
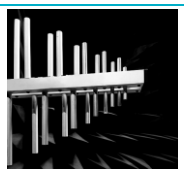
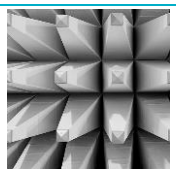

CTC advanced
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Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-7241/18-01-02

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

Testing laboratory

CTC advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.ctcadvanced.com
e-mail: mail@ctcadvanced.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-03

Applicant

Becker Avionics GmbH
Baden Airpark Gebäude B108
77836 Rheinmünster / GERMANY
Phone: +49 7229 305-216
Contact: Detlev Töpler
e-mail: toepler@becker-avionics.com
Phone: +49 7229 305-192

Manufacturer

Becker Avionics GmbH
Baden Airpark Gebäude B108
77836 Rheinmünster / GERMANY

Test standard/s

FCC - Title 47 CFR Part 87	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 87 - Aviation Services

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**Mode S Transponder**
Model name:	**BXT6553**
FCC ID:	**B54BXT6553**
Frequency:	Tx: 1090 MHz Rx: 1030 MHz
Antenna:	external antenna
Power supply:	18 V to 32.2 V DC
Temperature range:	-55°C to +70°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:

M. Walla

cn=Walla Meheza, o=ctcadvanced GmbH, ou=WAL-161220, email=meheza.walla@ctcadvanced.com, c=DE
2018.11.14 16:10:31 +01'00'

Meheza Walla
Lab Manager
Radio Communications & EMC

Test performed:

Geraldy Karsten

cn=Karsten Geraldy, o=CTC advanced GmbH, ou=GER-2017-03-14, email=Karsten.Geraldy@ctcadvanced.com, c=DE
2018.11.14 16:10:00 +01'00'

Karsten Geraldy
Lab Manager
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2018-09-26
Date of receipt of test item:	2018-11-05
Start of test:	2018-11-05
End of test:	2018-11-06
Person(s) present during the test:	Mr. Detlev Toepler

2.3 Test laboratories sub-contracted

None

3 Test standard/s and references

Test standard	Date	Description
FCC - Title 47 CFR Part 87		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 87 - Aviation Services

References	Date	Description
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American national standard of procedures for compliance testing of unlicensed wireless devices
ANSI C63.26-2015	-/-	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +70 °C during high temperature tests -55 °C during low temperature tests
Relative humidity content	:		45 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	28 V DC 32 V 18 V

5 Test item

5.1 General description

Kind of test item	:	Mode S Transponder
Type identification	:	BXT6553
S/N serial number	:	00063
Hardware status	:	MS07
Software status	:	SW1
Frequency band	:	Tx: 1090 MHz Rx: 1030 MHz
Type of modulation	:	Mode AC: PAM Mode S: DPSK
Number of channels	:	1
Antenna	:	external antenna
Power supply	:	18 V to 32.2 V DC
Temperature range	:	-55 °C to +70 °C

5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report: 1-7241/18-01-01_AnnexA
1-7241/18-01-01_AnnexB
1-7241/18-01-01_AnnexC

6 Description of the test setup

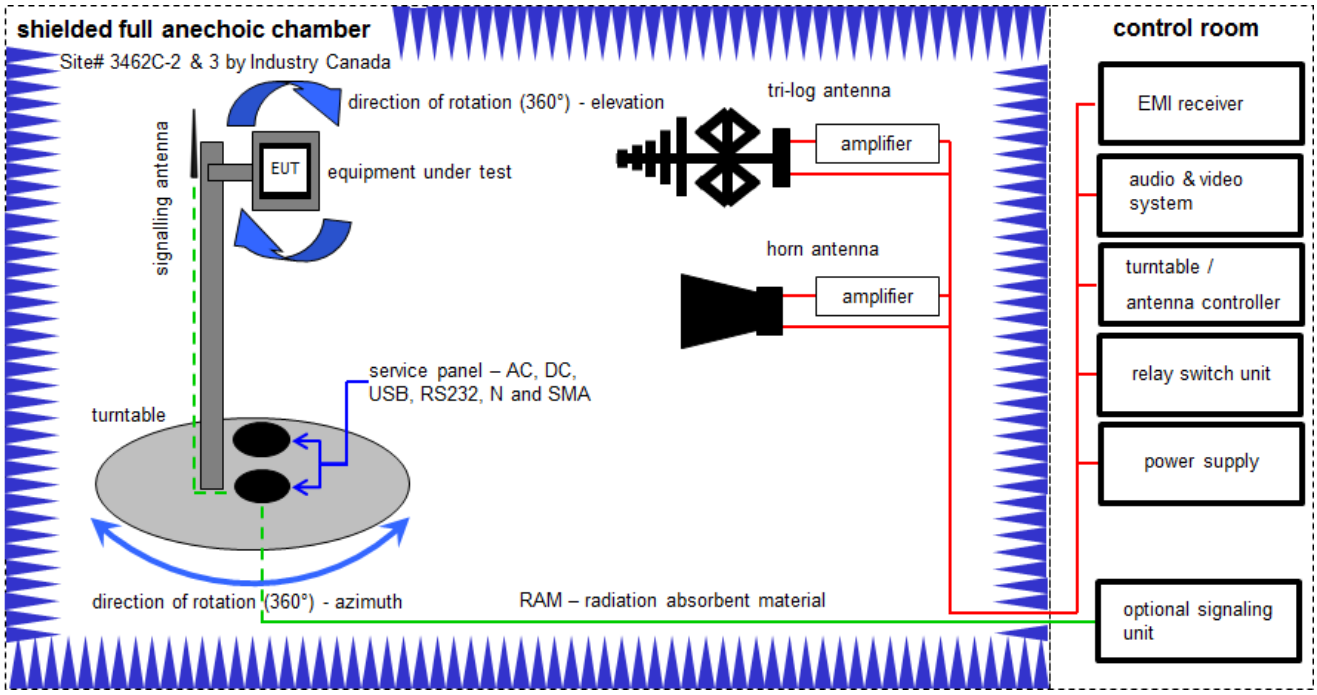
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Agenda: Kind of Calibration

k	calibration / calibrated		EK	limited calibration
ne	not required (k, ev, izw, zw not required)		zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification		izw	internal cyclical maintenance
Ve	long-term stability recognized		g	blocked for accredited testing
vlkl!	Attention: extended calibration interval			
NK!	Attention: not calibrated		*)	next calibration ordered / currently in progress

6.1 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter

OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

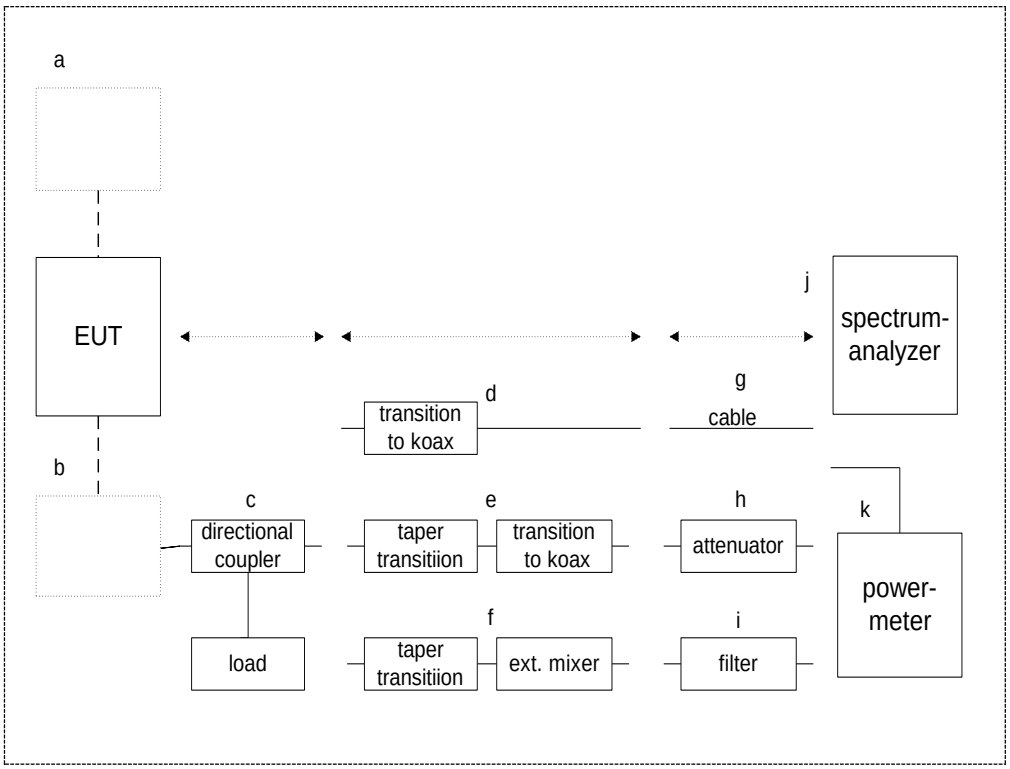
Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2818A03450	300001040	vIKI!	12.12.2017	11.12.2020
2	n. a.	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vIKI!	07.07.2017	06.07.2019
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
4	19	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3697	300001605	vIKI!	14.02.2017	13.02.2019
5	n. a.	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
6	9	Variable isolating transformer	MPL IEC625 Bus Variable isolating transformer	Erfi	91350	300001155	ne	-/-	-/-
7	n. a.	Band Reject filter	WRCG1850/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev	-/-	-/-
8	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev	-/-	-/-
9	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev	-/-	-/-
10	n. a.	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	20.12.2017	19.12.2018
11	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev	-/-	-/-
12	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	19	300003790	ne	-/-	-/-
13	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	vIKI!	27.01.2017	26.01.2020

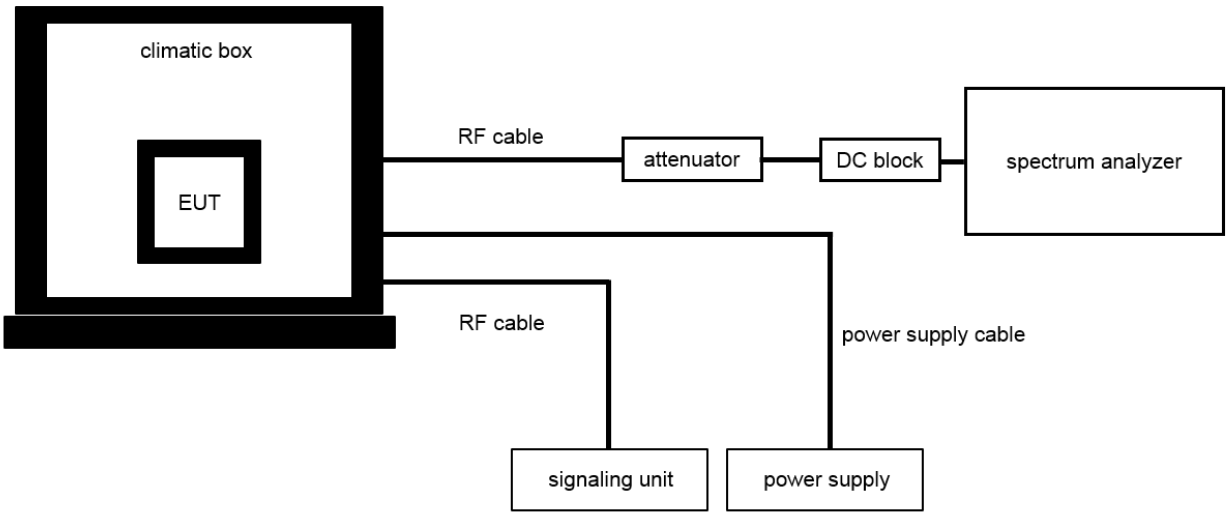
14	n. a.	High Pass Filter	VHF-3500+	Mini Circuits	-/-	400000193	ne	-/-	-/-
15	n. a.	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22049	300004481	ev	-/-	-/-
16	n. a.	Broadband Amplifier 5-13 GHz	CBLU5135235	CERNEX	22010	300004491	ev	-/-	-/-
17	n. a.	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
18	n. a.	NEXIO EMV-Software	BAT EMC V3.16.0.49	EMCO		300004682	ne	-/-	-/-
19	n. a.	PC	ExOne	F+W		300004703	ne	-/-	-/-
20	n. a.	Highpass Filter (Chebyshev)	WHKX10-4432.5-4925-18000-40SS	Wainwright	1	300005028	ev	-/-	-/-
21	n. a.	Lowpass Filter (Chebyshev)	WLK12-5975-6333.5-18000-40SS	Wainwright	1	400001213	ev	-/-	-/-
22	n. a.	RF-Amplifier	AMF-6F06001800-30-10P-R	NARDA-MITEQ Inc	2011572	300005241	ev	-/-	-/-
23	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	01029	300005379	vIKI!	07.04.2017	06.04.2020

