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TEST REPORT

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-SPF0025 Page (1) of (77)	KCTL

1. Client

- Name : Starnex Co., Ltd.
- Address : #201, Kolon Digital Tower Aston, 212, Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
- Date of Receipt : 2020-05-26

2. Use of Report : Certification

3. Name of Product and Model : SOCIAL TALKIE E1
- Model Number : ST-E1
- Manufacturer and Country of Origin : Starnex Co., Ltd. / KOREA

4. FCC ID : TN9ST-E1

5. Date of Test : 2016-06-02, 2020-06-01

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

7. Test Standards : IEEE 1528-2013, ANSI/IEEE C95.1, KDB Publication

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

Affirmation	Tested by Name : Kyounghoo Min (Signature)	Technical Manager Name : Jongwon Ma (Signature)

2020-06-16

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-06-16	Originally issued	-

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General remarks for test reports

1. Identification when information is provided by the customer: Information marked "#" is provided by the customer.

- Disclaimer: This information is provided by the customer and can affect the validity of results.

CONTENTS

1. General information

Client	:	Starnex Co., Ltd.
Address	:	#201, Kolon Digital Tower Aston, 212, Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
Manufacturer	:	Starnex Co., Ltd.
Address	:	#201, Kolon Digital Tower Aston, 212, Gasan Digital 1-ro, Geumcheon-gu, Seoul, South Korea
Contact Person	:	Seokwoo Choi / csw324@starnex.co.kr
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-3327, G-198, C-3706, T-1849
		Industry Canada Registration No. : 8035A
		KOLAS No.: KT231

1.1 Report Overview

This report details the results of testing carried out on the samples listed in section 2, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of KCTL Inc. Wireless lab or testing done by KCTL Inc. Wireless lab made in connection with the distribution or use of the tested product must be approved in writing by KCTL Inc. Wireless lab.

2. Device information

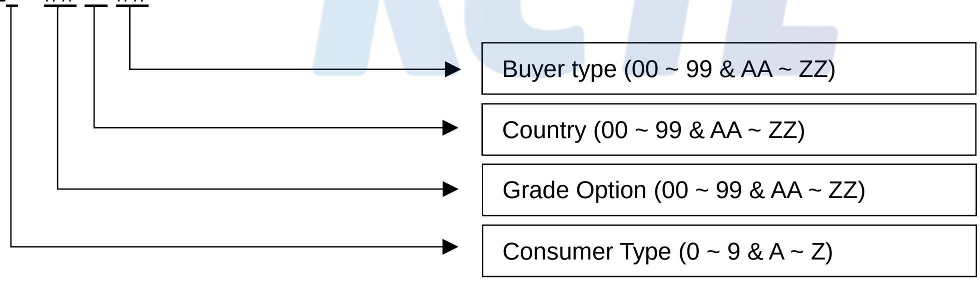
2.1 Basic description

Product Name		SOCIAL TALKIE E1		
Product Model Number		ST-E1		
Derivative Model		Please refer to Section 2.2		
Product Manufacturer		Starnex Co., Ltd		
Product Serial Number	Radiation	245d670555cb1e67		
		24735f035dd262d9		
		24b72d0558451dbf		
Tx Freq. Range		Band & Mode	Operating Modes	Tx Frequency(㎒)
		FHSS	Half	902.6 ~ 927.5
		FHSS	Hi-fi	903.0 ~ 927.5
		4GFSK	4GFSK	905.0 ~ 926.0

2.2 Model Information

The difference between basic model and derivative model is:

ST-E1* - ## ** ##



2.3 Summary of SAR Test Results

Mode	Equipment Class	Highest Reported 1g SAR (W/kg) Body
FHSS	DSS	**0.32**
4GFSK	DTS	0.02
Simultaneous SAR per KDB 690783 D01v01r03		N/A

Notes:

- The data documented in this new DSS report (FCC ID: TN9ST-E1) are exactly same as the data documented in another certified DSS report (FCC ID: TN9DOMINOE1 and report no: KCTL16-SFA0010). The two devices are electronic and electrically identical - the new DSS grant is to enable the 4GFSK mode via software without other changes and does not affect the existed frequency hopping section.

