TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-17/170

Applicant:	OTT Hydromet GmbH - Business Unit Adcon Telemetry Inkustraße 24 3400 Klosterneuburg, Austria
Tested Product:	UHF transceiver module
FCC-ID:	SHX-A432
IC-ID:	3606A-A432
Manufacturer:	OTT Hydromet GmbH - Business Unit Adcon Telemetry Inkustraße 24 3400 Klosterneuburg, Austria
Output power / field strength:	468 mW max. conducted
power supply:	6,2 VDC
Frequency range:	450 - 470 MHz
Channel separation:	12,5 kHz
Standard:	FCC: 47 CFR 90 10-1-16 Edition; RSS-119 Issue 12 (May 2015)

TUV Austria SERVICES GMBH
Test laboratory for EMC

Supervisor of EMC-laboratory: Ing. Wilhelm Seier

Rundsiegel

10.10.2017

checked by: Ing. Michael Emminger

Copy Nbr.: 01

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Inspection Body,
Certification Body,
Calibration Laboratory,
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IC 2932K-1

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Bank Details:
IBAN
AT1312000529490010
BIC BKAUATWW

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AT153100000104093
BIC RZBAATWW

VAT ATU63240488
DVR 3002476

LIST OF MEASUREMENTS

The complete list of measurements called for in 47 CFR 90 and (RSS-119) is given below.

TEST OBJECT DATA

General EUT Description

This transceiver module will be used exclusively by the applicant (limited modular approval) in telemetry devices. These telemetry devices will be situated in environment where normally no persons are situated and will work without user interaction.

3.3 There is no data port allowing direct modulation of the transmitter.

5.2 Type of emission: 9K00F1D – channel spacing 12,5 kHz (selectable stepsize: 6,25 kHz / 12,5 kHz / 25 kHz)

The maximum symbol rate is 4000 symbols per second (2kHz maximum modulation frequency).
The maximum frequency deviation is set to 2,5 kHz (nominal 2,3kHz with $\pm$ 0,2 kHz tolerance)
With k=1 the necessary bandwidth is calculated as: $B_N = 2M + 2DK = 4000 + 5000 = 9kHz$.

Details of the modulation scheme can be found in chapter 2.1.1 of the hardware description.

Frequency range: 450 – 470 MHz

Power range and Controls: There are NO user power controls, the output power is fixed to 468mW.

Maximum output power rating: 468 mW into whip antenna

DC Voltage and Current: 6,2 V nominal 10V maximum
maximum current consumption: 0,59A

For radiated measurements a typical configuration was set up to demonstrate compliance in normal operation configuration:

The telemetry device was mounted at top of the normally used vertical mast of 1,5m height. The solar cell was mounted in the same height on the backside of the telemetry device and connected to it. The normally used antenna was directly connected to the device. A combined temperature/humidity sensor was connected to the device.

This setup is referred as "EUT" in the description of test setups.

The measurement of the transmitter output power was made conducted. The antennas used for radiated measurements were that supplied with the equipment when sold. In case of damage or for other reasons antennas should be replaced with same antenna type only.

Date of tests: 20th and 21st July 2015 and 19th December 2016.

Power Output **§ 5.4**

Rated output power: 468mW

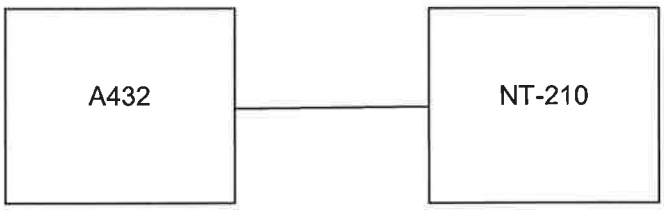
Conducted Measurement

Test conditions		Transmitter power (mW)		
		450 MHz	460 MHz	470 MHz
T_{nom} (21)°C	V_{nom} (6,2)V	468	457	427
Maximum deviation from output power under normal test conditions (dB)		0	-0,1	-0,4
Measurement uncertainty		± 0,75 dB		

LIMIT **SUBCLAUSE 5.4**

Under normal test conditons	± 1 dB

Test equipment used:



Emissions Mask D **§ 5.5**

LIMIT

5.5 and 5.8.3:

For transmitters designed to operate with a 12,5 kHz channel bandwidth in the frequency range 450-470 MHz, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
(1) On any frequency from the center of the authorized bandwidth f_0 to 5,625 kHz removed from f_0:
Zero dB.
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5,625 kHz but no more than 12,5 kHz: At least 7,27(f_d – 2,88 kHz) dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12,5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

Test equipment used:

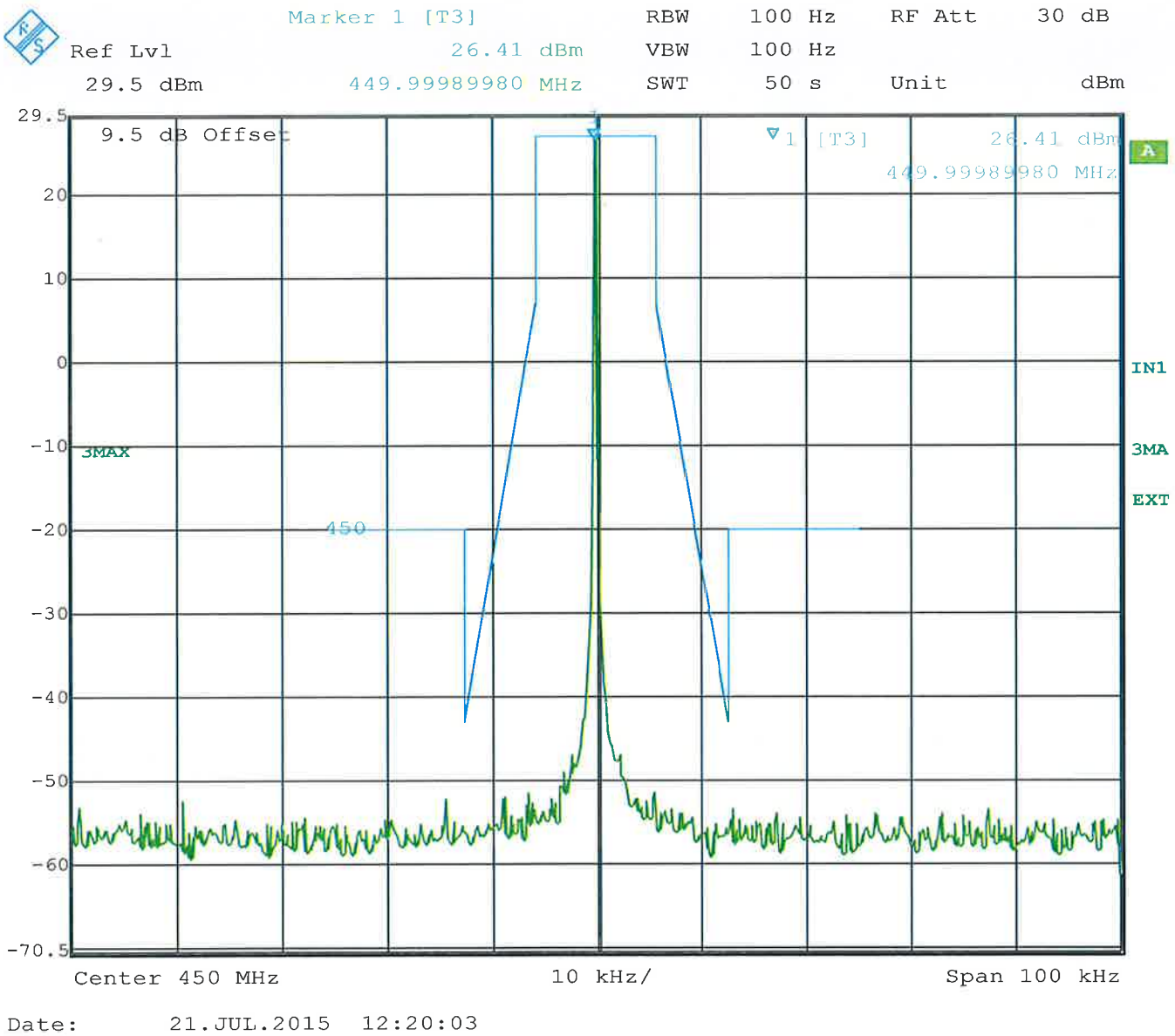
Ambient temperature: 21°C Relative humidity: 33%

Emissions Mask D § 5.5

Operating mode:

Frequency: 450 MHz

Modulation: unmodulated carrier

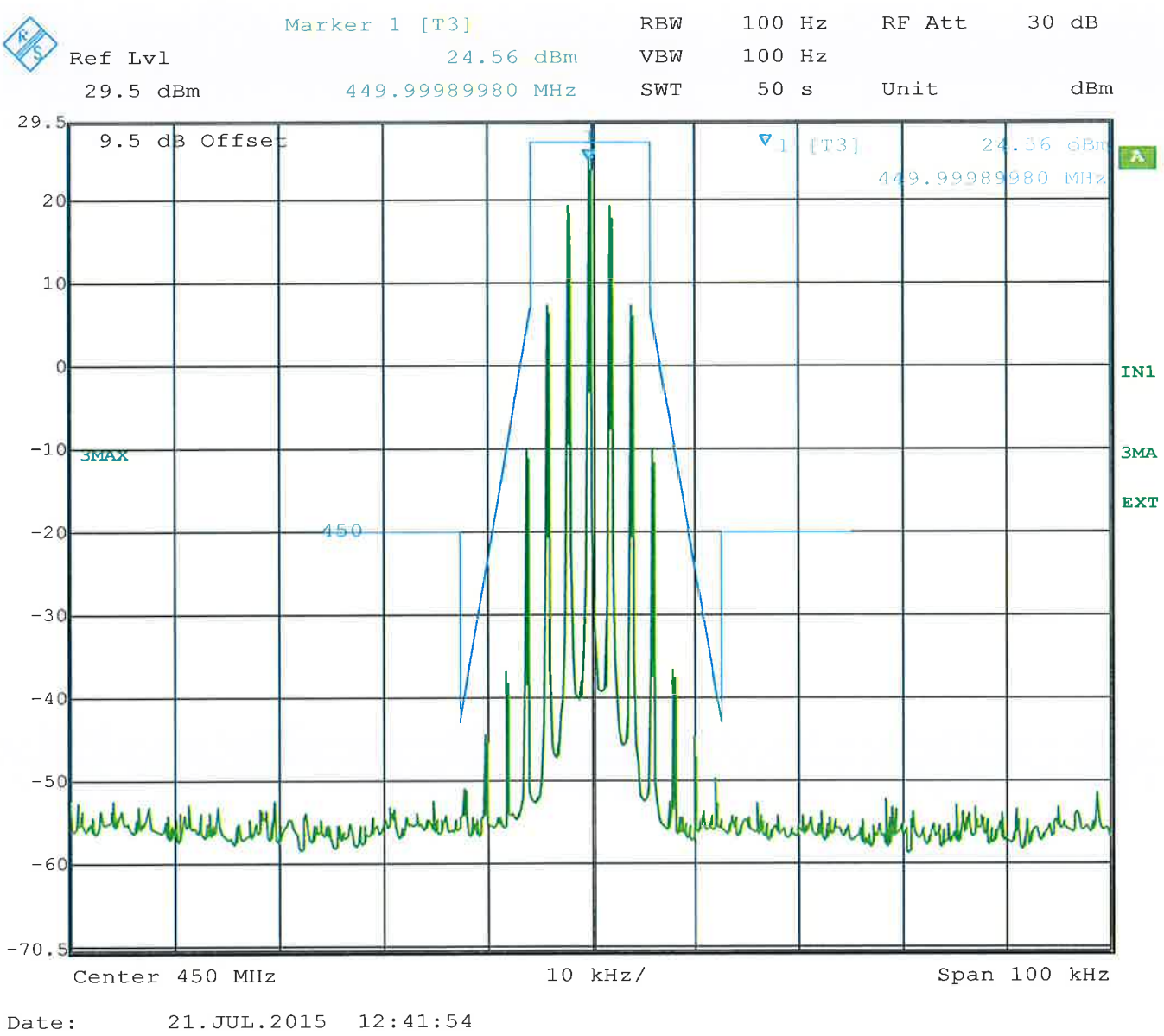


Emissions Mask D § 5.5

Operating mode:

Frequency: 450 MHz

Modulation: modulated carrier symbol 0 (2 kHz)



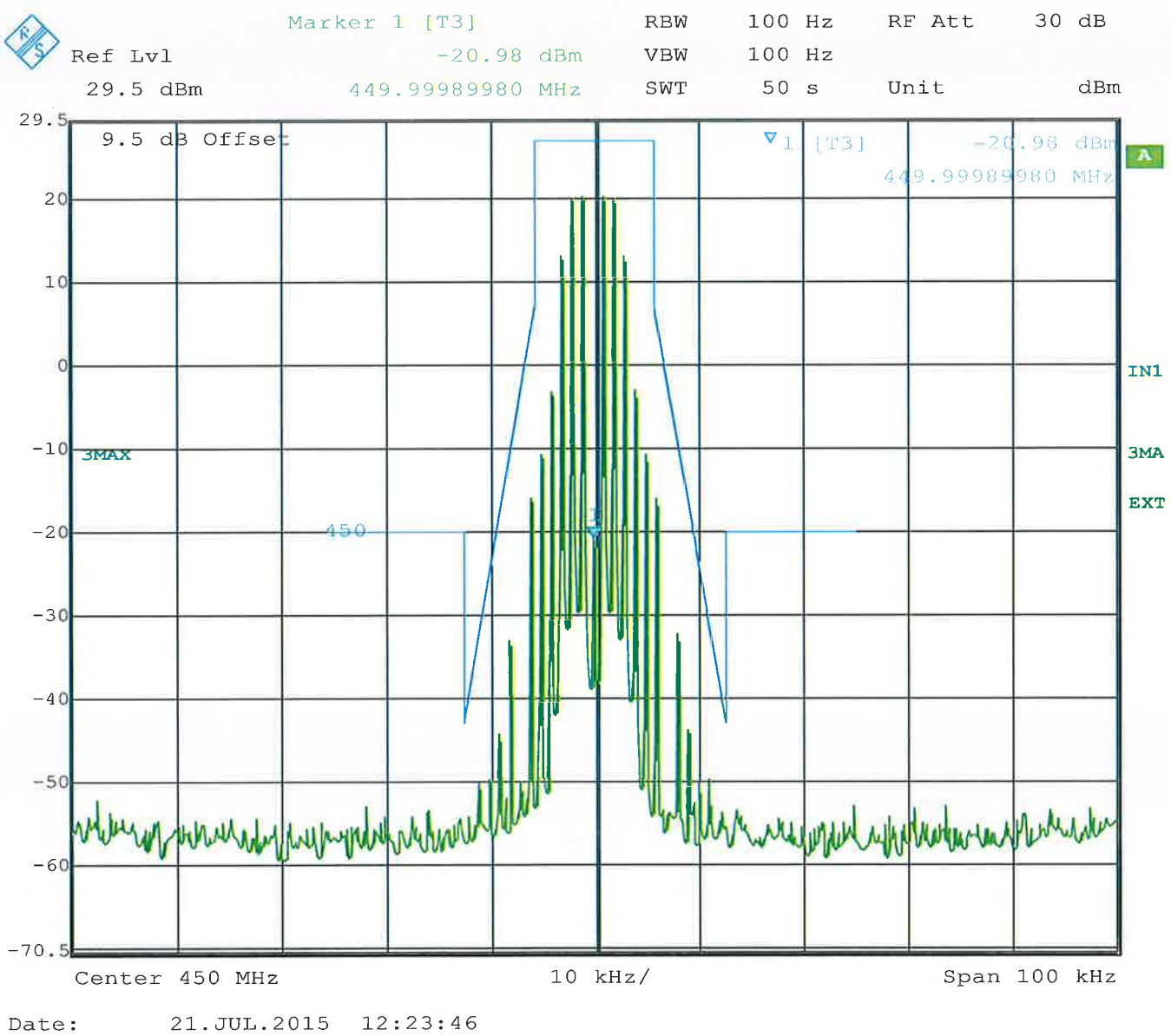
Date: 21.JUL.2015 12:41:54

Emissions Mask D § 5.5

Operating mode:

Frequency: 450 MHz

Modulation: modulated carrier symbol 1 (1 kHz)