6.2 Conducted measurements with peak power meter & spectrum analyzer



6.3 Frequency error

Conducted measurements normal & extreme conditions



Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1		Spectrum Analyzer 9kHz-50GHz	8565E	HP	3515A00283	300000916	vlKl!	24.02.2017	23.02.2019
2		USB/GPIB Interface	82357A	Agilent Technologies	MY46133276	300003426	ne	-/-	-/-
3		RF Peak Power Analyzer+ PPA Sensor	4500B + 58318	Boonton Electronics	12331 + 6276	300003871	k	18.12.2017	17.12.2018
4	R001	PXA Spectrum Analyzer 3Hz to 50GHz	N9030A PXA Signal Analyzer	Agilent Technologies	US51350267	300004338	k	05.03.2018	04.03.2019
5		Fixed Coaxial Attenuator 10dB 100W DC-18GHz	WA91-10-34	Weinschel Ass	#A244	300004265	ev	-/-	-/-
6	U312	Fixed Coaxial Attenuator, 20dB 100W DC-18GHz	WA91-20-43	Weinschel Ass	A514	300004824	ev	-/-	-/-
7	U023b	10 dB fixed attenuation	401001	Inmet	-/-	-/-	ev	-/-	-/-
8		Power Splitter	11667B	HP	00616	-/-	ev	-/-	-/-
9	F150	High Pass Filter	VHF-1500+	Mini-Circuits	31022	-/-	ev	-/-	-/-
10	C220	Coaxial cable	SF101	H&S	5183/1	-/-	ev	-/-	-/-
11		Climatic chamber	T-70/350	CTS GmbH	164036	300005308	ne	-/-	-/-

7 Sequence of testing

7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, it is placed on a table with 0.8 m height.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement*

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

*)Note: The sequence will be repeated three times with different EUT orientations.

7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

7.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Antenna gain	± 3 dB
Spectrum bandwidth	± 21.5 kHz absolute; ± 15.0 kHz relative
Maximum output power	± 1 dB
Detailed conducted spurious emissions @ the band edge	± 1 dB
Band edge compliance radiated	± 3 dB
Spurious emissions conducted	± 3 dB
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted below 30 MHz (AC conducted)	± 2.6 dB

9 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	47 CFR 87	see table	2018-11-14	-/-

Test specification clause	Test Case	temperature / voltages	Mode	pass	Fail	NA	NP	Results (max.)
§2.1046 §87.131	Measurements required: RF power output / Power and emissions	Nominal	TX	☒	☐	☐	☐	PK: 55.4 dBm AV: 29.7 dBm
§2.1049 §87.135	Measurements required: Occupied bandwidth / Bandwidth of emissions	Nominal	TX	☒	☐	☐	☐	8.5 MHz
§2.1051 §87.139	Measurements required: Spurious emissions at antenna terminals / Spectrum mask / Conducted spurious emissions	Nominal	TX	☒	☐	☐	☐	
§2.1053 §87.139	Measurements required: Field strength of spurious radiation/ Radiated spurious emissions	Nominal	TX	☒	☐	☐	☐	
§2.1055 §87.133	Measurements required: Frequency stability / Frequency stability	Nominal Extreme	TX	☒	☐	☐	☐	-9.2 ppm

Note:
NA = Not applicable; NP = Not performed

9.1 Power and emissions

§2.1046 Measurements required: RF power output.
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§87.131 Power and emissions.
Power must be determined by direct measurement.
The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:
(i) Mean power (pY) for amplitude modulated emissions and transmitting both sidebands using unmodulated full carrier.
(ii) Peak envelope power (pX) for all emission designators other than those referred to in paragraph (i) of this note.

Limits:

Note 7: maximum output power will be determined during the certification process

Measurement results:

Test Conditions		conducted output power (dBm)	
		AC-Mode	S-Mode
Pos-Peak	T_{nom} / V_{nom}	55.4 dBm	55.4 dBm
AVG	T_{nom} / V_{nom}	29.7 dBm	27.1 dBm

Note:
see chapter 10 Measurement results (Peak Power Measurements)

9.2 Occupied bandwidth

§2.1049 Measurements required: Occupied bandwidth.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

§87.135 Bandwidth of emission.
(a) Occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5 percent of the total mean power of a given emission.
(b) The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station.
(c) The necessary bandwidth for a given class of emission is the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

Limits:

occupied bandwidth: no limits defined

Measurement results:

Test Conditions		Occupied bandwidth (MHz)	
		AC-Mode	S-Mode
Pos-Peak Max-Hold	T_{nom} / V_{nom}	8.5 MHz	8.0 MHz

Note:
see chapter 11 Measurement results (Spectrum Measurements), plot 1 – 2

9.3 Spectrum mask and conducted spurious emissions

§2.1051 Measurements required: Spurious emissions at antenna terminals.
The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§87.139 Emission limitations.
(a) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091-5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:
(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;
(2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.
(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least $43 + 10 \log_{10}$ pY dB.

Measurement results:

Spurious emissions (Carrier-on state)								
AC-Mode			S-Mode			-/-		
F	BW	p	F	BW	p	F	BW	p
2180	1	-43.5	2180	1	-40.9			
3270	1	-38.2	3270	1	-43.1			
5450	1	-49.2	---	---	---			

Where F = Frequency of spurious (MHz)
BW = Measurement receiver bandwidth (MHz)
p = Level of spurious (dBm)

Note:
see chapter 11 Measurement results (Spectrum Measurements), plot 3 – 12

9.4 Radiated spurious emissions

§2.1053 Measurements required: Field strength of spurious radiation.
(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz.
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

§87.139 Emission limitations.
(a) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091-5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:
(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;
(2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.
(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least $43 + 10 \log_{10}$ pY dB.

Limits:

frequency range	max. spurious level
30 MHz – 11 GHz	-13 dBm / 1 MHz

Measurement results:

Spurious emissions (Carrier-on state)								
AC-Mode			S-Mode			-/-		
F	BW	p	F	BW	p	F	BW	p

Where F = Frequency of spurious (MHz)
BW = Measurement receiver bandwidth (MHz)
p = Level of spurious (dBm)

Note:
see chapter 11 Measurement results (Spectrum Measurements), plot 13 – 14

9.5 Frequency tolerance

§2.1055 Measurements required: Frequency stability.
(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.
(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and + 30° centigrade with no primary power applied.
(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.
(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.
(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

§87.133 Frequency stability.
(a) Except as provided in paragraphs (c), (d), (f), and (g) of this section, the carrier frequency of each station must be maintained within these tolerances:
7) Band-470 to 2450 MHz: Aeronautical utility mobile stations on 1090 MHz Tolerance of 1000 ppm

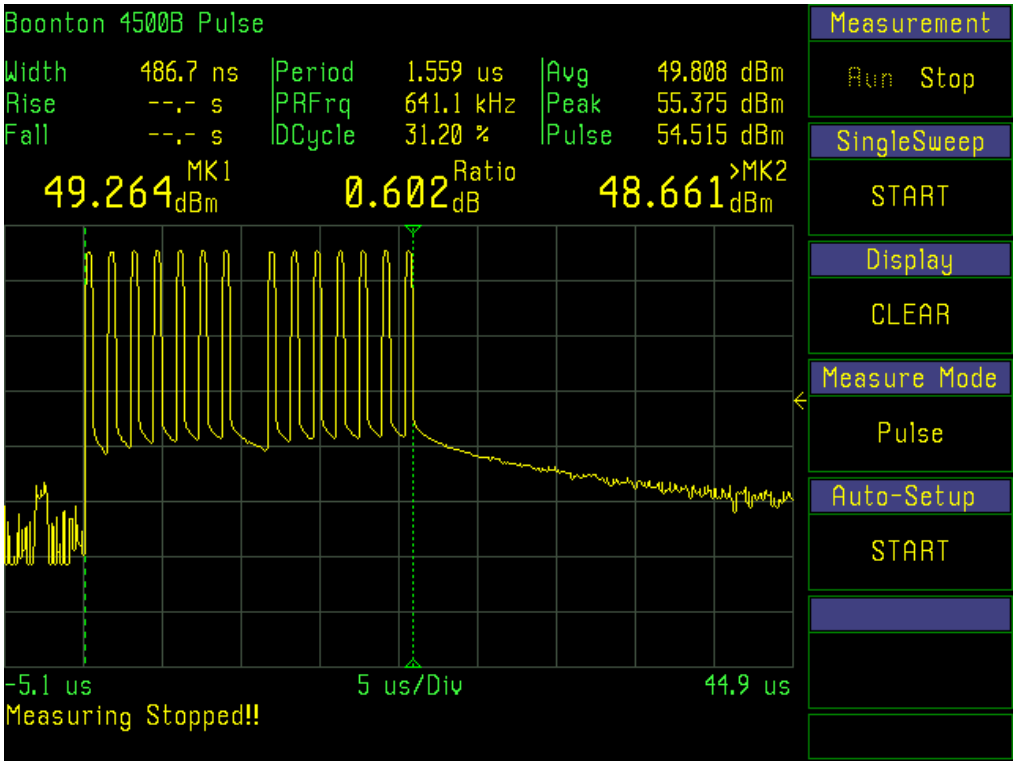
Measurement result:

Temperature [°C]	Voltage [V DC]	Reference Frequency [MHz]	Measured Frequency [MHz]	Deviation [kHz]	Deviation [ppm]
-55	*28*	*1090*	*1089.988*	*-12.000*	*-11.0*
-40	*28*	*1090*	*1089.989*	*-11.000*	*-10.1*
-30	28	1090	1089.990	-10.000	-9.2
-20	28	1090	1089.991	-9.000	-8.3
-10	28	1090	1089.992	-8.000	-7.3
0	28	1090	1089.993	-7.000	-6.4
10	28	1090	1089.993	-7.000	-6.4
20	18	1090	1089.994	-6.000	-5.5
20	28	1090	1089.994	-6.000	-5.5
20	32	1090	1089.994	-6.000	-5.5
30	28	1090	1089.995	-5.000	-4.6
40	28	1090	1089.998	-2.000	-1.8
50	28	1090	1089.999	-1.000	-0.9
60	*28*	*1090*	*1090.001*	*1.000*	*0.9*
70	*28*	*1090*	*1090.001*	*1.000*	*0.9*

