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Page: 1 of 18

FCC ID: 2AI2EMG20160706

# TEST REPORT

The following sample(s) was/were submitted and identified on behalf of the client as:

Application No.:	GZEM1605002975TX
Applicant:	SHENZHEN MINJUN ELECTRONIC TECHNOLOGY CO., LTD
Manufacturer:	Same as the applicant.
FCC ID:	2AI2EMG20160706
Product Description:	Genie helmet light.
Model No.:	Genie
Standards:	CFR 47 PART 15 Subpart C: 2014 section 15.249
Date of Receipt:	2016-05-13
Date of Test:	2016-05-23 to 2016-05-27
Date of Issue:	2016-08-01
Test Result :	Pass*

<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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Report No.: GZEM160500297501

Page: 2 of 18

## 2 Version

Revision Record									
Version	Chapter	Date	Modifier	Remark					
00		2016-08-01		Original Report					

Authorized for issue by:		
Tested By	(Curry Wu) /Project Engineer	2016-05-23 to 2016-05-27  Date
Prepared By	June Chen	2016-07-15
	(June Chen) /Clerk	Date
Checked By	Riday Liu	2016-07-15
	(Ricky Liu) /Reviewer	Date



Report No.: GZEM160500297501

Page: 3 of 18

## 3 Test Summary

Test	Test Requirement	Test method	Result
Field Strength of	FCC PART 15 C	ANSI C63.10:	DACC
Fundamental	section 15.249 (a)	Clause 6.6	PASS
F: 110; # 6	FCC PART 15 C	ANSI C63.10:	
Field Strength of Unwanted Emissions	section 15.249 (a)	Clause 6.4, 6.5 and	PASS
Onwanted Linissions	section 15.249 (d)	6.6	
Dand Edges	FCC PART 15 C	ANSI C63.10:	DACC
Band Edges	section 15.249 (d)	Clause 6.10	PASS
Occupied Denduidth	FCC PART 15 C	ANSI C63.10:	DACC
Occupied Bandwidth	section 15.215(c)	Clause 6.9.	PASS

#### Remark:

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.

ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report.



Report No.: GZEM160500297501

Page: 4 of 18

### 4 Contents

1	Cover Page							
2	Versi	on						
3	3 Test Summary							
4	Contents							
5 General Information								
	5.1	Client Information	5					
	5.2	General Description of E.U.T.	5					
	5.3	Details of E.U.T.						
	5.4	Description of Support Units	5					
	5.5	Other Information Requested by the Customer	5					
	5.6	Deviation from Standards						
	5.7	Test Location	6					
6	Equip	ment List	8					
7	Test I	Results	9					
	7.1	E.U.T. Operation	9					
	7.2	Antenna Requirement	10					
	7.3	Field Strength of Fundamental& Field Strength of Unwanted Emissions& Band Edge	11					
	7.4	Occupied Bandwidth						



Report No.: GZEM160500297501

Page: 5 of 18

### 5 General Information

#### 5.1 Client Information

Applicant: SHENZHEN MINJUN ELECTRONIC TECHNOLOGY CO., LTD

Address of Applicant: Libang technology Park, 3rd Xitian Industrial Zone, Guangming New

District, Shenzhen China

Manufacturer: Same as the applicant.

Address of Manufacturer: Same as the applicant.

### 5.2 General Description of E.U.T.

Product Description: Genie helmet light.

Model No.: Genie

#### 5.3 Details of E.U.T.

Operating Frequency 2406 MHz

Type of Modulation: GFSK

Number of Channels 1

Channel Separation: None

Antenna Type Integral antenna

Antenna gain: 0 dBi

Function: Radio Controller with 2.4GHz as carrier.

Power Supply: DC 3.0 V size "CR 2025" button cell for remote controller

Normal Test Voltage: The same as power supply.

Power cord: N/A

### 5.4 Description of Support Units

The EUT has been test as an independent unit.

### 5.5 Other Information Requested by the Customer

None.

