

**FCC - TEST REPORT**Report Number : **60.790.19.041.01R01** Date of Issue : January 31, 2020Model : **ST100**Product Type : **Smart bicycle trainer**Applicant : **4iiii Innovations Inc.**Address : **141 2nd Ave E, Cochrane AB, Canada**Production Facility : **Quasar Innotech**Address : **3F, NO 10 JINGKE; 8TH ROAD, TAICHUNG CITY,  
NANTUN DIST. 40852 TAIWAN**Test Result : ☒ **Positive** ☐ **Negative**Total pages  
including  
Appendices : 37

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## 2 Description of Equipment Under Test

### Description of the Equipment Under Test

Product: Smart bicycle trainer

Model no.: ST100

FCC ID: ZZN-ST100

Rating: 3.7V DC (Internal rechargeable battery)  
5 VDC (USB Type C input)

Frequency: 2402MHz-2480MHz (Tx and Rx)

Antenna gain: 0 dBi

Number of operated channel: 40

Modulation: GFSK

#### Auxiliary Equipment and Software Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	REMARK
Android Smart Phone	Huawei	---	OTA Control

#### Auxiliary Software Used during Test:

DESCRIPTION	SOFTWARE NAME	VERSION	REMARK
RF Test Mode Software	fouriiii-podcwtest.apk (Android APK)	---	Provided by applicant

### 3 Summary of Test Standards

Test Standards
----------------

FCC Part 15 Subpart C 10-1-18 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators
---

All the tests were performed using the procedures from ANSI C63.4(2014) and ANSI C63.10 (2013).

## 4 Details about the Test Laboratory

### Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
Building 12&13 Zhiheng Wisdomland Business Park,  
Nantou Checkpoint Road 2,  
Shenzhen 518052, P.R.China  
FCC Registration Number: 502708

Emission Tests	
Test Item	Test Site
<b>FCC Part 15 Subpart C</b>	
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	Site 1
FCC Title 47 Part 15.207 Conduct Emission	Site 1
FCC Title 47 Part 15.247(a) 6dB & 99% Bandwidth	Site 1
FCC Title 47 Part 15.247(b) Peak Output Power	Site 1
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	Site 1
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	Site 1
FCC Title 47 Part 15.247(e) Power Spectral Density	Site 1
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	Site 1

## 4.1 Test Equipment Site List

### Radiated emission Test – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
Signal Analyzer	Rohde & Schwarz	FSV40	101031	2020-6-28
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2020-7-7
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-7-5
Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-22
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2020-7-5
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 40A	100432	2020-6-28
Attenuator	Agilent	8491A	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

### Conducted Emission Test – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
LISN	Rohde & Schwarz	ENV432	101318	2020-7-19
LISN	Rohde & Schwarz	ENV216	100326	2020-6-28
ISN	Rohde & Schwarz	ENY81	100177	2020-6-28
ISN	Rohde & Schwarz	ENY81-CA6	101664	2020-6-28
High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	9420-584	2020-6-24
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2020-7-2
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

### 20dB & 99% Bandwidth, Peak Output Power, Spurious Emissions at Antenna Terminals, 100kHz Bandwidth of band edges, Power Spectral Density – Site 1

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-6-28

## 4.2 Measurement System Uncertainty

### Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.46dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz	3.21dB
Uncertainty for frequency test	$0.6 \times 10^{-7}$

## 5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission	12-15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.207 Conduct Emission	16-17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(a)(2) 6dB & 99% Bandwidth	18-20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(b) Peak Output Power	21-23	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals	24-29	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges	30-32	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.247(e) Power Spectral Density	33-35	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement	36	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for **FCC ID: ZZN-ST100**, complies with Section 15.203, 15.205, 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules for the DTS grant

The TX and RX range is 2402MHz-2480MHz.

### SUMMARY:

- All tests according to the regulations cited on page 8 were

■ - Performed

□ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

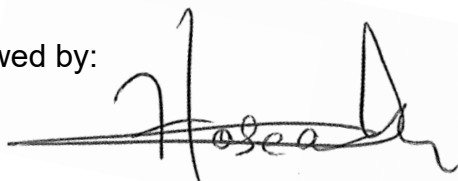
□ - **Does not** fulfill the general approval requirements.

Sample Received Date: November 25, 2019

Testing Start Date: November 27, 2019

Testing End Date: December 17, 2019

Reviewed by:



Hosea CHAN  
EMC Project Engineer

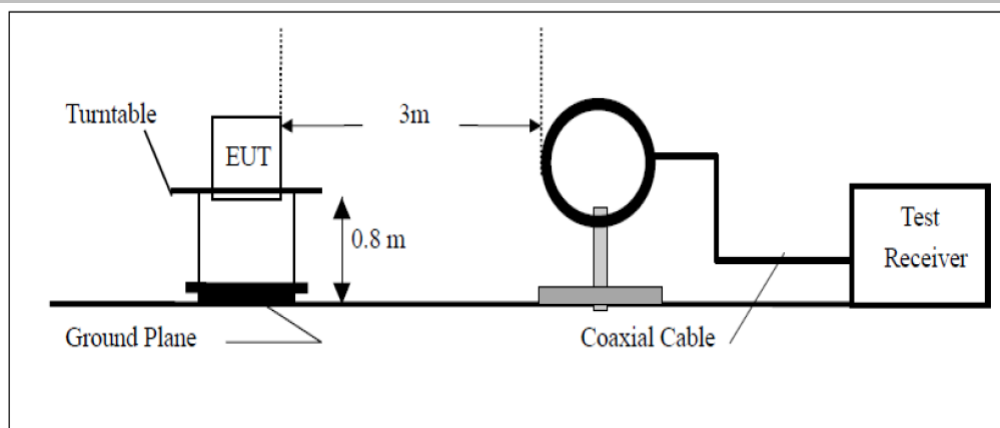
Prepared by:



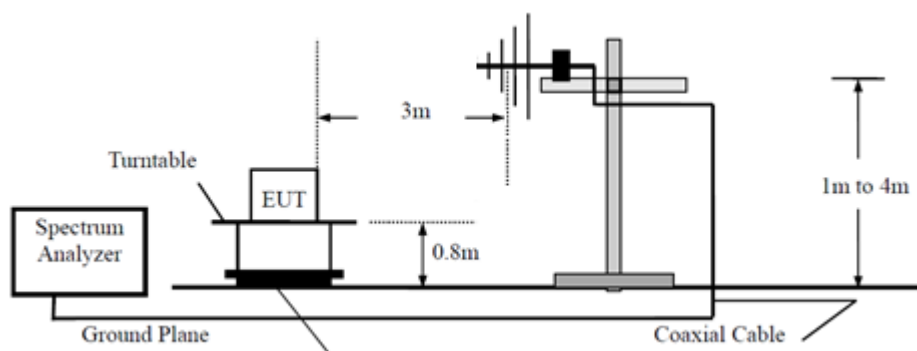
Eric LI  
EMC Senior Project Engineer

## 7 Test Setups

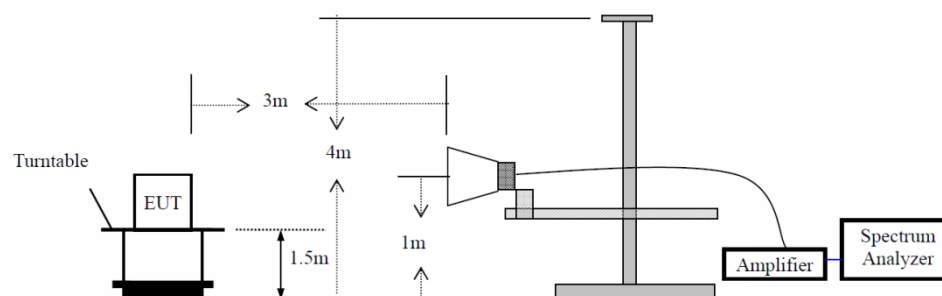
### 7.1 Radiated test setups 9kHz-30MHz



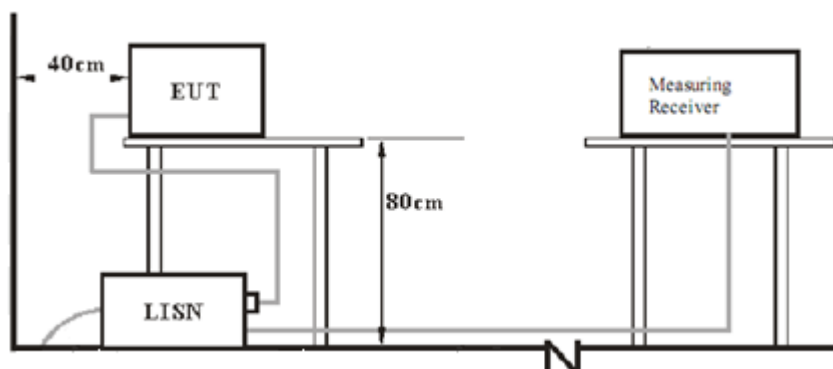
### 7.2 Radiated test setups Below 1GHz



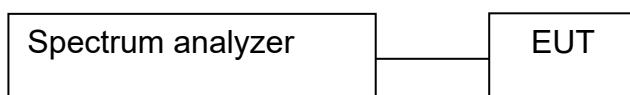
### 7.3 Radiated test setups Above 1GHz



## 7.4 AC Power Line Conducted Emission



## 7.5 Conducted RF test



## 8 Emission Test Results

### 8.1 Spurious Radiated Emission

EUT: ST100  
 Op Condition: Operated, TX Mode  
 (Low channel is the worst case)  
 Test Specification: FCC15.205, 15.209 & 15.247(d)  
 Comment: 3.7V DC  
 Remark: 9kHz to 1GHz

Test Result

☒ Passed☐ Not Passed

Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
44.280556	21.72	40.00	-18.28	Peak	H	-24.2
55.435556	20.69	40.00	-19.31	Peak	H	-24.7
879.073333	32.51	46.00	-13.49	Peak	H	-16.4
48.430000	22.06	40.00	-17.94	Peak	V	-24.0
62.548889	20.44	40.00	-19.56	Peak	V	-26.1
943.255000	33.26	46.00	-12.74	Peak	V	-15.8

Remark:

- As the measured peak value not exceeded the Quasi-peak limit, Quasi-peak value no need to be measured.

## Spurious Radiated Emission

EUT: ST100  
 Op Condition: Operated, TX Mode (2402MHz)  
 Test Specification: FCC15.205, 15.209 & 15.247(d)  
 Comment: 3.7V DC  
 Remark: 1GHz to 25GHz

### Test Result

☒ Passed  
☐ Not Passed

Frequency	Result	Limit	Margin	Detector	Ant. Polarity	Corr.
MHz	dBμV/m	dBμV/m	dB	PK/QP/AV	H/V	(dB)
2432.437500	35.08	54.00	-18.92	Peak	H	-6.6
2617.500000	28.01	54.00	-25.99	Peak	H	-5.8
4804.000000	39.67	54.00	-14.33	Peak	H	1.3
9419.531250	39.68	54.00	-14.32	Peak	H	7.4
15934.687500	48.66	54.00	-5.34	Peak	H	20.8
1988.000000	25.92	54.00	-28.08	Peak	V	-7.9
2194.875000	27.59	54.00	-26.41	Peak	V	-7.3
4804.000000	39.69	54.00	-14.31	Peak	V	1.3
9412.500000	39.48	54.00	-14.52	Peak	V	7.5
15938.906250	48.63	54.00	-5.37	Peak	V	20.9

### Remark:

1.As the measured peak value not exceeded the average limit, average value no need to be measured.

## Spurious Radiated Emission

EUT: ST100  
 Op Condition: Operated, TX Mode (2440MHz)  
 Test Specification: FCC15.205, 15.209 & 15.247(d)  
 Comment: 3.7V DC  
 Remark: 1GHz to 25GHz

### Test Result

☒ Passed  
☐ Not Passed

Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
1247.687500	28.02	54.00	-25.98	Peak	H	-13.0
1963.687500	27.82	54.00	-26.18	Peak	H	-8.1
4880.000000	42.51	54.00	-11.49	Peak	H	1.8
8287.500000	38.82	54.00	-15.18	Peak	H	7.4
15943.125000	48.13	54.00	-5.87	Peak	H	20.9
1241.562500	28.81	54.00	-25.19	Peak	V	-13.1
1664.562500	25.97	54.00	-28.03	Peak	V	-10.3
4880.000000	40.93	54.00	-13.07	Peak	V	1.8
9683.437500	39.21	54.00	-14.79	Peak	V	9.0
15922.500000	48.22	54.00	-5.78	Peak	V	20.4

### Remark:

1.As the measured peak value not exceeded the average limit, average value no need to be measured.

## Spurious Radiated Emission

EUT: ST100  
 Op Condition: Operated, TX Mode (2480MHz)  
 Test Specification: FCC15.205, 15.209 & 15.247(d)  
 Comment: 3.7V DC  
 Remark: 1GHz to 25GHz

### Test Result

☒ Passed  
☐ Not Passed

Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Detector PK/QP/AV	Ant. Polarity H/V	Corr. (dB)
1243.062500	29.57	54.00	-24.43	Peak	H	-13.1
1780.687500	26.82	54.00	-27.18	Peak	H	-9.4
4960.000000	44.27	54.00	-9.73	Peak	H	1.7
7572.656250	38.28	54.00	-15.72	Peak	H	5.9
15936.562500	49.10	54.00	-4.90	Peak	H	20.8
1240.375000	29.75	54.00	-24.25	Peak	V	-13.1
1789.937500	26.46	54.00	-27.54	Peak	V	-9.3
4960.000000	44.25	54.00	-9.75	Peak	V	1.7
9301.406250	38.98	54.00	-15.02	Peak	V	8.1
15958.593750	48.57	54.00	-5.43	Peak	V	20.6

### Remark:

- 1.As the measured peak value not exceeded the average limit, average value no need to be measured.

