FCC Part 15C

Measurement And Test Report

For

NEAREX PTE LTD.

80B Bencoolen Street, #12-05 The Bencoolen, Singapore 189648

FCC ID: 2AFM3XIPPOS

May 25, 2015

This Report Concerns: ☒ Original Report	**Equipment Type:** XipPos
Report Number:	MTI150504001RF-3
Test Engineer:	Bill Chen
Reviewed By:	Jason Zheng
Approved & Authorized By:	Hebe Lee
Test Date:	May 08, 2015 – May 25, 2015
Prepared By:	**Shenzhen Microtest Technology Co.,Ltd** 6F, Zhongbao Building, Gushu, Bao'an District, Shenzhen, P.R.China Tel: +86-755-8885 0135 Fax: +86-755-8885 0136

TEST RESULT CERTIFICATION	
Applicant's name ..... :	**NEAREX PTE LTD.**
Address..... :	80B Bencoolen Street, #12-05 The Bencoolen, Singapore 189648
Manufacture's Name..... :	**NEAREX PTE LTD.**
Address..... :	80B Bencoolen Street, #12-05 The Bencoolen, Singapore 189648
Product description	
Product name .....:	XipPos
Model and/or type reference :	XipPos
Serial Model.....:	N/A
Standards..... :	FCC Part15.247
Test procedure.....	ANSI C63.4-2009

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.203/15.247(c)	Antenna Requirement	PASSED	
15.207	Conducted Emission	PASSED	
15.247(b)(1)	Conducted Peak Output Power	PASSED	
15.247(a)(1)	20dB Occupied Bandwidth	PASSED	
15.247(a)(1)	Carrier Frequencies Separation	PASSED	
15.247(a)(1)	Hopping Channel Number	PASSED	
15.247(a)(1)	Dwell Time	PASSED	
15.205/15.209	Spurious Emission	PASSED	
15.247(d)	Band Edge	PASSED	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen Toby Technology Co., Ltd.
Add.: 10/F.,A Block,Jiada R&D Bldg.,No.5 Songpingshan, Road, Science&Technology Park, Shenzhen, 518057
FCC Registration No.:811562

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	XipPos
Trade Name	N/A
Model Name	XipPos
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a XipPos Operation Frequency: 2402-2480MHz Modulation Type: GFSK, π/4-DQPSK, 8-DPSK Bit Rate of Transmitter 1,2,3Mbps Number Of Channel 79CH Antenna Designation: Please see Note 3. Output Power(Conducted): 1.39dBm Antenna Gain (dBi) 0.0dbi Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Adapter	Model: K-T50501000U1 Input: 100-240V~50-60Hz 0.15A Max Output: 5V⎓1000mA
Battery	DC 3.7V, 600mAh
Connecting I/O Port(s)	Please refer to the User's Manual

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		
Remark: Channel 0, 39 &78 selected for GFSK, π/4-DQPSK and 8DPSK.					

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Internal antenna	Internal antenna	0	BT Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	GFSK CH1/CH40/CH79
Mode 2	π/4-DQPSK CH1/CH40/CH79
Mode 3	8-DPSK CH1/CH40/CH79
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

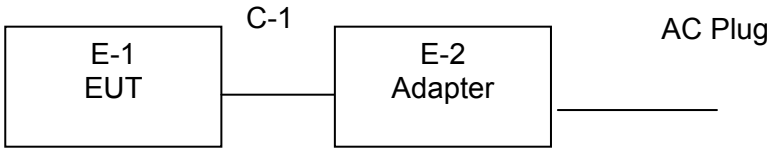
For Radiated Emission	
Final Test Mode	Description
Mode 1	GFSK CH1/CH40/CH79
Mode 2	π/4-DQPSK CH1/CH40/CH79
Mode 3	8-DPSK CH1/CH40/CH79

Note:

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

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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	Brand	Model/Type No.	Series No.	Note
E-1	XipPos	N/A	XipPos	N/A	EUT
E-2	Adapter	N/A	K-T50501000U1	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.8m	
C-2	NO	NO	0.8m	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Cal.Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2015	Mar. 19, 2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSP30	DE25181	Aug. 10, 2014	Aug. 09, 2015
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101165	Aug. 10, 2014	Aug. 09, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2015	Mar. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2015	Mar. 06, 2016
Hom Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2015	Mar. 06, 2016
Hom Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2015	Mar. 06, 2016
Pre-anplifier	HP	11909A	185903	Mar. 07, 2015	Mar. 06, 2016
Pre-anplifier	HP	8447B	3008A00849	Mar. 07, 2015	Mar. 06, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2015	Mar. 06, 2016
Signal Generator	ROHDE&SCHWARZ	SML03	IKW682-054	Feb. 11, 2015	Feb. 10, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

Conduction Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Cal.Due Date
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	1000321	2014-08-10	2015-08-09
50Ω Coaxial Switch	Anntsu	MP59B	X10321	2014-08-10	2015-08-09
LISN	ROHDE&SCHWARZ	ENV216	101131	2014-08-10	2015-08-09
LISN	SCHWARZBECK	NNBL 8226-2	8226-2/164	2014-08-10	2015-08-09

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

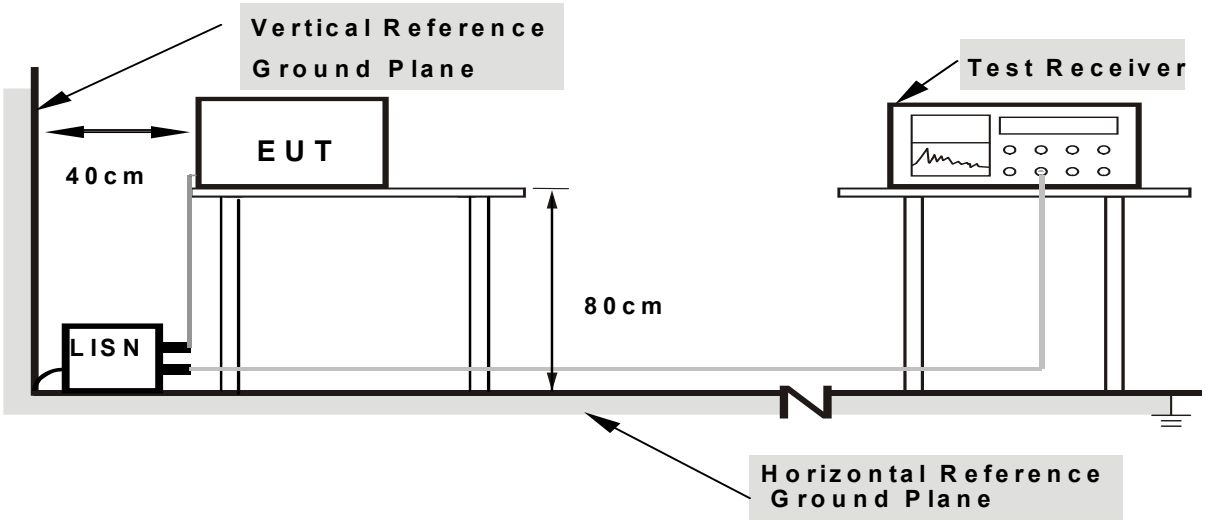
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



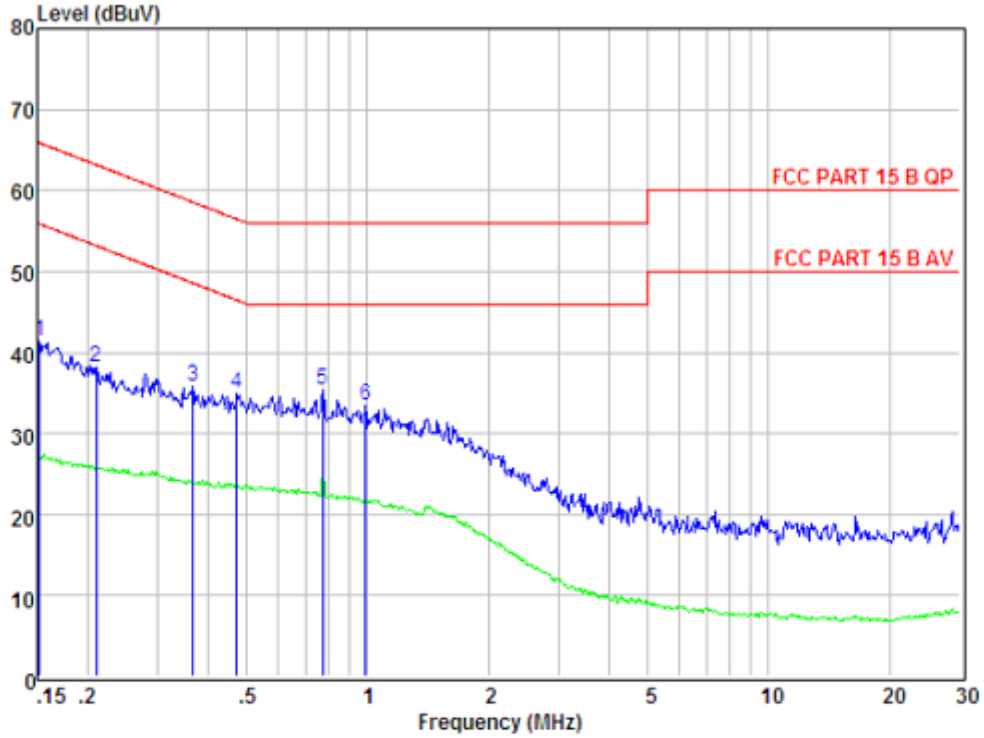
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

EUT：	XipPos	Model Name. ：	XipPos
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5Vfrom adapter AC 120V/60Hz	Test Mode：	Mode 4

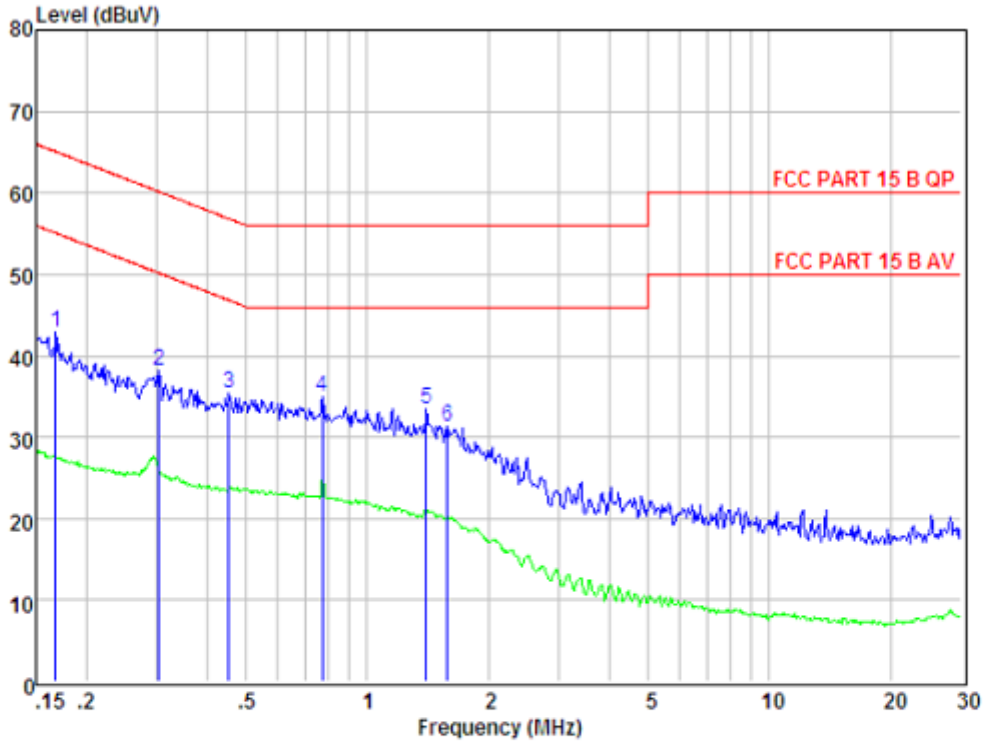


Condition : FCC PART 15 B QP POL: LINE Temp: Hum:

Item	Freq	Read	LISN Factor	Preamp Factor	Cable Lose	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	0.152	31.51	0.03	-9.72	0.10	41.36	65.91	-24.55	QP
2	0.211	28.29	0.03	-9.72	0.10	38.14	63.18	-25.04	QP
3	0.367	25.87	0.03	-9.72	0.10	35.72	58.56	-22.84	QP
4	0.471	25.12	0.03	-9.72	0.10	34.97	56.49	-21.52	QP
5	0.775	25.53	0.00	-9.71	0.10	35.34	56.00	-20.66	QP
6	0.989	23.69	0.04	-9.71	0.10	33.54	56.00	-22.46	QP

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

EUT：	XipPos	Model Name. ：	XipPos
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5Vfrom adapter AC 120V/60Hz	Test Mode：	Mode 4



Condition : FCC PART 15 B QP POL: NEUTRAL Temp: Hum:

Item	Freq	Read	LISN Factor	Preamp Factor	Cable Lose	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	0.168	33.04	0.03	-9.72	0.10	42.89	65.08	-22.19	QP
2	0.303	28.30	0.03	-9.72	0.10	38.15	60.15	-22.00	QP
3	0.452	25.44	0.03	-9.72	0.10	35.29	56.85	-21.56	QP
4	0.775	25.18	0.00	-9.71	0.10	34.99	56.00	-21.01	QP
5	1.403	23.65	0.05	-9.71	0.10	33.51	56.00	-22.49	QP
6	1.585	21.35	0.05	-9.71	0.10	31.21	56.00	-24.79	QP

