FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Square Inc.

Cash Register

SPB1-01

FCC ID: 2AF3K-SPB1

Prepared for : Square Inc.
1455 Market St. Suite 600 San Francisco, California United States 94103

Prepared By : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District, Shenzhen, Guangdong, China

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Report Number	:	ACS-F17137
Date of Test	:	Jul.05~09, 2017
Date of Report	:	Jul.11, 2017

TABLE OF CONTENTS

TEST REPORT CERTIFICATION

Applicant	:	Square Inc.
Manufacturer	:	Square Inc.,
Product	:	Cash Register
FCC ID	:	2AF3K-SPB1
		(A) Model No. : SPB1-01
		(B) Serial No. : N/A
		(C) Test Voltage : AC 120V/60Hz

Tested for comply with:
FCC CRF 47 Part 15 Subpart C

Test procedure used:
ANSI C63.10: 2013

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements. The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC and IC requirements. This report contains data that are not covered by the NVLAP accreditation.

This Report is made under FCC Part 2.1075. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Jul.05~09, 2017 Report of date: Jul.11, 2017

Prepared by : Monica Liu
Monica Liu / Assistant

Reviewed by :
Sunny Lu / Deputy Manager

信華科技（深圳）有限公司
Audix Technology (Shenzhen) Co., Ltd.
EMC 部門報告專用章
Stamp only for EMC Dept. Report

Approved & Authorized Signer
Signature: David Jin
David Jin / Manager

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	**Standard**	**Results**
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10 2013	PASS
Radiated Emission Test	FCC Part 15 15.209 FCC Part 15 15.247(d) ANSI C63.10 2013	PASS
Conducted Spurious Emissions	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10 2013	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Maximum Peak Output Power Test	FCC Part 15 15.247(b)(1)\ ANSI C63.10 2013	PASS
Band Edge Compliance Test	FCC Part 15 15.247(d) ANSI C63.10 2013	PASS

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

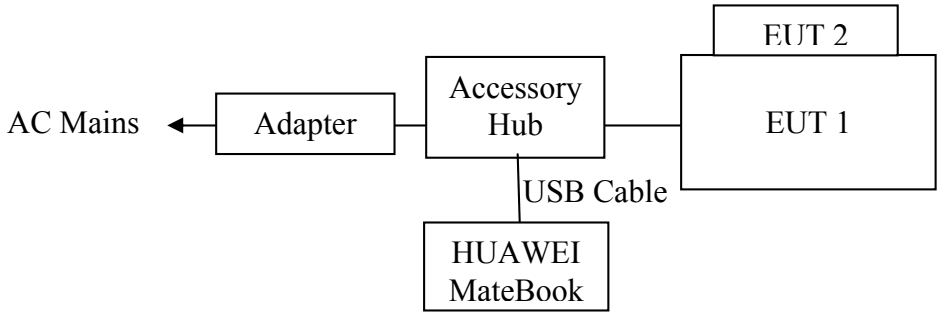
Product	:	Cash Register
Square Register Model No.	:	SPB1-01
Customer Display Model No.	:	SPB4-01
FCC ID	:	2AF3K-SPB1
Radio	:	IEEE802.11 a/b/g/n/ac; Bluetooth V3.0+EDR; Bluetooth V4.0; NFC
Operation Frequency	:	IEEE 802.11a: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT20: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT40: 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz IEEE 802.11ac VHT80: 5210MHz, 5290MHz; 5530MHz—5690MHz; 5775MHz IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE802.11nHT20: 2412MHz—2462MHz; 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE802.11nHT40: 2422MHz—2452MHz; 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz Bluetooth : 2402-2480MHz NFC: 13.56MHz
Modulation Technology	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11a/g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac VHT20, VHT40, VHT80: OFDM(16QAM, 64QAM, 256QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM,QPSK,BPSK) Bluetooth V3.0+EDR: GFSK, π/4DQPSK,8-DPSK Bluetooth V4.0:GFSK NFC: ASK

Antenna Assembly Gain	: Antenna Type: PIFA Bluetooth: 2.77dBi WIFI 2.4GHz:ANT 0: -1.95dBi; ANT 1: 2.77dBi WIFI 5GHz: Band 1: ANT 0: -2.39dBi; ANT 1: 6.13dBi Band 2: ANT 0: -1.76dBi; ANT 1: 6.74dBi Band 3: ANT 0: 1.42dBi; ANT 1: 6.92dBi Band 4: ANT 0: 0.55dBi; ANT 1: 6.98dBi
Applicant	: Square Inc. 1455 Market St. Suite 600 San Francisco, California United States 94103
Manufacturer	: Square Inc. 1455 Market St. Suite 600 San Francisco, California United States 94103
Factory	: Fu Tai Hua Industry (ShenZhen) Co., Ltd. 4/F, Building 3, K1 Area, No. 2, 2nd Donghuan Road, Longhua District, Shenzhen, Guangdong Province, P.R. China
Power Adapter	: Manufacturer: Square, Inc., M/N: SWB2-01; Cable: Unshielded, Detachable, 1.2m
Accessory Hub	: Manufacturer: Square, Inc., M/N: SHB3-01; Cable: Unshielded, Detachable, 1.25m
Micro USB Cable	: Shielded, Detachable, 1.0m
Power Cable	: Unshielded, Detachable, 1.3m(2C)
Date of Test	: Jul.05~09, 2017
Date of Receipt	: Jun.24, 2017

2.2. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	HUAWEI MateBook	---	HUAWEI	G2-MLB	---

2.3. Block Diagram of connection between EUT and simulators



EUT 1: Square Register
EUT 2: Customer Display

(EUT: Cash Register)

2.4. Test information

A special software was used to control EUT work in Continuous TX mode(GFSK, π/4DQPSK,8-DPSK Modulation), and select test channel.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps)	Channel	Frequency (MHz)
Tx Mode GFSK modulation	1	Low :CH 0	2402
	1	Middle: CH39	2441
	1	High: CH78	2480
Tx Mode 8-DPSK modulation	3	Low :CH 0	2402
	3	Middle: CH39	2441
	3	High: CH78	2480
Note: π/4DQPSK modulation is same type modulation with 8-DPSK, and according exploratory test, 8-DPSK will have worse emissions, so the final test were only performed with GFSK and 8-DPSK modulation.			

2.5. Test Facility

Site Description

Name of Firm	:	Audix Technology (Shenzhen) Co., Ltd. No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
EMC Lab.	:	Certificated by Industry Canada Registration Number: IC 5183A-1 Valid Date: May.07, 2020
	:	Certificated by DAkkS, Germany Registration No: D-PL-12151-01-00 Valid Date: Dec.07, 2021
	:	Accredited by NVLAP, USA NVLAP Code: 200372-0 Valid Date: Mar.31, 2018

2.6. Measurement Uncertainty (95% confidence levels, k=2)

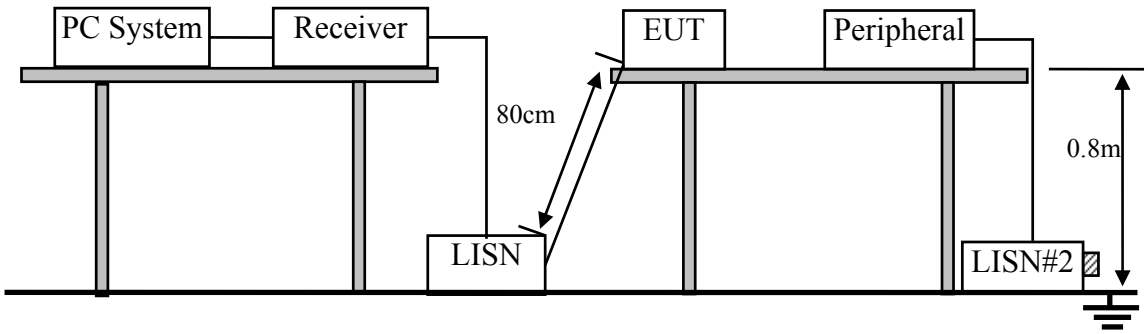
Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 1 Conduction	3.6dB (150KHz to 30MHz)
Uncertainty for Radiation Emission test in 3m chamber	2.8dB (30~200MHz, Polarization: H)
	2.8dB (30~200MHz, Polarization: V)
	3.0dB (200M~1GHz, Polarization: H)
	3.0dB (200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber	5.8dB (1~6GHz, Distance: 3m)
	5.8dB (6~18GHz, Distance: 3m)
	5.8dB (Above 18GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.6dB
Uncertainty for Conduction Spurious emission test	2.0dB
Uncertainty for Output power test	0.8dB
Uncertainty for Bandwidth test	83 kHz
Uncertainty for DC power test	0.1 %
Uncertainty for test site temperature and humidity	0.6℃
	3%

3. POWER LINE CONDUCTED EMISSION TEST

3.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room	AUDIX	N/A	N/A	Apr.17,17	1 Year
2.	Test Receiver	Rohde & Schwarz	ESCI	100842	Apr.22,17	1 Year
3.	L.I.S.N.	Rohde & Schwarz	ENV216	102160	Mar.06.17	1 Year
4.	L.I.S.N.#2	Kyoritsu	K NW-403D	8-1750-2	Apr.22,17	1 Year
5.	I.S.N.	TESEQ	S751	24559	Mar.06.17	1.year
6.	Terminator	Hubersuhner	50Ω	No.1	Apr.23,17	1 Year
7.	Terminator	Hubersuhner	50Ω	No.2	Apr.23,17	1 Year
8.	RF Cable	Fujikura	RG55/U	NO.2	Apr.22,17	1Year
9.	Coaxial Switch	Anritsu	MP59B	6201397223	Apr.22,17	1 Year
10.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
Note: N/A means Not applicable.						

3.2.Block Diagram of Test Setup



▨ :50Ω Terminator

3.3.Power Line Conducted Emission Test Limits

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.

3.4. Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4.1. Cash Register (EUT)

Model No. : SPB1-01
Serial No. : N/A

3.4.2. Support Equipment: As Tested Supporting System Details, in Section 2.2.

3.5. Operating Condition of EUT

3.5.1. Setup the EUT and simulator as shown as Section 3.2.

3.5.2. Turn on the power of all equipments.

3.5.3. PC run test software to control EUT work in BT 3.0 Tx mode.

3.6. Test Procedure

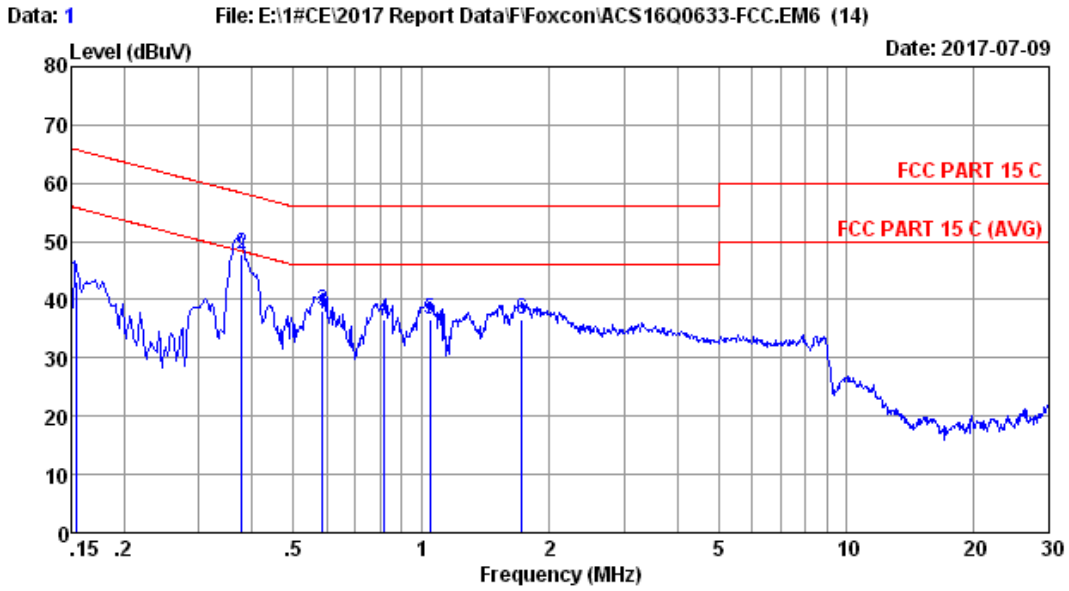
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via PC connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). 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 ESCI) is set at 9kHz.

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

3.7. Power Line Conducted Emission Test Results

PASS. **(**All emissions not reported below are too low against the prescribed limits.)

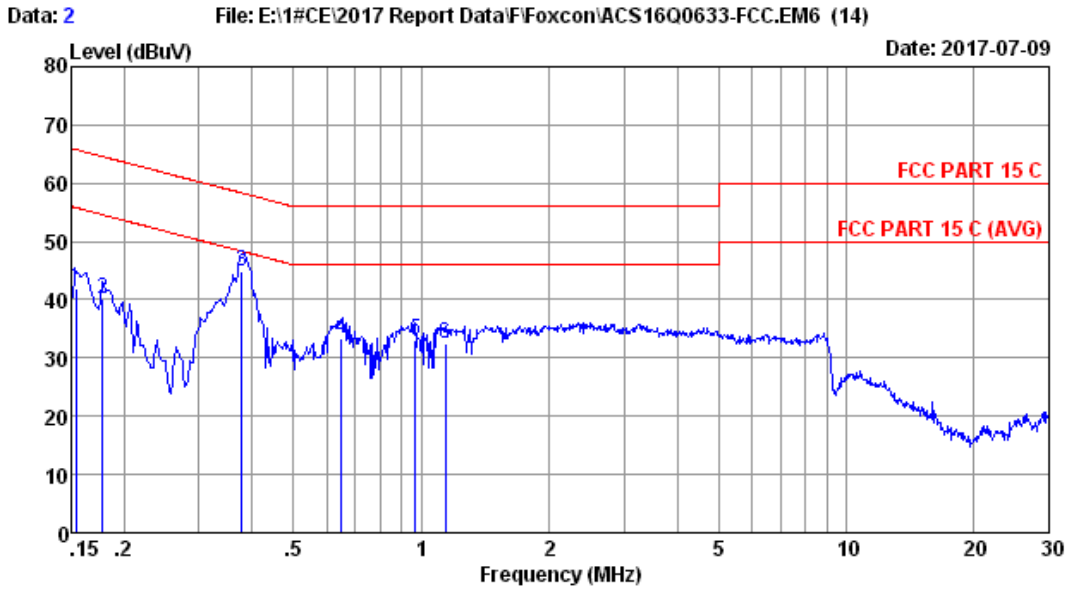


Site no :1# CE
Dis./Lisn :2017 LISN ENV216-L
Limit :FCC PART 15 C
Env./Ins. :22.5*C/53%
EUT :Cash Register M/N:SPB1-01
Power Rating :AC 120V/60Hz
Test Mode :BT3.0 TX

Data No :1
LISN phase:
Engineer :Garry

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.154	9.52	0.02	33.54	43.08	65.78	22.70	QP
2	0.377	9.39	0.03	38.54	47.96	58.34	10.38	QP
3	0.585	9.50	0.03	28.59	38.12	56.00	17.88	QP
4	0.817	9.50	0.04	26.95	36.49	56.00	19.51	QP
5	1.049	9.49	0.05	27.10	36.64	56.00	19.36	QP
6	1.725	9.49	0.06	27.05	36.60	56.00	19.40	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.



Site no :1# CE
Data No :2
Dis./Lisn :2017 LISN ENV216-N
LISN phase:
Limit :FCC PART 15 C
Env./Ins. :22.5*C/53%
Engineer :Garry
EUT :Cash Register M/N:SPB1-01
Power Rating :AC 120V/60Hz
Test Mode :BT3.0 TX

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.154	9.48	0.02	32.43	41.93	65.78	23.85	QP
2	0.178	9.47	0.02	30.54	40.03	64.59	24.56	QP
3	0.377	9.42	0.03	35.48	44.93	58.34	13.41	QP
4	0.647	9.32	0.04	24.06	33.42	56.00	22.58	QP
5	0.968	9.35	0.05	23.69	33.09	56.00	22.91	QP
6	1.141	9.35	0.05	23.05	32.45	56.00	23.55	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector. the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipments

Frequency range: 30~1000MHz

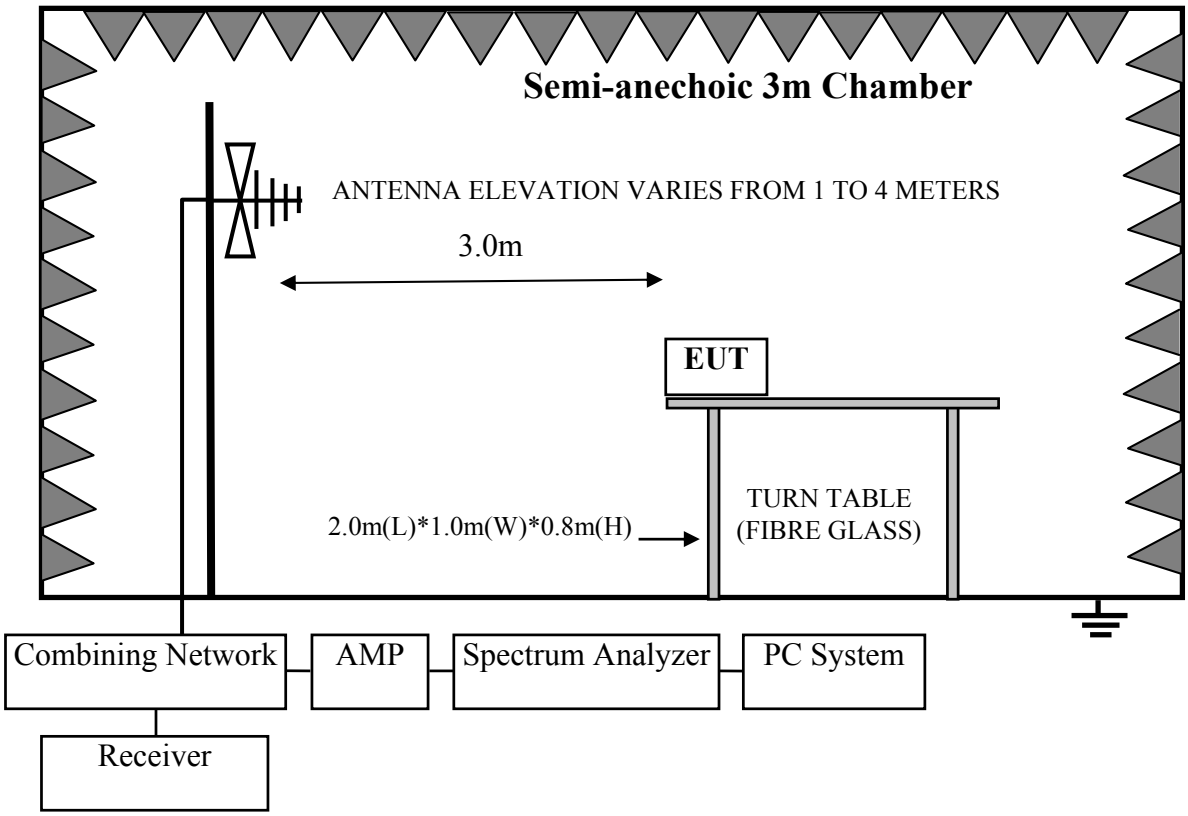
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber	AUDIX	N/A	N/A	Mar.28,17	1 Year
2.	Spectrum Analyzer	Agilent	E7405A	MY45116588	Oct.15,16	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.22,17	1 Year
4.	Amplifier	HP	8447D	2648A04738	Apr.22,17	1 Year
5.	Bi-log Antenna	TESEQ	CBL6112D	35375	Aug.03,16	1 Year
6.	Loop Antenna	Chase	HLA6120	1062	Sep.25,16	1 Year
7.	RF Cable	MIYAZAKI	CFD400NL-LW	No.3	Sep.26.16	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.22,17	1 Year
9.	Attenuator	EMCI	EMCI-N-6-06	AT-N0639	Sep.26.16	1 Year
10.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A
Note: N/A means Not applicable.						

Frequency range: above 1000MHz

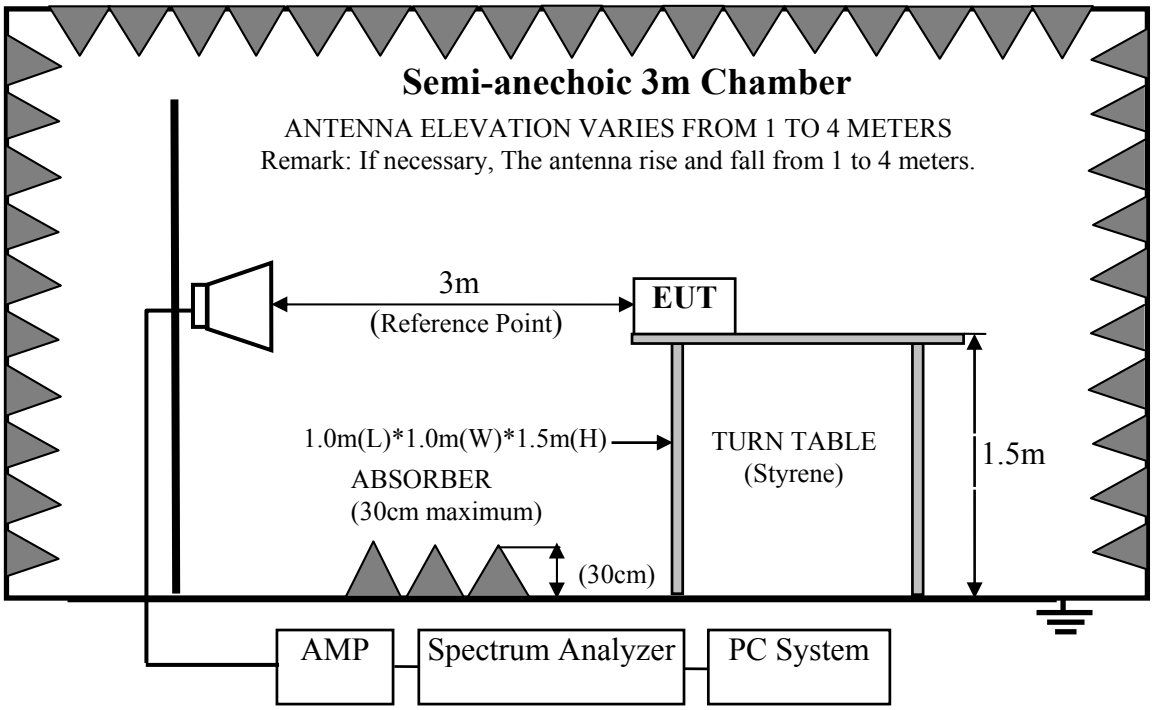
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300459	Apr.22,17	1 Year
2.	Horn Antenna	ETC	MCTD 1209	DRH15F03007	May.15,17	1 Year
3.	Amplifier	Agilent	8449B	3008A02495	Apr.22,17	1 Year
4.	RF Cable	Hubersuhner	SUCOFLEX104	274094/4	Apr.22,17	1 Year
5.	Horn Antenna	ETS	3116	00060089	Nov.16,16	1 Year
6.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A
Note: N/A means Not applicable.						

