# CE Test Report

| | | |
|---|---|---|
| **Equipment** | : | **Bluetooth 4.2 Dual Mode USB HCI Module**<br>**(Refer to item 1.1.1 for more details)** |
| **Model No.** | : | **BT850-SA**<br>**(Refer to item 1.1.1 for more details)** |
| **Brand Name** | : | **Laird Connectivity** |
| **Applicant** | : | **Laird Connectivity, Inc.** |
| **Address** | : | **W66N220 Commerce Court, Cedarburg, Wisconsin 53012, USA** |
| **Standard** | : | **EN 300 328 V2.2.2 (2019-07)** |
| **Received Date** | : | **May 12, 2020** |
| **Tested Date** | : | **Sep. 27 ~ Sep. 29, 2017(for original test)**<br>**May 15, 2020 (for new test)** |

**We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.**

**Reviewed by:**

**James Fan / Assistant Manager**

**Approved by:**

**Gary Chang / Manager**

Testing Laboratory 2732

# Table of Contents


**1 GENERAL DESCRIPTION ..... 5**

1.1 Information ..... 5
1.2 Local Support Equipment List ..... 8
1.3 Test Setup Chart ..... 8
1.4 Test Equipment List and Calibration Data ..... 9
1.5 Testing Applied Standards ..... 10
1.6 Deviation from Test Standard and Measurement Procedure ..... 10
1.7 Measurement Uncertainty ..... 10

**2 TEST CONFIGURATION ..... 11**

2.1 Testing Condition ..... 11
2.2 Testing Facility ..... 11
2.3 The Worst Test Modes and Channel Details ..... 12

**3 TRANSMITTER TEST RESULTS ..... 13**

3.1 RF Output Power ..... 13
3.2 Power Spectral Density ..... 15
3.3 Occupied Channel Bandwidth ..... 16
3.4 Transmitter Unwanted Emissions in the Out-Of-Band Domain ..... 17
3.5 Transmitter Unwanted Emissions in the Spurious Domain ..... 20

**4 RECEIVER TEST RESULTS ..... 40**

4.1 Receiver Spurious Emissions ..... 40

**5 RECEIVER BLOCKING TEST RESULTS ..... 60**

5.1 Receiver Blocking ..... 60
5.2 Receiver Blocking ..... 60

**6 PHOTOGRAPHS OF THE TEST CONFIGURATION ..... 67**

**7 TEST LABORATORY INFORMATION ..... 69**

# Release Record

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| ER791801-08AE | Rev. 01 | Initial issue | Jul. 30, 2020 |

# Summary of Test Results

| Ref. Std. Clause | Test Items | Measured | Result |
|---|---|---|---|
| 4.3.2.2 | RF Output Power | 9.88 dBm | Pass |
| 4.3.2.3 | Power Spectral Density | Meet the requirement of limit. | Pass |
| 4.3.2.4 | Duty Cycle, Tx-sequence, Tx-gap | Only for non-adaptive equipment | N/A |
| 4.3.2.5 | Medium Utilisation (MU) factor | Only for non-adaptive equipment | N/A |
| 4.3.2.6 | Adaptivity | The RF Output power is less than 10 dBm e.i.r.p. This item is not applicable. | N/A |
| 4.3.2.7 | Occupied Channel Bandwidth | Meet the requirement of limit. | Pass |
| 4.3.2.8 | Transmitter unwanted emissions in the out of band domain | Meet the requirement of limit. | Pass |
| 4.3.2.9 | Transmitter unwanted emissions in the spurious domain | Meet the requirement of limit. | Pass |
| 4.3.2.10 | Receiver spurious emissions | Meet the requirement of limit. | Pass |
| 4.3.2.11 | Receiver Blocking | Meet the requirement of limit. | Pass |
| 4.3.2.12 | Geo-location Capability | The device has no this capability. | N/A |

| **Declaration of Conformity:** |
|---|
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| **Comments and Explanations:** |
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

# 1 General Description

## 1.1 Information

This report is issued as a supplementary report to original ICC report no. ER791801AE. The difference is concerned with following items:

- ✧ Updating standard version from V2.1.1 to V2.2.2.
- ✧ New applicant name & brand name.

Therefore, related test items had been performed and presented in the following sections.

### 1.1.1 Product Details

| Brand Name | Model Name | Product Name | Description |
|---|---|---|---|
| Laird | BT850-SA | Bluetooth 4.2 Dual Mode USB HCI Module | chip antenna |
| | BT850-ST | | trace to external antenna |
| | BT860-SA | Bluetooth 4.2 Dual Mode UART HCI Module | chip antenna |
| | BT860-ST | | trace to external antenna |

### 1.1.2 Specification of the Equipment under Test (EUT)

| RF General Information | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Bluetooth Mode** | **Ch. Frequency (MHz)** | **Channel Number** | **Data Rate** |
| 2400-2483.5 | V4.2 LE | 2402-2480 | 0-39 [40] | 1 Mbps |
| Note 1: Bluetooth LE (Low energy) uses GFSK modulation. | | | | |

### 1.1.3 Antenna Details

| Ant. No. | Band/ Model | Type | Connector | Antenna Gain (dBi) |
|---|---|---|---|---|
| 1 | ACX / AT3216-B2R7HAA | Chip | NA | 0.5 |
| 2 | Laird / 0600-00040 | Dipole | UFL | 2 |
| 3 | Laird / NANOBLUE | PCB Dipole | UFL | 2 |
| 4 | Laird / 001-0014 | PIFA | UFL | 2 |
| 5 | Laird / 001-0030 | PIFA | UFL | 2 |

### 1.1.4 EUT Operational Condition

| | | | |
|---|---|---|---|
| **Power Supply Type** | 3.3Vdc from host | | |
| **SW Version** | NA | | |
| **Operational Climatic** | ☒ Tnom (20°C) | ☒ Tmax (85°C) | ☒ Tmin (-30°C) |

### 1.1.5 Accessories

N/A

### 1.1.6 Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|---|---|---|---|
| 37 | 2402 | 18 | 2442 |
| 0 | 2404 | 19 | 2444 |
| 1 | 2406 | 20 | 2446 |
| 2 | 2408 | 21 | 2448 |
| 3 | 2410 | 22 | 2450 |
| 4 | 2412 | 23 | 2452 |
| 5 | 2414 | 24 | 2454 |
| 6 | 2416 | 25 | 2456 |
| 7 | 2418 | 26 | 2458 |
| 8 | 2420 | 27 | 2460 |
| 9 | 2422 | 28 | 2462 |
| 10 | 2424 | 29 | 2464 |
| 38 | 2426 | 30 | 2466 |
| 11 | 2428 | 31 | 2468 |
| 12 | 2430 | 32 | 2470 |
| 13 | 2432 | 33 | 2472 |
| 14 | 2434 | 34 | 2474 |
| 15 | 2436 | 35 | 2476 |
| 16 | 2438 | 36 | 2478 |
| 17 | 2440 | 39 | 2480 |

### 1.1.7 Test Tool and Duty Cycle

| Test Tool | Broadcom BlueTool | |
|---|---|---|
| **Modulation Mode** | **Duty Cycle Of Test Signal (%)** | **Duty Factor (dB)** |
| GFSK-1Mbps | 62.90% | 2.01 |

### 1.1.8 Power Setting

| Modulation Mode | Test Frequency (MHz) | | |
|---|---|---|---|
| | **2402** | **2440** | **2480** |
| GFSK-1Mbps | 9 | 8 | 8 |

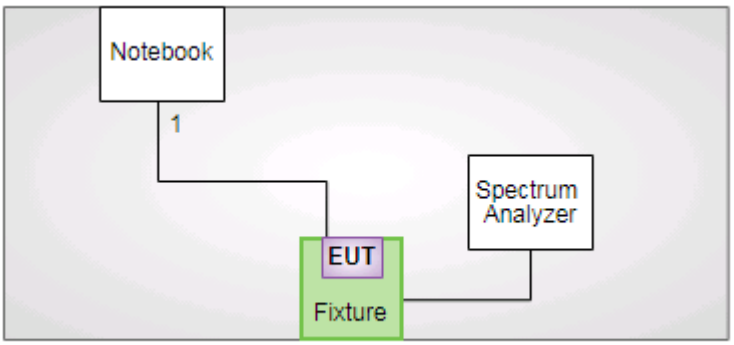
## 1.2 Local Support Equipment List

| Support Equipment List | | | | | | |
|---|---|---|---|---|---|---|
| **No.** | **Equipment** | **Brand** | **Model** | **S/N** | **FCC ID** | **Signal cable / Length (m)** |
| 1 | Notebook | DELL | Latitude E6430 | --- | DoC | USB, 0.5m shielded |
| 2 | 50Ω terminator | --- | --- | --- | --- | --- |
| 3 | Fixture | --- | --- | --- | --- | --- |

Note: No3 was provided by applicant.

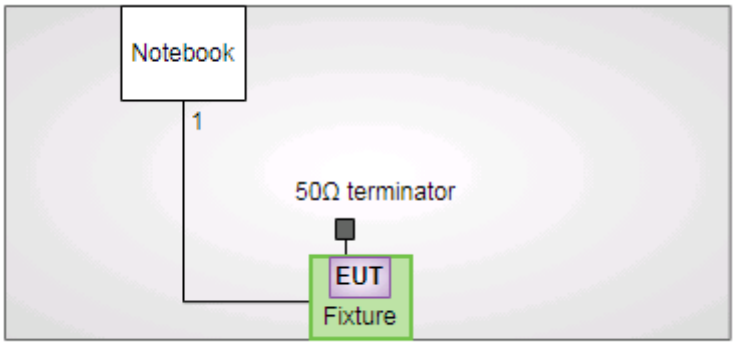
## 1.3 Test Setup Chart

**Test Setup Diagram (Conducted)**




1. USB, 0.5m shielded

**Test Setup Diagram (Radiated)**




1. USB, 0.5m shielded

## 1.4 Test Equipment List and Calibration Data

**For original test: Sep. 27 ~ Sep. 29, 2017**

| **Test Item** | Radiated Emissions | | | | |
|---|---|---|---|---|---|
| **Test Site** | Fully-anechoic chamber 2 / (05CH02-WS) | | | | |
| **Instrument** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Date** | **Calibration Until** |
| Spectrum Analyzer | Agilent | N9010A | MY52221474 | Oct. 14, 2016 | Oct. 13, 2017 |
| Bilog Antenna 30-1000MHz | SCHWARZBECK | VULB9168 | 9168-563 | Jan. 05, 2017 | Jan. 04, 2018 |
| Horn Antenna 1G-18G | SCHWARZBECK | BBHA 9120 D | 9120D-1205 | Jan. 05, 2017 | Jan. 04, 2018 |
| Horn Antenna 18G-40G | SCHWARZBECK | BBHA 9170 | BBHA 9170508 | Dec. 29, 2016 | Dec. 28, 2017 |
| Preamplifier | Agilent | 83017A | MY53270013 | Jan. 10, 2017 | Jan. 09, 2018 |
| Preamplifier 30-1000MHz | EMC | EMC02325 | 980188 | Dec. 13, 2016 | Dec. 12, 2017 |
| RF cable-1M | HUBER+SUHNER | SUCOFLEX104 | MY22622/4 | Dec. 13, 2016 | Dec. 12, 2017 |
| RF cable-1M | HUBER+SUHNER | SUCOFLEX104 | MY22623/4 | Dec. 14, 2016 | Dec. 13, 2017 |
| RF cable-3M | HUBER+SUHNER | SUCOFLEX104 | MY22621/4 | Dec. 14, 2016 | Dec. 13, 2017 |
| RF cable-4M | HUBER+SUHNER | SUCOFLEX104 | MY22579/4 | Dec. 14, 2016 | Dec. 13, 2017 |
| LF cable-0.8M | EMC | EMC8D-NM-NM-800 | EMC8D-NM-NM-800-002 | Dec. 14, 2016 | Dec. 13, 2017 |
| LF cable-3M | EMC | EMC8D-NM-NM-3000 | 131102 | Dec. 14, 2016 | Dec. 13, 2017 |
| LF cable-10M | EMC | EMC8D-NM-NM-10000 | 131101 | Dec. 14, 2016 | Dec. 13, 2017 |
| Measurement Software | AUDIX | e3 | 6.120210g | NA | NA |
| Note: Calibration Interval of instruments listed above is one year. | | | | | |

| **Test Item** | RF Conducted | | | | |
|---|---|---|---|---|---|
| **Test Site** | (TH01-WS) | | | | |
| **Instrument** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Date** | **Calibration Until** |
| Spectrum Analyzer | ROHDE&SCHWARZ | FSV40 | 101486 | Nov. 15, 2016 | Nov. 14, 2017 |
| TEMP&HUMIDITY CHAMBER | GIANT FORCE | GCT-225-40-SP-SD | MAF1212-002 | Nov. 21, 2016 | Nov. 20, 2017 |
| Power Sensor | Agilent | U2021XA | MY53480019 | Feb. 06, 2017 | Feb. 05, 2018 |
| Power Sensor | Agilent | U2021XA | MY53510003 | Feb. 06, 2017 | Feb. 05, 2018 |
| DC POWER SOURCE | GW INSTEK | GPC-6030D | EM892433 | Oct. 20, 2016 | Oct. 19, 2017 |
| Combiner(1X2) | woken | 0120A02201801O | DOM2AEW1A23 | Dec. 15, 2016 | Dec. 14, 2017 |
| Measurement Software | Sporton | Sporton_1 | 1.3.30 | NA | NA |
| Measurement Software | Agilent | EN RF test | 1.1501125 | NA | NA |
| Note: Calibration Interval of instruments listed above is one year. | | | | | |

**For new test: May 15, 2020**

| Test Item | Receiver Blocking | | | | |
|---|---|---|---|---|---|
| **Test Site** | (05CH01-WS) | | | | |
| **Instrument** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Date** | **Calibration Until** |
| Wireless connectivity tester | ROHDE&SCHWARZ | CMW270 | 100856 | Oct. 24, 2019 | Oct. 23, 2020 |
| Signal Generator | ROHDE&SCHWARZ | SMBV100A | 263146 | Jan. 15, 2020 | Jan. 14, 2021 |
| RF Cable | HUBER+SUHNER | SUCOFLEX_104 | 500202/4 | Oct. 16, 2019 | Oct. 15, 2020 |
| RF Cable | HUBER+SUHNER | SUCOFLEX_104 | 296088/4 | Oct. 16, 2019 | Oct. 15, 2020 |
| RF Cable | HUBER+SUHNER | SUCOFLEX_104 | 329023/4 | Oct. 16, 2019 | Oct. 15, 2020 |
| Combiner(1X2) | WOKEN | 2WAYDIV | 12101200003 | Oct. 16, 2019 | Oct. 15, 2020 |
| Note: Calibration Interval of instruments listed above is one year. | | | | | |

## 1.5 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

EN 300 328 V2.2.2 (2019-07)

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

| Measurement Uncertainty | | |
|---|---|---|
| **Parameters** | **Uncertainty** | **Limit** |
| Occupied Channel Bandwidth | ±0.0034 % | ±5 % |
| RF output power, conducted | ±0.537 dB | ±1.5 dB |
| Power Spectral Density, conducted | ±0.463 dB | ±3 dB |
| Unwanted Emissions, conducted | ±2.505 dB | ±3 dB |
| All emissions, radiated | ±3.401 dB | ±6 dB |
| Temperature | ±0.6 °C | ±3 °C |
| Supply voltages | ±0.16 % | ±3 % |
| Time | ±0.1 % | ±5 % |

# 2 Test Configuration

## 2.1 Testing Condition

| Test Item | Test Site | Ambient Condition | Tested By |
|---|---|---|---|
| RF Conducted | TH01-WS | 25°C / 65% | Chris Zeng |
| Radiated Emission | 05CH02-WS | 24°C / 65% | Ryan Lee |
| Receiver Blocking | 05CH01-WS | 25°C / 65% | Nai Xu |

## 2.2 Testing Facility

| | |
|---|---|
| **Test Laboratory** | International Certification Corp. |
| **Test Site** | TH01-WS, 05CH01-WS |
| **Address of Test Site (Kwei Shan)** | No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C. |

| | |
|---|---|
| **Test Site** | 05CH02-WS |
| **Address of Test Site (Kwei Shan II)** | No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C. |

## 2.3 The Worst Test Modes and Channel Details

| Test item | Modulation Mode | Test Frequency (MHz) | Data Rate | Test Configuration |
|---|---|---|---|---|
| RF Output Power | GFSK | 2402 / 2440 / 2480 | 1 Mbps | 1, 2, 3, 4 |
| Power Spectral Density | | | | |
| Transmitter unwanted emissions in the out of band domain | GFSK | 2402 / 2480 | 1 Mbps | 1 , 2 |
| Occupied Channel Bandwidth | GFSK | 2402 / 2480 | 1 Mbps | 2 |
| Transmitter Spurious Emissions ≤1GHz<br>Receiver Spurious Emissions ≤1GHz | GFSK | 2402 / 2480 | 1 Mbps | 2, 4 |
| Transmitter Spurious Emissions >1GHz<br>Receiver Spurious Emissions >1GHz | GFSK | 2402 / 2480 | 1 Mbps | 2 |
| Receiver Blocking | GFSK | 2402 / 2480 | 1 Mbps | 2 |

**NOTE:**

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** result was found as the worst case and was shown in this report.
2. The device can be operated under adapter mode and charging mode. Each mode was selected for related test items as below configuration.

