EMC TEST REPORT

Project No.	LBE20210294	Issue No.	3			
	Name of organization	Samsung Electronics Co., Ltd.				
Applicant	Address	,) 129, Samsung-ro, Yeongtong-gu, eonggi-do, 16677, Korea			
	Date of receipt	May 07, 2021	May 07, 2021			
	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 				
EUT	Equipment authorization	□ Certification	Supplier's Declaration of Conformity			
	FCC ID	A3LSMR885				
	Kind of product	Smart Wearable				
	Model No.	SM-R885U				
	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 St	andards	47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2014				
Test Perio	d	May 18, 2021 ~ May 20, 2021				
Issue date		June 8, 2021				
Test result : Complied The equipment under test has foun (Refer to the attached test result for		d to be compliar more detail.)	nt with the applied standards.			
Tested by: Soo-Joon Kim		Reviewed by : Sun-Ho Kim				

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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-R885U

1. Report Information

1.1 Revision history

No.	Date of Issue	Revised detailed information			
Issue 0	May 21, 2021	There are no revisions and this version is basic test report.			
Issue 1	May 21, 2021	Added FCC/IC ID of Wirelss Charger(EP-OR825) in clause 4.1			
Issue 2	May 26, 2021	Added variant model(SM-R885F) in clause 4.6.1			
Issue 3	June 8, 2021	Corrected typo (a bar type mobile phone → a watch type smart wearable) in clause 4.6			

* 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	
Α	Smart Wearable	SM-R885U	-	SAMSUNG	A3LSMR885	
В	Battery	EB-BR880ABY	-	SDI	-	
С	Wirelss Charger	EP-OR825		SAMSUNG	FCC : A3LEPOR825 IC : 649E-EPOR825	
D	Travel Adapter	EP-TA200	R37NBJAHBE5DK3	Dongyang	-	
Е	Laptop Computer	L atituda EE 90	1WYRYM2	Dell	DoC	
		Latitude5580	D3HRYM2	Dell	DoC	
F	Laptop	LA65NM130	5DEA	Dell	DoC	
Г	AC Adapter	AC Adapter	LAOSINIVISO	5B3C	Dell	DoC
G	Mouse	AA-SM7PCPB	CN57BA5903634ADV 8JJCD4371	SAMSUNG	DoC	
		SNJ-B138	Z5F8353	SAMSUNG	DoC	
Н	Douter	DID OOGA	RF0F1D8018454	D-Link	DoC	
	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	Cellular receiver (LTE FDD B26 Center Frequency) + Wirelss Charging (w/ TA)
2	Audio playback from internal memory data + Wirelss 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.

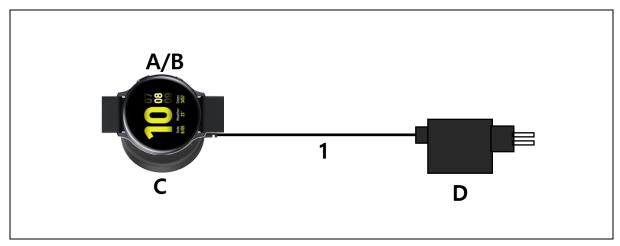
4.4 Used cable description

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:

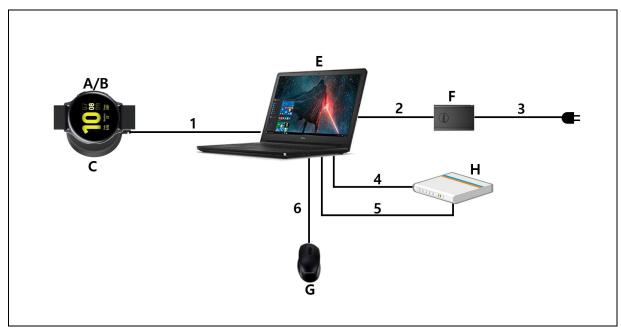
No.	Connected cable	Length [m]	Shielded [Y/N]	Note	
1	Wireless Charger cable	0.8	N	For Wireless Charger	
2	Power	1.8	N	From Laptop Computer to AC Adapter	
3	Power	1.5	N	For Laptop AC Adapter	
4	LAN	1.5	N	From Laptop Computer to Router	
5	USB	0.8	Y	From Laptop Computer to Router for DC Power	
6	USB	1.8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

