

試験報告書

TEST REPORT

Report number 報告書番号 : KR0140-RJ2409-001

Issue date 発行日 : 2024-09-02

申請者 Applicant	:	Helsel Co., Ltd. DA-323,324,325,520, Misa-daero, Hanam-si, Gyeonggi-do, Republic of Korea
型式又は名称 Model name	:	BALKIN TX
製造番号 Serial number	:	N/A
測定規格 Test procedure	:	証明規則第2条第19号の規定する特定無線設備の2.4GHz帯高度化 小電力データ通信システム
測定方法 Test method	:	総務省告示第88号別表第43
測定日 Date of test	:	2024-08-26
試験設備名 Name of facility	:	EMC Labs Co., Ltd.
試験結果 Test Result	:	適合

この試験報告書における測定結果は試験された装置にのみ該当します。
また、完全な複製を除き、当試験所の文書による承認なしに、報告書の一部分だけを複製することを禁止します。

測定者;
Tested by;


Joon Young, Jeon

承認者;
Approved by;


Jong Myoung, Shin

1. Summary of Test

1. Purpose of test

Ordinance on Technical Standards Conformity Certification of Specified Radio Equipment
2.4GHz Band wide band low power data communication System

2. Standards

Certification Ordinance Article 2 Clause 1 Item19

1) Test Methods

Ministry of Internal Affairs and Communications Notification Article 88 Appendix 43

2) Deviation from standards

None

3. List of applied test to the EUT

Article 88 Appendix 43	Classification of EUT	Condition	Result
1	Voltage fluctuation	Conducted	PASS
3	Frequency Tolerance	Conducted	PASS
4	Occupied Bandwidth	Conducted	PASS
4	Spread Bandwidth	Conducted	N/A
5	Unwanted (Spurious) Emission Strength	Conducted	PASS
6	RF Output Power Tolerance	Conducted	PASS
7	Secondary Emitted Radio Wave Strength	Conducted	N/A
8	Carrier Sensing Function (1)	Conducted	N/A
9	Carrier Sensing Function (2)	Conducted	N/A
10	Absolute Gain of Transmission Antenna	Conducted	N/A
11	Angle Width of Principal Radiation from Transmission Antenna	Conducted	N/A
12	Interference Prevention Function	Conducted	PASS
13	Hopping frequency dwell time	Conducted	N/A

1) Test set up

Table-Top

2) Modification to the EUT by laboratory

None

1. Test Information

1. Applicant

Helsel Co., Ltd

DA-323,324,325,520, Misa-daero, Hanam-si, Gyeonggi-do, Republic of Korea

2. Equipment under test

Remote Controller

3. Model number

BALKIN TX

4. Serial number

-

5. RF Specification Frequency range

2404-2481MHz

6. Number of RF Channels

62 Channels

ch.	Freq.(MHz)	ch.	Freq.(MHz)	ch.	Freq.(MHz)	ch.	Freq.(MHz)
1	2404	18	2421	35	2438	52	2455
2	2405	19	2422	36	2439	53	2456
3	2406	20	2423	37	2440	54	2457
4	2407	21	2424	38	2441	55	2458
5	2408	22	2425	39	2442	56	2459
6	2409	23	2426	40	2443	57	2460
7	2410	24	2427	41	2444	58	2461
8	2411	25	2428	42	2445	59	2462
9	2412	26	2429	43	2446	60	2463
10	2413	27	2430	44	2447	61	2464
11	2414	28	2431	45	2448	62	2481
12	2415	29	2432	46	2449		
13	2416	30	2433	47	2450		
14	2417	31	2434	48	2451		
15	2418	32	2435	49	2452		
16	2419	33	2436	50	2453		
17	2420	34	2437	51	2454		