4.2.Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range 1GHz-25GHz



4.3. Radiated Emission Limit Standard:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

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.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4.1. Cash Register (EUT)

Model No. : SPB1-01
Serial No. : N/A

4.5. Operating Condition of EUT

4.5.1. Setup the EUT and simulator as shown as Section 4.2.

4.5.2. Turn on the power of all equipments.

4.5.3. Let EUT work in BT 3.0 Tx mode.

4.6. Test Procedure

Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the 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. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horm antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver (R&S ESR7) is set at 120kHz for frequency range from 30MHz to 1000MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse Modulated, a duty cycle factor was used to calculated average level based measured peak level.

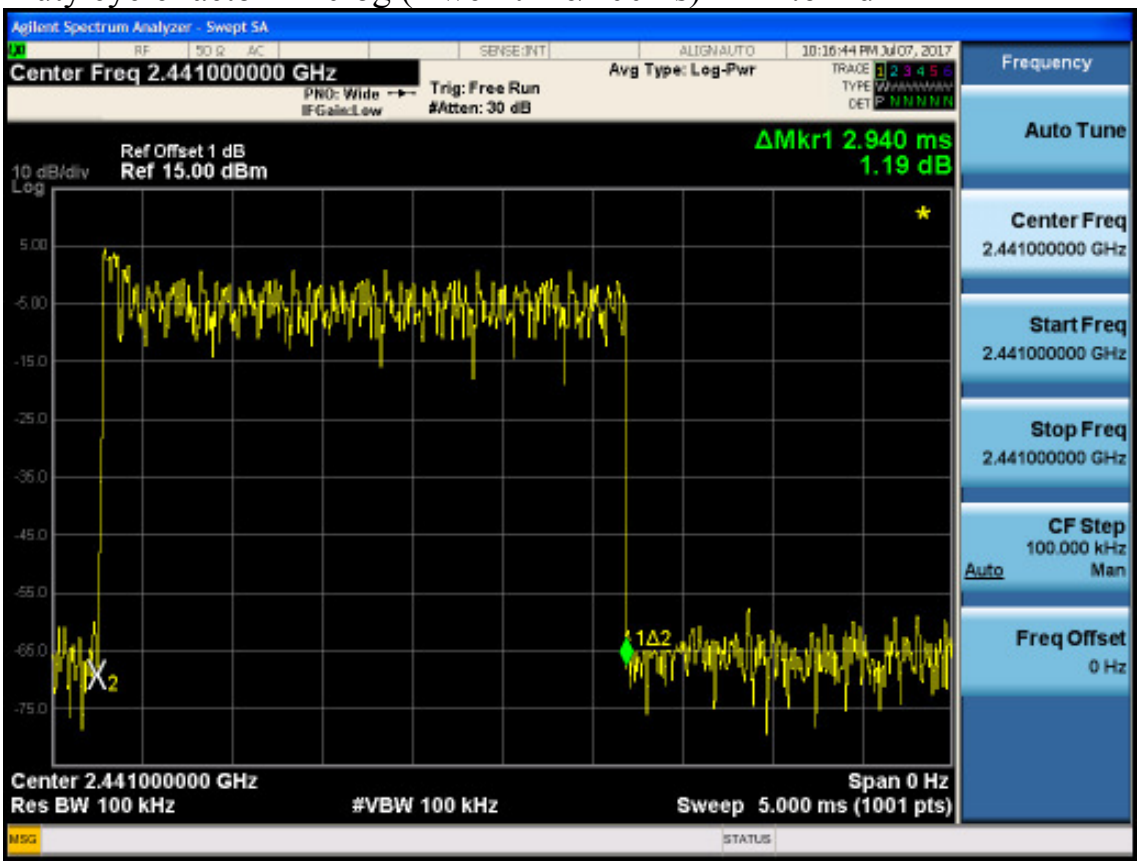
The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

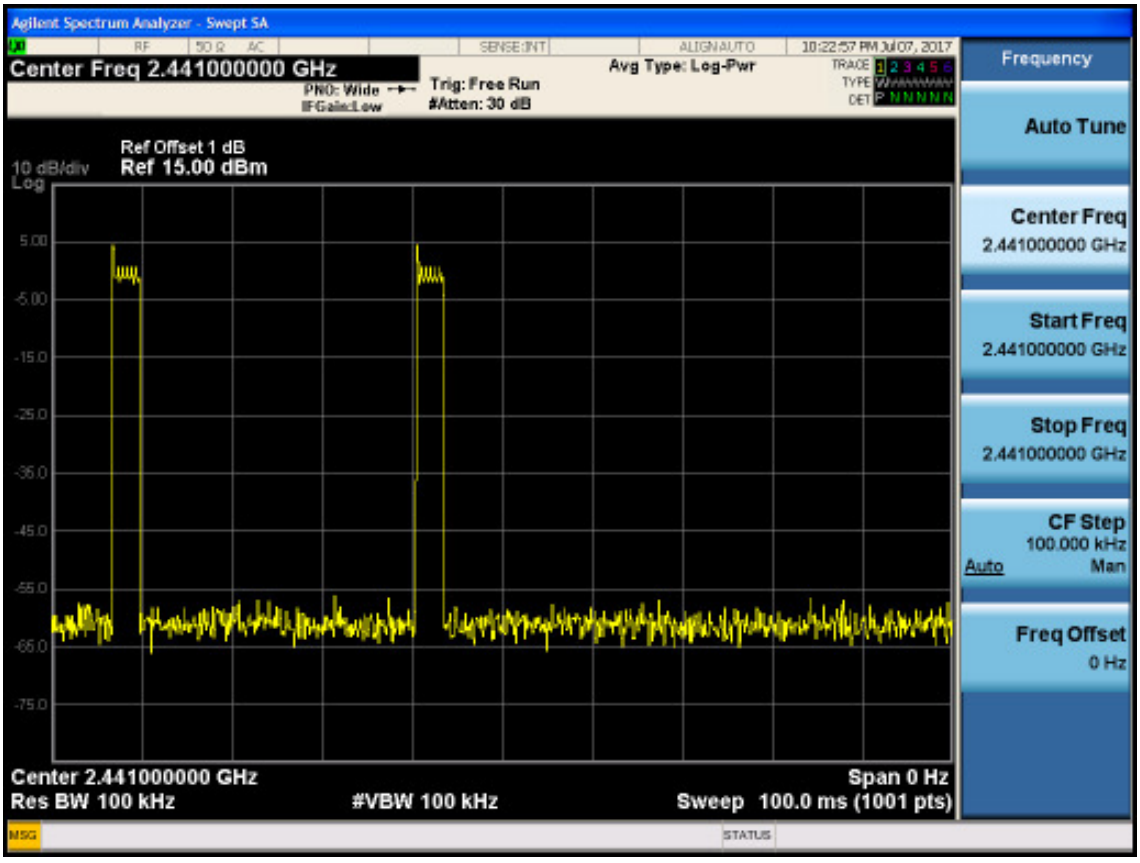
4.7. Radiated Emission Test Results

PASS.

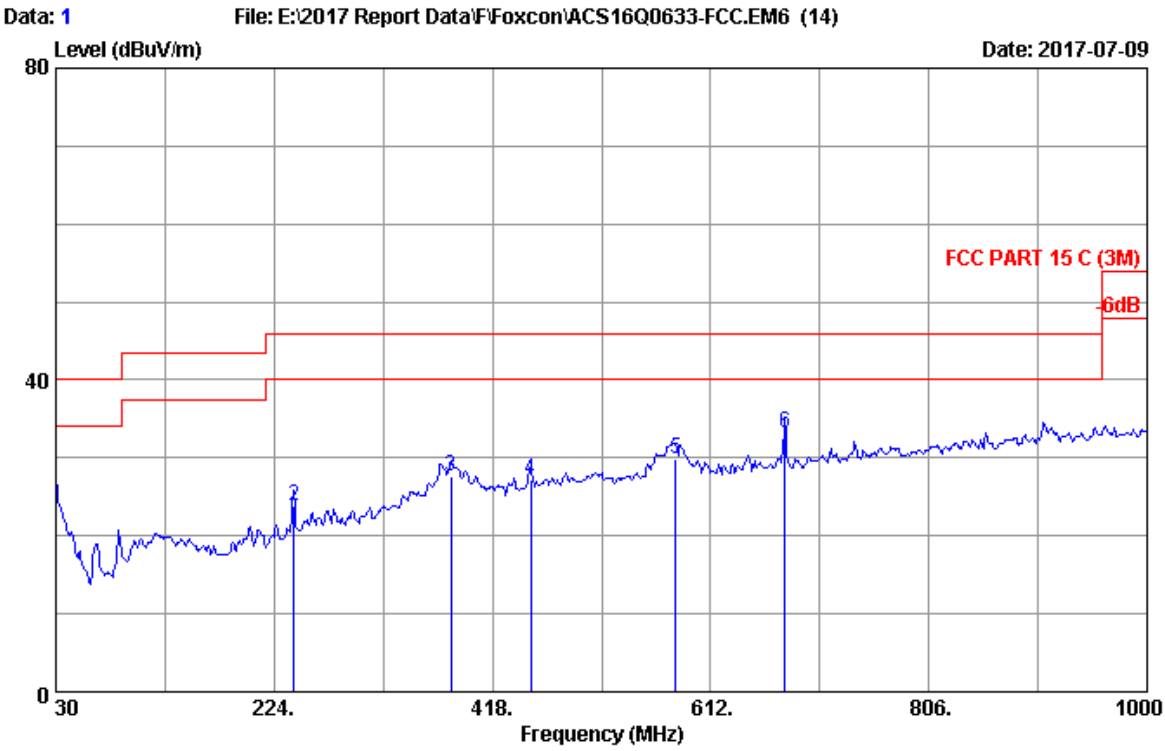
All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.
Note 1: The duty cycle factor for calculate average level is -24.612dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.
Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

Duty cycle factor = 20log (Dwell time/100ms) = -24.612dB





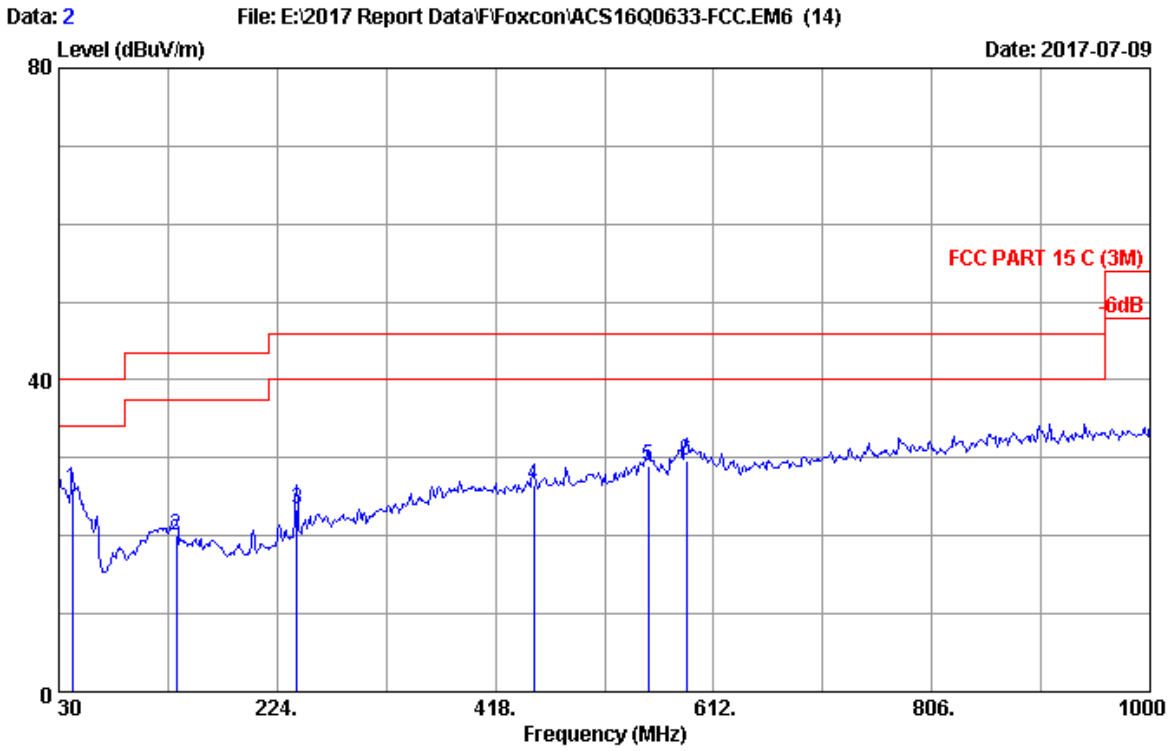
Frequency: 30MHz~1GHz



Site no. : 3m Chamber
Data no. : 1
Dis. / Ant. : 3m 2017 CBL6112D 35375
Ant. pol. : HORIZONTAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 21.8*C/54%
Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power rating : AC 120V/60Hz
Test Mode : BT 3.0 TX
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	18.90	6.57	-0.10	25.37	40.00	14.63	QP
2	241.460	12.76	7.55	3.48	23.79	46.00	22.21	QP
3	381.140	16.32	8.14	3.16	27.62	46.00	18.38	QP
4	451.950	17.58	8.40	1.29	27.27	46.00	18.73	QP
5	580.960	19.03	8.89	2.03	29.95	46.00	16.05	QP
6	677.960	19.90	9.44	3.90	33.24	46.00	12.76	QP

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



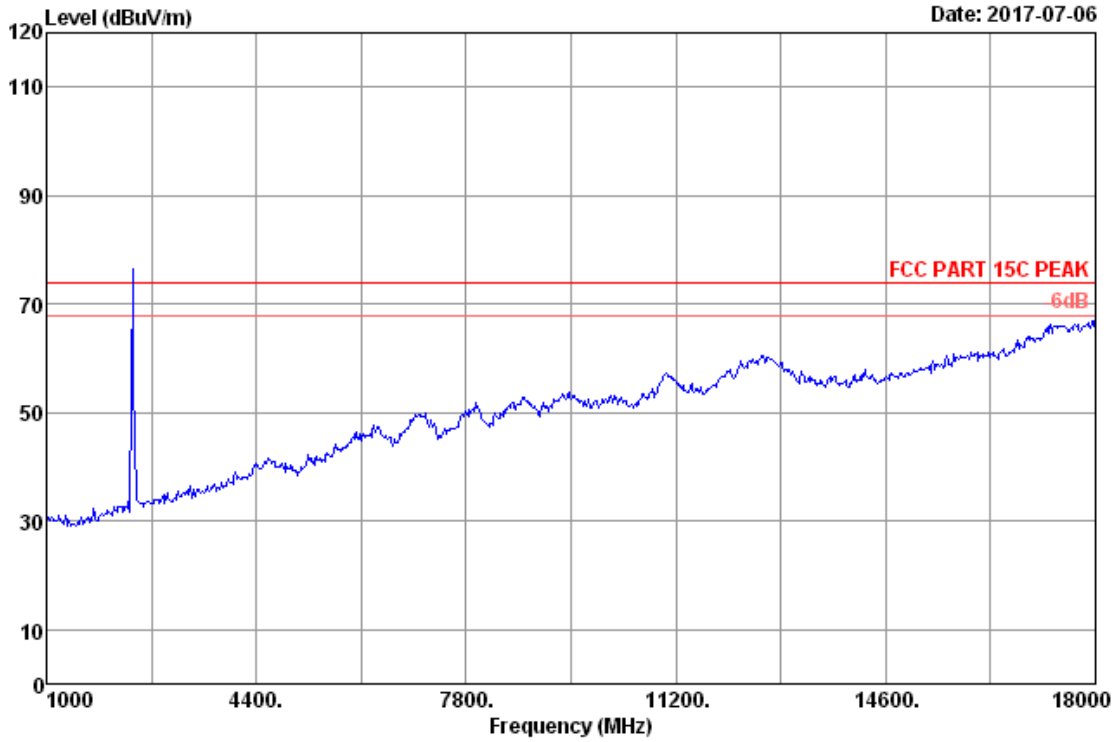
Site no. : 3m Chamber
Dis. / Ant. : 3m 2017 CBL6112D 35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 21.8*C/54%
EUT : Cash Register M/N:SPB1-01
Power rating : AC 120V/60Hz
Test Mode : BT 3.0 TX
:

Data no. : 2
Ant. pol. : VERTICAL
Engineer : Garry

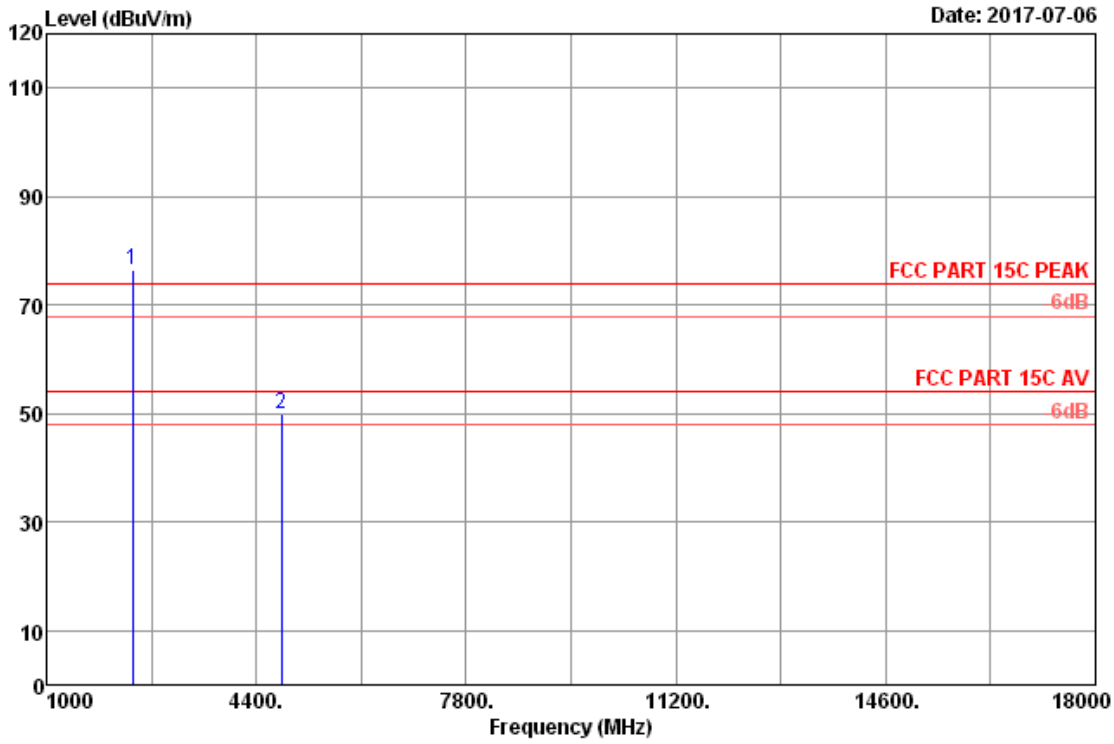
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	41.640	13.62	6.61	5.80	26.03	40.00	13.97	QP
2	134.760	12.27	7.07	0.78	20.12	43.50	23.38	QP
3	241.460	12.76	7.55	3.14	23.45	46.00	22.55	QP
4	451.950	17.58	8.40	0.60	26.58	46.00	19.42	QP
5	553.800	18.78	8.78	1.44	29.00	46.00	17.00	QP
6	587.750	19.09	8.91	1.64	29.64	46.00	16.36	QP

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

Frequency: 1GHz~18GHz



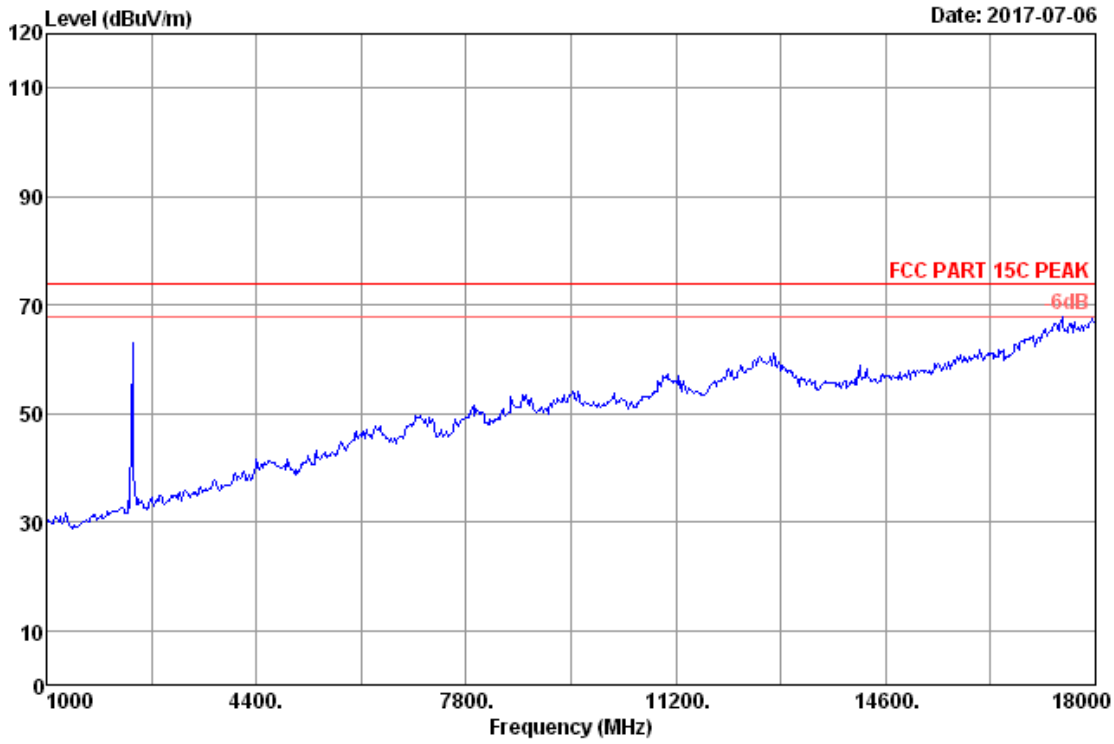
Site no.	: 3m Chamber	Data no.	: 1
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2402 Tx Mode		
	:		