4.5 Test arrangement

4.5.1 Conducted Emission

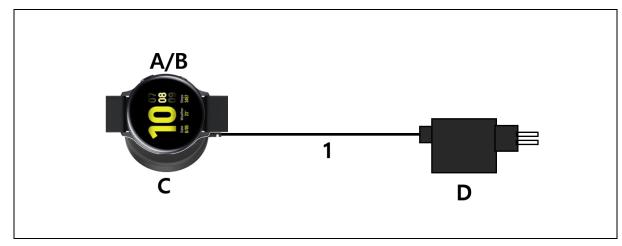


[Mode 1 - 2]



[Mode 3]

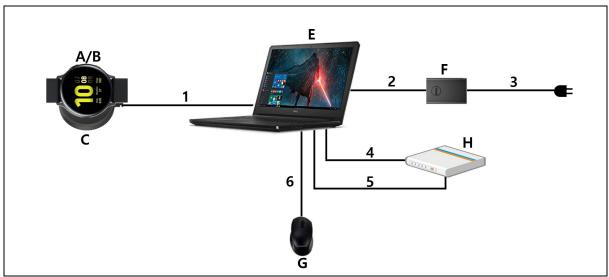
4.5.2 Radiated Emission



[Mode 1]



[Mode 2]



[Mode 3]

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4.6 EUT Description

The EUT is a watch type smart wearable which can operate on WCDMA FDD 2/4/5, LTE FDD 2/4/5/12/13/25/26/66/71 and incorporates a Bluetooth, Wi-Fi, Audio, GNSS, Wireless Charging and NFC.

4.6.1 The variant models

- SM-R885F

4.7 EUT Frequencies

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

Smart Wearable: SM-R885U

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 EUT was charged with Wireless Charger connected to Travel Adapter and USB port of Laptop Computer.

The audio with 1kHz sound were repetitively played.

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

- Test Voltage: AC 120 V, 60 Hz

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)

4.9.1 Emission

Test type	Measurement uncertainty (C.L. approximately 95 %, <i>k</i> = 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 [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-006	LTE Communicator	CMW500	R&S	132728	2022-04-06	12
E5I-015	EMI Test Receiver	ESU8	R&S	100481	2021-07-01	12
E5I-127	LISN	ENV216	R&S	102061	2021-07-29	12
-	Test software	EMC32	R&S	Ver 9.26.01	-	-

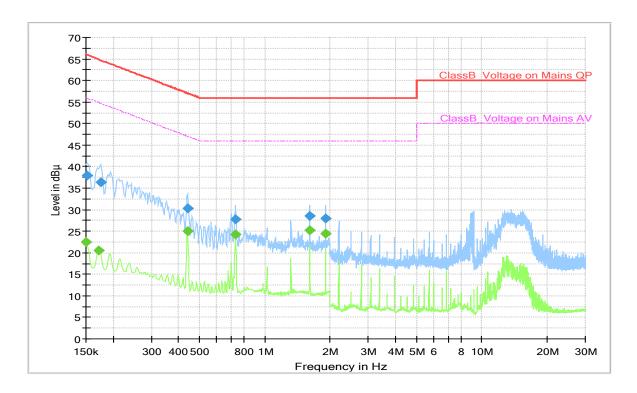
5.1.2 Temperature and humidity condition

Test date	2021-05-18	Test engineer	Soo-Joon Kim			
	Ambient temperature	(23.2 ± 0.5) ℃	Limit (15.0 to 35.0) ℃			
Climate condition	Relative humidity	(41.5 ± 0.5) % R.H. Limit (25.0 to 75.0) % R				
	Atmospheric pressure (100.3 ± 0.5) kPa Limit (86.0 to 106.0) kP					
Test place	Shield Room (SR8)					

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5.1.3 Test results

☐ Operating Mode 1: AC Mains



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

QP / CAV final measurement results table:

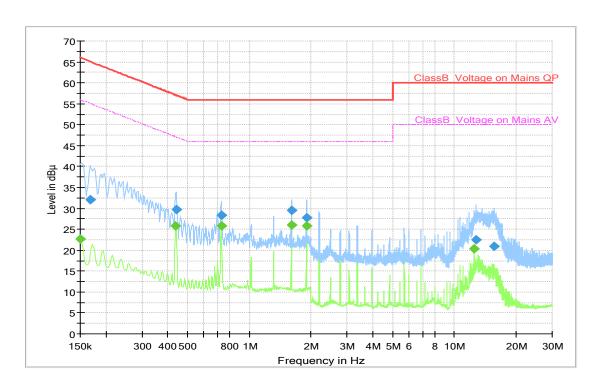
Frequency (MHz)	QP (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150		22.4	56.0	33.6	L1	9.9
0.152	38.0		65.9	27.9	N	10.0
0.173		20.5	54.8	34.4	L1	10.3
0.175	36.3		64.7	28.4	L1	10.3
0.440		25.0	47.1	22.1	L1	10.2
0.440	30.2		57.1	26.8	L1	10.2
0.733		24.3	46.0	21.7	L1	10.1
0.733	27.7		56.0	28.3	L1	10.1
1.613		25.2	46.0	20.8	L1	9.9
1.613	28.5		56.0	27.5	L1	9.9
1.905		24.5	46.0	21.5	L1	9.9
1.905	27.9		56.0	28.1	L1	9.9

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 2: AC Mains



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

QP / CAV final measurement results table:

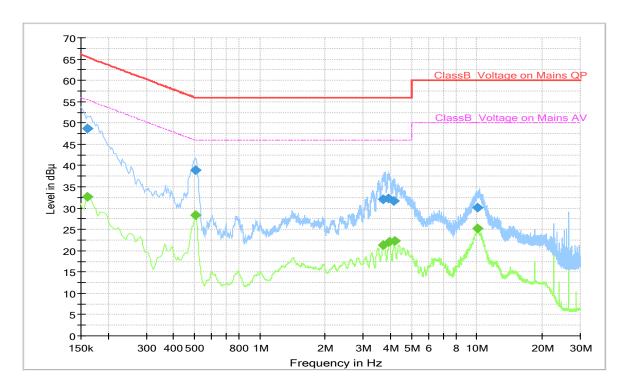
Frequency (MHz)	QP (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150		22.7	56.0	33.3	N	9.9
0.168	32.0		65.1	33.1	N	10.3
0.438		25.8	47.1	21.3	L1	10.2
0.440	29.8		57.1	27.3	L1	10.2
0.731		25.8	46.0	20.2	L1	10.1
0.733	28.4		56.0	27.6	L1	10.1
1.608		25.9	46.0	20.1	L1	9.9
1.608	29.5		56.0	26.5	L1	9.9
1.901		25.8	46.0	20.2	L1	9.9
1.903	27.8		56.0	28.2	L1	9.9
12.516		20.4	50.0	29.6	L1	10.2
12.725	22.4		60.0	37.6	L1	10.2
15.641	20.9		60.0	39.1	L1	10.3

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



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

QP / CAV final measurement results table:

Frequency (MHz)	QP (dBμV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.161		32.6	55.4	22.8	L1	10.1
0.161	48.7		65.4	16.7	L1	10.1
0.503	38.9		56.0	17.1	L1	10.1
0.506		28.3	46.0	17.7	L1	10.1
3.719	32.1		56.0	23.9	N	9.8
3.719		21.4	46.0	24.6	N	9.8
3.917	32.3		56.0	23.7	N	9.8
3.955		22.0	46.0	24.0	L1	9.8
4.153	31.7		56.0	24.3	N	9.8
4.175		22.3	46.0	23.7	L1	9.8
10.129	30.1		60.0	29.9	L1	9.8
10.129		25.1	50.0	24.9	L1	9.8

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

Smart Wearable: SM-R885U

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 fomula 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.

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5.2.1 Test instrumentation

					Next Cal	ibration
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	-	-

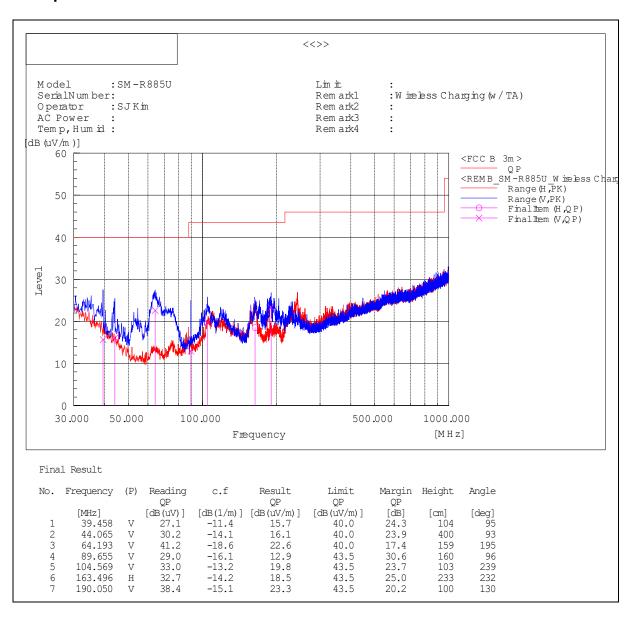
5.2.2 Temperature and humidity condition