   Configuration 1 : BT850-SA

   Configuration 2 : BT850-ST

   Configuration 3 : BT860-SA

   Configuration 4 : BT860-ST
3. Conducted emission is only measured for configuration 1 which has maximum conducted power.
4. 50Ω terminators are connected to antenna port of EUT for radiated emission measurement.

# 3 Transmitter Test Results

## 3.1 RF Output Power

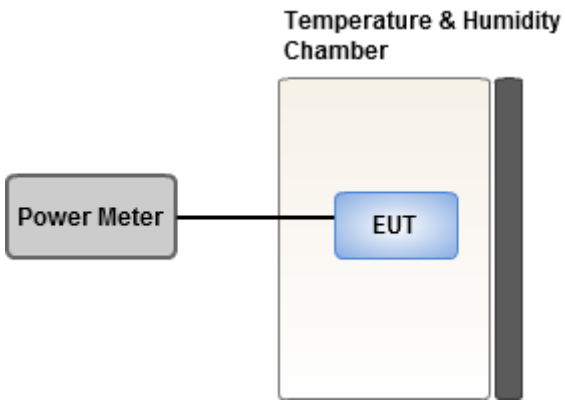
### 3.1.1 Limit of RF Output Power

The maximum RF output power shall be equal to or less than 20 dBm

### 3.1.2 Test Procedures

Reference to clause 5.4.2.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 3.1.3 Test Setup



### 3.1.4 Test Result of RF Output Power

***Configuration 1 : BT850-SA & Configuration 3 : BT860-SA***

| RF Output Power (dBm) | | | | |
|---|---|---|---|---|
| **Condition** | **Freq. (MHz)** | **EIRP Power** | **Limit (dBm)** | **Results** |
| $T_{nom}V_{nom}$ | 2402 | 7.70 | 20 | Pass |
| $T_{min}V_{nom}$ | 2402 | 8.17 | 20 | Pass |
| $T_{max}V_{nom}$ | 2402 | 7.35 | 20 | Pass |
| $T_{nom}V_{nom}$ | 2440 | 7.68 | 20 | Pass |
| $T_{min}V_{nom}$ | 2440 | 8.16 | 20 | Pass |
| $T_{max}V_{nom}$ | 2440 | 7.48 | 20 | Pass |
| $T_{nom}V_{nom}$ | 2480 | 7.62 | 20 | Pass |
| $T_{min}V_{nom}$ | 2480 | 8.38 | 20 | Pass |
| $T_{max}V_{nom}$ | 2480 | 7.26 | 20 | Pass |

***Configuration 2 : BT850-ST & Configuration 4 : BT860-ST***

| RF Output Power (dBm) | | | | |
|---|---|---|---|---|
| **Condition** | **Freq. (MHz)** | **EIRP Power** | **Limit (dBm)** | **Results** |
| $T_{nom}V_{nom}$ | 2402 | 9.20 | 20 | Pass |
| $T_{min}V_{nom}$ | 2402 | 9.67 | 20 | Pass |
| $T_{max}V_{nom}$ | 2402 | 8.85 | 20 | Pass |
| $T_{nom}V_{nom}$ | 2440 | 9.18 | 20 | Pass |
| $T_{min}V_{nom}$ | 2440 | 9.66 | 20 | Pass |
| $T_{max}V_{nom}$ | 2440 | 8.98 | 20 | Pass |
| $T_{nom}V_{nom}$ | 2480 | 9.12 | 20 | Pass |
| $T_{min}V_{nom}$ | 2480 | **9.88** | 20 | Pass |
| $T_{max}V_{nom}$ | 2480 | 8.76 | 20 | Pass |

## 3.2 Power Spectral Density

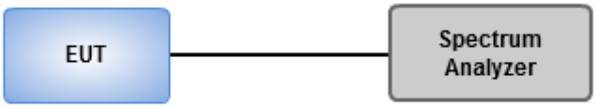
### 3.2.1 Limit of Power Spectral Density

For equipment using wide band modulations other than FHSS (e.g. DSSS, OFDM, etc.), the maximum Power Spectral Density is limited to 10 dBm per MHz.

### 3.2.2 Test Procedures

Reference to clause 5.4.3.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 3.2.3 Test Setup




### 3.2.4 Test Result of Power Spectral Density

***Configuration 1 : BT850-SA & Configuration 3 : BT860-SA***

| Modulation Mode | Freq. (MHz) | Power Density (dBm/1MHz) | Limit (dBm/1MHz) | Results |
|---|---|---|---|---|
| GFSK-1Mbps | 2402 | 8.65 | 10 | Pass |
| GFSK-1Mbps | 2440 | 8.37 | 10 | Pass |
| GFSK-1Mbps | 2480 | 8.35 | 10 | Pass |

***Configuration 2 : BT850-ST & Configuration 4 : BT860-ST***

| Modulation Mode | Freq. (MHz) | Power Density (dBm/1MHz) | Limit (dBm/1MHz) | Results |
|---|---|---|---|---|
| GFSK-1Mbps | 2402 | 9.12 | 10 | Pass |
| GFSK-1Mbps | 2440 | 9.10 | 10 | Pass |
| GFSK-1Mbps | 2480 | 9.04 | 10 | Pass |

## 3.3 Occupied Channel Bandwidth

### 3.3.1 Limit of Occupied Channel Bandwidth

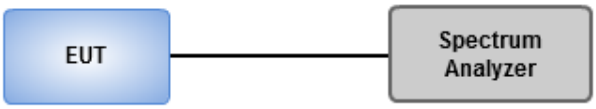
The Occupied Channel Bandwidth shall fall completely within 2.4~2.4835 GHz.

In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

### 3.3.2 Test Procedures

Reference to clause 5.4.7.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 3.3.3 Test Setup

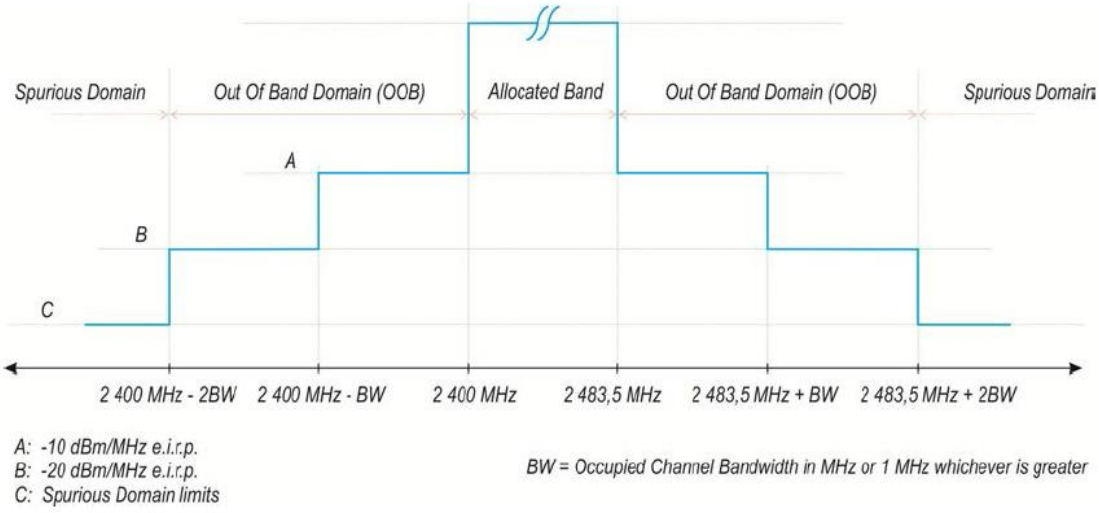



### 3.3.4 Test Result of Occupied Channel Bandwidth

| Modulation Mode | Frequency (MHz) | 99% Bandwidth (MHz) | $F_L$ at 99% BW (MHz) | $F_H$ at 99% BW (MHz) | Limit $F_L$ / $F_H$ (MHz) |
|---|---|---|---|---|---|
| GFSK-1Mbps | 2402 | 1.06 | 2401.49 | 2402.55 | 2400.0 |
| GFSK-1Mbps | 2480 | 1.07 | 2479.49 | 2480.56 | 2483.5 |

## 3.4 Transmitter Unwanted Emissions in the Out-Of-Band Domain

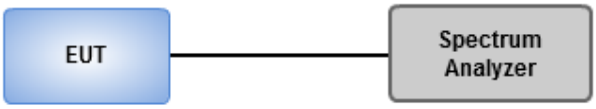
### 3.4.1 Limit of Transmitter Unwanted Emissions in the Out-Of-Band Domain




### 3.4.2 Test Procedures

Reference to clause 5.4.8.2 of ETSI EN 300 328 V2.2.2 (2019-07).

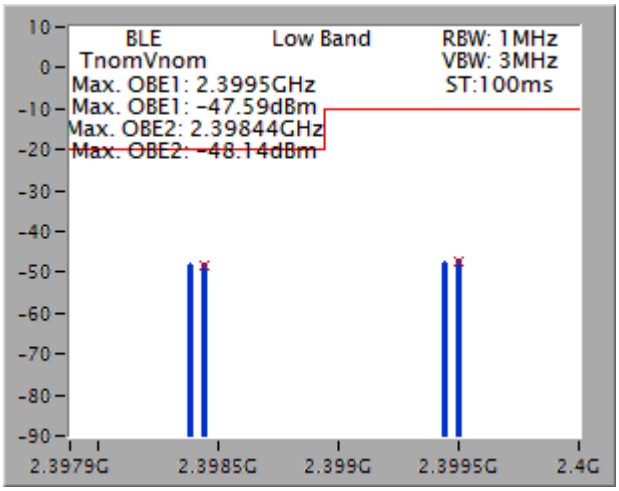
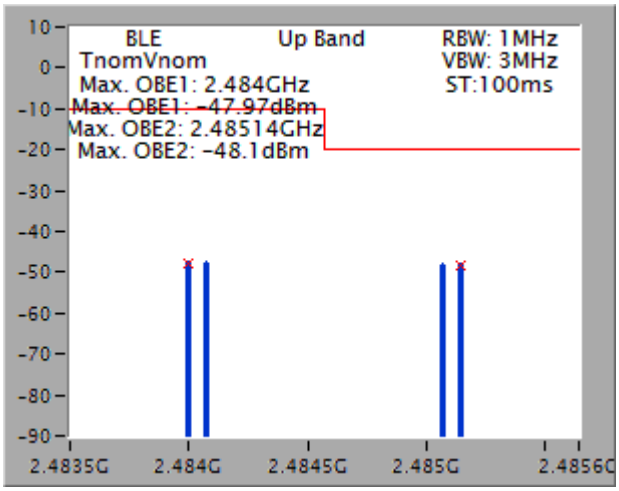
### 3.4.3 Test Setup



## *Configuration 1 : BT850-SA*

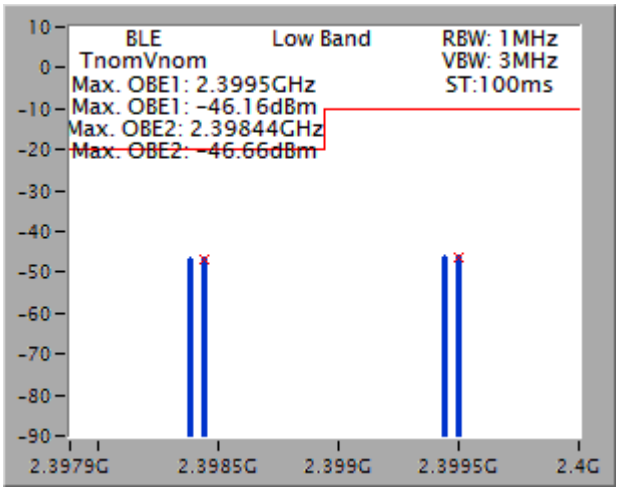
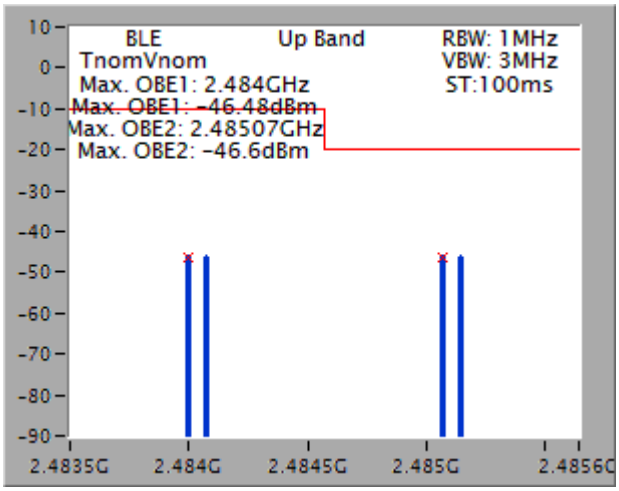
### 3.4.4 Test Result of Transmitter Unwanted Emissions in the Out-Of-Band Domain

| Condition | Modulation Mode | Freq. (MHz) | OOB Freq. (MHz) | OOB Emissions (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| TnomVnom | GFSK-1Mbps | 2402 | 2399.50 | -47.59 | -10 |
| TnomVnom | GFSK-1Mbps | 2402 | 2398.44 | -48.14 | -20 |
| TnomVnom | GFSK-1Mbps | 2480 | 2484.00 | -47.97 | -10 |
| TnomVnom | GFSK-1Mbps | 2480 | 2485.14 | -48.10 | -20 |

