FCC Part 15 Subpart B&C §15.247
RSS-247 Issue 3

Test Report

Equipment Under Test	**4CH 260Watts Class-D Bluetooth Amplifier**
Model Name	**EL-DA4260B**
Variant Model Name	**-**
FCC ID	**IPH-ELDA4260B**
Module FCC ID	**2AMWO-FSCBT1026**
IC Number	**1792A-ELDA4260B**
Module IC Number	**23872-FSCBT1026**
Applicant	**Garmin International Inc**
Manufacturer	**Deodio Co., Ltd**
Date of Test(s)	**2024. 03. 25**
Date of Issue	**2024. 06. 17**

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
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Issue to	Issue by
Garmin International Inc 1200 E, 151st, Street, Olathe, KS 66062 United States Tel.: +1 913-440-1946 Fax: +1 913-397-8282	**DEKRA Korea Co., Ltd.** 498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, 17030, Rep. of Korea Tel.: +82 31-338-8837 Fax: +82 31-338-8847

Revision history

Revision	Date of issue	Description	Revised by
--	2024.06.17	Initial	-

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1. Applicant Information

1.1. Details of applicant

Applicant	:	Garmin International Inc
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Contact Person	:	Ben Karsak
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1.2. Manufacturer Information

Manufacturer	:	Deodio Co., Ltd
Address	:	10F, 330, Yeomjeonro, Michuhol-gu, Incheon, Korea

2. Laboratory Information

Company name	:	DEKRA Korea Co., Ltd.
Test site number	:	FCC (KR0151), IC (24841)
Address	:	498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, 17030, Rep. of Korea
Web site	:	http://www.dekra.kr
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3. Summary of test results

The EUT has been tested according to the following specifications:

FCC Rule FCC part 15	IC Rule RSS-247, RSS-GEN	Description	Result
15.203 15.247(b)(4)	-	Antenna requirement	C
15.247(a)(1)	RSS-247 5.1(b) RSS-GEN 6.7	20 dB bandwidth & 99 % bandwidth	N/A[Note1]
15.247(b)(1)	RSS-247 5.4(b)	Peak output power	N/A[Note1]
15.247(a)(1)	RSS-247 5.1(b)	Carrier frequency separation	N/A[Note1]
15.247(a)(1)(iii)	RSS-247 5.1(d)	Number of hopping frequency	N/A[Note1]
15.247(a)(1)(iii)	RSS-247 5.1(b)	Time of occupancy (Dwell time)	N/A[Note1]
15.205(a) 15.209(a) 15.247(d)	RSS-GEN 8.10 RSS-GEN 8.9 RSS-247 5.5	Transmitter radiated spurious emissions, Conducted spurious emission	C
15.207(a)	RSS-GEN 8.8	AC power-line conducted emissions	N/A[Note2]

※ Abbreviation

C Complied
N/A Not applicable
F Fail

※ Note

Note 1 : This test is not applicable because the EUT uses certified module
Note 2 : This test is not applicable because the EUT uses battery and it's not to be connected to the Public utility(AC) power line

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C63.4:2014, ANSI C63.10:2020
FCC Public Notice KDB 558074 D01 v05r02
RSS-247 Issue 3, RSS-GEN Issue 5

Approval Signatories

Test and Report Completed by :	Report Approval by :
서수현	손 홍 인
Suhyun Seo Test Engineer DEKRA Korea Co., Ltd.	Kin Son Technical Manager DEKRA Korea Co., Ltd.

The above test certificate is a test report not related to the Korean Laboratory Accreditation Scheme

4. EUT Description

Kind of product	4CH 260Watts Class-D Bluetooth Amplifier
Model Name	EL-DA4260B
FCC ID	IPH-ELDA4260B
Module FCC ID	2AMWO-FSCBT1026
IC Number	1792A-ELDA4260B
Module IC Number	23872-FSCBT1026
Power supply	DC 14.40 V
Frequency range	2 402 MHz ~ 2 480 MHz
Modulation technique	GFSK, Pi/4DQPSK, 8DPSK
Number of channels	79 ch
Antenna gain / Type	2.01 dBi / PCB Antenna
Test Site Registration Number	FCC (KR0151), IC (24841)
H/W version / S/W version	PCB# 4045-046-00 / MCU240403_V03
Test S/W version	BlueTest3 3.3.5

4.1. Table for Test Modes and Frequency (Bluetooth)

Preliminary tests were performed in different data rate to find the worst radiated emission.
The data rate shown in the table below is the worst-case rate with respect to the specific test item.
Investigation has been done on all the possible configurations for searching the worst cases.
The following table is a list of the test modes shown in this test report.

