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THIS SPEC IS OBSOLETE

Spec No: 001-17581

Spec Title: WIRELESSUSB(TM) LP RDK JAPANESE
RADIO LAW TESTING AND VERIFICATION -
AN17581

Replaced by: NONE

AN17581

WirelessUSB™ LP RDK Japanese Radio Law Testing and Verification

Author: Ram Kandiar

Associated Project: No

Associated Part Family: CYWUSB6934, CYWUSB6935ic, CYRF6936, CYRF69213, CYRF69103

Software Version: None

Related Application Notes: None

To get the latest version of this application note, or the associated project file, please visit <http://www.cypress.com/go/AN17581>.

This application note discusses the necessary information for you to use a WirelessUSB™ LP radio in a product intended for the Japanese market. WirelessUSB-based systems require a certification to market the product to make certain that it meets international regulations and national laws. This application note serves as a reference point in selecting a WirelessUSB LP radio for your application needs. The use of a Cypress radio chip and its suitability for Japanese product development is demonstrated by providing the compliance data on a reference development kit.

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Introduction

One of the problems that product developers encounter in incorporating any radio communication device is tackling the legal aspect of qualifying the products and marketing them without legal problems. This application note demonstrates the performance of the WirelessUSB radio chip CYRF6936 against Japanese requirements by submitting a reference radio development kit to meet the Japanese requirements.

Purpose

This application note gives you an overview of the legal issues governing the manufacture and sale of wireless products intended for unlicensed operation in Japan. Although the operation of wireless radio devices in the ISM band (2.4 to 2.5 GHz) is license-free, products incorporating a WirelessUSB radio chip must be type-certified or meet certain requirements. In Japan, the Ministry of Internal Affairs and Communication is responsible for the regulation of all wireless radio devices.

Japanese Authorization Process Radio Law

The Japanese Radio Law provides rules for product development using wireless devices.

Type Certification (Radio Law Article 38-17)

Testing is conducted on one sample unit for each type of radio equipment applying for certification. An example of this type of testing is that done by the Registered Certification Body System (Radio Law Article 38-17) shown in Figure 1.

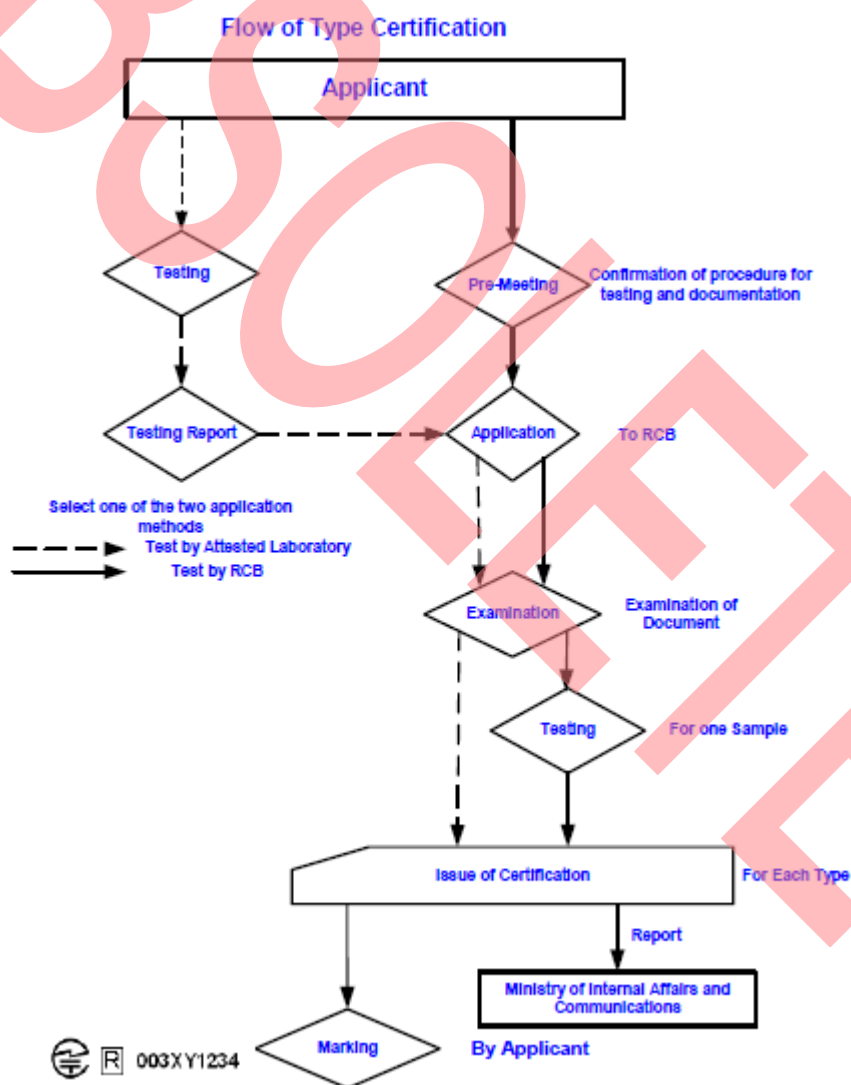
In this system, a person registered by the Ministry of Internal Affairs and Communications conducts an inspection of radio equipment under foreign statute and makes an application certifying that the specified radio equipment complies with technical standards of the Radio Law for use in Japan.

