



TÜVRheinland®



LAB N° 1356

Test Report

47 CFR FCC Part 15 subpart C Intentional Radiators

Report reference no. : 28118556-003

FCC Designation Number : IT0008

FCC Test Firm Registration # : 804595

Tested by (name + signature).....:

Andrea Bortolotti \ Tester

Approved by (name + signature).....:

Giovanni Molteni \ TM

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Testing Laboratory : TÜV Rheinland Italia S.r.l.

Address : Via Mattei 3 - 20010 - Pogliano Milanese (MI) – Italy

Applicant's name : Anticimex Innovation Center A/S

Address : Skovgaardsvej 25

Test item description : COPA Mesh

Trade Mark.....:



Manufacturer : Anticimex Innovation Center A/S

Model/Type reference : COPA Mesh

FCC ID : 2A0FP- E0048

Ratings : 3,6Vdc (internal battery)

Sample :

Samples received on : 05/06/2019

TUV reference samples : 190212 (sampled by the customer)

Samples tested n. : 1

Testing :

Start Date: : 06/06/2019

End Date: : 07/06/2019

The results in this Test Report are exclusively referred to the tested samples. Without the written authorization of TÜV Rheinland Italia S.r.l., this document can be reproduced only integrally



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1. Release Control Record

Test report Number	Reason of change	Date of Issue
28118556-001	Original release	05/09/2019
28118556-002	Re-tested: 15.247 (a) (2): 6dB Minimum Bandwidth for systems using digitally modulation 15:247 (d): 100 kHz Bandwidth of Frequency Band Edges 15:247 (e): Power Spectral Density Update test report with measure acquisition	23/09/2019
28118556-003	Re-tested: §15.247 (d): Out-of-band emissions §15.247 (d): 100 kHz Bandwidth of Frequency Band Edges Update test report with measure acquisition	31/10/2019

2. Reference Standards

Standard	Description
FCC Part 15 (Subpart C)	§15.247 Operation within the bands 902-928 MHz, 2400-2483,5 MHz, and 5725-5850 MHz.
FCC Part 15 (Subpart C)	§15.207 Conducted Limits
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements
FCC Part 15 (Subpart C)	§15.203 Antenna Requirement
ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices
558074 D01 DTS Meas Guidance v05 - August 24, 2018	Guidance for performing compliance measurements on digital transmission systems (DTS) operating under §15.247

**3. Summary of testing**

§ 15.203	Antenna Requirements	PASS
§ 15.247 (b)(4)(i)		
§ 15.207 (a)	Power Line Conducted Emission	Not performed
§ 15.209 (a) (f)	Radiated Emission	Not performed
§ 15.215 (a) (b) (c)	Additional provisions to the general radiated emission limitations	PASS
§ 15.247 (a)	Frequency Hopping Spread Spectrum Specifications:	
§ 15.247 (a) (1)	20 dB Bandwidth	N.A. ¹
§ 15.247 (a) (1) (i)	Number of Hopping Channels Used, Carrier frequency Separation and Time occupancy in band 902÷908MHz	N.A. ¹
§ 15.247 (a) (1) (ii)	Number of Hopping Channels Used, Carrier frequency Separation and Time occupancy in band 5725÷ 5850 MHz	N.A. ¹
§ 15.247 (a) (1) (iii)	Number of Hopping Channels Used, Carrier frequency Separation and Time occupancy in band 2400÷2483,5 MHz	N.A. ¹
§ 15.247 (a) (2)	6dB Minimum Bandwidth for systems using digitally modulation	PASS
§ 15.247 (b)	Maximum Peak Output Power:	
§ 15.247 (b) (1)	Peak Output Power (conducted) in band 2400÷2483,5 MHz and 5725÷ 5850 MHz (Hopping systems)	N.A. ¹
§ 15.247 (b) (2)	Peak Output Power (conducted) in band 902÷908MHz (Hopping systems)	N.A. ¹
§ 15.247 (b) (3)	RF power output (conducted) for systems using digitally modulation	PASS
§ 15.247 (b) (4)	Antenna gain	PASS
§ 15.247 (c)	Operation with directional antenna gains greater than 6 dBi	N.A. ³
§ 15.247 (d)	Out-of-band emissions	PASS
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edges	PASS
§ 15.247 (e)	Power Spectral Density	PASS
§ 15.247 (f)	Hybrid systems	N.A. ²
§ 15.247 (g)	FHSS Transmission characteristics	N.A. ¹
§ 15.247 (h)	Recognition of occupied channel and multiple transmission system	N.A. ¹

Note 1	Not applicable for DTS equipment
Note 2	No hybrid system
Note 3	Antenna gain: 1,3dBi



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Possible test case verdicts:

- test case does not apply to the test object.... : N/A
- test object does meet the requirement..... : PASS
- test object does not meet the requirement ... : FAIL

