

EMC TEST REPORT

Report No.: EME-040637

Model No.: DVD M1020

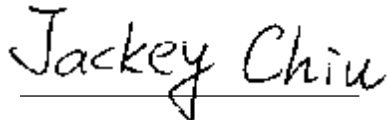
Issued Date: July 8, 2004

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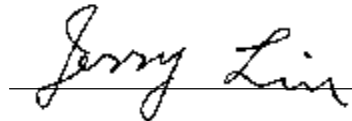
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Project Engineer



Jackey Chiu

Reviewed By



Jerry Liu

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Summary of Tests**In-Vehicle Entertainment -Model: DVDM1020****FCC ID: QYKEL708**

Test	Reference	Results
Bandwidth of fundamental frequency	15.239(a)	Complies
Field strength of fundamental frequency	15.239(b)	Complies
Radiated emission	15.239(c), 15.209	Complies
Power Line Conducted Emission test	15.207	Complies

1. General information

1.1 Identification of the EUT

Applicant:	E-Lead Electronic Co., Ltd
Product:	In-Vehicle Entertainment
Model No.:	DVDM1020
FCC ID.:	QYKEL708
Frequency Range:	88.1MHz to 97.9MHz
Channel Number:	50 channels
Frequency of Each Channel:	88.1+0.2k MHz, k=0,1~49
Type of Modulation:	FM
Power Supply:	12Vdc with Battery
Power Cord:	N/A
Sample Received:	July 1, 2004
Test Date(s):	July 1, 2004 ~ July 3, 2004

1.2 Additional information about the EUT

The DVDM1020 (EL-708) is an in-vehicle entertainment system that provides more entertainment and fun to passengers when they are traveling with vehicles on the roads. DVDM1020 will be mounted on the center of vehicle's roof where car dome lights are located. This entertainment system is compatible with an A/V Switch Box that allows users to connect some other media devices such as digital video cameras, portable DVD players, and game consoles. With a 10.2" TFT LCD and a DVD player, the DVDM1020 (EL-708) not only can play DVD and VCD movies but also can play CD and MP3 music discs.

The model EL-708 is identical to model DVDM1020 (EUT), the different model number for different marketing strategy.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: 0dBi

Antenna Type: PCB Printed

Connector Type: N/A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.239 、 §15.207 and ANSI C63.4/2001.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was supplied with 12Vdc with Battery. In radiated emission test, the EUT was tested in the status of continuously transmitting.

During the conducted emission test, it worked in normal operating mode.

The configuration of EUT was set up by the Client.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Last Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	June 6, 2004
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 24, 2004
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 19, 2003
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	VULB 9160-3133	Feb. 21, 2004
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A

Note: The above equipments are within the valid calibration period.

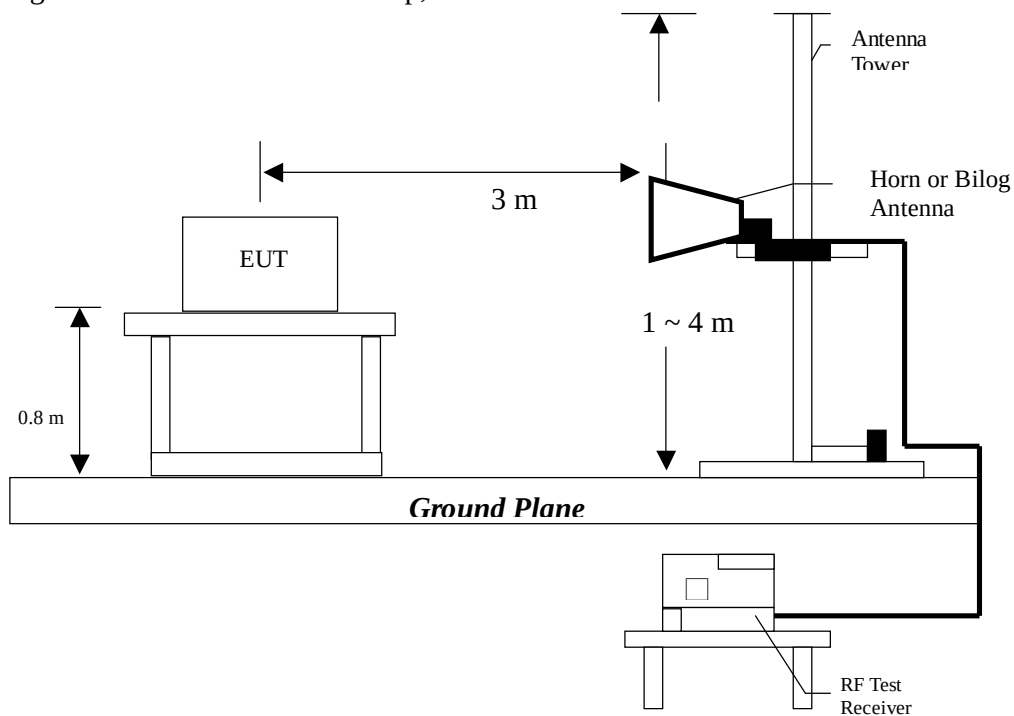
3. Radiated emission test FCC 15.239 (b)/(c)

