Prüfbericht-Nr.: *Test Report No.*:	**60393200 001**	**Auftrags-Nr.:** *Order No.*:	**158213329**	**Seite 1 von 17** *Page 1 of 17*
Kunden-Referenz-Nr.: *Client Reference No.*:	**N/A**	**Auftragsdatum:** *Order date*:	**30.06.2020**	
Auftraggeber: *Client*:	**Stadlbauer Marketing + Vertrieb G.m.b.H** **Rennbahn Allee 1, 5412 Puch, Salzburg, Austria**			
Prüfgegenstand: *Test item*:	**Short Range Device - Radio Control Toy Transmitter (2.4GHz)**			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**370410513**			
Auftrags-Inhalt: *Order content*:	**FCC Test**			
Prüfgrundlage: *Test specification*:	**FCC Part 15 Subpart C, ANSI C63.10-2013** **RSS-210 Issue 10, RSS Gen-Issue 5**			
Wareneingangsdatum: *Date of receipt*:	**06.07.2020**			
Prüfmuster-Nr.: *Test sample No.*:	**A002878039-011**			
Prüfzeitraum: *Testing period*:	**03.08.2020 - 07.08.2020**			
Ort der Prüfung: *Place of testing*:	**Hong Kong**			
Prüflaboratorium: *Testing laboratory*:	**TÜV Rheinland Hong Kong Ltd.**			
Prüfergebnis*: *Test result**:	**Pass**			

geprüft von / *tested by*:			**kontrolliert von /** *reviewed by*:		
07.09.2020	**Mika Chan / Project Manager**		**07.09.2020**	**Sharon Li / Unit Senior Manager**	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: **FCC ID: YFA370410513**
IC: 12260A-370410513

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Table of Content

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2410 - 2473MHz
Type of modulation	GFSK
Number of channels	58
Type of antenna	Integral Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.0 V

Product function and intended use

The equipment under test (EUT) is a radio control toy transmitter operating at 2.4GHz. It is powered by battery only.

FCC ID: YFA370410513/ IC: 12260A-370410513

Models	Product description
370410513	**Short Range Device - Radio Control Toy Transmitter (2.4GHz)**

Submitted documents

User manual

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.
- Normal operation mode

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- During test, 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 was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

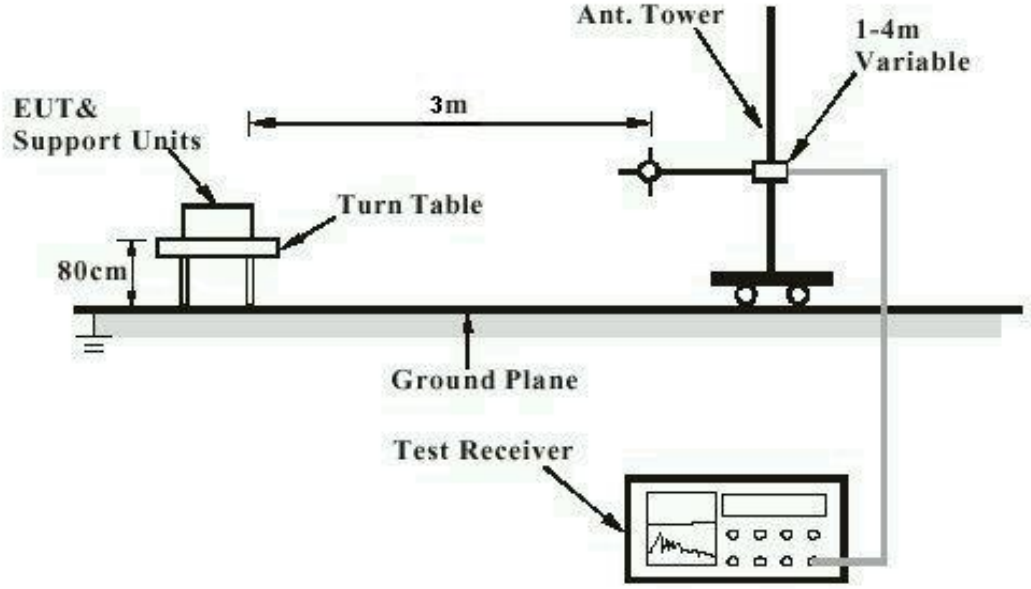
FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

