

RADIO TEST REPORT

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Report No: STS1710201W01

Issued for

Star Systems International Limited

Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK

Product Name:	RFID READER
Brand Name:	TITAN
Model Name:	HRD22000
Series Model:	N/A
FCC ID:	2AA7KTITAN-22000
Test Standard:	FCC Part 15.247

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Report No.: STS1710201W01

TEST RESULT CERTIFICATION

Applicant'sname:	Star Systems International Limited
Address	Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK
Manufacture's Name	Star Systems International Limited
Address	Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK
Product description	
Product Name:	RFID READER
Brand Name	TITAN
Model Name:	HRD22000
Series Model	N/A
Test Standards	FCC Part15.247
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 Test.....

Date (s) of performance of tests : 10 Oct. 2017~13 Nov. 2017

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Date of Issue: 13 Nov. 2017

Test Result Pass

Testing Engineer

Technical Manager

Sean She

(Sean she) alim. hou



APPROVAL

Authorized Signatory :

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	13 Nov. 2017	STS1710201W01	ALL	Initial Issue



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: DA 00-705

FCC Part 15.247,Subpart C					
Standard Section	Test Item	Judgment	Remark		
15.207	Conducted Emission	PASS			
15.247(a)(1)	Hopping Channel Separation	PASS			
15.247(a)(1)&(b)(1)	Output Power	PASS			
15.247(c)	Radiated Spurious Emission	PASS			
15.247(d)	Conducted Spurious & Band Edge Emission	PASS			
15.247(a)(iii)	Number of Hopping Frequency	PASS			
15.247(a)(iii)	Dwell Time	PASS			
15.247(a)(1)	Bandwidth	PASS			
15.205	Restricted Band Edge Emission	PASS			
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS			
15.203	Antenna Requirement PASS KDB 59				

NOTE:

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

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

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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 CNAS Registration No.: L7649; FCC Registration No.: 625569 IC Registration No.: 12108A; 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 % $^\circ$

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No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power, conducted	±0.71dB
4	Spurious emissions, conducted	±0.63dB
5	All emissions,radiated (9KHz-30MHz)	±3.02dB
6	All emissions, radiated (30MHz-200MHz)	±3.80dB
7	All emissions,radiated (200MHz-1000MHz)	±3.97dB
8	All emissions,radiated(>1G)	±3.03dB



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	RFID READER
Trade Name	TITAN
Model Name	HRD22000
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
RF Information	Frequency: 902~928MHz Modulation: FHSS
Adapter	Input: AC 100-240V, 800mA, 50/60 Hz Output: DC 24V, 1.25A
Operation mode	Dense reader mode
Operation mode	Single reader mode
Hardware version number	R5
Software version number	0.7.2.9319_rr
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. This device only supports SISO mode, just one of the four RF ports will be actived during normal operating. Meanwhile, the four RF ports are identical in RF characterics

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2. [Operation Frequency of channel					
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
Γ	01	902.75	18	911.25	35	919.75	
Γ	02	903.25	19	911.75	36	920.25	
Γ	03	903.75	20	912.25	37	920.75	
Γ	04	904.25	21	912.75	38	921.25	
Γ	05	904.75	22	913.25	39	921.75	
Γ	06	905.25	23	913.75	40	922.25	
Γ	07	905.75	24	914.25	41	922.75	
Γ	08	906.25	25	914.75	42	923.25	
Γ	09	906.75	26	915.25	43	923.75	
Γ	10	907.25	27	915.75	44	924.25	
Γ	11	907.75	28	916.25	45	924.75	
Γ	12	908.25	29	916.75	46	925.25	
Γ	13	908.75	30	917.25	47	925.75	
Γ	14	909.25	31	917.75	48	926.25	
Γ	15	909.75	32	918.25	49	926.75	
Γ	16	910.25	33	918.75	50	927.25	
Γ	17	910.75	34	919.25			

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	TITAN	HRD22000	Avior	N/A	15	Antenna
2	TITAN	HRD22000	Cheetah	N/A	12	Antenna
3	TITAN	HRD22000	Hydra	N/A	12	Antenna
4	TITAN	HRD22000	Bobcat	N/A	9	Antenna

4. The EUT has been programmed to continuously transmit during test by the PC via an Ethernet cable. The EUT is transmitting through a long enough antenna cable with a stated loss of 12dB into the antenna with typy N connector 15dBi gain. Power setting by the firewave is:
Invest shapped, 22dBm middle shapped, 22dBm, bisheat shapped, 22dBm.

lowest channel=33dBm,middle channel=33dBm ,highest channel =33dBm



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.

Worst Mode	Description	Operation mode
Mode 1	CH01	Dense reader mode
Mode 2	CH26	Dense reader mode
Mode 3	CH50	Dense reader mode
Mode 4	CH01	Single reader mode
Mode 5	CH26	Single reader mode
Mode 6	CH50	Single reader mode

Note:

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

(2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz

and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V,50/60Hz is shown in the report

For AC Conducted Emission

	Test Case
AC Conducted	Mode 7 : Keeping TX
Emission	

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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 of FHSS.

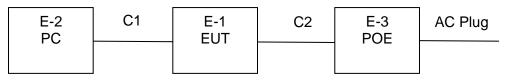


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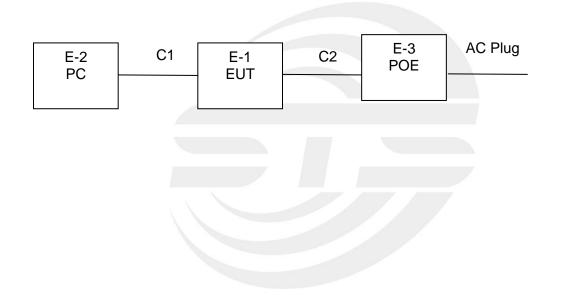
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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 of FHSS

Radiated Spurious EmissionTest



Conducted Emission Test



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2.5 DESCRIPTION OF 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
E-2	PC	4CV428DQXR	500-320cx	N/A	N/A
E-3	POE	Phihong	PSAC30U-240L6	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C1	Ethernet cable	NO	7m	N/A
C2	Power cord	NO	3m	N/A

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 $\[\]$ Length $\[\]$ column.
- (3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

vaulation rest equipm			-		
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESW	101535	2017.06.01	2018.05.31
Bilog Antenna	TESEQ	CBL6111D	34678	2017.03.24	2018.03.23
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1343	2017.03.06	2018.03.05
SHF-EHF Horn Antenna (15G-40GHz)	BBHA 9170	SCHWARZBECK	BBHA9170367	2017.05.02	2018.05.01
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14
Pre-mplifier (0.1M-3GHz)	EM	EM330	60538	2017.03.12	2018.03.11
PreAmplifier (1G-26.5GHz)	Agilent	8449B	60538	2017.10.15	2018.10.14
Pre-mplifier (18G-40G)	MINI-CIRCUITS	AP-040G	1382501	2017.05.15	2018.05.14
Operational Manual Passive Loop (9K30MHz)	ETS	6512	00165355	2017.03.06	2018.03.05
Low frequency cable	EM	R01	N/A	2017.03.12	2018.03.11
Low frequency cable	EM	R06	N/A	2017.03.12	2018.03.11
High frequency cable	SCHWARZBECK	R04	N/A	2017.03.12	2018.03.11
High frequency cable	SCHWARZBECK	R02	N/A	2017.03/12	2018.03.11
Semi-anechoic chamber	Changling	966	N/A	2017.10.15	2018.10.14
trun table	EM	SC100_1	60531	N/A	N/A
Antnna mast	EM	SC100	N/A	N/A	N/A
Max-full Antenna Corp	MF	MFA-440H	N/A	N/A	N/A

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
conduction Cable	EM	C01	N/A	2017.03.12	2018.03.11
Temperature & Humitidy	Mieo	HH660	N/A	2017.10.15	2018.10.14



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RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15100041SNO03	2017.10.15	2018.10.14
Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
Spectrum Analyzer	Agilent	E4407B	MY50140340	2017.03.11	2018.03.10
Signal Analyzer	Agilent	N9020A	MY49100060	2017.03.11	2018.03.10



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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 207(a) limit in the table below has to be followed.

