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RACOM
RADIO DATA NETWORKS

TEST REPORT

Racom_11102_TR_FCC version: B

Test of RipEX-400 Radio modem

The tests have been carried out with reference to 47CFR Parts 2 and 90

Measured by: Radek Holý

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1. Technical Summary And Test Results

1.1 Technical Summary

Applicant:	**Racom s r.o.** **Mírová 1283** **592 31 Nové Město na Moravě**
Manufacturer:	**Racom s.r.o.** **Mírová 1283** **592 31 Nové Město na Moravě** **Czech Republic**
Produced By:	**Racom s.r.o., Czech Republic**
Kind Of Equipment:	**Radio modem**
Type Designation(s):	**RipEX-400**
Code(s):	**RipEX-400**
RF Power:	**4-CPFSK 0.1 W to 10 W** **16-DEQAM 0.5W to 2W** **D8PSK 0.5W to 2W** **pi/4-DQPSK 0.5W to 2W**
Alignment Range:	**400 MHz to 432 MHz**
Switching Range:	**32 MHz**
Number Of Units:	**1**
Finish Of Test**:**	**15.5.2012** **Racom s r.o.** **Mírová 1283** **592 31 Nové Město na Moravě**

1.2 Test Results 400.0125 MHz

Type Designation:	**RipEX-400**
Code:	**RipEX-400**
Serial No.:	**10734106**
Channel Separation:	**6.25 kHz, 12.5 kHz**
FW version	**1.1.6.0**
Transmitter Part:	
CH 1	**400.0125 MHz**
Receiver Part:	
CH 1	**400.0125 MHz**
Power Supply Range:	**Vnom = 20.0 V DC**
	Vmin = 10.0 V DC
	Vmax = 30.0 V DC
Temperature Range:	**Tnom = Ambient temperature**
	Tmin = -25 ℃
	Tmax = +60 ℃

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.2.1. **RF POWER OUTPUT AT TERMINALS (10.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	7.80	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.2.2. **RF POWER OUTPUT AT TERMINALS (2.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.90	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.2.3. **FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
-30	0.50	- -	- -
-20	0.30	- -	- -
-10	0.10	- -	- -
0	0.05	- -	- -
10	-0.10	- -	- -
20	-0.10	- -	- -
30	-0.15	- -	- -
40	0.00	- -	- -
50	-0.05	- -	- -
60	0.00	- -	- -
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50

220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.2.4. **FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
10.0V	0.2	- -	- -
15.0V	0.2	- -	- -
20.0V	0.2	- -	- -
25.0V	0.2	- -	- -
30.0V	0.2	- -	- -
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50
220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5

854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.2.5. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

Limit$_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.1)= 45 dBc Where P = RF output power in watts

Limit $_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 40 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.2.6. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(10)= 65 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(10)= 60 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.2.7. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (2.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(2.0)= 58 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(2.0)= 53 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM, 41.67kbps; Random bit sequence

1.2.8. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.5 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.5)= 52 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.5)= 47 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.2.9. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty								

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.2.10. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
800.030	100	-40.3	- -	- -	- -	- -	- -	- -
For all other frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty								

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED:- -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.2.13. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 1, GRAPH 2)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.2.14. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 3,GRAPH 4)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.2.15. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 5, GRAPH 6)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.2.16. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 7, GRAPH 8)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement at maximum power level

1.2.17. **TRANSMITTER OCCUPIED BANDWIDTH**

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	10K0D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	34.72 kbit/s
Measured Peak Deviation	1.96 kHz	4.10 kHz	---	---	---	---
Measured 99% Occupied BW	4.35 kHz	8.85 kHz	5.05 kHz	5.00 kHz	4.91 kHz	10.1 kHz

Channel Spacing	12.5 kHz	12.5 kHz				
Emission Type	10K0G1DEN	10K0G1DDN				
Modulation	D8PSK	pi/4-DQPSK				
Data Rate	26.04 kbit/s	17.36 kbit/s				
Measured Peak Deviation	---	---				
Measured 99% Occupied BW	9.99 kHz	9.94 kHz				

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.2.18. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 9)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}$ ($f_d/5$)	$5 < f_o < 10$
	$29*\log_{10}$ ($f_d^2/11$) or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}$ (P)	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.2.19. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 10)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.2.20. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 6.25kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 11)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68 kbps; Random bit sequence

1.2.21. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 6.25kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 12)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.2.22. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 13)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.2.23. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 14)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.2.24. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 15)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}$ ($f_d/5$)	$5 < f_o < 10$
	$29*\log_{10}$ ($f_d^2/11$) or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}$ (P)	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.2.25. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 16)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.3 Test Results 406.1250 MHz

Type Designation:	**RipEX-400**
Code:	**RipEX-400**
Serial No.:	**10734106**
Channel Separation:	**6.25 kHz, 12.5 kHz**
FW version	**1.1.6.0**
Transmitter Part:	
CH 1	**406.125 MHz**
Receiver Part:	
CH 1	**406.125 MHz**
Power Supply Range:	**Vnom = 20.0 V DC**
	Vmin = 10.0 V DC
	Vmax = 30.0 V DC
Temperature Range:	**Tnom = Ambient temperature**
	Tmin = -25 ℃
	Tmax = +60 ℃

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.3.1. **RF POWER OUTPUT AT TERMINALS (10.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	8.00	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.3.2. **RF POWER OUTPUT AT TERMINALS (2.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.90	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.3.3. **FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
-30	0.50	- -	- -
-20	0.35	- -	- -
-10	0.10	- -	- -
0	0.10	- -	- -
10	-0.10	- -	- -
20	-0.10	- -	- -
30	-0.10	- -	- -
40	0.00	- -	- -
50	0.05	- -	- -
60	0.00	- -	- -
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50

220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.3.4. **FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
10.0V	0.2	- -	- -
15.0V	0.2	- -	- -
20.0V	0.2	- -	- -
25.0V	0.2	- -	- -
30.0V	0.2	- -	- -
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50
220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5

854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.3.5. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.1)= 45 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 40 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.3.6. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(10)= 65 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(10)= 60 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.3.7. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (2.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(2.0)= 58 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(2.0)= 53 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.3.8. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.5 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.5)= 52 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.5)= 47 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.3.9. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty								

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL	$55+10\log_{10}(P)$ or 65	$50+10\log_{10}(P)$ or 70	$43+10\log_{10}(P)$

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.3.10. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
812.258	100	-40.6	- -	100	- -	- -	- -	- -
For all other frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.3.13. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 17,GRAPH 18)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.3.14. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 19, GRAPH 20)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.3.15. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 21, GRAPH 22)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.3.16. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 23, GRAPH 24)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement at maximum power level

1.3.17. **TRANSMITTER OCCUPIED BANDWIDTH**

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	10K0D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	34.72 kbit/s
Measured Peak Deviation	2.00 kHz	4.20 kHz	---	---	---	---
Measured 99% Occupied BW	4.30 kHz	8.80 kHz	5.05 kHz	5.00 kHz	4.91 kHz	10.0 kHz

Channel Spacing	12.5 kHz	12.5 kHz				
Emission Type	10K0G1DEN	10K0G1DDN				
Modulation	D8PSK	pi/4-DQPSK				
Data Rate	26.04 kbit/s	17.36 kbit/s				
Measured Peak Deviation	---	---				
Measured 99% Occupied BW	9.99 kHz	9.99 kHz				

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.3.18. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 6,25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 25)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}$ (P)	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.3.19. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 26)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.3.20. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 27)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.3.21. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 28)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.3.22. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 29)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.3.23. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 30)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.3.24. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 31)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.3.25. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 32)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o <$ 250%Bw
	$43+10*\log_{10}$ (P)	250%Bw $< f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.4 Test Results 415.0250 MHz

Type Designation:	**RipEX-400**
Code:	**RipEX-400**
Serial No.:	**10734106**
Channel Separation:	**6.25 kHz, 12.5 kHz**
FW version	**1.1.6.0**
Transmitter Part:	
CH 1	**415.025 MHz**
Receiver Part:	
CH 1	**415.025 MHz**
Power Supply Range:	**Vnom = 20.0 V DC**
	Vmin = 10.0 V DC
	Vmax = 30.0 V DC
Temperature Range:	**Tnom = Ambient temperature**
	Tmin = -25 ℃
	Tmax = +60 ℃

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.4.1. **RF POWER OUTPUT AT TERMINALS (10.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	7.80	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.4.2. **RF POWER OUTPUT AT TERMINALS (2.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.90	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.4.3. **FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
-30	0.50	- -	- -
-20	0.30	- -	- -
-10	0.10	- -	- -
0	0.05	- -	- -
10	-0.10	- -	- -
20	-0.10	- -	- -
30	-0.05	- -	- -
40	0.00	- -	- -
50	0.05	- -	- -
60	0.00	- -	- -
Maximum frequency error	0.5 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50

220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.4.4. **FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
10.0V	0.2	- -	- -
15.0V	0.2	- -	- -
20.0V	0.2	- -	- -
25.0V	0.2	- -	- -
30.0V	0.2	- -	- -
Maximum frequency error	0.2 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50
220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5

854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.4.5. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.1)= 45 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 40 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.4.6. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

Limit$_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(10)= 65 dBc Where P = RF output power in watts

Limit $_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(10)= 60 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.4.7. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (2.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(2.0)= 58 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(2.0)= 53 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.4.8. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.5 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.1)= 52 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 47 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.4.9. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.4.10. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
830.065	100	-42.1	- -	- -	- -	- -	- -	- -
For all other frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.4.13. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 33,GRAPH 34)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.4.14. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 35, GRAPH 36)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.4.15. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 37, GRAPH 38)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.4.16. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 39, GRAPH 40)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement at maximum power level

1.4.17. **TRANSMITTER OCCUPIED BANDWIDTH**

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	10K0D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	34.72 kbit/s
Measured Peak Deviation	1.96 kHz	4.00 kHz	---	---	---	---
Measured 99% Occupied BW	4.35 kHz	8.84 kHz	5.00 kHz	5.00 kHz	4.95 kHz	10.0 kHz

Channel Spacing	12.5 kHz	12.5 kHz				
Emission Type	10K0G1DEN	10K0G1DDN				
Modulation	D8PSK	pi/4-DQPSK				
Data Rate	26.04 kbit/s	17.36 kbit/s				
Measured Peak Deviation	---	---				
Measured 99% Occupied BW	9.99 kHz	9.94 kHz				

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.4.18. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 41)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.4.19. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 42)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.4.20. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 43)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}$ ($f_d/5$)	$5 < f_o < 10$
	$29*\log_{10}$ ($f_d^2/11$) or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}$ (P)	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.4.21. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 44)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.4.22. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 45)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o <$ 250%Bw
	$43+10*\log_{10}$ (P)	250%Bw $< f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.4.23. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 46)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}$ $(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}$ $(f_d^2/11)$ or 50	$10 < f_o <$ 250%Bw
	$43+10*\log_{10}$ (P)	250%Bw $< f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.4.24. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 47)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.4.25. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 48)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}$ $(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}$ $(f_d^2/11)$ or 50	$10 < f_o <$ 250%Bw
	$43+10*\log_{10}$ (P)	250%Bw $< f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.5 Test Results 431.9875 MHz

Type Designation:	**RipEX-400**
Code:	**RipEX-400**
Serial No.:	**10734106**
Channel Separation:	**6.25 kHz, 12.5 kHz**
FW version	**1.1.6.0**
Transmitter Part:	
CH 1	**431.9875 MHz**
Receiver Part:	
CH 1	**431.9875 MHz**
Power Supply Range:	**Vnom = 20.0 V DC**
	Vmin = 10.0 V DC
	Vmax = 30.0 V DC
Temperature Range:	**Tnom = Ambient temperature**
	Tmin = -25 ℃
	Tmax = +60 ℃

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W (unmodulated carrier - constant envelope modulation)

1.5.1. **RF POWER OUTPUT AT TERMINALS (10.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	7.10	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W (unmodulated carrier - non-constant envelope modulation)

1.5.2. **RF POWER OUTPUT AT TERMINALS (2.0 W)**

RULE PART NUMBER: 2.1046

TEST METHOD: TIA-603-D; 2.2.1

TEST RESULTS:

TEST CONDITIONS		TRANSMITTER POWER [W]		
		CH 1	CH 2	CH 3
Tnom	Vnom	2.90	- -	- -
Measurement uncertainty		±0.6 dB		

LIMIT: - -

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.5.3. **FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
-30	0.45	- -	- -
-20	0.30	- -	- -
-10	0.1	- -	- -
0	0.05	- -	- -
10	-0.10	- -	- -
20	-0.10	- -	- -
30	-0.05	- -	- -
40	0.00	- -	- -
50	-0.05	- -	- -
60	0.00	- -	- -
Maximum frequency error	0.45 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50

220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement was carried out at maximum power level (open loop)

1.5.4. **FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION**

RULE PART NUMBER: 2.1055; 90.213

TEST METHOD: TIA-603-D; 2.2.2

TEST RESULTS:

TEST CONDITIONS	FREQUENCY ERROR [ppm]		
Temperature (℃)	CH 1	CH 2	CH 3
10.0V	0.0	- -	- -
15.0V	0.0	- -	- -
20.0V	0.0	- -	- -
25.0V	0.0	- -	- -
30.0V	0.0	- -	- -
Maximum frequency error	0.0 (limit 1.0ppm mobile; 0.5 base station)		
Measurement uncertainty	±45 Hz		

LIMIT:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25-50	20	20	50
72-76	5	…….	50
150-174	[5,11]5	[6]5	[4,6]50
216-220	1.0	…….	50
220-222	0.1	1.5	1.0
421-512	[7,11,14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5

854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	…….	……
935-940	0.1	1.5	1.5
1427-1435	[8]300	300	300
Above 2450	……..	……..	……..
Note: [1,2,3,4,5,6,7,8,9,10,11,12,13,14] FCC Part 90.213			

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.5.5. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.1)= 45 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 40 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609;

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.5.6. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(10)= 65 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(10)= 60 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.5.7. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (2.0 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(2.0)= 58 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(2.0)= 53 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.5.8. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.5 W)**

RULE PART NUMBER: 2.1051, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.13

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 20 dB below the limit.								
Measurement uncertainty			+2.8 dB/-3.3 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL [dBc]	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

$Limit_{(dBc)}$= 55+10log$_{10}$(P)= 55+10log$_{10}$(0.5)= 52 dBc Where P = RF output power in watts

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.5)= 47 dBc Where P = RF output power in watts

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

1.5.9. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (0.1 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
For all frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty			+4.4 dB/-4.5 dB					

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

1.5.10. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (10.0 W)**

RULE PART NUMBER: 2.1053, 90.210 (c,3)(d,3)(e,3)

TEST METHOD: TIA-603-D, 2.2.12

TEST RESULTS:

SPURIOUS EMISSIONS								
CH1			CH2			CH3		
Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]	Freq. [MHz]	Bandwidth [kHz]	Level [dBm]
863.975	100	-44.8	- -	- -	- -	- -	- -	- -
For all other frequencies the spurious emissions were detected at least 10 dB below the limit.								
Measurement uncertainty								

LIMIT:

CHANNEL BANDWIDTH	6.25 kHz	12.5 kHz	25.0 kHz
FREQUENCY RANGE	f_o > 4.6 kHz	f_o > 12.5	f_o > 250%Bw
SPURIOUS EMISSION LEVEL	55+10log$_{10}$(P) or 65	50+10log$_{10}$ (P) or 70	43+10log$_{10}$ (P)

TEST EQUIPMENT USED: - -

REMARKS: Measured in CMI – Laboratory TESTCOM Praha; Test report Ref. No.: 8551-PT-R0070-12 Annex 1

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.5.13. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 49, GRAPH 50)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - constant envelope modulation)

The measurement was carried out at maximum power level

1.5.14. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 51, GRAPH 52)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.5.15. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (12.5 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 53, GRAPH 54)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Transmitter operating unmodulated (unmodulated carrier - non-constant envelope modulation)

The measurement was carried out at maximum power level

1.5.16. **TRANSIENT FREQUENCY BEHAVIOR OF TRANSMITTER (6.25 kHz)**

RULE PART NUMBER: 90.214

TEST METHOD: TIA-603-D; 2.2.19

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 55, GRAPH 56)

LIMIT:

TRANSIENT FREQUENCY BEHAVIOR				
TIME INTERVAL		MAXIMUM FREQUENCY DIFFERENCE [kHz]	TIME [ms]	
			150-174 MHz	421-512 MHz
T1	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
T2	for 6.25 kHz channel separation	+/-3.125	20	25
	for 12.5 kHz channel separation	+/-6.25	20	25
	for 25.0 kHz channel separation	+/-12.5	20	25
T3	for 6.25 kHz channel separation	+/-6.25	5.0	10
	for 12.5 kHz channel separation	+/-12.5	5.0	10
	for 25.0 kHz channel separation	+/-25.0	5.0	10
Measurement uncertainty		±45 Hz		

TEST EQUIPMENT USED: 10258; 10172; 900000609; 900000611; 10293

REMARKS: See chapter 5 for plots of frequency and power versus time,

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

The measurement at maximum power level

1.5.17. **TRANSMITTER OCCUPIED BANDWIDTH**

RULE PART NUMBER: 2.201, 2.202, 2.1033 (C) (14), 2.1049 (H), 2.1041; 90.203(J) (3)

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS:

Channel Spacing	6.25 kHz	12.5 kHz	6.25 kHz	6.25 kHz	6.25 kHz	12.5 kHz
Emission Type	4K35F1DDN	8K90F1DDN	5K00D1DEN	5K00G1DEN	5K00G1DDN	10K0D1DEN
Modulation	4-CPFSK	4-CPFSK	16-DEQAM	D8PSK	pi/4-DQPSK	16-DEQAM
Data Rate	5.21 kbit/s	10.42 kbit/s	17.36 kbit/s	13.02 kbit/s	8.68 kbit/s	34.72 kbit/s
Measured Peak Deviation	2.00 kHz	4.00 kHz	---	---	---	---
Measured 99% Occupied BW	4.30 kHz	8.89 kHz	5.00 kHz	5.00 kHz	4.95 kHz	10.0 kHz

Channel Spacing	12.5 kHz	12.5 kHz				
Emission Type	10K0G1DEN	10K0G1DDN				
Modulation	D8PSK	pi/4-DQPSK				
Data Rate	26.04 kbit/s	17.36 kbit/s				
Measured Peak Deviation	---	---				
Measured 99% Occupied BW	9.94 kHz	9.94 kHz				

TEST EQUIPMENT USED: 80123; 900000611; 900000609; 10173

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 5.21kbps; Random bit sequence

1.5.18. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 57)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 17.36kbps; Random bit sequence

1.5.19. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 58)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 13.02kbps; Random bit sequence

1.5.20. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 59)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 8.68kbps; Random bit sequence

1.5.21. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 6.25 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 60)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

1.5.22. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 61)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 41.67kbps; Random bit sequence

1.5.23. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 62)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: D8PSK 31.25kbps; Random bit sequence

1.5.24. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 5, GRAPH 63)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	$30+16.67*(f_d-3kHz)$ or $55+10*\log_{10}(P)$ or 65	$3 < f_o < 4.6$
	$55+10*\log_{10}(P)$ or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	$7.27*(f_d-2.88kHz)$	$5.625 < f_o < 12.5$
	$50+10*\log_{10}(P)$ or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	$83*\log_{10}(f_d/5)$	$5 < f_o < 10$
	$29*\log_{10}(f_d^2/11)$ or 50	$10 < f_o < 250\%Bw$
	$43+10*\log_{10}(P)$	$250\%Bw < f_o$
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

Ambient temperature: (22±1) ℃ Relative humidity: (50±10) %

Rated output power: 2.0 W

Test signal: pi/4-DQPSK 20.83kbps; Random bit sequence

1.5.25. **TRANSMITTER OCCUPIED BANDWIDTH (pi/4-DQPSK, 2.0 W, 12.5 kHz)**

RULE PART NUMBER: 2.1049, 90.210

TEST METHOD: TIA-603-D; 3.2.11

TEST RESULTS: Meets minimum standards (See chapter 6, GRAPH 64)

LIMIT:

	Attenuator [dB]	Frequency offset [kHz]
Mask E	0.0 dB	$f_o < 3$
	30+16.67*(f_d-3kHz) or 55+10*$\log_{10}$(P) or 65	$3 < f_o < 4.6$
	55+10*$\log_{10}$(P) or 65	$f_o > 4.6$
Mask D	0.0 dB	$f_o < 5.625$
	7.27*(f_d-2.88kHz)	$5.625 < f_o < 12.5$
	50+10*$\log_{10}$ (P) or 70	$f_o > 12.5$
Mask C	0.0 dB	$f_o < 5$
	83*$\log_{10}$ (f_d/5)	$5 < f_o < 10$
	29*$\log_{10}$ (f_d^2/11) or 50	$10 < f_o <$ 250%Bw
	43+10*$\log_{10}$ (P)	250%Bw < f_o
	Note: P is output power in W; f_d displacement frequency in kHz	

TEST EQUIPMENT USED: 80123; 900000611; 900000609

REMARKS: - -

1.6 Summary of Test Results

P = Complied with the requirements of the specification for this test

U = The results were within measurement uncertainties

F = Not complied with the requirements of the specification for this test

N/A = Not applicable

Unit No. 1 (400.0125 MHz)

Unit No. 1 (406.1250 MHz)

Unit No. 1 (415.0250 MHz)

Unit No. 1 (431.9875 MHz)

2. Test Equipment

- Lab Id. No.	- Test equipment	Type	Manufacturer	Serial No.
10258	Signal Analyzer	FSIQ3	Rohde&Schwarz	830790/0001
10237	Spectrum Analyzer	FSP3	Rohde&Schwarz	100767
10219/1	Spectrum Analyzer	FSP30	Rohde&Schwarz	100015
10172	Stabilock 4040	SI 4040	Hewlett-Packard	2025057
10173	Stabilock 4040	SI 4040	Schlumbeger	1825233
900000611	Attenuator 30dB/40W	ATE 30dB/40W	APEX	051103
900000349	Attenuator 30dB/40W	ATE 30dB/40W	APEX	051106
900000613	Attenuator 30dB/40W	ATE 30dB/40W	APEX	051102
900000575	Step Attenuator	PE7033-2	Pasternack	900000575
-	Heating Chamber	-	-	-
10161	Freezing Box	-	-	-
699385	Digital Multimeter	M-3850	Metex	EB 127 259
	4-Port Junction Pad			
10293	Dig. Phosphor oscilloscope	DPO 2024	Tektronix	
10203	Digital Oscilloscope	TDS2014	Tektronix	C032141
10240	Signal Generator	IFR 2023B	IRF	202306/936
10046	Signal Generator	8640B	Hewlett-Packard	2250A20733
10238	Signal Generator	E4438	Agilent	MY45091475
10219/2	Signal Generator	SML03	Rohde&Schwarz	100560
-	Power Splitter	-	-	-
-	Termination 50 Ohm/1 W	-	-	-
-	Termination 50 Ohm/1 W	-	-	-
-	Termination 50 Ohm/1 W	-	-	-
-	Isolating Transformer	-	-	-
-	Interval Counter	-	-	-
900000609	Power Supply	Statron 2225 35V	Statron	0308023
900000457	Power Supply	Statron	Statron	0510006
160 testcom	ACP Filter	ACPX 107-125-A	COMNET Sys	736001
161 testcom	ACP Filter	ACPX 107-200-A	COMNET Sys	736002
162 testcom	ACP Filter	ACPX 107-250-A	COMNET Sys	736003
-	High Pass Filter (400MHz)	-	-	-
80123 **borrowed**	Signal & spectrum Analyzer	FSW	Rohde&Schwarz	13128000k26 -SN

3. Additional Information

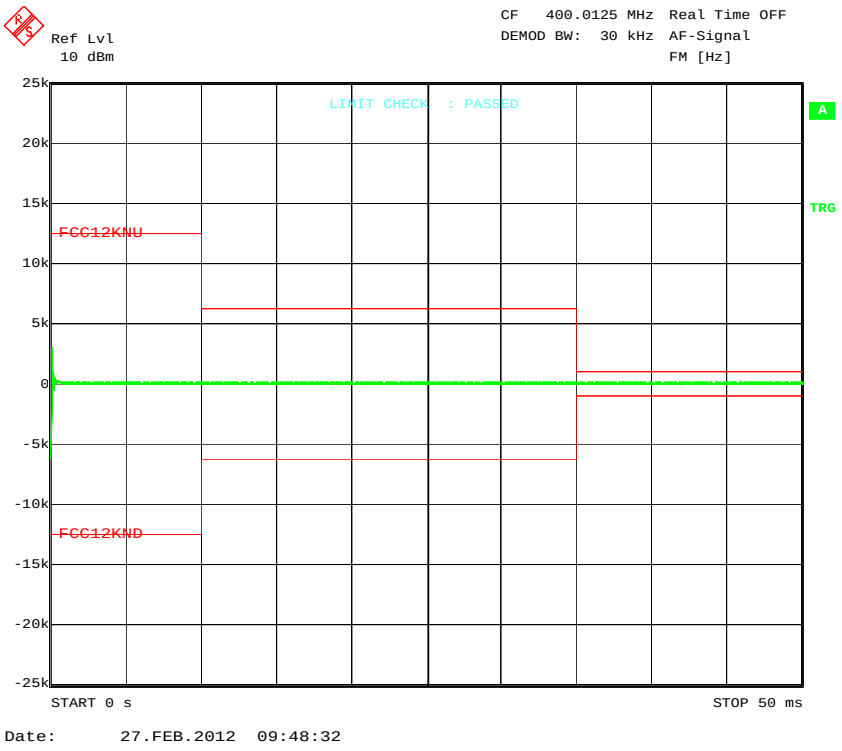
All reference levels of the emission masks were determined by the peak values of the adequate spectral plots taken with wider resolution bandwidth (RBW 30kHz), as shown in GRAPH 14.

