

TEST REPORT

For

Dual Band Digital Transceiver

In conformity with

FCC CFR 47 Part15 Subpart B

Model : FT1DR

FCC ID : K6620445X20

Test Item : Dual Band Digital Transceiver

Report No. : ERY1305P10R3

Issue Date : 10 May 2013

Prepared for

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Prepared by

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RF Technologies Ltd. The test results in this report apply only to the sample tested.

RF Technologies Ltd. is managed to ISO17025 and has the necessary knowledge and test facilities for
testing according to the referenced standards.

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History

Report No.	Date	Revisions	Issued By
ERY1304P17R3	17 Apr. 2013	Initial Issue	T.Kato
ERY1305P10R3	10 May 2013	Revise the section number of applicable rule (Sec 2.2)	T.Kato

1 General information

1.1 Product description

Test item	: Dual Band Digital Transceiver
Manufacturer	: YAESU MUSEN CO., LTD.
Address	: 43 Utsuroda, Morijuku, Sukagawa-shi, Fukushima-ken 962-0001 Japan
Model	: FT1DR
FCC ID	: K6620445X20
Serial number	: 2G010003
Software version	: N/A
Hardware version	: N/A
Highest operating frequency	: 534 MHz
Receipt date of EUT	: 15 Apr. 2013
Nominal power source voltages	: 7.4 Vdc (Lithium-ion Battery)

1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47. Part 15 subpart B (01 Oct. 2010)
Test method(s)	: ANSI C63.4: 2003
Test(s) started	: 17 Apr. 2013
Test(s) completed	: 17 Apr. 2013
Purpose of test(s)	: Certification (Combination with new AC adaptor)
Summary of test result	: <u>Complied</u>

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 in case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer : T. Kato
T. Kato
EMC testing Department

Reviewer : K. Ohnishi
K. Ohnishi
Manager
EMC testing Department

1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at RF Technologies Ltd., located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 1, 2010.

The description of the test facilities has been filed under registration number 319924 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

Registered by Industry Canada (IC): The registered facility number is as follows;
Test site No. 1 (Semi-Anechoic chamber 3m): 6974A-1

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

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB CODE 200780-0

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 result in the level of confidence of approximately 95% (k=2) is as follows;

Conducted emission: ± 3.4 dB (10 kHz - 30 MHz)

Radiated emission (9 kHz - 30 MHz): ± 3.3 dB

Radiated emission (30 MHz - 200 MHz): ± 5.0 dB

Radiated emission (200 MHz - 1000 MHz): ± 6.2 dB

1.5 Summary of test results

Requirement	Section in FCC15	Result	Section in this report
Radiated emissions (30 to 1000 MHz)	15.109	N/A (*)	2.1
AC power line conducted emissions	15.107	Complied	2.2

(*) Test item was selected by manufacturer.

1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

Equipment(s) under test

No.	Item	Manufacture	Model No.	Serial No.
A	Dual Band Digital Transceiver	YAESU MUSEN Co., LTD.	FT1DR	2G010003
B1	Li-ion Battery Pack	Vertex Standard Co., LTD.	FNB-101LI	L15C
B2	Li-ion Battery Pack	Vertex Standard Co., LTD.	FNB-102LI	K52C

Support Equipment(s)

No.	Item	Manufacture	Model No.	Serial No.	FCC ID
D	AC adaptor	YAESU MUSEN Co., LTD.	SAD-11B	1310	-
-	-	-	-	-	-

Connected cable(s)

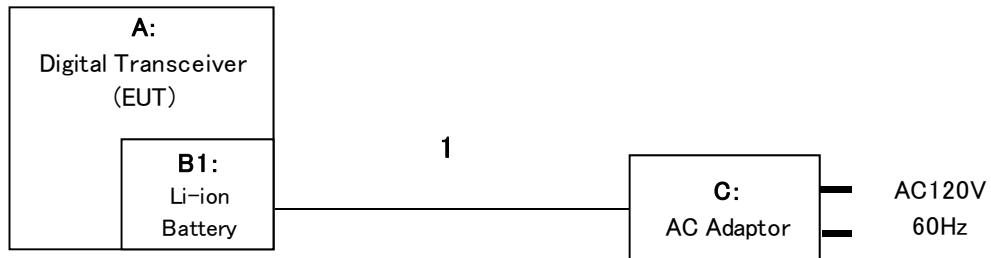
No.	Item	Identification (Manu.e.t.c)	Cable Shielded	Ferrite Core	Connector Shielded	Length [m]
1	DC cable (AC Adaptor)	YAESU MUSEN Co., LTD.	No	Yes	No	1.5
-	-	-	-	-	-	-