| Low Band | Up Band |
|---|---|
|  |  |

## *Configuration 2 : BT850-ST*

| Condition | Modulation Mode | Freq. (MHz) | OOB Freq. (MHz) | OOB Emissions (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| TnomVnom | GFSK-1Mbps | 2402 | 2399.50 | -46.16 | -10 |
| TnomVnom | GFSK-1Mbps | 2402 | 2398.44 | -46.66 | -20 |
| TnomVnom | GFSK-1Mbps | 2480 | 2484.00 | -46.48 | -10 |
| TnomVnom | GFSK-1Mbps | 2480 | 2485.07 | -46.60 | -20 |

| Low Band | Up Band |
|---|---|
|  |  |

## 3.5 Transmitter Unwanted Emissions in the Spurious Domain

### 3.5.1 Limit of Transmitter Unwanted Emissions in the Spurious Domain

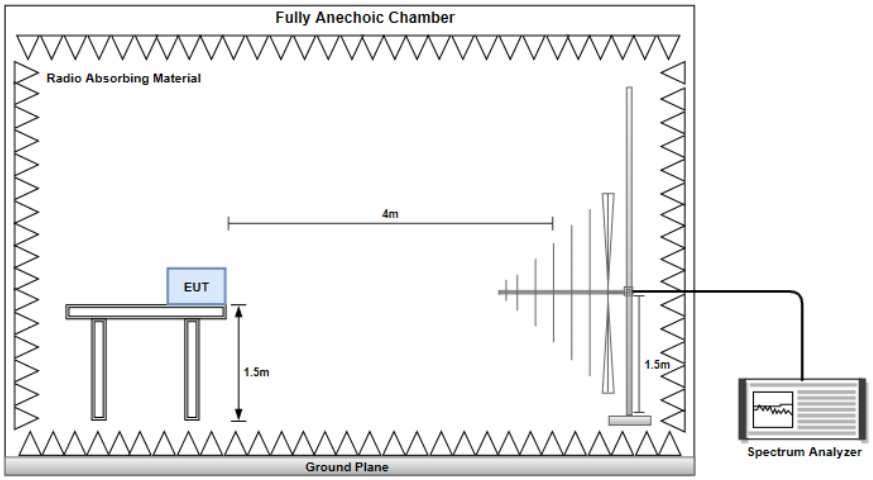
| Frequency Range (MHz) | Maximum power (dBm) | Bandwidth (kHz) |
|---|---|---|
| 30 to 47 | -36 | 100 |
| 47 to 74 | -54 | 100 |
| 74 to 87,5 | -36 | 100 |
| 87,5 to 118 | -54 | 100 |
| 118 to 174 | -36 | 100 |
| 174 to 230 | -54 | 100 |
| 230 to 470 | -36 | 100 |
| 470 to 694 | -54 | 100 |
| 694 to 1000 | -36 | 100 |
| 1000 to 12750 | -30 | 1000 |

### 3.5.2 Test Procedures

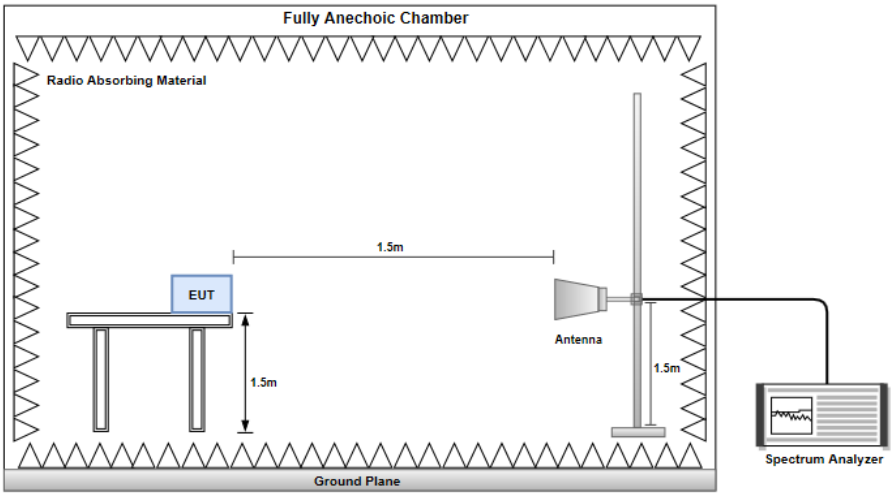
Reference to clause 5.4.9.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 3.5.3 Test Setup

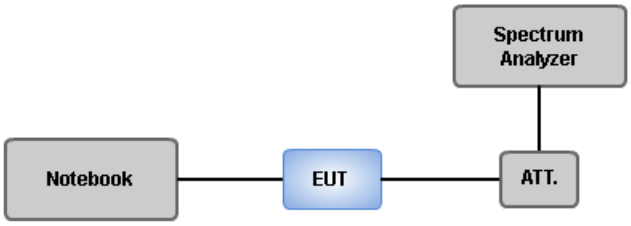
**Below 1GHz**




**Above 1 GHz**



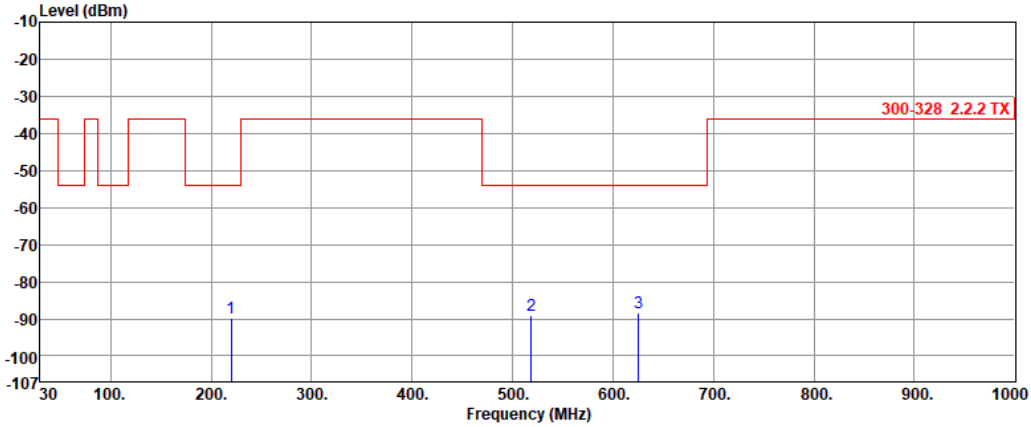

**Conducted Emission**



## *Configuration 2 : BT850-ST*

### 3.5.4 Transmitter Conducted Unwanted Emissions (Below 1GHz)

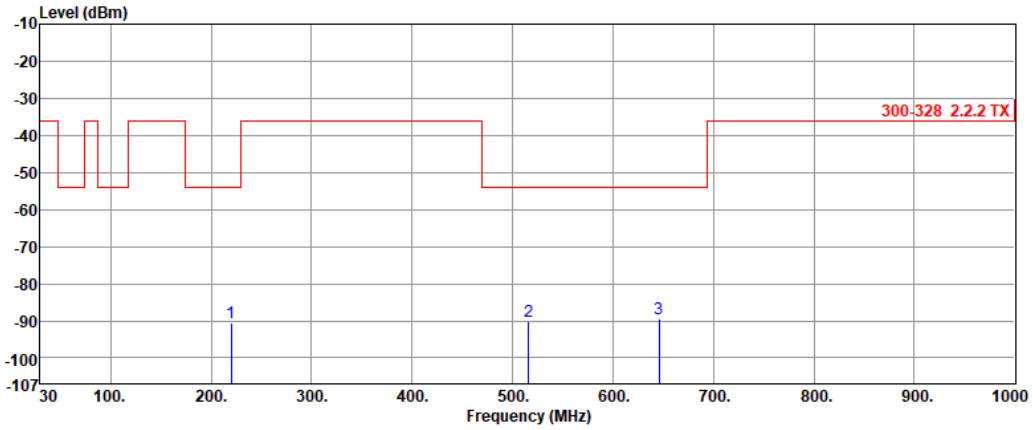
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 220.12 | -89.65 | -54.00 | -35.65 | 0.00 | -89.65 |
| 2 | 518.88 | -89.24 | -54.00 | -35.24 | 0.00 | -89.24 |
| 3 | 625.40 | -88.43 | -54.00 | -34.43 | 0.00 | -88.43 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

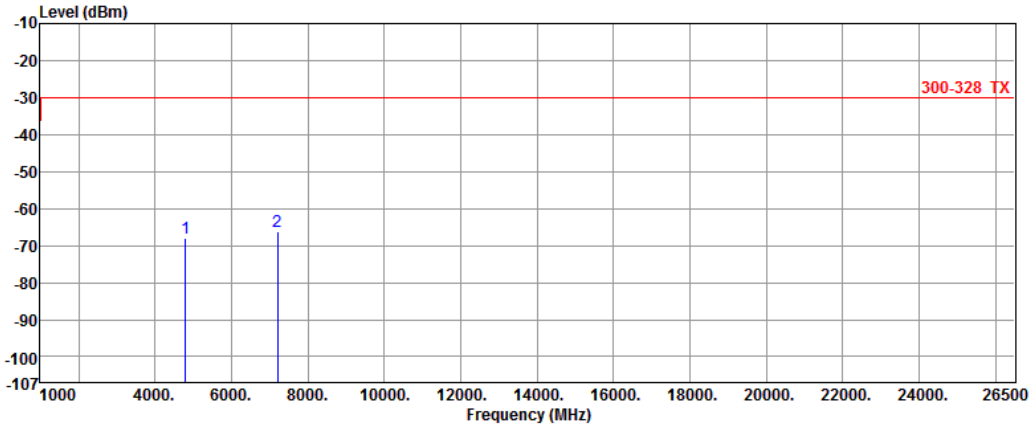



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 220.12 | -90.71 | -54.00 | -36.71 | 0.00 | -90.71 |
| 2 | 515.97 | -90.03 | -54.00 | -36.03 | 0.00 | -90.03 |
| 3 | 645.77 | -89.33 | -54.00 | -35.33 | 0.00 | -89.33 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 3.5.5 Transmitter Conducted Unwanted Emissions (Above 1GHz)

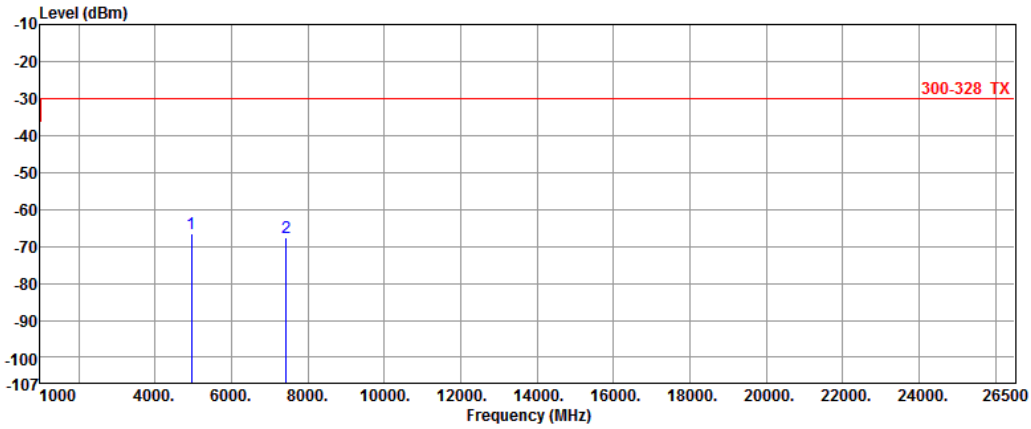
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4803.71 | -67.84 | -30.00 | -37.84 | 0.00 | -67.84 |
| 2 | 7205.18 | -66.10 | -30.00 | -36.10 | 0.00 | -66.10 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

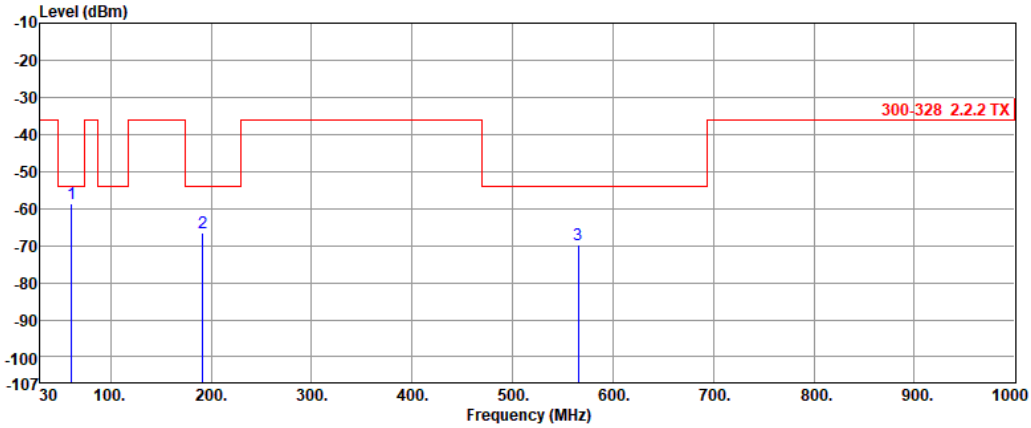



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4959.46 | -66.43 | -30.00 | -36.43 | 0.00 | -66.43 |
| 2 | 7439.54 | -67.59 | -30.00 | -37.59 | 0.00 | -67.59 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 3.5.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

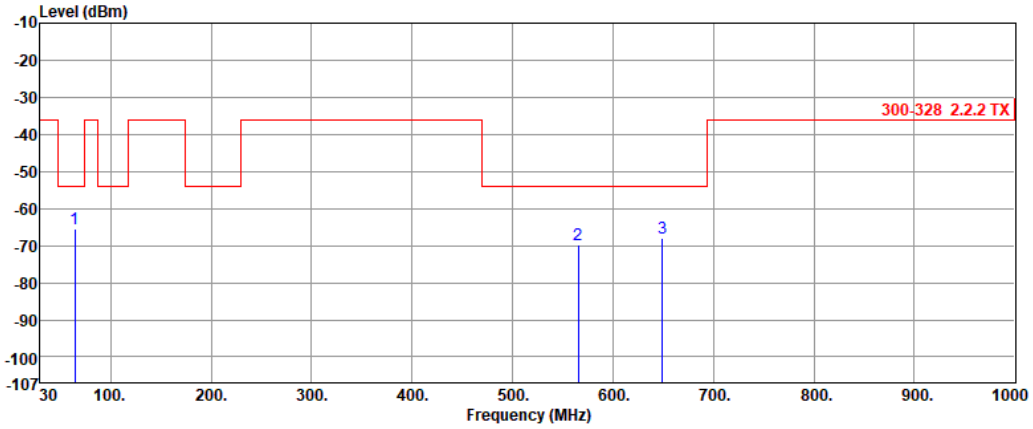
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 60.78 | -58.54 | -54.00 | -4.54 | -2.04 | -56.50 |
| 2 | 191.85 | -66.45 | -54.00 | -12.45 | -4.99 | -61.46 |
| 3 | 565.45 | -69.78 | -54.00 | -15.78 | 4.88 | -74.66 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

