Annex G

This test report annex 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 annex authorized:

cn=Thomas Vogler, o=CTC advanced GmbH, ou=VOG-211118, email=thomas.vogler@ctcadvanced.com, c=DE
2023.01.06 15:06:20 +01'00'

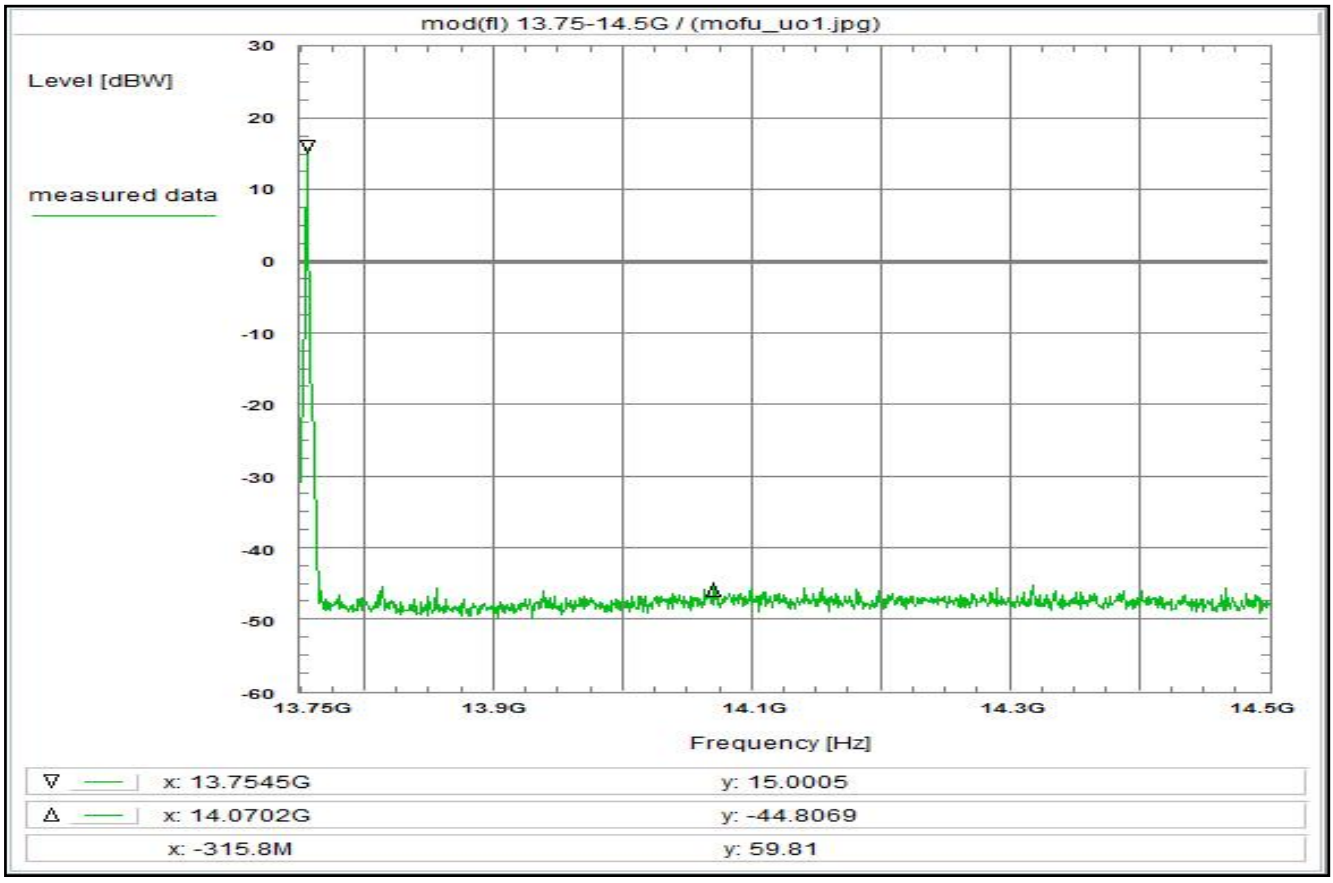
Thomas Vogler
Lab Manager
Radio Communications & EMC

1 Table of contents

2 Measurement results, FCC Part 25

This chapter consists of 44 pages including this page.

Plot No. 1



Subclause: -/- Function test
Modulated rf-carrier at the lower edge of the band (fl)
Measurement within the band

Limit:
no limits defined
This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted as close to the lower edge of the operating frequency band.

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

Operating condition of DUT:
operating condition 1, see test report chapter 5.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:
measurement for orientation

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:07:09	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

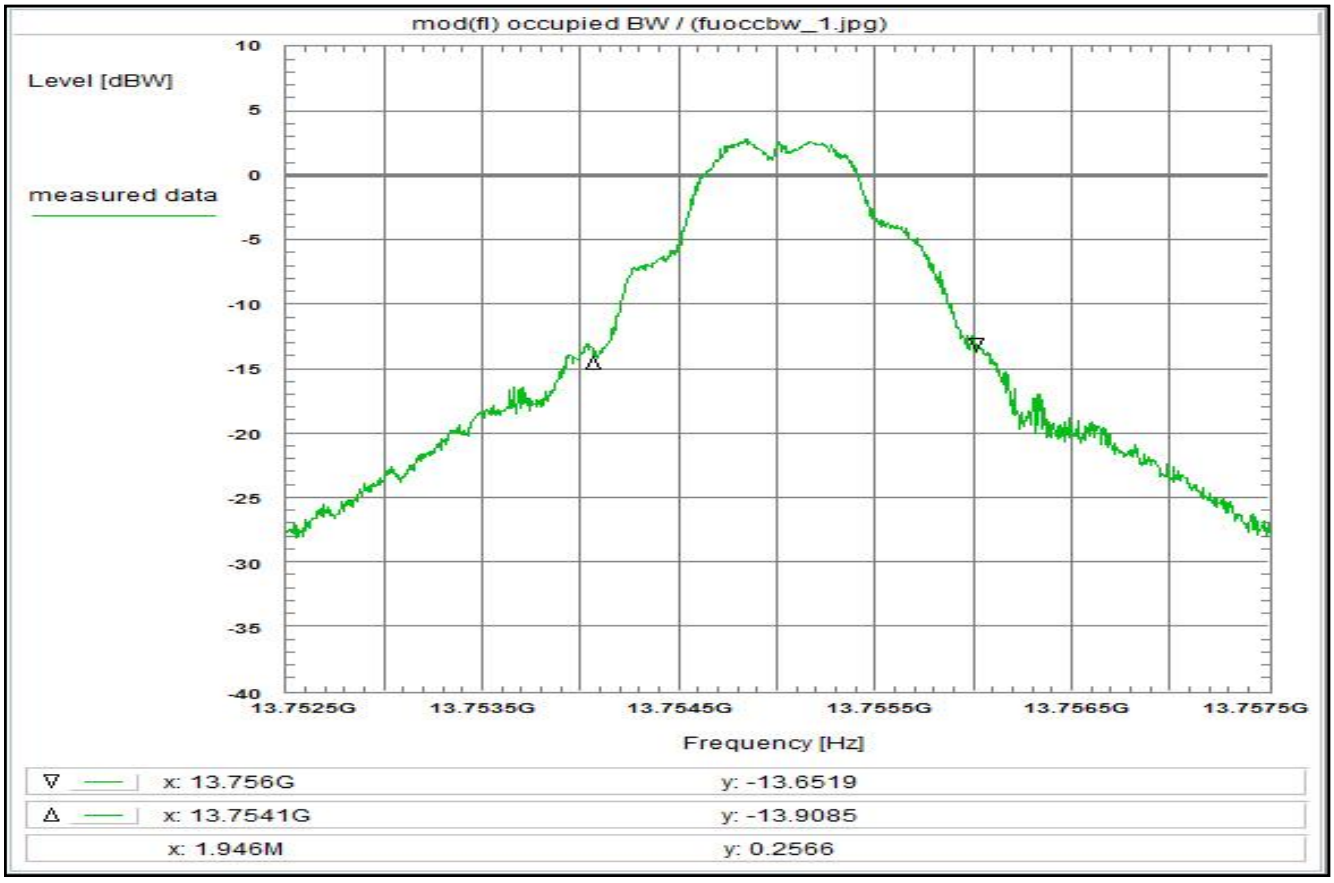
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	59.2	dB

Remarks:
Test of general function of the EUT and measurement for orientation

Plot No. 2



Subclause: -/- Function test
Modulated rf-carrier at the lower edge of the band (fl)
Determination of the occupied bandwidth

Limit:
no limits defined

The frequency range in the plot is about 3 times the expected occupied bandwidth.

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

Operating condition of DUT:
operating condition 1, see test report chapter 5.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:
measurement for orientation

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:05:12	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

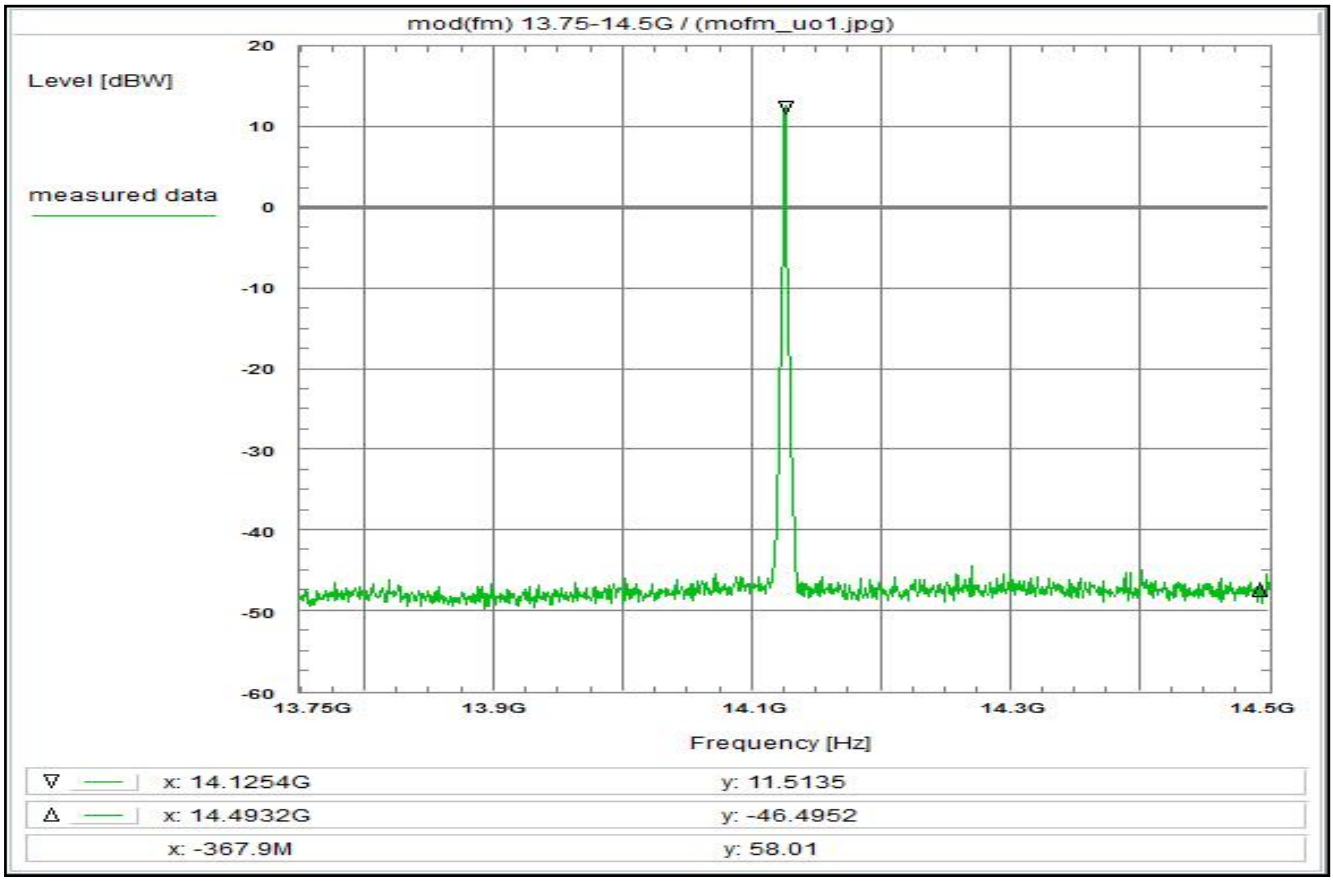
Start frequency:	13.7525	GHz
Stop frequency:	13.7575	GHz
Center frequency:	13.755	GHz
Frequency span:	5	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.8	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	44.8	dB

Remarks:
Determination of the occupied bandwidth.
The measured value is about 1.94 MHz (delta marker)
(according to the definition: 99% of the total mean power)
The internal function of the analyzer was used for determination.

Plot No. 3



Subclause: -/- Function test
Modulated rf-carrier in the middle of the band (fm)
Measurement within the band

Limit:
no limits defined
This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted in the middle of the band (EIRP).

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:
measurement for orientation

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:41:14	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

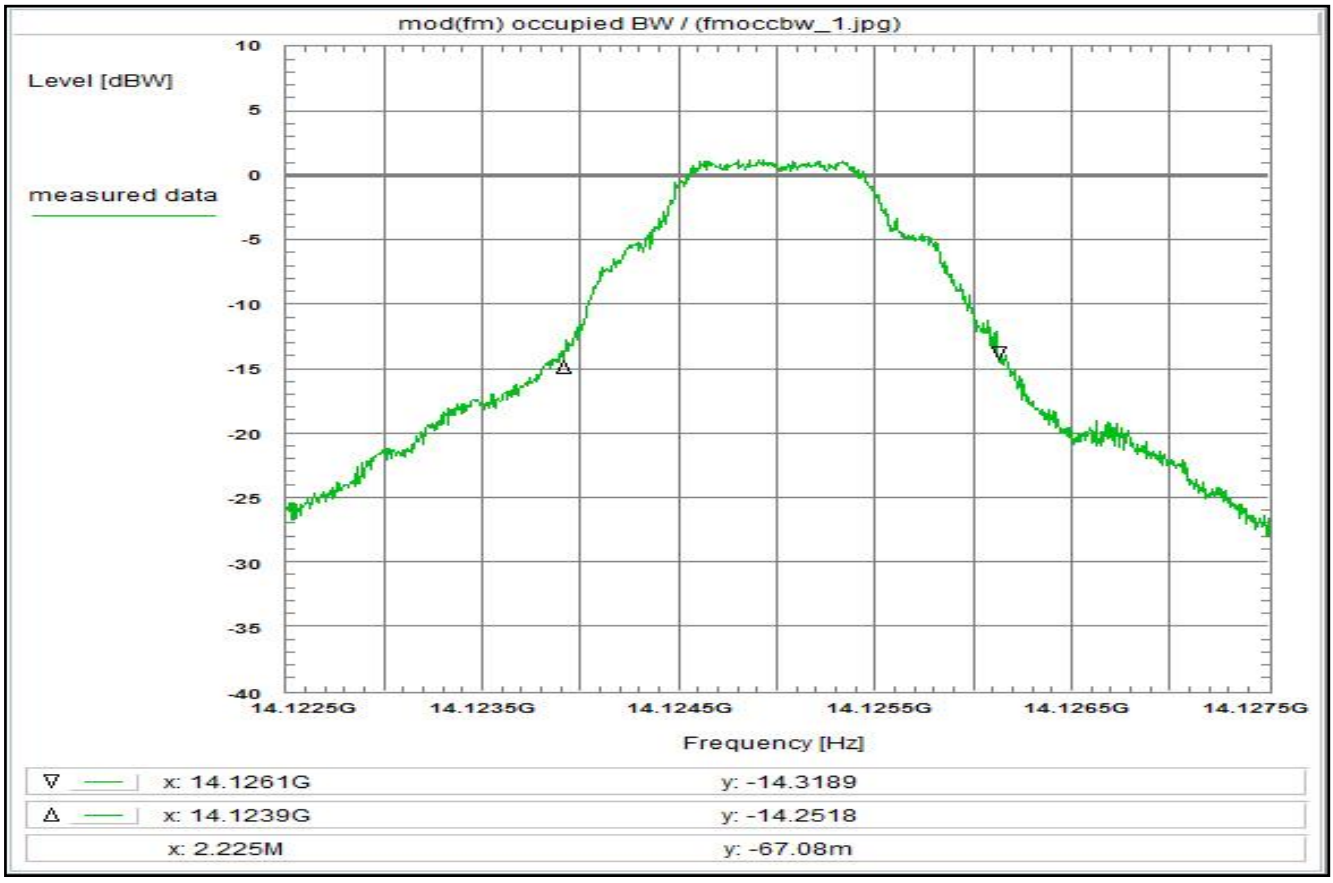
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	59.2	dB

Remarks:
Test of general function of the EUT and measurement for orientation

Plot No. 4



Subclause: -/- Function test
Modulated rf-carrier in the middle of the band (fm)
Determination of the occupied bandwidth

Limit:
no limits defined

The frequency range in the plot is about 3 times the expected occupied bandwidth.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:
measurement for orientation

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:46:56	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

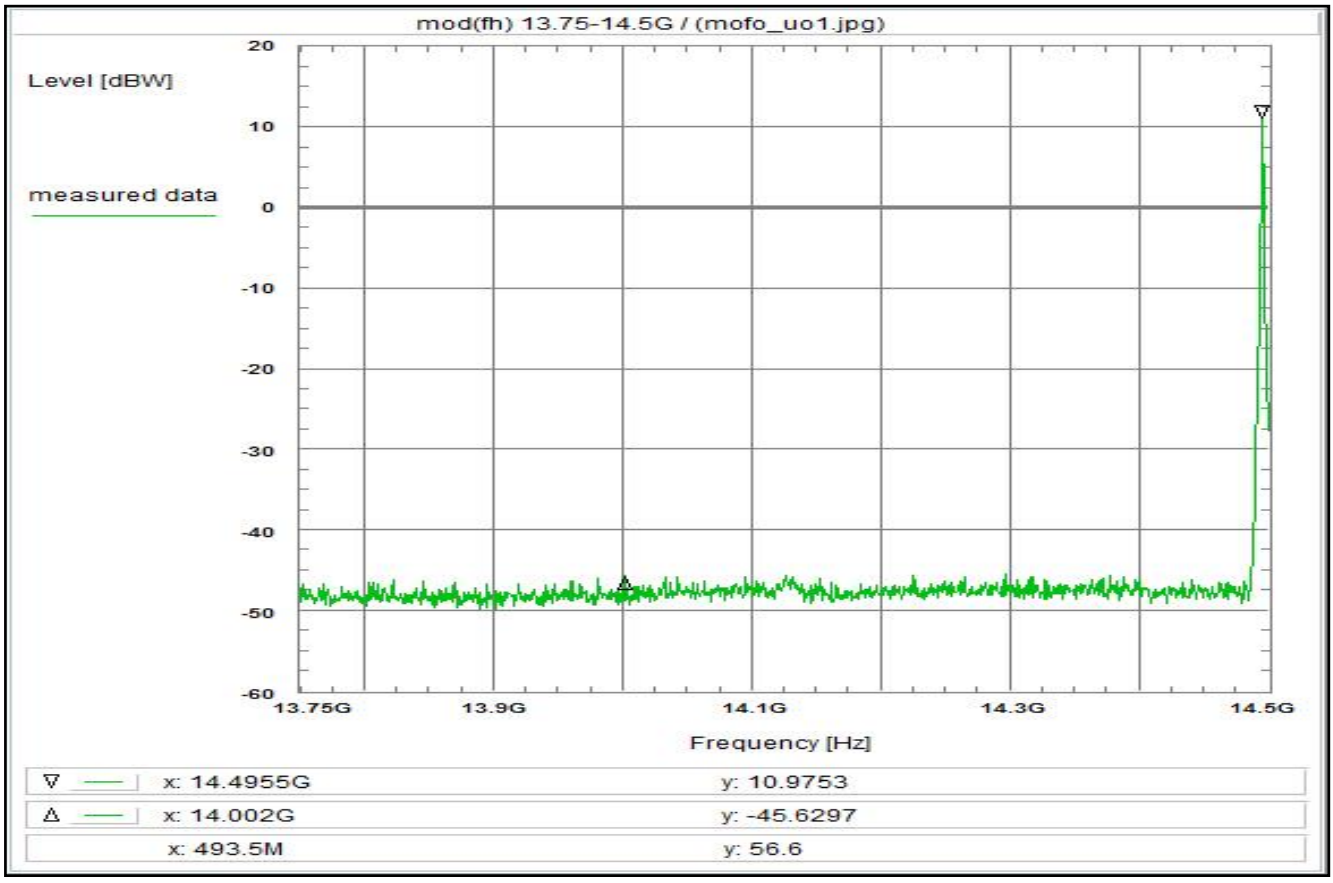
Start frequency:	14.1225	GHz
Stop frequency:	14.1275	GHz
Center frequency:	14.125	GHz
Frequency span:	5	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.3	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	45.3	dB

Remarks:
Determination of the occupied bandwidth.
The measured value is about 2.18 MHz (delta marker)
(according to the definition: 99% of the total mean power)
The internal function of the analyzer was used for determination.

