SLOVENSKI STANDARD
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Napredni sistem za vodenje in nadzor gibanja po zemlji (A-SMGCS) - 6. del: Harmonizirani EN, ki zajema bistvene zahteve člena 3.2 direktive R&TTE za aktivno zaznavalo radarja za površinsko gibanje - 1. poddel: Zaznavala, ki delujejo v frekvenčnem pasu X (10,525 GHz), z impulznimi signali in oddajno močjo do 100 kW

Advanced Surface Movement Guidance and Control System (A-SMGCS) - Part 6: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors - Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW

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Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 6: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW

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Foreword

This Harmonized European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Directive 98/34/EC [i.9] as amended, laying down a procedure for the provision of information in the field of technical standards and regulations.

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.1].

See article 5.1 of Directive 1999/5/EC [i.1] for information on presumption of conformity and Harmonised Standards or parts thereof the references of which have been published in the Official Journal of the European Union.

The requirements relevant to Directive 1999/5/EC [i.1] are summarised in annex A.

The present document is part 6, sub-part 1 of a multi-part deliverable covering Advanced Surface Movement Guidance and Control System (A-SMGCS), as identified below:

Part 1: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS Level 1 including external interfaces";

Part 2: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS Level 2 including external interfaces";

Part 3: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed cooperative sensor including its interfaces";

Part 4: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed non-cooperative sensor including its interfaces ";

Part 5: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for transmitter used in multilateration equipment";

Part 6: "Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors";

Sub-part 1: "X-Band sensors using pulsed signals and transmitting power up to 100 kW".

NOTE: SMR systems using FM-CW signals may be covered by future sub-parts of this multi-part deliverable.

National transposition dates	
Date of adoption of this EN:	19 September 2011
Date of latest announcement of this EN (doa):	31 December 2011
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2012
Date of withdrawal of any conflicting National Standard (dow):	30 June 2012

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [i.1]. The modular structure is shown in EG 201 399 [i.10].

1 Scope

The present document applies to X-band radar sensors intended for the surveillance of airport surface movement traffic with the following characteristics:

- Utilizing modulated or unmodulated pulses.
- Transmitter Peak Envelope Power up to 100 kW.
- The transceiver-antenna connection is using a hollow metallic rectangular waveguide.
- The antenna is rotating, waveguide- based and passive.
- At the transceiver output an RF-circulator is used.

The present document covers only the essential requirements of article 3.2 of the R&TTE Directive [i.1].

NOTE 1: Since transceiver and antenna are hollow metallic rectangular waveguide based the frequency range for measurements that needs to be addressed covers 6,56 GHz to 26 GHz The lower limit of this frequency range is obtained as cut-off frequency of the combination of WR112/R84 taper section and a WR90/R100 Waveguide IEC 60153-2 [i.3]. The upper limit corresponds to the upper limit stated in ERC/Recommendation 74-01 [i.5].

NOTE 2: Since at the transceiver output an RF circulator is used, it is assumed that the transceiver characteristics remain independent from the antenna.

NOTE 3: According Article 5 of the ITU Radio Regulations [i.6] the band 9 000 MHz to 9 200 MHz is allocated to the Aeronautical Radionavigation Service on a primary basis and the band 9 300 MHz to 9 500 MHz is allocated to the Aeronautical Radionavigation Service on a secondary basis.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 1999/5/EC of The European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[i.2] Merrill I. Skolnik: "Radar Handbook", 2nd Edition, McGraw Hill publications.

[i.3] IEC 60153-2 (Edition 2.0, 1974): "Hollow metallic waveguides. Part 2: Relevant specifications for ordinary rectangular waveguides".

[i.4] ECC/Recommendation (02)05 (2004): "Unwanted emissions".

[i.5] ERC/Recommendation 74-01 (2011): "Unwanted emissions in the spurious domain".

[i.6] International Telecommunication Union (ITU) Geneva 2008: "Radio Regulations".

[i.7] ITU-R Recommendation M.1177-4 (2011): "Techniques for measurement of unwanted emissions of radar systems".

[i.8] ITU-R Recommendation SM.1541-3 (2011): "Unwanted emissions in the out-of-band domain".

NOTE: More stringent requirements envisioned for future versions of ITU-R Recommendation SM.1541-3, ECC/Recommendation (02)05 and ERC/Recommendation 74-01 may need to be considered in a future version of the present document.

[i.9] Directive 98/34/EC of the European Parliament and of the Council laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on information society services.

[i.10] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the R&TTE Directive".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

necessary bandwidth: for a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

NOTE: This definition is taken from ITU Radio Regulation No. 1.152 [i.6].

occupied bandwidth: Width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage β/2 of the total mean power of a given emission. Unless otherwise specified in an ITU-R Recommendation for the appropriate class of emission, the value of β/2 should be taken as 0,5%.

NOTE: This definition is taken from ITU Radio Regulation No. 1.153 [i.6].

peak envelope power: average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions

NOTE: This definition is taken from ITU Radio Regulation No. 1.157 [i.6]).

pulse duration: time between the 50 % amplitude (voltage) points

pulse rise time: time taken for the leading edge of the pulse to increase from 10 % to 90 % of the maximum amplitude (voltage)

3.2 Symbols

For the purposes of the present document, the following symbols apply:

B_{-40}	-40 dB bandwidth
B_C	Chirp bandwidth
B_N	Necessary bandwidth
B_{res}	3 dB resolution bandwidth of transceiver

dBpp	dB with respect to peak power
$D_{no\ spur}$	Detectability Factor (function of PD & Pfa)
k	Boltzmann's constant
MDS	Minimum Detectable Signal
NF_{sys}	Noise Figure of the system
PD	Probability of detection
PEP	Peak Envelope Power
Pfa	Probability of false detection
P_t	Pulse power of transmission
t	Time
t_p	Pulse duration
t_r	Pulse rise time
T_0	Temperature in Kelvin
T_C	Chirp length in sec.
λ	Wavelength

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Alternating Current
FM-CW	Frequency Modulated Continuous Wave
LNA	Low Noise Amplifier
OoB	Out-of-Band
R&TTE	Radio and Telecommunication Terminal Equipment
SMR	Surface Movement Radar

4 Technical requirements

4.1 Environmental profile

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile which, as a minimum, shall be that specified in the test conditions contained in the present document.

As technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions as specified in the present document to give confidence of compliance for the affected technical requirements (which shall also be within the boundary limits of the declared operational environmental profile).

4.2 Conformance requirements

4.2.1 Operating frequency

4.2.1.1 Definition

The transmitter of a pulsed radar produces microwave pulses, which cause a broad frequency spectrum, depending on the pulse duration.

The operating frequency is to be understood as the frequency of the microwave emission during the transmitting pulse and is represented by the spectral line of highest amplitude.