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FCC TEST REPORT

Report No: STS1905100W01

Issued for

Kershaw Systems

555 N El Camino Real A242 San Clemente, CA 92672 United States

Product Name:	R-100 Prox Reader
Brand Name:	RISG
Model Name:	R-100
Series Model:	N/A
FCC ID:	2ATQ6R-100
Test Standard:	FCC Part 15 Subpart C

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**TEST RESULT CERTIFICATION**

Applicant's Name: Kershaw Systems
Address: 555 N El Camino Real A242 San Clemente, CA 92672 United States
Manufacture's Name: Kershaw Systems
Address: 555 N El Camino Real A242 San Clemente, CA 92672 United States

Product Description

Product Name: R-100 Prox Reader
Brand Name: RISG
Model Name: R-100
Series Model: N/A

Test Standards.....: FCC Part 15 Subpart C

Test Procedure: ANSI C63.10-2013

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

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Date of performance of tests.....: 29 May 2019 ~ 01 June 2019

Date of Issue: 03 June 2019

Test Result.....: **Pass**

Testing Engineer :

(Chris Chen)

Technical Manager :

(Sunday Hu)

Authorized Signatory :

(Vita Li)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	03 June 2019	STS1905100W01	ALL	Initial Issue





1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.209 (a)	Radiated emission, Spurious Emission	PASS	
2.1049	20 dB Bandwidth	PASS	

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

FCC test Firm Registration Number: 625569

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainly
1	RF output power, conducted	$\pm 0.71\text{dB}$
2	Unwanted Emissions, conducted	$\pm 0.63\text{dB}$
3	All emissions, radiated 30-200MHz	$\pm 3.43\text{dB}$
4	All emissions, radiated 200MHz-1GHz	$\pm 3.57\text{dB}$
5	All emissions, radiated >1G	$\pm 4.13\text{dB}$
6	Conducted Emission (9KHz-150KHz)	$\pm 3.18\text{dB}$
7	Conducted Emission (150KHz-30MHz)	$\pm 2.70\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	R-100 Prox Reader
Trade Name	RISG
Model Name	R-100
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
Equipemnt Category	Non-ISM frequency
Operating frequency	125KHz
Modulation Type	ASK
Power Rating:	Input: DC12V
Hardware version number	V1.0
Software version number	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (KHz)	Channel	Frequency (KHz)	Channel	Frequency (KHz)
00	125				

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	NOTE
1	RISG	R-100	Copper Coil Wire	N/A	Antenna

2.2 DESCRIPTION OF THE TEST MODES

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

Pretest Mode	Description
Mode 1	Charging+TX Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	Charging+TX Mode



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Radiated Emission Test

E-1
EUT

2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Note:

- (1) FCC DOC approved.
- (2) FTP is Foiled Twisted Pair.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12
Signal Analyzer	Agilent	N9020A	MY51110105	2019.03.02	2020.03.01
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2018.10.13	2019.10.12
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10
Test SW	BULUN	BL410-E/18.905			

3. CONDUCTED EMISSION TEST RESULT (SECTION 15.207)

3.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15.207 limit in the table below has to be followed.