7. Modulation method

GFSK

8. Data rate

1Mbps

9. Variation of the family model(s)

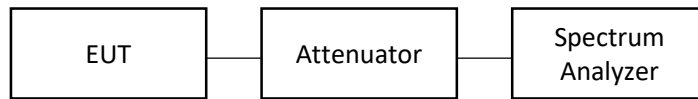
None

10. Operating Temperature

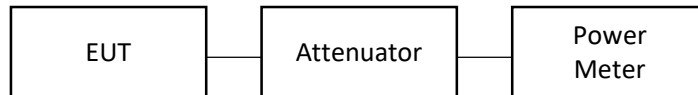
-20 °C ~ +50 °C

2. Configuration of equipment

1. Frequency tolerance, Occupied bandwidth, Unwanted(Spurious) emission strength



2. RF output power tolerance,



1. 試驗結果

Test results

Environment of test room	Date of test	2024-8-26
	Temperature	25.1 °C
	Humidity	48.8 %

Peak Antenna Gain	0.17	dBi
Declaration Output Power	0.1	mW
Declaration Output Power	-13.0103	dBm
E.I.R.P.	-12.8403	dBm
Input Power Voltage	6.0	VDC

Tested Circit Insertion Loss		0	dB
Transmission Time	ON TIME	0.6875	ms
	OFF TIME	3.368782	ms
	Ratio	0.1695	-

Test category :	2.4GHz Band Low-Power Data Communication System		
The reason why the tests are performed only at rated voltage :	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).		
The reason why the Secondary emitted radio wave strength is not tested :	EUT is only transmitter not receiver.		

Measurement Frequency		MHz	2404	2444	2481	Result	Limit	Note
Channel Number		Ch.	1	41	62	---	---	
Frequency Measurements		MHz	2403.990600	2443.988752	2480.988508	---	---	
Frequency Tolerance		ppm	-3.91015	-4.60229	-4.63200	PASS	±50×10 ⁻⁶ (50ppm)	
Occupied Bandwidth		MHz	2.32	1.98	1.9	PASS	26MHz or below	
RF Output Power		mW	0.047501	0.048854	0.048150	PASS	10mW or below	
RF Output Power Tolerance		%	-4.998602	-2.292029	-3.699178		+20 to -80%	
Unwanted (Spurious) Emission Strength	30 to 2387MHz	uW/MHz	0.006792	0.002254	0.002328	PASS	2.5uW/MHz or below	
		MHz	2384.643	2325.718	2370.501	----		
	2387 to 2400MHz	uW/MHz	0.129718	0.078343	0.002938	PASS	25uW/MHz or below	
		MHz	2399.909	2394.137	2389.691	----		
	2483.5 to 2496.5MHz	uW/MHz	0.003258	0.003990	0.462381	PASS	25uW/MHz or below	
		MHz	2487.114	2487.517	2483.500	----		
	2496.5 to 12500MHz	uW/MHz	0.048529	0.044566	0.044463	PASS	2.5uW/MHz or below	
		MHz	4807.309	4887.337	4957.361	----		
Interference Prevention Function			PASS			PASS		
Transmitting antenna absolute gain			N/A			N/A	*1	
Angular width of the main radiation of the transmitting antenna			N/A			N/A	*1	

