

FCC TEST REPORT

FCC ID: 2ABNA-TRM121

On Behalf of Guangzhou Geoelectron Science & Technology Company Limited Wireless Data Transceiver Module Model No.: TRM121

Prepared for	: Guangzhou Geoelectron Science & Technology Company Limited
Address	No.704, 7/F, Building C, No.7, Cai Pin Road, Science City, Luogang District, Guangzhou, China

Prepared By: Shenzhen Alpha Product Testing Co., Ltd.Address: Building i, No.2, Lixin Road, Fuyong Street, Bao'an District,
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TEST REPORT DECLARATION

Applicant	:	Guangzhou Geoelectron Science & Technology Company Limited	
Address	:	No.704, 7/F, Building C, No.7, Cai Pin Road, Science City, Luogang District, Guangzhou, China	
Manufacturer	:	Guangzhou Geoelectron Science & Technology Company Limited	
Address	:	No.704, 7/F, Building C, No.7, Cai Pin Road, Science City, Luogang District, Guangzhou, China	
EUT Description	:	Wireless Data Transceiver Module	
		(A) Model No. : TRM121	
		(B) Trademark : Geoelectron	

Measurement Standard Used:

FCC CFR Title 47 Part 90, FCC CFR Title 47 Part 2 ANSI C63.26: 2015

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 2, Part 90 limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Ella Liang Project Engineer

Ella biang

Approved by (name + signature).....:

Simple Guan Project Manager

Date of issue.....

July 22, 2019

Revision History

Revision	Issue Date	Revisions	Revised By
V 0	July 22, 2019	Initial released Issue	Simple Guan

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Test Requirement	Standards Paragraph	Result		
Transmitter Power(Conducted)	FCC PART 90	§ 90.205	Р		
Occupied Bandwidth & Emission Mask	FCC PART 90	§ 90.209, § 90.210	Р		
Spurious Emissions(conducted)	FCC PART 90	§ 90.210	Р		
Spurious Emissions(Radiated)	FCC PART 90	§ 90.210	Р		
Transient Frequency Behavior	FCC PART 90	§ 90.213	Р		
Frequency Stability	FCC PART 90 § 90.214		Р		
Modulation Characteristics - Audio Frequency Response	FCC PART 2 FCC PART 90§ 2.1047(a);§ 90.207		N/A		
Modulation Characteristics - Modulation Limiting	FCC PART 2 FCC PART 90§ 2.1047(b);§ 90.207		N/A		
Note: 1. P is an abbreviation for Pass.					
	2. F is an abbreviation for Fail.				
3. N/A is an abbreviation for Not Applicable.					

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

Description	Wireless Data Transceiver Module	
Trademark	Geoelectron	
Model Number	TRM121	
DIFF.	N/A	
Test Voltage	DC 3.3V	
UHF		
Operation frequency	410MHz-470MHz	
Conducted Power	1W(30dBm), 0.5W(27dBm)	
Bandwidth	12.5KHz, 25KHz	
Modulation type	GMSK	
Antenna Type	External Antenna, Maximum Gain is 4.0dBi	
Software version	V1.0	
Hardware version	TRM121_V1.0	

Note: All Conducted Power have been tested, and recorded the worst case 1W(30dBm) results in this report.

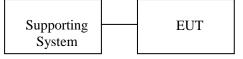
2.2. Accessories of Device (EUT)

Accessories1	:	/
Manufacturer	:	/
Model	:	/
Ratings	:	/

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
1	Notebook	ACER	ZQT	N/A	DOC
2	DC Battery	/	/	/	/

2.4.Block Diagram of connection between EUT and simulators



The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

2.5. Test Mode

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Mode				
Item	Description of operation mode	Note		
1	GMSK+BW12.5KHz+TX	at maximum rated power for transmitter		
2	GMSK+BW12.5KHz+TX	at minimum rated power for transmitter		
3	GMSK+BW25KHz+TX	at maximum rated power for transmitter		
4	GMSK+BW25KHz+TX	at minimum rated power for transmitter		

Note: The worst case modes for all test are the item 1 and item 3.

Description Operation Frequency

QMSK					
Test Channel	BW(MHz)	Channel	Frequency(MHz)		
I am	12.5	1	410.125		
Low	25	2	410.250		
Mid	12.5	3	456.125		
	25	4	456.250		
11° 1	12.5	5	469.975		
High	25	6	469.850		

2.6.Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	24°C
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	980kPa

2.7.Test Facility

Shenzhen Alpha Product Testing Co., Ltd Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission Registration Number: 293631

July 15, 2019 Certificated by IC Registration Number: CN0085

2.8.Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	2.74dB
Uncertainty for Radiation Emission test in 3m chamber	2.13 dB(Polarize: V)
(below 30MHz)	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber	3.77dB(Polarize: V)
(30MHz to 1GHz)	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber	4.16dB(Polarize: H)
(1GHz to 25GHz)	4.13dB(Polarize: V)
Uncertainty for radio frequency	5.4×10-8
Uncertainty for conducted RF Power	0.37dB
Uncertainty for temperature	0.2°C
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9.Test Equipment List

