EUROFINS PRODUCT SERVICE GMBH

Testing Cert # 1983.01

TEST - REPORT

FCC RULES PART 15 / SUBPART C §15.249
RSS 210 Issue 7

FCC ID: T7VPAN8550

Z-Wave Module

PAN8550

Test report no.: G0M21005-3172-C-1

Eurofins Product Service GmbH
Storkower Str. 38c, 15526 Reichenwalde,
Germany

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1 General Information

1.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Service GmbH is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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Operator:

Date	Eurofins Lab	Name	Signature
10.06.2010		W. Treffke	W. Treffke

Technical responsibility for area of testing:

Date	Eurofins	Name	Signature
10.06.2010		J. Zimmermann	J. Z.

1.2 Testing laboratory

1.2.1 Location

EUROFINS PRODUCT SERVICE GMBH
Storkower Strasse 38c
D- 15526 Reichenwalde
Germany
Telephone : + 49 33631 888 00
Telefax : + 49 33631 888 660

1.2.2 Details of accreditation status

DAR ACCREDITED TESTING LABORATORY
DAR-REGISTRATION NUMBER: DAT-P-268/08

RECOGNIZED NOTIFIED BODY EMC
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

RECOGNIZED NOTIFIED BODY R&TTE
REGISTRATION NUMBER: BNetzA-bS-02/51-53

FCC FILED TEST LABORATORY
REG.-NO. 96970

A2LA ACCREDITED TESTING LABORATORY
CERTIFICATE NO. 1983.01

BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

INDUSTRY CANADA FILED TEST LABORATORY
REG. NO. IC 3470

1.2.3 Details of approval holder

Name	: Panasonic Electronic Devices Europe GmbH
Street	: Zeppelinstr. 28
Town	: 21337 Lueneburg
Country	: Germany
Telephone	: +49 4131 899 304
Fax	: +49 4131 899 210
Contact	: Herr Heino Kaehler
Telephone	: +49 4131 899 304

1.4 Application details

Date of receipt of application	: 05.05.2010
Date of receipt of test item	: 05.05.2010
Date of test	: 19.05.2010 - 08.06.2010

1.5 Test item

Description of test item	: Z-Wave Module
Type identification	: PAN8550
Serial number	: without
Photos	: See Annex A

Technical data

Frequency band	: 908.42MHz
Tested frequencies	: F_1 908.390MHz
Antenna 1	: external antenna TB2-900D-UFL
Antenna gain 1	: +2dBi
Antenna 2	: external antenna ANT-916-CW-HWR-RPS
Antenna gain 2	: 0dBi
Number of Channels	: 1
Hardware Version	: ENW99A01N2D
Software version	: 1.xx
Power supply	: 3.0VDC

Manufacturer:

Name	: Panasonic Electronic Devices Slovakia s.r.o.
Street	: Tovarenska 13
Town	: 06401 Stara Lubovna
Country	: Slovakia

1.6 Test standards

Technical standard	:	FCC RULES PART 15 / SUBPART C § 15.249 IC Standards: RSS 210 Issue 7

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed. ☐

2.2 Test environment

Temperature	:	23°C		
Relative humidity content	:	45%		
Air pressure	:	936 hPa		
Extrem conditions parameters:	:	test voltage - extreme	nom.:	3.0VDC
			min.:	2.1VDC
			max:	3.6VDC
Additional information	:	The device works with two different antennas. The measurements were performed with HANKOOK antenna TB2-900D-MMCX as worst case operating mode.		

2.3 Test equipment utilized

ID No.	Test equipment	Type	Manufacturer
ETS 0012	Biconical Antenna	HK 116	R & S
ETS 0013	LPD Antenna	HL 223	R & S
ETS 0014	Log Periodical Antenna	HL 025	R & S
ETS 0271	Spectrum Analyzer	FSEK30	R & S
ETS 0288	Artificial mains	ESH2-Z5	R & S
ETS 00086	Anechoic chamber	AC 1	Frankonia

2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50 µH LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The resolution bandwidth of the spectrum analyzer was 100 kHz for measurements below 1 GHz and RBW 1 MHz was used above 1 GHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 23 ° C with a humidity of 43 %.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dBµV + 10.36 dB + 6 dB = 36.36 dBµV/m @ 3 m

ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5 m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.
Measurements were made by EUROFINS PRODUCT SERVICE GMBH
at the registered open field test site located at Storkower Str. 38c, 15526 Reichenwalde, Germany.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1 m to 4 m. The antenna was placed in both the horizontal and vertical planes.

