






TEST REPORT

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| <p>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</p> | <p>Report No.: KR20-SRF0054-A Page (1) of (19)</p> |  |
| <p>1. Client</p> <ul style="list-style-type: none"> ◦ Name : HYUNDAI MOBIS CO., LTD. ◦ Address : 203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea ◦ Date of Receipt : 2019-09-20 <p>2. Use of Report : Certification</p> <p>3. Name of Product and Model : WIDE AVN / ATC32HYAN</p> <p>4. Manufacturer and Country of Origin : Hyundai Mobis., Ltd. / Korea</p> <p>5. FCC ID : TQ8-ATC32HYAN</p> <p>6. Date of Test : 2019-10-16 to 2020-02-20</p> <p>7. Test Standards : FCC Part 2 FCC Part 22 subpart H FCC Part 24 subpart E</p> <p>8. Test Results : Refer to the test result in the test report</p> | | |
| Affirmation | <p>Tested by</p>  <p>Name : Euijung Kim (Signature)</p> | <p>Technical Manager</p>  <p>Name : Heesu Ahn (Signature)</p> |
| 2020-02-21 | | |
| <h2>KCTL Inc.</h2> | | |
| <p>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.</p> | | |

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Report No.:
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**Report revision history**

| Date | Revision | Page No |
|------------|----------------|-----------------|
| 2020-02-09 | Initial report | - |
| 2020-02-21 | Updated | 3,6,16,17,18,19 |
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Note. The report No. KR20-SRF0054 is superseded by the report No. KR20-SRF0054-A.



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1. General information

Client : HYUNDAI MOBIS CO., LTD.
Address : 203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea
Manufacturer : HYUNDAI MOBIS CO., LTD.
Address : 95, Sayang 2-Gil, Munbaek-Myeon, Jincheon-Gun, Chungcheongbuk-Do
27862 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-20080, G-20078, C-20059, T-20056
Industry Canada Registration No. : 8035A
KOLAS No.: KT231

2. Device information

Equipment under test : WIDE AVN
Model : ATC32HYAN
Derivative model : ATC32HCAN, ATC35HCAN
Frequency range : 779.5 MHz ~ 784.5 MHz (LTE Band 13)
824.7 MHz ~ 848.3 MHz (LTE Band 5)
1 710.7 MHz ~ 1 754.3 MHz (LTE Band 4)
1 850.7 MHz ~ 1 909.3 MHz (LTE Band 2)
824.7 MHz ~ 848.31 MHz (CDMA BC0)
1 851.25 MHz ~ 1 908.75 MHz (CDMA BC1)
Modulation technique : QPSK, 16-QAM (LTE)
QPSK (CDMA)
Power source : DC 14.4 V
Antenna specification : C-PAD Antenna(LTE), Shark Antenna(CDMA)
Software version : MQ4.USA.0000.V028.001.190821
Hardware version : MQ4.USA.STD_AVN_G5_WIDE.004.001
Test device serial No. : N/A
Operation temperature : -20 °C ~ 70 °C

2.1. Information about derivative model

The difference between basic model and derivative models is:

The derivative models have a different product identification number.

ATC32HCAN(96560 P4720), ATC35HCAN(96560 P4920)

2.2. Frequency/channel operations

This device contains the following capabilities:

LTE Band 13, LTE Band 5, LTE Band 4, LTE Band 2, CDMA 850/1900(BC0, BC1)

CDMA 850

| Ch. | Frequency (MHz) |
|------|-----------------|
| 1013 | 824.70 |
| 384 | 836.52 |
| 777 | 848.31 |

Table 2.2.1. BC0

CDMA1900

| Ch. | Frequency (MHz) |
|------|-----------------|
| 25 | 1 851.25 |
| 600 | 1 880.00 |
| 1175 | 1 908.75 |

Table 2.2.2. BC1

3. Maximum ERP/EIRP power

CDMA 850

| Mode | Tx frequency (MHz) | Emission designator | ERP | |
|------|--------------------|---------------------|------------------|----------------|
| | | | Max. power (dBm) | Max. power (W) |
| BC0 | 824.70 ~ 848.31 | 1M28F9W | 18.94 | 0.078 |

