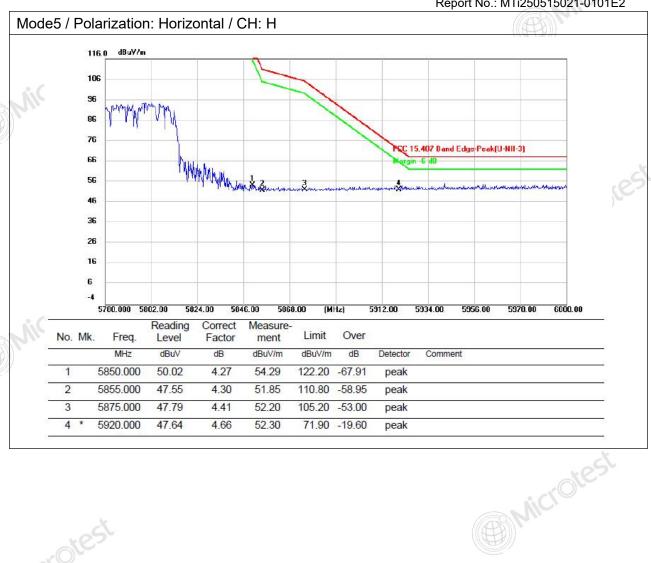


# **TEST REPORT**

Report No.: MTi250515021-0101E2

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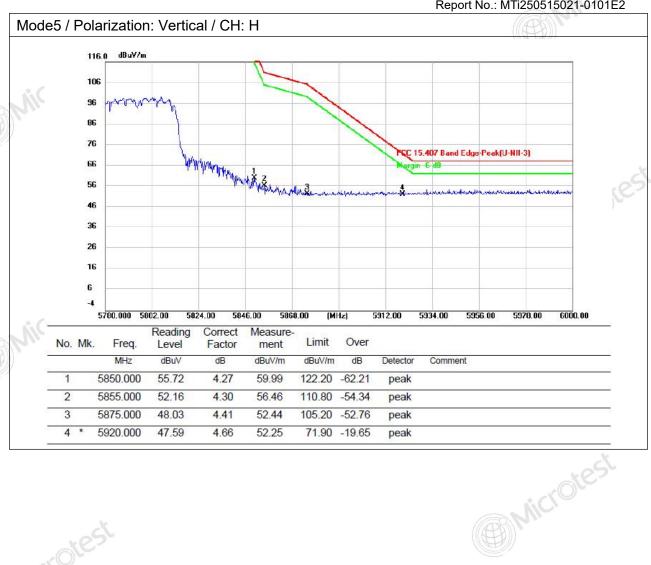
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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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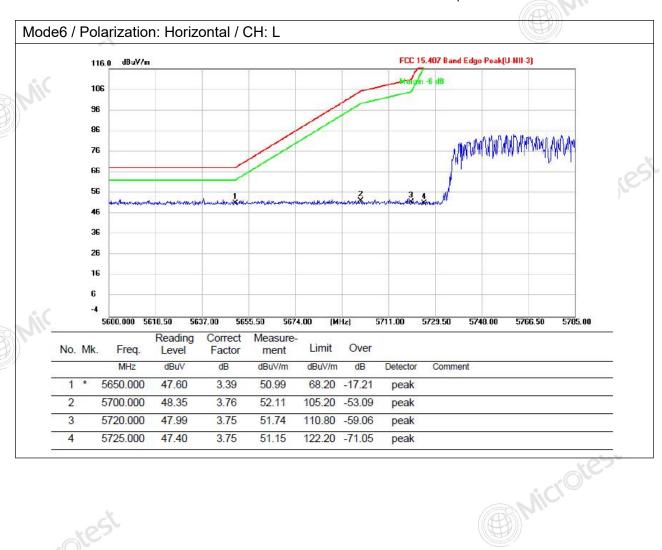
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# TEST REPORT

Report No.: MTi250515021-0101E2

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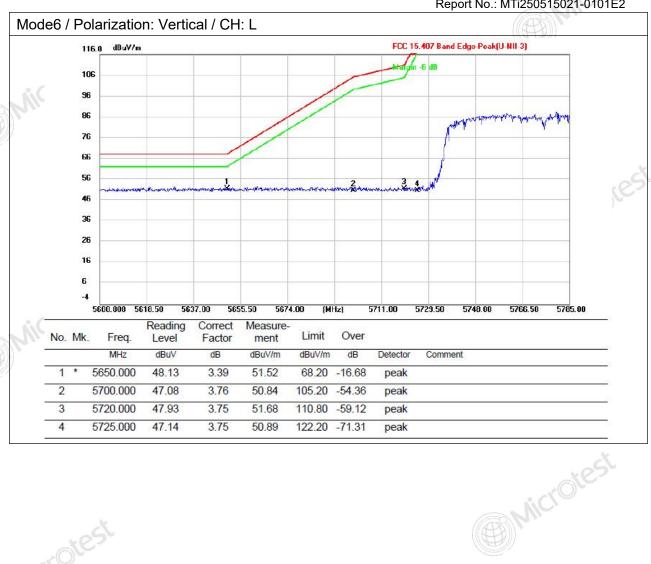




# **TEST REPORT**

Report No.: MTi250515021-0101E2

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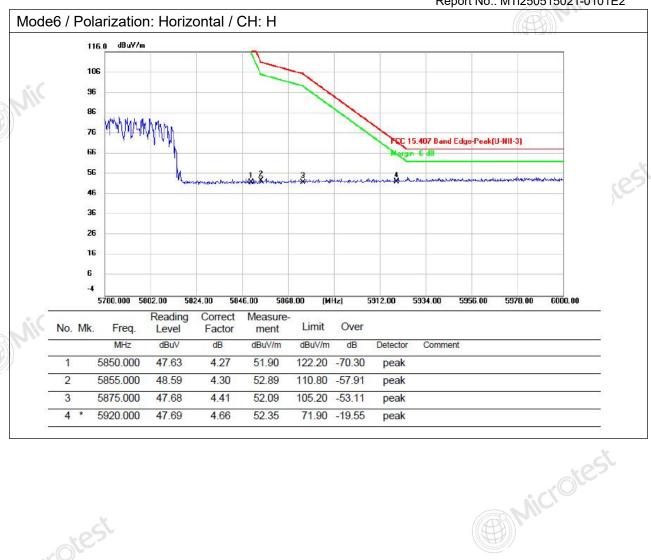




# **TEST REPORT**

Report No.: MTi250515021-0101E2

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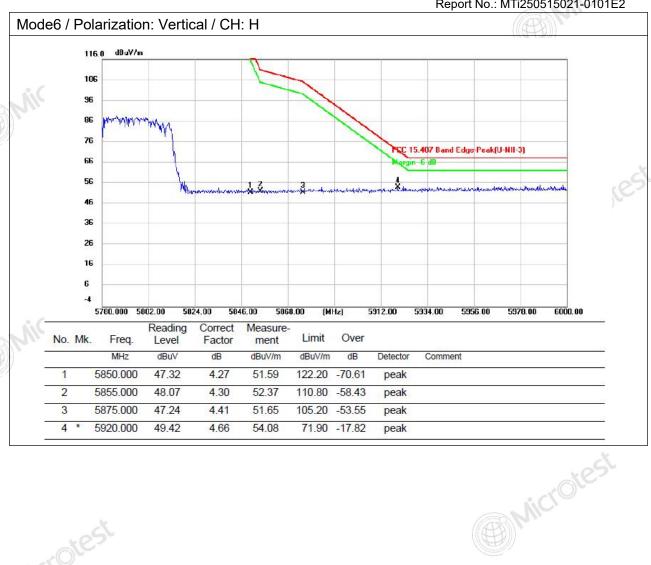




# **TEST REPORT**

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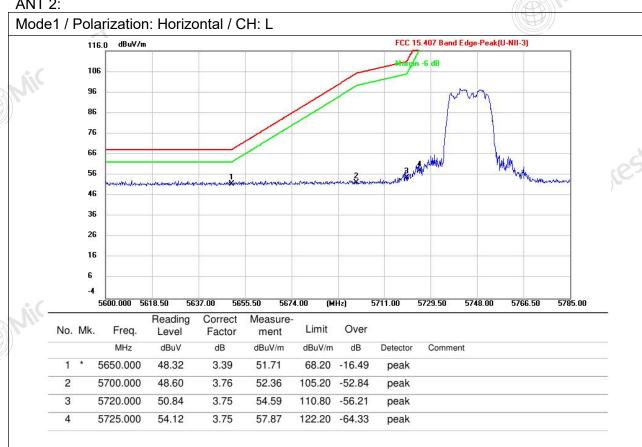


# **TEST REPORT**

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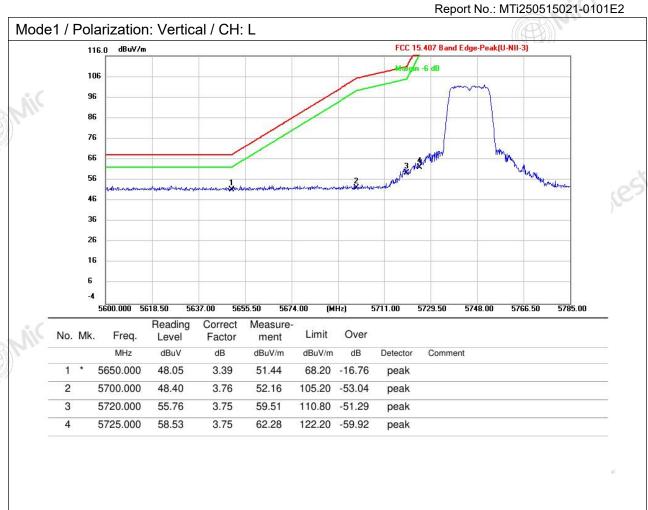
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# **TEST REPORT**