*1 Measurement only if the E.I.R.P. exceeds 12.14dBm

4. Measurement equipment list

USE	Equipment	Company	Model No.	Serial No.	Calibrated by	Cal. Method	Cal. Due	Cal. Date
	TEMP & HUMID CHAMBER	JFM Engineering	JFMA-001	20200929-01	HCT	∧\c)	Dec. 2024	Dec. 7, 2023
	CONTROLLER	SAMWON TECHNOLOGY	TEMI2500	S7800VK191 0707	HCT	∧\c)	Dec. 2024	Dec. 7, 2023
	PSA SERIES SPECTRUM ANALYZER	AGILENT	E4440A	MY45304057	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
X	MXG ANALOG SIGNAL GENERATOR	AGILENT	N5183A	MY50141890	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	SYSTEM DC POWER SUPPLY	AGILENT	6674A	MY53000118	HCT	∧\c)	Dec. 2024	Dec. 11, 2023
	VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	257524	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	BLUETOOTH TESTER	TESCOM	TC-3000A	3000A480088	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	DIRECTIONAL COUPLER	AGILENT	773D	2839A01855	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	ATTENUATOR	AGILENT	8493C	73193	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	TERMINATION	HEWLETT PACKARD	909D	7492	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	POWER DIVIDER	HEWLETT PACKARD	11636A	6916	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	SLIDE-AC	DAEKWANG T&M CO.,LTD.	SV-1023	-	HCT	∧\c)	Nov. 2024	Nov. 10, 2023
X	DIGITAL MULTIMETER	humantechstore	15B+	50561541WS	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	Temperature and Humidity Datalogger	CEM	DT-172	201000251	HCT	∧\c)	Apr. 2025	Apr. 5, 2024
	ATTENUATOR	ACE RF COM	ATT SMA 20W 20dB 8G	A-0820.SM20.2	HCT	∧\c)	Apr. 2025	Apr. 4, 2024
	TERMINATION	ACE RF COM	TERM SMA F 20W 8G	A-0008.SM20.2	HCT	∧\c)	Apr. 2025	Apr. 4, 2024
	ATTENUATOR	ACE RF COM	ATT 2.92 2W 20dB 40G	A-4020.2902.1	HCT	∧\c)	Apr 2025	Apr. 4, 2024
	High Pass Filter	WT Microwave INC.	WT-A3314-HS	WT22111804-1	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	High Pass Filter	WT Microwave INC.	WT-A3314-HS	WT23101704-6	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
	TUNABLE BAND REJECT FILTER	K&L MICROWAVE	3TNF-800/1000-0.2-N/N	504	HCT	∧\c)	Feb. 2025	Feb. 22, 2024
X	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSU26	200444	HCT	∧\c)	Feb. 2025	Feb. 22, 2024
	TERMINATION	ACE RF COM	TERM 2.92 F 2W 40G	A-0040.2920.2	HCT	∧\c)	Apr. 2025	Apr. 4, 2024
	E-SERIES AVG POWER SENSOR	AGILENT	E9304A	MY41499030	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
X	USB Peak Power Sensor	Anritsu	MA24408A	12321	HCT	∧\c)	Nov. 2024	Nov. 9, 2023
	Power meter	AGILENT	E4419B	GB38410188	HCT	∧\c)	Dec. 2024	Dec. 8, 2023
X	DC POWER SUPPLY	AGILENT	E3634A	MY40012120	HCT	∧\c)	Feb. 2025	Feb. 22, 2024
	VIBRATION TESTER	GREEN SCIENCE	GRV-500	LABS-RF-001	HCT	∧\c)	Feb. 2025	Feb. 22, 2024

Note1: "X" used equipment.

Note2: The validity of measurement equipment is one year from the first day of the following month of the calibration date.

Note3: Cal.Method ...

a) : Calibration conducted by the National Institute of Information and Communications Technology~NICT~ or a designated calibration agency under Article 102-18 paragraph (1)~ TELECOM Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc~.

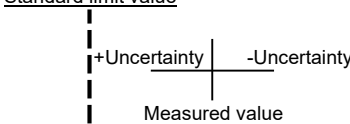
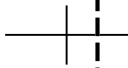
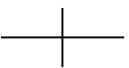
b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)~Japan Calibration Service System~

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)~ TELECOM Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc~.

d) : Calibration conducted by using other equipment that listed above from a) to c)