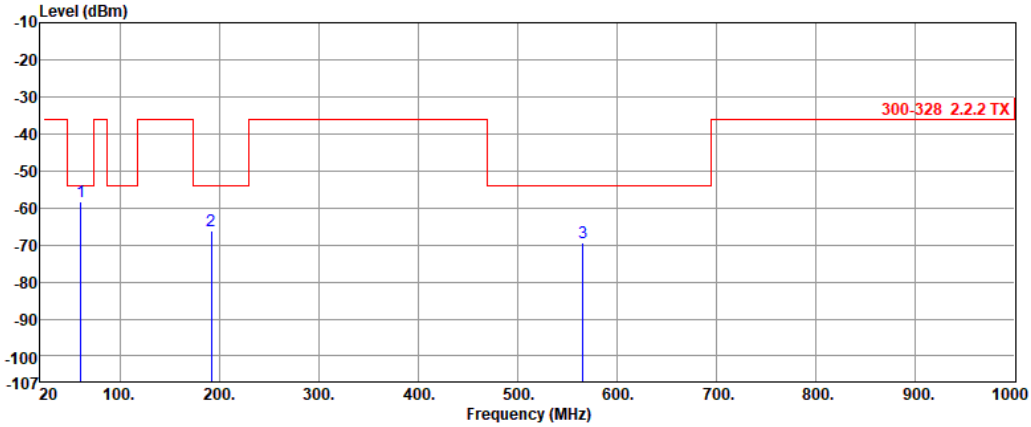
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 64.20 | -65.55 | -54.00 | -11.55 | -1.96 | -63.59 |
| 2 | 565.54 | -69.84 | -54.00 | -15.84 | 6.12 | -75.96 |
| 3 | 649.16 | -67.96 | -54.00 | -13.96 | 6.91 | -74.87 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

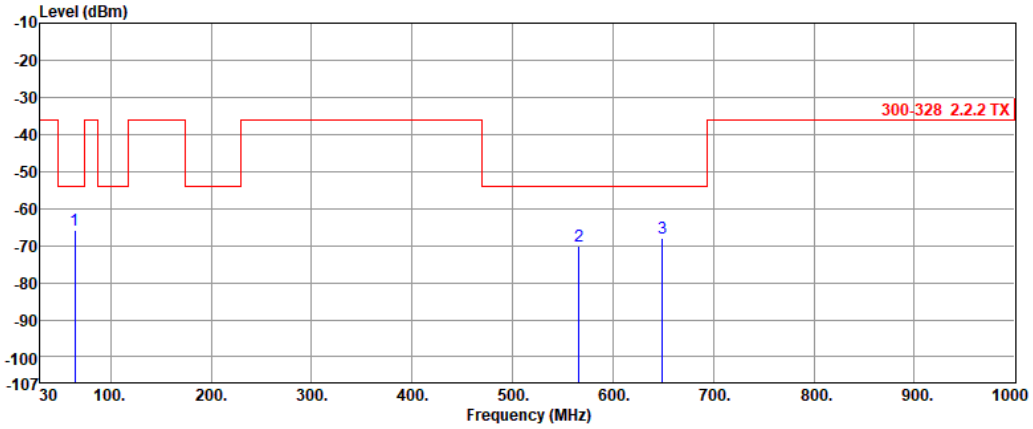
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 60.85 | -58.44 | -54.00 | -4.44 | -2.06 | -56.38 |
| 2 | 191.84 | -66.35 | -54.00 | -12.35 | -4.99 | -61.36 |
| 3 | 565.65 | -69.41 | -54.00 | -15.41 | 4.90 | -74.31 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |

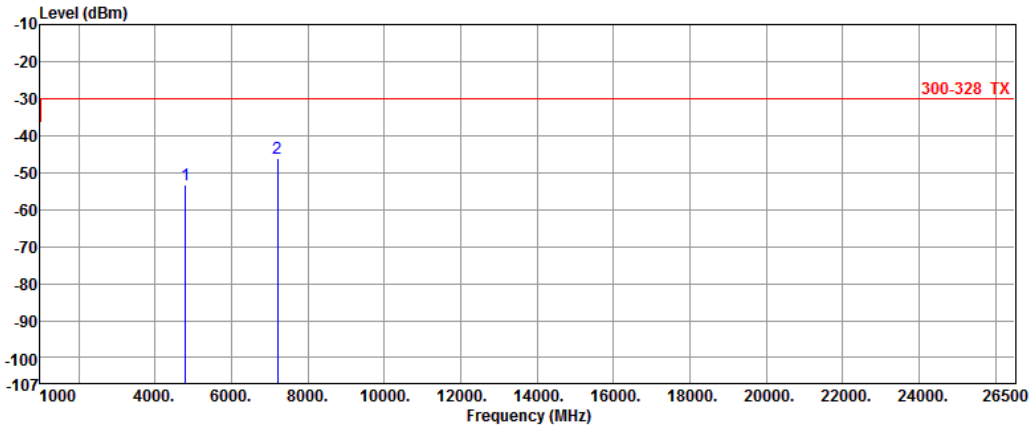



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 64.32 | -65.78 | -54.00 | -11.78 | -1.94 | -63.84 |
| 2 | 565.78 | -69.99 | -54.00 | -15.99 | 6.13 | -76.12 |
| 3 | 649.51 | -67.99 | -54.00 | -13.99 | 6.90 | -74.89 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

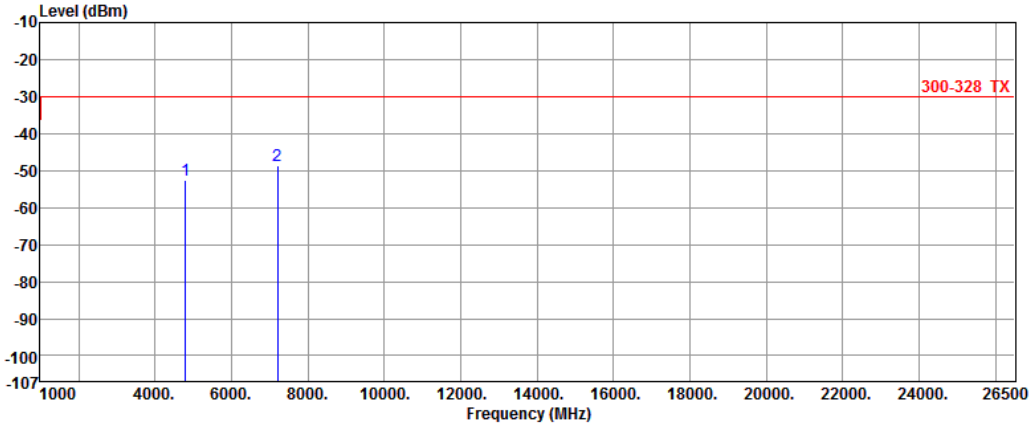
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4804.52 | -53.16 | -30.00 | -23.16 | 11.64 | -64.80 |
| 2 | 7205.54 | -46.02 | -30.00 | -16.02 | 17.38 | -63.40 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

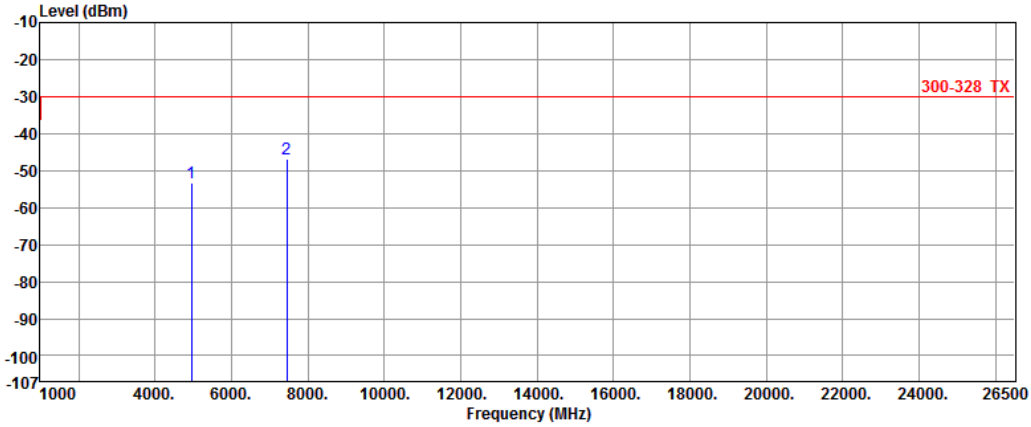
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4804.32 | -52.54 | -30.00 | -22.54 | 11.89 | -64.43 |
| 2 | 7205.21 | -48.59 | -30.00 | -18.59 | 17.16 | -65.75 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

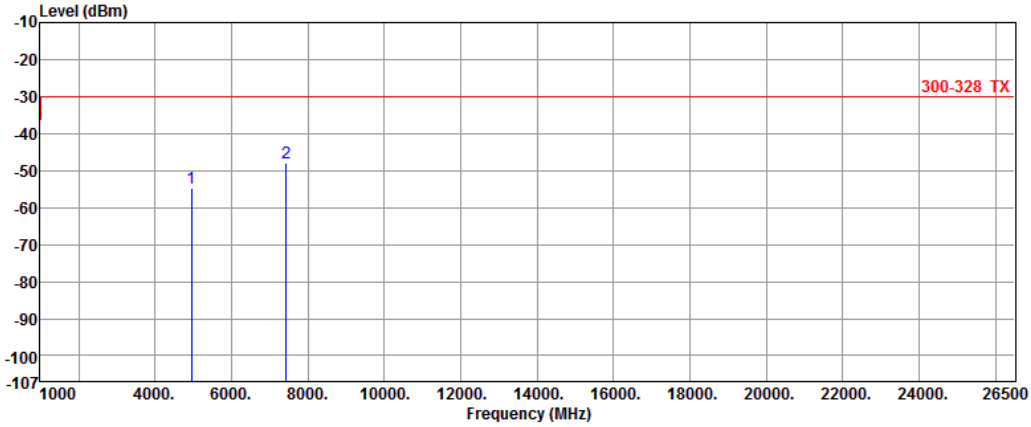
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4960.65 | -53.23 | -30.00 | -23.23 | 12.24 | -65.47 |
| 2 | 7440.54 | -47.03 | -30.00 | -17.03 | 17.00 | -64.03 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |



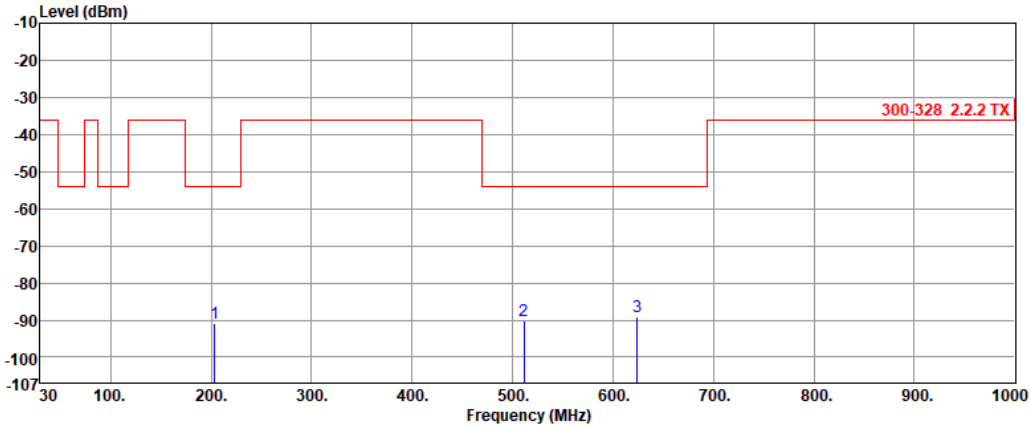

| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4960.32 | -54.88 | -30.00 | -24.88 | 11.66 | -66.54 |
| 2 | 7439.78 | -48.02 | -30.00 | -18.02 | 17.71 | -65.73 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

## *Configuration 4 : BT860-ST*

### 3.5.8 Transmitter Conducted Unwanted Emissions (Below 1GHz)

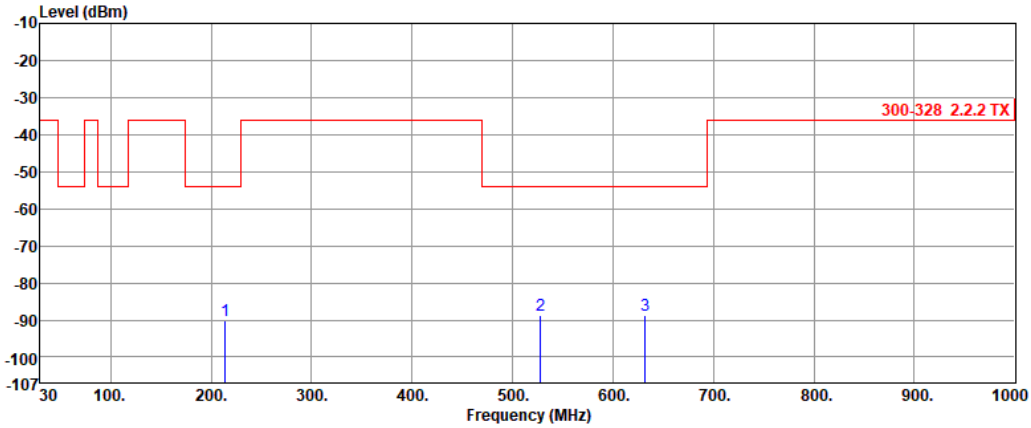
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 203.63 | -90.79 | -54.00 | -36.79 | 0.00 | -90.79 |
| 2 | 511.12 | -90.33 | -54.00 | -36.33 | 0.00 | -90.33 |
| 3 | 624.43 | -89.13 | -54.00 | -35.13 | 0.00 | -89.13 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

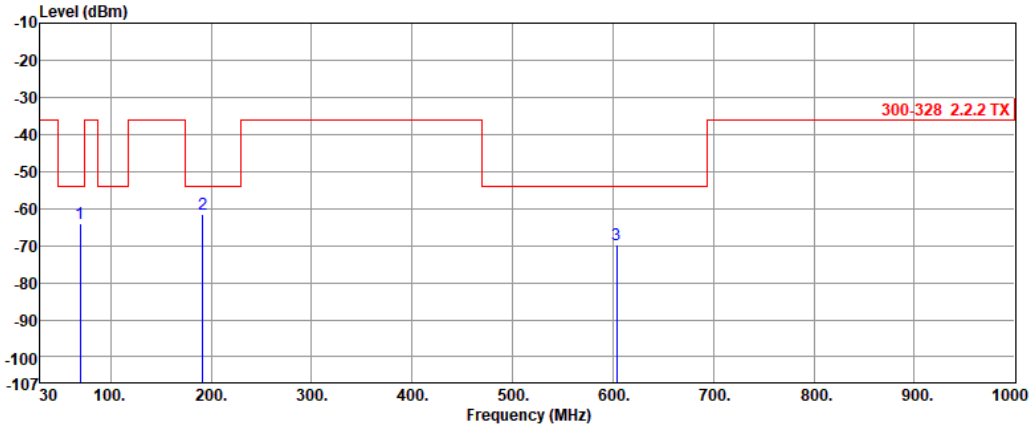



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 214.30 | -90.13 | -54.00 | -36.13 | 0.00 | -90.13 |
| 2 | 527.61 | -88.78 | -54.00 | -34.78 | 0.00 | -88.78 |
| 3 | 632.19 | -88.71 | -54.00 | -34.71 | 0.00 | -88.71 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 3.5.9 Transmitter Radiated Unwanted Emissions (Below 1GHz)

