





2.6 Radiated emissions (for restricted frequency band)

Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clauses 6. The test receiver is set as below

[9 - 150 kHz]

RBW: 200 Hz, Detector: Quasi Peak

[150 kHz - 30 MHz]

RBW: 9 kHz, Detector: Quasi Peak

[30 - 1000 MHz]

RBW: 120 kHz, Detector: Quasi Peak

[Above 1000 MHz]

RBW: 1 MHz, Detector: Average/Peak

Applicable rule and limitation

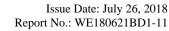
FCC 15.205 restricted bands of operation

Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of

the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.490 - 0.510	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	38.6 -

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in FCC 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in FCC 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.







FCC 15.209; Field strength limits

Frequency [MHz]	Field Strength [µV/m]	Measurement Distance [m]	Field Strength [dBµV/m]
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.

The emission limits shown in the above table are based on measurements employing a quasi-peak detector.

Test results - Complied with requirement

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

	AC01	CL11	TR06	PR21	BA07	CL30	CL38	PR12
ı	DH06	CH01	SH01	LP06	AT33	HPF4		

Test Date

(1 - 18 GHz and Restricted bandedge measurement)

Tested Date: July 4, 2018 Temperature: 21 degC Humidity: 53 % Atmos. Press: 1020 hPa

(30 - 1000 MHz and 18 - 25 GHz)

Tested Date: July 5, 2018 Temperature: 20 degC Humidity: 57 % Atmos. Press: 1014 hPa

(9 k - 30 MHz)

Tested Date: July 6, 2018 Temperature: 22 degC Humidity: 54 % Atmos. Press: 1017 hPa

Test software used

EMI1 Ver. 5.7

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB/m] = Ant. Factor [dB/m] + Loss [dB] - Gain [dB]Result $[dB\mu V/m] = Reading [dB\mu V] + Correction Factor [dB/m]$



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[SAPPHIRE-680FSG] Test Data (9 kHz - 30 MHz)

LE, 2402 MHz, 1Mbps, Y-plane (Worst) Operating mode:

Test site: Yokohama Laboratory

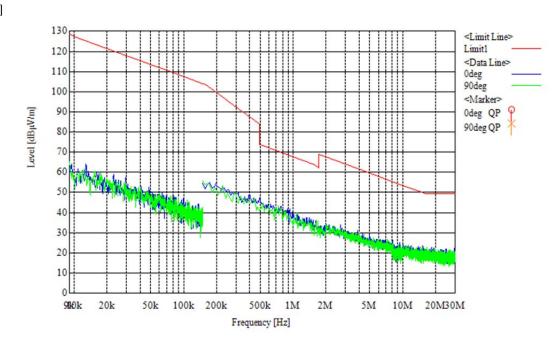
Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading [dBµV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-
-	-	-	i	-	-	-	-	1	ı

Note: All other emissions were under noise floor.

[Chart]





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Test Data (30 - 1000 MHz)

Operating mode: LE, 2440 MHz, 1Mbps, Y-plane (Worst)

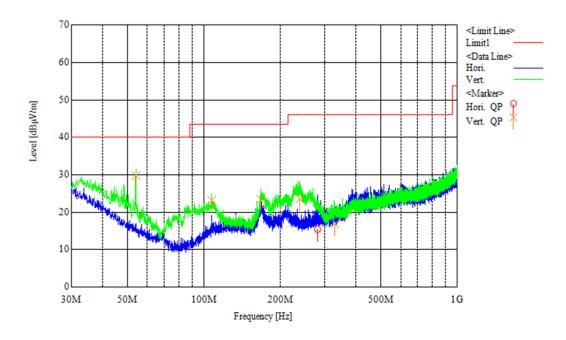
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBµV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Ant.
1	282.369	23.4	13.0	9.3	30.2	15.5	46.0	30.5	Hori.
2	53.999	40.9	11.9	7.2	30.3	29.7	40.0	10.3	Vert.
3	107.980	34.2	11.3	7.8	30.2	23.1	43.5	20.4	Vert.
4	168.017	34.8	10.4	8.4	30.2	23.4	43.5	20.1	Vert.
5	239.984	32.4	12.3	9.0	30.2	23.5	46.0	22.5	Vert.
6	328.342	23.3	14.1	9.7	30.2	16.9	46.0	29.1	Vert.

[Chart]





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Test Data (Above 1000 MHz)

Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2338.052	45.4	33.8	4.5	49.9	38.3	73.9	53.9	24.0	15.6	Hori.
2	4804.000	41.9	27.5	2.8	44.7	30.3	73.9	53.9	29.2	23.6	Hori.
3	2338.028	45.8	34.0	4.5	50.3	38.5	73.9	53.9	23.6	15.4	Vert.
4	4804.000	40.8	27.5	2.8	43.6	30.3	73.9	53.9	30.3	23.6	Vert.

Operating mode: LE, 2440 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2376.044	45.6	34.0	4.9	50.5	38.9	73.9	53.9	23.4	15.0	Hori.
2	4880.000	41.1	27.8	3.2	44.3	31.0	73.9	53.9	29.6	22.9	Hori.
3	2376.004	45.9	33.7	4.9	50.8	38.6	73.9	53.9	23.1	15.3	Vert.
4	4880.000	40.4	27.8	3.2	43.6	31.0	73.9	53.9	30.3	22.9	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

	DIIII	obton tever										
	No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
	1	2416.027	45.8	33.9	5.3	51.1	39.2	73.9	53.9	22.8	14.7	Hori.
	2	4960.000	41.5	28.2	3.4	44.9	31.6	73.9	53.9	29.0	22.3	Hori.
	3	2416.003	46.0	34.1	5.3	51.3	39.4	73.9	53.9	22.6	14.5	Vert.
ſ	4	4960.000	42.5	28.2	3.4	45.9	31.6	73.9	53.9	28.0	22.3	Vert.