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

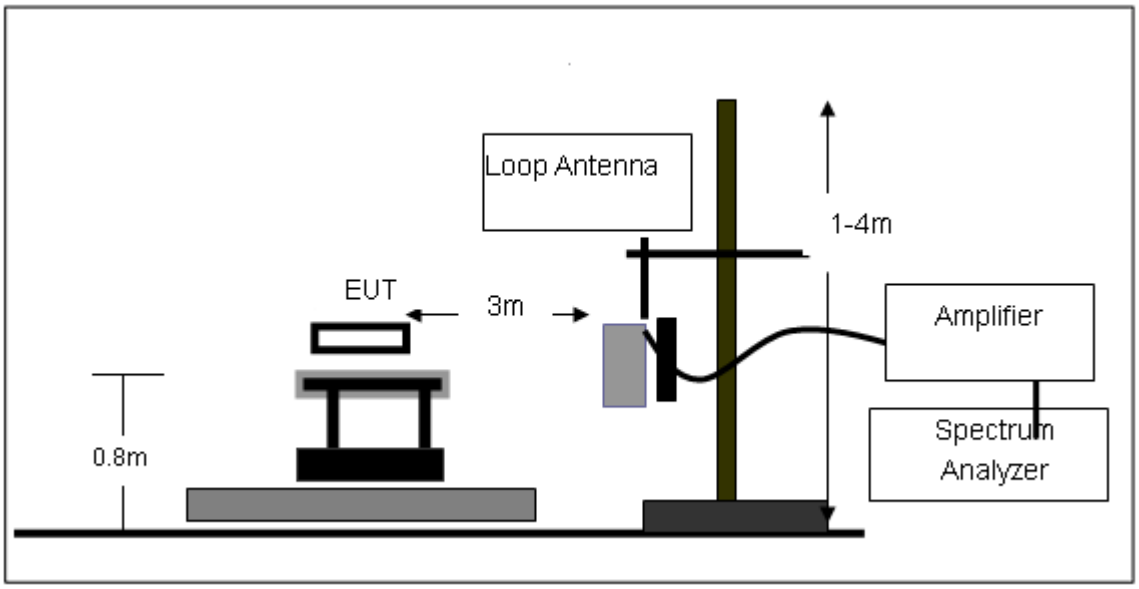
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

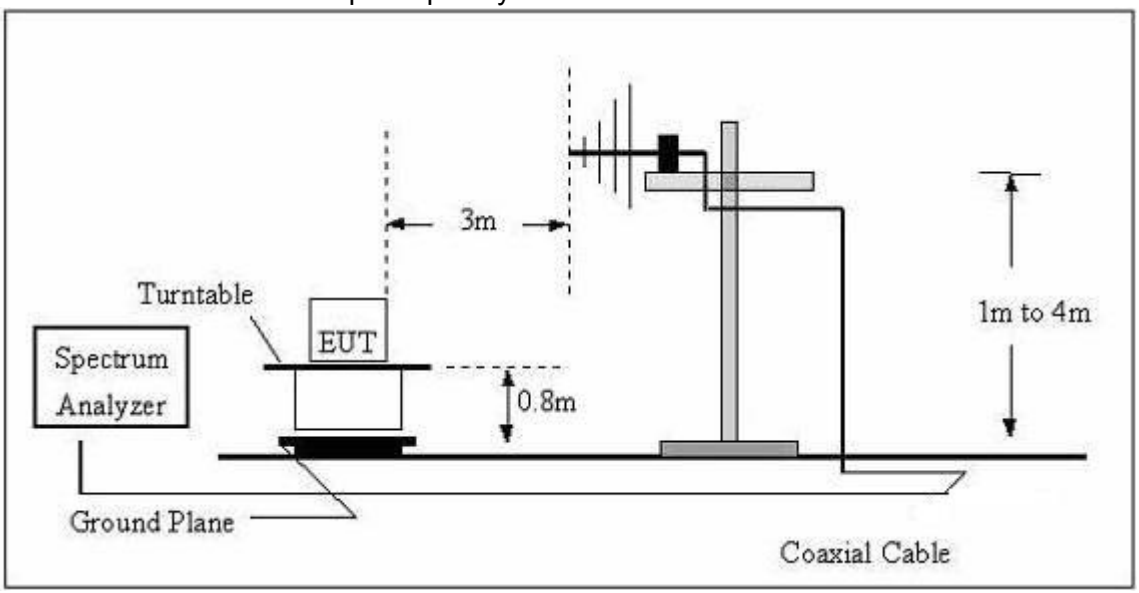
No deviation

3.2.4 TEST SETUP

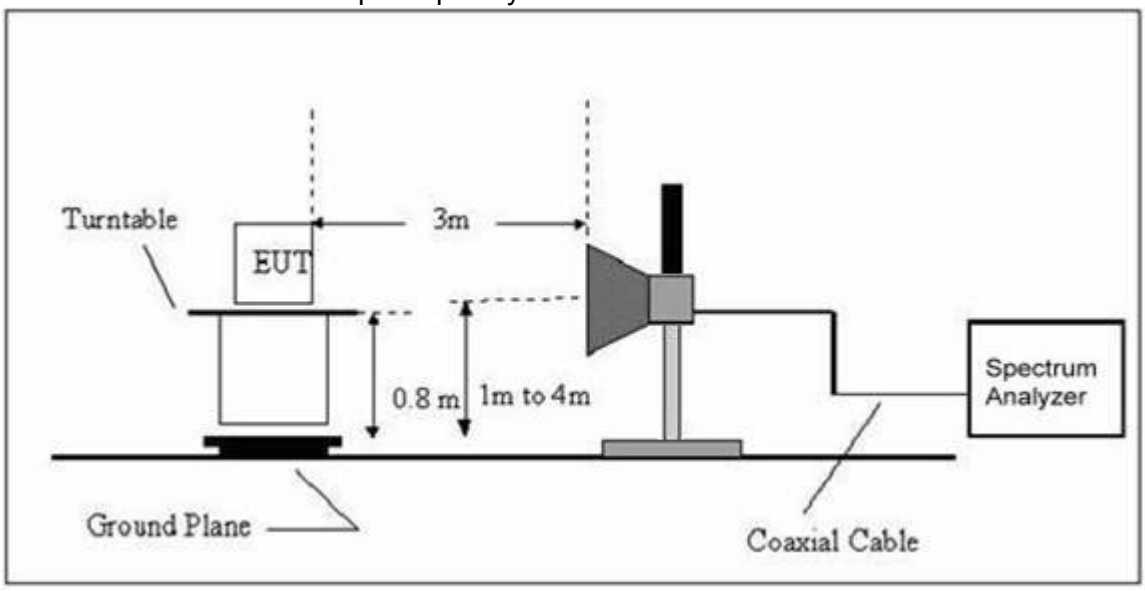
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT：	XipPos	Model Name. ：	XipPos
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5Vfrom adapter AC 120V/60Hz
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT：	XipPos	Model Name ：	XipPos
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	TX		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	136.7324	13.74	11.37	25.11	43.5	-18.39	QP
V	167.1467	21.23	13.63	34.86	43.5	-8.64	QP
V	392.6245	15.53	16.73	32.26	46	-13.74	QP
V	512.4582	13.33	22.25	35.58	46	-10.42	QP
V	921.2744	15.72	25.87	41.59	46	-4.41	QP
H	176.6637	12.62	13.92	26.54	43.5	-16.96	QP
H	352.7958	21.15	16.88	38.03	46	-7.97	QP
H	462.3472	17.92	18.94	36.86	46	-9.14	QP
H	648.2362	11.25	23.62	34.87	46	-11.13	QP
H	873.5442	14.15	24.18	38.33	46	-7.67	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level- Limit

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Factor added by measurement software automatically

3.2.8 TEST RESULTS (1G-25GHZ)

GFSK,

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (2402 MHz)							
Vertical	2491.777	54.23	-11.65	42.58	74	-31.42	Pk
Horizontal	2498.247	55.14	-12.73	42.41	74	-31.59	Pk
Vertical	4804.156	53.79	-3.50	50.29	74	-23.71	Pk
Horizontal	4804. 156	54.98	-9.17	45.81	74	-28.19	Pk
Vertical	1485.838	52.78	-17.1	35.68	74	-38.32	Pk
Vertical	1636.784	54.32	-16.06	38.26	74	-35.74	Pk
Vertical	2095.928	55.18	-11.88	43.30	74	-30.70	Pk
Horizontal	1074.301	53.65	-19.69	33.96	74	-40.04	Pk
Horizontal	1483.178	54.87	-17.09	37.78	74	-36.22	Pk
Horizontal	1895.832	53.29	-14.25	39.04	74	-34.96	Pk
Mid Channel (2441 MHz)							
Vertical	2474.777	54.78	-12.91	41.87	74	-32.13	Pk
Horizontal	2474.144	53.81	-11.59	42.22	74	-31.78	Pk
Vertical	4882.539	54.12	-9.05	45.07	74	-28.93	Pk
Horizontal	4882. 539	53.29	-3.49	49.80	74	-24.20	Pk
Vertical	1433.535	54.23	-18.27	35.96	74	-38.04	Pk
Vertical	1636.784	54.77	-16.06	38.71	74	-35.29	Pk
Vertical	2284.166	53.68	-11.99	41.69	74	-32.31	Pk
Horizontal	1280.515	55.12	-16.94	38.18	74	-35.82	Pk
Horizontal	1636.784	54.69	-15.04	39.65	74	-34.35	Pk
Horizontal	1892.438	53.71	-14.28	39.43	74	-34.57	Pk
High Channel (2480 MHz)							
Vertical	2453.883	54.12	-12.91	41.21	74	-32.79	Pk
Horizontal	2453.839	53.43	-11.59	41.84	74	-32.16	Pk
Vertical	4960.256	53.78	-9.05	44.73	74	-29.27	Pk
Horizontal	4960.478	53.12	-3.49	49.63	74	-24.37	Pk
Vertical	1187.688	54.68	-18.27	36.41	74	-37.59	Pk
Vertical	1636.784	53.94	-16.06	37.88	74	-36.12	Pk
Vertical	2084.693	52.78	-11.99	40.79	74	-33.21	Pk
Horizontal	1534.540	54.5	-16.94	37.56	74	-36.44	Pk
Horizontal	1786.985	53.56	-15.04	38.52	74	-35.48	Pk
Horizontal	1892.438	52.84	-14.28	38.56	74	-35.44	Pk

π/4-DQPSK

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402							
V	4804.428	52.47	-3.5	48.97	74	-25.03	Pk
V	4804.428	32.14	-3.5	28.64	54	-25.36	AV
H	4804.529	53.09	-3.5	49.59	74	-24.41	Pk
H	4804.529	31.83	-3.5	28.33	54	-25.67	AV
operation frequency:2441							
V	4882.548	51.79	-6.11	45.68	74	-28.32	Pk
V	4882.548	30.47	-6.11	24.36	54	-29.64	AV
H	4882.279	51.54	-6.11	45.43	74	-28.57	Pk
H	4882.279	30.88	-6.11	24.77	54	-29.23	AV
operation frequency:2480							
V	4960.358	53.14	-3.49	49.65	74	-24.35	pk
V	4960.358	31.56	-3.49	28.07	54	-25.93	AV
H	4960.591	50.75	-3.49	47.26	74	-26.74	pk
H	4960.591	31.29	-3.49	27.8	54	-26.20	pk

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

8-DPSK

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402							
V	4804.428	51.35	-3.53	47.82	74	-26.18	Pk
H	4804.529	51.01	-3.54	47.47	74	-26.53	Pk
operation frequency:2441							
V	4882.548	50.45	-3.64	46.81	74	-27.19	Pk
H	4882.279	49.74	-3.64	46.1	74	-27.9	Pk
operation frequency:2480							
V	4960.358	50.27	-3.75	46.52	74	-27.48	pk
H	4960.591	50.03	-3.74	46.29	74	-27.71	pk
Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit							

Note:The PK value is less than the AV value, AV value is not required
Factor added by measurement software automatically.

BAND EDGE(Radiated)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
GFSK							
2390	54.33	-13.06	41.27	74	-32.73	peak	Vertical
2390	56.11	-13.06	43.05	74	-30.95	peak	Horizontal
2483.5	51.87	-12.78	39.09	74	-34.91	peak	Vertical
2483.5	53.02	-12.78	40.24	74	-33.76	peak	Horizontal
π/4-DQPSK							
2390	54.19	-13.06	41.13	74	-32.87	peak	Vertical
2390	53.87	-13.06	40.81	74	-33.19	peak	Horizontal
2483.5	51.25	-12.78	38.47	74	-35.53	peak	Vertical
2483.5	50.29	-12.78	37.51	74	-36.49	peak	Horizontal
8-DPSK							
2390	53.87	-13.06	40.81	74	-33.19	peak	Vertical
2390	54.16	-13.06	41.10	74	-32.90	peak	Horizontal
2483.5	50.32	-12.78	37.54	74	-36.46	peak	Vertical
2483.5	50.15	-12.78	37.37	74	-36.63	peak	Horizontal

NOTE:The PK value is less than the AV value, AV value is not required.

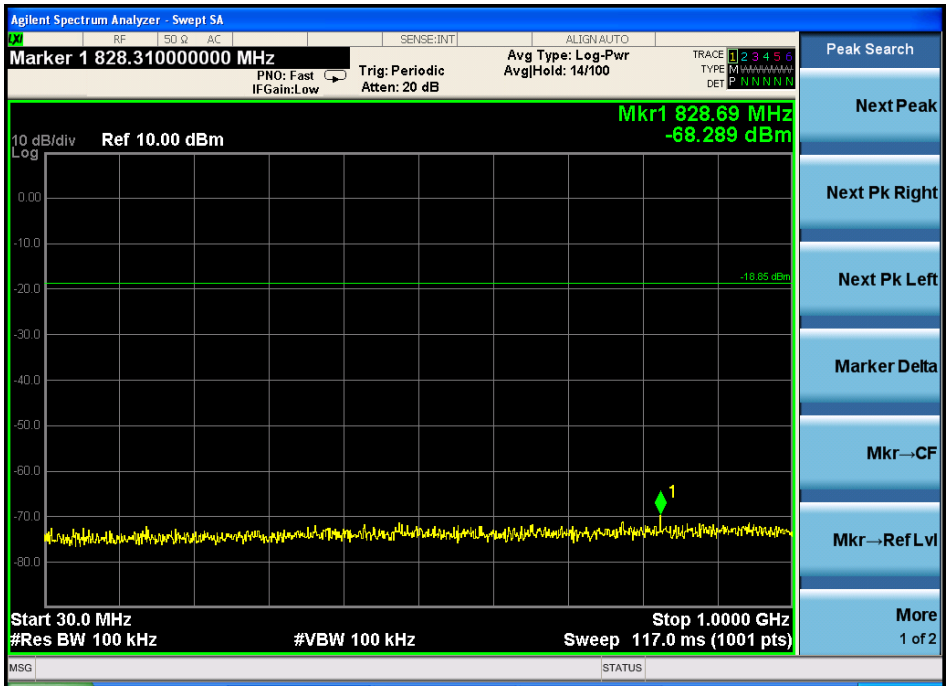
BAND EDGE(Radiated)(Hopping Mode)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
GFSK							
2390	54.52	-13.06	41.46	74	-32.54	peak	Vertical
2390	55.27	-13.06	42.21	74	-31.79	peak	Horizontal
2483.5	51.91	-12.78	39.13	74	-34.87	peak	Vertical
2483.5	52.08	-12.78	39.30	74	-34.70	peak	Horizontal
π/4-DQPSK							
2390	53.16	-13.06	40.1	74	-33.90	peak	Vertical
2390	53.67	-13.06	40.61	74	-33.39	peak	Horizontal
2483.5	51.09	-12.78	38.31	74	-35.69	peak	Vertical
2483.5	50.46	-12.78	37.68	74	-36.32	peak	Horizontal
8-DPSK							
2390	53.14	-13.06	40.08	74	-33.92	peak	Vertical
2390	53.67	-13.06	40.61	74	-33.39	peak	Horizontal
2483.5	50.49	-12.78	37.71	74	-36.29	peak	Vertical
2483.5	50.32	-12.78	37.54	74	-36.46	peak	Horizontal

