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Applicant	:	Shenzhen Shine Industrial Co., Ltd 2-3/F, Bldg5, 1st Industrial Zone, Town, Guangming District, Shenz	d. Changzhen Community, Yutang hen, Guangdong, China
Supplier / Manufacturer	:	Shenzhen Shine Industrial Co., Ltd 2-3/F, Bldg5, 1st Industrial Zone, Town, Guangming District, Shenz	d. Changzhen Community, Yutang hen, Guangdong, China
Description of Sample(s)	:	Submitted sample(s) said to beProduct:Smart Body WeBrand Name:VitafitModel No.:VT730UFCC ID:2A2DS-VT730	eight Scale U
Date Samples Received	:	2021-06-01	
Date Tested	:	2021-06-03 to 2021-06-09	
Investigation Requested	:	Perform ElectroMagnetic Interfere with FCC 47CFR [Codes of Feder ANSI C63.10:2013 for FCC Certif	ence measurement in accordance al Regulations] Part 15: 2017 and fication.
Conclusions	:	The submitted product <u>COMPLIE</u> Communications Commission [FC The tests were performed in accorr above and on Section 2.2 in this T	<u>D</u> with the requirements of Federal [C] Rules and Regulations Part 15. dance with the standards described est Report.
Remarks	:	Bluetooth DTS (GFSK) For additional model(s) details, pla	ease see page 3.

Dr. CHAN Kwok Hung, Bridit PNUSAL Authorized Signatory



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<u>1.0</u> <u>General Details</u>

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.EMC Laboratory10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong KongTelephone:852 2666 1888Fax:852 2664 4353

1.2 Equipment Under Test [EUT] Description of Sample(s)

Smart Body Weight Scale
Shenzhen Shine Industrial Co., Ltd.
2-3/F, Bldg5, 1st Industrial Zone, Changzhen Community, Yutang Town, Guangming District, Shenzhen, Guangdong, China
Vitafit
VT730U
VT7307U
4.5Vd.c ("AAA" battery x3)

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Smart Body Weight Scale. The transmission signal is digital modulated with channel frequency range 2402-2480MHz. The R.F. signal was modulated by IC; the type of modulation used was digital transmission Modulation.

1.3 Date of Order

2021-06-01

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2021-06-03 to 2021-06-09

1.6 Country of Origin

China

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1.7 RF Module Details

Module Model Number:	TLSR8232
Module FCC ID:	N/A
Module Transmission Type:	Bluetooth 4.2 BLE
Modulation:	GFSK
Data Rates:	1Mbps
Frequency Range:	2400-2483.5MHz
Carrier Frequencies:	2402MHz - 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Type:	PCB antenna
Antenna Gain:	2.95dBi

1.9 Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

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<u>2.0</u> <u>Technical Details</u>

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013for FCC Certification. The device was realized by test software.

EMI_TEST_v1.5	_ =
8232_8233.ini • SWIRE	- SWB SP
RF	
Setting:	Tx Rx
2402 Set_Channel	PA Set_Gpio
11.8dbm	Log_Window:
Set_Power	***************************************
BLE_1M Set_RF_Mode	@ Set Channel:2440 ***********************************
Carrier:	TC32 EVK: Swire OK Total Time: 0 ms ************************************
Carrier CarrierData 🔳 Hop	@Start Test Command ************************************
TX: Unlimited -	TC32 EVK: Swire OK Total Time: 0 ms ************************************
PRBS9 0x55 0x0f	Set Parameter ***********************************
DY.	@ Set Channel:2402 ***********************************
RxTest	TC32 EVK: Swire OK Total Time: 0 ms ************************************
	@Start Test Command
Read_Rx_Cnt ReadRssi	TC32 EVK: Swire OK

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2.2 Test Standards and Results Summary Tables

