



# TEST REPORT



Report No. : KES-RF250059-R1  
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## ■ FCC & IC TEST REPORT

### 1. Client

- Name : THINKWARE CORPORATION
- Address : A, 9FL., Samwhan Hipex, 240, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea

### 2. Sample Description

- Product item : THINKWARE DASH CAM
- Model name : ARC700
- Manufacturer etc. : THINKWARE CORPORATION

### 3. Date of test : 2025.03.05 ~ 2025.03.14

### 4. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

- Address : 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea

### 5. Test method used : Part 15 Subpart C 15.247, RSS-247 (Issue 3), RSS-Gen (Issue 5)

### 6. Test result : PASS

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
This laboratory is not accredited for the test results marked \*.  
This test report is not related to KOLAS accreditation.

|             |                                  |                                  |
|-------------|----------------------------------|----------------------------------|
| Affirmation | Tested by                        | Technical Manager                |
|             | Name : Gu-Bong, Kang (Signature) | Name : Yeong-Jun Cho (Signature) |

2025 . 03. 25.

**KES Co., Ltd.**

**Accredited by KOLAS, Republic of KOREA**



## REPORT REVISION HISTORY

| Date       | Test Report No. | Revision History                                                |
|------------|-----------------|-----------------------------------------------------------------|
| 2025.03.24 | KES-RF250059    | Initial                                                         |
| 2025.03.25 | KES-RF250059-R1 | Corrected Model name at Page 1, 4, 5 :<br>'ARC 700' -> 'ARC700' |
|            |                 |                                                                 |

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### Use of uncertainty of measurement for decisions on conformity (decision rule):

☒ No decision rule is specified by the standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other (to be specified, for example when required by the standard or client)



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## 1. General information

Applicant: THINKWARE CORPORATION  
Applicant address: A, 9FL., Samwhan Hipex, 240, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea  
Test site: KES Co., Ltd.  
Test site address: ☐ #3002, #3503, #3701, 40, Simin-daero365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Republic of Korea  
☒ 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea  
Test Facility: FCC Accreditation Designation No.: KR0100, Registration No.: 444148  
ISED Registration No.: 23298  
FCC rule part(s): 15.247  
FCC ID: 2ADTG-ARC700  
IC rule part(s): RSS-247 (Issue 3), RSS-Gen (Issue 5)  
IC Number: 12594A-ARC700  
Test device serial No.: ☒ Production ☐ Pre-production ☐ Engineering

### 1.1. EUT description

Equipment under test: THINKWARE DASH CAM  
Frequency range & Number of channels: **2 402 MHz ~ 2 480 MHz (LE 1 Mbps) : 40 ch**  
**2 412 MHz ~ 2 462 MHz (802.11b/g/n\_HT20) : 11 ch**  
**2 422 MHz ~ 2 452 MHz (802.11n\_HT40) : 7 ch**  
UNII-1 for FCC: 5 180 MHz ~ 5 240 MHz (802.11a/n\_HT20/ac\_VHT20) : 4 ch  
5 190 MHz ~ 5 230 MHz (802.11n\_HT40/ac\_VHT40) : 2 ch  
5 210 MHz (802.11ac\_VHT80) : 1 ch  
UNII-3 for IC: 5 745 MHz ~ 5 825 MHz (802.11a/n\_HT20/ac\_VHT20) : 5 ch  
5 755 MHz ~ 5 795 MHz (802.11n\_HT40/ac\_VHT40) : 2 ch  
5 775 MHz (802.11ac\_VHT80) : 1 ch  
Model: ARC700  
Modulation technique: **GFSK, DSSS, OFDM**  
Antenna specification: 2.4 GHz band PCB Antenna // Peak gain: 4.12 dBi  
UNII-1 PCB Antenna // Peak gain: 1.78 dBi  
UNII-3 PCB Antenna // Peak gain: 2.64 dBi  
Power source: DC 12 V, 24 V  
H/W version: V3.1  
S/W version: V0.21  
Serial Number: QALCCFLD000282B



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**1.2. Test configuration**

The **THINKWARE CORPORATION // THINKWARE DASH CAM // ARC700 // FCC ID: 2ADTG-ARC700 // IC number : 12594A-ARC700** was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15.247  
ISED RSS-247 Issue 3 and RSS-Gen Issue 5  
KDB 558074 D01 v05 r02  
ANSI C63.10-2013

**1.3. Information about derivative model**

N/A.

**1.4. Accessory information**

| Equipment                       | Manufacturer          | Model | Serial No. | Power source     |
|---------------------------------|-----------------------|-------|------------|------------------|
| Main unit (Front camera)        | THINKWARE CORPORATION | -     | -          | DC 12 V, DC 24 V |
| Rear camera                     | THINKWARE CORPORATION | -     | -          | -                |
| Power cable                     | -                     | -     | -          | -                |
| Hardwiring cable (Front camera) | -                     | -     | -          | -                |
| Hardwiring cable (Rear camera)  | -                     | -     | -          | -                |
| MicroSD memory card             | -                     | -     | -          | -                |

**1.5. Device modifications**

N/A

**1.6. Sample calculation**

Where relevant, the following sample calculation is provided  
For all conducted test items :

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 1.24 + 20 = 21.24 \text{ (dB)}\end{aligned}$$

For Radiation test :

$$\text{Field strength level (dB}\mu\text{V/m)} = \text{Measured level (dB}\mu\text{V)} + \text{Antenna factor (dB)} + \text{Cable loss (dB)} - \text{Amplifier gain (dB)}$$

**1.7. Worst case data rate**

1. Worst-case data rates were:

802.11b : 1 Mbps

802.11g : 6 Mbps

802.11n\_HT20/40 : MCS0

**1.8. Measurement Uncertainty**

| Test Item                                                                                                                                     |             | Uncertainty                |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|
| Uncertainty for Conduction emission test                                                                                                      |             | 2.22 dB ( SHIELD ROOM #6 ) |
| Uncertainty for Radiation emission test<br>(include Fundamental emission)                                                                     | Below 1 GHz | 4.04 dB ( SAC #6 )         |
|                                                                                                                                               | Above 1 GHz | 5.32 dB ( SAC #5 )         |
| Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |             |                            |

**1.9. Frequency/channel operations**

| Ch. | Frequency (MHz) | Rate(Mbps) |
|-----|-----------------|------------|
| 00  | 2 402           | LE 1 Mbps  |
| .   | .               | .          |
| 20  | 2 442           | LE 1 Mbps  |
| .   | .               | .          |
| 39  | 2 480           | LE 1 Mbps  |

| Ch. | Frequency (MHz) | Mode             |
|-----|-----------------|------------------|
| 1   | 2 412           | 802.11b/g/n_HT20 |
| .   | .               | .                |
| 6   | 2 437           | 802.11b/g/n_HT20 |
| .   | .               | .                |
| 11  | 2 462           | 802.11b/g/n_HT20 |

| Ch. | Frequency (MHz) | Mode         |
|-----|-----------------|--------------|
| 3   | 2 422           | 802.11n_HT40 |
| .   | .               | .            |
| 6   | 2 437           | 802.11n_HT40 |
| .   | .               | .            |
| 9   | 2 452           | 802.11n_HT40 |



## For FCC

| Ch. | Frequency (MHz) | Mode                     |
|-----|-----------------|--------------------------|
| 36  | 5 180           | 802.11a/an_HT20/ac_VHT20 |
| .   | .               | .                        |
| 44  | 5 220           | 802.11a/an_HT20/ac_VHT20 |
| .   | .               | .                        |
| 48  | 5 240           | 802.11a/an_HT20/ac_VHT20 |

| Ch. | Frequency (MHz) | Mode                   |
|-----|-----------------|------------------------|
| 38  | 5 190           | 802.11an_HT40/ac_VHT40 |
| .   | .               | .                      |
| 46  | 5 230           | 802.11an_HT40/ac_VHT40 |

| Ch. | Frequency (MHz) | Mode           |
|-----|-----------------|----------------|
| 42  | 5 210           | 802.11ac_VHT80 |

## For IC

| Ch. | Frequency (MHz) | Mode                     |
|-----|-----------------|--------------------------|
| 149 | 5 745           | 802.11a/an_HT20/ac_VHT20 |
| .   | .               | .                        |
| 157 | 5 785           | 802.11a/an_HT20/ac_VHT20 |
| .   | .               | .                        |
| 165 | 5 825           | 802.11a/an_HT20/ac_VHT20 |

| Ch. | Frequency (MHz) | Mode                   |
|-----|-----------------|------------------------|
| 151 | 5 755           | 802.11an_HT40/ac_VHT40 |
| .   | .               | .                      |
| 159 | 5 795           | 802.11an_HT40/ac_VHT40 |

| Ch. | Frequency (MHz) | Mode           |
|-----|-----------------|----------------|
| 155 | 5 775           | 802.11ac_VHT80 |

**2. Summary of tests**

| Section in FCC Part 15 | Section in RSS-247 & Gen        | Test description                          | Test results          |
|------------------------|---------------------------------|-------------------------------------------|-----------------------|
| -                      | RSS-Gen 6.7                     | 99% Occupied bandwidth                    | N/T <sup>Note.1</sup> |
| 15.247(a)(2)           | RSS-247 5.2(a)                  | 6 dB bandwidth                            | N/T <sup>Note.1</sup> |
| 15.247(b)(3)           | RSS-247 5.4(d)                  | Output power                              | Pass                  |
| 15.247(e)              | RSS-247 5.2(b)                  | Power spectral density                    | N/T <sup>Note.1</sup> |
| 15.205<br>15.209       | RSS-247 5.5<br>RSS-Gen 8.9,8,10 | Radiated restricted band and emission     | Pass                  |
| 15.247(d)              | RSS-247 5.5                     | Conducted spurious emission and band edge | N/T <sup>Note.1</sup> |
| 15.207(a)              | RSS-Gen 8.8                     | AC Conducted emissions                    | N/T <sup>Note.2</sup> |
| 15.203                 | -                               | Antenna Requirement                       | Pass                  |

\*N/T: Not Tested

Note.

