TEST REPORT

For

RF MCU Evaluation Kit

In conformity with

FCC CFR 47 Part15 Subpart B

Model : EB-RE01B

FCC ID : X8U0003

Test Item : RF MCU Evaluation Kit

Report No. : WE210514BB2-22

Issue Date : June 19, 2021

Prepared for

TESSERA TECHNOLOGY INC.
6F, Oak Yokohama Bldg., 2-15-10, Kitasaiwai, Nishi-ku,
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Prepared by

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History

Report No.	Date	Revisions	Issued By
WE210514BB2-21	June 7, 2021	Initial Issue	K. Onishi
WE210514BB2-22	June 19, 2021	Added FCC ID information Tested by other power supply mode	K. Onishi

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1 General information

1.1 Product description from applicant

Test item	: RF MCU Evaluation Kit
Manufacturer	: TESSERA TECHNOLOGY INC.
Address	: 6F, Oak Yokohama Bldg., 2-15-10, Kitasaiwai, Nishi-ku, Yokohama, Kanagawa 220-0004, JAPAN
Model	: EB-RE01B
FCC ID	: X8U0003
Serial number	: 10:07:23:A0:92:E8
Highest operating frequency	: 64 MHz
Receipt date of EUT	: May 27, 2021

1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47. Part 15 subpart B (01 Oct. 2020)
Test method(s)	: ANSI C63.4: 2014
Test(s) started	: June 2, 2021
Test(s) completed	: July 16, 2021

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.
The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.
Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer : K. Onishi
K. Onishi
C&P Connectivity Wireless RF Operation RF/EMC Lab.

Reviewer : Y. Taki
Y. Taki
Manager
C&P Connectivity Wireless RF Operation RF/EMC Lab.

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1.3 Test facility

[Kitayamata laboratory]

Address: 3-5-23, Kitayamata, Tsuzuki-ku, Yokohama, 224-0021, Japan
TEL: +81-45-550-3520
FAX: +81-45-592-7506

Accredited by National Voluntary Laboratory Accreditation Program (NVLAP) for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

Registered by Innovation, Science and Economic Development Canada (ISED):
The registered CAB identifier is JP0009.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)
Each registered facility number is as follows;
Test site A-0212

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1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in "Guide to the expression of uncertainty in measurement (GUM)" published by ISO. The Lab's uncertainty is determined by referring UKAS Publication LAB34: 2002 "The Expression of Uncertainty in EMC Testing" and CISPR16-4-2: 2011 "Uncertainty in EMC Measurements".
The uncertainty of the measurement results in the level of confidence of approximately 95% (k=2) is as follows;

Conducted emission : ± 3.3 dB (150 kHz - 30 MHz)
Radiated emission : ± 6.0 dB (30 MHz - 1000 MHz)

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1.5 Summary of test results

Requirement	Section in FCC15B	Result	Section in this report
Radiated emissions (30 to 1000 MHz) (*)	15.109	Complied	2.1
AC power line conducted emissions	15.107	Complied	2.2

(*) The highest internal operating frequency is below 108 MHz

1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

The test configuration of the EUT refers to following Tables.

Table: EUT

No.	Item	Model No.	Manufacture	Serial No.
A	RF MCU Evaluation Kit	EB-RE01	Tessera technology	10:07:23:A0:92:E8
-	-	-	-	-

Table: Support equipment

No.	Item	Model No.	Manufacture	Serial No.
B	PC	Inspiron 3501	DELL	9RB0MB3
C	AC adapter	LA45NM140	DELL	-
D	Headset	INNOVATION	hTC	-
E1	DC power supply	PMC35-2A	KIKUSUI	EF001839
E2	DC power supply	DC30-72	NF	9161864
F	Jig	-	-	-
-	-	-	-	-

Table: Cable connected to the EUT

No.	Item	From	To	Length [m]	Shield	Ferrite Core
1	USB cable 1	A	B	0.7	Yes	No
2	DC cable 1	B	C	1.7	No	Yes
3	AC cable 1	C	AC mains	0.8	No	No
4	Headset cable	B	D	1.3	Yes	No
5	DC cable 2	A	E	1.0	No	No
6	AC cable 2	E	AC mains	1.8	No	No
7	Jig cable	A	F	0.1	No	No

