



RADIO TEST REPORT

Test Report No. : 10968259S-C

Applicant : Japan Radio Co., Ltd.
Type of Equipment : Solid State Transmitter-Receiver
Model No. : NTG-420
Test regulation : FCC part 90 Subpart I: 2015
(Except frequency Stability with variation temperature test)
FCC ID : CKENTG420
Test Result : Complied

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2. The results in this report apply only to the sample tested.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: March 11 to April 11, 2016

Representative test engineer:

K. Adachi

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Engineer

Consumer Technology Division

Approved by :

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Akio Hayashi

Leader

Consumer Technology Division



- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

Original Test Report No.: 10968259S-C

CONTENTS	PAGEr
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.)	4
SECTION 3: Test specification, procedures and results	5
SECTION 4: Operation of E.U.T. during testing	8
SECTION 5: RF Output power	10
SECTION 6: Modulation Characteristics	10
SECTION 7: Emission Bandwidth and Emission masks	11
SECTION 8: Spurious emission at Antenna Terminals	11
SECTION 9: Field Strength of Spurious Emission	12
SECTION 10: Frequency Stability	13
Contents of APPENDIXES	14

SECTION 1: Customer information

Company Name : Japan Radio Co., Ltd.
Address : 1-1 Shimorenjyaku 5 chome, Mitaka-shi, Tokyo 181-8510, Japan
Telephone Number : +81-422-45-9831
Facsimile Number : +81-422-45-9683
Contact Person : Katsutoshi Ashida

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Solid State Transmitter-Receiver
Model Number : NTG-420
Serial Number : Refer to Section 4.2
Rating : DC 48 V
Size : Width 554 x Length 330 x Height 580 (mm)
Country of Mass-production : Japan
Condition of EUT : Production model
Receipt Date of Sample : March 10, 2016
Modification of EUT : The test lab did not make the modification to the EUT supplied from the customer to have it pass the tests.

2.2 Product Description

Model: NTG-420 (referred to as the EUT in this report) is a Solid State Transmitter-Receiver.

Radio Specification

Radio Type : Transceiver
Frequency of Operation : (Non-chirp pulse): 9410 MHz (P0N)
(Chirp pulse): 9440 MHz +/-15 MHz (Q0N)
(Non-Chirp/Chirp pulse): 9410 MHz and 9440 MHz (P0N/Q0N)
Clock frequency(ies) in the system : 84 MHz
RF output power (specification) : 200 W +1 dB/-3 dB (at EUT output port)
RF output power limit : None
Modulation type : (Non-chirp pulse): CW
(Chirp pulse): Frequency pulse modulation
(Non-Chirp/Chirp pulse): CW and Frequency pulse modulation
Antenna Connector Type : Wave guide
Intermediate frequency : 63 MHz (bandwidth 30 MHz)
Operating Temperature : -15 deg.C to +50 deg.C

(Antenna information) (* The antenna of the antenna gain maximum in the antenna with a used possibility.)
Model No. : NKE-378
Antenna type : 22 feet slotted array antenna
Antenna Gain (include cable loss) : 37 dBi max (= 38 dBi - cable loss 1 dB)

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SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 90: 2015, final revised on November 17, 2015
Title : PRIVATE LAND MOBILE RADIO SERVICES

3.2 Procedures and results

No.	Item	Test Procedure *1)	Specification	Remarks	Deviation	Worst margin	Results
1	RF Output Power	FCC section 2.1046, TIA-603-D 2.2.1	FCC section 90.205(r), RSS-238 section 4.2	-	N/A	-	N/A *2)
2	Modulation Characteristics	FCC section 2.1047(a) and (b), TIA-603-D 2.2.3, 2.2.6	FCC section 90.207 *5), RSS-238 section 3.2	-	N/A	-	N/A
3	Emission Bandwidth and Emission Limitations	FCC section 2.1049, TIA-603-D 2.2.11, 1.3.4.4	FCC section 90.209, 90.210(b), RSS-238 section 4.3	-	N/A	-	Complied
4	Spurious Emission at Antenna Terminals	FCC section 2.1051, TIA-603-D 2.2.13	FCC section 90.210, 90.215 *6), RSS-238 section 4.3	-	N/A	-	Complied *3)
5	Field Strength of Spurious Emission	FCC section 2.1053, TIA-603-D 2.2.12	FCC section 90.210, 90.215 *6), RSS-238 section 4.3	Radiated	N/A	0.4 dB, (28320 MHz, Horizontal, Peak)	Complied *3)
6	Frequency Stability	FCC section 2.1055, TIA-603-D 2.2.2	FCC section 90.213, RSS-238 section 4.1	-	N/A	-	Complied *4)

Note: UL Japan, Inc.'s EMI Work Test Procedure 13-EM-W0420.

*1) These tests were also referred to "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards" (TIA-603-D: 2010) The procedure used by this test between the latest edition TIA-603-E and TIA-603-D wasn't changed, so it was tested using TIA-603-D.

*2) Since RF output power no limit. EUT is radar equipment.

*3) The receiver spurious emission test is excluded since the transmitter and receiver are operating at the same frequency and the transmitter cannot be switched off as the carrier is used as receiver injection signal. (i.e. the receiving function does not work except this transmitting frequency.)

*4) This report is only the frequency stability test with variation of supply voltage. The frequency stability test with variation of ambient temperature is refer to report no.10968259S-D.

*5) Refer to 90.207 (no accreditation matter).

*6) Refer to 90.215 (no accreditation matter).

