

**Radio equipment according to Certification
Ordinance Article 2 Section 1 No.19
According to MIC Notice No. 88 Appendix 43
for
i-BTPSENSOR
Model No.: GTPS-01**

of

**Applicant: Co-Luck enterprise Co., Ltd.
Address: NO.2,LANE 187,SHI HOO RD., DALI DIST.,
TAICHUNG CITY 412 TAIWAN (R.O.C.)**

**Tested and Prepared
by**

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

A2LA Accredited No.: 2732.01

Report No.: W6M22004-19819-J-1

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
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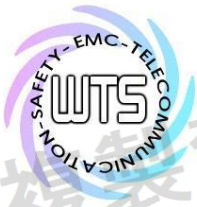
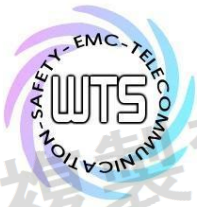


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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample, which has passed all the relevant tests conforms to a specification.

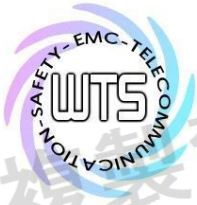
Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

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Worldwide Testing Services(Taiwan) Co., Ltd.

Tester:

December 29, 2020

Rick Chen

Rick Chen.

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

December 29, 2020

Kevin Wang

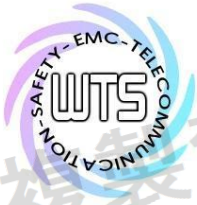
Kevin Wang

Date

WTS

Name

Signature



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1.2 Testing laboratory

1.2.1 Location

OATS

No.5-1, Shuang Sing Village,
LiShuei Rd., Wanli Dist.,
New Taipei City 207, Taiwan (R.O.C.)

Company

Worldwide Testing Services (Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.
NEIHU, TAIPEI 114, TAIWAN R.O.C.

Tel : +886-2-66068877

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1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

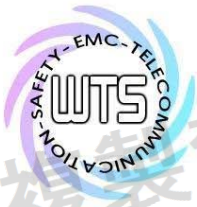
Telefication Reviewed Laboratory: TRL 0501

1.3 Details of applicant

Name	: Co-Luck enterprise Co., Ltd.
Street	: NO.2,LANE 187,SHI HOO RD., DALI DIST.,
Town	: TAICHUNG CITY 412
Country	: TAIWAN (R.O.C.)
Telephone	: 04-2493-4676
Fax	: 04-2495-3073

1.4 Application details

Date of receipt of test item	: April 15, 2020
Date of test	: from April 15, 2020 to December 23, 2020



1.5 Equipment information

Description of test item : i-BTPSENSOR

Type identification : GTPS-01

Multi-listing model number : ./.

Trade mark : GIYO

Modulation type : GFSK

Frequency range : 2.4000 GHz - 2.4835 GHz

Tested frequencies : 2.402 – 2.480 GHz (for BLE)
2.457 GHz (for ANT+)

Frequency of the used channel : BLE
Frequency (ch 0) : 2.402 GHz
Frequency (ch 19) : 2.440 GHz
Frequency (ch 39) : 2.480 GHz
ANT+
Frequency (ch 0) : 2.457 GHz

Type of antenna : Chip Antenna

Antenna gain : BLE: -0.56 dBi
ANT+: -0.69 dBi

Rated output power : BLE: 0.8 mW
ANT+: 0.5 mW

Manufacturer: (if different from applicant)

Name : ./.

Street : ./.

Town : ./.

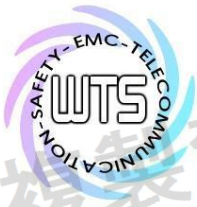
Country : ./.

1.6 Assembly

Ultrasonic welding will be used for preventing access RF part directly. For this EUT is opening only by destroying the equipment have been taken to satisfy sample requirement.

1.7 Test method

According to MIC Notice No. 88 Appendix 43.



2 Technical Test

2.1 Summary of test results

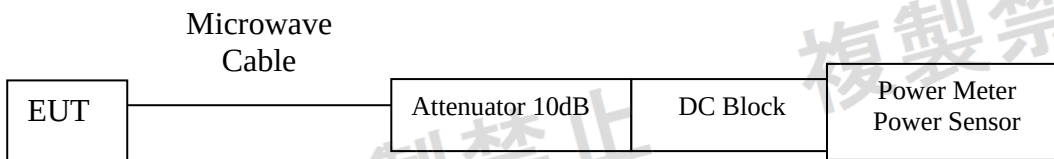
No deviations from the technical specifications were ascertained in the course of the test performed.

2.2 Test environment

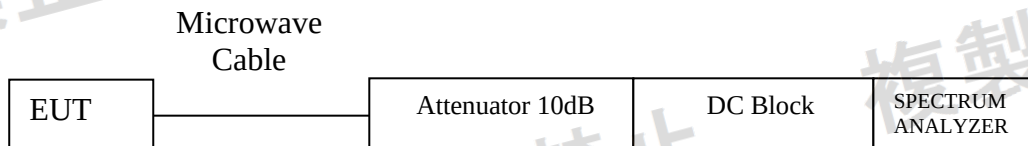
Temperature : 5 ° C - 35 ° C
 Relative humidity content : 45% - 85%
 Air pressure : 990 - 1300 hPa
 Details of power supply : Battery 3Vd.c. (CR1632)
 Other parameter : ./.
 Extreme conditions parameters : Vnom: 3 V
 Vmin: 2.7 V
 Vmax: 3.3 V

2.3 Test setup

Antenna power

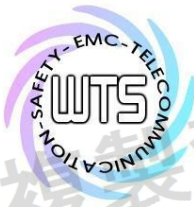


Frequency tolerance, Occupied bandwidth, Spreading bandwidth and Spurious emission



Test item Name	Measurement Uncertainty
Estimation Result of Uncertainty of Frequency Drift Measurement	Expanded Uncertainty : 6.11 Hz
Estimation Result of Uncertainty of Bandwidth Measurement	Expanded Uncertainty : 0.45 kHz
Estimation Result of Uncertainty of Conducted Output Power Measurement	Expanded Uncertainty : 1.14 dB

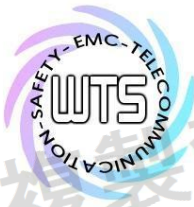
The decision rule is Measurement uncertainty is not included in the calculation of test results.



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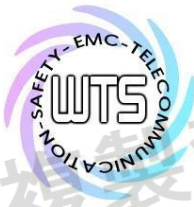
2.4 Test equipment utilized

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2020/6/11	2021/6/10
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2020/11/6	2021/11/5
ETSTW-CE 005	Line-Impedance Stabilisation Network	NNBM 8126D	137	Schwarzbeck	2020/4/8	2021/4/7
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2020/9/22	2021/9/21
ETSTW-CE 008	HF-EICHLITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2020/7/22	2021/7/21
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2020/10/26	2021/10/25
ETSTW-CE 024	IMPEDANCE STABILIZATION NETWORK	ISN T800	29454	TESEQ	2020/7/13	2021/7/12
ETSTW-CE 027	COUPLING AND DECOUPLING NETWORK	CDN ST08AS	38087	TESEQ	Function Test	
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2020/7/29	2021/7/28
ETSTW-CE 030	CISPR Passive probe	PMM SHC-1-1000	1021X30803	Narda S.T.S/PMM	2020/3/17	2021/3/16
ETSTW-CS 004	COUPLING AND DECOUPLING NETWORK	CDN M016	20053	SCHAFFNER	2020/8/27	2021/8/26
ETSTW-CS 005	RF Power Amplifier	100A250A	306547	AR	Function Test	
ETSTW-CS 010	6 dB Attenuator	SA3N1007-06	None	AISI	Function test	
ETSTW-CS 011	ESG Analog Signal Generator	E4428C	MY45280875	AGILENT	2020/7/27	2021/7/26
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2020/6/12	2021/6/11
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2020/9/14	2021/9/13
ETSTW-RE 010	ABSORBING CLAMP	MDS 21	03469	Schwarzbeck	2020/10/20	2021/10/19
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 019	MICROWAVE HORN ANTENNA	22240-25	121074	FM	2020/5/15	2021/5/14
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2020/7/8	2021/7/7
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2020/4/22	2021/4/21
ETSTW-RE 032	Millivoltmeter	URV 55	849086/013	R&S	2020/9/29	2021/9/28
ETSTW-RE 033	WaveRunner 6000A Serie Oscilloscope	WAVERUNNER 6100A	LCRY0604P14508	LeCroy	2020/7/27	2021/7/26
ETSTW-RE 034	Power Sensor	URV5-Z4	839313/006	R&S	2020/9/8	2021/9/7
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2020/2/18	2021/2/17
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2020/5/8	2021/5/7
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2020/8/3	2021/8/2
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	



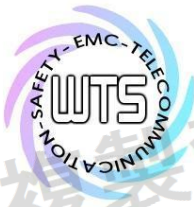
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ETSTW-RE 048	Triple Loop Antenna	HXYZ 9170	HXYZ 9170-134	Schwarzbeck	2020/12/11	2021/12/10
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2020/3/6	2021/3/5
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2020/2/20	2021/2/19
ETSTW-RE 061	Amplifier Module	CHC 1	None	ETS	2020/5/8	2021/5/7
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2020/5/15	2021/5/14
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 065	Amplifier	AMF-6F-18002650-25-10P	941608	MITEQ	2020/3/25	2021/3/24
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2020/10/15	2021/10/14
ETSTW-RE 073	Power Meter	N1911A	MY45100769	Agilent	2020/2/18	2021/2/17
ETSTW-RE 074	Power Sensor	N1921A	MY45241198	Agilent	2020/2/18	2021/2/17
ETSTW-RE 091	Match Pad	MDCS1500	None	WOKEN	2020/5/22	2021/5/21
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 105	2.4GHz Notch Filter	N0124411	39555	MICROWAVE CIRCUITS	2020/1/13	2021/1/12
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2020/6/11	2021/6/10
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2020/8/7	2021/8/6
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2020/8/7	2021/8/6
ETSTW-RE 127	RF Switch Box	RF5-01	None	WTS	2020/2/20	2021/2/19
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2020/8/7	2021/8/6
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2020/8/7	2021/8/6
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-RE 133	EXA Signal Analyzer	N9010A	MY53470566	Agilent	2020/5/6	2021/5/5
ETSTW-RE 134	MXG Vector Signal Generator	N5182B	MY53050664	Agilent	2020/5/6	2021/5/5
ETSTW-RE 135	EXG Analog Signal Generator	N5171B	MY53050476	Agilent	2020/5/6	2021/5/5
ETSTW-RE 136	USB Wideband Power Sensor	U2021XA	MY54070006	Agilent	2020/5/6	2021/5/5
ETSTW-RE 137	USB Wideband Power Sensor	U2021XA	MY54020004	Agilent	2020/5/6	2021/5/5
ETSTW-RE 138	USB Wideband Power Sensor	U2021XA	MY54110003	Agilent	2020/5/6	2021/5/5
ETSTW-RE 139	USB Wideband Power Sensor	U2021XA	MY54110004	Agilent	2020/5/6	2021/5/5
ETSTW-RE 140	Simultaneous sampling DAQ	U2531A	TW56143501	Agilent	Function Test	
ETSTW-RE 142	Amplifier	8447D	2805A03378	Agilent	2020/5/15	2021/5/14
ETSTW-RE 146	Preamplifier	JPA-10M1G	15090004	JPT	2020/6/5	2021/6/4



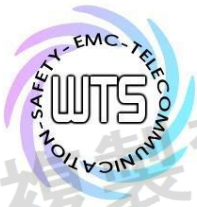
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ETSTW-RE 147	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04005	ETC	2020/4/9	2021/4/8
ETSTW-RE 148	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04006	ETC	2020/7/9	2021/7/8
ETSTW-RE 150	Blocking Test System	AD211	TW5451133	Keysight	Function Test	
ETSTW-EMI 001	HARMONICS 1000	HAR1000-1P	093	EMC-PARTNER	2020/6/12	2021/6/11
ETSTW-EMI 010	AC Power Source	PS3	0219	EMC PARTNER	2020/2/20	2021/2/19
ETSTW-EMI 011	USB Compact Modulator	SFC-U	101689	R&S	2020/5/21	2021/5/20
ETSTW-EMS 001	BASELSTRASSE 160 CH-4242 LAUFEN	CN-EFT1000	354	EMC-PARTNER	Function Test	
ETSTW-EMS 002	Frequency Converter	YF-6020	0308014	None	Function Test	
ETSTW-EMS 009	Magnetic Field Antenna	MF1000-1	104	EMC-PARTNER	Function Test	
ETSTW-EMS 010	Coupling De-coupling Network	CDN-UTP8	014	EMC-PARTNER	2020/9/29	2021/9/28
ETSTW-EMS 012	EM Injection Clamp	F-203I-23MM	476	FCC	2020/7/9	2021/7/8
ETSTW-EMS 016	EMF Tester	1390	071208732	TES	2020/10/14	2021/10/13
ETSTW-EMS 017	Multimeter	DM-1220	518614	HILA	2020/8/31	2021/8/30
ETSTW-EMS 019	Electrostatic Discharge Simulator	ESS-2002	ESS06Y6300	NoiseKen	2020/9/17	2021/9/16
ETSTW-EMS 023	Electrostatic Discharge Simulator	NSG 435	6984	TESEQ	2020/6/19	2021/6/18
ETSTW-EMS 024	Humidity Temperature Meter	TES-1260	160304437	TES	2020/9/23	2021/9/22
ETSTW-EMS 025	10/700 Surge Generator	SG-728G	EC0631106	3Ctest	2020/10/19	2021/10/18
ETSTW-EMS 026	Multifunction Generator	NSG 3040A	P1950236136	TESEQ	2020/1/8	2021/1/7
ETSTW-EMS 027	Single-phase toroidal transformer with autowinding	TVT 1-250-16	P1948235209	AMETEK	2020/1/7	2021/1/6
ETSTW-EMS 028	Ear simulator	4185	3244294	B&K	Function Test	
ETSTW-EMS 029	1/2" Free-field Microphone	4191	3215035	B&K	Function Test	
ETSTW-EMS 030	Two channel microphone conditioning amplifier	2690	3256070	B&K	Function Test	
ETSTW-EMS 031	Sound calibrator	4231	3024803	B&K	2020/1/20	2021/1/19
ETSTW-RS 007	14" COLOR VIDEO MONITOR	HS-CM145A	0512011548	None	Function Test	
ETSTW-RS 009	SIGNAL GENERATOR	8648C	3642U01656	HP	2020/2/12	2021/2/11
ETSTW-RS 010	Broadband Field Meter	NBM-520	C-0195	Narda	2020/5/25	2021/5/24
ETSTW-RS 011	RF Power Amplifier	150W1000	0464490	AR	Function Test	
ETSTW-RS 012	Log-Periodic Antenna	ATL80M1G	0348244	AR	Function Test	
ETSTW-RS 013	Stacked Log Periodic Antenna	STLP9149	473	RS	Function Test	
ETSTW-RS 014	Power Amplifier	AS0860B	1078553	MILMEGA	Function Test	
ETSTW-RS 015	SIGNAL GENERATOR	ITS6006B	37669	TESEQ	2020/4/1	2021/3/31
ETSTW-RS 016	Power sensor	PMR6006	75617	TESEQ	2020/4/1	2021/3/31
ETSTW-RS 017	Power sensor	PMR6006	75618	TESEQ	2020/4/1	2021/3/31
ETSTW-RS 018	Directional coupler	C5982-10	111833	WERLATONE	Function Test	
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2020/3/9	2021/3/8



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ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2020/4/20	2021/4/19
ETSTW-GSM 004	Wideband Radio Communication Tester	CMW500	128092	R&S	2020/11/10	2021/11/9
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40/12+9SS	3	WI	2020/1/13	2021/1/12
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2020/1/13	2021/1/12
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2020/1/13	2021/1/12
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2020/1/13	2021/1/12
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2020/9/8	2021/9/7
ETSTW-GSM 024	Radio Communication Analyzer	MT8821C	None	Anritsu	2020/3/27	2021/3/26
ETSTW-Cable 002	Microwave Cable	SUCOFLEX 104 (S_Cable 7)	238093	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 003	Microwave Cable	SUCOFLEX 104 (S_Cable 11)	209953	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2020/7/1	2021/6/30
ETSTW-Cable 023	BNC Cable	BNC Cable 3	None	JYE BAO CO.,LTD.	Function Test	
ETSTW-Cable 024	BNC Cable	BNC Cable 4	None	JYE BAO CO.,LTD.	Function Test	
ETSTW-Cable 025	BNC Cable	BNC Cable 5	None	JYE BAO CO.,LTD.	Function Test	
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2020/2/20	2021/2/19
ETSTW-Cable 039	Microwave Cable	SUCOFLEX 104	316739	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 042	Microwave Cable	SUCOFLEX 104 (S_Cable 22)	279847	HUBER+SUHNER	Function Test	
ETSTW-Cable 047	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2020/7/3	2021/7/2
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2020/5/15	2021/5/14
ETSTW-Cable 051	BNC Cable	BNC Cable 6	None	JYE BAO	2020/3/5	2021/3/4
ETSTW-Cable 052	BNC Cable	Clamp Cable	None	Schwarz beck	2020/3/5	2021/3/4
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2020/6/5	2021/6/4
ETSTW-Cable 071	N TYPE CABLE	EMCCFD400-NM-NM-25000	170239	EMCI	2020/6/5	2021/6/4
ETSTW-Cable 072	SMA type cable (8m)	SUCOFLEX 104	805800/4	HUBER+SUHNER	2020/5/15	2021/5/14
ETSTW-Cable 074	SMA type cable (2m)	SUCOFLEX 104	802563/4	HUBER+SUHNER	2020/5/15	2021/5/14
WTSTW-SW 001	EMI TEST SOFTWARE	Harmonics-1000	None	EMC PARTNER	HARCS Version 4.20 Firmware Version 2.20	
WTSTW-SW 002	EMI TEST SOFTWARE	EZ EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 003	EMS TEST SOFTWARE	i2	None	AUDIX	Version 3.2007-8-17b	
WTSTW-SW 005	GSM Fading Level Correction	GSMFadLevCor	None	R&S	Version 1.66	
WTSTW-SW 006	EMI TEST SOFTWARE	e3	None	AUDIX	Version 9.161014	
WTSTW-SW 007	Keysight.EN300328.V191.Test	Keysight	None	Keysight	Version 1.0.0.0	
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	
ETSTW-TH 002	Thermohygrometer	608-H1	45204317	Testo	2020/9/23	2021/9/22
ETSTW-TH 003	Wireless weather station	GAIA	N/A	TFA	2020/12/3	2021/12/2



Worldwide Testing Services(Taiwan) Co., Ltd.

3 Test results (enclosure)

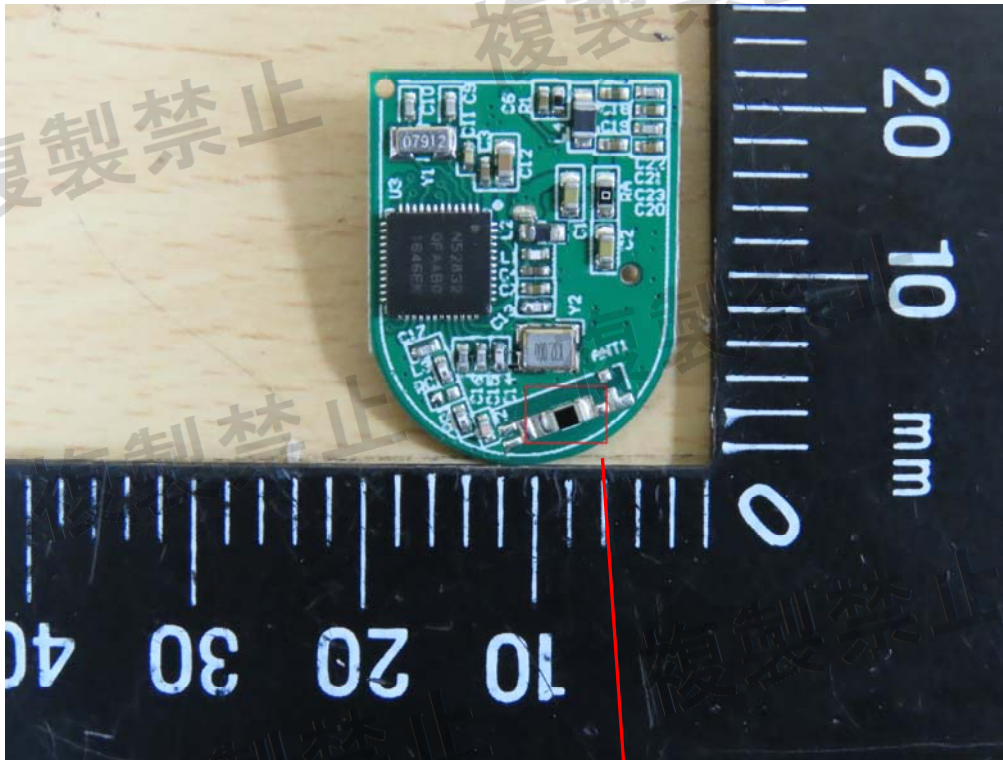
☒ 1st test

☐ test after modification

☐ production test

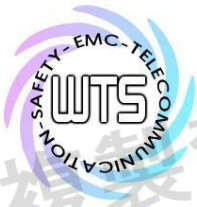
Test case	Subclause	Required	Status
<i>General provisions</i>			
Frequency tolerance	5	☒	C
Occupied bandwidth	6	☒	C
Spurious emissions	7	☒	C
<i>Transmitting equipment</i>			
Antenna power	14	☒	C
SAR	14.2	☐	NA
Frequency stabilization	15	☒	C
<i>Transmitter antenna</i>			
Type, configuration, etc. of transmitting antenna	20	☒	C
Directional pattern of transmitting antenna	22	☒	C
<i>Receiving equipment</i>			
Spurious emission of receiver	24	☒	C
Refer to all articles for transmitter antenna	26	☒	C
<i>Operating frequency 2402-2480MHz</i>			
High Frequency/modulation section cannot be opened easily	49.20(1); a	☒	C
Communication method	49.20(1); b	☒	C
Modulation method	49.20(1); c	☒	C
Spread spectrum method	49.20(1); d	☐	NA
Antenna power	49.20(1); e	☒	C
Absolute gain of transmitting antenna	49.20(1); f(1)	☒	C
Angular width of principal radiation (AWPR)	49.20(1); f(2)	☐	NA
Number of carriers within 1 MHz bandwidth in OFDM	49.20(1); g	☐	NA
Diffusion bandwidth	49.20(1); h	☒	C
Spreading factor	49.20(1); i	☐	NA
Frequency retention time (FH employed)	49.20(1); j	☐	NA
Carrier sense (Only Air craft equipment unless FHSS)	./.	☐	NA
Note 1: C = Conform NC = Not Conform NT = Not Tested NA = Not Applicable			

3.1 Antenna specifications



Antenna Type: Chip Antenna

Antenna gain: -0.56 dBi (BLE) & -0.69 dBi (ANT+)



Worldwide Testing Services(Taiwan) Co., Ltd.

3.2 Frequency Tolerance

Test date: December 19, 2020

Temperature: 20.3 °C

Humidity: 57.8 %

Tester: Rick

Tolerance from nominal frequency:
BLE

Test conditions		2.402 GHz	2.440 GHz	2.480 GHz
V_{nom} = 3 Vdc	Carrier frequency (GHz)	2.402009	2.440009	2.480009
	Frequency tolerance (ppm)	3.7	3.7	3.7
V_{min} = 2.7 Vdc	Carrier frequency (GHz)	2.402009	2.440009	2.480009
	Frequency tolerance (ppm)	3.7	3.7	3.7
V_{max} = 3.3 Vdc	Carrier frequency (GHz)	2.402009	2.440009	2.480009
	Frequency tolerance (ppm)	3.7	3.7	3.7

ANT+

Test conditions		2.457 GHz
V_{nom} = 3 Vdc	Carrier frequency (GHz)	2.457028846
	Frequency tolerance (ppm)	12.0
V_{min} = 2.7 Vdc	Carrier frequency (GHz)	2.457028846
	Frequency tolerance (ppm)	12.0
V_{max} = 3.3 Vdc	Carrier frequency (GHz)	2.457028846
	Frequency tolerance (ppm)	12.0

Test equipment used: ETSTW-RE 050, ETSTW-RE 055, ETSTW-RE 064, ETSTW-GSM 023

Limits:

Under all test conditions	< 50 ppm
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Worldwide Testing Services(Taiwan) Co., Ltd.