#### 5.6 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.



Report No.: GZEM160500297501

Page: 6 of 18

### 5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



Report No.: GZEM160500297501

Page: 7 of 18

### 5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

#### ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

### SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

### CNAS (Lab Code: L0167)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

### • FCC (Registration No.: 282399)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

#### Industry Canada (Registration No.: 4620B-1)

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

#### VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584, G-449 and T-1179 respectively.

#### • CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.



Report No.: GZEM160500297501

Page: 8 of 18

# 6 Equipment List

RE in Chamber								
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal.Due date		
NO.	rest Equipment	Manufacturer	wiodei No.	Serial NO.	(YYYY-MM-DD)	(YYYY-MM-DD)		
EMC0525	Compact Semi- Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-12-05	2016-12-04		
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2016-02-01	2017-01-31		
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2016-02-01	2017-01-31		
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2016-04-19	2018-04-18		
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS- ELEKTRONIK	VULB 9160	9160-3372	2014-07-14	2017-07-13		
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2013-08-31	2016-08-30		
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2014-05-04	2017-05-03		
EMC2026	Horn Antenna 1-18GHz  SCHWARZBECK MESS- ELEKTRONIK  BBHA 9120D 9120D-841		9120D-841	2013-08-31	2016-08-30			
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2016-01-25	2017-01-24		
EMC2065	Amplifier	HP	8447F	N/A	2016-07-04	2017-07-03		
EMC2086	PRE AMPLIFIER MH648A	I ANRIISII CORP I MH648A I N/A		N/A	2015-12-19	2016-12-18		
EMC2063	Pre-amplifier 1GHz- 26GHz	Compliance Direction Systems Lnc.	PAP-1G26-48	6279.628	2016-01-06	2017-01-05		
EMC0523	Active Loop Antenna	EMCO	6502	42963	2016-02-27	2018-02-26		
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS- ELEKTRONI	BBHA 9170	9170-375	2014-05-26	2017-05-25		
EMC2079	High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	009	2016-01-25	2017-01-24		
EMC2069	2.4GHz Filter	Micro-Tronics	BRM 50702	149	2016-01-25	2017-01-24		
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	2016-04-30	2018-04-29		

General used equipment							
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date	Cal.Due date	
NO.	rest Equipment	Manufacturei	woder No.	Serial No.	(YYYY-MM-DD)	(YYYY-MM-DD)	
EMC0006	DMM	Fluke	73	70681569	2015-09-17	2016-09-16	
EMC0007	DMM	Fluke	73	70671122	2015-09-17	2016-09-16	



Report No.: GZEM160500297501

Page: 9 of 18

### 7 Test Results

### 7.1 E.U.T. Operation

Test Voltage: DC 3.0 V

 Temperature:
 20.0 -25.0 °C

 Humidity:
 38-50 % RH

Atmospheric Pressure: 1000 -1010 mbar

Test frequencies and frequency range:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band

specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency

shown in the following table:

### Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which	Number of	Location in frequency range
device operates	frequencies	of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More then 10 MHz	2	1 near top, 1 near middle and 1
More than 10 MHz	3	near bottom

#### Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz,
9 KHZ to below 10 GHZ	whichever is lower
At or above 10 GHz to below	5th harmonic of highest fundamental frequency or to 100 GHz,
30 GHz	whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz,
At or above 30 GHZ	whichever is lower, unless otherwise specified



Report No.: GZEM160500297501

Page: 10 of 18

## 7.2 Antenna Requirement

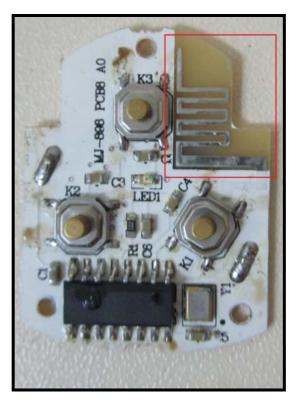
### Standard requirement

15.203 requirement:

For intentional device. According to 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.

#### **EUT Antenna**

The antenna is a PCB trace which integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0 dBi.



Test result: The unit does meet the FCC requirements.



Report No.: GZEM160500297501

Page: 11 of 18

# 7.3 Field Strength of Fundamental& Field Strength of Unwanted Emissions& Band Edge

Test Requirement: FCC Part15 C section 15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBµV/m @ 3m)	Field Strength of Harmonics (dB <sub>µ</sub> V/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Limits:

The fundamental frequency rang is in the frequency band of the EUT is

2405MHz ~ 2475MHz.