1. This product is equipped with an approved module, please refer to Module Report below for details.  
Report No. E04A24070678F00102, E04A24070678F00103
2. This device is powered by DC 12 V or DC 24 V.
3. By the request of applicant, test is performed with power setting value below :

| Mode                | 2.4 GHz         |               |
|---------------------|-----------------|---------------|
|                     | Frequency (MHz) | Setting value |
| LE 1 Mbps           | 2 402 ~ 2 480   | 14            |
| 802.11b (1 Mbps)    | 2 412 ~ 2 462   | 30            |
| 802.11g (6 Mbps)    |                 | 21            |
| 802.11n_HT20 (MCS0) |                 | 21            |
| 802.11n_HT40 (MCS0) | 2 422 ~ 2 452   | 22            |





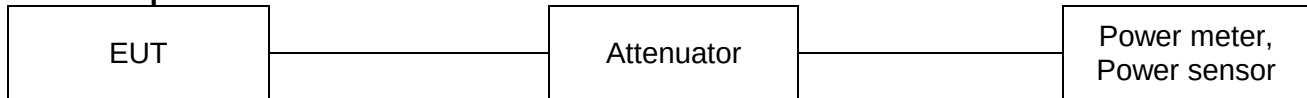
### 3. Test results

#### 3.1. Output power

##### Test procedure

ANSI C63.10-2013 - Section 11.9.1.3 and 11.9.2.3.2

##### Test setup



##### ANSI C63.10-2013 - Section 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

##### ANSI C63.10-2013 - Section 11.9.2.3.2

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

##### FCC Limit

According to §15.247(b)(3), For systems using digital modulation in the 902~928 MHz, 2 400~2 483.5 MHz, and 5 725~5 850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted out-put power. Maximum Conducted Out-put Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

##### IC Limit

According to RSS-247 5.4(d), For DTSSs employing digital modulation techniques operating in the bands 902-928 MHz and 2 400-2 483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

**Test results**

| Mode      | 2 402 MHz     |            | 2 442 MHz     |            | 2 480 MHz     |            | Power Limit (dBm) |
|-----------|---------------|------------|---------------|------------|---------------|------------|-------------------|
|           | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) |                   |
| LE 1 Mbps | 2.03          | 3.63       | 1.90          | 3.41       | 1.88          | 3.32       | 30.00             |

| Mode            | 2 412 MHz     |            | 2 437 MHz     |            | 2 462 MHz     |            | Power Limit (dBm) |
|-----------------|---------------|------------|---------------|------------|---------------|------------|-------------------|
|                 | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) |                   |
| 802.11b         | 12.45         | 15.10      | 12.59         | 15.23      | 12.48         | 15.11      | 30.00             |
| 802.11g         | 3.95          | 13.46      | 3.85          | 14.31      | 3.78          | 13.62      |                   |
| 802.11n<br>HT20 | 3.95          | 13.27      | 3.87          | 13.46      | 4.51          | 14.11      |                   |

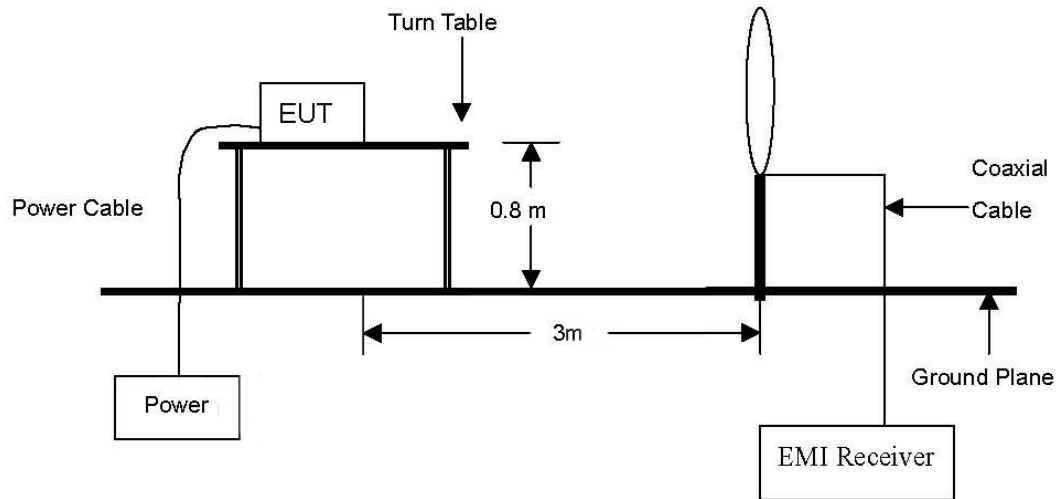
| Mode            | 2 422 MHz     |            | 2 437 MHz     |            | 2 452 MHz     |            | Power Limit (dBm) |
|-----------------|---------------|------------|---------------|------------|---------------|------------|-------------------|
|                 | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) | Average (dBm) | Peak (dBm) |                   |
| 802.11n<br>HT40 | 4.77          | 13.39      | 5.31          | 13.60      | 5.30          | 13.71      | 30.00             |



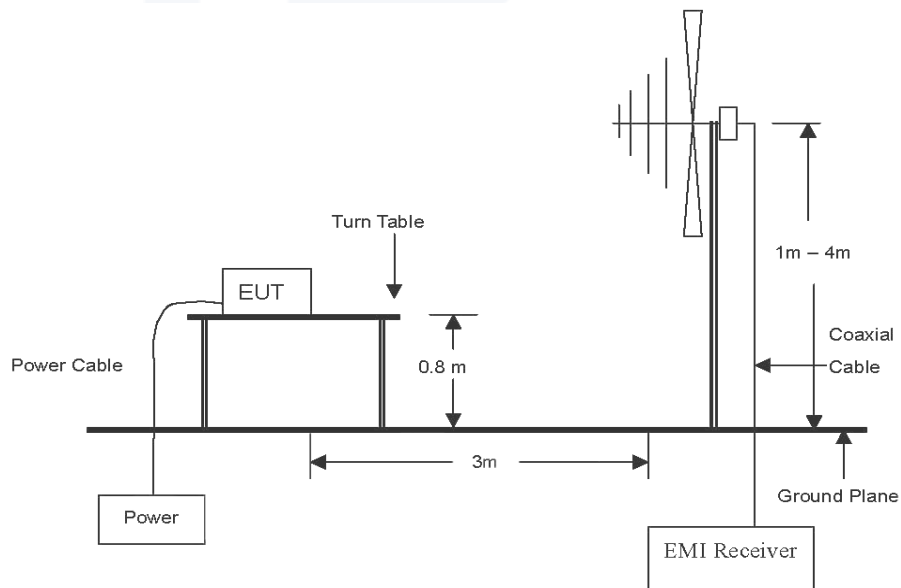
### 3.2. Radiated restricted band and emissions

#### Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.

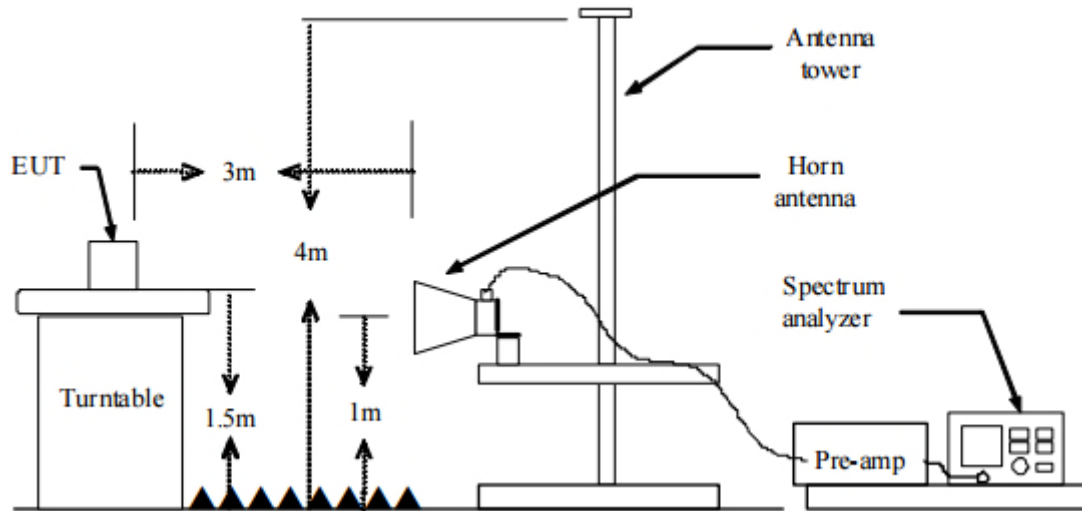


The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.





The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



### Test procedure

Radiated emissions from the EUT were measured according to the dictates in section 11.11 & 11.12 of ANSI C63.10-2013.

