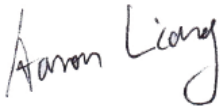


RF EXPOSURE REPORT



Report No.: 17070669-FCC-H

Applicant	HUMAX Co., Ltd.	
Product Name	Cable Set-top box	
Main Model No.	1008R-HDD-XXX(XXX=A~Z)	
Serial Model No.	1008C-STB-XXX(XXX=A~Z)	
Test Standard	FCC 2.1091: 2017	
Test Date	August 12, 2017 to January 09, 2018	
Issue Date	January 10, 2018	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		
		
Aaron Liang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070669-FCC-H	NONE	Original	January 10, 2018

2. Customer information

Applicant Name	HUMAX Co., Ltd.
Applicant Add	HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040
Manufacturer	HUMAX Co., Ltd.
Manufacturer Add	HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu Yongin-si, Gyeonggi-do South Korea 17040

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Labview of SIEMIC version 2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Cable Set-top box
Main Model:	1008R-HDD-XXX(XXX=A~Z)
Serial Model:	1008C-STB-XXX(XXX=A~Z)
Equipment Category :	DTS
Antenna Gain:	WIFI(2.4G): Antenna (Green): 1.9 dBi Antenna (Gray): 2.8 dBi Antenna (Black): 1.7 dBi WIFI(5150-5250MHz): Antenna (Green): 3.9 dBi Antenna (Gray): 3.8 dBi Antenna (Black): 2.5 dBi WIFI(5250-5350MHz): Antenna (Green): 3.8 dBi Antenna (Gray): 3.9 dBi Antenna (Black): 3.8 dBi WIFI(5470-5725MHz): Antenna (Green): 3.6 dBi Antenna (Gray): 3.9 dBi Antenna (Black): 3.7 dBi WIFI(5725-5850MHz): Antenna (Green): 3.8 dBi Antenna (Gray): 3.8 dBi Antenna (Black): 2.7 dBi RF4CE: Antenna 0: 2.35 dBi Antenna 1: 2.28 dBi
Antenna type :	WIFI: Dipole antenna RF4CE: PCB antenna
Input Power:	Adapter Model: ADP-30LR A Input: 100-240V~0.5A, 50/60Hz Output: 12V DC, 2.5A
Trade Name :	LGI

Port:	Please refer to the user manual
FCC ID:	O6ZEOS-1008C
Type of Modulation:	802.11b: DSSS 802.11g/n20/n40/a/ac20/ac40/ac80: OFDM RF4CE: O-QPSK
RF Operating Frequency (ies):	WIFI: 802.11b/g: 2412-2462 MHz(TX/RX) WIFI: 802.11n(20M): 2412-2462 MHz; 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) WIFI: 802.11n(40M): 2422-2452 MHz; 5190-5230 MHz; 5270-5310 MHz; 5510-5710 MHz; 5755-5795 MHz; (TX/RX) 802.11a: 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) 802.11ac 20: 5180-5240 MHz; 5260-5320 MHz; 5500-5700 MHz; 5745-5825 MHz; (TX/RX) 802.11ac 40: 5190-5230 MHz; 5270-5310 MHz; 5510-5710 MHz; 5755-5795 MHz; (TX/RX) 802.11ac 80: 5210 MHz; 5290 MHz; 5530-5690 MHz; 5775 MHz; (TX/RX) RF4CE: 2405-2480 MHz
Number of Channels:	WIFI :802.11b/g: 11CH WIFI :802.11a: 25CH WIFI :802.11n20: 11CH(2.4GHz); 25CH(5GHz) WIFI :802.11n40: 7CH(2.4GHz); 12CH(5GHz) WIFI :802.11ac20: 25CH WIFI :802.11ac40: 12CH WIFI :802.11ac80: 6CH RF4CE:16CH

5. FCC §2.1091 - Maximum Permissible exposure (MPE)

5.1 Applicable Standard

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

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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

5.2 Test Result

Zigbee

Type	CH	Frequency (MHz)	Conducted Power (dBm)		Conducted Power Limit (dBm)	Ant. Gain		Tune Up Power (dBm)
			Ant. 0	Ant. 1		Ant.0	Ant.1	
Output power	Low	2402	3.012	1.417	30	2.35	2.28	2±1
	Mid	2440	2.967	1.58	30	2.35	2.28	2±1
	High	2480	2.908	1.764	30	2.35	2.28	2±1