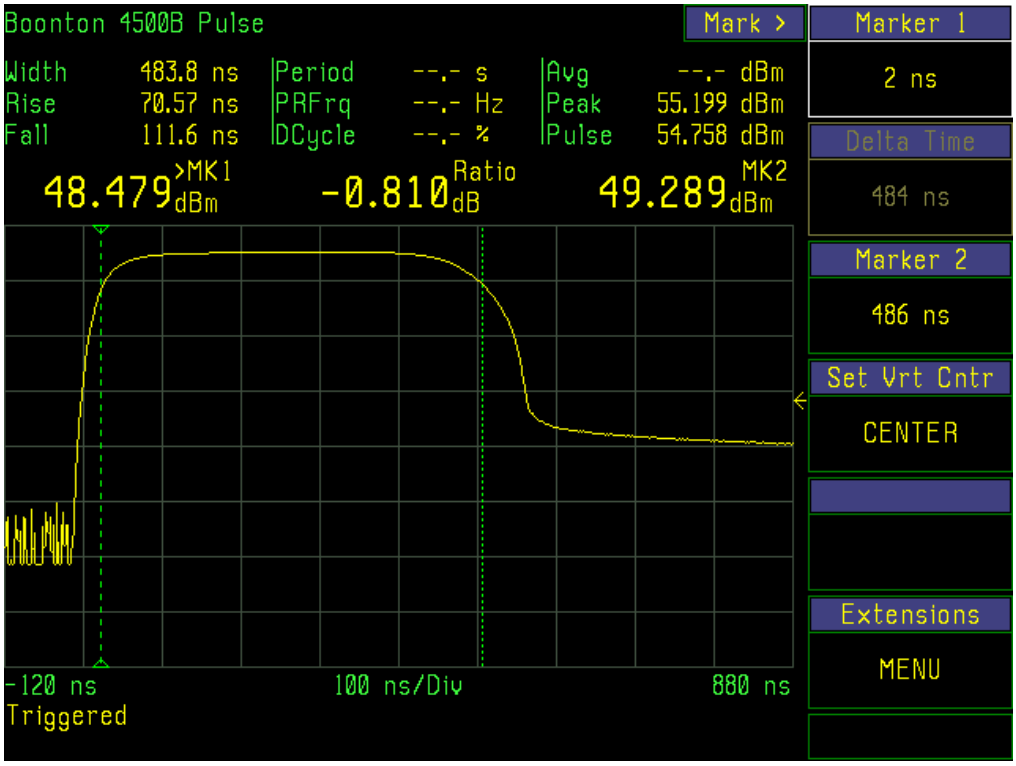
Note: Italic values for information only.

