TEST REPORT

KCTL KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.: KR20-SRF0160-A

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2020-04-24

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-T976B

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

5. FCC ID : A3LSMT976B

6. Date of Test : 2020-05-09 to 2020-06-22

7. Location of Test : ■ Permanent Testing Lab □ On Site Testing (Address: Address of testing location)

8. Test method used : 47 CFR Part 1.1310

9. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Taeyoung Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)

2020-07-02

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-06-24	Originally issued	-
2020-07-02	Updated	4,5

Note. The report No. KR20-SRF0160 is superseded by the report No. KR20-SRF0160-A.

General remarks for test reports

Nothing significant to report.

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1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	Samsung Electronics Vietnam Thai Nguyen Co., Ltd
Address	:	Yen binh Industrial Zone Pho Ten Dist., Thai Nguyen Province, Vietnam
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 Industry Canada Registration No. : 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Tablet PC
Model	:	SM-T976B
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11a/b/g/n/ac/ax)_DSSS, OFDM, OFDMA WPT_AM LTE_QPSK, 16QAM, 64QAM, 256QAM WCDMA_QPSK GSM_GMSK, 8-PSK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch 802.11b/g/n/ac/ax_HT20/VHT20/HE20 : 13 ch UNII-1: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2A: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2C: 12 ch (20 ㎒), 6 ch (40 ㎒), 3 ch (80 ㎒) UNII-3: 5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) WPT_1 ch
Power source	:	DC 3.86 Ⅴ
Antenna specification	:	LTE/WCDMA_Metal Antenna WIFI/Bluetooth(BDR/EDR/BLE)_Metal Antenna Loop Coil Antenna_Flat type (WPT)
Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE)_ ANT 1 : -5.71 ㏈i, ANT 2 : -6.52 ㏈i UNII-1 ANT 1 : -8.45 ㏈i, ANT 2 : -8.84 ㏈i UNII-2A ANT 1 : -6.15 ㏈i, ANT 2 : -8.46 ㏈i

		UNII-2C ANT 1 : -6.05 dBi, ANT 2 : -8.57 dBi
		UNII-3 ANT 1 : -8.65 dBi, ANT 2 : -7.70 dBi
Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒
		2 412 ㎒ ~ 2 472 ㎒ (802.11b/g/n/ac/ax_HT20/VHT20/HE20)
		UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-1: 5 210 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2A: 5 270 ㎒ ~ 5 310 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2A: 5 290 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2C: 5 510 ㎒ ~ 5 710 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2C: 5 530 ㎒ ~ 5 690 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-3: 5 775 ㎒ (802.11ac/ax_VHT80/HE80)
		LTE Band 2_1 850.7 ㎒ ~ 1909.3 ㎒
		LTE Band 4_1 710.7 ㎒ ~ 1754.3 ㎒
		LTE Band 5_824.7 ㎒ ~ 848.3 ㎒
		LTE Band 12_699.7 ㎒ ~ 715.3 ㎒
		LTE Band 13_779.5 ㎒ ~ 784.5 ㎒
		LTE Band 25_1850.7 ㎒ ~ 1914.3 ㎒
		LTE Band 26_824.7 ㎒ ~ 848.3 ㎒, 814.7 ㎒ ~ 824.0 ㎒
		LTE Band 41_2 498.5 ㎒ ~ 2 687.5 ㎒
		LTE Band 66_1 710.7 ㎒ ~ 1779.3 ㎒
		GSM 850_824.2 ㎒ ~ 848.8 ㎒
		GSM 1900_1 850.2 ㎒ ~ 1 909.8 ㎒
		WCDMA 850_826.4 ㎒ ~ 846.6 ㎒
		WCDMA 1700_1 712.4 ㎒ ~ 1752.6 ㎒
		WCDMA 1900_1 852.4 ㎒ ~ 1907.6 ㎒
		WPT_530 ㎑ ~ 600 ㎑
Software version	:	T976B.001
Hardware version	:	REV0.4
Test device serial No.	:	R32N4005MLN
Operation temperature	:	-30 ℃ ~ 50 ℃

