RADIO TEST REPORT

for

TOTEM ACOUSTIQUE INC.

Amplifier

Model Number: Kin Amp

Prepared for	:	TOTEM ACOUSTIQUE INC.
Address	:	9165, Champ d'Eau, St. Leonard, Quebec, H1P3M3, Canada
Prepared by	:	Guangdong Keyway Testing Technology Co., Ltd.
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Report No.	:	TR19050308-E-000
Date of Test	:	May 28~Jun. 11, 2019
Date of Report	:	Jun. 13, 2019

Guangdong Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	TOTEM ACOUSTIQUE INC. 9165, Champ d'Eau, St. Leonard, Quebec, H1P3M3, Canada
Manufacturer: **Address:**	TOTEM ACOUSTIQUE INC. 9165, Champ d'Eau, St. Leonard, Quebec, H1P3M3, Canada
E.U.T:	Amplifier
Model Number:	Kin Amp
Trade Name:	TOTEM
Date of Receipt:	May 27, 2019 **Date of Test:** May 28~Jun. 11, 2019
Test Specification:	ETSI EN 300 328 V2.1.1 (2016-11)
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: Jun. 19, 2019**

Tested by:	Reviewed by:	Approved by:
Jacob Ouyang / Engineer	Jack Bu / Supervisor	Andy Gao / Supervisor

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Guangdong Keyway Testing Technology Co., Ltd.

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1. Summary Of Test Results

1.1. Test procedures according to the technical standards:

The following essential requirements and test specifications are relevant to the presumption of conformity under Article 3.2 of the RED Directive			
No	Test Parameter	Clause No	Results
Transmitter Parameters			
1	RF output power	4.3.1.2	PASS
2	Duty Cycle, Tx-sequence, Tx-gap	4.3.1.3	N/A
4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	4.3.1.4	PASS
5	Hopping Frequency Separation	4.3.1.5	PASS
6	Medium Utilisation (MU) factor	4.3.1.6	N/A
7	Adaptivity (Adaptive Frequency Hopping)	4.3.1.7	N/A
8	Occupied Channel Bandwidth	4.3.1.8	PASS
9	Transmitter unwanted emissions in the out-of-band domain	4.3.1.9	PASS
10	Transmitter unwanted emissions in the spurious domain	4.3.1.10	PASS
Receiver Parameters			
11	Receiver spurious emissions	4.3.1.11	PASS
12	Receiver Blocking	4.3.1.12	PASS
13	Geo-location capability	4.3.1.13	N/A
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

1.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **CNAS —Registration No.: CNAS L5783**

Guangdong Keyway Testing Technology Co., Ltd., EMC Laboratory has been registered and fuly described in a report filed with the Certificated by CNAS China.

Registration No.: CNAS L5783.

Date of registration: August 8, 2012

● **Industry Canada (IC)**

The 3m Semi-anechoic chamber of Guangdong Keyway Testing Technology Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9868A -1.

1.3. Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1×10^{-7}
RF power, conducted	± 1.0 dB
Conducted emission of receivers	± 1 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Temperature	±1 degree
Humidity	± 5 %

2. General Information

2.1. General Description Of EUT

Product Name:	Amplifier
Test Model No.:	Kin Amp
Operation Frequency:	BT: 2402~2480MHz
Channel numbers:	79 channels for BR+EDR; 40 channels for BLE
Channel separation:	1MHz for BR+EDR; 2MHz for BLE
Modulation technology:	GFSK, Pi/4 QPSK, 8DPSK for BR+EDR; GFSK for BLE
Antenna Type:	External Antenna
Antenna gain:	0dBi
Power Input:	AC 220-240V～50Hz
Power:	200W

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Annex E

a) The type of modulation used by the equipment:

■FHSS

□other forms of modulation

b) In case of FHSS modulation:

•In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies:

•In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies: 79

The minimum number of Hopping Frequencies: 79

The Dwell Time: 311.37ms maximum

c) Adaptive / non-adaptive equipment:

■non-adaptive Equipment

□adaptive Equipment without the possibility to switch to a non-adaptive mode

□adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

■The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

□The equipment is Frame Based equipment

□The equipment is Load Based equipment

□The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: ..... μs

□The equipment has implemented an non-LBT based DAA mechanism

□The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): 6.17dBm

The maximum (corresponding) Duty Cycle: ……. %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power
  GFSK
- Power Spectral Density

.....

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)
  GFSK
- Hopping Frequency Separation (only for FHSS equipment)
  GFSK
- Medium Utilisation

.....

- Adaptivity & Receiver Blocking

.....

- Occupied Channel Bandwidth
  GFSK
- Transmitter unwanted emissions in the OOB domain
  GFSK
- Transmitter unwanted emissions in the spurious domain
  GFSK
- Receiver spurious emissions
  GFSK

g) The different transmit operating modes (tick all that apply):

■Operating mode 1: Single Antenna Equipment

■Equipment with only 1 antenna

□Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

□Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

□Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

□Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

□High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

□High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

□Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

□Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

□High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1

□High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

□symmetrical power distribution

□asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....

NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2402 MHz to 2480 MHz
- Operating Frequency Range 2: .....MHz to .....MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

Occupied Channel Bandwidth 1: 1.186MHz

Occupied Channel Bandwidth 2:

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

■Stand-alone

□Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

□Plug-in radio device (Equipment intended for a variety of host systems)

□Other

l) The normal and the extreme operating conditions that apply to the equipment:

Normal operating conditions (if applicable):

Operating temperature: 25 ° C

Other (please specify if applicable): ……

Extreme operating conditions:

Operating temperature range: Minimum: -22 ° C Maximum : 55° C

Other (please specify if applicable): …… Minimum: …… Maximum :……

Details provided are for the: ■stand-alone equipment

□combined (or host) equipment

□test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type

■External Antenna

Antenna Gain: 0dBi

If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB

□Temporary RF connector provided

□No temporary RF connector provided

□Dedicated Antennas (equipment with antenna connector)

□Single power level with corresponding antenna(s)

□Multiple power settings and corresponding antenna(s)
Number of different Power Levels: .....
Power Level 1: ..... dBm
Power Level 2: ..... dBm
Power Level 3: ..... dBm

NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☑stand-alone equipment
□combined (or host) equipment
□test jig

Supply Voltage ■AC mains State AC voltage: 230V
□DC State DC voltage :

In case of DC, indicate the type of power source
■Internal Power Supply
□External Power Supply or AC/DC adapter
□Battery: DC
□Other: .....

o) Describe the test modes available which can facilitate testing:
The EUT can be into the Engineer mode for testing.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
Bluetooth

2.2. Description Of Test Conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration
E-1 **EUT**

2.3. Test Conditions and Channel

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-22°C ~ 55°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	AC 230V	N/A

Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	2402
middle	CH39	2441
highest	CH78	2480

Note:

(1)Where tests at extreme temperatures are required, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.
The HT -22°C and LT 55°C was declared by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.

(2) The measurements are performed at the highest, middle, lowest available channels.

(3) The measurements are performed at worst mode for 1Mbps and 3Mbps.

2.4. Description Of Support Units

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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Amplifier	TOTEM	Kin Amp	N/A	EUT
E-2	Notebook	Lenovo	300-15SK	GB14477457	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in m in『Length』column.

2.5. Equipments List for All Test Items

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXG Signal Analyzer	Keysight	N9020A	MY56070279	Apr. 12,19	Apr. 11, 20
MIMO4TX-1	Keysight	MIMO4TX	TW5451101,TW5451102,TW545110,TW5451104	Apr. 12,19	Apr. 11, 20
MXG Vector Signal Generator	Agilent	N5182A	MY50143410	Apr. 12,19	Apr. 11, 20
MXG Analog Signal Generator	Agilent	N5181B	MY53050432	Apr. 12,19	Apr. 11, 20
Comprehensive tester	R&S	CMW500	106288	Apr. 12,19	Apr. 11, 20
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 12,19	Apr. 11, 20
Horn Antenna	DAZE	ZN30701	11003	Apr. 15,19	Apr. 14, 20
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170+AA 9213	866	Dec. 14, 18	Dec. 13, 19
Spectrum Analyzer	Keysight	N9020A	MY56070279	Apr. 12,19	Apr. 11, 20
Realtime Rpectrum Analyzer	R&S	FSVR40	100952	Dec. 7, 18	Dec. 6, 19
3m anechoic Chamber	ETS-LINDGREN	966	170326	Apr. 22,19	Apr. 21, 21
Signal Amplifier	ZHINAN	ZN3380C	11001	Apr. 12,19	Apr. 11, 20
Pre-Amplifier	EMCI	ENMC184045 B	980615	Apr. 12,19	Apr. 11, 20
RF Cable	Junkosha	MWX322-1m	1305G006	Apr. 12,19	Apr. 11, 20
RF Cable	Junkosha	MWX322-2m	1305G007	Apr. 12,19	Apr. 11, 20
RF Cable	Junkosha	MWX322-8m	1305G008	Apr. 12,19	Apr. 11, 20
Signal Cable	HUBER+SUHNER	40G-1.5m	18063131	Dec. 12, 18	Dec. 11, 19
Signal Cable	HUBER+SUHNER	40G-2.5m	18063132	Dec. 12, 18	Dec. 11, 19
Signal Cable	HUBER+SUHNER	40G-9.5m	18063133	Dec. 12, 18	Dec. 11, 19
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A
TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00829	Apr. 15,19	Apr. 14, 20

3. RF Output Power

3.1. Limit

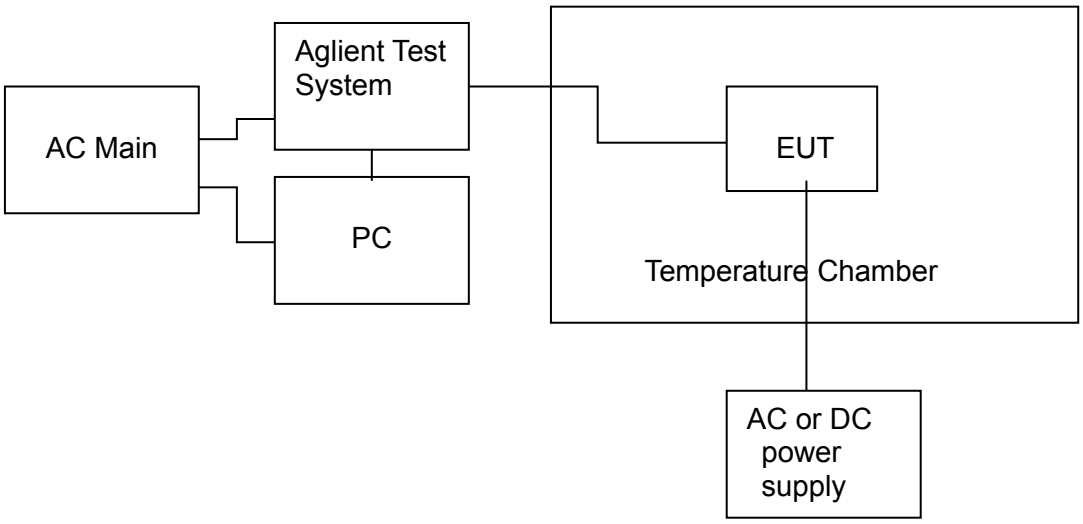
The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm.

The maximum RF output power for non-adaptive Frequency Hopping equipment shall be declared by the manufacturer. See clause 5.4.1). The maximum RF output power for this equipment shall be equal to or less than the value declared by the manufacturer. This declared value shall be equal to or less than 20 dBm.

This limit shall apply for any combination of power level and intended antenna assembly.

Limit
≤20dBm

3.2. Test Setup



3.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2
The conformance tests for this requirement are defined in clause 5.4.2 and specifically in clause 5.4.2.2.1.2.

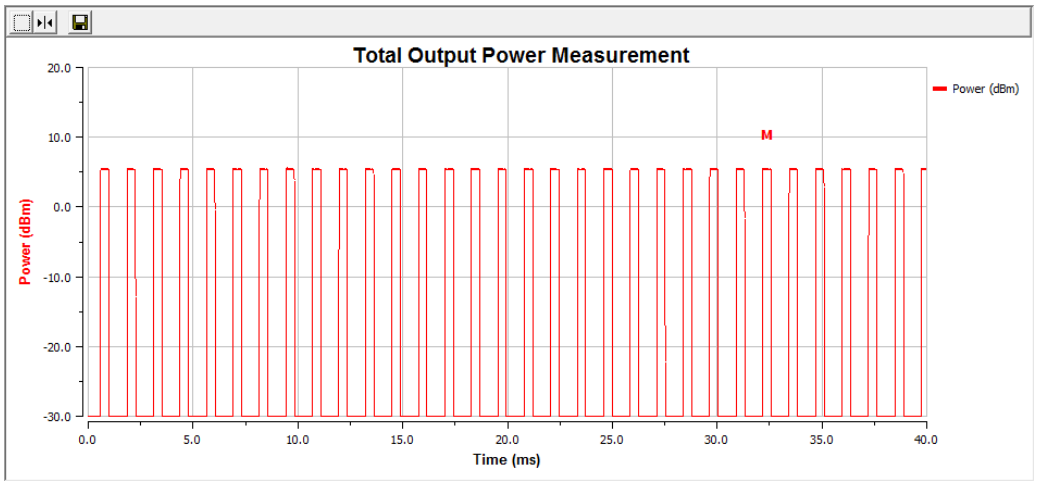
3.4. Test Result

EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

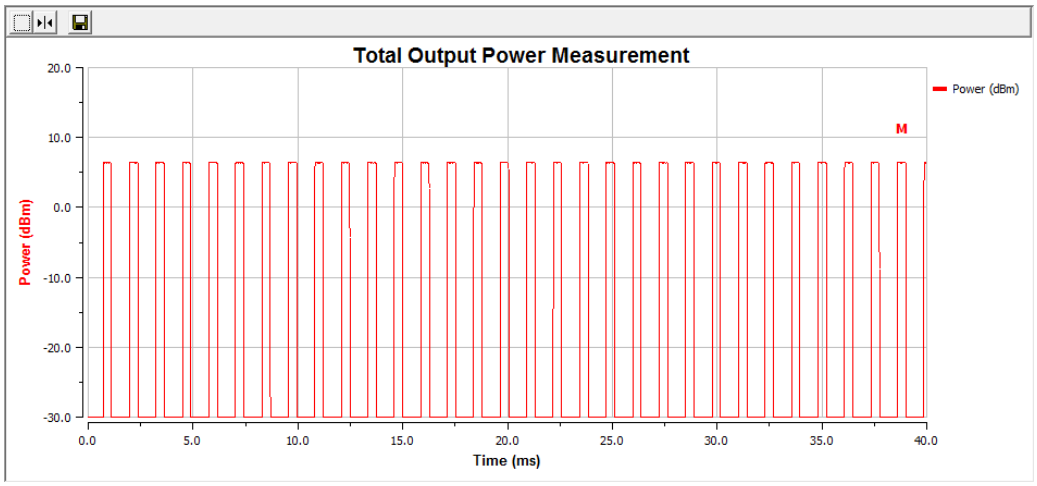
Test Mode: GFSK					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH00	CH39	CH78
Normal voltage	T nom (°C)	25.00	5.24	6.17	5.93
	T min (°C)	-20.00	5.37	6.02	5.79
	T max (°C)	55.00	4.83	5.38	5.83
Max RF Power			**6.17**		
Limits			20dBm		
Result			**Complies**		

The Worst Test Plots

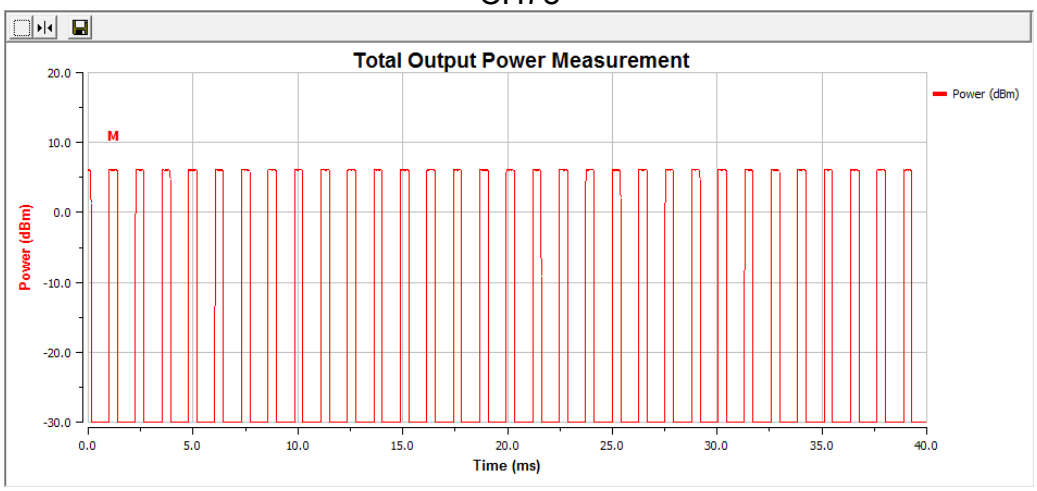
CH00



CH39



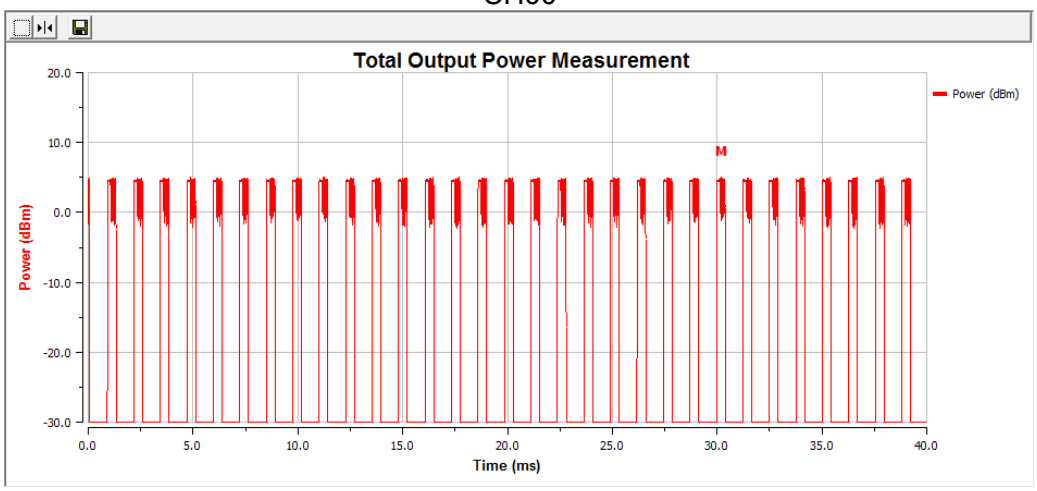
CH78



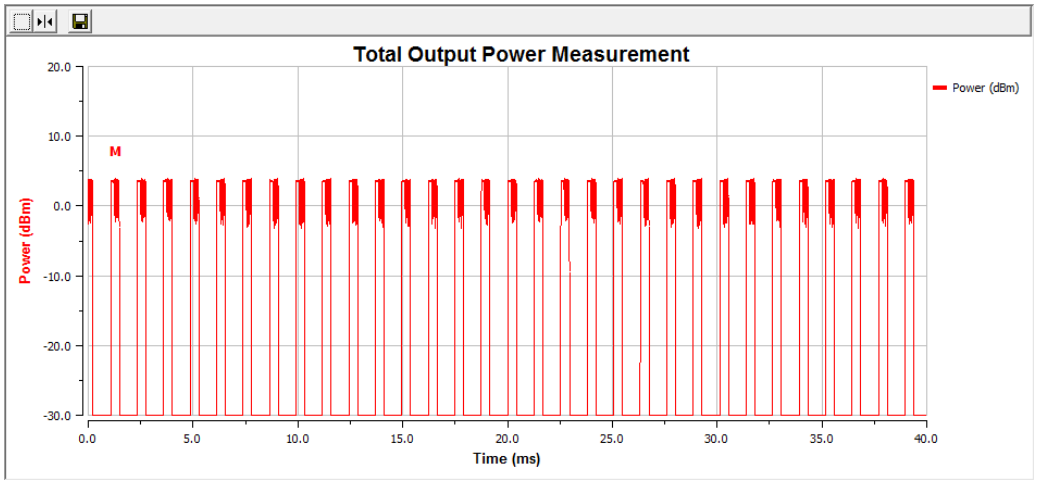
Test Mode: Pi/4 QPSK					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH00	CH39	CH78
Normal voltage	T nom (°C)	25.00	3.51	2.73	2.81
	T min (°C)	00.00	3.14	2.51	2.66
	T max (°C)	40.00	3.37	2.41	2.43
Max RF Power			**3.51**		
Limits			20dBm		
Result			**Complies**		