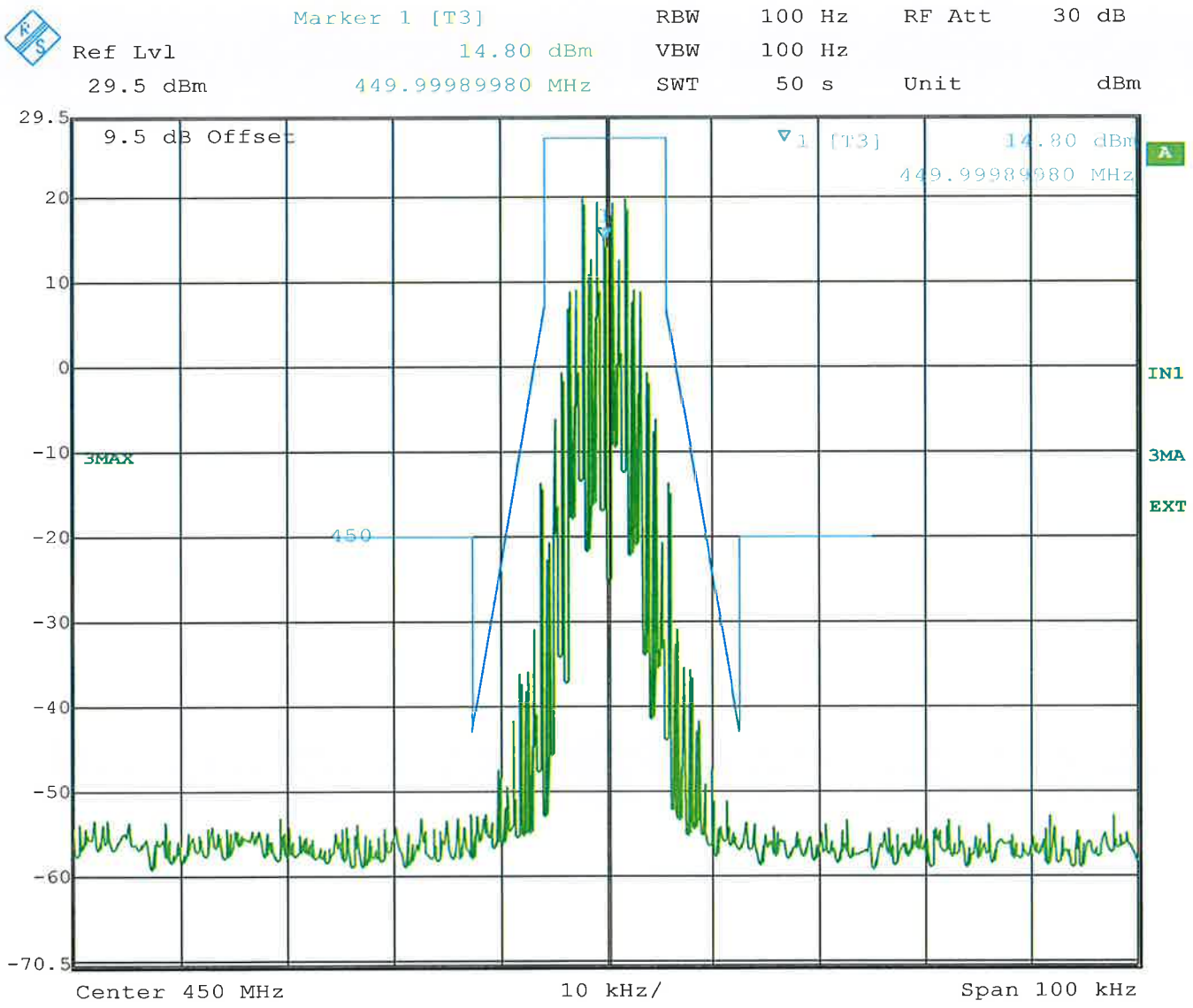
Ambient temperature: 21°C Relative humidity: 33%

Emissions Mask D § 5.5

Operating mode:

Frequency: 450 MHz

Modulation: modulated carrier symbol 0/1 at 1500 bps



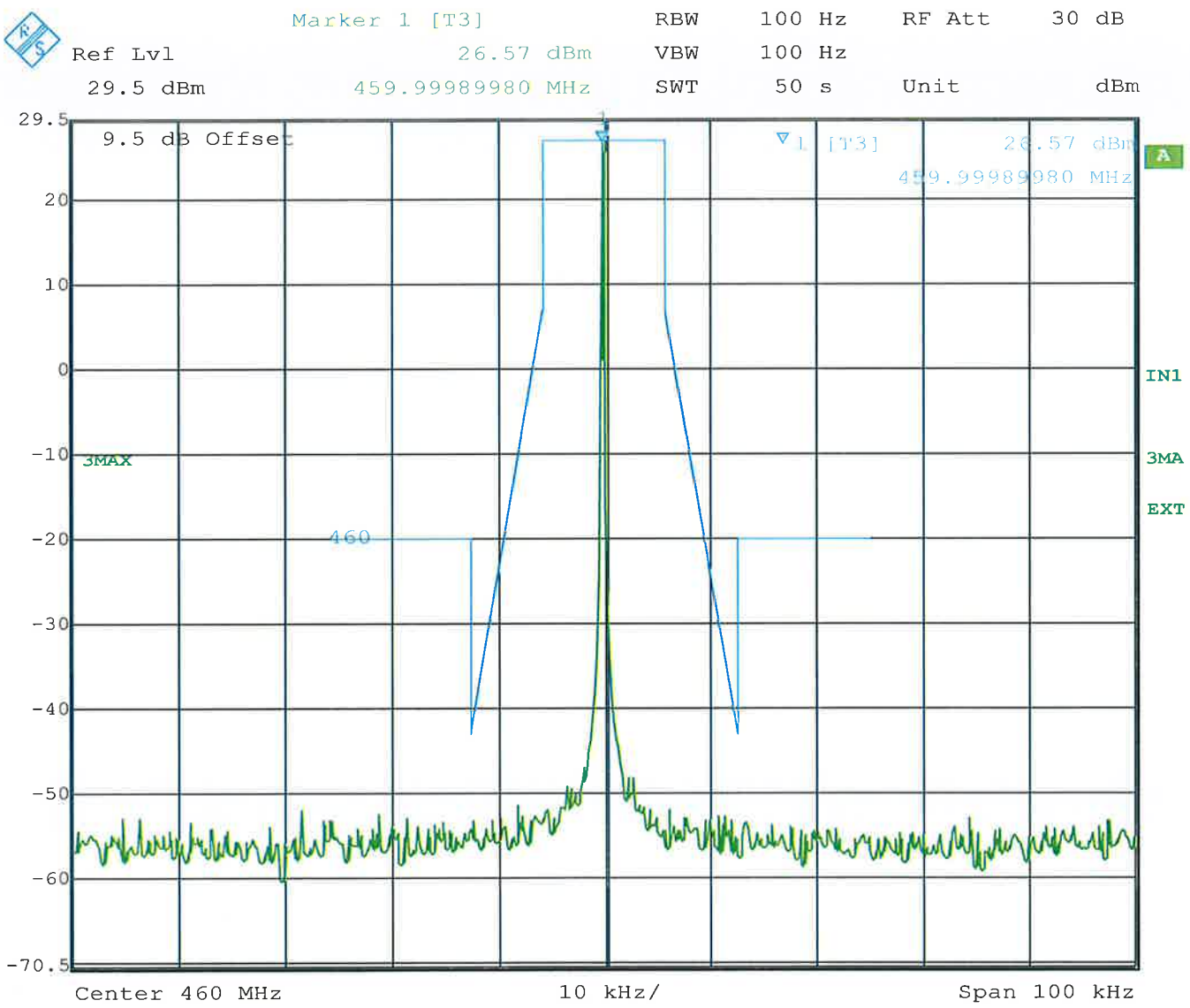
Date: 21.JUL.2015 12:25:38

Emissions Mask D § 5.5

Operating mode:

Frequency: 460 MHz

Modulation: unmodulated carrier



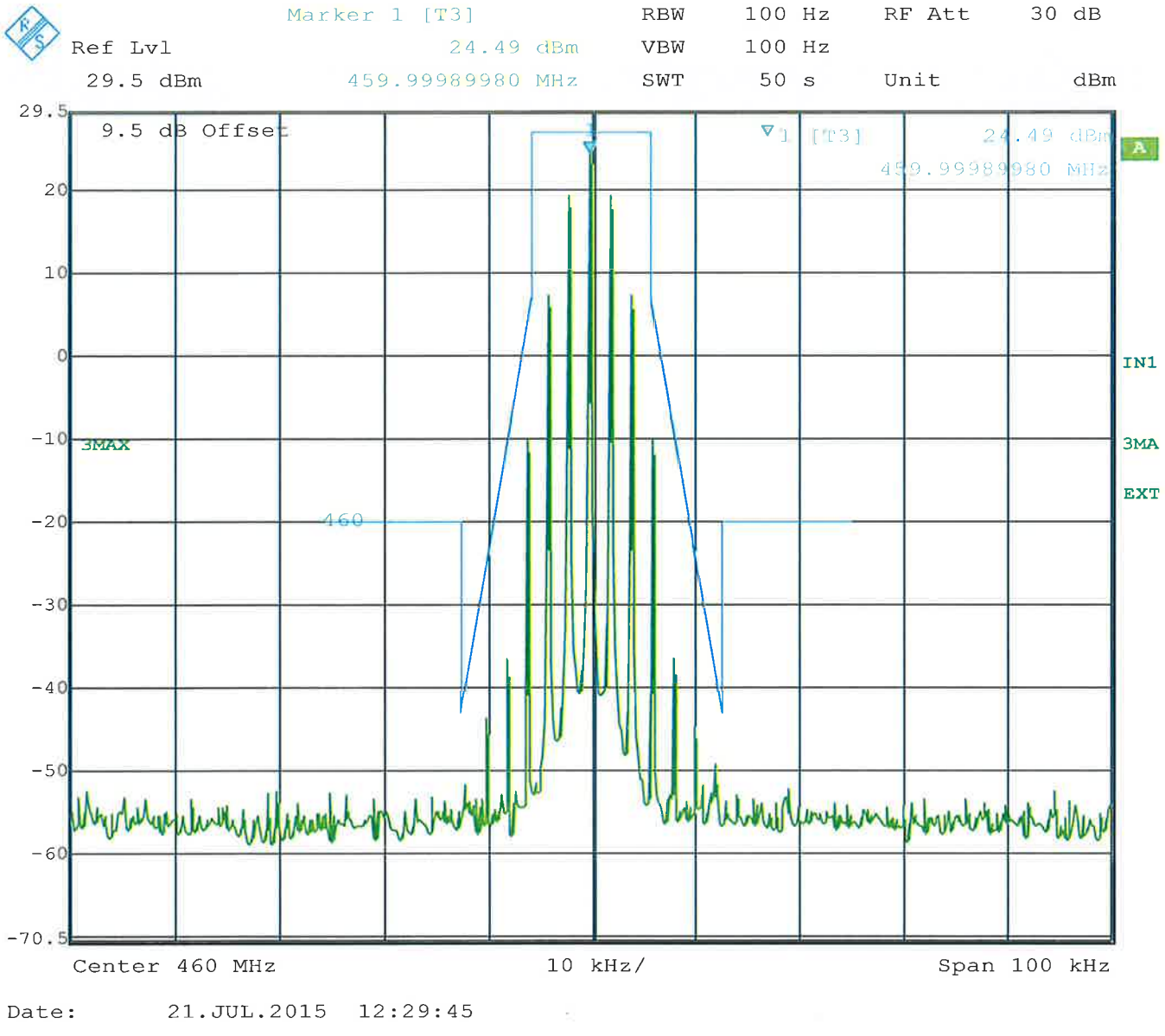
Ambient temperature: 21°C Relative humidity: 33%

Emissions Mask D **§ 5.5**

Operating mode:

Frequency: 460 MHz

Modulation: modulated carrier symbol 0 (2 kHz)

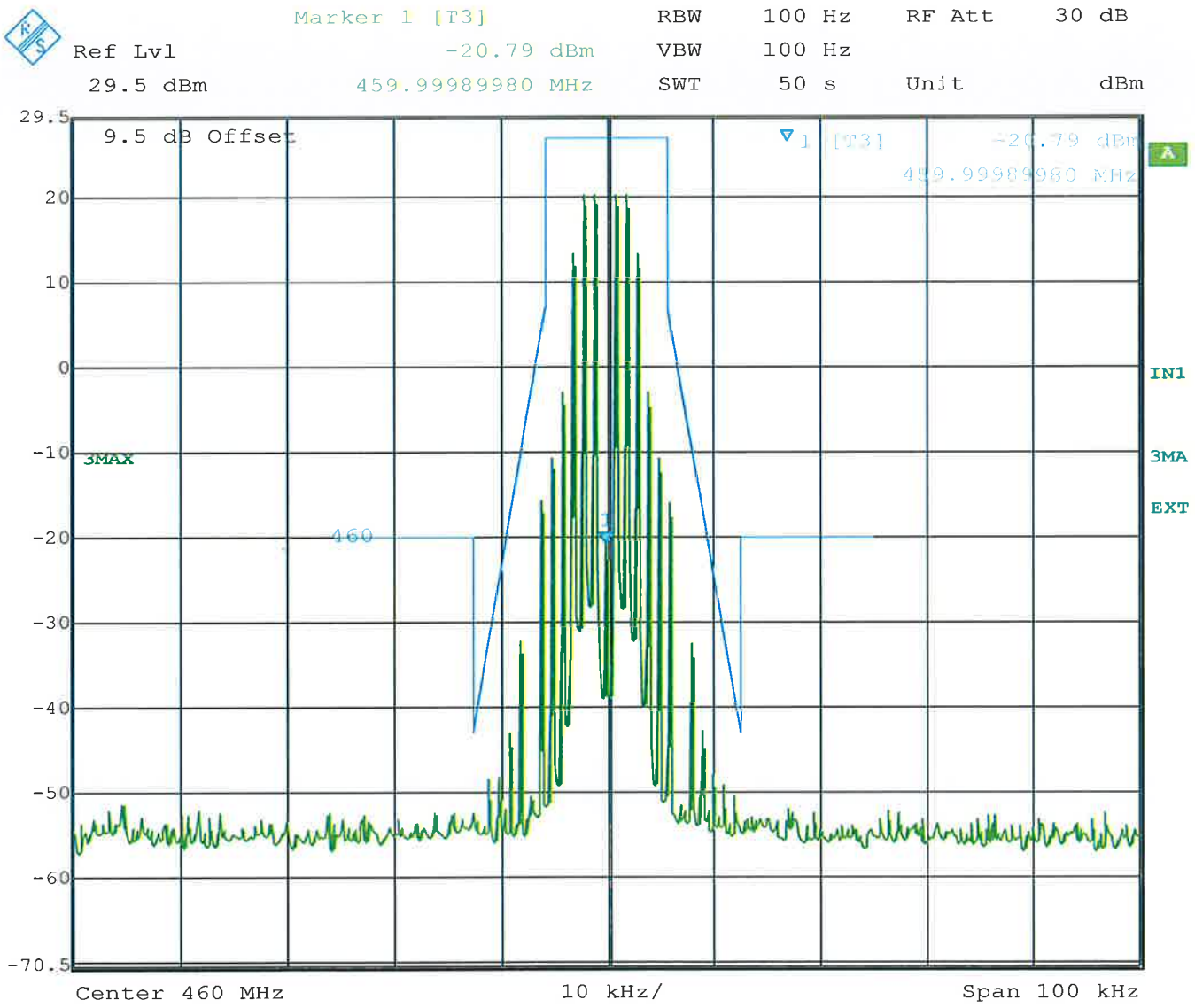


Emissions Mask D § 5.5

Operating mode:

Frequency: 460 MHz

Modulation: modulated carrier symbol 1 (1 kHz)



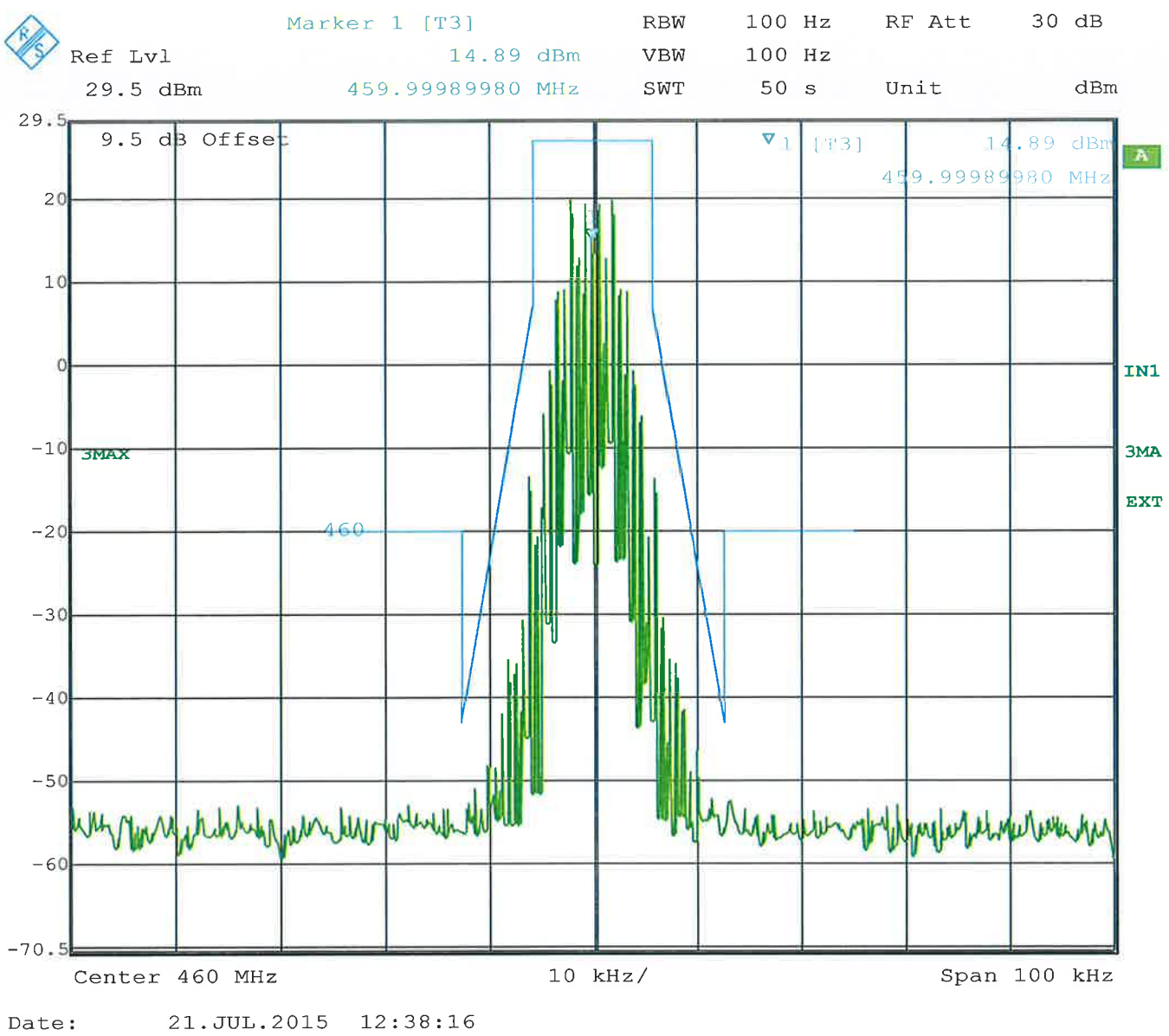
Date: 21.JUL.2015 12:35:39

Emissions Mask D § 5.5

Operating mode:

Frequency: 460 MHz

Modulation: modulated carrier symbol 0/1 at 1500 bps

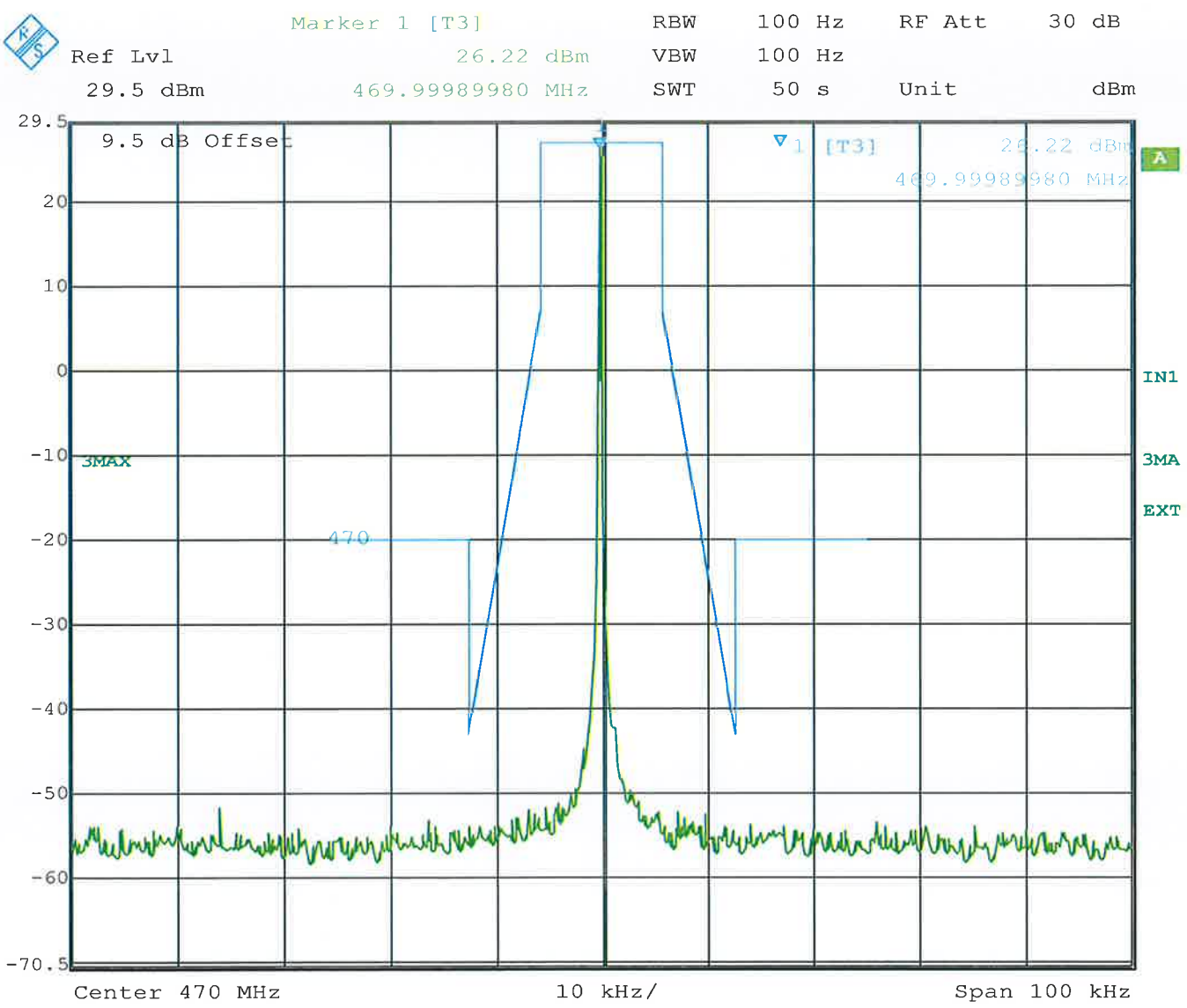


Emissions Mask D § 5.5

Operating mode:

Frequency: 470 MHz

Modulation: unmodulated carrier



Date: 21.JUL.2015 12:46:44

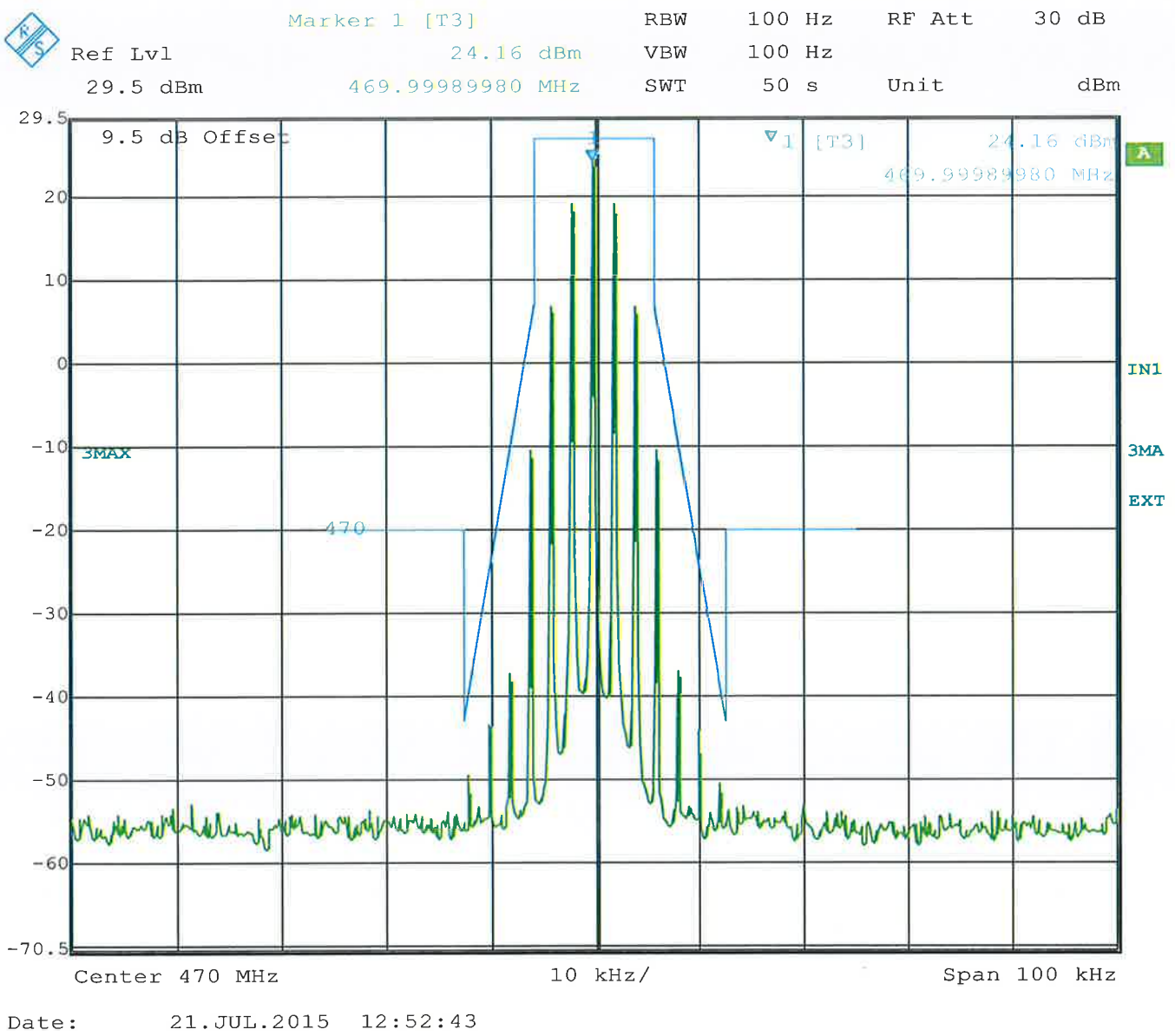
Ambient temperature: 21°C Relative humidity: 33%

Emissions Mask D § 5.5

Operating mode:

Frequency: 470 MHz

Modulation: modulated carrier symbol 0 (2 kHz)



Date: 21.JUL.2015 12:52:43

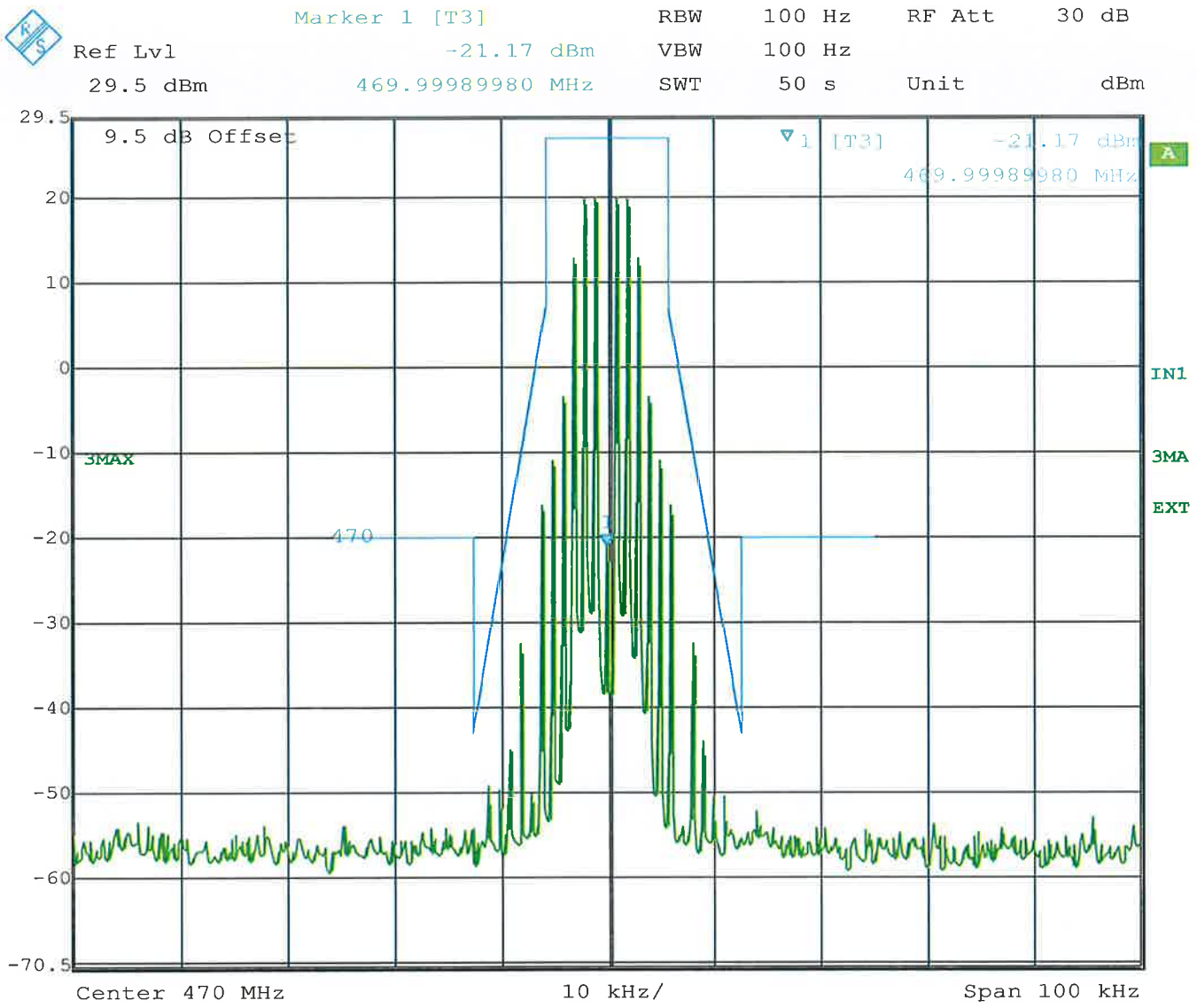
Ambient temperature: 21°C Relative humidity: 33%

Emissions Mask D § 5.5

Operating mode:

Frequency: 470 MHz

Modulation: modulated carrier symbol 1 (1 kHz)



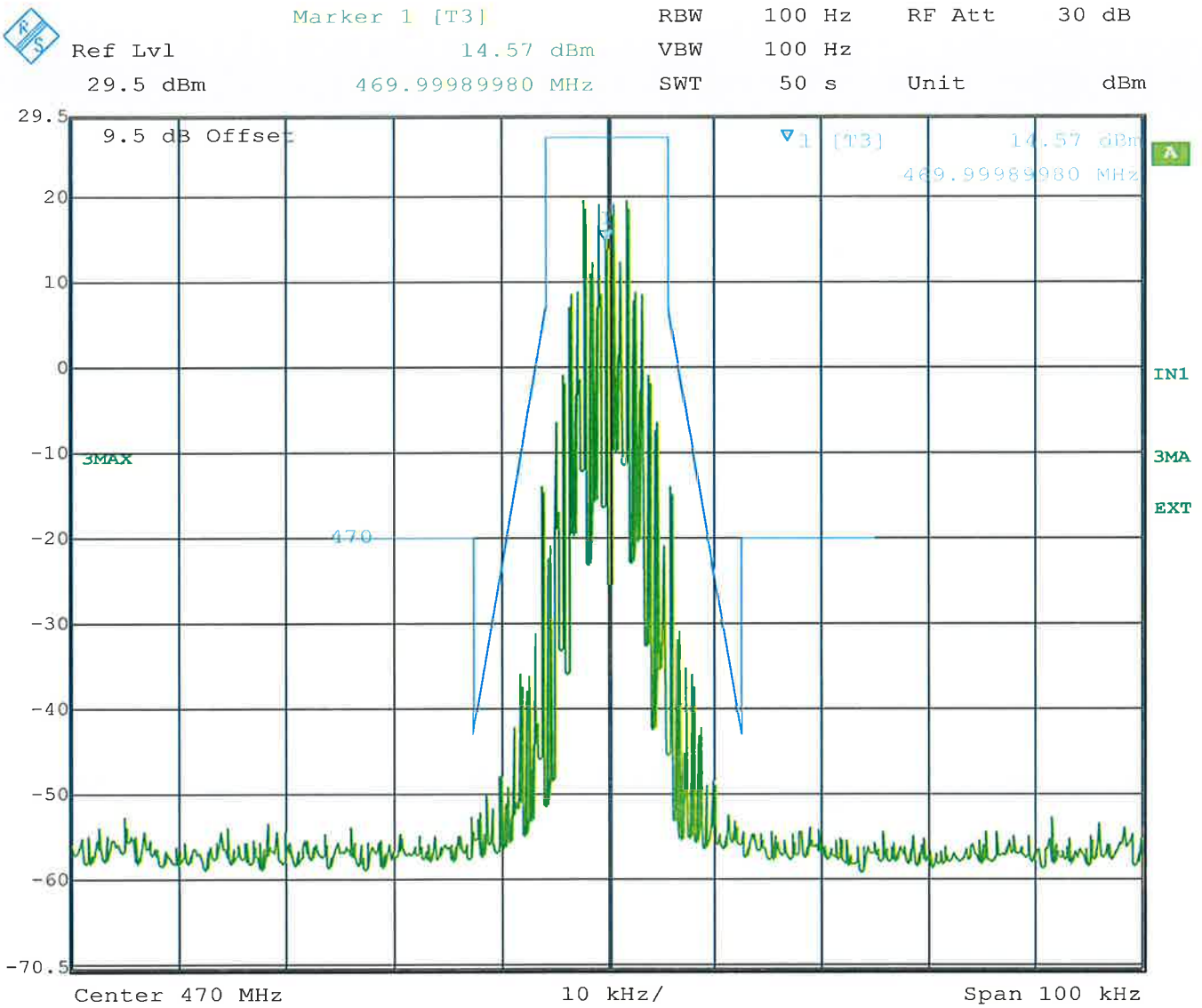
Date: 21.JUL.2015 12:55:52

Emissions Mask D § 5.5

Operating mode:

Frequency: 470 MHz

Modulation: modulated carrier symbol 0/1 at 1500 bps



Spurious conducted emissions **§ 5.8**

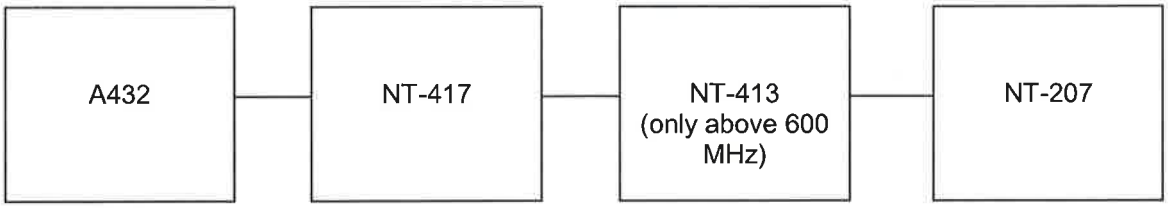
LIMIT

5.8:
For transmitters designed to operate with a 12,5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12,5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

With the given transmitter output Power of 468 mW this results in an absolute Limit of –20 dBm.