1.6.2 Operating condition:

- Normal operating mode (RF OFF)

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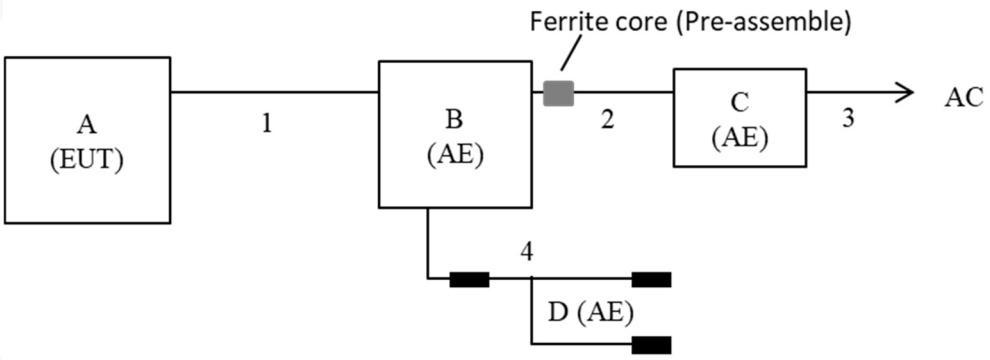
1.6.3 Setup diagram of tested system

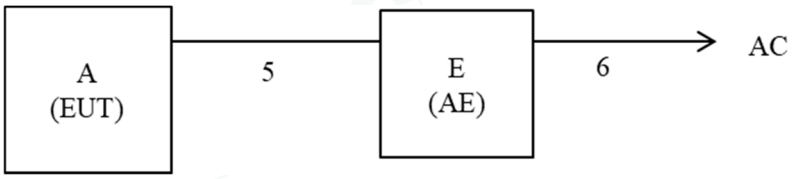
[Configuration 1]
In the following two power supply modes, the power input is internally connected and supplied to the input (5V) of the voltage regulator.

USB-Pass Power Supply Normal Power Supply Operation
Emulator J-Link/I-jet Supply Normal Power Operation

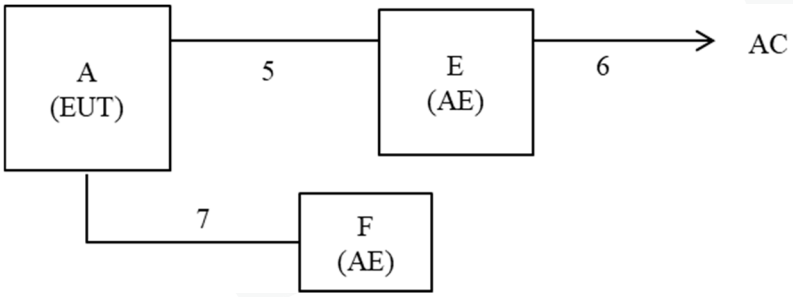


[Configuration 2]
In the following two power supply modes, the power input is internally connected and supplied to VCC/IOVCC, which is the power supply for the MPU. (DC power supply setting: DC 3.6V)

VCC-IN Supply Normal Power Supply Operation
Emulator E2 Supply Normal Power Operation



[Configuration 3]
EH (Energy Harvest) Power Operating Mode (DC power supply setting: DC 3.2V, Current limit: 10mA)



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1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

