

Report No. : FG16-114EFC (1/8)

EMI Test report

CATEGORY : FCC Part-15 (2016) ; Class B

PRODUCT : Personal Computer

MODEL : Q737
AC Adapter ADP-65MD B

MANUFACTURER : FUJITSU LIMITED
4-1-1, Kamikodanaka, Nakahara-ku, Kawasaki 211-8588 JAPAN

TEST SITE : FUJITSU GENERAL EMC LABORATORY
3-3-17, Suenaga, Takatsu-ku, Kawasaki 213-8502 JAPAN

DATE TESTED : August 17, 2016 23°C 52%

TESTED BY : Hiroyuki Aikawa

EUT conforms to the above mentioned regulation.

APPROVED BY :  DATE : August 18, 2016
for Eiji Miyachika, President

FUJITSU GENERAL EMC LABORATORY LIMITED
3-3-17, Suenaga, Takatsu-ku, Kawasaki 213-8502 JAPAN
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CLIENT : Client Products Division, FUJITSU LIMITED
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※ The description of the EUT and the system configuration in this report are provided by the client.



VLAC
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Accredited by VLAC.
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Registered on VCCI.

1. Description of EUT

The EUT: Q737 is personal computer using CPU; Core i7 2.6 GHz microprocessor. The EUT has a 13.3 inch FHD LCD (1920x1080) and storage device SSD (500 GB).

The EUT for Q737 has the interface for Mic-in/ Phone-out①, USB×2 ②③, HDMI⑥, Micro SD card slot, Bluetooth and wireless LAN module.

Internal clock frequency : 32.768 kHz, 12.000 MHz, 24.000 MHz, 25.000 MHz, 27.000 MHz, 33.000 MHz, 2.6 GHz (CPU)

Input power : AC 100~230 V, 50/ 60 Hz, Single-phase, 2 wires.

The EUT is intended to use generally in the residential / domestic area or commercial and light industrial area; category class B.

1.1 Test system configuration

The measurement was performed using Q737 as typical system configuration shown in figure-1 based on customer's request.

The EUT was selected from the pre-production line.

1.2 Operating condition

The following EUT and dependent devices were tested using "EMC64.exe" program under continuous operating condition to obtain maximum emission.

① P C	LCD-1:	Displaying "H" character on screen (Maximum contrast/ Luminescence)
		Display resolution: 1920×1080/ Refresh rate 60Hz
	SSD:	Read/ write the test data
	In-CAMERA:	Monitoring the video picture of in camera
	Out-CAMERA:	Monitoring the video picture of out camera
② Micro SD memory card:		Read/ write the test data
③ Headset:		Connecting only
④ USB (USB2.0):		Connecting only
⑤ HDD (USB3.0):		Read/ write the test data (5 G Max)
⑥ LCD-2:		Displaying LCD-1extension on screen (Maximum contrast/ Luminescence)
		Display resolution: 1920×1080 / Refresh rate 60Hz

2. EMI test results summary

Applied standards: FCC Part-15 (2016).

The test samples met the Class B limit based on FCC Part-15 (2016).

The limit of radiated emission (30 MHz to 1,000 MHz) of FCC Part-15 (2016) was applied limit of CISPR22 (2008).

The limit of conducted emission of FCC Part-15 (2016) was the same as limit of CISPR22 (2008).

The test result is effective in only the EUT.

The highest 6 point of each emission profiles are as follows.

2.1 Radiated emission (30 MHz to 1,000 MHz) : Measured at 10 m distance

Freq. (MHz)	Pol.	Noise level (QP: dB μ V/m)	Limit: ClassB (QP: dB μ V/m)	Margin (dB)
72.00	Horiz	26.9	30.0	3.1
72.00	Vert	25.3	30.0	4.7
216.00	Horiz	21.2	30.0	8.8
216.00	Vert	21.7	30.0	8.3
647.99	Horiz	29.6	37.0	7.4
695.99	Horiz	28.1	37.0	8.9

- Limit value: CISPR22 (2008)
- Measurement uncertainty : ± 3.6 dB (K=2, 95 %)

2.2 Over 1 GHz Radiated emission (1 GHz to 13 GHz) : Measured at 3 m distance

Freq. (GHz)	Pol.	Noise level (dB μ V/m)		Limit: ClassB (dB μ V/m)		Margin (dB)	
		Peak	AV	Peak	AV	Peak	AV
2.627	Horiz	52.4	50.1	74.0	54.0	21.6	3.9
2.627	Vert	52.6	49.6	74.0	54.0	21.4	4.4
2.745	Horiz	51.8	45.2	74.0	54.0	22.2	8.8
5.255	Horiz	48.6	45.0	74.0	54.0	25.4	9.0
6.000	Horiz	50.6	48.1	74.0	54.0	23.4	5.9
6.000	Vert	48.7	45.3	74.0	54.0	25.3	8.7

- Limit value: FCC Part-15 (2016)
- Measurement uncertainty : ± 4.3 dB (K=2, 95 %)

2.3 AC power line conducted emission (150 kHz to 30 MHz) : AC 120 V/ 60 Hz single phase

Freq. (MHz)	Line #	Noise level (dB μ V)		Limit: ClassB (dB μ V)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.189	# 1	51.6	31.7	64.1	54.1	12.5	22.4
0.189	# 2	51.4	29.6	64.1	54.1	12.7	24.5
0.255	# 1	43.2	24.4	61.6	51.6	18.4	27.2
0.255	# 2	43.0	22.0	61.6	51.6	18.6	29.6
11.610	# 1	35.3	29.4	60.0	50.0	24.7	20.6
11.610	# 2	33.6	28.1	60.0	50.0	26.4	21.9

- Limit value: CISPR22 (2008)
- Measurement uncertainty : ± 2.3 dB (K=2, 95 %)

3. EUT modification under the test

None.

4. Radiated emission and conducted emission

The measurement was performed without deviation from ANSI C63.4 (2014).

4.1 Radiated emission

4.1.1 Radiated emission (30 MHz to 1,000 MHz)

The radiated emission measurement was performed in the 10 m RF semi-anechoic chamber. The EUT was set on the turntable and the 80 cm height non-reflective desk (W: 150 cm×D: 100 cm) placed on the turntable, and operated by AC 120 V/ 60 Hz.

The maximum noise level in the frequency range from 30 MHz to 1,000 MHz were measured by 10 m method with scanning the antenna height from 1 m to 4 m above the ground plane, and rotating the EUT through 360 degrees for both horizontal and vertical polarization. Preliminary measurement using spectrum analyzer peak detection was performed to obtain the minimum margin spectrum. The setting of the interface cables was adjusted to obtain maximum level at the minimum margin spectrum. The final measurement was performed using the EMI test receiver (CISPR Quasi-peak, 120 kHz band width) and calibrated broadband antennas or dipole antennas about the main spectrums that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Model	S/N	Cal. Date	Due. Date
Bi Log antenna	Schwarzbeck	VULB9168	3118	2016.01.23	2017.01.23
Dipole antenna	Schwarzbeck	VHA9103	1573	2016.04.14	2018.04.14
Dipole antenna	Schwarzbeck	UHA9105	2119	2016.04.14	2018.04.14
EMI test receiver	Rohde & Schwarz	ESCS30	849650/024	2015.08.26	2016.08.26
Spectrum analyzer	HP	85422E	3746A00243	2016.01.23	2017.01.23
RF switch	Anritu	MB59	#M87079	2016.02.06	2017.02.06
RF cable	—	TF0207-2	—	2016.02.06	2017.02.06
2nd semi-anechoic chamber	Riken eletech	TF0202 (NSA)	—	2015.12.18	2016.12.18
EMI test program	FGE	Version 1.3			

4.1.2 Over 1 GHz radiated emission (1 GHz to 13 GHz)

The over 1 GHz radiated emission measurement was performed in the 10 m RF semi-anechoic chamber. The EUT was set on the turntable and the 80 cm height styrene foam desk (W: 150 cm×D: 100 cm) placed on the turntable, and operated by AC 120 V/ 60 Hz.

