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.: KR22-SPF0014 Page (1) of (58)	eurofins | KCTL

1. Client

- Name : ATID CO.,LTD
- Address : 1402, 83, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
- Date of Receipt : 2021-03-23

2. Use of Report : Certification

3. Name of Product and Model : UHF RFID Reader

- Model Name : ATS200
- Manufacturer and Country of Origin : ATID CO.,LTD / Korea

4. FCC ID : VUJATM2000S1

5. Date of Test : 2022-03-24

6. Location of Test : ■ Permanent Testing Lab □ On Site Testing
(Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

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	Technical Manager
	Name : Mungi Jeong (Signature)	Name : Jongwon Ma (Signature)

2022-03-30

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-03-30	Originally issued	-

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:
Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

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.

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1. General information

Client	:	ATID CO.,LTD
Address	:	1402, 83, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
Manufacturer	:	ATID CO.,LTD
Address	:	1402, 83, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
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		UHF RFID Reader		
Product Model Name		ATS200		
Derivative Model		RP200		
Product Manufacturer		ATID CO.,LTD		
Product Serial Number	Radiation	1		
	Conduction	2		
Device Overview		Band & Mode	Operating Modes	Tx Frequency (㎒)
		RFID	Data	902.75~ 927.25
		Bluetooth	Data	2 402.0 ~ 2 480.0

2.2 Summary of SAR Test Results

Band	Equipment Class	Highest Reported
		10g SAR (W/kg)
		Extremity
RFID	DSS	0.98
Simultaneous SAR per KDB 690783 D01v01r03		1.17

2.3 #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.

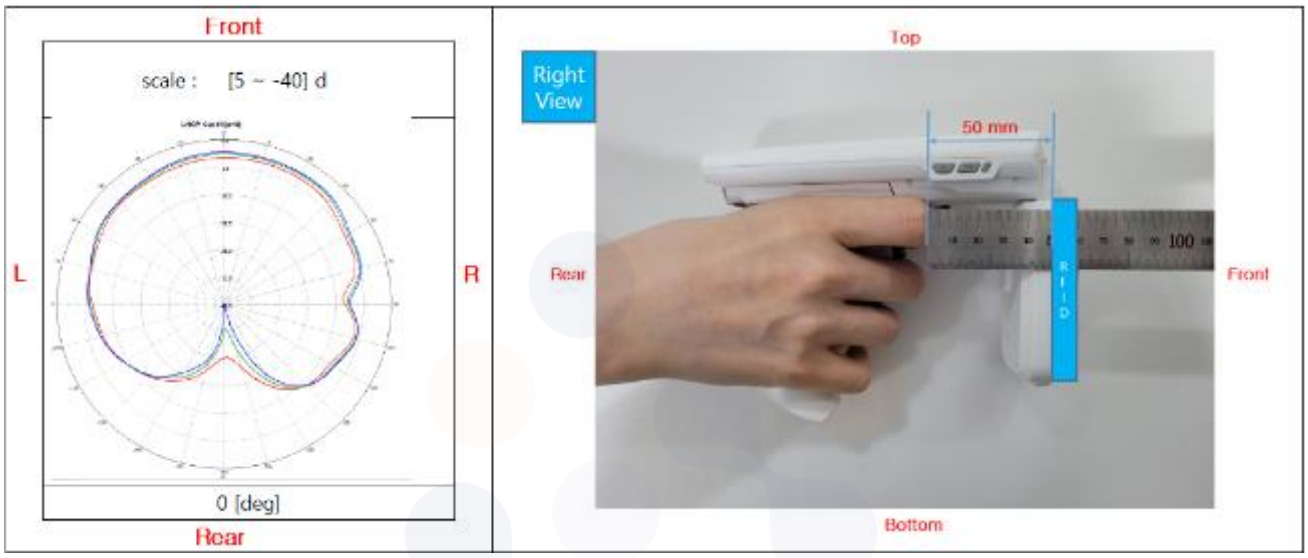
Band	Mode	Channel	Output Power (dBm)		
			Target	Max. Allowed	SAR Test
RFID		All Channel	29.00	**30.00**	**Yes**
Bluetooth	BDR	All Channel	10.50	**12.00**	No
	EDR	All Channel	7.50	**9.00**	No
	LE	All Channel	10.50	**12.00**	No

2.4 SAR Test Configurations

2.4.1 #DUT Antenna Locations

A diagram showing the location of the device antennas can be found in Appendix C.

