FCC TEST REPORT

According to

FCC Rules and Regulations Part 15 Subpart C

Applicant : Sonostar Inc.

Address 7F-1., No. 26, Lane 583, Rueiguang Rd.,

Neihu District, Taipei City 114, Taiwan

Equipment : SmartFit

Model No. : F01

FCC ID : 2ABYH-F01

Trade Name: Sonostar

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.
- The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014 Page No. : 1 of 35

Report No.: TEFQ1403171

FCC ID. : 2ABYH-F01

Contents

Report No.: TEFQ1403171

Issued Date :

Page No.

FCC ID.

May 13, 2014

2 of 35

: 2ABYH-F01

1.	Repo	ort of Measurements and Examinations	6
	1.1	List of Measurements and Examinations	6
2.	Test	Configuration of Equipment under Test	7
	2.1	Feature of Equipment under Test	7
	2.2	Carrier Frequency of Channels	7
	2.3	Test Mode and Test Software	7
	2.4	General Information of Test	8
	2.5	Measurement Uncertainty	8
3.	Ante	nna Requirements	
	3.1	Standard Applicable	
	3.2	Antenna Construction and Directional Gain	9
4.	Test	of Conducted Emission	
	4.1	Test Limit	10
	4.2	Test Procedures	
	4.3	Test Result and Data	10
5.	Test	of Radiated Emission	
	5.1	Test Limit	
	5.2	Test Procedures	
	5.3	Typical Test Setup	
	5.4	Measurement Equipment	
	5.5	Test Result and Data (9kHz ~ 30MHz)	
	5.6	Test Result and Data (30MHz ~ 1GHz)	
	5.7	Test Result and Data (1GHz ~ 25GHz)	
	5.8	Test Photographs	
6.	6dB	Bandwidth Measurement Data	
	6.1	Test Limit	
	6.2	Test Procedures	
	6.3	Test Setup Layout	
	6.4	Measurement Equipment	
	6.5	Test Result and Data	
7.		mum Peak and Average Output Power	
	7.1	Test Limit	
	7.2	Test Procedures	
	7.3	Test Setup Layout	
	7.4	Measurement Equipment	
	7.5	Test Result and Data	
8.		er Spectral Density	
	8.1	Test Limit	
	8.2	Test Procedures	
	8.3	Test Setup Layout	
	8.4	Measurement Equipment	
	8.5	Test Result and Data	
9.	Band	d Edges Measurement	31



CERPASS TECHNOLOGY CORP.

Ann	endix	A Photographs of FUT	Δ1 ~ Δ4
	10.1	Labeling Requirement	3
10.		ricted Bands of Operation	
		Restrict Band Emission Measurement Data	
		Test Result and Data	
		Measurement Equipment	
	9.3	Test Setup Layout	3 [.]
	9.2	Test Procedure	3 [.]
		Test Limit	

Tel:886-2-2655-8100 Fax:886-2-2655-8200

 Issued Date
 :
 May 13, 2014

 Page No.
 :
 3 of 35

 FCC ID.
 :
 2ABYH-F01

History of this test report

■ ORIGINAL.

 \square Additional attachment as following record:

Attachment No.	Issue Date	Description

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014

: 4 of 35

Report No.: TEFQ1403171

FCC ID. : 2ABYH-F01

Page No.

CERTIFICATE OF COMPLIANCE

According to

FCC Rules and Regulations Part 15 Subpart C

Applicant : Sonostar Inc.

Address 7F-1., No. 26, Lane 583, Rueiguang Rd.,

Neihu District, Taipei City 114, Taiwan

Equipment : SmartFit

Model No. : F01

FCC ID : 2ABYH-F01

I HEREBY CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 2009, KDB558074 & KDB662911. The equipment was *passed* the test performed according to FCC Rules and Regulations Part 15 Subpart C (2010).

The test was carried out on May 12, 2014 at Cerpass Technology Corp.

Approved by: Tested by:

Hill Chen

EMC/RF B.U. Assistant Manager

Aiden Lu Engineer

Dinlen

Issued Date : May 13, 2014
Page No. : 5 of 35

Report No.: TEFQ1403171

FCC ID. : 2ABYH-F01

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209 15.247(d)	. Radiated Emission	Pass
15.247(a)(2)	15.247(a)(2) . 6dB Bandwidth	
15.247(b)	. Maximum Peak Output Power	Pass
15.247(d)	. 100kHz Bandwidth of Frequency Band Edges	Pass
15.247(e)	. Power Spectral Density	Pass
1.1307 1.1310 2.1091 2.1093	. RF Exposure Compliance	Pass

