

Sound Land Corporation

TEST REPORT

SCOPE OF WORK:

FCC 1.1310 – Maximum Permissible Exposure report

Model:

JUST COMBO

REPORT NUMBER

201100129TWN-001

ISSUE DATE

Mar. 12, 2021

PAGES

10

DOCUMENT CONTROL NUMBER

GFT-OP-10h (28-Nov-2018)

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Maximum Permissible Exposure (MPE) Evaluation Report

Applicant:	Sound Land Corporation No.32, Keji 1st Rd., Gueishan Dist., Taoyuan City 33383, Taiwan
Product:	JUST COMBO
Model No.:	JUST COMBO
FCC ID:	2AYQYJUSTCOMBO
Test Method/ Standard:	FCC 1.1310 KDB 447498
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

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Revision History

Report No.	Issue Date	Revision Summary
201100129TWN-001	Mar. 12, 2021	Original report

Table of Contents

1. General Information	5
1.1 Identification of the EUT	5
1.2 Adapter information	5
1.3 Antenna description	5
1.4 Peripherals equipment	6
2. Test specifications.....	7
2.1 Introduction.....	7
2.2 RF Exposure Limit	7
2.3 RF Exposure calculations	8
2.4 Operation mode	8
2.5 Test equipment.....	8
2.6 Test Set-up	9
3. Test results	10

Summary of Tests**MPE Evaluation meet FCC OET No. 65: 1997, IEEE C95.1-2005**

Test	Reference	Results
MPE Evaluation	FCC Guidelines for Human Exposure IEEE C95.1	Complies

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	JUST COMBO
Model No.:	JUST COMBO
Module 1:	KB30ABC
Module 2:	KB87D
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	79 channels
Frequency of Each Channel:	2402+1 k, k=0 ~ 78
Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Rated Power:	DC 5V from adapter
Power Cord:	N/A
Sample receiving date:	2020/11/11
Sample condition:	Workable
Test Date(s):	2021/02/04 ~ 2021/02/05

1.2 Adapter information

The EUT will be supplied with a power supply from below list:

No.	Model no.	Specification
Adapter	AMS57-0501000FU	I/P: 100-240Vac, 50/60Hz 0.2A O/P: 5Vdc, 1.0A

1.3 Antenna description

For module 1\Module 2

Antenna Gain	: 5.3 dBi
Antenna Type	: Printed antenna
Connector Type	: Fixed

1.4 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H	1. Micro USB Cable 0.2 meter × 1 2. USB to TTL Serial Cable 0.5 meter × 1
Fixture	CSR	N/A	N/A	N/A

2. Test specifications

2.1 Introduction

The EUT operates in the 2.4 band. Due to the EUT (include antenna) at its normal operation distance is at least 20 cm from the human body, the EUT was defined as a Mobile Device.

The reason to do the MPE Evaluation is to avoid the RF hazard to human body. The maximum output power and gain of the antenna were used to calculate the limited Power density (S) at 20 cm distance away from the product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and Safety Code 6 are followed.

According to 1.1307 (b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

2.2 RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b) and KDB 447498 D01 General RF Exposure Guidance v06.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

2.3 RF Exposure calculations

From §FCC 1.1310 table 1, the maximum permissible RF exposure for an uncontrolled environment is 1 mW/(cm²) (or 10 W/m²)*

Power density (S) is calculated by the following formula:

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

where, S = Power density (mW/cm²)

P = Output power to antenna (mW)

R = Distance between radiating structure and observation point (cm)

G = Gain of antenna in numeric

$\pi = 3.1416$

Example:

Assume a mobile device operates at 2412MHz and its maximum output power is 50mW, and the maximum gain of antenna is 1 (numeric) /0dBi.

then the power density (S) = $(50 * 1) / 4 * \pi * 20^2 = 0.00995$ (mW/cm²) (or = 0.0995 W/m²)