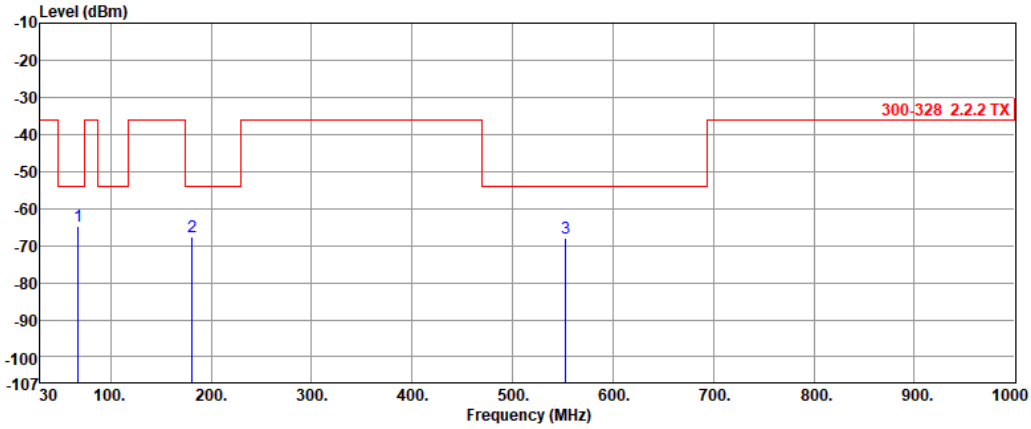
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 69.54 | -63.87 | -54.00 | -9.87 | -4.24 | -59.63 |
| 2 | 191.32 | -61.66 | -54.00 | -7.66 | -4.90 | -56.76 |
| 3 | 603.65 | -69.79 | -54.00 | -15.79 | 6.92 | -76.71 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

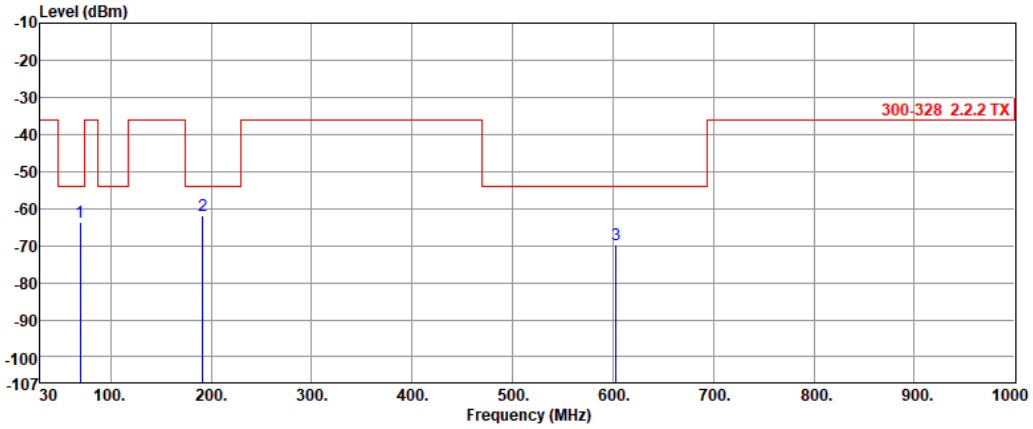
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 67.80 | -64.66 | -54.00 | -10.66 | -3.70 | -60.96 |
| 2 | 180.84 | -67.45 | -54.00 | -13.45 | -2.61 | -64.84 |
| 3 | 552.87 | -67.90 | -54.00 | -13.90 | 5.73 | -73.63 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

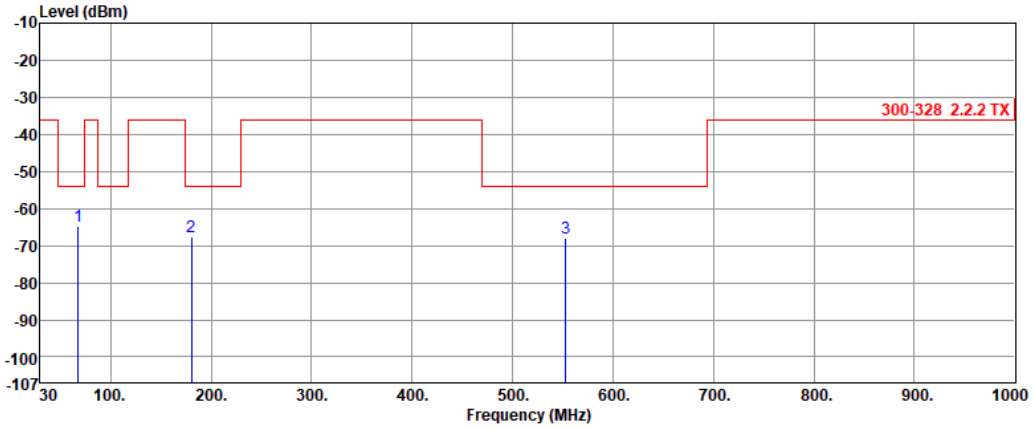
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 69.32 | -63.79 | -54.00 | -9.79 | -4.21 | -59.58 |
| 2 | 191.87 | -61.79 | -54.00 | -7.79 | -5.00 | -56.79 |
| 3 | 603.34 | -69.88 | -54.00 | -15.88 | 6.91 | -76.79 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 67.78 | -64.64 | -54.00 | -10.64 | -3.68 | -60.96 |
| 2 | 180.65 | -67.45 | -54.00 | -13.45 | -2.54 | -64.91 |
| 3 | 552.84 | -67.88 | -54.00 | -13.88 | 5.73 | -73.61 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

# 4 Receiver Test Results

## 4.1 Receiver Spurious Emissions

### 4.1.1 Limit of Receiver Spurious Emissions

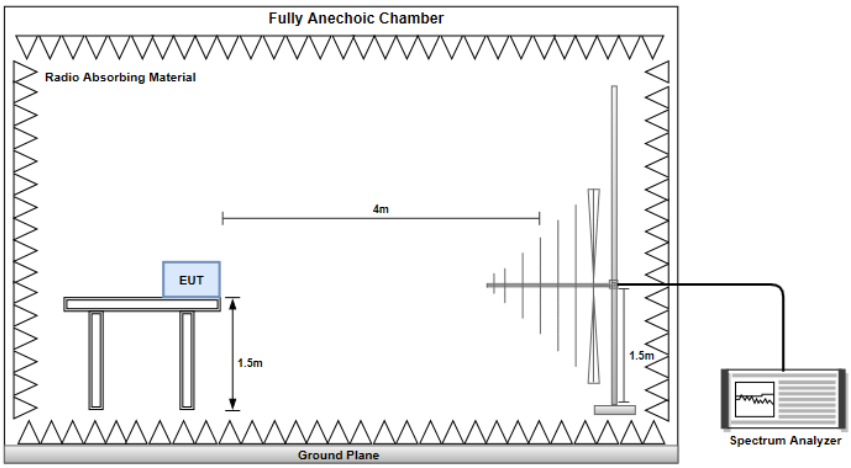
| Frequency Range | Maximum power (dBm) | Measurement bandwidth (kHz) |
|---|---|---|
| 30 MHz to 1 GHz | -57 | 100 |
| Above 1 GHz to 12,75 GHz | -47 | 1000 |

### 4.1.2 Test Procedures

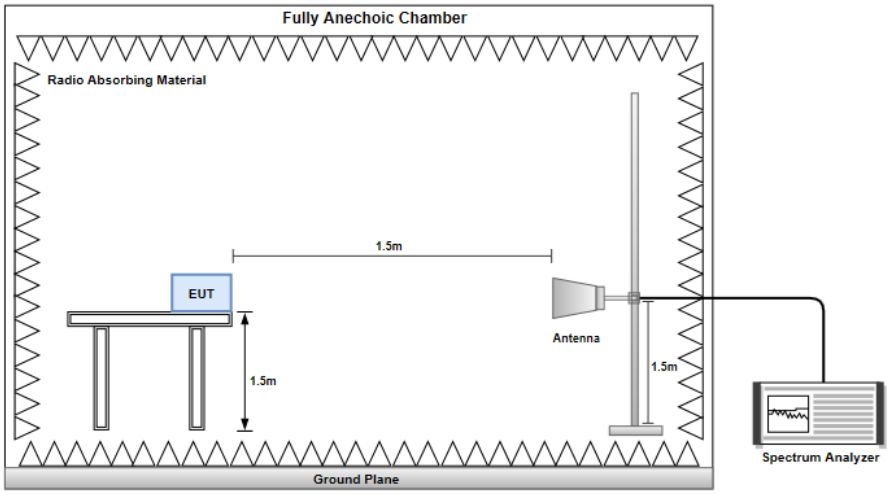
Reference to clause 5.4.10.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 4.1.3 Test Setup

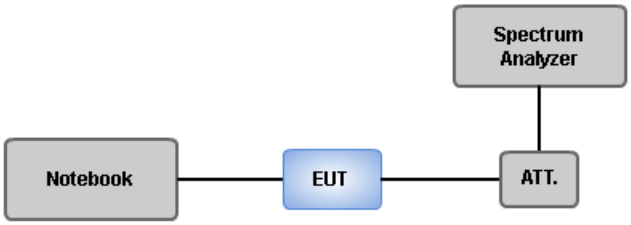
**Below 1GHz**




**Above 1 GHz**



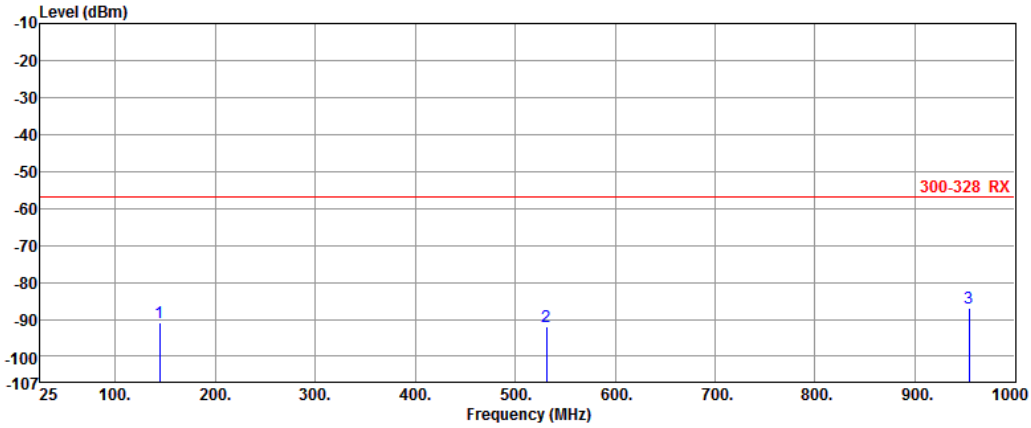

**Conducted Emission**



## *Configuration 2 : BT850-ST*

### 4.1.4 Receiver Conducted Unwanted Emissions (Below 1GHz)

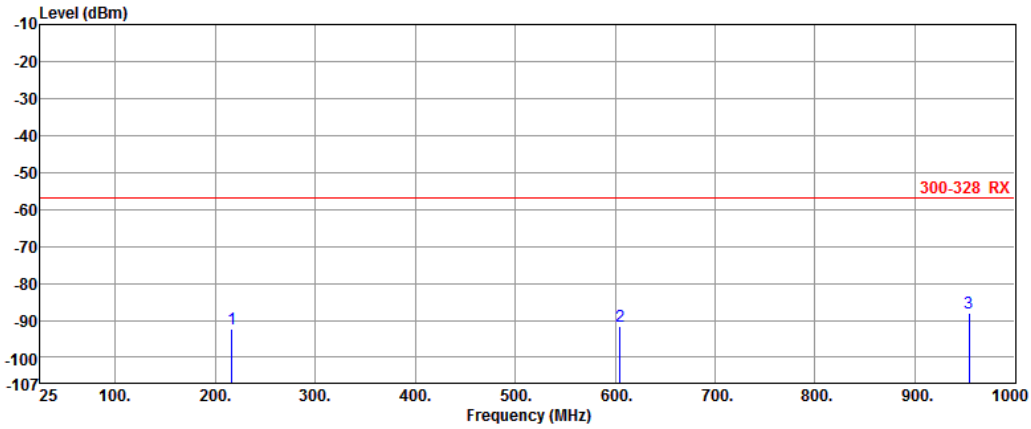
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 144.46 | -91.06 | -57.00 | -34.06 | 0.00 | -91.06 |
| 2 | 531.49 | -91.91 | -57.00 | -34.91 | 0.00 | -91.91 |
| 3 | 954.41 | -87.07 | -57.00 | -30.07 | 0.00 | -87.07 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

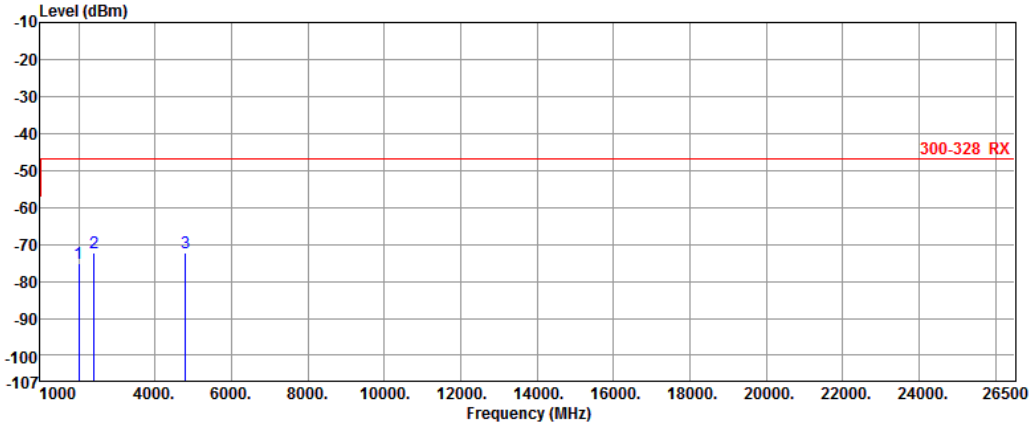



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 216.24 | -92.36 | -57.00 | -35.36 | 0.00 | -92.36 |
| 2 | 605.21 | -91.73 | -57.00 | -34.73 | 0.00 | -91.73 |
| 3 | 954.41 | -87.92 | -57.00 | -30.92 | 0.00 | -87.92 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 4.1.5 Receiver Conducted Unwanted Emissions (Above 1GHz)