EMISSION Results Summary								
Test Condition	Test Requirement	Test Method	Class /	Test Result				
			Severity	Pass	Failed	N/A		
Maximum Peak Output Power	FCC 47CFR 15.247(b)(3)	ANSI C63.10: 2013	N/A	\boxtimes				
Radiated Spurious	FCC 47CFR 15.209	ANSI C63.10:	N/A	\boxtimes				
Emissions	FCC 47CFR 15.205	2013						
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A			\boxtimes		
Conducted Spurious Emissions	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	\boxtimes				
Power Spectral Density	FCC 47CFR 15.247(e)	ANSI C63.10: 2013	N/A	\boxtimes				
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10: 2013	N/A	\boxtimes				
Band Edge Emissions	FCC 47CFR 15.247(d)	ANSI C63.10:	N/A	\boxtimes				
(Radiated)		2013						
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	\boxtimes				

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

Test Requirement:	FCC 47CFR 15.247(b)(3)	
Test Method:	ANSI C63.10: 2013	
Test Date:	2021-06-07	
Mode of Operation:	Bluetooth DTS Tx mode	
Ambient Temperature: 25℃	Relative Humidity: 51%	Atmospheric Pressure: 101 kPa

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

Spectrum Analyzer Setting:

RBW = 3 MHz, VBW= 10MHz, Sweep = Auto, Span = 10MHz Detector = Peak, Trace = Max. hold

Test Setup:



Note: a temporary antenna connector was soldered to the RF output.

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Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

Results of BT DTS Tx Mode (2402MHz to 2480MHz) : Pass (TX Unit) (GFSK)								
ChannelFrequency(MHz)Conducted power(dBm)AntennaE.I.R.P(dBm)E.I.R.P (Watt)								
0	2402	-2.94	2.95	0.01	0.001			
19	2440	-3.62	2.95	-0.67	0.000857			
39	2480	-3.38	2.95	-0.43	0.000906			

Calculated measurement uncertainty

:	30MHz to 1GHz	1.7dB
	1GHz to 26GHz	1.7dB



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Test plot of Maximum Peak Conducted Output Power :

Bluetooth Communication mode (BT DTS-GFSK, 2402MHz)

Spectrum	ر ب							Ē
Ref Level	20.00 dBm		RBW	3 MHz		_		
Att	30 dB	SWT 1	ms 🖷 VBW	10 MHz N	1ode Auto	Sweep		
●1Pk Max								
					M	1[1]		0.01 dBm
							2.40	19280 GHz
10 dBm								
0 dBm								
o dom								
			1					
-10 dBm							 <u> </u>	
-20 dBm								~
-20 0011								
and the second s								
-30 dBm								
-40 dBm								
10 abiii								
-50 dBm								
-60 dBm								
00 000								
-70 dBm-								
CF 2.402 G	iHz			691	pts		Span	10.0 MHz

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Bluetooth Communication mode (BT DTS-GFSK, 2440MHz)

Spectrum	Γ								
Ref Leve	20.00 dBm		👄 RBW	3 MHz					`
Att	30 dB	SWT 1 r	ns 👄 VBW	10 MHz N	lode Auto :	Sweep			
●1Pk Max									
					M	1[1]			-0.67 dBm
								2.43	98550 GHz
10 dBm									
				MI					
0 dBm									
		_		T			L		
10 dBm									
-10 0811								1	
-20 dBm									
									~
-30 dBm									
-40 dBm									
10 4011									
-50 dBm									
-60 dBm									
-70 dBm									
CF 2.44 GH	lz			691	pts			Span	10.0 MHz

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Bluetooth Communication mode (BT DTS-GFSK, 2480MHz)

Spectrum	Γ							
Ref Leve	20.00 dBm		😑 RBW	3 MHz				
Att	30 dB	SWT 1 n	ns 👄 VBW	10 MHz M	Node Auto	Sweep		
●1Pk Max								
					м	1[1]	2.47	-0.43 dBm 97680 GHz
10 dBm								
0 dBm				M1				
-10 dBm—								
-20 dBm								
-30 dBm-								
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm								
CF 2.48 GF	-lz			691	pts		Span	10.0 MHz

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3.1.2 Radiated Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2021-06-08
Mode of Operation:	Tx mode / Bluetooth Communication mode (GFSK)