Band	Device Edge for SAR Testing (Left View)					
	Front	Rear	Left Edge	Right Edge	Top	Bottom
RFID	Yes	No	Yes	Yes	Yes	Yes



Note: The following contents below were applied to the test location selection and test procedure of this equipment with high directivity to the front of the antenna.

- According to October 2020 TCBC workshop guidance for Handheld RFID device, Measure the 10-g Extremity SAR from the front of the RFID antenna at that antenna-to-finger distance and use that SAR value in place of the back side SAR data

a. Back side of RFID antenna is 50 mm away from user's finger during normal operation.
b. Test front surface at 50 mm away from flat phantom and use that SAR data in place of back

2.4.2 SAR Test Exclusion Considerations

Per FCC KDB 447498 D01v06, the 1g, 10 SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{\text{Max Power of Channel(mW)}}{\text{Test Separation Distance(mm)}} \times \sqrt{\text{Frequency(GHz)}} \leq 3.0(1\text{g} - \text{SAR}), 7.5(10\text{g} - \text{SAR})$$

Band / Mode	Position	Frequency	Maximum Allowed Power	Separation Distance	≤ 7.5 Not Required
		MHz	mW	mm	10g-SAR
Bluetooth	Extremity	2 480.0	16	7	3.6

Formulas round separation distance to nearest mm and power to nearest mW before calculating thresholds or exemption values.

2.5 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
- 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- April 2019 TCB Workshop Notes (Tissue Simulation Liquids)
- October 2020 TCB Workshop Notes (Handheld RFID/Barcode Scanners)

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:

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

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

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

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

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

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 MHz to 6 GHz v01r04.

			≤ 3 GHz	> 3 GHz
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 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 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 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 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 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 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 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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 dB 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. 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.

6. SAR General Measurement Procedures

6.1 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.

6.1.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 – 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

6.1.2 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

6.1.3 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/㎏, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7. RF Average Conducted Output Power

Power Measurement Setup

7.1 RFID Average Conducted Output Power

Band	Freq. [MHz]	Channel	Conducted Powers (dBm)
RFID	902.75	F1	28.30
	914.75	F2	**28.75**
	927.25	F3	28.67

7.2 Bluetooth Average Conducted Output Power

Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)
BDR	2 402.0	0	9.83
	2 441.0	39	10.16
	2 480.0	78	10.39
EDR	2 402.0	0	7.15
	2 441.0	39	7.46
	2 480.0	78	7.80
LE	2 402.0	0	9.83
	2 442.0	20	10.16
	2 480.0	39	10.39

7.3 Wireless Band Duty Cycle

Mode	Operating Modes	Duty Cycle (%)
RFID		100
Bluetooth		

Note: The tested in the worst Duty conditions using the program as requested by the Manufacturer.