10 Measurement results (Peak Power Measurements)

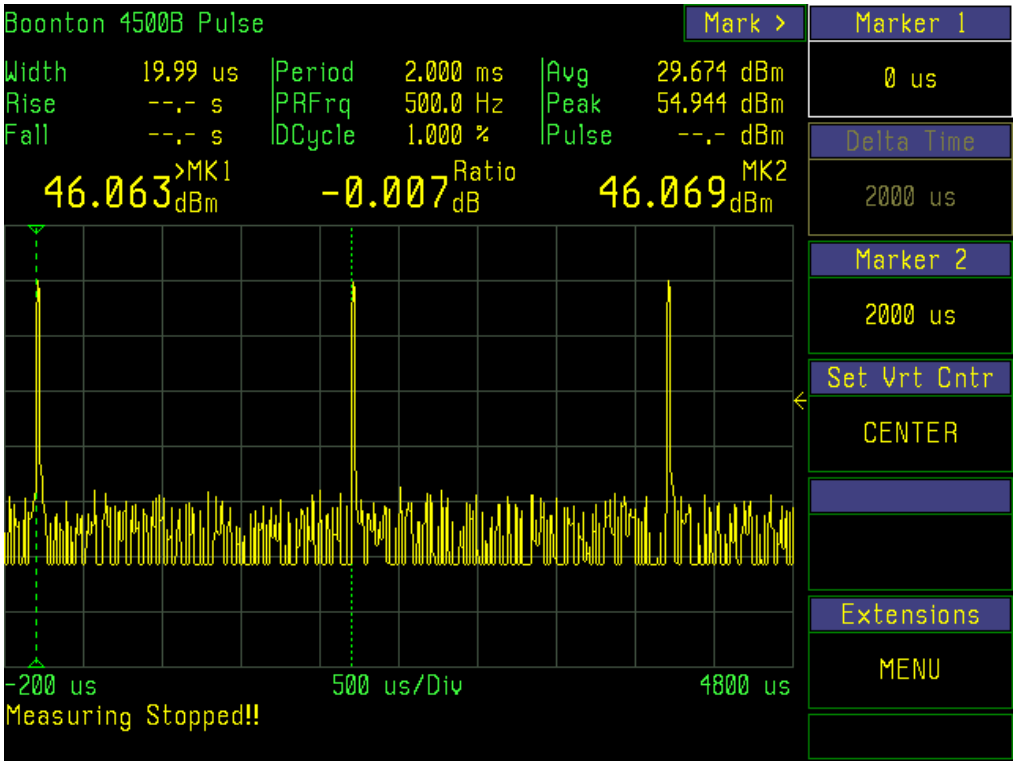
Plot No. 1: AC-Mode



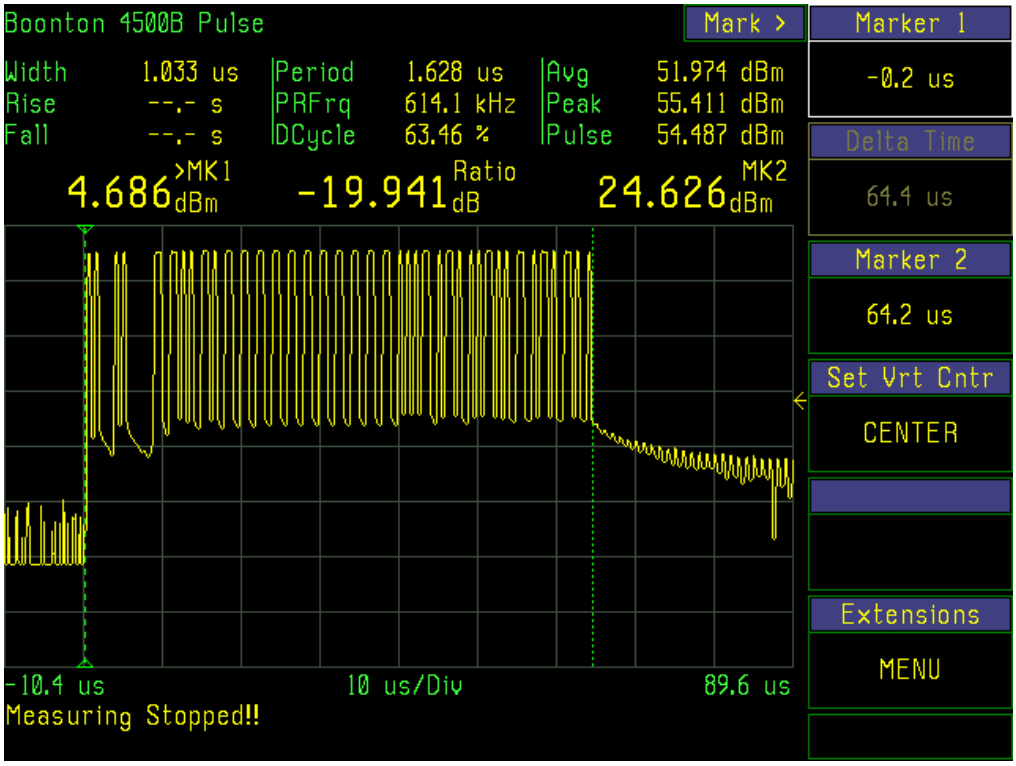
Plot No. 2: AC-Mode



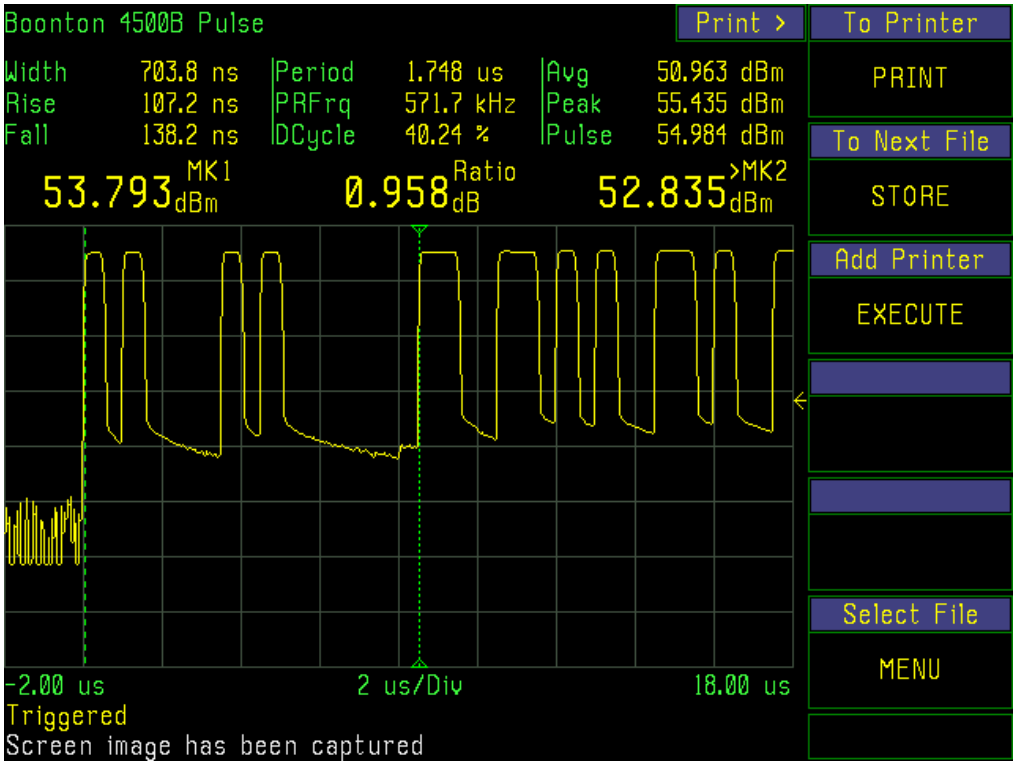
Plot No. 3: AC-Mode



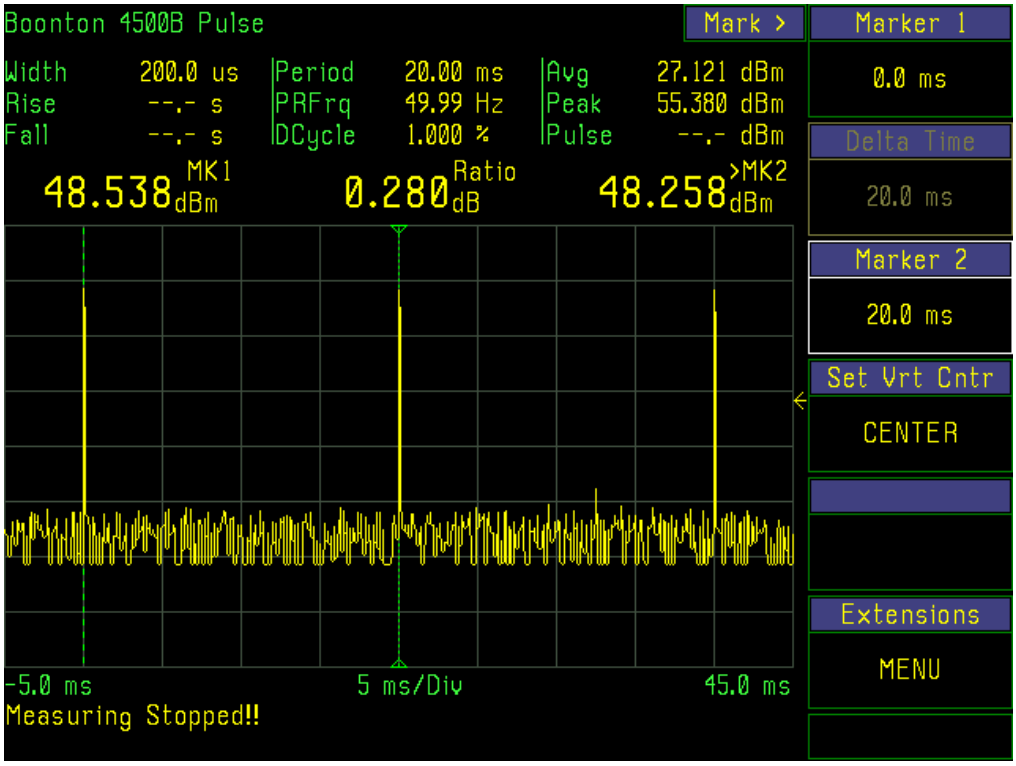
Plot No. 4: S-Mode



Plot No. 5: S-Mode



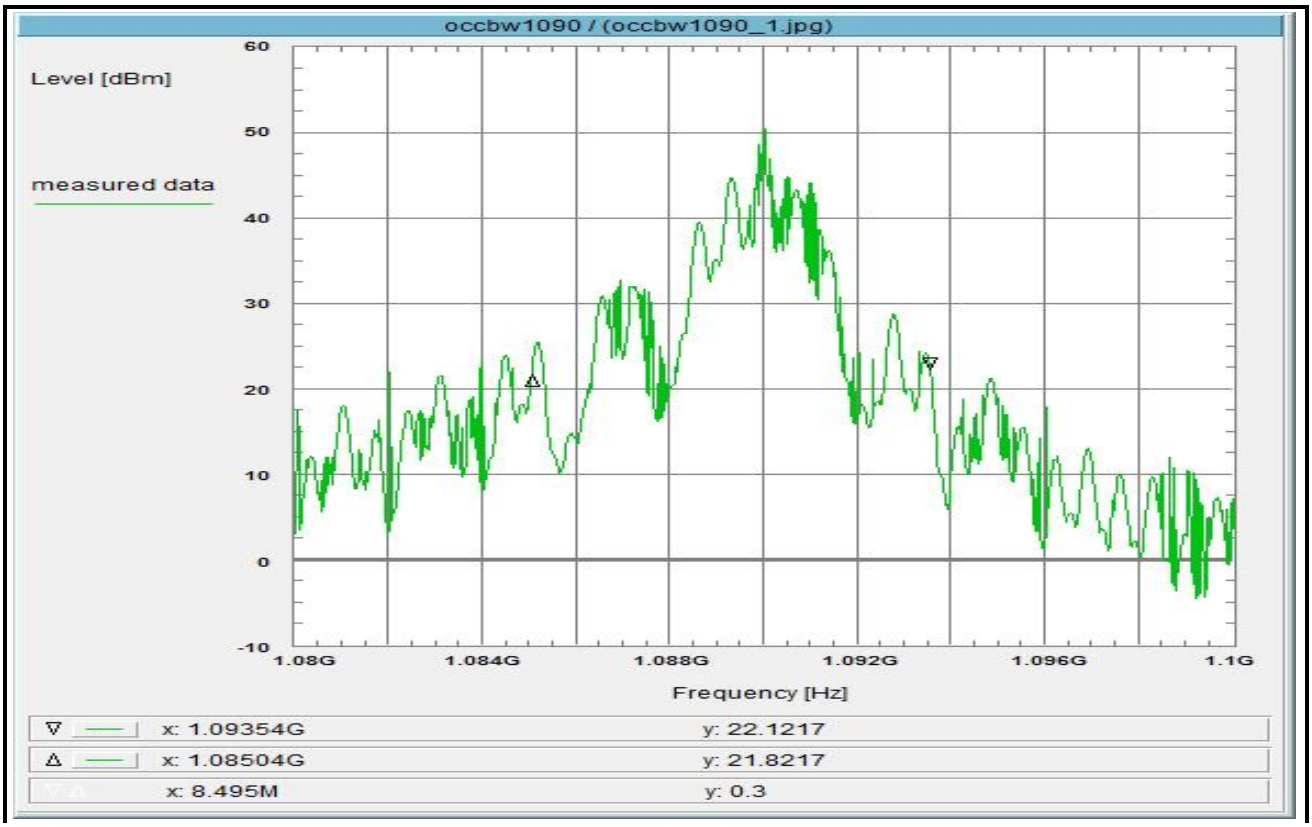
Plot No. 6: S-Mode



11 Measurement results (Spectrum Measurements)

This annex consists of 14 pages including this page

Plot No. 1 (14)



Subclause: -/- Function test
RF-carrier at 1090 MHz
Determination of the occupied bandwidth

Limit:
no limits defined

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U023, U023b, U312

Remark:

Test result: **Determination of the occupied bandwidth**

Environment condition:

Date & Time:	Mon 05/Nov/2018 15:23:36	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	1.08	GHz
Stop frequency:	1.1	GHz
Center frequency:	1.09	GHz
Frequency span:	20	MHz
Resolution-BW:	200	kHz
Video-BW:	1	MHz
Input attenuation:	30	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

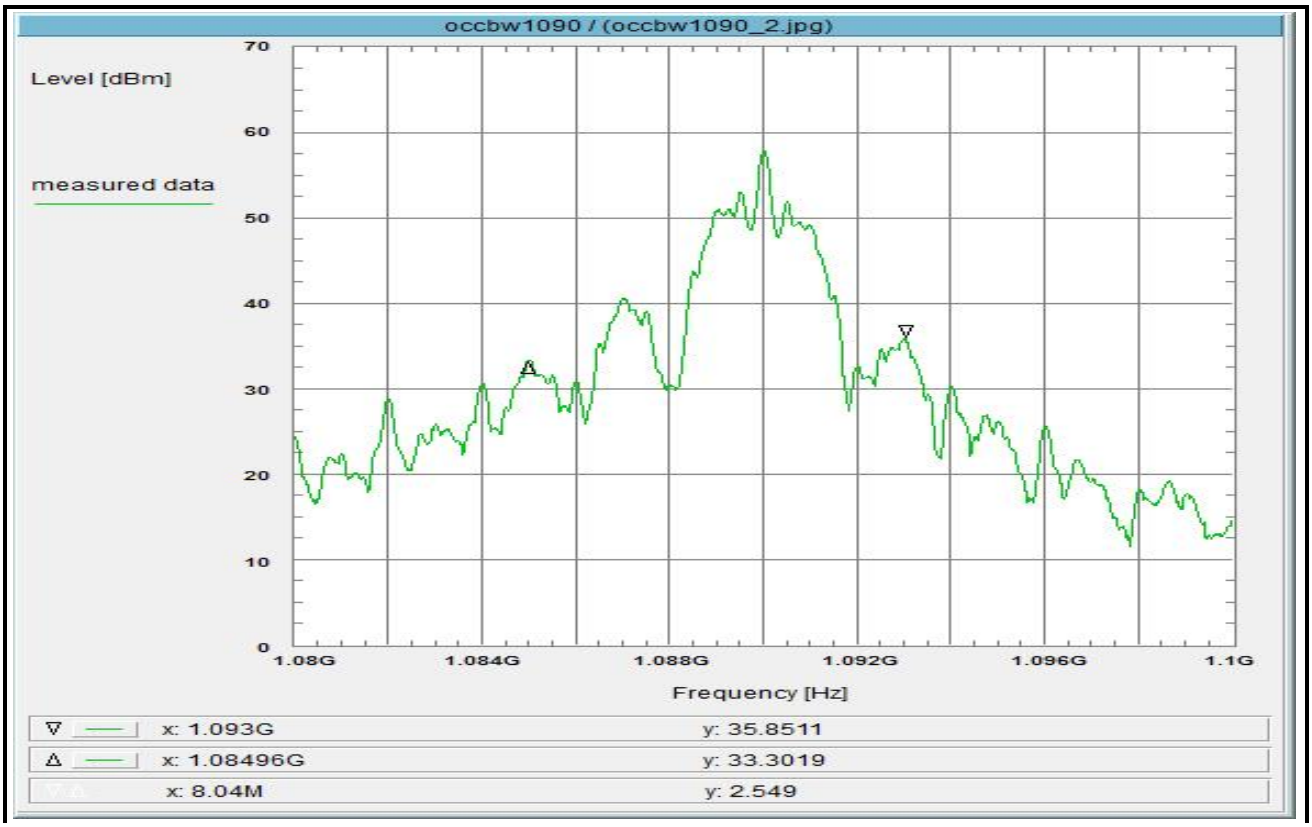
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.3	dB

Remarks:
Determination of the occupied bandwidth
The measured value is about 8.5 MHz (delta marker)
(acc. to the definitions: 99% of the total mean power)
Max-Hold measurement.

The internal function of the spectrum analyzer was user for determination the occupied bandwidth.

Plot No. 2 (14)



Subclause: -/- Function test
RF-carrier at 1090 MHz
Determination of the occupied bandwidth

Limit:
no limits defined

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Determination of the occupied bandwidth**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:15:47	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	1.08	GHz
Stop frequency:	1.1	GHz
Center frequency:	1.09	GHz
Frequency span:	20	MHz
Resolution-BW:	200	kHz
Video-BW:	1	MHz
Input attenuation:	40	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

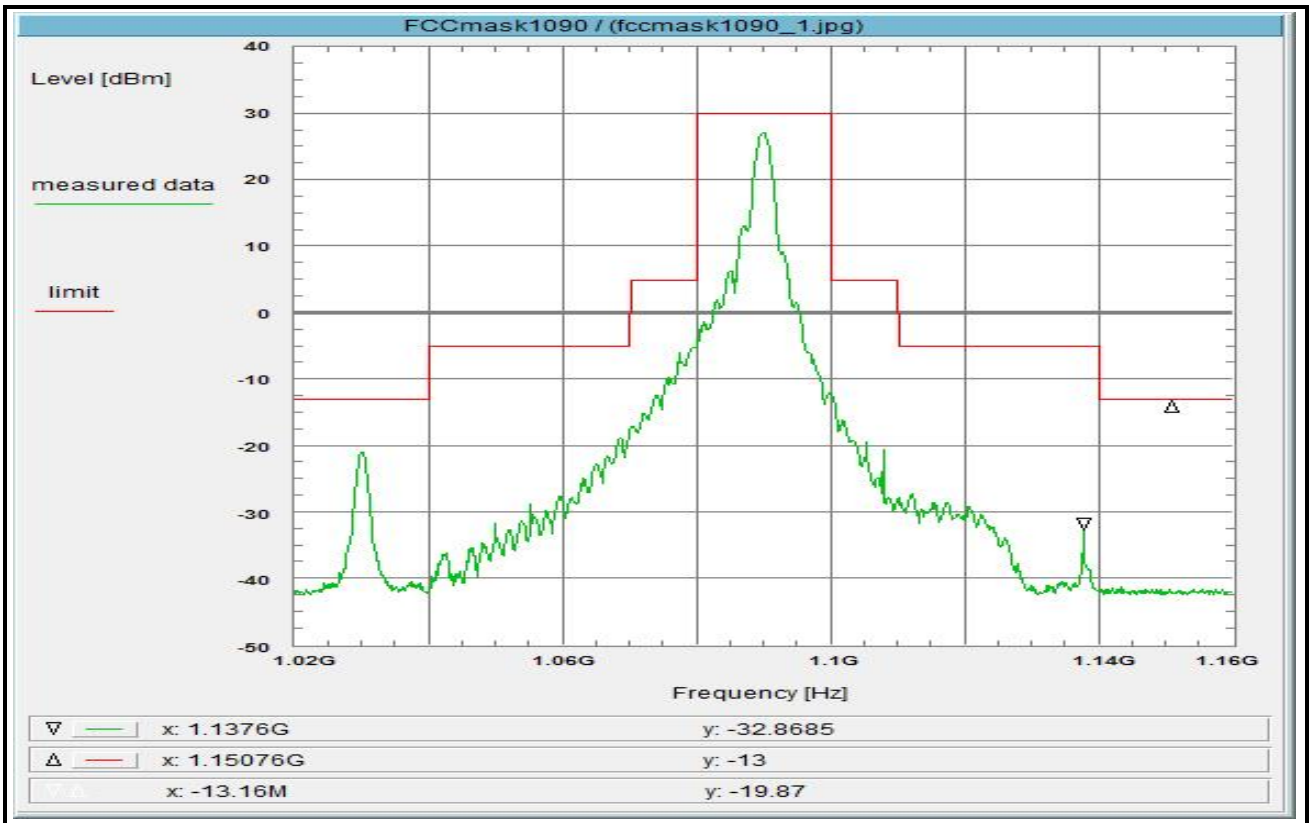
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (200k -> 1M)	+	7.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	43.3	dB

Remarks:
Determination of the occupied bandwidth
The measured value is about 8 MHz (delta marker)
(acc. to the definitions: 99% of the total mean power)
Max-Hold measurement.