3.3 Occupied Bandwidth (99% channel power bandwidth)

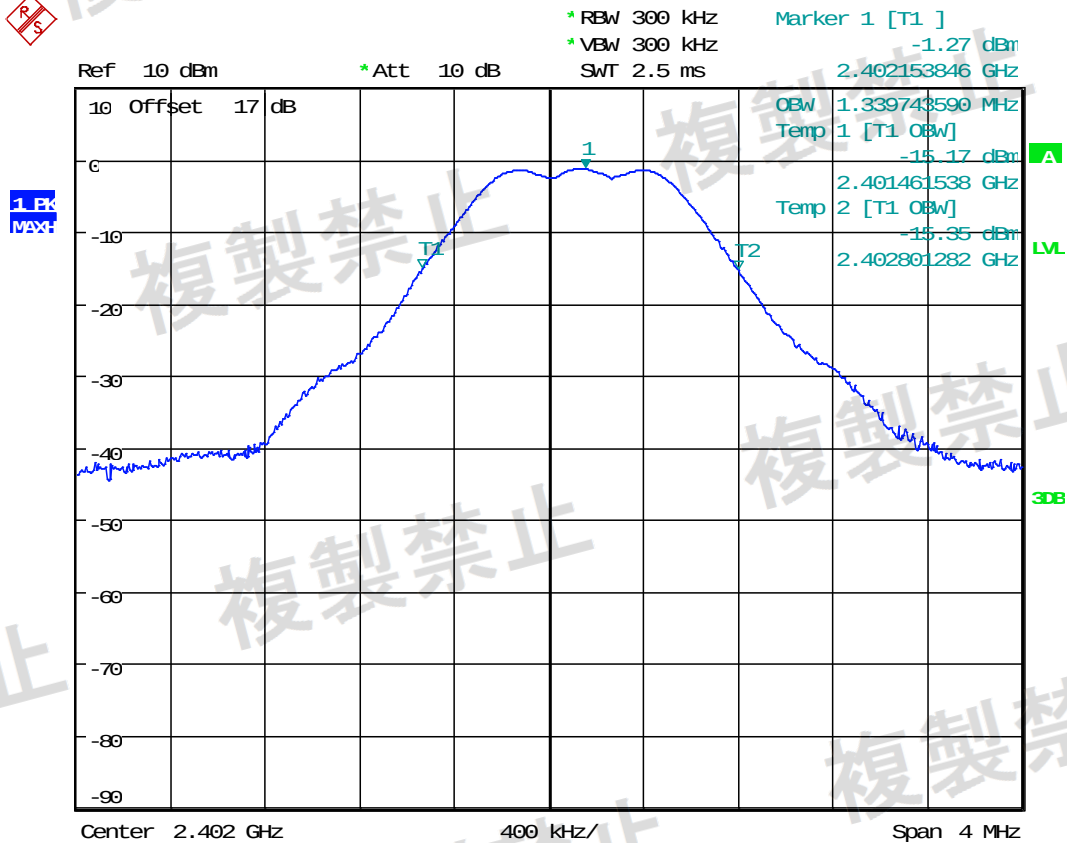
Test date: April 21-December 19, 2020

Temperature: 20.3 °C

Humidity: 57.8 %

Tester: Rick

BLE



OCCUPIED BANDWIDTH CH0 3V

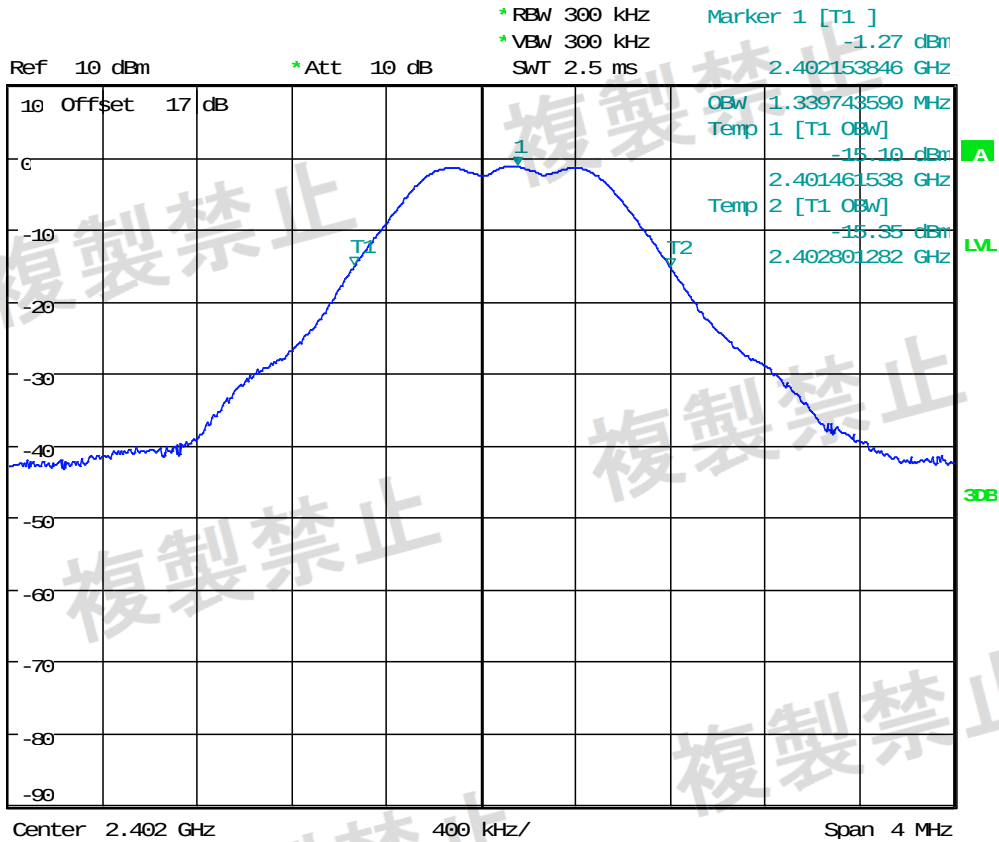
Date: 21.APR.2020 20:18:08



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



OCCUPIED BANDWIDTH CH0 2.7V

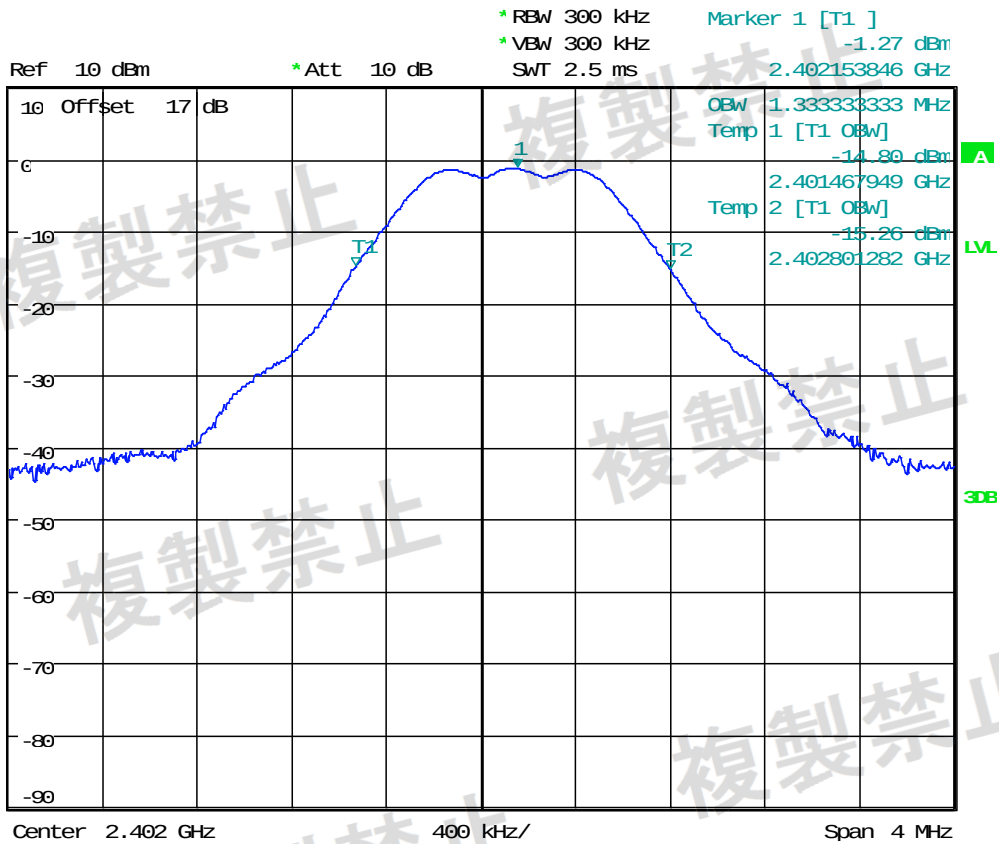
Date: 21.APR.2020 20:18:30



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX

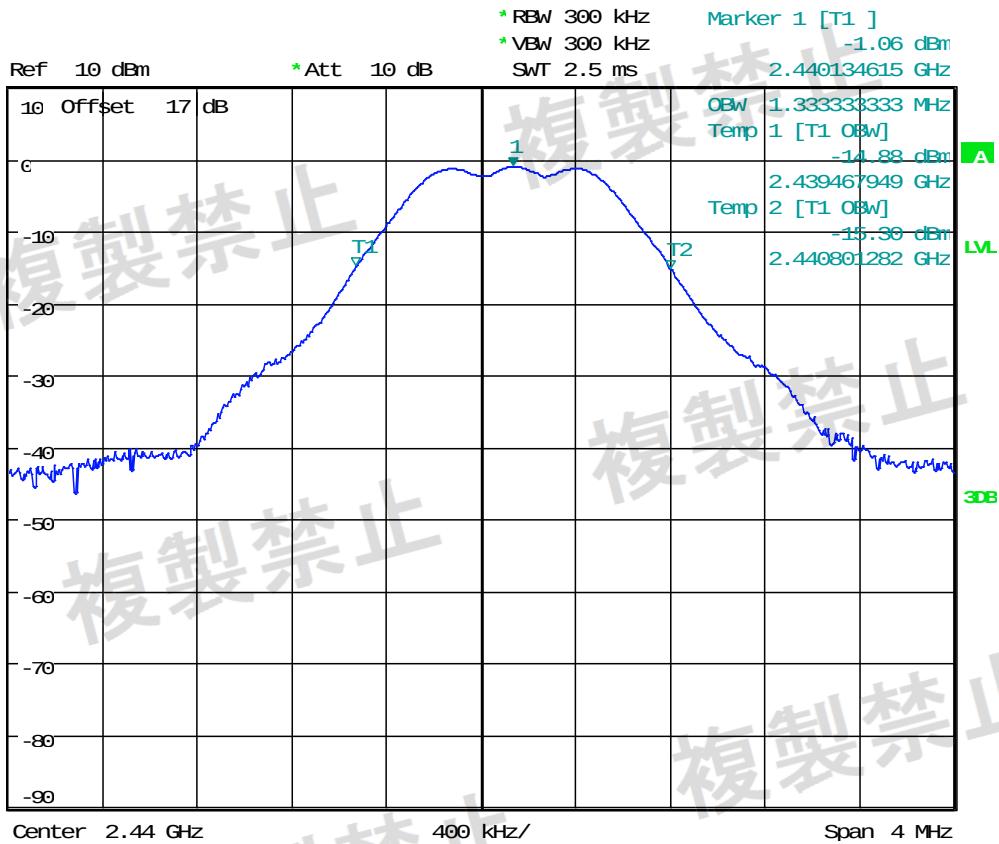




Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



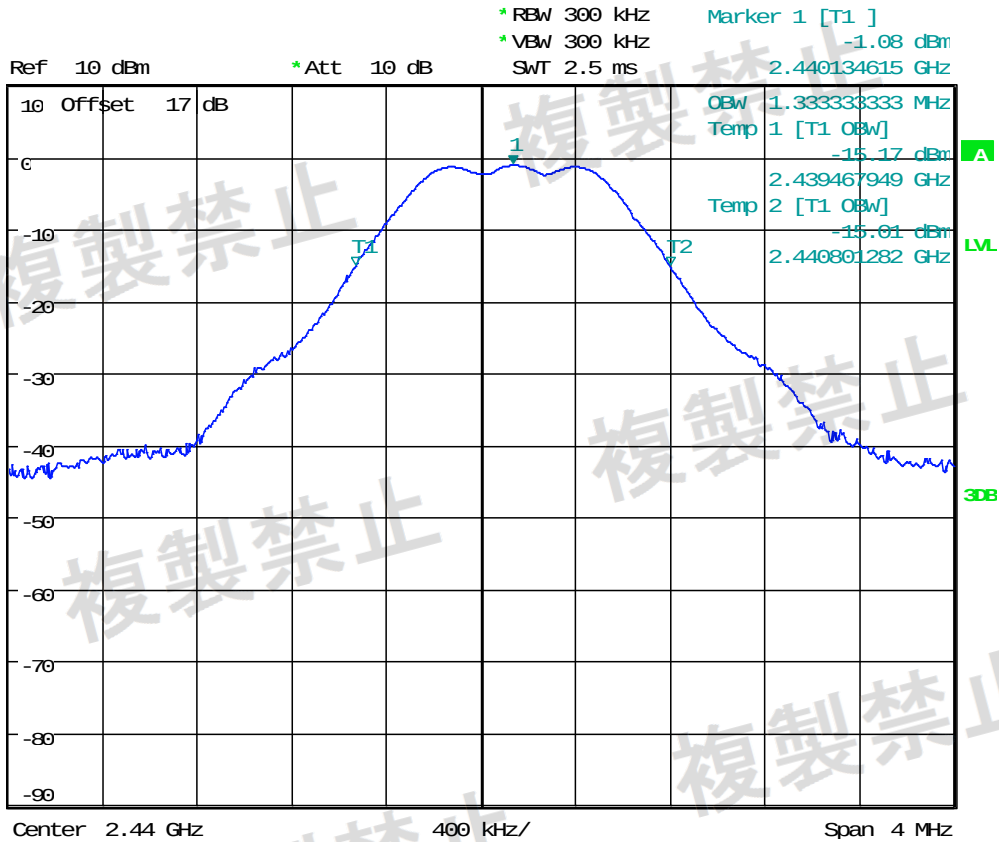
OCCUPIED BANDWIDTH CH19 3V
Date: 21.APR.2020 20:12:00



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



OCCUPIED BANDWIDTH CH19 2.7V

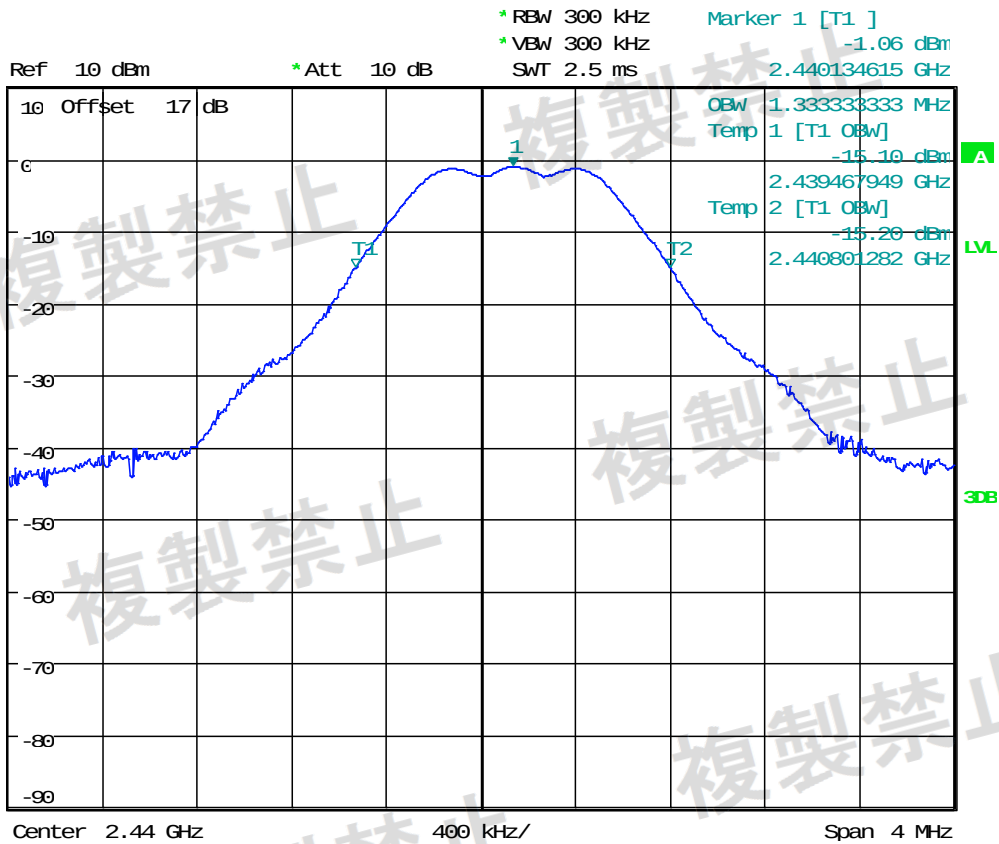
Date: 21.APR.2020 20:11:22



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX

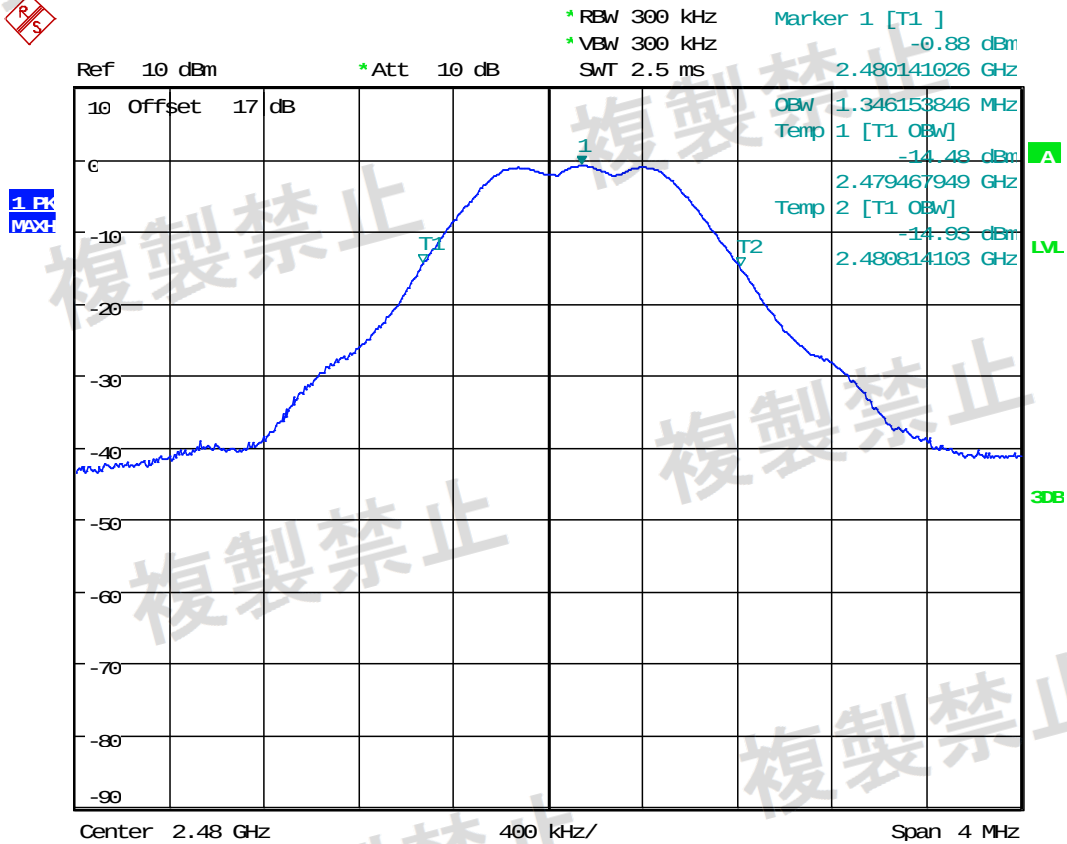


OCCUPIED BANDWIDTH CH19 3.3V

Date: 21.APR.2020 20:12:17



Worldwide Testing Services(Taiwan) Co., Ltd.



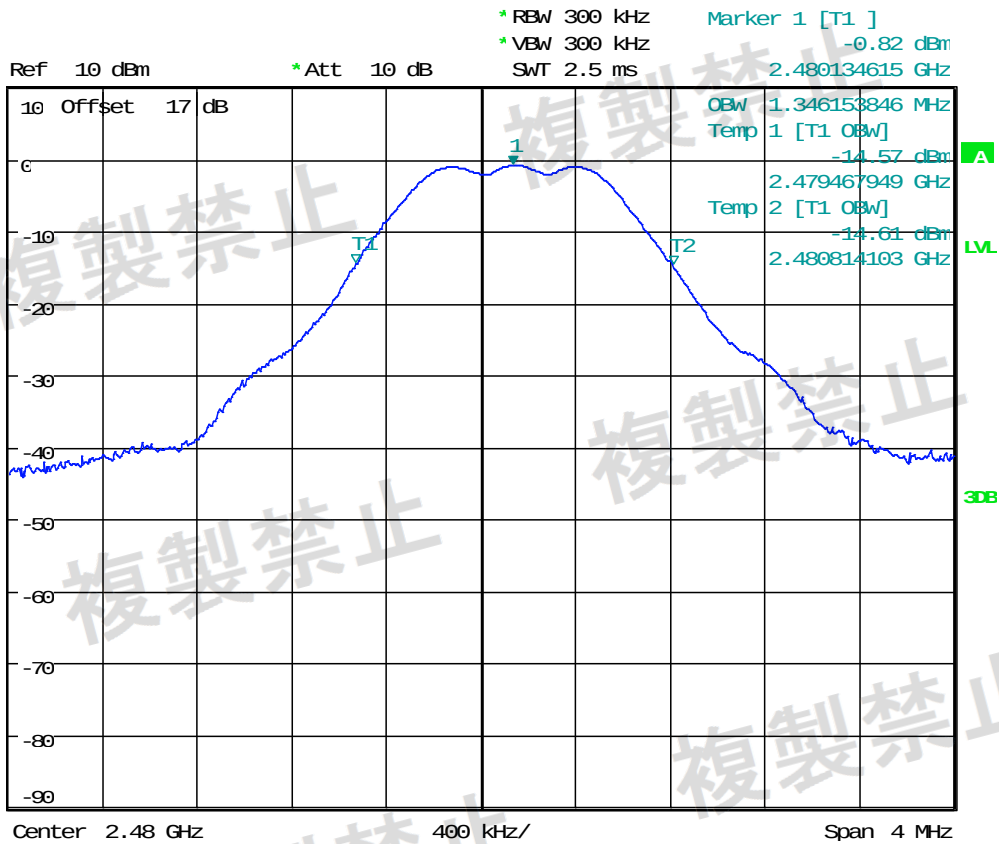
OCCUPIED BANDWIDTH CH39 3V
Date: 21.APR.2020 20:09:11



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX

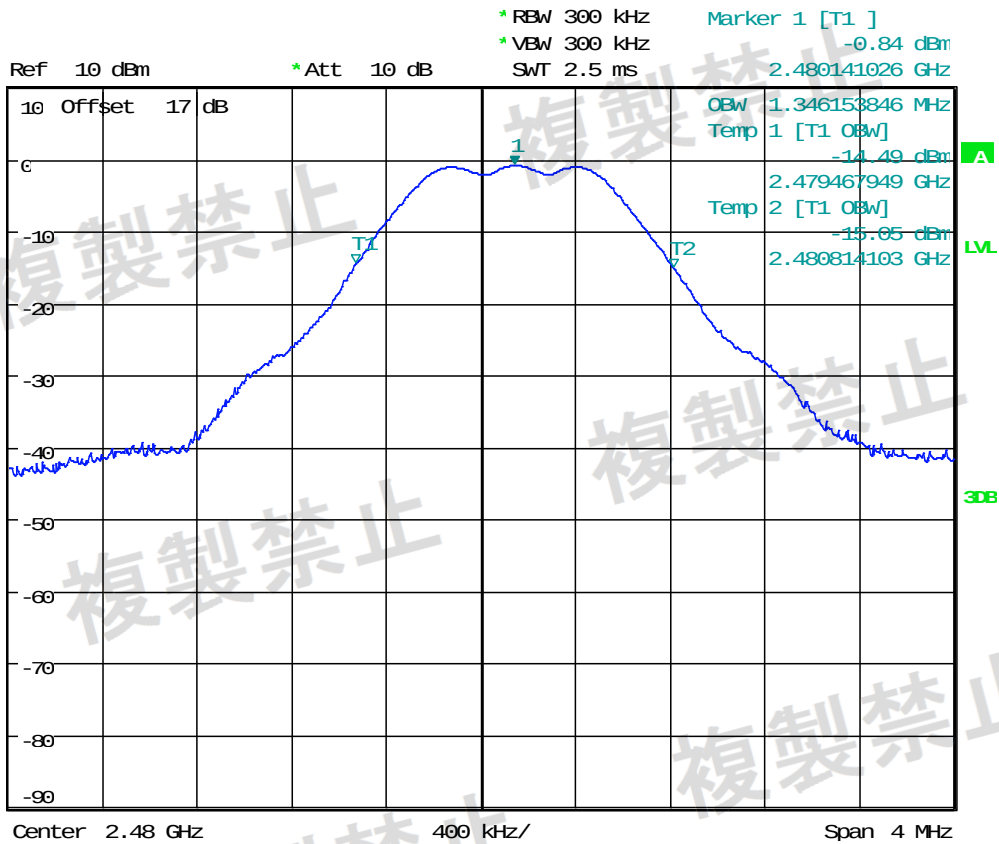




Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



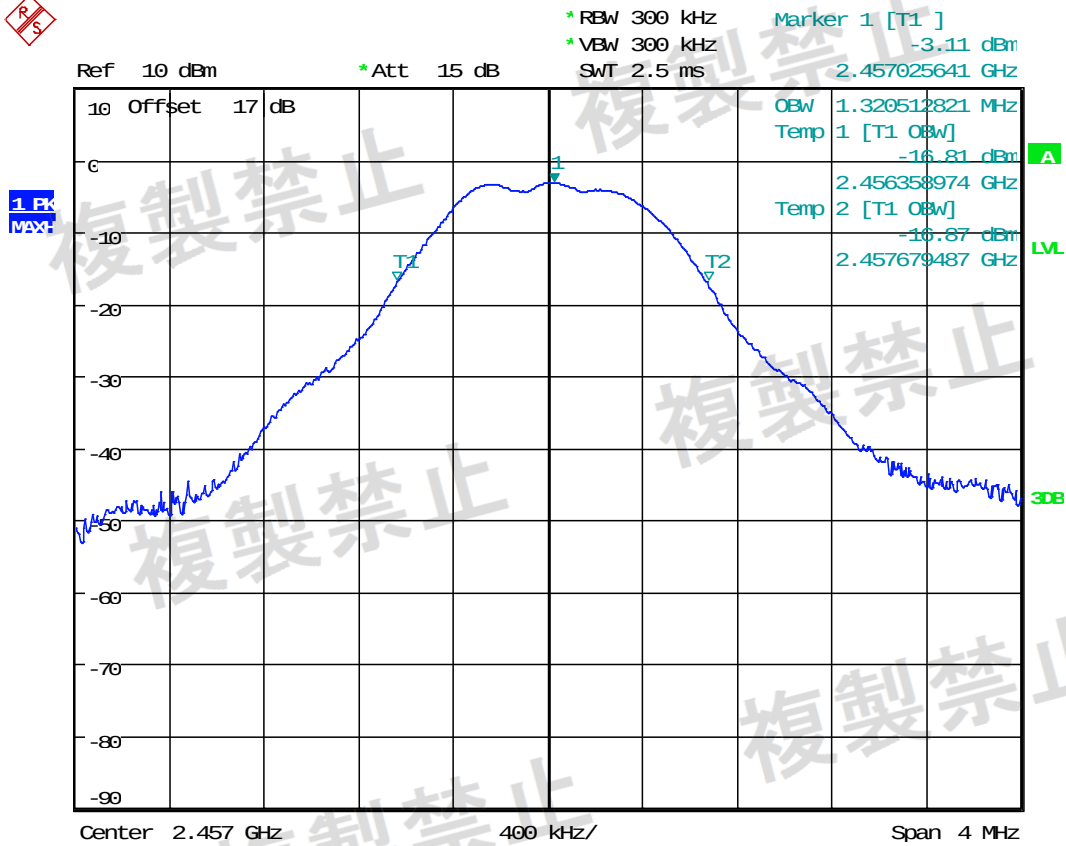
OCCUPIED BANDWIDTH CH39 3.3V

Date: 21.APR.2020 20:09:47



Worldwide Testing Services(Taiwan) Co., Ltd.

