



FCC - TEST REPORT

Report Number : **68.960.17.082.01** Date of Issue: November 20, 2017

Model : **T4HU1708/31k, T4HU1709/31k, T4HUXXXX (X is 0 to 9)**

Product Type : Remote control

Applicant : Tech4home, Lda.

Address : Rua de Fundoes, No.151, 3700-121 Sao Joao da Madeira, Portugal.

Production Facility : Guangdong Seneeasy Intelligent Technology Co., Ltd.

Address : No. 48, Zhongkai Hi-Tech Development Industrial Zone, 516000 Huizhou City, Guangdong, PEOPLE'S REPUBLIC OF CHINA

Test Result : **Positive** **Negative**

Total pages : 20

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

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

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

Test Firm Registration Number: 514049

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Remote control

Model: T4HU1708/31k

FCC ID: 2ALB6-T4HU1708

Rating Voltage: 3VDC (Supplied by 2 x 1.5V AAA batteries)

RF Transmission Frequency: 2405-2480MHz

Modulation: GFSK

Antenna Type: Integrated Antenna

Antenna Gain: 0dBi

Description of the EUT: The product is a Remote control that operated at 2.4GHz, The TX range is 2405MHz-2480MHz.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2016 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C 15.249					
Test Condition	Pages	Test Site	Test Result		
			Pass	Fail	N/A
15.207 Conducted emission AC power port	---	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.205(a), §15.209(a), §15.249(a), §15.249(c) Field strength of emissions and Restricted bands	9	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC §15.215(c) 20dB bandwidth	14	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.249(d) Out of band emissions	17	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203 Antenna requirement	See note 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses an integral PCB antenna, which gain is 0dBi. According to §15.203, 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: 2ALB6-T4HU1708 complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

All models are identical with Model T4HU1708/31k except model name. Unless otherwise specified the model: T4HU1708/31k was chosen as the representative model to perform full tests, and the other models were deemed to fulfil relevant RF requirements without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were.

- Performed

- Not Performed

The Equipment under Test

- Fulfils the general approval requirements.

- Does not fulfill the general approval requirements.

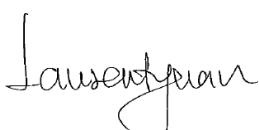
Sample Received Date: 08 October 2017

Testing Start Date: 09 October 2017

Testing End Date: 12 October 2017

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

Reviewed by:



Laurent Yuan

EMC Project Manager

Prepared by:



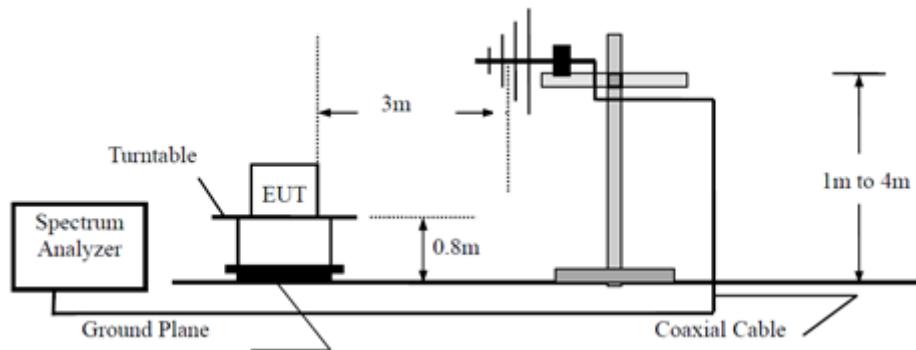


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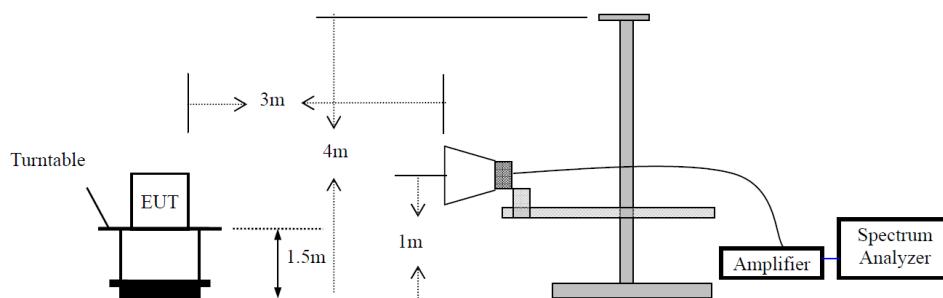
7 Test setups

