

## 5 TEST CONDITIONS AND RESULTS

### 5.1 Conducted emissions

For test instruments and accessories used see section 6 Part A 4.

#### 5.1.1 Description of the test location

Test location: Shielded Room S2

#### 5.1.2 Photo documentation of the test set-up



#### 5.1.3 Applicable standard

According to FCC Part 15C, Section 15.107(a) and Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

#### 5.1.4 Description of Measurement

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with  $50 \Omega / 50 \mu\text{H}$  (CISPR 16) characteristics and following the procedures set out in ANSI C63.4. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded.

To convert between  $\text{dB}\mu\text{V}$  and  $\mu\text{V}$ , the following conversions apply:

$$\text{dB}\mu\text{V} = 20 \log \mu\text{V}$$

$$\mu\text{V} = 10^{(\text{dB}\mu\text{V}/20)}$$

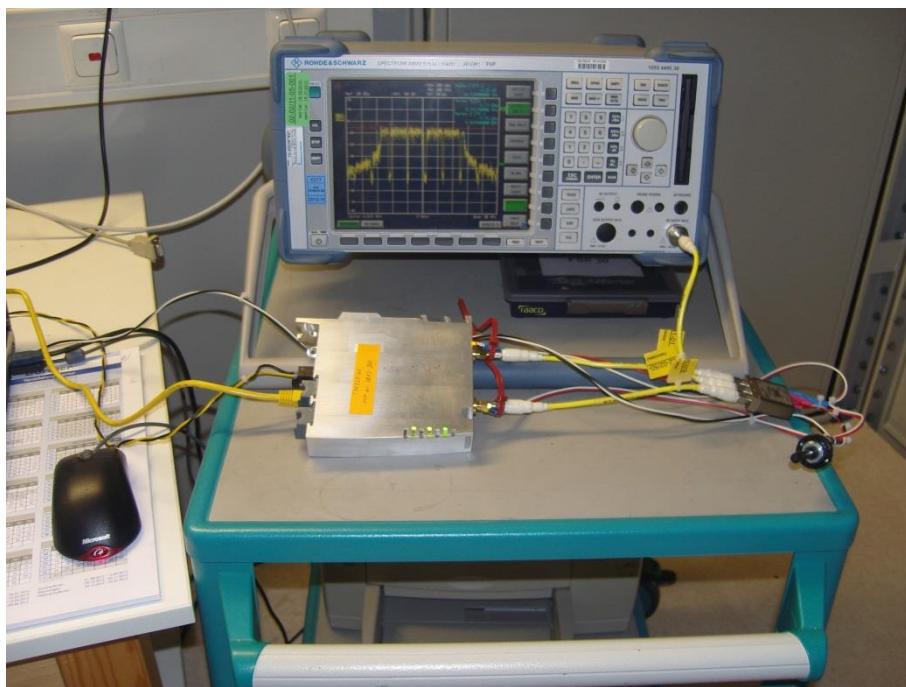
## 5.2 Emission bandwidth and occupied bandwidth

For test instruments and accessories used see section 6 Part **MB**.

### 5.2.1 Description of the test location

Test location: AREA4

### 5.2.2 Photo documentation of the test set-up



### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(2):

Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.2.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at the transmitter at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyser.

Spectrum analyser settings:

RBW: 100 kHz      VBW: 300 kHz,      Detector: Peak,      Trace mode: max hold;

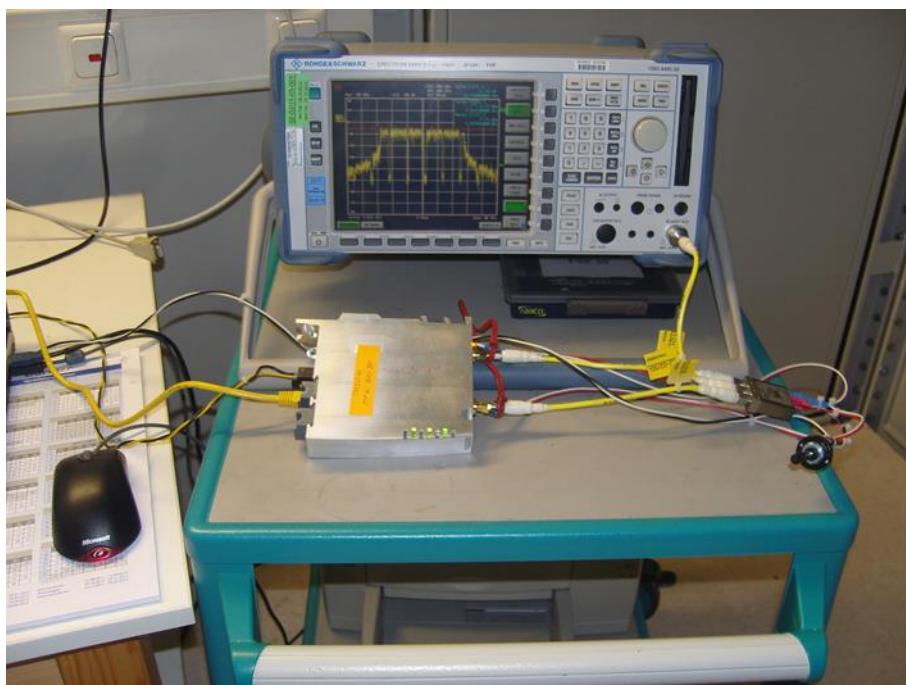
### 5.3 Maximum peak conducted output power