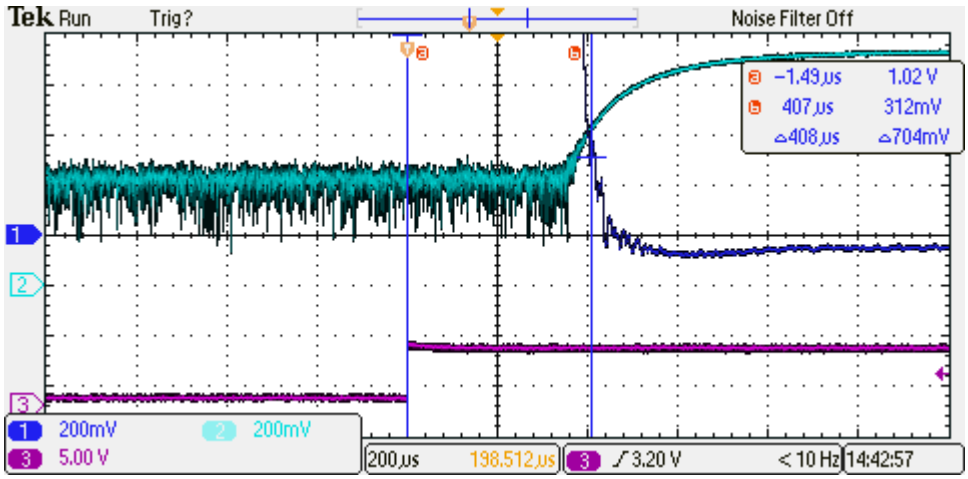
4. Graphs

List of graphs:

4.1 Graphs – 400.0125MHz

GRAPH 1: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



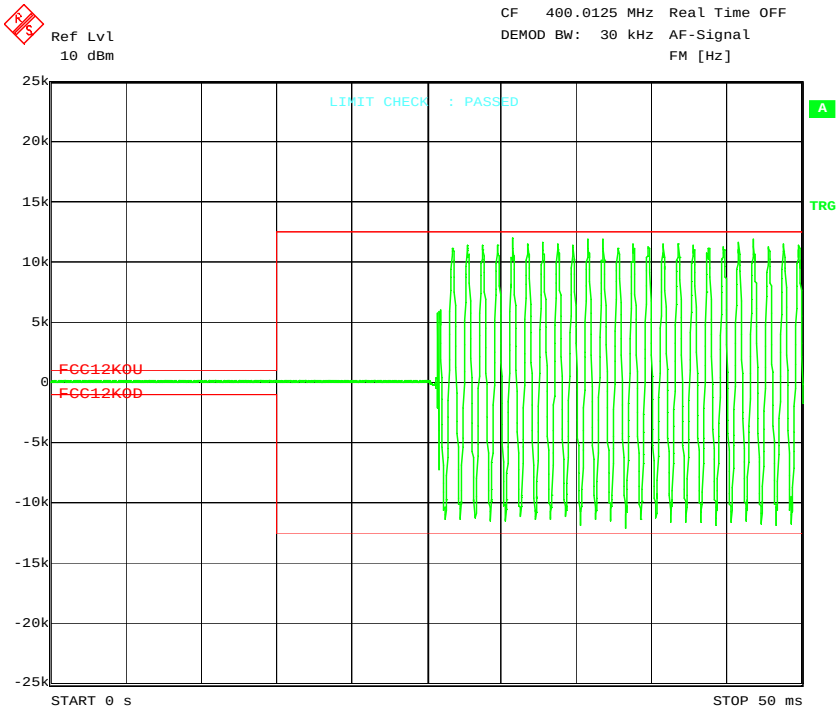


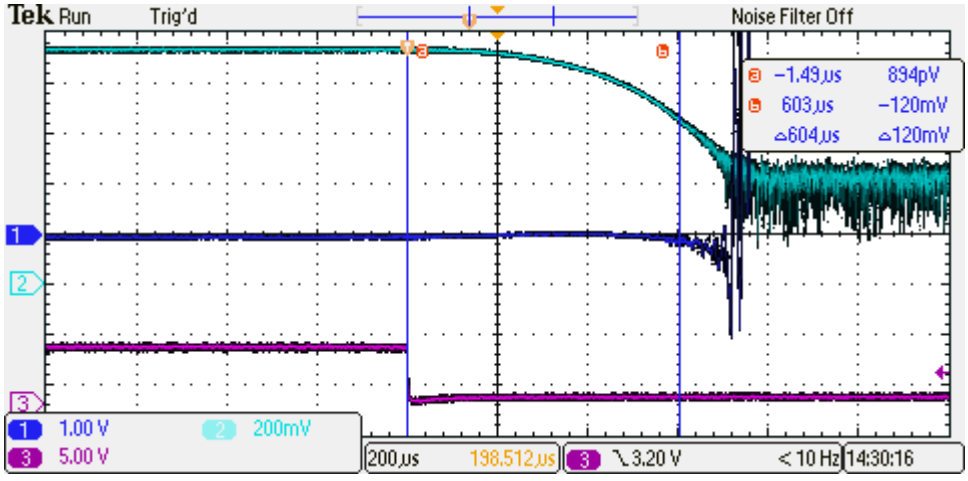
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 2: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



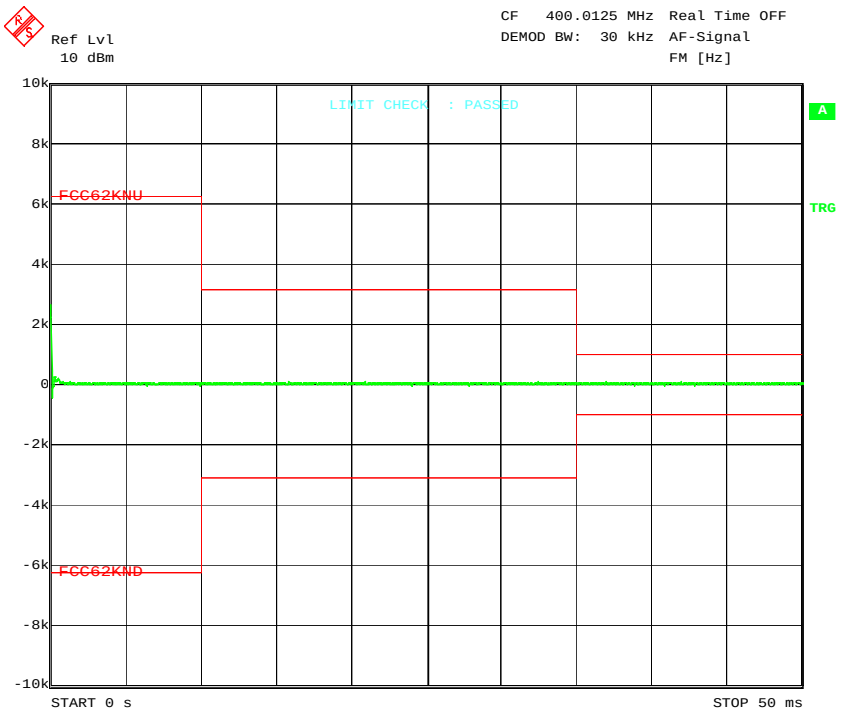


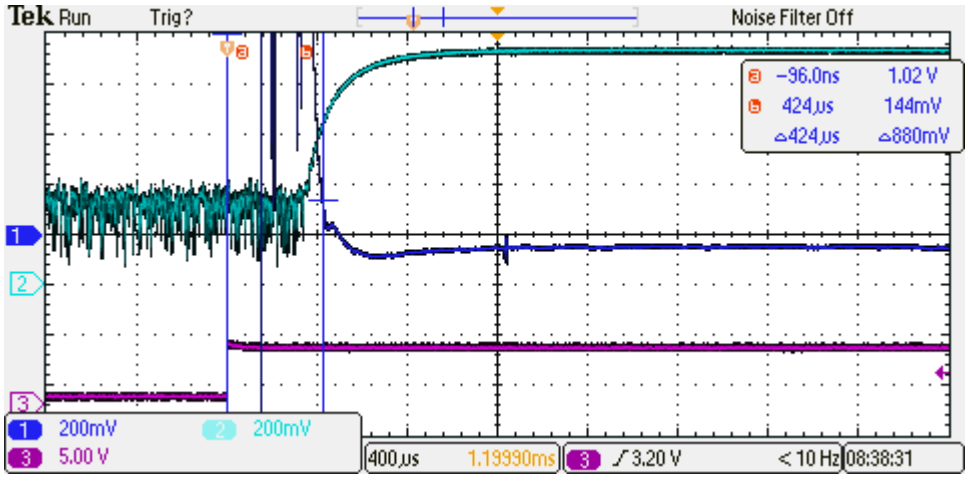
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 3: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



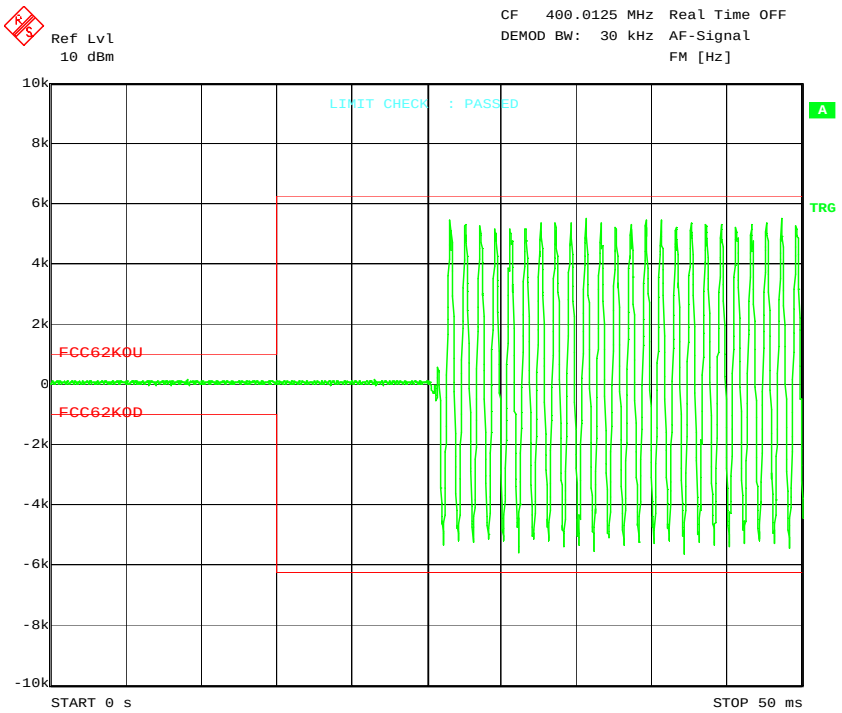


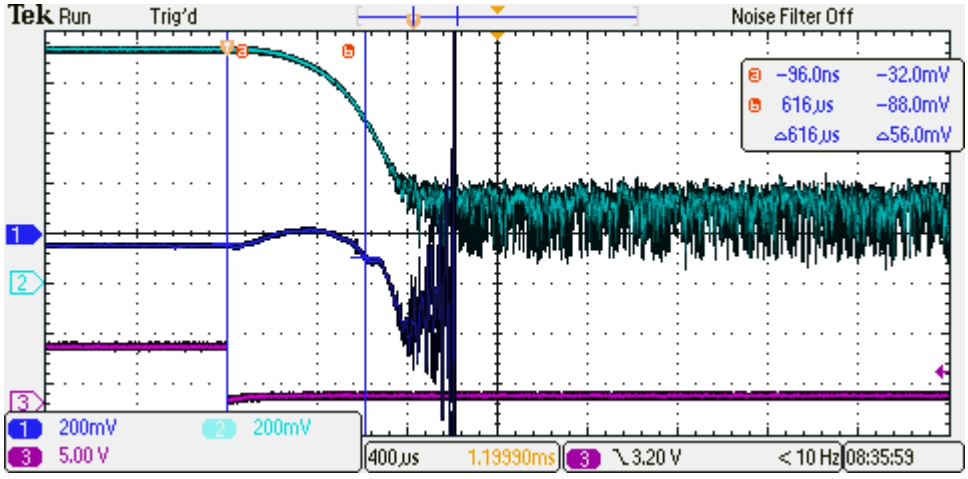
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 4: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



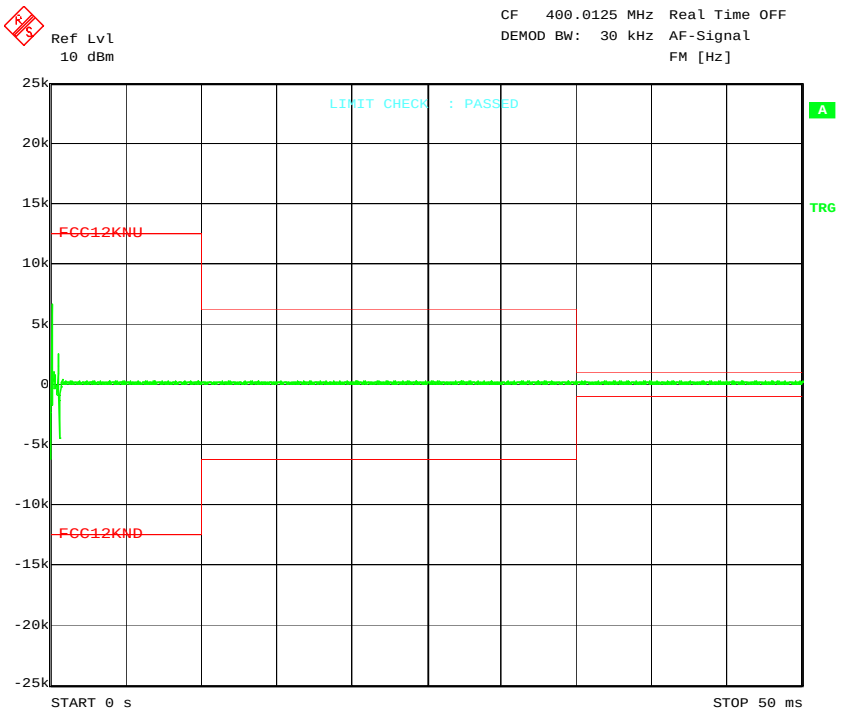


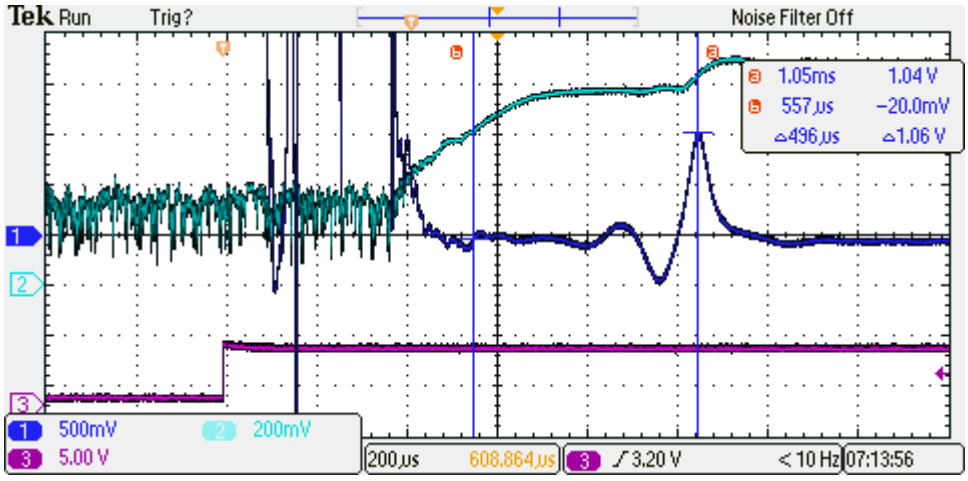
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 5: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



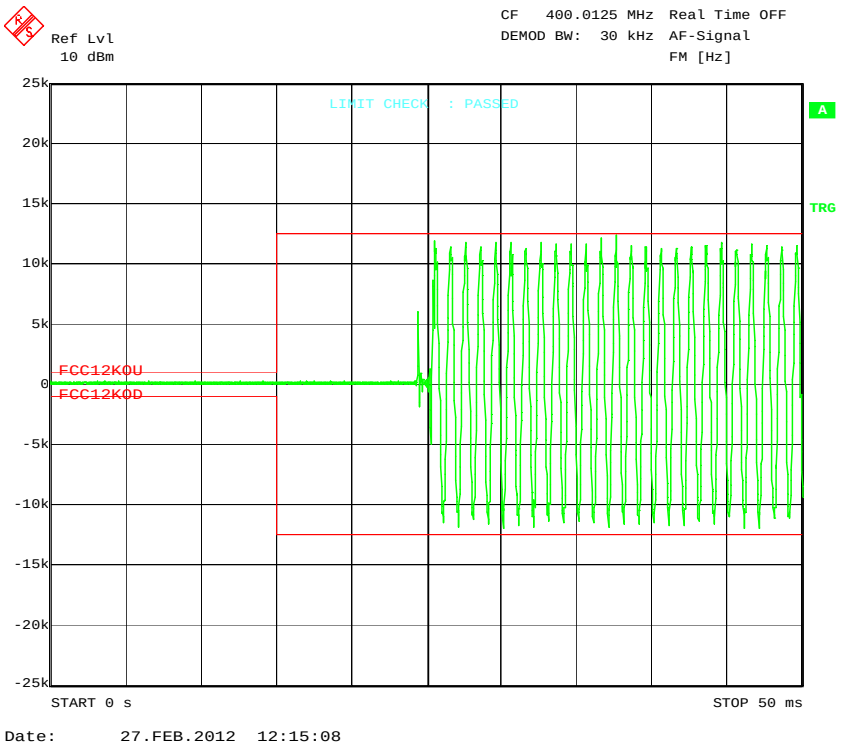


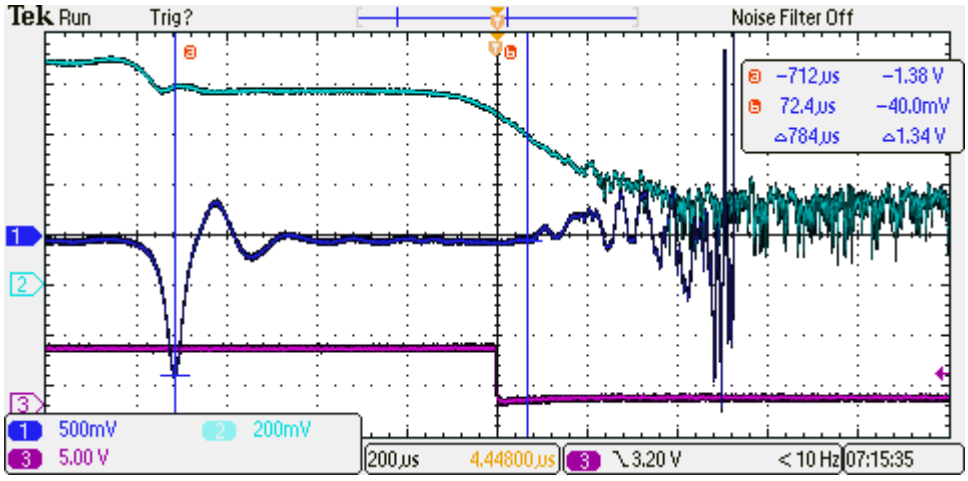
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 6: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



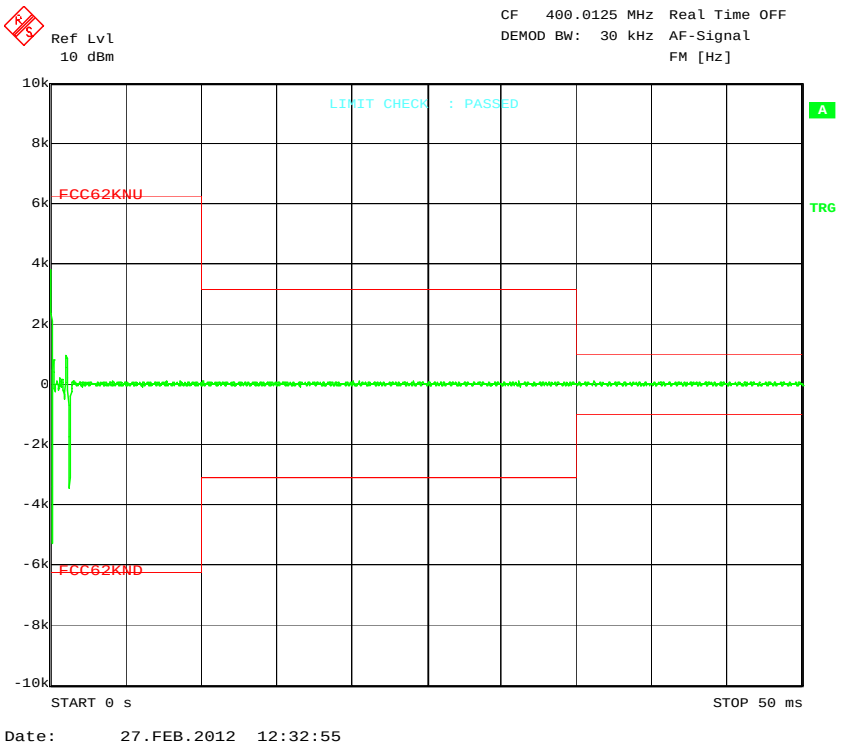


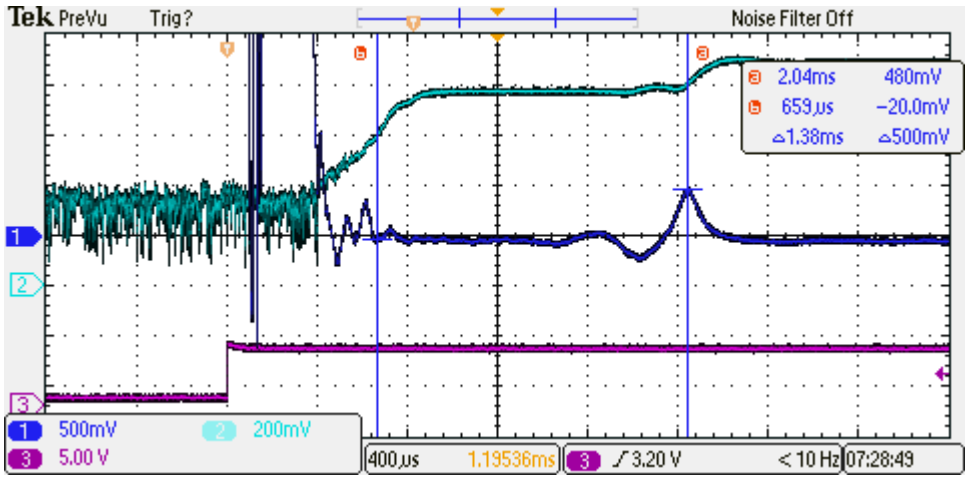
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 7: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



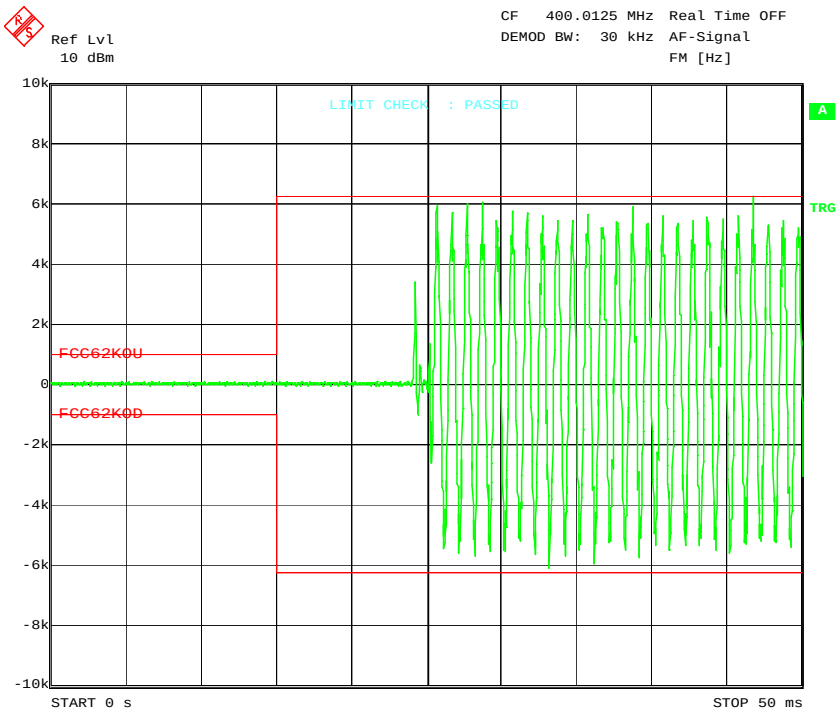


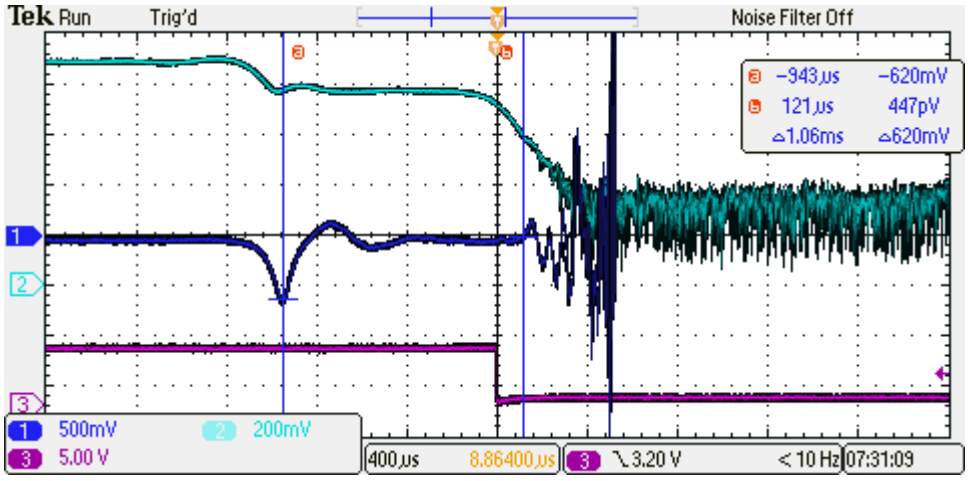
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 8: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



