

# FCC Radio Test Report

# FCC ID: 2AYGCCHL-LX3

This report concerns: Original Grant

Project No. Equipment Brand Name Test Model Series Model	:	CHL-LX3 N/A
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Date of Receipt	:	Dec. 04, 2020
Date of Test	:	Dec. 04, 2020 ~ Feb. 05, 2021
Issued Date	:	Mar. 01, 2021
<b>Report Version</b>	:	R00
Test Sample	:	Engineering Sample No.: DG20201210169 for radiated, DG20201210167 for conducted.
Standard(s)	:	FCC Part15, Subpart C (15.247) ANSI C63.10-2013 FCC KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Treen chen

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Steven In



Certificate #5123.02

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#### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective. Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.



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## **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Mar. 01, 2021



## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart C (15.247)						
Standard(s) Section	Test Item Test Result		Judgment	Remark		
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS			
15.247(d) 15.205(a) 15.209(a)	Radiated Emission	APPENDIX B APPENDIX C APPENDIX D	PASS			
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX E	PASS			
15.247 (a)(1)(iii)	Average Time Of Occupancy	APPENDIX F	PASS			
15.247(a)(1)	Hopping Channel Separation	APPENDIX G	PASS			
15.247(a)(1)	Bandwidth	APPENDIX H	PASS			
15.247(a)(1)	Maximum Output Power	APPENDIX I	PASS			
15.247(d)	Conducted Spurious Emission	APPENDIX J	PASS			
15.203	Antenna Requirement		PASS	Note(2)		

Note:

(1) "N/A" denotes test is not applicable in this test report

(2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.



#### **1.1 TEST FACILITY**

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China BTL's Test Firm Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

#### **1.2 MEASUREMENT UNCERTAINTY**

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)) The BTL measurement uncertainty as below table:

A. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.68

#### B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9kHz ~ 30MHz	-	3.02
	CISPR	30MHz ~ 200MHz	V	4.26
DG-CB03		30MHz ~ 200MHz	Н	3.38
		200MHz ~ 1,000MHz	V	3.98
		200MHz ~ 1,000MHz	Н	3.94
		1GHz ~ 6GHz	-	3.96
		6GHz ~ 18GHz	-	5.24
		18GHz ~ 26.5GHz	-	3.62
		26.5GHz ~ 40GHz	-	4.00

#### C. Other Measurement:

Test Item	Uncertainty
Conducted Spurious Emission	±2.71 dB
Hopping Channel Separation	±53.46 Hz
Maximum Output Power	±0.95 dB
Number of Hopping Frequency	±53.46 Hz
Bandwidth	±3.8 %
Temperature	±0.08 °C
Humidity	±1.5%

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.



## **1.3 TEST ENVIRONMENT CONDITIONS**

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	25°C	53%	AC 120V/60Hz	Gerry Zhao
Radiated Emissions-9K-30MHz	25°C	60%	AC 120V/60Hz	Grani Zhou
Radiated Emissions-30 MHz to 1GHz	26°C	52%	AC 120V/60Hz	Grani Zhou
Radiated Emissions-Above 1000 MHz	26°C	52%	AC 120V/60Hz	Grani Zhou
Number of Hopping Frequency	23.5°C	46%	DC 3.87V	Jesse Wang
Average Time Of Occupancy	23.5°C	46%	DC 3.87V	Jesse Wang
Hopping Channel Separation	23.5°C	46%	DC 3.87V	Jesse Wang
Bandwidth	23.5°C	46%	DC 3.87V	Jesse Wang
Maximum Output Power	23.5°C	46%	DC 3.87V	Silly Zheng
Conducted Spurious Emission	23.5°C	46%	DC 3.87V	Jesse Wang

## 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Phone
Brand Name	HONOR
Test Model	CHL-LX3
Series Model	N/A
Model Difference(s)	N/A
Hardware Version	HL3CHLM
Software Version	5.0.0.80(C900E76R1P4)
Power Source	1# DC voltage supplied from AC adapter. 2# Supplied from battery. 3# Supplied from USB port.
Power Rating	1# (1) I/P: 100-240V ~ 50/60Hz, 1.2A O/P: 5V === 2A OR 9V === 2V OR 10V === 4A (2) I/P: 100-240V ~ 50/60Hz, 0.75A O/P: 5V === 2A OR 9V === 2V OR 10V === 2.25A 2# DC 3.87V, 3900mAh 3# DC 5V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Technology	GFSK, π/4 DQPSK, 8-DPSK
Bit Rate of Transmitter	1 Mbps, 2Mbps, 3Mbps
Max. Output Power	1Mbps: 11.70 dBm (0.0148 W) 2Mbps: 10.96 dBm (0.0124 W) 3Mbps: 10.83 dBm (0.0121 W)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

## 2. Channel List:

**BIL** 

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

## 3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	-2

Note: The antenna gain is provided by the manufacturer.



4. The EUT contains following accessory devices:

Items	Trademark / Manufacturer / Factory	Model Name	Description	
Adapter	Honor Device Co., Ltd.	HW-100400E01 HW-100400U01 HW-100400B01 HW-100400A01 HW-100400E02 HW-100400U02 HW-100400B02 HW-100400A02	I/P: 100-240V ~50/60Hz, 1.2A O/P: 5V === 2A OR 9V === 2V OR 10V === 4A	
	Honor Device Co., Ltd. (Manufacturer: BYD / Huntkey / Phitek)	HW-100225E00	I/P: 100-240V ~50/60Hz, 0.75A	
	Honor Device Co., Ltd. (Manufacturer: BYD / Huntkey)	HW-100225U00 HW-100225B00 HW-100225A00	O/P: 5V === 2A OR 9V === 2V OR 10V === 2.25A	
Rechargeable	Honor Device Co., Ltd. (Manufacturer: Sunwoda / Desay / SCUD)	HB446589EFW	DC 3.87V, 3900mAh	
Li-ion Battery	Honor Device Co., Ltd. (Manufacturer: Sunwoda / Desay / SCUD / NVT)	HB446588EFW	DO 3.07 V, 3300MAN	
	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	MEND1532B528A11		
Earphone/ Headset	BOLUO COUNTY QUANCHENG ELECTRONIC CO.,LTD.	1293-3283-3.5mm-339	/	
	FOXCONN INTERCONNECT TECHNOLOGY LIMITED	EPAB542-2WH05-DH		
	NingBo Broad Telecommunication Co., Ltd.	WA0046		
	Freeport Resources Enterprises Corp.	AU2-CHO006HF		
	MING JI ELECTRONICS CO., LTD.	213-00989-0		
Data Cable	LUXSHARE PRECISION INDUSTRY CO., LTD.	L99UC138-CS-H		
	Freeport Resources Enterprises(JIANGXI) CO., LTD	18-93C2CHO-001HF	/	
	NingBo Broad Telecommunication Co., Ltd.	WA0020		
	LUXSHARE PRECISION INDUSTRY CO., LTD.	L99UC131-CS-H		
	MING JI ELECTRONICS CO., LTD.	203-1572-0		
	FUYU ELECTRONICAL TECHNOLOGY(HUAIAN)CO., LTD.	CUDU01B-HC295-EH		

\*Adapter HW-100400E01, HW-100400U01, HW-100400B01 and HW-100400A01 have same board. Adapter HW-100400E02, HW-100400U02, HW-100400B02 and HW-100400A02 have same board.



## 2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode NOTE (1)
Mode 2	TX Mode Channel 39_1Mbps

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test		
Final Test Mode	Description	
Mode 1	TX Mode Channel 39 _1Mbps	

Radiated emissions test - Below 1GHz		
Final Test Mode	Description	
Mode 2	TX Mode Channel 39 _1Mbps	

Radiated emissions test - Above 1GHz		
Final Test Mode	Description	
Mode 1	TX Mode NOTE (1)	

Conducted test		
Final Test Mode Description		
Mode 1	TX Mode NOTE (1)	

Note:

(1) The measurements for Output Power were tested during 1Mbps, 2Mbps and 3Mbps, the worst case were 1Mbps and 3Mbps, only worst case were documented for other test items.

(2) For radiated emission above 1 GHz test, 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

(3) For AC power line conducted emissions and radiated emissions below 1 GHz test, all adapters had been pre-tested and in this report only recorded the worst case.

(4) For AC power line conducted emissions and radiated spurious emissions below 1 GHz test, the 1Mbps channel 39 is found to be the worst case and recorded.

(5) This product has the mode of BT AFH, which was considered during testing, but this mode is not the worst case mode, and this report only shows the worst case mode.

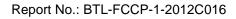




#### 2.3 PARAMETERS OF TEST SOFTWARE

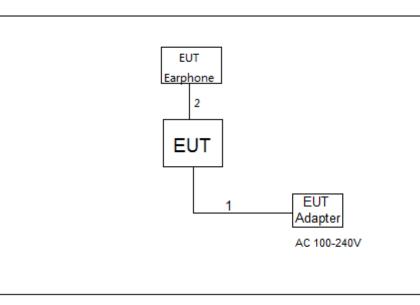
During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software	adb CMD		
Frequency (MHz)	2402	2441	2480
Parameters(1Mbps)	N/A	N/A	N/A
Parameters(2Mbps)	N/A	N/A	N/A
Parameters(3Mbps)	N/A	N/A	N/A





## 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



## 2.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	YES	NO	1m
2	Audio Cable	NO	NO	1.1m



## 3. AC POWER LINE CONDUCTED EMISSIONS TEST

### 3.1 LIMIT

Frequency of Emission (MHz)	Limit (dBµV)		
Frequency of Emission (MHz)	Quasi-peak	Average	
0.15 - 0.5	66 to 56*	56 to 46*	
0.5 - 5.0	56	46	
5.0 - 30.0	60	50	

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

#### The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 3.2 TEST PROCEDURE

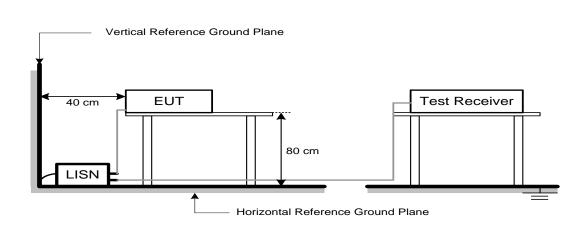
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

#### 3.3 DEVIATION FROM TEST STANDARD

No deviation



## 3.4 TEST SETUP



## 3.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting data or hopping on mode.

### 3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of [Note]. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.



## 4. RADIATED EMISSION TEST

#### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	(dBuV/m at 3 m)		
	Peak	Average	
Above 1000	74	54	

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).



Spectrum Parameter	Setting	
Attenuation	Auto	
Start Frequency	1000 MHz	
Stop Frequency	10th carrier harmonic	
RBW / VBW	RBW 1 MHz VBW 3 MHz peak detector for Pk value	
(Emission in restricted band)	RMS detector for AV value	

Receiver Parameter	Setting	
Attenuation	Auto	
Start ~ Stop Frequency 9 kHz~90 kHz for PK/AVG detector		
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector	
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector	
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector	
Start ~ Stop Frequency 30 MHz~1000 MHz for QP detector		

## 4.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

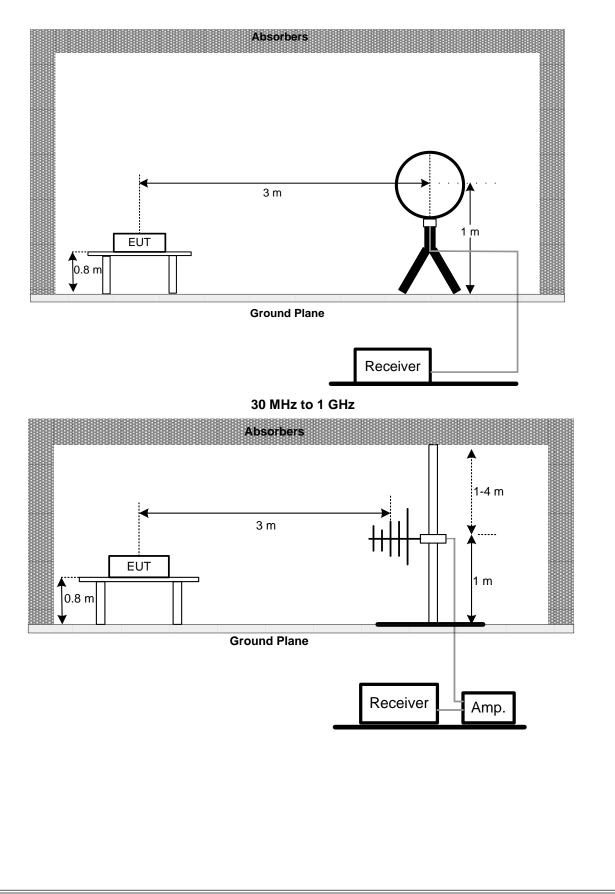
#### 4.3 DEVIATION FROM TEST STANDARD

No deviation



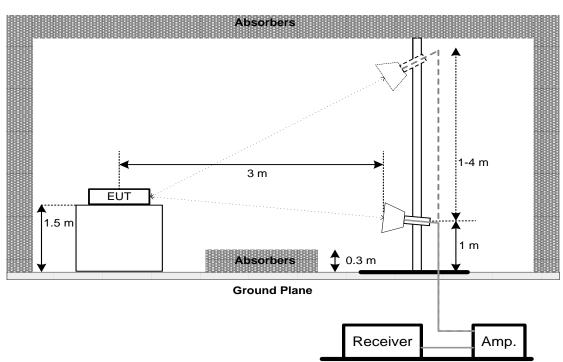
## 4.4 TEST SETUP

9 kHz-30 MHz





#### Above 1 GHz



## 4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 4.6 TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX B

Remark:

(1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).

