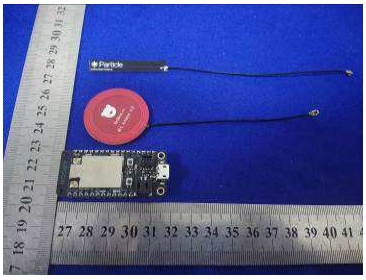
TEST REPORT

Applicant	Particle Industries,Inc
Address	126 Post St, 4th floor, San Francisco, CA 94108 USA

Manufacturer or Supplier	Particle Industries,Inc
Address	126 Post St, 4th floor, San Francisco, CA 94108 USA
Product	Argon
Brand Name	Particle Industries,Inc
Model	ARGN
Additional Model & Model Difference	N/A
Date of tests	Aug. 17, 2018 ~ Oct. 25, 2018



The submitted sample of the above equipment has been tested according to the requirements of the following standard:

☒ **EN 300 328 V2.1.1 (2016-11)**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Breeze Jiang Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	Date: Nov. 30, 2018

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RE180817N043-1	Original release	Nov. 30, 2018

1. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EN 300 328 V2.1.1		
Clause	**Test Parameter**	**Results**
	TRANSMITTER PARAMETERS	
4.3.2.2	RF Output Power	Pass
4.3.2.3	Power Spectral Density	Pass
4.3.1.3	Duty cycle, Tx-sequence, Tx-gap (Non-adaptive equipment)	Not Applicable
4.3.1.6	Medium Utilisation (Non-Adaptive Equipment)	Not Applicable
4.3.2.6	Adaptivity	Not Applicable (Note)
4.3.2.7	Occupied Channel Bandwidth	Pass
4.3.2.8	Transmitter unwanted emission in the OOB domain	Pass
4.3.2.9	Transmitter unwanted emissions in the spurious domain	Pass
	RECEIVER PARAMETERS	
4.3.2.10	Receiver Spurious Emissions	Pass
4.3.2.11	Receiver Blocking	Pass

Note: These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm EIRP or for equipment when operating in a mode where the RF Output power is less than 10 dBm EIRP.

1.1. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 21,18	Mar. 20,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Mar. 21,18	Mar. 20,19
Bilog Antenna	Teseq	CBL 6111D	30643	Aug. 11, 18	Aug. 10, 19
Horn Antenna	ETS-Lindgren	3117	00062558	Jul. 21, 18	Jul. 20, 19
GPS Generator+ Antenna	TOJOIN	GNSS-5000A	E1-010119	Sep. 08,18	Sep. 07,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Feb. 10,18	Feb. 09,19
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	N/A	N/A	N/A
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	May 05,18	May 04,19
Amplifier	Burgeon	BPA-530	100220	Apr. 18,18	Apr. 18,19
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Power Sensor	Keysight	U2021XA	MY55060016	Jun. 13,18	Jun. 12,19
Power Sensor	Keysight	U2021XA	MY55060018	Jun. 13,18	Jun. 12,19
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 21, 17	Oct.20, 18
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05, 18	Sep. 04,19
Oscilloscope	Agilent	DSO9254A	MY51260160	Nov. 08,17	Nov. 07,18
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Spectrum Analyzer	Keysight	N9020A	MY55400499	Mar. 21,18	Mar. 20,19
Signal Generator	Agilent	N5183A	MY50140980	Jan. 02,18	Jan. 01,19
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jan. 02,18	Jan. 01,19
Wireless Connectivity Tester	Rohde&Schwarz	CMW270	100908	Jan. 10, 18	Jan. 09, 19
Vector Signal Generator	Rohde&Schwarz	SMBV100A	257199	Jun. 13,18	Jun. 12,19
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A	N/A

NOTE:

1. The test was performed in 966 Chamber and RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

1.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameter	Uncertainty
Occupied Channel Bandwidth	±1.132x10^{-4} %
RF output power, conducted	±1.017dB
Power Spectral Density, conducted	±1.017dB
Unwanted Emissions, conducted	±2.855dB
All emissions, radiated	±2.855dB
Temperature	±0.7°C
Humidity	±2.5%
DC and low frequency voltages	±0.04%
Time	±5 %
Duty Cycle	±5 %

1.3. MAXIMUM MEASUREMENT UNCERTAINTY

For the test methods, according to ETSI EN 300 328 standard, the measurement uncertainty figures shall be calculated in accordance with ETR 100 028-1 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Duty Cycle	±5 %