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Operating mode: LE, 2402 MHz, 2 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2338.104	46.7	35.7	4.5	51.2	40.2	73.9	53.9	22.7	13.7	Hori.
2	2338.100	46.4	35.2	4.5	50.9	39.7	73.9	53.9	23.0	14.2	Vert.
3	4804.000	40.9	27.4	2.8	43.7	30.2	73.9	53.9	30.2	23.7	Hori.
4	4804.000	40.5	27.5	2.8	43.3	30.3	73.9	53.9	30.6	23.6	Vert.

Operating mode: LE, 2440 MHz, 2 Mbps, Y-plane

Yokohama Laboratory Test site:

Measurement distance:

[Emission level]

No	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2376.072	47.2	35.2	4.9	52.1	40.1	73.9	53.9	21.8	13.8	Hori.
2	4880.000	41.2	27.8	3.2	44.4	31.0	73.9	53.9	29.5	22.9	Hori.
3	2376.008	46.8	35.6	4.9	51.7	40.5	73.9	53.9	22.2	13.4	Vert.
4	4880.000	40.8	27.8	3.2	44.0	31.0	73.9	53.9	29.9	22.9	Vert.

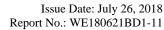
Operating mode: LE, 2480 MHz, 2 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

_	,										
No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2416.150	46.8	34.6	5.3	52.1	39.9	73.9	53.9	21.8	14.0	Hori.
2	2416.174	46.5	34.1	5.3	51.8	39.4	73.9	53.9	22.1	14.5	Vert.
3	4960.000	41.3	27.6	3.4	44.7	31.0	73.9	53.9	29.2	22.9	Hori.
4	4960.000	42.4	27.6	3.4	45.8	31.0	73.9	53.9	28.1	22.9	Vert.







Restricted bandedge measurement

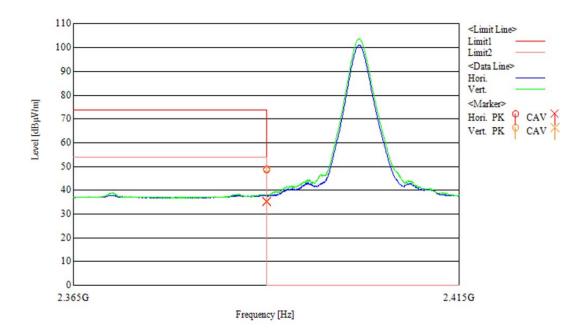
Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane

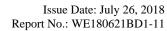
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

1	No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
	1	2390.000	43.9	30.5	5.0	48.9	35.5	73.9	53.9	25.0	18.4	Hori.
	2	2390.000	43.6	30.2	5.0	48.6	35.2	73.9	53.9	25.3	18.7	Vert.









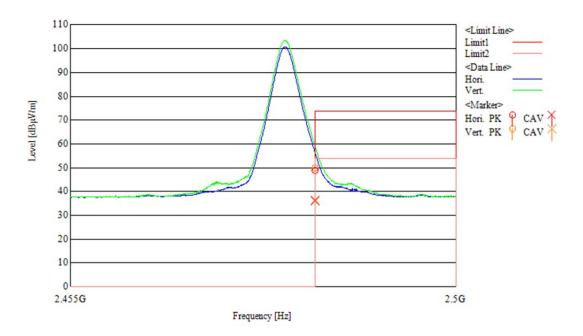
Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane

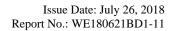
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	43.0	30.2	5.7	48.7	35.9	73.9	53.9	25.2	18.0	Hori.
2	2483.500	44.0	30.8	5.7	49.7	36.5	73.9	53.9	24.2	17.4	Vert.









Operating mode: LE, 2402 MHz, 2 Mbps, Y-plane

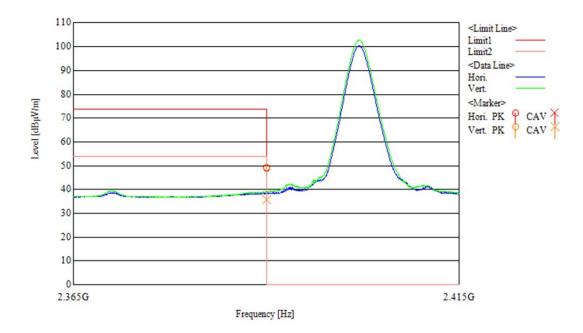
Test site: Yokohama Laboratory

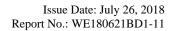
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2390.000	44.1	30.6	5.0	49.1	35.6	73.9	53.9	24.8	18.3	Hori.
2	2390.000	44.0	30.6	5.0	49.0	35.6	73.9	53.9	24.9	18.3	Vert.

[Chart]









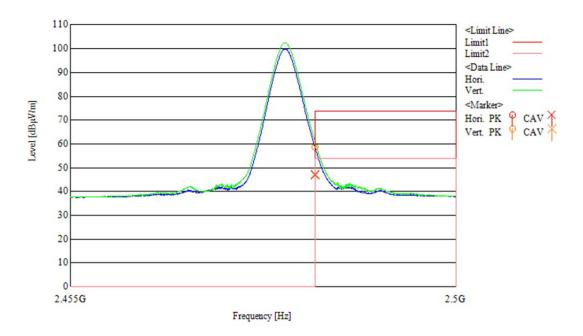
Operating mode: LE, 2480 MHz, 2 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	52.8	41.4	5.7	58.5	47.1	73.9	53.9	15.4	6.8	Hori.
2	2483.500	52.9	41.0	5.7	58.6	46.7	73.9	53.9	15.3	7.2	Vert.





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[SAPPHIRE-681FSG] Test Data (9 kHz - 30 MHz)

LE, 2402 MHz, 1Mbps, Y-plane (Worst) Operating mode:

Test site: Yokohama Laboratory

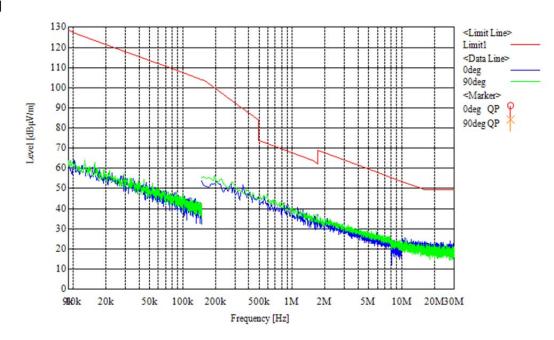
Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading [dBµV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Note: All other emissions were under noise floor.