For test instruments and accessories used see section 6 Part **CPC 3**.

#### 5.3.1 Description of the test location

Test location: AREA 4

#### 5.3.2 Photo documentation of the test set-up



#### 5.3.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3):

For systems using digital modulation in the 2400-2483.5 MHz and 5725 – 5850 MHz bands, the maximum peak output power of the transmitter shall not exceed 1 Watt. The limit is based on transmitting antennas of directional gain that do not exceed 6 dBi.

#### 5.3.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser with the function "integrated bandpower measurement" following the procedure set out in OET 558074, item 9.1.2. The EUT is set in TX continuous mode while measuring. The EUT is measured at chain 1 and chain 2. The measurement values are converted into linear values and the chain 1 and chain 2 is summed and converted back into log values. The resulting values are listed in the following tables.

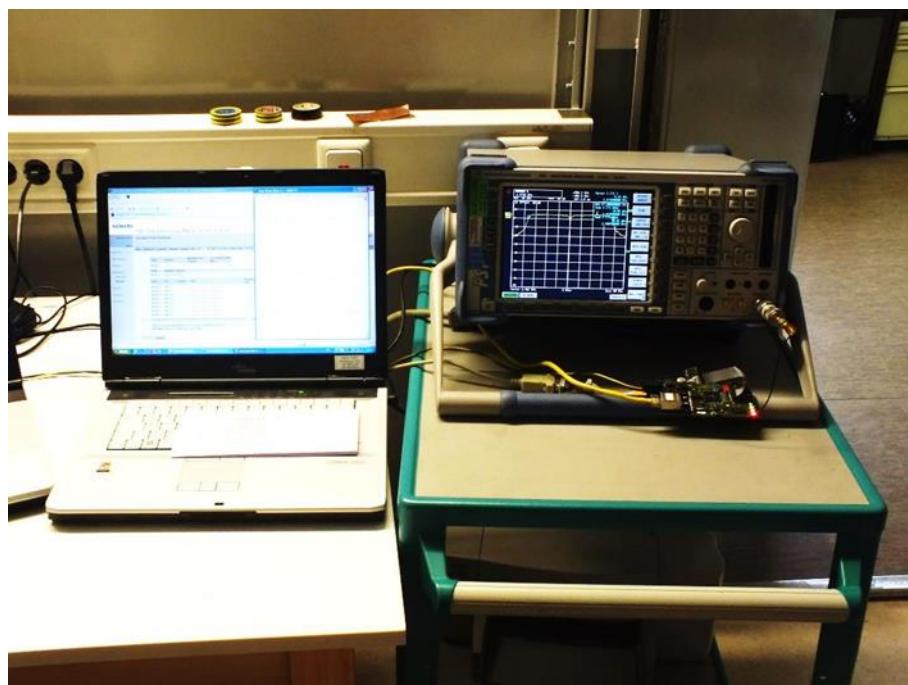
## 5.4 Power spectral density

For test instruments and accessories used see section 6 Part **CPC 3**.

### 5.4.1 Description of the test location

Test location: AREA 4

### 5.4.2 Photo documentation of the test set-up



### 5.4.3 Applicable standard

According to FCC Part 15, Section 15.247(e):

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 5.4.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser with the function "integrated bandpower measurement" following the procedure set out in OET 558074, item 9.1.2. Therefore the PSD is measured the same way. The "integrated bandpower measurement" is related to PSD (dBm/Hz). The EUT is set in TX continuous mode while measuring. The EUT is measured at chain 1 and chain 2. The measurement values are converted into linear values. The chain 1 and chain 2 are summed and converted back into log values and corrected with the conversion factor Hz to 3 kHz, 34.8 dB. The resulting values are listed in the following tables. The cable loss of .5 dB at 2.45 GHz and 1.0 dB at 5.8 GHz is taken into account.

