

TEST REPORT

Report No.: 21050183HKG-002

Genesis Industries Limited

Japan RF Law Type Approval- 2.4GHz Band Wideband Low-power Data Communication System (WWA)

Prepared and Checked By:

Approved by:

Signed On File
Matthew Lam
Assistant Engineer



Digitally signed by
Lee Shui Tim, Tim
Location: Intertek
Testing Services
Hong Kong Ltd.

Lee Shui Tim, Tim
Senior Supervisor
Date: 08 Jun 2021

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TEST REPORT

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TEST REPORT

1.0 GENERAL INFORMATION

Report No.:	21050183HKG-001
Applicant:	Genesis Industries Limited Room C, Phase I, 9/F., Hong Kong Spinners Industrial Building, 818 Cheung Sha Wan Road, Cheung Sha Wan, Kowloon, Hong Kong.
Equipment Under Test (EUT):	
Product Description:	Vehicle for Laser Battle Hunters
Model:	33298
Brand Name:	Not Applicable
Samples No:	1/2
Sample Receipt Date:	04 May 2021
Test Conducted Date:	15 May 2021 to 18 Jun 2021
Issue Date:	18 Jun 2021
Test Site Location:	Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong SAR, China.
Classification Of Specified Radio Equipment:	Article 2 Clause 1 Item 19
Type Of Emissions, Frequency and Declaration Output Power to Be Tested:	F1D 2407MHz~2453MHz (1MHz separate 47 Channels) 0.003W
Modulation Method:	Other Digital Modulation
Environmental Conditions:	Temperature: +5 to +35°C Humidity: 45 to 85%
Testing Conditions:	Temperature: +21°C Humidity: 58%
Test Category:	2.4GHZ Band Wideband Low-Power Data Communication System
Antenna Gain:	0dBi
Test Requirement:	MIC Test Procedure #43
Test Result:	Pass

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2.0 TEST RESULTS SUMMARY FOR JAPANESE CERTIFICATION

Genesis Industries Limited
Model: 33298

Test Item					limit	unit		7.5 V			Judge
Frequency					NA	MHz	Flow	Fmiddle		Fhigh	ment
Frequency Error					50	ppm	6.73	6.91		6.85	ok
Occupied Bandwidth					26	MHz	3.72	25.89		3.72	ok
Spreading Bandwidth					NA	kHz					-
Spreading factor					NA	-					-
Spurious	30	~	1000	MHz	-26	dBm/MHz	-57.88	-61.57		-64.35	ok
						MHz	670.20	685.72		716.76	
	1000	~	2387	MHz	-26	dBm/MHz	-39.07	-48.78		-52.06	ok
						MHz	2387.00	2373.13		2387.00	
	2387	~	2400	MHz	-16	dBm/MHz	-29.41	-40.86		-41.89	ok
						MHz	2399.92	2399.84		2398.49	
	2483.5	~	2496.5	MHz	-16	dBm/MHz	-54.97	-47.91		-45.75	ok
						MHz	2483.55	2484.33		2483.76	
	2496.5	~	4000	MHz	-26	dBm/MHz	-61.71	-57.81		-51.30	ok
						MHz	2499.51	2505.52		2499.51	
	4000	~	12500	MHz	-26	dBm/MHz	-45.88	-46.62		-49.04	ok
						MHz	7230.00	7264.00		7349.00	-
Rated Power					3	mW					ok
Antenna Power					10	mW	2.00	1.84		1.80	ok
				-80	-	20	%	-33.33	-38.67	-40.00	ok
Antenna Gain:	0	dBi			12.14	dBm	3.01	2.65		2.55	ok
Collateral emission	30	~	1000	MHz	-54	dBm/MHz	-71.31	-73.19		-69.21	ok
						MHz	916.58	695.42		916.58	
	1000	~	3000	MHz	-47	dBm/MHz	-61.99	-61.58		-61.68	ok
						MHz	2756.00	2780.00		2808.00	
	3000	~	6000	MHz	-47	dBm/MHz	-55.91	-55.48		-55.40	ok
						MHz	3288.00	3276.00		3240.00	
	6000	~	12500	MHz	-47	dBm/MHz	-56.84	-56.94		-56.77	ok
						MHz	8158.00	10992.00		9562.00	-
System:ID					yes		complies				ok
System:Carrier Sense					na						-
System:DFS					na						-

Note:

Measurement was conducted by the following test method:
MIC Annex #43 or the test method more than equivalent.

Test condition: Most strict condition is applied. That is, At F low 2407/2408/2409/2410MHz,
at F middle 2423/2430/2437/2447MHz at F high 2450/2451/2452/2453MHz

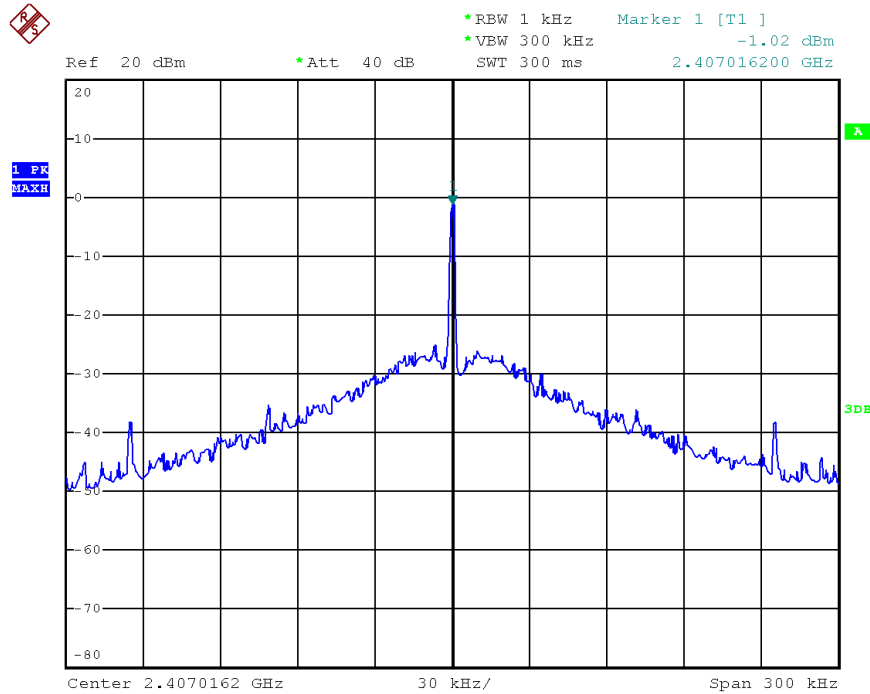
TEST REPORT

3.0 MEASUREMENT RESULTS

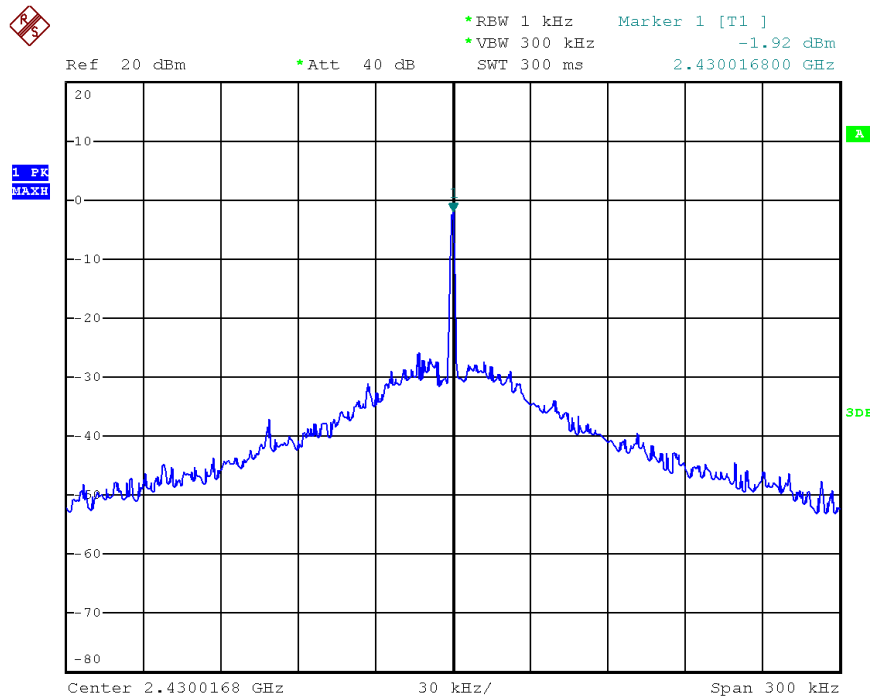
3.1 Frequency Tolerance

3.1.1 Modulation Type: car un-modulation

2407MHz



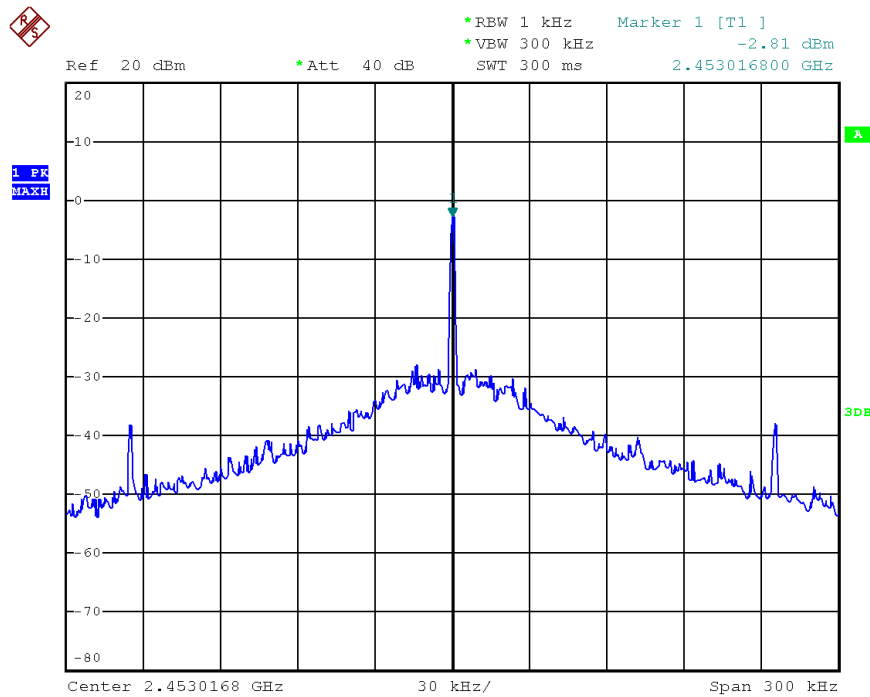
2430MHz



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3.1.1 Modulation Type: car un-modulation

2453MHz



Note: Conducted measurement was preformed for this test.

Japanese Regulation:

Frequency Tolerance shall be within +/-50ppm.

