




<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>NN22S76T 005</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	168377937	<b>Seite 1 von 24</b> <i>Page 1 of 24</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2022-06-14	
<b>Auftraggeber:</b> <i>Client:</i>	<b>Shenzhen Sonoff Technologies Co.,Ltd.</b> 3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Smart Power Meter Switch			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	POWR316, POWR320, POWR316D, POWR320D (Trademark: SONOFF )			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	RED approval			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	EN 300 328 V2.2.2:2019			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2022-06-14			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003291051-001 A003291051-004			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2022-06-14 to 2022-08-01			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von:</b> <i>tested by:</i>		<b>genehmigt von:</b> <i>authorized by:</i>		
<b>Datum:</b> <i>Date:</i>	2022-10-18 <small>Signed by: Breeze Jiang</small>	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2022-10-18 <small>Signed by: Lin Lin</small>	
<b>Stellung / Position:</b>	Assistant Project Manager	<b>Stellung / Position:</b>	Reviewer	
<b>Sonstiges / Other:</b>	<i>This report is for BLE of Article 3.2 Radio Spectrum requirements only.</i>			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
<b>* Legende:</b>	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
<b>* Legend:</b>	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

## Test Summary

**5.1.1 RF OUTPUT POWER***RESULT: Pass***5.1.2 POWER SPECTRAL DENSITY***RESULT: Pass***5.1.3 DUTY CYCLE, TX-SEQUENCE, TX-GAP***RESULT: Not applicable***5.1.4 MEDIUM UTILISATION (MU) FACTOR***RESULT: Not applicable***5.1.5 ADAPTIVITY***RESULT: Not applicable***5.1.6 OCCUPIED CHANNEL BANDWIDTH***RESULT: Pass***5.1.7 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN***RESULT: Pass***5.1.8 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN***RESULT: Pass***5.2.1 RECEIVER SPURIOUS EMISSIONS***RESULT: Pass***5.2.2 RECEIVER BLOCKING***RESULT: Pass***5.2.3 GEO-LOCATION CAPABILITY***RESULT: Not applicable*

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# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:  
Appendix A: Test Results of BLE of Article 3.2 Radio Spectrum.

## 2 Test Sites

### 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

CNAS Registration No.: L7649

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

### 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**
**TÜV Rheinland (Shenzhen) Co., Ltd.**

Conducted Test equipment					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
Power Sensor	Keysight	U2021XA	MY55520005	2021.09.30	2022.09.29
			MY55520006	2021.09.30	2022.09.29
			MY56120038	2021.09.30	2022.09.29
			MY56280002	2021.09.30	2022.09.29
Signal Generator	Agilent	N5182A	MY46240556	2021.09.30	2022.09.29
Signal Analyzer	Agilent	N9020A	MY49100060	2021.09.30	2022.09.29
Universal Radio communication tester	R&S	CMU200	111058	2021.09.29	2022.09.28
Wireless Communications Test Set	R&S	CMW 500	131428	2022.03.01	2023.02.28
Temperature & Humidity	HH660	Mieo	N/A	2021.10.09	2022.10.08
Temperature & Humidity test chamber	Safety test	AG80L	171200018	2022.03.01	2023.02.28
Programmable power supply	Agilent	E3642A	MY40002025	2021.10.08	2022.10.07
Attenuator	HP	8494B	DC-18G	2022.03.02	2023.03.01
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Router	WAVLINK	WL-WN575A2	WL1512260336	N.C.R	N.C.R
Digit Multi-meter	FLUKEF	15B+	N/A	2021.10.08	2022.10.07

<b>Radiated Test equipment</b>					
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Cal. Date</b>	<b>Cal. Until</b>
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2022.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2021.10.11	2023.10.10
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2021.10.08	2022.10.07
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2021.09.30	2022.09.29
Wireless Communications Test Set	R&S	CMW 500	131428	2022.03.01	2023.02.28
Signal Analyzer	R&S	FSV 40-N	101823	2021.09.30	2022.09.29
Temperature & Humidity	SW-108	SuWei	N/A	2022.03.02	2023.03.01
Turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Digit Multi-meter	FLUKEF	15B+	N/A	2021.10.08	2022.10.07

## 2.3 Uncertainty of Measurement

According to the requirement of EN 300 328 V2.2.2, the value of the measurement uncertainty of each parameter is listed as below:

**Table 2: Measurement Uncertainty**

<b>Parameter</b>	<b>Uncertainty</b>
Occupied Channel Bandwidth	± 3.6 %
RF Output Power, Conducted	± 0.71dB
Power Spectral Density, Conducted	± 2.19 dB
Unwanted Emission, Conducted	± 0.63dB
All Emissions, Radiated (Below 1GHz)	± 2.25dB
All Emissions, Radiated (1GHz-18GHz)	± 2.21dB
All Emissions, Radiated (18GHz-25GHz)	± 3.46dB
Temperature	± 0.5°C
Humidity	± 2%
DC and Low Frequency Voltages	± 2.1%
Time	± 2.8%
Duty Cycle	± 3.2%

## 3 General Product Information

### 3.1 Product Function and Intended Use

The EUT is a Smart Power Meter Switch, which supported 802.11 b/g/n and BLE wireless technologies.

According to the client's declaration, the all models are the same as the original ones in circuit design, layout only different in appearance.

The device includes a wireless module same as the original ones THR320D, according to clause 6.1 of EG 203 367 V1.1.1, the conditions in which the radio product is used in the combined equipment does not deviate from the assessment conditions. Therefore, the device comply with EN 300 328 V 2.2.2 requirement only test Radio Spurious Emissions, other data refer to original report NN22S76T 002 for EN 300 328 V2.2.2.

For details refer to the User Manual.

### 3.2 Ratings and System Details

**Table 3: Technical Specification of EUT**

General Information of EUT	Description
Kind of Equipment	Smart Power Meter Switch
Type Designation	POWR316, POWR320, POWR316D, POWR320D
Trade Mark	SONOFF
Operating Voltage	AC 100-240V, 50/60Hz
Operating Temperature Range	-10°C - +40°C
Technical Specification of BLE	
Characteristic	Description
Frequency Range	2402 - 2480 MHz
Type of Modulation	GFSK
Equipment types	Only one adaptive mode is implemented and could not operate in a non-adaptive mode
Channel Number	40 Channels
Channel Spacing	2 MHz
Bluetooth Version	4.2
Bluetooth Configuration	LE(Support 1M PHY)
Receiver Categories	Receiver category 2
Antenna Type	PCB Antenna
Antenna Gain	-1.04 dBi

Table 4: RF Channel and Frequency of BLE

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
<b>00</b>	<b>2402</b>	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	<b>19</b>	<b>2440</b>	29	2460	<b>39</b>	<b>2480</b>

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz.

### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, BLE wireless
  - 1 Transmitting (Low / Middle / High channel)
  - 2 Receiving (Low / Middle / High channel)
- B. On, BLE connecting mode
- C. Off

### 3.4 Noise Generating and Noise Suppressing Parts

For details refer to the Circuit Diagram.

### 3.5 Submitted Documents

- Application Form

- User Manual



## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5.

According to clause 3.1, all tests were performed on model *POWR320D* in this report.

This testing was carried out on all different data rates, but only the worst case was presented in this report.

### 4.3 Special Accessories and Auxiliary Equipment

Table 5: Auxiliary Equipment used during test

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 RF Output Power

RESULT:

Pass

**Test Specification**

Test standard	: EN 300 328 V2.2.2:2019
Test requirement	: EN 300 328 V2.2.2:2019, Clause 4.3.2.2
Limit	: EN 300 328 V2.2.2:2019, Clause 4.3.2.2.3
Test suites	: EN 300 328 V2.2.2:2019, Clause 5.4.2
Kind of test site	: Shielding Room

**Test Setup**

Date of testing	: 2022-07-12
Test voltage	: DC 5V
Test environment	: Normal and extreme temperature
Operation mode	: A.1
Test channel	: <input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest
Ambient temperature	: 24.5 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For details refer to following test result.

**Table 6: Test Result of RF Output Power, BLE**

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	5.45	33	4.41	<=20	Pass
NVNT	BLE 1M	2440	5.15	33	4.11	<=20	Pass
NVNT	BLE 1M	2480	5.60	33	4.56	<=20	Pass
NVLT	BLE 1M	2402	5.84	33	4.80	<=20	Pass
NVLT	BLE 1M	2440	5.54	33	4.50	<=20	Pass
NVLT	BLE 1M	2480	5.99	33	4.95	<=20	Pass
NVHT	BLE 1M	2402	5.14	33	4.10	<=20	Pass
NVHT	BLE 1M	2440	4.84	33	3.80	<=20	Pass
NVHT	BLE 1M	2480	5.29	33	4.25	<=20	Pass

**NOTE:**

The RF Output Power (E.I.R.P.) should be calculated using the formula below:

The RF Output Power (E.I.R.P.) =  $A_{(RMS\ power)} + G + Y$

Antenna gain(G): -1.04 dBi

## 5.1.2 Power Spectral Density

**RESULT:****Pass****Test Specification**

Test standard	: EN 300 328 V2.2.2:2019
Test requirement	: EN 300 328 V2.2.2:2019, Clause 4.3.2.3
Limit	: EN 300 328 V2.2.2:2019, Clause 4.3.2.3.3
Test suites	: EN 300 328 V2.2.2:2019, Clause 5.4.3
Kind of test site	: Shielding Room

**Test Setup**

Date of testing	: 2022-07-12
Test voltage	: DC 5V
Test environment	: Normal temperature
Test channel	: <input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest
Operation mode	: A.1
Ambient temperature	: 24.5 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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### 5.1.3 Duty Cycle, TX-sequence, TX-gap

**RESULT:****Not applicable****Test Specification**

Test standard : EN 300 328 V2.2.2:2019  
Test requirement : EN 300 328 V2.2.2:2019, Clause 4.3.2.4

**Exemption Condition(s):**

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in non-adaptive mode. The equipment is using wide band modulations other than FHSS.

**Conclusion:**

The EUT is adaptive equipment and does not support non-adaptive mode, hence this requirement is not applicable.

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### 5.1.4 Medium Utilisation (MU) Factor

**RESULT:****Not applicable****Test Specification**

Test standard : EN 300 328 V2.2.2:2019  
Test requirement : EN 300 328 V2.2.2:2019, Clause 4.3.2.5

**Exemption Condition(s):**

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in non-adaptive mode. The equipment is using wide band modulations other than FHSS.

**Conclusion:**

The EUT is adaptive equipment and does not support non-adaptive mode, hence this requirement is not applicable.

## 5.1.5 Adaptivity

**RESULT:****Not applicable****Test Specification**

Test standard	:	EN 300 328 V2.2.2:2019
Test requirement	:	EN 300 328 V2.2.2:2019, Clause 4.3.2.6
Limit	:	EN 300 328 V2.2.2:2019, Clause 4.3.2.6
Test suites	:	EN 300 328 V2.2.2:2019, Clause 5.4.6
Kind of test site	:	Shielding Room

\*Remark: not applicable. Refer to the EN 300 328 clause 4.3.2.6 section for the details.