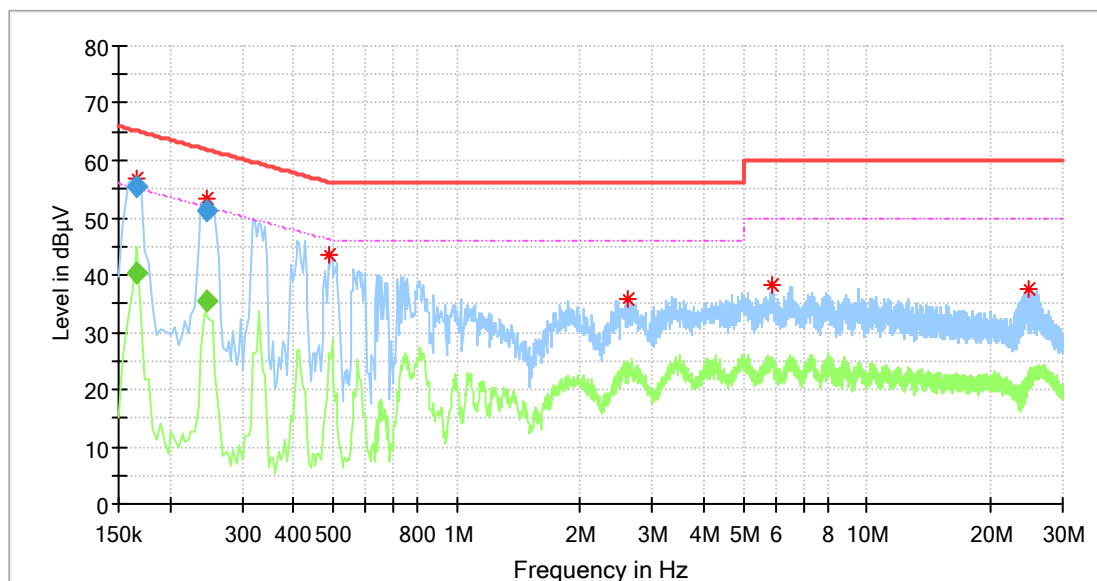
## 8.2 Conducted Emission at AC Power line

EUT: ST100  
 Op Condition: Operated, TX Mode  
 Test Specification: FCC15.107  
 Comment: 120V AC, L Line

### Test Result

☒ Passed

☐ Not Passed



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.165500	56.81	---	64.96	-8.15
0.245500	53.20	---	61.76	-8.56
0.486000	43.43	---	56.24	-12.80
2.598000	35.89	---	56.00	-20.11
5.902000	38.14	---	60.00	-21.86
24.914000	37.63	---	60.00	-22.37

### Final\_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.165500	---	40.21	55.18	-14.97
0.165500	55.55	---	65.18	-9.63
0.245500	---	35.28	51.91	-16.63
0.245500	51.31	---	61.91	-10.60



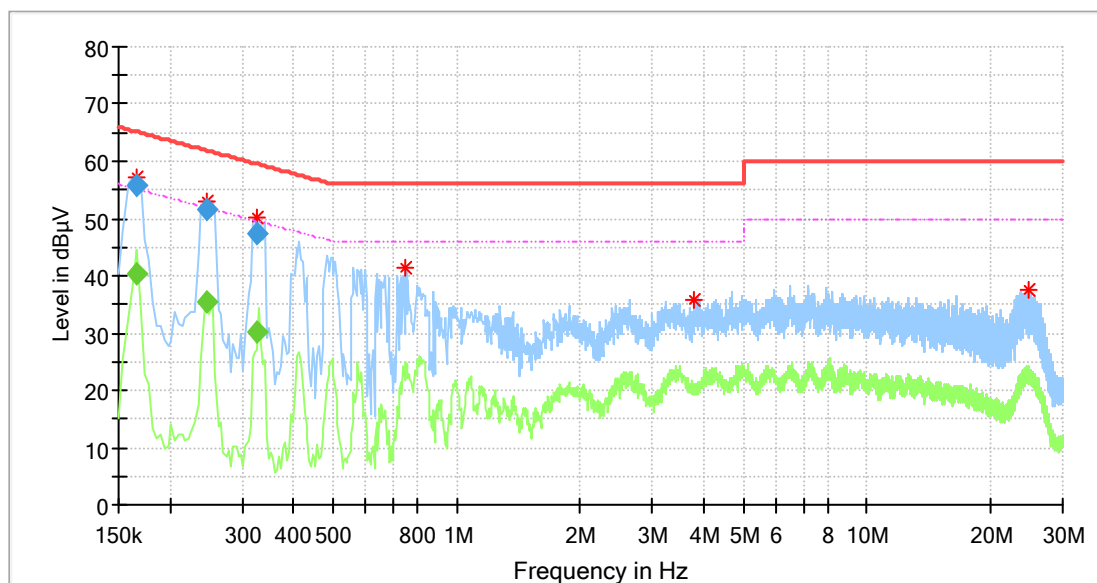
## Conducted Emission at AC Power Line

EUT: ST100  
 Op Condition: Operated, TX Mode  
 Test Specification: FCC15.107  
 Comment: 120V AC, N Line

### Test Result

☒ Passed

☐ Not Passed



### Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.165500	57.10	---	64.96	-7.86
0.245500	53.06	---	61.76	-8.70
0.326500	50.04	---	59.66	-9.61
0.750000	41.35	---	56.00	-14.65
3.806000	35.80	---	56.00	-20.20
24.650000	37.72	---	60.00	-22.28

### Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.165500	---	40.50	55.18	-14.68
0.165500	55.84	---	65.18	-9.34
0.245500	---	35.44	51.91	-16.47
0.245500	51.58	---	61.91	-10.33
0.326500	---	30.12	49.54	-19.42
0.326500	47.47	---	59.54	-12.07

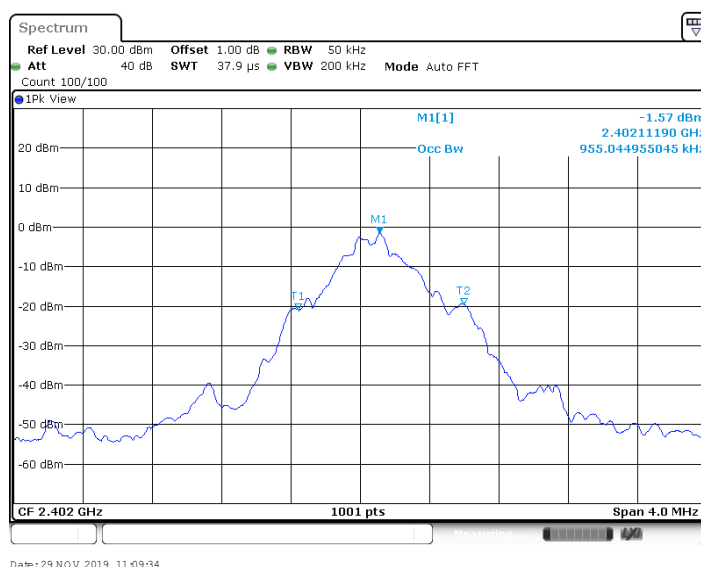
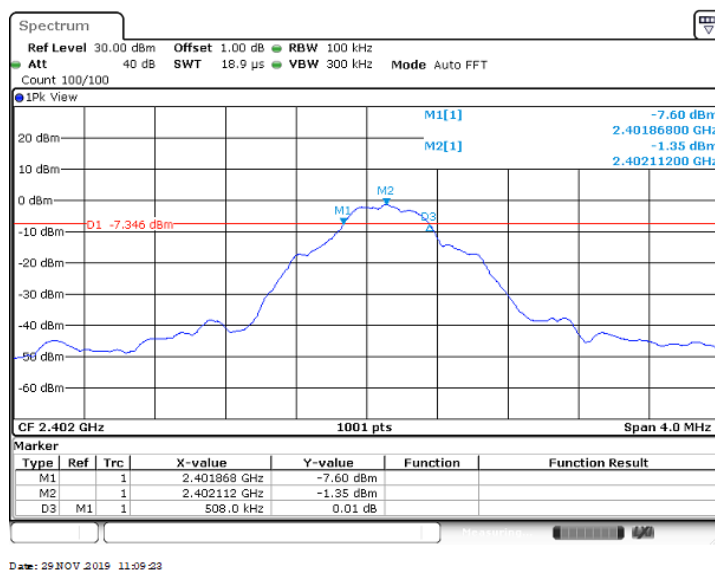
### 8.3 6dB & 99% Bandwidth