	Conducted Emissionlimit (dBuV)		
FREQUENCY (MHz)	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

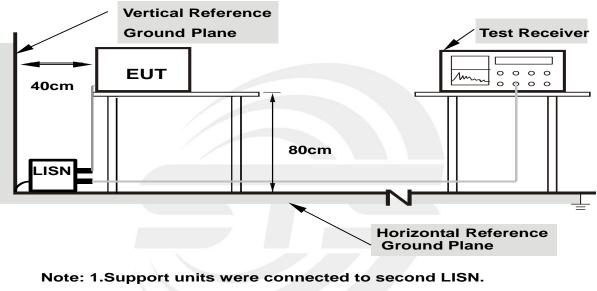
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3.1.2 TEST PROCEDURE

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.



3.1.3 TEST SETUP

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

3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

Dense reader mode and Dense reader mode have been tested, only show the worst case in the report



3.1.5 TEST RESULT

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	L
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 7

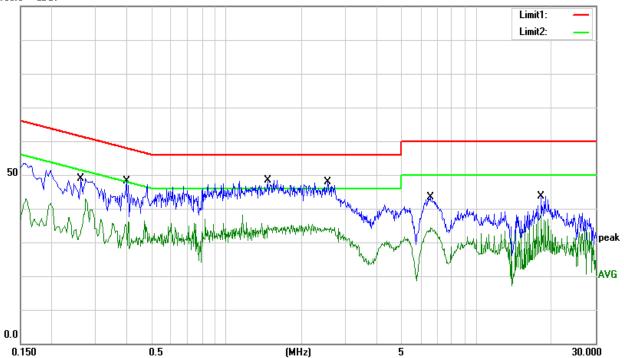
Frequency	Reading	Correct	Result	Limit	Margin	Domorik
(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	Remark
0.2620	38.83	10.06	48.89	61.37	-12.48	QP
0.2620	23.41	10.06	33.47	51.37	-17.90	AVG
0.3980	38.15	10.03	48.18	57.90	-9.72	QP
0.3980	22.32	10.03	32.35	47.90	-15.55	AVG
1.4660	38.63	9.79	48.42	56.00	-7.58	QP
1.4660	23.85	9.79	33.64	46.00	-12.36	AVG
2.5500	38.19	9.80	47.99	56.00	-8.01	QP
2.5500	24.58	9.80	34.38	46.00	-11.62	AVG
6.5540	33.54	9.88	43.42	60.00	-16.58	QP
6.5540	24.44	9.88	34.32	50.00	-15.68	AVG
18.1500	33.20	10.38	43.58	60.00	-16.42	QP
18.1500	28.29	10.38	38.67	50.00	-11.33	AVG

Remark:

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

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

100.0 dBuV



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Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Ν
Test Voltage:	AC 120V/60Hz	Test Mode:	Mode 7

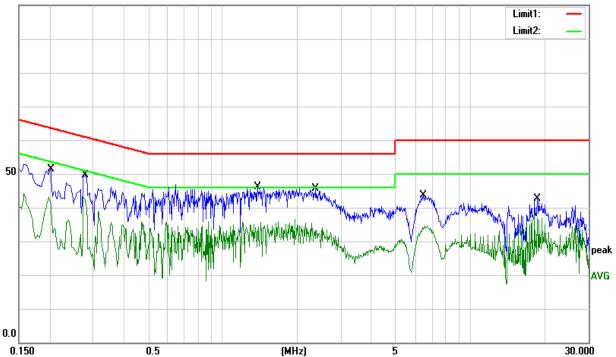
Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	Remark
0.2020	41.50	9.88	51.38	63.53	-12.15	QP
0.2020	29.21	9.88	39.09	53.53	-14.44	AVG
0.2780	39.55	10.18	49.73	60.88	-11.15	QP
0.2780	30.66	10.18	40.84	50.88	-10.04	AVG
1.3860	36.22	9.83	46.05	56.00	-9.95	QP
1.3860	22.77	9.83	32.60	46.00	-13.40	AVG
2.3780	35.81	9.89	45.70	56.00	-10.30	QP
2.3780	23.02	9.89	32.91	46.00	-13.09	AVG
6.4820	33.74	9.89	43.63	60.00	-16.37	QP
6.4820	24.71	9.89	34.60	50.00	-15.40	AVG
18.6820	32.28	10.37	42.65	60.00	-17.35	QP
18.6820	26.48	10.37	36.85	50.00	-13.15	AVG

Remark:

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

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

100.0 dBu¥



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3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 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
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

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

Notes:

(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).

For Radiated Emission

Spectrum Parameter	Setting			
Attenuation	Auto			
Detector	Peak			
Start Frequency	1000 MHz(Peak/AV)			
Stop Frequency	10th carrier hamonic(Peak/AV)			
RB / VB (emission in restricted				
band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz			

For Band edge

Spectrum Parameter	Setting			
Detector	Peak			
	Lower Band Edge: 800 to 904 MHz			
Start/Stop Frequency	Upper Band Edge: 924 to 1000 MHz			
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz			

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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 for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz,and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. 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 QuasiPeak detector mode re-measured.
- e. 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.
- f. 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

3.2.3 DEVIATION FROM TEST STANDARD

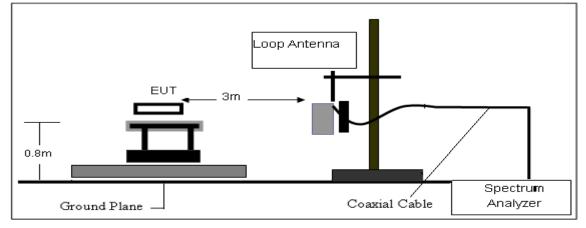
No deviation



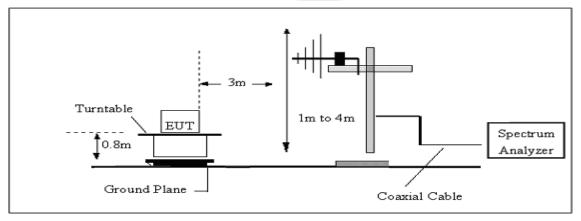


3.2.4 TESTSETUP

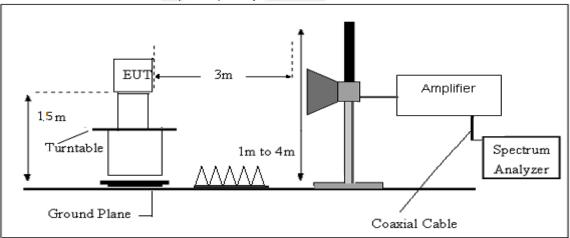
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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





3.2.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

Dense reader mode and Dense reader mode have been tested, only show the worst case in the report

3.2.6 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

Frequency	FS	RA	AF	CL	AG	Factor
(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



3.2.7 TEST RESULTS

(9KHz-30MHz)

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Mode:	TX Mode
Test Voltage:	DC 24V from adapter		

Freq.	Reading	Limit	Margin	State	Test Result	
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	iest Result	
					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.



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(30MHz-1000MHz)

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	DC 24V from adapter	Test Mode:	Mode 1/2/3/4/5/6 (Mode 1 worst mode)

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
32.5198	41.41	-12.48	28.93	40.00	-11.07	QP
106.7587	50.45	-18.61	31.84	43.50	-11.66	QP
155.3644	54.78	-18.25	36.53	43.50	-6.97	QP
400.4320	39.68	-11.22	28.46	46.00	-17.54	QP
801.7863	37.34	-3.49	33.85	46.00	-12.15	QP
938.8326	38.07	-0.75	37.32	46.00	-8.68	QP

Remark:

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







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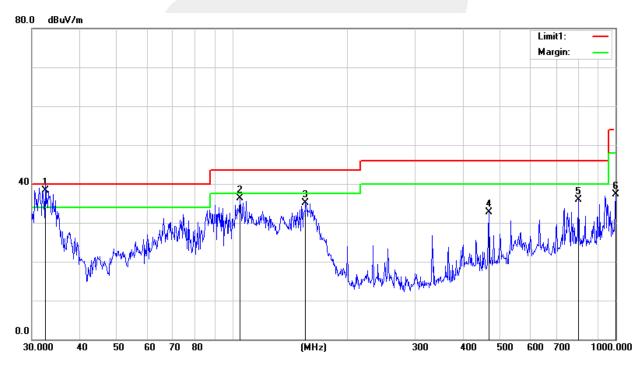
Report No.: STS1710201W01

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	DC 24V from adapter		Mode 1/2/3/4/5/6 (Mode 1 worst mode)

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
32.5790	50.85	-12.51	38.34	40.00	-1.66	QP
104.5361	55.12	-18.81	36.31	43.50	-7.19	QP
155.3644	53.45	-18.25	35.20	43.50	-8.30	QP
467.2350	42.49	-9.87	32.62	46.00	-13.38	QP
801.7863	39.44	-3.49	35.95	46.00	-10.05	QP
1000.0000	37.33	-0.07	37.26	54.00	-16.74	QP