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date: May 13, 2014

Report No.: TEFQ1403171

Page No. : 6 of 35 FCC ID. : 2ABYH-F01

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Hardware Spec.		
PCBA Size	20mm diameter circle	
Bluetooth Type	2.4GHz BLE 4.0	
G-sensor	3-axis electronic G sensor	
Battery Type	CR2032 coin battery	
Battery Life	6 months	
Button	One button	
Dutton	(1) The first time use of APP and pairing with the device automatically	
LED light Green: Click button		
Serial number	Each device must have a unique serial number	
I/O interface	Device via Bluetooth transmit to APP	
	(1) Wrist	
Wear position	(2) Waist	
	(3) Foot	
Software Spec.		
G sensor measuring	Anytime	
Stored Data Format	- Walk (Sum of the Steps) / Hour	
Olored Dala i Offial	- Sleep (Sum of the Steps) / 10 minute (default 23:00 ~ 7:00)	
Stored Data Size	6 months	

Report No.: TEFQ1403171

2.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

2.3 Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- b. The following test mode was performed for RF test:

• GFSK: CH 00: 2402MHz, CH 19: 2440MHz, CH 39: 2480MHz.

Cerpass Technology Corp. Issued Date : May 13, 2014

Tel:886-2-2655-8100 Fax:886-2-2655-8200 Page No. : 7 of 35 FCC ID. : 2ABYH-F01

2.4 General Information of Test

Test Site :	Cerpass Technology Corp. 2F-11, No. 3, Yuan Qu St., (Nankang Software Park), Taipei, Taiwan 115, R.O.C.
Test Site Location (OATS2-SD) :	No.68-1, Shihbachongsi, Shihding Township, Taipei City 223, Taiwan, R.O.C.
FCC Registration Number:	TW1049, TW1061, 390316, 488071
IC Registration Number :	4934B-1, 4934D-1
VCCI Registration Number:	T-1173 for Telecommunication Test C-4139 for Conducted emission test R-3428 for Radiated emission test G-97 for Radiated emission test above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.
Laboratory Accreditation :	NVLAP LAB CODE: 200954-0

2.5 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated emission	±4.11dB
Peak Output Power(conducted)	±1.38dB
Peak Output Power(Radiated)	±1.70dB
Power Spectral Density	±1.39dB
Radiated emission(3m)	±4.11dB
Radiated emission(10m)	±3.89dB

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 8 of 35
FCC ID. : 2ABYH-F01



3. Antenna Requirements

3.1 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 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3.2 Antenna Construction and Directional Gain

Antenna Type: Chip Antenna

Antenna Gain: 1.5 dBi

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014

Report No.: TEFQ1403171

Page No. : 9 of 35 FCC ID. : 2ABYH-F01



4. Test of Conducted Emission

4.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2009 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB µ V)	Average (dB µ V)
0.15 – 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 – 30.0	60	50

^{*}Decreases with the logarithm of the frequency.

4.2 Test Procedures

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connecting to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

4.3 Test Result and Data

The EUT is powered from battery. This test item is not applicable.

Cerpass Technology Corp.

Issued Date: May 13, 2014

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Page No. : 10 of 35 FCC ID. : 2ABYH-F01



5. Test of Radiated Emission

5.1 Test Limit

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

5.2 Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- i. "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.

Cerpass Technology Corp. Issued Date: May 13, 2014

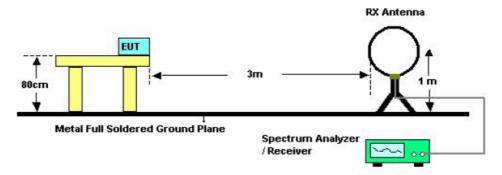
Tel:886-2-2655-8100 Fax:886-2-2655-8200

Page No. : 11 of 35
FCC ID. : 2ABYH-F01

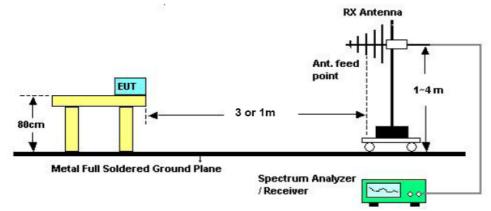


5.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB); Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

5.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB 9168	275	2013/10/01	2014/09/30
Amplifier	QuieTek	AP/0100A	CHM0906075	2013/09/30	2014/09/29
SPECTRUM ANALYZER	R&S	FSP40	100219	2013/09/14	2014/09/13
HORN ANTENNA	EMCO	3115	31601	2013/09/18	2014/09/17
PREAMPLIFIER	MITEQ	AMF-7D-001018 00-30-10P	1835099	2013/12/10	2014/12/09

5.5 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

Cerpass Technology Corp.

