RF PERFORMANCE CHARACTERIZATION AND VALIDATION

ESV Earth Station on Vessel

December 2021



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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-bycase 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.

Particular care has to be taken during ESV installation to ascertain the correct execution of the mute command issued by the ACU. The compliant function of the related hardware and firmware must be reconfirmed by actual trial to be carried out in the course of the ESV handover.

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.



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:jan.otterling@c2sat.se http://www.C2SAT.com Antenna model: 1.2m Ku II Antenna aperture dimensions: 1.2 m Standard: M Characterization date: 09-01-2012 Revision 1 date: 30-07-2012

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.

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-C2SAT will insert in the ITSA (Integrated Tactical and Sensor Assembly) a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers.

5-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.

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.



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 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

Tx Gain:

38.1 dBi (typical at 14.25 GHz)

Tx XPD:

>26 dB within -1 dB contour

Rx Frequency: 10.95 - 12.75 GHz

Rx Gain: 35.8 dBi (typical at 12.50 GHz)

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: <u>http://www.intelliantech.com</u>

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.



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 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 > 2.5° 33.5 dBW / 40 KHz for an orbital separation of the adjacent satellite $\ge 2.0^{\circ}$ 32.5 dBW / 40 KHz for an orbital separation of the adjacent satellite > 1.5°

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:

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.



Intellian Technology, Inc. 2nd Floor, Dongik Building, 98 Nonhyun-Dong Gangnam-Gu, Seoul, 135-010 Korea

Tel: +82-31-379-1072 Fax:+82-10-5197-4718 mailto: ciona.lee@intelliantech.com Antenna model: v100

> Diameter: 103 cm

Standard: M

Characterization date: 30-04-2013

Revision Date: 18-11-2013

System Description:

Stabilised maritime antenna – ring focus with shaped carbon fiber reflector – Sandwich foam pre-preg five layers radome. Three axis stabilization platform with conical RF tracking. BUC NJRC 8 W with integrated LNB.

Models Characterized:

Standard configuration: 13.75-14.5 GHz linear orthogonal polarization with co-polarized and cross-polarized signal reception.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 40.8 dBW / 40 kHz for an orbital separation of the adjacent satellite $\ge 2.5^{\circ}$ 39.7 dBW / 40 KHz for an orbital separation of the adjacent satellite $\ge 2.0^{\circ}$ 36.8 dBW / 40 kHz for an orbital separation of the adjacent satellite $\ge 1.5^{\circ}$

Tx Frequency:	
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13.75 – 14.50 GHz

Tx Gain: 41.6dBi (typical at 14.25 GHz)

Tx XPD: 31 dB within -1 dB contour **Rx Frequency:** 10.70-12.75 GHz

Rx Gain: 39.4 dBi (typical at 11.7 GHz)

Rx XPD: >35 dB within -1 dB contour

G/T (measured with radome) 19.6 dB/K @ 12.75 GHz

Remarks:

1. The manufacturer states that the RMS pointing error is less than 0.4° for the following ship motions:

Roll = $\pm 25^{\circ}$ @ 6 sec periods

- Pitch = $\pm 15^{\circ}$ @ 6 sec periods
- Yaw = $\frac{1}{2}$ 8° @ 6 sec periods
- 2. The RF performance characterization was performed on one antenna unit with radome, at the France Telecom test range of La Turbie, France on the 24-26 April 2013.
- 3. Intellian has inserted in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers. The transmission of the HPA is muted from the ACU when the maximum pointing error exceeds 0.4°, by sending an ACU command to a BUC capable of M&C functions.
- 4. The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.



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Tel: +82-2-511-2244 Fax:+82-2-511-2235 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 $+/-0.2^{\circ}$ for the following ship motions:

Roll= +/-20°at 8-12 sec periodsPitch= +/-10°at 6-12 sec periods2

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.



Intellian Technology, Inc. 18-7, Jinvisandan-ro, Jinwi-myeon (Chungo-ri) Pyeogtaek-si, Gyeonggi-do, 17709 Korea

Tel: +82-31-379-1000 mailto: martin.kweon@intelliantech.com Antenna model: v100NX (V5-11-UXXX) Diameter: 105 cm Standard: M Characterization date: 13-06-2019 Validity period: see Remark 4 Last test data submitted on: 29-05-2019

System Description:

Stabilised maritime antenna – Cassegrain ring focus with spinned Aluminum reflector – Sandwich foam pre-preg five layers radome. Three axis stabilization platform with conical RF tracking. BUC NJT 8 W (16W and 25 W option).

Models Characterized:

Standard configuration: 13.75-14.5 GHz three ports feed linear orthogonal polarization with co-polarized and cross-polarized signal reception.

