COMLAB
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EMC, Radio and Telecommunications

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Test report : 77118/5

Item tested : nRD24V1-Headset Reference Design

Equipment type : 2.4GHz Evaluation module

Client : Nordic semiconductor ASA

NORWEGIAN ACCREDITATION
TEST 031

Nemko Comlab is granted accreditation by Norwegian Accreditation under registration number TEST 031

Parts of ETSI EN 300 440

12 December 2006

Authorized by : .....

Geir Antonsen
Technical Verificator

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CONTENTS

1 GENERAL INFORMATION

1.1 Tested by

Name :	Nemko A/S
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E-mail:	comlab@nemko.com
Number of Pages:	19

1.2 Client Information

Name :	Nordic Semiconductor ASA
Address :	Vestre Rosten 81, N-7075 Tiller, Norway
Telephone :	+47 7289 89 00
Fax :	+47 72 89 89 89

Contact:

Name :	Endre Rindalsholt
E-mail :	endre.rindalsholt@nordicsemi.no

1.3 Manufacturer

Name :	Nordic Semiconductor ASA
Address :	Vestre Rosten 81, N-7075 Tiller, Norway
Telephone :	+47 72 89 89 00
Fax :	+47 72 89 89 89
E-mail :	/

2 Test Information

2.1 Tested Item

Name :	nRD24V1-Headset Reference Design
FCC ID :	-
Model/version :	A
Serial number :	
Hardware identity and/or version:	nRD24V1-USBDONGLE-A and nRD24V1-APPBOARD-A with nRD24V1-RFMODULE-A
Software identity and/or version :	
Frequency Range :	2402 – 2481 MHz
Tunable Bands :	1
Number of Channels :	79[1]
Operating Modes :	TX & RX
Type of Modulation :	GFSK
Emissions Designator :	G1D
User Frequency Adjustment :	None, Software controlled
Rated Output Power :	0 dBm
Type of Power Supply :	USB & Battery
Antenna Connector :	Integral antenna and SMA connector
Antenna Diversity Supported :	None

1) 79 channels in use

2.2 Test Environment

2.2.1 Normal test condition

Temperature:	22 – 25 °C
Relative humidity:	30 – 50 %
Normal test voltage:	3 V DC

The values are the limit registered during the test period.

2.2.2 Extreme test conditions

Not Tested

2.3 Test Period

Item received date: 2006-12-11

Test period : from 2006-12-11 to 2006-12-12

2.4 Test Engineer

G.Suhanthakumar

2.5 Test Equipment

See list of test equipment in clause 6.

2.6 Other Comments

The channels are selected with a laptop PC connected to the EUT. The laptop is only used for power suppy. The measurements are performed at channels near top Ch 81, near middle Ch 42 and near bottom Ch 02. And the output level is set to maximum in the software. The EUT complies at these channels.

All ports were populated during spurious emission measurements.

A temporary antenna connector is used only for making conducted RF measurements for evaluation purposes.

3 TEST REPORT SUMMARY

3.1 General

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with –

EN 300 440 – 1 V1.3.1 (2001-09)
Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range dvices; Radio equipment to be usd in the 1 GHz to 40 GHz frequency range;
Part 1: Technical characteristics and test methods

The test methods have been in accordance with According to Comlab 1003 and EN 300 440-1.

Radiated tests were performed is accordance with EN 300 440. The Radiated emissions are made in a 10m semi-anechoic chamber.

☐ Production Unit
☒ Pre-production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM (S) TESTED.
Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

TEST REPORT #: 77118/5

TESTED BY : _____ **DATE: 12.12.2006**
G.Suhanthakumar, Test Engineer

3.2 Test Summary

Transmitter parameters

Equivalent isotropically radiated power (eirp)

- radiated (P)

Pemitted range of operating frequencies

- Frequency range - for Non SS equipment (P)

Spurious emission, transmitter operating

- radiated (P)

Receiver parameters

Spurious radiations

- radiated (P)

[1] The tested equipment has integrated antennas only.

4 TEST RESULTS

4.1 TRANSMITTER MEASUREMENTS

EN 300 440

4.1.1 Equivalent isotropically radiated power (Radiated measurements) Clause 7.1

Rated output power level (maximum).- 0 dBm

nRD24V1-RFMODULE:

Test Conditions		Transmitter Power (mW)		
		Lowest Frequency	Middle Frequency	Highest Frequency
T_{nom}(.23.ºC)	V_{nom}(.3.Vdc)	1.15	1.04	0.82
Measurement Uncertainty		**+1,8/2,2 dB**		

nRD24V1-USBDONGLE :

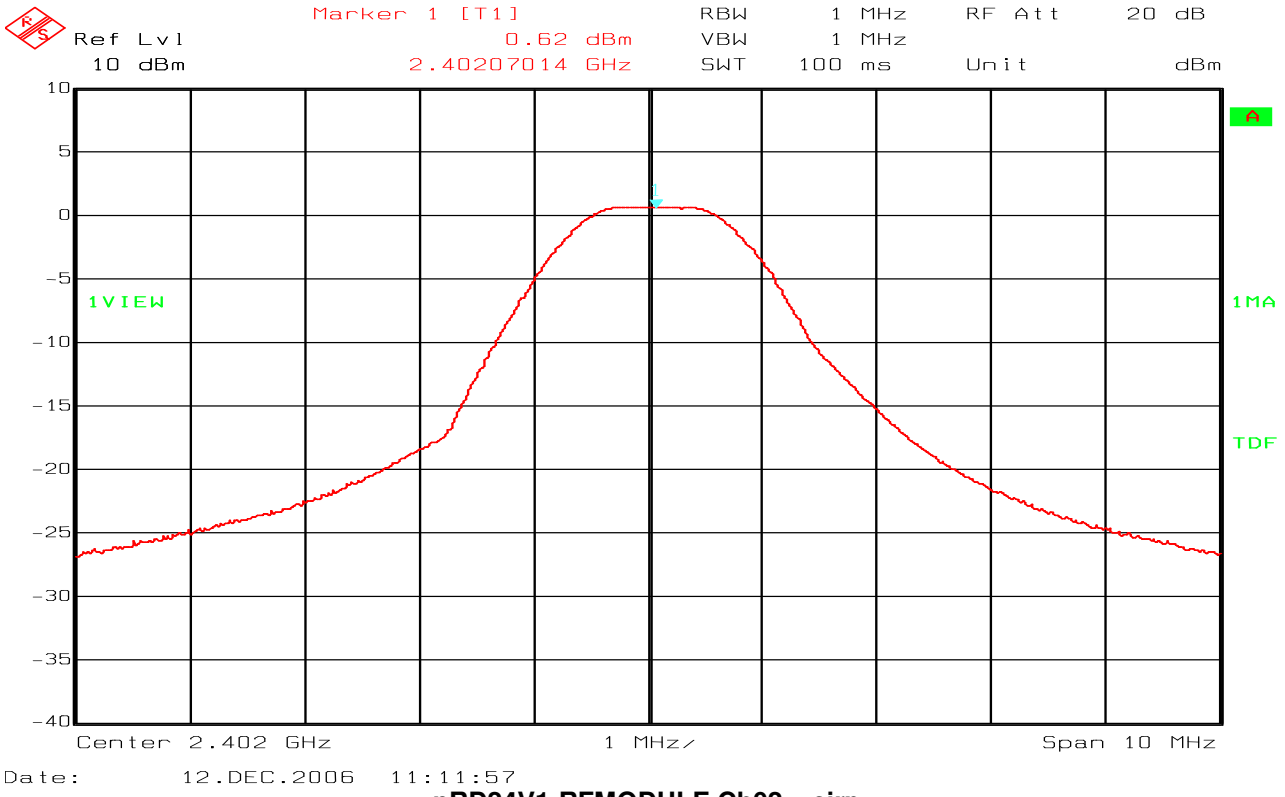
Test Conditions		Transmitter Power (mW)		
		Lowest Frequency	Middle Frequency	Highest Frequency
T_{nom}(.23.ºC)	V_{nom}(.3.Vdc)	0.35	0.21	0.16
Measurement Uncertainty		**+1,8/2,2 dB**		