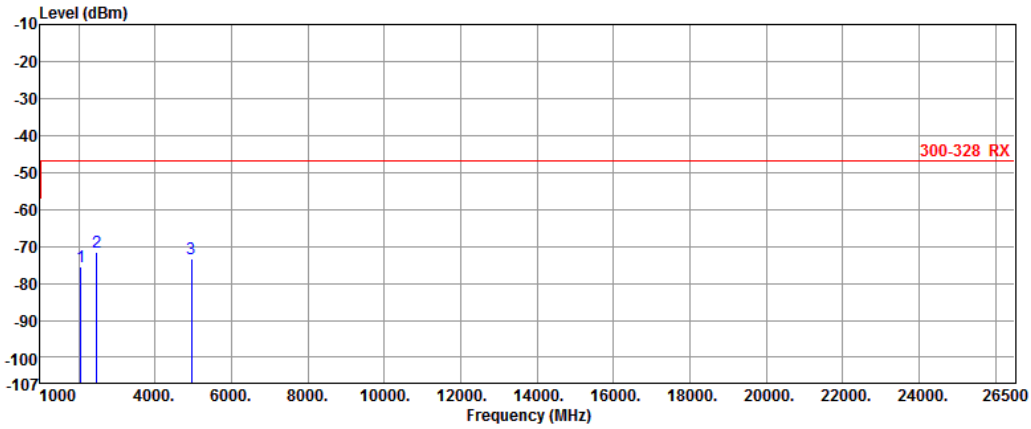
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 1997.69 | -75.23 | -47.00 | -28.23 | 0.00 | -75.23 |
| 2 | 2396.94 | -72.34 | -47.00 | -25.34 | 0.00 | -72.34 |
| 3 | 4793.92 | -72.17 | -47.00 | -25.17 | 0.00 | -72.17 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

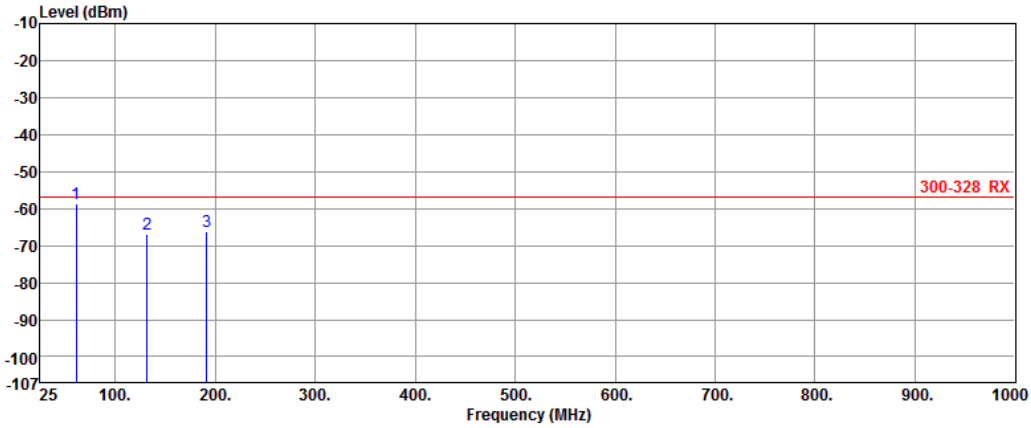



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 2062.49 | -75.38 | -47.00 | -28.38 | 0.00 | -75.38 |
| 2 | 2475.16 | -71.41 | -47.00 | -24.41 | 0.00 | -71.41 |
| 3 | 4950.01 | -73.19 | -47.00 | -26.19 | 0.00 | -73.19 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 4.1.6 Receiver Radiated Unwanted Emissions (Below 1GHz)

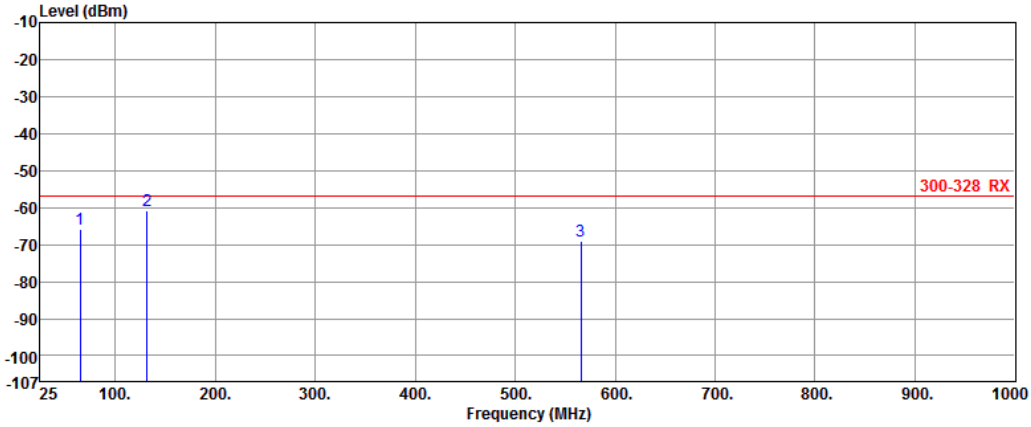
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 60.84 | -58.75 | -57.00 | -1.75 | -2.06 | -56.69 |
| 2 | 131.54 | -66.99 | -57.00 | -9.99 | -1.97 | -65.02 |
| 3 | 191.54 | -66.15 | -57.00 | -9.15 | -4.94 | -61.21 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

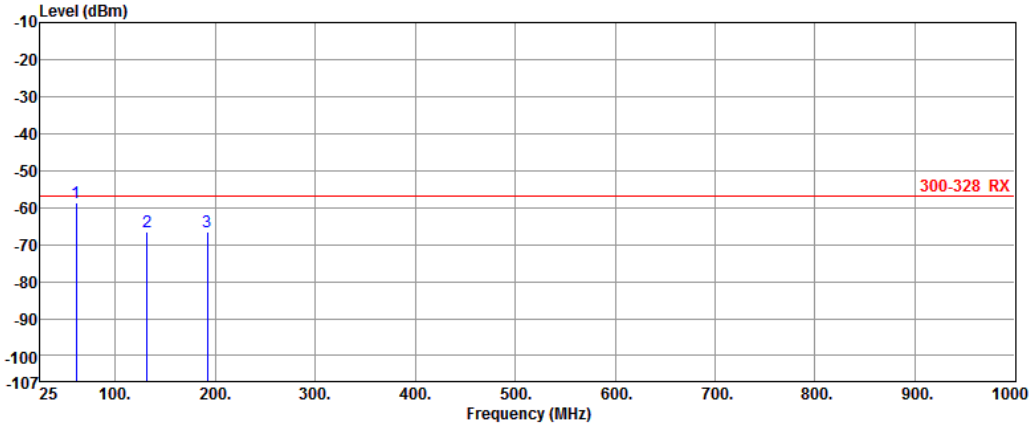
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 64.78 | -65.84 | -57.00 | -8.84 | -1.87 | -63.97 |
| 2 | 131.64 | -60.75 | -57.00 | -3.75 | -1.46 | -59.29 |
| 3 | 565.97 | -69.15 | -57.00 | -12.15 | 6.13 | -75.28 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

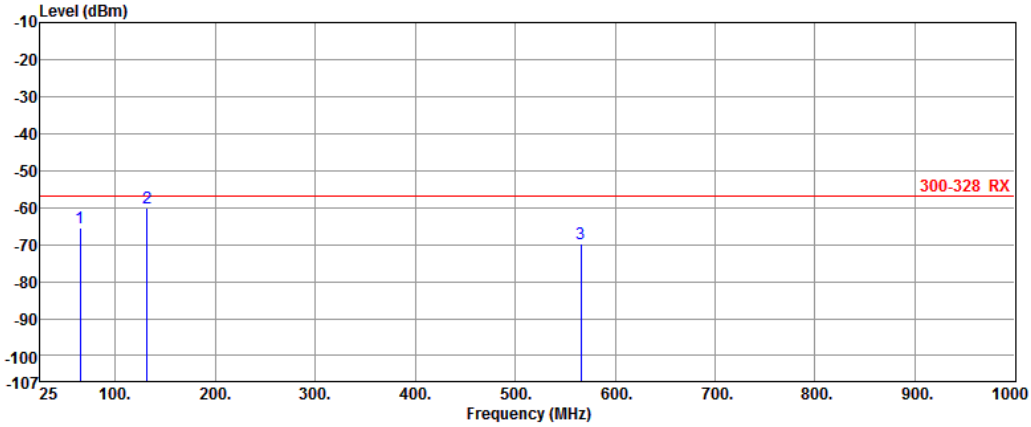
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 60.58 | -58.68 | -57.00 | -1.68 | -1.97 | -56.71 |
| 2 | 131.40 | -66.66 | -57.00 | -9.66 | -1.97 | -64.69 |
| 3 | 191.88 | -66.65 | -57.00 | -9.65 | -5.00 | -61.65 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |

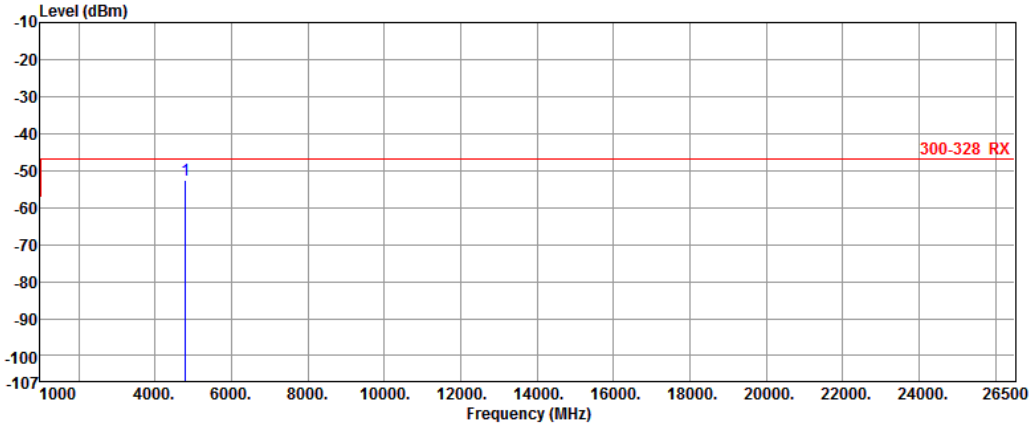



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 64.87 | -65.65 | -57.00 | -8.65 | -1.86 | -63.79 |
| 2 | 131.56 | -60.15 | -57.00 | -3.15 | -1.49 | -58.66 |
| 3 | 565.97 | -69.78 | -57.00 | -12.78 | 6.13 | -75.91 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 4.1.7 Receiver Radiated Unwanted Emissions (Above 1GHz)

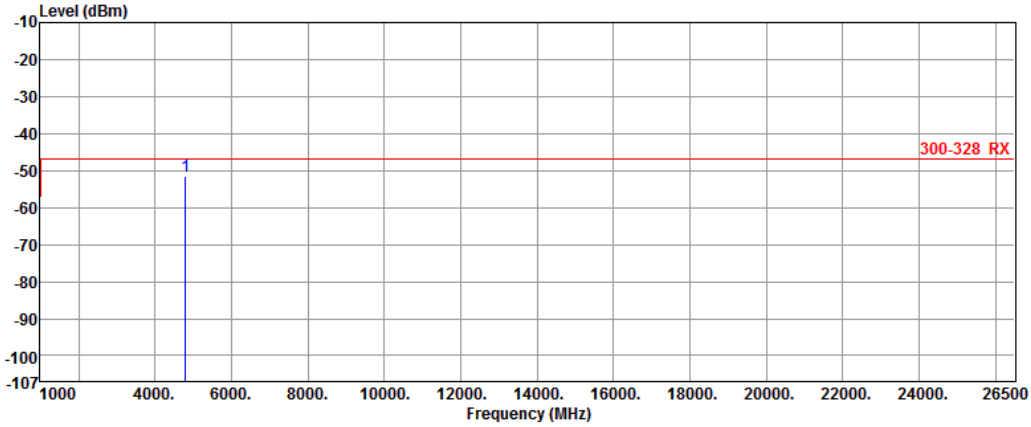
| | | | |
|---|---|---|---|
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4793.84 | -52.45 | -47.00 | -5.45 | 11.64 | -64.09 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

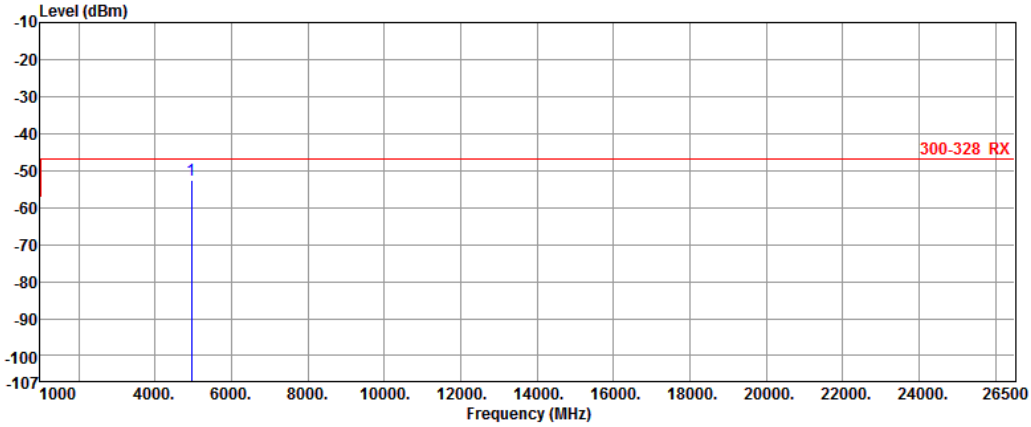
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4793.87 | -51.48 | -47.00 | -4.48 | 11.83 | -63.31 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

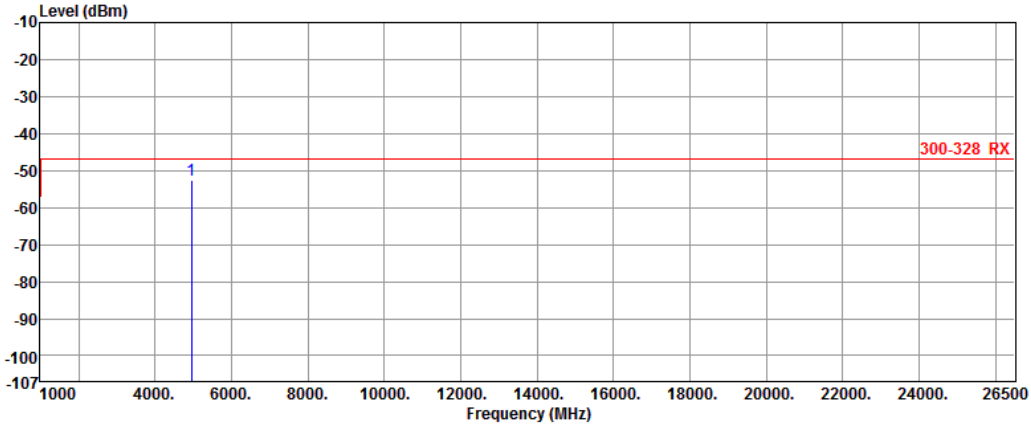
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4950.87 | -52.66 | -47.00 | -5.66 | 12.13 | -64.79 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |



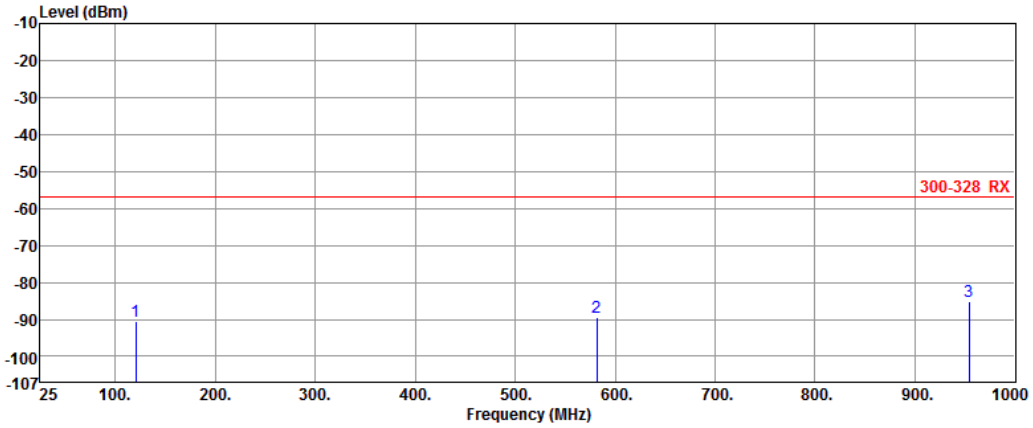

| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 4949.65 | -52.49 | -47.00 | -5.49 | 11.60 | -64.09 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