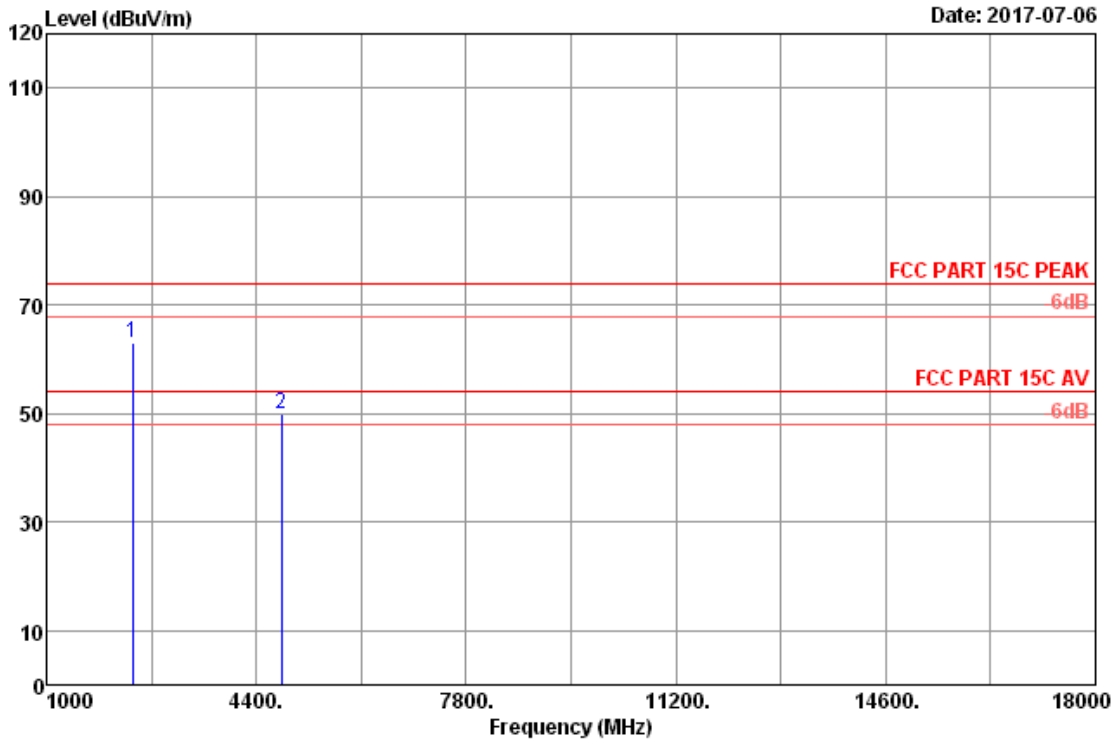
Site no. : 3m Chamber Data no. : 2
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.69	7.88	77.40	36.39	76.58	74.00	-2.58	Peak
2	4804.00	32.25	12.07	41.39	35.67	50.04	74.00	23.96	Peak

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



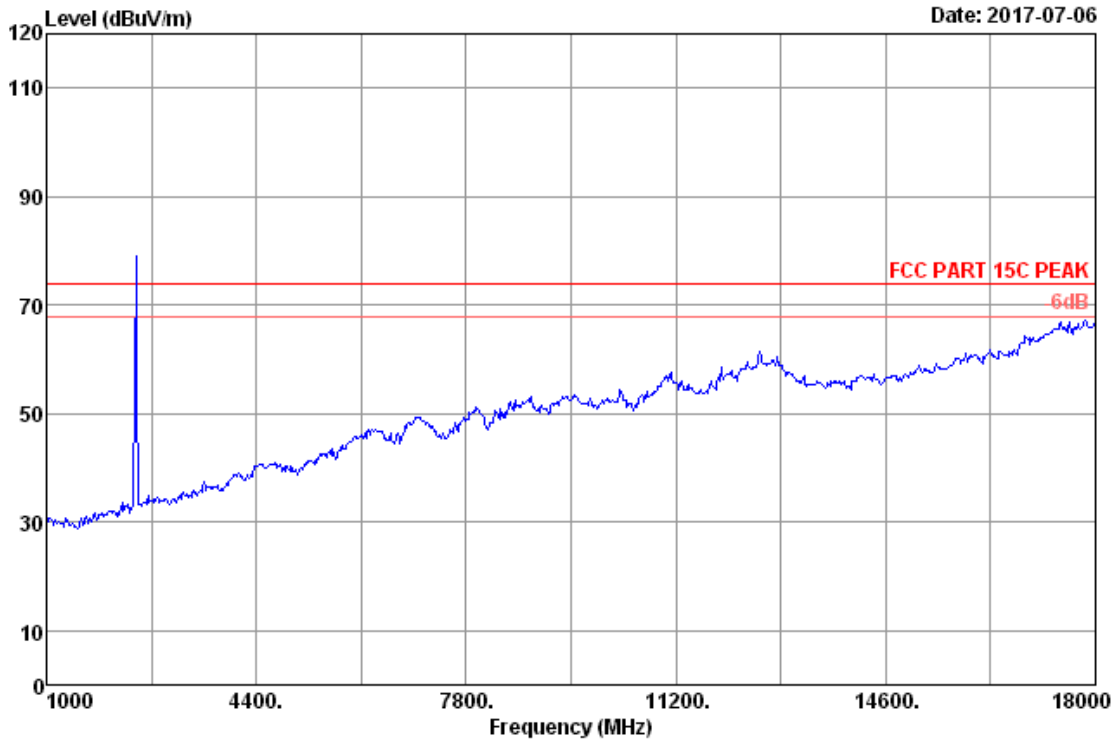
Site no.	: 3m Chamber	Data no.	: 3
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2402 Tx Mode		
	:		



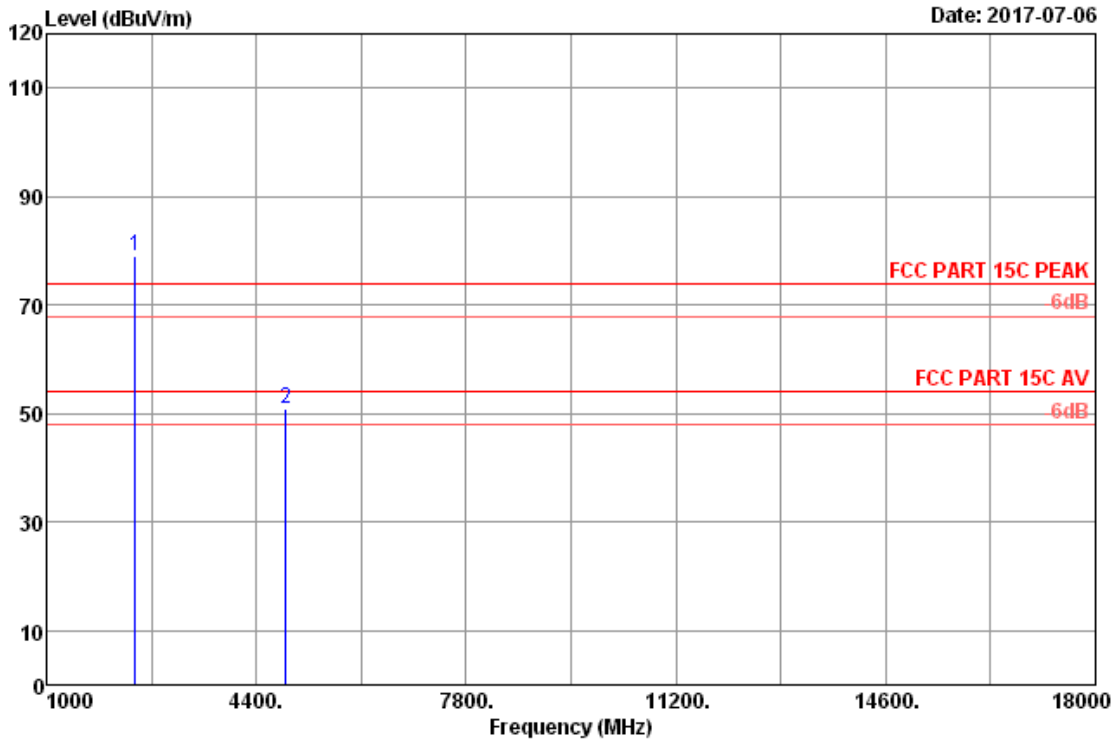
Site no. : 3m Chamber Data no. : 4
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.69	7.88	63.72	36.39	62.90	74.00	11.10	Peak
2	4804.00	32.25	12.07	41.38	35.67	50.03	74.00	23.97	Peak

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



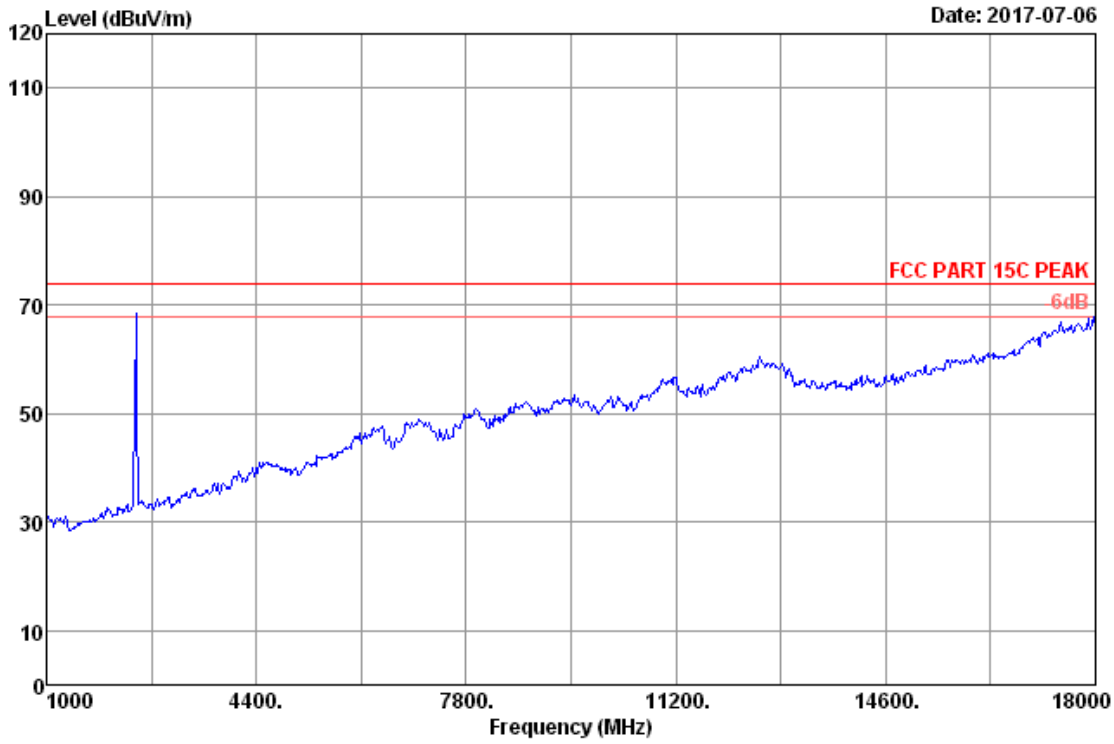
Site no.	: 3m Chamber	Data no.	: 7
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2441 Tx Mode		
	:		



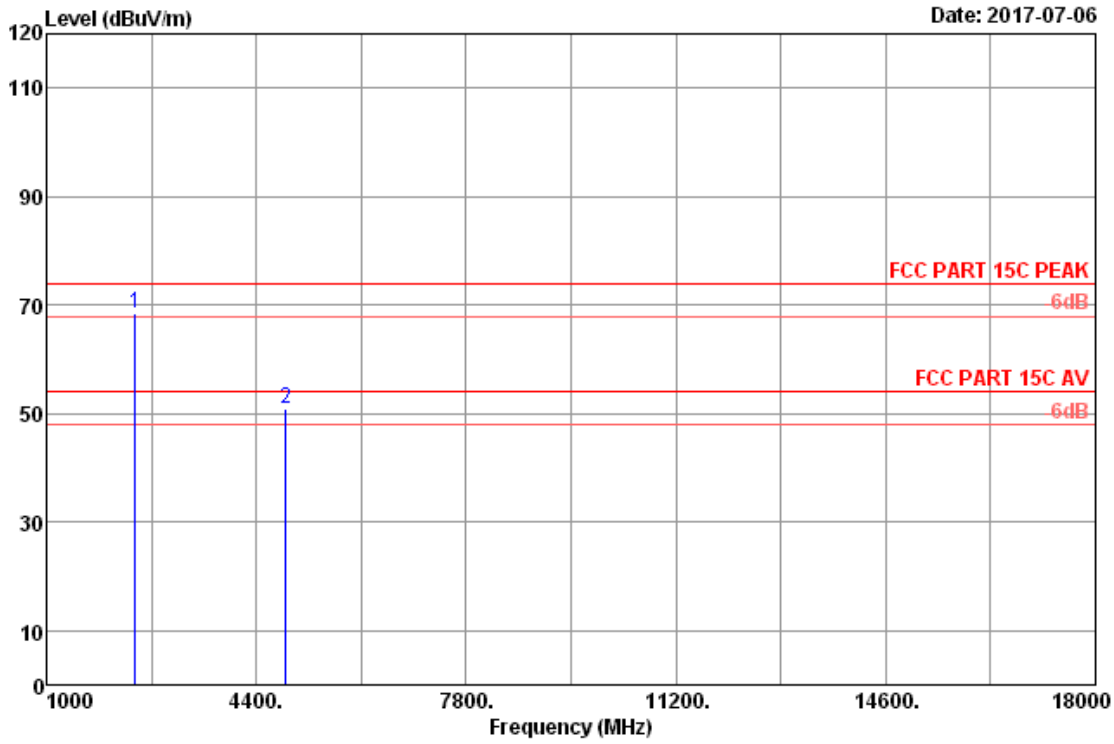
Site no. : 3m Chamber Data no. : 8
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2441 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.80	7.95	79.55	36.38	78.92	74.00	-4.92	Peak
2	4882.00	32.20	12.22	42.09	35.69	50.82	74.00	23.18	Peak

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



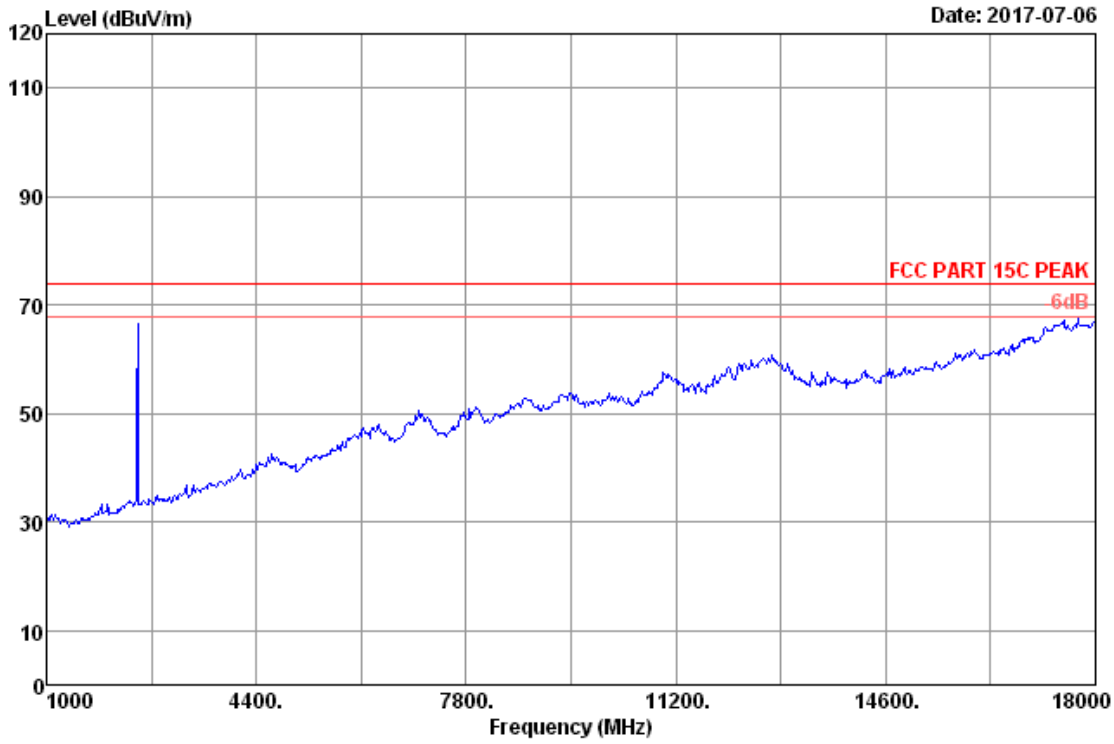
Site no.	: 3m Chamber	Data no.	: 9
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2441 Tx Mode		
	:		



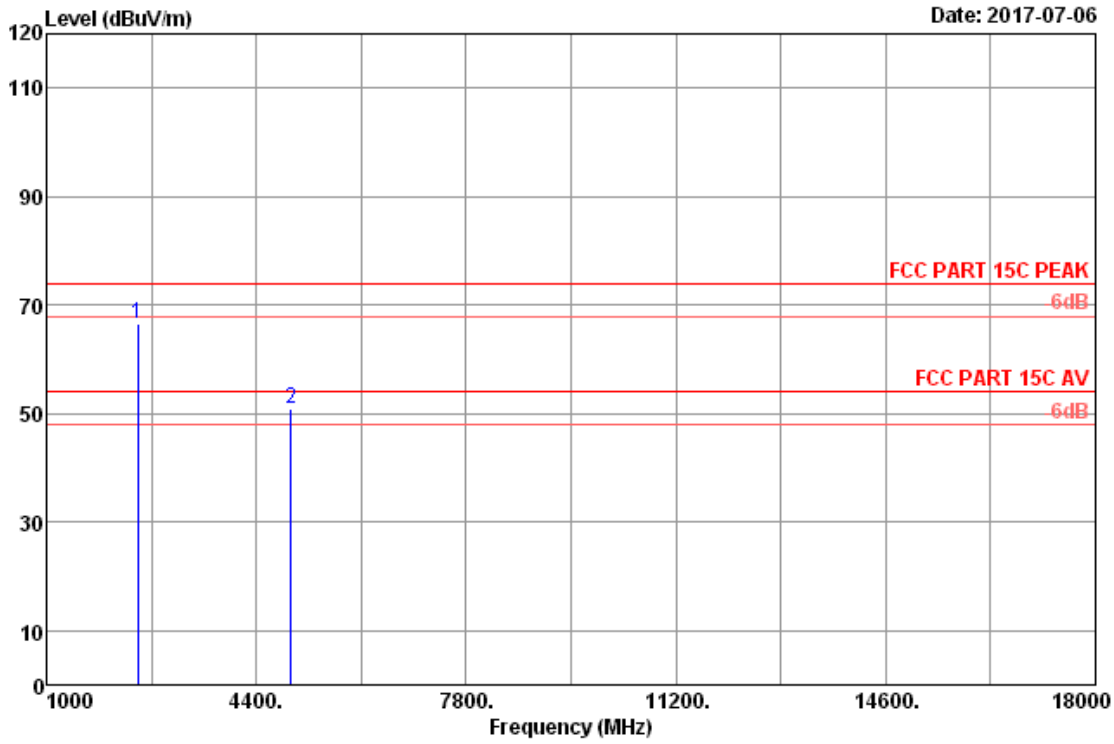
Site no. : 3m Chamber Data no. : 10
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2441 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.80	7.95	69.12	36.38	68.49	74.00	5.51	Peak
2	4882.00	32.20	12.22	42.14	35.69	50.87	74.00	23.13	Peak

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



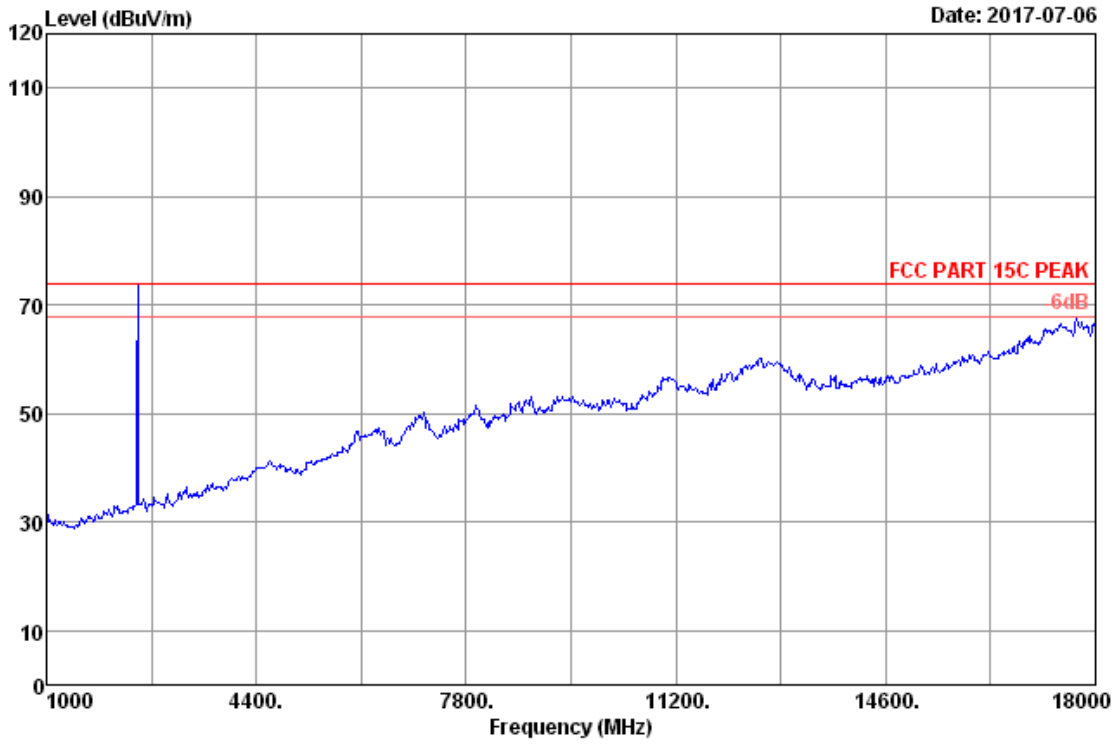
Site no.	: 3m Chamber	Data no.	: 11
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2480 Tx Mode		
	:		



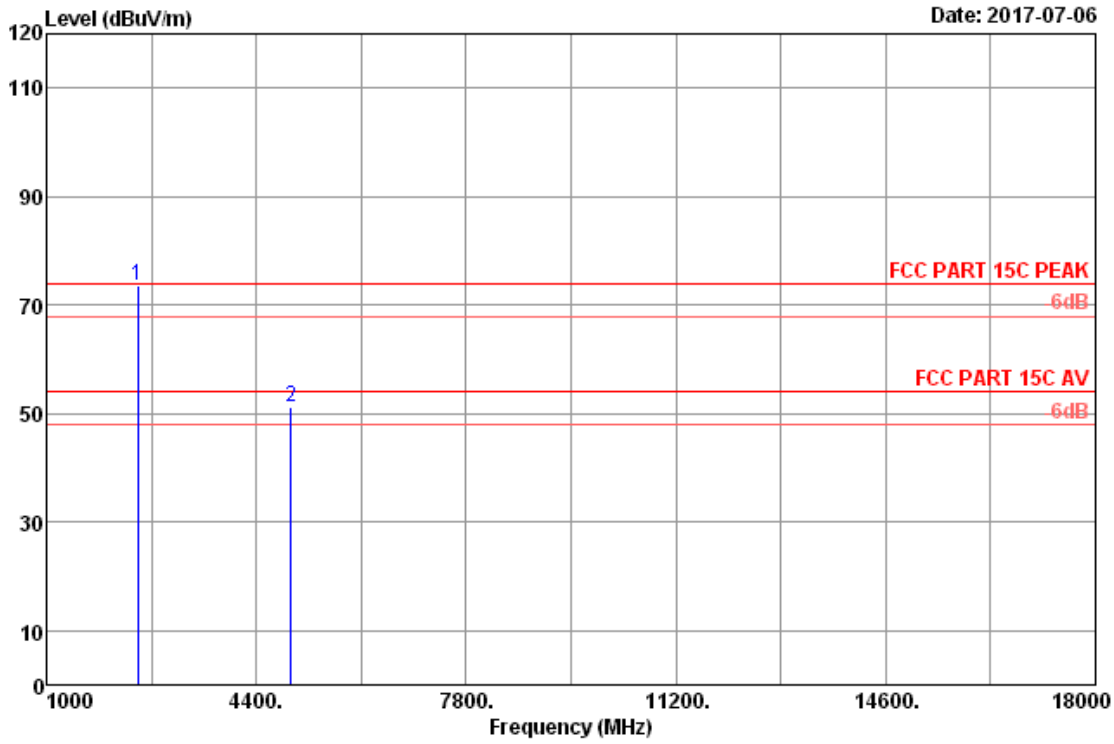
Site no. : 3m Chamber Data no. : 12
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	67.10	36.38	66.61	74.00	7.39	Peak
2	4960.00	32.13	12.38	42.08	35.71	50.88	74.00	23.12	Peak

