Test Report for Part 15

Report number:	**STD-FCC–06003**
Type of EUT:	**USB Flash Drive**
Model number:	**HMDS-04GC**
Family Model	HMDS-032C HMDS-256C HMDS-01GC HMDS-064C HMDS-512C HMDS-02GC HMDS-128C *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: *2006-02-06* ***Date of Issued:*** *2006-02-22*

Tested by: _____
SM Kim / Test Engineer

Approved by: _____
SS Seo / Senior Researcher

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1. General Information

1.1 Product information

Description of EUT :	USB Flash Drive		
Model number :	HMDS-04GC		
Family Model :	HMDS-032C	HMDS-256C	HMDS-01GC
	HMDS-064C	HMDS-512C	HMDS-02GC
	HMDS-128C		
	Model difference; Memory Capacity		
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, Joongwon-Gu, Seongnam-City, Gyeonggi-Do, 462-807, Korea
Phone No. :	+82-31-608-5510
Fax. No. :	+82-31-608-5400
Contact person :	Nae Sung Woo/swnae@hanamicron.co.kr
Manufacturer :	HANA MICRON Inc.
Address :	#902 Ssangyong IT Twin-Tower 1,442-17 Sangdaewon1-Dong, Joongwon-Gu, Seongnam-City, Gyeonggi-Do, 462-807, Korea
Phone No.:	+82-31-608-5510
Fax. No.:	+82-31-608-5400

2. Information of EMC Laboratory

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 : 624439

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

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;

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

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

4.1 Conditions of environment

Shield room	Temperature	27 °C
	Humidity	35 %
	Pressure	1022 hPa
OATS	Temperature	10 °C
	Humidity	61 %
	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: ± 4 dB

Power line conducted emission measurements: ± 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%.