(2) Limit line = specific limits (dBuV) + distance extrapolation factor.

#### 4.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

#### 4.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

#### Remark:

(1) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.



## 5. NUMBER OF HOPPING FREQUENCY

#### 5.1 LIMIT

FCC Part15, Subpart C (15.247)			
Section Test Item			
15.247(a)(1)(iii)	Number of Hopping Frequency		

Spectrum Parameters	Setting	
Attenuation	Auto	
Span Frequency	> Operating Frequency Range	
RBW	100 kHz	
VBW	100 kHz	
Detector	Peak	
Trace	Max Hold	
Sweep Time	Auto	

#### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100 kHz, VBW=100 kHz, Sweep time = Auto.

#### **5.3 DEVIATION FROM STANDARD**

No deviation.

## 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 5.6 TEST RESULTS

Please refer to the APPENDIX E



## 6. AVERAGE TIME OF OCCUPANCY

#### 6.1 LIMIT

FCC Part15, Subpart C (15.247)					
Section Test Item Limit					
15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec			

#### 6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses
- d. Sweep Time is more than once pulse time
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span
- f. Measure the maximum time duration of one single pulse
- g. Set the EUT for DH1, DH3 and DH5 packet transmitting
- h. Measure the maximum time duration of one single pulse
- i. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds
- j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds
- k. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds

#### 6.3 DEVIATION FROM STANDARD

No deviation.

#### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 6.6 TEST RESULTS

Please refer to the APPENDIX F



## 7. HOPPING CHANNEL SEPARATION MEASUREMENT

#### 7.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting		
Attenuation	Auto		
Span Frequency	> Measurement Bandwidth or Channel Separation		
RBW	30 kHz		
VBW	100 kHz		
Detector	Peak		
Trace	Max Hold		
Sweep Time	Auto		

#### 7.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Span = wide enough to capture the peaks of two adjacent channels Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = Auto Detector function = Peak

Trace = Max Hold

#### 7.3 DEVIATION FROM STANDARD

No deviation.

## 7.4 TEST SETUP



#### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 7.6 TEST RESULTS

Please refer to the APPENDIX G



## 8. BANDWIDTH TEST

#### 8.1 LIMIT

FCC Part15, Subpart C (15.247)			
Section Test Item			
15.247(a)(1) Bandwidth			

Spectrum Parameter	Setting		
Attenuation	Auto		
Span Frequency	> Measurement Bandwidth		
RBW	30 kHz		
VBW	100 kHz		
Detector	Peak		
Trace	Max Hold		
Sweep Time	Auto		

#### 8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 30 kHz, VBW=100 kHz, Sweep Time = Auto.

#### 8.3 DEVIATION FROM STANDARD

No deviation.

## 8.4 TEST SETUP



#### **8.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 8.6 TEST RESULTS

Please refer to the APPENDIX H



## 9. MAXIMUM OUTPUT POWER

#### 9.1 LIMIT

FCC Part15, Subpart C (15.247)				
Section Test Item Limit				
15.247(a)(1)	Maximum Output Power	0.125 Watt or 21 dBm		

Note: Frequency hopping systems shall have hopping channel carrier frequencies separated by

a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have

hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of t

he hopping channel, whichever is greater, provided the systems operate with an output power no greater th an 125 mW.

#### 9.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 1 MHz/3 MHz, VBW= 1 MHz/3 MHz, Sweep time = Auto.

## 9.3 DEVIATION FROM STANDARD

No deviation.

## 9.4 TEST SETUP



#### 9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### 9.6 TEST RESULTS

Please refer to the APPENDIX I



## **10. CONDUCTED SPURIOUS EMISSION**

#### 10.1 LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

#### **10.2 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100 kHz, VBW=100 kHz, Sweep time = Auto.

### **10.3 DEVIATION FROM STANDARD**

No deviation.

#### 10.4 TEST SETUP



#### **10.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

#### **10.6 TEST RESULTS**

Please refer to the APPENDIX J



## 11. MEASUREMENT INSTRUMENTS LIST

	AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	EMI Test Receiver	R&S	ESCI	100382	Feb. 27, 2022	
2	LISN	EMCO	3816/2	52765	Feb. 28, 2022	
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Feb. 27, 2022	
4	50Ω Terminator	SHX	TF5-3	15041305	Feb. 28, 2022	
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
6	Cable	N/A	RG223	12m	Feb. 28, 2022	
7	643 Shield Room	ETS	6*4*3m	N/A	N/A	

	Radiated Emissions - 9 kHz to 30 MHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Loop Antenna	EM	EM-6876-1	230	Apr. 16, 2021			
2	Cable	N/A	RG 213/U	C-102	May 29, 2021			
3	EMI Test Receiver	R&S	ESCI	100895	Feb. 27, 2022			
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
5	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021			

	Radiated Emissions - 30 MHz to 1 GHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2021			
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021			
3	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021			
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 22, 2021			
5	Controller	СТ	SC100	N/A	N/A			
6	Controller MF		MF-7802	MF780208416	N/A			
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
8	966 Chambe Room RM		9*6*6m	N/A	Jul. 25, 2021			

	Radiated Emissions - Above 1 GHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Double Ridged Guide Antenna	ETS	3115	75789	May 12, 2021			
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jul. 07, 2021			
3	Amplifier	Agilent	8449B	3008A02333	Feb. 28, 2022			
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 07, 2021			
5	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021			
6	Controller	СТ	SC100	N/A	N/A			
7	Controller	MF	MF-7802	MF780208416	N/A			
8	Cable	mitron	B10-01-01-12M	18072744	May 09, 2021			
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
10	Filter	STI	STI15-9912	N/A	Jul. 25, 2021			
11	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021			



Number of Hopping Frequency & Average Time of Occupancy & Hopping Channel Separation & Bandwidth & Maximum Output Power & Conducted Spurious Emission									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until				
1 Spectrum Analyzer R&S FSP40 100185 Jul. 25, 2021									
2	2 Attenuator WOKEN 6SM3502 VAS1214NL Feb. 07, 2022								
3	DC Block	Mini	N/A	N/A	N/A				
4 RF Cable Tongkaichuan N/A N/A N/A									

Remark "N/A" denotes no model name, serial no. or calibration specified.

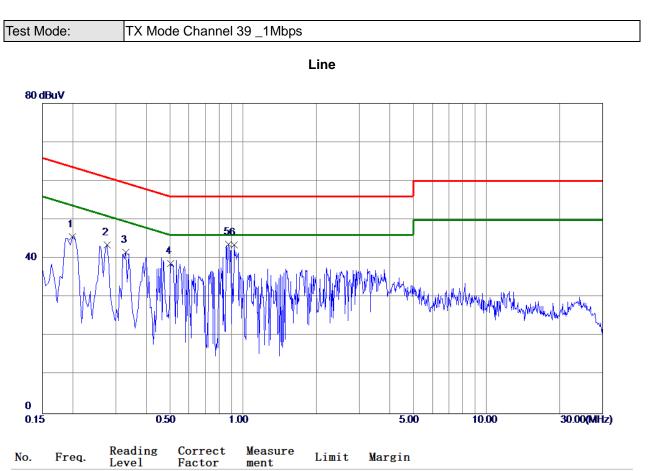
"\*" calibration period of equipment list is three year.

Except \* item, all calibration period of equipment list is one year.



## **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**

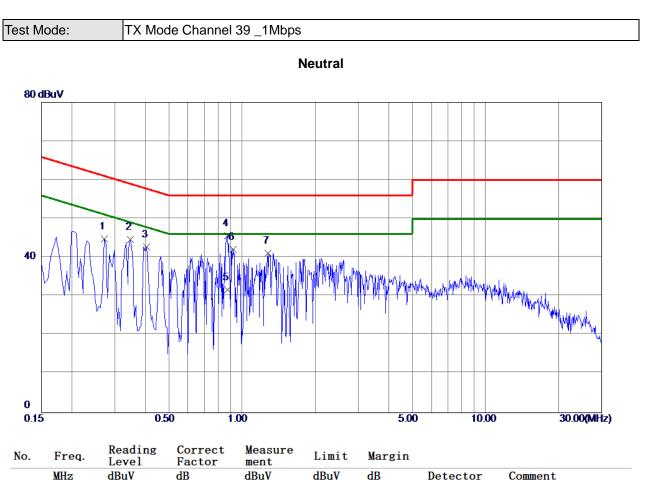




NO.	Preq.	Level	Factor	ment	LIMIC	Maigin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1995	35.66	9.91	45.57	63.63	-18.06	Peak	
2	0.2760	33.64	9.88	43. 52	<b>60.94</b>	-17.42	Peak	
3	0.3300	31.76	9.90	41.66	59.45	-17.79	Peak	
4	0.5055	28.73	9.95	38.68	56.00	-17.32	Peak	
5 *	0.8745	33.68	9.99	43.67	56.00	-12.33	Peak	
6	0.9195	33. 55	10.00	43.55	56.00	-12.45	Peak	

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





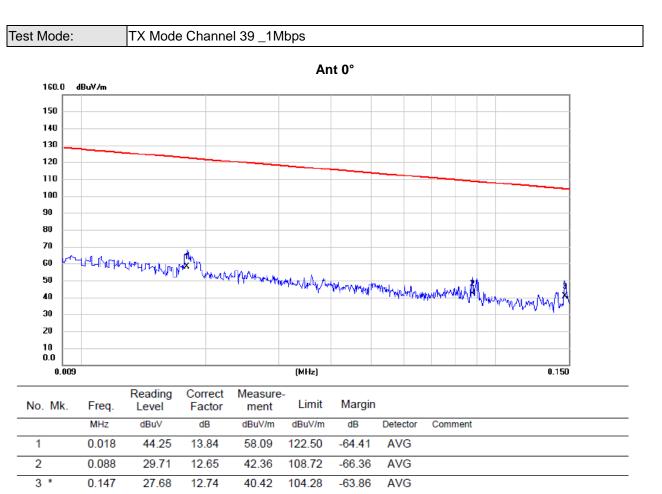
		20.01						
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.2714	34.76	9.99	44.75	61.07	-16. 32	Peak	
2	0.3480	34.58	10.05	44.63	59.01	-14. 38	Peak	
3	0.4065	32.70	10.09	42.79	57.72	-14. 93	Peak	
4 *	0.8745	35.37	10.26	45.63	56.00	-10.37	Peak	
5	0.8745	21.40	10.26	31.66	46.00	-14. 34	AVG	
6	0.9195	31.76	10.28	42.04	56.00	-13.96	Peak	
7	1.2750	30.82	10.33	41.15	56.00	-14.85	Peak	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



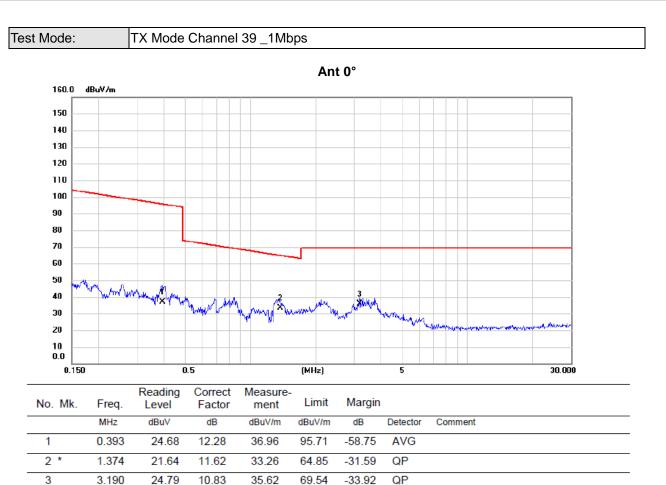
## **APPENDIX B - RADIATED EMISSION - 9 KHZ-30 MHZ**