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3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC part 90.

3.5 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k = 2$.

(EMI measurement)

Item	Frequency range	No.1 SAC* ¹ (±)	No.2 SAC(±)	No.3 SAC (±)
Radiated emission (Measurement distance: 3 m)	9 kHz - 30 MHz	2.7 dB	2.7 dB	3.1 dB
	30 MHz - 300 MHz	4.4 dB	4.4 dB	4.6 dB
	300 MHz - 1 GHz	5.6 dB	5.5 dB	5.3 dB
	1 GHz - 18 GHz	5.2 dB	5.2 dB	5.2 dB
Radiated emission (Measurement distance: 1 m)	1 GHz - 18 GHz	4.9 dB	4.9 dB	4.9 dB
	18 GHz - 40 GHz	4.9 dB	4.9 dB	4.9 dB

(Substitution measurement)

Item	Frequency range	No.1 SAC* ¹ (±)	No.2 SAC(±)	No.3 SAC (±)
Radiated emission (Substitution measurement; 3 m) (EUT height 0.8 m)	30 MHz - 300 MHz	4.8 dB	4.8 dB	4.8 dB
	300 MHz - 1 GHz	3.7 dB	3.7 dB	3.7 dB
	1 GHz - 18 GHz	5.0 dB	5.0 dB	5.0 dB
Radiated emission (Substitution measurement; 1 m) (EUT height 0.8 m)	18 GHz - 26.5 GHz	4.8 dB	4.8 dB	4.8 dB
	26.5 GHz - 40 GHz	4.1 dB	4.1 dB	4.1 dB

Radiated Emission Test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Power Measurement uncertainty above 1 GHz for this test was: (±) 0.76 dB

Conducted emissions Measurement (below 1 GHz) uncertainty for this test was: (±) 1.5 dB

Conducted emissions, Power Density Measurement (1GHz - 3 GHz) uncertainty for this test was: (±) 1.4 dB

Conducted emissions Measurement (3 GHz - 18 GHz) uncertainty for this test was: (±) 2.9 dB

Conducted emissions Measurement (18 GHz - 26.5 GHz) uncertainty for this test was: (±) 2.9 dB

Conducted emissions Measurement (26.5 GHz - 40 GHz) uncertainty for this test was: (±) 2.9 dB

Frequency Measurement uncertainty for this test was: (±) 5.3×10^{-6}

Bandwidth Measurement uncertainty for this test was: (±) 1.61%

Time measurement uncertainty for this test was: (±) 0.012 %

Voltage measurement uncertainty for this test was: (±) 0.24 %

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3.6 Test Location

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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☒ No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
☐ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
☒ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
☐ No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☒ No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
☒ No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.7 Data of EMI, Test instruments, Test set up

Refer to APPENDIX.

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SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used:

*((Non-chirp pulse): P, (Chirp pulse):Q, (Non-Chirp/Chirp pulse): P & Q)

- (1) Transmitting 9410 MHz, Transmission Table (1) No.0 (on 0.07 us., repetition 2280 Hz), mode P (pulse modulation)
- (2) Transmitting 9410 MHz, Transmission Table (1) No.1 (on 0.15 us., repetition 2280 Hz) , mode P (pulse modulation)
- (3) Transmitting 9410 MHz, Transmission Table (1) No.2 (on 0.30 us., repetition 2280 Hz) , mode P (pulse modulation)
- (4) Transmitting 9410 MHz, Transmission Table (1) No.3 (on 0.15 us., repetition 1280 Hz) , mode P (pulse modulation)
- (5) Transmitting 9410 MHz, Transmission Table (1) No.4 (on 0.15 us., repetition 640 Hz) , mode P (pulse modulation)
- (6) Transmitting 9410 MHz, Transmission Table (1) No.5 (on 0.30 us., repetition 1864 Hz) , mode P (pulse modulation)
- (7) Transmitting 9410 MHz, Transmission Table (1) No.6 (on 0.60 us., repetition 1280 Hz) , mode P (pulse modulation)
- (8) Transmitting 9410 MHz, Transmission Table (1) No.7 (on 0.07 us., repetition 4100 Hz) , mode P (pulse modulation)
- (9) Transmitting 9440 MHz, Transmission Table (1) No.0 (on 2.8 us., repetition 2280 Hz), mode Q (frequency modulation)
- (10) Transmitting 9440 MHz, Transmission Table (1) No.1 (on 4.6 us., repetition 2280 Hz), mode Q (frequency modulation)
- (11) Transmitting 9440 MHz, Transmission Table (1) No.2 (on 9.1 us., repetition 2280 Hz), mode Q (frequency modulation)
- (12) Transmitting 9440 MHz, Transmission Table (1) No.3 (on 18.3 us., repetition 1280 Hz), mode Q (frequency modulation)
- (13) Transmitting 9440 MHz, Transmission Table (1) No.4 (on 28.0 us., repetition 640 Hz), mode Q (frequency modulation)
- (14) Transmitting 9440 MHz, Transmission Table (1) No.5 (on 9.1 us., repetition 1864 Hz), mode Q (frequency modulation)
- (15) Transmitting 9440 MHz, Transmission Table (1) No.6 (on 9.1 us., repetition 1280 Hz), mode Q (frequency modulation)
- (16) Transmitting 9440 MHz, Transmission Table (1) No.7 (on 2.8 us., repetition 4100 Hz), mode Q (frequency modulation)
- (17) Transmitting 9410 MHz (P), Transmission Table (1) No.0 & Transmitting 9440 MHz (Q), Transmission Table (1) No.0
- (18) Transmitting 9410 MHz (P), Transmission Table (1) No.1 & Transmitting 9440 MHz (Q), Transmission Table (1) No.1
- (19) Transmitting 9410 MHz (P), Transmission Table (1) No.2 & Transmitting 9440 MHz (Q), Transmission Table (1) No.2
- (20) Transmitting 9410 MHz (P), Transmission Table (1) No.3 & Transmitting 9440 MHz (Q), Transmission Table (1) No.3
- (21) Transmitting 9410 MHz (P), Transmission Table (1) No.4 & Transmitting 9440 MHz (Q), Transmission Table (1) No.4
- (22) Transmitting 9410 MHz (P), Transmission Table (1) No.5 & Transmitting 9440 MHz (Q), Transmission Table (1) No.5
- (23) Transmitting 9410 MHz (P), Transmission Table (1) No.6 & Transmitting 9440 MHz (Q), Transmission Table (1) No.6
- (24) Transmitting 9410 MHz (P), Transmission Table (1) No.7 & Transmitting 9440 MHz (Q), Transmission Table (1) No.7