Ambient Temperature: 25°C Relative Humidity: 50% Atmospheric Pressure: 101 kPa

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semianechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

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Spectrum Analyzer Setting:

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Below 150KHz (QP)	RBW: VBW:	200Hz, 600Hz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
150KHz – 30MHz (QP)	RBW:	10kHz
	VBW:	30kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
30MHz – 1GHz (OP)	RBW:	120kHz
	VBW:	120kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Pk)	RBW:	1MHz
	VBW:	1MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Av)	RBW:	1MHz
	VBW:	10Hz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

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Test Setup:



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

Limits for Radiated Emissions FCC 47 CFR 15.209]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Remarks: No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

- ^k Denotes restricted band of operation.
 - Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor, Cable Attenuation, Amplifier.

Calculated measurement uncertainty

(9kHz-30MHz): 2.0dB (30MHz -1GHz): 4.9dB (1GHz -6GHz): 4.02dB (6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Result of Tx mode (2402.0 MHz) (GFSK) (9kHz – 30MHz): Pass

	Field Strength of Spurious Emissions								
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m								
	Emissions detected are more than 20 dB below the FCC Limits								

Result of Tx mode (2402.0 MHz) (GFSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions									
	Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	$dB\mu V/m$	dBµV/m	dB					
4804.0	56.8	0.82	57.6	74.0	16.4	Vertical				
4804.0	55.9	0.52	56.4	74.0	17.6	Horizontal				
7206.0	49.2	7	56.2	74.0	17.8	Vertical				
7206.0	49.3	6.5	55.8	74.0	18.2	Horizontal				
9608.0	47.0	8.5	55.5	74.0	18.5	Vertical				
9608.0	47.0	8.3	55.3	74.0	18.7	Horizontal				
12010.0	45.0	10.9	55.9	74.0	18.1	Vertical				
12010.0	45.2	10.8	56.0	74.0	18.0	Horizontal				

Field Strength of Spurious Emissions										
	Average Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4804.0	42.0	0.82	42.8	54.0	11.2	Vertical				
4804.0	41.0	0.52	41.5	54.0	12.5	Horizontal				
7206.0	34.2	7	41.2	54.0	12.8	Vertical				
7206.0	35.0	6.5	41.5	54.0	12.5	Horizontal				
9608.0	30.9	8.5	39.4	54.0	14.6	Vertical				
9608.0	31.2	8.3	39.5	54.0	14.5	Horizontal				
12010.0	30.1	10.9	41.0	54.0	13.0	Vertical				
12010.0	29.9	10.8	40.7	54.0	13.3	Horizontal				

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Result of Tx mode (2440.0 MHz) (GFSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions									
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m								
Emissions detected are more than 20 dB below the FCC Limits									

Result of Tx mode (2440.0 MHz) (GFSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions										
	Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4880.0	56.7	0.82	57.5	74.0	16.5	Vertical				
4880.0	56.4	0.52	56.9	74.0	17.1	Horizontal				
7320.0	49.1	7	56.1	74.0	18.0	Vertical				
7320.0	49.4	6.5	55.9	74.0	18.1	Horizontal				
9760.0	47.1	8.5	55.6	74.0	18.4	Vertical				
9760.0	47.3	8.3	55.6	74.0	18.4	Horizontal				
12200.0	45.2	10.9	56.1	74.0	17.9	Vertical				
12200.0	45.3	10.8	56.1	74.0	18.0	Horizontal				

Field Strength of Spurious Emissions										
	Average Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4880.0	42.1	0.82	42.9	54.0	11.1	Vertical				
4880.0	40.7	0.52	41.2	54.0	12.8	Horizontal				
7320.0	33.6	7	40.6	54.0	13.4	Vertical				
7320.0	33.5	6.5	40.0	54.0	14.0	Horizontal				
9760.0	31.0	8.5	39.5	54.0	14.5	Vertical				
9760.0	32.8	8.3	41.1	54.0	12.9	Horizontal				
12200.0	30.2	10.9	41.1	54.0	12.9	Vertical				
12200.0	30.3	10.8	41.1	54.0	12.9	Horizontal				