Note:
▪ SAR test report number : KR20-SPF0026-A

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID
Travel Adapter	Samsung Electronics Co., Ltd	EP-TA800	-	Input : 100-240V, 50-60 Hz Output : (PDO) 5.0V, 3A or 9.0V, 2.77A (PPS) 3.3-5.9V, 3A or 3.3-11.0V, 2.25A	-
Data Cable	Samsung Electronics Co., Ltd	EP-DT725BBE	-	-	-
Stylus Pen	Samsung Electronics Co., Ltd	EJ-PT870	-	DC 2.75 V	A3LEJPT870
Earphone	Samsung Electronics Co., Ltd	EHS64	-	-	-
External Keyboard	Samsung Electronics Co., Ltd	EF-DT970	-	DC 3.30 V	-

2.2. Equipment Approval Considerations item

Requirement		Device
A)	Power transfer frequency is less than 1 ㎒.	S-Pen : 530 ㎑ to 600 ㎑
B)	Output power from each primary coil is less than or equal to 15 watts.	S-Pen : 0.05 W
C)	The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.	The transfer system includes only single primary and secondary coils.[1)]
D)	Client device is placed directly in contact with the transmitter.	Yes.
E)	Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion)	This device is portable condition. (Refer to PAG)
F)	The aggregate H-field strengths at 15 ㎝ surrounding the device and 20 ㎝ above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	Aggregate fields were measured at distances < 15 ㎝ / 20 ㎝ following FCC guidance provided in a lab KDB enquiry. All measurements are significantly below 50% of the limit.

Note:
1. Coils are included in a FPCB. When the S-pen is attached on the tablet PC, S-pen is located properly through the magnet fixed on tablet PC. Therefore both coils can operated simultaneously (single coil does not operate).

3. RF Exposure

3.1. FCC Regulation

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC rules and Regulations.
The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Table 1 – Limits for Maximum Permissible Exposure (MPE)

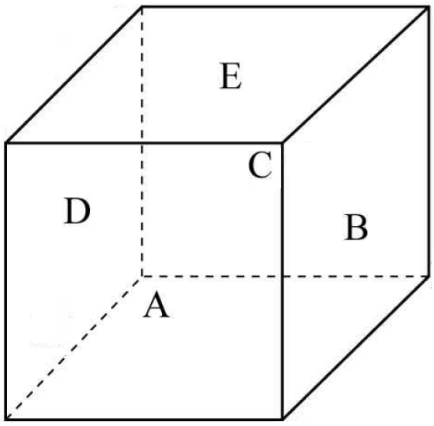
Frequency Range (㎒)	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [㎽/㎠]	Averaging Time [minute]
(A) Limits for Occupational / Controlled Exposure				
0.3 ~ 3.0	614	1.63	*100	6
3.0 ~ 30	1842/f	4.89/f	*900/f^2	6
30 ~ 300	61.4	0.163	1.0	6
300 ~ 1 500	/	/	f/300	6
1 500 ~ 15 000	/	/	5	6
(B) Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*100	30
1.34 ~ 30	824/f	2.19/f	*180/f^2	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

*f=frequency in ㎒, *= plane-wave equivalent power density*

3.2. Test Set-up

3.2.1. Isotropic Probe test setup

The measurement probe (EHP-200A) is a regular hexahedron and supports 3-axis (X, Y and Z) isotropic probe.



A: Front of measurement probe
B: Right of measurement probe
C: Rear of measurement probe
D: Left of measurement probe
E: Top of measurement probe
*Bottom of measurement probe is not used to measure RF exposure condition owing to connection with a stick.

In order to demonstrate the probe perturbation is not affecting the measurements,