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

**As the EUT about RF Output power level is less than 10 dBm e.i.r.p, so the test is not applicable and skipped.**

## 5.1.6 Occupied Channel Bandwidth

**RESULT:****Pass****Test Specification**

Test standard	: EN 300 328 V2.2.2:2019
Test requirement	: EN 300 328 V2.2.2:2019, Clause 4.3.2.7
Limit	: EN 300 328 V2.2.2:2019, Clause 4.3.2.7.3
Test suites	: EN 300 328 V2.2.2:2019, Clause 5.4.7
Kind of test site	: Shielding Room

**Test Setup**

Date of testing	: 2022-07-12
Test voltage	: DC 5V
Test environment	: Normal temperature
Test channel	: <input checked="" type="checkbox"/> Lowest <input type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest
Operation mode	: A.1
Ambient temperature	: 24.5 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.



### 5.1.7 Transmitter Unwanted Emissions in the OOB Domain

**RESULT:****Pass****Test Specification**

Test standard	: EN 300 328 V2.2.2:2019
Test requirement	: EN 300 328 V2.2.2:2019, Clause 4.3.2.8
Limit	: EN 300 328 V2.2.2:2019, Clause 4.3.2.8.3
Test suites	: EN 300 328 V2.2.2:2019, Clause 5.4.8
Kind of test site	: Shielding Room

**Test Setup**

Date of testing	: 2022-07-12
Test voltage	: DC 5V
Test environment	: Normal temperature
Test channel	: <input checked="" type="checkbox"/> Lowest <input type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest
Operation mode	: B
Ambient temperature	: 24.5 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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### 5.1.8 Transmitter Unwanted Emissions in the Spurious Domain

**RESULT:****Pass****Test Specification**

Test standard : EN 300 328 V2.2.2:2019  
Test requirement : EN 300 328 V2.2.2:2019, Clause 4.3.2.9  
Limit : EN 300 328 V2.2.2:2019, Clause 4.3.2.9.3  
Test suites : EN 300 328 V2.2.2:2019, Clause 5.4.9  
Kind of test site : 3m Fully Anechoic Room

**Test Setup**

Date of testing : 2022-08-01  
Test voltage : AC 230V, 50Hz  
Test environment : Normal temperature  
Operation mode : A.1  
Test channel :  Lowest     Middle     Highest  
Ambient temperature : Refer to test results  
Relative humidity : Refer to test results  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A.

## 5.2 Receiver Requirement & Test Suites

### 5.2.1 Receiver Spurious Emissions

RESULT:

Pass

**Test Specification**

Test standard	:	EN 300 328 V2.2.2:2019
Test requirement	:	EN 300 328 V2.2.2:2019, Clause 4.3.2.10
Limit	:	EN 300 328 V2.2.2:2019, Clause 4.3.2.10.3
Test suites	:	EN 300 328 V2.2.2:2019, Clause 5.4.10
Kind of test site	:	3m Fully Anechoic Room

**Test Setup**

Date of testing	:	2022-08-01
Test voltage	:	AC 230V, 50Hz
Test environment	:	Normal temperature
Operation mode	:	A.2
Test channel	:	<input checked="" type="checkbox"/> Lowest <input type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest
Ambient temperature	:	Refer to test results
Relative humidity	:	Refer to test results
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix A.

## 5.2.2 Receiver Blocking

**RESULT:****Pass****Test Specification**

Test standard : EN 300 328 V2.2.2:2019  
Test requirement : EN 300 328 V2.2.2:2019, Clause 4.3.2.11  
Limit : EN 300 328 V2.2.2:2019, Clause 4.3.2.11.3  
Test suites : EN 300 328 V2.2.2:2019, Clause 5.4.11  
Kind of test site : Shielding Room

**Test Setup**

Date of testing : 2022-07-12  
Test voltage : DC 5V  
Test environment : Normal temperature  
Operation mode : A.2  
Test channel :  Lowest     Middle     Highest  
Ambient temperature : 24.5 °C  
Relative humidity : 50 %  
Atmospheric pressure : 101 kPa

Receiver category 2

For the measurement records, refer to the appendix A.

### 5.2.3 Geo-location Capability

**RESULT:****Not applicable****Test Specification**

Test standard : EN 300 328 V2.2.2:2019  
Test requirement : EN 300 328 V2.2.2:2019, 4.3.2.12

**Exemption Condition(s):**

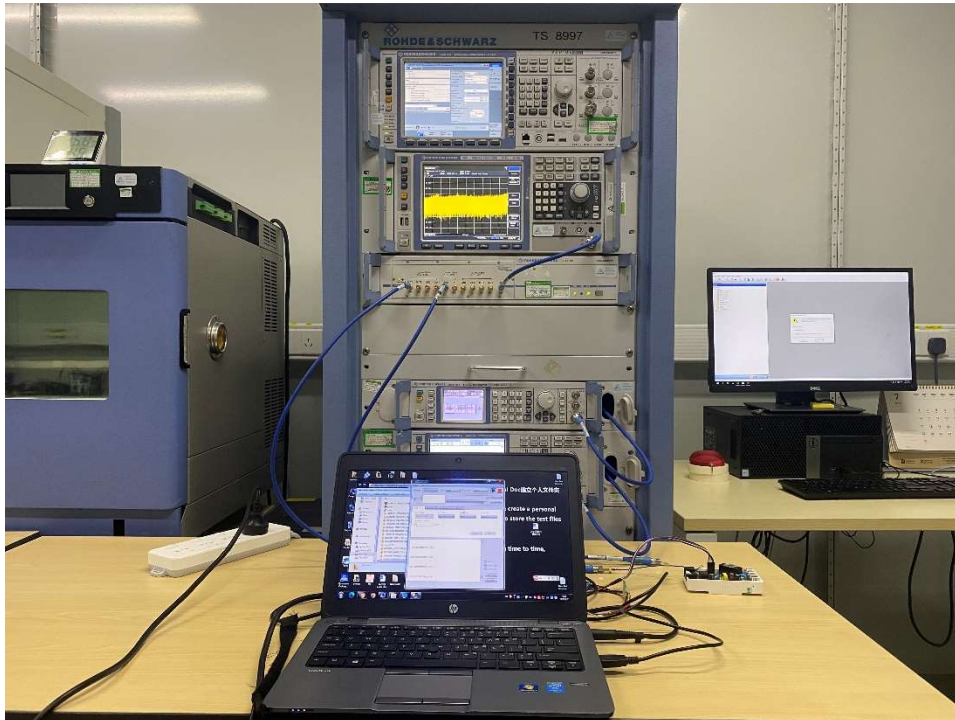
This requirement only applies to equipment with geo-location capability as defined in clause 4.3.2.12.2.

**Conclusion:**

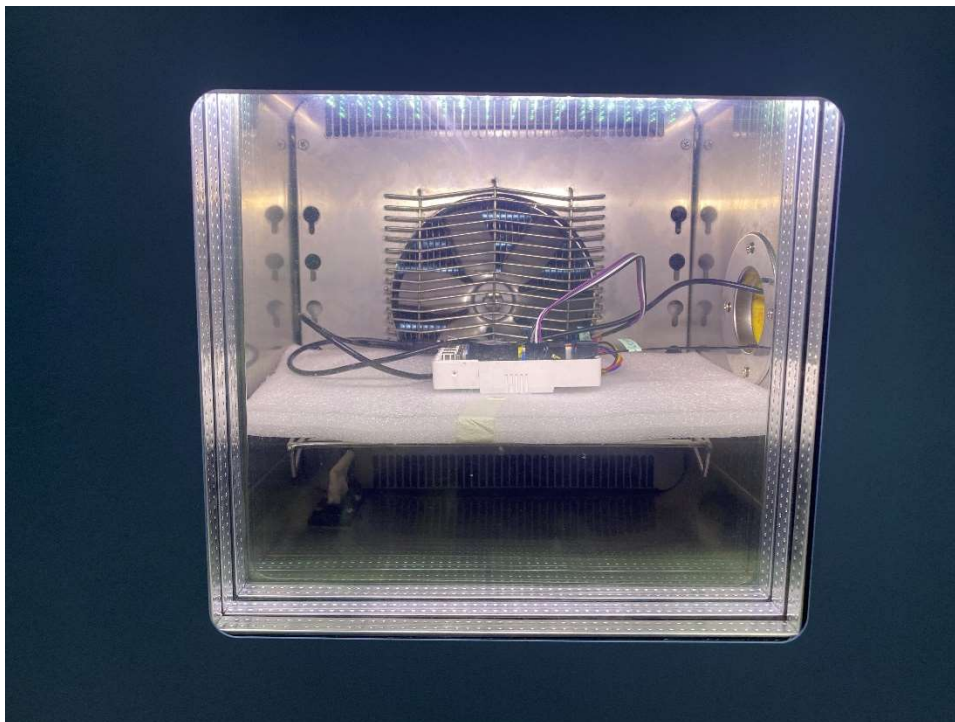
The EUT is adaptive equipment and does not support geo-location capability, hence this requirement is not applicable.

## 6 Photographs of the Test Set-Up

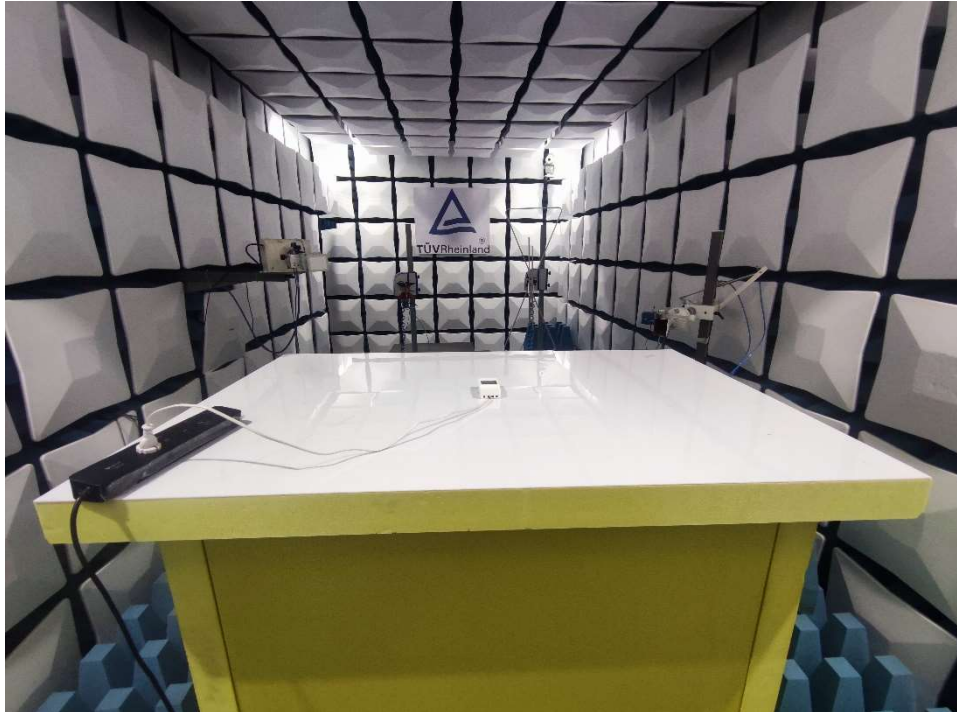
Photograph 1: Set-up for Radio Spectrum Testing, Normal Condition