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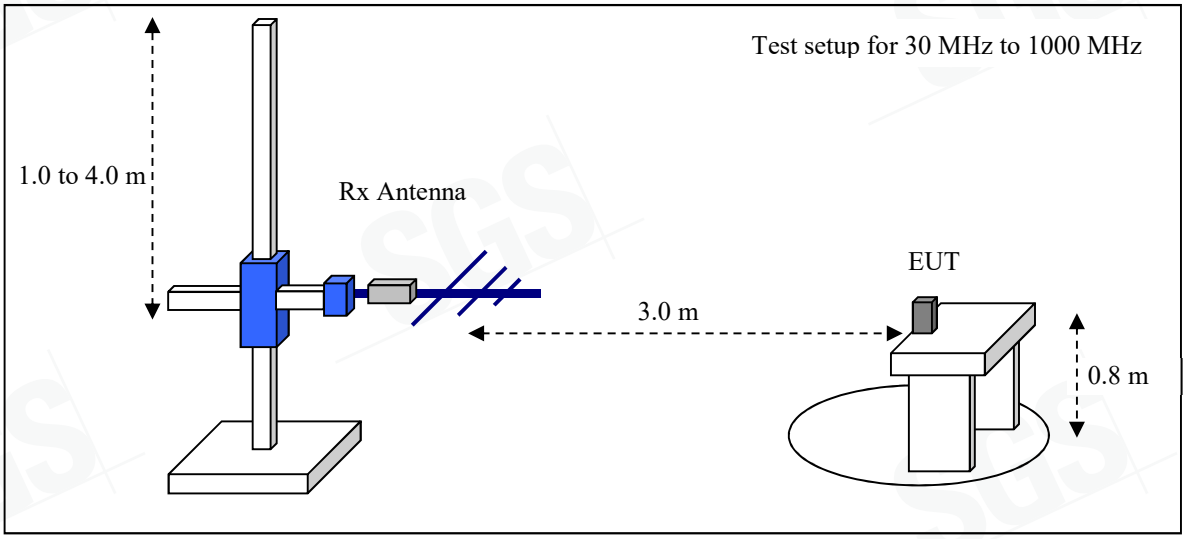
2 Test procedure and test data

2.1 Radiated emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2014 clause 6 “General requirements for EUT arrangements, configuration, and operation”, and clause 8 “Radiated emission measurements”.



Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2014 clauses 8.3.
The EUT is place on a non-conducted table which is 0.8 m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level.
The antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

The spectrum analyzer and receiver are set to the followings;
Between 30 - 1000 MHz: RBW=100 kHz, VBW= 300 kHz (Final measurement: RBW=120 kHz (QP))
Above 1000 MHz: RBW=1 MHz, VBW= 1 MHz (Final measurement: RBW=1 MHz (PK/AV))

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Applicable rule and limitation

§15.109 (b) Radiated emission limits

Frequency [MHz]	Field Strength [µV/m]	Measurement Distance [m]	Field Strength [dBuV/m] @3m
30 – 88	100	3	40.0
88 –216	150	3	43.5
216 – 960	200	3	46.0
Above 960	500	3	53.9

In the emission table above, the tighter limit applies at the band edges

Test results - *Complied with requirement*

Test equipment used (refer to List of utilized test equipment)

AC01	BA10	CL71	PR15	TR10	-	-	-
-	-	-	-	-	-	-	-

Test software used

EMI1 Ver. 6.1

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB/m] = Ant. Factor [dB/m] + Loss [dB] – Gain [dB]
Result [dBµV/m] = Reading [dBµV] + Correction Factor [dB/m]