Plot No. 5



Subclause: -/- Function test
Modulated rf-carrier at the upper edge of the band (fh)
Measurement within the band

Limit:
no limits defined
This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted as close to the upper edge of the operating frequency band.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:24:10	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

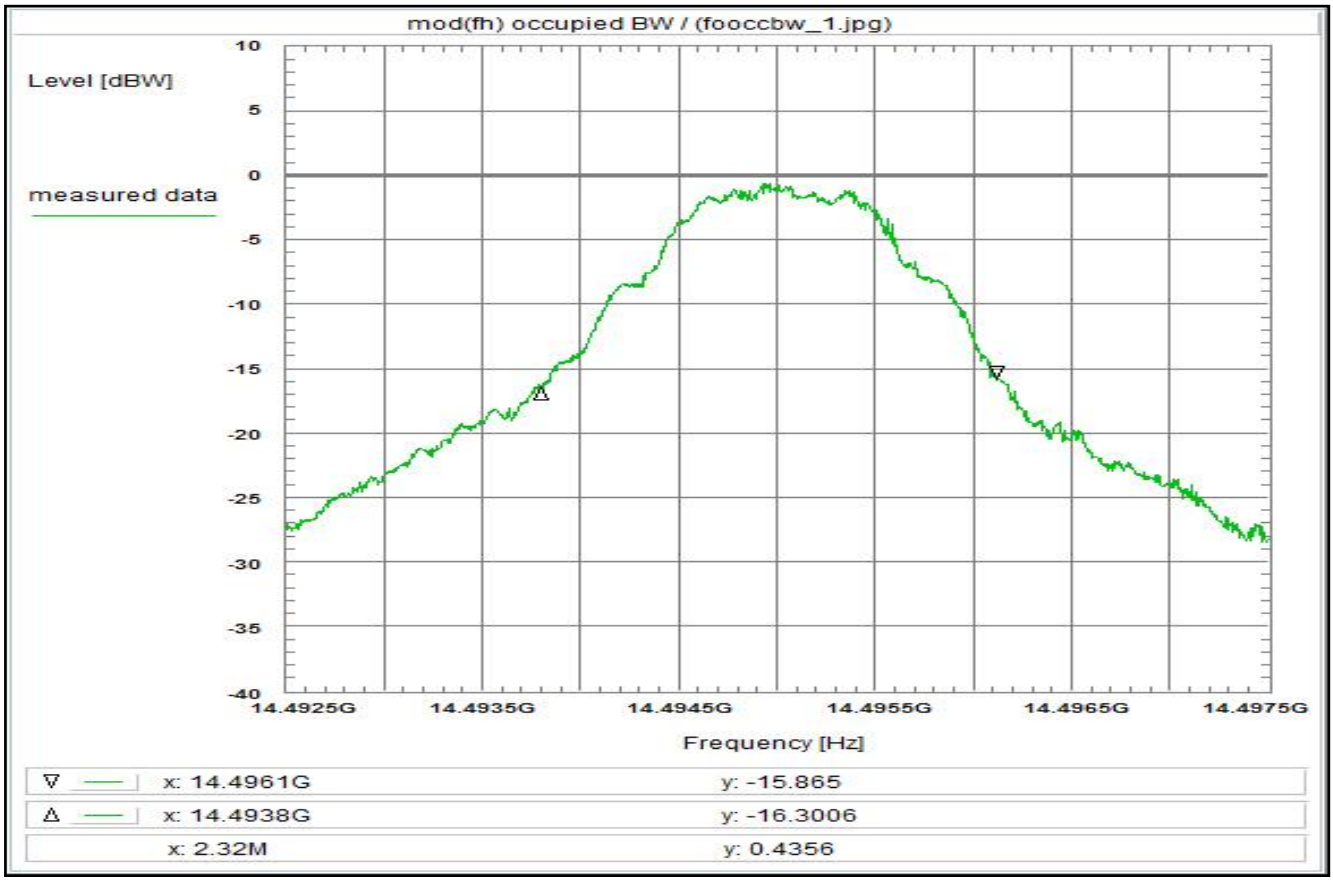
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	59.2	dB

Remarks:
Test of general function of the EUT and measurement for orientation

Plot No. 6



Subclause: -/- Function test
Modulated rf-carrier at the upper edge of the band (fh)
Determination of the occupied bandwidth

Limit:
no limits defined

The frequency range in the plot is about 3 times the expected occupied bandwidth.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:
measurement for orientation

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:34:04	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

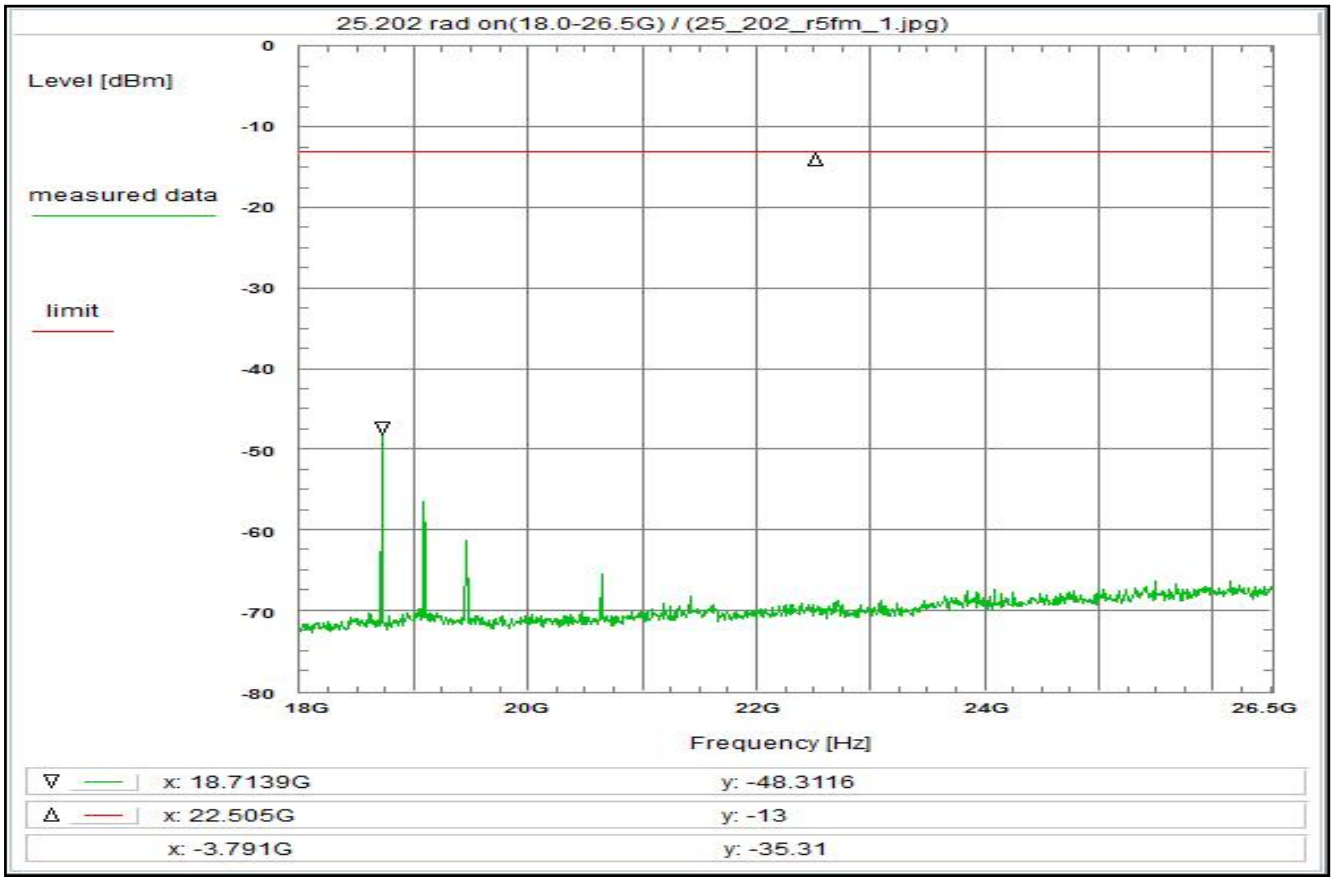
Start frequency:	14.4925	GHz
Stop frequency:	14.4975	GHz
Center frequency:	14.495	GHz
Frequency span:	5	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	45.2	dB

Remarks:
Determination of the occupied bandwidth.
The measured value is about 2.32 MHz (delta marker)
(according to the definition: 99% of the total mean power)
The internal function of the analyzer was used for determination.

Plot No. 7



Subclause: 25.202) Emission limitations
Modulated rf-carrier within the band (fl/fm/fh)
Radiation coming out of DUT-cabinet(s): 18.0 GHz - 26.5 GHz

Limit:
Limit acc. to 25.202): -13.0 dBm

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A019, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Wed 26/Oct/2022 15:31:07	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

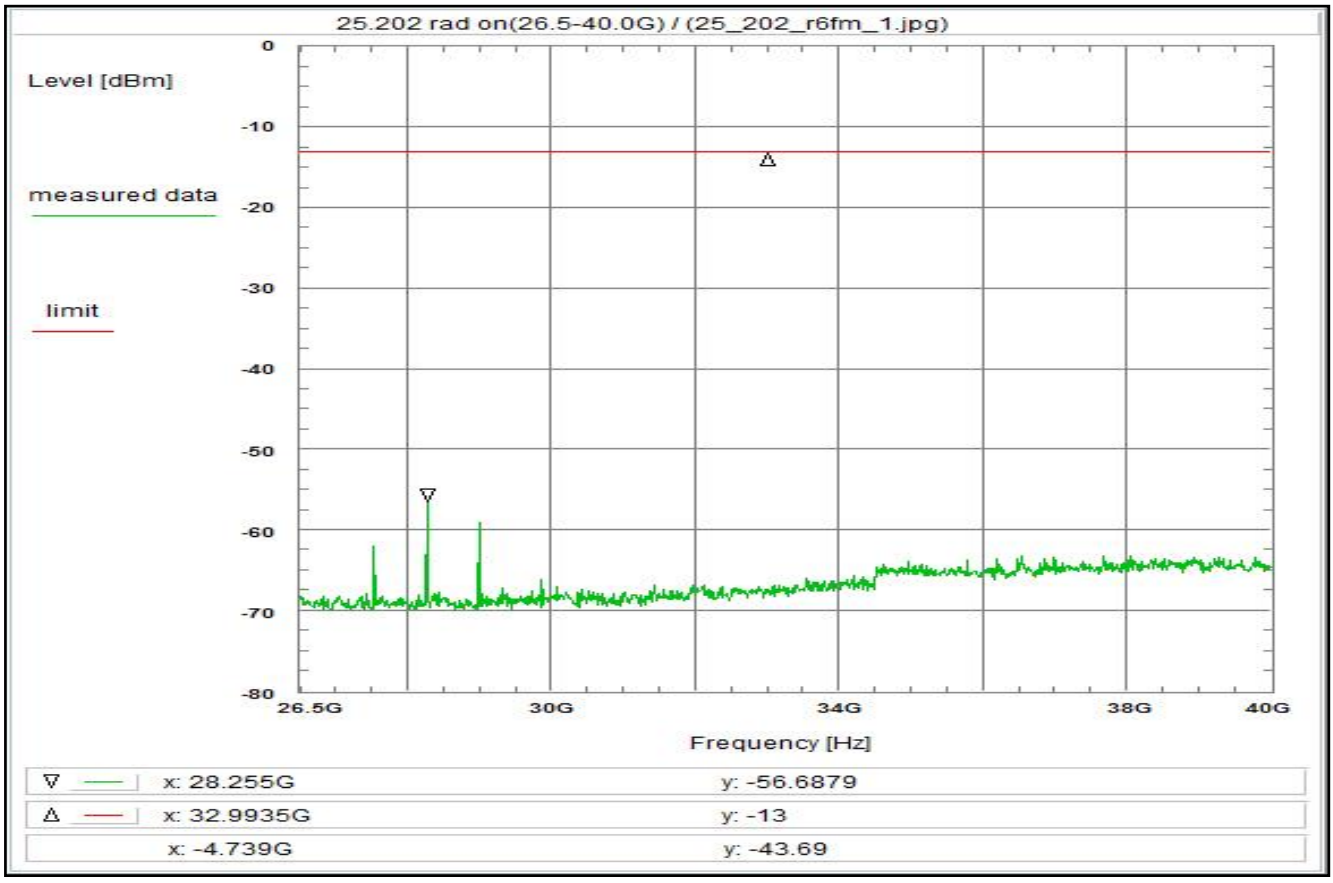
Start frequency:	18	GHz
Stop frequency:	26.5	GHz
Center frequency:	22.25	GHz
Frequency span:	8.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	3.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A019)	-	19.3	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (22.25GHz, 0.3m)	+	48.9	dB
TOTAL CORRECTION:	+	19.1	dB

Remarks:
Carrier-on state / Carrier within the the band (fl/fm/fh)
Measurement for orientation with a measuring antenna close to the DUT-cabinets.
If any critical spurious radiations are detected a measurement
in an exactly defined distance will be carried out.

Plot No. 8



Subclause: 25.202) Emission limitations
Modulated rf-carrier within the band (fl/fm/fh)
Radiation coming out of DUT-cabinet(s): 26.5 GHz - 40.0 GHz

Limit:
Limit acc. to 25.202): -13.0 dBm

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A021, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Wed 26/Oct/2022 15:18:13	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

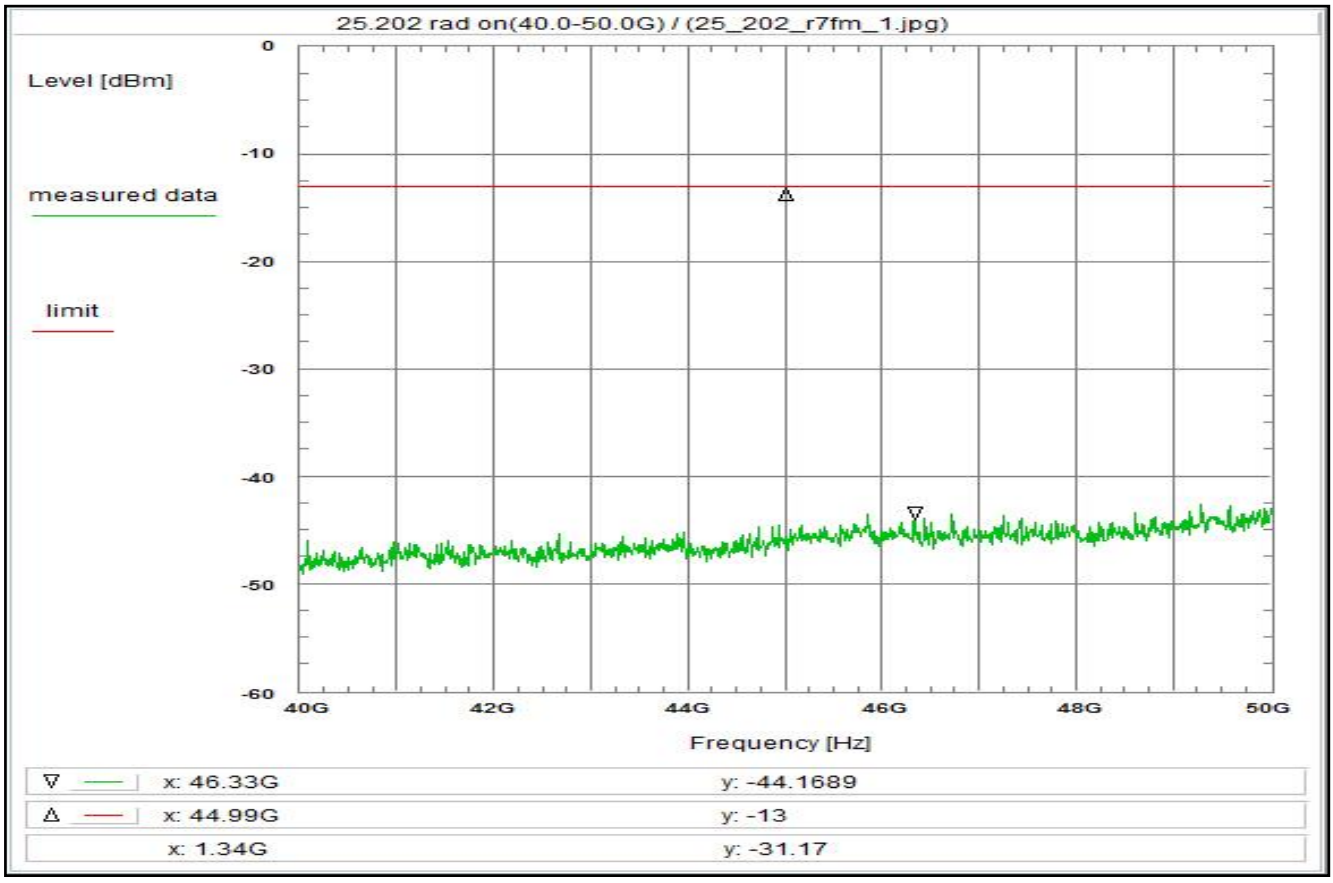
Start frequency:	26.5	GHz
Stop frequency:	40	GHz
Center frequency:	33.25	GHz
Frequency span:	13.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	4.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A021)	-	19.6	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (33.25GHz, 0.2m)	+	48.9	dB
TOTAL CORRECTION:	+	19.6	dB

Remarks:
Carrier-on state / Carrier within the the band (fl/fm/fh)
Measurement for orientation with a measuring antenna close to the DUT-cabinets.
If any critical spurious radiations are detected a measurement
in an exactly defined distance will be carried out.
2nd harmonics visible on plot

Plot No. 9



Subclause: 25.202) Emission limitations
Modulated rf-carrier within the band (fl/fm/fh)
Radiation coming out of DUT-cabinet(s): 40.0 GHz - 50.0 GHz

Limit:
Limit acc. to 25.202): -13.0 dBm

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A031, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Wed 26/Oct/2022 15:09:28	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

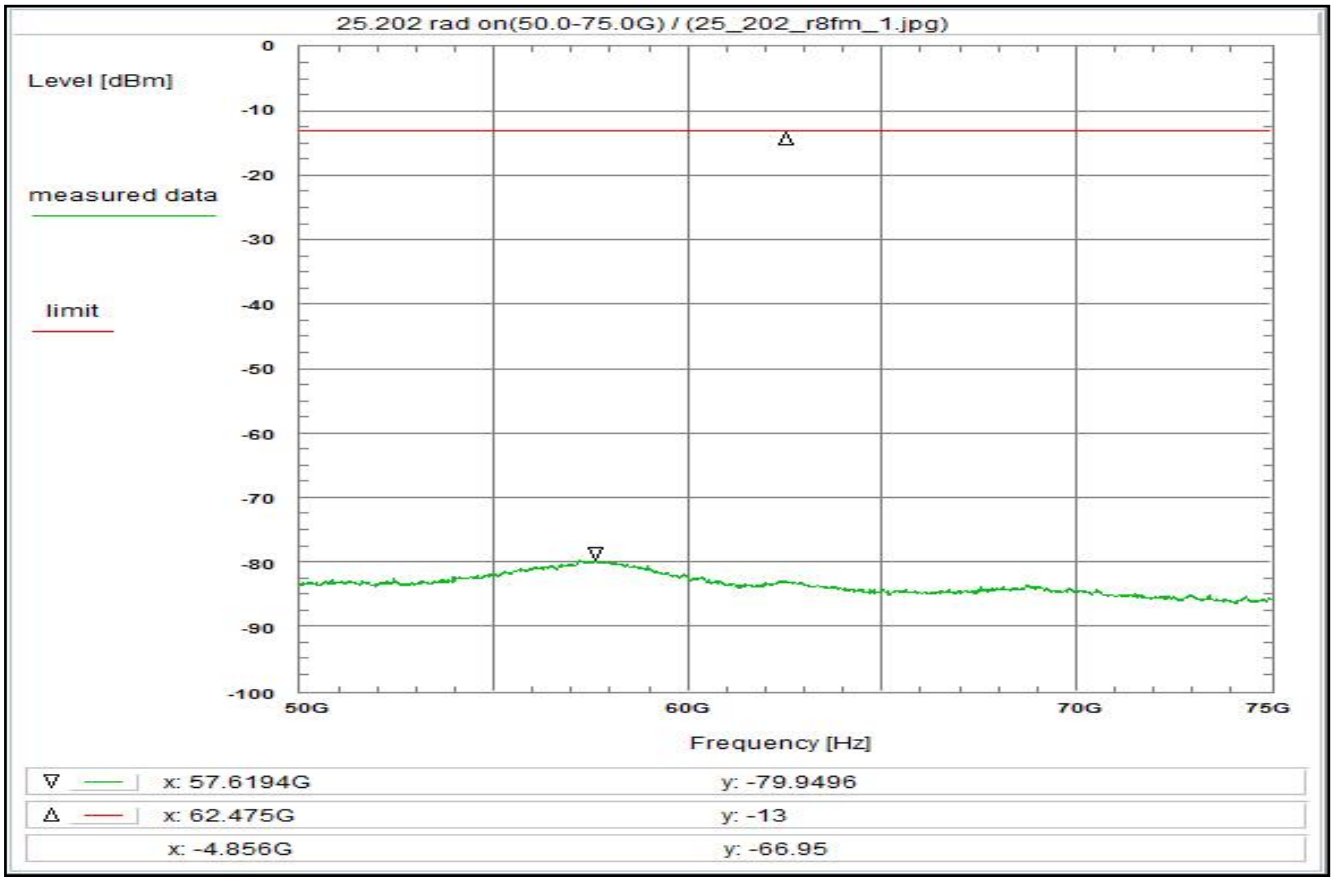
Start frequency:	40	GHz
Stop frequency:	50	GHz
Center frequency:	45	GHz
Frequency span:	10	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	5.2	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A031)	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (45.00GHz, 0.1m)	+	45.5	dB
TOTAL CORRECTION:	+	36.7	dB

Remarks:
Carrier-on state / Carrier within the the band (fl/fm/fh)
Measurement for orientation with a measuring antenna close to the DUT-cabinets.
If any critical spurious radiations are detected a measurement
in an exactly defined distance will be carried out.