2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

PRODUCT	Argon
TEST MODEL	ARGN
ADDITIONALMODEL	N/A
NOMINAL VOLTAGE	Li+ PIN /Battery connector: DC 3.7V from Li-ion Battery or VUSB PIN /USB connector :DC 5V from USB Host Unit
OPERATING TEMPERATURE RNAGE	-20 ~ +80℃
MODULATION TECHNOLOGY	DSSS(IEEE 802.15.4)
MODULATION TYPE	OQPSK
OPERATING FREQUENCY	2405-2480MHz
ADPTIVE/NON-ADPTIVE	☐ non-adaptive Equipment ☒ adaptive Equipment without the possibility to switch to a non-adaptive mode ☐ adaptive Equipment which can also operate in a non-adaptive mode
EIRP	-0.77dBm (Measured Max.)
ANTENNA TYPE	PCB Antenna, 0dBi Gain
I/O PORTS:	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 180817N043) for detailed product photo.
4. The EUT is wireless module, it no any accessories.
5. The EUT provides completed transmitter and receiver.

MODULATION MODE	TX FUNCTION
DSSS	1TX/1RX

2.2. DESCRIPTION OF TEST MODES

16 channels are provided:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
11	**2405 MHz**	19	2445 MHz
12	2410 MHz	20	2450 MHz
13	2415 MHz	21	2455 MHz
14	2420 MHz	22	2460 MHz
15	2425 MHz	23	2465 MHz
16	2430 MHz	24	2470 MHz
17	2435 MHz	25	2475 MHz
18	**2440 MHz**	**26**	**2480 MHz**

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2.2.1. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO								DESCRIPTION
	ROP	PSD	AD	OCB	OOB	SE<1G	SE≥1G	RB	
A	√	√	-	√	√	√	√	√	Powered by Fully Battery
B	-	-	-	-	-	-	-	-	Powered by Adapter

Where **ROP:** RF Output Power **PSD:** Power Spectral Density

AD: Adaptivity (Channel Access Mechanism) **OCB:** Occupied Channel Bandwidth

OOB: Transmitter unwanted emissioin in the out-of-band domain **SE<1G:** Spurious Emissions below 1GHz

SE≥1G: Spurious Emissions above 1GHz **RB:** Receiver Blocking

RF OUTPUT POWER TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11,18, 26	DSSS	OQPSK	250kbps

POWER SPECTRAL DENSITY TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11,18, 26	DSSS	OQPSK	250kbps

OCCUPIED CHANNEL BANDWIDTH TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11, 26	DSSS	OQPSK	250kbps

TRANSMITTER UNWANTED EMISSIOIN IN THE OUT-OF-BAND DOMAIN TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11, 26	DSSS	OQPSK	250kbps

SPURIOUS EMISSIONS TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11	DSSS	OQPSK	250kbps

SPURIOUS EMISSIONS TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11, 26	DSSS	OQPSK	250kbps

RECEIVER BLOCKING TEST:

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
11 to 26	11, 26	DSSS	OQPSK

RECEIVER BLOCKING TEST:

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
11 to 26	11, 26	DSSS	OQPSK	250kbps

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ROP	25deg. C, 60%RH	DC 3.7V from Battery	Robert Cheng
PSD	25deg. C, 60%RH	DC 3.7V from Battery	Robert Cheng
AD	N/A	N/A	N/A
OCB	25deg. C, 60%RH	DC 3.7V from Battery	Robert Cheng
OOB	25deg. C, 60%RH	DC 3.7V from Battery	Robert Cheng
SE<1G	23deg. C, 53%RH	DC 3.7V from Battery	Tank
SE≥1G	23deg. C, 53%RH	DC 3.7V from Battery	Tank
RB	25deg. C, 60%RH	DC 3.7V from Battery	Robert Cheng

2.3. GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

EN 300 328 V2.1.1 (2016-11)

All test items have been performed and recorded as per the above standards.

2.4. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A
2	Li-ion Battery	N/A	DC3.7V	N/A	N/A
3	Adapter	N/A	DC5V 1.5A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	N/A
3	USB Line: Unshielded, Detachable 0.6m

NOTE: All power cords of the above support units are non-shielded (1.8m).