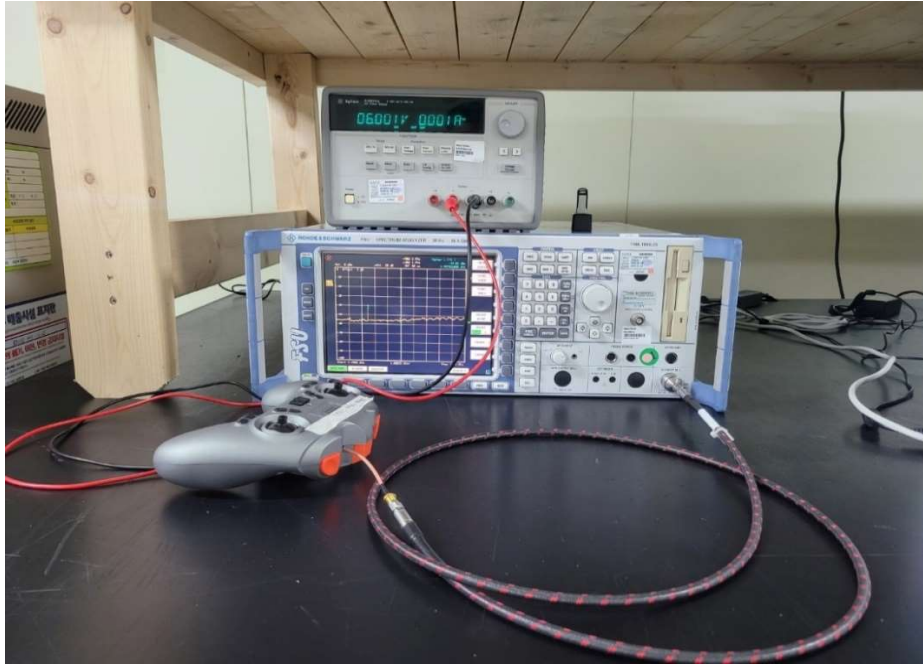
5. Uncertainty

Parameter	Uncertainty
Total RF power conducted	± 0.34 dB
Spurious emissions conducted	± 0.34 dB
Temperature	$\pm 0.8^{\circ}\text{C}$
Humidity	$\pm 4.4\%$

Judge	Measured value and standard limit value	
PASS	Case1  Even if it takes uncertainty into consideration, a standard limit value is fulfilled.	
	Case2  Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.	
FAIL	Case3  Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.	
	Case4  Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.	