Photograph 2: Set-up for Radio Spectrum Testing, Extreme Condition



**Photograph 3: Set-up for Transmitter & Receiver Spurious Emissions**



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## Appendix A: Test results of Bluetooth Low Energy

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## Appendix A.1 Occupied Channel Bandwidth

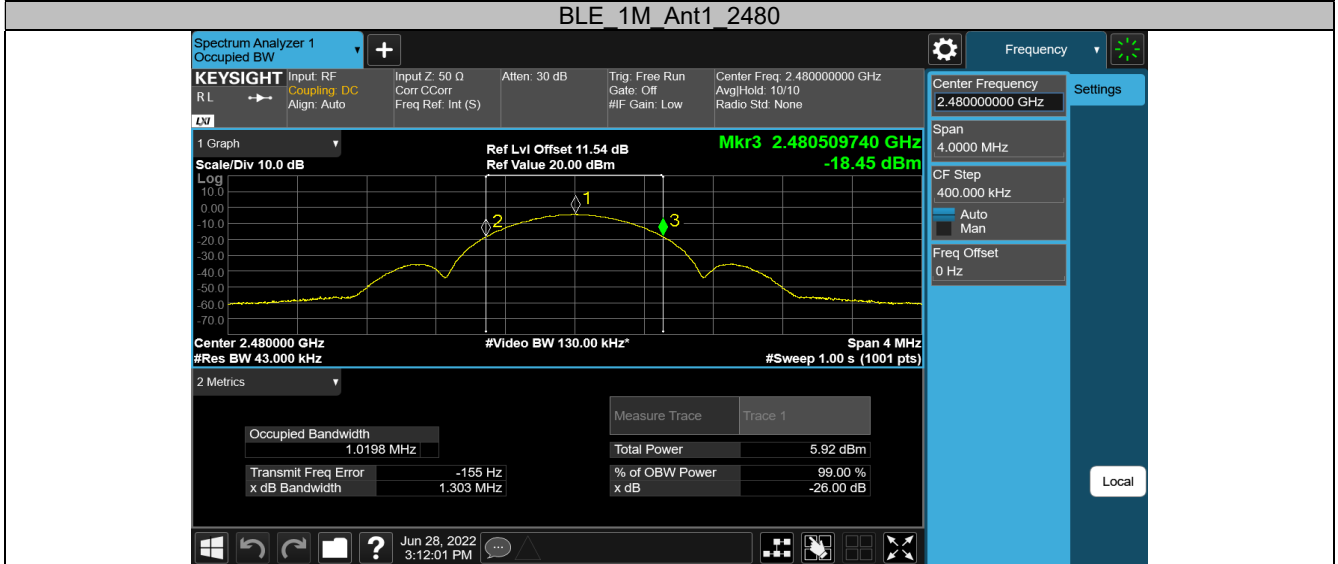
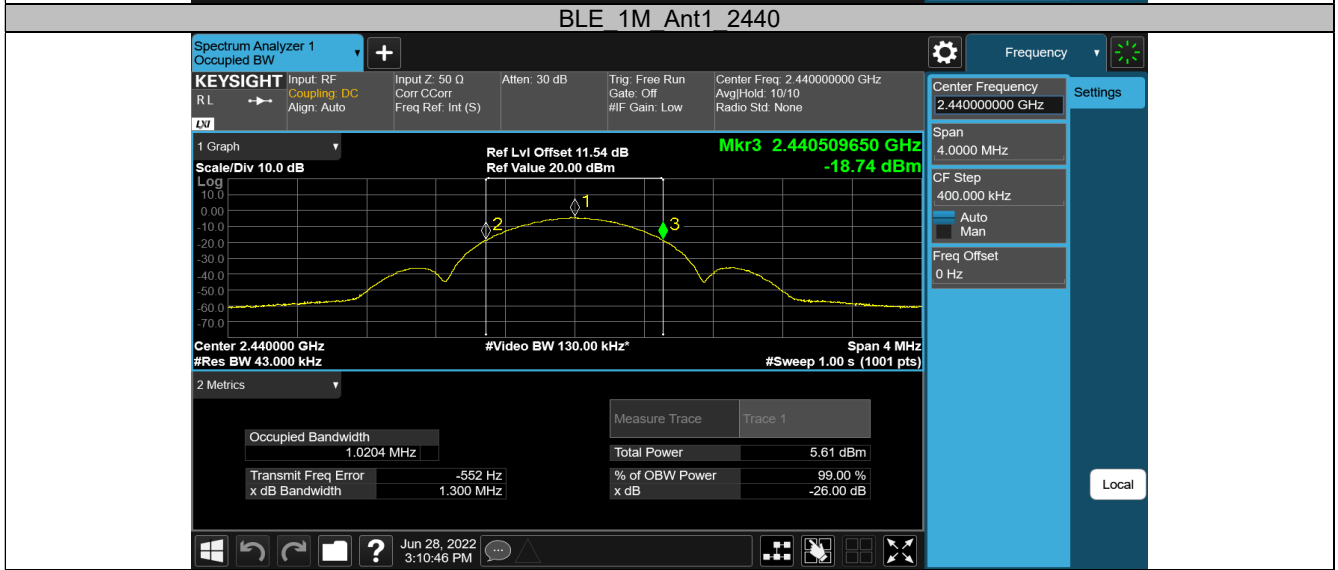
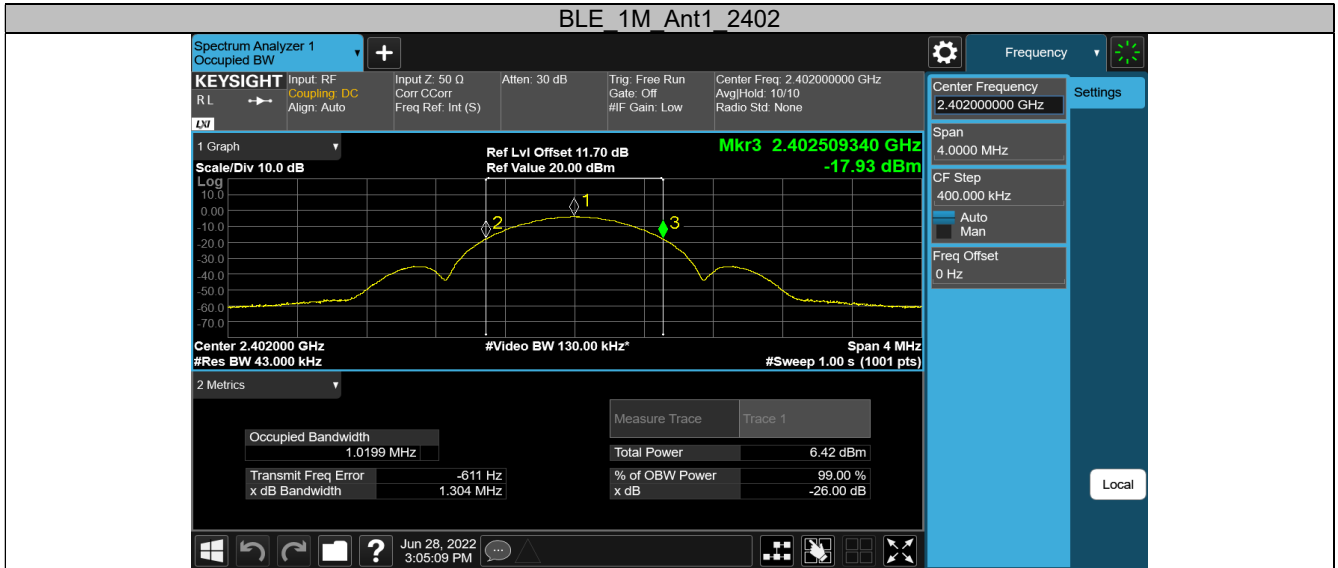
TestMode	Antenna	Frequency[MHz]	OCB[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0199	2401.4894	2402.5093	2400 to 2483.5	PASS
		2440	1.0204	2439.4893	2440.5097	2400 to 2483.5	PASS
		2480	1.0198	2479.4899	2480.5097	2400 to 2483.5	PASS

Appendix A  
 NN22S76T 005



Prüfbericht - Produkte  
 Test Report - Products

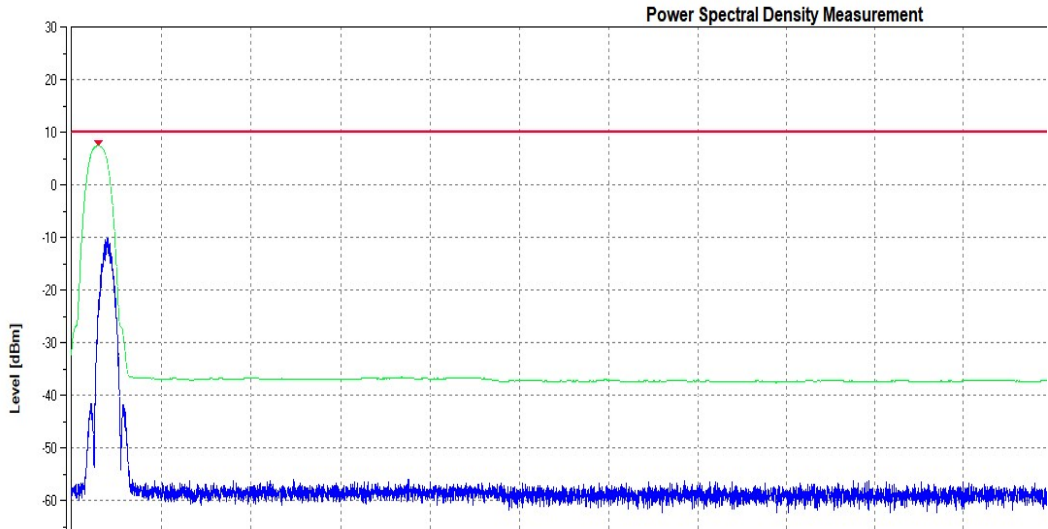
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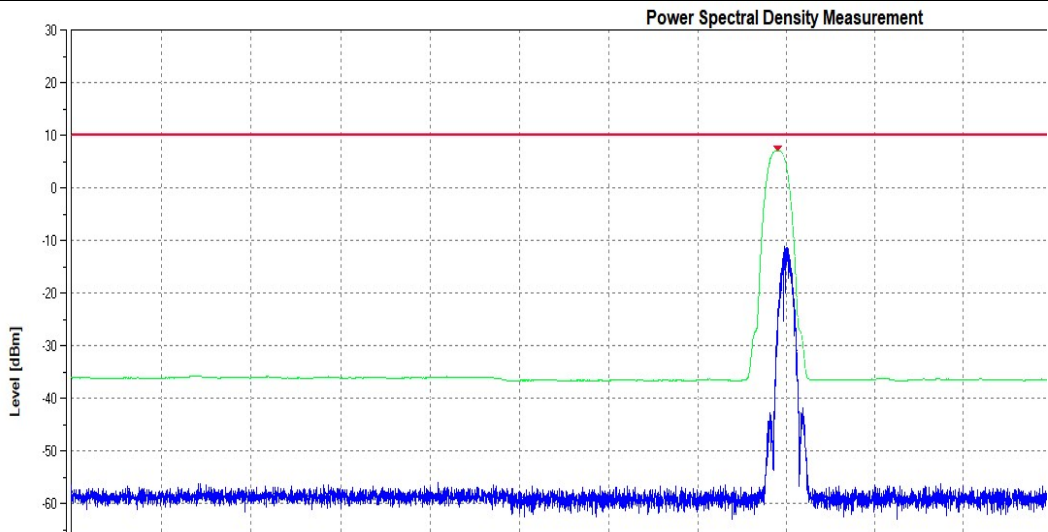
## Appendix A.2 Power Spectral Density

