



## Test Report for Part 15

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**Report number:** STD-FCC-05031

**Type of EUT:** USB Flash Drive

**Model number:** HMDV-512MB

**Family Model** HMDV-256MB HMDV-64MB

HMDV-128MB HMDV-32MB

*Model difference; Memory Capacity*

**Applicant:** HANA MICRON Inc.

**Applied standards:** FCC Part 15 Subpart B(Class B)

The above mentioned EUT had been tested by EMC Laboratory of Standard Engineering Company in order to confirm the compliance with the requirements of FCC rules and this test was executed in accordance with the measurement method specified in ANSI C63.4-2003

I hereby certify that the accuracy of test-data is true and correct with my best knowledge and belief. Also I prove this measurement was performed by qualified person.

**Date of tested:** 2005-12-15

**Date of Issued:** 2005-12-16

**Tested by:**   
KW Jung / Test Engineer

**Approved by:**   
SS Seo / Senior Researcher



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## 1. General Information

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### 1.1 Product information

|                      |                                          |           |  |
|----------------------|------------------------------------------|-----------|--|
| Description of EUT : | USB Flash Drive                          |           |  |
| Model number :       | HMDV-512MB                               |           |  |
| Family Model :       | HMDV-256MB                               | HMDV-64MB |  |
|                      | HMDV-128MB                               | HMDV-32MB |  |
|                      | <i>Model difference; Memory Capacity</i> |           |  |
| Specification :      | DC5V                                     |           |  |
| Applied Standard :   | FCC Part 15 subpart B (Class B)          |           |  |
| Test method :        | ANSI C63.4 - 2003                        |           |  |

### 1.2 Client information

|                  |                                                                                                                    |  |  |
|------------------|--------------------------------------------------------------------------------------------------------------------|--|--|
| Applicant :      | HANA MICRON Inc.                                                                                                   |  |  |
| Address :        | #902 Ssangyong IT Twin-Tower 1,442-17 Sangdaewon1-Dong,<br>Joongwon-Gu, Seongnam-City, Gyeonggi-Do, 462-807, Korea |  |  |
| Phone No. :      | +82-31-608-5537                                                                                                    |  |  |
| Fax. No. :       | +82-31-608-5400                                                                                                    |  |  |
| Contact person : | Nae Sung Woo/ <a href="mailto:swnae@hanamicron.co.kr">swnae@hanamicron.co.kr</a>                                   |  |  |
| Manufacturer :   | HANA MICRON Inc.                                                                                                   |  |  |
| Address :        | #902 Ssangyong IT Twin-Tower 1,442-17 Sangdaewon1-Dong,<br>Joongwon-Gu, Seongnam-City, Gyeonggi-Do, 462-807, Korea |  |  |
| Phone No.:       | +82-31-608-5537                                                                                                    |  |  |
| Fax. No.:        | +82-31-608-5400                                                                                                    |  |  |



## 2. Information of EMC Laboratory

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### Name of test laboratory

Standard Engineering Co., Ltd.

### Location

377-11 Sinjang-Ri, Eumam-Myeon, Seosan-Si Chungnam, Korea

Phone No. : +82-41-663-9436~7

Fax. No. : +82-41-663-9434

### FCC Filing Number : 284057

### Environment of Laboratory

This location can keep accuracy in measuring more than anywhere because surrounding noise ambient is low and silent excellently to be suitable in EMI's measuring.

### Map



### 3. Procedure of measurement

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#### 3.1 Conducted emissions

##### 3.1.1 Configuration of measurement

This measurement executed in shield-room and EUT was tested on 0.8m height wooden table located on the floor with 0.1m distance from the reference ground plane.

EUT's rear part had a distance from VCP(Vertical Conducted Plane) with 0.4m length and LISN placed on the grounded plane with 1m distance from EUT's side part .

Excess power cord and cables fixed in bundle style of 30~40cm length with non-inductive material, and power line was connected to power source through LISN to detect maximum EMI without external RFI from aux. instruments.

Measuring equipments and EUT confirmed that warming-up was performed during enough time and calibration of antenna as well as calibration of measuring equipment also completed beforehand.

This measurement was performed on condition of worst-case emission.

##### 3.1.2 Detector function selection and bandwidth

During conducted emission measurement, a radio noise meter that has a CISPR quasi-peak detector with 10 kHz IF bandwidth of 6 dB was utilized.

##### 3.1.3 Frequency range to be scanned

For conducted emissions measurement, frequency range of 150 kHz to 30 MHz included, was investigated.

##### 3.1.4 Line impedance stabilization network (LISN)

A LISN with characteristics that conform to the requirements of ANSI C63.4-2003 was used for the measurement of conducted power-line radio noise; (50 micro-henries / 50 ohms). Chassis and earth-points for grounding of the LISN were earth-grounded.

## **3.2 Radiated Emissions**

### **3.2.1 Configuration of measurement**

Preliminary measurement was performed in 3 meter semi-anechoic chamber to detect correct EMI frequency. For detecting the EMI frequency in semi-anechoic chamber, TRILOG antenna used on 30-1000MHz band.

Final measurement was executed at 3 meters OATS(Open Area Test Site) using Quasi-peak detector and TRILOG antenna.

EUT was placed on 0.8m height wooden table located on the floor with 0.1m distance from the reference ground plane.

Excess power cord and other excess cables fixed in bundle style of 30~40cm length with non-inductive material to detect maximum EMI emission from EUT.

Measuring equipments and EUT confirmed that warming-up was performed during enough time and calibration of antenna as well as calibration of measuring equipment also completed beforehand.

