

RADIO TEST REPORT

S T S

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Report No:STS1906029W01

Issued for

Bartec USA LLC.

44231 Phoenix Drive Sterling Heights Michigan United States

Product Name:	RITE-SENSOR
Brand Name:	Bartec
Model Name:	RITE-SENSOR
Series Model:	RS-1000
FCC ID:	SX8-RS1000
Test Standard:	FCC Part 15.231

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TEST REPORT CERTIFICATION

Applicant's Name:	Bartec USA LLC.
Address	44231 Phoenix Drive Sterling Heights Michigan United States
Manufacture's Name	Bartec USA LLC.
Address:	44231 Phoenix Drive Sterling Heights Michigan United States
Product Description	
Product Name:	RITE-SENSOR
Brand Name:	Bartec
Model Name:	RITE-SENSOR
Series Model:	RS-1000
Test Standards	FCC Part 15.231
Test Procedure:	ANSI C63.10-2013
This device described above has	sheen tested by STS, the test results show that the equipment

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 Test

Date of performance of tests ..: 11 June 2019 ~ 12 July 2019

Date of Issue 12 July 2019

Test Result Pass

Testing Engineer : Technical Manager : Authorized Signatory : (Vita Li)

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6.4 TEST RESULTS

7. PERIODIC OPERATION

7.1 TEST PROCEDURE

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	21 June 2019	STS1906029W01	ALL	Initial Issue



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 15.231,Subpart C					
Standard Section	Test Item	Judgment	Remark		
15.207	Conducted Emission	N/A			
15.205(a)/15.209/ 15.231.(e)	Radiated Spurious Emission	PASS			
15.231	Transmission requirement	PASS			
15.231(C)	Bandwidth	PASS			
15.203	Antenna Requirement	PASS			

NOTE: (1)"N/A" denotes test is not applicable in this Test Report

(2) All tests are according to ANSI C63.4-2014 and ANSI C63.10-2013

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd. 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 $\mathbf{y} \pm \mathbf{U}$, where expended uncertainty \mathbf{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	Uncertainty
1	RF output power, conducted	±0.71dB
2	Unwanted Emissions, conducted	±0.63dB
3	All emissions, radiated 30-200MHz	±3.43dB
4	All emissions, radiated 200MHz-1GHz	±3.57dB
5	All emissions, radiated>1G	±4.13dB
6	Conducted Emission (9KHz-150KHz)	±3.18dB
7	Conducted Emission (150KHz-30MHz)	±2.70dB



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	RITE-SENSOR			
Trade Name	Bartec			
Model Name	RITE-SENSOR	RITE-SENSOR		
Series Model	RS-1000			
Model Difference	Only difference in model name.			
Product Description	The EUT is a RITE-SEN Product Type Operation Frequency: Modulation Type: Antenna Designation: Antenna Gain(Peak) More details of EUT teo User's Manual.	NSOR Low Power Communication Device Transmitter 315MHz, 433.92MHz ASK,FSK Internal antenna 2 dBi		
Battery	Capacity: 345mAh Rated Voltage: DC3V			
Hardware version number	1.0.0			
Software version number	1.0.0			
Connecting I/O Port(s)	Please refer to the Use	r's Manual		

Note:

- 1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2. The EUT is assembled with three kinds of valves with different materials and structure, not affect the RF characteristics.
- 3. Table for filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	Bartec	RITE-SENSOR	Internal Ant.	N/A	2	Antenna



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible 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	TX Mode(315MHz)
Mode 2	TX Mode(433.92MHz)

	For Radiated Emission
Final Test Mode	Description
Mode 1	TX Mode(315MHz)
Mode 2	TX Mode(433.92MHz)

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

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

E-1	
EUT	

Note: New battery is used during all test, X, Y, Z axial test all have been done, only worse case is reported.

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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.

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

Necessary accessories

Support units

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

Note:

(1)The support equipment was authorized by Declaration of Confirmation.

(2)For detachable type I/O cable should be specified the length in cm in ^CLength₂ column.



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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	2020.11.01
Horn Antenna	SCHWARZBEC K	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10
Pre-Amplifier(0.1M-3 GHz)	EM	EM330	060665	2018.10.13	2019.10.12
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-4 5	SK2018080901	2018.10.13	2019.10.12
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10
turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power	DARE	RPR3006W	15100041SNO0	2018.10.13	2019.10.12
sensor			3	2010110110	2010110112
Signal Analyzer	Agilent	N9020A	MY49100060	2018.10.13	2019.10.12
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10

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3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15. 207(a) limit in the table below has to be followed.

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

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

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

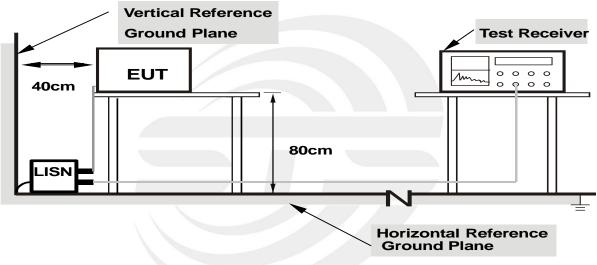
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

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3.2 TEST PROCEDURE

- a. The EUT was placed 0.4 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.
- b.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.
- c.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.
- d.LISN at least 80 cm from nearest part of EUT chassis.
- e.For the actual test configuration, please refer to the related Item -EUT Test Photos.



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:	26 ℃	Relative Humidity:	54%
Phase:	L/N	Test Mode:	N/A

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

3.3 TEST SETUP



4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on Part 15.205(a), then the Part 15.209(a) and Part 15.231(e) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies	Field Strength	Measurement Distance
(MHz)	(micorvolts/meter)	(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~40.66	100	3
40.66~40.70	100	3
40.70~70	100	3

LIMITS OF RADIATED EMISSION MEASUREMENT

Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)	Field Strength of Unwanted Emissions (microvolts/meter)
40.66 - 40.70	1,000	100
70 - 130	500	50
130 - 174	500 to 1,500 **	50 to 1,50 **
174 - 260	1,500	1,50
260 - 470	1,500 to 5,000 **	1,50 to 5,00 **
Above 470	5,000	5,00

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)		
	PEAK	AVERAGE	
Above 1000	74	54	

NOTE:** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental

field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 22.72727(F) - 2454.545;

for the band 260-470 MHz, uV/m at 3 meters = 16.6667(F) - 2833.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.] The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the

average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in 93 Section 15.209, whichever limit permits a higher field strength.