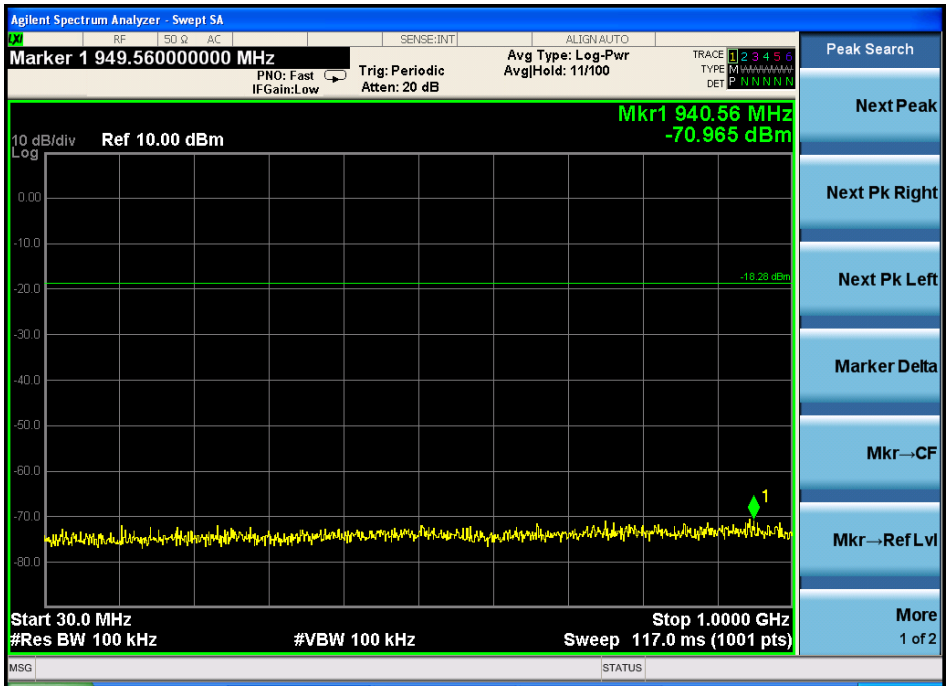
NOTE:The PK value is less than the AV value, AV value is not required.

Conducted Spurious Emissions at Antenna Port:

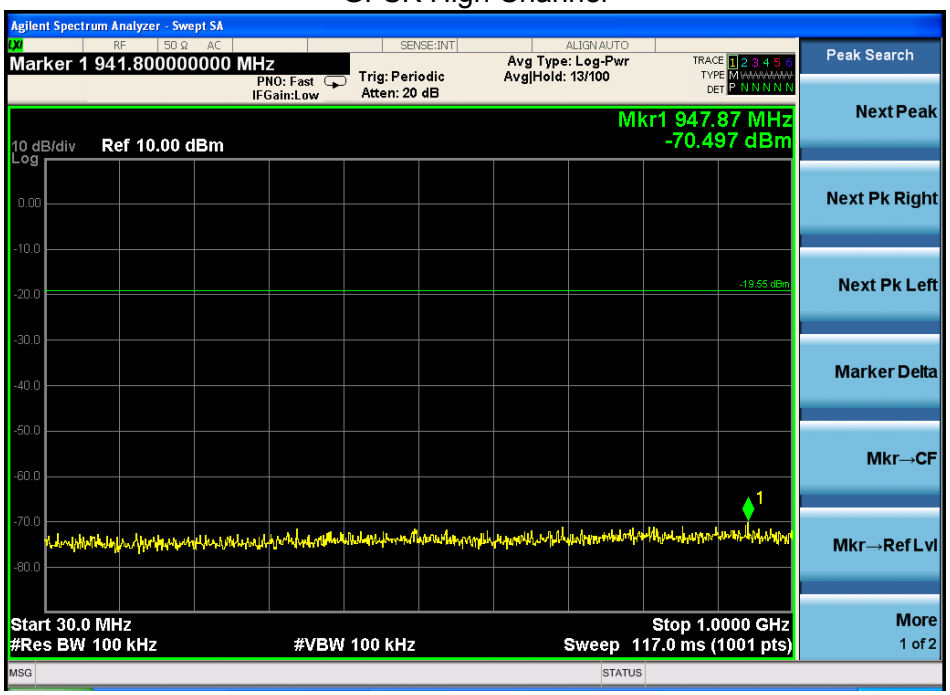
GFSK Low Channel



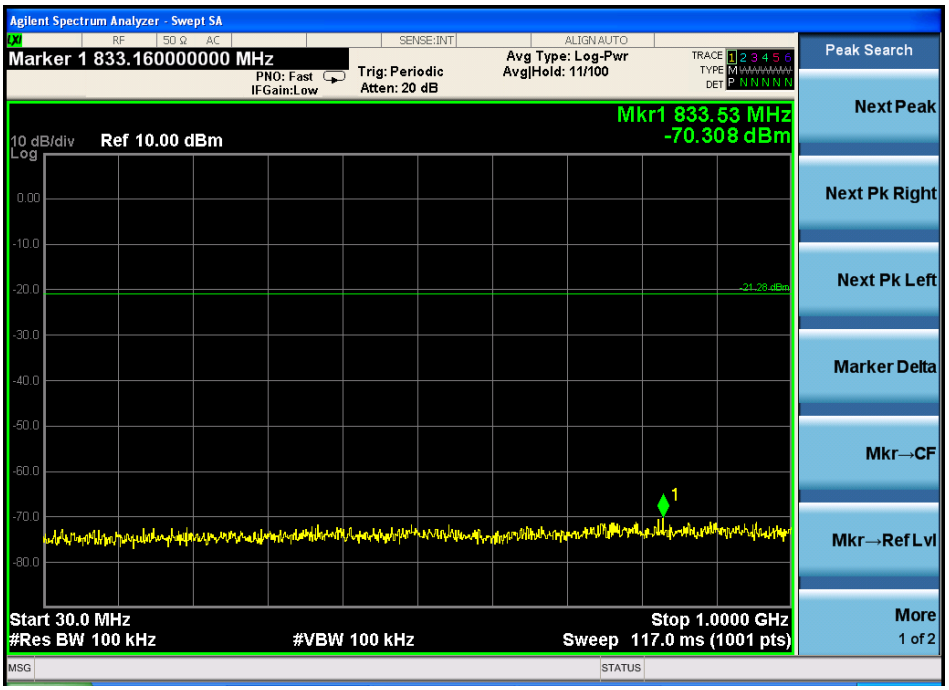
GFSK Middle Channel



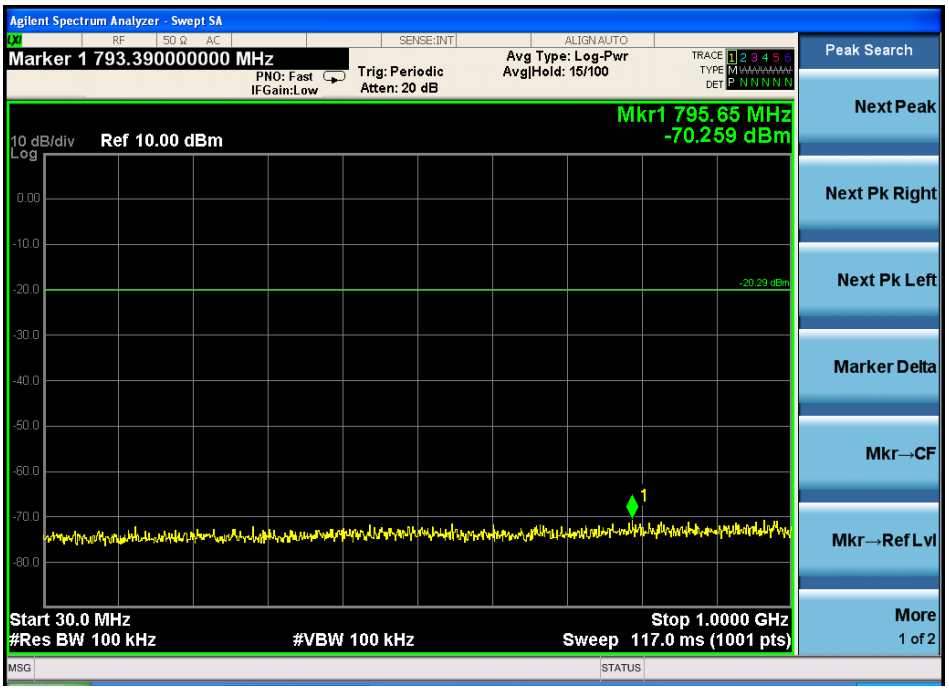
GFSK High Channel



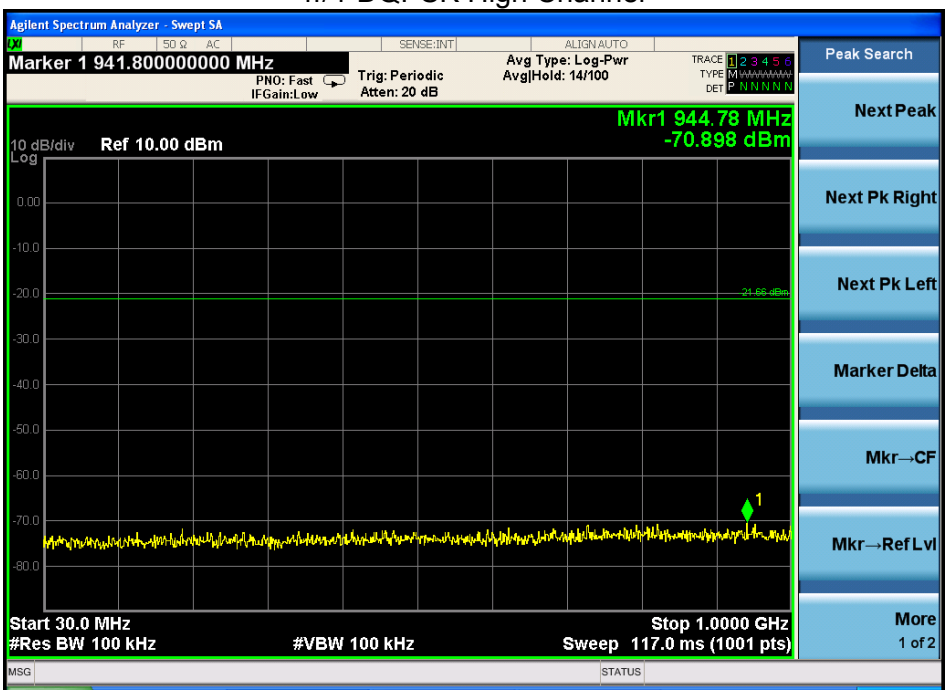
π/4-DQPSK Low Channel



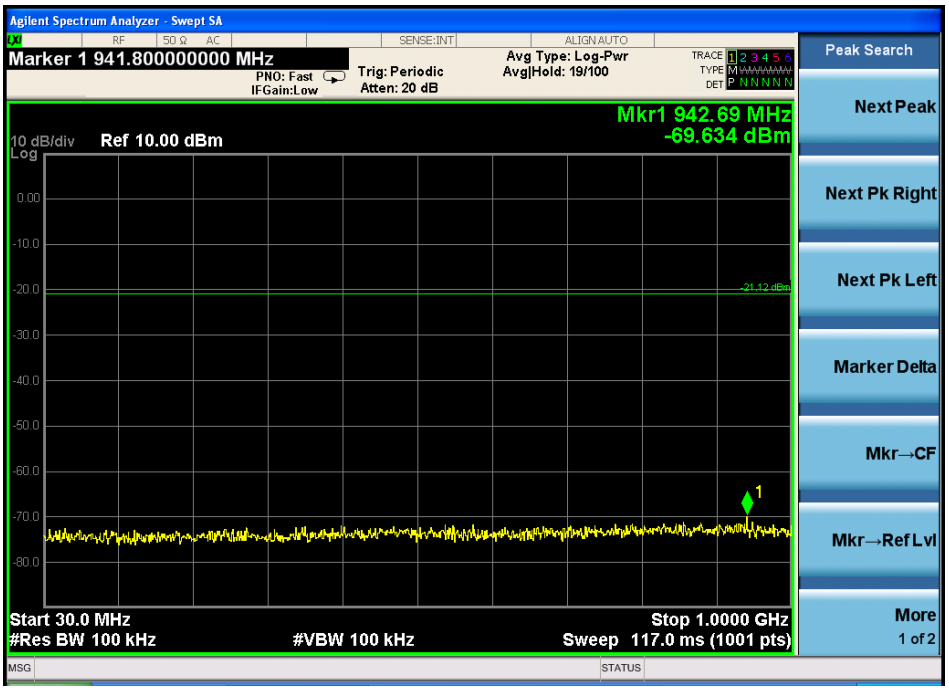
π/4-DQPSK Middle Channel



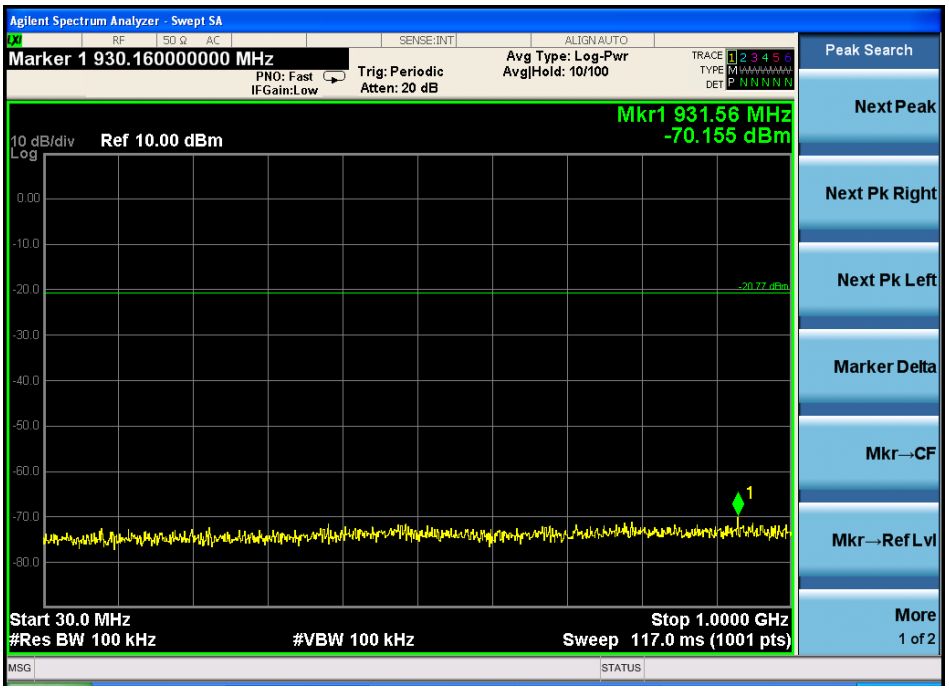
π/4-DQPSK High Channel



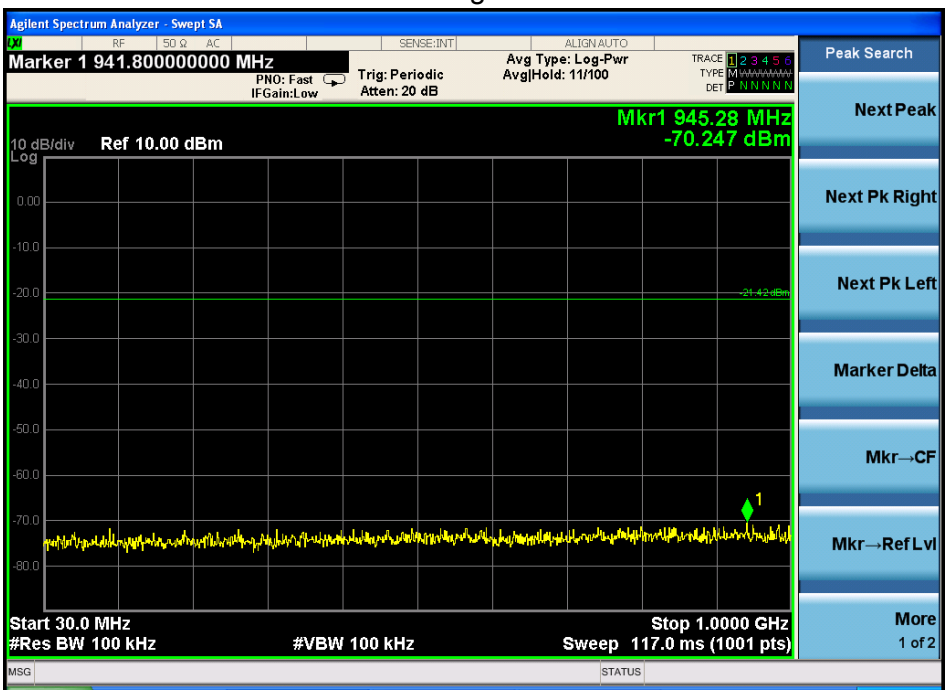
8-DPSK Low Channel



8-DPSK Middle Channel



8-DPSK High Channel



4. 20 DB OCCUPY BANDWIDTH

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247a(1)	20dB bandwidth	/	2400-2483.5	PASS

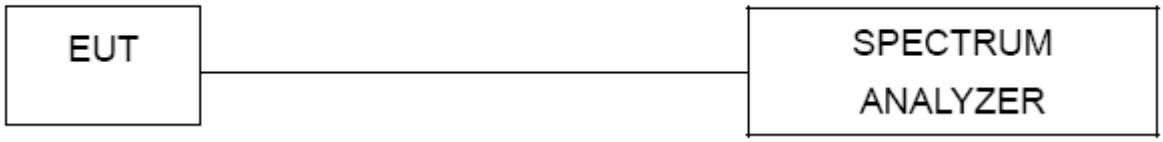
4.1.1 TEST PROCEDURE

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
Bandwidth: RBW=30 kHz, VBW=100 kHz, detector= Peak

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	GFSK Mode /CH01, CH40, CH79		

Frequency	20dB Bandwidth (KHz)	Limit	Result
2402 MHz	829.1	/	PASS
2441 MHz	831.9	/	PASS
2480 MHz	830.8	/	PASS

TX CH01

TX CH40

TX CH79

EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	π/4-DQPSK, Mode /CH01, CH40, CH79		

Frequency	20dB Bandwidth (KHz)	Limit	Result
2402 MHz	1110	/	PASS
2441 MHz	1116	/	PASS
2480 MHz	1117	/	PASS

TX CH01

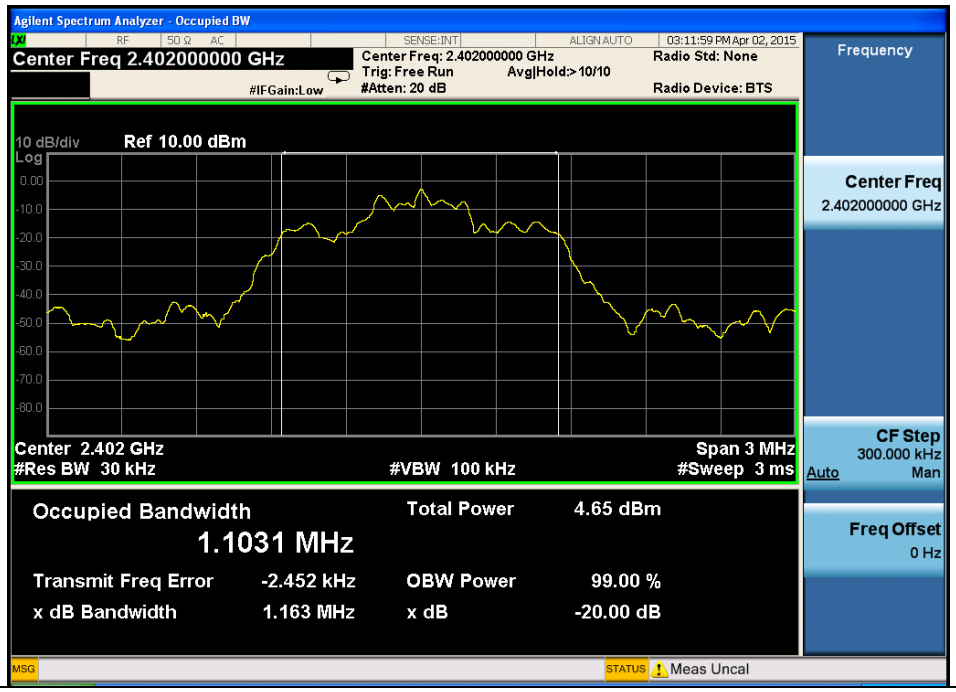
TX CH40

TX CH79

EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	8-DPSK Mode /CH01, CH40, CH79		

Frequency	20dB Bandwidth (KHz)	Limit	Result
2402 MHz	1163	/	PASS
2441 MHz	1160	/	PASS
2480 MHz	1163	/	PASS

TX CH01



TX CH40

TX CH79

5. CARRIER FREQUENCY SEPARATION TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)	Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth (Which is greater)	2400-2483.5	PASS

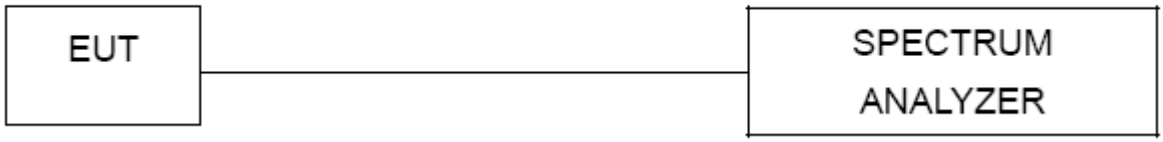
5.1.1 TEST PROCEDURE

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
RBW=100 kHz, VBW=300 kHz, detector= Peak, Sweep Time =auto.
(3) The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Test.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

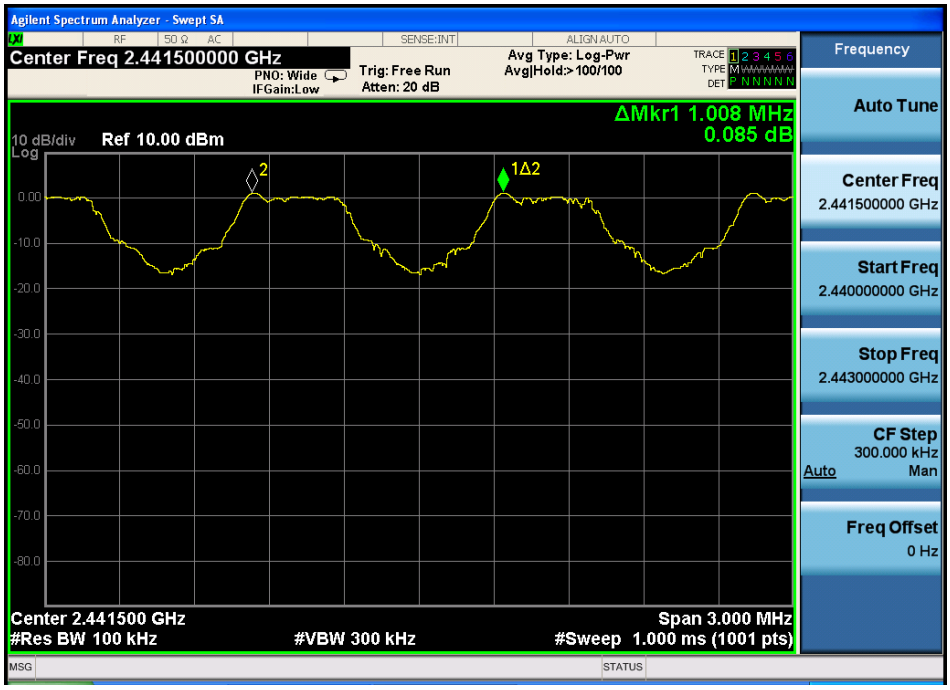
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

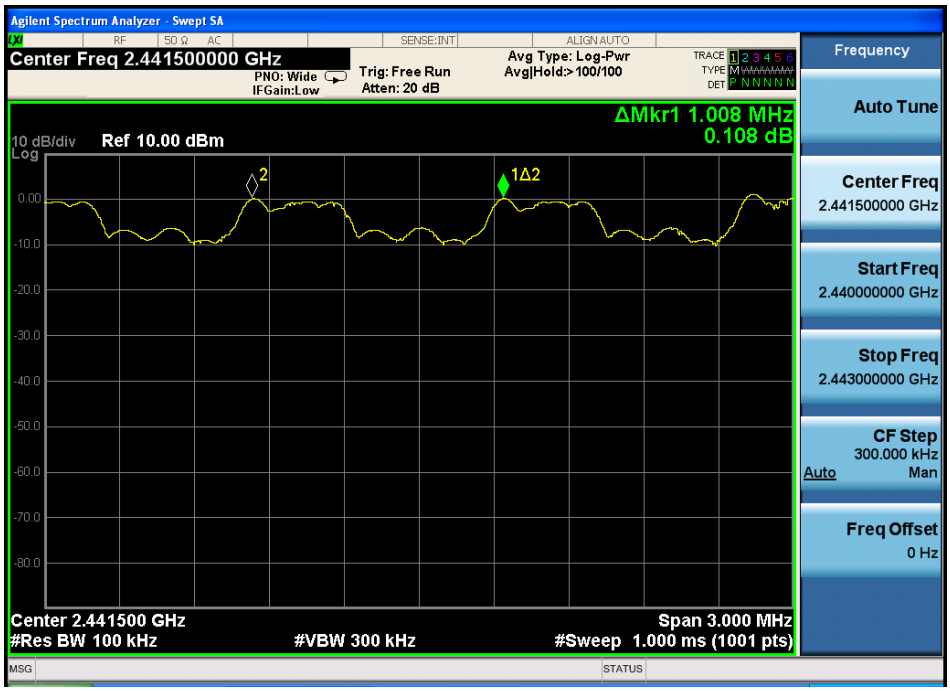
EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	GFSK Mode /CH01, CH40, CH79		

Mode	Channel	Frequency (MHz)	Test Result (KHz)	Limit (kHz)	Result
GFSK	Middle	2441	1008	554.6	Pass
π/4-DQPSK	Middle	2441	1008	744.0	Pass
8DPSK	Middle	2441	1008	773.3	Pass

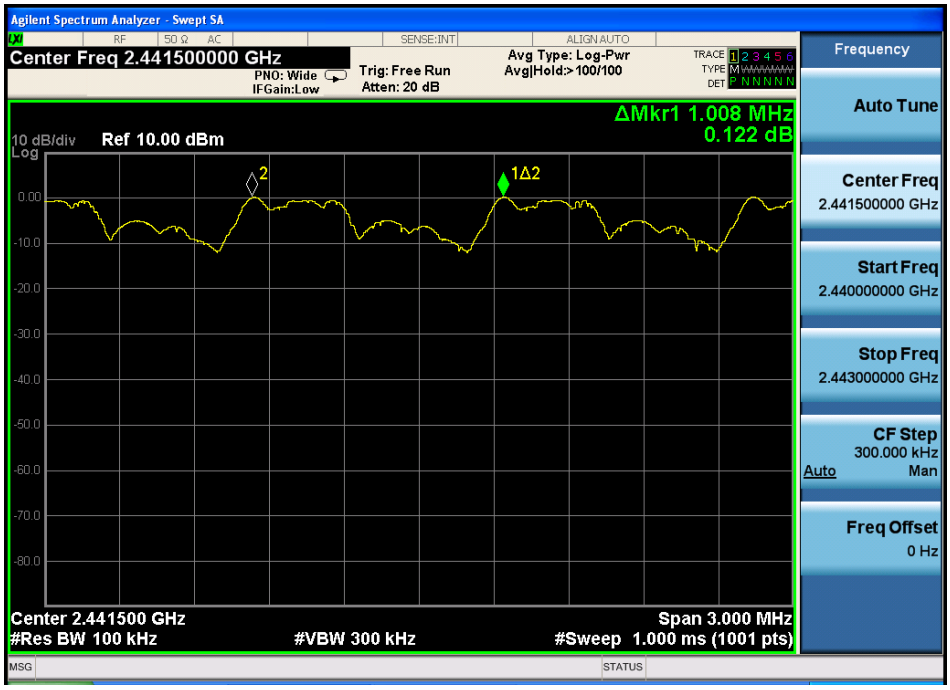
GFSK mode



π/4-DQPSK mode



8DPSK mode



6. NUMBER OF HOPPING CHANNEL

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(a)	Number of Hopping Channel	>15 channels	2400-2483.5	PASS