Limits: Clause 7.1.3

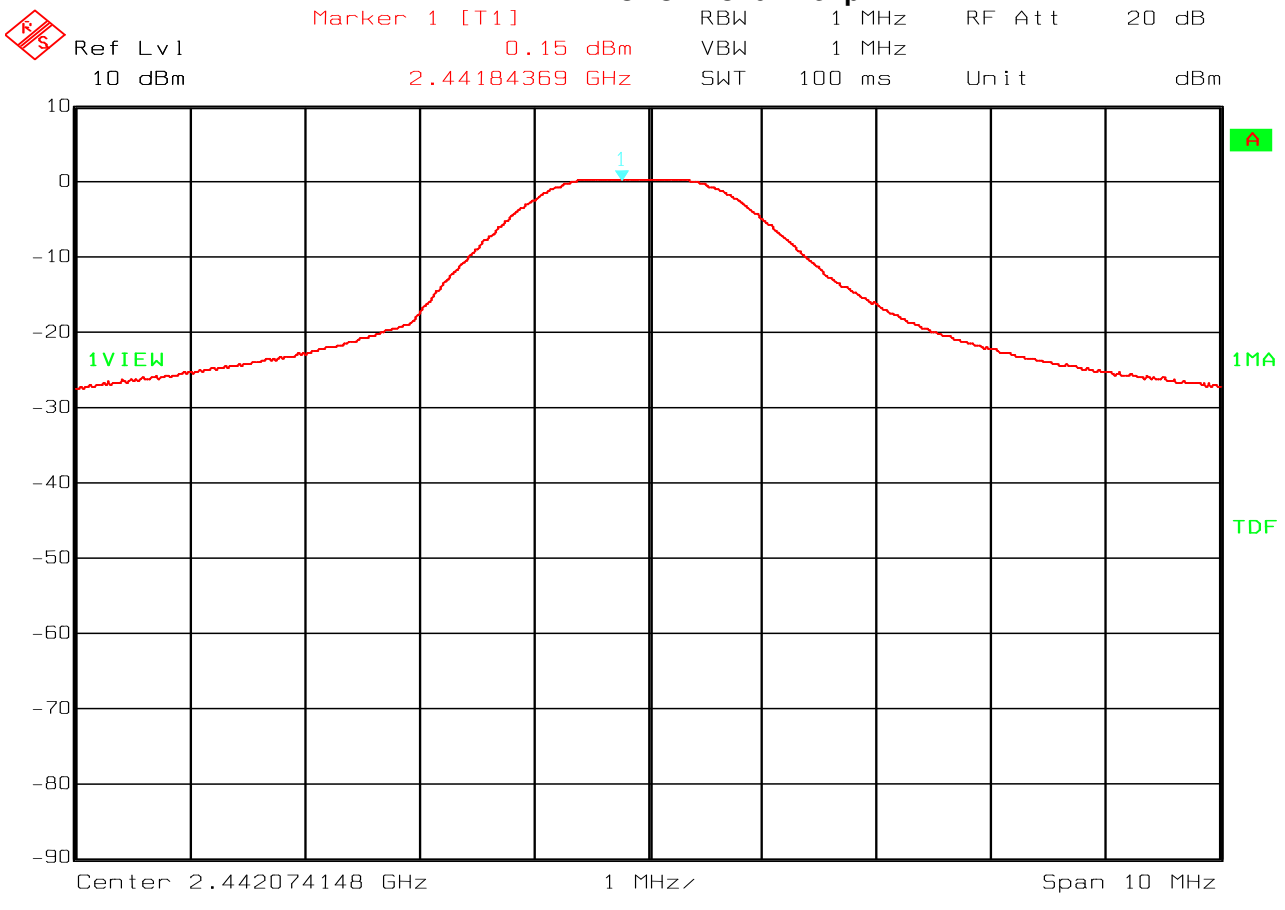
Maximum radiated peak power (eirp)

Power Class (note 1)	Power level (conducted or radiated)
8	10 mW
9	25 mW
11	100 mW
12	500 mW (see note 2)
13	1 W
14	2 W
14a	4 W (see note 2)
NOTE 1: Class designation is based on CEPT/ERC Recommendation 70-	
NOTE 2: For RFID applications, see annex C of the present document.	