2.4 #Maximum Tune-up power

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

2.4.1 #Maximum WLAN and Bluetooth Output Power

Mode	Output Power (dBm)		
	Target	Max. Allowed	SAR Test
FHSS	19.00	**20.00**	Yes
4GFSK	13.00	**14.00**	Yes

2.5 #DUT Antenna Locations

Mode	Device Edge for SAR Testing (Front View)					
	Front	Rear	Left Edge	Right Edge	Top	Bottom
FHSS	Yes	Yes	Yes	Yes	Yes	Yes
4GFSK	Yes	Yes	Yes	Yes	Yes	Yes

2.6 #Simultaneous Transmission Configurations

RF Exposure Condition	Scenario	Operation
FHSS	N/A	No
4GFSK	N/A	No

2.7 SAR Test Methods and Procedures

The tests documented in this report were performed in accordance with IEEE 1528-2013 and the following published KDB procedures:

- IEEE 1528-2013
- 447498 D01 General RF Exposure Guidance v06
- 865664 D01 SAR measurement 100 ㎒ to 6 ㎓ v01r04
- 865664 D02 RF Exposure Reporting v01r02

3. Specific Absorption Rate

3.1 Introduction

The SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational / controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathrm{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$\mathrm{SAR} = C\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$\mathrm{SAR} = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement Procedures

4.1 SAR Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan & Zoom Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot and Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing1 g and 10 g of simulated tissue. If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly. Area Scan & Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 ㎒ to 6 ㎓ v01r04.

			≤ 3 ㎓	> 3 ㎓
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 ㎓: ≤ 15 mm 2 – 3 ㎓: ≤ 12 mm	3 – 4 ㎓: ≤ 12 mm 4 – 6 ㎓: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 ㎓: ≤ 8 mm 2 – 3 ㎓: ≤ 5 mm*	3 – 4 ㎓: ≤ 5 mm* 4 – 6 ㎓: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 ㎓: ≤ 4 mm 4 – 5 ㎓: ≤ 3 mm 5 – 6 ㎓: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 ㎓: ≤ 3 mm 4 – 5 ㎓: ≤ 2.5 mm 5 – 6 ㎓: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 ㎓: ≥ 28 mm 4 – 5 ㎓: ≥ 25 mm 5 – 6 ㎓: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details. * When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 ㎓ to 3 ㎓, 3 ㎓ to 4 ㎓ and 4 ㎓ to 6 ㎓.				

Step 3: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in ㏈ from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

5. SAR Measurement Configurations

5.1 Body-Worn Accessory Configurations

Figure 7
Sample Body-Worn Diagram

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 7). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.
Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.
Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6. RF Exposure Limits

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Partial Peak SAR [1)] (Partial)	1.60 mW/g	8.00 mW/g
Partial Average SAR [2)] (Whole Body)	0.08 mW/g	0.40 mW/g
Partial Peak SAR [3)] (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

1) The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2) The spatial Average value of the SAR averaged over the whole body.
3) The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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7. SAR General Measurement Procedures

7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8. RF Average Conducted Output Power

8.1 Average Conducted Output Power

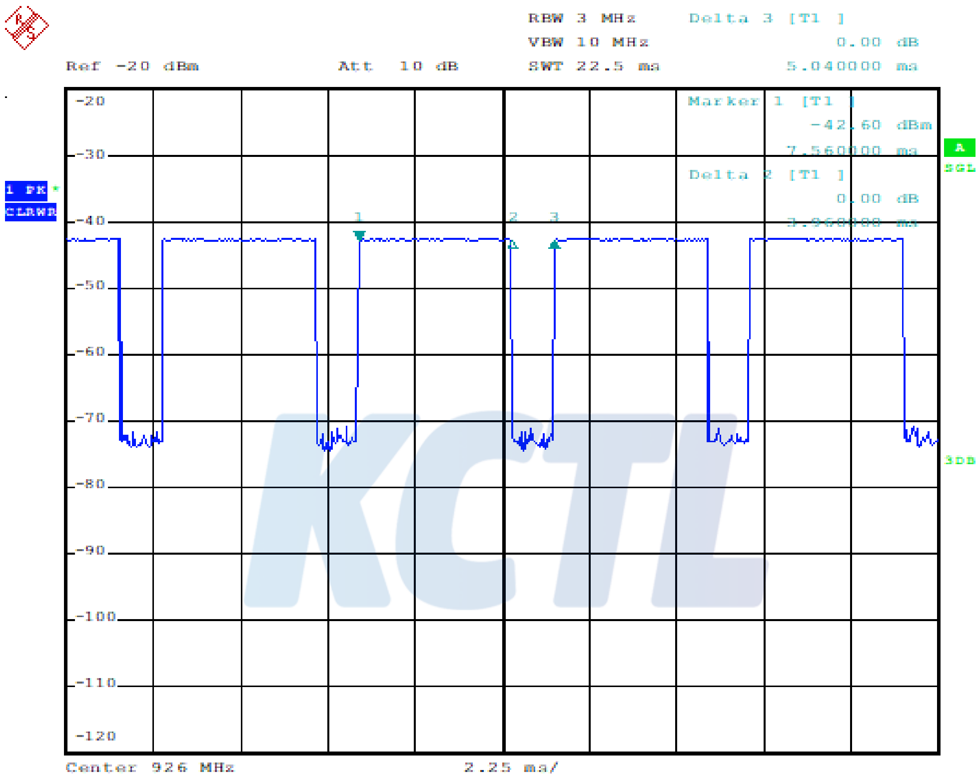
Mode	Average Conducted Power (㏈m)		
	Freq. (㎒)		
	902.6	915.0	927.5
FHSS (Half)	19.57	19.65	19.52