The radiated emission measurement from 1 GHz to 13 GHz: Maximum clock frequency 2.6 GHz was performed using the spectrum analyzer (Peak detection, 1MHz band width) and the horn antenna that was positioned at 3 m from test volume. The measurement was performed for both horizontal and vertical polarization with rotating the EUT through 360 degrees and the antenna height to 1 m. (The horizontal length included 3dB-Beam-Width of the receiving antenna placed at measurement distance: 3.05 m is 0.47m).

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Horn antenna	Schwarzbeck	BBHA9120D	414	2016.04.22	2017.04.22
Spectrum analyzer	Advantest	U3772	242000054	2016.04.08	2017.04.08
Pre amplifier	Agilent	8449B	3008A01020	2016.04.01	2017.04.01
2nd semi-anechoic chamber	Riken eletech	TF0203 (SVSWR)	—	2016.02.08	2017.02.08

4.2 AC power line conducted emission (150 kHz to 30 MHz)

The conducted emission measurement was performed in the shielded room. The EUT was set on the 80 cm height non-reflective desk and connected to the $50\Omega/50\mu\text{H}$ artificial mains network: AMN, and operated by AC 120V/ 60 Hz.

Preliminary measurement using spectrum analyzer peak detection was performed in the frequency range from 150 kHz to 30 MHz to arrange the minimum margin spectrum. The setting of the cables was adjusted to obtain maximum level at the minimum margin spectrum. The final measurement was performed using the EMI test receiver (CISPR Quasi-peak, 9 kHz band width) and recorded the maximum value in the monitored interval about the main spectrum that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Model	S/N	Cal. Date	Due. Date
AMN for EUT	Kyoritsu	KNW-407	8-823-18	2015.12.26	2016.12.26
AMN for AE	Kyoritsu	KNW-242C	8-1387-5	2015.12.26	2016.12.26
EMI test receiver	Rohde & Schwarz	ESCS30	849650/024	2015.08.26	2016.08.26
Spectrum analyzer	HP	85422E	3746A00243	2016.01.23	2017.01.23
RF switch	Anritsu	MB59	#M87079	2016.02.06	2017.02.06
Band pass filter	Advantest	TR14202	#03560027	2016.02.06	2017.02.06
10 dB Transient Limiter	Rohde & Schwarz	ESH3-Z2	#0857.8810.52	2016.02.06	2017.02.06
RF cable	—	TF0207-2	—	2016.02.06	2017.02.06
2nd shielded room	Riken eletech				
EMI test program	FGE	Version 1.3			

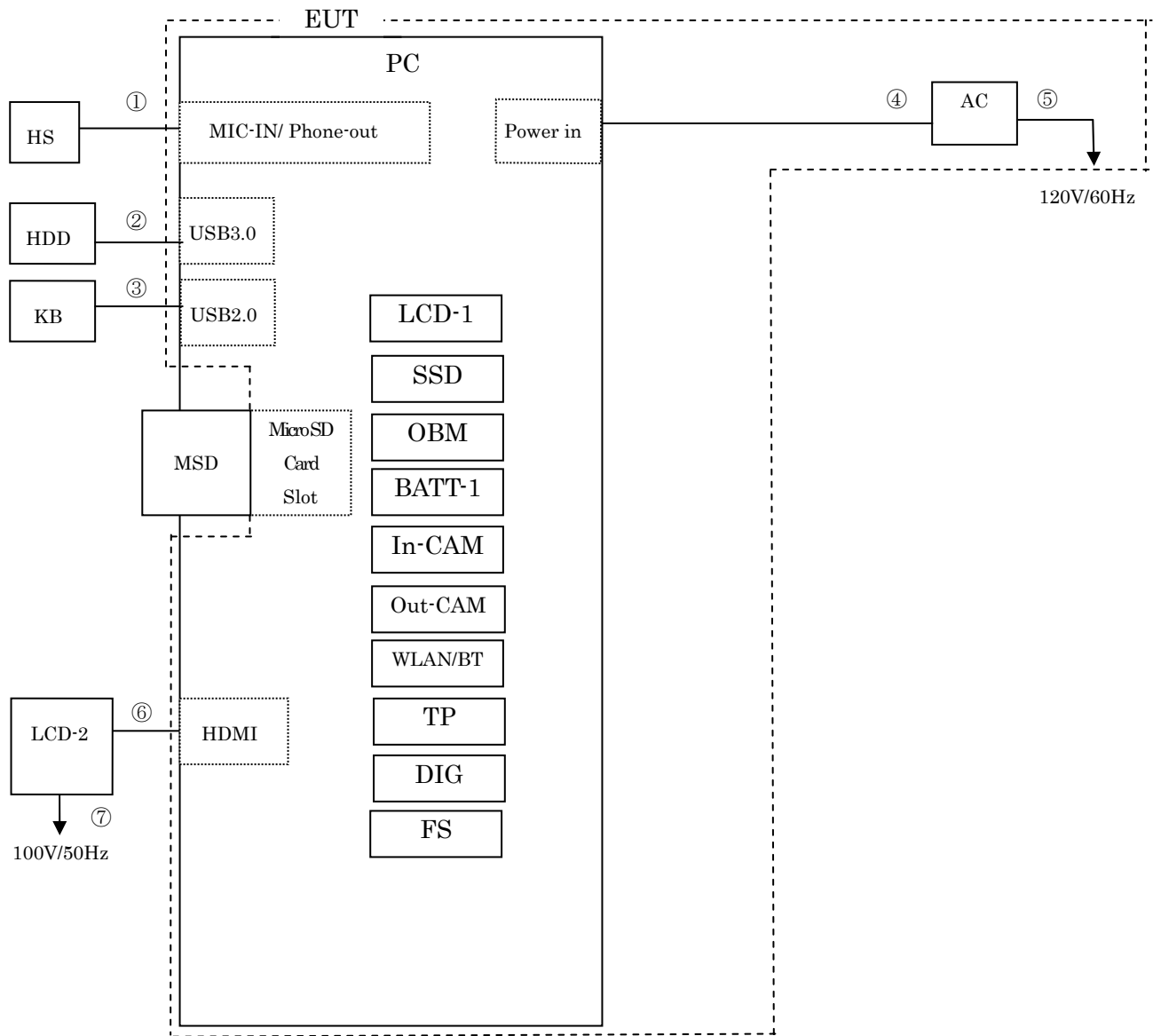
5. Test site and traceability

The Fujitsu General EMC Laboratory performs testing under VCCI / FCC / EN / CISPR regulations and manufacture's specifications. Test procedures and test facilities comply with the international standards. The laboratory is accredited from VLAC (Japan), appointed from TÜV Rheinland (Germany) and registered on VCCI (Japan).

VLAC:	Dec. 8th 2014 (Accreditation No.: VLAC-041)
VCCI:	Dec. 19st 2014 (Laboratory Registration No.: A-0202)
TÜV Rheinland Japan:	Aug. 25th 2005 (ID No.: 0000007034)

The measuring equipments using in the laboratory and test data are under national and international standards. All equipment is maintained by regular inspection and daily check as whole measurement system in order to keep accuracy.