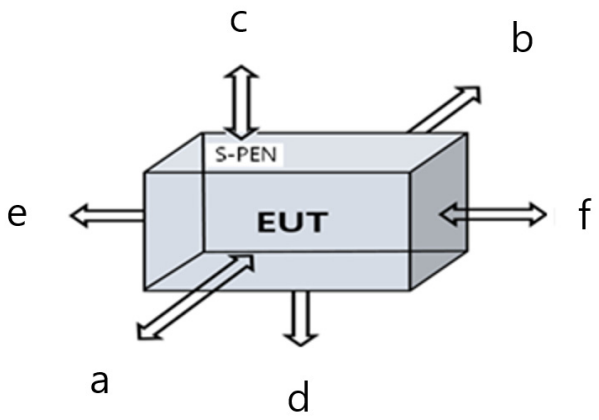
- For one of the sides of EUT several measurements be made at various distances, starting further away and then moving closer.
  - ✓ Further away: measurement distance of EUT was confirmed until isotropic probe could not read fundamental level anymore (Not detected level).
  - ✓ Moving closer: measurement isotropic probe directly contacts with sides of EUT (0 cm)
  - ✓ When the worst level of EUT's sides is found out, several measurements should be checked through various distance (1 cm step).

At 0 cm distance, measurement isotropic probe was investigated by rotating the probe through various angles for one of the EUT's sides as below.

Measurement Point	**A**	**B**	**C**	**D**	**E**
Direction	Front	Right	Rear	Left	Top
Measurement Point	**A to B**	**B to C**	**C to D**	**D to A**	**N/A**
Direction	Front to Right	Right to Rear	Rear to Left	Left to Front	-
Measurement Point	**A to E**	**B to E**	**C to E**	**D to E**	**N/A**
Direction	Front to Top	Right to Top	Rear to Top	Left to Top	-

When the worst angle among all angles was found, RF exposure measurement should be adjusted from worst angle.

3.2.2. EUT test setup



1) Testing was performed with a calibrated field probe.
2) Measurement was performed on each side of the EUT as described per below table.

a	b	c	d	e	f
Right	Left	Rear	Front (Display)	Top	Bottom

3) Testing was performed at the distances and different battery level as indicated on test result table.

- Test mode

In order to measure H-field of near field in portable condition, we refer to KDB680106 D01. KDB680106 D01 is a guide for evaluating RF exposure and explains how to measure H-field strength for the surface of EUT. In addition that more detail measurement guidance was referred to previous PAG.

We measure H-field level of WPT (Wireless power transfer) from 0 cm (contact) to possible reading distance (Not Detected level) based on EUT's surface.

Measurement Probe	EHP-200A (Manufacturer: Narda)
Measurement Method	Direct measurement
Measurement Distance	Edge of the EUT to the edge of the probe.

- Operational correction factor

The EUT charges of 15 minutes at maximum illumination to full charge. It recharges at maximum illumination when 10% or more of the battery level drop is detected.
Operational correction factor = 15 min / 30 min = 0.5

- Support equipment

Client device	Model	FCC ID
Stylus Pen (S-pen)	EJ-PT870	A3LEJPT870

3.3. Test configuration (worst case configuration and mode)

Worst case configuration is considered when the RF exposure is performed then worst result should be reported as below.

- Condition: AC adaptor

Mode	Case	Description
S-Pen charging mode	1	Tablet condition: Charging with AC adaptor Charging from EUT to S-Pen
	2	Tablet condition: Portable without AC adaptor Charging from EUT to S-Pen

- Condition: All RF communications

Mode	Case	Description
Connections	1	GSM 850 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	2	GSM 1900+ Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	3	WCDMA Band 2 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	4	WCDMA Band 4 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	5	WCDMA Band 5 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	6	LTE Band 2 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	7	LTE Band 4 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	8	LTE Band 5 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	9	LTE Band 12 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	10	LTE Band 13 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	11	LTE Band 25 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	12	LTE Band 26 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	13	LTE Band 41 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS
	14	LTE Band 66 + Bluetooth (2.4 ㎓) + WLAN (5 ㎓) + GNSS

Note:

- The H-field test was conducted while all other wireless technologies/RF communications operating at their under perspective maximum RF output.
- RF Exposure measurement is considered as highest power of each band/channel/RB condition/offset/mode etc.
- **Worst case: Case#1: with AC adaptor / Case#1: GSM 850 + Bluetooth (2.4 GHz) + WLAN (5 GHz) + GNSS**

3.4. Test result

3.4.1. Test mode: test result of rotating the probe through various angles

- H-field measurement results (Sides of probe)

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]					Limits [A/m]
		Probe rotation					
		A	B	C	D	E	
0.53	0	0.346 9	0.546 8	0.434 0	0.038 1	**0.564 0**	1.63