8. System Verification

8.1 Tissue Verification

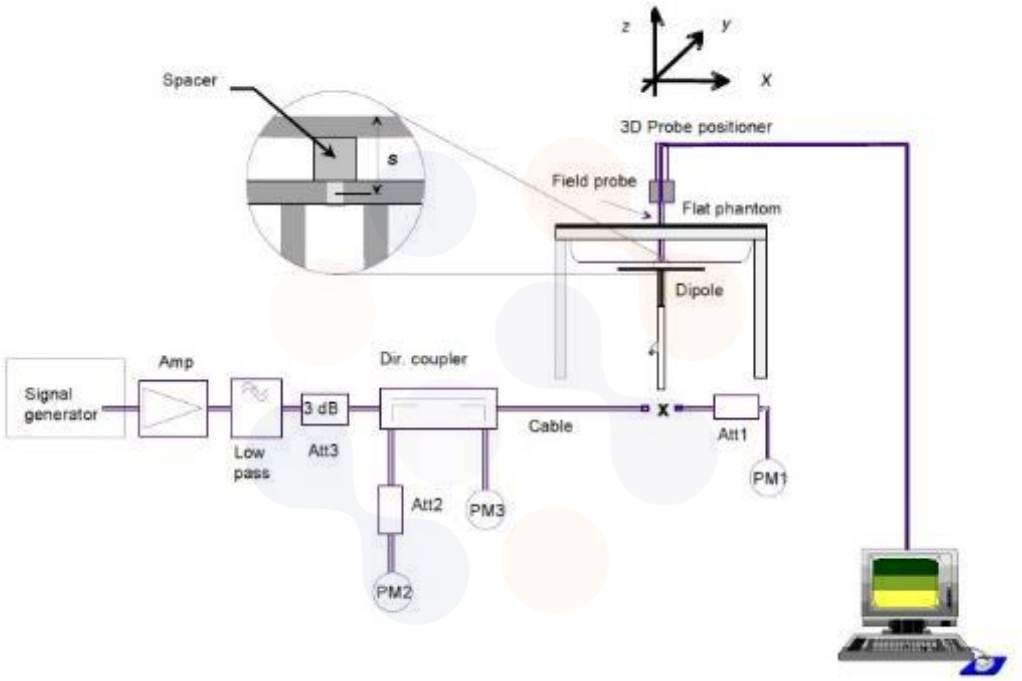
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 ㎒). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report.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

Freq. (㎒)	Limit/Measured		Permittivity (ρ)	Conductivity (σ)	Temp. (°C)
900.0	Recommended Limit		41.50 ± 5 % (39.43 ~ 43.58)	0.97 ± 5 % (0.92 ~ 1.02)	22 ± 2
	Measured	2022-03-24	41.15	0.97	20.71

<Table 1. Measurement result of Tissue electric parameters>

8.2 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)		
D900V2 SN: 1d138	EX3DV4 SN: 7540	900.0	HSL	Recommended Limit 10g (Normalized)		6.89 ± 10 % (6.20~7.58)
				Measured	2022-03-24	6.76

<Table 2. System Verification>

9. SAR Test Results

9.1 Standalone SAR Test Results

RFID									
RF Exposure Conditions	EUT Position	Distance (mm)	Frequency (MHz)	Measured Conducted Power (dB m)	Max. Tune-up Power (dB m)	Power Scaling Factor	Measured 10g SAR (W/kg)	Scaled 10g SAR (W/kg)	Plot No.
Extremity	Front	50	914.75	28.75	30.00	1.334	0.157	0.209	
	Left	0	914.75	28.75	30.00	1.334	0.731	**0.975**	1
	Right	0	914.75	28.75	30.00	1.334	0.659	0.879	
	Top	0	914.75	28.75	30.00	1.334	0.063	0.084	
	Bottom	0	914.75	28.75	30.00	1.334	0.417	0.556	

Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
3. All modes of operation were investigated, and worst-case results are reported.
4. Battery is fully charged for all readings and the standard batteries are the only options.
5. Liquid tissue depth was at least 15 cm.
6. 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.
7. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
8. According to 202010 TCBC workshop guidance for Handheld RFID device, Measure the 10-g Extremity SAR from the front of the RFID antenna at that antenna-to-finger distance and use that SAR value in place of the back side SAR data

10. Simultaneous Transmission

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.
This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g or 10g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is within SAR limits. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

10.1 #Simultaneous Transmission Configurations

No.	Scenario	Operation
1	RFID + Bluetooth	Yes

10.2 Estimated SAR

When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2 b), the following equation must be used to estimate the standalone 1g or 10g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(\text{GHz})}}{7.5} \times \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