Figure-1 System configuration and cables: Port replicator and Magnetic Card Reader



Main EUT				
Code	Name	Type	S/N	Product
PC	Personal computer	Q737	Pre-production sample	Fujitsu

Related EUT				
AC	AC adapter	ADP-65MD B	14500907C	Fujitsu

Included device; PC-1				
Code	Name	Type	S/N	Product
LCD-1	13.3 inch FHD	LQ133M1JW12	_____	SHARP
SSD	Solid state drive	MZNL512HCJH-00007(500GB)	_____	Samsung
OBM	Onboard Memory	K4EBE304EB-EGCF(16GB)	_____	Samsung
BATT-1	Battery (3cell)	FPCBP448 10.8V 46Wh	_____	Fujitsu
In-CAM	In-camera	CNFDF1621005130LH	_____	Chicony
Out-CAM	Out-camera	CKAD53221005130LH	_____	Chicony
TP	Touch Panel 13.3inch	FTU5-13H03U-01X	_____	WACOM
DIG	Digitizer	SU8C-13H19AS-01X	_____	WACOM
FS	Finger Print Sensor	VAL1196_R01-HF	_____	Validity
WLAN/BT	W-LAN/ Bluetooth	7265NGW (11a/b/g/n/ac,2x2+BT)	_____	Intel

Assisted equipment

Code	Name	Type	S/N	Product
LCD-2	LCD display-1	EV3237 (31.5 inch)	27551025	EIZO
HDD	USB3.0 Hard disk drive	LCH-RK500U3	1566130818627QR	LACIE
HS	Head set	ATH-CKS55i	_____	audio-technica
USB-KB	USB Keyboard	KB410K	1404003702808	Fujitsu
KB	Keyboard	USM512H 512MB	_____	Fujitsu
MSD	Micro SD memory card	SDXC I 64 GB	4462DF03T6ZS	SunDisk

Cables SLD: Shielded NSLD: Non-shielded CAX: Coaxial

Connector MC: Metal NMC: Non-metal PMC: Point contact metal

No.	I/O Port	Name	Type	Length	Cable type
①	Phone-out/ Mic-in	Headset cable	_____	1.2 m	NSLD, MC
②	USB3.0	USB cable	_____	1.0 m	SLD, MC
③	USB2.0	Keyboard cable	_____	1.8 m	SLD, MC
④	Power-in	AC Adapter cable	_____	1.3 m	SLD, MC
⑤	_____	AC power cable	_____	2.0 m	3P-NLD, NMC
⑥	μ -HDMI	μ -HDMI cable	_____	2.0 m	SLD, MC
⑦	_____	AC Power cable	_____	2.0 m	3P-NSLD

Appendix data (#16-114E : Total 7 pages)

1. Photograph #16-114E (4 pages)

- Radiated emission measurement : 30~1,000 MHz (Front) : Photo-1.1
 - (Back) : Photo-1.2
- 1~13 GHz (Front) : Photo-1.3
 - (Side) : Photo-1.4
- AC power line conducted emission measurement : Photo-2
- Label
 - Personal Computer Q737 : Photo-3.1
 - AC Adapter ADP-65MD B : Photo-3.2

2. Test data (3 pages)

- Radiated emission
 - 30~1,000 MHz : #16-114E-RE1 (1 page)
 - 1~13 GHz : #16-114E-GH1 (1 page)
- Power line conducted emission : #16-114E-CE1 (1 page)

Photo-1.1 Radiated emission measurement for 30-1000 MHz (Front)

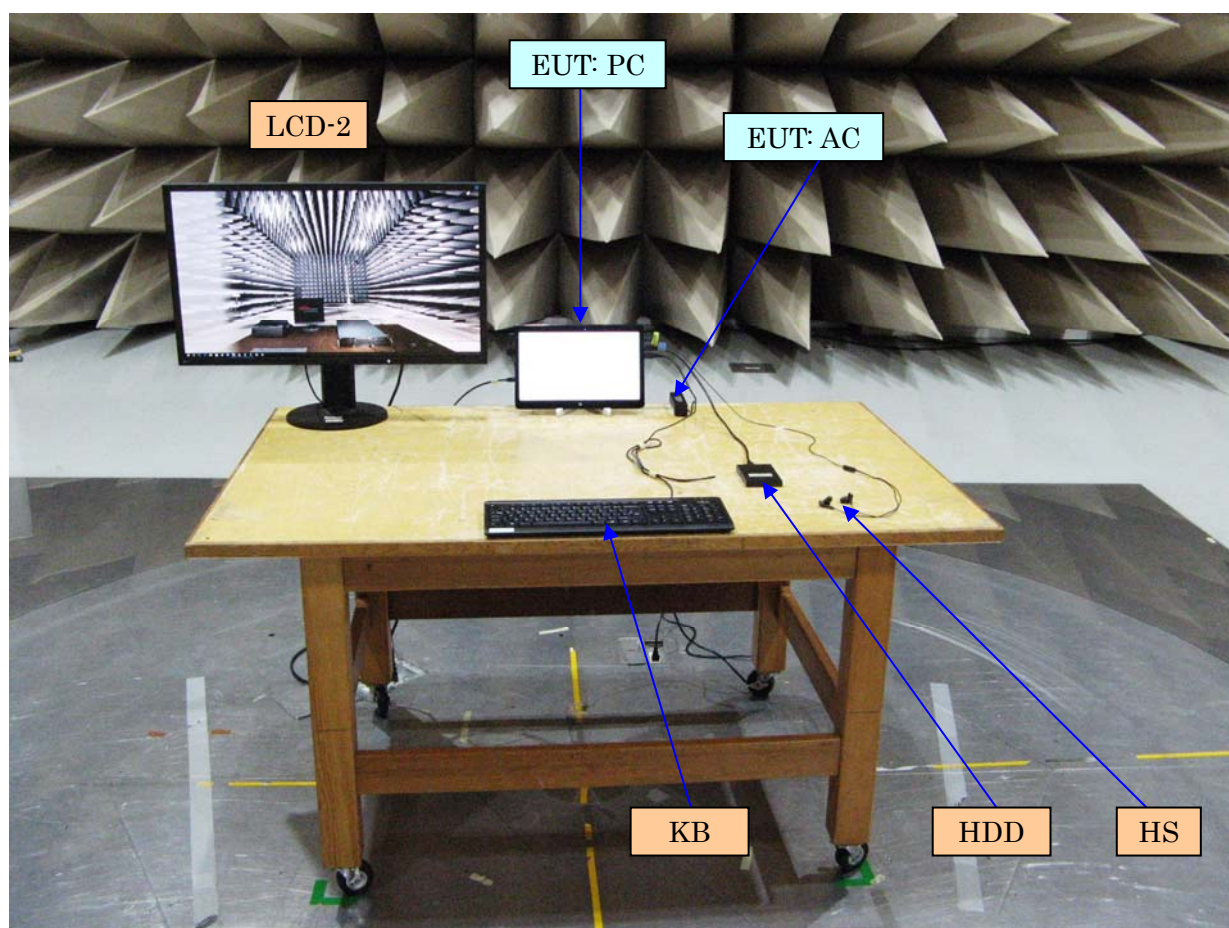


Photo-1.2 Radiated emission measurement for 30-1000 MHz (Back)