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

In the 14.00-14.50 GHz band:

36.0 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 1.5^{\circ}$ 38.6 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 2.0^{\circ}$ 41.6 dBW / 40 kHz for an orbital separation from the adjacent satellite ≥ 2.5 **In the 13.75-14.00 GHz band:** 33.1 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 1.5^{\circ}$ 34.9 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 2.0^{\circ}$ 38.9 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 2.0^{\circ}$ 38.9 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 2.5^{\circ}$

Tx Frequency: 13.75 – 14.50 GHz

Tx Gain:

41.6 dBi (average at 14.25 GHz)

Tx XPD: \geq 30.2 dB within -1 dB contour

Rx Frequency: 10.70 – 12.75 GHz

Rx Gain (co-polar and cross-polar ports): 40.6 dBi (average at 11.70 GHz)

Rx XPD :

≥ 27.3 dB within -1 dB contour (co-polar)

G/T:

20.04 dB/K typ @ 12.75 GHz at 30° EI

Remarks:

- 1. The manufacturer states that the RMS pointing error is less than 0.2° for the following ship motions: Roll = + 25° @ 6 sec periods
 - Pitch = $\pm 15^{\circ}$ @ 6 sec periods
 - Yaw = \pm 8° @ 6 sec periods
- 2. The RF performance characterization was performed on one antenna unit with radome, at the Thales Alenia Space test range of Cannes, France on the 27-29 May 2019.
- 3. Intellian has inserted in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers. The transmission of the HPA is muted from the ACU when the maximum pointing error exceeds 0.2°, by sending an ACU command to a BUC capable of M&C functions.
- 4. The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.
- 5. The worst sidelobe excess in the near region receive side is 7.16 dB. The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.
- 6. The transmission in the band 13.75-14.00 GHz for antennas with a diameter <1.2 m is subject to the ITU radio regulations in force.



Manufacturer: JOTRON AS

Dølasletta 7 NO – 3408 TRANBY NORWAY

Tel: + 47 33 13 97 00 Fax:+ 47 32 84 55 30 mailto:svein.skyttemyr@jotron.com web: www.jotron.com Antenna model: B85

Antenna aperture dimensions: 85 cm

> Standard: Nomenclature M-x

Characterization date: 05-07-2013

System Description:

Stabilised maritime antenna – Ring focus ADE (Axially Displaced Ellipse) with shaped sub-reflector configuration – Sandwich foam radome. Four axis stabilization platform with conical RF tracking. BUC various. Maximum rating 8W LNB various OMT Jotron

Models Characterized:

Standard configuration: linear orthogonal polarization with co-polarized or cross-polarized signal reception option.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 35.3 dBW / 40 kHz for an orbital separation of the adjacent satellite $\geq 2.5^{\circ}$ 34.0 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^{\circ}$ 33.4 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 1.5^{\circ}$

Tx Frequency:

13.75 – 14.50 GHz

Rx Frequency: 10.95-12.75 GHz

Tx Gain: 40.33 (typical at 14.25 GHz)

Tx XPD: 26 dB within -1 dB contour

Rx Gain: 36.6 dBi (typical at 11.7 GHz)

Rx XPD: 26 dB within -1 dB contour

G/T (measured with radome)

16.2 dB/K @ 11.70 GHz @ 30 ° Elevation

Remarks:

1. The manufacturer states that the RMS pointing error is less than 0.30° for the following ship motions:

Roll = $+/-24^{\circ}$ in a period of 10 sec Pitch = $+/-10^{\circ}$ in a period of 8 sec Yaw = $+/-8^{\circ}$ in a period of 20 sec

- 2. The RF performance characterization was performed on one antenna unit with radome, at the Politecnico of Torino, Italy on the 28-29 May 2013.
- 3. The transmission of the HPA is muted from the ACU via a DC switch when the maximum pointing error exceeds 0.5°.
- 4. The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.

Restrictions:

The worst excess in the receive side (+/-10°) to the EESS Gain mask is 4.7 dB.

The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.



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

Rx Gain:

Tx Gain: 36.4 dBi (typical at 14.25 GHz)

Tx XPD:

>27 dB within -1 dB contour

35.0 dBi (typical at 12.50 GHz) **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: <u>http://www.kns-kr.com</u> 2



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

S. KOREA

Antenna model: Supertrack Z8

> Diameter: 85 cm

Standard: Nomenclature M-x

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

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

Rx Frequency: 10.95 - 12.75 GHz

Tx Gain: 38.3 dBi (typical at 14.25 GHz)

Rx Gain: 38 dBi (typical at 12.50 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's web site: <u>http://www.kns-kr.com</u>

2



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: 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 NJT5116Fand 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*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 (**).

Rx Gain:

Rx XPD:

Tx Frequency:

13.75 - 14.50 GHz See restrictions below (*) **Rx Frequency:** 11.70 - 12.75 GHz See restrictions below (*)

30.4 dBi (typical at 11.70 GHz)

>27.1 dB within -1 dB contour

Tx Gain: 33.2 dBi (typical at 14.25 GHz)

Tx XPD:

>32.8 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 $+/-1.5^{\circ}$ 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.