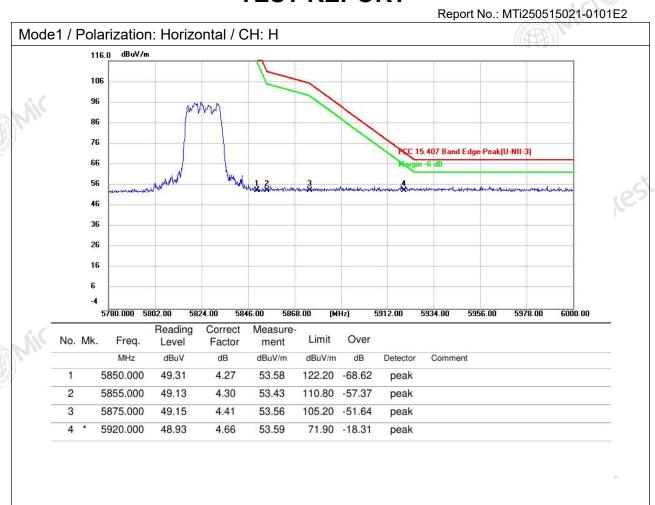
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# **TEST REPORT**

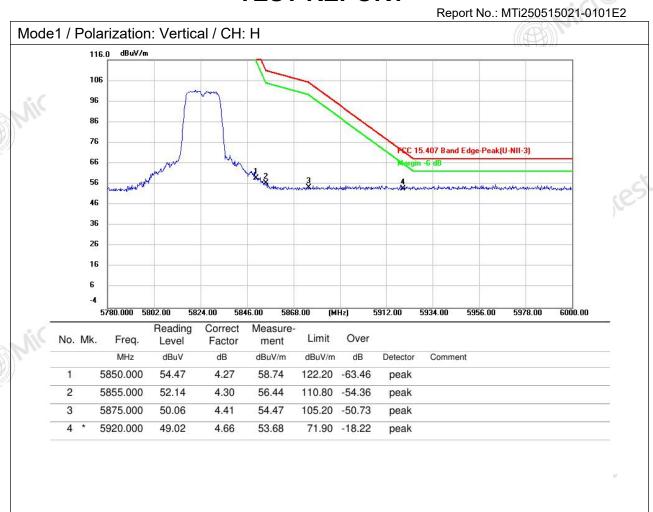


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# **TEST REPORT**



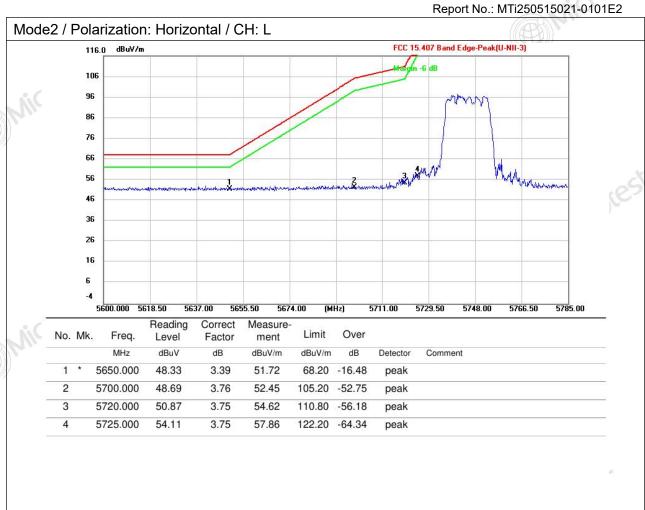
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# **TEST REPORT**

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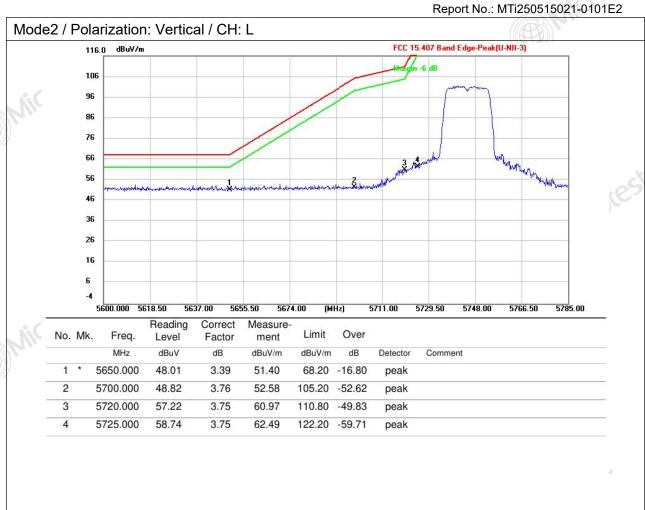




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# **TEST REPORT**

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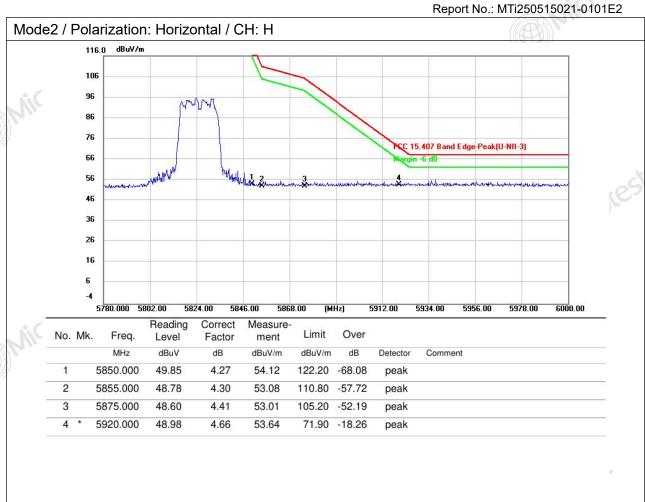




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# **TEST REPORT**

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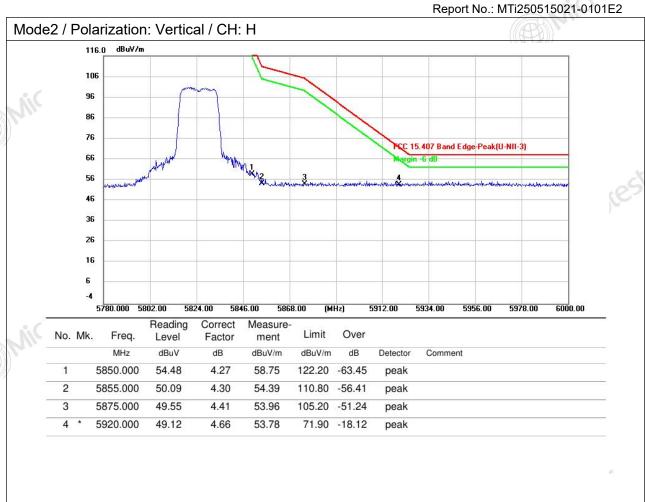




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# **TEST REPORT**

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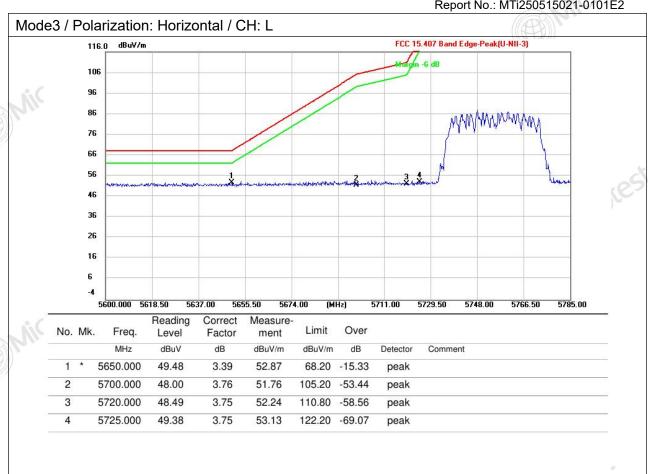


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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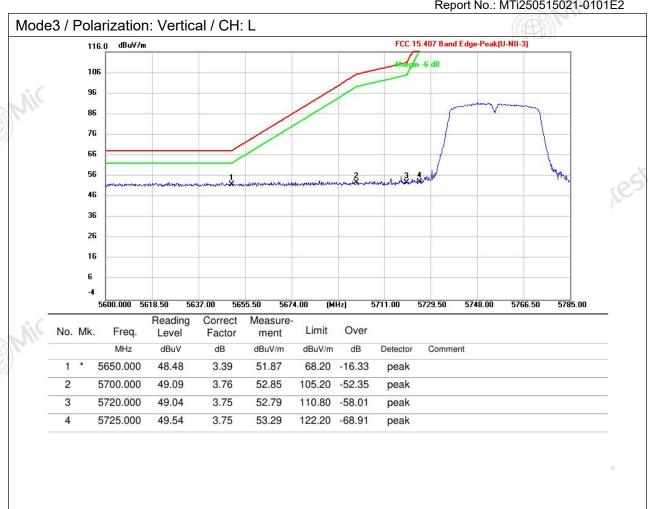