This EUT is two pulse radio-frequency output.

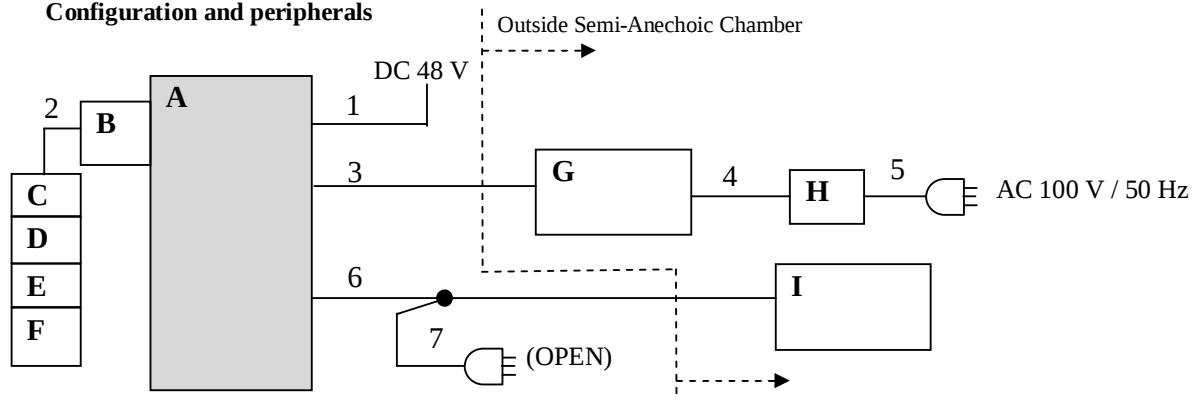
This EUT is two pulse radio-frequency output.

* The spurious emission (Radiated and Conducted) test were mode (21) that selected in the mode that became the worst result by Pre check.

* The frequency stability test were used at minimum measurement time mode. (It's pulse range table 5 ((6), (14)))
(Because EUT cannot set to no modulation.)

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Solid State Transmitter-Receiver	NTG-420	2016RRZ0004	Japan Radio Co., Ltd.	EUT
B	Wave guide to N transducer	35UM84N	175193-F	Anritsu	-
C	Attenuator (10dB)	PE7019-10	-	Pasternack	-
D	Attenuator (10dB)	PE7019-10	-	Pasternack	-
E	Attenuator (10dB)	PE7019-10	-	Pasternack	-
F	Terminator (50ohm)	CT-01 BP	-	TME	-
G	Personal Computer	HP ProBook450 G1	2CE4082KK0	HP	-
H	AC adapter	PPP009L-E	CT:WCNXA03U5 XCNE (4113257703)	HP	-
I	Scanner unit	NKE-1129	LB09643	Japan Radio Co., Ltd.	-

List of cables used

No.	Cable name	Length (m)	Shield	
			Cable	Connector
1	DC	1.7	Unshielded	Unshielded
2	Antenna	1.0	Shielded	Unshielded
3	LAN	20.24	Unshielded	Unshielded
4	DC	1.7	Unshielded	Unshielded
5	AC	1.0	Unshielded	Unshielded
6	Signal	14	Shielded	Unshielded
7	AC	3.0	Unshielded	Unshielded

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SECTION 5: RF Output power

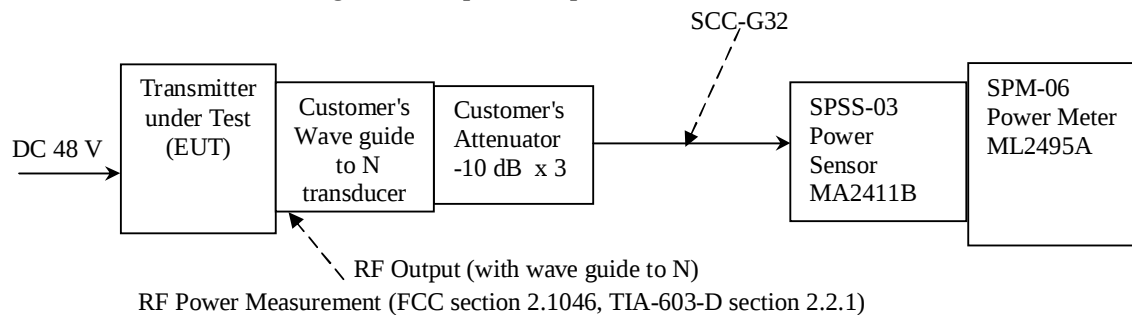
5.1 Test Procedure : FCC part 2 section 2.1046, TIA-603-D section 2.2.1
The RF output power was measured with a Power meter connected to the antenna port.

