto : guy@orbit-ltd.co.il

Certificate:
EA-A033

Antenna:
OrSat AL-7103-Ku Mk II

Diameter:
1.15m

Standard:
M

Approval date:
06-04-2007

Revision 2 date:
02-10-2008

System Description:

Stabilised maritime antenna consisting of OrSat 1.15m dual offset Gregorian composite material antenna with single piece foam or honeycomb radome, with three axis stabilization platform and a conical scanning tracking. Can support transceivers 4 W, 8 W, 16 and 20 W rating.

Models Available:

AL-7103-Ku-Mk II with two standard configurations: with ERA OMT and Tx Reject Filter or Orbit Integrated RF front-end.

Maximum Allowed EIRP:

39.3 or 41.3* dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502, Issue 12 - Rev.1, § 6.1 refers)

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

42.3 dBi (typical at 14.25 GHz)

Rx Gain:

41.0 or 40.2* dBi (typical at 12.50 GHz)

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>35 dB within -1 dB contour

Remarks:

1

Operations of the tracking has been tested on a Sea Simulator.

RMS pointing error 0.12° at 3σ for the following ship maximum velocity and acceleration:

Roll = $11^\circ/\text{sec}$ and $4^\circ/\text{sec}^2$

Pitch = $18^\circ/\text{sec}$ and $19^\circ/\text{sec}^2$

Yaw = $5^\circ/\text{sec}$ and $0.3^\circ/\text{sec}^2$

2

(*) applies to the configuration using the Orbit Integrated RF front-end

**Manufacturer:**

ORBIT Communication Ltd
 8 D Hatzoran St.P.O.B 8657
 Netanya,
 42504 ISRAEL
 Tel: + 972-9-8922-739
 Fax:+ 972-9-8922-820
<mailto:guy.naym@orbit-cs.com>

Antenna model:

AL-7107

Antenna aperture dimensions:

201x220 cm

Standard:

M

Characterization date:

17-10-2011

System Description:

Stabilised maritime antenna – dual optics gregorian – sandwich foam radome. Four axis stabilization platform with conical RF tracking.

BUC Codan 20, 40, W; Terrasat 40 W and Agilis 40 W.

PLL LNB Norsat.

Integrated front end ORBIT.

Models Characterized:

Standard configuration: C-Band 5.85-6.425 GHz circular orthogonal polarisation

Maximum Allowed EIRP:

37.1 dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 §6.1 refers).

Tx Frequency:

5.85 – 6.425 GHz

Rx Frequency:

3.625 – 4.2 GHz

Tx Gain:

38.3 dBi (typical at 6.15 GHz)

Rx Gain:

36.7 dBi (typical at 3.95 GHz)

Tx XPD:

>19.4 dB within -1 dB contour

Rx XPD:

>16.3 dB within -1 dB contour

G/T (measured with radome)

17.9 dB/K @ 30 ° Elevation, 3.95 GHz

Remarks:

1

The dynamic tests were performed at the 3-axis Orbit sea simulator on the 26 May 2011. The RMS pointing error is less than 0.2° for the following ship motions:

Roll = 10°/sec and 4°/sec²

Pitch = 8.9°/sec and 4.7°/sec²

Yaw = 3.2°/sec

2

The RF performance characterization was performed on one antenna unit with radome, at the Orbit Test Range in Netanya, Israel on the 4-5 September 2011.

Restriction:

The isolation at 3° of the level of the Rx sidelobes from the level of the boresight is comprised between 20 dB and 13.9 dB (worst case at 3.625 GHz, 4.5 dB excess to the EESS Gain mask); the isolation at 1.5° is 3.6 dB (worst case at 3.625 GHz, 7.3 dB excess the EESS Gain mask). The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired. Nevertheless, these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.

**Manufacturer:**

RADIO MARINE S.p.A.
c/o Sviluppo Italia Liguria
ex palazzina Omsav - Zona Porto
17100 - Savona
ITALY

Tel: +39 019 838 7134
Fax: +39 019 807 983
mailto: fp@radio-marine.com

Antenna model:
Radiomarine BroadBand80

Diameter:
80 cm

Standard:
Nomenclature M-x

Characterization date:
07-11-08

System Description:

Interactive maritime antenna; splash feed cassegrain. Carbon fibre antenna. fiberglass radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

33.0 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

39.0 dBi (typical at 14.25 GHz)

Rx Gain:

37.9 dBi (typical at 12.50 GHz)

Tx XPD:

>30 dB within -1 dB contour

Rx XPD:

>35 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.radio-marine.com>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

SEATEL
4030 Nelson Avenue
CONCORD, CA
94520
USA

Tel: +1 925 798 7979
Fax: +1 925 798 7986
mailto : Timothy.OConnor@cobham.com

Antenna model:
USAT24

Diameter:
60 cm

Standard:
Nomenclature M-x

Characterization date:
16-01-09

System Description:

Interactive maritime antenna -splash feed cassegrain – three layers 27 inches radome. Two axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

31.9 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

37.0 dBi (typical at 14.25 GHz)

Rx Gain:

35.9 dBi (typical at 12.50 GHz)

Tx XPD:

>25 dB within -1 dB contour

Rx XPD:

>30 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.seatel.com>. The manufacturer advises that this antenna is not suitable for operations in rough seas.