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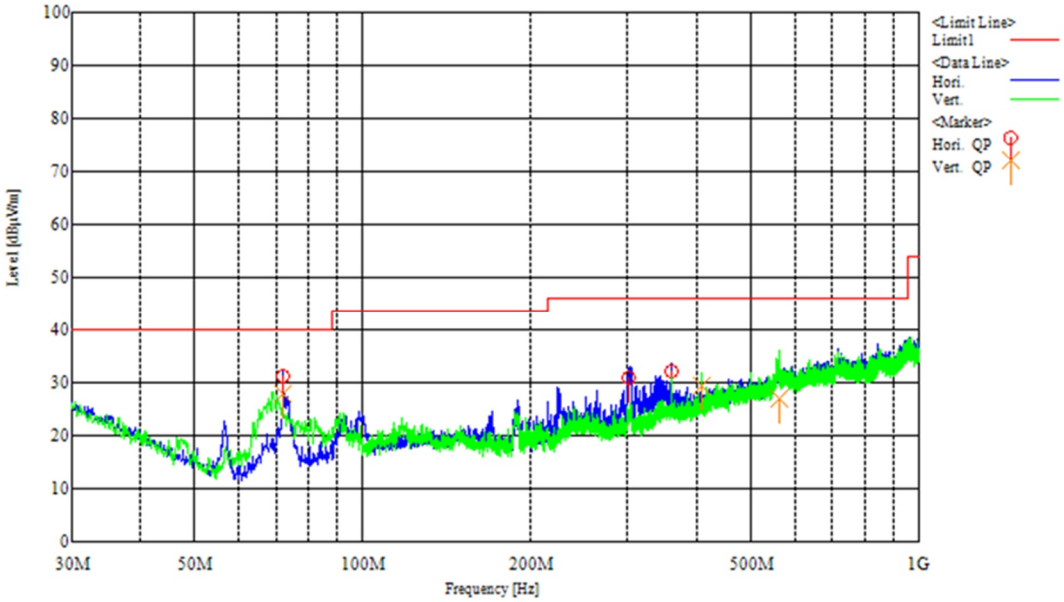
Test Data

Frequency range: 30 - 1000MHz (Max internal frequency is below 108MHz (64 MHz))
Measurement distance: 3 m

[Configuration 1]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	**72.002**	**48.2**	**6.5**	**6.6**	**30.2**	**31.1**	**40.0**	**8.9**	**Hori.**
2	301.756	40.1	13.2	7.6	29.9	31.0	46.0	15.0	Hori.
3	360.009	39.4	14.7	7.8	29.9	32.0	46.0	14.0	Hori.
4	72.002	45.1	6.5	6.6	30.2	28.0	40.0	12.0	Vert.
5	408.011	35.1	16.1	8.0	29.8	29.4	46.0	16.6	Vert.
6	561.022	27.7	20.4	8.3	29.5	26.9	46.0	19.1	Vert.

[Chart]



[Test condition]

Tested Date:	June 2, 2021	Temperature:	22 deg. C
Humidity:	62 %	Atmos. Press:	1016 hPa

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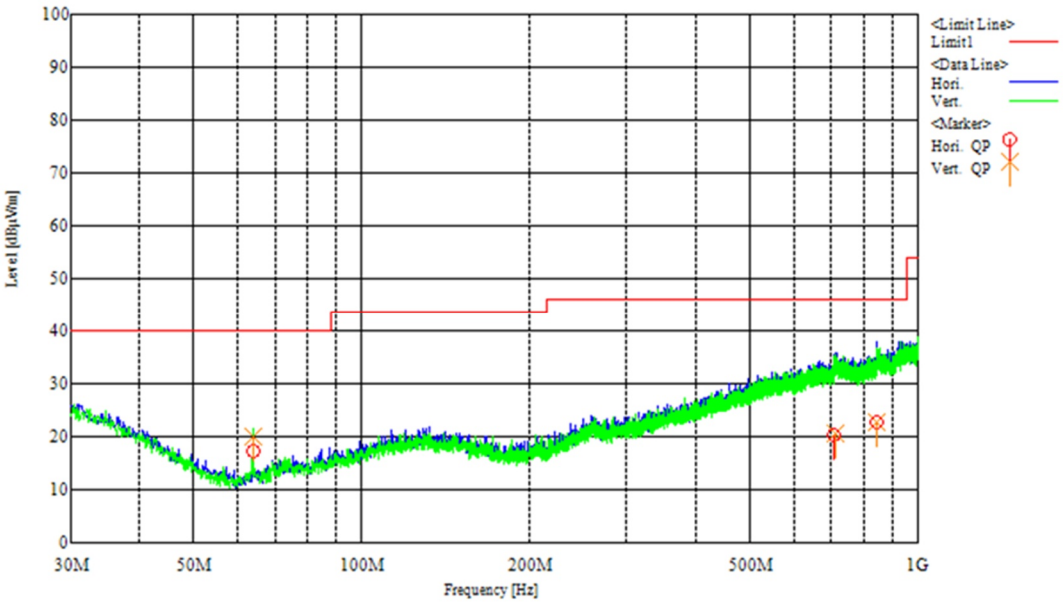
[Configuration 2] (DC power supply: E1)