Equipment	Manufacturer	Model No.	Serial No.	Last cal.	Cal Interval
Test Receiver	ROHDE&SCHWARZ	ESCI	101165	2018.09.21	1Year
Spectrum analyzer	ROHDE&SCHWA RZ	FSU	1166.1660.26	2018.09.21	1 Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2018.09.11	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2018.09.21	1Year
Filter	KANGMAI	ZLPF-LDC-1000- 1959	1209002075	2018.09.21	1 Year
RF Cable	Resenberger	Cable 4	N/A	2018.09.21	1 Year
Signal Analyzer	Agilent	N9020A	MY499100060	2018.09.11	1 Year
vector Signal Generator	Agilent	N5182A	MY49060042	2018.09.11	1 Year
vector Signal Generator	Agilent	E4438C	US44271917	2018.09.11	1 Year
Amplifier	Agilent	8449B	3008A02664	2018.09.21	1 Year
Test Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03- 102082-Wa	2018.09.21	1 Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2018.04.13	1 Year
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	/	/
RF Cable	Resenberger	Cable 1	N/A	2018.09.21	1 Year
RF Cable	Resenberger	Cable 2	N/A	2018.09.21	1 Year
RF Cable	Resenberger	Cable 3	N/A	2018.09.21	1 Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2018.09.26	2Year
Attenuator	HP	8494B	DC-18G	2018.10.21	1 Year
Attenuator	HP	8496B	DC-18G	2018.10.21	1 Year
Temperature& Humidity test chamber	GZGONGWEN	GDS-250	080821	2018.10.21	1 Year
Power Meter	Agilent	E9300A	MY41496625	2018.09.21	1Year
20dB Attenuator	ICPROBING	IATS1	82347	2018.09.21	1 Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2018.09.21	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2018.09.21	1 Year
Oscilloscope	Agilent	54833A	165521	2018.09.21	1Year

3. Test Results and Measurement Data

3.1. Transmitter Power (Conducted)

3.1.1.Test Specification

Test Requirement:	Part 90.205:		
Test Method:	FCC part 2.1046		
Limits:	Please refer section FCC Part 90.205		
Test Setup:	Power Meter EUT		
Test Procedure:	a) Connect the equipment as illustrated.b) Turn on the power meterc) Record value		
Test Result:	PASS		

3.1.2. Test Results

GMSK mode					
Test channel	Maximum Conducted Output Power(Peak) (dBm)	Maximum ERP(dBm)	Stated ERP Power (dBm)	Limit (dBm)	Result
1	28.665	30.515	30	33	PASS
2	28.445	30.295	30	33	PASS
3	28.409	30.259	30	33	PASS
4	29.182	31.032	30	33	PASS
5	28.545	30.395	30	33	PASS
6	29.825	31.675	30	33	PASS

GMSK mode					
Test channel	Maximum Conducted Output Power(Peak) (dBm)	Maximum ERP(dBm)	Stated ERP Power (dBm)	Limit (dBm)	Result
1	25.828	27.678	27	33	PASS
2	24.577	26.427	27	33	PASS
3	26.466	28.316	27	33	PASS
4	26.198	28.048	27	33	PASS
5	25.646	27.496	27	33	PASS
6	26.732	28.582	27	33	PASS

ERP= Maximum Conducted Output Power(Peak) + Antenna Gain - 2.15dB

3.2. Occupied Bandwidth and Emission Mask

3.2.1.Test Specification

Test Requirement:	FCC Part 90.209, FCC Part 90.210
Test Setup:	Spectrum Analyzer EUT
Test Procedure:	The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the Frequency band \pm 50KHz from the carrier frequency.
Test Result:	PASS

3.2.2.Test data

Occupied Bandwidth:

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result	
GMSK 12.5KHz Channel Spacing:					
1	410.125	10.44	7.556	PASS	
2	456.125	10.43	7.736	PASS	
3	469.975	10.38	7.802	PASS	

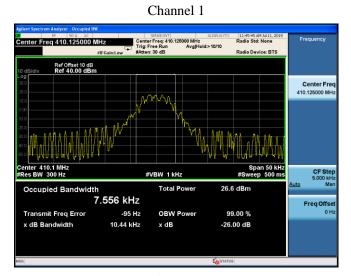
Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
GMSK 25K	Hz Channel Sp	bacing:		
4	410.250	22.06	19.143	PASS
5	456.250	21.70	19.000	PASS
6	469.850	21.93	19.187	PASS

Emission Mask:

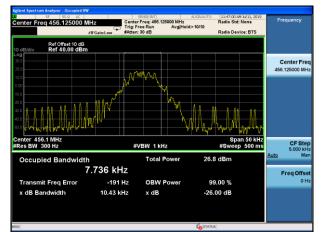
Channel	Frequency (MHz)	Applicable Mask	RBW	Result	
GMSK 12.5KHz Channel Spacing:					
1	410.125	D	300	PASS	
2	456.125	D	300	PASS	
3	469.975	D	300	PASS	