Issued Date : May 13, 2014

Report No.: TEFQ1403171

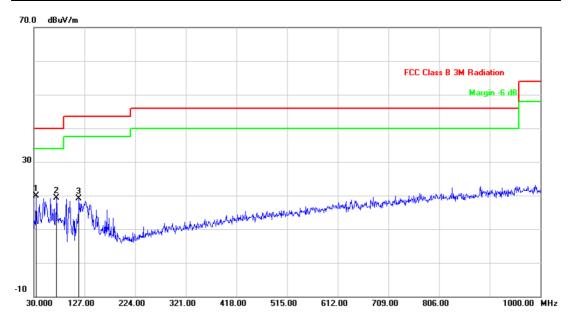
Tel:886-2-2655-8100 Fax:886-2-2655-8200

Page No. : 12 of 35 FCC ID. : 2ABYH-F01

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5.6 Test Result and Data (30MHz ~ 1GHz)

Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Transmit	Temperature	:	25 °C
Operation Channel	:	0	Humidity	:	60 %
Modulation Type	:	GFSK (1 Mbps)	Atmospheric Pressure	:	1014 hPa
Test Date	:	May 09, 2014			



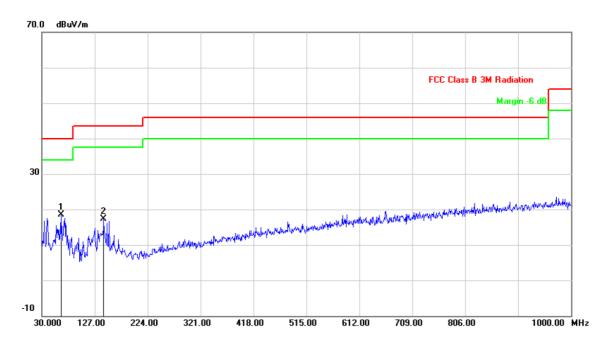
No.	Frequency	Factor	Reading	Level	Limit	Margin	Det.	Height	Azimuth
	(MHz)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		(cm)	(deg)
1	33.8800	-18.38	38.25	19.87	40.00	-20.13	peak	100	163
2	73.6500	-21.74	41.02	19.28	40.00	-20.72	peak	100	177
3	116.3298	-21.40	40.53	19.13	43.50	-24.37	peak	100	204

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 13 of 35
FCC ID. : 2ABYH-F01

Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode		Transmit	Temperature	:	25 °C
Operation Channel		0	Humidity	:	60 %
Modulation Type		GFSK (1 Mbps)	Atmospheric Pressure	:	1014 hPa
Test Date		May 09, 2014			



No.	Frequency	Factor	Reading	Level	Limit	Margin	Det.	Height	Azimuth
	(MHz)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)		(cm)	(deg)
1	64.9200	-19.70	38.22	18.52	40.00	-21.48	peak	100	165
2	143.4900	-19.00	36.21	17.21	43.50	-26.29	peak	100	196

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 14 of 35

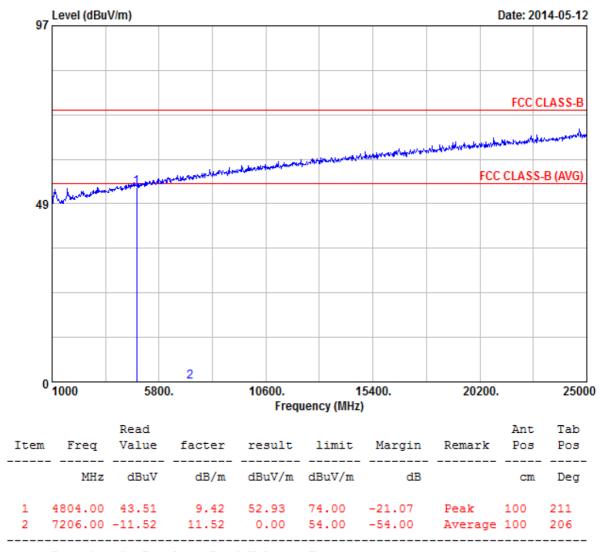
: 2ABYH-F01

FCC ID.



5.7 Test Result and Data (1GHz ~ 25GHz)

Power	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	Transmit	Temperature	:	24 °C
Operation Channel	0	Humidity		52 %
Modulation Type	GFSK (1 Mbps)	Atmospheric Pressure		1075 hPa



Remarks: 1. Result = Read Value + Factor

2. Factor = Antenna factor + Cable loss - Amplifier factor

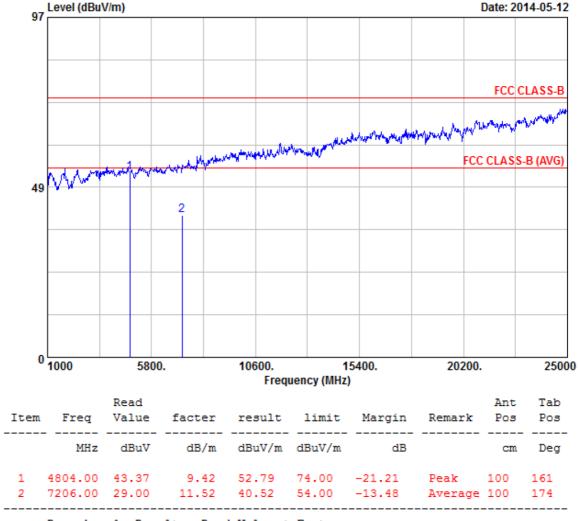
Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 15 of 35
FCC ID. : 2ABYH-F01



Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Transmit	Temperature	:	24 °C
Operation Channel	:	0	Humidity	:	52 %
Modulation Type	:	GFSK (1 Mbps)	Atmospheric Pressure	:	1075 hPa



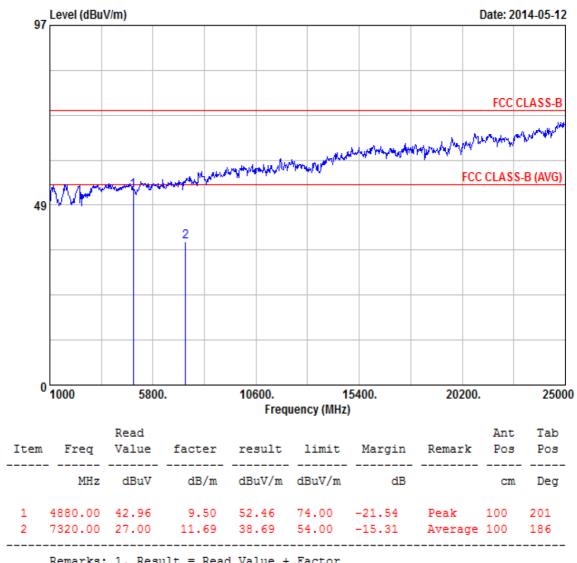
2. Factor = Antenna factor + Cable loss - Amplifier factor

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 16 of 35
FCC ID. : 2ABYH-F01



Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Transmit	Temperature	:	24 °C
Operation Channel	:	19	Humidity	:	52 %
Modulation Type	:	GFSK (1 Mbps)	Atmospheric Pressure	:	1075 hPa



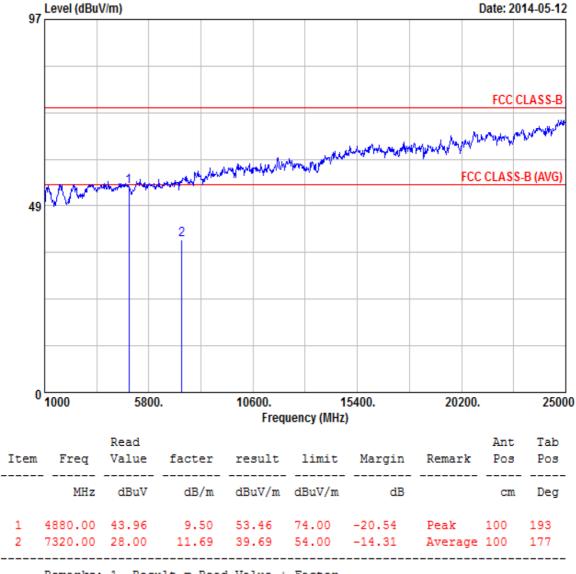
2. Factor = Antenna factor + Cable loss - Amplifier factor

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date: May 13, 2014 Page No. : 17 of 35 FCC ID. : 2ABYH-F01



Power :	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode :	Transmit	Temperature	:	24 °C
Operation Channel :	19	Humidity	:	52 %
Modulation Type :	GFSK (1 Mbps)	Atmospheric Pressure	:	1075 hPa



2. Factor = Antenna factor + Cable loss - Amplifier factor

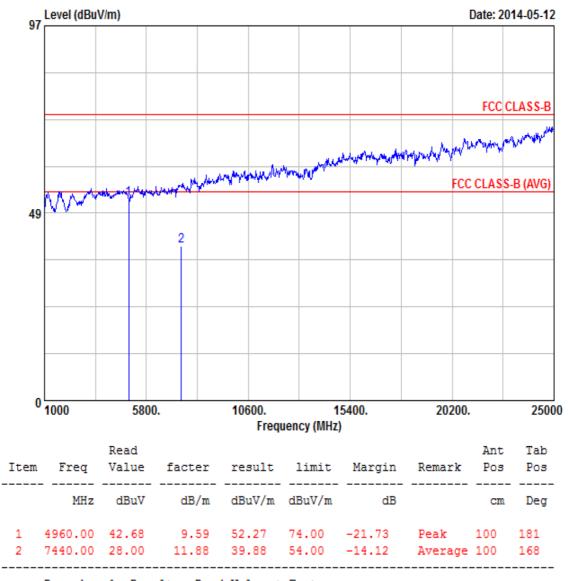
Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 18 of 35
FCC ID. : 2ABYH-F01