#### Test procedure below 30 MHz

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel, ground parallel and perpendicular of the antenna are set to make the measurement. It was determined that parallel was worst-case orientation; therefore, all final radiated testing was performed with the EUT in parallel.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

#### Test procedure above 30 MHz

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground for 30 MHz-1 GHz and 1.5 meters for above 1 GHz at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The antenna is a bi-log antenna, a horn antenna, and its height are varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
5. Spectrum analyzer settings for  $f < 1$  GHz:
  - ① Span = wide enough to fully capture the emission being measured
  - ② RBW = 120 kHz
  - ③ VBW  $\geq$  RBW
  - ④ Detector = quasi peak
  - ⑤ Sweep time = auto
  - ⑥ Trace = max hold



6. Spectrum analyzer settings for  $f \geq 1$  GHz: Peak

- ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- ② RBW = 1 MHz
- ③ VBW  $\geq 3$  MHz
- ④ Detector = peak
- ⑤ Sweep time = auto
- ⑥ Trace = max hold
- ⑦ Trace was allowed to stabilize

7. Spectrum analyzer settings for  $f \geq 1$  GHz: Average

- ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- ② RBW = 1 MHz
- ③ VBW  $\geq 3 \times$  RBW
- ④ Detector = RMS, if  $\text{span}/(\# \text{ of points in sweep}) \leq (\text{RBW}/2)$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- ⑤ Averaging type = power(i.e., RMS)
  - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
  - 2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- ⑥ Sweep = auto
- ⑦ Trace = max hold
- ⑧ Perform a trace average of at least 100 traces.
- ⑨ A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
  - 1) If power averaging (RMS) mode was used in step ⑤, then the applicable correction factor is  $10 \log(1/x)$ , where  $x$  is the duty cycle.
  - 2) If linear voltage averaging mode was used in step ⑤, then the applicable correction factor is  $20 \log(1/x)$ , where  $x$  is the duty cycle.
  - 3) If a specific emission is demonstrated to be continuous ( $\geq 98$  percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

**Note.**

1.  $f < 30$  MHz, extrapolation factor of 40 dB/decade of distance.  $F_d = 40\log(D_m/D_s)$   
 $f \geq 30$  MHz, extrapolation factor of 20 dB/decade of distance.  $F_d = 20\log(D_m/D_s)$   
 Where:  
 $F_d$  = Distance factor in dB  
 $D_m$  = Measurement distance in meters  
 $D_s$  = Specification distance in meters
2. Field strength(dB $\mu$ V/m) = Level(dB $\mu$ V) + CF (dB) + or DCF(dB)
3. Margin(dB) = Limit(dB $\mu$ V/m) – Field strength(dB $\mu$ V/m)
4. Emissions below 18 GHz were measured at a 3 meter test distance while emissions above 18 GHz were measured at a 1 meter test distance with the application of a distance correction factor.
5. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.
6. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
7. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

**FCC Limit**

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

| Frequency (MHz) | Distance (Meters) | Radiated ( $\mu$ V/m) |
|-----------------|-------------------|-----------------------|
| 0.009 ~ 0.490   | 300               | 2400/F(kHz)           |
| 0.490 ~ 1.705   | 30                | 24000/F(kHz)          |
| 1.705 ~ 30.0    | 30                | 30                    |
| 30 ~ 88         | 3                 | 100**                 |
| 88 ~ 216        | 3                 | 150**                 |
| 216 ~ 960       | 3                 | 200**                 |
| Above 960       | 3                 | 500                   |

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

**IC Limit**

According to RSS-Gen, Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits :

| Frequency (MHz) | Distance (Meters) | Radiated ( $\mu\text{W/m}$ ) |
|-----------------|-------------------|------------------------------|
| 0.009 ~ 0.490   | 300               | $2\,400 / F(\text{kHz})$     |
| 0.490 ~ 1.705   | 30                | $24\,000 / F(\text{kHz})$    |
| 1.705 ~ 30.0    | 30                | 30                           |
| 30 ~ 88         | 3                 | 100                          |
| 88 ~ 216        | 3                 | 150                          |
| 216 ~ 960       | 3                 | 200                          |
| Above 960*      | 3                 | 500                          |

\* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

**Note:** Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

**Duty cycle**

Regarding to KDB 558074 D01\_v05 r02, 6. Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

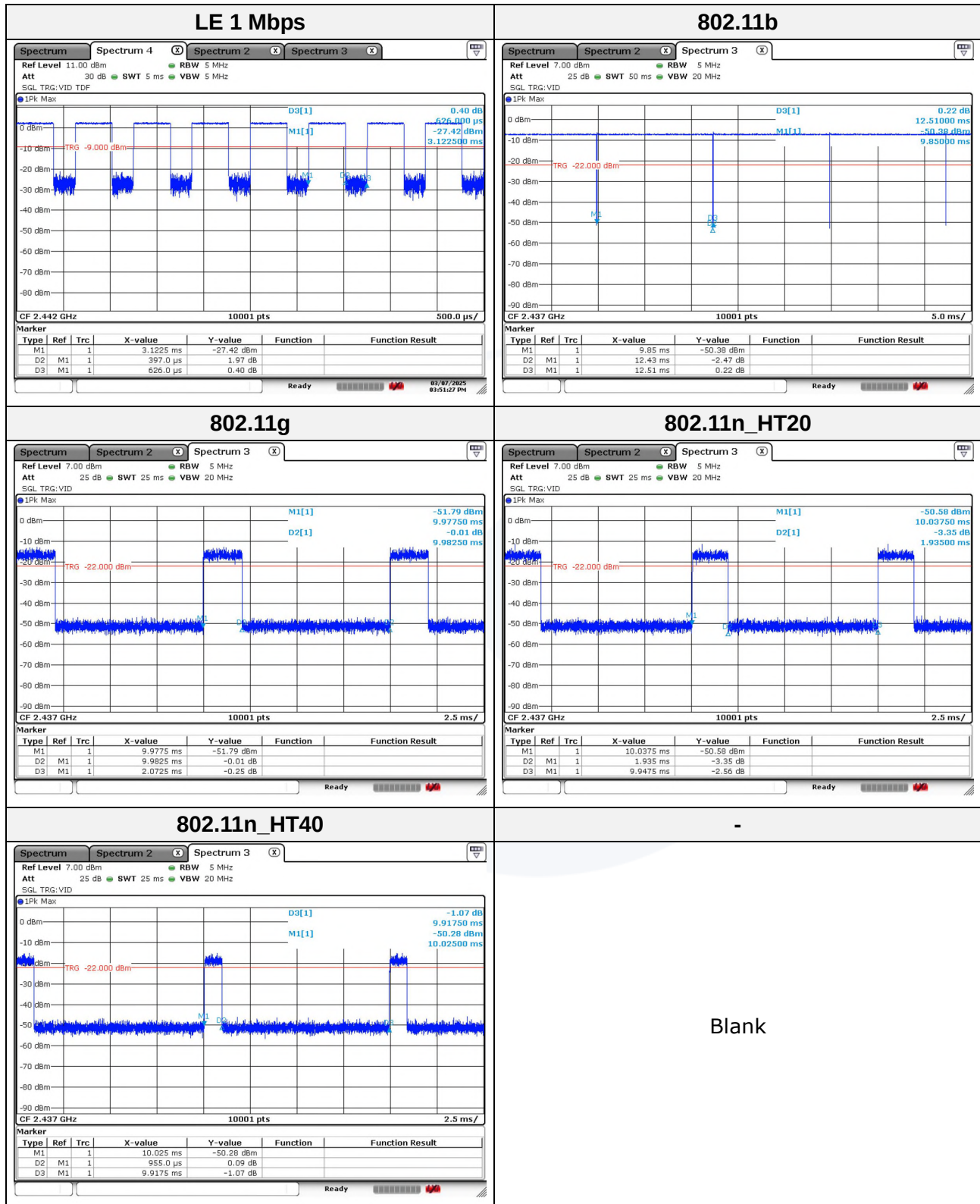
- A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
- The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal.

| Mode         | T <sub>on</sub> time<br>(ms) | Period<br>(ms) | Duty cycle<br>(Linear) | Duty cycle<br>(%) | Duty cycle correction<br>factor<br>(dB) |
|--------------|------------------------------|----------------|------------------------|-------------------|-----------------------------------------|
| LE 1 Mbps    | 0.397                        | 0.626          | 0.63                   | 63.42             | 2.01                                    |
| 802.11b      | 12.430                       | 12.510         | 0.99                   | 99.36             | 0.04                                    |
| 802.11g      | 2.073                        | 9.983          | 0.21                   | 20.77             | 6.78                                    |
| 802.11n_HT20 | 1.935                        | 9.948          | 0.19                   | 19.45             | 7.21                                    |
| 802.11n_HT40 | 0.955                        | 9.918          | 0.10                   | 9.63              | 10.00                                   |

Duty cycle (Linear) = T<sub>on</sub> time/Period

DCF(Duty cycle correction factor (dB)) = 10log(1/duty cycle)





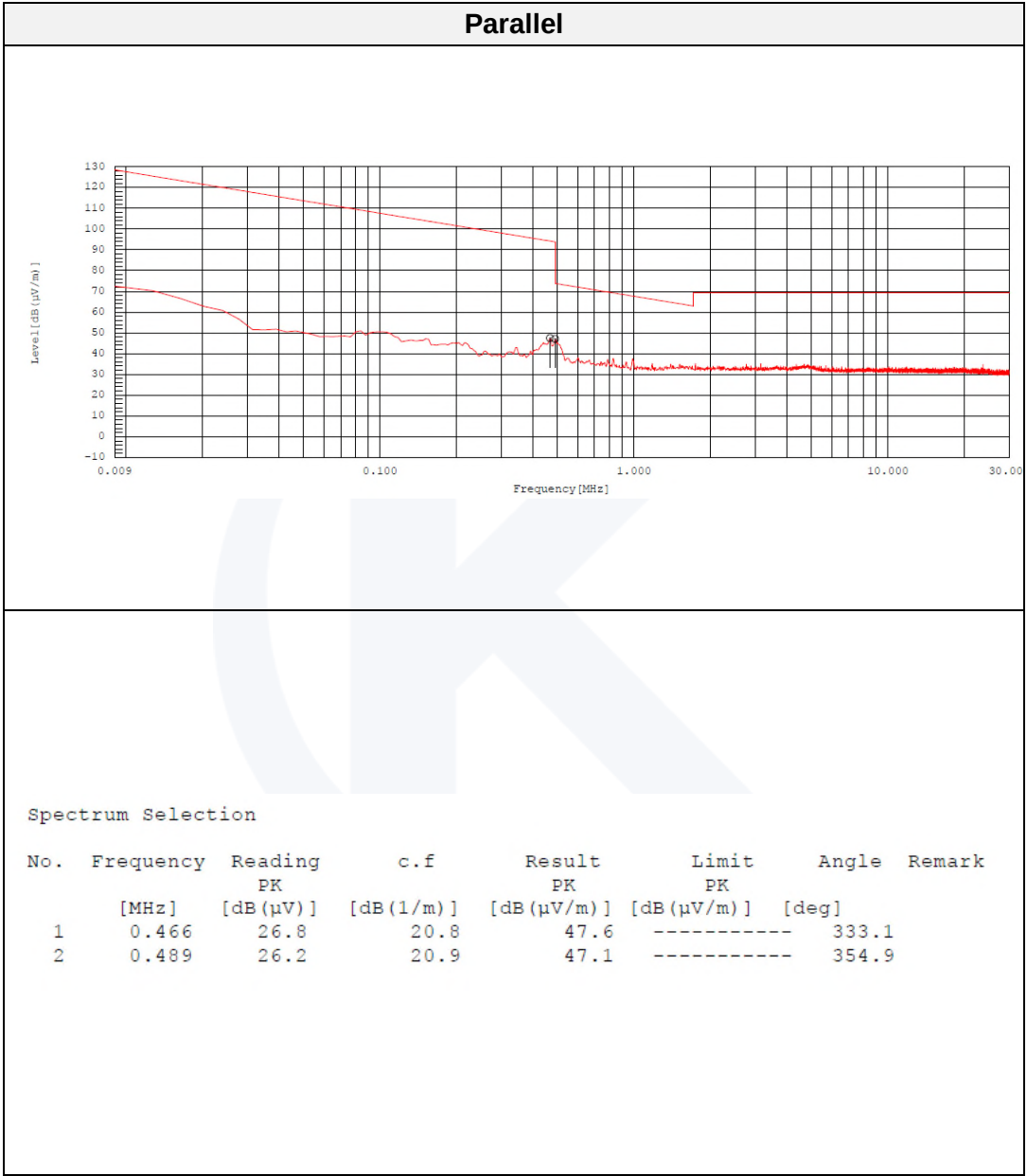
Note.