CDMA 1900

| Mode | Tx frequency (MHz) | Emission designator | EIRP | |
|------|---------------------|---------------------|------------------|----------------|
| | | | Max. power (dBm) | Max. power (W) |
| BC1 | 1 851.25 ~ 1 908.75 | 1M27F9W | 20.54 | 0.113 |

4. Summary of tests

| FCC Part Section(s) | Parameter | Test results |
|-------------------------------------|--|------------------------|
| 2.1046 | Conducted Output Power | N/T ^(note1) |
| 2.1049 | Occupied Bandwidth & 26 dB Bandwidth | N/T ^(note1) |
| 2.1051 | Band Edge Emissions at Antenna Terminal | N/T ^(note1) |
| 22.917(a) 24.238(a) | Spurious Emissions at Antenna Terminal | N/T ^(note1) |
| 22.913(d) 24.232(d) | Peak to Average Power Ratio | N/T ^(note1) |
| 2.1055 22.355 24.235 | Frequency stability | N/T ^(note1) |
| 2.1046 22.913(a)(5) 24.232(c) | Effective Radiated Power & Equivalent Isotropic Radiated Power | Pass |
| 2.1053 22.917(a) 24.238(a) | Radiated Spurious Emissions | Pass |

Notes: (N/T: Not Tested, N/A: Not Applicable)

1. This test item was not performed by the request of manufacturer. Please refer to original test report no. F690501/RF-RTL011908-1 issued on Nov. 09, 2017 by SGS Korea Co., Ltd. (Gunpo Laboratory)
2. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations and paging service configurations in the test data.
3. 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.
4. The test procedure(s) in this report were performed in accordance as following.
 - ◆ ANSI C63.26-2015
 - ◆ ANSI/TIA-603-E-2016
 - ◆ KDB 971168 D01 v03r01

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded uncertainty(±) | |
|-----------------------------|-------------------------|---------|
| Radiated spurious emissions | 9 kHz ~ 30 MHz | 2.28 dB |
| | 30 MHz ~ 1 GHz | 3.68 dB |
| | Above 1 GHz | 5.72 dB |