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

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

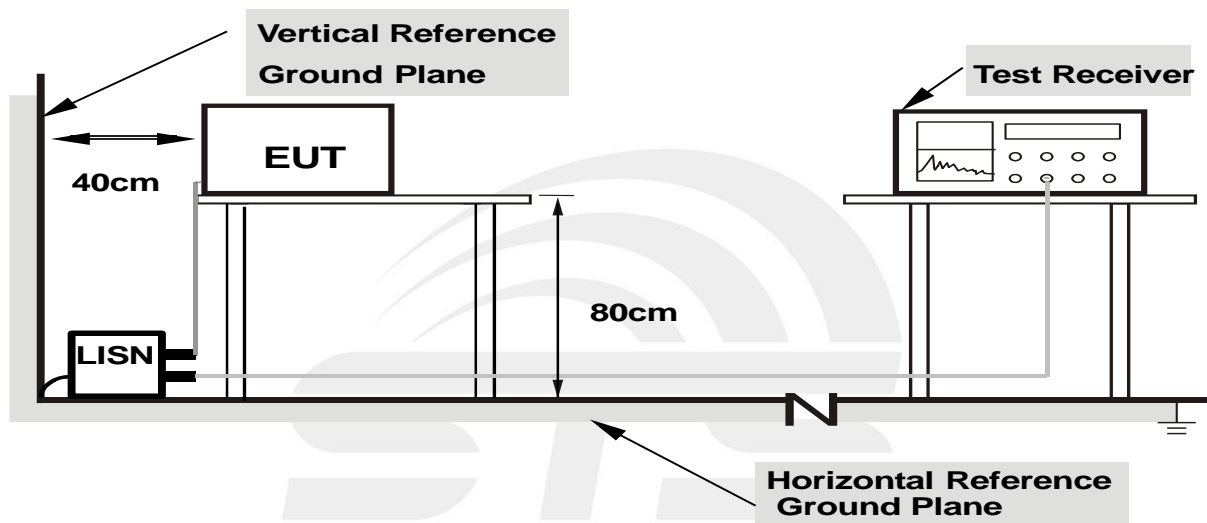
The following table is the setting of the receiver

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

3.2 TEST PROCEDURE

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

3.3 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 TEST RESULTS

Temperature:	22 °C	Relative Humidity:	55%
Test Voltage:	N/A	Phase:	L/N
Test Mode:	N/A		

Note: EUT is only power by DC Power, So it is not applicable for this test.

4. RADIATED& FIELD EMISSION TEST RESULT (SECTION 15.209)

4.1 Limit

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

§ 15.209(d) 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 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.2 TEST PROCEDURE

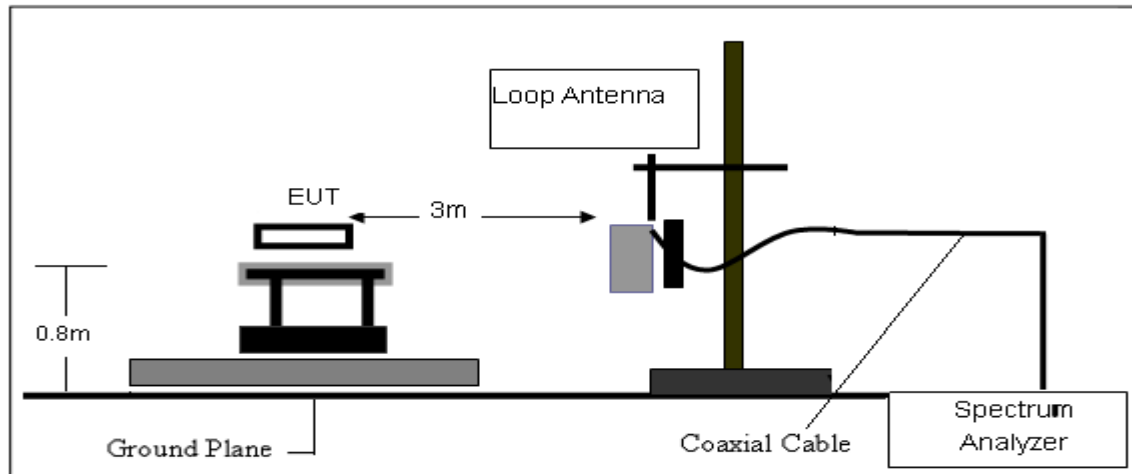
- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