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

SEATEL
4030 Nelson Avenue
CONCORD, CA
94520
USA

Tel: +1 925 798 7979
Fax: +1 925 798 7986
mailto : Timothy.OConnor@cobham.com

Antenna model:
2406

Diameter:
60 cm

Standard:
Nomenclature M-x

Characterization date:
14-01-09

System Description:

Interactive maritime antenna -splash feed cassegrain – three layers 34 inches radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

32.2 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
37.2 dBi (typical at 14.25 GHz)

Rx Gain:
36.1 dBi (typical at 12.50 GHz)

Tx XPD:
>25 dB within -1 dB contour

Rx XPD:
>25 dB within -1 dB contour

Remarks:

1

The characterization uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.seatel.com>.

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).

**Manufacturer:**

SEATEL
4030 Nelson Avenue
CONCORD, CA
94520
USA

Tel: +1 925 798 7979
Fax: +1 925 798 7986
mailto : Timothy.OConnor@cobham.com

Antenna model:
4006

Diameter:
1 m

Standard:
M

Characterization date:
25-09-08

System Description:

Interactive maritime antenna -splash feed cassegrain – three layers 50 inches radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

39.2 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
40.6 dBi (typical at 14.25 GHz)

Rx Gain:
39.8 dBi (typical at 12.50 GHz)

Tx XPD:
>26 dB within -1 dB contour

Rx XPD:
>30 dB within -1 dB contour

Remarks:

Operations of the tracking have been tested on a Sea Simulator.

Pointing error less than $\pm 0.2^\circ$ for the following ship motions:

Roll = ± 20 degrees at 8-12 sec periods

Pitch = ± 10 degrees at 6-12 sec periods

**Manufacturer:**

SEATEL
4030 Nelson Avenue
CONCORD, CA
94520
USA

Tel: +1 925 798 7979
Fax: +1 925 798 7986
mailto : Timothy.OConnor@cobham.com

Antenna model:
4009

Diameter:
1 m

Standard:
M

Characterization date:
01-12-09

System Description:

Interactive maritime antenna -splash feed cassegrain – three layers 50 inches radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

39.2 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Tx Gain:
40.6 dBi (typical at 14.25 GHz)

Rx Gain:
39.8 dBi (typical at 12.50 GHz)

Tx XPD:
>26 dB within -1 dB contour

Rx XPD:
>30 dB within -1 dB contour

Remarks:

Operations of the tracking have been tested on a Sea Simulator.

Pointing error less than $\pm 0.2^\circ$ for the following ship motions:

Roll = ± 20 degrees at 8-12 sec periods

Pitch = ± 10 degrees at 6-12 sec periods

**Manufacturer:**

Cobham SATCOM, Sea Tel Products
4030 Nelson Avenue
CONCORD, CA
94520
USA

Tel: + 1 925 798 7979
Fax: + 1 925 798 7986
mailto: Timothy.OConnor@cobham.com

Certificate:
EA-V058

Antenna model:
5009 StdM Mk2

Diameter:
1.2 m

Standard:
M

Approval date:
08-12-10

System Description:

Stabilised maritime antenna – splash feed axi-symmetric cassegrain – feed manufactured by ERA Technology (Cobham Technical Services) - three layers 1.68 m diameter radome manufactured by Ace Composites on Sea Tel design. Three axis stabilization platform with conical scanning tracking.

8 Watt CODAN BUC, referenced as 6908-WE-48EX-CE.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarization.
Option 1 : Tx and Rx parallel.

Maximum Allowed EIRP:

40.6 dBW / 40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 § 6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.70 - 12.75 GHz

Tx Gain:

42.4 dBi (typical at 14.25 GHz)

Rx Gain:

41.0 dBi (typical at 12.75 GHz)

Tx XPD:

>30 dB within -1 dB contour
>35 dB within maximum pointing error

Rx XPD:

>30 dB within -1 dB contour
>35 dB within maximum pointing error

Conditions and remarks:

1

Submission on at least a yearly basis of measurement results for at least one production unit.

2

Operations of the tracking has been tested with the antenna (without radome) on a Sea Simulator, with rms pointing error <0.2°.

Roll = +/-20°/8 sec

Pitch = +/-4°/8 sec

Yaw = +/-6°/8 sec

3

Measured G/T= 19.3 dB/K @ 12.50 GHz, 31.2° Elevation.

**Manufacturer:**

SITEP Italia Spa
V. Vincinella 14 (loc. Ponzano)
19035 SANTO STEFANO MAGRA (SP)
ITALY

Tel: +39 0187 695911
Fax: +39 0187 630503
mailto : p.salutari@sitep.it

Antenna model:
CommSat80

Diameter:
80 cm

Standard:
Nomenclature M-x

Characterization date:
18-09-08

System Description:

Interactive maritime antenna - splash feed cassegrain - honeycomb radome. Three axis stabilization platform with conical scanning tracking.

Maximum Allowed EIRP:

31.6 dBW/40kHz for digital carriers at the satellite receive contours of 0 dB/K (EESS502, issue 12 rev 1, §6.1 refers).

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency:

10.95 - 12.75 GHz

Tx Gain:

38.1 dBi (typical at 14.25 GHz)

Rx Gain:

36.5 dBi (typical at 12.50 GHz)

Tx XPD:

>28 dB within -1 dB contour

Rx XPD:

>28 dB within -1 dB contour

Remarks:

1

The characterisation uniquely refers to the RF electrical performance which was assessed in a professional test range facility.

The validation of the performance of the tracking subsystem and the operations of the antenna when installed on a ship is out of the scope of this summary. More information about this can be found on the manufacturer web site: <http://www.sitep.it>

2

This antenna should normally be used in both transmit and receive sides in conjunction with spread spectrum or CDMA modems. The association of this antenna with SCPC/TDMA modems is conditioned to the existence of a Eutelsat valid transmission plan (e.g. with high efficiency FEC (1/3, 1/4, etc) and BPSK modulations for the ship-to-shore carrier).