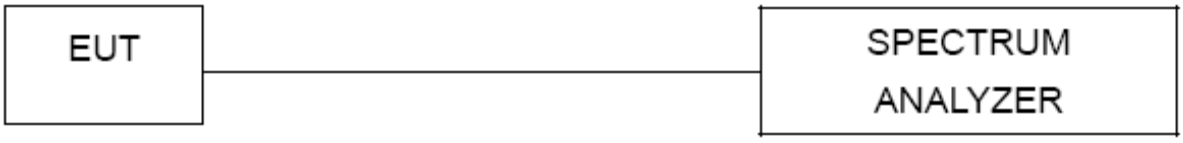
6.1.1 TEST PROCEDURE

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting: RBW=100 kHz, VBW=300 kHz, Detector=Peak, Sweep time= Auto.
(3) The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Test.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

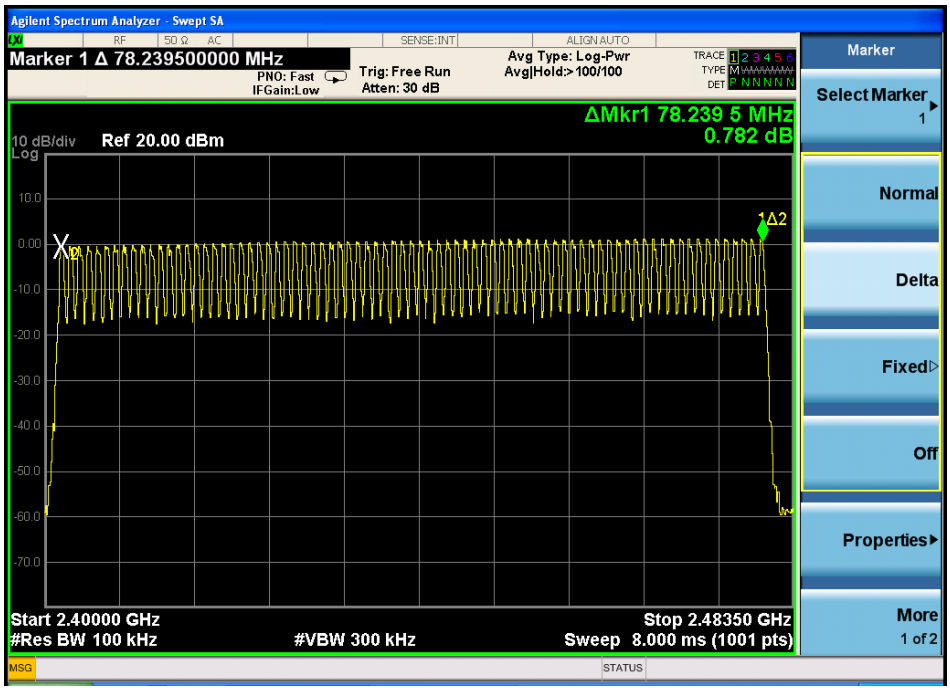
6.1.5 TEST RESULTS

EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	GFSK, π/4-DQPSK, 8-DPSK Mode /CH01, CH40, CH79		

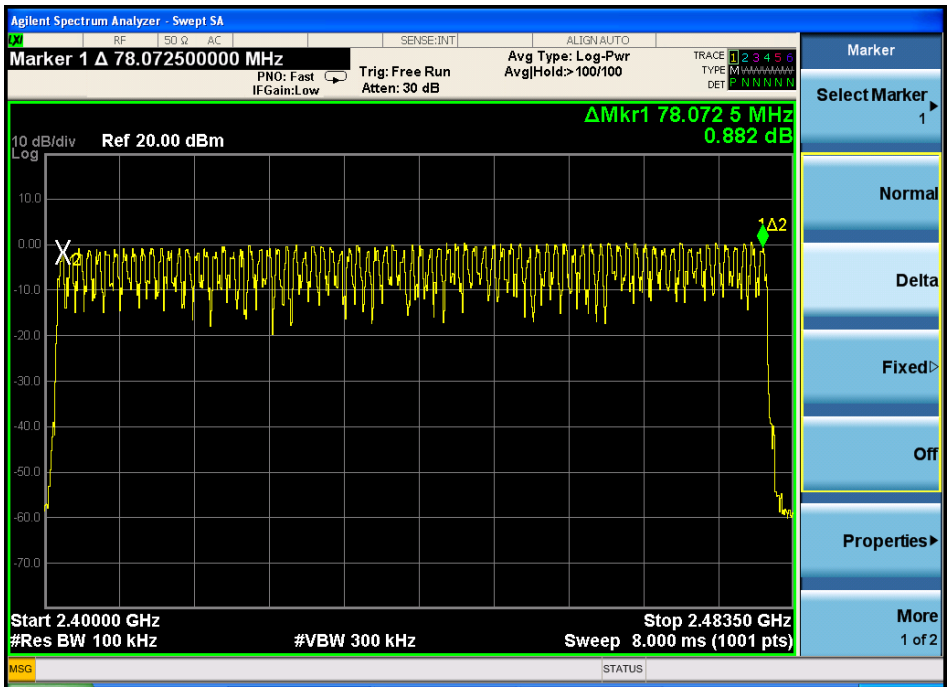
\\\\

Mode	Quantity of Hopping Channel	Limit	Judgment
GFSK, π/4-DQPSK, 8DPSK	79	>15	PASSED

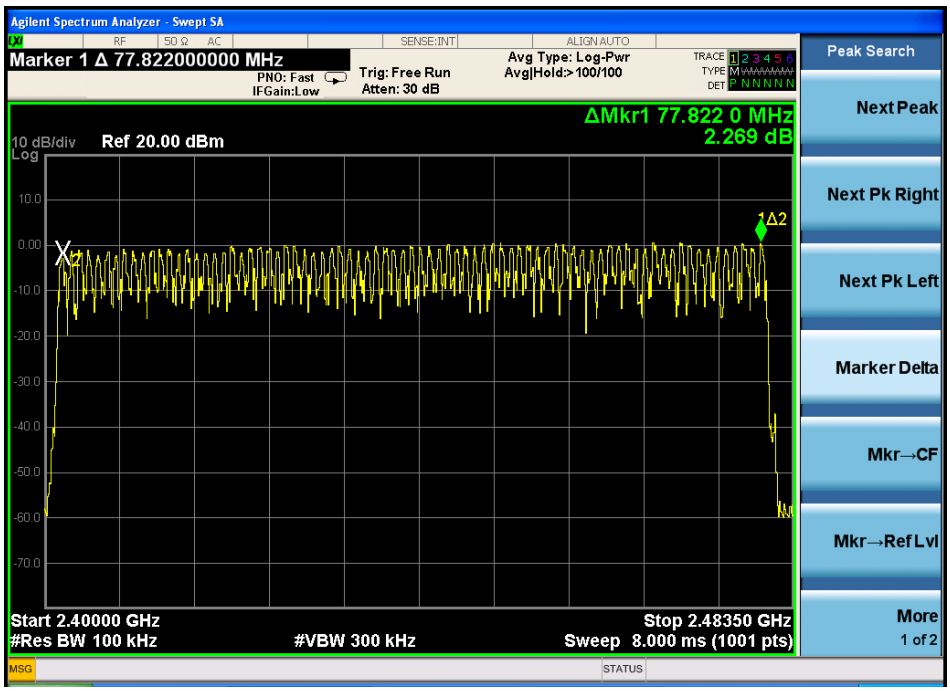
GFSK mode


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 78.239500000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
ΔMkr1 78.239 5 MHz
0.782 dB
10 dB/div
Log
Ref 20.00 dBm
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

π/4-DQPSK mode



8DPSK mode



7. DWELL TIME

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(a)	Dwell time	0.4 sec	2400-2483.5	PASS

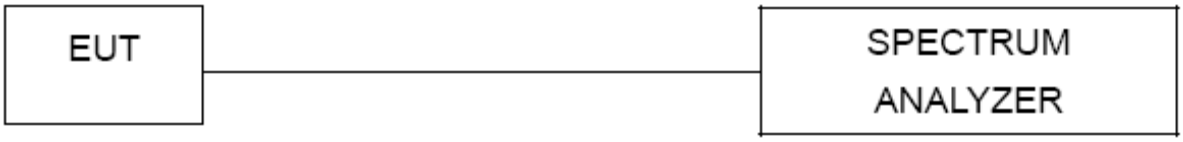
7.1.1 TEST PROCEDURE

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting: RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
(3) Use video trigger with the trigger level set to enable triggering only on full pulses.
(4) Sweep Time is more than once pulse time.
(5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
(6) Measure the maximum time duration of one single pulse.
(7) Set the EUT for packet transmitting.
(8) Measure the maximum time duration of one single pulse.
(9) The EUT was set to the Hopping Mode for Dwell Time Test

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

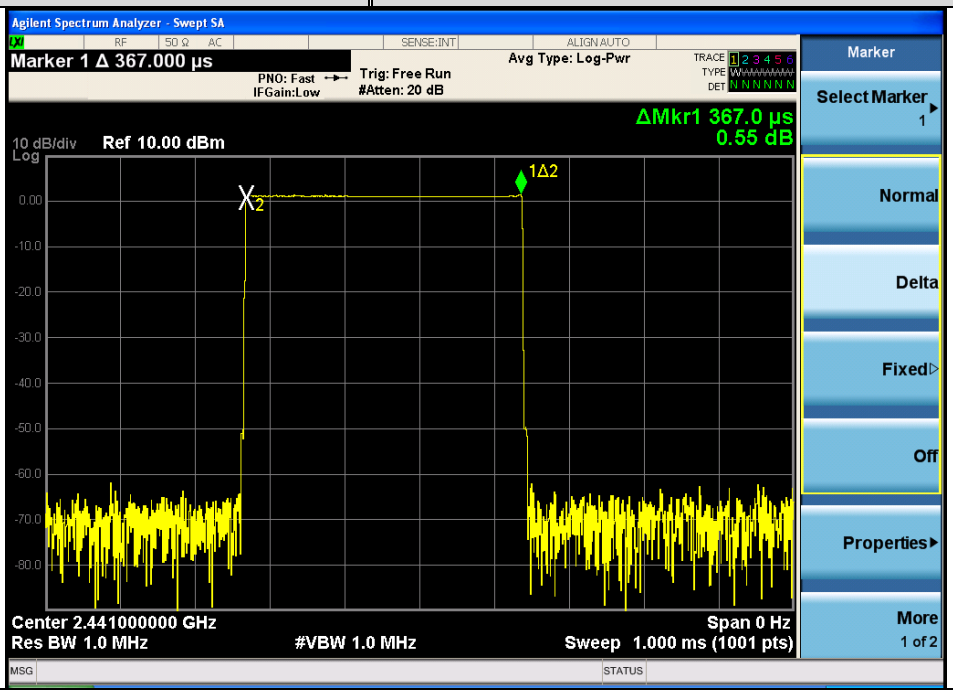
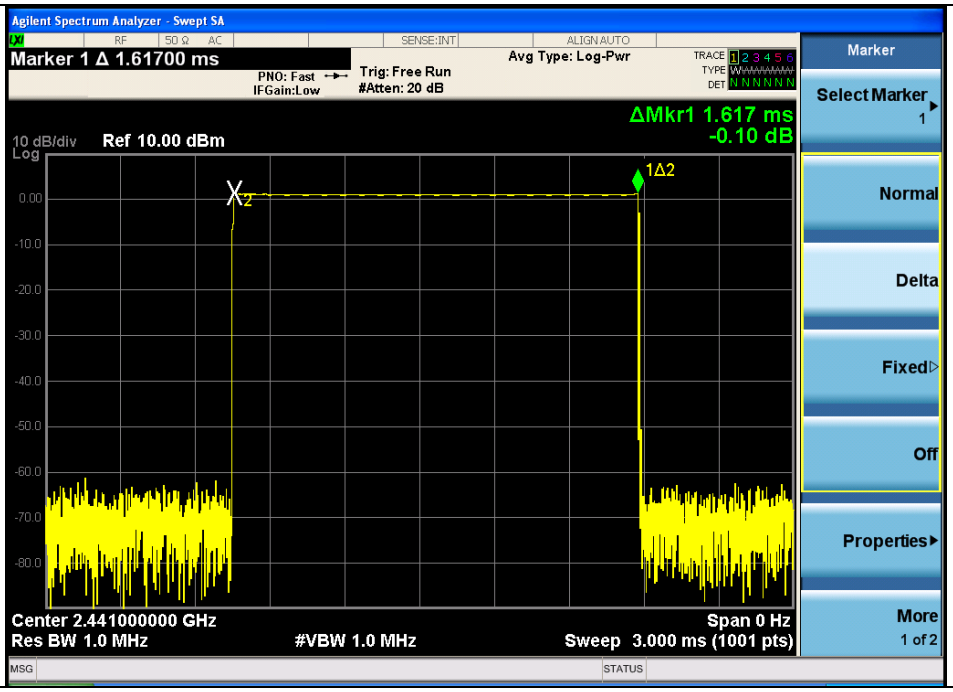
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