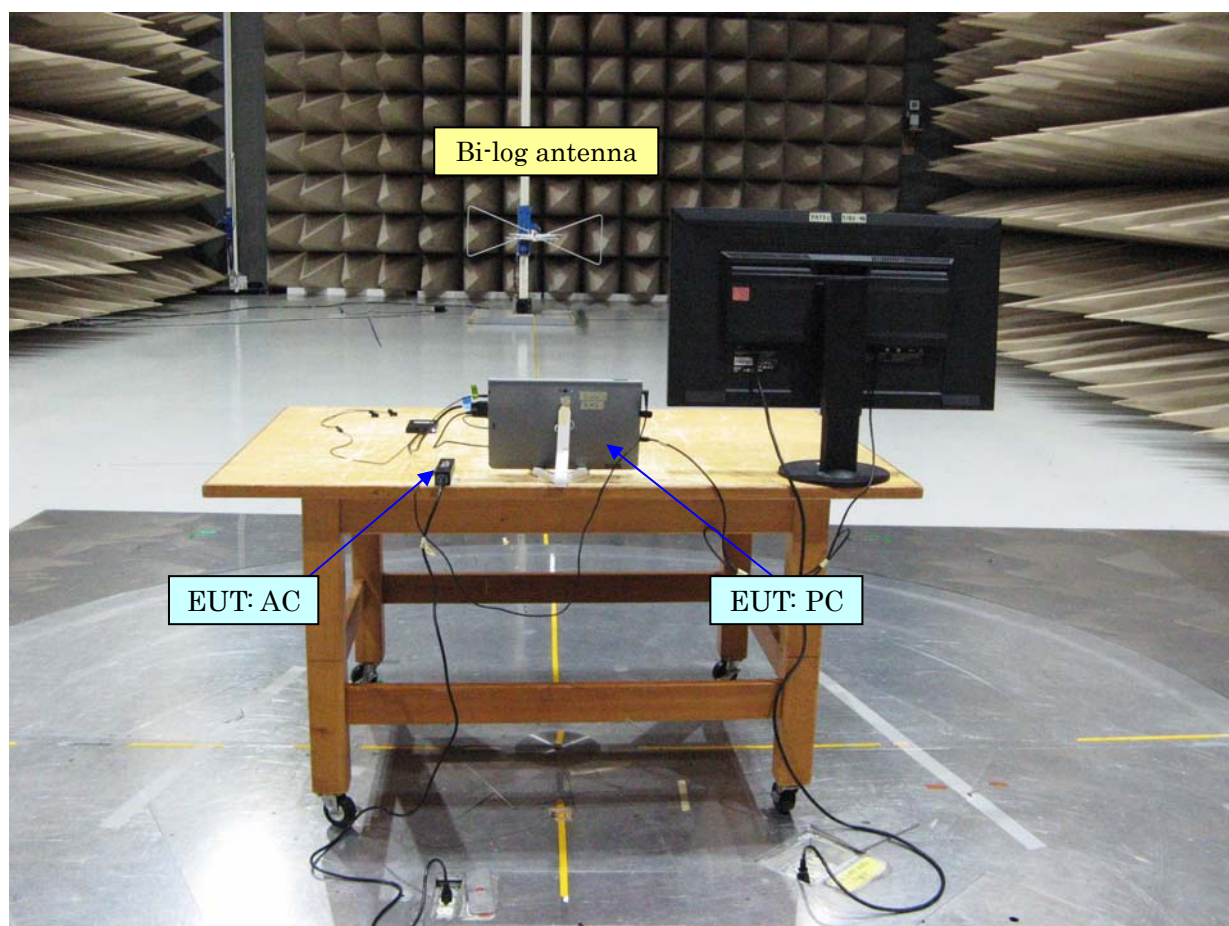


Photo-1.3 Over 1 GHz Radiated emission measurement (Front)

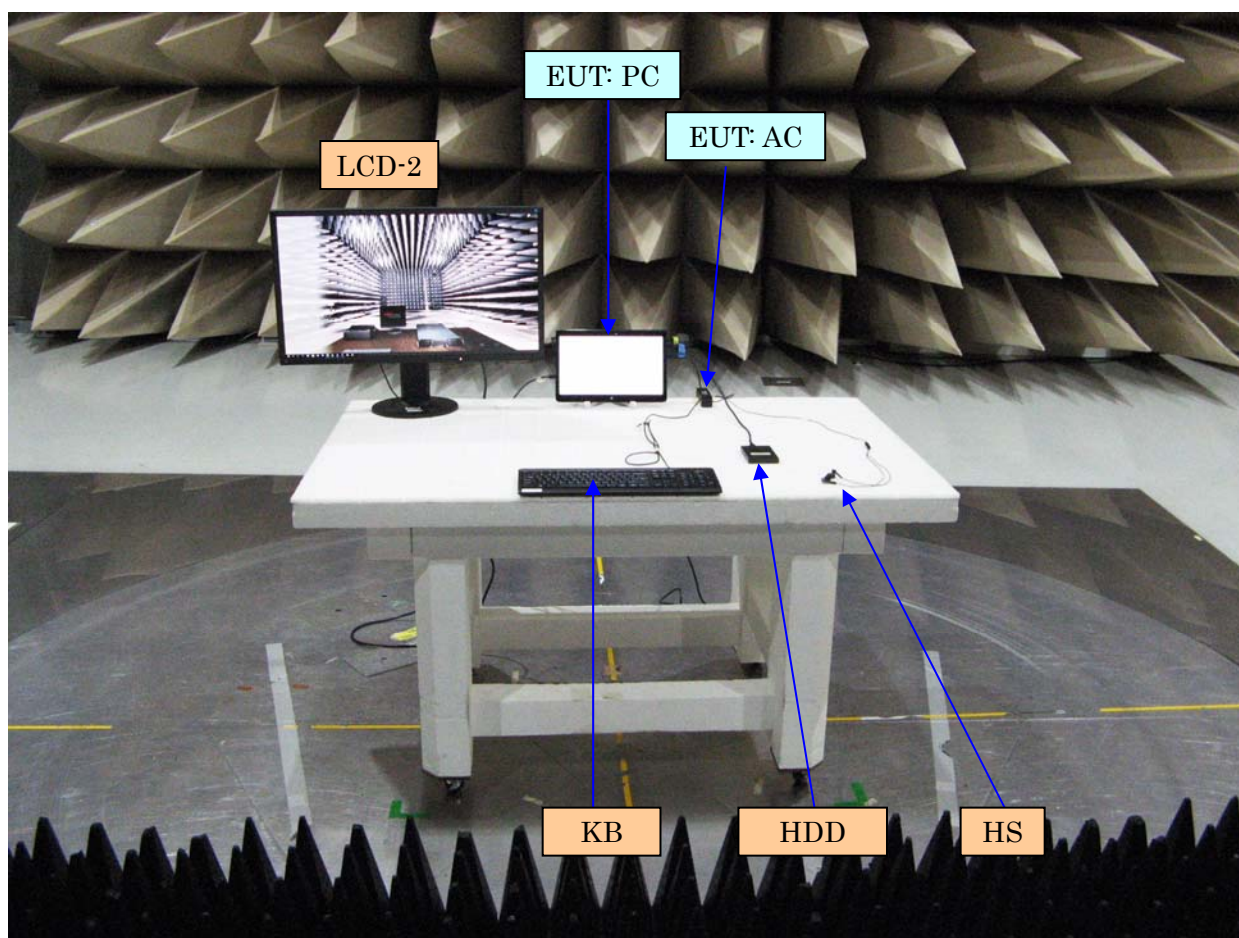


Photo-1.4 Over 1 GHz Radiated emission measurement (Side)