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Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3 MHz

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

4.2 TEST PROCEDURE

- a. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of arotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
- b. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
- c. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receive peak detector mode.
 Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform (Below 1GHz)
- f. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)
- 9. 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

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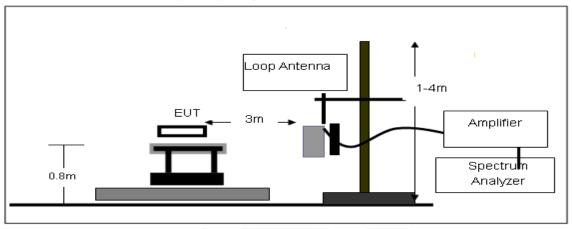
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4.3 DEVIATION FROM TEST STANDARD

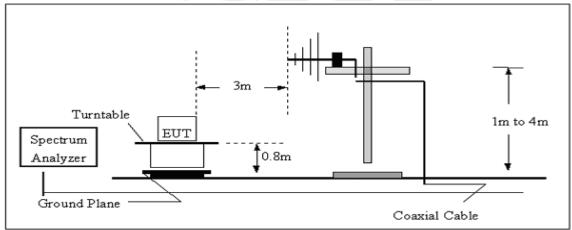
No deviation

4.4 TEST SETUP

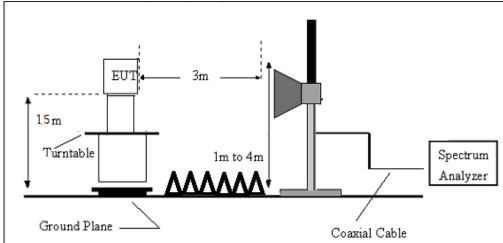
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



(C) Radiated Emission Test-Up Frequency Above 1GHz



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4.5 EUT OPERATING CONDITIONS

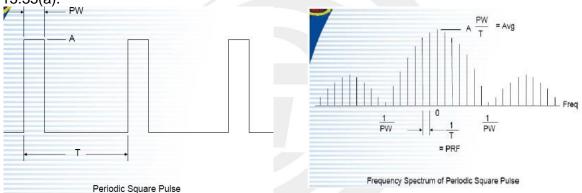
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

INTRODUCTION TO PDCF

Reference: (§15.35 Measurement detector functions and bandwidths.)

a. Part 15 of the FCC Rules provides for the operation of low power communication devices without an individual license (e.g., intrusion detectors, pulsed water tank level gauges, etc.), subject to certain requirements. Some of these devices use extremely narrow pulses to generate wideband emissions, which are measured to determine compliance with the rules. These measurements are typically performed with a receiver or spectrum analyzer. Depending on a number of factors (e.g., resolution bandwidth, pulsewidth, etc.), the spectrum analyzer may not always display the true peak value of the measured emission. This effect, called "pulse desensitization," relates to the capabilities of the measuring instrument. For the measurement and reporting of the true peak of pulsed emissions, it may be necessary to apply a "pulse desensitization correction factor" (PDCF) to the measured value, pursuant to 47 CFR 15.35(a).



If using spectrum analyzer to measure pulse signal , it have to make sure the RBW use is at least 2/PW.

•When RBW is less than 2/PW , you are able to measure the true peak level of the pulse signal. If this is the case , PDCF is required to compensate to determine true peak value. Pulse desensitization(ASK):

Pulse desensitization

For 315MHz:

PW =28700usec,Period=100000usec, Level=A; RBW>2/PW=0.07K , PRF=1/T=0.01K For 433.92MHz:

PW =16800usec,Period=100000usec, Level=A; RBW>2/PW=0.12K , PRF=1/T=0.01K Pulse desensitization(FSK):

For 315MHz:

PW =28900usec,Period=100000usec, Level=A; RBW>2/PW=0.07K , PRF=1/T=0.01K For 433.92MHz:

PW =17700usec,Period=100000usec, Level=A; RBW>2/PW=0.11K, PRF=1/T=0.01K

NOTE: 2 / PW < RBW, first don't need

b. For the actual test, please refer to the ANSI C63.10,Annex C refer to section 7 for more detail

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4.7 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG Where FS = Field Strength CL = Cable Attenuation Factor (Cable Loss) RA = Reading Amplitude AG = Amplifier Gain AF = Antenna Factor

For example

FS AF RA CL AG Factor Frequency (MHz) (dBµV/m) (dBµV/m) (dB) (dB) (dB) (dB) 300 40 58.1 12.2 1.6 31.9 -18.1

Factor=AF+CL-AG

4.8 TEST RESULTS (EMISSION)

(Radiated Emission<30MHz (9KHz-30MHz, H-field))

Temperature:	26.2 ℃	Relative Humidtity:	52%
Test Mode:	Mode 1	Polarization:	

Note: Vertical level have a test this is the worst.

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
				PASS
				PASS

Note:The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB); Limit line = specific limits(dBuv) + distance extrapolation factor.



Between 30MHz - 5000 MHz

ASK

Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Horizontal	Test Mode:	Mode 1

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.1052	29.02	-10.25	-	18.77	40.00	-21.23	QP
2	56.0007	36.11	-23.07	-	13.04	40.00	-26.96	QP
3	118.1860	28.30	-16.85	-	11.45	43.50	-32.05	QP
5	631.6884	36.46	-6.25	-	30.21	67.67	-37.46	Peak
8	631.6884	30.21	-	-10.84	19.37	47.67	-28.3	AV
6	945.4397	41.47	0.03		41.50	67.67	-24.17	Peak
9	945.4397	41.50	-	-10.84	30.66	47.67	-17.01	AV

Fundamental Frequency

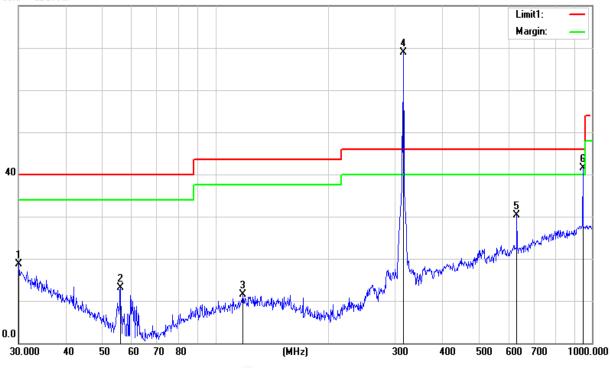
No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	315.4806	82.22	-13.32	-	68.90	87.67	-18.77	peak
7	315.4806	68.90	-	-10.84	58.06	67.67	-9.61	AV

Remark:

1. All readings are Quasi-Peak and Average values.

2. Margin = Result (Result = Reading + Factor)-Limit

80.0 dBuV/m



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Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Vertical	Test Mode:	Mode 1