Mode	Data rate (Worst case)	Frequency (Freq. MHz)
BDR	DH5	**Lowest** (2 402) / **Middle** (2 441) / **Highest** (2 480)
EDR	3-DH5	**Lowest** (2 402) / **Middle** (2 441) / **Highest** (2 480)

4.2. Information about the FHSS characteristics

4.2.1. Pseudorandom frequency hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1600 hops/s.

4.2.2. Medium access protocol

The manufacturer declares that the device uses Bluetooth protocol.
It confirmed that Medium access protocol is implemented.

5. Measurement equipment

Equipment	Manufacturer	Model	Serial number	Calibration Interval	Calibration date	Calibration due.
Test Receiver	R&S	ESR7	101922	1 year	23.05.16	24.05.16
Signal Generator	R&S	SMB100A	178128	1 year	23.05.17	24.05.17
Spectrum Analyzer	R&S	FSV-40	100832	1 year	23.05.16	24.05.16
DC Power Supply	Agilent	U8002A	MY56110033	1 year	23.05.16	24.05.16
Horn Antenna	R&S	HF906	100236	1 year	23.06.20	24.06.20
Horn Antenna	AH Systems	SAS-572	269	1 year	23.05.22	24.05.22
Horn Antenna	AH Systems	SAS-573	164	1 year	23.05.22	24.05.22
Bi-Log Ant.	S/B	VULB 9161SE	4159	2 year	24.03.21	26.03.21
Loop Antenna	ETS LINDGREN	6502	00118166	2 year	22.05.25	24.05.25
Power Amplifier	TESTEK	TK-PA18H	170013-L	1 year	23.05.16	24.05.16
Power Amplifier	COM-POWER	PAM-840A	18050014	1 year	23.07.26	24.07.26
Controller	INNCO	CO2000	CO2000/064/6961003/L	N/A	N/A	N/A
Antenna Master	INNCO	MA4000	MA4000/038/6961003/L	N/A	N/A	N/A
Controller	INNCO	CO3000	CO3000/812/34240914/L	N/A	N/A	N/A
Antenna Master	INNCO	MA4640-XP-ET	None	N/A	N/A	N/A
RF Cable	SUHNER	SUCOFLEX100	84047746	3 month	24.03.21	24.06.21
RF Cable	SUHNER	SUCOFLEX102	801270/2	3 month	24.03.21	24.06.21
RF Cable	SUHNER	SUCOFLEX102	801532/2	3 month	24.03.21	24.06.21
Band Rejection Filter	Micro-Tonics	BRM50702	064	1 year	23.05.16	24.05.16

※Remark

Support equipment

Description	Manufacturer	Model	Serial number
Notebook computer	DELL	E5440	8HCMN12

6. Antenna Requirement

6.1. Standard applicable

For intentional device, according to FCC 47 CFR Section §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section §15.247 (c) if transmitting antennas of directional gain greater than 6 dBi are used.

6.2. Antenna connected construction

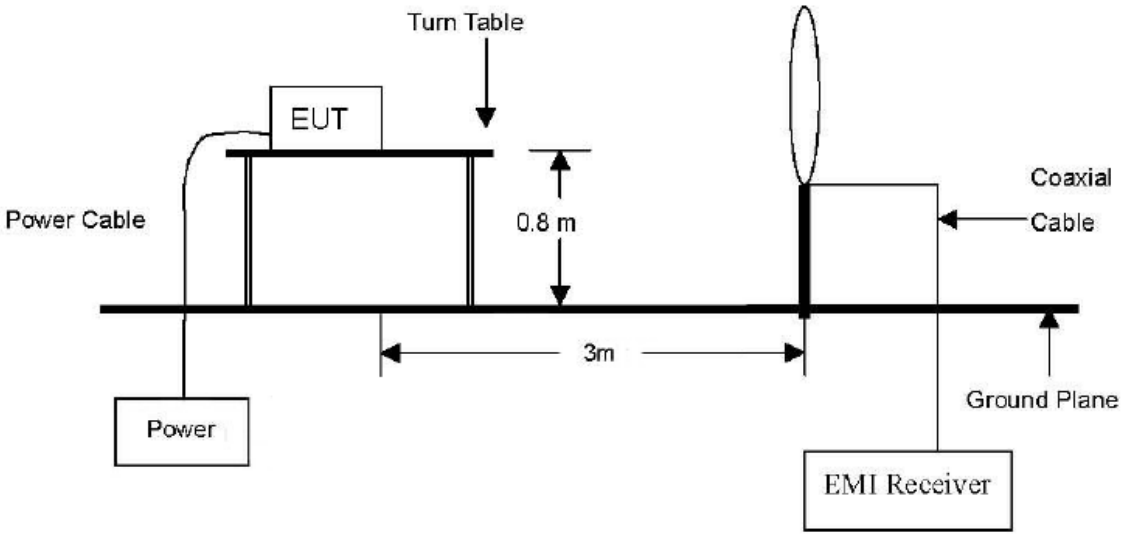
Antenna used in this product is PCB antenna,
Antenna gain is 2.01 dBi.