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	63.999	34.8	6.1	6.6	30.2	17.3	40.0	22.7	Hori.
2	709.514	20.7	20.8	8.8	29.9	20.4	46.0	25.6	Hori.
3	844.912	21.1	23.0	9.1	30.4	22.8	46.0	23.2	Hori.
4	63.999	37.6	6.1	6.6	30.2	20.1	40.0	19.9	Vert.
5	713.092	20.7	20.9	8.8	29.9	20.5	46.0	25.5	Vert.
6	844.719	21.0	23.0	9.1	30.4	22.7	46.0	23.3	Vert.

[Chart]



[Test condition]

Tested Date:	July 16, 2021	Temperature:	20 deg. C
Humidity:	60 %	Atmos. Press:	1017 hPa

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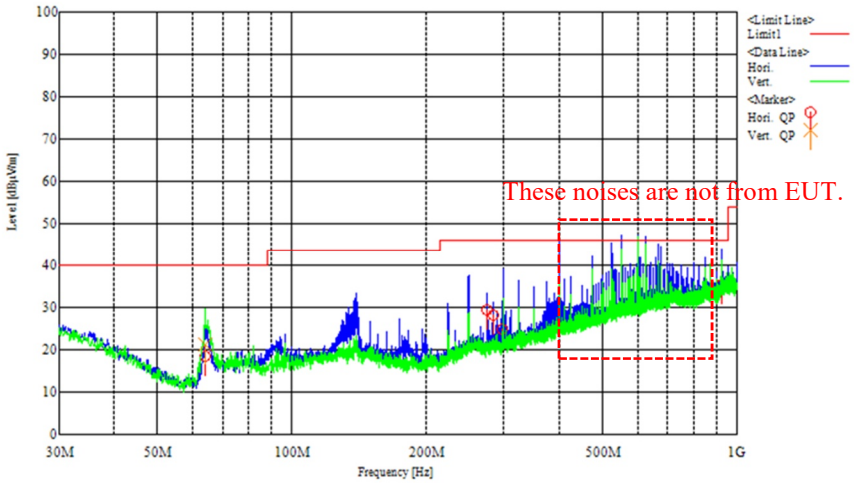
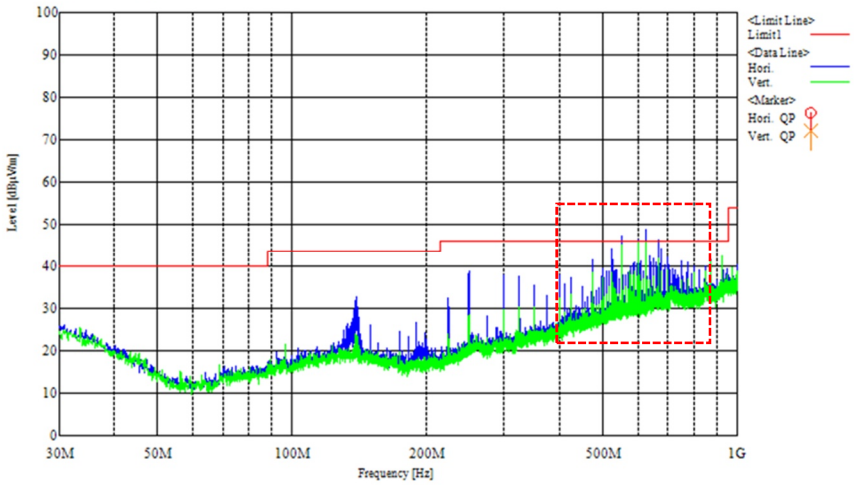
[Configuration 3] (DC power supply: E2)

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	63.947	36.0	6.1	6.6	30.2	18.5	40.0	21.5	Hori.
2	274.983	39.2	12.5	7.5	29.9	29.3	46.0	16.7	Hori.
3	283.332	37.8	12.7	7.6	29.9	28.2	46.0	17.8	Hori.
4	296.665	34.1	13.1	7.6	29.9	24.9	46.0	21.1	Hori.
5	924.952	32.7	23.9	9.2	30.3	35.5	46.0	10.5	Hori.
6	63.947	38.8	6.1	6.6	30.2	21.3	40.0	18.7	Vert.

