FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

BLAUPUNKT INDIA PVT LTD

Car MP3 player

Model Number: Colombo ML110 BT

FCC ID: 2AJ8C-COLOMBOML110

Prepared for:	BLAUPUNKT INDIA PVT LTD
	47, Atlanta Society, Nariman Point, Mumbai 400 021.India
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R1812036
Date of Test:	Dec. 05~18, 2018
Date of Report:	Dec. 18, 2018

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EST Technology Co., Ltd.

Applicant: **Address:**	BLAUPUNKT INDIA PVT LTD' 47, Atlanta Society, Nariman Point, Mumbai 400 021.India		
Manufacturer: **Address:**	BLAUPUNKT INDIA PVT LTD' 47, Atlanta Society, Nariman Point, Mumbai 400 021.India		
E.U.T:	Car MP3 player		
Model Number:	Colombo ML110 BT		
Power Supply:	DC 12V		
Test Voltage:	DC 12V		
Trade Name:	Blaupunkt	Serial No.:	------
Date of Receipt:	Dec. 05, 2018	Date of Test:	Dec. 05~18, 2018
Test Specification:	FCC Rules and Regulations Part 15 Subpart C:2018 ANSI C63.10:2013		
Test Result:	The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. **Date:** Dec. 18, 2018		
Prepared by: Ring / Assistant	Reviewed by: Tony / Engineer	Approved by: Iceman Hu / Manager	

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 EST Technology Co., Ltd.

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Car MP3 player
FCC ID	:	2AJ8C-COLOMBOML110
Model Number	:	Colombo ML110 BT
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	79
Antenna	:	Internal antenna (Antenna Gain:0 dBi)
Modulation	:	BT BDR: GFSK BT EDR: π/4-DQPSK BT EDR: 8-DPSK
Sample Type	:	Prototype production

2. SUMMARY OF TEST

2.1. Summary of test result

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) KDB 558074	PASS
20dB Bandwidth	FCC Part 15: 15.247a1 KDB 558074	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) KDB 558074	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) KDB 558074	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) KDB 558074	PASS
Radiated Emissions	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10:2013 KDB 558074	PASS
Band Edge Compliance	FCC Part 15: 15.247(d) KDB 558074	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013 KDB 558074	N/A
Antenna requirement	FCC Part 15: 15.203	PASS
Note: KDB 558074 D01 15.247 Meas Guidance v05		

2.2. Test Facilities

EMC Lab	:	Certificated by CNAS, CHINA Registration No.: L5288 Date of registration: November 13, 2017 Certificated by A2LA, USA Registration No.: 4366.01 Date of registration: November 07, 2017 Certificated by FCC, USA Designation Number: CN1215 Registration No.: 722932 Date of registration: November 21, 2017 Certificated by Industry Canada Registration No.: 9405A Date of registration: December 03, 2015 Certificated by VCCI, Japan Registration No.: R-13663; C-14103 Date of registration: July 25, 2017 This Certificate is valid until: July 24, 2020 Certificated by TUV Rheinland, Germany Registration No.: UA 50195514 0001 Date of registration: February 07, 2015 Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011 Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L2-64 Date of registration: April 28, 2011 Certificated by Nemko, Hong Kong Registration No.: 175193 Date of registration: May 4, 2011
Name of Firm	:	EST Technology Co., Ltd.
Site Location	:	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	±3.48dB
Uncertainty for spurious emissions test (30MHz-1GHz)	±4.60 dB(Polarize: H)
	±4.68 dB(Polarize: V)
Uncertainty for spurious emissions test (1GHz to 18GHz)	±4.96dB
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB

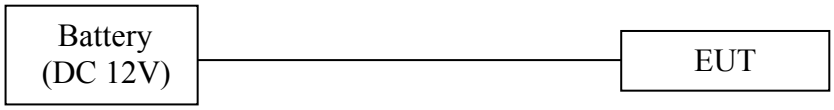
Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.4. Assistant equipment used for test

2.4.1. N/A

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground. EUT was beset into Bluetooth test mode by software before test.



(EUT: Car MP3 player)

2.6. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode

Mode	Channel	Frequency
GFSK	Low	2402MHz
	Middle	2441MHz
	High	2480MHz
8-DPSK	Low	2402MHz
	Middle	2441MHz
	High	2480MHz

2.7. Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2402	2	2403	3	2404	4	2405
5	2406	6	2407	7	2408	8	2409
9	2410	10	2411	11	2412	12	2413
13	2414	14	2415	15	2416	16	2417
17	2418	18	2419	19	2420	20	2421
21	2422	22	2423	23	2424	24	2425
25	2426	26	2427	27	2428	28	2429
29	2430	30	2431	31	2432	32	2433
33	2434	34	2435	35	2436	36	2437
37	2438	38	2439	39	2440	40	2441
41	2442	42	2443	43	2444	44	2445
45	2446	46	2447	47	2448	48	2449
49	2450	50	2451	51	2452	52	2453
53	2454	54	2455	55	2456	56	2457
57	2458	58	2459	59	2460	60	2461
61	2462	62	2463	63	2464	64	2465
65	2466	66	2467	67	2468	68	2469
69	2470	70	2471	71	2472	72	2473
73	2474	74	2475	75	2476	76	2477
77	2478	78	2479	79	2480	-	-

2.8. Test Equipment

2.8.1. For conducted emission test

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	832354	CEPREI	June 15,18	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	101260	CEPREI	June 15,18	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	101100	CEPREI	June 15,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.2. For radiated emission test(9 kHz-30MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	101780	CEPREI	June 15,18	1 Year
Active Loop Antenna	SCHWAREBECK	FMZB 1519B	1519B-088	N/A	Aug. 01,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.3. For radiated emissions test (30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	101780	CEPREI	June 15,18	1 Year
Bilog Antenna	Teseq	CBL 6111D	27090	CEPREI	June 15,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.4. For radiated emission test(above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120D1002	CEPREI	June 18,18	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170242	CEPREI	June 18,18	1Year
Signal Amplifier	SCHWARZBECK	BBV9718	9718-212	CEPREI	June 15,18	1 Year
Spectrum Analyzer	Rohde &Schwarz	FSV	103173	CEPREI	June 15,18	1 Year
PSA Series Spertrum Analyzer	Agilent	E4447A	MY50180031	CEPREI	June 15,18	1Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.5. For connect EUT antenna terminal test

Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Spectrum Analyzer	Rohde &Schwarz	FSV	103173	CEPREI	June 15,18	1 Year
Spectrum Analyzer	Agilent	E4408B	MY44211 139	CEPREI	June 15,18	1 Year

3. MAXIMUM PEAK OUTPUT POWER

3.1. Limit

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset employing at least 75 non-overlapping hopping channels; shall not exceed 0.125 W if the hopset employing at greater than or equal to 15 and less than 75 non-overlapping hopping channels.

3.2. Test Procedure

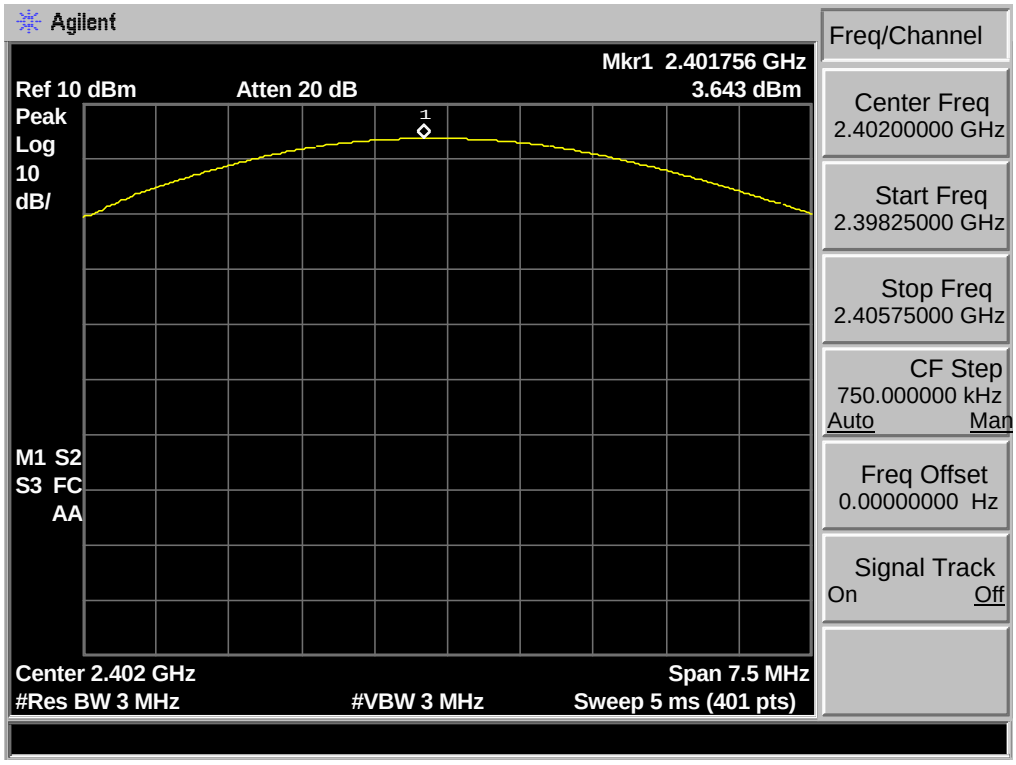
The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable.

3.3. Test Result

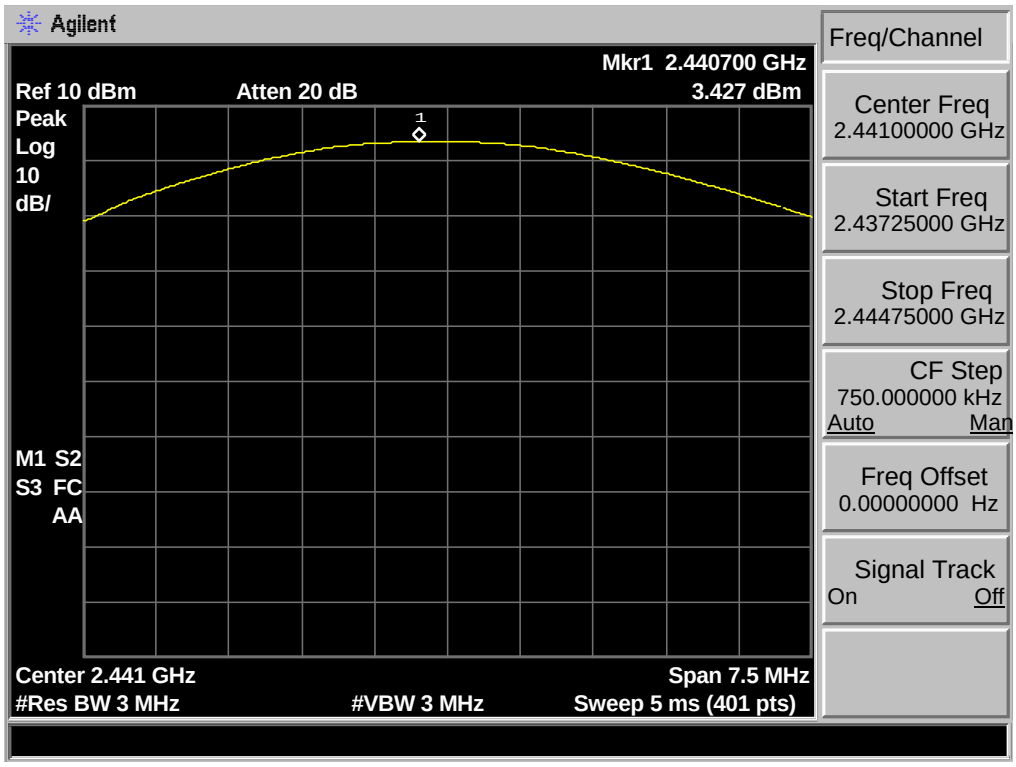
EUT: Car MP3 player					
M/N: Colombo ML110 BT					
Test date: 2018-12-09		Test site: RF site	Tested by: Seven		
Mode	Freq (MHz)	Result (dBm)	Limit		Conclusion
			dBm	W	
GFSK	2402	3.643	30.00	1	Pass
	2441	3.427	30.00	1	Pass
	2480	3.292	30.00	1	Pass
8-DPSK	2402	3.607	30.00	1	Pass
	2441	3.402	30.00	1	Pass
	2480	3.269	30.00	1	Pass

3.4. Test Data

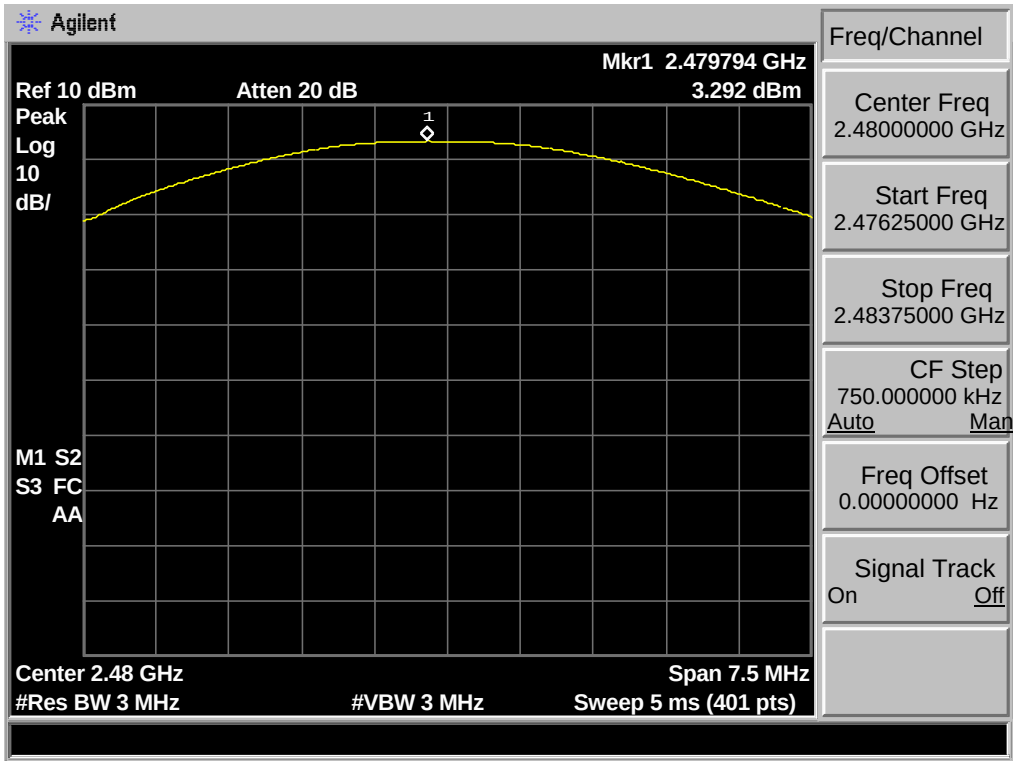
GFSK 2402 MHz



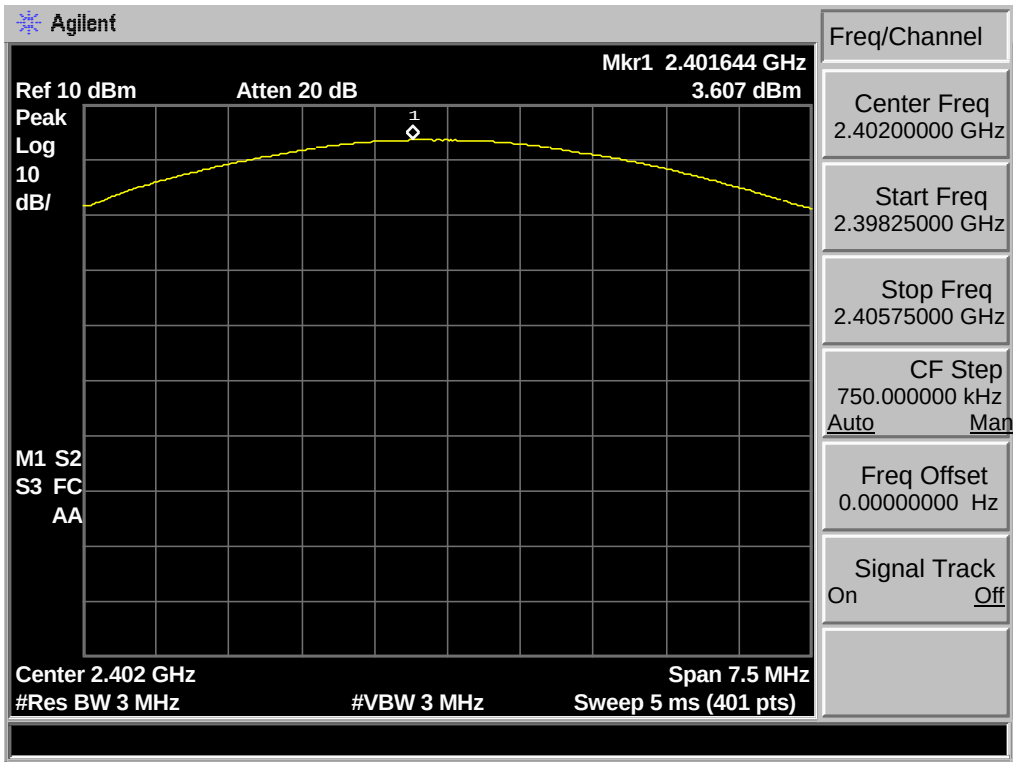
GFSK 2441 MHz



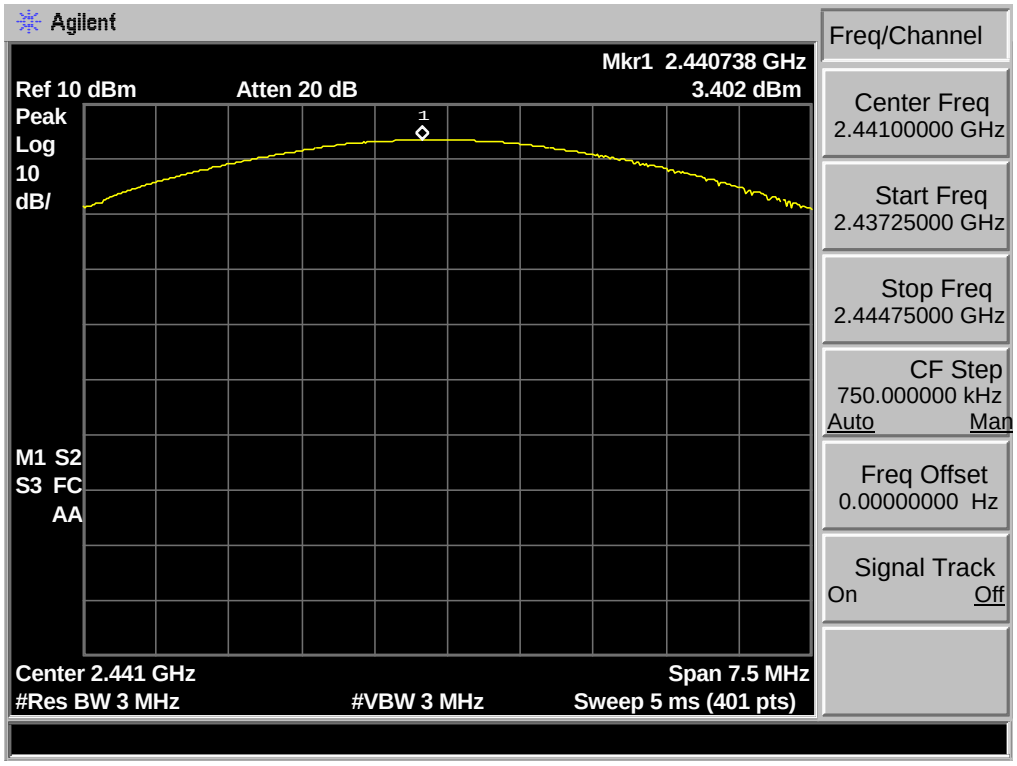
GFSK 2480 MHz



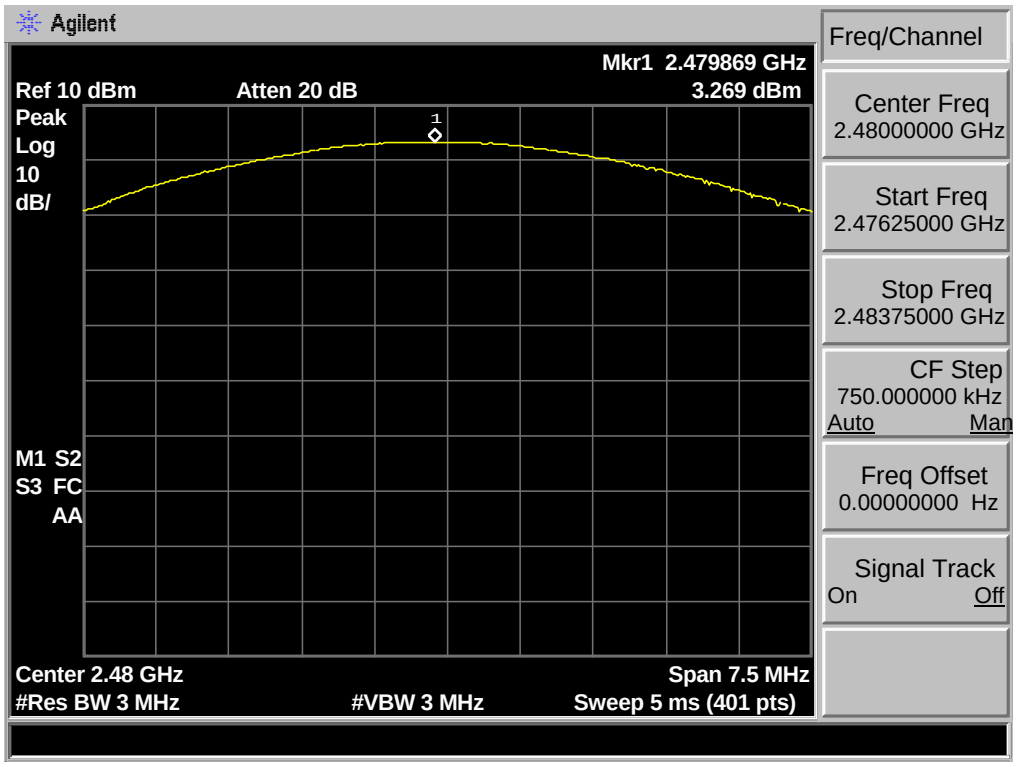
8-DPSK 2402 MHz



8-DPSK 2441 MHz



8-DPSK 2480 MHz



4. 20 DB BANDWIDTH

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.2. Test Procedure

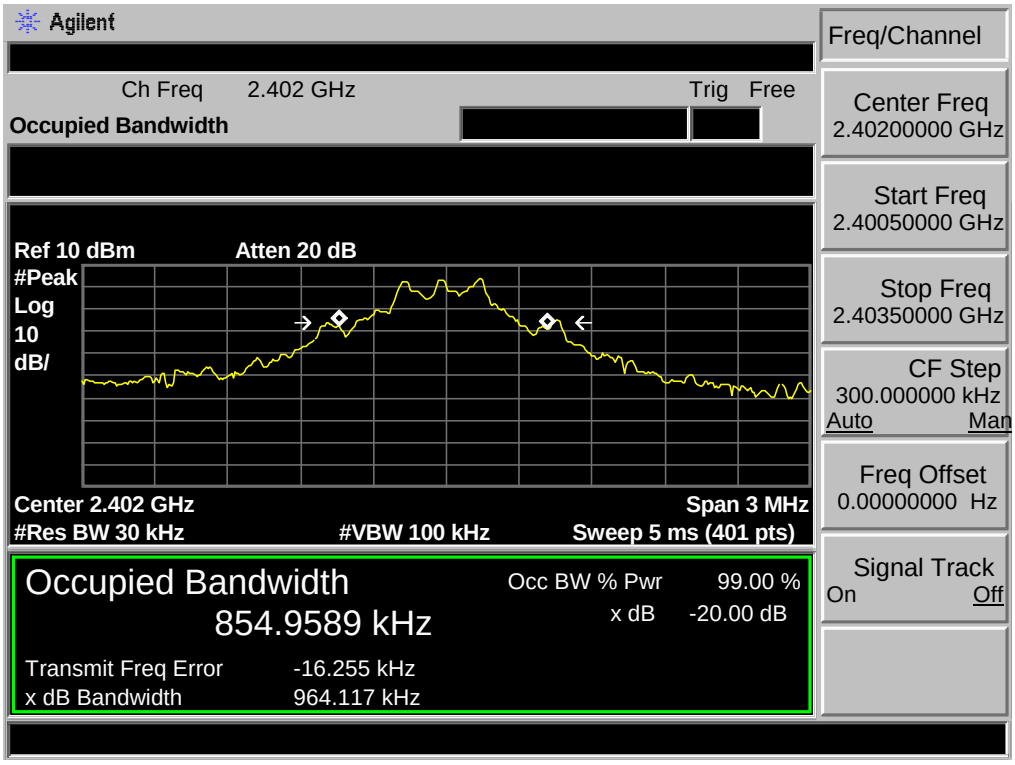
The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