5.2 Test data : APPENDIX 1

5.3 Test result : Pass

5.4 Test instruments : SPM-06, SPSS-03, SCC-G32

5.5 Measurement Block Diagram of RF power output



SECTION 6: Modulation Characteristics

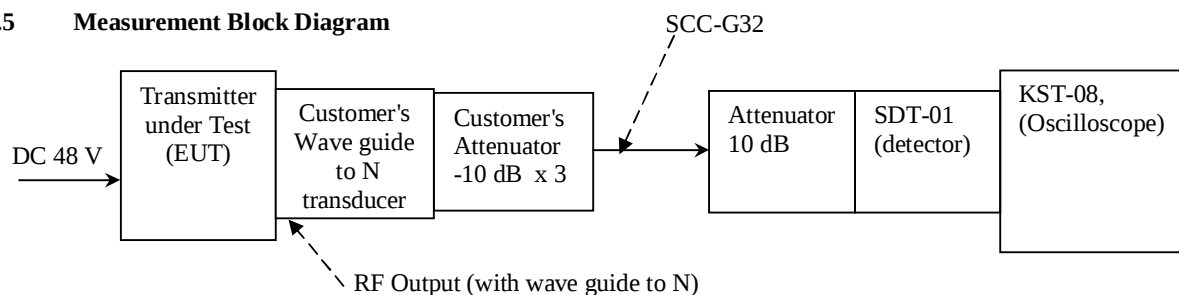
6.1 Test Procedure : FCC Part 2 section 2.1047, TIA-603-D section 2.2.3
The modulation characteristics were measured with an oscilloscope with radio signal detector connected to the antenna port.

6.2 Test Data : APPENDIX 1

6.3 Test Result : Pass

6.4 Test Instrument : KST-08, SDT-01, SAT10-10, SCC-G32

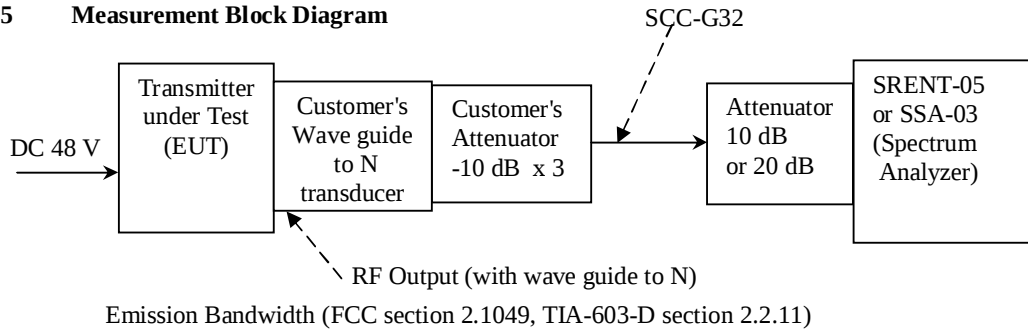
6.5 Measurement Block Diagram



Modulation Characteristics (FCC section 2.1047, TIA-603-D section 2.2.3)

SECTION 7: Emission Bandwidth and Emission masks

- 7.1 **Test Procedure** : FCC Part 2 section 2.1049, TIA-603-D section 2.2.11
The Emission Bandwidth and Emission masks was measured with a spectrum analyzer connected to the antenna port.
- 7.2 **Test Data** : APPENDIX 1
- 7.3 **Test Result** : Pass
- 7.4 **Test Instrument** : SRENT-05 or SSA-03, SAT10-10 or SAT20-07
- 7.5 **Measurement Block Diagram**



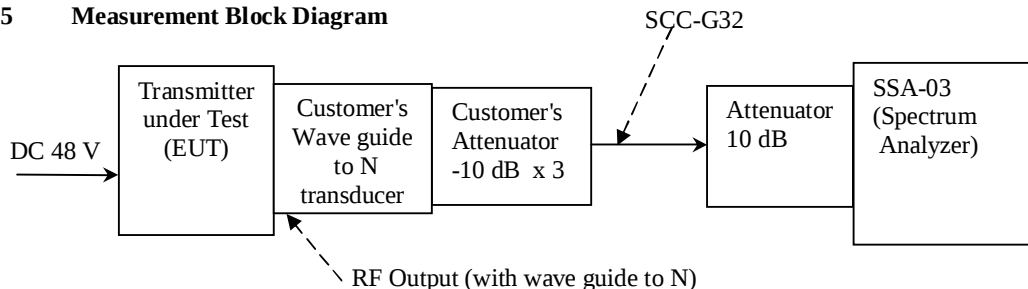
SECTION 8: Spurious emission at Antenna Terminals

- 8.1 **Test Procedure** : FCC part 2 section 2.1051, TIA-603-D section 2.2.13
The spurious emission at Antenna Terminals was measured with a spectrum analyzer connected to the antenna port.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	Peak: RBW: 10 kHz/VBW: 30 kHz	Peak: RBW: 1 MHz/VBW: 3 MHz