ANT+



OCCUPIED BANDWIDTH 2457MHz 3V

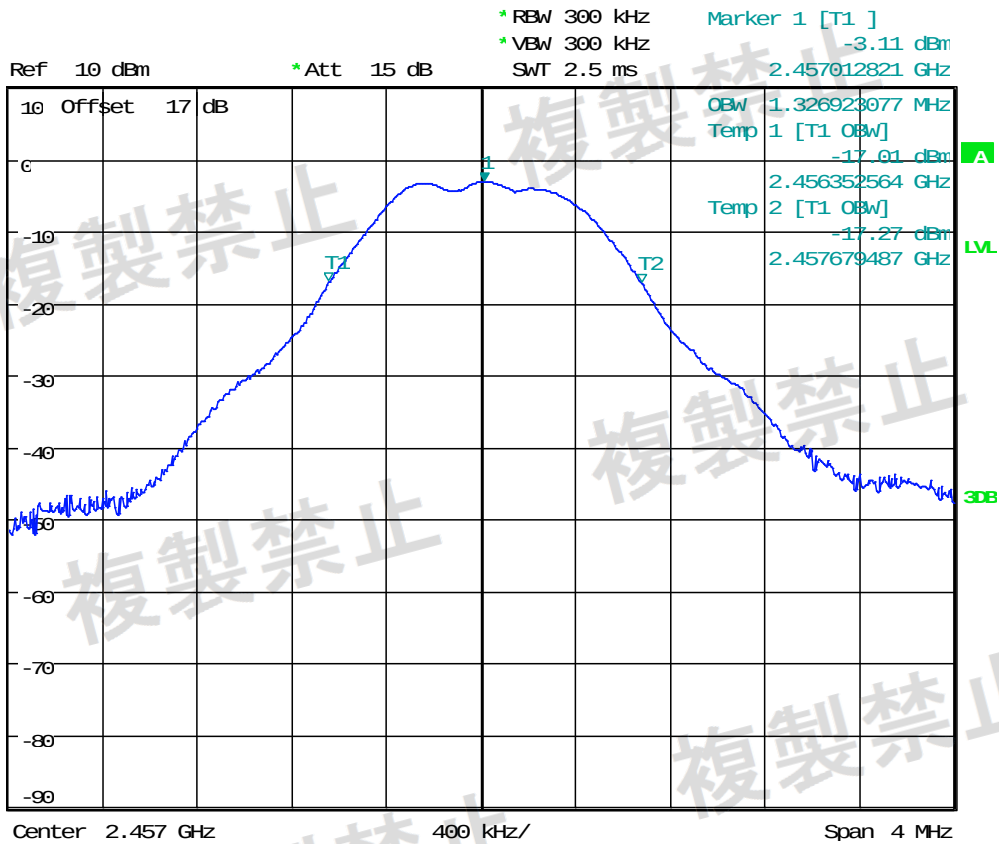
Date: 19.DEC.2020 18:44:25



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



OCCUPIED BANDWIDTH 2457MHz 2.7V

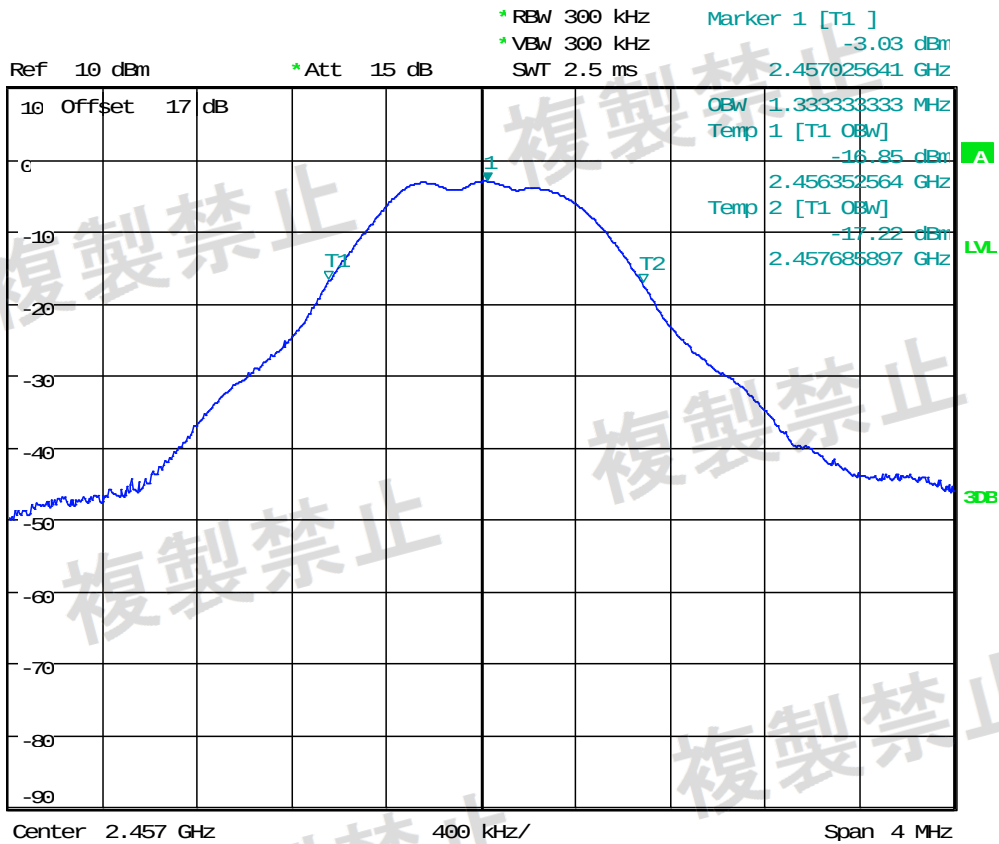
Date: 19.DEC.2020 18:44:47



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



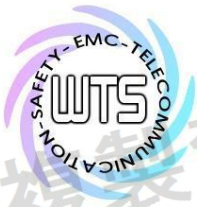
OCCUPIED BANDWIDTH 2457MHz 3.3V

Date: 19.DEC.2020 18:44:08

Limits:

Under all test conditions	Occupied bandwidth: ≤ 83.5 MHz
---------------------------	-------------------------------------

Test equipment used: ETSTW-RE 050, ETSTW-RE 055, ETSTW-RE 064, ETSTW-GSM 023



3.4 Spreading Bandwidth & Spreading Factor

3.4.1 Spreading Bandwidth

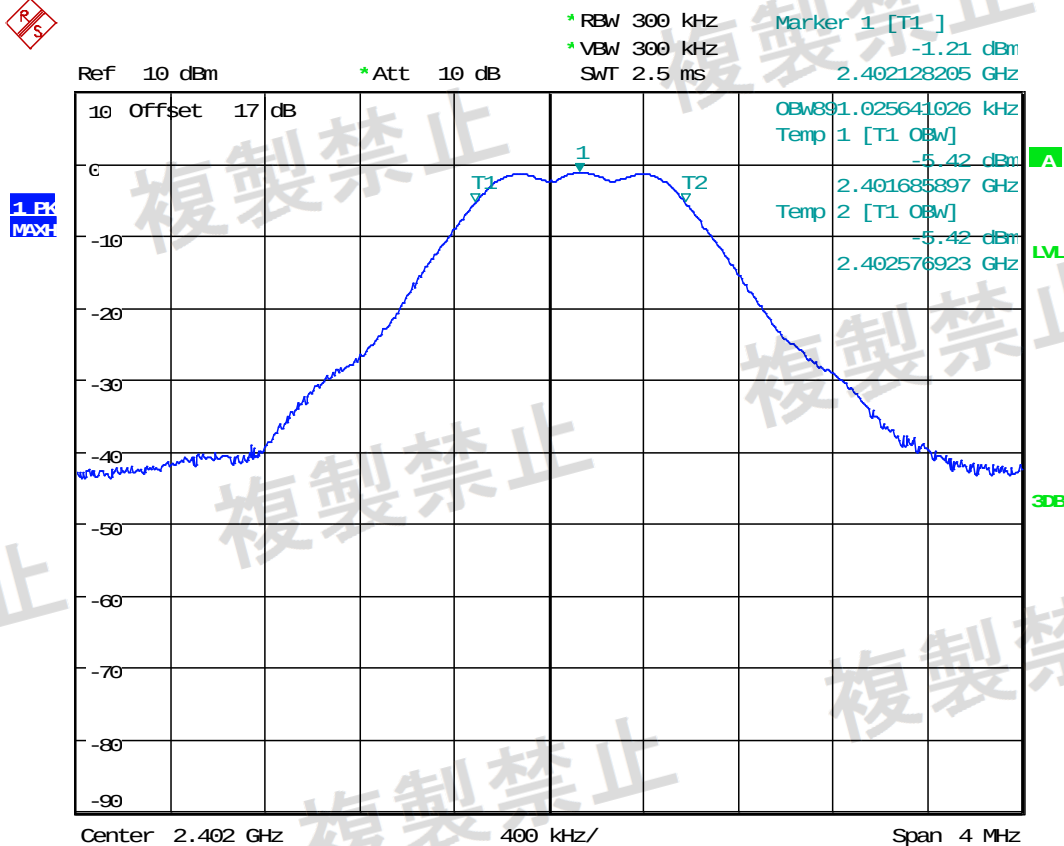
Test date: April 21-December 19, 2020

Temperature: 20.3 °C

Humidity: 57.8 %

Tester: Rick

BLE

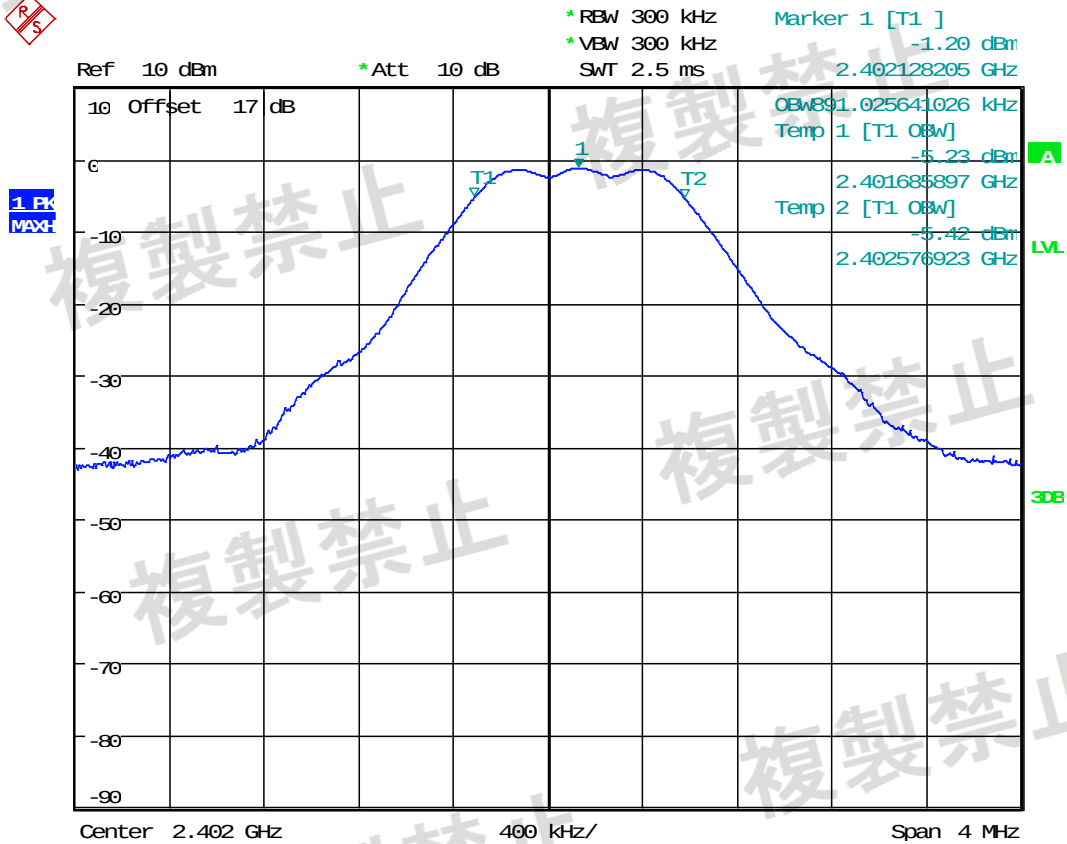


SPREADING BANDWIDTH CH0 3V

Date: 21.APR.2020 20:20:49



Worldwide Testing Services(Taiwan) Co., Ltd.

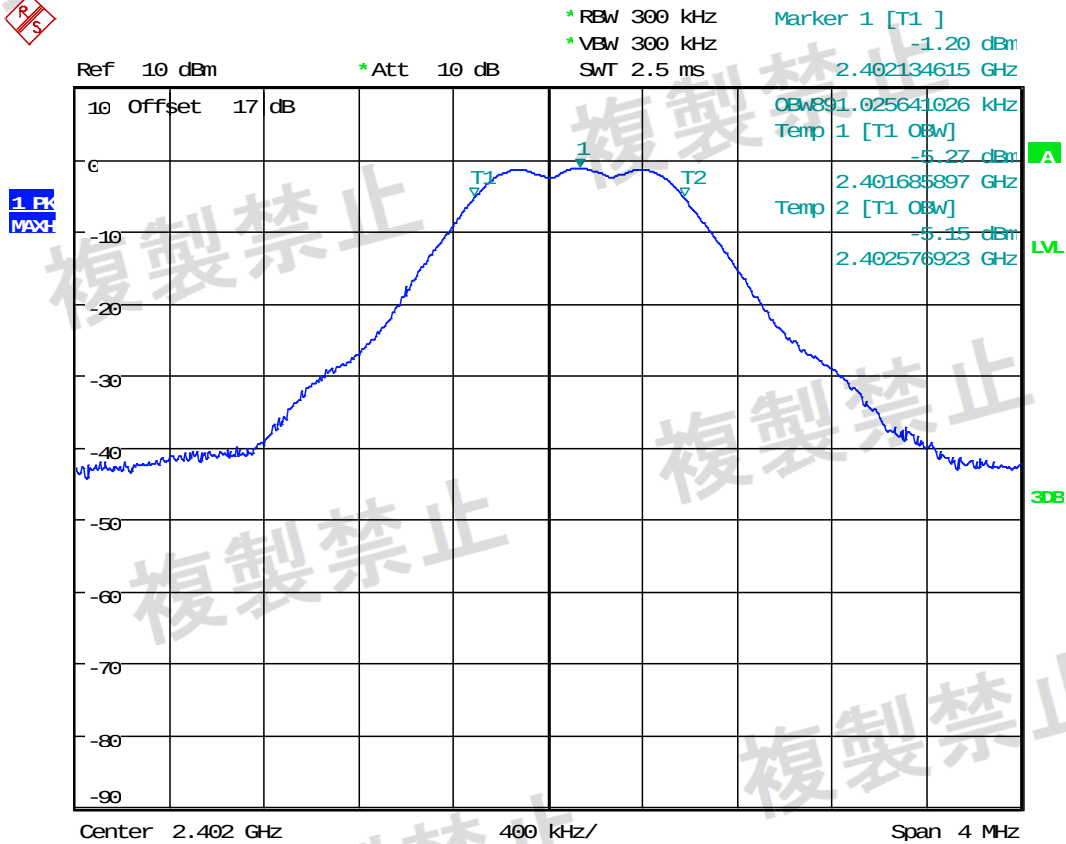


SPREADING BANDWIDTH CH0 2.7V

Date: 21.APR.2020 20:20:26



Worldwide Testing Services(Taiwan) Co., Ltd.

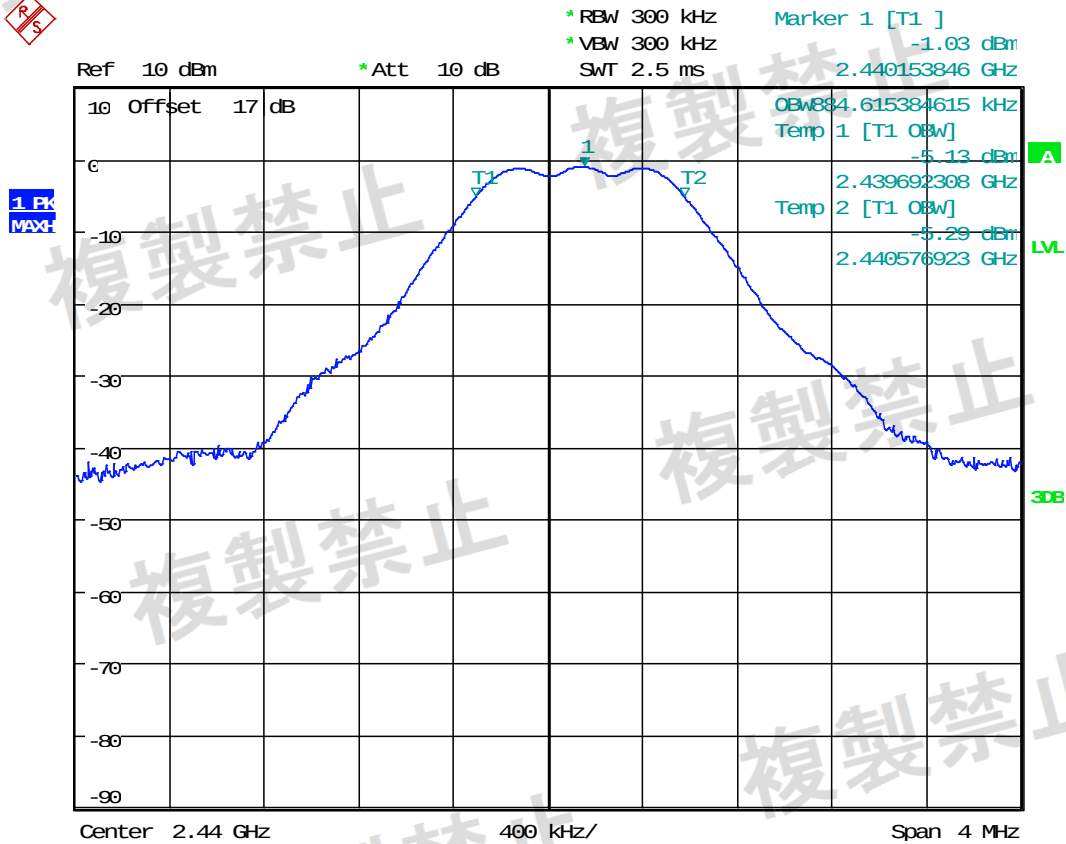


SPREADING BANDWIDTH CH0 3.3V

Date: 21.APR.2020 20:21:11



Worldwide Testing Services(Taiwan) Co., Ltd.

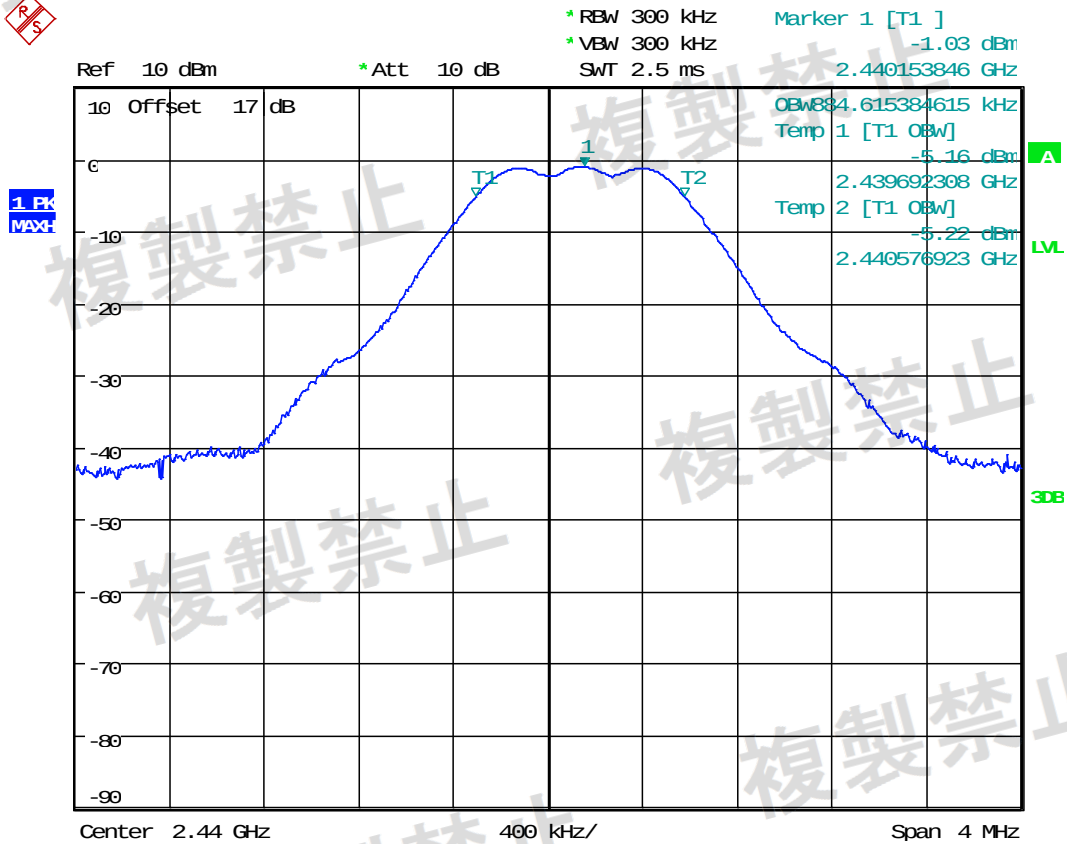


SPREADING BANDWIDTH CH19 3V

Date: 21.APR.2020 20:22:48



Worldwide Testing Services(Taiwan) Co., Ltd.

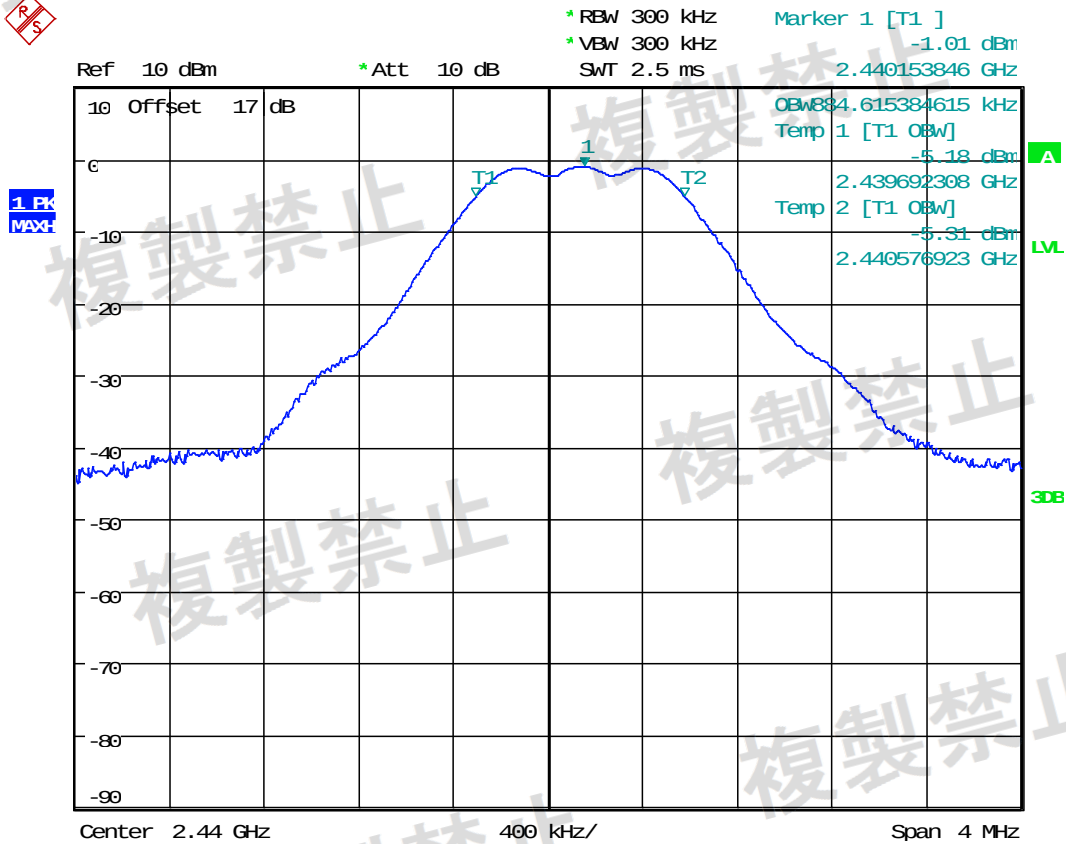


SPREADING BANDWIDTH CH19 2.7V

Date: 21.APR.2020 20:23:20



Worldwide Testing Services(Taiwan) Co., Ltd.



SPREADING BANDWIDTH CH19 3.3V

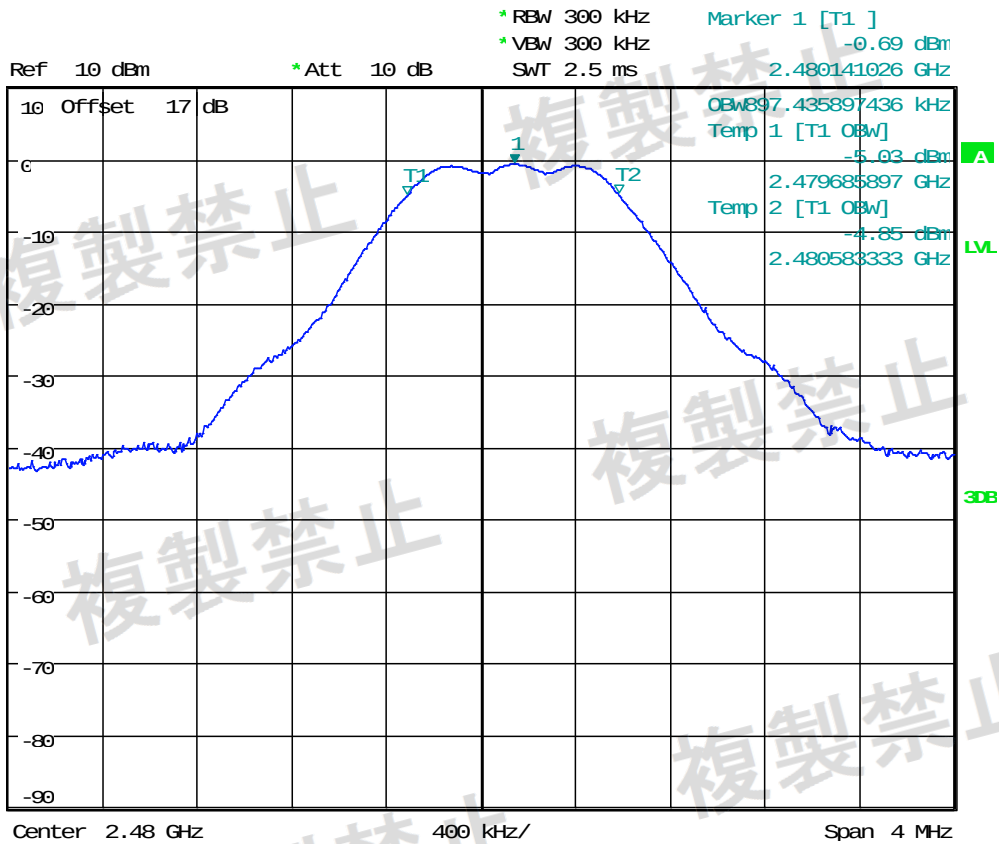
Date: 21.APR.2020 20:22:05



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



SPREADING BANDWIDTH CH39 3V

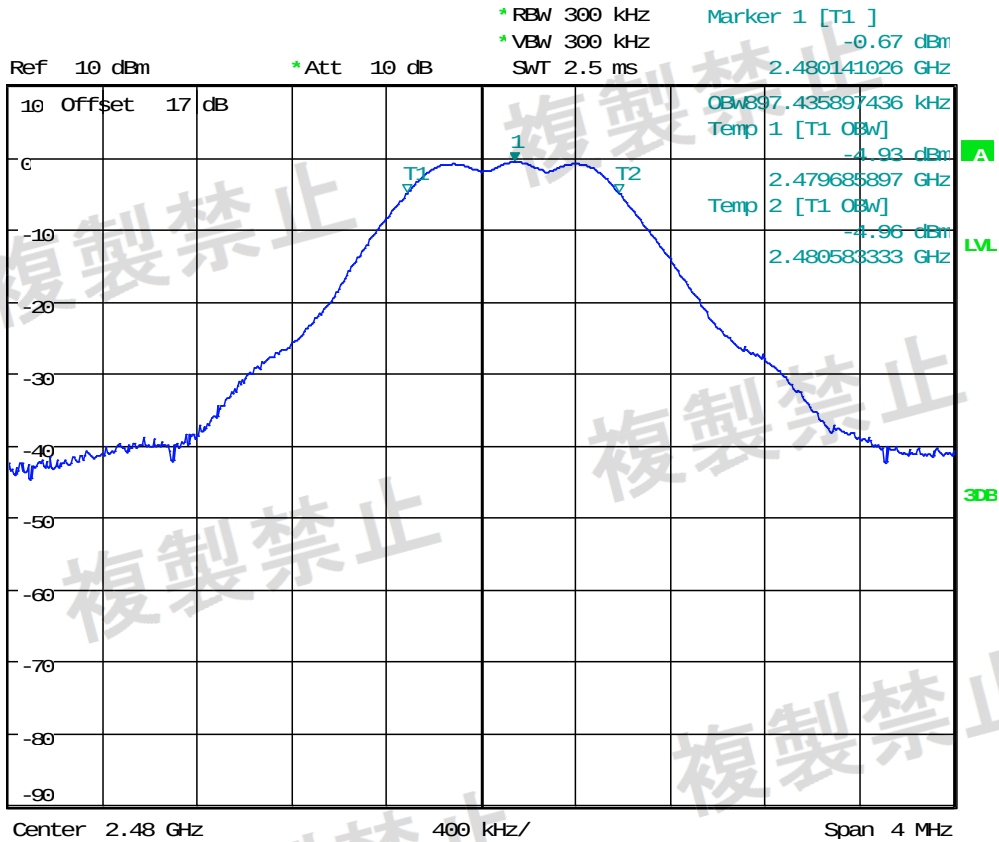
Date: 21.APR.2020 20:27:41



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX

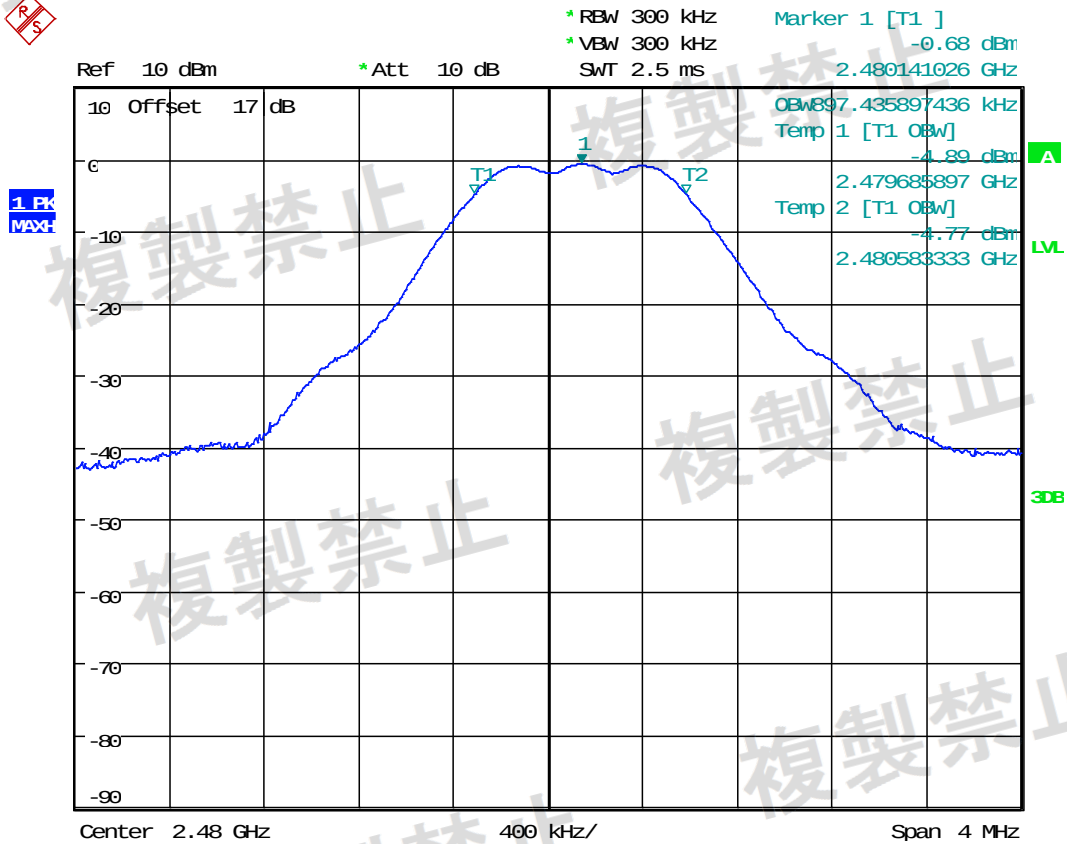


SPREADING BANDWIDTH CH39 2.7V

Date: 21.APR.2020 20:27:17

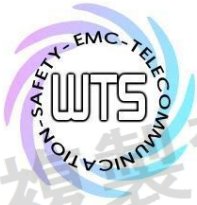


Worldwide Testing Services(Taiwan) Co., Ltd.