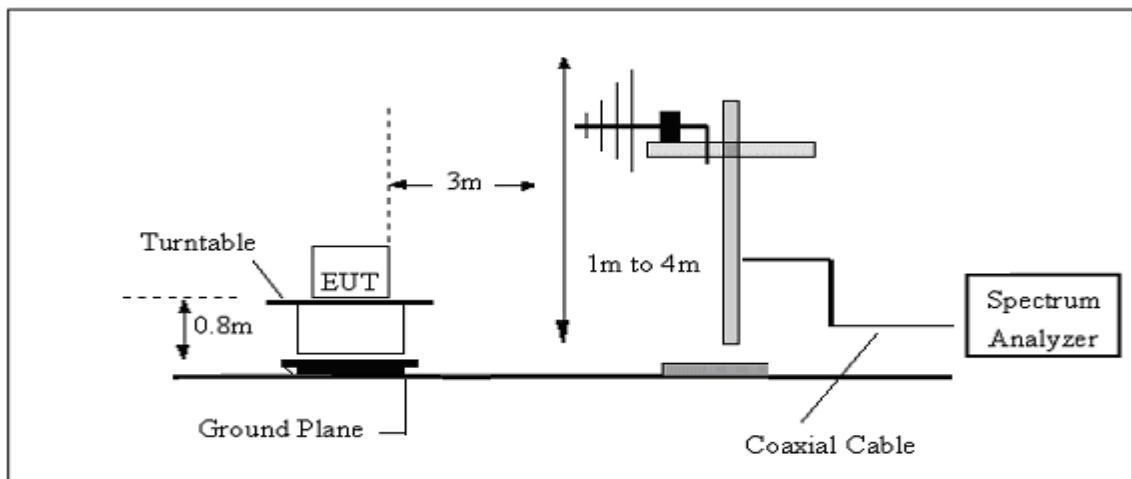
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

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



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





4.4 TEST RESULTS

Temperature :	22.7℃	Relative Humidity :	61%
Test Voltage :	DC 12V	Test Mode :	TX Mode

4.4.1 Spurious Radiated Emission Below 30 MHz

Frequency	Reading	Detector	Ant. Factor	Cable	Emission	Limits	Margin
(KHz)	(dBμV)	(PK/QP/AV)	(dB/m)	Loss	Level (dBμV/m)	(dBμV/m)	(dB)
15	76.08	PK	26.27	0.1	102.45	144.08	-41.63
15	60.66	AV	26.27	0.1	87.03	124.08	-37.05
36	71.94	PK	22.03	0.1	94.07	136.48	-42.41
36	57.00	AV	22.03	0.1	79.13	116.48	-37.35
125	100.76	PK	10.04	0.1	110.90	125.67	-14.77
125	85.35	AV	10.04	0.1	95.49	105.67	-10.18
205	97.67	PK	9.43	0.1	107.20	121.37	-14.17
205	81.83	AV	9.43	0.1	91.36	101.37	-10.01
495	66.05	QP	1.15	0.1	67.30	73.71	-6.41
21735	70.68	QP	-17.9	0.9	53.68	69.54	-15.86

1. “*” Means Fundamental frequency
2. Emission Level [dBμV/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]
3. Margin [dB] = Emission Level [dBμV/m] – Limit [dBμV/m]
4. Limit calculation: Limit at specified distance + $40\log(300/3)$ = Limit + 80 dB for up to 0.49 MHz
Limit at specified distance + $40\log(30/3)$ = Limit + 40 dB for above 0.49 MHz, Below 30 MHz
5. During the radiated emission test, the measurement antenna was aligned along the site axis and orthogonal to the axis, only the worst-case data recorded.