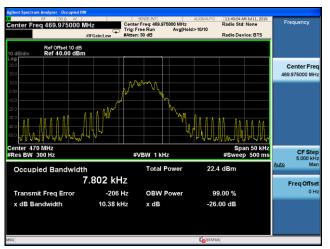
Channel	Frequency (MHz)	Applicable Mask	RBW	Result
GMSK 25KH	Iz Channel Spacing:			
4	410.250	В	300	PASS
5	456.250	В	300	PASS
6	469.850	В	300	PASS

Test plots as follows: GMSK mode: Occupied Bandwidth

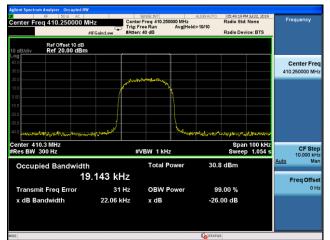


Channel 2

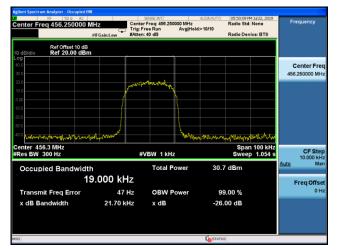








Channel 5



Center Freq 469.850000 N	Trig: F	SENSE:INT r Freq: 469.850000 MHz free Run Avg Hold n: 40 dB	1>10/10	05:50:47 PM 3ul 22, 2019 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 10 dB IO dB/div Ref 20.00 dBm	_				
•0g 40.0 30.0 20.0					Center Fre 469.850000 Mi
0.00	Wayay	WWW.			
20.0					
······································	mangloss	"Mutor	vitrophonete	·	
Center 469.9 MHz Res BW 300 Hz	#	VBW 1 kHz		Span 100 kHz Sweep 1.054 s	
Occupied Bandwidt) 9.187 kHz	Total Power	30.4	dBm	Auto Mi
Transmit Freq Error	-13 Hz	OBW Power	99.	00 %	01
x dB Bandwidth	21.93 kHz	x dB	-26.0	0 dB	
30			STATUS		

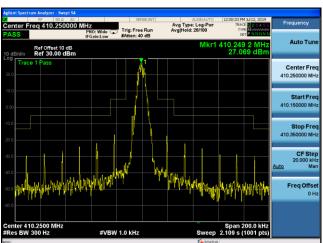
GMSK mode: Emission Mask



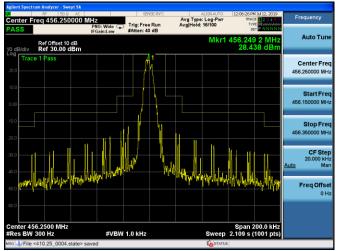
Channel 2

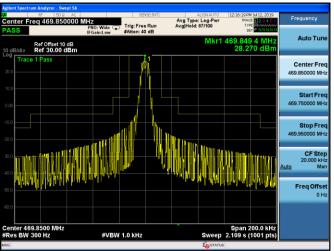






Channel 5





Channel 4

3.3. Spurious Emissions(conducted)

3.3.1.Test Specification

Test Requirement:	FCC Part 90.210
Test Setup:	
Test Limit:	Spectrum AnalyzerEUTModulation Type: GMSKFCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119Issue 12:For 12.5 bandwidth:On any frequency removed from the center of the authorizedbandwidth by a displacement frequency (fd in kHz) of more than 12.5kHz at least:High: 50 + 10 log (Pwatts) = 50 + 10 log (3.0) =54.77 dBLow: 50 + 10 log (Pwatts) = 50 + 10 log (1.0) =50.00 dBNote: In general, the worst case attenuation requirement shown abovewas applied.Calculation: Limit (dBm) =EL-50-10log10 (TP)Notes: EL is the emission level of the Output Power expressed in dBm,In this application, the EL is 34.77 dBm for High rated power and30.00 for lower rated power.High: Limit (dBm) = 34.77 - 50 - 10log (3.0) = -20 dBmLow: Limit (dBm) = 30.00 - 50 - 10log (1.0) = -20 dBmFor 25 kHz bandwidth:On any frequency removed from the center of the authorizedbandwidth by a displacement frequency (fd in kHz) of more than 62.5kHz at least:High: 43 + 10 log (Pwatts) = 43 + 10 log (3.0) = 47.77 dBLow: 43 + 10 log (Pwatts) = 43 + 10 log (1.0) = 43.00 dBNote: In general, the worst case attenuation requirement shown abovewas applied.Calculation: Limit (dBm) = EL-43-10log10 (TP)In this application, the EL is 34.77 dBm for High rated power and30.00 for lower rated power.High: 10 dBm = 30.00 - 43 - 10log (3.0) = -13 dBmLow: Limit (dBm) = 30.00 - 43 - 10log (1.0) = -13 dBmLow: Limit (dBm) = 30.00 - 43 - 10log (1.0) = -13 dBmLow: Limit (dBm) = 30.00
Test Result:	PASS