Remark:

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



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 E-mail: sts@stsapp.com



(1GHz~10GHz) Restricted band and Spurious emission Requirements

	Low Channel									
				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
				Low C	Channel (902.75	MHz)				
1805.50	62.32	45.23	5.70	26.74	-12.79	49.53	74.00	-24.47	PK	Vertical
1805.50	54.21	45.23	5.70	26.74	-12.79	41.42	54.00	-12.58	AV	Vertical
1805.25	62.38	45.23	5.70	26.74	-12.79	49.59	74.00	-24.41	PK	Horizontal
1805.25	40.18	45.23	5.70	26.74	-12.79	27.39	54.00	-26.61	AV	Horizontal
2708.25	64.96	44.82	8.41	29.65	-6.76	58.20	74.00	-15.80	PK	Vertical
2708.25	54.47	44.82	8.41	29.65	-6.76	47.71	54.00	-6.29	AV	Vertical
2708.36	60.49	44.82	8.41	29.65	-6.76	53.73	74.00	-20.27	PK	Horizontal
2708.36	50.48	44.82	8.41	29.65	-6.76	43.72	54.00	-10.28	AV	Horizontal
5360.20	47.40	43.20	10.05	32.15	-1.00	46.40	74.00	-27.60	PK	Vertical
5360.20	39.40	43.20	10.05	32.15	-1.00	38.40	54.00	-15.60	AV	Vertical
5385.00	47.39	43.20	10.05	32.15	-1.00	46.39	74.00	-27.61	PK	Horizontal
5385.00	39.38	43.20	10.05	32.15	-1.00	38.38	54.00	-15.62	AV	Horizontal
7523.29	52.87	43.01	11.58	35.96	4.53	57.40	74.00	-16.60	PK	Vertical
7523.29	44.83	43.01	11.58	35.96	4.53	49.36	54.00	-4.64	AV	Vertical
7525.42	52.87	43.01	11.58	35.96	4.53	57.40	74.00	-16.60	PK	Horizontal
7525.42	44.87	43.01	11.58	35.96	4.53	49.40	54.00	-4.60	AV	Horizontal

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Report No.: STS1710201W01

Mid Channel

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
				Mid 0	Channel (915.25	MHz)				
1830.50	62.90	45.23	5.70	26.74	-12.79	50.11	74.00	-23.89	PK	Vertical
1830.50	54.11	45.23	5.70	26.74	-12.79	41.32	54.00	-12.68	AV	Vertical
1832.25	61.93	45.23	5.70	26.74	-12.79	49.14	74.00	-24.86	PK	Horizontal
1832.25	40.78	45.23	5.70	26.74	-12.79	27.99	54.00	-26.01	AV	Horizontal
2745.75	65.52	44.82	8.41	29.65	-6.76	58.76	74.00	-15.24	PK	Vertical
2745.75	55.07	44.82	8.41	29.65	-6.76	48.31	54.00	-5.69	AV	Vertical
2743.10	60.04	44.82	8.41	29.65	-6.76	53.28	74.00	-20.72	PK	Horizontal
2743.10	49.95	44.82	8.41	29.65	-6.76	43.19	54.00	-10.81	AV	Horizontal
5363.14	46.52	43.20	10.05	32.15	-1.00	45.52	74.00	-28.48	PK	Vertical
5363.14	39.61	43.20	10.05	32.15	-1.00	38.61	54.00	-15.39	AV	Vertical
5384.25	47.54	43.20	10.05	32.15	-1.00	46.54	74.00	-27.46	PK	Horizontal
5384.25	39.41	43.20	10.05	32.15	-1.00	38.41	54.00	-15.59	AV	Horizontal
7522.52	53.65	43.01	11.58	35.96	4.53	58.18	74.00	-15.82	PK	Vertical
7522.52	44.97	43.01	11.58	35.96	4.53	49.50	54.00	-4.50	AV	Vertical
7523.31	53.25	43.01	11.58	35.96	4.53	57.78	74.00	-16.22	PK	Horizontal
7523.31	45.28	43.01	11.58	35.96	4.53	49.81	54.00	-4.19	AV	Horizontal

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High Channel

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
	High Channel (927.25 MHz)									
1854.50	61.95	45.23	5.70	26.74	-12.79	49.16	74.00	-24.84	PK	Vertical
1854.50	54.27	45.23	5.70	26.74	-12.79	41.48	54.00	-12.52	AV	Vertical
1856.14	61.68	45.23	5.70	26.74	-12.79	48.89	74.00	-25.11	PK	Horizontal
1856.14	40.35	45.23	5.70	26.74	-12.79	27.56	54.00	-26.44	AV	Horizontal
2781.75	65.39	44.82	8.41	29.65	-6.76	58.63	74.00	-15.37	PK	Vertical
2781.75	55.29	44.82	8.41	29.65	-6.76	48.53	54.00	-5.47	AV	Vertical
2780.11	59.85	44.82	8.41	29.65	-6.76	53.09	74.00	-20.91	PK	Horizontal
2780.11	50.47	44.82	8.41	29.65	-6.76	43.71	54.00	-10.29	AV	Horizontal
5362.24	46.75	43.20	10.05	32.15	-1.00	45.75	74.00	-28.25	PK	Vertical
5362.24	39.81	43.20	10.05	32.15	-1.00	38.81	54.00	-15.19	AV	Vertical
5363.32	48.23	43.20	10.05	32.15	-1.00	47.23	74.00	-26.77	PK	Horizontal
5363.32	39.12	43.20	10.05	32.15	-1.00	38.12	54.00	-15.88	AV	Horizontal
7521.32	54.35	43.01	11.58	35.96	4.53	58.88	74.00	-15.12	PK	Vertical
7521.32	44.57	43.01	11.58	35.96	4.53	49.10	54.00	-4.90	AV	Vertical
7521.38	53.94	43.01	11.58	35.96	4.53	58.47	74.00	-15.53	PK	Horizontal
7521.38	44.87	43.01	11.58	35.96	4.53	49.40	54.00	-4.60	AV	Horizontal

Note:

1) Scan with Dense reader mode and Single reader mode, the worst case is Dense reader mode

2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

The frequency emission of peak points that did not show above the forms are at least 10dB below the limit, the frequency

emission is mainly from the environment noise.

4) This device only supports SISO mode, four RF ports are identical in RF characterics. only show the data of port 1 in the report.



Band edge Requirements

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
902.00	69.25	43.80	4.91	25.90	-12.99	56.26	74	-17.74	PK	Vertical
902.00	55.06	43.80	4.91	25.90	-12.99	42.07	54	-11.93	AV	Vertical
902.00	70.26	43.80	4.91	25.90	-12.99	57.27	74	-16.73	PK	Horizontal
902.00	54.15	43.80	4.91	25.90	-12.99	41.16	54	-12.84	AV	Horizontal
928.00	71.06	43.80	5.12	25.90	-12.78	58.28	74	-15.72	PK	Vertical
928.00	54.04	43.80	5.12	25.90	-12.78	41.26	54	-12.74	AV	Vertical
928.00	71.14	43.80	5.12	25.90	-12.78	58.36	74	-15.64	PK	Horizontal
928.00	54.06	43.80	5.12	25.90	-12.78	41.28	54	-12.72	AV	Horizontal

Hopping Band edge

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
902.00	69.25	43.80	4.91	25.90	-12.99	56.26	74	-17.74	PK	Vertical
902.00	55.06	43.80	4.91	25.90	-12.99	42.07	54	-11.93	AV	Vertical
902.00	70.26	43.80	4.91	25.90	-12.99	57.27	74	-16.73	PK	Horizontal
902.00	54.15	43.80	4.91	25.90	-12.99	41.16	54	-12.84	AV	Horizontal
928.00	71.06	43.80	5.12	25.90	-12.78	58.28	74	-15.72	PK	Vertical
928.00	54.04	43.80	5.12	25.90	-12.78	41.26	54	-12.74	AV	Vertical
928.00	71.14	43.80	5.12	25.90	-12.78	58.36	74	-15.64	PK	Horizontal
928.00	54.06	43.80	5.12	25.90	-12.78	41.28	54	-12.72	AV	Horizontal

Note:

1) Scan with Dense reader mode and Single reader mode , the worst case is Dense reader mode

2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

The frequency emission of peak points that did not show above the forms are at least 10dB below the limit, the frequency

emission is mainly from the environment noise.

4) This device only supports SISO mode, four RF ports are identical in RF characterics. only show the data of port 1 in the report.



