EMC TEST REPORT

Project No.	LBE20210315	Issue No.	2		
	Name of organization	Samsung Electr	onics Co., Ltd.		
Applicant	Address		129, Samsung-ro, Yeongtong-gu, nggi-do, 16677, Korea		
	Date of receipt	May 04, 2021			
EUT	Type of device	 ✓ All other Receivers subject to part15 ✓ Class B Personal Computers and peripherals ✓ Other Class B digital devices and peripherals ✓ FM Broadcast Receiver 			
	Equipment authorization	□ Certification	☐ Supplier's Declaration of Conformity		
	FCC ID	A3LSMR895			
	Kind of product	Smart Wearable			
	Model No.	SM-R895U			
	Variant Model No.	Refer to clause 4.6			
	Manufacturer	AG TECH Co., Ltd. Lot G3, Que Vo Industrial Park (Expanded Area), Nam Son Ward, Bac Ninh City, Bac Ninh Province, Vietnam			
Applied Sta	andards	47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2014			
Test Period	b	May 04, 2021 ~ May 17, 2021			
Issue date		June 4, 2021			
Test result : Complied The equipment under test has found (Refer to the attached test result for			with the applied standards.		
Tested by	: Ji-Yeon Lee	Review	red by : Sun-Ho Kim		

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* Not KOLAS report

Samsung Electronics Co Ltd, Global CS Center (Maetan dong) 129, Samsung-ro, Yeongtong-Gu, Suwon-Si,Gyeonggi-Do 16677, Korea

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Smart Wearable: SM-R895U

1. Report Information

1.1 Revision history

No.	Date of Issue	Revised detailed information
Issue 0	20 May 2021	There are no revisions and this version is basic test report.
Issue 1	21 May 2021	FCC/IC ID of wireless charger(EP-OR825) is added in clause 4.1
Issue 2	4 June 2021	Variant model is added.

^{*} Remark

Compliance with Part 15B requirements for the receiver part of the licensed transmitter (equipment code CXX) is covered by other test report.

2. Summary of test results

2.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result
	Conducted emission (Mains port)	47 CFR Part 15 Subpart B / ANSI C63.4-2014	Complied
	Radiated emission	(Class B)	Complied

3. General Information

3.1 Test facility

The Global CS Center is located on Samsung Electronics Co., Ltd. at (Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea.

All testing are performed in Semi-anechoic chambers conforming to the site attenuation characteristics defined by ANSI C63.4, CISPR 32, CISPR 16-1-4 and Shielded rooms. And all antennas are properly calibrated using ANSI C63.5:2017.

The Global CS Center is an ISO/IEC 17025 accredited testing laboratory by the National Radio Research Agency with designation No. KR0004. for EMC testing.

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4. Test Setup configuration

4.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Mark	Description	Model No.	Serial No.	Manufacturer / Trademark	FCC ID	
А	Smart Wearable	SM-R895U	-	SAMSUNG	A3LSMR895	
В	Battery	EB-BR890ABY	-	SDI	-	
С	Wireless Charger	EP-OR825	-	SAMSUNG	FCC : A3LEPOR825 IC : 649E-EPOR825	
D	Travel Adapter	EP-TA200	R37NBJA0045DK3 Dongya		-	
E	Laptop Computer	Laptop	Laptop	1WYRYM2	Dell	DoC
_ =		captop Latitude5580	D3HRYM2	Dell	DoC	
_	F Laptop AC Adapter	LA65NM130	5DEA	Dell	DoC	
F		AC Adapter LAGS	LAOSINIVITSU	5B3C	Dell	DoC
G	Mouse	AA-SM7PCPB	CN57BA5903634A DV8JJCD4371	SAMSUNG	DoC	
		SNJ-B138	Z5F8353	SAMSUNG	DoC	
П	Poutor	DID 906A	RF0F1D8018454	D-Link	DoC	
Н	Router	DIR-806A	RF0F1D8011504	D-Link	DoC	

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4.2 EUT operating mode

To achieve compliance applied standard specification including CXX and JAB requirement, the following mode(s) were made during compliance testing:

4.2.1 Conducted emission

No.	Operating mode
1	Wireless Charging (w/TA) + Cellular Receiver (LTE FDD B26 Center Frequency)
2	Audio playback from internal memory data + Wireless Charging (w/TA)
3	Wireless Charging (w/USB port of Laptop Computer)

4.2.2 Radiated emission

No.	Operating mode
1	Wireless Charging (w/TA)
2	Audio playback from internal memory data
3	Wireless Charging (w/USB port of Laptop Computer)

4.3 Details of Sampling

Customer selected, single unit.