## *Configuration 4 : BT860-ST*

### 4.1.8 Receiver Conducted Unwanted Emissions (Below 1GHz)

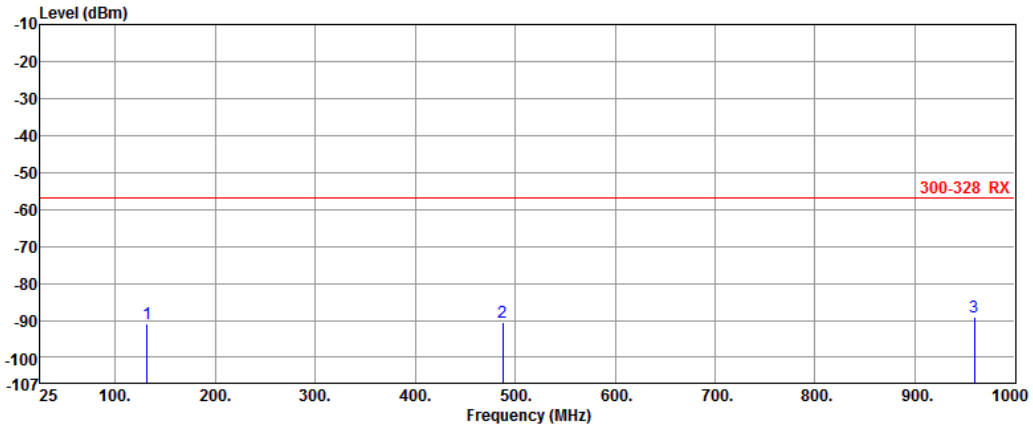
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 120.21 | -90.39 | -57.00 | -33.39 | 0.00 | -90.39 |
| 2 | 581.93 | -89.41 | -57.00 | -32.41 | 0.00 | -89.41 |
| 3 | 954.41 | -85.21 | -57.00 | -28.21 | 0.00 | -85.21 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|

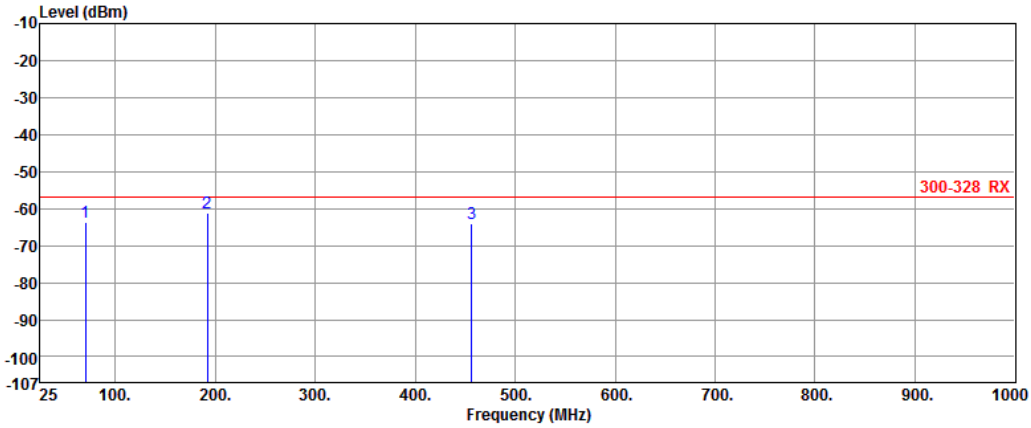



| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 131.85 | -91.00 | -57.00 | -34.00 | 0.00 | -91.00 |
| 2 | 487.84 | -90.71 | -57.00 | -33.71 | 0.00 | -90.71 |
| 3 | 959.26 | -89.14 | -57.00 | -32.14 | 0.00 | -89.14 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

### 4.1.9 Receiver Radiated Unwanted Emissions (Below 1GHz)

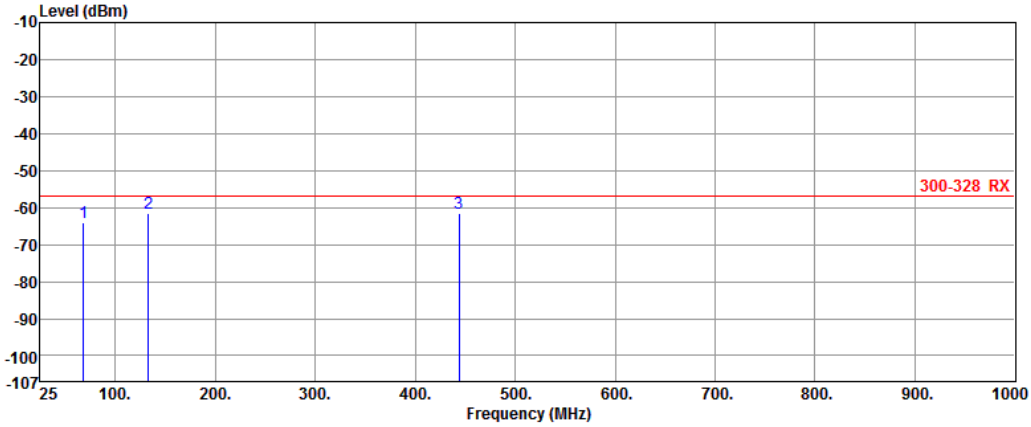
| **Modulation** | GFSK | **Test Freq. (MHz)** | 2402 |
|---|---|---|---|
| **Polarization** | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 69.77 | -63.53 | -57.00 | -6.53 | -4.28 | -59.25 |
| 2 | 191.99 | -61.04 | -57.00 | -4.04 | -5.02 | -56.02 |
| 3 | 456.80 | -64.14 | -57.00 | -7.14 | 2.89 | -67.03 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

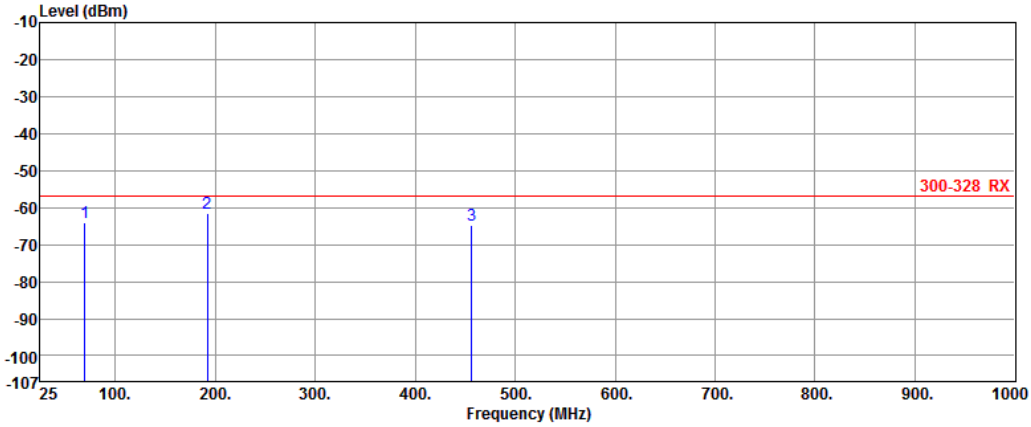
| Modulation | GFSK | Test Freq. (MHz) | 2402 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 67.83 | -64.04 | -57.00 | -7.04 | -3.72 | -60.32 |
| 2 | 132.82 | -61.57 | -57.00 | -4.57 | -1.03 | -60.54 |
| 3 | 444.19 | -61.62 | -57.00 | -4.62 | 2.78 | -64.40 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

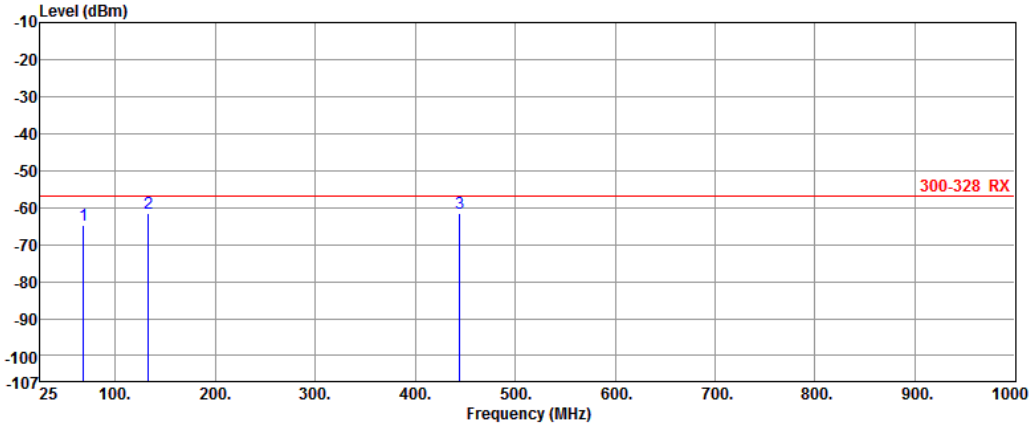
| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Horizontal | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 69.65 | -63.87 | -57.00 | -6.87 | -4.26 | -59.61 |
| 2 | 191.75 | -61.66 | -57.00 | -4.66 | -4.97 | -56.69 |
| 3 | 456.35 | -64.59 | -57.00 | -7.59 | 2.89 | -67.48 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

| Modulation | GFSK | Test Freq. (MHz) | 2480 |
|---|---|---|---|
| Polarization | Vertical | | |




| | Freq. | Measured value | Limit | Margin | Factor | Reading |
|---|---|---|---|---|---|---|
| | MHz | dBm | dBm | dB | dB | dBm |
| 1 | 67.87 | -64.66 | -57.00 | -7.66 | -3.74 | -60.92 |
| 2 | 132.87 | -61.54 | -57.00 | -4.54 | -1.01 | -60.53 |
| 3 | 444.69 | -61.45 | -57.00 | -4.45 | 2.80 | -64.25 |

Note 1: Measured Value (dBm) = Reading (dBm) + Factor (dB)
Note 2: Margin (dB) = Measured Value (dBm) – Limit (dBm)

# 5 Receiver Blocking Test Results

## 5.1 Receiver Blocking

## 5.2 Receiver Blocking

### 5.2.1 Limit of Receiver Blocking

| Receiver Blocking Parameters for Receiver Category 1 Equipment Limit | | | |
|---|---|---|---|
| **Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 4)** | **Blocking Signal Frequency (MHz)** | **Blocking Signal Power (dBm) (see note 4)** | **Type of Blocking Signal** |
| (-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2) | 2 380<br>2 504 | -34 | CW |
| (-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3) | 2 300<br>2 330<br>2 360<br>2 524<br>2 584<br>2 674 | | |

Note 1: OCBW is in Hz.

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: 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 $P_{min}$ + 20 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 4: 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.

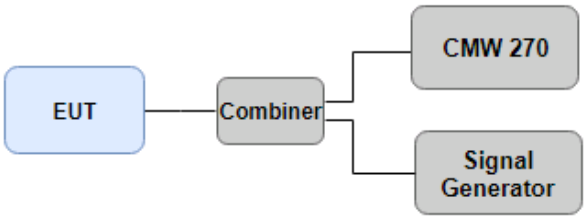
| Receiver Blocking Parameters for Receiver Category 2 Equipment Limit | | | |
|---|---|---|---|
| **Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 3)** | **Blocking Signal Frequency (MHz)** | **Blocking Signal Power (dBm) (see note 3)** | **Type of Blocking Signal** |
| (-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2) | 2 380<br>2 504<br>2 300<br>2 584 | -34 | CW |
| Note 1: OCBW is in Hz.<br>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.<br>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. | | | |

| Receiver Blocking Parameters for Receiver Category 3 Equipment Limit | | | |
|---|---|---|---|
| **Wanted Signal Mean Power from Companion Device (dBm) (see notes 1 and 3)** | **Blocking Signal Frequency (MHz)** | **Blocking Signal Power (dBm) (see note 3)** | **Type of Blocking Signal** |
| (-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less | 2 380<br>2 504<br>2 300<br>2 584 | -34 | CW |
| Note 1: OCBW is in Hz.<br>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 the test may be performed using a wanted signal up to $P_{min}$ + 30 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.<br>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. | | | |

### 5.2.2 Test Procedures

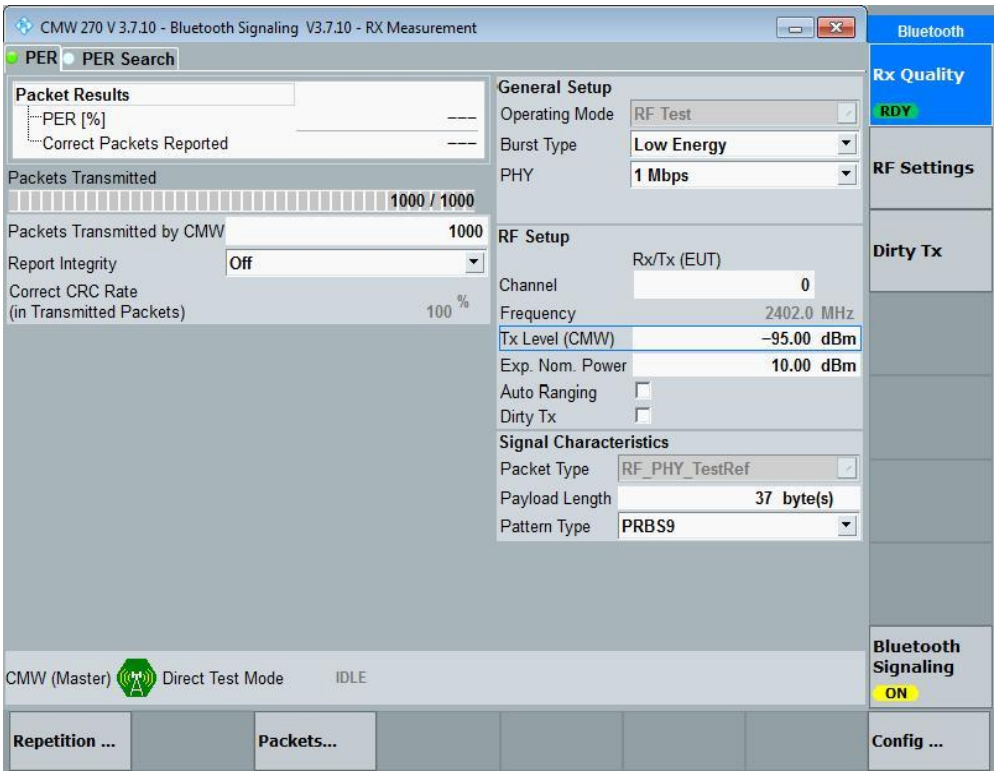
Reference to clause 5.4.11.2 of ETSI EN 300 328 V2.2.2 (2019-07).

