

**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-0535/15-01-02-A

Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH

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The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

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Manufacturer

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Test standard/s

47 CFR Part 74

Title 47 of the Code of Federal Regulations; Chapter I

Part 74 - Experimental radio, auxiliary. special broadcast and other program distribution services

RSS – 210 Issue 8
Amendment 1

Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands

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

Test Item

Kind of test item: Smart Passive Wideband Combiner**Model name:** CSI16T Combiner +
MTK952N-2W0-US**FCC ID:** POUMTK952N-2W0**IC:** 11967A-MTK952N**Frequency:** 470 MHz to 608 MHz and 614 MHz to 698 MHz**Technology tested:** Proprietary**Antenna:** External antenna port**Power supply:** 120 V AC**Temperature range:** -10°C to +55°C

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

Test report authorised:

Stefan BöS
Lab Manager
Radio Communications & EMC

Test performed:

David Lang
Lab Manager
Radio Communications & EMC

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report replaces the test report with the number 1-0535/15-01-02 and dated 2016-07-15

2.2 Application details

Date of receipt of order:	2016-03-28
Date of receipt of test item:	2016-03-28
Start of test:	2016-03-28
End of test:	2016-04-01
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 74	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 74 - Experimental radio, auxiliary. special broadcast and other program distribution services
RSS – 210 Issue 8 Amendment 1	05.02.2015	Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+55 °C during high temperature tests
	T_{min}	-10 °C during low temperature tests
Relative humidity content:		51 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	120 V AC
	V_{max}	138 V
	V_{min}	102 V

5 Test item

Kind of test item	:	Smart Passive Wideband Combiner
Type identification	:	CSI16T Combiner + MTK952N-2W0-US
HMN	:	-/-
PMN	:	MTK952N
HVIN	:	MTK952-2W0-US, CSI16T
FVIN	:	-/-
S/N serial number	:	V0700003
HW hardware status	:	6
SW software status	:	Boot:0.8.d or 1.1.d, App: v1.9d, DSP: 0.85.r
Number of channels	:	40 groups x 60 channels = 2400 channels
Frequency band	:	470 MHz to 608 MHz and 614 MHz to 698 MHz
Type of radio transmission	:	modulated carrier
Use of frequency spectrum	:	
Type of modulation	:	FM
Antenna	:	External antenna port
Power supply	:	120 V AC
Temperature range	:	-10°C to +55 °C

5.1 Additional information

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

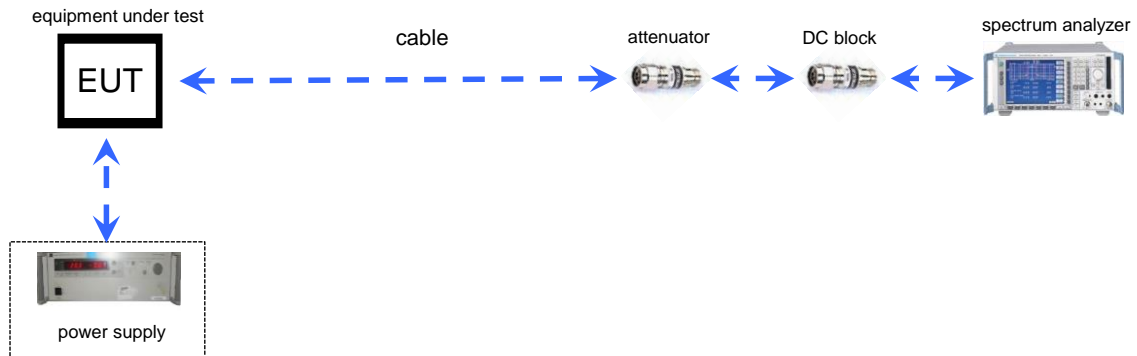
Test setup- and EUT-photos are included in test report: 1-0535/14-01-01_AnnexA
1-0535/14-01-01_AnnexB
1-0535/14-01-01_AnnexC

6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Conducted measurements



Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	26.01.2016	26.01.2017
2	A+B.	Audio Analyzer 2Hz - 300 kHz	UPD	R&S	841074/009	300001236	k	02.02.2016	02.02.2018
3	B.	Signal- and Spectrum Analyzer	FSW26	R&S	101455	300004528	k	14.03.2016	14.03.2017
4	A+B	RF-Cable WLAN-Tester Port 1	ST18/SMAM/SMAM/36	Huber & Suhner	Batch no. 601494	400001216	ev	-/-	-/-

