





# ETSI EN 301 428 V1.2.1 (2001-02)

---

*Candidate Harmonized European Standard (Telecommunications series)*

**Satellite Earth Stations and Systems (SES);  
Harmonized EN for Very Small Aperture Terminal (VSAT);  
Transmit-only, transmit/receive or receive-only  
satellite earth stations operating  
in the 11/12/14 GHz frequency bands  
covering essential requirements  
under article 3.2 of the R&TTE directive**

---



---

**Reference**

REN/SES-00048

---

**Keywords**

regulation, VSAT, satellite

**ETSI**

---

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at <http://www.etsi.org/tb/status/>

If you find errors in the present document, send your comment to:  
editor@etsi.fr

---

**Copyright Notification**

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2001.  
All rights reserved.

# Contents

Intellectual Property Rights .....	7
Foreword .....	7
Introduction .....	8
1 Scope .....	10
2 References .....	11
3 Definitions and abbreviations .....	11
3.1 Definitions .....	11
3.2 Abbreviations .....	13
4 Technical requirements specifications .....	14
4.1 General .....	14
4.1.1 Environmental profile .....	14
4.1.2 Control and Monitoring Functions (CMF) .....	14
4.1.3 Operational configurations .....	14
4.2 Conformance requirements .....	14
4.2.1 Off-axis spurious radiation .....	14
4.2.1.1 Justification .....	14
4.2.1.2 Specification .....	15
4.2.1.2.1 Transmit VSAT .....	15
4.2.1.2.2 Receive-only VSAT .....	16
4.2.1.3 Conformance tests .....	16
4.2.2 On-axis spurious radiation for transmit VSAT .....	16
4.2.2.1 Justification .....	16
4.2.2.2 Specification .....	16
4.2.2.2.1 "Carrier-on" state .....	16
4.2.2.2.2 "Carrier-off" state and transmission disabled state .....	17
4.2.2.3 Conformance tests .....	17
4.2.3 Off-axis EIRP emission density within the band .....	17
4.2.3.1 Justification .....	17
4.2.3.2 Specification .....	17
4.2.3.3 Conformance tests .....	18
4.2.4 Carrier suppression .....	18
4.2.4.1 Justification .....	18
4.2.4.2 Specification .....	18
4.2.4.3 Conformance tests .....	18
4.2.5 Mechanical (antenna pointing) for transmit VSAT .....	19
4.2.5.1 Justification .....	19
4.2.5.2 Specification .....	19
4.2.5.3 Conformance tests .....	19
4.2.6 Class A Control and Monitoring Functions .....	19
4.2.6.1 Control and Monitoring Functions (CMF) .....	19
4.2.6.1.1 General .....	19
4.2.6.1.2 CMF state transition diagram .....	20
4.2.6.1.3 Specification of states .....	21
4.2.6.2 Control Channels (CC) .....	21
4.2.6.2.1 Justification .....	21
4.2.6.2.2 Specification .....	22
4.2.6.2.3 Conformance tests .....	22
4.2.6.3 Self monitoring functions .....	22
4.2.6.3.1 General .....	22
4.2.6.3.2 Processor monitoring .....	23
4.2.6.3.2.1 Justification .....	23
4.2.6.3.2.2 Specification .....	23
4.2.6.3.2.3 Conformance tests .....	23

4.2.6.3.3	Transmit subsystem monitoring.....	23
4.2.6.3.3.1	Justification .....	23
4.2.6.3.3.2	Specification.....	23
4.2.6.3.3.3	Conformance tests .....	23
4.2.6.3.4	VSAT transmission validation .....	23
4.2.6.3.4.1	General.....	23
4.2.6.3.4.2	VSAT transmission validation by the CCMF.....	23
4.2.6.3.4.2.1	Justification .....	23
4.2.6.3.4.2.2	Specification .....	24
4.2.6.3.4.2.3	Conformance tests .....	24
4.2.6.3.4.3	VSAT transmission validation by receiving station(s).....	24
4.2.6.3.4.3.1	Justification .....	24
4.2.6.3.4.3.2	Specification .....	24
4.2.6.3.4.3.3	Conformance tests .....	24
4.2.6.3.4.4	Transmission validation for VSAT using external CC.....	24
4.2.6.3.4.4.1	Justification.....	24
4.2.6.3.4.4.2	Specification .....	24
4.2.6.3.4.4.3	Conformance tests .....	24
4.2.6.4	Reception of commands from the CCMF .....	25
4.2.6.4.1	General .....	25
4.2.6.4.2	Disable message.....	25
4.2.6.4.2.1	Justification .....	25
4.2.6.4.2.2	Specification.....	25
4.2.6.4.2.3	Conformance tests .....	25
4.2.6.4.3	Enable Message .....	25
4.2.6.4.3.1	Justification .....	25
4.2.6.4.3.2	Specification.....	25
4.2.6.4.3.3	Conformance tests .....	25
4.2.6.5	Power-on/Reset .....	25
4.2.6.5.1	Justification.....	25
4.2.6.5.2	Specification .....	25
4.2.6.5.3	Conformance tests.....	26
4.2.7	Class B Control and Monitoring Functions .....	26
4.2.7.1	Processor monitoring.....	27
4.2.7.1.1	Justification.....	27
4.2.7.1.2	Specification .....	27
4.2.7.1.3	Conformance tests.....	27
4.2.7.2	Transmit subsystem monitoring .....	28
4.2.7.2.1	Justification.....	28
4.2.7.2.2	Specification .....	28
4.2.7.2.3	Conformance tests.....	28
4.2.7.3	Power-on/Reset .....	28
4.2.7.3.1	Justification.....	28
4.2.7.3.2	Specification .....	28
4.2.7.3.3	Conformance tests.....	28
4.2.7.4	Control Channel (CC) reception.....	28
4.2.7.4.1	Justification.....	28
4.2.7.4.2	Specification .....	28
4.2.7.4.3	Conformance tests.....	29
4.2.7.5	Network control commands .....	29
4.2.7.5.1	Justification.....	29
4.2.7.5.2	Specification .....	29
4.2.7.5.3	Conformance test .....	29
4.2.7.6	Initial burst transmission.....	29
4.2.7.6.1	Justification.....	29
4.2.7.6.2	Specification .....	29
4.2.7.6.3	Conformance tests.....	29
5	Testing for compliance with technical requirements .....	30
5.1	Environmental conditions for testing.....	30
5.2	Essential radio test suites .....	30