Test equipment used:



Results:

See following page.

Spurious conducted emissions **§ 5.8**

Operating mode: Transmit at 468mW

Modulation: unmodulated carrier

SPURIOUS EMISSION LEVEL (dBm)								
CH 1 (450 MHz)			CH 2 (460 MHz)			CH 3 (470 MHz)		
f (MHz)	Bandwidth (kHz)	Level (dBm)	f (MHz)	Bandwidth (kHz)	Level (dBm)	f (MHz)	Bandwidth (kHz)	Level (dBm)
All		< -40	All		< -40	All		< -40
Measurement uncertainty			± 2 dB					

Bandwidth (kHz); this refers to the bandwith of the measurement receiver

Field strength of spurious emissions of the transmitter § 5.8.3

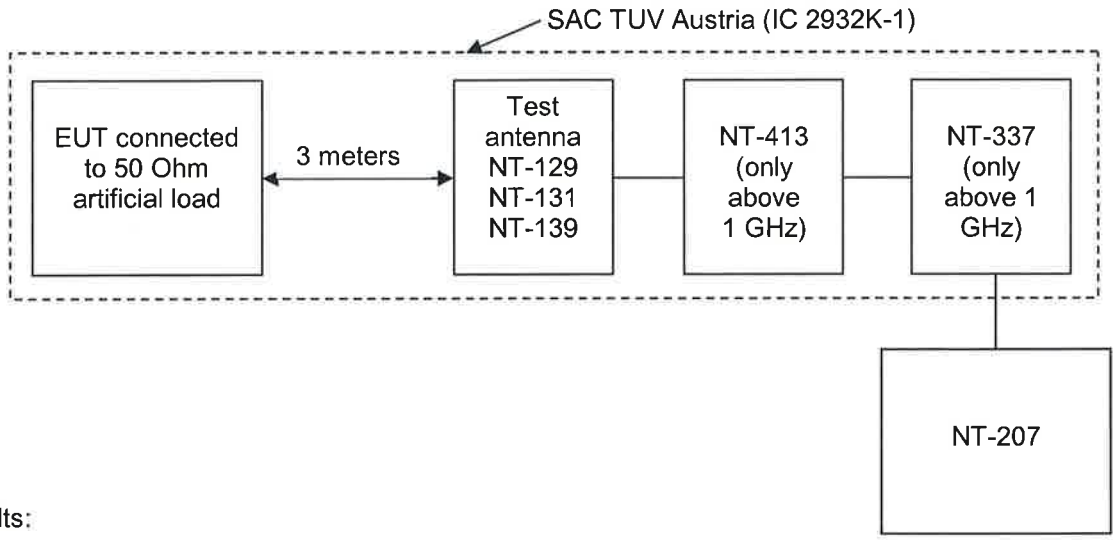
LIMIT

5.8.3:
For transmitters designed to operate with a 12,5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12,5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

With the given transmitter output Power of 468 mW this results in an absolute Limit of –20 dBm.

Test equipment used:



Results:

There were no other relevant emissions found except the harmonics in the spectrum from 30 MHz to the 10th harmonic.

CHANNEL					
450 MHz		460 MHz		470 MHz	
Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)
All	< -40	All	< -40	All	< -40

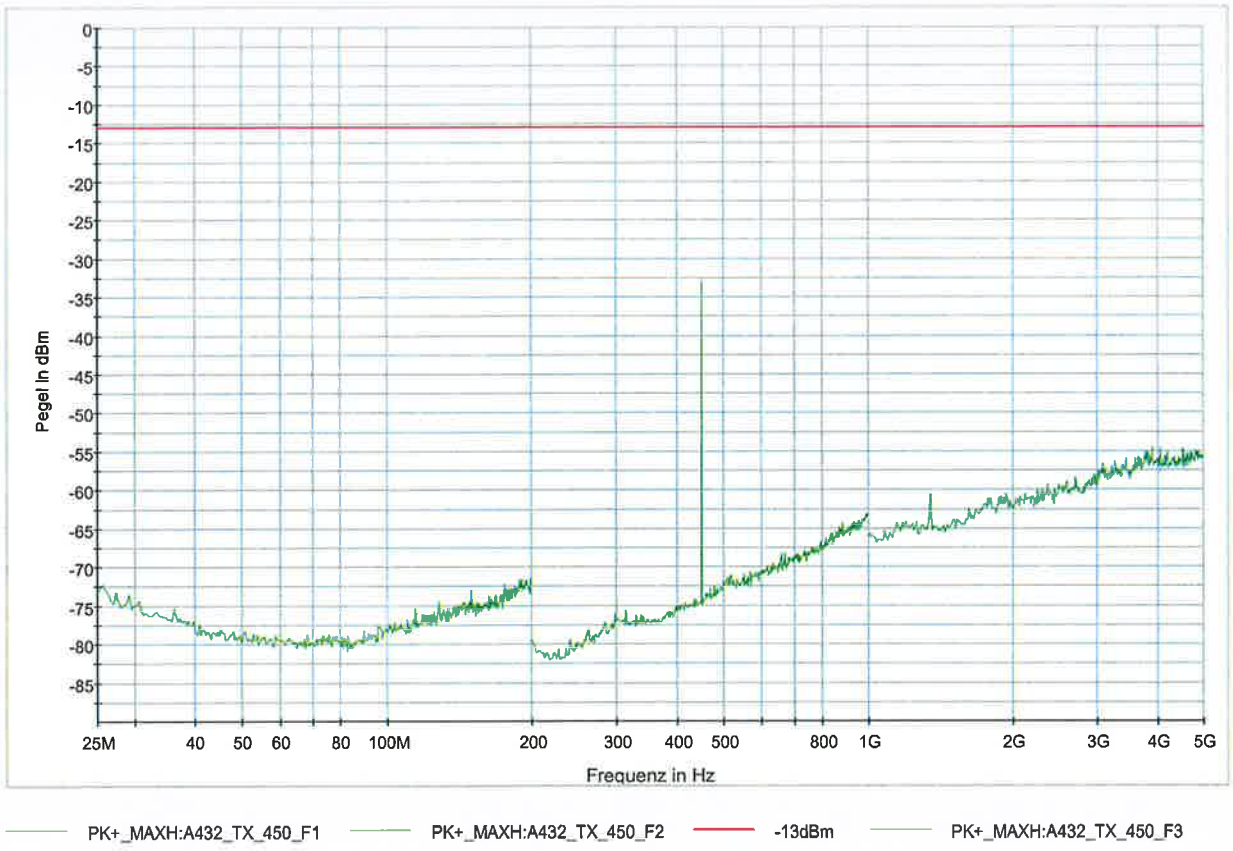
Ambient temperature: 21°C Relative humidity: 33%

Field strength of spurious emissions of the transmitter **§ 5.8.3**

Operating mode:

Frequency: 450 MHz

Modulation: unmodulated carrier



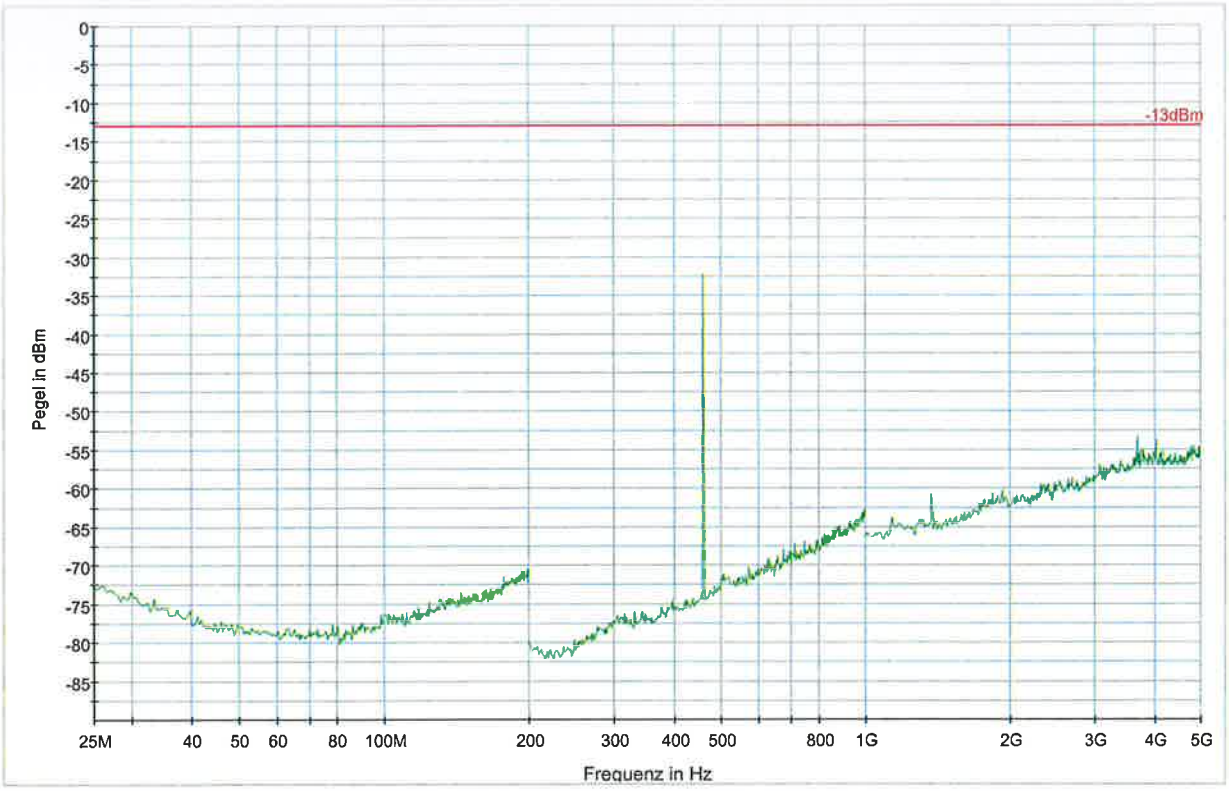
Ambient temperature: 21°C Relative humidity: 33%

Field strength of spurious emissions of the transmitter **§ 5.8.3**

Operating mode:

Frequency: 460 MHz

Modulation: unmodulated carrier

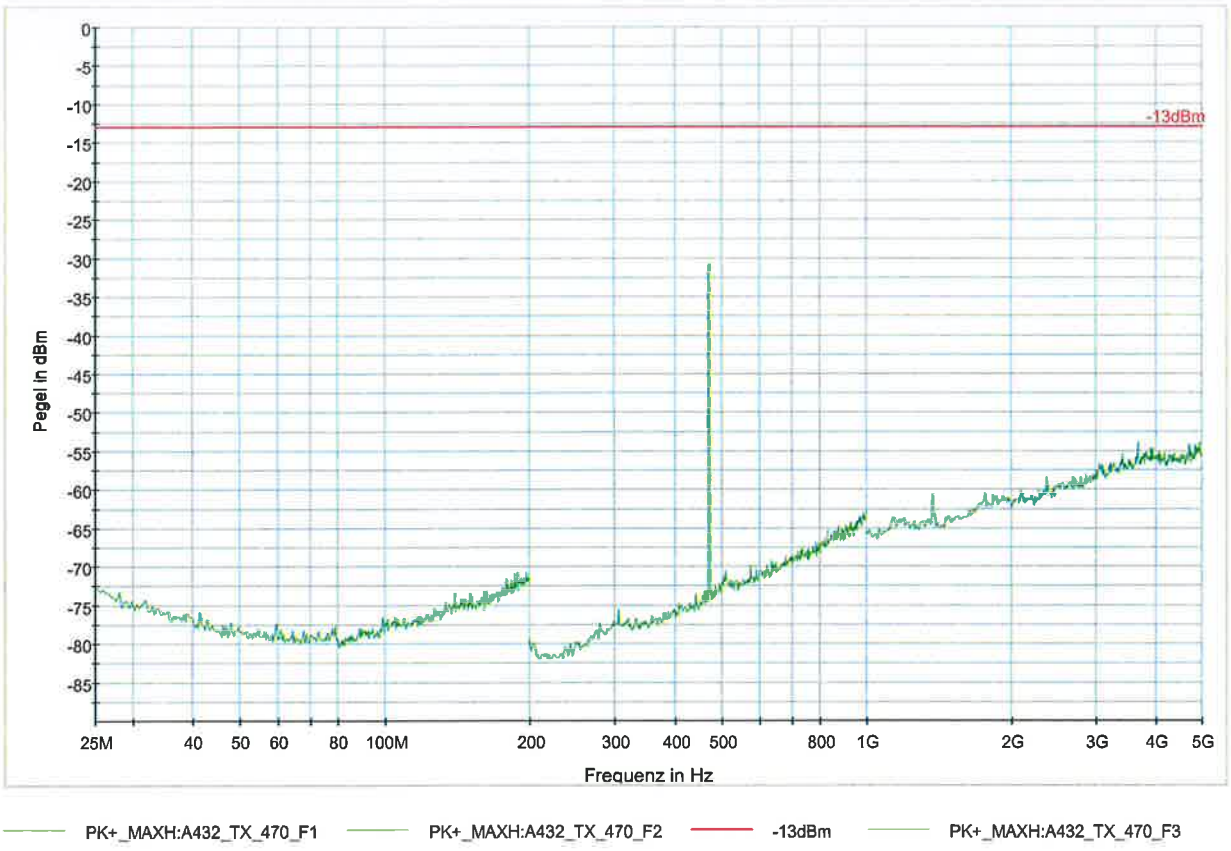


Field strength of spurious emissions of the transmitter **§ 5.8.3**

Operating mode:

Frequency: 470 MHz

Modulation: unmodulated carrier



Frequency stability § 5.3

Frequency error vs. Supply voltage

DC-Voltage	Frequency Error kHz			Frequency Error ppm		
	450 MHz	460 MHz	470 MHz	450 MHz	460 MHz	470 MHz
6,2 V	-0,042	-0,027	-0,020	-0,093	-0,059	-0,043
5,6 V	-0,048	-0,027	-0,004	-0,107	-0,059	-0,009
7,13 V	-0,042	-0,027	-0,020	-0,093	-0,059	-0,043
10 V	-0,042	-0,027	-0,020	-0,093	-0,059	-0,043

Frequency error vs. Temperature

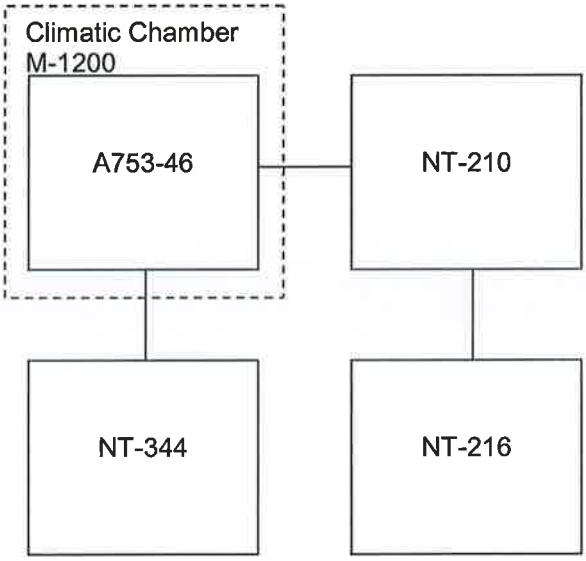
Temperature °C	Frequency Error kHz			Frequency Error ppm		
	450 MHz	460 MHz	470 MHz	450 MHz	460 MHz	470 MHz
-30	-0,350	-0,295	-0,270	-0,778	-0,641	-0,574
-20	-0,105	-0,180	-0,124	-0,233	-0,391	-0,264
-10	-0,024	-0,020	-0,024	-0,053	-0,043	-0,051
±0	-0,074	-0,057	-0,066	-0,164	-0,124	-0,140
+10	-0,145	-0,135	-0,153	-0,322	-0,293	-0,326
+20	-0,065	-0,032	-0,023	-0,144	-0,070	-0,049
+30	-0,023	-0,037	-0,025	-0,051	-0,080	-0,053
+40	-0,007	-0,010	-0,021	-0,016	-0,022	-0,045
+50	-0,091	-0,088	-0,052	-0,202	-0,191	-0,111

LIMIT **5.3 Table 1**

In the 450-470 MHz band, fixed and base stations with a 12,5 kHz channel bandwith must have a frequency stability of 1,5 ppm. In the 450-470 MHz band, mobile stations with a 12,5 kHz channel bandwith must have a frequency stability of 2,5 ppm.