6. Photographs

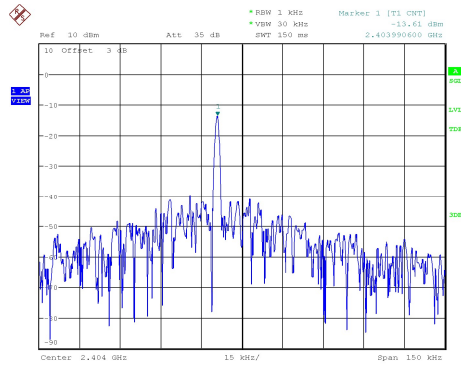
Conducted Measurement Photo



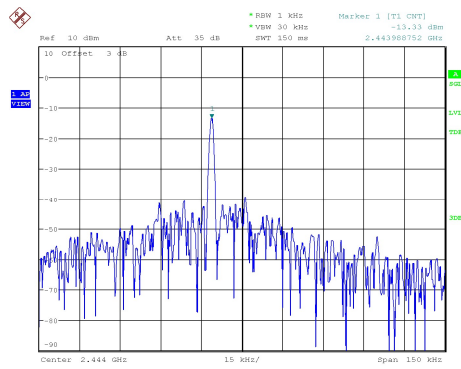
7. Test chart

7.1 Frequency tolerance

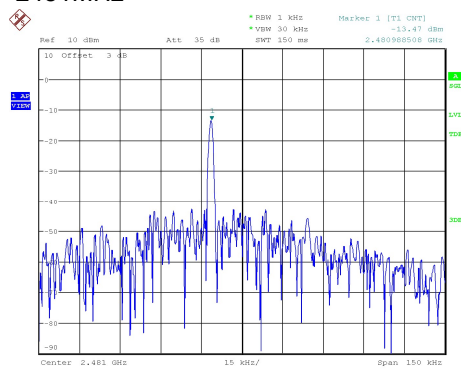
2404MHz



2444MHz

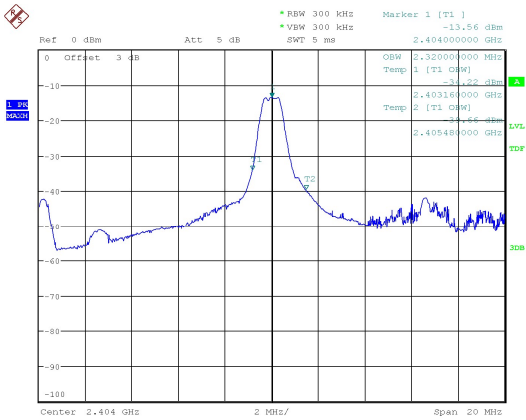


2481MHz

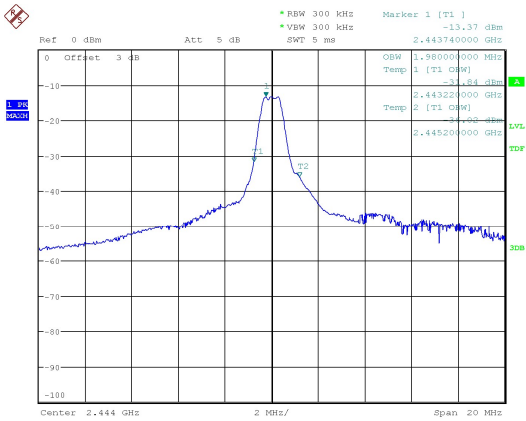


7.2 Occupied bandwidth