1. Tested with the maximum duty that can be set on the EUT.



Test results (Below 30 MHz)

Mode: LE 1 Mbps\_DC 12 V  
Distance of measurement: 3 meter  
Channel: 00 (Worst case)



Note.

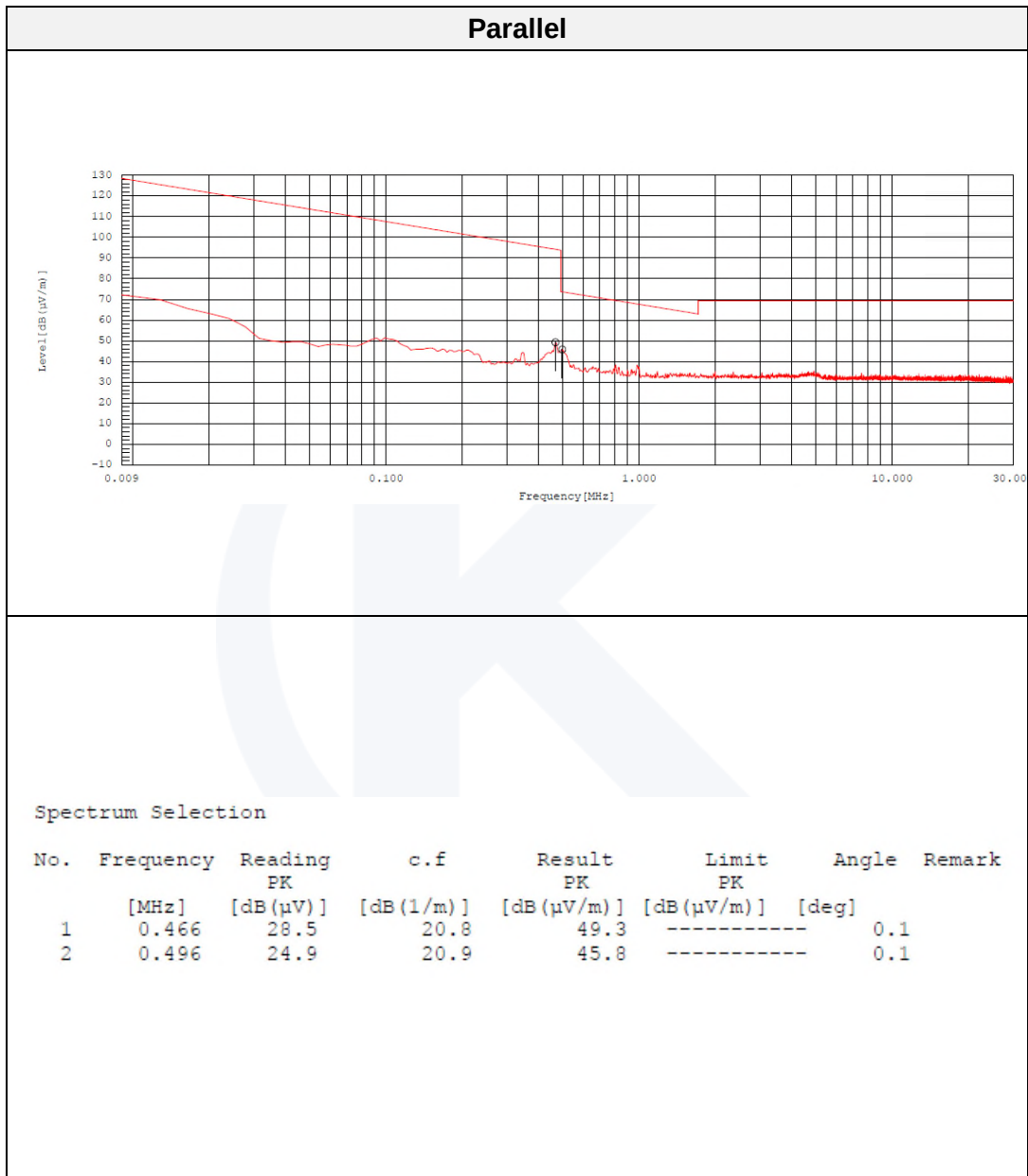
1. No spurious emission were detected under 30 MHz, Above data is peak result.



Mode: LE 1 Mbps\_DC 24 V

Distance of measurement: 3 meter

Channel: 00 (Worst case)

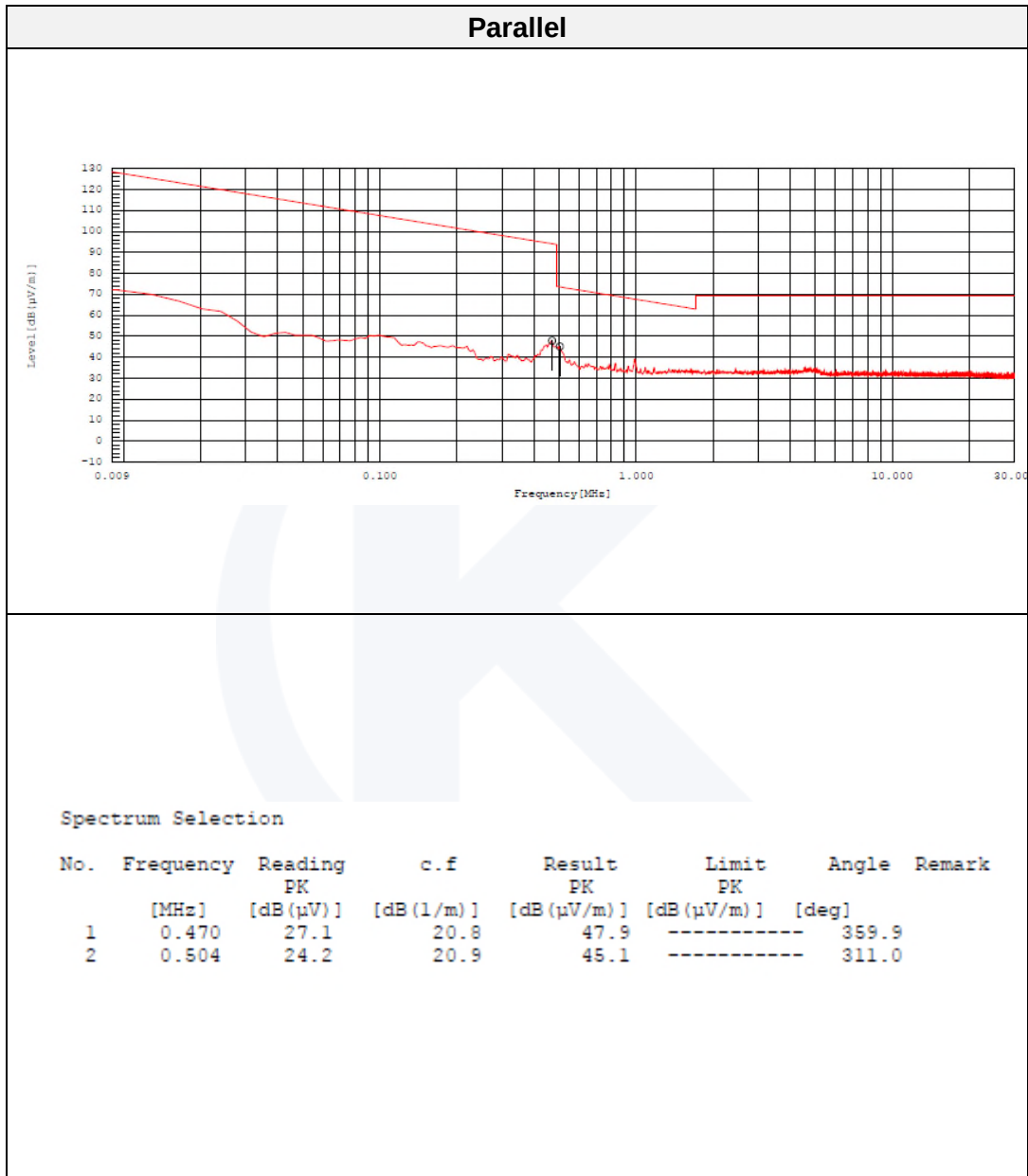


Note.