2.4G WIFI

Mode	duty factory	Antenna Path	Channel	Conducted Power						The Highst (SISO) or Total (MIMO) conducted power (dBm)	Puroto Rico/FCC Conducted power Limit (dBm)	Antenna Gain				Tune Up Power (dBm)
				Ant.Green		Ant .Gay		Ant.Black				Ant. Green	Ant. Gray	Ant. Black	Direc tional Gain (dBi)	
				Average Conducted Powe(dBm)	Average Conducted Powe with duty cycle factor (dBm)	Average Conducted Powe(dBm)	Average Conducted Powe with duty cycle factor (dBm)	Average Conducted Powe(dBm)	Average Conducted Powe with duty cycle factor (dBm)							
b	0.3	SISO	1	17.7	18.0	17.6	17.9	17.4	17.7	18.0	30.0	1.9	2.8	1.7	/	18±1
			6	17.7	18.0	17.7	18.0	17.4	17.7	18.0	30.0	1.9	2.8	1.7	/	18±1
			11	17.6	17.9	17.6	17.9	17.4	17.7	17.9	30.0	1.9	2.8	1.7	/	18±1
g	0.2	SISO	1	17.7	17.9	17.5	17.7	17.7	17.9	17.9	30.0	1.9	2.8	1.7	/	18±1
			6	17.8	18.0	17.8	18.0	17.7	17.9	18.0	30.0	1.9	2.8	1.7	/	18±1
			10	17.8	18.0	17.7	17.9	17.4	17.6	18.0	30.0	1.9	2.8	1.7	/	18±1
			11	16.5	16.7	16.4	16.6	17.6	17.8	17.8	30.0	1.9	2.8	1.7	/	18±1
n(HT20)	0.5	MIMO(3TX Green- Gray- Black)	1	12.7	13.2	13.1	13.6	12.7	13.2	18.1	30.0	1.9	2.8	1.7	2.8	18±1
			6	12.9	13.4	12.9	13.4	12.7	13.2	18.1	30.0	1.9	2.8	1.7	2.8	18±1
			11	12.8	13.3	13.1	13.6	12.4	12.9	18.1	30.0	1.9	2.8	1.7	2.8	18±1
n(HT40)	0.9	MIMO(3TX Green- Gray- Black)	3	12.9	13.8	13.2	14.1	12.8	13.7	18.6	30.0	1.9	2.8	1.7	2.8	18±1
			6	12.8	13.7	13.4	14.3	12.8	13.7	18.7	30.0	1.9	2.8	1.7	2.8	18±1
			7	11.9	12.8	12.3	13.2	12.0	12.9	17.7	30.0	1.9	2.8	1.7	2.8	18±1
			8	11.9	12.8	12.4	13.3	12.1	13.0	17.8	30.0	1.9	2.8	1.7	2.8	18±1
			9	11.8	12.7	12.4	13.3	11.9	12.8	17.7	30.0	1.9	2.8	1.7	2.8	18±1

5G WIFI

Mode	duty factory	Antenna Path	Channel	Conducted Power						The Highest (SISO) or Total (MIMO) conducted power	Puroto Rico/FCC Conducted power Limit (dBm)	Antenna Gain				Tune Up Power (dBm)
				Ant.Green		Ant .Gay		Ant.Black				Ant. Green	Ant. Gray	Ant. Black	Directonal Gain (dBi)	
				RMS Conducted Powe(dBm)	MAX Conducted Powe (dBm)	RMS Conducted Powe(dBm)	MAX Conducted Powe (dBm)	RMS Conducted Powe(dBm)	MAX Conducted Powe (dBm)							
A	0.1	SISO	5180MHZ	16.8	16.9	16.6	16.7	16.8	16.9	/	23.98	3.9	3.8	2.5	/	16.5±1
			5220MHZ	16.9	17	16.6	16.7	16.8	16.9	/	23.98	3.9	3.8	2.5	/	16.5±1
			5240MHZ	17	17.1	16.7	16.8	16.5	16.6	/	23.98	3.9	3.8	2.5	/	16.5±1
			5260MHZ	16.8	16.9	16.7	16.8	16.9	17	/	23.98	3.8	3.9	3.8	/	16.5±1
			5300MHZ	16.8	16.9	16.5	16.6	16.8	16.9	/	23.98	3.8	3.9	3.8	/	16.5±1
			5320MHZ	16.8	16.9	16.7	16.8	16.8	16.9	/	23.98	3.8	3.9	3.8	/	16.5±1
			5500MHZ	16.7	16.8	16.7	16.8	16.8	16.9	/	23.98	3.6	3.9	3.7	/	16.5±1
			5600MHZ	16.7	16.8	16.6	16.7	16.9	17	/	23.98	3.6	3.9	3.7	/	16.5±1
			5700MHZ	16.9	17	16.7	16.8	16.9	17	/	23.98	3.6	3.9	3.7	/	16.5±1
			5720MHZ	17	17.1	16.5	16.6	16.6	16.7	/	23.98	3.6	3.9	3.7	/	16.5±1
			5745MHZ	17	17.1	16.7	16.8	16.6	16.7	/	30	3.8	3.8	2.7	/	16.5±1
			5785MHZ	17.2	17.3	16.7	16.8	16.7	16.8	/	30	3.8	3.8	2.7	/	16.5±1
			5825MHZ	17.2	17.3	17	17.1	17.2	17.3	/	30	3.8	3.8	2.7	/	16.5±1
N20	0.4	MIMO	5180MHZ	12.4	12.8	12.1	12.5	12.2	12.6	17.41	23.98	3.9	3.8	2.5	3.9	17±1
			5220MHZ	12.4	12.8	12.2	12.6	12.4	12.8	17.51	23.98	3.9	3.8	2.5	3.9	17±1
			5240NHZ	12.6	13	12.2	12.6	12.4	12.8	17.57	23.98	3.9	3.8	2.5	3.9	17±1
			5260NHZ	12.5	12.9	12.1	12.5	12.3	12.7	17.47	23.98	3.8	3.9	3.8	3.9	17±1