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.2110	29.39	-11.30	-	18.09	40.00	-21.91	QP
2	53.5052	38.81	-22.48	-	16.33	40.00	-23.67	QP
3	132.2204	27.33	-17.54	-	9.79	43.50	-33.71	QP
5	631.6884	30.80	-6.40	-	24.40	67.67	-43.27	Peak
8	631.6884	24.40	-	-10.84	13.56	47.67	-34.11	AV
6	945.4397	40.86	-0.54		40.32	67.67	-27.35	Peak
9	945.4397	40.32	-	-10.84	29.48	47.67	-18.19	AV

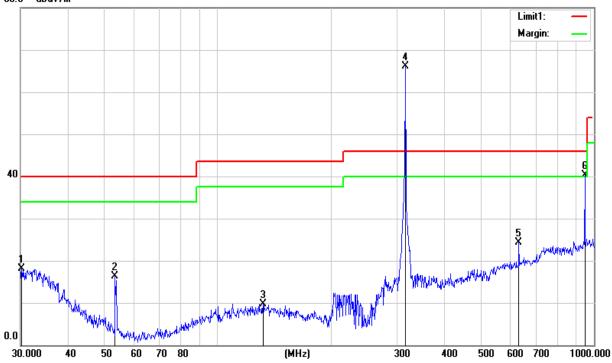
Fundamental Frequency

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	315.4806	80.51	-14.32	-	66.19	87.67	-21.48	peak
7	315.4806	66.19		-10.84	55.35	67.67	-12.32	AV

Remark:

2. Margin = Result (Result = Reading + Factor)-Limit

80.0 dBuV/m



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^{1.} All readings are Quasi-Peak and Average values.

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Report No.: STS1906029W01



Phase: Horizontal Test Mode: Mode 2	Temperature	e: 26.2 °C	Relative Humidtity:	52%
	Phase:	Horizontal	Test Mode:	Mode 2

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.0000	31.69	-10.19	-	21.50	40.00	-18.50	QP
2	129.4677	32.22	-16.64	-	15.58	43.50	-27.92	QP
3	280.0237	29.15	-14.20	-	14.95	46.00	-31.05	QP
5	640.6110	29.90	-5.96	-	23.94	46.00	-22.06	QP
6	869.1302	42.39	-2.32	-	40.07	72.87	-32.80	peak
8	869.1302	40.07		-15.49	24.58	52.87	-28.29	AV

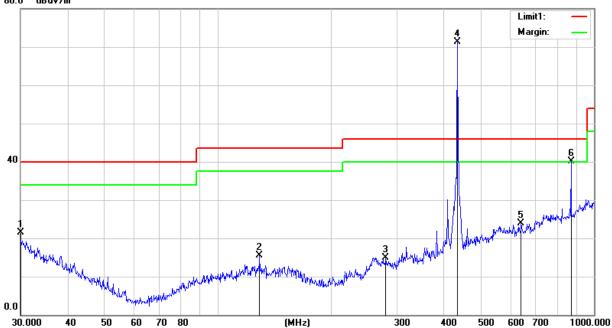
Fundamental Frequency

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	434.0651	82.26	-10.99	-	71.27	92.87	-21.60	peak
7	434.0651	71.27		-15.49	55.78	72.87	-17.09	AV

Remark:

- 1. All readings are Quasi-Peak and Average values.
- 2. Margin = Result (Result = Reading + Factor)-Limit





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Report No.: STS1906029W01

	1	
		7
1		

Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Vertical	Test Mode:	Mode 2

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.1054	32.25	-11.24	-	21.01	40.00	-18.99	QP
2	129.0146	30.25	-17.56	-	12.69	43.50	-30.81	QP
3	285.9778	30.89	-15.57	-	15.32	46.00	-30.68	QP
5	642.8613	29.64	-6.34	-	23.30	46.00	-22.70	QP
6	869.1302	37.26	-2.61	-	34.65	72.87	-38.22	peak
8	869.1302	34.65	-	-15.49	19.16	52.87	-33.71	AV

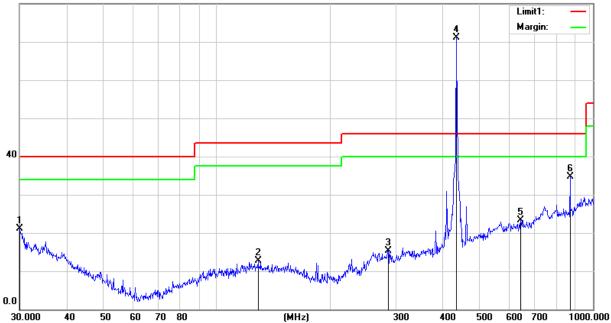
Fundamental Frequency

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	434.0651	82.01	-10.99		71.02	92.87	-21.85	peak
7	434.0651	71.02	-	-15.49	55.53	72.87	-17.34	AV

Remark:

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

80.0 dBuV/m



^{1.} All readings are Quasi-Peak and Average values.



FSK

Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Horizontal	Test Mode:	Mode 1

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.0000	28.09	-10.19	-	17.90	40.00	-22.10	QP
2	98.1420	27.17	-18.81	-	8.36	43.50	-35.14	QP
3	126.7723	27.18	-16.63	-	10.55	43.50	-32.95	QP
5	631.6884	40.83	-6.25	-	34.58	67.67	-33.09	peak
8	631.6884	34.58	-	-10.78	23.80	47.67	-23.87	AV
6	993.0113	24.46	0.07	-	24.53	67.67	-43.14	peak
9	993.0113	24.53	-	-10.78	13.75	47.67	-33.92	AV

Fundamental Frequency

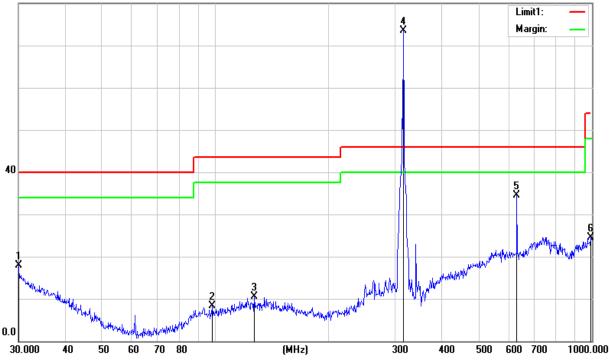
No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	315.4806	86.85	-13.32		73.53	87.67	-14.14	peak
7	315.4806	73.53	-	-10.78	62.75	67.67	-4.92	AV

Remark:

1. All readings are Quasi-Peak and Average values.

2. Margin = Result (Result = Reading + Factor)-Limit

80.0 dBu∀/m



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Report No.: STS1906029W01



Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Vertical	Test Mode:	Mode 1

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.5304	30.63	-11.47	-	19.16	40.00	-20.84	QP
2	109.7960	31.39	-18.36	-	13.03	43.50	-30.47	QP
3	231.7178	33.23	-18.36	-	14.87	46.00	-31.13	QP
5	631.6884	34.14	-6.40	-	27.74	67.67	-39.93	peak
8	631.6884	27.74	-	-10.78	16.96	47.67	-30.71	AV
6	945.4397	41.87	-0.54	-	41.33	67.67	-26.34	peak
9	945.4397	41.33	-	-10.78	30.55	47.67	-17.12	AV

Fundamental Frequency

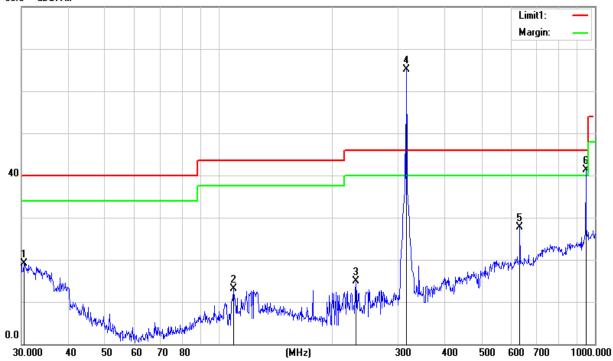
No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
4	315.4806	79.47	-14.32	-	65.15	87.67	-22.52	peak
7	315.4806	65.15	-	-10.78	54.37	67.67	-13.30	AV

Remark:

1. All readings are Quasi-Peak and Average values.

2. Margin = Result (Result = Reading + Factor)-Limit

80.0 dBuV/m



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Report No.: STS1906029W01



Phase: Horizontal Test Mode: Mode 2	Temperature:	26.2 ℃	Relative Humidtity:	52%
	Phase:	Horizontal	Test Mode:	Mode 2

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.3173	29.33	-10.36	-	18.97	40.00	-21.03	QP
2	55.2207	41.14	-22.75	-	18.39	40.00	-21.61	QP
3	82.6482	36.13	-21.23	-	14.90	40.00	-25.10	QP
4	145.3505	28.18	-17.01	-	11.17	43.50	-32.33	QP
6	869.1302	40.98	-2.32	-	38.66	72.87	-33.68	peak
8	869.1302	38.66	-	-15.04	23.62	52.87	-29.25	AV

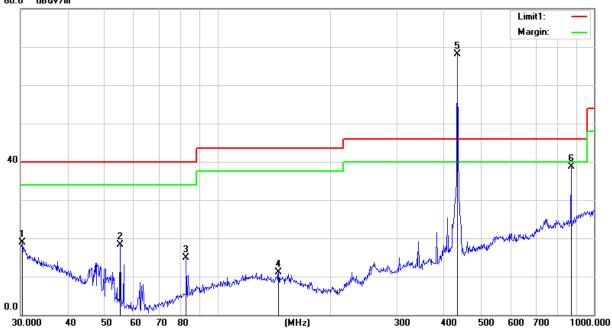
Fundamental Frequency

No.	Frequency	Reading	Correct	Duty cycle Result		Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	ctor(dB/m) (dBuV/m)		(dB)	
5	434.0651	79.08	-10.99	-	68.09	92.87	-24.78	peak
7	434.0651	68.09		-15.04	53.05	72.87	-19.82	AV

Remark:

- 1. All readings are Quasi-Peak and Average values.
- 2. Margin = Result (Result = Reading + Factor)-Limit





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Report No.: STS1906029W01

1	
	7

Temperature:	26.2 ℃	Relative Humidtity:	52%
Phase:	Vertical	Test Mode:	Mode 2

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.2110	30.48	-11.30	-	19.18	40.00	-20.82	QP
2	79.8002	35.52	-22.72	-	12.80	40.00	-27.20	QP
3	119.0180	28.90	-17.75	-	11.15	43.50	-32.35	QP
4	224.5192	36.52	-18.83	-	17.69	46.00	-28.31	QP
6	869.1301	33.80	-2.61	-	31.19	72.87	-41.68	peak
8	869.1301	31.19	-	-15.04	16.15	52.87	-36.72	AV

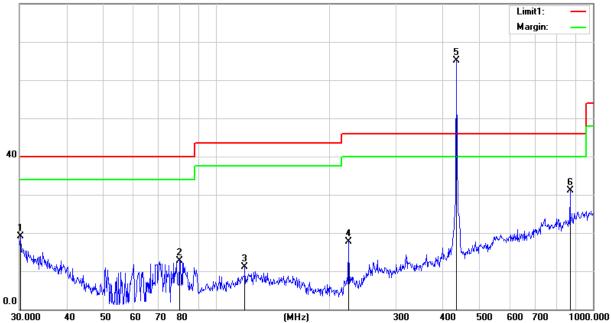
Fundamental Frequency

No.	Frequency	Reading	Correct	Duty cycle	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
5	434.0650	75.97	-10.90		65.07	92.87	-27.80	peak
7	434.0650	65.07		-15.04	50.03	72.87	-22.84	AV

Remark:

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

80.0 dBuV/m



^{1.} All readings are Quasi-Peak and Average values.



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ASK

315MHz: PEAK TEST RESULTS:

Frequency	Frequency Reading	Detector	Amplifier	Loss	Antenna Factor	Orrected Factor	Corrected Amplitude	FCC Part 15.231/15.209/205		RX Antenna
					Facior	Factor	Ampillude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(PK/QP/AV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
945.06	65.07	PK	45.1	4.0	25.1	-16.00	49.07	74	-24.93	н
945.06	65.76	PK	45.1	4.0	25.1	-16.00	49.76	74	-24.24	V
1260.04	63.10	PK	44.1	5.3	25	-13.80	49.30	74	-24.70	н
1260.04	64.20	PK	44.1	5.3	25	-13.80	50.40	74	-23.60	V
1575.04	61.29	PK	43.8	5.4	25.9	-12.47	48.82	74	-25.18	н
1575.04	62.26	PK	43.8	5.4	25.9	-12.47	49.79	74	-24.21	V
1890.02	57.17	PK	44.4	6.0	27.6	-10.77	46.40	74	-27.60	н
1890.02	57.18	PK	44.4	6.0	27.6	-10.77	46.41	74	-27.59	V

Note: Above 1.5GHz The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

AVG TEST RESULTS:

AV = Peak +20Log10(duty cycle) =PK+(-10.84) [refer to section 7 for more detail]

Frequency	PK Reading	Duty cycle	AV Reading	Orrected	Corrected		Part 5.209/205	RX Antenna
				Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
945.06	65.07	-10.84	54.23	-16.00	38.23	54	-15.77	н
945.06	65.76	-10.84	54.92	-16.00	38.92	54	-15.08	V
1260.04	63.10	-10.84	52.26	-13.80	38.46	54	-15.54	н
1260.04	64.20	-10.84	53.36	-13.80	39.56	54	-14.44	V
1575.04	61.29	-10.84	50.45	-12.47	37.98	54	-16.02	Н
1575.04	62.26	-10.84	51.42	-12.47	38.95	54	-15.05	V
1890.02	57.17	-10.84	46.33	-10.77	35.56	54	-18.44	Н
1890.02	57.18	-10.84	46.34	-10.77	35.57	54	-18.43	V



433.92MHz:

PEAK TEST RESULTS:

Frequency	Meter	Detector	Amplifier	Loss	Antenna	Orrected	Corrected	FCC Part 15.231/15.209/205		RX Antenna
	Reading				Factor	Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(PK/QP/AV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
1301.79	65.27	PK	45.1	4.0	25.1	-16.00	49.27	74	-24.73	Н
1301.79	65.57	PK	45.1	4.0	25.1	-16.00	49.57	74	-24.43	V
1735.69	62.97	PK	44.1	5.3	25	-13.80	49.17	74	-24.83	Н
1735.69	64.42	PK	44.1	5.3	25	-13.80	50.62	74	-23.38	V
2169.45	61.74	PK	43.8	5.4	25.9	-12.47	49.27	74	-24.73	Н
2169.45	62.27	PK	43.8	5.4	25.9	-12.47	49.80	74	-24.20	V
2603.39	57.20	PK	44.4	6.0	27.6	-10.77	46.43	74	-27.57	Н
2603.39	57.17	РК	44.4	6.0	27.6	-10.77	46.40	74	-27.60	V

Note: Above 1.5GHz The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

AVG TEST RESULTS:

Frequency	PK Reading	Duty cycle	AV Reading	Orrected	Corrected	FCC 15.231/1	RX Antenna	
				Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
1301.79	65.27	-15.49	49.78	-16.00	33.78	54	-20.22	н
1301.79	65.57	-15.49	50.08	-16.00	34.08	54	-19.92	V
1735.69	62.97	-15.49	47.48	-13.80	33.68	54	-20.32	н
1735.69	64.42	-15.49	48.93	-13.80	35.13	54	-18.87	V
2169.45	61.74	-15.49	46.25	-12.47	33.78	54	-20.22	н
2169.45	62.27	-15.49	46.78	-12.47	34.31	54	-19.69	V
2603.39	57.20	-15.49	41.71	-10.77	30.94	54	-23.06	н
2603.39	57.17	-15.49	41.68	-10.77	30.91	54	-23.09	V

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FSK

315MHz: PEAK TEST RESULTS:

Frequency	Frequency Reading Det	Detector	Amplifier	Loss	Antenna	Orrected	Corrected	FCC Part 15.231/15.209/205		RX Antenna
					Factor	Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(PK/QP/AV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
945.03	64.96	PK	45.1	4.0	25.1	-16.00	48.96	74	-25.04	н
945.03	65.54	PK	45.1	4.0	25.1	-16.00	49.54	74	-24.46	V
1260.16	62.99	PK	44.1	5.3	25	-13.80	49.19	74	-24.81	н
1260.16	64.23	PK	44.1	5.3	25	-13.80	50.43	74	-23.57	V
1575.14	61.33	PK	43.8	5.4	25.9	-12.47	48.86	74	-25.14	н
1575.14	61.94	PK	43.8	5.4	25.9	-12.47	49.47	74	-24.53	V
1890.01	57.10	PK	44.4	6.0	27.6	-10.77	46.33	74	-27.67	Н
1890.01	57.27	PK	44.4	6.0	27.6	-10.77	46.50	74	-27.50	V

Note: Above 1.5GHz The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

AVG TEST RESULTS:

AV = Peak +20Log10(duty cycle) =PK+(-10.78) [refer to section 7 for more detail]

Frequency	PK Reading	Duty cycle	AV Reading	Orrected	Corrected	FCC Part 15.231/15.209/205		RX Antenna
				Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
945.03	64.96	-10.78	54.18	-16.00	38.18	54	-15.82	Н
945.03	65.54	-10.78	54.76	-16.00	38.76	54	-15.24	V
1260.16	62.99	-10.78	52.21	-13.80	38.41	54	-15.59	Н
1260.16	64.23	-10.78	53.45	-13.80	39.65	54	-14.35	V
1575.14	61.33	-10.78	50.55	-12.47	38.08	54	-15.92	н
1575.14	61.94	-10.78	51.16	-12.47	38.69	54	-15.31	V
1890.01	57.10	-10.78	46.32	-10.77	35.55	54	-18.45	Н
1890.01	57.27	-10.78	46.49	-10.77	35.72	54	-18.28	V



433.92MHz:

PEAK TEST RESULTS:

Frequency	Meter	Detector	Amplifier	Loss	Antenna Factor	Orrected Factor	Corrected Amplitude	FCC Part 15.231/15.209/205		RX Antenna
	Reading				Factor	Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(PK/QP/AV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
1301.94	65.18	PK	45.1	4.0	25.1	-16.00	49.18	74	-24.82	Н
1301.94	65.64	PK	45.1	4.0	25.1	-16.00	49.64	74	-24.36	V
1735.87	62.97	PK	44.1	5.3	25	-13.80	49.17	74	-24.83	Н
1735.87	64.14	PK	44.1	5.3	25	-13.80	50.34	74	-23.66	V
2169.49	61.52	PK	43.8	5.4	25.9	-12.47	49.05	74	-24.95	Н
2169.49	61.96	PK	43.8	5.4	25.9	-12.47	49.49	74	-24.51	V
2603.47	56.98	PK	44.4	6.0	27.6	-10.77	46.21	74	-27.79	Н
2603.47	57.44	PK	44.4	6.0	27.6	-10.77	46.67	74	-27.33	V

Note: Above 1.5GHz The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

AVG TEST RESULTS:

Frequency	PK Reading	Duty cycle	AV Reading	Orrected	Corrected		Part 5.209/205	RX Antenna
				Factor	Amplitude	Limit	Margin	Polar
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(H/V)
1301.94	65.18	-15.04	50.14	-16.00	34.14	54	-19.86	Н
1301.94	65.64	-15.04	50.60	-16.00	34.60	54	-19.40	V
1735.87	62.97	-15.04	47.93	-13.80	34.13	54	-19.87	н
1735.87	64.14	-15.04	49.10	-13.80	35.30	54	-18.70	V
2169.49	61.52	-15.04	46.48	-12.47	34.01	54	-19.99	Н
2169.49	61.96	-15.04	46.92	-12.47	34.45	54	-19.55	V
2603.47	56.98	-15.04	41.94	-10.77	31.17	54	-22.83	Н
2603.47	57.44	-15.04	42.40	-10.77	31.63	54	-22.37	V

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5. BANDWIDTH TEST

5.1 LIMIT

FCC Part 15.231,Subpart C							
Section	Test Item	Limit	Frequency Range (MHz)	Result			
15.231(C)	20dB Bandwidth	The 20dB bandwidth of the emissions shall not exceed 0.25% of the center frequency	315,433.92	PASS			

Spectrum Parameter	Setting			
Attenuation	Auto			
Span Frequency	> Measurement Bandwidth			
RB	10 kHz (20dB Bandwidth)			
VB	30 kHz (20dB Bandwidth)			
Detector	Peak			
Trace	Max Hold			
Sweep Time	Auto			

5.2 TEST REQUIREMENTS

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting : RBW= 10KHz, VBW=30KHz, Sweep time = Auto.

5.4 TEST SETUP

EUT	SPECTRUM
	ANALYZER

5.5 EUT OPERATION CONDITIONS

TX mode.



5.6 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Test Mode:	TX Mode		

ASK								
Centre Frequency	Measurement							
	20dB Bandwidth	Limit(kHz)	Frequency Range					
1 9	(KHz)		(MHz)					
315 MHz	49.2	787.5	PASS					
433.92 MHz	48.34	1084.8	PASS					

315 MHz

	trum Analyzer - Occupied B	W					
Center I	RF 50 Q AC Freq 315.000000 I	WHZ Cent Trig:	SENSE:PULSE er Freq: 315.000 Free Run en: 10 dB	ALIGNAU 000 MHz Avg Hold:>10/10	лто 01:21:05 РМЈ Radio Std: N Radio Devic	lone	Frequency
10 dB/div Log	Ref 10.00 dBn	n					
0.00 +10.0 -20.0							Center Freq 315.000000 MHz
-30.0				<u> </u>			
-50.0 -60.0	manganganganganga	mmulmund		- www.twww.	᠕᠕᠕ᠰ᠕᠕ᡁᠬᢦᢛᠬᠬ᠕ᠰᡅᠡ	Monno	
-80.0	315 MHz				Snar	n 1 MHz (
	V 10 kHz		#VBW 30 kH	lz	Sweep	12.4 ms	CF Step 100.000 kHz
Occu	ipied Bandwidt	h	Total P	ower -4	.44 dBm		<u>Auto</u> Man
	7	0.728 kHz					Freq Offset
Trans	smit Freq Error	14.136 kHz	OBW P	ower	99.00 %		0 Hz
x dB	Bandwidth	49.20 kHz	x dB	-	20.00 d B		
MSG				S	TATUS		

Т

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433.92 MHz

	rum Analyzer - Occupied BW	/						
(XI RL Contor E	RF 50 Ω AC req 433.920000 M	Liz Cer	SENSE:PUL	SE 433.920000 MHz	ALIGN AUTO	09:46:38 AM Radio Std:	Jun 18, 2019 None	Frequency
	•	Trig	: Free Ru	n Avg Ho	d:>10/10			
		#IFGain:Low #Att	en: 10 dB:			Radio Devi	ce: BTS	
	Def 40.00 dDm							
10 dB/div Log	Ref 10.00 dBm							
0.00								Center Freq
-10.0			$+\Lambda$					433.920000 MHz
-20.0			+++					
-30.0			\downarrow					
-40.0				Market Market				
-50.0	montenanton	1 Aller Commander		- man and	mon	. MARAMA	ummin	
-60.0	A share but he	And A shares			1~414 4,2410	Mad 141.		
-70.0								
-80.0								
	22 0 BALL-					0		
Center 4 #Res BW			#VBW	30 kHz			un 1 MHz 12.4 ms	CF Step
#1100 D 11							1211 1110	100.000 kHz Auto Man
Occu	pied Bandwidth	1	Тс	otal Power	-5.38	3 dBm		<u>rato</u> man
	70).607 kHz						Freq Offset
Transr	mit Freq Error	-955 Hz	о	BW Power	99	9.00 %		0 Hz
x dB B	Bandwidth	48.34 kHz	x	dB	-20.	00 dB		
MSG					STATU	s		<u> </u>
						1		



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	Measurement							
Centre Frequency	20dB Bandwidth	Limit(kHz)	Frequency Range					
- 1 7	(KHz)		(MHz)					
315 MHz	125.7	787.5	PASS					
433.92 MHz	126.8	1084.8	PASS					

FSK

315 MHz

RL RF 50 Q AC	SE	ENSE:PULSE	ALIGNAUTO 09:55:09 A	M Jun 18, 2019	-
enter Freq 315.000000 M		r Freq: 315.000000 MHz	Radio Std	: None	Frequency
		reeRun Avg Holo ∷10 dB	Radio Dev	/ice: BTS	
dB/div Ref 10.00 dBm					
29					Center Fre
0.0	Λ				315.000000 MH
.0					
1.0	/	- T - Wu			
0.0		- here			
0.0 months when the way	ALANNA CONTRACT		namman	www.	
0.0					
1.0					
0.0					
enter 315 MHz			Sn	an 1 MHz	
Res BW 10 kHz	#	VBW 30 kHz		12.4 ms	CF Stej 100.000 kH
Occupied Bandwidth		Total Power	-1.58 dBm	A	<u>uto</u> Ma
	26.08 kHz				
12	0.00 KHZ				Freq Offse
Transmit Freq Error	4.353 kHz	OBW Power	99.00 %		0 H
x dB Bandwidth	125.7 kHz	x dB	-20.00 dB		
3			STATUS		

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433.92 MHz

ilent Spectrum Analyzer - Occupie RL RF 50 Ω AC		SENSE:INT	ALIGN AUTO	10:12:48 AM Jul 12, 2019	Frequency
enter Freq 433.92000	D MHz Cen	ter Freq: 433.920000 MHz		Radio Std: None	Frequency
		:FreeRun Avg Holo en:20 dB		Radio Device: BTS	
dB/div Ref 10.00 dB	3m				
00					Center Fre
1.0					433.920000 MH
10					
0		ψ			
.0	and the second	han a start a			
.0	and and and and a second	Mary Maryon			
arm the way are and a	And the second s		mould	www.	
.0					
0					
0					CF Ste
enter 433.9 MHz				Span 1 MHz	100.000 kH Auto Ma
les BW 10 kHz		#VBW 30 kHz		Sweep 9.6 ms	<u>Auto</u> Mit
Occupied Bandwid	dth	Total Power	-3.06	dBm	Freq Offs
=	125.04 kHz				01
Transmit Freq Error	-1.113 kHz	OBW Power	99.	00 %	
x dB Bandwidth	126.8 kHz	x dB	-20.0	0 dB	
3			STATUS		



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6. TRANSMITTER TIMEOUT

6.1 LIMIT

In addition, devices operated under the provisions of this paragraph shall be provided with a means For automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the but in no case less than 10 seconds.