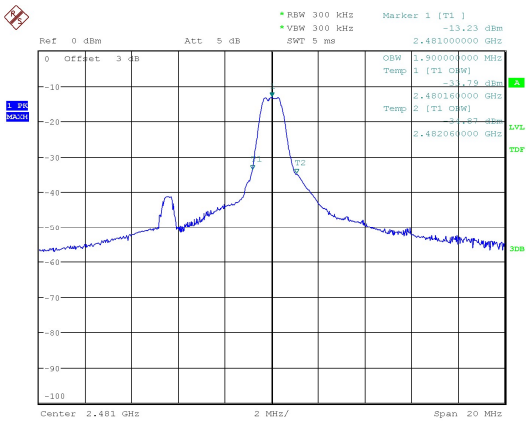
2404MHz



2444MHz

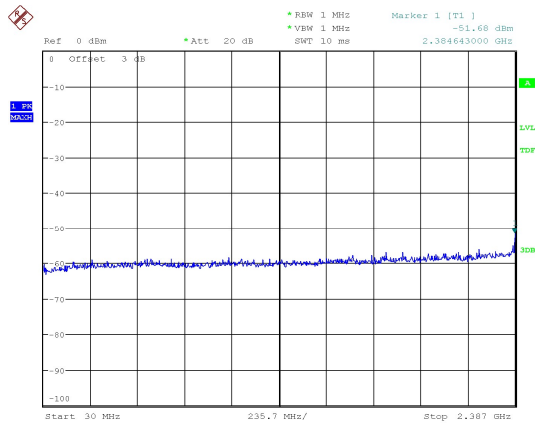


2481MHz

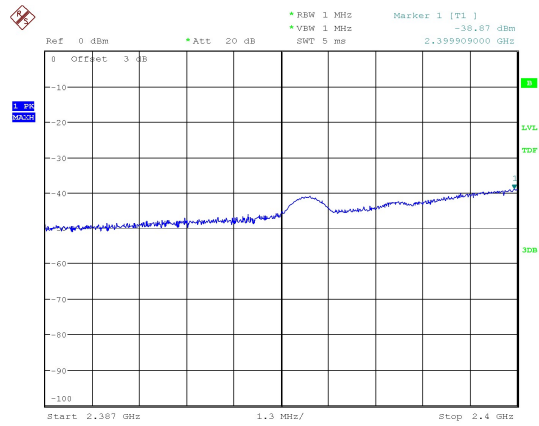


7.3 Unwanted(Spurious) emission strength

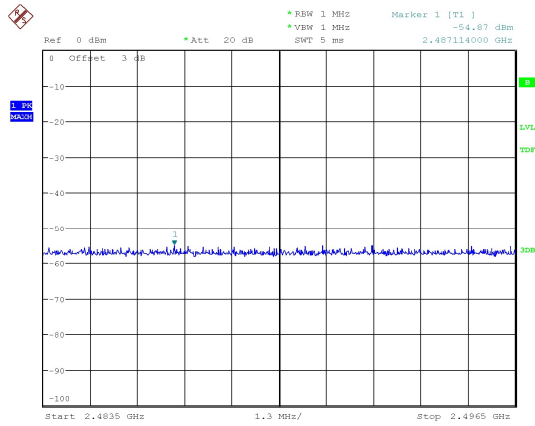
2404MHz
30-2387MHz



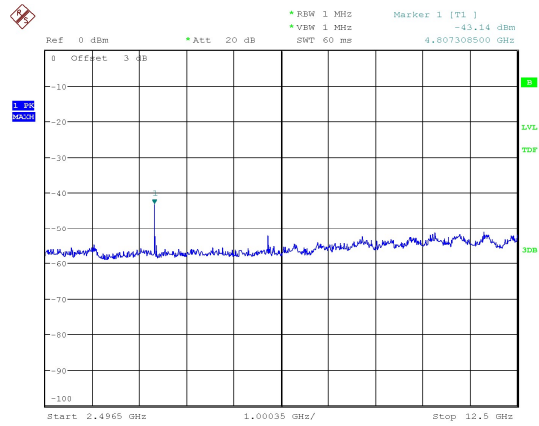
2387-2400MHz



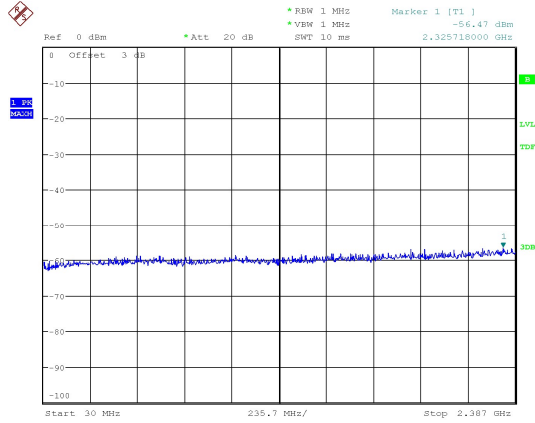