Transmitter spurious Limit: -60 dBc = Carrier peak level - 60 dB (refer to RSS-238 clause 4.3) or
-13 dBm = $10 \times \log (\text{mean power (W)} \times 10^3) - (43 + 10 \times \log (\text{mean power (W)}))$ (FCC 80.211(f)(3))

- 8.2 **Test Data** : APPENDIX 1
- 8.3 **Test result** : Pass
- 8.4 **Test Instrument** : SSA-03, SAT10-10
- 8.5 **Measurement Block Diagram**



SECTION 9: Field Strength of Spurious Emission

9.1 Test Procedure : FCC part 2 section 2.1053, TIA-603-D section 2.2.12

EUT was placed on a polystyrene platform of nominal size, 1.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3 m(below 18GHz) / 1 m(above 18 GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection of the test receiver.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	Peak: RBW: 10 kHz/VBW: 300 kHz	Peak: RBW: 1 MHz/VBW: 3 MHz

Transmitter Spurious Limit (General emissions): refer to FCC part 15 subpart C section 15.209

Transmitter Spurious Limit (Harmonics emissions): Carrier Level - (43 + 10 x log (Average power [W] = Peak power x Duty))

The Result is converted from electric field strength in dBuV/m to EIRP in Watts using the following formula

$$F [V/m] = 10^{(E [dBuV/m] - 120) / 20}$$

$$P = ((F \times d [m])^2) / (30 \times g)$$

E = measurement electric field strength, in dBuV/m

F = measurement electric field strength, in V/m

P = EIRP, in dBm

d = measurement distance, in meters = 3 [m]

g = numeric antenna gain (=1)

9.2 Test Data : APPENDIX 1

9.3 Test Result : Pass

9.4 Test Instrument :

[Common]: STM-G13

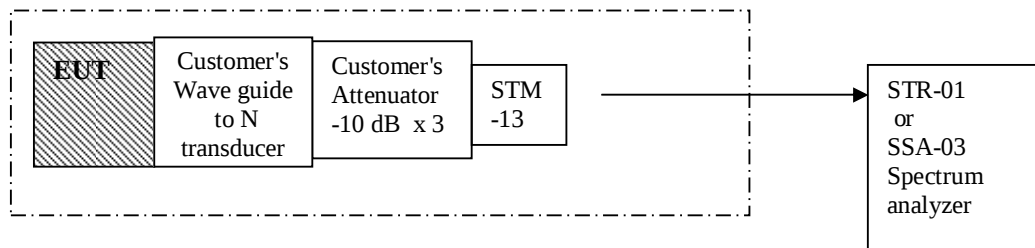
[30 MHz-1 GHz]: SAEC-03, SSA-03, SAF-03, SCC-C1/C2/C3/C4/C5/C10/SRSE-03, SAT6-08, SBA-03, SLA-03,

[1 GHz-18 GHz]: SAEC-01, STR-01, SCC-G21, SAF-04, SAT10-05, SCC-G01, SHA-01

[18 GHz-26 GHz]: SAEC-01, STR-01, SCC-G20, SAF-09, SHA-05

[26 GHz-40 GHz]: SAEC-01, STR-01, SCC-G19, SAF-10, SHA-06

9.5 Measurement Block Diagram



Field Strength of Spurious Emission (FCC section 2.1053, TIA-603-D section 2.2.12)

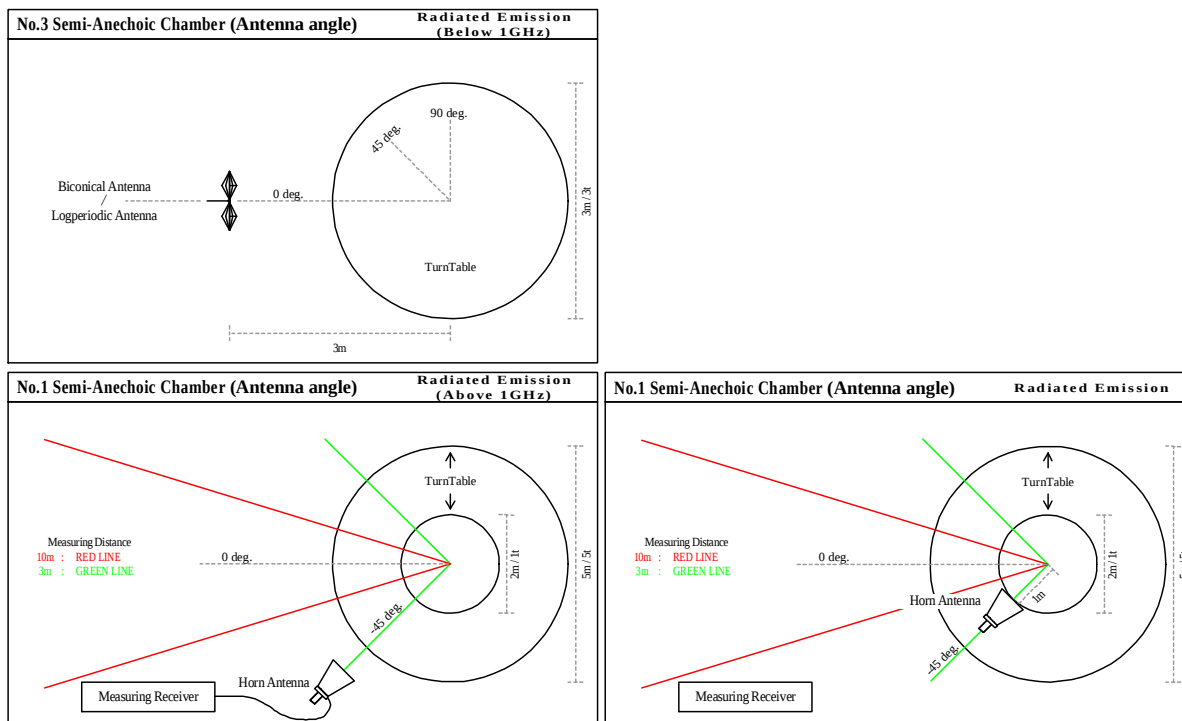
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SECTION 10: Frequency Stability

10.1 Test Procedure : FCC part 2 section 2.1055, TIA-603-D section 2.2.2

Refer to FCC part 2, section 2.1055.