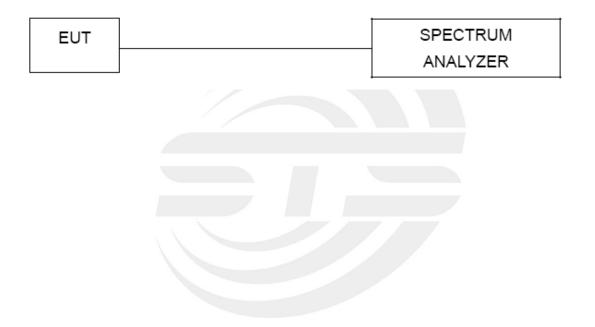
6.2 TEST PROCEDURE

(1) Put the EUT on the support in its standard position with associated equipment and switched on.

(2) Set center frequency of spectrum analyzer = operating frequency.

(3) Set the spectrum analyzer as RBW=100kHz, VBW=100kHz, Span=0Hz, Adjust Sweep=120s.(4) record the duration time

6.3 TEST SETUP



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6.4 TEST RESULTS

Temperature:	26 ℃	Relative Humidity:	53%
Test Mode:	TX Mode1		

	ASK	
Frequency(MHz)	Each transmission time(s)	silent period between transmissions(s)
315	0.36	15.15
433.92	0.95	30.95
Limit	<1s	>10s and > 30*(duration of transmission)
Result	Pa	SS

315 MHz

RL RF 50Ω AC	SENSE:PULSE	ALIGN AUTO	01:39:41 PM Jun 18, 2019		
arker 3 Δ 15.1500 s	PNO: Wide +++ Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWWW	Marker	
dB/div Ref 10.00 dBm	IFGain:Low Atten: 20 dB		ΔMkr3 15.15 s 1.79 dB	Select Marker 3	
29 .00 .00				Norm	
.0				Del	
	sala bernara sere un den annon	304	Langer and the second of the	Fixe	
enter 315.000000 MHz es BW 100 kHz	#VBW 100 kHz	•	Span 0 Hz 30.00 s (1001 pts)	c	
2 F 1 t Δ4 1 t (Δ) 4 F 1 t	360.0 ms (Δ) 1.65 dB 4.800 s -74.72 dBm 15.15 s (Δ) 1.79 dB 4.800 s -74.72 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Properties	
5 7 3 9				M a 1 o	
1			v .		

П

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433.92 MHz

		Ω AC			SENSE:	PULSE		ALIGN			AM Jun 18, 2019	Marker
rker 3 Z	30.9500	Js	PNO: Wid IFGain:Lo		Trig: Free Atten: 20		Avg Typ	e: Log	-Pwr	T	ACE 12345 E YPE WWWWWWWW DET PNNNNN	
dB/div	Ref 10.00) dBm								ΔMkr	3 30.95 s 0.10 dB	
												Norr
)												
)												De
	162	erte-ord-east	mar the reserves	90.104110 a	بونسر بوواد سوروار	بعسر الميهاسماة			3∆4 	elyson deetysen	munduel	Fixe
	8.920000 F 10 kHz	٧Hz	#\	/BW	100 kHz			Sw	/eep		Span 0 Hz (1001 pts)	
MODE TRO A2 1 F 1	sc∟ t (∆) t	×	950.0 ms 5.250 s	(Δ)	Y 0.13 d -74.06 dB	iB	ICTION FU	INCTION	WIDTH	FUNC	TION VALUE	
Δ4 1 F 1	t (Δ) t		30.95 s 5.250 s	(Δ)	0.10 d -74.06 dB	iB						Propertie
												м
											~	1



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FSK

Frequency(MHz)	Each transmission time(s)	silent period between transmissions(s)
315	0.39	15.15
433.92	0.95	31.2
Limit	<1s	>10s and > 30*(duration of transmission)
Result	Pa	ISS

315 MHz

ent Spectrum Analyzer - Swept SA RL RF 50 Ω AC		SENSE:PULSE	ALIGN AUTO	10:10:12 AM Jun 18, 2019	
nter Freq 315.000000	MHz PNO: Wide ↔ IFGain:Low		Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency
dB/div Ref 10.00 dBm	IFGain:Low	Auen. 20 40		ΔMkr3 15.15 s 0.41 dB	Auto Tun
					Center Fre 315.000000 MH
0					Start Fre 315.000000 MH
0 0 0 0	1∆2 ***	ร _{ด้สา} นการสมบารสมบารณ	normania and take the	3∆4 ndraandanadanadana	Stop Fro 315.000000 Mi
nter 315.000000 MHz s BW 100 kHz	#VBV	V 100 kHz	•	Span 0 Hz 30.00 s (1001 pts)	CF Ste 100.000 kł Auto Mi
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	390.0 ms (Δ) 8.400 s 15.15 s (Δ) 8.400 s	0.37 dB -74.19 dBm	FUNCTION VIOTH		Freq Offs 0 H



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433.92 MHz

						,		Analyzer			
Marker	02:11:06 PM Jun 18, 2019 TRACE 1 2 3 4 5 6	ALIGN AUTO Type: Log-Pwr	LSE	SENSE:			50Ω AC	RF 31.20			RI
Select Marke	TYPE WWWWWWWWW DET P N N N N N	rype. Log-i wi		Trig: Free Atten: 20 d		PNO: Wid IFGain:Lo	00 5	31.20	<u>5 </u>	ker	ar
3	ΔMkr3 31.20 s -0.02 dB						00 dBm	lef 10.	F	3/div) di
Norm											og).00
											0.0 0.0
Del											0.0 0.0
		3∆4					2				0.0 0.0
Fixed	statentinutation industries to the	renellation and the manufacture	and _{e l} enality	-to-galacerist of the sec	reterenteren		he the second and the	****	manaah		0.0 0.0
c	Span 0 Hz 50.00 s (1001 pts)	Sweep	FUNC	100 kHz Y	tvbw	#\) MHz ×	920000) kHz		BW	es
Properties	H			-0.52 d -73.60 dBi -0.02 d -73.60 dBi	s s(Δ)	950.0 ms 5.000 s 31.20 s 5.000 s		t (Δ) t t (Δ) t		Δ2 F Δ4 F	2
M o 1 o	•										7 8 9 0



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7. PERIODIC OPERATION

7.1 TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

The Duty Cycle Was Determined By The Following Equation: To Calculate The Actual Field Intensity, The Duty Cycle Correction Factor In Decibel Is Needed For Later Use And Can Be Obtained From Following Conversion

Duty Cycle(%)=Total On Interval In A Complete Pulse Train/ Length Of A Complete Pulse Train * %

Duty Cycle Correction Factor(Db)=20 * Log10(Duty Cycle(%)

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

TX mode.