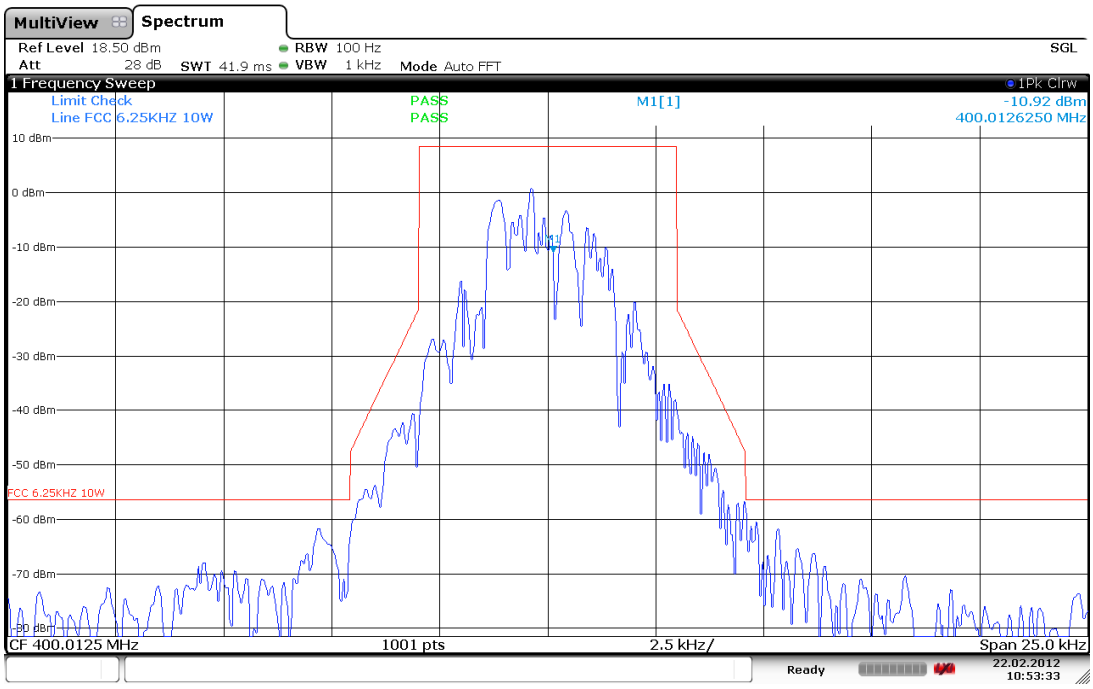


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

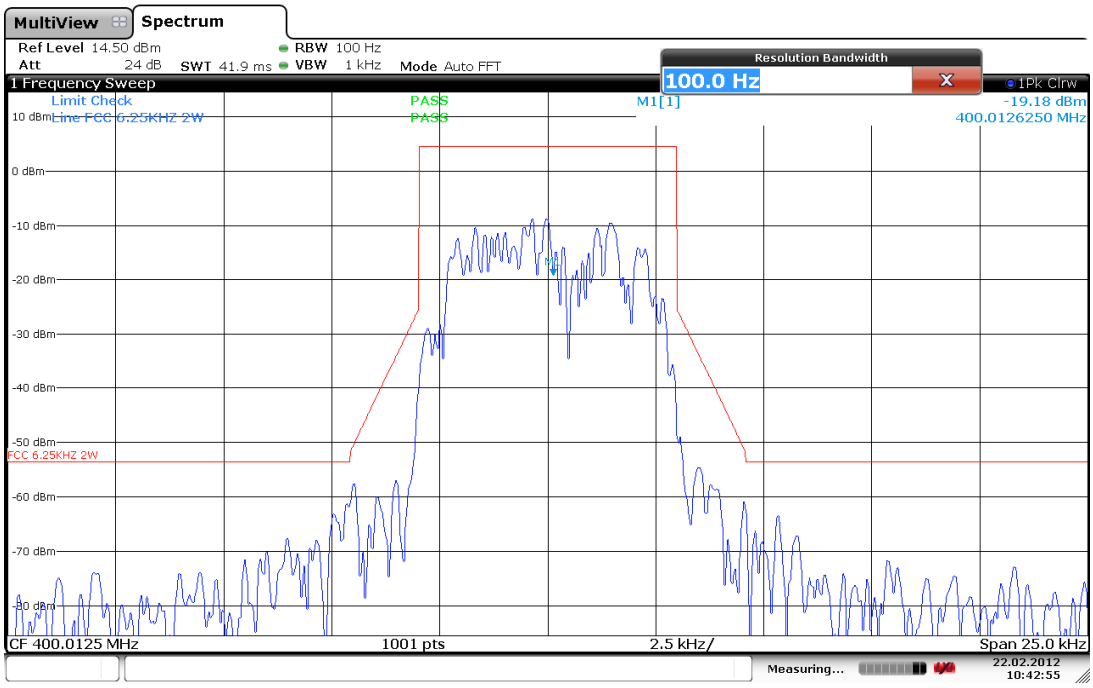
violet – PTT

GRAPH 9: Spectrum for Emission 6.25 kHz 4-CPFSK



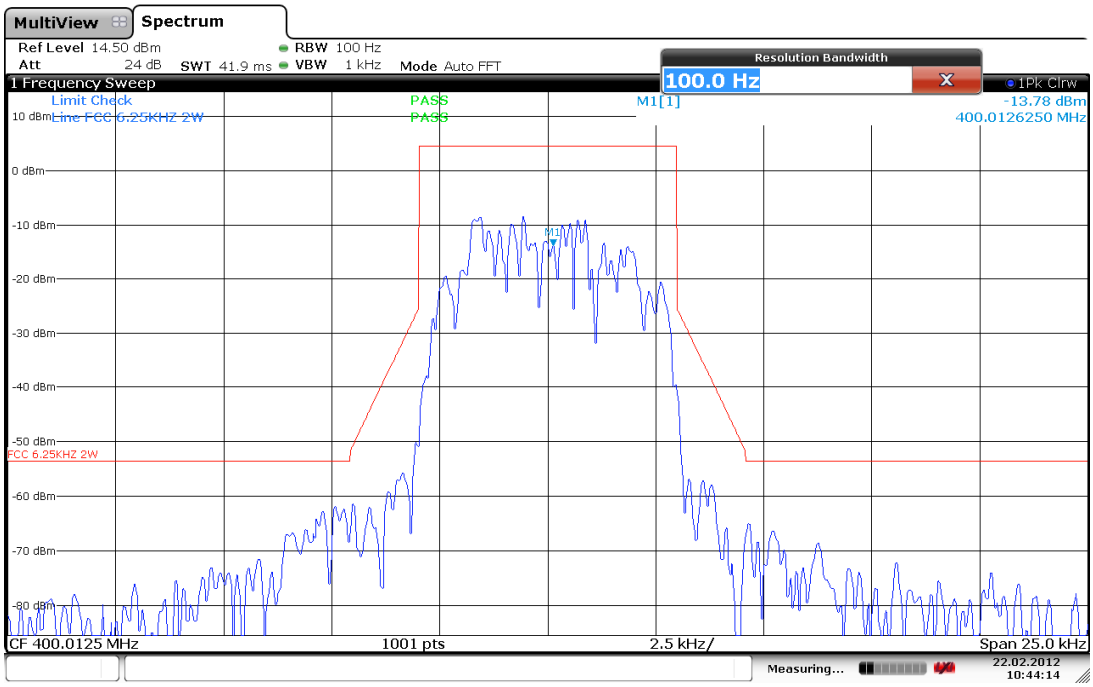
Date: 22.FEB.2012 10:53:34

GRAPH 10: Spectrum for Emission 6.25 kHz 16-DEQAM



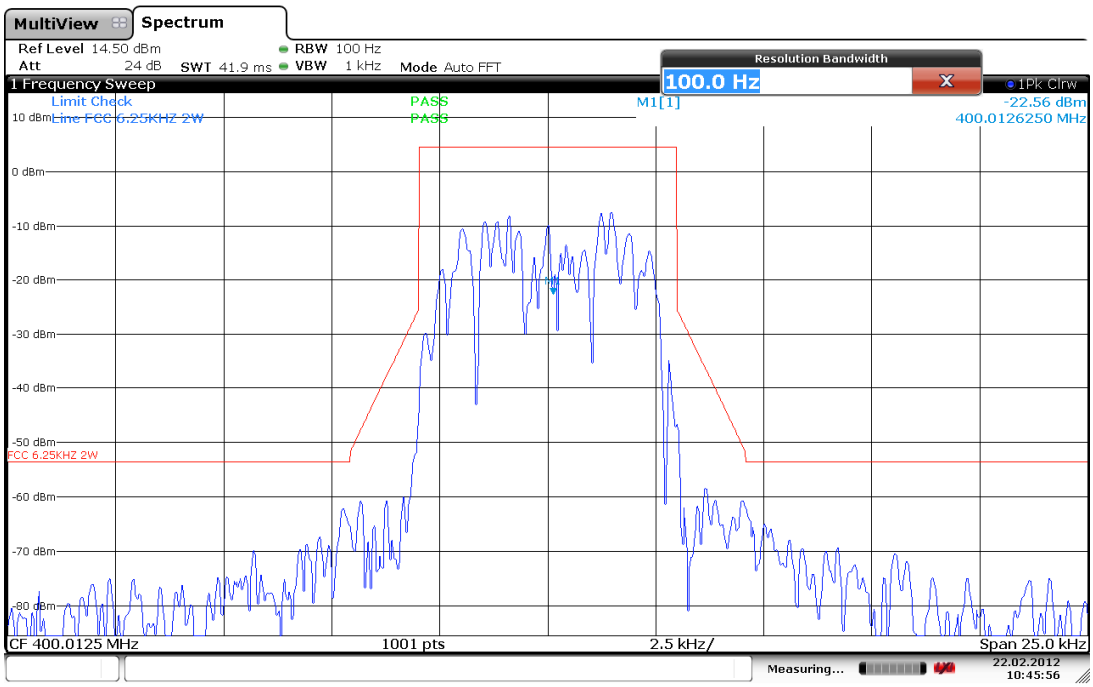
Date: 22.FEB.2012 10:42:54

GRAPH 11: Spectrum for Emission 6.25 kHz D8PSK



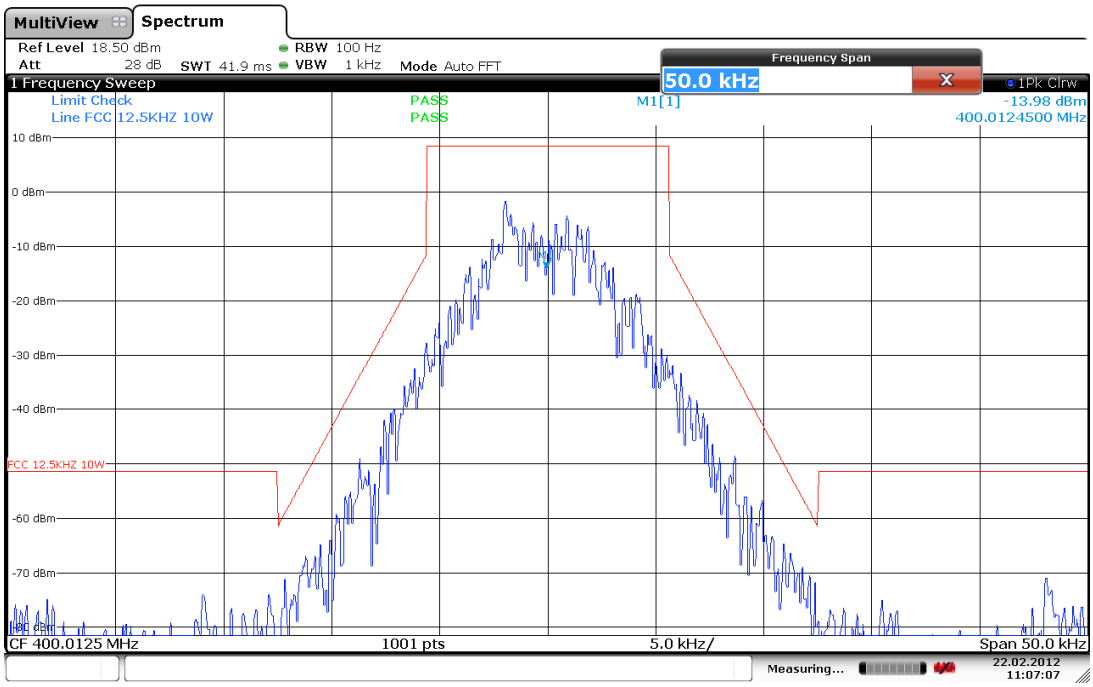
Date: 22.FEB.2012 10:44:14

GRAPH 12: Spectrum for Emission 6.25 kHz pi/4-DQPSK



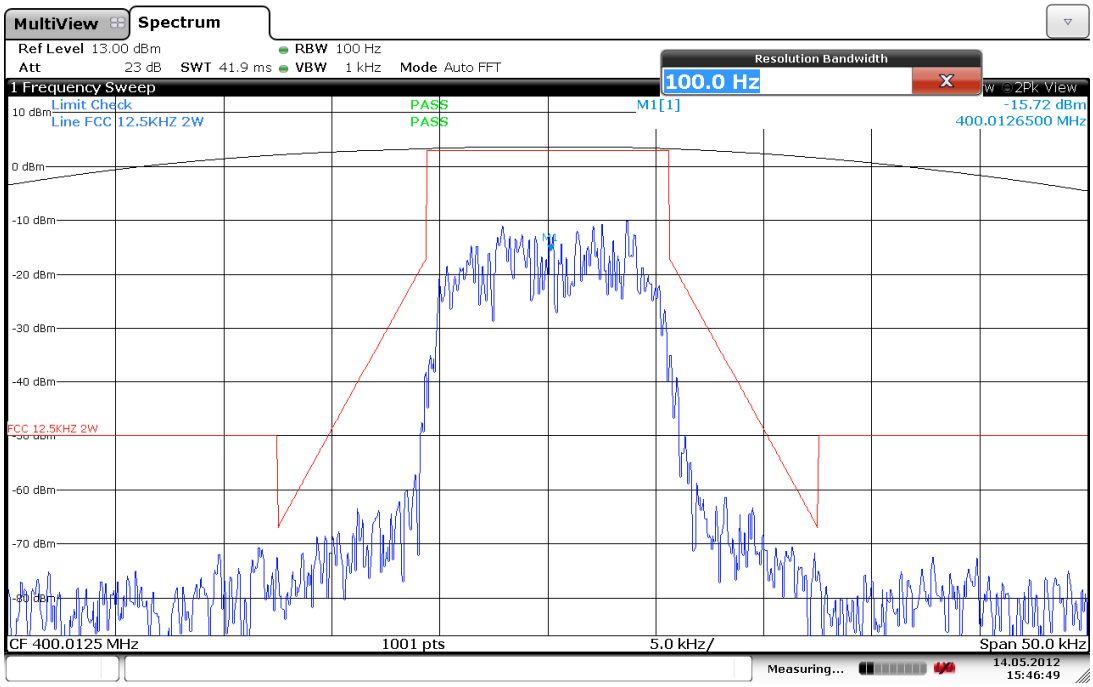
Date: 22.FEB.2012 10:45:56

GRAPH 13: Spectrum for Emission 12.5 kHz 4-CPFSK



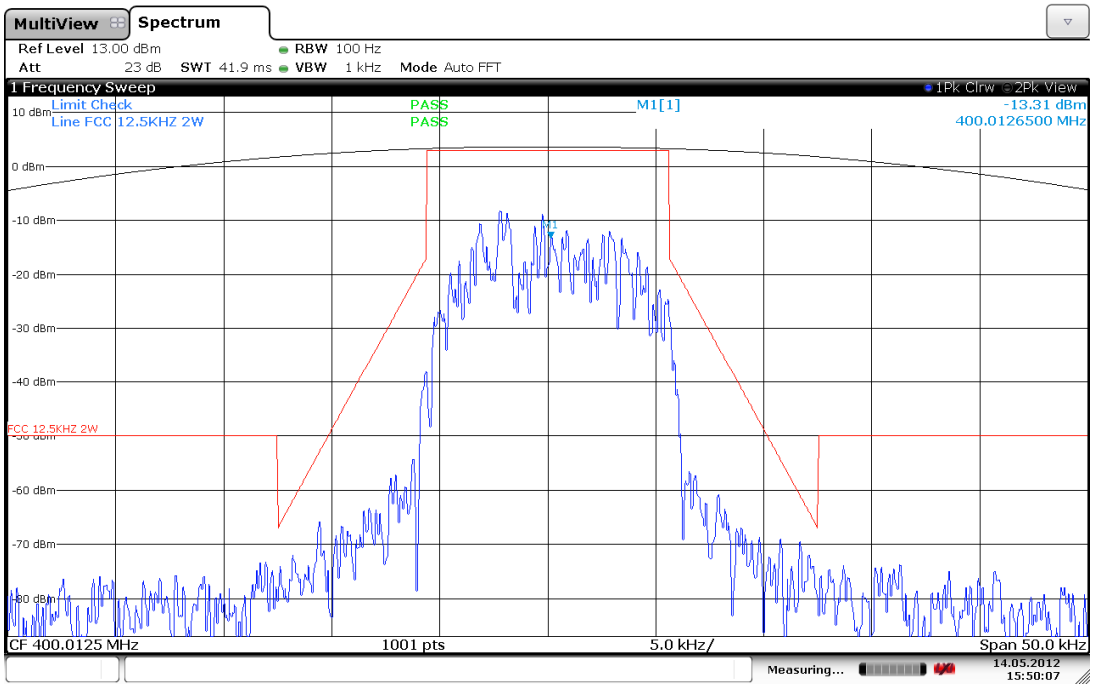
Date: 22.FEB.2012 11:07:07

GRAPH 14: Spectrum for Emission 12.5 kHz 16-DEQAM



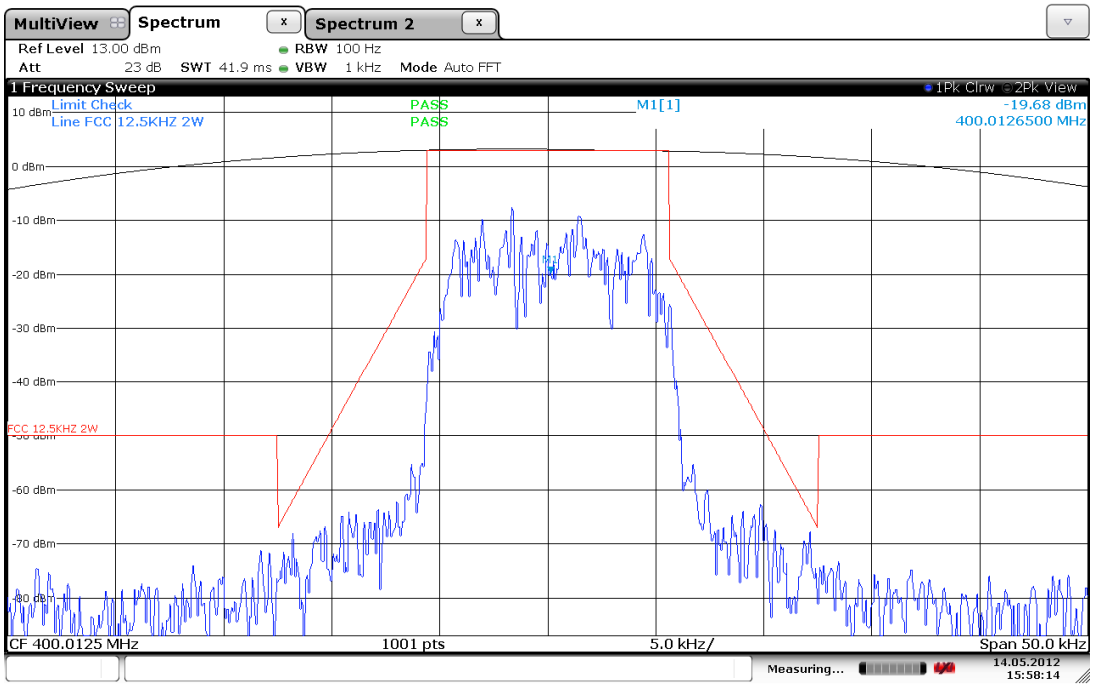
Date: 14.MAY.2012 15:46:49

GRAPH 15: Spectrum for Emission 12.5 kHz D8PSK



Date: 14.MAY.2012 15:50:07

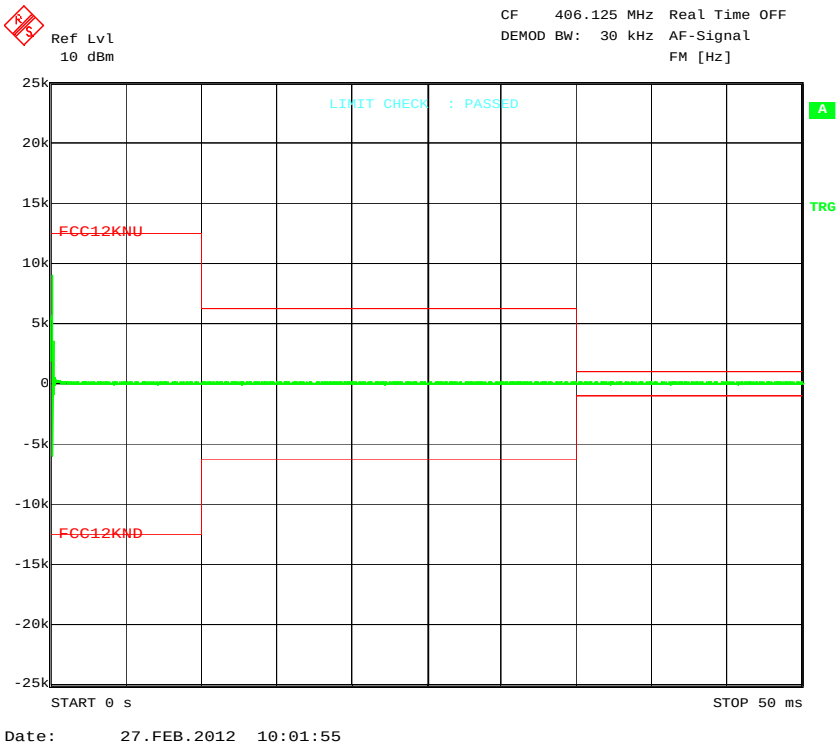
GRAPH 16: Spectrum for Emission 12.5 kHz pi/4-DQPSK

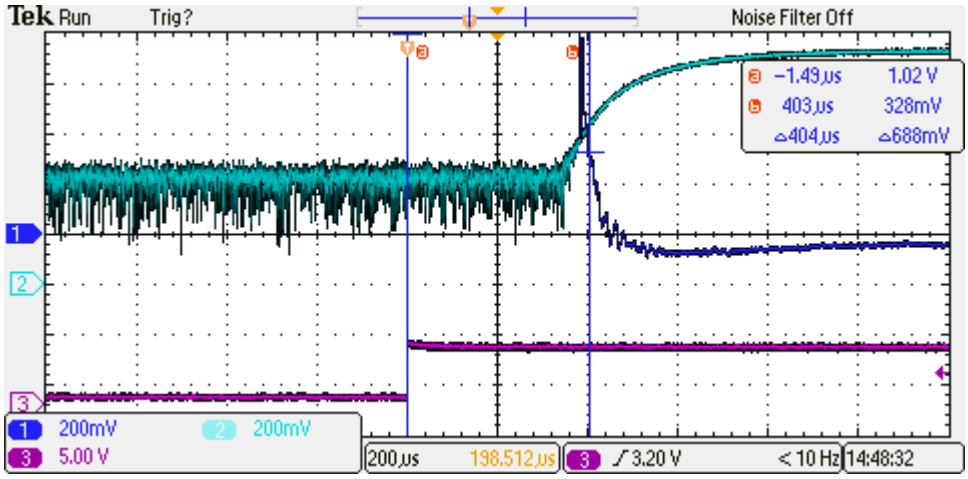


Date: 14.MAY.2012 15:58:13

4.2 Graphs – 406.125 MHz

GRAPH 17: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



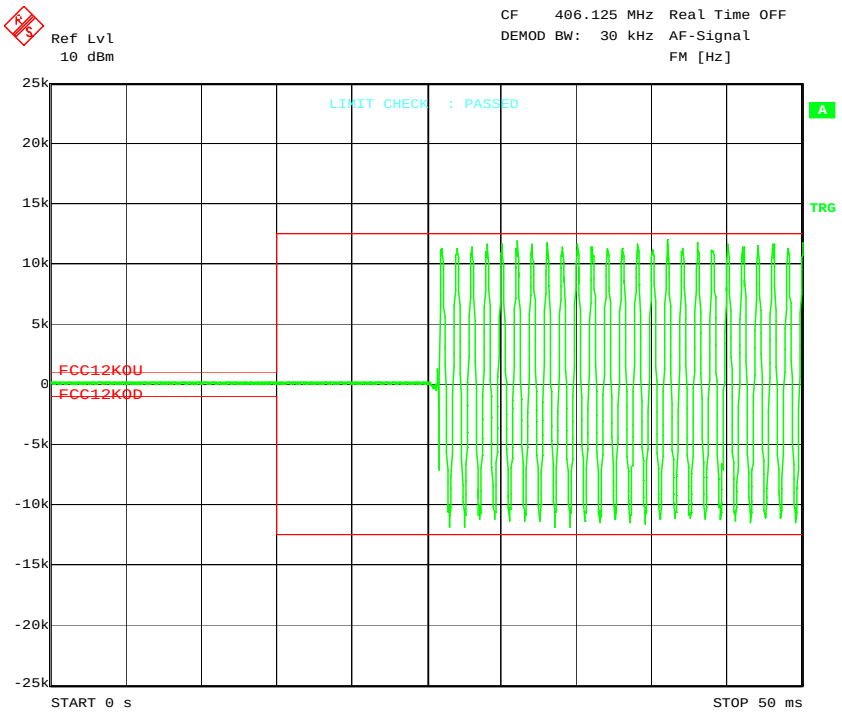


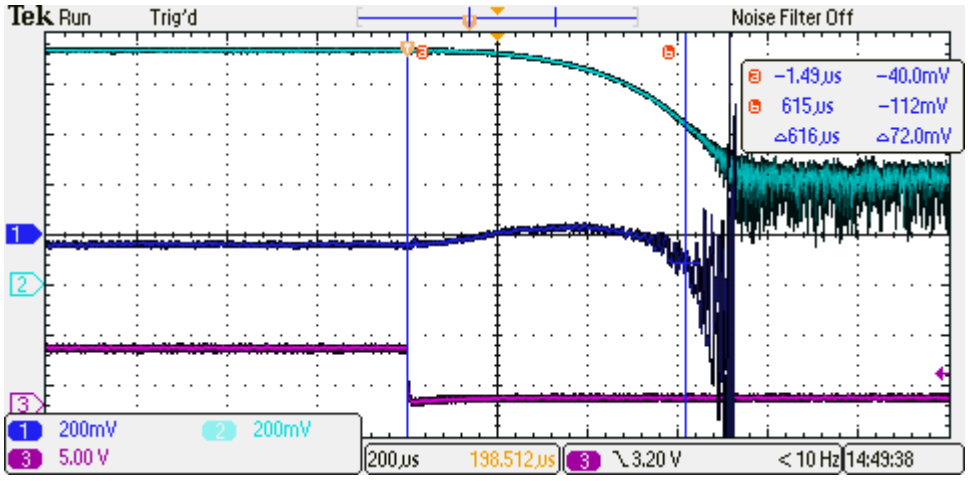
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 18: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