Frequency stability § 5.3

Test equipment used:



Transient frequency behaviour **§ 5.9**

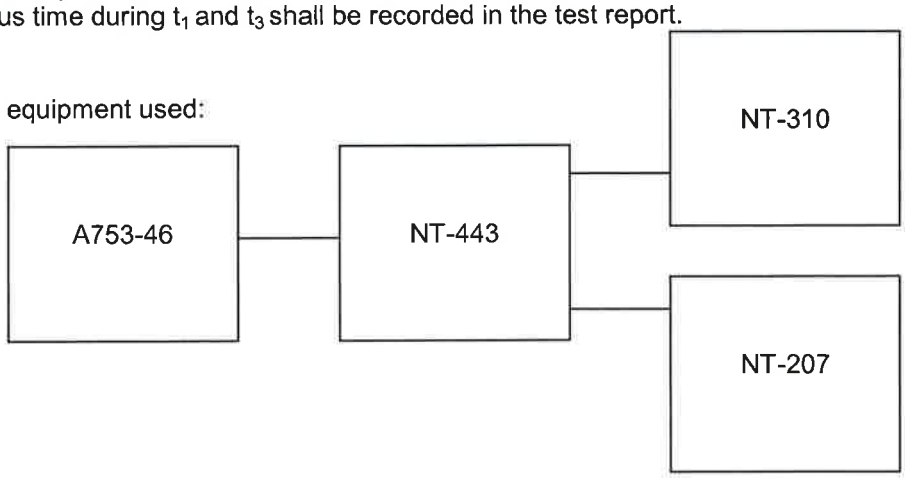
LIMIT

5.9:
Transmitters designed to operate in the 138-174 MHz and 406,1-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals [1,2]	Maximum frequency Difference [3]	All Equipment	
		138 to 174 MHz	406,1 to 512 MHz
Transient Freqeuncy Behaviour for Equipment designed to Operate on 25 kHz Channels			
t_1	± 25,0 kHz	5,0 ms	10,0 ms
t_2	± 12,5 kHz	20,0 ms	25,0 ms
t_3	± 25,0 kHz	5,0 ms	10,0 ms
Transient Freqeuncy Behaviour for Equipment designed to Operate on 12,5 kHz Channels			
t_1	± 12,5 kHz	5,0 ms	10,0 ms
t_2	± 6,25 kHz	20,0 ms	25,0 ms
t_3	± 12,5 kHz	5,0 ms	10,0 ms
Transient Freqeuncy Behaviour for Equipment designed to Operate on 6,25 kHz Channels			
t_1	± 6,25 kHz	5,0 ms	10,0 ms
t_2	± 3,125 kHz	20,0 ms	25,0 ms
t_3	± 6,25 kHz	5,0 ms	10,0 ms

[1] t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
t_1 is the time period immediately following t_{on}
t_2 is the time period immediately following t_1
t_3 is the time period from the instant when the transmitter is turned off until t_{off}
t_{off} is the instant when the 1 kHz test signal starts to rise.
[2] If the transmitter carrier output power rating is 6 W or less, the frequency difference during the time periods t_1 and t_3 may exceed the maximum frequency difference for these time periods. The corresponding plot of frequency versus time during t_1 and t_3 shall be recorded in the test report.

Test equipment used:

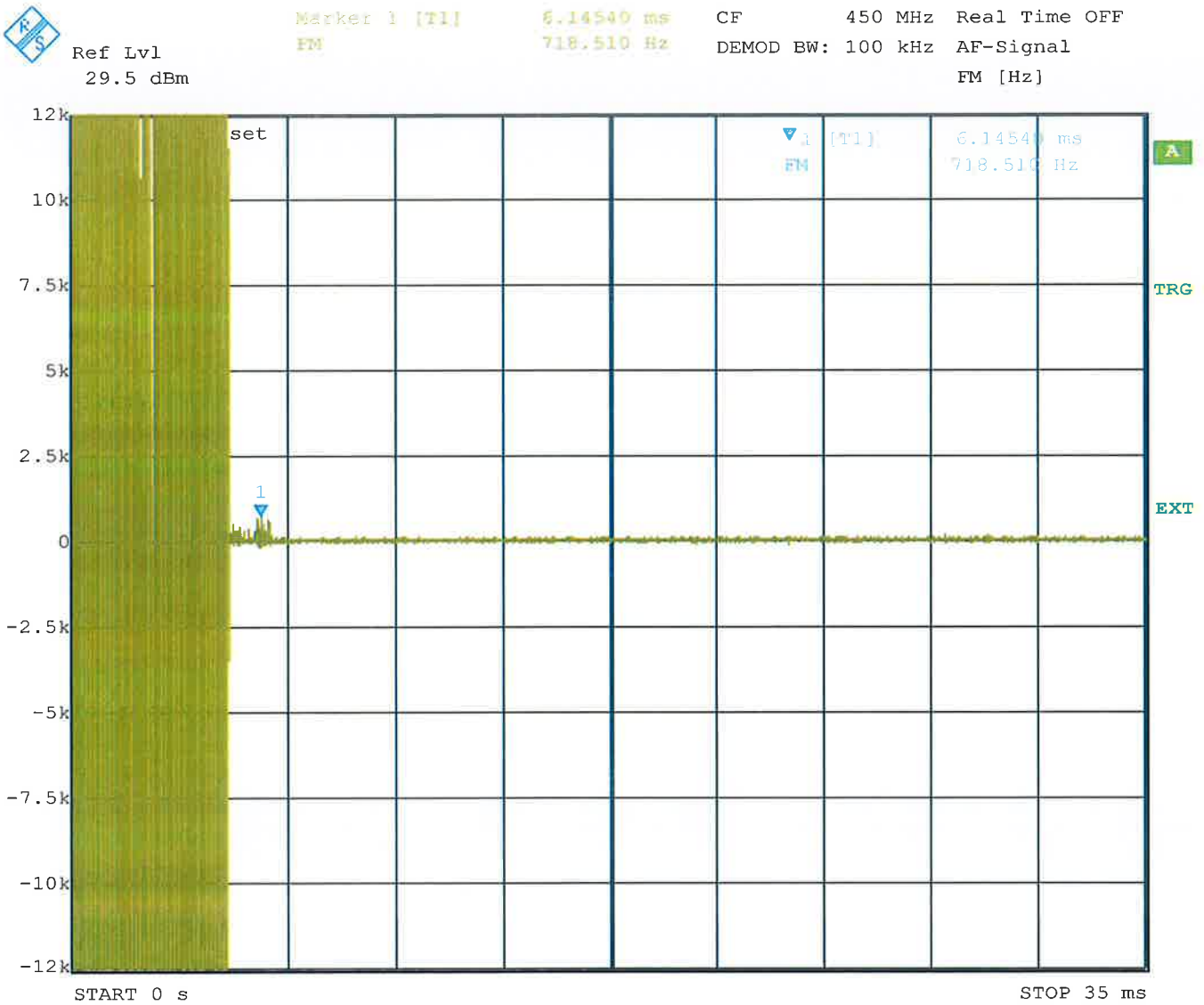


Transient frequency behaviour § 5.9

Operating mode: t_{on} is in the middle of the screen (25ms pre-trigger)

Frequency: 450 MHz

Transmitter switching on



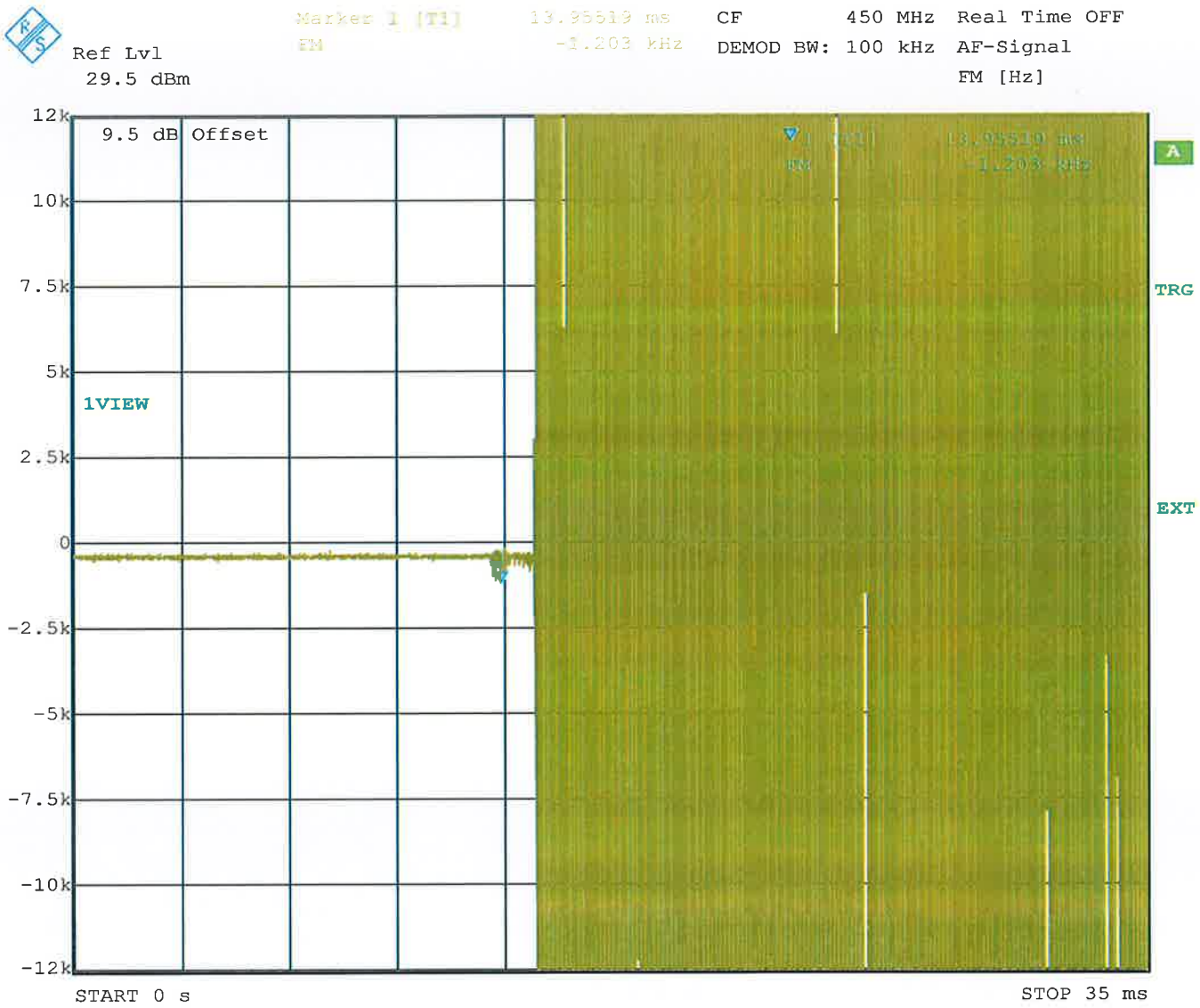
Date: 20.JUL.2015 16:01:02

Transient frequency behaviour § 5.9

Operating mode: t_{off} is in the middle of the screen (25ms pre-trigger)

Frequency: 450 MHz

Transmitter switching off



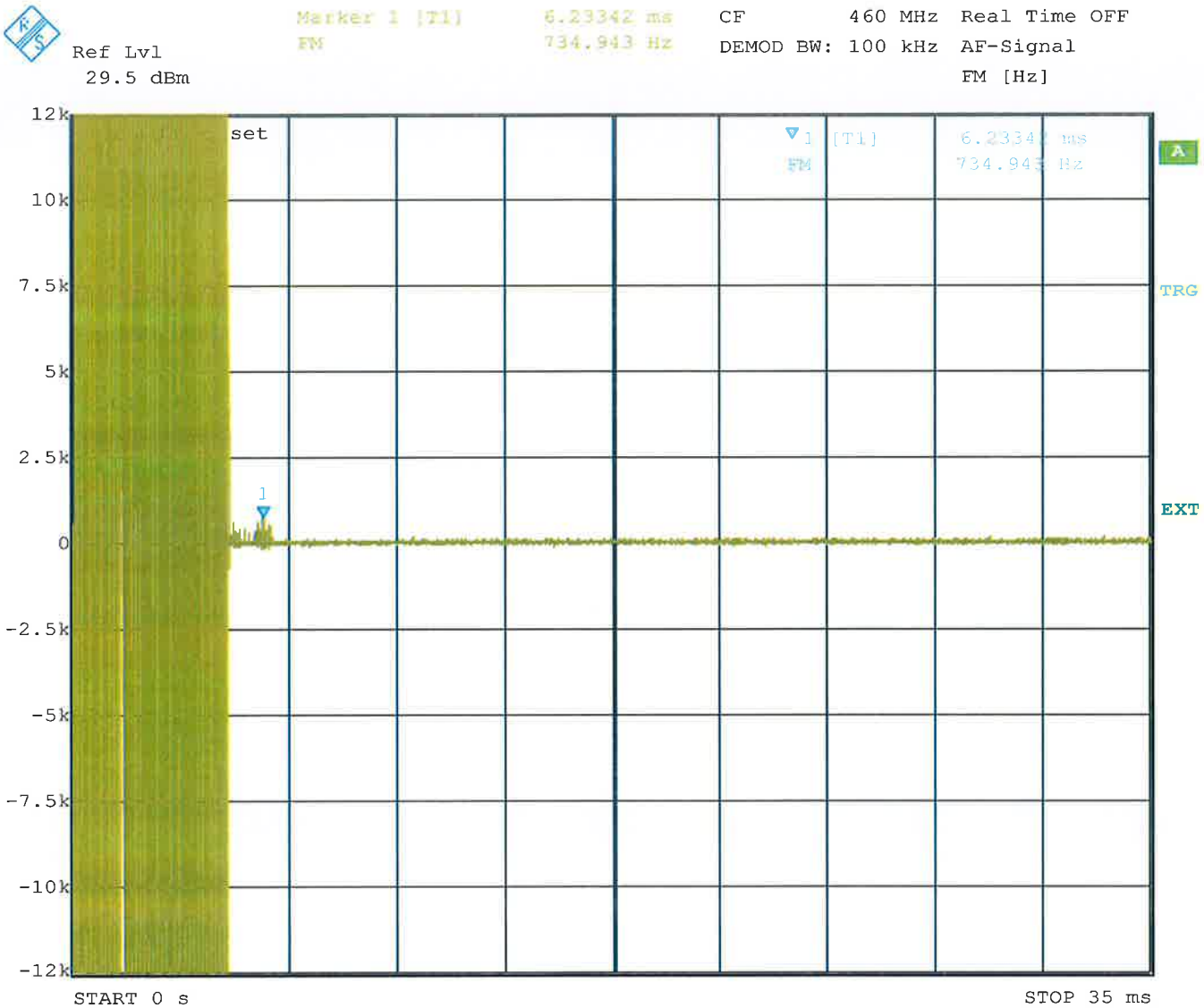
Date: 20.JUL.2015 16:00:13

Transient frequency behaviour § 5.9

Operating mode: t_{on} is in the middle of the screen (25ms pre-trigger)