ANTENNA & GROUND:
The unit use external antennas.

3 Test results (enclosure)

TEST CASE	FCC 49CFR PART	IC RSS-	Required	Test passed	Test failed
Transmitter parameter					
Output Power (Field Strength)	15.249(a)	RSS 210 A 2.9	☒	☒	☐
Spurious Emissions radiated - Transmitter operating	15.249 (d)	RSS 210 A 2.9	☒	☒	☐
Spurious Emissions conducted - Transmitter operating	15.249 (d)	RSS 210 A2.9	☐	☐	☐
Occupied bandwidth	15.215(c);	RSS GEN 4.6.1	☐	☐	☐
Out of Band Spurious Emission, Bandedge-Transmitter operating	15.249 (d)	RSS 210 A 2.9	☐	☐	☐
Conducted Measurement at (AC) Power Line	15.207	Gen 7.2.2	☐	☐	☐
Receiver Parameter					
Radiated emissions	15.107	Gen 7.2.3	☐	☐	☐

3.1 Output Power (Field Strength) FCC § 15.249 (a), RSS 210 A2.9

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

Limits:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

The power was measured with modulation (declared by the applicant).

Test conditions	**Frequency** [dBµV/m]
	908.390MHz
T_{nom} = ° C V_{nom} = 12VDC	91.88
Measurement uncertainty	< 3 dB

Remark: See attached diagrams Annex.

3.1.2 De facto equivalent isotropic radiated power

Because using an permanent antenna there are no deviations from the radiated test results according 3.1.

3.1.3 Transmitter

At the transmitter the measurement was transacted with the modulation declared by the manufacturer and the maximum available output power of the EUT.

3.2 RF Exposure Compliance Requirements

Not applicable for this kind of device for the low power level.

3.3 Radiated Emissions; FCC § 15.249 (d); RSS 210 A2.9

Out of Band Radiated Emissions

FCC Rule: 15.249(d), 15.35(b); RSS 210 A2.9
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.
For frequencies above 1000 MHz, 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.

Limits:

Frequency of Emission (MHz)	Field strength (microvolts/meter)	Field Strength (dB microvolts/meter)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

For frequencies above 1GHz (Peak measurements).

Limit + 20 dB
54.0 dBµV/m + 20 dB= 74 dBµV/m or
46.0 dBµV/m + 20 dB= 66 dBµV/m

Must be antenuatted at least 50 dB below the level of fundamental emission

Spurious emission was measured with modulation (declared by manufacturer).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance with point 2.3.

The peak and average spurious emission plots was measured with the average limits.
The critical peak value listed in the table agree with the above calculated limits.

Summary table with radiated data of the test plots

Freq.	Used Ch.	Frequency Marker [GHz]	Polari-zation	Max. Field Strength [dBµV/m]	Compliance Limit [dBµV/m]	Detector	BW [MHz]	Margin [dB]
3		1.817	V	38.06	54	P	1	-15.94
3		1.817	H	41.53	54	P	1	-12.47

Freq. – Frequency Range:

1: 30 – 200 MHz
2: 200 – 1000 MHz
3: 1 – 4 GHz
4: 4 – 8 GHz
5: 8 – 12 GHz
6: 12 – 17 GHz
7: 17 – 26.5 GHz

TEST RESULT (Transmitter): The unit DOES meet the FCC requirements.

Remark: See attached diagrams Annex.