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



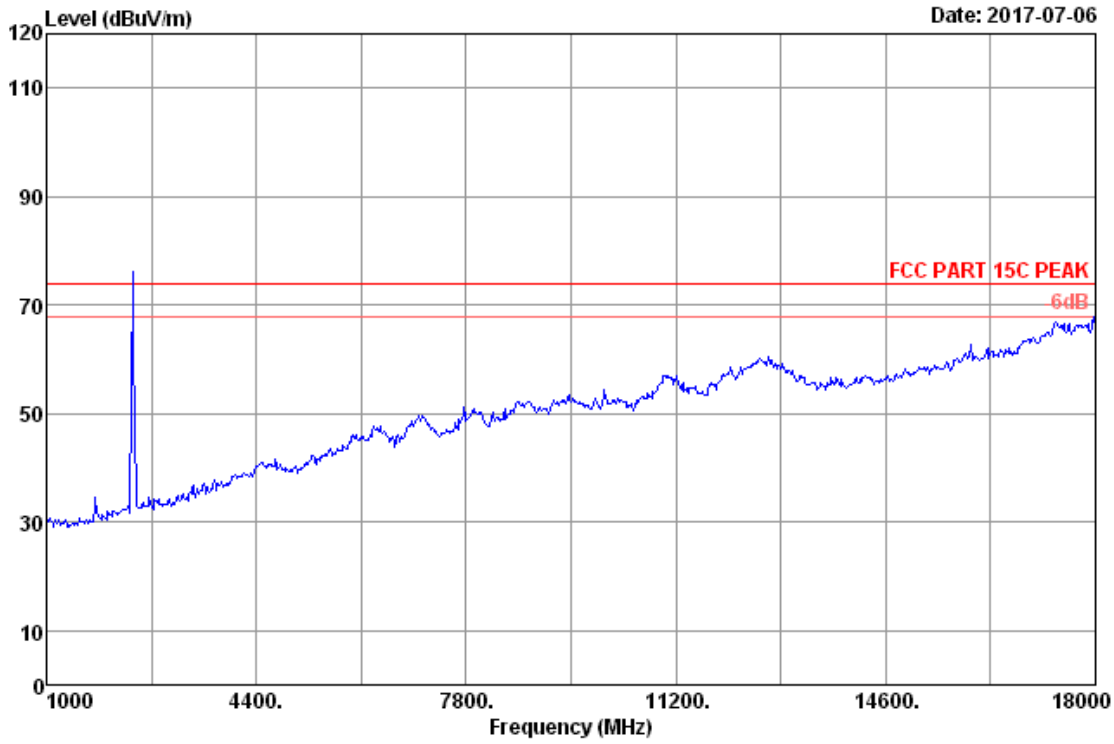
Site no.	: 3m Chamber	Data no.	: 13
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 GFSK 2480 Tx Mode		
	:		



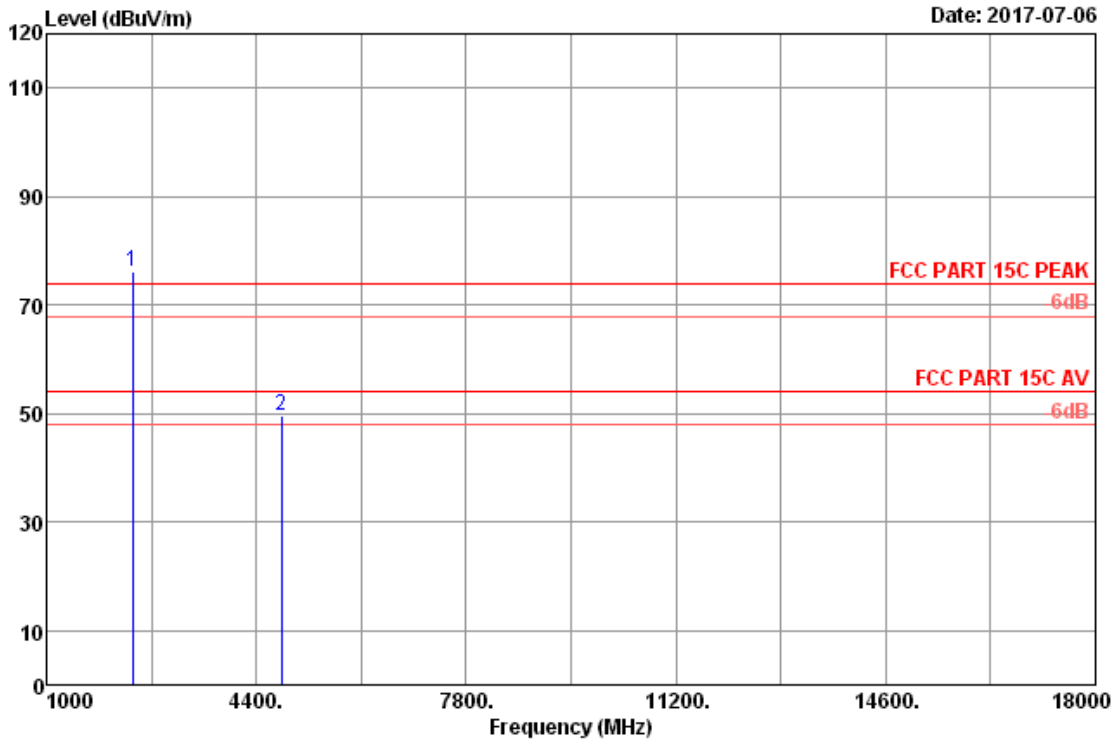
Site no. : 3m Chamber Data no. : 14
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	74.03	36.38	73.54	74.00	0.46	Peak
2	4960.00	32.13	12.38	42.28	35.71	51.08	74.00	22.92	Peak

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



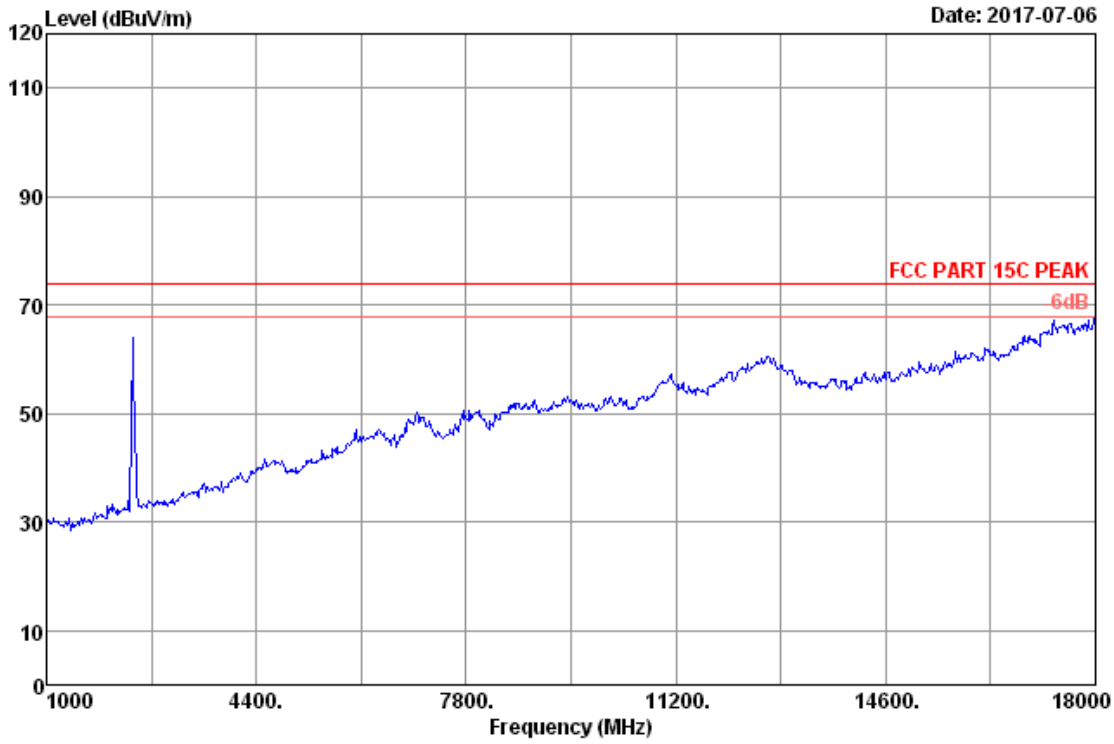
Site no.	: 3m Chamber	Data no.	: 17
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2402 Tx Mode		
	:		



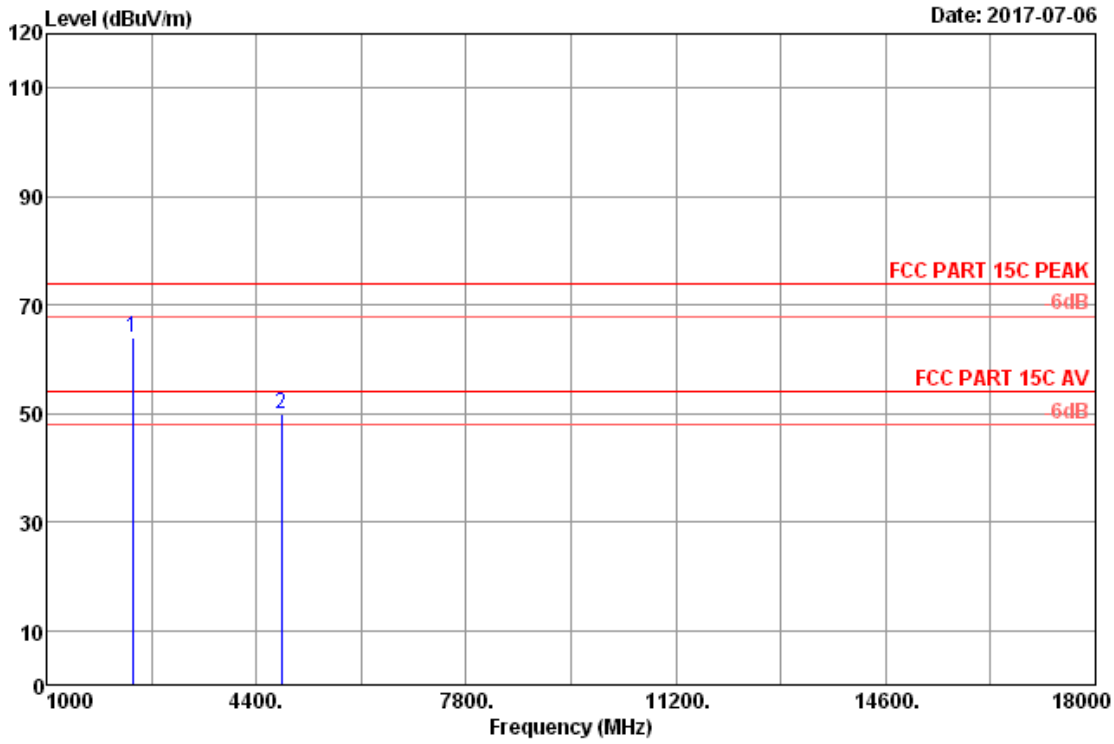
Site no. : 3m Chamber Data no. : 18
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.69	7.88	76.83	36.39	76.01	74.00	-2.01	Peak
2	4804.00	32.25	12.07	41.07	35.67	49.72	74.00	24.28	Peak

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



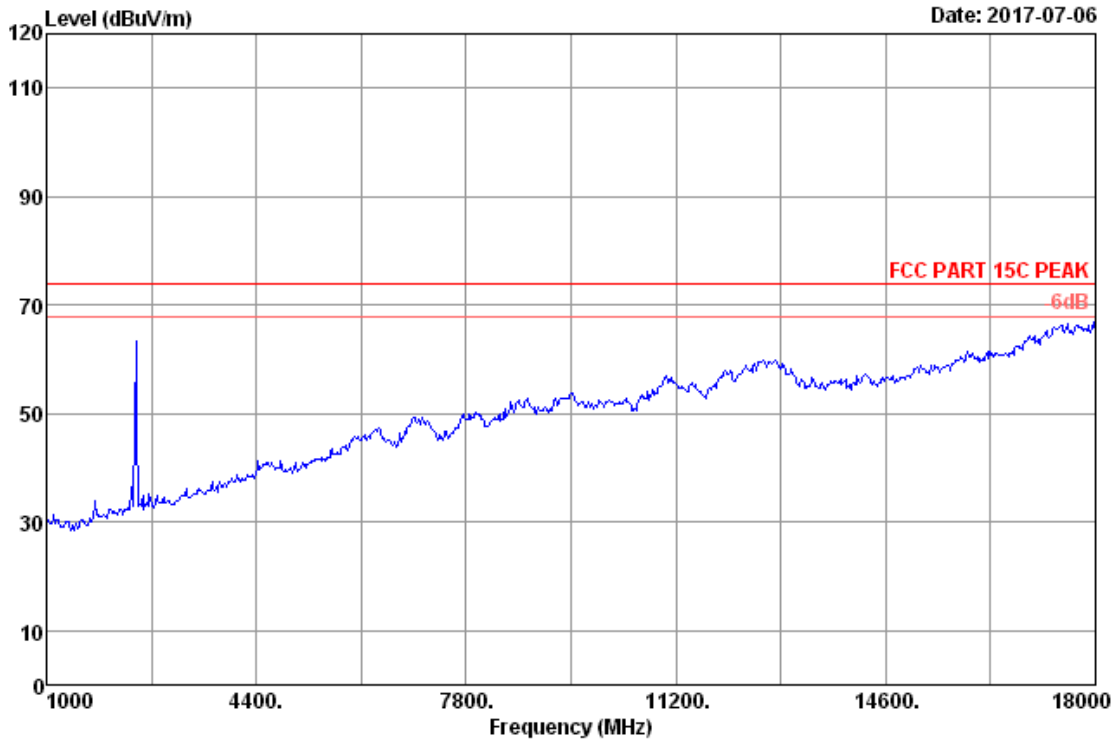
Site no.	: 3m Chamber	Data no.	: 19
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2402 Tx Mode		
	:		



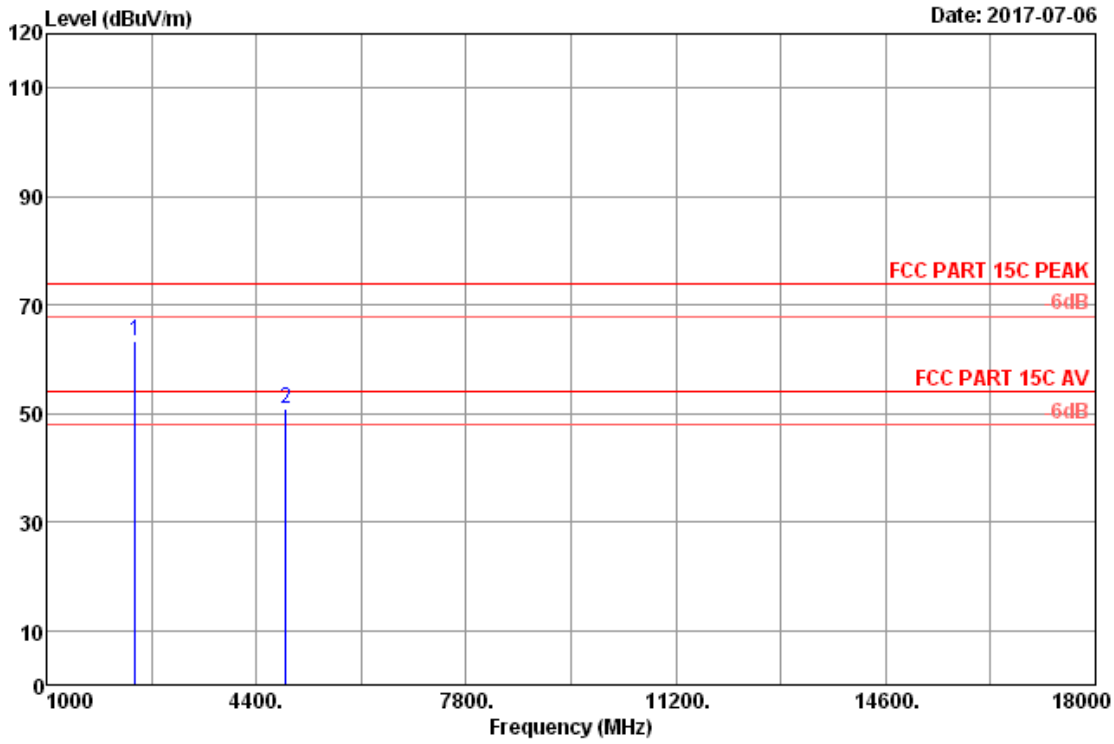
Site no. : 3m Chamber Data no. : 20
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.69	7.88	64.88	36.39	64.06	74.00	9.94	Peak
2	4804.00	32.25	12.07	41.39	35.67	50.04	74.00	23.96	Peak

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



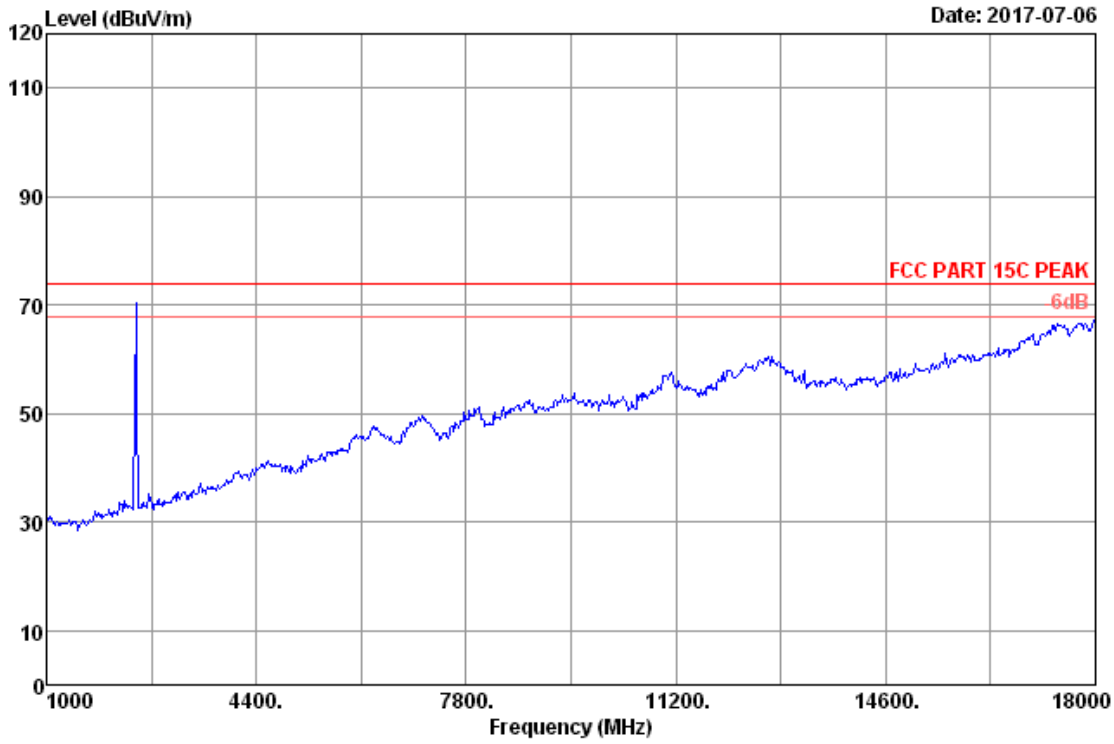
Site no.	: 3m Chamber	Data no.	: 23
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2441 Tx Mode		
	:		



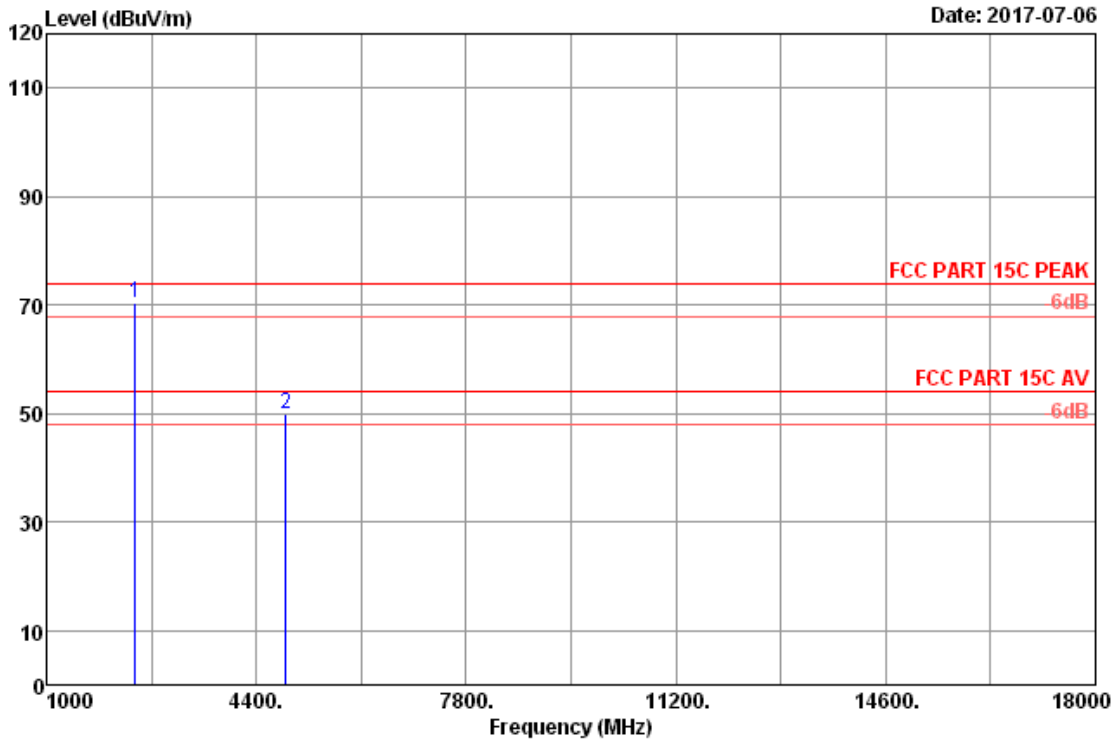
Site no. : 3m Chamber Data no. : 24
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2441 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.80	7.95	64.04	36.38	63.41	74.00	10.59	Peak
2	4882.00	32.20	12.22	42.13	35.69	50.86	74.00	23.14	Peak