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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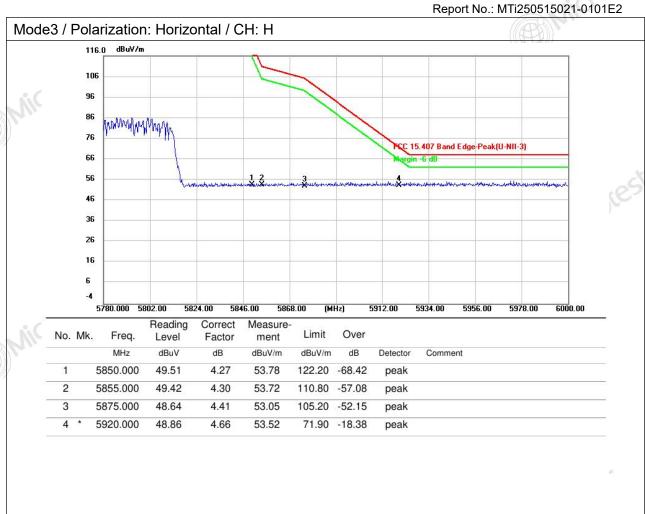




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# **TEST REPORT**

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# **TEST REPORT**



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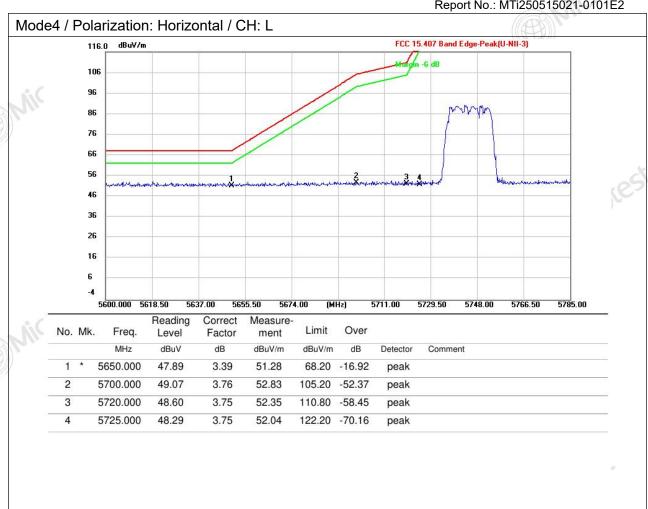


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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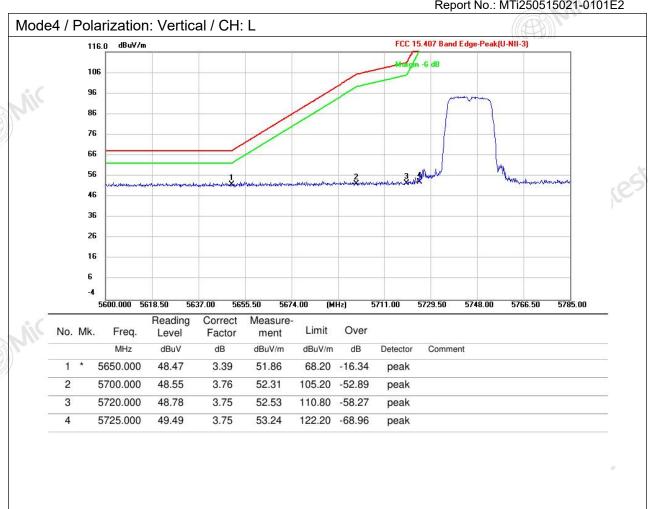


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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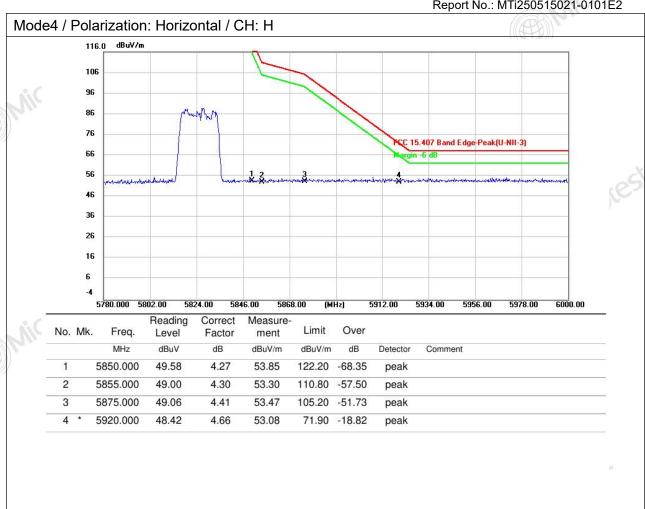


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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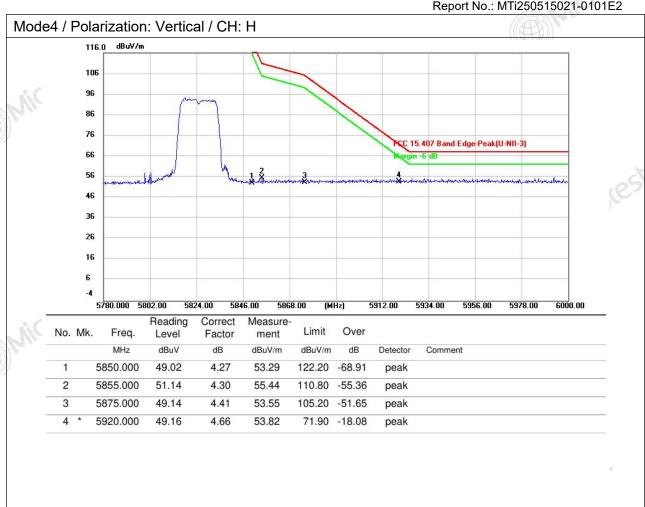


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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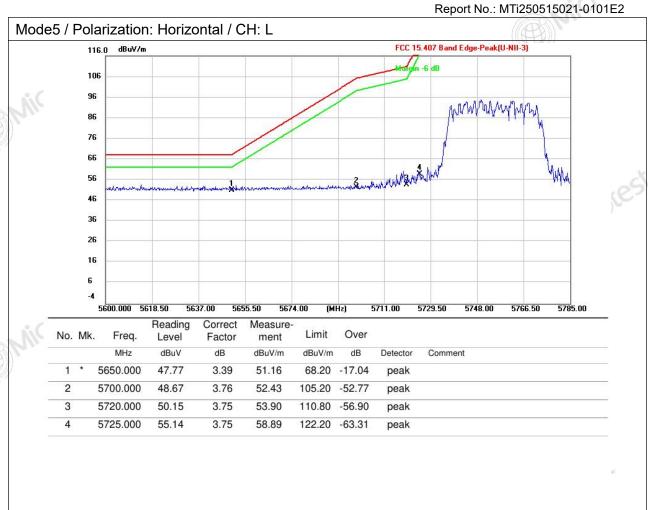




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# **TEST REPORT**

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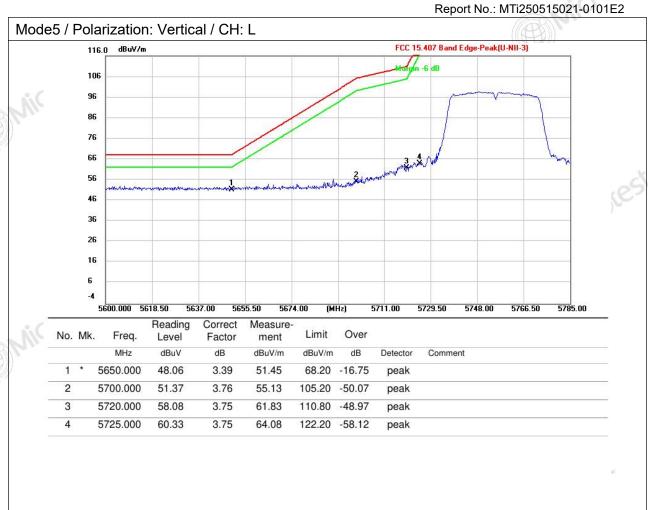




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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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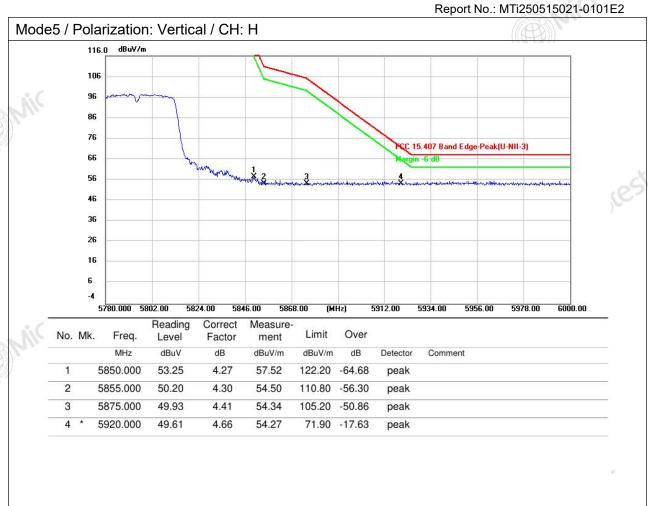