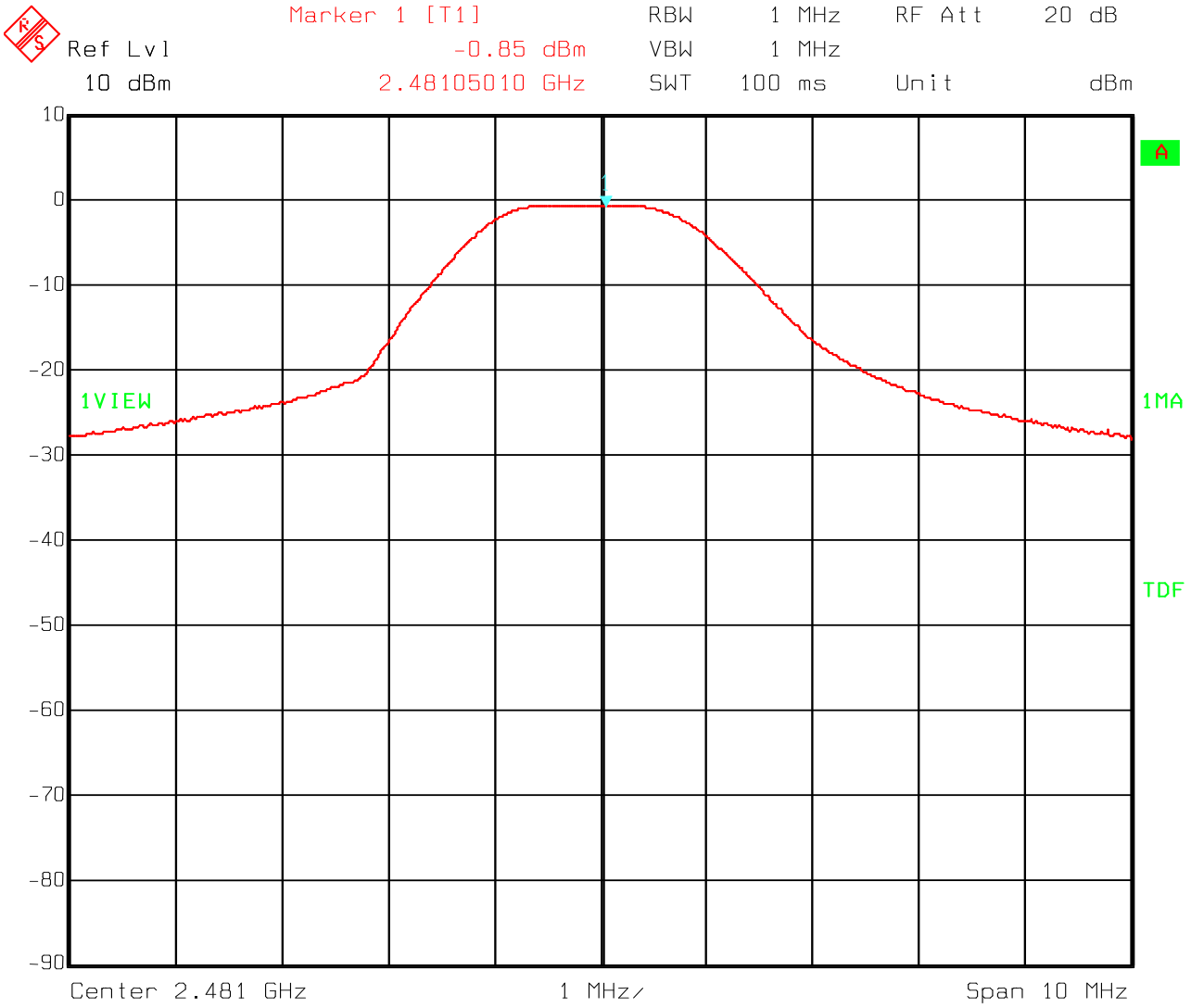
Test Equipment Used:LR 1137, LR1330, LR1410,LR 1322



