RF EXPOSURE EVALUATION REPORT

Product Name:	HD Intercom & Facility Control Station
Trade Mark:	GRANDSTREAM
Model No.:	GSC3575
Add. Model No.:	GSC3574
Report Number:	2401279067RFC-5
Test Standards:	FCC 47 CFR Part 1 Subpart I
FCC ID:	YZZGSC3575
Test Result:	PASS
Date of Issue:	May 11, 2024

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:	David Chen	Reviewed by:	Robben Chen
	David Chen Senior Project Engineer		Robben Chen Assistant Manager
Approved by:		Date:	May 11, 2024
	Billy Li Technical Director		

Version

Version No.	Date	Description
V1.0	May 11, 2024	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

Product Name:	HD Intercom & Facility Control Station		
Model No.:	GSC3575		
Add. Model No.:	GSC3574		
Trade Mark:	GRANDSTREAM		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n/ax	
		Bluetooth V5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac/ax
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac/ax
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac/ax
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac/ax
Sample Received Date:	January 26, 2024		
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.			

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For BT_LE	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth LE/2LE/LE Code
Type of Modulation:	GFSK
Number of Channels:	40
Channel Separation:	2 MHz
Antenna Type:	PIFA Antenna
Antenna Gain: (Provided by the customer)	4.72 dBi
Maximum Peak Power:	9.36 dBm

For BT_EDR	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth BR + EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Channel Separation:	1 MHz
Antenna Type:	PIFA Antenna
Antenna Gain: (Provided by the customer)	4.72 dBi

Maximum Peak Power:	9.31 dBm
For 2.4 GHz ISM Band of Wi-Fi	
Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2462 MHz
Support Standards:	IEEE 802.11b/g/n-HT20/n-HT40/ax-HE20/ax-HE40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11ax:OFDM/ OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7 IEEE 802.11n-HT40: Up to MCS7 IEEE 802.11ax-HE20/ HE40: Up to MCS11
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20/ax-HE20: 11 IEEE 802.11n-HT40/ax-HE40: 7
Channel Separation:	5 MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	4.72 dBi
Maximum EIRP (dBm):	IEEE 802.11b: 25.73 dBm IEEE 802.11g: 29.25 dBm IEEE 802.11n-HT20: 29.30 dBm IEEE 802.11n-HT40: 29.40 dBm IEEE 802.11ax-HE20: 29.13 dBm IEEE 802.11ax-HE40: 29.49 dBm
Maximum conducted output power:	IEEE 802.11b: 21.01 dBm IEEE 802.11g: 24.53 dBm IEEE 802.11n-HT20: 24.58 dBm IEEE 802.11n-HT40: 24.68 dBm IEEE 802.11ax-HE20: 24.41 dBm IEEE 802.11ax-HE40: 24.77 dBm

For 5 GHz U-NII Bands of Wi-Fi	
Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)
	5250 MHz to 5350 MHz (U-NII-2A)
	5470 MHz to 5725 MHz (U-NII-2C)
	5 725 MHz to 5 850 MHz (U-NII-3)
Frequency Ranges:	5180 MHz to 5240 MHz
	5260 MHz to 5320 MHz
	5500 MHz to 5700 MHz
	5745 MHz to 5825 MHz
Support Standards:	IEEE 802.11a/n/ac/ax
TPC Function:	Not Support
DFS Operational mode:	Slave without radar Interference detection function
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ax:

	☑ OFDM (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) ☑ OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)				
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20: 20 MHz				
	IEEE 802.11n-HT40/ac-VHT40/ax-HE40: 40 MHz				
Data Rate:	IEEE 802.11a: Up to 54 Mbps				
	IEEE 802.11n-HT20: Up to MCS7				
	IEEE 802.11n-HT40: Up to MCS7				
	IEEE 802.11ac-VHT20: Up to MCS8				
	IEEE 802.11ac-VHT40: Up to MCS9				
	IEEE 802.11ax-HE20/HE40: Up to MCS11				
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20 2 for IEEE 802.11n-HT40)/ac-VHT40/ax-HE40				
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20 2 for IEEE 802.11n-HT40)/ac-VHT40/ax-HE40				
	5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20 5 for IEEE 802.11n-HT40/ac-VHT40/ax-HE40				
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20/ax-HE20 2 for IEEE 802.11n-HT40/ac-VHT40/ax-HE40				
Antenna Type:	Dipole Antenna				
Antenna Gain: (Provided by the customer)	5150 MHz to 5250 MHz: 6.45 dBi				
	5250 MHz to 5350 MHz: 6.45 dBi				
	5470 MHz to 5725 MHz: 6.45 dBi				
	5725 MHz to 5850 MHz: 6.45 dBi				
Maximum conducted output power (dBm):		**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	17.73	17.38	21.30	18.81
	IEEE 802.11n-HT20:	17.57	17.68	21.25	18.72
	IEEE 802.11n-HT40:	17.39	17.48	18.27	18.95
	IEEE 802.11ac-VHT20	17.80	17.86	21.50	19.25
	IEEE 802.11ac-VHT40	17.32	17.40	21.19	18.89
	IEEE 802.11ax-HE20	17.45	17.38	21.22	18.81
	IEEE 802.11ax-HE40	17.08	17.14	19.28	18.54
Maximum EIRP (dBm):		**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	24.18	23.83	27.75	25.26
	IEEE 802.11n-HT20:	24.02	24.13	27.70	25.17
	IEEE 802.11n-HT40:	23.84	23.93	24.72	25.40
	IEEE 802.11ac-VHT20	24.25	24.31	27.95	25.70
	IEEE 802.11ac-VHT40	23.77	23.85	27.64	25.34
	IEEE 802.11ax-HE20	21.99	21.92	25.76	23.35
	IEEE 802.11ax-HE40	21.62	21.68	23.82	23.08

1.4 OTHER INFORMATION

Test channels for BT_LE				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK	2402 MHz to 2480 MHz	Channel 0	Channel 19	Channel 39
		2402 MHz	2440 MHz	2480 MHz

Test channels for BT_EDR				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
π/4DQPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
8DPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz

Test channels for 2.4 GHz ISM Band of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20 IEEE 802.11ax-HE20	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT40 IEEE 802.11ax-HE40	2422 MHz to 2452 MHz	Channel 3	Channel 7	Channel 9
		2422 MHz	2437 MHz	2452 MHz

Test channels for 5 GHz U-NII Bands of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20 IEEE 802.11ax-HE20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 116	Channel 140
		5500 MHz	5580 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40 IEEE 802.11ax-HE40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 110	Channel 134
		5510 MHz	5550 MHz	5670 MHz

	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I

All test items have been performed and recorded as per the above standards

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.

3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

3.2.1.1 FCC 47 CFR Part 1 Subpart I

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	**1**	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density.

3.2.2 Test Procedure

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

3.3 MPE CALCULATION METHOD

FCC 47 CFR Part 1 Subpart I

S = PG/4πR^2= EIRP/4πR^2

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 = 20cm distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: *For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.*

3.4.1 For WLAN

For Wi-Fi function, operating at 2412MHz to 2462 MHz for IEEE802.11b/g/n/ax and
operating at 5150 MHz to 5250 MHz for IEEE802.11a/n/ac/ax and
operating at 5250 MHz to 5350 MHz for IEEE802.11a/n/ac/ax and
operating at 5470 MHz to 5725 MHz for IEEE802.11a/n/ac/ax and
operating at 5725 MHz to 5850 MHz for IEEE802.11a/n/ac/ax.

3.4.1.1 Antenna Type:

PIFA Antenna

Antenna Gain:

2412 MHz to 2462 MHz: 4.72 dBi
5150 MHz to 5250 MHz: 6.45 dBi
5250 MHz to 5350 MHz: 6.45 dBi
5470 MHz to 5725 MHz: 6.45 dBi
5725 MHz to 5850 MHz: 6.45 dBi