Mode	Average Conducted Power (㏈m)		
	Freq. (㎒)		
	903.0	915.0	927.5
FHSS (Hi-fi)	18.49	18.52	18.40

Mode	Average Conducted Power (㏈m)		
	Freq. (㎒)		
	905.0	914.0	926.0
4GFSK	12.81	13.10	13.54

8.2 Wireless Band Duty Cycle

Mode	Operating Modes	Duty Cycle (%)			
FHSS	Half, Hi-fi	100			
4GFSK		On Time (ms)	On-Off Time (ms)	Duty Cycle (%)	Duty Crest Factor
		3.96	5.04	0.786	1.273



9. System Verification

9.1 Tissue Verification

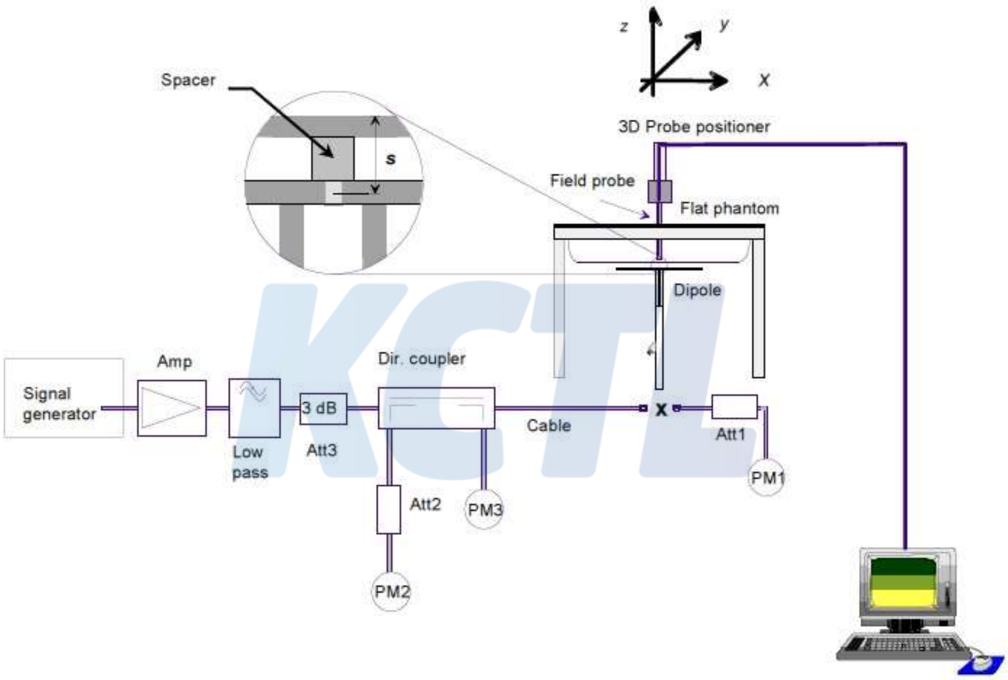
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 ㎒). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report. The temperature variation of the Tissue Simulant Liquids was (22 ± 2) ℃.