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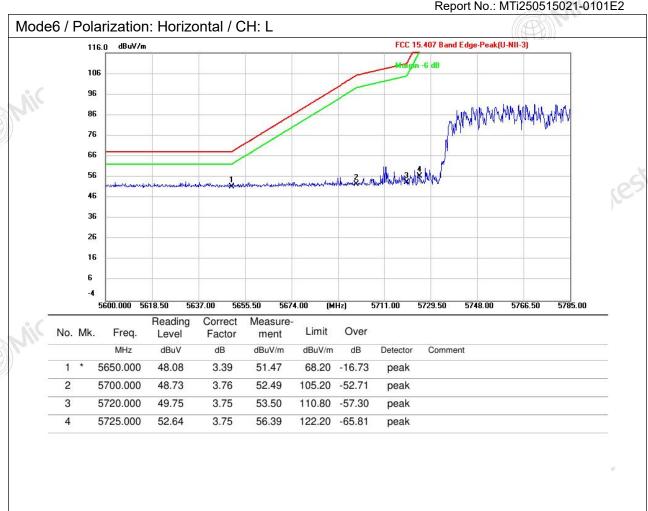
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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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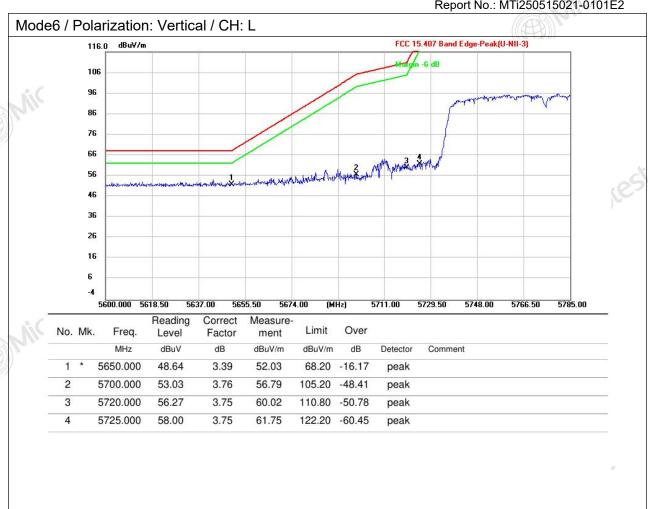


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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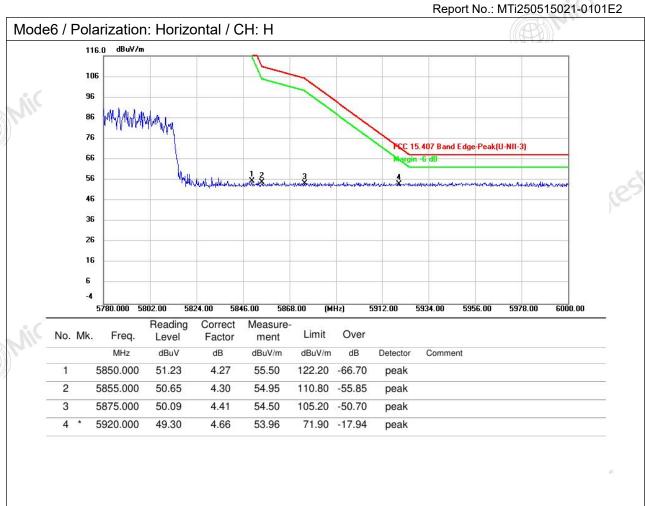




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# **TEST REPORT**

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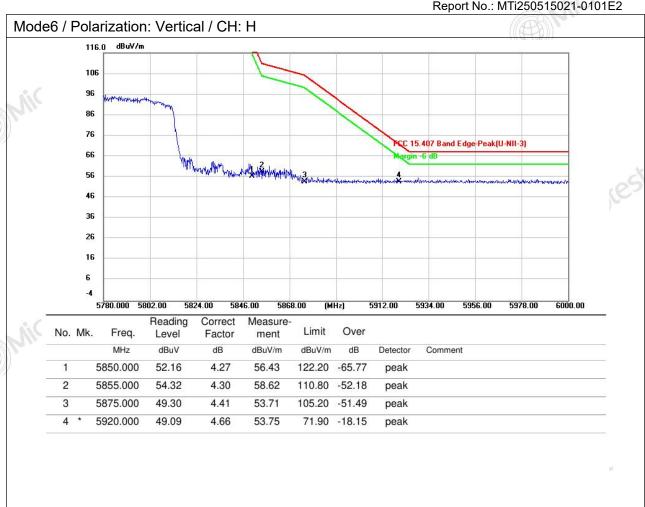


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# **TEST REPORT**

Report No.: MTi250515021-0101E2

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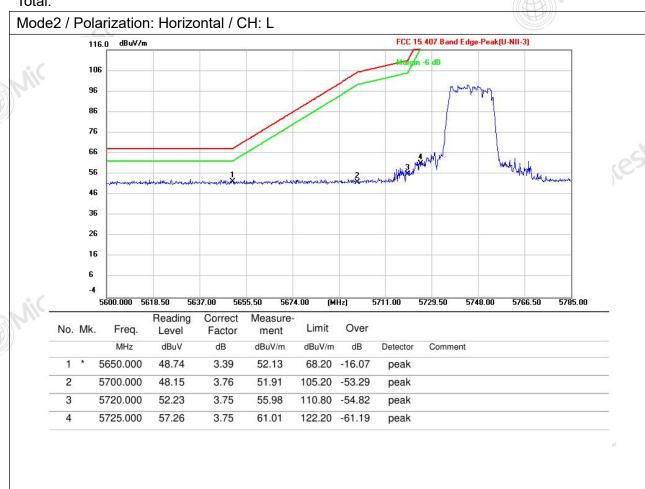
# **TEST REPORT**

Report No.: MTi250515021-0101E2

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### Total:

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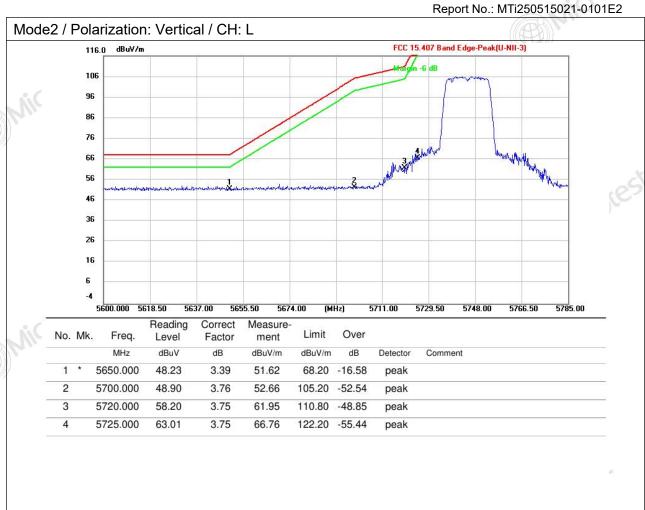




**MANIC** Otest

# **TEST REPORT**

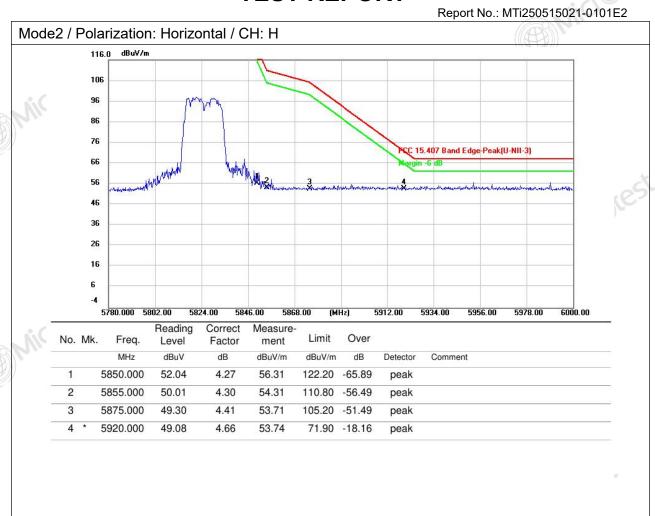
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# **TEST REPORT**



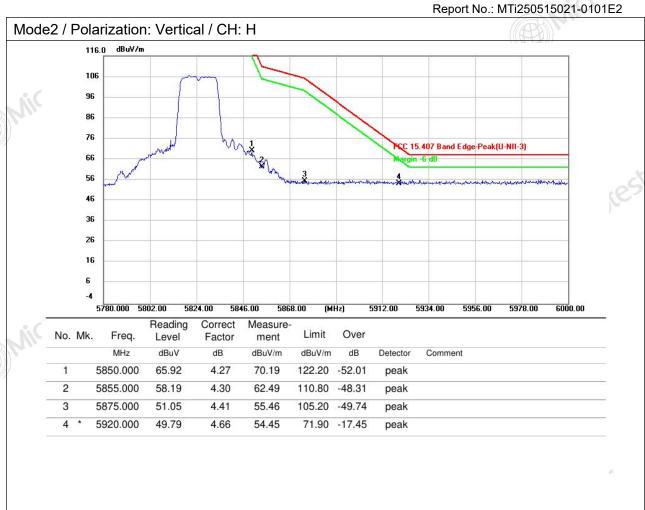
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# **TEST REPORT**