Smart Wearable: SM-R895U

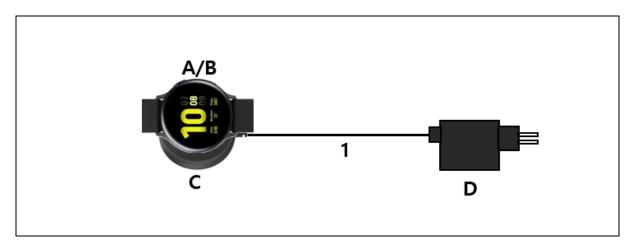
4.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected:

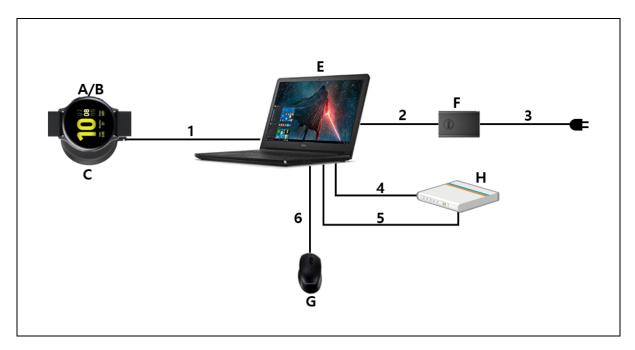
No.	Connected cable	Length [m]	Shielded [Y/N]	Note	
1	Wireless Charger Cable	0.8	N	For Wireless Charger	
2	Power	1.8	N	From Laptop Computer to Laptop AC Adapter	
3	Power	1.5	N	For Laptop AC Adapter	
4	LAN	1.5	N	From Laptop Computer to Router	
5	USB	0.8	Y	From Laptop Computer to Router for DC Power	
6	USB	1.8	Y	From Laptop Computer to Mouse	

4.5 Test arrangement

4.5.1 Conducted emission

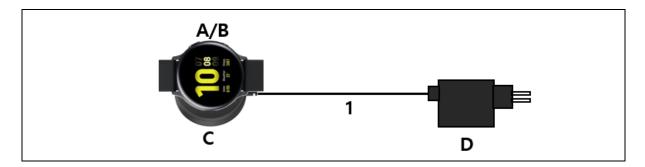


[Mode 1 - 2]

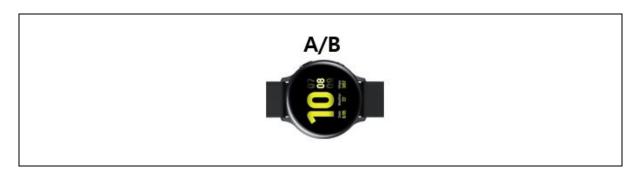


[Mode 3]

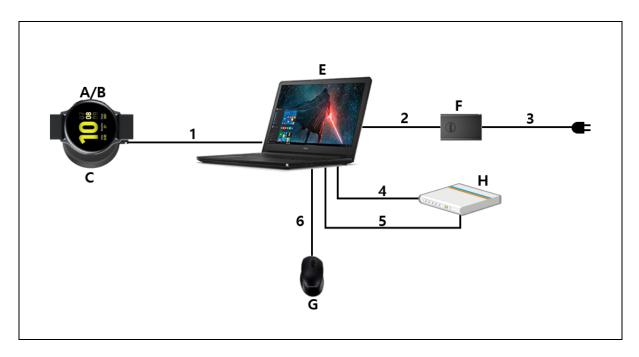
4.5.2 Radiated emission



[Mode 1]



[Mode 2]



[Mode 3]

Smart Wearable: SM-R895U

4.6 EUT Description

The EUT is a watch type smart wearable which can operate on WCDMA FDD2/4/5, LTE FDD2/4/5/12/13/25/26/66/71 bands and incorporates a Bluetooth, Wi-Fi(802.11 a/b/g/n), GNSS, NFC, Wireless Charging and Audio.