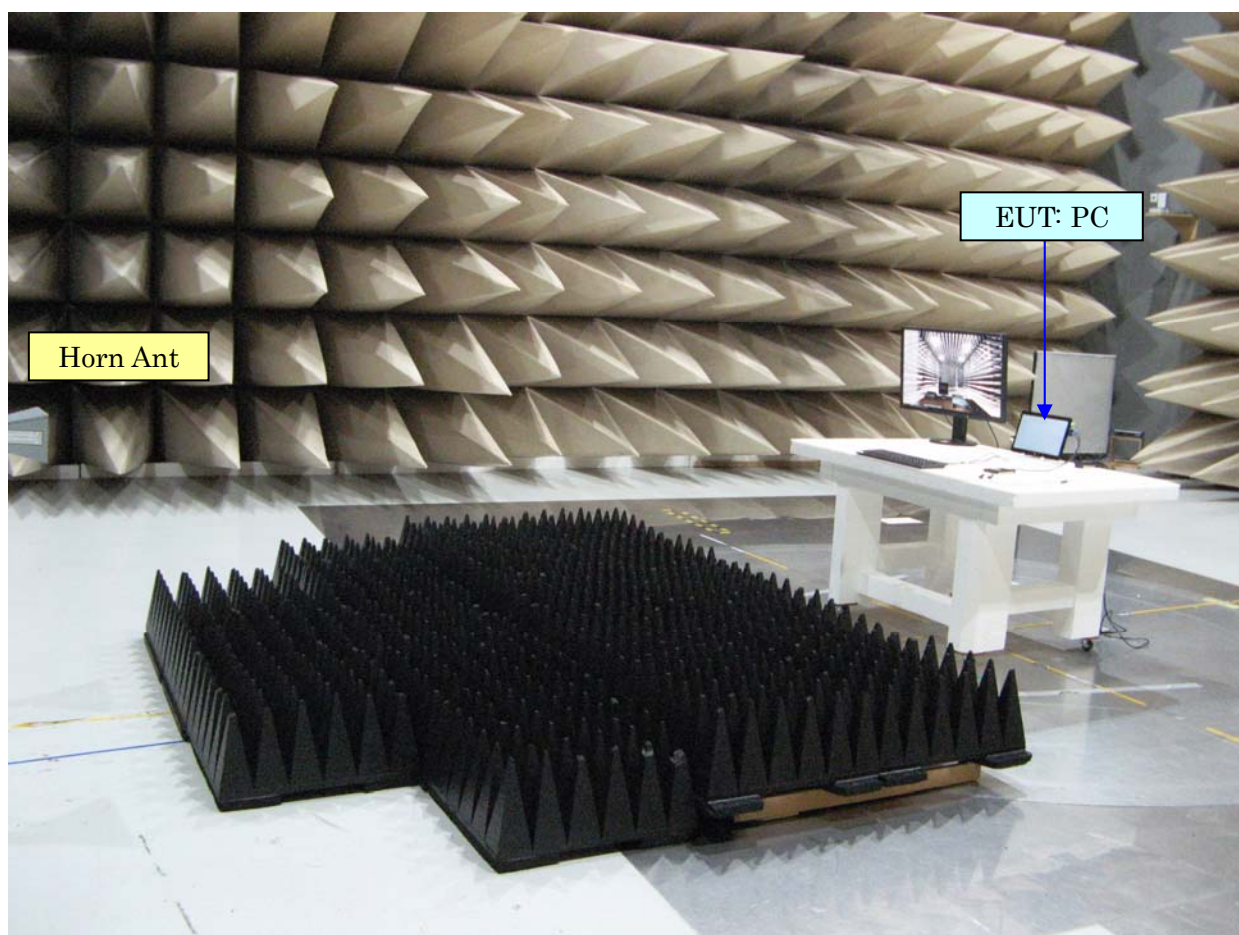


Photo-2 AC Power line conducted emission measurement

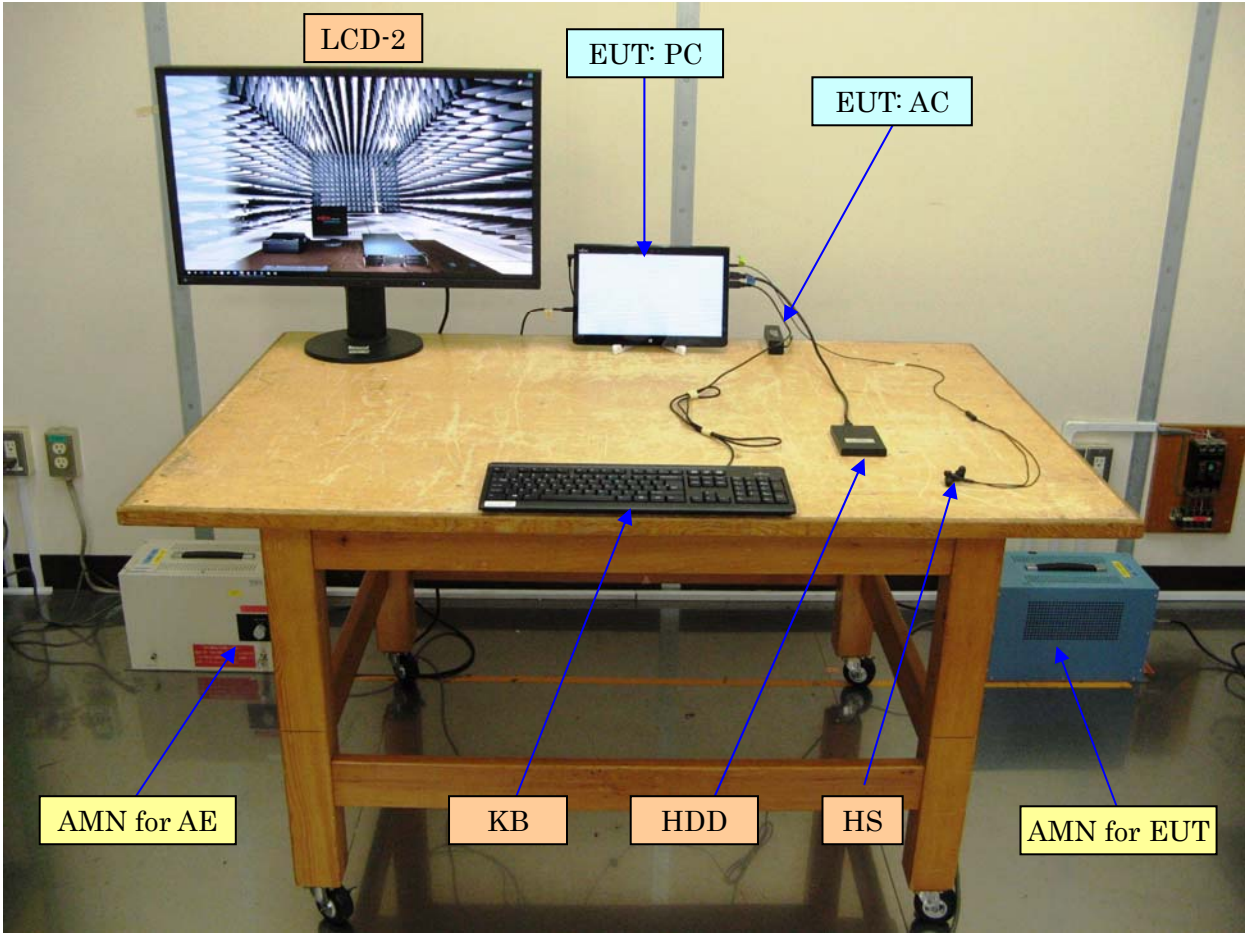


Photo-3.1 Label: Personal Computer Q737