EUT: ST100  
 Op Condition: Operated, TX Mode (2402MHz)  
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth  
 Comment: 3.7V DC

Test Result

☒ Passed

☐ Not Passed



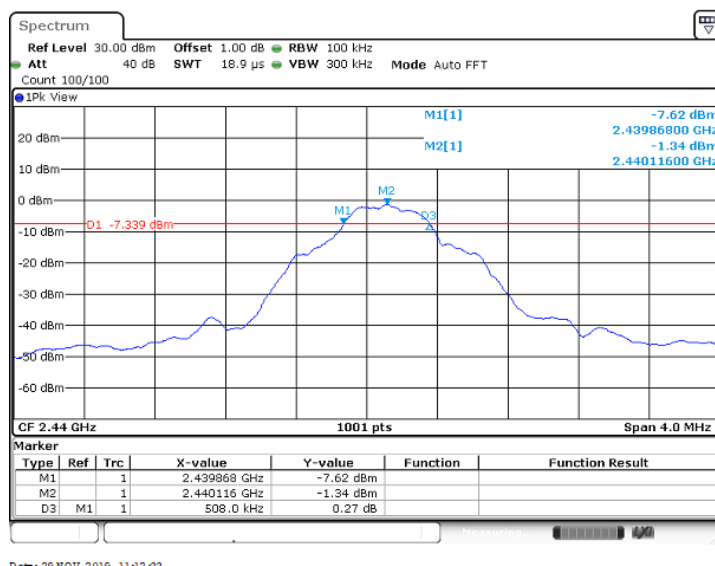
Bandwidth	Measured Value	Limit
6dB bandwidth	0.508 MHz	> 0.5MHz
99% OCB	0.955 MHz	NA

## 6dB & 99% Bandwidth

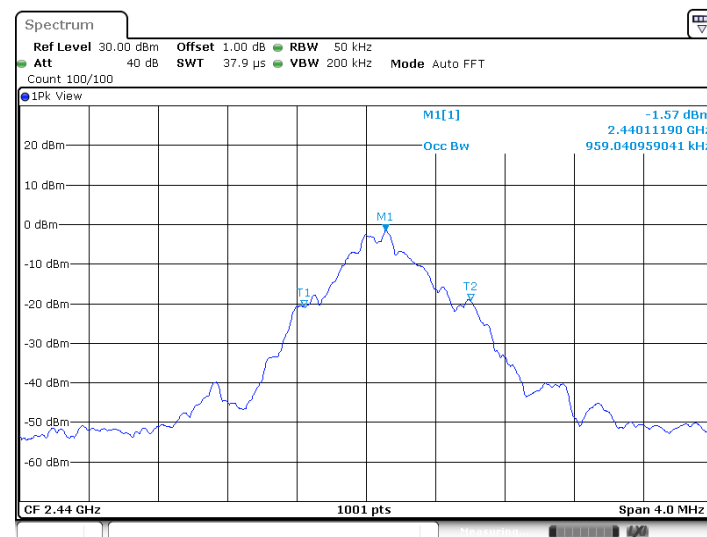
EUT: ST100  
 Op Condition: Operated, TX Mode (2440MHz)  
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed



Date: 29 NOV 2019 11:12:23



Date: 29 NOV 2019 11:12:44

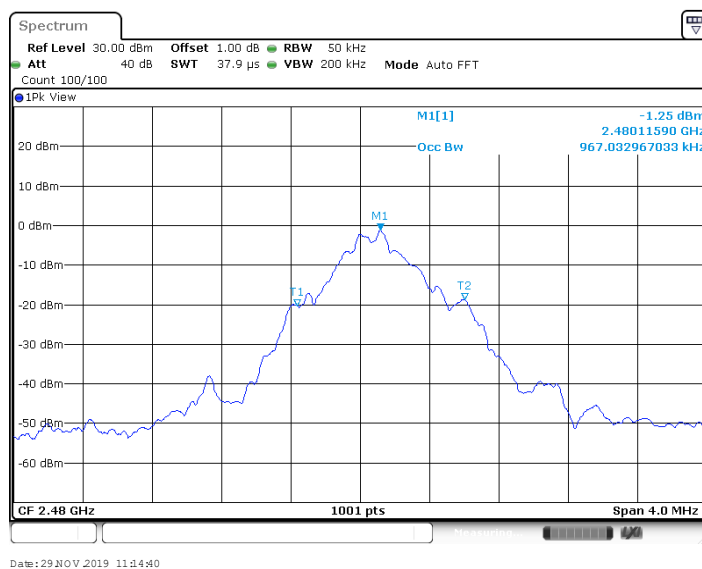
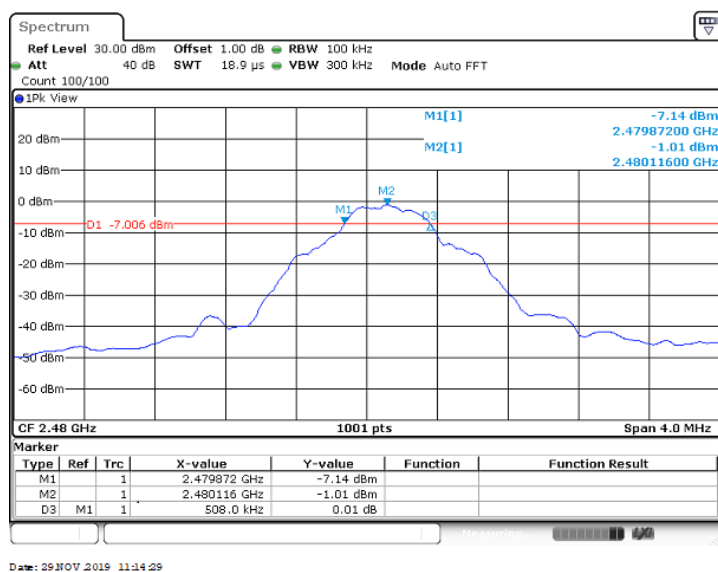
Bandwidth	Measured Value	Limit
6dB bandwidth	0.508 MHz	> 0.5 MHz
99% OCB	0.959 MHz	NA

## 6dB & 99% Bandwidth

EUT: ST100  
 Op Condition: Operated, TX Mode (2480MHz)  
 Test Specification: FCC15.247(a)(2), 6dB Bandwidth & 99% Bandwidth  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed



Bandwidth	Measured Value	Limit
6dB bandwidth	0.508 MHz	> 0.5 MHz
99% OCB	0.967 MHz	NA

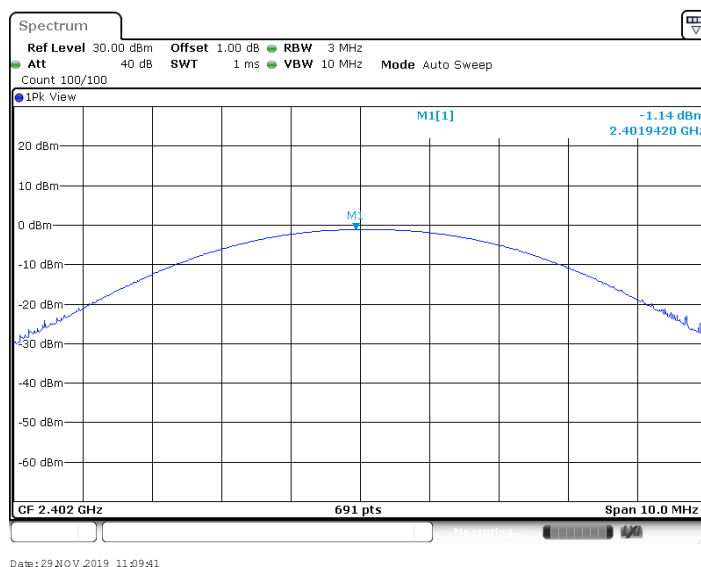
## 8.4 Peak Output Power

EUT: ST100  
 Op Condition: Operated, TX Mode (2402MHz)  
 Test Specification: FCC15.247(b)  
 Comment: 3.7V DC