3.1 Operating environment

Temperature:	22	°C	(10-40°C)
Relative Humidity:	60	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental	
	(uV/m@3m)	(dBuV/m@3m)
88-108	250	48

The emission limit above is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

3.3.2 General radiated emission limits

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 4.98 dB.

3.4 Radiated emission test data

The radiated emissions at

Frequency(MHz)	Margin
66.730	-0.28
220.750	-10.91
363.720	-9.57

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : DVD M1020

Test Condition : Tx at 88.1MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
42.370	QP	V	12.91	20.93	33.84	40.00	-6.16	100.00	124.00
66.730	QP	V	12.53	27.19	39.72	40.00	-0.28	100.00	189.00
101.870	QP	V	10.78	25.60	36.38	43.50	-7.12	110.00	216.00
121.300	QP	V	12.55	23.40	35.95	43.50	-7.55	108.00	181.00
175.580	QP	V	14.10	26.61	40.71	43.50	-2.79	101.00	125.00
217.050	QP	V	12.13	26.40	38.53	46.00	-7.47	100.00	175.00
67.720	QP	H	12.17	23.45	35.62	40.00	-4.38	155.00	173.00
220.750	QP	H	11.94	23.15	35.09	46.00	-10.91	157.00	200.00
363.720	QP	H	15.53	20.90	36.43	46.00	-9.57	160.00	187.00
485.990	QP	H	18.53	20.60	39.13	46.00	-6.87	158.00	212.00
518.920	QP	H	19.10	20.00	39.10	46.00	-6.90	172.00	258.00
546.040	QP	H	19.62	20.21	39.83	46.00	-6.17	148.00	262.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

The radiated emissions at

Frequency(MHz)	Margin
67.720	-0.39

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : DVDMM1020

Test Condition : Tx at 97.9MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
47.900	QP	V	13.01	23.10	36.11	40.00	-3.89	101.00	218.00
67.720	QP	V	12.17	27.44	39.61	40.00	-0.39	105.00	254.00
121.170	QP	V	12.55	25.87	38.42	43.50	-5.08	101.00	316.00
220.180	QP	V	11.94	28.15	40.09	46.00	-5.91	108.00	256.00
485.890	QP	V	18.53	23.80	42.33	46.00	-3.67	110.00	200.00
970.150	QP	V	25.99	20.91	46.90	54.00	-7.10	105.00	211.00
67.722	QP	H	12.17	24.80	36.97	40.00	-3.03	100.00	132.00
218.210	QP	H	12.04	28.50	40.54	46.00	-5.46	100.00	187.00
264.720	QP	H	12.99	27.70	40.69	46.00	-5.31	100.00	360.00
485.990	QP	H	18.53	21.30	39.83	46.00	-6.17	100.00	311.00
728.230	QP	H	22.75	16.09	38.84	46.00	-7.16	101.00	258.00
970.190	QP	H	25.99	21.31	47.30	54.00	-6.70	102.00	313.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