Power :	DC 3V	Pol/Phase	:	VERTICAL
Test Mode :	Transmit	Temperature	:	24 °C
Operation Channel :	39	Humidity	:	52 %
Modulation Type :	GFSK (1 Mbps)	Atmospheric Pressure	:	1075 hPa



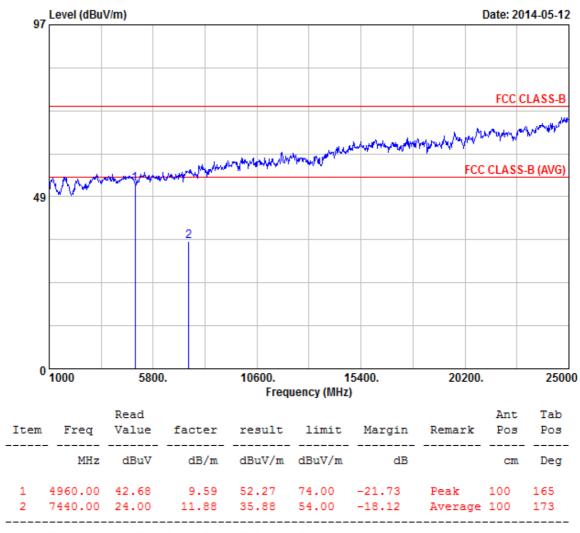
2. Factor = Antenna factor + Cable loss - Amplifier factor

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Page No. : May 13, 2014
Page No. : 19 of 35
FCC ID. : 2ABYH-F01



Power :	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode :	Transmit	Temperature	:	24 °C
Operation Channel :	39	Humidity	:	52 %
Modulation Type :	GFSK (1 Mbps)	Atmospheric Pressure	:	1075 hPa



2. Factor = Antenna factor + Cable loss - Amplifier factor

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 20 of 35
FCC ID. : 2ABYH-F01

6. 6dB Bandwidth Measurement Data

6.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

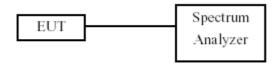
6.2 Test Procedures

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set RBW of spectrum analyzer to $1\sim5\%$ of the emission bandwidth and VBW $\geq 3x$ RBW.

Report No.: TEFQ1403171

- c. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- d. The 6dB Bandwidth was measured and recorded.

6.3 Test Setup Layout



6.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

6.5 Test Result and Data

Test Date: May 09, 2014 Temperature: 23 °C Atmospheric pressure: 1027 hPa Humidity: 47 %

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	2/3 20dB Bandwidth (KHz)
	00	2402	1.5	3.8
GFSK (1Mbps)	19	2441	1.5	4.0
(1141600)	39	2480	1.5	4.2

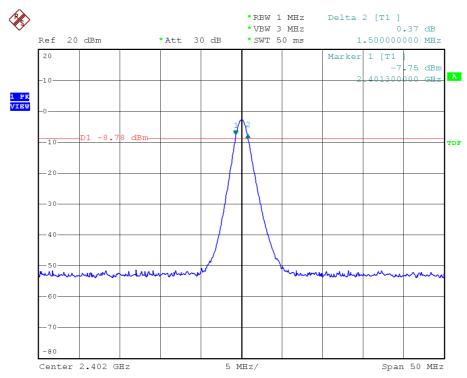
Cerpass Technology Corp. Issued Date: May 13, 2014

Tel:886-2-2655-8100 Fax:886-2-2655-8200 Page No. : 22 of 35 FCC ID. : 2ABYH-F01



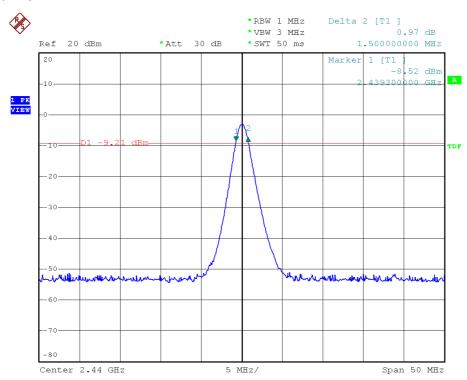
Modulation Standard: GFSK (1Mbps)





Modulation Standard: GFSK (1Mbps)

Channel: 19

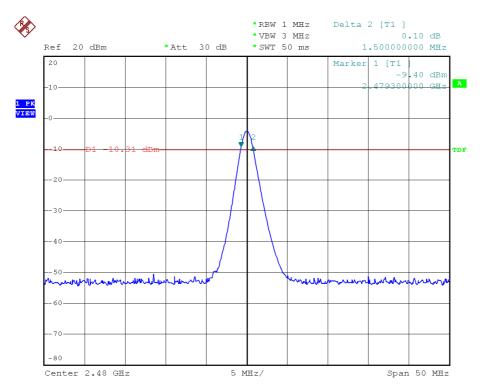


Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 23 of 35
FCC ID. : 2ABYH-F01