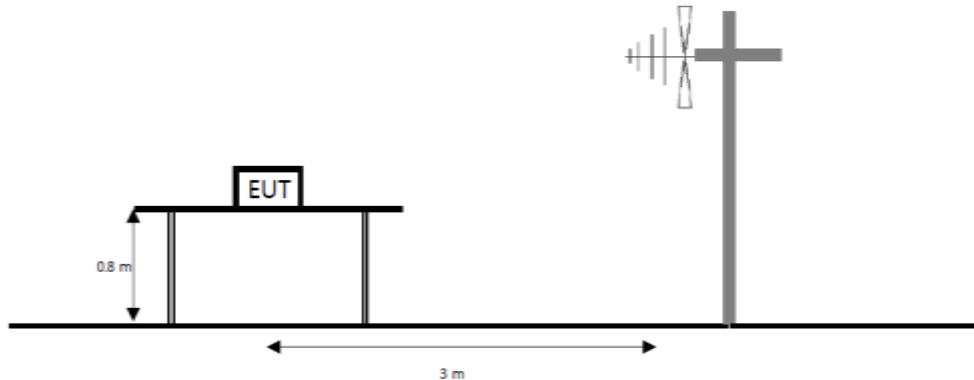


6. Test results

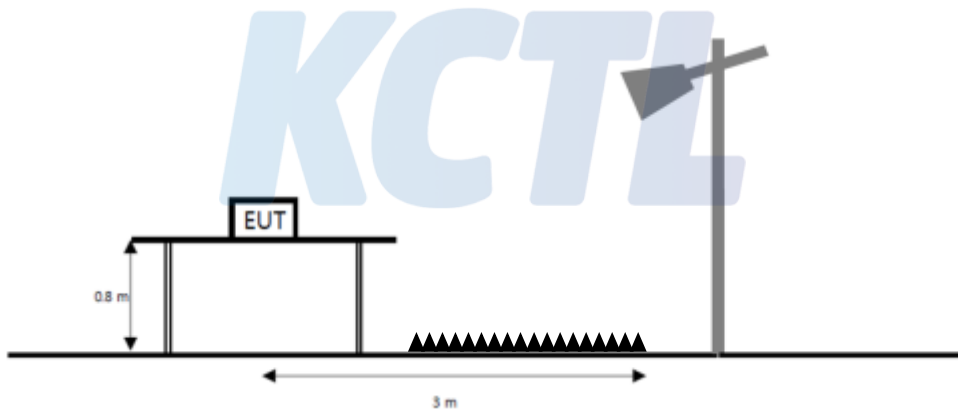
6.1. Radiated Power (ERP/EIRP)

Test setup

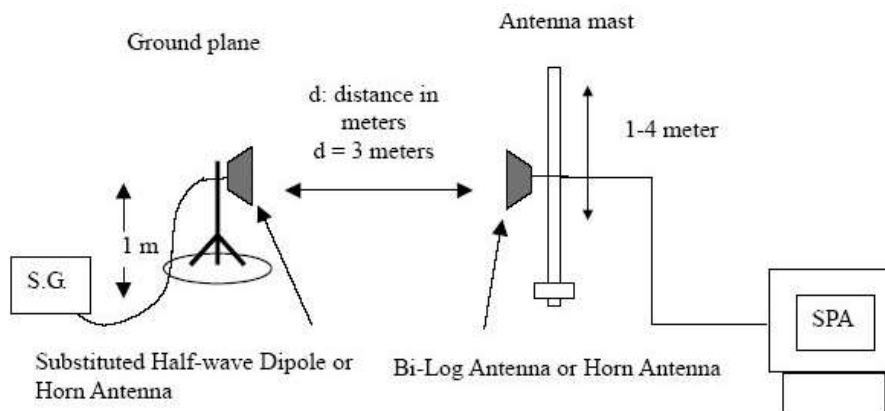
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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.



The diagram below shows the test setup for substituted method.



Limit

According to §22.913(a)(5), the ERP of transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to §24.232(c) mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

Test procedure

971168 D01 v03r01 - Section 5.2.2

ANSI 63.26-2015 – Section 5.2.4.4.1

ANSI/TIA-603-E-2016 - Section 2.2.17

Test settings

- 1) RBW = 1 % to 5 % of the OBW.
- 2) VBW $\geq 3 \times$ RBW.
- 3) SPAN = 2 \times to 3 \times the OBW.
- 4) Number of measurement points in sweep $\geq 2 \times$ span / RBW.
- 5) Sweep time :
 - 1) Auto couple, or
 - 2) $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
- 6) Detector = RMS
- 7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
- 8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
- 9) Trace mode = trace averaging (RMS) over 100 sweeps.
- 10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- 11) Allow trace to fully stabilize.

Notes:

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
The power is calculated by the following formula;
$$Pd(\text{dBm}) = Pg(\text{dBm}) - \text{Cable loss (dB)} + \text{Antenna gain (dB)}$$

Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

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**Test results****CDMA 850**

| Mode | Channel | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|------|---------|-----------|-------|--------------|------|------------------|-------|-------|
| | | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| BC0 | 1013 | 824.70 | H | -0.60 | 3.69 | 23.23 | 18.94 | 0.078 |
| | 384 | 836.52 | H | -0.50 | 3.72 | 22.49 | 18.27 | 0.067 |
| | 777 | 848.31 | H | -0.50 | 3.74 | 21.95 | 17.71 | 0.059 |

CDMA 1900

| Mode | Channel | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|------|---------|-----------|-------|--------------|------|------------------|-------|-------|
| | | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| BC1 | 25 | 1 851.25 | V | 6.18 | 5.74 | 18.63 | 19.07 | 0.081 |
| | 600 | 1 880.00 | V | 6.14 | 5.78 | 19.18 | 19.54 | 0.090 |
| | 1175 | 1 908.75 | V | 6.11 | 5.81 | 20.24 | 20.54 | 0.113 |

Note.