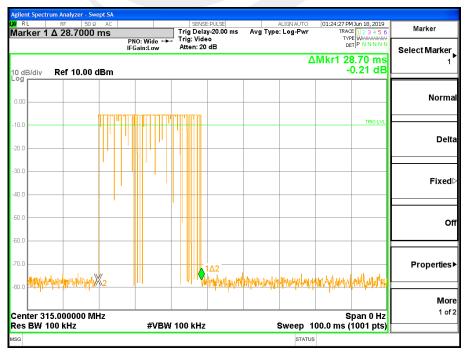


7.4 TEST RESULTS

ASK 315 MHz FCC Part15.231(e) Total On interval in a complete pulse train(ms) 28.7 Length of a complete pulse train(ms) 100 Duty Cycle(%) 28.70% Duty Cycle Correction Factor(dB) -10.84433.92 MHz FCC Part15.231(e) Total On interval in a complete pulse train(ms) 16.8 100 Length of a complete pulse train(ms) Duty Cycle(%) 16.80% Duty Cycle Correction Factor(dB) -15.49

Refer to the duty cycle plot (as below), This device meets the FCC requirement. Length of a complete pulse train

Remark:FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.



315 MHz

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433.92 MHz

												t Spectrum An	
Marker	D4 AM Jun 18, 2019 TRACE 1 2 3 4 5 6	09:12:04 AM		Avg Type	::PULSE y-20.00 ms					AC	50 Ω		XIRL
Select Marker	TYPE WWWWWWWWW DET P N N N N N	TYI	. Log-r wi	Avg type	0	Trig: Vide Atten: 20	e ⊶⊷ w	O: Wide ain:Lov	PN IFG	ns	.8000 n	ker 1 Δ 1	mari
	16.80 ms -4.81 dB		Δ							Зm	10.00 di	3/div Re i	10 dB Log r
Norma													0.00
													-10.0
Delta	TRIG LVL												-20.0
Fixed⊳													-30.0
													-40.0
Off													-50.0
													60.0
Properties►	and the station	u Universite		المعادية المعاد			102			,			-70.0
More	kit/alkadroit/sit/sit	ultriworkihity	N. A. Marina	htereden gehateren var Anterese anterese anterese anterese anterese anterese anterese anterese anterese anteres Anterese anterese anter	internation (th rumhult with	V ive ii	л. ЦК	<u>l</u>	2 '	AND A CONTRACT OF A CONTRACTACT OF A CONTRACTACT OF A CONTRACTACT OF A CONTRACTACT OF A CONTRACTACTACTACTACTACTACTACTACTACTACTACTACTA	www.coloryh	-80.0
1 of 2	Span 0 Hz s (1001 pts)		Sweep 1			100 kHz	/BW	#V		z		er 433.92 BW 100 k	
			STATUS										MSG



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FSK

FCC Part	15 231(e)									
T CC F alt	13:231(e)									
Total On interval in a complete pulse train(ms)	28.9									
Length of a complete pulse train(ms)	100									
Duty Cycle(%)	28.90%									
Duty Cycle Correction Factor(dB)	-10.78									
433.92	2 MHz									
FCC Part	FCC Part15.231(e)									
Total On interval in a complete pulse train(ms)	17.7									
Length of a complete pulse train(ms)	100									
Duty Cycle(%)	17.70%									
Duty Cycle Correction Factor(dB)	-15.04									

Refer to the duty cycle plot (as below), This device meets the FCC requirement. Length of a complete pulse train

Remark:FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

Marker Select Marke		09:57:07 AM TRACE TYPE DE	ALIGN AUTO :: Log-Pwr				PNO: Wide ↔→ IFGain:Low		RF 50 Ω 28.9000	
	8.90 ms 2.29 dB	Mkr1 28	Δ					dBm	Ref 10.00 d	B/div R
Norr										
De	TRIG LVL						1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,			
Fixe										
Propertie	Jo at shit day	yuuluuluu	in a static to the	a dhaanaa ah an	1Δ2 mb for				to and and	Manand
M (1)	pan 0 Hz				call house on a	¥		Hz	000000 MH	nter 315.0

315 MHz



433.92 MHz

Agilent Spectrum Analyzer - Swept SA					
Marker 1 Δ 17.7000 ms		vse:PULse elay-20.00 ms	ALIGNAUTO Avg Type: Log-Pwr	02:04:58 PM Jun 18, 2019 TRACE 1 2 3 4 5 6	Marker
	PNO: Wide +++ Trig: Vi IFGain:Low Atten: :	deo	ing type. Log i ni	DET P N N N N	Select Marker
۵ مالکتر معند من معند من ۵ مالکتر معند من ۵ مالکتر معند من معند من ۵ مالکتر معند معند من ۵ مالکتر معند معند من ۵ مالکتر معند معند معند معند معند معند معند معند					1
0.00					Normal
-10.0					
-20.0				TRIG LVL	Delta
-30.0					Fixed⊳
-40.0					
-50.0					Off
-60.0					
-70.0 -80.0	1 <u>0</u> 2	with the state of	where a strain where the	Muunumahanathalaha	Properties►
		len de la	· · · · · · · · · ·		More 1 of 2
Center 433.920000 MHz Res BW 100 kHz	#VBW 100 kH	z	Sweep 1	Span 0 Hz 00.0 ms (1001 pts)	. 012
MSG			STATUS		



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8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

According to the FCC Part 15 Paragraph 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. The use of a permanently attached antenna to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product use a permanent ceramic printed antenna, fulfill the requirement of this section

8.2 EUT ANTENNA

The EUT antenna is Internal antenna. It conforms to the standard requirements.



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APPENDIX 1- 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****



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