The WirelessUSB LP reference design kit (RDK) CY4672 was verified in this way to fulfill Japanese compliance by D.S.P. Research, one of the registered certification bodies in Japan.

The WirelessUSB LP RDK has a precertified chip set and reference designs certified by D.S.P. Research.

D.S.P. Research enables you to waive the regular compliance procedure on your devices built with WirelessUSB LP RDK. Contact the sales department of D.S.P. Research (Cypress0706@dspr.co.jp).

Figure 1. Flow Chart of Type Certification



The Japanese Radio Law testing requirements and a brief overview of the required tests are described in the following section.

The tests are as follows:

- Frequency tolerance
- Occupied bandwidth and spread bandwidth
- Transmission output power
- Spurious emission strength
- Secondly emitted radio wave strength
- Burst ratio

The RDK consists of a mouse, keyboard, and a dongle. The mouse and keyboard are tested at two supply voltages and the dongle is tested at a single supply voltage.

Measurement Details

This application note documents the measurements and data collected on the RDK - mouse, keyboard, and dongle using the WirelessUSB LP chip. This is used to verify that the radio module meets the Japanese regulation.

The Japanese Radio Law testing was performed at the DSP Research test facility on a Cypress RDK.

1. The mouse, keyboard, and dongle are tested individually.
2. The mouse, keyboard, and dongle are installed with EMC Test code to exercise the radio in single-frequency transmit mode. The mouse, keyboard, and dongle are set up to transmit continuously at lowest, middle, and highest frequency channels.
3. Performed all the tests required by Japanese Radio Law at lowest channel at 2402 MHz, mid channel at 2439 MHz and highest channel at 2479 MHz. All measurements are taken with the power level set at 7.

Mouse with Input Power 3.0 V

Environment of Test Room	Temperature	22 °C
	Humidity	58%

Peak Antenna Gain	3.54	dBi
Declaration Output Power	4	mW/MHz
Declaration Output Power	6.0206	dBm/MHz
E.I.R.P	9.5606	dBm/MHz
Input Power Voltage	3	VDC

Tested Circuit Insertion Loss		14.638	dBm
Burst Ratio	ON Time	2.1	m sec
	OFF Time	0.58	m sec
	Ratio	78.358	%
Packet Type (Mode)		Not Applicable	Mode