Freq. (㎒)	Limit/Measured		Permittivity (ρ)	Conductivity (σ)	Temp. (°C)
850.0	Recommended Limit		55.15 ± 5 % (52.39 ~ 57.91)	0.99 ± 5 % (0.94 ~ 1.04)	22 ± 2
	Measured	2016-06-02	56.86	0.98	21.30
902.6	Recommended Limit		55.00 ± 5 % (52.25 ~ 57.75)	1 .05 ± 5 % (1.00 ~ 1.10)	22 ± 2
	Measured	2016-06-02	56.60	1.04	21.30
903.0	Recommended Limit		55.00 ± 5 % (52.25 ~ 57.75)	1 .05 ± 5 % (1.00 ~ 1.10)	22 ± 2
	Measured	2016-06-02	56.63	1.04	21.30
915.0	Recommended Limit		55.00 ± 5 % (52.25 ~ 57.75)	1.06 ± 5 % (1.01 ~ 1.11)	22 ± 2
	Measured	2016-06-02	56.49	1.05	21.30
927.5	Recommended Limit		54.98 ± 5 % (52.23 ~ 57.73)	1.07 ± 5 % (1.02 ~ 1.12)	22 ± 2
	Measured	2016-06-02	56.31	1.06	21.30
850.0	Recommended Limit		41.50 ± 5 % (39.43~43.58)	0.92 ± 5 % (0.87~0.97)	22 ± 2
	Measured	2020-06-01	42.19	0.90	20.77

<Table 1.Measurement result of Tissue electric parameters>

9.2 Test System Verification

The microwave circuit arrangement for system verification is sketched below picture.
The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within ± 10% from the t arget SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the Table 2. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ℃, th e relative humidity was in the range(50 ± 20)% and the liquid depth Above the ear/grid refer ence points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



Verification Kit	Probe S/N	Frequency (㎒)	Tissue Type	Limit/Measured (Normalized to 1 W)		
D850V2 SN: 1006	EX3DV4 SN: 3865	850.0	MSL	Recommended Limit 1g (Normalized)		9.75 ± 10 % (8.78 ~ 10.73)
				Measured	2016-06-02	8.96
D850V2 SN: 1006	EX3DV4 SN: 7541	850.0	HSL	Recommended Limit 1g (Normalized)		9.95 ± 10 % (8.96~10.95)
				Measured	2020-06-01	10.08

<Table 2. System Verification>

10. SAR Test Results

10.1 Standalone Body SAR Test Results

RF Exposure Conditions	Mode	EUT Position	Distance (mm)	Frequency (㎒)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Measured 1g SAR (W/kg) Duty 100%	Measured 1g SAR (W/kg) Duty 50%	Scaled 1g SAR (W/kg)	Plot No.
Body	Half	Clip									
		Rear	0	915.0	19.65	20.00	1.08	0.144	0.072	0.078	
		Magnet									
		Rear	0	915.0	19.65	20.00	1.08	0.215	0.108	0.117	
		Front	0	915.0	19.65	20.00	1.08	0.498	0.249	0.270	
		Left	0	915.0	19.65	20.00	1.08	0.031	0.016	0.017	
		Right	0	915.0	19.65	20.00	1.08	0.185	0.093	0.100	
		Top	0	915.0	19.65	20.00	1.08	0.149	0.075	0.081	
		Bottom	0	915.0	19.65	20.00	1.08	0.249	0.125	0.135	
		Front	0	902.6	19.57	20.00	1.10	0.533	0.267	0.294	
		Front	0	927.5	19.52	20.00	1.12	0.497	0.249	0.278	
	Hi-fi	Front	0	903.0	18.49	20.00	1.42	0.452	0.226	**0.320**	1
	4GFSK	Front	0	926.0	13.54	14.00	1.112	0.029	0.015	**0.016**	2
		Rear	0	926.0	13.54	14.00	1.112	0.012	0.006	0.007	
		Left	0	926.0	13.54	14.00	1.112	0.003	0.002	0.002	
		Right	0	926.0	13.54	14.00	1.112	0.011	0.005	0.006	
		Top	0	926.0	13.54	14.00	1.112	0.013	0.007	0.007	
		Bottom	0	926.0	13.54	14.00	1.112	0.020	0.010	0.011	

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D01v06.
2. All modes of operation were investigated, and worst-case results are reported.
3. Battery is fully charged for all readings and the standard batteries are the only options.
4. Liquid tissue depth was at least 15 cm.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.