[Chart]





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Test Data (30 - 1000 MHz)

Operating mode: LE, 2440 MHz, 1Mbps, Y-plane (Worst)

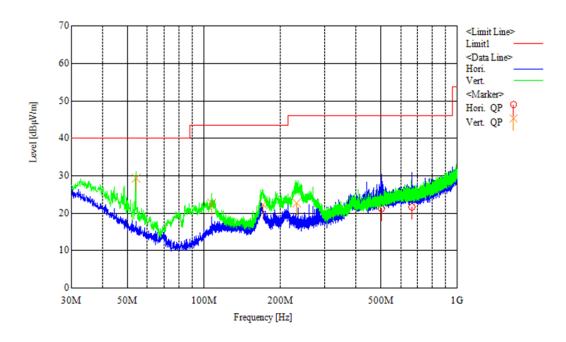
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBµV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Ant.
1	503.798	23.4	17.2	10.7	30.1	21.2	46.0	24.8	Hori.
2	663.444	21.7	18.6	11.6	30.2	21.7	46.0	24.3	Hori.
3	54.000	40.5	11.9	7.2	30.3	29.3	40.0	10.7	Vert.
4	107.985	33.9	11.3	7.8	30.2	22.8	43.5	20.7	Vert.
5	171.315	33.8	10.3	8.4	30.2	22.3	43.5	21.2	Vert.
6	233.001	31.9	12.2	8.9	30.2	22.8	46.0	23.2	Vert.

[Chart]





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Test Data (Above 1000 MHz)

Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2337.990	46.2	35.1	4.5	50.7	39.6	73.9	53.9	23.2	14.3	Hori.
2	4804.000	42.7	29.5	2.8	45.5	32.3	73.9	53.9	28.4	21.6	Hori.
3	2337.982	46.6	35.4	4.5	51.1	39.9	73.9	53.9	22.8	14.0	Vert.
4	4804.000	42.5	29.5	2.8	45.3	32.3	73.9	53.9	28.6	21.6	Vert.

Operating mode: LE, 2440 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2376.017	46.7	36.3	4.9	51.6	41.2	73.9	53.9	22.3	12.7	Hori.
2	4880.000	42.5	27.9	3.2	45.7	31.1	73.9	53.9	28.2	22.8	Hori.
3	2376.017	47.3	36.1	4.9	52.2	41.0	73.9	53.9	21.7	12.9	Vert.
4	4880.000	42.2	28.0	3.2	45.4	31.2	73.9	53.9	28.5	22.7	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

	DIIII.	obton teverj										
	No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
I	1	4880.000	42.5	27.9	3.2	45.7	31.1	73.9	53.9	28.2	22.8	Hori.
	2	4960.000	41.3	27.7	3.4	44.7	31.1	73.9	53.9	29.2	22.8	Hori.
I	3	4880.000	42.2	28.0	3.2	45.4	31.2	73.9	53.9	28.5	22.7	Vert.
I	4	4960.000	41.9	27.7	3.4	45.3	31.1	73.9	53.9	28.6	22.8	Vert.



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Operating mode: LE, 2402 MHz, 2 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2338.032	47.4	36.4	4.5	51.9	40.9	73.9	53.9	22.0	13.0	Hori.
2	4804.000	41.7	27.5	2.8	44.5	30.3	73.9	53.9	29.4	23.6	Hori.
3	2338.008	46.8	36.5	4.5	51.3	41.0	73.9	53.9	22.6	12.9	Vert.
4	4804.000	41.3	27.5	2.8	44.1	30.3	73.9	53.9	29.8	23.6	Vert.

Operating mode: LE, 2440 MHz, 2 Mbps, Y-plane

Test site: Yokohama Laboratory

Measurement distance:

[Emission level]

No	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]		Margin Average [dB]	Antenna Pola.
1	2376.001	47.1	36.6	4.9	52.0	41.5	73.9	53.9	21.9	12.4	Hori.
2	4880.000	42.3	28.0	3.2	45.5	31.2	73.9	53.9	28.4	22.7	Hori.
3	2376.091	47.4	36.9	4.9	52.3	41.8	73.9	53.9	21.6	12.1	Vert.
4	4880.000	41.7	28.0	3.2	44.9	31.2	73.9	53.9	29.0	22.7	Vert.

Operating mode: LE, 2480 MHz, 2 Mbps, Y-plane

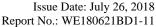
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Result Peak [dBµV/m]	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2351.865	47.0	35.4	4.6	51.6	40.0	73.9	53.9	22.3	13.9	Hori.
2	4960.000	41.8	27.7	3.4	45.2	31.1	73.9	53.9	28.7	22.8	Hori.
3	2351.929	46.5	34.5	4.6	51.1	39.1	73.9	53.9	22.8	14.8	Vert.
4	4960.000	41.3	27.7	3.4	44.7	31.1	73.9	53.9	29.2	22.8	Vert.





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Restricted bandedge measurement

Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane

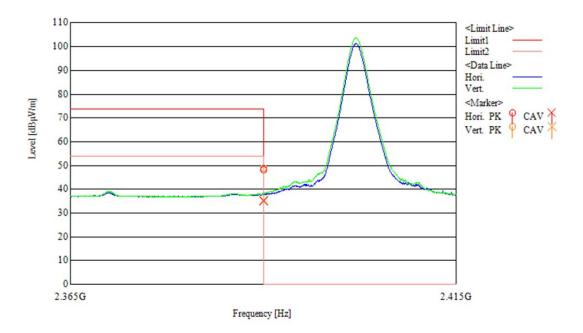
Test site: Yokohama Laboratory

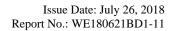
Measurement distance: 3 m

[Emission level]

No	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2390.000	43.3	29.9	5.0	48.3	34.9	73.9	53.9	25.6	19.0	Hori.
2	2390.000	43.9	30.3	5.0	48.9	35.3	73.9	53.9	25.0	18.6	Vert.

