FCC ID: KR55WK49244

EMI -- T E S T R E P O R T

Test Report No. : T31116-01-00KJ	25. October 2006 Date of issue

Type / Model Name : 5WK4 9244

Product Description : Radio Frequency Transmitter

Applicant : Siemens AG, Siemens VDO Automotive

Address : Siemensstrasse 12

93055 Regensburg, Germany

Manufacturer : Siemens AG, Siemens VDO Automotive

Address : Siemensstrasse 12

93055 Regensburg, Germany

Licence holder : Siemens AG, Siemens VDO Automotive

Address : Siemensstrasse 12

93055 Regensburg, Germany

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Deutscher Akkreditierungs Rat DAR

DAT-P-207/05-00

mikes-testingpartners gmbh
Ohmstrasse 2-4 · 94342 Strasskirchen
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Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (October 01, 2005)

Part 15, Subpart C, Section 15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz §15.231(a) Signal deactivation §15.231(b) Radiated emissions, Fundamental & Harmonics §15.231(c) Emission Bandwidth
Part 15, Subpart C, Section 15.35(c)	Correction for Pulse Operation (Duty Cycle)
Part 15, Subpart C, Section 15.209(a)	Radiated emissions, general requirements

2 SUMMARY

GENERAL REMARKS:

None

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 19. September 2006

Testing concluded on : 27. September 2006

Checked by:

Thomas Weise
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2006.10.25 16:05:09 +02'00'

Thomas Weise
Dipl.-Ing.(FH)
Laboratory Manager

Tested by:

Josef Knab
Ich bin der Verfasser dieses Dokuments
2006.10.25 15:46:12 +02'00'

Josef Knab

3.2 Power supply system utilised

Power supply voltage : 3 V / DC

3.3 Short description of the Equipment under Test (EuT)

The EuT is a RF transmitter for a keyless entry system. The RF transmitter is mechanically integrated in the head of the key. This transmitter is used to transmit information for locking or unlocking the vehicle by a unidirectional RF transmission line for normal remote operation by pressing a button.

Number of tested samples: 1
Serial number: 827

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- max. rated RF power at 314.703 MHz, 315.000 MHz and 315.297 MHz

- standby

-

EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 Strasskirchen
Germany

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement Protocol

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

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:

5.1.2 Photo documentation of the test set-up

5.1.3 Description of Measurement

The final level, expressed in dBμV, 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 dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/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 50Ω/50 μH (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.

5.1.4 Test result

Remarks: The measurement is not applicable because the EuT is battery powered.

5.2 Radiated power of the fundamental wave

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

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 radiated power of the fundamental wave from the EUT is measured in the frequency range of 30 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 dBµV/m, is arrived by taking the reading from the EMI receiver (Level dBµV) 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.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: ResBW: 120 kHz

5.2.4 Test result

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
314.73	57.0	56.2	57.8	120	16.3	73.3	72.5	74.1	75.6	2.3

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
315.02	57.1	56.3	57.7	120	16.3	73.4	73.4	74.0	75.6	2.2

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
315.32	57.0	56.2	57.8	120	16.3	73.3	72.5	74.1	75.6	2.3

Limit according to FCC Subpart 15.231(b)

Frequency (MHz)	Fieldstrength of fundamental		Fieldstrength of spurious emissions	
	(µV/m)	dB (µV/m)	(µV/m)	dB (µV/m)
40,66 – 40,70	2250	67	225	47
70 - 130	1250	62	125	42
130 - 174	1250 to 3750*	62 to 71,4*	125 to 375*	42 to 51,4*
174 - 260	3750	71,4	375	51,4
260 - 470	**3750 to 12500***	**71,4 to 81,9***	375 to 1250*	51,4 to 61,9*
Above 470	12500	81,9	1250	61,9

*Linear interpolations

The requirements are **FULFILLED.**

Remarks: _____

5.3 Radiated emissions (electric field) 30 MHz – 18 GHz

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

5.3.1 Description of the test location

Test location: OATS1
Test distance: 3 metres

Test location: Anechoic Chamber A1
Test distance: 3 metres

5.3.2 Photo documentation of the test set-up

5.3.3 Description of Measurement

Radiated 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 dBµV/m, is arrived by taking the reading from the EMI receiver (Level dBµV) 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.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. 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 horizontally from the EuT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwith set to 1 MHz.
All tests are performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration procedure the highest emission relative the limit and therefore shall be used for final testing. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. When the EuT is larger than the beamwidth of the measuring antenna, the measurement antenna will be moved over the surfaces for the four sides or the test distance will be reduced to demonstrate that emissions were at maximum at the limit distance.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: ResBW: 120 kHz
1000 MHz – 18000 MHz ResBW: 1 MHz

5.3.4 Test result

Testresult in detail:(<1GHz)

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
629.45	26.9	25.3	28.0	120	23.4	50.3	48.7	51.4	55.6	5.3
944.18	18.0	16.5	18.9	120	27.8	45.8	44.3	46.7	55.6	9.8

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
630.05	26.0	25.1	26.8	120	23.4	49.4	48.5	50.2	55.6	6.2
945.07	17.4	15.7	18.9	120	27.8	45.2	43.5	46.7	55.6	10.4

Frequency [MHz]	L: QP [dBµV]	L: AV [dBµV]	L: PK [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	L: PK [dBµV/m]	Limit [dBµV/m]	Delta [dB]
630.64	25.8	24.8	26.6	120	23.4	49.2	48.2	50.0	55.6	6.4
945.96	17.6	15.8	19.1	120	27.8	45.4	43.6	46.9	55.6	10.2