TestMode	Antenna	Frequency[MHz]	EIRP PSD[dBm/MHz]	Limit[dBm/MHz]	Verdict
BLE_1M	Ant1	2402	7.39	10	PASS
		2440	7.09	10	PASS
		2480	7.54	10	PASS

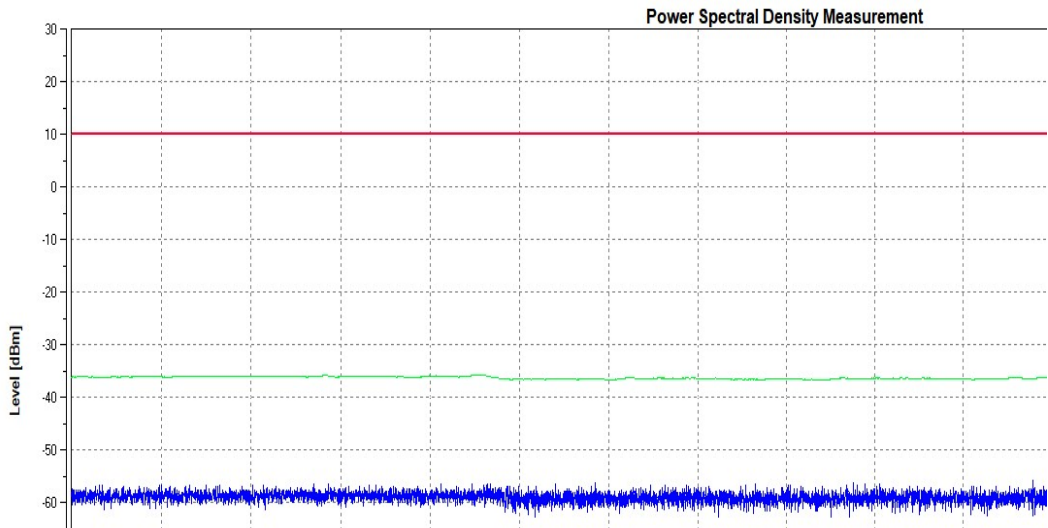
BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440



BLE\_1M\_Ant1\_2480



### Appendix A.3 Receiver Blocking

Wanted signal meanpower from companion device (dBm)	Test Channel	Blocking signal frequency (MHz)	Blocking signal power(dBm) CW	PER	Limit	Results
-66.91	Low	2300 2380	-32	0.21%	≤10%	PASS
				0.03%		
	High	2504 2584		0.16%		
				0.37%		

NOTE 1: OCBW is 1009000Hz.

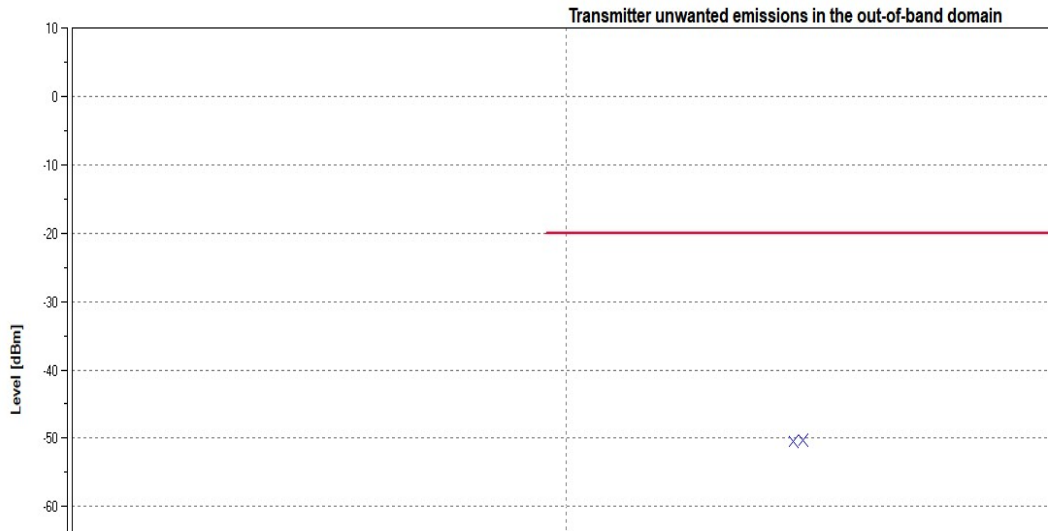
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to  $P_{min} + 26$  dB where  $P_{min}$  is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

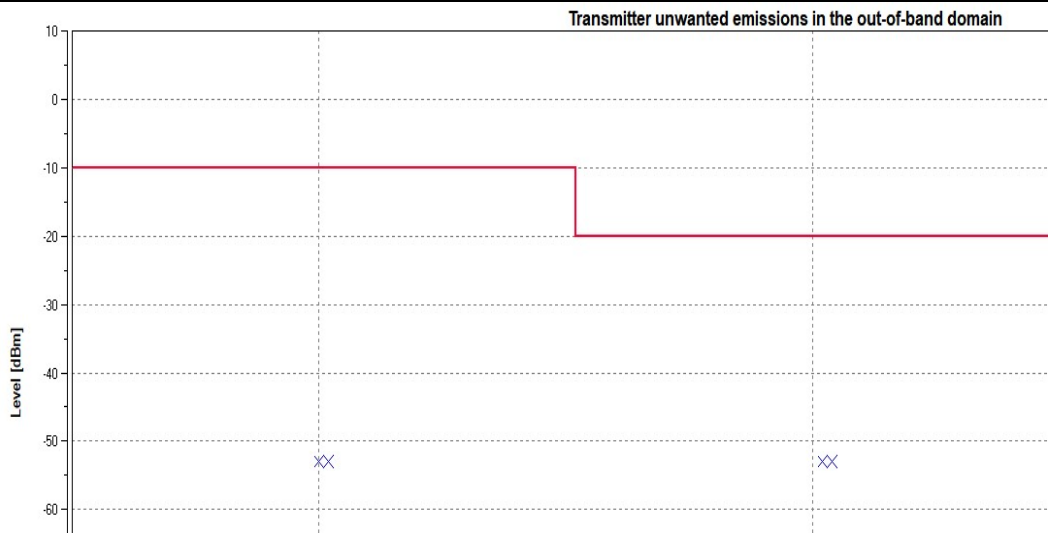
**Appendix A.4Tx unwanted emissions in the out-of-band domain**

TestMode	Antenna	Frequency[MHz]	Freq. [MHz]	Level[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	2398.4602	-50.45	-20.00	PASS
			2398.4801	-50.26	-20.00	PASS
			2399.4801	-44.49	-10.00	PASS
			2399.5	-44.30	-10.00	PASS
			2484	-53.02	-10.00	PASS
			2484.0199	-53.04	-10.00	PASS
			2485.0199	-53.00	-20.00	PASS
			2485.0398	-53.00	-20.00	PASS
		2480	2398.4604	-53.30	-20.00	PASS
			2398.4802	-53.29	-20.00	PASS
			2399.4802	-52.36	-10.00	PASS
			2399.5	-52.29	-10.00	PASS
			2484	-51.29	-10.00	PASS
			2484.0198	-51.33	-10.00	PASS
			2485.0198	-51.88	-20.00	PASS
			2485.0396	-51.91	-20.00	PASS

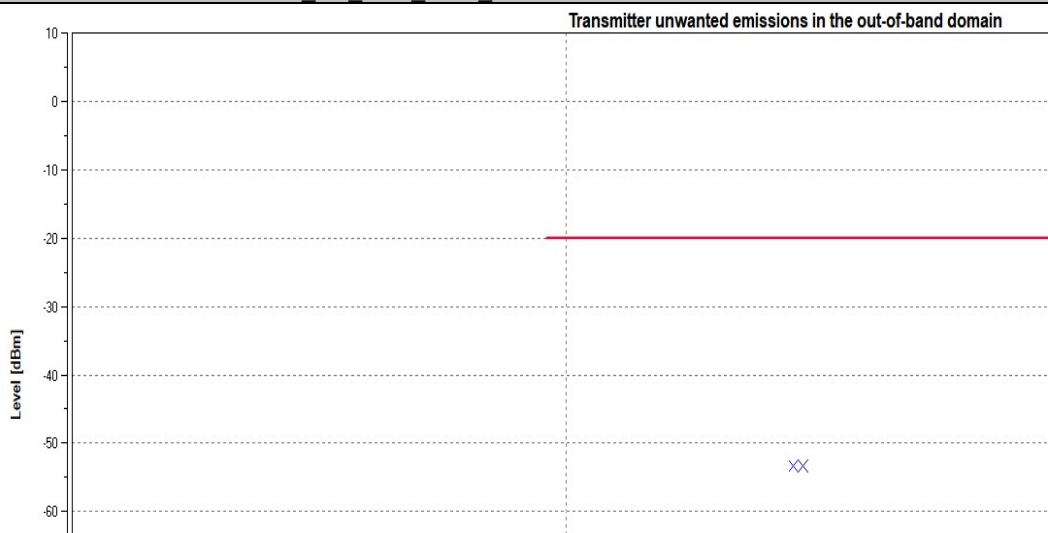
BLE 1M\_Ant1\_2402\_2400MHz-2BW to 2400MHz