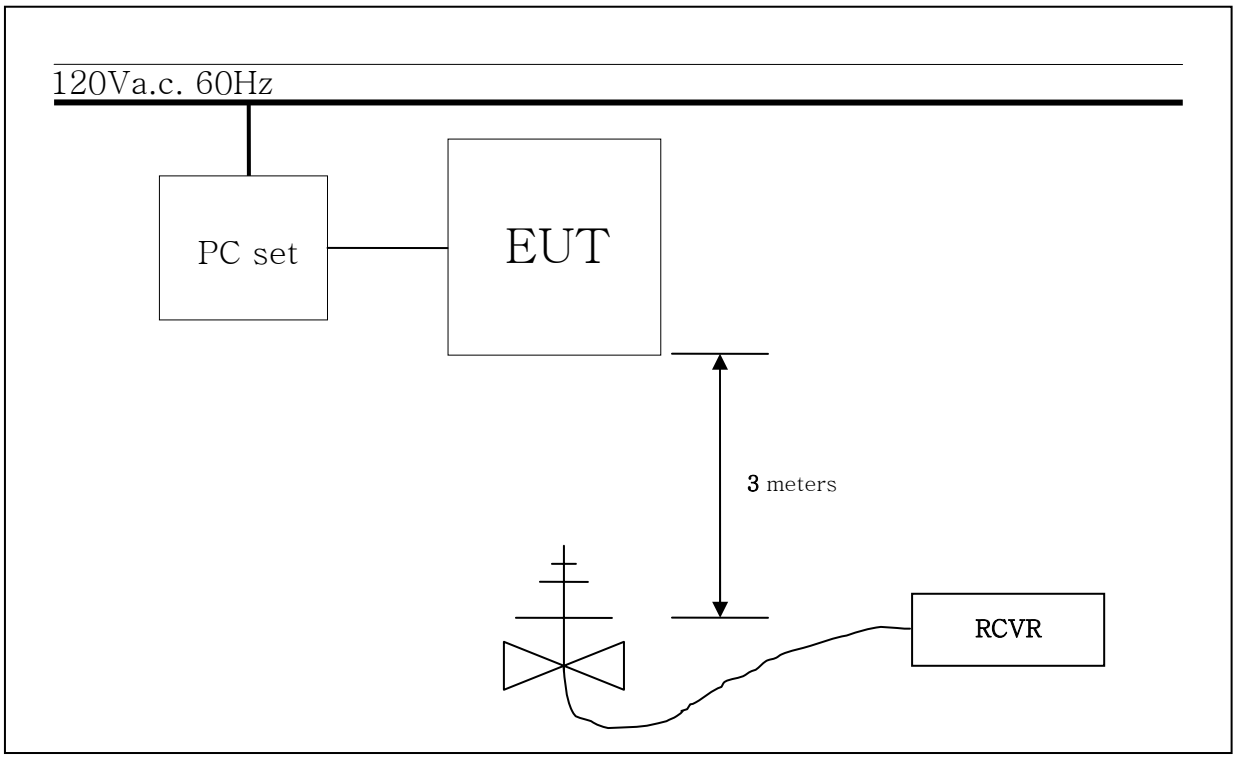
4.3 List of Test equipments

Used	Equipment	Maker	Model No.	S/No.	Cal.due date.
■	EMI Test Receiver	Rhode & Schwarz	ESIB7	100119	05/20/2006
■	Spectrum Analyzer	ADVANTEST	R3132	130300485	09/15/2006
□	Artificial Mains	Rhode & Schwarz	ESH2-Z5	100064	09/22/2006
■	Artificial Mains	Rhode & Schwarz	ESH3-Z5	100204	09/22/2006
□	Signal Generator	Rhode & Schwarz	SML03	101003	01/27/2007
□	Absorbing Clamp	Rhode & Schwarz	MDS-21	100076	09/21/2006
■	TRILOG Antenna	Schwarzbeck	VULB9163	164	05/16/2006
□	2 Wire ISN	Rhode & Schwarz	ENY22	10086	N/A
□	4 Wire ISN	Rhode & Schwarz	ENY41	100095	N/A
■	Pulse Limitter	Rhode & Schwarz	ESH3-Z2	100137	N/A
□	Attenuator	Rhode & Schwarz	DNF	100041	N/A
□	Attenuator	Rhode & Schwarz	MDS-2	100274	N/A
□	Ferrite Clamp	Rhode & Schwarz	EZ-24	100002	N/A

4.4 List of Peripherals & Cables

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

4.5 Configuration of EUT



Used Peripherals

Descriptions	Maker	Type	S/No.	Remarks
EUT	HANA MICRON Inc.	HMDS-04GC	N/A	
Reference PC set	TG	TG Notebook(H2)	50052-788-00057	Notebook
	EPSON	P730A	60H0187628	Printer
	panwest	PM6F2X4013756	Cyber Beetle Ⅱ	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+, Linux 2.4.0+ (Driver install is required only for Windows 98[SE])
Requirement	IBM PC/AT or compatible, Desktop/ Notebook /Sub-Notebook, Mac which has USB port.
Interface	USB 1.1, VoIP(S/W Supprot)
Power	USB Bus Power(DC5V, 500mA)
Speed	Read: 8MB/s, Write: 5MB/s
Size	55 X 17 X 14 mm (LWH)
Memory	32MB K9F5608U0M / SAMSUNG 64MB K9F1208U0M / SAMSUNG 128MB K9F1G08U0M / SAMSUNG 256MB K9F2G08U0M / SAMSUNG 512MB K9F4G09U0M / SAMSUNG 1G K9K8G08U0M / SAMSUNG 2G K9WAG08U1M / SAMSUNG 4G K9WAG08U1M(x2) / SAMSUNG

5. Result of Measurement

5.1 Conducted Emission

5.1.1 Test data

Frequency [MHz]	Line	Limit[dBuV]		Result[dBuV]		Factor [dB]	Margin[dBuV]	
		QP	AV	QP	AV		QP	AV
0.170	N	64.96	54.96	42.44	15.16	13.55	22.52	39.80
0.205	N	63.41	53.41	43.93	30.34	13.43	19.48	23.07
0.235	N	62.27	52.27	34.29	14.59	13.33	27.98	37.68
0.300	N	60.24	50.24	28.07	17.88	13.11	32.17	32.36
1.265	N	56.00	46.00	29.33	26.43	10.67	26.67	19.57
0.150	L	66.00	56.00	47.57	29.90	13.62	18.43	26.10
0.210	L	63.21	53.21	52.00	37.57	13.41	11.21	15.64
0.280	L	60.82	50.82	43.67	30.41	13.18	17.15	20.41
0.420	L	57.45	47.45	37.71	31.17	12.68	19.74	16.28