3 TEST PROCEDURES AND RESULTS

TRANSMITTER PARAMETERS

3.1. RF OUTPUT POWER

3.1.1 LIMITS OF RF OUTPUT POWER

CONDITION	FREQUENCY BAND	LIMIT (e.i.r.p.)
Under all test conditions	2400 ~ 2483.5 MHz	AV: 20dBm

3.1.2 TEST PROCEDURE

Refer to chapter 5.4.2.2 of ETSI EN 300 328 V2.1.1.

Measurement	
☒Conducted measurement	☐ Radiated measurement

3.1.3 DEVIATION FROM TEST STANDARD

No deviation.

3.1.4 TEST SETUP

The measurement was performed at both normal environmental conditions and at the extremes of the operating temperature. The measurement was performed at the lowest, the middle, and the highest channel. The equipment was configured to operate under its worst case situation with respect to output power. (In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator.) Controlling software has been activated to set the EUT on specific channel and power level.

3.1.5 TEST RESULTS

TEST CONDITION			EIRP POWER (dBm)			LIMIT (dBm)
			(CH11) 2405 MHz	(CH18) 2440 MHz	(CH26) 2480 MHz	
T_{nom}(℃)	+25	V_{nom}(v)	-1.10	-1.41	-1.80	20
T_{min}(℃)	-20	V_{nom}(v)	**-0.77**	-1.14	-1.60	20
T_{max}(℃)	+80	V_{nom}(v)	-1.44	-1.76	-2.18	20

NOTE: 1.EIRP = Conducted output power + ANT Gain

3.2. POWER SPECTRAL DENSITY

3.2.1 LIMIT OF POWER SPECTRAL DENSITY

CONDITION	FREQUENCY BAND	LIMIT (e.i.r.p.)
Under normal conditions	2400 ~ 2483.5 MHz	10dBm / 1MHz

3.2.2 TEST PROCEDURE

Refer to chapter 5.4.3.2 of ETSI EN 300 328 V2.1.1.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement
☒ Option 1: For equipment with continuous and non-continuous transmissions	
☐ Option 2: For equipment with continuous transmission capability or for equipment operating (or with the capability to operate) with a constant duty cycle (e.g. Frame Basedequipment)	

3.2.3 DEVIATION FROM TEST STANDARD

No deviation.

3.2.4 TEST SETUP

The measurement was performed at normal environmental conditions only. The measurement was performed at the lowest, the middle, and the highest channel. The equipment was configured to operate under its worst case situation with respect to output power. (In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator.) Controlling software has been activated to set the EUT on specific status.

3.2.5 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER DENSITY (dBm/1MHz) (E.I.R.P)	LIMIT (dBm/1MHz) (E.I.R.P)	PASS/FAIL
11	2405	-2.67	10	PASS
18	2440	-2.94	10	PASS
26	2480	-3.35	10	PASS

3.3. OCCUPIED CHANNEL BANDWIDTH

3.3.1 LIMIT OF OCCUPIED CHANNEL BANDWIDTH

CONDITION		LIMIT
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p >10dBm.	Less than 20MHz
	For non-adaptive Frequency Hopping system and e.i.r.p >10dBm.	Less than 5MHz

3.3.2 TEST PROCEDURE

Refer to chapter 5.4.7.2 of ETSI EN 300 328 V2.1.1.

Measurement	
☒Conducted measurement	☐ Radiated measurement

3.3.3 DEVIATION FROM TEST STANDARD

No deviation.

3.3.4 TEST SETUP

The measurement was performed at normal environmental conditions only. This measurement was performed at the lowest and the highest channel. The equipment was configured to operate under its worst case situation with respect to output power. (In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator.) Controlling software has been activated to set the EUT on specific status.