The internal function of the spectrum analyzer was user for determination the occupied bandwidth.

Plot No. 3 (14)



Subclause: -/- Spectrum mask
RF-carrier at 1090 MHz
Spectrum mask

Limit:
Limit acc. to FCC Part 87.139

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 15:41:24	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	1.02	GHz
Stop frequency:	1.16	GHz
Center frequency:	1.09	GHz
Frequency span:	140	MHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	30	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

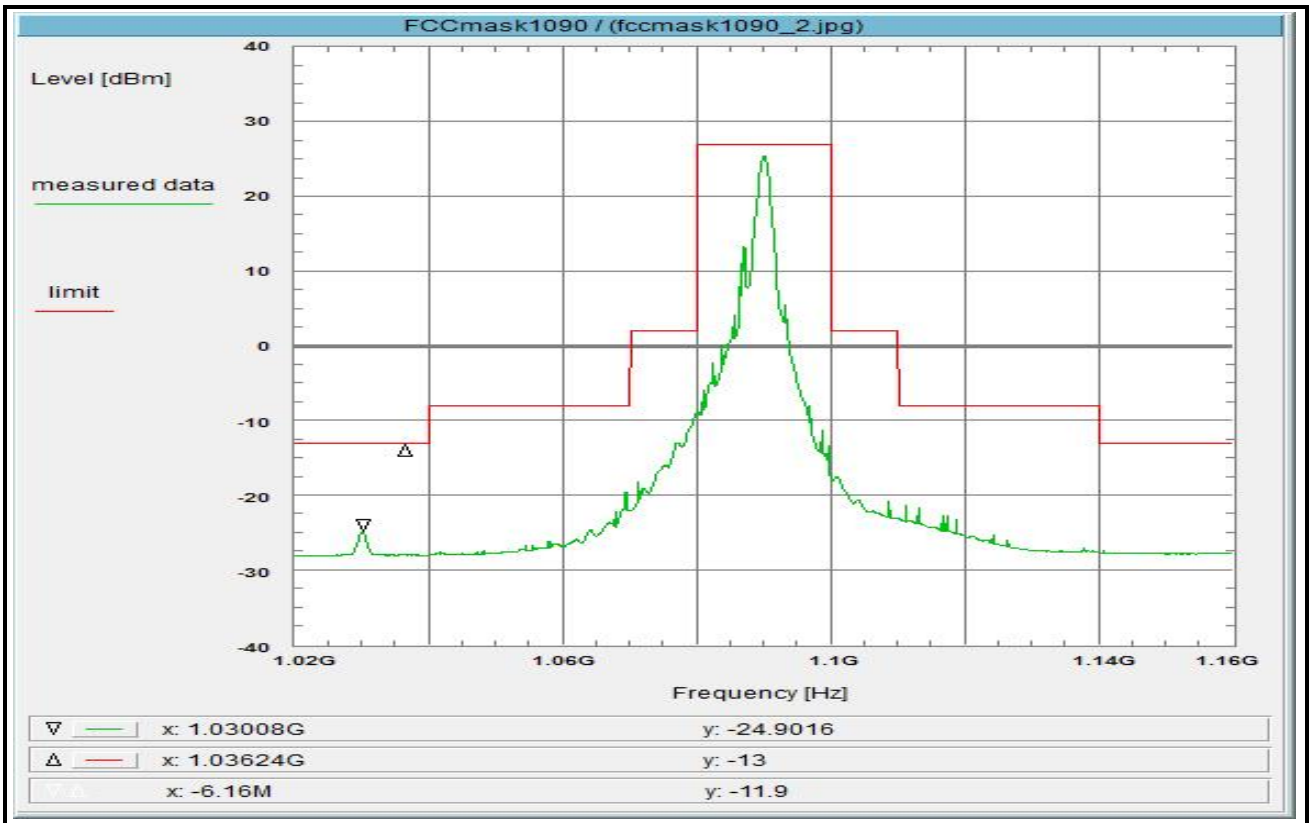
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.3	dB

Remarks:
Spectrum mask according to picture 1
Max-Hold measurement.

Mask based on 30 dBm mean power and 20 MHz bandwidth.
Plot shows 1030 MHz signalling unit (interrogation).

Plot No. 4 (14)



Subclause: -/- Spectrum mask
RF-carrier at 1090 MHz
Spectrum mask

Limit:
Limit acc. to FCC Part 87.139

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:18:49	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	1.02	GHz
Stop frequency:	1.16	GHz
Center frequency:	1.09	GHz
Frequency span:	140	MHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	30	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

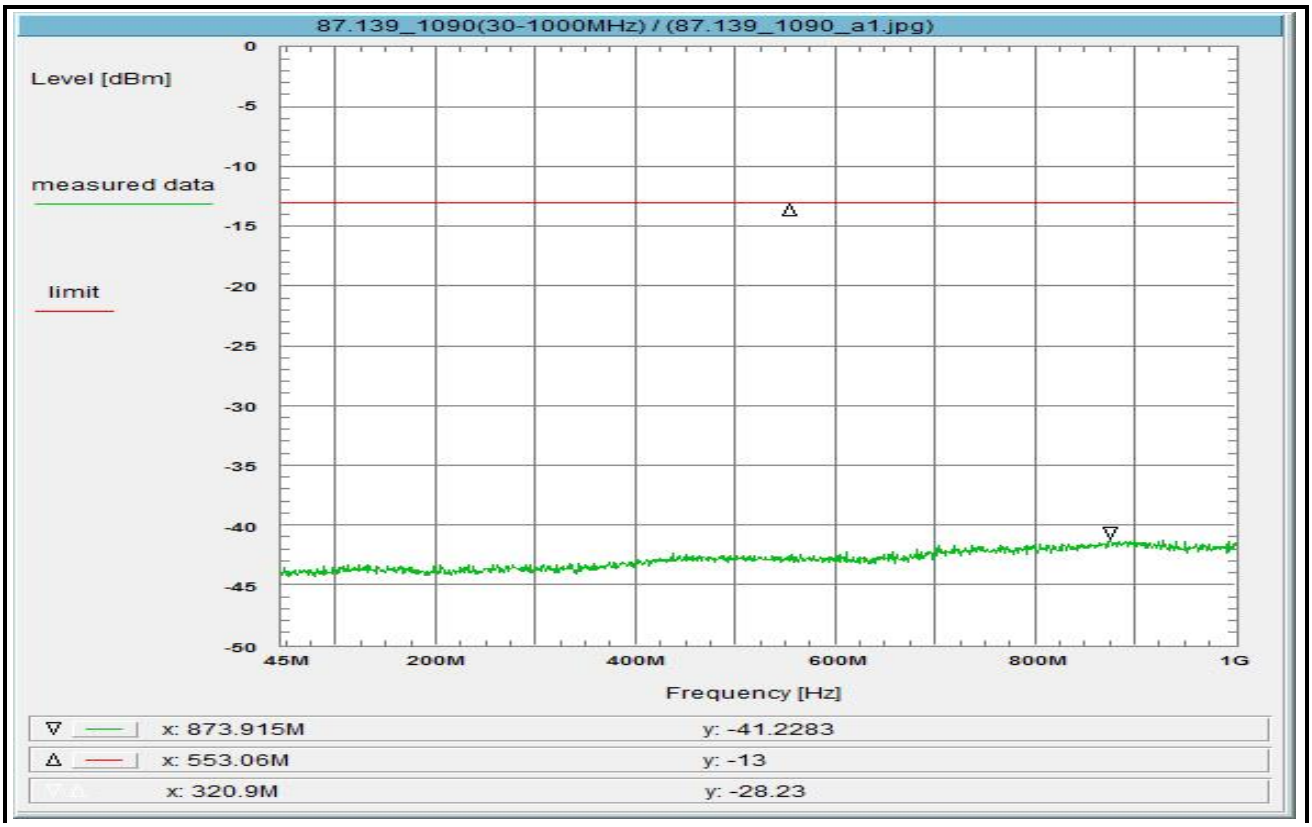
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.3	dB

Remarks:
Spectrum mask according to picture 1
Max-Hold measurement.

Mask based on 27 dBm mean power and 20 MHz bandwidth.
Plot shows 1030 MHz signalling unit (interrogation).

Plot No. 5 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 30 MHz - 1000 MHz

Limit:
Limit acc. to 87.139_1090.3: -36.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 15:46:39	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