4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

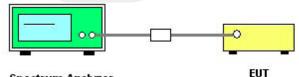
Spectrum Parameter	Setting		
Detector	Peak		
Start/Stop Frequency	30 MHz to 10th carrier harmonic		
RB / VB (emission in restricted band)	100 KHz/300 KHz		
Trace-Mode:	Max hold		

For Band edge

Spectrum Parameter	Setting			
Detector	Peak			
Start/Stop Eroguanau	Lower Band Edge: 800 to 904 MHz			
Start/Stop Frequency	Upper Band Edge: 924 to 1000 MHz			
RB / VB (emission in restricted band)	100 KHz/300 KHz			
Trace-Mode:	Max hold			

Remark : Hopping on and Hopping off mode all have been tested, only worst case hopping off is reported.

4.3 TEST SETUP



Spectrum Analyzer

The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

4.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



4.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter
Test Mode:	Dense reader mode /CH01, C⊦	126, CH50	

СН	01

	F 50Ω A		SEN	ISE:PULSE	AL	IGN AUTO			1 AMNov 13, 20
splay Line	97.94 dBm	F	PNO: Fast 😱 Gain:Low	Trig: Free Ru Atten: 40 dB	n	Avg Type: Avg Hold:		T	TYPE MWAAAAA DET P N N N I
	ef 30.00 dB	m						Mkr1 90 27.	7.36 MH .957 dBi
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art 30 MHz	^							Stop	10.000 GH
MIL OV INITIZ	1643		#VBV	V 300 kHz			Swee	p 952.9 m	s (1001 pi
es BW 100) KHZ								
es BW 100 Mode TRC SC		×	¥	FUNCTIO	IN FUNCT	ION WIDTH	F	UNCTION VALUE	
es BW 100 MODE TEC SC N 1 f N 1 f		907.36 MHz 2.711 93 GHz	27.957 -43.915 (dBm dBm	IN FUNCT	ION WIDTH	f	FUNCTION VALUE	
es BW 100 MODE TEC SC N 1 f N 1 f		907.36 MHz		dBm dBm	IN FUNCT	ION WIDTH	F	FUNCTION VALUE	
es BW 100 N 1 f N 1 f N 1 f		907.36 MHz 2.711 93 GHz	-43.915 (dBm dBm	IN FUNCT	ION WIDTH	F	FUNCTION VALUE	
es BW 100 MODE TRC SC N 1 f N 1 f		907.36 MHz 2.711 93 GHz	-43.915 (dBm dBm	IN FUNCT	ION WIDTH	f	FUNCTION VALUE	
es BW 100 N 1 f N 1 f N 1 f		907.36 MHz 2.711 93 GHz	-43.915 (dBm dBm		ION WIDTH		UNCTION VALUE	
es BW 100 N 1 f N 1 f N 1 f		907.36 MHz 2.711 93 GHz	-43.915 (dBm dBm		ION WIDTH	ſ	UNCTION VALUE	



				_			
Agilent Spectrum Analy	/zer - Swept SA 50 Ω AC	SENSE		ALIGN AUTO		10:16:40.4	MNov 13, 201
	8910000000 GHz	PNO: East	Trig: Free Run Atten: 40 dB		≥: Log-Pwr ≫100/100	TRA T)	CE 1 2 3 4 5 PE M M N N N DET P N N N N
10 dB/div Ref :	30.00 dBm				N	/lkr3 7.038 -46.9	91 GH: 45 dBn
20.0							
10.0							7.43 dB
0.00							
10.0							
20.0							
30.0							
40.0	<mark>2</mark>				3		
50.0	- manual and the	And marked approved and	and the second second second second	- manner	and and the states	and the lost of the second	بوليد مير مي . سوليد مي مي ال
60.0							
Start 30 MHz #Res BW 100 kl	Hz	#VBW	300 kHz		Swee	Stop 10 p 952.9 ms (0.000 GH (1001 pts
KR MODE TRC SCL 1 N 1 f 2 N 1 f	× 917.33 Mł 1.834 57 Gł			FUNCTION WIDTH	F	UNCTION VALUE	
3 N 1 f	7.038 91 G						
4 5							
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1							
G				STATUS			>
2				STATUS			

=#

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CH 50

		SENSE:PULSE		ALIGNAUTO Avg Type: L	a Dur	11:04:46 /	MNOV 13
ker 3 7.068820	PN	NO: Fast 😱 Trig: Fr Sain:Low Atten: 4		Avg Hold>10		T)	
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t 30 MHz						Stop 10	0.000
s BW 100 kHz		#VBW 300 k	Hz		Swee	p 952.9 ms	
	× 927.30 MHz	27.364 dBm	FUNCTION FUI	NCTION WIDTH		FUNCTION VALUE	
IODE TRC SCL		-44.601 dBm					
N 1 f N 1 f	2.781 72 GHz						
N 1 f	2.781 72 GHz 7.068 82 GHz	-48.048 dBm					
N 1 f N 1 f							
N 1 f N 1 f							
N 1 f N 1 f							
N 1 f N 1 f							



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For Band edge

CH 01

Agilent Spectrum Analyzer - Swept SA			
X L RF 50 Ω AC Display Line 8.05 dBm	SENSE:PULSE	ALIGN AUTO Avg Typ	10:41:22 AMNov 13, 20: e: Log-Pwr TRACE 1 2 3 4 5
	PNO: Fast Trig: Fr IFGain:Low Atten: 4		1>100/100 TYPE MWWWW DET P N N N
			Mkr3 882.784 MH
10 dB/div Ref 30.00 dBm			-49.591 dBr
20.0			
10.0			8.05 df
0.00			
10.0			
20.0			
30.0			
40.0			3
50.0 more than the second seco		and an transmitter and a standard and a standard	an marked and an and a second
60.0			
Start 800.00 MHz			Stop 904.00 MH
Res BW 100 kHz	#VBW 300 kl		Sweep 10.00 ms (1001 pt
MKR MODE TRO SCL X	752 MHz 28.048 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE
2 N 1 f 901.	688 MHz -26.972 dBm 784 MHz -49.591 dBm		
4	704 Miliz 43.031 dBill		
5 6 7			
7 8 9			
9 10			
11			>
SG		STATUS	
	~		

CH 50

L RF 50 Ω	AC	SENSE:PULS	E	ALIGN AUTO		10:54:57 AMNov	
ker 3 960.936000	PNG		Free Run n: 40 dB	Avg Type:∣ Avg Hold≫1	Log-Pwr 100/100	TRACE 1 2 TYPE MU DET P N	AAAAA
B/div Ref 30.00 d	IBm				M	kr3 960.936 -50.824	
							7.41
/ _2							
nt hum			A ³				
- Whenther		www.www.witeralized.com	month and the second	man manager and	mush marrie all	สมาร์สารสารสารสารสารสารสารสารสารสารสารสารสารส	ann Je
rt 924.00 MHz						Stop 1.00000	
s BW 100 kHz		#VBW 300	kHz		Sweep	7.267 ms (100	1 p
MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE	
N 1 f N 1 f N 1 f	927.268 MHz 928.940 MHz 960.936 MHz	27.406 dBm -35.503 dBm -50.824 dBm					