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

4. General product information

Description: COPA Mesh

Brand:  **Anticimex®**

Model: COPA mesh

Ratings: 3,6Vdc



5. General Chipset information

Texas instruments CC1312R

SimpleLink™ sub-1 GHz wireless MCU



- Microcontroller
 - Powerful 48-MHz Arm® Cortex®-M4F Processor
 - EEMBC CoreMark® score: 148
 - 352KB of in-system Programmable Flash
 - 256KB of ROM for protocols and library functions
 - 8KB of Cache SRAM (Alternatively available as general-purpose RAM)
 - 80KB of ultra-low leakage SRAM. The SRAM is protected by parity to ensure high reliability of operation.
 - 2-Pin cJTAG and JTAG debugging
 - Supports Over-the-Air upgrade (OTA)
- Ultra-Low Power Sensor Controller with 4KB of SRAM
 - Sample, store, and process sensor data
 - Operation independent from system CPU
 - Fast wake-up for low-power operation
- TI-RTOS, drivers, Bootloader, and IEEE 802.15.4 MAC in ROM for optimized application size
- RoHS-compliant package
 - 7-mm × 7-mm RGZ VQFN48 (30 GPIOs)
- Peripherals
 - Digital peripherals can be routed to any GPIO
 - 4× 32-bit or 8× 16-bit general-purpose timers
 - 12-Bit ADC, 200 kSamples/s, 8 channels
 - 2× comparators with internal reference DAC (1× continuous time, 1× ultra-low power)
 - Programmable current source
 - 2× UART
 - 2× SSI (SPI, MICROWIRE, TI)
 - I2C
 - I2S
 - Real-Time Clock (RTC)
 - AES 128- and 256-bit Crypto Accelerator
 - ECC and RSA Public Key Hardware Accelerator
 - SHA2 Accelerator (Full suite up to SHA-512)
 - True Random Number Generator (TRNG)
 - Capacitive sensing, up to 8 channels
 - Integrated temperature and battery monitor
- External system
 - On-chip Buck DC/DC Converter
- Low Power
 - Wide supply voltage range: 1.8 V to 3.8 V
 - Active-Mode RX: 5.8 mA (3.6 V, 868 MHz)
 - Active-Mode TX at +14 dBm: 24.9 mA (868 MHz)
 - Active-Mode MCU 48 MHz (CoreMark): 2.9 mA (60 µA/MHz)
 - Sensor Controller, Low Power-Mode, 2 MHz, running infinite loop: 30.8 µA
 - Sensor Controller, Active-Mode, 24 MHz, running infinite loop: 808 µA
 - Standby: 0.85 µA (RTC on, 80KB RAM and CPU retention)
 - Shutdown: 150 nA (wake-up on external events)
- Radio section
 - Flexible high-performance sub-1 GHz RF transceiver
 - Excellent receiver sensitivity:
 - 121 dBm for SimpleLink long-range mode at 5 kbps
 - 110 dBm at 50 kbps
 - Output power up to +14 dBm with temperature compensation
 - Suitable for systems targeting compliance with worldwide radio frequency regulations
 - ETSI EN 300 220 Receiver Category 1.5 and 2, EN 303 131, EN 303 204 (Europe)
 - FCC CFR47 Part 15
 - ARIB STD-T108
 - Wide standard support
- Development Tools and Software
 - CC1312R LaunchPad™ Development Kit
 - SimpleLink™ CC13X2-CC26X2 Software Development Kit
 - SmartRF™ Studio for simple radio configuration
 - Sensor Controller Studio for building low-power sensing applications



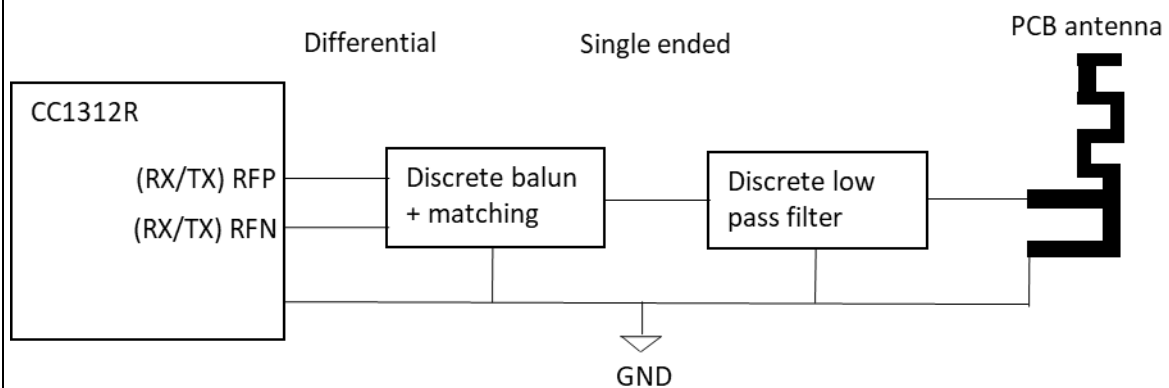
6. General Antenna information

MESH BOARD ANTENNA

Antenna type; IFA type PCB antenna.

MAX GAIN MEASURED FOR MESH BOARD

Frequency band	Max antenna gain for TX [dBi]
917MHz – 926MHz	1.3
868.3MHz	1





7. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	COPA Mesh	Anticimex Innovation Center A/S	E0048	---

Note:

* Use :

EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

No other Auxiliary/Associated Equipment was connected/installed on the EUT

8. Input/Output Ports

CONNECTIONS

Port		Description	Connection	Cable lenght
1	Enclosure	Non conductive surface	Closed by pressure	---
2	AC Power Port	AC Input	Port not present	---
3	DC Power Port	DC Input	Internal battery powered	
4	I/O	Universal inputs/outputs	Port not present	---

*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
WN = Wired Network

9. Power Interface

Mode #	Voltage (V)	Current (A)	Power (VA)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	3,6Vdc	---	---	---	---	Internal battery



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10. Derived model(s)

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11. EUT Operation Modes

Operation mode	Description
#1	Continuous Modulation RF Transmission (DTS) RF setting during tests: Frequency: 917MHz (low channel); 922MHz (mid channel); 926MHz (high channel); Max. Power setting: 14dBm



12. EUT Configuration Modes

Description		
PAR.	TEST	EUT OPERATION MODES
§ 15.203 § 15.247 (b) (4) (i)	Antenna Requirements	#1
§ 15.215 (a) (b) (c)	Additional provisions to the general radiated emission limitations	#1
§ 15.247 (a) (2)	6 dB minimum Bandwidth	#1
§ 15.247 (b) (3)	RF power output (conducted) for systems using digitally modulation	#1
§ 15.247 (d)	Out-of-band emissions	#1
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edges	#1
§ 15.247 (e)	Power Spectral Density	#1

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V/m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

**13. Test Conditions and Results**

TEST: Antenna requirements		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C
	Relative Humidity (%)	56%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc	Enclosure
Equipment mode:	Operation mode	#1
FCC Standard	§15.203 § 15.247 (B) (4) (I)	
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.		
Antenna specifications		
N° of authorized antenna types	---	
Antenna type	Internal PCB antenna	
Maximum total gain	As delcared by the manufacturer, antenna gain +1,3dBi	
External power amplifiers	Not present	



TEST: 6dB Bandwidth		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C
	Relative Humidity (%)	48%
	Air pressure (hPa)	1020
—	Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc	SMA temporary Connector
Equipment mode:	Operation mode	#1
FCC Standard	§15.247 (A) (2)	
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.		
Further information to test setup	EUT Attenuator (optional) Spectrum Analyzer (or Power Meter)	



