

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Analysis of compliance of Forward Link Only air interface
specification (ETSI TS 102 589) with
DVB-T Harmonized Standard EN 302 296**



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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document handles the spectrum compliance of Forward Link Only air interface specification (TS 102 589 [i.1]) with DVB-T Harmonized Standard EN 302 296 [i.2].

Introduction

An introduction to the Forward Link Only air interface can be found in informative annex A of TS 102 589 [i.1]. Additional details on the derivation of the baseline parameters for 8 MHz, 7 MHz, 6 MHz and 5 MHz RF channel bandwidths is provided in annex B of TS 102 589 [i.1].

1 Scope

The present document provides an analysis of the spectrum compatibility of Forward Link Only air interface as specified in TS 102 589 [i.1] with DVB-T in the bands addressed in the scope of EN 302 296 [i.2]. In accordance with the corresponding Work Item description, the present document reviews test methodology, test set configurations, and measurement results for Forward Link Only compliance with respect to a DVB-T waveform and ETSI critical mask for adjacent channel interference.

2 References

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] ETSI TS 102 589 (V1.1.1): "Forward Link Only Air Interface; Specification for Terrestrial Mobile Multimedia Multicast".
- [i.2] ETSI EN 302 296 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Transmitting equipment for the digital television broadcast service, Terrestrial (DVB-T); Harmonized EN under article 3.2 of the R&TTE Directive".
- [i.3] 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.4] Rhode & Schwarz 8000 Transmitter @ 300W through Myatt Filter (Part # ERD00108E32).

3 Definitions, and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 302 296 [i.2] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in EN 302 296 [i.2] apply.

4 Compliance Analysis

4.1 Methodology

As pointed out in the scope, the aim of the present document is to analyse the spectrum compatibility of Forward Link Only air interface with DVB-T. The logical methodology to perform such analysis is to follow the methods given in clause 4 of Harmonized Standard EN 302 296 [i.2] for demonstrating the compliance with the technical requirements specified in that clause. These requirements are intended to cover the provisions of article 3.2 of Directive 1999/5/EC (R&TTE Directive) [i.3] which addresses the effective use of the spectrum allocated to terrestrial/space radio communications and orbital resources in such a way to avoid harmful interference. In particular, clause 4.2 on "Antenna port measurements" is considered in the present document. In the following, results on the measurements of "Spurious emissions" (clause 4.2.1) and "Out-of-band emissions" (clause 4.2.2) for the transmitter given in [i.4] are presented. This transmitter is referred to as "the typical commercial transmitter" in the rest of the present document.

4.2 Results

4.2.1 Spurious emissions

The main scope of the present document is to present test methodology, test set configurations and measurement results for Forward Link Only compliance with respect to a DVB-T waveform and ETSI critical mask for adjacent channel interference. However, it is useful and informative to present as well results which demonstrate Forward Link Only compliance with respect to the spurious emissions specified in EN 302 296 [i.2]. This clause is addressing this subject.

The methodology used to measure the spurious emissions is according to clause 4.2.1 of EN 302 296 [i.2]. The results for the typical commercial transmitter and 8 MHz channel, in the frequency range > 862 MHz, were compared to the limits for this frequency range given in table 4.1 of EN 302 296 [i.2] and are shown in figure 1.