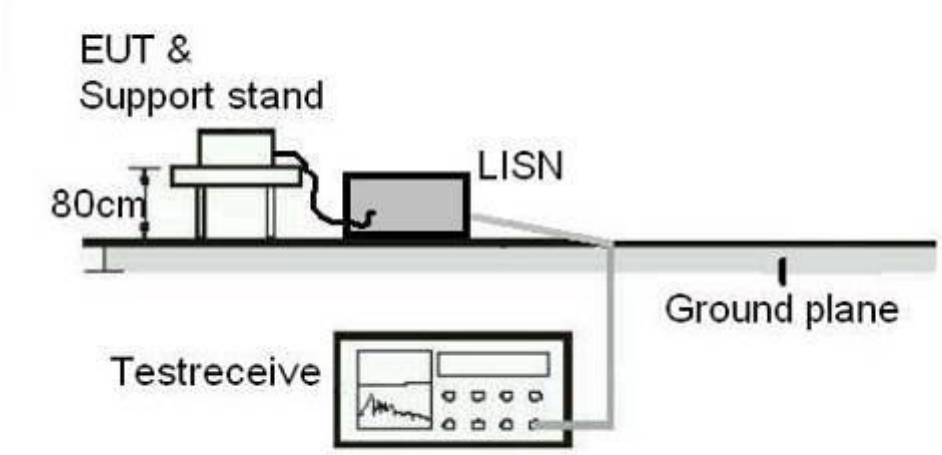
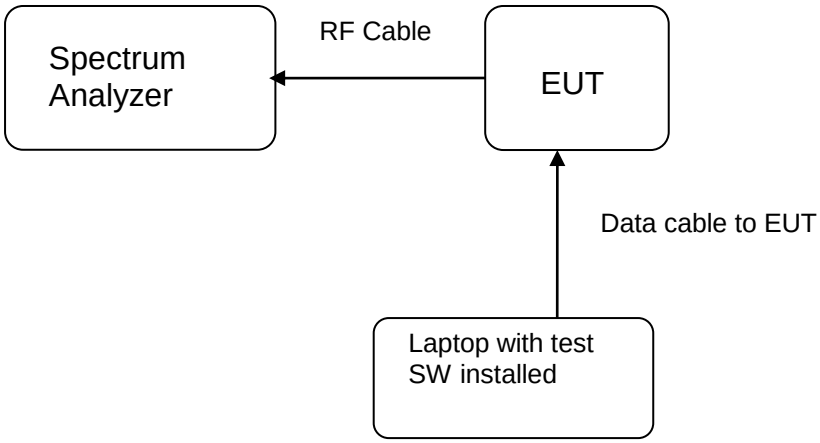


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong·
Tel.: +852 2192 1000
Fax: +852 2192 1001
Email service-gc@tuv.com
Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Type	:	Accredited Test Firm
Designation Number	:	HK0013
Test Firm Registration Number	:	371735
Scope	:	Intentional Radiators

Industry Canada

Type	:	Accredited Test Firm
CAB identifier	:	HK0013
ISED number	:	26152
Scope	:	RSS-Gen, RSS-210, RSS-247