* 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 [MHz]	Polarization [Ver/Hor]	Limit [dBuV/m]	Result [dBuV/m]	Factor [dB]	Margin [dBuV/m]
77.16	V	40.00	27.24	8.57	12.76
88.68	V	43.50	25.11	10.64	18.39
198.12	H	43.50	23.03	11.89	20.47
200.16	H	43.50	24.75	12.03	18.75
222.42	H	46.00	27.33	12.88	18.67
390.84	V	46.00	37.45	17.74	8.55
960.06	H	53.90	38.22	26.44	15.68

* Detector function was set into Quasi-peak mode.
* Factor = Antenna factor + Cable loss
* External Amp Gain : 0 dB

5.2.1 Result

Complied

377-11 Sinjang-Ri, Eumam-Myeon
Seosan-Si, Chungnam, Korea
Tel.: +82-41-663-9436, Fax :+82-41-663-9434
e-mail: stdeng@stdeng.com

6. Attachments

6.1 Sample Label

HANA MICRON Inc.
USB Flash Drive
MODEL : HMDS-04GC
POWER : 5Vd.c.
FCC ID. : QH7HMDS-04GC

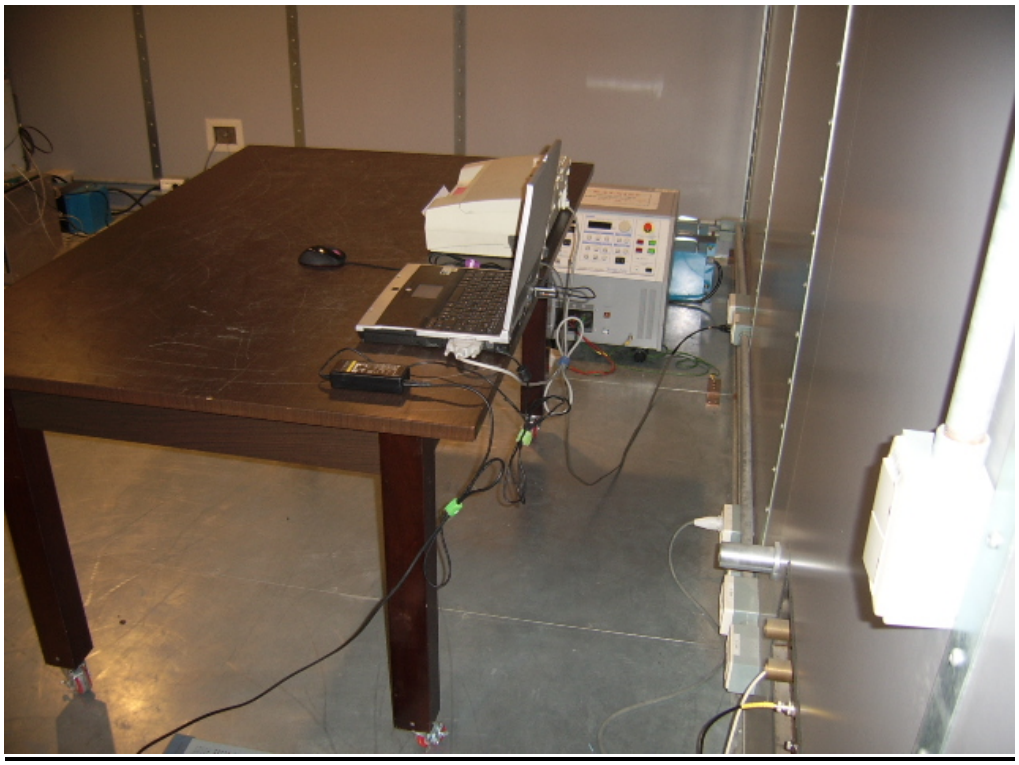
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES.
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS :
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED
INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED
OPERATION Made In Korea

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.