4.6.1 The variant models

- SM-R895F

4.7 EUT Frequencies

The highest frequencies (Generated and used)	Frequency [MHz]	
Wi-Fi	5 825	

4.8 Test configuration and condition

The system was configured for testing in a typical fashion that a customer would normally use.

Cables were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables.

The EUT was investigated in three orientations and the worst case orientation is reported.

RX mode(850MHz) testing was performed with the LTE FDD26 RX Test mode at center frequency. All licensed communication (850MHz) RX mode, GSM/WCDMA/LTE, test results are not significantly different.

The audio(1 kHz sound) were repetitively played.

The EUT was charged with wireless charger connected to travel adapter or USB port of laptop computer.

Power source for the EUT operating was supplied by CVCF made by the Pacific Corp.

- Test Voltage: AC 120 V, 60 Hz

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4.9 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4-2 and UKAS M3003)

Test type	Measurement uncertainty (C.L. approximately 95 %, $k = 2$)	
Conducted emission	AC Mains	2.83 dB
Radiated emission	Horizontal	4.47 dB
(Below 1 GHz)	Vertical	5.67 dB
Radiated emission	Horizontal	5.21 dB
(Above 1 GHz)	Vertical	5.21 dB

^{*} Remark

¹⁾ The values for uncertainty of conducted and radiated emissions are less than the Corresponding values of Ucispr given in CISPR 16-4-2. Therefore no adjustment of measurement results is necessary when comparing them with the relevant limits.

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5. Results of individual test

5.1 Conducted emission

The EUT is connected to a LISN via travel adapter. If the EUT is connected to the Laptop Computer USB port, the Laptop AC adapter is connected to a LISN.

Both conducted lines are measured in Quasi-Peak and CISPR-Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in standards.

Limits for conducted emission at the mains ports of Class B

Frequency range Limits	Resolution Bandwidth	Limits [dB(μV)]		
[MHz]	[kHz]	Quasi-peak	Average	
0.15 to 0.50	9	66 to 56	56 to 46	
0.50 to 5	9	56	46	
5 to 30	9	60	50	

NOTE 1 The lower limit shall apply at the transition frequency.

NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.1.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Next Calibration	
					Date	Interval (Month)
E5I-127	Two-Line V-Network	ENV216	R&S	102061	2021-07-29	12
E5I-015	EMI Test Receiver	ESU8	R&S	100481	2021-07-01	12
E5I-006	LTE Communicator	CMW500	R&S	132728	2022-04-06	12
-	Test software	EMC32	R&S	Ver 9.26.01	-	-

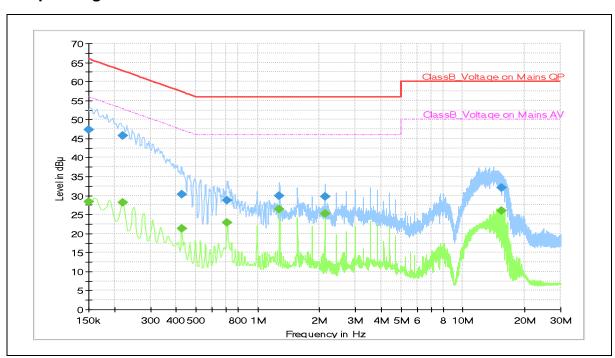
5.1.2 Temperature and humidity condition

Test date	2021-05-17	Test engineer	Ji-Yeon Lee		
Climate condition	Ambient temperature	(21.6 ± 0.5) ℃	Limit (15.0 to 35.0) ℃		
	Relative humidity	(39.4 ± 0.5) % R.H.	Limit (25.0 to 75.0) % R.H.		
	Atmospheric pressure (100.7 ± 0.5) kPa Limit (86.0 to 106.0				
Test place	Shield Room (SR8)				

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5.1.3 Test results

☐ Operating Mode 1: AC Mains



QP / CAV final measurement results table:

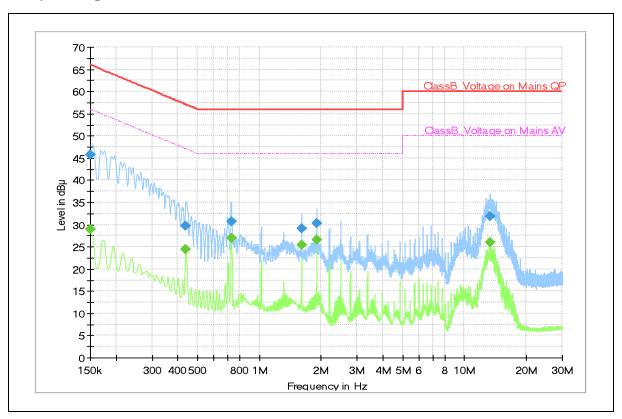
Frequency (MHz)	QP (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150		28.28	56.00	27.72	N	9.9
0.150	47.37		66.00	18.63	N	9.9
0.220	45.78		62.83	17.05	L1	9.9
0.220		28.09	52.83	24.73	L1	9.9
0.427	30.27		57.32	27.05	N	10.2
0.427		21.23	47.32	26.09	N	10.2
0.708	28.84		56.00	27.16	L1	10.1
0.708		22.79	46.00	23.21	L1	10.1
1.277	29.90		56.00	26.10	L1	10.0
1.277		26.44	46.00	19.56	L1	10.0
2.128		25.30	46.00	20.70	L1	9.9
2.128	29.63		56.00	26.37	L1	9.9
15.416		25.96	50.00	24.04	L1	10.3
15.416	32.05		60.00	27.95	L1	10.3

Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph. Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss) Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)

QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

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☐ Operating Mode 2: AC Mains



QP / CAV final measurement results table:

Frequency (MHz)	QP (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150		28.84	56.00	27.16	L1	9.9
0.150	45.67		66.00	20.33	L1	9.9
0.438		24.52	47.10	22.58	L1	10.2
0.438	29.77		57.10	27.32	L1	10.2
0.731		26.93	46.00	19.07	L1	10.1
0.731	30.62		56.00	25.38	L1	10.1
1.610		25.51	46.00	20.49	L1	9.9
1.610	29.05		56.00	26.95	L1	9.9
1.903		26.52	46.00	19.48	L1	9.9
1.903	30.23		56.00	25.77	L1	9.9
13.331		26.09	50.00	23.91	L1	10.3
13.331	31.93		60.00	28.07	L1	10.3

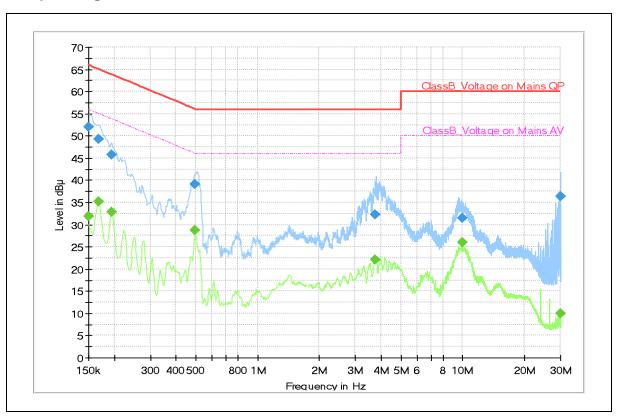
Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss)

Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)

QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

☐ Operating Mode 3: AC Mains



QP / CAV final measurement results table:

Frequency (MHz)	QP (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150	52.01		66.00	13.99	N	9.9
0.150		31.85	56.00	24.15	N	9.9
0.168	49.35		65.06	15.71	L1	10.3
0.168		35.18	55.06	19.88	L1	10.3
0.195	45.69		63.82	18.13	L1	10.1
0.195		32.91	53.82	20.91	L1	10.1
0.497	39.07		56.06	16.99	L1	10.2
0.497		28.68	46.06	17.38	L1	10.2
3.757		22.15	46.00	23.85	L1	10.0
3.757	32.24		56.00	23.76	L1	10.0
9.994		25.92	50.00	24.08	L1	10.1
9.994	31.39		60.00	28.61	L1	10.1
29.983		9.98	50.00	40.02	N	10.8
29.983	36.40		60.00	23.60	N	10.8

Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss)

Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)

QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

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5.2 Radiated emission

The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin.

Peak measurements were made over the changeable frequency range 30 MHz to 1 GHz at a measurement distance of 3 m for the following antenna and turntable arrangements:

Antenna Height [cm]	Antenna Polarisation	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]	Turntable position [degrees]	
100 ~ 400	Horizontal, Vertical	120	300	Continuous	

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using quasi-peak detector.