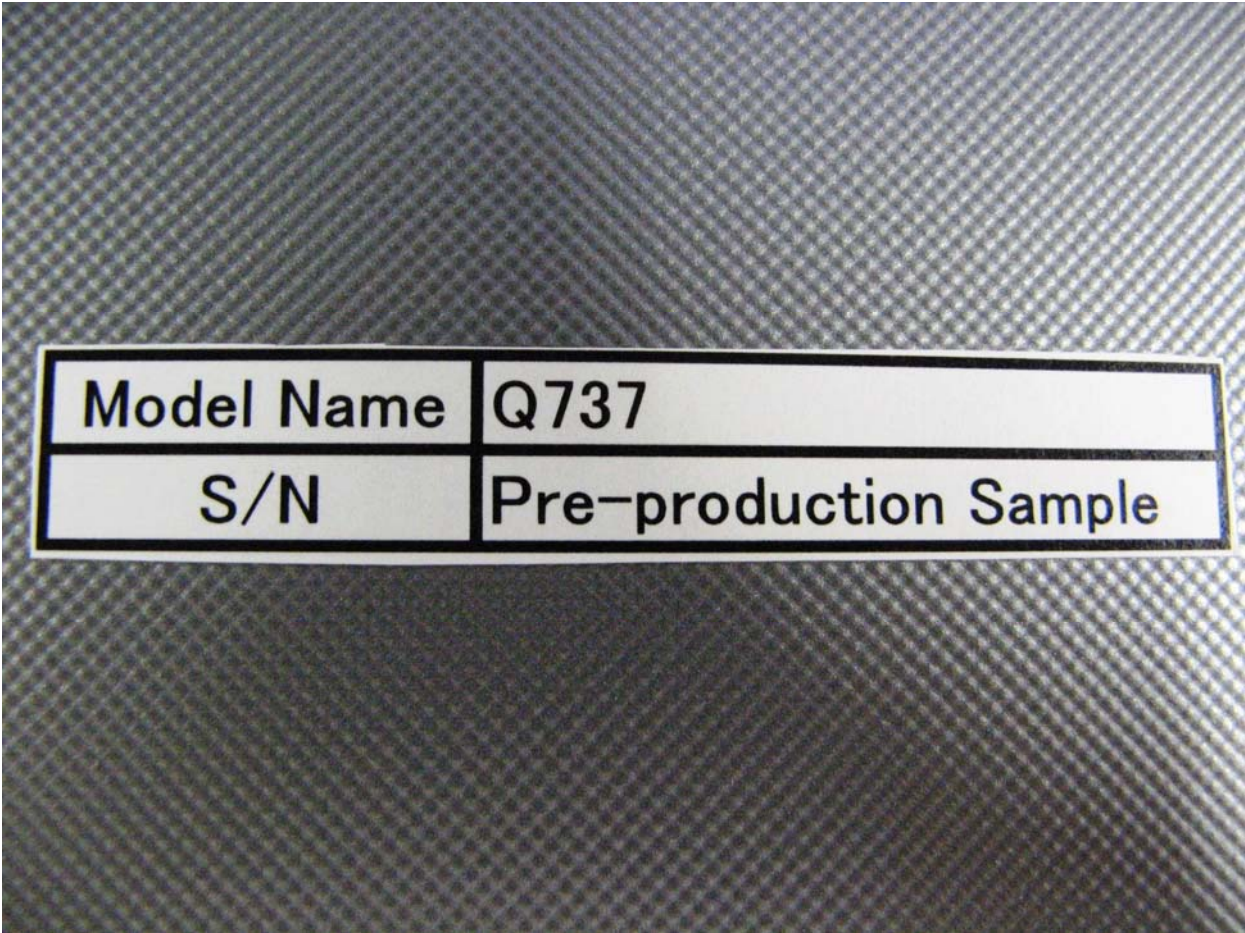
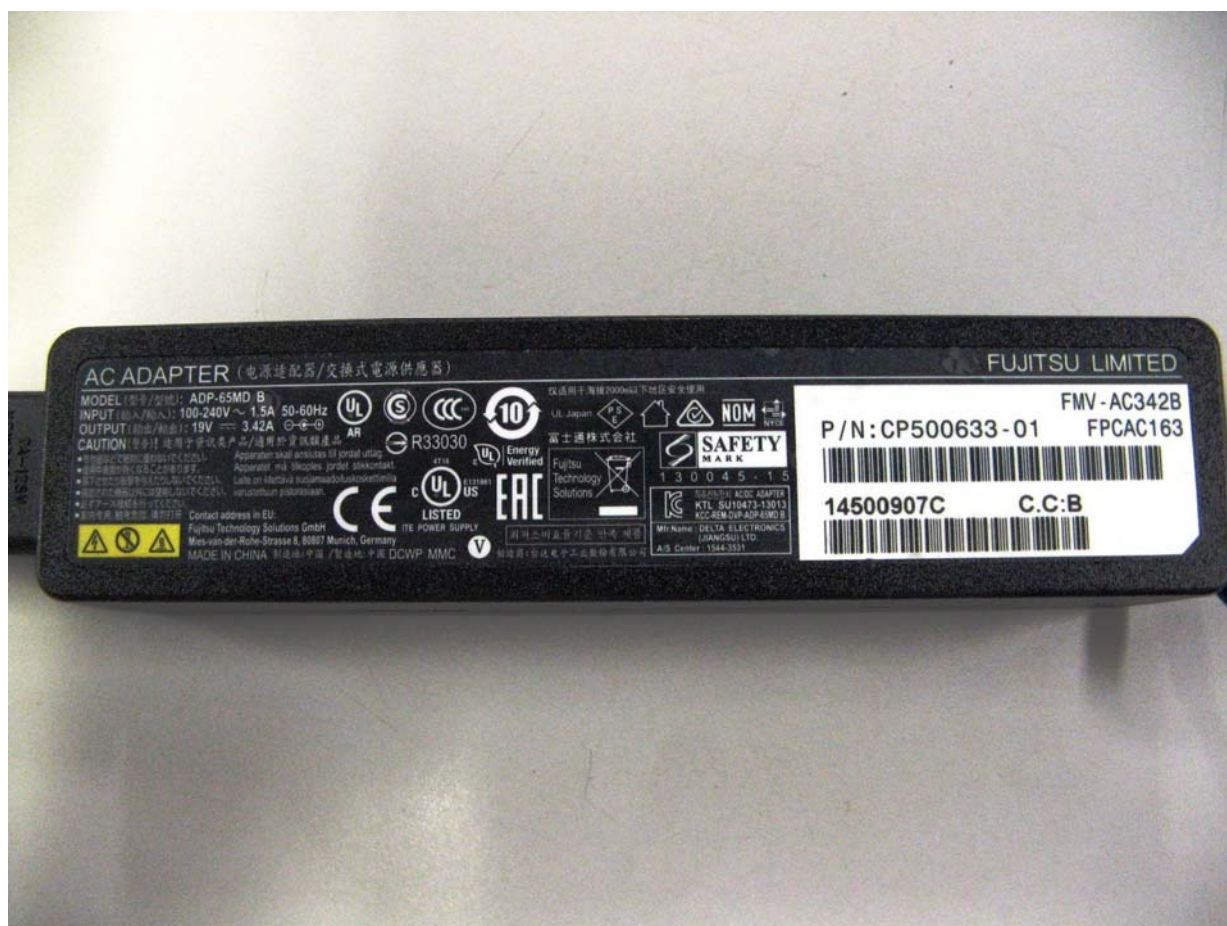


Photo-3.2 Label: AC Adapter ADP-65MD B



RADIATED EMISSION MEASUREMENT (30MHz~1000MHz)