3.3.2.Test data

Test plots as follows:

GMSK mode

Channel 1

Frequency	12:10:45 PM Jul 11, 2019 TRACE 2 3 4 5 0 TYPE 2 3 4 5 0 DET P.N.N.N.N	I-Pwr	AUGN Avg Type: Log Avg Hold>100			NO: Fast C	000 GHz	RF 50 S	art Freq	Frequency	1 Jul 11, 2019 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6	TRAI	Log-Pwr >100/100	Avg Type Avg[Hold	e Run 0 dB		(0: Fast 🕞	PI	RF 50 8 30.00000	tart Fr
Auto T	r1 3.040 GHz -25.843 dBm	Mkr1 -?				CON	dB	ef Offset 10 ef 40.00	dB/div	Auto Tune	24 MHz 69 dBm	kr1 410. 26.9	MI					dB	Ref Offset 10 Ref 40.00 (dB/div
Center 1 3.000000000									3.0	Center Freq 515.000000 MHz							-			0.0
Start F 1.000000000									3.0 3.0	Start Freq 30.000000 MHz										1.0 1.0
Stop F 5.000000000									1.0	Stop Freq 1.000000000 GHz										.0
CF : 400.000000 Auto	-20.00 (0.00)		and have a starter	م استرحلیسان	allongon biss	المعرية مرد إنطار	huminet		10	CF Step 97.000000 MHz <u>Auto</u> Man	-20.00 dBm									0
Freq O									1.0	Freq Offset 0 Hz	alan filosof	-Markingon	planetaat in	ad affective discount	nandusta)	e den de la de	and a start of the	~	un grann film	1.0
	Stop 5.000 GHz	st						Hz	art 1.000		000 GHz	Stop 1.							MHz	art 30.
	67 ms (1001 pts)	ep 6.667			/ 3.0 MHz	#VBW			Res BW 1		1001 pts)	2.73 ms (Sweep 9		2	300 kH	#VBW		00 kHz	

Channel 2

Aglient Spectrum Analyzer - Swept SA 85 500 AC Start Freq 30.000000 MI	SENSE:INT	ALION AUTO Avg Type: Log-Pwr Avg Hold>100/100	12:12:51 PM Jul 11, 2019 18:ACE 2 3 4 5 0 TYPE DET P SININ N	Frequency	Addem Systems Analyze: Server 34 Server 34
Ref Offset 10 dB		Mk	r1 455.83 MHz 27.686 dBm	Auto Tune	ne Mkr1 3.344 GHz 10 dB/div Ref 40.00 dBm -27.056 dBm
30.0	↑			Center Freq 515.000000 MHz	
10.0				Start Freq 30.000000 MHz	
10.0				Stop Freq 1.000000000 GHz	
30.0			-20.00 dBm	CF Step 97.000000 MHz <u>Auto</u> Man	Hz 2000 400.00000 M
10.0	paral material and a server management	Careston in construction of the August	กลังหมู่เสาะให้หม่อมูลเลงอุ	Freq Offset 0 Hz	Freq Offs
50.0 Start 30.0 MHz			Stop 1.0000 GHz		810 Star 1.000 GHz Stop 5.000 GHz
#Res BW 100 kHz	#VB₩ 300 kHz	Sweep 92	2.73 ms (1001 pts)		start stop 3.000 GHZ stop 3.000 GHZ #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 6.667 st010 pts)

gilent Spectrum Analyzer - Swept SA				Agilent Spectrum Analyzer - Swept SA
RF SO AC SENSE 3VT	Aug Type: Log-Pwr Avg Hold: 72/100	12:14:11 PM Jul 11, 2019 TRACE 1 2 3 4 5 6 TYPE Mythodology	Frequency	D EF SOG_AC SENERAL AUDIANTO 12:19:19 Mulli 2019 Start Freq 1.000000000 GHz PR0: Fast Trig: Free Run Avgite/ds/100/000 Trig: Trig: Free Run Avgite/ds/100/000 Trig: Trig: Free Run Avgite/ds/100/00 Trig: Trig: Trig: Free Run Avgite/ds/100/00 Trig: Tri
IFGain:Low Atten: 40 dB Ref Offset 10 dB 0 dB/div Ref 40.00 dBm	M	kr1 470.38 MHz 28.250 dBm	Auto Tune	IFGain:Low Atten: 40 dB ben attention
10.0			Center Freq 615.000000 MHz	
			Start Freq 30.000000 MHz	
			Stop Freq 1.000000000 GHz	
xo		-20.00 d0m	CF Step 97.000000 MHz <u>Auto</u> Man	1z 400.000000 N
100 halfyetyelawelaharmatikatan materian katurturtan hanara terme	La la esta de la compañía de la comp	henninger alle and a start	Freq Offset 0 Hz	et en Freq Off
50.0 Hz		Stop 1.0000 GHz		500 Start 1.000 GHz Stop 5.000 GHz
Res BW 100 kHz #VBW 300 kHz	Sweep 9	2.73 ms (1001 pts)		#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 6.667 ms (1001 pts)