Peak/CISPR-Average measurements were made over the changeable frequency range 1 GHz to 40 GHz or 5th harmonics of the highest frequency generated or used in the device or on which the device operates or tunes at a measurement distance of 3 m for the following antenna and turntable arrangements. The measurements above 1 GHz were performed with the bore-sighting antenna aimed at the EUT.

Antenna Height [cm]	Antenna Polarisation	Resolution Bandwidth [MHz]	Video Bandwidth [MHz]	Turntable position
100 ~ 400	Horizontal, Vertical	1	3	Continuous

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using peak and CISPR-average detectors.

Limits for radiated emission of Class B at a measuring distance of 3 m and 10 m

Frequency range Limits	Field Strength				
[MHz]	3 m [μV/m]	3 m [dB(μV/m)]	10 m [dB(μV/m)]		
30 to 88	100	40.0	29.5		
88 to 216	150	43.5	33.0		
216 to 960	200	46.0	35.5		
Above 960	500	54.0	43.5		

Note) Distance correction formula from $D_1(3m)$ to $D_2(10m)$

: Limit at D_2 = Limit at D_1 + $20Log(D_1/D_2)$

Results checked manually; and points close to the limit line were re-measured.

Smart Wearable: SM-R895U

5.2.1 Test instrumentation

					Next Calibration	
EMC No.	Test Instrument	Model name	Manufacturer Serial No.		Date	Interval (Month)
E5I-021	EMI Test Receiver	ESU40	R&S	100376	2022-02-04	12
E5I-072	BiLog Antenna	CBL6112D	TESEQ	36009	2022-05-15	24
E5I-223	6 dB Fixed Attenuator	8491B-006	Agilent	58359	2022-05-15	24
E5I-093	Preamplifier	310N	SONOMA	273122	2022-01-21	12
E5I-035	Horn Antenna	HF907	R&S	100506	2021-08-30	24
E5I-040	Signal Conditioning Unit	SCU-18	R&S	10210	2022-04-06	12
E5I-037	WideBand Horn Antenna	WBH 18-40K	R&S	11201	2023-02-15	24
E5I-042	Signal Conditioning Unit	SCU-40A	R&S	10004	2021-09-09	12
-	Test software	EP7RE	TOYO	Ver 5.8.2	-	-
-	Test software	EMC32	R&S	Ver 9.25.00	-	-

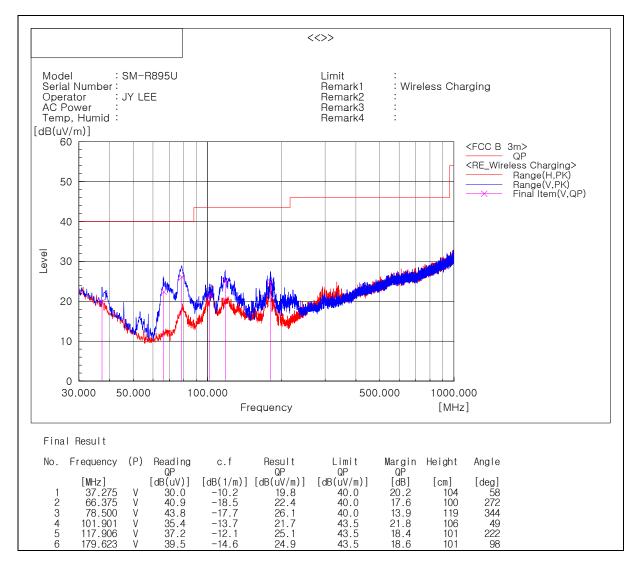
5.2.2 Temperature and humidity condition

Test date	2021-05-04, 2021-05-06	Test engineer	Ji-Yeon Lee		
Climate condition	Ambient temperature	(23.2 ± 0.5) ℃	Limit (15.0 to 35.0) $^{\circ}\mathrm{C}$		
	Relative humidity	(41.1 ± 0.5) % R.H.	Limit (25.0 to 75.0) % R.H.		
	Atmospheric pressure	Limit (86.0 to 106.0) kPa			
Test place	Semi-Anechoic Chamber (SAC5)				