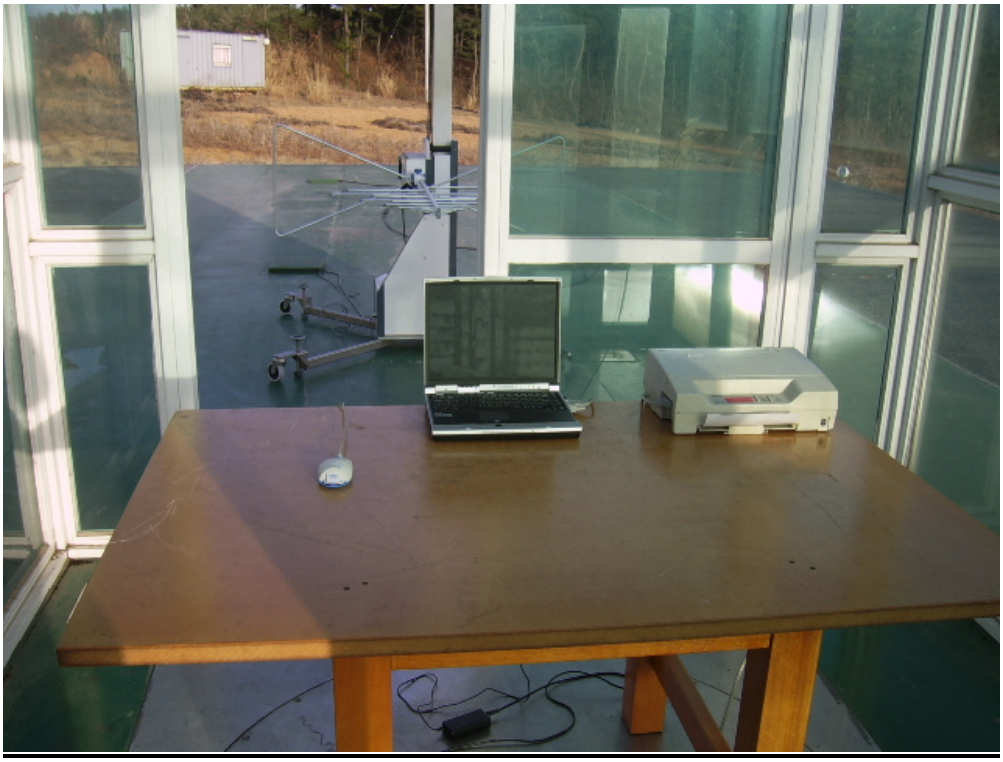
6.2 Photographs of Set-up

Conducted emission test (Front)

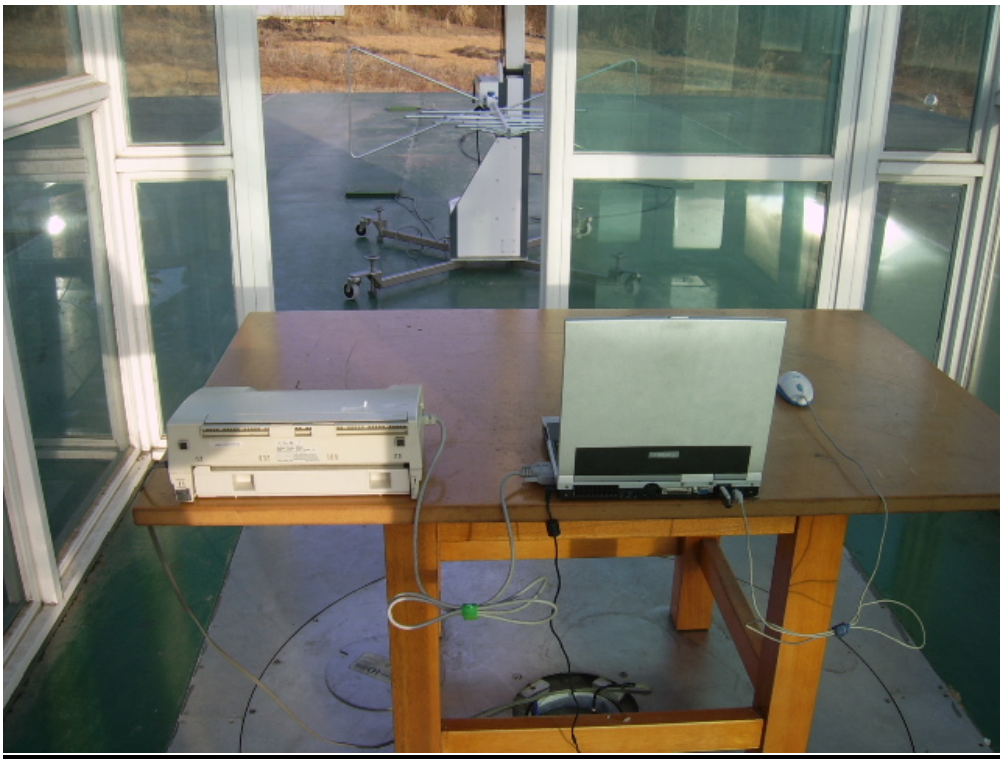
Conducted emission test (Rear)