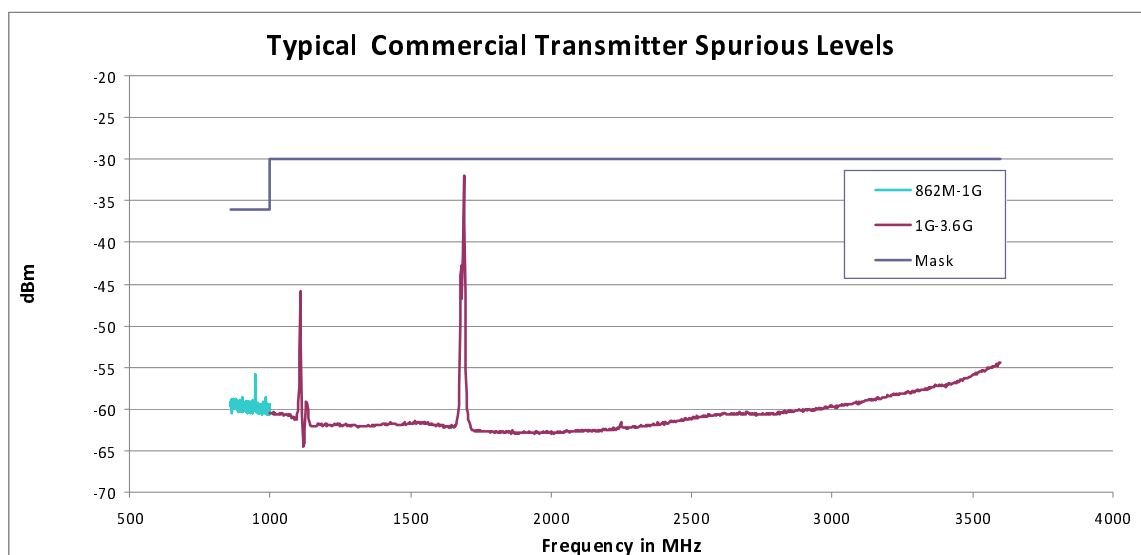


Figure 1: Results of measurement of the spurious emissions (measured in 100 kHz)

4.2.2 Out-of-band emissions

The methodology used to measure the out-of-band emissions is according to clause 4.2.2 of EN 302 296 [i.2]. The results for the typical commercial transmitter and 8 MHz channel were compared to the limits given in table 4.2 of EN 302 296 [i.2] and are shown in figure 2 for 3 kHz measurement bandwidth.

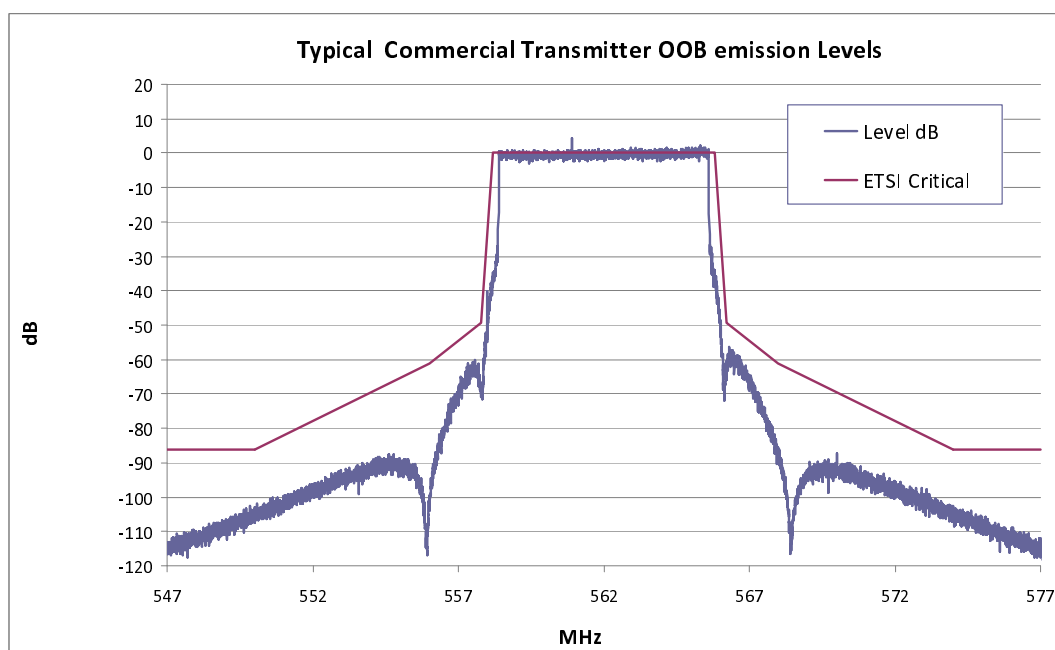


Figure 2: Results of measurement of the out-of-band emissions (measured in 3 kHz)

The out-of-band limits in table 4.2 of EN 302 296 [i.2] are measured in a 4 kHz bandwidth. Table 1 shows these limits by applying the correction factor -1,25 dB required to convert the 4 kHz reference bandwidth to the measurement bandwidths used in the tests.