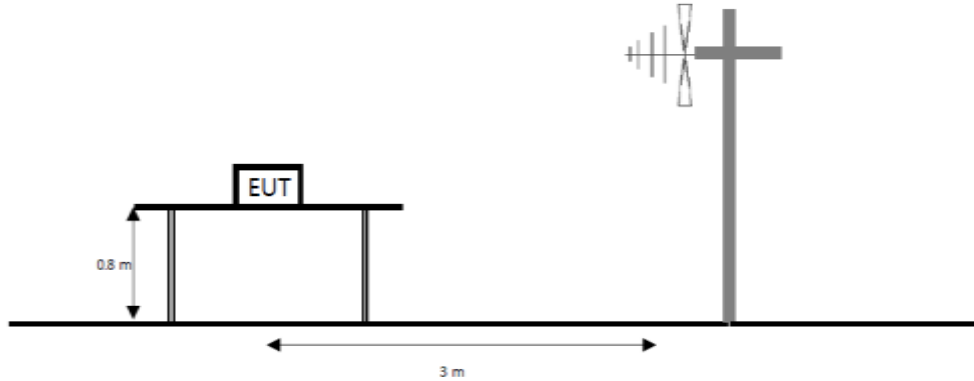
1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)



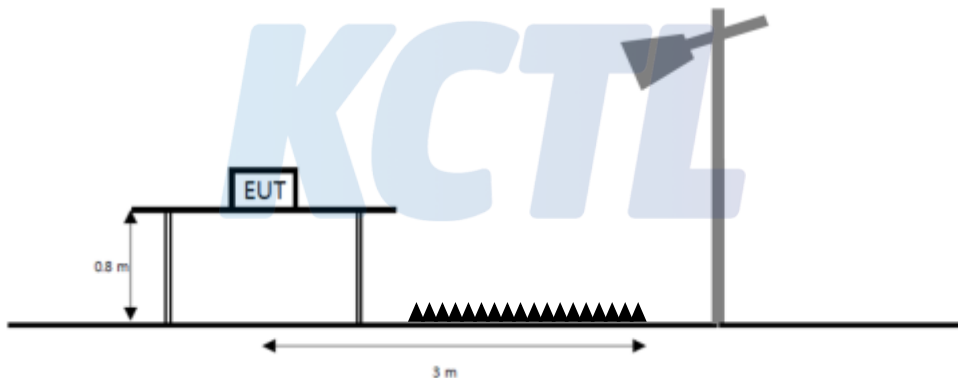
6.2. Radiated Spurious Emissions

Test setup

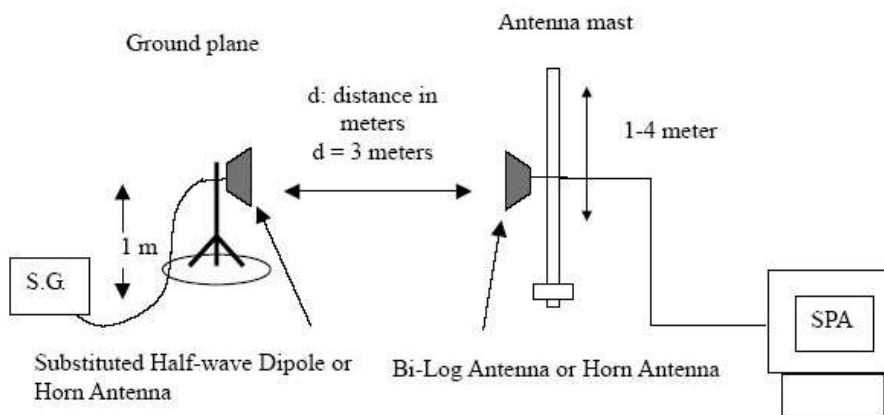
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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.



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), §24.238(a) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P_{\text{Watts}})$ dB.

Test procedure

971168 D01 v03r01 - Section 5.8

ANSI 63.26-2015 – Section 5.5

ANSI/TIA-603-E-2016 - Section 2.2.12

Test settings

- 1) RBW = 1 kHz for below 1 GHz and 1 MHz for above 1 GHz.
- 2) VBW $\geq 3 \times$ RBW.
- 3) Detector = RMS
- 4) Trace mode = Max hold
- 5) Sweep time = Auto couple
- 6) Number of sweep points $\geq 2 \times$ span / RBW
- 7) Allow trace to fully stabilize.