11. SAR Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1) **Repeated measurements are not required when the original highest measured SAR is < 0.80 W/㎏.**
2) When the original highest measured SAR is ≥ 0.80 W/㎏, the measurement was repeated once.
3) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/㎏ (~ 10% from the 1-g SAR limit).
4) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/㎏ and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Band	Frequency (㎒)	EUT Position	Separation Distance (㎜)	Measured 1 g SAR (W/kg)	Measured 1 g SAR (W/kg)	Ratio
N/A						

12. Measurement Uncertainty

Per KDB 865664 D01 SAR measurement 100㎒ to 6㎓, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of *k* = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Standard 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

13. Test Equipment Information

Test Data	**2016-06-02**			
Test Platform	SPEAG DASY4 System			
Version	DASY4: V4.7,Build80 SEMCAD: V1.8,Build 186			
Location	KCTL Inc, 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea			
Manufacture	SPEAG			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	Shield Room	None	N/A	N/A
DASY4 Robot	RX90BL Speag	F05/51E0A1/A01	N/A	N/A
DASY4 Controller	RX90BL Speag	F05/51E0A1/C/01	N/A	N/A
Phantom	Twin SAM Phantom	1363	N/A	N/A
Mounting Device	Mounting Device	None	N/A	N/A
DAE	DAE4	666	2016-05-11	2017-05-11
Probe	EX3DV4	3865	2015-08-28	2016-08-28
Dipole Validation Kits	D850V2	1006	2016-04-20	2018-04-20
Network Analyzer	E5071B	MY42403524	2016-02-11	2017-02-11
Dual Directional Coupler	778D	16059	2015-07-14	2016-07-14
Signal Generator	E4438C	MY42080486	2016-01-08	2017-01-08
Power Amplifier	2055BBS3Q7E9I	1005D/C0521	2016-05-18	2017-05-18
LP Filter	LA-30N	40058	2015-07-14	2016-07-14
Dual Power Meter	E4419B	GB43312301	2015-07-14	2016-07-14
Power Sensor	8481H	3318A19377	2015-07-15	2016-07-15
Power Sensor	8481H	3318A19379	2015-07-15	2016-07-15
Dielectric Assessment Kit	DAK-3.5	1078	2015-08-19	2016-08-19
Humidity/Baro/Temp. Data Recorder	MHB-382SD	23107	2016-02-11	2017-02-11

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Test Data	**2020-06-01**			
Test Platform	SPEAG DASY5 System			
Version	DASY52: 52.10.4.1527 / SEMCAD: 14.6.14 (7483)			
Location	KCTL Inc, 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea			
Manufacture	SPEAG			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	-	8F - 4	-	-
DASY6 Robot	TX60 Lspeag	F/19/0007289/A/001	-	-
Phantom	Twin SAM Phantom	1983	-	-
DAE	DAE4	1587	2019-07-16	2020-07-16
Probe	EX3DV4	7541	2019-07-22	2020-07-22
ESG Vector Signal Generator	E4438C	MY42080845	2020-03-12	2021-03-12
Dual Power Meter	EPM-442A	GB37480680	2020-05-12	2021-05-12
Power Sensor	8481H	2703A11902	2020-05-12	2021-05-12
Power Sensor	8481H	3318A18090	2020-05-12	2021-05-12
Attenuator	8491A	21552	2020-05-12	2021-05-12
Attenuator	8491A	35560	2020-05-12	2021-05-12
Attenuator	8491A	35934	2020-05-12	2021-05-12
Power Amplifier	AMP2027	10010	2020-05-12	2021-05-12
Dual Directional Coupler	778D-012	50136	2020-05-12	2021-05-12
Low Pass Filter	NLP-1000+	VUU79701846	2020-05-12	2021-05-12
Dipole Validation Kits	D850V2	1006	2020-04-21	2022-04-21
Network Analyzer	E5071B	MY42403524	2020-02-27	2021-02-27
Dielectric Assessment Kit	DAK-3.5	1046	2020-04-28	2021-04-28
Humidity/Temp	MHB-382SD	46301	2020-03-21	2021-03-21
Spectrum Analyzer	FSP7	100289	2020-01-03	2021-01-03