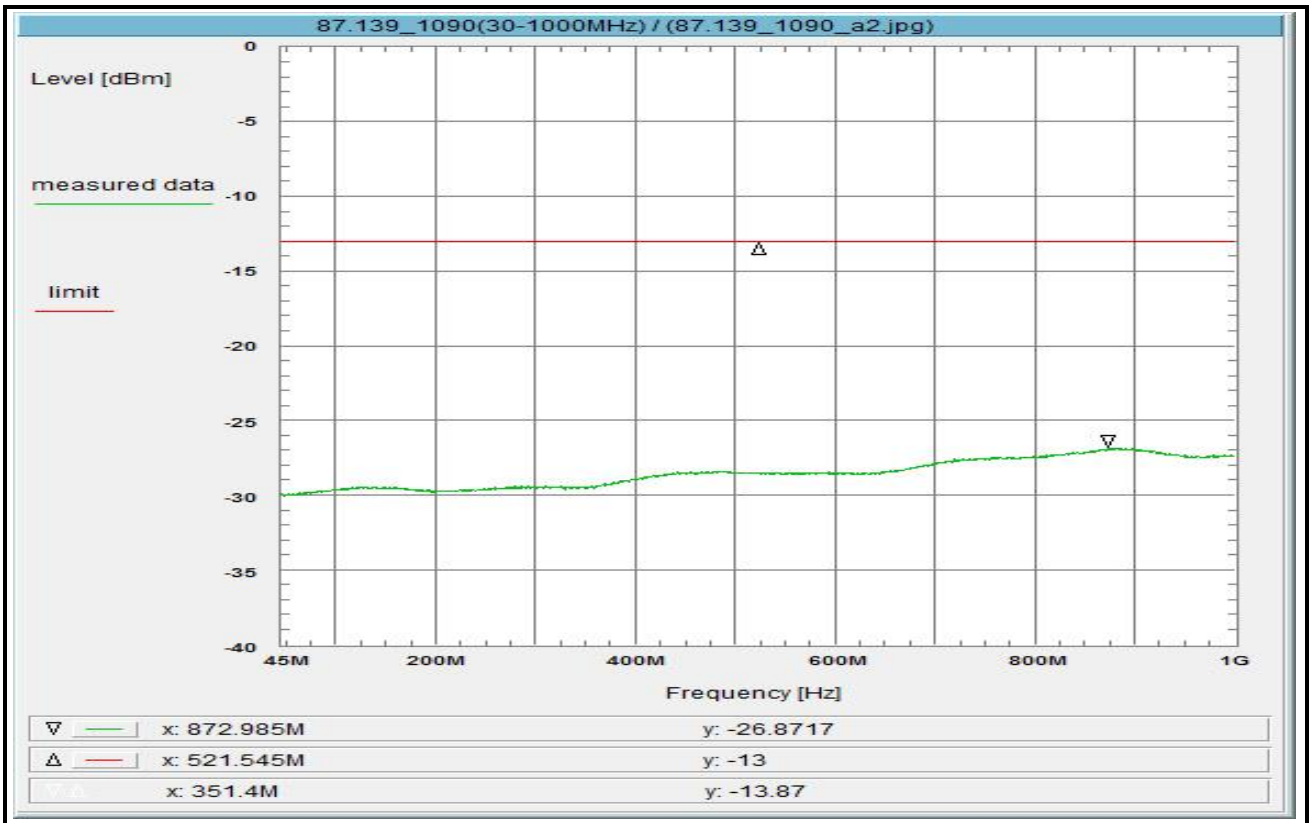
Start frequency:	45	MHz
Stop frequency:	1	GHz
Center frequency:	522.5	MHz
Frequency span:	955	MHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	30	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.5	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.0	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plot No. 6 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 30 MHz - 1000 MHz

Limit:
Limit acc. to 87.139_1090.3: -36.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:19:32	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

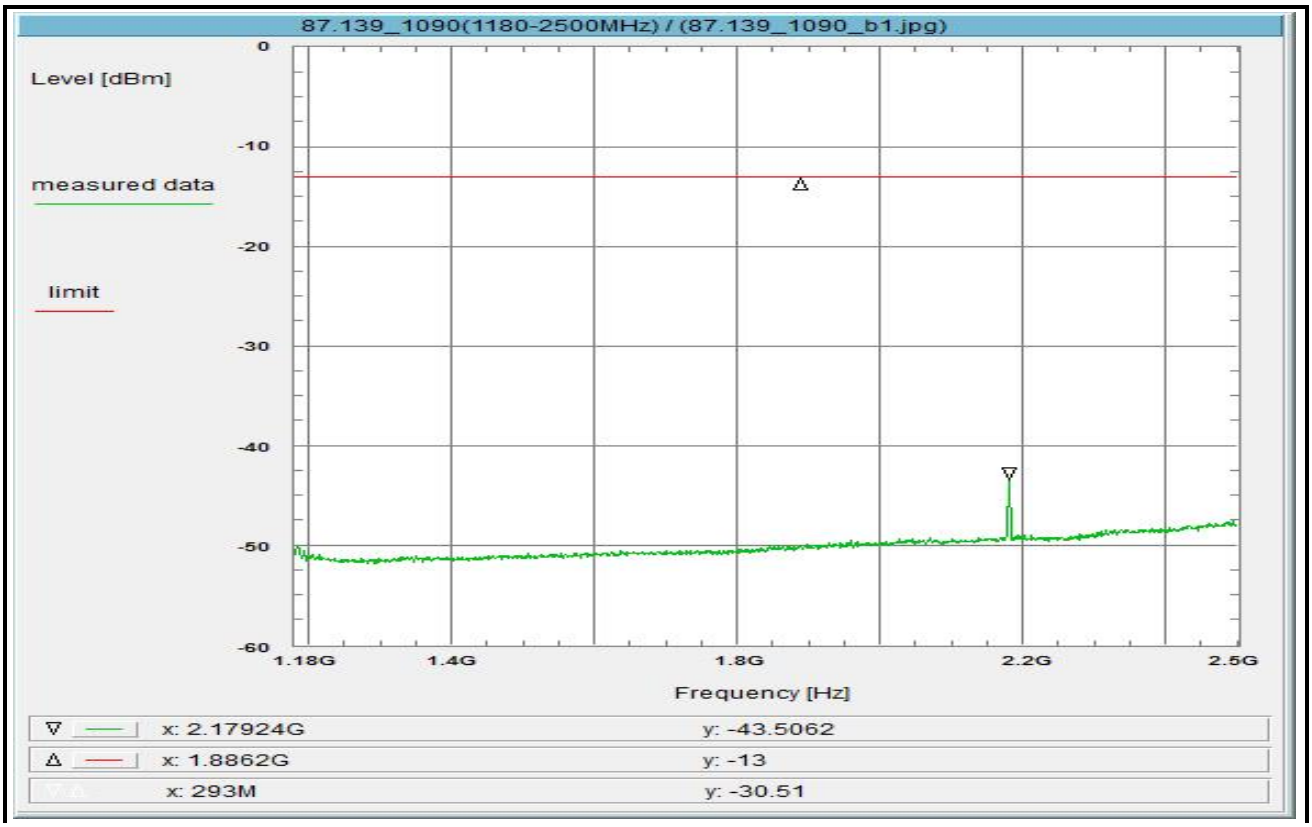
Start frequency:	45	MHz
Stop frequency:	1	GHz
Center frequency:	522.5	MHz
Frequency span:	955	MHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	30	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.5	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.0	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plot No. 7 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 1180 MHz - 2500 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2higj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 16:04:33	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	1.18	GHz
Stop frequency:	2.5	GHz
Center frequency:	1.84	GHz
Frequency span:	1.32	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	20	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

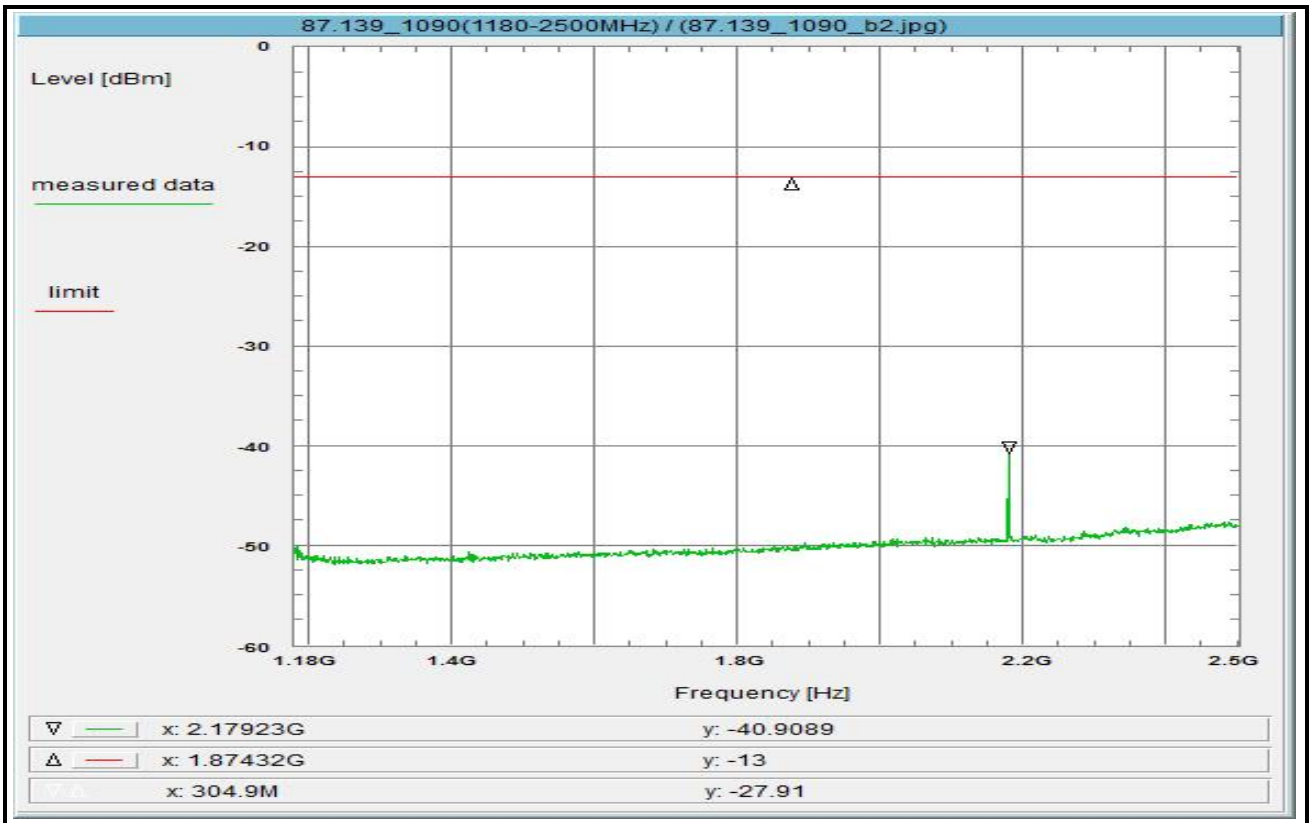
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.9	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.5	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plots shows 2nd harmonic.

Plot No. 8 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 1180 MHz - 2500 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2hgj

Test equipment:
see annex 2: C220, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:21:17
Location:	CTC advanced GmbH, Laboratory RCE-Sat
Temperature:	22 °C
Humidity:	40 %
Voltage:	28 Vdc

Setup of measurement equipment:

Start frequency:	1.18	GHz
Stop frequency:	2.5	GHz
Center frequency:	1.84	GHz
Frequency span:	1.32	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	20	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