Test Result

☒ Passed

☐ Not Passed



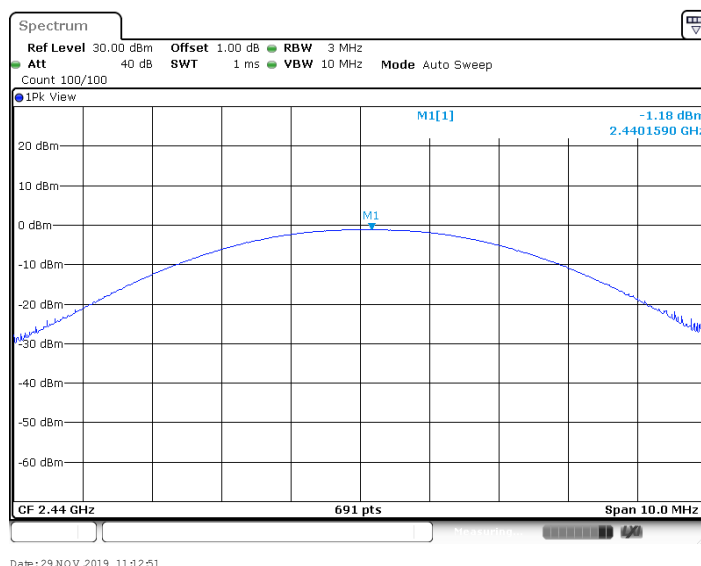
Conducted Output Power	Limit
-1.14 dBm	< 30dBm

**Peak Output Power**

EUT: ST100  
Op Condition: Operated, TX Mode (2440MHz)  
Test Specification: FCC15.247(b)  
Comment: 3.7V DC

**Test Result**

☒ Passed  
☐ Not Passed

**Conducted Output Power**

-1.18 dBm

**Limit**

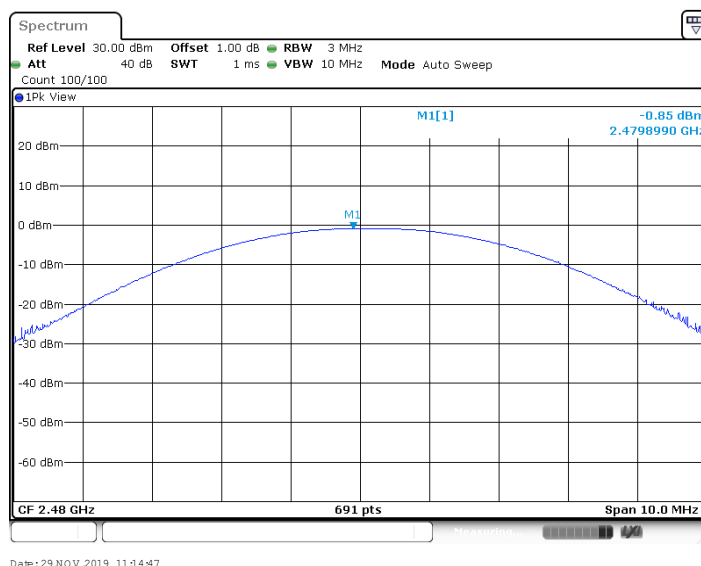
&lt; 30dBm

**Peak Output Power**

EUT: ST100  
Op Condition: Operated, TX Mode (2480MHz)  
Test Specification: FCC15.247(b)  
Comment: 3.7V DC

**Test Result**

☒ Passed  
☐ Not Passed



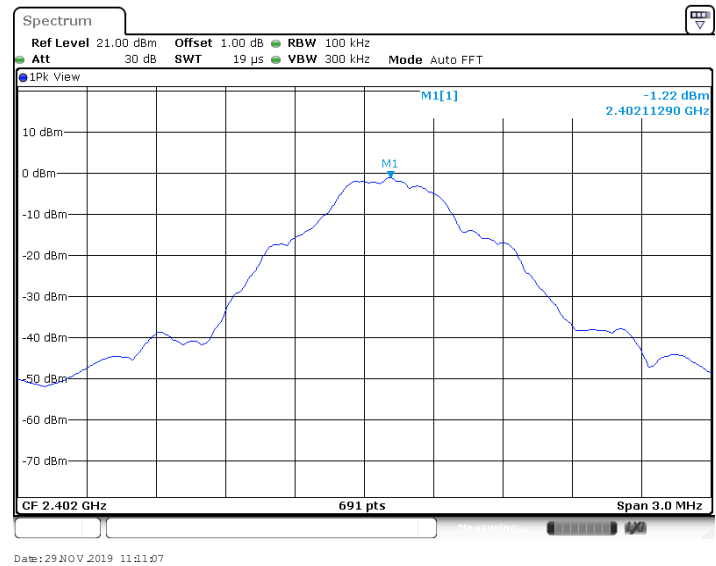
Conducted Output Power	Limit
-0.85 dBm	< 30dBm

### 8.5 Spurious Emissions at Antenna Terminals

EUT: ST100  
Op Condition: Operated, TX Mode (2402MHz)  
Test Specification: FCC2.1051 & 15.247(d)  
Comment: 3.7V DC

Test Result	
<input checked="checked" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Channel	FreqRange	RefLevel	Result	Limit	Verdict
2402	Reference	-1.22	-1.22	---	PASS
2402	30~1000	-1.22	-67.93	<=-21.22	PASS
2402	1000~26500	-1.22	-52.2	<=-21.22	PASS