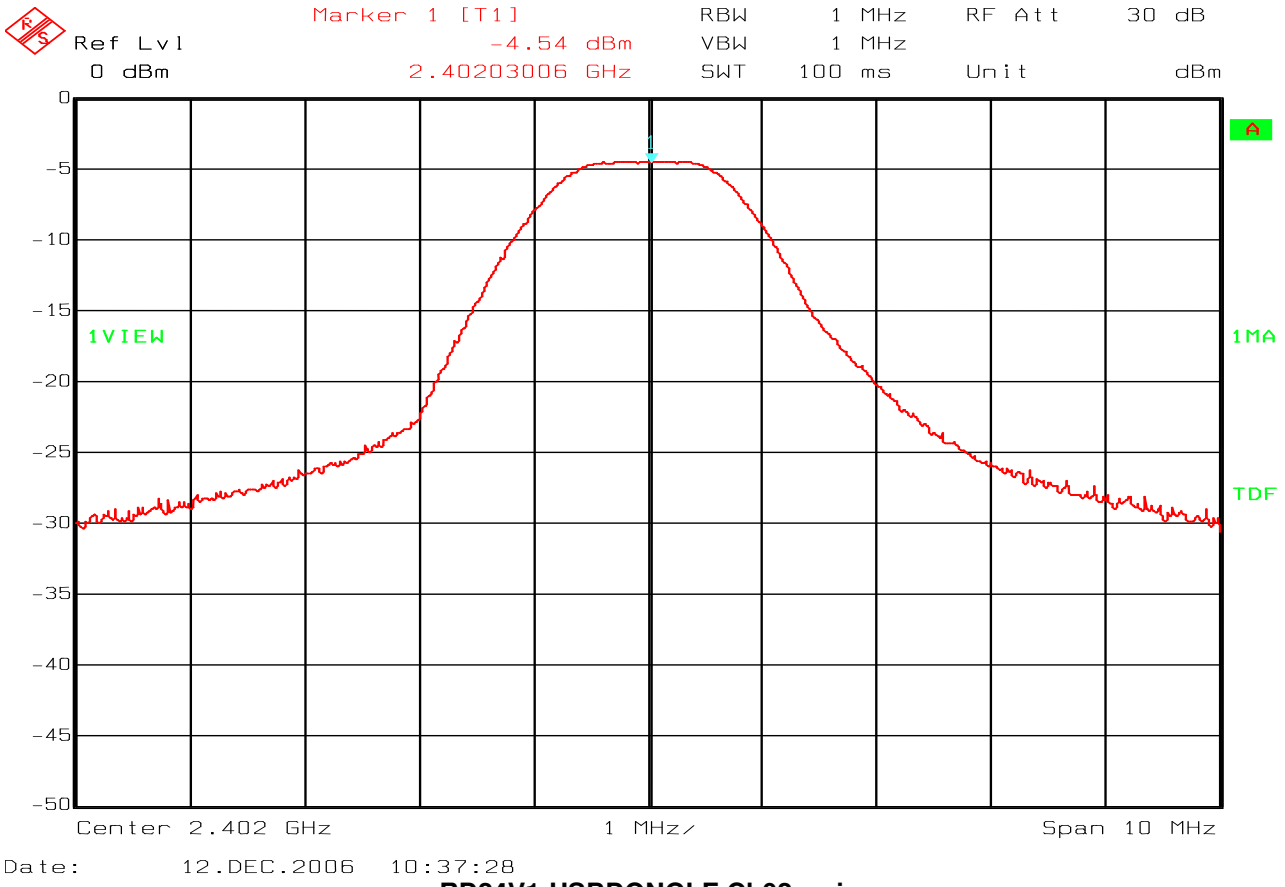
nRD24V1-RFMODULE Ch02 – eirp



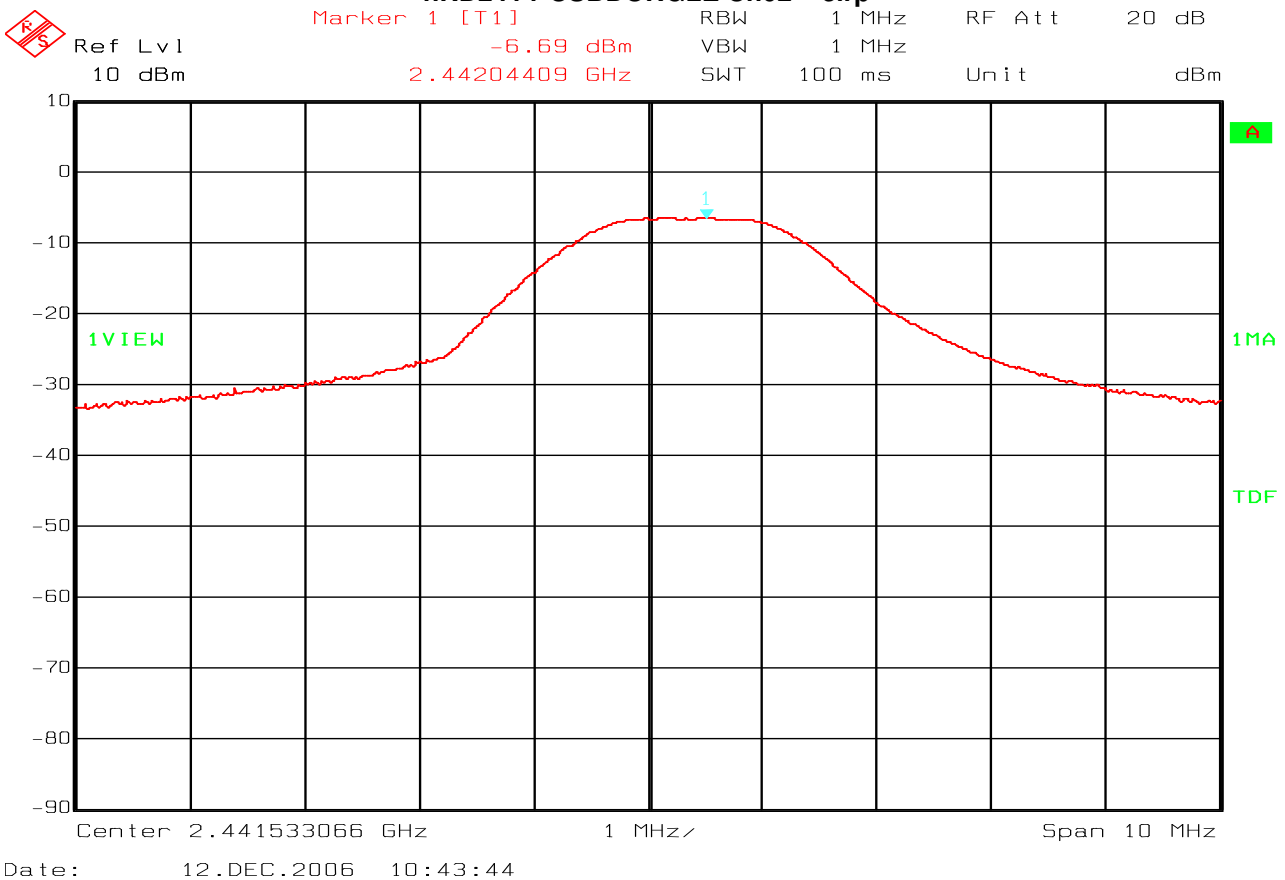
nRD24V1-RFMODULE Ch42 – eirp



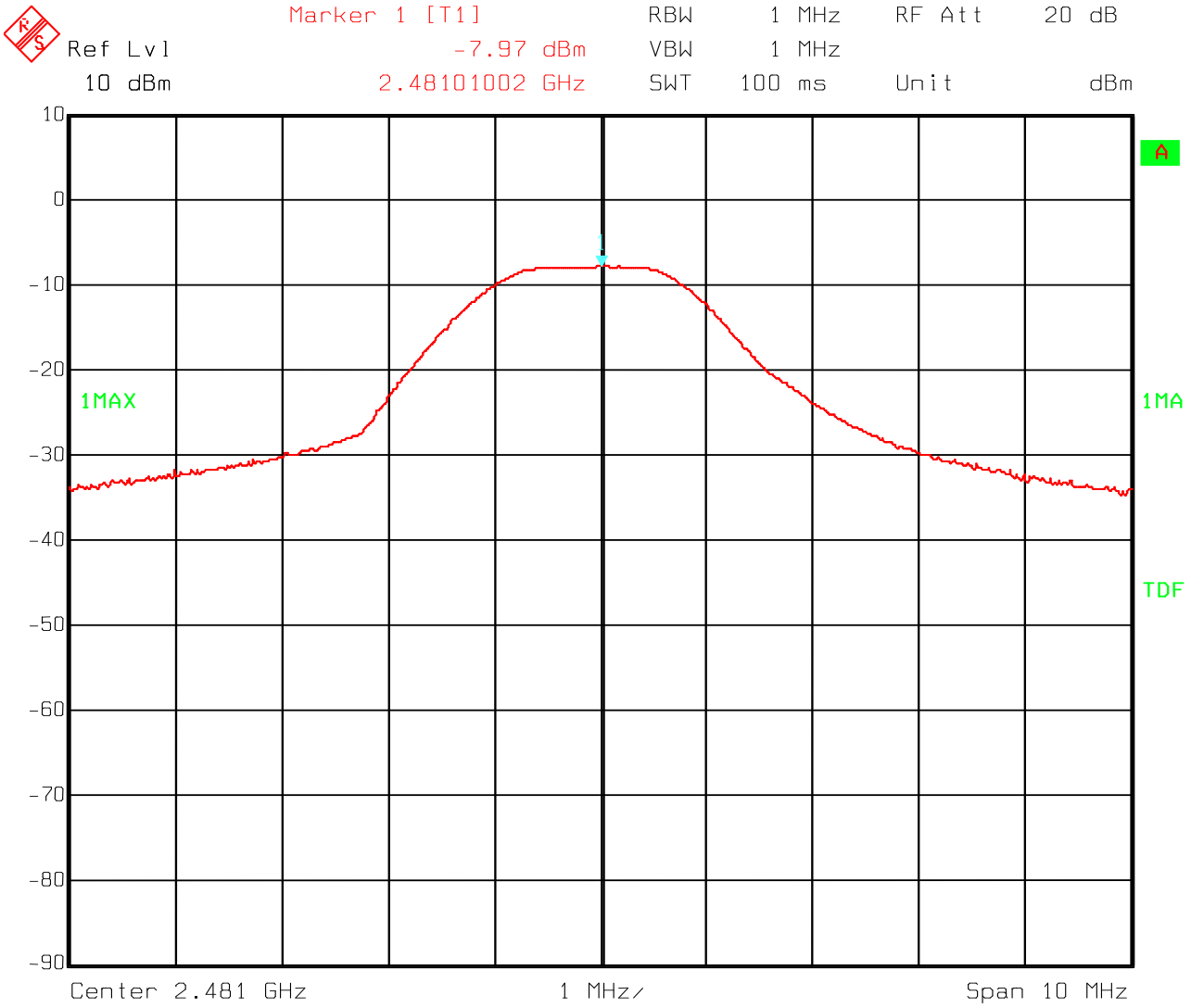
nRD24V1-RFMODULE Ch81 – eirp



nRD24V1-USBDONGLE Ch02 – eirp



nRD24V1-USBDONGLE Ch42 – eirp



nRD24V1-USBDONGLE Ch81 – eirp

EN 300 440

4.1.2 Permitted range of operating frequencies — Clause 7.2

nRD24V1-RFMODULE:

Test Conditions		Frequency (MHz) At Which -30dBm Occurs	
		Lowest	**Highest**