Frequency Equal to the Transmission Rate of the Modulation Signal
0.03125 MHz

Test category: 2.4-GHz bandwidth band low-power data communication system

Comprehensive operation test

Test Results

Measurement Frequency		MHz	2402	2441	2479	Result	Notes
Channel Number		Ch.	0	39	77	.....
Reading Frequency		MHz	2402.012	2441.012	2479.012	.....
Frequency Tolerance		ppm	4.99584	4.91602	4.84066	PASS	
Occupied Bandwidth		MHz	1.96	2	2.24	PASS	
Spread Bandwidth		MHz	1.12	1.08	1.16	PASS	
RF Output Power		mW/MHz	2.516	2.563	2.436	PASS	
RF Output Power Tolerance		%	-37.10	-35.93	-39.09	PASS	
Real Total Output Power		dBm	2.948	3.028	2.808	.....	WirelessUSB LP RDK CY4672
TX Spurious Emission Strength	2387 MHz Under	μW/MHz	0.674792	0.564976	0.692931	PASS	
		MHz	1601.296	1627.26	1652.69	.....
	2387-2400 MHz	μW/MHz	24.199144	0.071912	0.016512	PASS	
		MHz	2399.988	2399.128	2388.018	.....
	2483.5-2496.5 MHz	μW/MHz	0.011036	0.030255	2.217175	PASS	
		MHz	2483.95	2484.57	2483.524	.....
	2496.5 MHz Over	μW/MHz	0.292954	0.208833	0.192221	PASS	
		MHz	7207.345	7324.387	4957.654	.....
Secondarily Emitted Radio Wave Strength (RX Spurious)	1 GHz Under	nW	0.028301	0.023431	0.030255	PASS	
		MHz	999.873	261.37	820.94	.....
	1 GHz Over	nW	2.127159	2.436688	2.522319	PASS	
		MHz	1601.86	1602.01	1601.99	.....
Spread Factor		.....	35.84	34.56	37.12	PASS	

Frequency Tolerance

Measurement Frequency	Reading Frequency	Frequency Tolerance	Limit	Result
2402 MHz	2402.012 MHz	4.9958 ppm	±50 ppm	Pass
2441 MHz	2441.012 MHz	4.9160 ppm	±50 ppm	Pass
2479 MHz	2479.012 MHz	4.8407 ppm	±50 ppm	Pass

Japanese Regulation*

*Frequency tolerance must be within ±50 ppm

Occupied Bandwidth and Spread Bandwidth

Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Occupied bandwidth	1.96 MHz	26 MHz or less	Pass
	Spread Bandwidth	1.12 MHz	500 KHz or more	Pass
	Spread Factor	35.84	5 or more	Pass
2441 MHz	Occupied Bandwidth	2.00 MHz	26 MHz or less	Pass
	Spread Bandwidth	1.06 MHz	500 KHz or more	Pass
	Spread Factor	34.56	5 or more	Pass
2479 MHz	Occupied Bandwidth	2.24 MHz	26 MHz or less	Pass
	Spread Bandwidth	1.16 MHz	500 KHz or more	Pass
	Spread Factor	37.12	5 or more	Pass

Frequency Equal to the Transmission Rate of the Modulation Signal	0.03125 MHz
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Japanese Regulation

- Occupied bandwidth must be 26 MHz or less.
- Spread bandwidth must be 500 KHz or more.
- Spread factor must be 5 or more.

Transmission Output Power

Declaration Output Power	4 mW/MHz
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Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Output Power	4.007 dBm/MHz	10 mW/MHz	Pass
		2.516 mW/MHz		
	Power Tolerance	-37.10%	+20% to -80%	Pass
2441 MHz	Output Power	4.087 dBm/MHz	10 mW/MHz	Pass
		2.563 mW/MHz		
	Power Tolerance	-35.93%	+20% to -80%	Pass
2479 MHz	Output Power	3.367 dBm/MHz	10 mW/MHz	Pass
		2.436 mW/MHz		
	Power Tolerance	-39.09%	+20% to -80%	Pass

Japanese Regulation

- Output power must be 10 mW/MHz or less.
- Output power tolerance must range between +20% to -80%.

Spurious Emission Strength

Table 1. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 Mhz-2387 MHz	1601.296 MHz	-31.7083 dBm/MHz	0.674792 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2399.988 MHz	-16.162 dBm/MHz	24.199144 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2483.95 MHz	-49.572 dBm/MHz	0.011036 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	7207.345 MHz	-35.332 dBm/MHz	0.292954 μ W/MHz	25 μ W/MHz	Pass

Table 2. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1627.26 MHz	-32.4797 dBm/MHz	0.564876 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2399.128 MHz	-41.432 dBm/MHz	0.071912 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2484.57 MHz	-45.192 dBm/MHz	0.030255 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	7324.387 MHz	-36.802 dBm/MHz	0.208833 μ W/MHz	25 μ W/MHz	Pass

Table 3. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1652.69 MHz	-31.5931 dBm/MHz	0.692931 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2388.018 MHz	-47.822 dBm/MHz	0.016512 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2483.524 MHz	-28.542 dBm/MHz	0.217175 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	4957.654 MHz	-37.1622 dBm/MHz	0.192221 μ W/MHz	25 μ W/MHz	Pass