6	Test methods for the complete VSAT .....	30
6.1	General .....	30
6.2	Off-axis spurious radiation .....	31
6.2.1	Test method .....	31
6.2.1.1	Up to 1 000 MHz .....	31
6.2.1.1.1	Test site .....	31
6.2.1.1.2	Measuring receivers .....	32
6.2.1.1.3	Procedure .....	32
6.2.1.2	Above 1 000 MHz .....	32
6.2.1.2.1	Identification of the significant frequencies of spurious radiation .....	32
6.2.1.2.1.1	Test site .....	32
6.2.1.2.1.2	Procedure .....	32
6.2.1.2.2	Measurement of radiated power levels of identified spurious radiation .....	33
6.2.1.2.2.1	Test site .....	33
6.2.1.2.2.2	Procedure .....	33
6.2.1.2.3	Measurement of conducted spurious radiation at the antenna flange .....	34
6.2.1.2.3.1	Test site .....	34
6.2.1.2.3.2	Procedure .....	34
6.3	On-axis spurious radiation .....	35
6.3.1	Test method .....	35
6.3.1.1	Test site .....	35
6.3.1.2	Method of measurement .....	35
6.3.1.2.1	General .....	35
6.3.1.2.2	Method of measurement at the antenna flange .....	35
6.3.1.2.3	Method of measurement with a test antenna .....	36
6.4	Off-axis EIRP emission density within the band .....	37
6.4.1	Test method .....	37
6.4.1.1	General .....	37
6.4.1.2	Transmit output power density .....	38
6.4.1.2.1	General .....	38
6.4.1.2.2	Test site .....	38
6.4.1.2.3	Method of measurement .....	38
6.4.1.3	Antenna transmit gain .....	39
6.4.1.3.1	General .....	39
6.4.1.3.2	Test site .....	39
6.4.1.3.3	Method of measurement .....	39
6.4.1.4	Antenna transmit radiation patterns .....	40
6.4.1.4.1	General .....	40
6.4.1.4.2	Test site .....	40
6.4.1.4.3	Test arrangement .....	41
6.4.1.4.4	Co-polar radiation pattern-azimuth .....	41
6.4.1.4.5	Co-polar radiation pattern-elevation .....	41
6.4.1.4.6	Cross-polar radiation pattern-azimuth .....	42
6.4.1.4.7	Cross-polar radiation pattern-elevation .....	42
6.4.2	Computation of results .....	43
6.5	Carrier suppression .....	43
6.5.1	Test method .....	43
6.6	Antenna pointing for transmit VSAT .....	44
6.6.1	Test method .....	44
6.7	Class A Control and Monitoring Functions .....	44
6.7.1	General .....	44
6.7.2	Test arrangement .....	45
6.7.3	Control Channels (CC) .....	45
6.7.3.1	Test method .....	45
6.7.3.1.1	Test method for internal CC .....	46
6.7.3.1.2	Test method for external CC .....	46
6.7.4	Processor monitoring .....	46
6.7.4.1	Test method .....	46
6.7.5	Transmit subsystem monitoring .....	47
6.7.5.1	Test method .....	47
6.7.6	VSAT transmission validation .....	47
6.7.6.1	Test method for VSAT validation by the CCMF for VSAT using internal CC .....	47

6.7.6.2	Test method for VSAT validation by receiving station(s) for VSAT using internal CC.....	47
6.7.6.3	Test method for transmission validation for VSAT using external CC.....	47
6.7.7	Reception of commands from the CCMF.....	47
6.7.7.1	Test method.....	47
6.7.8	Power-on/Reset.....	48
6.7.8.1	Test method.....	48
6.8	Class B Control and Monitoring Functions.....	48
6.8.1	Test arrangement.....	49
6.8.2	Processor monitoring- Test method .....	49
6.8.3	Transmit subsystem monitoring-Test method.....	50
6.8.4	Power-on/Reset-Test method.....	50
6.8.5	Control Channel (CC) reception-Test method .....	50
6.8.6	Network Control commands-Test method.....	51
6.8.7	Initial burst transmission-Test method .....	53
7	Test methods for modified VSAT .....	53
7.1	General .....	53
7.2	Antenna subsystem replacement .....	54
<b>Annex A (normative):</b>	<b>The EN Requirements table (EN-RT) .....</b>	<b>55</b>
<b>Annex B (informative):</b>	<b>Pointing stability methodology .....</b>	<b>56</b>
<b>Annex C (informative):</b>	<b>Bibliography.....</b>	<b>57</b>
History .....		58