1. No spurious emission were detected under 30 MHz, Above data is peak result.



Mode: 802.11b (Worst case)\_DC 12 V  
Distance of measurement: 3 meter  
Channel: 06 (Worst case)

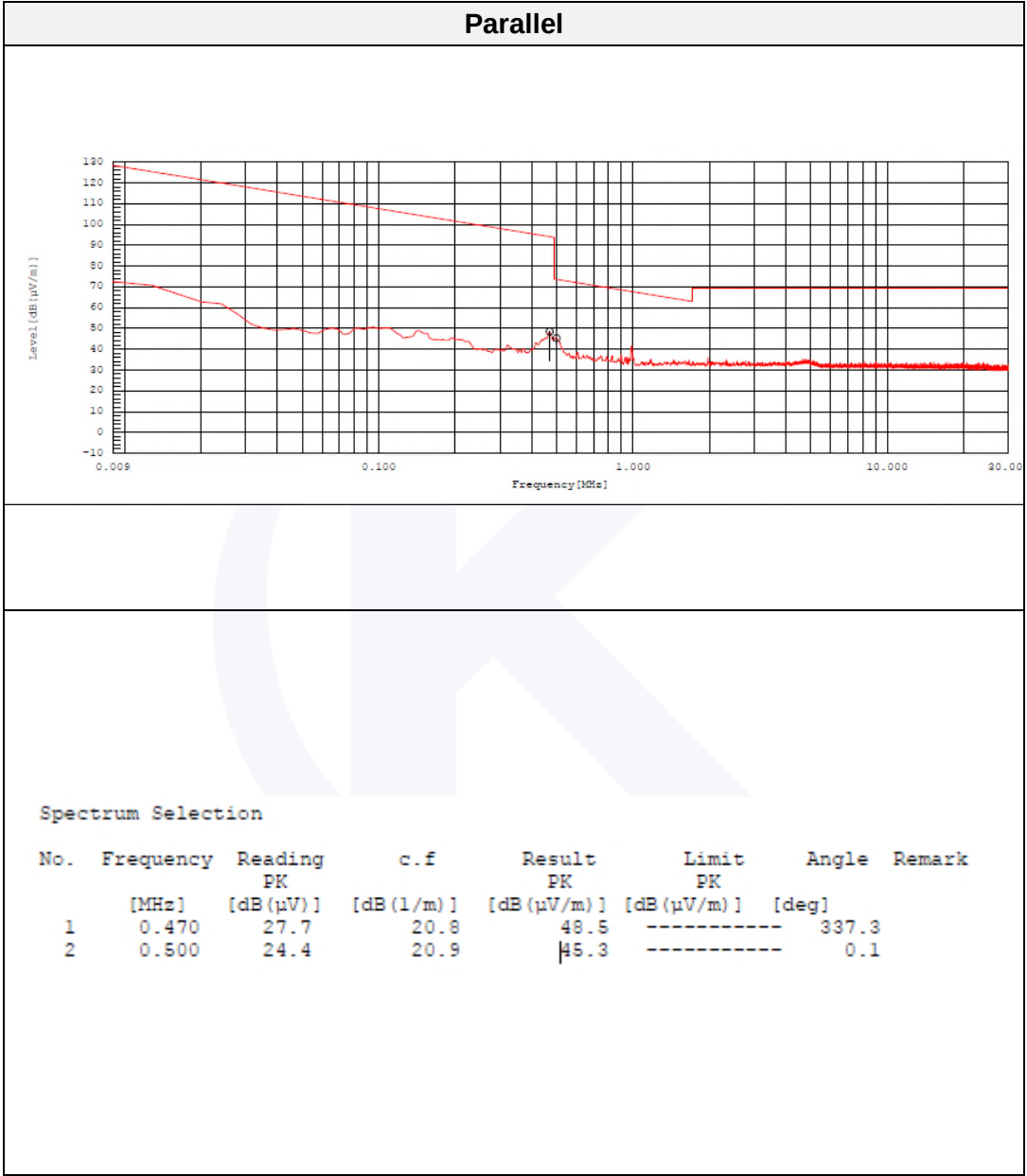


Note.

1. No spurious emission were detected under 30 MHz, Above data is peak result.



Mode: 802.11b (Worst case)\_DC 24 V  
Distance of measurement: 3 meter  
Channel: 06 (Worst case)



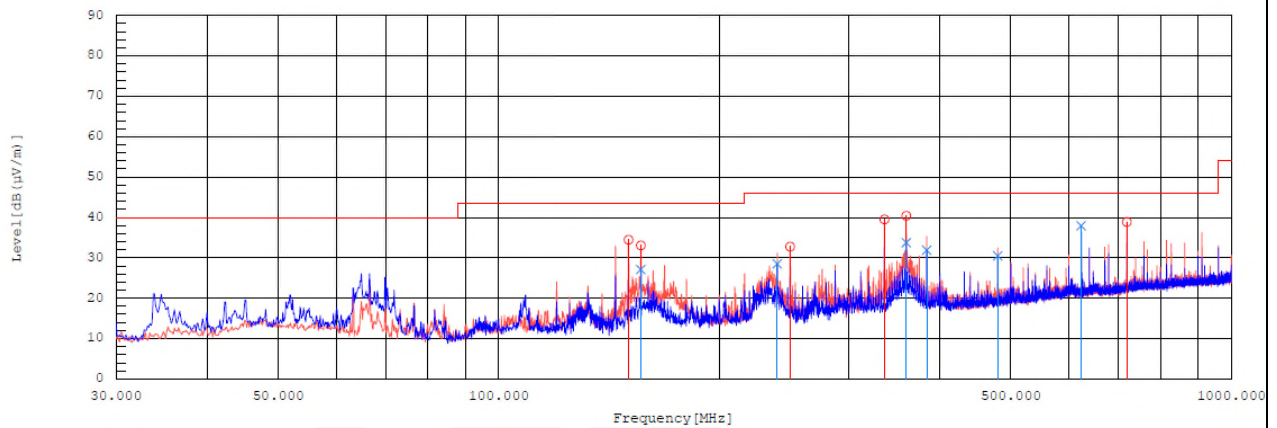
Note.  
1. No spurious emission were detected under 30 MHz, Above data is peak result.

**Test results (Below 1 000 MHz)**

Mode: LE 1 Mbps\_DC 12 V

Distance of measurement: 3 meter

Channel: 00 (Worst case)

**Horizontal // Vertical****Final Result**

| No. | Frequency<br>[MHz] | Pol | Reading<br>QP<br>[dB (μV)] | c.f<br>[dB (1/m)] | Result<br>QP<br>[dB (μV/m)] | Limit<br>QP<br>[dB (μV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|----------------------------|-------------------|-----------------------------|----------------------------|----------------------|----------------|----------------|--------|
| 1   | 150.401            | H   | 51.6                       | -17.1             | 34.5                        | 43.5                       | 9.0                  | 213.0          | 95.4           |        |
| 2   | 156.343            | H   | 49.7                       | -16.6             | 33.1                        | 43.5                       | 10.4                 | 211.0          | 73.2           |        |
| 3   | 156.343            | V   | 43.7                       | -16.6             | 27.1                        | 43.5                       | 16.4                 | 100.0          | 97.2           |        |
| 4   | 240.005            | V   | 40.5                       | -12.0             | 28.5                        | 46.0                       | 17.5                 | 119.0          | 0.3            |        |
| 5   | 249.948            | H   | 44.5                       | -11.7             | 32.8                        | 46.0                       | 13.2                 | 100.0          | 113.3          |        |
| 6   | 336.035            | H   | 48.4                       | -8.9              | 39.5                        | 46.0                       | 6.5                  | 100.0          | 288.8          |        |
| 7   | 360.043            | H   | 48.6                       | -8.2              | 40.4                        | 46.0                       | 5.6                  | 103.0          | 221.6          |        |
| 8   | 360.043            | V   | 41.9                       | -8.2              | 33.7                        | 46.0                       | 12.3                 | 142.0          | 359.9          |        |
| 9   | 383.929            | V   | 39.9                       | -8.0              | 31.9                        | 46.0                       | 14.1                 | 157.0          | 22.6           |        |
| 10  | 479.959            | V   | 36.6                       | -6.1              | 30.5                        | 46.0                       | 15.5                 | 110.0          | 30.8           |        |
| 11  | 624.004            | V   | 41.1                       | -3.2              | 37.9                        | 46.0                       | 8.1                  | 107.0          | 226.2          |        |
| 12  | 720.034            | H   | 40.8                       | -1.9              | 38.9                        | 46.0                       | 7.1                  | 123.0          | 0.0            |        |



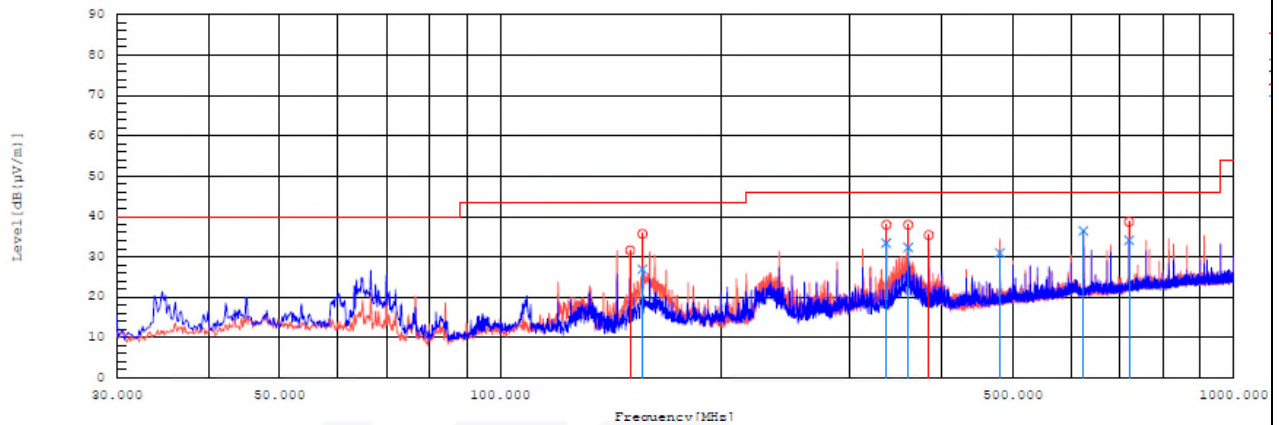


Mode: LE 1 Mbps\_DC 24 V

Distance of measurement: 3 meter

Channel: 00 (Worst case)