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



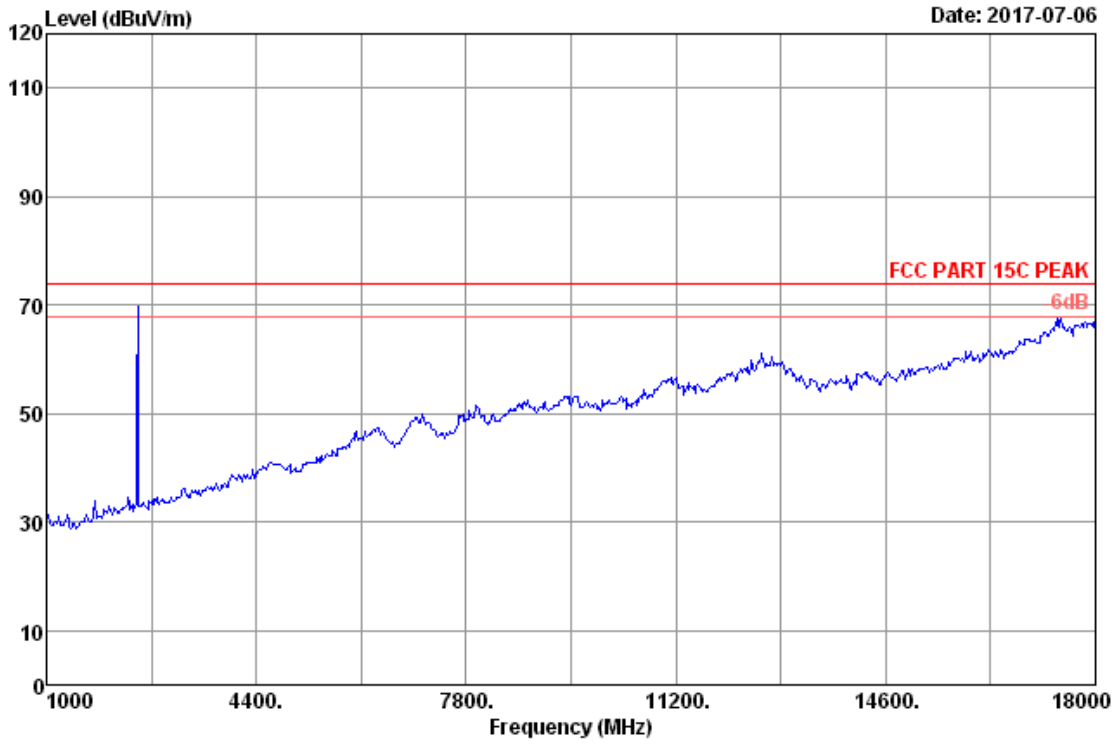
Site no.	: 3m Chamber	Data no.	: 25
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2441 Tx Mode		
	:		



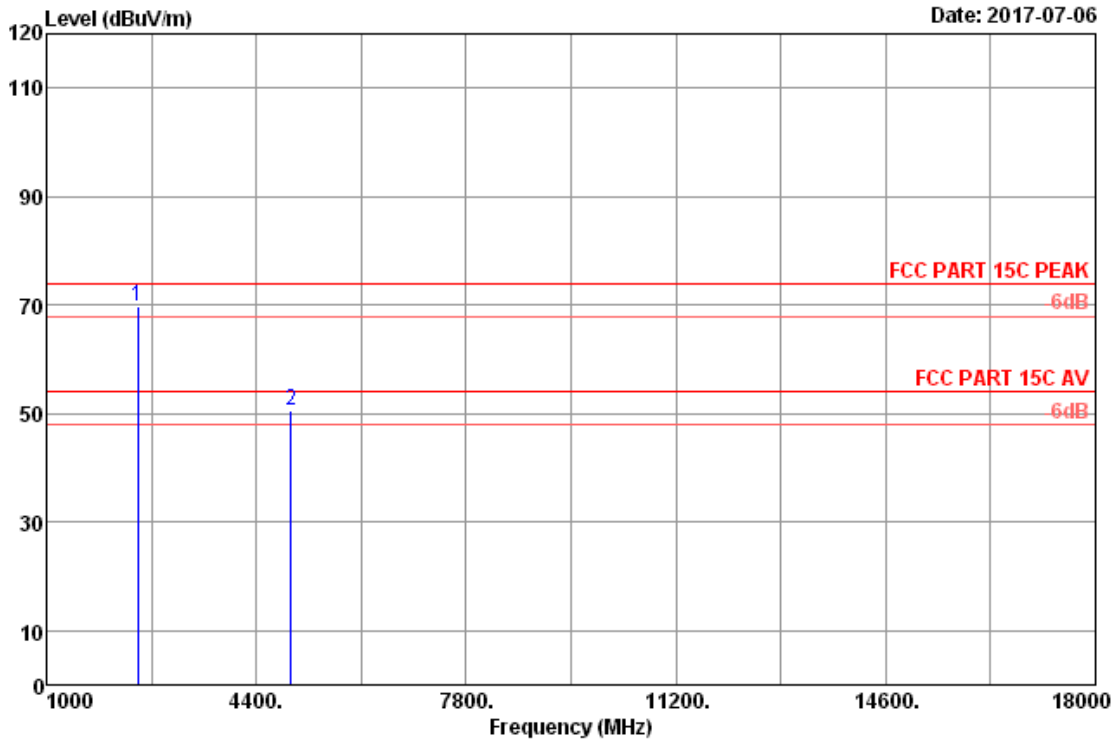
Site no. : 3m Chamber Data no. : 26
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2441 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.80	7.95	70.94	36.38	70.31	74.00	3.69	Peak
2	4882.00	32.20	12.22	41.35	35.69	50.08	74.00	23.92	Peak

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



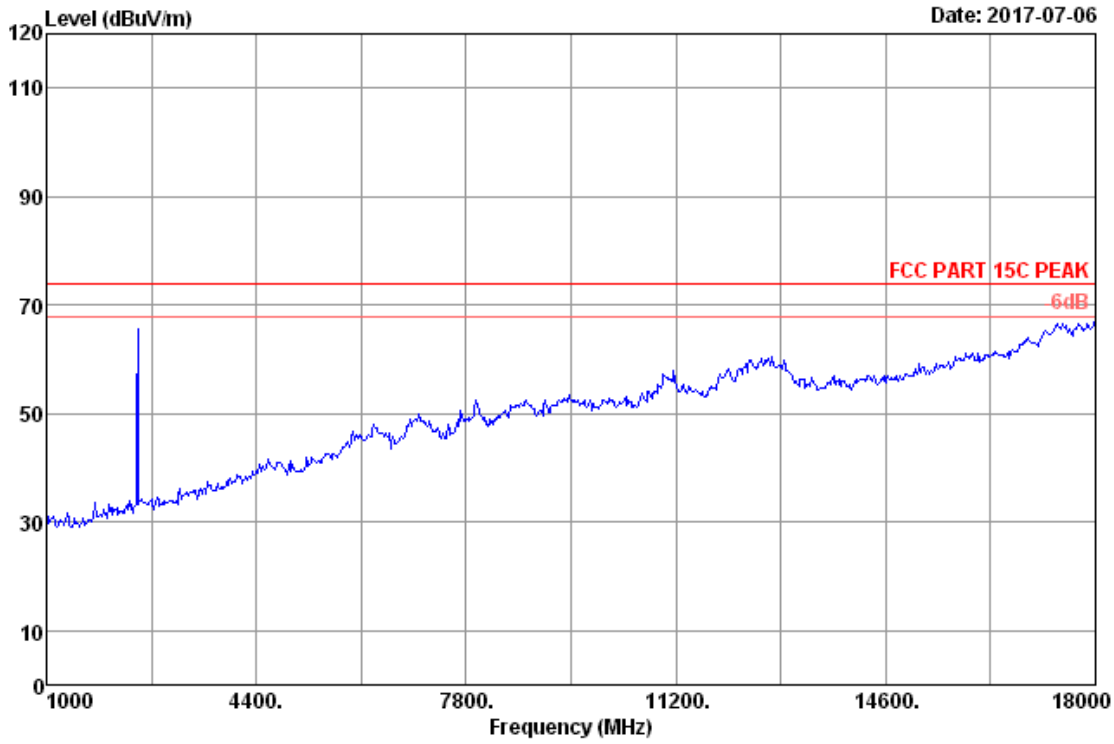
Site no.	: 3m Chamber	Data no.	: 27
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1% Engineer	: Garry	
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2480 Tx Mode		
	:		



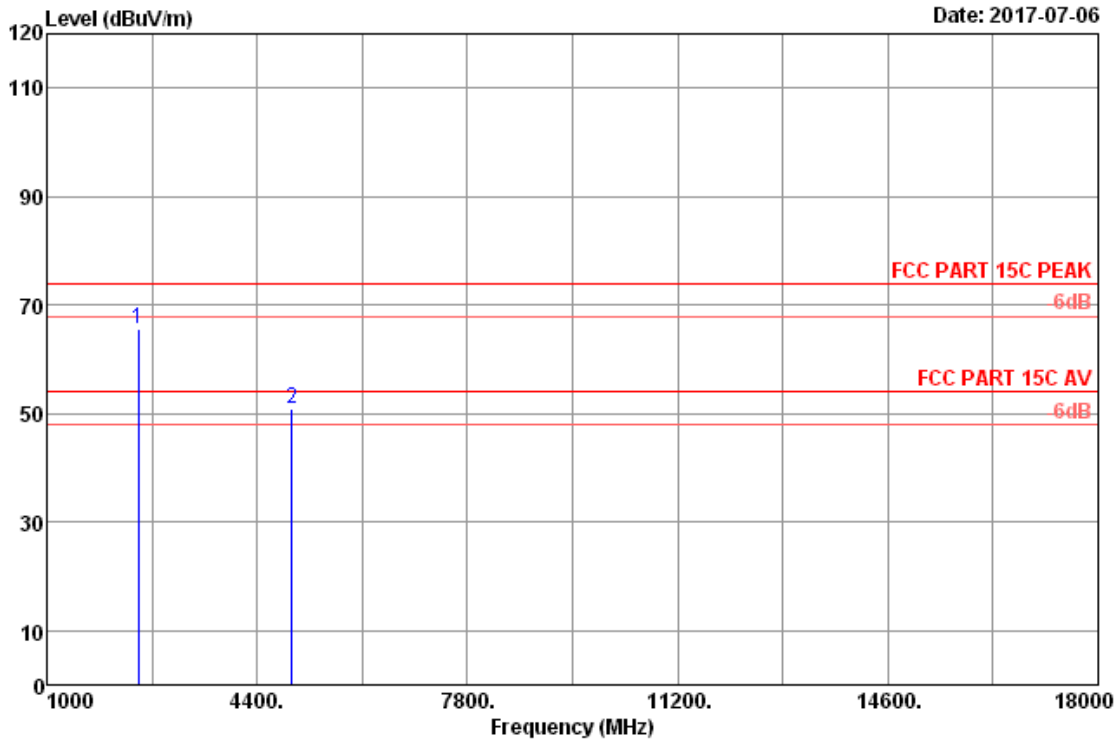
Site no. : 3m Chamber Data no. : 28
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	70.37	36.38	69.88	74.00	4.12	Peak
2	4960.00	32.13	12.38	41.65	35.71	50.45	74.00	23.55	Peak

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



Site no.	: 3m Chamber	Data no.	: 29
Dis. / Ant.	: 3m 2017 ANT 3007 HF	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	: 101.2kPa
Env. / Ins.	: 23.1*C/53.1%	Engineer	: Garry
EUT	: Cash Register M/N:SPB1-01		
Power	: AC 230V/50Hz		
Test Mode	: BT3.0 8-DPSK 2480 Tx Mode		
	:		



Site no. : 3m Chamber Data no. : 30
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	66.02	36.38	65.53	74.00	8.47	Peak
2	4960.00	32.13	12.38	42.05	35.71	50.85	74.00	23.15	Peak

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

5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	Attenuator	Agilent	8491B	MY39262165	Apr.27,17	1Year
3.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

5.2. Limit

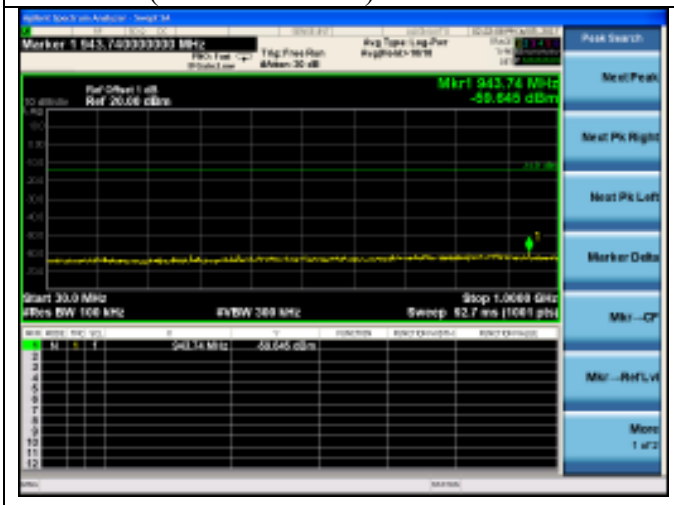
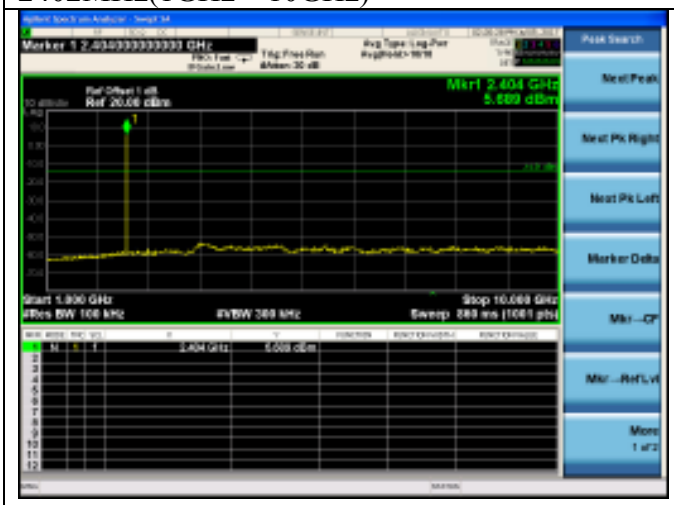
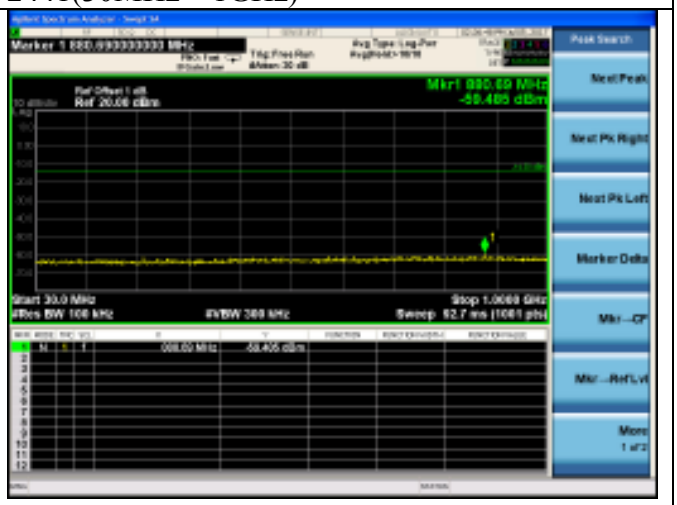
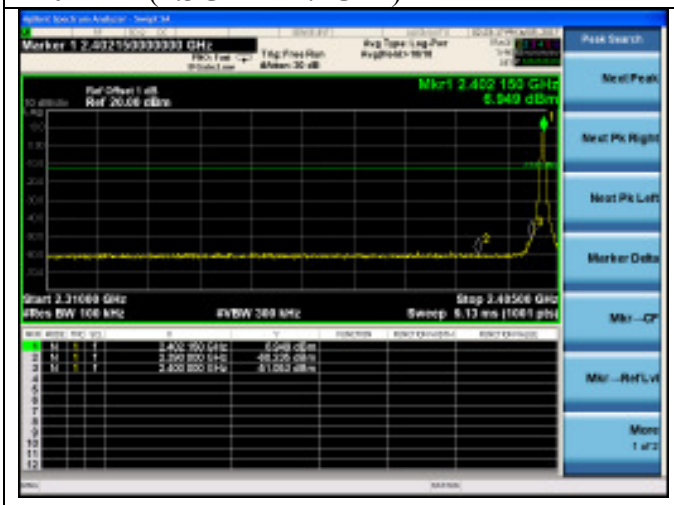
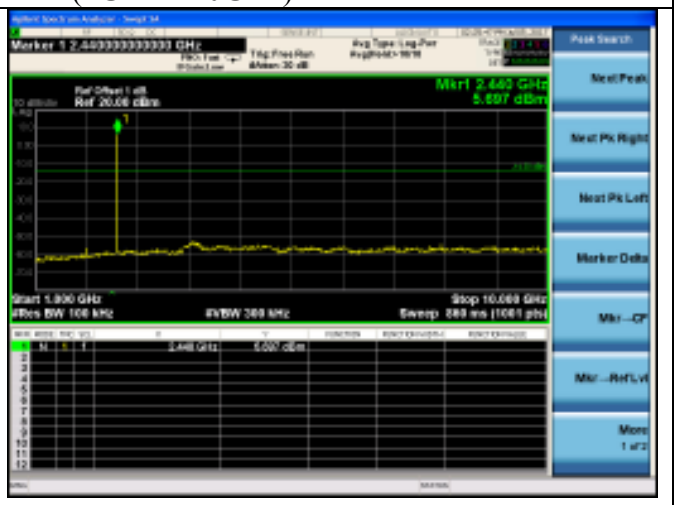
In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

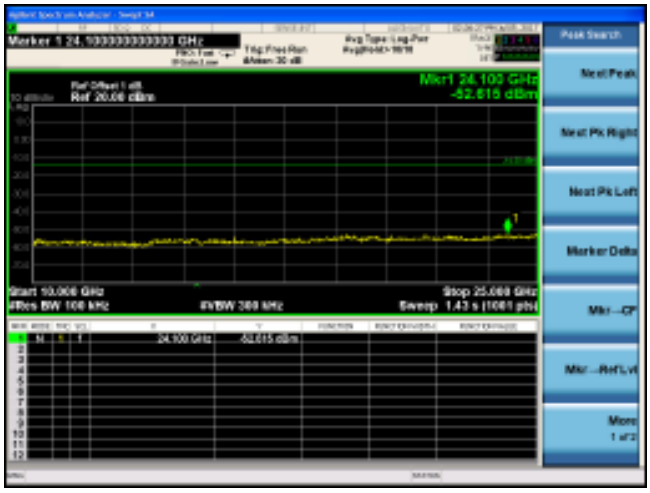
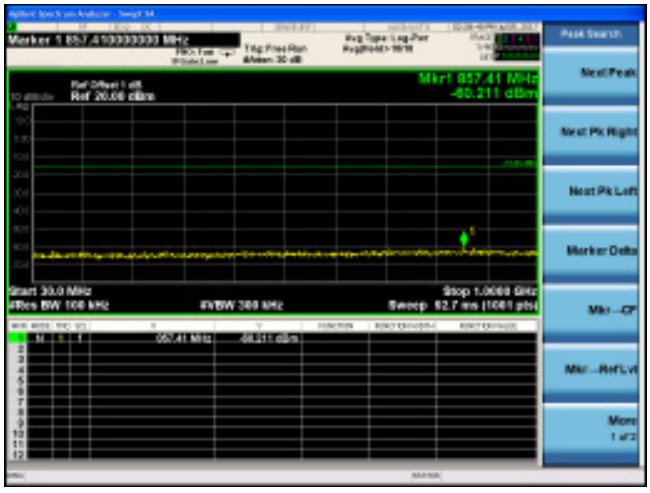
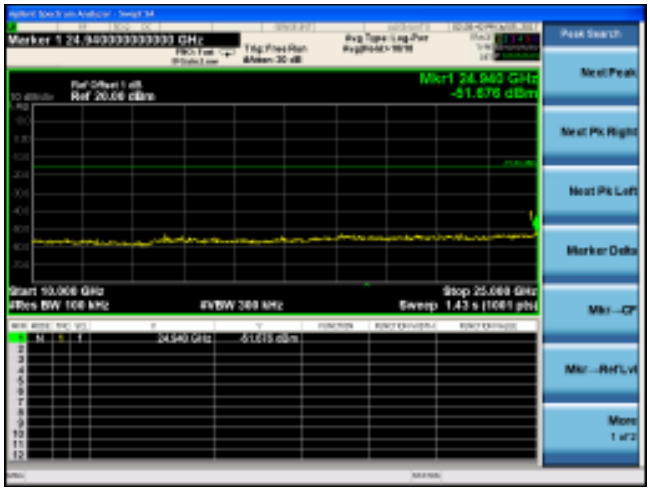
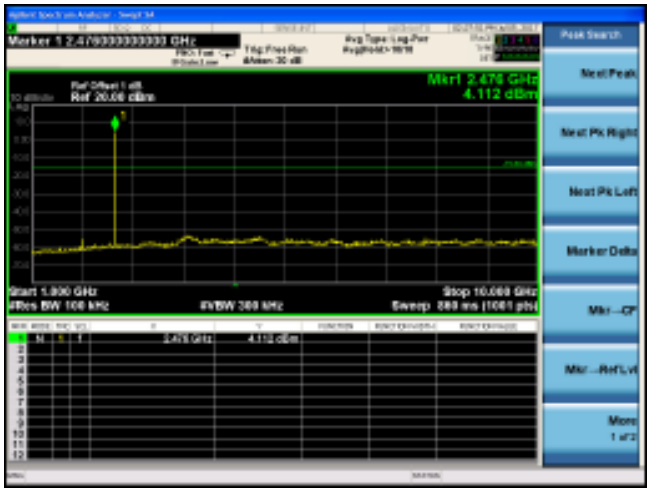
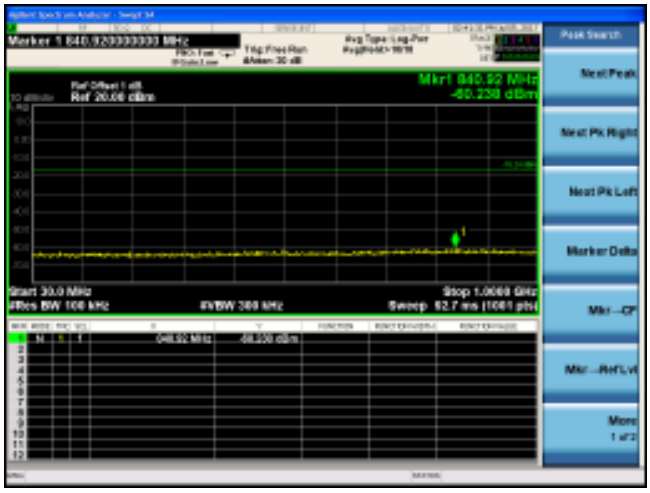
5.3. Test Procedure

