FCC Test Report

Part 15 subpart C

Client Information:

Applicant: SHENZHEN EXPORTPRO TECHNOLOGY CO., LTD

Applicant add.: 2nd Floor,99 Industrial Centre, Western Industrial Park, Shajing Town, Bao'an District, Shenzhen City, Guangdong Province, People's Republic of China

Product Information:

EUT Name: Digital Proportional System

Model No.: MT-201, MC-201, MR-201

Brand Name: N/A

FCC ID: 2ANFRMT-201

Standards: FCC PART 15 Subpart C: 2016 section 15.249

Test procedure used: ANSI C63.10-2013

Prepared By:

ATS Electronic Technology Co., Ltd.

Add. : 3/F, Building A, No. 1 Hedong Three Road, Jinxia Communityt, Changan Town, DongGuan City, GuangDong, P.R.China

Date of Receipt: 2017-06-23 Date of Test: 2017-06-26 to 2017-07-12

Date of Issue: 2017-07-13 Test Result: Pass

This device described above has been tested by ATT Product Service Co.,Ltd, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: Rock Huang **Approved by:** Simon Zeng

1 Contents

Page

COVER PAGE

1 CONTENTS 2

2 TEST SUMMARY 4

2.1 COMPLIANCE WITH FCC PART 15 SUBPART C 4
2.2 TEST LOCATION 5
2.3 MEASUREMENT UNCERTAINTY 5

3 GENERAL INFORMATION 6

3.1 GENERAL DESCRIPTION OF EUT 6
3.2 DESCRIPTION OF TEST CONDITIONS 8
3.3 TEST PERIPHERAL LIST 9
3.4 EUT PERIPHERAL LIST 9

4 EQUIPMENTS LIST FOR ALL TEST ITEMS 10

5 TEST RESULT 11

5.1 ANTENNA REQUIREMENT 11
5.1.1 Standard requirement 11
5.1.2 EUT Antenna 11
5.2 CONDUCTION EMISSIONS MEASUREMENT 12
5.3 RADIATED EMISSIONS MEASUREMENT 13
5.3.1 Applied procedures / Limit 13
5.3.2 Test setup 14
5.3.3 Test procedure 16
5.3.4 Test Result 17
TEST RESULTS (Outside of Band Emission) 22
5.4 BANDWIDTH TEST 25
5.4.1 Applied procedures / Limit 25
5.4.2 Test procedure 25
5.4.3 Deviation from standard 25
5.4.4 Test setup 25
5.4.5 Test results 26
5.5 CARRIER FREQUENCIES SEPARATED 29
5.5.1 Applied procedures / Limit 29
5.5.2 Test procedure 29
5.5.3 Deviation from standard 29
5.5.4 Test setup 29
5.5.5 Test results 30

6 PHOTOGRAPHS 33

6.1 RADIATED SPURIOUS EMISSION TEST SETUP 33

7 APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS 34

2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC Part 15 C:2016	Section 15.249(c)	**PASS**
Conduction Emissions	FCC Part 15 C:2016	Section 15.207(a)	**PASS**
Radiated Emissions	FCC Part 15 C:2016	15.209,&15.205,&15.249	**PASS**
Outside of Band Emission	FCC Part 15 C:2016	&15.249(d)	**PASS**
20dB Bandwidth	FCC Part 15 C:2016	&15. 215(c)	**PASS**

2.2 Test Location

All tests were performed at:

ATT Product Service Co., Ltd.
No. 3, ChangLianShan Industrial Park, ChangAn Town, DongGuan City, GuangDong, China.

The FCC Registration: 923232

2.3 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.10:2013, the maximum value of the uncertainty as below

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.52 dB (Polarize: V)
	3.54 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	5.54dB (Polarize: V)
	3.56dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

3 General Information

3.1 General Description of EUT

Manufacturer:	SHENZHEN EXPORTPRO TECHNOLOGY CO., LTD
Manufacturer Address:	2nd Floor,99 Industrial Centre, Western Industrial Park, Shajing Town, Bao'an District, Shenzhen City, Guangdong Province, People's Republic of China
EUT Name:	Digital Proportional System
Model No:	MT-201
Derivative model No.:	MC-201, MR-201 (All the same except appearence color and model name)
Brand Name:	N/A
Operation frequency:	2405 MHz to 2478 MHz
Number of channel:	74
Modulation Technology:	FHSS
H/W No.:	SCAT_TX001_V1.0
S/W No.:	SCAT_TX001_5FAA
Antenna Type:	Integral Antenna
Antenna Gain:	Maximum: 2.5 dBi
Power Supply Range:	6Vdc from battery (size AA 1.5V*4Pcs)
Power Supply:	6Vdc from battery (size AA 1.5V*4Pcs)
Power Cord:	N/A
Model description:	
Note:	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

Channels	Frequency (GHz)	Channels	Frequency (GHz)
00	2.405	37	2.442
01	2.406	38	2.443
02	2.407	39	2.444
03	2.408	40	2.445
04	2.409	41	2.446
05	2.410	42	2.447
06	2.411	43	2.448
07	2.412	44	2.449
08	2.413	45	2.450
09	2.414	46	2.451
10	2.415	47	2.452
11	2.416	48	2.453
12	2.417	49	2.454
13	2.418	50	2.455
14	2.419	51	2.456
15	2.420	52	2.457
16	2.421	53	2.458
17	2.422	54	2.459
18	2.423	55	2.460
19	2.424	56	2.461
20	2.425	57	2.462
21	2.426	58	2.463
22	2.427	59	2.464
23	2.428	60	2.465
24	2.429	61	2.466
25	2.430	62	2.467
26	2.431	63	2.468
27	2.432	64	2.469
28	2.433	65	2.470
29	2.434	66	2.471
30	2.435	67	2.472
31	2.436	68	2.473
32	2.437	69	2.474
33	2.438	70	2.475
34	2.439	71	2.476
35	2.440	72	2.477
36	2.441	73	2.478

3.2 Description of Test conditions

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

1. Block diagram of EUT configuration(TX Mode)
EUT
Note: 1.This product is performing independent test under the battery is fully charged.

(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.

(5) Pre-test the EUT in all transmitting mode at the lowest (2405 MHz), middle (2441 MHz) and highest (2478 MHz) .

(6) The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

3.3 Test Peripheral List

No.	Equipment	Manufacturer	FCC approved	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

3.4 EUT Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2017.06.27	2018.06.26
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2017.06.27	2018.06.26
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2017.06.27	2018.06.26
4	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2017.06.27	2018.06.26
5	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2017.06.27	2018.06.26
6	Loop Antenna	ARA	PLA-1030/B	1029	2017.06.27	2018.06.26
7	EMI Test Receiver	Rohde & Schwarz	ESIB26	100394	2017.06.27	2018.06.26
8	Radiated Cable 1# (9KHz-1GHz)	FUJIKURA	5D-2W	01	2017.01.04	2018.01.03
9	Radiated Cable 2# (1GHz -25GHz)	FUJIKURA	10D2W	02	2017.01.04	2018.01.03

5 Test Result

5.1 Antenna Requirement

5.1.1 Standard requirement

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 15.249 (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.