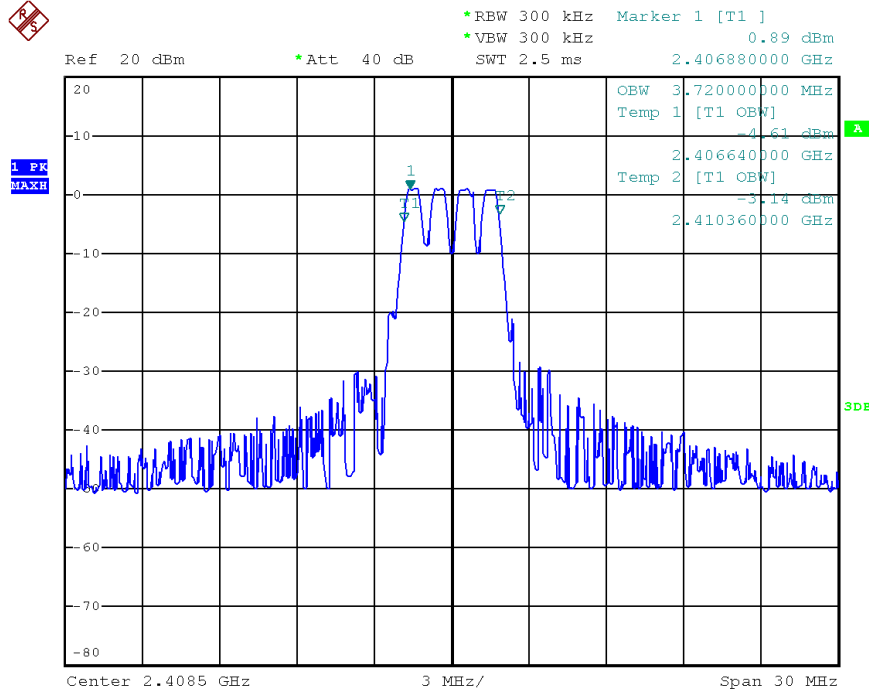
TEST REPORT

3.1.2

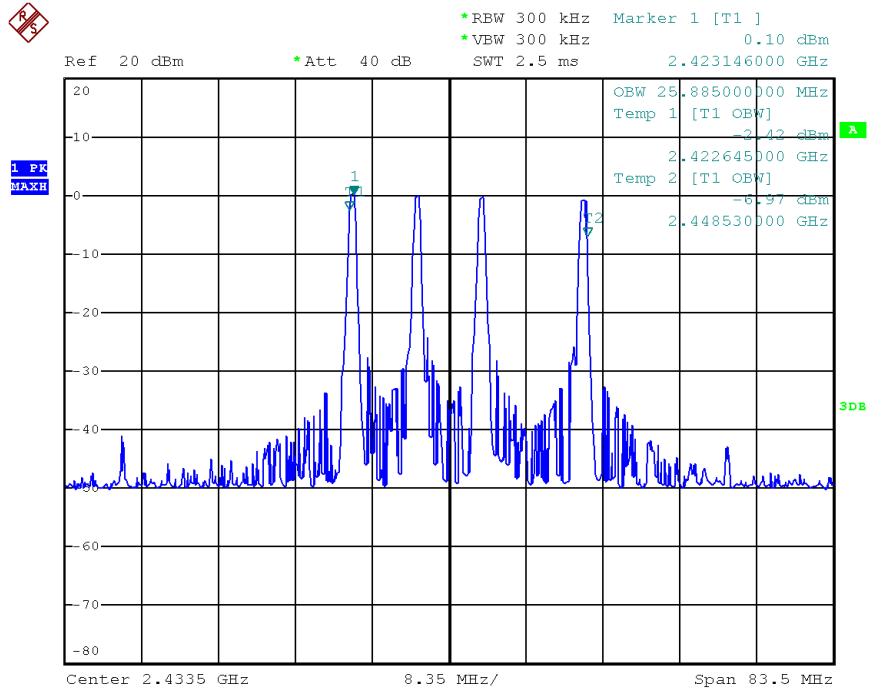
3.2 Occupied Bandwidth

3.2.1 Modulation Type: car Tx 1-3

2408MHz



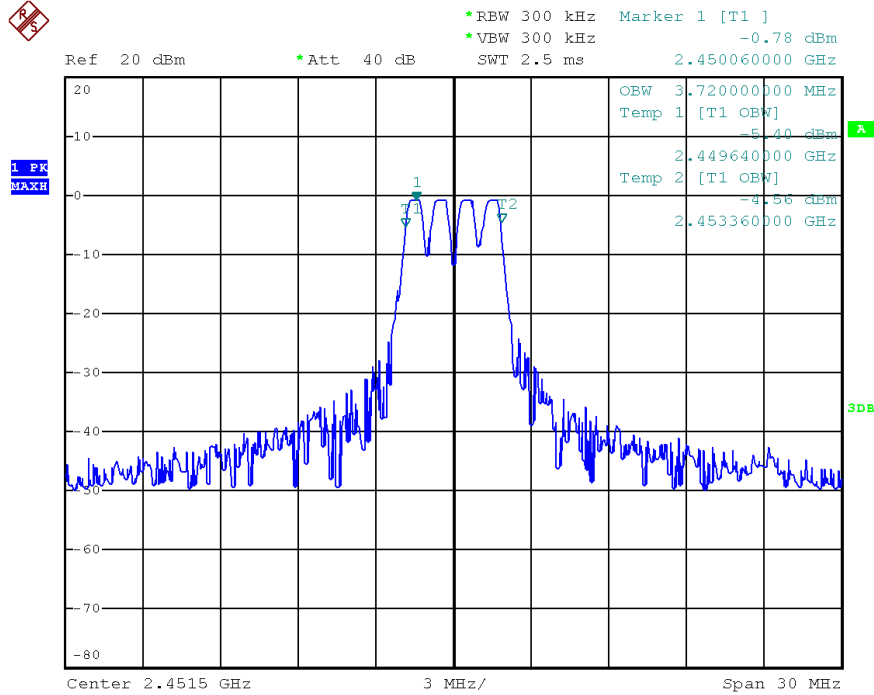
2423/2430/2437/2447MHz



TEST REPORT

3.2.1 Modulation Type: car Tx 1-3

2451MHz



Note: Conducted measurement was preformed for this test.

Japanese Regulation:

Occupied Bandwidth shall be 26 MHz or below.

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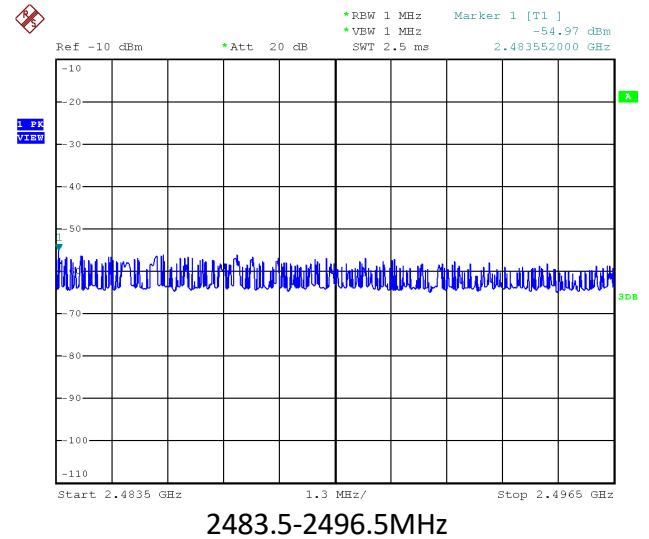
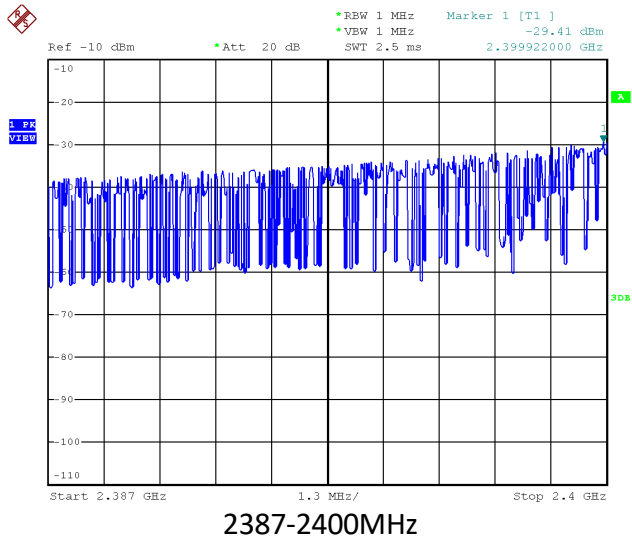
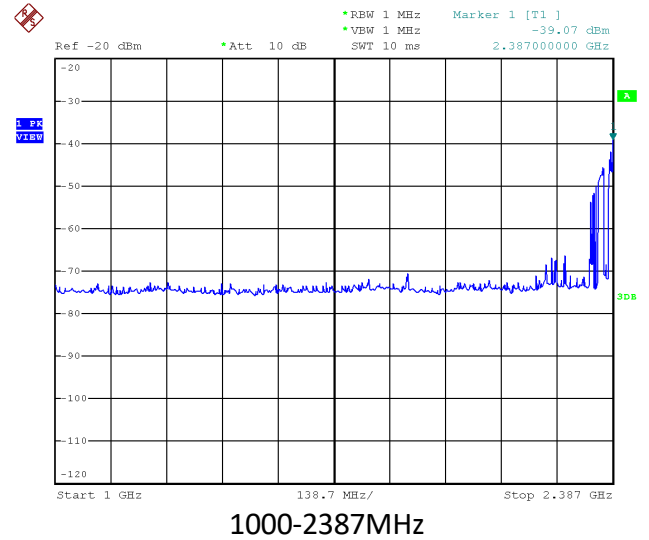
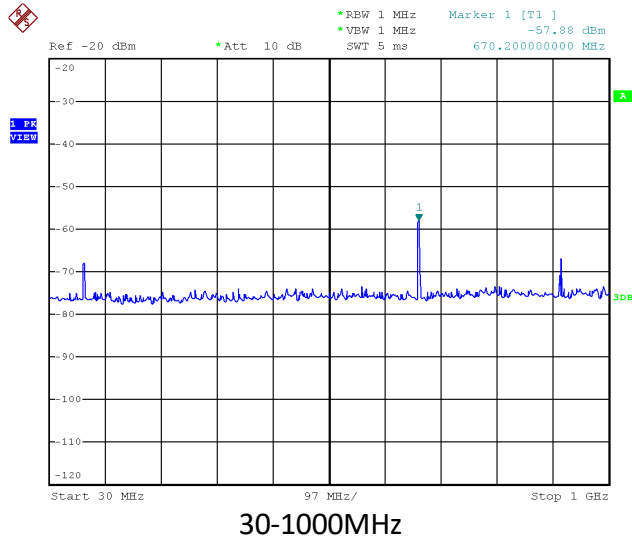
3.4 Spreading Rate Calculation

NA

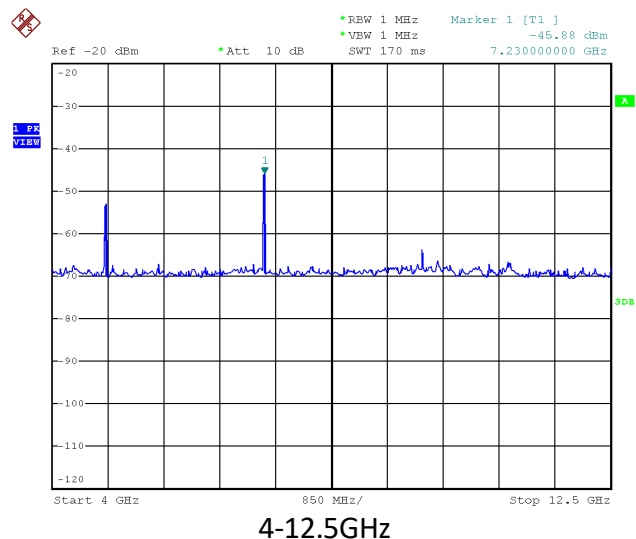
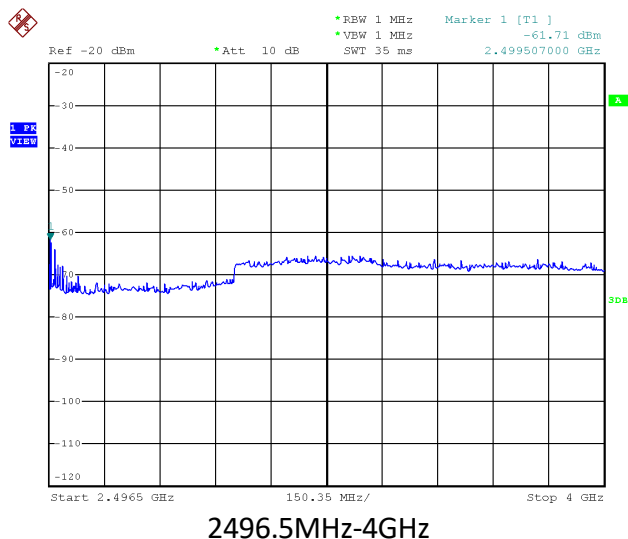
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3.5 Spurious Strength

3.5.1 Modulation Type: car Tx 1 Frequency: 2408 MHz



TEST REPORT

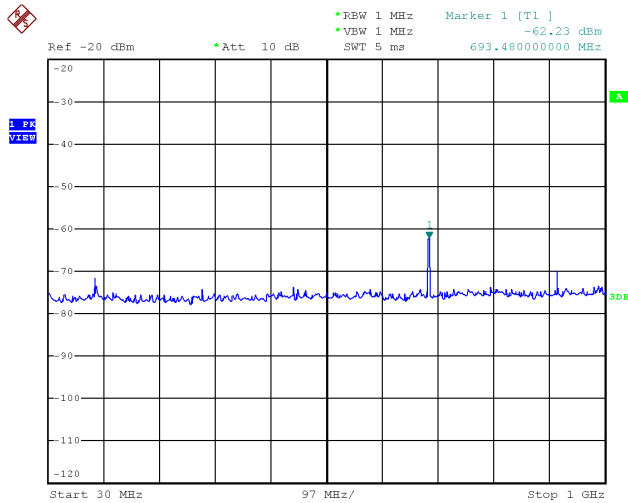


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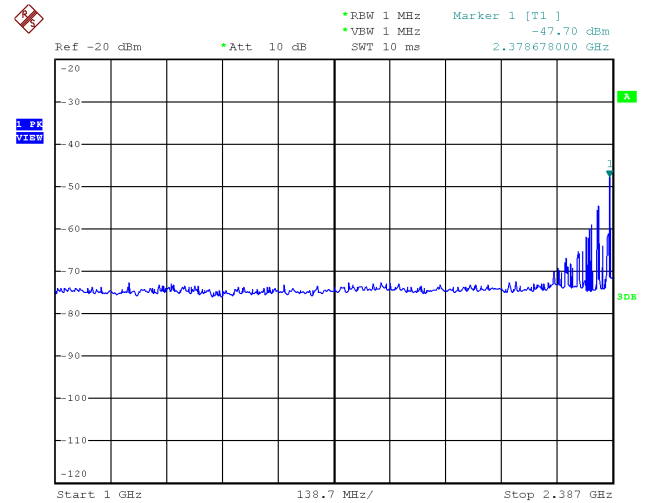
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