Japanese Regulation

30 MHz-2387 MHz and 2496.5 MHz-12.5 GHz must be 2.5 mW or less.

2387 MHz-2400 MHz and 2400 MHz must be 25 mW or less.

Secondarily Emitted Radio Wave Strength

Table 4. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	999.873 MHz	-75.482 dBm	0.028301 nW	4 nW	Pass
Over 1 GHz	1601.86 MHz	-56.722 dBm	2.127159 nW	20 nW	Pass

Table 5. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	261.37 MHz	-76.302 dBm	0.023431 nW	4 nW	Pass
Over 1 GHz	1602.01 MHz	-56.132 dBm	2.436688 nW	20 nW	Pass

Table 6. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	820.94 MHz	-75.192 dBm	0.030255 nW	4 nW	Pass
Over 1 GHz	1601.99 MHz	-55.982 dBm	2.522319 nW	20 nW	Pass

Japanese Regulation

Less than 1 GHz must be 4 nW or less.

More than 1 GHz must be 20 nW or less.

Burst Ratio

	Time (mSec)	Limit	Result	On Time Ratio
ON	2.1	400 msec	Pass	78.358%
OFF	0.58			

Japanese Regulation

On Time must be 400 msec or less.

The mouse was tested at input power voltage of 2.7 V and 3.3 V. The test results are obtained from DSP Research and can be downloaded from the Cypress website at <http://www.cypress.com>.

Keyboard with Input Power 3.0 V

Environment of Test Room	Temperature	22 °C
	Humidity	64%

Peak Antenna Gain	3.64	dBi
Declaration Output Power	4	mW/MHz
Declaration Output Power	6.0206	dBm/MHz
E.I.R.P	9.5606	dBm/MHz
Input Power Voltage	3	VDC

Tested Circuit Insertion Loss		9.466	dBm
Burst Ratio	ON Time	2.1	msec
	OFF Time	0.57	msec
	Ratio	78.652	%
Packet Type (Mode)		Not Applicable	Mode

Frequency Equal to the Transmission Rate of the Modulation Signal
0.03125 MHz

Test Category: 2.4 GHz bandwidth band low-power data communication system

Comprehensive operation test

Test Results

Measurement Frequency		MHz	2402	2441	2479	Result	Notes
Channel Number		Ch	0	39	78	.....
Reading Frequency		MHz	2401.958	2440.957	2478.956	.....
Frequency Tolerance		ppm	-17.48543	-17.61573	-17.74909	PASS	
Occupied Bandwidth		MHz	1.92	2.2	2.32	PASS	
Spread Bandwidth		MHz	1.08	1.2	1.24	PASS	
RF Output Power		mW/MHz	2.338	2.393	2.182	PASS	
RF Output Power Tolerance		%	-41.54	-40.18	-45.45	PASS	
Real Total Output Power		dBm	2.646	2.746	2.346	.....	WirelessUSB LP RDK CY4872
TX Spurious Emission Strength	2387 MHz Under	μW/MHz	0.615177	0.790915	0.953103	PASS	
		MHz	1601.296	1627.24	1652.65	.....
	2387-2400 MHz	μW/MHz	18.348476	0.070081	0.021459	PASS	
		MHz	2399.964	2389.768	2399.352	.....
	2483.5-2496.5 MHz	μW/MHz	0.005869	0.033466	2.278243	PASS	
		MHz	2494.314	2483.55	2483.59	.....
Secondarily Emitted Radio Wave Strength (RX Spurious)	2496.5 MHz Over	μW/MHz	0.207778	0.270147	0.201187	PASS	
		MHz	4803.598	4881.326	4958.754	.....
	1 GHz Under	nW	0.0006896	0.007355	0.0019125	PASS	
		MHz	463.49	780.96	350.68	.....
	1 GHz Over	nW	0.870162	0.996782	1.031811	PASS	
		MHz	3206.65	3206.56	3206.68	.....
Spread Factor		.....	34.56	38.40	39.68	PASS	

Frequency Tolerance

Measurement Frequency	Reading Frequency	Frequency Tolerance	Limit	Result
2402 MHz	2401.958 MHz	-17.4854 ppm	±50 ppm	PASS
2441 MHz	2440.957 MHz	-17.6157 ppm	±50 ppm	PASS
2479 MHz	2478.956 MHz	-17.7491 ppm	±50 ppm	PASS
Japanese Regulation*				
*Frequency Tolerance must be within ±50 ppm				

