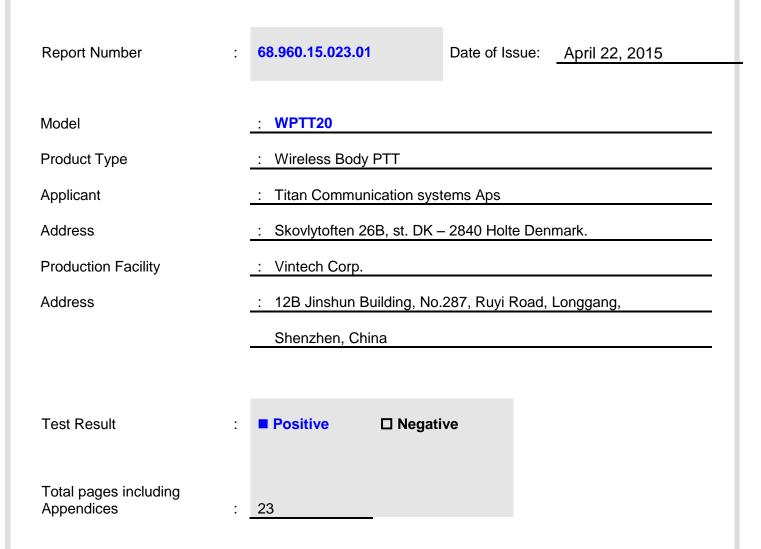


FCC/IC- TEST REPORT



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2 Details about the Test Laboratory

Details about the Test Laboratory

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

FCC Registration 502708 Number:

Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299



3 Description of the Equipment under Test

Description of the Equipment Under Test

Product:	Wireless Body PTT
Model no.:	WPTT-20
FCC ID:	2ACD5WPTT20
Rating Voltage:	DC 3.0V By CR2 Lithium battery
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Duty Cycle:	65.7%
Antenna Type:	Internal Antenna
Antenna Gain:	2.12dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless Body PTT operated at 2.4GHz



4 Summary of Test Standards

Test Standards						
FCC Part 15 Subpart C	FCC Part 15 Subpart C PART 15 - RADIO FREQUENCY DEVICES					
10-1-2014 Edition Subpart C - Intentional Radiators						
RSS-Gen Issue 4	General Requirements for the Certification of Radio Apparatus					
November 2014						
RSS-210 Issue 8	RSS-210 Issue 8 RSS-210 — Licence-exempt Radio Apparatus (All Frequency					
December 2010	Bands): Category I Equipment					

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements						
FCC Part 15 Sub	part C, RSS-Gen, F	RSS-210				
Test Condition		Pages	-	est Resul	-	
	Γ		T ages	Pass	Fail	N/A
§15.207	RSS-GEN A8.8	Conducted emission AC power port				\boxtimes
§15.247 (b) (1)	RSS-210 A8.4	Conducted peak output power	10	\boxtimes		
§15.247(a)(1)	RSS-210 A8.2(a) & RSSGEN 6.6	20dB bandwidth				\boxtimes
§15.247(a)(1)	RSS-210 A8.1(a)	Carrier frequency separation				\square
§15.247(a)(1)(iii)	RSS-210 A8.1(b)	Number of hopping frequencies				\square
§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Dwell Time				\square
§15.247(a)(2)	RSS-210 A8.1(c)	6dB bandwidth and 99% Occupied Bandwidth	11	\boxtimes		
§15.247(e)	RSS-210 A8.2(b)	Power spectral density	13	\boxtimes		
§15.247(d)	RSS-210 A8.5	Spurious RF conducted emissions	14	\boxtimes		
§15.247(d)	RSS-210 A8.5	Band edge	18	\boxtimes		
§15.247(d) & §15.209	RSS-210 2.5 & RSSGEN 6.13	Spurious radiated emissions for transmitter	20	\boxtimes		
§15.203	RSSGEN 8.3	Antenna requirement	See note 1	\boxtimes		

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a Embedded Type antenna, which gain is 2.12dBi. According to §15.203 and RSSGEN 8.3, it is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ACD5WPTT20 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-210.

SUMMARY:

All tests according to the regulations cited on page 5 were

Performed

- Not Performed

The Equipment under Test

■ - Fulfills the general approval requirements.