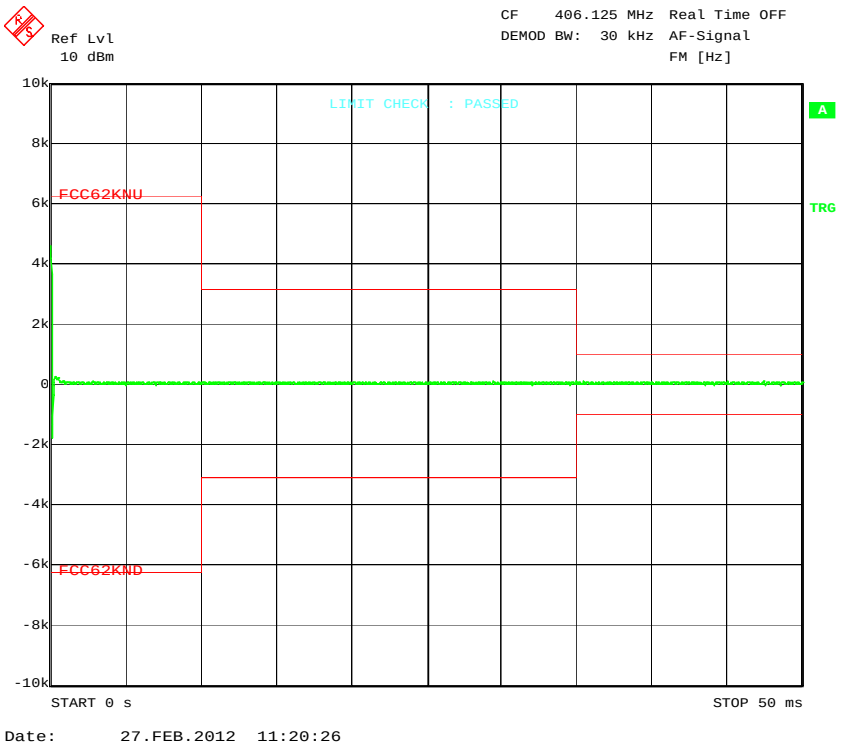


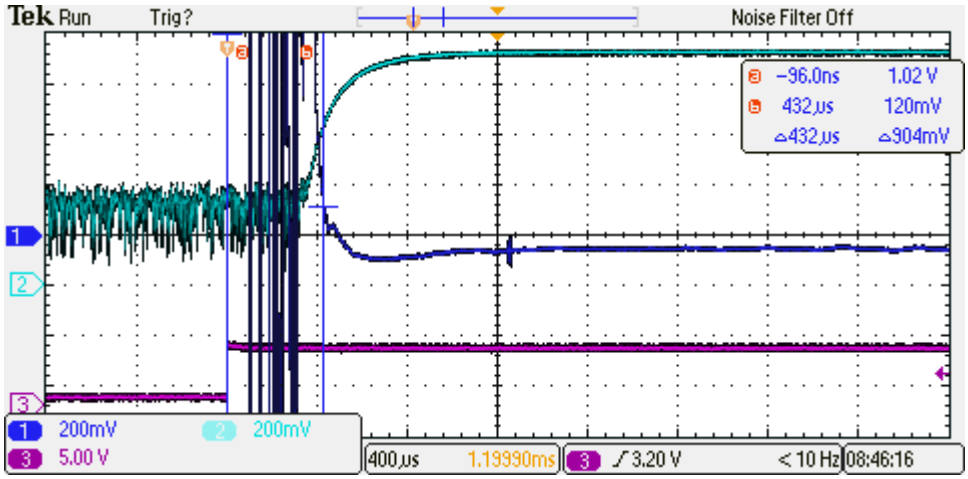
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 19: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



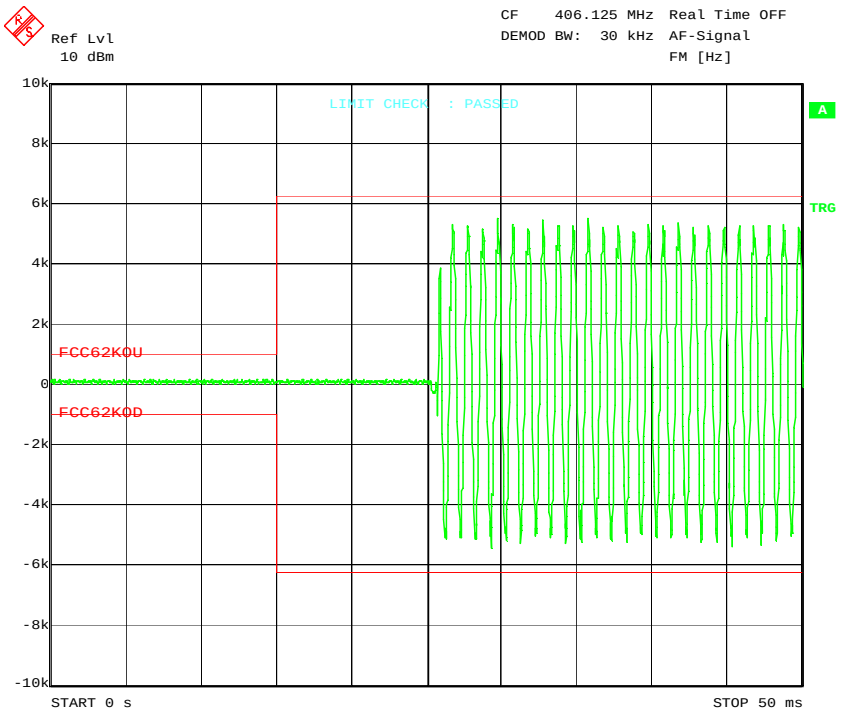


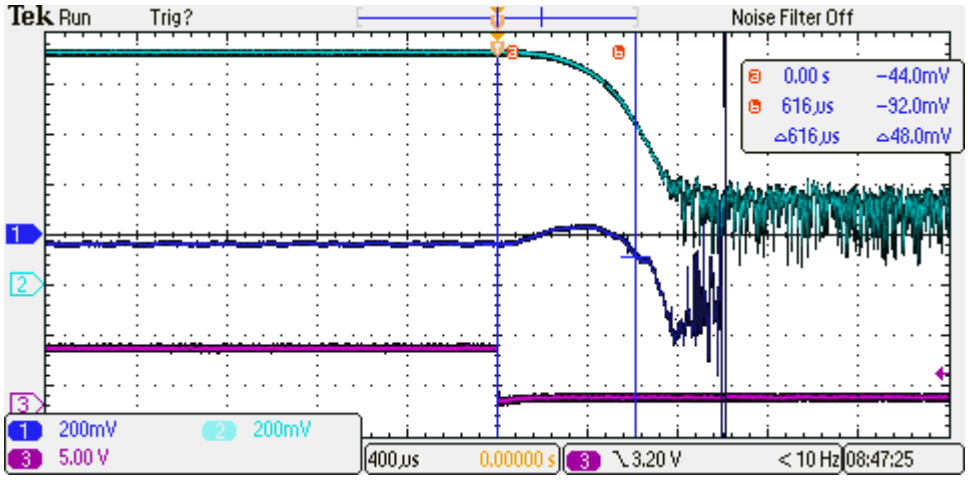
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 20: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



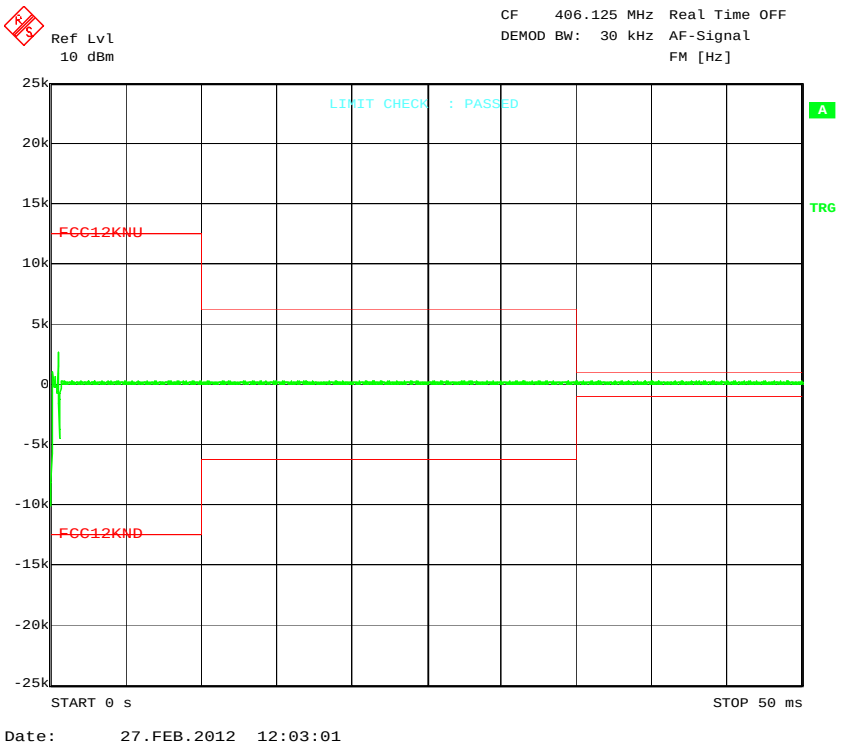


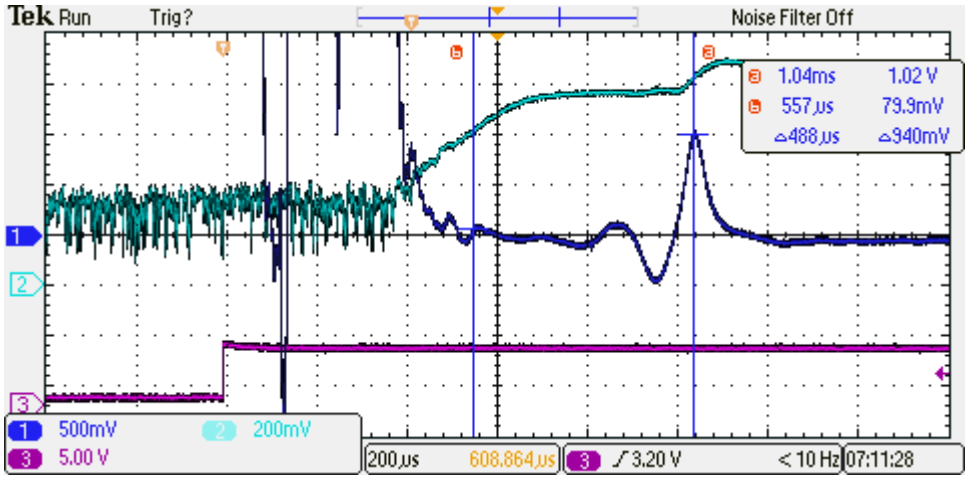
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 21: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



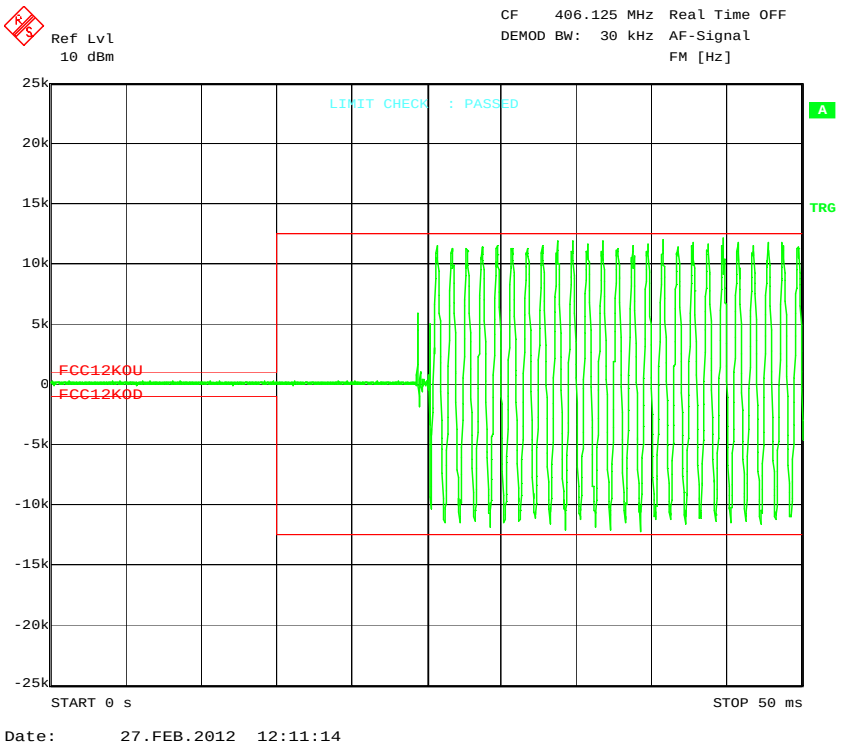


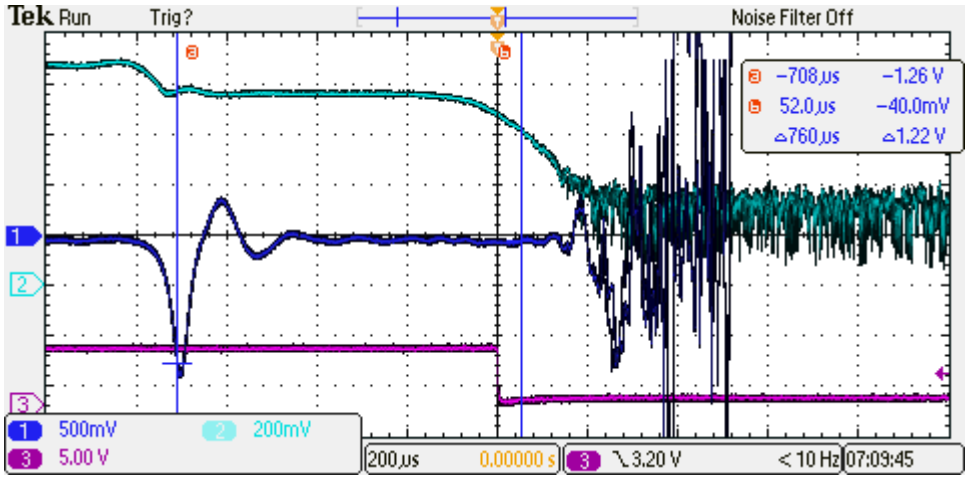
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 22: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



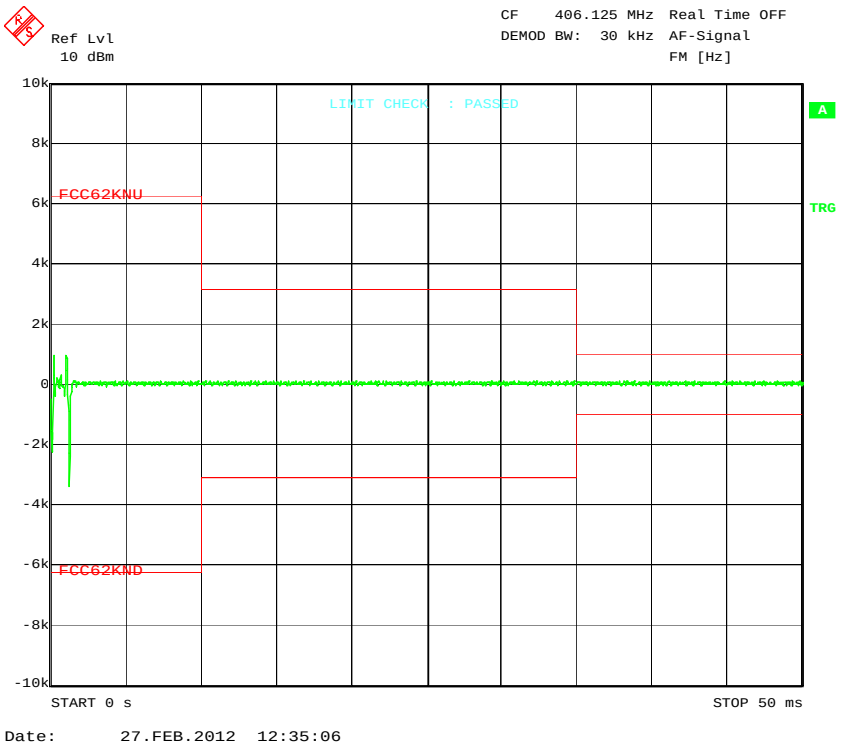


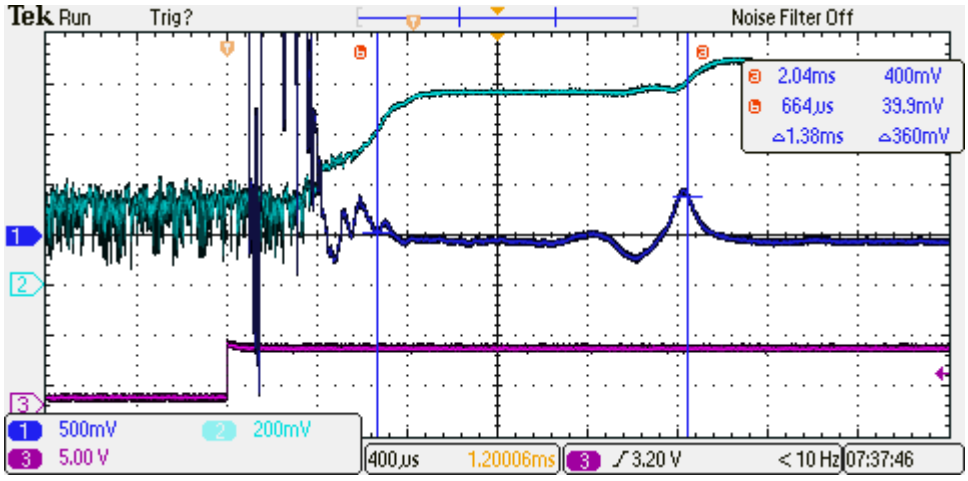
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 23: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



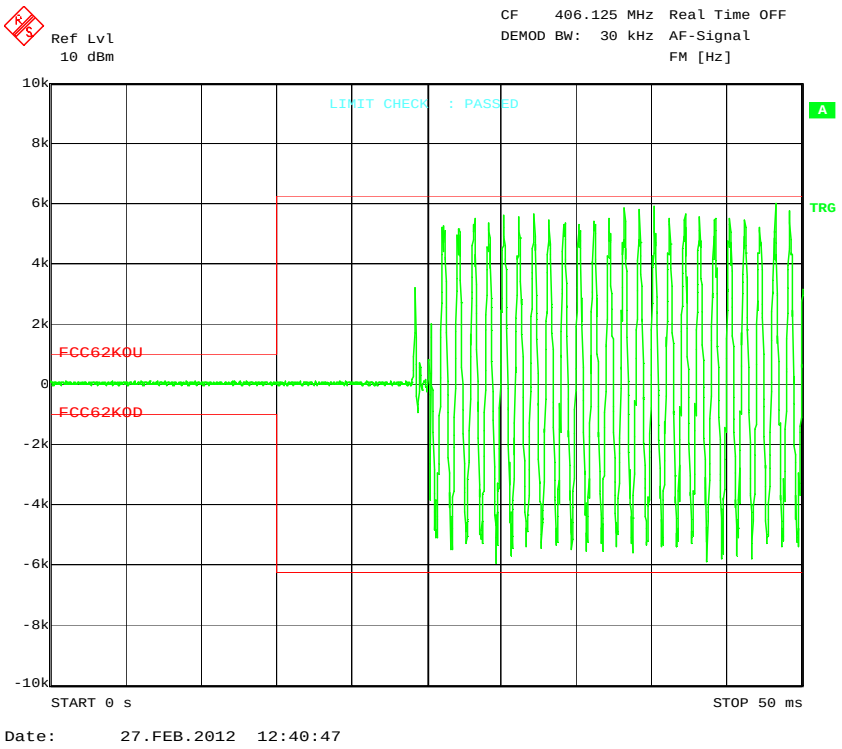


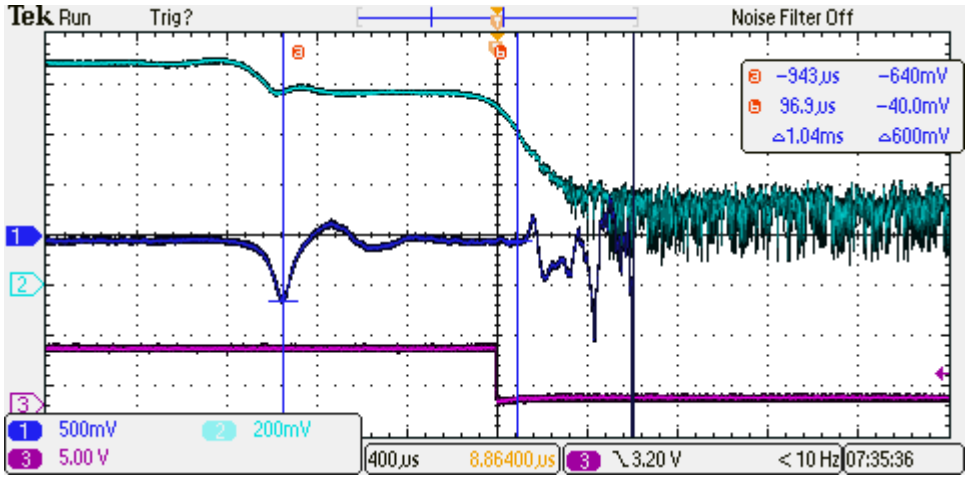
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 24: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