List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	20 Mar 2020	20 Mar 2021
Test Receiver	R & S	ESU40	10 Oct 2019	10 Oct 2020
Bi-conical Antenna	R & S	HK116	07 Mar 2019	07 Mar 2021
Log Periodic Antenna	R & S	HL223	06 Mar 2019	06 Mar 2021
Standard Gain Horn	ETS-Lindgren	3160-07	04 Sep 2018	04 Sep 2020
Standard Gain Horn	ETS-Lindgren	3160-08	26 Sep 2018	26 Sep 2020
Standard Gain Horn	ETS-Lindgren	3160-10	03 Oct 2018	03 Oct 2020
Double-Ridged Waveguide Horn	EMCO	3116	05 Oct 2018	05 Oct 2020
Double-Ridged Waveguide Horn	EMCO	3117	30 Aug 2018	30 Aug 2020
Coaxial cable	Huber+Suhner	CNM-NMCMILX800-473	04 Oct 2018	04 Oct 2020
High Frequency Cable	Pasternack	PE3VNA4001-3M	29 Jan 2019	29 Jan 2021
Microwave Preamplifier	COM-POWER Corporation	PAM-118A	06 Mar 2020	06 Mar 2021
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	30 Jan 2019	30 Jan 2021
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30 Oct 2019	30 Oct 2021

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSV40	17 Jan 2020	17 Jan 2021

Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions measurements is ±4.81dB (9kHz to 30MHz) and ±4.62dB (30MHz to 200MHz) and ±5.67dB (200MHz to 1000MHz) and is ±5.07dB (1GHz to 8.2GHz) and ±4.58dB (8.2GHz to 12.4GHz) and ±4.78dB (12.4GHz to 18GHz)

The estimated combined standard uncertainty for antenna conducted emission is ±2.1dB

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C / RSS-210 Issue 9

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: b) Manufacturer and model no: c) Peak Gain:	Fixed Integral antenna N/A 1.8 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only one integral antenna can be used.
Verdict:	N/A

RSS-Gen 6.3 – External Control	**Pass**
IC Requirement:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.
Verdict:	Pass

RSS-Gen 8.3 – Antenna Requirement		**Pass**
IC Requirement:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: b) Manufacturer c) model no d) Gain with reference to an isotropic radiator:	Fixed Integral wire antenna N/A N/A 1.8 dBi
Verdict:	Pass	

Subclause 15.215 (c) – 20 dB Bandwidth	**Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 07.08.2020
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Requirement: The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

For test protocols refer to Appendix 1.

Frequency (MHz)	**20 dB left (MHz)**	**Limit (MHz)**	**20 dB right (MHz)**	**Limit (MHz)**
2410	2409.334	> 2400	2410.624	< 2483.5
2445	2444.334	> 2400	2445.625	< 2483.5
2473	2472.329	> 2400	2473.631	< 2483.5

RSS-Gen 6.6 – Occupied Bandwidth	**Pass**

FCC/ IC Requirement : N/A

Test Specification : RSS-Gen
Test date : 07.08.2020
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

For test protocols refer to Appendix 1.

Frequency (MHz)	**Left (MHz)**	**Right (MHz)**	**99% bandwidth (MHz)**
2410	2409.381	2410.590	1.210
2445	2444.362	2445.602	1.239
2473	2472.351	2473.619	1.268

Subclause 15.249 (a) / RSS-210 B.10 (a) – Field Strength of Fundamental and HarmonicsPass

Test Specification : ANSI C63.10 – 2013
Test date : 05.08.2020
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: PASS.

Fundamental Frequency 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2409.990	72.8	114.0 / PK
2409.990	45.1	94.0 / AV

Fundamental Frequency 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2410.057	70.9	114.0 / PK
2410.057	43.1	94.0 / AV

Harmonics 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4819.442	61.0	74.0 / PK
4819.442	31.7	54.0 / AV
7229.131	52.7	74.0 / PK
7229.131	31.7	54.0 / AV

Harmonics 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4819.955	57.1	74.0 / PK
4819.955	33.7	54.0 / AV
7229.211	50.9	74.0 / PK
7229.211	30.7	54.0 / AV

Fundamental Frequency 2445MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2444.766	72.0	114.0 / PK
2444.766	44.0	94.0 / AV

Fundamental Frequency 2445MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2444.785	69.3	114.0 / PK
2444.785	41.8	94.0 / AV

