

Project No: TM-2409000206P  
Report No.: TMWK2409003203KS

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## SAR TEST REPORT

FCC 47 CFR § 2.1093  
IEEE Std 1528-2013

for  
Mullion Video Intercom with Reader

Model Name.: TD33-HW

Prepared for:

**Verkada Inc**  
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Prepared by

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Revision History

| Rev. | Issue Date        | Revisions                        | Effect Page | Revised By |
|------|-------------------|----------------------------------|-------------|------------|
| 00   | November 11, 2024 | Initial Issue                    | ALL         | Peggy Tsai |
| 01   | November 22, 2024 | See the following Note Rev. (01) | P.9         | Peggy Tsai |
| 02   | December 4, 2024  | See the following Note Rev. (02) | P.7         | Peggy Tsai |

Note:

Rev. (01)

- 1. Modify Standalone SAR Test Exclusion Considerations in section 4.1.

Rev. (02)

- 1. Modify Antenna Specification in section 3.2.



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## 1 Attestation of Test Results

|   |  |
|---|--|
| Applicant Name  | Verkada Inc  |
| Model Name  | TD33-HW  |
| Applicable Standards  | FCC 47 CFR § 2.1093<br>Published RF exposure KDB procedures<br>IEEE Std 1528-2013                  |
| Receive EUT Date:   | September 12, 2024   |
| Date Tested   | October 30, 2024   |
| Test Results  | Exempt   |
| Compliance Certification Services Inc. , tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement,not taking into account measurement instrumentation uncertainty.All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. |  |
| Approved & Released By:<br>  | Tested by:<br> |
| Sky Zhou<br>Asst. Section Manager<br>Compliance Certification Services Inc.   | Jack Yang<br>Engineer<br>Compliance Certification Services Inc.                                    |



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## 2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure [KDB](#) procedures:

- 447498 D01 General RF Exposure Guidance v06
- 865664 D02 RF Exposure Reporting v01r02

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### 3 Device Under Test (DUT) Information

#### 3.1 DUT Description

|                      |   |
|----------------------|---|
| Applicant Name       | Verkada Inc   |
| Applicant Address    | 405 E. 4th Ave. San Mateo California United States 94401        |
| Manufacturer Name    | CHICONY ELECTRONICS ( THAILAND) CO., LTD                        |
| Manufacturer Address | 82 MOO 4 T. THAKHAM A. BANGPAKONG, CHACHOENGSAO, THAILAND 24130 |
| Product              | Mullion Video Intercom with Reader                              |
| Trade Name           | Verkada   |
| Model No.            | TD33-HW   |
| Model Discrepancy    | N/A   |
| Hardware Version     | 60-B04001-A   |
| Software Version     | 5.1.4   |
| Sample Stage         | PVT   |

### 3.2 Wireless Technologies

| Wireless technologies | Frequency bands | Peak Antenna Gain (dBi) | Operating mode | Duty Cycle used for SAR testing |
|-----------------------|-----------------|-------------------------|----------------|---------------------------------|
| Bluetooth             | 2.4 GHz         | 2.55                    | BLE            | 63.2%                           |
| Antenna Specification | Brand Name      | SPEED                   |                |                                 |
|                       | Type            | PIFA Antenna            |                |                                 |
|                       | Parts Number    | F-0Q-51-6007-001-00     |                |                                 |
| NFC                   | 13.56MHz        |                         |                | N/A                             |
| Antenna Specification | Brand Name      | SPEED                   |                |                                 |
|                       | Type            | Loop Antenna            |                |                                 |
|                       | Parts Number    | F-0W-51-6006-006-00     |                |                                 |
| RFID                  | 125kHz          |                         |                | N/A                             |
| Antenna Specification | Brand Name      | SPEED                   |                |                                 |
|                       | Type            | Loop Antenna            |                |                                 |
|                       | Parts Number    | F-0W-51-6006-006-00     |                |                                 |

#### Notes:

- Duty cycle for BLE is referenced from the BLE reports.
- The sample selected for test was prototype that representative to production product and was provided by manufacturer
- Variant information between/among model numbers / trademarks is provided by the applicant, test results of this report are applicable to the sample EUT received of main test model name.
- Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received
- SAR test exemption.

## 4 RF Exposure Conditions

Evaluated with a minimum test separation distance of 5 mm.