[Chart]



[Chart (DC power supply only]



[Test condition]

Tested Date:	July 16, 2021	Temperature:	20 deg. C
Humidity:	60 %	Atmos. Press:	1017 hPa

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2.2 AC power line conducted emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2014 clause 6 "General requirements for EUT arrangements, configuration and operation" and clause 7 "AC power-line conducted emission measurements".

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2014 clauses 7.3.
Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.
Final ac power line conducted emission measurements were performed based on the exploratory tests.
The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.
When the measurement value is greater than average limitation the average detection measurements were performed.

Applicable rule and limitation

§15.107 (b) AC power line conducted limits

Frequency of Emission [MHz]	Conducted emissions Limit [dBμV]	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency. The lower limit applies at the band edges.

Test equipment used (refer to List of utilized test equipment)

CL72	LN13	TR09	-

Test software used

EMI1 Ver. 6.1

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = LISN Factor [dB] + Loss [dB]
Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

Test results - *Complied with requirement*

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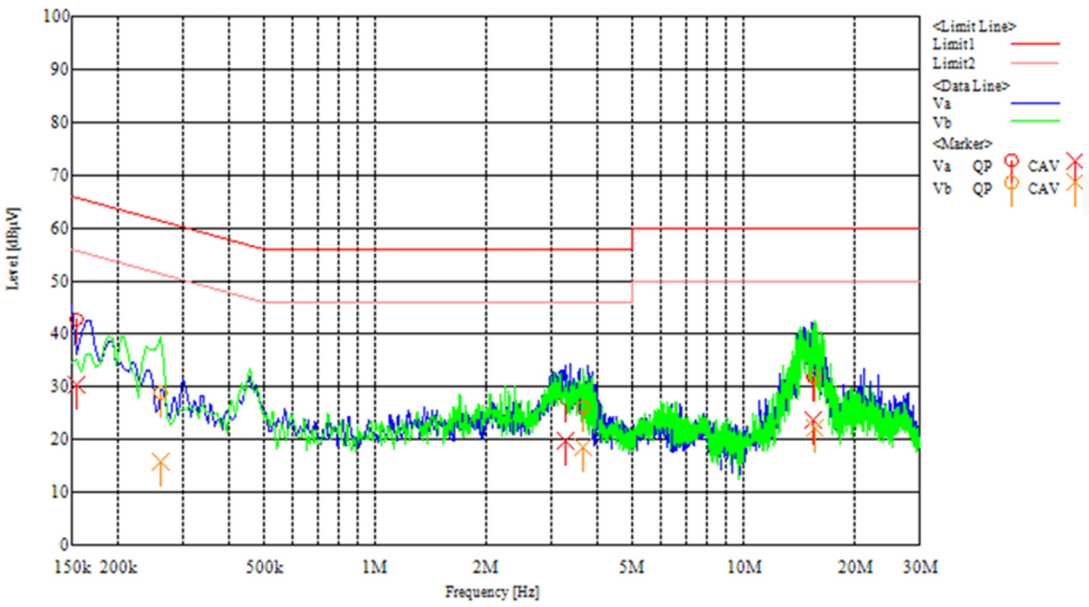
Test Data

[Configuration 1]

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		Phase
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.15493	32.4	19.9	10.3	42.7	30.2	65.7	55.7	23.0	25.5	Va
2	3.29865	17.6	9.5	10.2	27.8	19.7	56.0	46.0	28.2	26.3	Va
3	15.41570	21.3	13.1	10.4	31.7	23.5	60.0	50.0	28.3	26.5	Va
4	0.26333	18.5	5.6	10.2	28.7	15.8	61.3	51.3	32.6	35.5	Vb
5	3.66328	15.9	8.2	10.2	26.1	18.4	56.0	46.0	29.9	27.6	Vb
6	15.60026	21.5	11.6	10.4	31.9	22.0	60.0	50.0	28.1	28.0	Vb