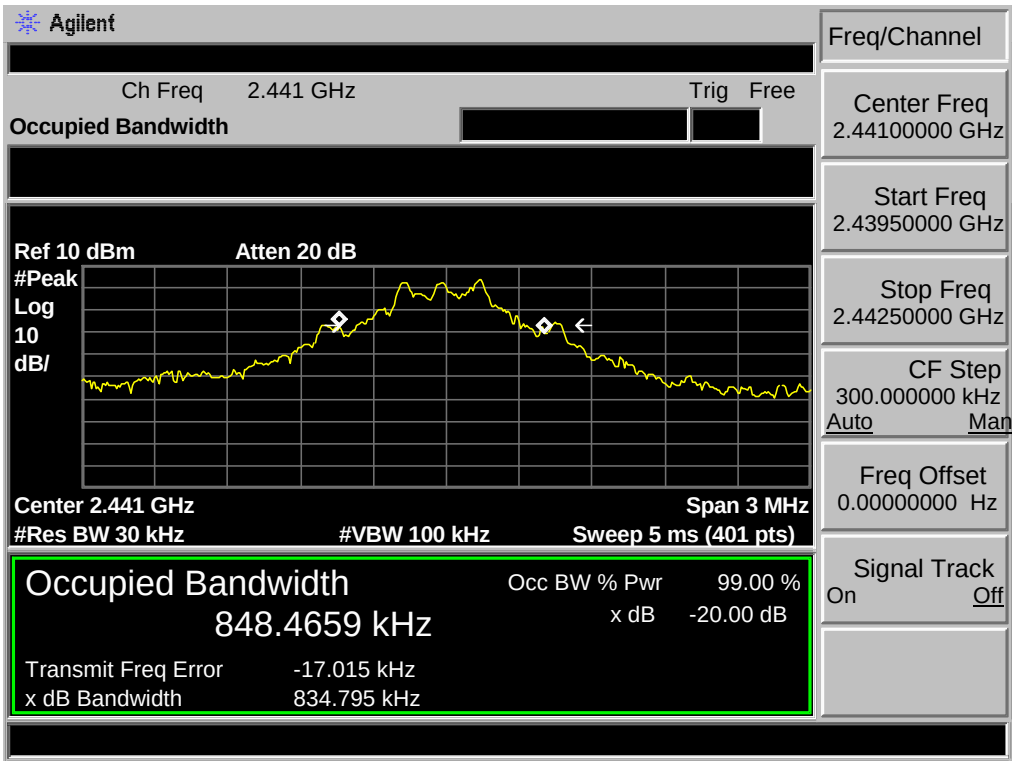
EUT: Car MP3 player				
M/N: Colombo ML110 BT				
Test date: 2018-12-09		Test site: RF site	Tested by: Seven	
Mode	Freq (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Conclusion
GFSK	2402	0.964117	/	PASS
	2441	0.834795	/	PASS
	2480	0.806606	/	PASS
8-DPSK	2402	1.230000	/	PASS
	2441	1.235000	/	PASS
	2480	1.241000	/	PASS

4.4. Test Data

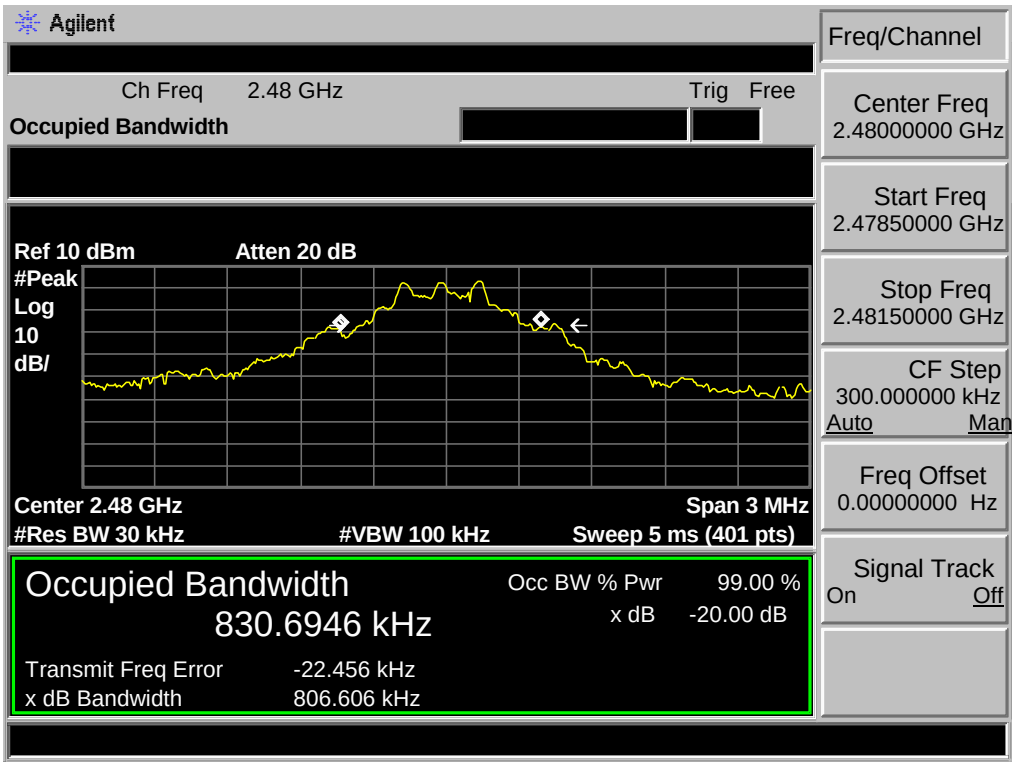
GFSK 2402MHz



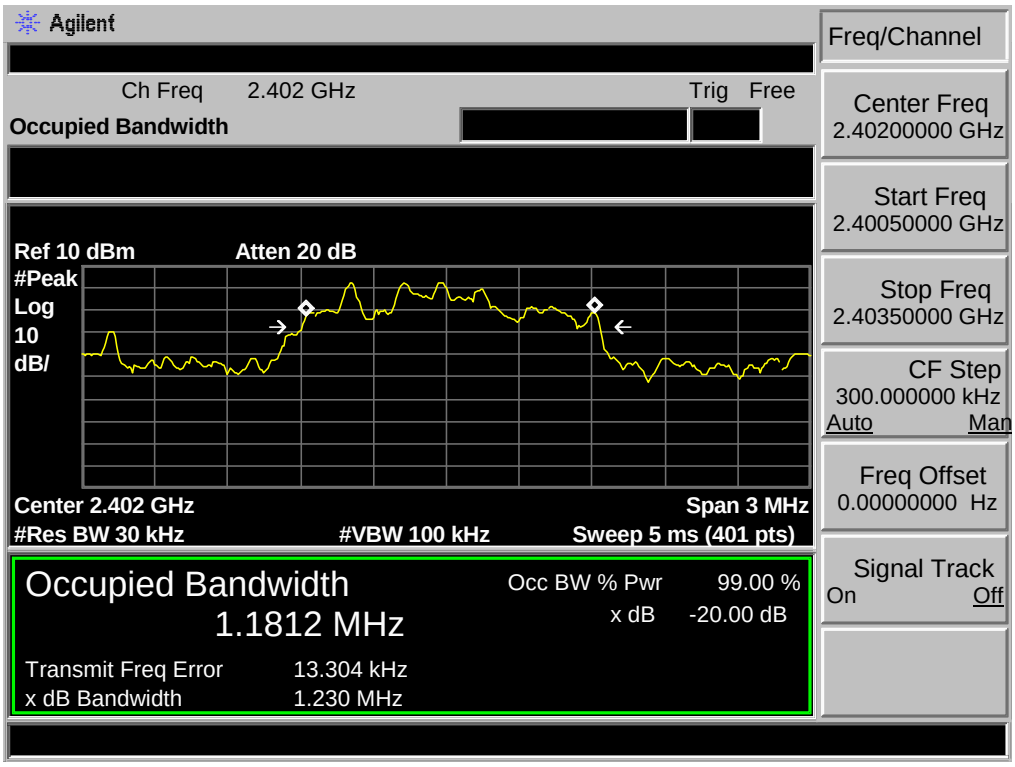
GFSK 2441MHz



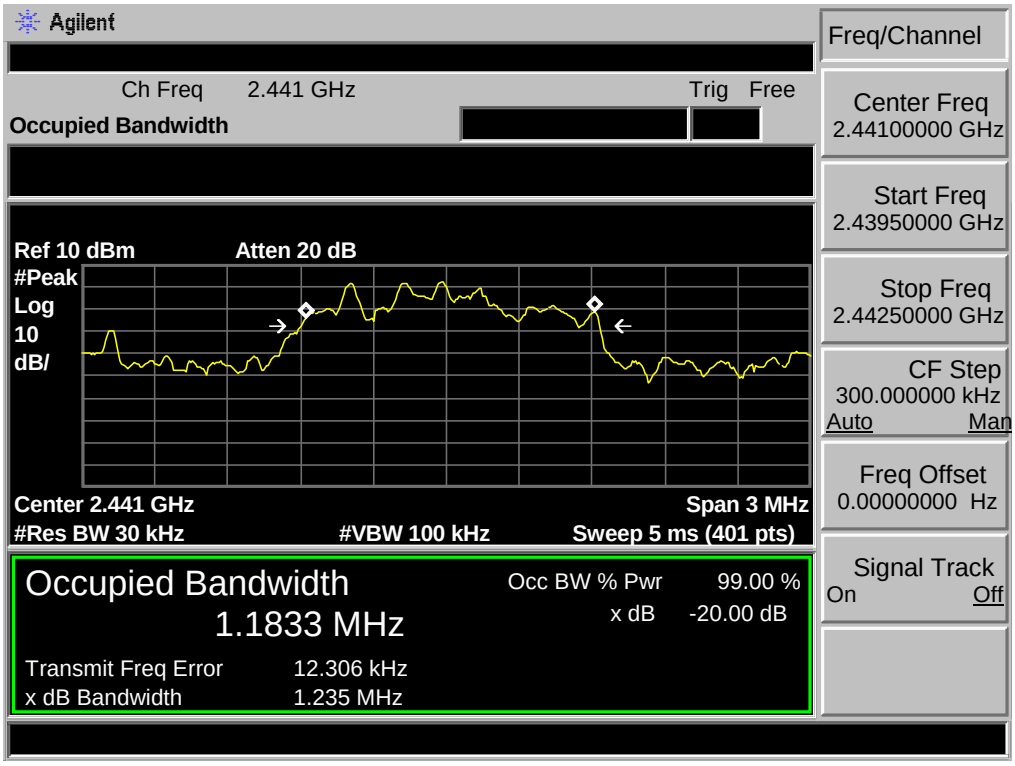
GFSK 2480MHz



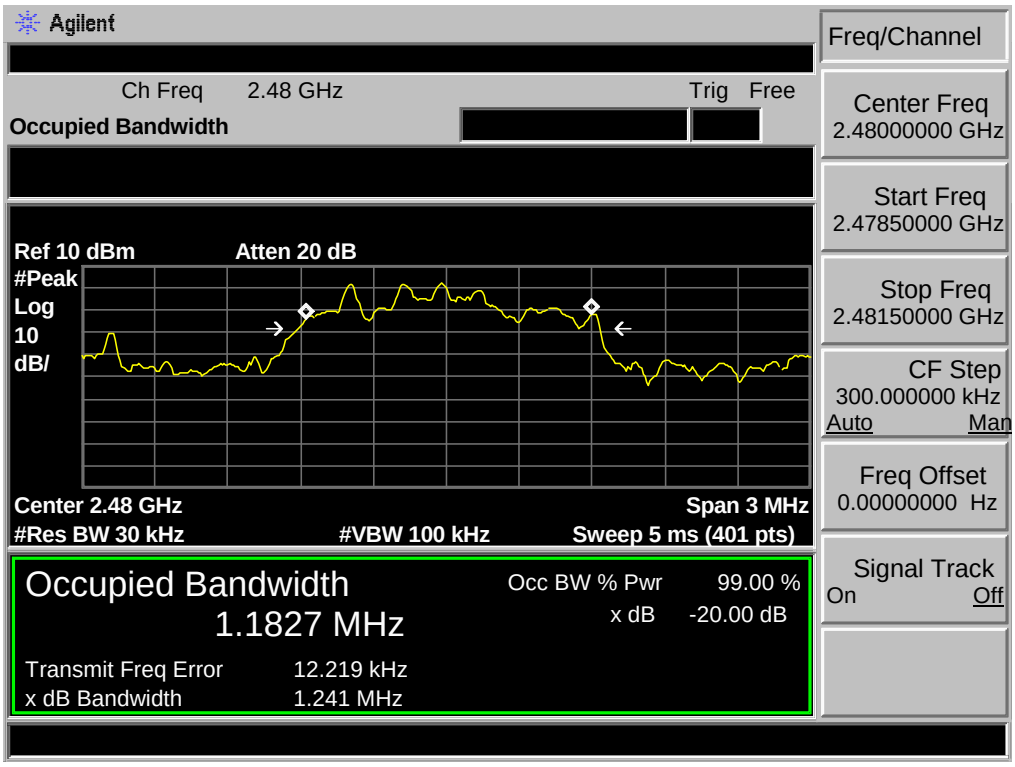
8-DPSK 2402MHz



8-DPSK 2441MHz



8-DPSK 2480MHz



5. CARRIER FREQUENCY SEPARATION

5.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.2. Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable. The carrier frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW.

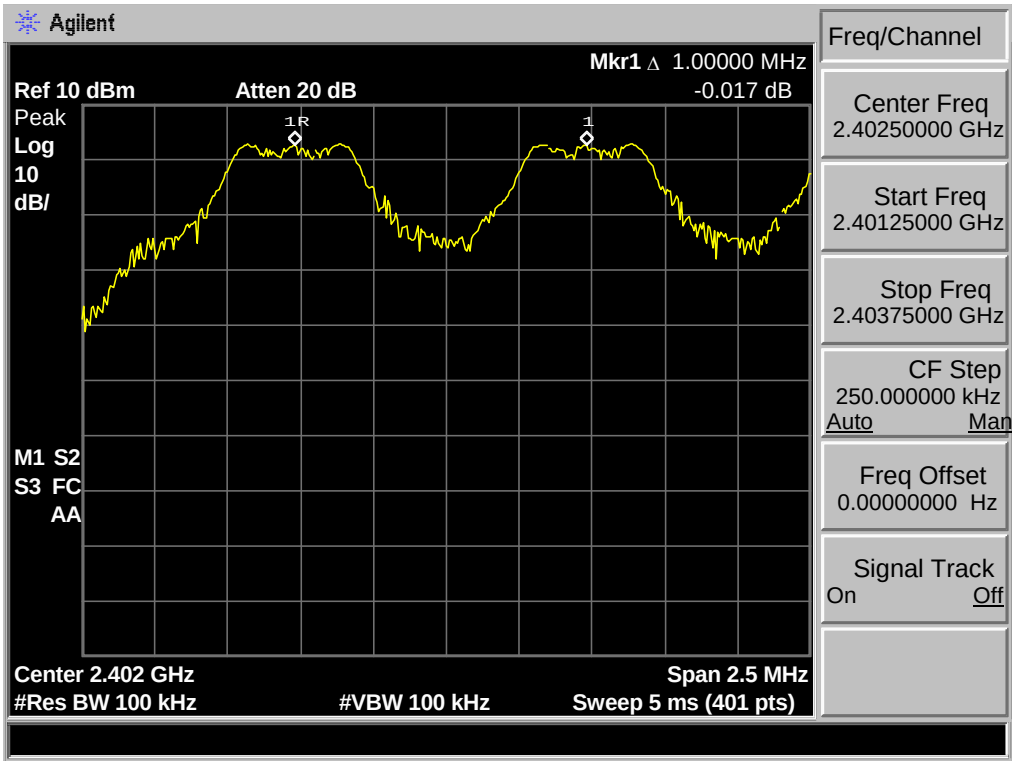
5.3. Test Result

EUT: Car MP3 player				
M/N: Colombo ML110 BT				
Test date: 2018-12-09			Test site: RF site Tested by: Seven	
Mode	Channel	Channel separation (MHz)	Limit (MHz)	Conclusion
GFSK	Low CH	1.000000	0.964117	PASS
	Mid CH	1.000000	0.834795	PASS
	High CH	1.000000	0.806606	PASS
8-DPSK	Low CH	1.000000	> 2/3 of the 20dB Bandwidth or 25[kHz](whichever is greater)	PASS
	Mid CH	1.000000		PASS
	High CH	1.000000		PASS