Test Equipment Used

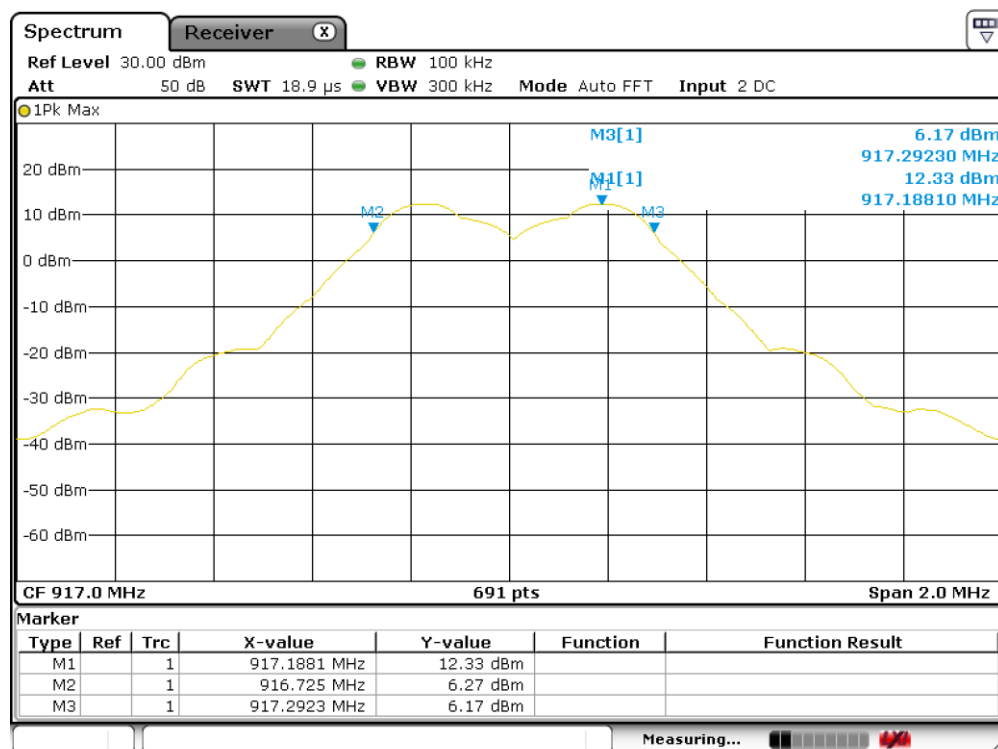
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU 40	2782345	05/2019	05/2020

Test Method Used

According to Par. 8.2 of KDB 558074 D01 15.247 Meas Guidance v05r02
(and par. 11.8.1 Option 1 of ANSI C63.10)

Graphical representation of 6dB Bandwidth

Operation Mode: #1 – Low Channel (917MHz)



Channel (No.)	Frequency (MHz)	Channel Bandwidth at -6dB (kHz)
Low	917,00	570

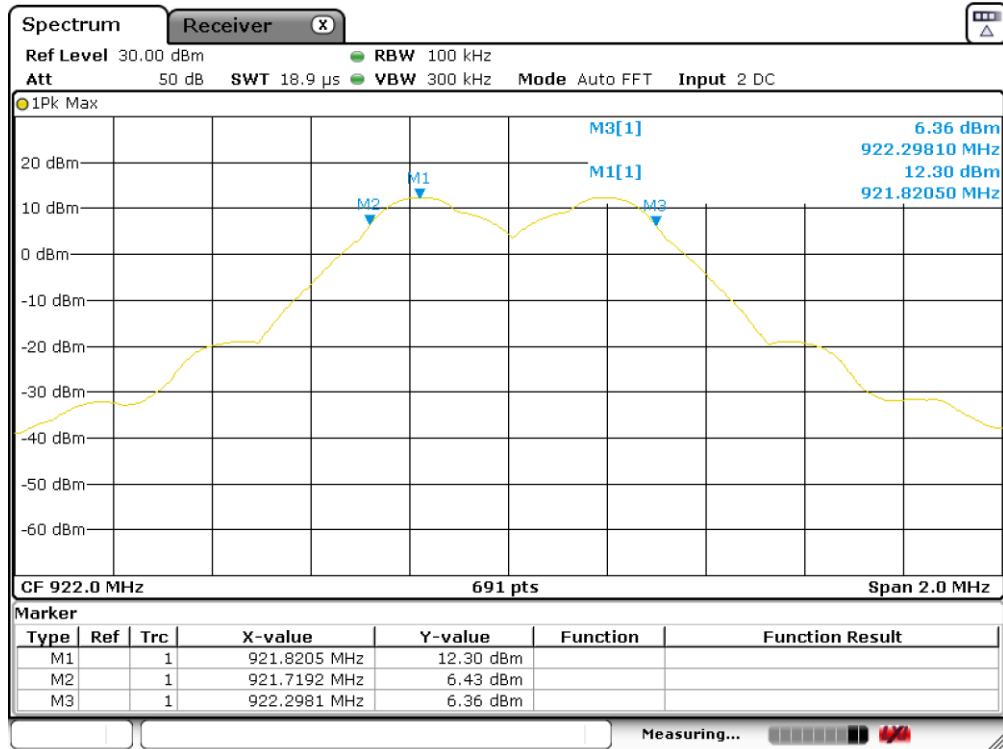
Bandwidth at -6dB (Fmin and Fmax)

Fmin	916,72	Fmax	917,29
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Graphical representation of 6dB Bandwidth



Operation Mode: #1 – Middle Channel (922MHz)



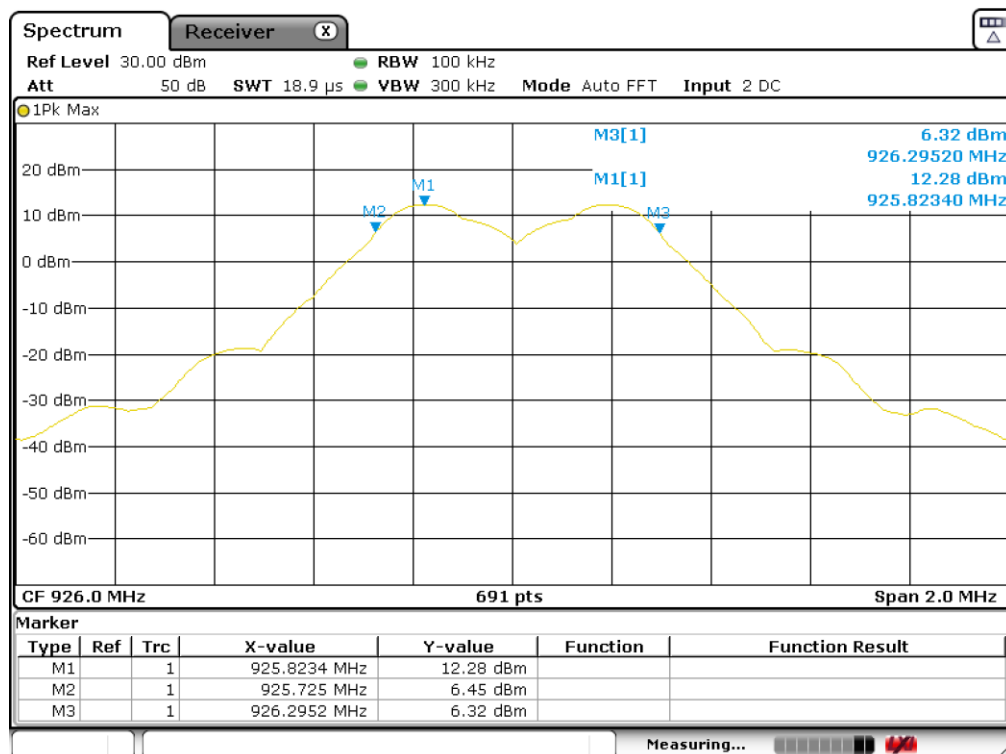
Channel (No.)	Frequency (MHz)	Channel Bandwidth at -6dB (kHz)
Middle	922,00	570