[Chart]



[Test condition]

Tested Date:	June 2, 2021	Temperature:	22 deg. C
Humidity:	62 %	Atmos. Press:	1016 hPa

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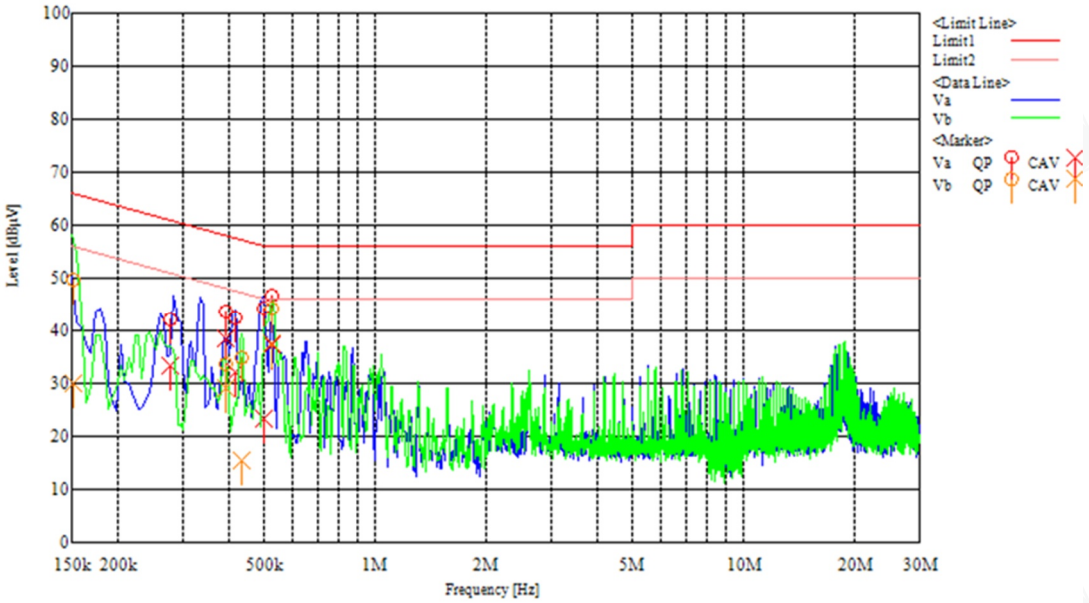
[Configuration 2] (DC power supply: E2)

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		Phase
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.27921	31.8	23.2	10.2	42.0	33.4	60.8	50.8	18.8	17.4	Va
2	0.39430	33.6	28.3	10.1	43.7	38.4	58.0	48.0	14.3	9.6	Va
3	0.41858	32.4	21.9	10.1	42.5	32.0	57.5	47.5	15.0	15.5	Va
4	0.49985	34.2	13.2	10.1	44.3	23.3	56.0	46.0	11.7	22.7	Va
5	0.52538	36.6	27.2	10.1	46.7	37.3	56.0	46.0	9.3	8.7	Va
6	0.15270	39.3	19.8	10.3	49.6	30.1	65.9	55.9	16.3	25.8	Vb
7	0.39380	23.4	18.9	10.1	33.5	29.0	58.0	48.0	24.5	19.0	Vb
8	0.43579	24.8	5.4	10.1	34.9	15.5	57.1	47.1	22.2	31.6	Vb
9	**0.52498**	**34.0**	**27.6**	**10.1**	**44.1**	**37.7**	**56.0**	**46.0**	**11.9**	**8.3**	**Vb**

[Chart]



[Test condition]

Tested Date:	July 16, 2021	Temperature:	20 deg. C
Humidity:	60 %	Atmos. Press:	1017 hPa