1.6.2 Operating condition:

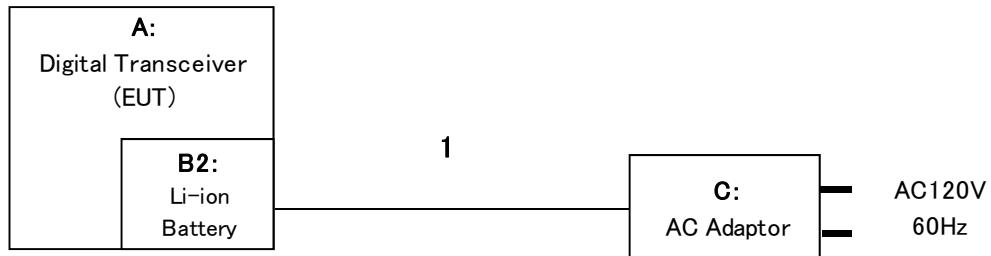
Receiving mode: EUT is set to Receiving mode (at 430 MHz).

1.6.3 Setup diagram of tested system

[Configuration A]



[Configuration B]



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

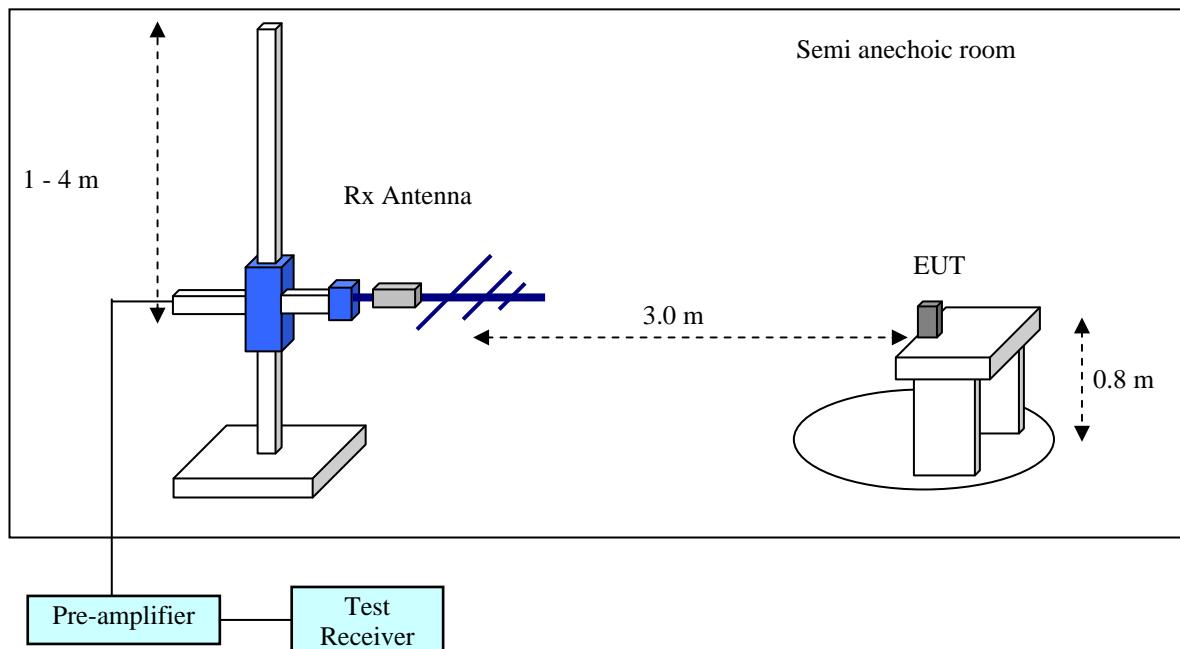
No deviations from the standards described in clause 1.2.

2 Test procedure and test data

2.1 Radiated emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 “General requirements for EUT equipment arrangements and operation”, clause 8.2 and Annex H.3 “Radiated emission measurements setup”.



Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 8.2. 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;

RBW=100 kHz, VBW= 300 kHz

Final measurement is carried out with a receiver RBW of 120 kHz (QP)

Applicable rule and limitation

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 - This item was not tested.

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

-	-	-	-	-	-	-	-
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Test Data*Operating mode:* -*Measurement distance:* -**Spurious level (worst data in each spurious frequency)**

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-

[Chart]

2.2 AC power line conducted emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 “General requirements for EUT equipment arrangements and operation” and Annex H.1 “AC power line conducted emission measurements setup”.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 7, clause 13.1.3 and Annex H.2 “AC power line conducted emission measurements”.

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 grater than average limitation the average detection measurements were performed.