BLE 1M\_Ant1\_2402\_2483.5MHz to 2483.5MHz+2BW

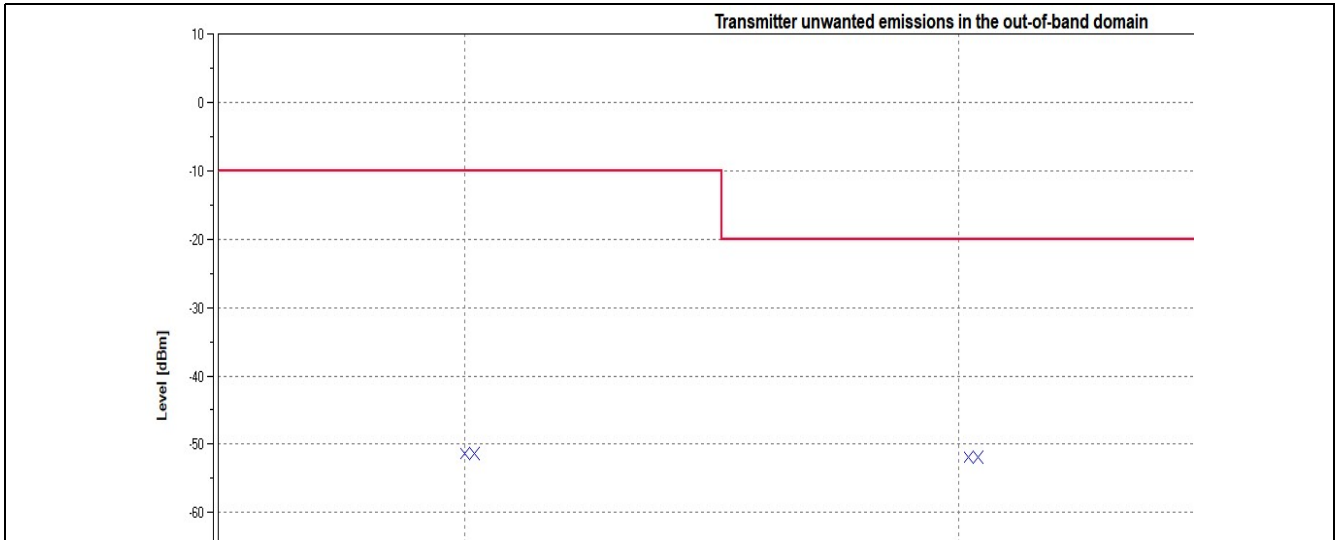


BLE 1M\_Ant1\_2480\_2400MHz-2BW to 2400MHz



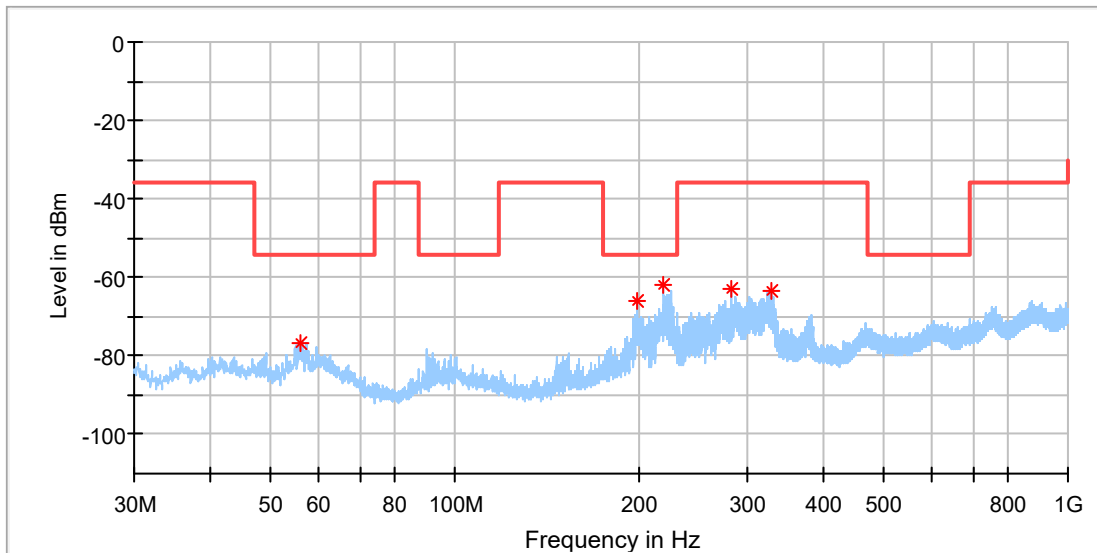
BLE 1M\_Ant1\_2480\_2483.5MHz to 2483.5MHz+2BW





## Appendix A.5 Transmitter unwanted emissions

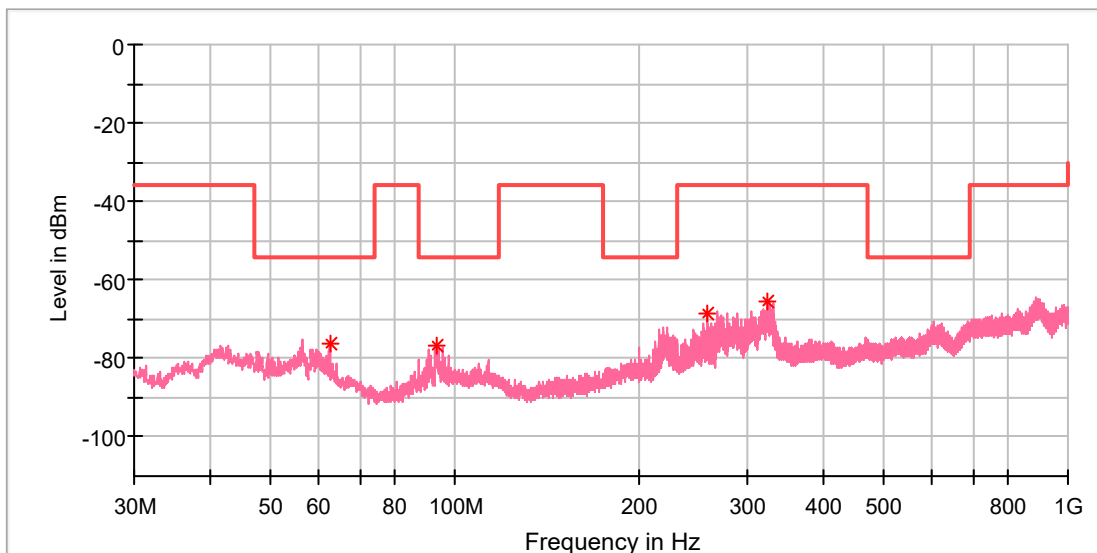
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	TX_BLE L CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
55.850500	-76.65	-54.00	22.65	150.0	H	26.0	-117.6
198.489000	-66.04	-54.00	12.04	150.0	H	312.0	-117.5
219.441000	-62.01	-54.00	8.01	150.0	H	302.0	-117.7
283.315500	-63.12	-36.00	27.12	150.0	H	319.0	-116.9
329.148000	-63.55	-36.00	27.55	150.0	H	319.0	-114.4

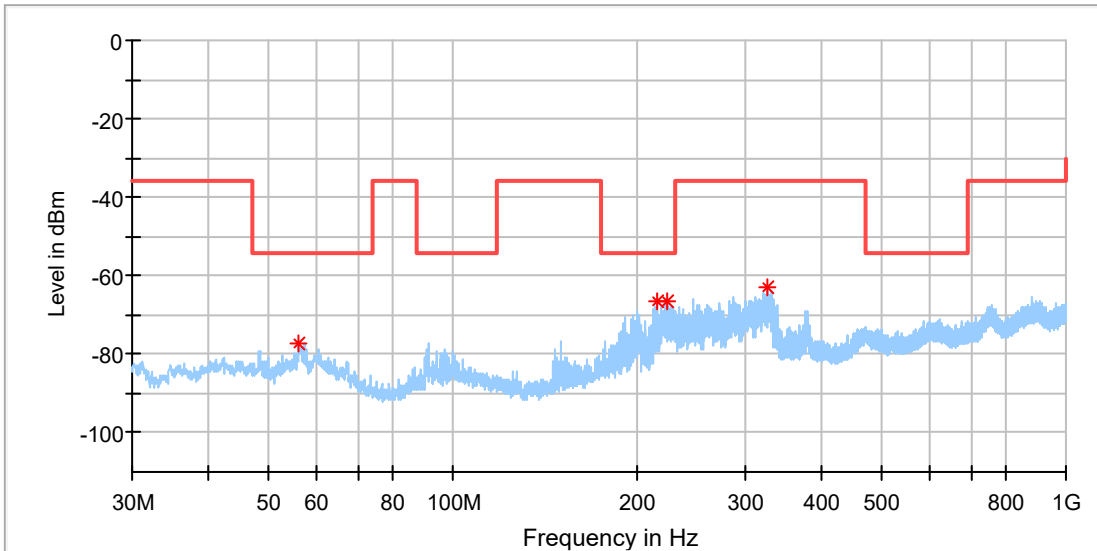
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	TX_BLE L CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



**Critical Freqs**

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
62.495000	-76.23	-54.00	22.23	150.0	V	181.0	-117.8
93.341000	-76.54	-54.00	22.54	150.0	V	63.0	-119.2
257.465000	-68.57	-36.00	32.57	150.0	V	199.0	-116.8
324.637500	-65.67	-36.00	29.67	150.0	V	249.0	-113.7

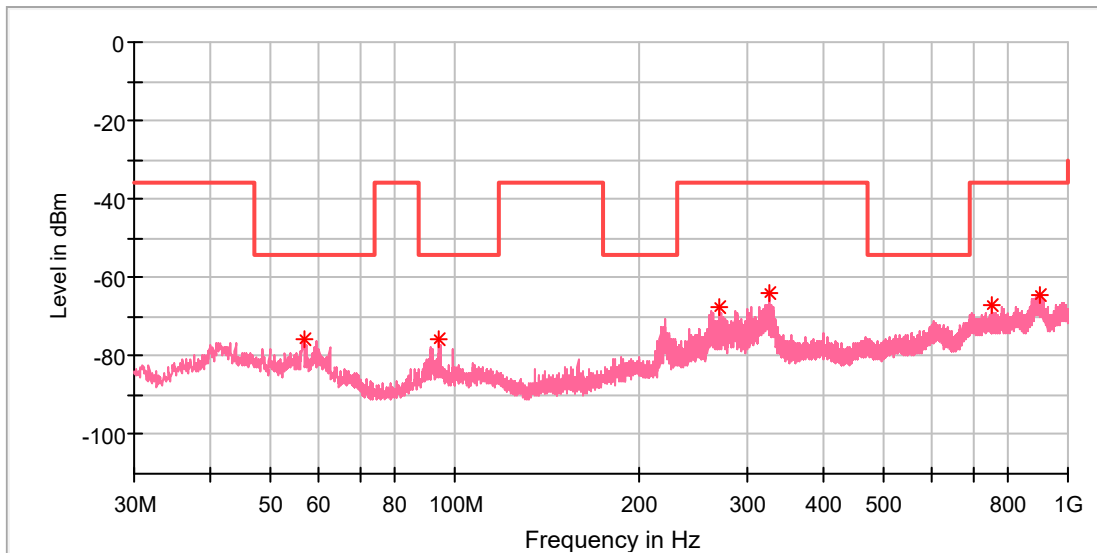
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	TX_BLE H CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
56.190000	-77.02	-54.00	23.02	150.0	H	281.0	-117.5
215.221500	-66.68	-54.00	12.68	150.0	H	310.0	-118.2
224.533500	-66.47	-54.00	12.47	150.0	H	292.0	-117.0
326.480500	-63.04	-36.00	27.04	150.0	H	308.0	-114.6