Measurement antenna height was varied 1 to 4 meters and set position in both horizontal and vertical plane to search maximum EMI emission frequency.

### **3.2.2 Detector function selection and bandwidth**

In radiated emissions measurement, a field strength meter that has a CISPR quasi-peak detector was used. The 6 dB bandwidth of the detector of instrument is 120 kHz over frequency range of 30 to 1000 MHz.

### **3.3 Method of Calculations**

#### **3.3.1 Unit of Conducted emission measurement**

Conducted Emission Test results for conducted emissions are reported in micro-volts.

#### **3.3.2 Unit of Radiated emission measurement**

Test results of radiated emissions measurement are reported in micro-volts per meter at the specific distance. Using the unit of dBuV on the test instrument, the indication unit was converted to field strength unit of uV/m as following method;

$$F \text{ (uV/m)} = 10^{\{(R+CL+AF)/20\}} \text{ (uV/m)}$$

F: Field Strength in uV/m, R: Meter Reading Level in dB(uV),

CL: Cable Loss from antenna to meter in dB,

AF: Antenna Factor of receiving antenna in dB(/m)

#### **Sample calculation (Radiated emission)**

Emission level is calculated as follows;

Emission Level(dBuV/m)

= Reading Level + Ant. Factor + Cable Loss – Amp Gain

Margin Level is calculated as follows;

Margin(dBuV) = Limit Level – Emission Level

Example) Standard limit = 40 dBuV/m,

Reading Level = 10 dBuV,

Ant. Factor = 15 dB,

Cable Loss= 1 dB

External Amp Gain= 0 dB

**Emission Level(dBuV/m) = 10 + 15 + 1 - 0 = 26 (dBuV/m)**

**Margin(dBuV) = 40 – 26 = 14 (dBuV)**

## 4. Environments of measurement

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### 4.1 Conditions of environment

|             |             |          |
|-------------|-------------|----------|
| Shield room | Temperature | 15 °C    |
|             | Humidity    | 47 %     |
|             | Pressure    | 1022 hPa |
| OATS        | Temperature | 5 °C     |
|             | Humidity    | 66 %     |
|             | Pressure    | 1022 hPa |

### 4.2 Measurement uncertainty

All measurements, especially EUT's measurement includes uncertain level that can happen for the reason as following;

Variation of antenna factor by changes of height, center, polarization, directivity.

Uncertainty factor by change of measurement distance, site's imperfection.

Radiated emissions measurements:  $\pm 4$  dB

Power line conducted emission measurements:  $\pm 3$  dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurement uncertainty was calculated in accordance with NAMAS NIS 81 : The treatment of uncertainty in EMC measurement.”

The measurement uncertainty was given with a confidence of 95%.

