

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
Email:	ee.shenzhen@sgs.com

Report No.: SZEM180500405705 Page: 1 of 8

RF Exposure Evaluation Report

Application No.:	SZEM1805004057CR
Applicant:	Harman International Industries, Inc.
Address of Applicant:	8500 Balboa Boulevard, Northridge, California, 91329, United States
Manufacturer:	Harman International Industries, Inc.
Address of Manufacturer:	8500 Balboa Boulevard, Northridge, California, 91329, United States
Factory:	 Shenzhen 3Nod Digital Technology Co., Ltd. Guangxi 3Nod Digital Technology Co., Ltd.
Address of Factory:	 4/F., and Section A, 1/F., Workshop 15, Zhongfu Road, Tangxiayong Community, Songgang Neighbourhood, Bao'an, Shenzhen, Guangdong, China The B02 Plant Building of 3nod Smart Industrial Park in Beihai Industrial
	Park, East of Jilin Road, North of Longtoujiang Reservoir, Guangxi, P.R China
EUT Name:	Wireless Speaker
Model No.:	CITATION 300
Trade mark:	harman/kardon
FCC ID:	APIHKCT300
Standards:	47 CFR Part 1.1307 (2016)
	47 CFR Part 1.1310 (2016)
Date of Receipt:	2018-05-21
Date of Test:	2018-05-25 to 2018-07-19
Date of Issue:	2018-07-20
Test Result :	PASS*

* In the configuration tested, the EUT complied with the standards specified above.



EMC Laboratory Manager

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. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

This document is issued by the Company subject to its General Conditions of Service printed overlear, available on request or accessible at http://www.sas.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="http://www.sas.com/en/Terms-and-Conditions/Terms-an



Shenzhen Branch

Report No.: SZEM180500405705 Page: 2 of 8

2 Version

	Revision Record					
Version	Chapter	Date	Modifier	Remark		
01		2018-07-23		Original		

Authorized for issue by:		
	Bonson Wong	
	Benson Wang /Project Engineer	-
	Evic Fu	
	Eric Fu /Reviewer	-

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>http://www.sqs.com/en/Terms-and-Conditions.aspx</u> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>http://www.sqs.com/en/Terms-and-Conditions.Terms-eDocument.aspx</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction form exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unaution, forger or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



Shenzhen Branch

Report No.: SZEM180500405705 Page: 3 of 8

3 Contents

		Page
1	COVER PAGE	
2	VERSION	
3	CONTENTS	
4	GENERAL DESCRIPTION OF EUT	
4	4.1 TEST LOCATION	
	 4.1 TEST LOCATION	
4	4.3 DEVIATION FROM STANDARDS	
4	4.4 ABNORMALITIES FROM STANDARD CONDITIONS	
4	4.5 OTHER INFORMATION REQUESTED BY THE CUSTOMER	
5	RF EXPOSURE EVALUATION	
	5.1 RF Exposure Compliance Requirement	-
	511 Limits	2
	5.1.2 Test Procedure	
	4.1.3 EUT RF Exposure Evaluation	8