Notes:

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close To normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360° , and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

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

Test mode : CDMA 850

Frequency(MHz) : 824.70

Channel : 1013

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC0 | 1 649.54 | V | 6.42 | 5.36 | -64.16 | -63.10 | -13.00 | 50.10 |
| | 2 384.59 | V | 6.00 | 6.51 | -53.49 | -54.00 | -13.00 | 41.00 |
| | 2 473.59 | H | 6.00 | 6.63 | -57.87 | -58.50 | -13.00 | 45.50 |
| | 3 302.14 | H | 7.36 | 7.67 | -57.79 | -58.10 | -13.00 | 45.10 |
| | 3 406.65 | V | 7.59 | 7.79 | -54.50 | -54.70 | -13.00 | 41.70 |

Test mode : CDMA 850

Frequency(MHz) : 836.50

Channel : 384

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC0 | 1 673.04 | V | 6.39 | 5.40 | -63.79 | -62.80 | -13.00 | 49.80 |
| | 2 384.59 | V | 6.00 | 6.51 | -54.69 | -55.20 | -13.00 | 42.20 |
| | 2 510.09 | H | 6.01 | 6.67 | -59.34 | -60.00 | -13.00 | 47.00 |
| | 3 347.65 | V | 7.46 | 7.72 | -57.34 | -57.60 | -13.00 | 44.60 |
| | 4 182.20 | H | 8.78 | 8.65 | -59.23 | -59.10 | -13.00 | 46.10 |

Test mode : CDMA 850

Frequency(MHz) : 848.31

Channel : 777

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC0 | 1 696.04 | V | 6.36 | 5.44 | -60.22 | -59.30 | -13.00 | 46.30 |
| | 2 542.10 | H | 6.06 | 6.73 | -58.33 | -59.00 | -13.00 | 46.00 |
| | 3 005.63 | H | 6.71 | 7.31 | -54.80 | -55.40 | -13.00 | 42.40 |
| | 3 406.65 | V | 7.59 | 7.79 | -52.40 | -52.60 | -13.00 | 39.60 |
| | 4 231.20 | V | 8.83 | 8.69 | -57.84 | -57.70 | -13.00 | 44.70 |

Note.

1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

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KCTL-TIR001-003/2

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Test mode : CDMA 1900

Frequency(MHz) : 1 851.25

Channel : 25

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC1 | 3 703.00 | V | 8.12 | 8.15 | -37.67 | -37.70 | -13.00 | 24.70 |
| | 5 553.00 | V | 10.60 | 10.05 | -49.95 | -49.40 | -13.00 | 36.40 |
| | 7 405.50 | V | 11.83 | 11.63 | -54.70 | -54.50 | -13.00 | 41.50 |
| | 9 256.00 | V | 12.95 | 13.13 | -54.02 | -54.20 | -13.00 | 41.20 |

Test mode : CDMA 1900

Frequency(MHz) : 1 880.00

Channel : 600

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC1 | 3 760.00 | V | 8.22 | 8.24 | -34.98 | -35.00 | -13.00 | 22.00 |
| | 5 639.50 | V | 10.60 | 10.18 | -47.82 | -47.40 | -13.00 | 34.40 |
| | 7 520.00 | V | 12.02 | 11.83 | -52.99 | -52.80 | -13.00 | 39.80 |
| | 9 397.50 | V | 13.04 | 13.31 | -54.03 | -54.30 | -13.00 | 41.30 |

Test mode : CDMA 1900

Frequency(MHz) : 1 908.75

Channel : 1175

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| BC1 | 3 817.50 | V | 8.31 | 8.21 | -41.70 | -41.60 | -13.00 | 28.60 |
| | 5 725.00 | V | 10.60 | 10.45 | -43.05 | -42.90 | -13.00 | 29.90 |
| | 7 623.50 | V | 12.12 | 11.91 | -53.51 | -53.30 | -13.00 | 40.30 |
| | 9 544.00 | H | 13.06 | 13.31 | -53.95 | -54.20 | -13.00 | 41.20 |

Note.