3.3.5 TEST RESULTS

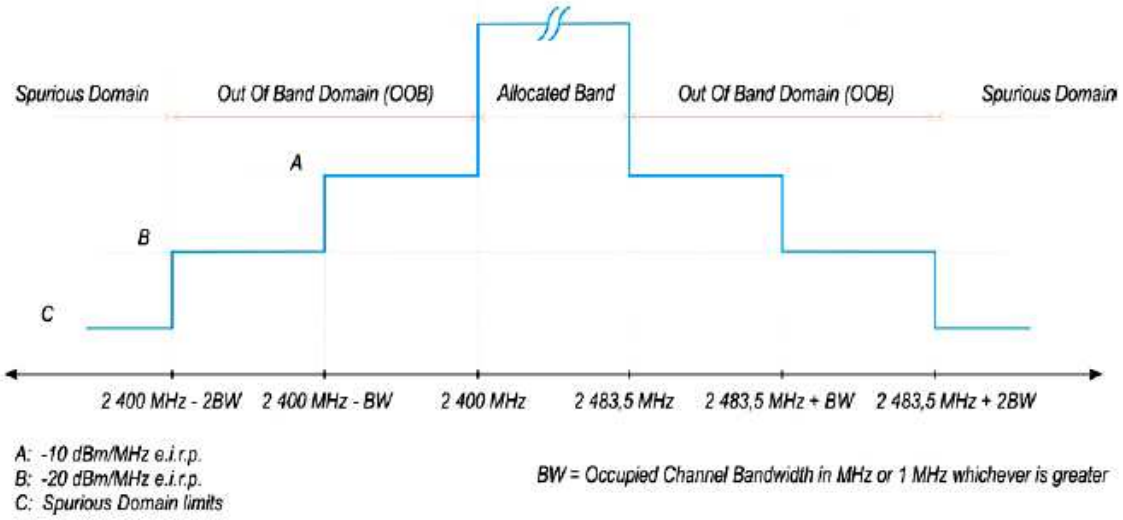
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHZ)	Measured frequencies		LIMIT	PASS/FAIL
			FL (MHz)	FH (MHz)		
11	2405	2.26	2403.86	2406.12	FL > 2.4 GHz and FH < 2.4835 GHz	PASS
26	2480	2.28	2478.86	2481.14		PASS

Note: FL is the lowest frequency of the 99% occupied bandwidth of power envelope.
FH is the highest frequency of the 99% occupied bandwidth of power envelope.

3.4. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

3.4.1 LIMITS OF TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

CONDITION	LIMIT
Under all test conditions	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in below figure.



3.4.2 TEST PROCEDURE

Refer to chapter 5.4.8.2 of ETSI EN 300 328 V2.1.1.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

3.4.3 DEVIATION FROM TEST STANDARD

No deviation.

3.4.4 TEST SETUP

The measurements were performed at normal environmental conditions and shall be repeated at the extremes of the operating temperature and voltage range. The measurement was performed at the lowest and the highest channel on which the equipment can operate. The equipment was configured to operate under its worst case situation with respect to output power. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. The power source of the EUT has to be connected with the power supply for voltage change. The frequency has to be recorded for the right and left end above threshold of highest and lowest channel respectively.

3.4.5 TEST RESULTS

CHANNEL FREQ.(MHz)			**2405**				**2480**			
TEST CONDITION			**OOB Emission (MHz)**				**OOB Emission (MHz)**			
			2397.74 ~ 2400		**2395.48 ~ 2397.74**		**2483.5 ~ 2485.78**		**2485.78 ~ 2488.06**	
Temperature		Voltage	Freq. (MHz)	Power (dBm)	Freq. (MHz)	Power (dBm)	Freq. (MHz)	Power (dBm)	Freq. (MHz)	Power (dBm)
Tnorm(℃)	+25	Normal	2398.50	-69.47	2397.24	-69.79	2484.00	-68.86	2487.26	-69.33
Limit (dBm/MHz)			-10.00		-20.00		-10.00		-20.00	
PASS/FAIL			PASS		PASS		PASS		PASS	

3.5. TRANSMITTER SPURIOUS EMISSIONS

3.5.1 LIMITS OF TRANSMITTER SPURIOUS EMISSIONS

Transmitter limits for narrowband spurious emissions

Frequency Range	Maximum Power Limit (e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz))	Bandwidth
30 MHz to 47 MHz	-36dBm	100kHz
47 MHz to 74 MHz	-54dBm	100kHz
74 MHz to 87,5 MHz	-36dBm	100kHz
87,5 MHz to 118 MHz	-54dBm	100kHz
118 MHz to 174 MHz	-36dBm	100kHz
174 MHz to 230 MHz	-54dBm	100kHz
230 MHz to 470 MHz	-36dBm	100kHz
470 MHz to 862 MHz	-54dBm	100kHz
862 MHz to 1 GHz	-36dBm	100kHz
1GHz ~ 12.75GHz	-30dBm	1MHz

Note: These limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

3.5.2 TEST PROCEDURE

Refer to chapter 5.4.9.2 of ETSI EN 300 328 V2.1.1.

