

## 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 Description of Measurement

The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

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

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

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. 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  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

## 5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part CPR 1.

### 5.2.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



### 5.2.3 Description of Measurement

The magnetic field strength from the EuT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with an EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209 (d) [2].

The final level, expressed in  $\text{dB}\mu\text{V}/\text{m}$ , is arrived at by taking the reading from the EMI receiver (Level  $\text{dB}\mu\text{V}$ ) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: ResBW: 200 Hz

150 kHz – 30 MHz: ResBW: 9 kHz

### 5.3 Spurious emissions (Magnetic field) 9 kHz – 30 MHz

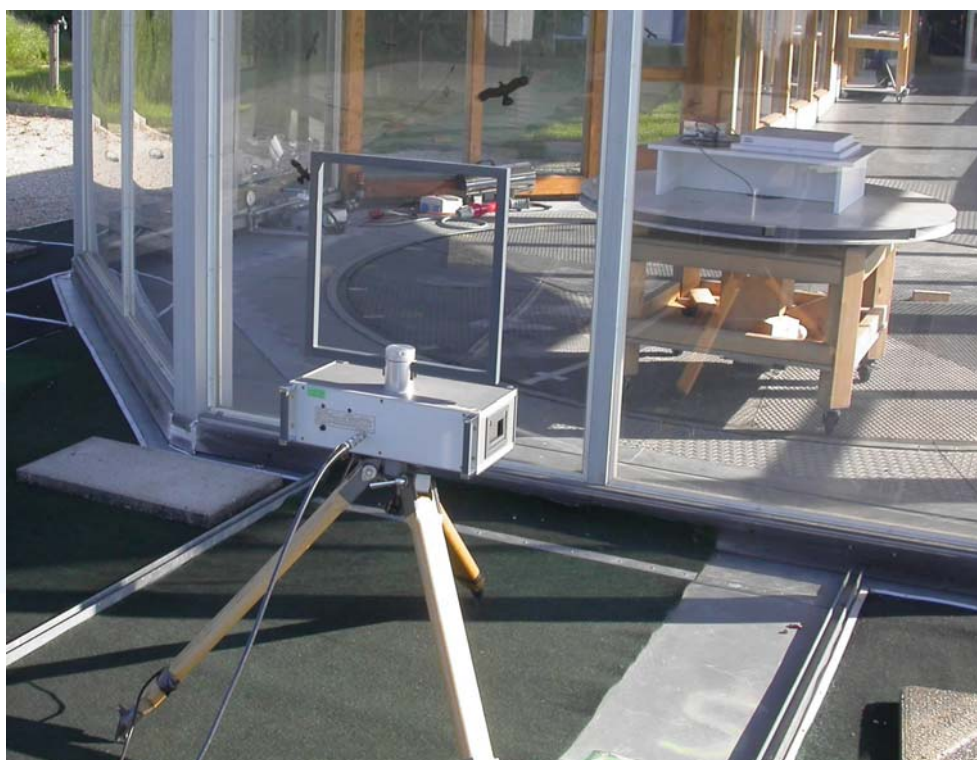
For test instruments and accessories used see section 6 Part SER 1.

#### 5.3.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



#### 5.3.3 Description of Measurement

The spurious emissions from the EuT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with an EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209 (d) [2].

The final level, expressed in  $\text{dB}\mu\text{V}/\text{m}$ , is arrived at by taking the reading from the EMI receiver (Level  $\text{dB}\mu\text{V}$ ) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: ResBW: 200 Hz

150 kHz – 30 MHz: ResBW: 9 kHz



## 5.4 Radiated emissions (electric field) 30 MHz – 1 GHz

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

### 5.4.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



### 5.4.3 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

## 5.5 Frequency tolerance of the carrier

For test instruments and accessories used see section 6 Part FE.

### 5.5.1 Description of the test location

Test location: AREA4

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



### 5.5.3 Test result

Test conditions		Test result		
		Frequency (MHz)		
$T_{\min}$ (-20)°C	$V_{\text{nom}}$ (115)V	13.559626		
$T$ (-10)°C	$V_{\text{nom}}$ (115)V	13.559554		
$T$ (0)°C	$V_{\text{nom}}$ (115)V	13.559518		
$T$ (10)°C	$V_{\text{nom}}$ (115)V	13.559454		
$T_{\text{nom}}$ (20)°C	$V_{\min}$ (98)V	13.559442		
	$V_{\text{nom}}$ (115)V	13.559442		
	$V_{\max}$ (132)V	13.559442		
$T$ (30)°C	$V_{\text{nom}}$ (115)V	13.559434		
$T$ (40)°C	$V_{\text{nom}}$ (115)V	13.559414		
$T_{\max}$ (50)°C	$V_{\text{nom}}$ (115)V	13.559422		
Maximum tolerance of carrier frequency (kHz)		-0.028 / +0.184		
Measurement uncertainty		$\pm 10$ Hz		

## 5.6 Emission Bandwidth

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

### 5.6.1 Description of the test location

Test location: Shielded Room S4

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



### 5.6.3 Description of Measurement

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio of -20 dB. The reference level is the level of the highest amplitude signal observed from 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.

The resolution bandwidth of measuring instrument was set to a value as shown in the following table below according to ANSI C63.4-2003.

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

### 5.6.4 Test result

Channel Frequency [MHz]	20 dB Bandwidth [kHz]
13.56	2.72

**Remarks:** For detailed test result please refer to following test protocol.

## 5.8 Receiver radiated emissions (Magnetic field) 9 kHz – 30 MHz

For test instruments and accessories used see section 6 Part SER 1.

### 5.8.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



### 5.8.3 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.

The final level, expressed in dB $\mu$ V/m, is arrived at by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.



## 5.9 Receiver radiated emissions (electric field) 30 MHz – 1 GHz

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

### 5.9.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



### 5.9.3 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range of 30 MHz to 10 times the highest used frequency using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.