[Chart]









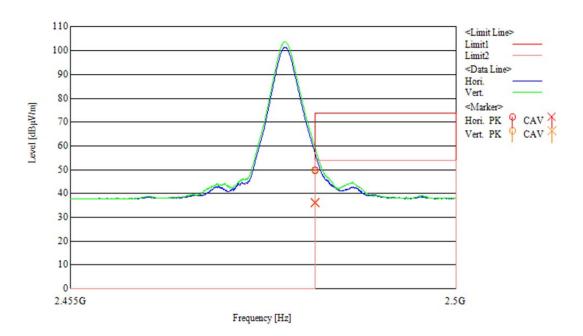
Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane

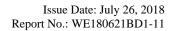
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	44.3	30.4	5.7	50.0	36.1	73.9	53.9	23.9	17.8	Hori.
2	2483.500	43.9	30.7	5.7	49.6	36.4	73.9	53.9	24.3	17.5	Vert.









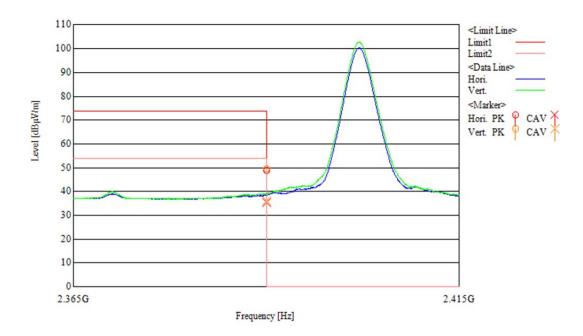
Operating mode: LE, 2402 MHz, 2 Mbps, Y-plane

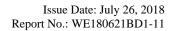
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2390.000	43.8	30.5	5.0	48.8	35.5	73.9	53.9	25.1	18.4	Hori.
2	2390.000	44.6	30.9	5.0	49.6	35.9	73.9	53.9	24.3	18.0	Vert.









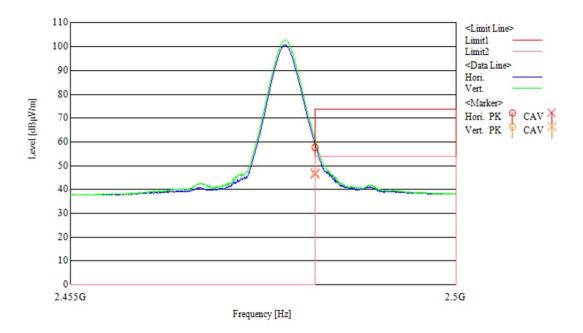
Operating mode: LE, 2480 MHz, 2 Mbps, Y-plane

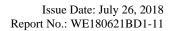
Test site: Yokohama Laboratory

Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBµV]	Reading Average [dBµV]	C.Factor [dB]	Peak	Result Average [dBµV/m]	Limit Peak [dBµV/m]	Limit Average [dBµV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	51.9	40.9	5.7	57.6	46.6	73.9	53.9	16.3	7.3	Hori.
2	2483.500	52.3	41.4	5.7	58.0	47.1	73.9	53.9	15.9	6.8	Vert.









2.7 AC power line conducted emissions

Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.2.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clause 6.2.

Applicable rule and limitation

FCC 15.207; AC power line conducted emissions limits

Frequency of Emission	Conducted emissi	ons Limit [dBµV]
[MHz]	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)

I NO5	CI 18	TR06
LINUS	CLIS	TKUO

Test Date

Tested Date: July 6, 2018 Temperature: 22 degC Humidity: 55 % Atmos. Press: 1015 hPa

Test software used

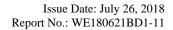
EMI Ver. 5.7

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]Result $[dB\mu V]$ = Reading $[dB\mu V]$ + Correction Factor [dB]

Test results - Complied with requirement





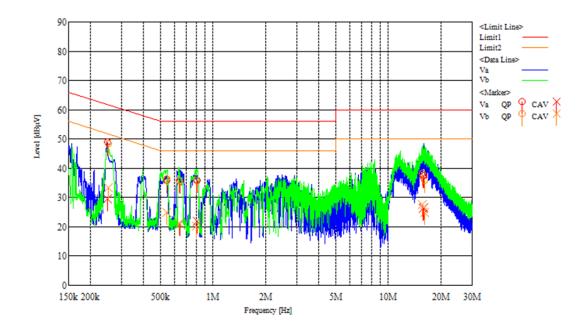


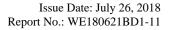
[SAPPHIRE-680FSG] **Test Data**

Operating mode: LE, 2402 MHz, 1 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.24951	39.0	19.6	10.1	49.1	29.7	61.8	51.8	12.7	22.1	Va
2	0.54194	25.9	14.8	10.1	36.0	24.9	56.0	46.0	20.0	21.1	Va
3	0.64647	25.6	10.9	10.1	35.7	21.0	56.0	46.0	20.3	25.0	Va
4	0.81151	25.8	11.8	10.1	35.9	21.9	56.0	46.0	20.1	24.1	Va
5	15.69886	27.0	15.8	10.4	37.4	26.2	60.0	50.0	22.6	23.8	Va
6	15.95881	27.0	16.1	10.4	37.4	26.5	60.0	50.0	22.6	23.5	Va
7	0.25368	38.5	23.2	10.1	48.6	33.3	61.6	51.6	13.0	18.3	Vb
8	0.54194	26.3	14.9	10.1	36.4	25.0	56.0	46.0	19.6	21.0	Vb
9	0.63933	25.9	11.2	10.1	36.0	21.3	56.0	46.0	20.0	24.7	Vb
10	0.80165	25.7	10.2	10.1	35.8	20.3	56.0	46.0	20.2	25.7	Vb
11	15.54689	28.0	17.2	10.4	38.4	27.6	60.0	50.0	21.6	22.4	Vb
12	16.11078	25.4	14.4	10.4	35.8	24.8	60.0	50.0	24.2	25.2	Vb