Occupied Bandwidth and Spread Bandwidth

Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Occupied bandwidth	1.92 MHz	26 MHz or less	Pass
	Spread bandwidth	1.08MHz	500 KHz or more	Pass
	Spread factor	34.56	5 or more	Pass
2441 MHz	Occupied bandwidth	2.20 MHz	26 MHz or less	Pass
	Spread bandwidth	1.20 MHz	500 KHz or more	Pass
	Spread factor	38.40	5 or more	Pass
2479 MHz	Occupied bandwidth	2.32 MHz	26 MHz or less	Pass
	Spread bandwidth	1.24MHz	500 KHz or more	Pass
	Spread factor	39.68	5 or more	Pass

Frequency Equal to the Transmission Rate of the Modulation Signal	0.03125 MHz
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Japanese Regulation

- Occupied Bandwidth must be 26 MHz or less.
- Spread Bandwidth must be 500 KHz or more.
- Spread Factor must be 5 or more.

Transmission Output Power

Declaration Output Power	4 mW/MHz
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Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Output Power	3.689 dBm/MHz 2.338 mW/MHz	10 mW/MHz	PASS
	Power Tolerance	-41.18%	+20% to -80%	PASS
2441 MHz	Output Power	3.789 dBm/MHz 2.393 mW/MHz	10 mW/MHz	PASS
	Power Tolerance	-40.18%	+20% to -80%	PASS
2479 MHz	Output Power	3.389dBm/MHz 2.182 mW/MHz	10 mW/MHz	PASS
	Power Tolerance	-45.45%	+20% to -80%	PASS

Japanese Regulation

- Output Power must be 10 mW/MHz or less.
- Output Power Tolerance must range between +20% to -80%.

Spurious Emission Strength

Table 7. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1601.296 MHz	-32.11 dBm/MHz	0.615177 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2399.964 MHz	-17.364 dBm/MHz	18.348476 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2494.314 MHz	-52.314 dBm/MHz	0.005869 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	4803.598 MHz	-36.824 dBm/MHz	0.207778 μ W/MHz	25 μ W/MHz	Pass

Table 8. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1627.24 MHz	-31.0187 dBm/MHz	0.790915 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2389.768 MHz	-41.544 dBm/MHz	0.070081 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2483.55 MHz	-44.754 dBm/MHz	0.033466 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	4881.326 MHz	-35.684 dBm/MHz	0.270147 μ W/MHz	25 μ W/MHz	Pass

Table 9. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1652.65 MHz	-30.2086 dBm/MHz	0.953103 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2399.352 MHz	-46.684 dBm/MHz	0.021459 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2483.59 MHz	-26.424 dBm/MHz	2.278243 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	4958.754 MHz	-36.964 dBm/MHz	0.201187 μ W/MHz	25 μ W/MHz	Pass

Secondarily Emitted Radio Wave Strength

Table 10. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	463.49 MHz	-81.614 dBm	0.007355 nW	4 nW	Pass
Over 1 GHz	3206.65 MHz	-60.604 dBm	0.996782 nW	20 nW	Pass

Table 11. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	780.96 MHz	-77.184 dBm	0.019125 nW	4 nW	Pass
Over 1 GHz	3206.56 MHz	-59.864 dBm	1.031811 nW	20 nW	Pass

Table 12. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Under 1 GHz	350.68 MHz	-77.184 dBm	0.019125 nW	4 nW	Pass
Over 1 GHz	3206.68 MHz	-59.864 dBm	1.031811 nW	20 nW	Pass

Japanese Regulation

Less than 1 GHz must be 4 nW or less.

More than 1 GHz must be 20 nW or less.

Burst Ratio

	Time (msec)	Limit	Result	On Time Ratio
ON	2.1	400 msec	Pass	78.358%
OFF	0.58			

The keyboard was tested at input power voltage of 2.7 V and 3.3 V. The test results are obtained from DSP Research and can be downloaded from the Cypress web site at <http://www.cypress.com>.

Japanese Regulation

On Time must be 400 msec or less.