Bandwidth at -6dB (Fmin and Fmax)			
Fmin	921,72	Fmax	922.30



Graphical representation of 6dB Bandwidth

Operation Mode: #1 – High Channel (926 MHz)



Channel (No.)	Frequency (MHz)	Channel Bandwidth at -6dB (kHz)
High	926,00	570

Bandwidth at -6dB (Fmin and Fmax)			
Fmin	925,72	Fmax	926,29



TEST: RF power output, conducted (ERP)		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22,5°C
	Relative Humidity (%)	51%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc internal battery	SMA temporary Connector
Equipment mode:	Operation mode	#1
FCC Standard	§15.247 (B) (3)	
(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section. (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode. (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.		
Further information to test setup	EUT Attenuator (optional) Spectrum Analyzer (or Power Meter)	



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Test Equipment Used

Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU 40	2782345	05/2019	05/2020

Test Method Used

According to Par. 8.3.1.1 of KDB 558074 D01 15.247 Meas Guidance v05r02 (and par. 11.9.1.1 RBW $\geq$ DTS bandwidth of ANSI C63.10)

Test Result

Channel (No.)	Frequency (MHz)	Conducted Output Power		Limit (W)
		(dBm)	(mW)	
Low	917,00	11,61	14,49	1
Middle	922,00	13,59	22,86	1
High	926,00	11,59	14,42	1



TEST: Out-of-band emissions		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C
	Relative Humidity (%)	50%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc	SMA temporary Connector
Equipment mode:	Operation mode	#1
FCC Standard	§15.247 (D)	
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Further information to test setup	EUT Attenuator (optional) Spectrum Analyzer (or Power Meter)	



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Report No. 28118556-003

Test Equipment Used

Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU 40	2782345	05/2019	05/2020

Test Method Used

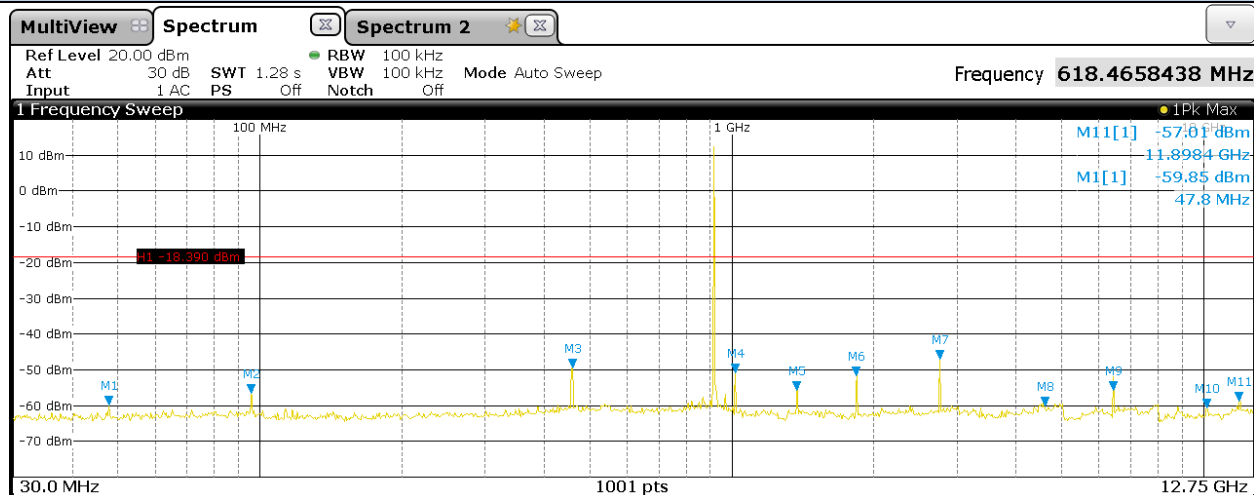
According to Par. 8.5 of KDB 558074 D01 15.247 Meas Guidance v05r02 (and par. 11.11 of ANSI C63.10)

If the maximum peak conducted output power procedure was used to determine compliance as described in 11.9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).



Graphical representation of Antenna Port Spurious Emission - Conducted

Operation Mode: #1 – Low Channel (917 MHz)