2483.5-2496.5MHz



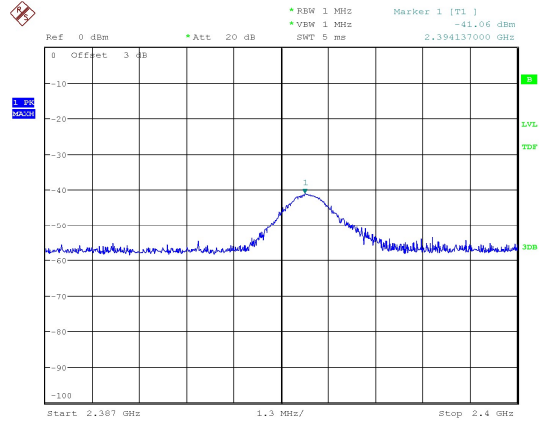
2496.5-12500MHz



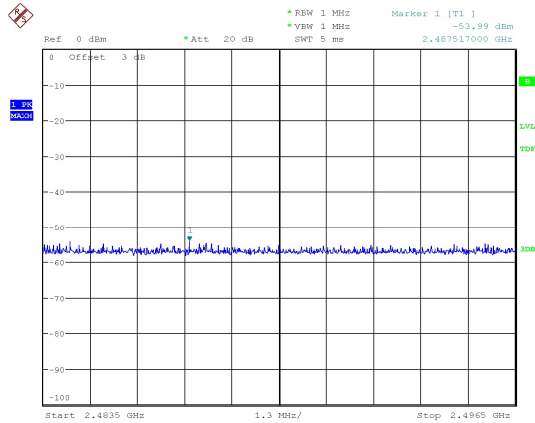
2444MHz 30-2387MHz



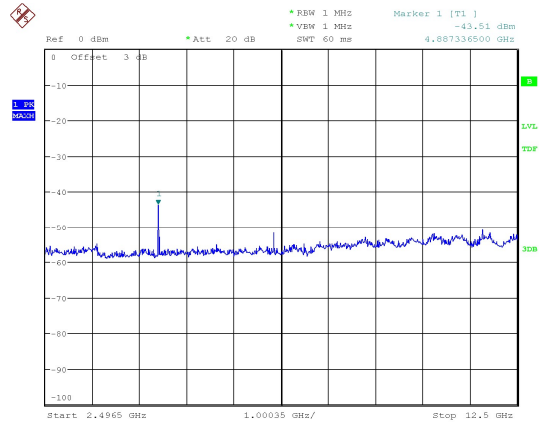
2387-2400MHz



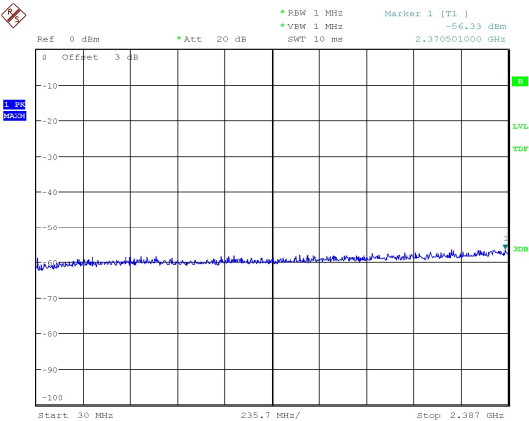
2483.5-2496.5MHz



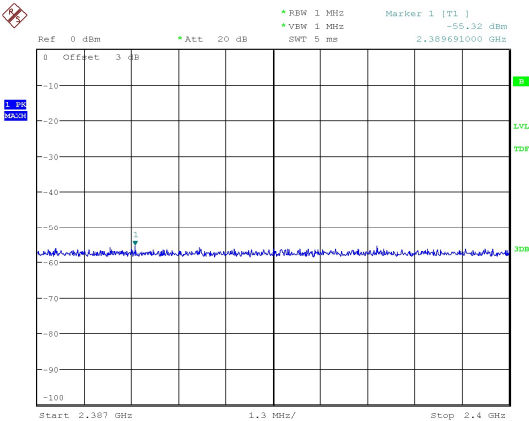
2496.5-12500MHz