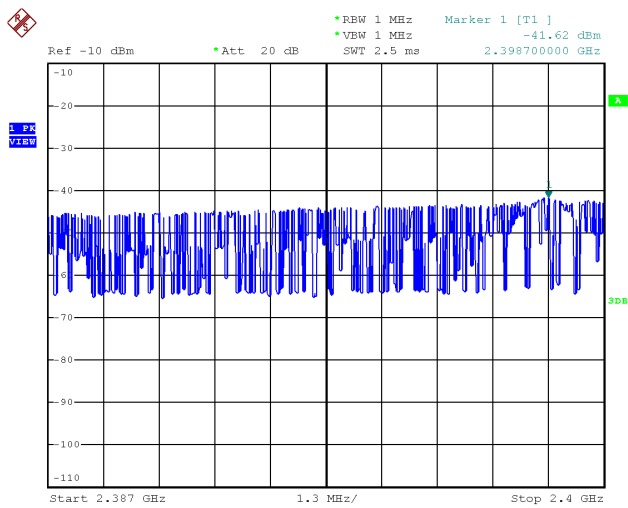
3.5.2 Modulation Type: car TX2 Frequency: 2430 MHz



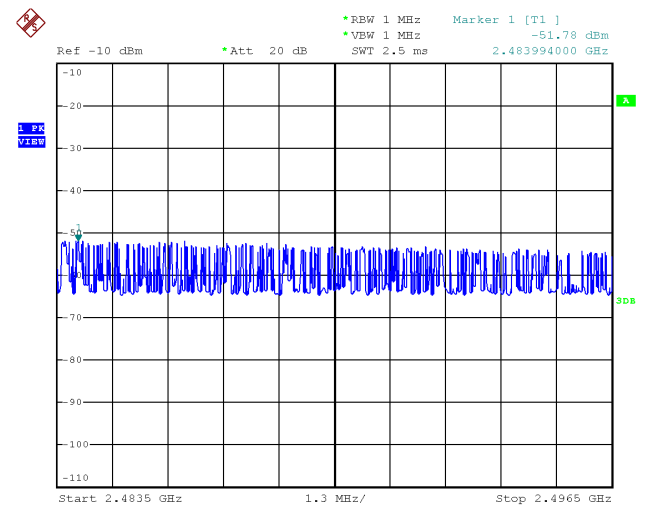
30-1000MHz



1000-2387MHz

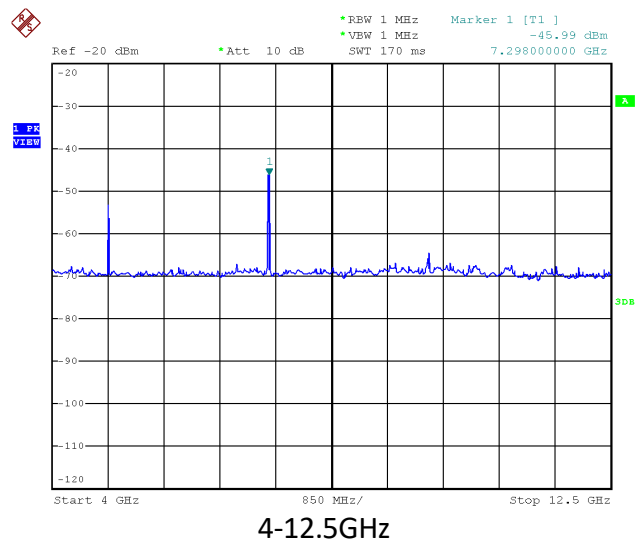
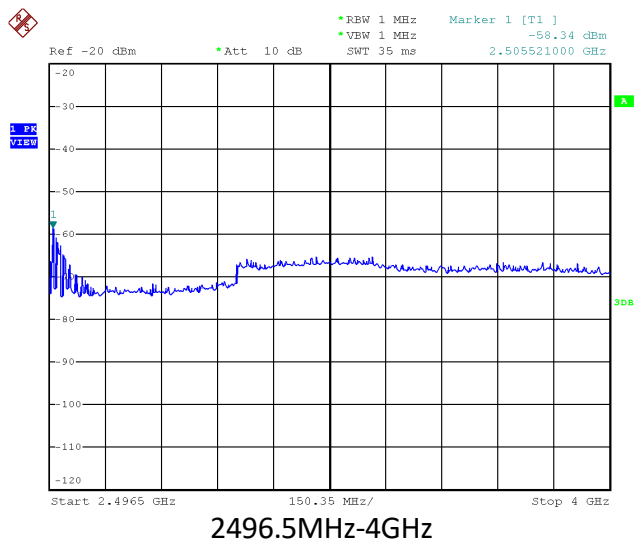


2387-2400MHz



2483.5-2496.5MHz

TEST REPORT

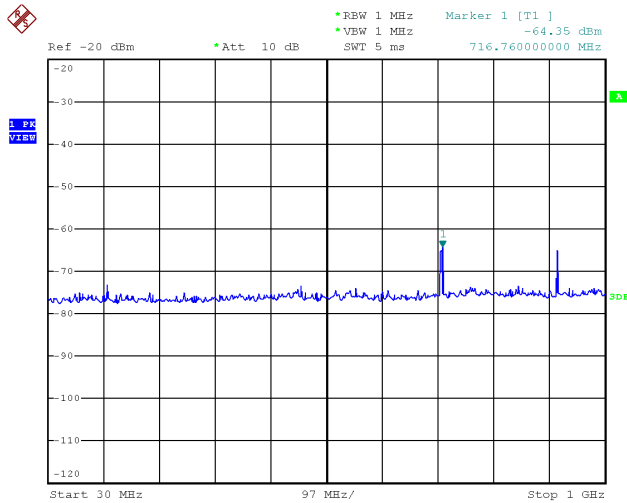


Note:

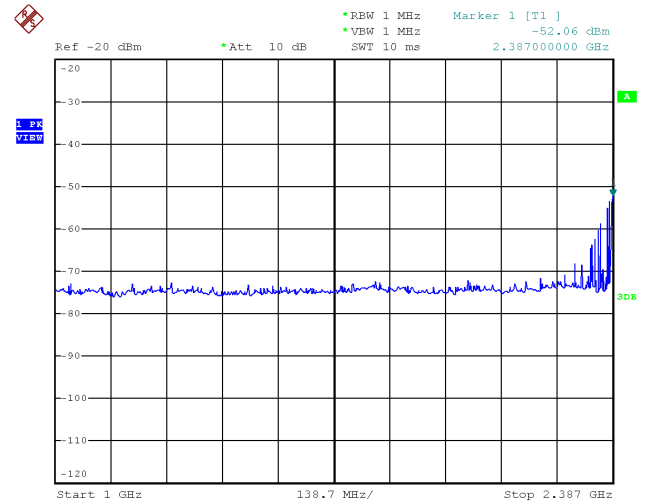
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

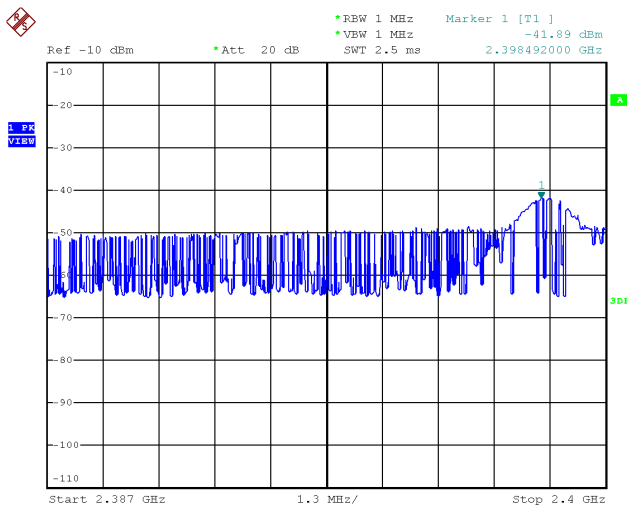
3.5.3 Modulation Type: car TX3 Frequency: 2451 MHz