3.5 Fundamental Radiated Emission Data

EUT : DVDMM1020

Test Condition : Tx at 88.1MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
88.10300	PK	V	9.50	35.89	45.39	68.00	-22.61	100	95
88.10300	AV	V	9.50	33.18	42.68	48.00	-5.32	100	95
88.10100	PK	H	9.50	33.74	43.24	68.00	-24.76	235	181
88.10100	AV	H	9.50	31.29	40.79	48.00	-7.21	235	181

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

EUT : DVD1020

Test Condition : Tx at 97.9MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
88.10300	PK	V	9.50	37.11	46.61	68.00	-21.39	129	47
88.10300	AV	V	9.50	36.08	45.58	48.00	-2.42	129	47
88.10100	PK	H	9.50	36.25	45.75	68.00	-22.25	181	123
88.10100	AV	H	9.50	35.09	44.59	48.00	-3.41	181	123

Remark:

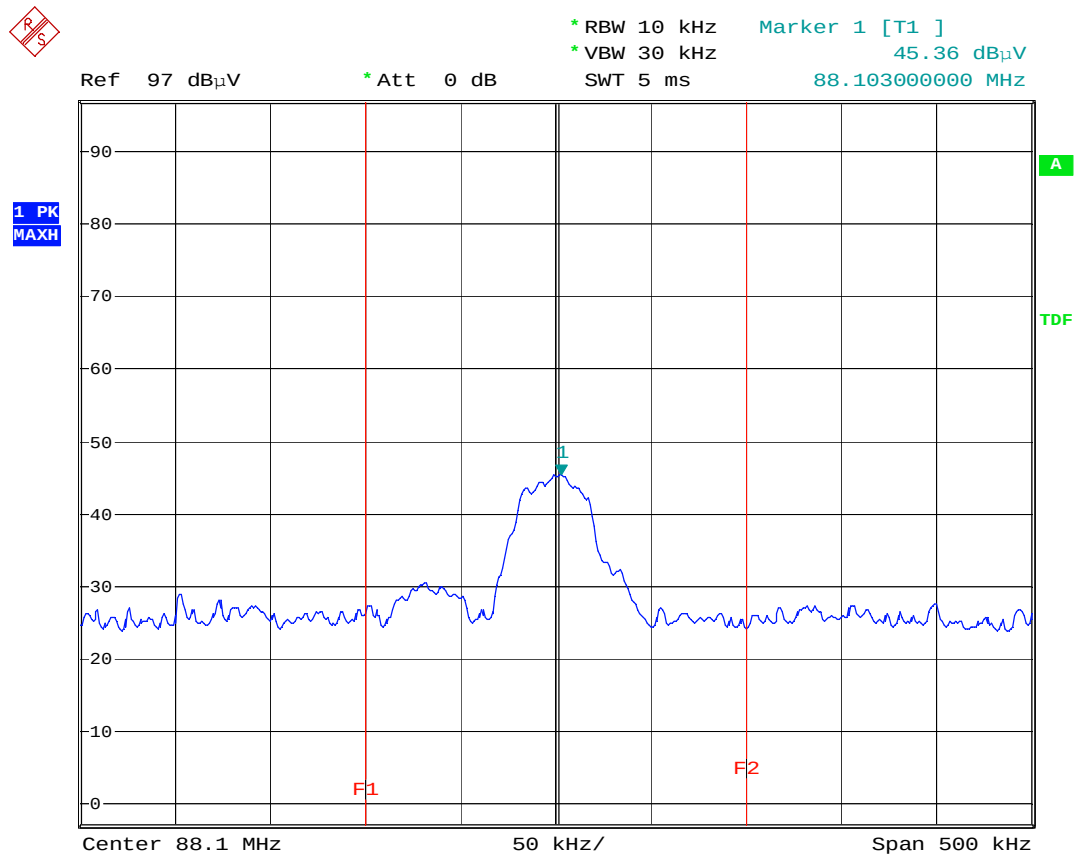
1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

4. Bandwidth of fundamental frequency FCC 15.239(a)

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operation frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