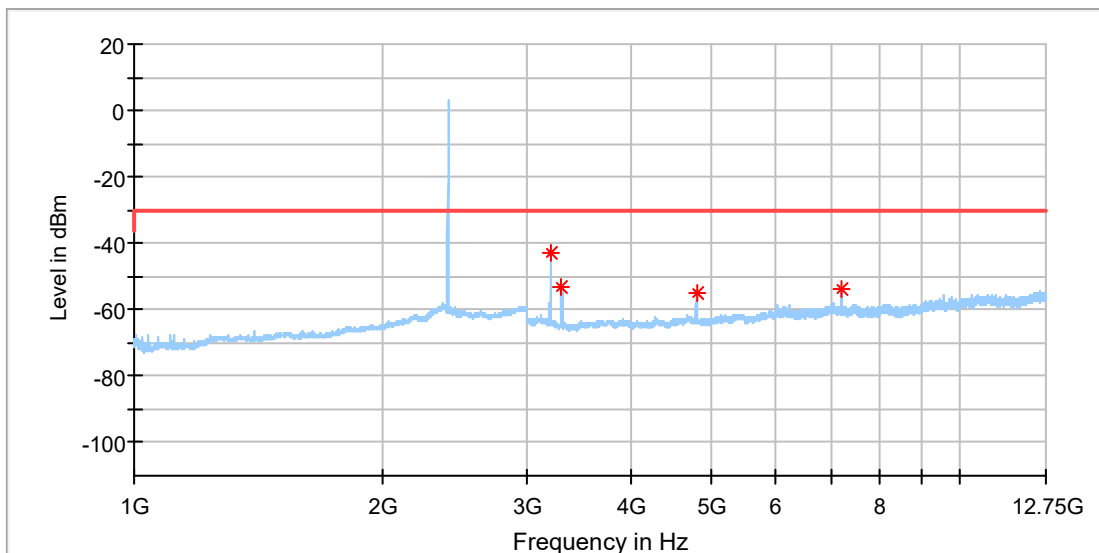
EUT Name: Smart Power Meter Switch  
 Model: POWR320D  
 Sample No: A003291051-004  
 Test Mode: TX\_BLE H CH  
 Test Voltage: Adaptor  
 Remark: Temp:21.8;Humi:54%  
 Test standard: EN 300328  
 Tested By: Xiqiang Ma  
 Reviewed by: Terry Yin



**Critical\_Freqs**

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
56.772000	-75.83	-54.00	21.83	150.0	V	165.0	-116.7
94.117000	-75.49	-54.00	21.49	150.0	V	87.0	-119.0
270.123500	-67.38	-36.00	31.38	150.0	V	113.0	-117.2
326.092500	-64.19	-36.00	28.19	150.0	V	121.0	-113.6
750.613000	-67.10	-36.00	31.10	150.0	V	199.0	-106.6
898.926000	-64.30	-36.00	28.30	150.0	V	76.0	-102.5

EUT Name: Smart Power Meter Switch  
 Model: POWR320D  
 Sample No: A003291051-004  
 Test Mode: TX\_BLE L CH  
 Test Voltage: DC3.3V  
 Remark: Temp:23.5;Humi:59%  
 Test standard: EN 300328  
 Tested By: Xiqiang Ma  
 Reviewed by: Terry Yin



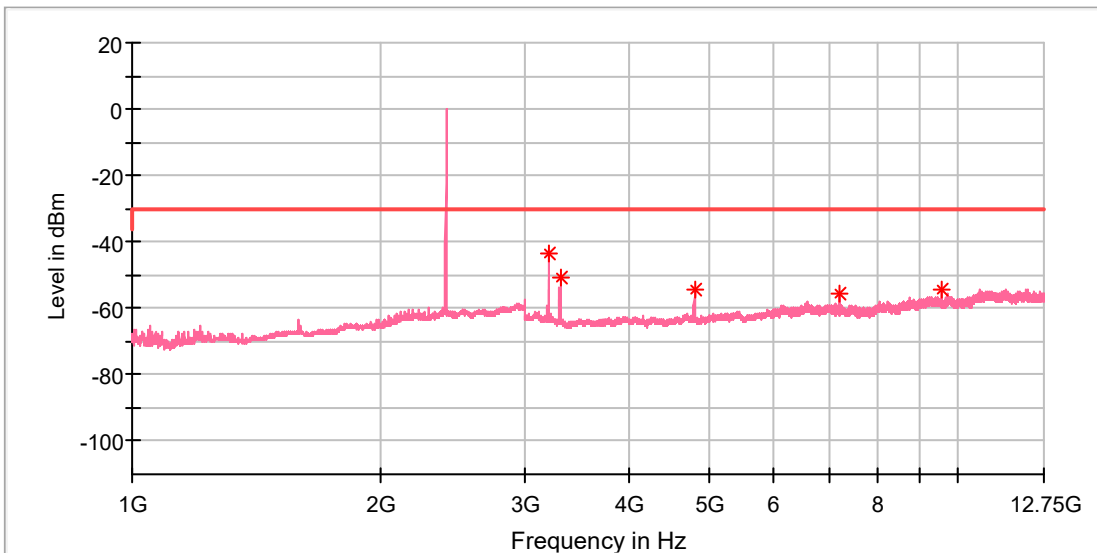
### Critical\_Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3202.500000	-43.05	-30.00	13.05	150.0	H	245.0	-96.3
3298.500000	-53.19	-30.00	23.19	150.0	H	209.0	-97.5
4804.000000	-55.10	-30.00	25.10	150.0	H	44.0	-94.8
7205.357143	-53.69	-30.00	23.69	150.0	H	6.0	-90.7

The highest waveform in the figure is BLE Fundamental.

Remarks: The emission over limit is fundamental frequency signal which can be ignored.

EUT Name: Smart Power Meter Switch  
 Model: POWR320D  
 Sample No: A003291051-004  
 Test Mode: TX\_BLE L CH  
 Test Voltage: DC3.3V  
 Remark: Temp:23.5;Humi:59%  
 Test standard: EN 300328  
 Tested By: Xiqiang Ma  
 Reviewed by: Terry Yin

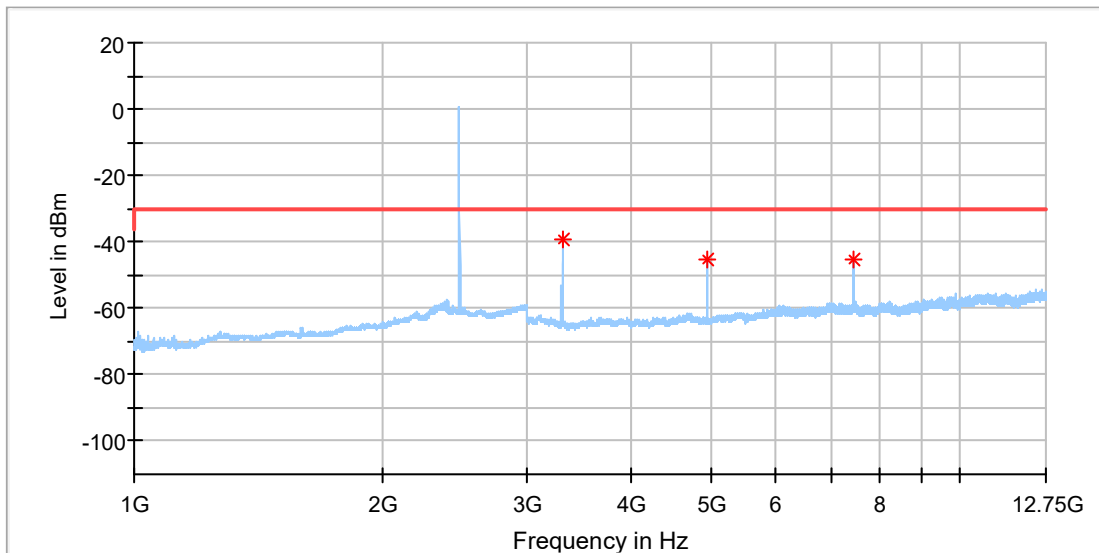


### Critical\_Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3202.500000	-43.34	-30.00	13.34	150.0	V	152.0	-96.0
3311.500000	-51.02	-30.00	21.02	150.0	V	246.0	-97.5
4804.500000	-54.35	-30.00	24.35	150.0	V	351.0	-95.1
7206.321429	-55.58	-30.00	25.58	150.0	V	64.0	-91.4
9608.357143	-54.35	-30.00	24.35	150.0	V	64.0	-89.2

The highest waveform in the figure is BLE Fundamental.  
 Remarks: The emission over limit is fundamental frequency signal which can be ignored.

EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	TX_BLE H CH
Test Voltage:	DC3.3V
Remark:	Temp:23.5;Humi:59%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical\_Freqs

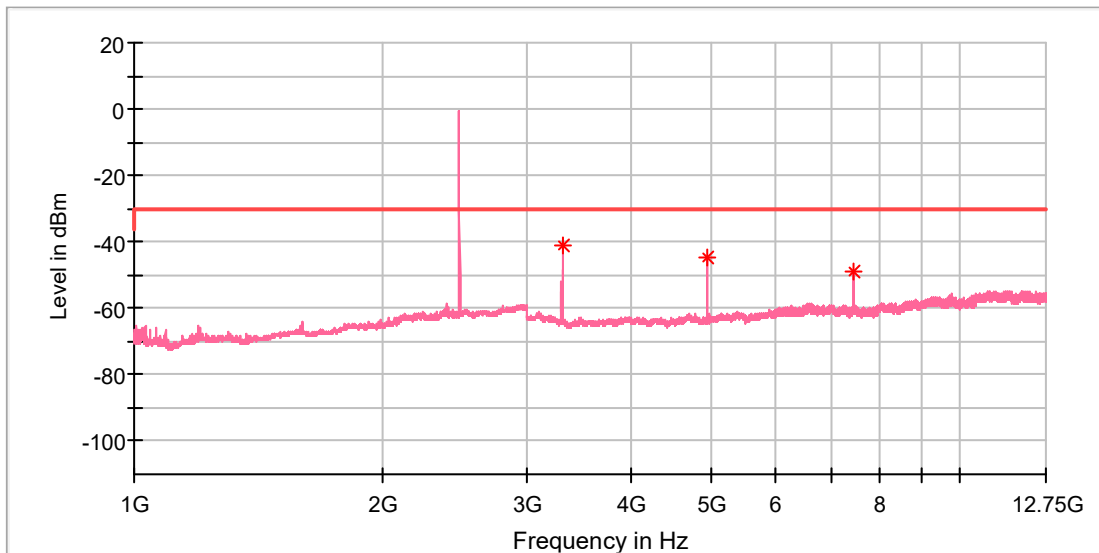
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3306.500000	-39.51	-30.00	9.51	150.0	H	319.0	-97.5
4960.000000	-45.23	-30.00	15.23	150.0	H	55.0	-94.8
7439.678572	-45.10	-30.00	15.10	150.0	H	288.0	-90.6

The highest waveform in the figure is BLE Fundamental.