EUT Name: Personal Computer

Limit: CISPR22 Class B

Test date: 2016/8/17

Antenna: Schwarzbeck VULB9168 S/N:3118

Test site: 2nd semianechoic chamber

Type: Q737(ADP-65MD B) S/N: Pre-production Sample

Measurement distance is 10m

Temp: 23 °C

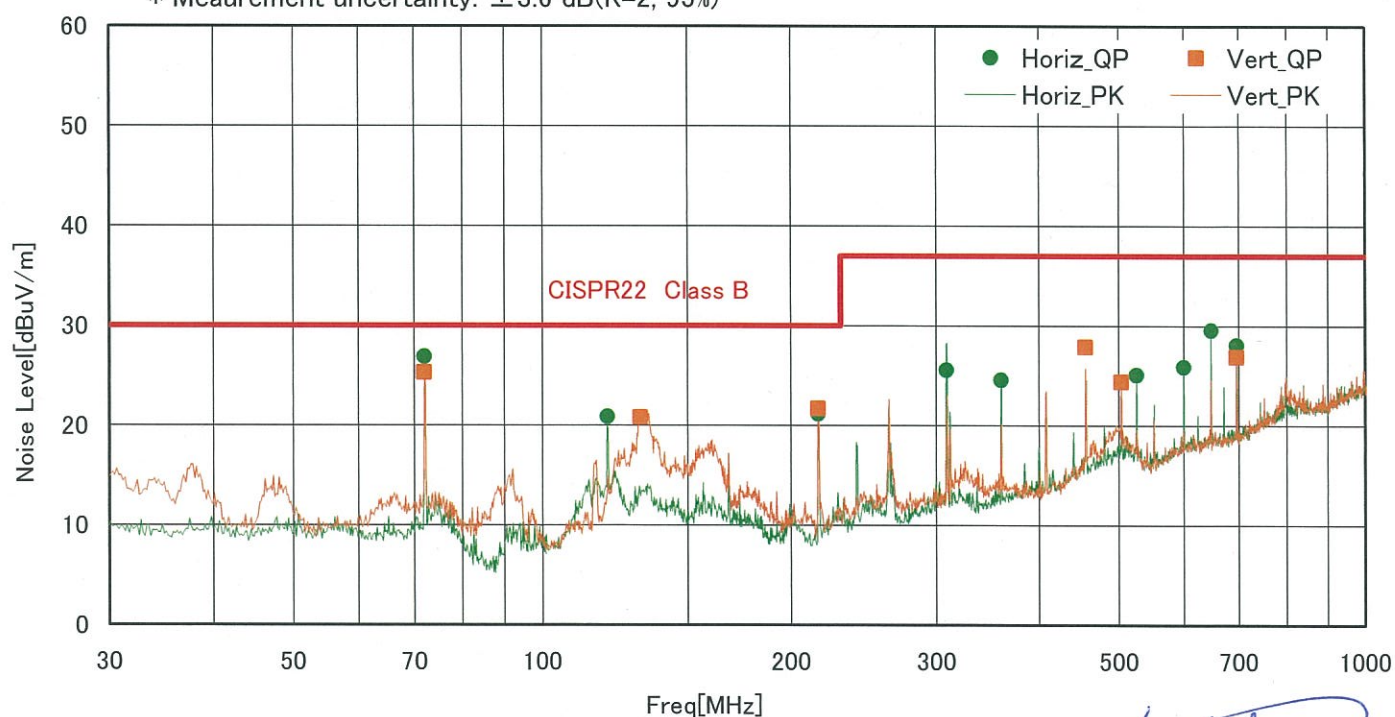
R/H: 52 %

Receiver: HP 85422E S/N:3746A00243

Software: EMI measurement software of Version 1.3

Freq [MHz]	Pol.	Meter Reading [QP:dBuV]	Factor [dB/m]	Noise Level [QP:dBuV/m]	Limit [QP:dBuV/m]	Margin [dB]	Height [cm]	Angle [°]
72.00	Horiz	39.6	-12.7	26.9	30.0	3.1	400	300
72.00	Vert	38.0	-12.7	25.3	30.0	4.7	100	0
120.00	Horiz	33.0	-12.1	20.9	30.0	9.1	400	240
131.53	Vert	32.2	-11.4	20.8	30.0	9.2	100	120
216.00	Horiz	33.7	-12.5	21.2	30.0	8.8	350	300
216.00	Vert	34.2	-12.5	21.7	30.0	8.3	100	300
308.90	Horiz	33.5	- 7.9	25.6	37.0	11.4	250	300
359.99	Horiz	31.0	- 6.4	24.6	37.0	12.4	250	120
455.99	Vert	31.3	- 3.4	27.9	37.0	9.1	100	60
504.01	Vert	26.9	- 2.5	24.4	37.0	12.6	300	210
525.49	Horiz	27.1	- 2.0	25.1	37.0	11.9	150	30
599.99	Horiz	25.7	0.2	25.9	37.0	11.1	150	270
647.99	Horiz	28.6	1.0	29.6	37.0	7.4	150	30
695.99	Horiz	26.2	1.9	28.1	37.0	8.9	100	90
695.99	Vert	25.0	1.9	26.9	37.0	10.1	300	90

* Noise Level = Meter Reading + Antenna Factor + Cable Loss

* Measurement uncertainty: ± 3.6 dB(K=2, 95%)

Tested by

RADIATED EMISSION MEASUREMENT (1GHz-13GHz)

EUT Name: Personal Computer

Type: Q737 (ADP-65MD B)

S/N: Pre-production Sample

Limit: FCC ClassB 3m

Measurement distance: 3.05 m

Temp: 23 °C

Test date: 2016/08/17

(Noise Level is calculated for 3m distance)