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Result of Tx mode (2480.0 MHz) (GFSK) (9kHz – 30MHz): Pass

	Field Strength of Spurious Emissions								
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m								
Emissions detected are more than 20 dB below the FCC Limits									

Result of Tx mode (2480.0 MHz) (GFSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions											
Peak Value												
Frequency	Measured	Correction	Field	Limit	Margin	E-Field						
	Level @3m	Factor	Strength	@3m		Polarity						
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB							
4960.0	57.2	0.82	58.0	74.0	16.0	Vertical						
4960.0	56.3	0.52	56.8	74.0	17.2	Horizontal						
7440.0	48.6	7	55.6	74.0	18.4	Vertical						
7440.0	49.5	6.5	56.0	74.0	18.0	Horizontal						
9920.0	47.2	8.5	55.7	74.0	18.3	Vertical						
9920.0	47.1	8.3	55.4	74.0	18.6	Horizontal						
12400.0	45.2	10.9	56.1	74.0	17.9	Vertical						
12400.0	45.2	10.8	56.0	74.0	18.0	Horizontal						

	Field Strength of Spurious Emissions											
Average Value												
Frequency	Measured	Correction	Field	Limit	Margin	E-Field						
	Level @3m	Factor	Strength	@3m		Polarity						
MHz	dBµV	dB/m	dBµV/m	$dB\mu V/m$	dB							
4960.0	41.8	0.82	42.6	54.0	11.4	Vertical						
4960.0	41.5	0.52	42.0	54.0	12.0	Horizontal						
7440.0	33.3	7	40.3	54.0	13.7	Vertical						
7440.0	33.4	6.5	39.9	54.0	14.2	Horizontal						
9920.0	32.6	8.5	41.1	54.0	12.9	Vertical						
9920.0	31.7	8.3	40.0	54.0	14.0	Horizontal						
12400.0	30.4	10.9	41.3	54.0	12.7	Vertical						
12400.0	30.3	10.8	41.1	54.0	12.9	Horizontal						

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Radiated Emissions Measurement:

Limit :

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.205(c)).

Field Strength of Band-edge Compliance										
	Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
2390.0	50.2	-4.8	45.4	74.0	28.6	Vertical				
2390.0	49.1	-4.7	44.4	74.0	29.6	Horizontal				

Result: RF Radiated Emissions (Lowest)-GFSK

Field Strength of Band-edge Compliance											
	Average Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB						
2390.0	43.3	-4.8	38.5	54.0	15.5	Vertical					
2390.0	42.6	-4.7	37.9	54.0	16.1	Horizontal					

Result: RF Radiated Emissions (Highest) -GFSK

	Field Strength of Band-edge Compliance										
	Peak Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB						
2483.5	59.5	-4.8	54.7	74.0	19.3	Vertical					
2483.5	58.8	-4.7	54.1	74.0	19.9	Horizontal					

Field Strength of Band-edge Compliance											
	Average Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB						
2483.5	43.7	-4.8	38.9	54.0	15.1	Vertical					
2483.5	42.8	-4.7	38.1	54.0	15.9	Horizontal					

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Results of Bluetooth Communication mode (2402.0 MHz) (30MHz – 1GHz): Pass Please refer to the following table for result details(The data is the worst cases) Horizontal



Relative Humidity : 50.2%

/Phase
izontal

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Results of Bluetooth Communication mode (2402.0 MHz) (30MHz – 1GHz): Pass Please refer to the following table for result details(The data is the worst cases) Vertical



Relative Humidity : 50.2%

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	42.900	31.09	40.00	-8.91	QP	Vertical
2	45.695	32.31	40.00	-7.69	QP	Vertical
3	56.395	27.65	40.00	-12.35	QP	Vertical
4	337.216	25.95	46.00	-20.05	QP	Vertical
5	428.019	28.91	46.00	-17.09	QP	Vertical
6	558.730	32.16	46.00	-13.84	QP	Vertical

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3.1.3 Power Spectral Density