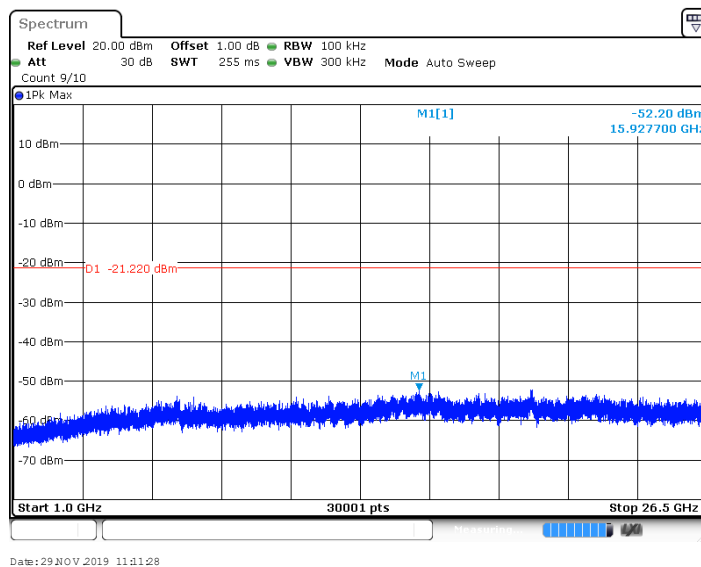
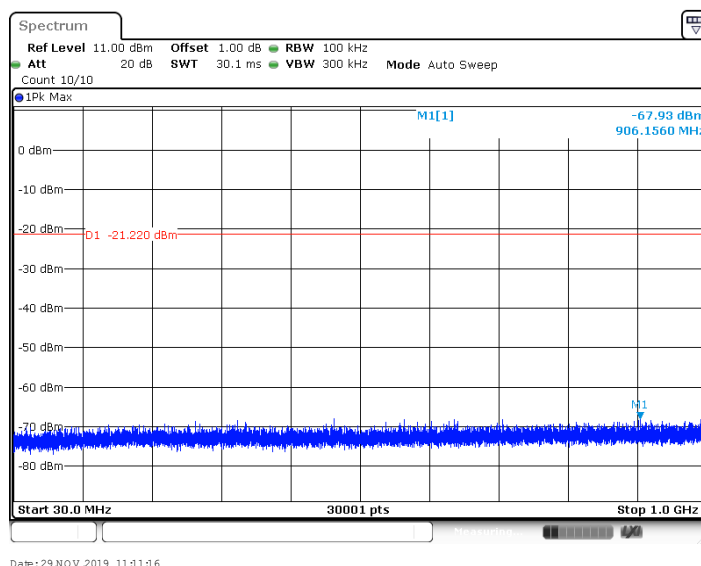


**Spurious Emissions at Antenna Terminals**

EUT: ST100  
Op Condition: Operated, TX Mode (2402MHz)  
Test Specification: FCC2.1051 & 15.247(d)  
Comment: 3.7V DC

**Test Result**

☒ Passed  
☐ Not Passed



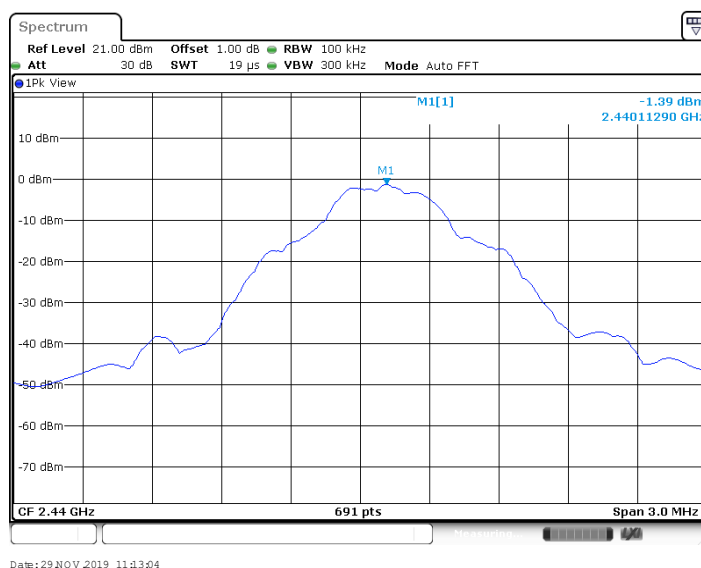
## Spurious Emissions at Antenna Terminals

EUT: ST100  
 Op Condition: Operated, TX Mode (2440MHz)  
 Test Specification: FCC2.1051 & 15.247(d)  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed

Channel	FreqRange	RefLevel	Result	Limit	Verdict
2440	Reference	-1.39	-1.39	---	PASS
2440	30~1000	-1.39	-67.83	<=-21.39	PASS
2440	1000~26500	-1.39	-52.26	<=-21.39	PASS

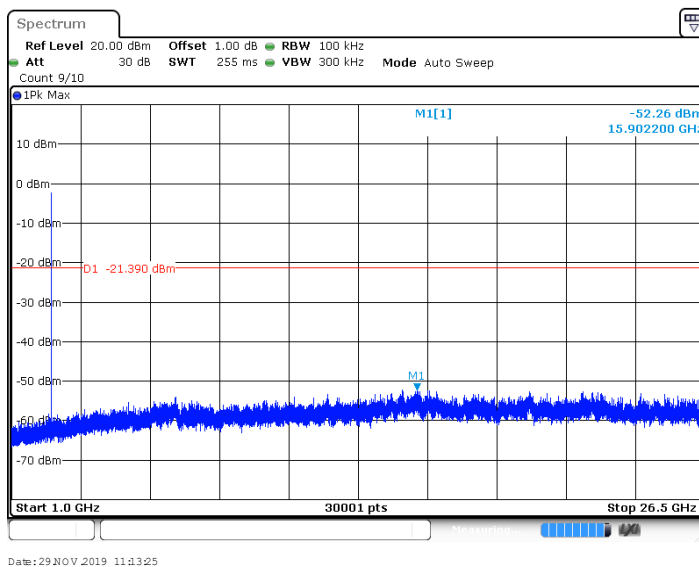
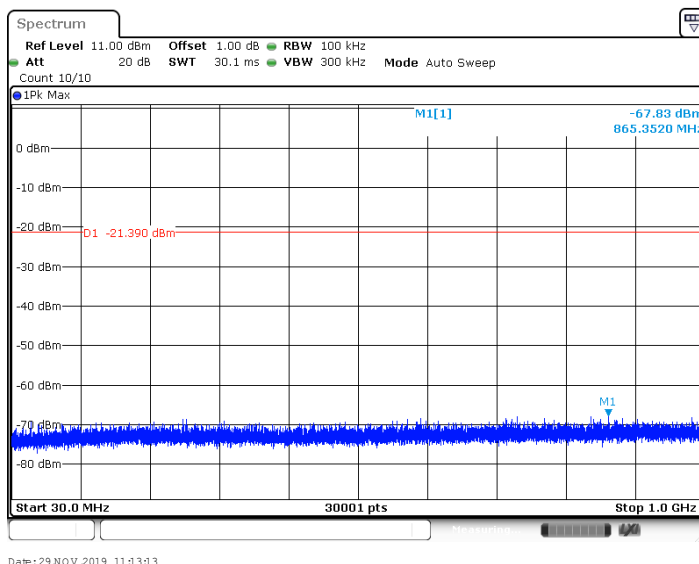


**Spurious Emissions at Antenna Terminals**

EUT: ST100  
Op Condition: Operated, TX Mode (2440MHz)  
Test Specification: FCC2.1051 & 15.247(d)  
Comment: 3.7V DC

**Test Result**

☒ Passed  
☐ Not Passed



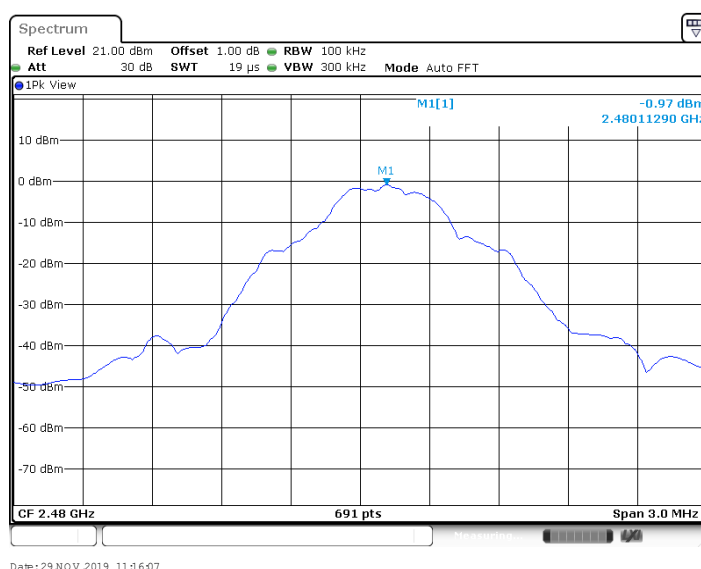
## Spurious Emissions at Antenna Terminals