3.4.1.2 Results for FCC 47 CFR Part 1 Subpart I

	Operating Mode	Freq.	Declared maximum conducted output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
		(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(mw/cm^2)	
SISO	IEEE 802.11b	2412	21	1	4.72	26.72	469.8941	1	0.0935
		2437	21	1	4.72	26.72	469.8941	1	0.0935
		2462	21	1	4.72	26.72	469.8941	1	0.0935
	IEEE 802.11g	2412	24	1	4.72	29.72	937.5620	1	0.1865
		2437	24	1	4.72	29.72	937.5620	1	0.1865
		2462	24	1	4.72	29.72	937.5620	1	0.1865
	IEEE 802.11n-HT20 IEEE 802.11ax-HE20	2412	24	1	4.72	29.72	937.5620	1	0.1865
		2437	24	1	4.72	29.72	937.5620	1	0.1865
		2462	24	1	4.72	29.72	937.5620	1	0.1865
	IEEE 802.11n-HT40 IEEE 802.11ax-HE40	2422	24	1	4.72	29.72	937.5620	1	0.1865
		2437	24	1	4.72	29.72	937.5620	1	0.1865
		2452	24	1	4.72	29.72	937.5620	1	0.1865
	IEEE 802.11a	5180	17	1	6.45	24.45	278.6121	1	0.0554
		5220	17	1	6.45	24.45	278.6121	1	0.0554
		5240	17	1	6.45	24.45	278.6121	1	0.0554
		5260	17	1	6.45	24.45	278.6121	1	0.0554
		5300	17	1	6.45	24.45	278.6121	1	0.0554
		5320	17	1	6.45	24.45	278.6121	1	0.0554
		5500	21	1	6.45	28.45	699.8420	1	0.1392
		5580	20	1	6.45	27.45	555.9043	1	0.1106
		5700	20	1	6.45	27.45	555.9043	1	0.1106
		5720	20	1	6.45	27.45	555.9043	1	0.1106
		5745	18	1	6.45	25.45	350.7519	1	0.0698
		5785	18	1	6.45	25.45	350.7519	1	0.0698
		5825	18	1	6.45	25.45	350.7519	1	0.0698
	IEEE 802.11n-HT20 802.11ac-VHT20 IEEE 802.11ax-HE20	5180	17	1	6.45	24.45	278.6121	1	0.0554
		5220	17	1	6.45	24.45	278.6121	1	0.0554
		5240	17	1	6.45	24.45	278.6121	1	0.0554
		5260	17	1	6.45	24.45	278.6121	1	0.0554
		5300	17	1	6.45	24.45	278.6121	1	0.0554
		5320	17	1	6.45	24.45	278.6121	1	0.0554
		5500	21	1	6.45	28.45	699.8420	1	0.1392
		5580	20	1	6.45	27.45	555.9043	1	0.1106
		5700	20	1	6.45	27.45	555.9043	1	0.1106
		5720	20	1	6.45	27.45	555.9043	1	0.1106
		5745	18	1	6.45	25.45	350.7519	1	0.0698
		5785	18	1	6.45	25.45	350.7519	1	0.0698
		5825	18	1	6.45	25.45	350.7519	1	0.0698
	IEEE 802.11n-HT40 IEEE 802.11ac-VHT40 IEEE 802.11ax-HE40	5190	17	1	6.45	24.45	278.6121	1	0.0554
		5230	17	1	6.45	24.45	278.6121	1	0.0554
		5270	17	1	6.45	24.45	278.6121	1	0.0554
		5310	17	1	6.45	25.45	350.7519	1	0.0698
		5510	18	1	6.45	25.45	350.7519	1	0.0698
		5550	18	1	6.45	25.45	350.7519	1	0.0698
		5670	16	1	6.45	23.45	221.3095	1	0.0440
		5710	16	1	6.45	23.45	221.3095	1	0.0440
		5755	18	1	6.45	25.45	350.7519	1	0.0698
		5795	18	1	6.45	25.45	350.7519	1	0.0698

3.4.2 For BT

For BT_LE/2LE/ LE Code function, operating at 2402MHz to 2480 MHz for GFSK and
For BT_EDR function, operating at 2402MHz to 2480 MHz for GFSK, π/4 DQPSK, 8DPSK

3.4.2.1 Antenna Type:

PIFA Antenna

3.4.2.2 Antenna Gain:

2402MHz to 2480 MHz: 4.72 dBi

3.4.2.3 Results for FCC 47 CFR Part 1 Subpart I

Operating Mode	Freq.	Declared maximum conducted output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(mW)	(mW /cm^2)	
LE/2LE/ LE Code	2402-2480	9	1	4.72	14.72	29.6483	1	0.0059
EDR	2402-2480	9	2.5	4.72	16.22	41.8794	1	0.0083

3.4.3 Simultaneous Multi-band Transmission MPE Analysis

3.4.2.1 List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Support/Not Support
1	2.4G _WLAN + BT	Support
2	5G_WLAN + BT	Support
3	2.4G _WLAN + 5G_WLAN	Not Support

3.4.2.2 Results for transmit simultaneously

FCC 47 CFR Part 1 Subpart I

No.	Configurations	Maximum MPE Value			Limits
		WLAN (mw/cm^2)	BT (mw/cm^2)	Transmit simultaneously	
1	2.4G _WLAN + BT	0.1865	0.0083	0.1948	1
2	5G_WLAN + BT	0.1392	0.0083	0.1475	1

Note:

According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

Transmit simultaneously MPE = Σ of MPE ratios

MPE ratios = Field strengths or power density / MPE limit at the test frequency

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal Photos.

*** End of Report ***