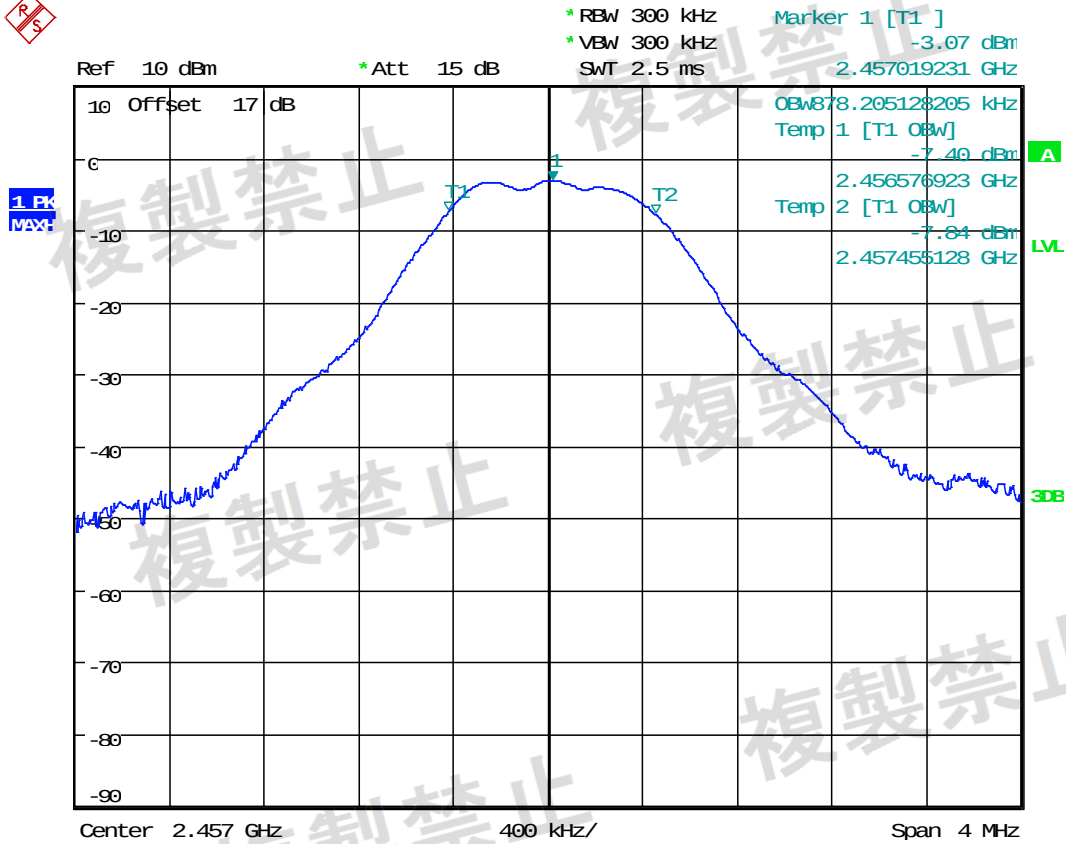
SPREADING BANDWIDTH CH39 3.3V

Date: 21.APR.2020 20:28:08



Worldwide Testing Services(Taiwan) Co., Ltd.

ANT+

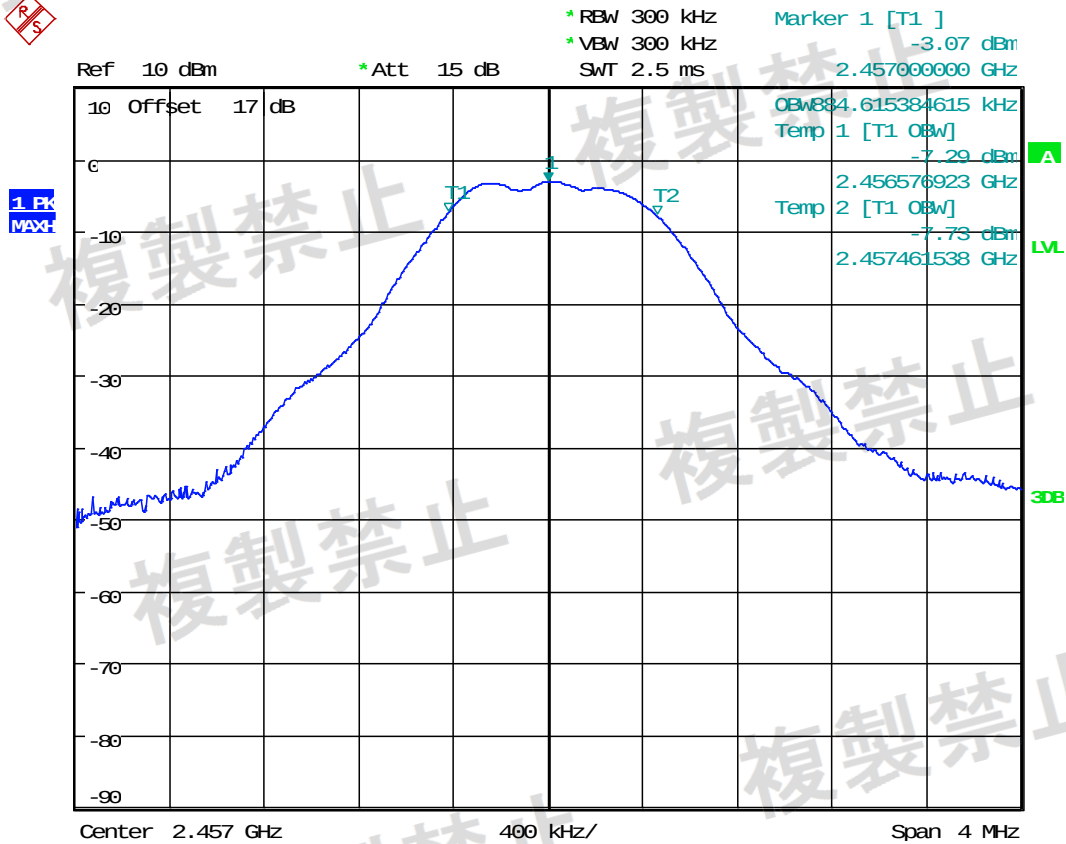


SPREADING BANDWIDTH 2457MHz 3V

Date: 19.DEC.2020 18:46:09

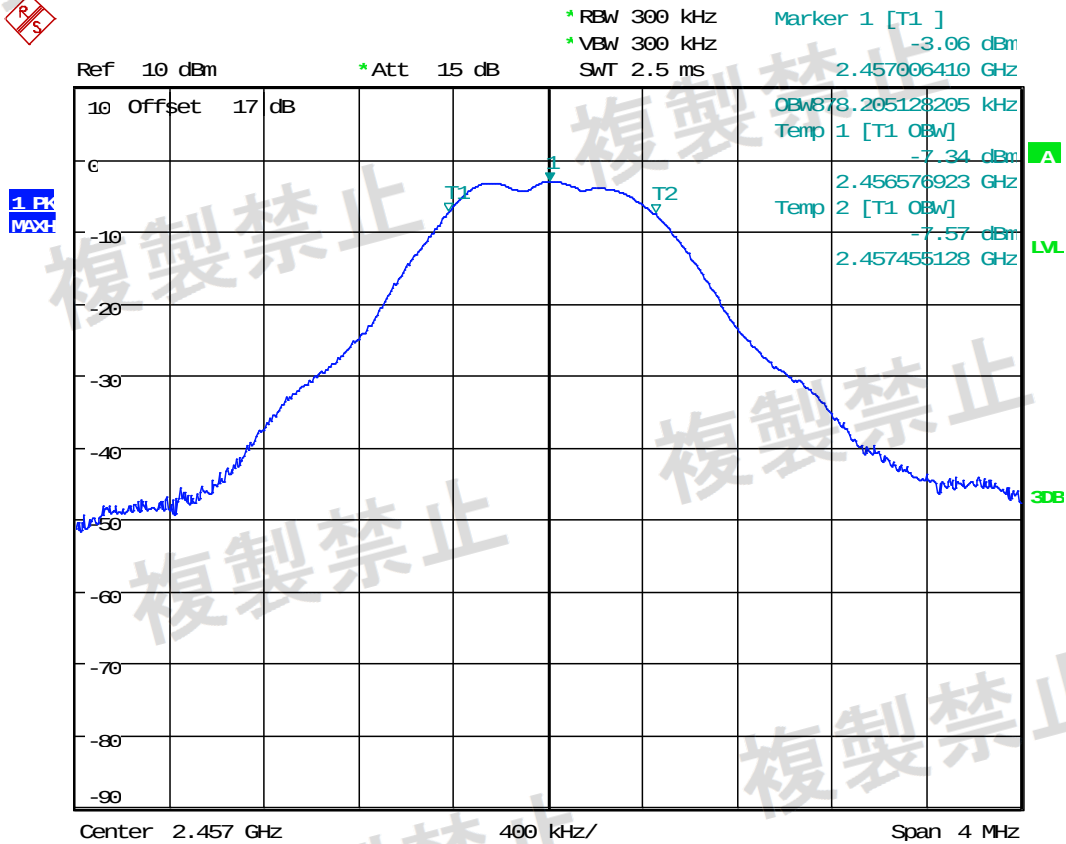


Worldwide Testing Services(Taiwan) Co., Ltd.



SPREADING BANDWIDTH 2457MHz 2.7V

Date: 19.DEC.2020 18:45:50



SPREADING BANDWIDTH 2457MHz 3.3V

Date: 19.DEC.2020 18:46:34

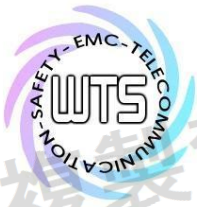
3.4.2 Spreading Factor

Explanation: This item is not required.

Limits:

Under all test conditions	<p>Occupied bandwidth: ≥ 500 kHz</p> <p>Spreading factor:</p> <p>Operating frequency 2400 – 2483 MHz: ≥ 5</p> <p>Operating frequency 2471 – 2497 MHz: ≥ 10</p>
---------------------------	--

Test equipment used: ETSTW-RE 050, ETSTW-RE 055, ETSTW-RE 064, ETSTW-GSM 023



Worldwide Testing Services(Taiwan) Co., Ltd.

3.5 Spurious emissions (conducted)_transmitter

Test date: April 21-December 19, 2020

Temperature: 20.3 °C

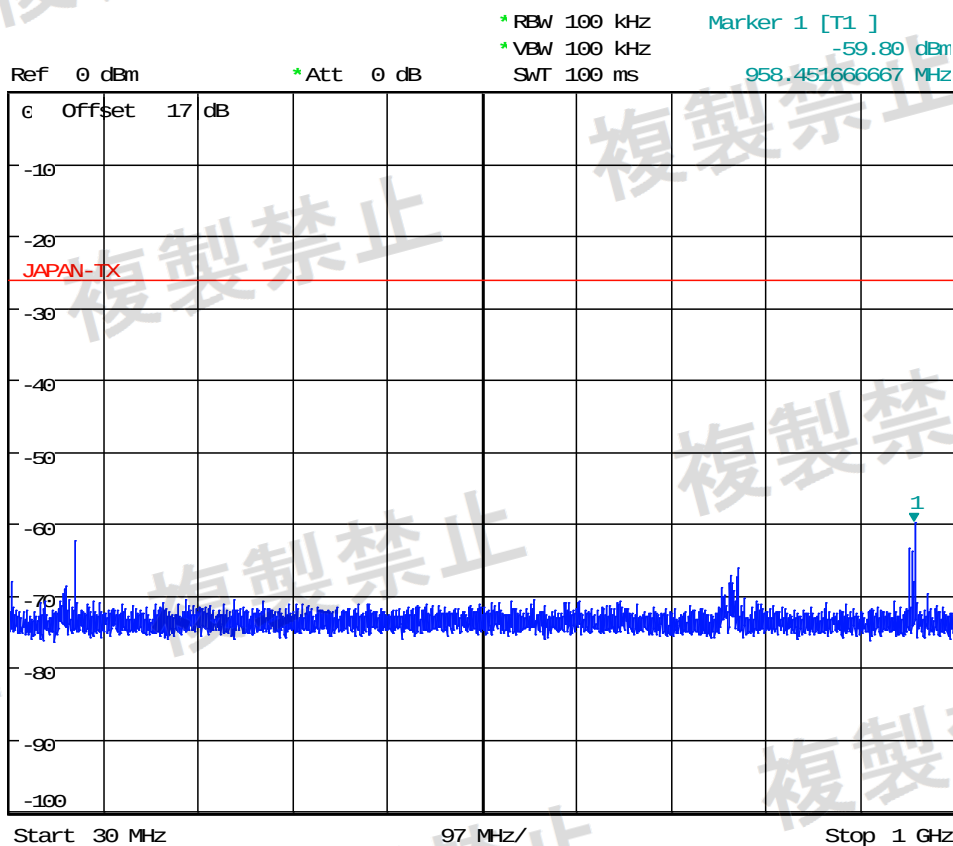
Humidity: 57.8 %

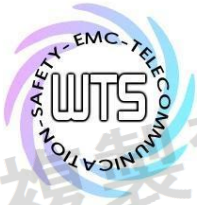
Tester: Rick

BLE



1.5K
MAX

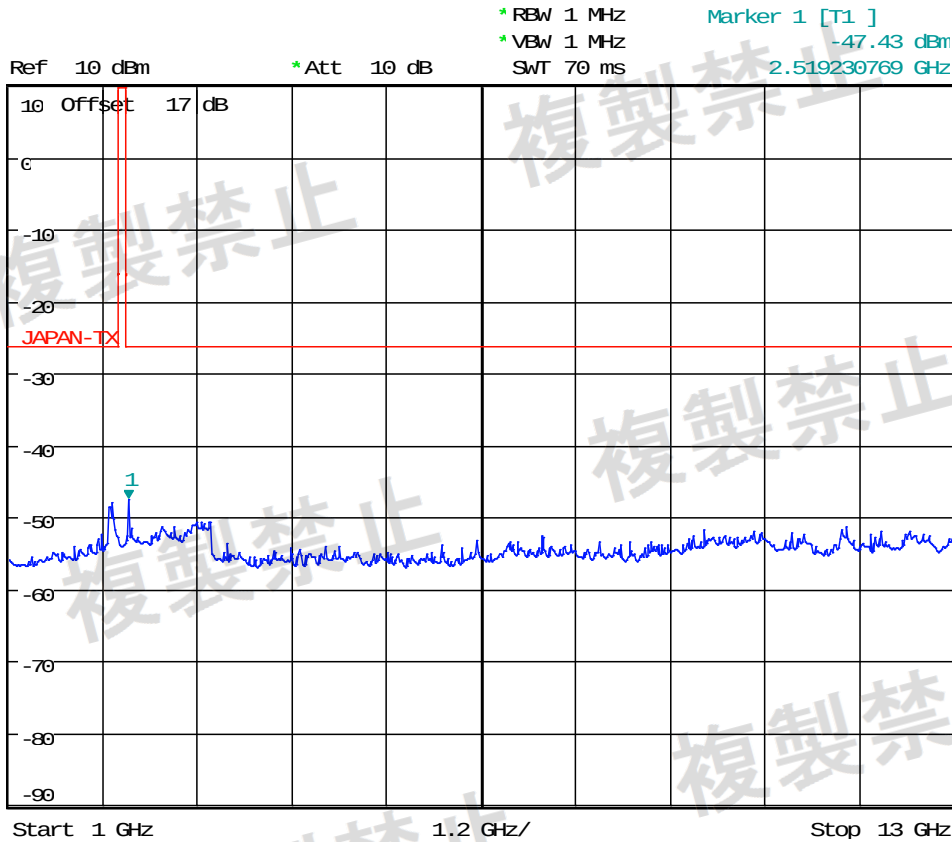




Worldwide Testing Services(Taiwan) Co., Ltd.

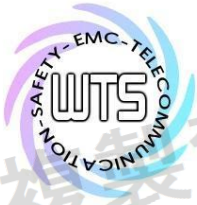


1 PK
MAX



SPURIOUS EMISSION CH0 3V

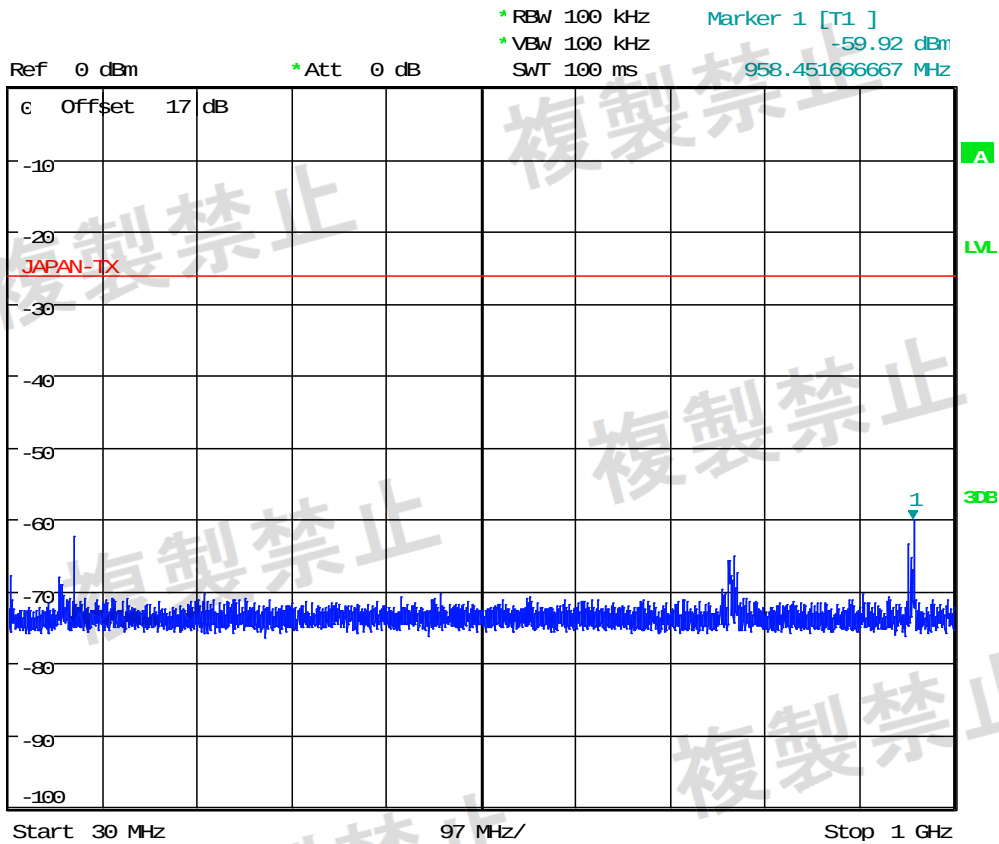
Date: 21.APR.2020 21:12:05



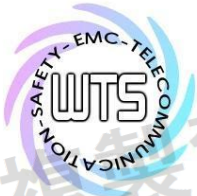
Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



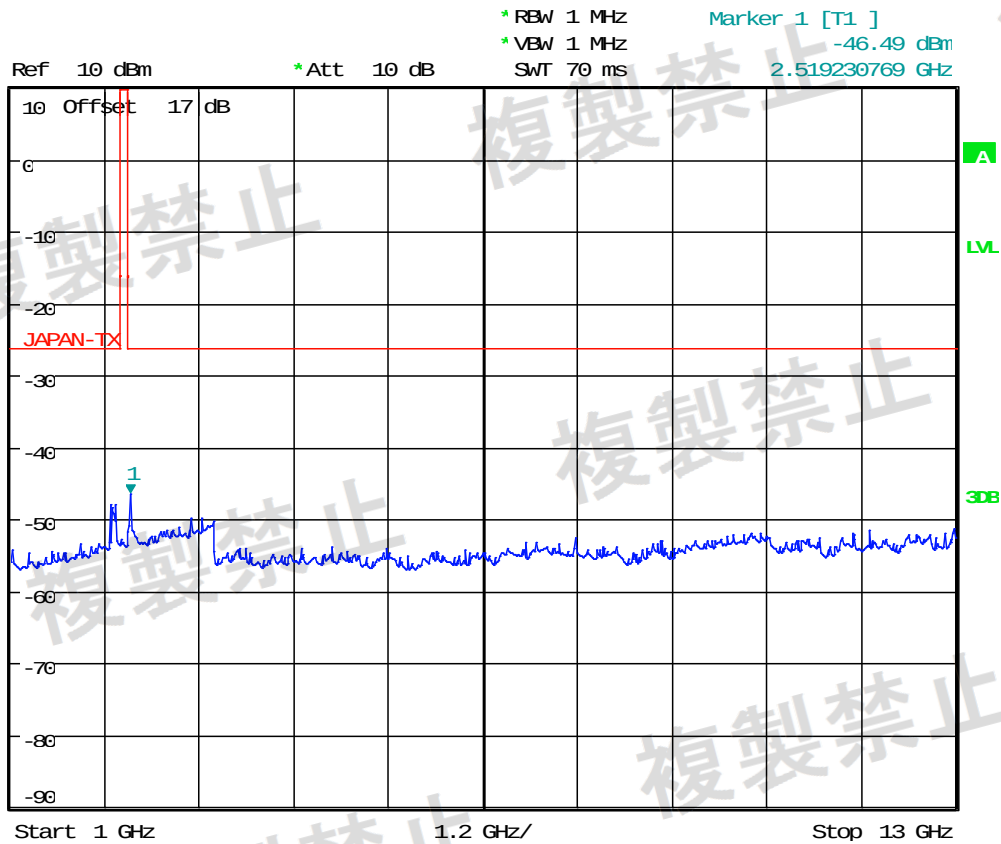
SPURIOUS EMISSION CH0 2.7V
Date: 21.APR.2020 20:57:26



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



SPURIOUS EMISSION CH0 2.7V

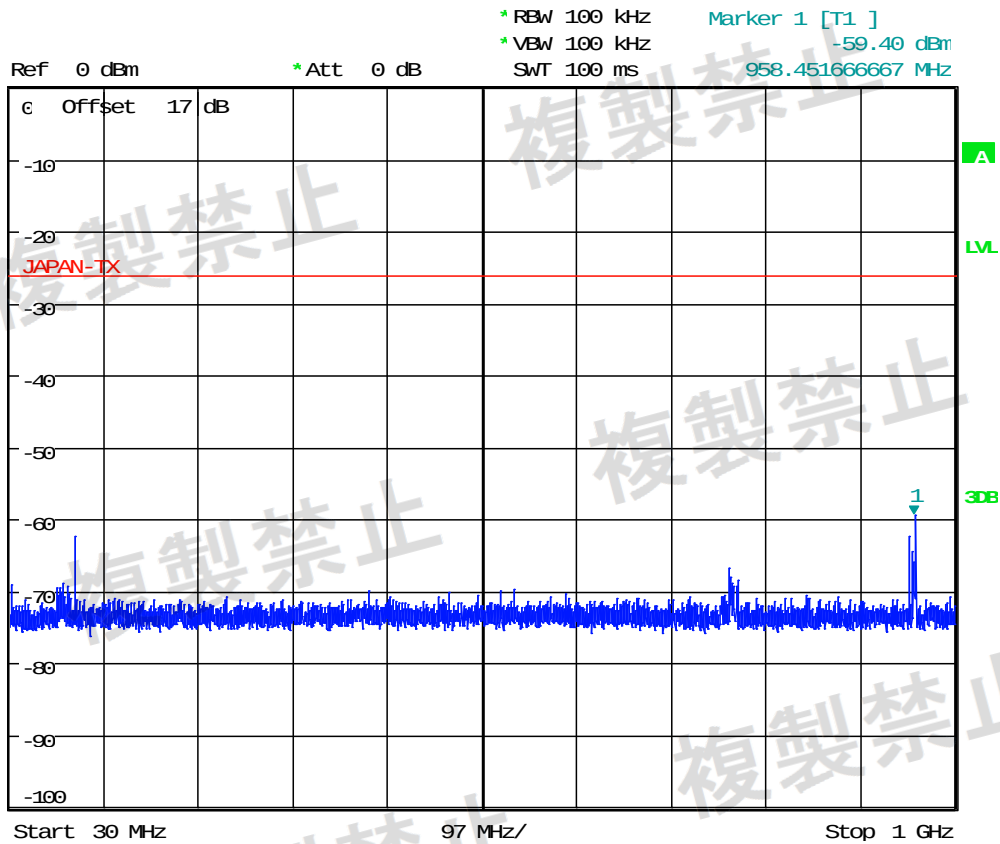
Date: 21.APR.2020 21:12:21



Worldwide Testing Services(Taiwan) Co., Ltd.