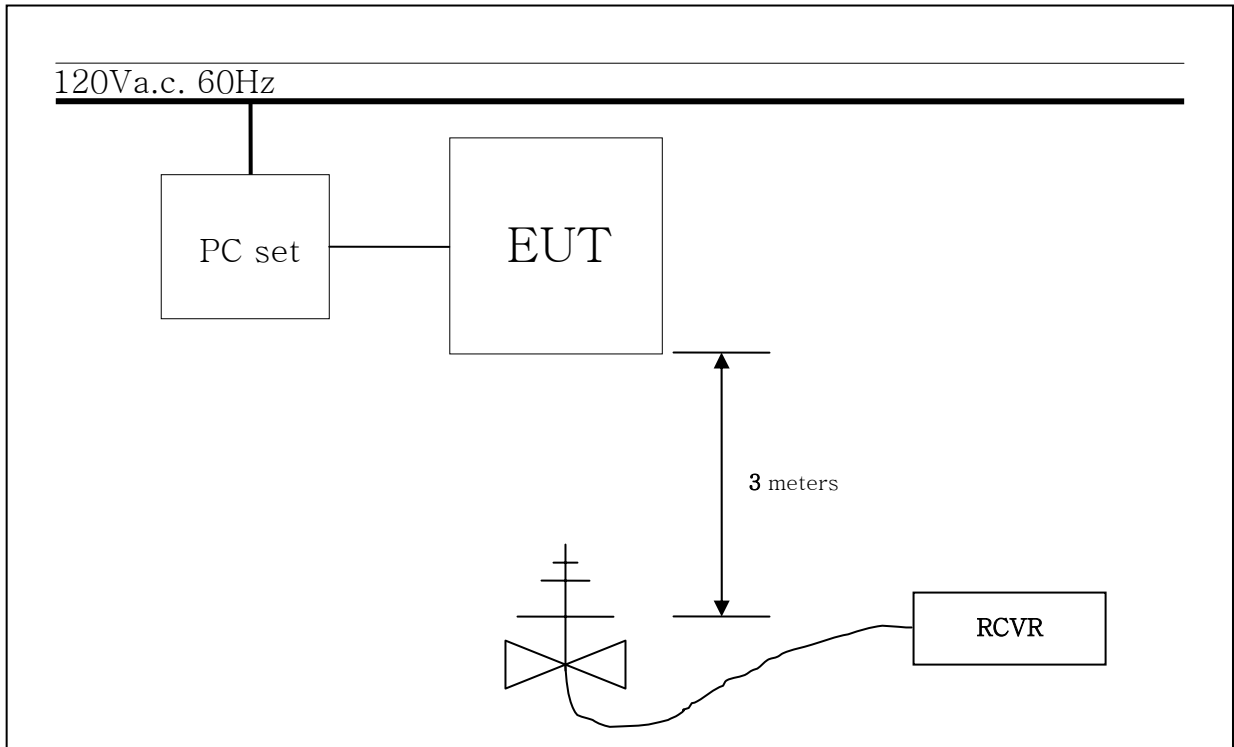
#### 4.3 List of Test equipments

| Used                                | Equipment         | Maker           | Model No. | S/No.     | Cal.due date. |
|-------------------------------------|-------------------|-----------------|-----------|-----------|---------------|
| <input checked="" type="checkbox"/> | EMI Test Receiver | Rhode & Schwarz | ESIB7     | 100119    | 05/20/2006    |
| <input checked="" type="checkbox"/> | Spectrum Analyzer | ADVANTEST       | R3132     | 130300485 | 09/15/2006    |
| <input type="checkbox"/>            | Artificial Mains  | Rhode & Schwarz | ESH2-Z5   | 100064    | 09/22/2006    |
| <input checked="" type="checkbox"/> | Artificial Mains  | Rhode & Schwarz | ESH3-Z5   | 100204    | 09/22/2006    |
| <input type="checkbox"/>            | Signal Generator  | Rhode & Schwarz | SML03     | 101003    | 11/18/2005    |
| <input type="checkbox"/>            | Absorbing Clamp   | Rhode & Schwarz | MDS-21    | 100076    | 09/21/2006    |
| <input checked="" type="checkbox"/> | TRILOG Antenna    | Schwarzbeck     | VULB9163  | 164       | 05/16/2006    |
| <input type="checkbox"/>            | 2 Wire ISN        | Rhode & Schwarz | ENY22     | 10086     | N/A           |
| <input type="checkbox"/>            | 4 Wire ISN        | Rhode & Schwarz | ENY41     | 100095    | N/A           |
| <input checked="" type="checkbox"/> | Pulse Limiter     | Rhode & Schwarz | ESH3-Z2   | 100137    | N/A           |
| <input type="checkbox"/>            | Attenuator        | Rhode & Schwarz | DNF       | 100041    | N/A           |
| <input type="checkbox"/>            | Attenuator        | Rhode & Schwarz | MDS-2     | 100274    | N/A           |
| <input type="checkbox"/>            | Ferrite Clamp     | Rhode & Schwarz | EZ-24     | 100002    | N/A           |

#### 4.4 List of Peripherals & Cables

| Used                                | Descriptions           | Maker    | Type            | S/No.           | Approval                      |
|-------------------------------------|------------------------|----------|-----------------|-----------------|-------------------------------|
| <input checked="" type="checkbox"/> | Reference PC set       | TG       | TG Notebook(H2) | 50052-788-00057 | Class B<br>CE/FCC<br>MIC/VCCI |
| <input checked="" type="checkbox"/> | Reference Printer      | EPSON    | P730A           | 60H0187628      |                               |
| <input type="checkbox"/>            | Reference Printer      | HP       | Deskjet 540     | US52M1B0NF      |                               |
| <input type="checkbox"/>            | DC Power Supply        | HP       | 6574A           | US36340515      | CE                            |
| <input checked="" type="checkbox"/> | M/W Cable/2GHz 5m      | H+Suhner | SF104/2x11BNC   | 14354           |                               |
| <input type="checkbox"/>            | M/W Cable/2GHz10m      | "        | "               | 14353           |                               |
| <input type="checkbox"/>            | M/W Cable/18GHz18m     | "        | SF104/2x11N     | 6025            |                               |
| <input checked="" type="checkbox"/> | M/W Cable/18GHz18m     | "        | "               | 6026            |                               |
| <input type="checkbox"/>            | M/W Cable/18GHz10m     | "        | "               | 6027            |                               |
| <input checked="" type="checkbox"/> | M/W Cable/2GHz43m      | Thermax  | MS-P400         |                 |                               |
| <input type="checkbox"/>            | Color monitor/composit | Samsung  | SCM-14          |                 |                               |
| <input type="checkbox"/>            | Function Generator     | HP       | 3311A           | 1244A25104      |                               |
| <input type="checkbox"/>            | CCD Color Camera       | Sung Eun | PSS-C5327       |                 |                               |

#### 4.5 Configuration of EUT



#### Used Peripherals

| Descriptions     | Maker            | Type            | S/No.           | Remarks  |
|------------------|------------------|-----------------|-----------------|----------|
| EUT              | HANA MICRON Inc. | HMDV-512MB      | N/A             |          |
| Reference PC set | TG               | TG Notebook(H2) | 50052-788-00057 | Notebook |
|                  | EPSON            | P730A           | 60H0187628      | Printer  |
|                  | DELL             | MO56UD          | 337000527       | Mouse    |

#### EUT Operation

Windows Media Playing Mode.