FCC 47CFR 15.247(e)
ANSI C63.10:2013
2021-06-07
Tx mode

Ambient Temperature: 25°C Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz, VBW=10KHz, Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple, Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Test Limit:

The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Results of Tx Mode GFSK (Tx:2402MHz to 2480MHz) : Pass (Tx Unit) Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2402.0	-9.24	8dBm
2440.0	-10.16	8dBm
2480.0	-10.05	8dBm

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Tx mode GFSK (Tx: 2402MHz to 2480MHz) CH 0 (2402.0 MHz)

-80 dBm

CF 2.44 GHz

D-61								[
Att	/el 10.00 dB	m iB SWT 63	9 1 us 🖨 VI	3W 3 kHz	Mode Auto	FET		
1Pk Max	(J 3W1 05	2.1 µ3 🖝 🗰	0 10 MIL	Mode Adto			
					M1[1]		-9.24 di
					1	1	1	2.40214625 G
0 dBm-								
10.40-						M1		
-10 dBm-			mount	numeroun	manum	Mummun	man.	
00 40	. 0.	www.					The	numper 1.
-20 aBm-	man							
when	-							
-30 UBIII-								
-40 dBm-								
-40 00111								
-50 dBm-								
-50 0.5111								
-60 dBm-								
00 00.00								
-70 dBm-								
/ 0 ubiii								
-80 dBm-								
[CF 2.402	2 GHZ			691 b	ts		եր	an 1.0419 MF
) MHZ))							
								1
Spectru	um 🗍							(
Spectru Ref Lev	um vel 10.00 dB	m	e Ri	3W 3 kHz				(
Spectru Ref Lev Att	um vel 10.00 dB 20 d	m 18 SWT 63	● RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz	Mode Auto	FFT		(
Spectru Ref Lev Att	um vel 10.00 dB 20 d	m 4B SWT 63	e Ri 2.3 μs e Vi	3W 3 kHz 3W 10 kHz	Mode Auto	FFT		-10 16 d
Spectru Ref Lev Att 1Pk Max	um	m IB SWT 63	<mark>⊜ Ri</mark> 2.3 µs ⊜ V I	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FFT		-10.16 d 2.44011540 0
Spectru Ref Lev Att 1Pk Max	um	m IB SWT 63	⊜ RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FFT]		-10.16 d 2.44011540 (
Spectru Ref Lev Att 1Pk Max	um vel 10.00 dB 20 d	m IB SWT 63	e Ri 2.3 μs e Vi	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FF T]		-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm-	um vel 10.00 dB 20 c	m IB SWT 63	● RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FFT		-10.16 d 2.44011540 d
Spectru Ref Lev Att IPk Max 0 dBm	um	m B SWT 63	● RI 2.3 μs ● VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1 M1	FFT	hundun	-10.16 d 2.44011540 c
Spectru Ref Lev Att IPk Max 0 dBm- -10 dBm- -20 dBm-	um vel 10.00 dB 20 c	m B SWT 63	● RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz AwrmMAA	Mode Auto M1[1 M1	FFT	monte	-10.16 d 2.44011540 c
Spectru Ref Lev Att 1Pk Max 0 dBm- -10 dBm- -20 dBm-	um vel 10.00 dB 20 c	m BB SWT 63	● RI 2.3 µs ● VI	3 kHz 3W 10 kHz	Mode Auto M1[1 M1	FFT	mander	-10.16 d 2.44011540 c
Spectru Ref Lev Att 1Pk Max 0 dBm- -10 dBm- -20 dBm- V30 dBm-	um vel 10.00 dB 20 c	m BB SWT 63	● RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz Murmunda	Mode Auto M1[1 M1	FFT	mound	-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm	um vel 10.00 dB 20 c	m BB SWT 63	● RI 2.3 µs ● VI	3W 3 kHz 3W 10 kHz Mwrminian	Mode Auto M1[1 M1	FFT	mulu	-10.16 d 2.44011540 c
Spectru Ref Lev Att 1Pk Max 0 dBm- -10 dBm- -20 dBm- -20 dBm- -40 dBm-	um vel 10.00 dB 20 c	m BB SWT 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz MurmmA	Mode Auto M1[1	Aruhun	hunder	-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm	um vel 10.00 dB 20 c	m B swt 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz	Mode Auto	FFT	hunder	-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm	um vel 10.00 dB 20 c	m BB SWT 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz	Mode Auto	FFT	hunder	-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm- -10 dBm- -20 dBm- -20 dBm- -30 dBm- -40 dBm- -50 dBm-	um vel 10.00 dB 20 c	m B swt 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FFT	hundur	-10.16 d 2.44011540 C
Spectru Ref Lev Att 1Pk Max 0 dBm- -10 dBm- -20 dBm- -20 dBm- -40 dBm- -50 dBm-	um vel 10.00 dB 20 c	m B SWT 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1	FFT	hundur	-10.16 d 2.44011540 C
Spectru Ref Lev Att 10 dBm- -10 dBm- -20 dBm- -20 dBm- -40 dBm- -50 dBm-	um vel 10.00 dB 20 c	m IB SWT 63	€ RI 2.3 μs € VI	3W 3 kHz 3W 10 kHz	Mode Auto M1[1 M1	FFT	hundur	-10.16 d 2.44011540 c