[Chart]





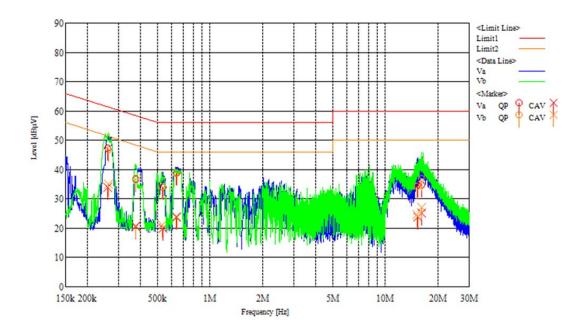


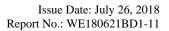


Operating mode: LE, 2440 MHz, 1 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Li	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.26065	37.3	23.9	10.1	47.4	34.0	61.4	51.4	14.0	17.4	Va
2	0.37503	26.7	10.4	10.1	36.8	20.5	58.4	48.4	21.6	27.9	Va
3	0.53667	23.9	10.0	10.1	34.0	20.1	56.0	46.0	22.0	25.9	Va
4	0.64103	28.8	13.6	10.1	38.9	23.7	56.0	46.0	17.1	22.3	Va
5	15.30294	24.4	13.5	10.4	34.8	23.9	60.0	50.0	25.2	26.1	Va
6	16.17076	24.4	14.8	10.4	34.8	25.2	60.0	50.0	25.2	24.8	Va
7	0.26388	36.7	24.9	10.1	46.8	35.0	61.3	51.3	14.5	16.3	Vb
8	0.37622	27.0	10.7	10.1	37.1	20.8	58.4	48.4	21.3	27.6	Vb
9	0.53276	24.2	10.9	10.1	34.3	21.0	56.0	46.0	21.7	25.0	Vb
10	0.64596	28.9	13.8	10.1	39.0	23.9	56.0	46.0	17.0	22.1	Vb
11	15.10698	23.9	14.2	10.4	34.3	24.6	60.0	50.0	25.7	25.4	Vb
12	16.05079	26.6	16.8	10.4	37.0	27.2	60.0	50.0	23.0	22.8	Vb

[Chart]





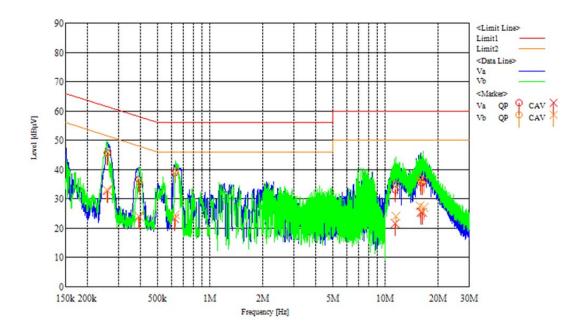


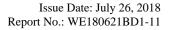


Operating mode: LE, 2480 MHz, 1 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.25997	35.6	22.8	10.1	45.7	32.9	61.4	51.4	15.7	18.5	Va
2	0.39118	26.7	13.9	10.1	36.8	24.0	58.0	48.0	21.2	24.0	Va
3	0.62845	28.9	13.2	10.1	39.0	23.3	56.0	46.0	17.0	22.7	Va
4	11.37173	22.9	11.4	10.3	33.2	21.7	60.0	50.0	26.8	28.3	Va
5	15.87083	25.1	15.0	10.4	35.5	25.4	60.0	50.0	24.5	24.6	Va
6	16.27075	25.1	15.2	10.4	35.5	25.6	60.0	50.0	24.5	24.4	Va
7	0.25725	35.6	23.0	10.1	45.7	33.1	61.5	51.5	15.8	18.4	Vb
8	0.39526	25.5	13.6	10.1	35.6	23.7	58.0	48.0	22.4	24.3	Vb
9	0.63661	29.7	14.5	10.1	39.8	24.6	56.0	46.0	16.2	21.4	Vb
10	11.46371	24.7	13.9	10.3	35.0	24.2	60.0	50.0	25.0	25.8	Vb
11	15.81884	26.7	17.2	10.4	37.1	27.6	60.0	50.0	22.9	22.4	Vb
12	16.51470	26.1	16.8	10.4	36.5	27.2	60.0	50.0	23.5	22.8	Vb

[Chart]