7. Transmitter radiated spurious emissions and conducted spurious emissions

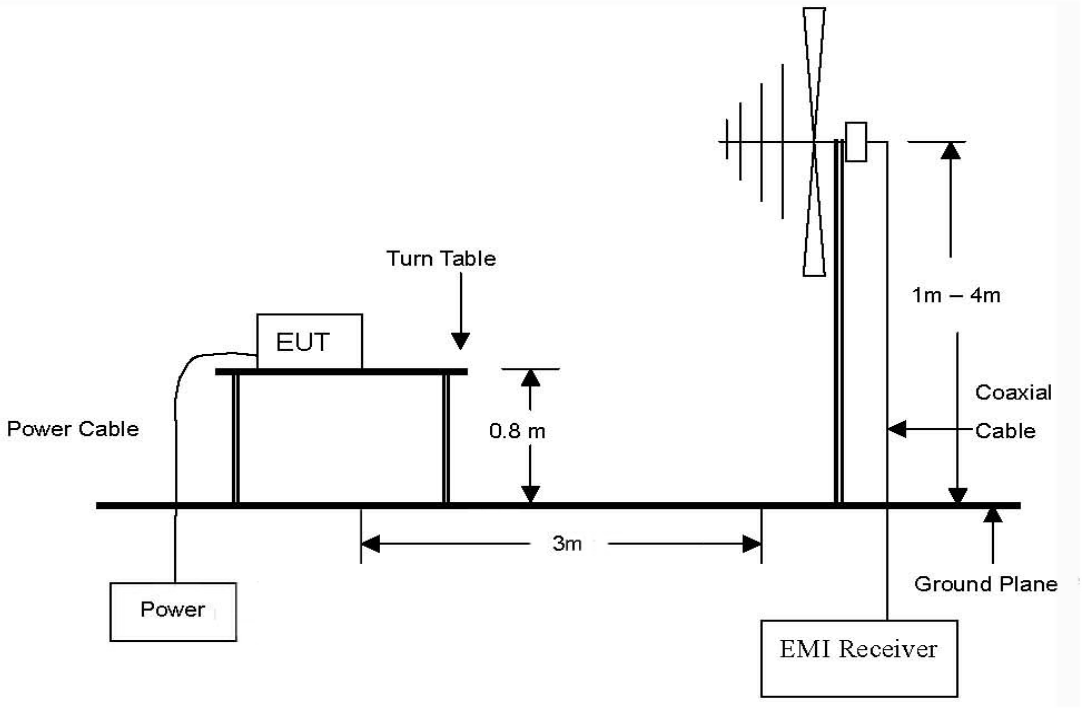
7.1. Test setup

7.1.1. Transmitter radiated spurious emissions

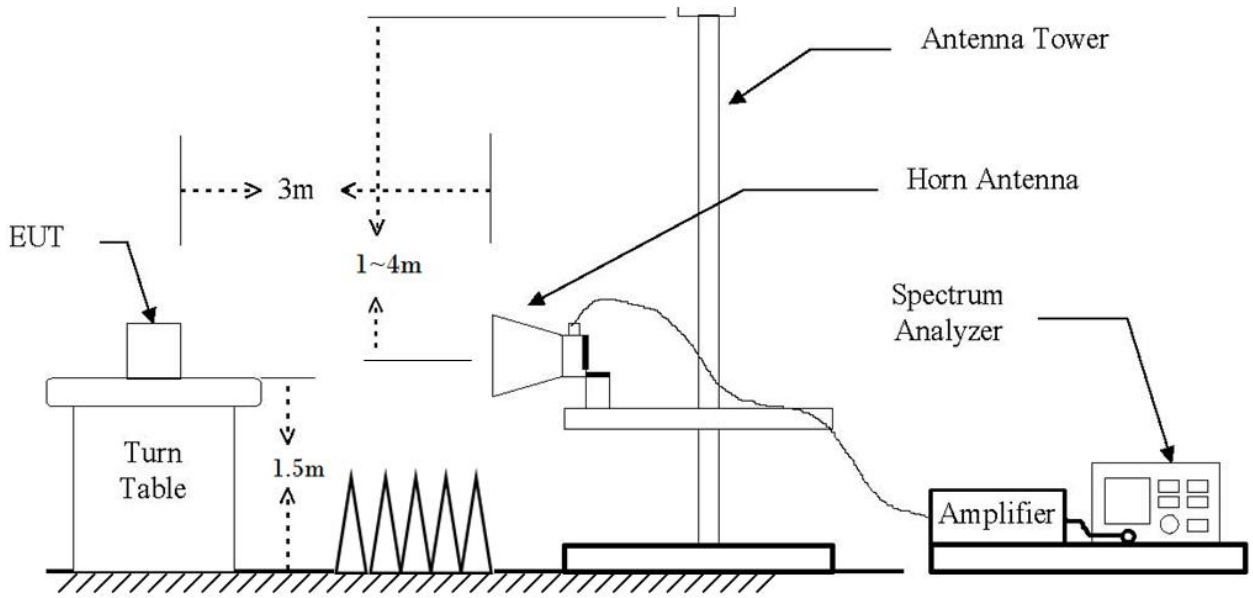
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 40 GHz emissions.