2.4 Operation mode

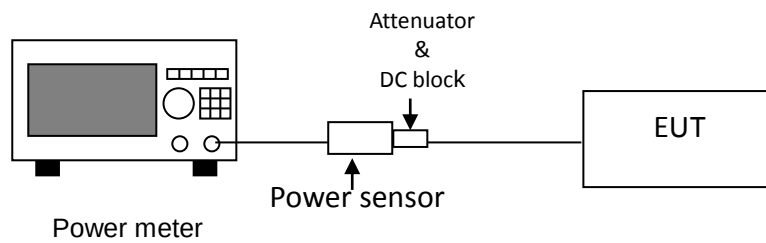
The EUT was supplied with DC 5V from adapter (Test voltage: 120Vac, 60Hz).

Connected to Notebook via USB to TTL Serial Cable, open “Blue test 3” and select different frequency and modulation.

2.5 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Power Meter	Anritsu	ML2495A	0844001	2020/10/28	2021/10/27
Power Sensor	Anritsu	MA2411B	0738452	2020/10/28	2021/10/27
20dB Attenuator	Mini-Circuits	BW-S20W5+	N/A	2020/05/27	2021/05/26

2.6 Test Set-up



TEST REPORT

3. Test results

For Module 1

Mode	Channel	Frequency (MHz)	Antenna Gain (mW)	Output power (dBm)	Output power (mW)	Tune-up Power Tolerance (dB)	Max Tune-up Power (dBm)	Max Tune-up Power (mW)	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
DH5	0	2402	3.39	-0.50	0.89	2.00	0.39	1.09	0.00060	1.0
	39	2441	3.39	-0.91	0.81	2.00	-0.10	0.98	0.00055	1.0
	78	2480	3.39	0.09	1.02	2.00	1.11	1.29	0.00069	1.0
2DH5	0	2402	3.39	-1.49	0.71	2.00	-0.78	0.84	0.00048	1.0
	39	2441	3.39	-0.66	0.86	2.00	0.20	1.05	0.00058	1.0
	78	2480	3.39	-0.99	0.80	2.00	-0.19	0.96	0.00054	1.0
3DH5	0	2402	3.39	-1.17	0.76	2.00	-0.41	0.91	0.00051	1.0
	39	2441	3.39	-1.30	0.74	2.00	-0.56	0.88	0.00050	1.0
	78	2480	3.39	-0.05	0.99	2.00	0.94	1.24	0.00067	1.0

For Module 2

Mode	Channel	Frequency (MHz)	Antenna Gain (mW)	Output power (dBm)	Output power (mW)	Tune-up Power Tolerance (dB)	Max Tune-up Power (dBm)	Max Tune-up Power (mW)	Power density (mW/cm ²)	Limit of power density (mW/cm ²)
DH5	0	2402	3.39	0.32	1.08	2.00	1.40	1.38	0.00073	1.0
	39	2441	3.39	0.65	1.16	2.00	1.81	1.52	0.00078	1.0
	78	2480	3.39	0.57	1.14	2.00	1.71	1.48	0.00077	1.0
2DH5	0	2402	3.39	0.34	1.08	2.00	1.42	1.39	0.00073	1.0
	39	2441	3.39	-0.32	0.93	2.00	0.61	1.15	0.00063	1.0
	78	2480	3.39	-0.70	0.85	2.00	0.15	1.04	0.00057	1.0
3DH5	0	2402	3.39	-0.38	0.92	2.00	0.54	1.13	0.00062	1.0
	39	2441	3.39	-0.38	0.92	2.00	0.54	1.13	0.00062	1.0
	78	2480	3.39	-0.50	0.89	2.00	0.39	1.09	0.00060	1.0

The Notice in Installation Manual has been stated as below:

While installing and operating this transmitter, the radio frequency exposure limit of 1 mW/ (cm²) may be exceeded at distances close to the transmitter. Therefore, the user must maintain a minimum distance of 20 cm from the device at all time.