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

Rx Gain:

Tx Gain: 36.6 dBi (typical at 14.25 GHz)

Tx XPD:

>35 dB within -1 dB contour

35.4 dBi (typical at 12.50 GHz) **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: <u>http://www.kvh.com</u> 2



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

Tel: +39 02 706411 Fax:+39 02 70641120 mailto : <u>carlo.muzio@mac.fastwebnet.it</u> 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: <u>http://www.sitmar.it</u>



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 : <u>http://global.mitsubishielectric.com</u> 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 polarisationOption 1: Tx and Rx parallel.Option 2: 13.75 GHz extended bandOption 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

Tx Gain: 40.9 dBi (typical at 14.25 GHz)

Tx XPD: >30 dB within -1 dB contour

Rx Frequency: 10.70 - 12.75 GHz

Rx Gain: 39.8 dBi (typical at 12.75 GHz)

Rx XPD: >30 dB within -1 dB contour

Remarks:

1

2

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

Roll $=+/-30^{\circ}/7 \sec$ and $24.2^{\circ}/\sec^2$ Pitch $=+/-10^{\circ}/5 \sec$ and $15.8^{\circ}/\sec^2$ Yaw $=+/-4^{\circ}/14 \sec$ and $0.8^{\circ}/\sec^2$

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



Applicant:	Certificate:
	EA-V059
MITSUBISHI ELECTRIC CORPORATION	
2-7-3, Marunouchi Chiyoda-ku, Tokyo	Antenna:
100-8310, Japan	SX 5410 Ku Mate
Tel : +81-3-3218-3346	
Fax : +81-3-3218-9492	Diameter:
Website : http://global.mitsubishielectric.com	1.2 m
Contact point:	Standard:
Sato.Hirovuki@ea.mitsubishielectric.co.ip	М

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 5	410):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°. 41.4 dBW / 40 kHz for satellite orbital separations \geq 2°.

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain:

41.9 dBi (typical at 14.25 GHz)

Rx Frequency:

10.70 - 12.75 GHz

Rx Gain: 41.6 dBi (typical at)

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 $= \frac{+}{4} \frac{4^{\circ}}{20}$ 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.

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.



Applicant:	Certificate: EA-V060
MITSUBISHI ELECTRIC CORPORATION 2-7-3, Marunouchi Chiyoda-ku, Tokyo 100-8310, Japan Tol : +91 2 2218 2246	Antenna: MVA60
Fax : +81-3-3218-9492 Website : http://global.mitsubishielectric.com	Diameter: 0.62 m
Contact point: Sato.Hiroyuki@ea.mitsubishielectric.co.jp	Standard: M
	Approval date: 15-06-2012

System Description:

Stabilized maritime antenna equipped with linear polarized 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 0.6 m ring focus aluminum antenna with backfire feedhorn, with 750 mm diameter 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 (MVA60-DS8):14.00-14.50 GHz Tx and Rx orthogonal and parallel polarizationOption 1 (MVA60-DE8):14.00-14.50 GHz Tx and Rx orthogonal polarizationOption 2 (MVA60-SS8):13.75-14.50 GHz Tx extended band and Rx orthogonalOption 3 (MVA60-SE8):13.75-14.50 GHz Tx extended band and Rx orthogonal and
parallel polarization

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502, § 6.1 refers): 31.0 dBW / 40 kHz for satellite orbital separations \geq 1.5° 32.1 dBW / 40 kHz for satellite orbital separations \geq 2.5° 33.2 dBW / 40 kHz for satellite orbital separations > 3°

Rx Frequency: 10.70 - 12.75 GHz Rx Gain: 35.6 dBi (typical at 11.70 GHz) Rx XPD: >26 dB within -1 dB contour G/T: 15.0 dB/K at 12.50 GHz (parallel port) 15.5 dB/K at 12.50 GHz (orthogonal port)
15.5 dB/K at 12.50 GHz (orthogonal port)

Remarks:

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

Roll = \pm 30°/7 sec; Pitch = \pm 10°/5 sec; Yaw = \pm 4°/14 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 Tsukaguchi, Japan between the 9 and 18 May 2012.

3-The worst excess of the EESS masks in the Rx side is equal to 8.4 dB (10.70 GHz) hence the service quality in the receive side may be impaired. Nevertheless, these operations may be exceptionally authorized according to a valid transmission plan.

4-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.

5-Any change to the characterised configuration needs to be notified to Eutelsat and may be subject to further tests.

6- The polarization skew of the Eutelsat satellites is automatically taken into account in the ACU software via pre-programmed look-up tables.



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:

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



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: <u>http://www.navisystem.com</u>.

2



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: <u>http://www.navisystem.com</u>.