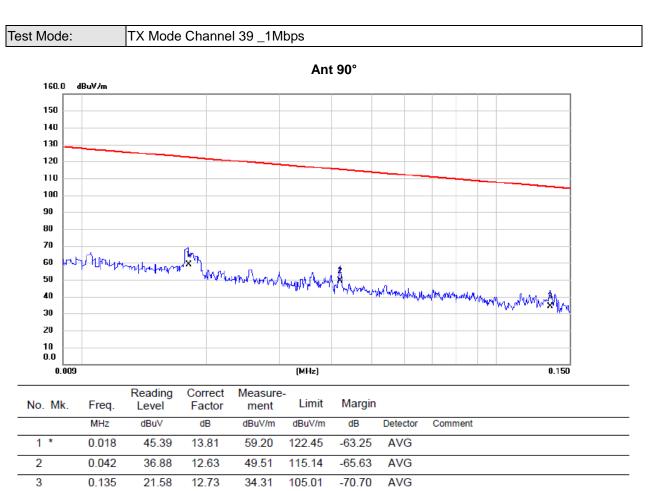
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





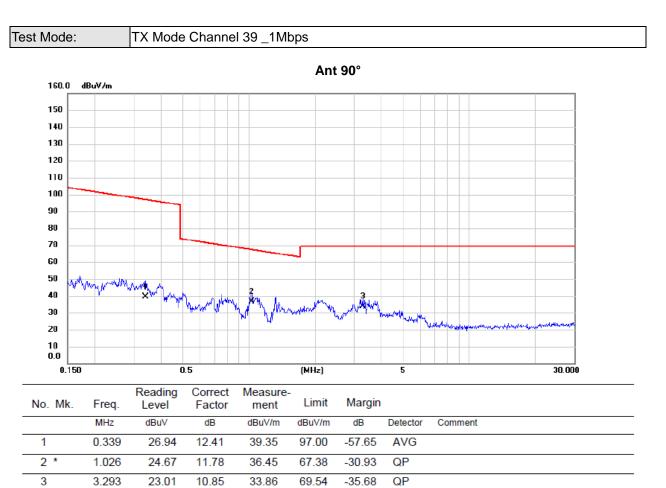
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



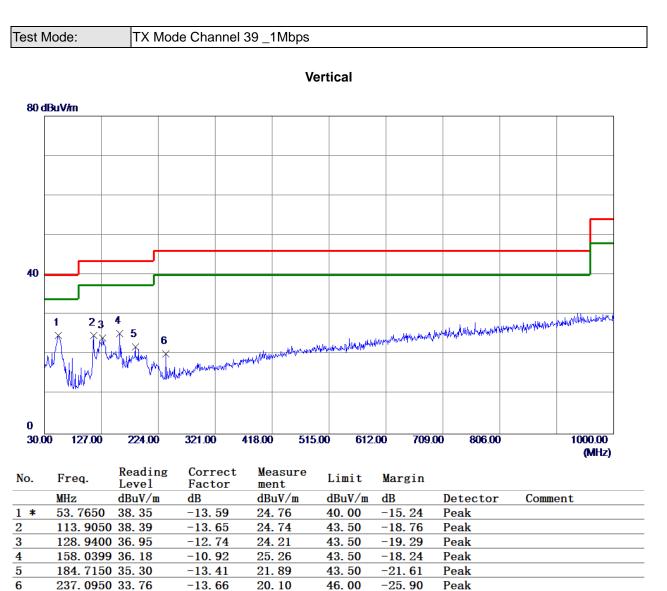


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



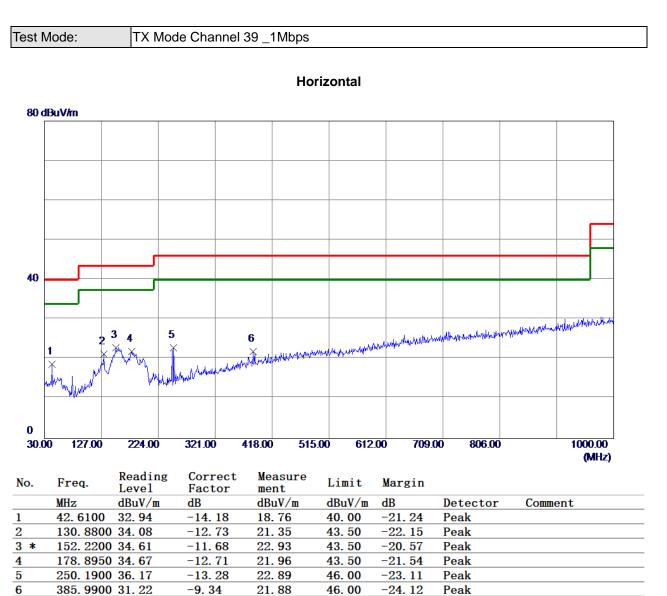
## APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ





REMARKS: (1) Measurement Value = Reading Level + Correct Factor.



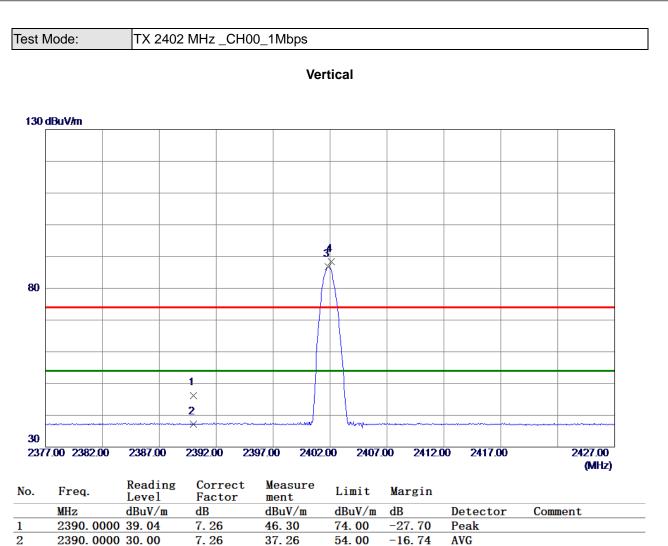


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



## **APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ**





3 \*

4

2401.8500 79.51

2402. 1000 81. 13

(1) Measurement Value = Reading Level + Correct Factor.

7.26

7.26

86.77

88.39

54.00

74.00

32.77

14.39

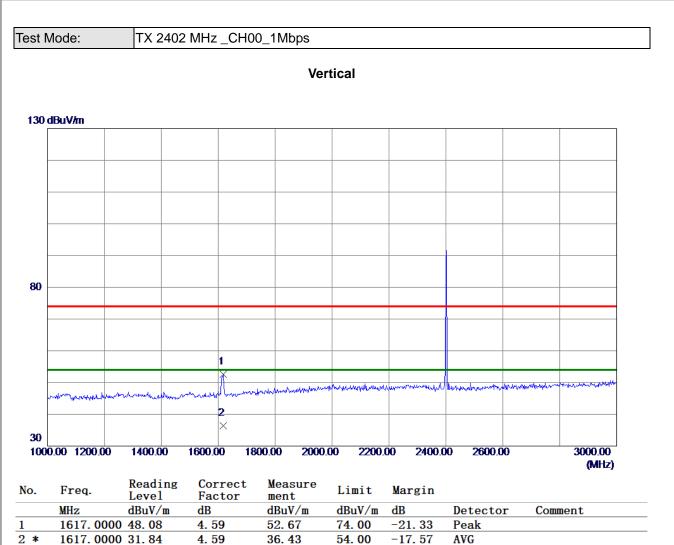
AVG

Peak

No Limit

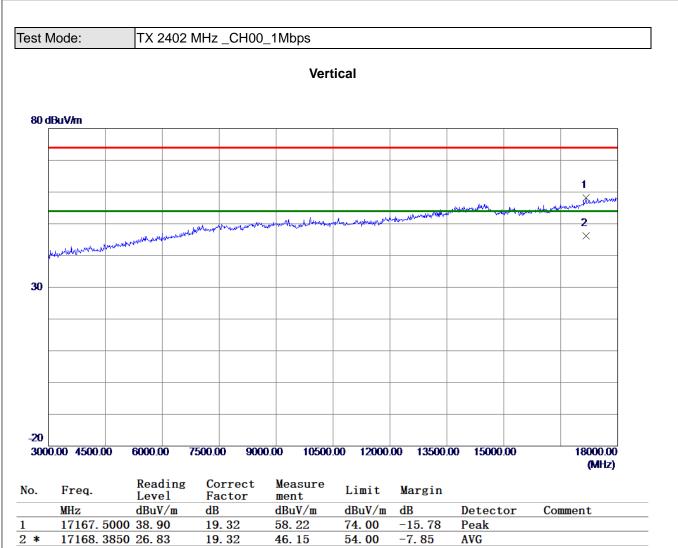
No Limit





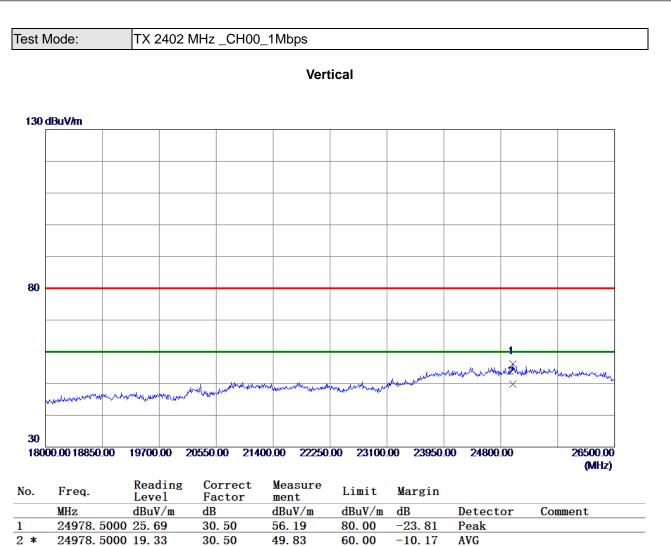
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





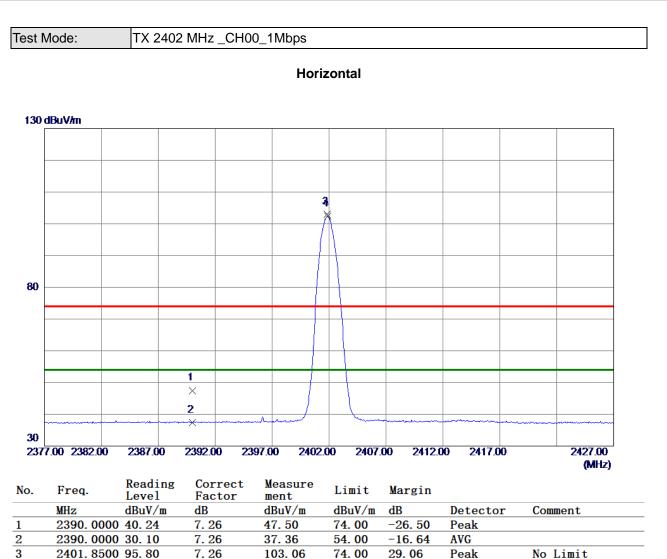
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





4 \*

2401. 9000 95. 22

(1) Measurement Value = Reading Level + Correct Factor.