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14. Test System Verification Results

Date: 6/2/2016

Procedure Name: d=15mm, Pin=250mW

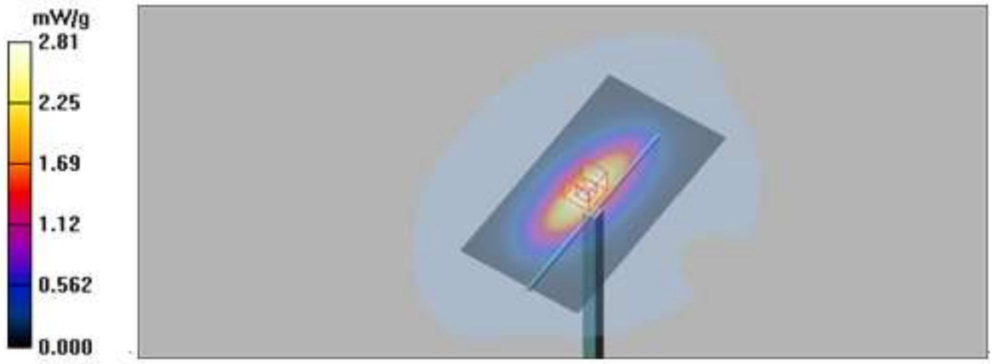
Frequency: 850 MHz; Duty Cycle: 1:1
Medium parameters used: f = 850 MHz; σ = 0.977 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3 Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3865; ConvF(10.25, 10.25, 10.25); Calibrated: 2015-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2016-05-11
- Phantom: SAM B; Type: SAM; Serial: 1363
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=15mm, Pin=250mW/Area Scan (81x151x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 2.81 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.9 V/m; Power Drift = 0.072 dB Peak
SAR (extrapolated) = 3.23 W/kg
SAR(1 g) = 2.24 mW/g; SAR(10 g) = 1.49 mW/g
Maximum value of SAR (measured) = 2.81 mW/g



Date: 6/1/2020

Test Laboratory: KCTL Inc.
File Name: 850 MHz Verification Input Power 250 mW 2020-06-01.da53:0

DUT: Dipole 850 MHz D850V2, Type: D850V2, Serial: D850V2 - SN:1006

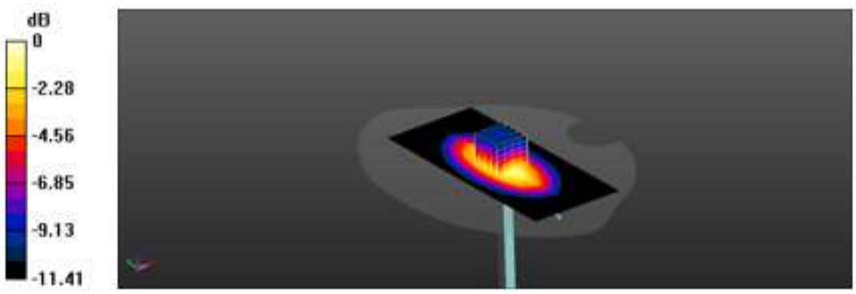
Communication System: UID 0, CW (0); Frequency: 850 MHz; Duty Cycle: 1:1
Medium parameters used: f = 850 MHz; σ = 0.895 S/m; ε_r = 42.194; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7541; ConvF(9.87, 9.87, 9.87) @ 850 MHz; ; Calibrated: 7/22/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1587; Calibrated: 7/16/2019
- Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 Ax; Serial: 1983
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/850 MHz Verification Input Power 250 mW 2020-06-01/Area Scan (7x15x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.39 W/kg

Configuration/850 MHz Verification Input Power 250 mW 2020-06-01/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 64.19 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.97 W/kg
SAR(1 g) = 2.52 W/kg; SAR(10 g) = 1.62 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 63.3%
Maximum value of SAR (measured) = 3.47 W/kg



0 dB = 3.47 W/kg = 5.40 dBW/kg

15. Test Results

1)