4.4.2 Spurious Radiated Emission below 1 GHz

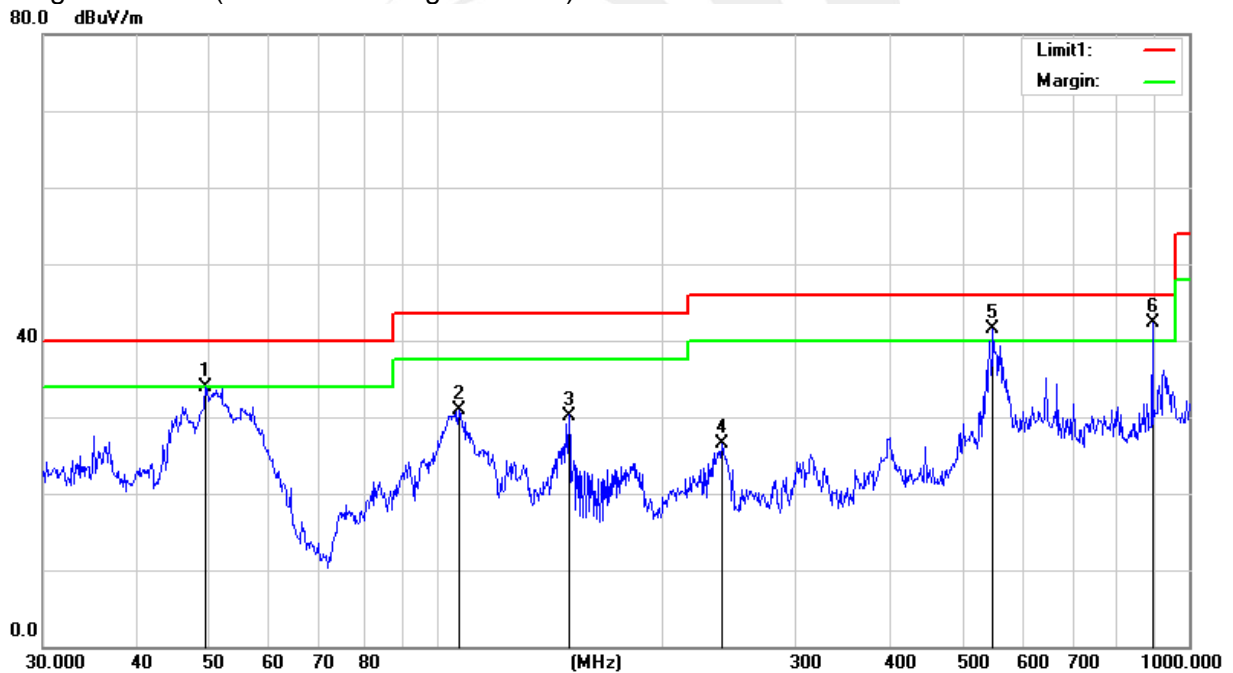
Temperature :	22.7℃	Relative Humidity :	61%
Test Voltage :	DC 12V	Test Mode :	Mode 1

The following table shows the highest levels of radiated emissions on polarizations of vertical

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
49.3594	54.96	-21.15	33.81	40.00	-6.19	QP
107.1337	49.46	-18.58	30.88	43.50	-12.62	QP
150.0107	48.17	-17.97	30.20	43.50	-13.30	QP
239.1473	44.34	-17.82	26.52	46.00	-19.48	QP
549.0193	48.32	-6.80	41.52	46.00	-4.48	QP
893.8567	44.59	-2.34	42.25	46.00	-3.75	QP

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit





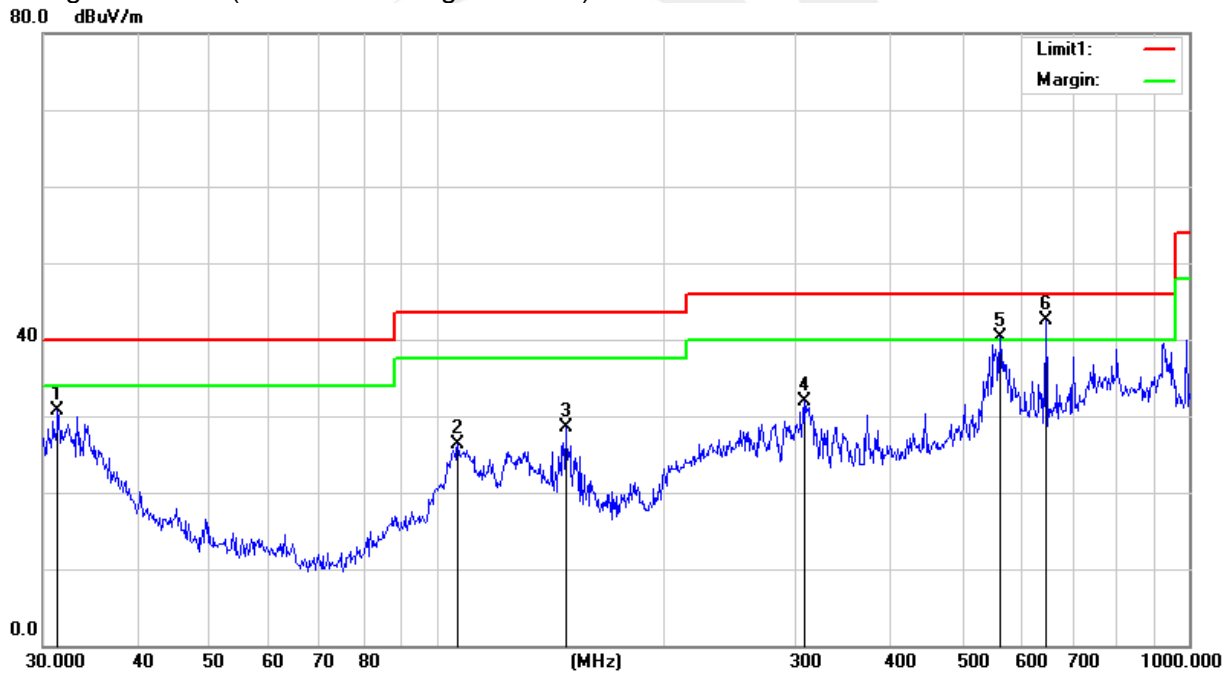
Temperature :	22.7°C	Relative Humidity :	61%
Test Voltage :	DC 12V	Test Mode :	Mode 1