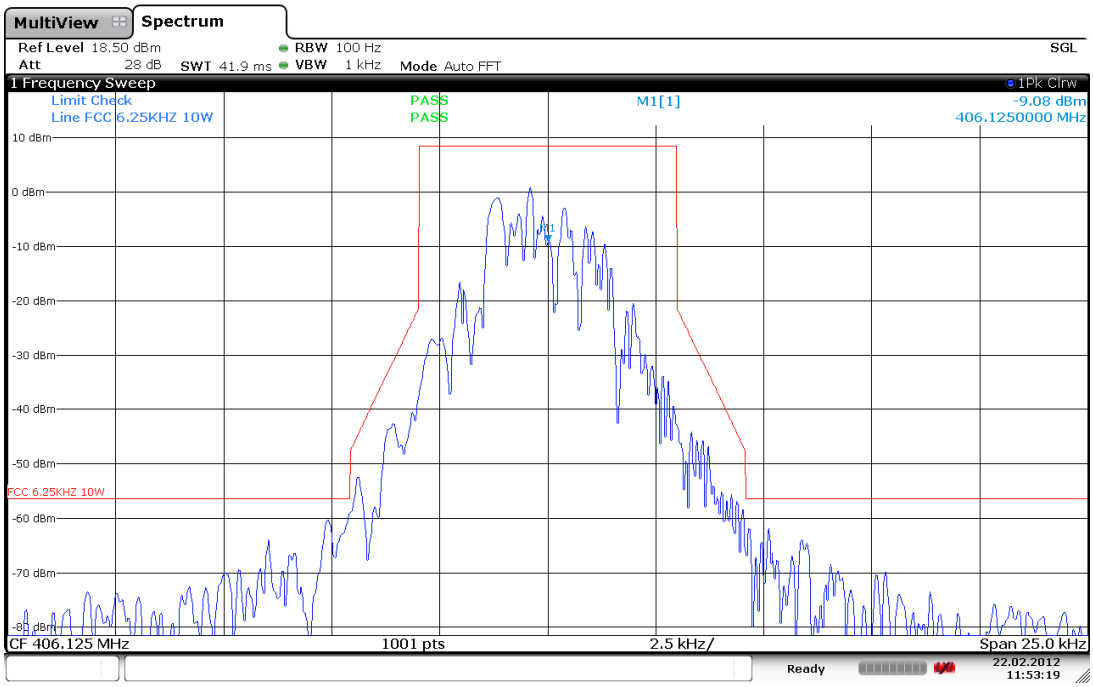


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

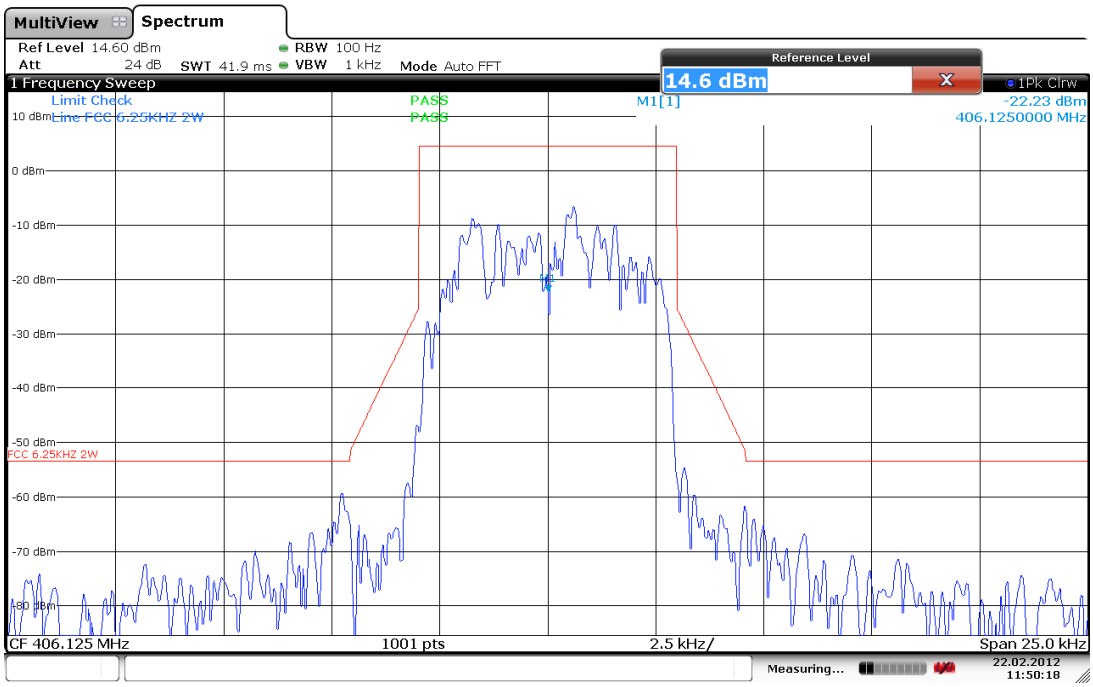
violet – PTT

GRAPH 25: Spectrum for Emission 6.25 kHz 4-CPFSK



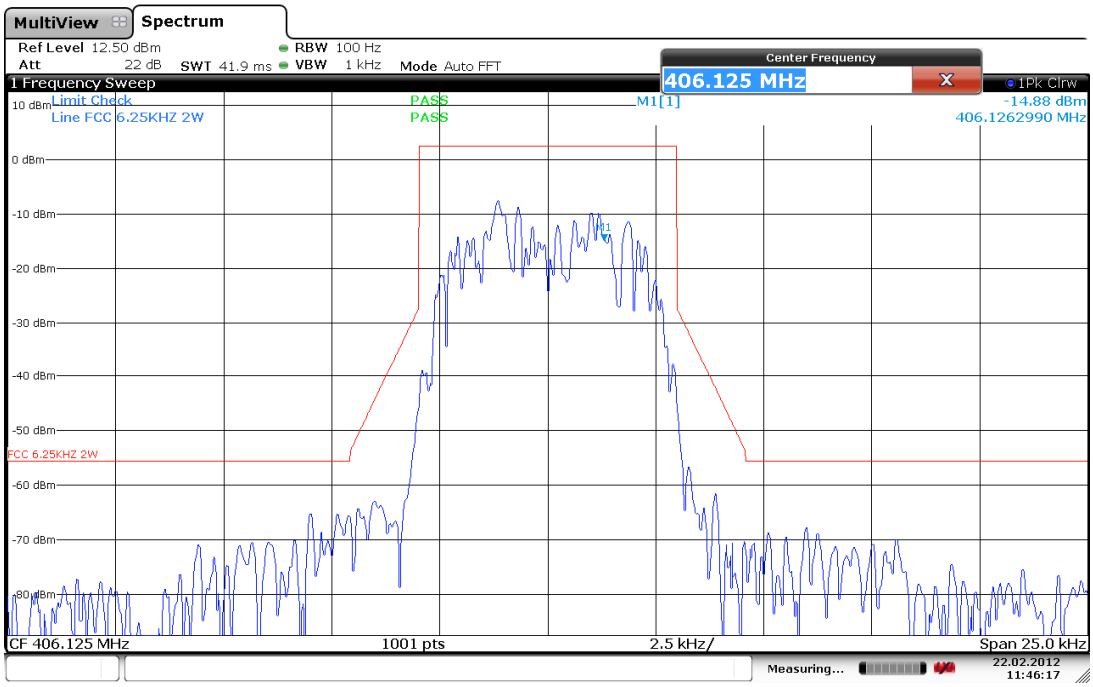
Date: 22.FEB.2012 11:53:19

GRAPH 26: Spectrum for Emission 6.25 kHz 16-DEQAM



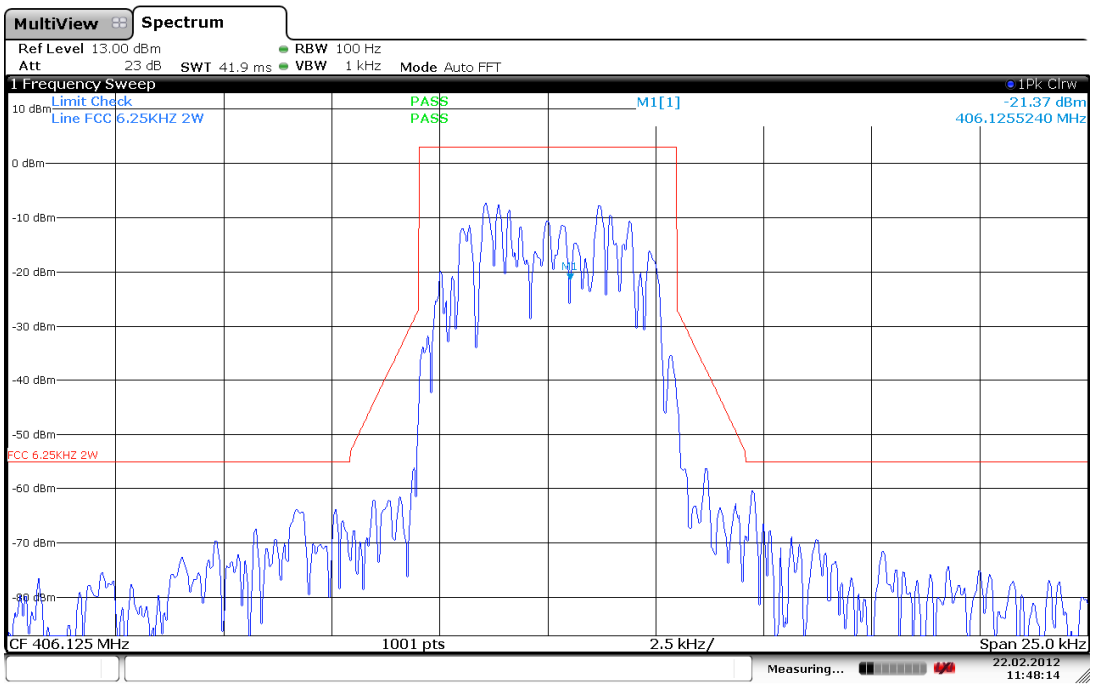
Date: 22.FEB.2012 11:50:18

GRAPH 27: Spectrum for Emission 6.25 kHz D8PSK



Date: 22.FEB.2012 11:46:17

GRAPH 28: Spectrum for Emission 6.25 kHz pi/4-DQPSK

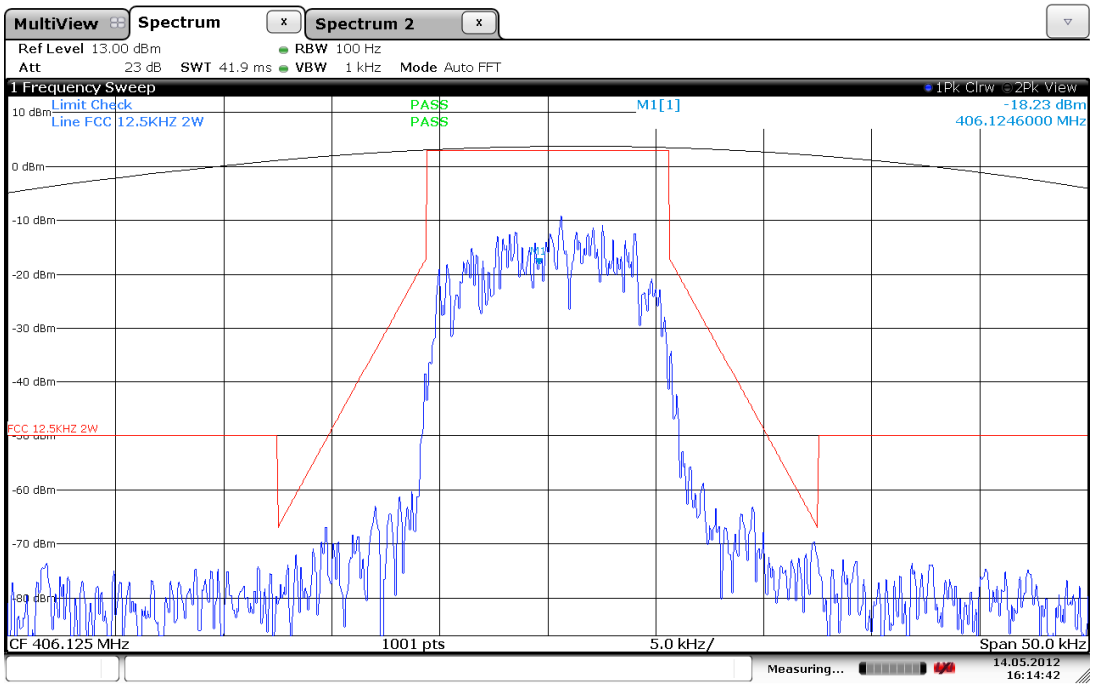


Date: 22.FEB.2012 11:48:14

GRAPH 29: Spectrum for Emission 12.5 kHz 4-CPFSK

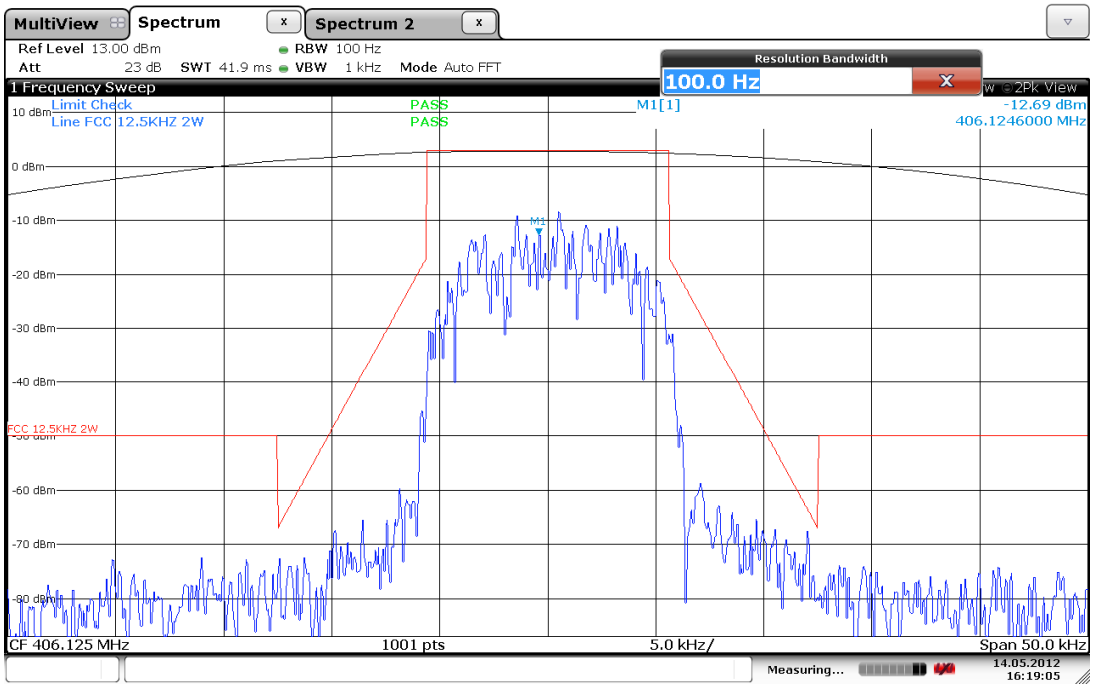
Date: 22.FEB.2012 11:20:13

GRAPH 30: Spectrum for Emission 12.5 kHz 16-DEQAM



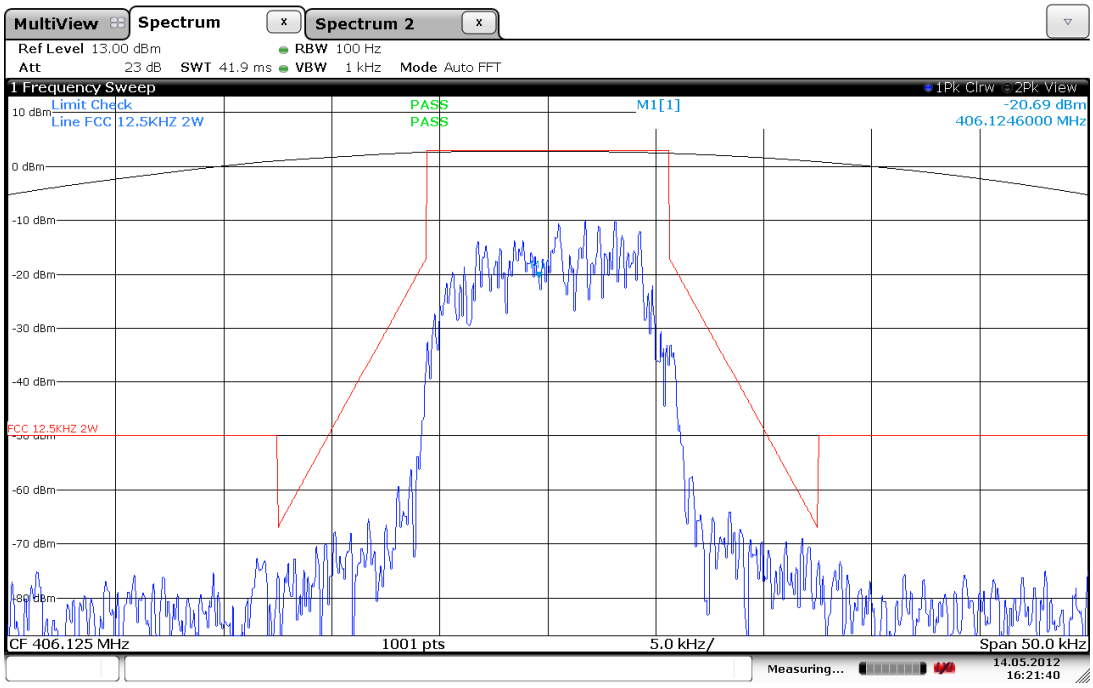
Date: 14.MAY.2012 16:14:42

GRAPH 31: Spectrum for Emission 12.5 kHz D8PSK



Date: 14.MAY.2012 16:19:05

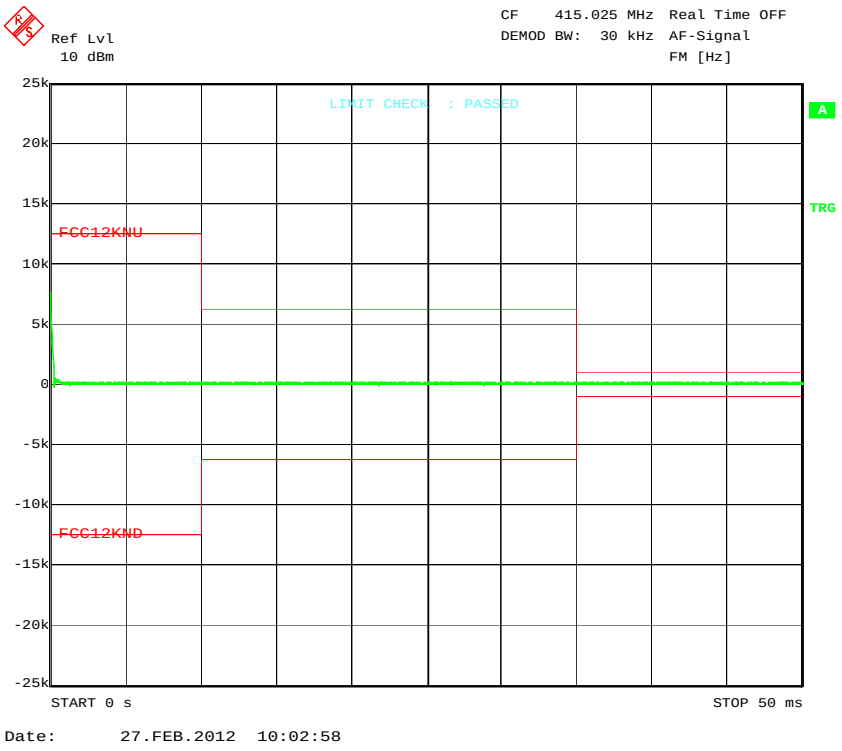
GRAPH 32: Spectrum for Emission 12.5 kHz pi/4-DQPSK

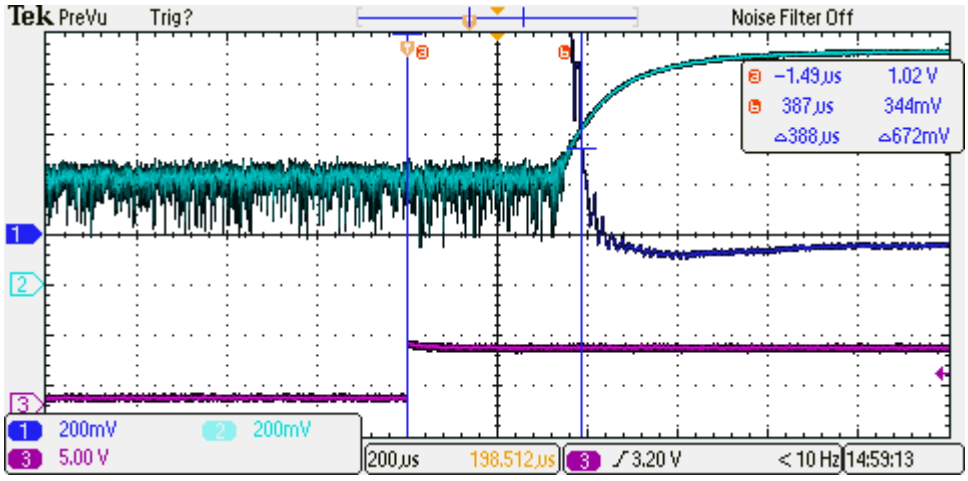


Date: 14.MAY.2012 16:21:40

4.3 Graphs – 415.025MHz

GRAPH 33: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



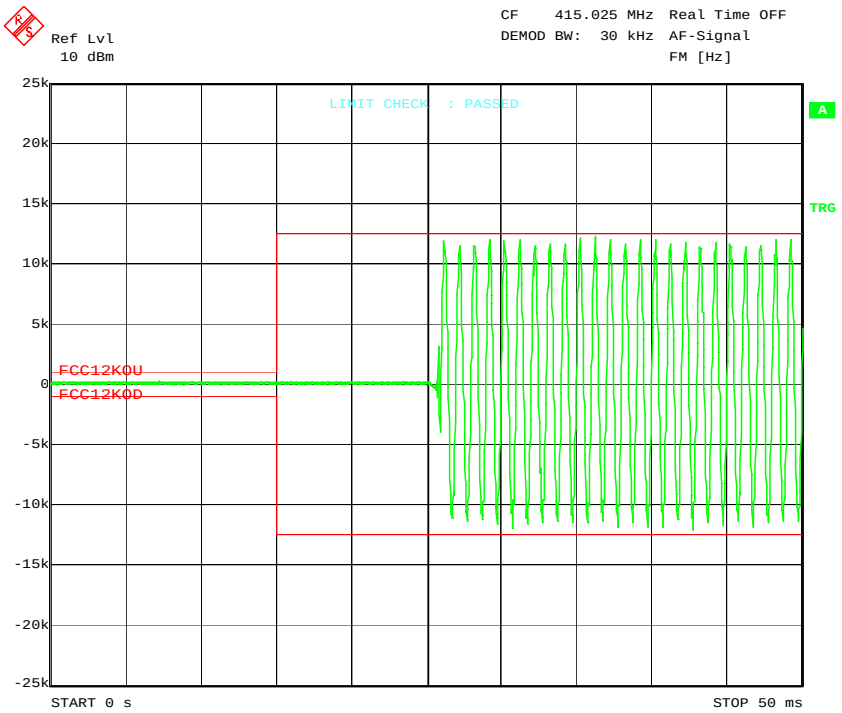


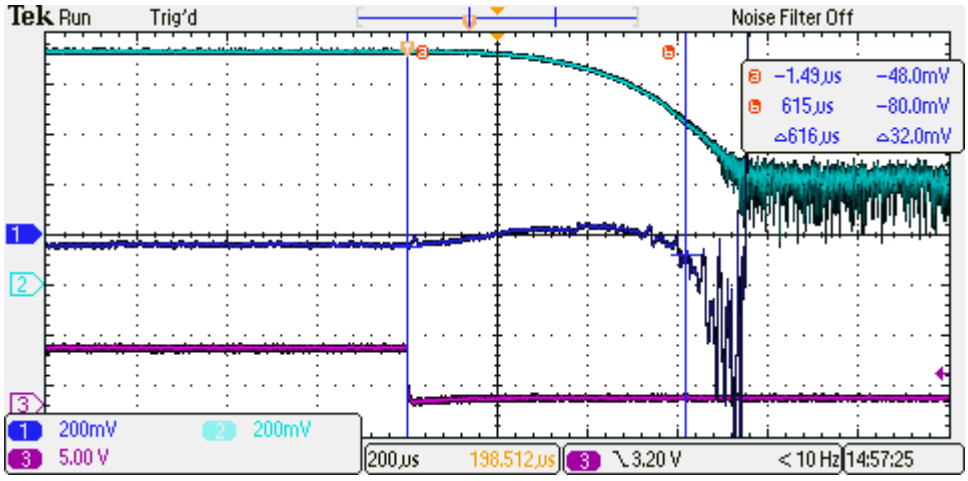
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 34: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



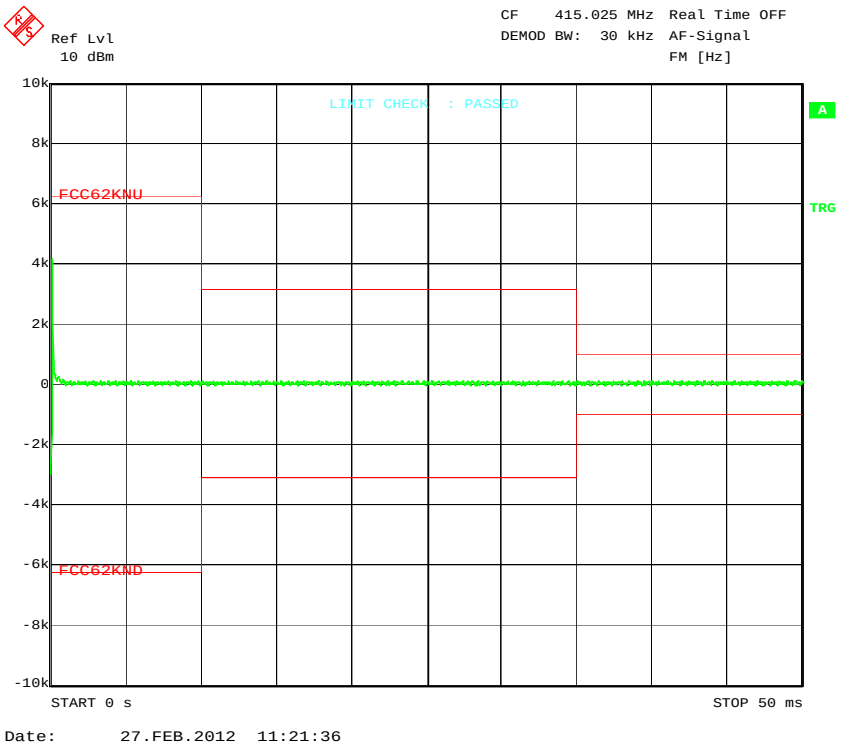


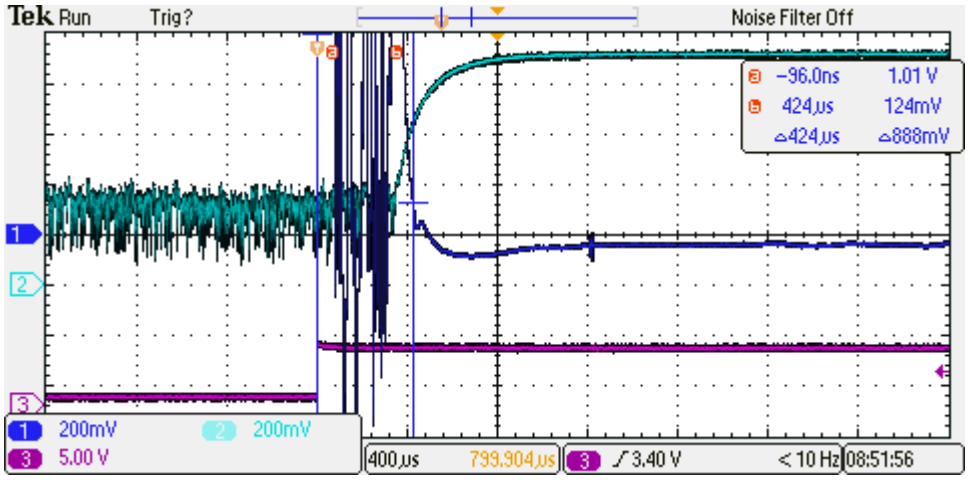
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 35: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



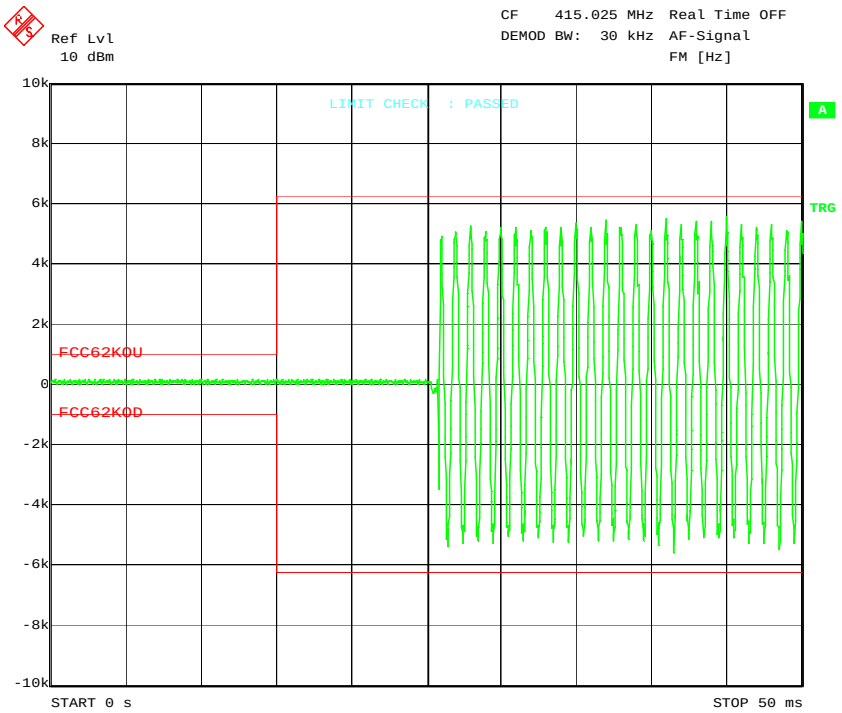


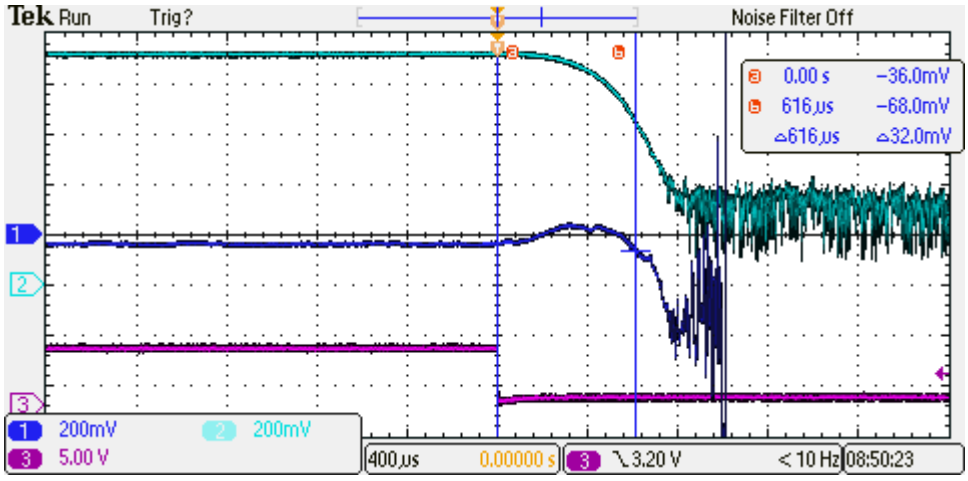
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 36: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