For Hopping Band edge

CH 01

Agile	nt Spe	ctrur		lyzer - Swept SA									
~~~	L		RF	50 Ω AC			SENS	6E:PULSE	A	LIGN AUTO			7 AMNov 13, 2017
Mai	ker	38	857.	40800000	D MHz					Avg Type:			FRACE 1 2 3 4 5 6
						PNO: Fast	$\mathbf{P}$	Trig: Free F		Avg Hold>	100/100		DET P N N N N N
					I	FGain:Low		Atten: 40 d	В				Derp revenue
												Mkr3 857	.408 MHz
			<b>.</b>	00.00 JB									.851 dBm
10 c Log	B/div	/	Ret	30.00 dBm	1							-00	.oor abii
20.0													1 M
20.0													
10.0													5.56 dBm
0.00													
	L												
-10.0													
-20.0													
-30.0													() () () () () () () () () () () () () (
	1												Ĭ
-40.0									▲3				aland
-50.0									<b></b>		and the state of the		
-60.0													
<b>.</b>													
	rt 80										_		904.00 MHz
#R6	s Bl	WI	UU I	KHZ		7.	¥V BW	/ 300 kHz			SW	eep 10.00 m	s (1001 pts)
MKR	MODE	TRC	SCL	×	<		Y	FUNC	TION   FUNC	TION WIDTH		FUNCTION VALUE	~
1	Ν	1	f		02.752 MHz	25	.557 d						
2	Ν		f		901.816 MHz	-30	.625 d	Bm					
3	Ν		f		357.408 MHz	-50	.851 d	Bm					
4 5 6 7 8 9													
6													
7													
8													
9													
10													
<													>
MSG										STATUS			
m3G										STATUS			

CH 50

	IQ AC	SENSE:PULS		ALIGN AUTO		11:20:49 AMNov 13, 20
rker 3 955.5400	PNO		Free Run n: 40 dB	Avg Type: L Avg Hold:>1		TRACE 1 2 3 4 TYPE MWWWW DET P N N N
B/div Ref 30.00	0 dBm				M	r3 955.540 MF -51.962 dB
						4.90 c
)						
how		3				
	hand the stand of	and and the second s	and a start of the	and and a state of the second s	annan - sgyddan ar sin	
rt 924.00 MHz es BW 100 kHz		#VBW 300	kHz		Sweep	Stop 1.00000 Gi 7.267 ms (1001 pi
MODE TRC SCL N 1 f N 1 f N 1 f	× 926.280 MHz 928.104 MHz 955.540 MHz	¥ 24.902 dBm -29.033 dBm -51.962 dBm	FUNCTION	FUNCTION WIDTH	FUNC	TION VALUE



Page 35 of 64

Report No.: STS1710201W01

Temperature:	<b>25</b> ℃	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter
Test Mode:	Single reader mode /CH01, CH	26, CH50	

CH (	)1
------	----



# CH 26

L RF 5	iO.Ω AC	SENSE:PULSE		LIGN AUTO	1.	L:43:47 AMNov 13, 20
splay Line 7.36	dBm		ree Run	Avg Type: Log Avg Hold: 73/10	-Pwr	TRACE 1 2 3 4 TYPE MWMMM DET P N N N
dB/div Ref 30.0	0 dBm				Mkr3 1	.834 57 GF 45.239 dB
0.0						
1.0						7.30
0						
.0						
0						
0						
0	$\wedge^3$ $\wedge^2$					
0		madaman	the manufacture	e manon manual man		-
0						
art 30 MHz tes BW 100 kHz		#VBW 300 k	Hz		Si Sweep 952.9	op 10.000 G 9 ms (1001 p
R MODE TRC SCL	X	Y 27.364 dBm	FUNCTION FUN	CTION WIDTH	FUNCTION V	LUE
	917.33 MHz 2.741 84 GHz	-44.137 dBm				
N 1 f						
N 1 f N 1 f	1.834 57 GHz	-45.239 dBm				
N 1 f N 1 f	1.834 57 GHz	-45.239 dBm				
N 1 f N 1 f	1.834 57 GHz	-45.239 dBm				
N 1 f N 1 f	1.834 57 GHz	-45.239 dBm				
N 1 f N 1 f	1.834 57 GHz	-45.239 dBm				
N 1 f	1.834 57 GHz	-45.239 dBm				,

╡



#### CH 50

	50 Ω AC	SEN	NSE:PULSE	ALIGN				i AMNov 13, 20
splay Line 7.2	28 dBm		Tain Free Day	/	\vg Type: Log vg Hold: 68/1	J-Pwr	TR	RACE 1 2 3 4 5
		PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 40 dB	A	vglinola: 66/1	00		DET P N N N I
		II Gam.Eow				5.4	kr3 5.44	2 74 CU
	<b></b>					IVI		942 dBi
dB/div Ref 30	0.00 dBm							342 UDI
.0								7.20 d
								7.20 0
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.0								
.0								
.0								
.0	() ²			<mark>≜</mark> 3				
.0	1 manual	den many march	and the stand of the stand	munning	melicerow	munu	where the state	and the second
	200 Bollow Hand							
							Stop 1	0.000 GH
art 30 MHz		#\/D\	W 300 kHz			Sweep	952.9 ms	
	z	#VD						
art 30 MHz tes BW 100 kH BMMDB HEB SOU	-	#VB1		FUNCTION	WIDTH I	FU	NCTION VALUE	
es BW 100 kH	× 927.25 M	Y 1Hz 27.286		FUNCTION	WIDTH	FU	NCTION VALUE	
es BW 100 kH R MODE THE SCL N 1 f N 1 f	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
Res BW 100 kH N 1 f N 1 f N 1 f	× 927.25 M	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
Res BW 100 kH	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
Res BW 100 kH N 1 f N 1 f N 1 f N 1 f	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
tes BW 100 kH Model TRC Scl N 1 f N 1 f N 1 f	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
es BW 100 kH N 1 f N 1 f N 1 f	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	
es BW 100 kH N 1 f N 1 f N 1 f	× 927.25 M 1.854 51 G	Hz 27.286	dBm dBm	FUNCTION	WIDTH	FU	NCTION VALUE	>



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Shenzhen STS Test Services Co., Ltd.

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# For Band edge

CH 01

jilent Spectrum Analyzer -						
RL RF 5		SENSE:PUL	SE	ALIGN AUTO Avg Type: L	og-Pwr	11:31:13 AMNov 13, 201 TRACE 1 2 3 4 5
arker 5 662. 1000	PI		: Free Run	Avg Hold>1	00/100	TYPE MWWWWW DET P N N N N
	IFC	Gain:Low Att	en: 40 dB			,
					Mkr	3 882.160 MH
0 dB/div Ref 30.0	0 dBm					-51.673 dBr
20.0						
0.0						7.92 de
).00						
0.0						
0.0						
0.0						Y
10.0						
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50.0 horacon and a filmed and	and the state of the second	Autorphyspaces areas with	a Tanahar Tangan Salar Sala	and the second	and a second and the second	and a star and a star and a
:0.0						
tart 800.00 MHz						Stop 904.00 MH
Res BW 100 kHz		#VBW 30	0 kHz		Sweep 10	.00 ms (1001 pt
KR MODE TRC SCL	×	Ÿ	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE
1 N 1 f 2 N 1 f	902.752 MHz 901.088 MHz	27.924 dBm -23.997 dBm				
3 N 1 f	882.160 MHz	-51.673 dBm				
5						
5 6 7						
9 9						
9 0						
1						
						>
3				STATUS		

CH 50

AC	SENSE:PULS	E	ALIGN AUTO			MNov 13, 20
PNC			Avg Type: Avg Hold>	Log-Pwr 100/100	T	ACE 1 2 3 4 APE M MAAAAA DET P N N N
IBm				N		180 MH 38 dB
						7.90
		A3				
Mary Anna and mary and alo	- In the the test of the second second	na Jun summer	manager marks and the	outreture method	manathrowned	***
					Oten 4.0	0000 0
	#VBW 300	kHz		Sweep		
×	Y	FUNCTION	FUNCTION WIDTH	FL	INCTION VALUE	
927.268 MHz 928.788 MHz 960.480 MHz	27.304 dBm -22.207 dBm -51.438 dBm					
						>
	IEGa IBm IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGa IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA IIEGA	PRO: Fast IFGain:Low Atte IBm IBm IBm IBm IBm IBm IBm IBm	PNO: Fast IFGain:Low Trig: Free Run Atten: 40 dB IBm	IBm         Trig: Free Run         AvgiHoid>           IBm         Image: State of the state of th	PN0: Fast IFGain:Low         Trig: Free Run Atten: 40 dB         Avg Hold>100/100           IBm	PHO: Fast IFGain:Low         Trig: Free Run Atten: 40 dB         AvgiHoid>100/100         Trig: Mkr3 960.4           IBm         -51.4           IBm         -51.4





# For Hopping Band edge

CH 01



#### CH 50





# 5. NUMBER OF HOPPING CHANNEL

# 5.1 APPLIED PROCEDURES / LIMIT

	FCC Pa	art 15.247,Subpa	rt C	
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(i)	Number of Hopping Channel	≥25	902-928	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### **5.2 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