7.2. Limit

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement , provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))
According to § 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated at 3M (dBuV/m)	Radiated (uV/m)
0.009–0.490	300	See the remark	2400/F(kHz)
0.490–1.705	30		24000/F(kHz)
1.705–30.0	30		30
30 - 88	3	40.0	100
88 – 216	3	43.52	150
216 – 960	3	46.02	200
Above 960	3	53.97	500

※Remark

1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =20log(Specific distance/ test distance)(dB)
   Limit line=Specific limits(dBuV) + distance extrapolation factor.

7.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10:2020
In case of the air temperature of the test site is out of the range is 10 to 40 °C before the testing proceeds the warm-up time of EUT maintain adequately

7.3.1. Test procedures for radiated spurious emissions

1. The EUT is placed on a turntable, which is 0.8 m (Below 1 GHz.)/ 1.5 m (Above 1GHz) above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

※Remark

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for Peak detection (PK) at frequency below 30 MHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

7.3.2. Test procedures for conducted spurious emissions

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=100 kHz, VBW=100 kHz.

7.4. Test results

7.4.1. Radiated spurious emissions (9 kHz to 30 MHz)

The frequency spectrum from 9 kHz to 30 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.
To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Test mode : EDR_2 402 MHz (Worst case)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.					

※Remark

1. Result = Reading + Ant. factor - Amp + CL (Cable loss)
2. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
3. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty

7.4.2. Radiated spurious emissions (30 MHz to 1 000 MHz)

The frequency spectrum from 30 MHz to 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.
To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Test mode : EDR_2 402 MHz (Worst case)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.85	QP	V	39.06	40.00	0.94
78.84	QP	V	32.06	40.00	7.94
Above 100 MHz Not detected					

※Remark

1. Result = Reading + Ant. factor - Amp + CL (Cable loss)
2. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
3. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty

7.4.3. Radiated spurious emissions & Bandedge (Above 1 000 MHz)

The frequency spectrum above 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB.
To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Test mode : BDR

A. Lowest Ch. (2 402 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2 312.76	Peak	V	37.67	74.00	36.33
*4 803.55	Peak	H	47.02	74.00	26.98
Above 5 000 MHz Not detected					

B. Middle Ch. (2 441 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4 882.06	Peak	H	45.28	74.00	28.72
Above 5 000 MHz Not detected					

※Remark

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Actual = Reading + Ant. factor - Amp + CL (Cable loss) + DCCF
4. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
5. * is Restricted band.
6. Average measurement did not take place because the peak data did not exceed average limit
7. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty

C. Highest Ch. (2 480 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2 499.99	Peak	V	36.41	74.00	37.59
*4 960.19	Peak	H	43.57	74.00	30.43
Above 5 000 MHz Not detected					

※Remark

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Actual = Reading + Ant. factor - Amp + CL (Cable loss) + DCCF
4. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
5. * is Restricted band.
6. Average measurement did not take place because the peak data did not exceed average limit
7. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty

Test mode : EDR

A. Lowest Ch. (2 402 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2 329.65	Peak	H	37.73	74.00	36.27
*4 803.81	Peak	H	48.34	74.00	25.66
Above 5 000 MHz Not detected					

B. Middle Ch. (2 441 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4 882.19	Peak	H	45.66	74.00	28.34
Above 5 000 MHz Not detected					

※Remark

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Actual = Reading + Ant. factor - Amp + CL (Cable loss) + DCCF
4. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
5. * is Restricted band.
6. Average measurement did not take place because the peak data did not exceed average limit
7. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty

C. Highest Ch. (2 480 MHz)

Frequency (MHz)	Detector Mode	Pol.	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2 498.49	Peak	H	36.20	74.00	37.80
*4 960.45	Peak	H	44.14	74.00	29.86
Above 5 000 MHz Not detected					

※Remark

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Actual = Reading + Ant. factor - Amp + CL (Cable loss) + DCCF
4. 15.31 Measurement standards.
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
5. * is Restricted band.
6. Average measurement did not take place because the peak data did not exceed average limit
7. These results are satisfied in accordance with decision rules, including measurements and estimates of measurement uncertainty