T_{nom}(..**23**.°C)	V_{nom}(**3**V)	2399	2482
Measurement Uncertainty		**Con +13 /-12 KHz**	

nRD24V1-USBDONGLE:

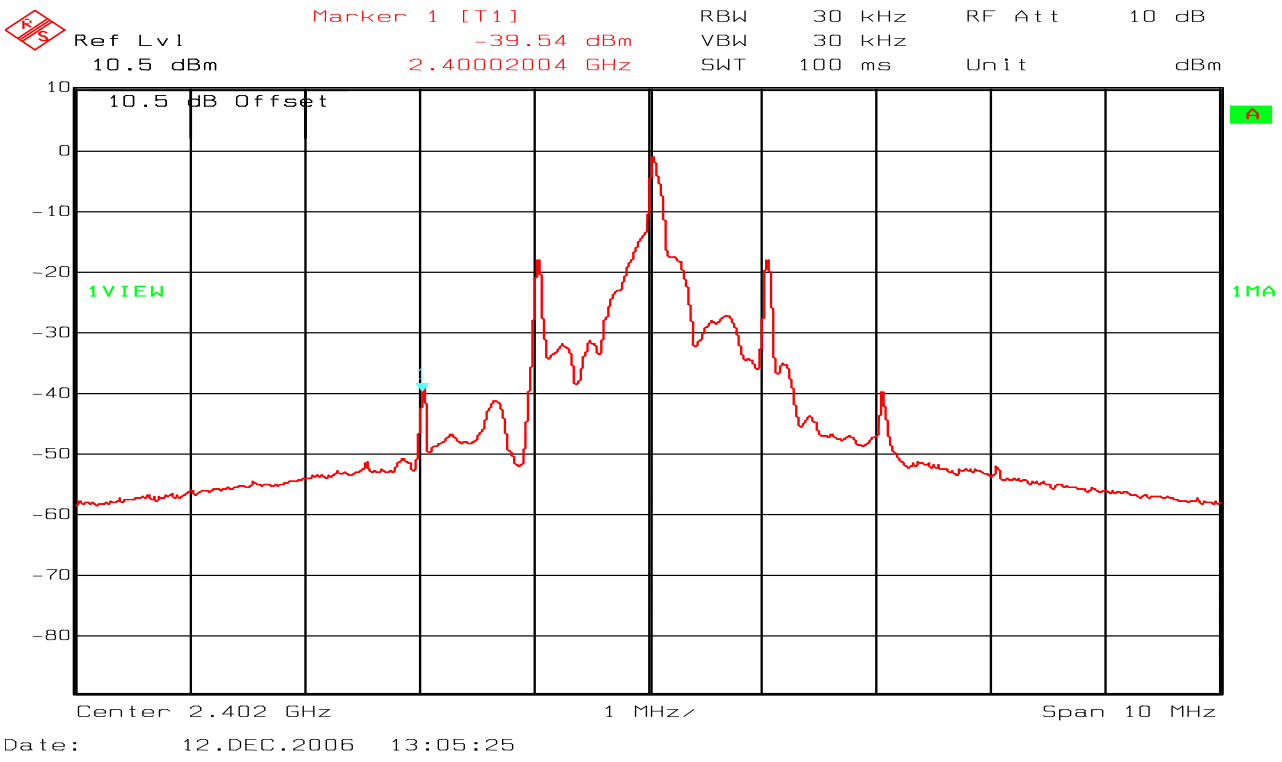
Test Conditions		Frequency (MHz) At Which -30dBm Occurs	
		Lowest	**Highest**
T_{nom}(..**23**.°C)	V_{nom}(**3**V)	2399	2482
Measurement Uncertainty		**Con +13 /-12 KHz**	

This measurement should be done with average detector. But here the measurements done with peak detector and test results are within the requirement.