5.1.2 EUT Antenna

The antenna is Integral Antenna and no consideration of replacement. Antenna gain is Maximum 2.5 dBi from 2.4GHz to 2.5GHz.

5.2 Conduction Emissions Measurement

N/A:Not Applicable.

5.3 Radiated Emissions Measurement

5.3.1 Applied procedures / Limit

15.249 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	μV/m	dBμV/m	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

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])

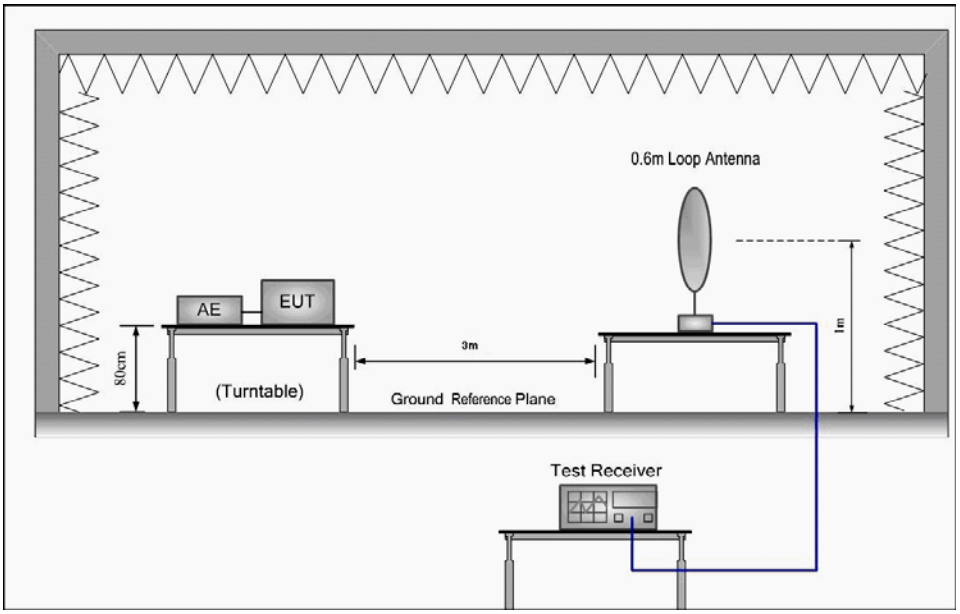
15.249 Limit:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

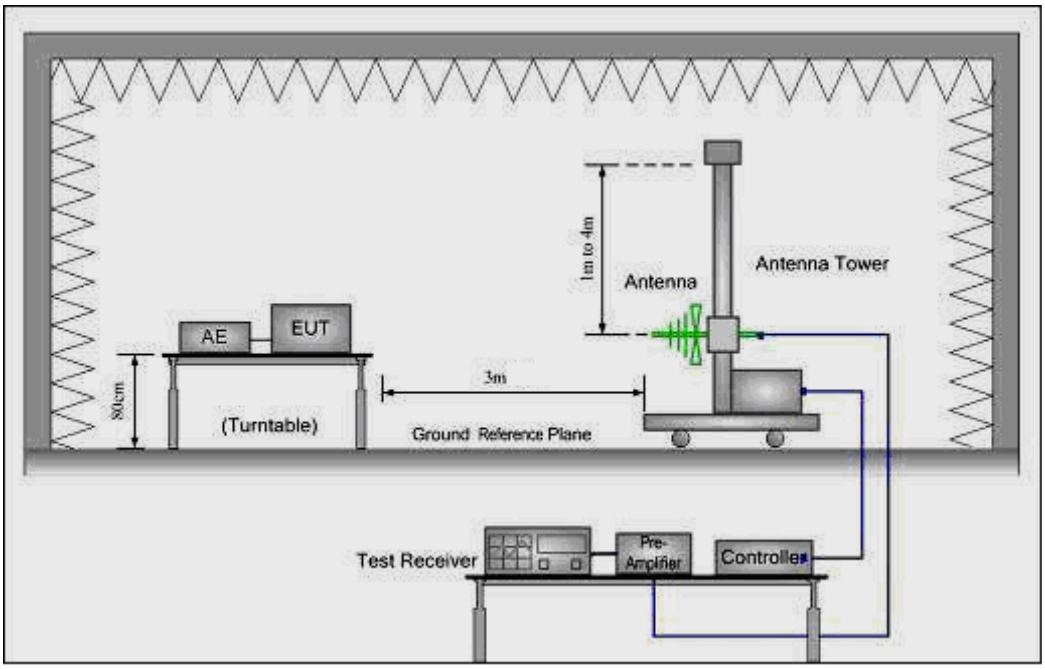
5.3.2 Test setup

Test Configuration:

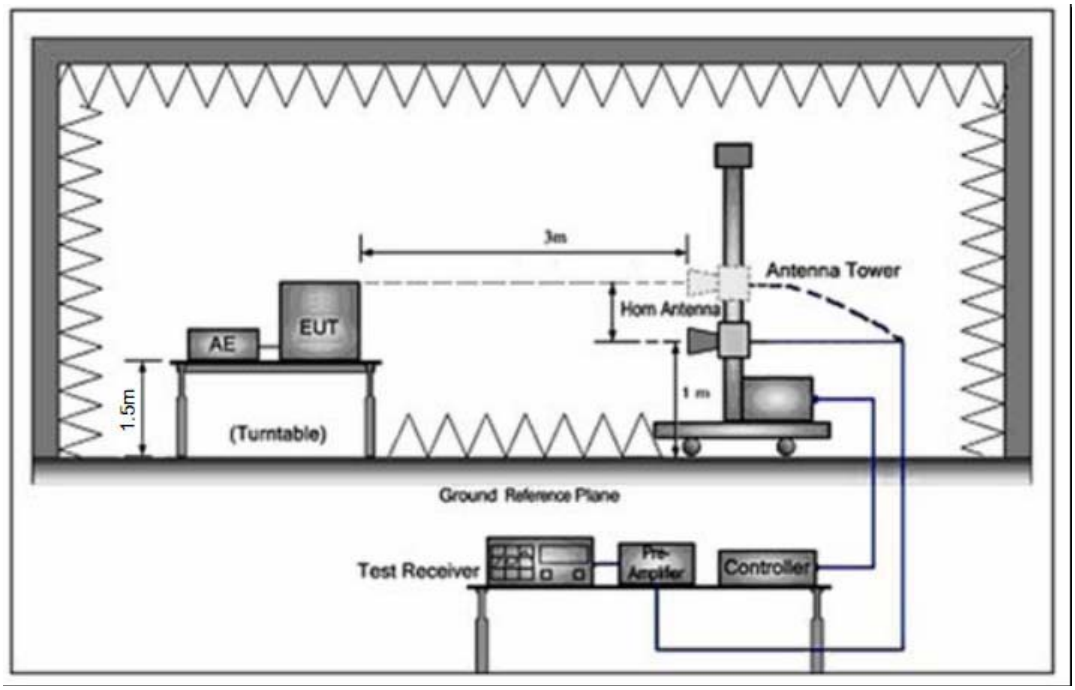
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 GHz emissions:



5.3.3 Test procedure

(1) EUT was placed on a non-metallic table, 150 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.4 and 8.2

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Change power supply range from 85% to 115% of the rated supply voltage

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 10Hz for Average measure, Detector is at PK.