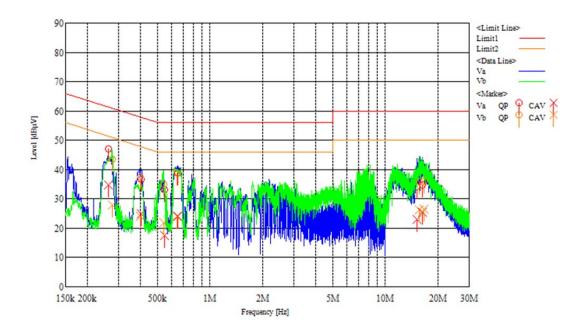


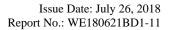


Operating mode: LE, 2402 MHz, 2 Mbps Test site: Yokohama Laboratory

	Emaguamari	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.26405	37.1	24.6	10.1	47.2	34.7	61.3	51.3	14.1	16.6	Va
2	0.40444	26.5	14.9	10.1	36.6	25.0	57.8	47.8	21.2	22.8	Va
3	0.54806	23.0	7.3	10.1	33.1	17.4	56.0	46.0	22.9	28.6	Va
4	0.65157	28.7	14.1	10.1	38.8	24.2	56.0	46.0	17.2	21.8	Va
5	15.15897	23.7	12.7	10.4	34.1	23.1	60.0	50.0	25.9	26.9	Va
6	16.33873	24.4	15.1	10.4	34.8	25.5	60.0	50.0	25.2	24.5	Va
7	0.27577	33.4	17.7	10.1	43.5	27.8	60.9	50.9	17.4	23.1	Vb
8	0.40223	27.5	14.1	10.1	37.6	24.2	57.8	47.8	20.2	23.6	Vb
9	0.54415	25.0	11.9	10.1	35.1	22.0	56.0	46.0	20.9	24.0	Vb
10	0.65004	28.8	14.1	10.1	38.9	24.2	56.0	46.0	17.1	21.8	Vb
11	15.59888	25.5	15.9	10.4	35.9	26.3	60.0	50.0	24.1	23.7	Vb
12	16.53069	25.8	16.2	10.4	36.2	26.6	60.0	50.0	23.8	23.4	Vb

[Chart]





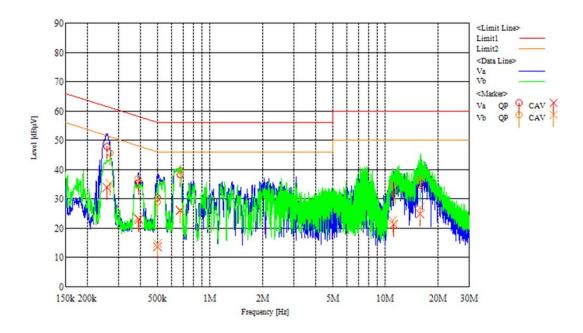


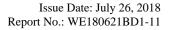


Operating mode: LE, 2440 MHz, 2 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.25878	37.9	23.9	10.1	48.0	34.0	61.5	51.5	13.5	17.5	Va
2	0.39254	25.5	12.8	10.1	35.6	22.9	58.0	48.0	22.4	25.1	Va
3	0.50149	20.3	3.7	10.1	30.4	13.8	56.0	46.0	25.6	32.2	Va
4	0.67672	28.3	15.8	10.1	38.4	25.9	56.0	46.0	17.6	20.1	Va
5	11.11978	22.2	11.0	10.3	32.5	21.3	60.0	50.0	27.5	28.7	Va
6	15.78684	24.5	14.5	10.4	34.9	24.9	60.0	50.0	25.1	25.1	Va
7	0.26915	35.6	25.2	10.1	45.7	35.3	61.1	51.1	15.4	15.8	Vb
8	0.38676	26.8	13.5	10.1	36.9	23.6	58.1	48.1	21.2	24.5	Vb
9	0.50081	18.9	4.6	10.1	29.0	14.7	56.0	46.0	27.0	31.3	Vb
10	0.67282	29.5	16.2	10.1	39.6	26.3	56.0	46.0	16.4	19.7	Vb
11	11.04779	24.6	12.5	10.3	34.9	22.8	60.0	50.0	25.1	27.2	Vb
12	15.76685	26.2	16.7	10.4	36.6	27.1	60.0	50.0	23.4	22.9	Vb

[Chart]





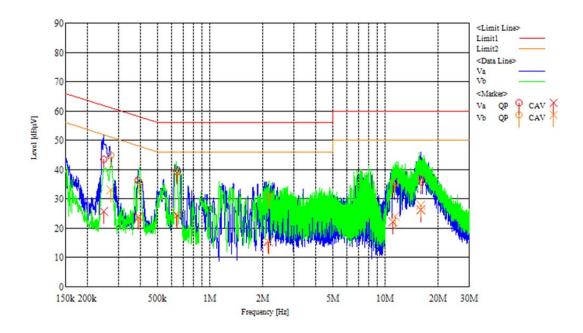


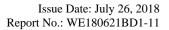


Operating mode: LE, 2480 MHz, 2 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.24739	33.4	15.6	10.1	43.5	25.7	61.8	51.8	18.3	26.1	Va
2	0.39016	26.3	13.8	10.1	36.4	23.9	58.1	48.1	21.7	24.2	Va
3	0.64426	29.0	14.4	10.1	39.1	24.5	56.0	46.0	16.9	21.5	Va
4	2.14637	21.4	5.6	10.1	31.5	15.7	56.0	46.0	24.5	30.3	Va
5	11.05979	24.2	12.0	10.3	34.5	22.3	60.0	50.0	25.5	27.7	Va
6	15.95881	25.4	15.8	10.4	35.8	26.2	60.0	50.0	24.2	23.8	Va
7	0.27153	34.7	23.1	10.1	44.8	33.2	61.1	51.1	16.3	17.9	Vb
8	0.39577	25.5	13.7	10.1	35.6	23.8	57.9	47.9	22.3	24.1	Vb
9	0.63899	29.5	14.7	10.1	39.6	24.8	56.0	46.0	16.4	21.2	Vb
10	2.16797	20.9	5.1	10.1	31.0	15.2	56.0	46.0	25.0	30.8	Vb
11	11.31574	25.2	13.8	10.3	35.5	24.1	60.0	50.0	24.5	25.9	Vb
12	15.96281	26.6	17.5	10.4	37.0	27.9	60.0	50.0	23.0	22.1	Vb

[Chart]