### 5.2.3 Test Setup



### 5.2.4 Test Result of Receiver Blocking

**2402 MHz**

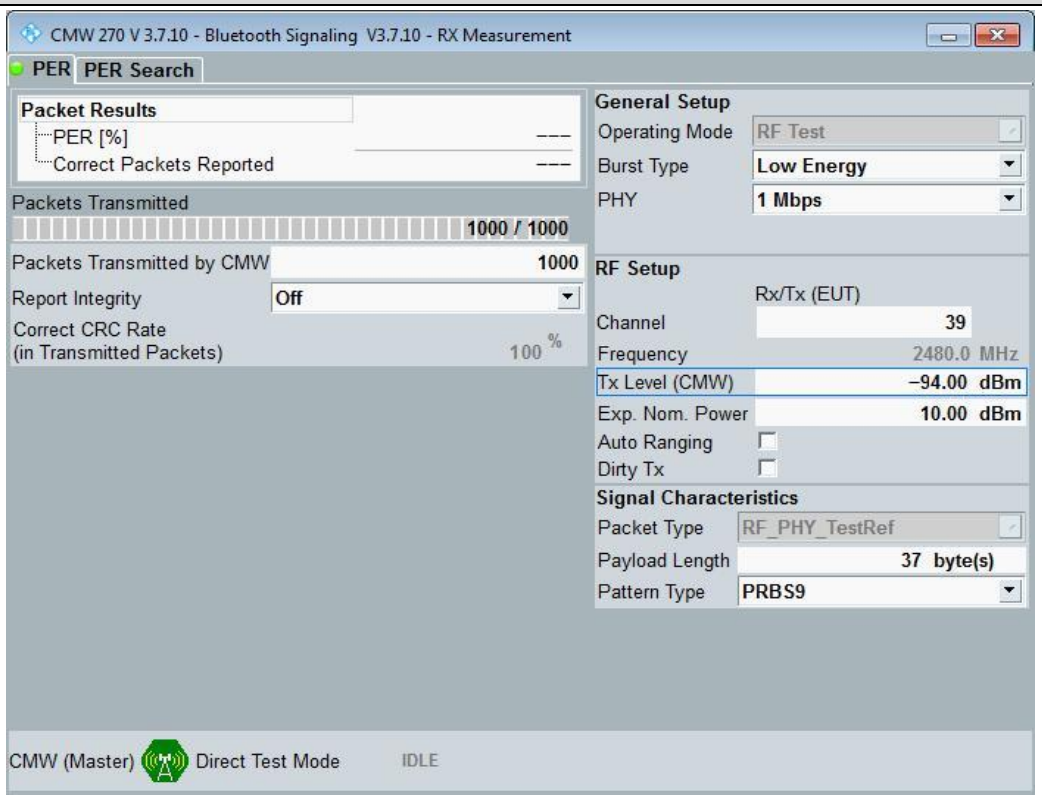



```
16:47.645  usb0  <c  LE_Test_End
                     HCI Command Complete Event
    [0E 06]: 01 1F 20 00 A0 03
    event = 0xE (14, "Command Complete")
    Num_HCI_Command_Packets = 0x1 (1)
    Command_Opcode = 0x201F (8223, "LE_Test_End")
    Status = 0x0 (0, "Success")
    Num_Of_Packets_Received = 0x3A0 (928)
```

| | |
|---|---|
| Packet Sent Numbers | 1000 |
| Packet Received Numbers | 928 |
| PER(%) | 7.2 |

| Receiver Category | 2 | | |
|---|---|---|---|
| Performance Criteria Limit | PER ≤ 10 % | | |
| Wanted Signal Mean Power from Companion Device (dBm) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) | Test Result |
| -66.75 | 2380 | -32 | Pass |
| -66.75 | 2504 | -32 | Pass |
| -66.75 | 2300 | -32 | Pass |
| -66.75 | 2584 | -32 | Pass |

**2480 MHz**



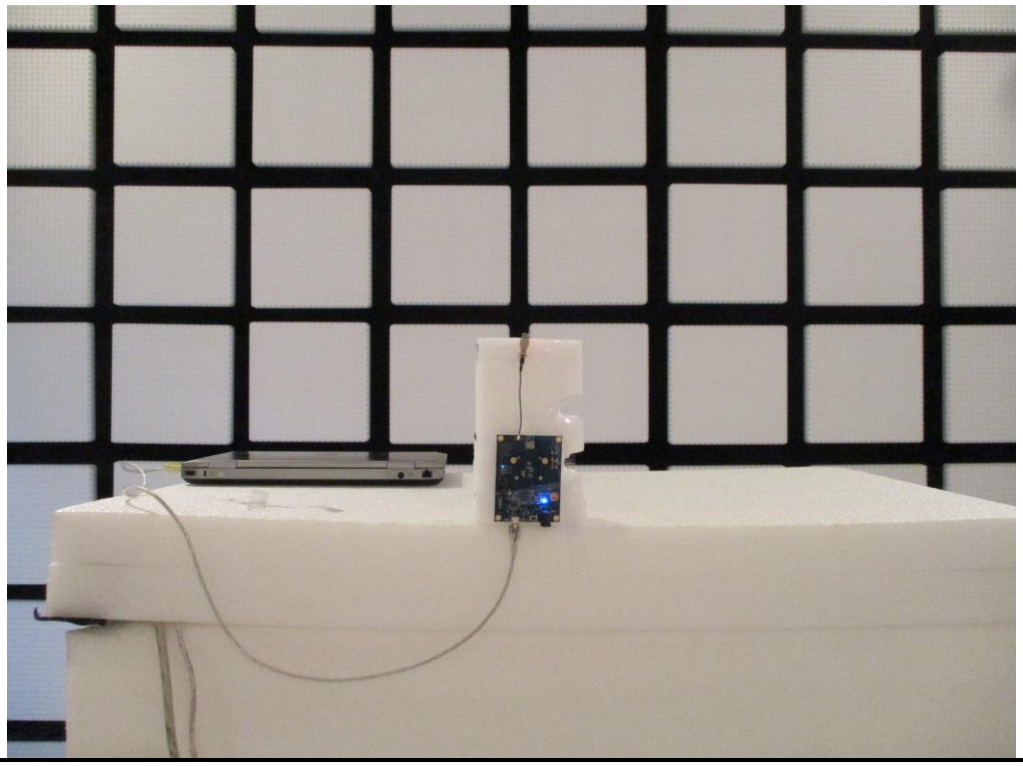

```
26:06.406  usb0  <c  LE_Test_End
                     HCI Command Complete Event
    [0E 06]: 01 1F 20 00 CF 03
    event = 0xE (14, "Command Complete")
    Num_HCI_Command_Packets = 0x1 (1)
    Command_Opcode = 0x201F (8223, "LE_Test_End")
    Status = 0x0 (0, "Success")
    Num_Of_Packets_Received = 0x3CF (975)
```

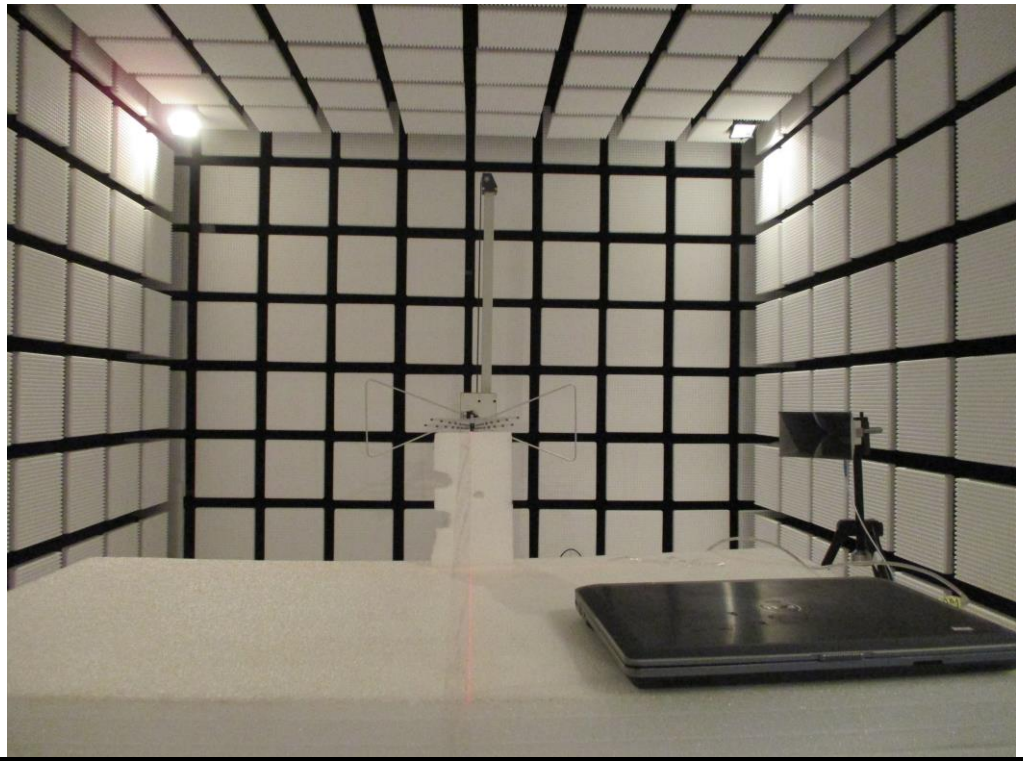
| | |
|---|---|
| Packet Sent Numbers | 1000 |
| Packet Received Numbers | 975 |
| PER(%) | 2.5 |

| Receiver Category | 2 | | |
|---|---|---|---|
| Performance Criteria Limit | PER ≤ 10 % | | |
| Wanted Signal Mean Power from Companion Device (dBm) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) | Test Result |
| -66.71 | 2380 | -32 | Pass |
| -66.71 | 2504 | -32 | Pass |
| -66.71 | 2300 | -32 | Pass |
| -66.71 | 2584 | -32 | Pass |

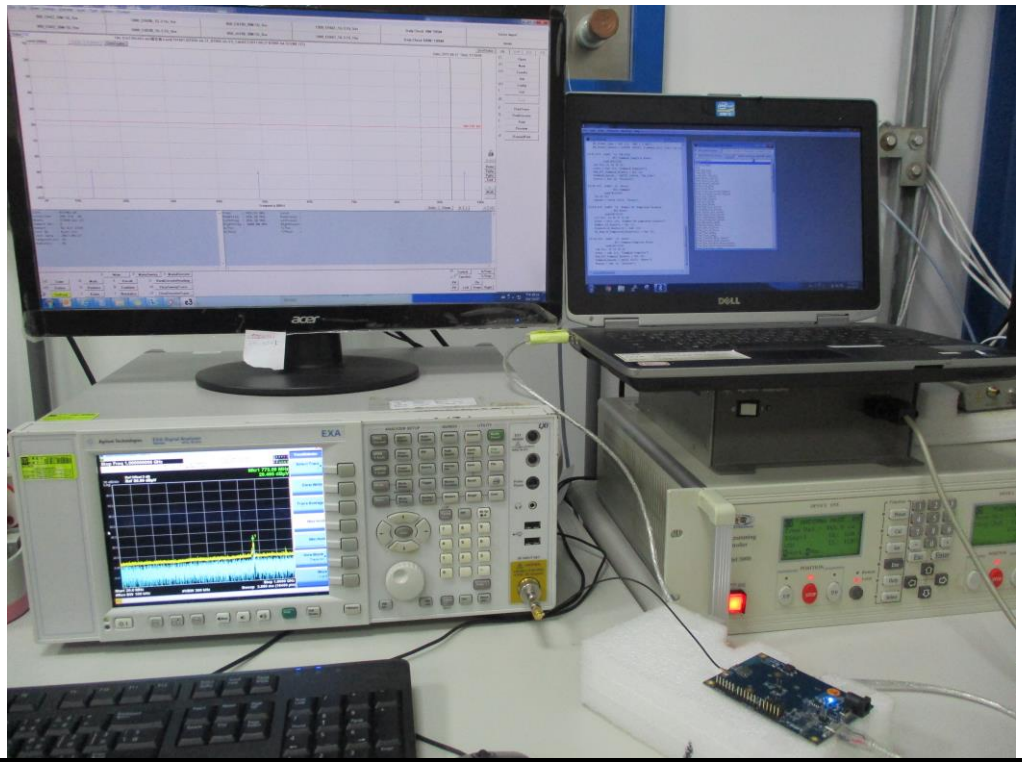
# 6 Photographs of the Test Configuration

**Spurious Emission Test (Radiated)**

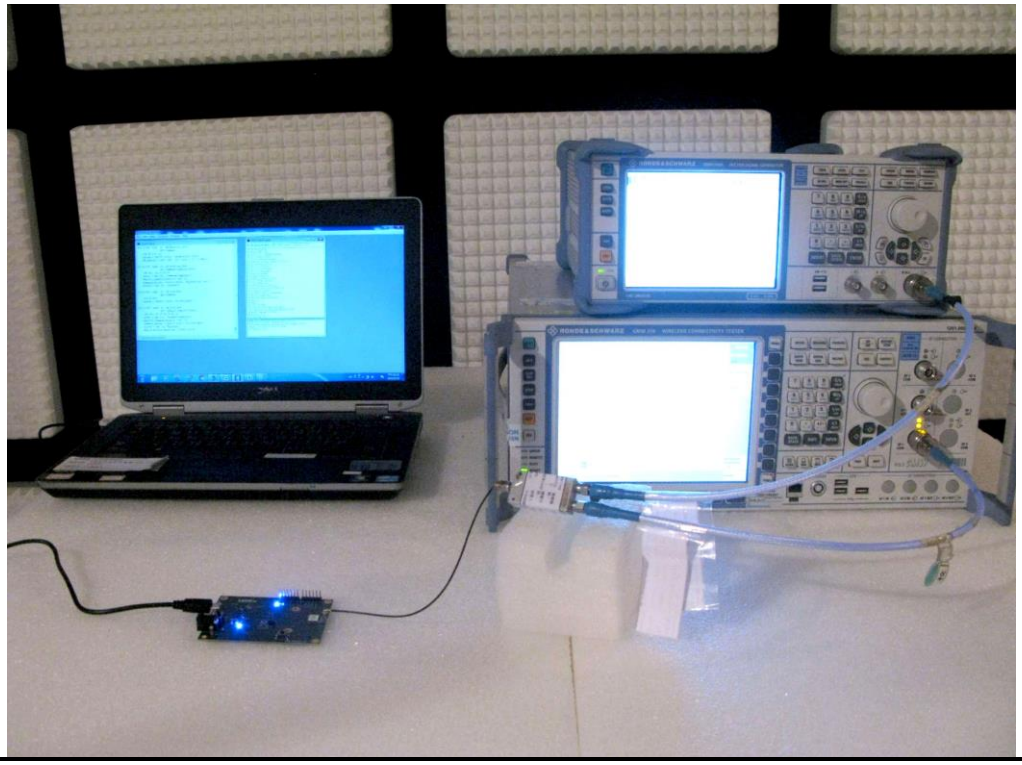




**Spurious Emission Test (Conducted)**




**Receiver Blocking Test**



# 7 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

| **Linkou** | **Kwei Shan** | **Kwei Shan Site II** |
|---|---|---|
| Tel: 886-2-2601-1640 | Tel: 886-3-271-8666 | Tel: 886-3-271-8640 |
| No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C. | No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C. | No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.. |

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

**═END═**