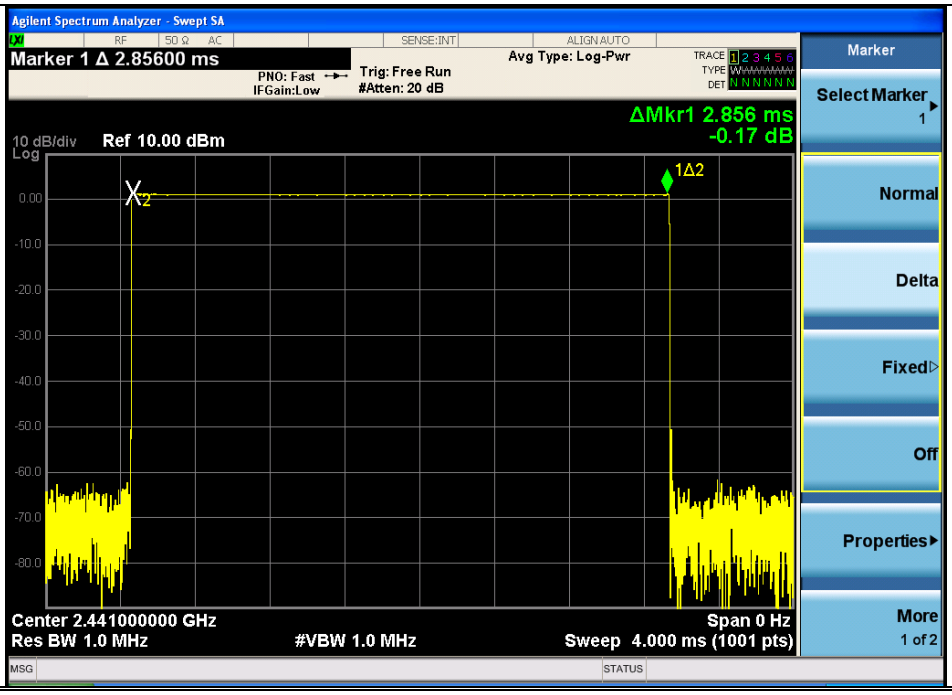
7.1.5 TEST RESULTS

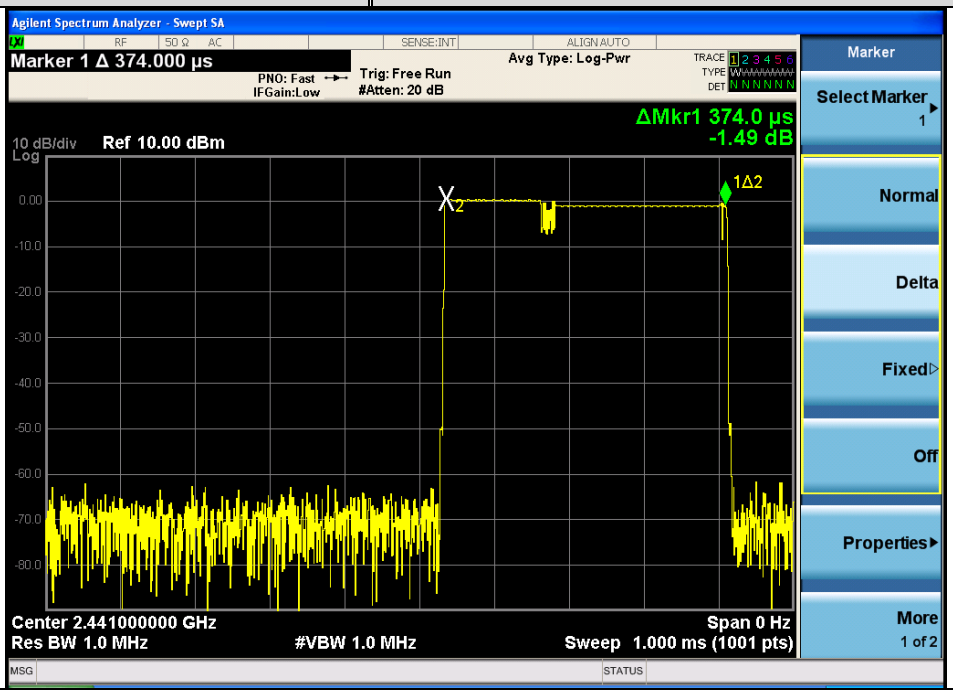
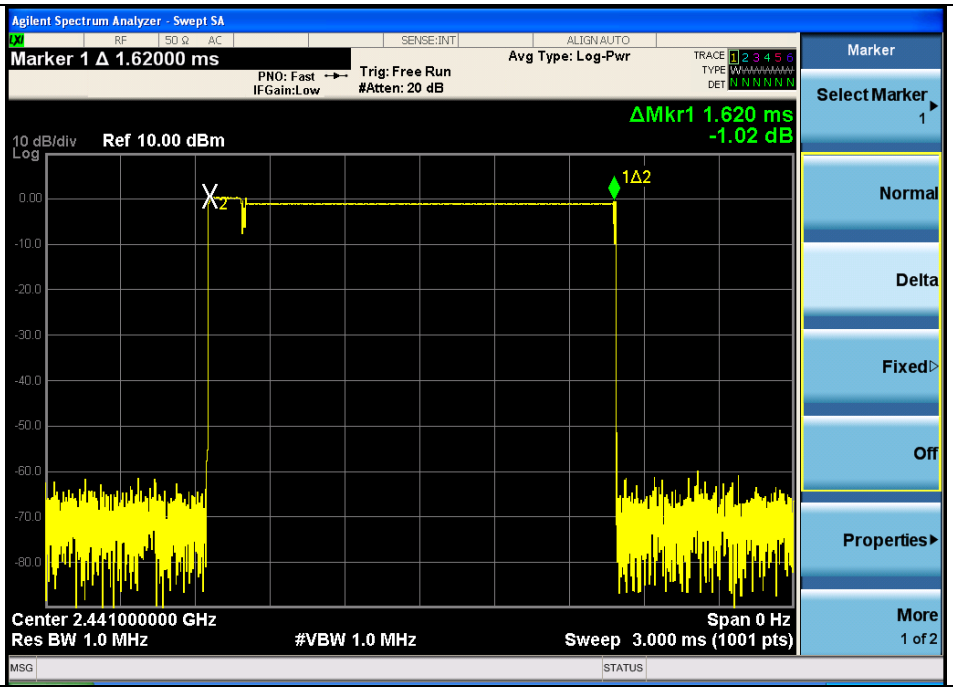
EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	GFSK, π/4-DQPSK, 8-DPSK Mode /CH01, CH40, CH79		

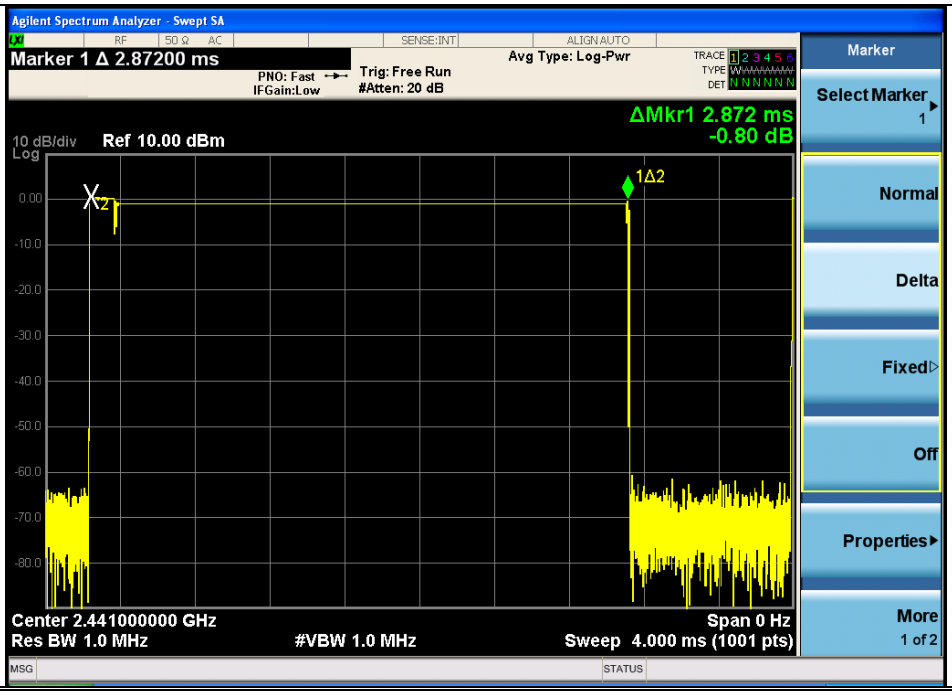
For GFSK, π/4-DQPSK and 8DPSK:
The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

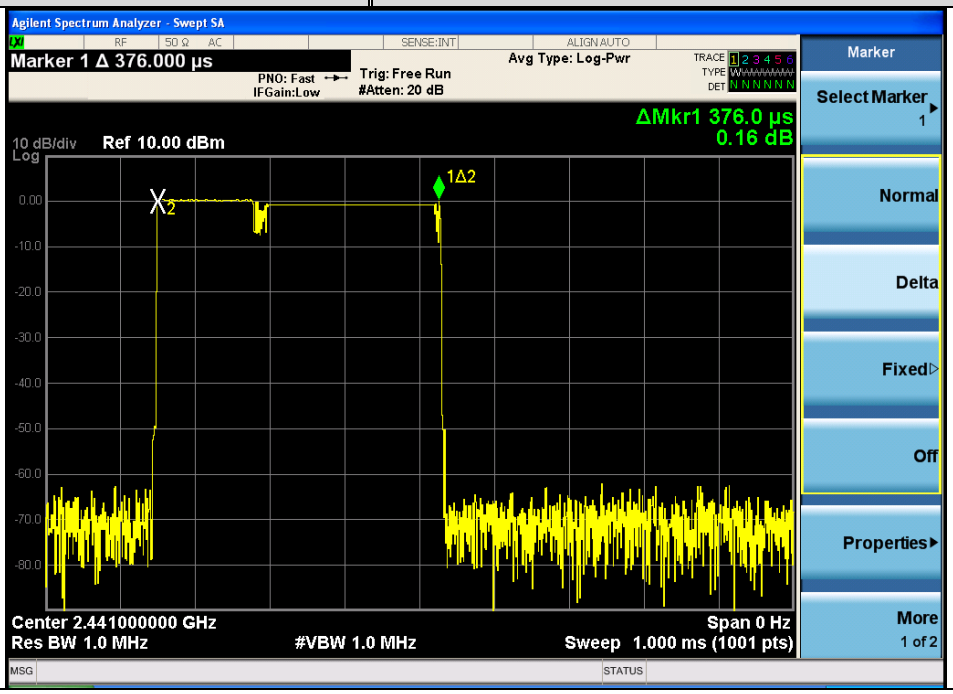
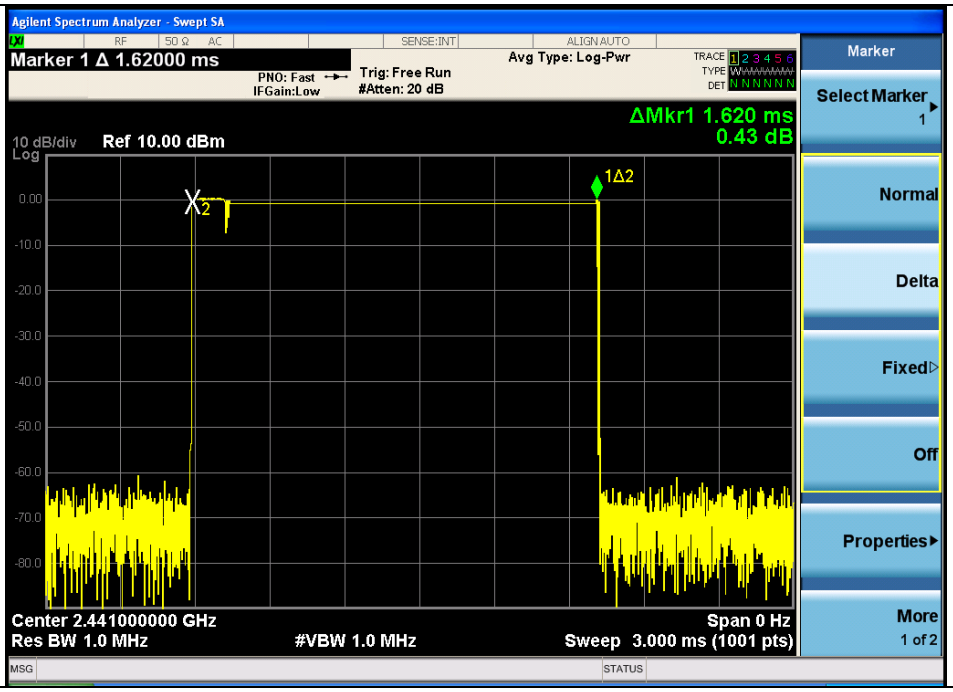
Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Conclusion
GFSK	DH1	2441	0.367	0.235	<0.4	PASS
	DH3	2441	1.617	0.345	<0.4	PASS
	DH5	2441	2.856	0.366	<0.4	PASS
π/4 DQPSK	DH1	2441	0.374	0.239	<0.4	PASS
	DH3	2441	1.620	0.346	<0.4	PASS
	DH5	2441	2.872	0.368	<0.4	PASS
8- DQPSK	DH1	2441	0.376	0.241	<0.4	PASS
	DH3	2441	1.62	0.346	<0.4	PASS
	DH5	2441	2.860	0.366	<0.4	PASS
Note: 1 A period time = 0.4 (s) * 79 = 31.6(s) 2 DH1 time slot = Pulse Duration * (1600/(1*79)) * A period time DH3 time slot = Pulse Duration * (1600/(3*79)) * A period time DH5 time slot = Pulse Duration * (1600/(5*79)) * A period time						

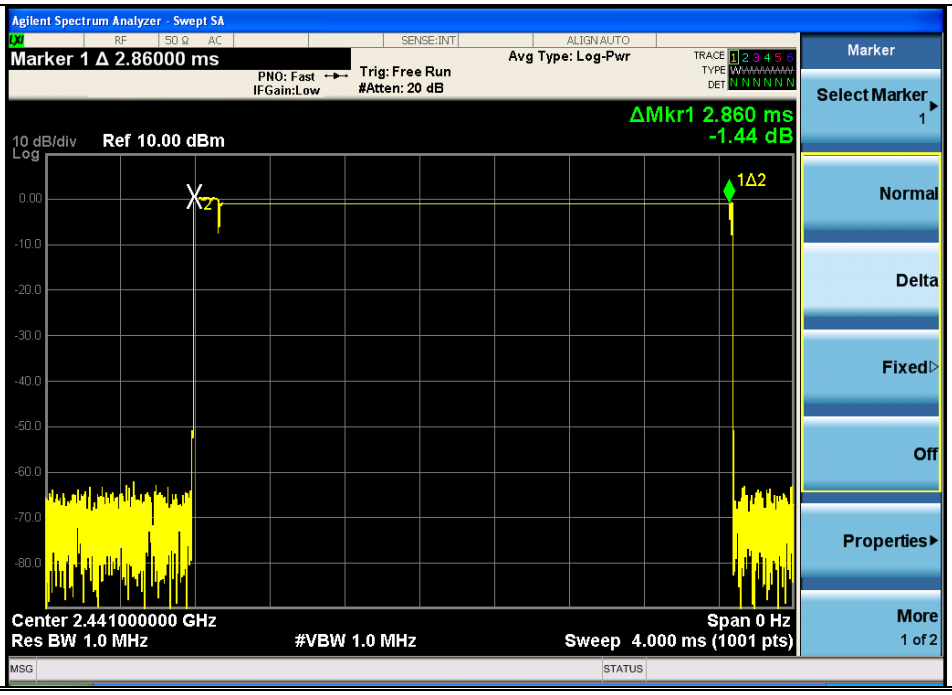
Modulation mode		GFSK mode
DH1		
DH3		

DH5		 Agilent Spectrum Analyzer - Swept SA Marker 1 Δ 2.85600 ms PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr ΔMkr1 2.856 ms -0.17 dB 10 dB/div Log Ref 10.00 dBm 1Δ2 Center 2.441000000 GHz Res BW 1.0 MHz #VBW 1.0 MHz Span 0 Hz Sweep 4.000 ms (1001 pts) Marker Select Marker Normal Delta Fixed Off Properties More 1 of 2