Modulation Standard: GFSK (1Mbps) Channel: 39





Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014 Page No. : 24 of 35 FCC ID. : 2ABYH-F01

7. Maximum Peak and Average Output Power

7.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

7.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

7.3 Test Setup Layout



7.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

7.5 Test Result and Data

Test Date: May 09, 2014 Temperature: 23° C Atmospheric pressure: 1027 hPa Humidity: 47%

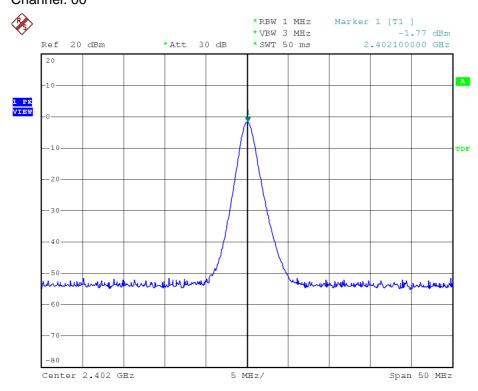
Modulation Standard	Channel	Frequency (MHz)	Power Output (dBm)	Peak Power Output (mW)
GFSK (1Mbps)	00	2402	-1.77	0.665
	19	2440	-2.81	0.524
	39	2480	-4.20	0.380

Cerpass Technology Corp. Issued Date: May 13, 2014

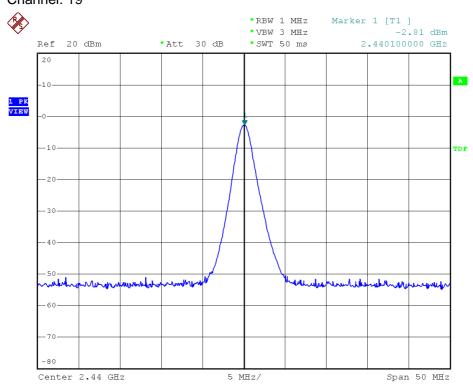
Page No. : 25 of 35 FCC ID. : 2ABYH-F01



Modulation Standard: GFSK (1Mbps) Channel: 00



Modulation Standard: GFSK (1Mbps) Channel: 19

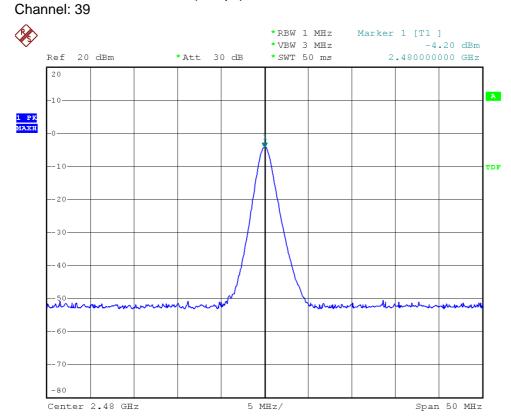


Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 26 of 35
FCC ID. : 2ABYH-F01

CERPASS TECHNOLOGY CORP.

Modulation Standard: GFSK (1Mbps)



Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 27 of 35
FCC ID. : 2ABYH-F01

8. Power Spectral Density

8.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

8.2 Test Procedures

- a. The transmitter output was connected to spectrum analyzer.
- b. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.

Report No.: TEFQ1403171

c. The power spectral density was measured and recorded.

8.3 Test Setup Layout



8.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

8.5 Test Result and Data

Test Date: May 09, 2014 Temperature: 23℃ Atmospheric pressure: 1027 hPa Humidity: 47%

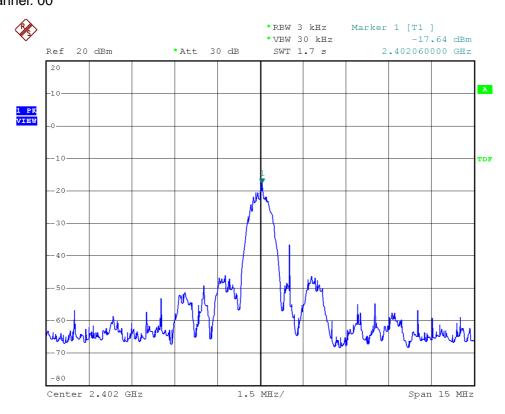
Modulation Standard	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)
GFSK	00	2402	-17.64
(1Mbps)	19	2440	-17.75
(Tivibps)	39	2480	-17.70