Dongle with Input Power 5.0 V

Environment of Test Room	Temperature	22 °C
	Humidity	49%

Peak Antenna Gain	3.54	dBi
Declaration Output Power	4	mW/MHz
Declaration Output Power	6.0206	dBm/MHz
E.I.R.P	9.5606	dBm/MHz
Input Power Voltage	5	VDC

Tested Circuit Insertion Loss		9.466	dBm
Burst Ratio	ON Time	2.093	m sec
	OFF Time	0.539	m sec
	Ratio	79.521	%
Packet Type (Mode)		Not Applicable	Mode

Frequency Equal to the Transmission Rate of the Modulation Signal
0.03125 MHz

Test Category: 2.4 GHz Band Wide Band Low Power Data communication System

Comprehensive Operation Test

Test Results

Measurement Frequency		MHz	2402	2441	2480	Result	Notes
Channel Number		Ch	0	39	78	.....
Reading Frequency		MHz	2401.933	2440.932	2479.931	.....
Frequency Tolerance		ppm	-27.89342	-27.85744	-27.82258	PASS	
Occupied Bandwidth		MHz	2	2.08	2.48	PASS	
Spread Bandwidth		MHz	1.08	1.2	1.32	PASS	
RF Output Power		mW/MHz	3.149	2.986	2.774	PASS	
RF Output Power Tolerance		%	-21.29	-25.35	-30.65	PASS	
Real Total Output Power		dBm	3.986	3.756	3.436	.....	WirelessUSB LP RDK CY4672
TX Spurious Emission Strength	2387 MHz Under	μW/MHz	0.002289	0.002580	0.002704	PASS	
		MHz	1601.48	1627.689	1653.236	.....
	2387-2400 MHz	μW/MHz	16.054619	0.096294	0.019934	PASS	
		MHz	2399.486	2390.136	2398.93	.....
	2483.5-2496.5 MHz	μW/MHz	0.007881	0.035942	4.060692	PASS	
		MHz	2488.246	2492.504	2483.606	.....
Secondarily Emitted Radio Wave Strength (RX Spurious)	2496.5 MHz Over	μW/MHz	0.002121	0.192132	0.143087	PASS	
		MHz	3188.71	3254.799	3306.948	.....
	1 GHz Under	nW	0.263390	0.009432	0.244118	PASS	
		MHz	12.005	890.93	12.015	.....
	1 GHz Over	nW	1.752266	1.404753	1.369620	PASS	
		MHz	3203.99	3255.937	3307.935	.....
Spread Factor		.....	34.56	38.40	42.24	PASS	

Frequency Tolerance

Measurement Frequency	Reading Frequency	Frequency Tolerance	Limit	Result
2402 MHz	2401.933 MHz	-27.8934 ppm	±50 ppm	PASS
2441 MHz	2440.932 MHz	-27.8574 ppm	±50 ppm	PASS
2479 MHz	2479.931MHz	-27.8226 ppm	±50 ppm	PASS
Japanese Regulation*				
*Frequency Tolerance must be within ±50 ppm				

Occupied Bandwidth and Spread Bandwidth

Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Occupied bandwidth	2.00 MHz	26 MHz or less	Pass
	Spread bandwidth	1.08 MHz	500 KHz or more	Pass
	Spread factor	34.56	5 or more	Pass
2441 MHz	Occupied bandwidth	2.08 MHz	26 MHz or less	Pass
	Spread bandwidth	1.20 MHz	500 KHz or more	Pass
	Spread factor	38.40	5 or more	Pass
2480 MHz	Occupied bandwidth	2.48 MHz	26 MHz or less	Pass
	Spread bandwidth	1.32 MHz	500 KHz or more	Pass
	Spread factor	42.24	5 or more	Pass

Frequency Equal to the Transmission Rate of the Modulation Signal	0.03125 MHz
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Japanese Regulation

- Occupied Bandwidth must be 26 MHz or less.
- Spread Bandwidth must be 500 KHz or more.
- Spread Factor must be 5 or more.

Transmission Output Power

Declaration Output Power	4 mW/MHz
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Measurement Frequency	Category	Measurement Value	Limit	Result
2402 MHz	Output power	4.981 dBm/MHz	10 mW/MHz	PASS
		3.149 mW/MHz		
2441 MHz	Output power	4.751 dBm/MHz	10 mW/MHz	PASS
		2.986 mW/MHz		
2479 MHz	Output power	4.431 dBm/MHz	10 mW/MHz	PASS
		2.774 mW/MHz		
	Power tolerance	-21.29%	+20% to -80%	PASS
	Power tolerance	-25.35%	+20% to -80%	PASS
	Power tolerance	-30.65%	+20% to -80%	PASS

Japanese Regulation

- Output Power must be 10 mW/MHz or less.
- Output Power Tolerance must range between +20% to -80%.