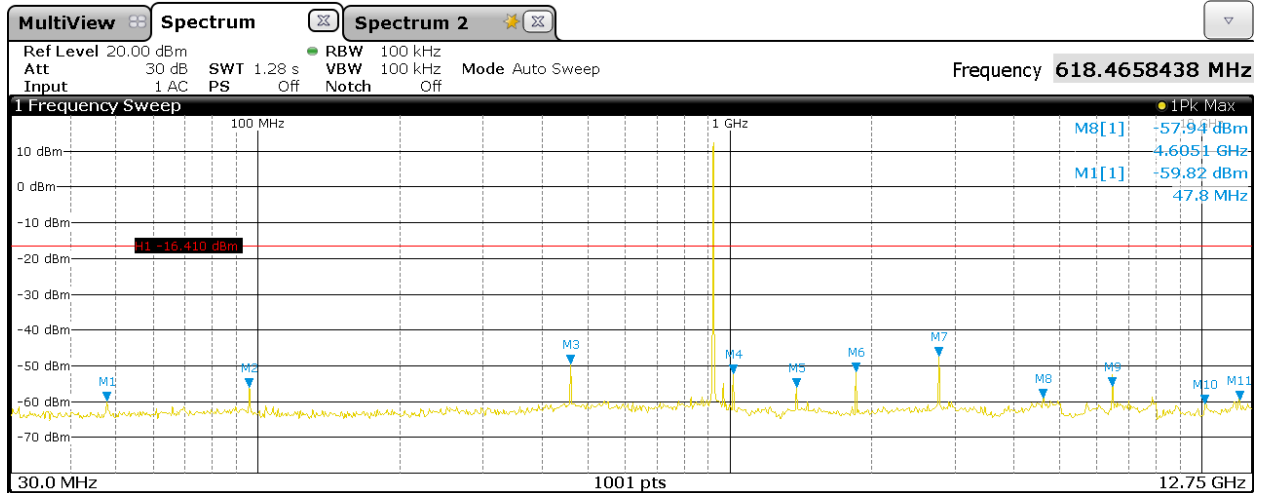


Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / Spurious (dB)	Peak Limit at PK power -30dB (dBm)	Margin (dB)
47,8	-59,85	11,61	71,46	-18,39	41,46
95,6	-56,70	11,61	68,31	-18,39	38,31
460,1	-49,54	11,61	61,15	-18,39	31,15
1015,8	-50,81	11,61	62,42	-18,39	32,42
1374,3	-55,62	11,61	67,23	-18,39	37,23
1837,1	-51,53	11,61	63,14	-18,39	33,14
2754,5	-47,13	11,61	58,74	-18,39	28,74
4605,1	-60,81	11,61	72,42	-18,39	42,42
6421,8	-52,06	11,61	63,67	-18,39	33,67
10167,6	-61,00	11,61	72,61	-18,39	42,61
11898,4	-57,01	11,61	68,62	-18,39	38,62



Graphical representation of Antenna Port Spurious Emission - Conducted

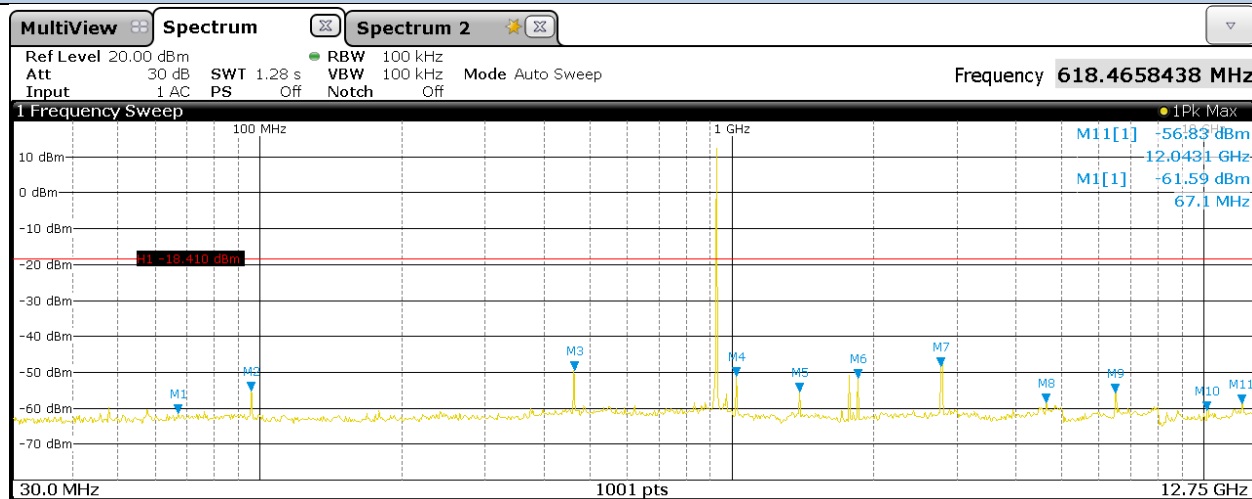
Operation Mode: #1 – Middle Channel (922 MHz)



Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / Spurious (dB)	Peak Limit at PK power -30dB (dBm)	Margin (dB)
47,8	-59,82	13,59	73,41	-16,41	43,41
95,6	-56,06	13,59	69,65	-16,41	39,65
460,1	-49,50	13,59	63,09	-16,41	33,09
1015,8	-52,17	13,59	65,76	-16,41	35,76
1382,7	-56,10	13,59	69,69	-16,41	39,69
1848,2	-51,76	13,59	65,35	-16,41	35,35
2771,2	-47,25	13,59	60,84	-16,41	30,84
4605,1	-57,94	13,59	71,53	-16,41	41,53
6406,7	-52,48	13,59	66,07	-16,41	36,07
10167,6	-59,79	13,59	73,38	-16,41	43,38
12043,1	-61,22	13,59	74,81	-16,41	44,81

Graphical representation of Antenna Port Spurious Emission - Conducted

Operation Mode: #1 – High Channel (926 MHz)



Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / Spurious (dB)	Peak Limit at PK power -30dB (dBm)	Margin (dB)
67,1	-61,59	11,59	73,18	-18,41	43,18
95,6	-55,11	11,59	66,70	-18,41	36,70
462,9	-49,40	11,59	60,99	-18,41	30,99
1021,9	-51,09	11,59	62,68	-18,41	32,68
1391,0	-55,59	11,59	67,18	-18,41	37,18
1848,2	-51,71	11,59	63,30	-18,41	33,30
2771,2	-48,41	11,59	60,00	-18,41	30,00
4633,0	-58,49	11,59	70,08	-18,41	40,08
6499,9	-53,17	11,59	64,76	-18,41	34,76
10167,6	-58,85	11,59	70,44	-18,41	40,44
12043,1	-56,83	11,59	68,42	-18,41	38,42



TEST: 100 kHz Bandwidth of Frequency Band Edges		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C
	Relative Humidity (%)	52%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc	SMA temporary Connector
Equipment mode:	Operation mode	#1
FCC Standard	§15.247 (D)	
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Further information to test setup (conducted)	EUT Attenuator (optional) Spectrum Analyzer (or Power Meter)	



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LAB N° 1356

Report No. 28118556-003

Test Equipment Used

Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU 40	2782345	05/2019	05/2020