The following table shows the highest levels of radiated emissions on polarizations of horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
31.3992	42.65	-11.91	30.74	40.00	-9.26	QP
106.7587	44.87	-18.61	26.26	43.50	-17.24	QP
148.4410	46.40	-17.89	28.51	43.50	-14.99	QP
307.8312	46.39	-14.57	31.82	46.00	-14.18	QP
560.6928	46.96	-6.57	40.39	46.00	-5.61	QP
645.1195	48.89	-6.33	42.56	46.00	-3.44	QP

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit





5. 20 DB BANDWIDTH TEST

5.1 Limit

FCC Part 2.1049, Only applicable to report.

5.2 TEST SETUP

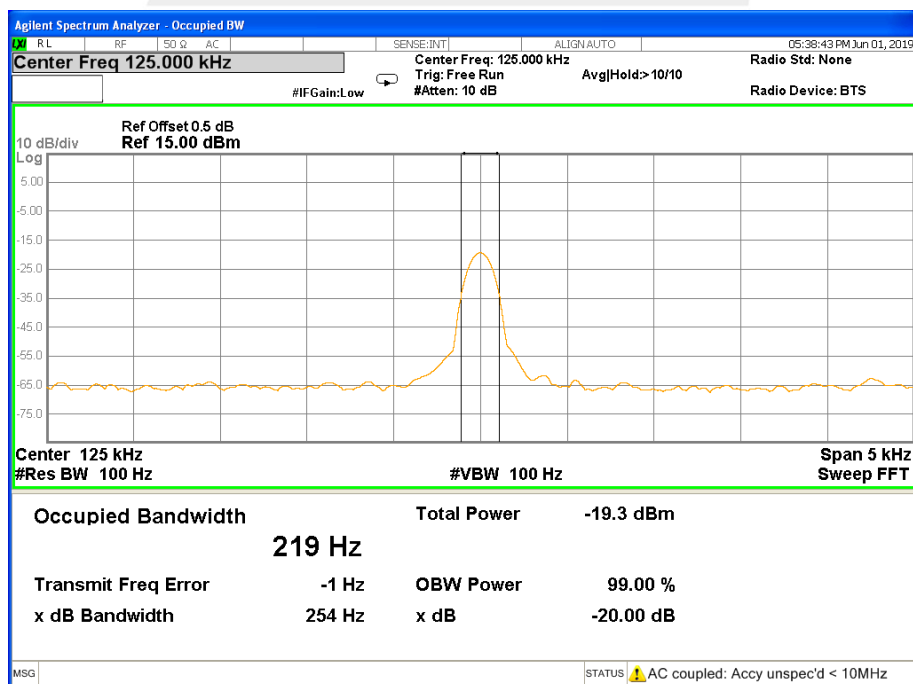
Spectrum Parameter	Setting
Span Frequency	approximately 2 to 3 times the 20 dB bandwidth
RB	greater than 1 % of the 20 dB bandwidth,
VB	equal to the RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

The test program and configuration, Refer to 4.2 and 4.3

5.3 TEST RESULTS

Operating Frequency (kHz)	20 dB Bandwidth(Hz)
125	254

CH00





APPENDIX-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※