8 Summary of measurement results

- ☐ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained
☒ This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	FCC 47 CFR § 74.861 RSS – 210 Issue 8 Amendment 1	See table	2016-07-22	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	C	NC	NA	NP	Remark
FCC 47 CFR § 74.861 (e)(1)(ii) RSS-210 Issue 8	Output power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
FCC 47 CFR § 74.861 RSS-210 Issue 8	Frequency stability	Nominal	Extreme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note ¹
		Extreme	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
FCC 47 CFR § 2.1049 § 74.861	Modulation characteristics	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note ¹
FCC 47 CFR § 2.1049 § 74.861 RSS-210 Issue 8	Occupied bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note ¹
FCC 47 CFR § 74.861	Unwanted radiation (spectrum mask)	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note ¹
FCC 47 CFR § 74 RSS-210 Issue 8	Field strength of spurious radiation Transmitter unwanted emissions	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
FCC 47 CFR § 15.209 RSS-210 Issue 8	Receiver spurious emissions (radiated)	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	-/-

C = Compliant; NC = Not compliant; NA = Not Applicable; NP = Not Performed

Note ¹: The CSI16T combiner, was tested with a pre-certified transmitter (FCC ID: POUMTK952N-2W0). Since the combiner contains no frequency converting or amplifying elements only the Output Power and Spurious Emissions tests were performed to show compliance for any possible routing setup (see section 8.1 for detailed routing information).

8.1 Additional comments

Reference documents: Transmitter test report 1-9103/14-01-03-A issued by Cetecom ICT Services GmbH 2015-04-10.
Product description CSI16T-en-b01.pdf

Special test descriptions: The CSI16T combiner can be operated in three different routing setups. Routing setups are selectable by a dip switch.



Setup	Mode	Remarks
A	[16:1]	16 inputs combined into 1 output.
B	2 x [8:1]	8 inputs combined into 1 output.
C	4 x [4:1]	4 inputs combined into 1 output

While in any setup the lowest, middle and highest channel per band was tested the combiner was always feed with the maximum routable amount of inputs.

Frequency table:

Setup	Transmitter	Frequencies tested [MHz]	Frequencies input additionally [MHz]
A	[16:1]	470.1, 539.0, 607.9, 614.9, 626.6, 697.9	488.6, 499.8, 510.2, 521.2, 560.0, 590.2, 585.0, 640.0, 655.0, 679.5
B	2 x [8:1]	470.1, 539.0, 607.9, 614.9, 626.6, 697.9	488.6, 655.0
C	4 x [4:1]	470.1, 607.9, 614.9, 697.9	-/-


Configuration descriptions:

Output power setting per transmitter:

Setup	Mode	Output power per transmitter [mW]
A	[16:1]	10
B	2 x [8:1]	10
C	4 x [4:1]	10

Modulation type: ENR-Wisy Stereo

Sixteen transmitters (eight dual transmitters) were available for testing:

Transmitter	Serial number	-/-
1	V0900075	
2	V0900074	
3	V0900077	
4	V0900076	
5	V1200065	
6	V1200067	
7	V1200066	
8	V1200064	

9 Measurement uncertainty

Measurement uncertainty	
Test case	Uncertainty
Transmitter output power	± 3 dB
Occupied bandwidth	± 3 kHz to 10 kHz (depends on the used RBW)
Transmitter frequency stability	± 1 Hz to 1 kHz (depends on the used RBW)
Transmitter unwanted emissions (radiated or conducted)	Radiated: ± 3 dB Conducted: ± 0.5 dB
Modulation characteristics	-/-

10 Measurement results

10.1 Output power (conducted)

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	5 MHz
Trace-Mode:	Max. hold
Test-up:	A (see section 7.1)
Measurement uncertainty:	See section 9

Limits:

FCC	IC
47 CFR § 74.861 (e)(1)(ii)	RSS-123 §6.2 Issue 2
Maximum transmitter power	
470-608 and 614-698MHz bands - 250mW (24 dBm)	

Result Setup A:

ENR-Wisy Stereo modulation:

Frequency [MHz]	Conducted output power [dBm]
470.1	20.9
539.0	20.4
607.9	21.0
614.1	20.5
626.6	21.0
697.9	20.8

Result Setup B:

ENR-Wisy Stereo modulation:

Frequency [MHz]	Conducted output power [dBm]
470.1	23.3
539.0	23.3
607.9	23.4
614.1	23.2
626.6	23.5
697.9	23.3

Result Setup C:

ENR-Wisy Stereo modulation:

Frequency [MHz]	Conducted output power [dBm]
470.1	23.8
607.9	23.9
614.1	23.3
697.9	23.2

10.2 Field strength of spurious radiation (conducted)

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Video bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Span:	-/-
Trace-Mode:	Max. hold
Test-up:	B (see section 7.1)
Measurement uncertainty:	See section 9

Limits:

FCC	IC
<p>Emissions for LPRS transmitters operating on standard band channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following: Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency: at least 30 dB; and emissions more than 22.5 kHz away from the channel center frequency: FCC: at least $43 + 10\log(\text{carrier power in watts})$ dB IC: at least $55 + 10\log(\text{carrier power in watts})$ dB.</p>	

Results FCC:

ENR-Wisy Stereo modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
Setup A			Setup B			Setup C		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

Results IC:

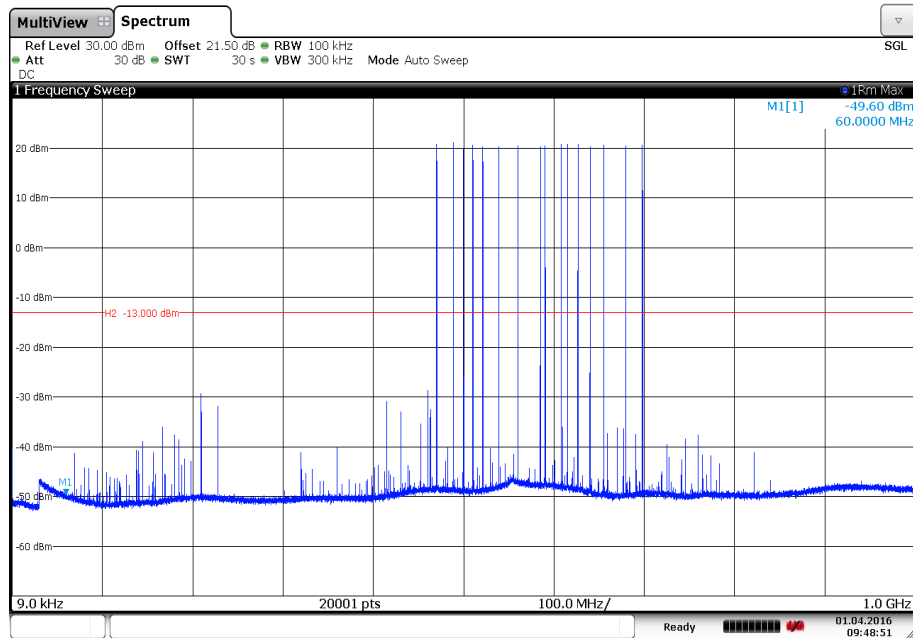
ENR-Wisy Stereo modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
Setup A			Setup B			Setup C		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

Plots FCC: Setup A

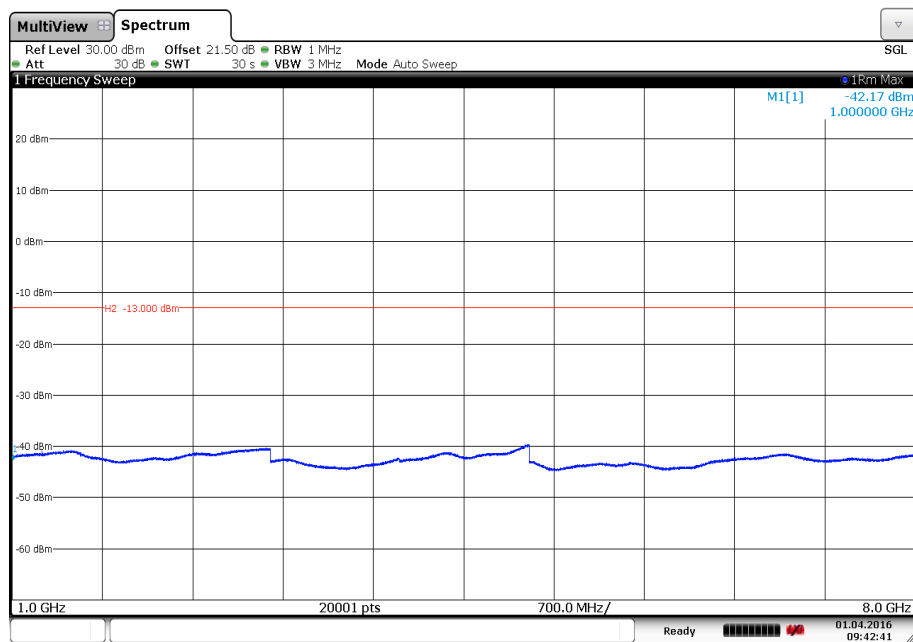
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR.2016 09:48:51