Remarks: The emission over limit is fundamental frequency signal which can be ignored.



EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	TX_BLE H CH
Test Voltage:	DC3.3V
Remark:	Temp:23.5;Humi:59%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical\_Freqs

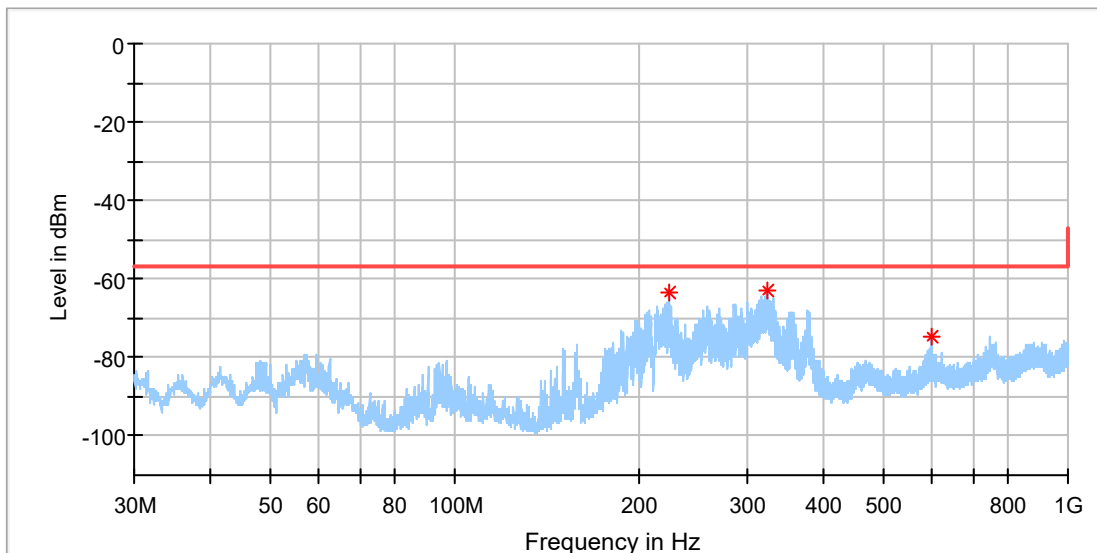
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3306.500000	-41.04	-30.00	11.04	150.0	V	16.0	-97.5
4960.000000	-44.60	-30.00	14.60	150.0	V	65.0	-95.0
7439.678572	-48.98	-30.00	18.98	150.0	V	79.0	-91.6

The highest waveform in the figure is BLE Fundamental.

Remarks: The emission over limit is fundamental frequency signal which can be ignored.

## Appendix A.6 Receiver spurious emissions

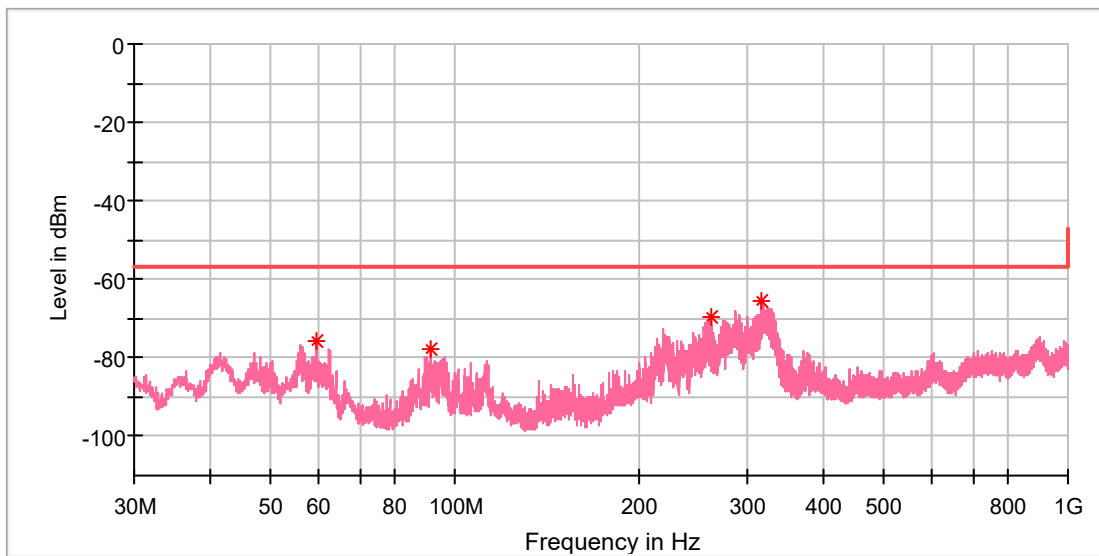
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE L CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
224.194000	-63.60	-57.00	6.60	150.0	H	311.0	-117.0
324.298000	-62.78	-57.00	5.78	150.0	H	329.0	-114.7
597.256000	-74.55	-57.00	17.55	150.0	H	299.0	-108.8

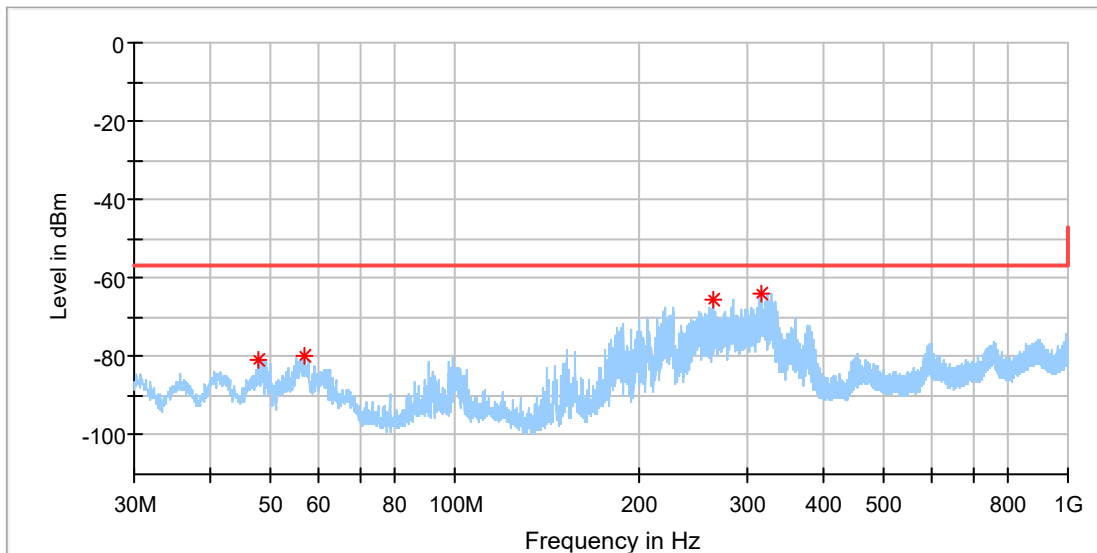
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE L CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



**Critical\_Freqs**

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
59.342500	-75.86	-57.00	18.86	150.0	V	186.0	-117.0
91.304000	-77.98	-57.00	20.98	150.0	V	154.0	-119.9
261.102500	-69.36	-57.00	12.36	150.0	V	120.0	-117.2
315.810500	-65.62	-57.00	8.62	150.0	V	146.0	-114.6

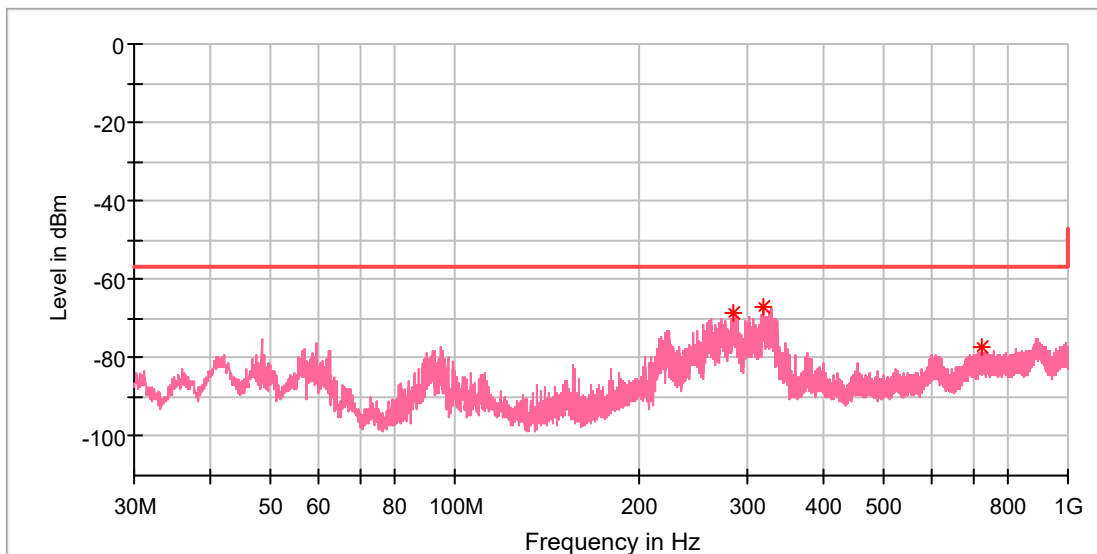
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE H CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



**Critical\_Freqs**

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.896500	-80.72	-57.00	23.72	150.0	H	64.0	-118.6
56.966000	-79.97	-57.00	22.97	150.0	H	249.0	-117.0
263.333500	-65.50	-57.00	8.50	150.0	H	296.0	-117.6
316.053000	-63.75	-57.00	6.75	150.0	H	299.0	-115.1