#### 4.6 Rating and Physical Characteristics

|               |                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------|
| Supporting OS | Windows 98[SE]/ME/2000/XP/2003/CE.NET, Mac 9.0+,<br>Linux 2.4.0+<br>(Driver install is required only for Windows 98[SE]) |
| Requirement   | IBM PC/AT or compatible, Desktop/ Notebook /Sub-Notebook,<br>Mac which has USB port.                                     |
| Interface     | USB 1.1, VoIP(S/W Supprot)                                                                                               |
| Power         | USB Bus Power(DC5V, 500mA)                                                                                               |
| Speed         | Read: 8MB/s, Write: 7MB/s                                                                                                |
| Size          | 55 X 17 X 14 mm (LWH)                                                                                                    |

## 5. Result of Measurement

### 5.1 Conducted Emission

#### 5.1.1 Test data

| Frequency<br>[MHz] | Line | Limit[dBuV] |       | Result[dBuV] |       | Factor<br>[dB] | Margin[dBuV] |       |
|--------------------|------|-------------|-------|--------------|-------|----------------|--------------|-------|
|                    |      | QP          | AV    | QP           | AV    |                | QP           | AV    |
| 0.150              | N    | 66.00       | 56.00 | 45.25        | 28.55 | 10.59          | 20.75        | 27.45 |
| 0.190              | L    | 64.04       | 54.04 | 38.22        | 12.01 | 10.59          | 25.82        | 42.03 |
| 0.210              | N    | 63.21       | 53.21 | 49.17        | 37.04 | 10.59          | 14.04        | 16.17 |
| 0.215              | L    | 63.01       | 53.01 | 45.33        | 32.25 | 10.59          | 17.68        | 20.76 |
| 0.280              | L    | 60.82       | 50.82 | 40.99        | 28.44 | 10.61          | 19.83        | 22.38 |
| 0.350              | L    | 58.96       | 48.96 | 37.47        | 31.89 | 10.63          | 21.49        | 17.07 |
| 0.420              | N    | 57.45       | 47.45 | 36.38        | 32.51 | 10.61          | 21.07        | 14.94 |
| 1.265              | N    | 56.00       | 46.00 | 34.90        | 31.90 | 10.65          | 21.10        | 14.10 |
|                    |      |             |       |              |       |                |              |       |
|                    |      |             |       |              |       |                |              |       |
|                    |      |             |       |              |       |                |              |       |
|                    |      |             |       |              |       |                |              |       |
|                    |      |             |       |              |       |                |              |       |

\* Detector function was set into Quasi-peak & Average mode.

\* Factor = LISN Factor + Cable loss + Pulse Limiter

#### 5.1.2 Result

Complied

## 5.2 Radiated Emission

### 5.2.1 Test data

| Frequency<br>[MHz] | Polarization<br>[Ver/Hor] | Limit<br>[dBuV/m] | Result<br>[dBuV/m] | Factor<br>[dB] | Margin<br>[dBuV/m] |
|--------------------|---------------------------|-------------------|--------------------|----------------|--------------------|
| 79.74              | V                         | 40.00             | 29.84              | 8.32           | 10.16              |
| 80.04              | V                         | 40.00             | 29.97              | 8.30           | 10.03              |
| 209.16             | H                         | 43.50             | 28.12              | 12.37          | 15.38              |
| 390.84             | V                         | 46.00             | 35.88              | 17.74          | 10.12              |
| 400.00             | V                         | 46.00             | 31.03              | 17.92          | 14.97              |
| 488.58             | V                         | 46.00             | 32.76              | 19.28          | 13.24              |
|                    |                           |                   |                    |                |                    |
|                    |                           |                   |                    |                |                    |
|                    |                           |                   |                    |                |                    |
|                    |                           |                   |                    |                |                    |

\* Detector function was set into Quasi-peak mode.

\* Factor = Antenna factor + Cable loss

\* External Amp Gain : 0 dB

### 5.2.1 Result

Complied

## 6. Attachments

### 6.1 Sample Label

**HANA MICRON Inc.**

**USB Flash Drive**

**MODEL : HMDV-512MB**

**POWER : 5Vd.c.**

**FCC ID. : QH7HMDV-512MB**

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES.  
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS :  
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND  
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED  
INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE  
OPERATION

Made In Korea

Labeling Requirements per section 2.925 & 15.19

The label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.

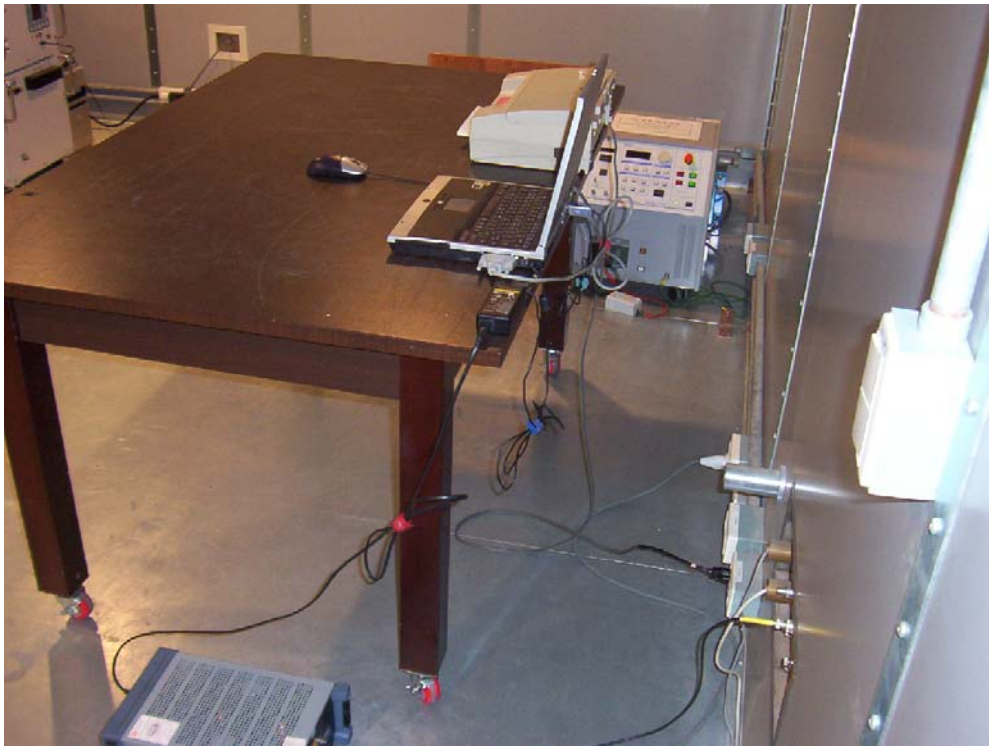


## 6.2 Photographs of Set-up

Conducted emission test (Front)