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

Sample Received Date:

Testing Start Date: April 1, 2015

Testing End Date:

April 16, 2015

March 13, 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

John 2hi

John Zhi EMC Project Manager

Prepared by:

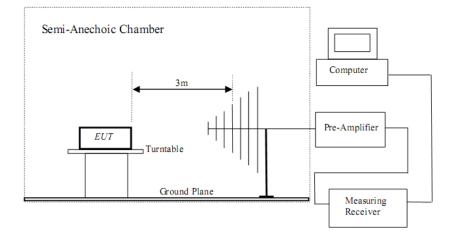
Alen X3000

Alan Xiong EMC Project Engineer

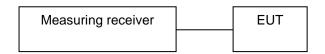


7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups







8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	X240	

Test software: CSR uEnergy Tools 2.0.

The system was configured to channel 0, 19, and 39 for the test.

9 Technical Requirement

9.1 Conducted peak output power

Test Method

- Use the following spectrum analyzer settings: RBW > the 6 dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW Sweep = auto, Detector function = peak, Trace = max hold.
- 2. Add a correction factor to the display.
- 3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

F	Frequency Range	Limit	Limit
	MHz	W	dBm
	2400-2483.5	≤1	≤30

Test result as below table

	Conducted Peak	
Frequency	Output Power	Result
MHz	dBm	
Top channel 2402MHz	-5.57	Pass
Middle channel 2440MHz	-4.15	Pass
Bottom channel 2480MHz	-1.78	Pass





9.2 6dB bandwidth and 99% Occupied Bandwidth

Test Method

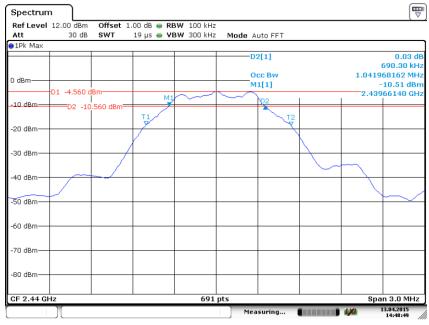
- 1. Use the following spectrum analyzer settings:
- RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
 Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the
 - fundamental emission that might be \geq 6 dB.
- 3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

	Limit	[kHz]			
≥500					
est result					
Frequency	6dB bandwidth	99% Bandwidt	h Result		
MHz	kHz	kHz			
Top channel 2402MHz	690.3	1046.3	Pass		
Middle channel 2440MHz	690.3	1042.0	Pass		
Bottom channel 2480MHz	699.0	1042.0	Pass		
	2402	MHz			
Spectrum					
RefLevel 12.00 dBn Att 30 dB					
● 1Pk Max					
		D2[1]	-0.24 dB 690.30 kHz		
0 dBm		Occ Bw M1[1]	1.046309696 MHz -11.72 dBm		
-10 dBm	dBm M1		2.40166570 GHz		
-10 dBin D2 -:	.2.000 dBm	T2			
-20 dBm	T1 P				
-30 dBm					
-50 dBin			~		
-40 dBm			<u> </u>		
-60 dBm					
-70 dBm					
70 dB.H					
-80 dBm					
CF 2.402 GHz	691	pts	Span 3.0 MHz		
			13.04.2015		

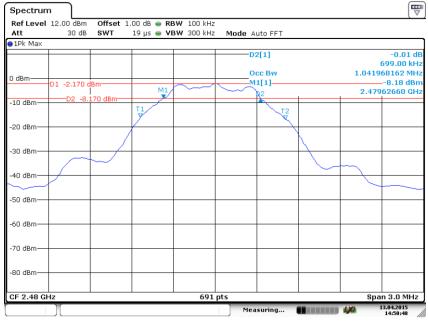


2440MHz



Date: 13.APR.2015 14:48:49

2480MHz



Date: 13.APR.2015 14:50:48

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9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

- Set analyzer center frequency to DTS channel center frequency. RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
- 2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
- 3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]

≤8

Test result

	Power spectral	
Frequency	density	Result
MHz	dBm	
Top channel 2402MHz	-20.40	Pass
Middle channel 2440MHz	-20.19	Pass
Bottom channel 2480MHz	-17.52	Pass