Plot No. 10



Subclause: 25.202) Emission limitations
Modulated rf-carrier within the band (fl/fm/fh)
Radiation coming out of DUT-cabinet(s): 50.0 GHz - 75.0 GHz

Limit:
Limit acc. to 25.202): -13.0 dBm

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A025, R001, R025

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Wed 26/Oct/2022 14:47:06	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

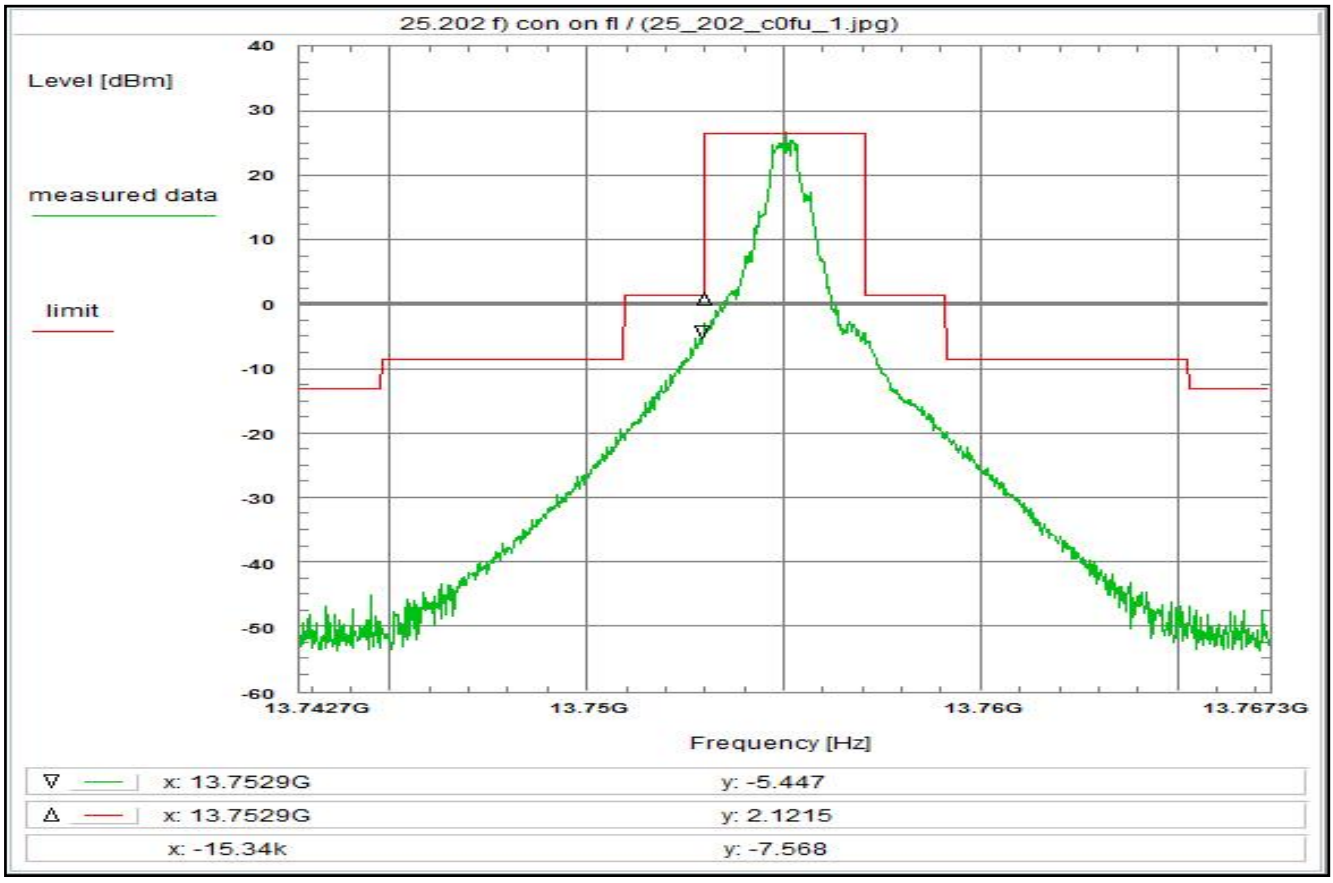
Start frequency:	50	GHz
Stop frequency:	75	GHz
Center frequency:	62.5	GHz
Frequency span:	25	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable	+	0.0	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A025)	-	20.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (62.50GHz, 0.05m)	+	42.3	dB
TOTAL CORRECTION:	+	8.3	dB

Remarks:
Carrier-on state / Carrier within the the band (fl/fm/fh)
Measurement for orientation with a measuring antenna close to the DUT-cabinets.
If any critical spurious radiations are detected a measurement
in an exactly defined distance will be carried out.

Plot No. 11



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f):
50-100% of assigned bw: -25 dBc/4 kHz
100-250% of assigned bw: -35 dBc/4 kHz
> 250% of assigned bw: -43+10log(Pmax) dBc/4 kHz

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:13:41	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

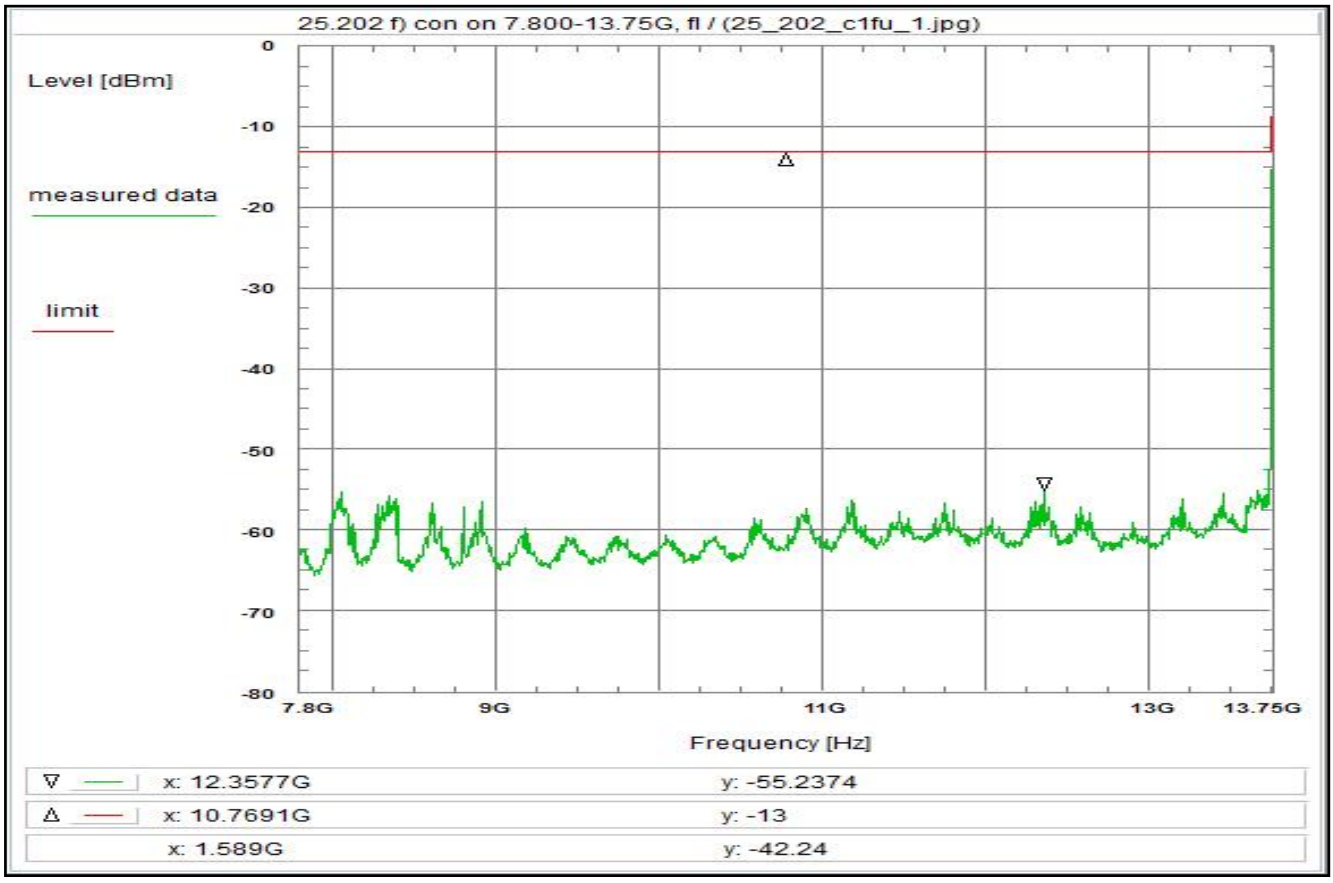
Start frequency:	13.7427	GHz
Stop frequency:	13.7673	GHz
Center frequency:	13.755	GHz
Frequency span:	24.6	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.9	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	54.7	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 12



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:14:54	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

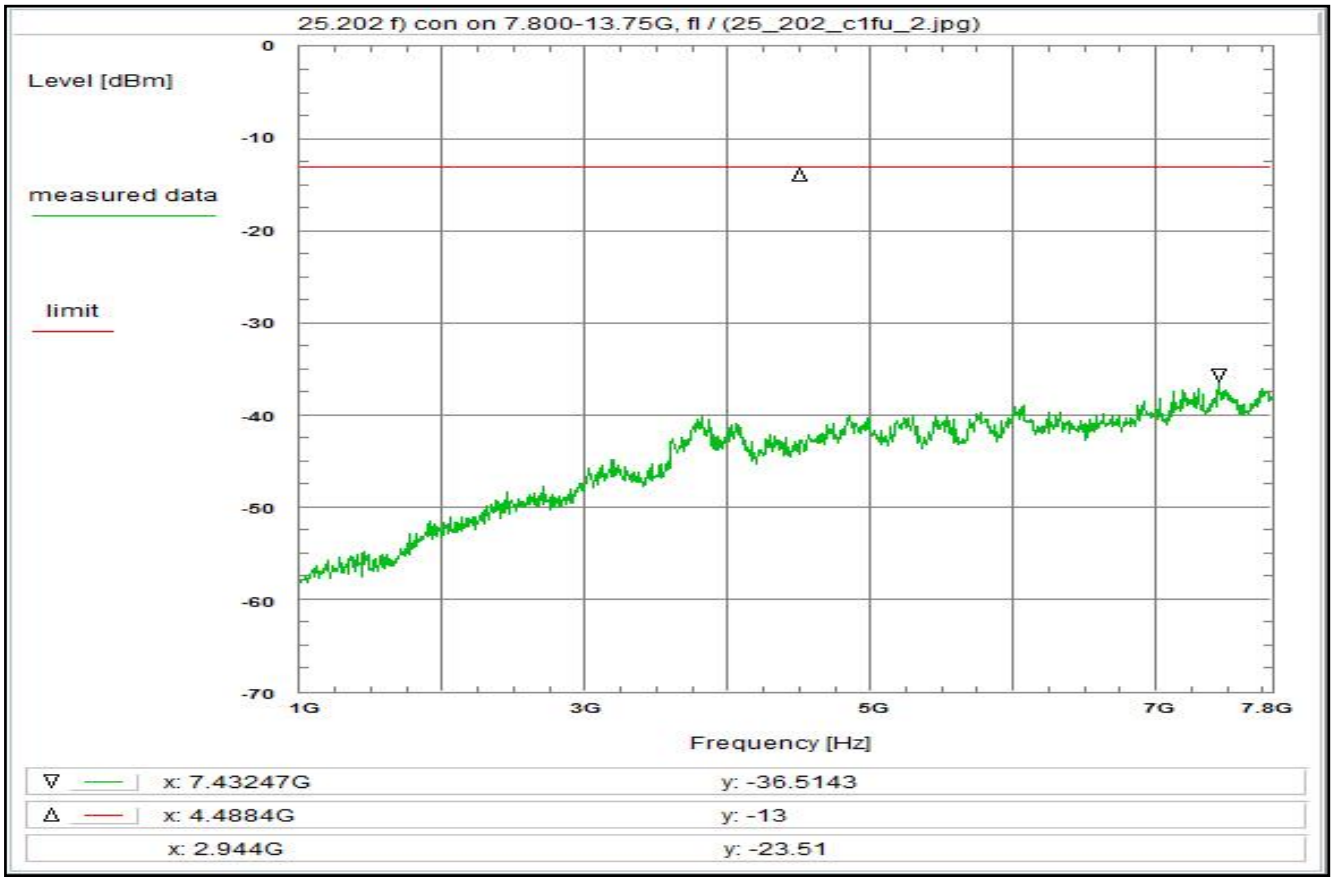
Start frequency:	7.8	GHz
Stop frequency:	13.75	GHz
Center frequency:	10.775	GHz
Frequency span:	5.95	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	12.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.8	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 13



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 27/Oct/2022 17:12:41	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

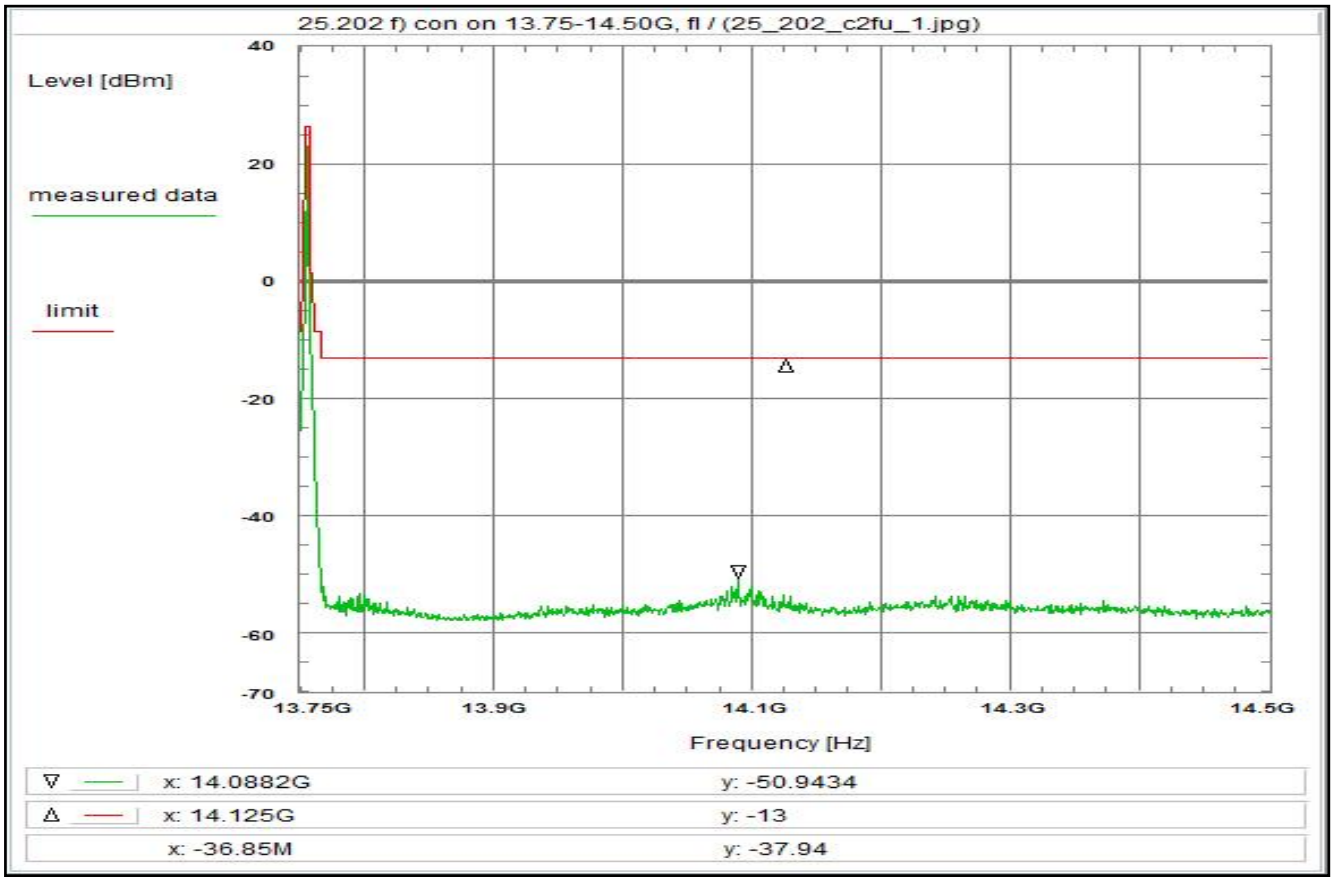
Start frequency:	1	GHz
Stop frequency:	7.8	GHz
Center frequency:	4.4	GHz
Frequency span:	6.8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	1.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	9.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (10.78GHz, 4.2m)	+	65.6	dB
TOTAL CORRECTION:	+	43.5	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 14



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:15:39	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

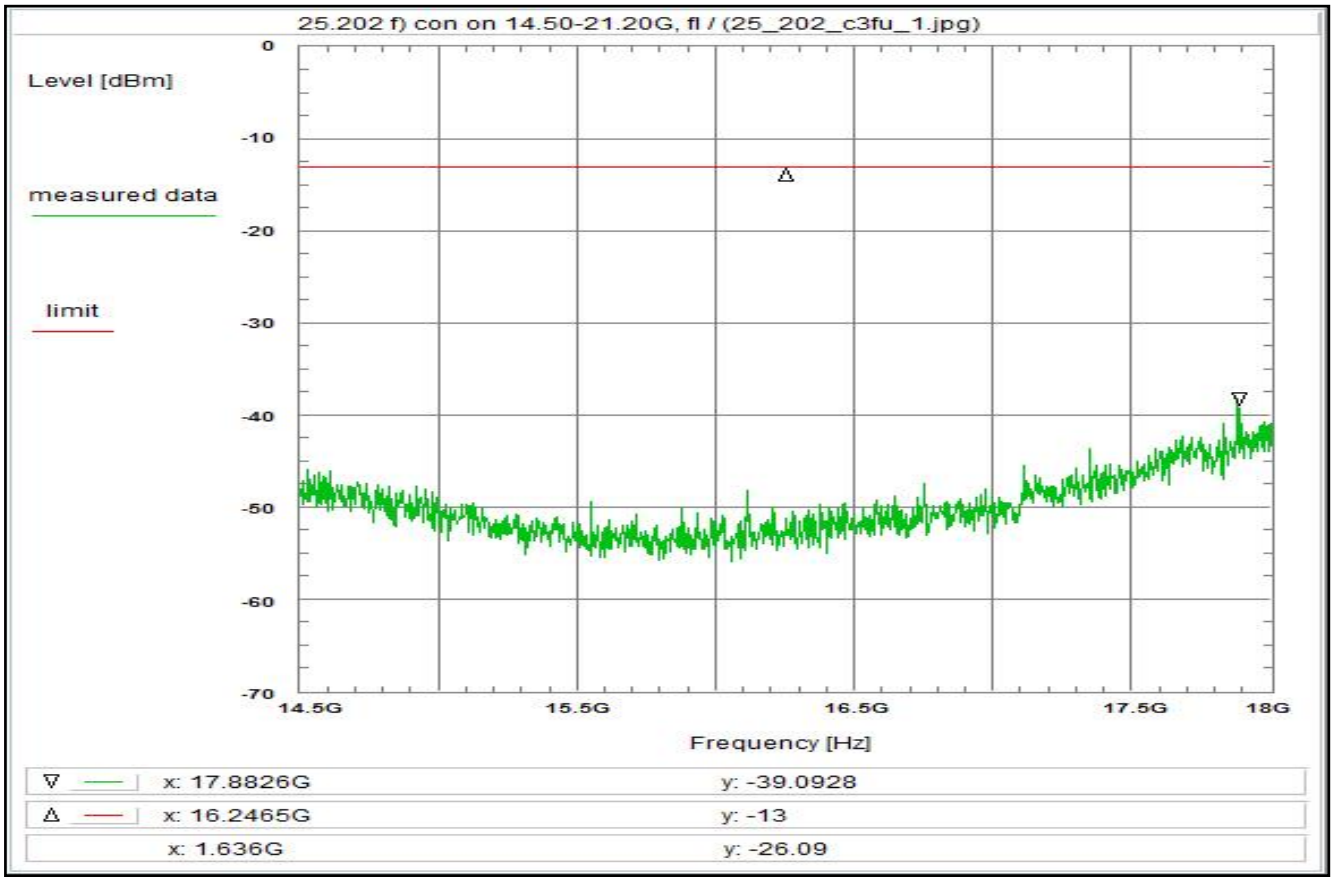
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	45.2	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 15



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:16:35	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

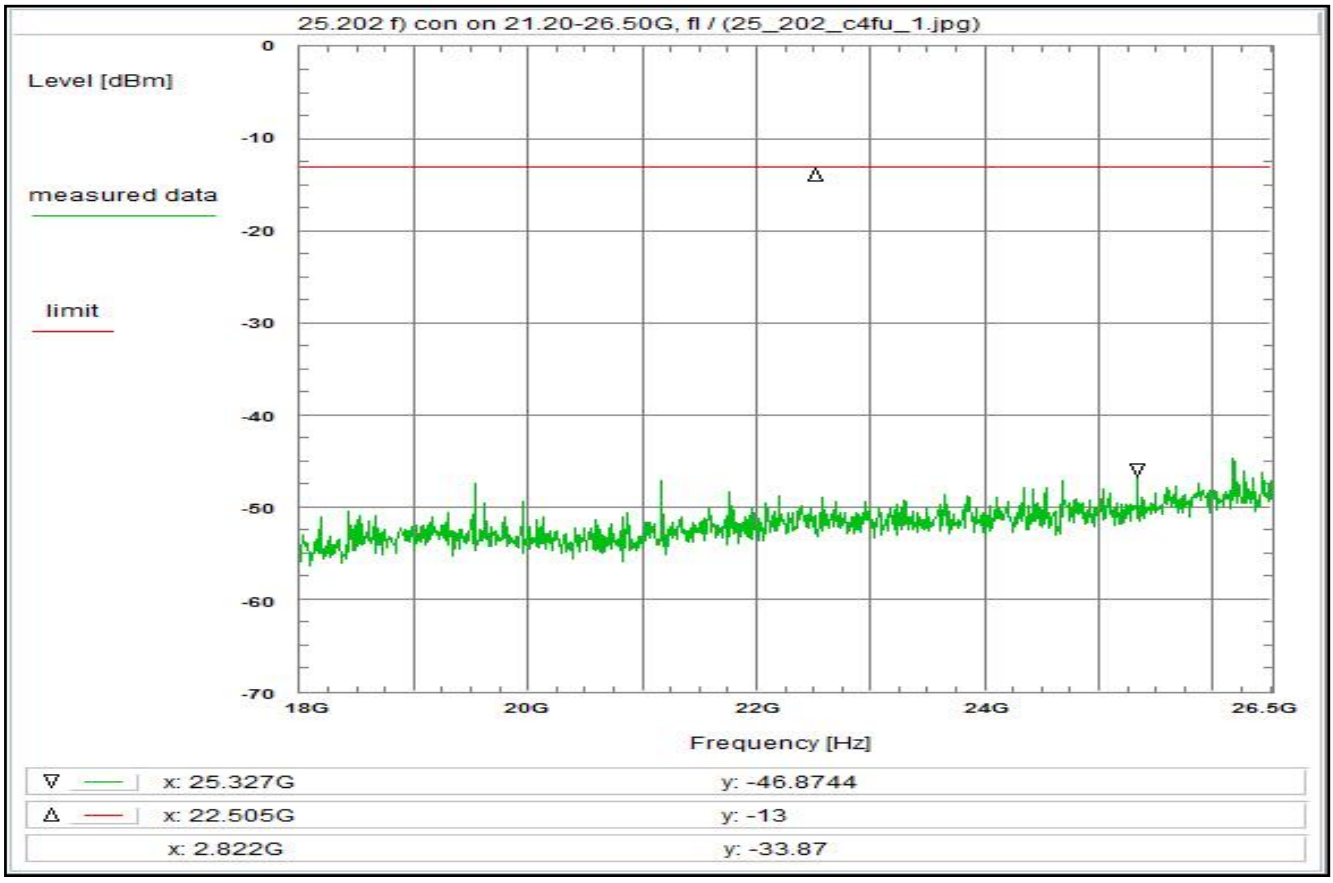
Start frequency:	14.5	GHz
Stop frequency:	18	GHz
Center frequency:	16.25	GHz
Frequency span:	3.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.9	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	13.7	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.1	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 16



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A019, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:22:06	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