Conducted emission test (Rear)



**Radiated Emission (Front)**



**Radiated Emission (Rear)**



### **6.3 Photographs of EUT**

**Front View**



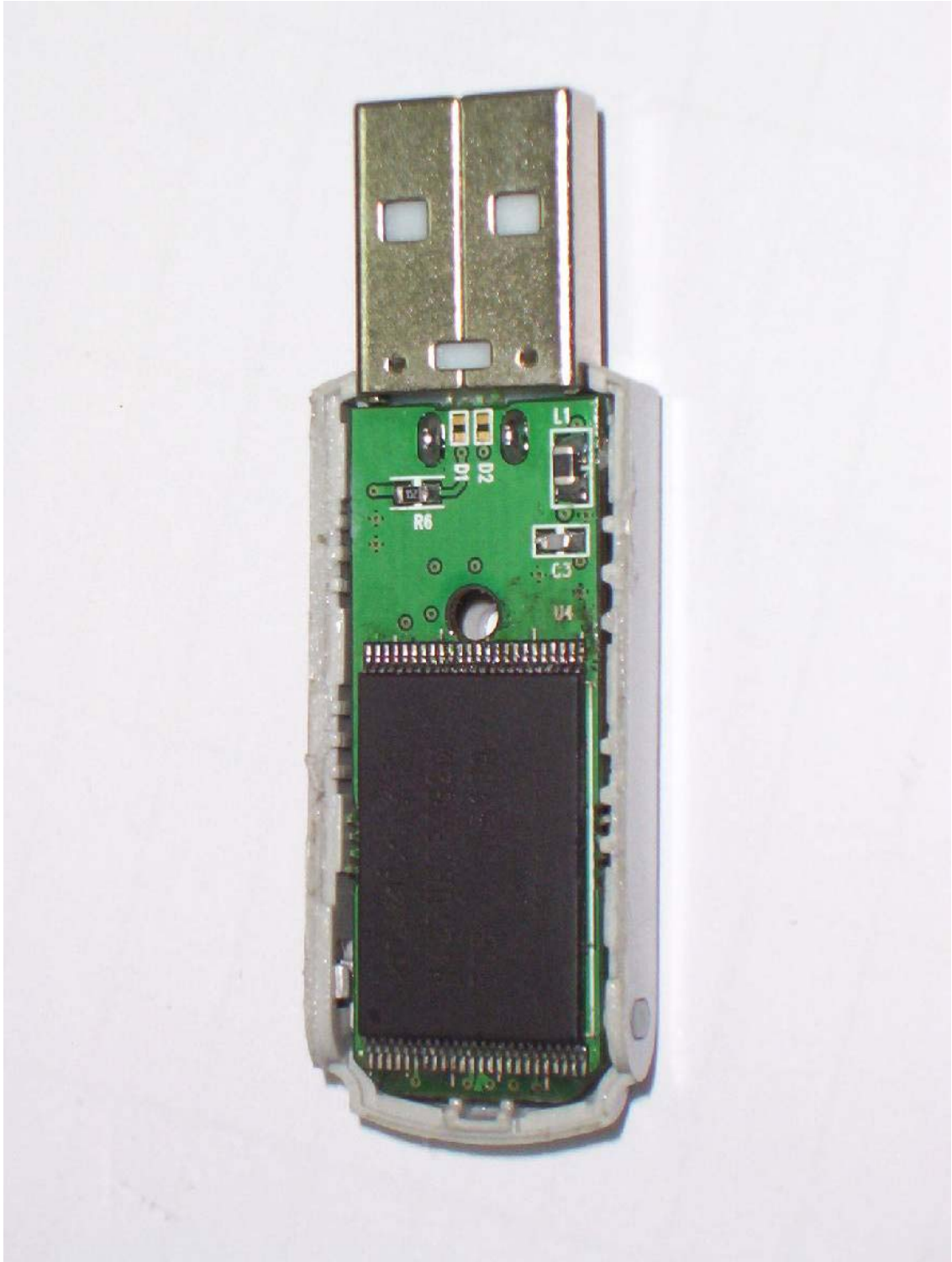
**Rear View**



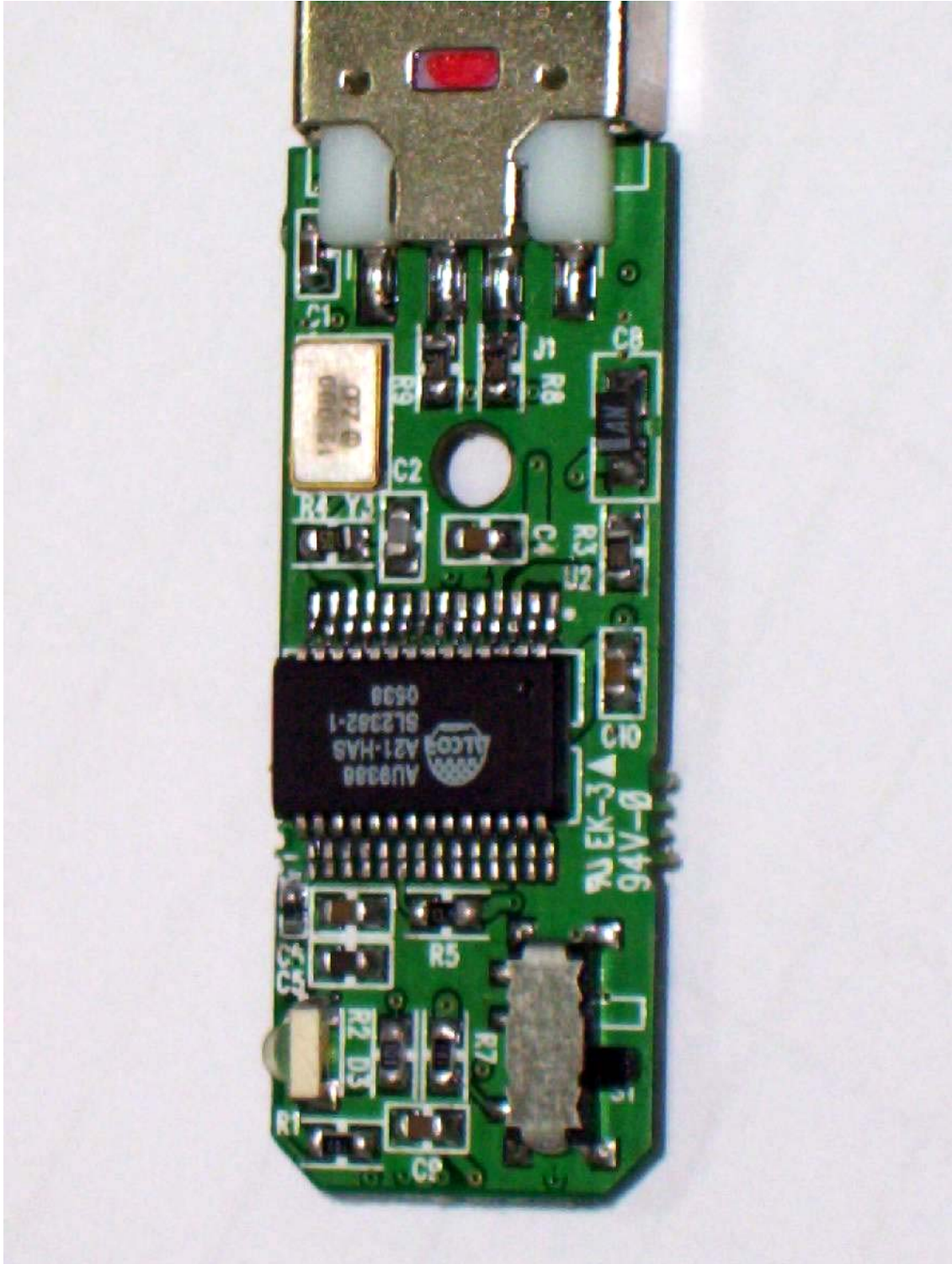