			5300MHZ	12.6	13	12.1	12.5	12.4	12.8	17.54	23.98	3.8	3.9	3.8	3.9	17±1
			5320MHZ	12.5	12.9	12.2	12.6	12.3	12.7	17.51	23.98	3.8	3.9	3.8	3.9	17±1
			5500MHZ	12.2	12.6	12.1	12.5	12	12.4	17.27	23.98	3.6	3.9	3.7	3.9	17±1
			5600MHZ	12.4	12.8	12.4	12.8	12.1	12.5	17.47	23.98	3.6	3.9	3.7	3.9	17±1
			5700MHZ	12.5	12.9	12.3	12.7	12.2	12.6	17.51	23.98	3.6	3.9	3.7	3.9	17±1
			5720MHZ	12.6	13	12.5	12.9	12.4	12.8	17.67	23.98	3.6	3.9	3.7	3.9	17±1
			5745MHZ	12.4	12.8	12.1	12.5	12.3	12.7	17.44	30	3.8	3.8	2.7	3.8	17±1
			5785MHZ	12.4	12.8	12.5	12.9	12.1	12.5	17.51	30	3.8	3.8	2.7	3.8	17±1
			5825MHZ	12.3	12.7	12.1	12.5	11.9	12.3	17.27	30	3.8	3.8	2.7	3.8	17±1
N40	0.8	MIMO	5190MHZ	11.4	12.2	11.1	11.9	11.4	12.2	16.87	23.98	3.9	3.8	2.5	3.9	17±1
			5230MHZ	11.8	12.6	11.2	12	11.6	12.4	17.11	23.98	3.9	3.8	2.5	3.9	17±1
			5270MHZ	11.6	12.4	11.2	12	11.7	12.5	17.08	23.98	3.8	3.9	3.8	3.9	17±1
			5310MHZ	11.5	12.3	11.2	12	11.5	12.3	16.97	23.98	3.8	3.9	3.8	3.9	17±1
			5510MHZ	11.4	12.2	11.1	11.9	11.4	12.2	16.87	23.98	3.6	3.9	3.7	3.9	17±1
			5590MHZ	11.6	12.4	11.2	12	11.5	12.3	17.01	23.98	3.6	3.9	3.7	3.9	17±1
			5670MHZ	11.2	12	11	11.8	11.5	12.3	16.81	23.98	3.6	3.9	3.7	3.9	17±1
			5710MHZ	11.7	12.5	11.1	11.9	11.6	12.4	17.05	23.98	3.6	3.9	3.7	3.9	17±1
			5755MHZ	11.3	12.1	11.1	11.9	11.2	12	16.77	30	3.8	3.8	2.7	3.8	17±1
AC20	0.4	MIMO	5795MHZ	11.9	12.7	11.7	12.5	11.9	12.7	17.41	30	3.8	3.8	2.7	3.8	17±1
			5180MHZ	12.4	12.8	12.1	12.5	12.4	12.8	17.47	23.98	3.9	3.8	2.5	3.9	17±1
			5220MHZ	12.4	12.8	12.2	12.6	12.4	12.8	17.51	23.98	3.9	3.8	2.5	3.9	17±1
			5240MHZ	12.4	12.8	12.4	12.8	12.5	12.9	17.6	23.98	3.9	3.8	2.5	3.9	17±1
			5260MHZ	12.4	12.8	12.2	12.6	12.4	12.8	17.51	23.98	3.8	3.9	3.8	3.9	17±1
			5300MHZ	12.4	12.8	12.2	12.6	12.4	12.8	17.51	23.98	3.8	3.9	3.8	3.9	17±1
			5320MHZ	12.4	12.8	12.1	12.5	12.3	12.7	17.44	23.98	3.8	3.9	3.8	3.9	17±1
			5500MHZ	12.5	12.9	12.4	12.8	12.4	12.8	17.6	23.98	3.6	3.9	3.7	3.9	17±1
			5600MHZ	12	12.4	12	12.4	11.8	12.2	17.11	23.98	3.6	3.9	3.7	3.9	17±1