Channel 4

Agilent Spectrum Analyzer - Swept SA					Agilent Spectrum Analyzer - Swept SA	
Start Freq 30.000000 MHz	PN0: Fast C Trig: Free Run IFGain:Low Atten: 40 dB	AUSNAUTO Avg Type: Log-Pwr Avg Hold: 67/100	12:20:17 PM Jul 11, 2019 TRACE 1 2 3 4 5 6 TYPE MUNICIPAL OF P N N N N	Frequency	00 197 190 AC 1996/2017 AL398/UFO 1220339M J11/2019 Fri Start Freq 1.000000000 GHz Frig. Free Run Arg Type: Log-Pwr Trig. Free Run	requency
Ref Offset 10 dB 10 dB/div Ref 40.00 dBm	In our and the second	M	kr1 455.83 MHz 24.505 dBm	Auto Tune		Auto Tune
30.0	∳ ¹			Center Freq 515.000000 MHz		Center Freq 0000000 GHz
20.0				Start Freq 30.000000 MHz		Start Free
100			-13.00 « Dn	Stop Freq 1.000000000 GHz		Stop Free
100				CF Step 97.000000 MHz <u>Auto</u> Man	400	CF Step 0.000000 MH Mar
0.0 10 10 10 10 10 10 10 10 10 10 10 10 10 1	Aligned and the second	hander and a star of the second s	anan anna farbhairt	Freq Offset 0 Hz		Freq Offse 0 H
Start 30.0 MHz			Stop 1.0000 GHz		Start 1.000 GHz Stop 5.000 GHz	
Res BW 100 kHz	#VBW 300 kHz	Sweep 9	2.73 ms (1001 pts)		#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 6.667 ms (1001 pts)	



Agilent Spectrum Analyzer - Swept SA	SENSE:INT ALIGNAUT		Frequency	Agilent Spectrum Analyzer - Sw UT RF 50 g	AC AC	SENSE: INT		2:23:05 PM Jul 11, 2019	Farmer
Start Freq 30.000000 MHz PNO: Fast IFGain:Low Atte	Free Run Avg Hold>100/100	O TYPE NNNNN		Start Freq 1.000000	PNO: East T	rig:FreeRun Av htten:40 dB	vg Type: Log-Pwr g Hold: 41/100	TRACE 23456 TYPE MUNICIPALITY DET PINNNNN	Frequency
Ref Offset 10 dB 10 dB/div Ref 40.00 dBm		Mkr1 469.41 MHz 23.322 dBm	Auto Tune	Ref Offset 10) dB dBm		Mk	r1 2.404 GHz -27.010 dBm	Auto Tune
30.0	j1		Center Freq 615.000000 MHz						Center Freq 3.000000000 GHz
20.0			Start Freq 30.000000 MHz						Start Freq 1.000000000 GHz
-100		-13.00 4040	Stop Freq 1.000000000 GHz					-13.00 dBrg	Stop Freq 5.00000000 GHz
-30.0			CF Step 97.000000 MHz <u>Auto</u> Man	-20.0	م مرابع المربع الم	Hilandranan			CF Step 400.000000 MHz Auto Man
400 millionia management of the second second second	anterior and a second second second	alatiki aliki alika ana ang	Freq Offset 0 Hz	-40.0	afer Shilled Shide of Later by open stand and a second standing are and			a substantia a subst	Freq Offset 0 Hz
Start 30.0 MHz		Stop 1.0000 GHz		Start 1.000 GHz				Stop 5.000 GHz	
#Res BW 100 kHz #VBW 300	kHz Sweep	92.73 ms (1001 pts)		#Res BW 1.0 MHz	#VBW 3.0	0 MHz	Sweep 6.66	7 ms (1001 pts)	

3.4. Radiated Spurious Emission

3.4.1.Test Specification

Test Requirement:	FCC Part 90.210						
Test Method:	ANSI C63.26						
Measurement Distance:	3 m						
Antenna Polarization:	Horizontal & Vertical						
Operation mode:	Refer to item 4.1						
Receiver Setup:	FrequencyRBWVBW9kHz- 150kHz200Hz1kHz150kHz-9kHz30kHz30MHz-30MHz-1GHz100KHz300KHzAbove 1GHz1MHz3MHz						
Limit:	For equipment using 25 kHz channel spacing, on any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10log (P) dB. For equipment using 12.5 kHz channel spacing, on any frequency removed from the center of The authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log(P) dB or 70 dB, whichever is the lesser attenuation.						
Test setup:	Receiver Test Antenna Antenna RECEIVER UNDER TEST TURNTABLE STANDARD TEST SITE						
Test Procedure:	The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. The frequency range up to teeth harmonic of the fundamental frequency was investigated. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by						

	the substitution. Spurious emissions in dB =10, 1g (TXpwr in Watts/0.001)-the absolute level Spurious attenuation limit in dB = $50+10 \text{ Log}_{10}$ (power out in Watts) for EUT with a 12.5 kHz and 25KHz channel bandwidth.
Test results:	PASS