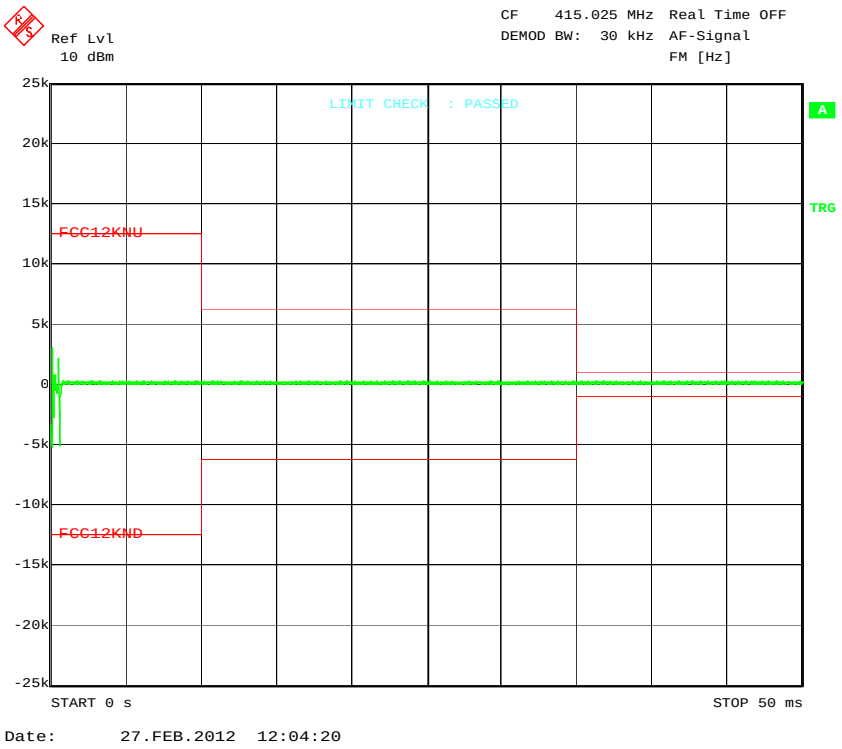


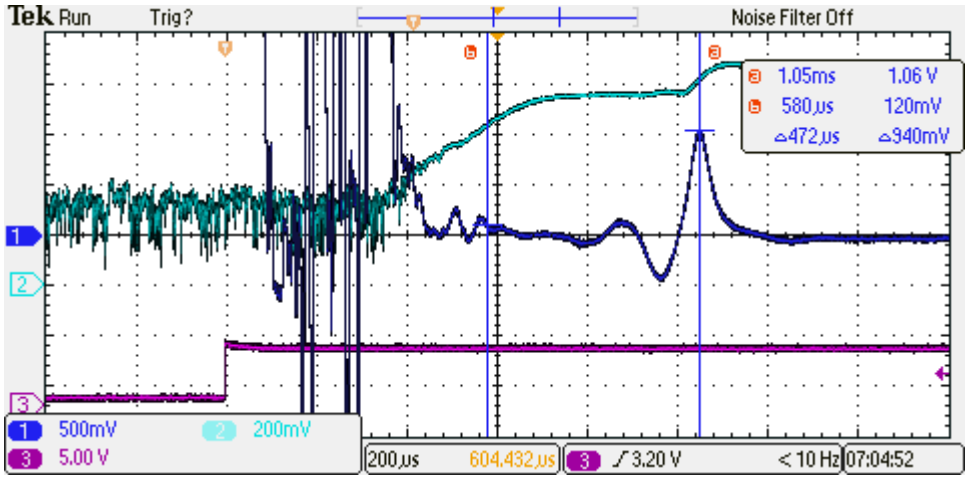
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 37: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



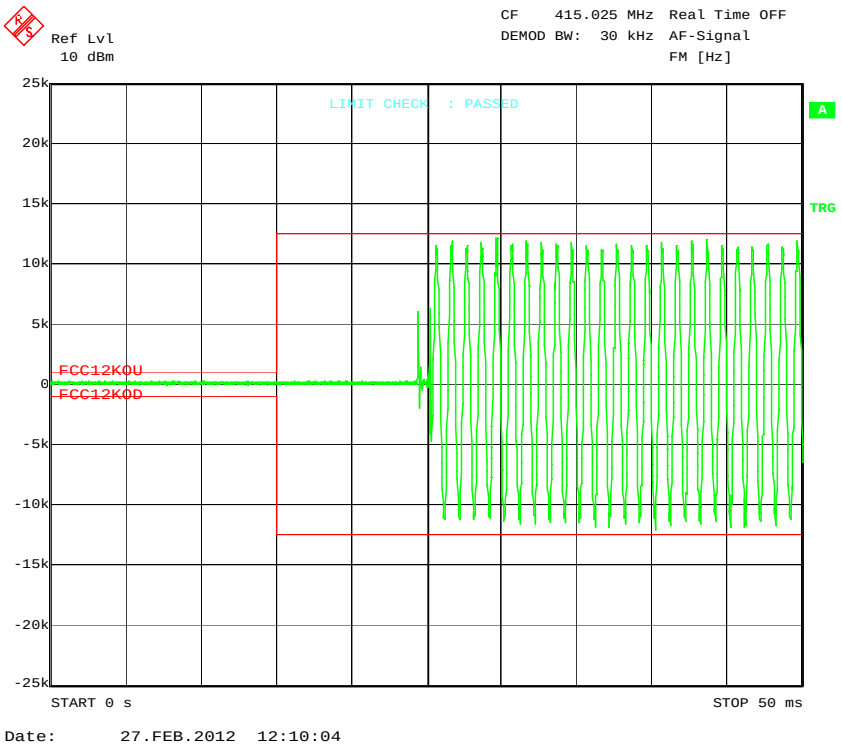


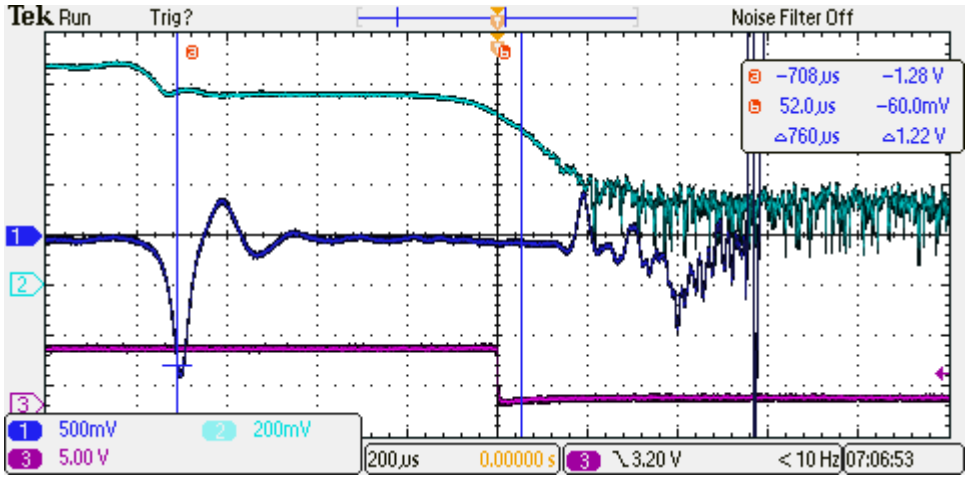
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 38: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



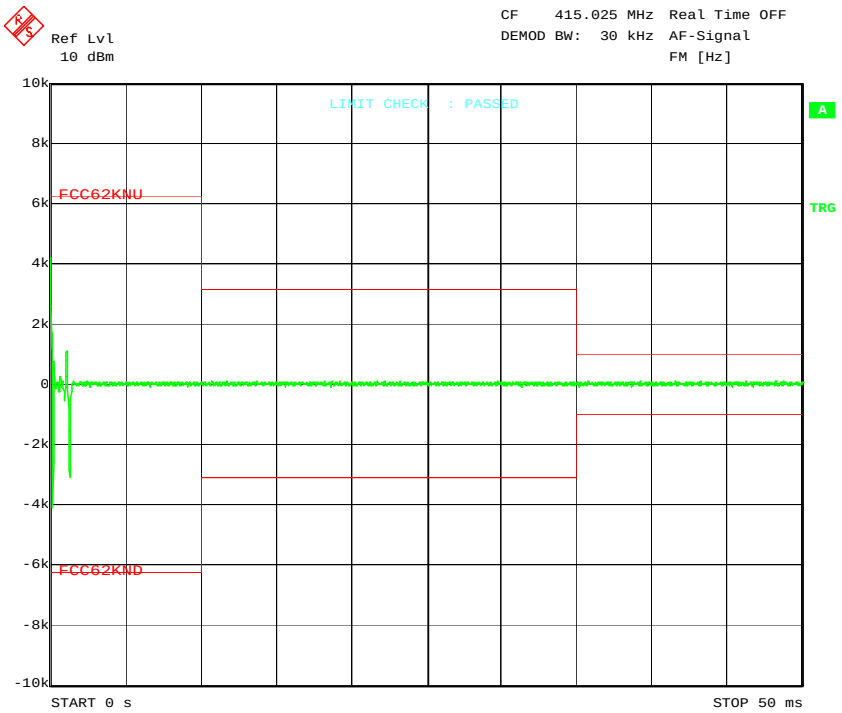


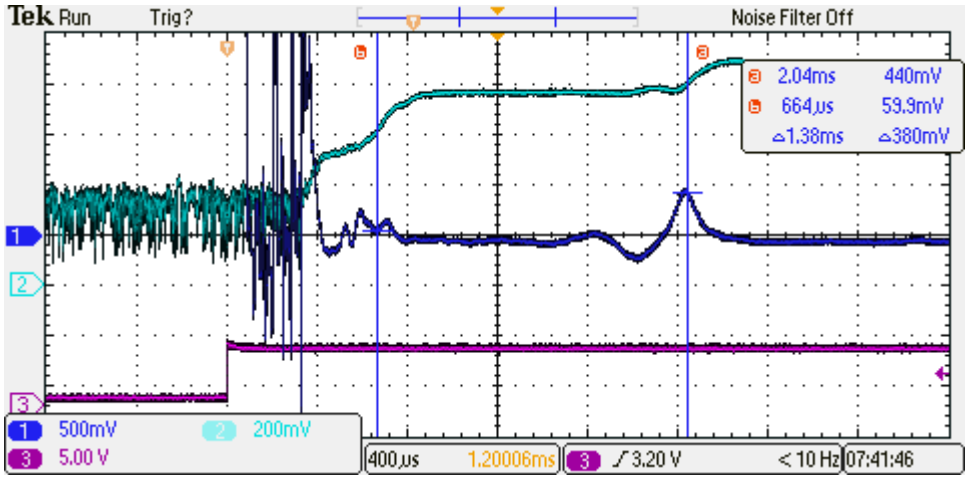
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 39: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



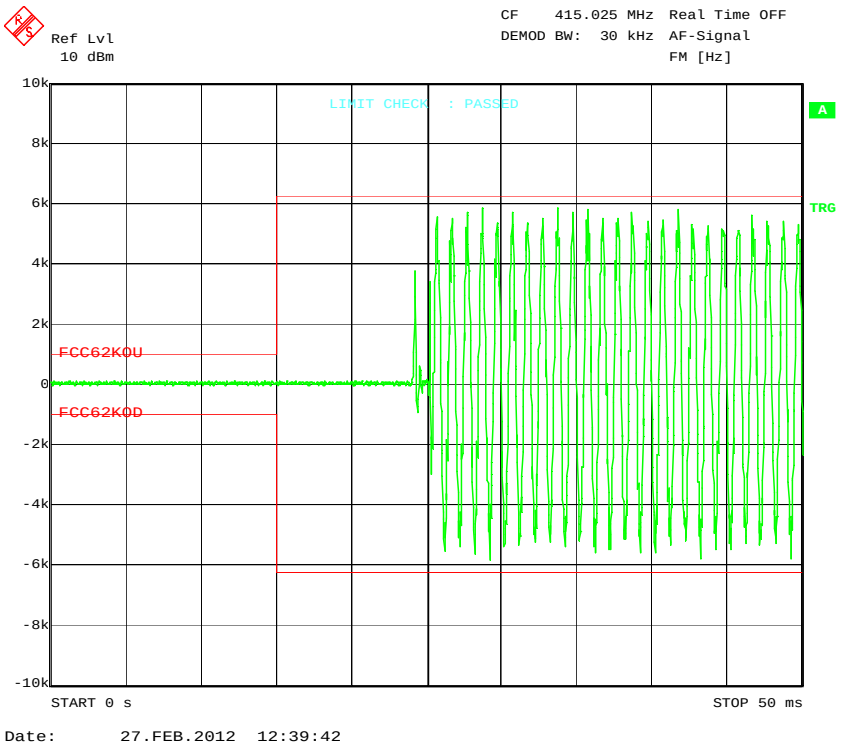


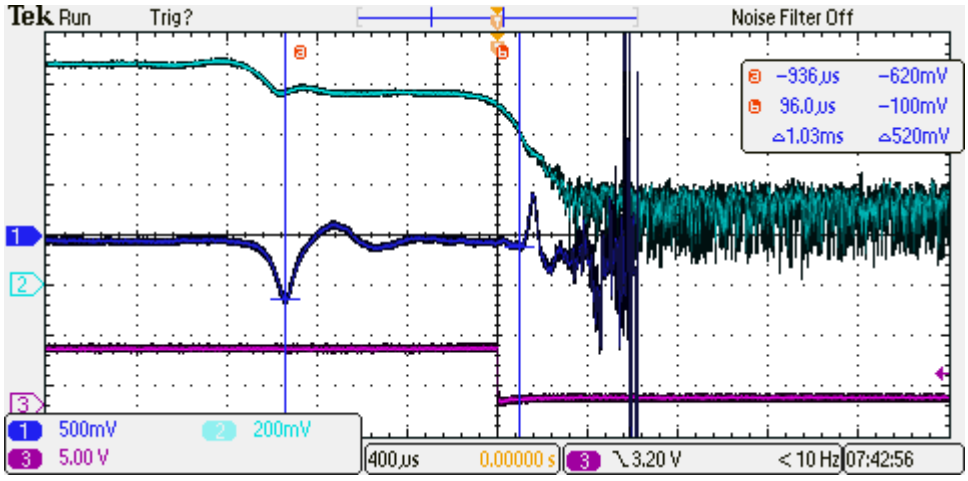
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 40: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