The Worst Test Plots

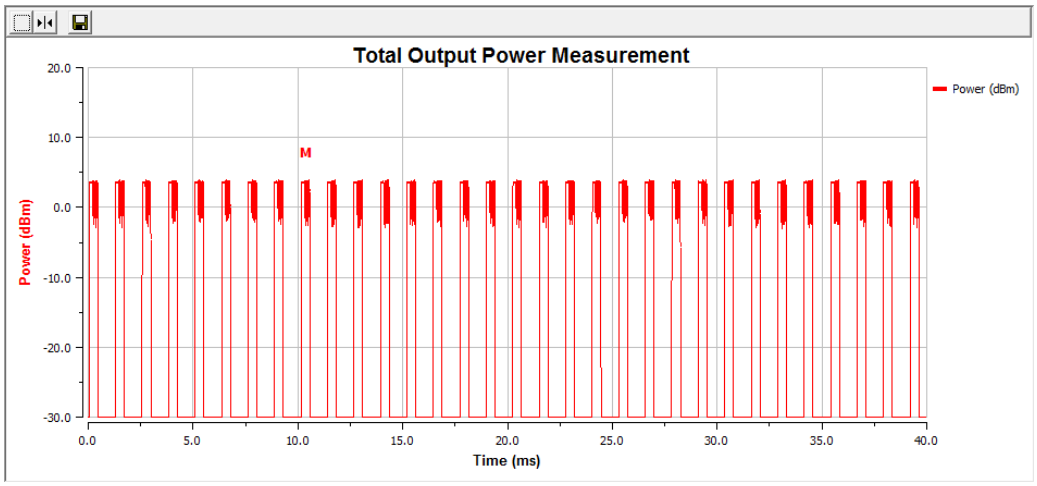
CH00



CH39


Total Output Power Measurement
Power (dBm)
M
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Time (ms)

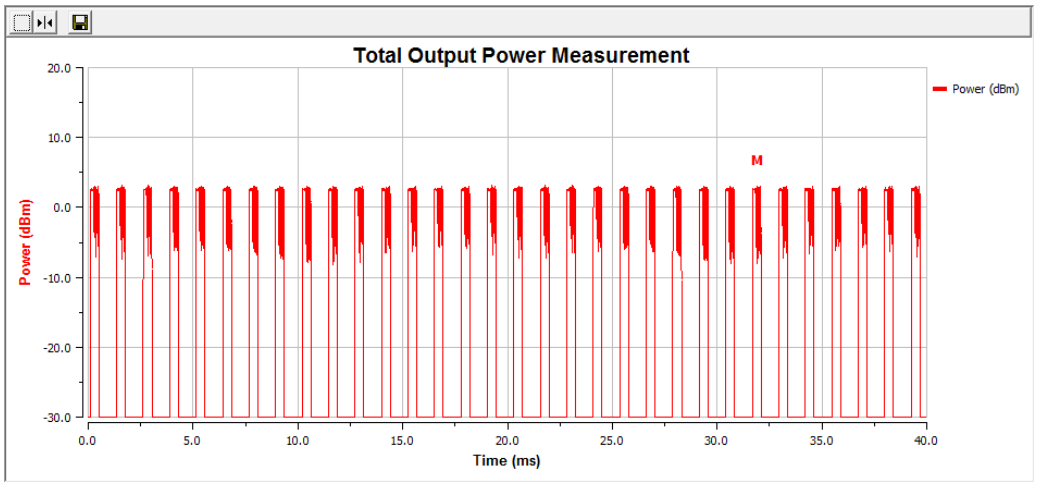
CH78


Total Output Power Measurement
Power (dBm)
M
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Time (ms)

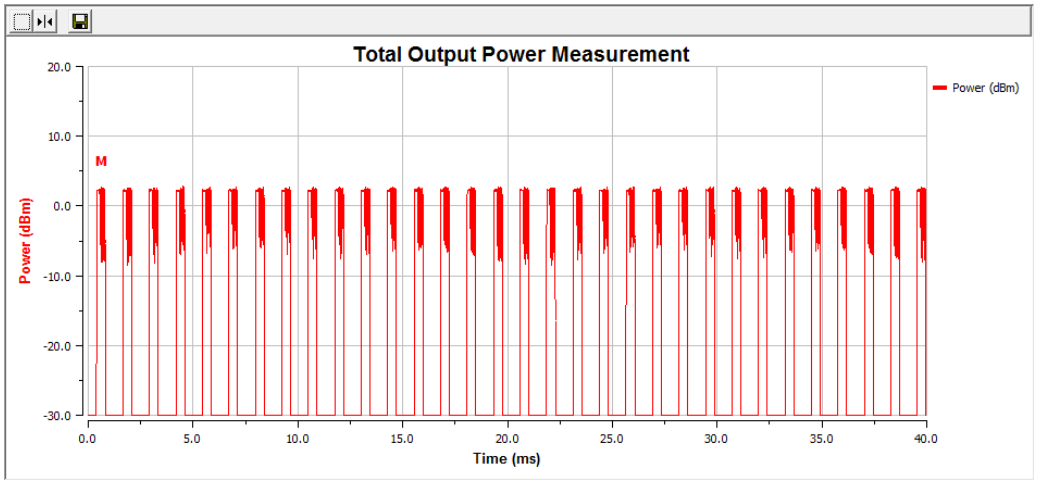
Test Mode: 8DPSK					
TEST CONDITIONS			Total e.i.r.p (dBm)		
			CH00	CH39	CH78
Normal voltage	T nom (°C)	25.00	1.83	1.54	1.83
	T min (°C)	-20.00	1.49	1.33	1.55
	T max (°C)	55.00	1.58	1.21	1.77
Max RF Power			**1.83**		
Limits			20dBm		
Result			**Complies**		

The Worst Test Plots

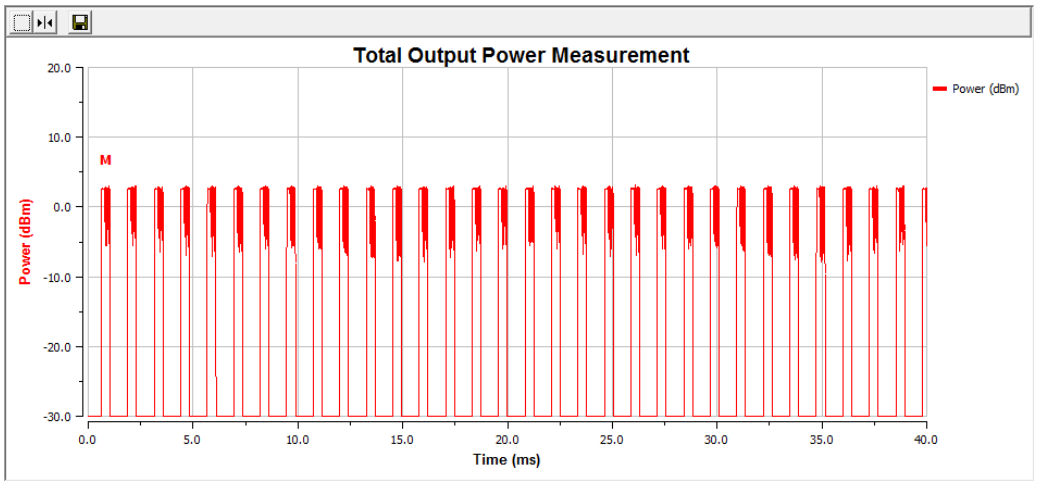
CH00



CH39



CH78

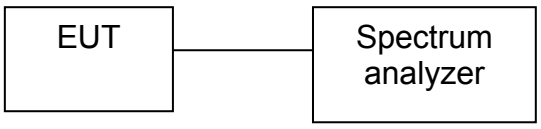

Total Output Power Measurement
Power (dBm)
M
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Time (ms)

4. Duty Cycle, Tx-sequence, Tx-gap

4.1. Limit

For non-adaptive FHSS equipment, the Duty Cycle shall be equal to or less than the maximum value declared by the manufacturer. In addition, the maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.

4.2. Test Setup



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2
The conformance tests for this requirement are defined in clause 5.4.2 and specifically in clause 5.4.2.2.1.3.

4.4. Test Result

Not applicable
Note:The EUT belong to adaptive frequency hopping equipment and can not operate in a non-adaptive mode, the maximum ouput power of EUT less than 10dBm e.i.r.p. , so not applicable.

5. Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

5.1. Limit

For Non-adaptive frequency hopping systems

The Accumulated Transmit Time on any hopping frequency shall not be greater than 15 ms within any observation period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options:

Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use.

Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use.

The hopping sequence(s) shall contain at least N hopping frequencies where N is either 5 or the result of 15 MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. According to clause 4.3.1.5.3.1 the minimum Hopping Frequency Separation for non-adaptive equipment is equal to the Occupied Channel Bandwidth with a minimum of 100 kHz.

For Adaptive frequency hopping systems

Adaptive Frequency Hopping equipment shall be capable of operating over a minimum of 70 % of the band specified in table 1.

The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

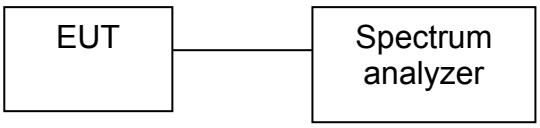
In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options:

Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use.

Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use.

The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is either 15 or the result of 15 MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.4.
The conformance tests for this requirement are defined in clause 5.4.4 and specifically in clause 5.4.4.2.1.

Connect the UUT to the spectrum analyzer and use the following settings:

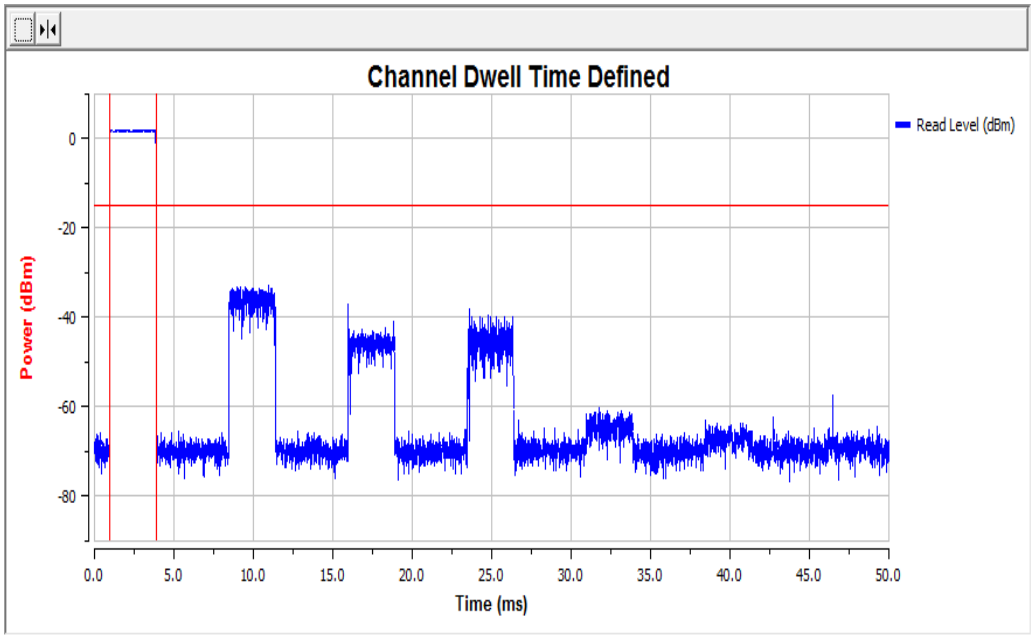
Centre Frequency :	Equal to the hopping frequency being inAmplifierigated
Frequency Span :	0 Hz
RBW :	~ 50 % of the Occupied Channel Bandwidth
VBW :	≥ RBW
Detector :	RMS
Sweep Time :	Equal to the applicable observation period (see clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2)
Number of sweep points :	30000
Trace Mode :	Clear / Write
Trigger :	Free Run

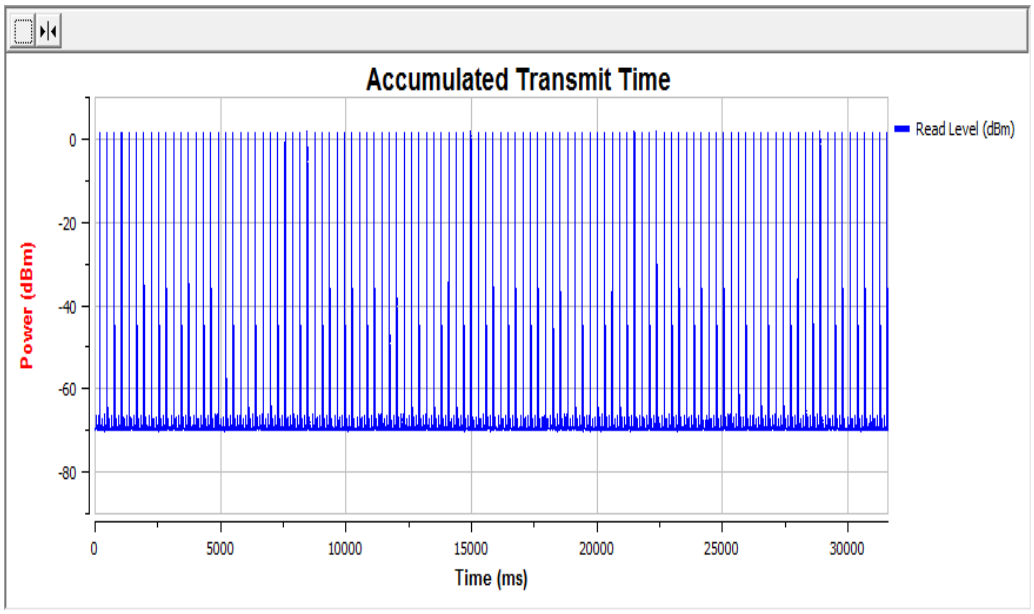
5.4. Test Result

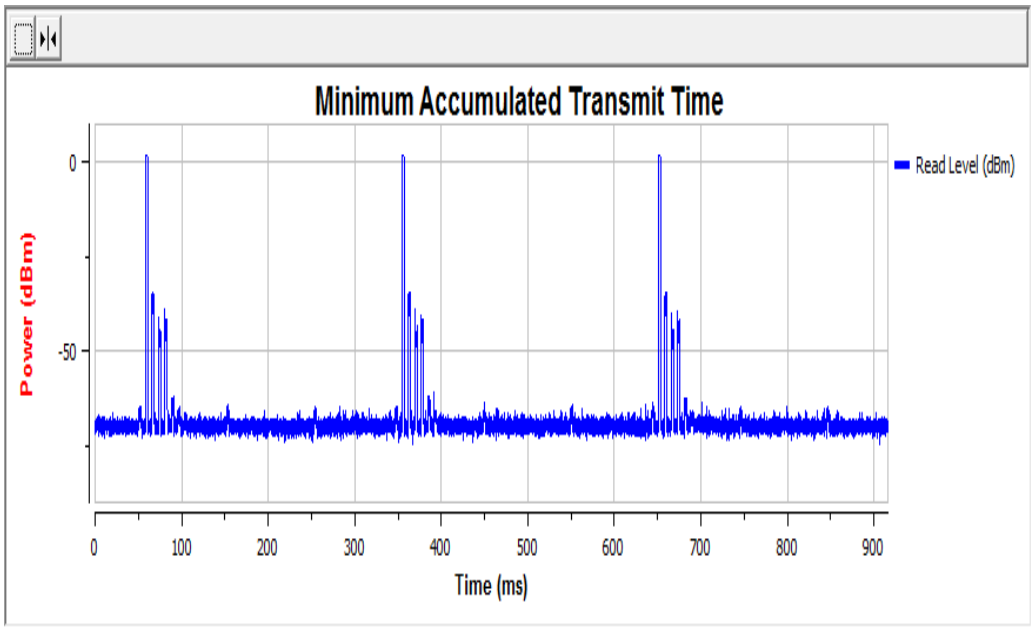
Test Mode: GFSK					
Type	Frequency	Pulse time (ms)	Dwell Time (ms)	Limits (ms)	Result
Dwell Time	2402	2.90	309.33	400	Pass
	2441	2.90	309.33	400	Pass
	2480	2.90	309.33	400	Pass