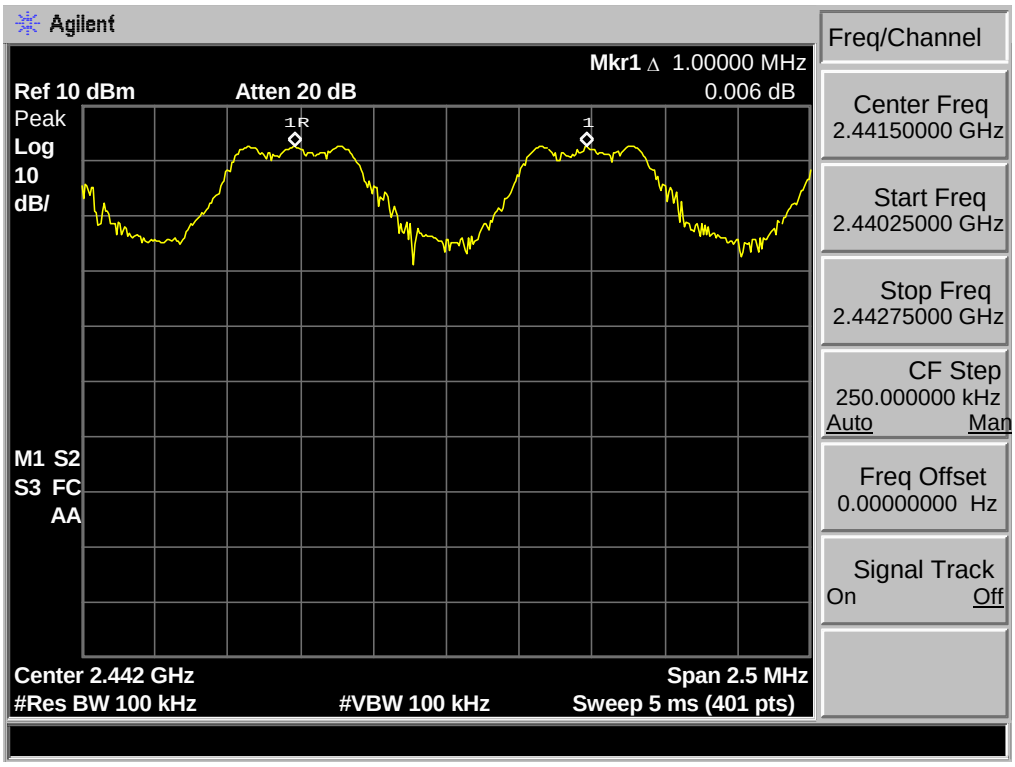
5.4. Test Data

GFSK

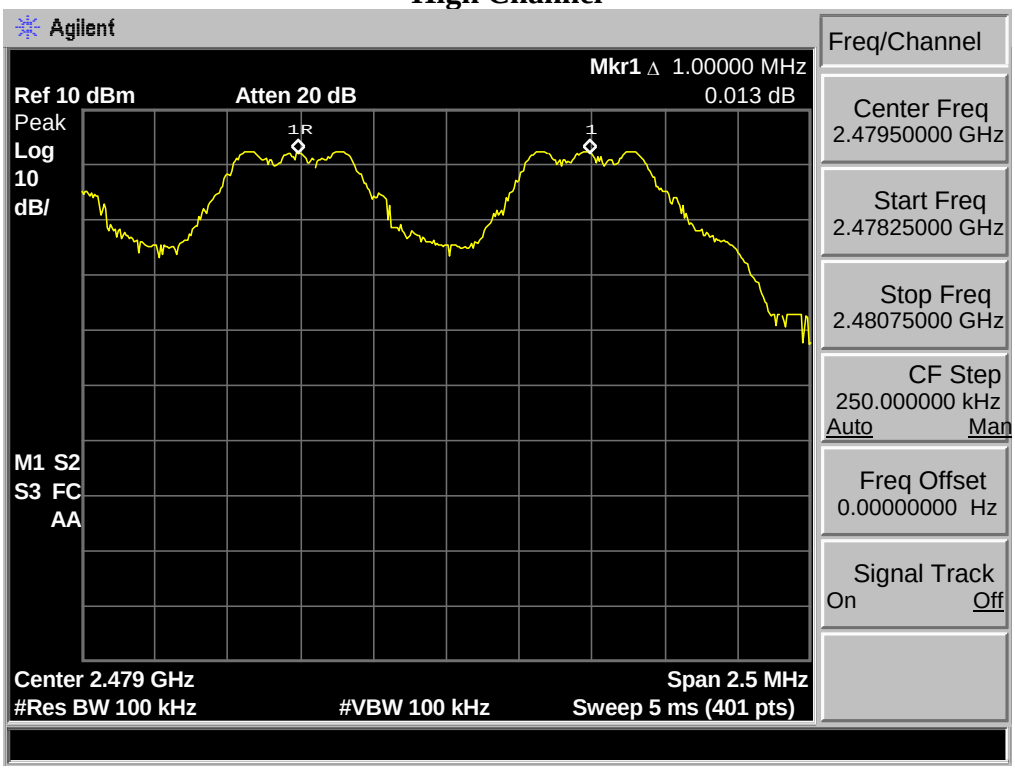
Low Channel



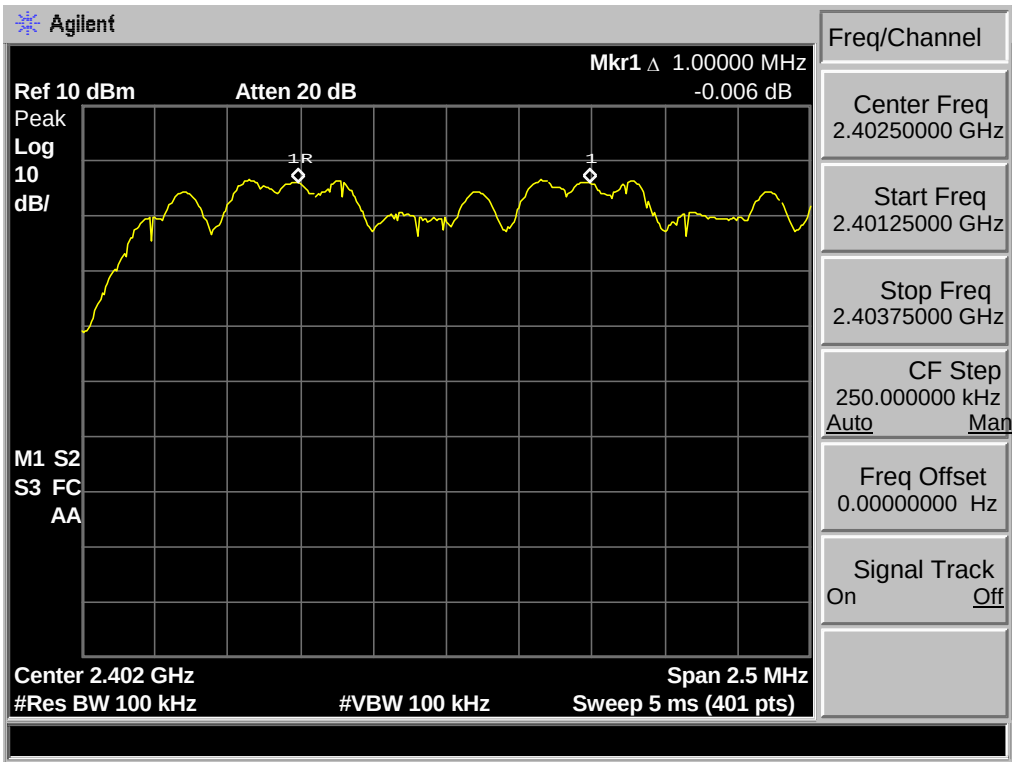
Mid Channel



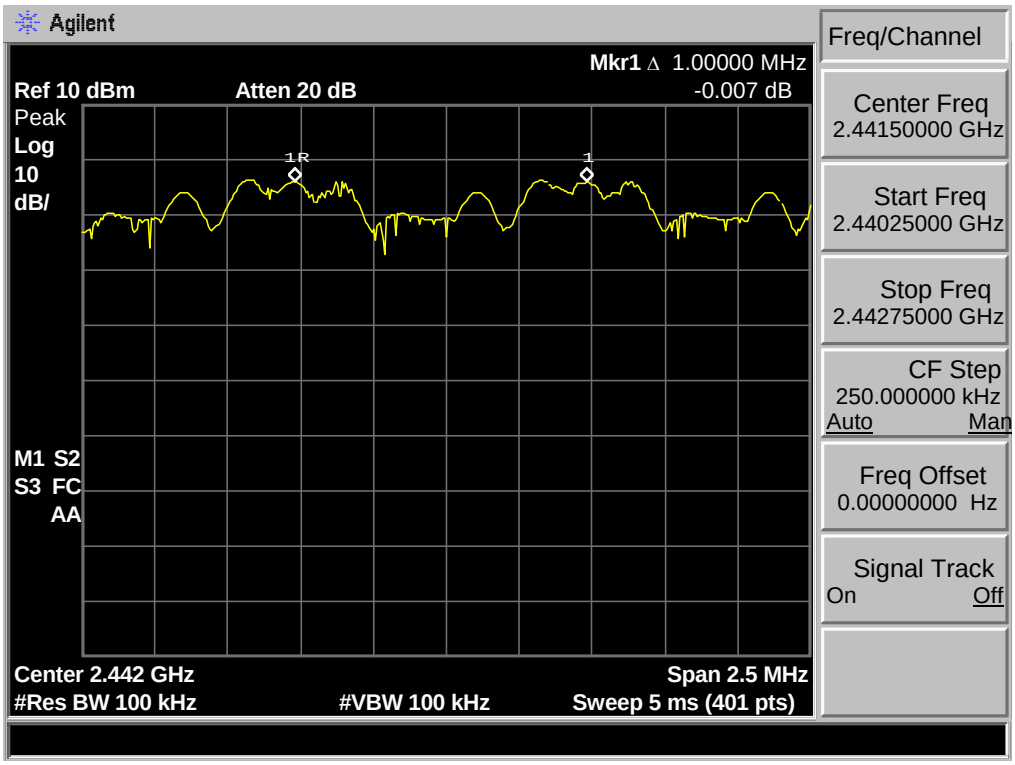
High Channel



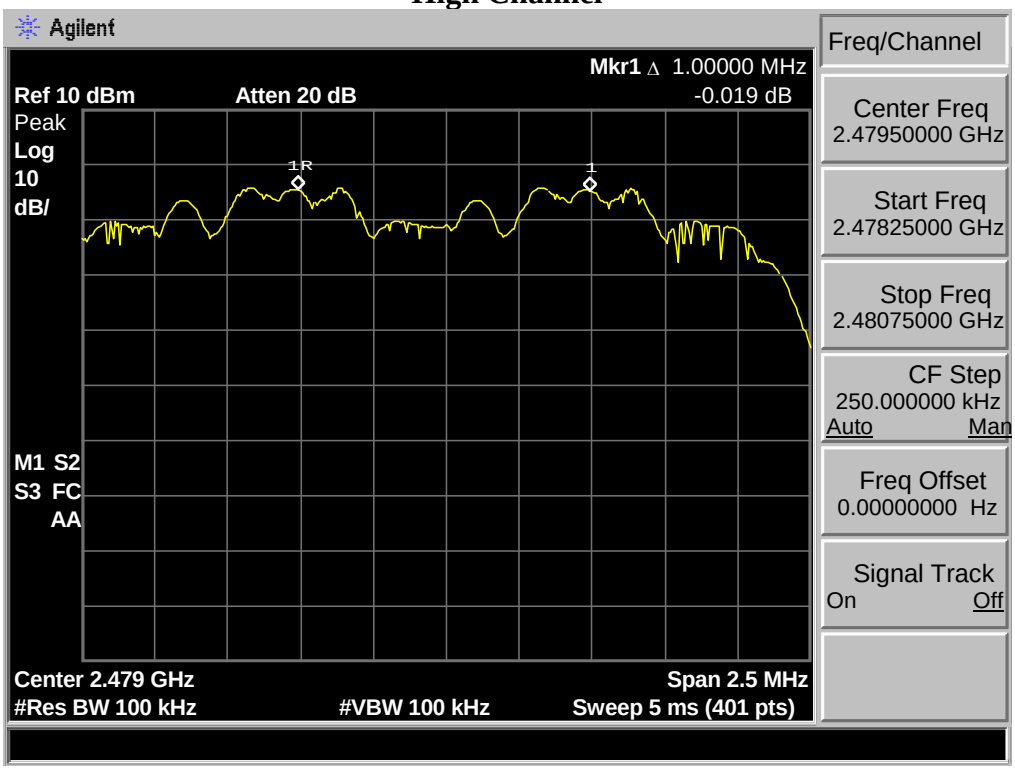
8-DPSK
Low Channel



Mid Channel



High Channel



6. NUMBER OF HOPPING CHANNEL

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

6.2. Test Procedure

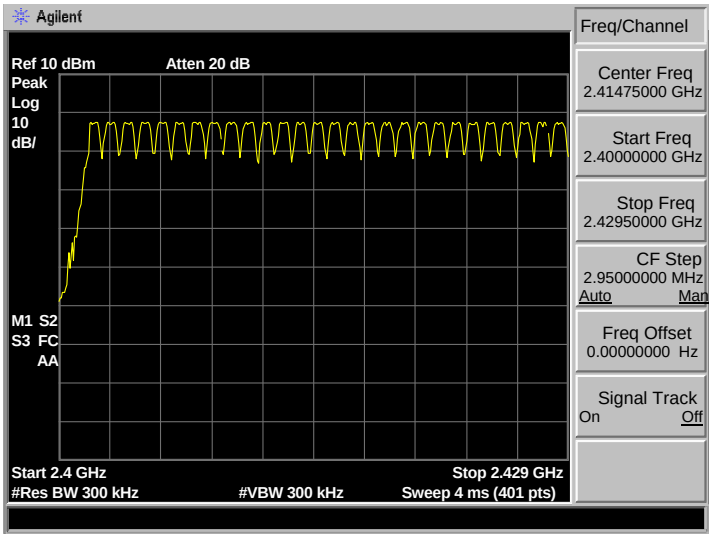
The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 300kHz VBW.

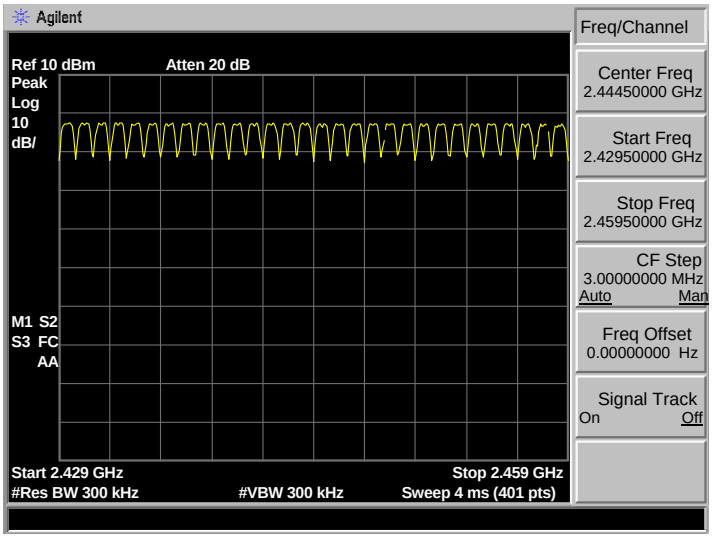
6.3. Test Result

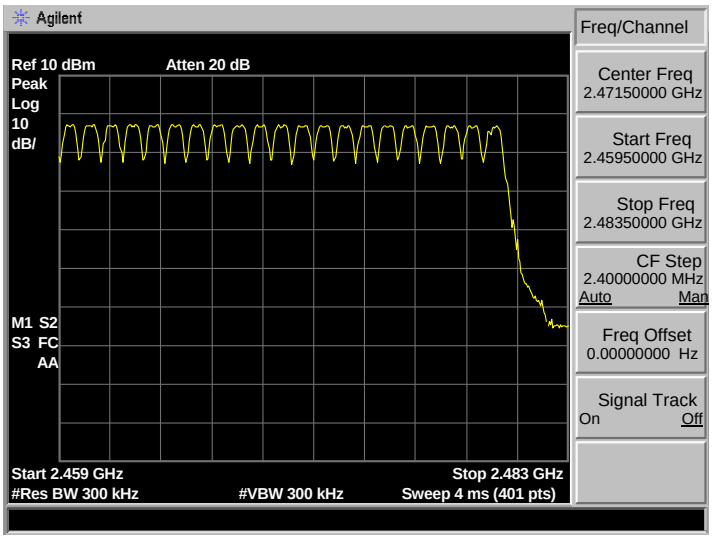
EUT: Car MP3 player			
M/N: Colombo ML110 BT			
Test date: 2018-12-09	Test site: RF site	Tested by: Seven	
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
8-DPSK	79	>15	PASS

6.4. Test Data

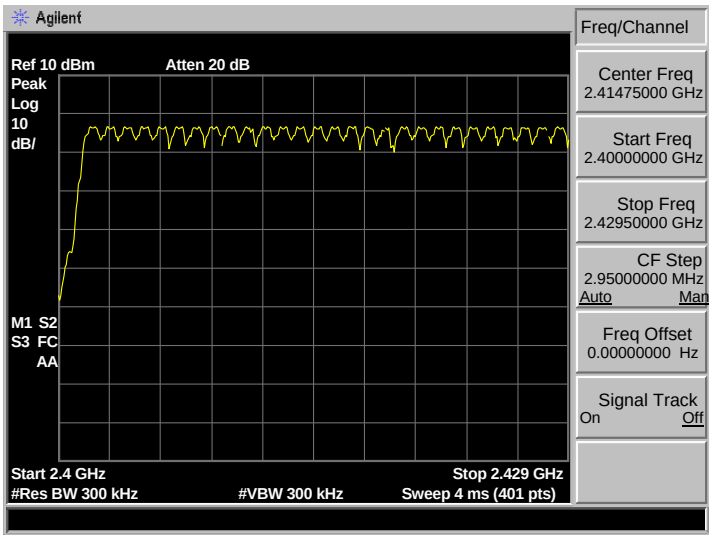
GFSK

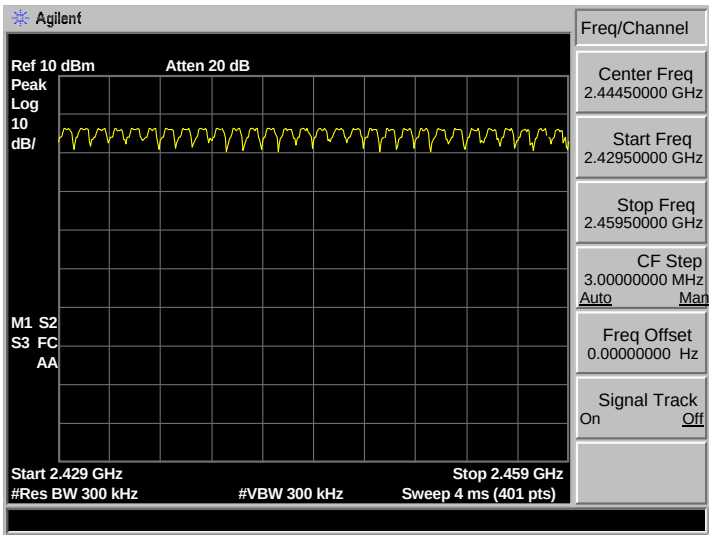


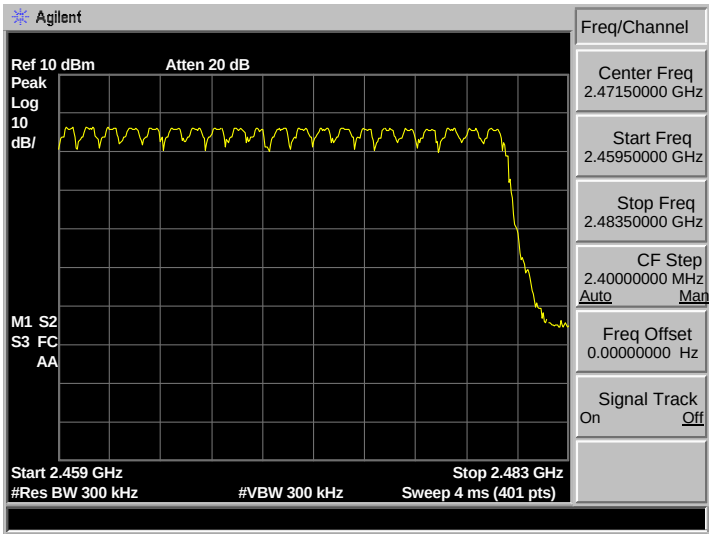




8-DPSK


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Start 2.4 GHz
Stop 2.429 GHz
#Res BW 300 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.41475000 GHz
Start Freq
2.40000000 GHz
Stop Freq
2.42950000 GHz
CF Step
2.95000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Start 2.429 GHz
Stop 2.459 GHz
#Res BW 300 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44450000 GHz
Start Freq
2.42950000 GHz
Stop Freq
2.45950000 GHz
CF Step
3.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Start 2.459 GHz
Stop 2.483 GHz
#Res BW 300 kHz
#VBW 300 kHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.47150000 GHz
Start Freq
2.45950000 GHz
Stop Freq
2.48350000 GHz
CF Step
2.40000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

7. DWELL TIME

7.1. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

7.2. Test Procedure

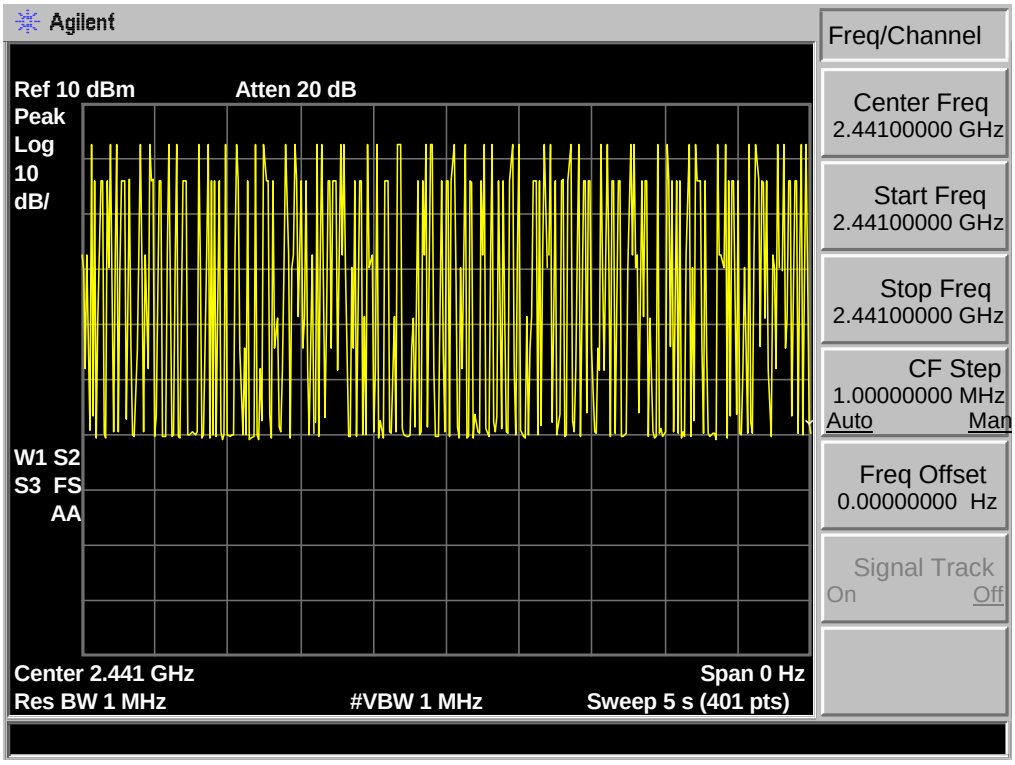
1. The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 1MHz, VBW= 1MHz, Frequency Span = 0 Hz.
4. Set sweep time properly to capture the entire dwell time per hopping channel.
5. Set detector type to Peak and trace mode to Max Hold and make the measurement.
6. Repeat step 3-5 until all channels measured were complete.

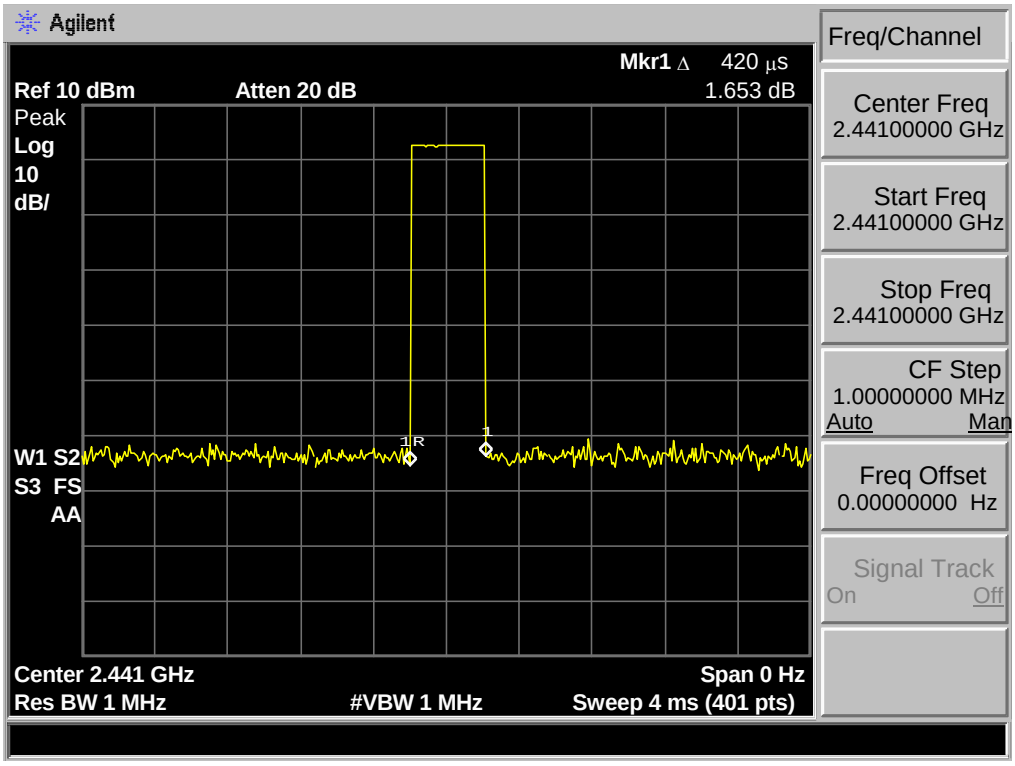
7.3. Test Result

EUT: Car MP3 player						
M/N: Colombo ML110 BT						
Test date: 2018-12-09	Test site: RF site			Tested by: Seven		
Mode	Hopping number	Measure time (s)	Burst on time (ms)	Dwell time (ms)	Limit	Conclusion
GFSK DH1	51	5	0.42	135.374	<400ms	PASS
GFSK DH3	23	5	1.71	248.566	<400ms	PASS
GFSK DH5	20	5	2.97	375.408	<400ms	PASS
8-DPSK 3DH1	49	5	0.45	139.356	<400ms	PASS
8-DPSK 3DH3	23	5	1.71	248.566	<400ms	PASS
8-DPSK 3DH5	15	5	2.96	280.608	<400ms	PASS
Dwell time = Hopping number/measure time *0.4*79*burst on time.						