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691 pts

Span 1.0224 MHz



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CH 39 (2480.0 MHz)

Spectrum									E
Ref Level	10.00 dBm		e Ri	BW 3 kHz					(-
Att	20 dB	SWT 63	2.4 µs 🖷 V i	BW 10 KHZ	Mode Au	Ito FFT			
The wax			· · · · · · · · · · · · · · · · · · ·		м	1[1]			10.05 dBm
0 dBm								2.480	14770 GHz
-10 dBm						M1			
-10 0011			abreak	human	nonnande	when	mound		
-20 dBm	month	when						mun	when
wat dBm				-		(
-40 dBm									
-50 dBm									
-60 dBm									
-70 dBm									
-80 dBm									
CF 2.48 GH	z			691	pts			Span 1.	0746 MHz

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3.1.4 6dB Spectrum Bandwidth Measurement

FCC 47CFR 15.247(a)(2)
ANSI C63.10:2013
2021-06-09
Tx mode

Ambient Temperature: 25°C Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.



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Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency	6dB Bandwidth	FCC Limits
[MHz]	[KHz]	[kHz]
2402.0	694.6	> 500

Spectrum	ιÌ								
Ref Level	25.00 dBm		🔵 RBW	100 kHz					,
Att	40 dB	SWT 19	µs 🖷 VBW	300 kHz	Mode Auto	FFT			
●1Pk Max 20 dBm					M:	1[1] IB		2.401	-0.10 dBm 80900 GHz 6.00 dB
10 dBm				M1	By Q M:	factor 2[1]		694.6000 - 2.403	00000 kHz 3457.6 46.68 dBm 50000 GHz
-10 dBm						T2 P			
-20 dBm			/				$\overline{\}$		
-30 aBm	\square	\sim						\frown	\
-50 dBm—									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-60 dBm									
-70 dBm									

6dB Bandwidth of Fundamental Emission on GFSK (2402MHz)

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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range	6dB Bandwidth	FCC Limits
[MHz]	[KHz]	[kHz]
2440.0	681.6	> 500

Spectrum	<u> </u>									₽
Ref Level	25.00 dBm			RBW	100 kHz					,
Att	40 dB	SWT 19	us 😑	VBW	300 kHz	Mode Auto	FFT			
●1Pk Max										
20 dBm						M	1[1]		2.439	-0.99 dBm 80030 GHz
10 dBm						Bi Q	w factor		681.6000	00000 kHz 3579.4
					M1	м	2[1]		-	47.20 dBm
0 dBm				Ţ			T2 V		2.441	50000 GHz
-10 dBm										
-20 dBm		/						\backslash		
-30 dBm		\rightarrow							\sim	
-50 dBm	/									27
-60 dBm										
-70 dBm										
CF 2.44 GH	z				69:	lipts			Spa	n 3.0 MHz

6dB Bandwidth of Fundamental Emission on GFSK (2440MHz)