5.2.3 Test results

□ Operating Mode 1

- Frequencies below 1 GHz



Note1) Receiving antenna polarization: Horizontal, Vertical

Test Distance: 3 m, Antenna Height: 1 to 4 meters

Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

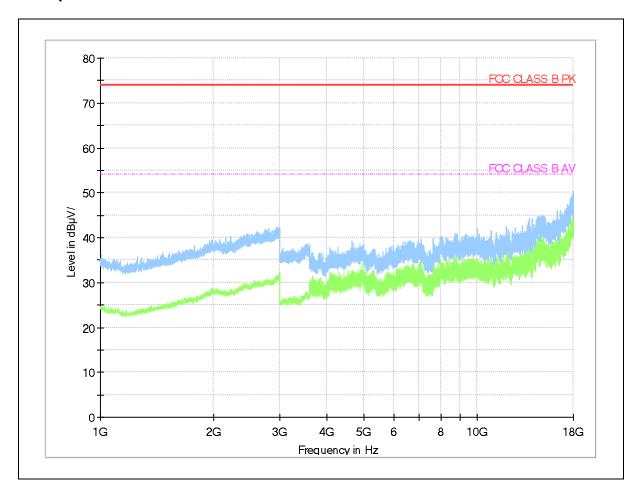
QP = Quasi-Peak, c.f = Correction Factor

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Smart Wearable: SM-R895U

- Frequencies above 1 GHz



Note 1) We have also tested from 18 GHz to 30 GHz and found no emissions.

Note 2) Receiving antenna polarization : Horizontal, Vertical

Test Distance: 3 m, Antenna Height: 1 to 4 meters

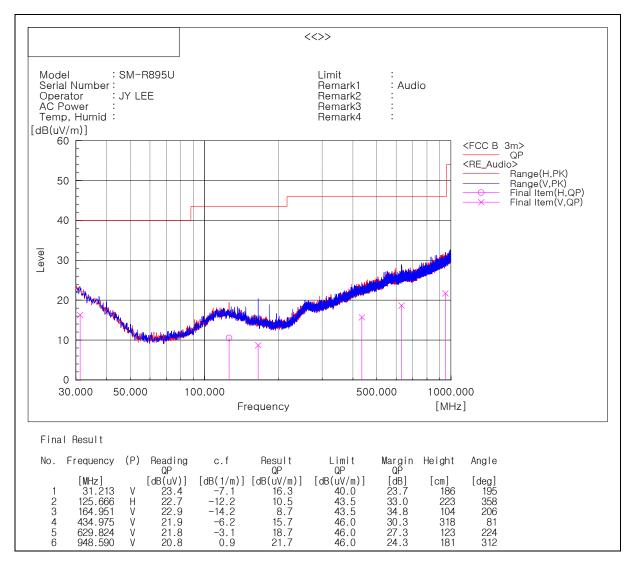
Level (PK and/or CAV) = Reading (PK and/or CAV) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)

Margin (PK and/or CAV) = Limit – Level (PK and/or CAV)

PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

☐ Operating Mode 2

- Frequencies below 1 GHz



Note1) Receiving antenna polarization : Horizontal, Vertical Test Distance : 3 m, Antenna Height : 1 to 4 meters

Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

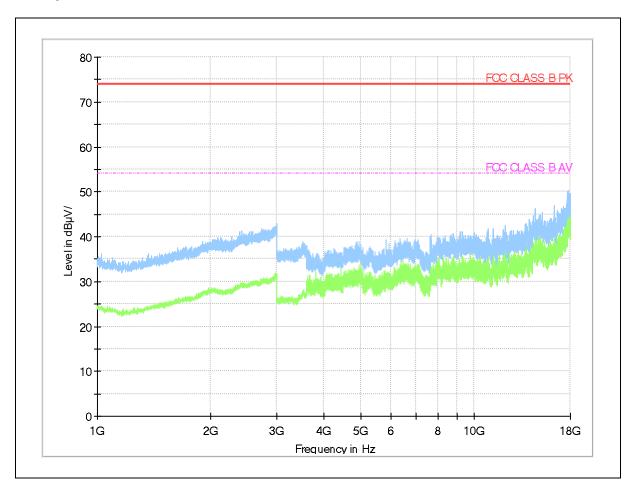
Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak, c.f = Correction Factor

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Smart Wearable: SM-R895U

- Frequencies above 1 GHz



Note 1) We have also tested from 18 GHz to 30 GHz and found no emissions.