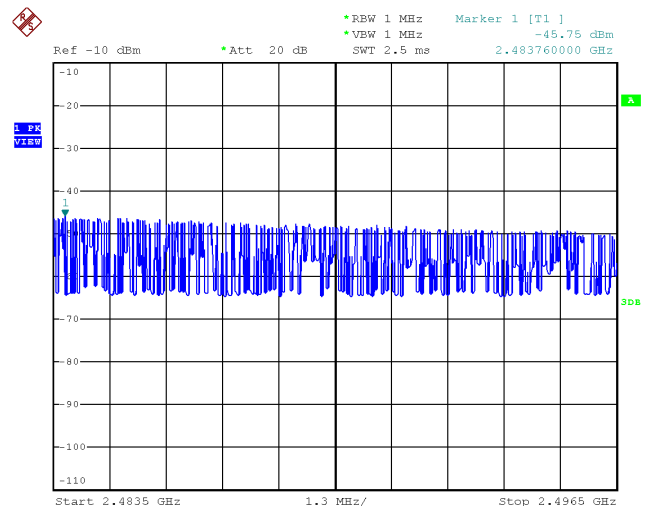
30-1000MHz



1000-2387MHz

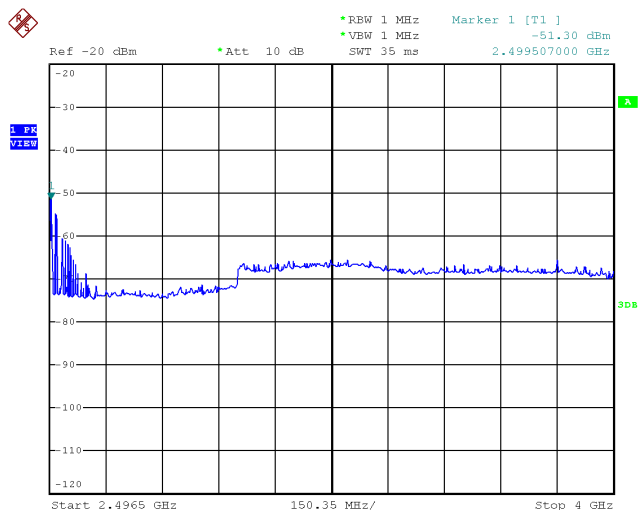


2387-2400MHz

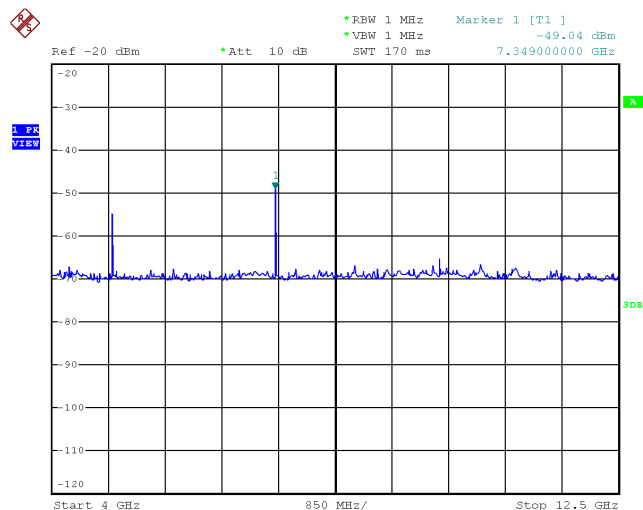


2483.5-2496.5MHz

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2496.5MHz-4GHz



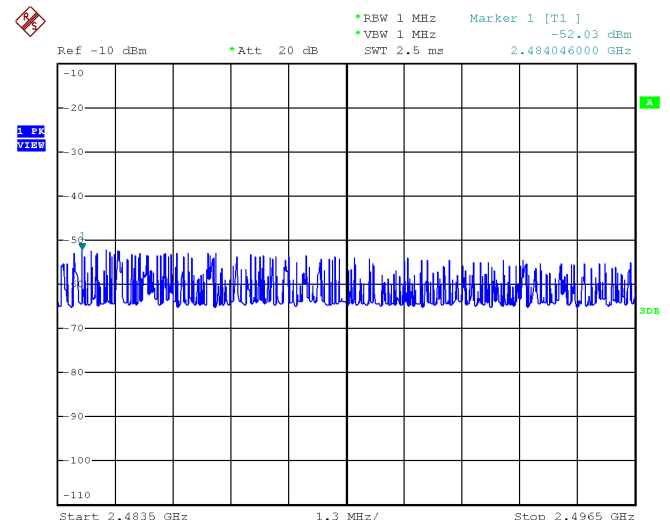
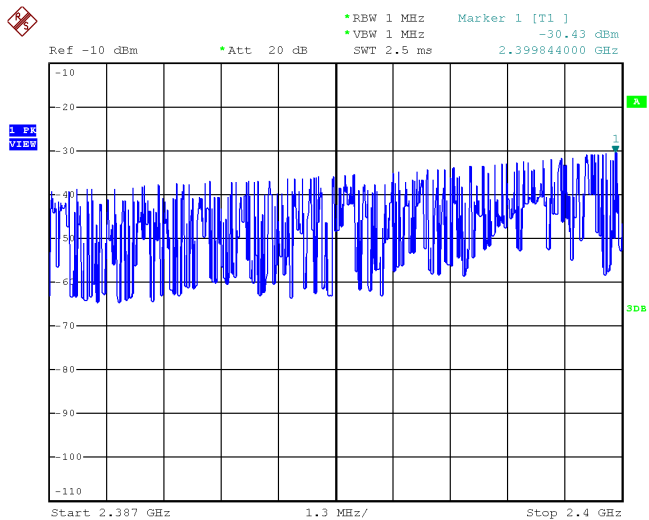
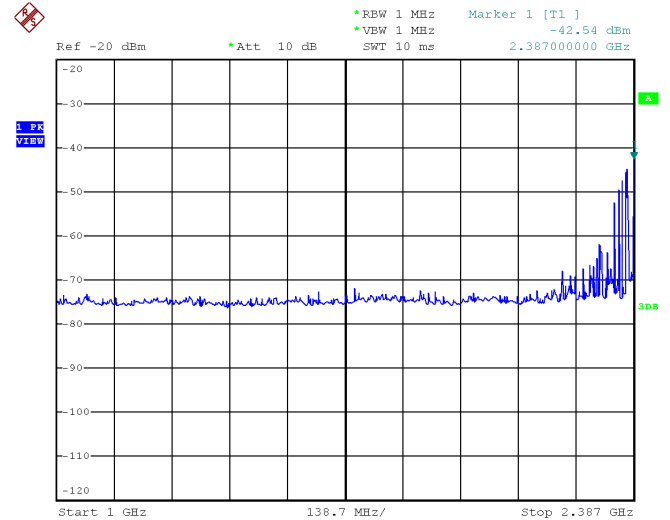
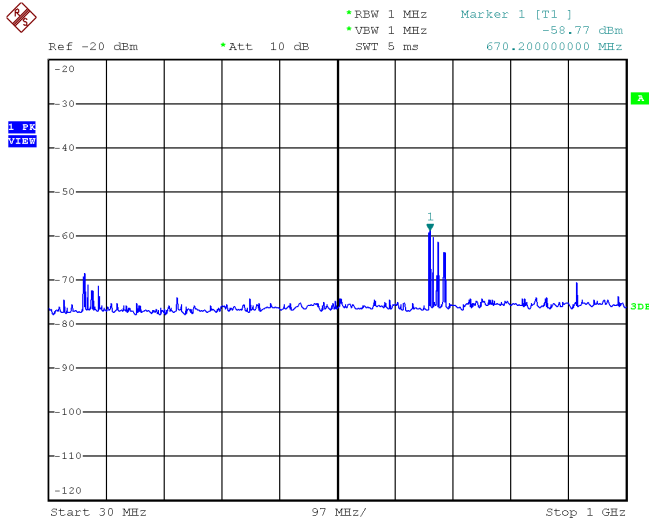
4-12.5GHz

Note:

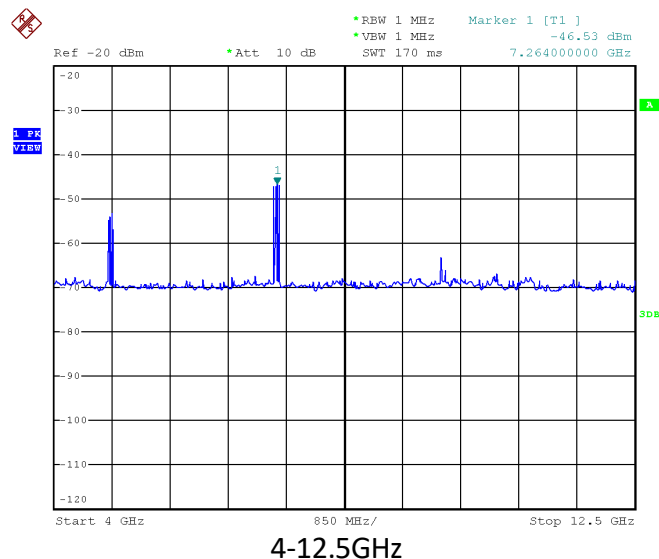
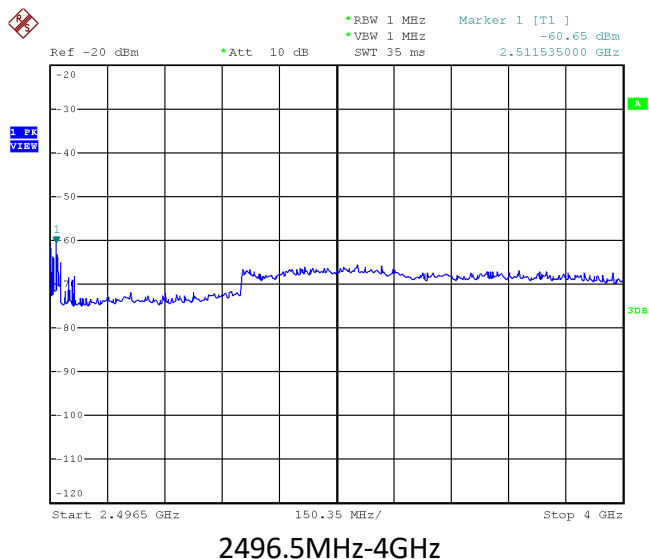
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

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3.5.4 Modulation Type: car TX4 Frequency: 2407 MHz



TEST REPORT

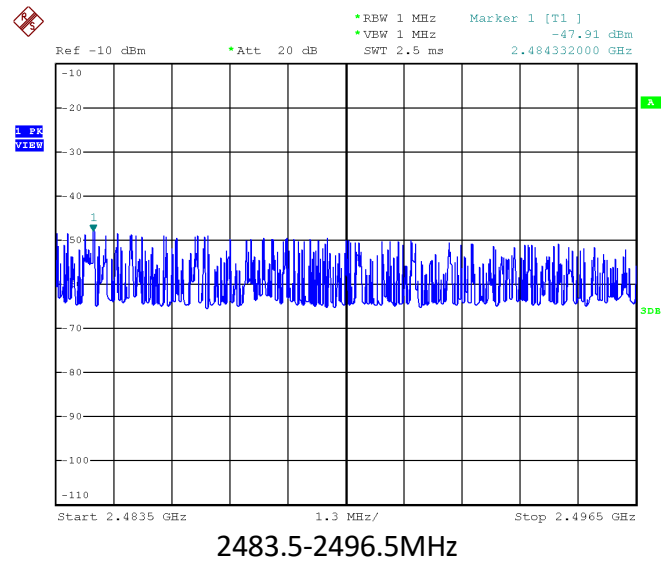
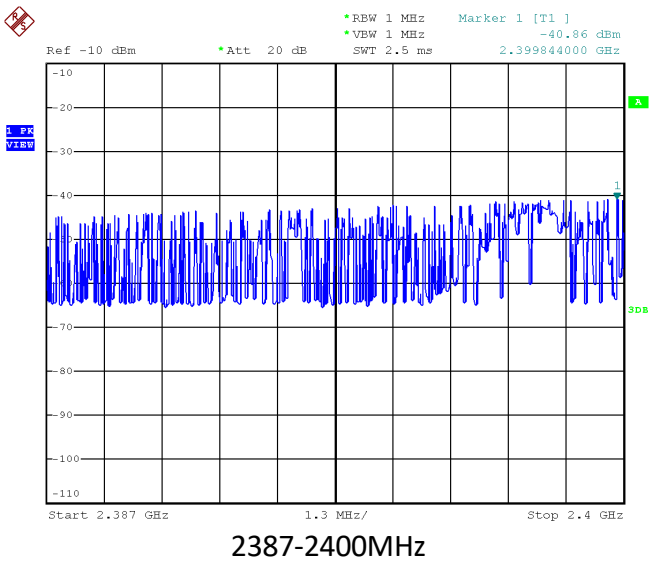
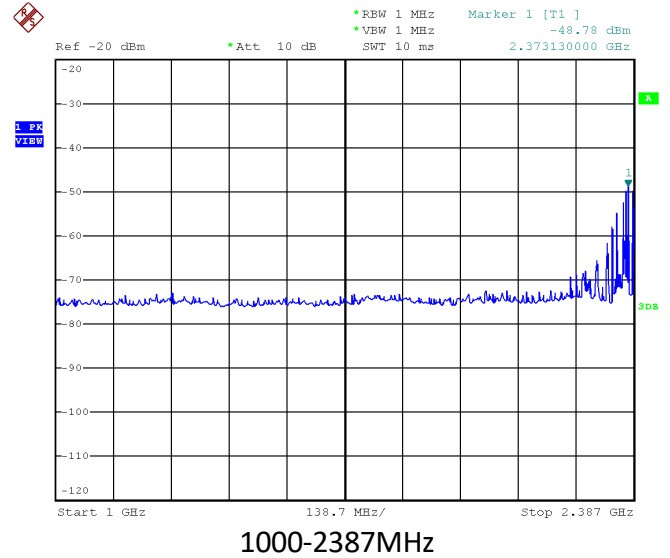
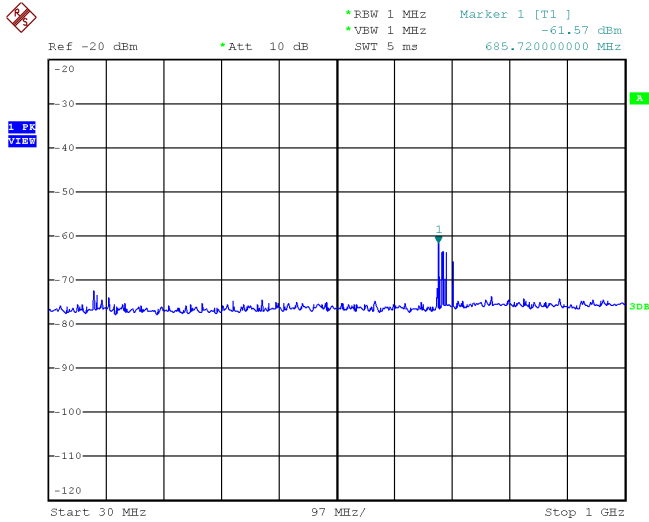


Note:

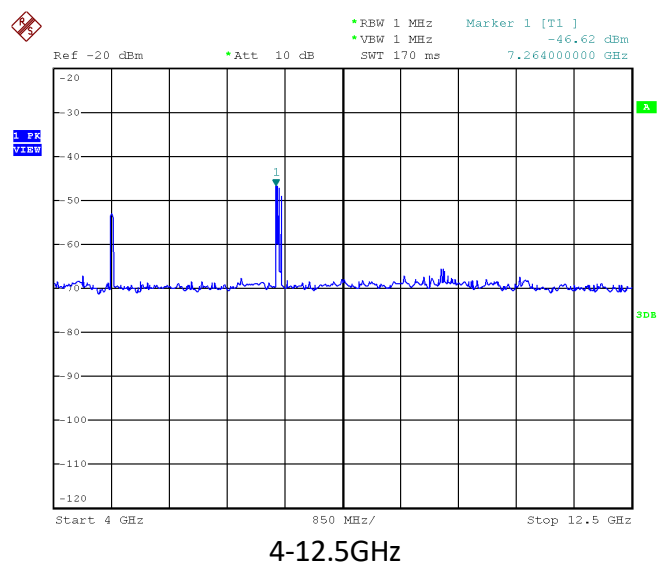
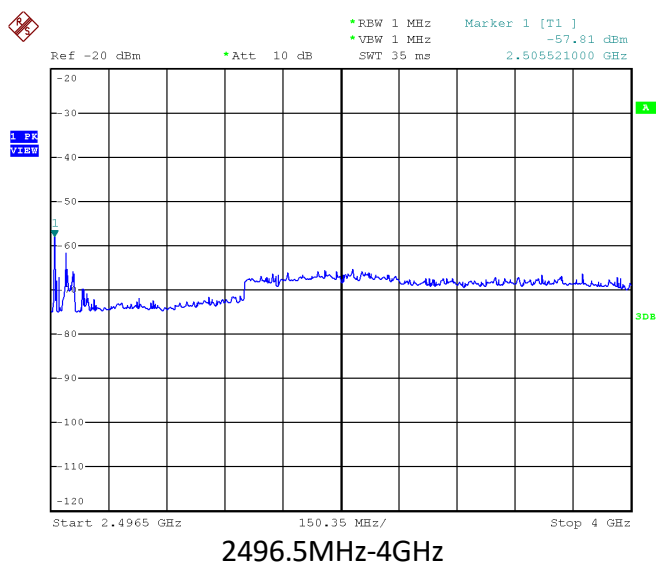
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