Plot 2: 1 GHz – 8 GHz

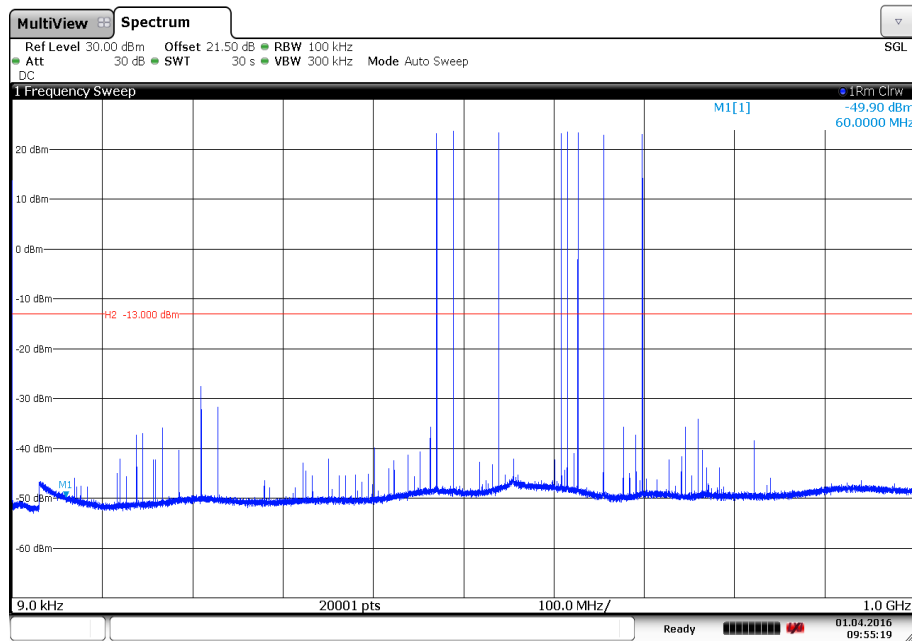


Date: 1 APR.2016 09:42:41

Plots FCC: Setup B

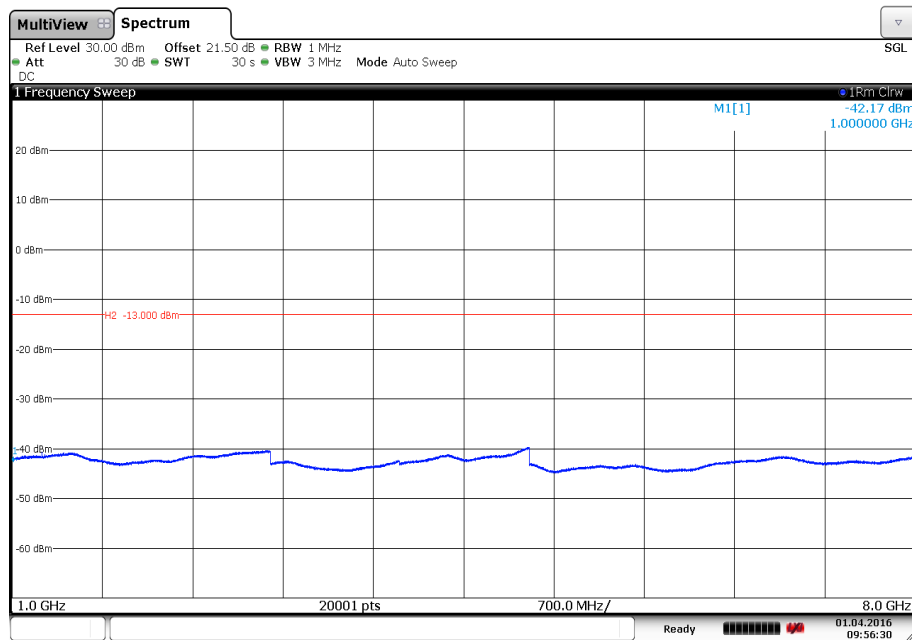
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR. 2016 09:55:19