			5700MHZ	12.5	12.9	12.1	12.5	12.2	12.6	17.44	23.98	3.6	3.9	3.7	3.9	17±1
			5720MHZ	12.2	12.6	12.2	12.6	11.8	12.2	17.24	23.98	3.6	3.9	3.7	3.9	17±1
			5745MHZ	12.2	12.6	12.1	12.5	12	12.4	17.27	30	3.8	3.8	2.7	3.8	17±1
			5785MHZ	12.4	12.8	12.4	12.8	12.5	12.9	17.6	30	3.8	3.8	2.7	3.8	17±1
			5825MHZ	12.4	12.8	12	12.4	11.9	12.3	17.28	30	3.8	3.8	2.7	3.8	17±1
AC40	0.8	MIMO	5190MHZ	11.9	12.7	11.6	12.4	12.1	12.9	17.44	23.98	3.9	3.8	2.5	3.9	17±1
			5230MHZ	11.5	12.3	11.1	11.9	11.7	12.5	17.01	23.98	3.9	3.8	2.5	3.9	17±1
			5270MHZ	11.5	12.3	11.3	12.1	11.6	12.4	17.04	23.98	3.8	3.9	3.8	3.9	17±1
			5310MHZ	11.7	12.5	11.3	12.1	11.7	12.5	17.14	23.98	3.8	3.9	3.8	3.9	17±1
			5510MHZ	11.9	12.7	11.3	12.1	11.6	12.4	17.18	23.98	3.6	3.9	3.7	3.9	17±1
			5590MHZ	11.8	12.6	11.3	12.1	11.6	12.4	17.14	23.98	3.6	3.9	3.7	3.9	17±1
			5670MHZ	11.7	12.5	11.2	12	11.6	12.4	17.08	23.98	3.6	3.9	3.7	3.9	17±1
			5710MHZ	11.8	12.6	11.4	12.2	11.7	12.5	17.21	23.98	3.6	3.9	3.7	3.9	17±1
			5755MHZ	11.9	12.7	11.6	12.4	11.7	12.5	17.31	30	3.8	3.8	2.7	3.8	17±1
			5795MHZ	12.1	12.9	11.6	12.4	11.9	12.7	17.44	30	3.8	3.8	2.7	3.8	17±1
AC80	1.4	MIMO	5210MHZ	11.3	12.7	1	2.4	11.3	12.7	15.91	23.98	3.9	3.8	2.5	3.9	16.7±1
			5290MHZ	11.3	12.7	11	12.4	11.4	12.8	17.41	23.98	3.8	3.9	3.8	3.9	16.7±1
			5530MHZ	11.5	12.9	11	12.4	10.7	12.1	17.25	23.98	3.6	3.9	3.7	3.9	16.7±1
			5610MHZ	11.4	12.8	11	12.4	10.9	12.3	17.28	23.98	3.6	3.9	3.7	3.9	16.7±1
			5690MHZ	11.6	13	11	12.4	10.9	12.3	17.35	23.98	3.6	3.9	3.7	3.9	16.7±1
			5775MHZ	11.7	13.1	11.3	12.7	11	12.4	17.51	30	3.8	3.8	2.7	3.8	16.7±1

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

2.4G WIFI:

For the antenna manufacturer provide only used limited to ERP/EIRP or radiated spurious emission test. The MPE evaluation as below:

Maximum output power at antenna input terminal: 19(dBm)

Maximum output power at antenna input terminal: 79.43(mW)

Prediction distance: >20 (cm)

Predication frequency: 2437 (MHz) middle frequency

Antenna Gain (typical): 2.8 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.03(mW/cm²)

5G WIFI:

For the antenna manufacturer provide only used limited to ERP/EIRP or radiated spurious emission test. The MPE evaluation as below:

Maximum output power at antenna input terminal: 18(dBm)

Maximum output power at antenna input terminal: 63.10(mW)

Prediction distance: >20 (cm)

Predication frequency: 5785 (MHz) middle frequency

Antenna Gain (typical):2.455 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.03(mW/cm²)

Because 2.4G WIFI and 5G WIFI bands can be operate simultaneously, the total power density of 2.4G and 5G WIFI is 0.06mW/cm²

MPE limit for general population exposure at prediction frequency: 1 (mW/cm²)

0.06(mW/cm²) < 1.0 (mW/cm²)

Result: Pass