## Horizontal // Vertical

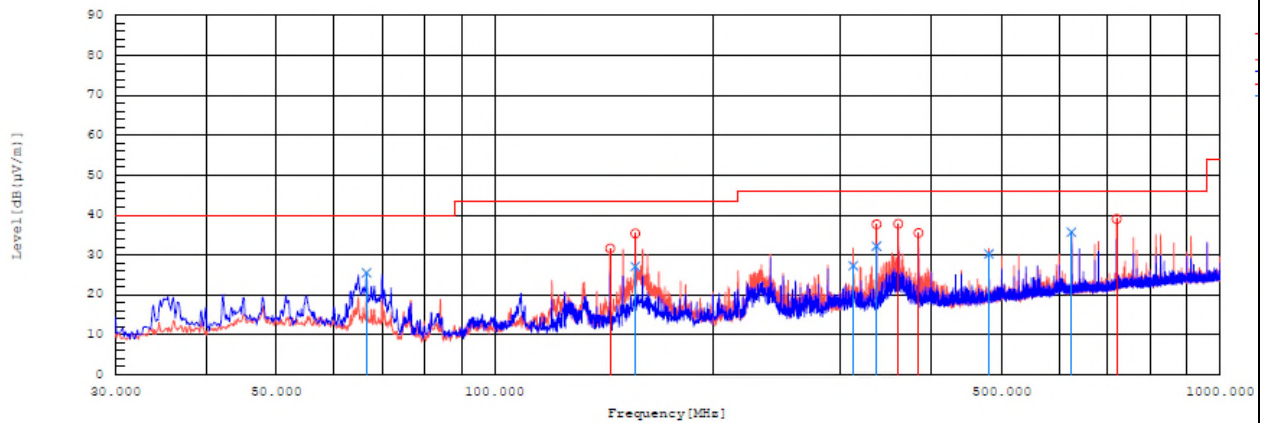


## Final Result

| No. | Frequency<br>[MHz] | Pol | Reading<br>QP<br>[dB(μV)] | c.f<br>[dB(1/m)] | Result<br>QP<br>[dB(μV/m)] | Limit<br>QP<br>[dB(μV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|---------------------------|------------------|----------------------------|---------------------------|----------------------|----------------|----------------|--------|
| 1   | 150.401            | H   | 48.7                      | -17.1            | 31.6                       | 43.5                      | 11.9                 | 213.0          | 265.2          |        |
| 2   | 156.343            | H   | 52.3                      | -16.6            | 35.7                       | 43.5                      | 7.8                  | 192.0          | 46.0           |        |
| 3   | 156.343            | V   | 43.5                      | -16.6            | 26.9                       | 43.5                      | 16.6                 | 107.0          | 45.7           |        |
| 4   | 335.914            | V   | 42.3                      | -8.9             | 33.4                       | 46.0                      | 12.6                 | 117.0          | 333.6          |        |
| 5   | 336.035            | H   | 46.8                      | -8.9             | 37.9                       | 46.0                      | 8.1                  | 109.0          | 227.5          |        |
| 6   | 360.043            | H   | 46.1                      | -8.2             | 37.9                       | 46.0                      | 8.1                  | 100.0          | 74.0           |        |
| 7   | 360.043            | V   | 40.5                      | -8.2             | 32.3                       | 46.0                      | 13.7                 | 146.0          | 0.0            |        |
| 8   | 383.929            | H   | 43.4                      | -8.0             | 35.4                       | 46.0                      | 10.6                 | 103.0          | 53.7           |        |
| 9   | 479.959            | V   | 37.1                      | -6.1             | 31.0                       | 46.0                      | 15.0                 | 107.0          | 289.7          |        |
| 10  | 624.004            | V   | 39.6                      | -3.2             | 36.4                       | 46.0                      | 9.6                  | 117.0          | 27.4           |        |
| 11  | 720.034            | H   | 40.6                      | -1.9             | 38.7                       | 46.0                      | 7.3                  | 107.0          | 332.6          |        |
| 12  | 720.034            | V   | 36.0                      | -1.9             | 34.1                       | 46.0                      | 11.9                 | 158.0          | 162.6          |        |



Mode: 802.11b (Worst case)\_DC 12 V  
Distance of measurement: 3 meter  
Channel: 06 (Worst case)

**Horizontal // Vertical****Final Result**

| No. | Frequency<br>[MHz] | Pol | Reading<br>QP<br>[dB (μV)] | c.f<br>[dB (1/m)] | Result<br>QP<br>[dB (μV/m)] | Limit<br>QP<br>[dB (μV/m)] | Margin<br>QP<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark |
|-----|--------------------|-----|----------------------------|-------------------|-----------------------------|----------------------------|----------------------|----------------|----------------|--------|
| 1   | 66.618             | V   | 40.9                       | -15.4             | 25.5                        | 40.0                       | 14.5                 | 103.0          | 337.5          |        |
| 2   | 144.339            | H   | 48.4                       | -16.8             | 31.6                        | 43.5                       | 11.9                 | 202.0          | 72.6           |        |
| 3   | 156.343            | H   | 52.0                       | -16.6             | 35.4                        | 43.5                       | 8.1                  | 211.0          | 94.4           |        |
| 4   | 156.343            | V   | 43.7                       | -16.6             | 27.1                        | 43.5                       | 16.4                 | 103.0          | 97.2           |        |
| 5   | 312.028            | V   | 37.2                       | -9.9              | 27.3                        | 46.0                       | 18.7                 | 108.0          | 337.5          |        |
| 6   | 336.035            | H   | 46.6                       | -8.9              | 37.7                        | 46.0                       | 8.3                  | 107.0          | 22.5           |        |
| 7   | 336.035            | V   | 41.1                       | -8.9              | 32.2                        | 46.0                       | 13.8                 | 158.0          | 66.5           |        |
| 8   | 360.043            | H   | 46.0                       | -8.2              | 37.8                        | 46.0                       | 8.2                  | 114.0          | 22.5           |        |
| 9   | 383.929            | H   | 43.5                       | -8.0              | 35.5                        | 46.0                       | 10.5                 | 110.0          | 22.5           |        |
| 10  | 479.959            | V   | 36.3                       | -6.1              | 30.2                        | 46.0                       | 15.8                 | 120.0          | 332.6          |        |
| 11  | 624.004            | V   | 38.9                       | -3.2              | 35.7                        | 46.0                       | 10.3                 | 107.0          | 53.8           |        |
| 12  | 720.034            | H   | 40.9                       | -1.9              | 39.0                        | 46.0                       | 7.0                  | 136.0          | 22.5           |        |





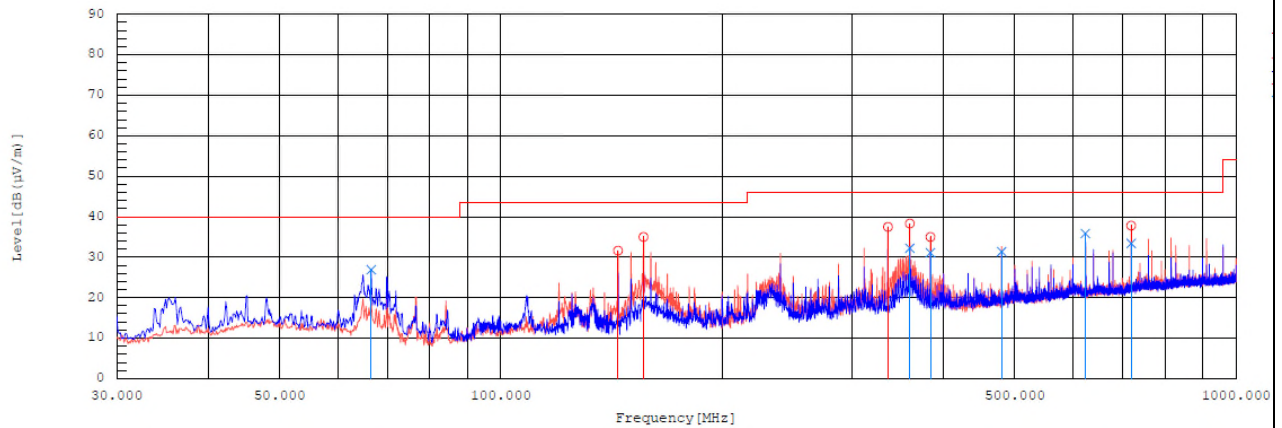
Report No. : KES-RF250059-R1

Mode: 802.11b (Worst case)\_DC 24 V

Distance of measurement: 3 meter

Channel: 06 (Worst case)

## Horizontal // Vertical



## Final Result

| No. | Frequency | Pol | Reading  | c.f       | Result     | Limit      | Margin | Height | Angle | Remark |
|-----|-----------|-----|----------|-----------|------------|------------|--------|--------|-------|--------|
|     | [MHz]     |     | QP       |           | QP         | QP         | QP     |        |       |        |
|     |           |     | [dB(μV)] | [dB(1/m)] | [dB(μV/m)] | [dB(μV/m)] | [dB]   | [cm]   | [deg] |        |
| 1   | 66.618    | V   | 42.3     | -15.4     | 26.9       | 40.0       | 13.1   | 103.0  | 355.9 |        |
| 2   | 144.339   | H   | 48.4     | -16.8     | 31.6       | 43.5       | 11.9   | 189.0  | 67.7  |        |
| 3   | 156.343   | H   | 51.6     | -16.6     | 35.0       | 43.5       | 8.5    | 206.0  | 67.7  |        |
| 4   | 336.035   | H   | 46.4     | -8.9      | 37.5       | 46.0       | 8.5    | 107.0  | 249.7 |        |
| 5   | 359.921   | V   | 40.4     | -8.2      | 32.2       | 46.0       | 13.8   | 159.0  | 29.7  |        |
| 6   | 360.043   | H   | 46.5     | -8.2      | 38.3       | 46.0       | 7.7    | 107.0  | 273.4 |        |
| 7   | 383.929   | V   | 39.1     | -8.0      | 31.1       | 46.0       | 14.9   | 103.0  | 22.5  |        |
| 8   | 383.929   | H   | 43.0     | -8.0      | 35.0       | 46.0       | 11.0   | 107.0  | 249.7 |        |
| 9   | 479.959   | V   | 37.5     | -6.1      | 31.4       | 46.0       | 14.6   | 101.0  | 333.5 |        |
| 10  | 624.004   | V   | 39.0     | -3.2      | 35.8       | 46.0       | 10.2   | 114.0  | 67.2  |        |
| 11  | 720.034   | V   | 35.3     | -1.9      | 33.4       | 46.0       | 12.6   | 110.0  | 333.5 |        |
| 12  | 720.034   | H   | 39.7     | -1.9      | 37.8       | 46.0       | 8.2    | 100.0  | 0.1   |        |