2



Applicant:

ORBIT Communication Systems Ltd 8 D Hatzoran St. P.O.B 8657 Netanya, 4250608 ISRAEL

Tel: + 972-9-8922-701 Cel: + 972-54-4242627 Fax:+ 972-9-8922-820 mailto: <u>yoav.barzilay@orbit-cs.com</u> 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 11 - Rev.0, § 6.1 refers)

Tx Frequency: 13.75 - 14.50 GHz

Tx Gain: 42.3 dBi (typical at 14.25 GHz)

Tx XPD: >30 dB within -1 dB contour

Rx Frequency: 10.95 - 12.75 GHz

Rx Gain: 41.0 or 40.2* dBi (typical at 12.50 GHz)

Rx XPD: >35 dB within -1 dB contour

Remarks:

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°/sec and 4°/sec² Pitch =18°/sec and 19°/sec² Yaw = 5°/sec and 0.3°/sec²

2

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

25

Maritime Characterization

Manufacturer:

ORBIT Communication Systems Ltd 8 D Hatzoran St. P.O.B 8657 Netanva. 4250608 ISRAEL

P EUTELSAT

Tel: + 972-9-8922-701 Cel: + 972-54-4242627 Fax:+ 972-9-8922-820 mailto: yoav.barzilay@orbit-cs.com Antenna aperture dimensions: 201x220 cm

> Standard: Μ

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

Tx Gain: 38.3 dBi (typical at 6.15 GHz)

Tx XPD: >19.4 dB within -1 dB contour **Rx Frequency:** 3.625 - 4.2 GHz

Rx Gain: 36.7 dBi (typical at 3.95 GHz)

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:

= 10°/sec and 4°/sec² Roll 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.





ORBIT Communication Systems Ltd 8 D Hatzoran St. P.O.B 8657 Netanya, 4250608 ISRAEL

Tel: + 972-9-8922-701 Cel: + 972-54-4242627 Fax:+ 972-9-8922-820

mailto: voav.barzilay@orbit-cs.com

Antenna model: OceanTRx4-500 (Ku) Antenna aperture dimensions: 1.15 m Standard: M Characterization date: 05-01-2017 Validity period: See remark 4 Last test data submitted on: 14-01-2020

System Description:

Stabilized maritime antenna system linear polarization, lighter version of Orsat AL-7103-Ku-Mk II, consisting of a 1.15m dual offset Gregorian composite material antenna, with single piece 5 layers honeycomb sandwich radome type C. Three axis stabilization platform with conical RF tracking. HPA / Block upconverters (BUC) 8, 16, 25 and 40 W rating. Philtech LNB or equivalent. Integrated front end ORBIT.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): In the 14.00-14.50 GHz band: 37.9 dBW / 40 kHz for an orbital separation from the adjacent satellite $\geq 1.5^{\circ}$ 40.6 dBW / 40 kHz for an orbital separation from the adjacent satellite $\geq 2.0^{\circ}$ In the 13.75-14.00 GHz band: 35.0 dBW / 40 kHz for an orbital separation from the adjacent satellite $\geq 1.5^{\circ}$ 38.4 dBW / 40 kHz for an orbital separation from the adjacent satellite $\geq 2.0^{\circ}$

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain: 41.9 dBi (typical at 14.25 GHz)

Tx XPD: >27 dB within -1 dB contour

Rx Frequency: 10.70 – 12.75 GHz

Rx Gain: 40.1 dBi (typical at 11.70 GHz)

Rx XPD: >27.4 dB within -1 dB contour

G/T (measured with radome)

19.4 dB/K @ 40° Elevation, 11.70 GHz

Restrictions and remarks:

1. The manufacturer measured an RMS pointing error less than 0.16° for the following ship motions:

Roll = Sinusoidal +/-28° amplitude over 8 second half-period Pitch = Sinusoidal +/-16° amplitude over 6 second half-period Yaw = Linear +/- 80° amplitude over 25 second half-period

- 2. The RF performance characterization was performed on one antenna unit with radome, at the Orbit test range in Netanya during the month of August 2016.
- 3. Orbit has inserted in their ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers. The transmission of the HPA (BUC) is muted from the ACU when the maximum pointing error exceeds 0.5°, by initialization of a mute command to the BUC through its M&C.
- 4. The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.



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

Rx Gain:

Tx Gain: 39.0 dBi (typical at 14.25 GHz)

Tx XPD:

>30 dB within -1 dB contour

37.9 dBi (typical at 12.50 GHz)

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: <u>http://www.radio-marine.com</u> 2



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: <u>http://www.seatel.com</u>. The manufacturer advises that this antenna is not suitable for operations in rough seas.

2



SEATEL 4030 Nelson Avenue CONCORD, CA 94520 USA

Tel: +1 925 798 7979 Fax:+1 925 798 7986 mailto : <u>Timothy.OConnor@cobham.com</u> 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: <u>http://www.seatel.com</u>.

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COBHAM SATCOM, SEA TEL PRODUCTS 4030 Nelson Avenue CONCORD, CA 94520 USA Antenna model: 3011W

> Diameter: 75 cm

Standard: Nomenclature M-x

Characterization date: 04-07-2012

Tel: + 1 925 798 7979 Fax:+ 1 925 798 7986 Website: <u>http://www.cobham.com/seatel</u> Contact point: <u>Darren.Manning@cobham.com</u>

System Description:

Stabilised maritime antenna – ring focus cassegrain – sandwich composite foam radome. Four axis stabilization platform with conical scanning tracking.