7.26

102.48

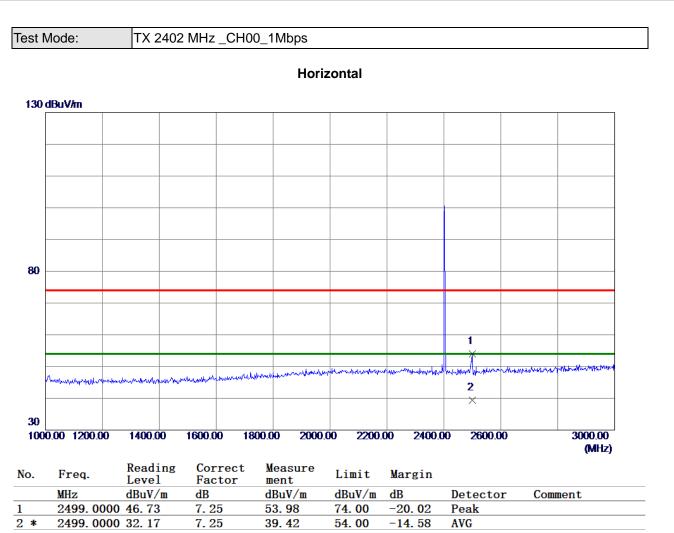
54.00

48.48

AVG

No Limit

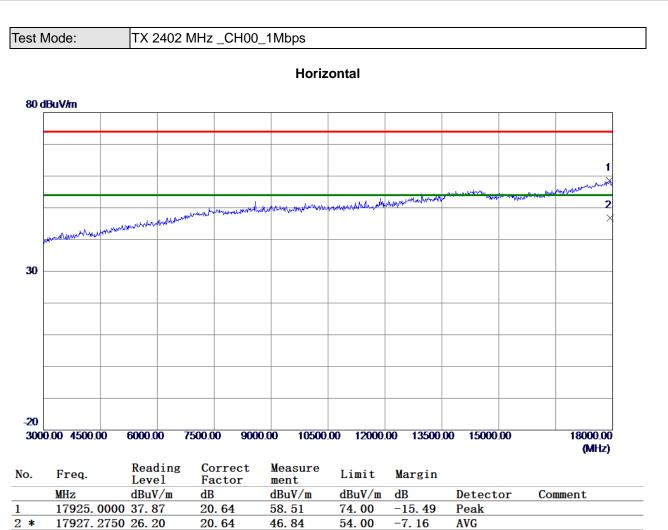




\*\*\*

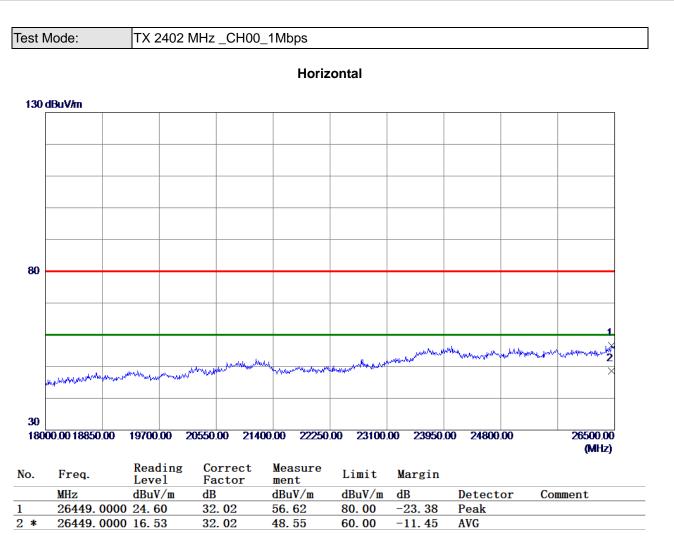
(1) Measurement Value = Reading Level + Correct Factor.





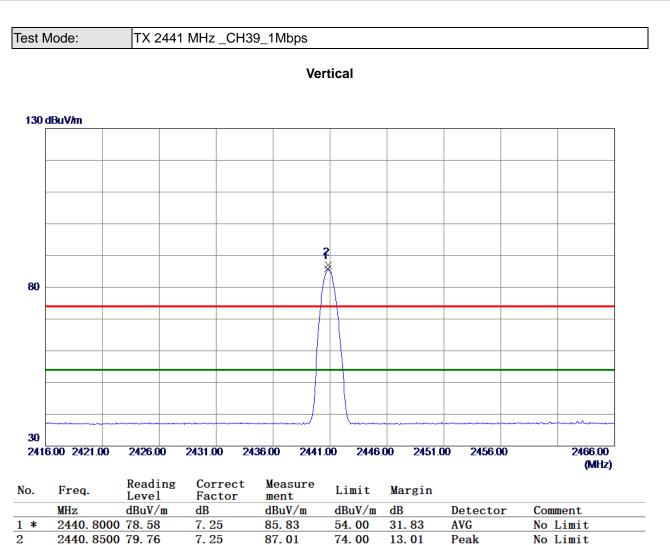
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





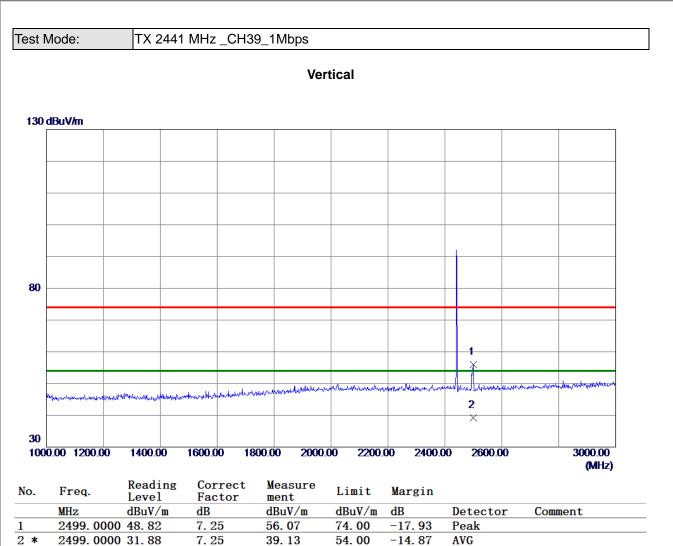
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





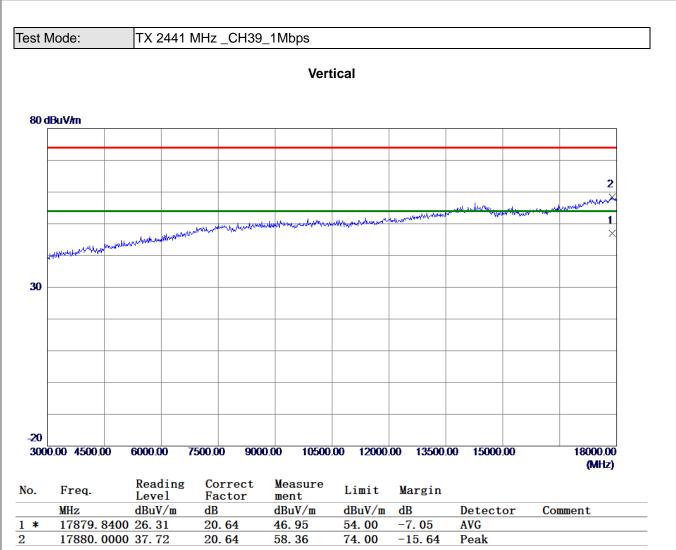
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





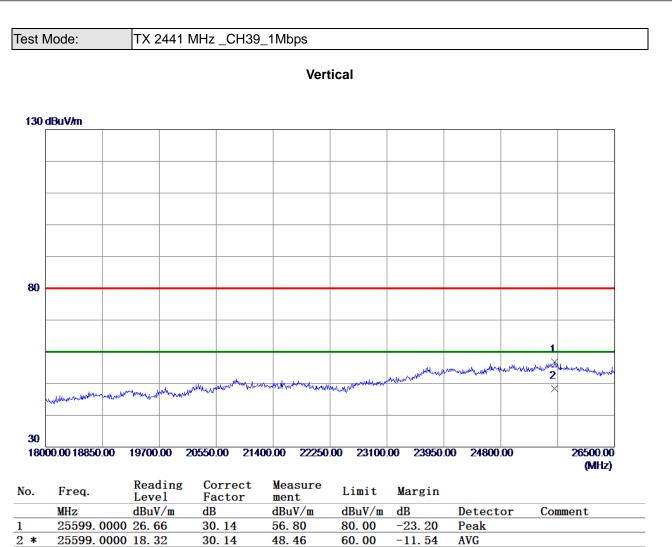
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





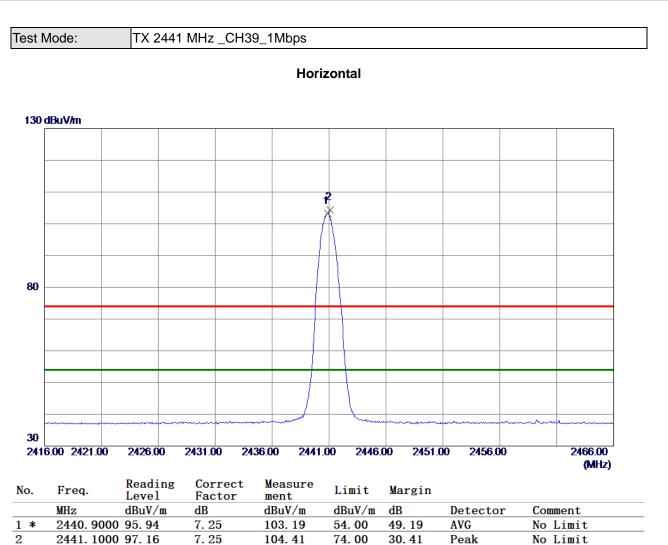
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





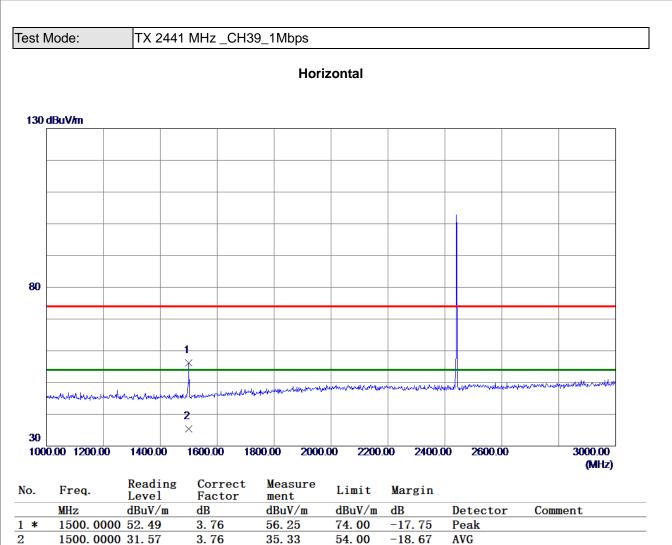
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- (2) Margin Level = Measurement Value Limit Value.





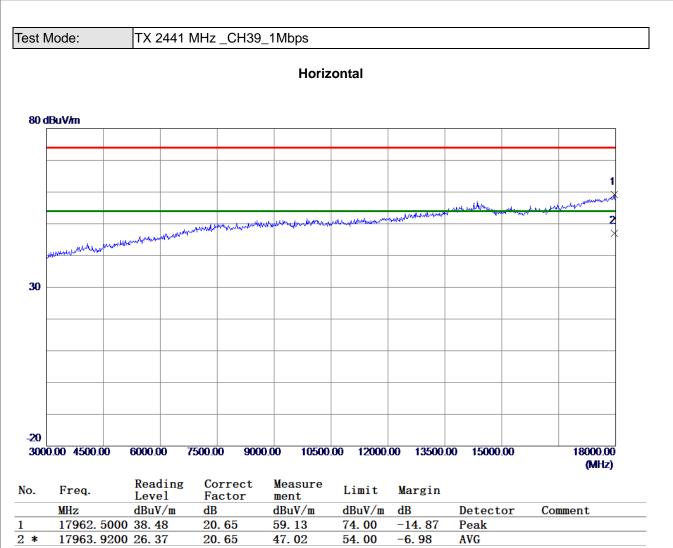
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





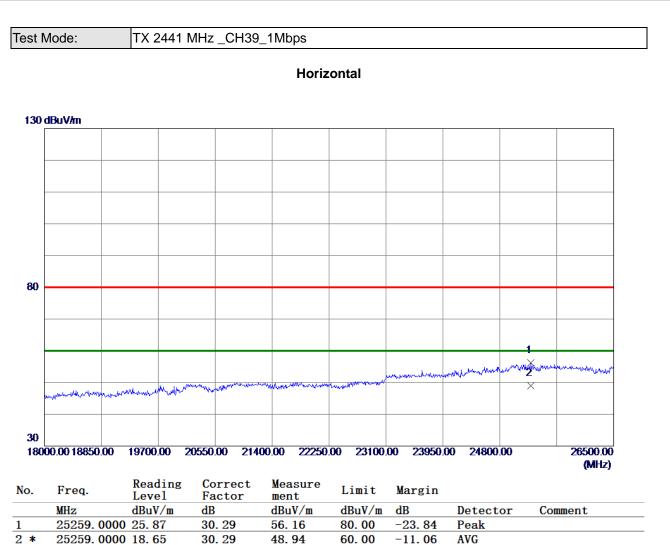
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





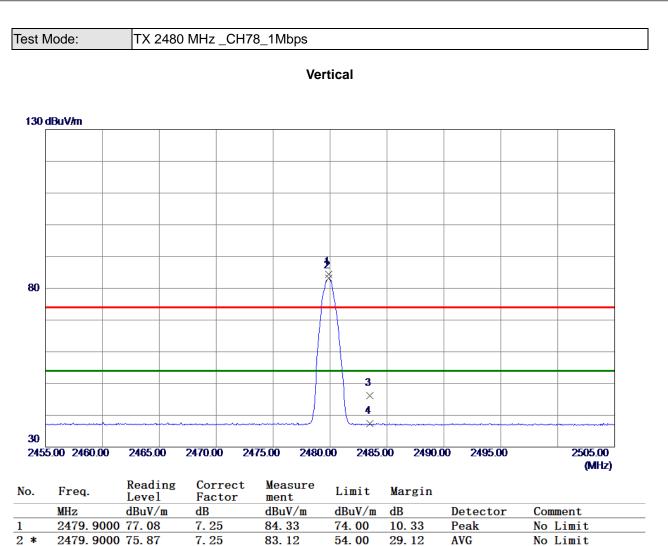
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





3

4

2483. 5000 38. 93

2483. 5000 30. 11

(1) Measurement Value = Reading Level + Correct Factor.