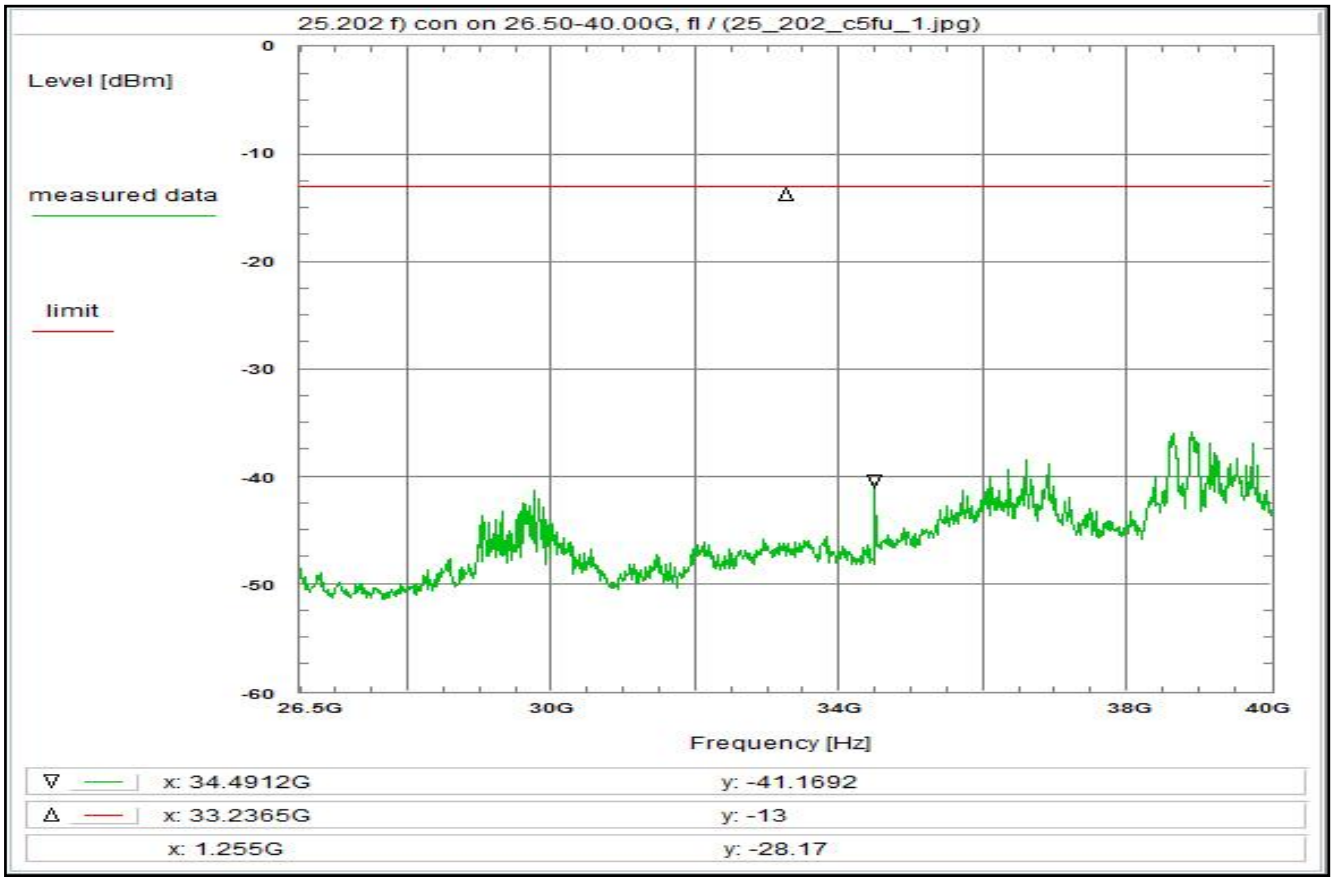
Start frequency:	18	GHz
Stop frequency:	26.5	GHz
Center frequency:	22.25	GHz
Frequency span:	8.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	3.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A019)	-	19.3	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (23.85GHz, 4.2m)	+	72.5	dB
TOTAL CORRECTION:	+	42.7	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 17



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A031, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 10:56:44	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

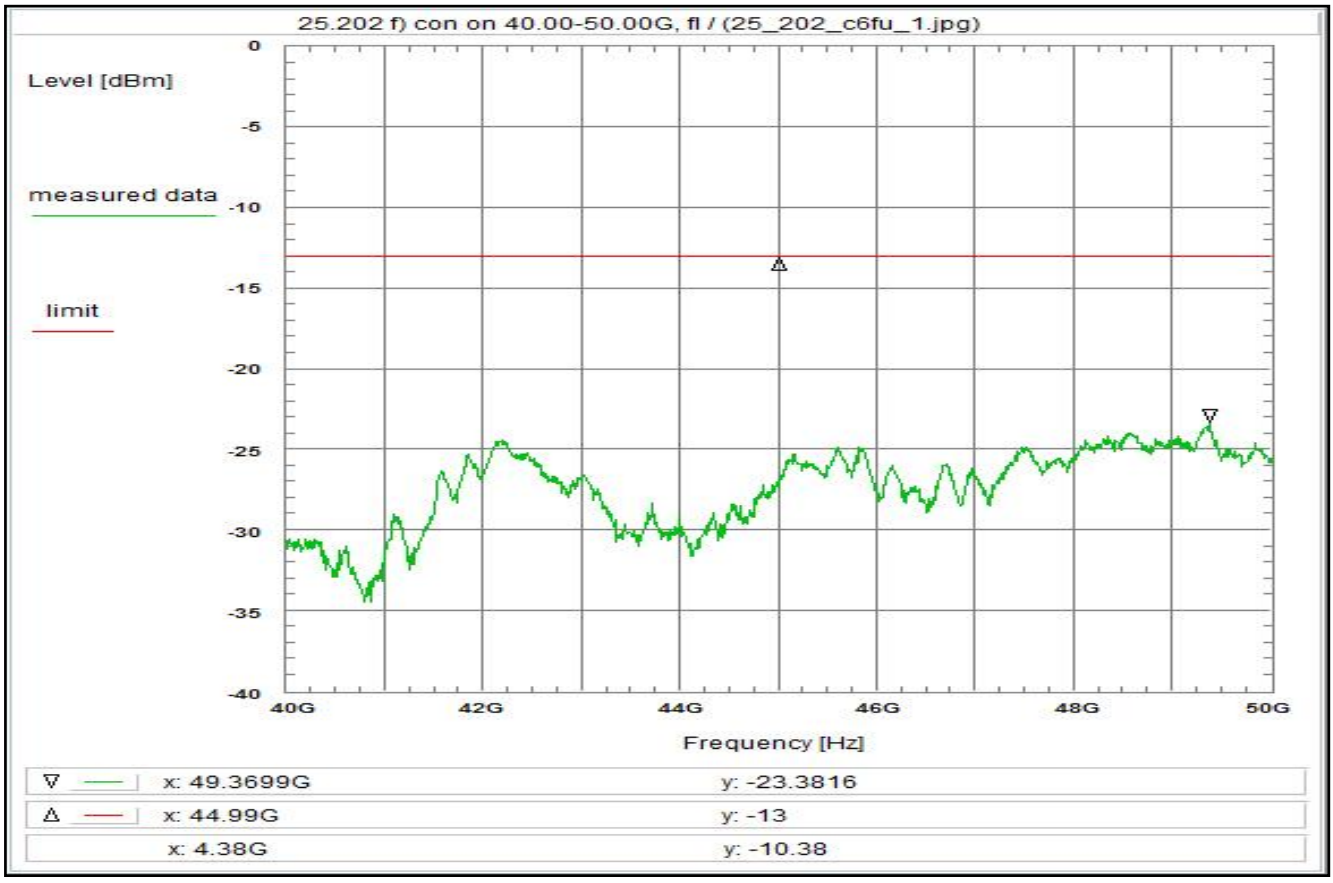
Start frequency:	26.5	GHz
Stop frequency:	40	GHz
Center frequency:	33.25	GHz
Frequency span:	13.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	4.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A031)	-	16.2	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (33.25GHz, 4.2m)	+	75.3	dB
TOTAL CORRECTION:	+	49.4	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 18



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A023, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 10:43:07	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

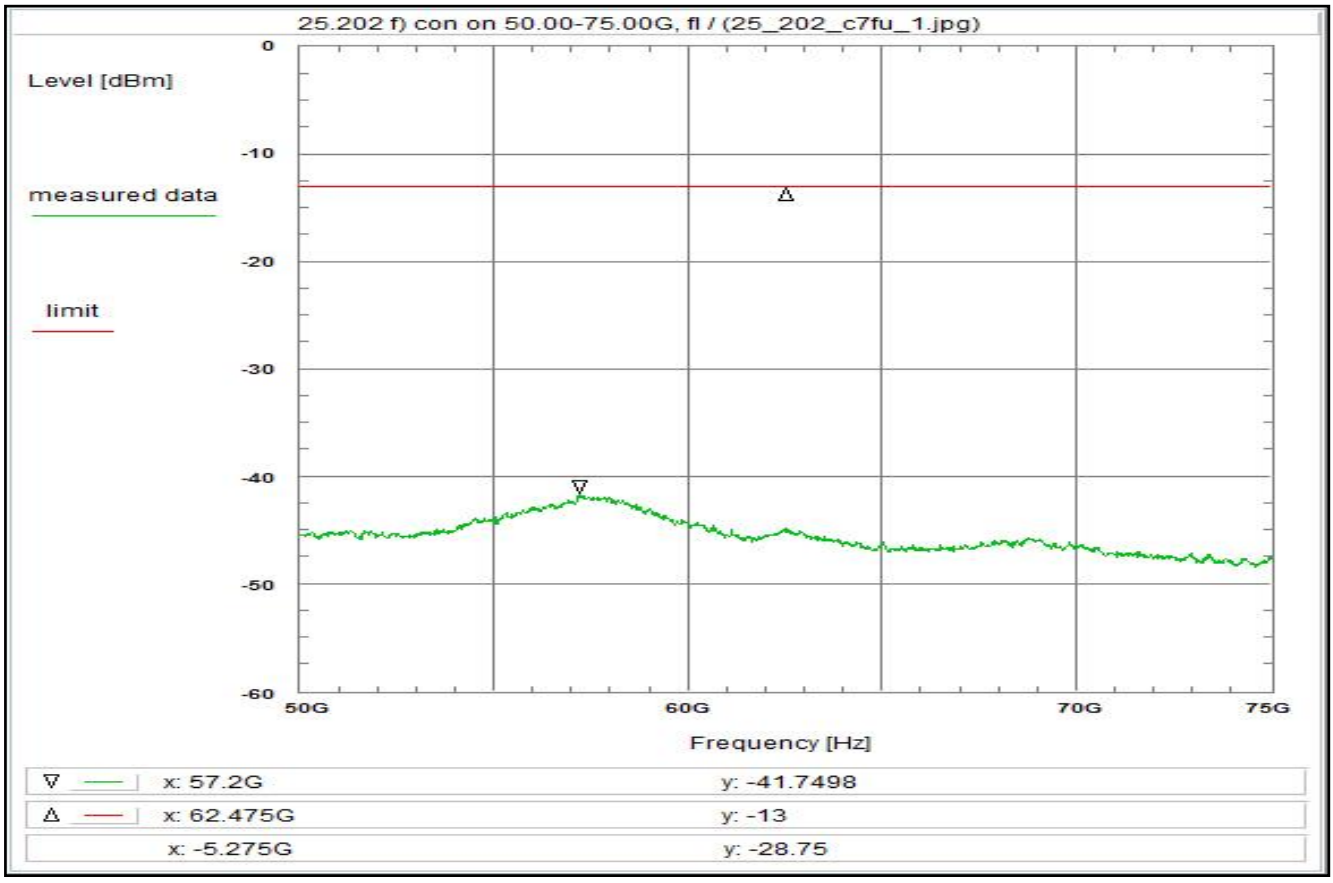
Start frequency:	40	GHz
Stop frequency:	50	GHz
Center frequency:	45	GHz
Frequency span:	10	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	5.2	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A023)	-	18.9	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (45.00GHz, 4.2m)	+	78.0	dB
TOTAL CORRECTION:	+	50.3	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 19



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fl)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A025, R001, R029

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 13:03:57	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

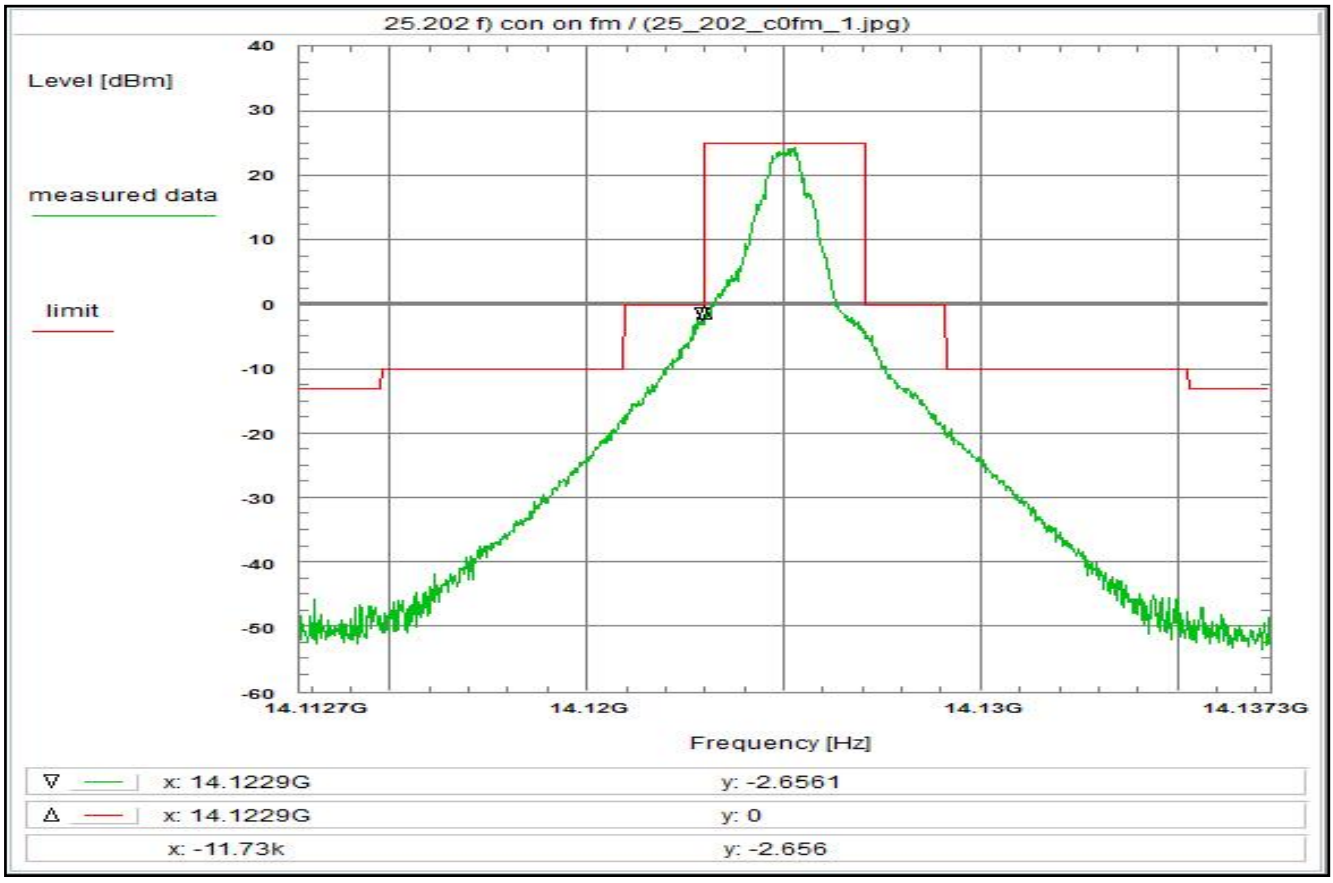
Start frequency:	50	GHz
Stop frequency:	75	GHz
Center frequency:	62.5	GHz
Frequency span:	25	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable	+	0.0	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A025)	-	20.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (62.50GHz, 4.2m)	+	80.8	dB
TOTAL CORRECTION:	+	46.8	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fl)

Plot No. 20



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f):
50-100% of assigned bw: -25 dBc/4 kHz
100-250% of assigned bw: -35 dBc/4 kHz
> 250% of assigned bw: -43+10log(Pmax) dBc/4 kHz

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:51:28	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

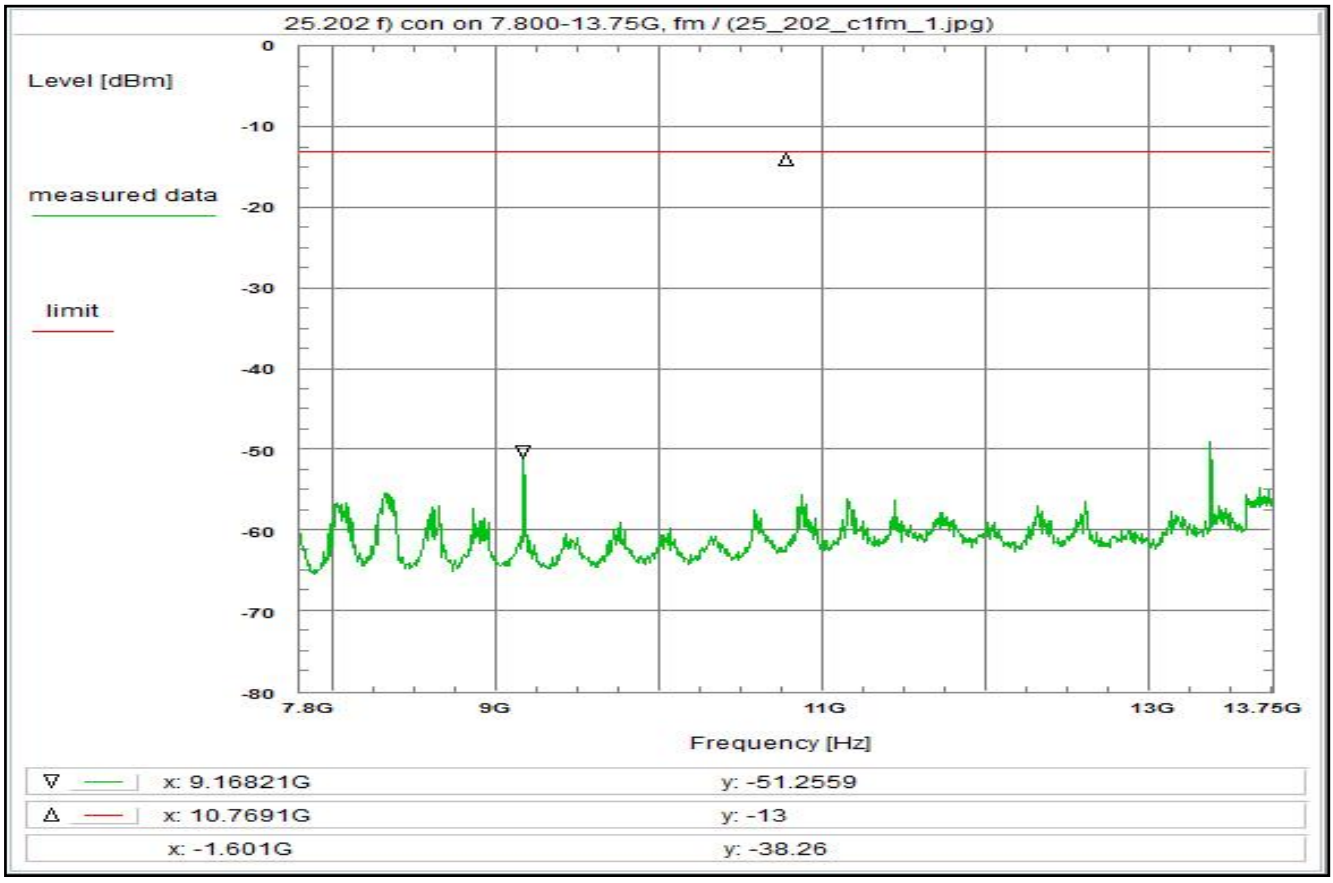
Start frequency:	14.1127	GHz
Stop frequency:	14.1373	GHz
Center frequency:	14.125	GHz
Frequency span:	24.6	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.3	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	55.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 21



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:52:31	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

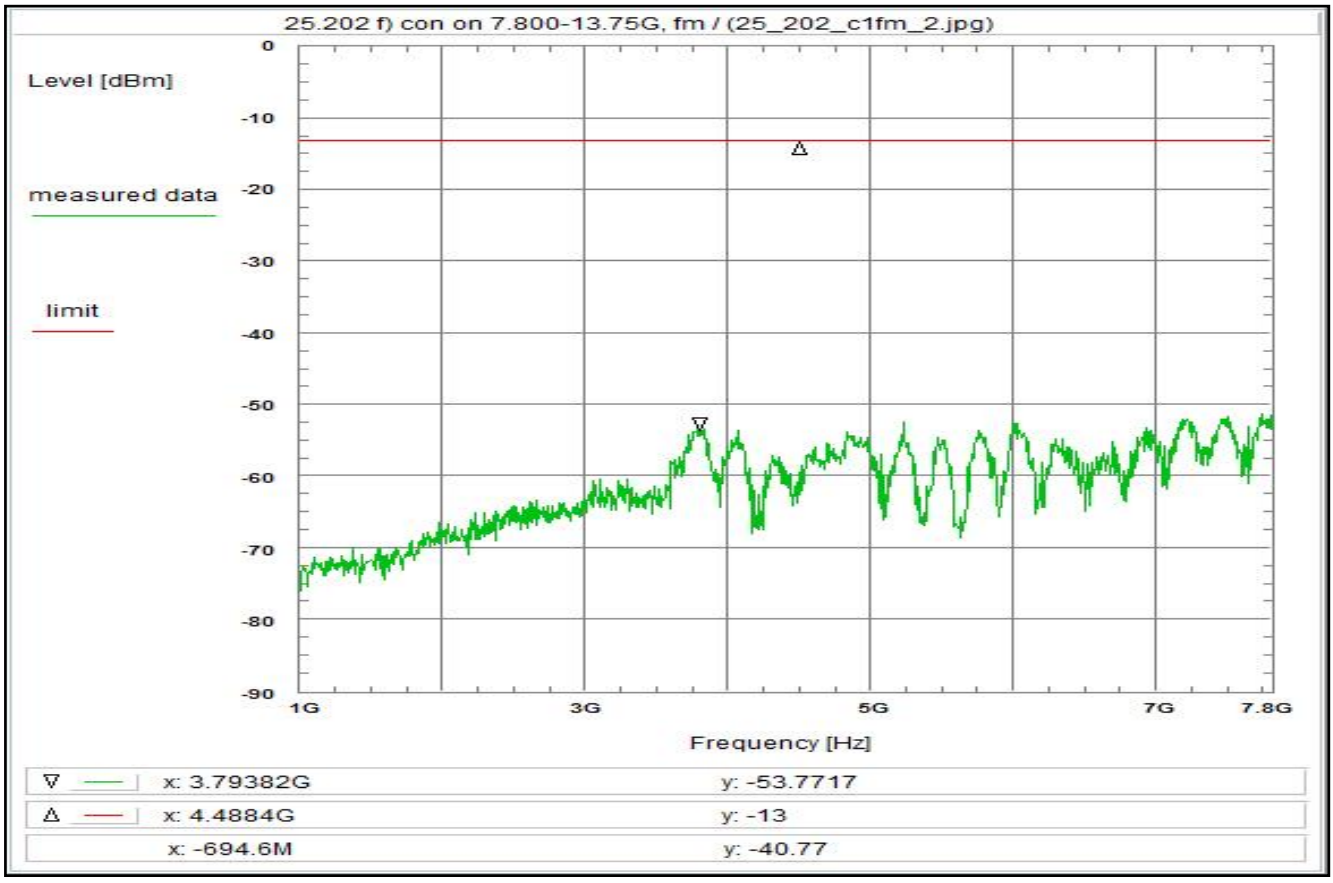
Start frequency:	7.8	GHz
Stop frequency:	13.75	GHz
Center frequency:	10.775	GHz
Frequency span:	5.95	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	12.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.8	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 22