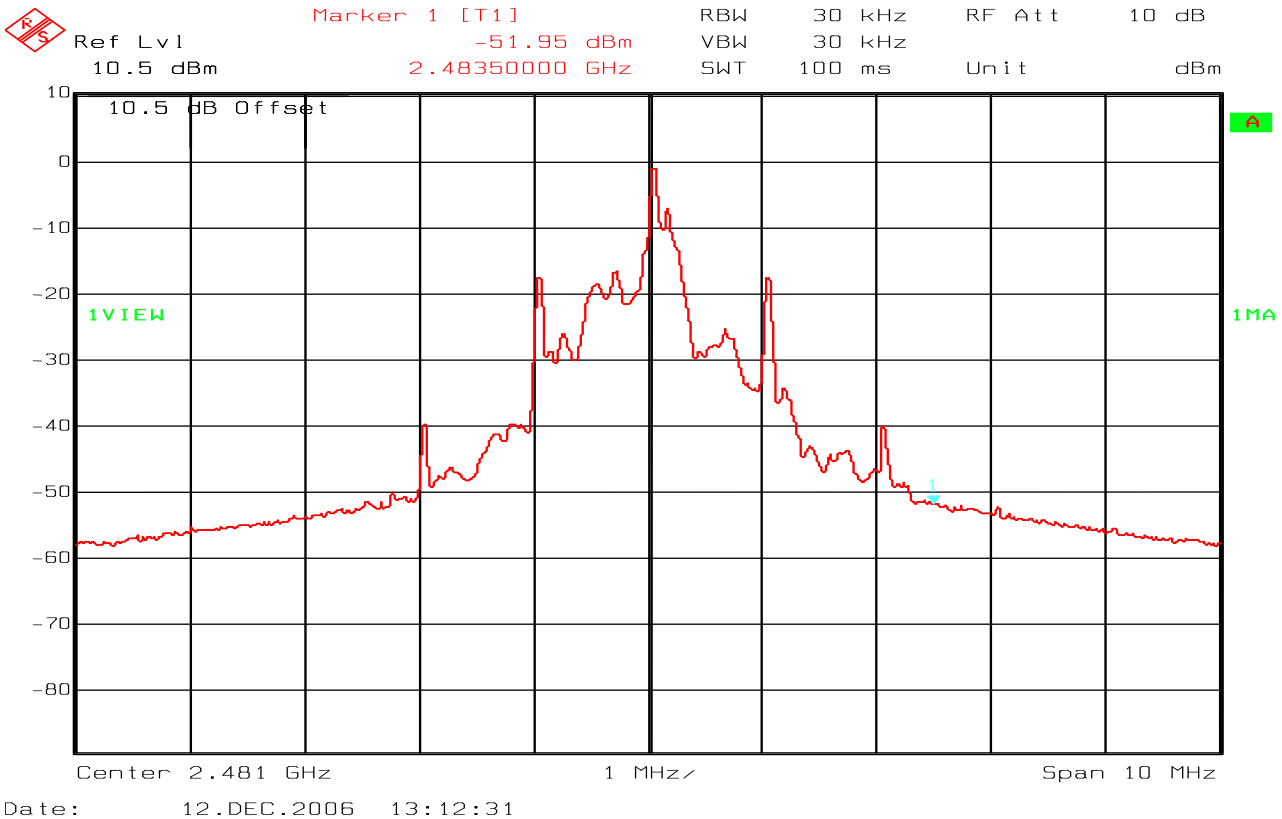
Limits: Clause 7.2.4

Under All Test Conditions	f_L > 2400 MHz f_H < 2483.5 MHz

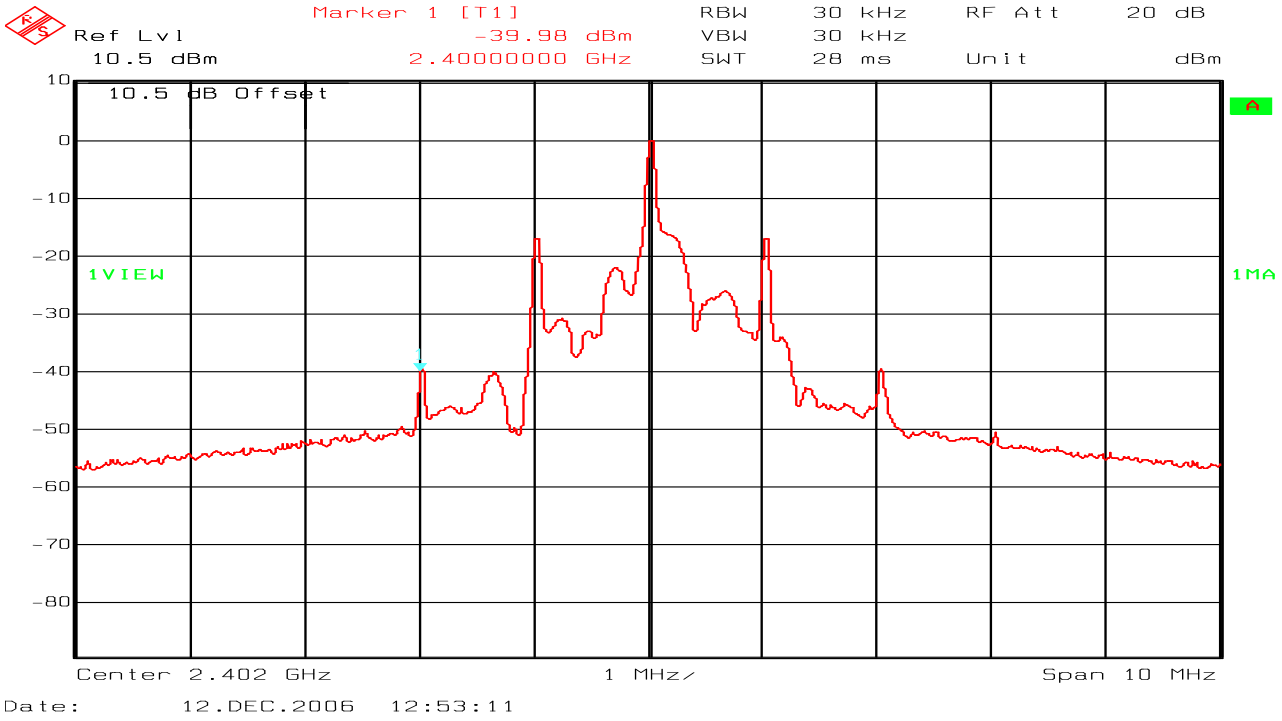
Test Equipment Used: LR 1337, LR >



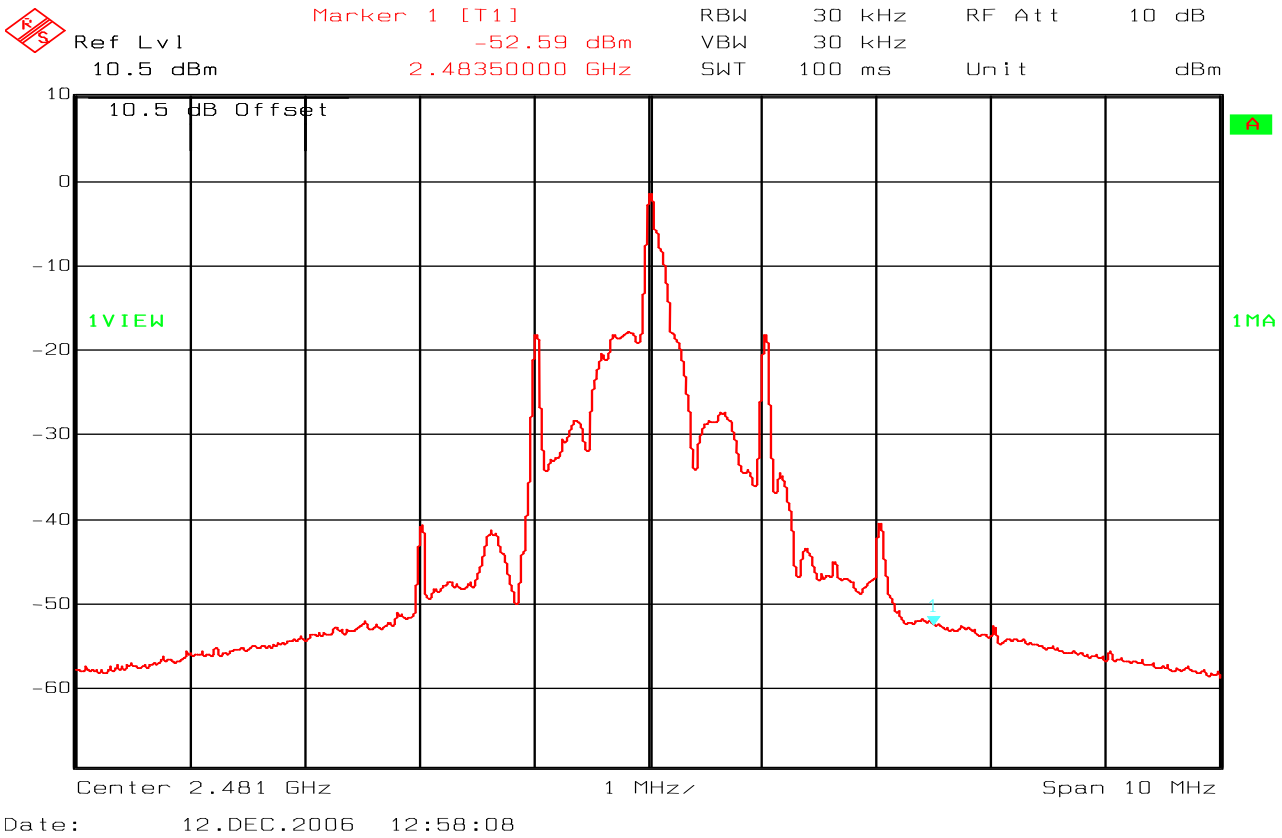
nRD24V1-RFMODULE Lower limit – Ch02



nRD24V1-RFMODULE – upper limit – Ch81



nRD24V1-USBDONGLE Lower limit – Ch02



nRD24V1-USBDONGLE upper limit – Ch81

EN 300 440

4.1.3 Spurious Emissions - Radiated (Transmitter Operating) Clause 7.3.5

Frequency (MHz)	**Measurement Bandwidth (MHz)**	**Spurious Emission Level (dBm)**
30 - 1000	**0.1**	**None dectected**
4880	1	-43 dBm
1 – 25 GHz	1	None detected
Measurement Uncertainty	**25 – 1GHz - +1,9/-2,4 dB 1 – 8 GHz - +1,8/-2,1 dB 8 – 18 GHz - +1,9/-2,4 dB**	

Bandwidth (MHz) refers to the bandwidth of the measuring receiver.

Limits: Clause 7.3.7

