EN IEC 62311:2020
EN 50665:2017

TEST REPORT

FOR

Bluetooth Module

Model No.: HM-BT2102
Series Model: HM-BT2101, HM-BT2103, HM-BT2104

Trademark: HOPERF

Report No.: E01A23050809H00201

Issue Date: June 30, 2023

Prepared for

Shenzhen Hope Microelectronics Co., Ltd

30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China

Prepared by

Dong Guan Anci Electronic Technology Co., Ltd.

1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

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TEST REPORT DESCRIPTION

Applicant	:	Shenzhen Hope Microelectronics Co., Ltd 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China
Manufacturer	:	Shenzhen Hope Microelectronics Co., Ltd 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China
EUT	:	Bluetooth Module
Model No.	:	HM-BT2102
Series Model:	:	HM-BT2101, HM-BT2103, HM-BT2104
Difference Description	:	All the same except for the model name.
Trade Mark	:	HOPERF
Ratings	:	DC 1.71V-3.8V

Test Procedure Used:

EN IEC 62311:2020
EN 50665: 2017

The device described above is tested by Dong Guan Anci Electronic Technology Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. This report shows the EUT to be technically compliant with the EN IEC 62311:2020 and EN 50665: 2017requirements. The test results are contained in this report and Dong Guan Anci Electronic Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these tests.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Dong Guan Anci Electronic Technology Co., Ltd.

Date of Test : June 10, 2023 to June 20, 2023

Prepared by : EMC Engineer/Duke Liu

Reviewer & Authorized Signer : EMC Supervisor /Tiger Xu

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Version	/	E01A23050809H00201

1. GENERAL INFORMATION

1.1 Description of Device (EUT)

Version:	5.1
Modulation:	GFSK
Operation frequency:	2402MHz-2480MHz
Channel number:	40 channels
Channel separation:	2MHz
Max ERIP:	19.87dBm(97.05mW)

1.2 Test Facility

Site Description

Name of Firm	:	Dong Guan Anci Electronic Technology Co., Ltd..
Site Location	:	1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

2. GENERAL PRODUCT INFORMATION

2.1 Basic Restriction

The essential requirements of Directive 2014/53/EU in the article 3.1(a) and the limits must be taken from Council Recommendation 99/519/EC for General Population or form the ICNIRP Guidelines for Occupational Exposure. EN 62479:2010 Generic standard to demonstrate the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields. The average power of EUT is less than 20mW then comply with basic restriction (1999/519/EC) without test.

3. TEST RESULT

3.1. EMF Exposure Measurement

3.1.1 Limit

Basic Restrictions

Council Recommendation 99/519/EC Annex II
Basic restrictions for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz)

Frequency range	Magnetic flux density (mT)	Current density (mA/m^2) (rms)	Whole body average SAR (W/kg)	Localized SAR (head and trunk) (W/kg)	Localized SAR (limbs) (W/kg)	Power density, S (W/m^2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1–4Hz	-	8/f	-	-	-	-
4Hz–1000Hz	-	2	-	-	-	-
1000Hz–100kHz	-	f/500	-	-	-	-
100kHz–10MHz	-	f/500	0.08	2	4	-
10MHz–10GHz	-	-	0.08	2	4	-
10GHz–300GHz	-	-	-	-	-	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1 cm^2 perpendicular to the current direction.
4. For frequencies up to 100kHz, AV current density values can be obtained by multiplying the rms value by$\sqrt{2}$ (=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as-1/(2tp).
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging Mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognized that this concept can be used in computational dissymmetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dissymmetric quantities have conservative values relative to the exposure guidelines.

8. For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated an=1/(2tp). Additionally, for pulsed exposures, in the frequency rage 0.3 to 10GHz and for localized exposure of the head, in order to limit and avoid auditory effects caused by thermoplastic expansion, an additional basic restriction is recommended. This is that the SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Reference Levels