Shenzhen Branch

Report No.: SZEM180500405705 Page: 4 of 8

4 General Description of EUT

For BLE: 2402MHz-2480MHz Bluetooth Version: BT42 dual mode Modulation Type: GFSK Number of Channel: 40 Antenna Type: PIFA Antenna Gain: 2.14dBi For BT: 2402MHz-2480MHz Operation Frequency: 2402MHz-2480MHz Bluetooth Version: BT4.2 dual mode Modulation Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Type: PIFA Antenna Type: PIEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Operation Frequency: IEEE 602.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g/n (HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 602.11b/g/n (EEE 802.11n/HT20): 11 Channels Channel Numbers: IEEE 602.11b/g/n (HT20): 0FDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11c/HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 602.11n/ac 20MHz 5180-5240	Power supply:	Powered by	AC120V				
Bluetooth Version: BT4.2 dual mode Modulation Type: GFSK Number of Channel: 40 Antenna Type: PIFA Antenna Gain: 2.14dBi For BT: Operation Frequency: Qatz Bluetooth Version: BT4.2 dual mode Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/ADQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: SMHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11a (Mode Frequency Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: Operation Frequency:							
Bluetooth Version: BT4.2 dual mode Modulation Type: GFSK Number of Channel: 40 Antenna Type: PIFA Antenna Gain: 2.14dBi For BT: Operation Frequency: Qatz Bluetooth Version: BT4.2 dual mode Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/ADQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: SMHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11a (Mode Frequency Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: Operation Frequency:	Operation Frequency:	Frequency: 2402MHz~2480MHz					
Number of Channel: 40 Antenna Type: PIFA Antenna Gain: 2.14dBi For BT: Operation Frequency: 2402MHz-2480MHz Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi: Geration Frequency: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b/g. IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n/ac 20MHz 5180-5240 Vo antenna can simultaneous transmission. For 5G wiff: IEEE 8		BT4.2 dual m					
Antenna Type: PIFA Antenna Gain: 2.14dBi For BT: Operation Frequency: 2402MHz-2480MHz Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: Adaptive Frequency Hopping systems Antenna Gain: 2.14dBi For 2.4G wiffi: Operation Frequency: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g/n (HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b/g. IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (At 20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (At 20): Antenna 2: 2.28dBi Two antennas can simultaneous transmission.	Modulation Type:	GFSK	GFSK				
Antenna Gain: 2.14dBi For BT: Operation Frequency: 2402MHz-2480MHz Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wiff: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b/g. IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz Type of Modulation: IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna S can simultaneous transmission. For 5G wiff: Viriannels IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 UNII Band IEEE 802.11n/ac 40MHz 5190-5230 <td>Number of Channel:</td> <td>40</td> <td></td> <td></td> <td></td>	Number of Channel:	40					
For BT: Operation Frequency: 2402MHz~2480MHz Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, π/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wift: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: SMHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : 0 FDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wiff: IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11n/ac 40MHz 5190-5230 2 UNII Band IEEE 802.11n/ac 20MHz 5200-5320 4 IEEE 802.11n/ac 40MHz 5200-5320 4 II-A IE	Antenna Type:	PIFA					
Operation Frequency: 2402MHz-2480MHz Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, m/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wiff:		2.14dBi	2.14dBi				
Bluetooth Version: BT4.2 dual mode Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, π/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wiff: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Operation Frequency: IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wiff: Operation Frequency: Band IEEE 802.11n/ac 20MHz 5180-5240							
Modulation Technique: Frequency Hopping Spread Spectrum(FHSS) Modulation Type: GFSK, π/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi: U Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b /// IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n/ac 200Hz Stan-scan simultaneous transmission. For 5G wift: IEEE 802.11a Stan-scan simultaneous transmission <td></td> <td>2402MHz~24</td> <td>180MHz</td> <td></td> <td></td>		2402MHz~24	180MHz				
Modulation Type: GFSK, π/4DQPSK, 8DPSK Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wift: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n/ac target strassmission. Two antennas can simultaneous transmission. For 5G wifi: VIII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5190-5230 2 IEEE 802.11a 5210 1 UNII Band IEEE 802.11a	Bluetooth Version:	BT4.2 dual m	node				
Number of Channel: 79 Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz SMHz Type of Modulation: IEEE for 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE for 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE for 802.11b: DSSS(CCK, DQPSK, BPSK) IEEE for 802.11b/g, IEEE for 802.11a For 5G wiff: Operation Frequency: UNII Band IEEE 802.11n/ac 20MHz 5180-5240 IEEE 802.11n/ac 40MHz 5190-5230 IEEE 802.11a 5180-5240 IEEE 802.11a IEEE 802.11a S180-5240 IEEE 802.11a IEEE 80	Modulation Technique:	Frequency H	opping Spread Spectrum(FH	SS)			
Hopping Channel Type: Adaptive Frequency Hopping systems Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wiff:	Modulation Type:	GFSK, π/4D	QPSK, 8DPSK				
Antenna Type: PIFA Antenna Gain: 2.14dBi For 2.4G wifi:	Number of Channel:	79					
Antenna Gain: 2.14dBi For 2.4G wifi: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 1 IEEE 802.11n/ac 20MHz 5190-5230 2 UNII Band IEEE 802.11a 5180-5240 4 1 IEEE 802.11a 5180-5240 4 UNII Band IEEE 802.11a a 5180-5230 2 1 IEEE 802.11a 520-5320 4 UNII Band IEEE 802.11a a 520-5320 4 1 IEEE 802.11n/ac 20MHz 5210 1 UNII Band IEEE 802.11a a 520-5320 4 1 IEEE 802.11a a	Hopping Channel Type:	Adaptive Fre	quency Hopping systems				