Measurement	
☐ Conducted measurement	☒ Radiated measurement
For Conducted measurement: The level of unwanted emissions shall be measured as their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation).	
Conducted measurement (For equipment with multiple transmit chains): ☐ Option 1: The results for each of the transmit chains for the corresponding 1MHz segments shall be added and compared with the limits. ☐ Option 2: The results for each of the transmit chains shall be individually compared with the limits after these limits have been reduced by 10 x log (N) (number of active transmit chains)	

3.5.3 DEVIATION FROM TEST STANDARD

No deviation.

3.5.4 TEST SETUP

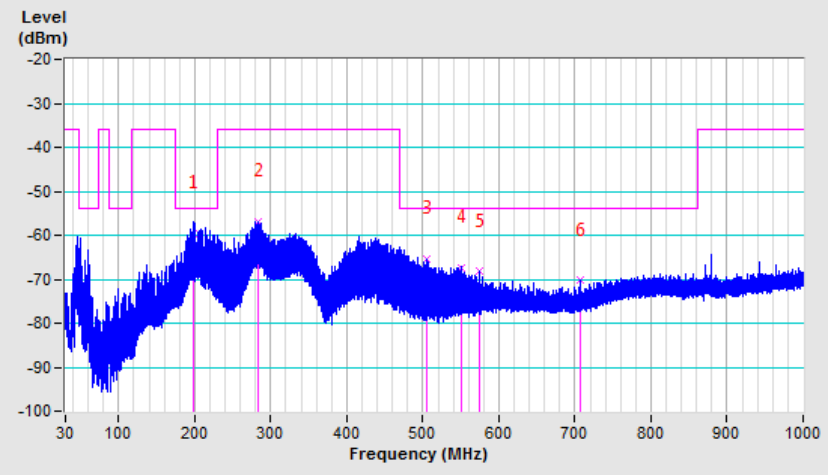
1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
3. The equipment was configured to operate under its worst case situation with respect to output power.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

3.5.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

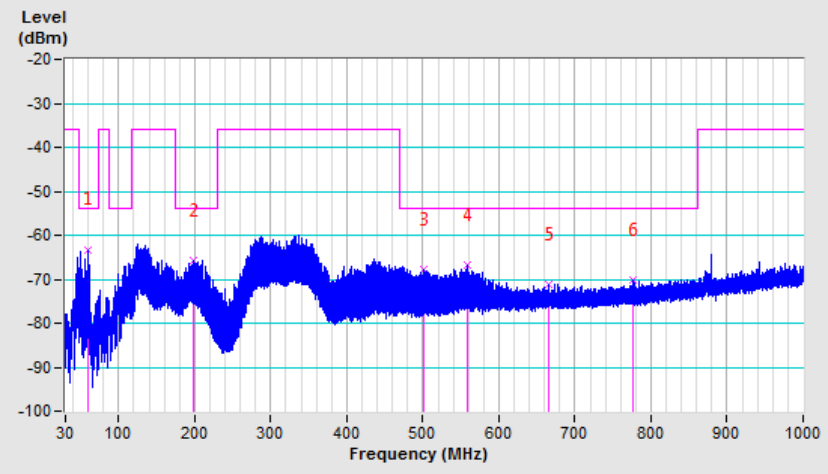
SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	11

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
198.20	H	-59.63	-54.00	-5.63
282.62	H	-56.93	-36.00	-20.93
504.78	H	-65.37	-54.00	-11.37
550.99	H	-67.48	-54.00	-13.48
573.49	H	-68.29	-54.00	-14.29
707.97	H	-70.27	-54.00	-16.27



SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	11

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
59.10	V	-63.45	-54.00	-9.45
198.42	V	-65.90	-54.00	-11.90
501.00	V	-67.95	-54.00	-13.95
558.55	V	-66.94	-54.00	-12.94
665.38	V	-71.28	-54.00	-17.28
776.90	V	-70.33	-54.00	-16.33



ABOVE 1GHz WORST-CASE DATA

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	11, 26

SPURIOUS EMISSION LEVEL					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
11	4810.00	H	-58.26	-30.00	-28.26
	4810.00	V	-56.70	-30.00	-26.70
	7215.00	H	-52.32	-30.00	-22.32
	7215.00	V	-53.21	-30.00	-23.21
26	4960.00	H	-55.01	-30.00	-25.01
	4960.00	V	-54.59	-30.00	-24.59
	7440.00	H	-52.68	-30.00	-22.68
	7440.00	V	-51.45	-30.00	-21.45

RECEIVER PARAMETERS

3.6. RECEIVER SPURIOUS RADIATION

3.6.1 LIMITS OF RECEIVER SPURIOUS RADIATION

Frequency Range	Maximum Power Limit (e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz))
30MHz ~ 1GHz	-57dBm
1GHz ~ 12.75GHz	-47dBm

Note: These limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

3.6.2 TEST PROCEDURE

Refer to chapter 5.4.10.2 of ETSI EN 300 328 V2.1.1.