State	47 to 74 MHz 87,5 to 118 MHz 174 to 230 MHz 470 to 862 MHz	Other frequencies ≥ 25 to ≤ 1000 MHz	Frequencies > 1000 MHz
Operating	4 nW / -54dBm	250 nW / -36dBm	1 µW / -30dBm
Standby	2 nW / -57dBm	2 nW / -57dBm	20 nW / -47dBm

Test Equipment Used: LR 1410, LR 1337, LR1101, LR 1260, LR 1261

4.2 RECEIVER MEASUREMENTS

EN 300 440

4.2.1 Spurious Radiation - Radiated

Clause 8.4.4

NRD24V1-RFMODULE:

Frequency (MHz)	Measurement Bandwidth (MHz)	Spurious Emission Level (dBm)
2790	**0.1**	**- 49**
Measurement Uncertainty	**25 – 1GHz - +1,9/-2,4 dB 1 – 8 GHz - +1,8/-2,1 dB 8 – 18 GHz - +1,9/-2,4 dB**	

NRD24V1-USBDONGLE:

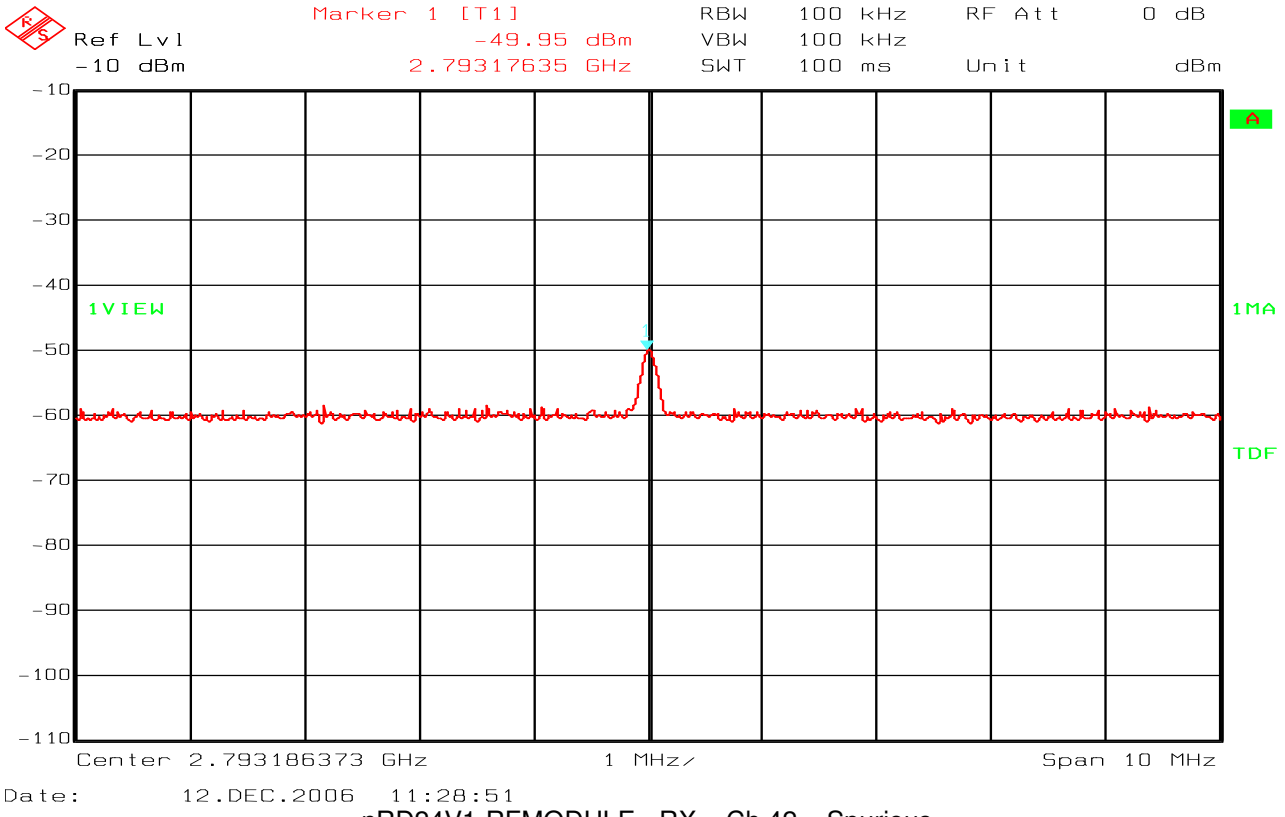
Frequency (MHz)	Measurement Bandwidth (MHz)	Spurious Emission Level (dBm)
2790	**1**	**- 48**
Measurement Uncertainty	**25 – 1GHz - +1,9/-2,4 dB 1 – 8 GHz - +1,8/-2,1 dB 8 – 18 GHz - +1,9/-2,4 dB**	