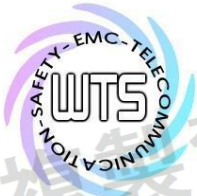


1 PK
MAX



SPURIOUS EMISSION CH0 3.3V

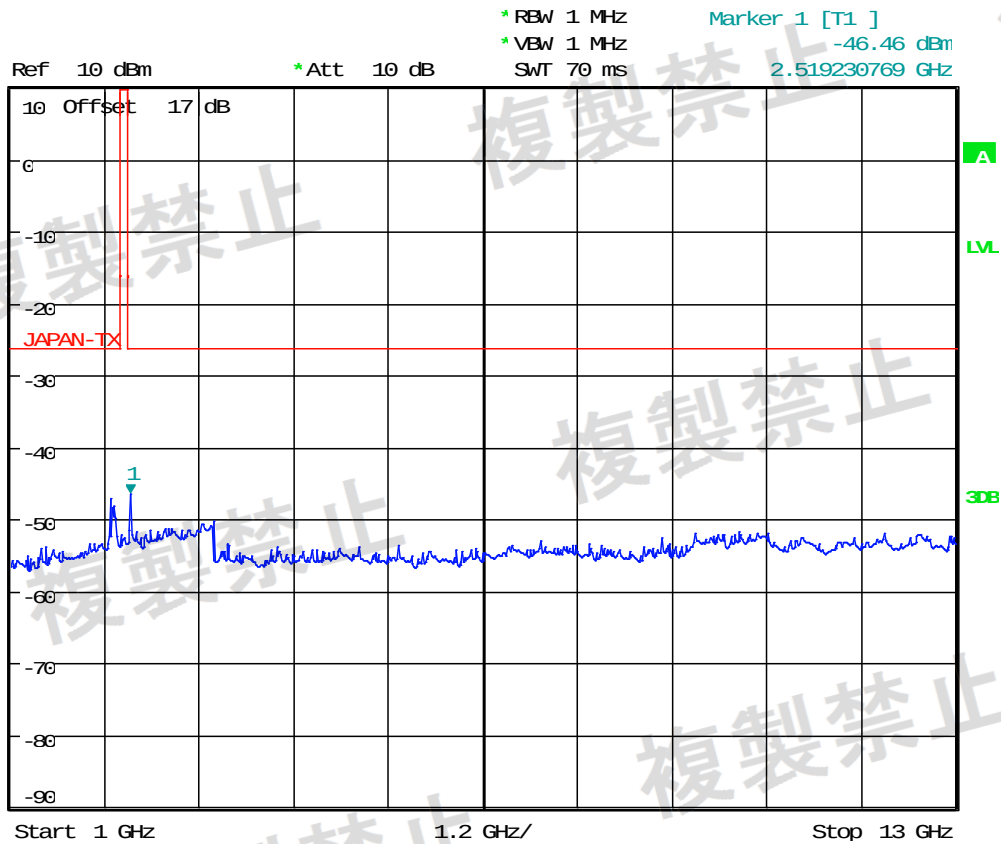
Date: 21.APR.2020 20:56:39



Worldwide Testing Services(Taiwan) Co., Ltd.

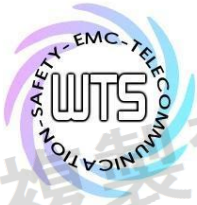


1 Pk
MAX



SPURIOUS EMISSION CH0 3.3V

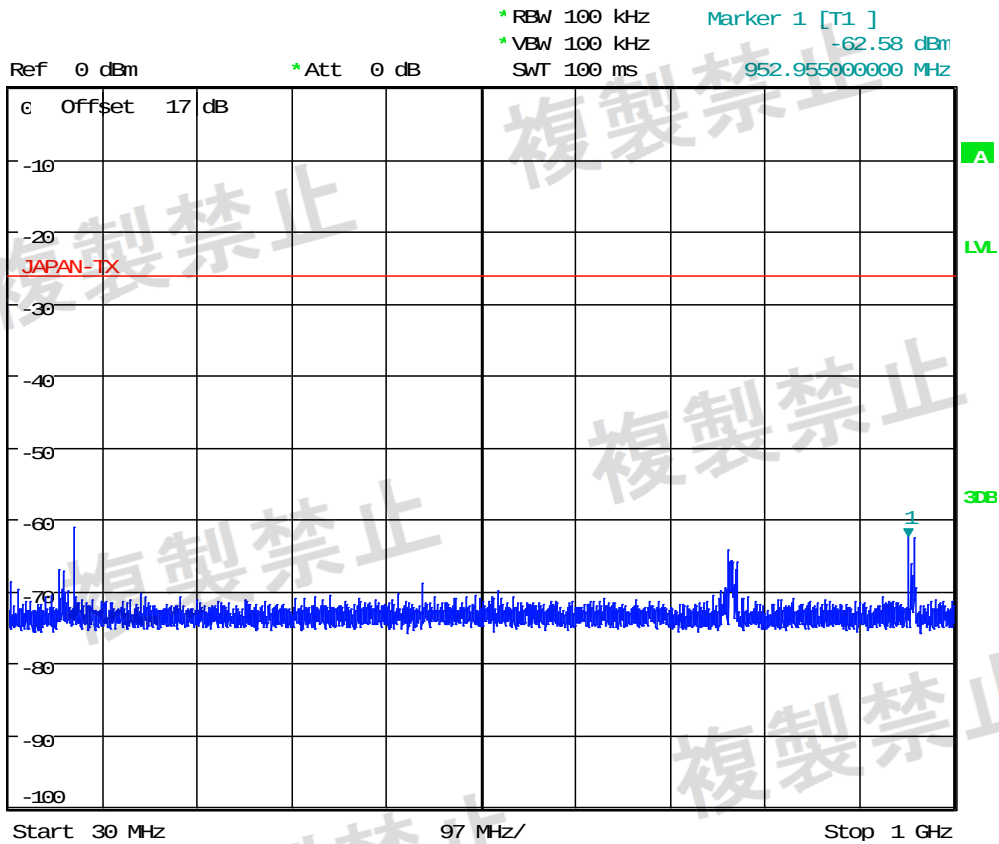
Date: 21.APR.2020 21:11:50



Worldwide Testing Services(Taiwan) Co., Ltd.

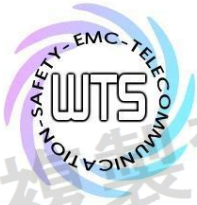


1 PK
MAX



SPURIOUS EMISSION CH19 3V

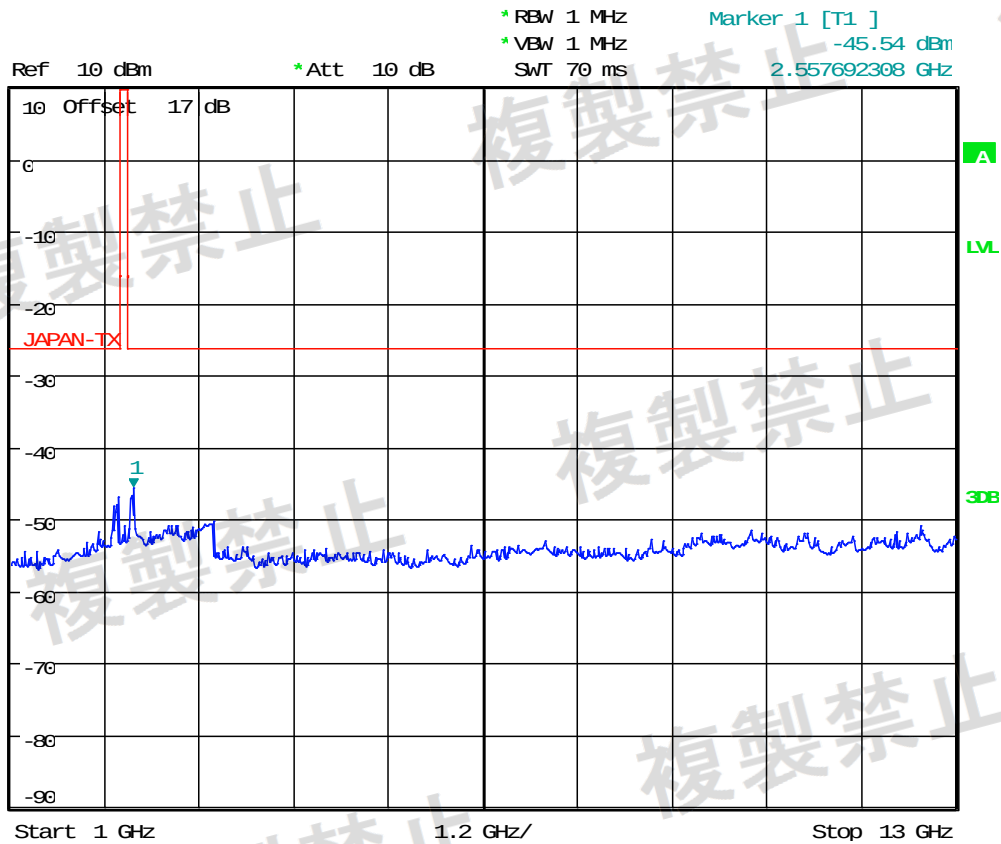
Date: 21.APR.2020 20:55:38



Worldwide Testing Services(Taiwan) Co., Ltd.



1 Pk
MAX



SPURIOUS EMISSION CH19 3V

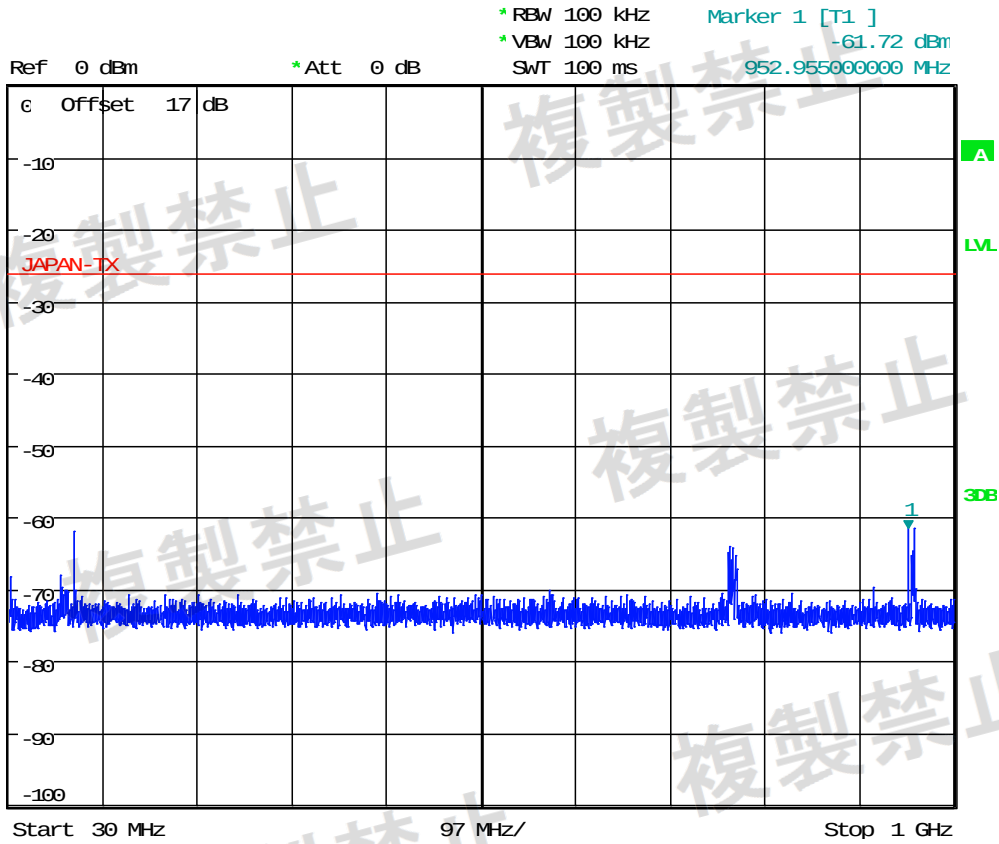
Date: 21.APR.2020 21:10:56



Worldwide Testing Services(Taiwan) Co., Ltd.

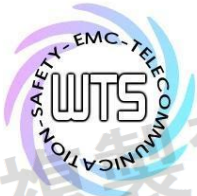


1 PK
MAX



SPURIOUS EMISSION CH19 2.7V

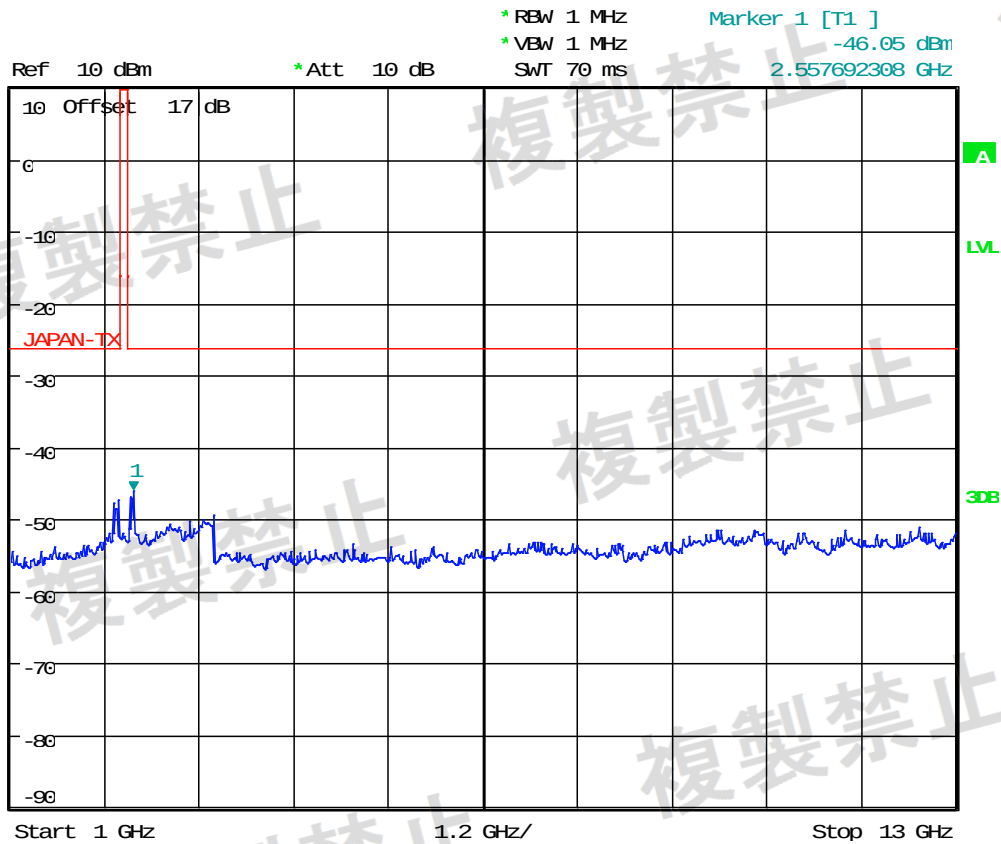
Date: 21.APR.2020 20:55:14



Worldwide Testing Services(Taiwan) Co., Ltd.

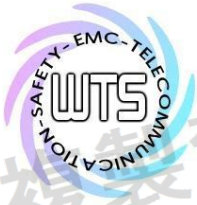


1 PK
MAX



SPURIOUS EMISSION CH19 2.7V

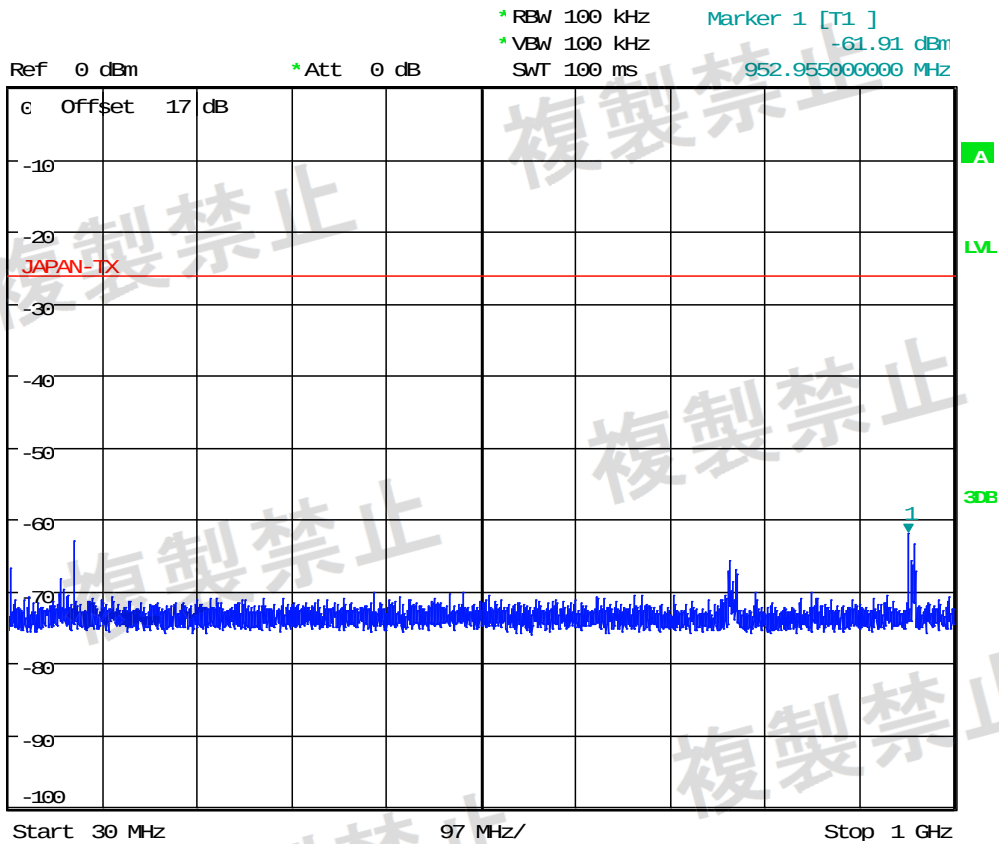
Date: 21.APR.2020 21:10:35



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



SPURIOUS EMISSION CH19 3.3V

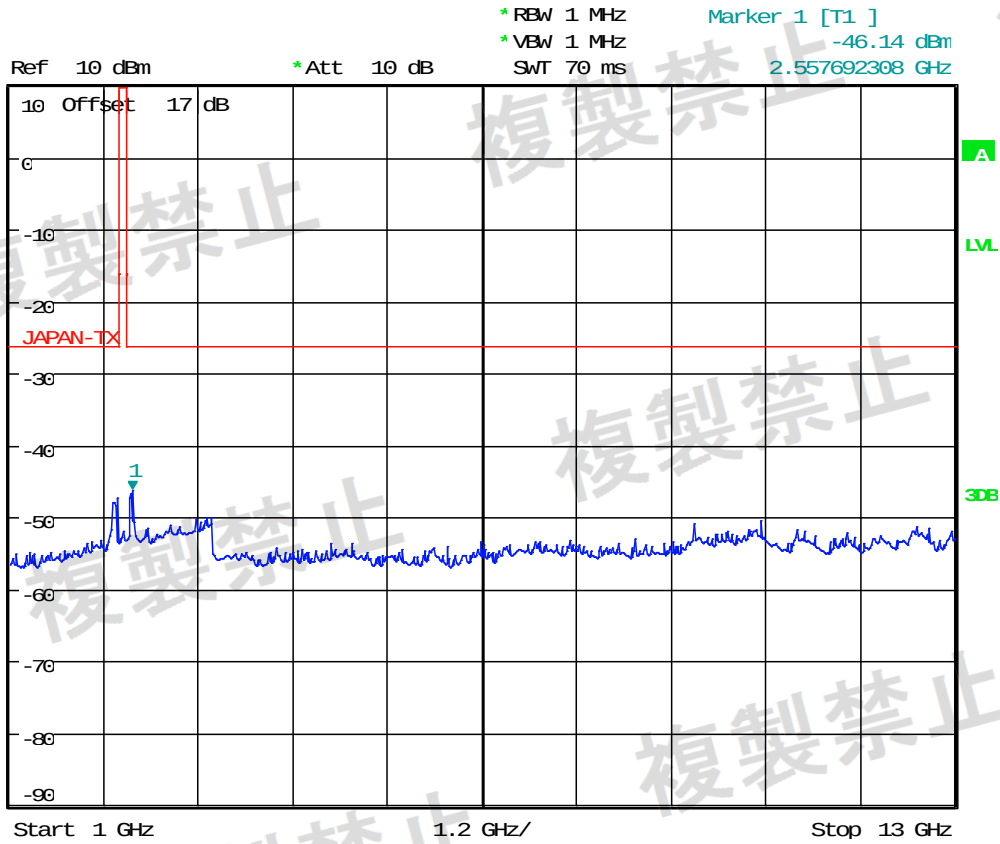
Date: 21.APR.2020 20:56:02



Worldwide Testing Services(Taiwan) Co., Ltd.

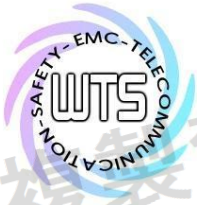


1 PK
MAX



SPURIOUS EMISSION CH19 3.3V

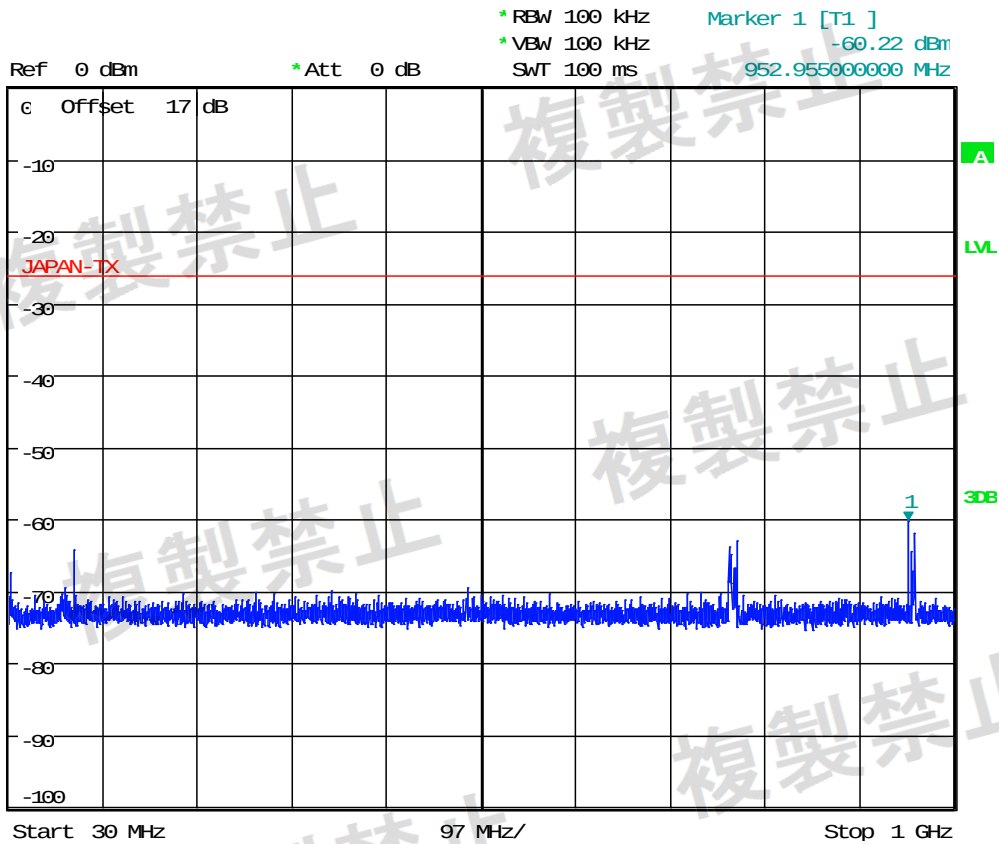
Date: 21.APR.2020 21:11:16



Worldwide Testing Services(Taiwan) Co., Ltd.

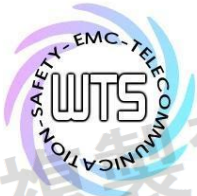


1 PK
MAX

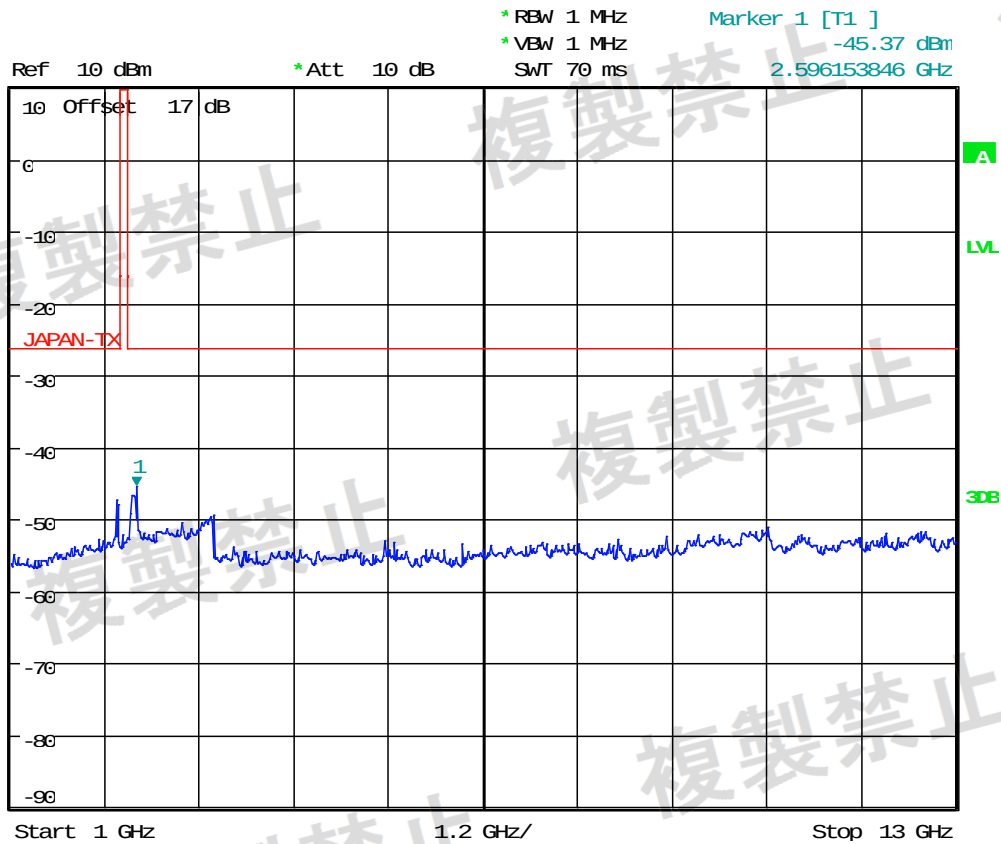


SPURIOUS EMISSION CH39 3V

Date: 21.APR.2020 20:53:22



1 Pk
MAX



SPURIOUS EMISSION CH39 3V

Date: 21.APR.2020 21:09:30



Worldwide Testing Services(Taiwan) Co., Ltd.