Modulation mode		π/4-DQPSK
2-DH1		
2-DH3		

2-DH5		 Agilent Spectrum Analyzer - Swept SA Marker 1 Δ 2.87200 ms PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr ΔMkr1 2.872 ms -0.80 dB 10 dB/div Log Ref 10.00 dBm 1Δ2 Center 2.441000000 GHz Res BW 1.0 MHz #VBW 1.0 MHz Span 0 Hz Sweep 4.000 ms (1001 pts) Marker Select Marker Normal Delta Fixed Off Properties More 1 of 2

Modulation mode		8DPSK
3-DH1		
3-DH3		

3-DH5		

Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 2.86000 ms
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
ΔMkr1 2.860 ms
-1.44 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125 mW(21dBm)	2400-2483.5	PASS

8.1.1 TEST PROCEDURE

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) Spectrum Setting:
RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz)
RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz)
(3) The EUT was set to continuously transmitting in the max power during the test.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP

8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	GFSK, π/4-DQPSK, 8-DPSK Mode /CH01, CH40, CH79		

TX GFSK Mode			
Test Channe	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH01	2402	1.131	30
CH40	2441	1.162	30
CH79	2480	1.399	30
TX π/4-DQPSK Mode			
CH01	2402	0.589	30
CH40	2441	0.752	30
CH79	2480	0.693	30
TX 8-DPSK Mode			
CH01	2402	0.363	30
CH40	2441	0.427	30
CH79	2480	0.514	30

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9. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

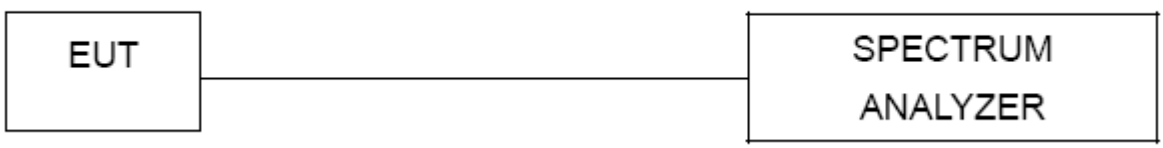
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

9.1 DEVIATION FROM STANDARD

No deviation.

9.2 TEST SETUP



9.3 EUT OPERATION CONDITIONS

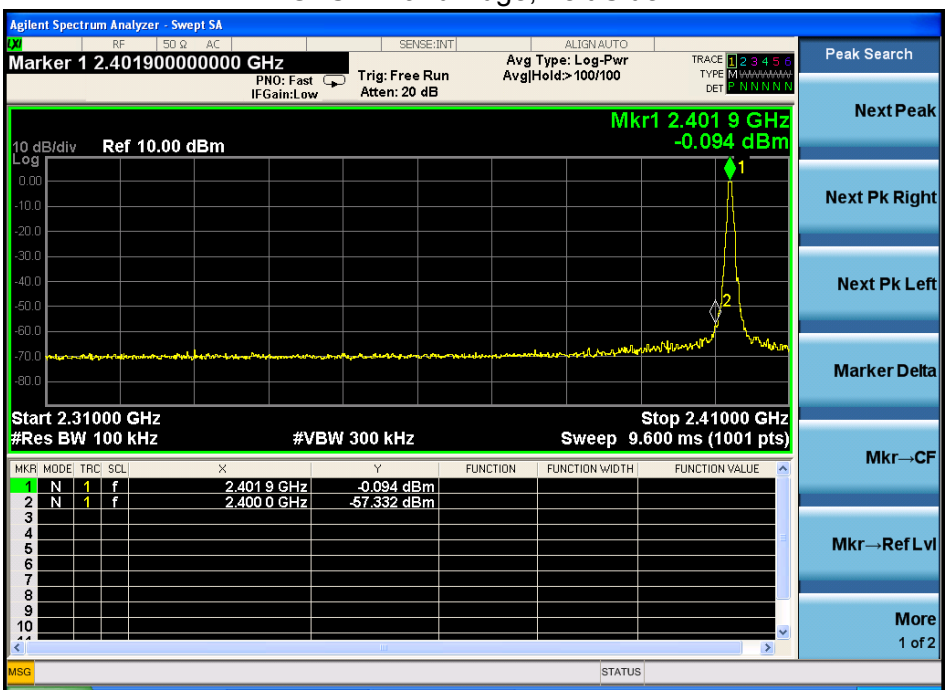
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.4 TEST RESULTS

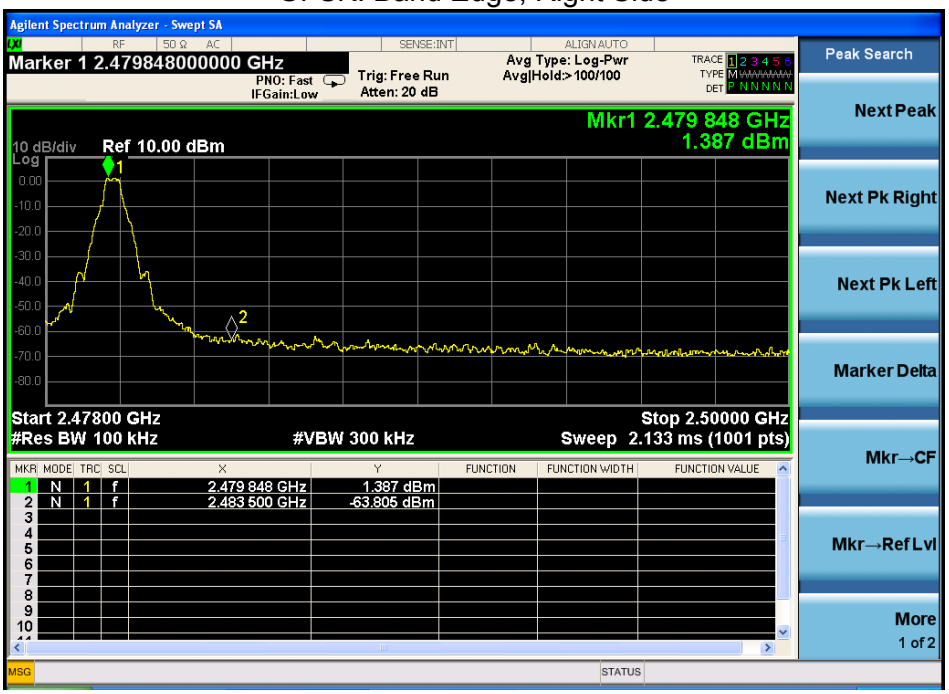
EUT：	XipPos	Model Name ：	XipPos
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter

Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
GFSK mode			
Left-band	57.24	20	Pass
Right-band	65.12	20	Pass
π/4-DQPSK mode			
Left-band	56.75	20	Pass
Right-band	62.53	20	Pass
8-DPSK mode			
Left-band	56.49	20	Pass
Right-band	61.64	20	Pass