For 2.4G wiff: Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: IEEE 802.11a Operation Frequency: IEEE 802.11a UNII Band IEEE 802.11n/ac 20MHz UNII Band IEEE 802.11a IEEE 802.11n/ac 40MHz 5180-5240 UNII Band IEEE 802.11a IEEE 802.11a 60MHz 5210 IEEE 802.11n/ac 40MHz 5260-5320 IEEE 802.11n/ac 40MHz 5270-5310 IEEE 802.11a c 80MHz	Antenna Type:	PIFA					
Operation Frequency: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: Band Mode Frequency Range(MHz) Number of channels UNII Band I IEEE 802.11a 5180-5240 4 1 UNII Band II-A IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band II-A IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band II-A IEEE 802.11n/ac 20MHz 5210 1 UNII Band II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11n/ac 40MHz 5290 1	Antenna Gain:	2.14dBi					
Channel Numbers: IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: IEEE 802.11a UNII Band IEEE 802.11a 5180-5240 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5210 1 UNII Band IEEE 802.11a 5260-5320 4 IEA IEEE 802.11n/ac 20MHz 5260-5320 4 IEA IEEE 802.11n/ac 40MHz 5270-5310 2 IEA IEEE 802.11ac 80MHz 5290 1	For 2.4G wifi:						
Channel Separation: 5MHz Type of Modulation: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: IEEE 802.11a S180-5240 4 UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11ac 40MHz 5190-5230 2 1 UNII Band IEEE 802.11a 60MHz 5210 1 UNI Band IEEE 802.11a 60MHz 5200 4	Operation Frequency:	IEEE 802.11	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz				
Type of Modulation:IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)Antenna Type:PIFAAntenna Gain:Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission.For 5G wifi:BandModeFrequency Range(MHz)Number of channelsUNII BandIEEE 802.11a5180-52404UNII BandIEEE 802.11n/ac 20MHz5180-52404UNII BandIEEE 802.11a5260-53202IEEE 802.11a5260-53204UNII BandIEEE 802.11n/ac 20MHz5260-53204II-AIEEE 802.11n/ac 40MHz5270-53102IEEE 802.11n/ac 40MHz52901	Channel Numbers:	IEEE 802.11	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels				
IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK) Antenna Type: PIFA Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: Number of channels Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5190-5230 2 UNII Band IEEE 802.11a 5260-5320 4 UNII Band IEEE 802.11n/ac 20MHz 5260-5320 4 UNII Band IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11n/ac 40MHz 5290 1	Channel Separation:	5MHz					
Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5230 2 IEEE 802.11n/ac 20MHz 5190-5230 2 IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 1 IEEE 802.11n/ac 20MHz 5260-5320 4 1 IEEE 802.11n/ac 40MHz 5270-5310 2 1	Type of Modulation:	IEEE for 802	.11b: DSSS(CCK,DQPSK,DE	BPSK)			
Antenna Type:PIFAAntenna Gain:Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission.For 5G wifi:BandModeFrequency Range(MHz)Number of channelsUNII BandIEEE 802.11a5180-52404IIEEE 802.11n/ac 20MHz5180-52404IIEEE 802.11n/ac 40MHz5190-52302IEEE 802.11a5260-53204II-AIEEE 802.11a5260-53204IEEE 802.11n/ac 40MHz5200-53204IEEE 802.11n/ac 40MHz5270-53102IEEE 802.11n/ac 40MHz52901			o	,			
Antenna Gain: Antenna 1: 2.14dBi; Antenna 2: 2.28dBi Two antennas can simultaneous transmission. For 5G wifi: Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 20MHz 5190-5230 2 IEEE 802.11n/ac 40MHz 5210 1 UNII Band IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 40MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11n/ac 40MHz 5290 1			.11n(HT20) : OFDM (64QAM	, 16QAM, QPSK, E	BPSK)		
Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11a 5180-5240 4 I IEEE 802.11n/ac 20MHz 5180-5240 4 UNII Band IEEE 802.11n/ac 20MHz 5180-5240 4 I IEEE 802.11n/ac 20MHz 5190-5230 2 UNII Band IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11n/ac 20MHz 5260-5320 4 II-A IEEE 802.11n/ac 40MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11n/ac 40MHz 5290 1	Antenna Type:	PIFA					
Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1	Antenna Gain:		-				
Band Mode Frequency Range(MHz) Number of channels UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11n/ac 40MHz 5210 1 UNII Band IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11n/ac 80MHz 5290 1	5 50 10	Two antenna	is can simultaneous transmis	sion.			
Operation Frequency: Image Notes Range (MHz) of channels UNII Band IEEE 802.11a 5180-5240 4 I IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11ac 80MHz 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5270-5310 2 IEEE 802.11n/ac 80MHz 5290 1	For 5G WITI:	1					
Operation Frequency: Image Notes Range (MHz) of channels UNII Band IEEE 802.11a 5180-5240 4 I IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11ac 80MHz 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5270-5310 2 IEEE 802.11n/ac 80MHz 5290 1		Band	Mode	Frequency	Number		
UNII Band IEEE 802.11a 5180-5240 4 IEEE 802.11n/ac 20MHz 5180-5240 4 IEEE 802.11n/ac 20MHz 5190-5230 2 IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11ac 80MHz 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1			mode				
Image: Dependence of the system Image:					channels		
Operation Frequency: IEEE 802.11n/ac 40MHz 5190-5230 2 IEEE 802.11ac 80MHz 5210 1 UNII Band II-A IEEE 802.11a 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1		UNII Band	IEEE 802.11a	5180-5240	4		
Unit Band IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1			IEEE 802.11n/ac 20MHz	5180-5240	4		
IEEE 802.11ac 80MHz 5210 1 UNII Band IEEE 802.11a 5260-5320 4 II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 20MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1	Operation Frequency:		IEEE 802.11n/ac 40MHz	5190-5230	2		
II-A IEEE 802.11n/ac 20MHz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1	Operation Frequency.		IEEE 802.11ac 80MHz	5210	1		
IEEE 802.111/ac 200Hz 5260-5320 4 IEEE 802.11n/ac 40MHz 5270-5310 2 IEEE 802.11ac 80MHz 5290 1			IEEE 802.11a	5260-5320	4		
IEEE 802.11ac 80MHz 5290 1		II-A	IEEE 802.11n/ac 20MHz	5260-5320	4		
			IEEE 802.11n/ac 40MHz	5270-5310	2		
UNII Band IEEE 802.11a 5500-5700 11			IEEE 802.11ac 80MHz	5290	1		
		UNII Band	IEEE 802.11a	5500-5700	11		