* RBW 100 kHz
* VBW 100 kHz
SWT 100 ms

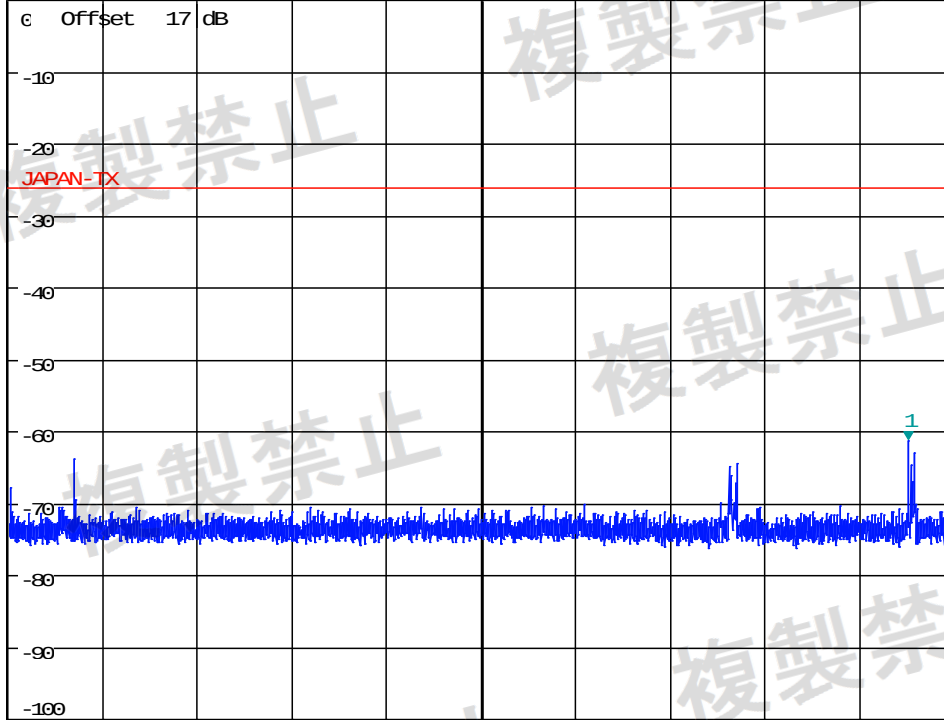
Marker 1 [T1]

-61.19 dBm

952.955000000 MHz

Ref 0 dBm

* Att 0 dB



Start 30 MHz

97 MHz/

Stop 1 GHz

SPURIOUS EMISSION CH39 2.7V

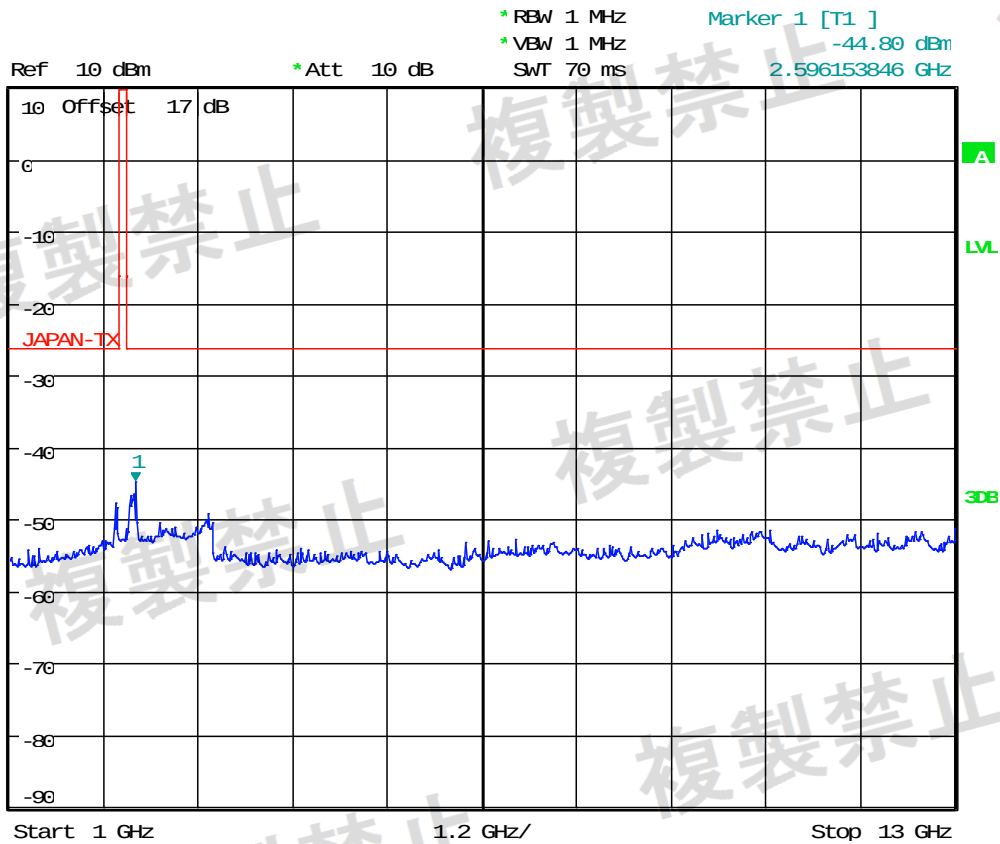
Date: 21.APR.2020 20:53:44



Worldwide Testing Services(Taiwan) Co., Ltd.

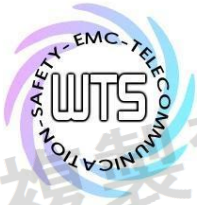


1 PK
MAX



SPURIOUS EMISSION CH39 2.7V

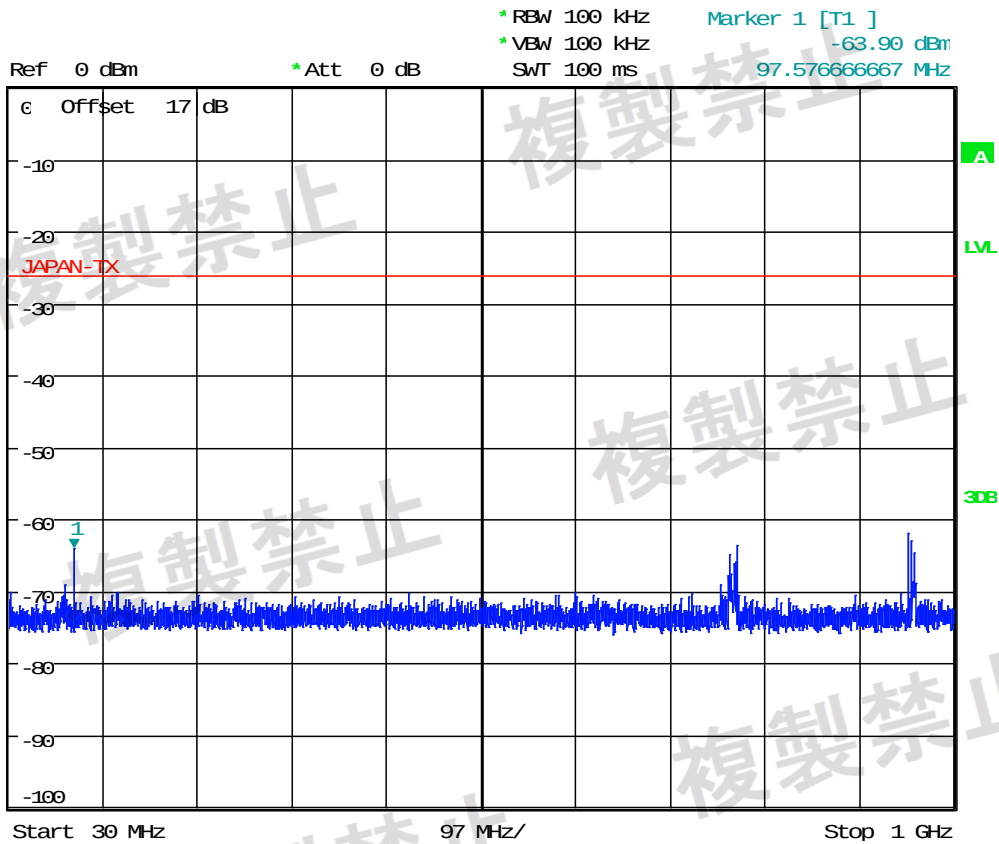
Date: 21.APR.2020 21:09:51



Worldwide Testing Services(Taiwan) Co., Ltd.

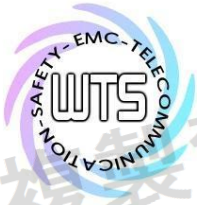


1 PK
MAX



SPURIOUS EMISSION CH39 3.3V

Date: 21.APR.2020 20:52:50

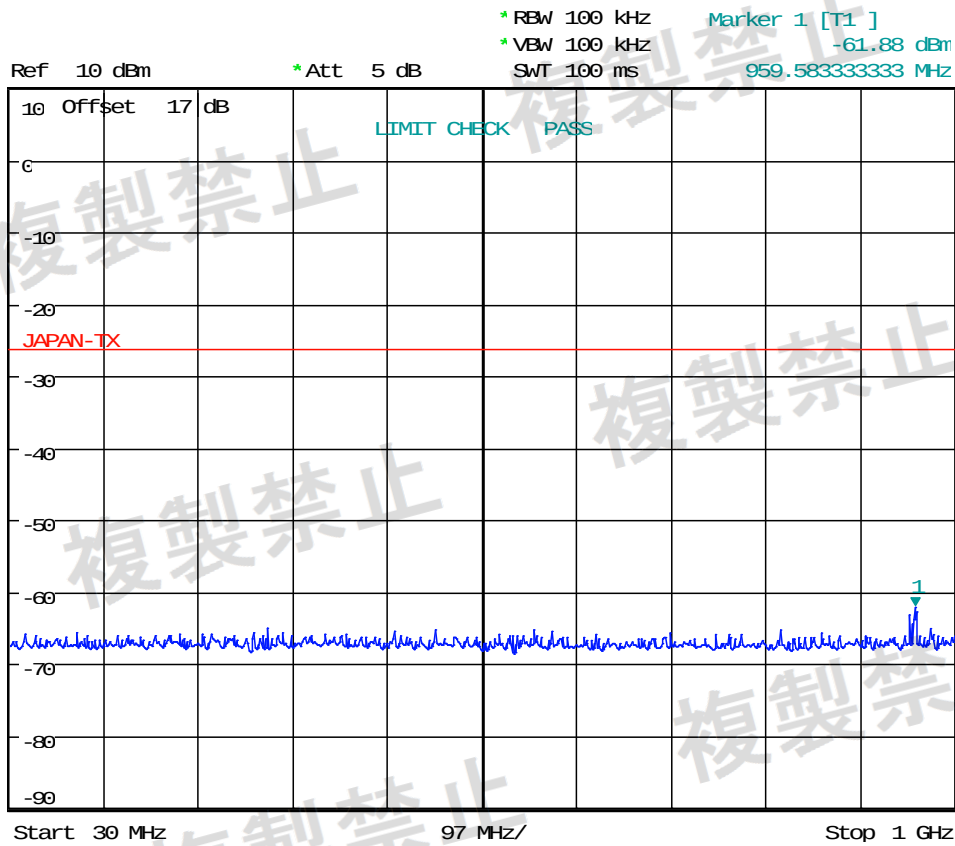


Worldwide Testing Services(Taiwan) Co., Ltd.

ANT+

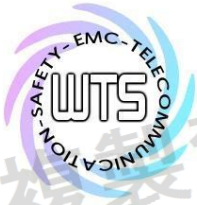


1. PK
MAX



CONDUCTED SPURIOUS EMISSION 2457MHz 3V

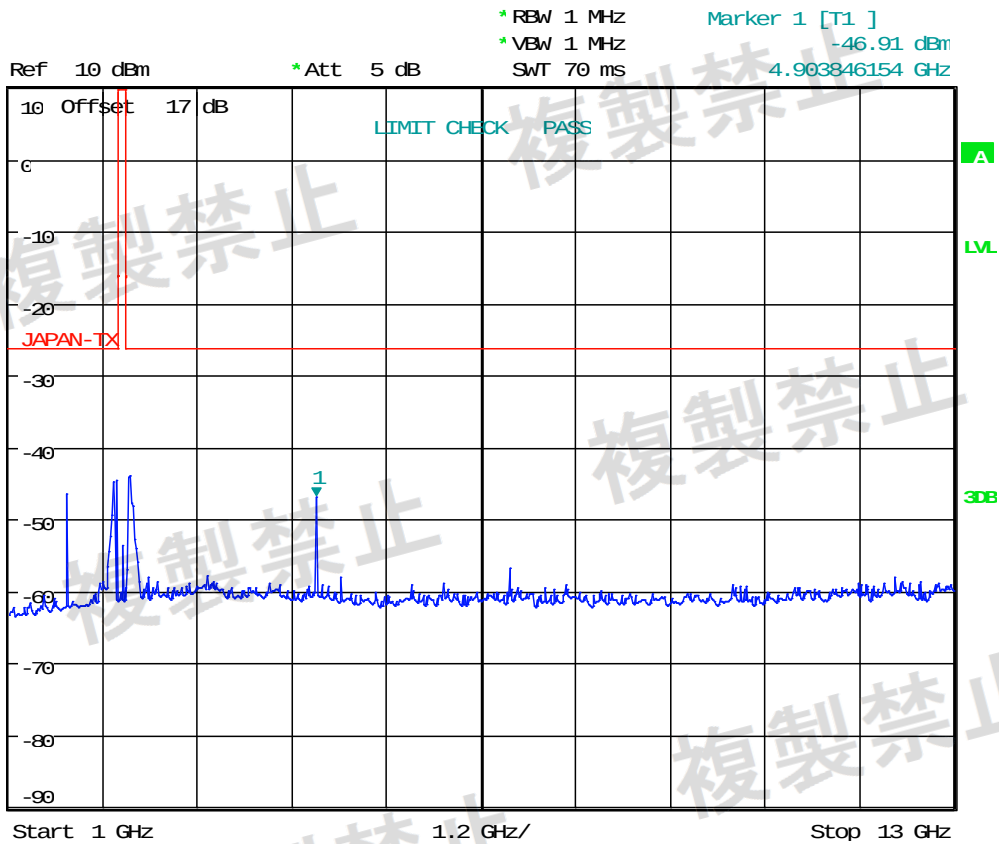
Date: 19.DEC.2020 18:51:41



Worldwide Testing Services(Taiwan) Co., Ltd.

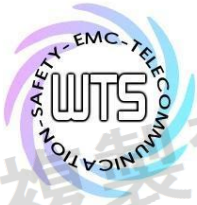


1 PK
MAX



CONDUCTED SPURIOUS EMISSION 2457MHz 3V

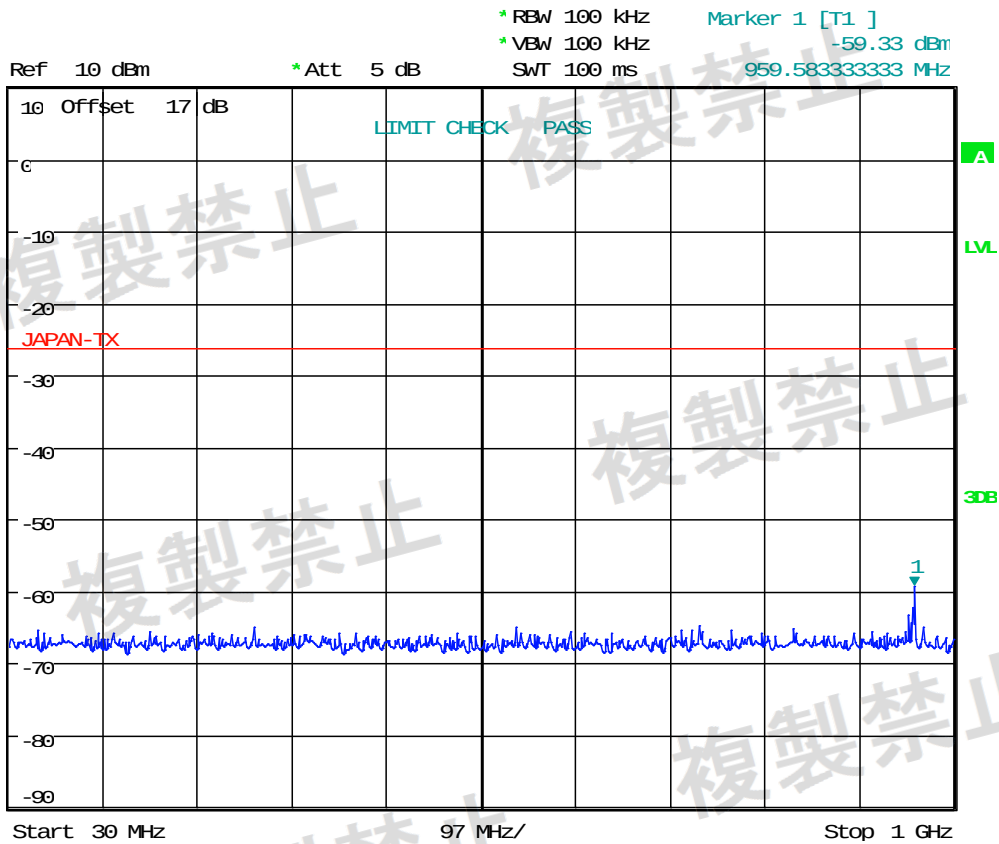
Date: 19.DEC.2020 18:50:34



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX

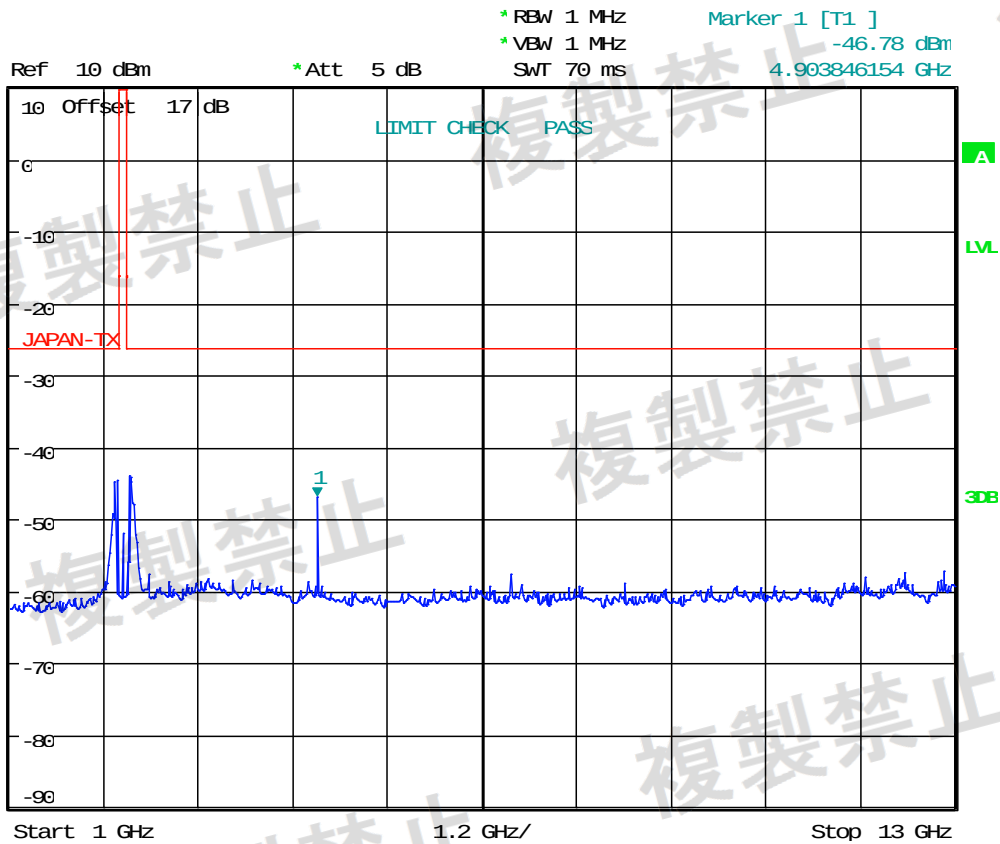




Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



CONDUCTED SPURIOUS EMISSION 2457MHz 2.7V

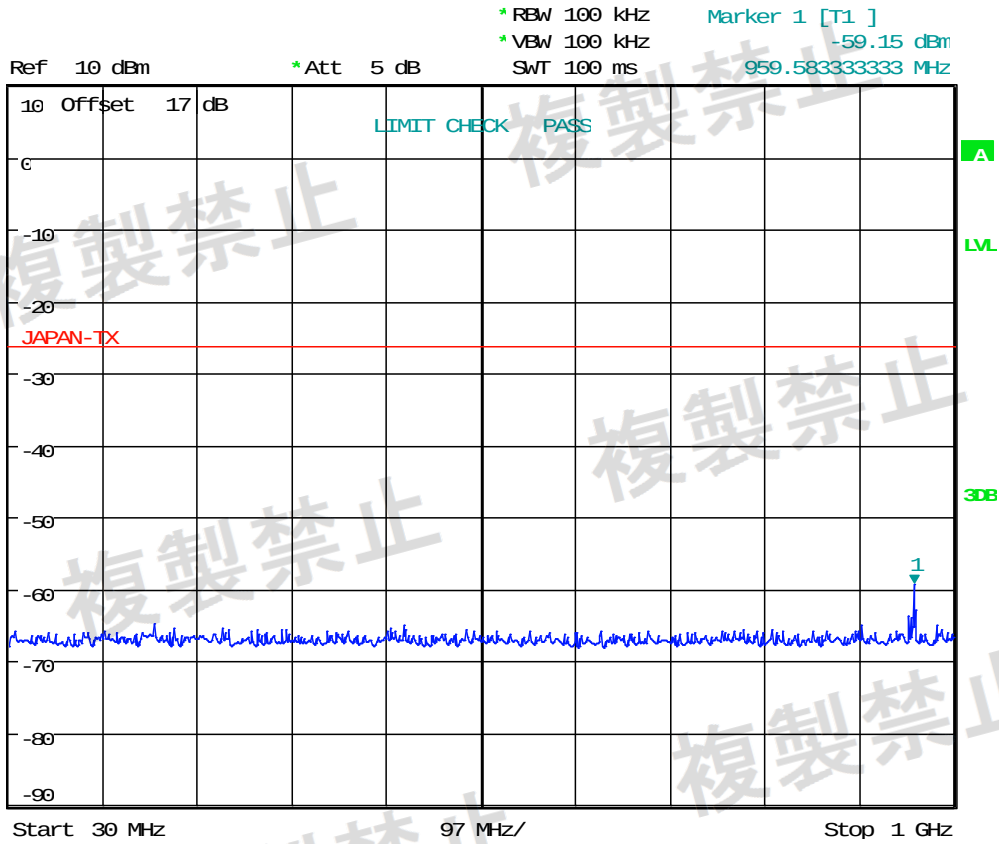
Date: 19.DEC.2020 18:50:57



Worldwide Testing Services(Taiwan) Co., Ltd.

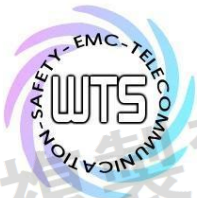


1 PK
MAX

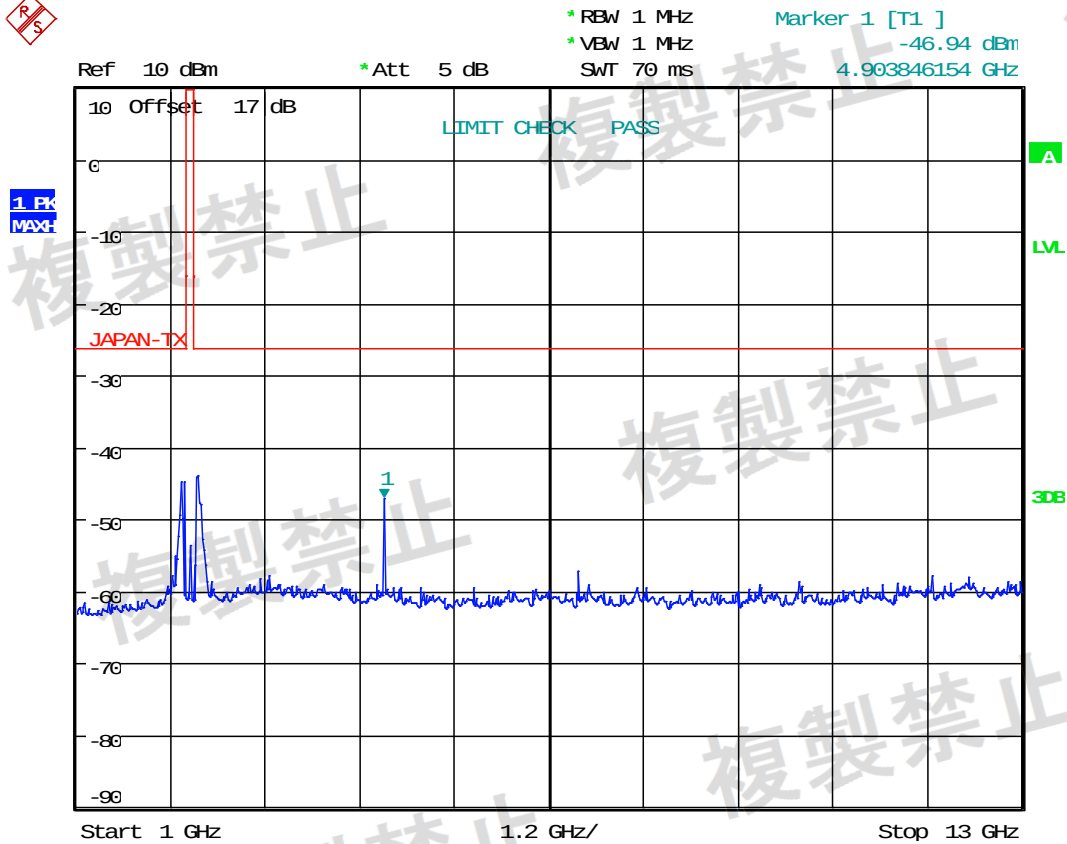


CONDUCTED SPURIOUS EMISSION 2457MHz 3.3V

Date: 19.DEC.2020 18:52:01



Worldwide Testing Services(Taiwan) Co., Ltd.



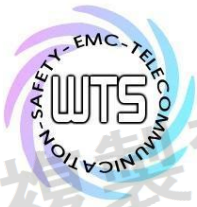
CONDUCTED SPURIOUS EMISSION 2457MHz 3.3V

Date: 19.DEC.2020 18:50:16

Limits:

Transmitting operating	Operating frequency 2400 – 2483 MHz:
	Below 2387MHz : 2.5μW/MHz (-26 dBm)
	2387 to 2400MHz : 25μW/MHz (-16 dBm)
	2483.5 through 2496.5MHz : 25μW/MHz (-16 dBm)
	Over 2496.5MHz : 2.5μW/MHz (-16 dBm)

Test equipment used: ETSTW-RE 050, ETSTW-RE 055, ETSTW-RE 064, ETSTW-GSM 023



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3.6 Antenna Power

Test date: December 19, 2020

Temperature: 20.3 °C

Humidity: 57.8 %

Tester: Rick

Max Output Power				
	BLE			Unit
	CH0 2402MHz	CH19 2440MHz	CH39 2480MHz	
V _{nor} = 3V	0.77	0.79	0.82	mW
V _{min} = 2.7V	0.75	0.77	0.80	
V _{max} = 3.3V	0.78	0.81	0.85	

Max Output Power		
	ANT+	Unit
	CH0 2457MHz	
V _{nor} = 3V	0.52	mW
V _{min} = 2.7V	0.51	
V _{max} = 3.3V	0.52	

BLE

Tolerance based on rated output power 0.8 mW	
0.75 mW	-6.25 %
0.85 mW	6.25 %

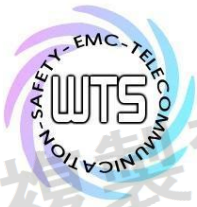
ANT+

Tolerance based on rated output power 0.5 mW	
0.51 mW	2.00 %
0.52 mW	4.00 %

Limits:

Under all test conditions	Conducted	<p>(1) FH, FH+DS, FH+OFDM 3mW/MHz (used in the range of 2427 - 2470.75MHz)</p> <p>(2) Other than (1) of OFDM & DS : 10mW/MHz</p> <p>(3) Other than (1) & (2) : 10mW</p> <p>Tolerance: +20%,-80%</p>
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Test equipment used: ETSTW-RE 050, ETSTW-RE 073, ETSTW-RE 074, ETSTW-RE 064,
ETSTW-GSM 023



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3.7 Angular width of principal radiation (AWPR)

The angular width of principal radiation (AWPR), which follows from the antenna pattern specifications, shall satisfy the expression $360/A$ degrees.