Testresult in detail:(>1GHz)

Frequency [MHz]	L: PK [dBµV]	Corr. Duty Cycle [dB]	L: AV [dBµV]	Band width [kHz]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
1258.9	52.6	-6.0	46.6	1000	-14.3	38.3	32.3	55.6	-23.3
1573.7	59.8	-6.0	53.8	1000	-13.8	46.0	40.0	54.0	-14.0
1888.4	57.6	-6.0	51.6	1000	-11.6	46.0	40.0	55.6	-15.6

Frequency [MHz]	L: PK [dBµV]	Corr. Duty Cycle [dB]	L: AV [dBµV]	Band width [kHz]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
1260.1	53.0	-6.0	47.0	1000	-14.3	38.7	32.7	55.6	-22.9
1575.1	61.3	-6.0	55.3	1000	-13.8	47.5	41.5	54.0	-12.5
1890.1	57.6	-6.0	51.6	1000	-11.6	46.0	40.0	55.6	-15.6

Frequency [MHz]	L: PK [dBµV]	Corr. Duty Cycle [dB]	L: AV [dBµV]	Band width [kHz]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
1261.3	52.4	-6.0	46.4	1000	-14.3	38.1	32.1	55.6	-23.5
1576.6	58.4	-6.0	52.4	1000	-13.8	44.6	38.6	54.0	-15.4
1891.9	58.1	-6.0	52.1	1000	-11.6	46.5	40.5	55.6	-15.1

Limit according to FCC Subpart 15.231(b) Subpart 15.209(a) / Subpart 15.205(a)

Frequency (MHz)	Fieldstrength of fundamental		Fieldstrength of spurious emissions	
	(µV/m)	dB (µV/m)	(µV/m)	dB (µV/m)
40,66 – 40,70	2250	67	225	47
70 - 130	1250	62	125	42
130 - 174	1250 to 3750*	62 to 71,4*	125 to 375*	42 to 51,4*
174 - 260	3750	71,4	375	51,4
260 - 470	3750 to 12500*	71,4 to 81,9*	**375 to 1250***	**51,4 to 61,9***
Above 470	12500	81,9	1250	61,9

*Linear interpolations

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in the table above or to the general limits shown in the table below according to § 15.209, whichever limit permits a higher field strength.

Frequency [MHz]	15.209 Limits [µV/m]	15.209 Limits [dBµV/m]
30-88	100	40
88-216	150	43,5
216-960	**200**	**46**
Above 960	**500**	**54**

Besides is a limit according to §15.35(b) on the radio frequency emissions, as measured with a peak detector, corresponding to 20 dB above the maximum permitted average limits.

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209

MHz	MHz	GHz
25.5 – 25.67	960 – 1240	4.5 – 5.15
37.5 – 38.25	1300 – 1427	5.35 – 5.46
73 – 74.6	1435 – 1626.5	7.25 – 7.75
74.8 – 75.2	1645.5 – 1646.5	8.025 – 8.5
108 – 121.94	1660 – 1710	9.0 – 9.2
123 – 138	1718.8 – 1722.2	9.3 – 9.5
149.9 – 150.05	2200 – 2300	10.6 – 12.7
156.52475 – 156.52525	2310 – 2390	13.25 – 13.4
156.7 – 156.9	2483.5 – 2500	14.47 – 14.5
162.0125 – 167.17	2655 – 2900	15.35 – 16.2
167.72 – 173.2	3260 – 3267	17.7 – 21.4
240 – 285	3332 – 3339	22.01 – 23.12
322 – 335.4	3345.8 – 3358	23.6 – 24.0
399.9 – 410	3600 – 4400	31.2 – 31.8
608 – 614		36.43 – 36.5

The requirements are

Remarks: During the test, the Eut was set into continuous transmitting mode.

The measurement was performed up to the 10th harmonic (3150MHz).

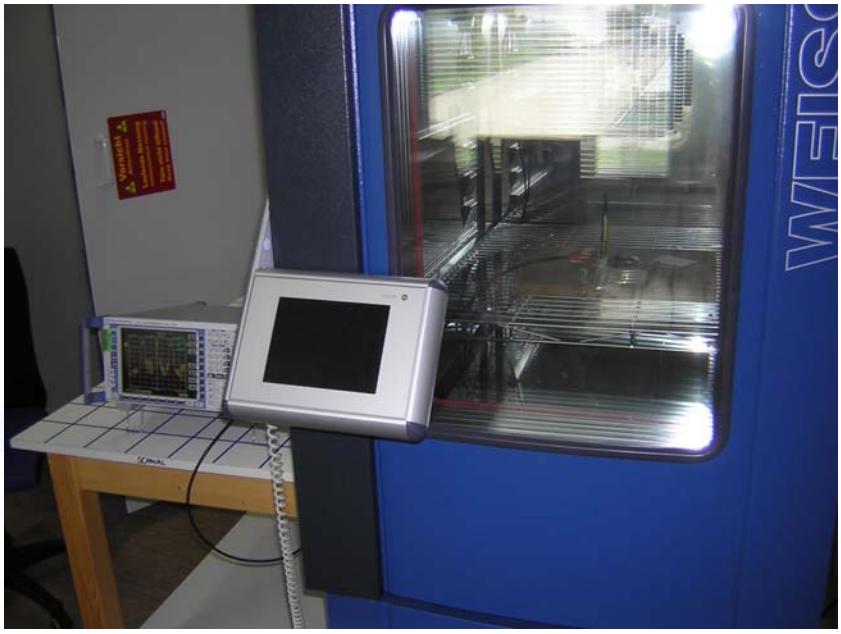
5.4 Correction for Pulse Operation (Duty Cycle)