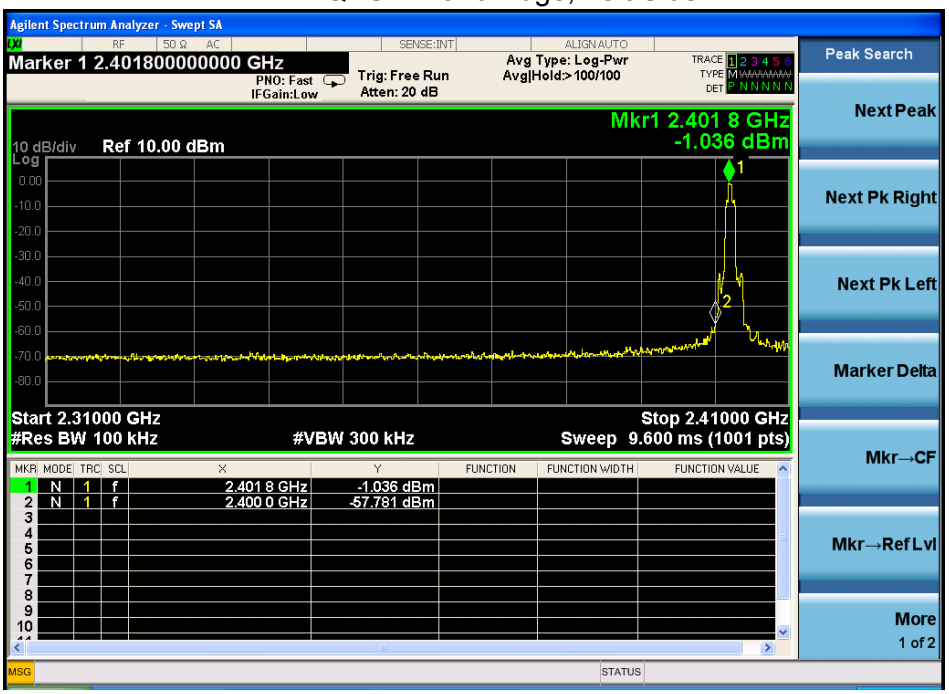
GFSK: Band Edge, Left Side



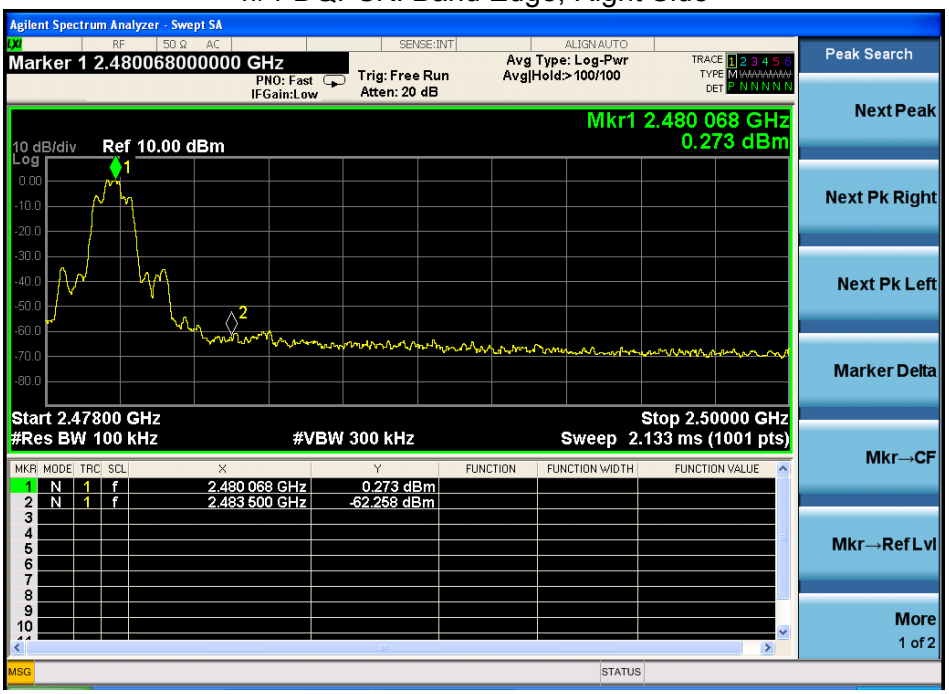
GFSK: Band Edge, Right Side



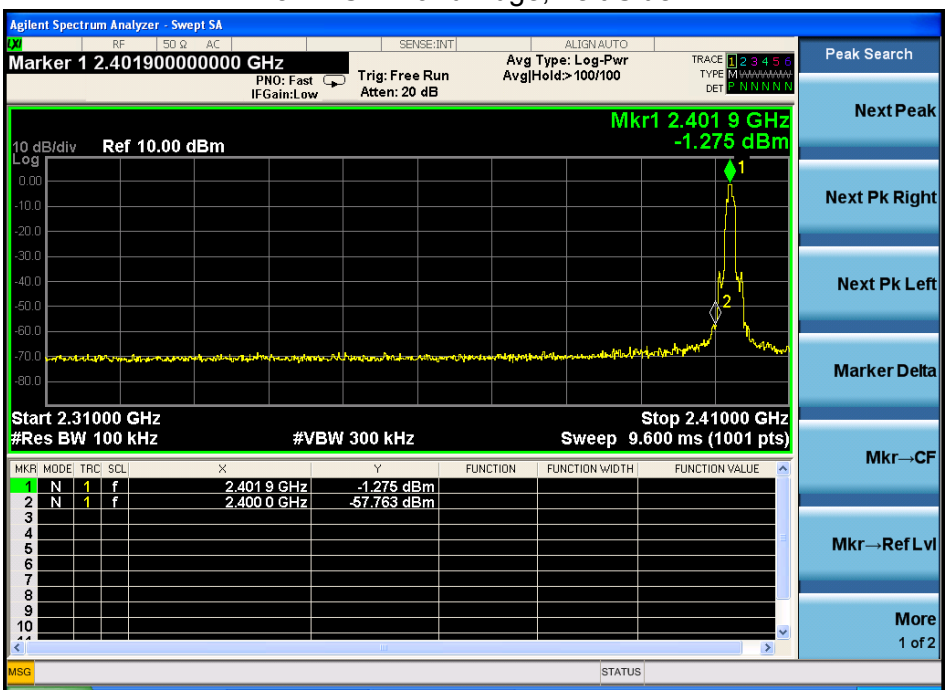
π/4-DQPSK: Band Edge, Left Side



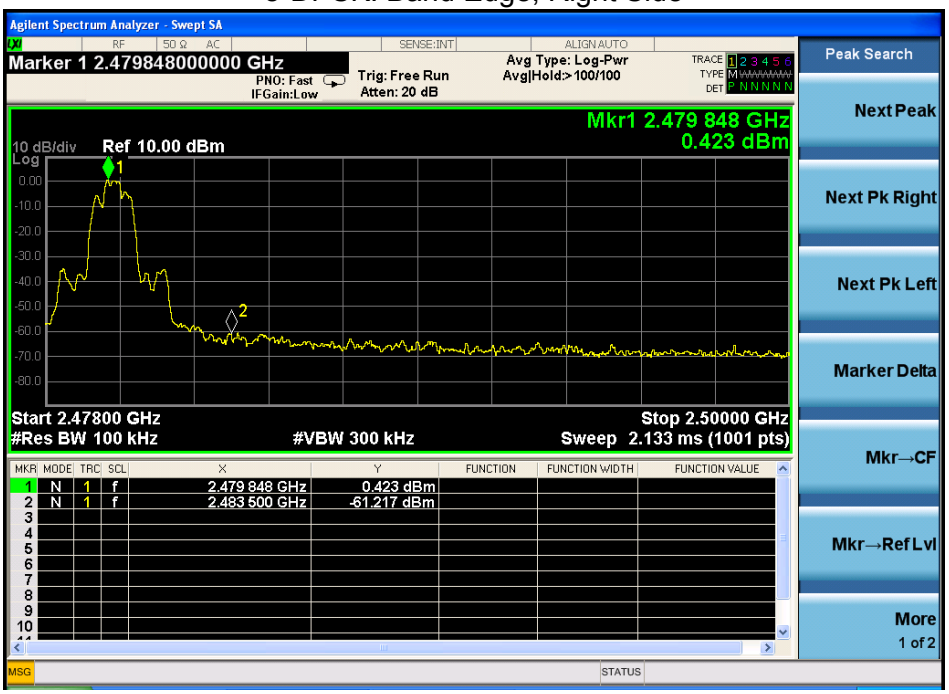
π/4-DQPSK: Band Edge, Right Side



8-DPSK: Band Edge, Left Side



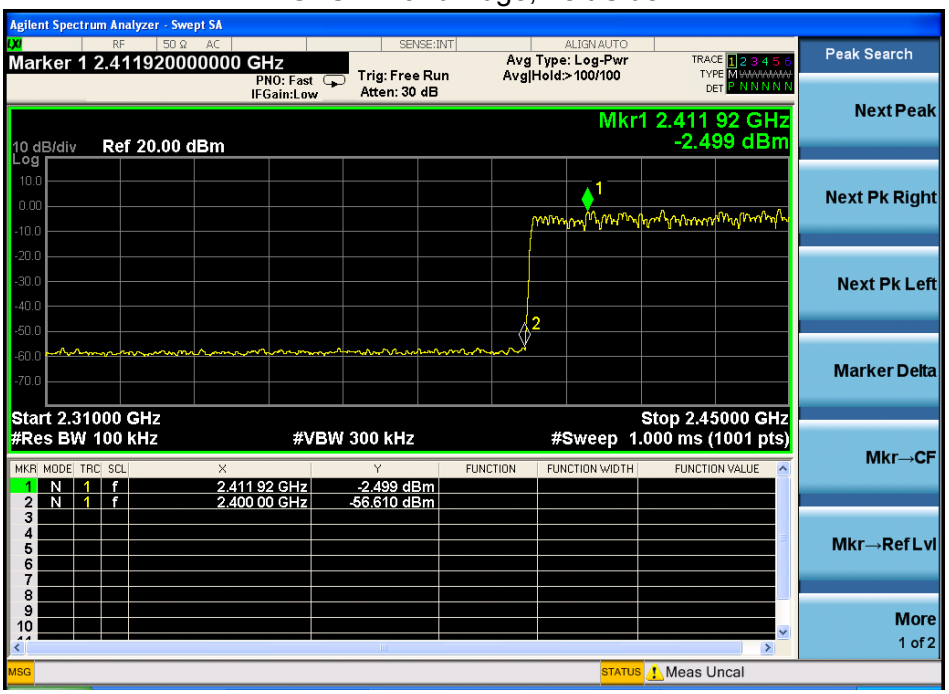
8-DPSK: Band Edge, Right Side



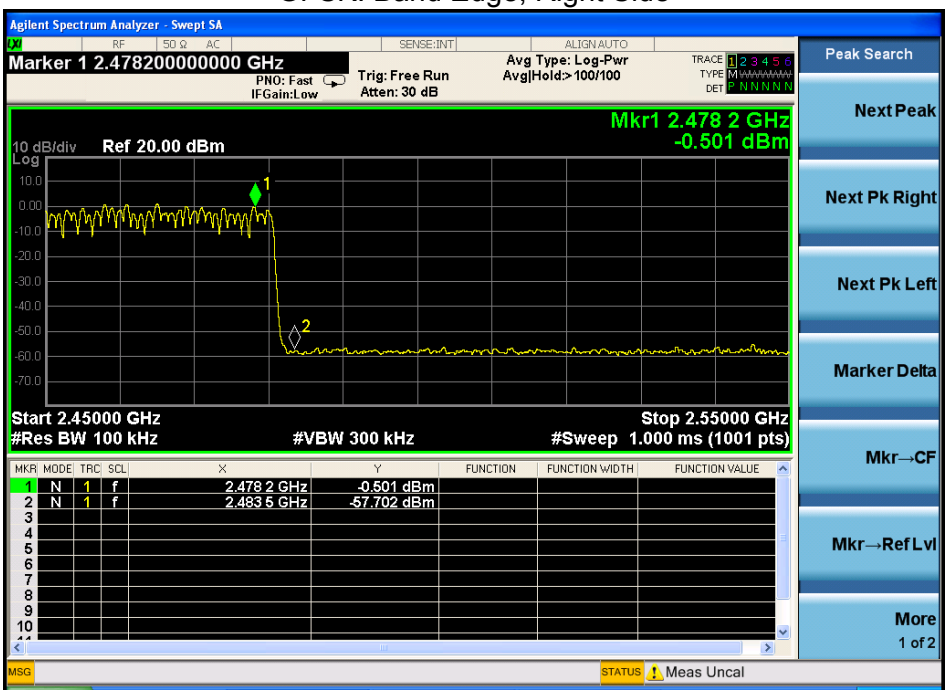
Hopping Mode

Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
GFSK mode			
Left-band	54.11	20	Pass
Right-band	57.20	20	Pass
π/4-DQPSK mode			
Left-band	53.67	20	Pass
Right-band	58.43	20	Pass
8-DPSK mode			
Left-band	48.50	20	Pass
Right-band	58.31	20	Pass

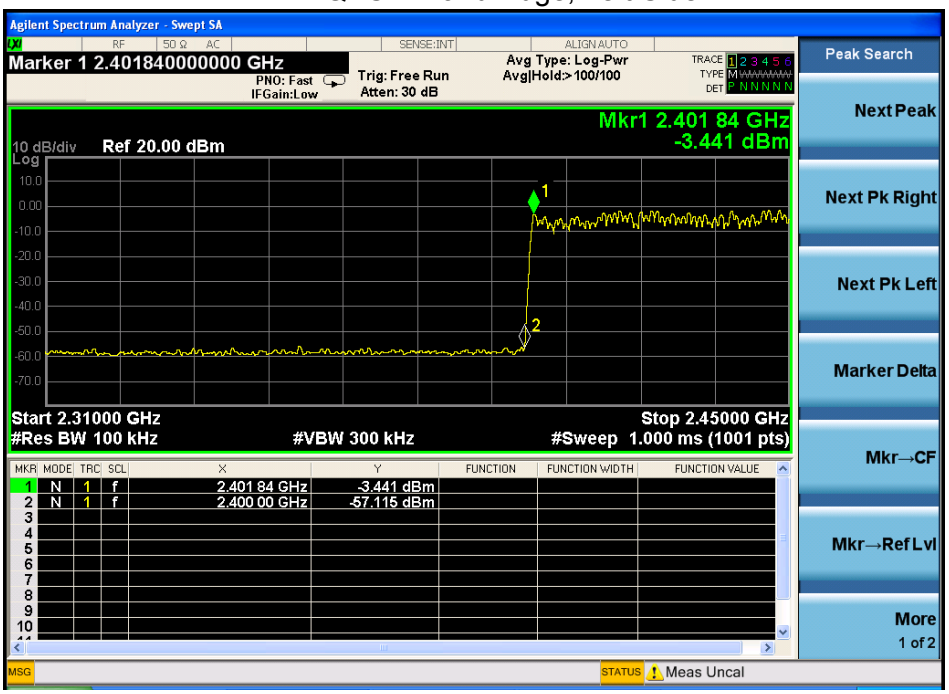
GFSK: Band Edge, Left Side



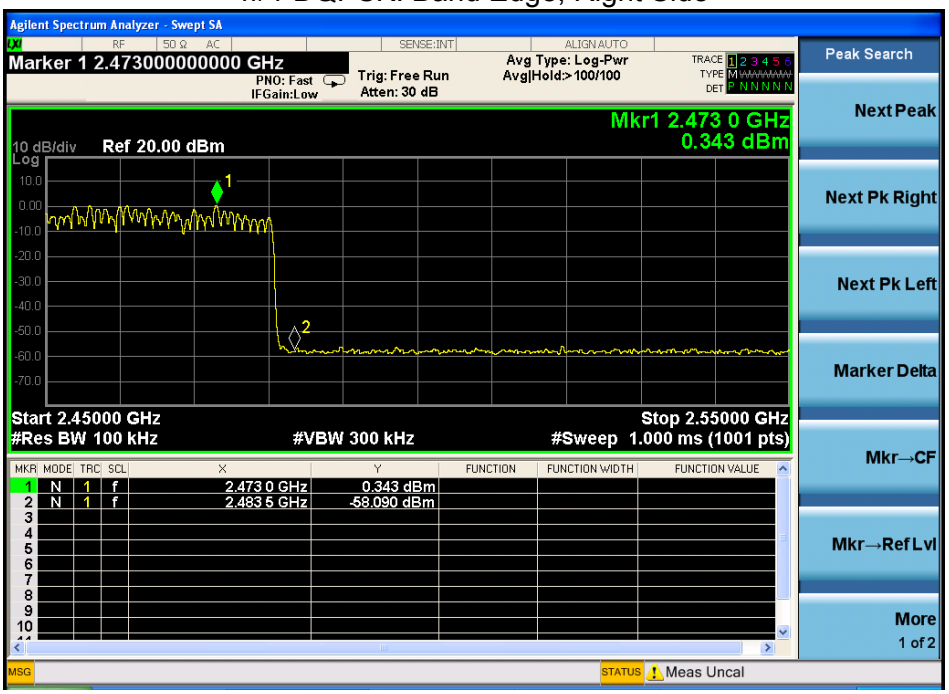
GFSK: Band Edge, Right Side



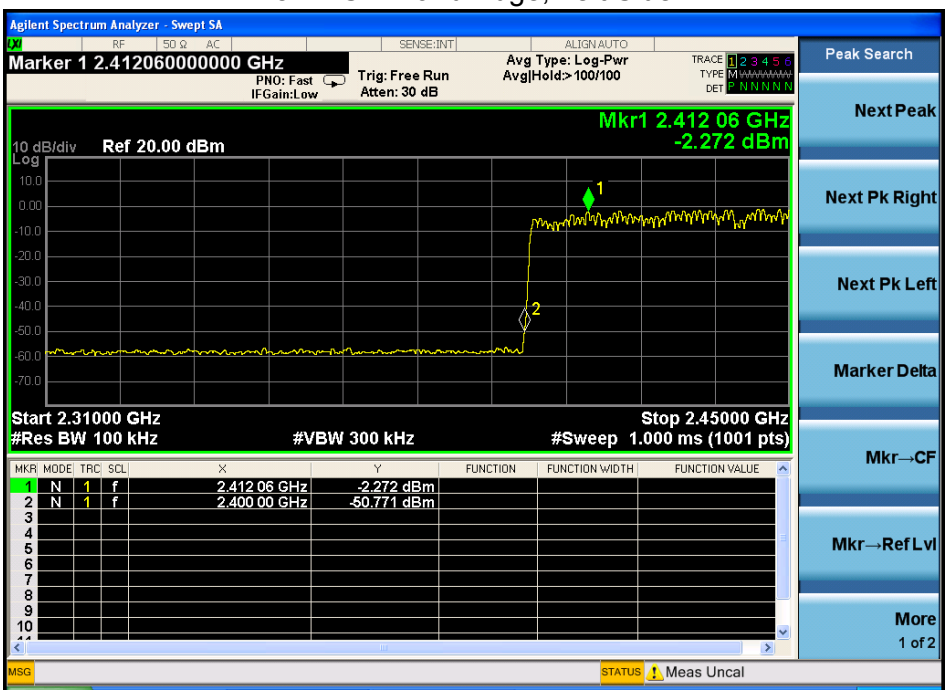
π/4-DQPSK: Band Edge, Left Side



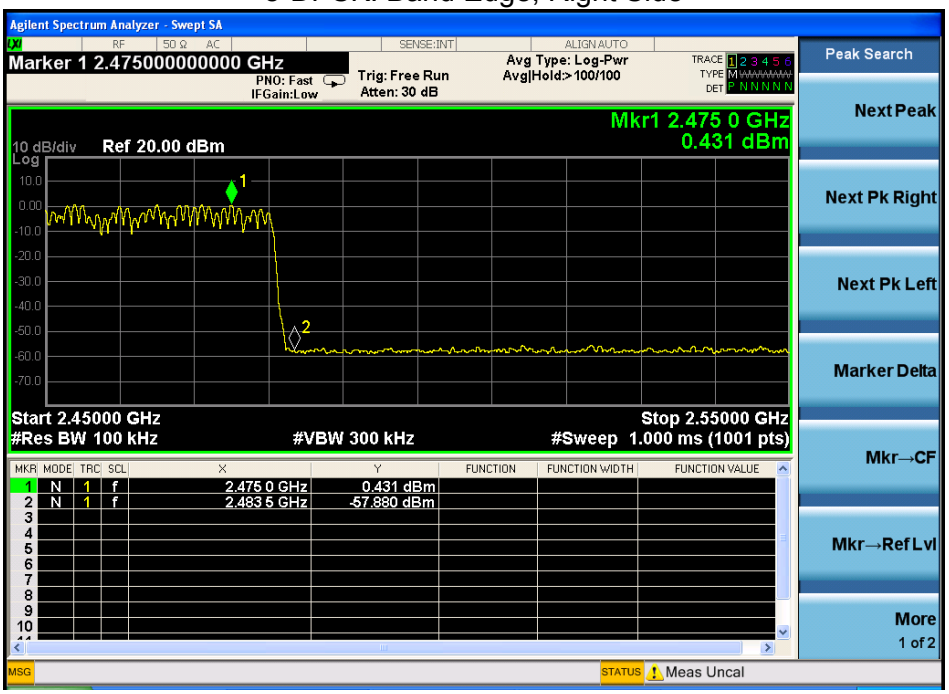
π/4-DQPSK: Band Edge, Right Side



8-DPSK: Band Edge, Left Side



8-DPSK: Band Edge, Right Side



10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

The EUT antenna is External antenna(PIFA antenna,0.0dbi). It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.