Input Voltage: 85 % to 115 % at 20 deg.C.

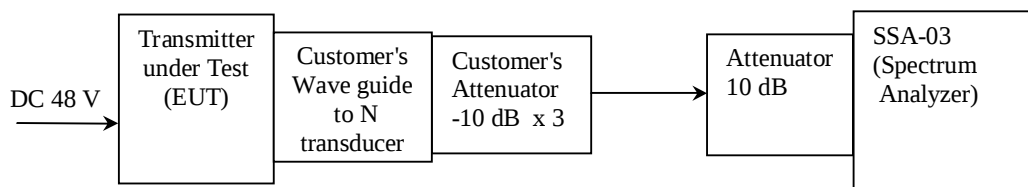
* The test with variation of ambient temperature is referring to report no.10968259S-D.

10.2 Test Data : APPENDIX 1

10.3 Test Result : Pass

10.4 Test Instrument : SSA-03, SAT10-10, SCC-G32

10.5 Measurement Block Diagram



Frequency Stability (FCC section 2.1055, TIA-603-D section 2.2.2)

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

RF output power

Modulation Characteristics

Emissions Bandwidth

Spurious emission at antenna terminal

Emissions Limitation

Field Strength of spurious emission (Radiated Emission Test)

Frequency stability

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Antenna terminal conducted tests

Radiated emission

APPENDIX 1: Data of Radio tests

RF Output Power (Conducted)(mean power)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date March 15, 2016
 Temperature / Humidity 25 deg.C 48 %RH
 Engineer Kenichi Adachi
 Mode Transmitting

Pulse range table 0 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power)	
P	9410.0	19.43	2.77	29.88	0.83	37.97	14.94	0.031
Q	9440.0	19.49	2.77	29.74	0.84	21.95	30.89	1.228
P + Q	9410 + 9440	19.49	2.77	29.74	0.84	21.95	30.89	1.228

Pulse range table 1 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power)	
P	9410.0	19.67	2.77	29.88	0.83	34.66	18.49	0.071
Q	9440.0	19.41	2.77	29.74	0.84	19.89	32.87	1.937
P + Q	9410 + 9440	19.56	2.77	29.74	0.84	19.89	33.02	2.005

Pulse range table 2 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power)	
P	9410.0	19.71	2.77	29.88	0.83	31.65	21.54	0.143
Q	9440.0	19.32	2.77	29.74	0.84	16.88	35.79	3.795
P + Q	9410 + 9440	19.52	2.77	29.74	0.84	16.88	35.99	3.974

Pulse range table 3 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power)	
P	9410.0	19.68	2.77	29.88	0.83	37.17	15.99	0.040
Q	9440.0	19.34	2.77	29.74	0.84	16.30	36.39	4.352
P + Q	9410 + 9440	19.50	2.77	29.74	0.84	16.30	36.55	4.515

Pulse range table 4 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power)	
P	9410.0	19.63	2.77	29.88	0.83	40.18	12.93	0.020
Q	9440.0	19.42	2.77	29.74	0.84	17.47	35.30	3.391
P + Q	9410 + 9440	19.59	2.77	29.74	0.84	17.47	35.47	3.526

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss + Wave guide Loss - Duty factor

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RF Output Power (Conducted)(mean power)

Pulse range table 5

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power) [dBm] [W]	
P	9410.0	19.76	2.77	29.88	0.83	32.52	20.72	0.118
Q	9440.0	19.37	2.77	29.74	0.84	17.75	34.97	3.138
P + Q	9410 + 9440	19.57	2.77	29.74	0.84	17.75	35.17	3.286

Pulse range table 6

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power) [dBm] [W]	
P	9410.0	19.77	2.77	29.88	0.83	31.15	22.10	0.162
Q	9440.0	19.44	2.77	29.74	0.84	19.39	33.40	2.190
P + Q	9410 + 9440	19.60	2.77	29.74	0.84	19.39	33.56	2.272

Pulse range table 7

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]	Duty factor [dB]	Result (average power) [dBm] [W]	
P	9410.0	19.51	2.77	29.88	0.83	35.42	17.57	0.057
Q	9440.0	19.41	2.77	29.74	0.84	19.40	33.36	2.167
P + Q	9410 + 9440	19.41	2.77	29.74	0.84	19.40	33.36	2.167

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss + Wave guide Loss - Duty factor

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RF Output Power (Conducted)(Peak power)

Test place UL Japan, Inc. Shonan EMC Lab.
 Date March 15, 2016
 Temperature / Humidity 25 deg.C 48 %RH
 Engineer Kenichi Adachi
 Mode Transmitting

No.1 Measurement Room

Pulse range table 0 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.43	2.77	29.88	0.83		52.91	0.195	-	60.000
Q	9440.0	19.49	2.77	29.74	0.84		52.84	0.192	-	60.000
P + Q	9410 + 9440	19.49	2.77	29.74	0.84		52.84	0.192	-	60.000