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3.5.5 Modulation Type: car TX5 Frequency: 2423 MHz



TEST REPORT

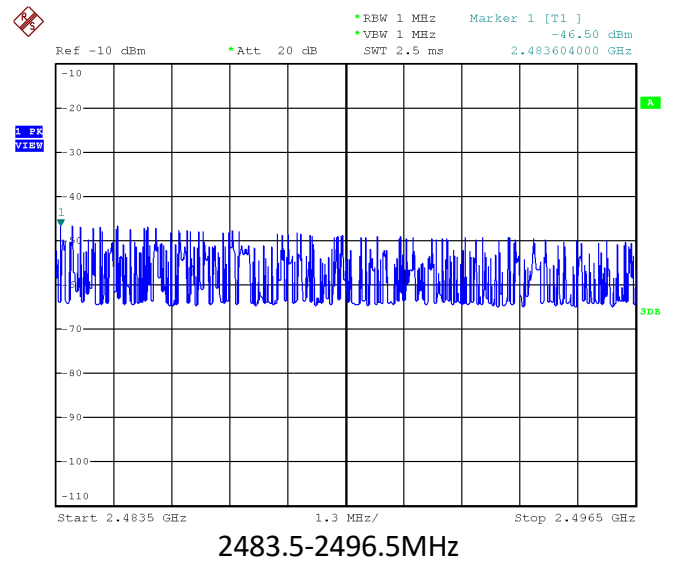
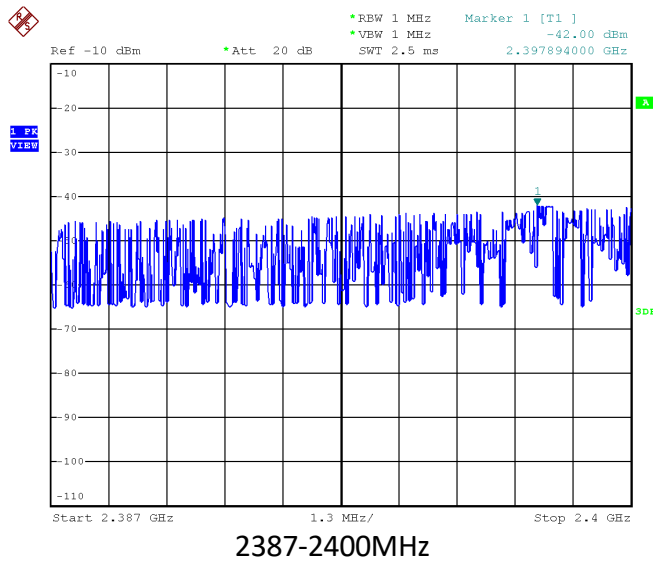
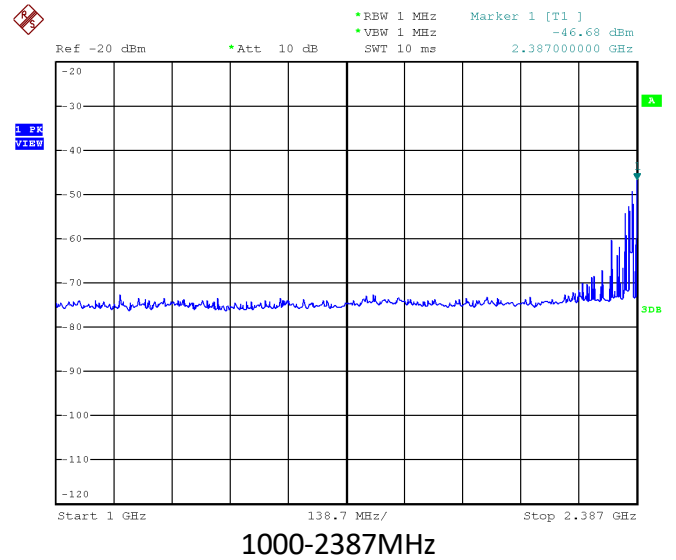
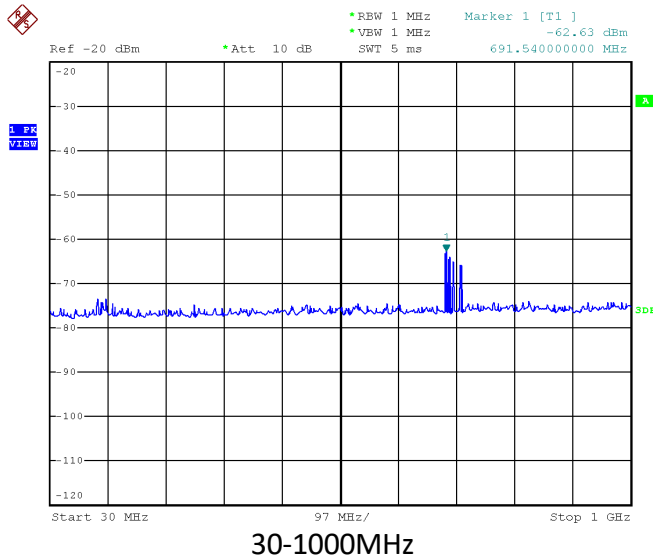


Note:

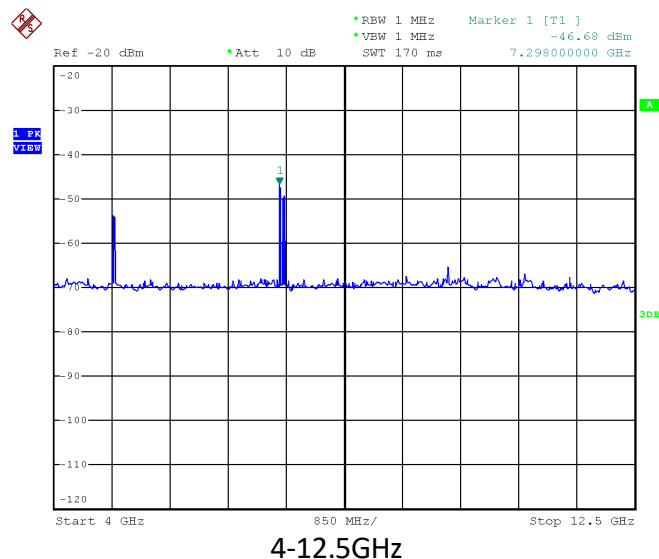
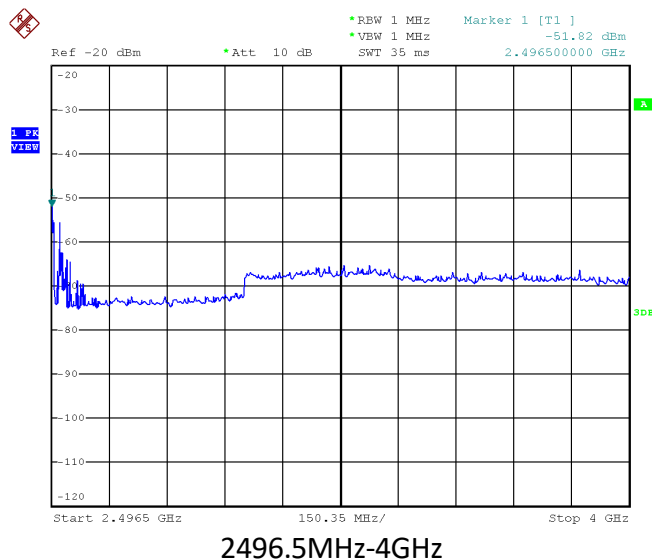
1. Negative sign (-) in the margin column signify levels below the limit.
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3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

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3.5.6 Modulation Type: car TX6 Frequency: 2428 MHz



TEST REPORT

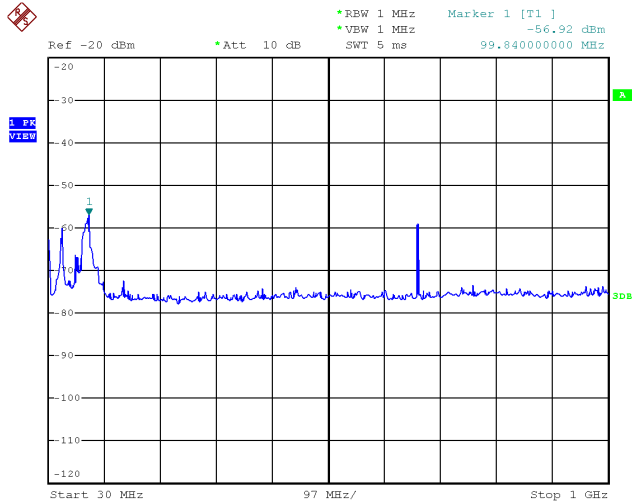


Note:

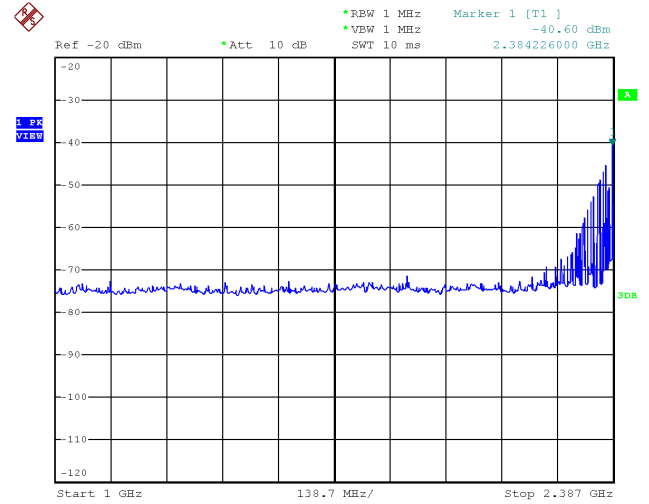
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
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4. -26.0dBm corresponds to 2.5uW.
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6. Radiated measurement was performed for this test.

TEST REPORT

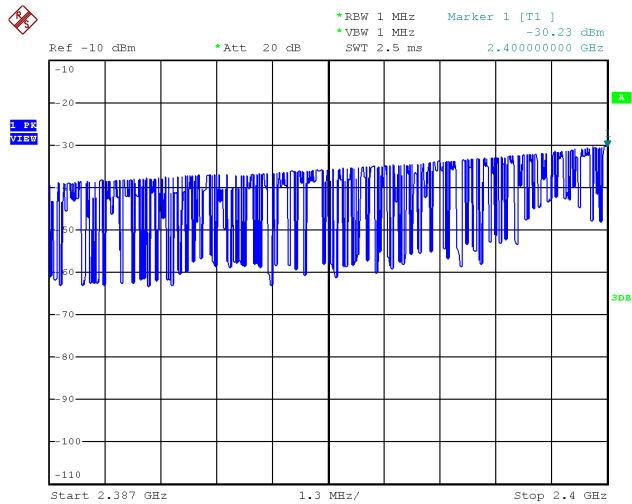
3.5.7 Modulation Type: car Tx7 Frequency: 2407 MHz