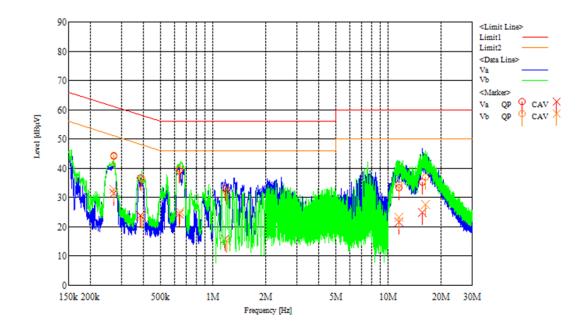


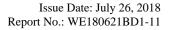
[SAPPHIRE-681FSG] **Test Data**

Operating mode: LE, 2402 MHz, 1 Mbps Test site: Yokohama Laboratory

	Emaguamari	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.27272	34.3	21.5	10.1	44.4	31.6	61.0	51.0	16.6	19.4	Va
2	0.38523	26.6	13.8	10.1	36.7	23.9	58.2	48.2	21.5	24.3	Va
3	0.64001	29.0	14.2	10.1	39.1	24.3	56.0	46.0	16.9	21.7	Va
4	1.17457	22.9	5.7	10.1	33.0	15.8	56.0	46.0	23.0	30.2	Va
5	11.51970	23.0	11.4	10.3	33.3	21.7	60.0	50.0	26.7	28.3	Va
6	15.63087	24.9	14.6	10.4	35.3	25.0	60.0	50.0	24.7	25.0	Va
7	0.27187	34.1	22.8	10.1	44.2	32.9	61.1	51.1	16.9	18.2	Vb
8	0.39220	26.2	13.5	10.1	36.3	23.6	58.0	48.0	21.7	24.4	Vb
9	0.64970	29.6	15.2	10.1	39.7	25.3	56.0	46.0	16.3	20.7	Vb
10	1.19436	21.6	5.1	10.1	31.7	15.2	56.0	46.0	24.3	30.8	Vb
11	11.51170	24.3	12.9	10.3	34.6	23.2	60.0	50.0	25.4	26.8	Vb
12	16.21476	26.6	17.3	10.4	37.0	27.7	60.0	50.0	23.0	22.3	Vb

[Chart]





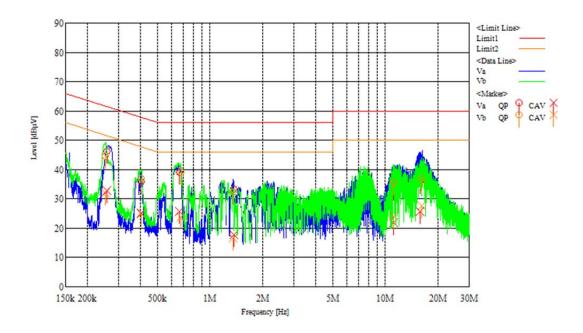


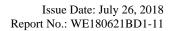


Operating mode: LE, 2440 MHz, 1 Mbps Test site: Yokohama Laboratory

	Енасионац	Rea	ding	C.F.	Res	sult	Limit		Margin		
No.	Frequency [MHz]	QP	AV	С.г. [dВ]	QP	AV	QP	AV	QP	AV	PHASE
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
1	0.25810	36.1	22.7	10.1	46.2	32.8	61.5	51.5	15.3	18.7	Va
2	0.40291	25.9	15.2	10.1	36.0	25.3	57.8	47.8	21.8	22.5	Va
3	0.66874	29.1	15.7	10.1	39.2	25.8	56.0	46.0	16.8	20.2	Va
4	1.35993	23.3	7.8	10.1	33.4	17.9	56.0	46.0	22.6	28.1	Va
5	11.15577	23.3	11.7	10.3	33.6	22.0	60.0	50.0	26.4	28.0	Va
6	15.69886	25.4	15.4	10.4	35.8	25.8	60.0	50.0	24.2	24.2	Va
7	0.25368	34.4	21.9	10.1	44.5	32.0	61.6	51.6	17.1	19.6	Vb
8	0.40291	26.8	14.8	10.1	36.9	24.9	57.8	47.8	20.9	22.9	Vb
9	0.68301	29.1	13.7	10.1	39.2	23.8	56.0	46.0	16.8	22.2	Vb
10	1.35813	22.2	6.5	10.1	32.3	16.6	56.0	46.0	23.7	29.4	Vb
11	11.18776	25.2	13.7	10.3	35.5	24.0	60.0	50.0	24.5	26.0	Vb
12	16.03879	26.6	17.3	10.4	37.0	27.7	60.0	50.0	23.0	22.3	Vb

[Chart]





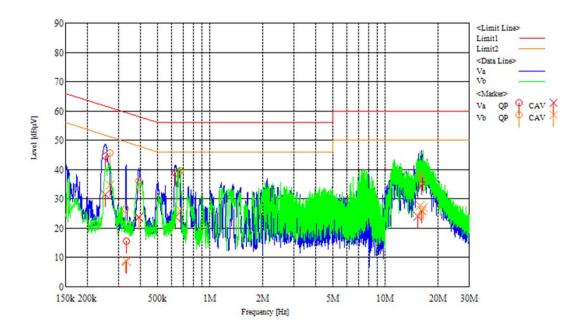


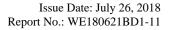


Operating mode: LE, 2480 MHz, 1 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.25368	34.6	21.3	10.1	44.7	31.4	61.6	51.6	16.9	20.2	Va
2	0.33169	5.5	-1.4	10.1	15.6	8.7	59.4	49.4	43.8	40.7	Va
3	0.39135	26.1	13.7	10.1	36.2	23.8	58.0	48.0	21.8	24.2	Va
4	0.63270	28.8	13.6	10.1	38.9	23.7	56.0	46.0	17.1	22.3	Va
5	15.37093	24.1	13.7	10.4	34.5	24.1	60.0	50.0	25.5	25.9	Va
6	16.17076	25.2	15.6	10.4	35.6	26.0	60.0	50.0	24.4	24.0	Va
7	0.26728	35.7	24.6	10.1	45.8	34.7	61.2	51.2	15.4	16.5	Vb
8	0.32829	16.4	-1.0	10.1	26.5	9.1	59.5	49.5	33.0	40.4	Vb
9	0.39237	26.1	13.4	10.1	36.2	23.5	58.0	48.0	21.8	24.5	Vb
10	0.67333	29.5	16.3	10.1	39.6	26.4	56.0	46.0	16.4	19.6	Vb
11	15.84283	27.8	17.3	10.4	38.2	27.7	60.0	50.0	21.8	22.3	Vb
12	16.40272	26.0	16.6	10.4	36.4	27.0	60.0	50.0	23.6	23.0	Vb