1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

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Test mode : Simultaneously
CDMA 1900
+ 2.4G WIFI 802.11g
Frequency(MHz) : 1 851.25 + 2 412
Channel : 25, 1

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|-------------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + OFDM | 1 293.07 | V | 4.61 | 4.75 | -18.96 | -19.10 | -13.00 | 6.10 |
| | 2 970.49 | V | 6.66 | 7.26 | -29.09 | -29.70 | -13.00 | 16.70 |
| | 3 703.00 | V | 8.12 | 8.15 | -33.97 | -34.00 | -13.00 | 21.00 |
| | 4 822.50 | H | 9.62 | 9.29 | -57.12 | -56.80 | -13.00 | 43.80 |
| | 5 555.50 | V | 10.60 | 10.05 | -43.65 | -43.10 | -13.00 | 30.10 |
| | 7 234.00 | V | 11.52 | 11.53 | -50.79 | -50.80 | -13.00 | 37.80 |

Test mode : Simultaneously
CDMA 1900
+ 5G WIFI 802.11a
Frequency(MHz) : 1 851.25 + 5 500
Channel : 25, 100

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|-------------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + OFDM | 1 797.57 | V | 6.24 | 5.61 | -19.53 | -18.90 | -13.00 | 5.90 |
| | 1 903.58 | V | 6.12 | 5.79 | -22.73 | -22.40 | -13.00 | 9.40 |
| | 3 702.50 | V | 8.12 | 8.15 | -30.77 | -30.80 | -13.00 | 17.80 |
| | 5 560.50 | V | 10.60 | 10.05 | -39.75 | -39.20 | -13.00 | 26.20 |
| | 11 001.10 | V | 12.90 | 14.32 | -51.38 | -52.80 | -13.00 | 39.80 |
| | 16 500.40 | V | 12.80 | 17.79 | -45.61 | -50.60 | -13.00 | 37.60 |

Note.

1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

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Test mode : Simultaneously
CDMA 1900 + BT
Frequency(MHz) : 1 851.25 + 2 441
Channel : 25, 39

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|-------------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK | 1 265.07 | V | 4.34 | 4.71 | -18.84 | -19.20 | -13.00 | 6.20 |
| | 3 707.50 | H | 8.13 | 8.16 | -33.87 | -33.90 | -13.00 | 20.90 |
| | 4 882.00 | V | 9.71 | 9.44 | -56.67 | -56.40 | -13.00 | 43.40 |
| | 5 553.50 | V | 10.60 | 10.05 | -41.75 | -41.20 | -13.00 | 28.20 |
| | 7 323.50 | V | 11.68 | 11.56 | -53.72 | -53.60 | -13.00 | 40.60 |

Test mode : Simultaneously
CDMA 1900 + BT
+ 2.4G WIFI 802.11g
Frequency(MHz) : 1 851.25 + 2 441
+ 2 412
Channel : 25, 39, 1

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|--------------------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK + OFDM | 1 265.07 | V | 4.34 | 4.71 | -17.44 | -17.80 | -13.00 | 4.80 |
| | 1 291.57 | V | 4.60 | 4.75 | -19.15 | -19.30 | -13.00 | 6.30 |
| | 2 969.99 | H | 6.66 | 7.26 | -31.19 | -31.80 | -13.00 | 18.80 |
| | 2 999.50 | H | 6.70 | 7.30 | -30.80 | -31.40 | -13.00 | 18.40 |
| | 3 707.00 | V | 8.13 | 8.16 | -33.17 | -33.20 | -13.00 | 20.20 |
| | 4 825.50 | V | 9.62 | 9.30 | -56.02 | -55.70 | -13.00 | 42.70 |
| | 4 882.00 | H | 9.71 | 9.44 | -57.67 | -57.40 | -13.00 | 44.40 |
| | 5 559.50 | V | 10.60 | 10.05 | -43.45 | -42.90 | -13.00 | 29.90 |
| | 7 233.00 | H | 11.52 | 11.53 | -49.99 | -50.00 | -13.00 | 37.00 |
| 7 323.50 | V | 11.68 | 11.56 | -53.32 | -53.20 | -13.00 | 40.20 | |

Note.