Spurious Emission Strength

Table 13. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1601.48 MHz	-58.404 dBm/MHz	0.002289 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2399.486 MHz	-17.944 dBm/MHz	16.054619 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2488.246 MHz	-51.034 dBm/MHz	0.007881 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	3188.71 MHz	-56.734 dBm/MHz	0.002121 μ W/MHz	25 μ W/MHz	Pass

Table 14. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1627.689 MHz	-55.884 dBm/MHz	0.002580 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2390.136 MHz	-40.164 dBm/MHz	0.096294 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2482.504 MHz	-44.444 dBm/MHz	0.035942 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	3254.789 MHz	-37.164 dBm/MHz	0.192132 μ W/MHz	25 μ W/MHz	Pass

Table 15. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
30 MHz-2387 MHz	1653.236 MHz	-55.68 dBm/MHz	0.002704 μ W/MHz	25 μ W/MHz	Pass
2387 MHz-2400 MHz	2398.93 MHz	-47.004 dBm/MHz	0.019934 μ W/MHz	25 μ W/MHz	Pass
2483.5 MHz-2496.5 MHz	2483.606 MHz	-23.914dBm/MHz	4.060692 μ W/MHz	25 μ W/MHz	Pass
2496.5 MHz-12.5 GHz	3308.048 MHz	-38.444 dBm/MHz	0.143087 μ W/MHz	25 μ W/MHz	Pass

Japanese Regulation

30 Mhz-2387 MHz and 2496.5 MHz must be 2.5 micrW or less.

2387 MHz-2400 MHz and 2483.5 MHz-2496.5 MHz must be 25 microW or less.

Secondarily Emitted Radio Wave Strength

Table 16. Channel 0: 2402 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Less than 1 GHz	12.005 MHz	-65.794 dBm	0.263390 nW	4 nW	Pass
More than 1 GHz	3203.99 MHz	-57.564 dBm	1.752266 nW	20 nW	Pass

Table 17. Channel 39: 2441 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
Less than 1 GHz	890.93 MHz	-80.254 dBm	0.009432 nW	4 nW	Pass
More than 1 GHz	3255.937 MHz	-58.524 dBm	1.404753nW	20 nW	Pass

Table 18. Channel 78: 2479 MHz

Frequency Range	Frequency	Measurement Value		Limit	Result
More than 1 GHz	12.015 MHz	-66.124 dBm	0.244118 nW	4 nW	Pass
More than 1 GHz	3307.935 MHz	-58.634 dBm	1.369620 nW	20 nW	Pass

Japanese Regulation

Less than 1 GHz must be 4 nW or less.

More than 1 GHz must be 20 nW or less.

Burst Ratio

	Time (msec)	Limit	Result	On Time Ratio
ON	2.093	400 msec	Pass	79.521%
OFF	0.539			

Japanese Regulation

On Time must be 400 msec or less

Note The dongle was tested at input voltage of 5.0 V. The test results are obtained from DSP Research and can be downloaded from the Cypress web site at <http://www.cypress.com>.

Summary

The Japanese radio law (RF) on the reference development kit is tested and verified. The equipment under test (EUT) passed all the tests required by Japanese Radio law to meet Japanese Government certification requirements. This application note provides an overview of the wireless product compliance process for radio equipment technical requirement in Japan. It also serves as a guideline for selecting the Cypress's WirelessUSB™ LP radio system chip to wireless application solutions. The Japanese electromagnetic compatibility (EMC) is not mandatory and is served voluntary guideline by VCCI (www.vcci.or.jp).

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	1430223	BOO	08/30/2007	New application note.
*A	3111220	CSAI	12/15/2010	Updated Associated Part Families. Updated "Type Certification (Radio Law Article 38-17)" section.
*B	4284420	CSAI	02/18/2014	Updated in new template. Completing Sunset Review.
*C	5740123	ANKC	05/23/2017	Obsoleting the AN

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