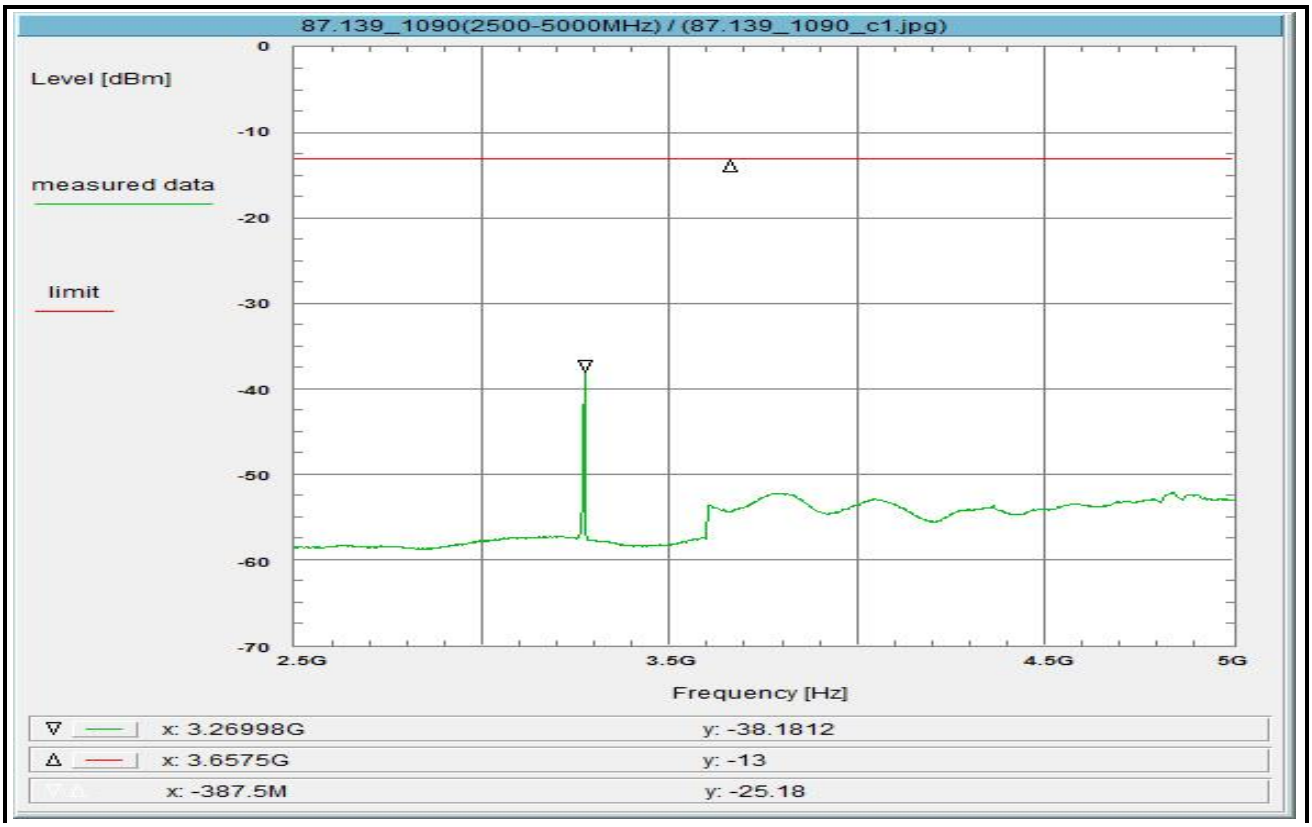
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	0.9	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.6	dB
Attenuation (U023b)	+	10.0	dB
Powersplitter	+	6.0	dB
TOTAL CORRECTION:	+	36.5	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plot shows 2nd harmonic.

Plot No. 9 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 2500 MHz - 5000 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2higj

Test equipment:
see annex 2: C220, F150, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 16:01:53	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	2.5	GHz
Stop frequency:	5	GHz
Center frequency:	3.75	GHz
Frequency span:	2.5	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	6	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

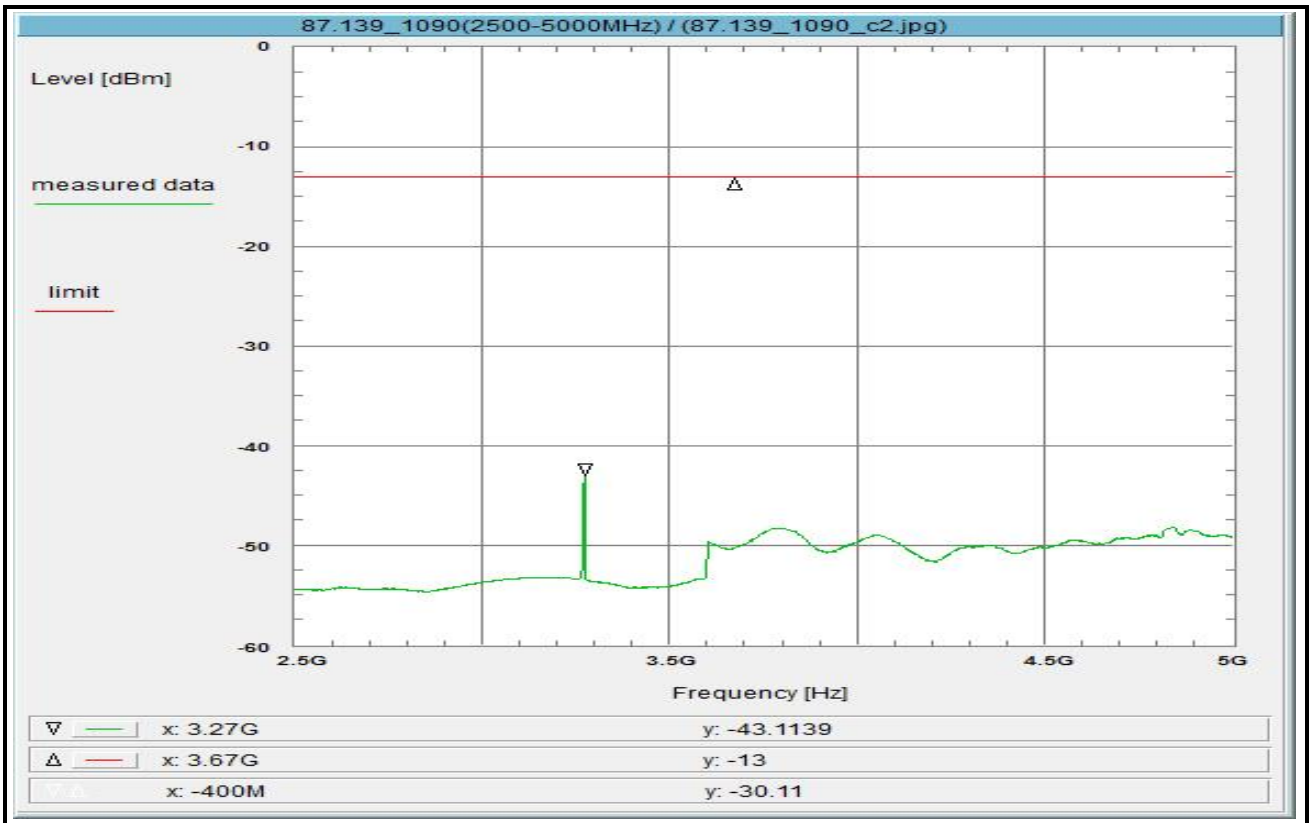
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	1.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.7	dB
Powersplitter	+	6.0	dB
HPF (F150)	+	0.4	dB
TOTAL CORRECTION:	+	27.4	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plots shows 3rd harmonic.

Plot No. 10 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 2500 MHz - 5000 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2higj

Test equipment:
see annex 2: C220, F150, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:25:06	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	2.5	GHz
Stop frequency:	5	GHz
Center frequency:	3.75	GHz
Frequency span:	2.5	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

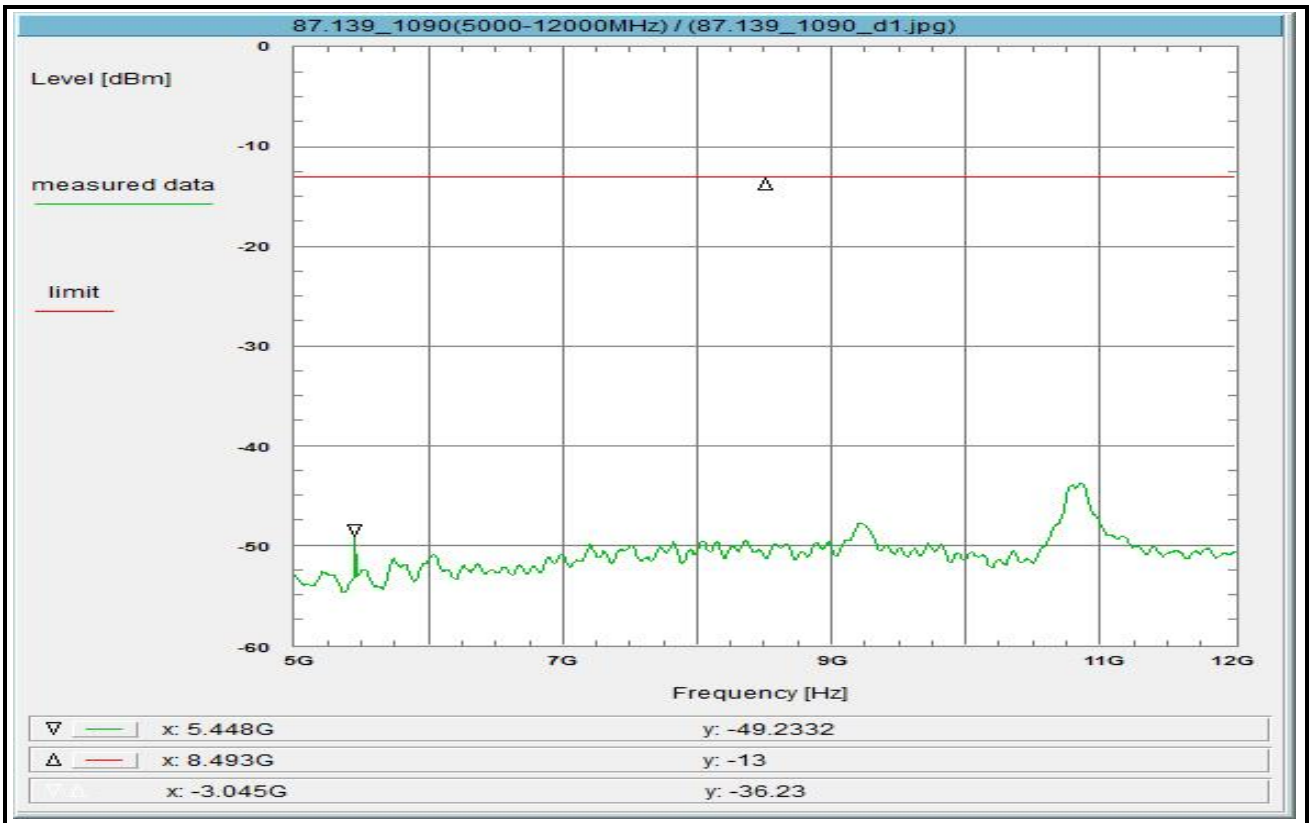
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	1.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.7	dB
Powersplitter	+	6.0	dB
HPF (F150)	+	0.4	dB
TOTAL CORRECTION:	+	27.4	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plot shows 3rd harmonic.

Plot No. 11 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 5000 MHz - 12000 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
AC-Mode

Test setup:
see section 8.1: 1.2higj

Test equipment:
see annex 2: C220, F150, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 16:00:48	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

Start frequency:	5	GHz
Stop frequency:	12	GHz
Center frequency:	8.5	GHz
Frequency span:	7	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	6	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