5.3.4 Test Result

Radiated Emissions Test Data Below 30MHz

EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	25 ℃	Test Data	2017-07-05
Pressure：	1005 hPa	Relative Humidity：	60%
Test Mode ：	TX	Test Voltage ：	6Vdc from battery (size AA 1.5V*4Pcs)
Measurement Distance	3 m	Frequency Range	9KHz to 30MHz
RBW/VBW	9KHz~150KHz/RB 200Hz for QP, 150KHz~30MHz/RB 9KHz for QP		

No emission found between lowest internal used/generated frequencies to 30MHz.

Radiated Emissions Test Data Below 1GHz

EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	25 ℃	Test Data	2017-07-05
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX CH00 (worst case)	Test Voltage ：	6Vdc from battery (size AA 1.5V*4Pcs)
Measurement Distance	3 m	Frequency Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
46.82	48.11	-16.85	31.26	40.00	-8.74	QP
65.79	31.67	-14.21	17.46	40.00	-22.54	QP
132.66	31.66	-9.69	21.97	43.50	-21.53	QP
288.95	29.38	-3.58	25.80	46.00	-20.20	QP

(b) Antenna polarization: vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
38.34	40.74	-18.65	22.09	40.00	-17.91	QP
60.70	35.74	-14.27	21.47	40.00	-18.53	QP
191.76	35.26	-8.26	27.00	43.50	-16.50	QP
245.35	35.77	-5.67	30.10	46.00	-15.90	QP

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Radiated Emissions Test Data Above 1GHz

EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	25 ℃	Test Data	2017-07-05
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	Tx	Test Voltage ：	6Vdc from battery (size AA 1.5V*4Pcs)
Measurement Distance	3 m	Frequency Range	1GHz to 25GHz
RBW/VBW	Spurious emission: 1MHz/3MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2405.00	102.09	3.65	105.74	114.00	-8.26	peak
2405.00	85.13	3.65	88.78	94.00	-5.22	AVG
4810.00	49.31	5.08	54.39	74.00	-19.61	peak
4810.00	35.45	5.08	40.53	54.00	-13.47	AVG
7215.00	41.63	7.16	48.79	74.00	-25.21	peak
7215.00	33.53	7.16	40.69	54.00	-13.31	AVG

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2405.00	96.09	3.65	99.74	114.00	-14.26	peak
2405.00	78.78	3.65	82.43	94.00	-11.57	AVG
4810.00	46.67	5.08	51.75	74.00	-22.25	peak
4810.00	34.13	5.08	39.21	54.00	-14.79	AVG
7215.00	40.64	7.16	47.80	74.00	-26.20	peak
7215.00	32.78	7.16	39.94	54.00	-14.06	AVG

Note:

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Lowest channel: 2405 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2441.00	96.88	3.68	100.56	114.00	-13.44	peak
2441.00	81.36	3.68	85.04	94.00	-8.96	AVG
4882.00	48.94	5.13	54.07	74.00	-19.93	peak
4882.00	31.49	5.13	36.62	54.00	-17.38	AVG
7323.00	34.91	7.20	42.11	74.00	-31.89	peak
7323.00	32.68	7.20	39.88	54.00	-14.12	AVG

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2441.00	91.52	3.68	95.20	114.00	-18.80	peak
2441.00	77.94	3.68	81.62	94.00	-12.38	AVG
4882.00	44.97	5.13	50.10	74.00	-23.90	peak
4882.00	35.13	5.13	40.26	54.00	-13.74	AVG
7323.00	39.64	7.20	46.84	74.00	-27.16	peak
7323.00	28.78	7.20	35.98	54.00	-18.02	AVG

Note:

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Middle Channel: 2441 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2478.00	98.37	3.71	102.08	114.00	-11.92	peak
2478.00	82.95	3.71	86.66	94.00	-7.34	AVG
4956.00	48.46	5.19	53.65	74.00	-20.35	peak
4956.00	35.11	5.19	40.30	54.00	-13.70	AVG
7434.00	36.91	7.25	44.16	74.00	-29.84	peak
7434.00	27.35	7.25	34.60	54.00	-19.40	AVG

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector Type
2478.00	94.75	3.71	98.46	114.00	-15.54	peak
2478.00	75.06	3.71	78.77	94.00	-15.23	AVG
4956.00	44.49	5.19	49.68	74.00	-24.32	peak
4956.00	33.28	5.19	38.47	54.00	-15.53	AVG
7434.00	40.30	7.25	47.55	74.00	-26.45	peak
7434.00	28.06	7.25	35.31	54.00	-18.69	AVG

Note:

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Highest Channel: 2478 MHz

TEST RESULTS (Outside of Band Emission)

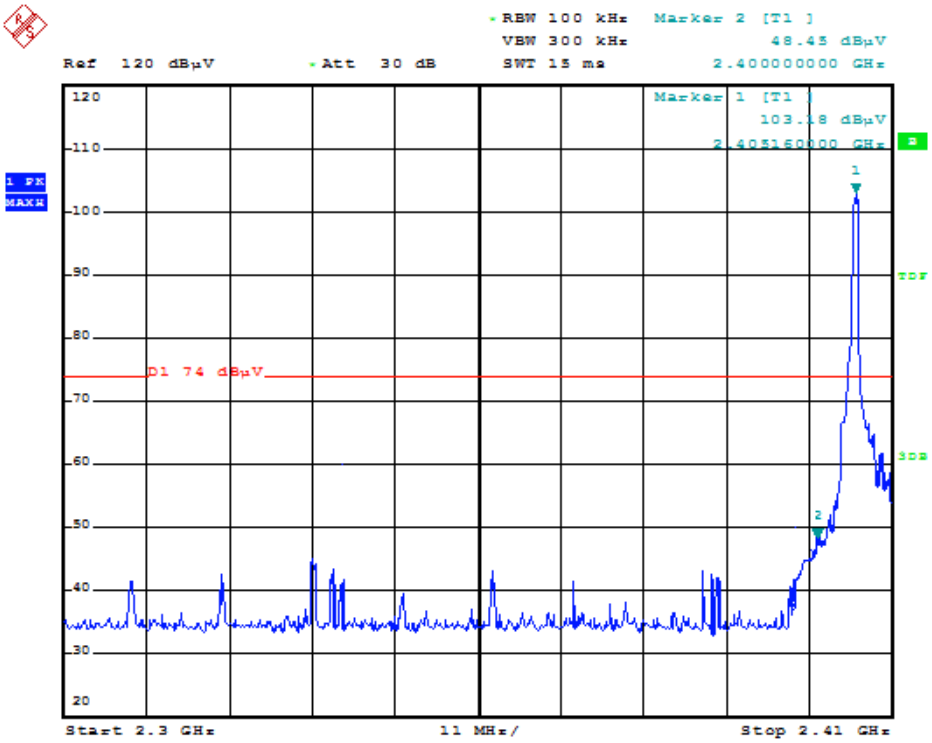
EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	25 ℃	Test Data	2017-07-05
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX	Test Voltage ：	6Vdc from battery (size AA 1.5V*4Pcs)
RBW/VBW	1MHz/3MHz for Peak, 1MHz/10Hz for Average.		
Note：	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz. 3. The data of 2390MHz and 2483.5MHz was the worst.		