BUC Various (NJRC, Codan, Comtech, Terrasat, Gilat) 4-8-16-20-40 W with integrated SMW Q-PLL LNB.

Models Available:

Standard configuration: 13.75-14.50 GHz linear orthogonal polarization Option 1 : TX and RX parallel

Maximum Allowed EIRP:

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

35.1 dBW / 40 kHz for an orbital separation of the adjacent satellite > 3.0°

35.1 dBW / 40 KHz for an orbital separation of the adjacent satellite > 2.5°

32.4 dBW / 40 KHz for an orbital separation of the adjacent satellite > 2.0°

32.3 dBW / 40 KHz for an orbital separation of the adjacent satellite \geq 1.5°

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain:

38.8 dBi (typical at 14.25 GHz)

Tx XPD:

>27.5 dB within -1 dB contour

Rx Frequency: 10.70 - 12.75 GHz See restrictions below Rx Gain: 36.8 dBi (typical at 11.70 GHz) side port 37.0 dBi (typical at 11.70 GHz) back port Rx XPD: >30 dB within -1 dB contour G/T 16.7 dB/K @30° Elevation at 12.2 GHz

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.seatel.com

2-The RF performance characterization was performed on one antenna unit with radome, at the CTS test range of Leatherhead, UK, on the 8-9 February 2012.

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.

Restriction:

The worst excess in the receive side to the EESS Gain mask is 8.6 dB.

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.



COBHAM SATCOM, SEATEL PRODUCTS 4030 Nelson Avenue CONCORD, CA 94520 USA

Antenna model: 3612

> Diameter: 90 cm

Standard: Nomenclature M-x

Fax:+ 1 925 798 7986 http://www.cobham.com/seatel Contact points: Darren.Manning@cobham.com

Characterization date: 05-07-2013

System Description:

Tel: + 1 925 798 7979

Website:

Stabilised maritime antenna - splash feed axi-symmetric - three layers 1.27 m diameter radome manufactured by Ace Composites on SEATEL design. Three axis stabilization platform with conical scanning tracking.

BUC Various (NJRC, Codan, Comtech, Terrasat, Gilat) 4-8-16-40 Watt with integrated SMW Q-PLL or NJRC LNB.

Models Available:

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

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 38.0 dBW / 40 KHz for an orbital separation of the adjacent satellite > 2.5° 35.5 dBW / 40 KHz for an orbital separation of the adjacent satellite > 2.0° 34.7 dBW / 40 KHz for an orbital separation of the adjacent satellite > 1.5°

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain: 40.6 dBi (typical at 14.25 GHz)

Tx XPD: >28.5 dB within -1 dB contour **Rx Frequency:** 10.70 - 12.75 GHz

Rx Gain: 39.3 dBi (typical at 11.70 GHz)

Rx XPD: >28.5 dB within -1 dB contour

G/T (measured with radome):

18.1 dB/K @ 12.20 GHz

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.cobham.com/seatel.
- 2- The RF performance characterization was performed on one antenna unit with radome, at the ITT Exelis test range of Loop Canyon, California US, on the 10-18 March 2013.

Restriction:

The worst excess in the receive side to the EESS Gain mask is 5.4 dB.

The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.



SEATEL 4030 Nelson Avenue CONCORD, CA 94520 USA

Tel: +1 925 798 7979 Fax:+1 925 798 7986 mailto : <u>Timothy.OConnor@cobham.com</u> 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 +-0.2° for the following ship motions: Roll =+-20 degrees at 8-12 sec periods Pitch =+-10 degrees at 6-12 sec periods



SEATEL 4030 Nelson Avenue CONCORD, CA 94520 USA

Tel: +1 925 798 7979 Fax:+1 925 798 7986 mailto : <u>Timothy.OConnor@cobham.com</u> 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 +-0.2° for the following ship motions: Roll =+-20 degrees at 8-12 sec periods Pitch =+-10 degrees at 6-12 sec periods



Certificate: EA-V058

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 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

Tx Gain: 42.4 dBi (typical at 14.25 GHz)

Tx XPD:

>30 dB within -1 dB contour >35 dB within maximum pointing error **Rx Frequency:** 10.70 - 12.75 GHz

Rx Gain: 41.0 dBi (typical at 12.75 GHz)

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 $<0.2^{\circ}$.

Roll = $+/-20^{\circ}/8$ sec Pitch = $+/-4^{\circ}/8$ sec Yaw = $+/-6^{\circ}/8$ sec

3

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



COBHAM SATCOM, SEATEL PRODUCTS 4030 Nelson Avenue CONCORD, CA 94520 USA Antenna model: 6012

> Diameter: 1.5 m

Standard: M

Tel: + 1 925 798 7979 Fax:+ 1 925 798 7986 Website: <u>http://www.cobham.com/seatel</u> Contact points: <u>Darren.Manning@cobham.com</u>

Characterization date: 05-07-2013

System Description:

Stabilised maritime antenna – splash feed axi-symmetric-- three layers 1.93 m diameter radome manufactured by Ace Composites on SEATEL design. Three axis stabilization platform with conical scanning tracking.

