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Edition 2.0 2015-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radio data system (RDS) – Receiver products and characteristics – Methods of measurement

Système de radiodiffusion de données (RDS) – Récepteurs et caractéristiques – Méthodes de mesure

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RADIO DATA SYSTEM (RDS) – RECEIVER PRODUCTS AND CHARACTERISTICS – METHODS OF MEASUREMENT

FOREWORD

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International Standard IEC 62634 has been prepared by technical area 1: Terminals for audio, video and data services and contents, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- the ±100 kHz test measurement case from Clause 8 of IEC 62634:2011 was deleted as it did not permit to achieve stable and reproducible measurement results;
- an error has been corrected. The term "de-emphasis" shall read correctly "pre-emphasis".

The text of this standard is based on the following documents:

CDV	Report on voting
100/2121/CCDV	100/2419/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This International Standard gives commonly agreed measuring methods to complement the RDS standard IEC 62106 and the RBDS standard (NRSC-4-A) in the USA.

The RDS measuring methods presented here are directed at all manufacturers of RDS receiver products, and in particular tuner modules with embedded RDS functionality, including TMC (see ISO 14819 series of standards).

RADIO DATA SYSTEM (RDS) – RECEIVER PRODUCTS AND CHARACTERISTICS – METHODS OF MEASUREMENT

1 Scope

This International Standard describes how to measure minimum RDS receiver performance requirements which concern three RDS receiver product categories. However, it should be noted that there are also RDS receiver products on the market that significantly out-perform the minimum RDS receiver performance requirements quoted.

Methods and algorithms to achieve automatic programme service-following by means of AF lists are, however, very customer- and manufacturer-specific, and are therefore not covered in this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62106, *Specification of the Radio Data System (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 MHz to 108,0 MHz*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply. Terms and definitions of the RDS features used shall be found in IEC 62106.

3.1.1
RDS product category 1
RDS receiver product with high-ohmic input impedance

EXAMPLE For portable devices.

3.1.2
RDS product category 2
RDS receiver product with 50 Ω input impedance

EXAMPLE Car radio optimized for active antenna.

3.1.3
RDS product category 3
RDS receiver product with 75 Ω input impedance

EXAMPLE Car radio optimized for rod antenna or home receiver.

3.1.4
RDS reception
the signal at which the RDS signal is received with 50 % non-corrected error-free blocks

Note 1 to entry: In practice, the level at which the TP bit is immediately detected.

3.1.5
large signal behaviour
capability of the RDS receiver to fulfil its function at or in the neighbourhood of strong FM signals

3.1.6
RDS selectivity
capability of the RDS receiver to cope with adjacent signals at both sides of the tuning frequency: ± 200 kHz

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

AF	Alternative Frequency
dBμV	Signal level in μV; 0 dBμV = 1 μV, 6 dBμV = 2 μV, 20 dBμV = 10 μV
EON	Enhanced Other Networks information
FM	Frequency Modulation
GUI	Graphic User Interface
IPR	Intellectual Property Rights
PI	Programme Identification
PND	Personal Navigation Device
PS	Programme Service name
PTY	Programme TYpe
RDS	Radio Data System
RBDS	USA Radio Data System[1]
S+200	Unwanted signal, +200 kHz offset from the wanted signal
S−200	Unwanted signal, −200 kHz offset from the wanted signal
TA/TP	Traffic Announcement/Traffic Programme
TMC	Traffic Message Channel

4 Measuring method

4.1 Standard measuring signal

Unless otherwise stated, the following measuring signal shall be applied.

Tuning frequency	97,1 MHz
Signal input level V_i	60 dBμV
Deviation Δf	22,5 kHz
Modulation frequency F_{mod}	1 kHz
Pilot 19 kHz deviation	6,75 kHz
Modulation method	$L = R$
Deviation RDS carrier Δf_{RDS}	2 kHz
Pre-emphasis	50 μs (USA: 75 μs)

Where an unwanted signal will be added, for RDS car radio selectivity measurements, this will be done with the coupling circuit shown in Figure 1. The circuit shows how to couple two

[1] See NRSC-4-A, RBDS standard cited in the Bibliography.

generators with 50 Ω output so that the total output impedance remains 50 Ω. Depending on the input impedance, one of the matching circuits shown in Figure 2 should be applied in addition.