3.4.2.Test Data

Frequency	Reading level	Antenna	Cable loss	Ant.Gain	Emission level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
152.648	-93.88	V	0.24	31.35	-62.77	-20	-42.77
360.904	-91.75	V	0.26	31.34	-60.67	-20	-40.67
673.313	-94.80	V	0.42	31.24	-63.98	-20	-43.98
863.444	-95.21	V	0.58	30.71	-65.08	-20	-45.08
1263.509	-83.81	V	1.23	26.38	-58.66	-20	-38.66
3864.166	-81.43	V	1.68	25.47	-57.64	-20	-37.64
285.253	-94.73	Н	0.43	31.24	-63.92	-20	-43.92
399.050	-95.70	Н	0.45	30.68	-65.47	-20	-45.47
479.190	-95.26	Н	0.64	30.85	-65.05	-20	-45.05
675.773	-97.21	Н	0.79	31.12	-66.88	-20	-46.88
1368.694	-83.38	Н	1.29	26.12	-58.55	-20	-38.55
3258.712	-83.10	Н	1.62	25.41	-59.31	-20	-39.31

Test Mode: Channel 1, Channel Spacing 12.5KHz

Test Mode: Channel 2, Channel Spacing 12.5KHz

Frequency	Reading level	Antenna	Cable loss	Ant.Gain	Emission level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
155.210	-92.37	V	0.24	31.35	-61.26	-20	-41.26
364.462	-92.01	V	0.26	31.34	-60.93	-20	-40.93
669.814	-95.45	V	0.42	31.24	-64.63	-20	-44.63
862.247	-95.00	V	0.58	30.71	-64.87	-20	-44.87
1261.405	-80.61	V	1.23	26.38	-55.46	-20	-35.46
3858.853	-79.63	V	1.68	25.47	-55.84	-20	-35.84
290.754	-94.04	Н	0.43	31.24	-63.23	-20	-43.23
397.852	-97.22	Н	0.45	30.68	-66.99	-20	-46.99
479.276	-94.47	Н	0.64	30.85	-64.26	-20	-44.26
683.561	-95.93	Н	0.79	31.12	-65.6	-20	-45.6
1368.272	-82.77	Н	1.29	26.12	-57.94	-20	-37.94
3262.627	-80.06	Н	1.62	25.41	-56.27	-20	-36.27

		I Channel Space	Ŭ		Emission		
-	Reading					1 1	M
Frequency	level	Antenna	Cable loss	Ant.Gain	level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
149.976	-94.12	V	0.24	31.35	-63.01	-20	-43.01
363.698	-92.48	V	0.26	31.34	-61.40	-20	-41.40
672.157	-93.22	V	0.42	31.24	-62.4	-20	-42.4
867.135	-94.84	V	0.58	30.71	-64.71	-20	-44.71
1259.426	-83.31	V	1.23	26.38	-58.16	-20	-38.16
3858.867	-83.32	V	1.68	25.47	-59.53	-20	-39.53
290.920	-96.37	Н	0.43	31.24	-65.56	-20	-45.56
405.147	-97.54	Н	0.45	30.68	-67.31	-20	-47.31
473.758	-95.11	Н	0.64	30.85	-64.90	-20	-44.9
677.316	-97.94	Н	0.79	31.12	-67.61	-20	-47.61
1372.894	-82.73	Н	1.29	26.12	-57.90	-20	-37.9
3264.131	-80.99	Н	1.62	25.41	-57.2	-20	-37.2

Test Mode: Channel 3, Channel Spacing 12.5KHz

Test Mode: Channel 4, Channel Spacing 25KHz

Frequency	Reading level	Antenna	Cable loss	Ant.Gain	Emission level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
149.365	-93.82	V	0.24	31.35	-62.71	-13	-49.71
360.122	-90.44	V	0.26	31.34	-59.36	-13	-46.36
672.254	-92.94	V	0.42	31.24	-62.12	-13	-49.12
867.320	-94.85	V	0.58	30.71	-64.72	-13	-51.72
1259.385	-81.22	V	1.23	26.38	-56.07	-13	-43.07
3856.570	-79.47	V	1.68	25.47	-55.68	-13	-42.68
287.978	-95.40	Н	0.43	31.24	-64.59	-13	-51.59
402.660	-95.49	Н	0.45	30.68	-65.26	-13	-52.26
475.190	-94.61	Н	0.64	30.85	-64.40	-13	-51.4
678.902	-95.64	Н	0.79	31.12	-65.31	-13	-52.31
1370.493	-83.84	Н	1.29	26.12	-59.01	-13	-46.01
3258.430	-78.97	Н	1.62	25.41	-55.18	-13	-42.18