Mode	Position	Frequency	Maximum Allowed Power	Separation Distance	Estimated 10g SAR
		MHz	mW	mm	W/kg
Bluetooth	Extremity	2 480.0	16	7	0.192

Note:
- Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06.
- Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

10.3 Simultaneous Transmission Analysis

Exposure Condition /Position		licensed	Bluetooth	Summation
		[①]	[②]	[①+②]
Extremity	Front	0.209	0.192	0.401
	Left	0.975	0.192	**1.167**
	Right	0.879	0.192	1.071
	Top	0.084	0.192	0.276
	Bottom	0.556	0.192	0.748

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/kg.**
2) When the original highest measured SAR is ≥ 0.80 W/kg, 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/kg (~ 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/kg 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 10 g SAR (W/kg)	Repeated 10 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 Platform	SPEAG DASY5 System			
Version	DASY52: 52.10.4.1535 / SEMCAD: 14.6.14 (7501)			
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	2mm Oval Phantom ELI5	2098	-	-
Mounting Device	Mounting Device	-	-	-
DAE	DAE4	1587	2021-07-26	2022-07-26
Probe	EX3DV4	7540	2021-04-29	2022-04-29
ESG Vector Signal Generator	E4438C	MY42080845	2022-02-24	2023-02-24
Dual Power Meter	EPM-442A	GB37480680	2021-05-11	2022-05-11
Power Sensor	8481H	2703A11902	2021-05-11	2022-05-11
Power Sensor	8481H	3318A18090	2021-05-11	2022-05-11
Attenuator	8491A	21552	2021-05-10	2022-05-10
Attenuator	8491A	35560	2021-05-10	2022-05-10
Attenuator	8491A	35934	2021-05-10	2022-05-10
Dual Directional Coupler	778D	17236	2021-05-31	2022-05-31
Power Amplifier	AMP2027	10010	2021-05-10	2022-05-10
Low Pass Filter	NLP-1000+	VUU79701846	2021-05-10	2022-05-10
Dipole Validation Kits	D900V2	1d138	2020-05-19	2022-05-19
Network Analyzer	E5071B	MY42403524	2022-02-15	2023-02-15
Dielectric Assessment Kit	DAK-3.5	1078	2021-05-26	2022-05-26
Humidity/Temp	MHB-382SD	46301	2022-02-25	2023-02-25
Spectrium Analyzer	FSQ40	200062	2021-05-10	2022-05-10

14. Test System Verification Results

Date: 3/24/2022

Test Laboratory: KCTL Inc.
File Name: 900 MHz Verification Input Power 250 mW 2022-03-24.da52:0

DUT: Dipole 900 MHz D900V2, Type: D900V2, Serial: D900V2 - SN:1d138

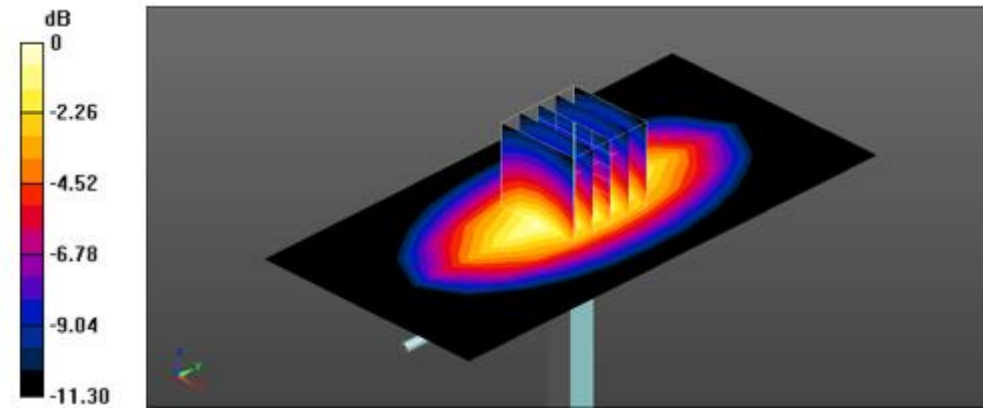
Communication System: UID 0, CW (0); Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.973 S/m; ε_r = 41.147; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7540; ConvF(9.43, 9.43, 9.43) @ 900 MHz; ; Calibrated: 4/29/2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1587; Calibrated: 7/26/2021
- Phantom: ELI V8.0_Left; Type: QD OVA 004 AA; Serial: 2098
- Measurement SW: DASY52, Version 52.10 (4);