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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range	6dB Bandwidth	FCC Limits
[MHz]	[KHz]	[kHz]
2480.0	707.7	> 500

Spectrum	-									
Ref Level	25.00 dBn	n	•	RBW	100 kHz					
Att	40 de	3 SWT	19 µs 🦷	VBW	300 kHz	Mode /	Auto FFT			
●1Pk Max					-	_				
							M1[1]			-1.77 dBm
20 dBm-							_		2.480	00000 GHz
							ndB		707 7000	6.00 dB
10 dBm							O factor		/0/./000	3504.5
							M2[1]		-	48.09 dBm
0 dBm					~	M1			2.481	50000 GHz
				Ţ	1/					
-10 dBm			_	_	r		- ×			
			/							
-20 dBm								\wedge		
			Á							
-30 dBm		L /	/					\uparrow		
		$1 \sim$								
-40 dBm										
	/									M
-50 dBm										~
-60 dBm			_			_				
-70 dBm										
70 abiii										
CE 2,48 GH	7				60	1 nts			Sna	n 3.0 MHz

6dB Bandwidth of Fundamental Emission on GFSK (2480MHz)

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3.1.5 Band Edges Measurement

Test Requirement:	FCC 47CFR 15.247
Test Method:	ANSI C63.10:2013
Test Date:	2021-06-09
Mode of Operation:	Tx mode

Ambient Temperature: 25°C Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Test Method:

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW are set to 100kHz and VBW are set to 300kHz for this measurement.

Test Setup:

As Test Setup of clause 3.1.2 in this test report.



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Band-edge Compliance of RF Conducted Emissions Measurement:

Limit :

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result	
[MHz]	[dBm]	[dBm]	[dBm]		
2400 - Lowest	0.24	20.24	40.62	DASS	
Fundamental (2402)	-0.24	-20.24	-49.02	PASS	

Spectru	ım		U	-							
Ref Lev	/el :	25.00 dB	m	e R	BW 100 kHz		201 - M 28	COMPANI			
Att 🛛		35 (3B SWT 76	µs 🖷 V	'BW 300 kHz	Mo	de Auto	FFT			
1Pk Max											
20 dBm—	_						M	1[1]		20022	-0.24 dBm
										2.40	23000 GHz
10 dBm—	_		-			-	M	2[1]		-	49.58 dBm
ro abin								í.	E .	2.40	UUUUU GHZ
0 dBm—						_					TAL T
-10 dBm-	_					-					$ \rightarrow $
											17.1
20 dBm-						-					+
-30 dBm-	+					-					H L
										/	א מ
-40 dBm-	+										\vdash
						M3	3			M2 {	
-50 dBm-	h					M	1.		Deade AS	1/	- <u></u>
menen	1	man	man more	mour	mound	¥.	mour	manan	walker berger	with a	
-60 dBm-	+					-					
-70 dBm—	+					-					
Start 2.3	375	GHz			691	pts				Stop 2	2.404 GHz
1arker											
Type F	Ref	Trc	X-value	.	Y-value		Func	tion	Fund	tion Result	
M1		1	2.40	23 GHz	-0.24 d	Bm					
M2		1	2	.4 GHz	-49.58 d	Bm					
MЗ		1	2.3902	55 GHz	-49.62 d	3m					

Band-edge Compliance of RF Emissions – Lowest (GFSK)

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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 - Highest Fundamental (2480)	-0.67	-20.67	-59.48	PASS