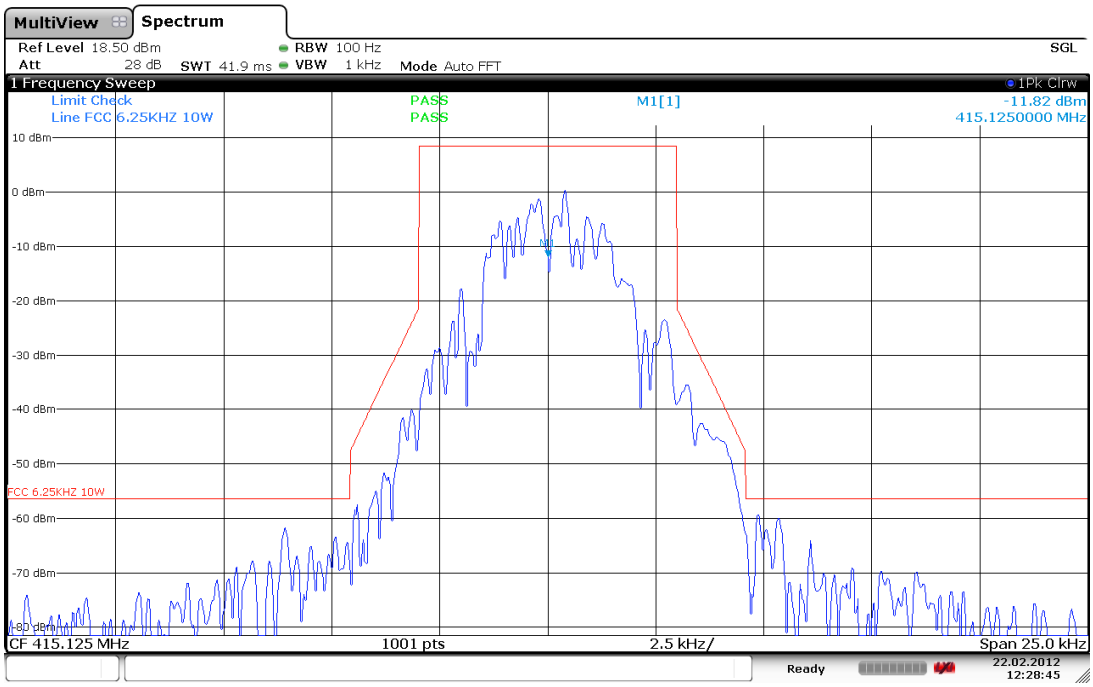


blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

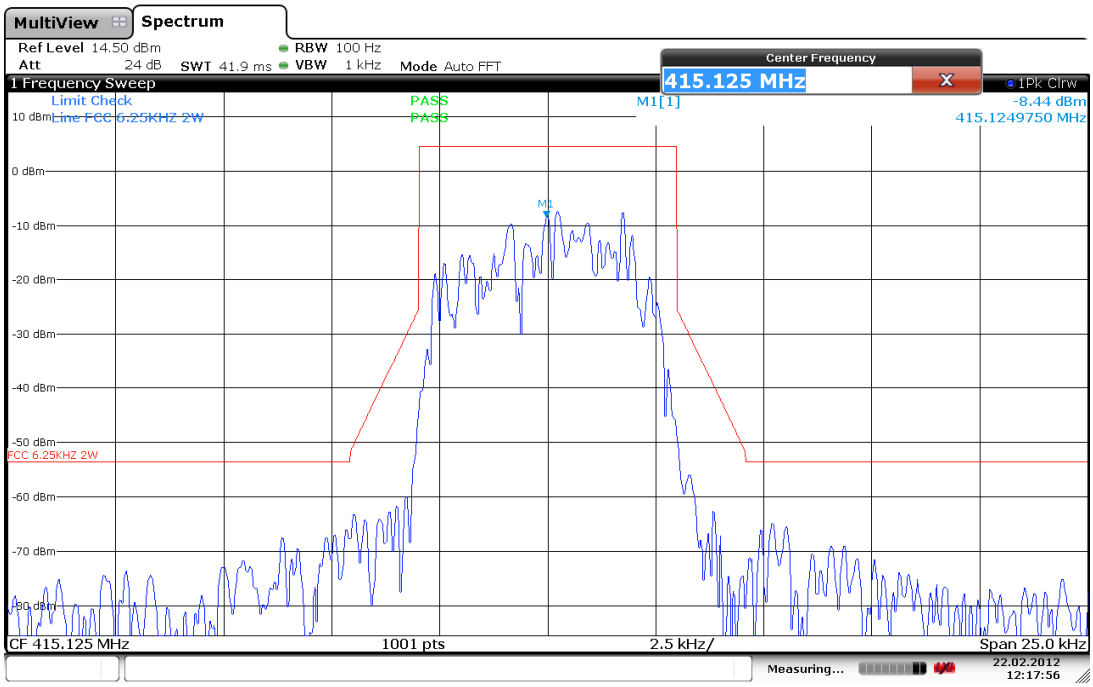
violet – PTT

GRAPH 41: Spectrum for Emission 6.25 kHz 4-CPFSK



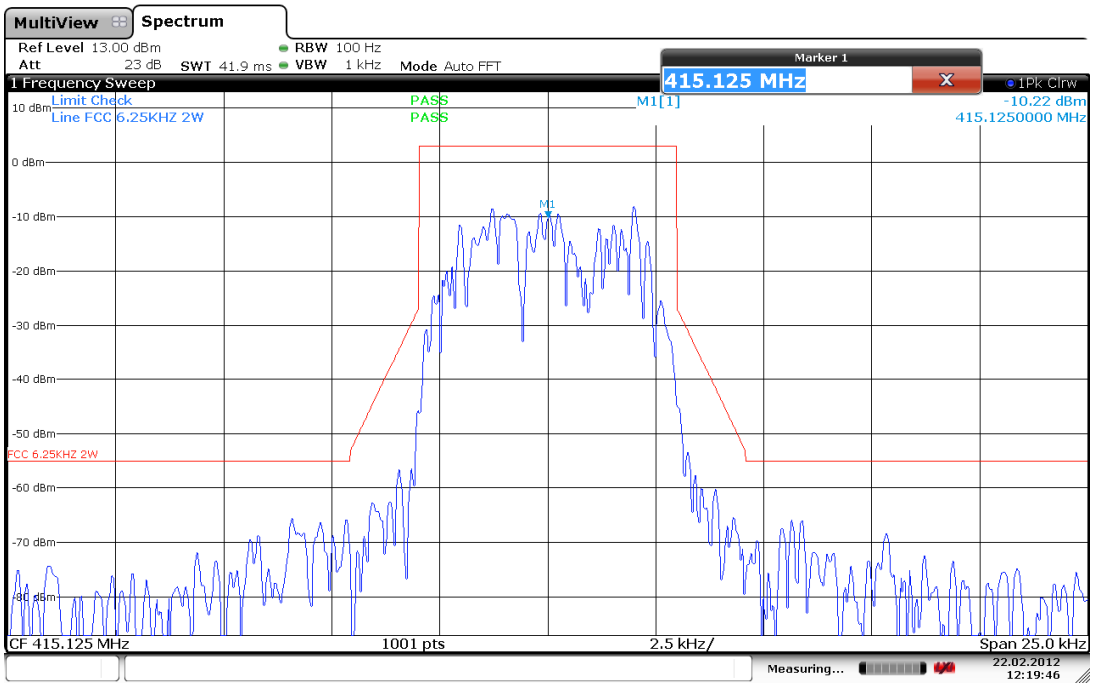
Date: 22.FEB.2012 12:28:46

GRAPH 42: Spectrum for Emission 6.25 kHz 16-DEQAM



Date: 22.FEB.2012 12:17:57

GRAPH 43: Spectrum for Emission 6.25 kHz D8PSK

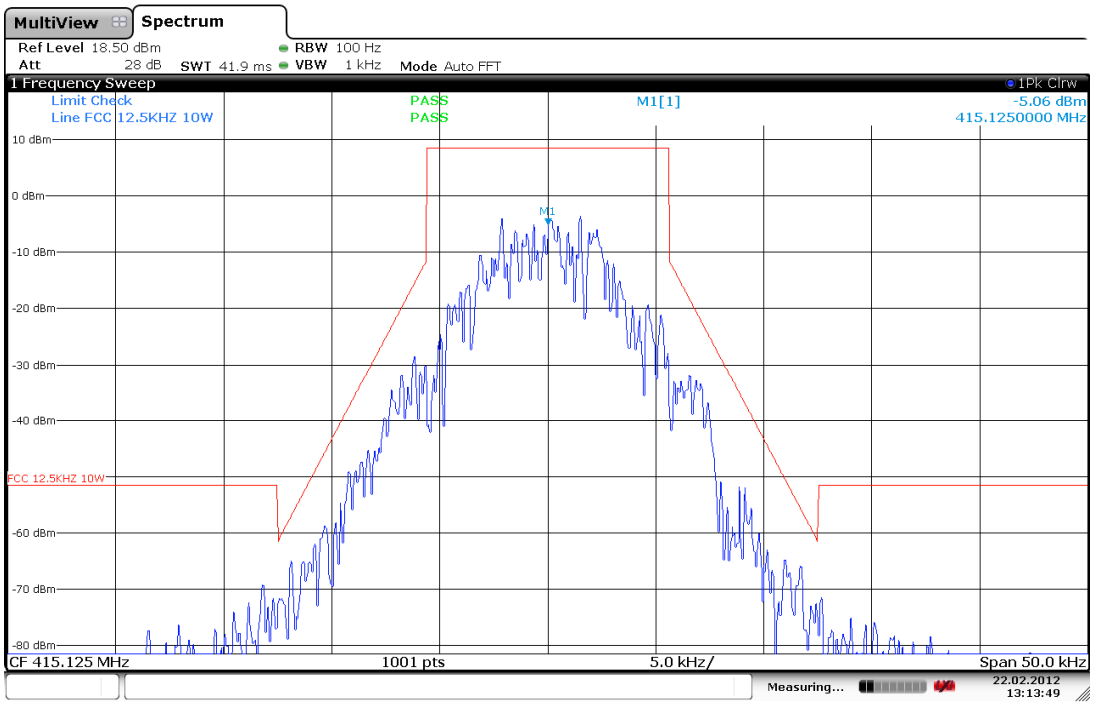


Date: 22.FEB.2012 12:19:46

GRAPH 44: Spectrum for Emission 6.25 kHz pi/4-DQPSK

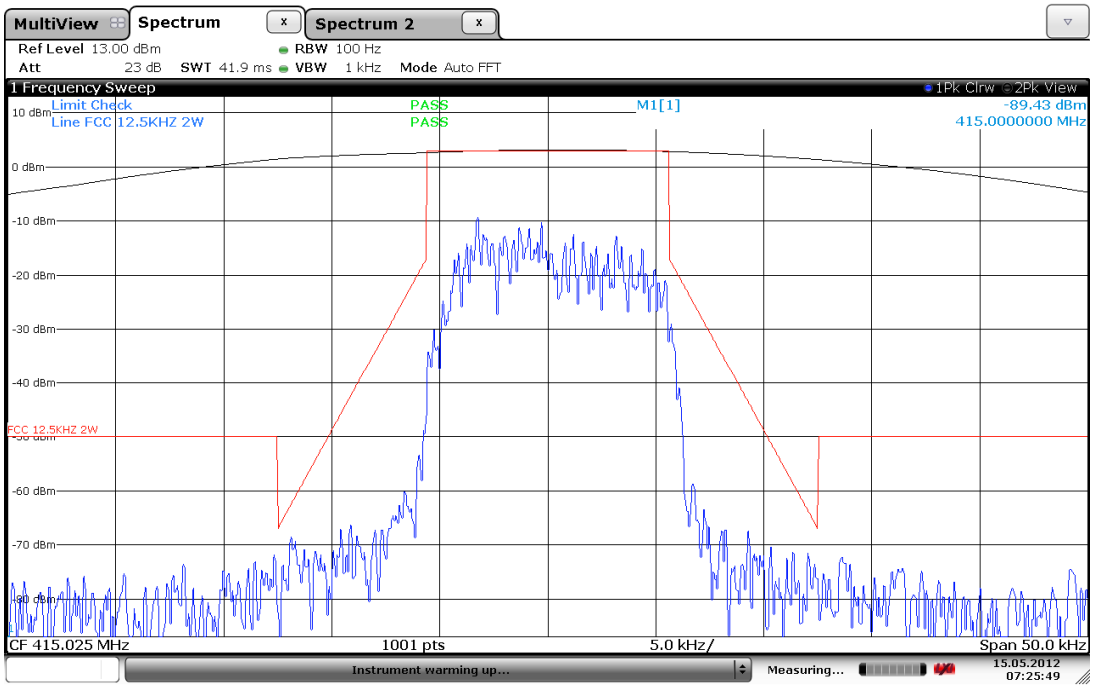
Date: 22.FEB.2012 12:23:43

GRAPH 45: Spectrum for Emission 12.5 kHz 4-CPFSK



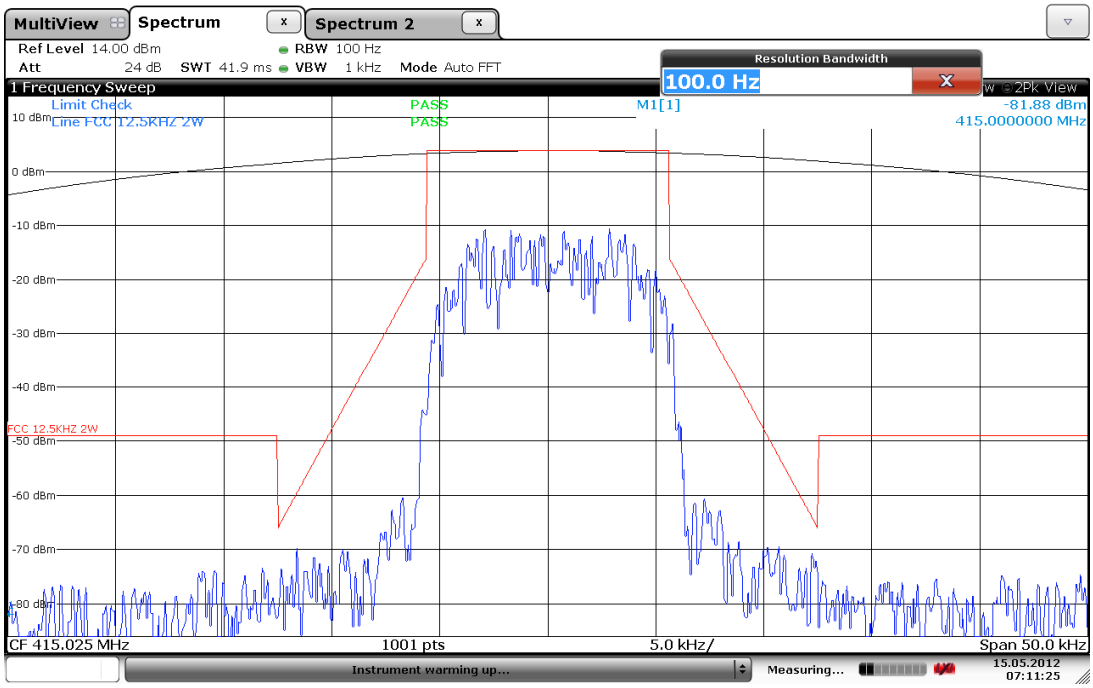
Date: 22.FEB.2012 13:13:49

GRAPH 46: Spectrum for Emission 12.5 kHz 16-DEQAM



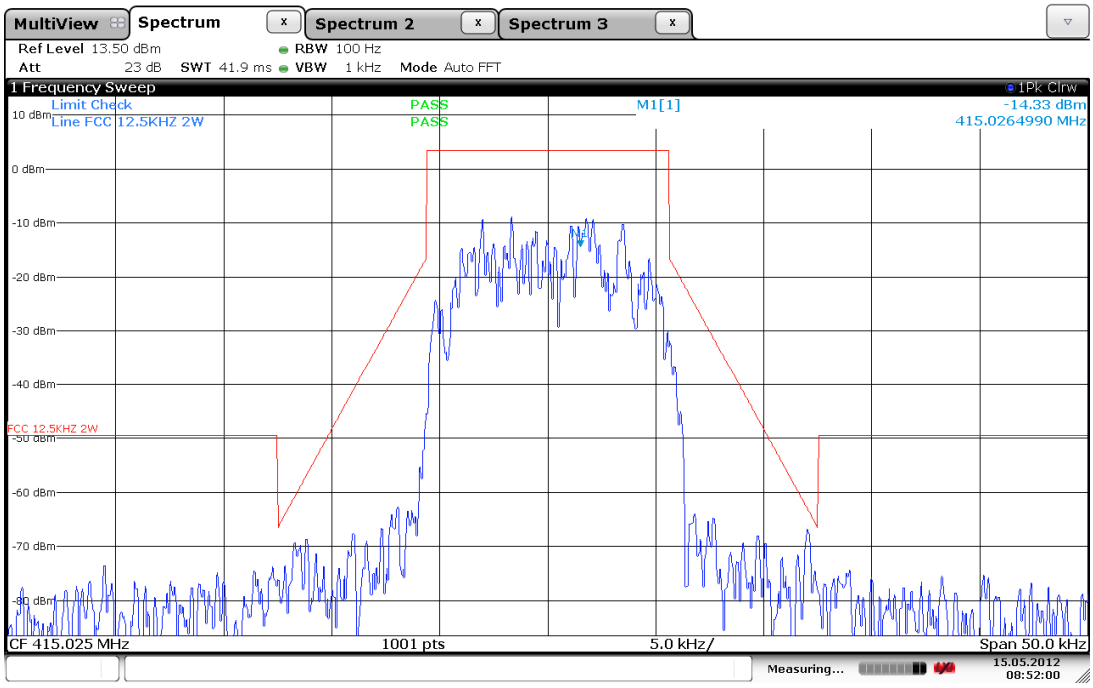
Date: 15.MAY.2012 07:25:48

GRAPH 47: Spectrum for Emission 12.5 kHz D8PSK



Date: 15.MAY.2012 07:11:25

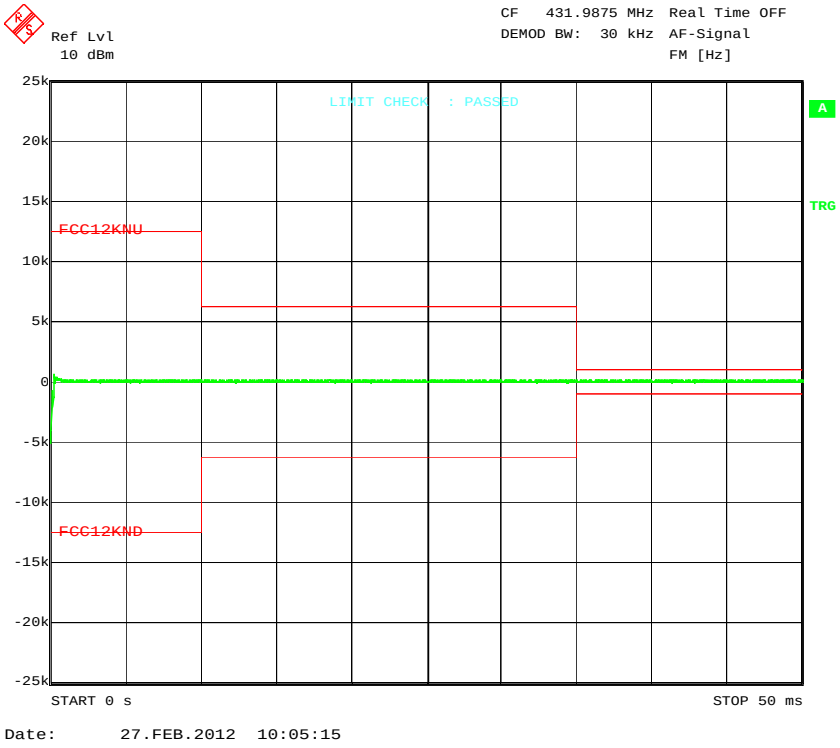
GRAPH 48: Spectrum for Emission 12.5 kHz pi/4-DQPSK

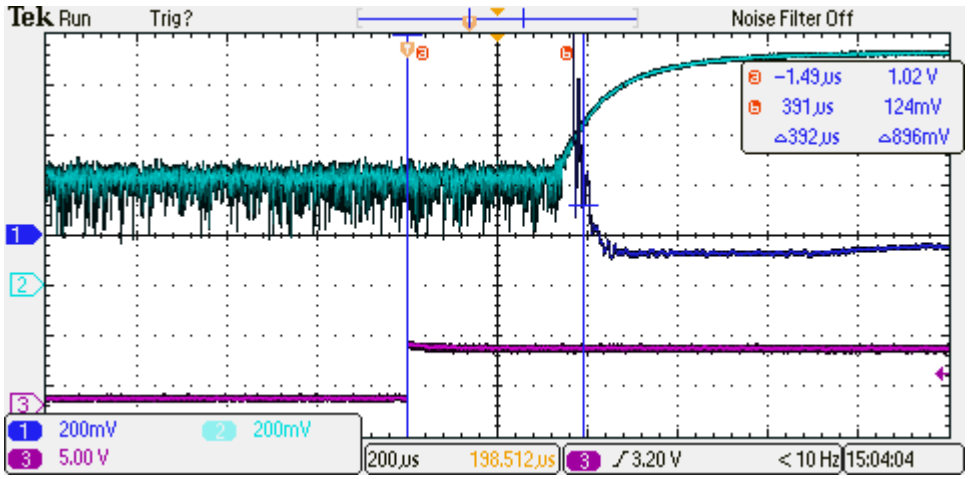


Date: 15.MAY.2012 08:52:00

4.4 Graphs – 431.9875 MHz

GRAPH 49: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



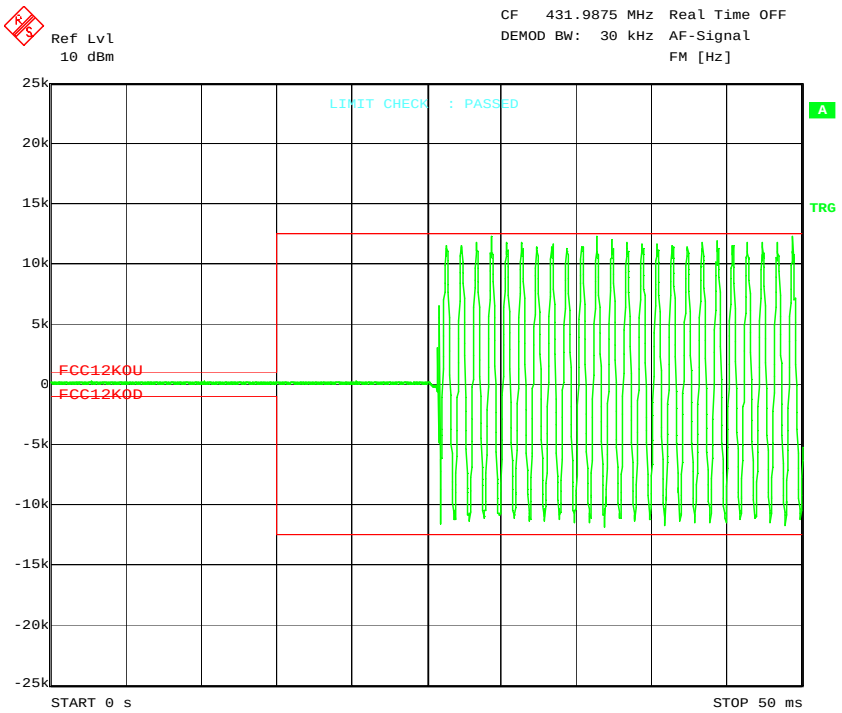


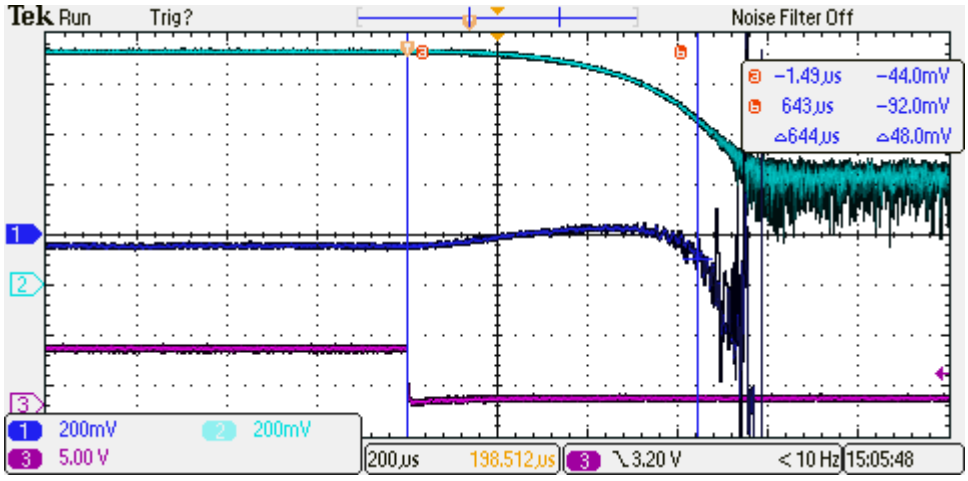
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 50: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



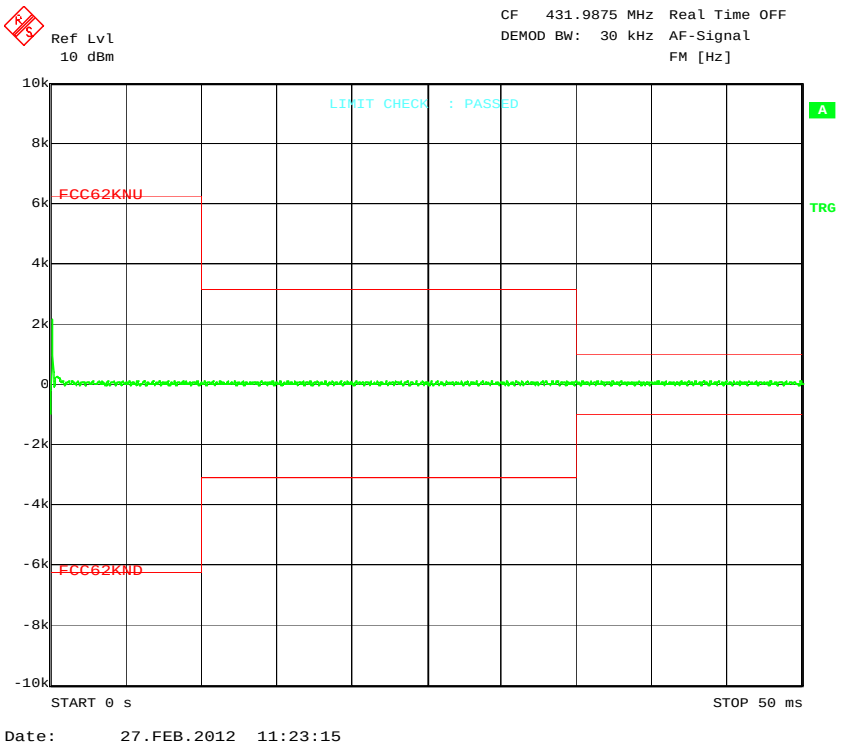


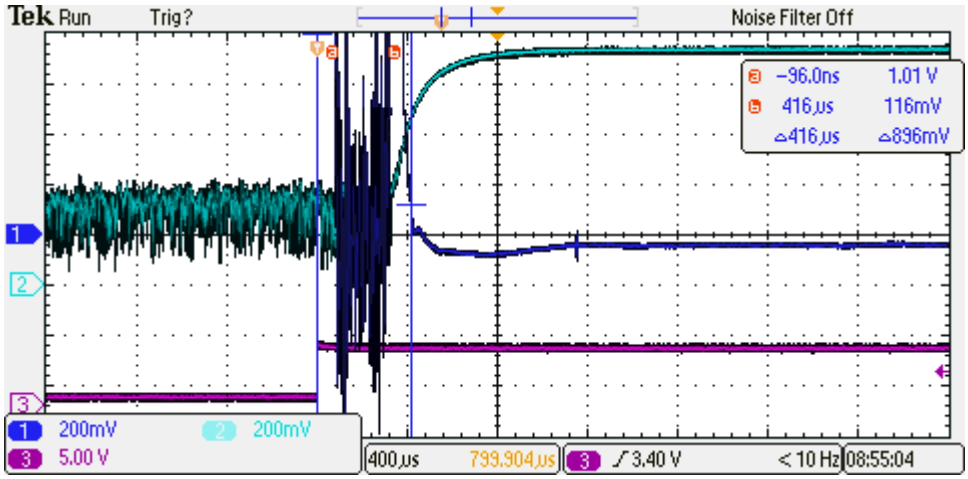
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 51: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



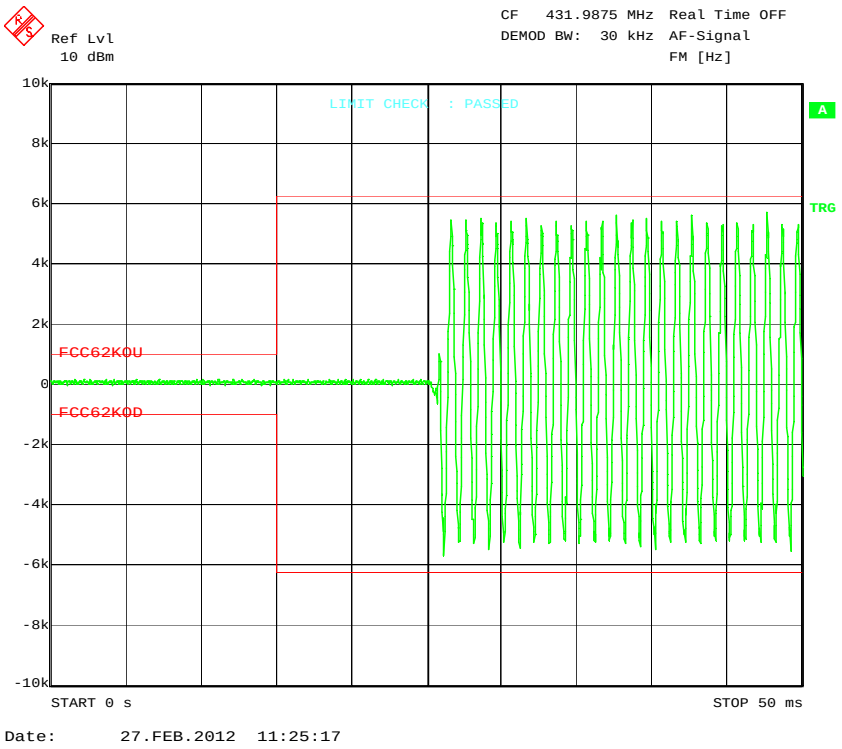


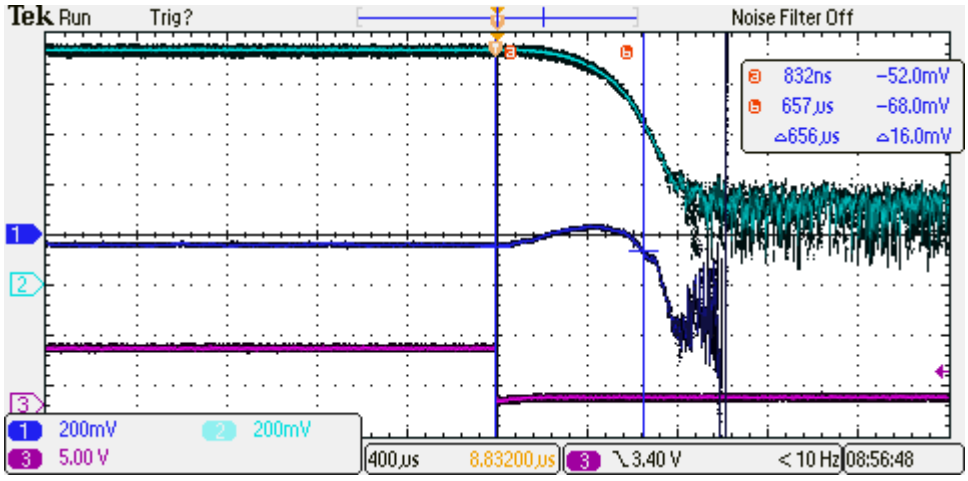
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 52: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



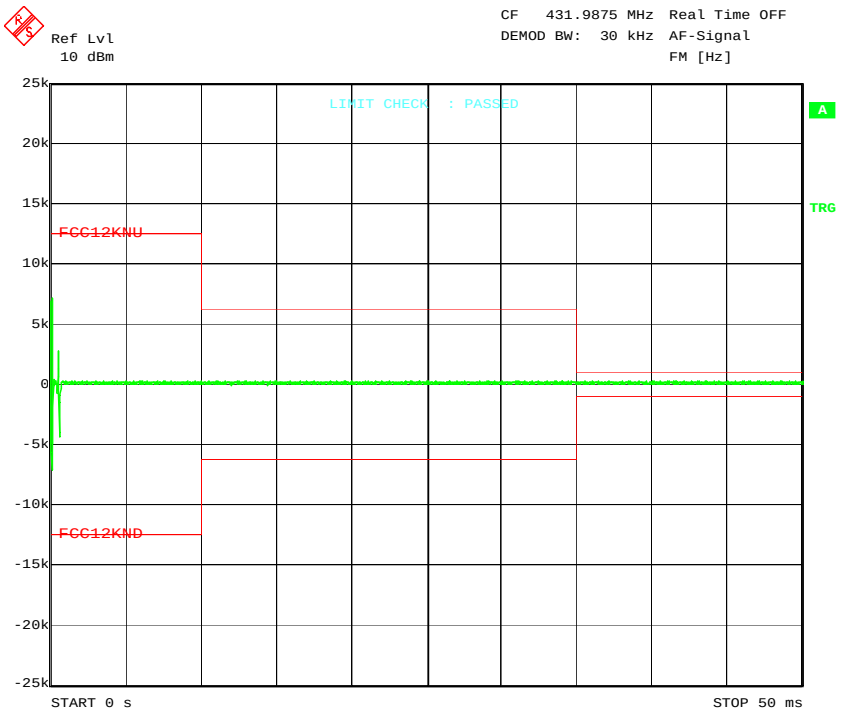


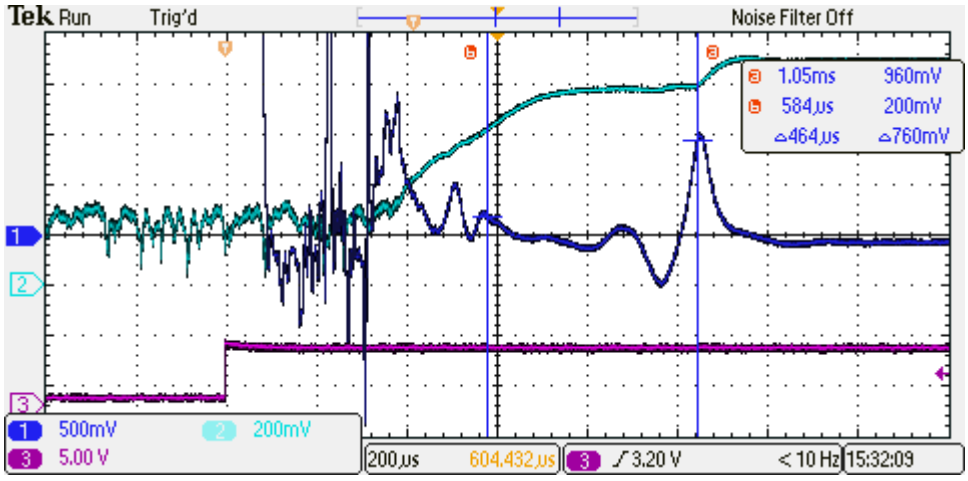
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 53: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



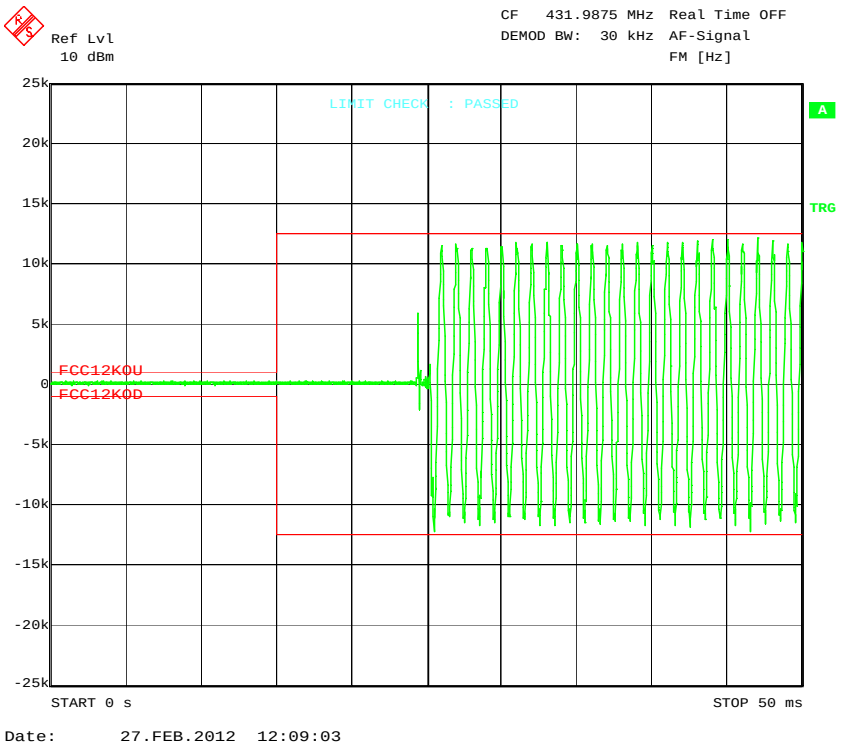


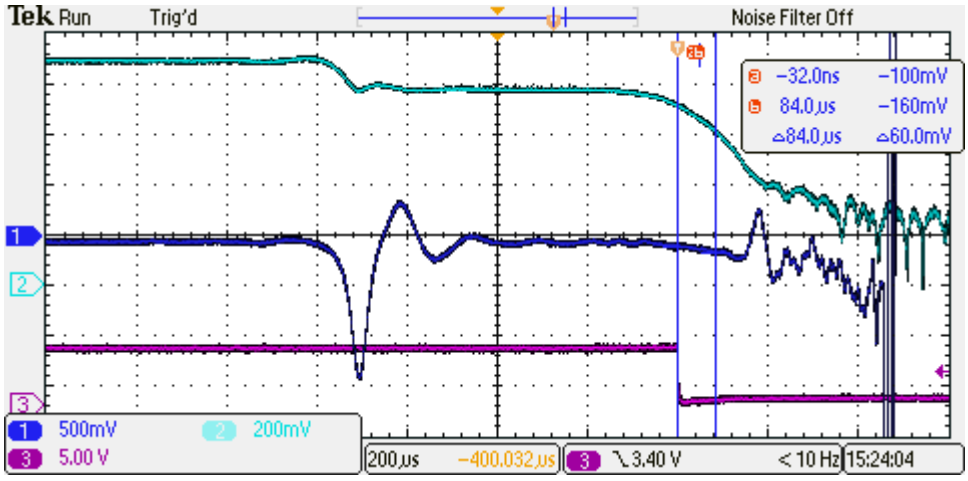
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 54: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF



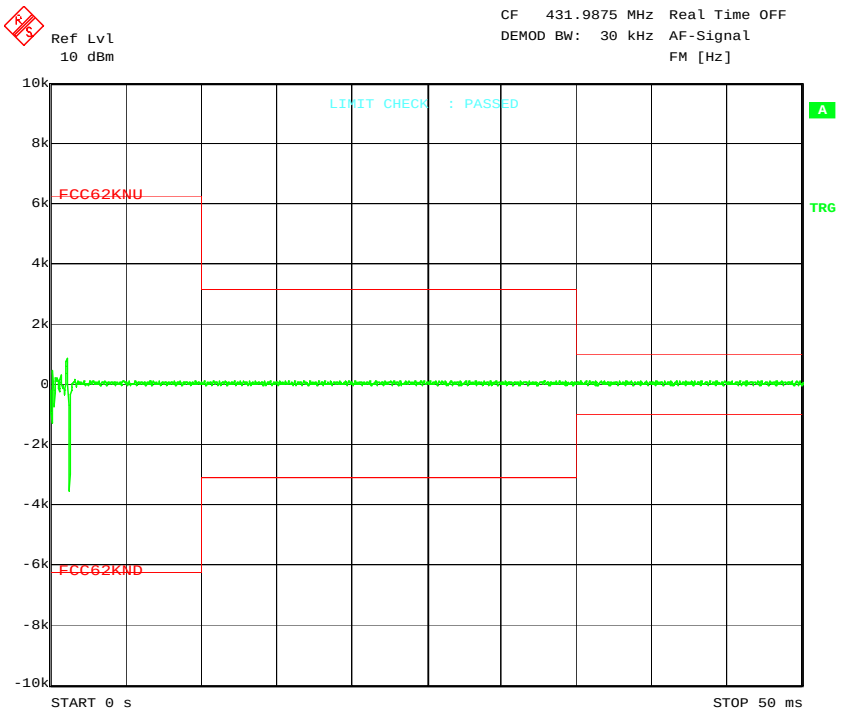


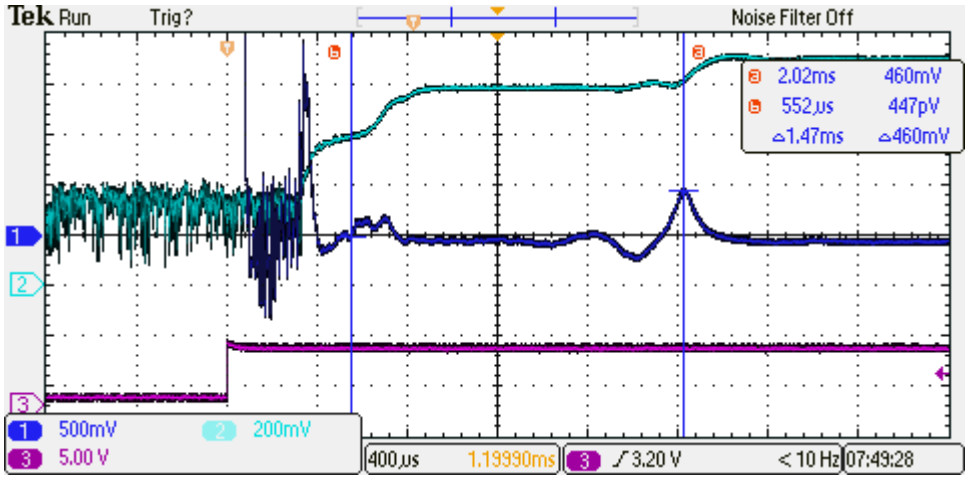
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 55: Transient behaviour, carrier frequency as a function of time, CH 1, switch ON



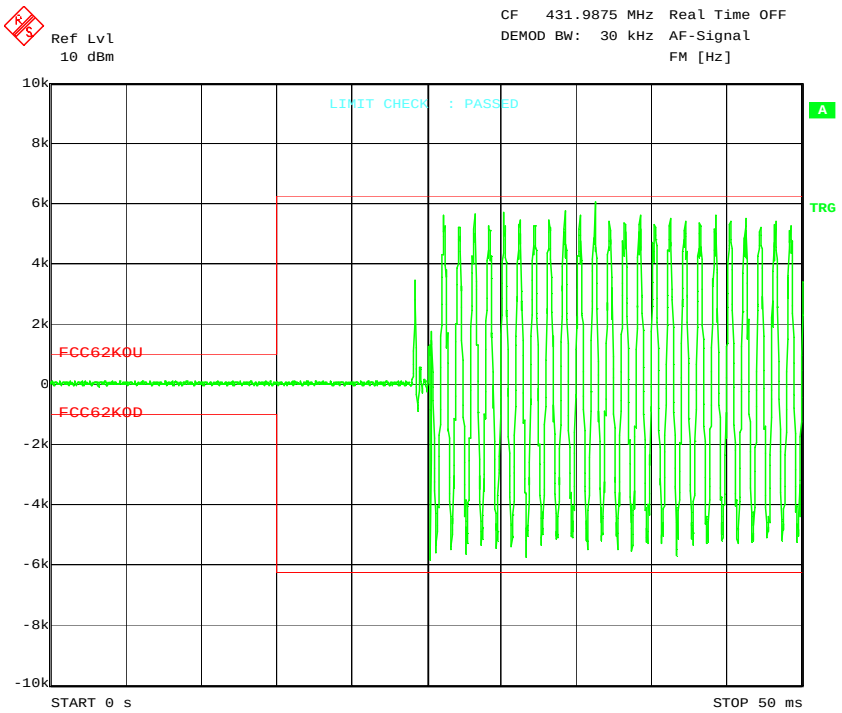


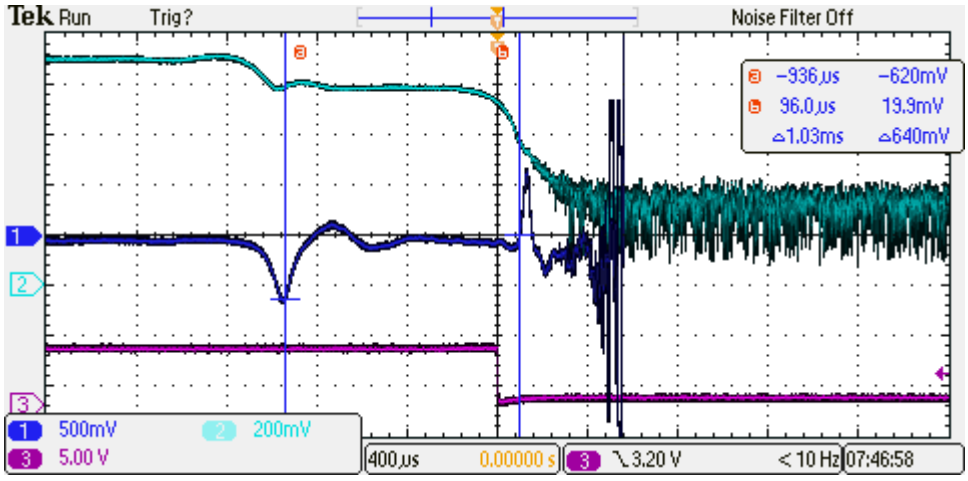
blue – power as a function of time (90 mV/10dB)

dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 56: Transient behaviour, carrier frequency as a function of time, CH 1, switch OFF





blue – power as a function of time (90 mV/10dB)

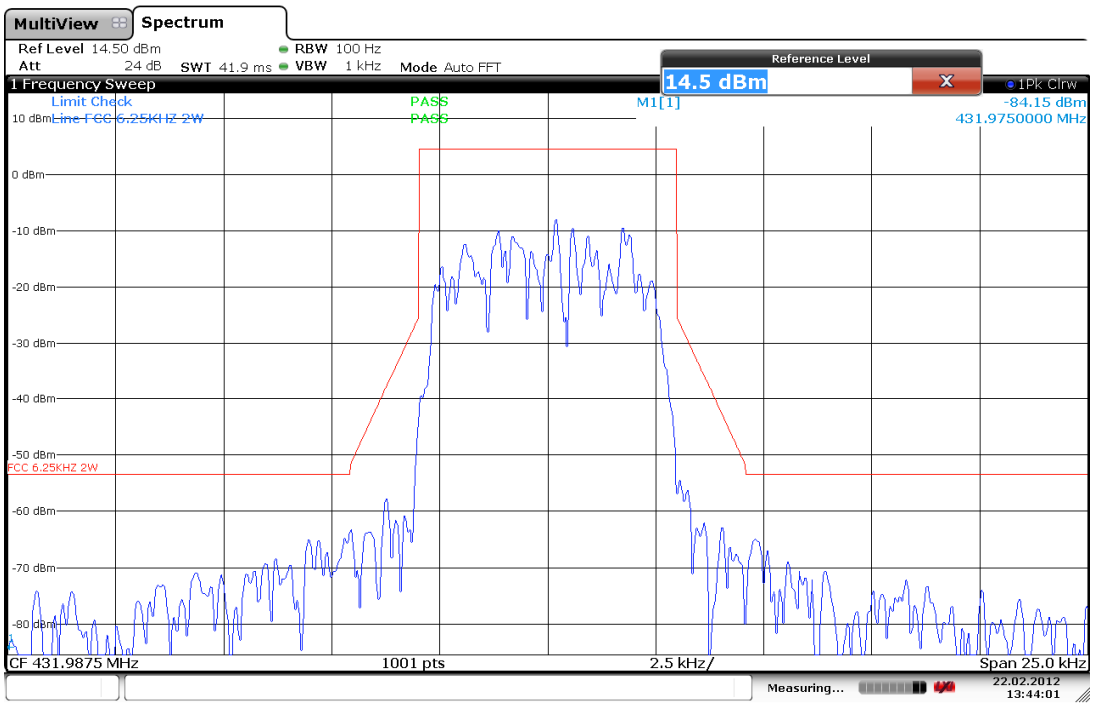
dark blue – frequency as a function of time (200mV/1kHz)

violet – PTT

GRAPH 57: Spectrum for Emission 6.25 kHz 4-CPFSK

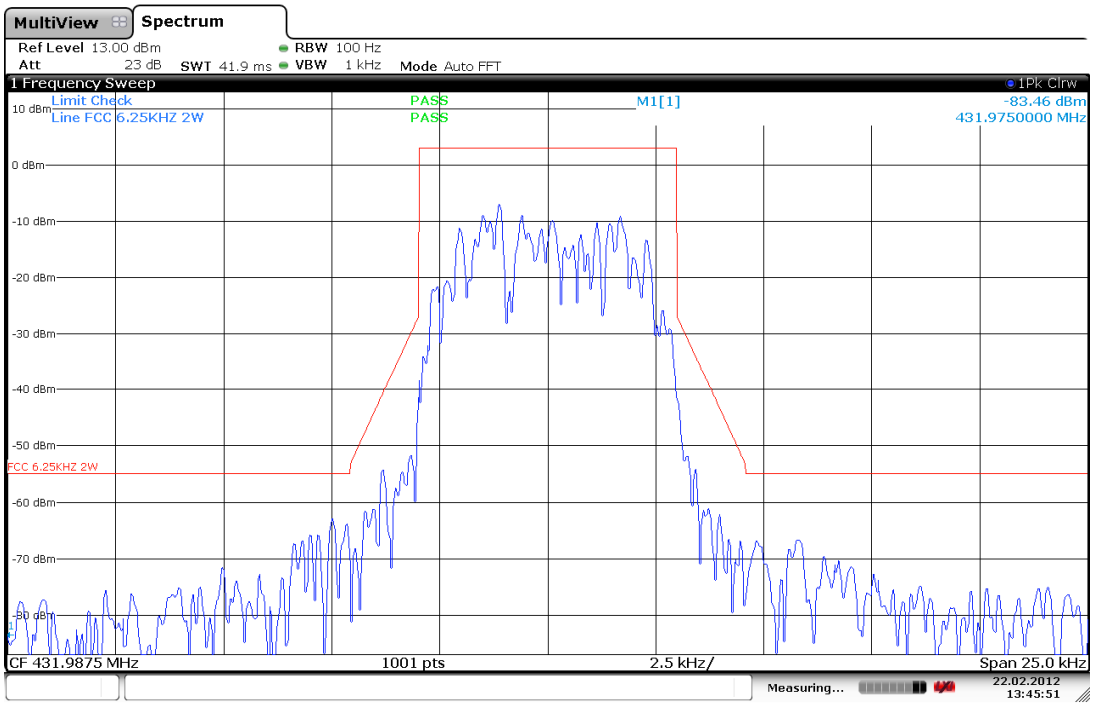
Date: 22.FEB.2012 13:58:17

GRAPH 58: Spectrum for Emission 6.25 kHz 16-DEQAM



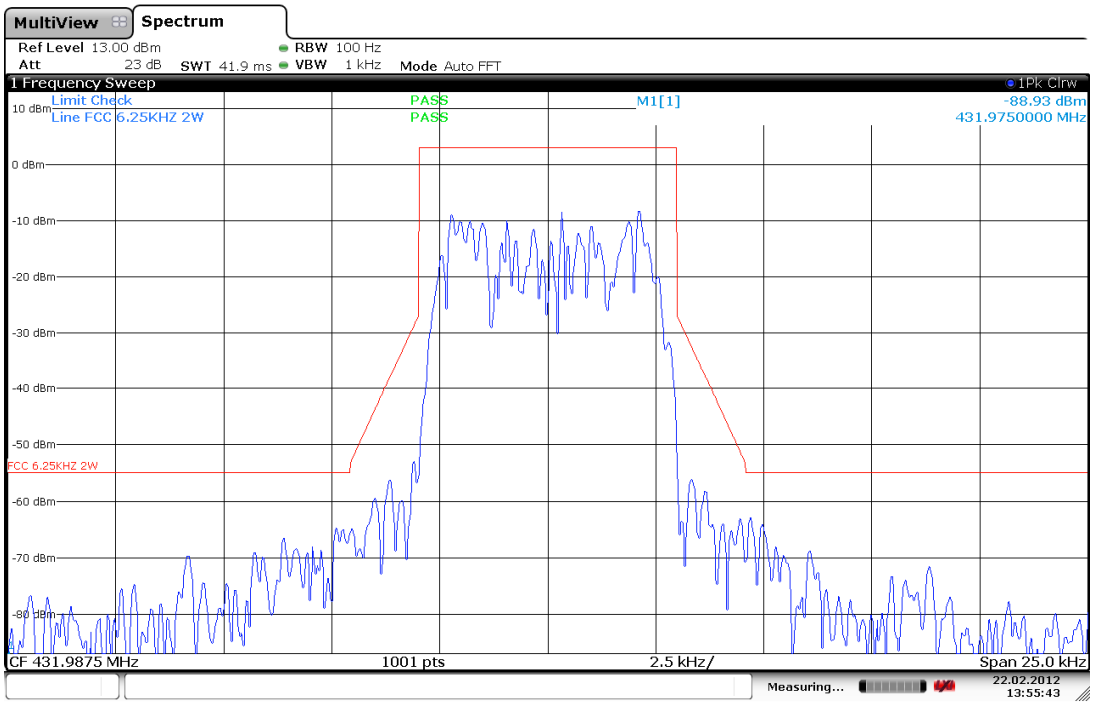
Date: 22.FEB.2012 13:44:01

GRAPH 59: Spectrum for Emission 6.25 kHz D8PSK



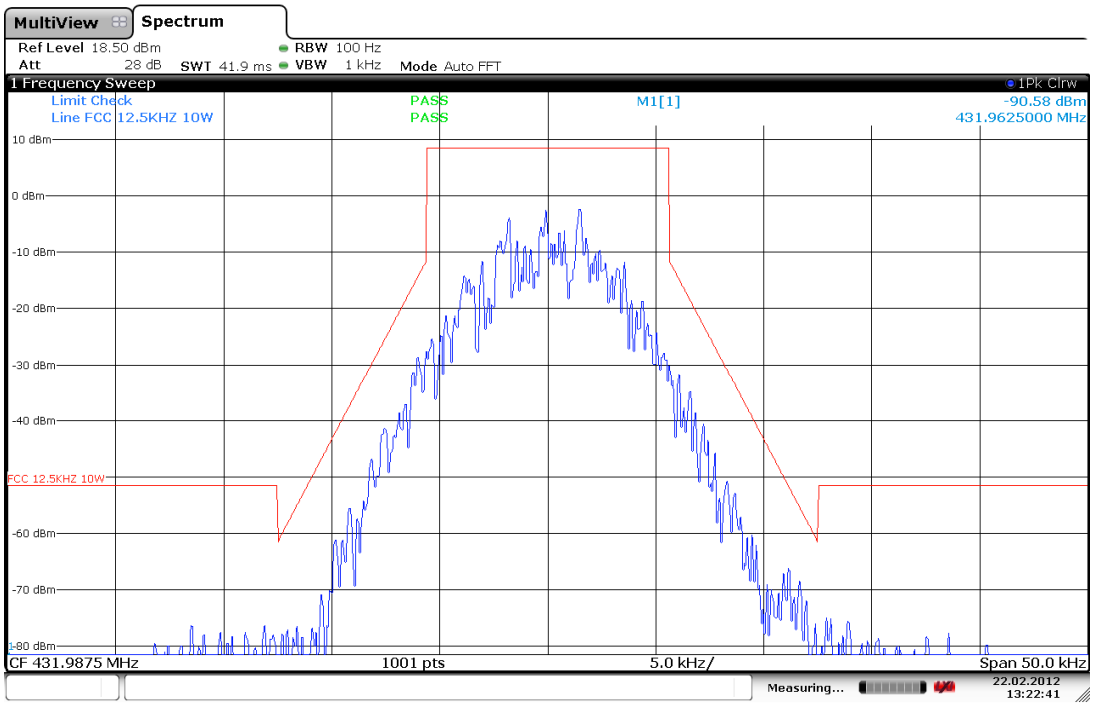
Date: 22.FEB.2012 13:45:51

GRAPH 60: Spectrum for Emission 6.25 kHz pi/4-DQPSK



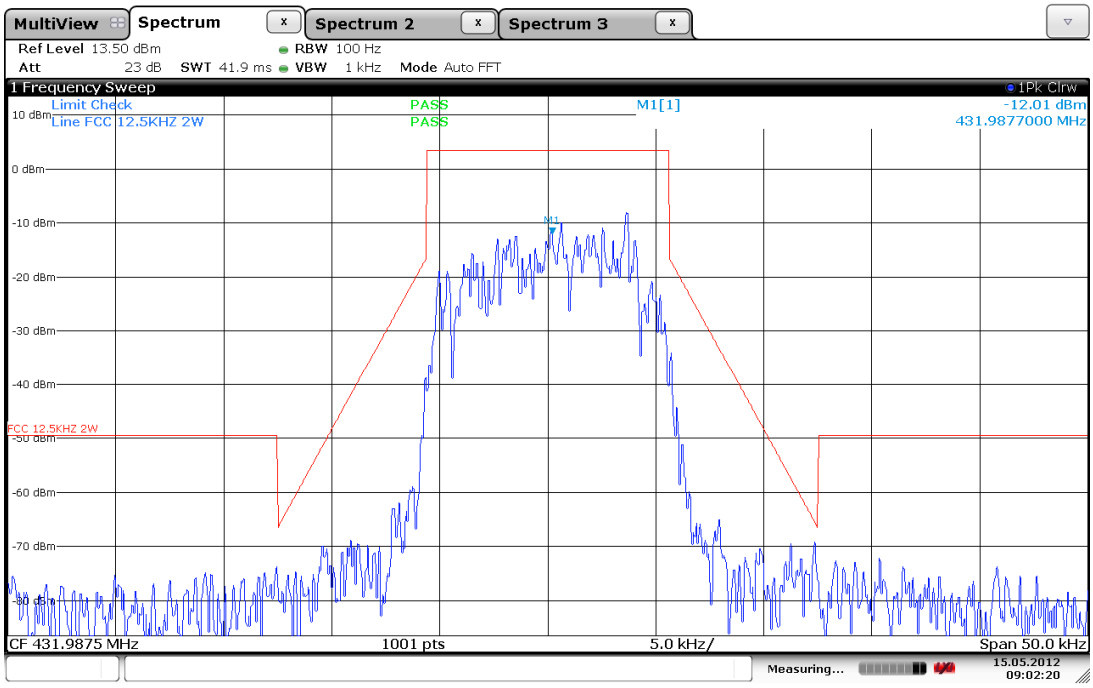
Date: 22.FEB.2012 13:55:43

GRAPH 61: Spectrum for Emission 12.5 kHz 4-CPFSK



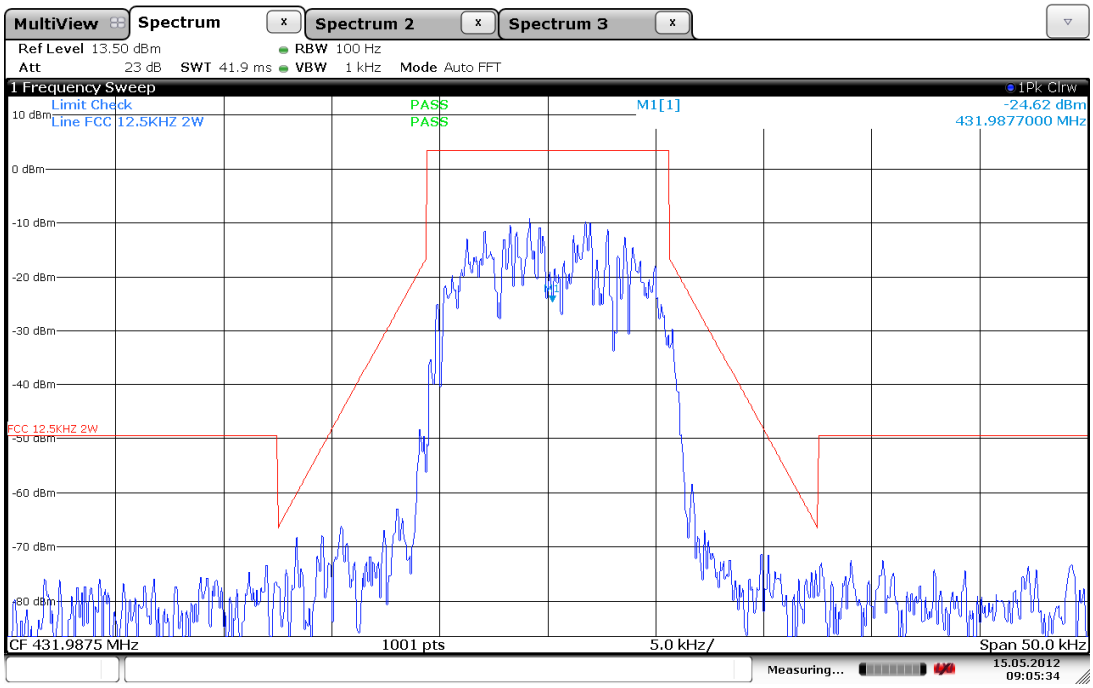
Date: 22.FEB.2012 13:22:41

GRAPH 62: Spectrum for Emission 12.5 kHz 16-DEQAM



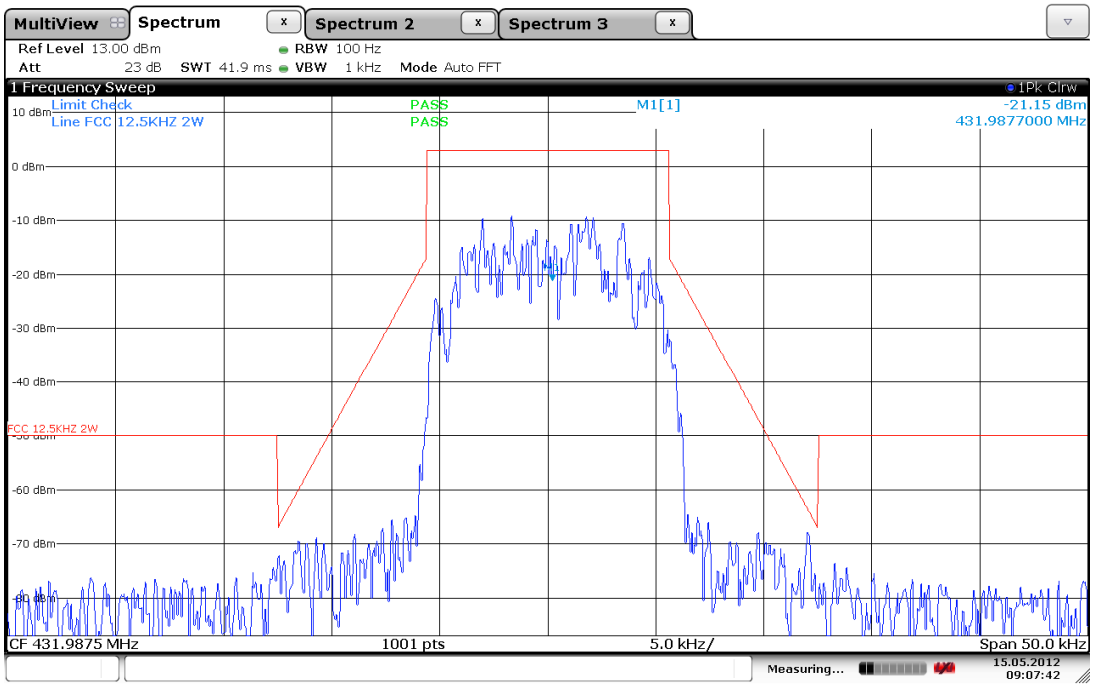
Date: 15.MAY.2012 09:02:20

GRAPH 63: Spectrum for Emission 12.5 kHz D8PSK



Date: 15.MAY.2012 09:05:34

GRAPH 64: Spectrum for Emission 12.5 kHz pi/4-DQPSK



Date: 15.MAY.2012 09:07:42