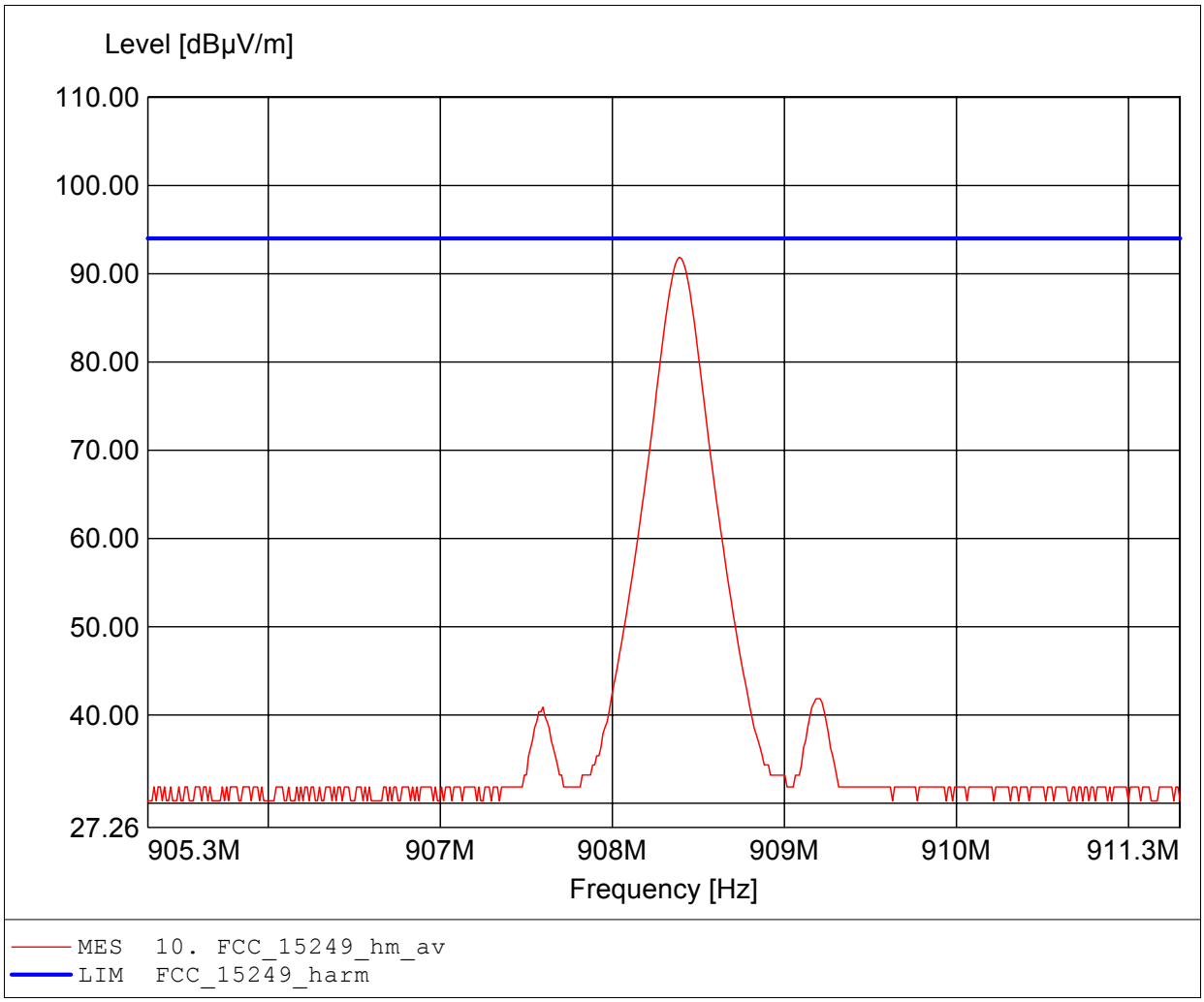
Annex B

Fundamental Field Strength

Carrier power (Field Strength)