Spectrum analyser settings: integrated bandpower measurement related to dBm/Hz  
RBW: 1 MHz, VBW: 3 MHz, Detector: Peak, Sweep time: 10 ms,

## 5.5 Radiated emissions in non-restricted bands

For test instruments and accessories used see section 6 Part **SER 2, SER 3**.

### 5.5.1 Description of the test location

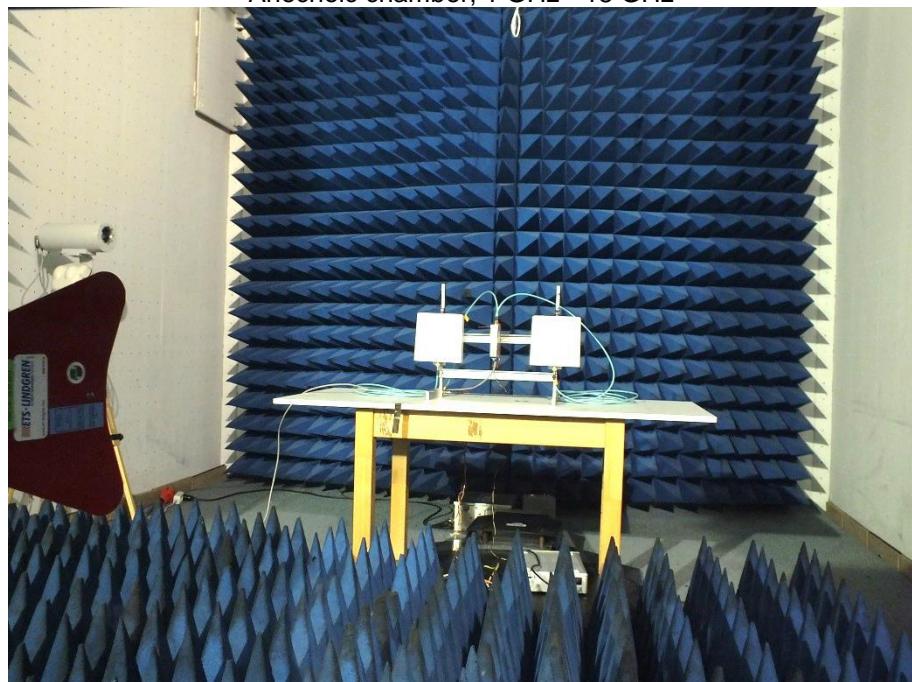
Test location: OATS 1  
Test location: Anechoic chamber 2  
Test distance: 3 m

#### 5.5.1 Photo documentation of the test set-up

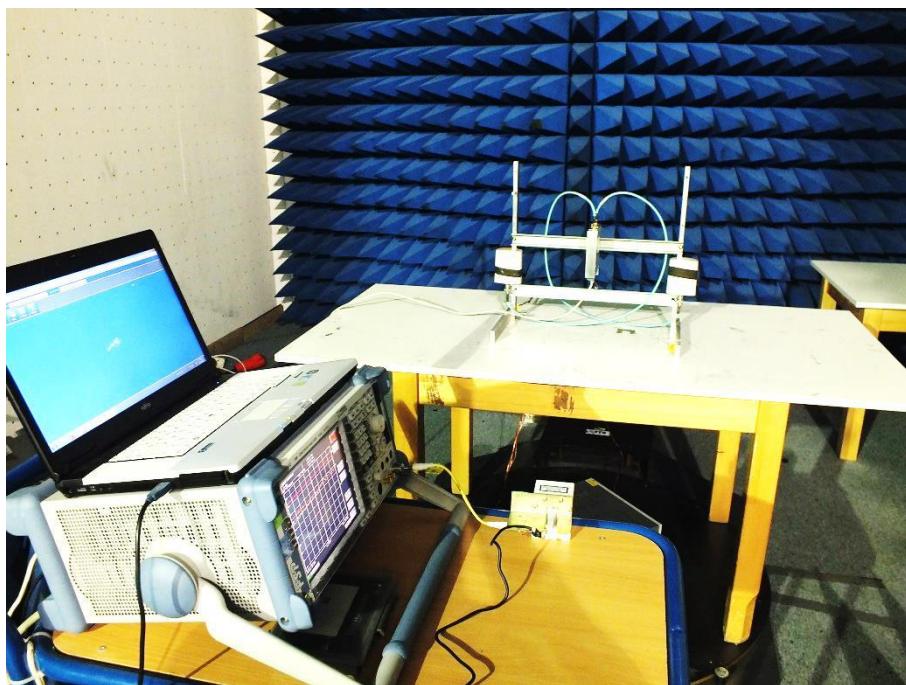
Open area test site, 30 MHz - 1000 MHz



Anechoic chamber, 1 GHz - 18 GHz



Anechoic chamber, 18 GHz - 40 GHz



### 5.5.2 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement.

### 5.5.3 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4 and KDB 558074 for DTS. If the emission level of the EUT in peak mode complies with the average limit then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured again in average mode and reported.