Frequency: 460 MHz

Transmitter switching on



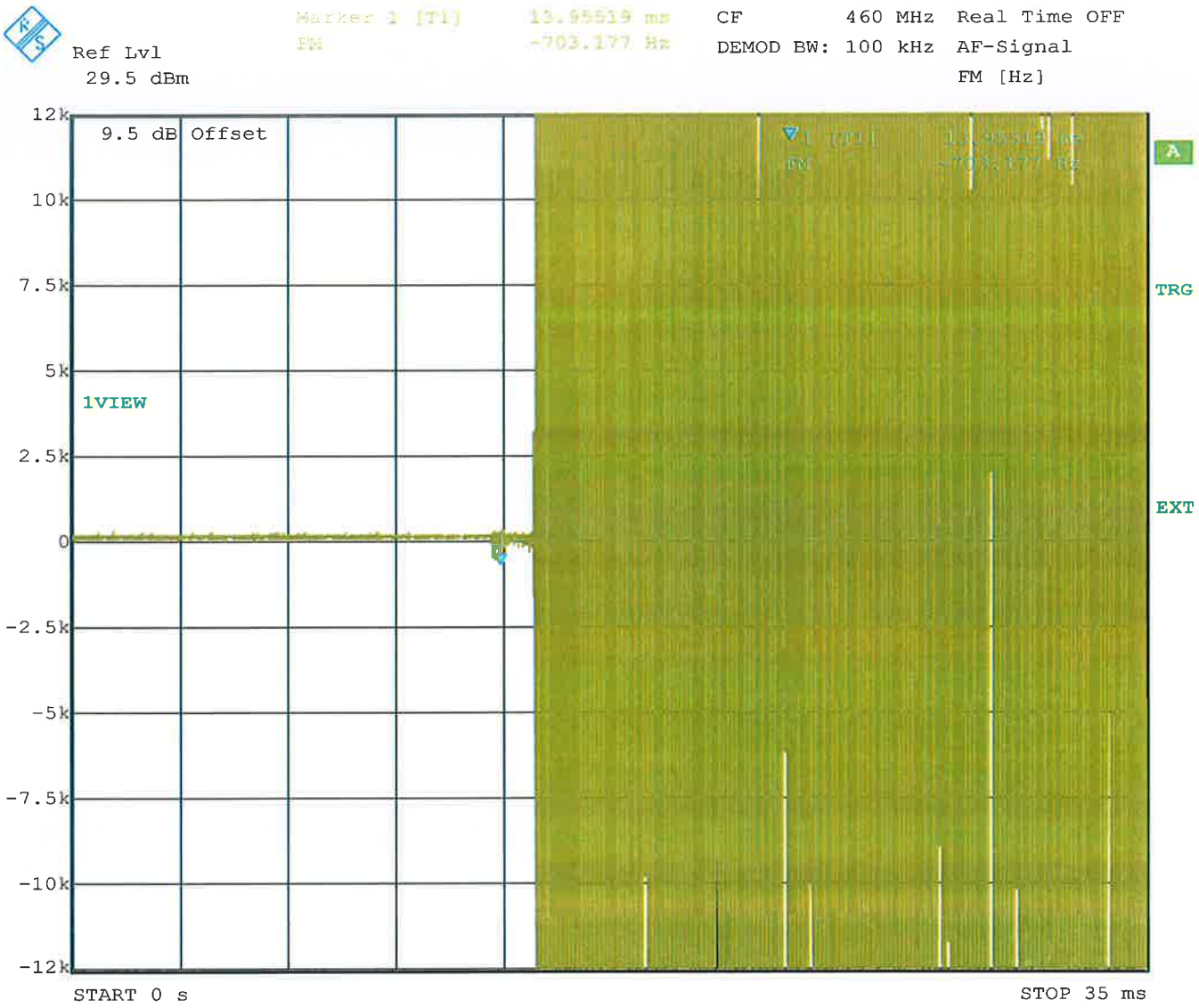
Date: 20.JUL.2015 16:02:06

Transient frequency behaviour § 5.9

Operating mode: t_{off} is in the middle of the screen (25ms pre-trigger)

Frequency: 460 MHz

Transmitter switching off

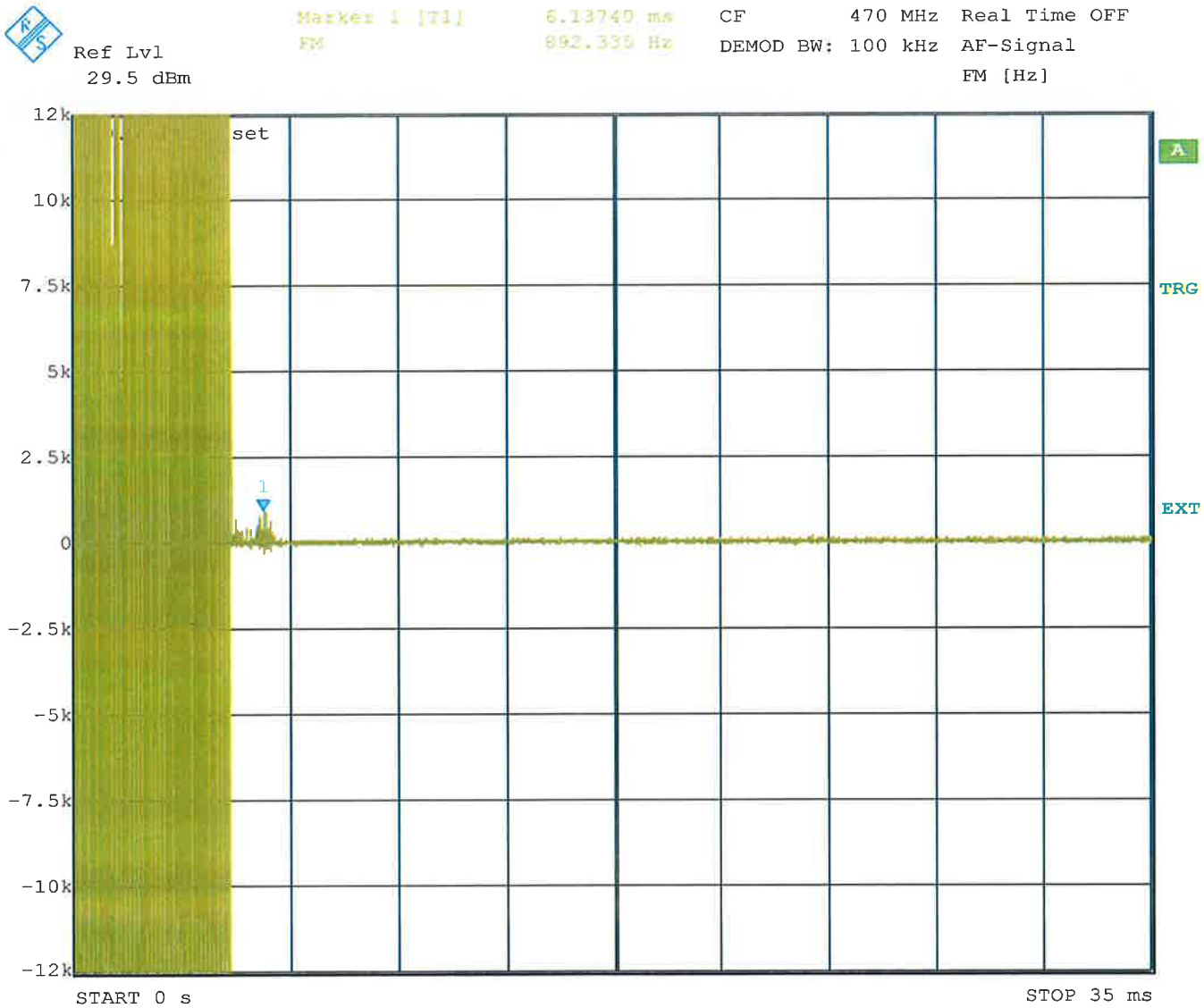


Transient frequency behaviour § 5.9

Operating mode: t_{on} is in the middle of the screen (25ms pre-trigger)

Frequency: 470 MHz

Transmitter switching on

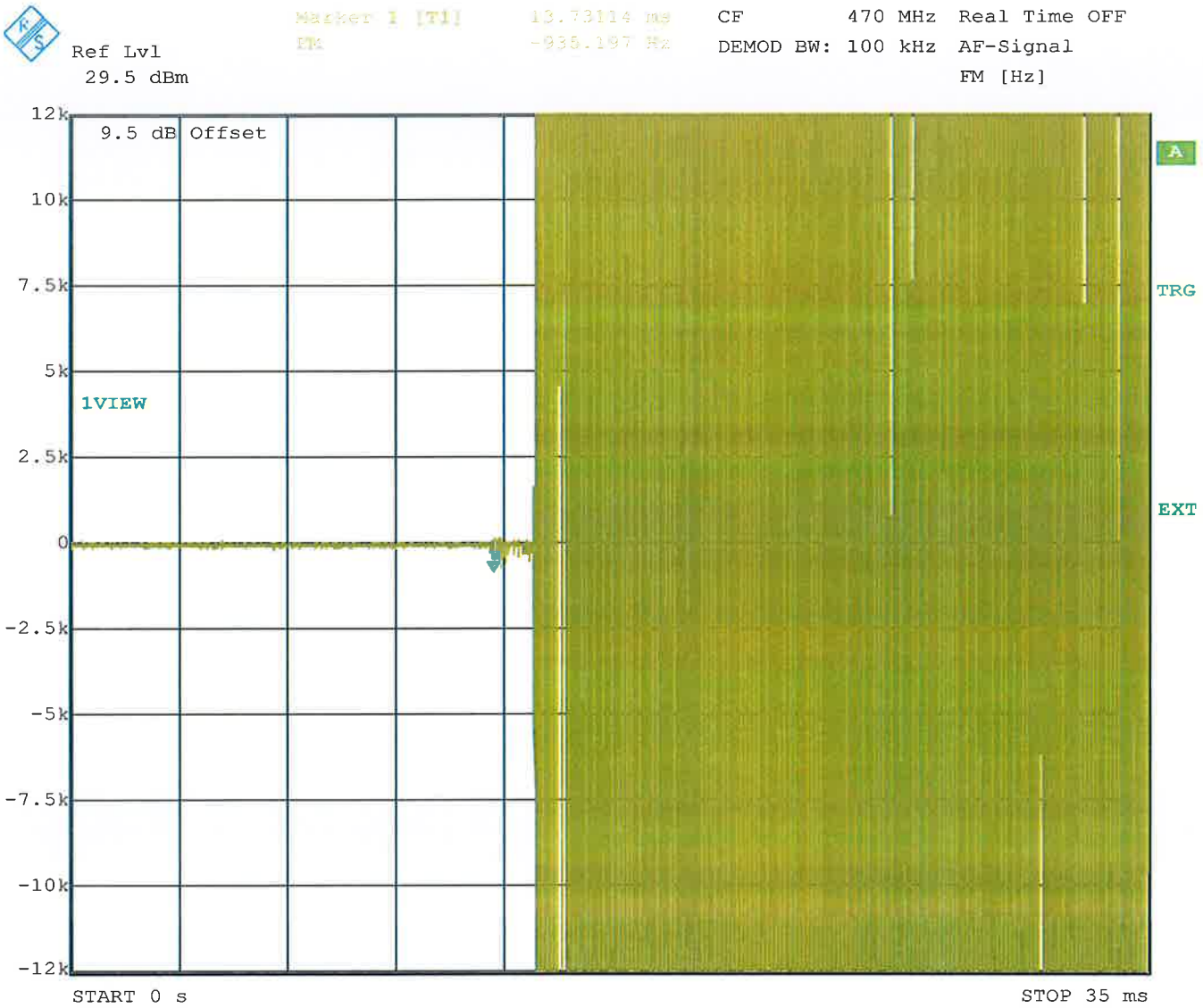


Transient frequency behaviour § 5.9

Operating mode: t_{off} is in the middle of the screen (25ms pre-trigger)

Frequency: 470 MHz

Transmitter switching off



Date: 20.JUL.2015 15:45:03

Receiver spurious emissions **§ 5.11**

LIMIT

The following receiver spurious emission limits shall be complied with:

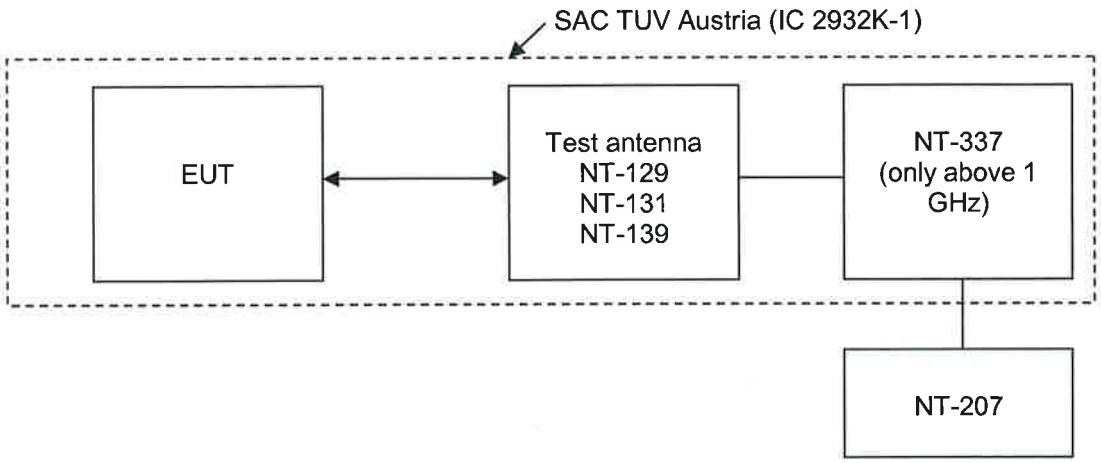
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious frequency (MHz)	Field strength (µV/m) at 3 metres
30-88 88-216 216-960 above 960	100 150 200 500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test equipment used:



CHANNEL					
450 MHz		460 MHz		470 MHz	
Frequency (MHz)	Level (dBµV/m)	Frequency (MHz)	Level (dBµV/m)	Frequency (MHz)	Level (dBµV/m)
≤ 1000	< 35 PK	≤ 1000	< 35 PK	≤ 1000	< 35 PK
> 1000	< 45 PK	> 1000	< 45 PK	> 1000	< 45 PK

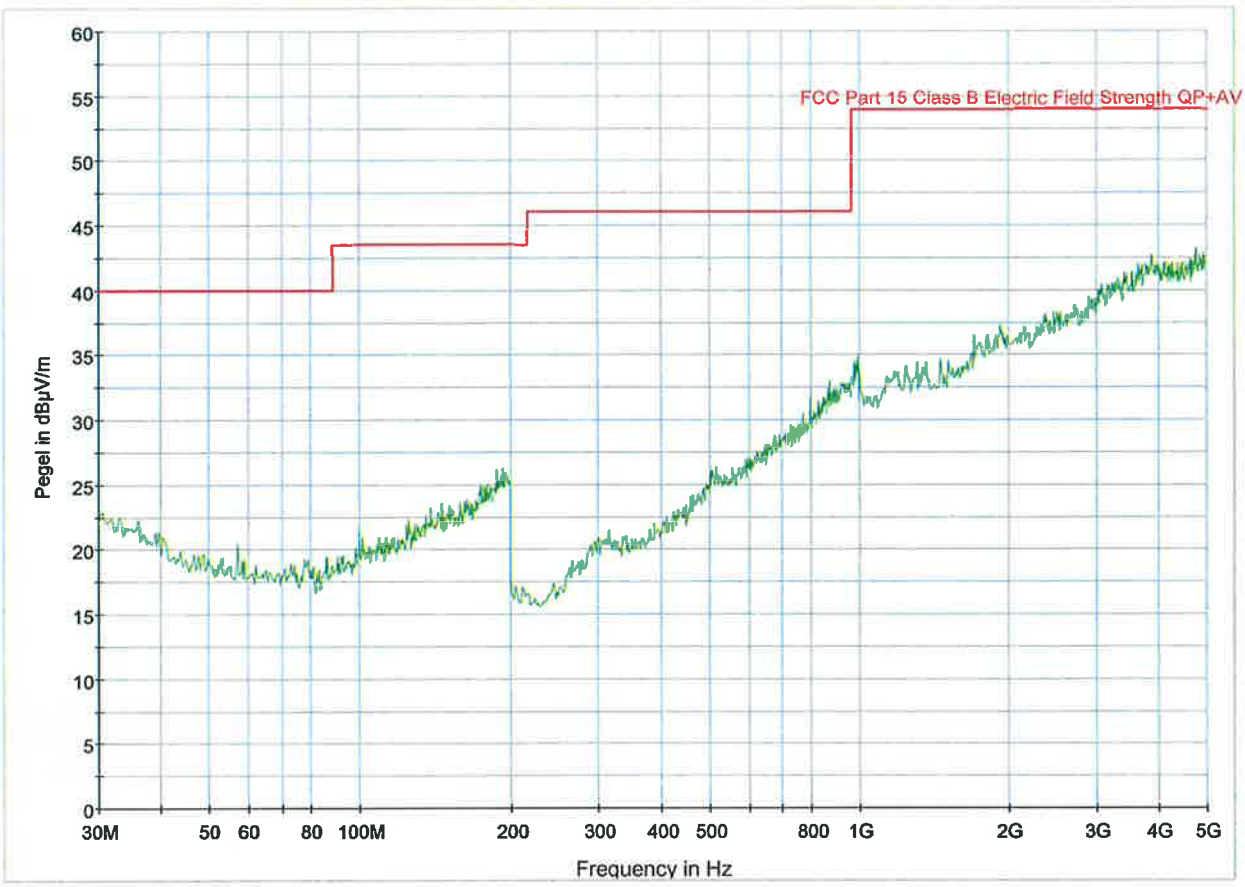
Receiver spurious emissions § 5.11

Operating mode:

Frequency: 450 MHz

Receiving

As peak values were all below Quasipeak / Average limits, no additional measurements were performed