### 4.1 Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is  $\leq 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is  $> 5$  mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

### SAR Test Exclusion Calculations

#### BLE

4.3.1 a) For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm, the 1-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR.

|  |          |
|--|----------|
| f(GHz)   | 2.48     |
| max. tune up power (dBm)                                     | 3        |
| max. power (mW)  | 2.00     |
| min. test separation distance (mm)                           | 5        |
| SAR test exclusion power (mW)                                | 0.63     |
| SAR test exclusion Limit (1-g SAR test exclusion thresholds) | $\leq 3$ |
| Result   | Pass     |



## NFC

### 4.3.1 b) 1.

**{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz**

|  |     |
|--|-----|
| f(GHz)                                   | 0.1 |
| min. test separation distance (mm)       | 5   |
| Threshold at 50 mm                       | 474 |
| b) 1. SAR test exclusion thresholds (mW) | 444 |

### 4.3.1 C) 1.

**the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by  $[1 + \log(100/f(\text{MHz}))]$**

|  |         |
|--|---------|
| f(GHz)                                   | 0.01356 |
| b) 1. SAR test exclusion thresholds (mW) | 444     |
| c) 1. SAR test exclusion thresholds (mW) | 830     |

### 4.3.1 C) 2.

**For test separation distances  $\leq 50$  mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by  $\frac{1}{2}$**

|   |         |
|---|---------|
| f(GHz)                                    | 0.01356 |
| max. Electric field strength (dBuV/m @3m) | 52.13   |
| max. EIRP power (dBm)                     | -43.1   |
| max. EIRP Tune up power (dBm)             | -42.5   |
| max. EIRP power (mW)                      | 0       |
| min. test separation distance (mm)        | 5       |
| c) 1. SAR test exclusion thresholds (mW)  | 830     |
| c) 2. SAR test exclusion thresholds (mW)  | 415     |
| Result                                    | Pass    |

## RFID

### 4.3.1 b) 1.

**{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz**

|  |     |
|--|-----|
| f(GHz)                                   | 0.1 |
| min. test separation distance (mm)       | 5   |
| Threshold at 50 mm                       | 474 |
| b) 1. SAR test exclusion thresholds (mW) | 444 |

### 4.3.1 C) 1.

**the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by  $[1 + \log(100/f(\text{MHz}))]$**

|  |          |
|--|----------|
| f(GHz)                                   | 0.000125 |
| b) 1. SAR test exclusion thresholds (mW) | 444      |
| c) 1. SAR test exclusion thresholds (mW) | 1734     |

### 4.3.1 C) 2.

**For test separation distances  $\leq 50$  mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by  $\frac{1}{2}$**

|  |          |
|--|----------|
| f(GHz)                                   | 0.000125 |
| max.Electric field strength (dBuV/m @3m) | 75.86    |
| max. EIRP power (dBm)                    | -19.37   |
| max. EIRP Tune up power (dBm)            | -19      |
| max.EIRP power (mW)                      | 0.01     |
| min. test separation distance (mm)       | 5        |
| c) 1. SAR test exclusion thresholds (mW) | 1734     |
| c) 2. SAR test exclusion thresholds (mW) | 867      |
| Result                                   | Pass     |

#### Note(s):

1. The BLE tune up power referred the AVG power of the test report TMWK2409003201KR for RF Exposure assessment purpose.
2. The NFC tune up power referred the Field strength of the test report TMWK2409003199KR for RF Exposure assessment purpose.
3. The RFID tune up power referred the Field strength of the test report TMWK2409003200KR for RF Exposure assessment purpose.

## 5 Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

### Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

### SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$\text{SPLSR} = (\text{SAR}_1 + \text{SAR}_2)^{1.5} / R_i$$

Where:

**SAR<sub>1</sub>** is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

**SAR<sub>2</sub>** is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

**R<sub>i</sub>** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of  $[(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(\text{SAR}_1 + \text{SAR}_2)^{1.5} / R_i \leq 0.04$$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest reported SAR for the frequency bands should be used to determine SAR<sub>1</sub> or SAR<sub>2</sub>. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

The antennas in all antenna pairs that do not qualify for simultaneous transmission SAR test exclusion must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01

### Estimated SAR for Simultaneous Transmission SAR Analysis Considerations for SAR estimation

1. When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
2. Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
  - When the separation distance from the antenna to an adjacent edge is  $\leq 5$  mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
  - When the separation distance from the antenna to an adjacent edge is  $> 5$  mm but  $\leq 50$  mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
  - When the minimum test separation distance is  $> 50$  mm, the estimated SAR value is 0.4 W/kg
3. Please refer to Estimated SAR Tables to see which test positions are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values  $< 1.2$  W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.
4. Estimated independent SAR value formula:
  - 1)  $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x]$  W/kg, for test separation distances  $\leq 50$  mm; where  $x = 7.5$  for 1-g SAR and  $x = 18.75$  for 10-g SAR.
  - 2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is  $> 50$  mm.

### Estimated SAR for BLE & NFC & RFID

| Tx Interface | Frequency (MHz) | Output Power |    | Separation Distances (mm) | Estimated 1-g SAR Value (W/kg) |
|--------------|-----------------|--------------|----|---------------------------|--------------------------------|
|              |                 | dBm          | mW |                           |                                |
| BLE          | 2480            | 3            | 2  | 5                         | 0.084                          |
| NFC          | 13.56           | -42.5        | 0  | 5                         | 0.000                          |
| RFID         | 0.125           | -19          | 0  | 5                         | 0.000                          |

### 5.1 Sum of the BLE + NFC +RFID

$0.084+0+0=0.084$

#### Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is  $< 1.6$  W/kg or the SPLSR is  $< 0.04$  for all circumstances that require SPLSR calculation.



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## 6 Facilities

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan.

**END OF REPORT**