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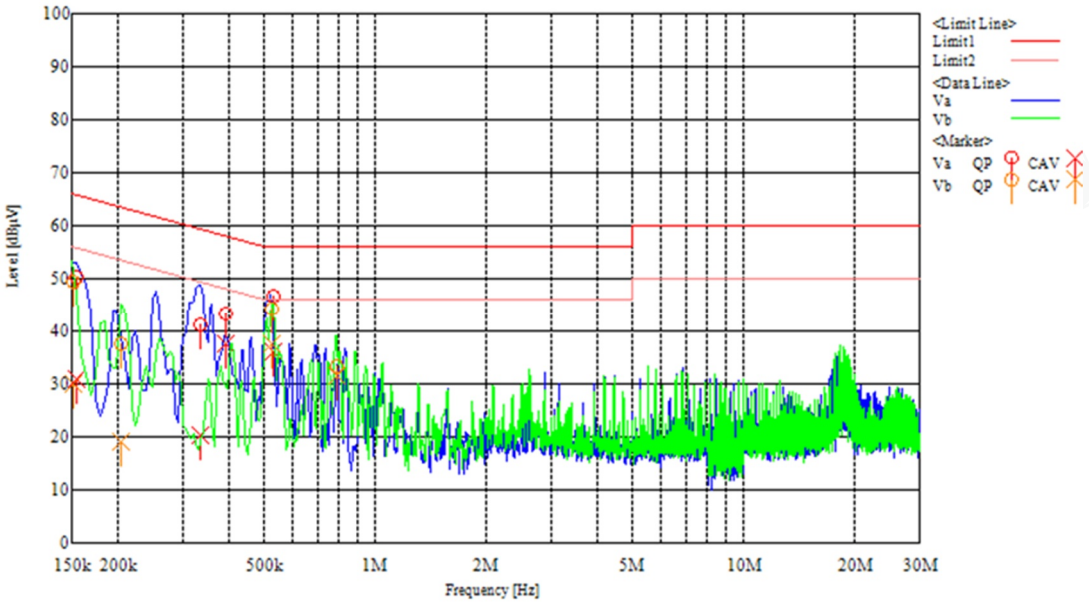
[Configuration 3] (DC power supply: E2)

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		Phase
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.15493	39.9	20.7	10.3	50.2	31.0	65.7	55.7	15.5	24.7	Va
2	0.33724	31.1	10.1	10.2	41.3	20.3	59.3	49.3	18.0	29.0	Va
3	0.39416	33.3	27.5	10.1	43.4	37.6	58.0	48.0	14.6	10.4	Va
4	0.52824	36.5	26.0	10.1	46.6	36.1	56.0	46.0	9.4	9.9	Va
5	0.15261	39.1	19.8	10.3	49.4	30.1	65.9	55.9	16.5	25.8	Vb
6	0.20420	27.5	8.8	10.2	37.7	19.0	63.4	53.4	25.7	34.4	Vb
7	**0.52527**	**34.0**	**27.6**	**10.1**	**44.1**	**37.7**	**56.0**	**46.0**	**11.9**	**8.3**	**Vb**
8	0.78794	23.3	21.5	10.1	33.4	31.6	56.0	46.0	22.6	14.4	Vb

[Chart]



[Test condition]

Tested Date:	July 16, 2021	Temperature:	20 deg. C
Humidity:	60 %	Atmos. Press:	1017 hPa

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4 List of utilized test equipment / calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC11(EM)	Anechoic Chamber	TDK	-	-	2020/08/11	2021/08/31
AC11(EG)	Anechoic Chamber	TDK	-	-	2020/08/01	2021/08/31
CL71	RF Cable for RE	RFT	-	-	2021/01/18	2022/01/31
CL72	RF Cable for CE	RFT	-	-	2021/01/18	2022/01/31
LN13	LISN	Kyoritsu	KNW-407F	8-2003-3	2020/07/21	2021/07/31
PR15	Pre. Amplifier	Anritsu	MH648A	6201156141	2021/06/15	2022/06/30
TR09	Test Receiver (F/W: 4.43 SP3)	Rohde & Schwarz	ESU8	100386	2021/07/08	2022/07/31
TR10	Test Receiver (F/W: 2.26)	Rohde & Schwarz	ESR26	101313	2021/03/22	2022/03/31

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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