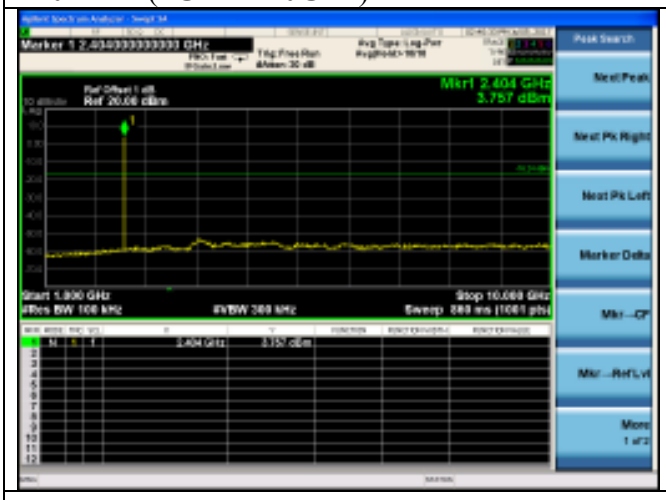
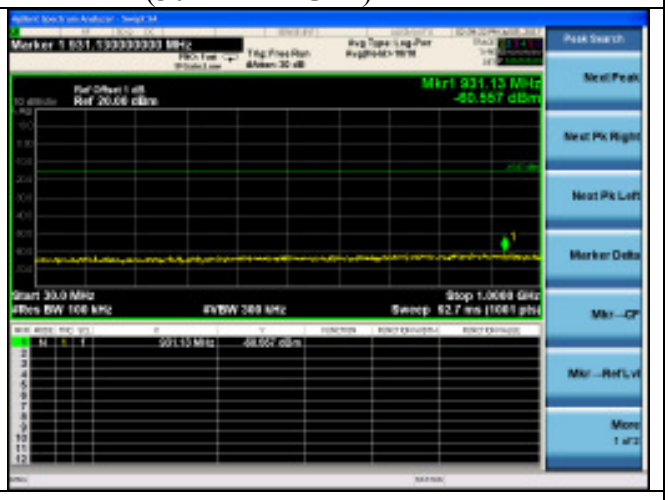
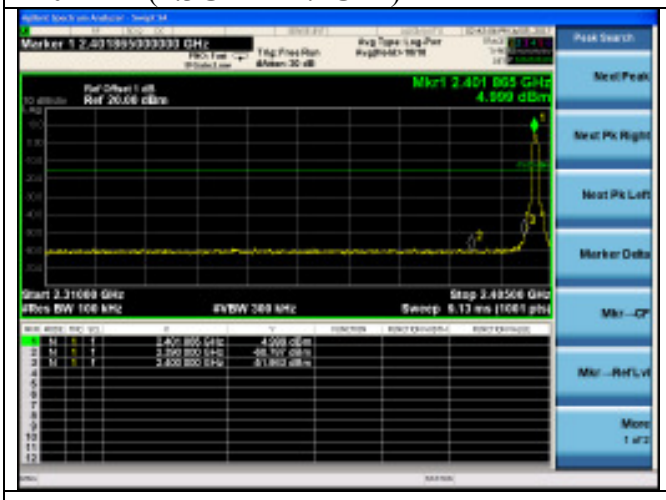
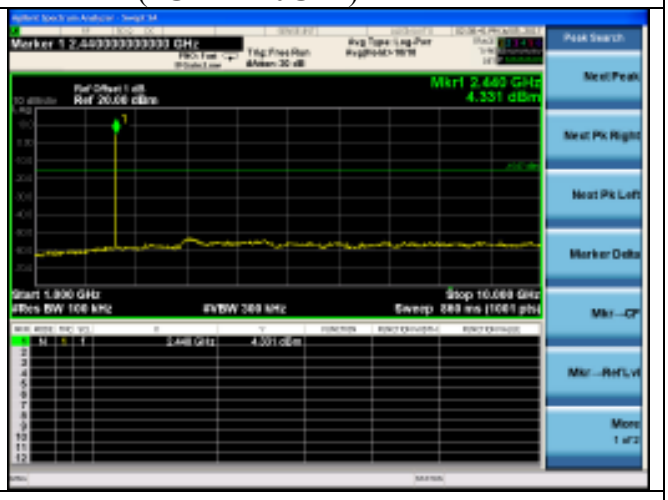
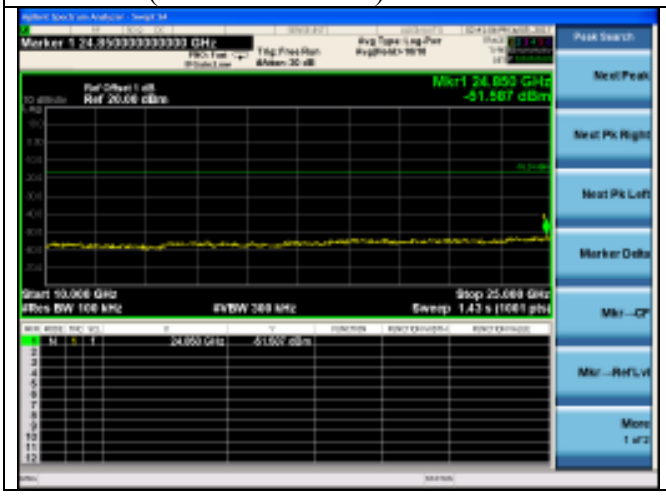
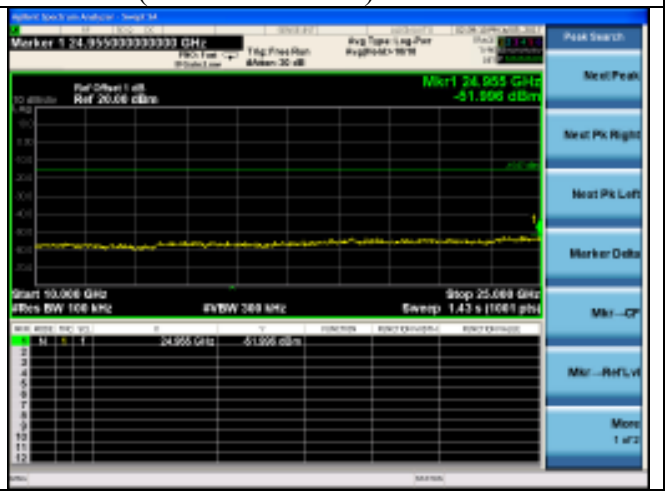
The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

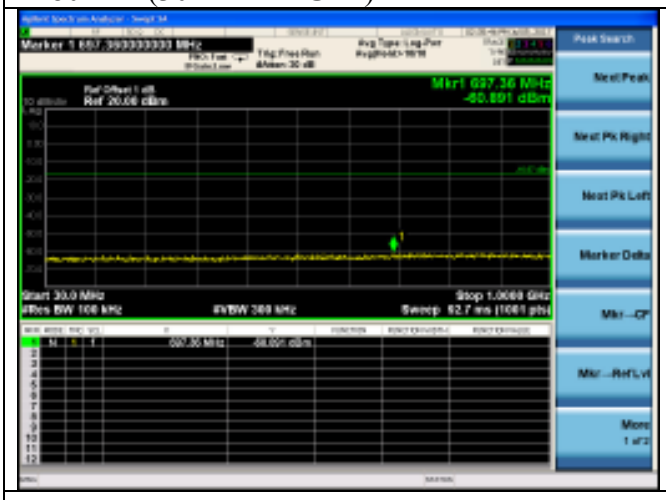
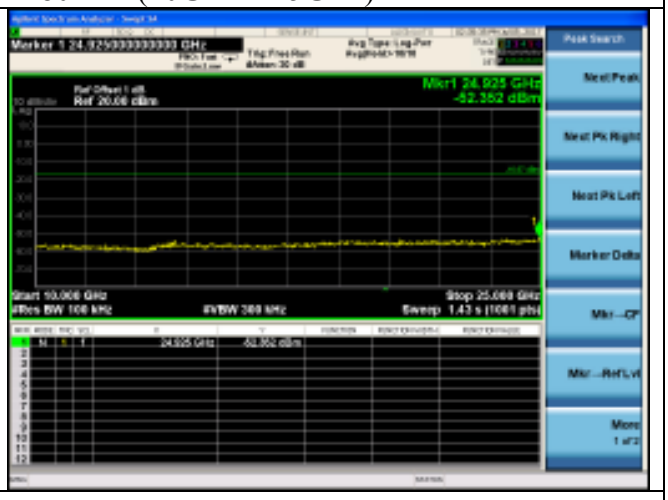
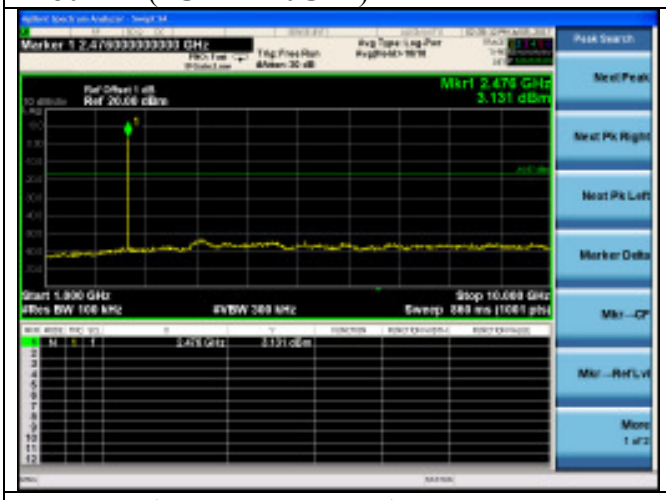
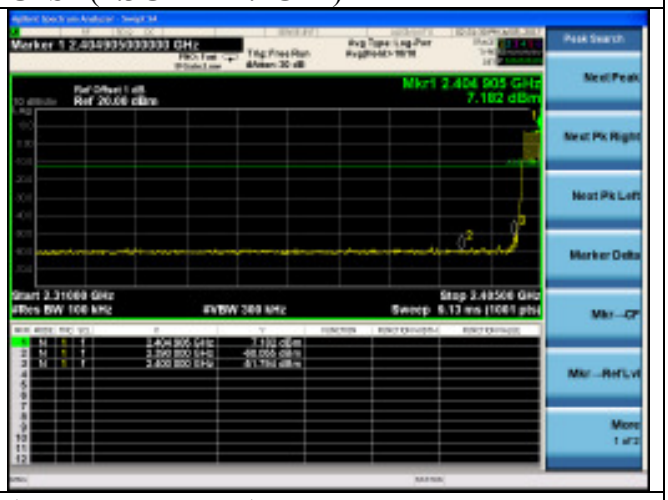
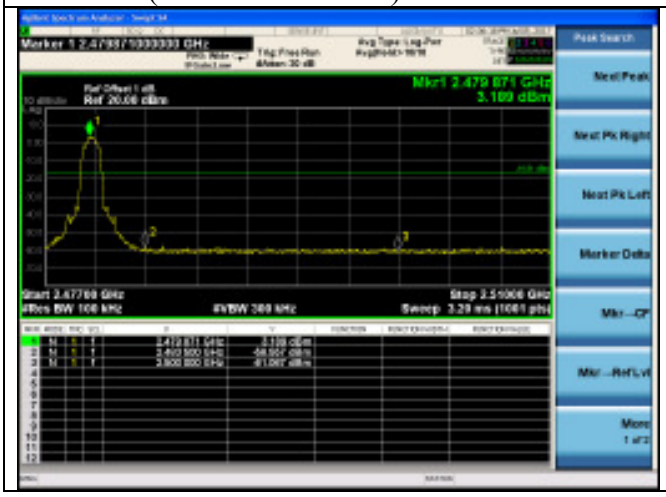
5.4. Test result

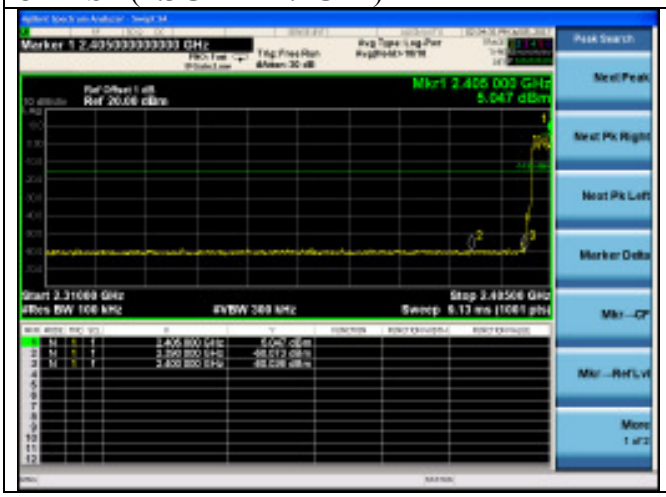
PASS (The testing data was attached in the next pages.)

Hopping off	
GFSK	
2402MHz(30MHz – 1GHz)	2402MHz(10GHz – 25GHz)
	
2402MHz(1GHz – 10GHz)	2441(30MHz – 1GHz)
	
2402MHz(2.3GHz – 2.4GHz)	2441(1GHz – 10GHz)
	

2441(10GHz – 25GHz)	2480MHz(2.4GHz – 2.5GHz)
	
2480MHz(30MHz – 1GHz)	2480MHz(10GHz – 25GHz)
	
	8-DPSK
2480MHz(1GHz – 10GHz)	2402MHz(30MHz – 1GHz)
	

2402MHz(1GHz – 10GHz)	2441MHz (30MHz – 1GHz)
	
2402MHz(2.3GHz – 2.4GHz)	2441MHz(1GHz – 10GHz)
	
2402MHz(10GHz – 25GHz)	2441MHz(10GHz – 25GHz)
	

2480MHz(30MHz – 1GHz)	2480MHz(10GHz – 25GHz)
	
	Hopping on
2480MHz(1GHz – 10GHz)	GFSK(2.3GHz – 2.4GHz)
	
2480MHz(2.4GHz – 2.5GHz)	(2.4GHz – 2.5GHz)
	

8-DPSK(2.3GHz – 2.4GHz)	(2.4GHz – 2.5GHz)
	

6. 20 DB BANDWIDTH TEST

6.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.27,17	1 Year
3.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

6.2. 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.

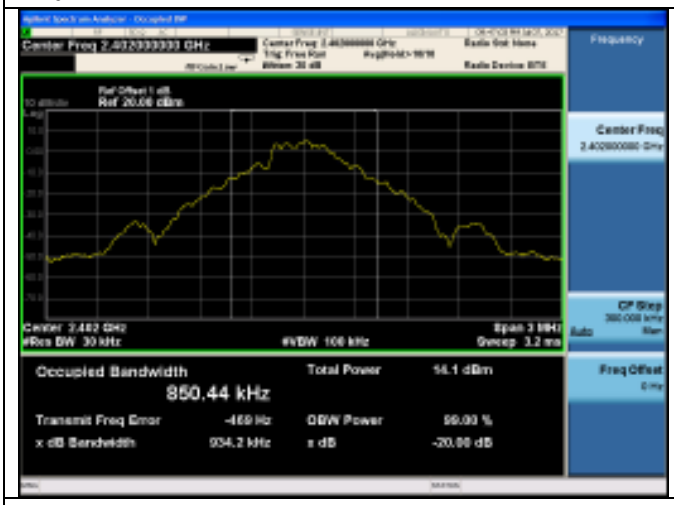
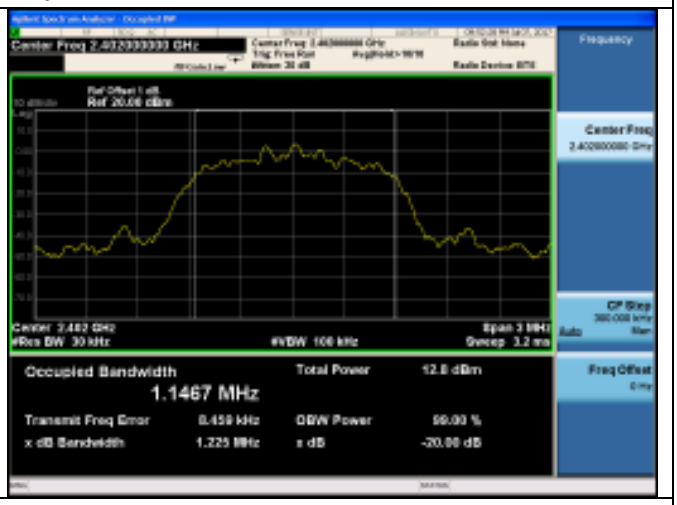
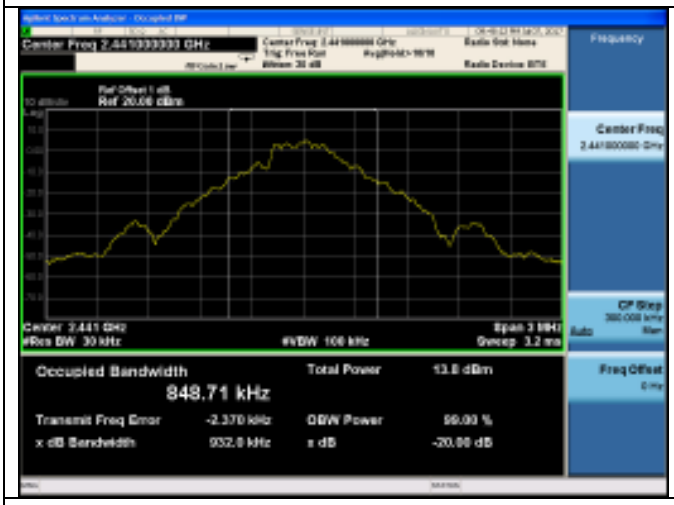
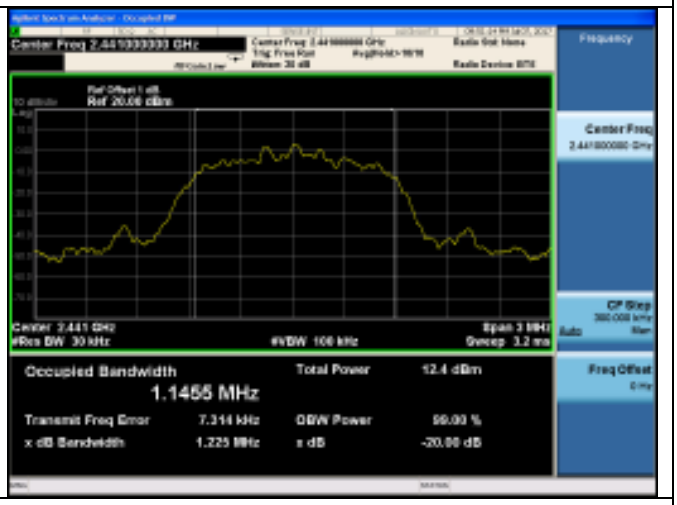
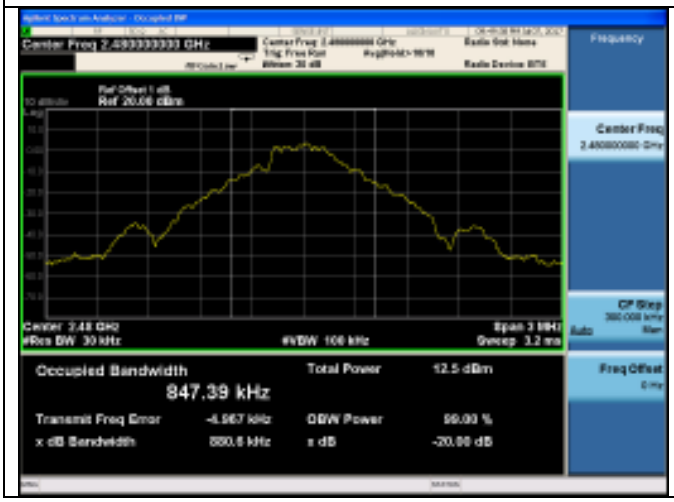
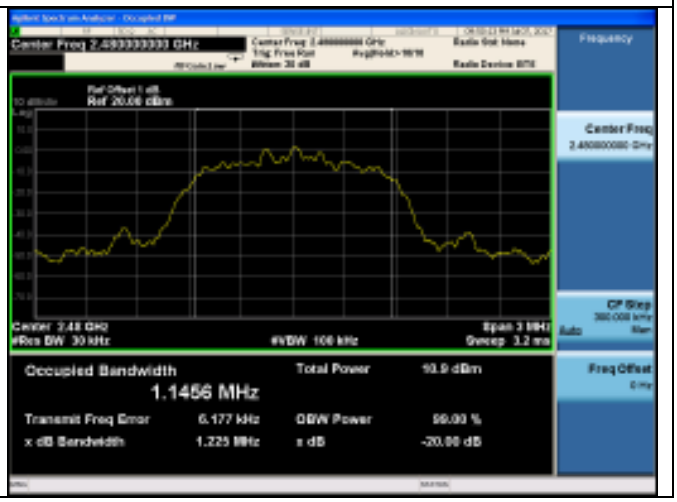
6.3. Test Procedure

1. Connect the antenna port of the EUT to the spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel with test software.
3. Setting of SA is following as: RBW: 30kHz / VBW: 100kHz
   Sweep Mode: Continuous sweep
   Detect mode: Positive peak
   Trace mode: Max hold.
4. Use the occupied bandwidth function of the SA measure the 20dB bandwidth directly.

6.4. Test Results

EUT: Cash Register		
M/N: SPB1-01		
Test date: 2017-07-07	Pressure: 102.5±1.0 kpa	Humidity: 52.3±3.0%
Tested by: Lynn	Test site: RF site	Temperature:22.1±0.6 ℃

Test Mode	Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	934.2	N/A
	2441	932.0	N/A
	2480	880.6	N/A
8-DPSK	2402	1225	N/A
	2441	1225	N/A
	2480	1225	N/A
Conclusion：PASS			

GFSK	8-DPSK
2402MHz	2402MHz
	
2441MHz	2441MHz
	
2480MHz	2480MHz
	

7. CARRIER FREQUENCY SEPARATION TEST

7.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

7.2. Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB 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.