To be assessed:

$$AWPR < 360/A$$

A represents the value determined by dividing an equivalent isotropically radiated power by the value obtained by applying an antenna power with the mean power of 3 mW to the transmitting antenna with its absolute gain being 2.14 dB, and shall be 1 when it is lower than 1.

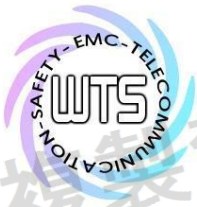
Highest Antenna Power	mW/MHz	dBm/MHz
	--	--

The max. gain of the antenna is -- dBi, so the resulting EIRP is:

EIRP	dBm/MHz
	--

Both EIRP values are lower than 6.91 dBm/MHz, so there is no need to calculate a half power beamwidth for the antenna. It is allowed to have an antenna with an Omni characteristic (360 degrees).

Note: The product does not belong to DSSS or FHSS device, so this item is not applicable.



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3.8 Spurious emission receiver

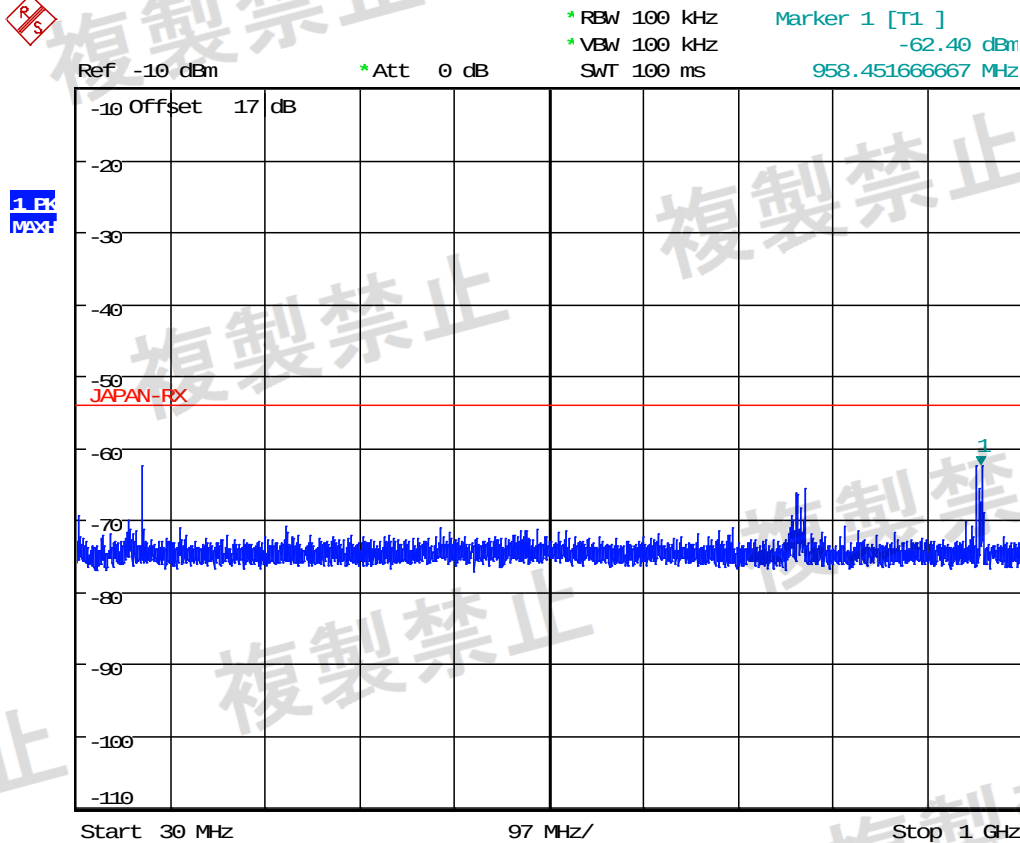
Test date: April 21, 2020

Temperature: 21.9 °C

Humidity: 56.8 %

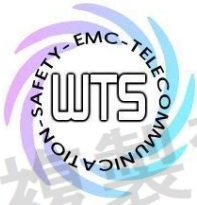
Tester: Rick

BLE



SPURIOUS EMISSION CH0 3V

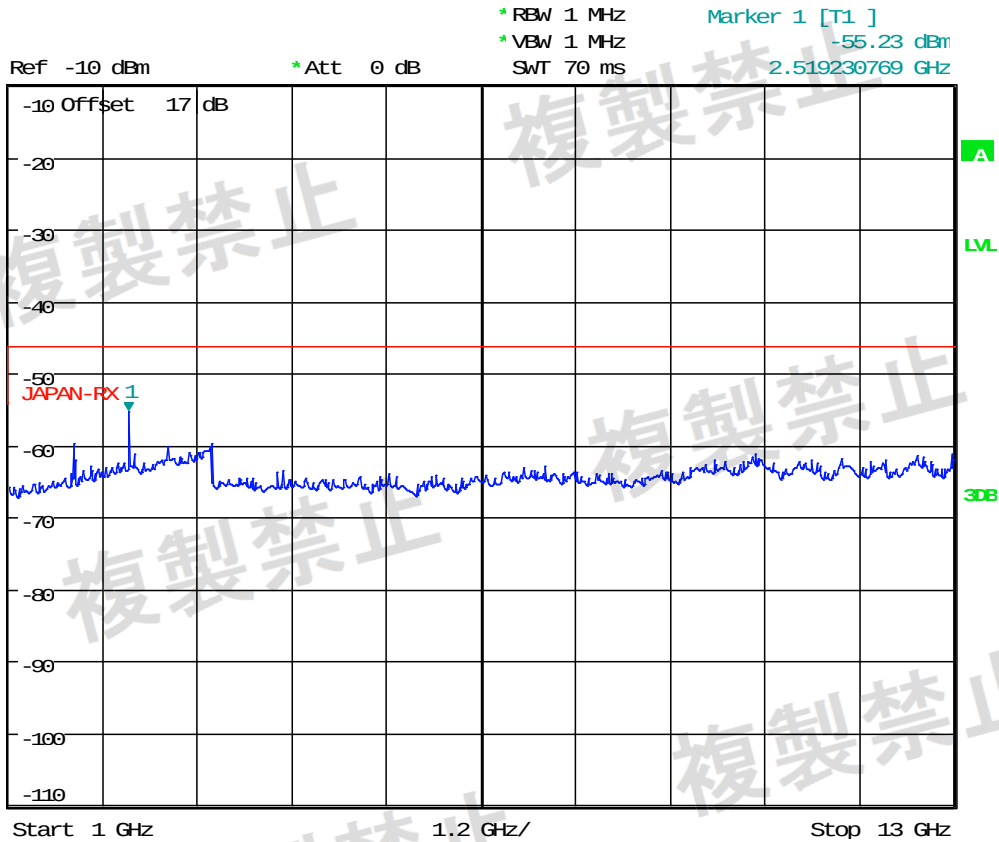
Date: 21.APR.2020 20:59:16



Worldwide Testing Services(Taiwan) Co., Ltd.

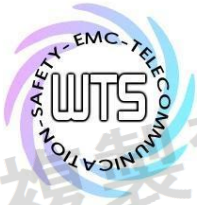


1 PK
MAX



SPURIOUS EMISSION CH0 3V

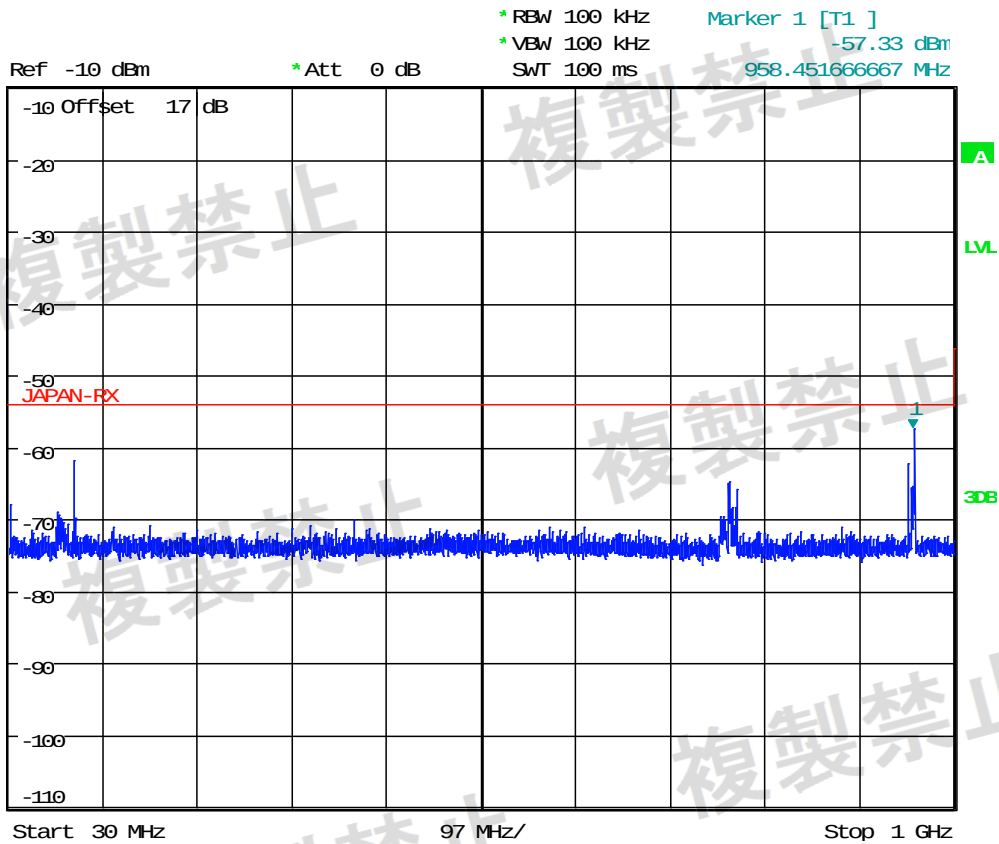
Date: 21.APR.2020 21:14:19



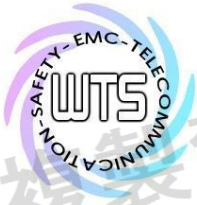
Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



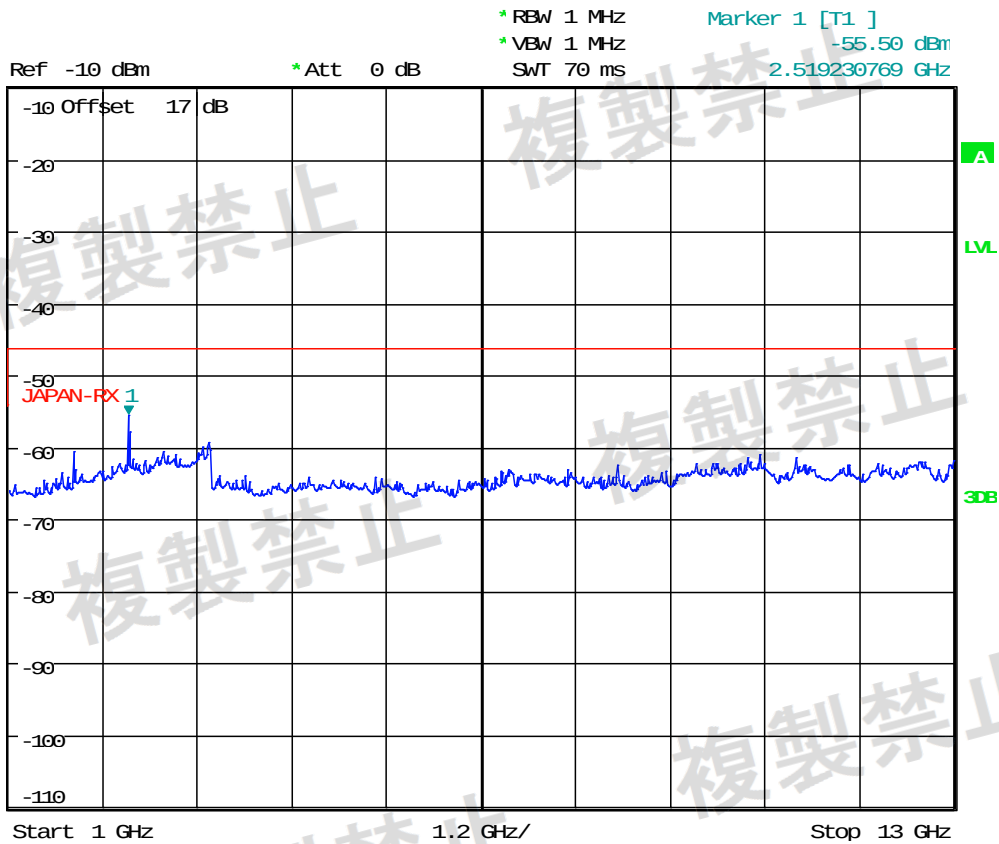
SPURIOUS EMISSION CH0 2.7V
Date: 21.APR.2020 20:58:52



Worldwide Testing Services(Taiwan) Co., Ltd.

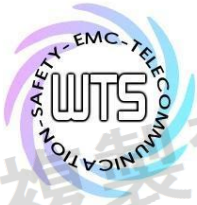


1 PK
MAX



SPURIOUS EMISSION CH0 2.7V

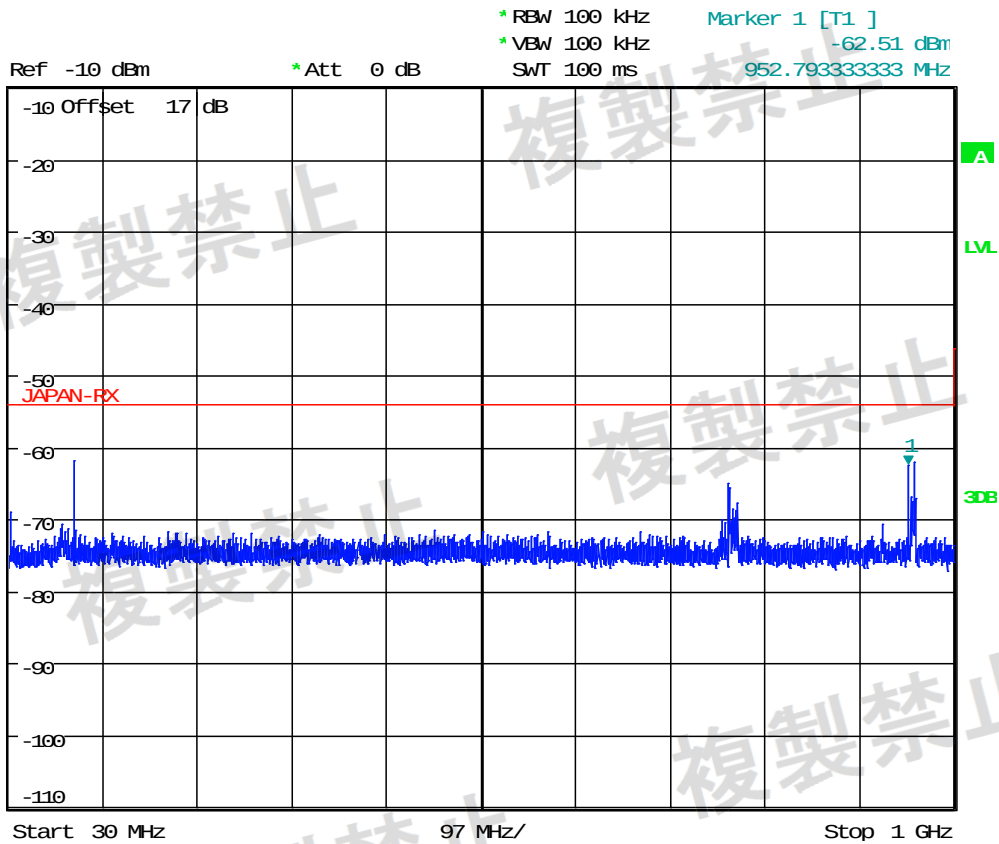
Date: 21.APR.2020 21:13:39



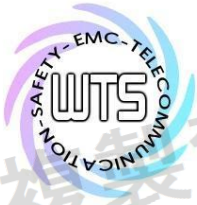
Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



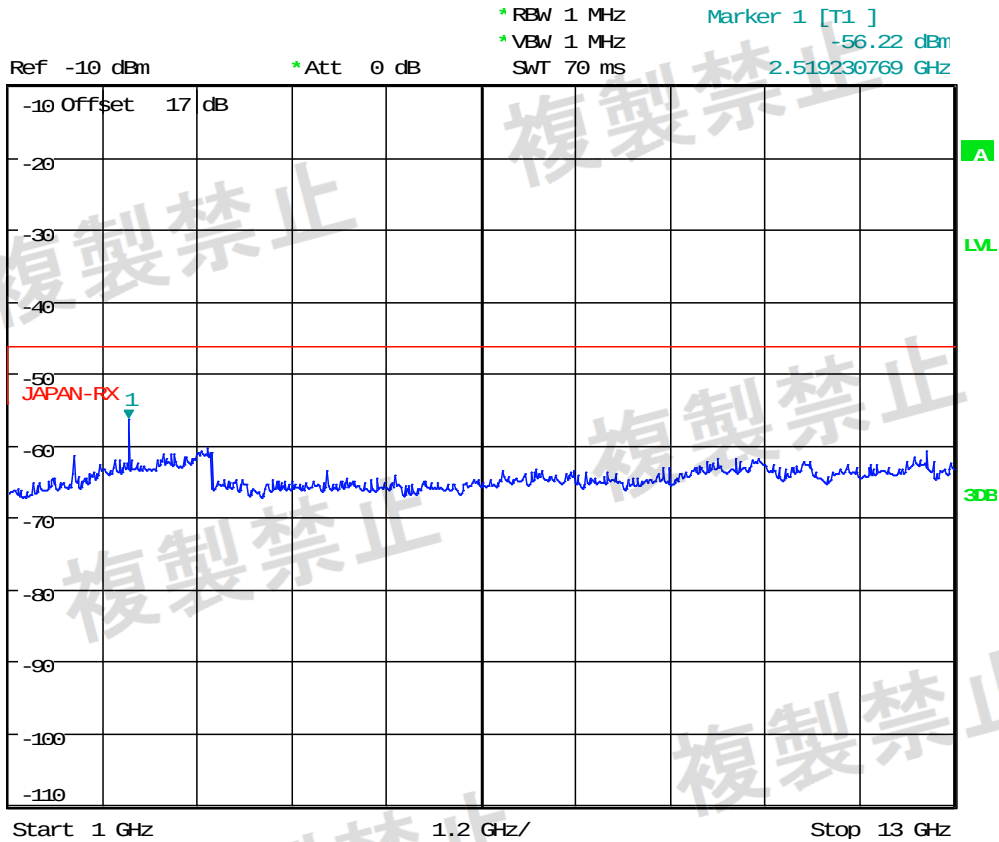
SPURIOUS EMISSION CH0 3.3V
Date: 21.APR.2020 20:59:38



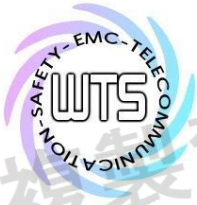
Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



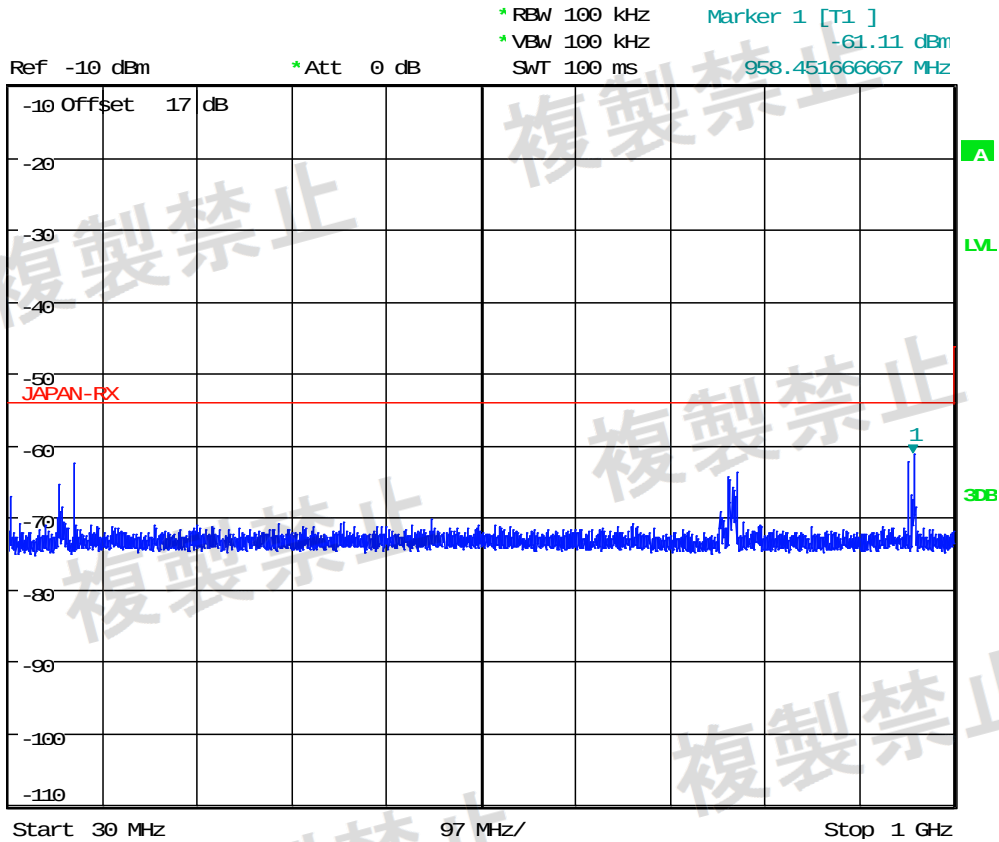
SPURIOUS EMISSION CH0 3.3V
Date: 21.APR.2020 21:14:35



Worldwide Testing Services(Taiwan) Co., Ltd.

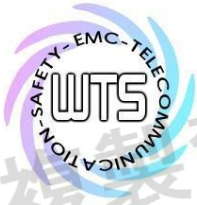


1 PK
MAX



SPURIOUS EMISSION CH19 3V

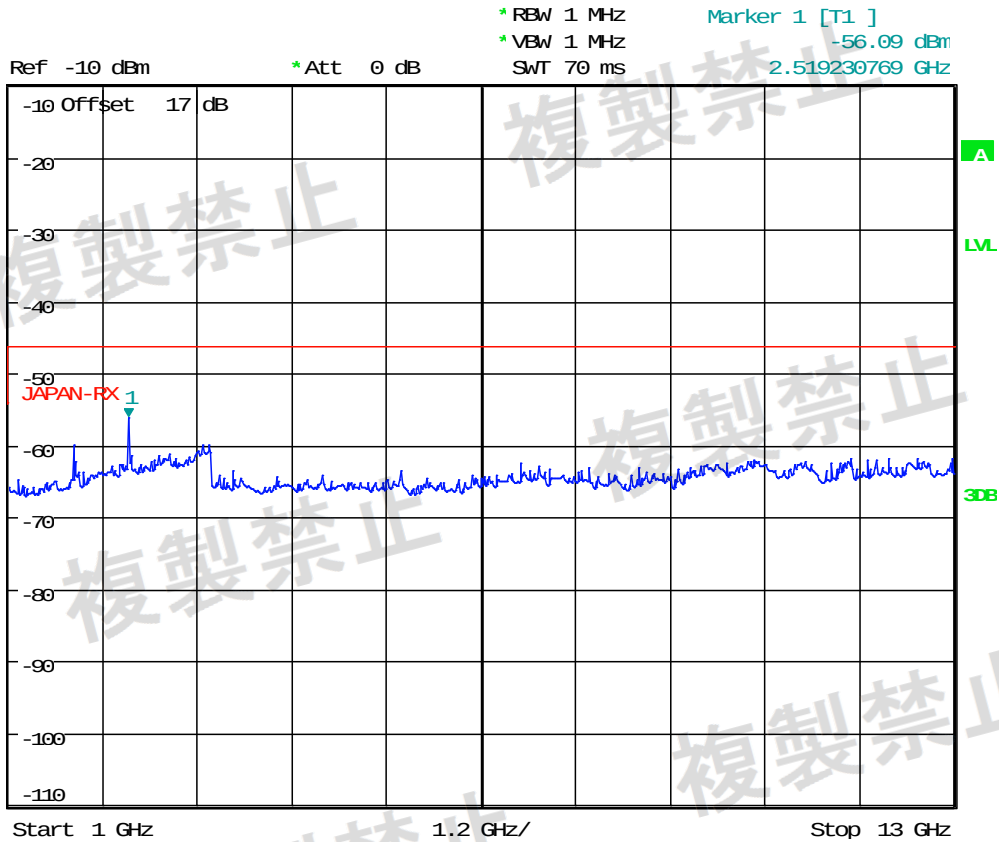
Date: 21.APR.2020 21:02:06



Worldwide Testing Services(Taiwan) Co., Ltd.

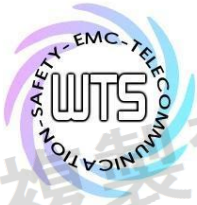


1 PK
MAX



SPURIOUS EMISSION CH19 3V

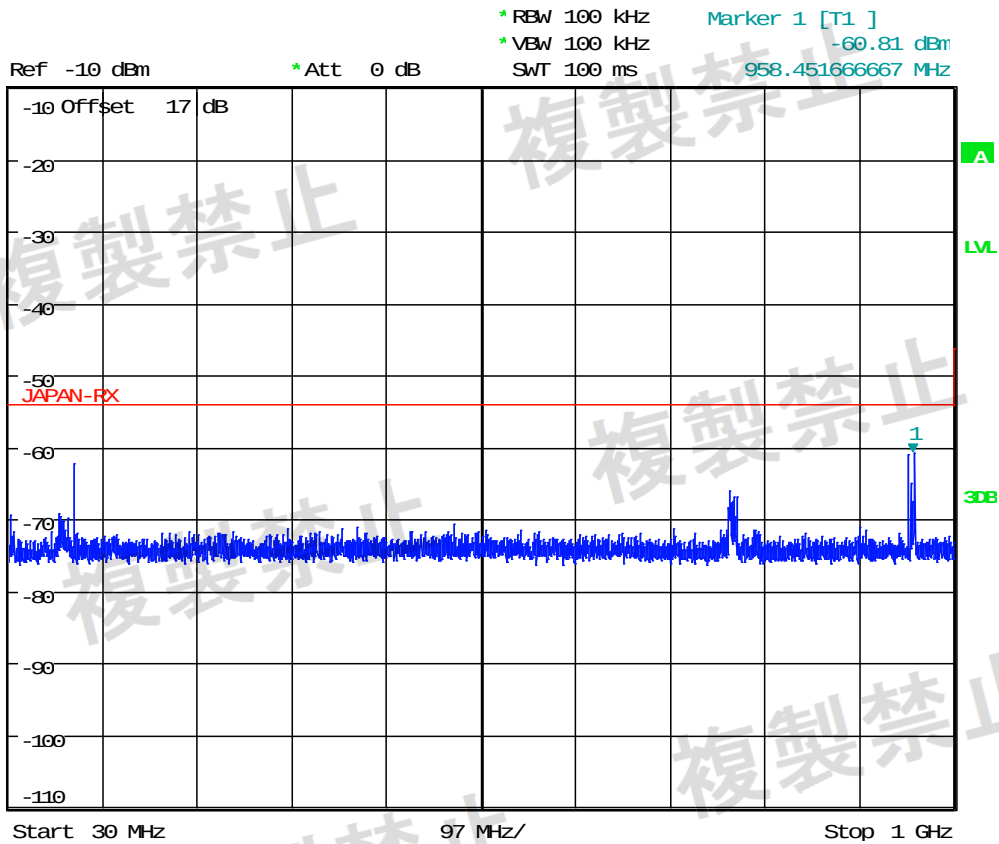
Date: 21.APR.2020 21:15:23



Worldwide Testing Services(Taiwan) Co., Ltd.