9.4 Spurious RF conducted emissions

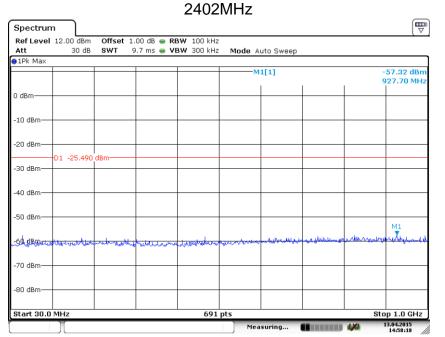
Test Method

- 1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
- 2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
- 3. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Spurious RF conducted emissions



Date: 13.APR.2015 14:58:19

EMC_SZ_FR_21.00 FCC Release 2014-03-20



Ref Level Att	12.00 dBm 30 dB	Offset SWT	1.00 dB 👄 R 96 ms 👄 V	BW 1 MHz BW 3 MHz	Mode Aut	n Sween			
●1Pk Max	00 00	0			Mode Add	0 00000			
					M	1[1]		:	-5.49 dB 2.4070 GF
-10 dBm									
-20 dBm									
-30 dBm	D1 -25.490	dBm							
-40 dBm						La Mariana			
	mandarate	andrehand	rlaunderna	and an and the state of the sta	wohnth	www.n	why your	hundrer	nuhuru
-60 dBm									
-70 dBm									
-80 dBm									
Start 1.0 G	H7			691	nte			Stor	25.0 GH

Date: 13.APR.2015 14:57:44

2440MHz

Spectrum			
Ref Level 12.00 dBm	Offset 1.00 dB RBW 100 kH		· · · · · · · · · · · · · · · · · · ·
Att 30 dB	SWT 9.7 ms 👄 VBW 300 kH	Iz Mode Auto Sweep	
		M1[1]	-57.67 dBm 867.30 MHz
0 dBm			
-10 dBm			
-20 dBm	d0		
-30 dBm	abm		
-40 dBm			
-50 dBm			M1
169. ABOOM Martine	would she would wonth	and the second	washered the hearth duth the areas
-70 dBm			
-80 dBm			
CF 515.0 MHz	69	1 pts	Span 970.0 MHz
		Measuring	13.04.2015 14:57:05

Date: 13.APR.2015 14:57:05

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Ref Level 12 Att	.00 dBm Offse 30 dB SWT	et 1.00 dB 👄 R 96 ms 👄 V		lode Auto Sweep			
●1Pk Max							
				M1[1]			-4.03 dE 2.4410 G
-10 dBm							
-20 dBm							
-30 dBm	-24.030 dBm						
-40 dBm				und M.A.			
-50-86m	renterret	motherworkship	- whether	ynar warden werden w	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	nonmenter	market
-60 dBm					_		
-70 dBm							
-80 dBm							
Start 1.0 GHz			691 pt			Eton	25.0 GF

Date: 13.APR.2015 14:55:49

2480MHz

Spectrum				
Ref Level 12.00 dBm	Offset 1.00 dB 👄 RE	3W 100 kHz		· · · · · · · · · · · · · · · · · · ·
Att 30 dB	SWT 9.7 ms 👄 VE	3W 300 kHz Mode	Auto Sweep	
1Pk Max				
			M1[1]	-57.59 dBr
			1 1	826.60 MH
0 dBm				
-10 dBm				
-20 dBm				
D1 -21.690	J dBm			
-30 dBm				
-40 dBm				
-50 dBm				
-50 dbiii				M1
60 dBm - Hunner	Marthan Martin Martin		was mult a heating will a made	
Child Berry and and many	www.madelendlend.ch. Marchald frees	housedhoreaction		
-70 dBm				
-/U UBM				
00.40				
-80 dBm				
		601		
Start 30.0 MHz		691 pts		Stop 1.0 GHz
		Me	easuring 🚺	13.04.2015 14:54:41

Date: 13.APR.2015 14:54:41

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Ref Level Att	12.00 dBm 30 dB	Offset SWT	1.00 dB 👄 RE 96 ms 👄 VE		Mode Aut	o Sween			
●1Pk Max	00 40	0.111			Houe Au	0 011000			
-					M	1[1]			-1.69 dBi 2.4760 GH
-10 dBm									
-20 dBm	D1 -21.690)_dBm							
-30 dBm									
-40 dBm			muunnund			Mr. Corres h	Ah 1 is now	at me and	And A
-50 dBm	untwichthe	hand	mannanan	www.me.m	P. Marco a		v . • 00 00 + 00		- market
-60 dBm—									
-70 dBm—									
-80 dBm									
Start 1.0 0				691	nte			Etor	25.0 GH

Date: 13.APR.2015 14:54:13

9.5 Band edge

Test Method

1 Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 kHz, VBW \ge RBW, Sweep = auto, Detector function = peak, Trace = max hold.

- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

Spectrur	n 12.00 dBm		RBW 100 kHz			
Att	12.00 aBr 30 dB			Mode Auto Swi	een	
1Pk Max	00 66		• 1811 000 Mile	Hous Auto om	000	
				M1[1]		-6.32 dBn
						2.402180 GHz
D dBm				M2[1]		-59.45 dBn
						2.390000 GH
-10 dBm—						
-20 dBm—						
	D1 -26.32	0 dBm				
-30 dBm—						
-40 dBm—						
						МЗ и
-50 dBm—						
no data da					den an hala ta	M2
-80 dBfn-b-					****	nd francisco contine
-70 dBm						
-70 uBm-						
-80 dBm						
-80 aBm—						
Start 2.31	CH2		691 pt			Stop 2.405 GHz
larker	3.12		591 pc			000p 2.400 GHZ
	f	X-value	Y-value	Function	Eun	iction Result
M1	1	2.40218 GHz	-6.32 dBm	ranction	Fui	iccion Result
M2	1	2.39 GHz				
M3	1	2.4 GHz				

Date: 13.APR.2015 14:59:36

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Spectrum								
Ref Level 1				RBW 100 kHz			_	
Att	30 dE	SWT 75	.9 µs 👄 '	/BW 300 kHz	Mode A	uto FF	T	
0 dBm M1						3[1] 1[1]		-51.60 dBr 2.4835000 GH -2.17 dBr 2.4799850 GH
-10 dBm								
-20 dBm	1 -22.17	0 dBm						
-30 dBm	h							
-50 dBm	- when	MB						
-60 dBm		m	www.	m	mon	Am	M2	
-70 dBm							· · ·	
-80 dBm								
Start 2.477	GHz			691	pts			Stop 2.51 GHz
Marker								
Type Ref		X-value	E CUE	<u>Y-value</u> -2.17 dB	Func	tion	Fu	nction Result
M1 M2	1	2.47998	5 GHZ 5 GHZ	-2.17 dB				
M3	1		5 GHz	-51.60 dB				
)[Mea	suring		13.04.2015 15:01:06

Date: 13.APR.2015 15:01:06



9.6 Spurious radiated emissions for transmitter

Test Method

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Use the following spectrum analyzer settings: Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

Emission

2402MHz

	Frequency	Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBµV/m	
	279.96	39.03	Horizontal	46	QP	6.97	Pass
	875.84	38.22	Vertical	46	QP	7.78	Pass
	*4804	41.62	Horizontal	74	PK	32.38	Pass
	*4804	41.16	Vertical	74	PK	32.84	Pass
2440MHz							
	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBµV/m	
	*4880	42.47	Horizontal	74	PK	31.53	Pass
	*4880	45.38	Vertical	74	PK	28.62	Pass

2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
*4960	41.86	Horizontal	74	PK	31.14	Pass
*4960	47.63	Vertical	74	PK	26.37	Pass

Remark:

- (1) AV Emission Level= PK Emission Level+20log (dutycycle)
- (2) Data of measurement within 30-1000MHz frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.



10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
С	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2015-8-17
	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2015-8-17
DE	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2017-8-17
RE	Horn Antenna	Rohde & Schwarz	HF907	102294	2017-8-17
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2015-8-17
	3m Semi-anechoic chamber	TDK	9X6X6		2019-5-29

C - Conducted RF tests

Conducted peak output power

- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density
- Spurious RF conducted emissions
- Band edge



11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System I	Measurement	Uncertainty

Items	Extended Uncertainty
Radiation emission	Horizontal: 4.83dB; (30MHz-1GHz) Vertical: 4.91dB; (30MHz-1GHz)
	Horizontal: 4.89dB; (1Hz-18GHz) Vertical: 4.88dB; (1Hz-18GHz)