7.1 Radiated test setups

Below 1GHz



Above 1GHz



8 Technical Requirement

8.2 Field strength of emissions and restricted bands

Test Method

- 1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average
 measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

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 \geq RBW for peak measurement, Sweep = auto, Detector function
 = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log (1/duty cycle))).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limits

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters.

According to §15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to §15.205 and Unwanted emissions falling into restricted bands in §15.205 (a) Table 3 shall comply with the limits specified in §15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/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

Field strength of emissions and Restricted bands

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.

EUT: Remote control

M/N: T4HU1708/31k

Operating Condition: Tx; 2405MHz

Below 1GHz

Frequency (MHz)	Emission Level (dB μ V/m)	E-Field Polarity	Limits		Margin (dB)	Value Type	Emission Type
			(dB μ V/m)	(dB)			
887.37	27.67	H	46	18.33	QP		Spurious
944.92	30.17	V	46	15.83	QP		Spurious
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

Above 1GHz

Frequency (MHz)	Maximum Emission (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	E-Field Polarity	Limits		Margin (dB)	Value Type	Emission Type
					(dB μ V/m)	(dB)			
2405	90.21	-6.0	84.10	H	114.00	29.9	Peak	Fundamental	
2405	83.07	-5.8	77.27	V	114.00	36.73	Peak	Fundamental	
2437.06*	53.06	-5.9	53.94	H	74.00	20.06	Peak	Spurious	
2341.00*	48.20	-6.0	42.20	V	74.00	31.80	Peak	Spurious	
10036.87	41.63	9.7	31.93	H	74.00	42.07	Peak	Spurious	
13113.28	43.68	13.4	30.28	V	74.00	43.72	Peak	Spurious	
Remark:									
Factor = Antenna Factor + Cable Loss – Pre-amplifier.									

Remark

1: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

2: 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.

EUT: Remote control
 M/N: T4HU1708/31k
 Operating Condition: Tx; 2445MHz

Above 1GHz

Frequency (MHz)	Maximum Emission (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	E-Field Polarity	Limits	Margin	Value Type	Emission Type
					(dB μ V/m)	(dB)		
2445	88.07	-5.8	82.27	H	114.00	31.73	Peak	Fundamental
2445	81.26	-5.7	75.56	V	114.00	38.44	Peak	Fundamental
2413.06*	53.20	-5.9	47.30	H	74.00	26.70	Peak	Spurious
2477.06*	47.04	-5.5	41.54	V	74.00	32.46	Peak	Spurious
15024.84	46.85	18.7	28.15	H	74.00	45.85	Peak	Spurious
14997.18	47.60	18.7	28.90	V	74.00	45.10	Peak	Spurious

Remark:

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

Remark

- 1: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- 2: 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.

EUT: Remote control

M/N: T4HU1708/31k

Operating Condition: Tx; 2480MHz

Above 1GHz

Frequency (MHz)	Maximum Emission (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	E-Field Polarity	Limits	Margin	Value Type	Emission Type
					(dB μ V/m)	(dB)		
2480	87.92	-5.6	82.32	H	114.00	31.68	Peak	Fundamental
2480	81.46	-5.5	75.96	V	114.00	38.04	Peak	Fundamental
2416.06*	51.91	-5.9	46.01	H	74.00	27.99	Peak	Spurious
2448.06*	46.80	-5.6	41.20	V	74.00	32.80	Peak	Spurious
14053.12	44.75	15.3	29.45	H	74.00	44.55	Peak	Spurious
13080.46	44.79	13.3	31.49	V	74.00	42.51	Peak	Spurious

Remark:

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

Remark

- 1: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- 2: 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.