The Test Plots

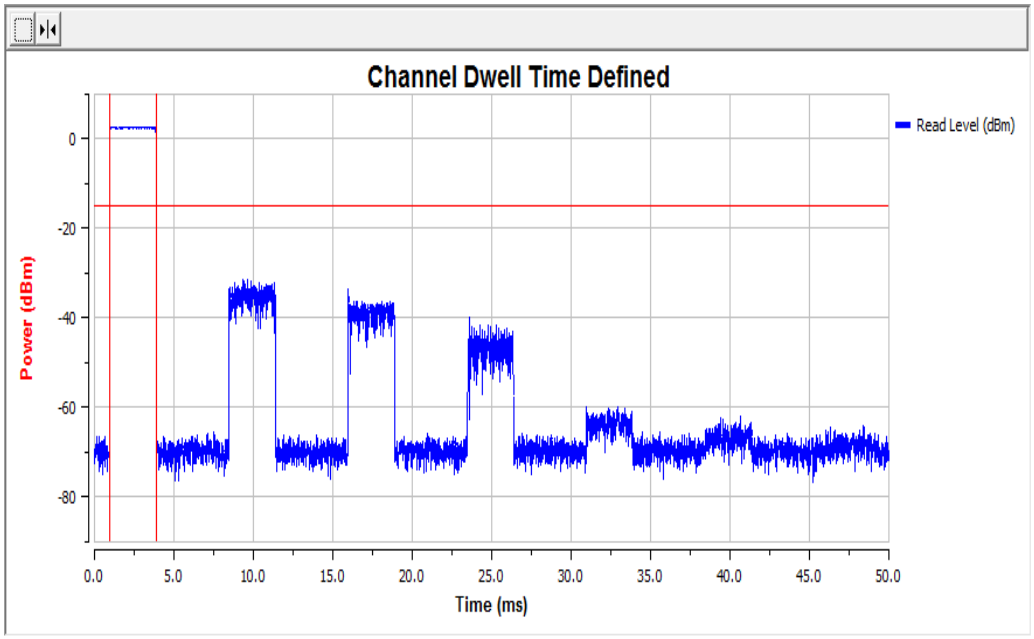
CH00






Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

CH39


Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
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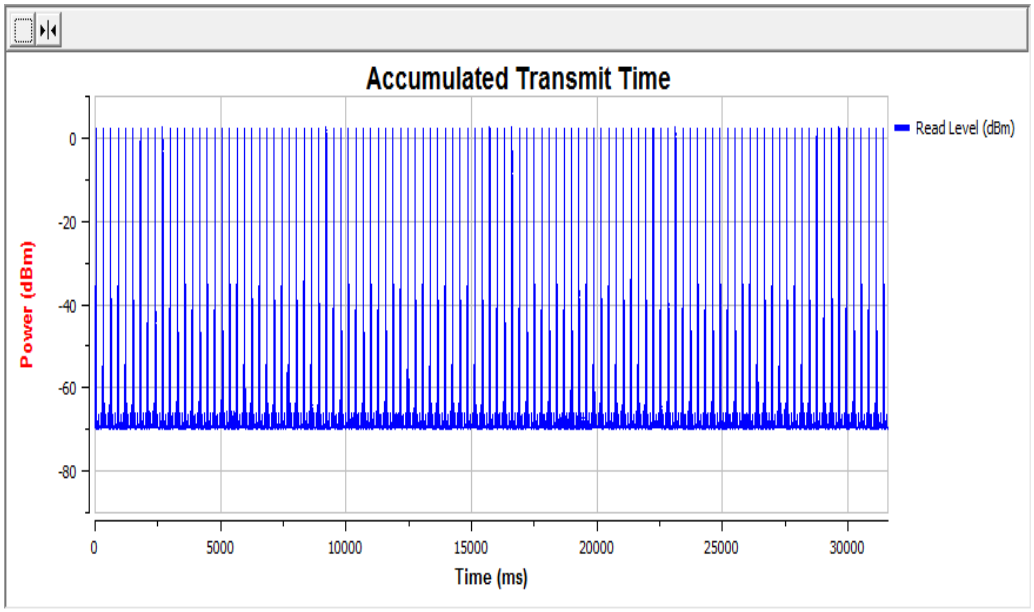
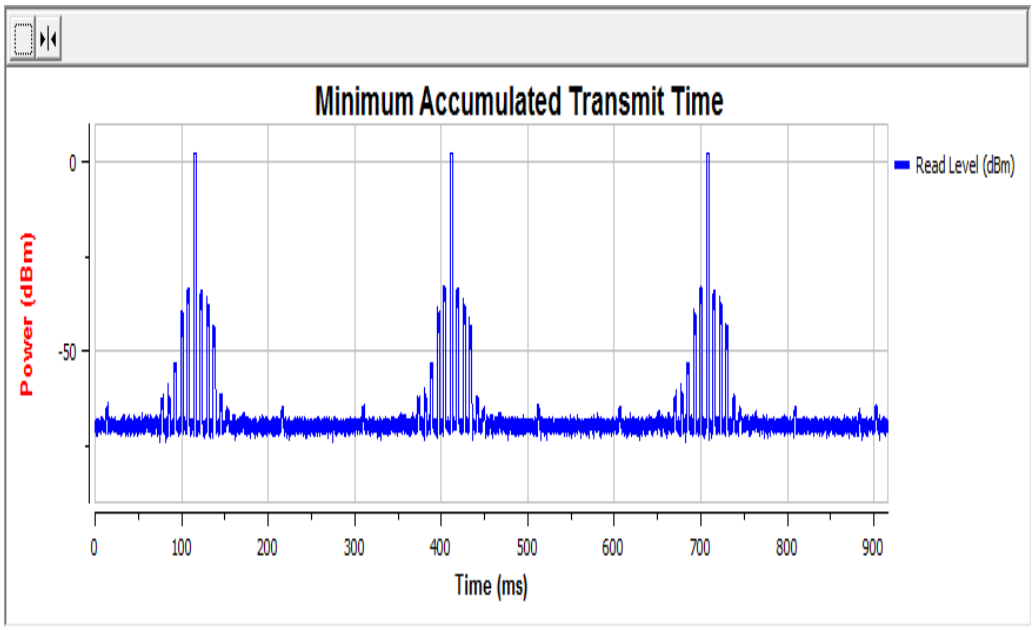
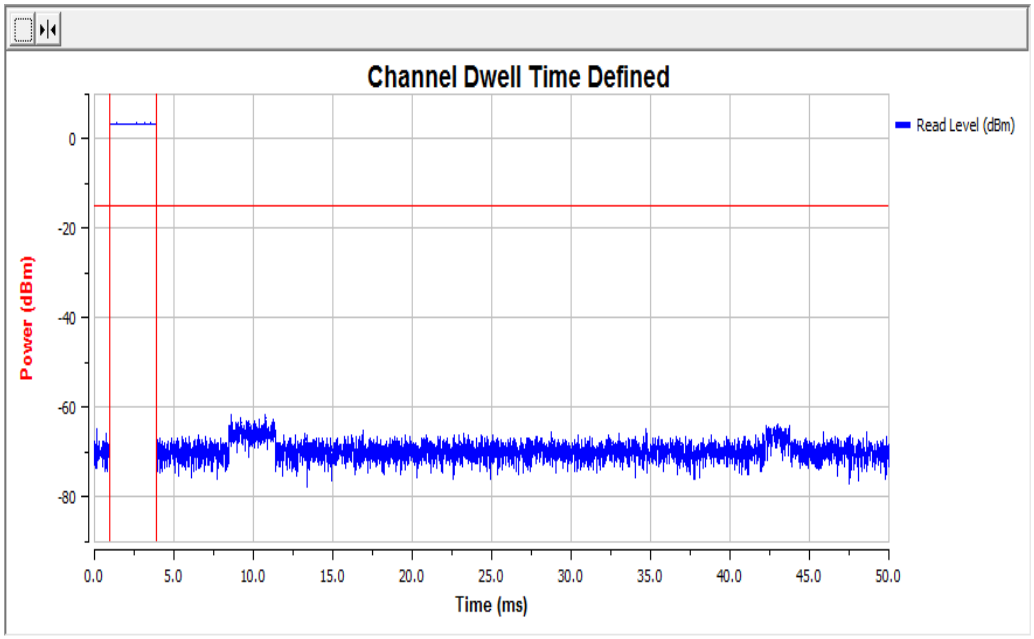
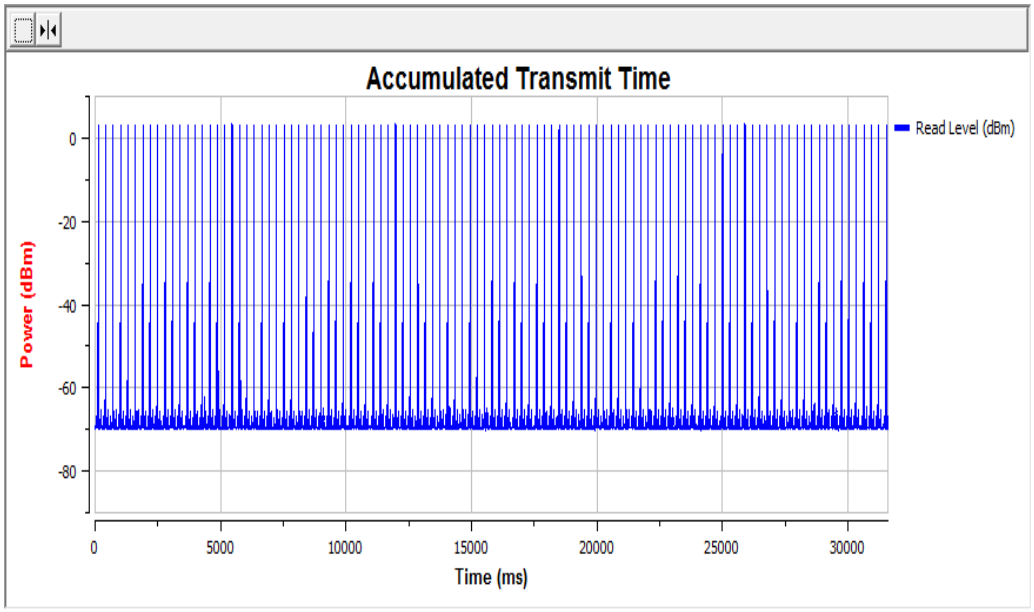
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)


Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)


Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

CH78


Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)


Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
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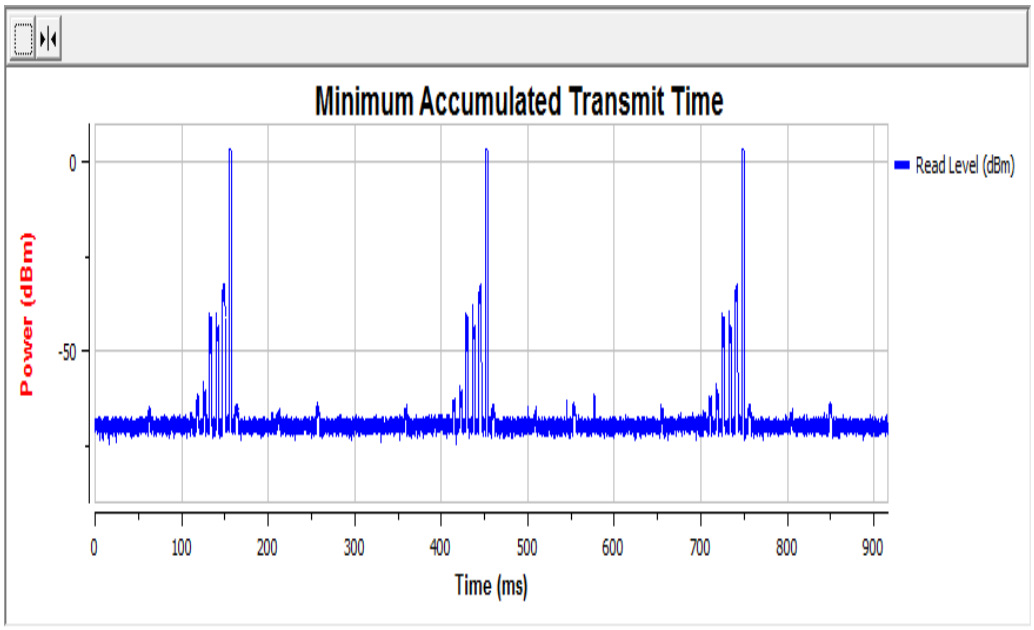
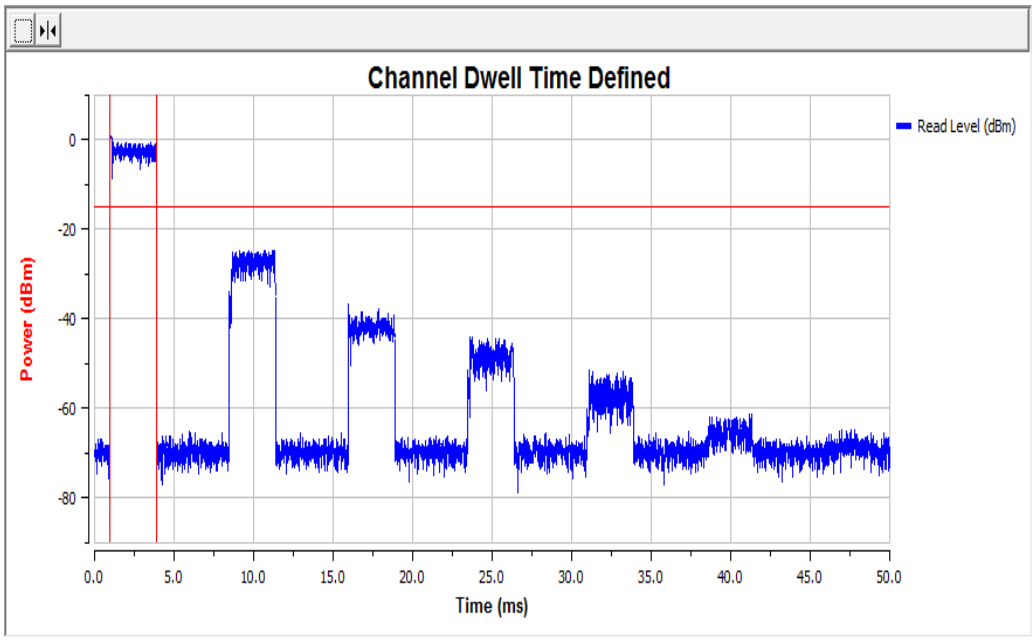
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)

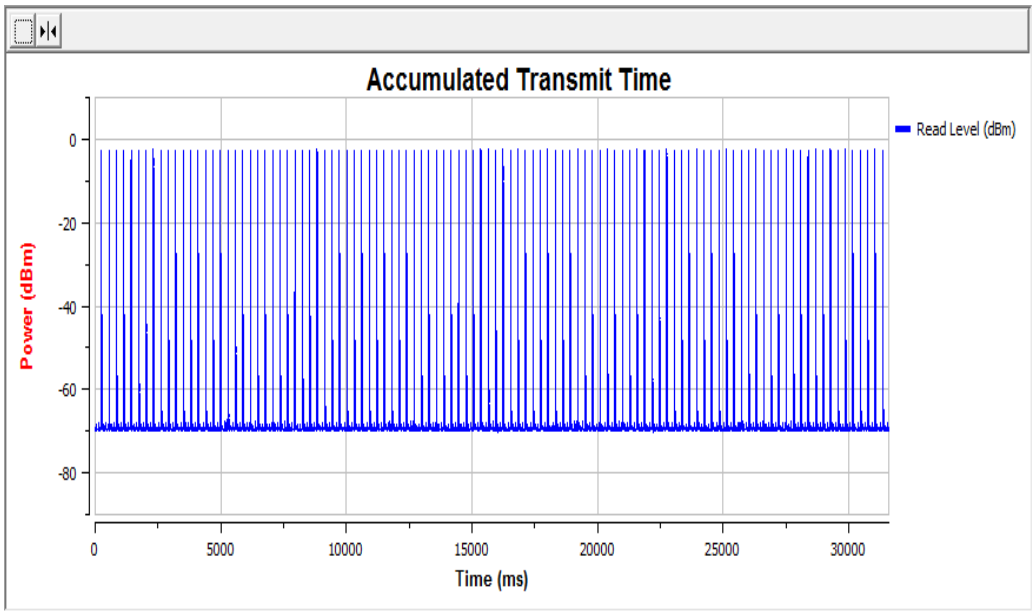


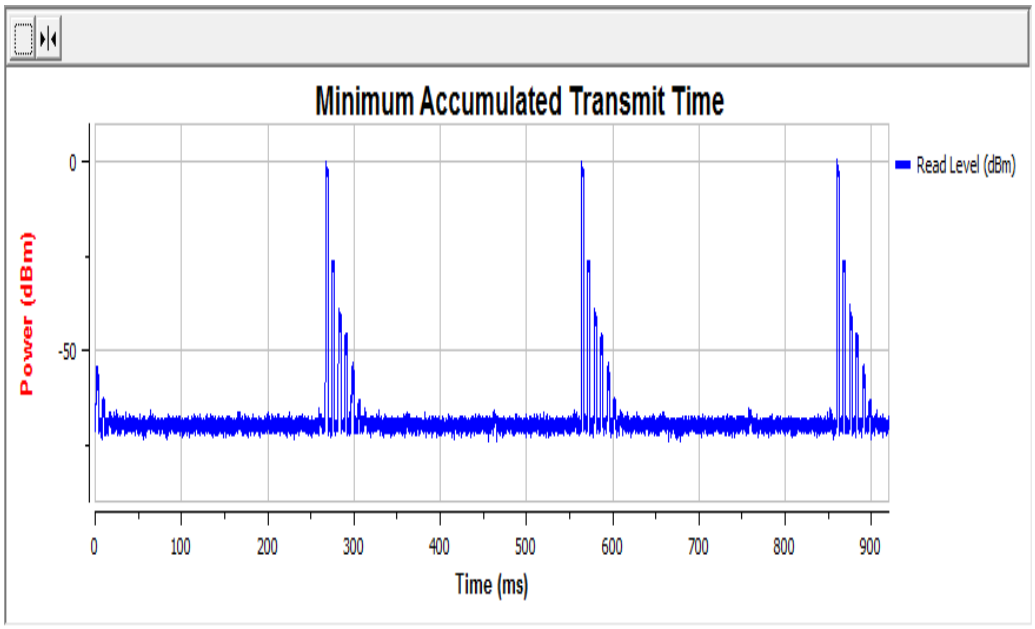
Test Mode: Pi/4 QPSK					
Type	Frequency	Pulse time (ms)	Dwell Time (ms)	Limits (ms)	Result
Dwell Time	2402	2.91	310.40	400	Pass
	2441	2.91	310.40	400	Pass
	2480	2.91	310.40	400	Pass

The Test Plots

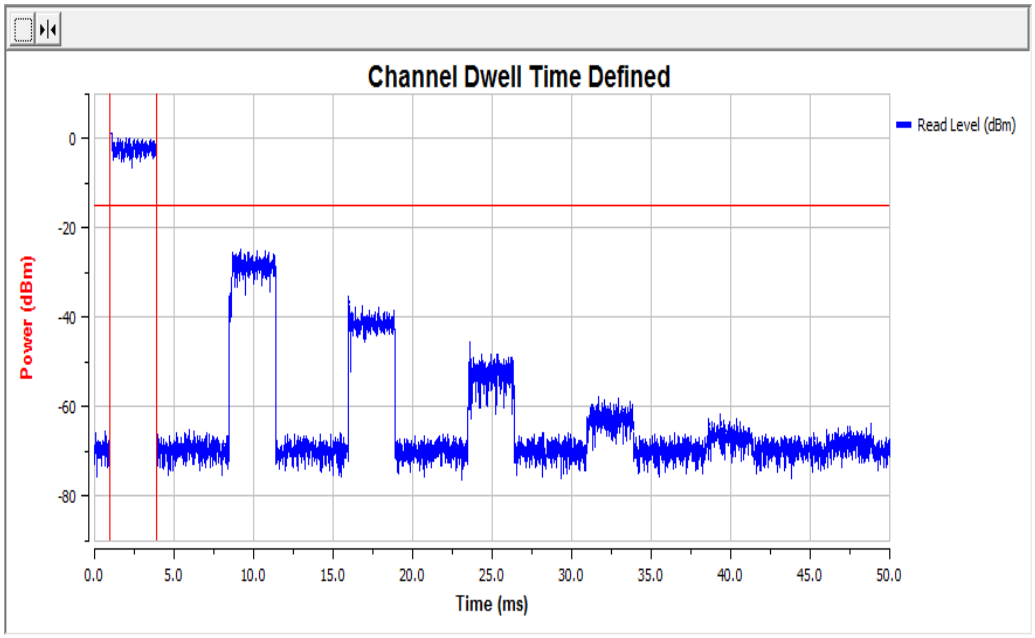
CH00

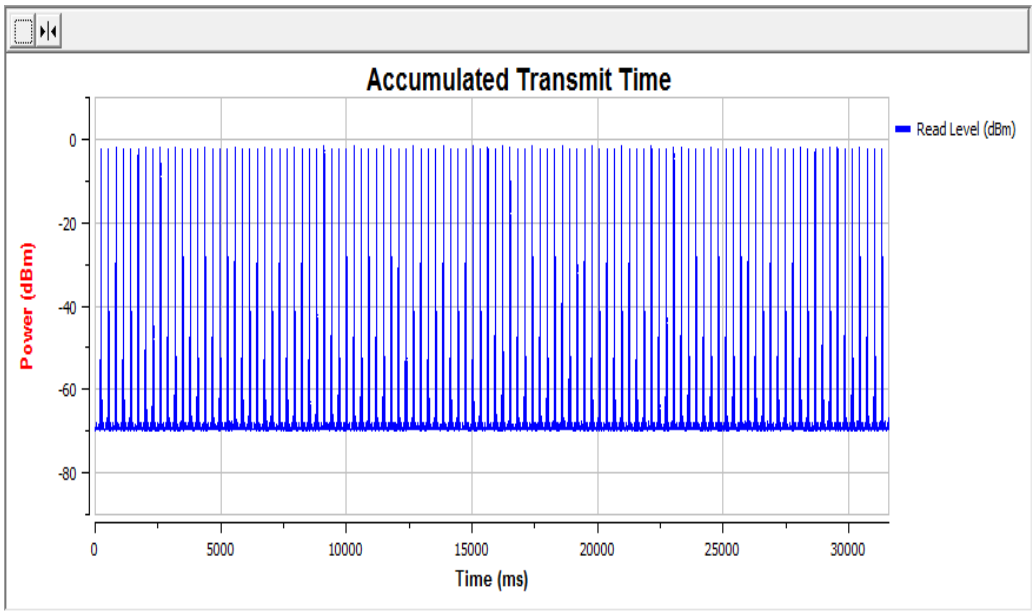


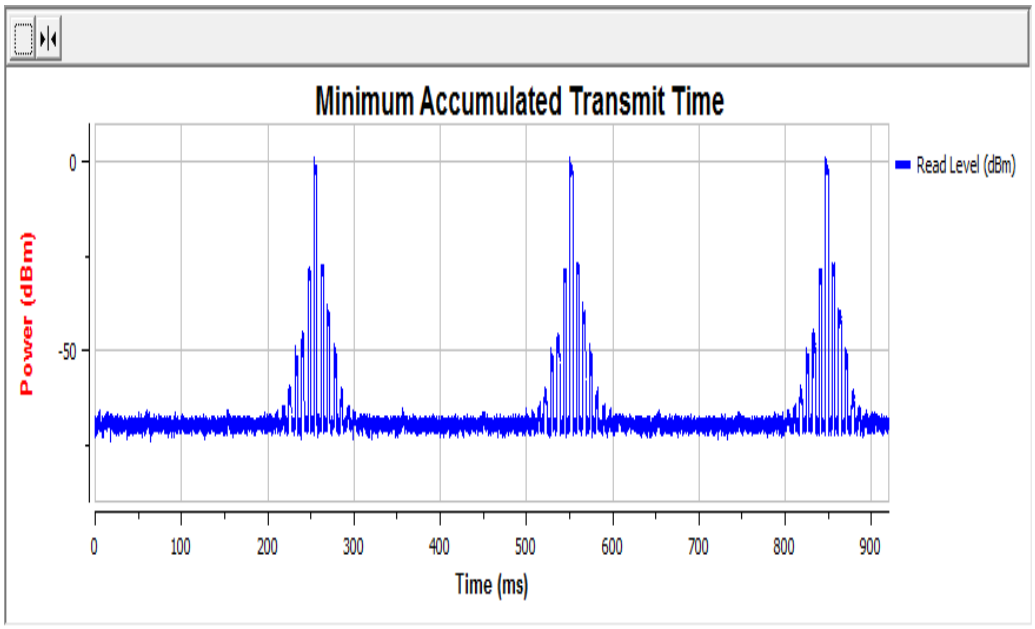

Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)


Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

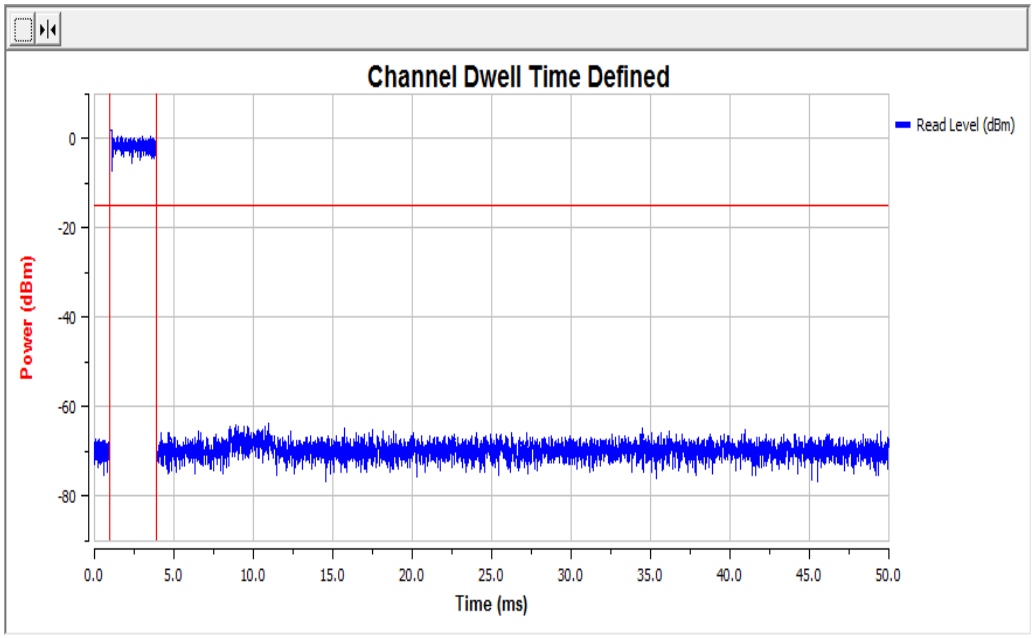
CH39

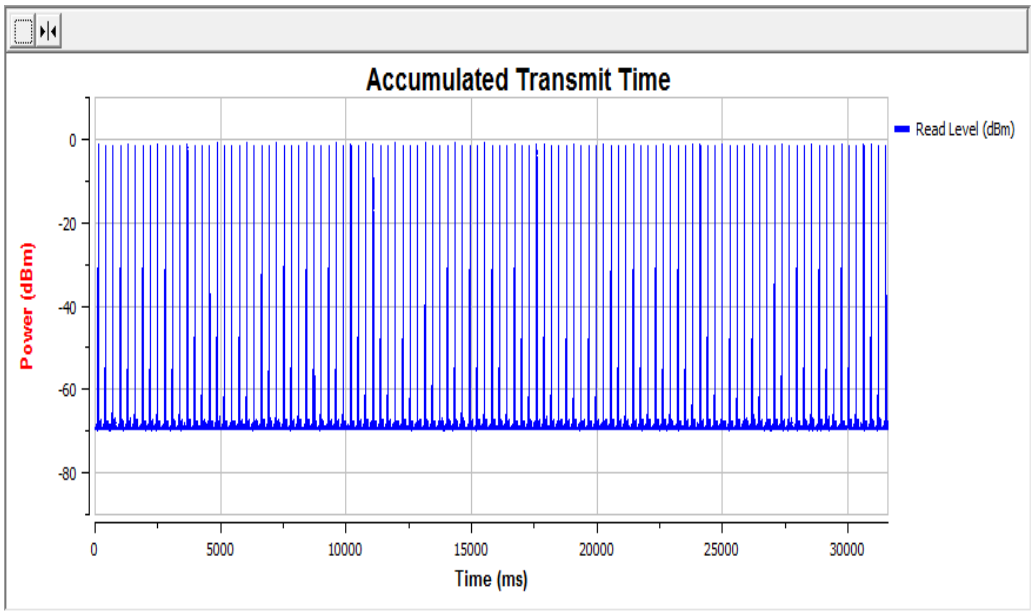

Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)

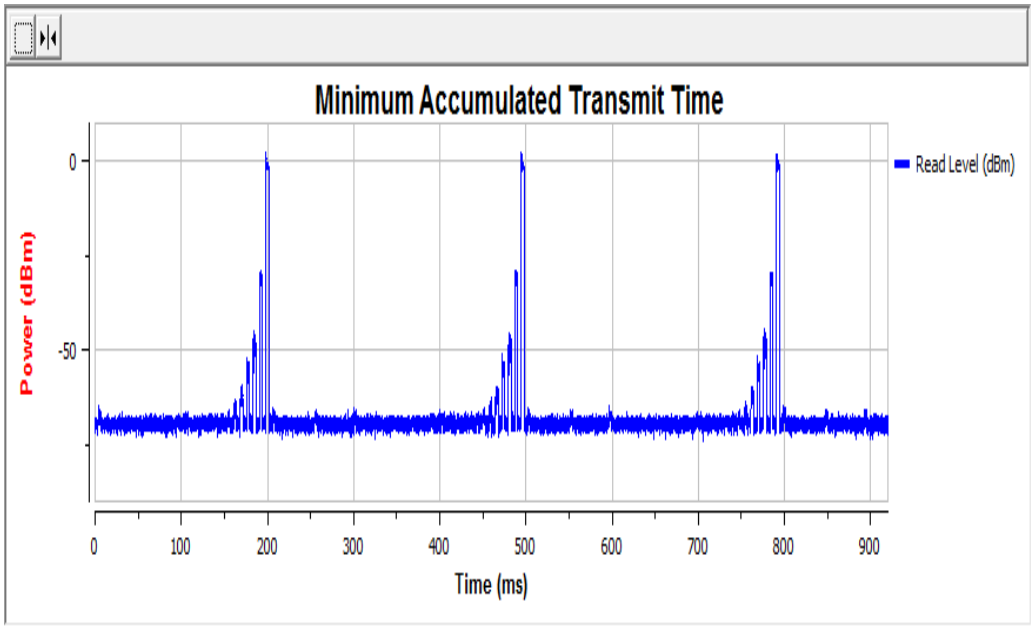

Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)


Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

CH78


Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)

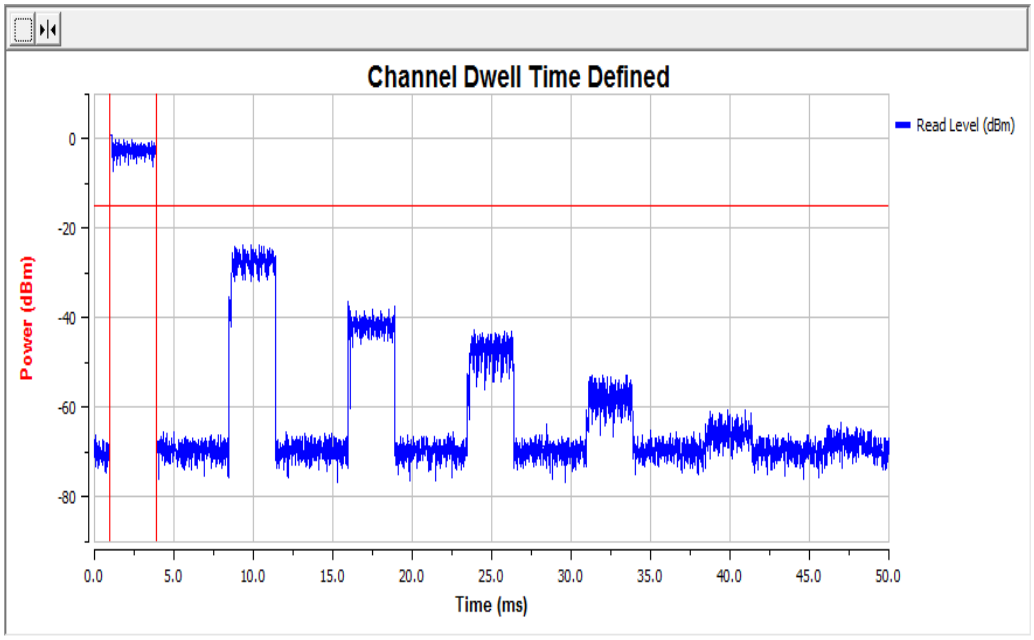

Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)

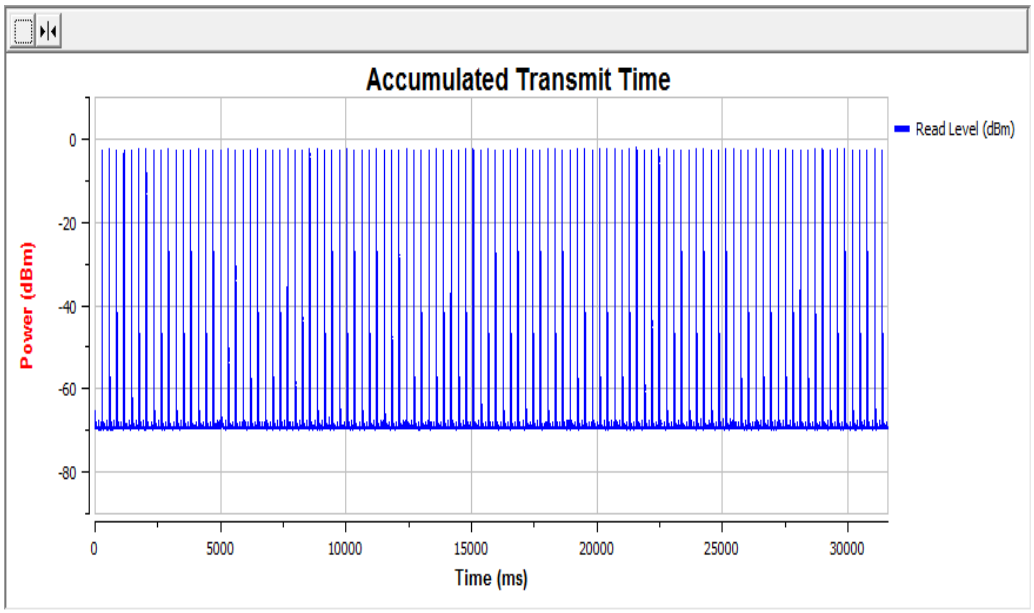

Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

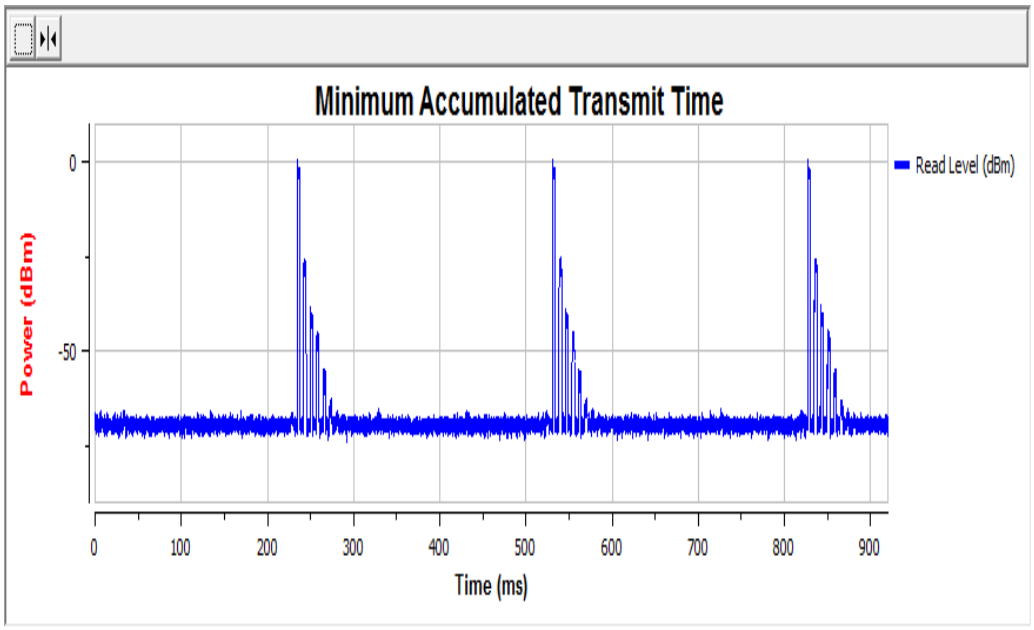
Test Mode: 8DPSK					
Type	Frequency	Pulse time (ms)	Dwell Time (ms)	Limits (ms)	Result
Dwell Time	2402	2.91	310.40	400	Pass
	2441	2.91	310.40	400	Pass
	2480	2.91	310.40	400	Pass