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-en-Document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



Shenzhen Branch

Report No.: SZEM180500405705 Page: 5 of 8

	II-C	IEEE 802.11n/ac 20MHz	5500-5700	11
		IEEE 802.11n/ac 40MHz	5510-5670	5
		IEEE 802.11ac 80MHz	5530-5610	2
	UNII Band	IEEE 802.11a	5745-5825	5
		IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
		IEEE 802.11ac 80MHz	5775	1
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)			
Antenna type:	PIFA			
Antenna gain	Antenna 1: 3.14dBi; Antenna 2: 2.85dBi			
	Two antennas can simultaneous transmission.			



Shenzhen Branch

Report No.: SZEM180500405705 Page: 6 of 8

4.1 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.2 Test Facility

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

CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC

Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

FCC – Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.3 Deviation from Standards

None.

4.4 Abnormalities from Standard Conditions

None.

4.5 Other Information Requested by the Customer

None.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions/Terms-en/Commutions-aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



Shenzhen Branch

Report No.: SZEM180500405705 Page: 7 of 8

5 **RF Exposure Evaluation**

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b) 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)				
(A) Limits for Occupational/Controlled Exposures								
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f2) 1.0 f/300 5	6 6 6 6 6				
(B) Limits	for General Populati	on/Uncontrolled Ex	oosure					
0.3–1.34 1.34–30 30–300 300–1500 1500–100,000	614 824/f 27.5	1.63 2.19/f 0.073	*(100) *(180/f ²) 0.2 f/1500 1.0	30 30 30 30 30				

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout^{*}G)/(4^{*} Pi^{*} R^{2})$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sqs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sqs.com/en/Terms-and-Conditions.aspx and, for liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction form exercising all their inghts and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unautrion, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



Shenzhen Branch

Report No.: SZEM180500405705 Page: 8 of 8

4.1.3 EUT RF Exposure Evaluation

Remark: The Bluetooth and Wifi function can't simultaneous transmission at the same time. **For BT/BLE**

Antenna: 2.14dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is1.64 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power	Output Power	Power Density	Limit	Result
(including tune-up tolerance)	to Antenna	at R = 20 cm		
(dBm)	(mW)	(mW/cm²)		
6.09	4.06	0.001	1.0	PASS

For 2.4G WIFI

Antenna 1: 2.14dBi, Antenna 2: 2.28dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.64, 1.69 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power	Output Power	Power Density	Limit	Result
(including tune-up tolerance)	to Antenna	at R = 20 cm		
(dBm)	(mW)	(mW/cm²)		
26.66	463.45	0.156	1.0	PASS

For 5GHz

Antenna 1:3.14dBi; Antenna 2: 2.85dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.06, 1.93in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power	Output Power	Power Density	Limit	Result
(including tune-up tolerance)	to Antenna	at R = 20 cm		
(dBm)	(mW)	(mW/cm ²)		
21.93	155.96	0.064	1.0	PASS

The distancer (3RD column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

- End of the Report -

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exoerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or faisification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.