Test date	2021-05-20	Test engineer	Soo-Joon Kim				
	Ambient temperature	(23.3 ± 0.5) ℃	Limit (15.0 to 35.0) ℃				
Climate condition	Relative humidity	(40.5 ± 0.5) % R.H.	Limit (25.0 to 75.0) % R.H.				
	Atmospheric pressure	tmospheric pressure (101.1 ± 0.5) kPa 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

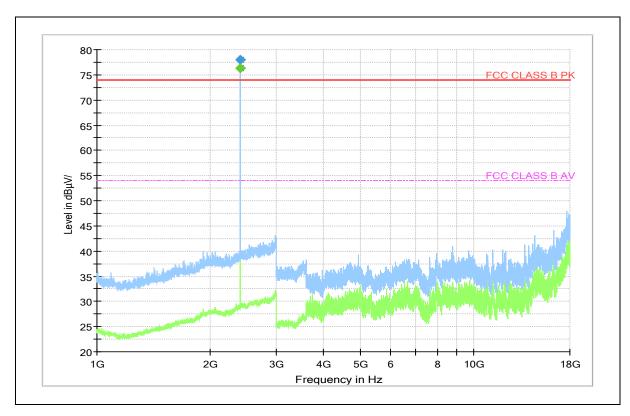
Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

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

Smart Wearable: SM-R885U

- Frequencies above 1 GHz



Frequency (MHz)	PK (dBµV/m)	CAV (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2 402.000		76.31	54.00	-22.31	101.0	٧	347.0	12.8
2 402.000	77.99		74.00	-3.99	100.0	V	347.0	12.8

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)

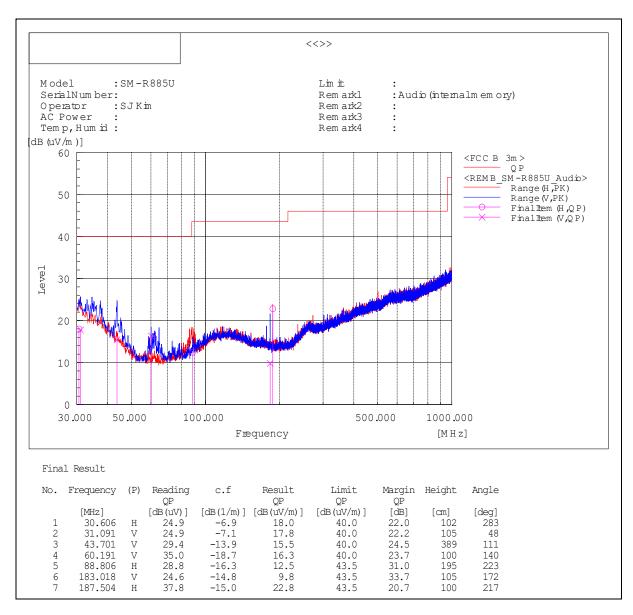
PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

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

□ Operating Mode 2

- Frequencies below 1 GHz



Note1) Receiving antenna polarization : Horizontal, Vertical

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

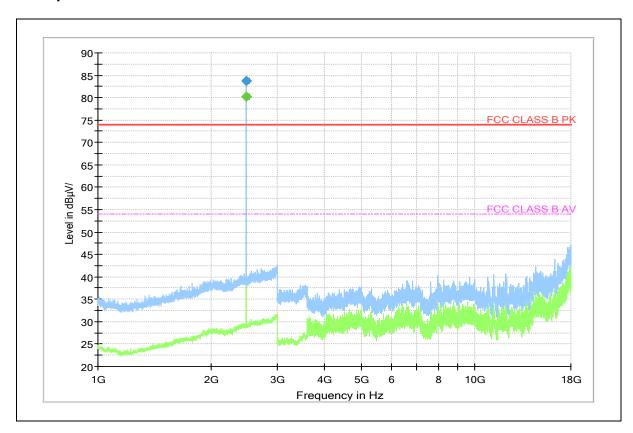
Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