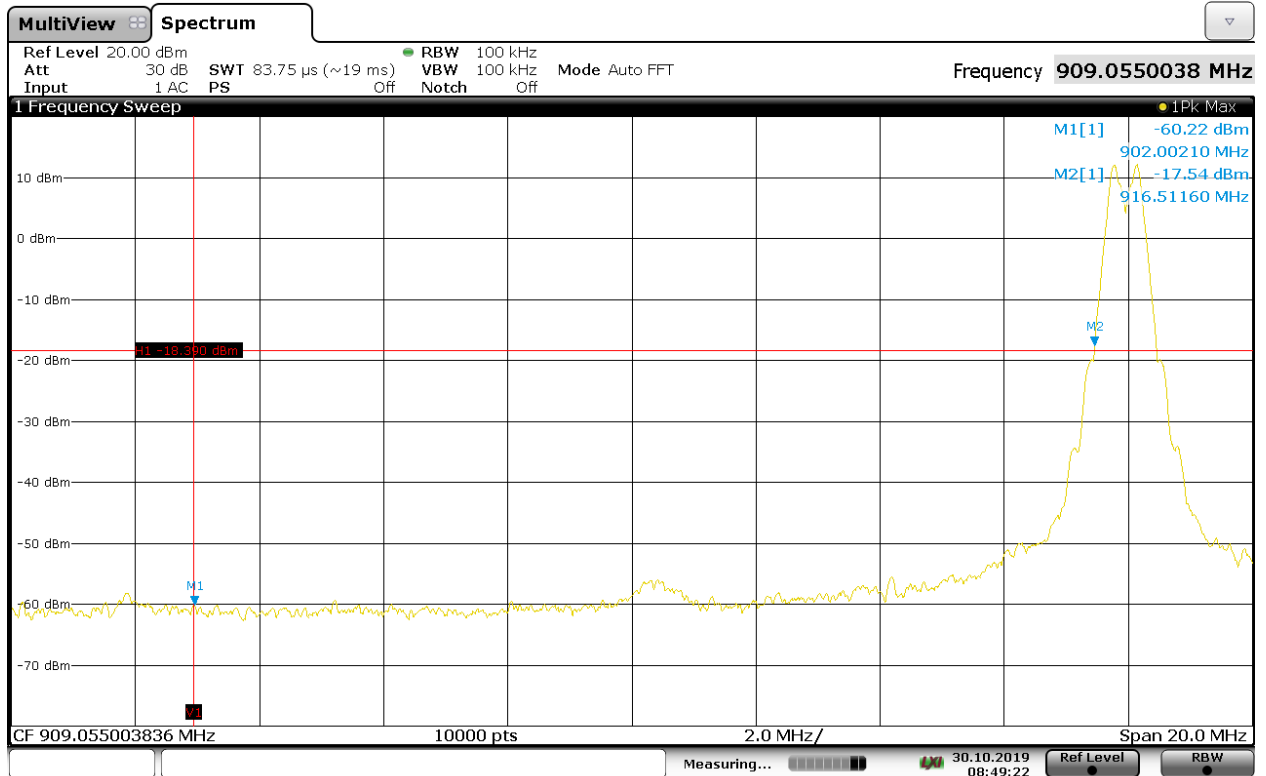
Test Method Used

According to Par. 8.7.2 (Marker-Delta method) of KDB 558074 D01 15.247 Meas Guidance v05r02 (and par. 11.13.2 of ANSI C63.10)



Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted

Operation Mode: #1 – Low Channel (917 MHz)



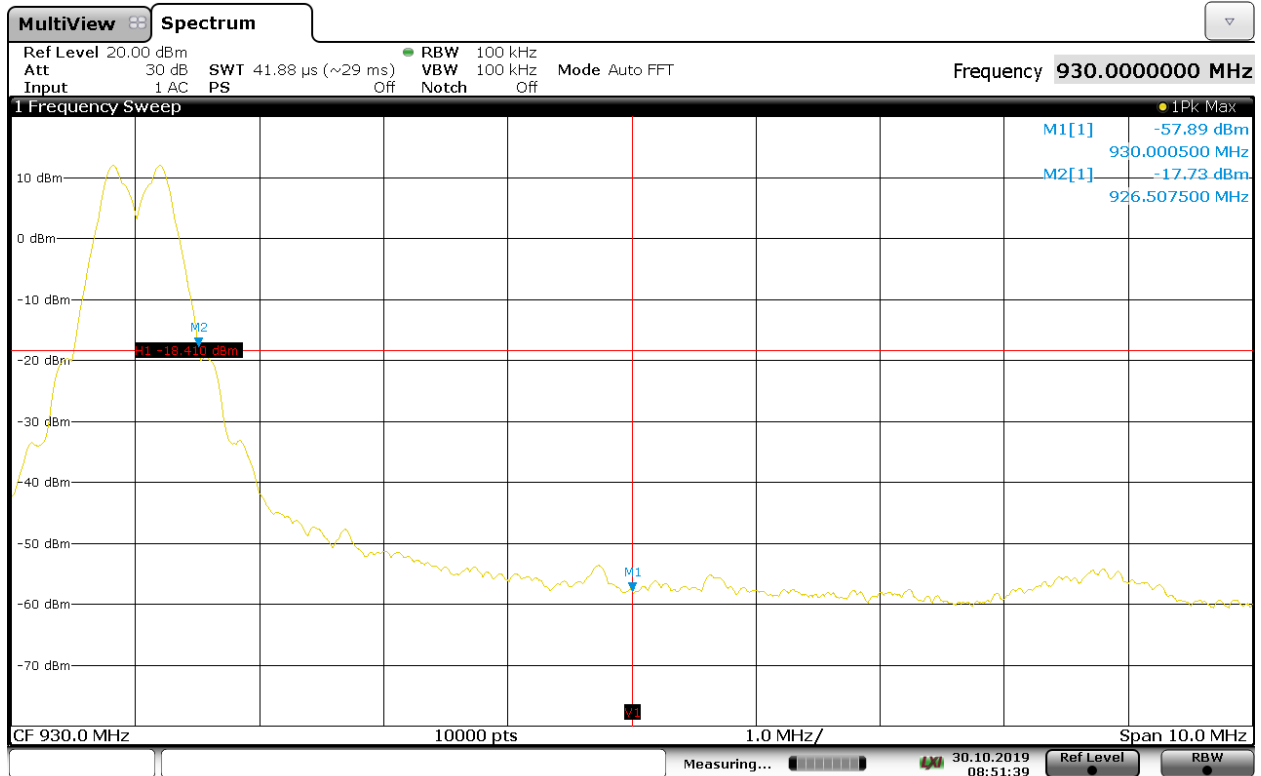
08:49:22 30.10.2019

Frequency (MHz)	Measured power at the band edge (dBm)	Measured peak power at fundamental frequency (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power -30 dB (dBm)	Margin (dB)
917,00	-60,22	11,61	71,83	-18,39	41,83



Graphical representation of 100 kHz Bandwidth of Frequency Band Edges - Conducted

Operation Mode: #1 – High Channel (926 MHz)