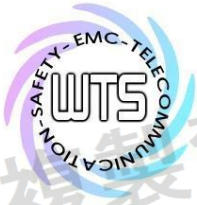


1 PK
MAX



SPURIOUS EMISSION CH19 2.7V

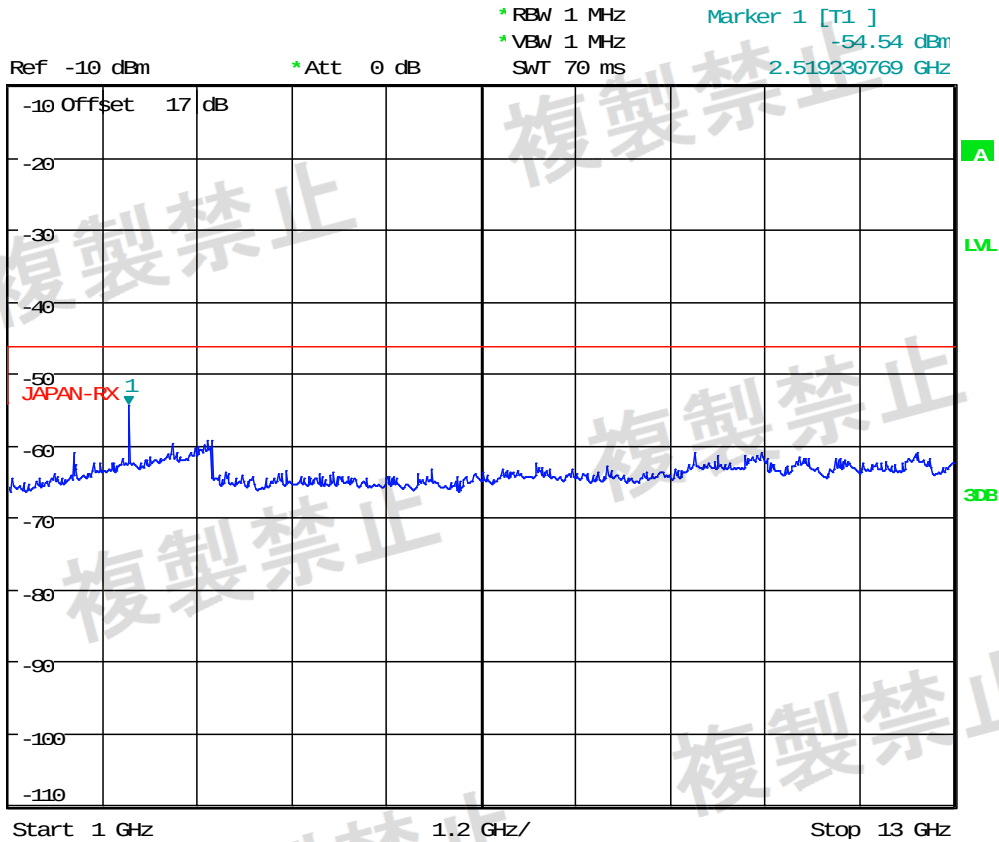
Date: 21.APR.2020 21:02:43



Worldwide Testing Services(Taiwan) Co., Ltd.

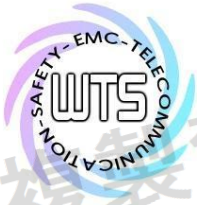


1 PK
MAX



SPURIOUS EMISSION CH19 2.7V

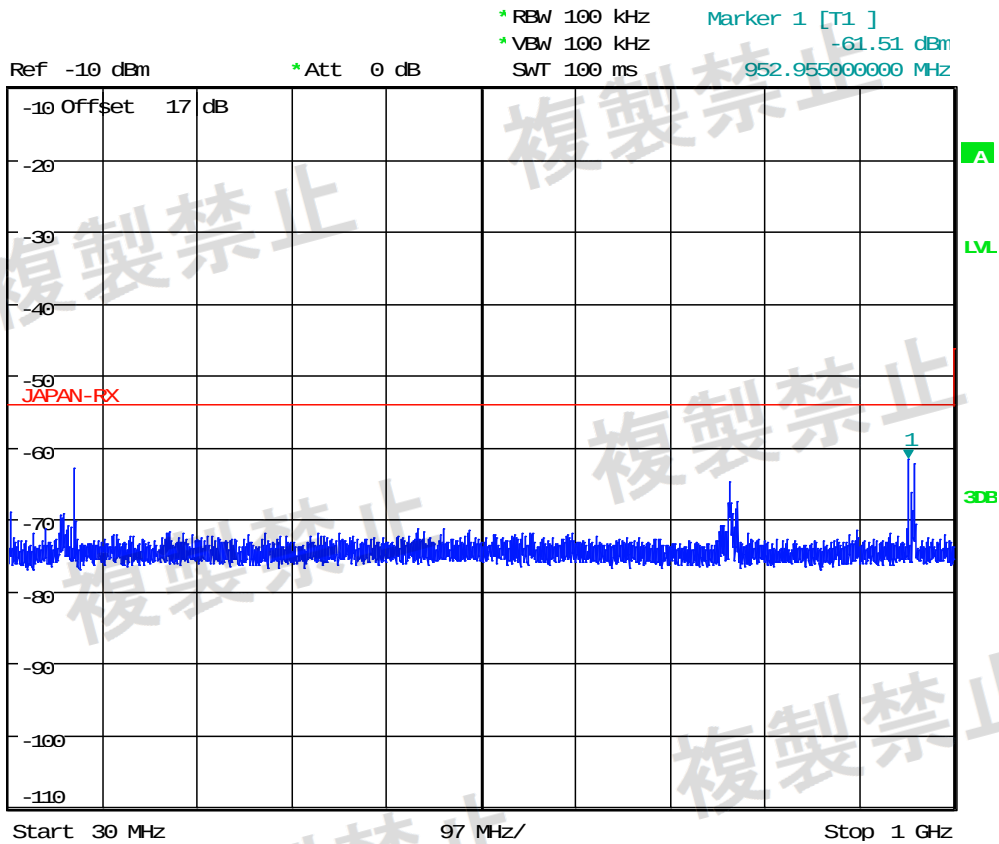
Date: 21.APR.2020 21:16:14



Worldwide Testing Services(Taiwan) Co., Ltd.

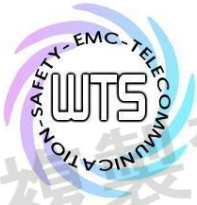


1 PK
MAX



SPURIOUS EMISSION CH19 3.3V

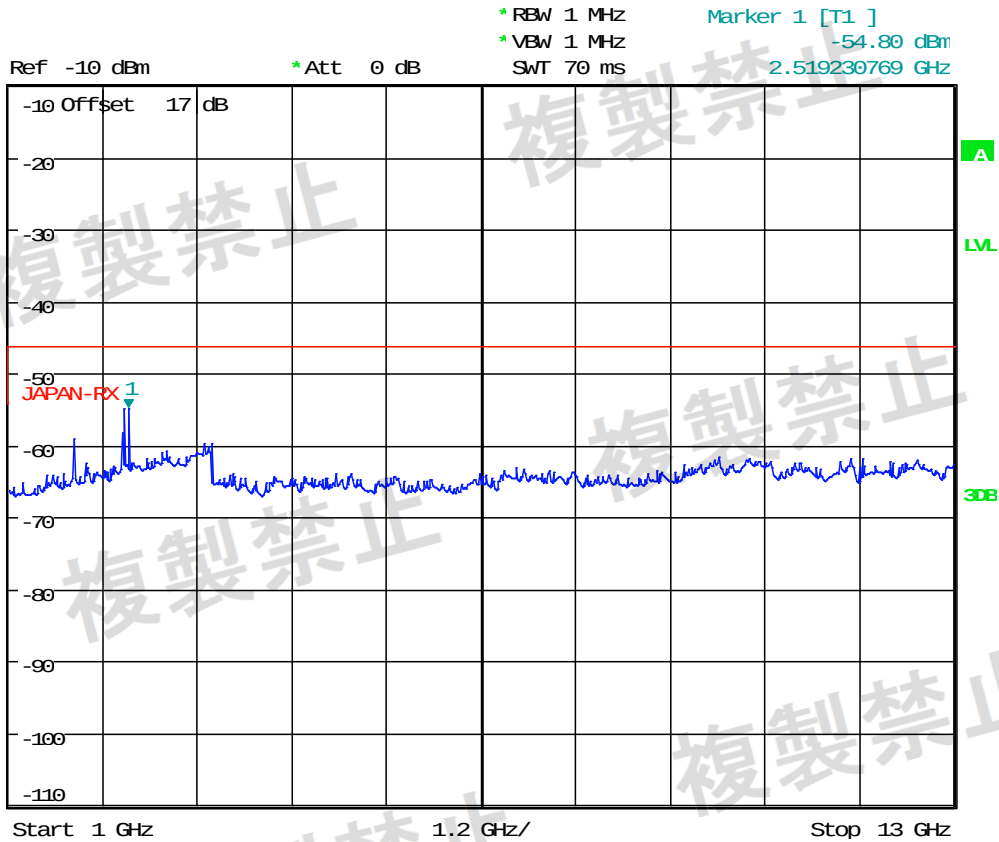
Date: 21.APR.2020 21:00:08



Worldwide Testing Services(Taiwan) Co., Ltd.

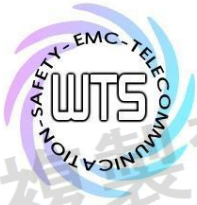


1 PK
MAX



SPURIOUS EMISSION CH19 3.3V

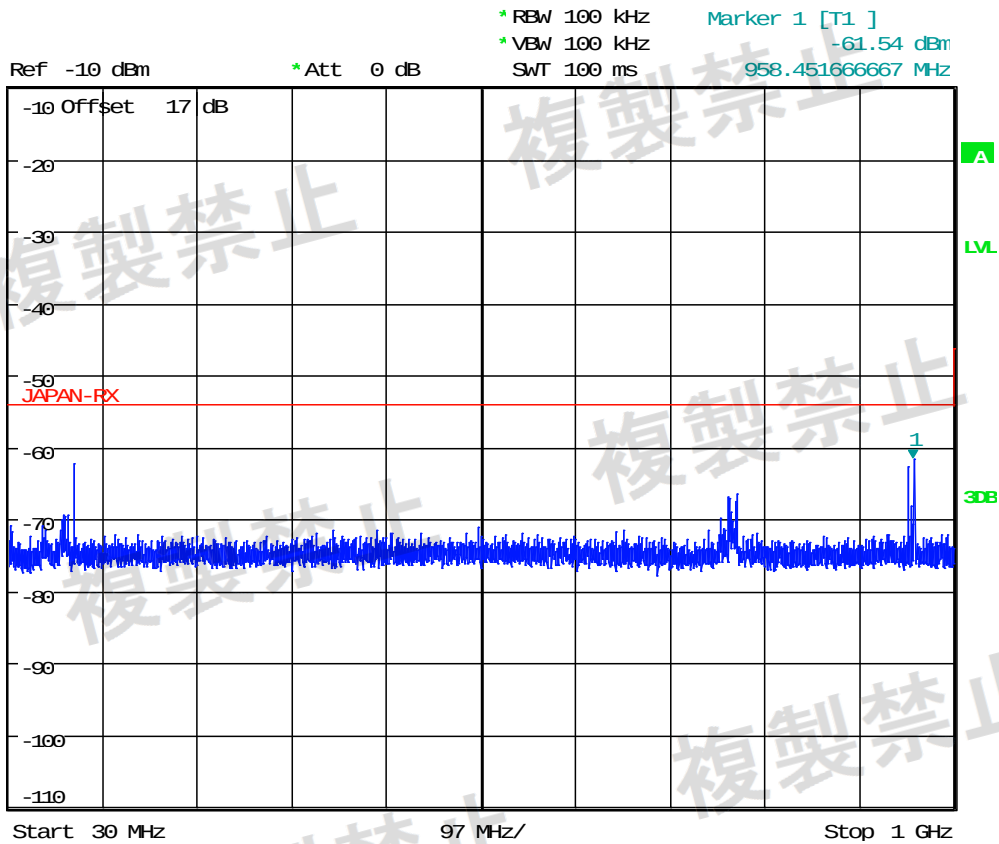
Date: 21.APR.2020 21:15:05



Worldwide Testing Services(Taiwan) Co., Ltd.

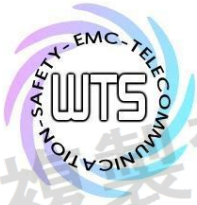


1 PK
MAX



SPURIOUS EMISSION CH39 3V

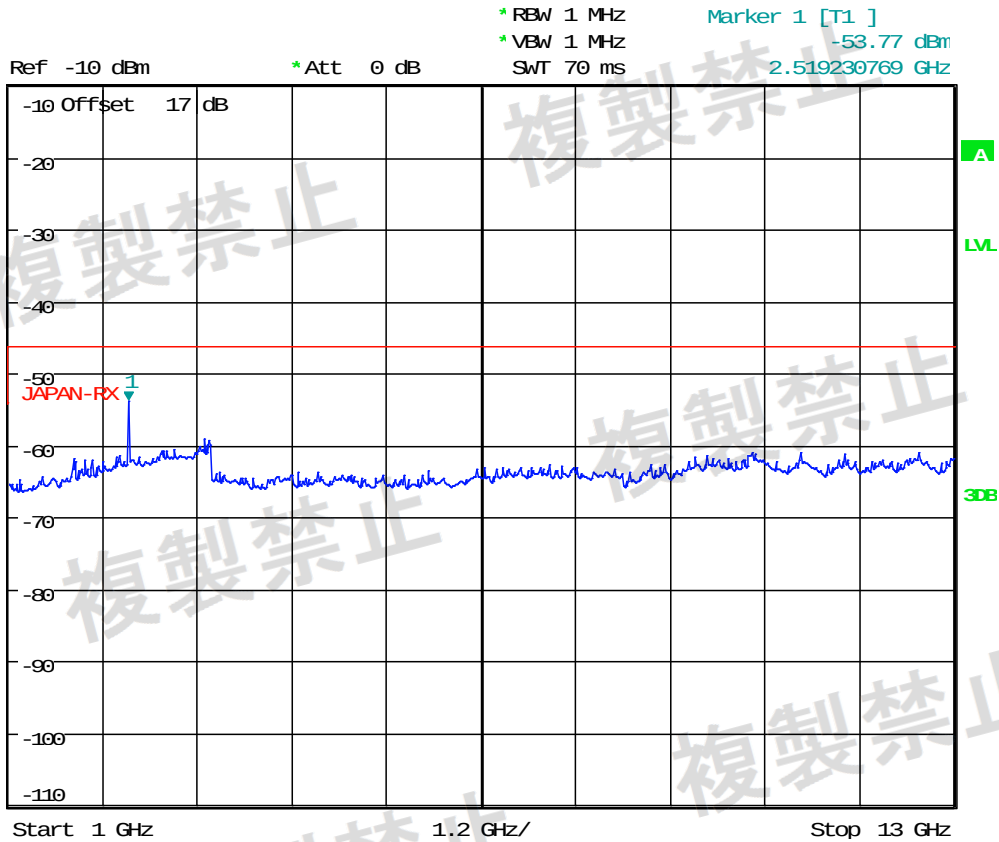
Date: 21.APR.2020 21:03:41



Worldwide Testing Services(Taiwan) Co., Ltd.

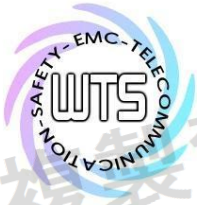


1 PK
MAX



SPURIOUS EMISSION CH39 3V

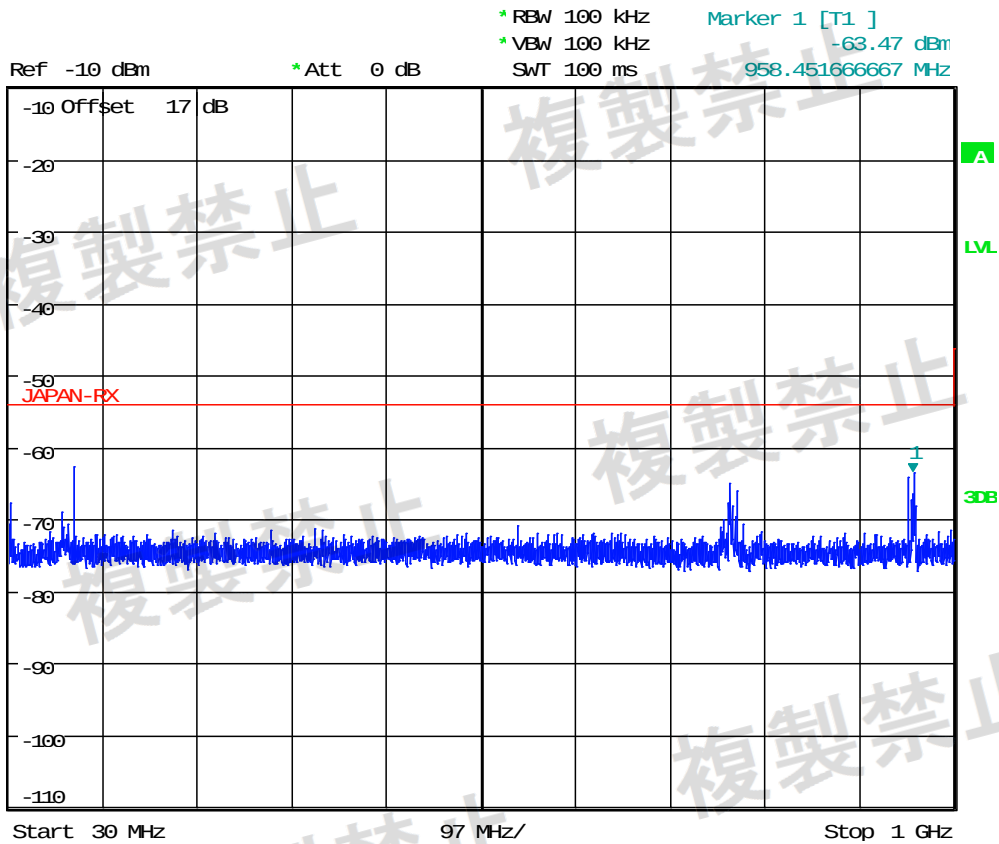
Date: 21.APR.2020 21:18:06



Worldwide Testing Services(Taiwan) Co., Ltd.

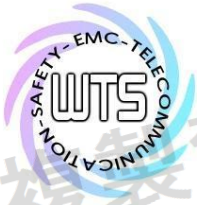


1 PK
MAX



SPURIOUS EMISSION CH39 2.7V

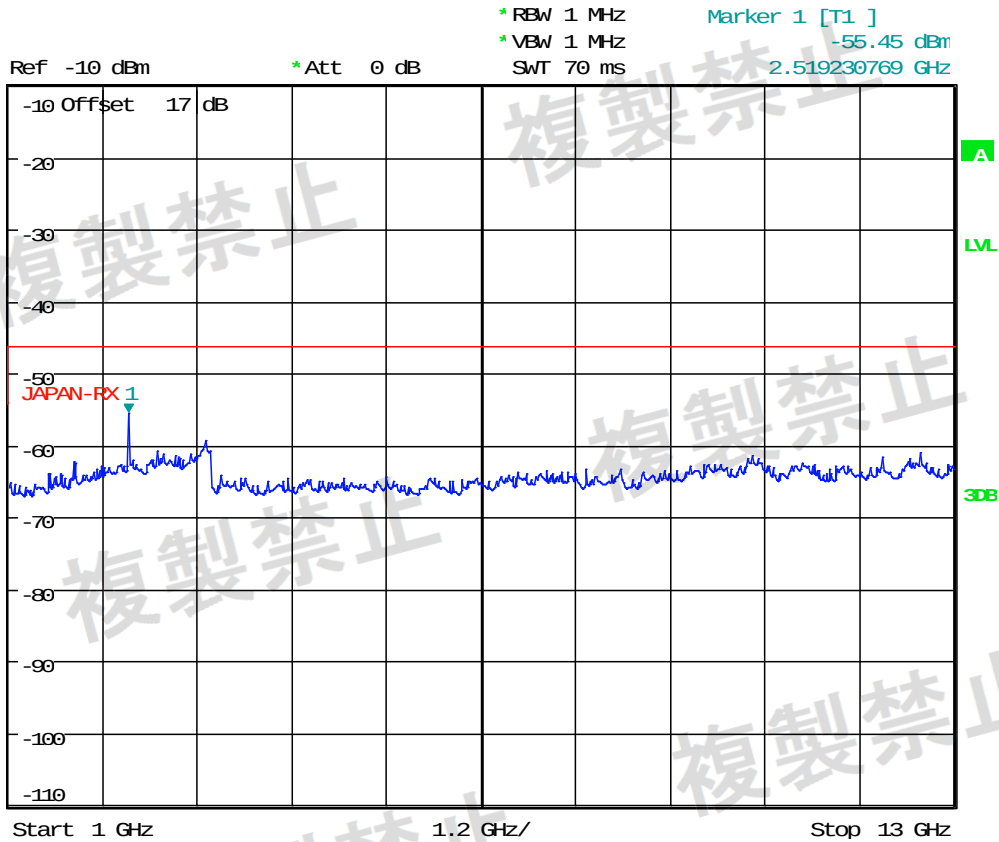
Date: 21.APR.2020 21:03:25



Worldwide Testing Services(Taiwan) Co., Ltd.

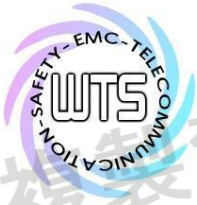


1 PK
MAX



SPURIOUS EMISSION CH39 2.7V

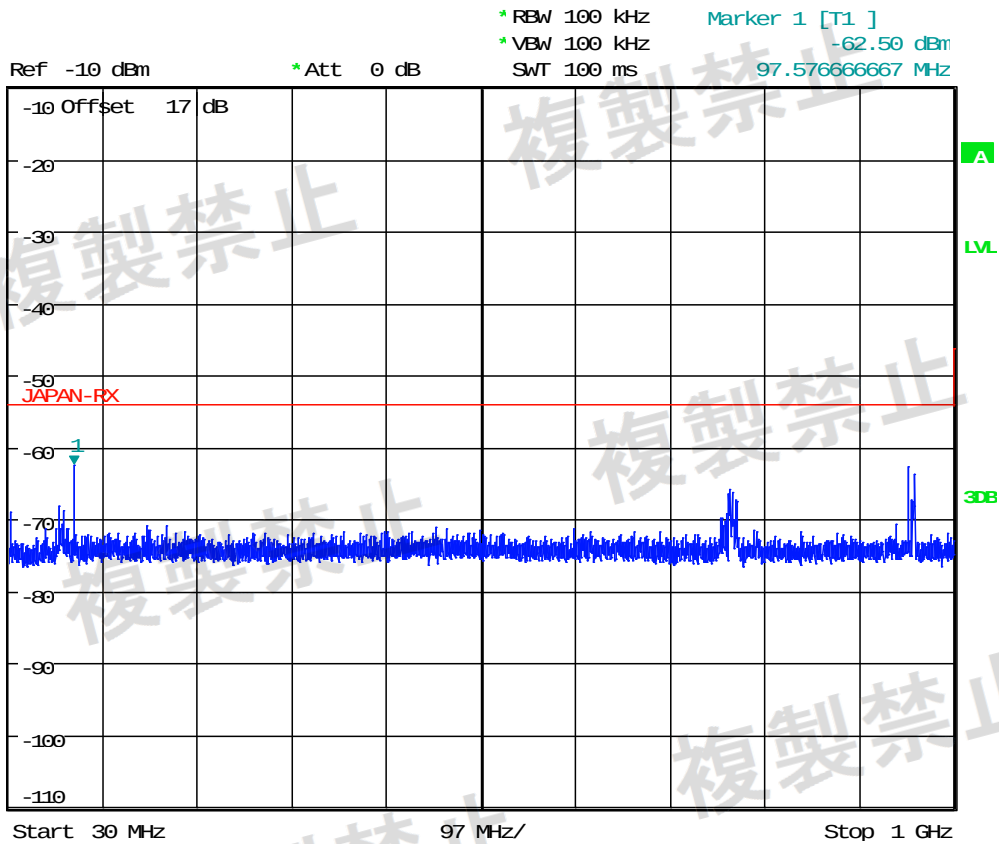
Date: 21.APR.2020 21:16:41



Worldwide Testing Services(Taiwan) Co., Ltd.

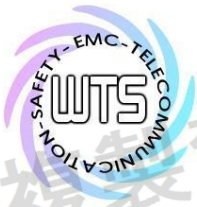


1 PK
MAX



SPURIOUS EMISSION CH39 3.3V

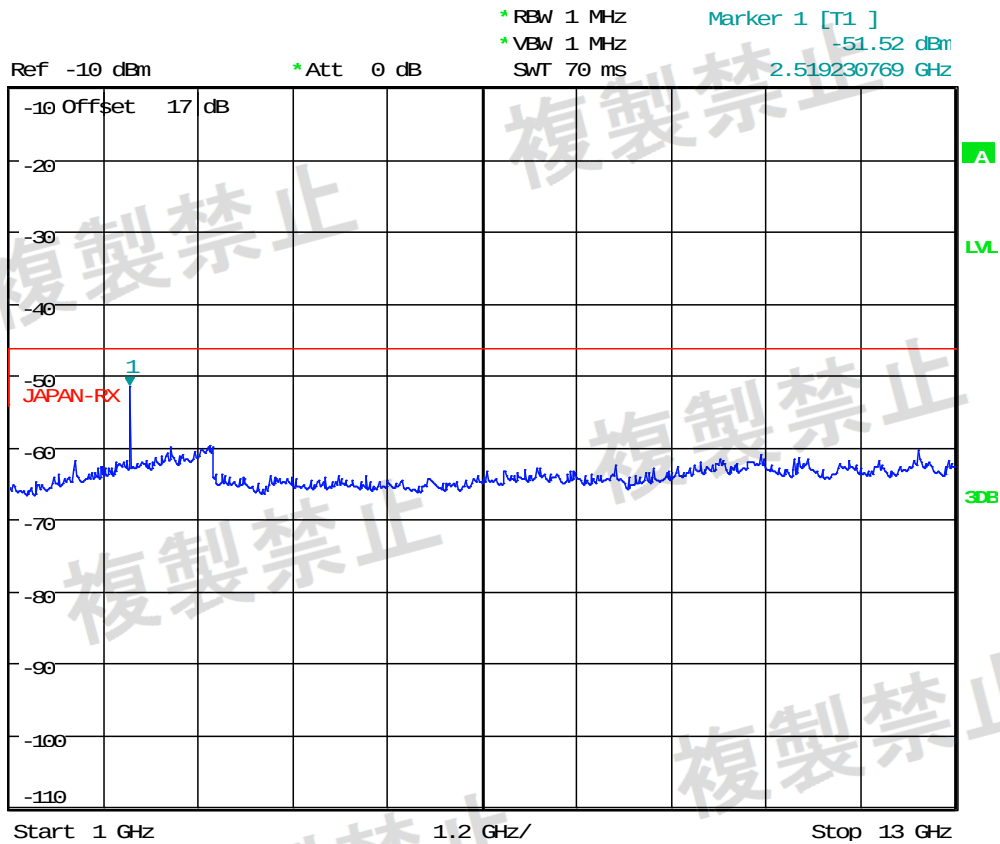
Date: 21.APR.2020 21:04:13



Worldwide Testing Services(Taiwan) Co., Ltd.



1 PK
MAX



SPURIOUS EMISSION CH39 3.3V

Date: 21.APR.2020 21:31:28

Limit:

Receiver operating	$\leq 1000 \text{ MHz: } \leq 4\text{nW } (-54 \text{ dBm})$ $\geq 1000 \text{ MHz: } \leq 20\text{nW } (-47 \text{ dBm})$
--------------------	---

Test equipment used: ETSTW-RE 050, ETSTW-RE 055, ETSTW-RE 064, ETSTW-GSM 023