Test Mode	Ant.Pol. H/V	Freq. (MHz)	Reading		Ant/CF CF(dB)	Act		Limit	
			Peak (dBuv)	AV (dBuv)		Peak (dBuv/m)	AV (dBuv/m)	Peak (dBuv/m)	AV (dBuv/m)
Tx	V	2390.0	58.89	47.17	-5.79	53.10	41.38	74.00	54.00
	H	2390.0	59.61	48.72	-5.79	53.82	42.93	74.00	54.00
	V	2483.5	56.02	44.94	-4.98	51.04	39.96	74.00	54.00
	H	2483.5	57.53	44.60	-4.98	52.55	39.62	74.00	54.00

Remark：	
(1)	Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode.
(2)	During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
(3)	Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

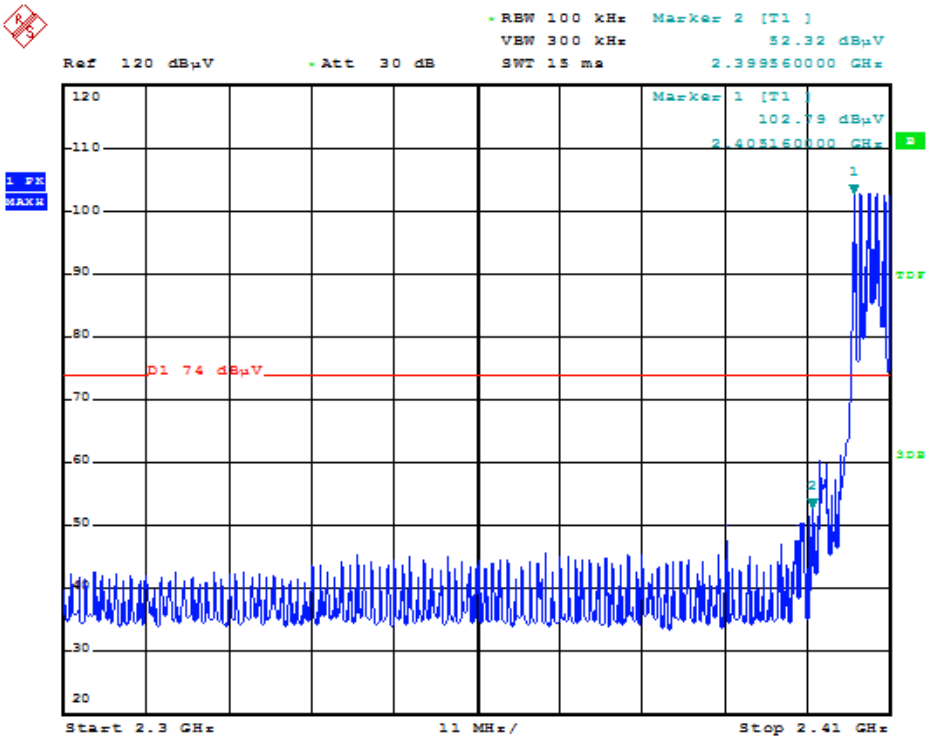
Plot of outside band:

CH00 (Lower)

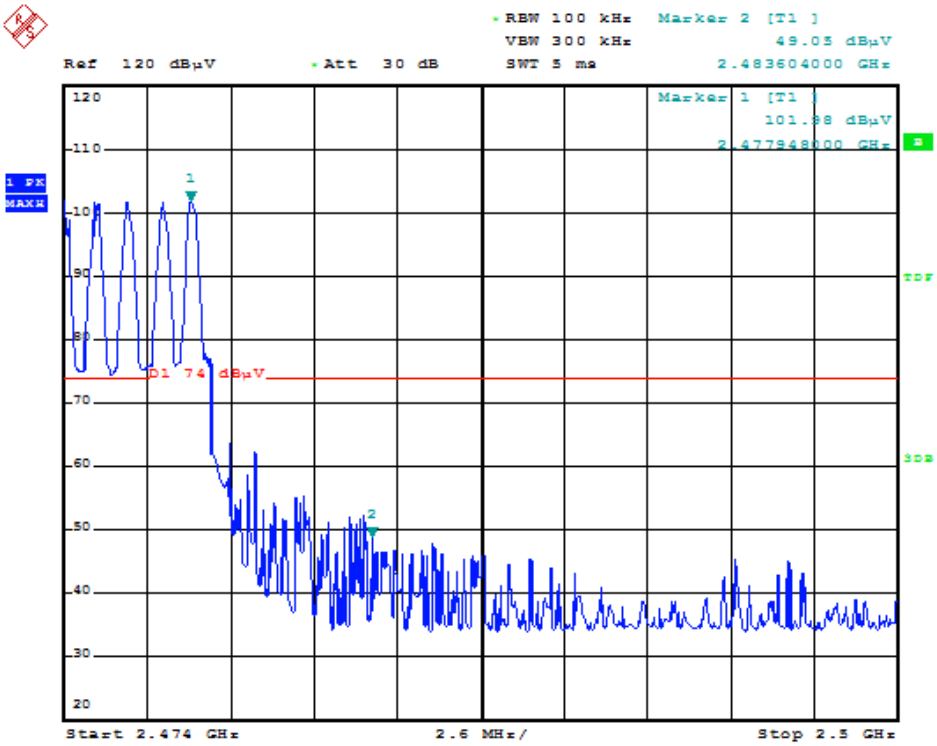


CH 73 (Upper)

Hopping (Lower)



Hopping (Upper)



5.4 BANDWIDTH TEST

5.4.1 Applied procedures / Limit

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

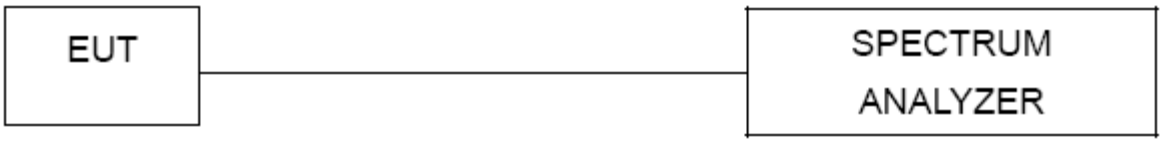
5.4.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW, Sweep = auto, Detector function = peak
Trace = max hold

5.4.3 Deviation from standard

No deviation.