The limit for Average field strength  $dB_{\mu}V/m$  for the fundamental frequency =

 $94.0~dB\mu V/m$ .

The limit for Peak field strength  $dB\mu V/m$  for the fundamental frequency =

 $114.0\ dB\mu V/m$ .

No fundamental is allowed in the restricted bands.

The limit for average field strength  $dB\mu V/m$  for the harmonics = 54.0  $dB\mu V/m$ . The limit for peak field strength  $dB\mu V/m$  for the harmonics = 74.0  $dB\mu V/m$ . Emission radiated outside of the specified frequency bands, except for

harmonics, shall be attenuated by at least 50dB below the level of the fundamental or 54.0 dB $\mu\text{V/m}$  in 15.209. Here the limit for the other emission

is 54.0 dB $\mu$ V/m.

Test Method: ANSI C63.10: Clause 6.4, 6.5 and 6.6 for Field Strength of Fundamental&

Field Strength of Unwanted Emissions

ANSI C63.10: Clause 6.10 for Band Edge

Status Pre-test the EUT in continuous transmitting mode with setup as stand-alone

in X, Y, Z threes axes, found the worst case is X axes and report the data.

Measurement Distance:

3m (Semi-Anechoic Chamber)

Frequency range

9 kHz – 25 GHz for transmitting mode.

Test instrumentation resolution bandwidth

9 kHz (9 kHz - 30 MHz), 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz -

25 GHz)



Report No.: GZEM160500297501

Page: 12 of 18

#### **Test Procedure:**

1)9 kHz to 30 MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT, During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

### 2)30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

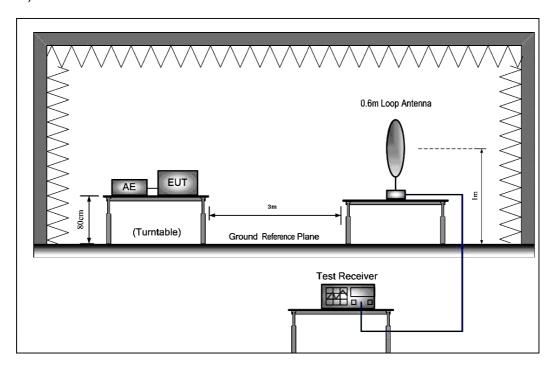
### 3)1 GHz to 25 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2010 was used to perform radiated emission test above 1 GHz.

For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

### **Test Configuration:**

1) 9 kHz to 30 MHz emissions:

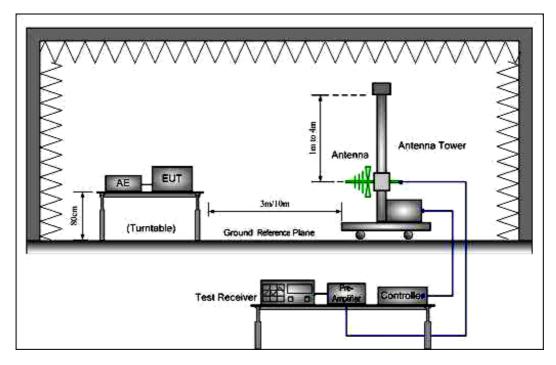




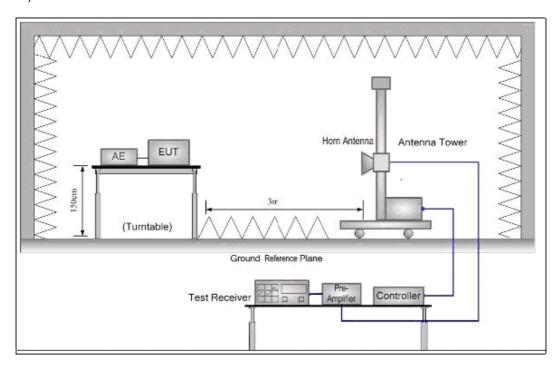
Report No.: GZEM160500297501

Page: 13 of 18

#### 2) 30 MHz to 1 GHz emissions:



#### 3) 1 GHz to 25 GHz emissions:



The field strength is calculated by adding the Antenna Factor, Cable Loss & Per-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Loss - Preamplifier Factor