[Chart]





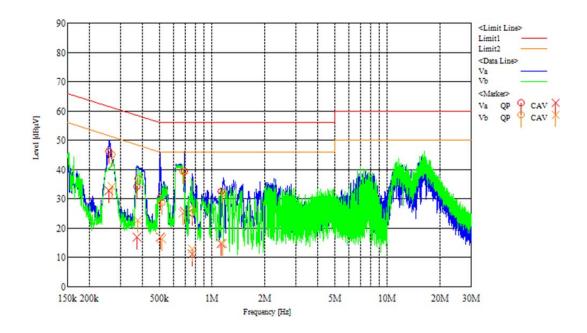




Operating mode: LE, 2402 MHz, 2 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.25895	36.2	22.7	10.1	46.3	32.8	61.5	51.5	15.2	18.7	Va
2	0.37096	24.2	6.8	10.1	34.3	16.9	58.5	48.5	24.2	31.6	Va
3	0.50438	20.2	6.9	10.1	30.3	17.0	56.0	46.0	25.7	29.0	Va
4	0.69780	29.3	15.7	10.1	39.4	25.8	56.0	46.0	16.6	20.2	Va
5	0.77310	15.1	1.2	10.1	25.2	11.3	56.0	46.0	30.8	34.7	Va
6	1.12597	22.4	4.6	10.1	32.5	14.7	56.0	46.0	23.5	31.3	Va
7	0.26966	35.0	24.1	10.1	45.1	34.2	61.1	51.1	16.0	16.9	Vb
8	0.37690	26.9	12.6	10.1	37.0	22.7	58.3	48.3	21.3	25.6	Vb
9	0.51798	18.7	6.4	10.1	28.8	16.5	56.0	46.0	27.2	29.5	Vb
10	0.68165	29.3	15.0	10.1	39.4	25.1	56.0	46.0	16.6	20.9	Vb
11	0.76664	16.5	2.9	10.1	26.6	13.0	56.0	46.0	29.4	33.0	Vb
12	1.15297	22.0	4.6	10.1	32.1	14.7	56.0	46.0	23.9	31.3	Vb

[Chart]





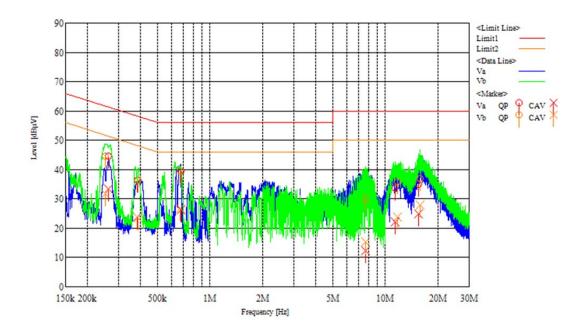


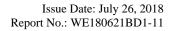


Operating mode: LE, 2440 MHz, 2 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.26405	34.6	23.2	10.1	44.7	33.3	61.3	51.3	16.6	18.0	Va
2	0.38251	26.2	13.6	10.1	36.3	23.7	58.2	48.2	21.9	24.5	Va
3	0.67978	29.4	16.3	10.1	39.5	26.4	56.0	46.0	16.5	19.6	Va
4	7.69466	17.8	2.1	10.3	28.1	12.4	60.0	50.0	31.9	37.6	Va
5	11.42372	23.3	11.8	10.3	33.6	22.1	60.0	50.0	26.4	27.9	Va
6	15.42292	24.7	14.4	10.4	35.1	24.8	60.0	50.0	24.9	25.2	Va
7	0.25317	34.6	21.6	10.1	44.7	31.7	61.7	51.7	17.0	20.0	Vb
8	0.38727	26.4	13.4	10.1	36.5	23.5	58.1	48.1	21.6	24.6	Vb
9	0.67723	29.6	16.8	10.1	39.7	26.9	56.0	46.0	16.3	19.1	Vb
10	7.71626	19.9	5.0	10.3	30.2	15.3	60.0	50.0	29.8	34.7	Vb
11	11.74365	25.5	13.6	10.3	35.8	23.9	60.0	50.0	24.2	26.1	Vb
12	15.80284	26.7	17.4	10.4	37.1	27.8	60.0	50.0	22.9	22.2	Vb

[Chart]









Operating mode: LE, 2480 MHz, 2 Mbps Test site: Yokohama Laboratory

	E	Rea	ding	CE	Res	sult	Liı	mit	Ma	rgin	
No.	Frequency [MHz]	QP [dBuV]	AV [dBuV]	C.F. [dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	PHASE
1	0.26150	36.3	22.9	10.1	46.4	33.0	61.4	51.4	15.0	18.4	Va
2	0.37639	26.9	12.7	10.1	37.0	22.8	58.4	48.4	21.4	25.6	Va
3	0.65310	29.1	15.0	10.1	39.2	25.1	56.0	46.0	16.8	20.9	Va
4	2.11758	21.4	5.1	10.1	31.5	15.2	56.0	46.0	24.5	30.8	Va
5	11.36773	23.0	11.6	10.3	33.3	21.9	60.0	50.0	26.7	28.1	Va
6	15.92282	25.7	15.8	10.4	36.1	26.2	60.0	50.0	23.9	23.8	Va
7	0.24331	24.5	8.0	10.1	34.6	18.1	62.0	52.0	27.4	33.9	Vb
8	0.37419	26.9	10.9	10.1	37.0	21.0	58.4	48.4	21.4	27.4	Vb
9	0.65242	29.7	15.3	10.1	39.8	25.4	56.0	46.0	16.2	20.6	Vb
10	2.14997	20.8	4.5	10.1	30.9	14.6	56.0	46.0	25.1	31.4	Vb
11	11.31174	25.4	13.9	10.3	35.7	24.2	60.0	50.0	24.3	25.8	Vb
12	16.15077	26.4	17.1	10.4	36.8	27.5	60.0	50.0	23.2	22.5	Vb

[Chart]