Applicable rule and limitation

§15.107 (a) AC power line conducted limits

Frequency of Emission [MHz]	Conducted Limit [dB μ V]	
	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)

TR09	LN05	CL18
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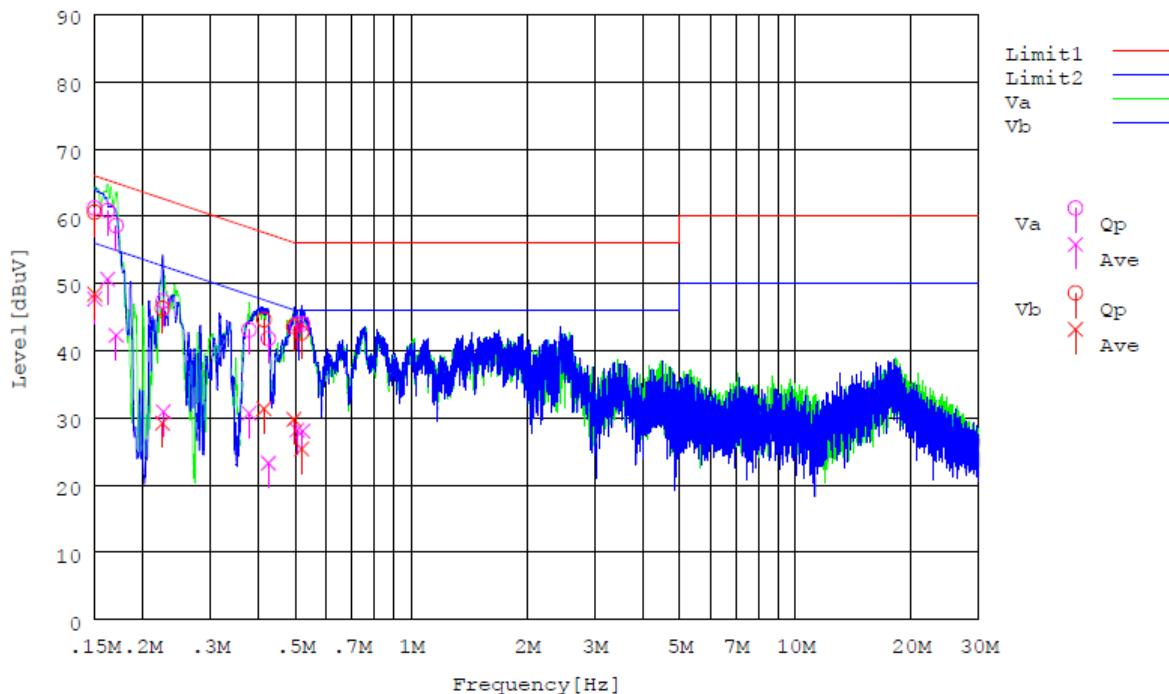
Test results - Complied with requirement

Test Data

 Operating Mode: Receiving mode
 Configuration: A

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Phase	Pass/Fail
		QP [dB μ V]	AV [dB μ V]		QP [dB μ V]	AV [dB μ V]	QP [dB μ V]	AV [dB μ V]		
1	0.15000	51.0	37.5	10.2	61.2	47.7	66.0	56.0	Va	Pass
2	0.16221	50.7	40.5	10.1	60.8	50.6	65.4	55.4	Va	Pass
3	0.17072	48.5	32.2	10.1	58.6	42.3	64.9	54.9	Va	Pass
4	0.22658	37.3	20.8	10.1	47.4	30.9	62.6	52.6	Va	Pass
5	0.37862	33.1	20.7	10.0	43.1	30.7	58.3	48.3	Va	Pass
6	0.42486	31.8	13.3	10.0	41.8	23.3	57.4	47.4	Va	Pass
7	0.50402	33.9	18.2	10.0	43.9	28.2	56.0	46.0	Va	Pass
8	0.52215	34.0	18.0	10.0	44.0	28.0	56.0	46.0	Va	Pass
9	0.15000	50.4	38.2	10.2	60.6	48.4	66.0	56.0	Vb	Pass
10	0.22510	36.2	19.1	10.1	46.3	29.2	62.6	52.6	Vb	Pass
11	0.41376	34.6	21.4	10.0	44.6	31.4	57.6	47.6	Vb	Pass
12	0.49551	33.6	19.8	10.0	43.6	29.8	56.1	46.1	Vb	Pass
13	0.51845	32.6	15.4	10.0	42.6	25.4	56.0	46.0	Vb	Pass

[Chart]