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

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up



5.4.3 Description of Measurement

The Duty cycle factor, expressed in dB, is arrived by taking the following formula:

$$K_E = 20 \log [(t_{iB} * p)/T_w]$$

K_E: pulse operation correction factor [dB]
t_{iw} pulse duration for one complete pulse track [msec]
t_{iB} pulse duration for one pulse [µsec]
T_w a period of the pulse track [msec]
p number of pulses in one train

5.4.4 Test result

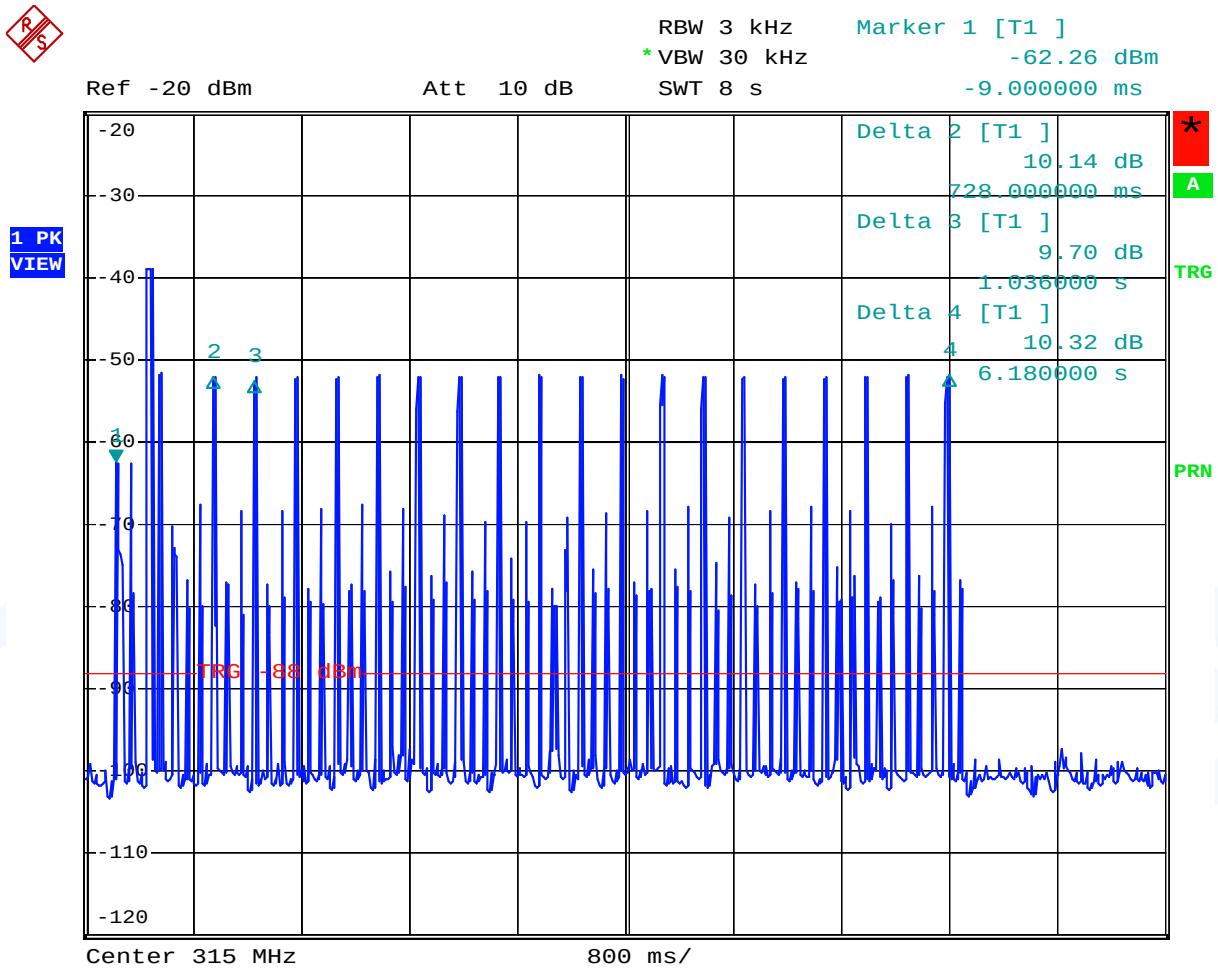
Duty cycle	t_{iw} [msec]	T_w [msec]	t_{iB} [msec]	p	K_E [dB / %]
Real Duty cycle					-
Within 100 msec		100	50.2	1	-5.99 dB / 50.2 %

Remarks: The pulse train [Tw] exceeds 100 ms, therefore the duty cycle have been calculated by averaging the sum of the pulsewidths over the 100 ms width with the highest average value.