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 27/Oct/2022 17:11:20	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

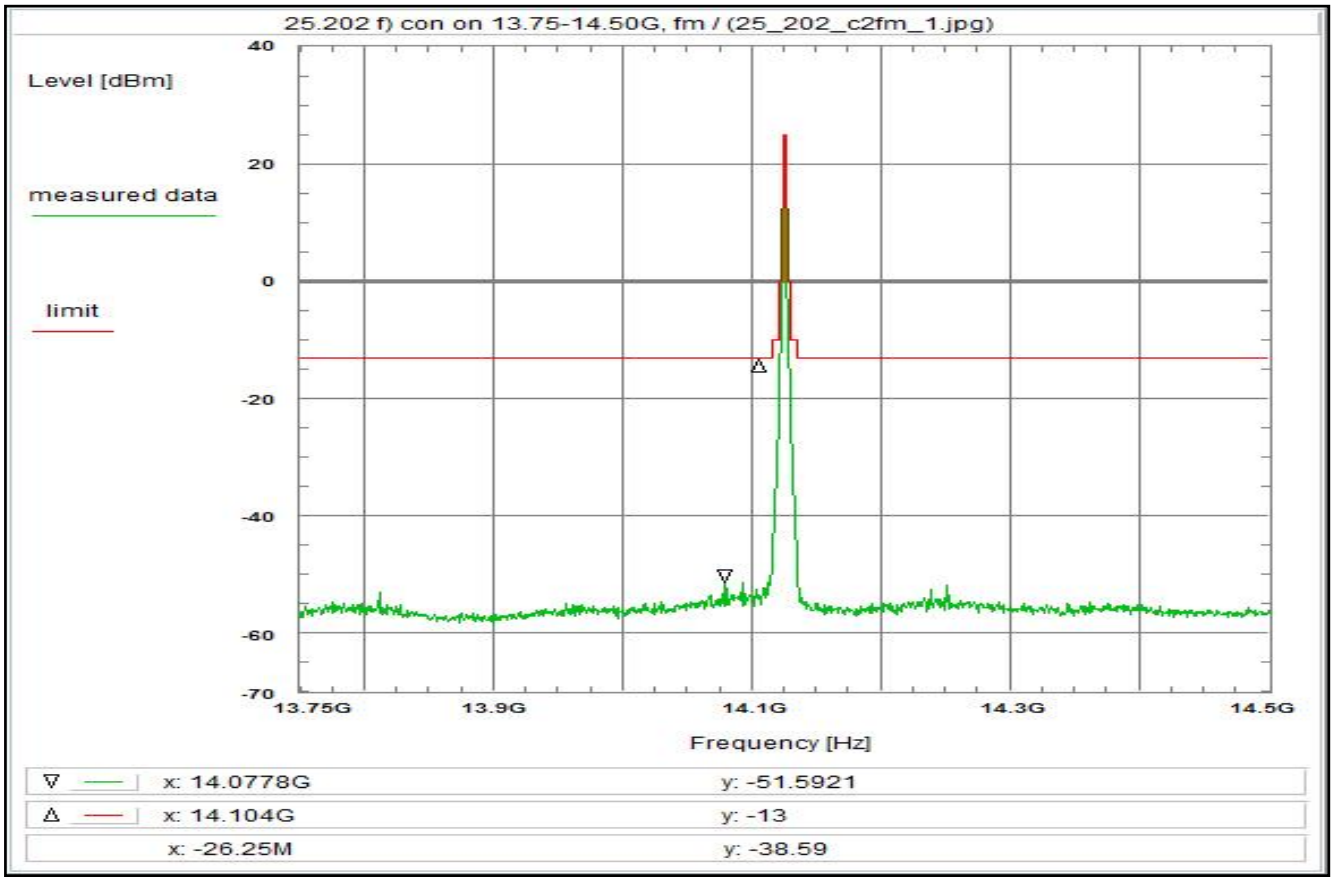
Start frequency:	1	GHz
Stop frequency:	7.8	GHz
Center frequency:	4.4	GHz
Frequency span:	6.8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	1.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	9.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (10.78GHz, 4.2m)	+	65.6	dB
TOTAL CORRECTION:	+	43.5	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 23



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:53:26	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

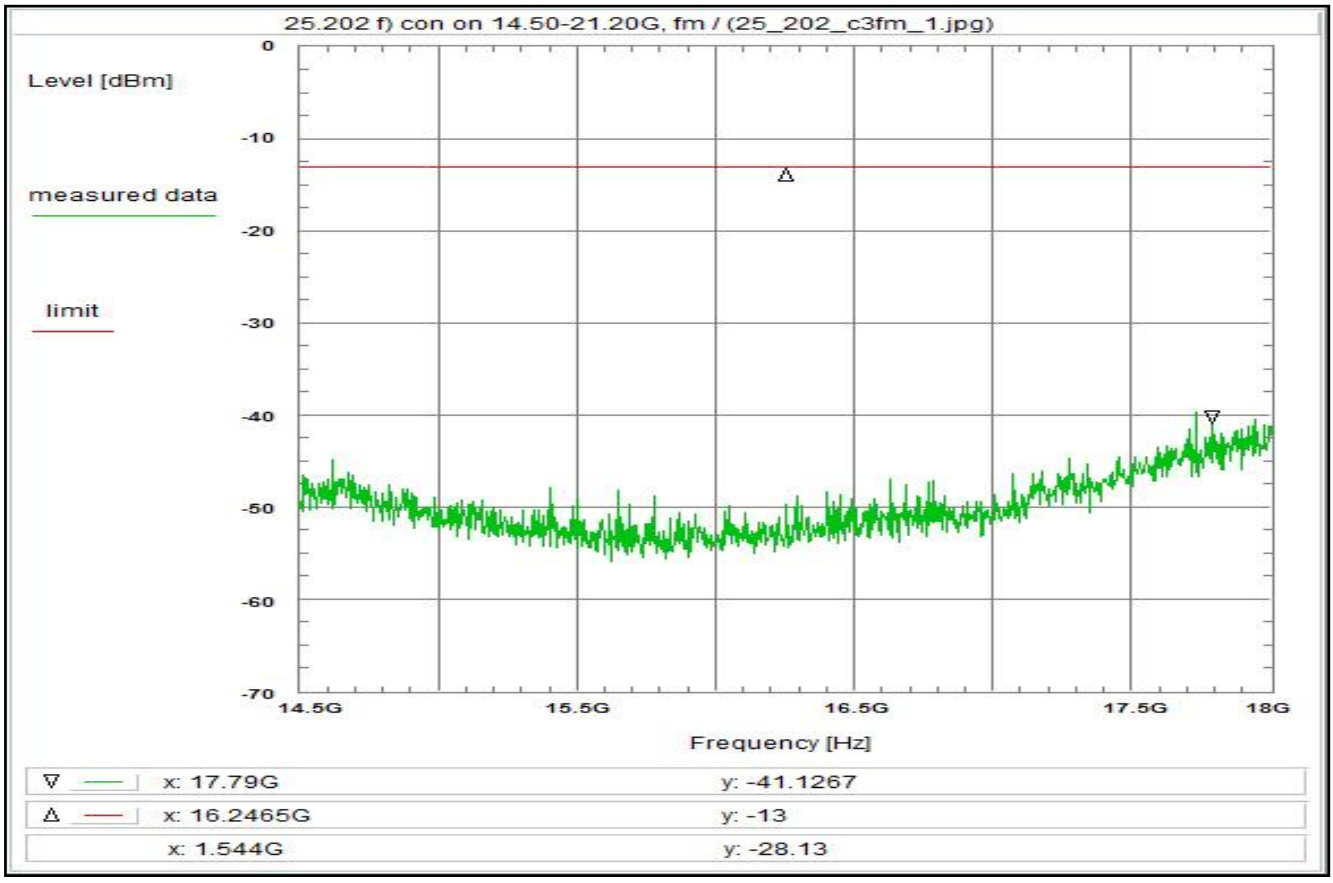
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	45.2	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 24



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:54:29	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

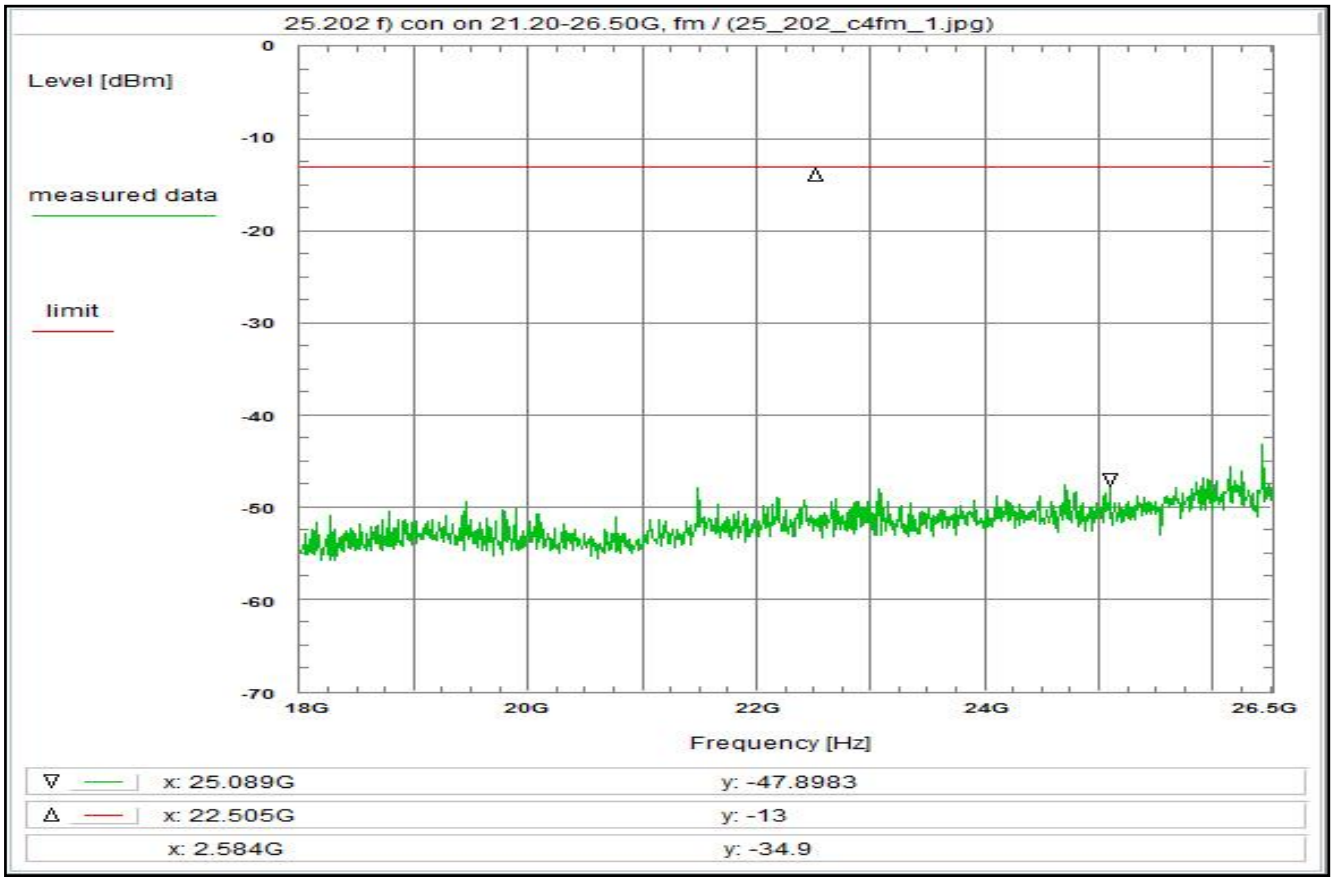
Start frequency:	14.5	GHz
Stop frequency:	18	GHz
Center frequency:	16.25	GHz
Frequency span:	3.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.9	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	13.7	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.1	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 25



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A019, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:13:51	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

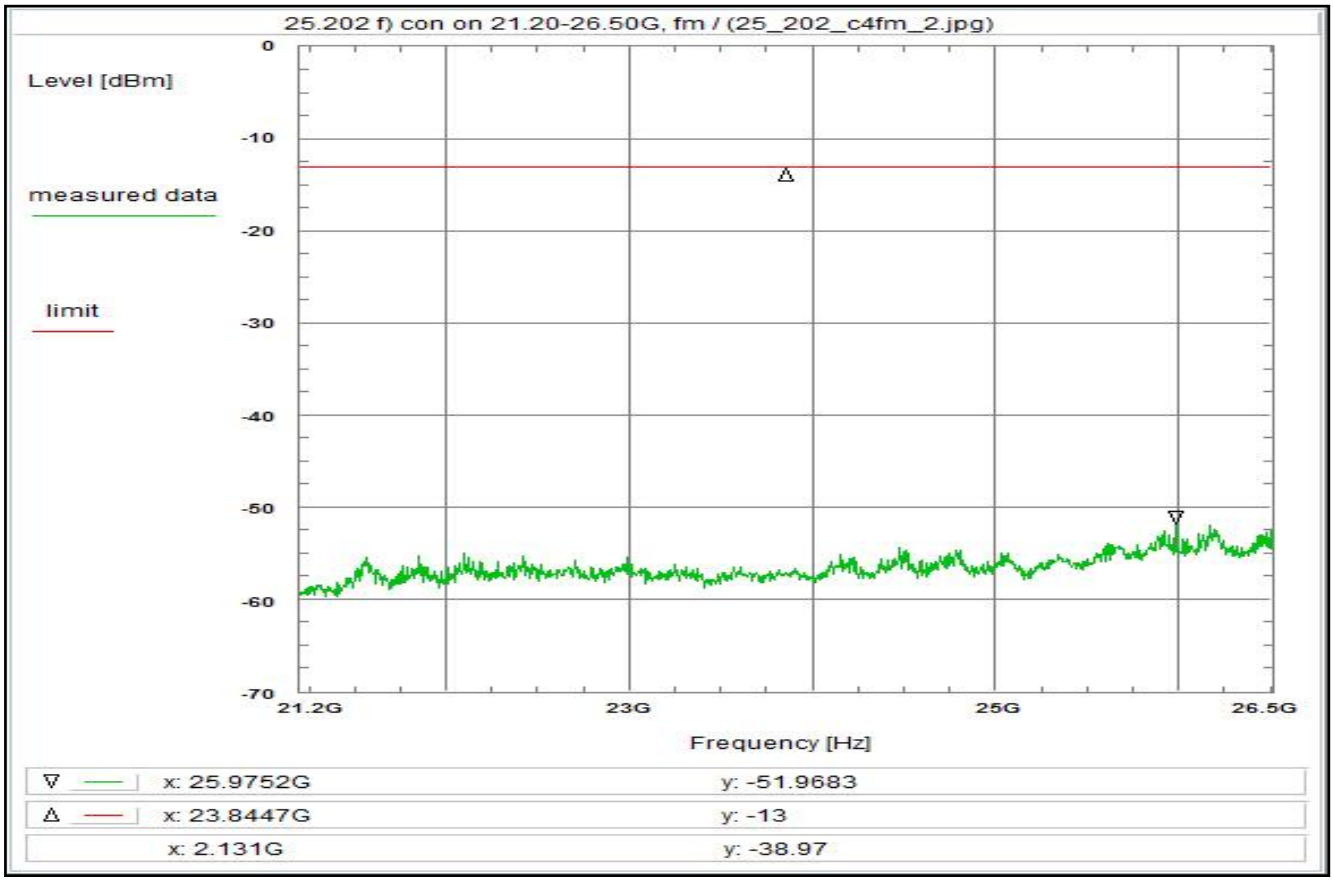
Start frequency:	18	GHz
Stop frequency:	26.5	GHz
Center frequency:	22.25	GHz
Frequency span:	8.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	3.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A019)	-	19.3	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (23.85GHz, 4.2m)	+	72.5	dB
TOTAL CORRECTION:	+	42.7	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 26



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A019, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:13:00	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

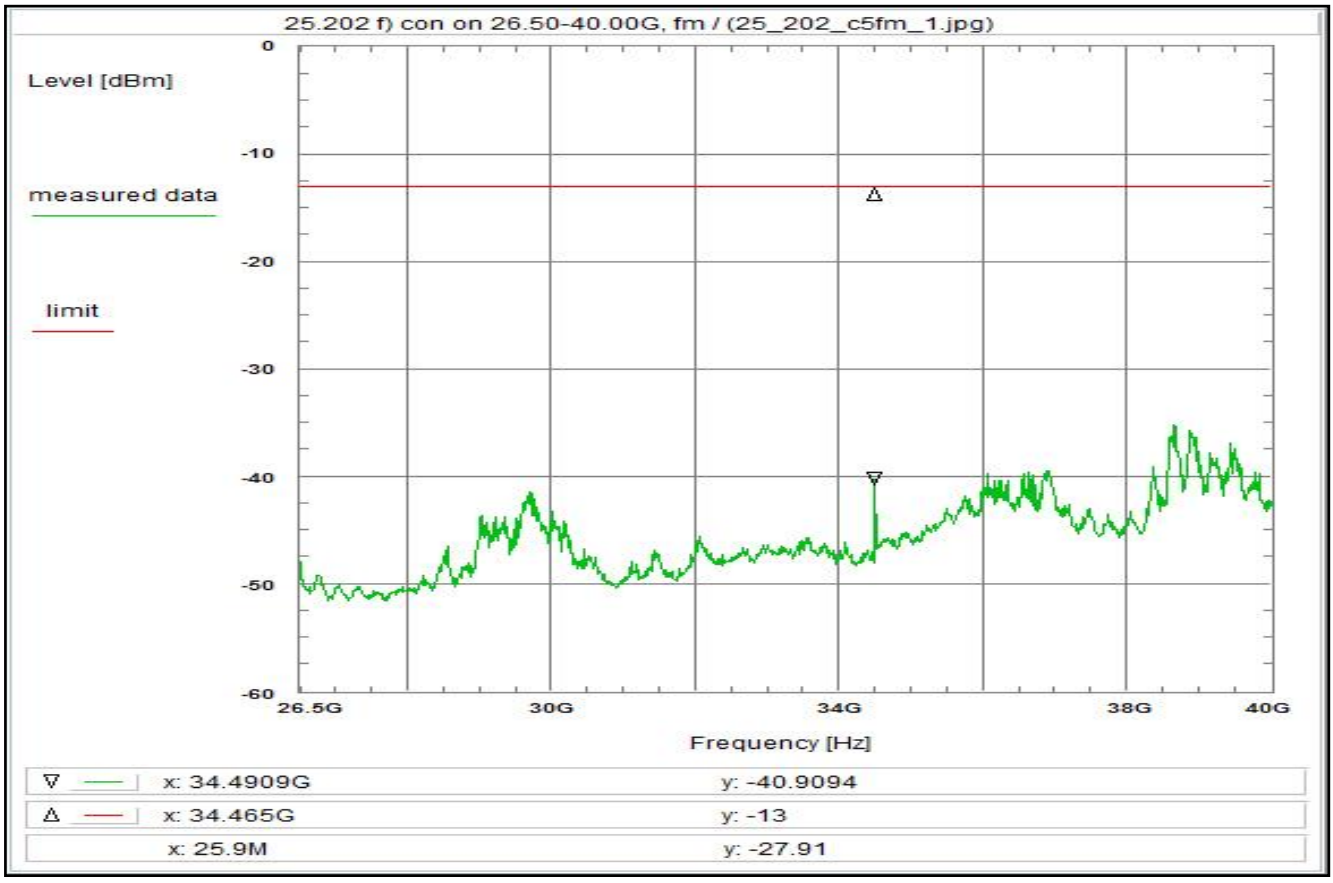
Start frequency:	21.2	GHz
Stop frequency:	26.5	GHz
Center frequency:	23.85	GHz
Frequency span:	5.3	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	3.6	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A019)	-	19.8	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (23.85GHz, 4.2m)	+	72.5	dB
TOTAL CORRECTION:	+	42.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 27



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A031, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 10:31:37	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