Test Mode:	Reading				Emission		
Frequency	level	Antenna	Cable loss	Ant.Gain	level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
157.727	-94.68	V	0.24	31.35	-63.57	-13	-50.57
361.299	-91.06	V	0.26	31.34	-59.98	-13	-46.98
670.384	-94.13	V	0.42	31.24	-63.31	-13	-50.31
859.190	-92.82	V	0.58	30.71	-62.69	-13	-49.69
1262.116	-82.89	V	1.23	26.38	-57.74	-13	-44.74
3860.246	-79.92	V	1.68	25.47	-56.13	-13	-43.13
285.515	-93.87	Н	0.43	31.24	-63.06	-13	-50.06
404.347	-93.76	Н	0.45	30.68	-63.53	-13	-50.53
472.970	-93.59	Н	0.64	30.85	-63.38	-13	-50.38
682.270	-96.99	Н	0.79	31.12	-66.66	-13	-53.66
1370.178	-81.28	Н	1.29	26.12	-56.45	-13	-43.45
3261.045	-81.54	Н	1.62	25.41	-57.75	-13	-44.75

Test Mode:	Channel 5	Channel S	pacing 25KHz
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Test Mode: Channel 6, Channel Spacing 25KHz

Reading Emission							
Frequency	level	Antenna	Cable loss	Ant.Gain	level	Limit	Margin
(MHz)	(dBm)	Polarization	(dB)	(dBi)	(dBm)	(dBm)	(dB)
154.820	-93.04	V	0.24	31.35	-61.93	-13	-48.93
363.368	-92.54	V	0.26	31.34	-61.46	-13	-48.46
670.811	-92.97	V	0.42	31.24	-62.15	-13	-49.15
865.805	-94.84	V	0.58	30.71	-64.71	-13	-51.71
1258.551	-80.86	V	1.23	26.38	-55.71	-13	-42.71
3858.923	-80.78	V	1.68	25.47	-56.99	-13	-43.99
291.012	-96.83	Н	0.43	31.24	-66.02	-13	-53.02
400.454	-94.07	Н	0.45	30.68	-63.84	-13	-50.84
475.645	-94.26	Н	0.64	30.85	-64.05	-13	-51.05
680.453	-98.21	Н	0.79	31.12	-67.88	-13	-54.88
1373.809	-84.09	Н	1.29	26.12	-59.26	-13	-46.26
3264.509	-78.93	Н	1.62	25.41	-55.14	-13	-42.14

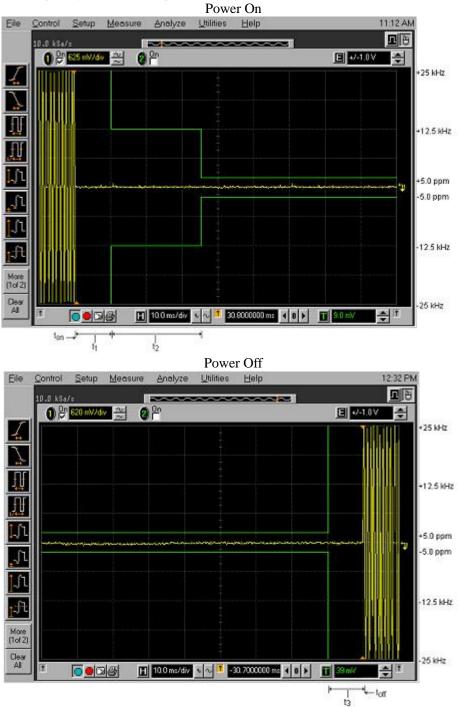
3.5. Transient Frequency Behavior

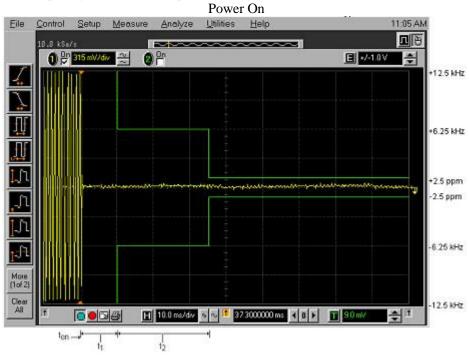
3.5.1.Test Specification

Test Requirement:	FCC Part 9	0.214				
Test Setup:	Oscilloscope EUT					
			Frequency Tolerance (ppm)			
	Frequency Range	Channel Bandwidth	Fixed and Base Station	Mobile > 2W	Stations ≤ 2W	
Test Limit	150-174MHz	6.25 12.5 25	1.0 2.5 5.0	2.0 5.0 5.0	2.0 5.0 50.0*	
Test Linnt	421-512MHz	6.25 12.5 25	0.5 1.5 2.5	1.0 2.5 5.0	1.0 2.5 5.0	
	 * Stations operating in the 154.45 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm. * Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band. 					
	The EUT was set in the climate chamber and connected to an external DC power supply and AC power supply. The RF output was directly					
	connected to Oscilloscope. The coupling loss of the additional cables					
	was recorded and taken in account for all the me					
Test Procedure:					ch stage), the	
	frequency for the lower, the middle and the highest frequency range					
	was recorded. For Frequency stability Vs. Voltage the EUT was					
	connected to a DC power supply or AC power supply and the voltage					
	was adjusted in the required ranges. The result was recorded.					
Test Result:	PASS					