Spectru	m		0	•						0			E
Ref Lev	el 20	0.00 d	dBm		RBW	100 kHz							
Att		30	dB SWT 56.	9 µs 👄	VBW	300 kHz	Mo	ode Au	to FFT				
●1Pk Max													
								М	1[1]				-0.67 dBm
10 dBm—	_				_				0[1]			2.48	03080 GHz
	M1							IVI.	2[1]			2.48	39.48 aBM 35000 GHz
0 dBm	-16		_										
j	R												
-10 dBm/-	T.												
20 49 4	$ \rangle$												
-20 ubiji-													
-30 dBm—	+												
N	1.3	7											
-40 dBm—	+	+											
		1							M3				
-50′ dBm—	+	~	2		-				1				
60 d0m			M2 M2		man	ing	m		1	1.00	men yr		
-60 üBm-				~						V			
-70 dBm—	_												
Start 2 4	79.0	L1-7				601	nte					Sto	n 2 5 CHz
Markor	70 G	12				091	prs					310	p 2.5 GHZ
	ef '	Trc	X-value	1		r-value	1	Euro	tion	1	Fund	tion Result	1
M1		1	2,48030	08 GHz		-0.67 dB	m	Tunc			i unc	cion Result	
M2		1	2.483	35 GHz		-59.48 dB	m						
M3		1	2.491992	28 GHz		-48.61 dB	m						

Band-edge Compliance of RF Emissions – Highest (GFSK)

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Compliance of RF Emissions Measurement:

Limit :

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

Spect	rum														
Ref Le	evel	15.00	dBm		•	RBV	V 100 kHz	100							
Att 1Pk Ma	эх	2	5 dB	SWT 25	0 ms 🖷	VBV	V 300 KHZ	M	ode Au	to Swe	ер				
10 dBm-							-	M1[1] M2[1]			-0.95 dBm 2.4020 GHz -35.70 dBm 4.8190 GHz				
-10 dBm	+		-					_		<u> </u>	- 1				
-20 dBm			-			-		_							
-30 dBm	+	-	M2			_		-							
-40 dBm	+		-	Ma		M4 ▼		-							
-50 dBm	⊢		++			+		\vdash							
-60 dBm പംസംസം	ù.f	walnunk	with	- Langer and	man	nh	annude	-~-	www.huby	when	لالاسلم	herman	mound	manner	
-70 dBm	+		-												
-80 dBm	+		-			_		-							
Start 3	0.0	MHz					691	pts		·			Stop	25.0 GHz	
Marker															
Type	Ref	Trc	X-value			Y-value			Function			Function Result			
M1		1	2.402 GHz		-0.95 dBm		m	1							
M2		1		4.8	19 GHz		-35.70 dB	m							
M3		1		7.2	04 GHz		-39.89 dB	m							
M4		1		9.62	41 GHz		-45.25 dB	m							

Compliance of RF Emissions – (GFSK 2402MHz) (the worst case)

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3.1.6 Antenna Requirement

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Test Requirements: § 15.203

Test Specification:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

This is PCB antenna. There is no external antenna, the antenna gain = 2.95dBi. User is unable to remove or changed the Antenna.



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Appendix A

List of Measurement Equipment

Kaulated Emission											
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL					
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A					
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A					
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2020/04/20	2022/04/20					
EM356	ANTENNA	ETS-LINDGREN	2171B	00150346	N/A	N/A					
	POSITIONING TOWER										
EM336	PRECISION CONICAL DIPOLE	SEIBERSDORF LABORATORIES	PCD 3100	6236/M	2020/05/30	2022/05/30					
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2020/05/13	2022/05/13					
EM276	BROADBAND HORN ANTENNA	A-INFOMW	JXTXLB- 10180-SF	J203109090300 7	2019/03/20	2022/03/29					
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2020/04/28	2022/04/28					
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2020/04/28	2022/04/28					
EM022	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2019/11/30	2021/11/30					
EM200	DUAL CHANNEL POWER METER	R & S	NRVD	100592	2019/10/11	2021/10/11					
EM012	PRE-AMPLIFIER	HP	HP8448B	3008A00262	2019/11/08	2021/11/08					

Remarks:-

CM Corrective Maintenance

N/A Not Applicable

TBD To Be Determined

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Appendix B

Photographs of EUT



Inside View of the product



Inner circuit bottom view





Inner circuit top view





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Photographs of EUT



Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)





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Photographs of EUT





***** End of Test Report *****

Conditions of Issuance of Test Reports

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- 5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
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- 11. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.
- 12. Issuance records of the Report are available on the internet at www.stc.group. Further enquiry of validity or verification of the Reports should be addressed to the Company.