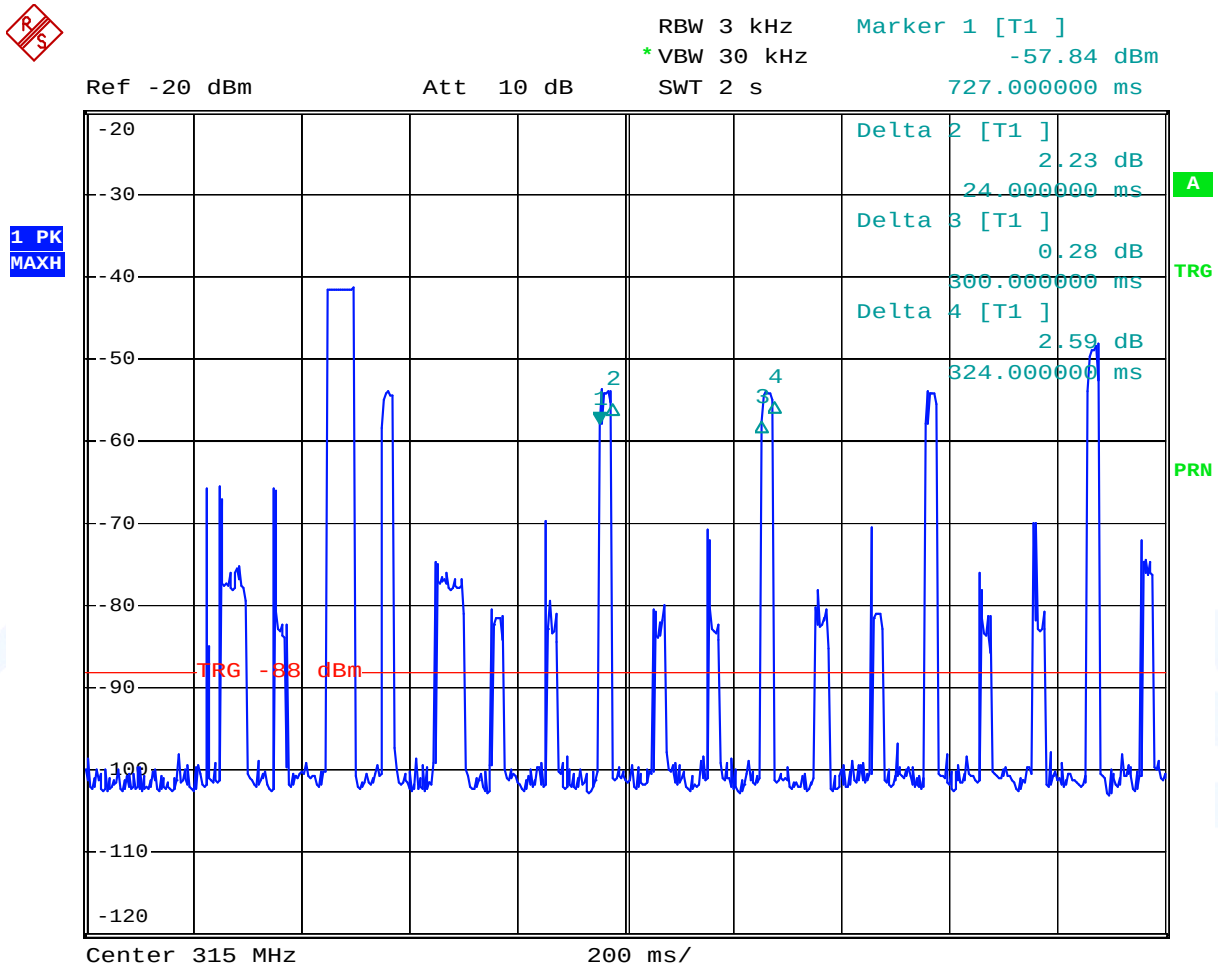
For detailed results, please see the test protocol below.

5.4.5 Test protocol

Correction for Pulse Operation (Duty Cycle)
FCC Part 15 Subpart 15.35(c)