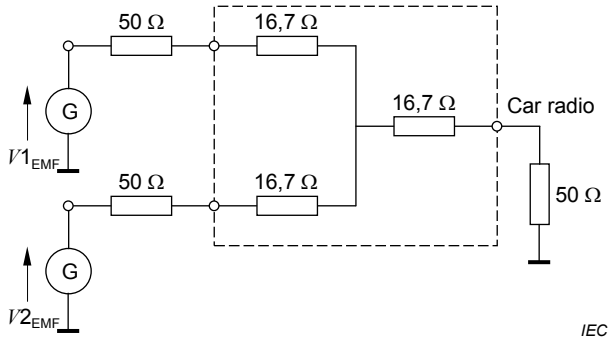

Figure 1 – Coupling circuit

4.2 RDS data conditions

4.2.1 General

The RDS data shall consist of an appropriate PI code, a PS name, one or more AFs and chosen values for, e.g. TP (=1), DI (=0000), TA (=0), PTY (=00001) and M/S (=1), with a maximum repetition rate for group type 0A of four groups per second. Use group type A only.

4.2.2 Matching circuit

For the three types of RDS product devices (modules for portable devices, car radio and home receiver), the matching circuit is given in Figure 2.

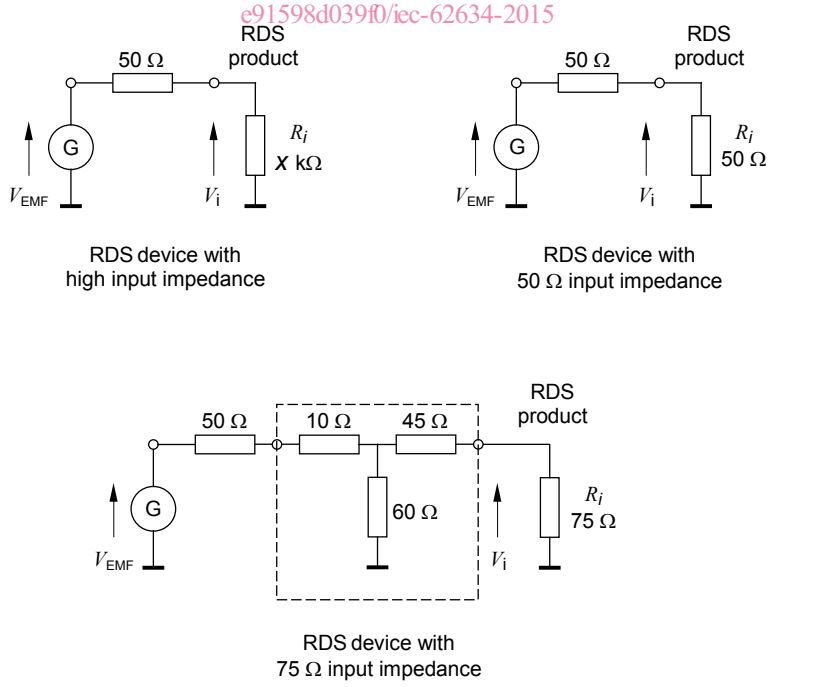

Figure 2 – Matching circuits for RDS product devices with three different input impedances

RF generators have a characteristic impedance of 50 Ω. For a device with an input impedance of 50 Ω, no additional matching circuit is needed. The antenna input signal V_i is then V_{EMF} – 6 dB. In case of a category 1 device like a PND, which generally has a high input impedance, V_i is then almost equal to the generator voltage V_{EMF}. When the input impedance cannot be ignored in relation to the 50 Ω generator impedance, the correction shall be calculated separately.

EXAMPLE For a device with 2 kΩ input impedance this will give $V_i = V_{EMF} \times 2\,000/(2\,000 + 50)$ and in dBμV this yields V_i dBμV = V_{EMF} dBμV – 0,2 dBμV.

5 Measurement of the RDS sensitivity

5.1 General

The lowest FM input signal is determined for which RDS reception is obtained.

5.2 Method of measurement

The receiver and the signal source are operated under standard measuring conditions, according to 4.1.

a) When a GUI is available, which is capable of measuring good and bad blocks, then a reading of 50 % good blocks is an accurate result for the sensitivity measurement. The ratio should be calculated over at least 2 000 receivable blocks.

b) A good alternative in the case, where a GUI and statistical read-out is not available to measure the level of correctly received RDS blocks, is the TP flag.

Turn the signal level up until 50 % error free RDS blocks are received. Alternatively, turn the signal level up until the TP flag lights up. Repeat this three times and take the average value of these three observations.

If the TP flag cannot be displayed, then the complete PS can be used instead. However, care should be taken that a new programme service name is entered into the RDS encoder each time a new measurement is done. The new programme service name shall differ from the previous one in all eight characters.

5.3 Presentation of the results

The result is presented in dBμV.

Minimum receiver sensitivity requirement:	RDS product category 1	21 dBμV
	RDS product category 2	18 dBμV
	RDS product category 3	18 dBμV

6 Measurement of the RDS data acquisition

6.1 General

Particularly for tuner modules or circuits with RDS fully integrated for mobile use, it is important to know the time to synchronize after a re-tune. Strongly related to this is the time to receive the PI code for the first time.

6.2 Time to synchronise

When tuned to an FM-RDS station, it is important to have RDS synchronisation immediately.