Measurement	
☐ Conducted measurement	☒ Radiated measurement
For Conducted measurement: The level of unwanted emissions shall be measured as their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation).	
Conducted measurement (For equipment with multiple transmit chains): ☐ Option 1: The results for each of the transmit chains for the corresponding 1MHz segments shall be added and compared with the limits. ☐ Option 2: The results for each of the transmit chains shall be individually compared with the limits after these limits have been reduced by 10 x log (N) (number of active transmit chains)	

3.6.3 DEVIATION FROM TEST STANDARD

No deviation.

3.6.4 TEST SETUP

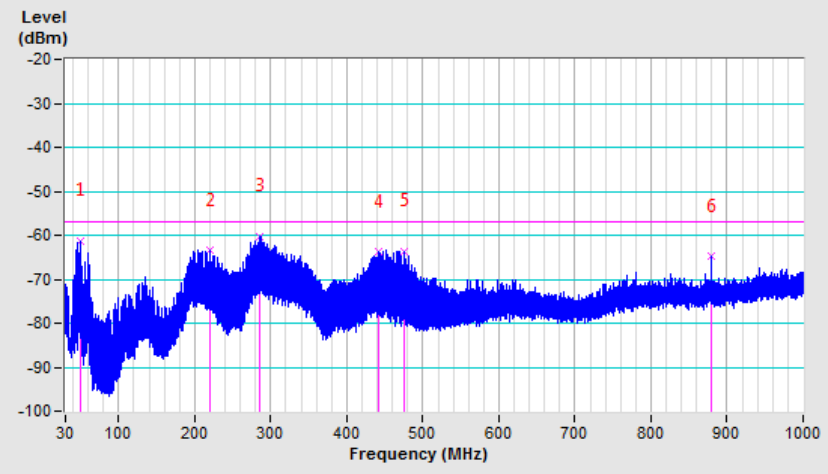
1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. Testing was performed when the equipment was in a receive-only mode.
3. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

3.6.5 TEST RESULTS

RX WORST-CASE DATA

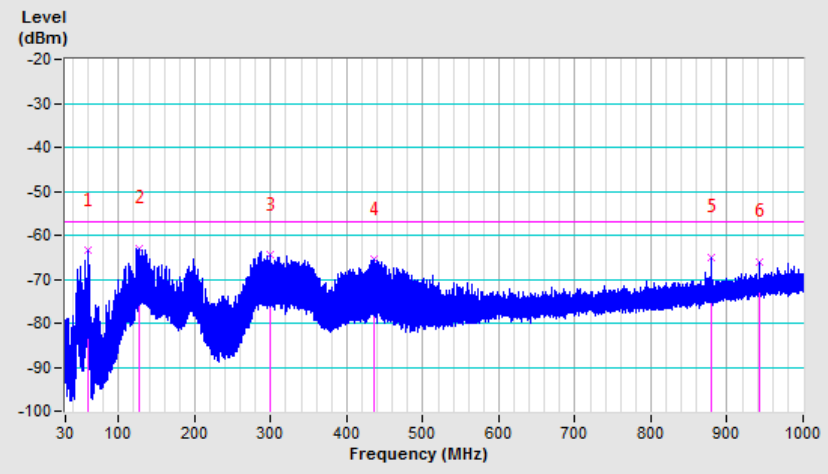
SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	11

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
49.17	H	-61.24	-57.00	-4.24
219.21	H	-63.54	-57.00	-6.54
285.27	**H**	**-60.35**	**-57.00**	**-3.35**
441.15	H	-63.84	-57.00	-6.84
476.33	H	-63.62	-57.00	-6.62
879.49	H	-64.85	-57.00	-7.85



SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	11

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
59.00	V	-63.54	-57.00	-6.54
127.87	V	-62.99	-57.00	-5.99
299.30	V	-64.50	-57.00	-7.50
435.65	V	-65.53	-57.00	-8.53
879.46	V	-65.03	-57.00	-8.03
943.35	V	-66.01	-57.00	-9.01