Plot 2: 1 GHz – 8 GHz

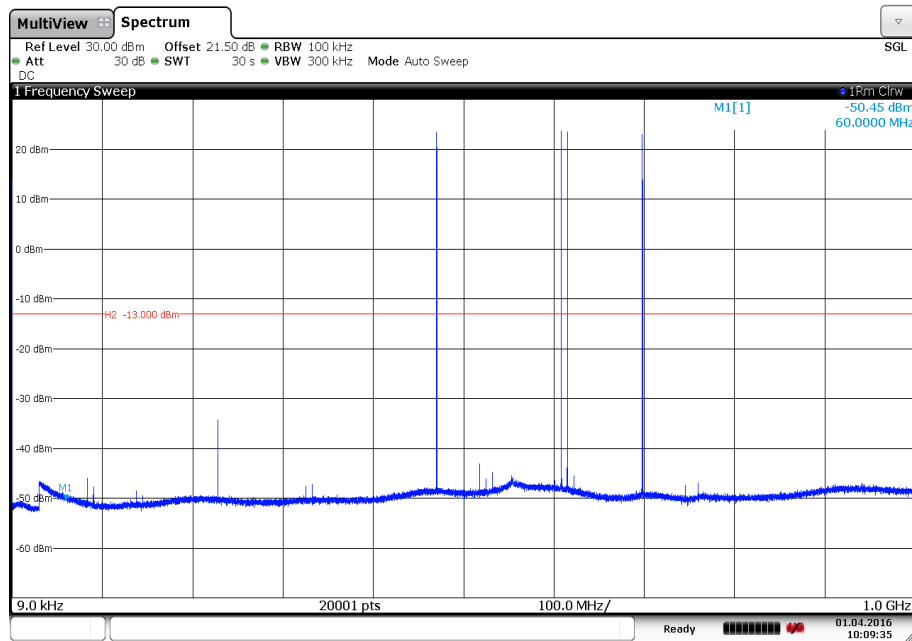


Date: 1 APR. 2016 09:55:29

Plots FCC: Setup C

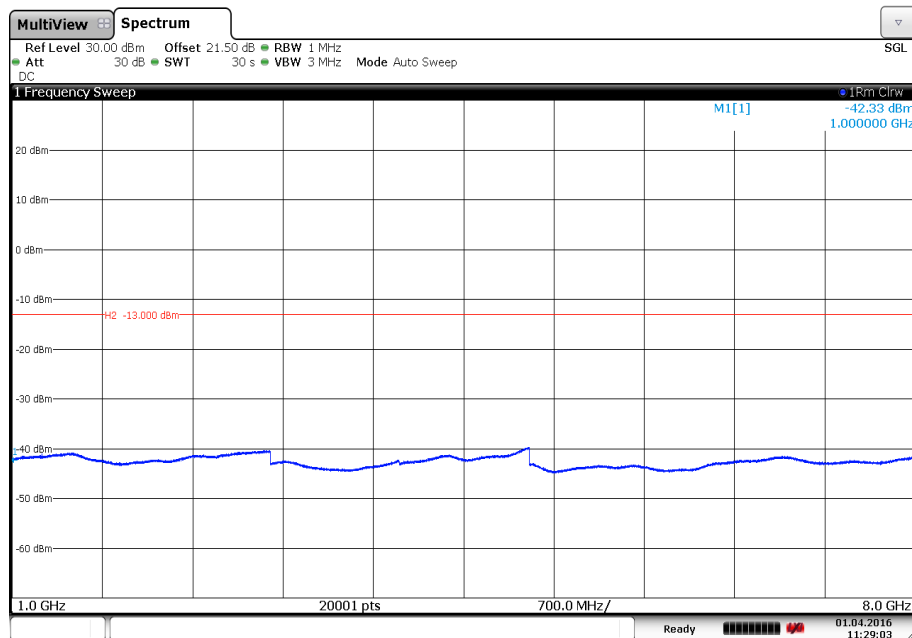
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR. 2016 10:09:36