Harmonics 2445MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4889.964	60.5	74.0 / PK
4889.964	35.7	54.0 / AV
7335.820	53.2	74.0 / PK
7335.820	31.1	54.0 / AV
Harmonics 2445MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4889.426	56.8	74.0 / PK
4889.426	32.7	54.0 / AV
Fundamental Frequency 2473MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2472.782	71.8	114.0 / PK
2472.782	43.9	94.0 / AV
Fundamental Frequency 2473MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2472.785	69.5	114.0 / PK
2472.785	41.9	94.0 / AV
Harmonics 2473MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4945.426	59.9	74.0 / PK
4945.426	34.4	54.0 / AV
7417.987	53.8	74.0 / PK
7417.987	31.7	54.0 / AV
Harmonics 2473MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4946.211	58.0	74.0 / PK
4946.211	33.9	54.0 / AV
7418.019	50.7	74.0 / PK
7418.019	30.9	54.0 / AV

Subclause 15.249 (d), 15.205 / RSS-210 B.10 (b) – Out Of Band Radiated Emission **Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 21.04.2020
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 3.0VDC
Temperature : 23ºC
Humidity : 50%

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Results: All three transmit frequency modes comply with the field strength limit of section 15.209. There is no spurious found below 30MHz.

Tx frequency 2446MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2390.000	39.5	74.0 / PK
2390.000	26.1	54.0 / AV
2400.000	39.2	74.0 / PK
2400.000	26.2	54.0 / AV

Tx frequency 2446MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2390.000	38.6	74.0 / PK
2390.000	25.8	54.0 / AV
2400.000	39.2	74.0 / PK
2400.000	25.8	54.0 / AV

Tx frequency 2458MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No Peak Found	---	74.0 / PK
No Peak Found	---	54.0 / AV

Tx frequency 2458MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No Peak Found	---	74.0 / PK
No Peak Found	---	54.0 / AV

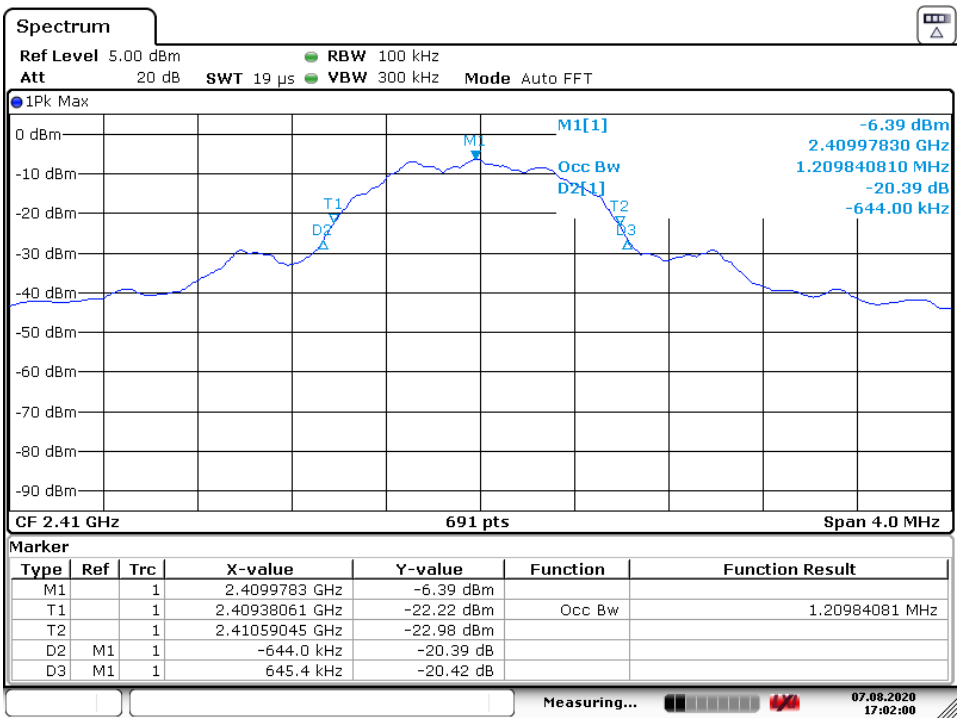
Tx frequency 2474MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	40.0	74.0 / PK
2483.500	26.3	54.0 / AV
Tx frequency 2474MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	39.3	74.0 / PK
2483.500	26.2	54.0 / AV