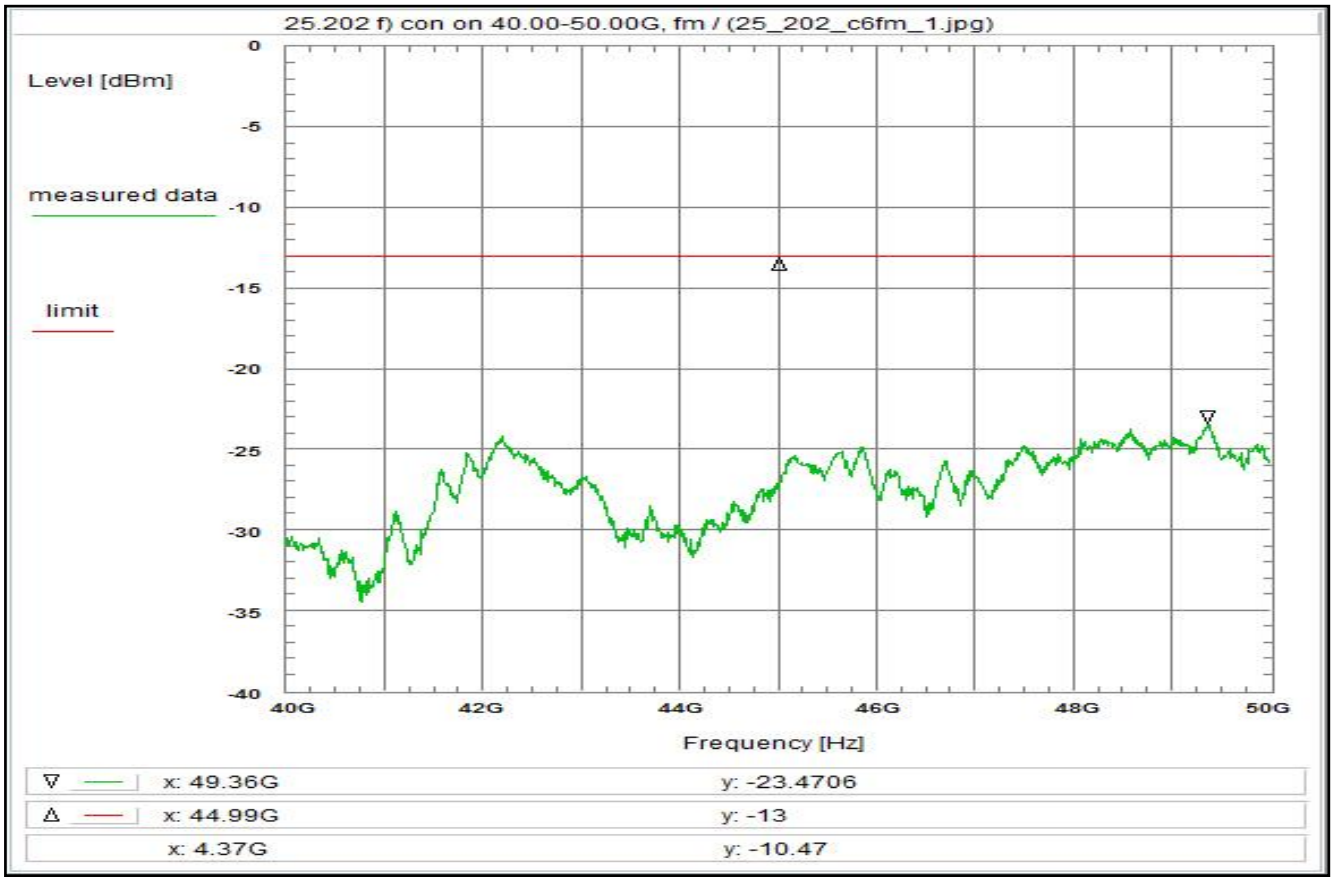
Start frequency:	26.5	GHz
Stop frequency:	40	GHz
Center frequency:	33.25	GHz
Frequency span:	13.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	4.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A031)	-	16.2	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (33.25GHz, 4m)	+	74.9	dB
TOTAL CORRECTION:	+	49.0	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 28



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A023, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 10:46:13	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

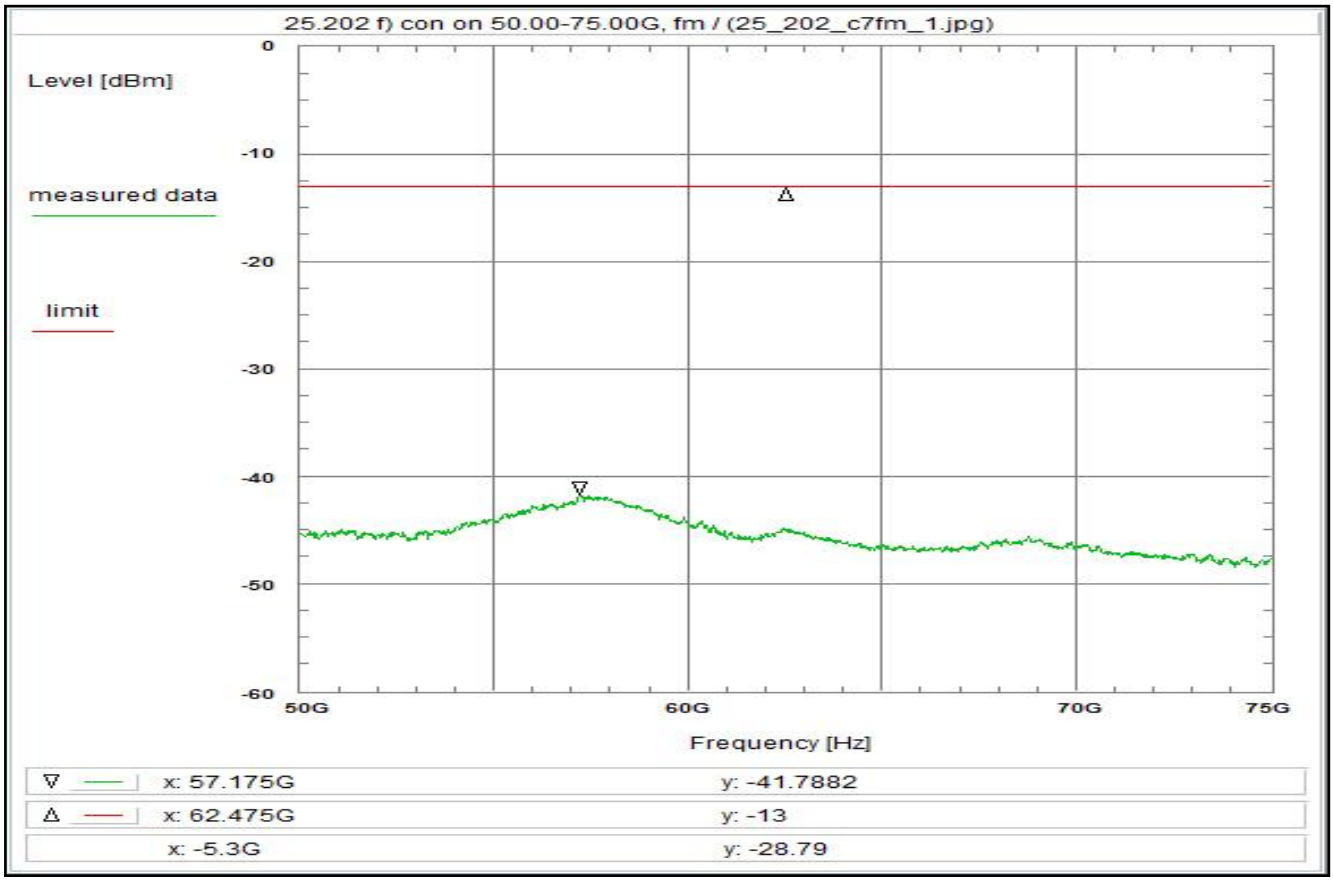
Start frequency:	40	GHz
Stop frequency:	50	GHz
Center frequency:	45	GHz
Frequency span:	10	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	5.2	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A023)	-	18.9	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (45.00GHz, 4.2m)	+	78.0	dB
TOTAL CORRECTION:	+	50.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 29



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A025, R001, R029

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 13:01:43	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

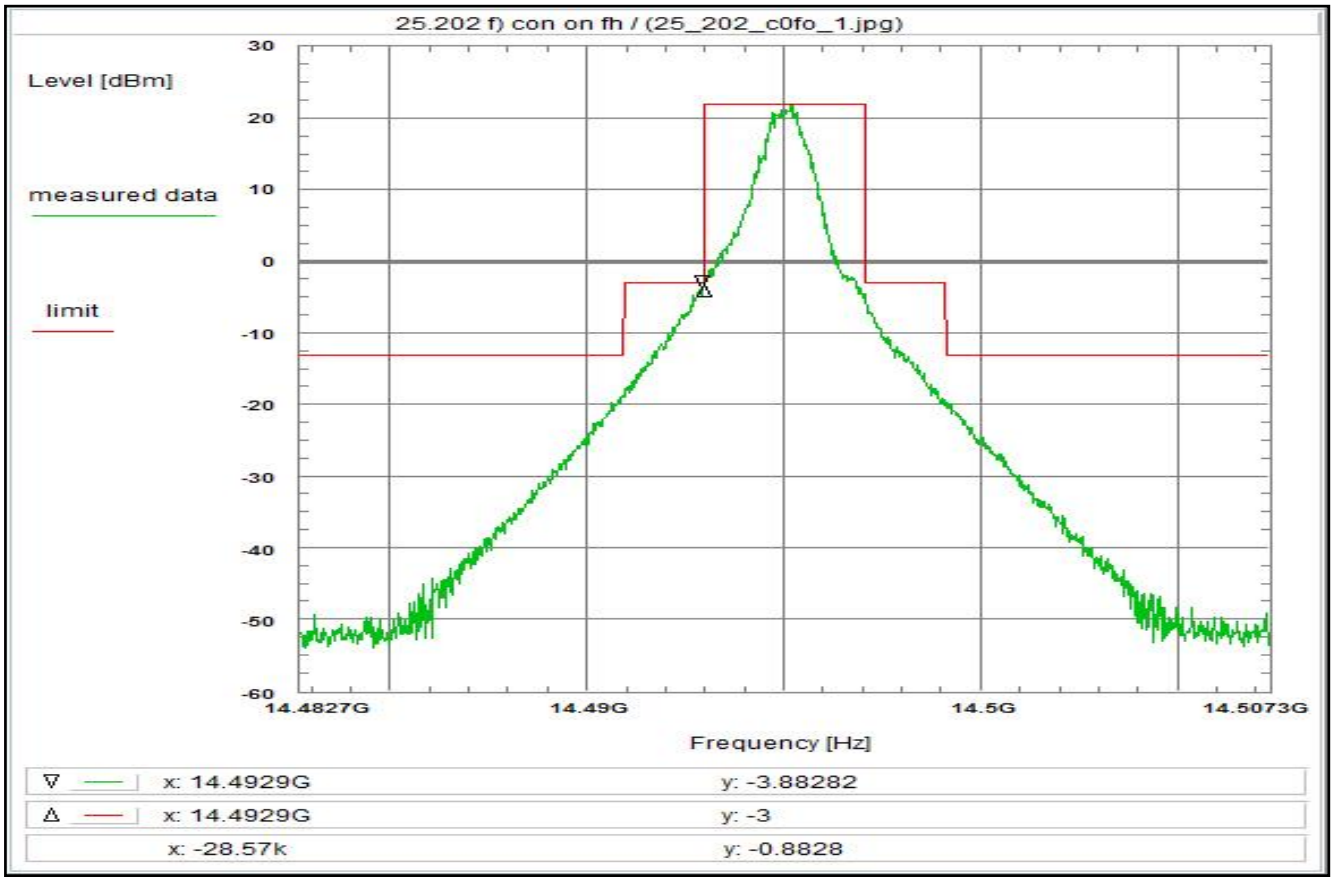
Start frequency:	50	GHz
Stop frequency:	75	GHz
Center frequency:	62.5	GHz
Frequency span:	25	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable	+	0.0	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A025)	-	20.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (62.50GHz, 4.2m)	+	80.8	dB
TOTAL CORRECTION:	+	46.8	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 30



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f):
50-100% of assigned bw: -25 dBc/4 kHz
100-250% of assigned bw: -35 dBc/4 kHz
> 250% of assigned bw: -43+10log(Pmax) dBc/4 kHz

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:36:30	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

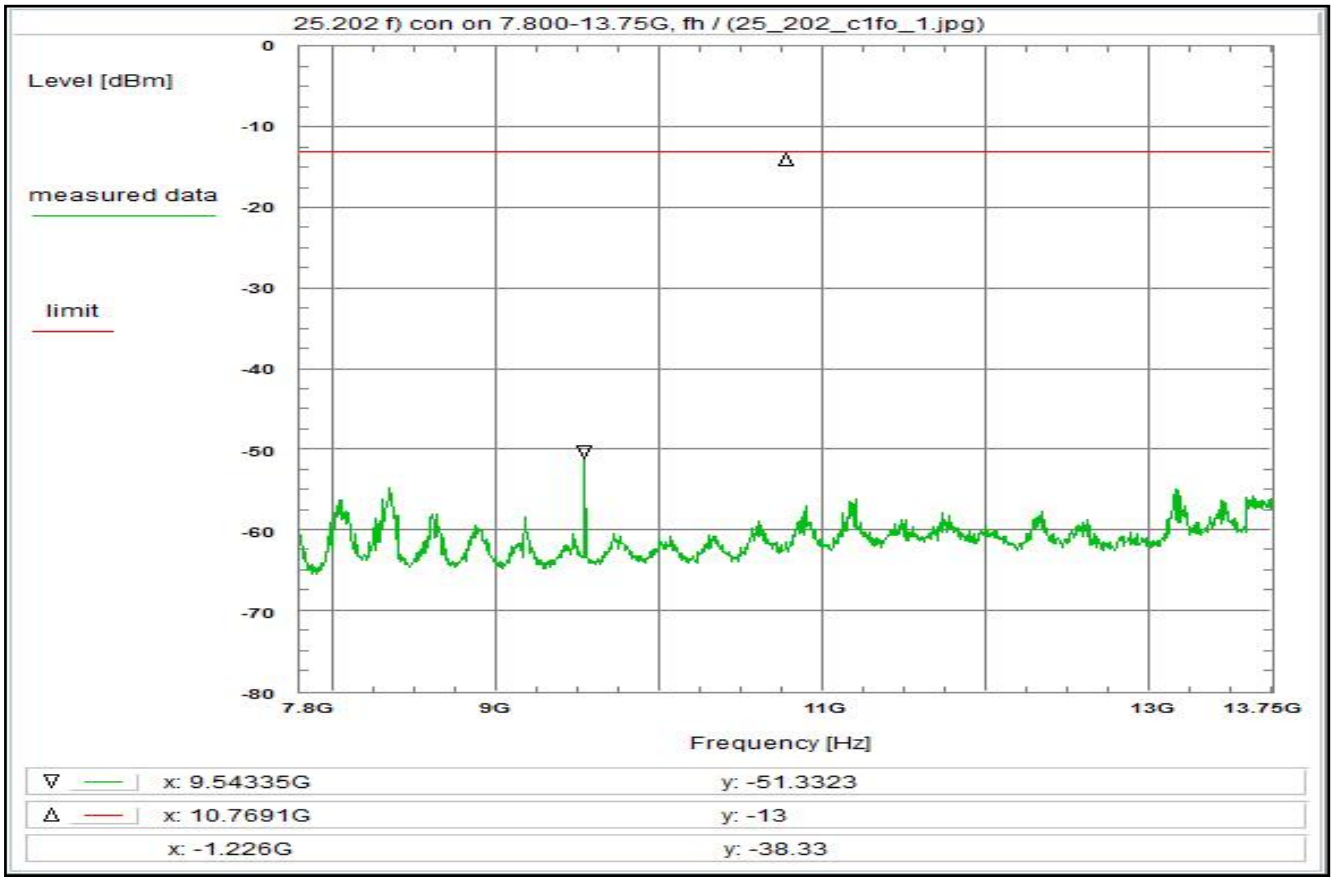
Start frequency:	14.4827	GHz
Stop frequency:	14.5073	GHz
Center frequency:	14.495	GHz
Frequency span:	24.6	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	55.2	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 31



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:37:23	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

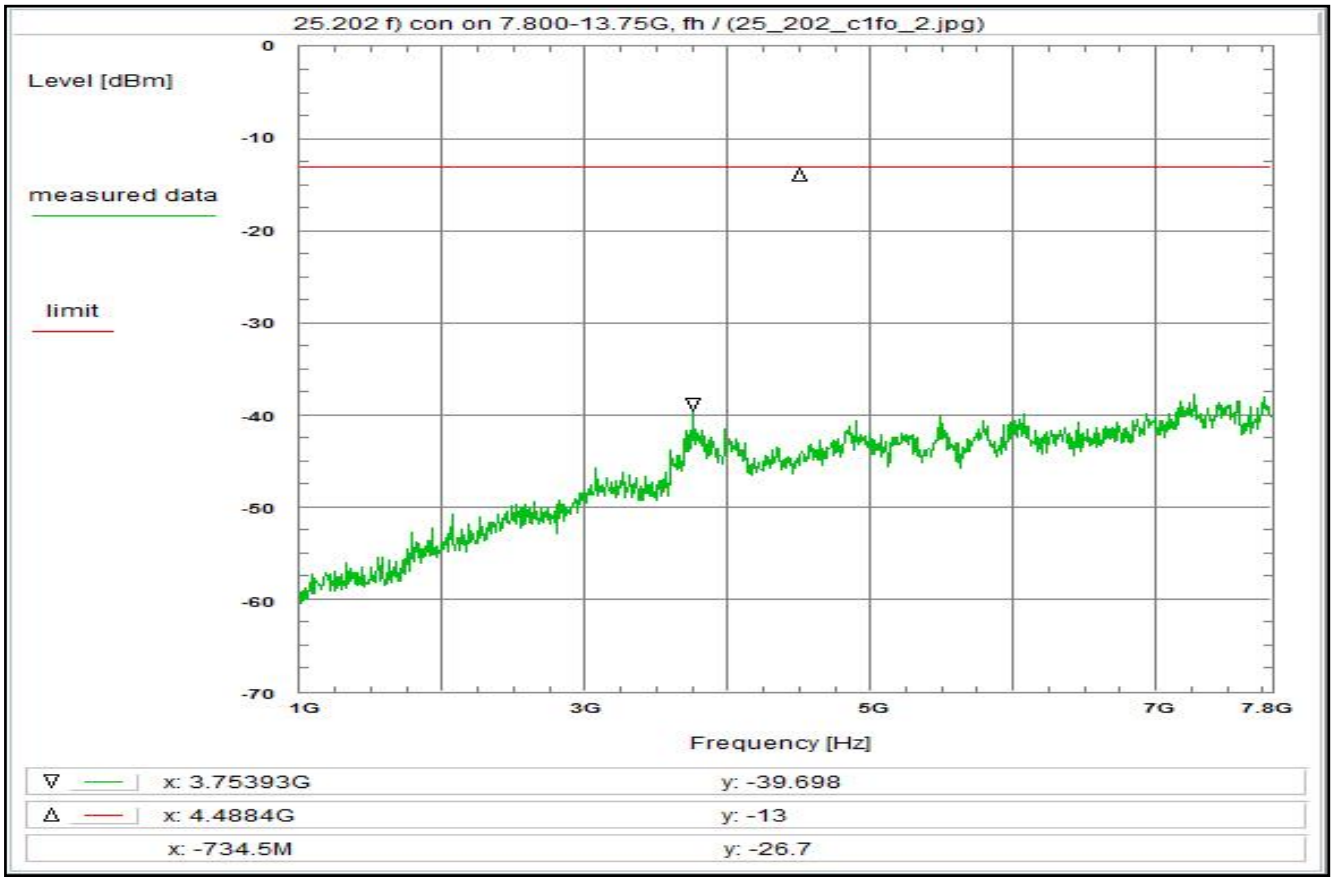
Start frequency:	7.8	GHz
Stop frequency:	13.75	GHz
Center frequency:	10.775	GHz
Frequency span:	5.95	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	12.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.8	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 32



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 27/Oct/2022 17:09:47	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

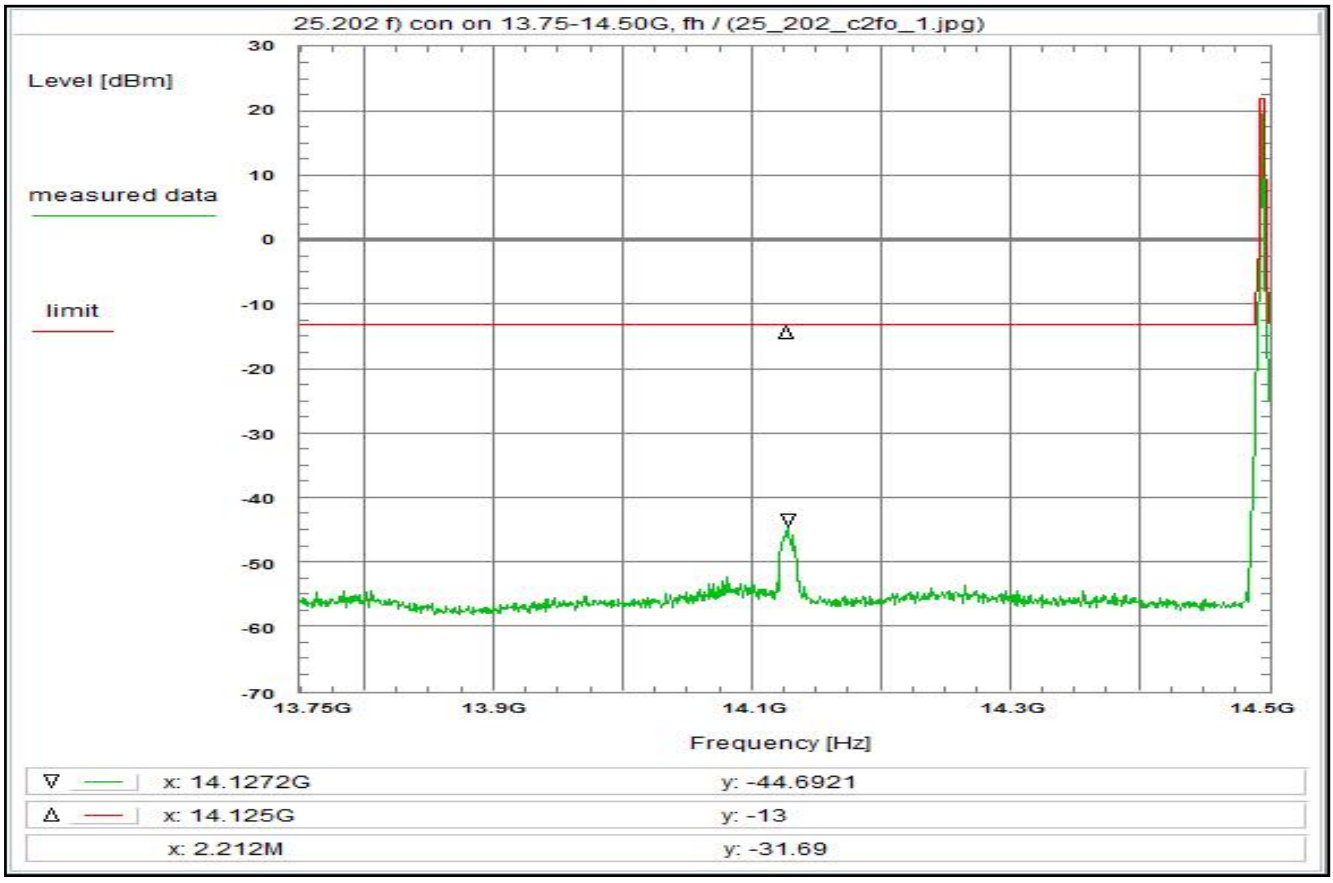
Start frequency:	1	GHz
Stop frequency:	7.8	GHz
Center frequency:	4.4	GHz
Frequency span:	6.8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	1.4	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	9.5	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (10.78GHz, 4.2m)	+	65.6	dB
TOTAL CORRECTION:	+	43.5	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 33



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:38:10	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