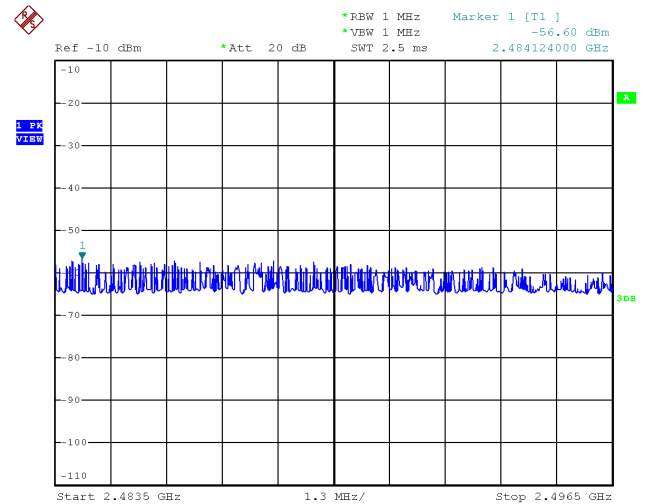
30-1000MHz



1000-2387MHz

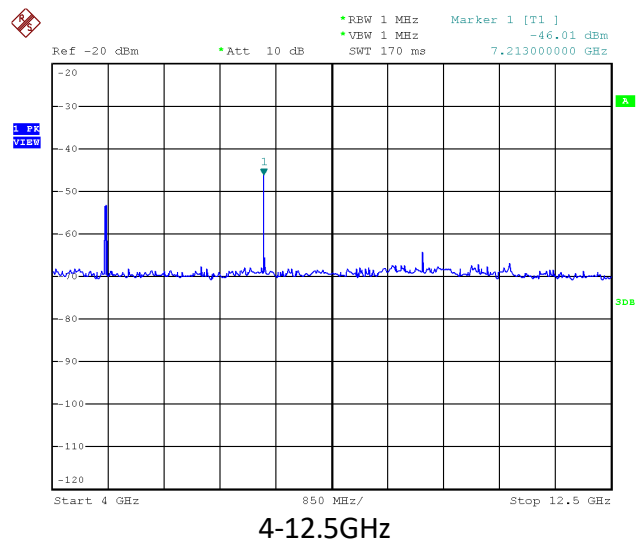
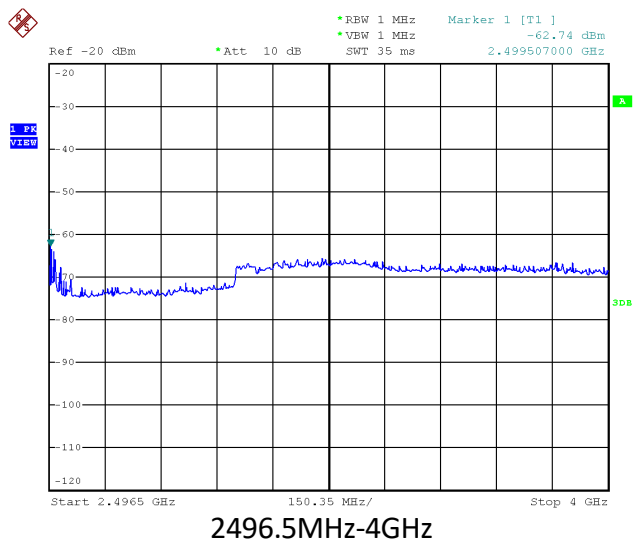


2387-2400MHz



2483.5-2496.5MHz

TEST REPORT

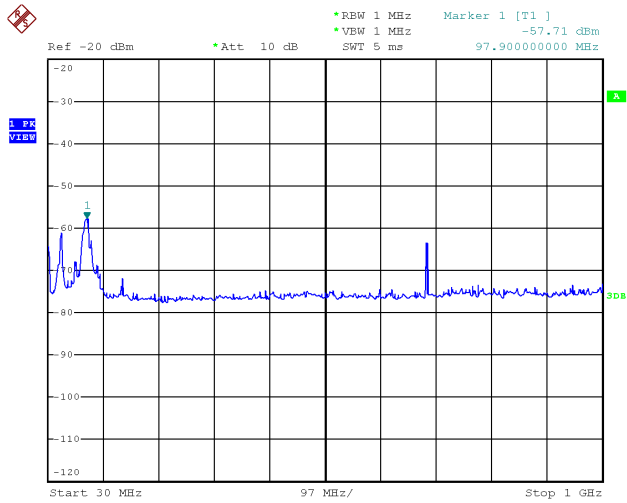


Note:

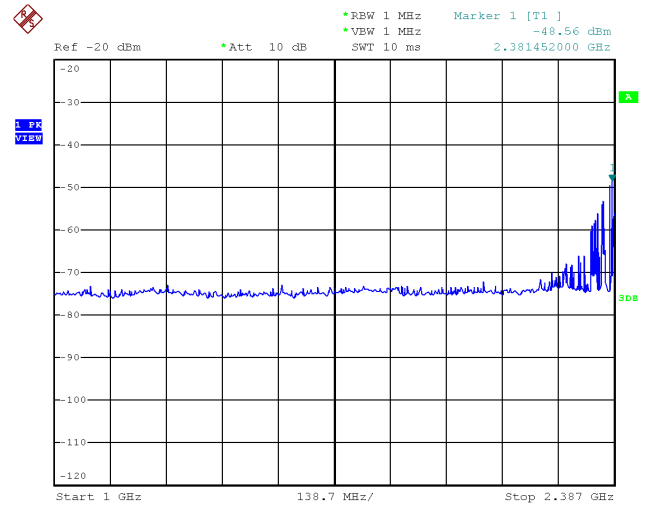
1. Negative sign (-) in the margin column signify levels below the limit.
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5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

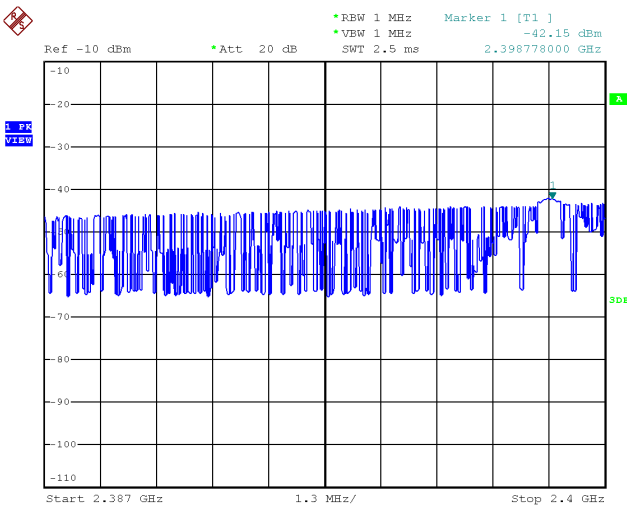
3.5.8 Modulation Type: car TX8 Frequency: 2430 MHz



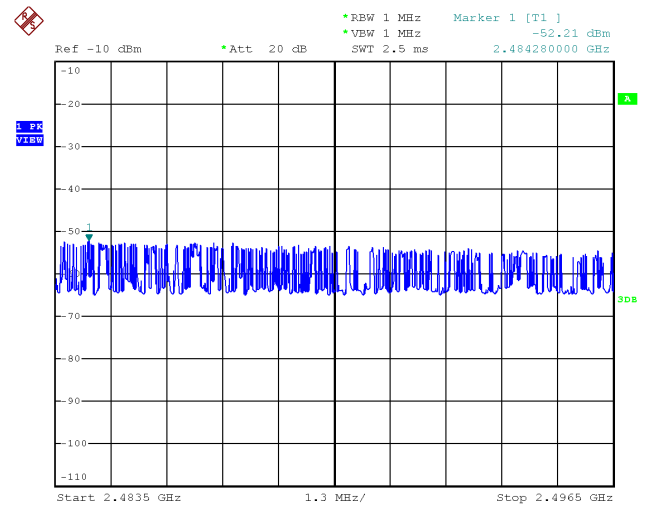
30-1000MHz



1000-2387MHz

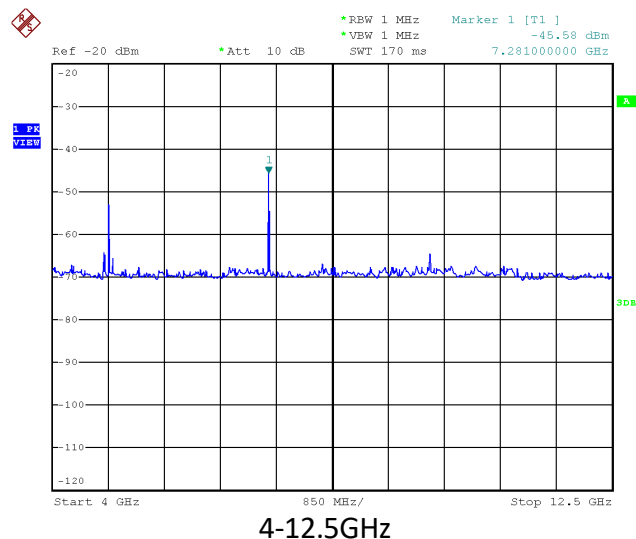
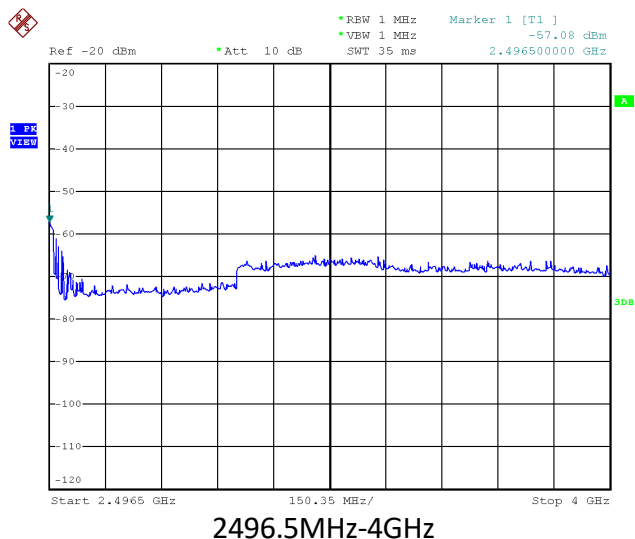


2387-2400MHz



2483.5-2496.5MHz

TEST REPORT

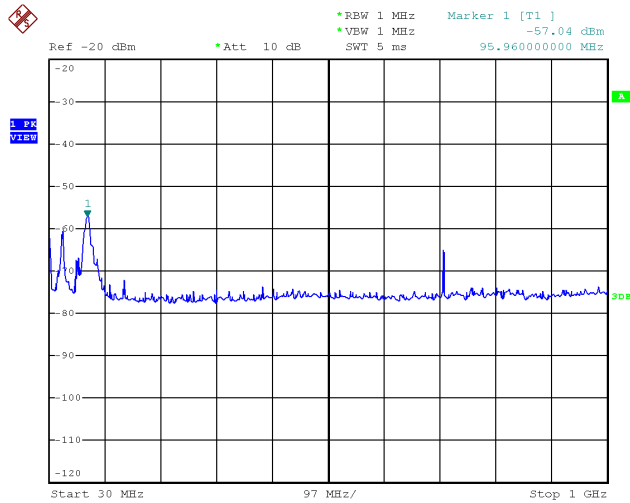


Note:

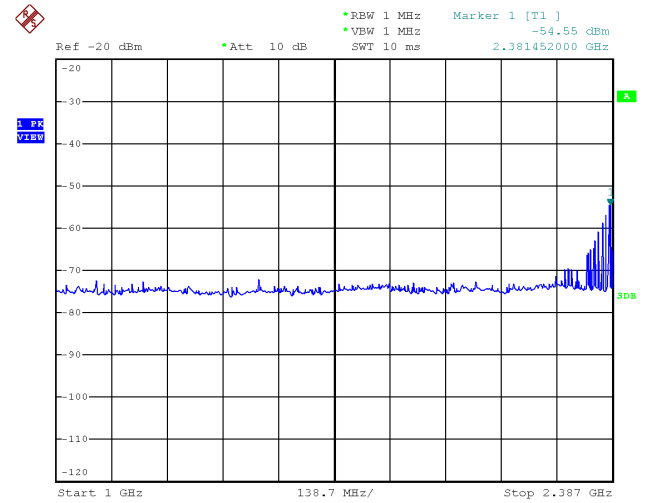
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3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

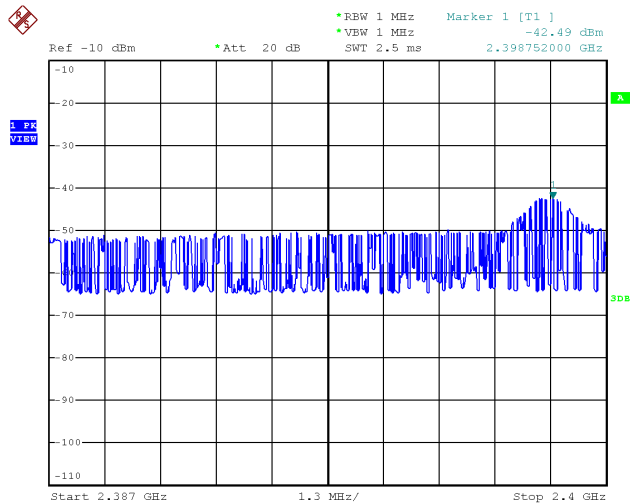
3.5.9 Modulation Type: car TX9 Frequency: 2453 MHz