7.25

7.25

46.18

37.36

74.00

54.00

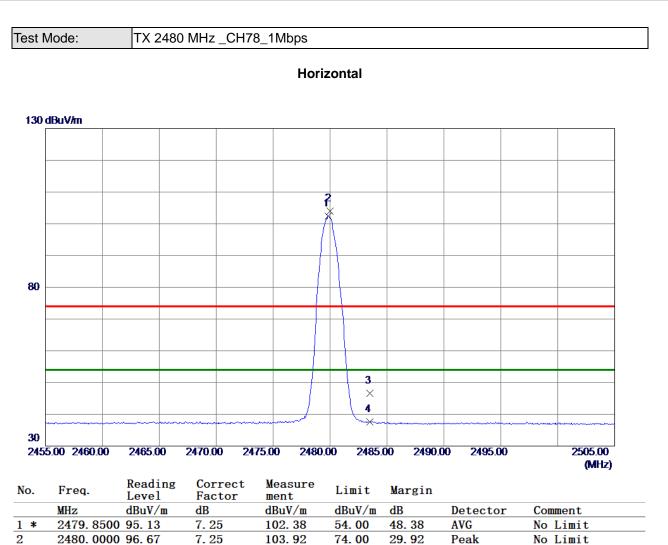
-27.82

-16.64

Peak

AVG





3

4

2483. 5000 39. 42

2483. 5000 30. 35

(1) Measurement Value = Reading Level + Correct Factor.

7.25

7.25

46.67

37.60

74.00

54.00

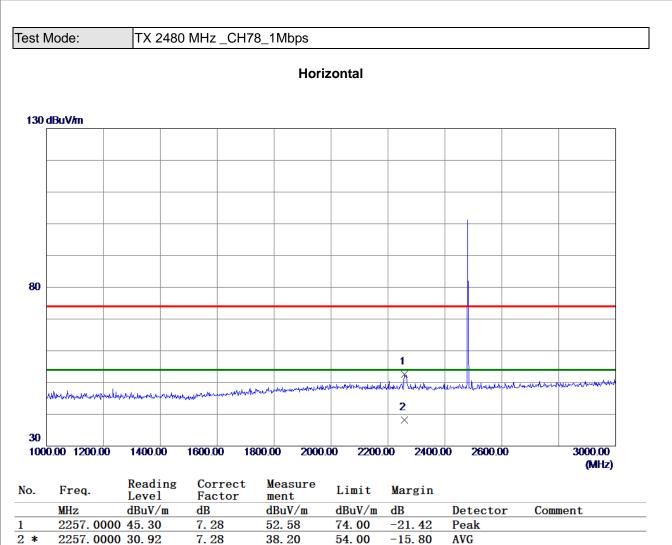
-27.33

-16.40

Peak

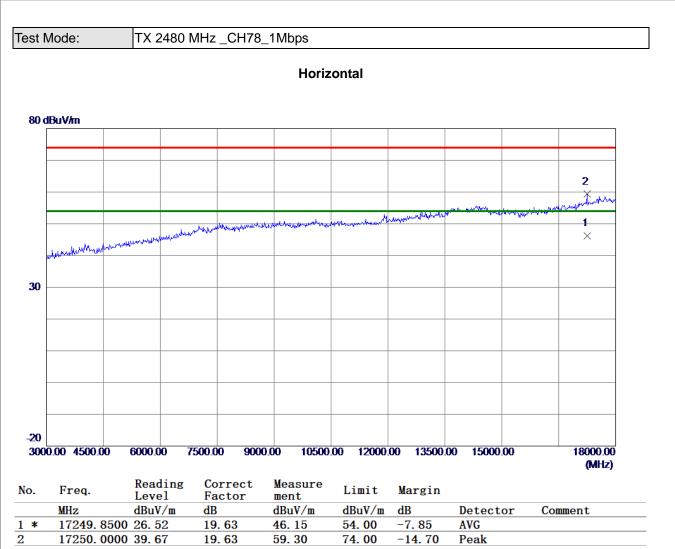
AVG





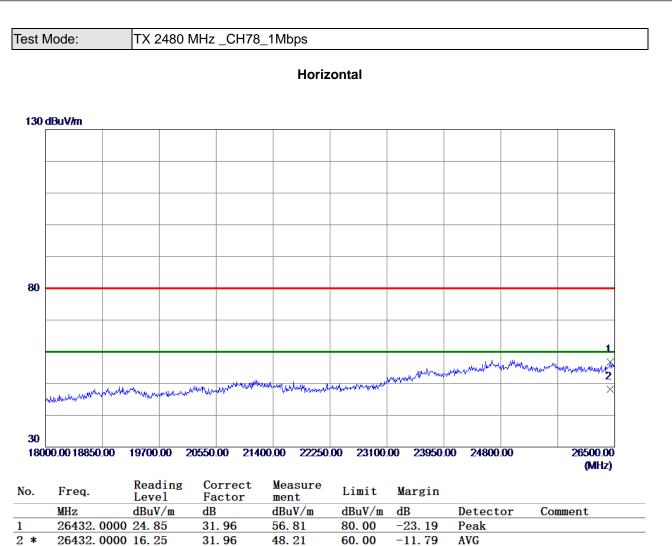
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





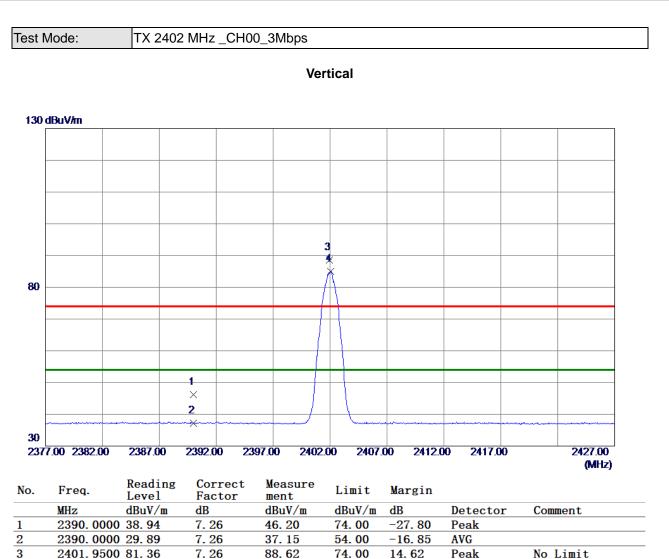
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





4 \*

2402.0500 77.66

(1) Measurement Value = Reading Level + Correct Factor.

7.26

**84.9**2

54.00

30.92

AVG

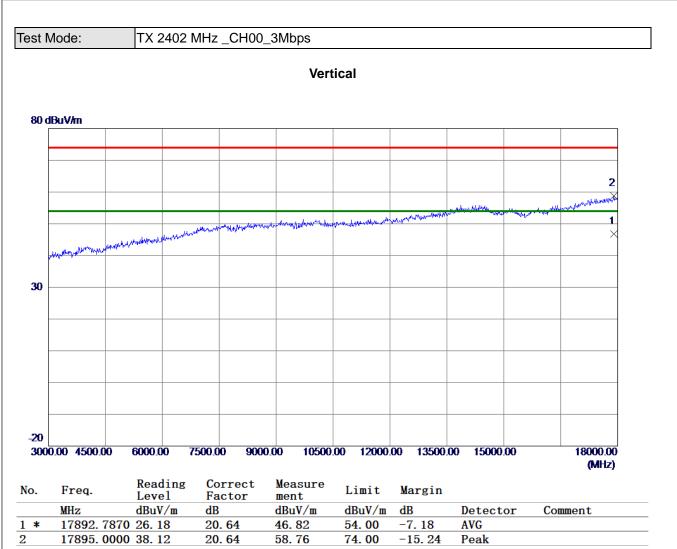
No Limit





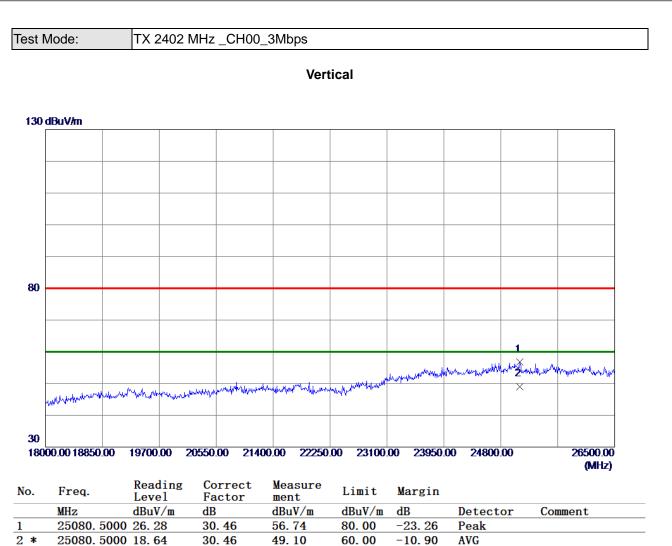
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





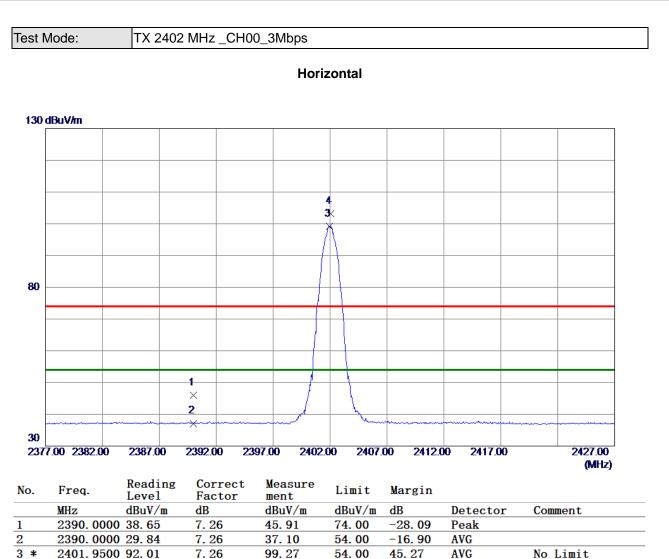
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





4

2402.0500 95.91

(1) Measurement Value = Reading Level + Correct Factor.