5.4.4 Test setup

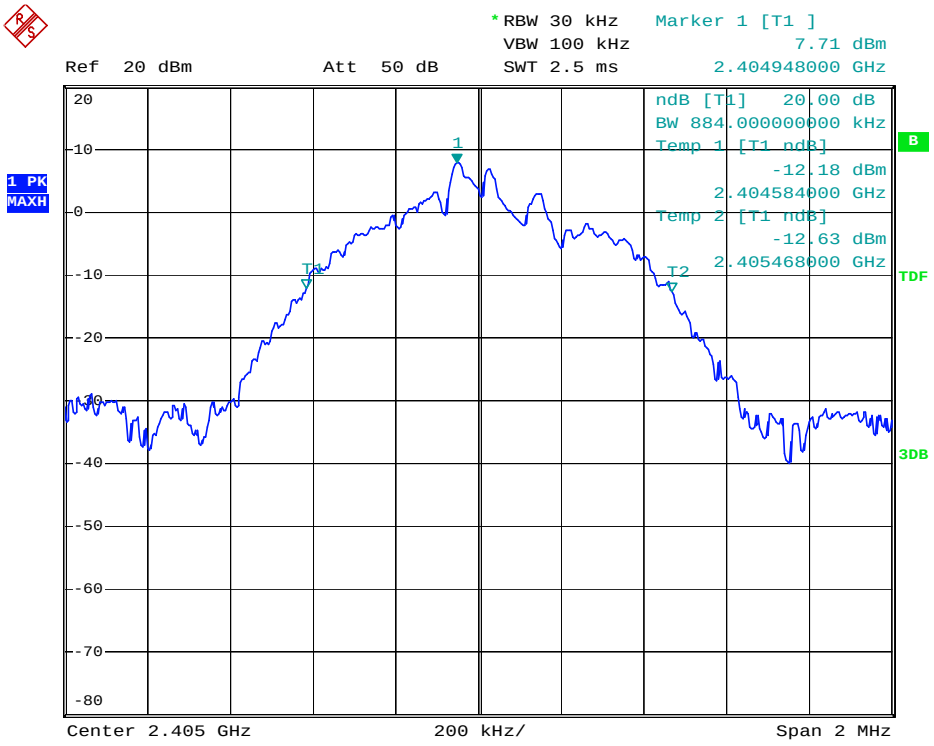


5.4.5 Test results

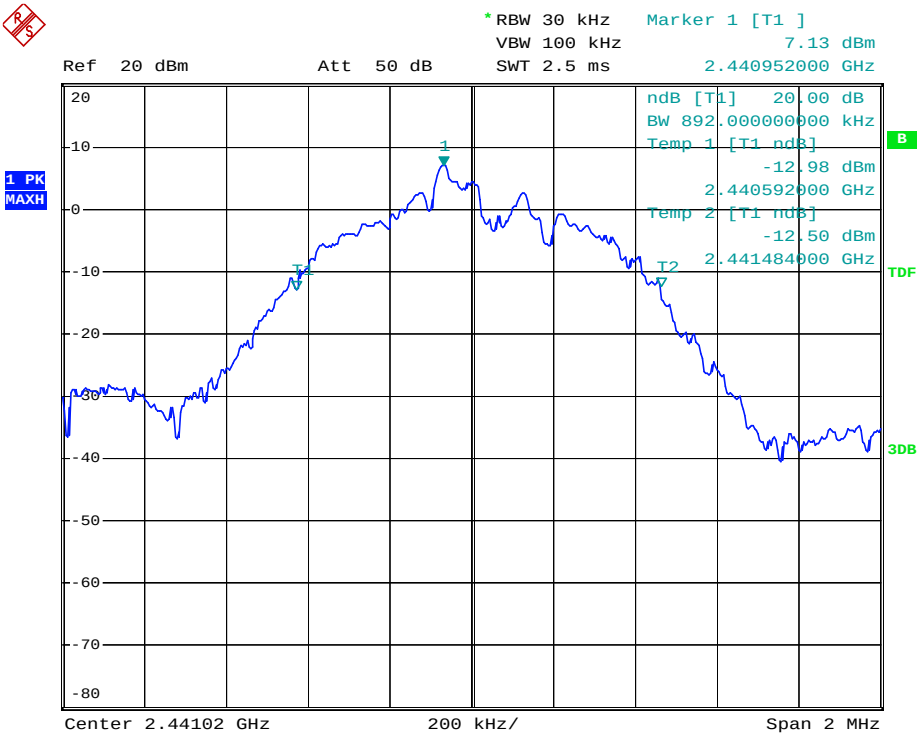
EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	6Vdc from battery (size AA 1.5V*4Pcs)
Test Mode ：	TX		

Channel		Channel frequency (MHz)	bandwidth (KHz)	Limit (KHz)	Conclusion
Tx	Low	2405	884.0	N/A	Pass
	Middle	2441	892.0	N/A	Pass
	High	2478	880.0	N/A	Pass

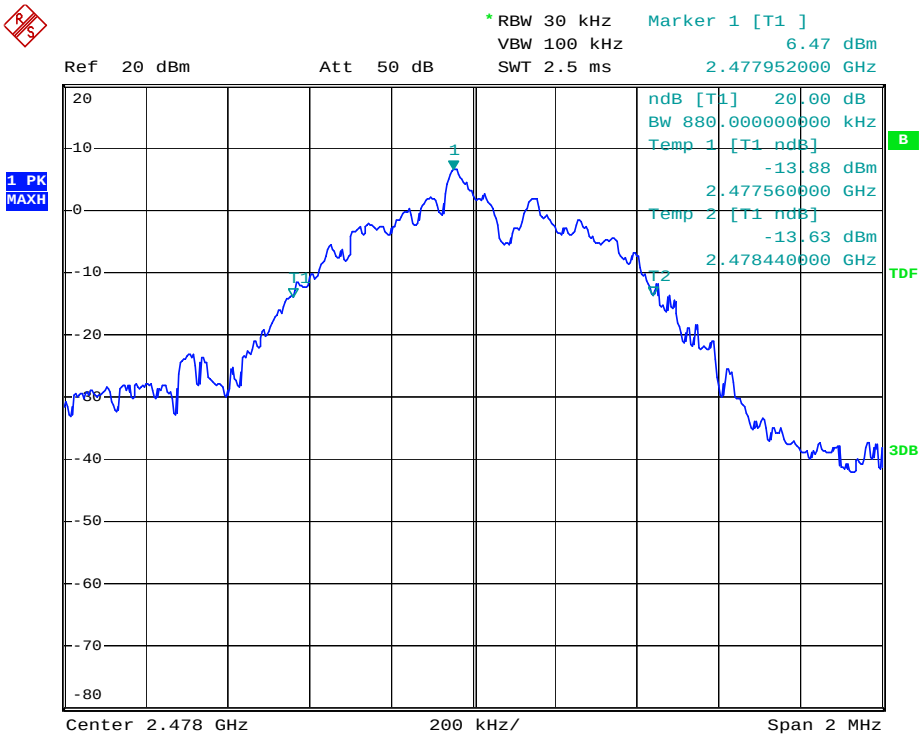
CH00


*RBW 30 kHz
VBW 100 kHz
SWT 2.5 ms
Marker 1 [T1]
7.71 dBm
2.404948000 GHz
Ref 20 dBm
Att 50 dB
ndB [T1] 20.00 dB
BW 884.000000000 kHz
Temp 1 [T1 ndB]
-12.18 dBm
2.404584000 GHz
Temp 2 [T1 ndB]
-12.63 dBm
2.405468000 GHz
1 PK
MAXH
B
TDF
3DB
Center 2.405 GHz
200 kHz/
Span 2 MHz