The Test Plots

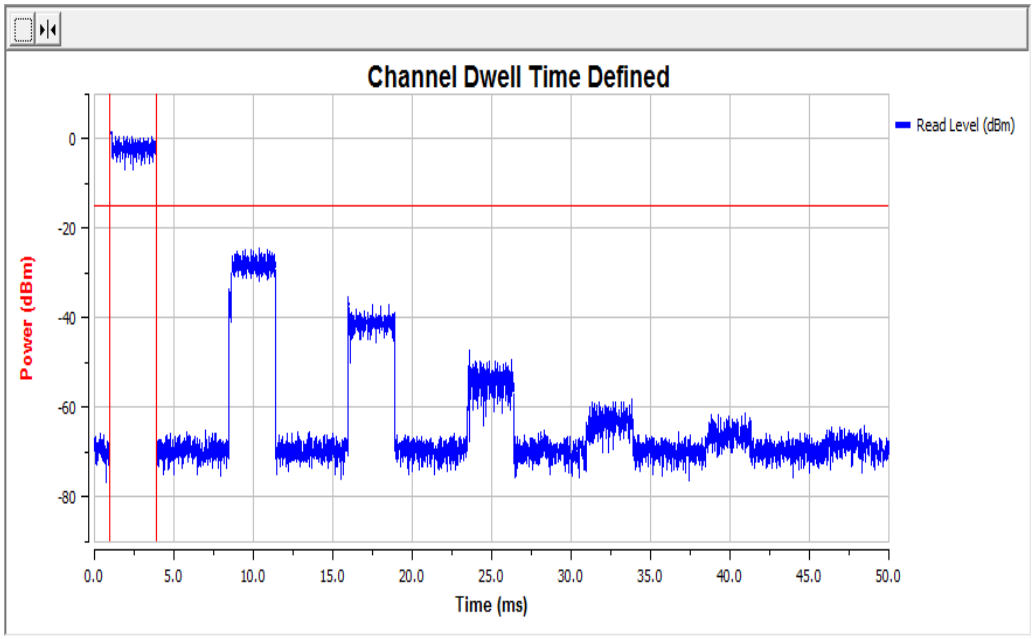
CH00

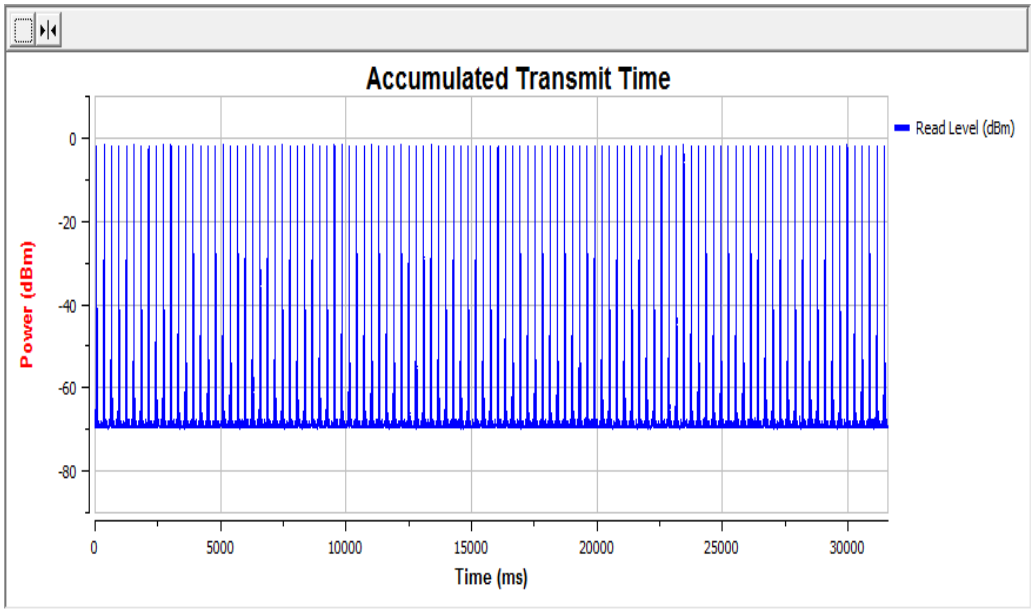


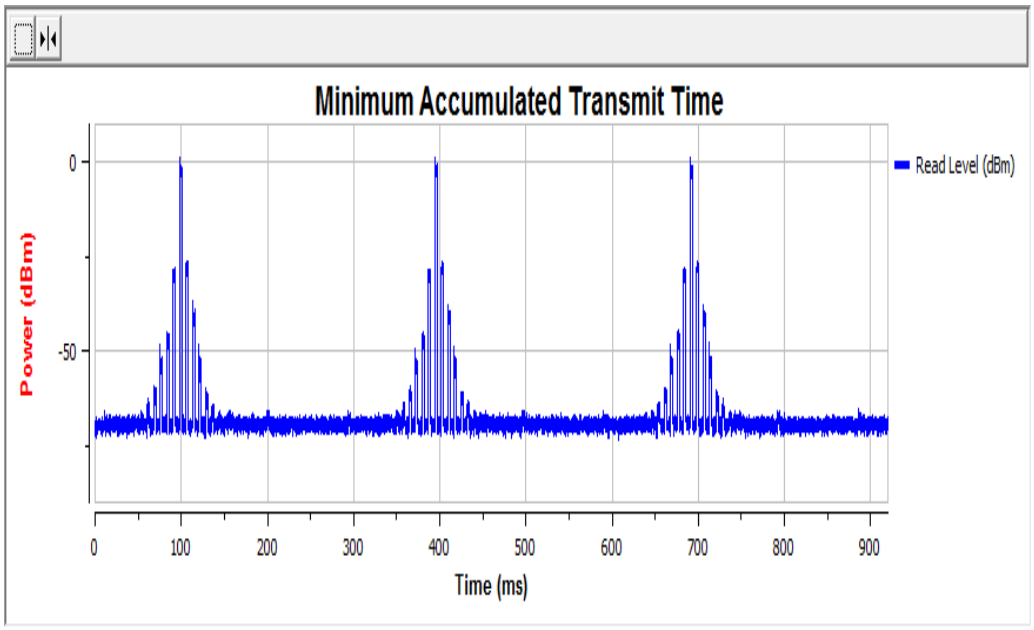



Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

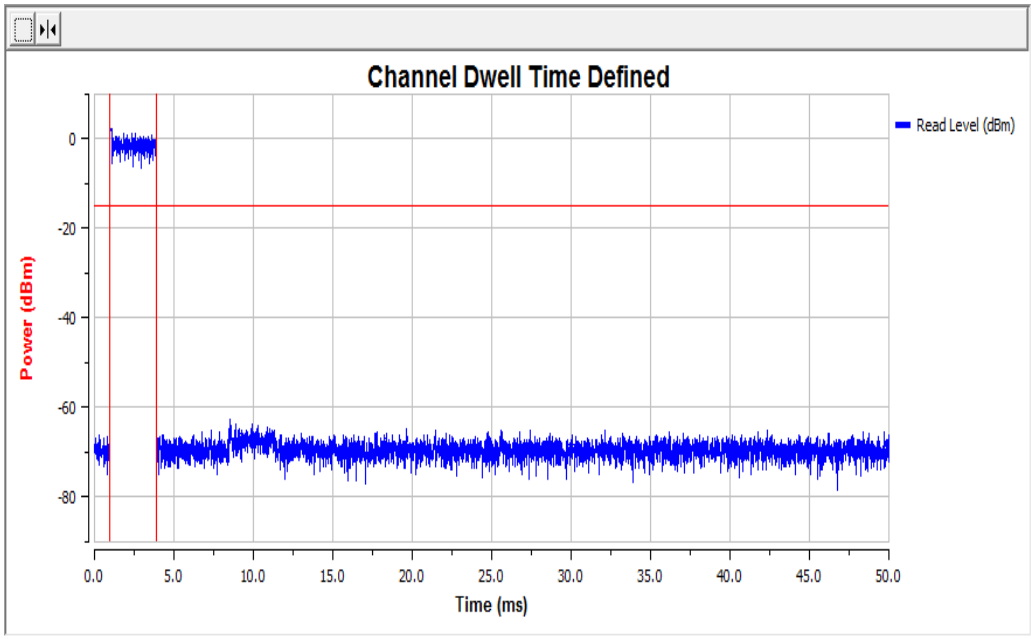
CH39

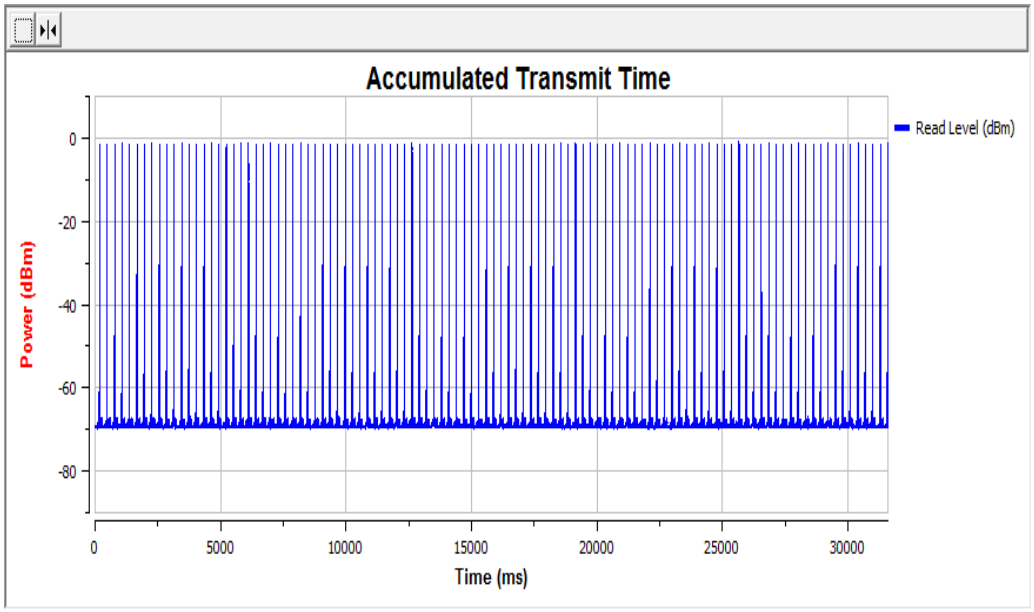

Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)

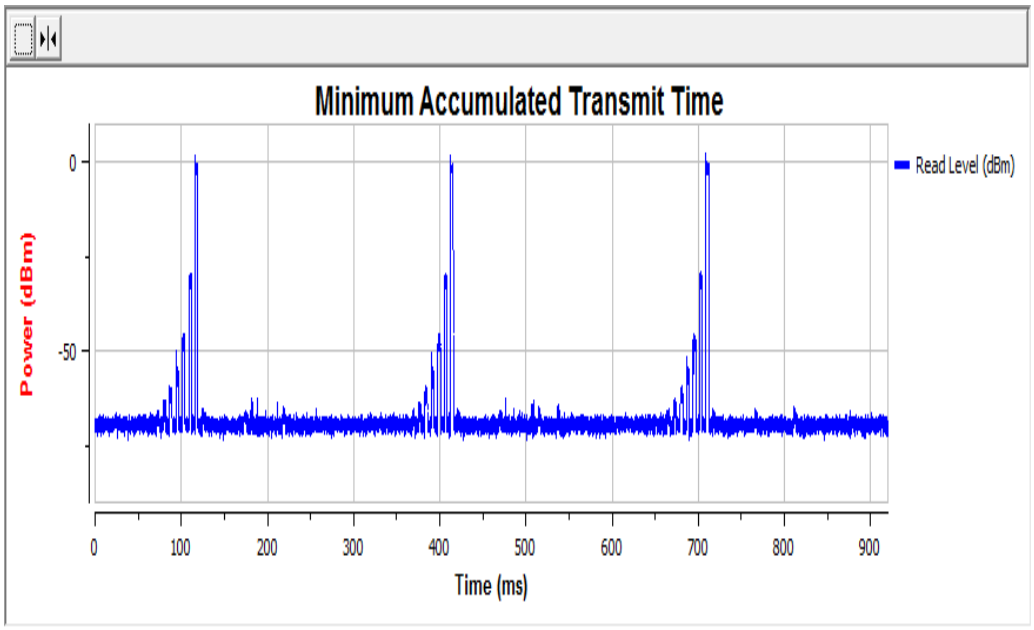

Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)


Minimum Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-50
0
100
200
300
400
500
600
700
800
900
Time (ms)

CH78

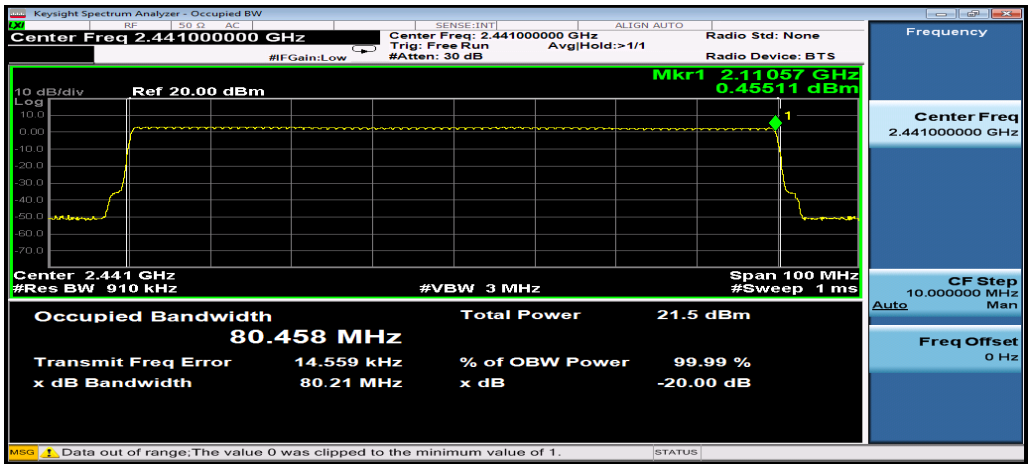

Channel Dwell Time Defined
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Time (ms)

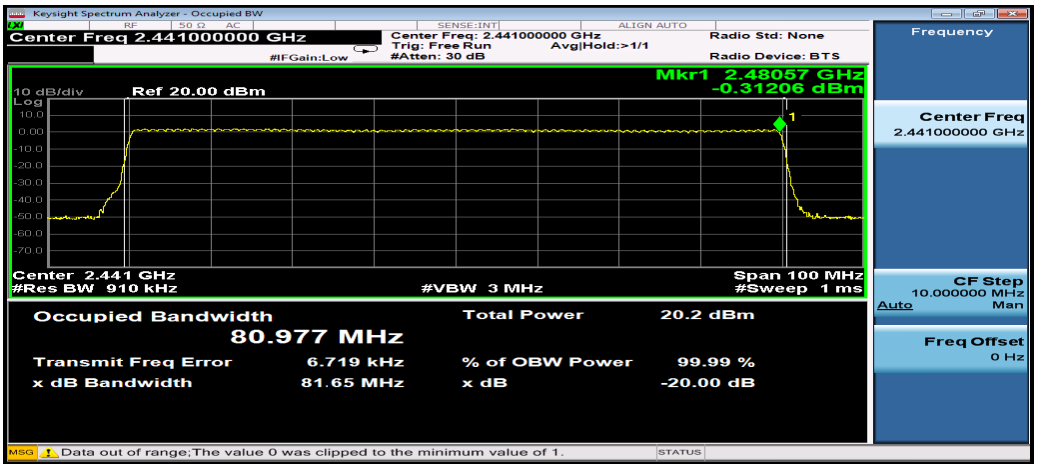

Accumulated Transmit Time
Read Level (dBm)
Power (dBm)
0
-20
-40
-60
-80
0
5000
10000
15000
20000
25000
30000
Time (ms)



Hopping Mode	-20dB BW	Hopping Sequence (%)	Limit	Number of hopping	Limit	Result
GFSK	80.21	96.06%	70%	79	⩾15	Pass
8DPSK	81.65	97.78%	70%	79	⩾15	Pass

The Test Plots





Remark:

1. For adaptive systems, using the lowest and highest -20 dB points from the total spectrum . 2. envelope, it shall be verified whether the system uses 70 % of the band specified. 3. Hopping Sequence(%) = (20dB BW/83.5)*100

6. Hopping Frequency Separation

6.1. Limit

For Non-adaptive frequency hopping equipment

For non-adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal to or greater than the Occupied Channel Bandwidth (see clause 4.3.1.8), with a minimum separation of 100 kHz.

For equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-adaptive Frequency Hopping equipment operating in a mode where the RF Output power is less than 10 dBm e.i.r.p. only the minimum Hopping Frequency Separation of 100 kHz applies.

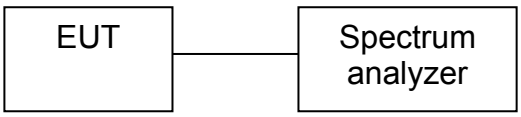
For Adaptive frequency hopping equipment

For adaptive Frequency Hopping equipment, the minimum Hopping Frequency Separation shall be 100 kHz.

Adaptive Frequency Hopping equipment that switched to a non-adaptive mode for one or more hopping frequencies because interference was detected on these hopping frequencies with a level above the threshold level defined in clause 4.3.1.7.2.2, point 5 or clause 4.3.1.7.3.2, point 5, is allowed to continue to operate with a minimum Hopping Frequency Separation of 100 kHz as long as the interference remains present on these hopping frequencies. The equipment shall continue to operate in an adaptive mode on other hopping frequencies.

Adaptive Frequency Hopping equipment which decided to operate in a non-adaptive mode on one or more hopping frequencies without the presence of interference, shall comply with the limit for Hopping Frequency Separation for non-adaptive equipment defined in clause 4.3.1.5.3.1 (first paragraph) for these hopping frequencies as well as with all other requirements applicable to non-adaptive frequency hopping equipment.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.5.

The conformance tests for this requirement are defined in clause 5.4.5 and specifically in clause 5.4.5.2.1.

Connect the UUT to the spectrum analyzer and use the following settings:

Centre Frequency	Centre of the two adjacent hopping frequencies
Frequency Span	Sufficient to see the complete power envelope of both hopping frequencies
RBW	1 % of the Span
VBW	3 × RBW (100KHz)
Detector	Max Peak
Trace	Max hold
Sweep time	Auto

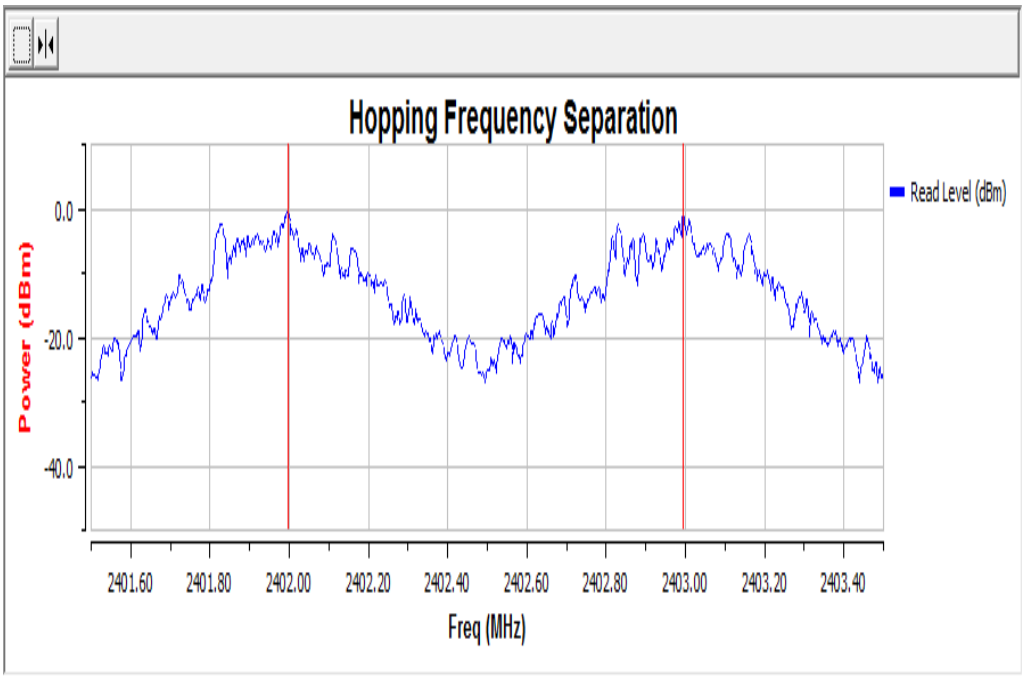
6.4. Test Result

GFSK (CH00/CH78)

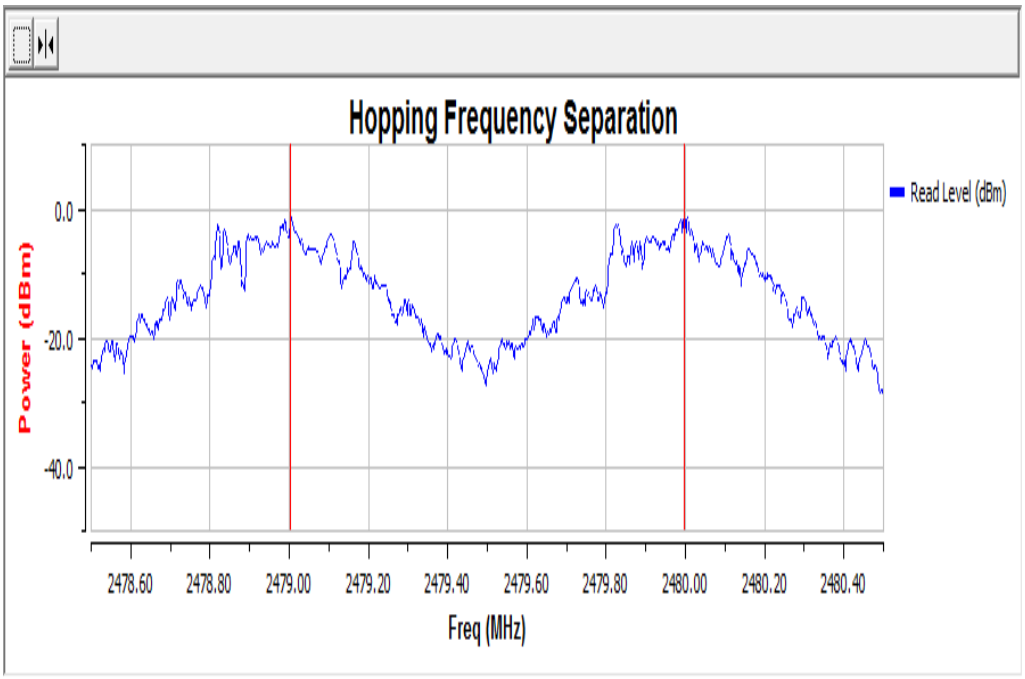
Channel Number	Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	PASS/FAIL
			Minimum	
00	2402	1.00	0.100	PASS
78	2480	0.99	0.100	PASS

The Test Plots

CH00



CH78

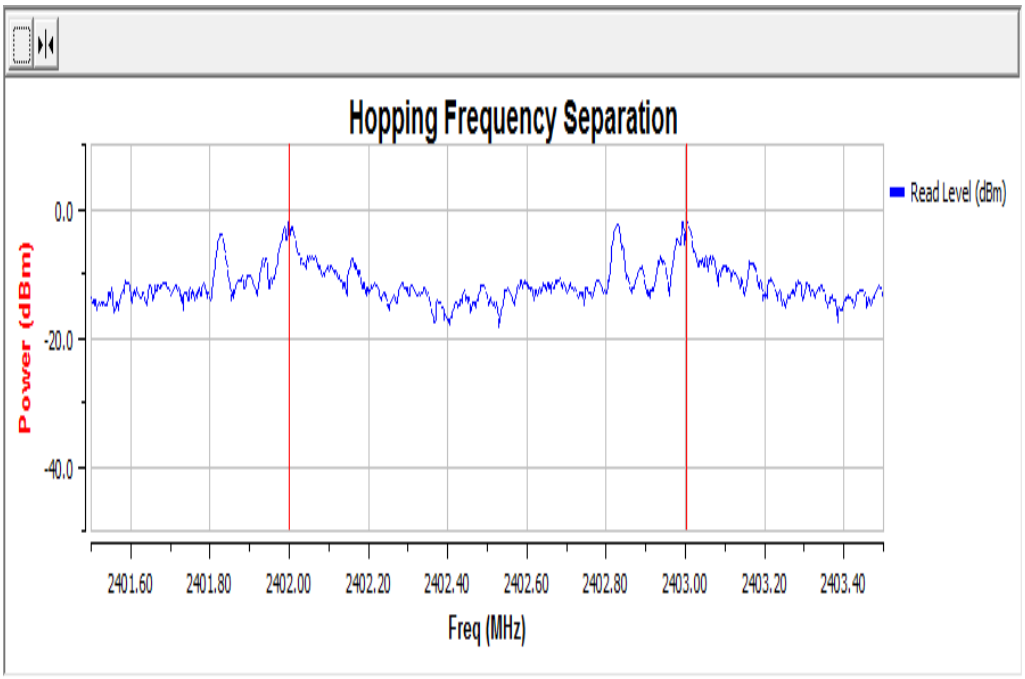


8DPSK (CH00/CH78)

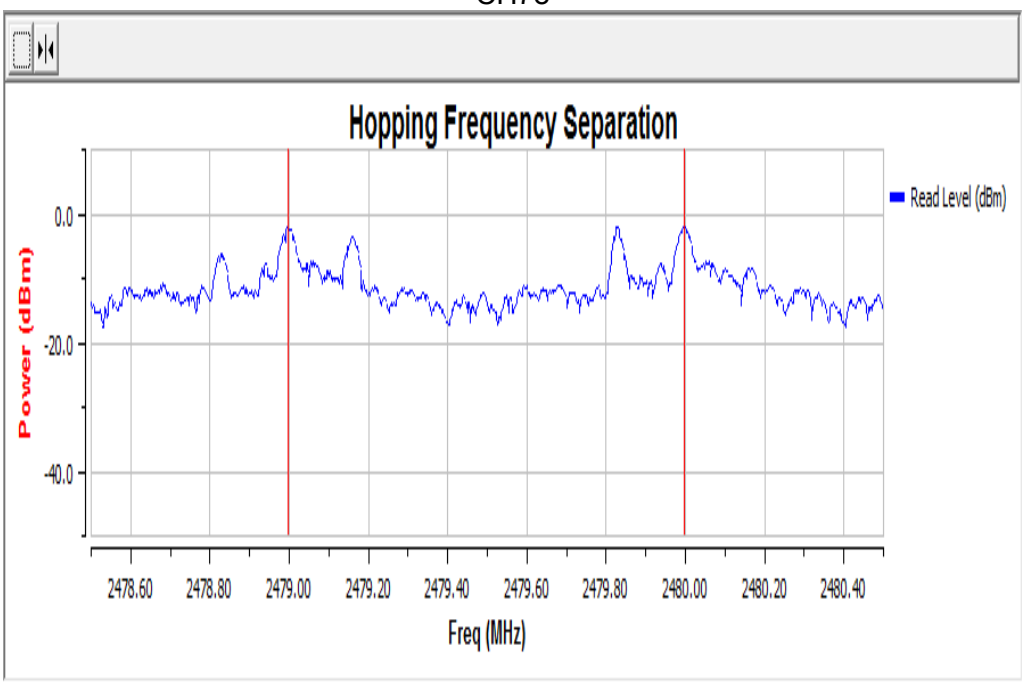
Channel Number	Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	PASS/FAIL
			Minimum	
00	2402	1.00	0.100	PASS
78	2480	1.00	0.100	PASS

The Test Plots

CH00



CH78

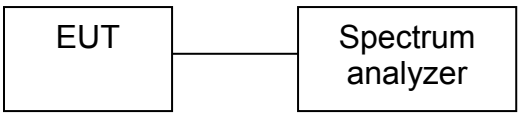


7. Medium Utilization (MU) factor

7.1. Limit

The maximum Medium Utilization factor for non-adaptive Frequency Hopping equipment shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.2
The conformance tests for this requirement are defined in clause 5.4.2 and specifically in clause 5.4.2.2.1.4.