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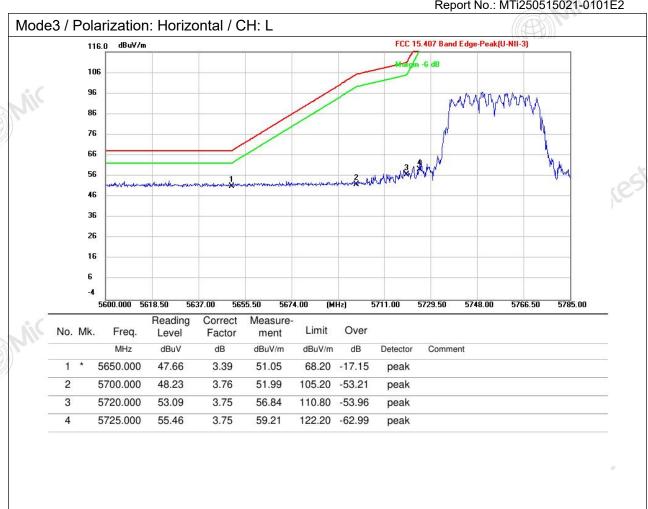


**MANIC** Otest

# **TEST REPORT**

Report No.: MTi250515021-0101E2

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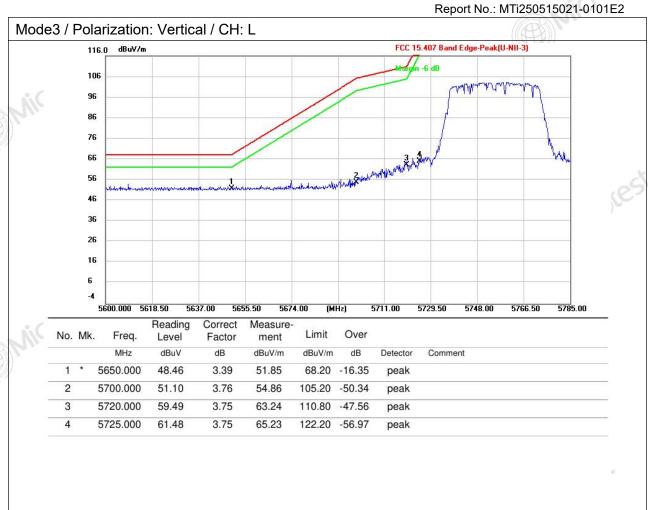




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# **TEST REPORT**

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## **TEST REPORT**

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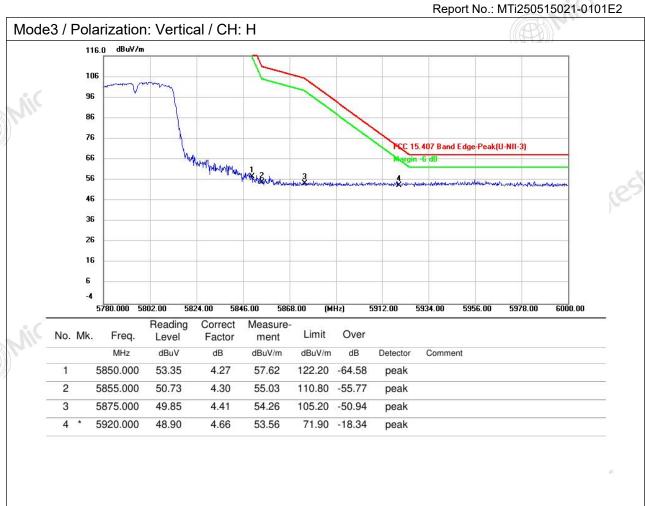
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## **TEST REPORT**

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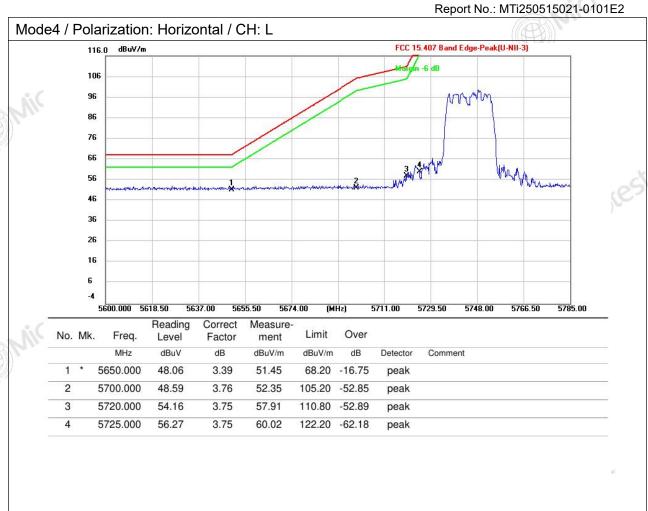




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## **TEST REPORT**

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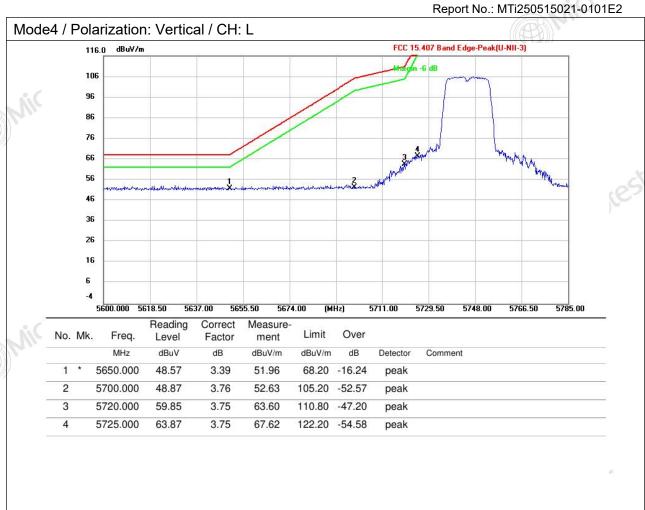




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## **TEST REPORT**

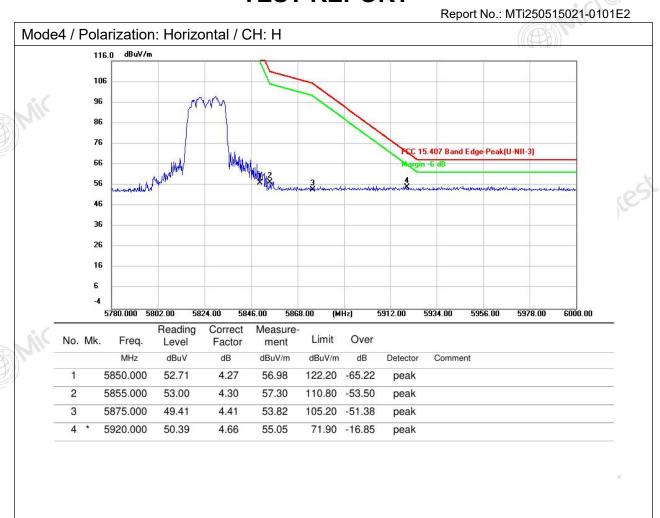
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## **TEST REPORT**

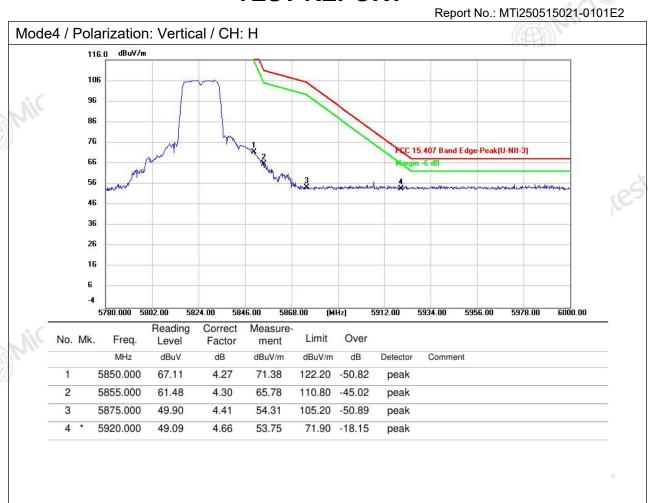


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## **TEST REPORT**



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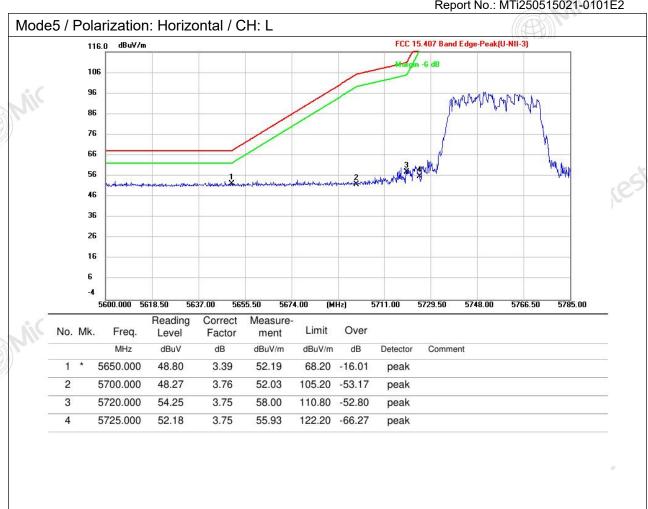