Peak-measurement:

30 – 1000 MHz:	RBW: 100 kHz,	VBW: 300 kHz,	Detector: Max peak,	Trace Mode: Max hold;
1 – 40 GHz:	RBW: 100 kHz,	VBW: 300 kHz,	Detector: Max peak,	Trace Mode: Max hold;

Note: Most of the emissions are measured with a RBW=1 MHz because they are compliant with this. Only in band edges the RBW=100 kHz, if necessary.

## 5.6 Radiated emissions in restricted bands

For test instruments and accessories used see section 6 Part **SER 1**, **SER 2**, **SER 3**.

### 5.6.1 Description of the test location

Test location: OATS 1  
Test location: Anechoic chamber 2  
Test distance: 3 m

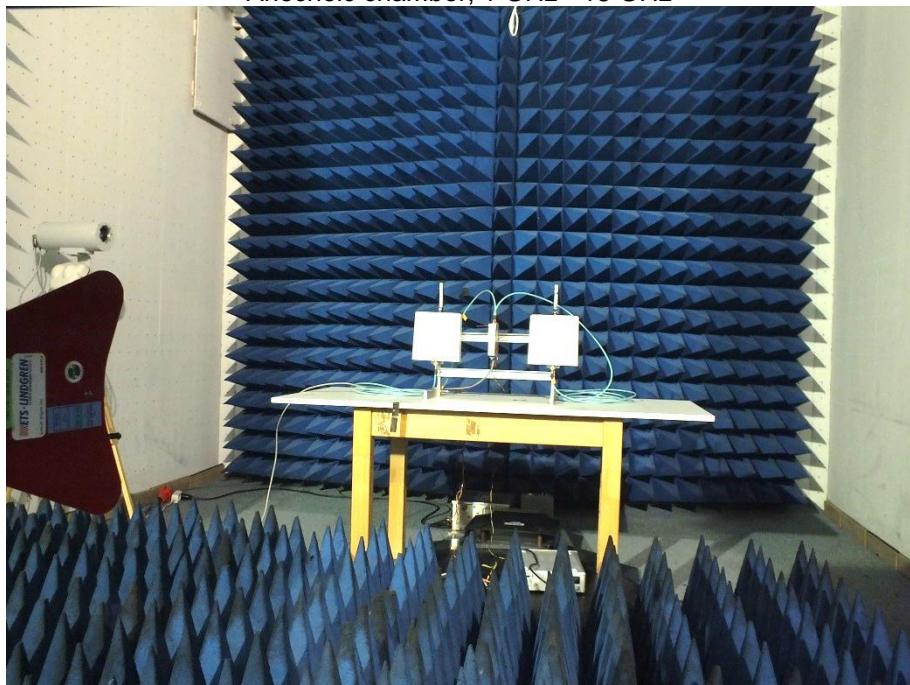
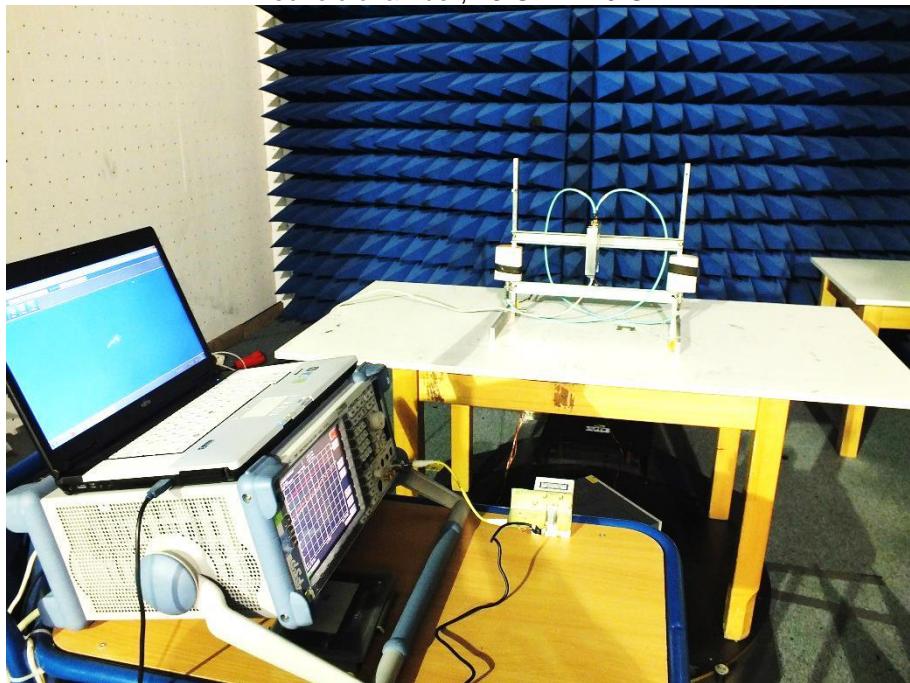
### 5.6.2 Photo documentation of the test set-up