CH 39


*RBW 30 kHz
VBW 100 kHz
SWT 2.5 ms
Marker 1 [T1]
7.13 dBm
2.440952000 GHz
Ref 20 dBm
Att 50 dB
ndB [T1] 20.00 dB
BW 892.000000000 kHz
Temp 1 [T1 ndB]
-12.98 dBm
2.440592000 GHz
Temp 2 [T1 ndB]
-12.50 dBm
2.441484000 GHz
1 PK
MAXH
B
TDF
3DB
Center 2.44102 GHz
200 kHz/
Span 2 MHz

CH 78


*RBW 30 kHz
VBW 100 kHz
SWT 2.5 ms
Marker 1 [T1]
6.47 dBm
2.477952000 GHz
Ref 20 dBm
Att 50 dB
ndB [T1] 20.00 dB
BW 880.000000000 kHz
Temp 1 [T1 ndB]
-13.88 dBm
2.477560000 GHz
Temp 2 [T1 ndB]
-13.63 dBm
2.478440000 GHz
1 PK
MAXH
B
TDF
3DB
Center 2.478 GHz
200 kHz/
Span 2 MHz

5.5 Carrier Frequencies Separated

5.5.1 Applied procedures / Limit

15.249(a) (1) 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.

5.5.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as Span = wide enough to capture the peaks of two adjacent channels, Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span, Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold

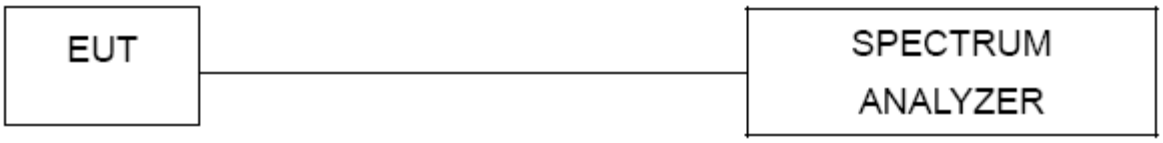
(2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation.

5.5.3 Deviation from standard

No deviation.

5.5.4 Test setup



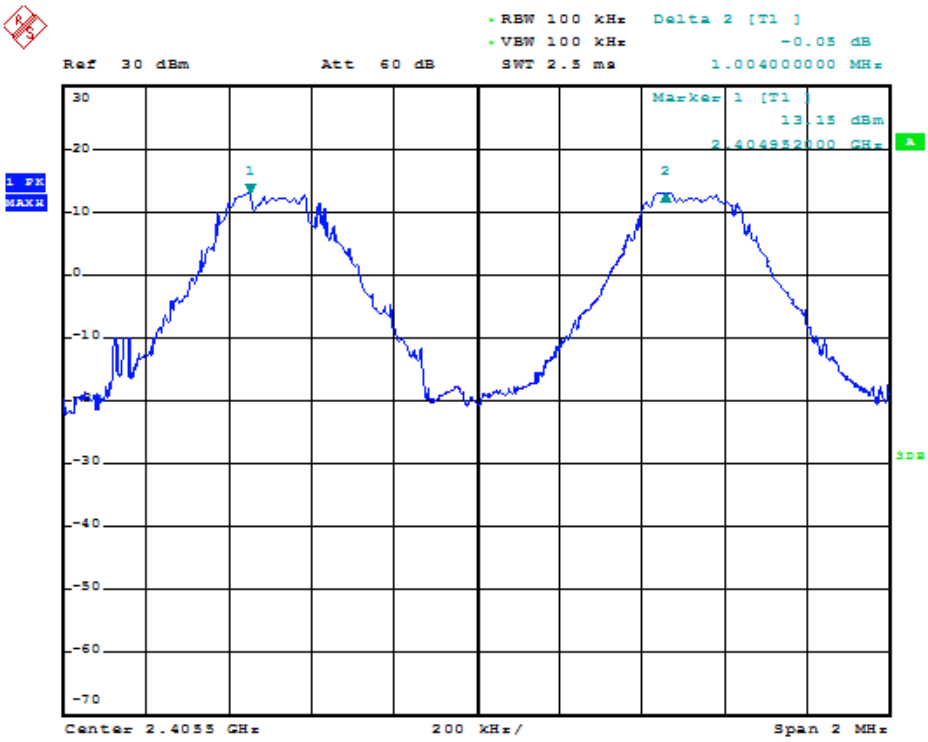
5.5.5 Test results

EUT：	Digital Proportional System	Model Name ：	MT-201
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	6Vdc from battery (size AA 1.5V*4Pcs)
Test Mode ：	TX		

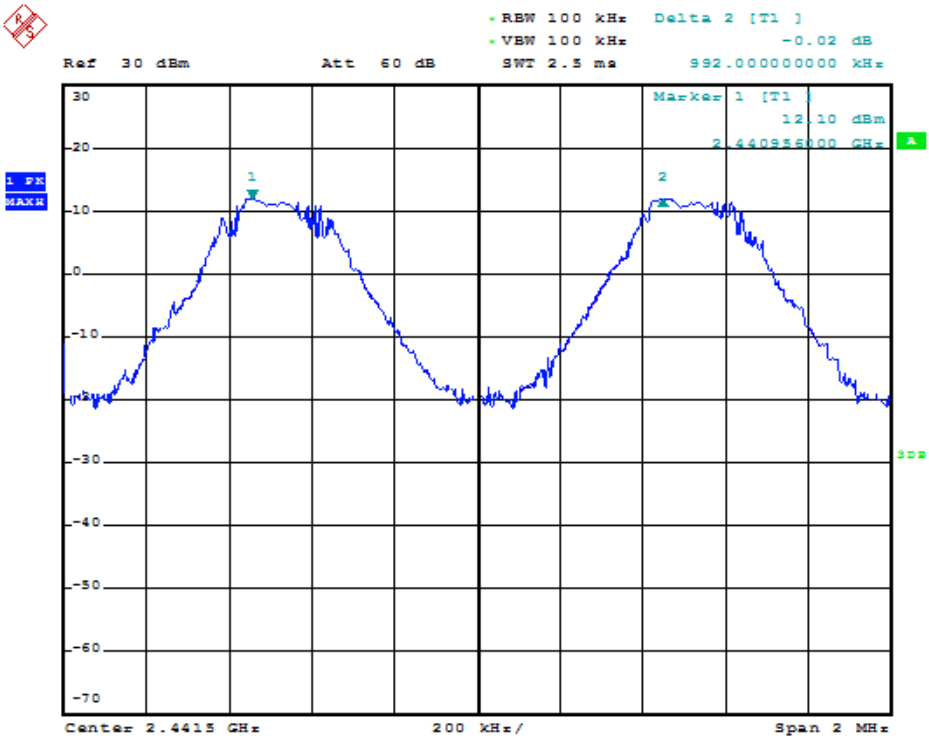
Channel		Channel frequency (MHz)	Channel Separation (KHz)	Conclusion
Tx	Low	2405	1004.0	Pass
	Middle	2441	992.0	Pass
	Highest	2478	1004.0	Pass

