

EMC TEST REPORT

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6

Electromagnetic compatibility - Unintentional radiators

Testing Laboratory: Eurofins Product Service GmbH

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15526 Reichenwalde

Germany

Accreditation:



A2LA Accredited Testing Laboratory, Certificate No.: 1983.01

FCC Test Firm Designation Number: DE0008

ISED Testing Laboratory site: 3470A-3

Applicant's name: Phillips-Medisize A/S

Address: Gimsinglundvej 20

7600 Struer DENMARK

Test specification:

Standard.....: 47 CFR Part 15 Subpart B

ISED ICES-003 Issue 6

ANSI C63.4:2014

Equipment under test (EUT):

Product description SynfuGo, an automated personalized infusion pump

Model No. SynfuGo

Additional Models None

Hardware version HDR ver 3.00

Firmware / Software version 01.05.00

Contains FCC-ID: 2AAGY-SYNFUGO IC:N/A

Test result Passed



Possible test case verdicts:			
- not applicable to test object:		N/A	
- test object does meet the requirement	:	P (Pass)	
- test object does not meet the requirem	nent:	F (Fail)	
Testing:			
Date of receipt of test item		2017-10-12	
Date (s) of performance of tests		2017-12-07 - 201	18-06-01
Compiled by:	Ruslan Colbasi	uc	
Tested by (+ signature):	Ruslan Colbasii Andreas Pflug	uc	Colbosic A 75
Approved by (+ signature): Deputy Head of Lab	Jens Marquardt	t	J. K. W
Date of issue:	2019-01-28		
Total number of pages:	28		
General remarks:			
The test results presented in this report is the responsibility of the manufact requirements detailed within this rep	eflect the resulurer to ensure t	ts for this particu	ular model and serial number. It

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laboratory.

Additional comments:



Version History

Version	Issue Date	Remarks	Revised by
V01	2019-01-28	Initial Release	



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1 Equipment (Test item) Description

Description	SynfuGo, an automated personalized infusion pump
Model	SynfuGo
Additional Models	None
Serial number	1709000001114 (EUT with special software for continuous vial scan)
Serial number	1709000001077 (EUT with special software for continuous motor operating)
Hardware version	HDR ver 3.00
Software / Firmware version	01.05.00
FCC-ID	2AAGY-SYNFUGO
IC	N/A
Power supply	3.7 VDC (Rechargeable battery)
AC/DC-Adaptor	Model: ASSA54e-050100 Manufacturer: AQUIL STAR PRECISION INDUSTRIAL Input: 100-240 V, 50/60 Hz Output: 5 VDC
Manufacturer	Phillips-Medisize A/S Gimsinglundvej 20 7600 Struer DENMARK
Highest internal frequency	Fmax [MHz] = 2483
Device classification	Class B
Equipment type	Tabletop
Number of tested samples	2 (Both device were tested by the radiated emission. Operating mode and configuration with maximum emission are represented in this test report)



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments (e.g. serial no.)
AE	USB charging cable	AQUIL STAR PRECISION INDUSTRIAL	ASDC527002	
SIM	Laptop	Lenovo	ThinkPad W530	For Bluetooth communication
SIM	Vials	-	-	For checking the RFID scanning

*Note: Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test)

CABL: Connecting cables

1.5 Input / Output Ports

Port #	Name	Type*	Max. Cable Length	Cable Shielded	Comments (e.g. Cat. of Cable)
1	USB Micro B	DC	1 m	Yes	Only for charging

*Note: Use the following abbreviations:

AC : AC power port
DC : DC power port
N/E : Non electrical

I/O : Signal input or output port
TP : Telecommunication port



1.6 Operating Modes and Configurations

Mode #	Description
1	Charging mode. No other function are active
2	Active mode 'Scanning continues vials' + Bluetooth communication with the Laptop
3	Active mode 'Continues operating motor' + Bluetooth communication with the Laptop

Configuration #	EUT Configuration
1	AC/DC Adaptor connected via USB to the EUT. Device is charging
2	Device powered up via battery. Vials vial mounted near EUT. On the EUT is running a special mode for continues scan
3	Device powered up via battery. In the EUT is mounted a syringe. On the EUT is running a special mode for continues operating motor.