7.4. Test Result

Not applicable
Note:The EUT belong to adaptive frequency hopping equipment and can not operate in a non-adaptive mode, the maximum ouput power of EUT less than 10dBm e.i.r.p. , so not applicable.

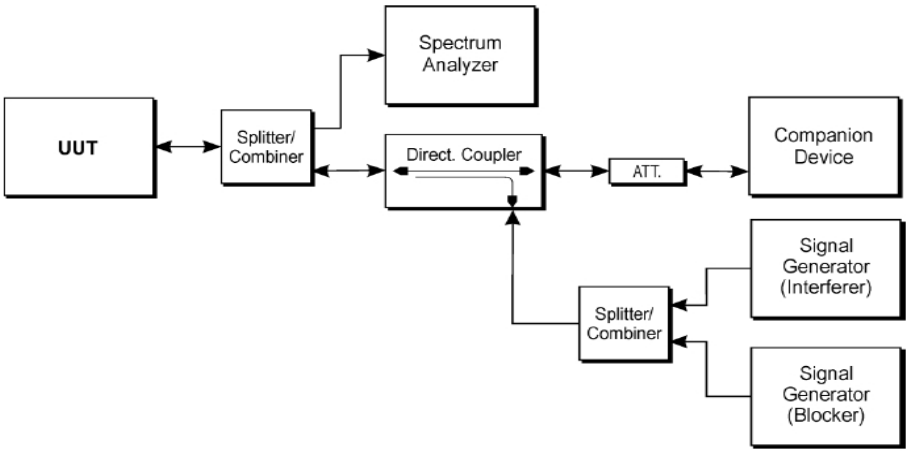
8. Adaptivity

8.1. Limit

The frequency range of the equipment is determined by the lowest and highest

Non-LBT based Detect and Avoid: 1. The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an 'available' channel; 2. COT ≤ 40 ms; 3. Idle Period = 5% of COT; 4. Detection threshold level = -70 dBm/MHz + 10 x log10 (100mW/Pout)
LBT based Detect and Avoid (Frame Based Equipment): 1. Minimum Clear Channel Assessment (CCA) time = 20 us; 2. CCA observation time declared by the supplier; 3. COT = 1~10 ms; 4. Idle Period = 5% of COT; 5. Detection threshold level = -70 dBm/MHz + 10 x log10 (100mW/Pout)
LBT based Detect and Avoid (Load Based Equipment): 1. Minimum Clear Channel Assessment (CCA) time = 20 us; 2. CCA declared by the manufacturer; 3. COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; 4. Detection threshold level = -70 dBm/MHz + 10 x log10 (100mW/Pout)
Short Control Signalling Transmissions: If implemented, Short Control Signalling Transmissions shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms or within an observation period equal to the dwell time, whichever is less.

8.2. Test Setup



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.6.

8.4. Test Result

Not applicable
Note:The maximum ouput power of EUT less than 10dBm e.i.r.p. , so not applicable.

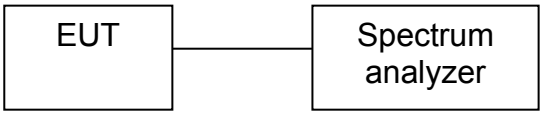
9. Occupied Channel Bandwidth

9.1. Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band between 2.4GHz to 2.4835GHz.

For non-adaptive Frequency Hopping equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the Nominal Channel Bandwidth declared by the manufacturer. See clause 5.4.1 j). This declared value shall not be greater than 5 MHz.

9.2. Test Setup



9.3. Test Procedure

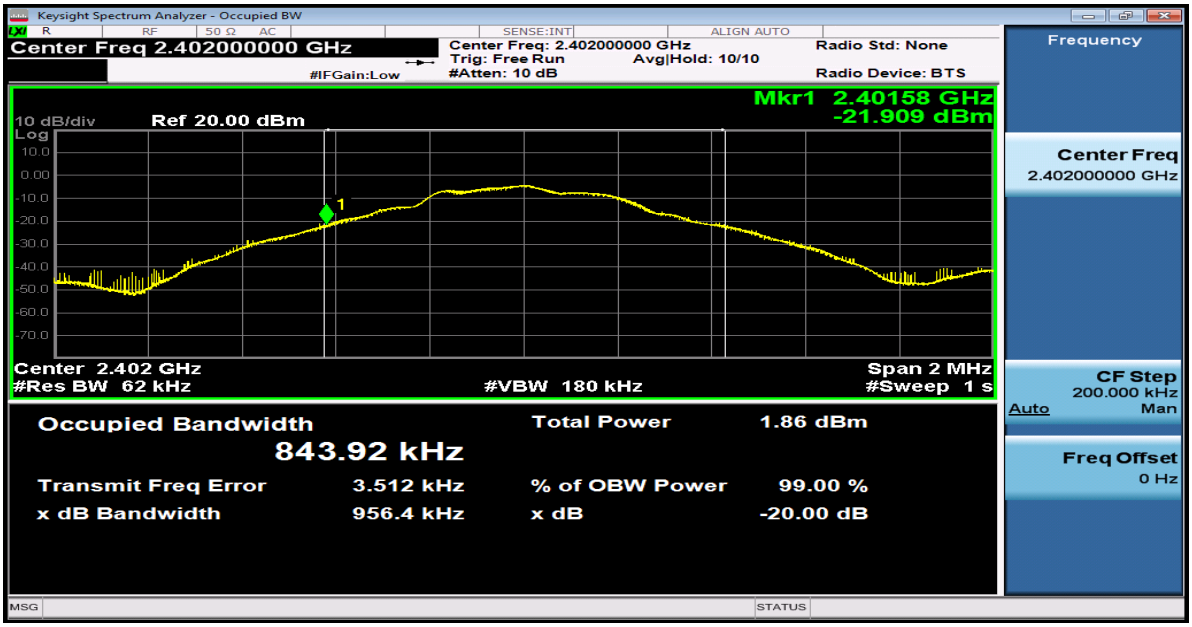
Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.7.

Connect the UUT to the spectrum analyzer and use the following settings:

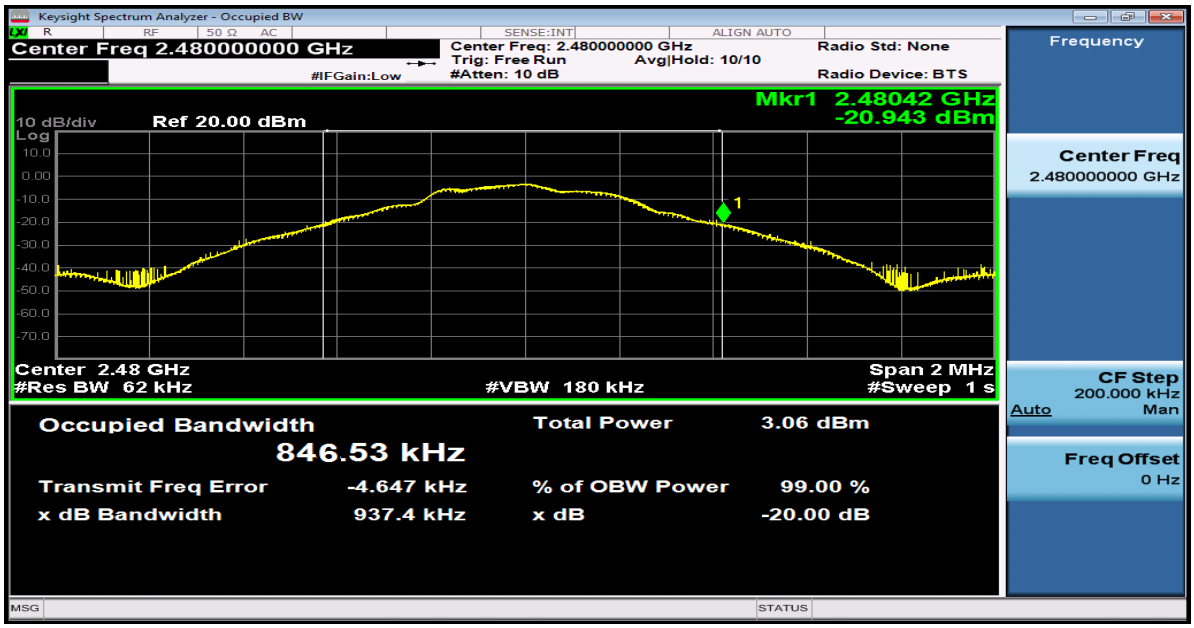
Centre Frequency:	The centre frequency of the channel under test
Frequency Span:	2 × Nominal Channel Bandwidth
RBW:	~ 1 % of the span without going below 1 %
VBW:	3 × RBW
Detector Mode:	RMS
Trace Mode:	Max hold
Sweep time:	1 s

9.4. Test Result

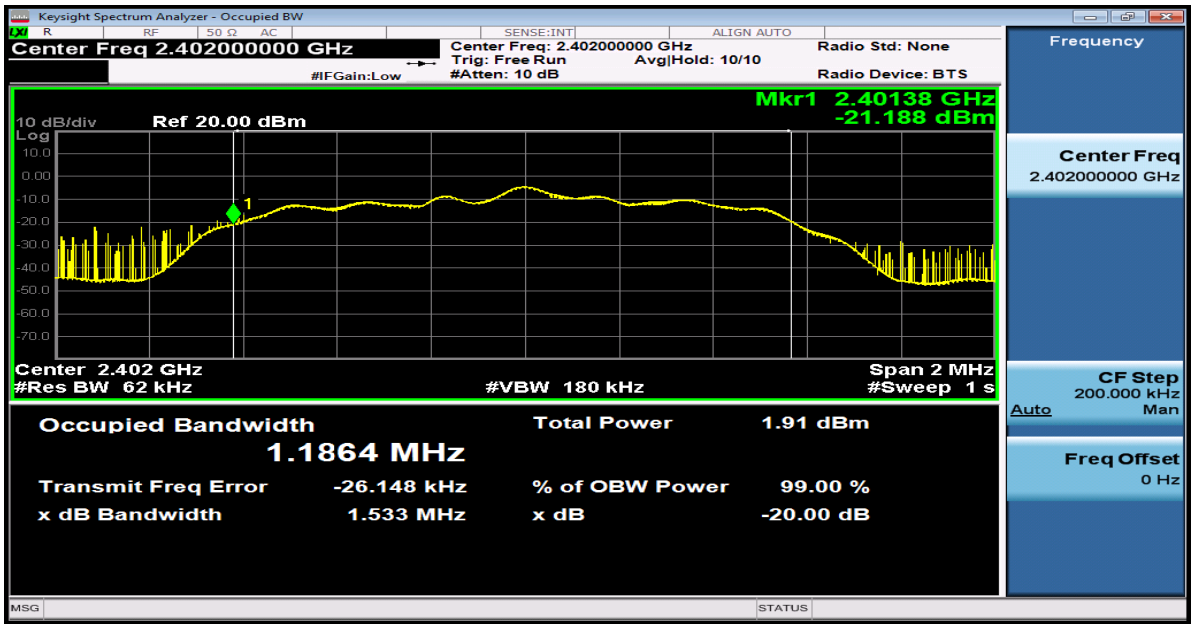
Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
GFSK(1M) DH1	2401.58	0.844	2401.58	> 2400	Pass



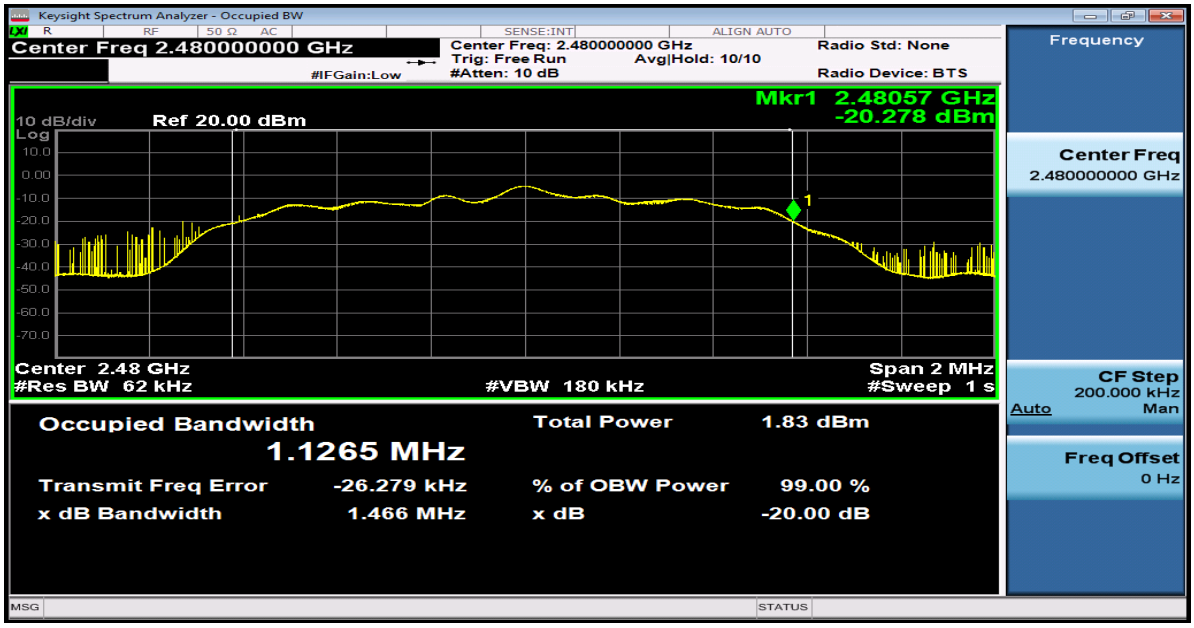
Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
GFSK(1M) DH1	2480.42	0.847	2480.42	< 2483.5	Pass



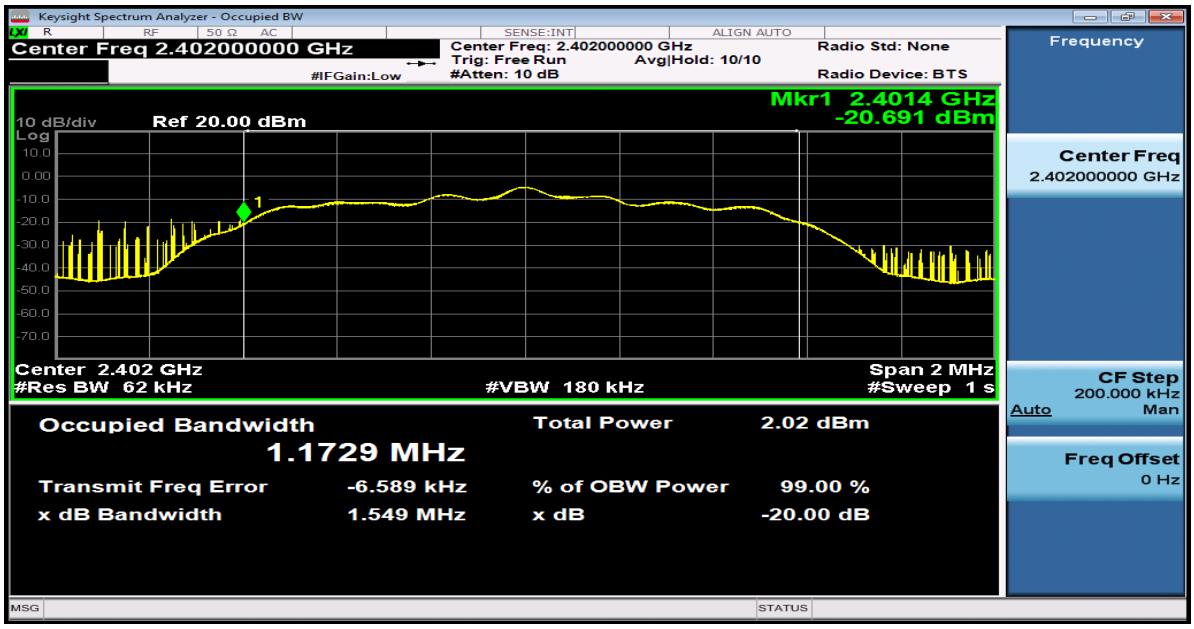
Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
Pi/4 QPSK (2M) DH1	2401.38	1.186	2401.38	> 2400	Pass



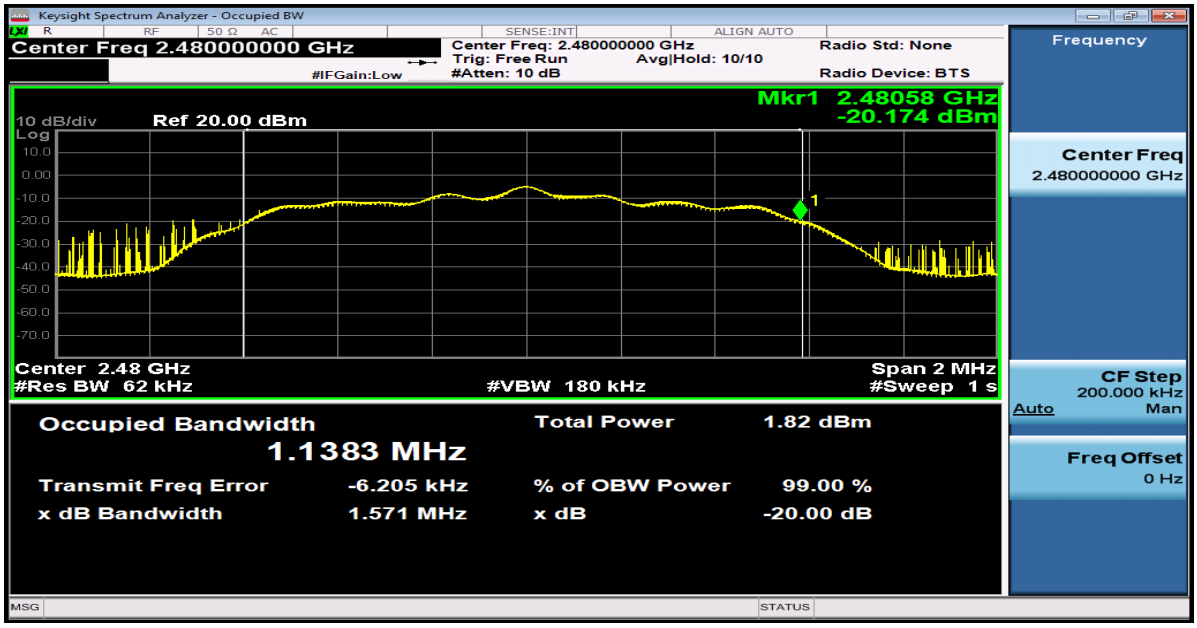
Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
Pi/4 QPSK (2M) DH1	2480.57	1.127	2480.57	< 2483.5	Pass



Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
8DPSK(3M) DH1	2401.40	1.173	2401.40	> 2400	Pass



Modulation	Measured Channel	Occupied BandWidth (MHz)	Measured Freq (MHz)	Limit (MHz)	Status
8DPSK(3M) DH1	2480.58	1.138	2480.58	> 2400	Pass



10. Transmitter unwanted emissions in the out-of-band domain

10.1. Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

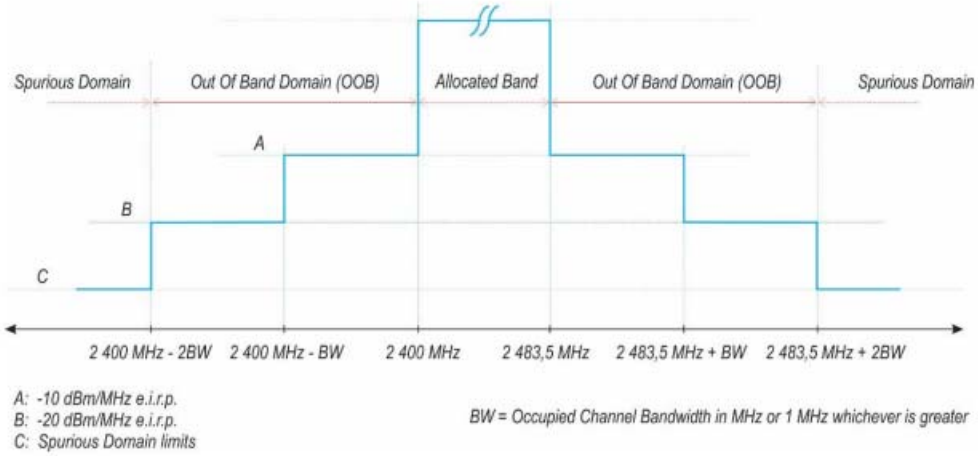
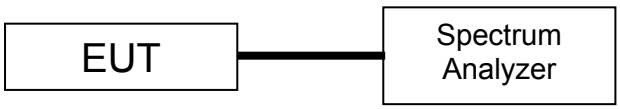


Figure 1: Transmit mask

10.2. Test Setup



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

10.3. Test Procedure

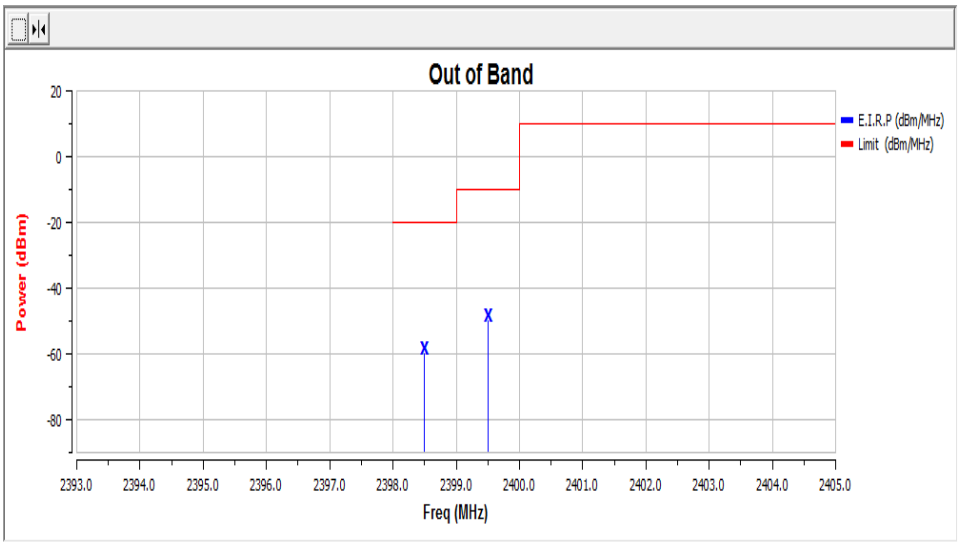
Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.8.

Connect the UUT to the spectrum analyzer and use the following settings:

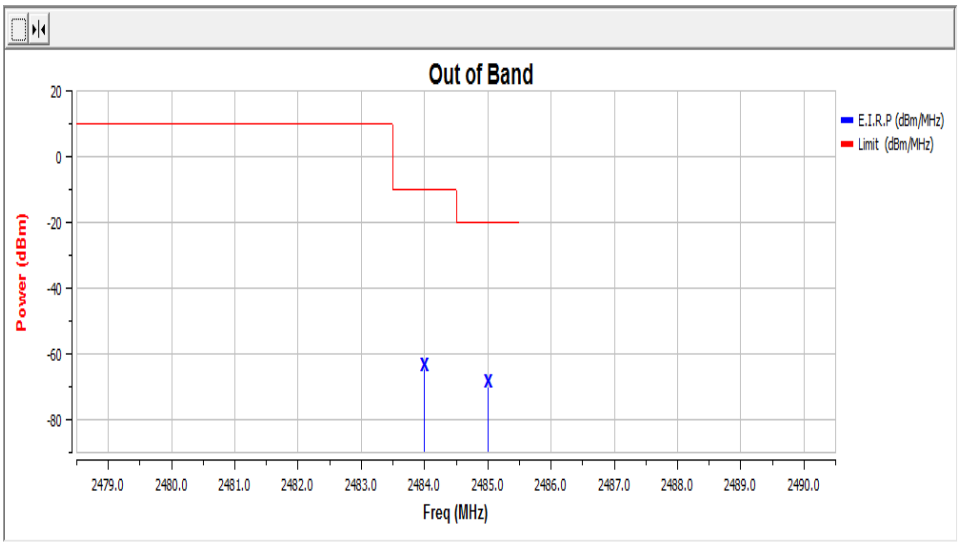
Centre Frequency:	2484 MHz
Span	0Hz
RBW/ VBW	1MHz/3MHz
Filter Mode	Channel filter
Sweep Mode	Continuous
Sweep Points	Sweep Time [s] / (1 µs) or 5 000 whichever is greater
Detector	RMS
Trace Mode	Max Hold
Trigger Mode	Video trigger; in case video triggering is not possible, an external trigger source may be used
Sweep Time:	> 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

10.4. Test Result

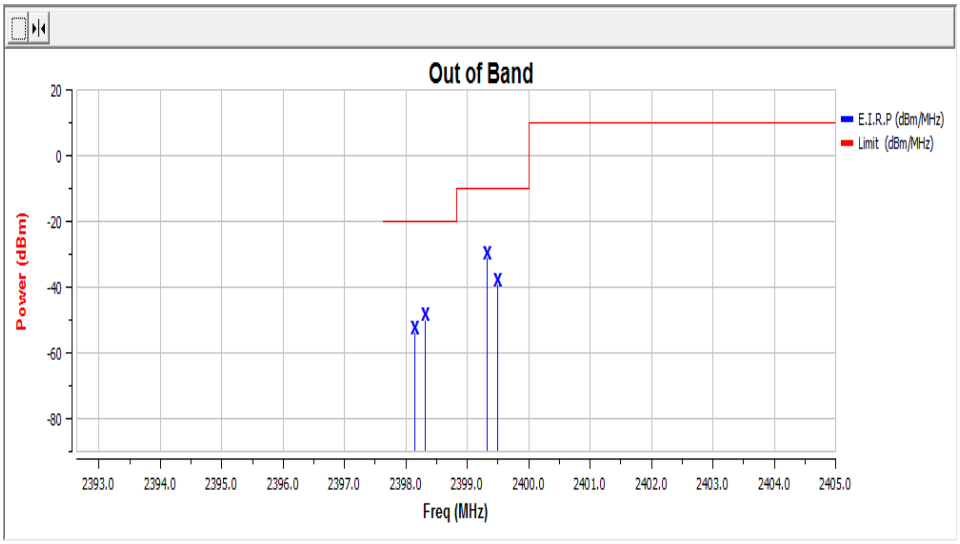
Test Mode: GFSK			
Channel	Freq(MHz)	Level	Limit
CH Low-2402	2399.5	-50.21	-10
CH Low-2402	2398.5	-60.03	-20



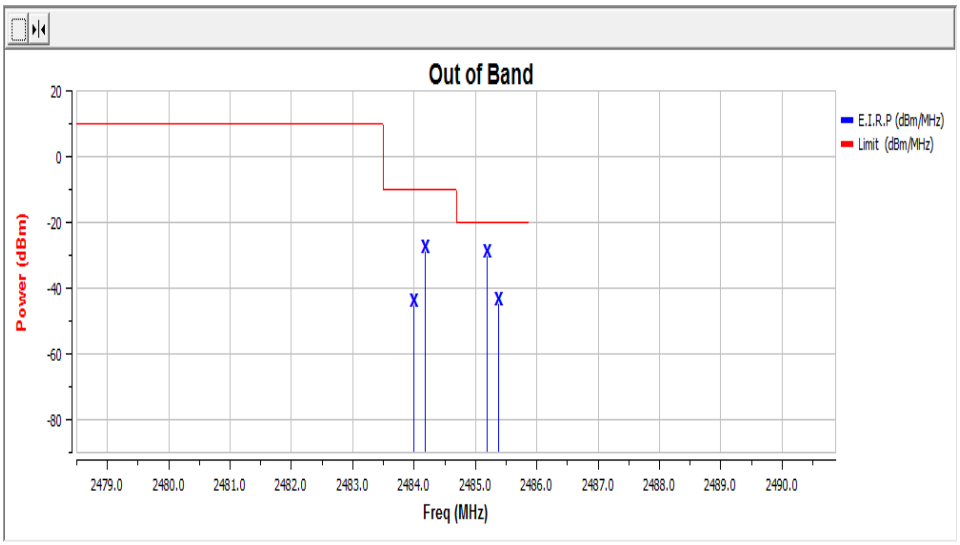
Test Mode: GFSK			
Channel	Freq(MHz)	Level	Limit
CH High-2480	2484	-65.2	-10
CH High-2480	2485	-70.31	-20



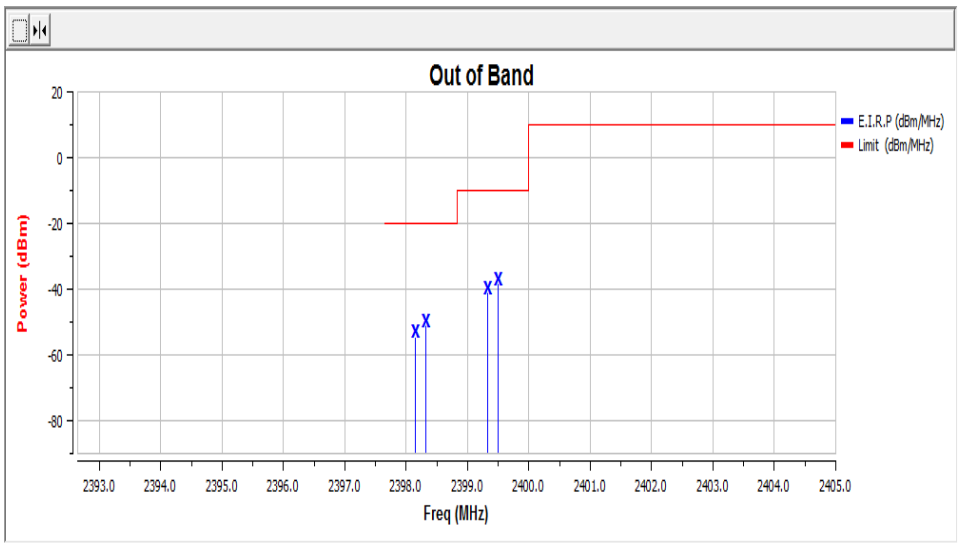
Test Mode: Pi/4 QPSK			
Channel	Freq(MHz)	Level	Limit
CH Low-2402	2399.5	-39.55	-10
CH Low-2402	2399.319	-31.42	-10
CH Low-2402	2398.319	-50.32	-20
CH Low-2402	2398.138	-54.18	-20



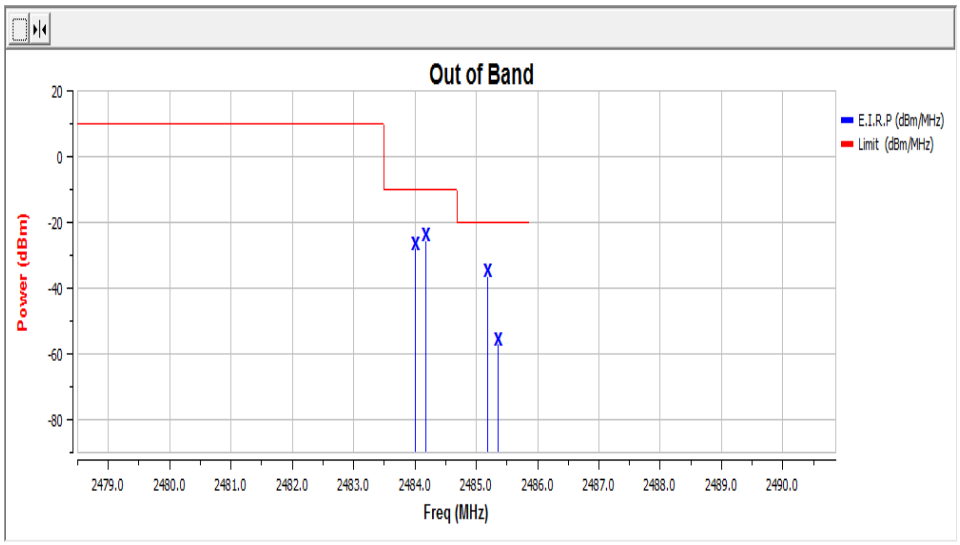
Test Mode: Pi/4 QPSK			
Channel	Freq(MHz)	Level	Limit
CH High-2480	2484	-45.59	-10
CH High-2480	2484.186	-29.06	-10
CH High-2480	2485.186	-30.58	-20
CH High-2480	2485.372	-45.17	-20



Test Mode: 8DPSK			
Channel	Freq(MHz)	Level	Limit
CH Low-2402	2399.5	-38.75	-10
CH Low-2402	2399.322	-41.39	-10
CH Low-2402	2398.322	-51.39	-20
CH Low-2402	2398.144	-54.89	-20



Test Mode: 8DPSK			
Channel	Freq(MHz)	Level	Limit
CH High-2480	2484	-28.35	-10
CH High-2480	2484.181	-25.74	-10
CH High-2480	2485.181	-36.71	-20
CH High-2480	2485.362	-57.46	-20



11. Transmitter unwanted emissions in the spurious domain

11.1. Applied Procedures / Limit

Frequency range	Maximum power	Bandwidth
30MHz-47MHz	-36dBm	100kHz
47MHz-74MHz	-54dBm	100kHz
74MHz-87.5MHz	-36dBm	100kHz
87.5MHz-118MHz	-54dBm	100kHz
118MHz-174MHz	-36dBm	100kHz
174MHz-230MHz	-54dBm	100kHz
230MHz-470MHz	-36dBm	100kHz
470MHz-862MHz	-54dBm	100kHz
862MHz-1GHz	-36dBm	100kHz
1GHz -12.75GHz	-30dBm	1MHz

11.2. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum Analyzer	Setting
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	100 kHz / 300 kHz
Sweep Points	≥ 19 400

The emissions over the range 1 GHz to 12.75 GHz shall be identified.

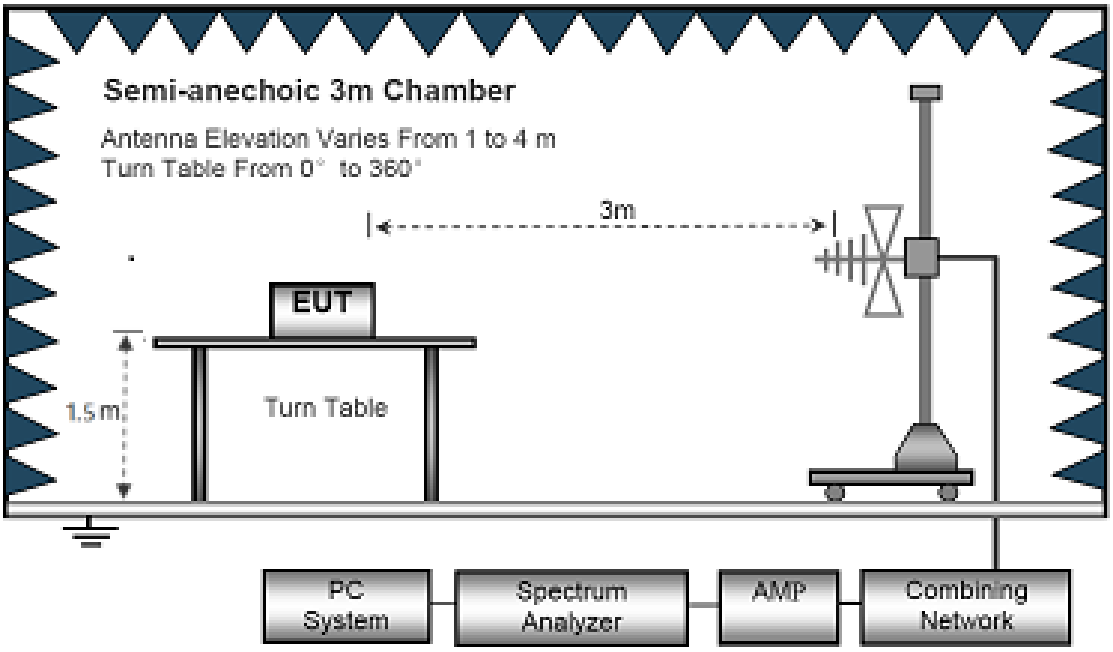
Spectrum Analyzer	Setting
Start Frequency	1 GHz
Stop Frequency	12.75 GHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	1 MHz / 3 MHz
Sweep Points	≥ 23 500

11.3. Test Procedures

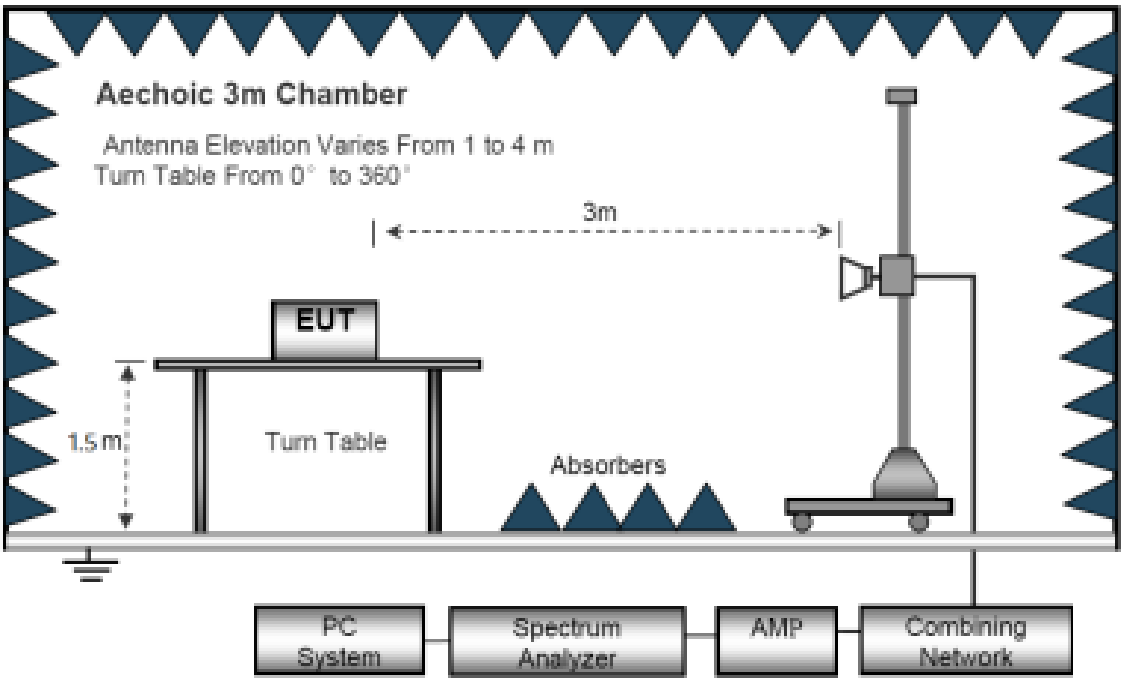
Refer to EN 300 328 V2.1.1 clause 5.4.9.