Report No.: GZEM160500297501

Page: 14 of 18

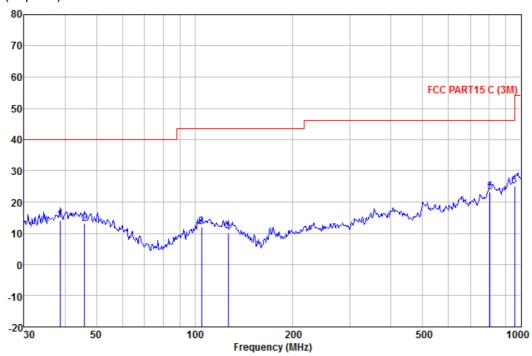
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

### 30 MHz~1 GHz Field Strength of Unwanted Emissions.Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBµV/m)



#### Quasi-peak measurement

	ReadAntenna		Cable	Preamp		Limit		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
38.616	21.38	18.58	1.10	27.00	14.06	40.00	-25.94	QP
46.016	19.93	18.90	1.22	27.00	13.05	40.00	-26.95	QP
104.903	22.70	14.30	1.86	26.90	11.96	43.50	-31.54	QP
126.772	20.80	14.12	2.13	26.88	10.17	43.50	-33.33	QP
804.603	25.73	19.80	5.60	27.90	23.23	46.00	-22.77	QP
955.438	26.07	20.43	6.10	27.61	24.99	46.00	-21.01	QP



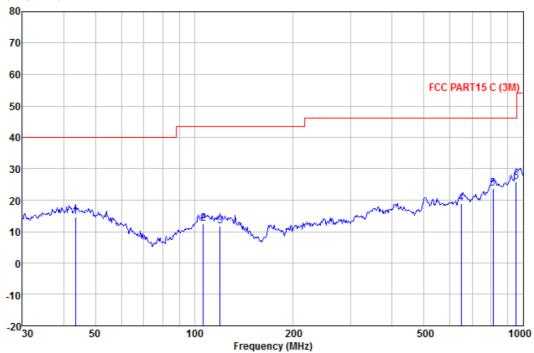
Report No.: GZEM160500297501

Page: 15 of 18

#### Horizontal:

Peak scan

Level (dBµV/m)



### Quasi-peak measurement

			ReadAntenna Cable Preamp						
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		-
43.506	22.46	19.25	0.00	27.00	14.71	40.00	-25.29	QP	
106.385	24.86	14.63	0.00	26.90	12.59	43.50	-30.91	QP	
119.856	23.71	14.90	0.00	26.90	11.71	43.50	-31.79	QP	
649.660	29.27	17.70	0.00	28.06	18.91	46.00	-27.09	QP	
810.265	31.69	20.00	0.00	27.90	23.79	46.00	-22.21	QP	
952.094	32.77	20.77	0.00	27.62	25.92	46.00	-20.08	QP	