Ch. Separation >2/3(20dB bandwidth)

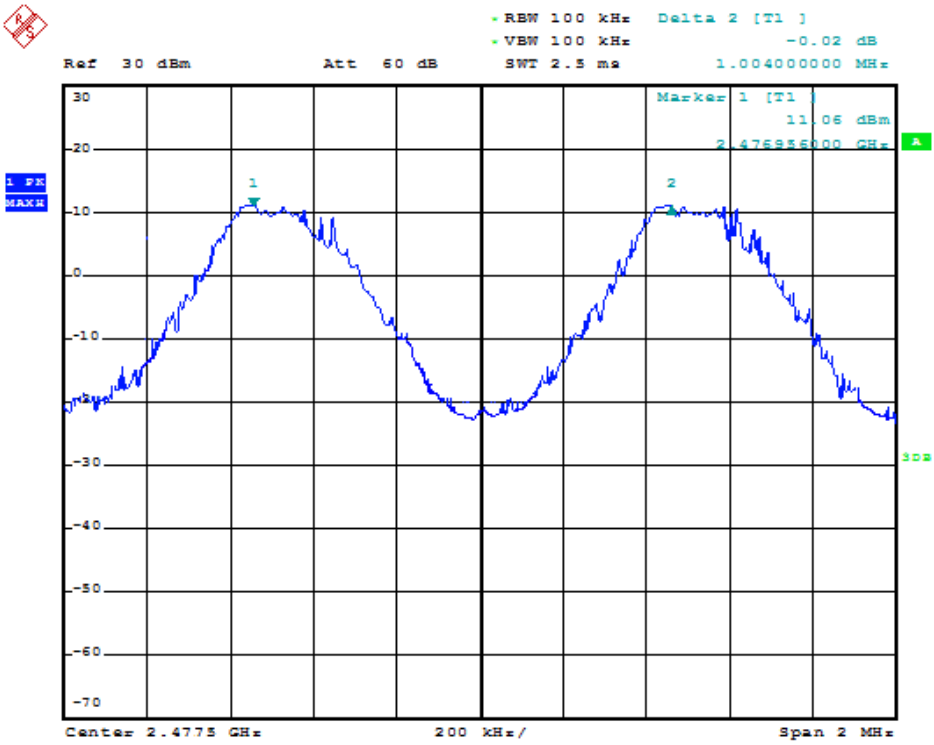
CH 00


RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.05 dB
1.004000000 MHz
Ref 30 dBm
Att 60 dB
Marker 1 [T1]
13.15 dBm
2.404952000 GHz
1 PK
MAXH
Center 2.4055 GHz
200 kHz/
Span 2 MHz

CH 39


RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.02 dB
992.000000000 kHz
Ref 30 dBm
Att 60 dB
Marker 1 [T1]
12.10 dBm
2.440956000 GHz
1 PK
MAXH
Center 2.4415 GHz
200 kHz/
Span 2 MHz

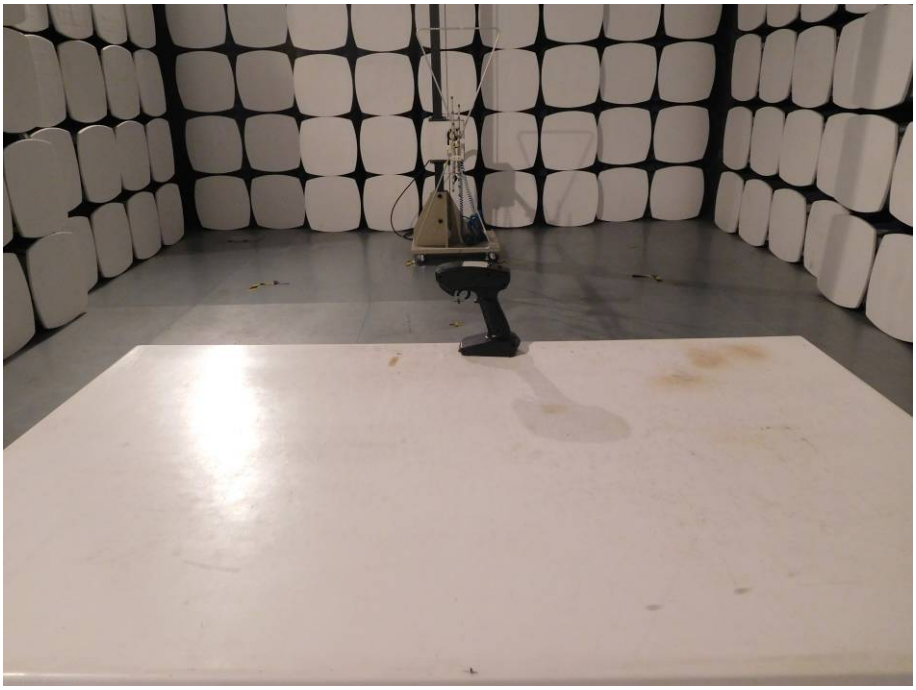
CH 78


RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
Delta 2 [T1]
-0.02 dB
1.004000000 MHz
Ref 30 dBm
Att 60 dB
Marker 1 [T1]
11.06 dBm
2.476956000 GHz
1 PK
MAXH
A
3DB
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Center 2.4775 GHz
200 kHz/
Span 2 MHz