1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

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Test mode : Simultaneously
CDMA 1900 + BT
+ 5G WIFI 802.11a
Frequency(MHz) : 1 880.0 + 2 441
+ 5 500
Channel : 25, 39, 100

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|--------------------------|-----------|-------|--------------|------------|------------------|--------|--------|--------|
| | [MHz] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK + OFDM | 1 265.52 | V | 4.35 | 4.71 | -21.64 | -22.00 | -13.00 | 9.00 |
| | 1 792.57 | V | 6.25 | 5.60 | -17.14 | -16.50 | -13.00 | 3.50 |
| | 3 706.50 | V | 8.13 | 8.16 | -30.07 | -30.10 | -13.00 | 17.10 |
| | 4 882.00 | V | 9.71 | 9.44 | -56.37 | -56.10 | -13.00 | 43.10 |
| | 5 554.50 | V | 10.60 | 10.05 | -37.35 | -36.80 | -13.00 | 23.80 |
| | 11 003.86 | V | 12.90 | 14.32 | -50.08 | -51.50 | -13.00 | 38.50 |
| | 16 000.84 | V | 13.30 | 17.33 | -46.07 | -50.10 | -13.00 | 37.10 |

Note.

1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

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7. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Cal. Date | Next Cal. Date |
|-------------------------------------|-----------------------------|------------------------|-------------|-----------|----------------|
| Biconical VHF-UHF Broadband Antenna | SCHWARZBECK | VUBA9117 | 275 | 19.04.13 | 20.04.13 |
| Bilog Antenna | Teseq GmbH | CBL 6143A | 35039 | 19.05.21 | 21.05.21 |
| Horn Antenna | ETS.lindgren | 3117 | 00161083 | 19.09.18 | 20.09.18 |
| Horn Antenna | ETS.lindgren | 3117 | 161225 | 19.05.22 | 20.05.22 |
| Horn Antenna | Steatite Antennas | QMS-00225 | 17790 | 19.08.12 | 20.08.12 |
| Horn Antenna | ETS.lindgren | 3116 | 00086635 | 19.05.09 | 20.05.09 |
| High pass Filter | Wainwright Instruments GmbH | WHKX3.0/18G-12SS | 44 | 20.01.21 | 21.01.21 |
| High pass Filter | Wainwright Instruments GmbH | WHKX1.0/1.5S-10SS | 14 | 20.01.21 | 21.01.21 |
| Attenuator | Weinschel ENGINEERING | 10 | AJ1239 | 19.05.14 | 20.05.14 |
| Attenuator | API Inmet | 40AH2W-10 | 12 | 19.05.15 | 20.05.15 |
| Amplifier | SONOMA INSTRUMENT | 310N | 185799 | 20.01.21 | 21.01.21 |
| Amplifier | L-3 Narda-MITEQ | AMF-7D-01001800-22-10P | 2031196 | 20.02.12 | 21.02.12 |
| Amplifier | L-3 Narda-MITEQ | JS44-18004000-33-8P | 2000997 | 19.08.01 | 20.08.01 |
| Spectrum Analyzer | AGILENT | N9040B | MY57010132 | 19.07.31 | 20.07.31 |
| Signal Generator | R&S | SMB100A | 176206 | 20.01.21 | 21.01.21 |
| Wideband Radio Communication Tester | R & S | CMW500 | 141780 | 19.04.18 | 20.04.18 |
| Antenna Mast | MATURO | EAS 1.5 | 042/8941211 | N/A | N/A |
| Antenna Mast | MATURO | EAS 1.5 | 043/8941211 | N/A | N/A |
| Turn Table | MATURO | TT 0.8 PF | 041/8941211 | N/A | N/A |
| Cable Assembly | Radiall | R286303620 | 1649.241 | N/A | N/A |
| Cable Assembly | Radiall | TESTPRO 3 | - | N/A | N/A |

End of test report