Plot 2: 1 GHz – 8 GHz

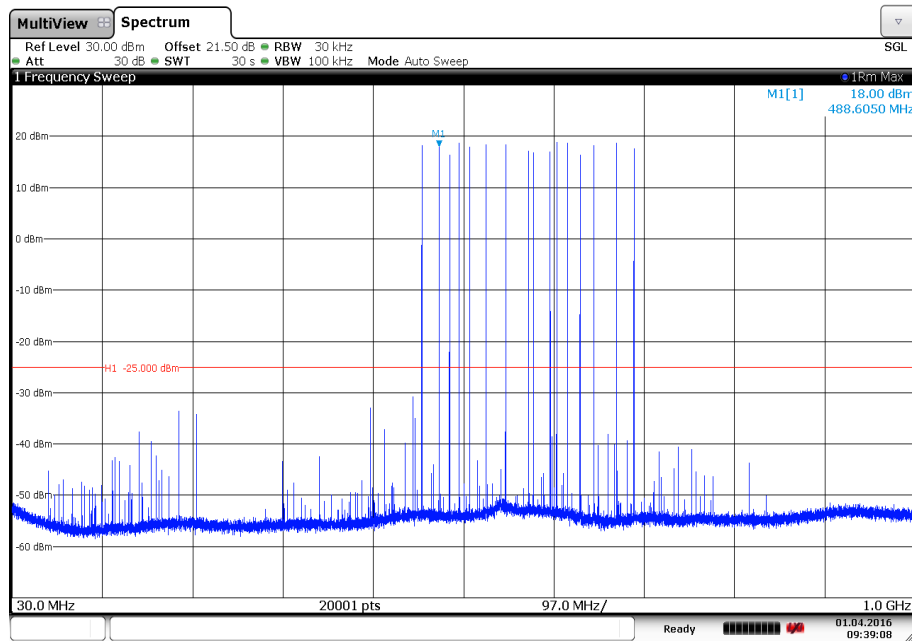


Date: 1 APR. 2016 11:29:03

Plots IC: Setup A

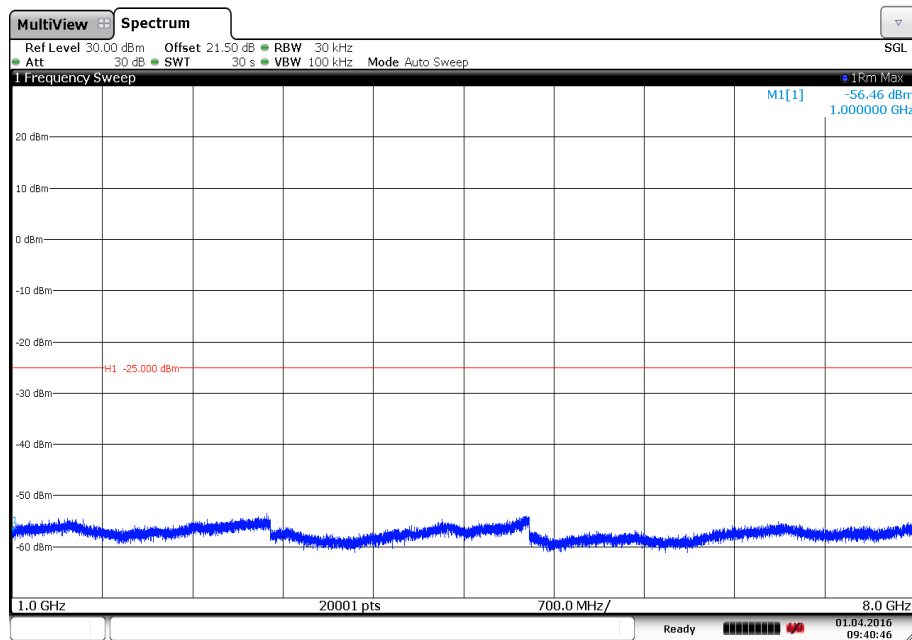
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR.2016 09:39:08