1.7 Test Equipment Used During Testing

Measurement Software				
Description	Manufacturer	Name	Version	
EMC Test Software	Dare Instruments	Radimation	2016.1.10	

	Conducted emissions SR1					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
AMN	R&S	ESH2-Z5	EF00182	2017-01	2019-01	
AMN	R&S	ESH3-Z5	EF00036	2017-01	2019-01	
EMI Test Receiver	R&S	ESR7	EF00943	2017-07	2018-07	
Cable	-	RG223/U	-	System Cal.	System Cal.	

	Radiated emissions AC6						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due		
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2016-11	2019-11		
Double-Ridged Guide Antenna	ETS-Lindgren	3117	EF00976	2016-03	2019-03		
EMI Test Receiver	R&S	ESU26	EF00887	2017-07	2018-07		
RF Cable	Huber & Suhner	Sucoflex 106	-	System Cal.	System Cal		
RF Cable	Huber & Suhner	Multiflex 141	-	System Cal.	System Cal		



1.8 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in $dB\mu V$. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB/,. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyser ($dB\mu V$) + A.F. (dB/m) = Net field strength ($dB\mu V/m$)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of $dB\mu V/m$). The FCC limits are given in units of $\mu V/m$. The following formula is used to convert the units of $\mu V/m$ to $dB\mu V/m$:

Limit (dB μ V/m) = 20*log (μ V/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF = Net Reading : Net reading - FCC limit = Margin +21.5 dB μ V + 26 dB/m = 47.5 dB μ V/m : 47.5 dB μ V/m - 57.0 dB μ V/m = -9.5 dB



2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6					
Product Specific Standard	Requirement – Test	Reference Method	Result	Remarks	
47 CFR 15.109 ICES-003 Item 6.2	Radiated emissions	ANSI C 63.4	PASS		
47 CFR 15.107 ICES-003 Item 6.1 AC power line conducted emissions ANSI C63.4 PASS					
Remarks:					



3 Test Conditions and Results

3.1 Test Conditions and Results - Radiated emissions

Radiated emission	ons acc. FCC 47 CF	R 15.109 / ICES-003			Verdict: PASS			
Laboratory	Parameters:	Required prior to the test			During the test			
Ambient T	emperature		15 to 35 °C	21 °C				
Relative	Humidity		30 to 60 %		30 %			
Test accordi	ng referenced		Referenc	e Metho	d			
	dards	ANSI C63.4						
Sample is tested	with respect to the		Equipme	ent class				
requirements of th	ne equipment class	Class B						
Test frequency ran	ge determined from	Highest emission frequency						
	sion frequency	Fmax [MHz] = 2483						
Fully configured sa	ample scanned over	Frequency range						
the following frequency range		30 MHz to 13 GHz						
Operati	ng mode	1/2/3						
Config	juration	1/2/3						
	Li	imits and results Class B						
Frequency [MHz]	Quasi-Peak [dBµV/m	n] Result	Average [dBµV/m]	Result	Peak [dBµV/m]	Result		
30 – 88	40	PASS	-		-	-		
88 – 216	43.5	PASS	-		-	-		
216 – 960	46	PASS	-		-	-		
960 – 1000	– 1000 – 54		-		-	-		
> 1000 -		-	54	PASS	74	PASS		

Comments:

Just the operation modes and power interface modes with the maximized emissions are represented in this report.

The measurement are made on 10 m measurement distance , the results are corrected to 3 m measurement distance $\,$



Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC. The measurement procedure is as follows:

Exploratory measurement:

- The EUT was placed on a non-conductive table at a height of 0.8m.
- The EUT and support equipment, if needed, were set up to simulate typical usage.
- Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
- The antenna was placed at a distance of 3 or 10 m.
- The received signal was monitored at the measurement receiver.
 - Cables not bundled were manipulated within the range of likely arrangements to produce the highest emission amplitude
 - To maximize the suspected emissions the EUT is rotated 360 degrees. If the signal exceeds the previous amplitude, go back to the corresponding azimuth and manipulate the cables again for maximizing the emissions if possible.
 - Move the antenna from 1 to 4m to maximize the suspected highest amplitude signal.
- This procedure has to be performed in both antenna polarizations, horizontal and vertical.
- The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3.

Final measurement:

- The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver
- A biconical antenna was used for the frequency range 30 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast
- The EUT and cable arrangement were based on the exploratory measurement results
- Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
- The test data of the worst-case conditions were recorded and shown on the next pages.