**Test results (Above 1 000 MHz)**

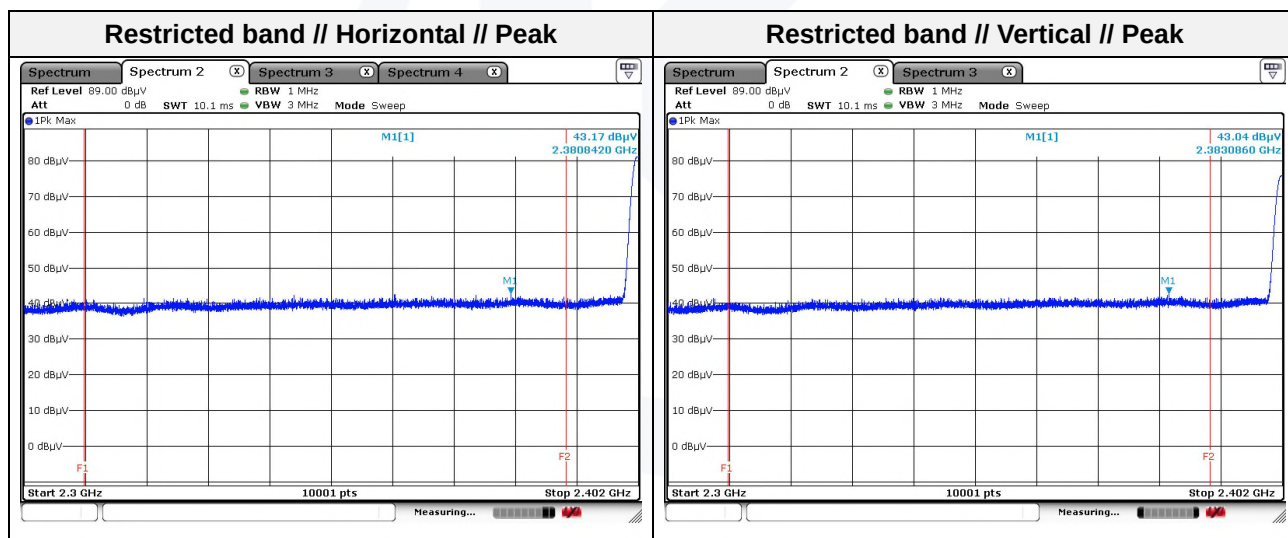
Mode: DC 12 V\_LE 1 Mbps  
Distance of measurement: 3 meter  
Channel: 00

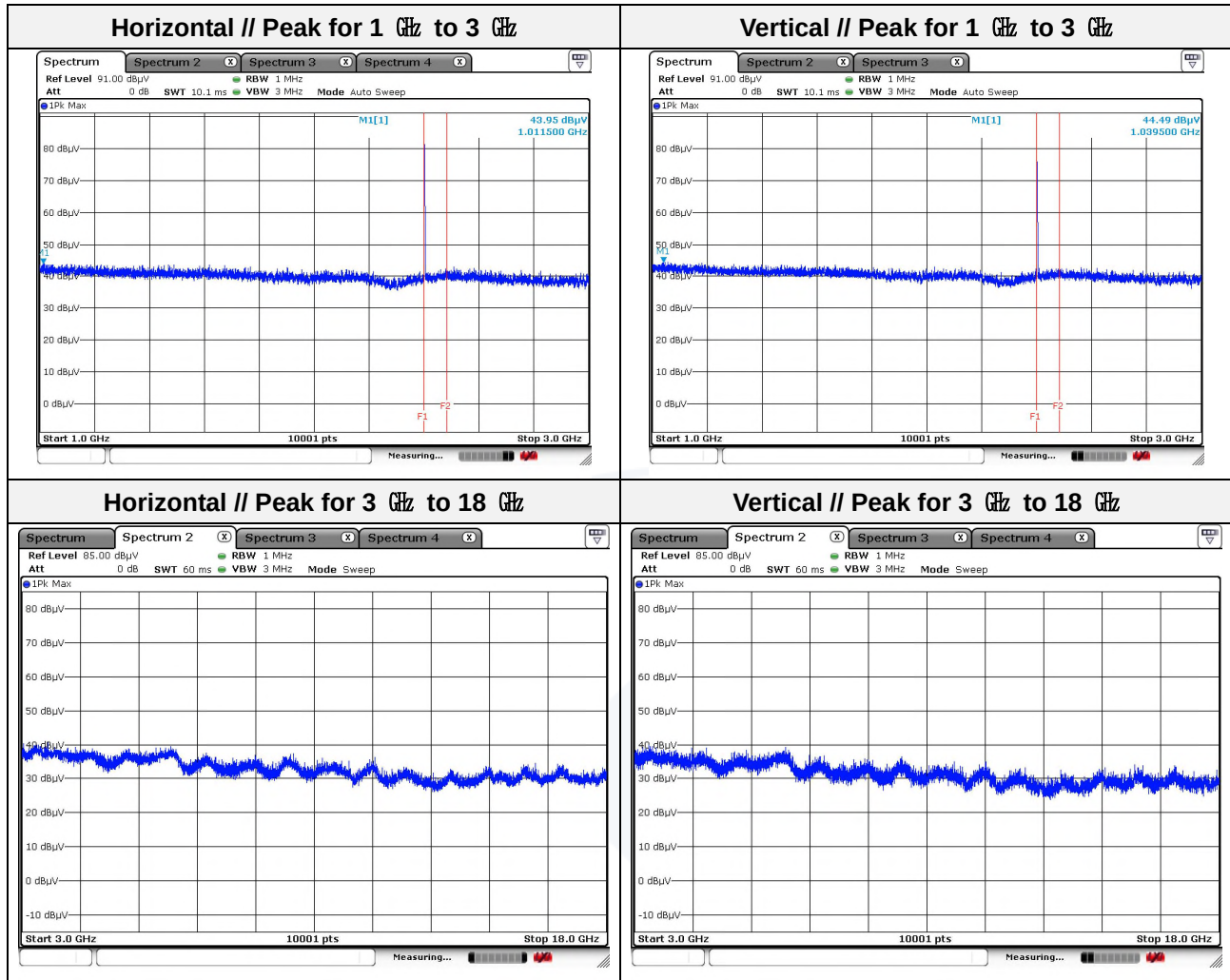
**- Spurious**

| Frequency (MHz) | Level (dB $\mu$ V) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------------|-------------|-----------------|---------|----------|-------------------------------|----------------------|-------------|
| 1 011.50        | 43.95              | Peak        | H               | -7.82   | -        | 36.13                         | 74.00                | 37.87       |
| 1 039.50        | 44.49              | Peak        | V               | -7.67   | -        | 36.82                         | 74.00                | 37.18       |

**- Band edge**

| Frequency (MHz) | Level (dB $\mu$ V) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------------|-------------|-----------------|---------|----------|-------------------------------|----------------------|-------------|
| 2 380.84        | 43.17              | Peak        | H               | -2.13   | -        | 41.04                         | 74.00                | 32.96       |
| 2 383.09        | 43.04              | Peak        | V               | -2.13   | -        | 40.91                         | 74.00                | 33.09       |





Note.

1. No spurious emission were detected above 3 GHz.
2. Average test would be performed if the peak result were greater than the average limit.