Plot 2: 1 GHz – 8 GHz

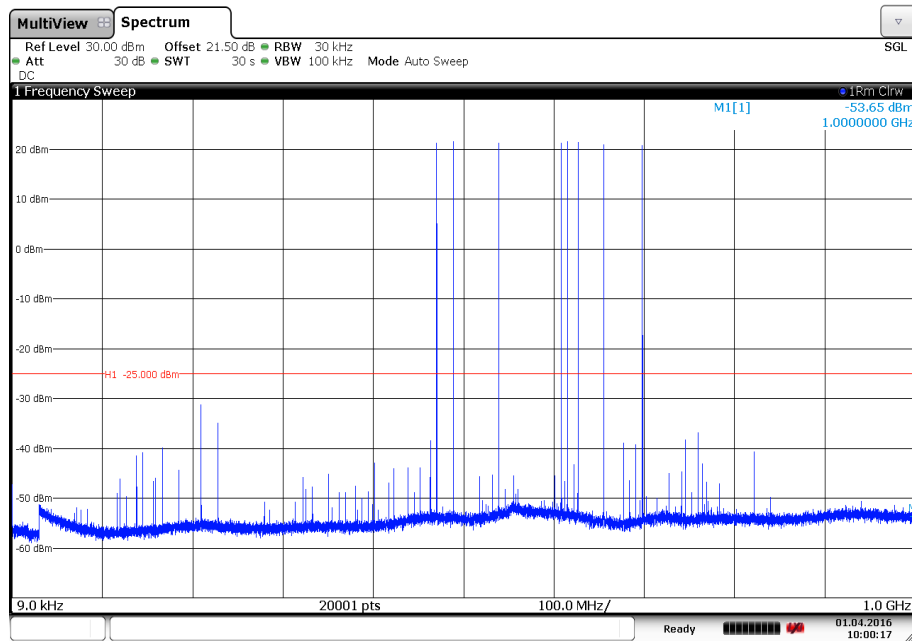


Date: 1 APR.2016 09:40:46

Plots IC: Setup B

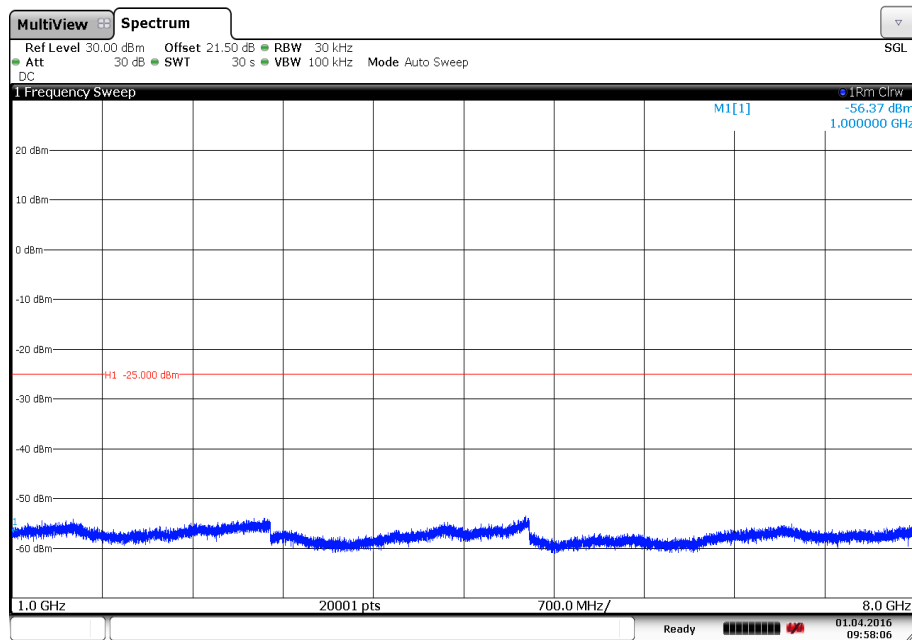
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR. 2016 10:00:17