Date: 6/2/2016

Procedure Name: Hi-fi_Magnet_f.903_Front_0 mm

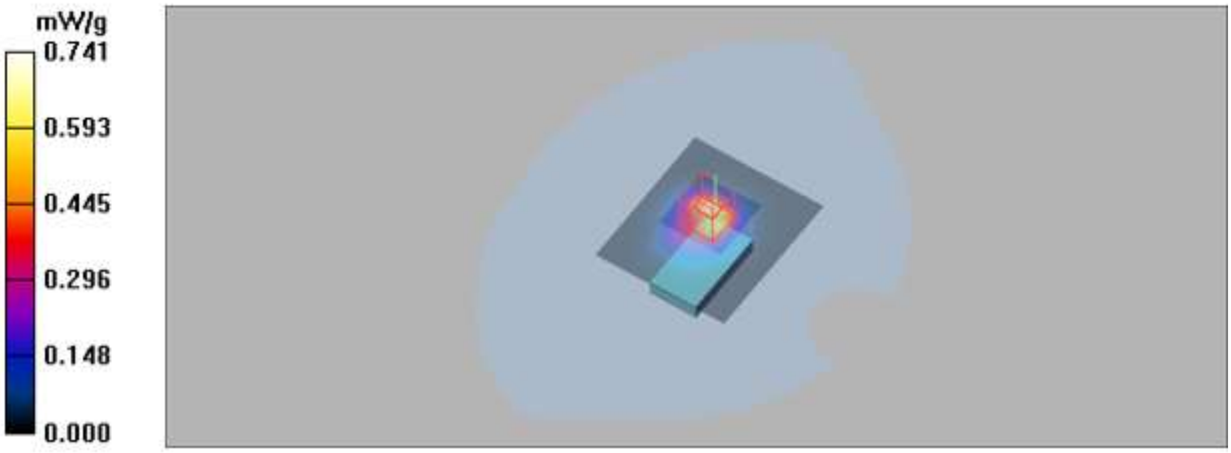
Frequency: 903 MHz; Duty Cycle: 1:1
Medium parameters used: f = 903 MHz; σ = 1.04 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3865; ConvF(10.05, 10.05, 10.05); Calibrated: 2015-08-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2016-05-11
- Phantom: SAM B; Type: SAM; Serial: 1363
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Hi-fi_Magnet_f.903_Front_0 mm/Area Scan (71x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.741 mW/g

Hi-fi_Magnet_f.903_Front_0 mm/Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.5 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.452 mW/g; SAR(10 g) = 0.226 mW/g
Maximum value of SAR (measured) = 0.864 mW/g



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2)

Date: 6/1/2020

Test Laboratory: KCTL Inc.
File Name: 1.4GFSK&FHSS.da53:0

DUT: ST-E1, Type: SOCIAL TALKIE E1, Serial: 24735f035dd262d9

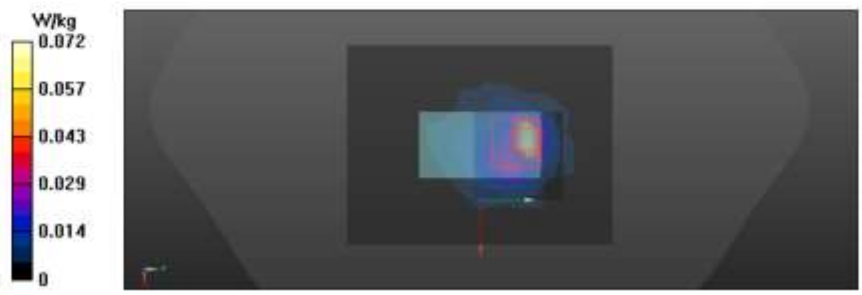
Communication System: UID 0, 4GFSK (0); Frequency: 926 MHz; Duty Cycle: 1:1.26154
Medium parameters used: f = 926 MHz; σ = 0.978 S/m; ε_r = 41.508; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7541; ConvF(9.87, 9.87, 9.87) @ 926 MHz; ; Calibrated: 7/22/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1587; Calibrated: 7/16/2019
- Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 Ax; Serial: 1983
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/WMIC_CH24_Front_0 mm/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0236 W/kg

Configuration/WMIC_CH24_Front_0 mm/Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.227 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.113 W/kg
SAR(1 g) = 0.029 W/kg; SAR(10 g) = 0.011 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 24.4%
Maximum value of SAR (measured) = 0.0718 W/kg



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