FCC RULES PART 15, SUBPART C

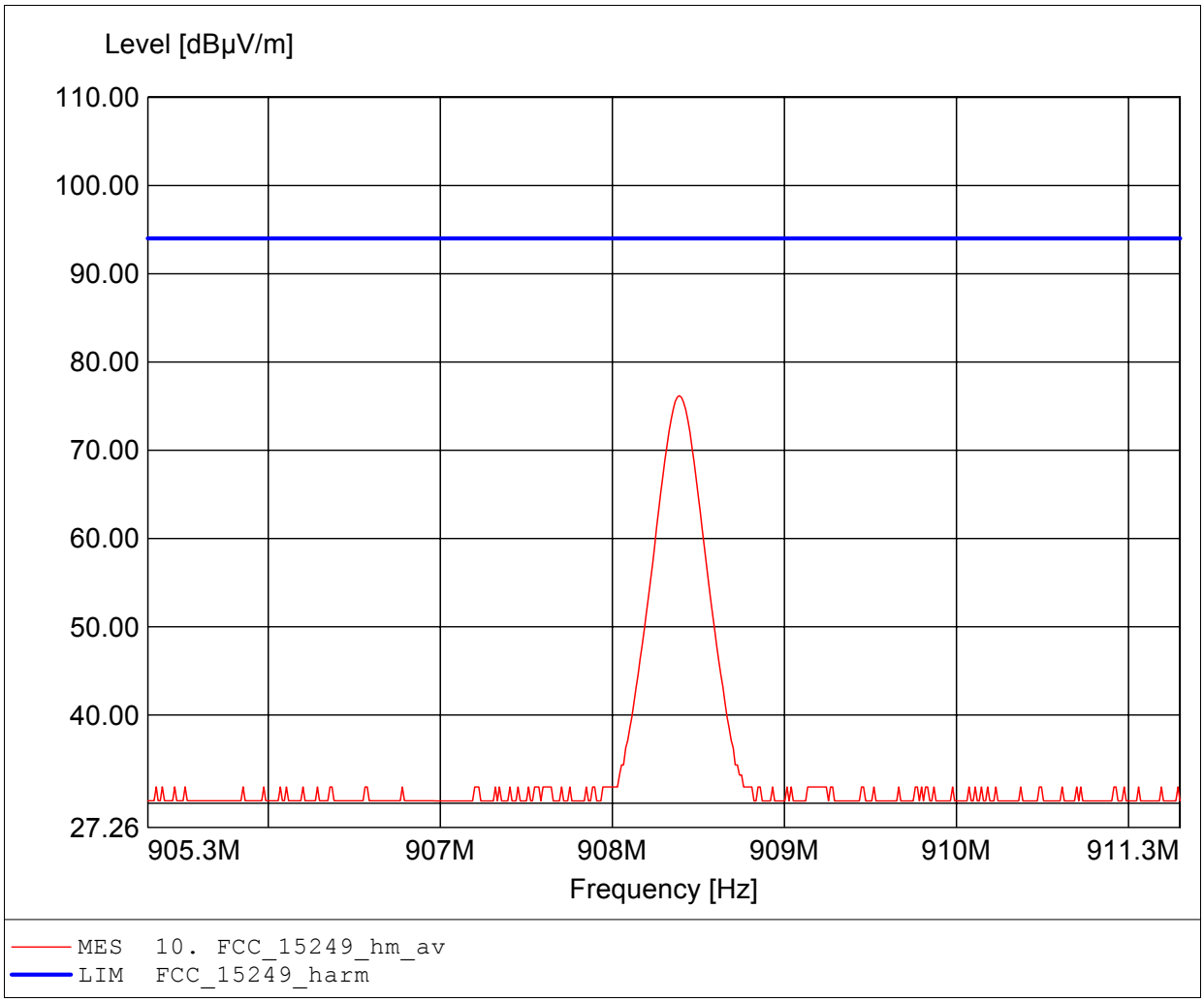
Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module / G0M21005-3172
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Vnom: 3.0V DC
Test Specification:	according to §15.249, average detector
Comment 1:	Dist.: 3m, Ant.: HL 223
Comment 2:	Freq: 908.390MHz, Pmax: 91.88dBµV/m, RBW: 1MHz



Carrier power (Field Strength)