System Performance Check/900 MHz Verification Input Power 250 mW 2022-03-24/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.60 W/kg

System Performance Check/900 MHz Verification Input Power 250 mW 2022-03-24/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 63.32 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 4.12 W/kg
SAR(1 g) = 2.63 W/kg; SAR(10 g) = 1.69 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 63.7%
Maximum value of SAR (measured) = 3.60 W/kg



0 dB = 3.60 W/kg = 5.56 dBW/kg

15. Test Results

1)

Date: 3/24/2022

Test Laboratory: KCTL Inc.
File Name: 1. RFID_Extremity SAR.da53:1

DUT: ATS200, Type: UHF RFID Reader, Serial: 1

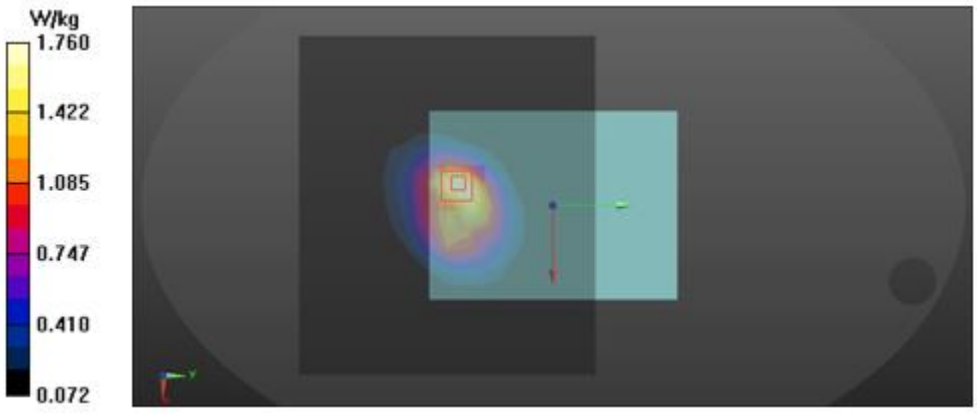
Communication System: UID 0, RFID (0); Frequency: 914.75 MHz; Duty Cycle: 1:1
Medium parameters used: f = 914.75 MHz; σ = 0.987 S/m; ε_r = 41.056; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7540; ConvF(9.43, 9.43, 9.43) @ 914.75 MHz; ; Calibrated: 4/29/2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1587; Calibrated: 7/26/2021
- Phantom: ELI V8.0_Left; Type: QD OVA 004 AA; Serial: 2098
- Measurement SW: DASY52, Version 52.10 (4);

Configuration 2/RFID_CH F2_Left_0 mm/Area Scan (17x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.85 W/kg

Configuration 2/RFID_CH F2_Left_0 mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 43.80 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.19 W/kg
SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.731 W/kg
Smallest distance from peaks to all points 3 dB below = 12.9 mm
Ratio of SAR at M2 to SAR at M1 = 55.5%
Maximum value of SAR (measured) = 1.76 W/kg



Appendixes List

Appendix A	A.1 Probe Calibration certificate (EX3DV4_7540) A.2 Dipole Calibration certificate (D900V2_1d138) A.3 Justification for Extended SAR Dipole Calibrations
Appendix B	SAR Tissue Specification
Appendix C	#Antenna Location & Distance
Appendix D	EUT Photo
Appendix E	Test Setup Photo