Pulse range table 1 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.67	2.77	29.88	0.83		53.15	0.207	-	60.000
Q	9440.0	19.41	2.77	29.74	0.84		52.76	0.189	-	60.000
P + Q	9410 + 9440	19.56	2.77	29.74	0.84		52.91	0.195	-	60.000

Pulse range table 2 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.71	2.77	29.88	0.83		53.19	0.208	-	60.000
Q	9440.0	19.32	2.77	29.74	0.84		52.67	0.185	-	60.000
P + Q	9410 + 9440	19.52	2.77	29.74	0.84		52.87	0.194	-	60.000

Pulse range table 3 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.68	2.77	29.88	0.83		53.16	0.207	-	60.000
Q	9440.0	19.34	2.77	29.74	0.84		52.69	0.186	-	60.000
P + Q	9410 + 9440	19.50	2.77	29.74	0.84		52.85	0.193	-	60.000

Pulse range table 4 (* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.63	2.77	29.88	0.83		53.11	0.205	-	60.000
Q	9440.0	19.42	2.77	29.74	0.84		52.77	0.189	-	60.000
P + Q	9410 + 9440	19.59	2.77	29.74	0.84		52.94	0.197	-	60.000

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss + Wave guide Loss

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RF Output Power (Conducted)(Peak power)

Pulse range table 5

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.76	2.77	29.88	0.83		53.24	0.211	-	60.000
Q	9440.0	19.37	2.77	29.74	0.84		52.72	0.187	-	60.000
P + Q	9410 + 9440	19.57	2.77	29.74	0.84		52.92	0.196	-	60.000

Pulse range table 6

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.77	2.77	29.88	0.83		53.25	0.211	-	60.000
Q	9440.0	19.44	2.77	29.74	0.84		52.79	0.190	-	60.000
P + Q	9410 + 9440	19.60	2.77	29.74	0.84		52.95	0.197	-	60.000

Pulse range table 7

(* P/M: Power Meter with power sensor)

mode	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Wave guide Loss [dB]		Result (Peak power)		FCC Limit [kW]	RSS-238 Limit [kW]
							[dBm]	[kW]		
P	9410.0	19.51	2.77	29.88	0.83		52.99	0.199	-	60.000
Q	9440.0	19.41	2.77	29.74	0.84		52.76	0.189	-	60.000
P + Q	9410 + 9440	19.41	2.77	29.74	0.84		52.76	0.189	-	60.000

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss + Wave guide Loss

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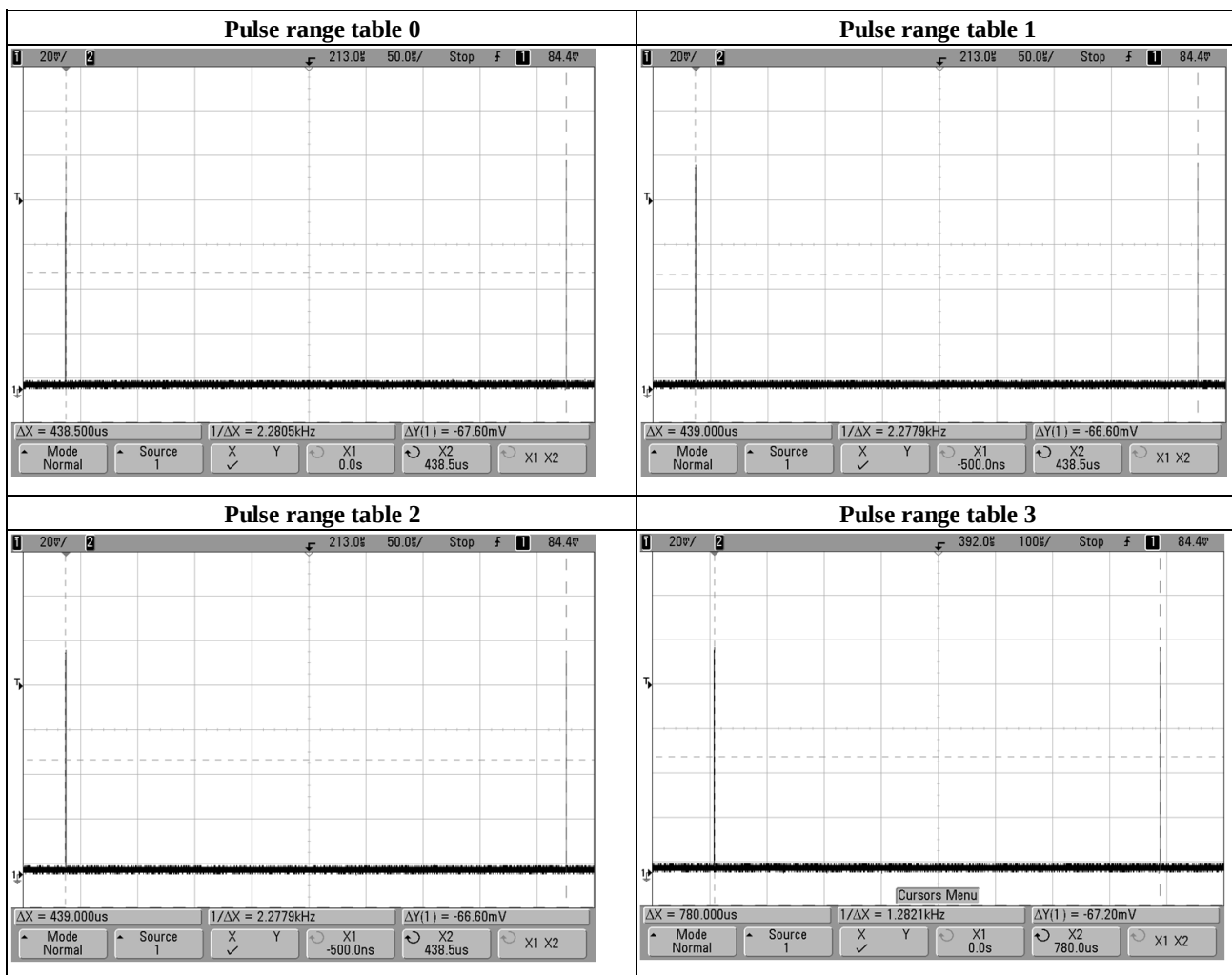
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Modulation Characteristics (Pulse chart 1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Pulse 1 cycle time [us]	Pulse Repetition rate [Hz]	1.5 / T [MHz]
0	438.500	2280.502	0.003
1	439.000	2277.904	0.003
2	439.000	2277.904	0.003
3	780.000	1282.051	0.002