Appendix 1

Test Results

20dB Bandwidth

Tx frequency: 2410MHz



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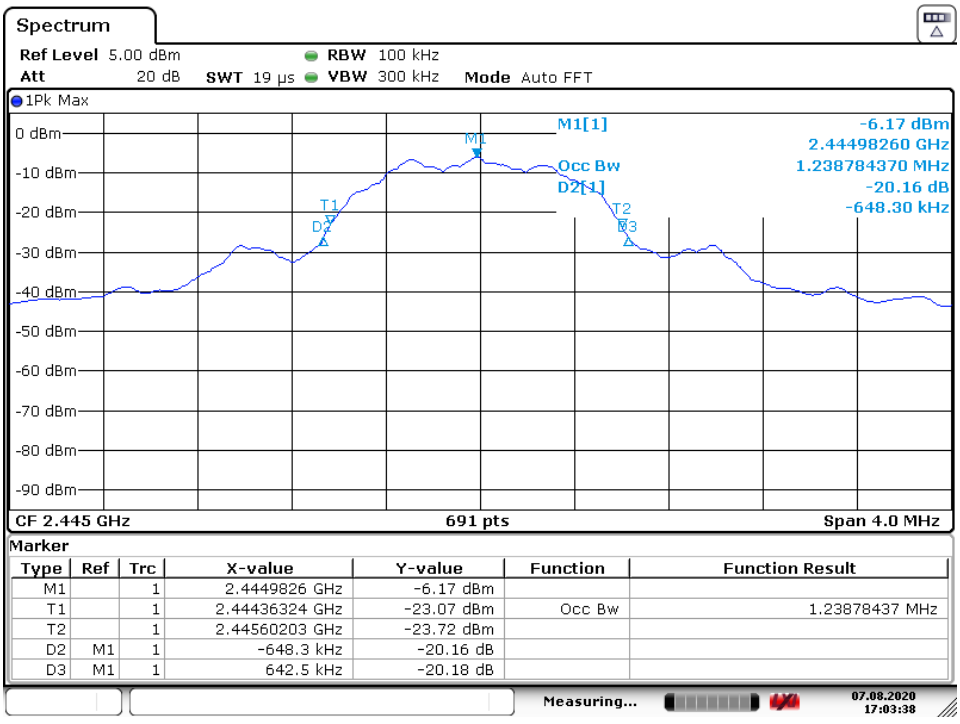
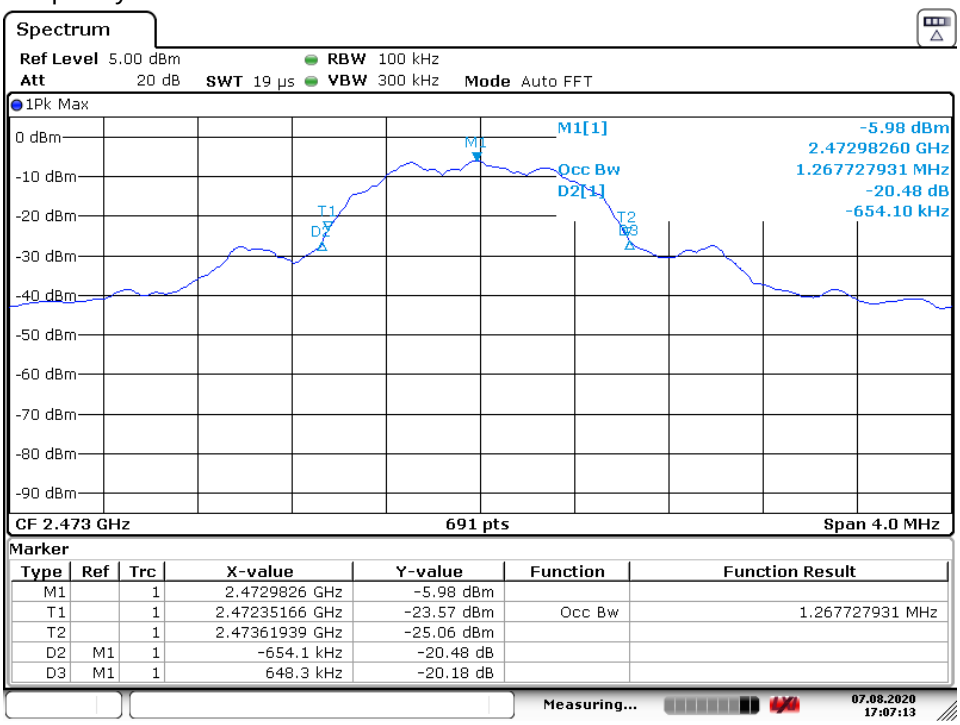
Tx frequency: 2445MHz