7.26

103.17

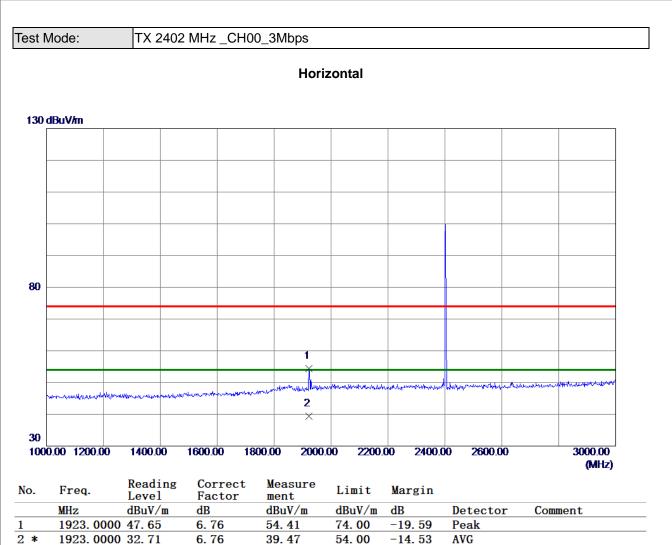
74.00

29.17

Peak

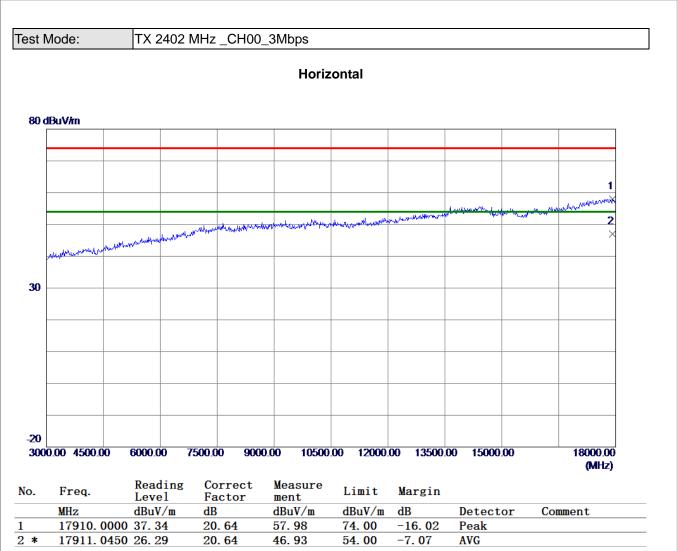
No Limit





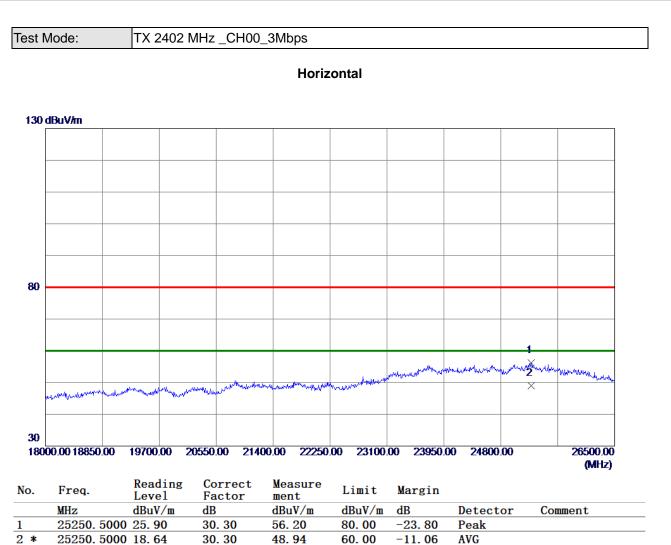
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





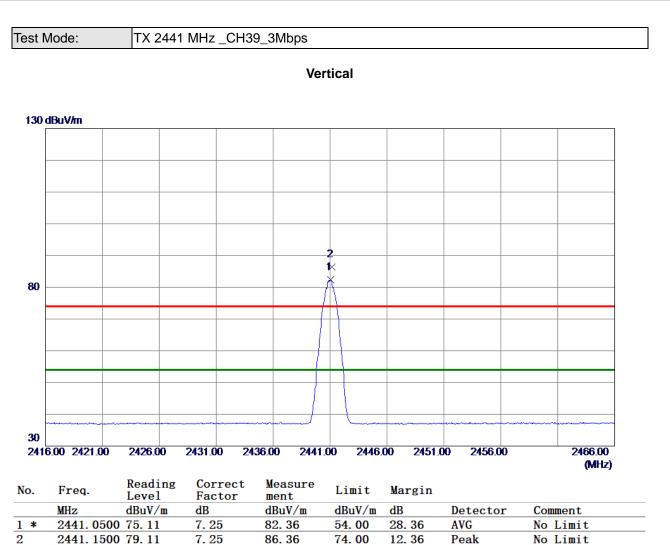
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





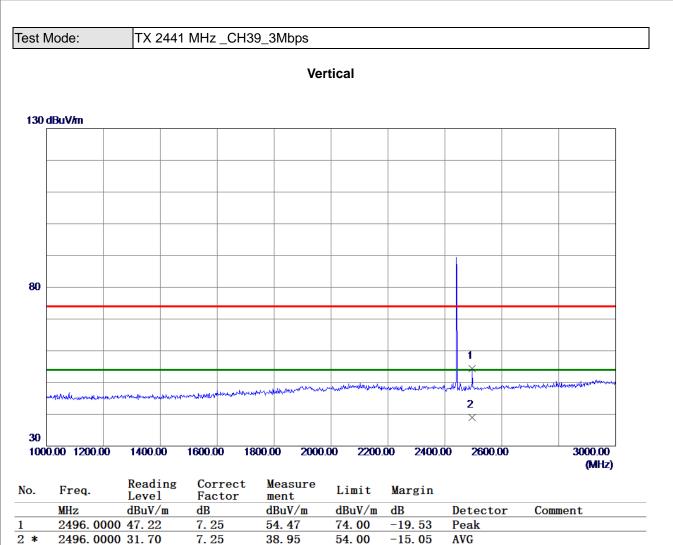
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





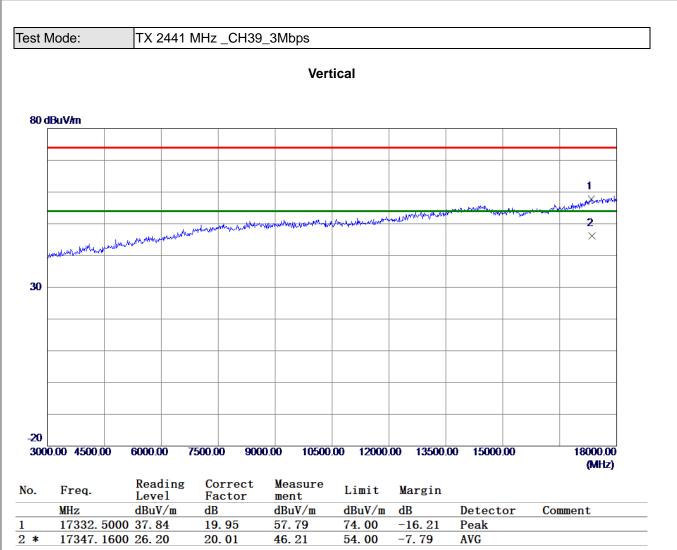
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





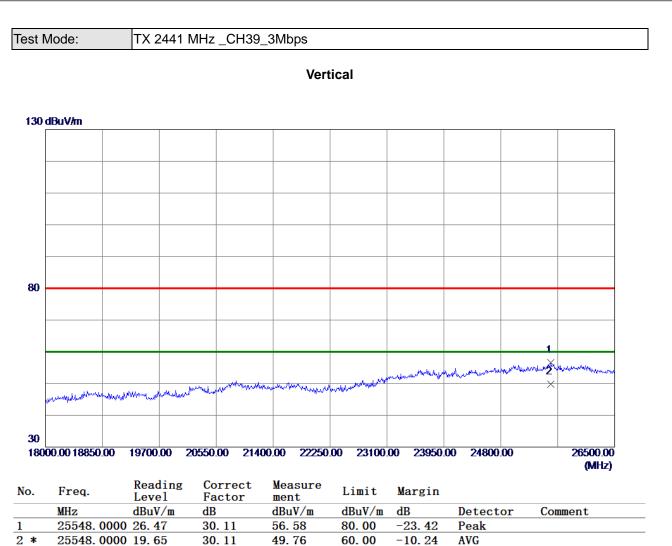
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





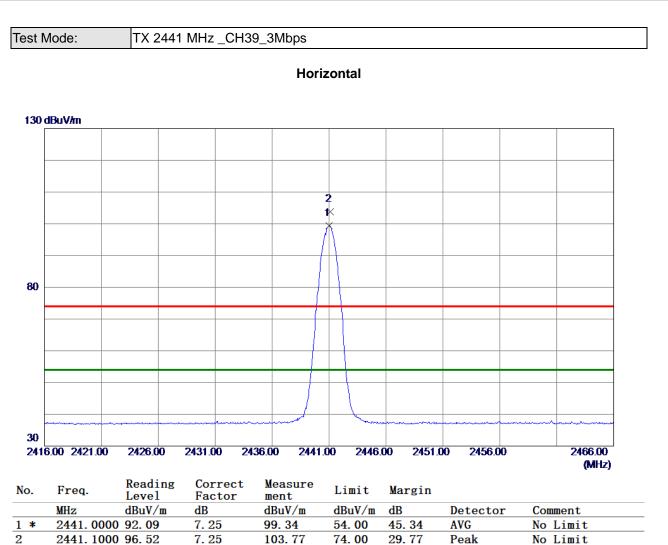
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- (2) Margin Level = Measurement Value Limit Value.





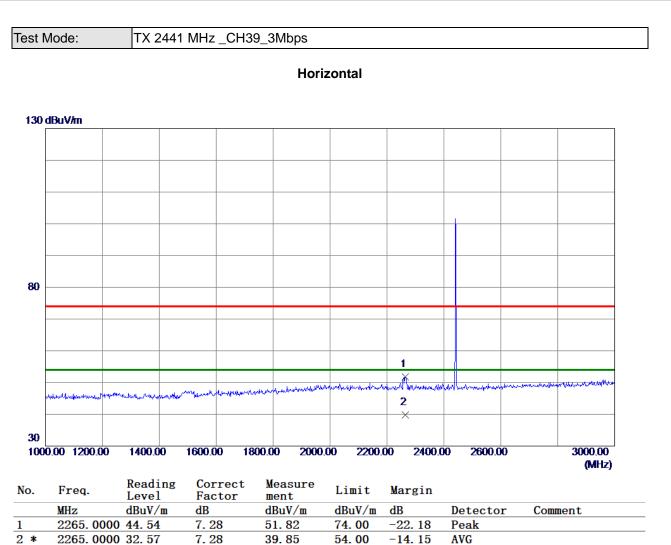
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





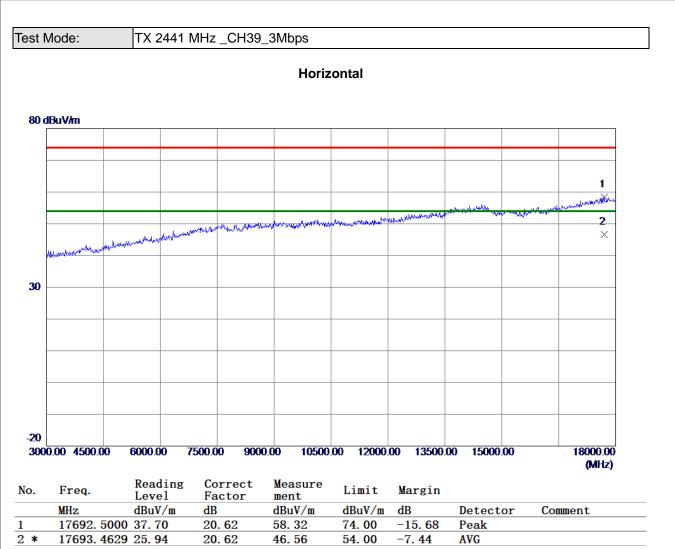
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





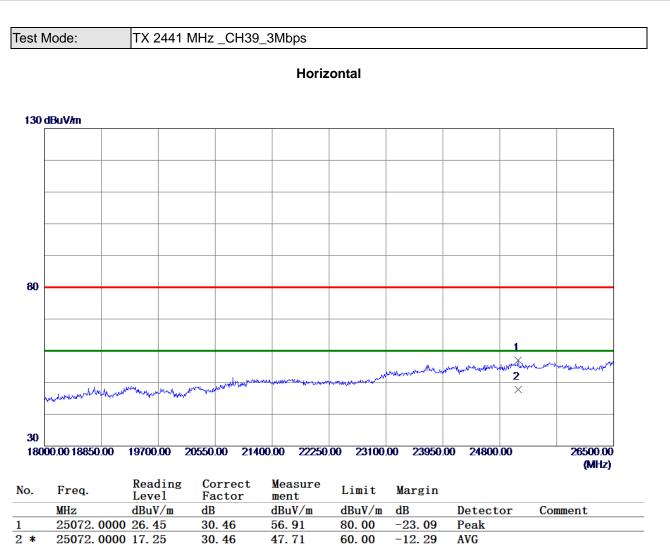
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





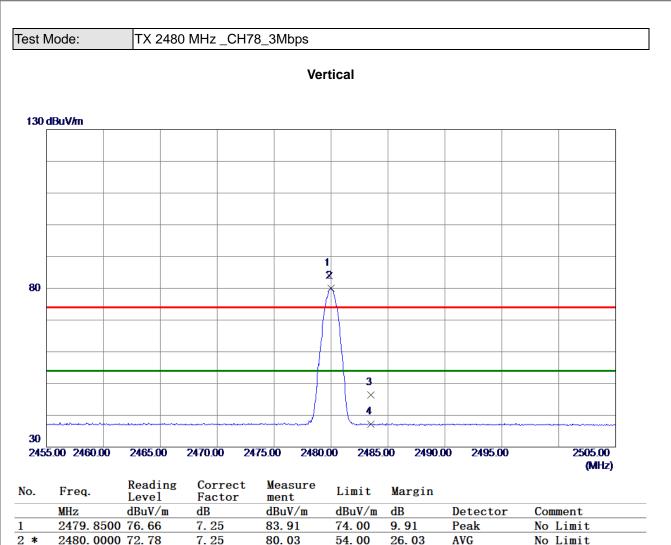
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





3

4

2483. 5000 39. 12

2483. 5000 29. 89

(1) Measurement Value = Reading Level + Correct Factor.