#### 5.3 TEST SETUP



## 5.4 EUT OPERATION 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.



# 5.5 TEST RESULTS

Temperature:	<b>25℃</b>	Relative Humidity:	60%		
Pressure:	1015 hPa	Test Voltage:	DC 24V from adapter		
Test Mode: Hopping Mode (Dense reader mode)					

Number of Hopping Channel

50



# Hopping channel

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Report No.: STS1710201W01

Temperature:	<b>25</b> ℃	Relative Humidity:	60%		
Pressure:	1015 hPa	Test Voltage:	DC 24V from adapter		
Test Mode: Hopping Mode (Single reader mode)					

Number of Hopping Channel

50

# Hopping channel



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# 6. AVERAGE TIME OF OCCUPANCY

# 6.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C							
Section	Test Item	Limit	FrequencyRange (MHz)	Result			
15.247 (a)(1)(i)	Average Time of Occupancy	0.4sec	902-928	PASS			

#### 6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer

- b. Set RBW =1MHz/VBW =3MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is 20 second.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.

6.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

## 6.4 EUT OPERATION 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.



# 6.5 TEST RESULTS

Temperature:	<b>25</b> ℃	Relative Humidity:		50%	
Pressure:	1012 hPa	Test Voltage:		DC 24V	from adapter
Test Mode:	Dense reader mode /CH01, CH26, CH50				
Frequency	Dwell Time(s)	Dwell Time(s)		s(s)	result
902.75 MHz 0.378			0.4		Pass
915.25 MHz 0.377			0.4		Pass
927.25 MHz 0.377			0.	4	Pass

RF 50 Ω AC	SEN	SE:PULSE	ALIGN AUTO		49:11 PM Nov 13
er 1 10.0000 s	PNO: Wide +++ IFGain:Low	Trig: Free Run #Atten: 40 dB	Avg Type: Log	Pwr	TRACE 1 2 3 TYPE WWW DET P N N
/div Ref 30.00 dBm					
"home mane with	some have a second	public has been adverted	warme an any and and	marganese by	and the second
er 902.750000 MHz					Span
BW 100 kHz	#VBV	V 300 kHz		Sweep 20.	
ODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VA	UE

## CH01

L	RF	lyzer - Swept S		9	ENSE:PULS	E	ALIGNAUTO		02:50:	25 PMNov 13, 20
rker '		'8.000 ms	PN	O: Wide ↔ jain:Low	Trig	: Free Run en: 40 dB		e: Log-Pwr		TRACE 1 2 3 4 TYPE WWWWW DET P N N N
dB/div	Ref	30.00 dBn	n						∆Mkr1	378.0 m -1.25 d
				1						
<u> </u>										
				[						
								14	2	
D Mandal	المرواد والمرود	an madel and an and a planter	gon an and have	In a start in the second	1					monterio
i –					4					
	02.750 100 ki	0000 MHz Hz		#VE	3W 300	kHz		Swe	ep 1.000	Span 0 s (1001 p
	TRC SCL		×	Y		FUNCTION	FUNCTION WIDTH	f	UNCTION VALUE	
Δ2 F	1 t 1 t	(Δ)	378.0 ms ( 386.0 ms		25 dB dBm					
			000.0 110	00.0	, abiii					

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L RF	50 Q AC	SE	INSE:PULSE	ALIGNAUTO		02:53:26 PMNov 13, 2
		PNO: Wide ↔ IFGain:Low	. Trig: Free Run #Atten: 40 dB	Avg Type:	Log-Pwr	TRACE 1 2 3 4 TYPE WAANA DET P N N N
B/div Ref 30	.00 dBm					
,						
)						
und management	mound in	month - construction	and the second secon	and a start and a start and a start and	man man the man work	mysour mand in
)						
nter 915.25000	0 MHz					Span 0
s BW 100 kHz		#VB	W 300 kHz		Sweep 2	20.00 s (1001 p
MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE
						>

GENGE-PLIL GE	ALIGN ALITO	1	2:51:49 PMNov 13, 20
PNO: Wide +++ Trig:	Avg Typ Free Run		TRACE 1 2 3 4 TYPE WWWWW DET P N N N
		ΔΜ	kr1 377.0 n 3.81 d
		102	
where the man algo Mar /		Landon And	when you wohn
A2			
#VBW 300	kHz	Sweep 1.	Span 0   000 s (1001 p
377.0 ms (Δ) 3.81 dB	FUNCTION FUNCTION WIDTH	FUNCTION	ALUE
400.0 ms -56.48 dBm			
			>
	PHO: Wide         →         Trig: #Atte           "y ⁻¹ "         #Atte           "y ⁻¹ "         #WBW 300           #VEW 300         381 dB           400.0 ms         -56.48 dBm	PRO: Wide → Trig: Free Run #Atten: 40 dB	Avg Type: Log-Pwr           Prov. Wide         Trig: Free Run #Atten: 40 dB           Image: Comparison of the second se

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RF	50 Ω AC		SENS	GE:PULSE	ALIGNAUTO		02:54:24 PMNov 1
r Freq 92	7.250000 M	Hz PNO: Wide IFGain:Low	•••	Trig: Free Run #Atten: 40 dB	Avg T	ype: Log-Pwr	TRACE 1 2 TYPE WW DET P N
liv Ref 3	0.00 dBm						
				1			
(and the second strength of the second streng	for an and stranger of the stranger	ender and the second		hand market and the second	all man and and and and and and and and and a	man and my mound	- manuman
r 927.2500	00 MHz						Span
W 100 kHz		#	٧В٧	/ 300 kHz		Sw	eep 20.00 s (100
DE TRC SCL	×		<i>(</i>	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE

L	RF	50 Ω AC		SE	VSE:PULS	E	ALIGN AUTO		02:55	:35 PMNov 13, 20
arker	1Δ37	7.000 ms	PN	O: Wide 🔸		Free Run en: 40 dB	Avg Typ	e: Log-Pwr		TRACE 1 2 3 4 TYPE WWWWW DET P N N N
dB/div	Ref	30.00 dBn	ı						∆Mkr′	377.0 m 0.10 d
1 <u> </u>									1Δ2	
	والمسارية	mon torken der versel	muniferenteren	downwork the	1-X/					mound
Ē					_7\\2_					
nter:	927.25	0000 MHz								Span 0
	/ 100 k			#VB	W 300	kHz		Sv	/eep 1.000	
	TRC SCL		×	Y		FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
<u>Δ2</u> F	1 t	(Δ)	377.0 ms ( 425.0 ms	ム) U.1 -55.79	0 dB dBm					

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Shenzhen STS Test Services Co., Ltd.



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Report No.: STS1710201W01

Temperature:	<b>25</b> ℃	Relative Humidity:	50%						
Pressure:	1012 hPa	DC 24V from adapter							
Test Mode:	Single reader mode /CH01, CH	Single reader mode /CH01, CH26, CH50							

Frequency	Dwell Time(s)	Limits(s)	Result
902.75 MHz	0.377	0.4	Pass
915.25 MHz	0.377	0.4	Pass
927.25 MHz	0.377	0.4	Pass

# CH01

Photo-Weiler         Trigs: Free Run HitGalet.ov         Avg Type: Log-Pvr         Med Type: Log-Pvr           distain         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0	L RF 50 Q AC	SENSE:PUL	.SE	ALIGN AUTO		02:21:12 PMNov 13, 201	
dididy Ref 30.00 dBm dididy Ref 30.00 dBm dididy Ref 30.00 dBm dididy Ref 30.00 dBm dididy Ref 30.00 dBm ref 902.750000 MHz s BW 100 kHz ref 302 sources ref 302 sources ref 302 sources ref 302 sources ref 30.00 dBm ref					-Pwr	TRACE 1 2 3 4 5	
9         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1			ten: 40 dB			DET PNNNN	
9         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1							
Image: status       Image: status<	dB/div Ref 30.00 dBm						
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Ess BW 100 kHz         #VBW 300 kHz         Sweep         1.000 s (1001           Id D2 1 t         (Δ)         377.0 ms         Δ.051 dB         Function         Function with the second	Int Spectrum Analyzer - Swept SA           L         RF         [50 Q         AC           arker 1 Δ 377.000 ms	PNO: Wide Trig	g:Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log		02:18:30 PMNor 13,200 TRACE [] ≥ 3 4 5 TYTE [] ≥ 14 5 PYTE [] > NNN Mkr1 377.0 m -0.51 di	