Table 1: Out-of-band emission limits for transmitter with output power ≥ 25 W measured in 3 kHz

Classification accordingly the frequency assignment	8 MHz Channel, frequency difference from the centre frequency (MHz)	Relative level (dBc)
Non-critical cases	$\pm 3,81$	-34,05
	$\pm 4,2$	-74,25
	± 6	-86,25
	± 12	-111,25
Critical cases	$\pm 3,81$	-34,05
	$\pm 4,2$	-84,25
	± 6	-96,25
	± 12	-121,25

4.3 Discussion and Conclusions

The aim of the present document is to analyse the spectrum compatibility of Forward Link Only transmitter with digital TV systems operating in the bands addressed in the scope of EN 302 296 [i.2]. The assessment criterion is the comparison of Forward Link Only out of band emissions with those of DVB-T. For this purpose, the compliance of Forward Link Only transmitter with Harmonized Standard EN 302 296 [i.2] is used as the methodology to show the spectrum compatibility. The rationale for this approach is the fact that requirements defined in a Harmonized Standard are intended to cover the provisions of article 3.2 of R&TTE Directive in terms of effective use of spectrum in such a way to avoid harmful interference. On the other hand, a full compliance with all requirements of the EN 302 296 [i.2] is required only for placing digital TV radio equipments on the market. However this is not the goal of the present document, rather to demonstrate spectrum compatibility in the context of the corresponding Work Item description. Therefore, a compromise approach, as described in the following, was selected in order, on one hand, to reduce the number of required measurements and, on the other hand, to demonstrate the compliance with the most essential requirements specified in EN 302 296 [i.2].

Out-of-band emission, which is technology dependent, was considered in the corresponding Work Item description as the core requirement for the verification of spectrum compatibility. Figure 3 demonstrates this fact, where the out of band emissions of Forward Link Only are compared to those of DVB-T. It can be identified from this figure that the only place that there is a discernable difference between the results for the two technologies is in frequency separations from the centre frequency in the range of 3,81 MHz to 4,2 MHz, where frequency response of Forward Link Only is slightly narrower. The compliance of Forward Link Only transmitter with the out-of-band emission requirements of digital TV in EN 302 296 [i.2] was shown for the typical commercial transmitter in clause 4.2.2 of the present document.

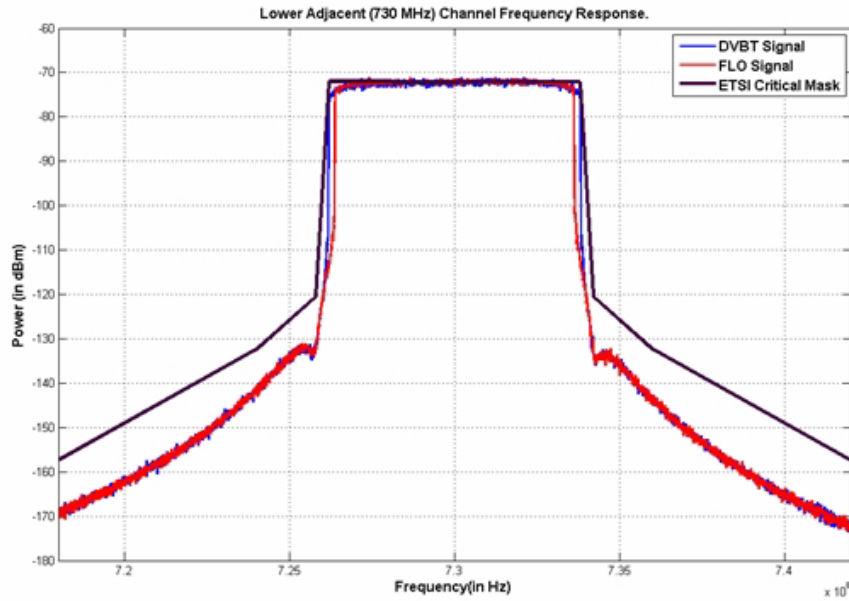


Figure 3: Comparison of Forward Link Only frequency response with that of DVB-T

The spurious response test is not requested in the corresponding Work Item description. This is due to the fact that it is unrelated to the technology and is a characteristic of the transmitter filter. However, it was considered as useful and informative to present results which demonstrate Forward Link Only compliance with respect to the spurious emissions specified in EN 302 296 [i.2]. Therefore, the compliance of Forward Link Only spurious emissions with the limits specified for DVB-T in EN 302 296 [i.2] was not tested for the entire frequency range in table 4.1 EN 302 296 [i.2], but in the frequency range above 862 MHz. The compliance of Forward Link Only transmitter with the spurious emission requirements of digital TV was demonstrated for the typical commercial transmitter in clause 4.2.1 of the present document.

Annex A: Bibliography

TIA 1099 (March 2007): "Forward Link Only Air Interface for Terrestrial Mobile Multimedia Multicast".

NOTE: Available at: <http://www.tiaonline.org/standards/technology/tm3/>

History

Document history		
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