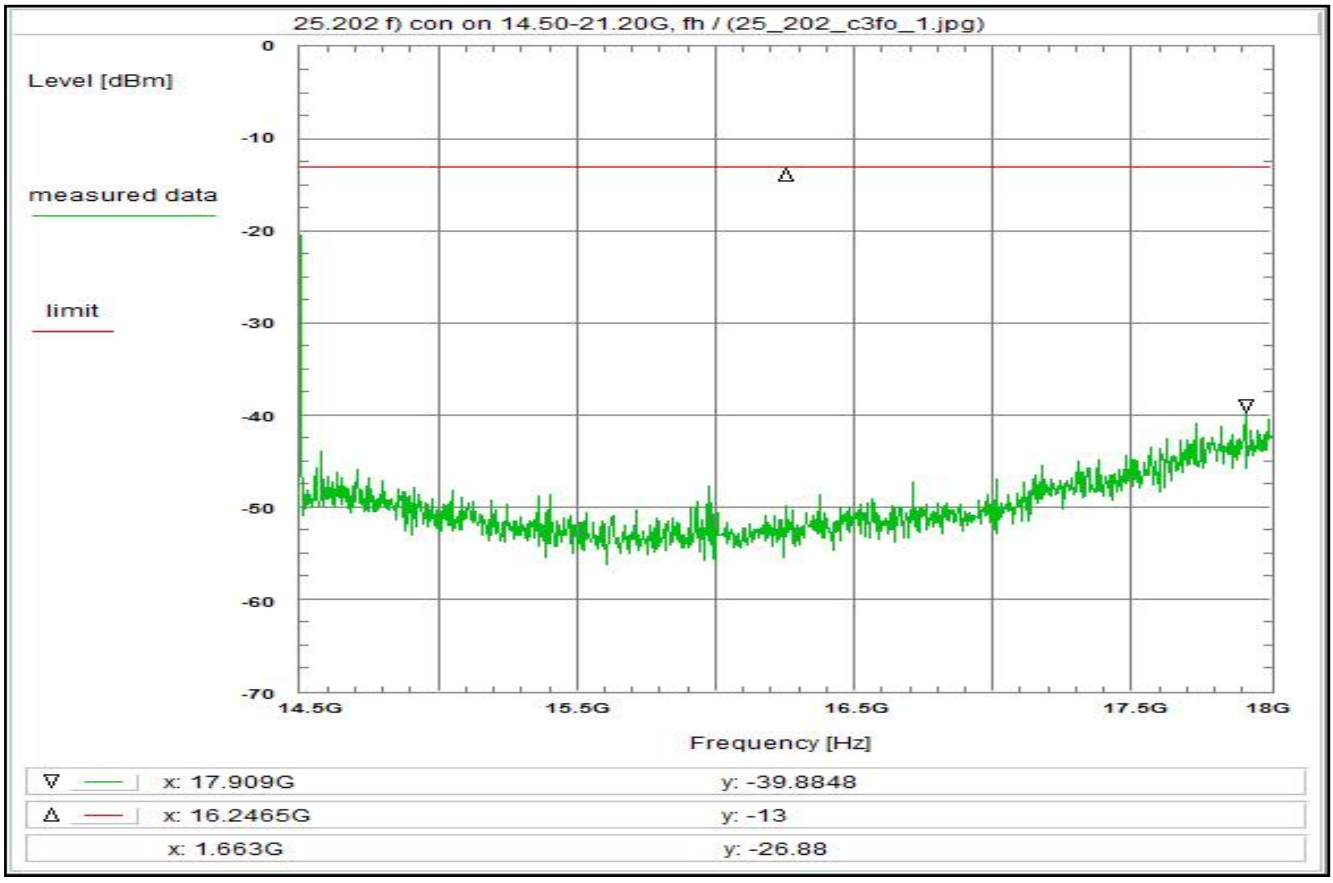
Start frequency:	13.75	GHz
Stop frequency:	14.5	GHz
Center frequency:	14.125	GHz
Frequency span:	750	MHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	45.2	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 34



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:39:27	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

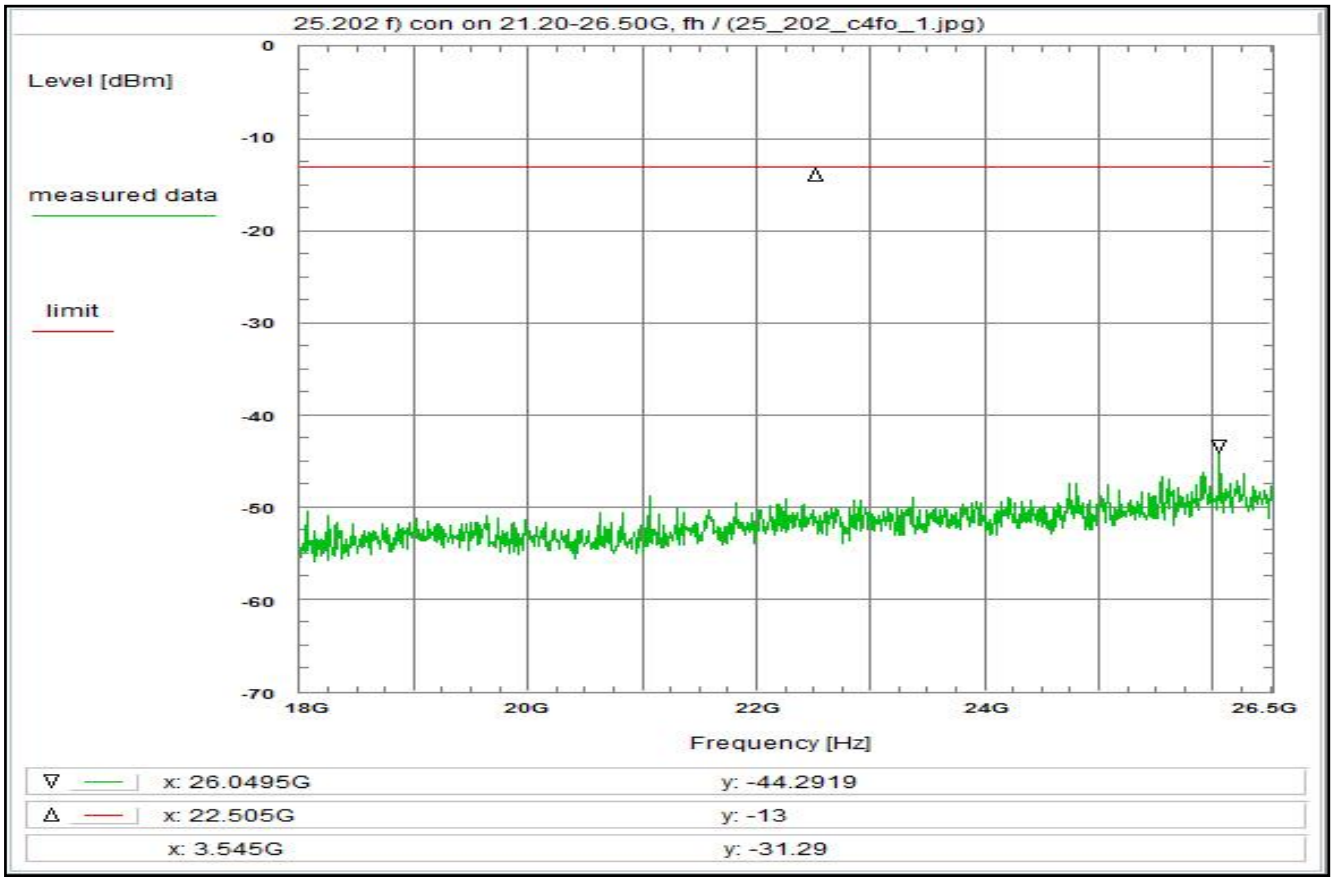
Start frequency:	14.5	GHz
Stop frequency:	18	GHz
Center frequency:	16.25	GHz
Frequency span:	3.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.9	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A037)	-	13.7	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
TOTAL CORRECTION:	+	43.1	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 35



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A019, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:09:44	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

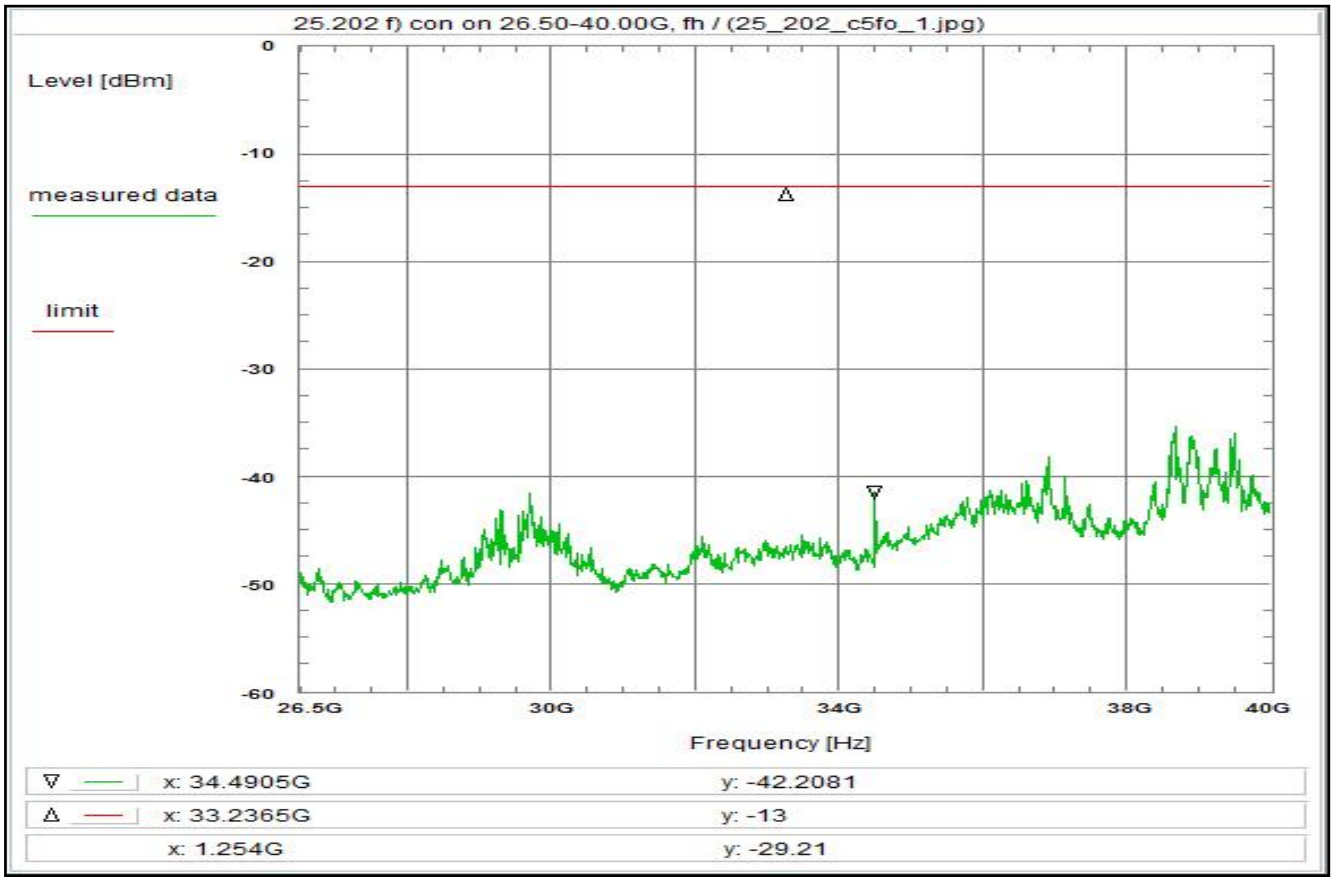
Start frequency:	18	GHz
Stop frequency:	26.5	GHz
Center frequency:	22.25	GHz
Frequency span:	8.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	3.5	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A019)	-	19.3	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (23.85GHz, 4.2m)	+	72.5	dB
TOTAL CORRECTION:	+	42.7	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 36



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A031, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:25:44	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

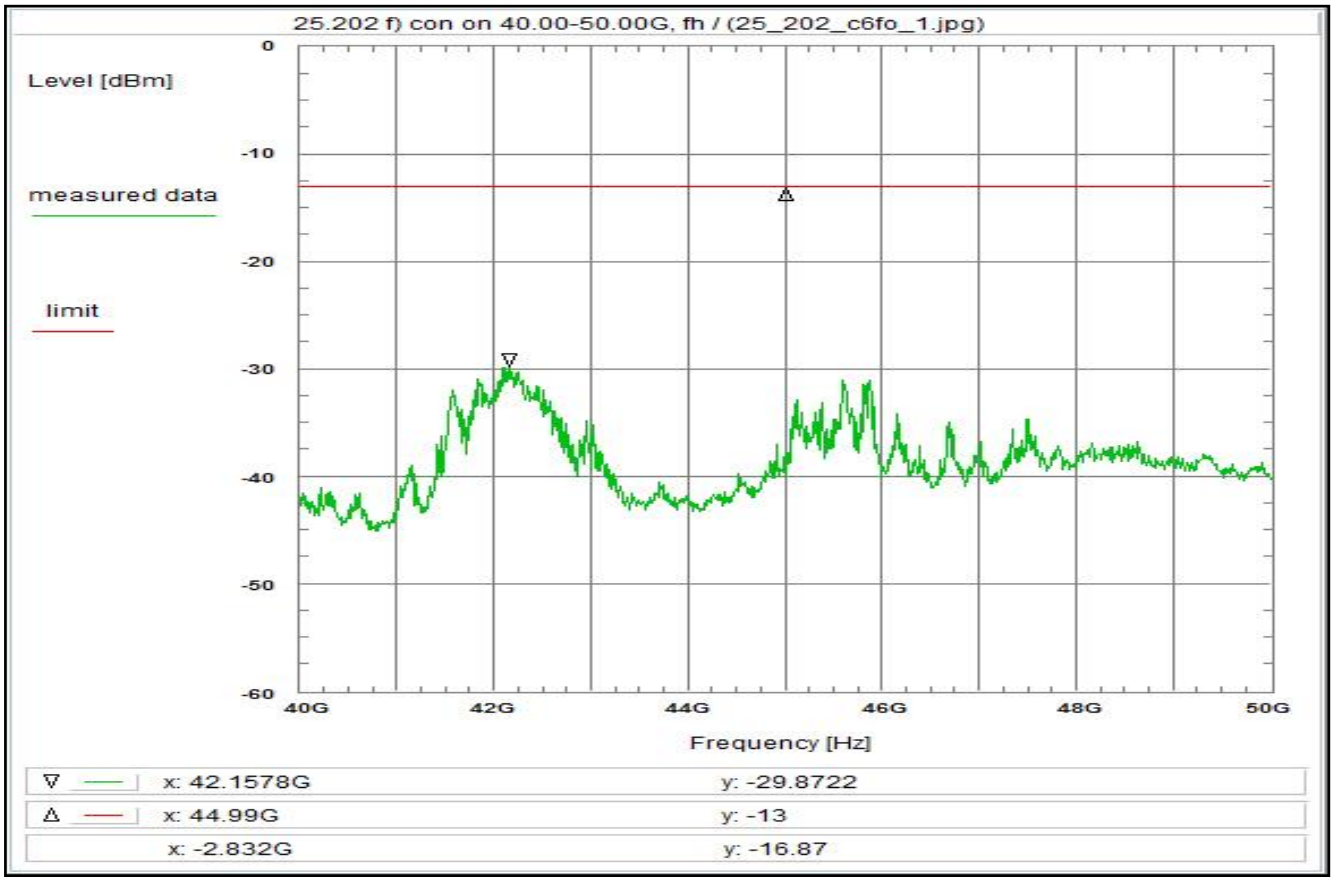
Start frequency:	26.5	GHz
Stop frequency:	40	GHz
Center frequency:	33.25	GHz
Frequency span:	13.5	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	4.3	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A031)	-	16.2	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (33.25GHz, 4.2m)	+	75.3	dB
TOTAL CORRECTION:	+	49.4	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 37



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A023, C220, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 11:30:06	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

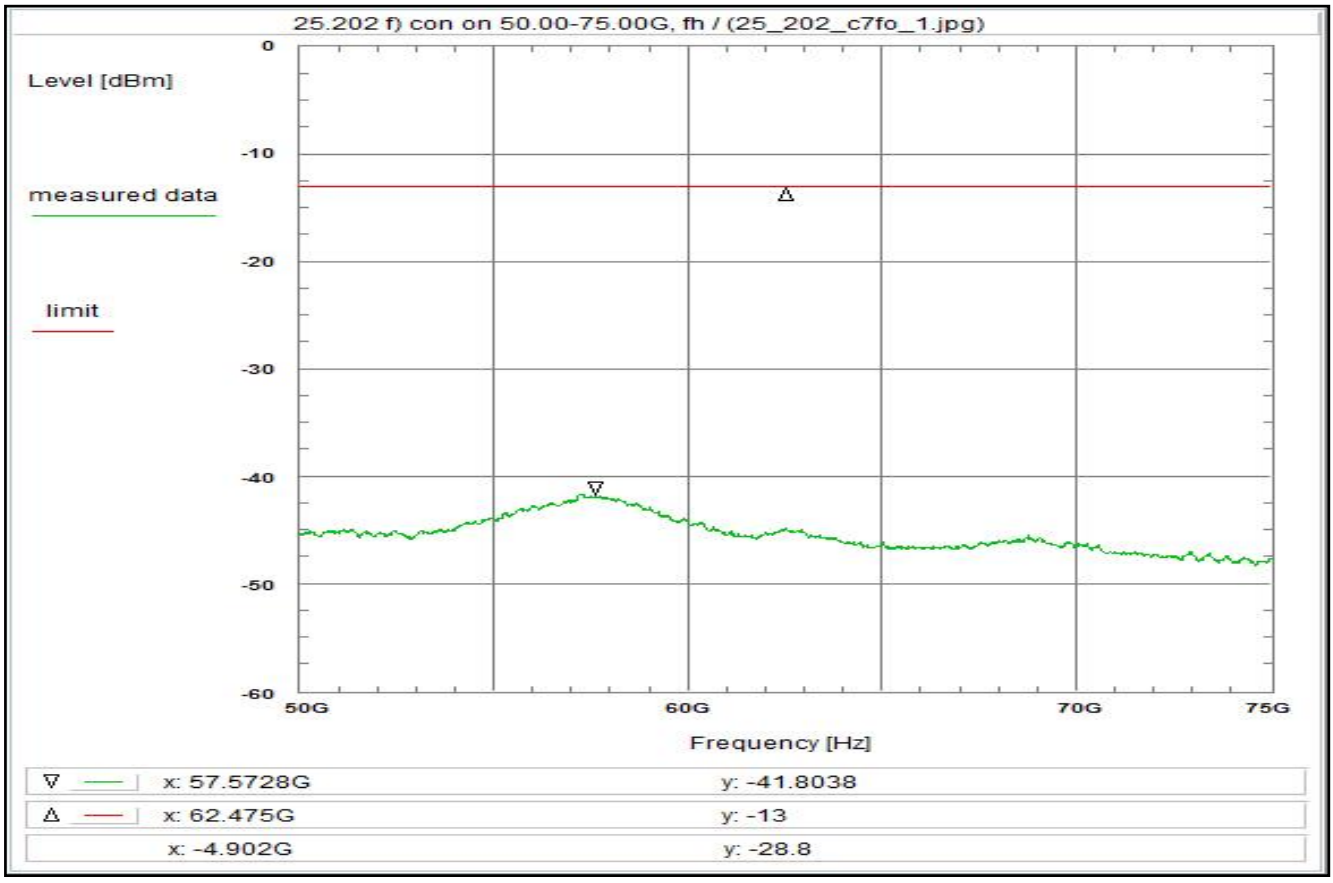
Start frequency:	40	GHz
Stop frequency:	50	GHz
Center frequency:	45	GHz
Frequency span:	10	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	5.2	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A023)	-	18.9	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (45.00GHz, 4.2m)	+	78.0	dB
TOTAL CORRECTION:	+	50.3	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 38



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fh)

Limit:
Limit acc. to 25.202 f): -43+10log(Pmax) dBc
This corresponds to a limit of -13 dBm.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A025, R001, R029

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Wed 26/Oct/2022 13:00:18	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

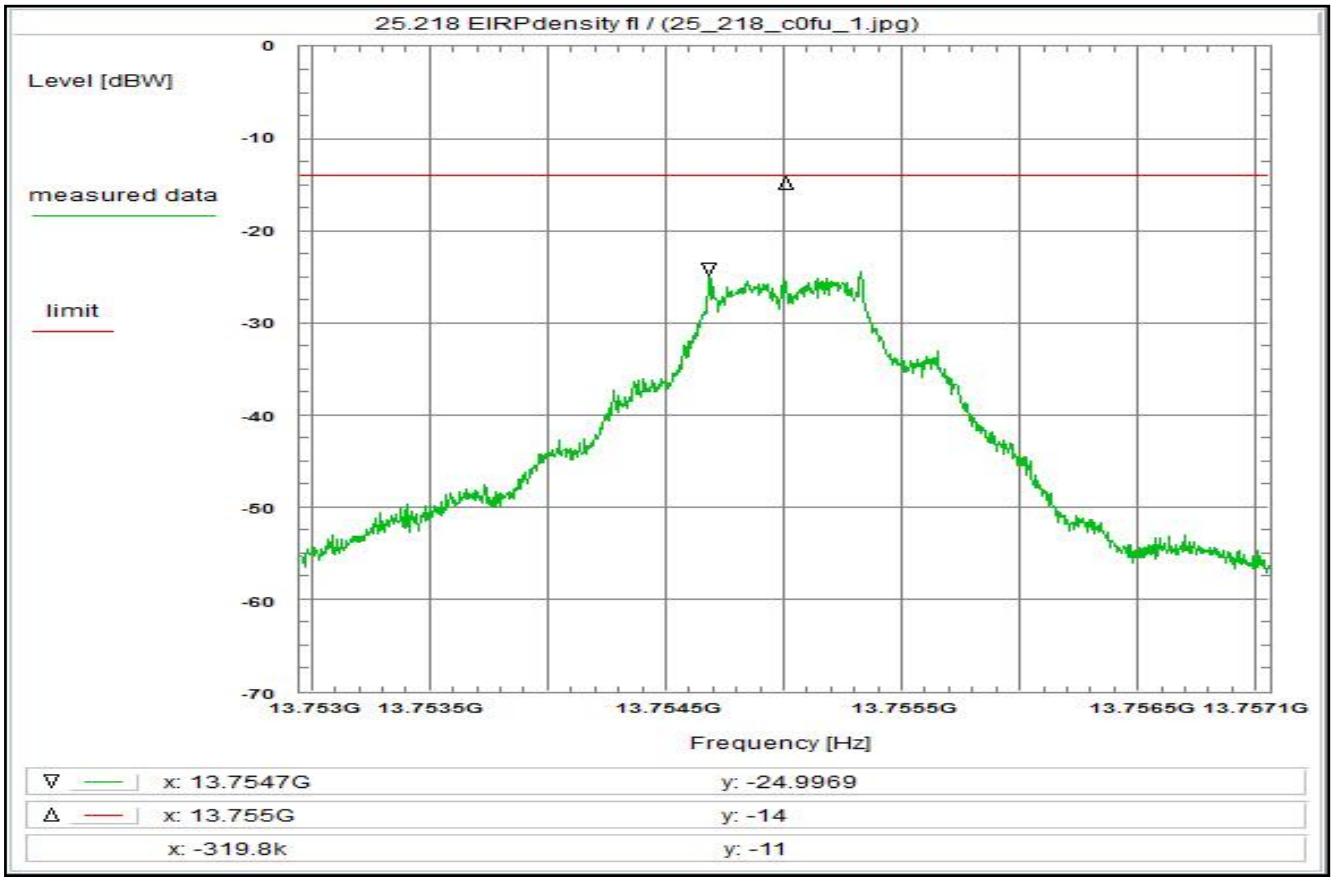
Start frequency:	50	GHz
Stop frequency:	75	GHz
Center frequency:	62.5	GHz
Frequency span:	25	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	10	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable	+	0.0	dB
DUT-Antenna	+	0.0	dBi
Test antenna (A025)	-	20.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (62.50GHz, 4.2m)	+	80.8	dB
TOTAL CORRECTION:	+	46.8	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fh)