Note 2) Receiving antenna polarization : Horizontal, Vertical

Test Distance: 3 m, Antenna Height: 1 to 4 meters

Level (PK and/or CAV) = Reading (PK and/or CAV) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)

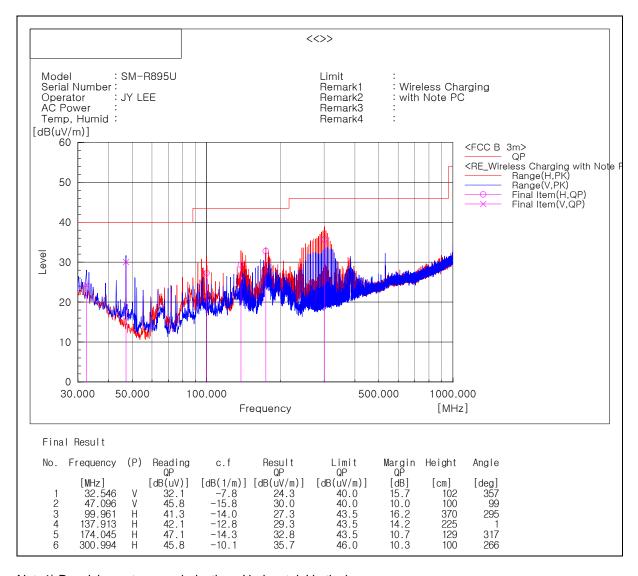
Margin (PK and/or CAV) = Limit – Level (PK and/or CAV)

PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

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☐ Operating Mode 3

- Frequencies below 1 GHz



Note1) Receiving antenna polarization: Horizontal, Vertical

Test Distance: 3 m, Antenna Height: 1 to 4 meters

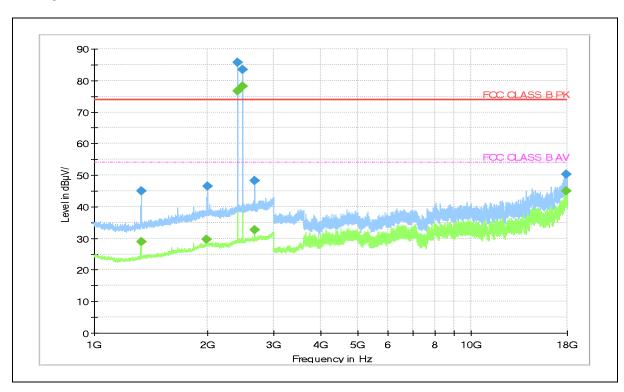
Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak, c.f = Correction Factor

.

- Frequencies above 1 GHz



Frequency (MHz)	PK (dBµV/	CAV (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 331.500		29.00	54.00	25.00	102.3	V	12.0	7.1
1 331.500	45.01		74.00	28.99	103.4	V	12.0	7.1
1 991.000		29.70	54.00	24.30	109.1	V	0.0	11.7
1 996.000	46.43		74.00	27.57	108.8	V	18.0	11.8
2 401.500	85.73		74.00	-11.73	100.2	V	230.0	12.8
2 401.500		76.67	54.00	-22.67	101.5	V	230.0	12.8
2 480.000	83.53		74.00	-9.53	103.6	V	320.0	13.0
2 480.000		78.07	54.00	-24.07	105.4	V	320.0	13.0
2 658.000	48.19		74.00	25.81	100.0	V	284.0	13.8
2 658.000		32.80	54.00	21.20	101.5	V	284.0	13.8
17 890.500	50.16		74.00	23.84	106.0	Η	1.0	38.5
17 907.500		45.06	54.00	8.94	108.1	Н	175.0	38.5

Note 1) We have also tested from 18 GHz to 30 GHz and found no emissions.

Note 2) Receiving antenna polarization: Horizontal, Vertical

Test Distance: 3 m, Antenna Height: 1 to 4 meters

Level (PK and/or CAV) = Reading (PK and/or CAV) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)

Margin (PK and/or CAV) = Limit – Level (PK and/or CAV)

PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

Note 3) Radiated emissions (Tx / Rx frequency) from the transceiver shall be ignored.

- Data transmission in the 2.4 GHz ISM band (Bluetooth/Wi-Fi 802.11b/g/n)
- : Operating frequencies (2 400 ~ 2 483.5) MHz

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