08:51:39 30.10.2019

Frequency (MHz)	Measured power at the band edge (dBm)	Measured peak power at fundamental frequency (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power -30 dB (dBm)	Margin (dB)
926,00	-57,89	11,59	69,48	-18,41	39,48



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Report No. 28118556-003

TEST: Additional provisions to the general radiated emission limitations.		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C
	Relative Humidity (%)	37%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc internal powered	-----
Equipment mode:	Operation mode	#1
FCC Standard	§15.215 (A) (B) (C)	
(A) The regulations in §§ 15.217-15.257 provide alternatives to the general radiated emission limits for intentional radiators operating in specified frequency bands. Unless otherwise stated, there are no restrictions as to the types of operation permitted under these sections.		
(B) In most cases, unwanted emissions outside of the frequency bands shown in these alternative provisions must be attenuated to the emission limits shown in Section 15.209. In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emission.		VERDICT
		PASS
(C) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least		VERDICT
		PASS



TEST: Power Spectral Density		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C
	Relative Humidity (%)	37%
	Air pressure (hPa)	1020
—	Power Supply / Frequency	Application Point
Fully configured sample tested at the power line frequency	3,6Vdc internal powered	SMA temporary Connector
Equipment mode:	Operation mode	#1
FCC Standard	§15.247 (E)	
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.		
Further information to test setup	EUT Attenuator (optional) Spectrum Analyzer (or Power Meter)	



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Test Equipment Used

Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
EMI Test Receiver	R&S	ESU 40	2782345	05/2019	05/2020

Test Method Used

According to Par. 8.4 of KDB 558074 D01 15.247 Meas Guidance v05r02 (and par. 11.10.2 Method PKPSD (peak PSD))



Graphical representation of Power Spectral Density

Operation Mode: #1 – Low Channel (917MHz)

Spectrum

Receiver

Ref Level 30.00 dBm

RBW 3 kHz

Att 50 dB

SWT 632.3 μ s

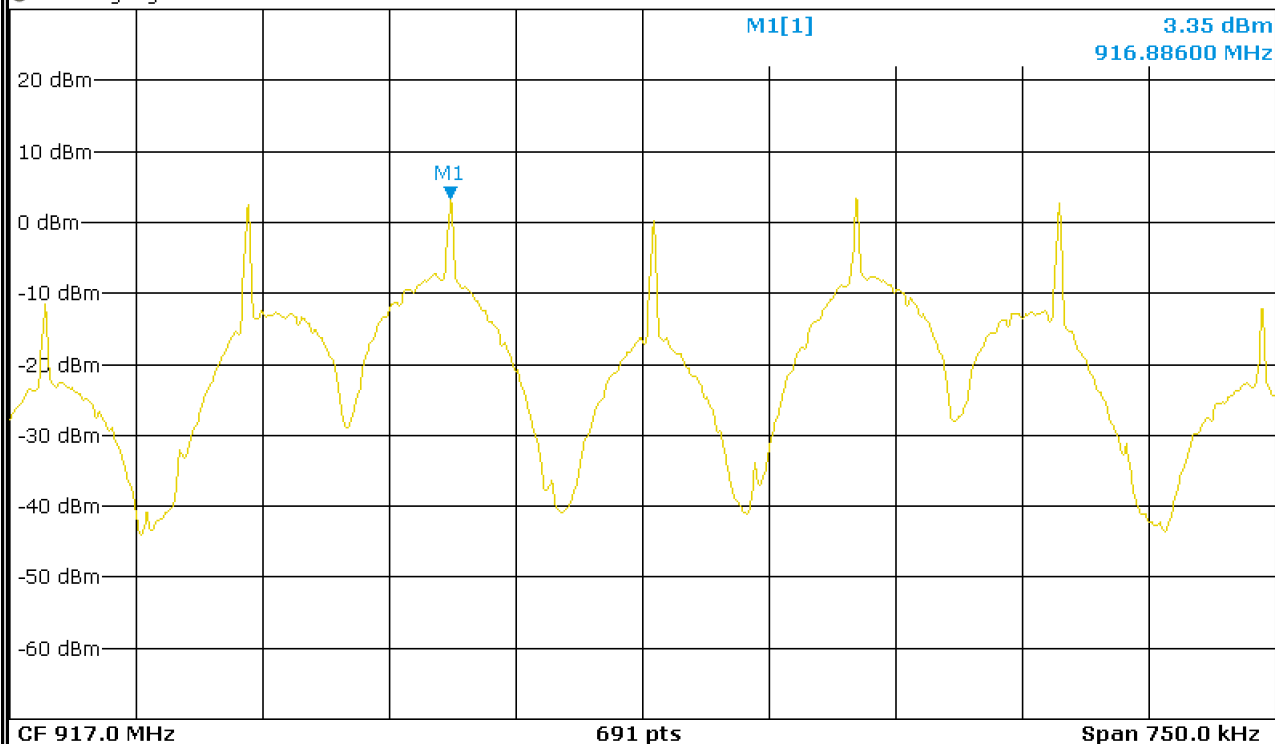
VBW 30 kHz

Mode Auto FFT

Input 2 DC

Count 100/100

1Rm AvgLog



Date: 23.SEP.2019 09:30:31

Channel (No.)	Frequency (MHz)	Conducted Power Spectral Density (dBm)	Limit (dBm)
Low	917	3,35	8



Graphical representation of Power Spectral Density

Operation Mode: #1 – Middle Channel (922 MHz)