Ambient temperature: 21°C Relative humidity: 33%

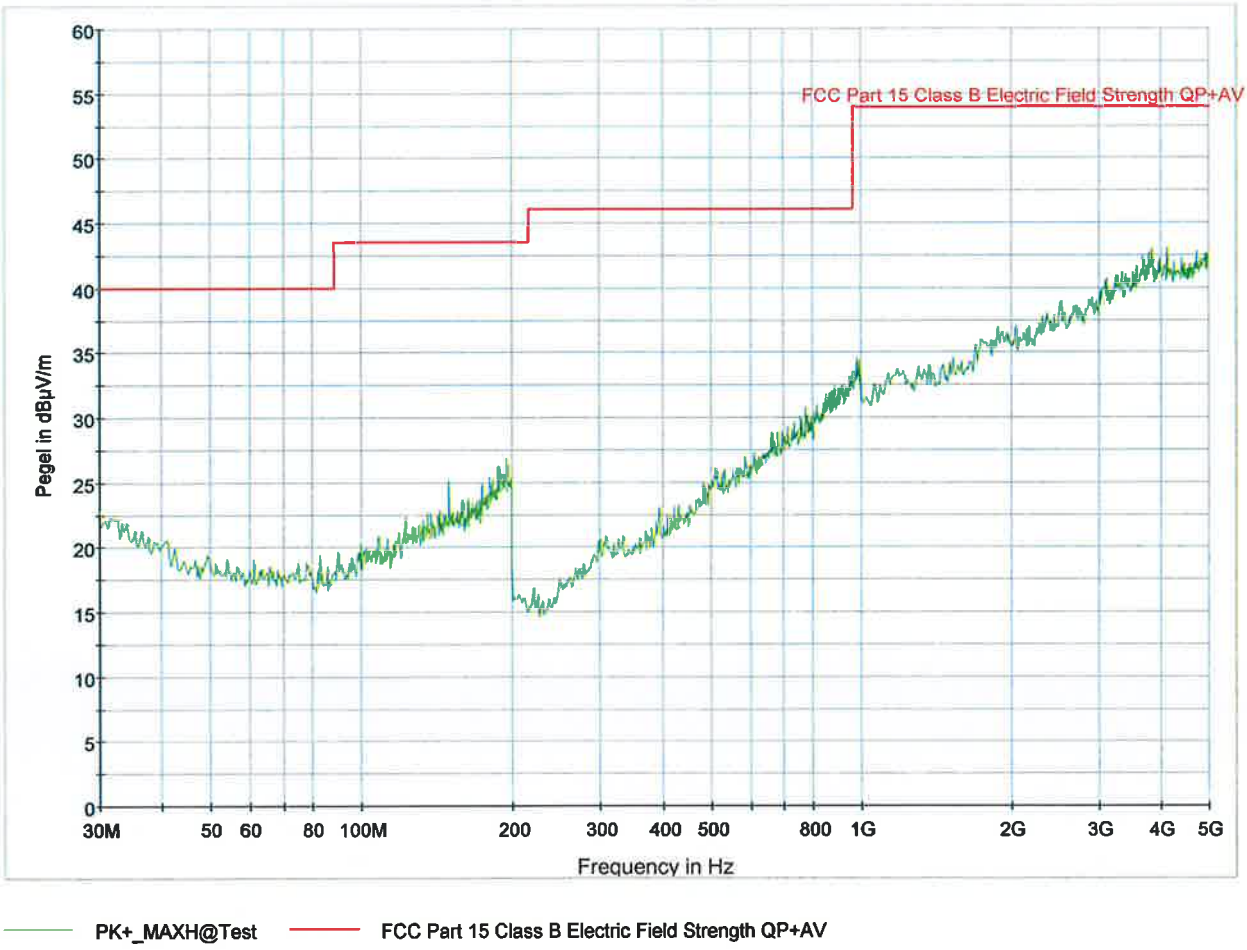
Receiver spurious emissions **§ 5.11**

Operating mode:

Frequency: 460 MHz

Receiving

As peak values were all below Quasipeak / Average limits, no additional measurements were performed



Ambient temperature: 21°C Relative humidity: 33%

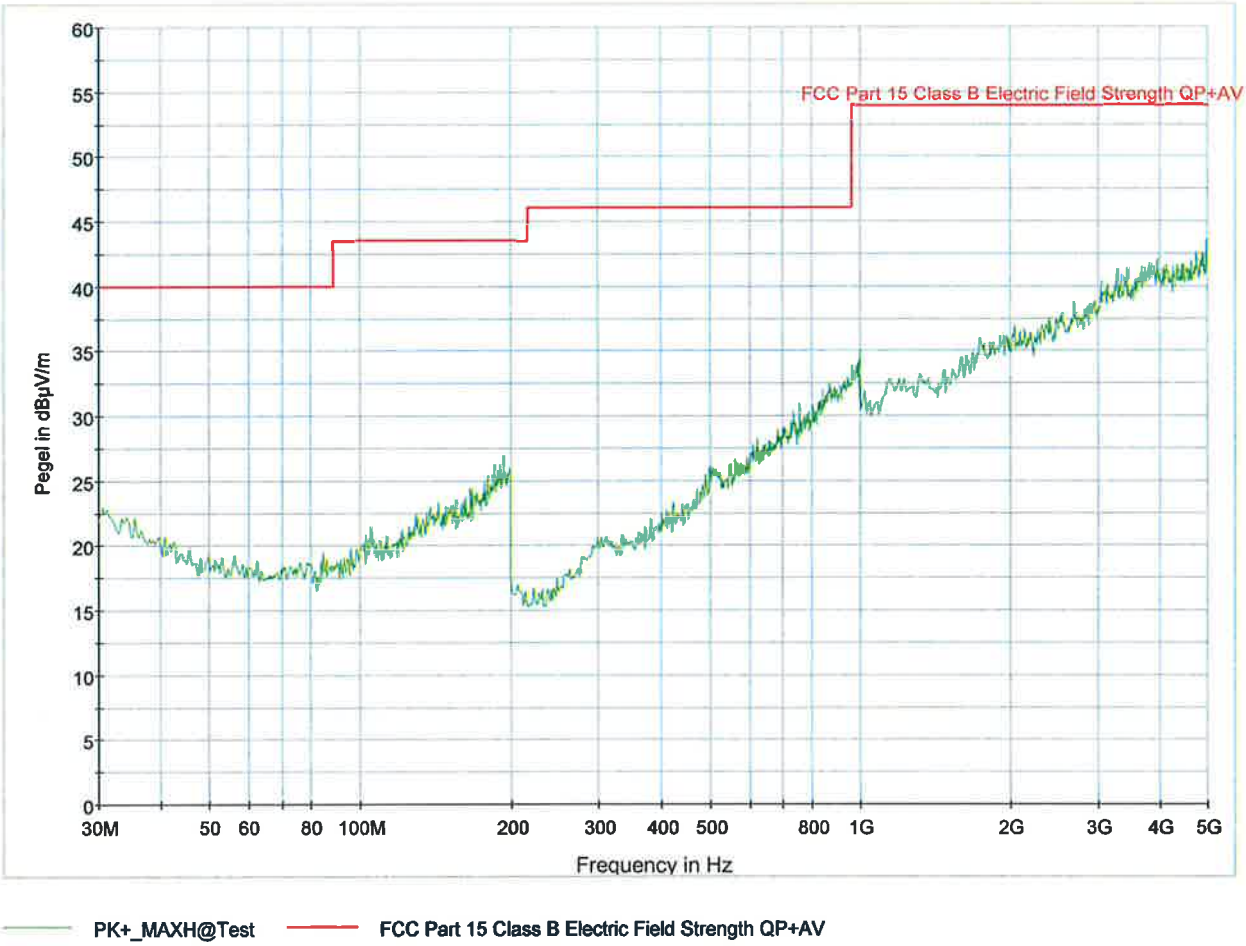
Receiver spurious emissions **§ 5.11**

Operating mode:

Frequency: 470 MHz

Receiving

As peak values were all below Quasipeak / Average limits, no additional measurements were performed



AC Power-Lines Conducted Emission **§ 7.2.4 of RSS-Gen**

LIMIT

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

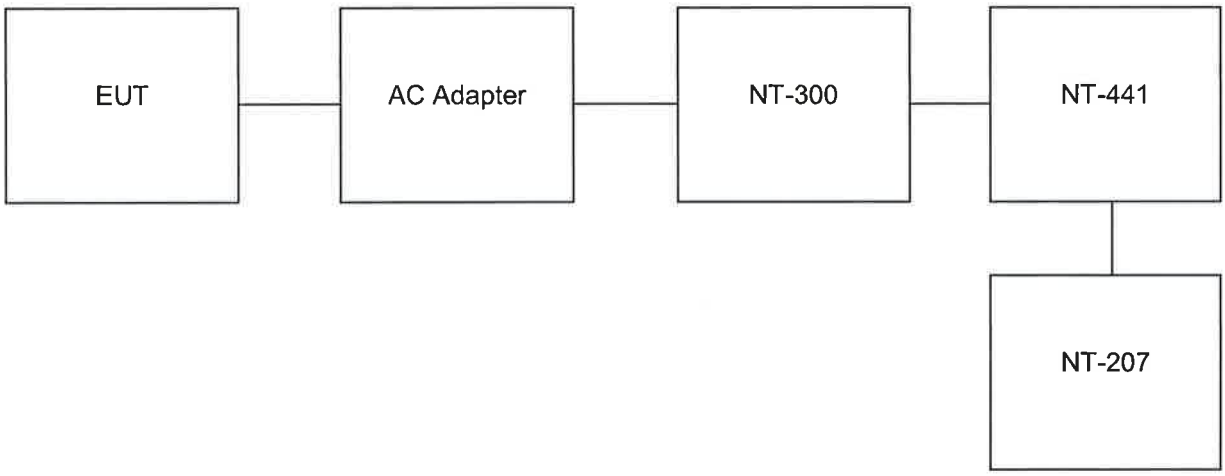
The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network.

Table 2 - AC Power Lines Conducted Emission Limits

Frequency range (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

*Decreases with the logarithm of the frequency.

Test Equipment used:



AC Power-Lines Conducted Emission § 7.2.4 of RSS-Gen

No AC Power connection.

Appendix 1
Test equipment used

☐	Anechoic Chamber with 3m measurement distance	NT-100
☐	Stripline according to ISO 11452-5	NT-108
☐	MA4000 - Antenna mast 1 - 4 m height	NT-110/1
☐	DS - Turntable 0 - 400 ° Azimuth	NT-111/1
☐	CO3000 Controller Mast+Turntable	NT-112/1
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121
☐	HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130
☐	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131
☐	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1
☐	Loop Antenna H-Field	NT-132
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133
☐	Horn Antenna 500 MHz - 6000 MHz	NT-133/1
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137
☐	Conical Dipol Antenna PCD8250	NT-138
☐	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139
☐	HZ-1 Antenna tripod	NT-150
☐	BN 1500 Antenna tripod	NT-151
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156
☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173
☐	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
☐	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☐	Digital Radio Tester CTS55	NT-208
☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	RubiSource T&M Timing reference	NT-216
☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	DSO9104 Digital scope	NT-220/1
☐	TPS 2014 Digital scope	NT-222
☐	Artificial Ear according to IEC 60318	NT-224
☐	1 kHz Sound calibrator	NT-225
☐	B10 - Harmonics and flicker analyzer	NT-232
☐	SRM-3000 Spectrumanalyzer	NT-233
☐	SRM-3006 Spectrumanalyzer	NT-233/1a
☐	E-field probe SRM 75 MHz – 3 GHz	NT-234
☐	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d
☐	Hall-Teslameter ETM-1	NT-241
☐	EFA-3 H-field- / E-field probe	NT-243
☐	EHP-50F H-field- / E-field probe	NT-243/1
☐	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	H-field probe 300 kHz – 30 MHz	NT-246

Division:
Industry & Energy

Department: FG

Test report number:
INE-AT/FG-17/170

Date: 10.10.2017

Checked by:

Appendix 1 (continued)
Test equipment used

☐	E-field probe 3 MHz – 18 GHz	NT-247
☐	H-field probe 27 MHz – 1 GHz	NT-248
☐	ELT-400 1 Hz – 400 kHz	NT-249
☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250
☐	FCC-203I EM Injection clamp	NT-251
☐	FCC-203I-DCN Ferrite decoupling network	NT-252
☐	PR50 Current Probe	NT-253
☐	i310s Current Probe	NT-254/1
☐	Fluke 87 V True RMS Multimeter	NT-260
☐	Model 2000 Digital Multimeter	NT-261
☐	Fluke 87 V Digital Multimeter	NT-262/1
☐	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300
☐	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a
☐	PHE 4500/B Power amplifier	NT-304
☐	EZ10 T-Artificial Network	NT-305
☐	SMG - Signal generator 0,1 - 1000 MHz	NT-310
☐	SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1
☐	RefRad Reference generator	NT-312
☐	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313
☐	40 MHz Arbitrary Generator TGA1241	NT-315
☐	Artificial mains network NSLK 8127-PLC	NT-316
☐	PEFT - Burst generator up to 4 kV	NT-320
☐	ESD 30 System up to 25 kV	NT-321
☐	PSURGE 4.1 Surge generator	NT-324
☐	IMU4000 Immunity test system	NT-325/1
☐	VCS 500-M6 Surge-Generator	NT-326
☐	Oscillatory Wave Simulator incl. Coupling networks	NT-328a+b+c
☐	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
☐	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
☐	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
☐	Preamplifier 1 GHz - 4 GHz	NT-335
☐	Preamplifier for GPS MKU 152 A	NT-336
☐	Preamplifier 100 MHz – 23 GHz	NT-337
☐	DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐	2-97201 Electronic load	NT-341
☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐	VDS 200 Mobil-impuls-generator	NT-350
☐	LD 200 Mobil-impuls-generator	NT-351
☐	MPG 200 Mobil-Impuls-Generators	NT-352
☐	EFT 200 Mobil-impuls-generator	NT-353
☐	AN 200 S1 Artificial Network	NT-354
☐	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐	PHE 4500 - Mains impedance network	NT-401
☐	IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐	IP 4 - Capacitive clamp (Burst)	NT-411
☐	Highpass-Filter 100 MHz – 3 GHz	NT-412
☐	Highpass-Filter 600 MHz – 4 GHz	NT-413
☐	Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐	Highpass-Filter 1800 MHz – 16 GHz	NT-415

Appendix 1 (continued)
Test equipment used

TÜV AUSTRIA

☐	Highpass-Filter 3500 MHz – 18 GHz	NT-416
☐	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417
☐	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418
☐	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419
☐	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421
☐	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423
☐	RF-Attenuator 30 dB	NT-424
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426
☐	RF-Attenuator 6 dB	NT-428
☐	RF-Attenuator 0 dB - 81 dB	NT-429
☐	WRU 27 - Band blocking 27 MHz	NT-430
☐	WHJ450C9 AA - High pass 450 MHz	NT-431
☐	WHJ250C9 AA - High pass 250 MHz	NT-432
☐	RF-Load 150 W	NT-433
☐	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-436
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-437
☐	RF-Attenuator DC – 18 GHz 10 dB	NT-438
☐	RF-Attenuator DC – 18 GHz 20 dB	NT-439
☐	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440
☐	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441
☐	Power Divider 6 dB/1 W/50 Ohm	NT-443
☐	Directional coupler 0,1 MHz – 70 MHz	NT-444
☐	Directional coupler 0,1 MHz – 70 MHz	NT-445
☐	Tube imitations according to EN 55015	NT-450
☐	FCC-801-M3-16A Coupling decoupling network	NT-458
☐	FCC-801-M2-50A Coupling decoupling network	NT-459
☐	FCC-801-M5-25 Coupling decoupling network	NT-460
☐	FCC-801-AF10 Coupling decoupling network	NT-461
☐	FCC-801-S25 Coupling decoupling network	NT-462
☐	FCC-801-T4 Coupling decoupling network	NT-463
☐	FCC-801-C1 Coupling decoupling network	NT-464
☐	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
☐	95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐	GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐	Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐	Van der Hoofden Test Head	NT-484
☐	PC P4 3 GHz Test computer	NT-500
☐	PC P4 1700 MHz Notebook	NT-505
☐	Monitoring camera with Monitor	NT-511
☐	ES-K1 Version 1.71 SP2 Test software	NT-520
☐	EMC32 Version 10.28.00 Test software	NT-520/1
☐	SRM-TS Version 1.3 software for SRM-3000	NT-522
☐	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
☐	Spitzenberger und Spies Test software V4.1	NT-525
☐	Noise power test apparatus according to EN 55014	NT-530
☐	Vertical coupling plane (ESD)	NT-531
☐	Test cable #4 for EN 61000-4-6	NT-553
☐	Test cable #3 for conducted emission	NT-554
☐	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐	Test cable #8 Sucoflex 104EA	NT-559
☐	Test cable #9 (for outdoor measurements)	NT-580
☐	Test cable #10 (for outdoor measurements)	NT-581
☐	Test cable #13 Sucoflex 104PE	NT-584
☐	Test cable #21 for SRM-3000	NT-592
☐	Shield chamber	NT-600
☐	Climatic chamber	M-1200