Report No.: GZEM160500297501

Page: 16 of 18

### 1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.

Peak & Average Measurement

Peak & Ave	1	aromonic								
	Peak Measurement:									
Frequency (MHz)	Antenna	Cable	Preamp	Reading	Emission	Limit (dB <sub>µ</sub> V/m)	Over limit	Antenna polarization		
	factors	loss	factor	Level	Level					
	(dB/m)	(dB)	(dB)	(dBμV)	(dB <sub>µ</sub> V/m)			polarization		
2406.13	27.58	6.92	35.20	80.36	79.66	114.00	-34.34	V		
4810.13	31.53	9.95	36.41	39.49	44.56	74.00	-29.44	V		
7215.06	36.47	12.76	37.04	36.81	49.00	74.00	-25.00	V		
2405.73	27.58	6.92	35.20	75.99	75.29	114.00	-38.71	Н		
4810.13	31.53	9.95	36.41	39.88	44.95	74.00	-29.05	Н		
7215.02	36.47	12.76	37.04	37.45	49.64	74.00	-24.36	Н		
	Average Measurement:									
Eroguopov										
Ereguency	Antenna	Cable	Preamp	Reading	Emission	Limit		Antonna		
Frequency	Antenna factors	Cable loss	Preamp factor	Reading Level	Emission Level	Limit	Over limit	Antenna		
Frequency (MHz)			•	•		Limit (dBμV/m)	Over limit	Antenna polarization		
'	factors	loss	factor	Level	Level		Over limit			
(MHz)	factors (dB/m)	loss (dB)	factor (dB)	Level (dBμV)	Level (dBμV/m)	(dBμV/m)		polarization		
(MHz) 2406.13	factors (dB/m) 27.58	loss (dB) 6.92	factor (dB) 35.20	Level (dBμV) 75.18	Level (dBμV/m) 74.48	(dBμV/m) 94.00	-19.52	polarization V		
(MHz) 2406.13 4810.13	factors (dB/m) 27.58 31.53	loss (dB) 6.92 9.95	factor (dB) 35.20 36.41	Level (dBμV) 75.18 27.70	Level (dBμV/m) 74.48 32.77	(dBμV/m) 94.00 54.00	-19.52 -21.23	polarization V V		
(MHz) 2406.13 4810.13 7215.06	factors (dB/m) 27.58 31.53 36.47	loss (dB) 6.92 9.95 12.76	factor (dB) 35.20 36.41 37.04	Level (dBμV) 75.18 27.70 25.50	<b>Level</b> (dBμV/m) 74.48 32.77 37.69	(dBμV/m) 94.00 54.00 54.00	-19.52 -21.23 -16.31	polarization  V  V  V		



Report No.: GZEM160500297501

Page: 17 of 18

**Band Edge:** 

Lana Lagor											
Peak Measurement:											
Frequency (MHz)	Antenna	ctors (dB)	Preamp factor	Reading Level	Emission Level	Limit (dBμV/m)	Over limit	Antenna polarization			
	(dB/m)		(dB)	(dBµV)	(dBμV/m)						
2400.00	27.58	6.90	35.20	44.05	43.33	74.00	-30.67	V			
2483.50	27.55	7.07	35.27	41.18	40.53	74.00	-33.47	V			
2483.50	27.55	7.07	35.27	40.83	40.18	74.00	-33.82	Н			
2400.00	27.58	6.90	35.20	43.22	42.50	74.00	-31.50	Н			
Average Measurement:											
Frequency (MHz)	Antenna	Cable loss (dB)	Preamp	Reading	Emission	Limit (dBμV/m)	Over limit	Antenna polarization			
	factors		factor	Level	Level						
	(dB/m)		(dB)	(dBμV)	(dB <sub>µ</sub> V/m)						
2400.00	27.58	6.90	35.20	31.36	30.64	54.00	-23.36	V			
2483.50	27.55	7.07	35.27	27.40	26.75	54.00	-27.25	V			
2483.50	27.55	7.07	35.27	27.37	26.72	54.00	-27.28	Н			
2400.00	27.58	6.90	35.20	29.52	28.80	54.00	-25.20	Н			

### Remark:

1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Loss - Preamplifier Factor.

- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.
- 4). For Radiated Emissions fall in the restricted bands (2400MHz is worse case than 2390MHz and report it as above), which set out in Section 15.205 Restricted bands.

Also there is not any other emission which falls in restricted bands can be detected and reported.

Test result: The unit does meet the FCC requirements.



Report No.: GZEM160500297501

Page: 18 of 18

### 7.4 Occupied Bandwidth

Test Requirement:

FCC Part 15 C section 15.215(c)

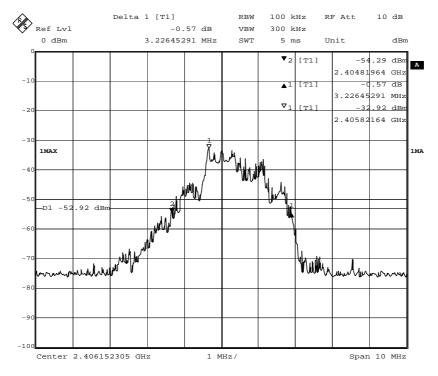
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Method: ANSI C63.10: Clause 6.9.

Operation within the band 2.400 to 2.4835 GHz

Method of measurement: A small sample of the transmitter output was fed into the Spectrum

Analyzer and the attached plot was taken.



The results: The unit does meet the FCC requirements.

--End of the report--