Bandwidth (MHz) refers to the bandwidth of the measuring receiver.

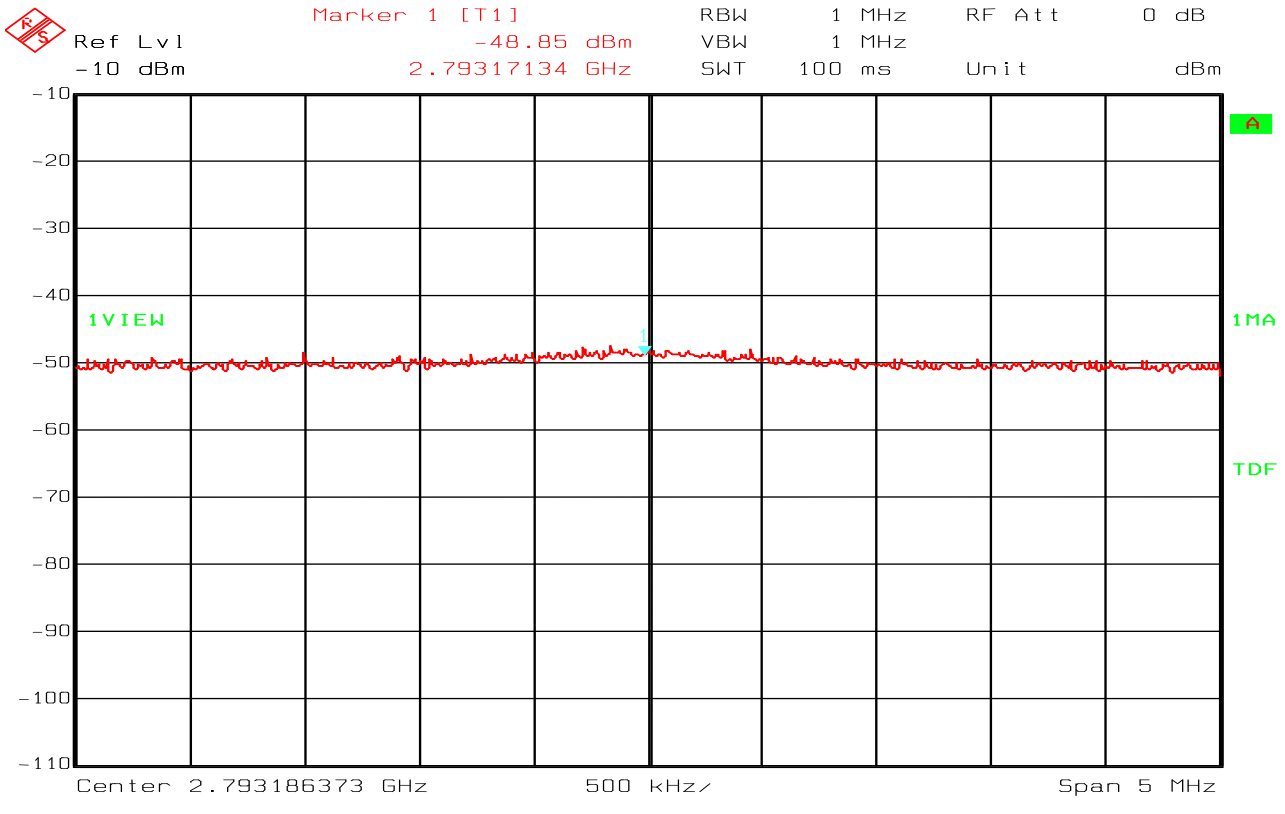
Limits: Clause 8.4.5

Frequency	≥ 25 to ≤ 1000 MHz	> 1000 MHz
Limits	2 nW / -57dBm	20 nW / -47dBm

Test Equipment Used: LR 1337, LR 1410, LR 1322



nRD24V1-RFMODULE - RX – Ch 42 – Spurious



nRD24V1-USBDONGLE – RX- Ch2 – Spurious

5 TEST EQUIPMENT AND ANCILLARIES

To simplify identification of the test equipment and ancillaries used, all item used are identified by the testhouse on each page of the test report. All numbers are referenced to the list given below.

C	No	Instrument/Ancillary	Manufacturer	Type	Kaldato	IntRe
LR	1123	Spectrum Analyzer	Advantest	R3271	14.02.2001	24
LR	1170	Filter Band Pass	Trilithic	5VF500/100	17.12.1996	12
LR	1022	Power Supply	Oltronix	B32-10R	20.08.1992	
LR	191	Filter Band Pass	Texn	5VF1000/20	17.12.1996	12
LR	42	Filter Band Pass	Texn	5VF2000/40	08.10.1996	12
LT	5108	Multimeter	Fluke	8060A	17.04.2001	24
LR	1083	Climate Chamber	ACS	TY80		
LR	1261	Antenna Log-periodic	R&S	HL 223	13.03.2001	36
LR	1333	Antenna Dipole	R&S	HZ-13	05.08.1998	36
LR	1237	EMI-Receiver	R&S	ESN	31.05.2001	12
LR	130	Attenuator Adjustable	R&S	DPU	01.08.2002	12
LR	85	Hybrid	Anza	H-9	16.04.2002	24
LR	1079	Generator, AF/../UHF	R&S	SMHU56	11.05.2001	24
LR	1185	Attenuator	Suhner	6810.17.A	09.08.2002	12
LR	1170	Filter Band Pass	Trilithic	5VF500/100	17.12.1996	12
LR	1410	EMC chamber				
LR	1330	Antenna Horn	EMCO	3115	01.02.2002	36
LR	1337	Spectrum Analyzer	R&S	FSEK	20.12.2001	24
LR	1226	Antenna Horn	EMCO	3115	01.02.2002	36