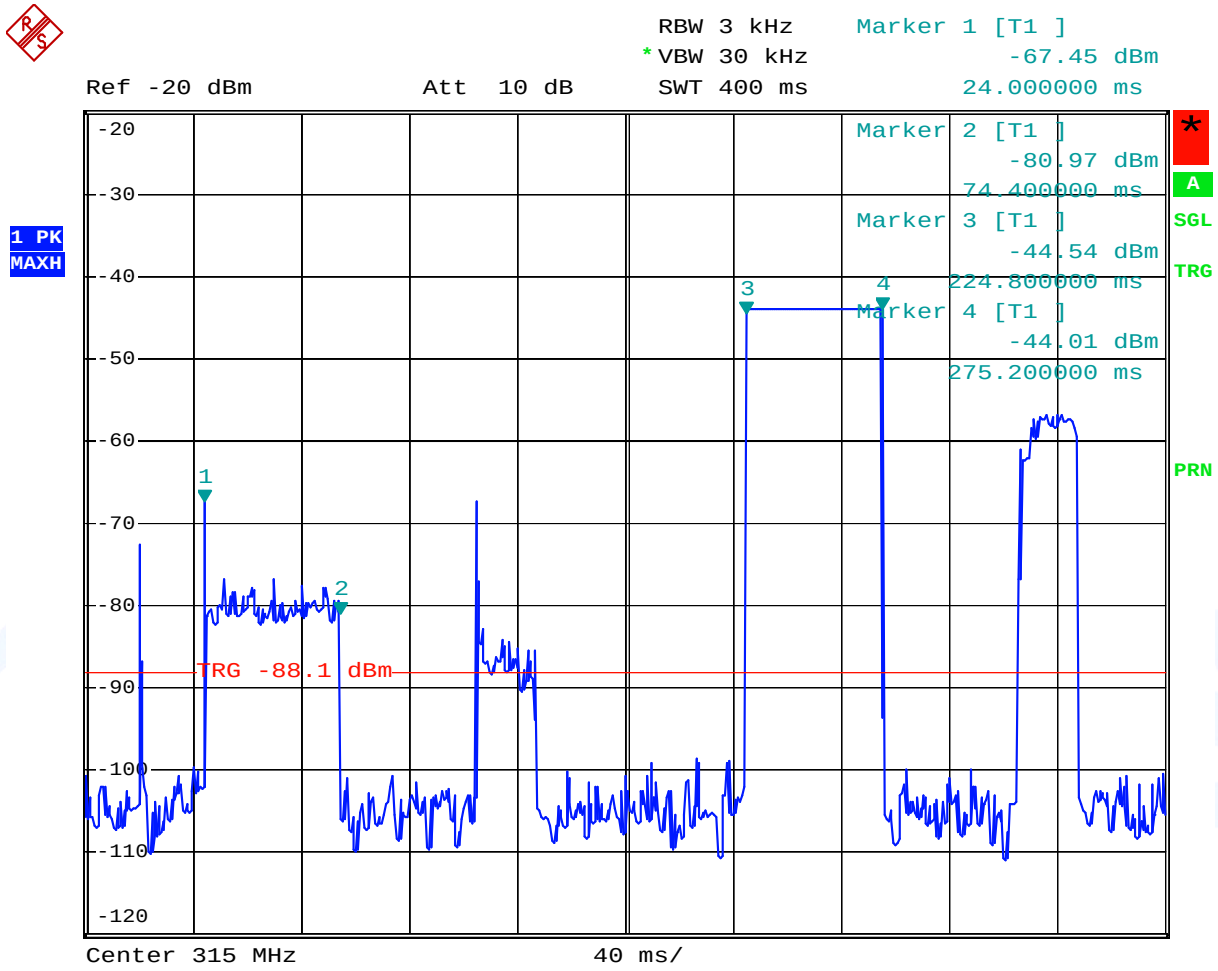


Correction for Pulse Operation (Duty Cycle)
RSS-GEN, section 4.3



Correction for Pulse Operation (Duty Cycle)

FCC Part 15 Subpart 15.35(c)



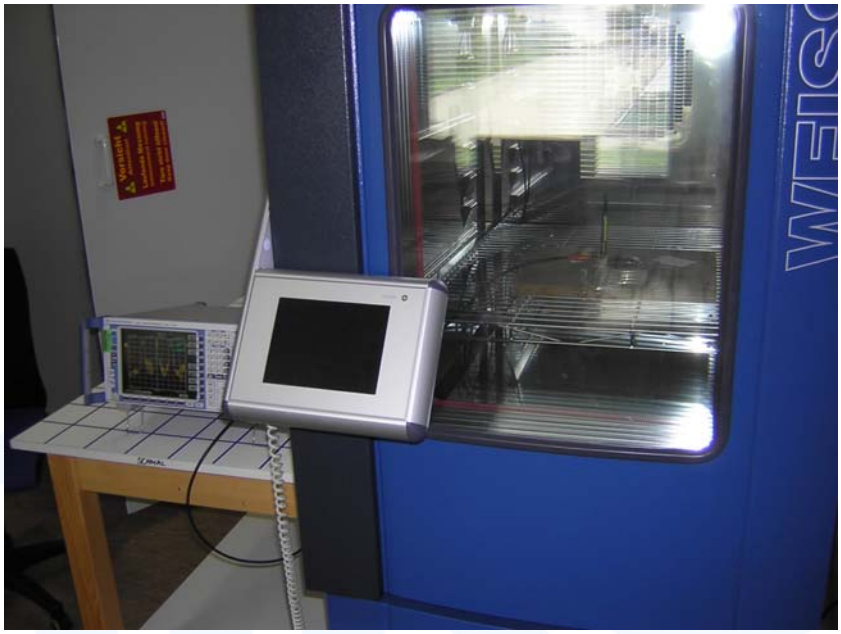
5.5 Emission Bandwidth

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

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

Fundamental [MHz]	Duty Cycle	20dB Bandwidth F1 [MHz]	20dB Bandwidth F2 [MHz]	Measured Bandwidth [MHz]	LIMIT Fundamental f*0,0025 [MHz]
315.000	-5.99	314.661	315.361	0.7	0.7875

Limit according to FCC Part 15 Subpart 15.231(c):