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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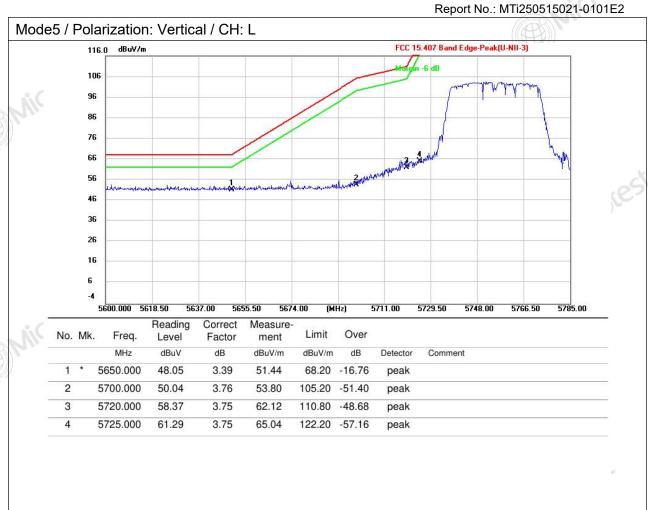




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## **TEST REPORT**

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## **TEST REPORT**



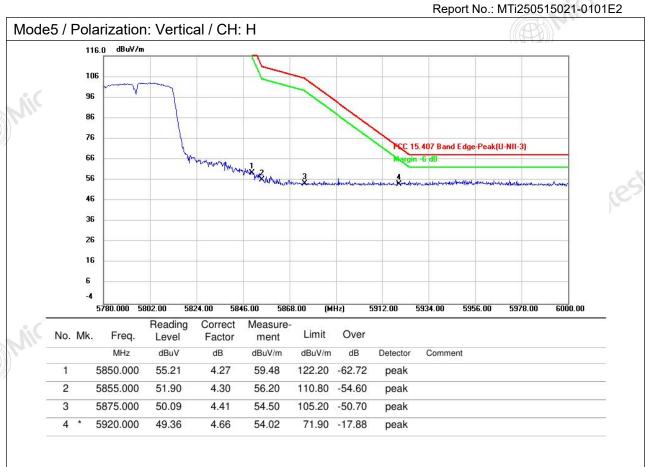
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## **TEST REPORT**

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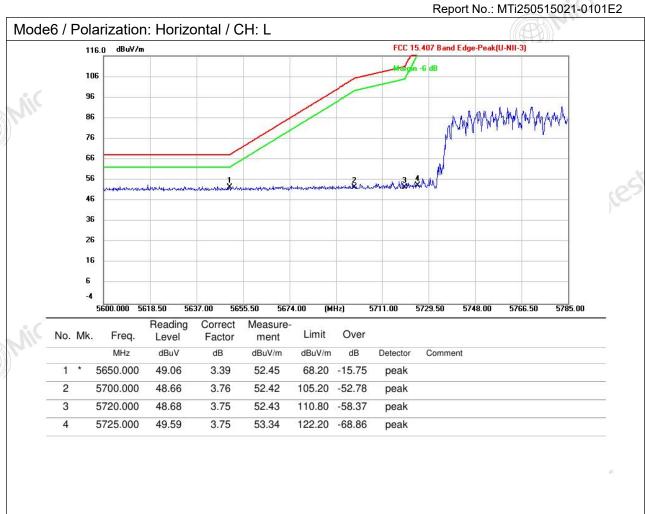


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## **TEST REPORT**

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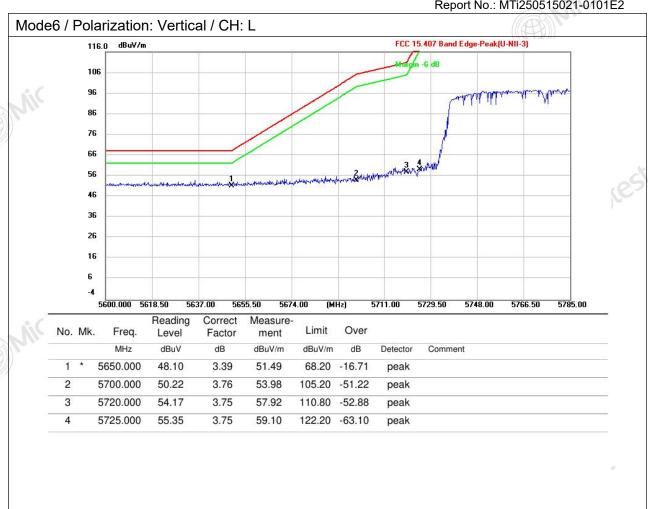


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

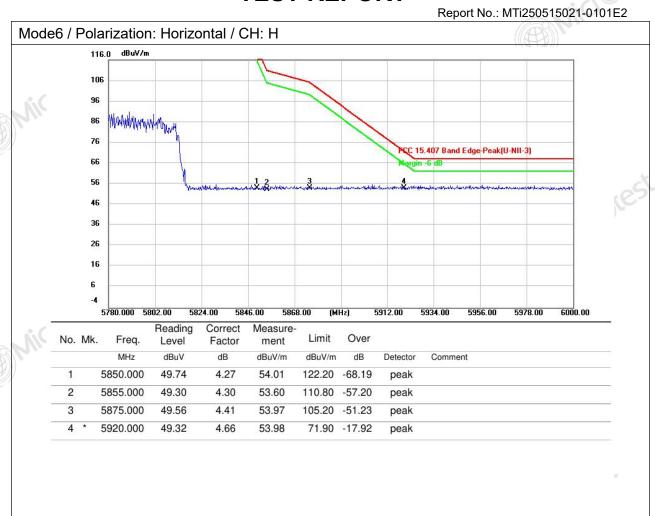
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## **TEST REPORT**



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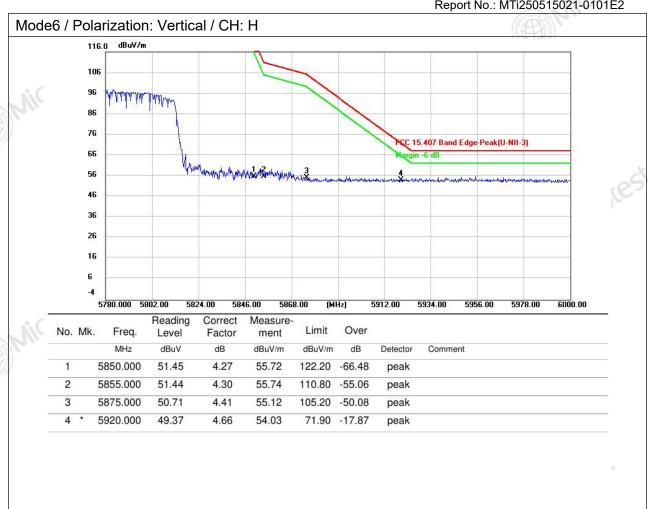


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## **TEST REPORT**

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#### 6.7 Undesirable emission limits (below 1GHz)

6.7 Undesira	ible emission limits (belov	w 1GHZ)	
Test Requirement:	47 CFR Part 15.407(b)(9)		
Test Limit:	Unwanted emissions belo limits set forth in § 15.209		the general field strength
			nissions from an intentional ecified in the following table:
	Frequency (MHz)	Field strength (microvolts/meter)	Measuremen t distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
A.	30-88	100 **	3
	88-216	150 **	3
ates	216-960	200 **	3
icio	Above 960	500	3
	radiators operating under bands 54-72 MHz, 76-88 operation within these free part, e.g., §§ 15.231 and In the emission table about The emission limits shown employing a CISPR quasi kHz, 110–490 kHz and ab	this section shall not be locally MHz, 174-216 MHz or 470 quency bands is permitted 15.241. The equation in the above table are base-peak detector except for the coverage of the section	-806 MHz. However, under other sections of this at the band edges. sed on measurements he frequency bands 9–90 emission limits in these
T4 NA -411:	three bands are based on		an average detector.
Test Method:	ANSI C63.10-2013, section	n 12.7.4, 12.7.5	
Procedure:	meters above the ground rotated 360 degrees to de b. The EUT was set 3 or 1 antenna, which was mour c. The antenna height is v to determine the maximum vertical polarizations of the d. For each suspected em then the antenna was tune frequency of below 30MHz	n value of the field strengthe antenna are set to make ission, the EUT was arranged to heights from 1 meter z, the antenna was tuned t	c chamber. The table was highest radiation. terference-receiving e-height antenna tower. ur meters above the ground n. Both horizontal and the measurement. ged to its worst case and to 4 meters (for the test to heights 1 meter) and the
Microtest	reading. e. The test-receiver system Bandwidth with Maximum f. If the emission level of the specified, then testing coube reported. Otherwise the re-tested one by one using in a data sheet. g. Test the EUT in the low	m was set to Peak Detect F Hold Mode. ne EUT in peak mode was ld be stopped and the pea e emissions that did not ha g quasi-peak method as sp	10dB lower than the limit alk values of the EUT would are 10dB margin would be becified and then reported annel, the Highest channel



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Transmitting mode, and found the X axis positioning which it is the worst case.