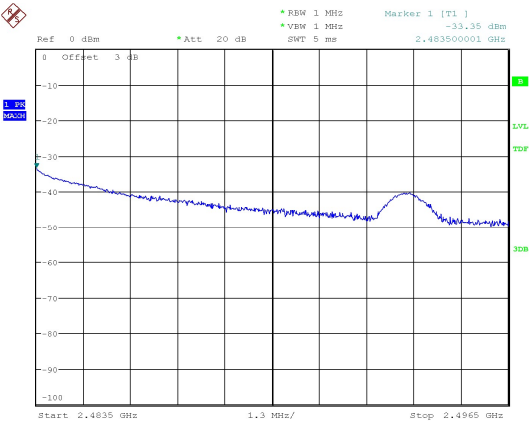
2481MHz
30-2387MHz



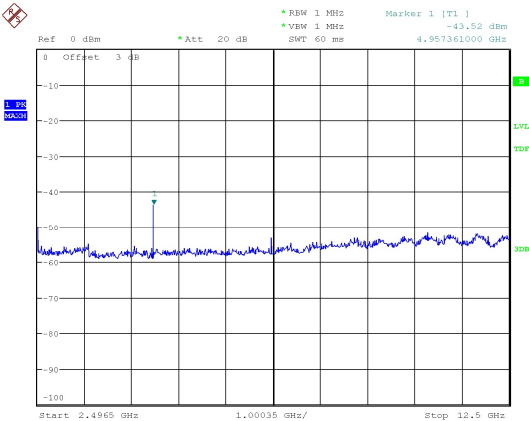
2387-2400MHz



2483.5-2496.5MHz

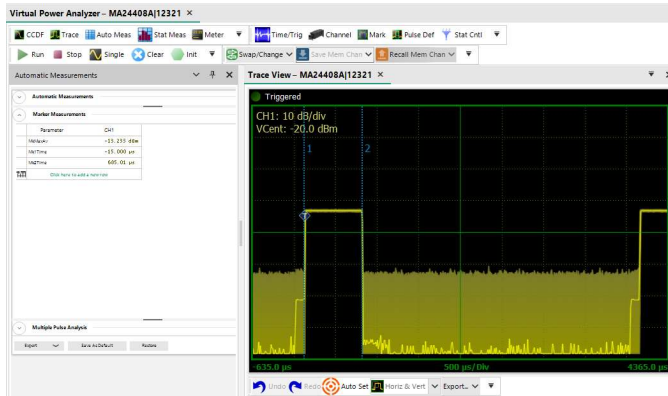


2496.5-12500MHz

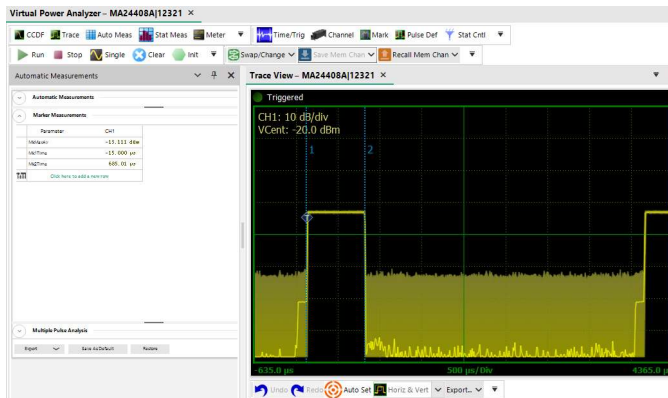


7.4 RF output power tolerance

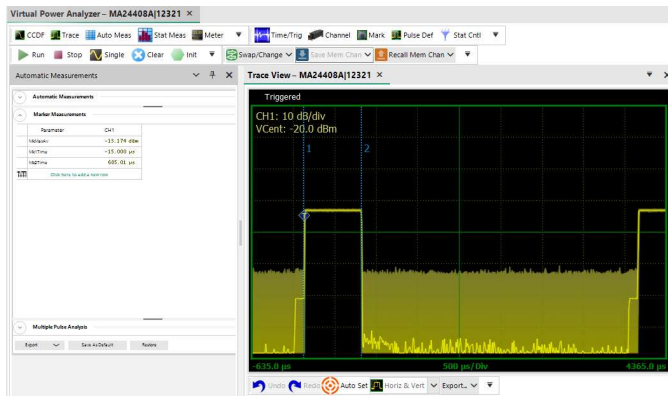
2404MHz



2444MHz



2481MHz



ON/OFF time