Radiated Emission (Front)



Radiated Emission (Rear)



6.3 Photographs of EUT

Front View

Rear View

Side View

Inside View

Board Front

Board Rear

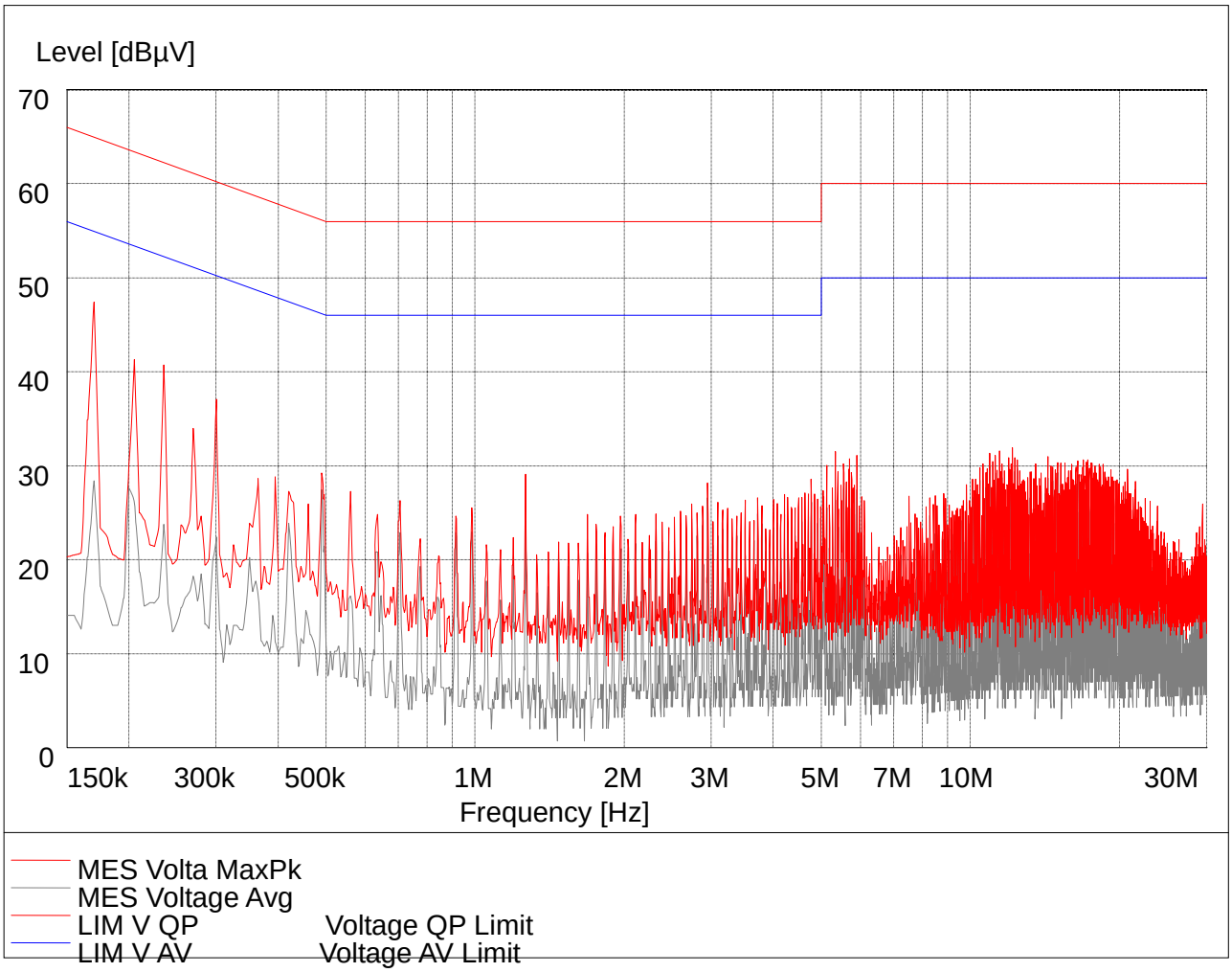
6.4 Data sheet of Conducted Emission

Standard Engineering Co., Ltd.
Conducted Emission Measurement

EUT:	HMDS-04GC
Manufacturer:	HANA MICRON Inc.
Operating Condition:	Normal
Test Site:	Shield Room
Operator:	SM Kim
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