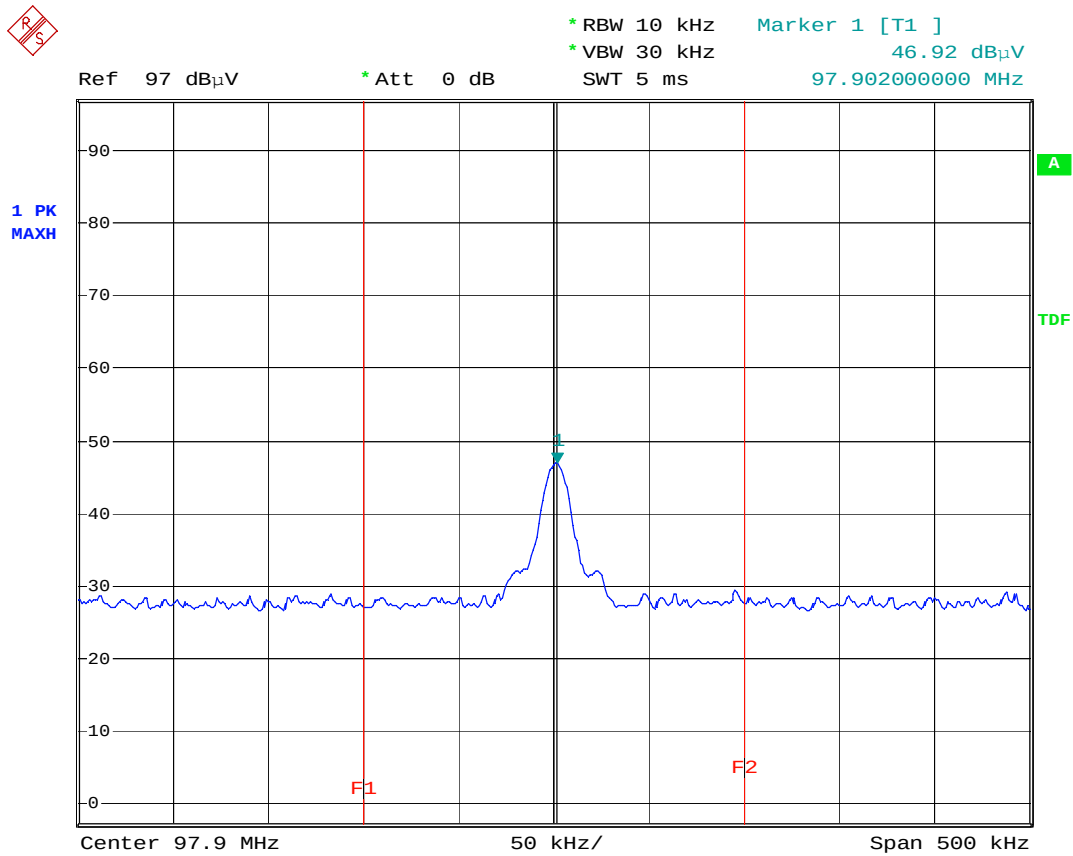
Please see the plot below.



Comment: Band-width at 88.1MHz

Comment: Vertical polarization (EC338/353)

Date: 2.JUL.2004 18:00:58



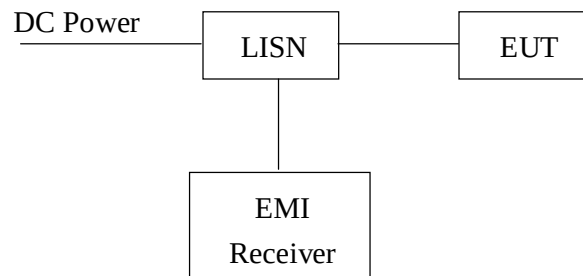
Comment: Band-width at 97.9MHz
 Comment: Vertical polarization (EC338/353)
 Date: 2.JUL.2004 17:47:42

5. Power Line Conducted Emission test §FCC 15.207

5.1 Operating environment

Temperature:	21	°C	(10-40°C)
Relative Humidity:	54	%	(10-90%)
Atmospheric Pressure	1022	hPa	(860-1061hPa)

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement. The AC power conducted emissions was investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

Please see the plot below.