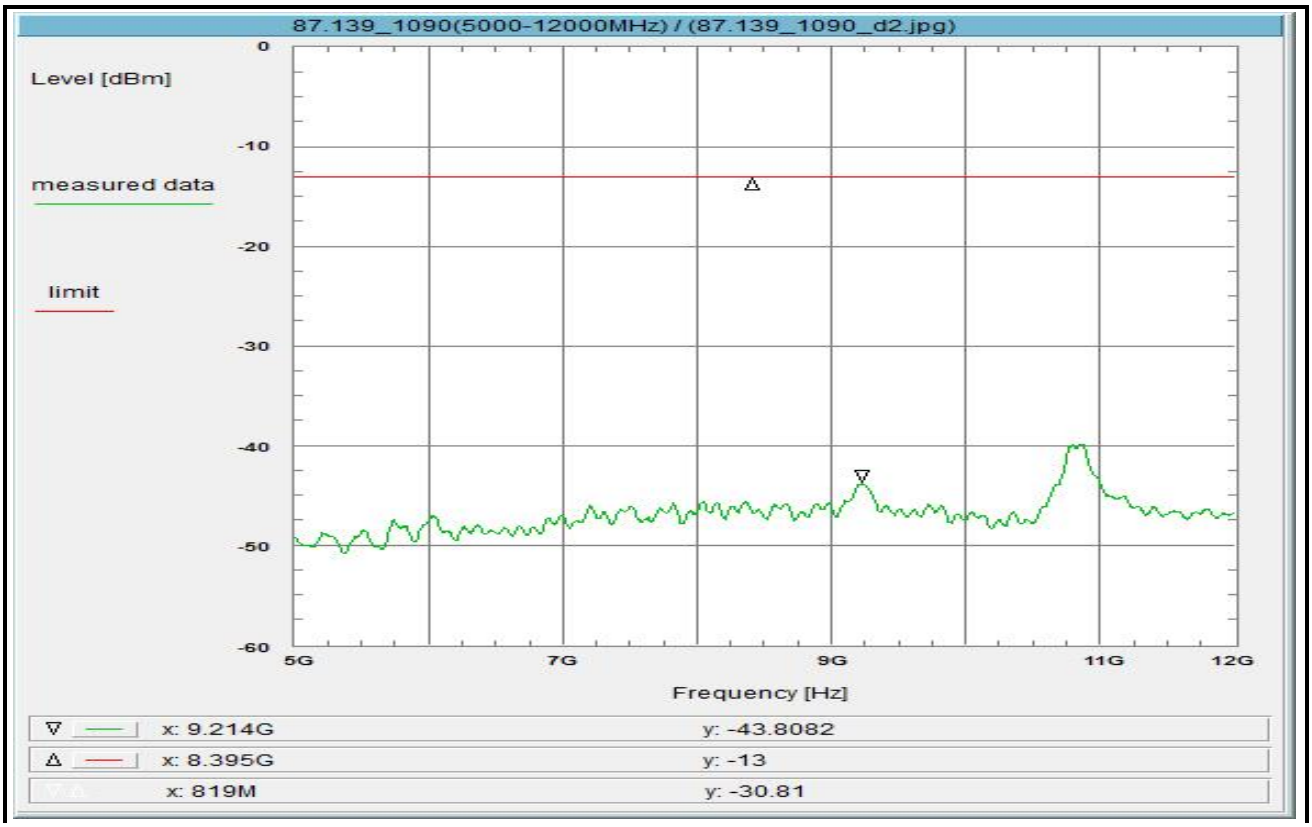
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.1	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.8	dB
Powersplitter	+	6.0	dB
HPF (F150)	+	3.1	dB
TOTAL CORRECTION:	+	31.0	dB

Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plots shows 5th harmonic.

Plot No. 12 (14)



Subclause: -/- Spurious emissions
RF-carrier at 1090 MHz
Examination of the frequency range 5000 MHz - 12000 MHz

Limit:
Limit acc. to 87.139_1090.3: -30.0 dBm/1MHz

Test results:
see plot (an explicit table was not generated)

Operating condition of DUT:
operating condition 2, see subclause 1.5.2
S-Mode

Test setup:
see section 8.1: 1.2higj

Test equipment:
see annex 2: C220, F150, R001, U312

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Mon 05/Nov/2018 17:27:29	
Location:	CTC advanced GmbH, Laboratory RCE-Sat	
Temperature:	22	°C
Humidity:	40	%
Voltage:	28	Vdc

Setup of measurement equipment:

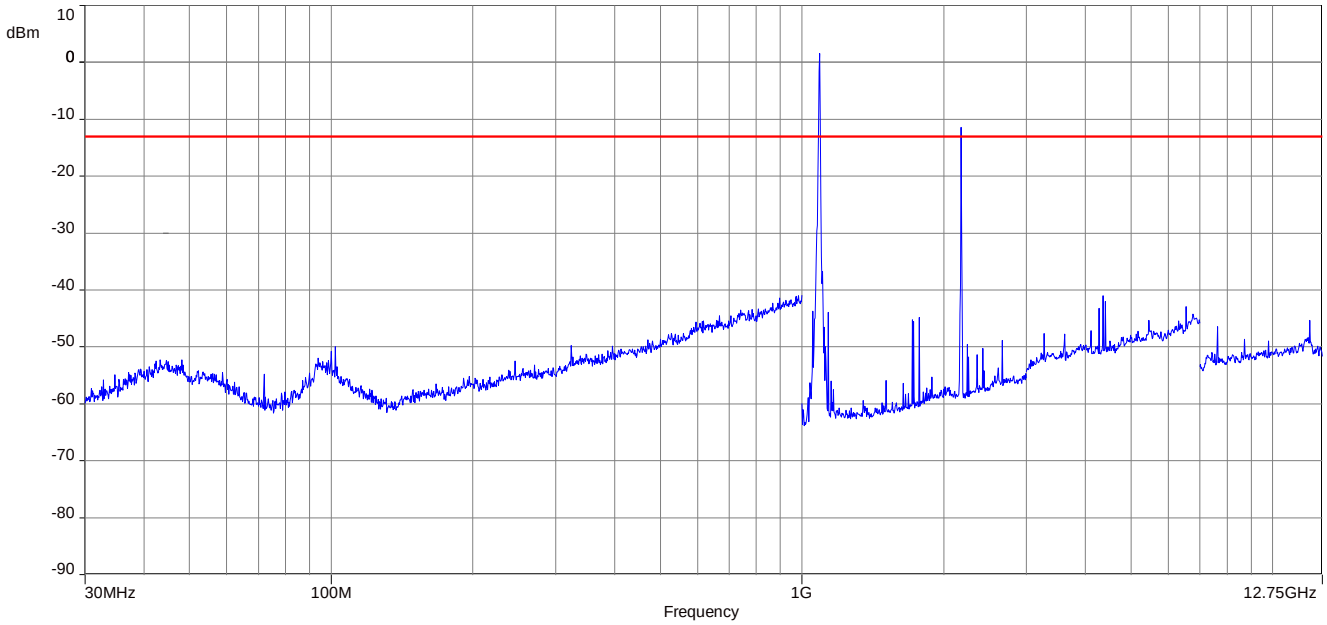
Start frequency:	5	GHz
Stop frequency:	12	GHz
Center frequency:	8.5	GHz
Frequency span:	7	GHz
Resolution-BW:	1	MHz
Video-BW:	3	MHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.1	dB
DUT-Antenna	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Attenuation (U312)	+	19.8	dB
Powersplitter	+	6.0	dB
HPF (F150)	+	3.1	dB
TOTAL CORRECTION:	+	31.0	dB

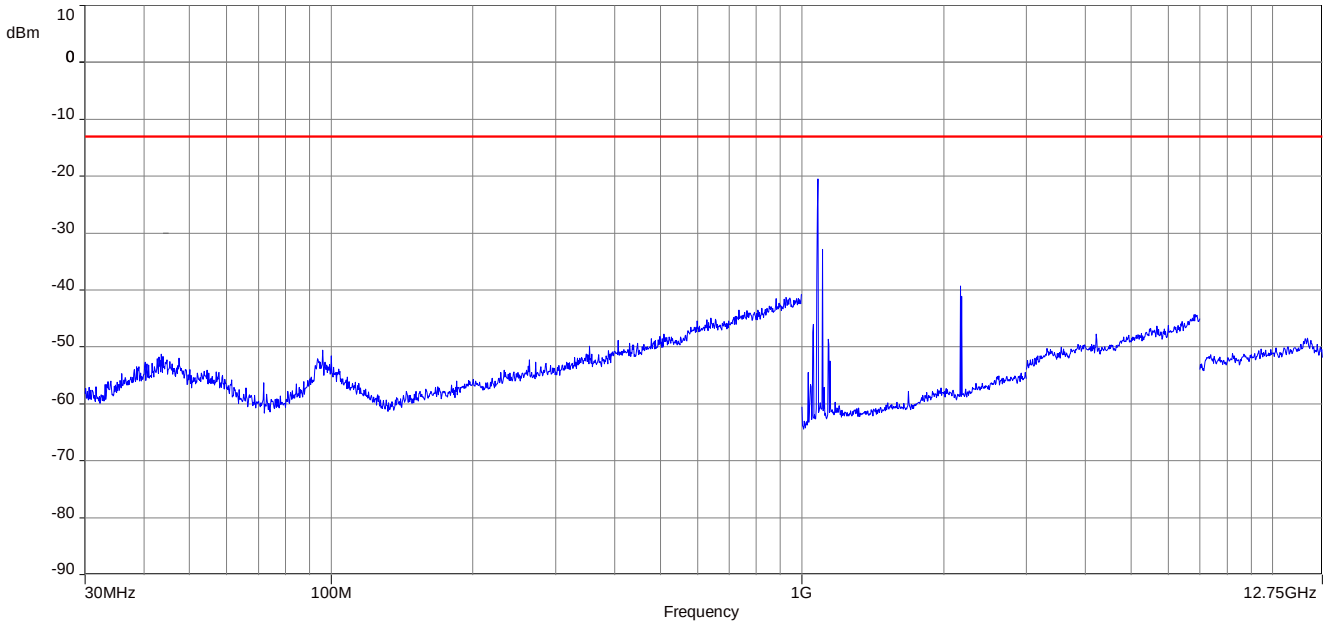
Remarks:
Spurious emissions under normal test conditions
Max-Hold measurement.

Plot No. 13 (14): AC-Mode



Note:
Plot shows wanted signal at 1090 MHz and 2nd harmonic at 2180 MHz generated by internal pre-amplifier.

Plot No. 14 (14): S-Mode



Note:
Plot shows wanted signal at 1090 MHz and 2nd harmonic at 2180 MHz generated by internal pre-amplifier not by DUT.

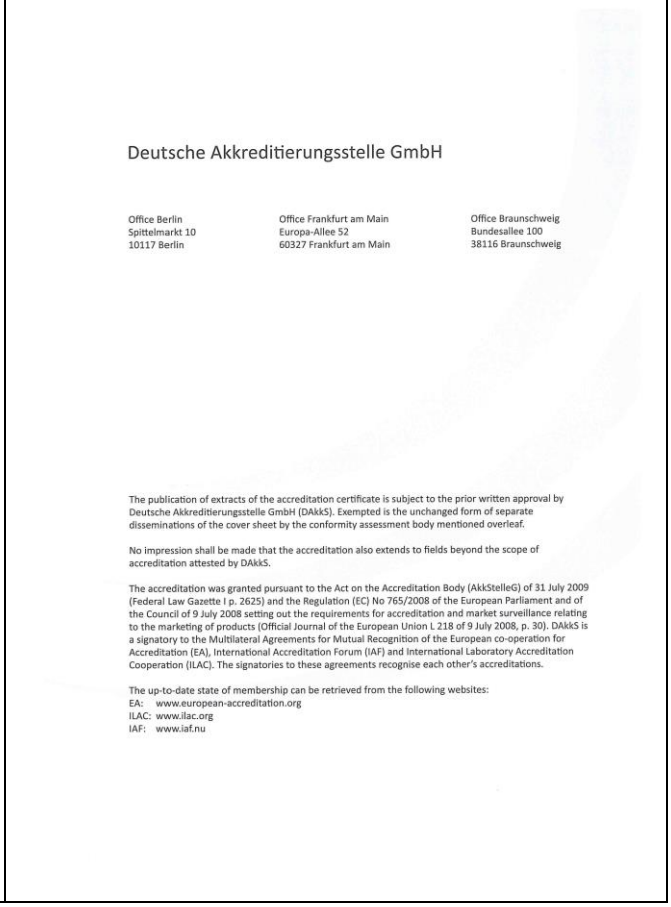
12 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N_0	Carrier to noise-density ratio, expressed in dB-Hz

13 Document history

Version	Applied changes	Date of release
-/-	Initial release - DRAFT	2018-11-09
	Editorial changes based on applicant's remarks	2018-11-14

14 Accreditation Certificate

first page	last page
	

Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

https://www.dakks.de/as/ast/d/D-PL-12076-01-03e.pdf

########## END OF TEST REPORT ##########