Date: 7.AUG.2020 17:03:39

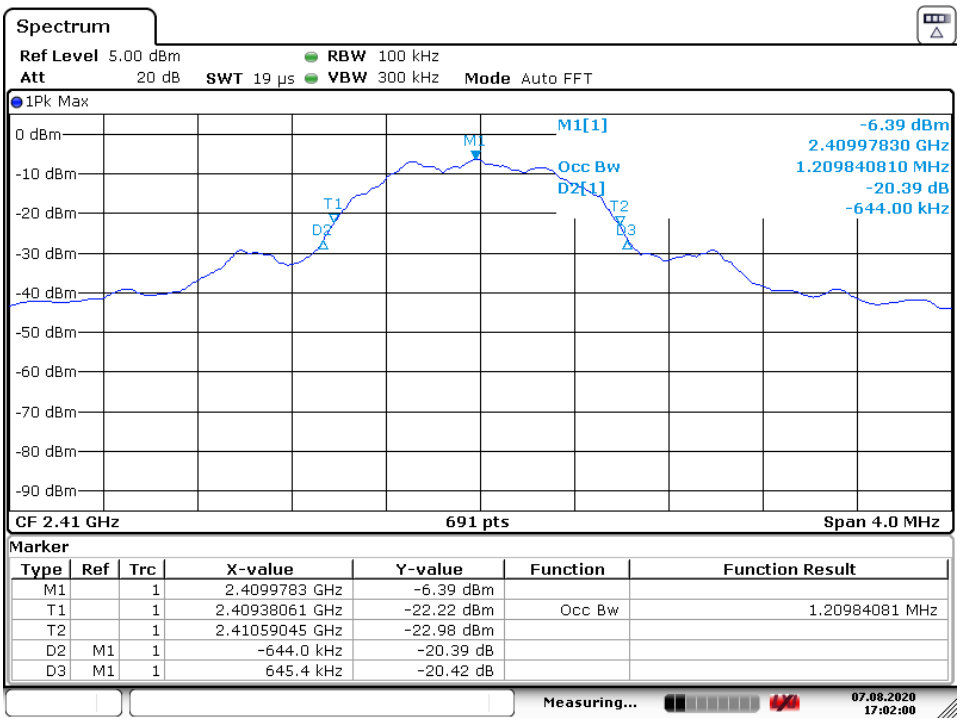
Tx frequency: 2473MHz



Date: 7.AUG.2020 17:07:14

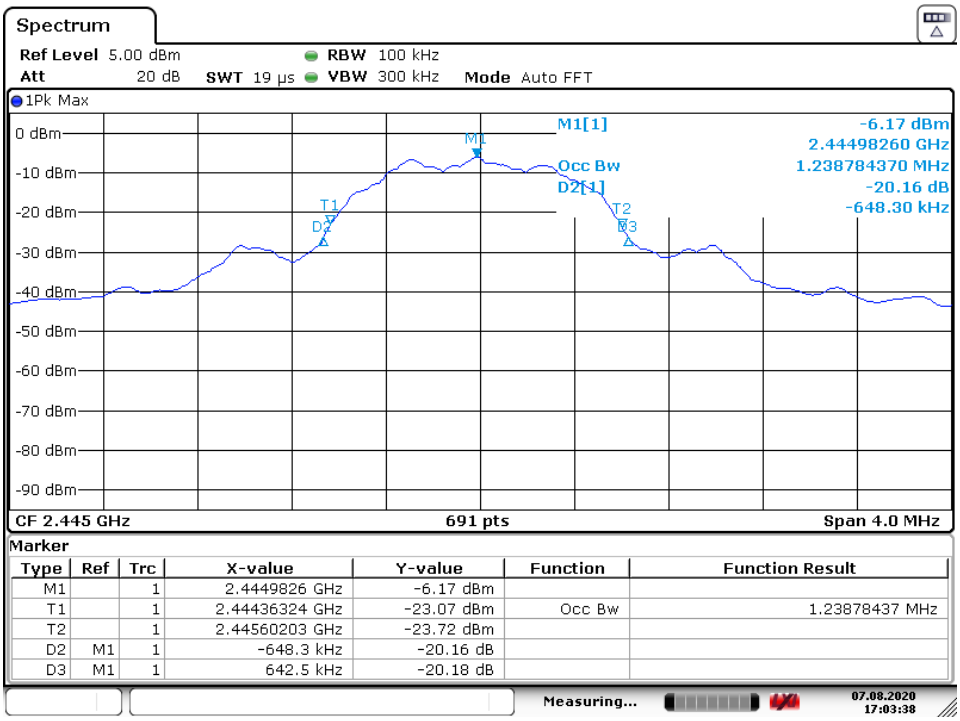
99% Bandwidth

Tx frequency: 2410MHz