- i. Repeat above procedures until all frequencies measured was complete.
   Remark:
- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

#### Above 1GHz:

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete. Remark:
- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had



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## **TEST REPORT**

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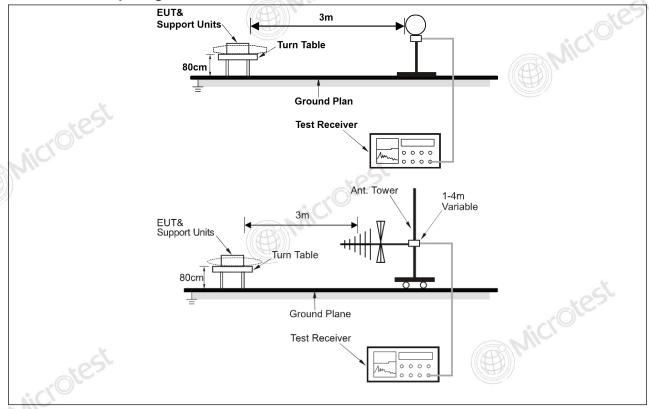
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#### 6.7.1 E.U.T. Operation:

	Operating Envi	ronmer	nt:				
	Temperature:	22.4 °	С	Humidity:	56 %	Atmospheric Pressure:	101 kPa
1	Pre test mode:		Mod	e1, Mode2, N	Mode3, Mode	4, Mode5, Mode6	
	Final test mode	<b>)</b> :		•	re-test mode recorded in	were tested, only the data the report	of the worst

#### 6.7.2 Test Setup Diagram:



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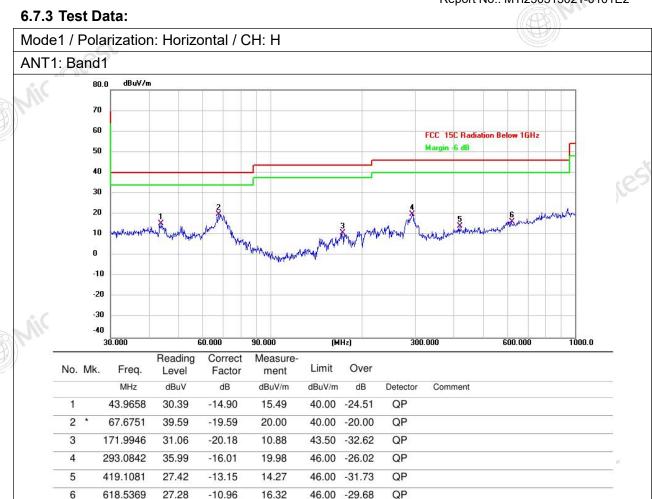


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## **TEST REPORT**

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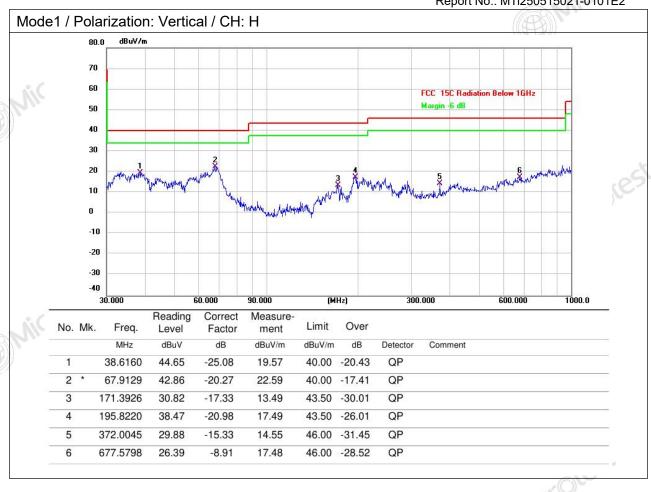


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## **TEST REPORT**

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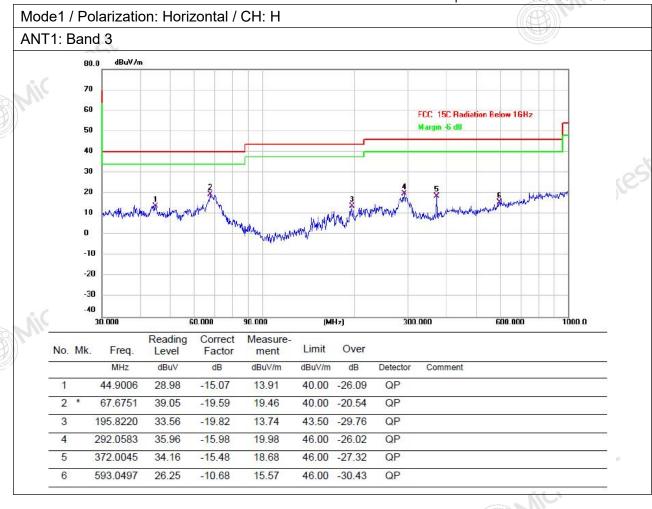


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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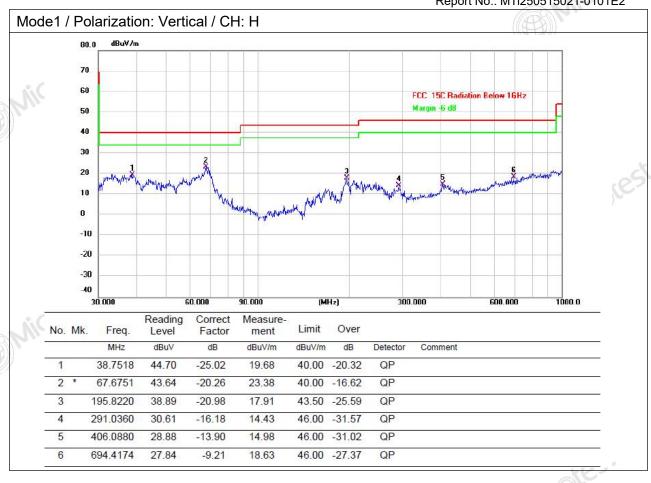


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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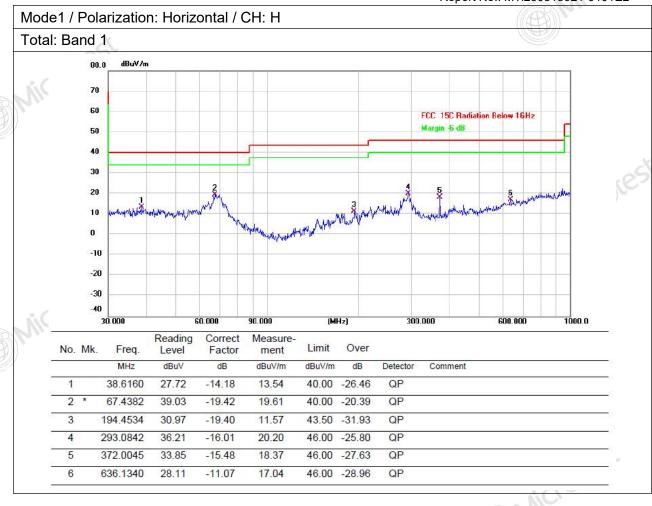


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## **TEST REPORT**

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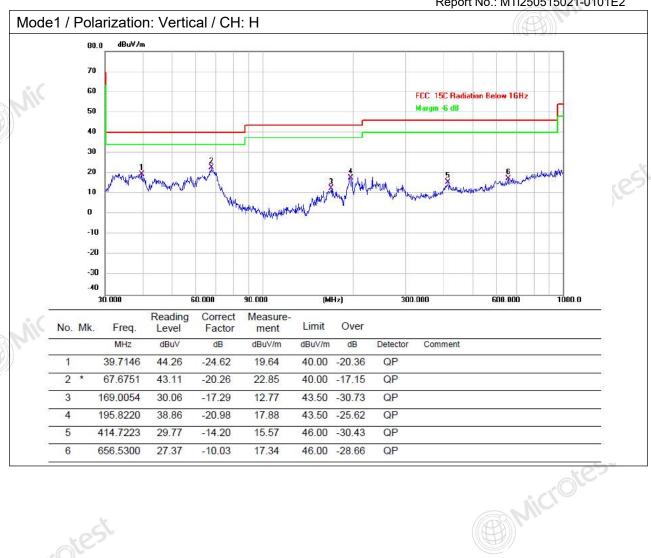


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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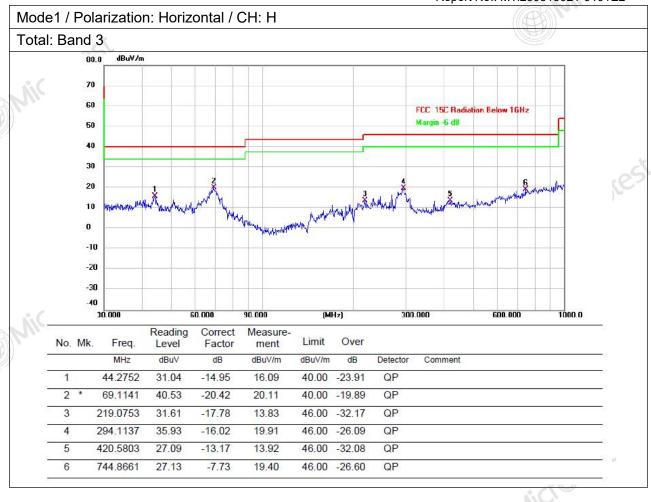