Project number: G0M-1708-6775

Applicant: Medicom Innovation Partner a/s

EUT Name: SynfuGo, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

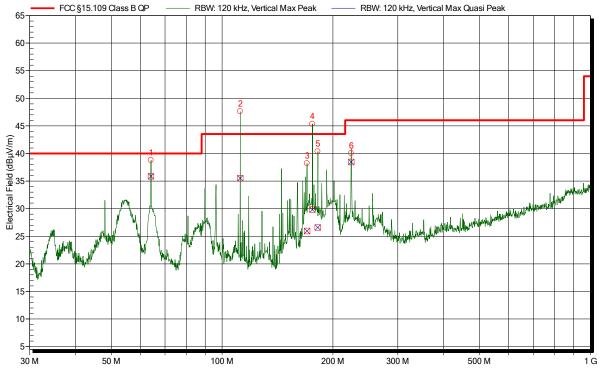
Operator: Mr. Colbasiuc

Test Conditions: Tnom: 21°C, Unom: 120V/60Hz
Antenna: Schwarzbeck VULB 9162, Vertical

Measurement distance: 10 m Mode: 1

Test Date: 2018-06-01

Note:



Freq	uency	(Hz)

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	64.08 MHz	35.9 dBµV/m	40 dBµV/m	-4.1 dB	Pass	175 Degree	1.5 m
2	112.05 MHz	35.5 dBµV/m	43.5 dBµV/m	-8.0 dB	Pass	175 Degree	1.5 m
3	170.04 MHz	26 dBµV/m	43.5 dBµV/m	-17.6 dB	Pass	175 Degree	1.5 m
4	175.824 MHz	29.8 dBµV/m	43.5 dBµV/m	-13.7 dB	Pass	175 Degree	1.5 m
5	181.95 MHz	26.6 dBµV/m	43.5 dBµV/m	-16.9 dB	Pass	175 Degree	1.5 m
6	224.28 MHz	38.5 dBµV/m	46 dBµV/m	-7.6 dB	Pass	175 Degree	1.5 m



Project number: G0M-1708-6775

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EUT Name: SynfuGo, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

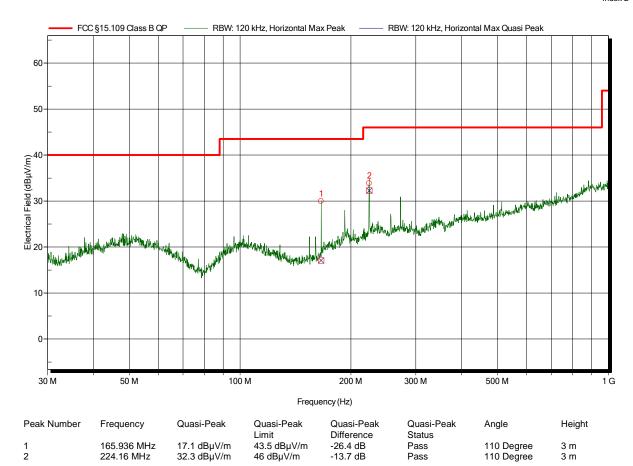
Operator: Mr. Colbasiuc

Test Conditions: Tnom: 21°C, Unom: 120V/60Hz
Antenna: Schwarzbeck VULB 9162, Horizontal

Measurement distance: 10 m Mode: 1

Test Date: 2018-06-01

Note:





Project number: G0M-1708-6775

Applicant: Medicom Innovation Partner a/s

EUT Name: SynfuGo device, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

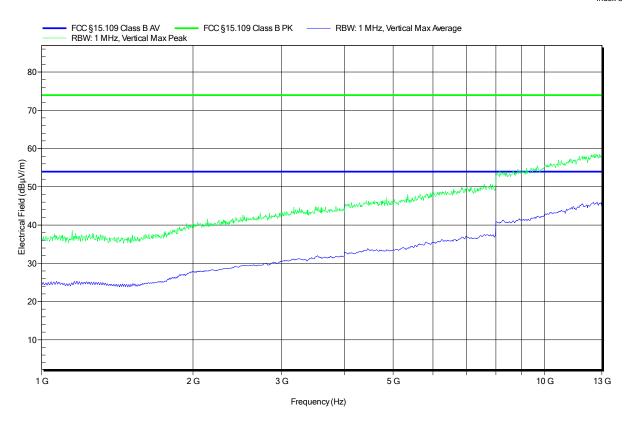
Operator: Mr. Meili

Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz Antenna: ETS-Lindgren 3117, Vertical