RX ABOVE 1GHz DATA

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	11, 26

SPURIOUS EMISSION LEVEL					
Channel	**Frequency (MHz)**	**Antenna Polarization**	**Level (dBm)**	**Limit (dBm)**	**Margin (dB)**
11	4810.00	H	-56.83	-47.00	-9.83
	4810.00	V	-58.12	-47.00	-11.12
	7215.00	H	-52.24	-47.00	-5.24
	7215.00	V	-53.91	-47.00	-6.91
26	4960.00	H	-56.35	-47.00	-9.35
	4960.00	V	-55.72	-47.00	-8.72
	7440.00	**H**	**-51.74**	**-47.00**	**-4.74**
	7440.00	V	-52.74	-47.00	-5.74

3.7. RECEIVER BLOCKING

3.7.1. LIMITS OF RECEIVER BLOCKING

This requirement applies to all receiver categories.

Receiver Category		
☐Category 1(EIRP>10dBm)	☐Category 2(EIRP≦10dBm)	☒Category 3(EIRP≦0dBm)
Minimum performance criterion	☒PER ≦10%	
	☐Alternative performance criteria (See note)	
Note: The manufacturer was declared performance criteria is x% for the intended use of the equipment.		

Receiver Category 1 Equipment			
Wanted signal mean power from companion device (dBm)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (See note 2)**	**Type of blocking signal**
P_{min} + 6 dB	2 380 2 503.5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523.5 2 553.5 2 583.5 2 613.5 2 643.5 2 673.5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Receiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (See note 2)**	**Type of blocking signal**
P_{min} + 6 dB	2 380 2 503.5	-57	CW
P_{min} + 6 dB	2 300 2 583.5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (See note 2)**	**Type of blocking signal**
P_{min} + 12 dB	2 380 2 503.5	-57	CW
P_{min} + 12 dB	2 300 2 583.5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

3.7.2. TEST PROCEDURE

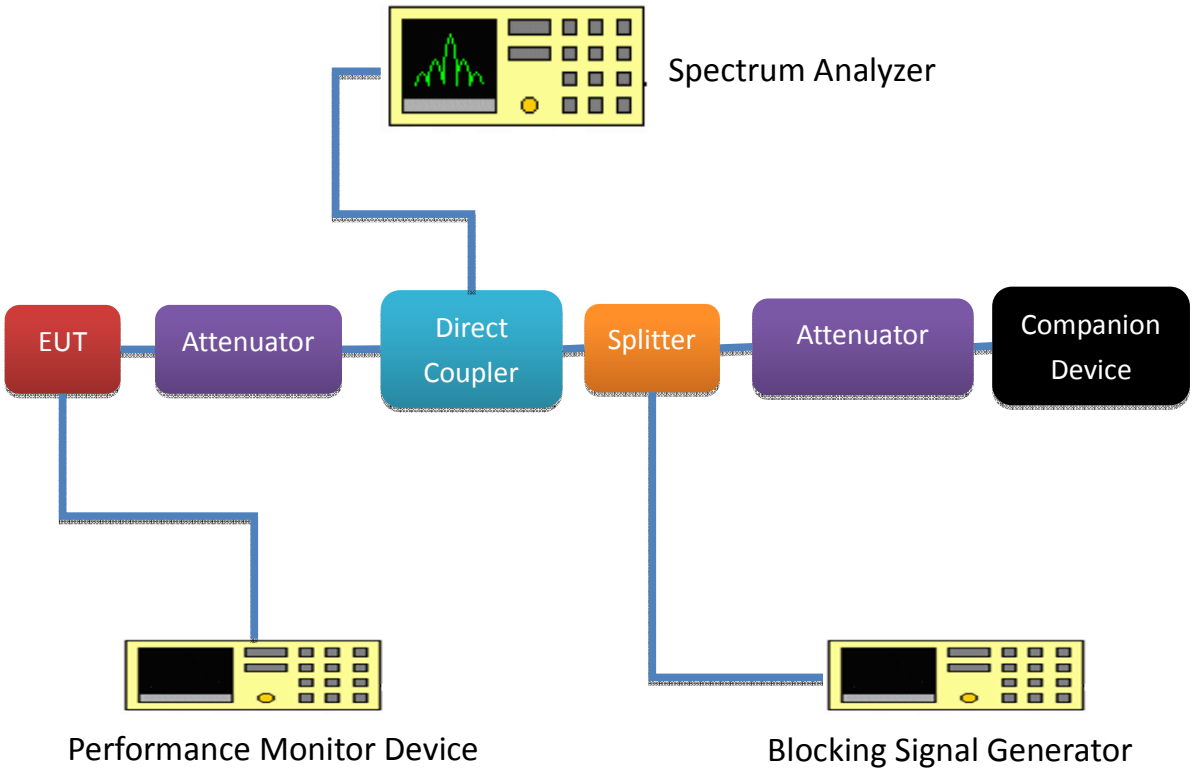
Refer to chapter 5.4.11.2. of ETSI EN 300 328 V2.1.1.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

3.7.3. DEVIATION FROM TEST STANDARD

No deviation.