Spectrum

Receiver



Ref Level 30.00 dBm

RBW 3 kHz

Att 50 dB

SWT 632.3 μ s

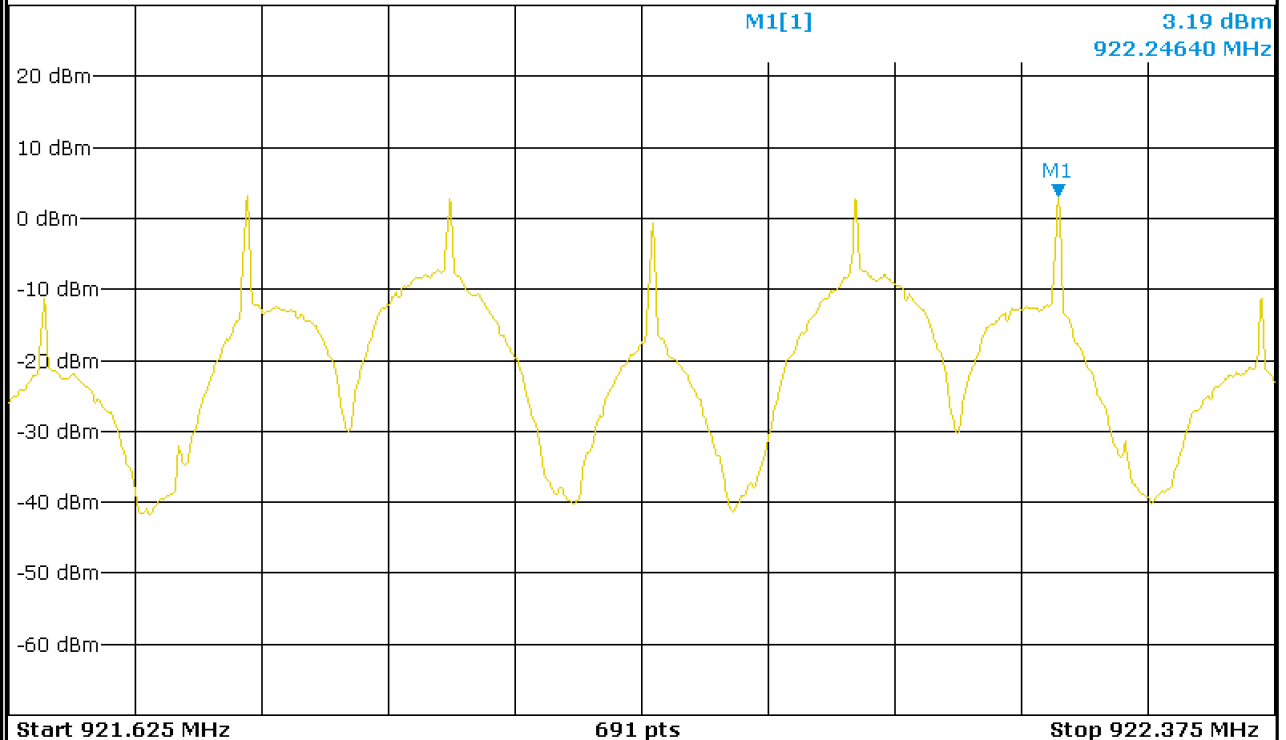
VBW 30 kHz

Mode Auto FFT

Input 2 DC

Count 100/100

1Rm AvgLog



Measuring...



Date: 23.SEP.2019 09:32:40

Channel (No.)	Frequency (MHz)	Conducted Power Spectral Density (dBm)	Limit (dBm)
Middle	922	3,19	8



Graphical representation of Power Spectral Density

Operation Mode: #1 – High Channel (926 MHz)

Spectrum

Receiver



Ref Level 30.00 dBm

RBW 3 kHz

Att 50 dB

SWT 632.3 μ s

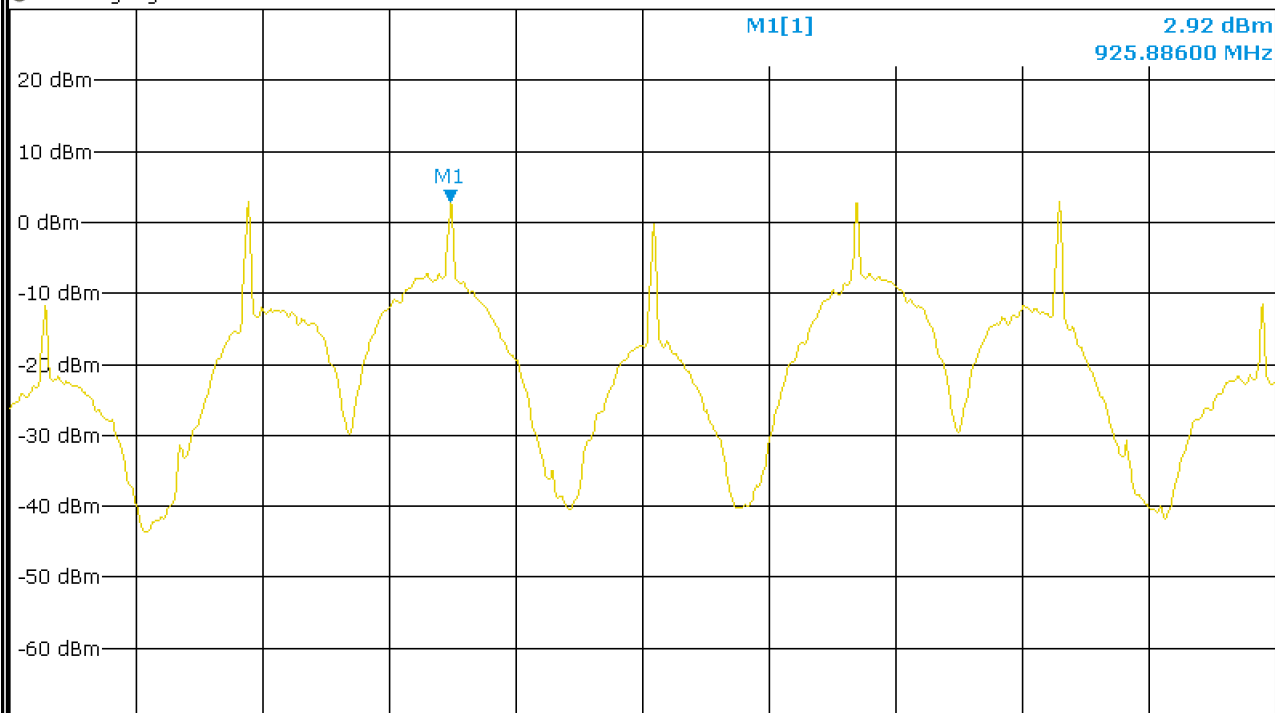
VBW 30 kHz

Mode Auto FFT

Input 2 DC

Count 100/100

1Rm AvgLog



CF 926.0 MHz

691 pts

Span 750.0 kHz

Measuring...



Date: 23.SEP.2019 09:33:34

Channel (No.)	Frequency (MHz)	Conducted Power Spectral Density (dBm)	Limit (dBm)
High	926	2.92	8



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12. MEASUREMENT UNCERTAINTY

TEST	Expanded uncertainty	Coverage probability	Coverage factor
6 dB minimum Bandwidth	0,25% of reading value	95%	2,3
RF power output (conducted)	1,2 dB	95%	2,2
Out-of-band emissions	1,2 dB	95%	2,2
100 kHz Bandwidth of Frequency Band Edges	1,2 dB	95%	2,2
Power Spectral Density	1,2 dB	95%	2,2

END OF TEST REPORT