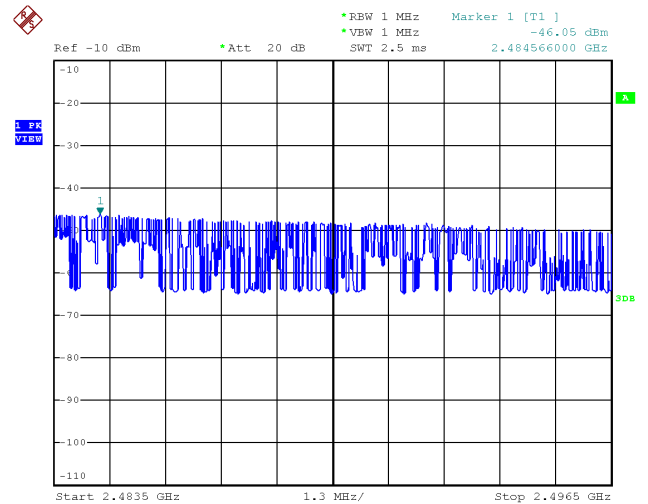
30-1000MHz



1000-2387MHz

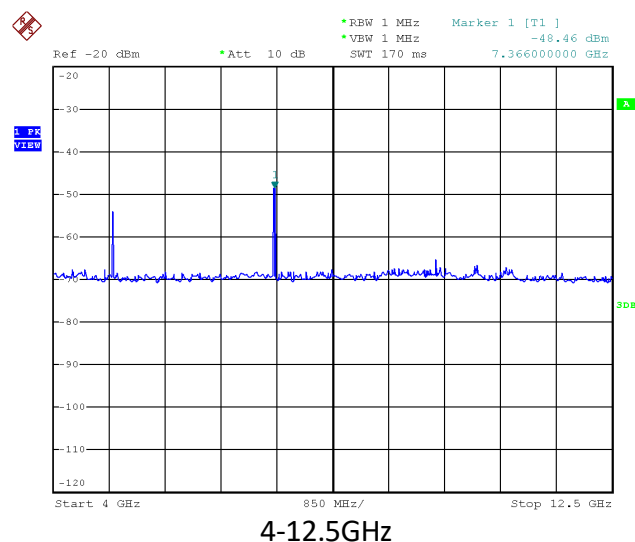
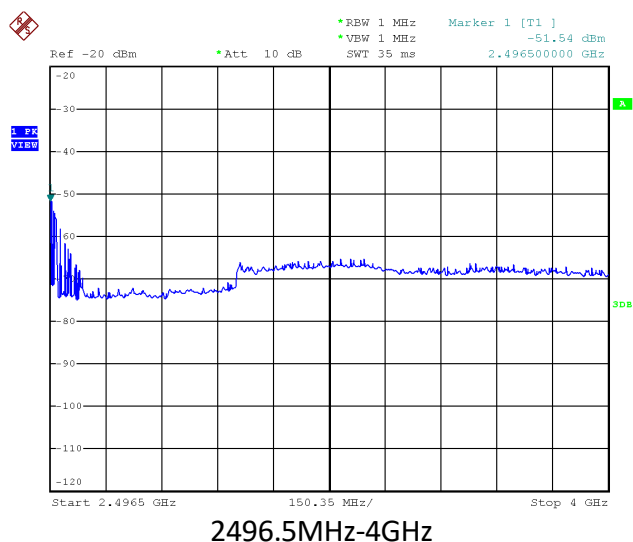


2387-2400MHz



2483.5-2496.5MHz

TEST REPORT



Note:

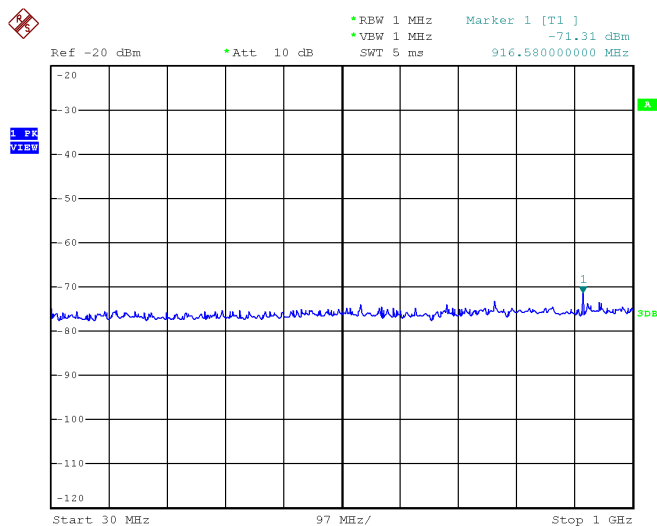
1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -16.0dBm corresponds to 25uW.
4. -26.0dBm corresponds to 2.5uW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

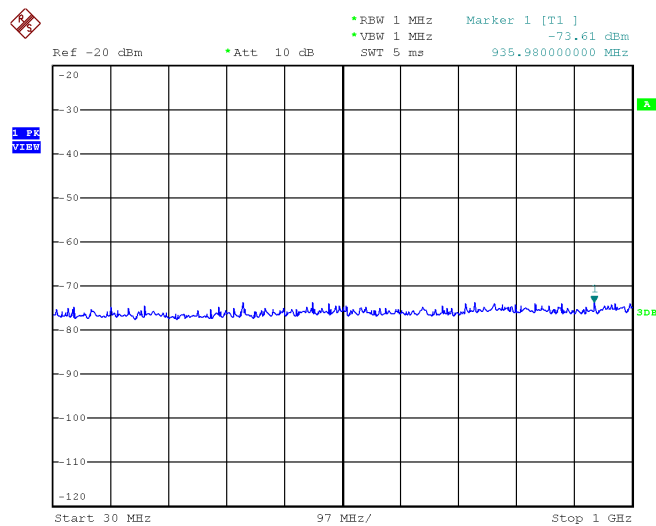
3.6 Collateral Emission Strength

3.6.1 Modulation Type: car Rx

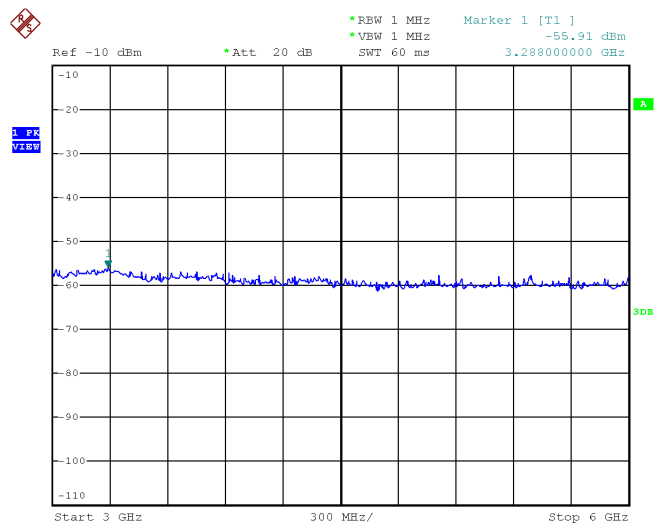
Frequency: 2407 MHz



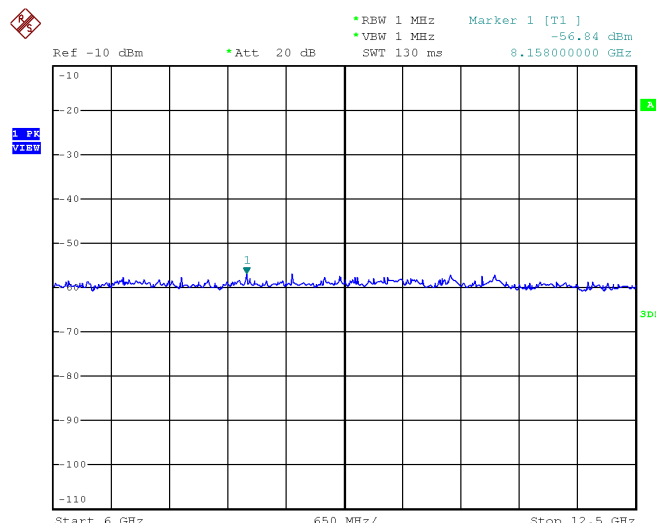
30-1000MHz



1000-3000MHz



3000-6000MHz



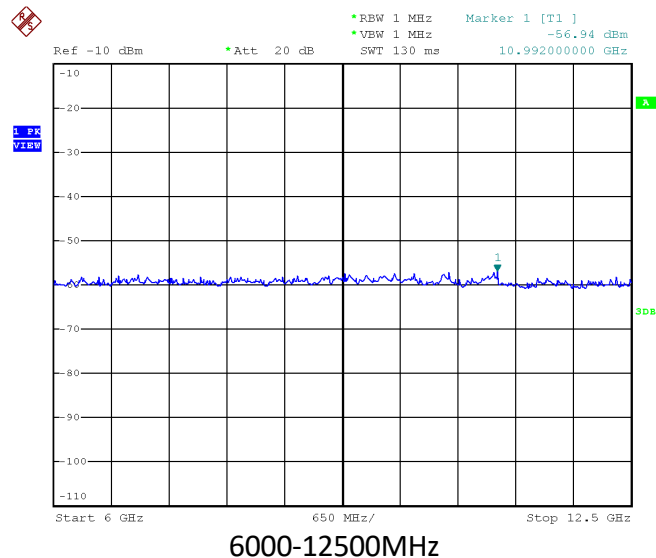
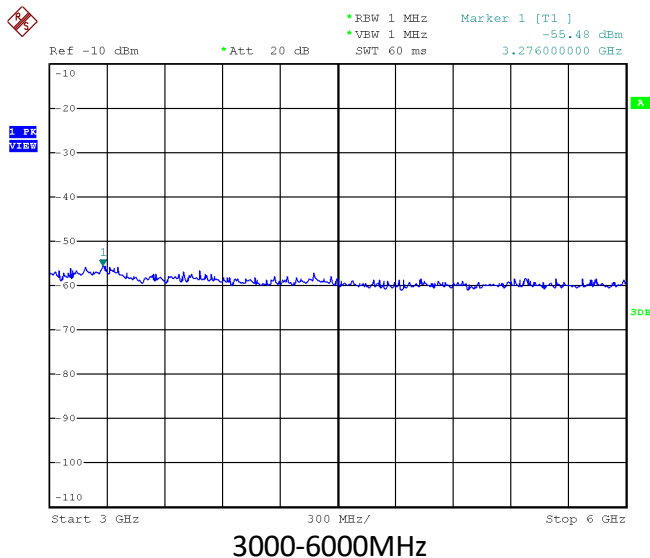
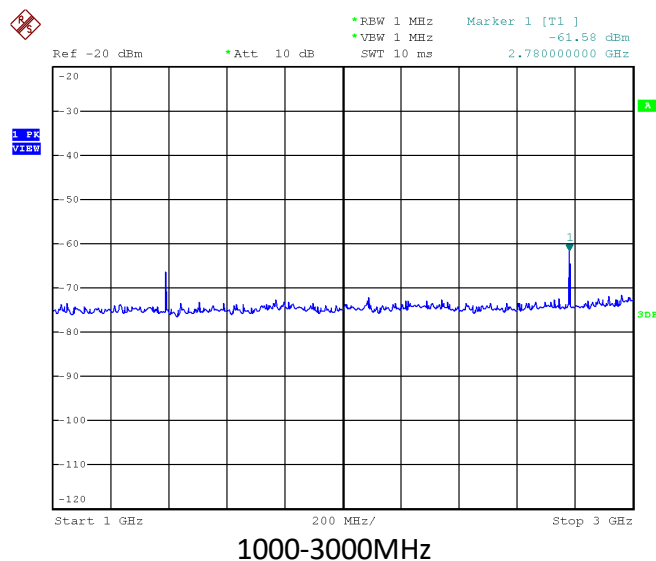
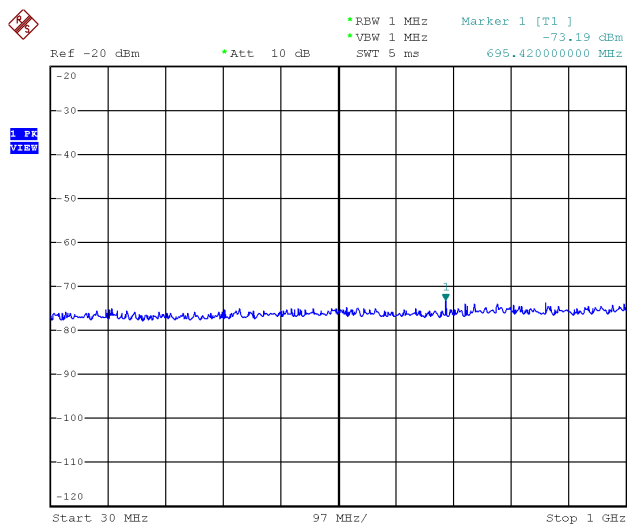
6000-12500MHz

Note:

1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -54.0dBm corresponds to 4nW.
4. -47.0dBm corresponds to 20nW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