Open area test site, 9 kHz - 30 MHz



Open area test site, 30 MHz - 1000 MHz



**Anechoic chamber, 1 GHz - 18 GHz**

**Anechoic chamber, 18 GHz - 40 GHz**


### 5.6.3 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

### 5.6.4 Description of Measurement

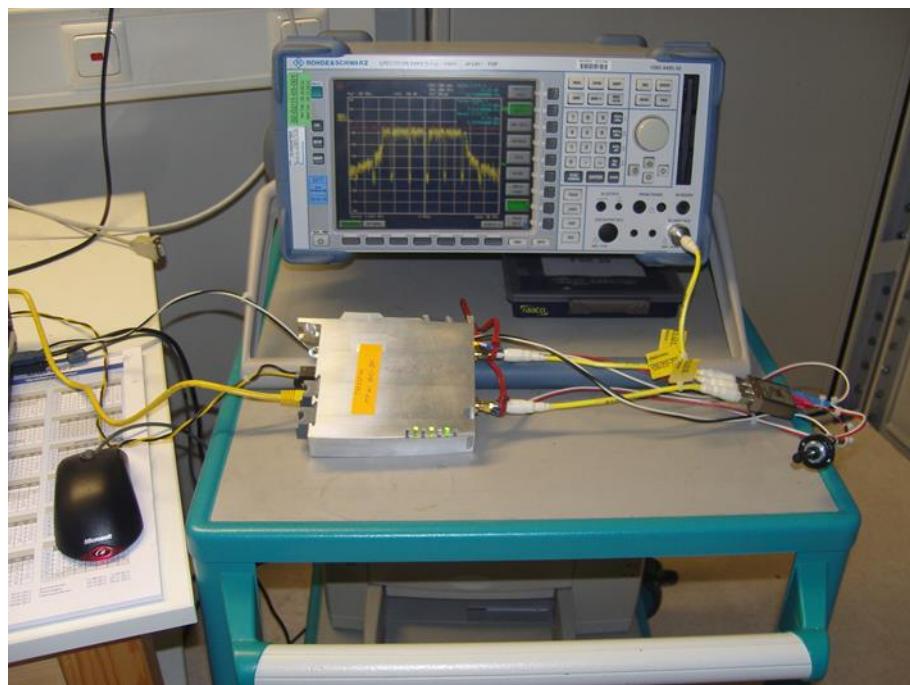
## 5.8 CDD functionality

For test instruments and accessories used see section 6 Part **CPC 3**.

### 5.8.1 Description of the test location

Test location: AREA 4

### 5.8.2 Photo documentation of the test set-up



### 5.8.3 Applicable standard

According to FCC KDB 662911 D01, accounting for directional and array gain.

### 5.8.4 Description of Measurement

The CDD functionality is measured with the spectrum analyser. The different amplitude level of the transmission modes are stored with different traces.

### 5.8.5 Test result

Array gain:

The only correlated signal is sent in legacy mode. The spurious emission measurement is made radiated. Therefore it is accounted for the array gain.

Directional gain:

The directional gain calculation for in-band measurements:

If any transmit signals are correlated with each other,

$$\text{Directional gain} = G_{\text{ANT}} + 10 \log (N_{\text{ANT}}) \text{ dBi};$$

If all transmit signals are completely uncorrelated with each other,

$$\text{Directional gain} = G_{\text{ANT}}$$

The directional gain appears when the transmission rate fall back from dual stream transmission to one stream or legacy mode. In this case the EUT reduce the output power 3 dB in order to be at the same as before.