Cerpass Technology Corp. Issued Date: May 13, 2014

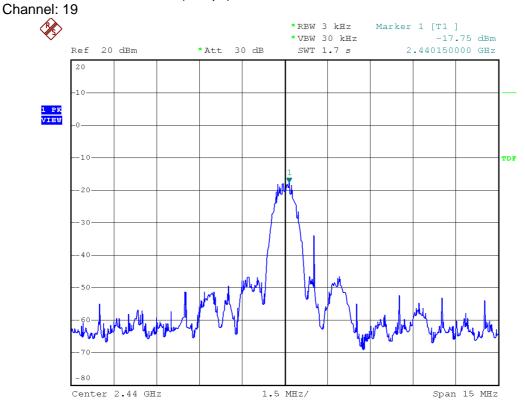
Tel:886-2-2655-8100 Fax:886-2-2655-8200 Page No. : 28 of 35 FCC ID. : 2ABYH-F01



Modulation Standard: GFSK (1Mbps) Channel: 00



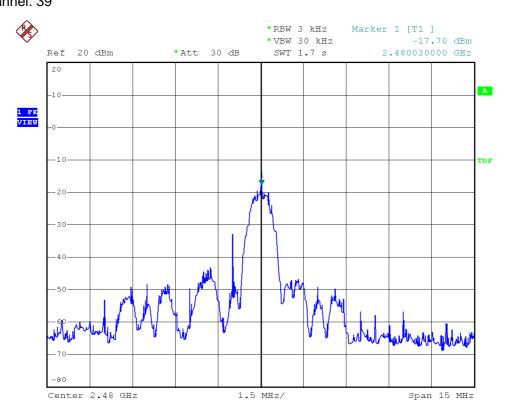
Modulation Standard: GFSK (1Mbps)



Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 29 of 35
FCC ID. : 2ABYH-F01

Modulation Standard: GFSK (1Mbps) Channel: 39



Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 30 of 35
FCC ID. : 2ABYH-F01

9. Band Edges Measurement

9.1 Test Limit

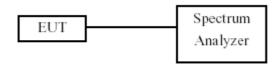
Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

Report No.: TEFQ1403171

9.2 Test Procedure

- a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
- b. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- c. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- d. The band edges was measured and recorded.

9.3 Test Setup Layout



9.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

9.5 Test Result and Data

Test Date: May 09, 2014 Temperature: 23℃ Atmospheric pressure: 1027hPa Humidity: 47%

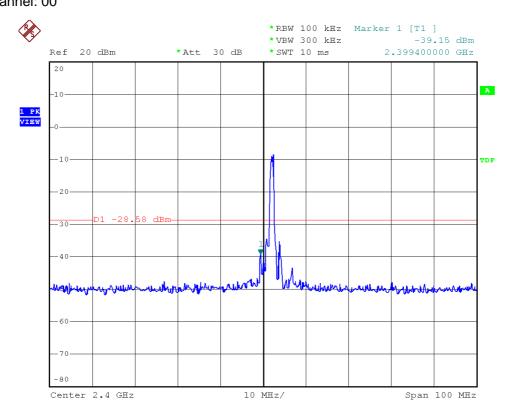
Modulation Standard	Channel	Frequency (MHz)	maximum value in frequency(MHz)	maximum value (dBm)	Limit (dBm)
GFSK	0	2402	2399.40	-39.15	-28.58
(1Mbps)	39	2480	2059.00	-41.98	-24.97

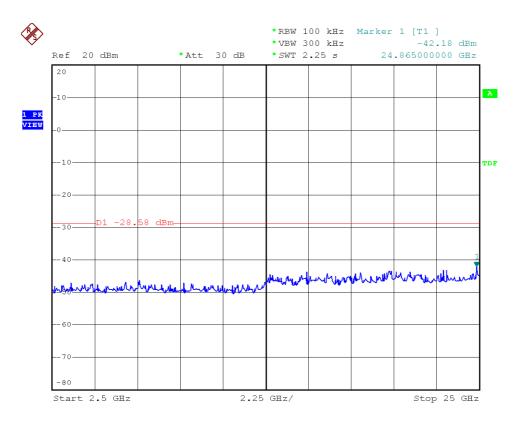
Cerpass Technology Corp. Issued Date: May 13, 2014