BUC Various (NJRC, Codan, Comtech, Terrasat, Gilat) 4-8-16-40 Watt with integrated SMW Q-PLL or NJRC LNB.

Models Available:

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

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 43.2 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^{\circ}$ 40.5 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 1.5^{\circ}$

Tx Frequency:

13.75 - 14.50 GHz

Tx Gain:

44.3 dBi (typical at 14.25 GHz)

Tx XPD:

28.5 dB within -1 dB contour

Rx Frequency: 10.70 - 12.75 GHz

Rx Gain:

42.9 dBi (typical at 11.70 GHz)

Rx XPD:

>28.5 dB within -1 dB contour

G/T (measured with radome): 21.9 dB/K @ 12.20 GHz

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.cobham.com/seatel.

2-The RF performance characterization was performed on one antenna unit with radome, at the ITT Exelis test range of Loop Canyon, California US, on the 12-18 March 2013.

Restriction:

The worst excess in the receive side to the EESS Gain mask is 4.5 dB.

The service quality in conjunction with operations with reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.



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

Rx Gain:

Tx Gain: 38.1 dBi (typical at 14.25 GHz)

50. I UDI

Tx XPD:

>28 dB within -1 dB contour

Rx XPD:

36.5 dBi (typical at 12.50 GHz)

>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



Applicant:

THRANE & THRANE A/S trading as COBHAM SATCOM Lundtoftegaardsvej 93D, 2800 Kgs. Lyngby DENMARK Antenna model: SAILOR 600 Ku Diameter: 0.65 m Standard: Nomenclature M-x Characterization date: 19-05-2017 Validity period: See remark 4 Last test data submitted on: 23-02-2017

Tel: +45 39 55 89 59

Website : <u>www.cobham.com</u> Email : <u>info@cobham.com</u>

System Description:

Stabilized maritime antenna one Tx port, two (co-polar and cross-polar) Rx ports; splash feed Gregorian. Hydroformed aluminum reflector. Tuned multi-layer sandwich radome. Three axis stabilization platform with conical scanning tracking. BUC: NexGenWave 6 W; LNB: Thrane & Thrane.

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

In the 14.00-14.50 GHz band:

31.6 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 1.5^{\circ}$ 31.7 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0° 33.5 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.5° 35.6 dBW / 40 kHz for an orbital separation from the adjacent satellite > 3.0° **In the 13.75-14.00 GHz band:** 29.6 dBW / 40 kHz for an orbital separation from the adjacent satellite $\ge 1.5^{\circ}$ 29.7 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0° 31.9 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0° 32.9 dBW / 40 kHz for an orbital separation from the adjacent satellite > 2.0°

Tx Frequency:	Rx Frequency:
13.75 – 14.50 GHz	10.70 – 12.75 GHz
Tx Gain:	Rx Gain (co-polar and cross-polar ports):
37.6 dBi (average at 14.25 GHz)	35.8 dBi (average at 11.70 GHz)
Tx XPD:	Rx XPD :
> 35 dB within -1 dB contour	> 30.2 dB within -1 dB contour (co-polar)
	\geq 31 dB within -1 dB contour (cross-polar)
	G/T:
	15.9 dB/K typ @ 11.70 GHz at 30° El
Destrictions and remarks.	

Restrictions and remarks:

- 1. The manufacturer states that the RMS pointing error is less than 0.2° for the following ship motions: Roll = + $30^{\circ}/6s$
 - Pitch = $\pm 15^{\circ}/5s$
 - Yaw = $\pm 10^{\circ}/8s$
- 2. The RF performance characterization was performed on one antenna unit with radome, at the Thales Alenia Space test range of Cannes, France on the 21-23 February 2017.
- 3. Cobham has inserted in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers. The transmission of the HPA is muted from the ACU when the maximum pointing error exceeds 0.5°, by cutting off the 10 MHz reference.
- 4. The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.
- 5. The worst sidelobe excess in the near region receive side is 7.15 dB. The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.
- 6. The transmission in the band 13.75-14.00 GHz for antennas with a diameter <1.2 m is subject to the ITU radio regulations in force.



Thrane & Thrane A/S trading as Cobham SATCOM Lundtoftegaardsvej 93 D DK-2800 Kgs. Lyngby DENMARK

EUTELSAT

Tel: + 45 39 55 88 00 Fax:+ 45 39 55 88 88 Website: <u>http://www.cobham.com/lyngby</u> Antenna model: SAILOR 800 VSAT 407008A-00500

Antenna aperture dimensions: 83 cm

> Standard: M

Characterization date: 09-10-2013

System Description:

Stabilized maritime antenna – ring focus Gregorian configuration – Sandwich foam RTM (Resin Transfer Molding) radome. Three axis stabilization platform with conical RF tracking. BUC NextGenWave 6W rating LNB PhilTech OMT Thrane & Thrane TT 60-131011.