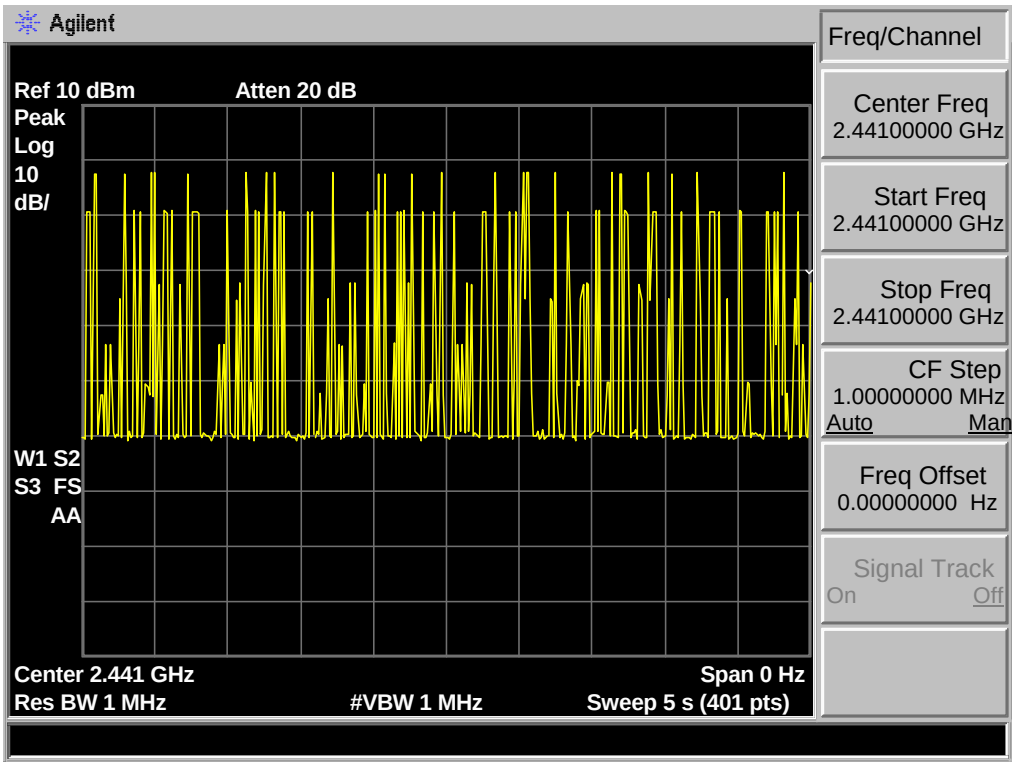
7.4. Test Data

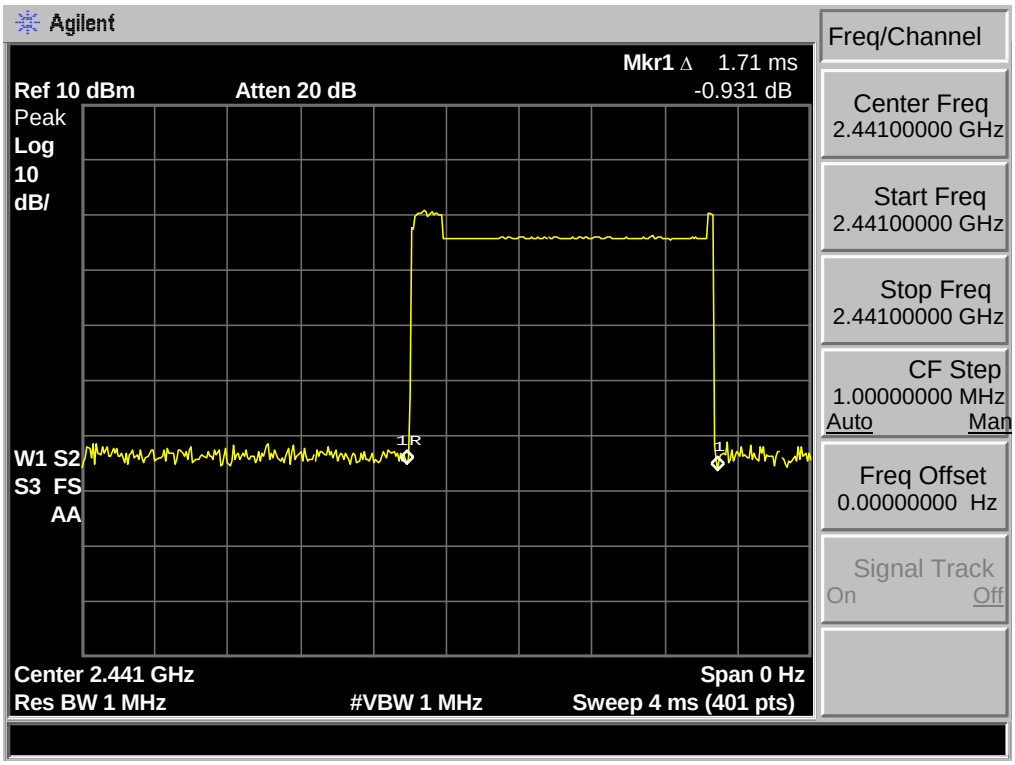
GFSK DH1



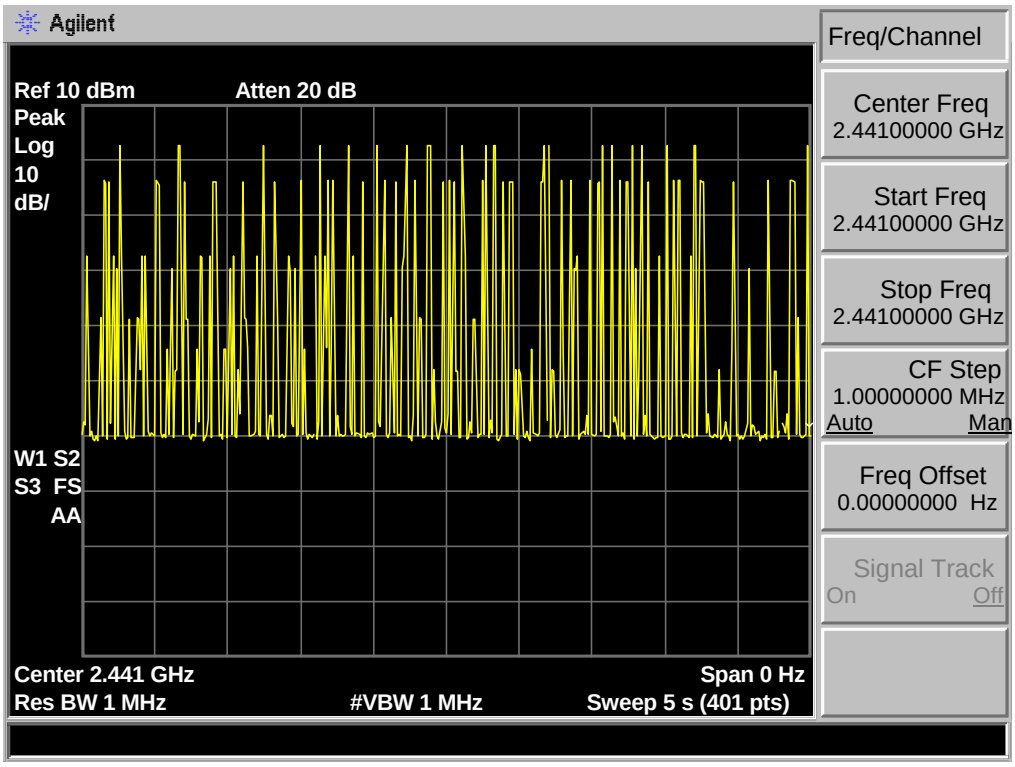


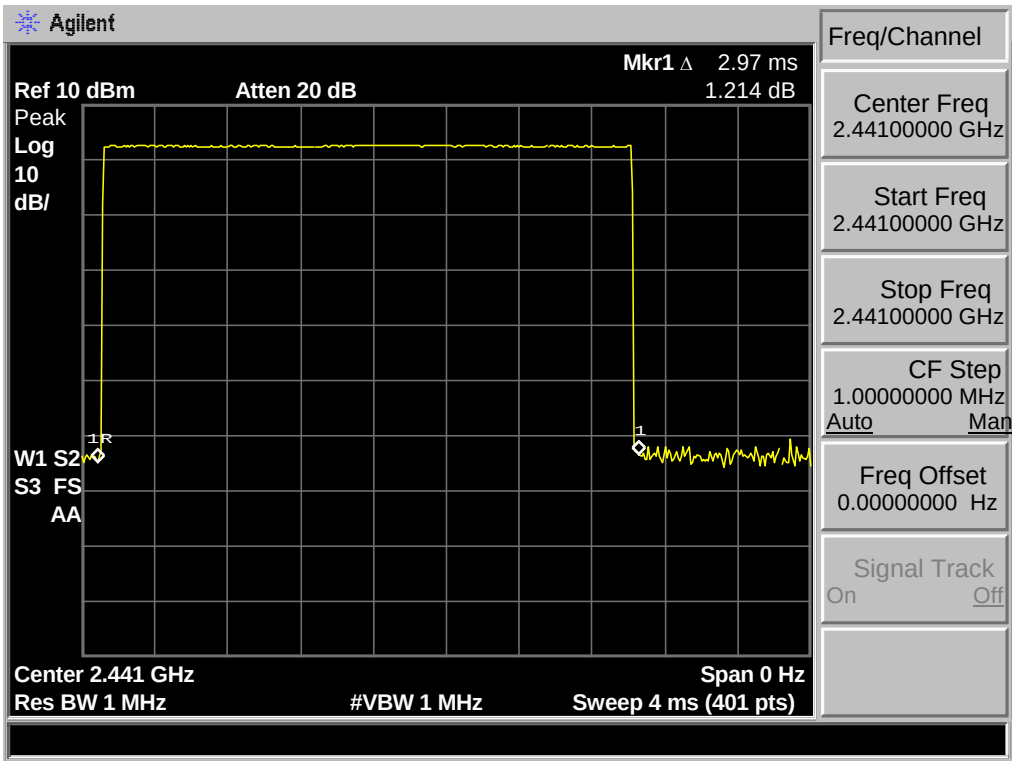
GFSK DH3


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

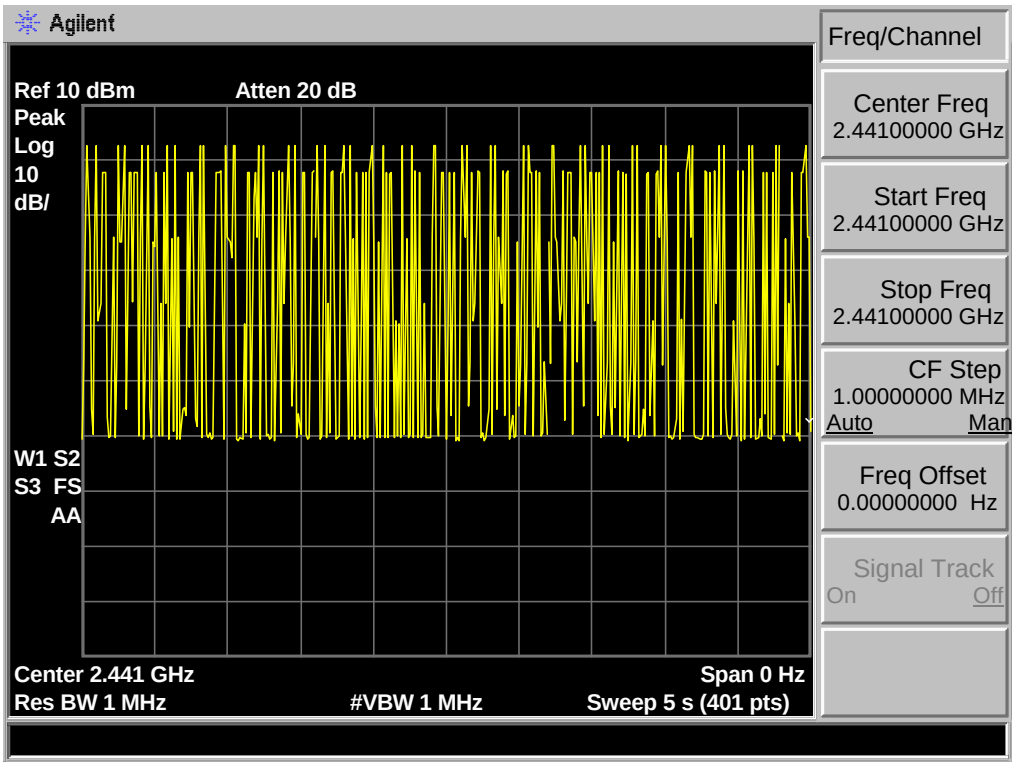

Agilent
Mkr1 Δ 1.71 ms
-0.931 dB
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

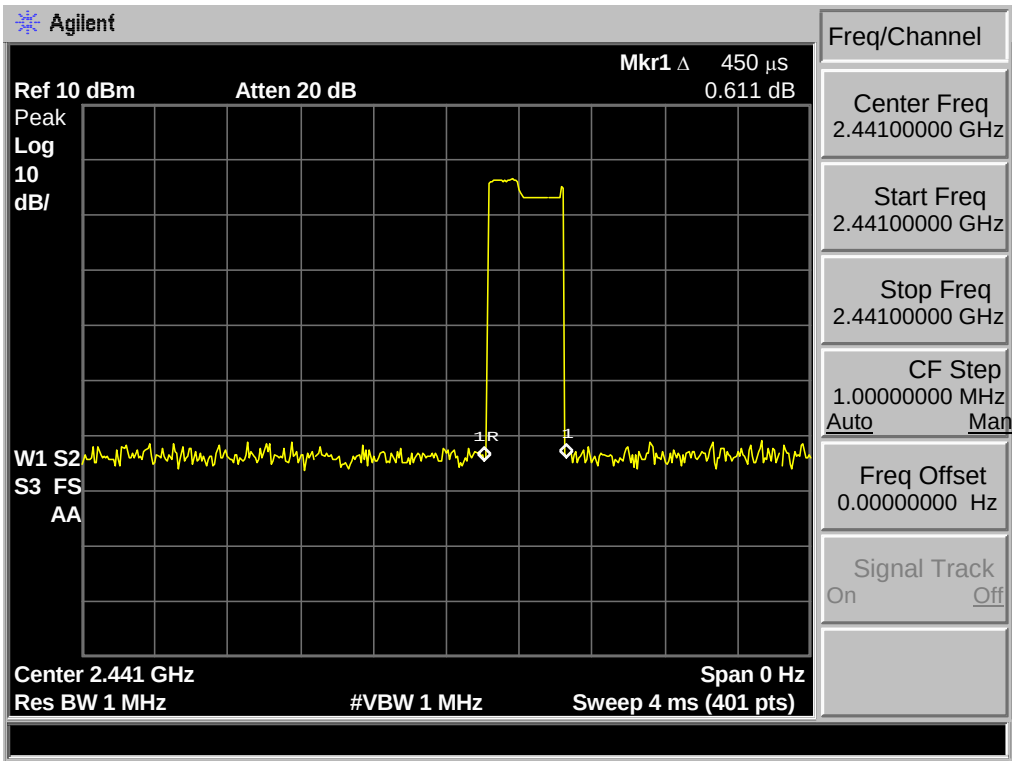
GSFK DH5


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

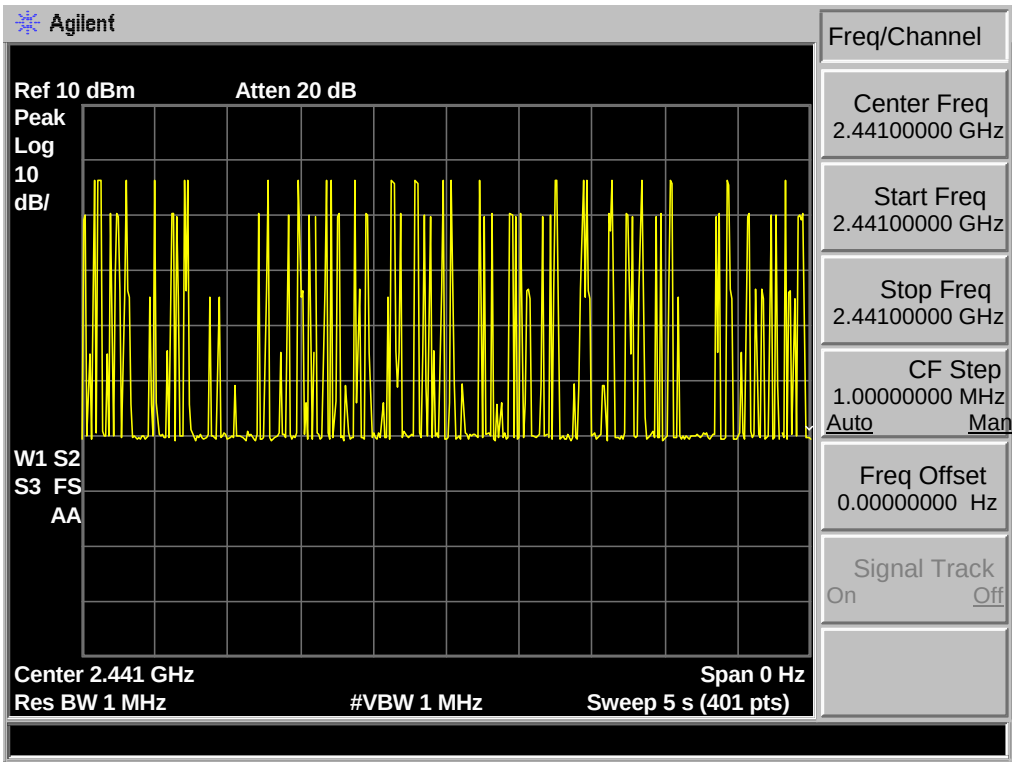

Agilent
Mkr1 Δ 2.97 ms
1.214 dB
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

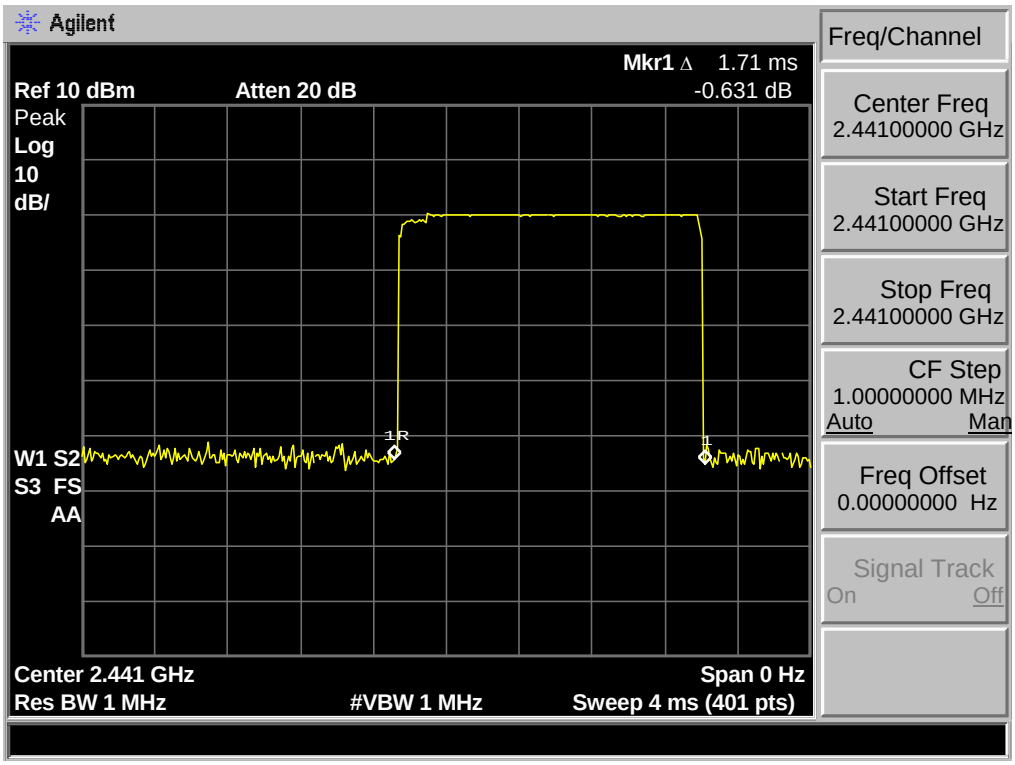
8-DPSK 3DH1


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

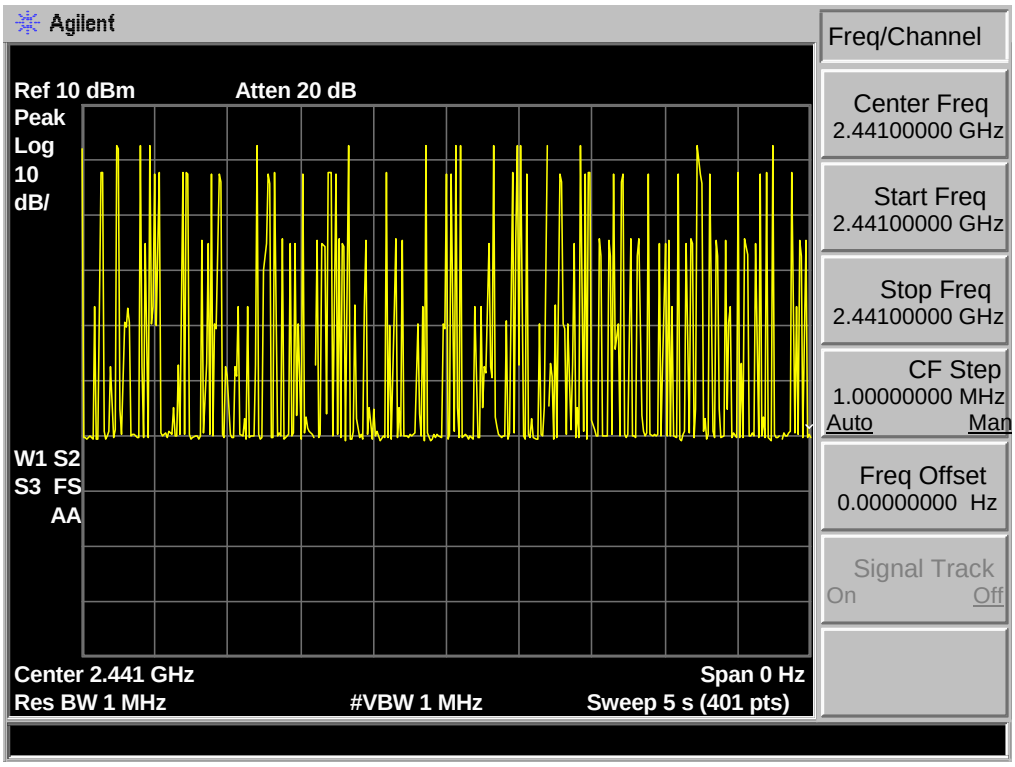

Agilent
Mkr1 Δ 450 µs
0.611 dB
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

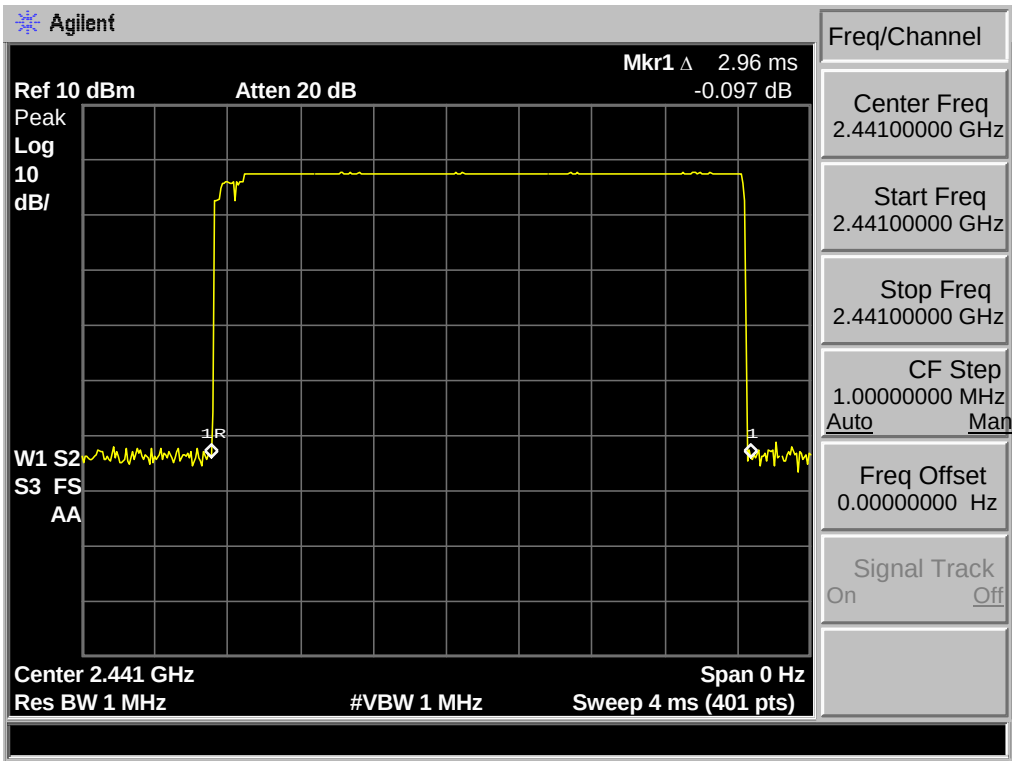
8-DPSK 3DH3


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
Mkr1 Δ 1.71 ms
-0.631 dB
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

8-DPSK 3DH5


Agilent
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
Mkr1 Δ 2.96 ms
-0.097 dB
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
W1 S2
S3 FS
AA
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
Freq/Channel
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

8. RADIATED EMISSIONS

8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

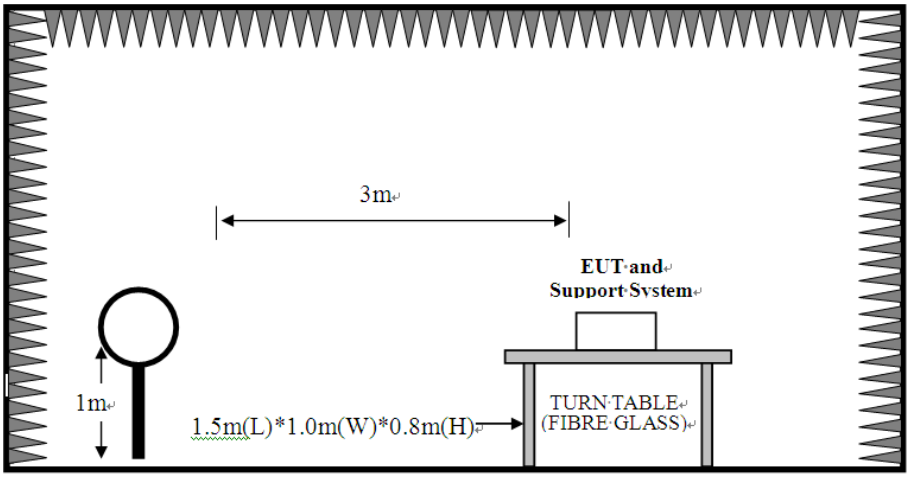
15.209 Limit

Frequency (MHz)	Field Strength(μV/m)	Distance(m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

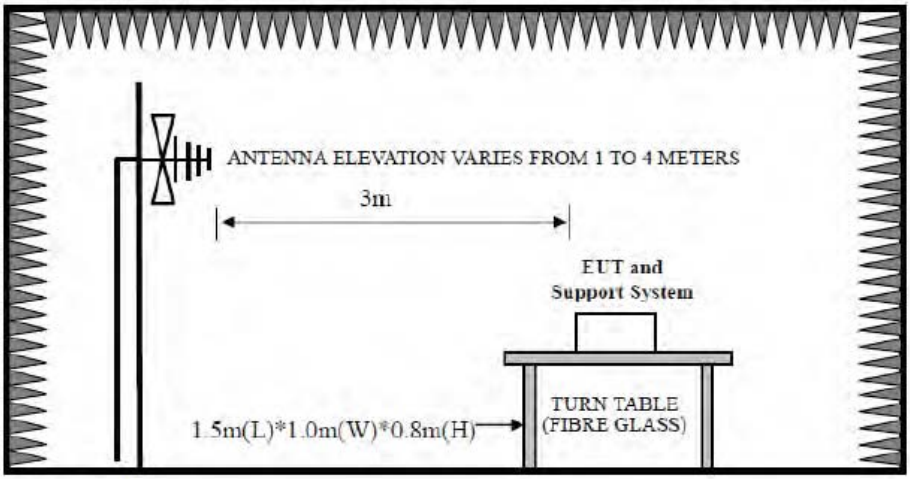
Remark：(1) Emission level dBμV = 20 log Emission level μV/m
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

8.2. Block Diagram of Test setup

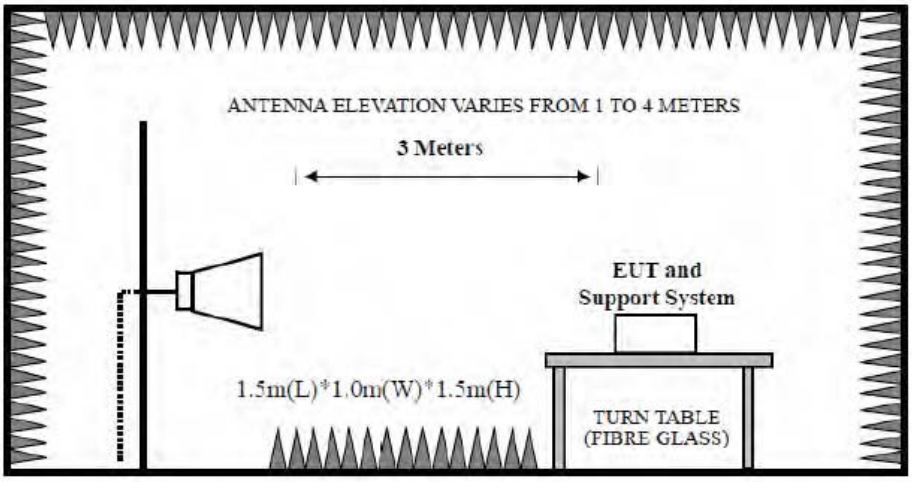
9kHz~30MHz



30~1000MHz



Above 1GHz



8.3. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground for 9kHz~1000MHz test, and which is 1.5 meter high above ground for above 1GHz test. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

PEAK detector, 1MHz/1MHz for PAEK measurement,

PEAK detector, 1MHz/10Hz for Average measurement

The frequency range from 30MHz to 10th harmonic (25GHz) are checked.