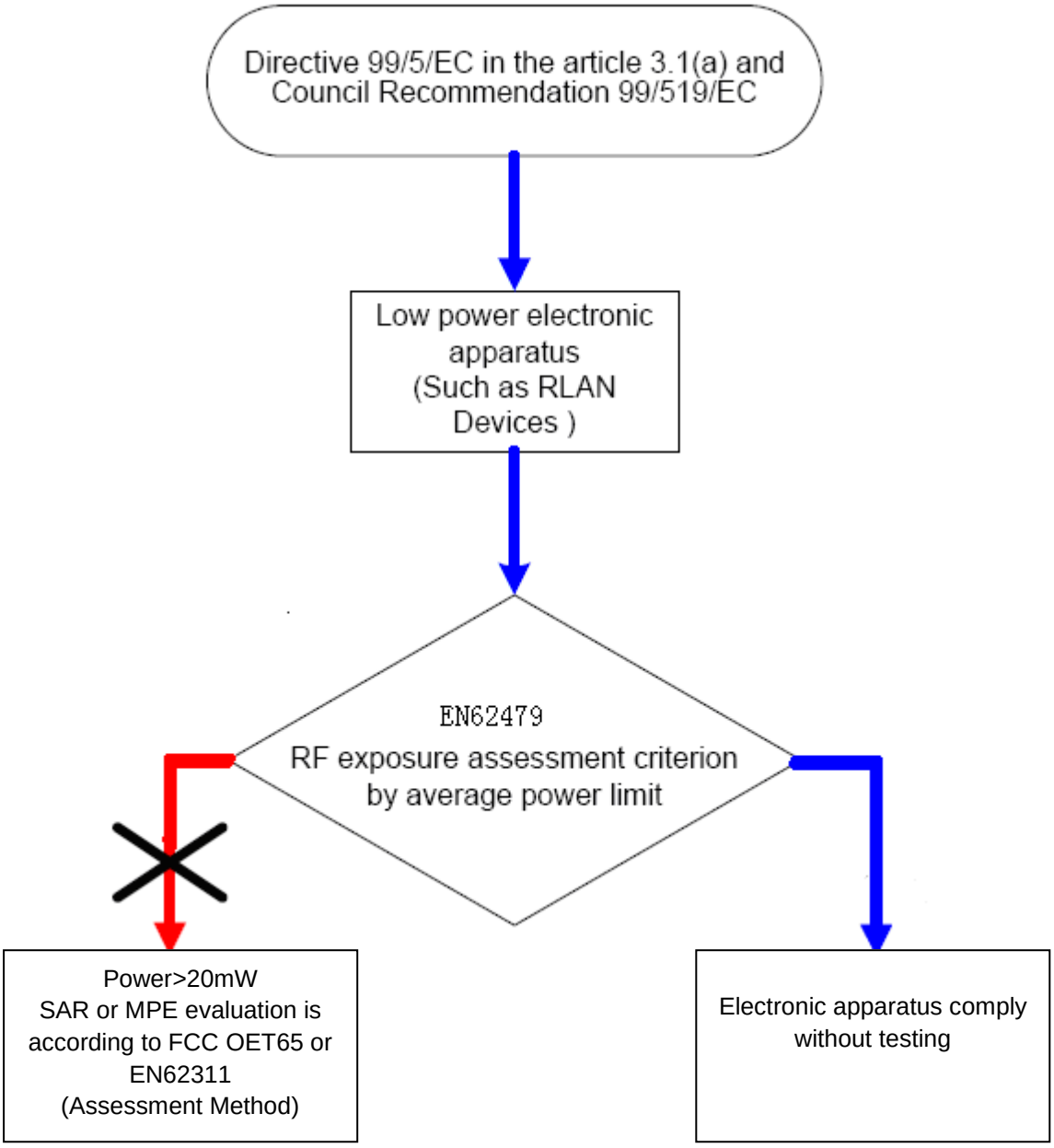
Council Recommendation 99/519/EC Annex III
Reference levels for electric, magnetic and electromagnetic fields (0 Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1 Hz	-	3.2×10^4	4×10^4	-
1-8 Hz	10000	$3.2\times10^4/f^2$	$4\times10^4/f^2$	-
8-25 Hz	10000	4000/f	5000/f	-
0.025-0.8 kHz	250/f	4/f	5/f	-
0.8-3 kHz	250/f	5	6.25	-
3-150 kHz	87	5	6.25	-
0.15-1 MHz	87	0.73/f	0.92/f	-
1-10 MHz	$87/f^{1/2}$	0.73/f	0.92/f	-
10-400 MHz	28	0.073	0.095	2
400-2000 MHz	$1.375\ f^{1/2}$	$0.0037\ f^{1/2}$	$0.0046\ f^{1/2}$	f/200
2-300 GHz	61	0.16	0.2	10

Notes:
1. As indicated in the frequency range column.
2. For frequencies between 100kHz and 10 GHz, Seq, E2, H2 and B2 are to averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, Seq, E2, H2, and B2 are averaged over any 68/1.05-minute period(in GHz).
4. No E-field value is provided for frequencies<1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

3.1.2. Evaluation Routine

Low Power Electronic Apparatus for RF exposure evaluation routine



3.1.3. EMF Exposure Levels Calculated

3.2 Detailed results

3.2.1 Summary of Results

Antenna Gain:0.5dBi

Frequency Range	EIRP or ERP	Limit (W/ m²)	Result (W/ m²)	Verdict
BT: 2402MHz to 2480MHz	19.87dBm	10	0.0217	Pass

3.2.2 MPE Evaluation

$S = (P*G) / 4\pi R^2$

P = Output power to antenna (Watts)

G =Antenna Gain (numeric)

R = distance to the center of radiation of antenna (in meter) = 0.20 m

Note:

1) P (Watts)=(10 ^ (dBm /10))/1000

2) G (Antenna gain in numeric) = 10^ (Antenna gain in dBi /10)

3) π=3.142

3.2.3 Measurement Uncertainty

Extended Uncertainty (k=2) 95% 0.5dB

4.PHOTO OF EUT

Please refer to the report : E01A23050809E00201.

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