Models Characterized:

Standard configuration: linear orthogonal polarization with co-polarized or cross-polarized signal reception option.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 38.6 dBW / 40 kHz for an orbital separation of the adjacent satellite $\geq 2.5^{\circ}$ 34.2 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^{\circ}$ 34.0 dBW / 40 kHz for an orbital separation of the adjacent satellite $\geq 1.5^{\circ}$

Tx Frequency: 13.75 – 14.50 GHz

Tx Gain: 40.0dBi (typical at 14.25 GHz)

Tx XPD: > 31.7 dB within -1 dB contour

Rx Frequency: 10.70-12.75 GHz

Rx Gain: 37.9 dBi (typical at 11.7 GHz)

Rx XPD: \geq 30.5 dB within -1 dB contour

G/T (measured with radome) 18.2 dB/K @ 12.75 GHz 30 ° Elevation

Remarks:

- 1. The manufacturer states that the RMS pointing error is less than 0.20° for the following ship motions:
 - Roll = 30° in a period of 6 sec
 - Pitch = 15° in a period of 4 sec
 - Yaw = 10° in a period of 10 sec
- 2. The RF performance characterization was performed on one antenna unit with radome, at the CTS test range of Leatherhead, UK, on the 21-22 August 2013.
- 3. The transmission of the HPA is muted from the ACU when the maximum pointing error exceeds 0.5°, by inhibiting the 10 MHz reference signal to the BUC.
- 4. Thrane & Thrane has inserted in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers.
- 5. The characterization's validity is subject to regular submission of patterns to confirm that the system remains complaint with the Eutelsat standards.

Restrictions:

 The worst excess in the receive side (+/-10°) to the EESS Gain mask is 6.3 dB @ 3°. The service quality in conjunction with operations in certain Rx bands and/or reduced orbital separations from the adjacent satellites may be impaired due to excessive Rx sidelobe levels. Nevertheless, to achieve the required service quality the level of the outroute carrier may need to be increased according to a valid Eutelsat transmission plan.



Maritime Characterization

Manufacturer:

Thrane & Thrane A/S Lundtoftegaardsvej 93 D DK-2800 Kgs. Lyngby DENMARK Antenna model: SAILOR 900 VSAT 407009B-00500 and 407009E-00500

Antenna aperture dimensions: 1.03 m

Tel: + 45 39 55 88 00 Fax:+ 45 39 55 88 88 mailto:info@thrane.com

Characterization date: 30-04-2013

Last update: 19-01-2017

Standard:

Μ

System Description:

Stabilised maritime antenna – ring focus Gregorian configuration – Sandwich foam pre-preg layers radome. Three axis stabilization platform with conical RF tracking.

BUC 407009B-0500 NextGenWave 8W rating 407009E-0500 NextGenWave 20W rating

LNB Philtech OMT Thrane & Thrane TT 60-131011

Models Characterized:

Standard configuration: linear orthogonal polarization with co-polarized or cross-polarized signal reception option.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 39.8 dBW / 40 kHz for an orbital separation of the adjacent satellite $\ge 2.5^{\circ}$ 39.6 dBW / 40 KHz for an orbital separation of the adjacent satellite $\ge 2.0^{\circ}$ 35.6 dBW / 40 kHz for an orbital separation of the adjacent satellite $\ge 1.5^{\circ}$

Tx Frequency:

13.75 - 14.50 GHz

Rx Frequency: 10.70-12.75 GHz

Tx Gain: 41.1dBi (typical at 14.25 GHz)

Tx XPD: >30 dB within -1 dB contour

Rx Gain: 40.2 dBi (typical at 11.7 GHz)

Rx XPD: >30 dB within -1 dB contour

G/T (measured with radome)

19.9 dB/K @ 12.75 GHz 30 ° Elevation

Remarks:

1-The manufacturer states that the RMS pointing error is less than 0.20° for the following ship motions:

Roll = 30° in a period of 6 sec

Pitch = 15° in a period of 4 sec

Yaw = 10° in a period of 10 sec

- 2-The RF performance characterization was performed on one antenna unit with radome, at the France Telecom test range of La Turbie, France on the 18-20 April 2013.
- 3-Thrane & Thrane has inserted in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers.
- 4-The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.

Restrictions:

The use of Rx band 10.7 to 10.95 GHz may be subject to impairments because the isolation of the sidelobes at 3° from the boresight is less than 20 dB at 10.70 GHz (17.8 dB). Nevertheless these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.



Thrane & Thrane A/S Lundtoftegaardsvej 93 D DK-2800 Kgs. Lyngby DENMARK

P EUTELSAT

Antenna model: SAILOR 900 VSAT 407009A-00500

Antenna aperture dimensions: 1.05 m

Tel: + 45 39 55 88 00 Fax:+ 45 39 55 88 88 mailto:info@thrane.com Standard: M

Characterization date: 16-11-2012

System Description:

Stabilised maritime antenna – ring focus Gregorian configuration – sandwich foam RTM (Resine Transfer Molding) radome. Three axis stabilization platform with conical RF tracking. BUC NextGenWave 8W rating LNB Philtech OMT Thrane & Thrane TT 60-131011

Models Characterized:

Standard configuration: linear orthogonal polarization with co-polarized or cross-polarized signal reception option.