8.4. Test Result

Pass

Note: 1、For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

2、The frequency 2402MHz 、2441MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

8.5. Test Data

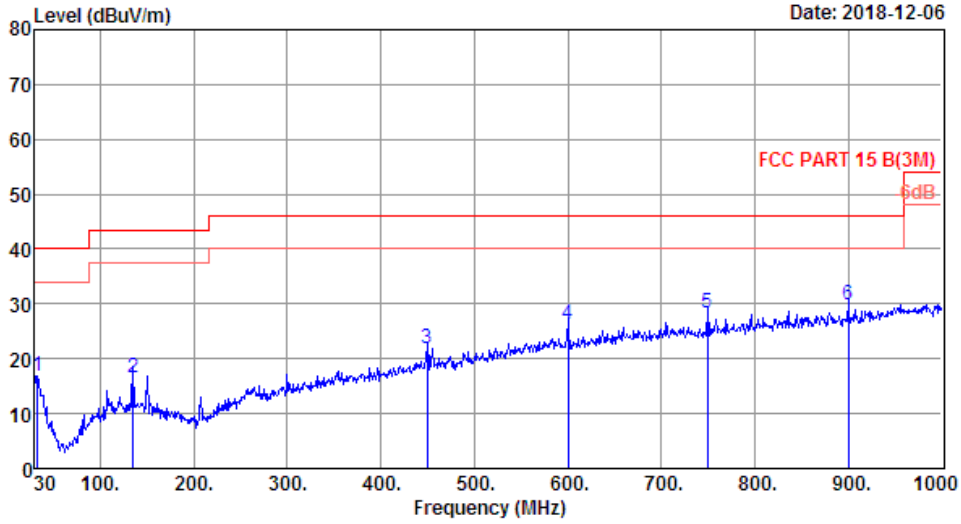
9 kHz – 30 MHz
Pass
Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

30 MHz – 1000 MHz

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 1 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.      : 1# 966 Chamber              Data no.  : 1
Dis. / Ant.   : 3m   37062                  Ant. pol. : VERTICAL
Limit         : FCC PART 15 B(3M)
Env. / Ins.   : Temp:18.6';Humi:48.1%;Press:101.52kPa
Engineer      : ZERO
EUT           : Car MP3 player
Power         : DC 12V
M/N           : Colombo ML110 BT
Test Mode     : TX Mode
```

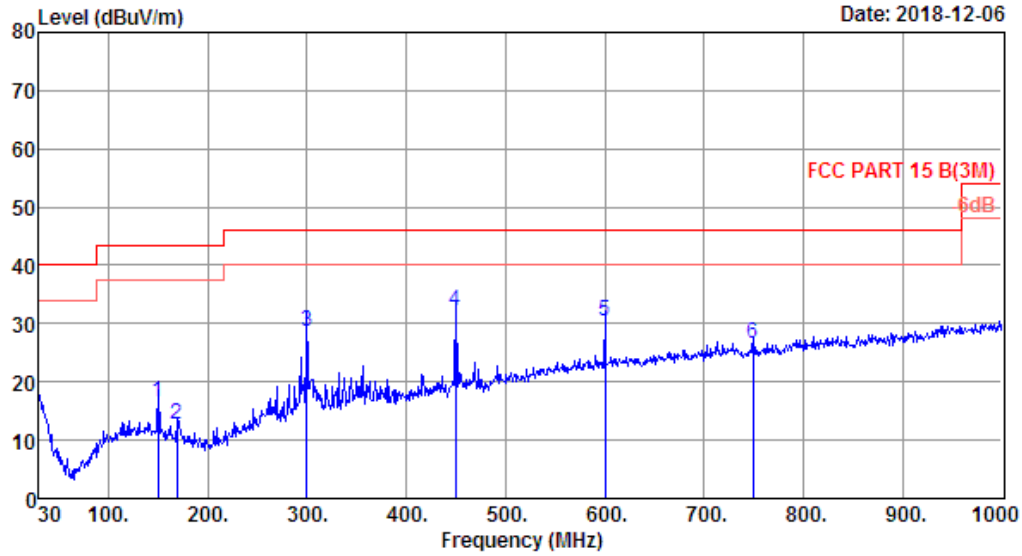
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	32.91	16.35	0.35	0.09	16.79	40.00	23.21	QP
2	134.76	11.90	1.22	3.33	16.45	43.50	27.05	QP
3	450.01	17.10	2.73	2.13	21.96	46.00	24.04	QP
4	600.36	20.20	3.19	3.00	26.39	46.00	19.61	QP
5	749.74	22.30	3.85	2.19	28.34	46.00	17.66	QP
6	900.09	23.90	4.05	1.72	29.67	46.00	16.33	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 2 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 2
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:18.6';Humi:48.1%;Press:101.52kPa
Engineer : ZERO
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : TX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	150.28	11.60	1.31	3.73	16.64	43.50	26.86	QP
2	168.71	9.98	1.40	1.24	12.62	43.50	30.88	QP
3	299.66	13.80	2.05	12.90	28.75	46.00	17.25	QP
4	450.01	17.10	2.73	12.25	32.08	46.00	13.92	QP
5	600.36	20.20	3.19	6.89	30.28	46.00	15.72	QP
6	749.74	22.30	3.85	0.35	26.50	46.00	19.50	QP

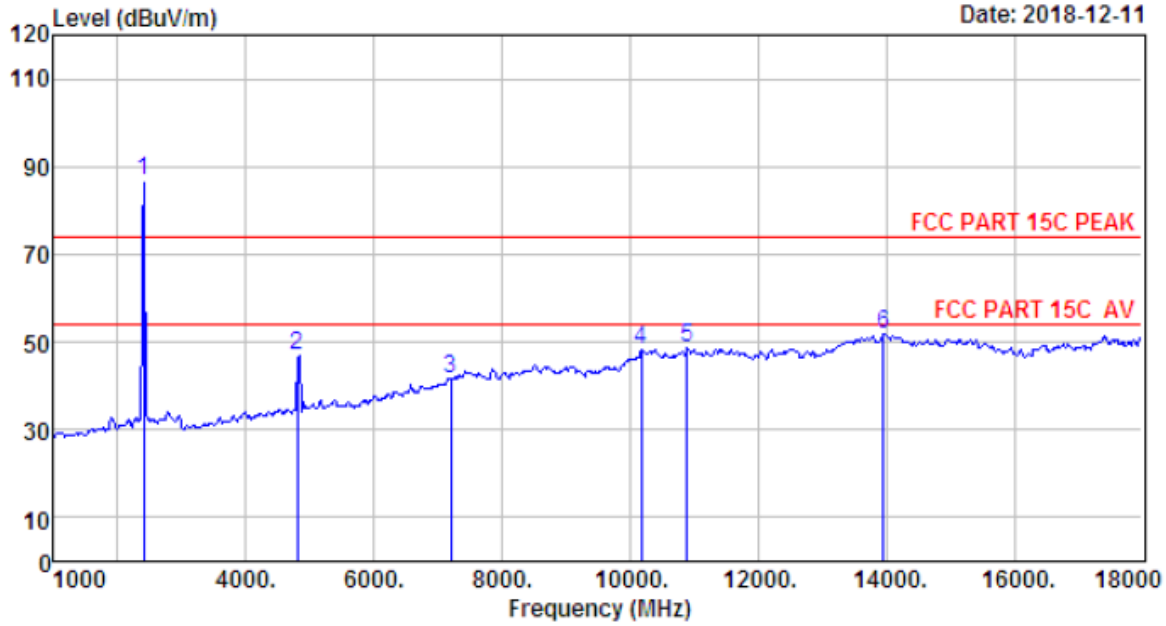
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

1000-18000MHz

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 3 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 3
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.35	3.21	34.94	91.20	86.82	74.00	-12.82	Peak
2	4804.00	32.06	4.67	35.06	45.48	47.15	74.00	26.85	Peak
3	7206.00	36.56	5.99	33.45	32.39	41.49	74.00	32.51	Peak
4	10180.00	39.17	9.62	34.47	33.97	48.29	74.00	25.71	Peak
5	10894.00	39.78	8.65	33.60	33.92	48.75	74.00	25.25	Peak
6	13954.00	41.66	10.12	32.84	33.00	51.94	74.00	22.06	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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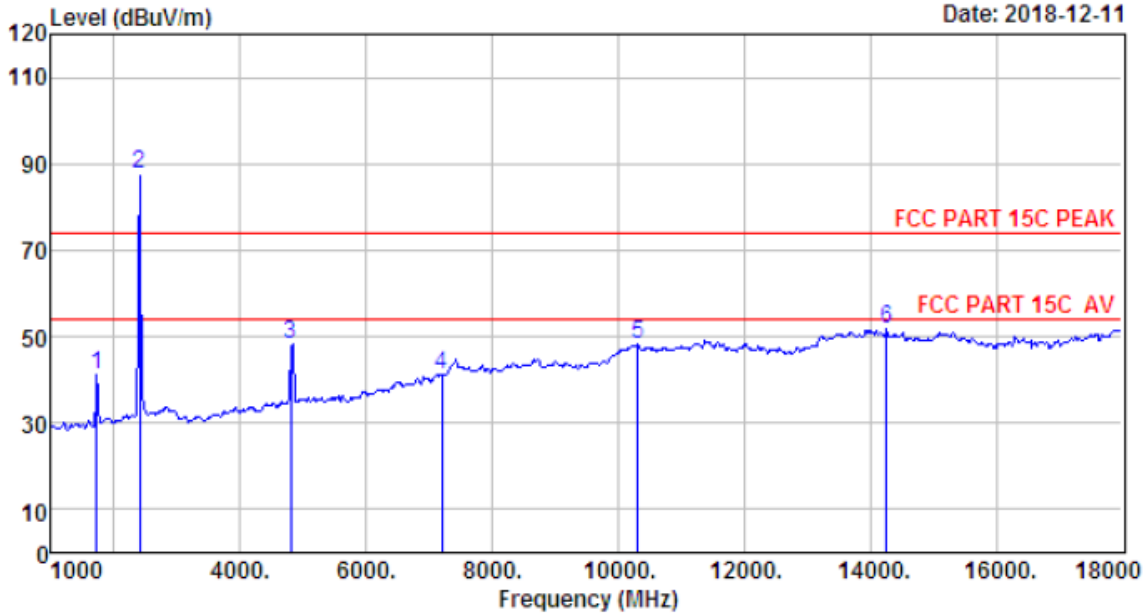
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 4 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 4
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	47.50	41.36	74.00	32.64	Peak
2	2402.00	27.35	3.21	34.94	92.14	87.76	74.00	-13.76	Peak
3	4804.00	32.06	4.67	35.06	46.67	48.34	74.00	25.66	Peak
4	7206.00	36.56	5.99	33.45	32.14	41.24	74.00	32.76	Peak
5	10316.00	39.23	10.20	34.34	33.03	48.12	74.00	25.88	Peak
6	14260.00	41.44	10.16	33.20	33.20	51.60	74.00	22.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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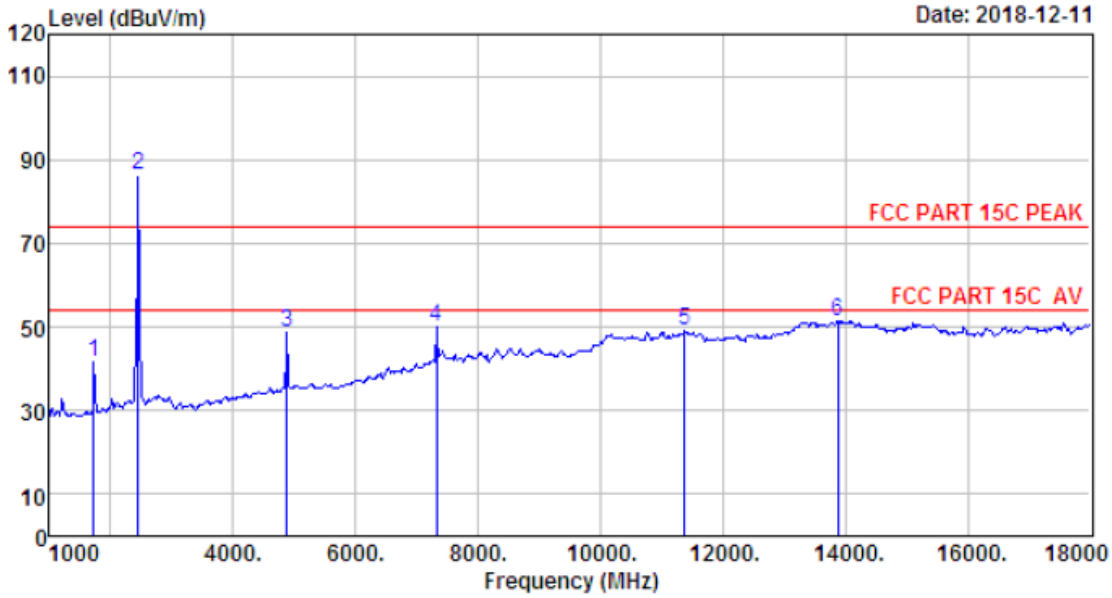
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 5 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 5
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	47.69	41.55	74.00	32.45	Peak
2	2441.00	27.48	3.26	35.07	90.58	86.25	74.00	-12.25	Peak
3	4882.00	32.18	4.73	35.14	47.09	48.86	74.00	25.14	Peak
4	7323.00	36.82	6.10	33.28	40.24	49.88	74.00	24.12	Peak
5	11370.00	40.05	8.30	32.78	33.40	48.97	74.00	25.03	Peak
6	13886.00	41.61	10.11	32.80	32.65	51.57	74.00	22.43	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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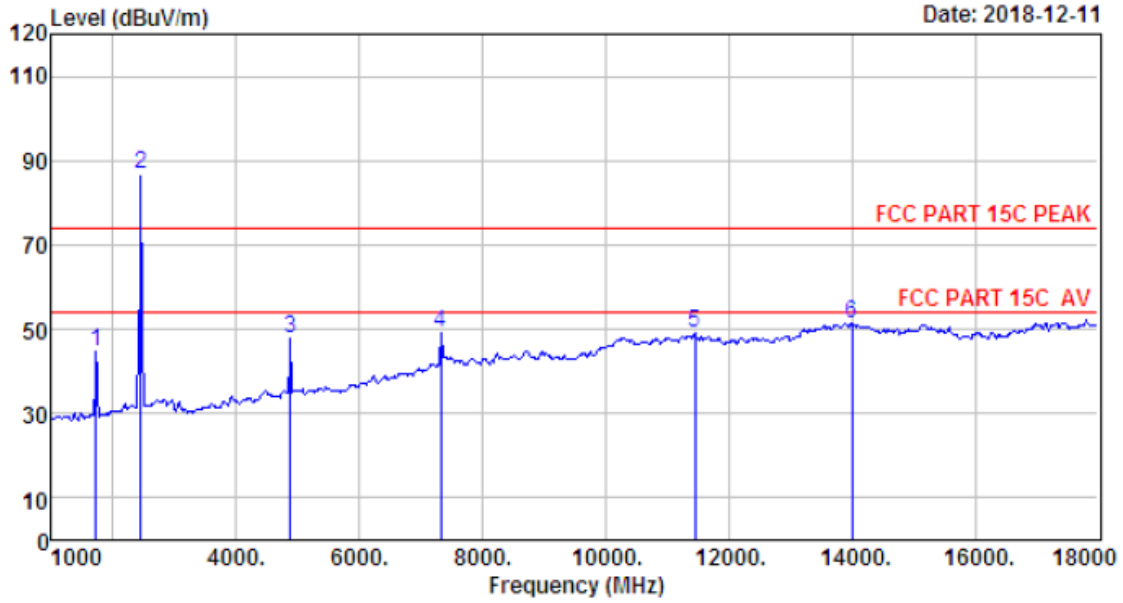
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 6 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 6
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	50.88	44.74	74.00	29.26	Peak
2	2441.00	27.48	3.26	35.07	90.93	86.60	74.00	-12.60	Peak
3	4882.00	32.18	4.73	35.14	46.04	47.81	74.00	26.19	Peak
4	7323.00	36.82	6.10	33.28	39.57	49.21	74.00	24.79	Peak
5	11455.00	40.08	8.28	32.62	33.31	49.05	74.00	24.95	Peak
6	14005.00	41.70	10.13	32.88	32.61	51.56	74.00	22.44	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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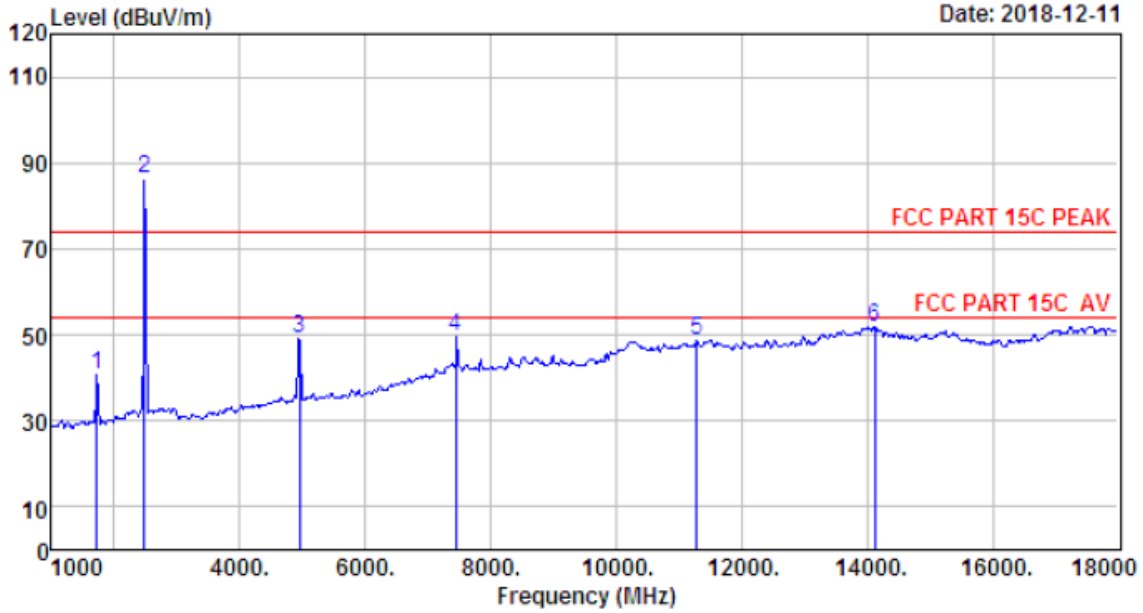
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 7 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 7
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	46.83	40.69	74.00	33.31	Peak
2	2480.00	27.56	3.29	35.21	90.78	86.42	74.00	-12.42	Peak
3	4960.00	32.34	4.80	35.24	47.10	49.00	74.00	25.00	Peak
4	7440.00	37.09	6.13	33.08	39.24	49.38	74.00	24.62	Peak
5	11285.00	40.01	8.36	32.94	33.30	48.73	74.00	25.27	Peak
6	14124.00	41.58	10.14	33.04	33.32	52.00	74.00	22.00	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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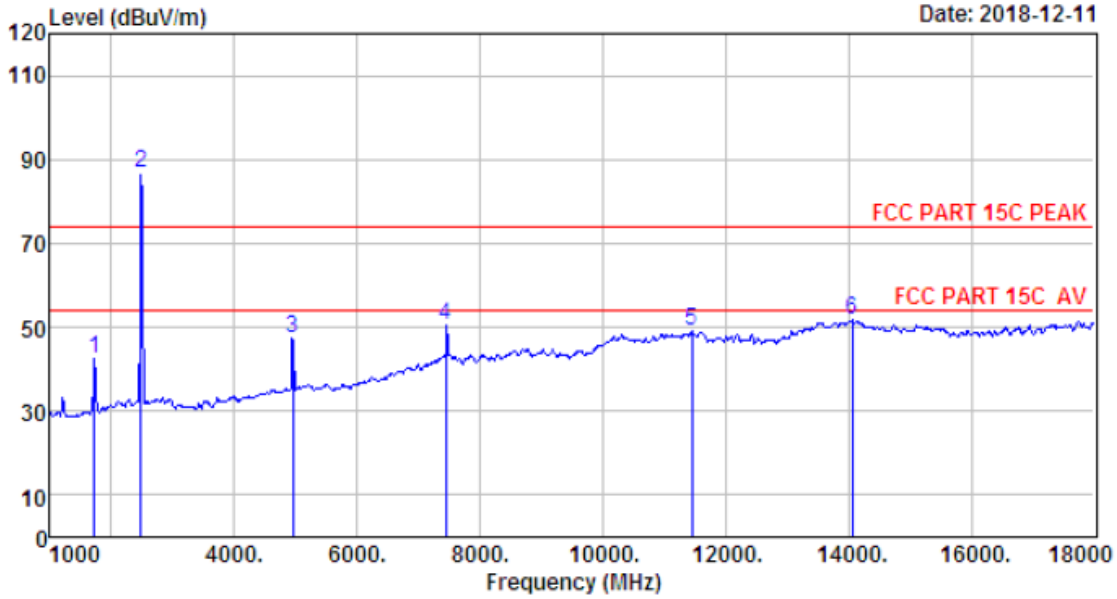
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 8 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 8
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	48.74	42.60	74.00	31.40	Peak
2	2480.00	27.56	3.29	35.21	91.25	86.89	74.00	-12.89	Peak
3	4960.00	32.34	4.80	35.24	45.65	47.55	74.00	26.45	Peak
4	7440.00	37.09	6.13	33.08	40.15	50.29	74.00	23.71	Peak
5	11455.00	40.08	8.28	32.62	33.23	48.97	74.00	25.03	Peak
6	14056.00	41.65	10.13	32.95	32.84	51.67	74.00	22.33	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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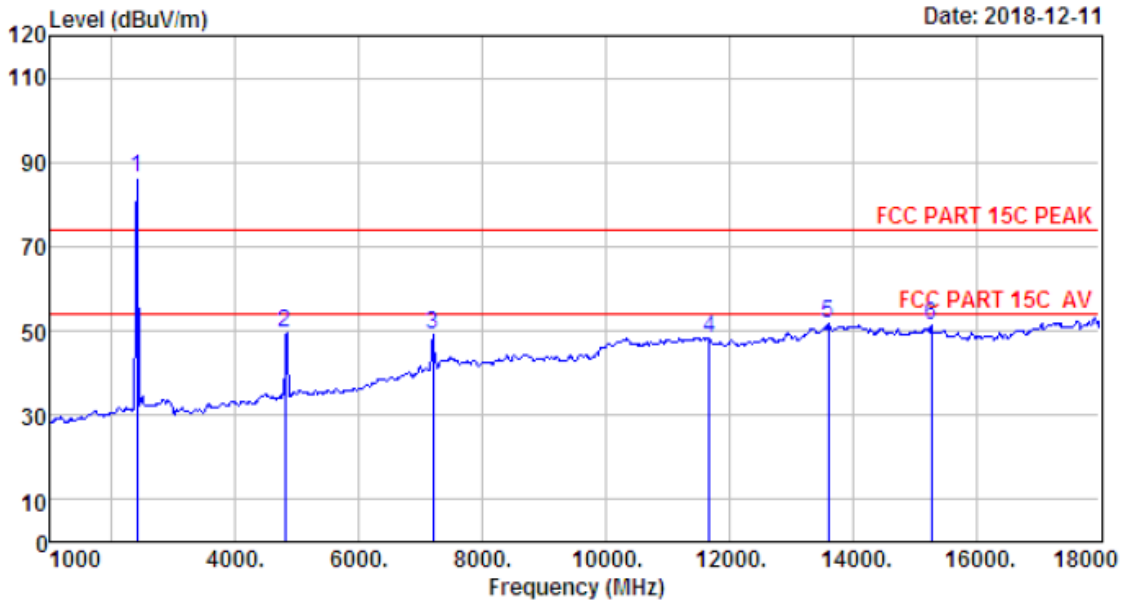
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 9 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 9
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.35	3.21	34.94	90.83	86.45	74.00	-12.45	Peak
2	4804.00	32.06	4.67	35.06	47.94	49.61	74.00	24.39	Peak
3	7206.00	36.56	5.99	33.45	40.15	49.25	74.00	24.75	Peak
4	11676.00	39.86	8.25	32.39	32.71	48.43	74.00	25.57	Peak
5	13614.00	41.39	9.82	32.59	33.09	51.71	74.00	22.29	Peak
6	15280.00	39.86	10.97	32.84	33.45	51.44	74.00	22.56	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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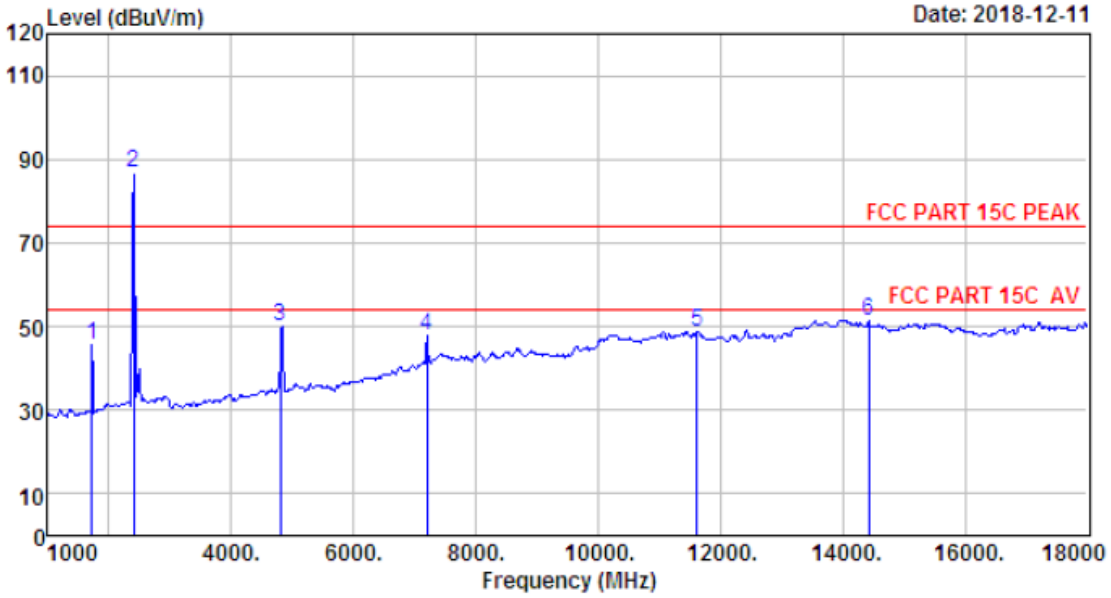
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 10 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.      : 1# 966 Chamber              Data no.  : 10
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Seven
EUT           : Car MP3 player
Power         : DC 12V
M/N           : Colombo ML110 BT
Test Mode     : 8-DPSK TX 2402MHz
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	51.64	45.50	74.00	28.50	Peak
2	2402.00	27.35	3.21	34.94	91.16	86.78	74.00	-12.78	Peak
3	4804.00	32.06	4.67	35.06	48.45	50.12	74.00	23.88	Peak
4	7206.00	36.56	5.99	33.45	38.65	47.75	74.00	26.25	Peak
5	11625.00	39.93	8.25	32.37	33.12	48.93	74.00	25.07	Peak
6	14430.00	41.27	10.19	33.43	33.42	51.45	74.00	22.55	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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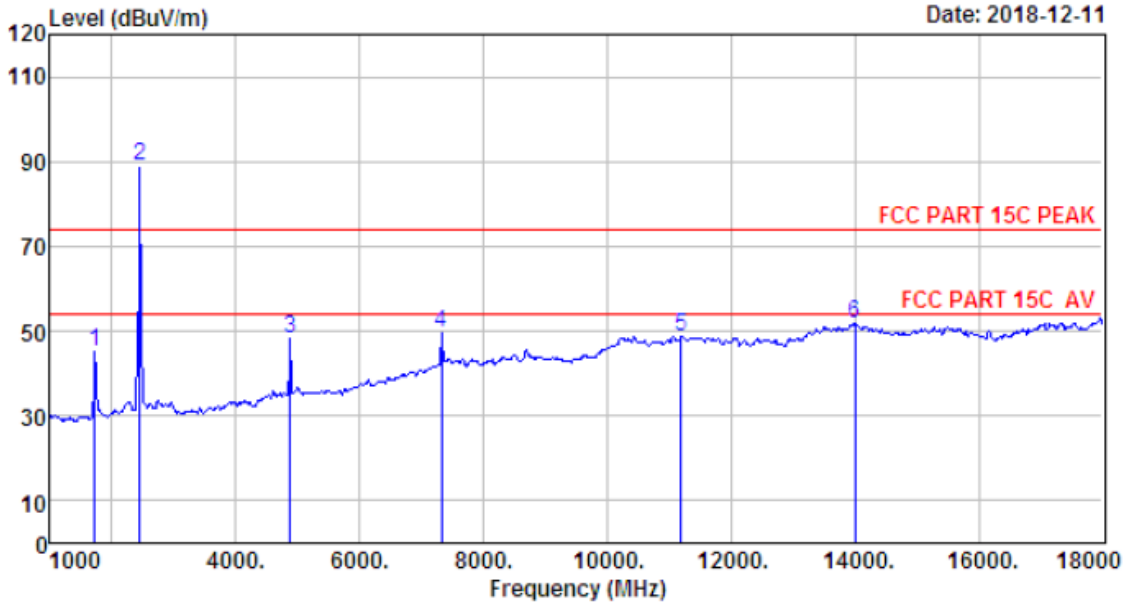
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 11 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 11
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	51.23	45.09	74.00	28.91	Peak
2	2441.00	27.48	3.26	35.07	93.25	88.92	74.00	-14.92	Peak
3	4882.00	32.18	4.73	35.14	46.55	48.32	74.00	25.68	Peak
4	7323.00	36.82	6.10	33.28	40.15	49.79	74.00	24.21	Peak
5	11200.00	39.98	8.43	33.10	33.26	48.57	74.00	25.43	Peak
6	14005.00	41.70	10.13	32.88	32.92	51.87	74.00	22.13	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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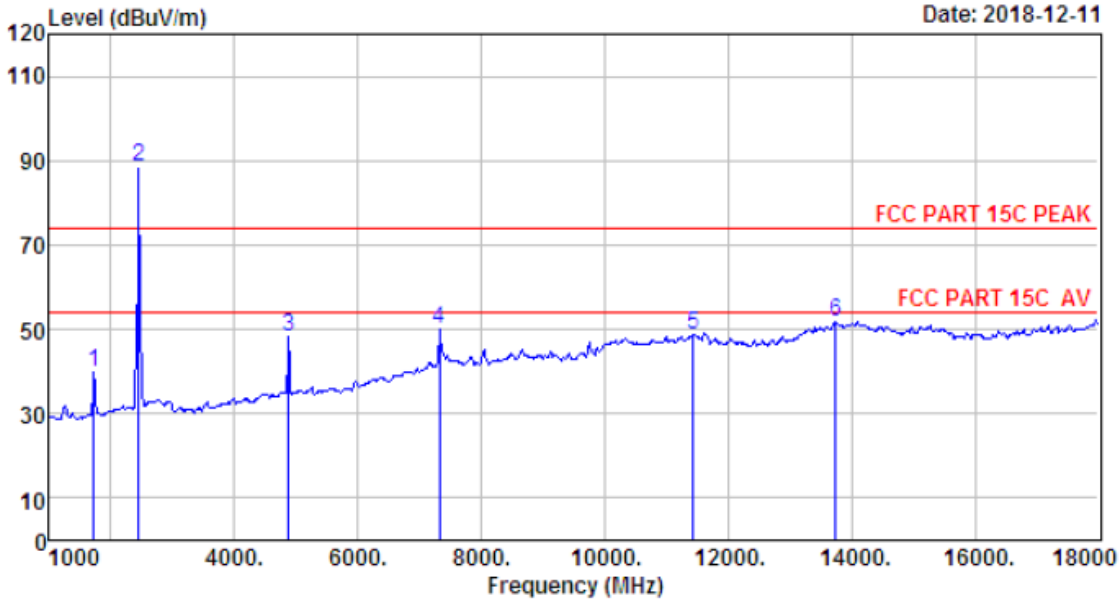
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 12 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 12
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	45.83	39.69	74.00	34.31	Peak
2	2441.00	27.48	3.26	35.07	93.03	88.70	74.00	-14.70	Peak
3	4882.00	32.18	4.73	35.14	46.59	48.36	74.00	25.64	Peak
4	7323.00	36.82	6.10	33.28	40.27	49.91	74.00	24.09	Peak
5	11438.00	40.07	8.29	32.65	33.02	48.73	74.00	25.27	Peak
6	13750.00	41.50	10.01	32.69	33.07	51.89	74.00	22.11	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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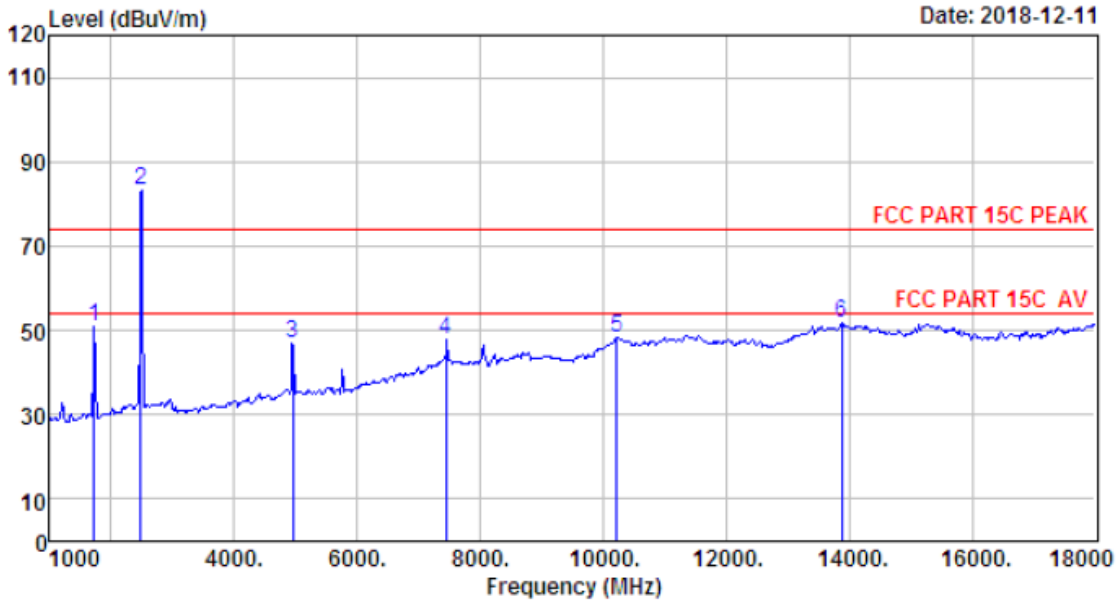
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 13 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 13
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	57.07	50.93	74.00	23.07	Peak
2	2480.00	27.56	3.29	35.21	87.50	83.14	74.00	-9.14	Peak
3	4960.00	32.34	4.80	35.24	45.12	47.02	74.00	26.98	Peak
4	7440.00	37.09	6.13	33.08	37.77	47.91	74.00	26.09	Peak
5	10214.00	39.19	9.77	34.43	33.92	48.45	74.00	25.55	Peak
6	13886.00	41.61	10.11	32.80	32.93	51.85	74.00	22.15	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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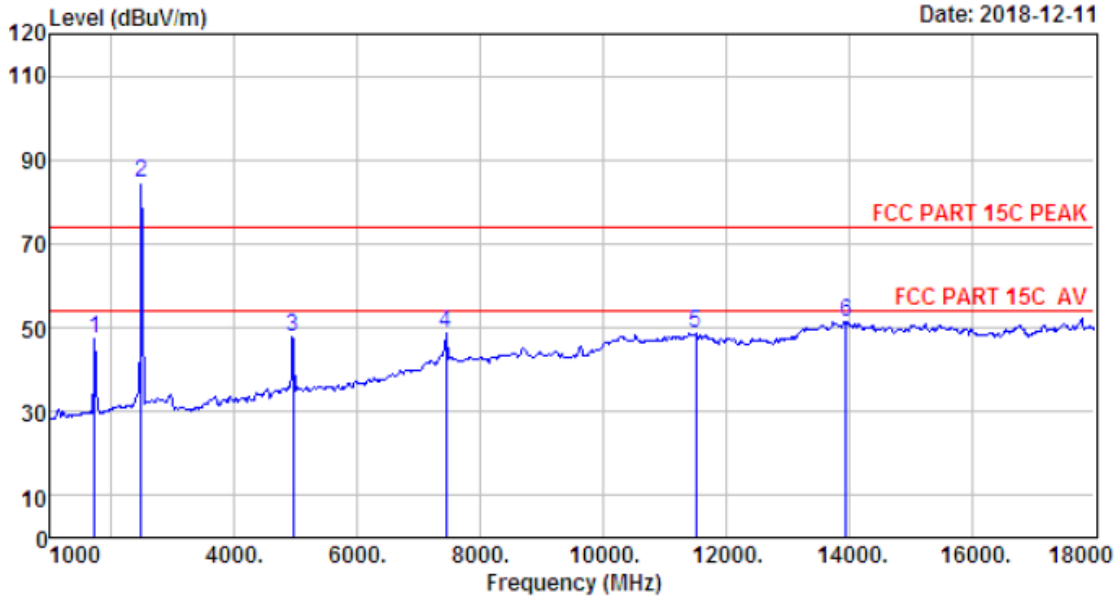
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 14 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 14
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	1714.00	25.95	2.72	34.81	53.62	47.48	74.00	26.52	Peak
2	2480.00	27.56	3.29	35.21	88.93	84.57	74.00	-10.57	Peak
3	4960.00	32.34	4.80	35.24	45.90	47.80	74.00	26.20	Peak
4	7440.00	37.09	6.13	33.08	38.58	48.72	74.00	25.28	Peak
5	11506.00	40.10	8.28	32.55	32.78	48.61	74.00	25.39	Peak
6	13954.00	41.66	10.12	32.84	32.47	51.41	74.00	22.59	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

18000MHz – 25000MHz

Pass

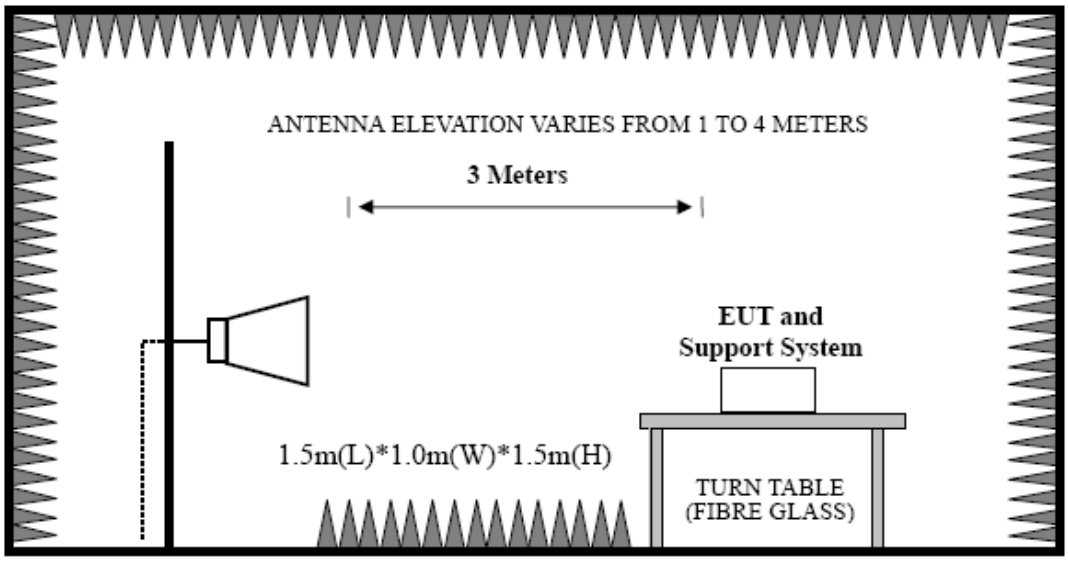
Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

9. BAND EDGE COMPLIANCE

9.1. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

9.2. Block Diagram of Test setup



9.3. Test Procedure

EUT was placed on a turn table, which is 1.5 m high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of emissions
Peak : RBW = 1MHz, VBW = 1MHz, Detector=PEAK detector, Sweep time = auto.
AV : RBW = 1MHz, VBW = 10Hz, Detector=PEAK detector, Sweep time = auto.

9.4. Test Result

Pass (The testing data was attached in the next pages.)

Note: 1、For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

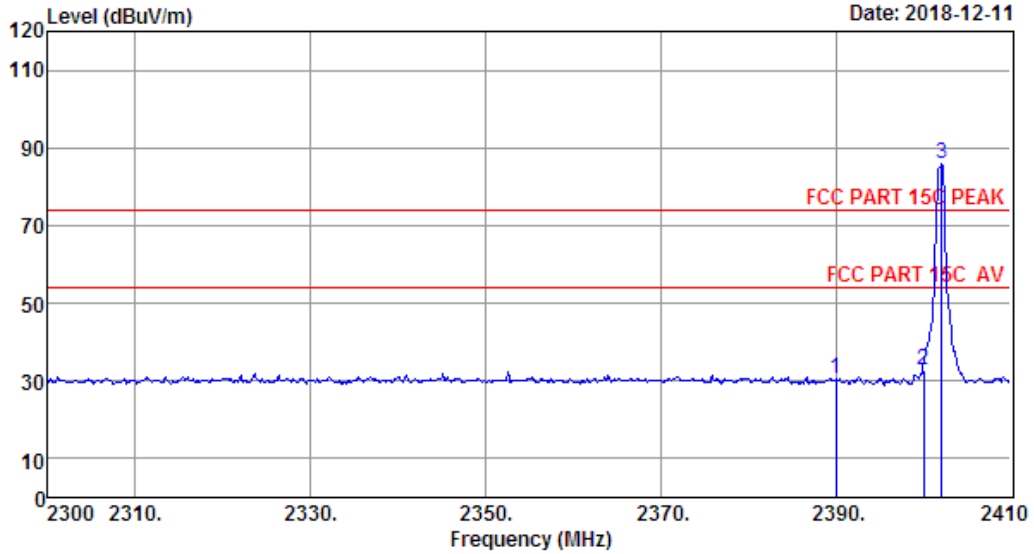
2、The frequency 2402MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

9.5. Test Data

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 15 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.       : 1# 966 Chamber              Data no.  : 15
Dis. / Ant.    : 3m   ANT9120D 1-18G         Ant. pol. : HORIZONTAL
Limit          : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer       : Seven
EUT            : Car MP3 player
Power          : DC 12V
M/N            : Colombo ML110 BT
Test Mode      : GFSK TX 2402MHz(No hopping)
```