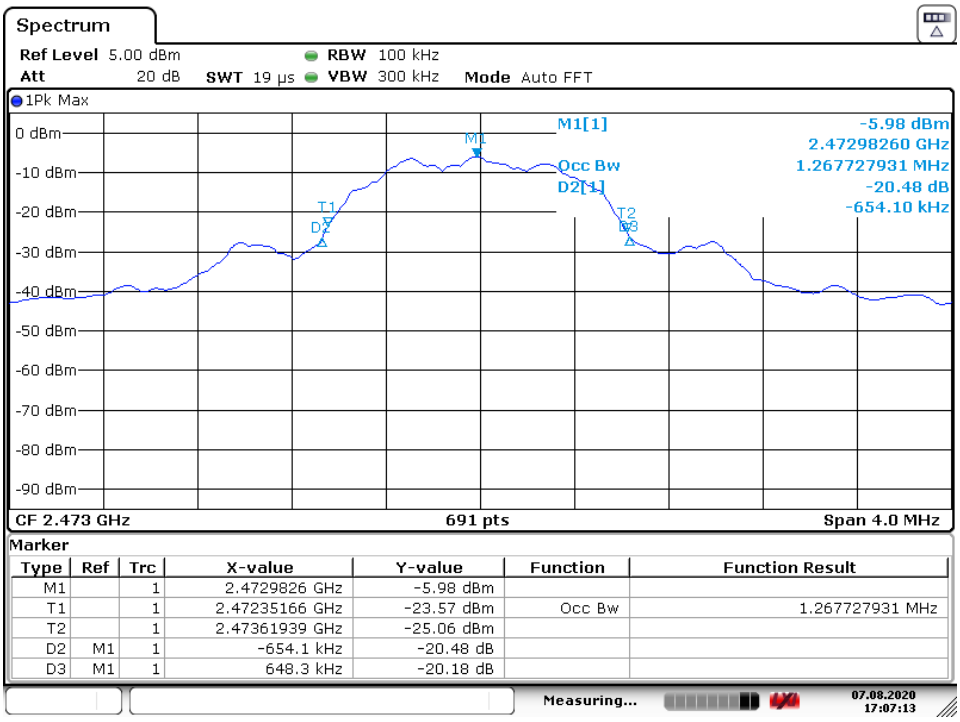
Date: 7.AUG.2020 17:02:00

Tx frequency: 2445MHz



Date: 7.AUG.2020 17:03:39

Tx frequency: 2473MHz



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