EUT: ST100  
 Op Condition: Operated, TX Mode (2480MHz)  
 Test Specification: FCC2.1051 & 15.247(d)  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed

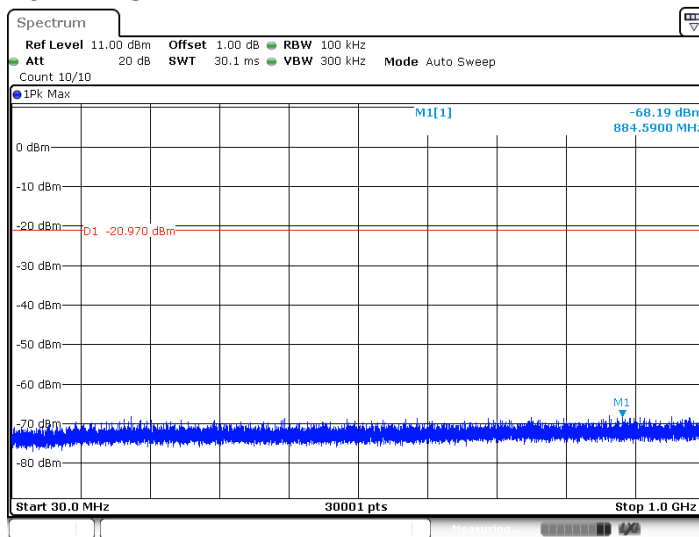
Channel	FreqRange	RefLevel	Result	Limit	Verdict
2480	Reference	-0.97	-0.97	---	PASS
2480	30~1000	-0.97	-68.19	<=-20.97	PASS
2480	1000~26500	-0.97	-51.43	<=-20.97	PASS



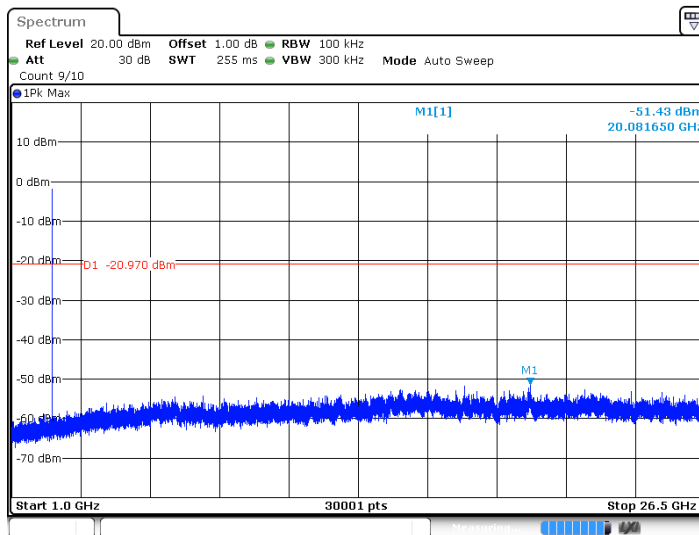
**Spurious Emissions at Antenna Terminals**

EUT: ST100  
Op Condition: Operated, TX Mode (2480MHz)  
Test Specification: FCC2.1051 & 15.247(d)  
Comment: 3.7V DC

Test Result

☒ Passed☐ Not Passed

Date: 29 NOV 2019 11:16:17

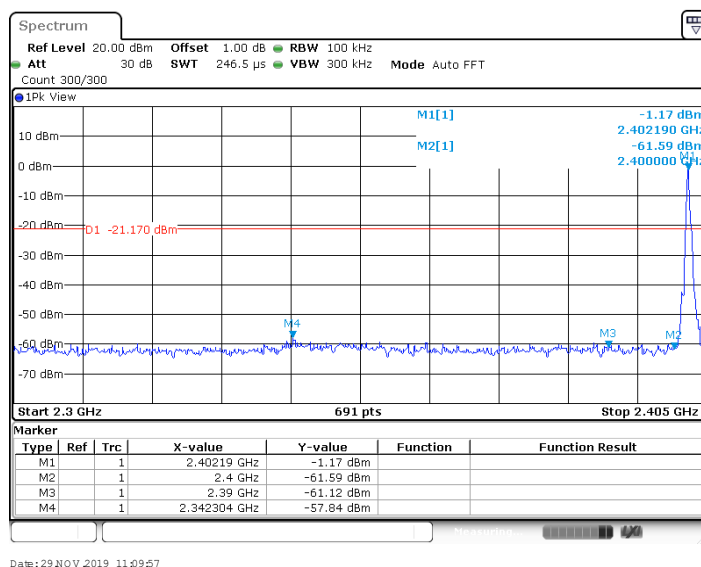


Date: 29 NOV 2019 11:16:28

## 8.6 100kHz Bandwidth of band edges

EUT: ST100  
 Op Condition: Operated, TX Mode (2402MHz)  
 Test Specification: FCC15.247(d), Conducted  
 Comment: 3.7V DC

Test Result

☒ Passed☐ Not Passed

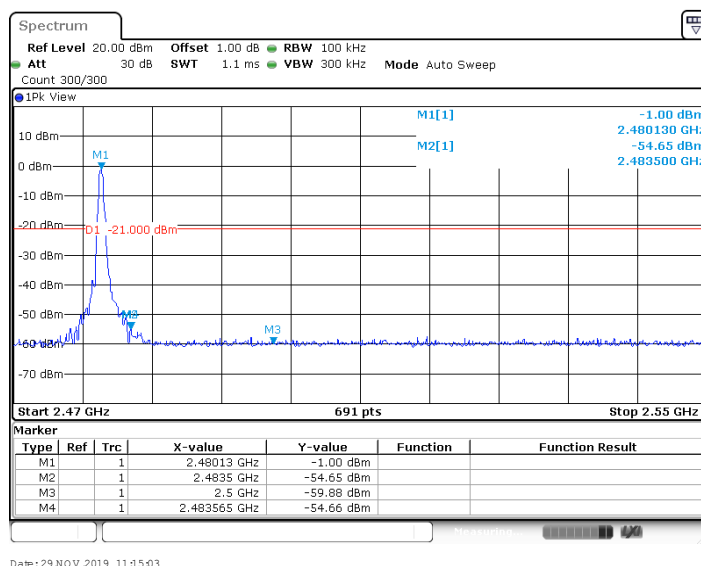
Band edges	Limit
60.42 dB	> 20dB

### 100kHz Bandwidth of band edges

EUT: ST100  
 Op Condition: Operated, TX Mode (2480MHz)  
 Test Specification: FCC15.247(d), Conducted  
 Comment: 3.7V DC

#### Test Result

☒ Passed  
☐ Not Passed



Band edges	Limit
53.65 dB	> 20dB

### 100kHz Bandwidth of band edges

EUT: ST100  
 Op Condition: Operated, TX Mode (2402MHz & 2480MHz)  
 Test Specification: FCC15.247(d), Radiated method  
 Comment: 3.7V DC