3.6.2 Modulation Type: car Rx Frequency: 2430 MHz

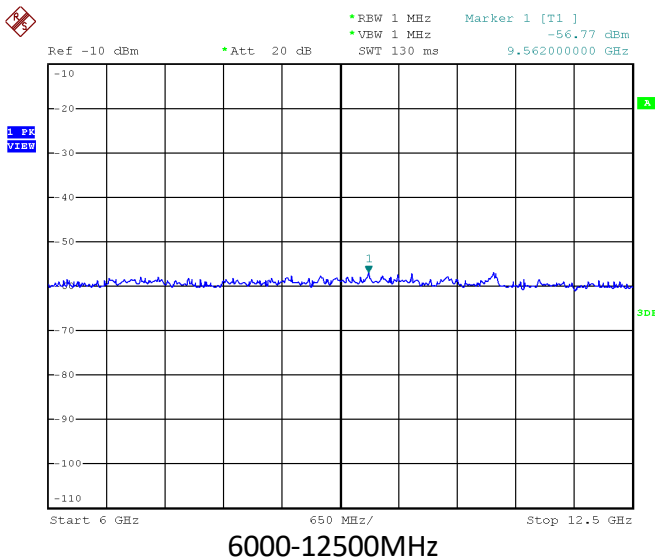
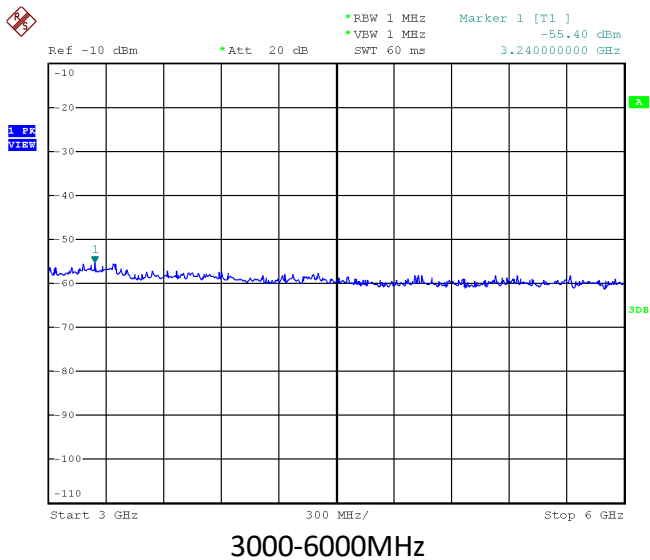
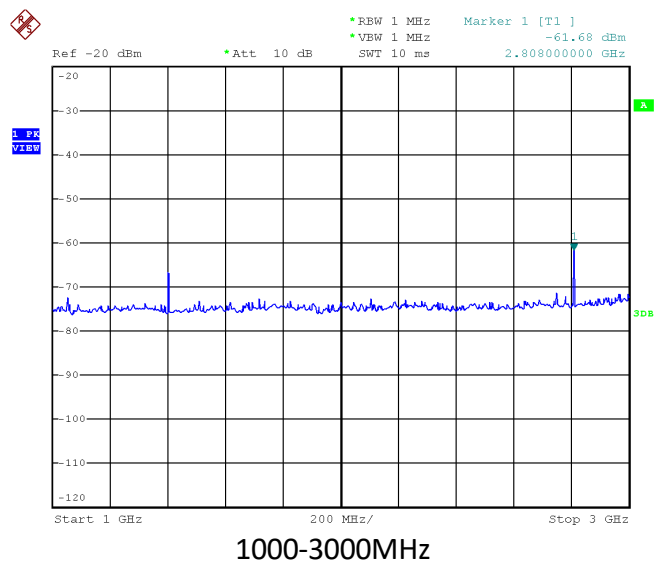
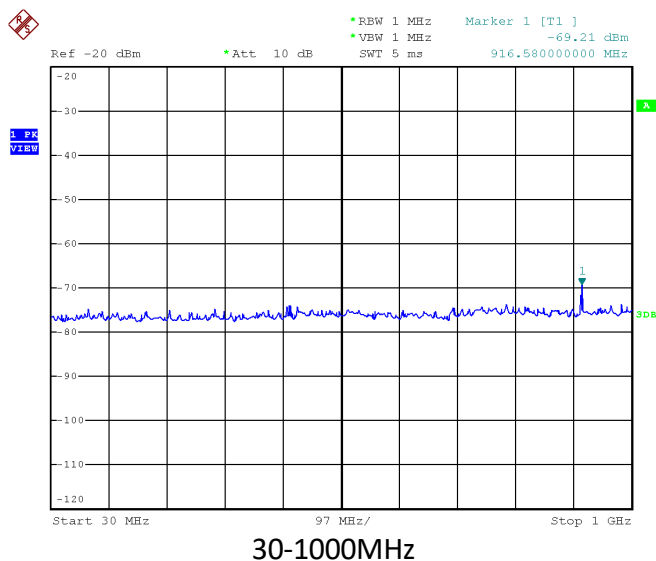


Note:

1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -54.0dBm corresponds to 4nW.
4. -47.0dBm corresponds to 20nW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

3.6.3 Modulation Type: car RX Frequency: 2453 MHz



Note:

1. Negative sign (-) in the margin column signify levels below the limit.
2. Other emissions found were at least 10 dB below the limit at the measurement range.
3. -54.0dBm corresponds to 4nW.
4. -47.0dBm corresponds to 20nW.
5. Measurement uncertainty is ± 5.3 dB at a level of confidence of 95%.
6. Radiated measurement was performed for this test.

TEST REPORT

3.7 Dwell Time

NA

Note: Conducted measurement was preformed for this test.

Japanese Regulation:

Dwell time shall be smaller or equal to 0.4 second.

TEST REPORT

3.8 Dwell Time

NA

TEST REPORT

3.9 Voltage measurement data for RF IC

Measured the voltage to EUT when the 7.5C to EUT is changed by +/- 10%.

Aims: Confirm the power of the EUT in the wireless circuit changes within $\pm 1\%$ while the external input voltage of the EUT changes of 10%

Nominal voltage input: to EUT: 7.5VDC

Nominal voltage DC voltage to RFIC: 3.3VDC

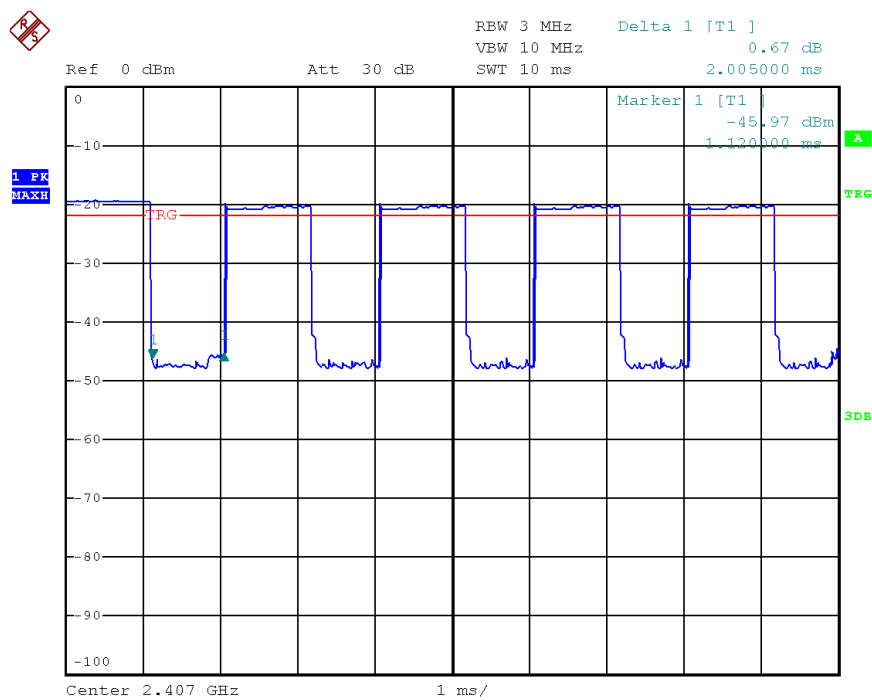
Testing voltage input (VDC)	Voltage output (VDC)	Voltage different (%)	Result
8.25	3.3	0.0%	Pass
7.50	3.3	0.0%	Pass
6.75	3.3	0.0%	Pass

Conclusion: It has been confirmed the change of the DC voltage to EUT is less than 1% when the nominal input voltage to EUT is changed by +/- 10%. The MIC test procedure allows to test only at the nominal voltage only when this requirement is met.

TEST REPORT

3.10 Conducted Output Power of Different Data Rate

Duty cycle for one Frequency (12.5% there are 4 Frequencies. Total duty 55%)



On Time: 1.1ms

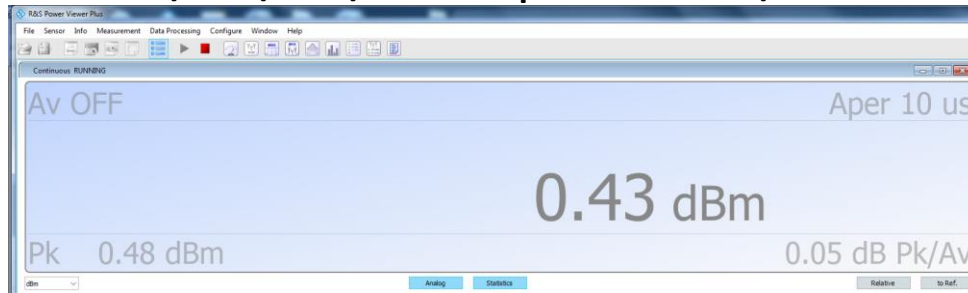
Off Time: 0.905ms

Duty Cycle: $1.1 \text{ ms} / (1.1 \text{ ms} + 0.905 \text{ ms}) = 55\%$

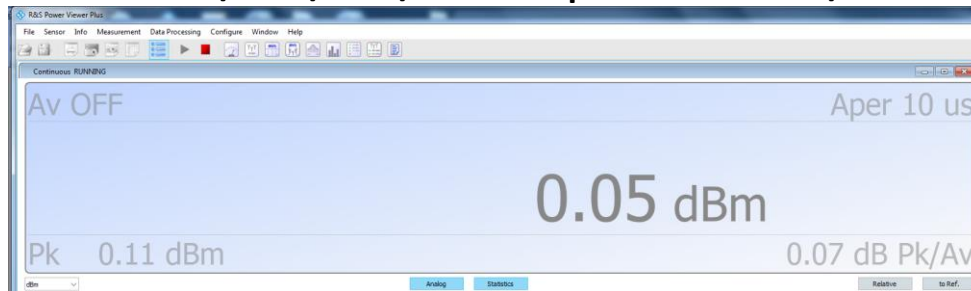
TEST REPORT

Power meter indication

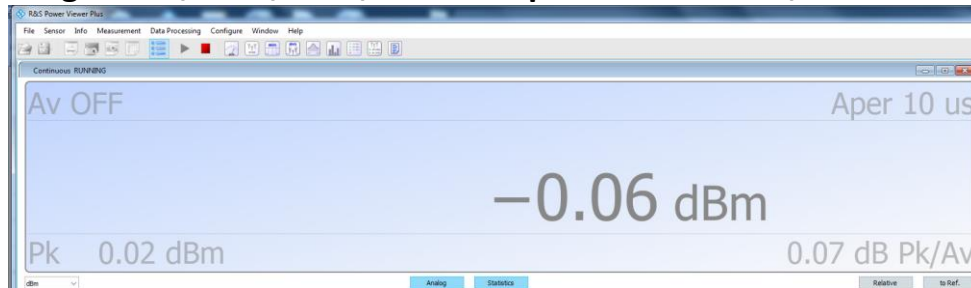
F low 2407/2408/2409/2410MHz power = $1.1\text{mW}/0.55 = 2\text{mW}$



F middle 2423/2430/2437/2447MHz power = $1.01\text{mW}/0.55 = 1.84\text{mW}$



F high 2450/2451/2452/2453MHz power = $0.99\text{mW}/0.55 = 1.8\text{mW}$



TEST REPORT

4.0 EQUIPMENT LIST

Equipment	Signal Generator	Spectrum Analyzer	Wideband Power Sensor (50MHz - 18GHz)
Registration No.	EW-2985	EW-2466	EW-2466
Manufacturer	ROHDESCHWARZ	ROHDESCHWARZ	ROHDESCHWARZ
Model No.	SMB100A	FSV40	FSV40
Serial number	107790	101076	101076
Calibration Date	26 Jun 2020	05 Sep 2020	05 Sep 2020
Calibration Due Date	26 Jun 2021	05 Sep 2021	05 Sep 2021
Calibration Authority	R&S Germany	R&S Germany	R&S Germany

TEST REPORT

5.0 EQUIPMENT PHOTOGRAPHS