**Side View**



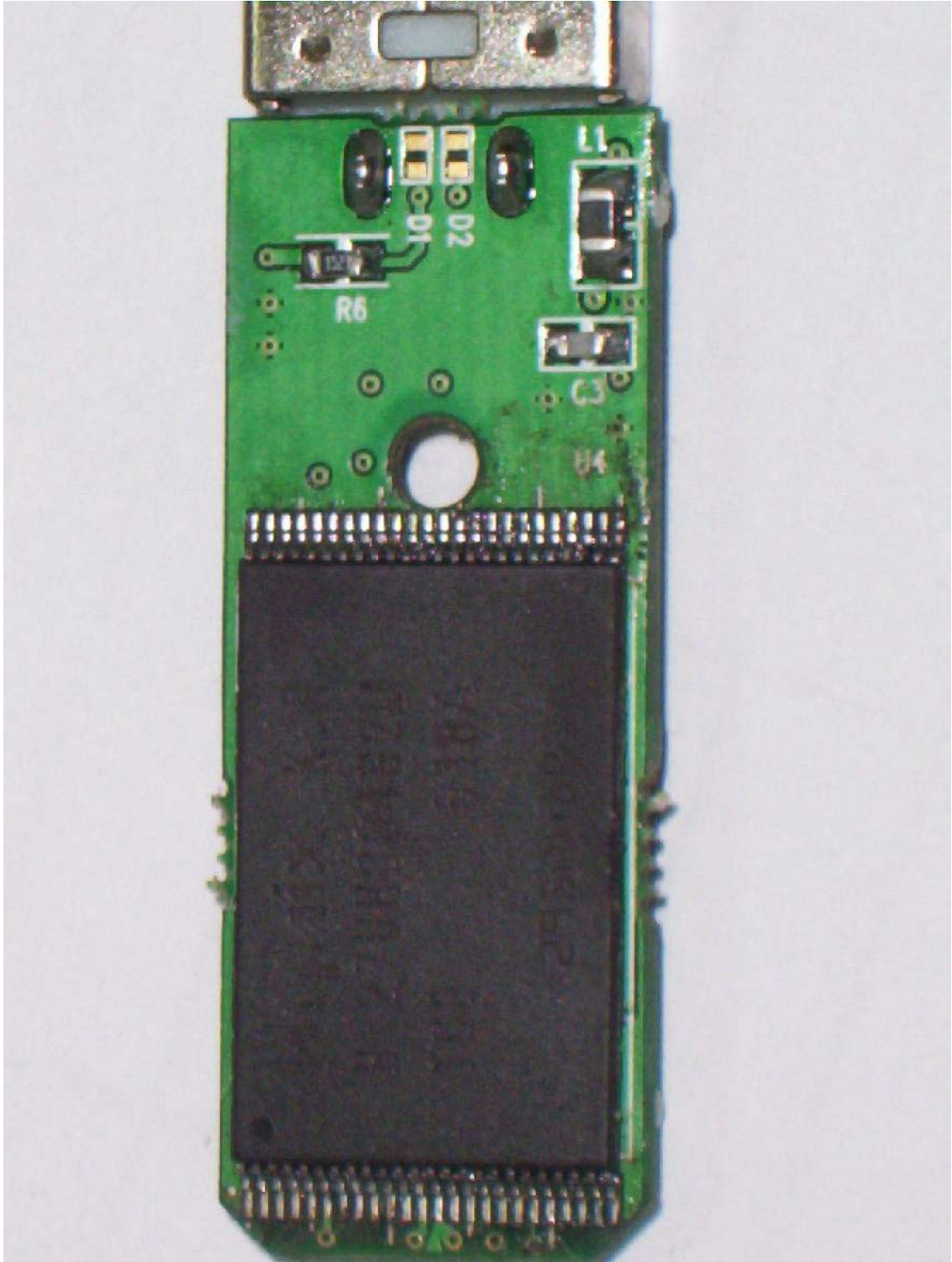
**Inside View**



Board Front



**Board Rear**



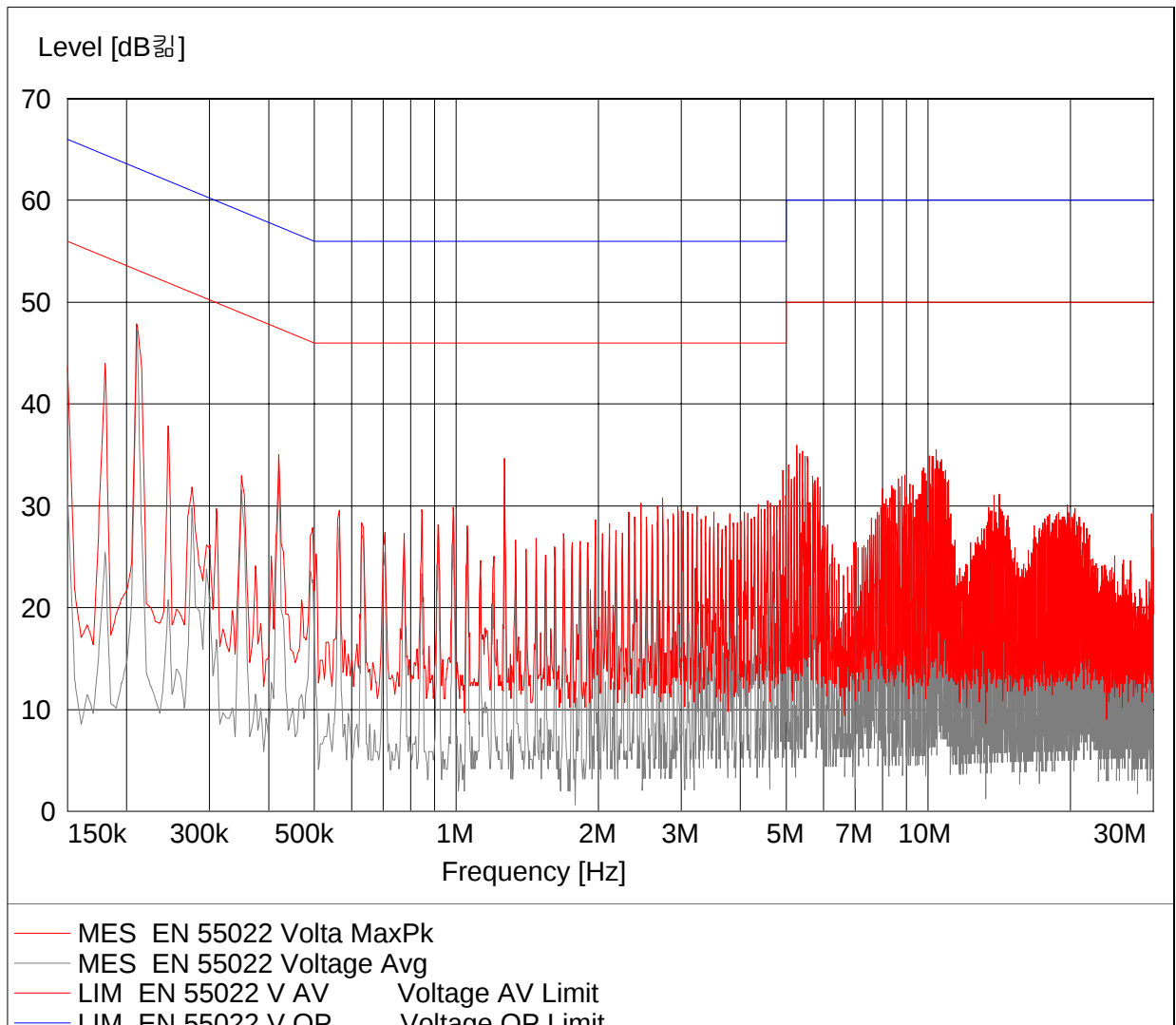
## 6.4 Data sheet of Conducted Emission

*Standard Engineering Co., Ltd.*  
*Conducted Emission Measurement*

EUT: HMDV-512MB  
Manufacturer: HANA MICRON Inc.  
Operating Condition: Normal  
Test Site: Shield Room  
Operator: KW Jung  
Test Specification: Conducted Emission Fcc Part 15 Subpart B / Class B  
Comment: Phase N