FCC RULES PART 15, SUBPART C

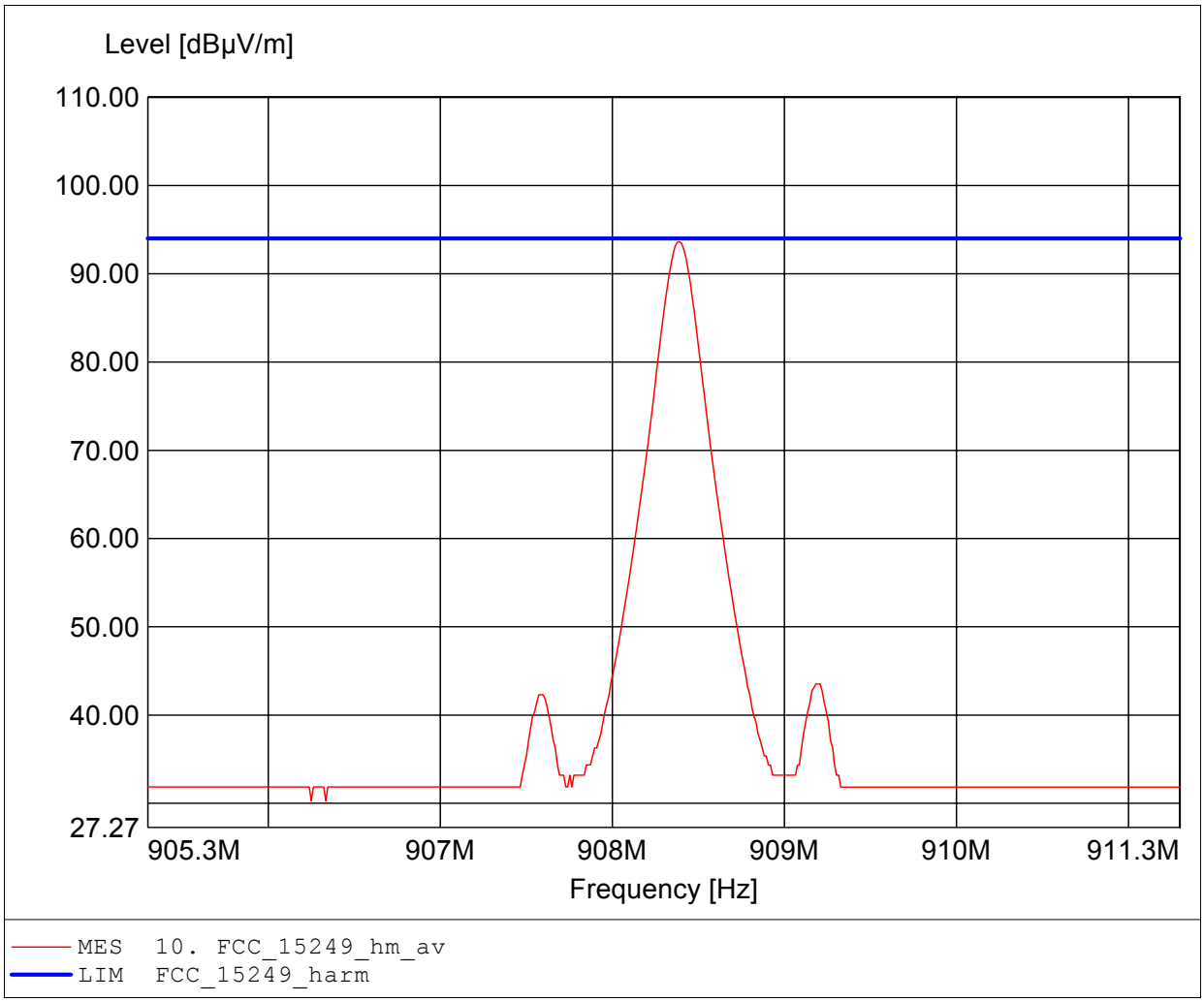
Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module / G0M21005-3172
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Vnom: 3.0V DC
Test Specification:	according to §15.249, average detector
Comment 1:	Dist.: 3m, Ant.: HL 223
Comment 2:	Freq: 908.390MHz, Pmax: 76.18dBµV/m, RBW: 1MHz



Carrier power (Field Strength)

FCC RULES PART 15, SUBPART C

Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module / G0M21005-3172
Model:	PAN8550 / antenna TB2-900Dxxxx with ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Vnom: 3.0V DC
Test Specification:	according to §15.249, average detector
Comment 1:	Dist.: 3m, Ant.: HL 223
Comment 2:	Freq: 908.390MHz, Pmax: 93.64dBµV/m, RBW: 1MHz