9.2 20dB Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Limits:

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

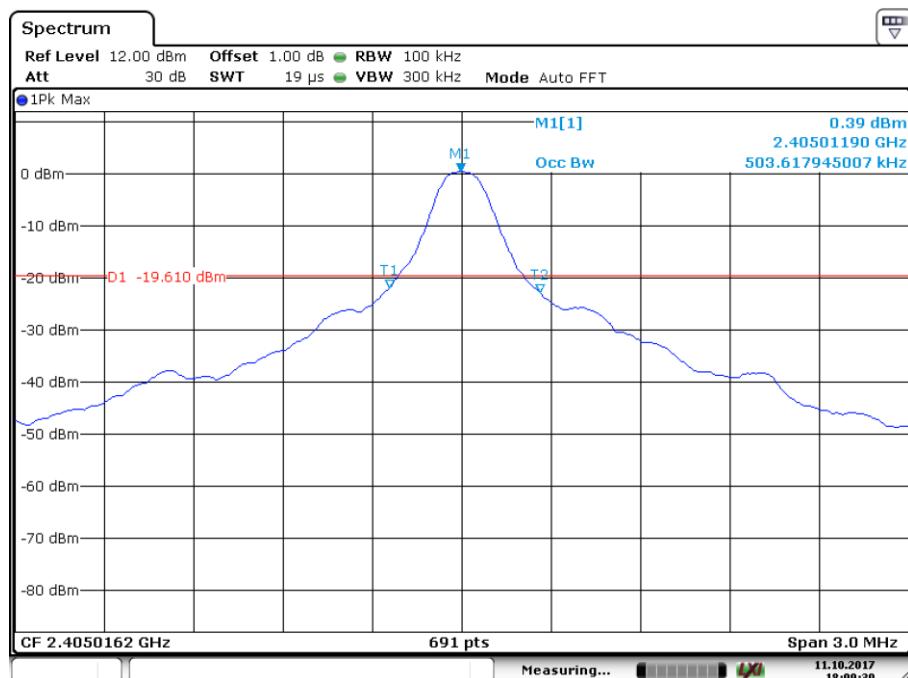
20dB Bandwidth

EUT: Remote control

M/N: T4HU1708/31k

Operating Condition: Tx

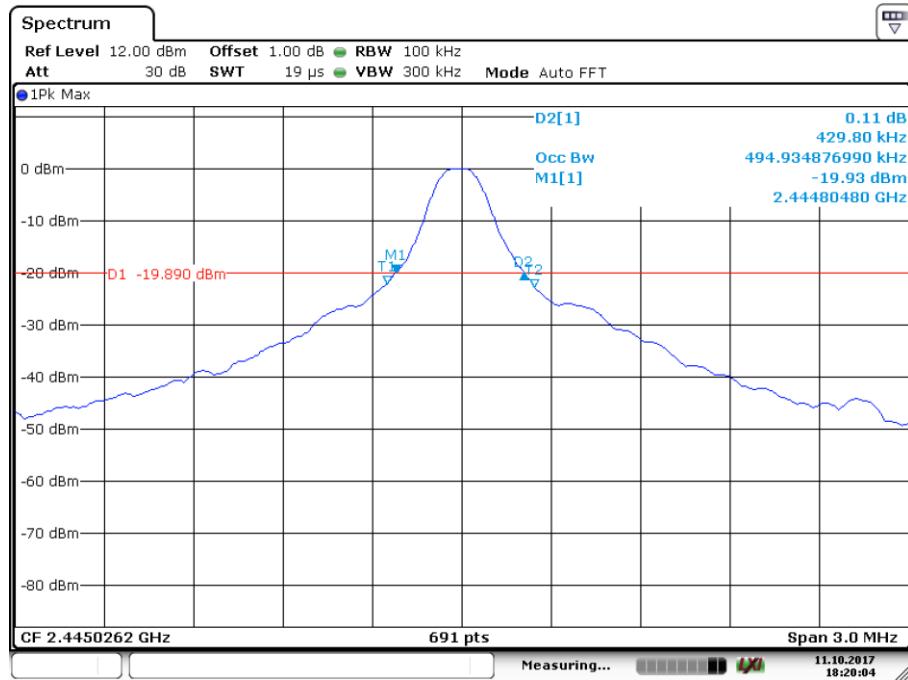
Frequency MHz	20dB Bandwidth MHz	Limit kHz	Result
2405	503.6	/	Pass
2445	494.9	/	Pass
2480	503.6	/	Pass