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

Smart Wearable: SM-R885U

- Frequencies above 1 GHz



Fr	requency (MHz)	PK (dBµV/m)	CAV (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2	480.500		80.15	54.00	-26.15	100.0	Н	96.0	13.0
2	480.500	83.79		74.00	-9.79	100.0	Н	96.0	13.0

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

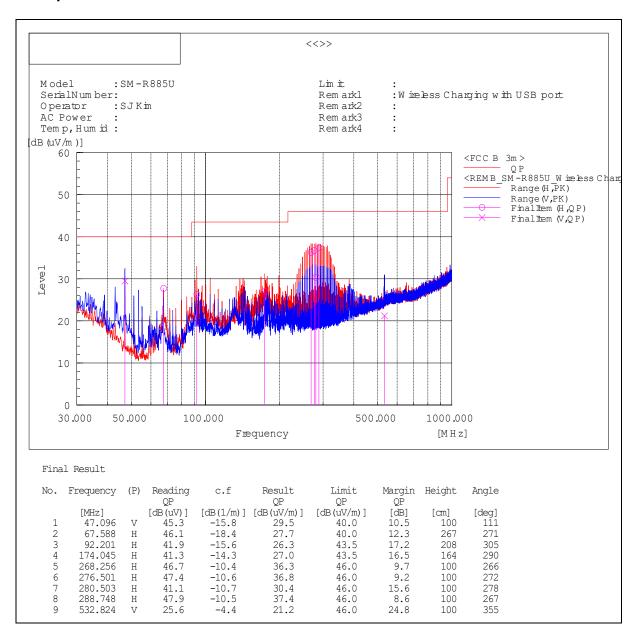
Note 3) Radiated emissions (Tx / Rx frequency) from the transceiver shall be ignored.

- Data transmission in the 2.4 GHz ISM band (Bluetooth/Wi-Fi 802.11b/g/n)

: Operating frequencies (2 400 ~ 2 483.5) MHz

□ Operating Mode 3

- Frequencies below 1 GHz



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

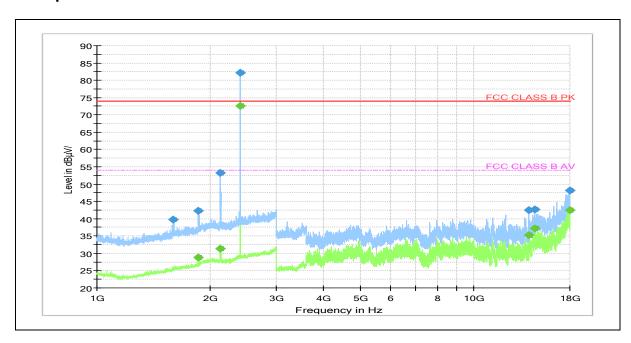
Result (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

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

Smart Wearable: SM-R885U

- Frequencies above 1 GHz



Frequency (MHz)	PK (dBμV/m)	CAV (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 592.500	39.73		74.00	34.27	101.0	V	139.0	9.2
1 858.500	42.30		74.00	31.70	100.0	V	358.0	10.5
1 861.000		28.83	54.00	25.17	100.0	V	16.0	10.6
2 127.000	53.28		74.00	20.72	100.0	V	25.0	11.6
2 127.000		31.25	54.00	22.75	100.0	V	25.0	11.6
2 403.000	82.15		74.00	-8.15	103.0	V	224.0	12.8
2 403.000		72.66	54.00	-18.66	101.0	V	224.0	12.8
14 000.500	42.52		74.00	31.48	101.0	V	336.0	26.9
14 005.000		35.30	54.00	18.70	100.0	V	359.0	26.9
14 485.000		37.30	54.00	16.70	102.0	V	24.0	29.2
14 535.500	42.59		74.00	31.41	101.0	Н	318.0	29.3
17 996.500	48.18		74.00	25.82	100.0	V	66.0	37.8
17 997.500		42.50	54.00	11.50	100.0	Н	303.0	37.8

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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