### SCAN TABLE: "ZFCCCEB"

| Start Frequency | Stop Frequency | Step Width | Detector        | Meas. Time | IF Bandw. | Transducer |
|-----------------|----------------|------------|-----------------|------------|-----------|------------|
| 150.0 kHz       | 30.0 MHz       | 5.0 kHz    | MaxPeak Average | 1.0 ms     | 9 kHz     | ESH3-Z2    |

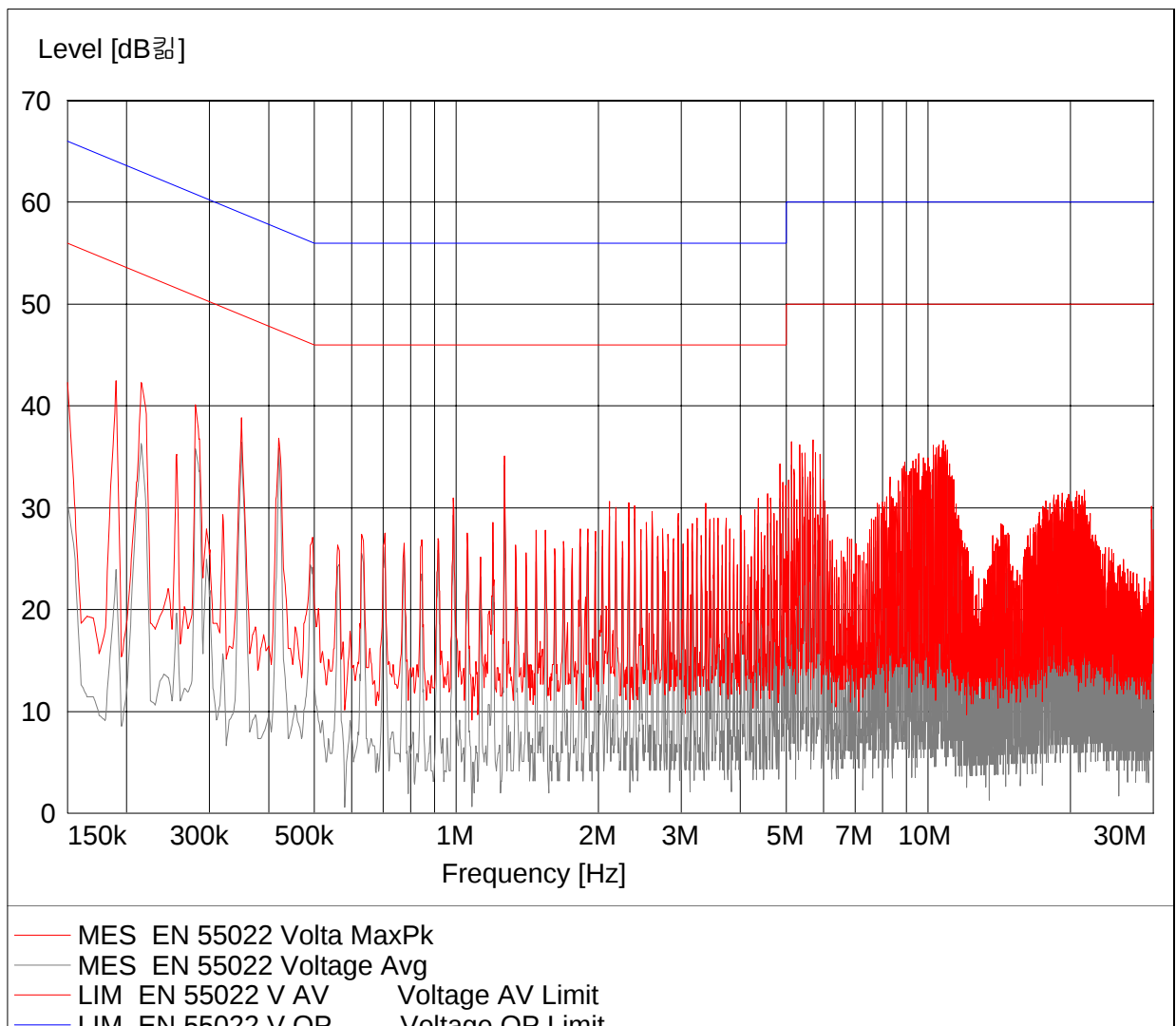


**Standard Engineering Co., Ltd.**  
**Conducted Emission Measurement**

EUT: HMDV-512MB  
 Manufacturer: HANA MICRON Inc.  
 Operating Condition: Normal  
 Test Site: Shield Room  
 Operator: KW Jung  
 Test Specification: Conducted Emission Fcc Part 15 Subpart B / Class B  
 Comment: Phase L

**SCAN TABLE: "ZFCCCEB"**

| Start Frequency | Stop Frequency | Step Width | Detector        | Meas. Time | IF Bandw. | Transducer |
|-----------------|----------------|------------|-----------------|------------|-----------|------------|
| 150.0 kHz       | 30.0 MHz       | 5.0 kHz    | MaxPeak Average | 1.0 ms     | 9 kHz     | ESH3-Z2    |





## **6.5 Block Diagram/Circuit**

**Attached**

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## **6.6 User's Manual**

**Attached**