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

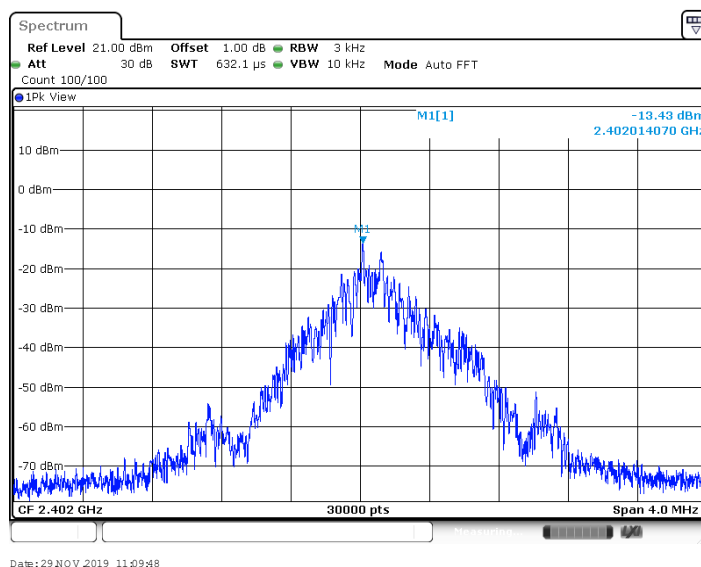
Channel	Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Detector PK /AV	Ant. Polarity H/V	Corr. (dB)
2402	2400.00	47.17	74.00	-26.83	Peak	H	-5.5
2402	2400.00	41.25	54.00	-12.75	Average	H	-5.5
2402	2400.00	50.26	74.00	-23.74	Peak	V	-5.5
2402	2400.00	42.88	54.00	-11.12	Average	V	-5.5
2480	2483.50	45.45	74.00	-28.55	Peak	H	-4.8
2480	2483.50	37.26	54.00	-16.74	Average	H	-4.8
2480	2483.50	47.14	74.00	-26.86	Peak	V	-4.8
2480	2483.50	39.75	54.00	-14.25	Average	V	-4.8



## 8.7 Power Spectral Density

EUT: ST100  
Op Condition: Operated, TX Mode (2402MHz)  
Test Specification: FCC15.247(e)  
Comment: 3.7V DC

Test Result

☒ Passed☐ Not Passed

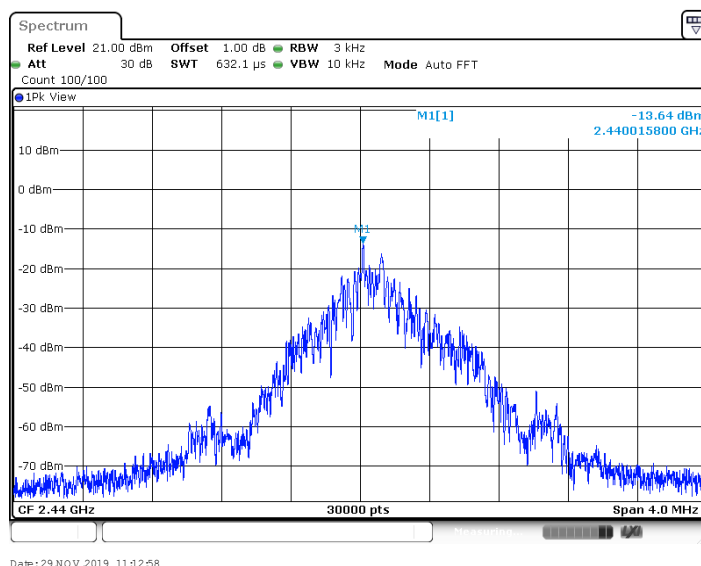
PSD	Limit
-13.43 dBm	< 8 dBm

## Power Spectral Density

EUT: ST100  
 Op Condition: Operated, TX Mode (2440MHz)  
 Test Specification: FCC15.247(e)  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed



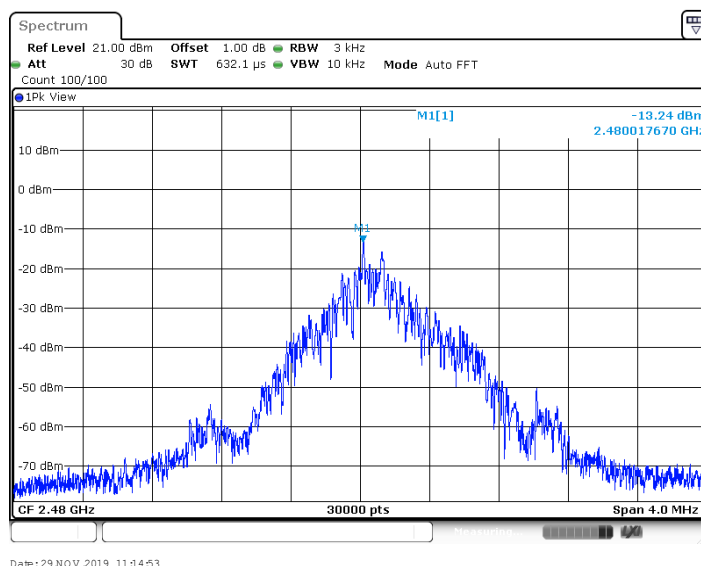
PSD	Limit
-13.64 dBm	< 8 dBm

## Power Spectral Density

EUT: ST100  
 Op Condition: Operated, TX Mode (2480MHz)  
 Test Specification: FCC15.247(e)  
 Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed



PSD	Limit
-13.24 dBm	< 8 dBm

## 8.8 Antenna Requirement

EUT: ST100  
Op Condition: Operated, TX Mode  
Test Specification: FCC15.203 & 15.247(b)  
Comment: 3.7V DC

### Test Result

☒ Passed  
☐ Not Passed

### Limit

For intentional device, according to FCC Title 47 Part 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 Title 47 Part 15.247(b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Antenna Connector Construction

The antenna used in this product is build-in antenna on PCB, and the maximum gain of this antenna is 0.0 dBi.

## 9 Appendix A - General Product Information

### Radiofrequency radiation exposure evaluation

This exposure evaluation is intended for **FCC ID: ZZN-ST100**

According to KDB 447498 D01v06 section 4.3.1, For frequencies between 100 MHz to 6GHz and test separation distances  $\leq 50$  mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR

>> The fundamental frequency of the EUT is 2402-2480MHz,  
the test separation distance is  $\leq 50$ mm.  
(Manufacturer specified the separation distance is: 5mm)

Step a)

>> Numeric threshold (2402MHz),  $\text{mW} / 5\text{mm} \cdot \sqrt{2.402\text{GHz}} \leq 3.0$   
Numeric threshold (2402MHz)  $\leq 9.678\text{mW}$

>> Numeric threshold (2440MHz),  $\text{mW} / 5\text{mm} \cdot \sqrt{2.440\text{GHz}} \leq 3.0$   
Numeric threshold (2440MHz)  $\leq 9.602\text{mW}$

>> Numeric threshold (2480MHz),  $\text{mW} / 5\text{mm} \cdot \sqrt{2.480\text{GHz}} \leq 3.0$   
Numeric threshold (2480MHz)  $\leq 9.525\text{mW}$

>> The power of EUT measured (2402MHz) is:  $-1.14\text{dBm} = 0.769\text{mW}$   
The power of EUT measured (2440MHz) is:  $-1.18\text{dBm} = 0.762\text{mW}$   
The power of EUT measured (2480MHz) is:  $-0.85\text{dBm} = 0.822\text{mW}$

Which is smaller than the Numeric threshold.

Therefore, the device is exempt from stand-alone SAR test requirements.