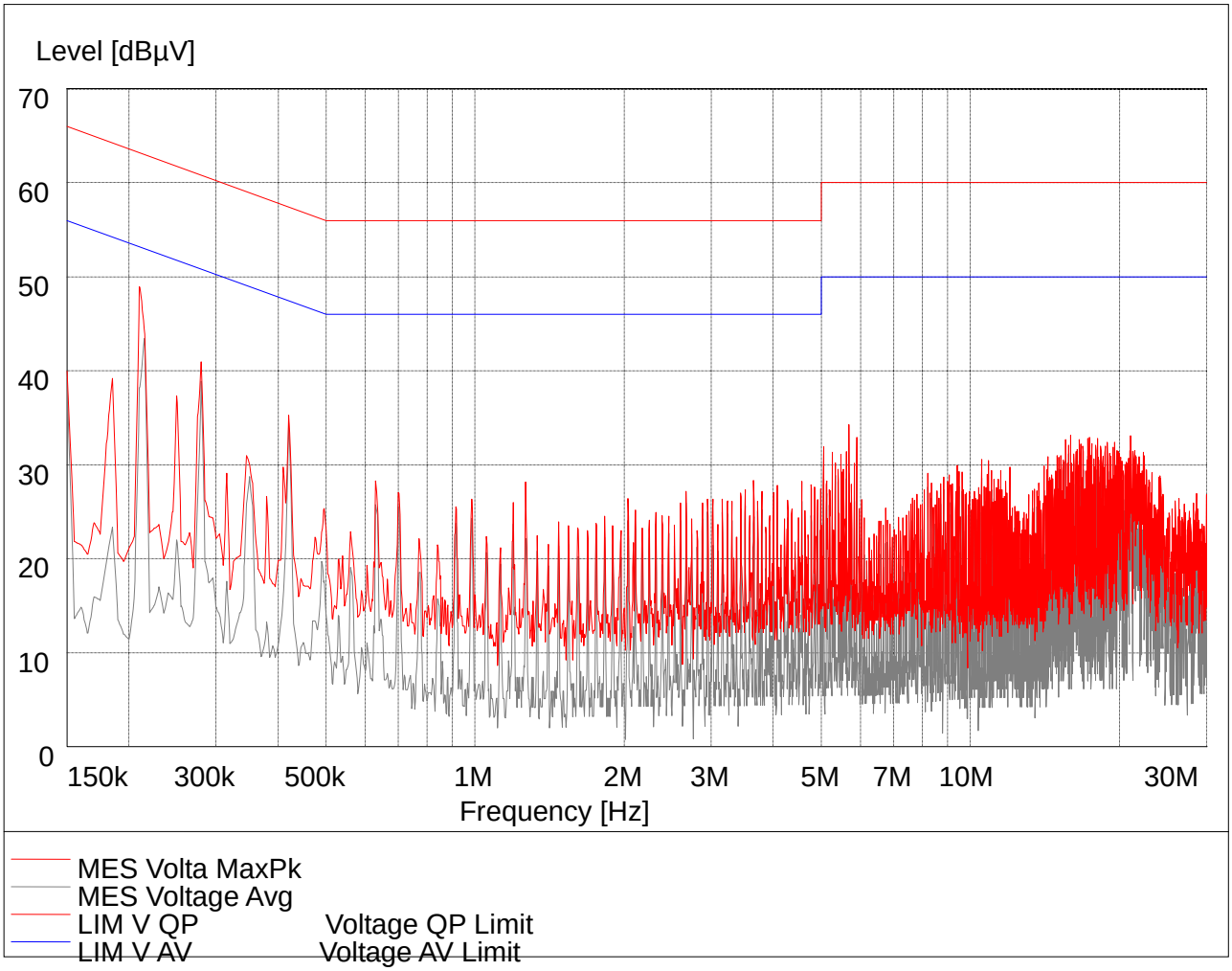


Standard Engineering Co., Ltd.
Conducted Emission Measurement

EUT:	HMDS-04GC
Manufacturer:	HANA MICRON Inc.
Operating Condition:	Normal
Test Site:	Shield Room
Operator:	SM Kim
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

6.6 User's Manual

Attached