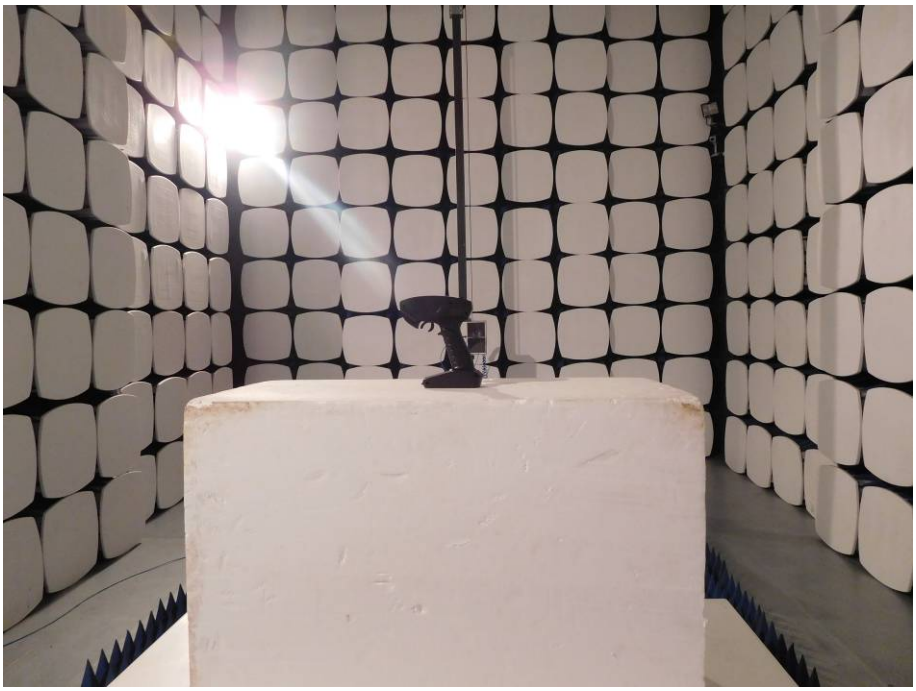
6 Photographs

6.1 Radiated Spurious Emission Test Setup

Below 1GHz:

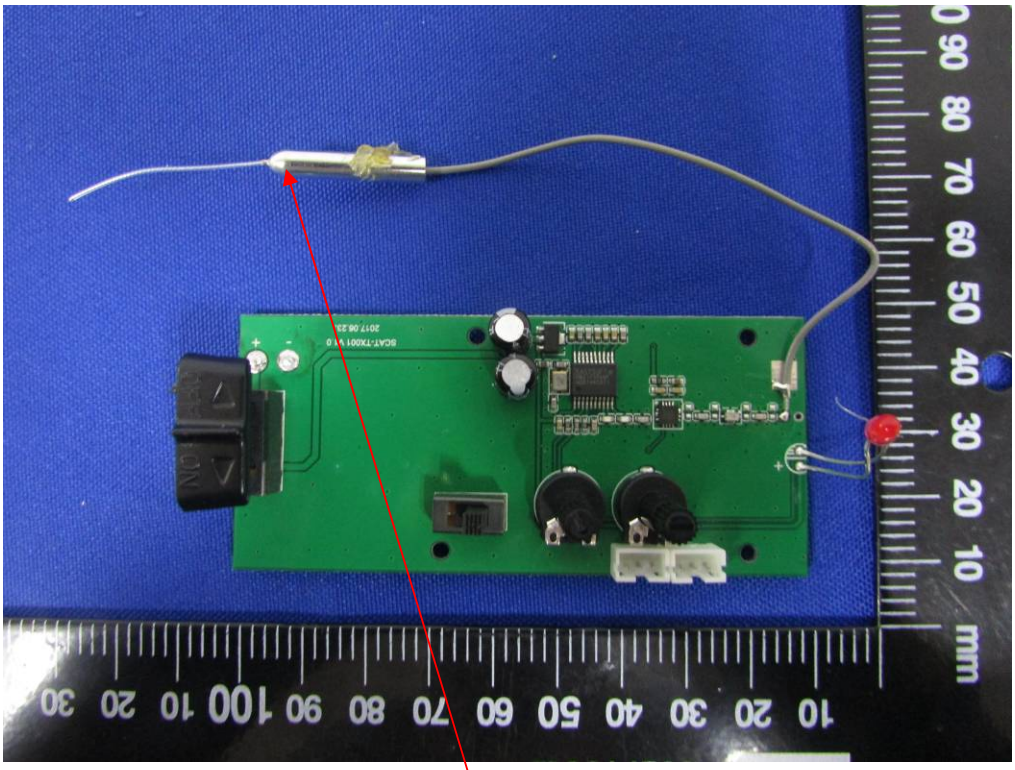


Above 1GHz:

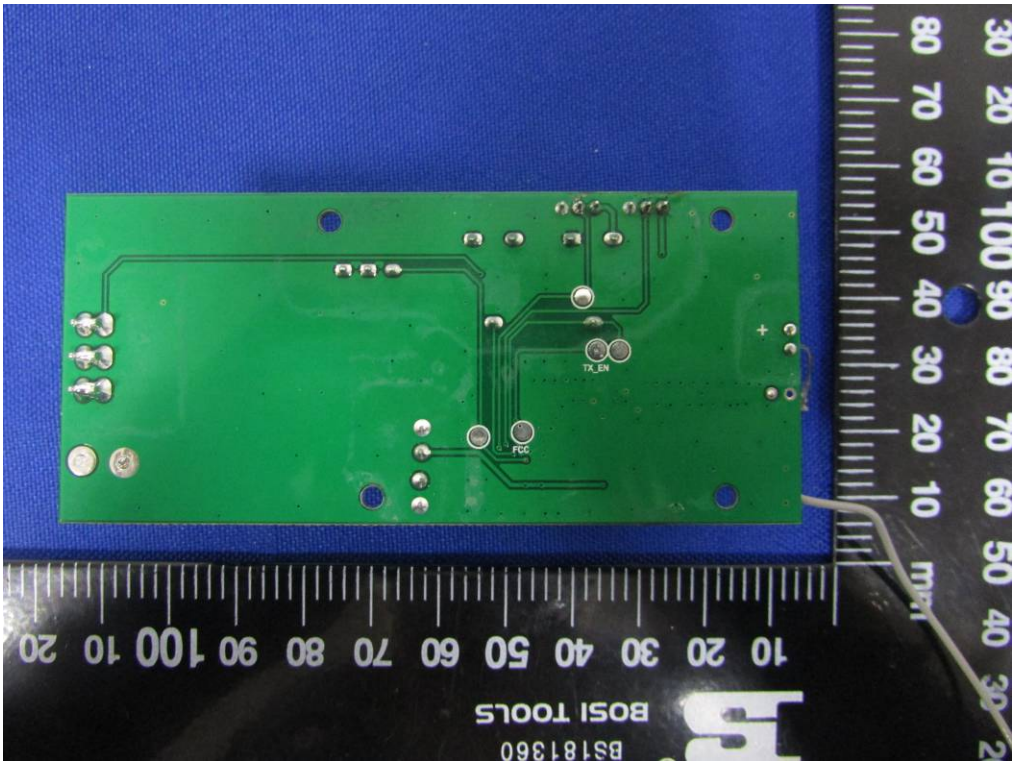


7 APPENDIX-Photographs of EUT Constructional Details

OFF
ON
ST
Reverse
ST D/R
ST Trim



Antenna



**** End of report ****