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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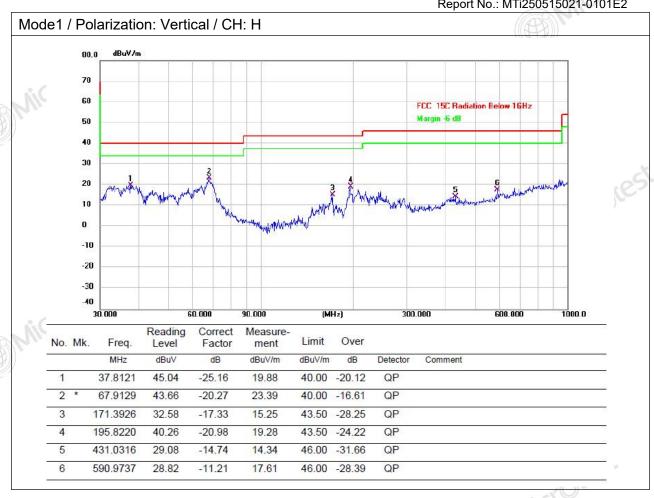


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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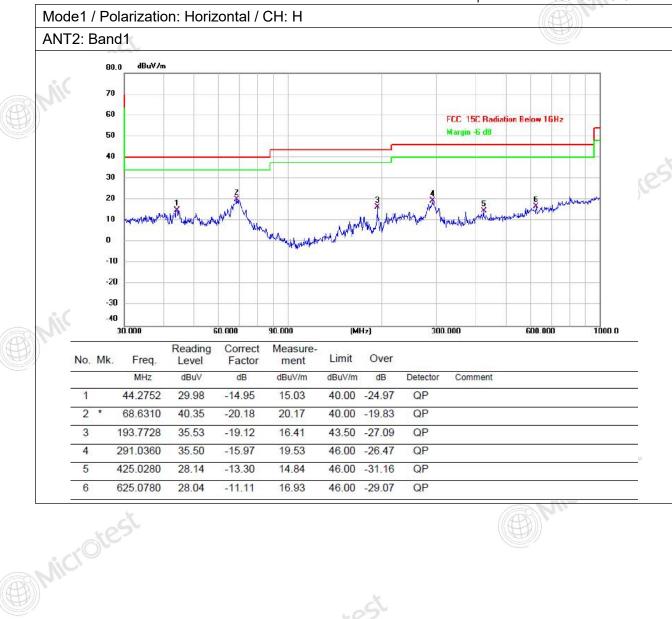


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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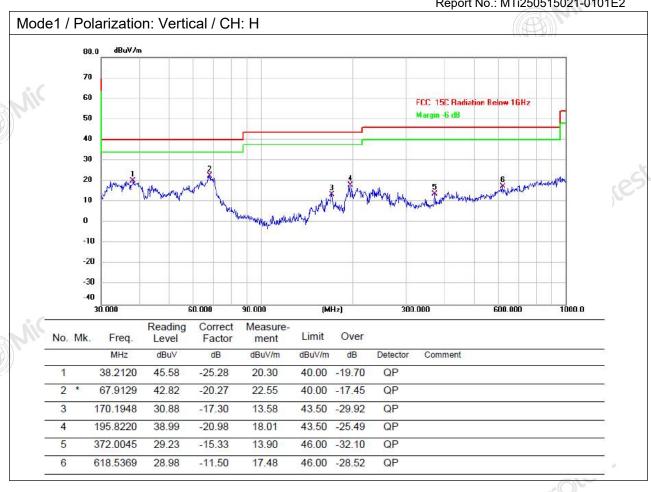


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## **TEST REPORT**

Report No.: MTi250515021-0101E2

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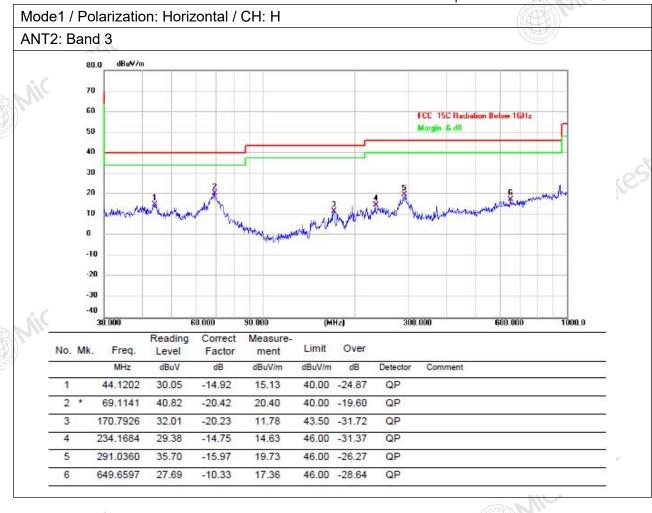


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# TEST REPORT

Report No.: MTi250515021-0101E2

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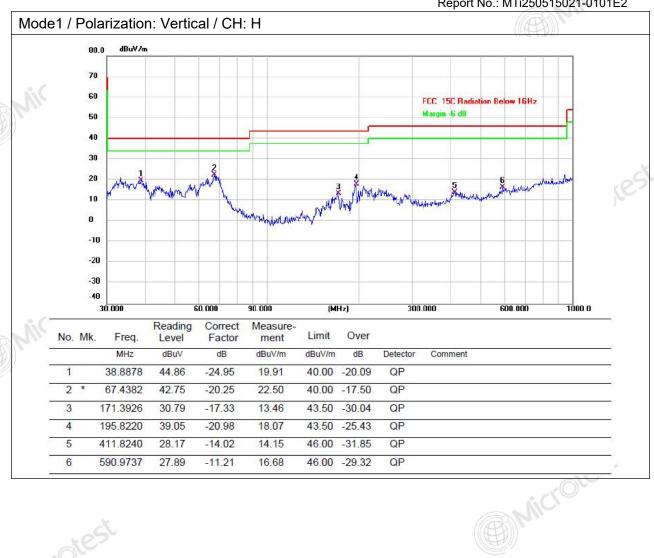


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## **TEST REPORT**

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#### 6.8 Undesirable emission limits (above 1GHz)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(4)	
	47 CFR Part 15.407(b)(10)	

Test Limit:

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For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

-			( Charles )
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475- 16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425- 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5- 1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8- 1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475- 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-	240-285	3345.8-3358	36.43-36.5
12.52025			
12.57675-	322-335.4	3600-4400	(2)
12.57725	17.		_\
13.36-13.41			162

<sup>&</sup>lt;sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

<sup>&</sup>lt;sup>2</sup> Above 38.6



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Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength	Measuremen
	(microvolts/meter)	t distance
	1	(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

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method:

ANSI C63.10-2013, section 12.7.4, 12.7.6, 12.7.7

#### Procedure:

#### Above 1GHz:

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete. Remark:
- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low.



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Microtest

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The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

#### 6.8.1 E.U.T. Operation:

Microtest

Operating Envi	ronmen	ıt:				
Temperature:	22.4 °	С	Humidity:	56 %	Atmospheric Pressure:	101 kPa
Pre test mode:		Mod	e1, Mode2, N	Mode3, Mode	e4, Mode5, Mode6	
Final test mode	):		f the listed pre e (Mode1) is		were tested, only the data the report	of the worst

Microlest



Microlest

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#### 6.8.2 Test Data:

Mode	e1 / Polarizati	on: Horiz	ontal / CH: I	_			(CA	
ANT1	1: Band 1							
Mic	No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector

INO.	ivin	rieq.	Levei	Factor	ment	Littie	OVCI	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		10360.000	45.31	10.59	55.90	74.00	-18.10	peak
2		10360.000	33.73	10.59	44.32	54.00	-9.68	AVG
3		15540.000	46.96	12.96	59.92	74.00	-14.08	peak
4	*	15540.000	35.51	12.96	48.47	54.00	-5.53	AVG

No.	М	lk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		10	360.000	44.93	10.59	55.52	74.00	-18.48	peak
2		10	360.000	33.80	10.59	44.39	54.00	-9.61	AVG
3		15	540.000	46.42	12.96	59.38	74.00	-14.62	peak
4	*	15	540.000	34.73	12.96	47.69	54.00	-6.31	AVG



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Mhicrote:

No	No.	M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
36			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
111-	1		10400.000	43.89	10.65	54.54	74.00	-19.46	peak
	2		10400.000	32.62	10.65	43.27	54.00	-10.73	AVG
-	3		15600.000	45.87	13.11	58.98	74.00	-15.02	peak
	4	*	15600.000	34.25	13.11	47.36	54.00	-6.64	AVG

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		10400.000	44.45	10.65	55.10	74.00	-18.90	peak
2		10400.000	33.56	10.65	44.21	54.00	-9.79	AVG
3		15600.000	47.04	13.11	60.15	74.00	-13.85	peak
4	*	15600.000	35.56	13.11	48.67	54.00	-5.33	AVG