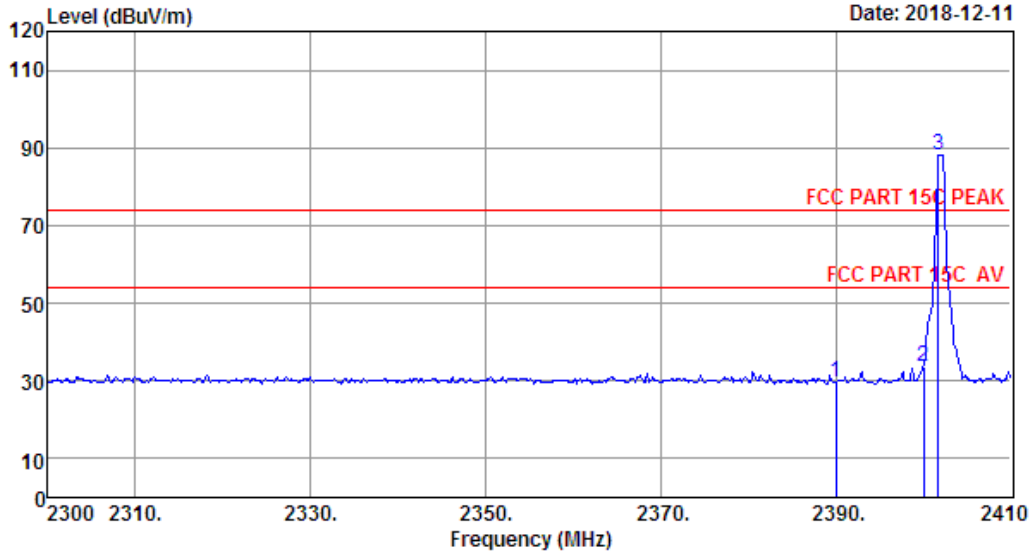
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	34.68	30.37	74.00	43.63	Peak
2	2400.00	27.35	3.21	34.94	37.07	32.69	74.00	41.31	Peak
3	2402.08	27.35	3.21	34.94	90.24	85.86	74.00	-11.86	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 16 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 16
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2402MHz(No hopping)

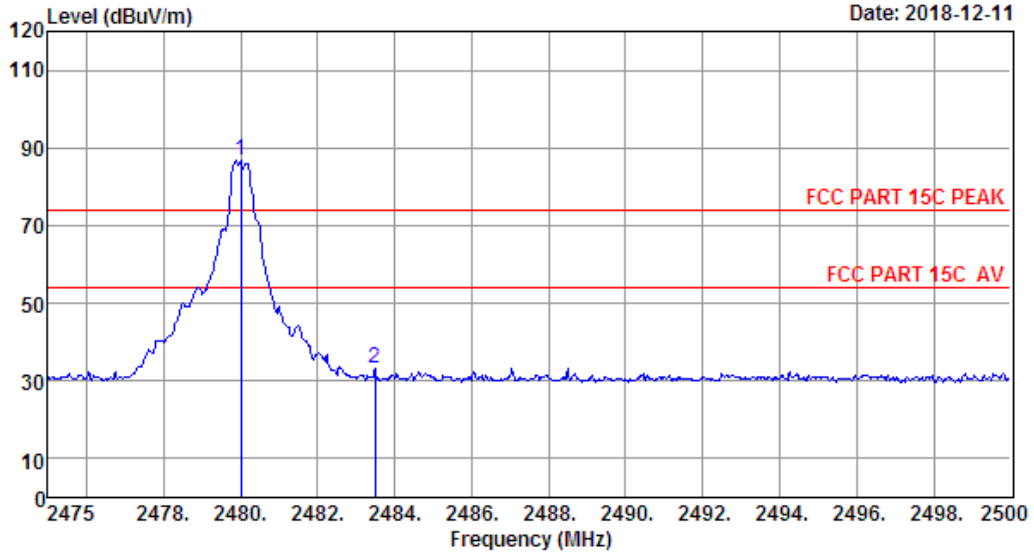
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	33.87	29.56	74.00	44.44	Peak
2	2400.00	27.35	3.21	34.94	37.83	33.45	74.00	40.55	Peak
3	2401.75	27.35	3.21	34.94	92.55	88.17	74.00	-14.17	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 17 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.       : 1# 966 Chamber              Data no.  : 17
Dis. / Ant.    : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit          : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer       : Seven
EUT            : Car MP3 player
Power          : DC 12V
M/N            : Colombo ML110 BT
Test Mode      : GFSK TX 2480MHz(No hopping)
```

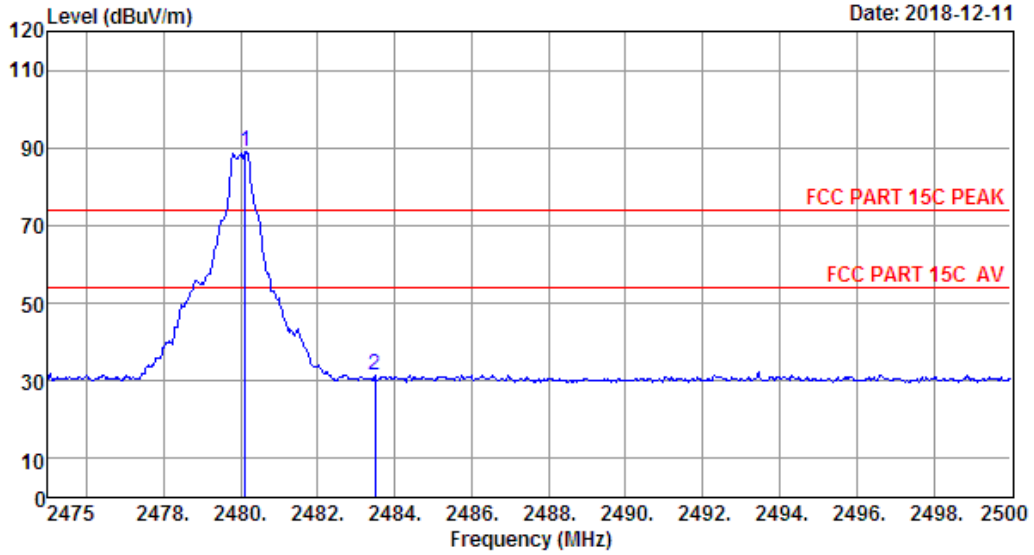
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.56	3.29	35.21	91.08	86.72	74.00	-12.72	Peak
2	2483.50	27.56	3.29	35.21	37.71	33.35	74.00	40.65	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 18 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.       : 1# 966 Chamber              Data no.  : 18
Dis. / Ant.    : 3m   ANT9120D 1-18G         Ant. pol. : HORIZONTAL
Limit          : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer       : Seven
EUT            : Car MP3 player
Power          : DC 12V
M/N            : Colombo ML110 BT
Test Mode      : GFSK TX 2480MHz(No hopping)
```

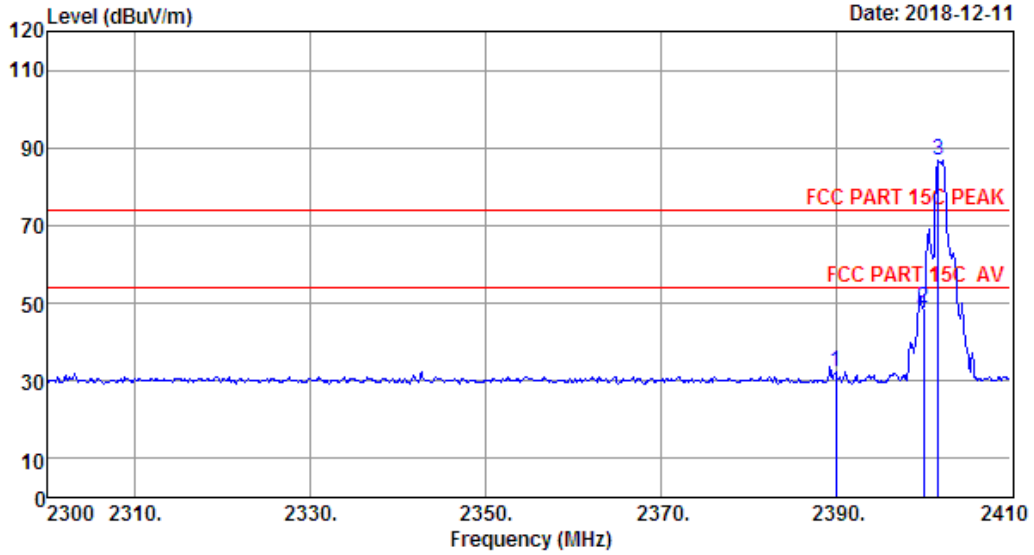
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.13	27.56	3.29	35.21	93.25	88.89	74.00	-14.89	Peak
2	2483.50	27.56	3.29	35.21	35.87	31.51	74.00	42.49	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 19 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.       : 1# 966 Chamber              Data no.  : 19
Dis. / Ant.    : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit          : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer       : Seven
EUT            : Car MP3 player
Power          : DC 12V
M/N            : Colombo ML110 BT
Test Mode      : 8-DPSK TX 2402MHz(No hopping)
```

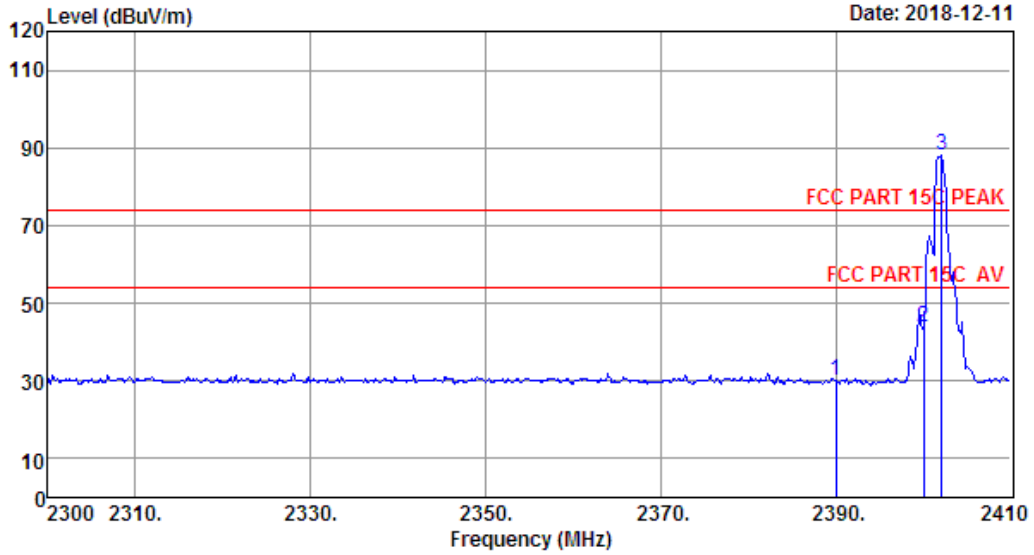
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	36.62	32.31	74.00	41.69	Peak
2	2400.00	27.35	3.21	34.94	53.25	48.87	74.00	25.13	Peak
3	2401.75	27.35	3.21	34.94	91.06	86.68	74.00	-12.68	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 20 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 20
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2402MHz(No hopping)

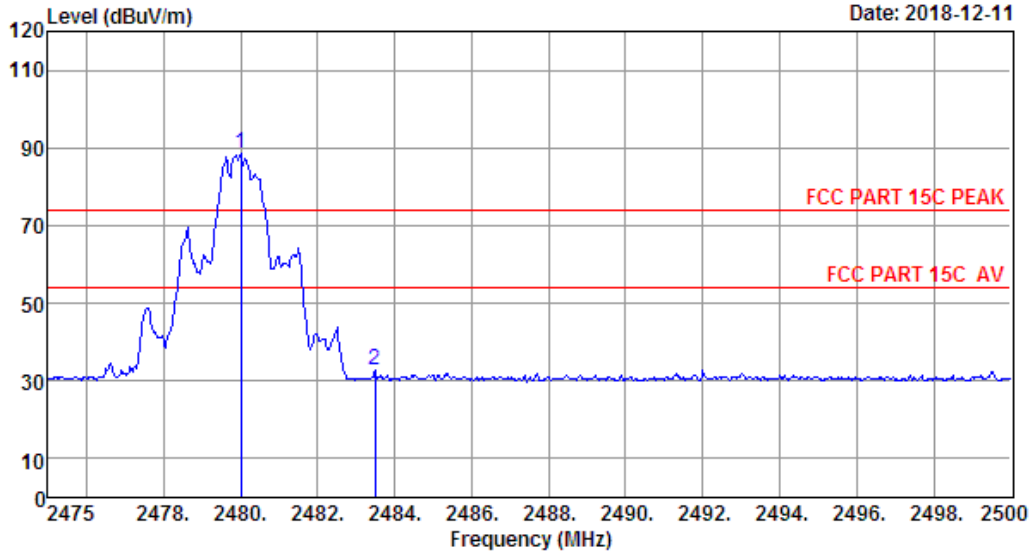
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	34.40	30.09	74.00	43.91	Peak
2	2400.00	27.35	3.21	34.94	48.04	43.66	74.00	30.34	Peak
3	2402.08	27.35	3.21	34.94	92.37	87.99	74.00	-13.99	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 21 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 21
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2480MHz(No hopping)

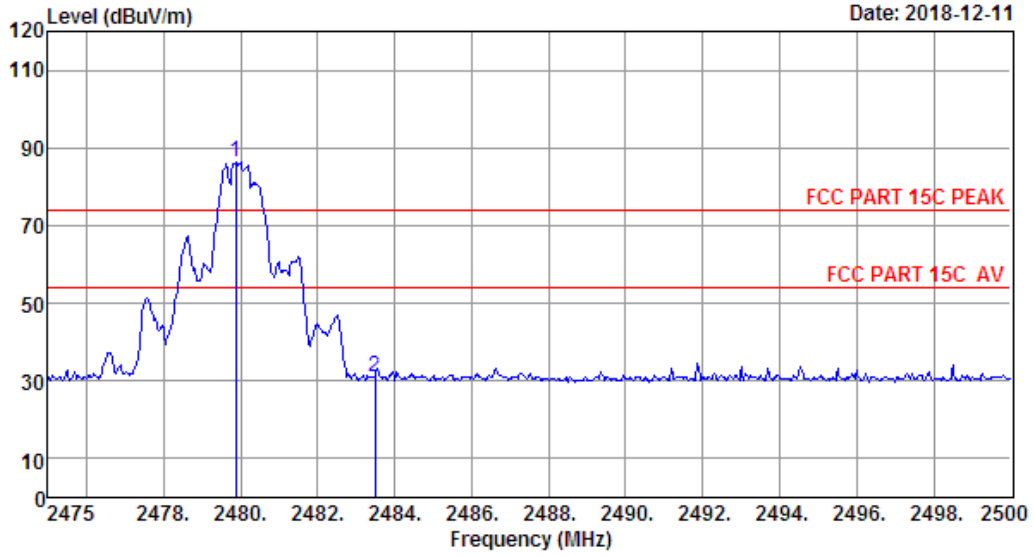
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.56	3.29	35.21	92.80	88.44	74.00	-14.44	Peak
2	2483.50	27.56	3.29	35.21	37.19	32.83	74.00	41.17	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 22 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.       : 1# 966 Chamber              Data no.  : 22
Dis. / Ant.    : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit          : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer       : Seven
EUT            : Car MP3 player
Power          : DC 12V
M/N            : Colombo ML110 BT
Test Mode      : 8-DPSK TX 2480MHz(No hopping)
```