R/H: 52%

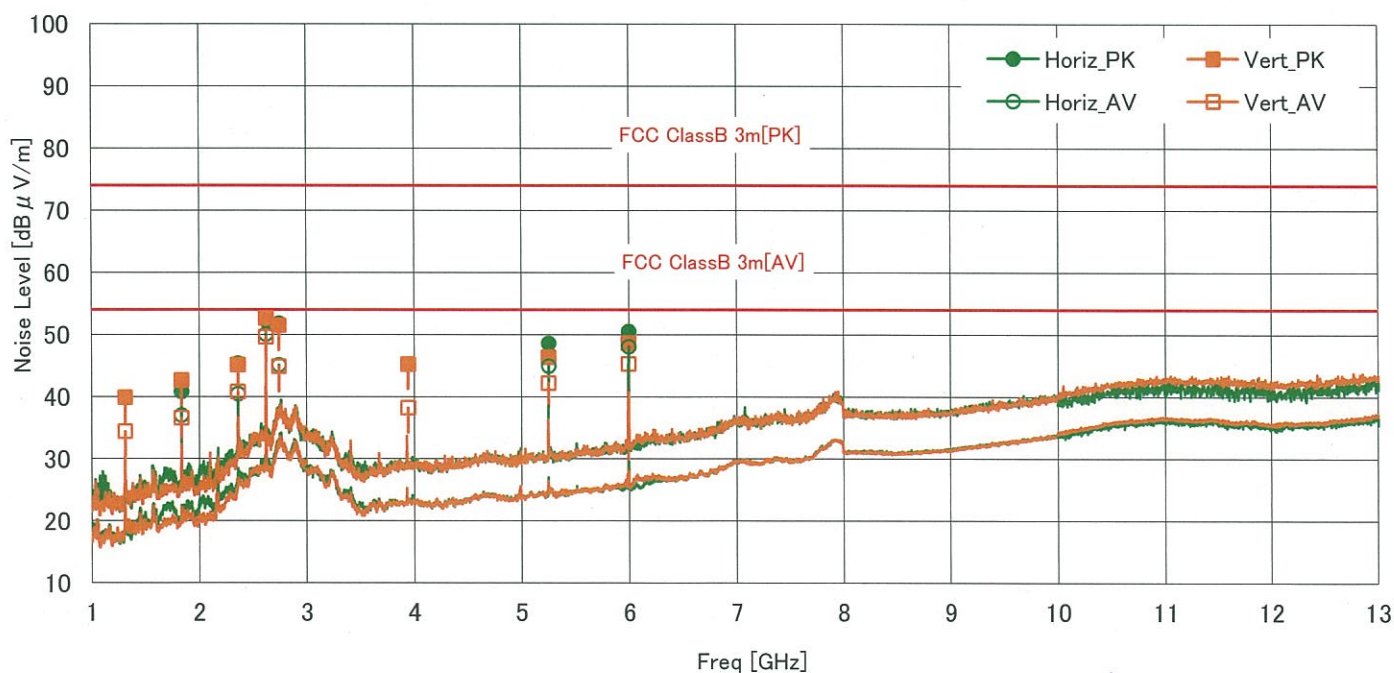
Antenna: Schwarzbeck BBHA9120D S/N: 414

Spectrum analyzer: Advantest U3772 S/N: 240200054

Test site: 2nd semi-anechoic chamber

Freq [GHz]	Pol	Meter Reading [dBuV]		Factor [dB/m]	Noise Level [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
		PK	AV		PK	AV	PK	AV	PK	AV
1.314	Vert	47.9	42.5	-8.1	39.9	34.4	74.0	54.0	34.1	19.6
1.839	Horiz	47.1	43.3	-6.3	40.9	37.1	74.0	54.0	33.1	16.9
1.839	Vert	48.9	42.9	-6.3	42.7	36.6	74.0	54.0	31.3	17.4
2.365	Horiz	50.1	45.2	-4.6	45.4	40.5	74.0	54.0	28.6	13.5
2.365	Vert	49.8	45.4	-4.6	45.1	40.8	74.0	54.0	28.9	13.2
2.627	Horiz	56.3	54.0	-4.0	52.4	50.1	74.0	54.0	21.6	3.9
2.627	Vert	56.6	53.6	-4.0	52.6	49.6	74.0	54.0	21.4	4.4
2.745	Horiz	55.6	48.9	-3.7	51.8	45.2	74.0	54.0	22.2	8.8
2.745	Vert	55.2	48.6	-3.7	51.5	44.9	74.0	54.0	22.5	9.1
3.949	Vert	46.7	39.7	-1.4	45.3	38.2	74.0	54.0	28.7	15.8
5.255	Horiz	47.2	43.5	1.5	48.6	45.0	74.0	54.0	25.4	9.0
5.255	Vert	44.9	40.7	1.5	46.4	42.2	74.0	54.0	27.6	11.8
6.000	Horiz	48.4	45.9	2.2	50.6	48.1	74.0	54.0	23.4	5.9
6.000	Vert	46.5	43.1	2.2	48.7	45.3	74.0	54.0	25.3	8.7

* Noise Level = Meter Reading + Factor (= Antenna Factor - Preamp Gain + Cable Loss + 3m Distance Factor)

* Measurement uncertainty: ± 4.3 dB (k=2, 95%)

 Tested by

POWER LINE CONDUCTED EMISSION MEASUREMENT (150kHz~30MHz)

EUT Name: Personal Computer

Type: Q737(ADP-65MD B)

S/N: Pre-production Sample

Limit: CISPR22 Class B

Test voltage: 120 VAC Single Phase

Test date: 2016/8/17

Temp: 23 °C

R/H: 52 %

AMN: Kyoritsu KNW-407 S/N: 8-823-18

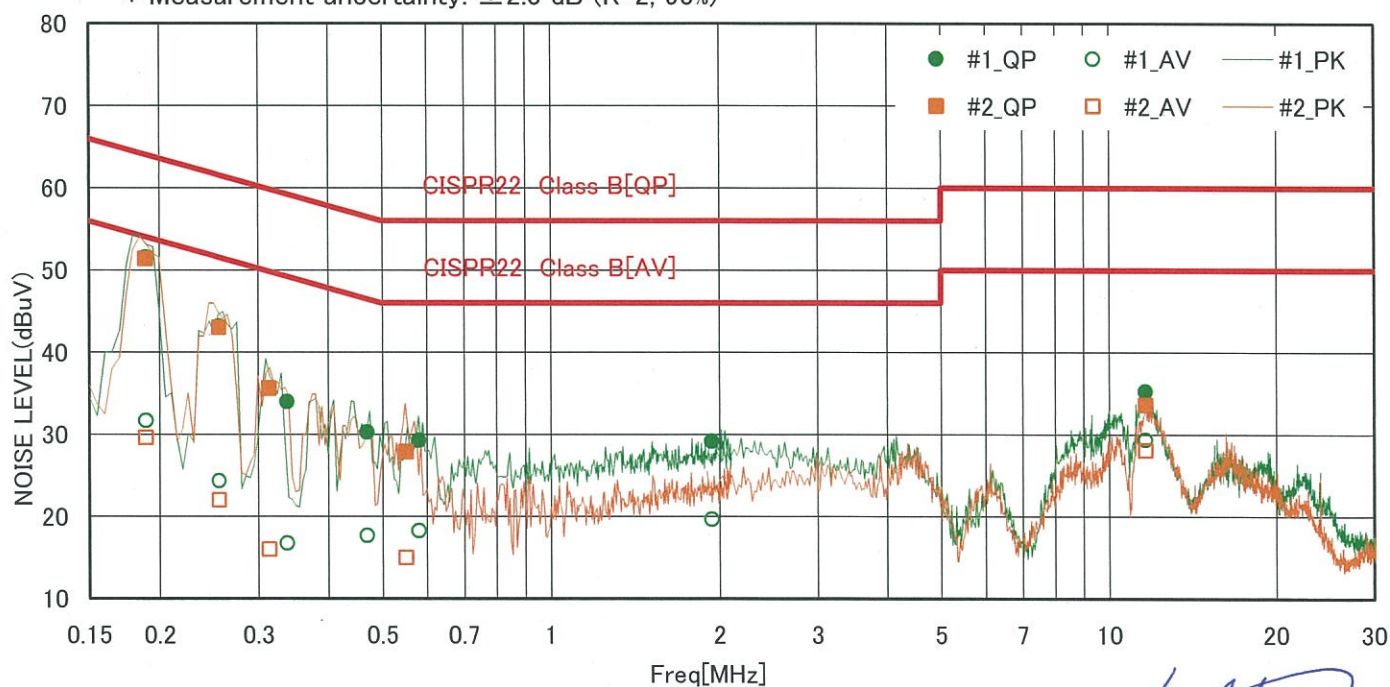
Receiver: HP 85422E S/N: 3746A00243

Test site: 2nd shielded room

Software: EMI measurement software of Version 1.3

Freq [MHz]	Line	Meter Reading [dBuV]		Factor [dB]	Noise Level [dBuV]		Limit [dBuV]		Margin [dB]	
		QP	AV		QP	AV	QP	AV	QP	AV
0.189	# 1	40.8	20.9	10.8	51.6	31.7	64.1	54.1	12.5	22.4
0.189	# 2	40.6	18.8	10.8	51.4	29.6	64.1	54.1	12.7	24.5
0.255	# 1	32.5	13.7	10.7	43.2	24.4	61.6	51.6	18.4	27.2
0.255	# 2	32.3	11.3	10.7	43.0	22.0	61.6	51.6	18.6	29.6
0.313	# 2	25.1	5.5	10.5	35.6	16.0	59.9	49.9	24.3	33.9
0.337	# 1	23.5	6.3	10.5	34.0	16.8	59.3	49.3	25.3	32.5
0.469	# 1	20.1	7.5	10.2	30.3	17.7	56.5	46.5	26.2	28.8
0.550	# 2	17.8	4.9	10.1	27.9	15.0	56.0	46.0	28.1	31.0
0.580	# 1	19.2	8.2	10.1	29.3	18.3	56.0	46.0	26.7	27.7
1.934	# 1	19.1	9.6	10.1	29.2	19.7	56.0	46.0	26.8	26.3
11.610	# 1	24.6	18.7	10.7	35.3	29.4	60.0	50.0	24.7	20.6
11.610	# 2	22.9	17.4	10.7	33.6	28.1	60.0	50.0	26.4	21.9

* Noise Level = Meter Reading + AMN Factor + 10dB pad + Cable Loss

* Measurement uncertainty: ± 2.3 dB (K=2, 95%)

Tested by