 Tested Date: 17 Apr. 2013
 Humidity: 50 %

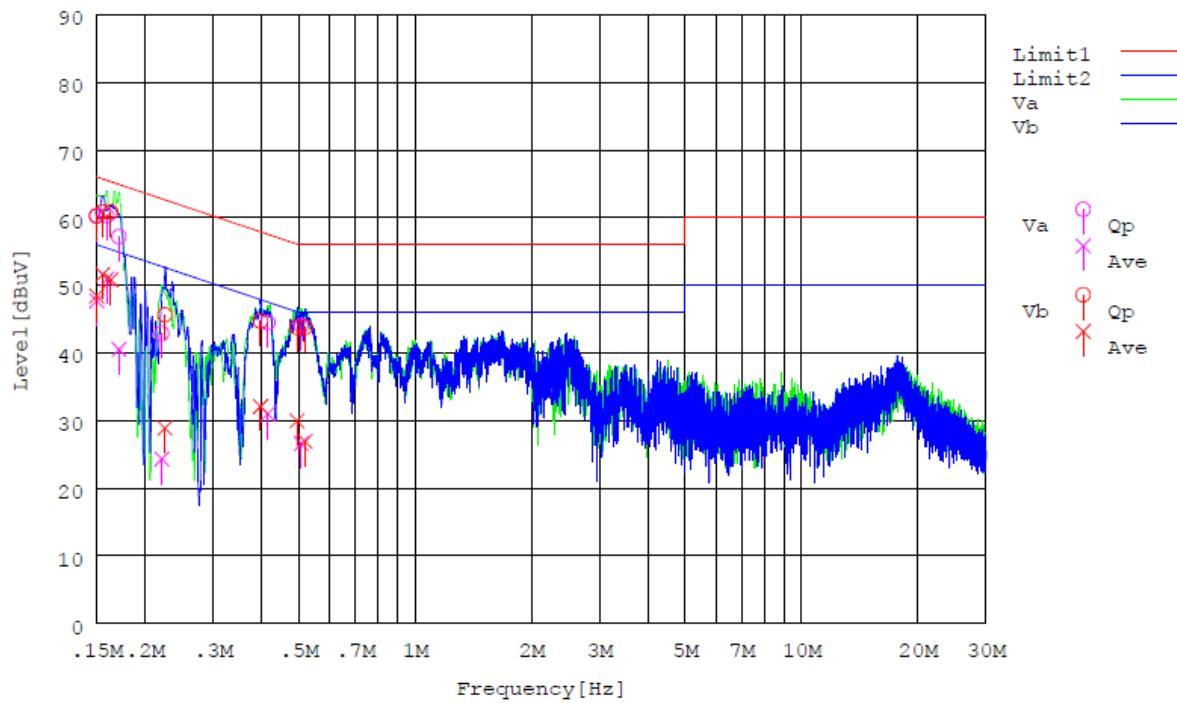
 Temperature: 24 degC
 Atmos. Press: 1011 hPa

Operating Mode: Receiving mode

Configuration: B

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Phase	Pass/Fail
		QP [dB μ V]	AV [dB μ V]		QP [dB μ V]	AV [dB μ V]	QP [dB μ V]	AV [dB μ V]		
1	0.15000	50.0	37.5	10.2	60.2	47.7	66.0	56.0	Va	Pass
2	0.15962	50.1	40.7	10.2	60.3	50.9	65.5	55.5	Va	Pass
3	0.17146	47.1	30.4	10.1	57.2	40.5	64.9	54.9	Va	Pass
4	0.22103	32.8	14.2	10.1	42.9	24.3	62.8	52.8	Va	Pass
5	0.41598	34.5	21.0	10.0	44.5	31.0	57.5	47.5	Va	Pass
6	0.50698	34.0	16.6	10.0	44.0	26.6	56.0	46.0	Va	Pass
7	0.15000	50.1	38.2	10.2	60.3	48.4	66.0	56.0	Vb	Pass
8	0.15555	50.6	41.4	10.2	60.8	51.6	65.7	55.7	Vb	Pass
9	0.16332	50.7	40.7	10.1	60.8	50.8	65.3	55.3	Vb	Pass
10	0.22510	35.5	18.8	10.1	45.6	28.9	62.6	52.6	Vb	Pass
11	0.39859	34.7	22.1	10.0	44.7	32.1	57.9	47.9	Vb	Pass
12	0.49514	33.8	20.0	10.0	43.8	30.0	56.1	46.1	Vb	Pass
13	0.52030	33.8	16.9	10.0	43.8	26.9	56.0	46.0	Vb	Pass

[Chart]


 Tested Date: 17 Apr. 2013
 Humidity: 50 %

 Temperature: 24 degC
 Atmos. Press: 1011 hPa

3 Test setup photographs

3.1 Radiated emissions

This item was not tested.

3.2 AC power line conducted emissions



[Configuration A]



[Configuration B]

4 List of utilized test equipment / calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
CL18	Antenna Cable for CE	RFT	-	-	2012/5/2	2013/5/31
LN05	LISN	Kyoritsu	KNW-407F	8-1773-2	2012/5/10	2013/5/31
TR09	Test Receiver (F/W : 4.43 SP3)	Rohde & Schwarz	ESU8	100386	2013/1/28	2014/1/31

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.