



REPORT No. : SZ16100032S01

RF EXPOSURE EVALUATION REPORT

APPLICANT : GLORY HORSE INDUSTRIES LTD.
PRODUCT NAME : M18/M12 Wireless Jobsite Speaker
MODEL NAME : 2891-20 / WSR1602
TRADE NAME : Milwaukee
BRAND NAME : Milwaukee
FCC ID : 2ABL52891-M18
47CFR 2.1091
STANDARD(S) : KDB 447498 D01 General RF Exposure
Guidance v06
ISSUE DATE : 2016-11-14



SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555

Fax: 86-755-36698525

Http://www.morlab.com

E-mail: service@morlab.cn



DIRECTORY

TEST REPORT DECLARATION..... 3

1. TECHNICAL INFORMATION..... 4

1.1. IDENTIFICATION OF APPLICANT 4

1.2. IDENTIFICATION OF MANUFACTURER 4

1.3. EQUIPMENT UNDER TEST (EUT)..... 4

1.3.1. PHOTOGRAPHS OF THE EUT 5

1.3.2. IDENTIFICATION OF ALL USED EUT 6

1.4. APPLIED REFERENCE DOCUMENTS 6

2. DEVICE CATEGORY AND RF EXPOSURE LIMIT..... 7

3. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER 8

4. RF EXPOSURE EVALUATION 9

ANNEX C GENERAL INFORMATION 10

Change History		
Issue	Date	Reason for change
1.0	2016-11-14	First edition

**TEST REPORT DECLARATION**

Applicant	GLORY HORSE INDUSTRIES LTD.
Applicant Address	workshop 8, 4/f., World-Wide Industrial Centre, 43-47 Shan Mei street, Fotan, Shatin, N.T., Hong Kong
Manufacturer	Glory Horse Digitech Ltd. Dongguan
Manufacturer Address	No. 11, Jin YuLing Road, Sang Yuan Industrial District, Dongcheng, Dongguan, Guangdong, China.
Product Name	M18/M12 Wireless Jobsite Speaker
Model Name	2891-20 / WSR1602
Brand Name	Milwaukee
HW Version	REV05
SW Version	REV1.5
Test Standards	47CFR 2.1091; KDB 447498 D01 General RF Exposure Guidance v06
Issue Date	2016-11-14
SAR Evaluation	Not Required

Tested by : Chen Shengkui
Chen Shengkui

Reviewed by : Liu Jun
Liu Jun

Approved by : Peng Huarui
Peng Huarui



1. TECHNICAL INFORMATION

Note: the following data is based on the information by the applicant.

1.1. Identification of Applicant

Company Name:	GLORY HORSE INDUSTRIES LTD.
Address:	workshop 8, 4/f., World-Wide Industrial Centre, 43-47 Shan Mei street, Fotan, Shatin, N.T., Hong Kong

1.2. Identification of Manufacturer

Company Name:	Glory Horse Digitech Ltd. Dongguan
Address:	No. 11, Jin YuLing Road, Sang Yuan Industrial District, Dongcheng, Dongguan, Guangdong, China.

1.3. Equipment Under Test (EUT)

Model Name:	2891-20 / WSR1602
Trade Name:	Milwaukee
Brand Name:	Milwaukee
Hardware Version:	REV05
Software Version:	REV1.5
Frequency Bands:	Bluetooth 4.0; Bluetooth 2.1 ;
Modulation Mode:	Bluetooth 4.0:GFSK; Bluetooth 2.1+EDR: GFSK/ π /4-DQPSK/8-DPSK
Antenna type:	PCB Antenna
Development Stage:	Identical prototype

1.3.1. Photographs of the EUT

1. EUT front view



2. EUT rear view





1.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	REV05	REV1.5

1.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	47 CFR§2.1091	Radiofrequency Radiation Exposure Evaluation: mobile devices
2	KDB 447498 D01v06	General RF Exposure Guidance



2. DEVICE CATEGORY AND RF EXPOSURE LIMIT

Per user manual. Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) 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
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density



3. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER

Bluetooth Average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			GFSK	$\pi/4$ -DQPSK	8-DPSK
BT2.1	0	2402	6.06	3.67	3.67
	39	2441	6.20	4.13	4.12
	78	2480	5.54	3.40	3.35

Band	Channel	Frequency (MHz)	Output Power(dBm)
			GFSK
BT 4.0	0	2402	6.49
	19	2440	6.86
	39	2480	6.14



4. RF EXPOSURE EVALUATION

Standalone transmission MPE evaluation

Bands	Frequency (MHz)	Antenna Gain (dBi)	Conducted Average Power (dBm)	Time-averaging EIRP (mW)	Power density (mW/cm ²)	Limit for MPE (mW/cm ²)
Bluetooth 4.0	2440	1	6.86	6.11	0.001	1.0
Bluetooth 2.1	2441	1	6.20	5.25	0.001	1.0

Note:

1. MPE calculation method

$$\text{Power Density} = \text{EIRP}/4\pi R^2$$

Where: $\text{EIRP} = P \cdot G$

P = Peak out power

G = Antenna gain

R = Separation distance (20cm)



ANNEX GENERAL INFORMATION

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, Guangdong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, Guangdong Province, P. R. China

***** END OF REPORT *****