Plot No. 39



Subclause: 25.218 Off-axis EIRP spectral density (co-, cross-polar) within the band
Modulated rf-carrier at the lower edge of the band (fl)
Measurement of the wanted signal within 5 * occupied bandwidth

Limit:
Limit acc. to 25.218: 15-25log2° dBW;4kHz
-ant.-pattern envelope: -(29-25log2° dBi)
==>: -14 dBW;4kHz (copolar)
(-10*log N for N>1: consideration in correction data)
The subtraction of the terms results in a constant limit.
The antenna gain is set to zero in the correction data for this calculation.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:18:08	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

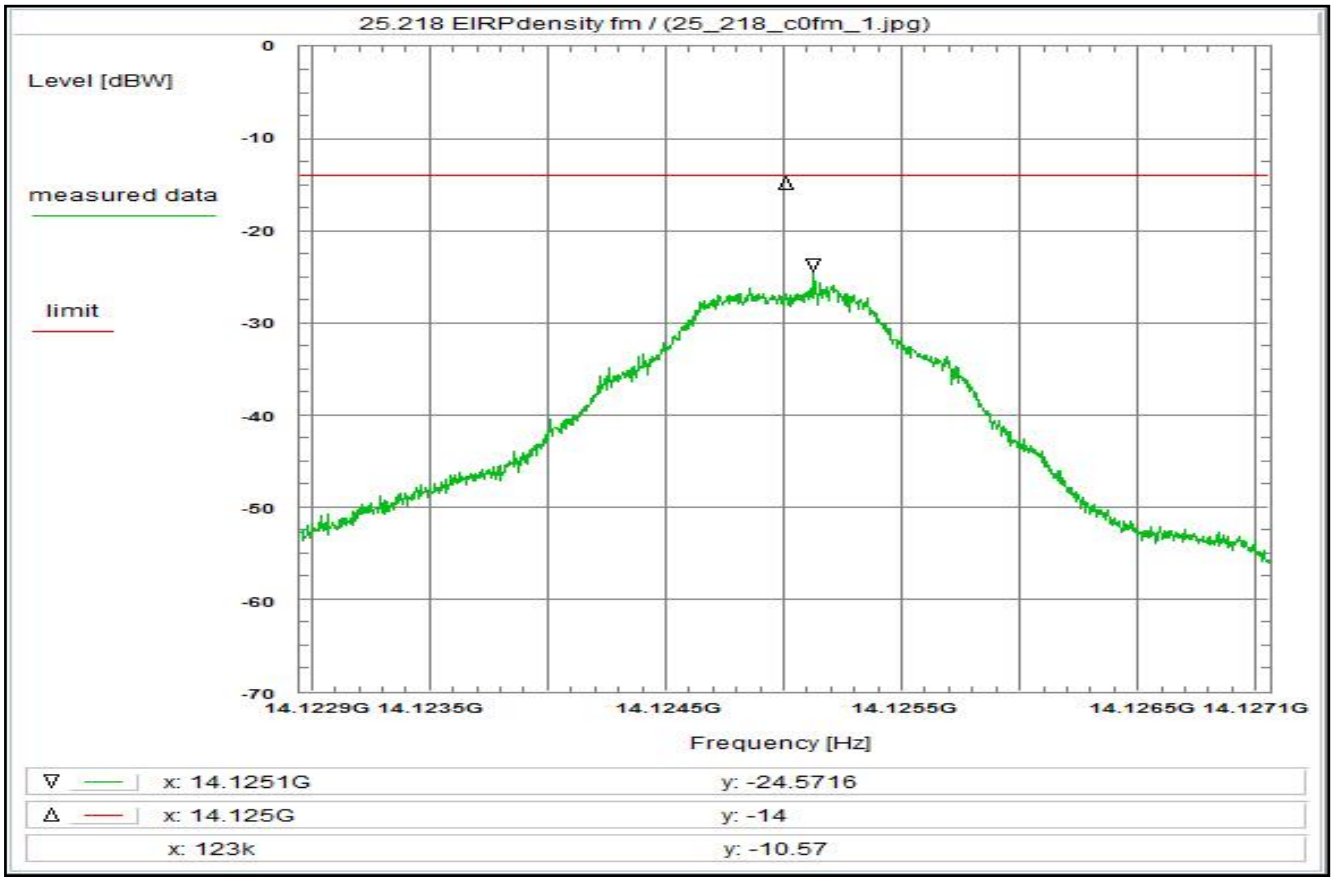
Start frequency:	13.75295	GHz
Stop frequency:	13.75705	GHz
Center frequency:	13.755	GHz
Frequency span:	4.1	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (see under limit)	+	0.0	dBi
Test antenna (A037)	-	11.8	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
Antenna gain subtracted	-	21.0	dB
TOTAL CORRECTION:	+	33.8	dB

Remarks:
The envelope curves for the antenna patterns (´worst case´) are used for this calculation - the actual antenna patterns have to fulfill these requirements (co- and crosspolar envelope curves).
See the separate plot after the measurement plots, too.
Measurement with 30 kHz resolution filter and noise averaging.

Plot No. 40



Subclause: 25.218 Off-axis EIRP spectral density (co-, cross-polar) within the band
Modulated rf-carrier in the middle of the band (fm)
Measurement of the wanted signal within 5 * occupied bandwidth

Limit:
Limit acc. to 25.218: 15-25log2° dBW;4kHz
-ant.-pattern envelope: -(29-25log2° dBi)
==>: -14 dBW;4kHz (copolar)
(-10*log N for N>1: consideration in correction data)
The subtraction of the terms results in a constant limit.
The antenna gain is set to zero in the correction data for this calculation.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 16:58:03	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

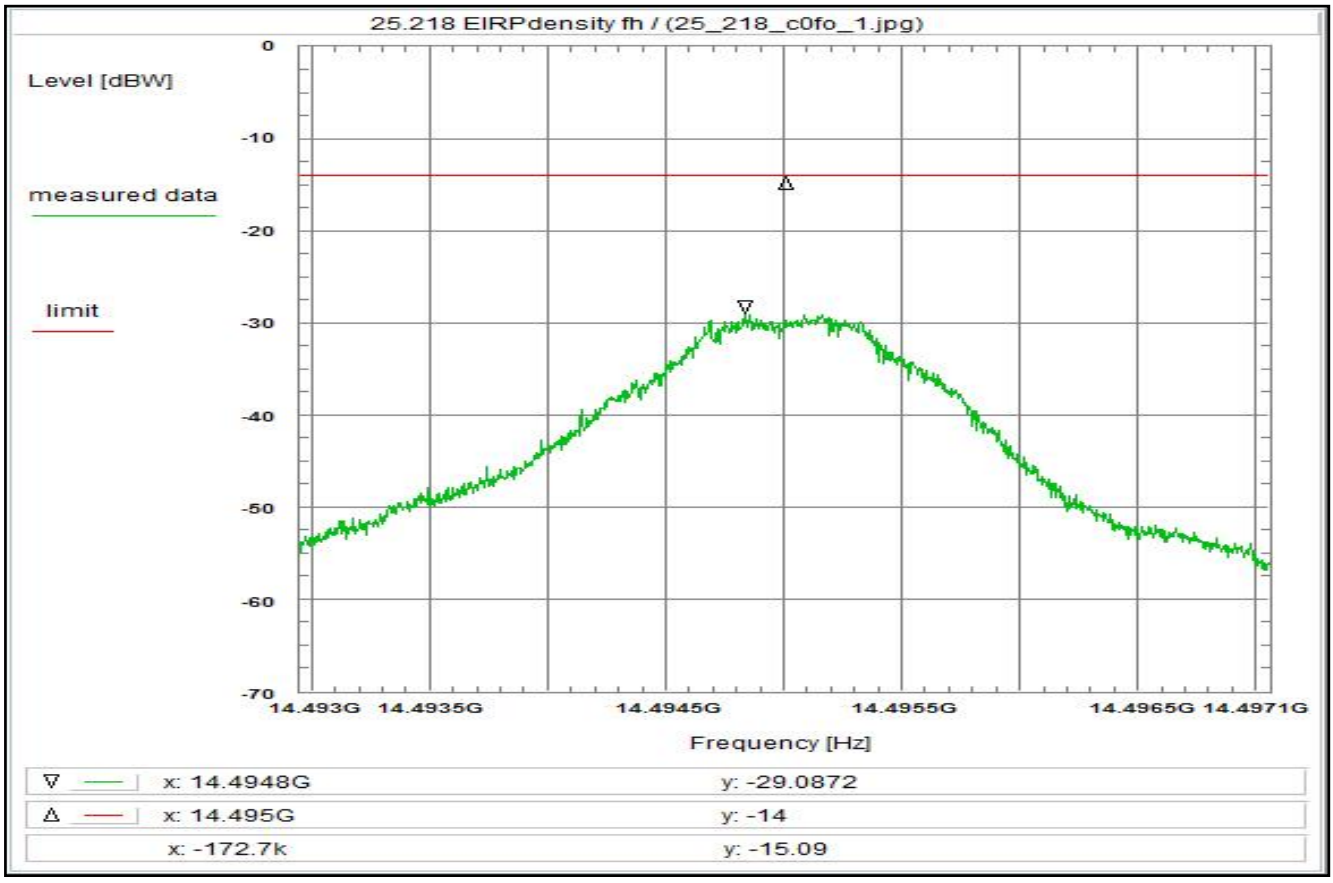
Start frequency:	14.12295	GHz
Stop frequency:	14.12705	GHz
Center frequency:	14.125	GHz
Frequency span:	4.1	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (see under limit)	+	0.0	dBi
Test antenna (A037)	-	11.3	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
Antenna gain subtracted	-	21.0	dB
TOTAL CORRECTION:	+	34.3	dB

Remarks:
The envelope curves for the antenna patterns (´worst case´) are used for this calculation - the actual antenna patterns have to fulfill these requirements (co- and crosspolar envelope curves).
See the separate plot after the measurement plots, too.
Measurement with 30 kHz resolution filter and noise averaging.

Plot No. 41



Subclause: 25.218 Off-axis EIRP spectral density (co-, cross-polar) within the band
Modulated rf-carrier at the upper edge of the band (fh)
Measurement of the wanted signal within 5 * occupied bandwidth

Limit:
Limit acc. to 25.218: 15-25log2° dBW;4kHz
-ant.-pattern envelope: -(29-25log2° dBi)
==>: -14 dBW;4kHz (copolar)
(-10*log N for N>1: consideration in correction data)
The subtraction of the terms results in a constant limit.
The antenna gain is set to zero in the correction data for this calculation.

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

Operating condition of DUT:
operating condition 1, see test report chapter 6.4

Test setup:
see test report chapter 7.2:

Test equipment:
see test report chapter 7.2: A037, C220, R001

Remark:

Test result: Test passed

Environment condition:

Date & Time:	Tue 25/Oct/2022 17:20:37	
Location:	CTC advanced GmbH, Laboratory RC-SYS	
Temperature:	22	°C
Humidity:	55	%
Voltage:	54	Vdc

Setup of measurement equipment:

Start frequency:	14.49295	GHz
Stop frequency:	14.49705	GHz
Center frequency:	14.495	GHz
Frequency span:	4.1	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	10	dB
Trace-Mode:	Clear Write	
Detector-Mode:	AVG	

Correction:

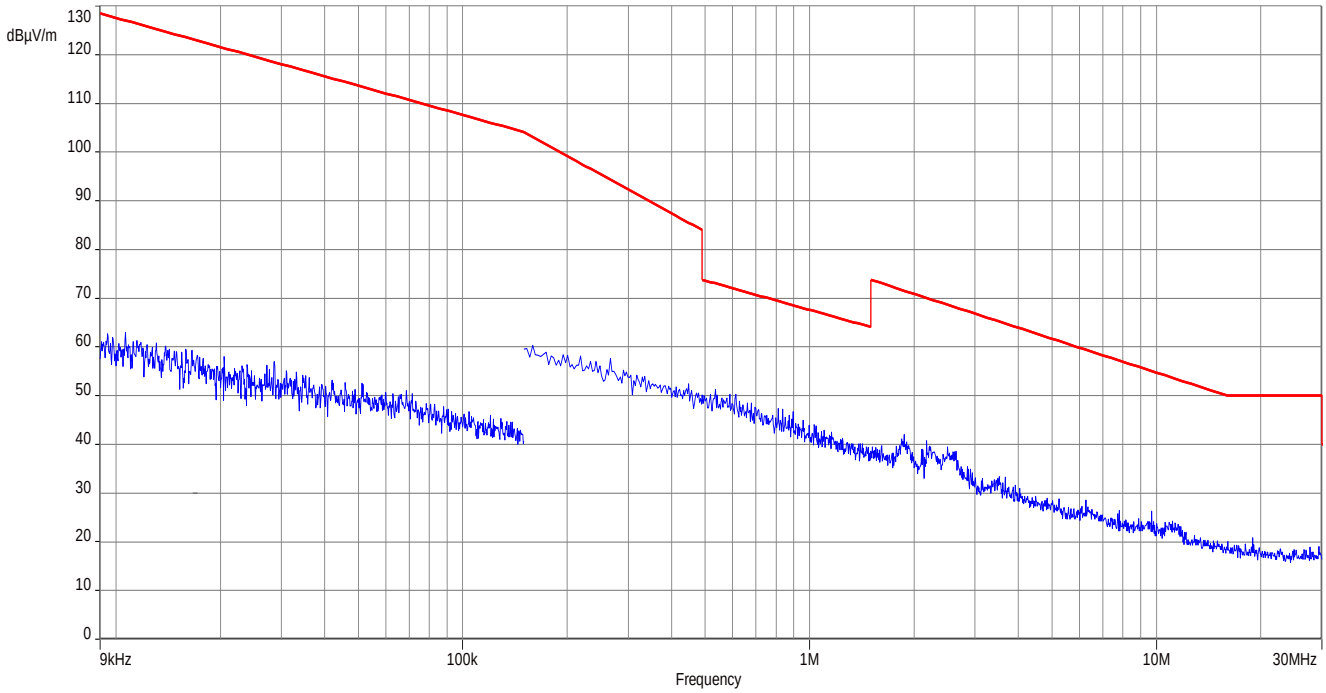
Directional coupler	+	0.0	dB
Coaxial cable (C220)	+	2.7	dB
DUT-Antenna (see under limit)	+	0.0	dBi
Test antenna (A037)	-	11.4	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	-	0.0	dB
Freefield attenuation (14.13GHz, 4.2m)	+	67.9	dB
Antenna gain subtracted	-	21.0	dB
TOTAL CORRECTION:	+	34.2	dB

Remarks:
The envelope curves for the antenna patterns (´worst case´) are used for this calculation - the actual antenna patterns have to fulfill these requirements (co- and crosspolar envelope curves).
See the separate plot after the measurement plots, too.
Measurement with 30 kHz resolution filter and noise averaging.

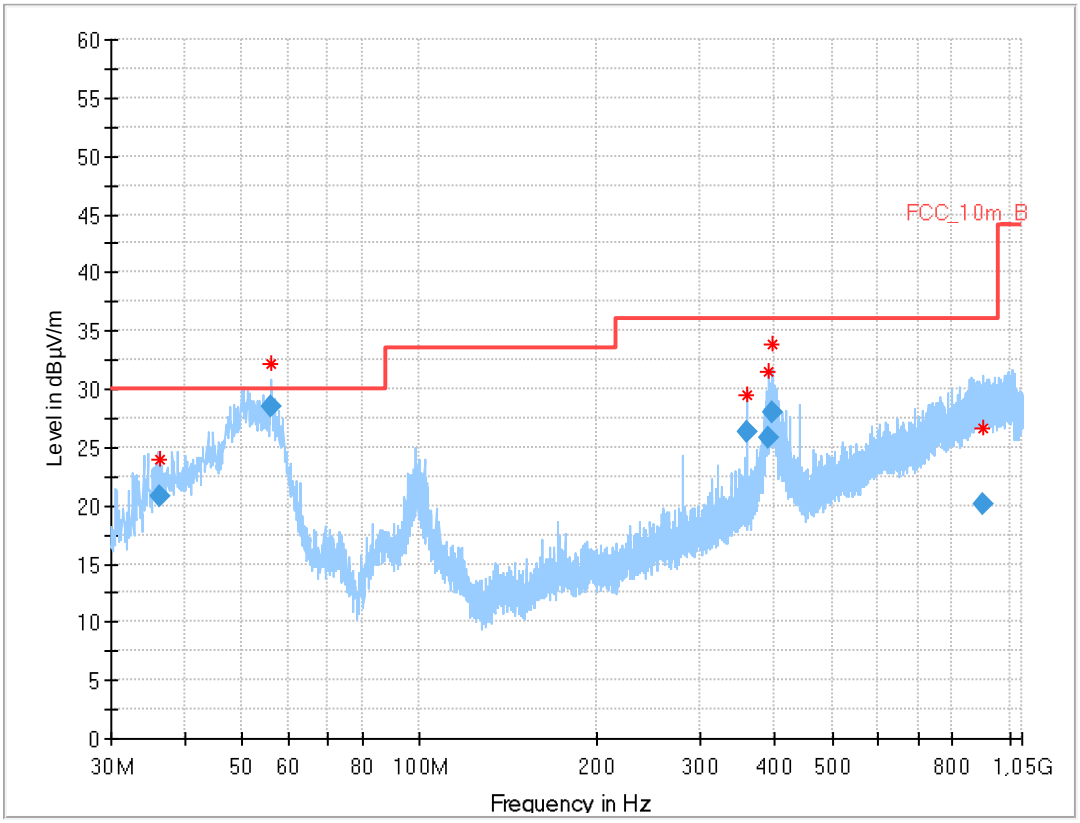
3 Measurement results, Spurious emissions 30MHz - 18 GHz

This Chapter 3 consists of 4 pages including this page.

Plot No. 1: 150 kHz – 30 MHz, antenna vertical / horizontal Tx/Rx



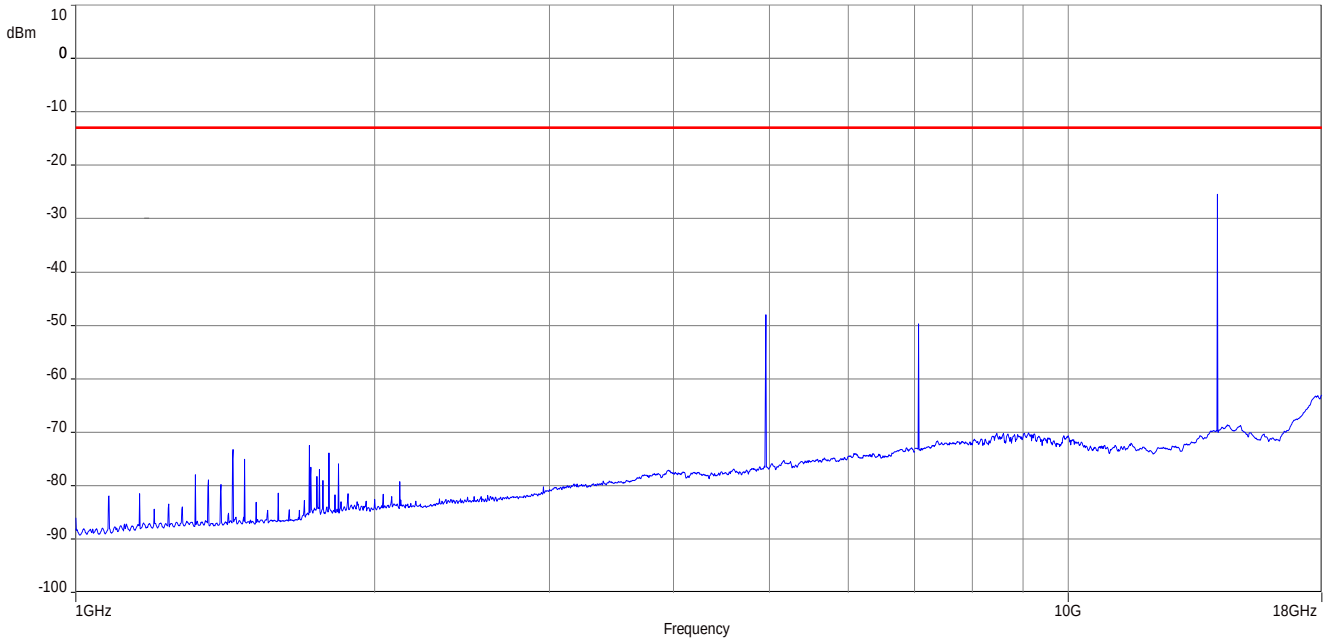
Plot No. 2: 30 MHz – 1 GHz, antenna vertical / horizontal Tx



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
36.152	20.82	30.0	9.2	1000	120.0	103.0	V	45	14
55.995	28.51	30.0	1.5	1000	120.0	100.0	V	240	16
360.022	26.35	36.0	9.7	1000	120.0	322.0	H	246	17
391.324	25.78	36.0	10.2	1000	120.0	223.0	H	97	18
397.060	27.94	36.0	8.1	1000	120.0	250.0	H	270	18
904.209	20.06	36.0	15.9	1000	120.0	153.0	V	135	26

Plot No. 3: 1 GHz – 18 GHz, antenna vertical / horizontal Tx



Note: carrier visible on plot

4 Measurement results, FCC Part 15B

This Chapter 3 consists of 1 pages including this page.

Refer to test report 1-3494_21-01-05.pdf

5 Document history

Version	Applied changes	Date of release
	Initial release - DRAFT	2022-10-22
	Initial release	2023-01-06