Plot 2: 1 GHz – 8 GHz

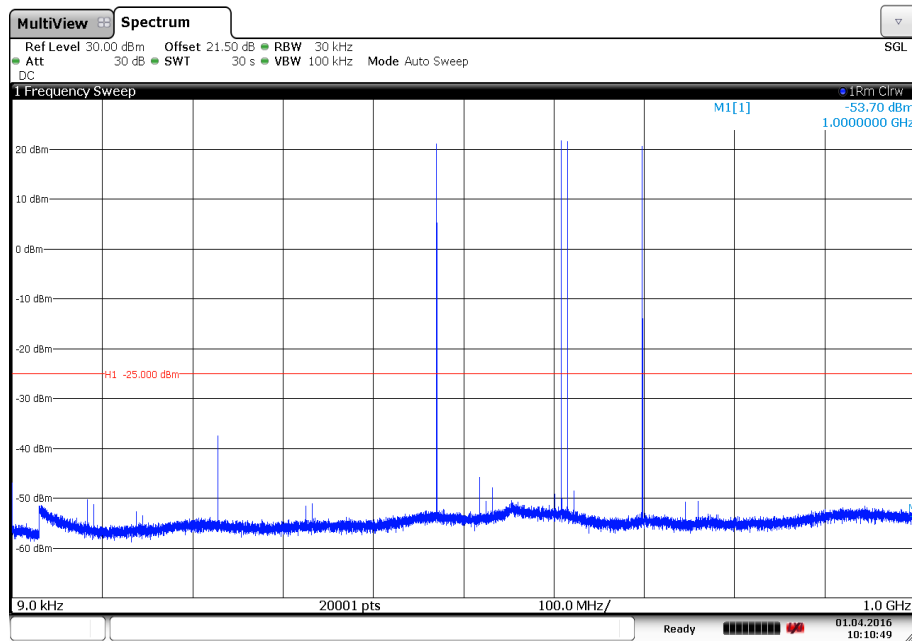


Date: 1 APR. 2016 09:58:06

Plots IC: Setup C

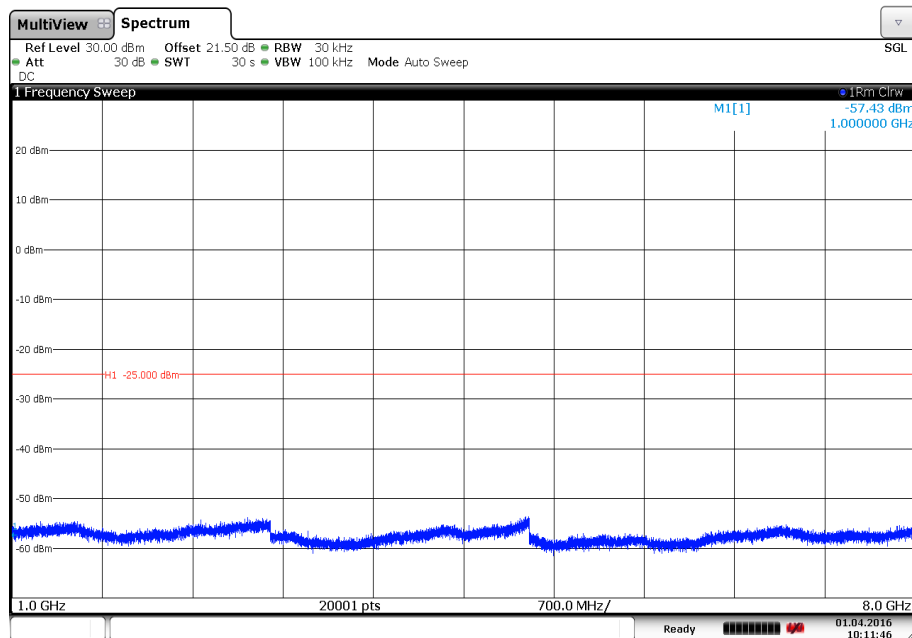
ENR-Wisy Stereo modulation:

Plot 1: 30 MHz – 1 GHz



Date: 1 APR. 2016 10:10:48

Plot 2: 1 GHz – 8 GHz



Date: 1 APR. 2016 10:11:46

11 Observations

No observations except those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2016-07-15
A	Editorial changes: Model Name & HVIN corrected; Referenced standards corrected (page 6)	2016-07-22

Annex B Further information

Glossary

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Belehrung gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
 Unterzeichnerin der Multilateralen Abkommen
 von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
 Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

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 VoIP und DECT
 Akustik
 Funk einschließlich WLAN
 Short Range Devices (SRD)
 RFID
 WiMax und Richtfunk
 Mobilfunk (GSM / GPRS, Over the Air (OTA) Performance)
 Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
 Produktsicherheit
 SAR und Hearing Aid Compatibility (HAC)
 Umweltsimulation
 Smart Card Terminals
 Bluetooth
 Wi-Fi Services

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Registrierungsnummer der Urkunde: D-PL-12076-01-00

Frankfurt am Main, 07.03.2014

Date of issue of the certificate

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 Akkreditierungsstellenleiterin

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<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>