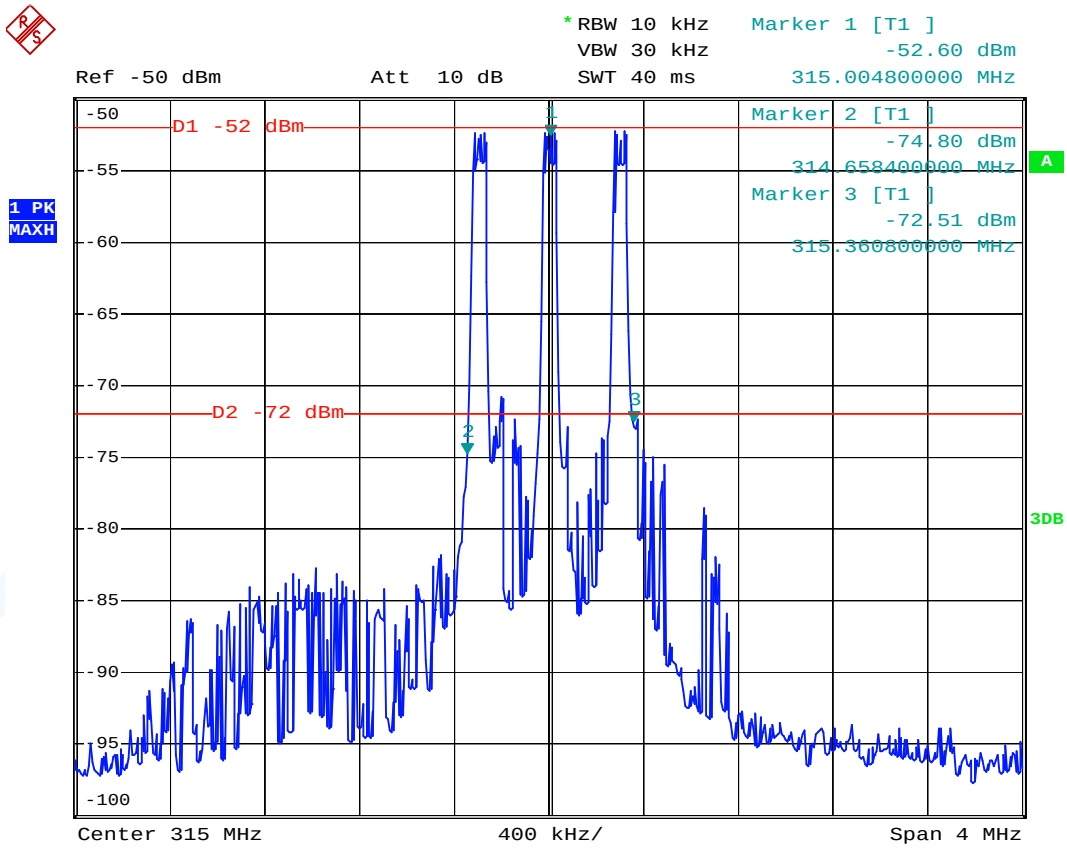
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The requirements are

Remarks: For detailed results, please see the test protocol below.

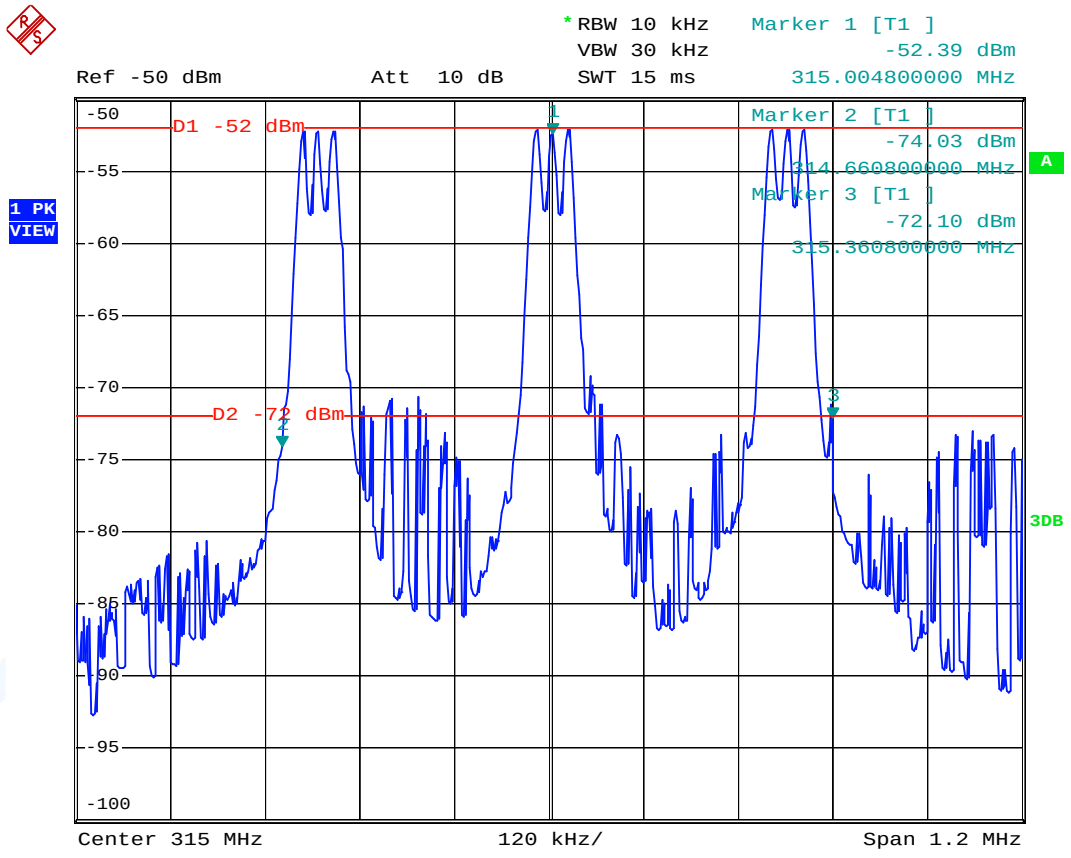
5.5.4 Test protocol

Emission Bandwidth
FCC Part 15 Subpart 15.231(c)



Emission Bandwidth

FCC Part 15 Subpart 15.231(c)