3.7.4. TEST SETUP CONFIGURATION



3.7.5. TEST RESULT

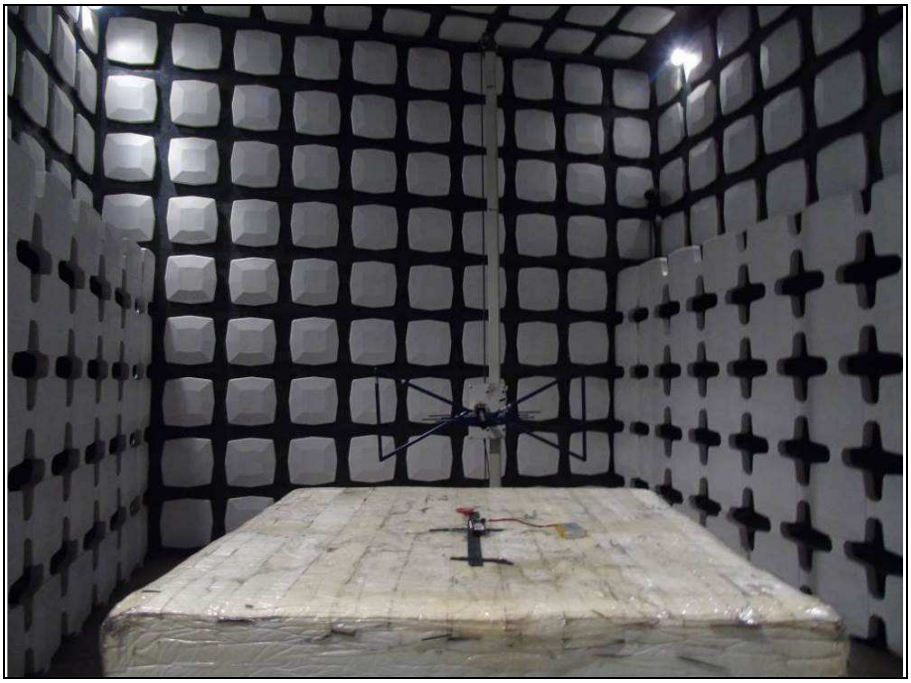
Receiver Category 3 Equipment

Receiver blocking performance when operating at the lowest operating channel(CH11)				
P_{min}: -89.44dBm			antenna gain(G) : 0dBi	
The actual blocking signal power(Note1)			☒ at the antenna connector ☐ in front of the antenna	
Note1: For the conducted measurements , the level shall be corrected as follows: the actual blocking signal power = blocking signal power + G				
Wanted signal mean power from companion device (dBm)	**Blocking signal frequency (MHz))**	**The actual blocking signal power (dBm)**	**PER(%)**	**Pass/Fail**
P_{min} + 12 dB	2380	-57	1.47	PASS
	2503.5	-57	0.81	PASS
	2300	-47	0.59	PASS
	2583.5	-47	0.24	PASS

Receiver blocking performance when operating at the Highest operating channel(CH26)				
P_{min}: -91.05dBm			antenna gain(G) : 0dBi	
The actual blocking signal power(Note1)			☒ at the antenna connector ☐ in front of the antenna	
Note1: For the conducted measurements , the level shall be corrected as follows: the actual blocking signal power = blocking signal power + G				
Wanted signal mean power from companion device (dBm)	**Blocking signal frequency (MHz))**	**The actual blocking signal power (dBm)**	**PER(%)**	**Pass/Fail**
P_{min} + 12 dB	2380	-57	0.00	PASS
	2503.5	-57	0.17	PASS
	2300	-47	0.00	PASS
	2583.5	-47	0.33	PASS

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

SPURIOUS EMISSION TEST BELOW 1GHz



SPURIOUS EMISSION TEST ABOVE 1GHz

RECEIVING BLOCKING

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

--- END ---