Tel:886-2-2655-8100 Fax:886-2-2655-8200 Page No. : 31 of 35 FCC ID. : 2ABYH-F01



Modulation Standard: GFSK (1Mbps) Channel: 00



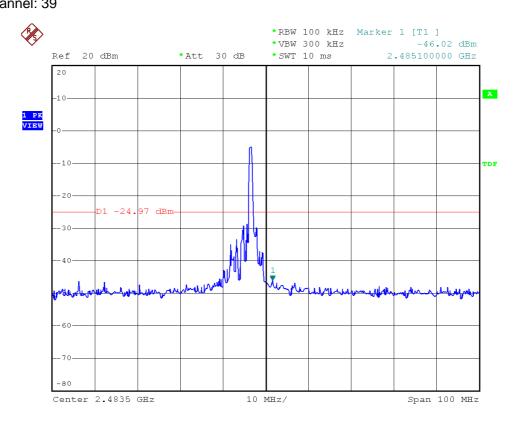


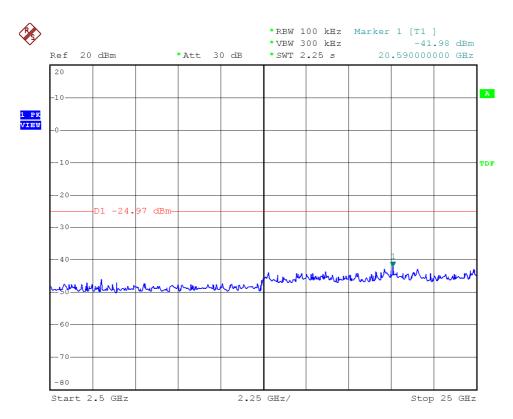
Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 32 of 35
FCC ID. : 2ABYH-F01



Modulation Standard: GFSK (1Mbps) Channel: 39





Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014
Page No. : 33 of 35
FCC ID. : 2ABYH-F01



9.6 Restrict Band Emission Measurement Data

Test Date: May 09, 2014 Temperature: 23 ℃ Atmospheric pressure: 1027 hPa Humidity: 47 %

Antenna Gain: 1.5dBi

Modulation Standard: GFSK

Channel 1						Fu	ndamen	tal Frequ	ency: 24	412 MHz
Frequency	Ant-Pol	Meter Reading	Corrected	Result	Remark	`	BuV/m)	Margin	Table	Ant High
(MHz)	H/V	(dBuV)	Factor (dB)	(dBuV/m)	Roman	Peak	Ave	(dB)	Deg.	(m)
2389.52	Ι	47.14	6.50	53.64	Peak	74	54	-20.36	184	1.00
	Ι				Ave	74	54		-	
2322.75	V	49.43	3.67	53.10	Peak	74	54	-20.90	259	1.00
	V				Ave	74	54		-	
Channel 1	Channel 11 Fundamental Frequency: 2462 MHz									
Frequency	Ant-Pol	Meter	Corrected	Result	Domork	Limit (d	BuV/m)	Margin	Table	Ant High
(MHz)	H/V	Reading (dBuV)	Factor (dB)	(dBuV/m)	Remark	Peak	Ave	(dB)	Deg.	(m)
2484.64	Η	45.39	6.64	52.03	Peak	74	54	-21.97	178	1.00
	Η				Ave	74	54			
2489.33	V	46.62	6.50	53.12	Peak	74	54	-20.88	213	1.00
	V				Ave	74	54			

Report No.: TEFQ1403171

Notes:

- 1. Result = Meter Reading + Factor
- 2. Factor = Antenna Factor + Cable Loss Amplifier
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector peak mode) for Peak detection at frequency above 1GHz.
- 4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector sample mode) for Average detection at frequency above 1GHz.

Cerpass Technology Corp. Issued Date: May 13, 2014

Tel:886-2-2655-8100 Fax:886-2-2655-8200 Page No. : 34 of 35 FCC ID. : 2ABYH-F01



10. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 - 0.11000	16.42000 - 16.42300	399.9 – 410.0	4.500 - 5.250
0.49500 - 0.505**	16.69475 - 16.69525	608.0 - 614.0	5.350 - 5.460
2.17350 - 2.19050	16.80425 - 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 - 4.12800	25.50000 - 25.67000	1300.0 – 1427.0	8.025 - 8.500
4.17725 – 4.17775	37.50000 - 38.25000	1435.0 – 1626.5	9.000 - 9.200
4.20725 - 4.20775	73.00000 - 74.60000	1645.5 – 1646.5	9.300 - 9.500
6.21500 - 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 - 6.26825	108.00000 - 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 - 6.31225	123.00000 - 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 - 8.29400	149.90000 - 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 - 8.36600	156.52475 - 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 - 8.38675	156.70000 - 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 - 8.41475	162.01250 - 167.17000	3260.0 - 3267.0	23.600 – 24.000
12.29000 - 12.29300	167.72000 - 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 - 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 - 335.40000	3600.0 - 4400.0	Above 38.6
13.36000 - 13.41000			

^{**:} Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

10.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cerpass Technology Corp.

Tel:886-2-2655-8100 Fax:886-2-2655-8200

Issued Date : May 13, 2014

Report No.: TEFQ1403171

Page No. : 35 of 35 FCC ID. : 2ABYH-F01