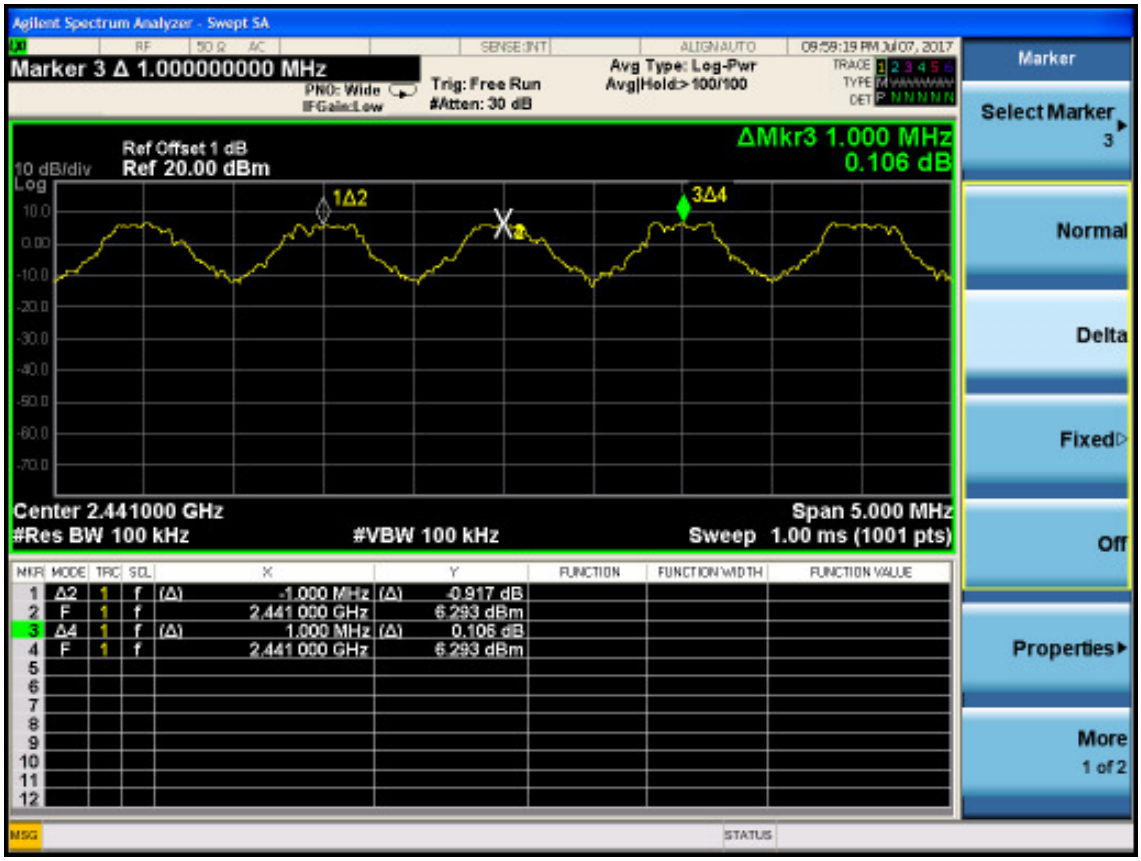
7.3. Test Procedure

1. Connect the antenna port of the EUT to the Spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel.
3. Setting of SA is following as: RBW: 100kHz / VBW: 100kHz.Span:5MHz
4. Use the mark Delta function of the SA measure out the channel separation.

7.4.Test Results.

EUT: Cash Register		
M/N: SPB1-01		
Test date: 2017-07-07	Pressure: 101.4±1.0kpa	Humidity: 51.4±3.0%
Tested by: Lynn	Test site: RF Site	Temperature: 23.4±0.6℃

Test Mode	Channel separation	Limit(KHz)	Conclusion
GFSK	1.0MHz	622.800	PASS
8-DPSK	1.0MHz	816.667	PASS



8. NUMBER OF HOPPING FREQUENCY TEST

8.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

8.2.Limit

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

8.3.Test Procedure

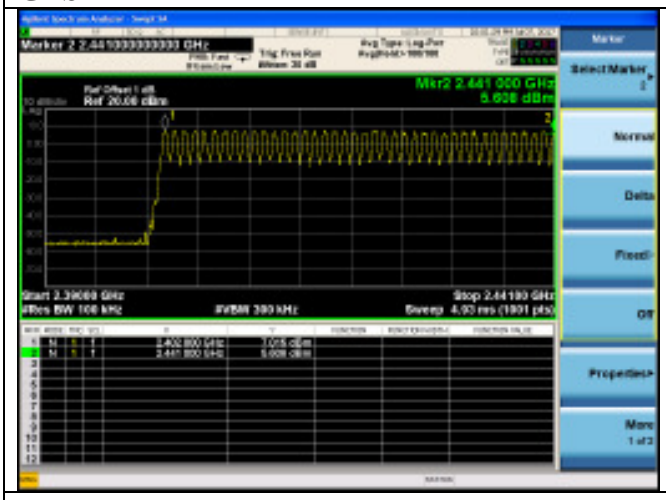
1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz
   Start frequency: 2390MHz
   Stop frequency: 2483.5MHz
   And waiting for the hopping trace until stability, count out the number of the hopping.

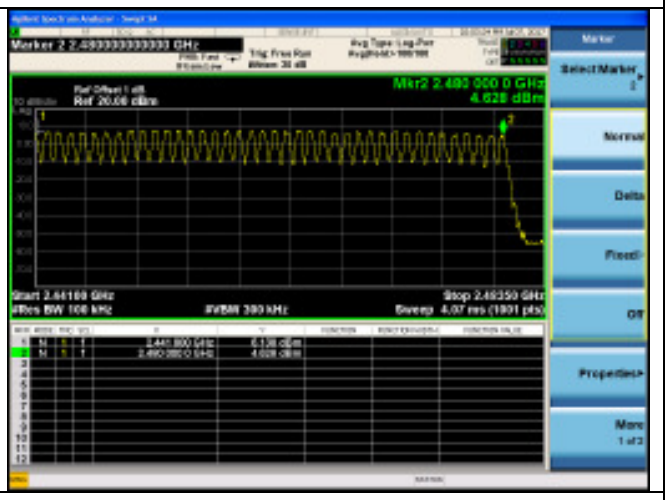
8.4.Test Results

EUT: Cash Register		
M/N: SPB1-01		
Test date: 2017-07-07	Pressure: 101.4±1.0 kpa	Humidity: 51.4±3.0%
Tested by: Lynn	Test site: RF Site	Temperature: 23.4±0.6℃

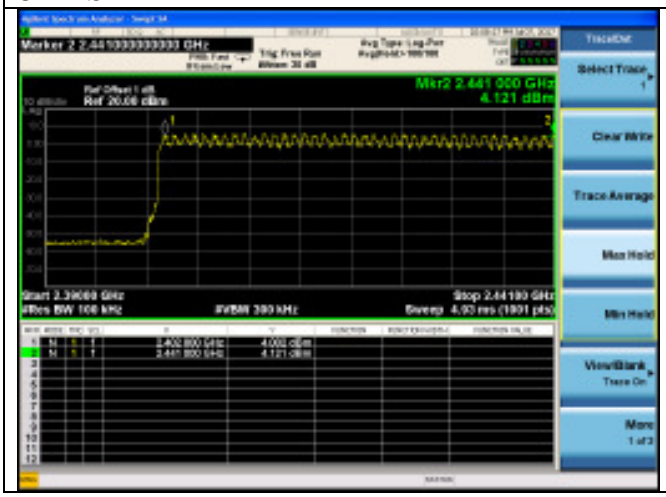
Test Mode	Number of channel	Limit	Conclusion
GFSK	79	>=15	PASS
8-DPSK	79	>=15	PASS

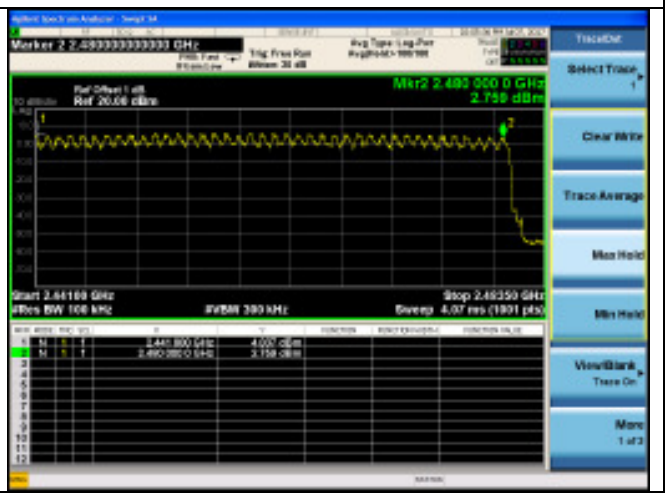
GFSK





8-DPSK





9. DWELL TIME

9.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

9.2.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.

9.3.Test Procedure

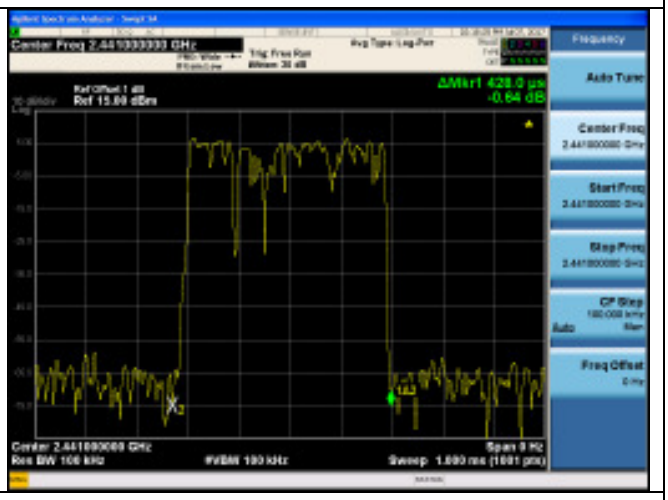
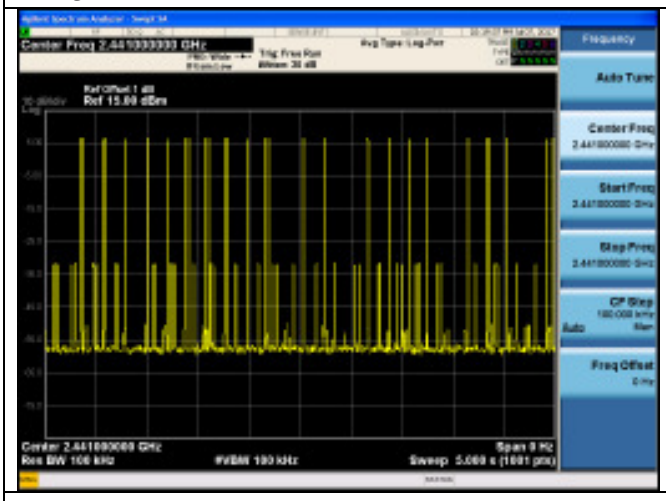
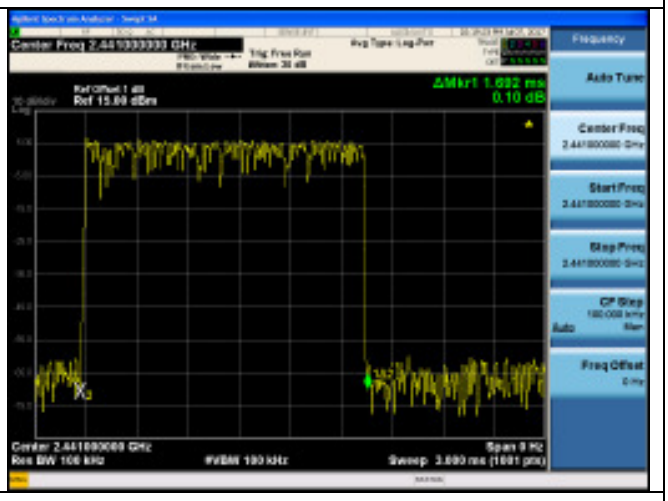
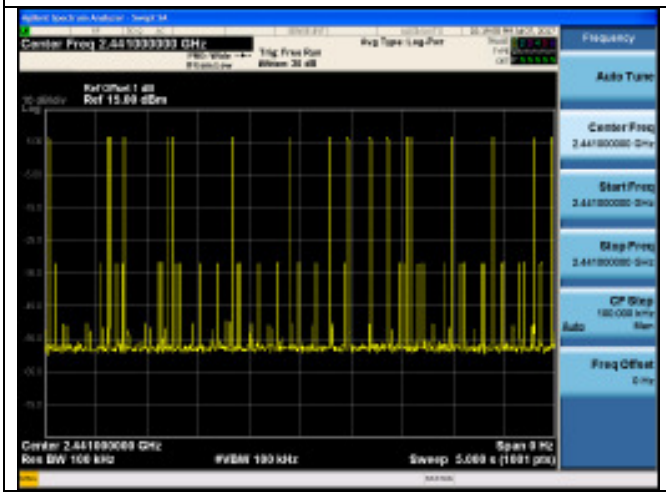
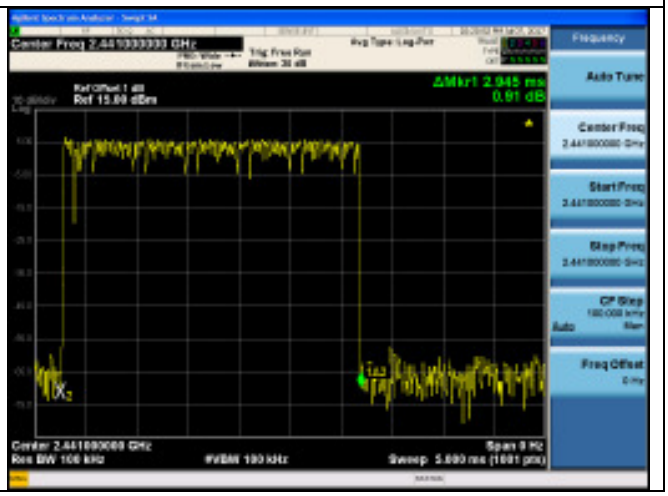
1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as:
   RBW: 100kHz / VBW: 100kHz
   Sweep Mode: Single
   Detect mode: Positive peak
   Trace mode: Auto
   Span: 0Hz
   Sweep time: 5s and big enough to measure one hopping signal
3. Use below formula calculate the Dwell time
   Dwell time=Hopping number per second*0.4*channel number*Pulse bandwidth per hopping.

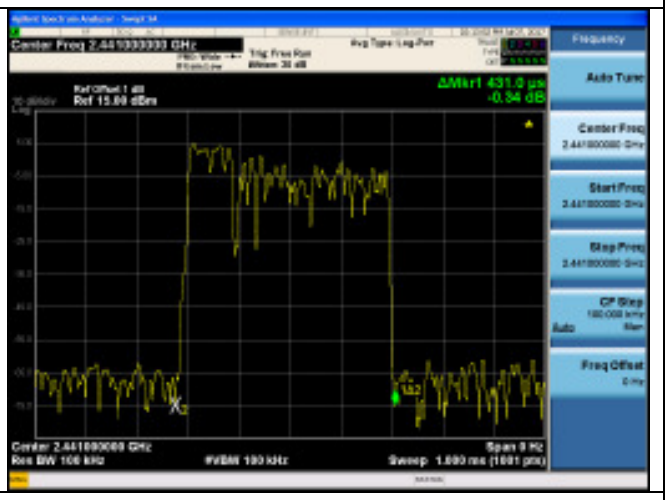
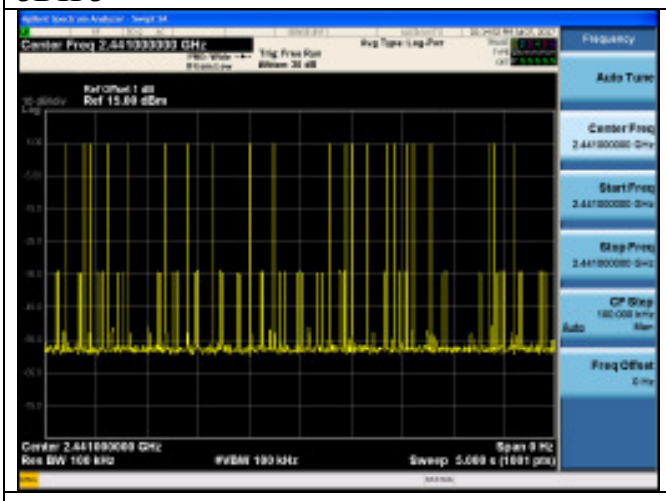
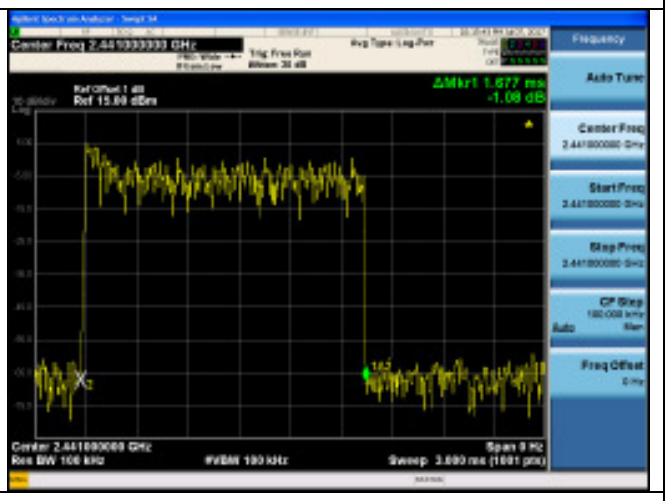
9.4.Test Results

EUT: Cash Register		
M/N: SPB1-01		
Test date: 2017-07-07	Pressure: 101.4±1.0kpa	Humidity: 51.4±3.0%
Tested by: Lynn	Test site: RF Site	Temperature: 23.4±0.6℃

Mode		dwell time	Limit	Conclusion
GFSK	DH1	50 hops/5s*0.4*79chanels* 0.428 ms =135.248ms	≦400ms	PASS
	DH3	28 hops/5s*0.4*79chanels* 1.692 ms =299.416ms	≦400ms	PASS
	DH5	18 hops/5s*0.4*79chanels* 2.945 ms =335.023ms	≦400ms	PASS
8-DPSK	3-DH1	50 hops/5s*0.4*79chanels* 0.431 ms =136.196ms	≦400ms	PASS
	3-DH3	22 hops/5s*0.4*79chanels* 1.677 ms =233.170ms	≦400ms	PASS
	3-DH5	17 hops/5s*0.4*79chanels* 2.940 ms =315.874ms	≦400ms	PASS

Note: All the lower levels were signaled from receiver and should not be considered in here.

GFSK	
DH 1	
	
DH 3	
	
DH 5	
	

8-DPSK	
3DH 1	
	
3DH 3	
	
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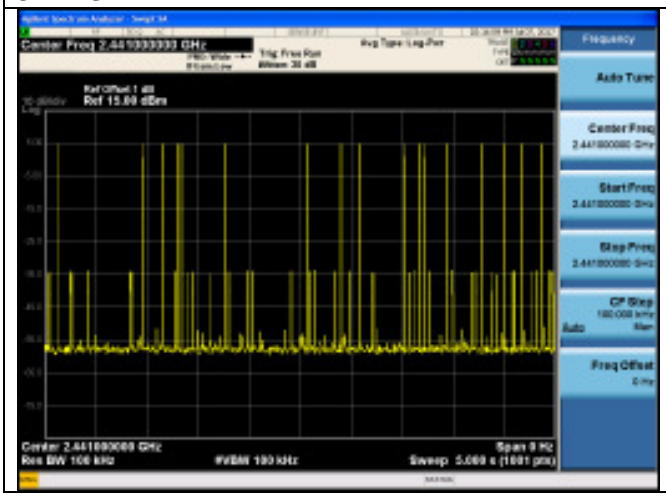
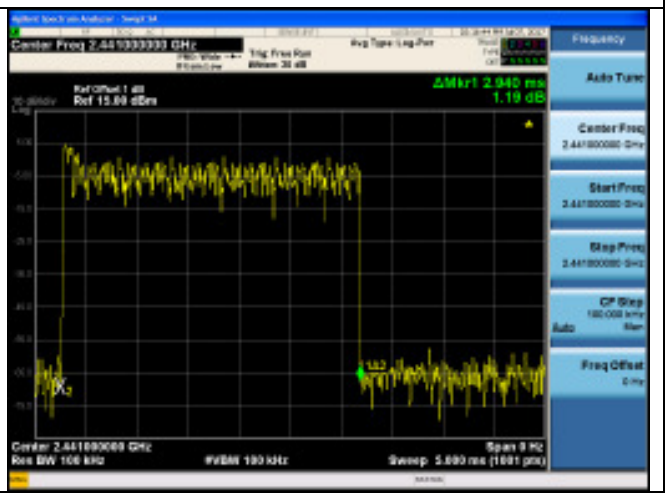
	

10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.15,16	1Year
2.	Power meter	Anritsu	ML2487A	6K00002472	Apr.22,17	1Year
3.	Power sensor	Anritsu	MA2491A	0033005	Apr.22,17	1Year
4.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.22,17	1 Year
5.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,16	1 Year

10.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

10.3. Test Procedure

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power directly.

10.4. Test Results

EUT: Cash Register		
M/N: SPB1-01		
Test date: 2017-07-07	Pressure: 102.5±1.0 kpa	Humidity: 52.3±3.0%
Tested by: Lynn	Test site: RF site	Temperature:22.1±0.6 ℃

Test Mode	Frequency (MHz)	Peak output Power （dBm）	Limit (dBm)
GFSK	2402	3.14	21
	2441	2.79	21
	2480	2.60	21
8-DPSK	2402	3.20	21
	2441	2.98	21
	2480	2.72	21
Conclusion: PASS			

11. BAND EDGE COMPLIANCE TEST

11.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.22,17	1 Year
2.	Amp	HP	8449B	3008A02495	Apr.22.17	1 Year
3.	Horn Antenna	ETC	MCTD 1209	DRH15F03007	MAY.15,17	1 Year
4.	HF Cable	Hubersuhner	Sucoflex104	274094/4	Apr.22,17	1 Year

11.2. 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.