11.4. Test Setup

Below 1GHz



Above 1GHz



11.5. Test Results

The worst test mode is GFSK, and the test data are record as below:

Below 1GHz

Test Mode: GFSK-CH00			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
130.5672	-58.63	2.36	-56.27	-36	-20.27	peak	Horizontal
241.4384	-61.35	3.55	-57.80	-36	-21.80	peak	Horizontal
356.2783	-57.34	3.64	-53.70	-36	-17.70	peak	Horizontal
536.6546	-74.26	4.05	-70.21	-54	-16.21	peak	Horizontal
728.5492	-68.49	4.65	-63.84	-54	-9.84	peak	Horizontal
833.3893	-73.46	5.58	-67.88	-54	-13.88	peak	Horizontal
91.3465	-66.59	2.21	-64.38	-54	-10.38	peak	Vertical
239.6562	-57.48	3.55	-53.93	-36	-17.93	peak	Vertical
439.1274	-61.35	3.64	-57.71	-36	-21.71	peak	Vertical
541.5782	-75.82	4.05	-71.77	-54	-17.77	peak	Vertical
669.5791	-76.38	4.65	-71.73	-54	-17.73	peak	Vertical
832.1872	-71.45	5.58	-65.87	-54	-11.87	peak	Vertical

Test Mode: GFSK-CH78			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
130.2875	-59.33	2.36	-56.97	-36	-20.97	peak	Horizontal
241.4574	-60.72	3.55	-57.17	-36	-21.17	peak	Horizontal
356.3474	-59.39	3.64	-55.75	-36	-19.75	peak	Horizontal
536.8241	-74.35	4.05	-70.30	-54	-16.30	peak	Horizontal
728.5182	-73.36	4.65	-68.71	-54	-14.71	peak	Horizontal
833.4110	-75.21	5.58	-69.63	-54	-15.63	peak	Horizontal
91.4215	-66.77	2.21	-64.56	-54	-10.56	peak	Vertical
239.7021	-61.27	3.55	-57.72	-36	-21.72	peak	Vertical
433.1154	-62.08	3.64	-58.44	-36	-22.44	peak	Vertical
541.4789	-77.19	4.05	-73.14	-54	-19.14	peak	Vertical
671.5422	-74.11	4.65	-69.46	-54	-15.46	peak	Vertical
832.4756	-72.43	5.58	-66.85	-54	-12.85	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB)
3. GFSK mode is the worst mode and its data have been recorded in this report.

Above 1GHz

Test Mode: GFSK-CH00			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
4804.129	-60.24	12.35	-47.89	-30	-17.89	peak	Horizontal
6372.653	-65.27	18.21	-47.06	-30	-17.06	peak	Horizontal
7413.784	-61.23	18.87	-42.36	-30	-12.36	peak	Horizontal
9093.563	-63.96	20.25	-43.71	-30	-13.71	peak	Horizontal
10029.783	-60.16	21.65	-38.51	-30	-8.51	peak	Horizontal
11058.675	-63.11	23.67	-39.44	-30	-9.44	peak	Horizontal
4804.129	-60.57	12.35	-48.22	-30	-18.22	peak	Vertical
6372.653	-61.93	18.21	-43.72	-30	-13.72	peak	Vertical
7413.784	-64.38	18.87	-45.51	-30	-15.51	peak	Vertical
9093.563	-61.03	20.25	-40.78	-30	-10.78	peak	Vertical
10029.783	-64.29	21.65	-42.64	-30	-12.64	peak	Vertical
11058.675	-64.85	23.67	-41.18	-30	-11.18	peak	Vertical

Test Mode: GFSK-CH78			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
4959.102	-58.43	12.38	-46.05	-30	-16.05	peak	Horizontal
6614.563	-63.49	18.55	-44.94	-30	-14.94	peak	Horizontal
7438.764	-62.48	18.89	-43.59	-30	-13.59	peak	Horizontal
9082.681	-66.38	20.25	-46.13	-30	-16.13	peak	Horizontal
9571.785	-62.38	21.64	-40.74	-30	-10.74	peak	Horizontal
11446.693	-61.86	23.65	-38.21	-30	-8.21	peak	Horizontal
4959.102	-59.58	12.38	-47.2	-30	-17.2	peak	Vertical
6614.563	-61.47	18.55	-42.92	-30	-12.92	peak	Vertical
7438.764	-62.06	18.89	-43.17	-30	-13.17	peak	Vertical
9082.681	-65.18	20.25	-44.93	-30	-14.93	peak	Vertical
9571.785	-66.34	21.64	-44.7	-30	-14.7	peak	Vertical
11446.693	-64.29	23.65	-40.64	-30	-10.64	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB)
3. GFSK mode is the worst mode and its data have been recorded in this report.

12. Receiver spurious emissions

12.1. Applied Procedures / Limit

The spurious emissions of the receiver shall not exceed the values given in the following table. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Clause	Frequency range	Maximum power	Bandwidth
4.3.1.11.3	30MHz-1GHz	-57dBm	100kHz
	1GHz -12.75GHz	-47dBm	1MHz

12.2. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum Analyzer	Setting
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	100 kHz / 300 kHz
Sweep Points	≥ 19 400

The emissions over the range 1 GHz to 12.75 GHz shall be identified.

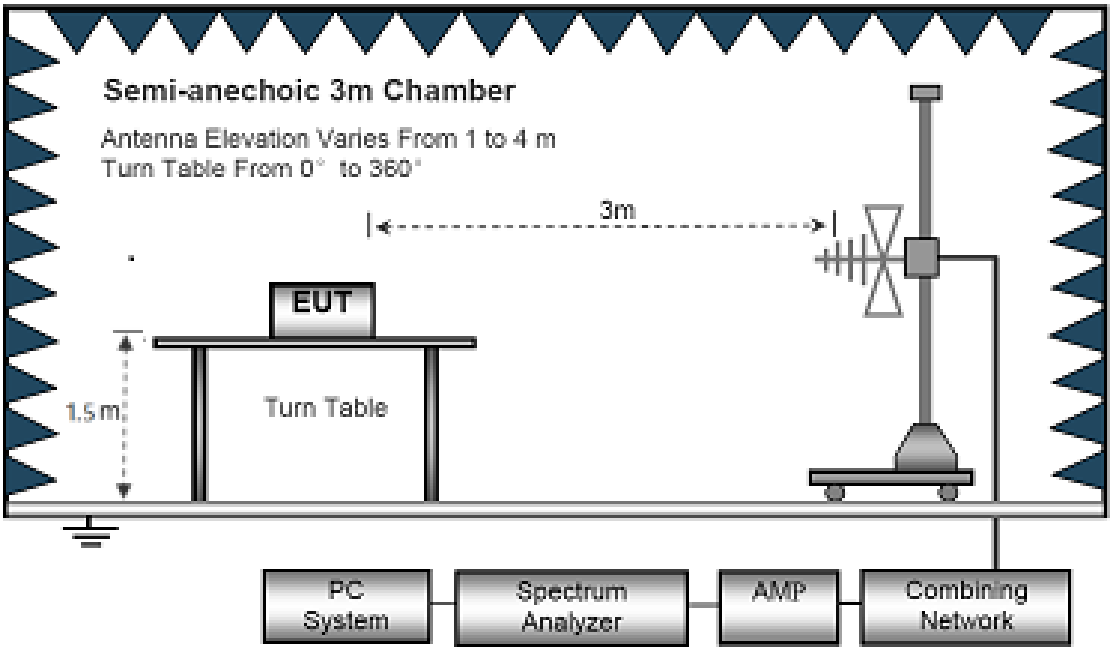
Spectrum Analyzer	Setting
Start Frequency	1 GHz
Stop Frequency	12.75 GHz
Detector Mode	Peak
Trace Mode	Max Hold
Filter type	3 dB (Gaussian)
RBW / VBW	1 MHz / 3 MHz
Sweep Points	≥ 23 500

12.3. Test Procedures

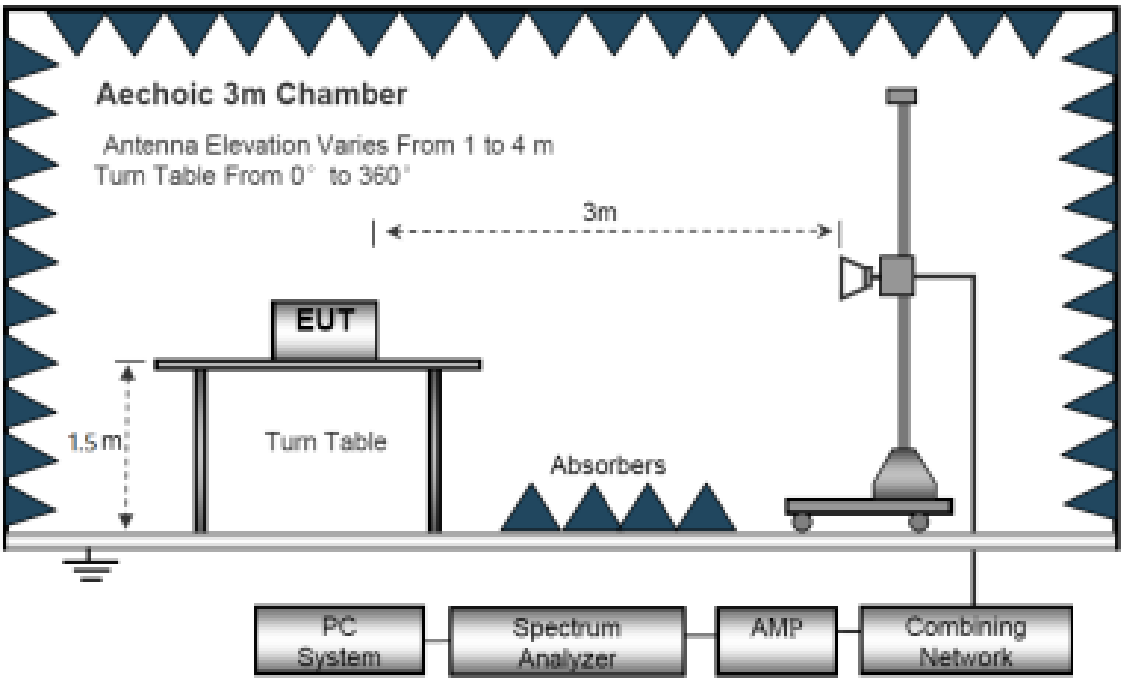
Refer to EN 300 328 V2.1.1 clause 5.4.10.

12.4. Test Setup

Below 1GHz



Above 1GHz



12.5. Test Results

The worst test mode is GFSK, and the test data are record as below:

Below 1GHz

Test Mode: GFSK-CH00			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
128.5439	-69.35	2.34	-67.01	-57	-10.01	peak	Horizontal
242.2387	-68.49	3.55	-64.94	-57	-7.94	peak	Horizontal
541.2129	-71.59	3.65	-67.94	-57	-10.94	peak	Horizontal
665.5747	-75.16	4.01	-71.15	-57	-14.15	peak	Horizontal
778.9824	-75.83	4.76	-71.07	-57	-14.07	peak	Horizontal
949.7529	-74.86	5.68	-69.18	-57	-12.18	peak	Horizontal
88.2463	-72.34	2.21	-70.13	-57	-13.13	peak	Vertical
234.3562	-71.27	3.56	-67.71	-57	-10.71	peak	Vertical
522.2781	-76.16	3.65	-72.51	-57	-15.51	peak	Vertical
665.9872	-74.96	4.01	-70.95	-57	-13.95	peak	Vertical
826.2193	-73.37	4.72	-68.65	-57	-11.65	peak	Vertical
896.7924	-76.72	5.62	-71.1	-57	-14.1	peak	Vertical

Test Mode: GFSK-CH78			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
244.6729	-70.34	3.36	-66.98	-57	-9.98	peak	Horizontal
393.2876	-71.72	3.58	-68.14	-57	-11.14	peak	Horizontal
544.1287	-75.82	3.85	-71.97	-57	-14.97	peak	Horizontal
695.4572	-75.14	3.94	-71.2	-57	-14.2	peak	Horizontal
803.3482	-73.33	4.51	-68.82	-57	-11.82	peak	Horizontal
905.8971	-74.86	5.51	-69.35	-57	-12.35	peak	Horizontal
96.6746	-67.35	3.21	-64.14	-57	-7.14	peak	Vertical
236.6754	-70.27	3.52	-66.75	-57	-9.75	peak	Vertical
438.1293	-72.21	3.74	-68.47	-57	-11.47	peak	Vertical
545.8962	-76.81	3.84	-72.97	-57	-15.97	peak	Vertical
725.6538	-73.33	4.59	-68.74	-57	-11.74	peak	Vertical
879.9651	-75.63	5.58	-70.05	-57	-13.05	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB)
3. GFSK mode is the worst mode and its data have been recorded in this report.

Above 1GHz

Test Mode: GFSK-CH00			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
3533.478	-70.28	12.04	-58.24	-47	-11.24	peak	Horizontal
4684.561	-72.34	12.31	-60.03	-47	-13.03	peak	Horizontal
5731.189	-74.46	17.98	-56.48	-47	-9.48	peak	Horizontal
6671.162	-74.38	18.55	-55.83	-47	-8.83	peak	Horizontal
8286.356	-77.52	19.54	-57.98	-47	-10.98	peak	Horizontal
9791.274	-77.34	21.69	-55.65	-47	-8.65	peak	Horizontal
3705.348	-72.33	12.14	-60.19	-47	-13.19	peak	Vertical
4952.264	-70.89	12.33	-58.56	-47	-11.56	peak	Vertical
5924.452	-73.38	17.85	-55.53	-47	-8.53	peak	Vertical
6912.386	-76.79	18.67	-58.12	-47	-11.12	peak	Vertical
8542.391	-77.84	19.56	-58.28	-47	-11.28	peak	Vertical
9602.463	-75.81	21.58	-54.23	-47	-7.23	peak	Vertical

Test Mode: GFSK-CH78			
EUT:	Amplifier	Model Name:	Kin Amp
Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	AC 230V

Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Polarization
3533.578	-75.01	12.05	-62.96	-47	-15.96	peak	Horizontal
4684.665	-70.13	12.32	-57.81	-47	-10.81	peak	Horizontal
5732.258	-75.31	17.99	-57.32	-47	-10.32	peak	Horizontal
6672.398	-74.34	18.56	-55.78	-47	-8.78	peak	Horizontal
8286.514	-74.09	19.55	-54.54	-47	-7.54	peak	Horizontal
9792.057	-76.38	21.71	-54.67	-47	-7.67	peak	Horizontal
3706.251	-70.27	12.15	-58.12	-47	-11.12	peak	Vertical
4953.214	-72.33	12.34	-59.99	-47	-12.99	peak	Vertical
5925.325	-71.39	18.02	-53.37	-47	-6.37	peak	Vertical
6914.236	-74.82	18.68	-56.14	-47	-9.14	peak	Vertical
8545.329	-74.34	19.58	-54.76	-47	-7.76	peak	Vertical
9601.896	-76.17	21.62	-54.55	-47	-7.55	peak	Vertical

Note:
1. The emission behaviour belongs to narrowband spurious emission.
2. Calculation of result is: Result (dBm)= Reading (dBm)+ Correct Factor (dB)
3. GFSK mode is the worst mode and its data have been recorded in this report.

13. Receiver Blocking

13.1. Categorization

Receiver category 1

Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver category 2

Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver category 3

Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

13.2. Limit

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 1, table 2 or table 3.

Table 1 contains the Receiver Blocking parameters for Receiver Category 1 equipment.

Table 1

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW

NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Table 2 contains the Receiver Blocking parameters for Receiver Category 2 equipment.

Table 2

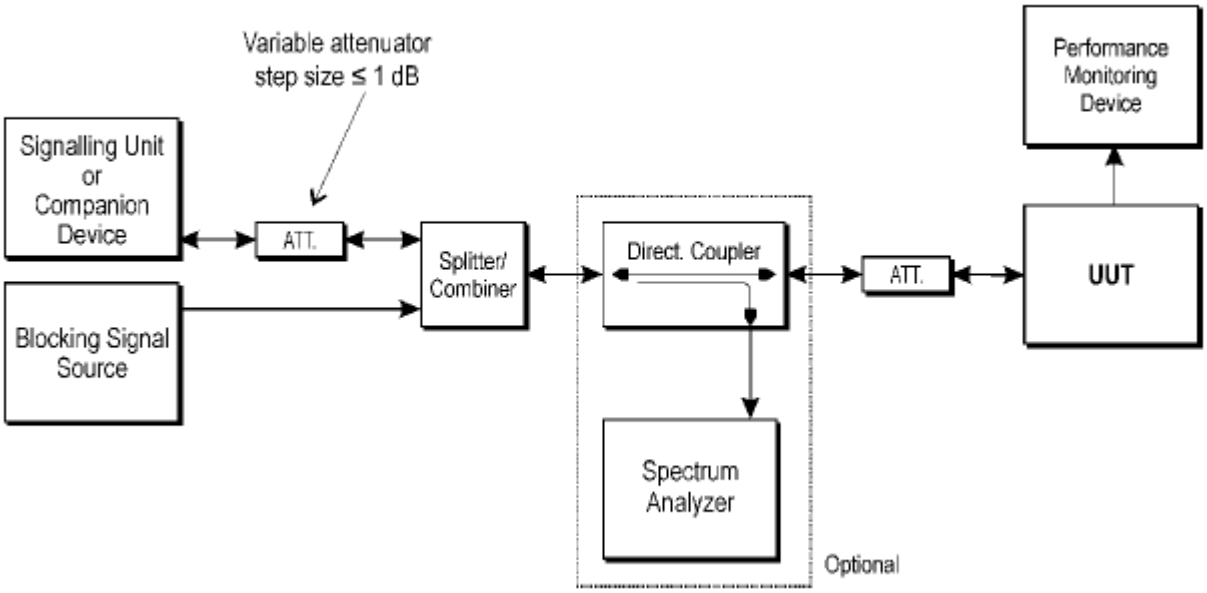
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

Table 3 contains the Receiver Blocking parameters for Receiver Category 3 equipment.

Table 3

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

13.3. Test Setup



13.4. Test Procedure

Refer to ETSI EN 300 328 V2.1.1 (2016-11) Clause 5.4.11

13.5. Test Result

Test Mode	GFSK Low Channel					
Pmin	-79.81dBm					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
Pmin + 6 dB	2380.0	-54.54	CW	2.24	≦10	Pass
	2503.5			2.47		Pass
Pmin + 6 dB	2300.0	-44.54	CW	3.18	≦10	Pass
	2583.5			3.45		Pass

Test Mode	GFSK High Channel					
Pmin	-78.22dBm					
Wanted signal Mean power From companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	PER (%)	PER (%) Limit	Result
Pmin + 6 dB	2380.0	-54.54	CW	4.34	≦10	Pass
	2503.5			4.22		Pass
Pmin + 6 dB	2300.0	-44.54	CW	3.31	≦10	Pass
	2583.5			3.15		Pass

Note:
GFSK mode is the worst mode and its data have been recorded in this report.

14. Test Photograph

15. EUT Constructional Details

Reference to the test report No. TR19050308-E-003.

*** the end of report ***