Appendix 1 (continued)
Test equipment used

☐	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100
☐	Turntabel 6 m diameter	EMV-101
☐	Antenna mast 1 – 4 m	EMV-102
☐	Mast and Turntable controller FC-06	EMV-103
☐	EMC Video/Audiosystem	EMV-104
☐	EMC Software EMC32 Version 10.28.00	EMV-105
☐	Hornantenna 1 – 18 GHz HF 907	EMV-110
☐	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111
☐	Trilog Antenna 30-3000 MHz VULB9163	EMV-112
☐	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113
☐	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114
☐	DC Artificial Network PVDC 8300	EMV-150
☐	AC Artificial Network NNLK 8121 RC	EMV-151
☐	EMI Receiver ESR26	EMV-200
☐	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201
☐	GPS Frequency normal B-88	EMV-202
☐	DC Power supply N5745A	EMV-203
☐	Spektrum Analyzator FSV40	EMV-205
☐	Thd Multimeter Model 2015	EMV-206
☐	Poweramplifier PAS15000	EMV-207/abc
☐	Inrush Current Source	EMV-208/abc
☐	Arb.-generator Sycore	EMV-209
☐	Harmonics/Flicker analyzer ARS 16/3	EMV-210
☐	HF- Ampflifier 9 kHz-250 MHz BBA150	EMV-300
☐	HF- Amplifier 80 -1000 MHz BBA150	EMV-301
☐	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302
☐	High Power Ant. 20-200 MHz VHBD 9134	EMV-303
☐	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304
☐	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
☐	HF- Ampflifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306
☐	Load Dump Generator LD 200N	EMV-350
☐	Ultra Compact Symulator UCS 200N100	EMV-351
☐	Automotive Power fail module PFM 200N100.1	EMV-352
☐	Voltage Drop Symulator VDS 200Q100	EMV-353
☐	Arb. Generator AutoWave	EMV-354
☐	Ultra Compact Symulator UCS 500N7	EMV-355
☐	Coupling decoupling network CNI 503B7 / 32 A	EMV-356
☐	Coupling decoupling network CNI 503B7 / 63 A	EMV-357
☐	Telecom Surge Generator TSurge 7	EMV-358
☐	Coupling decoupling network CNI 508N2	EMV-359
☐	Coupling decoupling network CNV 504N2.2	EMV-360
☐	Immunity generator NSG4060/NSG4060-1	EMV-361
☐	Coupling network CDND M316-2	EMV-362
☐	Coupling network CT419-5	EMV-363
☐	ESD Generator NSG 437	EMV-364
☐	Pulse Limiter VTSD 9561-F BNC	EMV-405
☐	Transient emission BSM200N40+BS200N100	EMV-450+451
☐	Cap. Coupling Clamp HFK	EMV-455
☐	Mag. Field System MS100N+MC26100+MC2630	EMV-456-458
☐	Coupling network CDN M2-100A	EMV-459
☐	Coupling network CDN M3-32A	EMV-460
☐	Coupling network CDN M5-100A	EMV-461
☐	Current Clamp CIP 9136A	EMV-462
☐	DC Artificial Network HV-AN 150	EMV-464+465
☐	Coupling Clamp EM 101	EMV-466
☐	Decoupling Clamp FTC 101	EMV-467
☐	Power attenuator 10 dB / 250 Watt	EMV-469/2

Appendix 2
Photodocumentation

Description: Top view

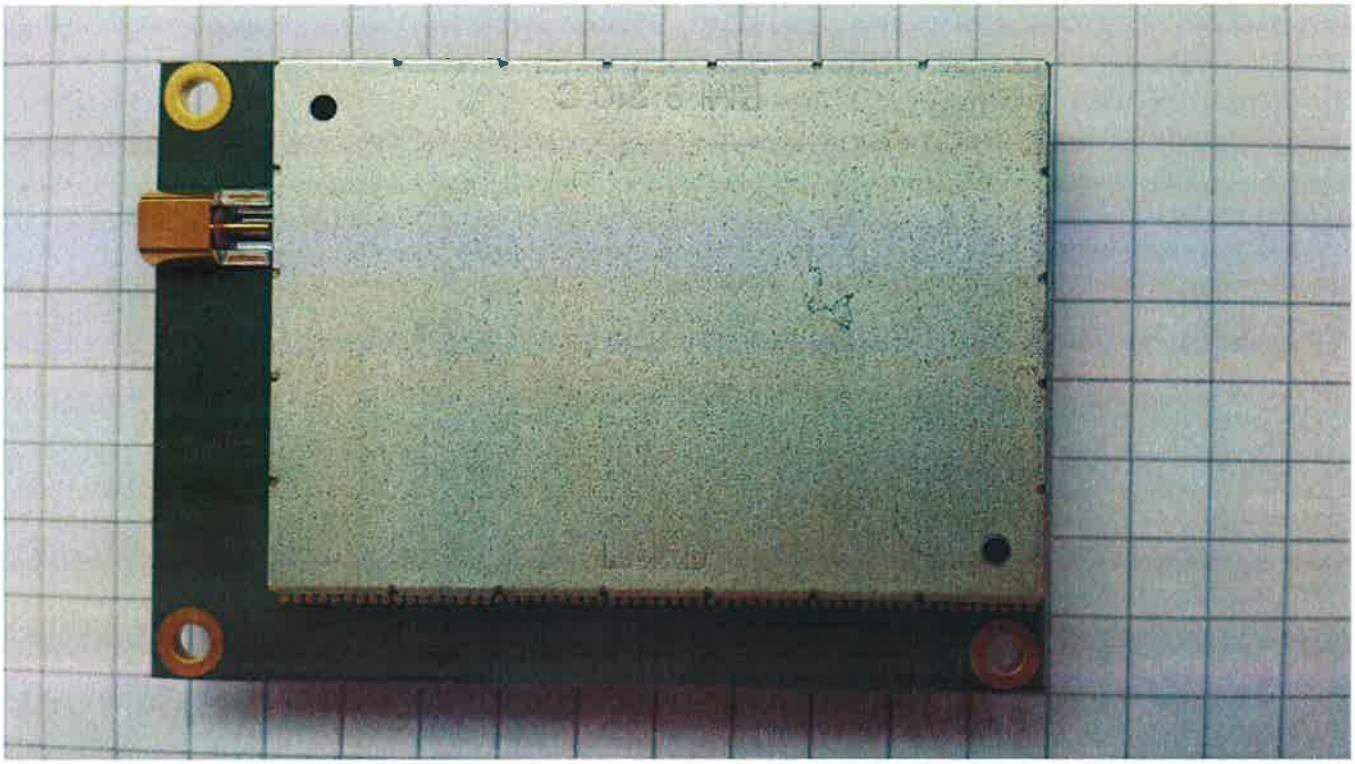
Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/170

Date: 10.10.2017

checked by: M



Appendix 2
Photodocumentation

Description: Bottom view

Appendix 2
Photodocumentation

Description: Shielding detached

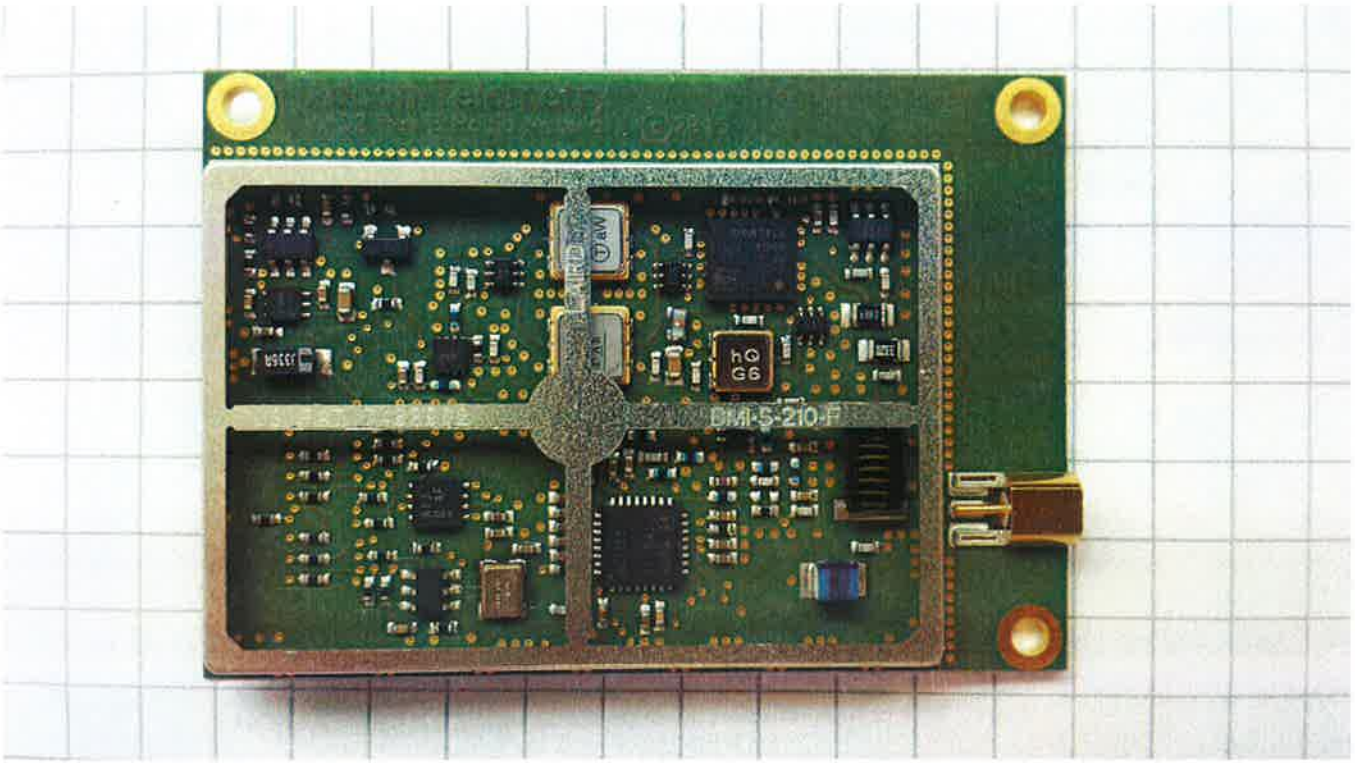
Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/170

Date: 10.10.2017

checked by:



Appendix 2
Photodocumentation

Description: Module inside a A753S5UHF

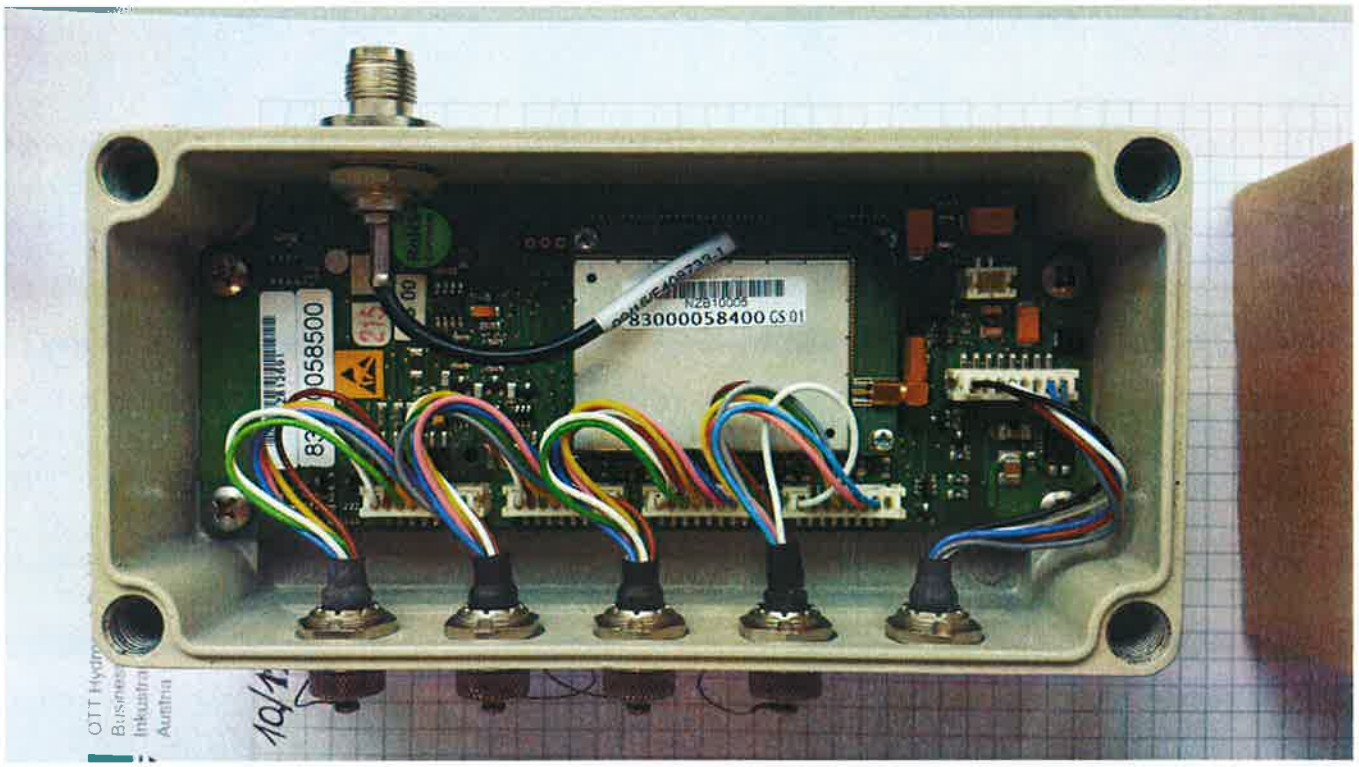
Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/170

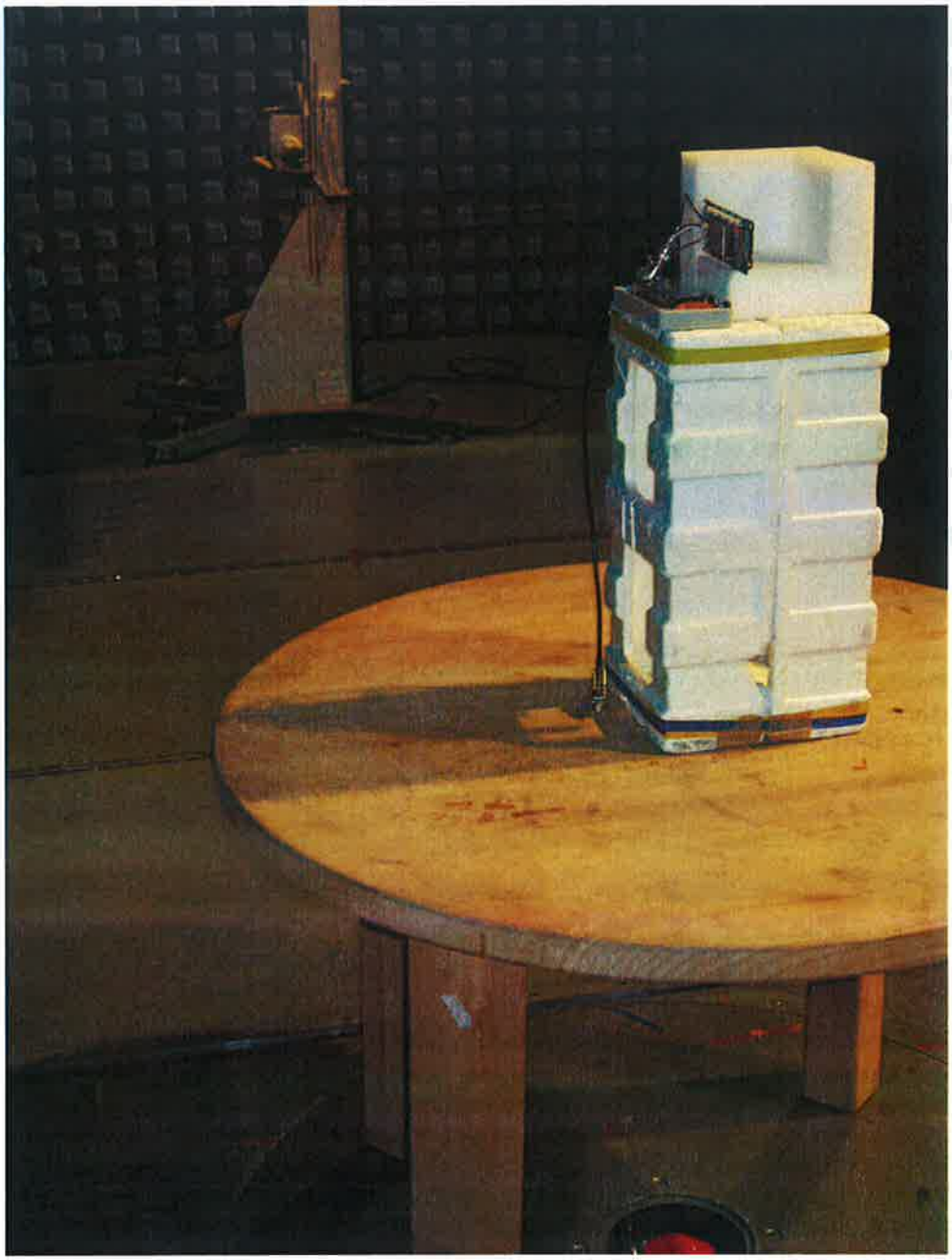
Date: 10.10.2017

checked by:



Appendix 2
Photodocumentation

Description: Test setup



Appendix 2
Photodocumentation

Description: Test setup detail