11.3. Test Procedure

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz） from the band-edge use below produce:

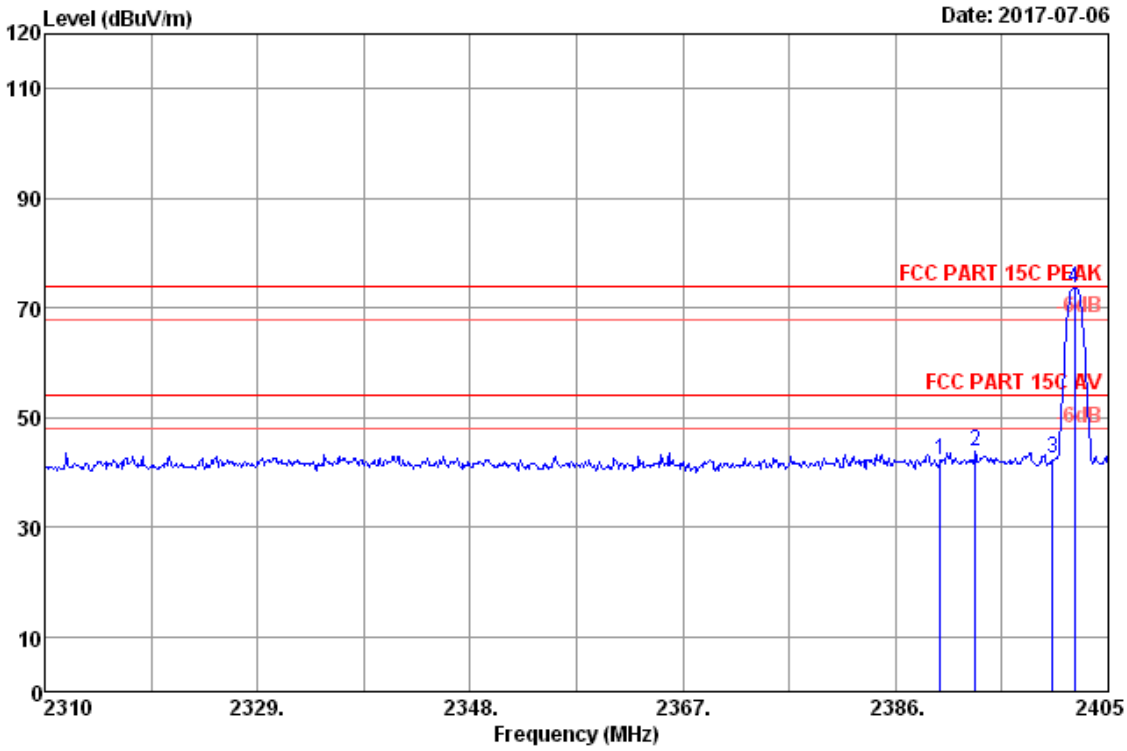
1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a insulating material (up to 12mm thick) worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
   (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
   (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

11.4. Test Results

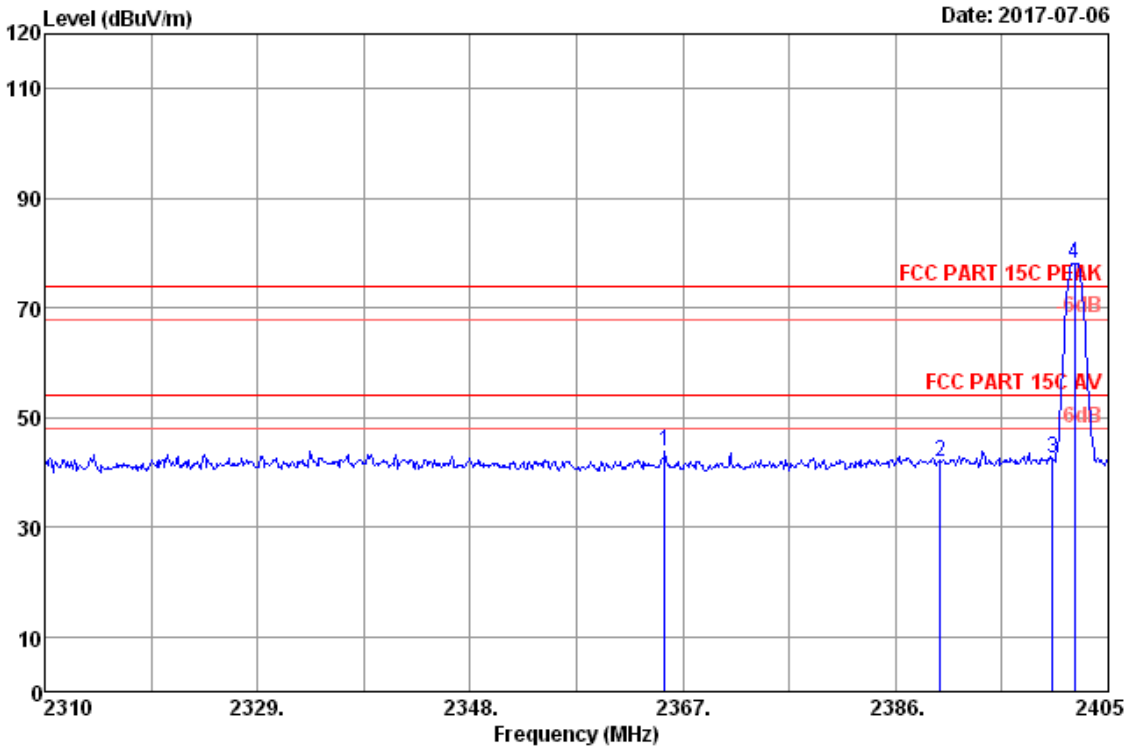
Pass (The testing data was attached in the next pages.)
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.



Site no. : 3m Chamber Data no. : 5
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.69	7.84	42.95	36.39	42.09	74.00	31.91	Peak
2	2393.13	27.69	7.88	44.71	36.39	43.89	74.00	30.11	Peak
3	2400.00	27.69	7.88	43.27	36.39	42.45	74.00	31.55	Peak
4	2402.00	27.69	7.88	74.35	36.39	73.53	74.00	0.47	Peak

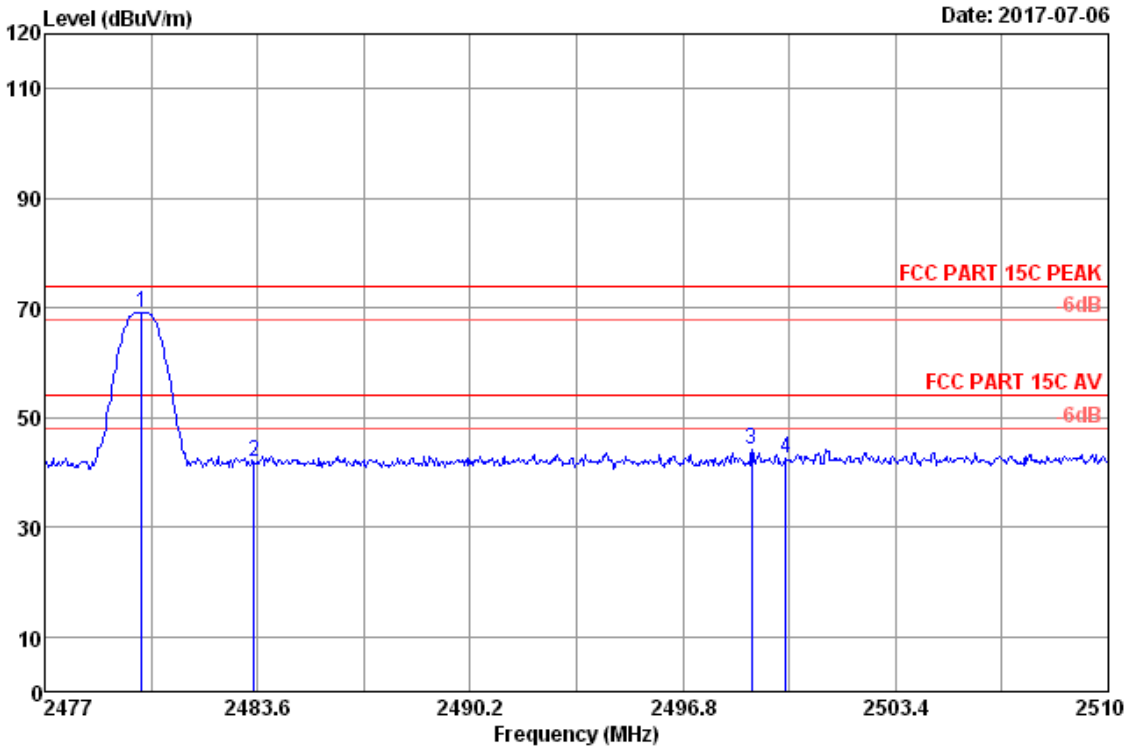
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 6
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2365.39	27.62	7.81	44.81	36.39	43.85	74.00	30.15	Peak
2	2390.00	27.69	7.84	42.78	36.39	41.92	74.00	32.08	Peak
3	2400.00	27.69	7.88	43.37	36.39	42.55	74.00	31.45	Peak
4	2402.00	27.69	7.88	78.97	36.39	78.15	74.00	-4.15	Peak

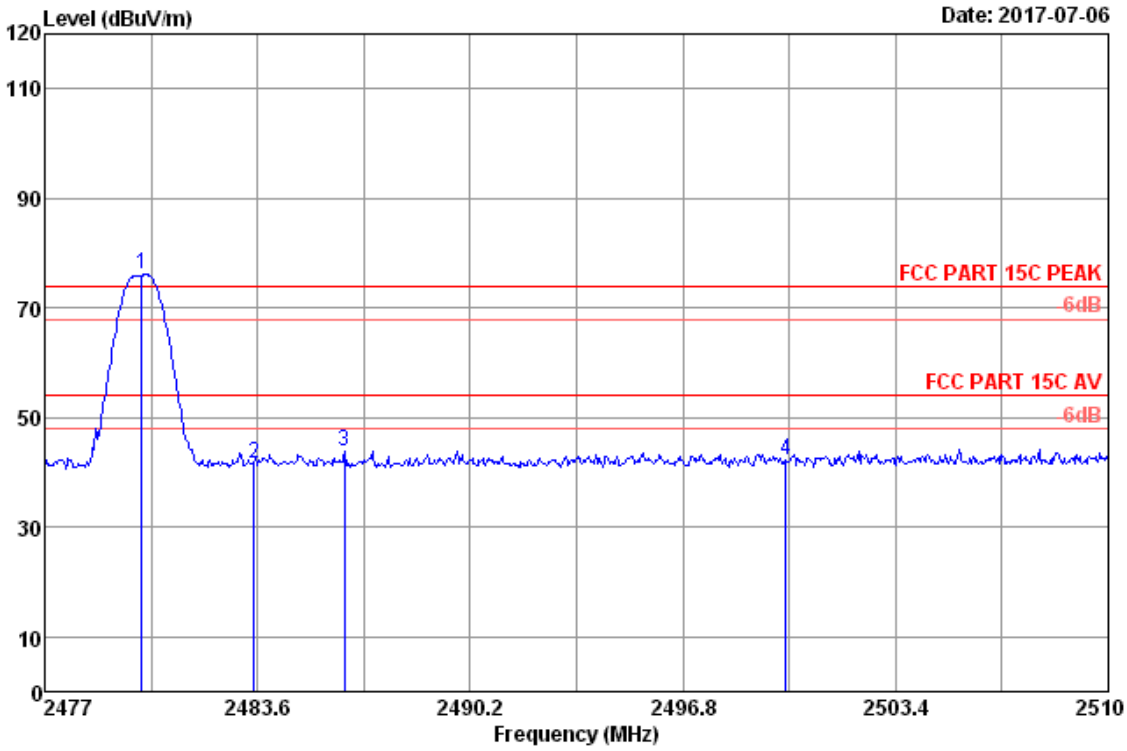
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 15
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	69.66	36.38	69.17	74.00	4.83	Peak
2	2483.50	27.87	8.02	42.44	36.38	41.95	74.00	32.05	Peak
3	2498.95	27.90	8.05	44.74	36.38	44.31	74.00	29.69	Peak
4	2500.00	27.90	8.05	43.15	36.38	42.72	74.00	31.28	Peak

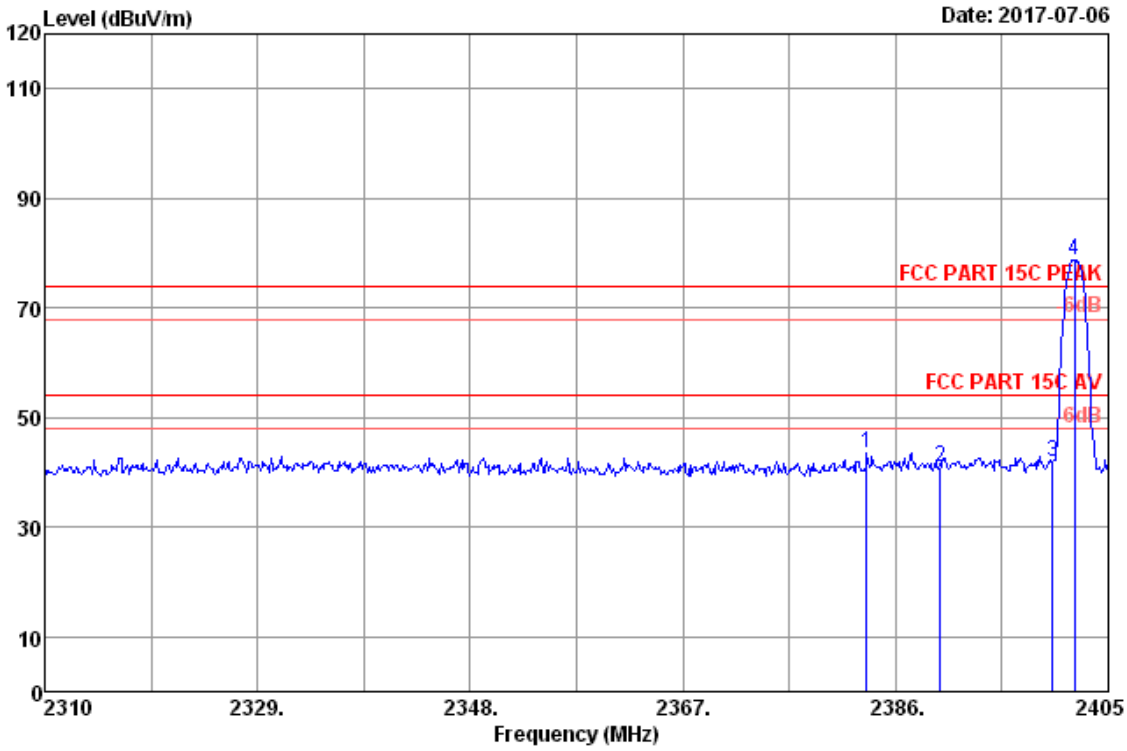
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 16
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 GFSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	76.56	36.38	76.07	74.00	-2.07	Peak
2	2483.50	27.87	8.02	42.13	36.38	41.64	74.00	32.36	Peak
3	2486.31	27.87	8.02	44.44	36.38	43.95	74.00	30.05	Peak
4	2500.00	27.90	8.05	42.76	36.38	42.33	74.00	31.67	Peak

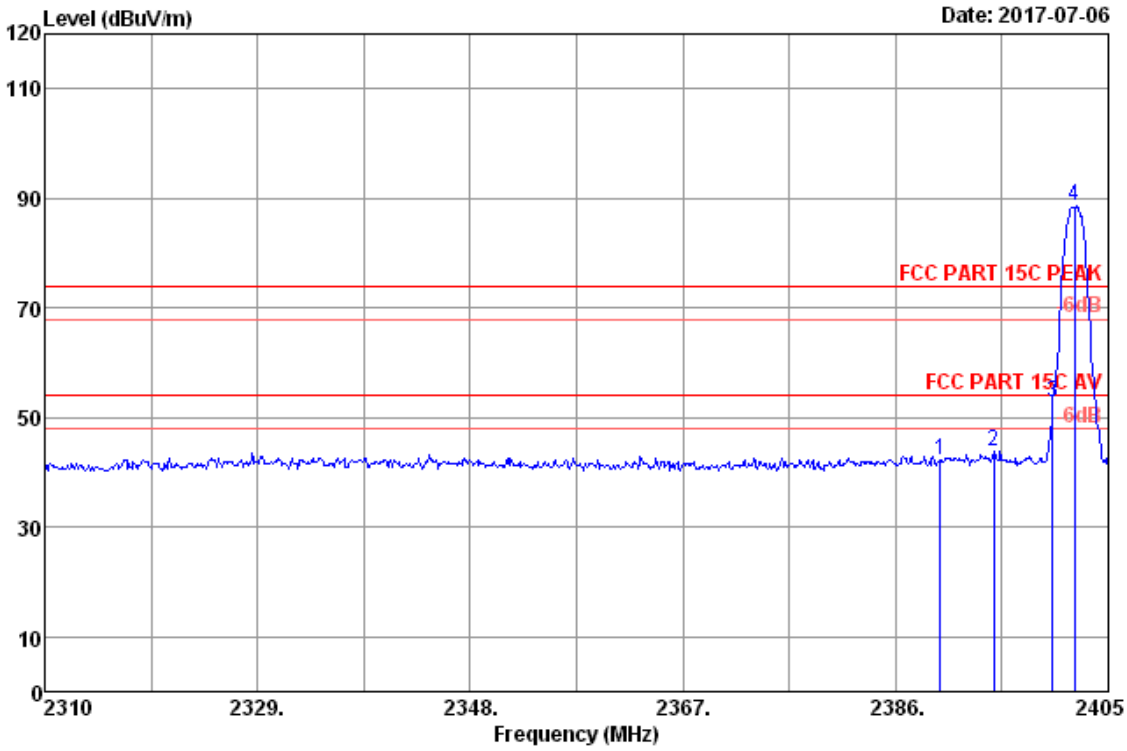
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 21
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2383.44	27.66	7.84	44.45	36.39	43.56	74.00	30.44	Peak
2	2390.00	27.69	7.84	41.86	36.39	41.00	74.00	33.00	Peak
3	2400.00	27.69	7.88	42.88	36.39	42.06	74.00	31.94	Peak
4	2402.00	27.69	7.88	79.64	36.39	78.82	74.00	-4.82	Peak

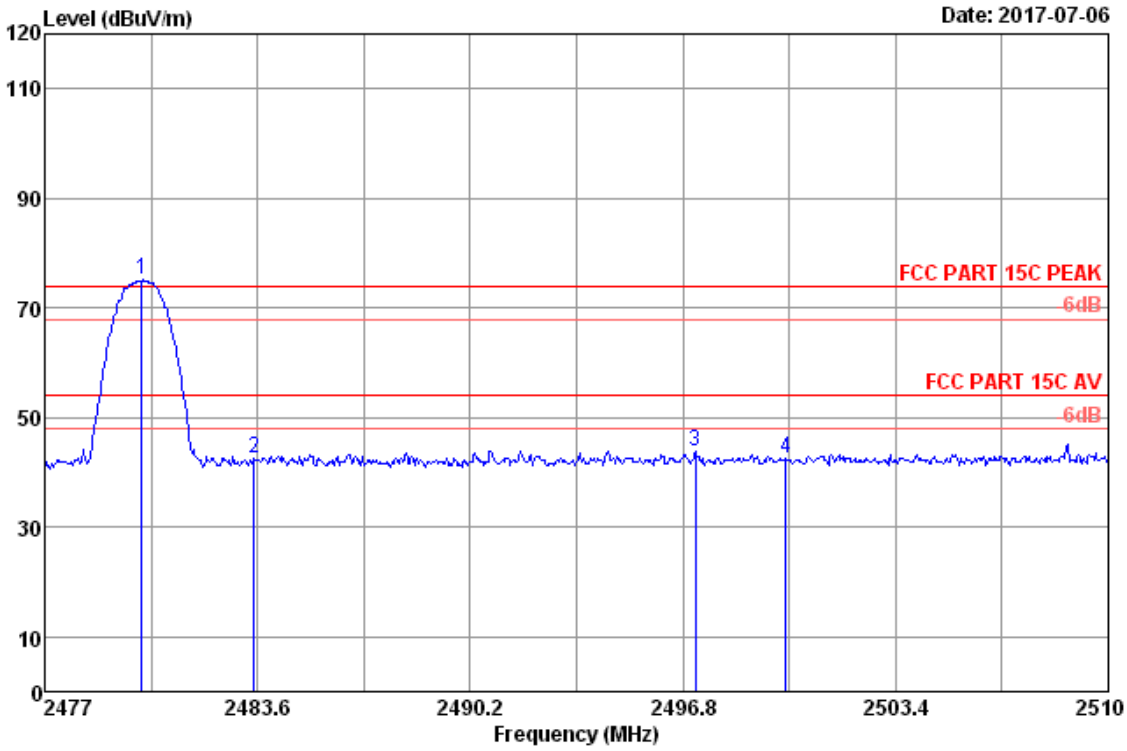
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 22
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2402 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.69	7.84	43.07	36.39	42.21	74.00	31.79	Peak
2	2394.74	27.69	7.88	44.59	36.39	43.77	74.00	30.23	Peak
3	2400.00	27.69	7.88	53.72	36.39	52.90	74.00	21.10	Peak
4	2402.00	27.69	7.88	89.39	36.39	88.57	74.00	-14.57	Peak

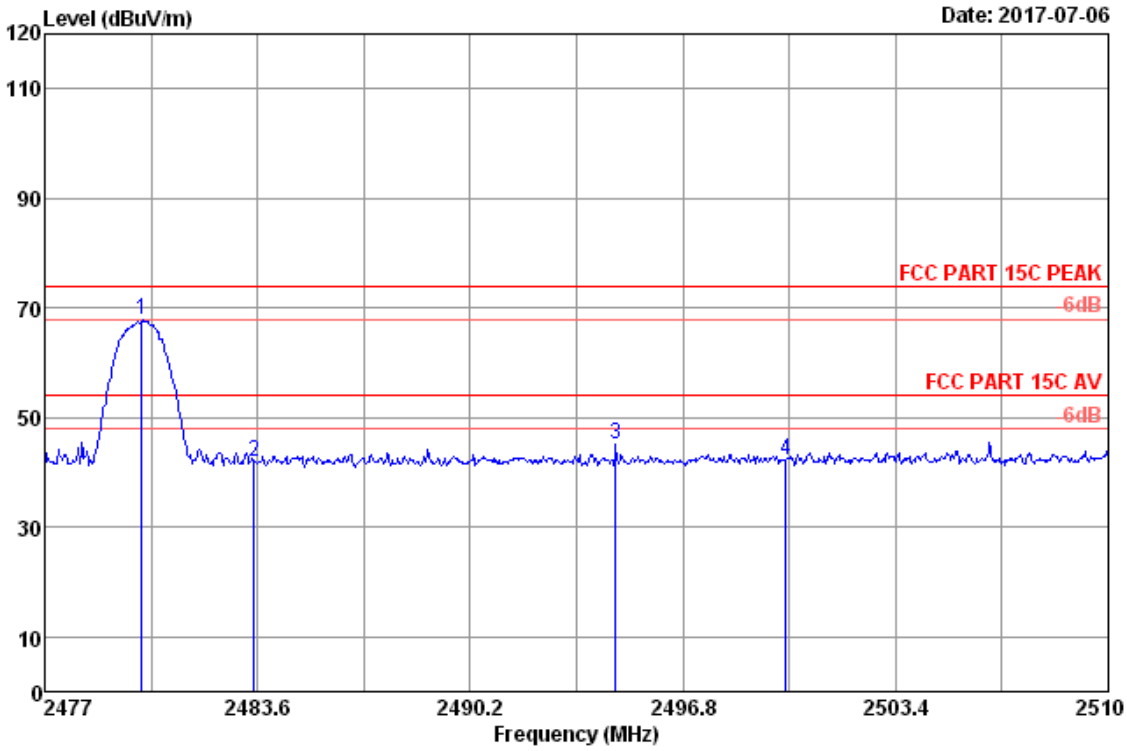
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 31
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	75.61	36.38	75.12	74.00	-1.12	Peak
2	2483.50	27.87	8.02	43.07	36.38	42.58	74.00	31.42	Peak
3	2497.20	27.90	8.05	44.40	36.38	43.97	74.00	30.03	Peak
4	2500.00	27.90	8.05	43.10	36.38	42.67	74.00	31.33	Peak

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



Site no. : 3m Chamber Data no. : 32
Dis. / Ant. : 3m 2017 ANT 3007 HF Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre : 101.2kPa
Env. / Ins. : 23.1*C/53.1% Engineer : Garry
EUT : Cash Register M/N:SPB1-01
Power : AC 230V/50Hz
Test Mode : BT3.0 8-DPSK 2480 Tx Mode
:

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	AMP factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.87	8.02	68.21	36.38	67.72	74.00	6.28	Peak
2	2483.50	27.87	8.02	42.38	36.38	41.89	74.00	32.11	Peak
3	2494.72	27.90	8.05	45.45	36.38	45.02	74.00	28.98	Peak
4	2500.00	27.90	8.05	42.73	36.38	42.30	74.00	31.70	Peak

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

12. ANTENNA REQUIREMENT

12.1. Standard Applicable

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.

12.2. Antenna Connected Construction

The antennas used for this product are PIFA antenna 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 2.77Bi

13. DEVIATION TO TEST SPECIFICATIONS

[NONE]