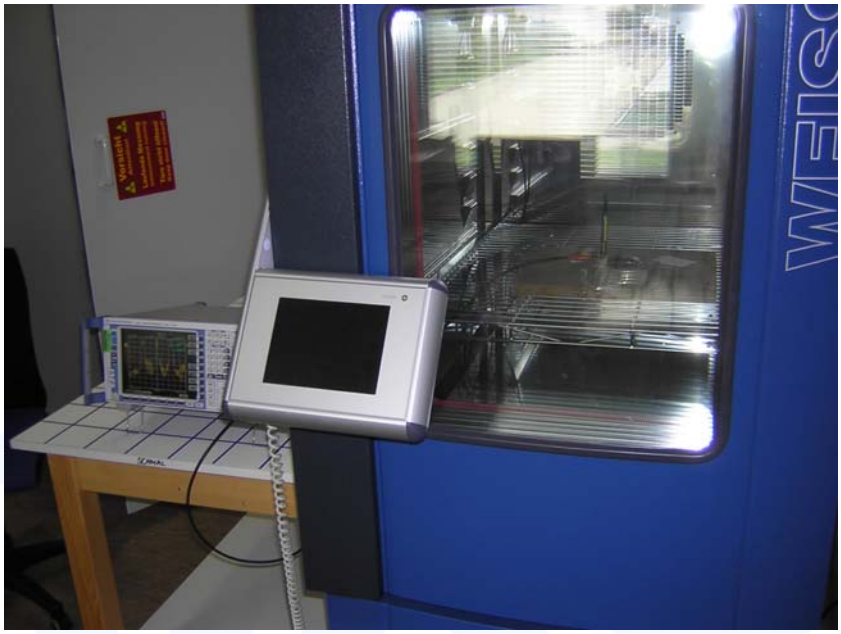
5.6 Signal deactivation

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

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Photo documentation of the test set-up



5.6.3 Test result

The duration of the transmission is 352 milliseconds each time the button is pushed which meets the requirement of ceasing transmission within 5 seconds of the button being released.

Limit according to FCC Part 15 Subpart 15.231(a):

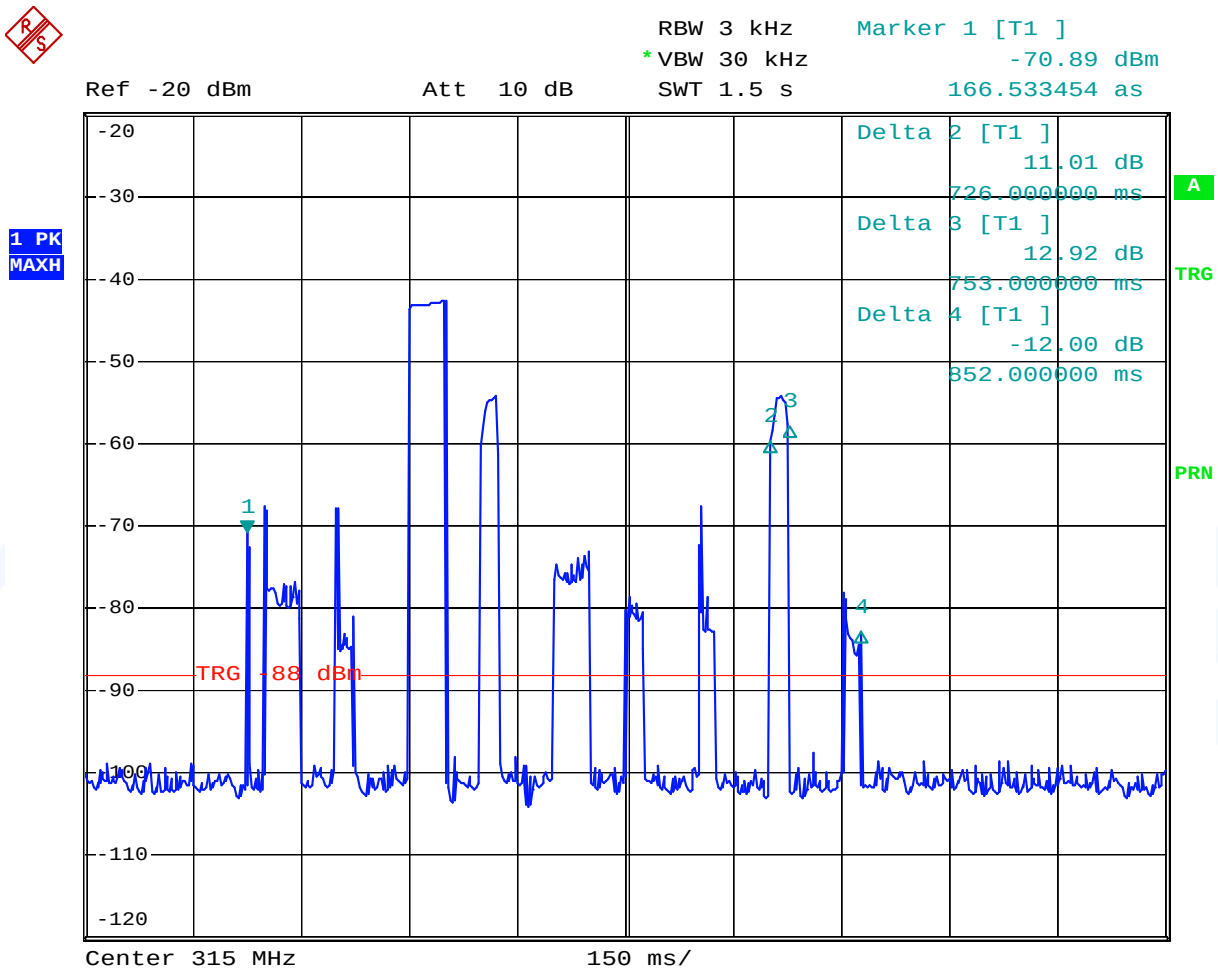
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released and a transmitter activated automatically shall cease transmission within 5 seconds after activation.

The requirements are **FULFILLED.**

Remarks: For detailed test results, please see the test protocol below.