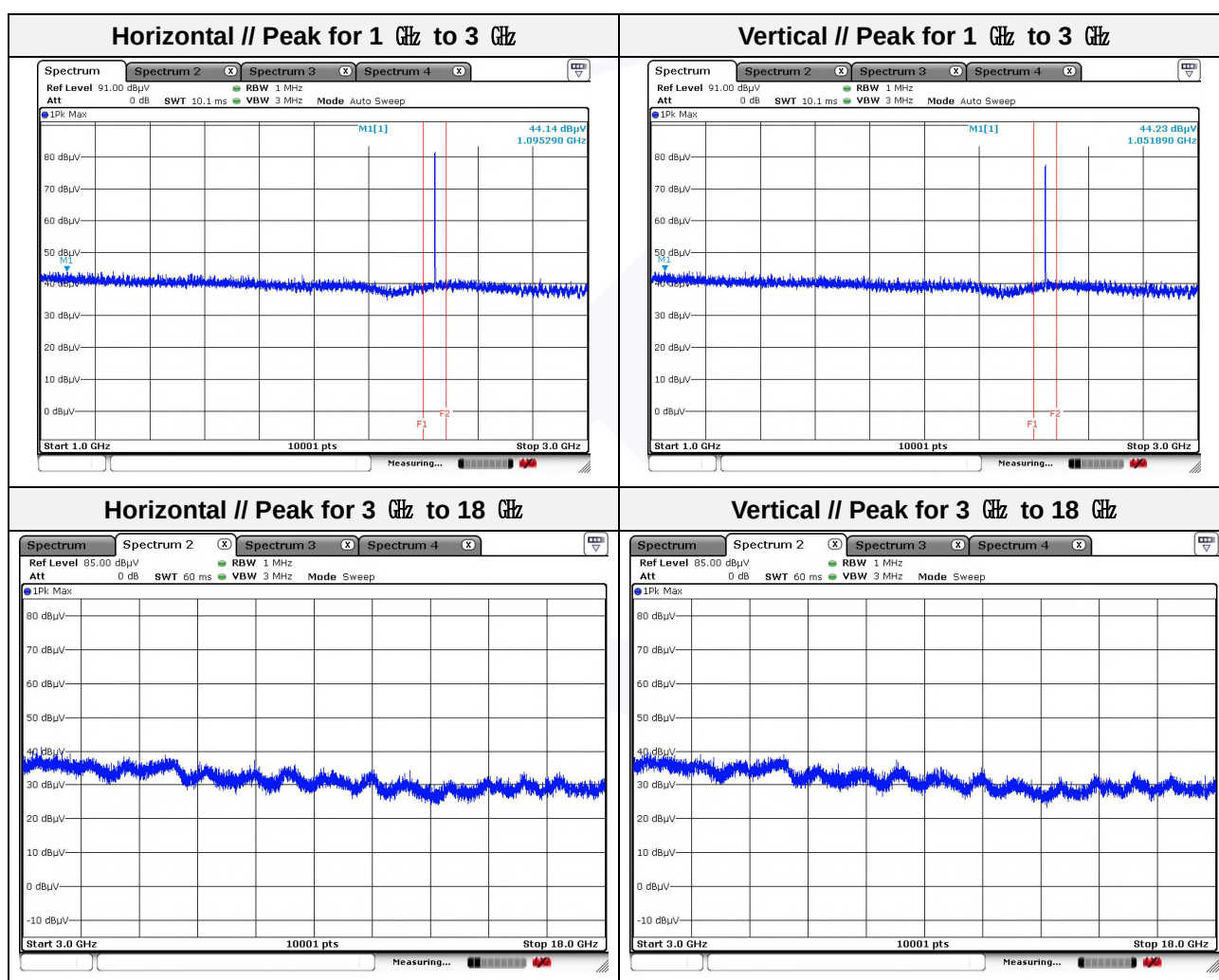


Report No. : KES-RF250059-R1

Mode: DC 12 V\_LE 1 Mbps  
Distance of measurement: 3 meter  
Channel: 20

**- Spurious**

| Frequency (MHz) | Level (dBμV) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|--------------|-------------|-----------------|---------|----------|-------------------------|----------------|-------------|
| 1 051.89        | 44.23        | Peak        | V               | -7.61   | -        | 36.62                   | 74.00          | 37.38       |
| 1 095.29        | 44.14        | Peak        | H               | -7.38   | -        | 36.76                   | 74.00          | 37.24       |



Note.

1. No spurious emission were detected above 3 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Report No. : KES-RF250059-R1

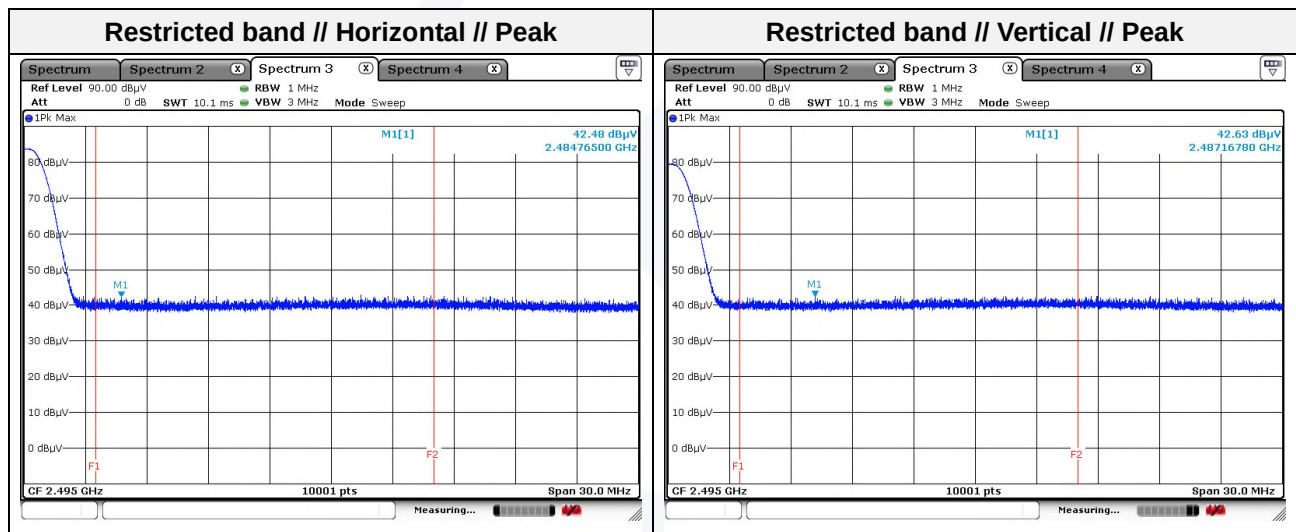
Mode: DC 12 V\_LE 1 Mbps  
Distance of measurement: 3 meter  
Channel: 39

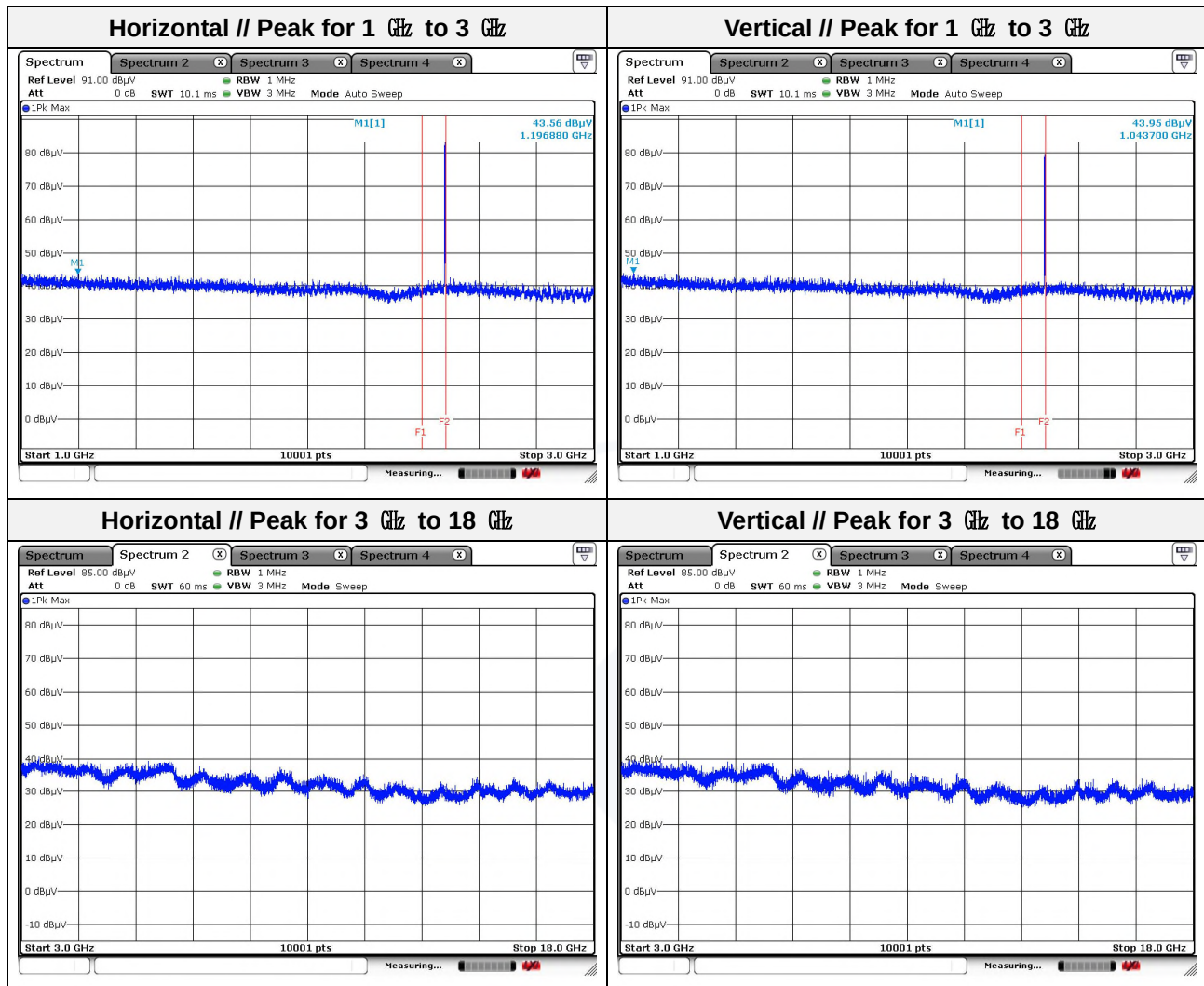
**- Spurious**

| Frequency (MHz) | Level (dB $\mu$ V) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------------|-------------|-----------------|---------|----------|-------------------------------|----------------------|-------------|
| 1 043.70        | 43.95              | Peak        | V               | -7.65   | -        | 36.30                         | 74.00                | 37.70       |
| 1 196.88        | 43.56              | Peak        | H               | -6.85   | -        | 36.71                         | 74.00                | 37.29       |

**- Band edge**

| Frequency (MHz) | Level (dB $\mu$ V) | Detect mode | Ant. Pol. (H/V) | CF (dB) | DCF (dB) | Field strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|--------------------|-------------|-----------------|---------|----------|-------------------------------|----------------------|-------------|
| 2 484.77        | 42.48              | Peak        | H               | -1.91   | -        | 40.57                         | 74.00                | 33.43       |
| 2 487.17        | 42.63              | Peak        | V               | -1.90   | -        | 41.40                         | 74.00                | 32.60       |





Note.

1. No spurious emission were detected above 3 GHz.
2. Average test would be performed if the peak result were greater than the average limit.