Measurement distance: 3 m Mode: 1

Test Date: 2017-12-13

Note:





Project number: G0M-1708-6775

Applicant: Medicom Innovation Partner a/s

EUT Name: SynfuGo device, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

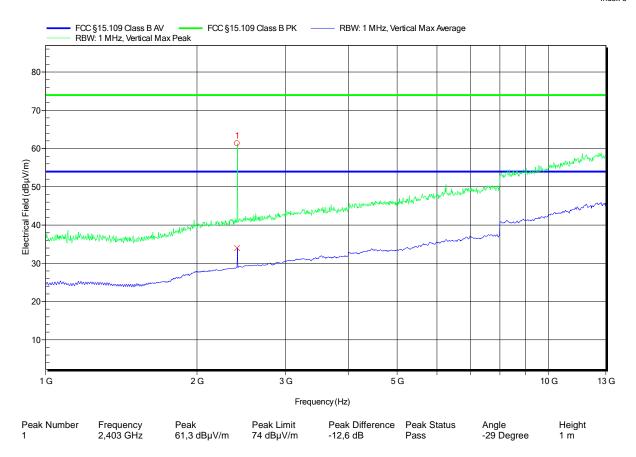
Operator: Mr. Meili

Test Conditions: Tnom: 21°C, Unom: 120 V / 60 Hz Antenna: ETS-Lindgren 3117, Vertical

Measurement distance: 3 m Mode: 1

Test Date: 2017-12-13

Note:





3.2 Test Conditions and Results – AC power line conducted emissions

Conducted emissions acc. FCC 47 CFR 15.107 / ICES-003 Verdict: PAS						Verdict: PASS	
Laboratory Para	Req	uired prior to the t	est	Durin	g the test		
Ambient Tempe	erature	15 to 35 °C 21 °C			1 °C		
Relative Hum	nidity		30 to 60 %		30 %		
Test according re	ferenced		Re	ference	Method		
standards	5		ANSI C63.4				
Fully configured sample	e scanned over		Fi	requency	y range		
the following freque	ency range	0.15 MHz to 30 MHz					
Sample is tested with respect to the		Equipment class					
requirements of the eq	uipment class	Class B					
Points of Appli	cation	Application Interface					
AC Mains	3	LISN					
Operating m	ode	1					
Configurati	on	1					
	L	imits and	l results Class B				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Avera	age [dBµV]	Result	
0.15 to 5	66 to 56*		PASS	50	6 to 46*	PASS	
0.5 to 5	56		PASS		46	PASS	
5 to 30	60		PASS		50	PASS	

Comments:

^{*} Limit decreases linearly with the logarithm of the frequency.



Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC. The measurement procedure is as follows:

Exploratory measurement:

- The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
- The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
- The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
- The LISN measurement port was connected to a measurement receiver
- I/O cables were bundled not longer than 0.4 m
- Measurement was performed in the frequency range 0.15 30MHz on each current-carrying conductor
- To maximize the emissions the cable positions were manipulated
- The worst configuration of EUT and cables is shown on a test setup picture at item 1.3

Test Procedure:

Final measurement:

- The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
- The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
- The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
- The LISN measurement port was connected to a measurement receiver
- The EUT and cable arrangement were based on the exploratory measurement results
- The test data of the worst-case conditions were recorded and shown on the next pages.



EMI voltage test in the ac-mains according to FCC 15B

Project number: G0M-1708-6775

Applicant: Medicom Innovation Partner a/s

EUT Name: SynfuGo device, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

Operator: Mr. Colbasiuc

Test Conditions: Tnom: 21°C, Unom: 120V / 60Hz

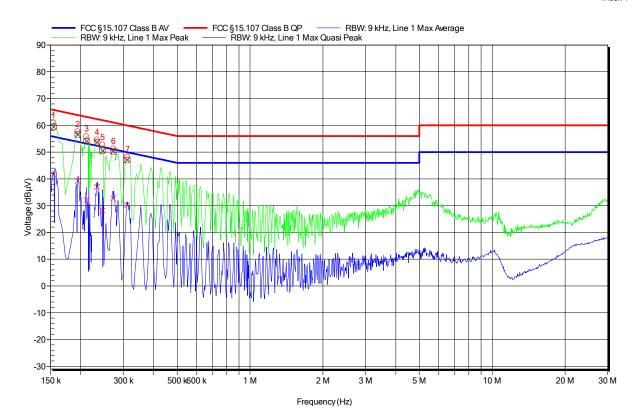
LISN: ESH2-Z5 L

Mode:

Test Date: 2017-12-07

Note:

Index 1



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	154,05 kHz	59,53 dBµV	65,78 dBµV	-6,25 dB	Pass
2	194,1 kHz	56,67 dBµV	63,86 dBµV	-7,19 dB	Pass

2	194,1 kHz	56,67 dBµV	63,86 dBµV	-7,19 dB	Pass
3	211,2 kHz	54,13 dBµV	63,16 dBµV	-9,03 dB	Pass
4	233,25 kHz	53,74 dBµV	62,33 dBµV	-8,59 dB	Pass
5	245,85 kHz	50,68 dBµV	61,9 dBµV	-11,22 dB	Pass
6	272,4 kHz	50,31 dBµV	61,04 dBµV	-10,74 dB	Pass
7	311,1 kHz	47,06 dBµV	59,94 dBµV	-12,88 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	154,05 kHz	41,75 dBµV	55,78 dBµV	-14,03 dB	Pass
2	194,1 kHz	39,26 dBµV	53,86 dBµV	-14,6 dB	Pass
3	211,2 kHz	32,13 dBµV	53,16 dBµV	-21,03 dB	Pass
4	233,25 kHz	37 dBμV	52,33 dBµV	-15,34 dB	Pass
5	245,85 kHz	28,18 dΒμV	51,9 dBµV	-23,72 dB	Pass
6	272,4 kHz	32,72 dBµV	51,04 dBµV	-18,33 dB	Pass
7	311,1 kHz	30,3 dBµV	49,94 dBµV	-19,64 dB	Pass



EMI voltage test in the ac-mains according to FCC 15B

Project number: G0M-1708-6775

Applicant: Medicom Innovation Partner a/s

EUT Name: SynfuGo device, an automated personalized infusion pump

Model: SynfuGo

Test Site: Eurofins Product Service GmbH

Operator: Mr. Colbasiuc

Test Conditions: Tnom: 21°C, Unom: 120V / 60Hz

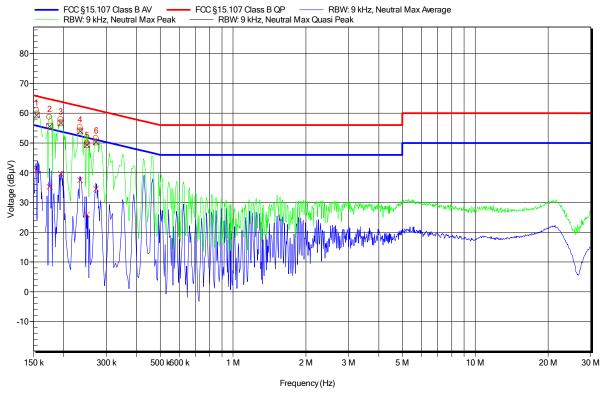
LISN: ESH2-Z5 N

Mode: 1

Test Date: 2017-12-07

Note:

Index 2



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	154,05 kHz	59,41 dBµV	65,78 dBµV	-6,37 dB	Pass
2	174,3 kHz	55,69 dBµV	64,75 dBµV	-9,07 dB	Pass
3	194,1 kHz	56,7 dBµV	63,86 dBµV	-7,16 dB	Pass
4	233,25 kHz	54 dBµV	62,33 dBµV	-8,33 dB	Pass
5	249,45 kHz	49,38 dBµV	61,78 dBµV	-12,4 dB	Pass
6	271,95 kHz	50,33 dBμV	61,06 dBµV	-10,73 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	154.05 kHz	40,89 dBµV	55,78 dBµV	-14.89 dB	Pass
2	174,03 kHz	35,29 dBµV	54,75 dBµV	-14,09 dB -19,46 dB	Pass
3	194.1 kHz	39,7 dBµV	53,86 dBµV	-14.16 dB	Pass
4	233,25 kHz	37,48 dBµV	52,33 dBµV	-14,85 dB	Pass
5	249,45 kHz	25,93 dBµV	51,78 dBµV	-25,85 dB	Pass
6	271,95 kHz	34,59 dBµV	51,06 dBµV	-16,46 dB	Pass