7.25

7.25

46.37

37.14

74.00

54.00

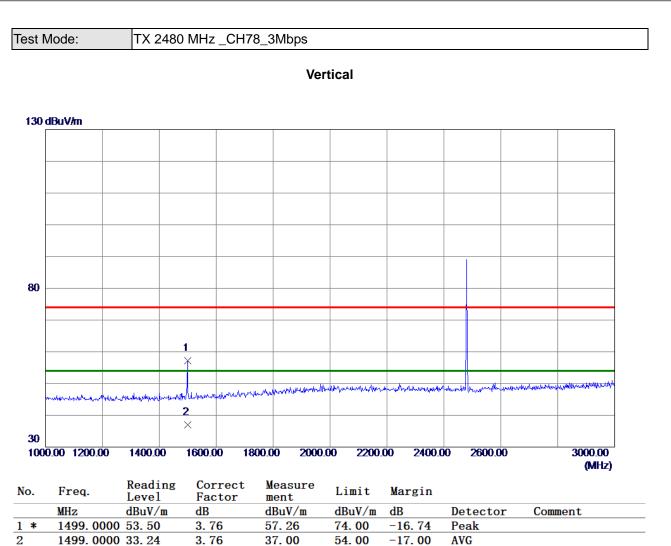
-27.63

-16.86

Peak

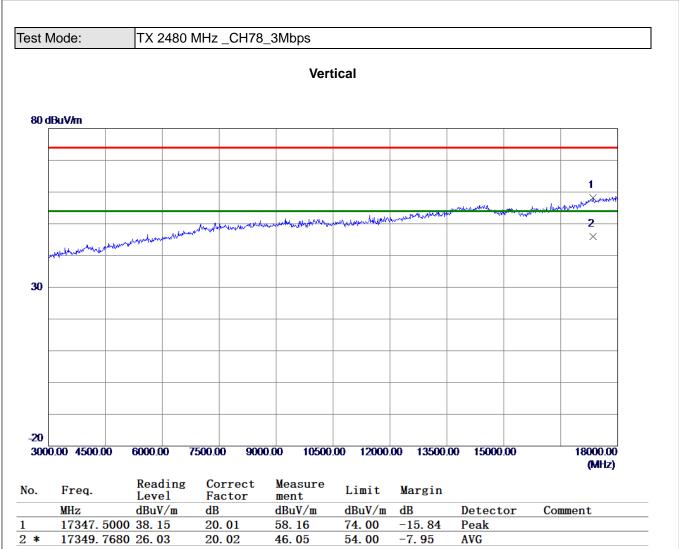
AVG



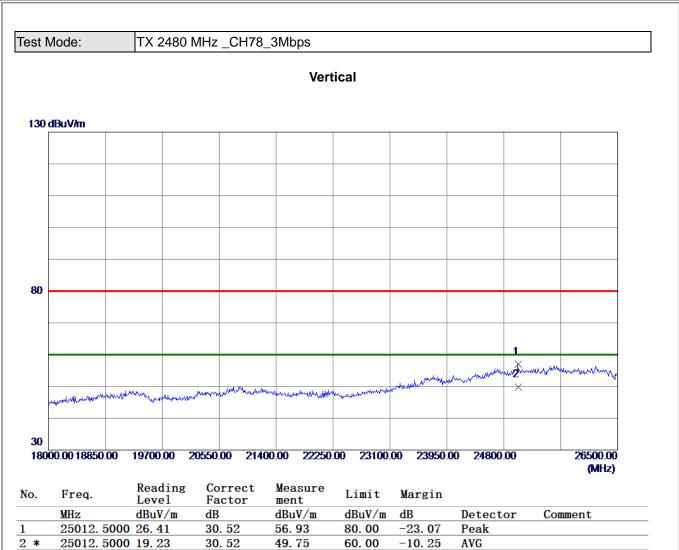


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



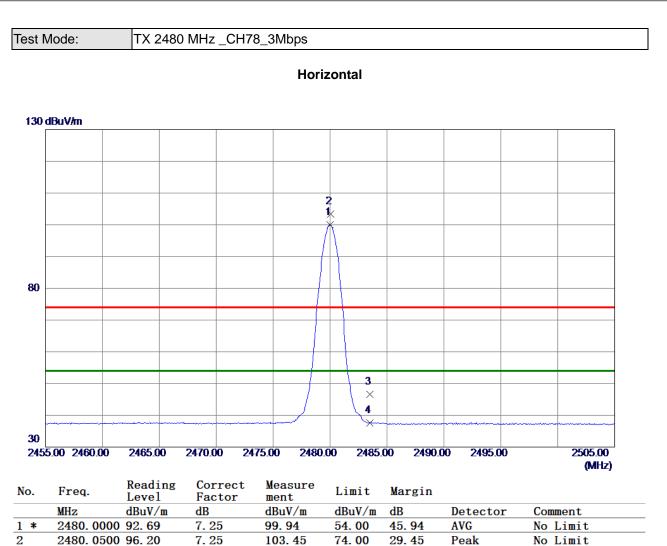


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



(1) Measurement Value = Reading Level + Correct Factor.





3

4

2483. 5000 39. 28

2483. 5000 30. 39

(1) Measurement Value = Reading Level + Correct Factor.

7.25

7.25

46.53

37.64

74.00

54.00

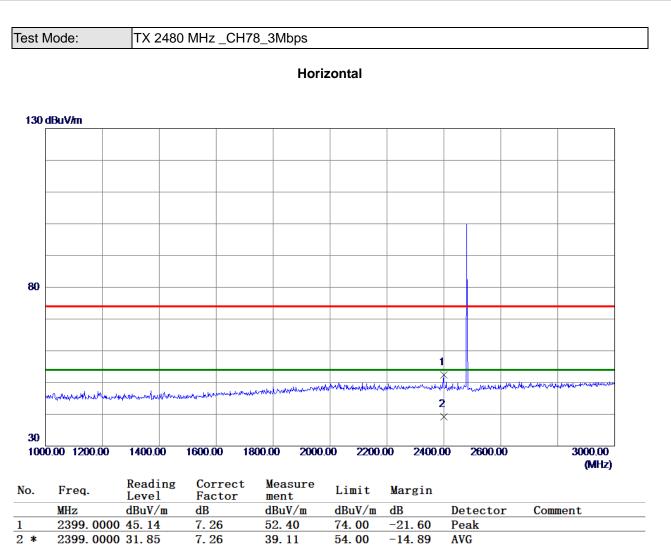
-27.47

-16.36

Peak

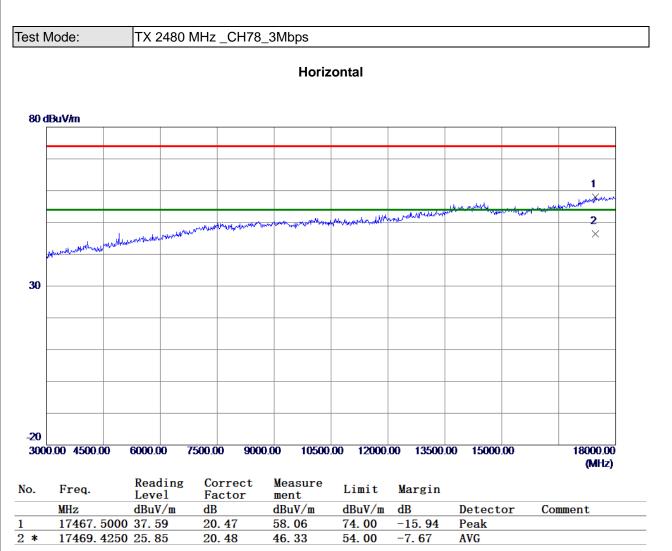
AVG





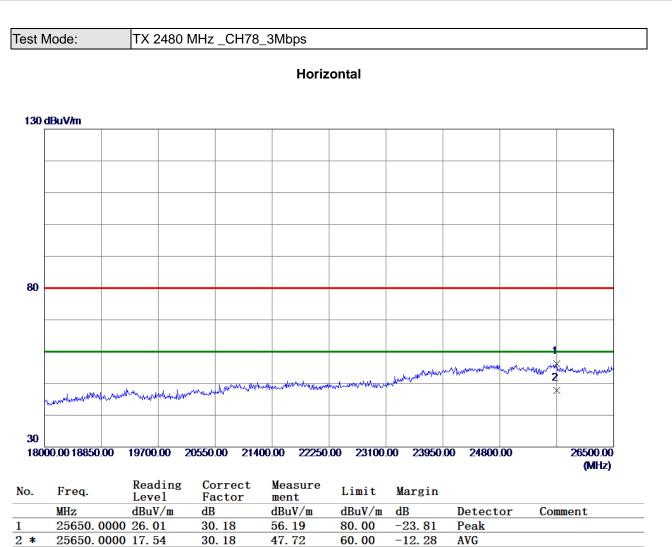
(1) Measurement Value = Reading Level + Correct Factor.





(1) Measurement Value = Reading Level + Correct Factor.





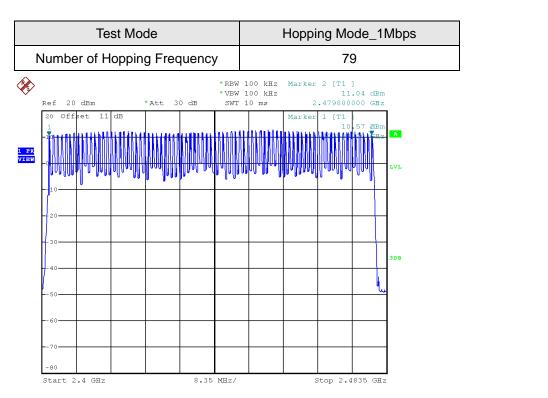
(1) Measurement Value = Reading Level + Correct Factor.



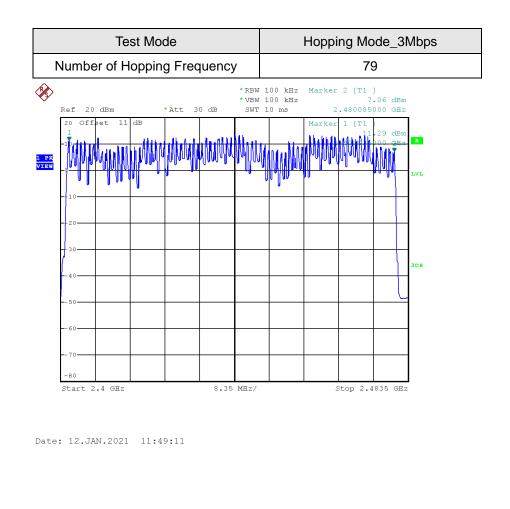


### **APPENDIX E - NUMBER OF HOPPING FREQUENCY**





Date: 19.DEC.2020 17:22:27





# **APPENDIX F - AVERAGE TIME OF OCCUPANCY**



Test Mode: T	X Mode_1Mbps				
		l			[
Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test Result
Data Facket	(MHz)	(ms)	(s)	(s)	restresuit
DH1	2402	0.3800	0.1216	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH5	2402	2.9200	0.3115	0.4000	Pass
DH1	2441	0.3800	0.1216	0.4000	Pass
DH3	2441	1.6400	0.2624	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH1	2480	0.3800	0.1216	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass

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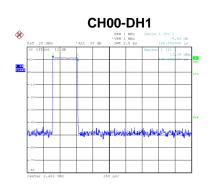
CH78-DH1