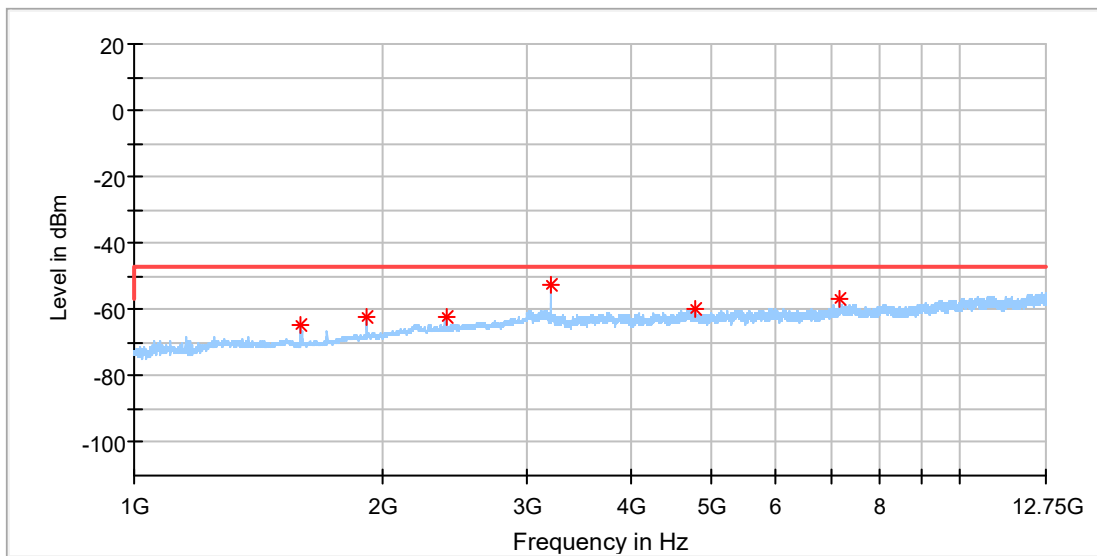
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE H CH
Test Voltage:	Adaptor
Remark:	Temp:21.8;Humi:54%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical\_Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
284.188500	-68.43	-57.00	11.43	150.0	V	25.0	-117.0
319.593500	-67.07	-57.00	10.07	150.0	V	141.0	-114.2
723.792500	-77.12	-57.00	20.12	150.0	V	241.0	-106.8

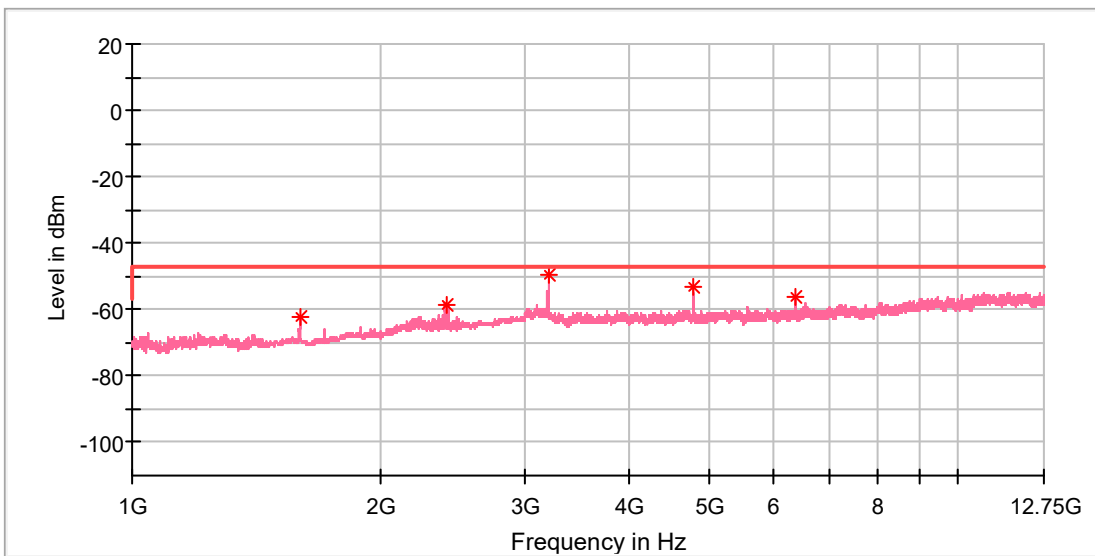
EUT Name: Smart Power Meter Switch  
 Model: POWR320D  
 Sample No: A003291051-004  
 Test Mode: RX\_BLE L CH  
 Test Voltage: DC3.3V  
 Remark: Temp:23.5;Humi:59%  
 Test standard: EN 300328  
 Tested By: Xiqiang Ma  
 Reviewed by: Terry Yin



### Critical Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1593.000000	-64.83	-47.00	17.83	150.0	H	252.0	-99.7
1911.500000	-62.12	-47.00	15.12	150.0	H	23.0	-97.0
2389.500000	-62.15	-47.00	15.15	150.0	H	147.0	-94.7
3205.291667	-52.59	-47.00	5.59	150.0	H	62.0	-96.4
4789.125000	-60.00	-47.00	13.00	150.0	H	187.0	-94.7
7154.041667	-57.06	-47.00	10.06	150.0	H	196.0	-90.7

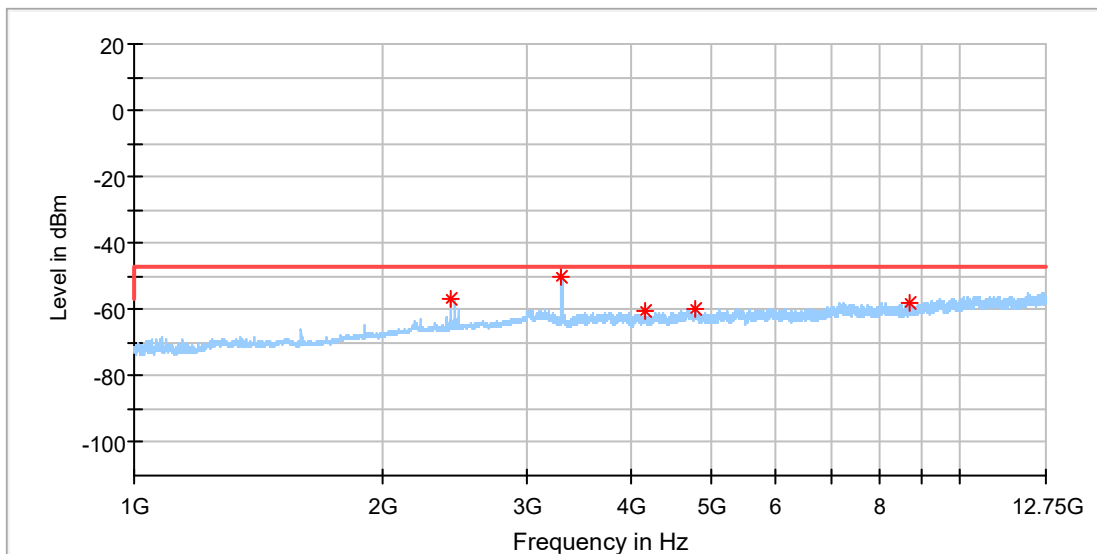
EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE L CH
Test Voltage:	DC3.3V
Remark:	Temp:23.5;Humi:59%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1596.000000	-61.93	-47.00	14.93	150.0	V	97.0	-98.6
2408.500000	-58.53	-47.00	11.53	150.0	V	86.0	-94.7
3205.291667	-49.82	-47.00	2.82	150.0	V	62.0	-96.1
4779.916667	-53.40	-47.00	6.40	150.0	V	206.0	-95.0
6372.958333	-56.14	-47.00	9.14	150.0	V	254.0	-91.9

EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE H CH
Test Voltage:	DC3.3V
Remark:	Temp:23.5;Humi:59%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin

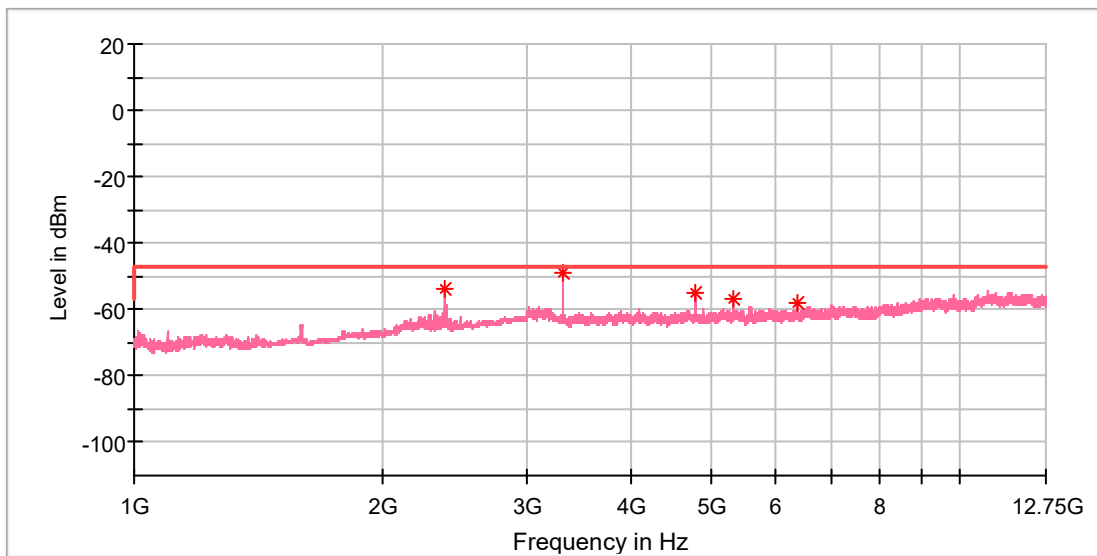


### Critical\_Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2425.000000	-56.83	-47.00	9.83	150.0	H	104.0	-94.3
3297.375000	-50.35	-47.00	3.35	150.0	H	70.0	-97.5
4153.208333	-60.50	-47.00	13.50	150.0	H	84.0	-96.3
4785.875000	-59.53	-47.00	12.53	150.0	H	152.0	-94.7
8738.416667	-58.24	-47.00	11.24	150.0	H	314.0	-91.0



EUT Name:	Smart Power Meter Switch
Model:	POWR320D
Sample No:	A003291051-004
Test Mode:	RX_BLE H CH
Test Voltage:	DC3.3V
Remark:	Temp:23.5;Humi:59%
Test standard:	EN 300328
Tested By:	Xiqiang Ma
Reviewed by:	Terry Yin



### Critical\_Freqs

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2382.500000	-54.07	-47.00	7.07	150.0	V	58.0	-94.7
3309.291667	-49.12	-47.00	2.12	150.0	V	65.0	-97.5
4782.625000	-54.90	-47.00	7.90	150.0	V	198.0	-95.0
5313.458333	-57.02	-47.00	10.02	150.0	V	350.0	-93.6
6381.083333	-57.89	-47.00	10.89	150.0	V	171.0	-91.9