Maximum Allowed EIRP:

For digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 refers): 40.0 dBW / 40 KHz for an orbital separation of the adjacent satellite $\geq 2.0^{\circ}$ 36.1 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:

41.9 dBi (typical at 14.25 GHz)

Tx XPD: >35 dB within -1 dB contour

Rx Gain: 40.1 dBi (typical at 11.7 GHz)

Rx XPD:

>31.1 dB within -1 dB contour

G/T (measured with radome)

19.9 dB/K @ 12.75 GHz 30 ° Elevation

Remarks:

1-The manufacturer states that the RMS pointing error is less than 0.20° for the following ship motions:

Roll = 30° in a period of 6 sec

Pitch = 15° in a period of 4 sec

Yaw = 10° in a period of 10 sec

2-The RF performance characterization was performed on one antenna unit with radome, at the France Telecom test range of La Turbie, France on the 23-25 October 2012.

3-Thrane & Thrane will insert in the ACU software a look-up table with the polarization skew of the Eutelsat satellites, to protect against the mishandling of polarization skew values by installers.

4-The characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standards.

Restriction:

The use of Rx band 10.7 to 10.95 GHz may be subject to impairments because the isolation of the sidelobes at 3° from the boresight is less than 20 dB at 10.70 GHz (16.4 dB). Nevertheless these operations may be exceptionally authorized according to a valid Eutelsat transmission plan.



Applicant:

P EUTELSAT

Thrane & Thrane A/S trading as Cobham SATCOM Lundtoftegaardsvej 93D 2800 Kgs. Lyngby Denmark

Tel: + 45 39 55 88 00 Fax:+ 45 39 55 88 88 mailto:info@cobham.com Certificate: CH-MAR-COB-103-589 Antenna model: Sailor 1000 XTR Ku Diameter: 1.03 m Standard: M Characterization Date: 07/12/2021 Last test data submitted on: 06/10/2021

System Description:

Maritme Antenna with auto-pointing system, conical scanning (Conscan), with one Tx port and two RX ports. It provides a F/D ratio of 0.291, it is equipped with a radome and a BUC of max 16 W.

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

Frequency (GHz)	13.75 GHz	14.00 GHz	14.25 GHz	14.50 GHz
Satellite sep. ≥ 1.5°	34.4 dBW/40KHz	34.0 dBW/40KHz	35.8 dBW/40 KHz	35.3 dBW/40 KHz
Satellite sep. ≥ 2.0°	38.5 dBW/40 KHz	38.3 dBW/40KHz	39.6 dBW/40KHz	38.3 dBW/40KHz
Satellite sep. ≥ 2.5°	39.9 dBW/40KHz	39.5 dBW/40KHz	42.7 dBW/40KHz	42.8 dBW/40KHz
Satellite sep. ≥ 3°	39.9 dBW/40KHz	39.5 dBW/40KHz	42.1 dBW/40KHz	41.5 dBW/40KHz

Tx Frequency: 13.75 - 14.50 GHz	Rx Frequency: 10.70 - 12.75 GHz
Tx Gain: 40.9 dBi (typical at 14.00 GHz)	Rx Gain: 40.4 dBi (typical at 11.50 GHz)
Tx XPD: \geq 36.9 dB within -1 dB contour (worst case at 14.00 GHz)	Rx XPD: <u>></u> 26.9 dB at boresight and at 10.7 GHz in H-Pol (Port 1)
Pointing and wind load error: < 0.2°	G/T: 17.3 dB/K theoretical assuming NF for the LNB of 1.6 dB and a gain for LNB equal to 50 dB

Restrictions and remarks:

- 1) The access is assumed to be in TDMA mode on digital carriers of maximum 10 MSym/s
- The authorization to operate the terminal is conditioned to the approval to access the Eutelsat S.A. Space Segment (ref. <u>http://www.eutelsat.com/files/contributed/satellites/pdf/esog110.pdf</u>, ESOG 110).
- This Characterization has been performed at the test range of Catapult in Harwell Campus (Oxford, UK) between September and October 2021.
- 4) The Characterization's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard.

Eutelsat is one of the world's leading and most experienced operators of communications satellites.

Our extensive network of high-performance satellites, located between 133° West and 174° East, provides capacity to clients that include broadcasters and broadcasting associations, pay-TV operators, video, data and Internet service providers, enterprises and government agencies.

Eutelsat's satellites provide ubiquitous coverage of Europe, the Middle East, Africa, Asia-Pacific and the Americas, enabling video, data, broadband and government communications to be established irrespective of a user's location.

Headquartered in Paris, with offices and teleports around the globe, Eutelsat represents a workforce of 1,200 men and women from 46 countries who are experts in their fields and work with clients to deliver the highest quality of service.

fields and work with clients to deliver the highest quality of service.