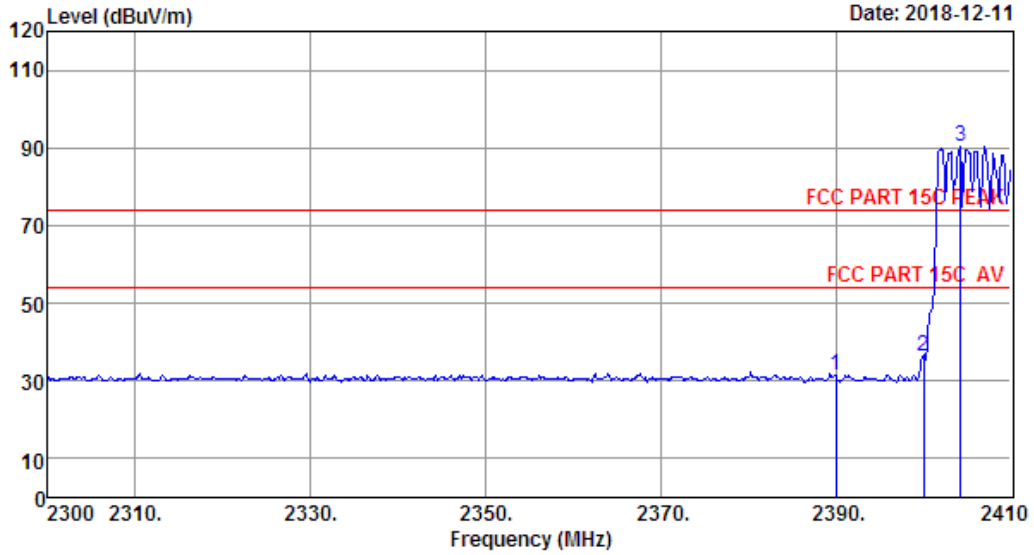
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.88	27.56	3.29	35.21	90.57	86.21	74.00	-12.21	Peak
2	2483.50	27.56	3.29	35.21	35.37	31.01	74.00	42.99	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 23 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 23
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2402MHz(Hopping on)

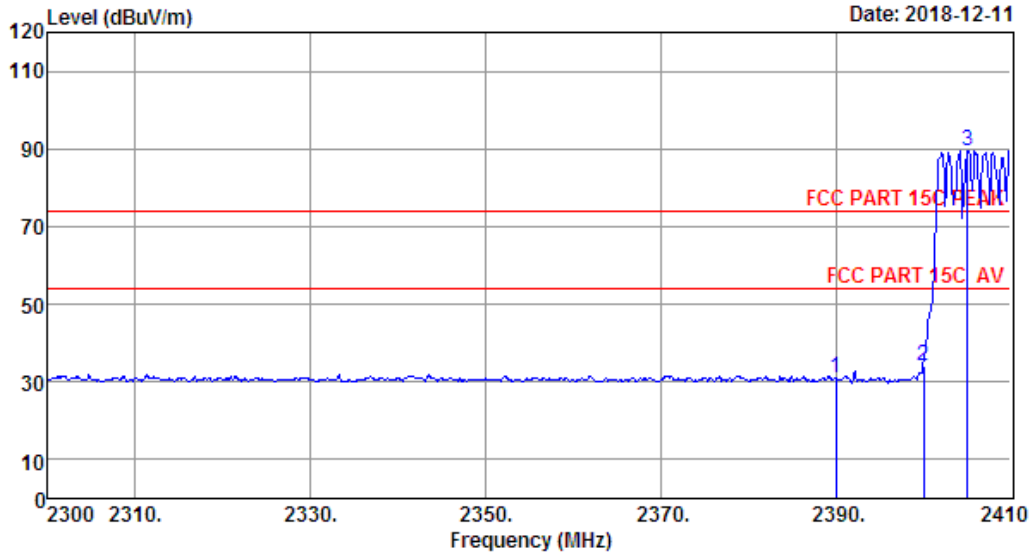
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	35.88	31.57	74.00	42.43	Peak
2	2400.00	27.35	3.21	34.94	40.82	36.44	74.00	37.56	Peak
3	2404.28	27.39	3.23	34.94	94.80	90.48	74.00	-16.48	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 24 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 24
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2402MHz(Hopping on)

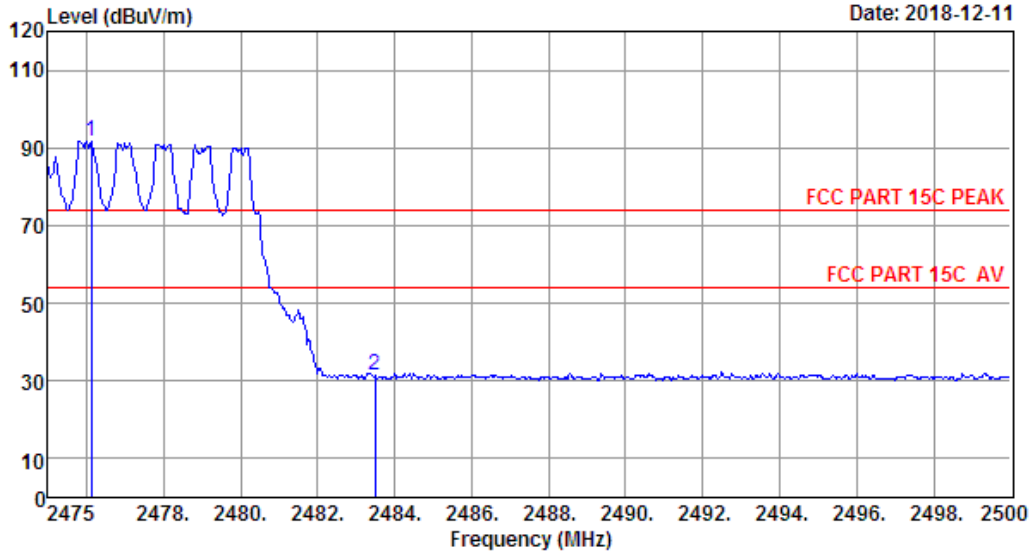
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	35.22	30.91	74.00	43.09	Peak
2	2400.00	27.35	3.21	34.94	38.67	34.29	74.00	39.71	Peak
3	2405.05	27.39	3.23	34.94	93.84	89.52	74.00	-15.52	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 25 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 25
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : GFSK TX 2480MHz(Hopping on)

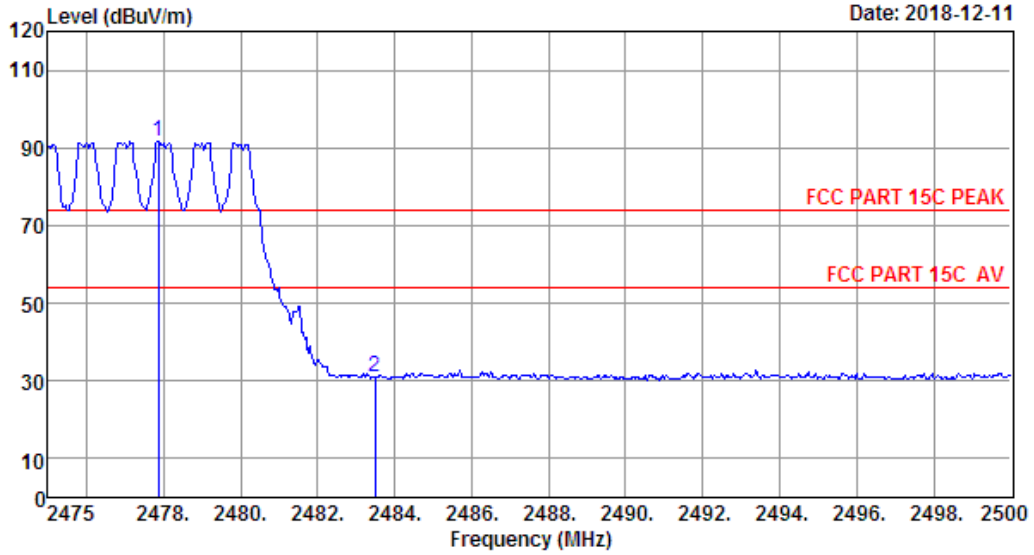
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2476.13	27.56	3.29	35.21	95.93	91.57	74.00	-17.57	Peak
2	2483.50	27.56	3.29	35.21	35.76	31.40	74.00	42.60	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 26 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)




```
Site no.      : 1# 966 Chamber              Data no.  : 26
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Seven
EUT           : Car MP3 player
Power         : DC 12V
M/N           : Colombo ML110 BT
Test Mode     : GFSK TX 2480MHz(Hopping on)
```

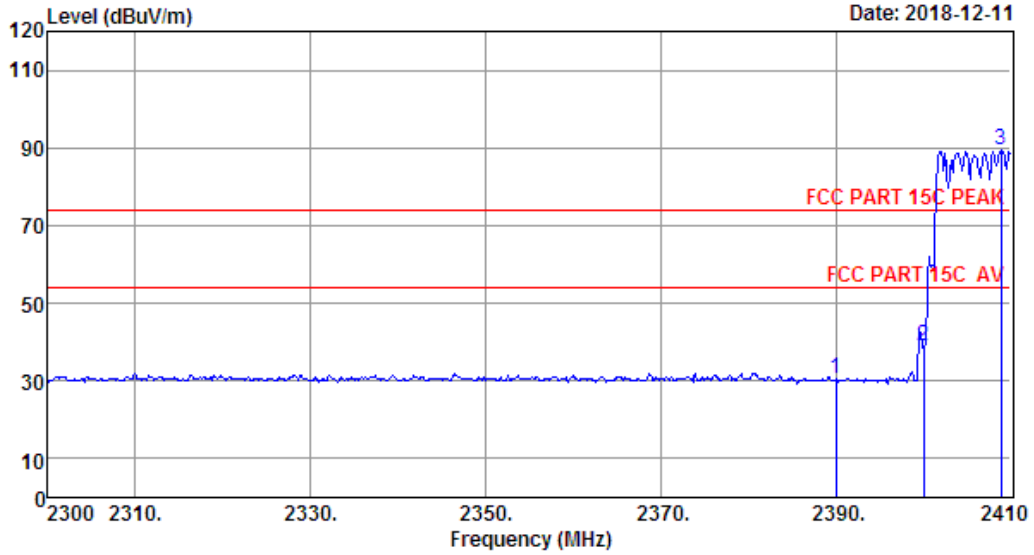
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2477.88	27.56	3.29	35.21	96.04	91.68	74.00	-17.68	Peak
2	2483.50	27.56	3.29	35.21	35.37	31.01	74.00	42.99	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 29 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : site Data no. : 29
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2402MHz(Hopping on)

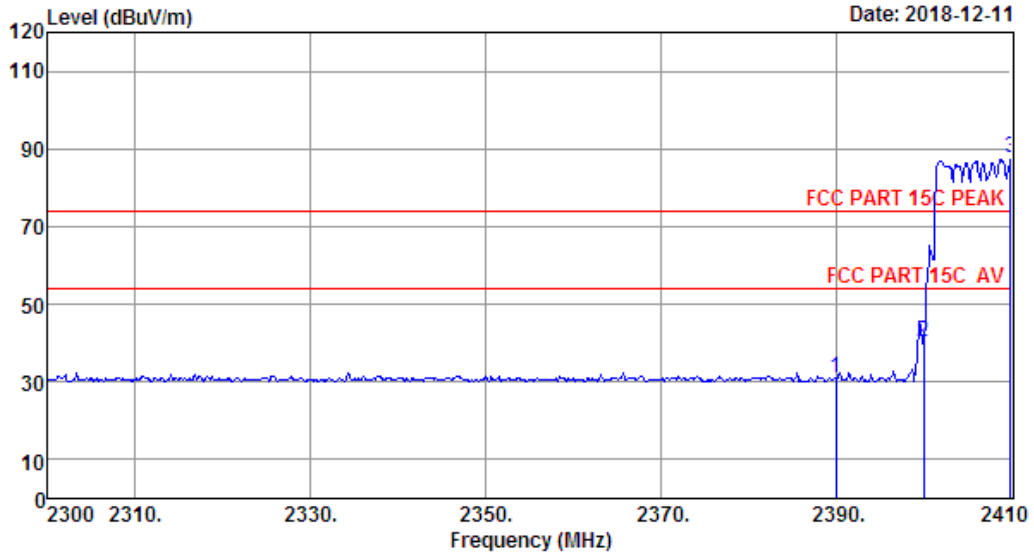
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	34.73	30.42	74.00	43.58	Peak
2	2400.00	27.35	3.21	34.94	43.20	38.82	74.00	35.18	Peak
3	2408.90	27.39	3.23	34.94	93.59	89.27	74.00	-15.27	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 30 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 30
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2402MHz(Hopping on)

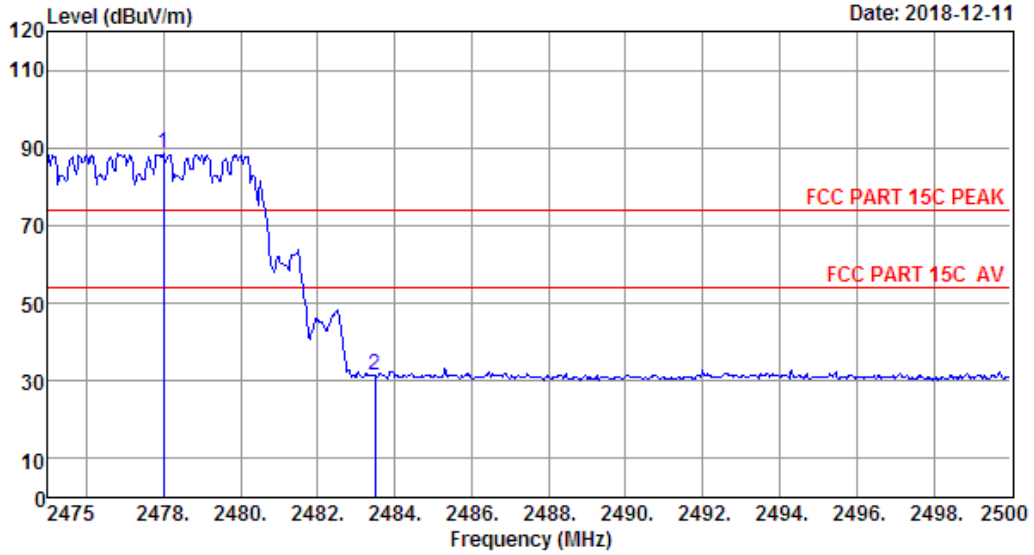
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	35.27	30.96	74.00	43.04	Peak
2	2400.00	27.35	3.21	34.94	44.80	40.42	74.00	33.58	Peak
3	2410.00	27.39	3.23	34.94	91.82	87.50	74.00	-13.50	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 27 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 27
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2480MHz(Hopping on)

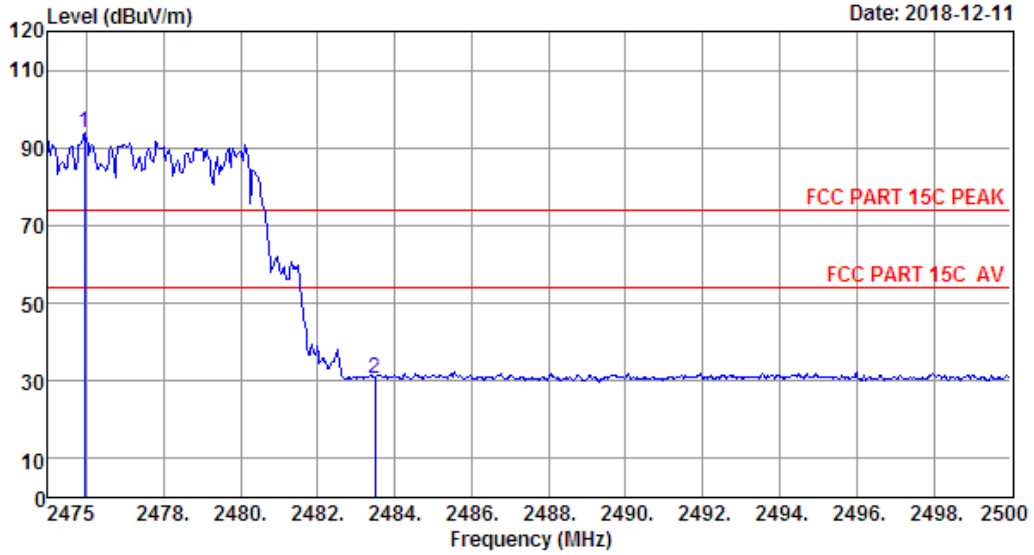
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2478.00	27.56	3.29	35.21	92.73	88.37	74.00	-14.37	Peak
2	2483.50	27.56	3.29	35.21	35.61	31.25	74.00	42.75	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 28 File: \\Emc-966-1\test data\2018\RF\F\Foryou\Colombo ML110 BT.EM6 (30)



Site no. : 1# 966 Chamber Data no. : 28
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer : Seven
EUT : Car MP3 player
Power : DC 12V
M/N : Colombo ML110 BT
Test Mode : 8-DPSK TX 2480MHz(Hopping on)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2475.95	27.56	3.29	35.21	98.26	93.90	74.00	-19.90	Peak
2	2483.50	27.56	3.29	35.21	35.10	30.74	74.00	43.26	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

10. POWER LINE CONDUCTED EMISSIONS

10.1. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

10.2. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESHS30) is set at 10kHz.

The frequency range from 150kHz to 30MHz is checked.

10.3. Test Result

N/A.

11. ANTENNA REQUIREMENTS

11.1. Limit

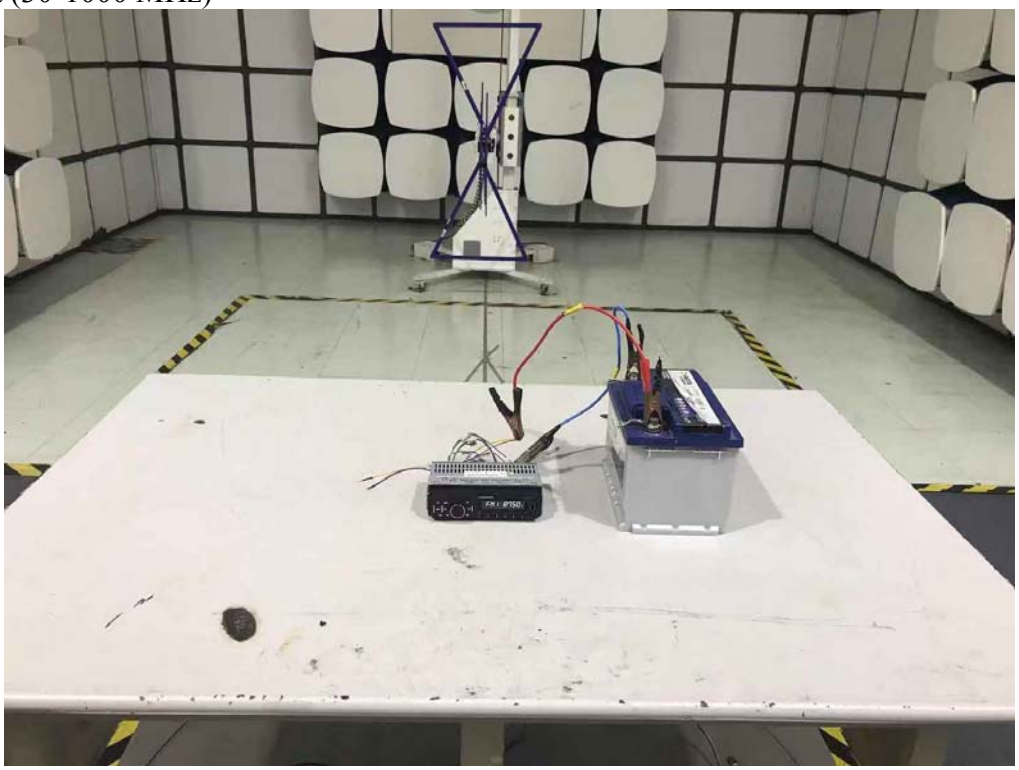
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are Internal antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0 dBi.