Emission Limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

5.3 Power Line Conducted Emission test data

(1) Line

EUT : DVD M1020

Test Condition : Normal operation mode

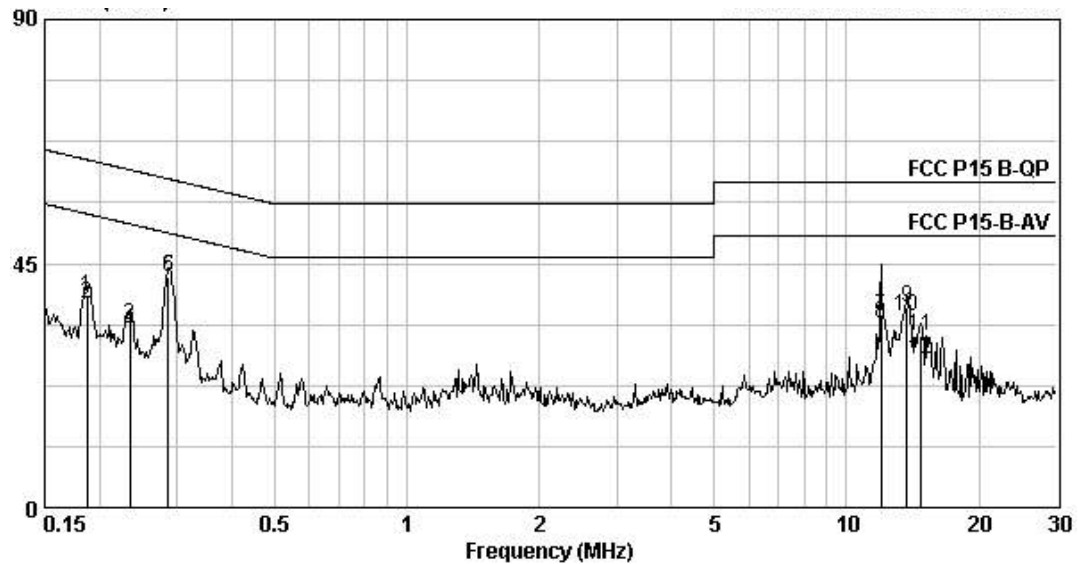
Freq. (MHz)	Correction Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
0.187	0.07	38.94	64.15	-25.21	QP
0.187	0.07	37.42	54.15	-16.73	AVERAGE
0.234	0.05	33.57	62.29	-28.72	QP
0.234	0.05	32.29	52.29	-20	AVERAGE
0.286	0.03	42.69	60.64	-17.95	QP
0.286	0.03	42.49	50.64	-8.15	AVERAGE
12.006	0.36	35.11	60	-24.89	QP
12.006	0.36	33.87	50	-16.13	AVERAGE
13.747	0.41	36.88	60	-23.12	QP
13.747	0.41	35.35	50	-14.65	AVERAGE
14.769	0.44	31.73	60	-28.27	QP
14.769	0.44	27.25	50	-22.75	AVERAGE

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) = Level (dBuV) – Limit (dBuV)

(dBuV)



(2) Neutral

EUT : DVDM1020

Test Condition : Normal operation mode

Freq. (MHz)	Correction Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
0.186	0.07	37.89	64.21	-26.32	QP
0.186	0.07	36.43	54.21	-17.78	AVERAGE
0.234	0.06	32.69	62.29	-29.60	QP
0.234	0.06	31.27	52.29	-21.02	AVERAGE
0.288	0.04	42.00	60.57	-18.57	QP
0.288	0.04	41.88	50.57	-8.69	AVERAGE
12.006	0.32	39.26	60.00	-20.74	QP
12.006	0.32	37.87	50.00	-12.13	AVERAGE
13.747	0.34	40.41	60.00	-19.59	QP
13.747	0.34	38.82	50.00	-11.18	AVERAGE
14.769	0.36	36.08	60.00	-23.92	QP
14.769	0.36	32.27	50.00	-17.73	AVERAGE

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) = Level (dBuV) – Limit (dBuV)

(dBuV)