R Model TeC SQL         X         Y         FUNCTION         FUNCTION with TH         FUNCTION with TH           ΔΔ2         1         t         (Δ)         377.0 ms (Δ)         -0.51 dB         -0.51 dB           3         2         F         1         t         163.0 ms         -54.00 dBm           3         3         -         -         -         -         -         -	Int Spectrum Analyzer - Swept SA           L         RF         [50 Q         AC           arker 1 Δ 377.000 ms	PNO: Wide Trig	g:Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log		02:18:30 PMNor 13,200 TRACE [] ≥ 3 4 5 TYTE [] ≥ 14 5 PYTE [] > NNN Mkr1 377.0 m -0.51 di	
Δ2         1         t         (Δ)         377.0 ms         (Δ)         -0.51 dB           2         F         1         t         153.0 ms         -54.00 dBm           4         -         -         -         -         -           5         -         -         -         -         -           4         -         -         -         -         -           5         -         -         -         -         -           3         -         -         -         -         -           3         -         -         -         -         -           4         -         -         -         -         -         -           5         -         -         -         -         -         -         -           5         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	Int Spectrum Analyzer - Swept SA           L         RF         [50 Ω         AC           arker 1 Δ 377.000 ms	PNO: Wide Trig	g:Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log		02:18:30 PMNor 13,200 TRACE [] ≥ 3 4 5 TYTE [] ≥ 14 5 PYTE [] > NNN Mkr1 377.0 m -0.51 di	
2 F 1 t 163.0 ms 54.00 dBm	Interference         Ref         S0.00         AC           arker 1 Δ 377.000 ms         arker 1 Δ 377.000 ms         arker 1 Δ 377.000 ms           dB/div         Ref 30.00 dBm         arker 1 Δ 377.000 ms         arker 1 Δ 377.000 ms	Provisition TriffAtt	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log		02:10:30 PMNov 13, 200 TRACE 12, 3 4 5 TYPE VALUES DET P NNNN Mkr1 377.0 m -0.51 dl	
	Int Spectrum Analyzer - Swept SA           RF         [50 Ω         AC           arker 1 Δ 377.000 ms	PRO: Wide  Trif Att  FGain:Low	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	Itent Spectrum Analyzer - Swept SA           L         RF         [50 g] AC           arker 1 Δ 377.000 ms	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	Itent Spectrum Analyzer - Swept SA           L         RF         [50 g] AC           arker 1 Δ 377.000 ms	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	Itent Spectrum Analyzer - Swept SA           L         RF         [50 g] AC           arker 1 Δ 377.000 ms	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	arker 1 Δ 377.000 ms	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	Interference         State         State	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	
	dB/div Ref 30.00 dBm	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:30 PMNor 13, 20 TRACE 12:3 = 1 TYPE TWO THE TOP TYPE TWO THE TOP TO TYPE TWO THE TOP TO TYPE TWO THE TOP TO TYPE TWO THE TO TYPE THE TO TYPE TWO THE TO TYPE THE TO TYPE TWO THE TO TYPE THE TO T	
	ent Spectrum Analyzer - Swept SA           RF         10.0 a           AC         F           Inter 1 Δ 377.000 ms	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:30 PMNor 13, 20 TRACE 12:3 = 1 TYPE TWO THE TOP TYPE TWO THE TOP TO TYPE TWO THE TOP TO TYPE TWO THE TOP TO TYPE TWO THE TO TYPE THE TO TYPE TWO THE TO TYPE THE TO TYPE TWO THE TO TYPE THE TO T	
s STATUS	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	PRO: Wida → Tri IFGain:Low → Tri Att	g: Free Run ten: 40 dB	ALIGNAUTO Avg Type: Log	A	02:10:20 PMNov 13, 200 TRACE 12:3:3:5 TYPE PNNNN Mkr1 377.0 m -0.51 dl	

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	AC	SE	NSE:PULSE	AL	IGN AUTO		02	:30:01 PMNov 13,
ter Freq 915.250	0000 MHz	PNO: Wide	Trig: Free R Atten: 40 dB		Avg Type:	Log-Pwr		TRACE 1 2 3 TYPE WWW DET P N N
B/div Ref 30.00	dBm							
and a manufacture of the second strategy on t			Tear state to care		A		المراجع المراجع	
and a construction of the second	Mar Marris			- An Draft And				
nter 915.250000 M BW 100 kHz	Hz	#VB	W 300 kHz			Swe	eep 20.	Span 0 00 s (1001
MODE TRC SCL	×	Y	FUNCT	ION FUNC	TION WIDTH	ł	UNCTION VA	LUE

L	RF 50 Ω	AC	SENSE:PUL	.92	ALIGNAUTO	(	2:25:59 PMNov 13.2
arker 1	Δ 377.000	ms P	NO:Wide 🛶 Tri	g: Free Run :en: 40 dB	Avg Type: L		TRACE 1 2 3 4 TYPE WWWW DET P N N N
dB/div	Ref 30.00	dBm				ΔM	kr1 377.0 r -0.02 d
				102		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man personal and a second
miller	"Marring of			moundaria	بالمهارية والمالي والمارية	and a company	
	// 52						
s BW 1	15.250000 M 100 kHz		#VBW 30				Span 0 000 s (1001 p
MODE II A2 1 F 1	rc sol t (Δ) t	× 377.0 ms 89.00 ms	(Δ) -0.02 dB -53.70 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION	ALUE

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L RF	50 Ω AC		SEI	VSE:PULSE	AL	.IGN AUTO		02:2	28:41 PMNov 13, 2
		P	NO: Wide ↔ Gain:Low	Trig: Free F Atten: 40 d	Run B	Avg Type:	Log-Pwr		TRACE 1 2 3 4 TYPE WWWW DET P N N 1
B/div Ref	30.00 dBm					1			
upon benop united	and and a start and a start of the	an and the second	An and provide the state	a hard a good and have a	man the	and the second	Junen	no he	North Hadren Tarafa
nter 927.250			<i>//</i> 2 ( <b>1</b> )				-		Span 0
s BW 100 kH	z		#VB	W 300 kHz					10 s (1001 p
MODE TRC SCL	×		Ϋ́	FUNC	TION FUNC	TION WIDTH		FUNCTION VAL	UE

		Analyzer - Sv								
L		ة 50 £ 377.000			SEN	SE:PULSE	ALIGNAUTO Ava Txp	e: Log-Pwr	02:2	7:14 PM Nov 13, 20 TRACE 1 2 3 4
arker		577.000	ms	PNO: N IFGain	Wide ↔↔ :Low	Trig: Free Run Atten: 40 dB	118.19	e. Loga m		DET P N N N
dB/di	. в	ef 30.00	dBm						ΔMkr	1 377.0 m 0.06 d
g		00.00	ubili							
1.0										
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, <b>~~</b>	ntrathuma	Manan	mb who mension	of the second second	mr and a			Vent.	Here when the second	volanderalin
"										
	927.2 V 100	50000 N kHz	1Hz		#VBV	V 300 kHz		Sw	eep 1.00	Span 0 H 0 s (1001 pt
	E TRC S		Х		Y	FUNCTION	FUNCTION WIDTH		FUNCTION VALU	E
∆2 F	1 1	(Δ)		7.0 ms (∆) 9.0 ms	-55.58 c	6 dB				
		•	07	3.0 1113	-00.00 0	,Dill				
										>

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# 7. HOPPING CHANNEL SEPARATION MEASUREMEN

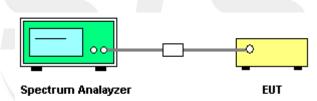
# 7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

## 7.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.
- 7.3 TEST SETUP



# 7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.



# 7.5 TEST RESULTS

Temperature:	<b>25</b> ℃	Relative Humidity:	50%					
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter					
Test Mode:	Dense reader mode /CH01, CH26, CH50							

Frequency	Ch. Separation (KHz)	Limit(KHz)	Result
902.75MHz	499.0	108.4	Complies
915.25 MHz	497.5	105.4	Complies
927.25 MHz	500.0	105.2	Complies

# Ch. Separation Limits: > 20dB bandwidth

#### CH01

	RF 50 Ω AC		SENSE:PULSE	AL	IGN AUTO		10:23:41 AMNov 13, 2
rker 2 90	3.250000000		 ide		Avg Type: Log Avg Hold:>100	j-Pwr /100	TRACE 1234 TYPE MWWW DET PNNN
	ef 30.00 dBm					Mkr2	903.250 MI 27.913 dB
						<u></u> 2	
							$\sim$
			$\sim$				la l
~~							
$\sim$							
rt 902.50 s BW 30			#VBW 100 kH	17		Sto Sweep 1.0	op 903.5000 M 67 ms (1001 p