12. TEST SETUP PHOTO

Radiated Test (30-1000 MHz)



Radiated Test (Above 1GHz)

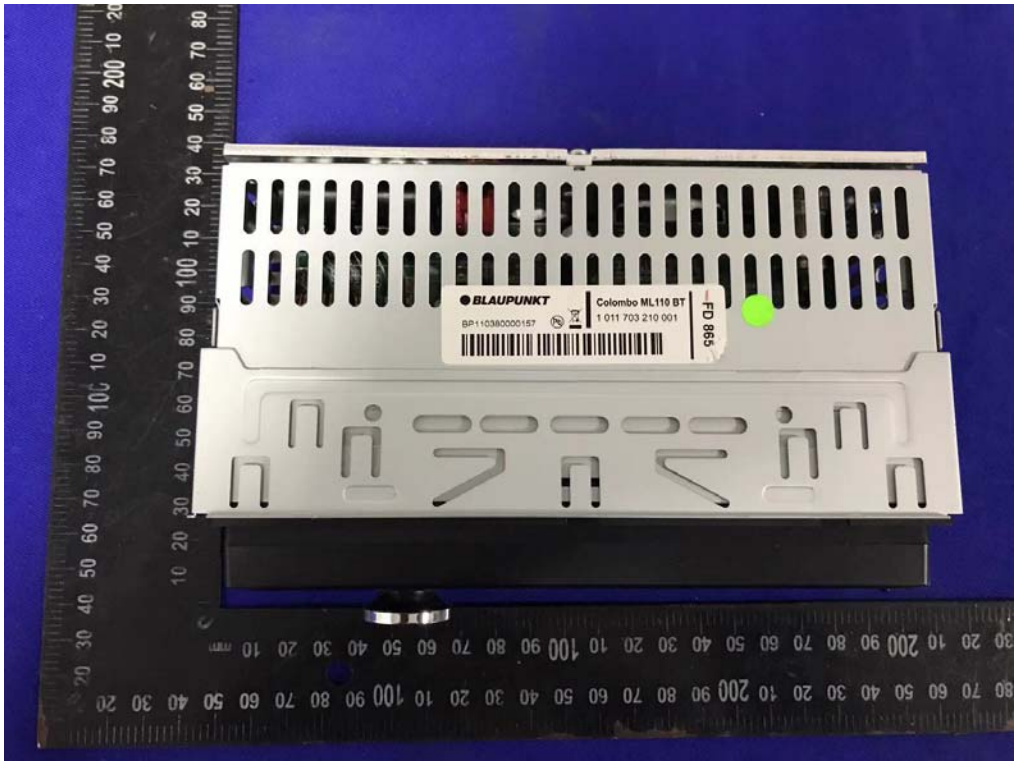
13.PHOTO EUT

External Photos

M/N: Colombo ML110 BT

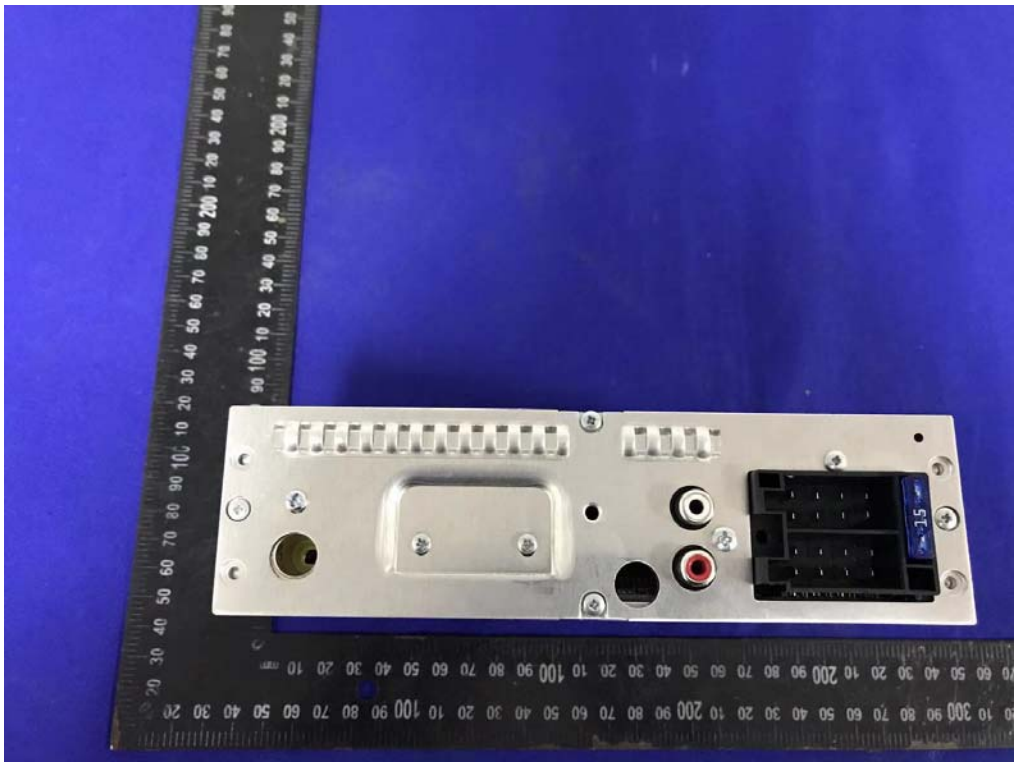
External Photos

M/N: Colombo ML110 BT



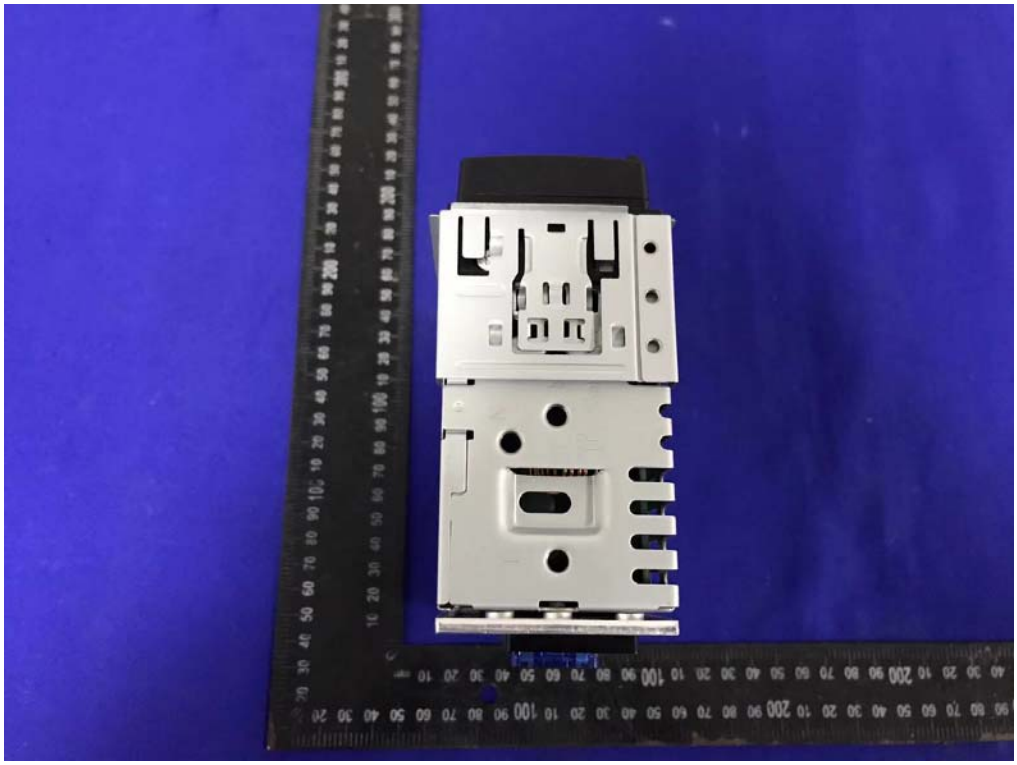
External Photos

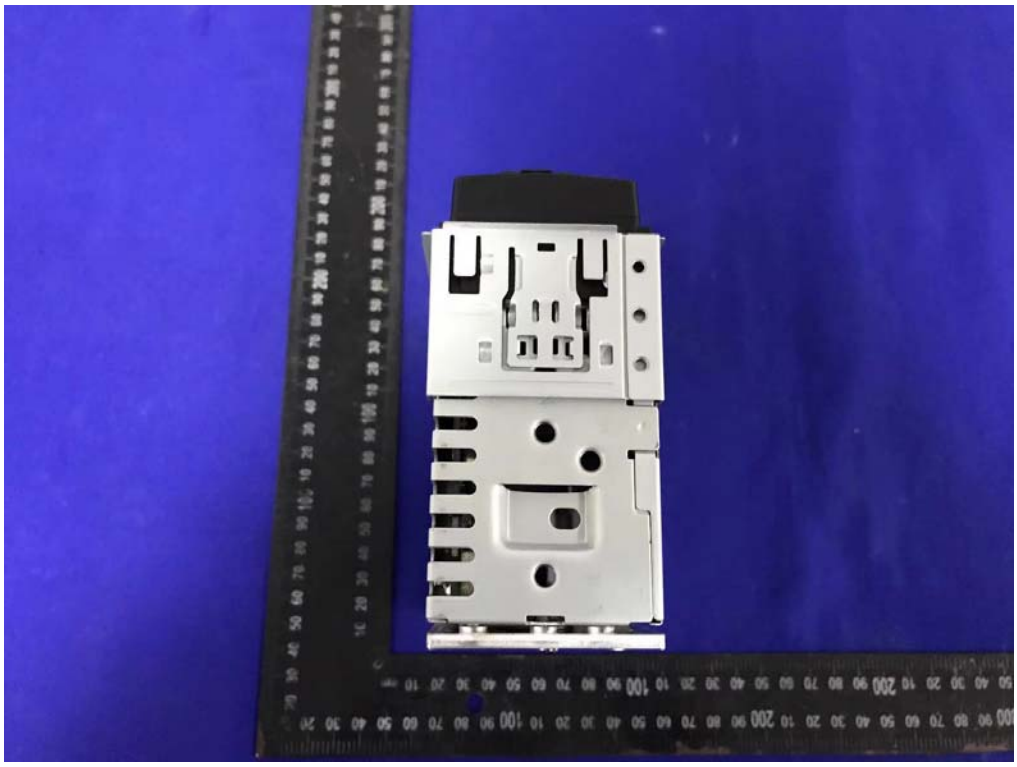
M/N: Colombo ML110 BT



External Photos

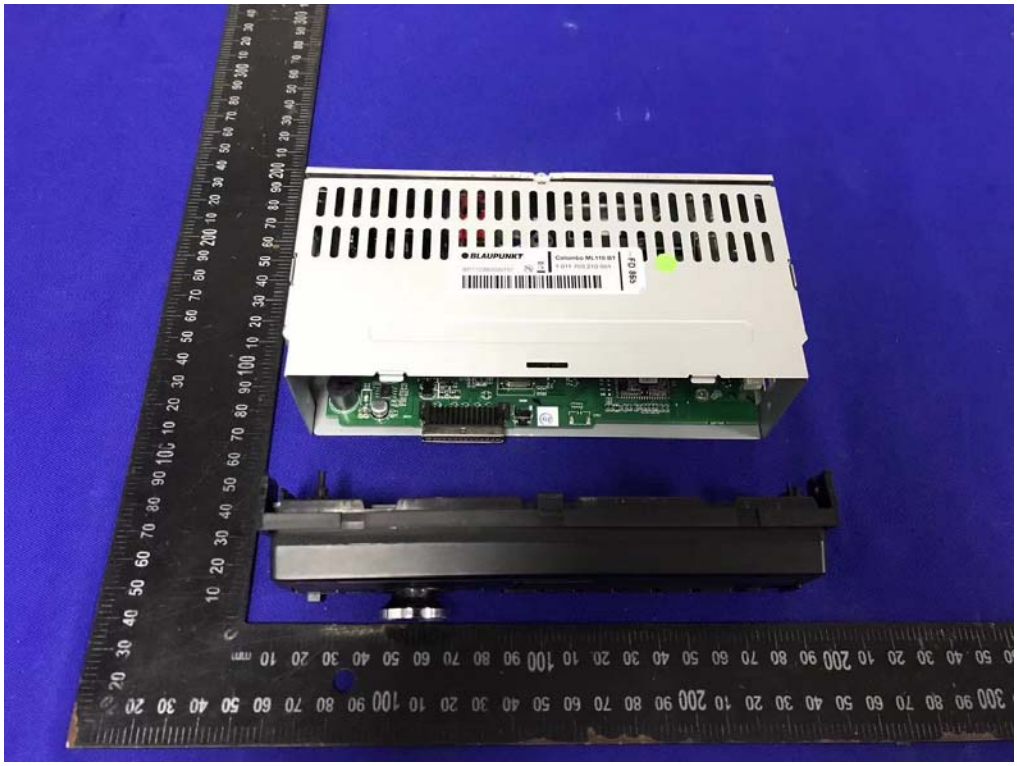
M/N: Colombo ML110 BT

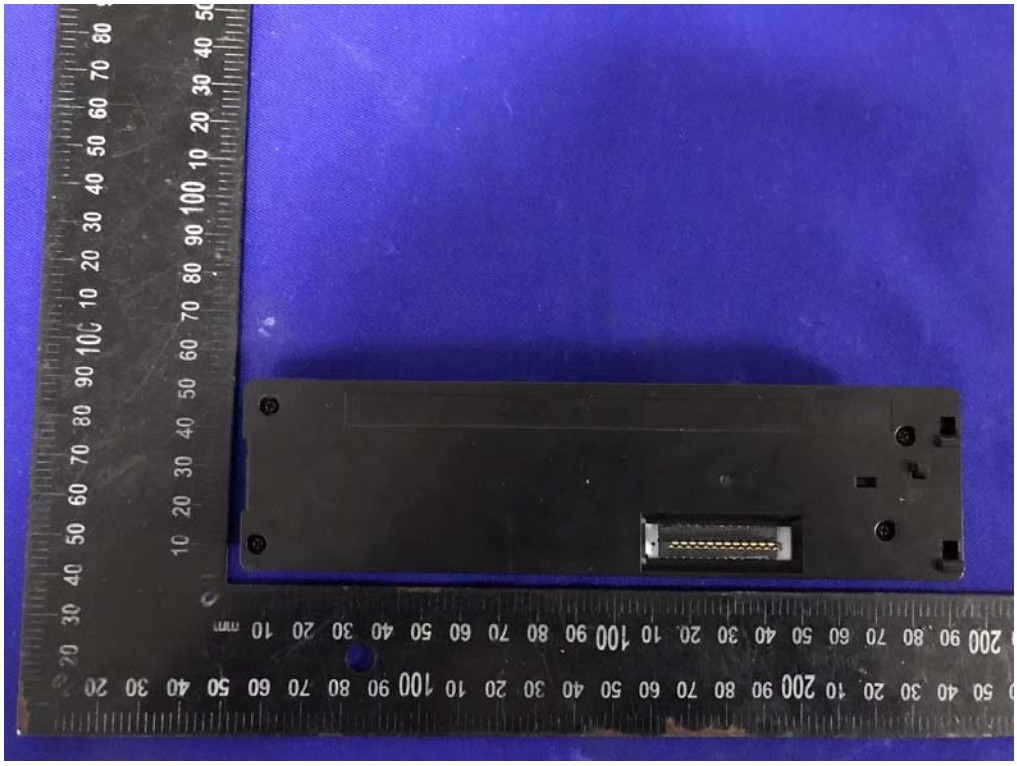




Internal Photos

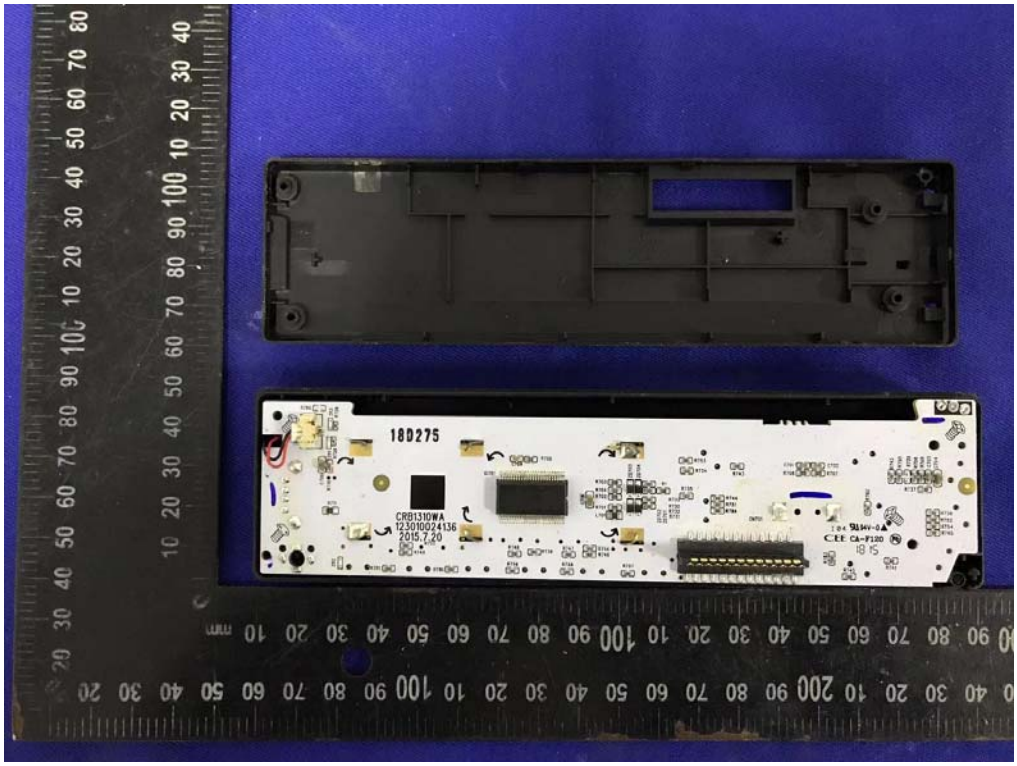
M/N: Colombo ML110 BT





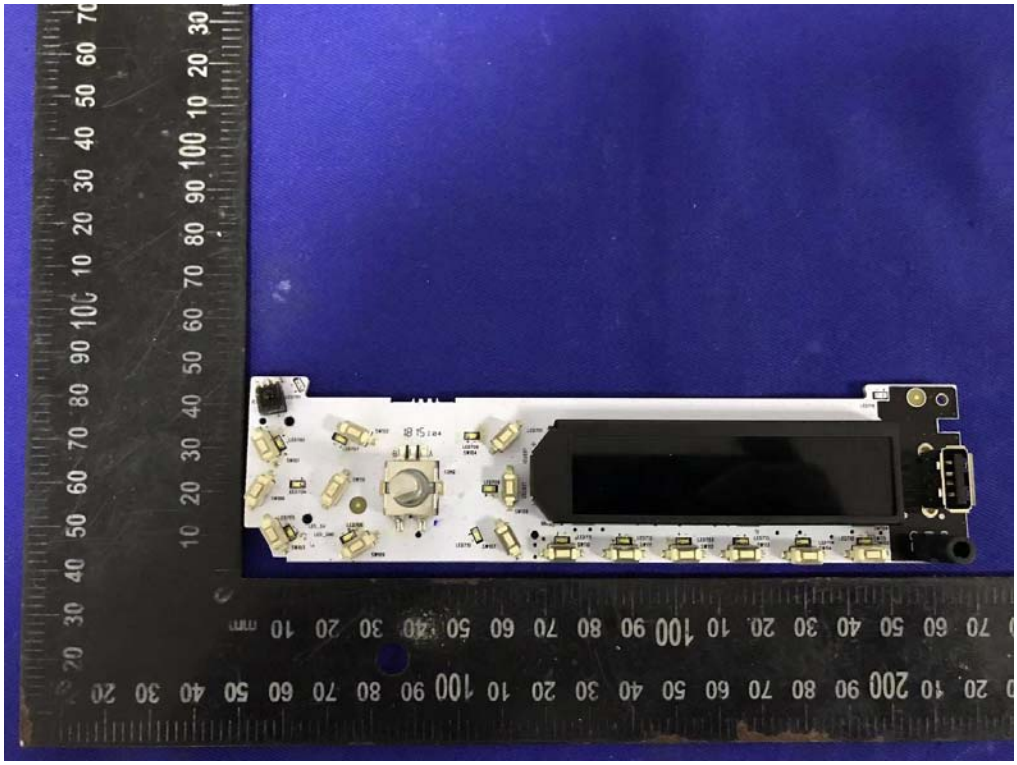
Internal Photos

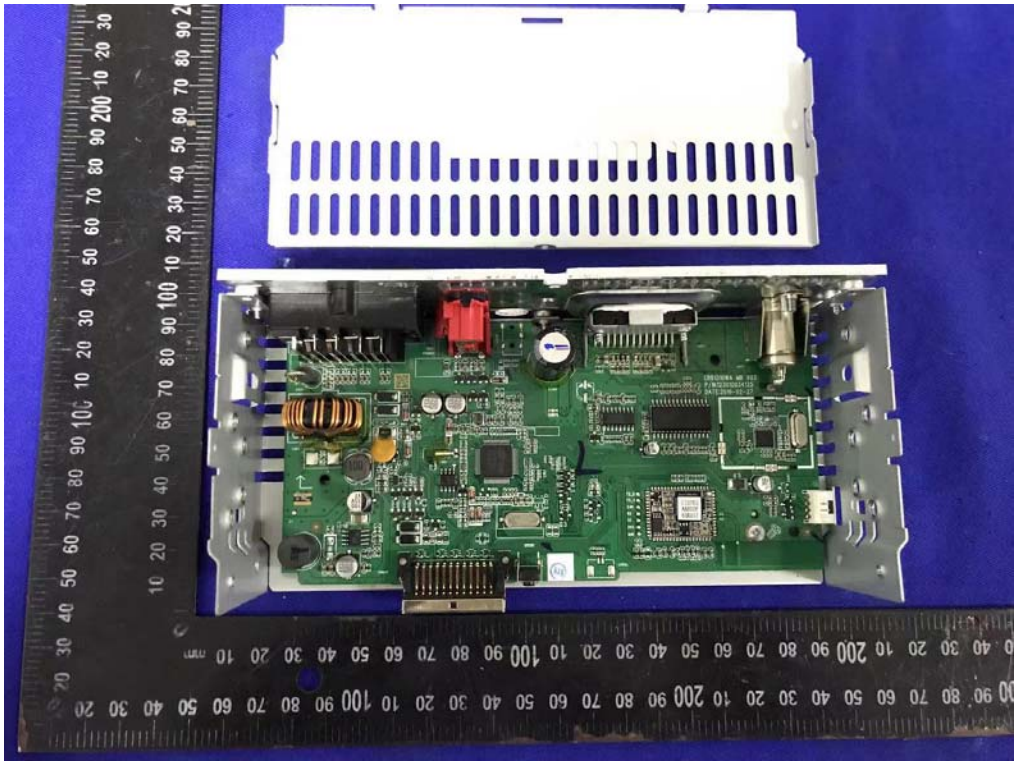
M/N: Colombo ML110 BT



Internal Photos

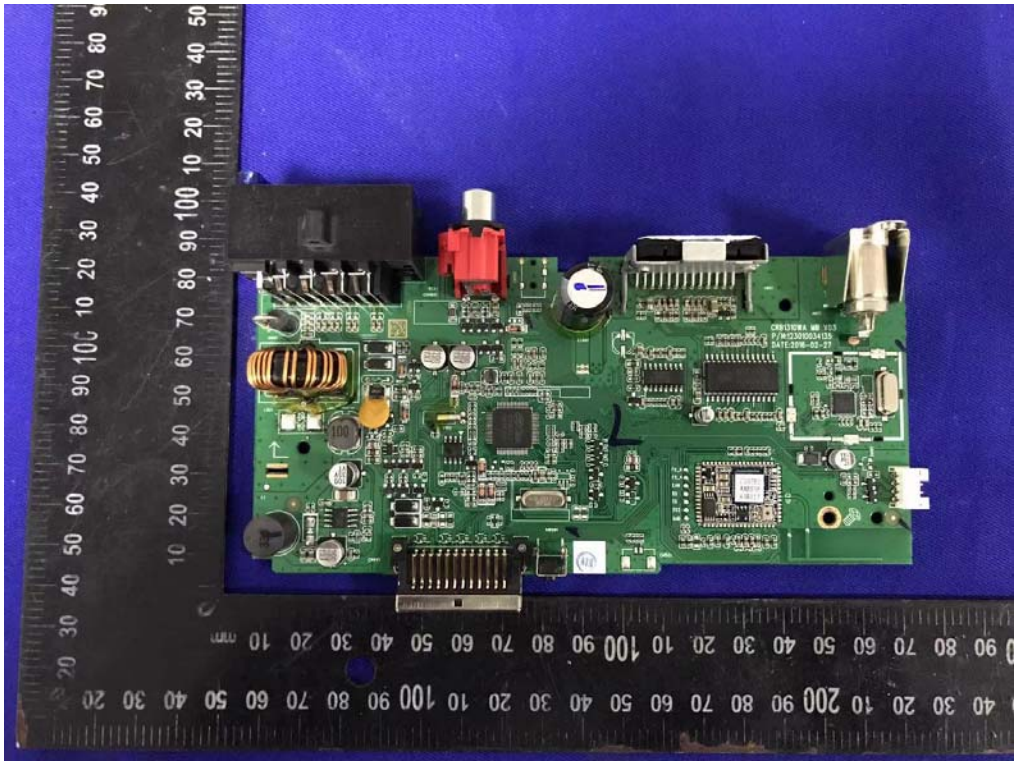
M/N: Colombo ML110 BT

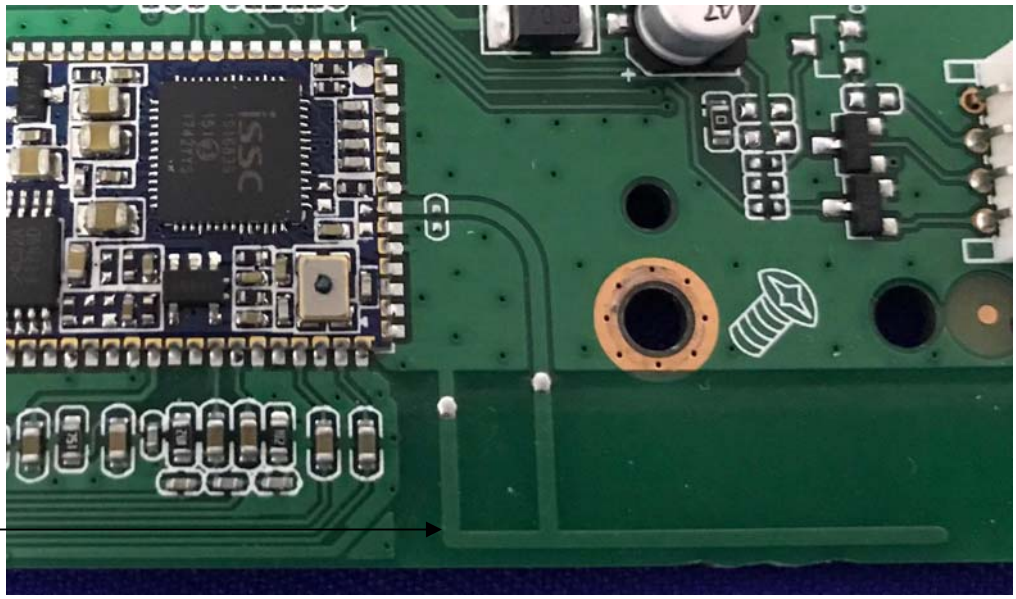




Internal Photos

M/N: Colombo ML110 BT





Internal Photos

M/N: Colombo ML110 BT