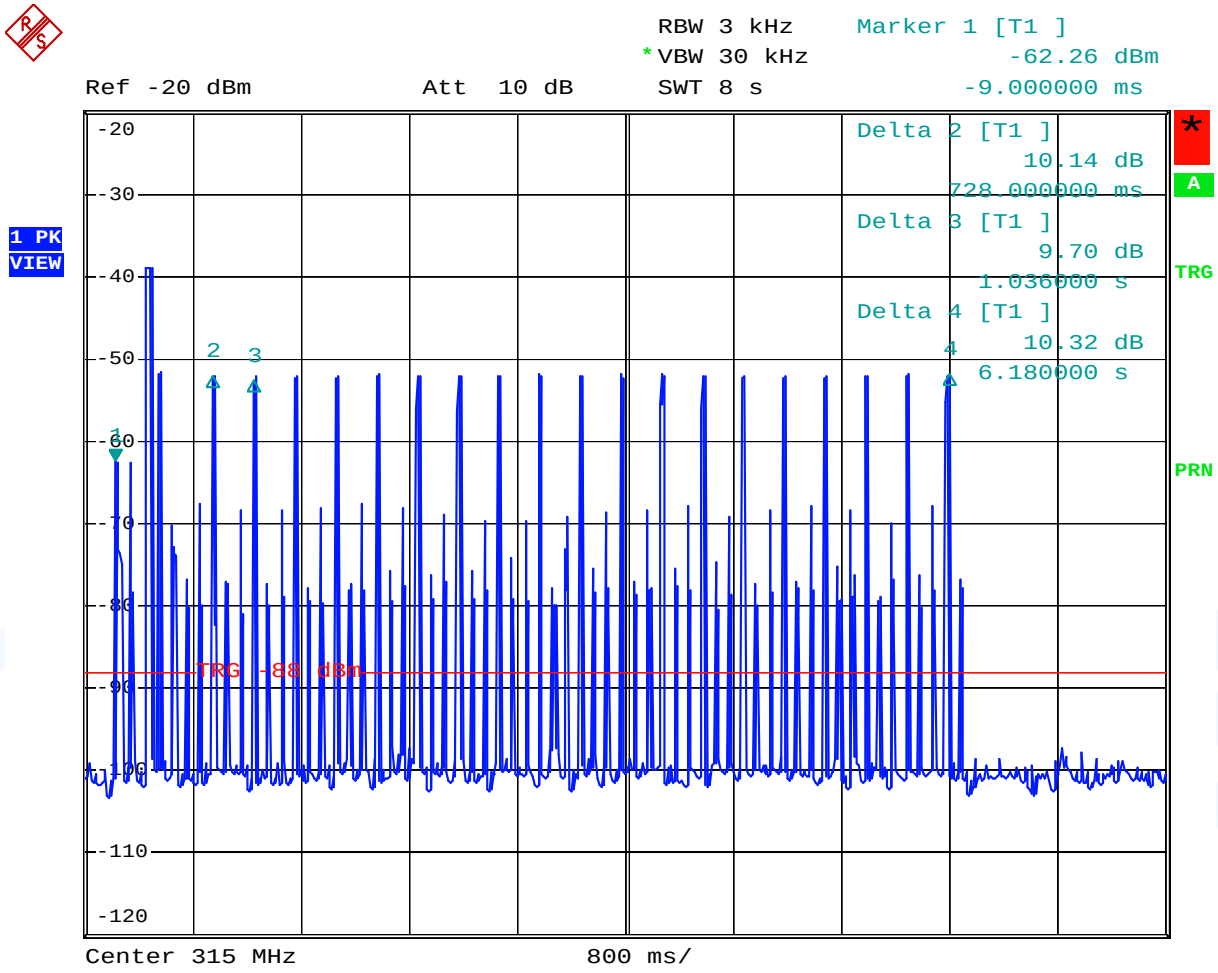
5.6.4 Test protocol

Signal deactivation
FCC Part 15 Subpart 15.231(a)
minimum transmission time after releasing



Date: 27.SEP.2006 14:08:20

Signal deactivation
FCC Part 15 Subpart 15.231(a)
automatically deactivation time



Date: 27.SEP.2006 14:14:56

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

The calibration intervals and the calibration history will be given out on request.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
CPR 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005
	S10162-B/+11N-50-10-5/+11N	RF Cable 33m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113
DC	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005
	THS730A	Handheld Scope	Tektronix GmbH	02-02/13-05-001
	RF Antenna	Broad-Band Antenna	mikes-testingpartners gmbh	02-02/24-05-032
	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001
	6543A	Power Supply	HP Hewelett-Packard	02-02/50-05-157
MB	ESCI	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-005
	THS730A	Handheld Scope	Tektronix GmbH	02-02/13-05-001
	RF Antenna	Broad-Band Antenna	mikes-testingpartners gmbh	02-02/24-05-032
	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001
	6543A	Power Supply	HP Hewelett-Packard	02-02/50-05-157
SER 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005
	S10162-B/+11N-50-10-5/+11N	RF Cable 33m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113
SER 3	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	AFS4-01000400-10-10P-4	RF Amplifier 1-4 GHz	PARZICH GMBH	02-02/17-05-003
	AMF-4F-04001200-15-10P	RF Amplifier 4-12 GHz	PARZICH GMBH	02-02/17-05-004
	AFS5-12001800-18-10P-6	Amplifier	PARZICH GMBH	02-02/17-06-002
	3117	Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	02-02/24-05-009
	Sucoflex N-1600-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-073
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-075