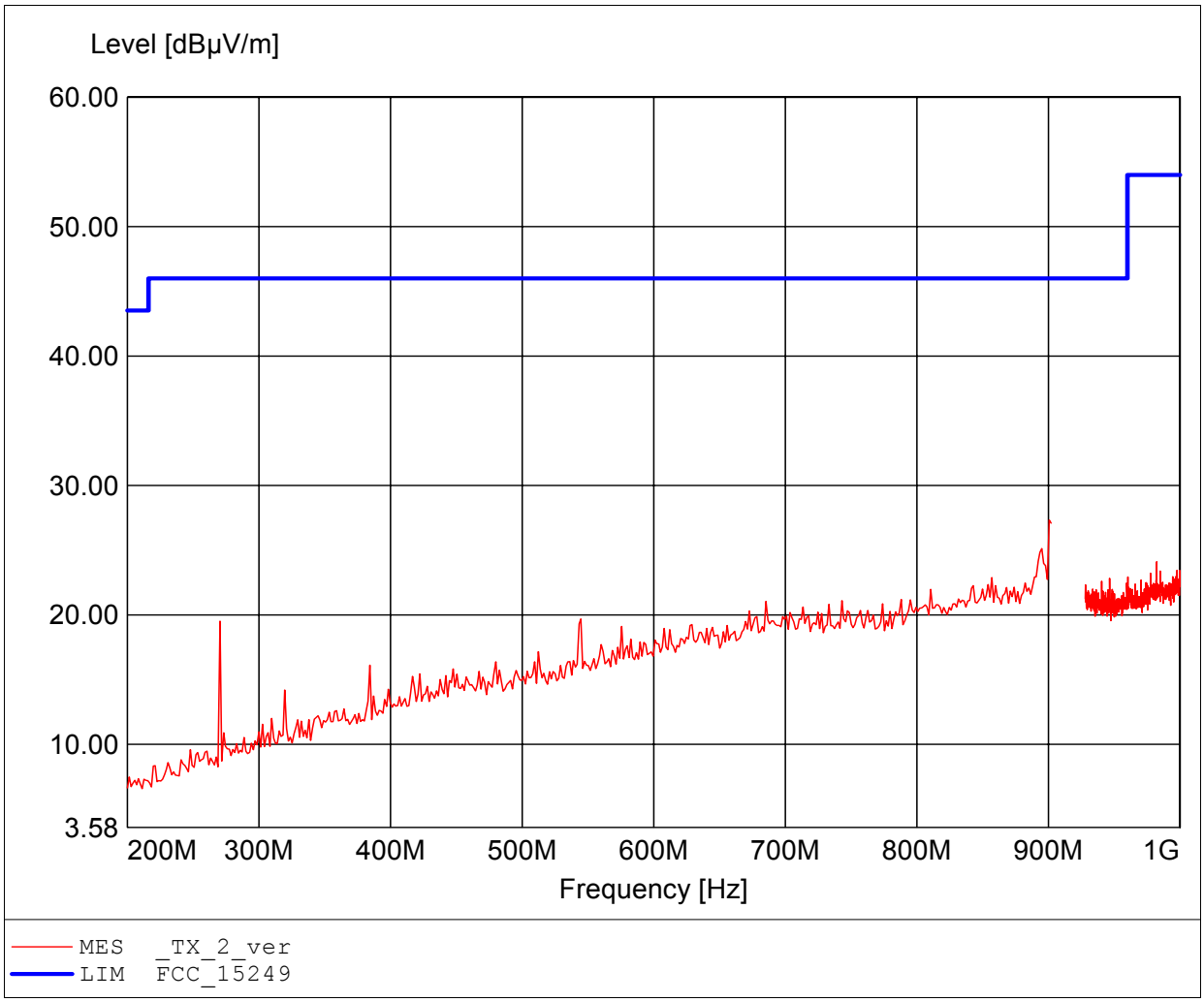
Annex C

Spurious Emissions radiated - Transmitter operating

Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

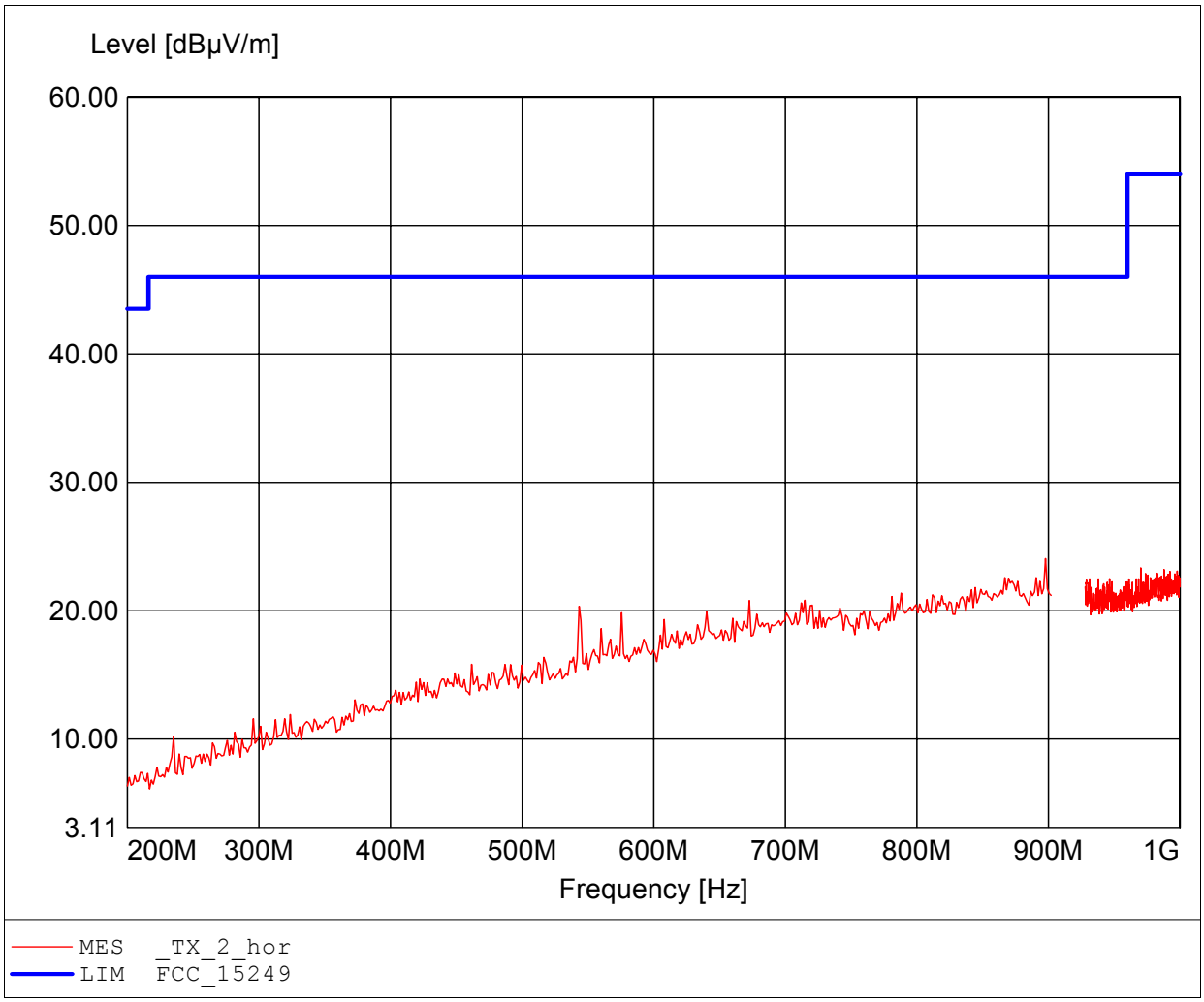
Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Unom.: 3.0 V DC
Test Specification:	Freq. / CH:
Comment 1:	Dist.: 3m, Ant.: HL 223, amplif.
Comment 2:	Freq: 900.593MHz, Emax: 27.33dBµV/m, RBW: 100kHz



Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

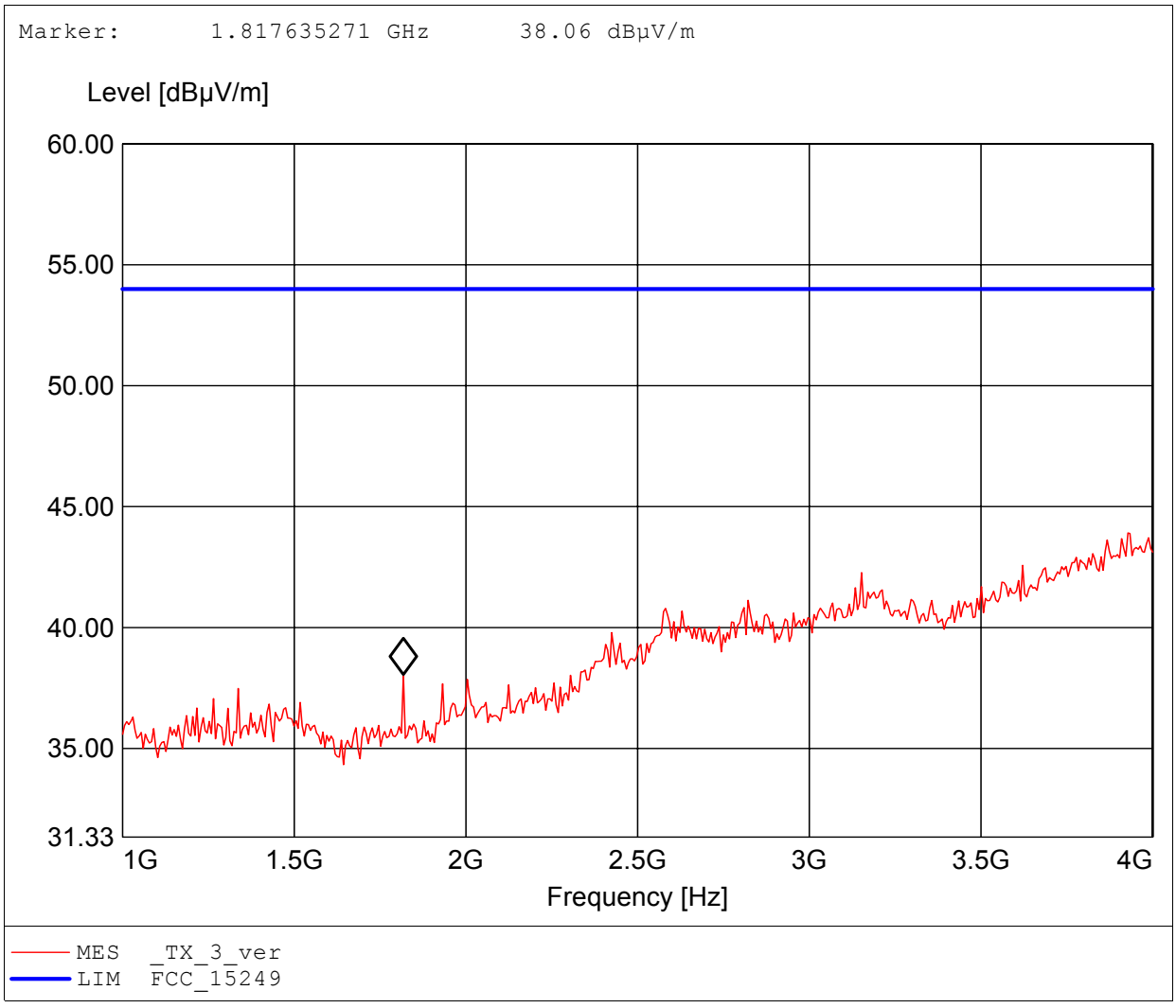
Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Unom.: 3.0 V DC
Test Specification:	Freq. / CH:
Comment 1:	Dist.: 3m, Ant.: HL 223, amplif.
Comment 2:	Freq: 897.780MHz, Emax: 24.05dBµV/m, RBW: 100kHz



Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Unom.: 3.0 V DC
Test Specification:	Freq. / CH:
Comment 1:	Dist.: 3m, Ant.: BBHA9120D, amplif.
Comment 2:	Freq: 3.928GHz, Emax: 43.91dBµV/m, RBW: 1MHz



Spurious emissions Field Strength

FCC RULES PART 15, SUBPART C

Approval Holder:	Panasonic Electronic Device Europe GmbH
EUT:	Z-Wave Module
Model:	PAN8550 / antenna TB2-900Dxxxx without ground
Test Site / Operator:	Eurofins Product Service GmbH / Mr. Treffke
Test Condition:	Tnom: 23°C / Unom.: 3.0 V DC
Test Specification:	Freq. / CH:
Comment 1:	Dist.: 3m, Ant.: BBHA9120D, amplif.
Comment 2:	Freq: 3.958GHz, Emax: 44.29dBµV/m, RBW: 1MHz