MODE TRC S					TION WIDTH	FUNCTION	<u> </u>
N 1 1	f 90	02.751 MHz	28.155 dBm	inchent Pronot		төленөл	
N 1 1	f 90	03.250 MHz	27.913 dBm				
							>





**CH50** 





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Report No.: STS1710201W01

Temperature:	<b>25</b> ℃	Relative Humidity:	50%		
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter		
Test Mode:	Single reader mode /CH01, CH26, CH50				

Frequency	Ch. Separation (MHz)	Limit	Result
902.75MHz	500.0	192.6	Complies
915.25 MHz	499.5	190.5	Complies
927.25 MHz	500.0	190.8	Complies

## Ch. Separation Limits: > 20dB bandwidth

· · · · ·	rum Analyzer - Swept SA				
L andren 2	RF 50 Ω AC 2 903.251000000 MHz	SENSE:PULSE	ALIGN AUTO	e: Log-Pwr	11:34:57 AMNov 13, 2017 TRACE 1 2 3 4 5
arker 2	2 903.251000000 MH2	PNO: Wide Trig: F IFGain:Low Atten:	ree Run Avg Hold	d:>100/100	DET P N N N N
) dB/div	Ref 30.00 dBm			Mkr2	903.251 MHz 27.929 dBm
0.0	*			2	
0.0					
.00					
0.0					
0.0					
0.0					
0.0					
0.0					
0.0					
	2.5000 MHz / 30 kHz	#VBW 100 k	Hz	Sto Sweep 1.00	p 903.5000 MH: 67 ms (1001 pts
KR MODE T			FUNCTION FUNCTION WIDTH	FUNCTION	VALUE
1 N 2 N	1 f 902.751 1 f 903.251				
3	1 300.201	MITE 21.525 00M			
4					
6					
7					
4 5 6 7 8 9 0					
0 1					
					»
3			STATUS		

# CH01





Spectrum Analyze						A
RF	50 Ω AC D255000 MHz	SEN	SE:PULSE	ALIGN AUTO Avg Type: I	_og-Pwr	11:52:47 AMNov 13 TRACE 1 2 3
012313.13		PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 40 dB	Avg Hold>1	100/100	
3/div <b>Ref 30</b>	.00 dBm				Mkr2	2 915.750 3 N 27.452 d
					<u>2</u>	~
			$\searrow$			
t 915.0050 MH s BW 30 kHz	lz	#VBV	V 100 kHz			Stop 916.0000 1.067 ms (1001
ADDE TRC SCL	×		FUNCTION	FUNCTION WIDTH		TION VALUE
N 1 f	915.250 8 I 915.750 3 I					
	910.700 31	VIE12 27.452 (	ioin			
						)

#### **CH50**

	50 Ω AC	SENSE:PUL!	Æ	ALIGN AUTO		01:45:32 PM Nov 13, 2
rker 2 926.750	PI		: Free Run en: 40 dB	Avg Type: L Avg Hold≫1	og-Pwr 00/100	TRACE 1 2 3 4 TYPE M WANA DET P N N N
B/div Ref 30.	00 dBm				Mł	(r2 926.750 MI 27.275 dB
	*2	~			<u> </u>	~
rt 926.5000 MH es BW 30 kHz	lz	#VBW 100	) kHz		Sweep	Stop 927.5000 M 1.067 ms (1001 p
MODE TRC SCL	Х	Y	FUNCTION FU	INCTION WIDTH	FUNC	TION VALUE
N 1 f N 1 f	927.250 MHz 926.750 MHz	27.286 dBm 27.275 dBm				
	320.7 00 MI 12	27.275 0.511				

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# 8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 15.247,Subpart C					
Section	Test Item	Limit	FrequencyRange (MHz)	Result	
15.247 (a)(1)(i)	20dB Bandwidth	500KHz	902-928	PASS	

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	1 kHz (20dB Bandwidth) /1 kHz (Channel Separation)
VB	3 kHz (20dB Bandwidth) 3 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### **8.2 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 1KHz, VBW=3KHz, Sweep time = Auto.

## 8.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

## 8.4 EUT OPERATION 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.



# 8.5 TEST RESULTS

Temperature:	<b>25</b> ℃	Relative Humidity:	50%		
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter		
Test Mode:	Dense reader mode /CH01, CH26, CH50				

Frequency	20dB Bandwidth(kHz)	Limit (KHz)	Result
902.75 MHz	108.4	500	PASS
915.25 MHz	105.4	500	PASS
927.25 MHz	105.2	500	PASS

**CH01** 







**CH50** 





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Report No.: STS1710201W01

Temperature:	<b>25</b> ℃	Relative Humidity:	50%	
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter	
Test Mode:	Single reader mode /CH01, CH26, CH50			

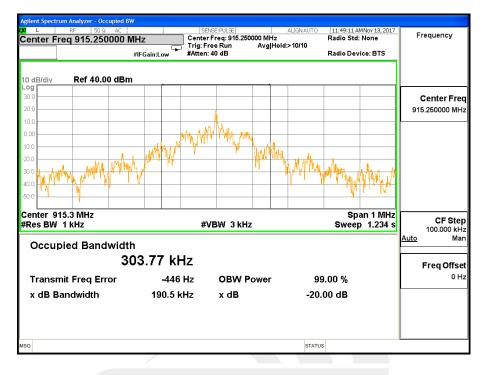
Frequency 20dB Bandwidth(kHz)		Limit (KHz)	Result
902.75 MHz	192.6	500	PASS
915.25 MHz	190.5	500	PASS
927.25 MHz	190.8	500	PASS



#### CH01

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# **CH50**





# 9. OUTPUT POWER TEST

# 9.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C					
Section         Test Item         Limit         FrequencyRange (MHz)				Result	
15.247 (b)(2)	Output Power	1 W	902-928	PASS	

## 9.2 TEST PROCEDURE

- a. The EUT was directly connected to the Power Meter
- b. Power setting by the firewave is:
- lowest channel=33dBm,middle channel=33dBm ,highest channel =33dBm 9.3 TEST SETUP

EUT 20dB attenuator		Power meter
---------------------	--	-------------

# 9.4 EUT OPERATION 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.



# 9.5 TEST RESULTS

Temperature:	<b>25</b> ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage:	DC 24V from adapter

Dense reader mode				
Test Channel	Frequency	Conducted Output Power	LIMIT	
Test Channel	(MHz)	Peak (dBm)	dBm	
CH01	902.75	29.564	30	
CH26	915.25	29.032	30	
CH50	927.25	29.123	30	

Single reader mode				
Test Channel	Frequency	Conducted Output Power	LIMIT	
lest channel	(MHz)	Peak (dBm)	dBm	
CH01	902.75	29.634	30	
CH26	915.25	29.427	30	
CH50	927.25	29.110	30	

Note: The EUT is transmitting through a long enough antenna cable with a stated loss of 12dB into the antenna with typy N connector 15dBi gain.

Worst case modulation used by the device.

KDB 594280. Professional installation or authorized service personnel is required to configure radio parameters of the transmitter using the software for adjusting total EIRP (36dBm) power at local installation to ensure compliance with FCC Rules.

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# **10. ANTENNA REQUIREMENT**

## **10.1 STANDARD REQUIREMENT**

15.203 requirement: For intentional device, according to 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.

Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

## 10.2 EUT ANTENNA

The EUT antenna is installed professionally by the installer, so that the limits in this part are not exceeded.



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# 11. RF EXPOSURE COMPLIANCE

## 11.1 LIMIT

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

#### Limits for Maximum Permissible Exposure (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density			
(MHz)	Strength (V/m) Strength (A/m)		(mW/cm²)			
Limits for Occupational / c	Limits for Occupational / controlled Exposures					
300 - 1500		F/30				
1500 – 100000		5.0				
Limits for General population / Uncontrolled Exposure						
300 - 1500			F/1500			
1500 – 100000	-		1.0			

#### 11.2 RESULT

Protocol	MAX EIRP (dBm)	MAX EIRP (mW)	Power Density (mW/cm <del>)</del>	Limit (mW/cm <del>)</del>	Result
FHSS	36	3981	0.032	0.6013	Pass

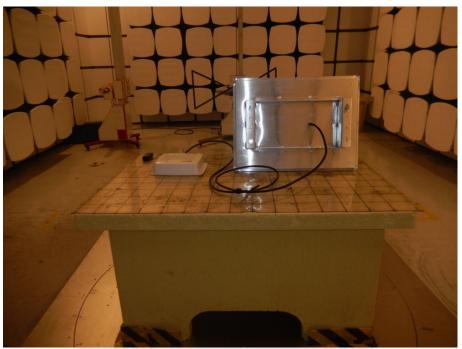
Friss Transmission Formula:  $Pd = (Pout) / (4*pi*R^2)$ 

Where  $Pd = power density in mW/cm^2$  Pout = antenna power in mW Pi = 3.1416R = Distance between observation point and the center of radiator in cm, R=100cm



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# **APPENDIX-PHOTOS OF TEST SETUP**



## **Radiated Measurement Photos**



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## **Conducted Measurement Photos**



#### ** ** ** ** END OF THE REPORT ** ** ** **

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