Date: 11.OCT.2017 18:09:30

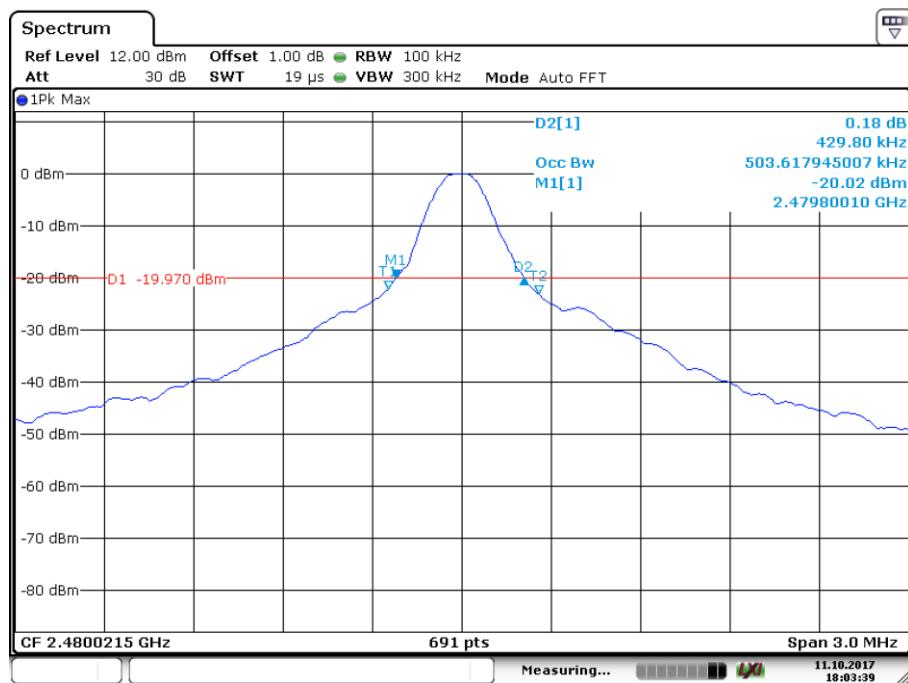
2405MHz

20dB Bandwidth



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2445MHz



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2480MHz

9.3 Out of band emissions

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 \geq 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:

According to §15.249(d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

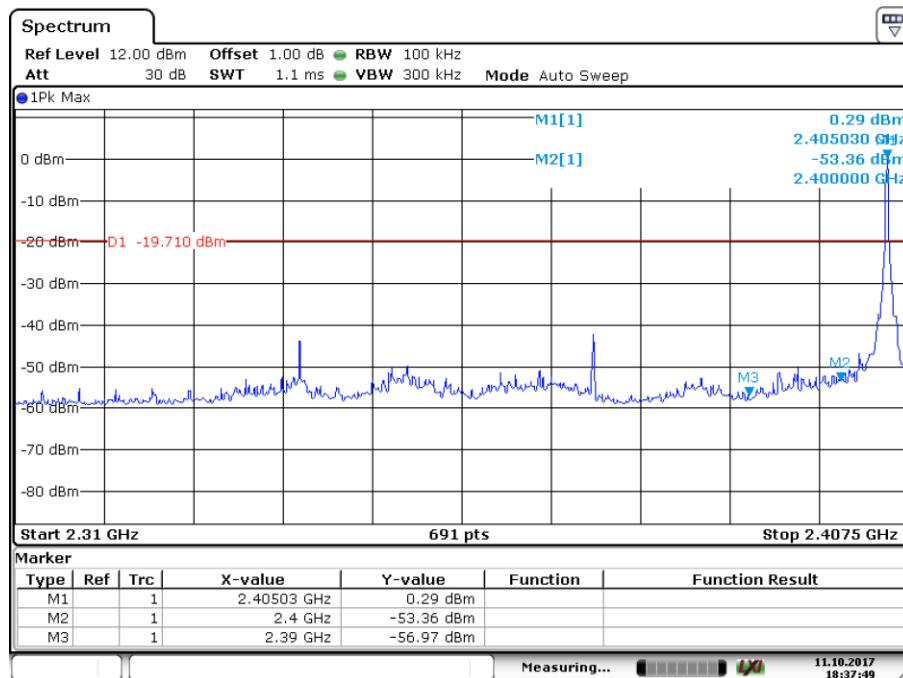
Band edge testing

EUT: Remote control

M/N: T4HU1708/31k

Operating Condition: Tx; 2405MHz

Comment: Receiver



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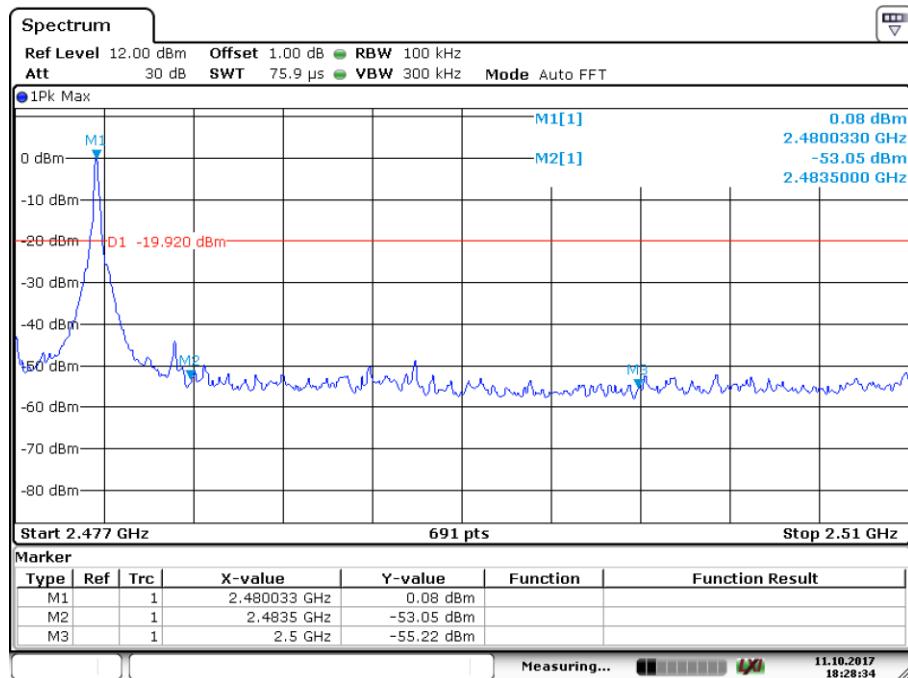
Band edge testing

EUT: Remote control

M/N: T4HU1708/31k

Operating Condition: Tx; 2480MHz

Comment: Receiver



Date: 11.OCT.2017 18:28:33

10 Test equipment list

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2018-7-14
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2018-7-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2018-7-14
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2018-7-14
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2018-7-7
Attenuator	Agilent	8491A	MY39264334	2018-7-7
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

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 Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.99dB; Vertical: 4.97dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.96dB; Vertical: 4.95dB;
Uncertainty for Conducted RF test with TS 8997	Power level test involved: 2.06dB Frequency test involved: 1.16×10^{-7}