- H-field measurement results (Rotation of probe)

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]								Limits [A/m]
		Probe rotation								
		A to B	B to C	C to D	D to A	A to E	B to E	C to E	D to E	
0.53	0	0.043 4	0.043 1	0.036 2	0.033 9	0.104 3	0.190 7	0.171 6	0.097 7	1.63

- Corrected H-field measurement results (Sides of probe)

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]					Limits [A/m]
		Probe rotation					
		A	B	C	D	E	
0.53	0	0.173 5	0.273 4	0.217 0	0.01 91	**0.282 0**	1.63

- Corrected H-field measurement results (Rotation of probe)

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]								Limits [A/m]
		Probe rotation								
		A to B	B to C	C to D	D to A	A to E	B to E	C to E	D to E	
0.53	0	0.021 7	0.021 6	0.018 1	0.017 0	0.052 2	0.095 4	0.085 8	0.048 9	1.63

Note:
- Operating duty factor is based on averaging time of §table 1
  Corrected H-field measurement results = measurement results(A/m) x 0.5
- Worst Case: one of the several angles was found as **E-side** of isotropic probe.

3.4.2. Test mode: Test result of EUT's sides about the distance

- H-field measurement results

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]								Limits [A/m]
		EUT sides								
		a	b	c	c	c	d	e	f	
0.53	0	0.257 4	0.034 0	**0.564 0**	0.558 1	0.553 9	0.045 7	0.118 4	0.034 2	1.63
0.53	1			0.436 7	0.431 9	0.433 3				1.63
0.53	2			0.292 1	0.278 8	0.280 0				1.63
0.53	3			0.169 6	0.168 5	0.164 5				1.63
0.53	4			0.107 1	0.119 8	0.114 5				1.63
0.53	5			0.076 0	0.075 1	0.071 8				1.63
0.53	6			0.052 0	0.053 5	0.054 1				1.63
0.53	7			0.042 0	0.043 5	0.041 6				1.63
0.53	8			0.034 7	0.034 0	0.033 9				1.63
0.53	9			0.033 7	0.033 8	0.033 8				1.63
0.53	10			0.033 7	0.033 7	0.033 6				1.63
0.53	11	Not detected (similar level between 8 cm and 10 cm)								1.63

- Corrected H-field measurement results

Frequency [MHz]	Distance [cm]	H-field Measurement [A/m]								Limits [A/m]
		EUT sides								
		a	b	c	c	c	d	e	f	
0.53	0	0.128 7	0.017 0	**0.282 0**	0.279 1	0.277 0	0.022 9	0.059 2	0.017 1	1.63
0.53	1			0.218 4	0.216 0	0.216 7				1.63
0.53	2			0.146 1	0.139 4	0.140 0				1.63
0.53	3			0.084 8	0.084 3	0.082 3				1.63
0.53	4			0.053 6	0.059 9	0.057 3				1.63
0.53	5			0.038 0	0.037 6	0.035 9				1.63
0.53	6			0.026 0	0.026 8	0.027 1				1.63
0.53	7			0.021 0	0.021 8	0.020 8				1.63
0.53	8			0.017 4	0.017 0	0.017 0				1.63
0.53	9			0.016 9	0.016 9	0.016 9				1.63
0.53	10			0.016 9	0.016 9	0.016 8				1.63
0.53	11	Not detected (similar level between 8 cm and 10 cm)								1.63

Note:

- Corrected H-field measurement results = Measurement results(A/m) x 0.5
- When the worst level of EUT's sides is found out, several measurements should be checked through various distance (1 cm step).
- Above RF exposure measurement was performed considering worst position (E-side) of isotropic probe.

3.5 Measurement Equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
E&H Field Probe	Narda	EHP-200A	170WX81015	21.02.14
Wireband Radio Coummunication Tester	R&S	CMW500	141780	21.04.16
Bluetooth Tester	TESCOM	TC-3000C	3000C000270	20.07.31
Wireless Communications Test Set	R&S	CMW270	100999	21.05.11*
EXG Vector Signal Generator	Keysight	N5182B	MY57301153	20.07.31

* Tests related to this equipment were progressed after the calibration was completed.

End of test report