3.5.2.Test data

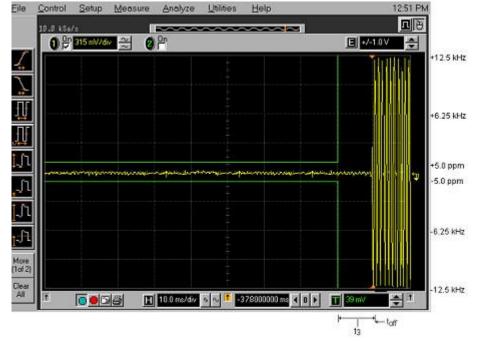
Test Plots for channel spacing 25KHz, EUT power setting: Maximum.





Test Plots for channel spacing 12.5KHz. EUT power setting: Maximum





3.6. Behavior Frequency Stability

3.6.1.Test Specification

Test Requirement:	FCC Part 90.213		
Test Method:	ANSI C63.26		
Test Setup:	Laptop RF Communication Test Set Test Set Equipment Attenuator(s) Mini-Circuit Under Test RF Detector Modulation Hewlett Packard AC/DC Adapter		
Test Procedure:	Method of Measurement (using a Modulation Domain Analyzer). The output of the EUT was connected to a power meter in order to get a reference power measurement. And the reference level is -20dBm. Once the reference power measurement was determined, an external signal source was connected to the Modulation Domain Analyzer in order to set the trigger level. The EUT was connected to the Modulation Domain Analyzer. In order to capture a single-shot turn-on of the transmitter signal, the modulation domain analyzer was set to trigger on the rising edge of the waveform. Plots were taken. The modulation domain analyzer was then adjusted to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transient of the transmitter signal. Plots were taken.		
Test Result:	PASS		

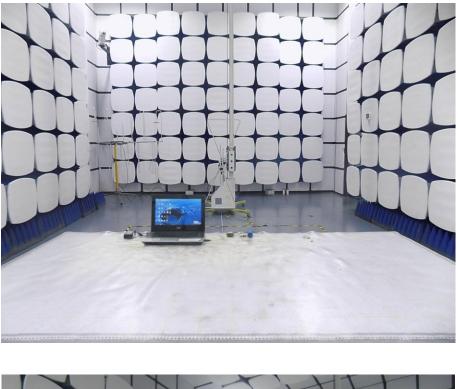
3.6.2. Test data

Conclusion: PASS			
Mode	Voltage	Frequency error	frequency error
	(V)	(Hz)	(ppm)
	3.1V	-39	-0.0855
Middle Channel 12.5KHz	2.9V	-39	-0.0855
Channel Spacing	2.7V	-39	-0.0855
Channel Spacing	2.5V	-39	-0.0855
Limit		2.5ppm	
Middle Channel	3.1V	-41	-0.0899
Middle Channel 25KHz Channel	2.9V	-41	-0.0899
Spacing	2.7V	-41	-0.0899
Spacing	2.5V	-41	-0.0899
Limit		5ppm	
Mode	Temperature	Frequency error	frequency error
	(°C)	(Hz)	(ppm)
	-40	-32	-0.0702
	-30	-31	-0.0680
	-20	-29	-0.0636
-	-10	-50	-0.1096
	0	-12	-0.0263
	10	-29	-0.0636
Middle Channel	20	-45	-0.0987
12.5KHz	30	-23	-0.0504
Channel Spacing	40	-15	-0.0329
	50	-29	-0.0636
	60	-35	-0.0767
	70	-38	-0.0833
	80	-32	-0.0702
	85	-39	-0.0855
Limit		2.5ppm	
	-40	-29	-0.0636
	-30	-24	-0.0526
	-20	-25	-0.0548
	-10	-52	-0.0548
	0	-19	-0.0417
	10	-27	-0.0592
Middle Channel	20	-40	-0.0392
25KHz Channel Specing	30	-23	-0.0504
Channel Spacing	40	-23	-0.0504
	50	-21	-0.0460
	60	-27	-0.0592
	70	-27	-0.0548
	80	-32	-0.0702
-	85	-30	-0.0658
Limit	0.5	50	0.0050

Test Requirement:	FCC Part 90.207
Test Result:	According to FCC § 2.1047(d), Part 22, 74, 90 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

4. TEST SETUP PHOTO

4.1.Photos of Radiated emission





5. TEST SETUP PHOTO

Please refer to the report A1906079-C01-R05.

-----THE END OF REPORT------