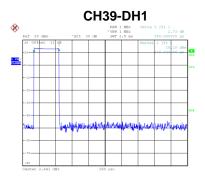
NBN 1 MHz VBN 1 MHz SWT 2.5 XX

8

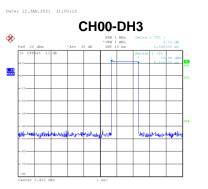
1 PK

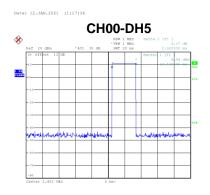






CH39-DH3

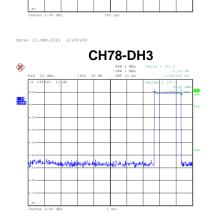


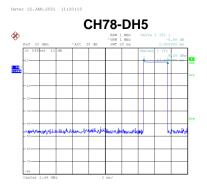


Det: 2.2007.02 1117:97

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Date: 12.JAN.2021 11:26:29

### Date: 12.JAN.2021 11:27:30

Date: 12.JAN.2021 11:00

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Date: 12.JAN.2021 11:25:04



Test Mode: TX Mode_3Mbps						
Data Packet	Frequency	Pulse	Dwell Time(s)	Limits(s)	Test Result	
Data Tacket	(MHz)	Duration(ms)				
3DH1	2402	0.3900	0.1248	0.4000	Pass	
3DH3	2402	1.6400	0.2624	0.4000	Pass	
3DH5	2402	2.8800	0.3072	0.4000	Pass	
3DH1	2441	0.3900	0.1248	0.4000	Pass	
3DH3	2441	1.6400	0.2624	0.4000	Pass	
3DH5	2441	2.8800	0.3072	0.4000	Pass	
3DH1	2480	0.3900	0.1248	0.4000	Pass	
3DH3	2480	1.6400	0.2624	0.4000	Pass	
3DH5	2480	2.9200	0.3115	0.4000	Pass	

CH78-3DH1

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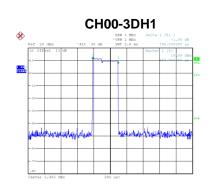
NEW 1 MHZ VBW 1 MHZ SWT 2.5 XX

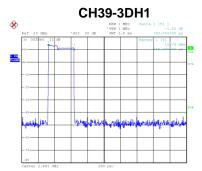
8

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CH39-3DH3

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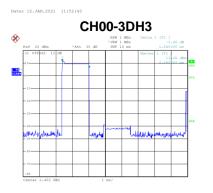
Date: 12.JAN.2021 11:52:50

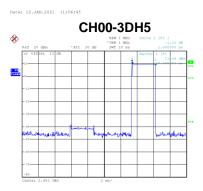
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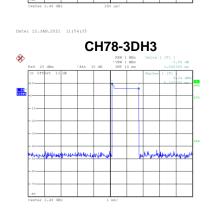


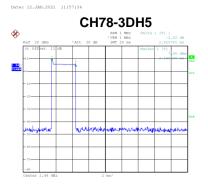


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Description

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Date: 12.JAN.2021 11:58:28

Date: 12.JAN.2021 13:33:56

Date: 12.JAN.2021 11:59:56

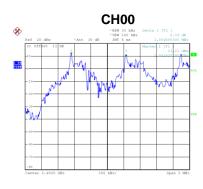




### APPENDIX G - HOPPING CHANNEL SEPARATION MEASUREMENT



Test Mode: Hopping on _1Mbps						
	Channel	Frequency	Channel Separation	2/3 of 20 dB Bandwidth	Test Result	
	Channel	(MHz)	(MHz)	(MHz)	Test Result	
	00	2402	1.005	0.543	Pass	
	39	2441	1.005	0.544	Pass	
	78	2480	1.002	0.540	Pass	







Pass

Date: 12.JAN.2021 11:03:51

0.767

Date: 12.JAN.2021 11:13:22

78

Test Mode:

Hopping on \_3Mbps

2480

### Frequency **Channel Separation** 2/3 of 20 dB Bandwidth Channel **Test Result** (MHz) (MHz) (MHz) 2402 0.998 00 0.765 Pass 2441 1.004 0.769 Pass 39

1.001



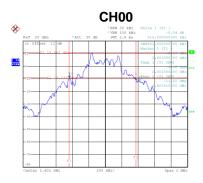
Page 95 of 105

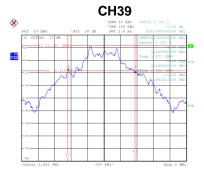


### **APPENDIX H - BANDWIDTH**



Те	Test Mode: TX Mode _1Mbps							
		Frequency	20 dB Bandwidth	99 % Emission Bandwidth				
	Channel	(MHz)	(MHz)	(MHz)				
	00	2402	0.814	0.852				
	39	2441	0.816	0.844				
	78	2480	0.810	0.832				







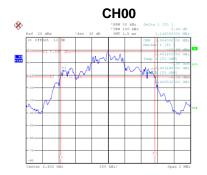
Date: 19.DEC.2020 17:07:10

Date: 19.DEC.2020 17:09:55

Date: 19.DEC.2020 17:10:59

Test Mode: TX Mode \_3Mbps

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
00	2402	1.148	1.084
39	2441	1.153	1.072
78	2480	1.150	1.076







Date: 19.DEC.2020 17:48:28

Date: 19.DEC.2020 17:45:12

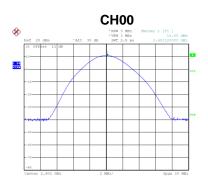
Date: 19.DEC.2020 17:47:19



### **APPENDIX I - MAXIMUM OUTPUT POWER**



Test Mode: TX Mode _1Mbps							
[		Frequency	Output Power	Output Power	Max. Limit	Max. Limit	Test
	Channel	(MHz)	(dBm)	(W)	(dBm)	(W)	Result
	00	2402	10.80	0.0120	21.00	0.125	Pass
	39	2441	11.70	0.0148	21.00	0.125	Pass
	78	2480	11.27	0.0134	21.00	0.125	Pass







Date: 19.DEC.2020 17:07:44

Test Mode: TX Mode \_2Mbps

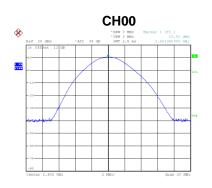
Channel	Frequency	Output Power	Output Power	Max. Limit	Max. Limit	Test
Channel	(MHz)	(dBm)	(W)	(dBm)	(W)	Result
00	2402	10.02	0.0100	21.00	0.125	Pass
39	2441	10.96	0.0124	21.00	0.125	Pass
78	2480	10.10	0.0102	21.00	0.125	Pass

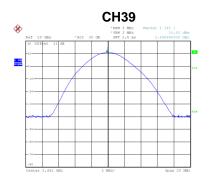


Date: 14.JAN.2021 16:03:08



### Test Mode: TX Mode \_3Mbps Frequency **Output Power** Output Power Max. Limit Max. Limit Test Channel (W) (MHz) (dBm) (W) (dBm) Result 00 2402 10.51 0.0112 21.00 0.125 Pass 39 2441 10.83 0.0121 21.00 0.125 Pass 78 2480 10.28 0.0107 21.00 0.125 Pass







Date: 19.DEC.2020 17:45:43

Date: 19.DEC.2020 17:47:24

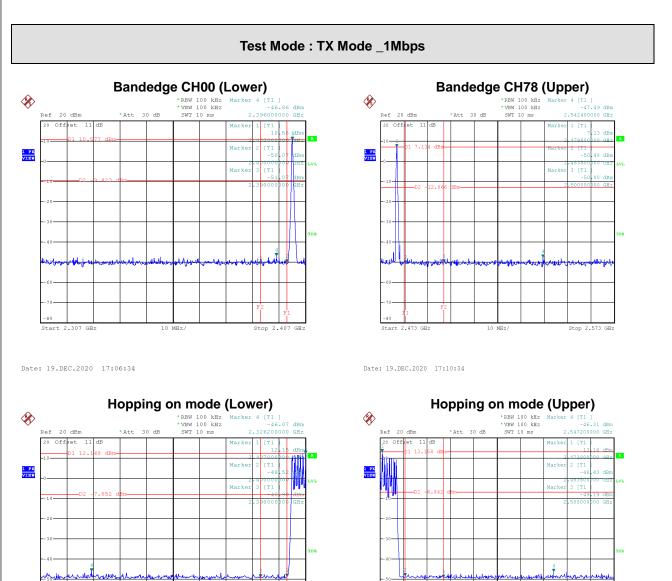
Date: 19.DEC.2020 17:49:01





## **APPENDIX J - CONDUCTED SPURIOUS EMISSION**





Date: 12.JAN.2021 11:29:03

10 MHz/

Stop 2.407 GHz

Start 2.307 GHz

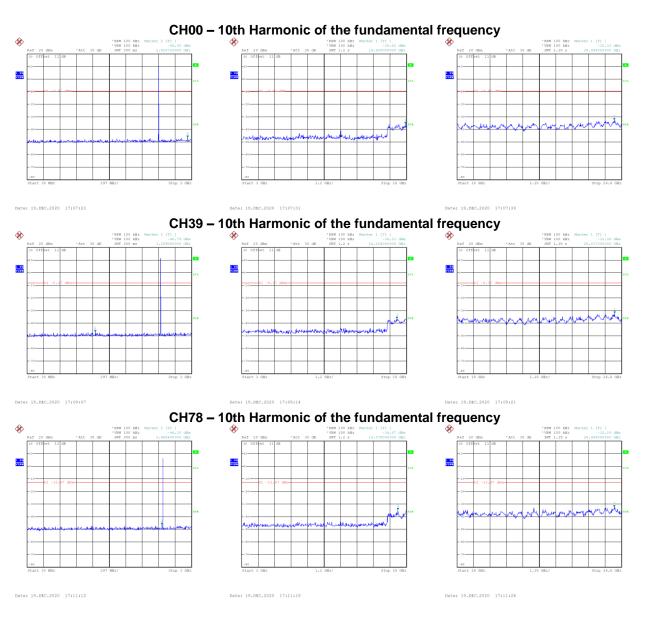
Date: 12.JAN.2021 11:15:07

Start 2.473 GHz

10 MHz/

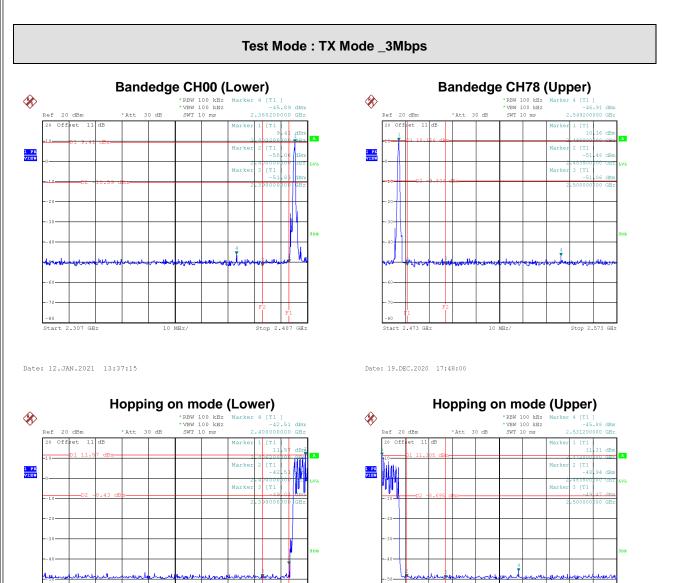
Stop 2.573 GHz







Stop 2.573 GHz



Date: 12.JAN.2021 11:50:02

10 MHz/

Stop 2.407 GHz

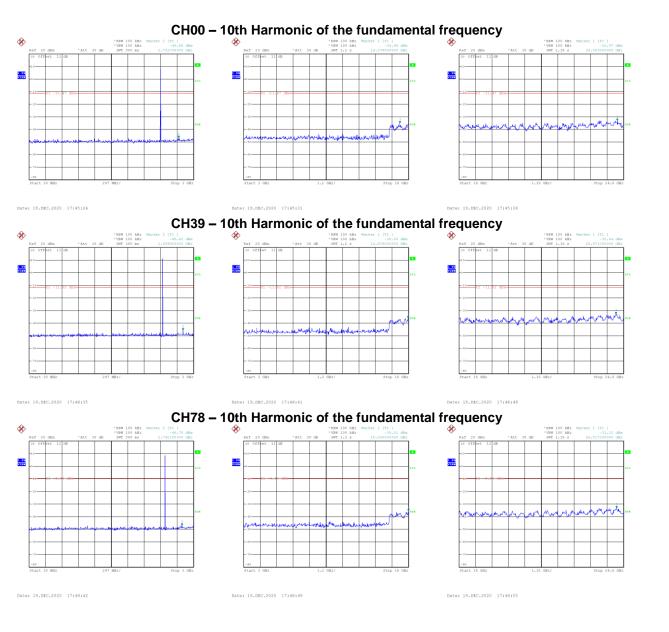
Start 2.307 GHz

Date: 12.JAN.2021 11:50:53

10 MHz/

Start 2.473 GHz





End of Test Report