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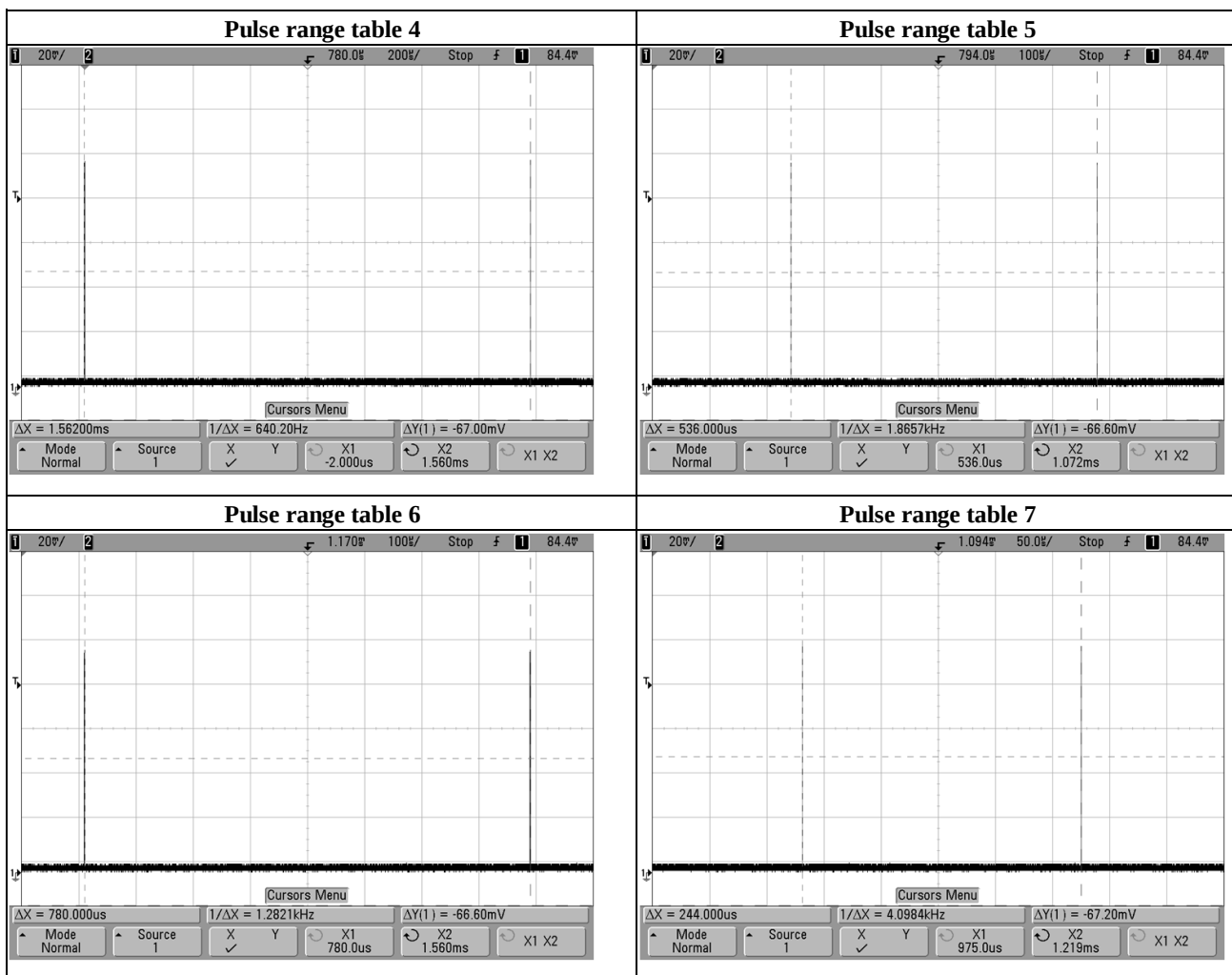
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Modulation Characteristics (Pulse chart 1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Pulse 1 cycle time [us]	Pulse Repetition rate [Hz]	1.5 / T [MHz]
4	1562.000	640.205	0.001
5	536.000	1865.672	0.003
6	780.000	1282.051	0.002
7	244.000	4098.361	0.006



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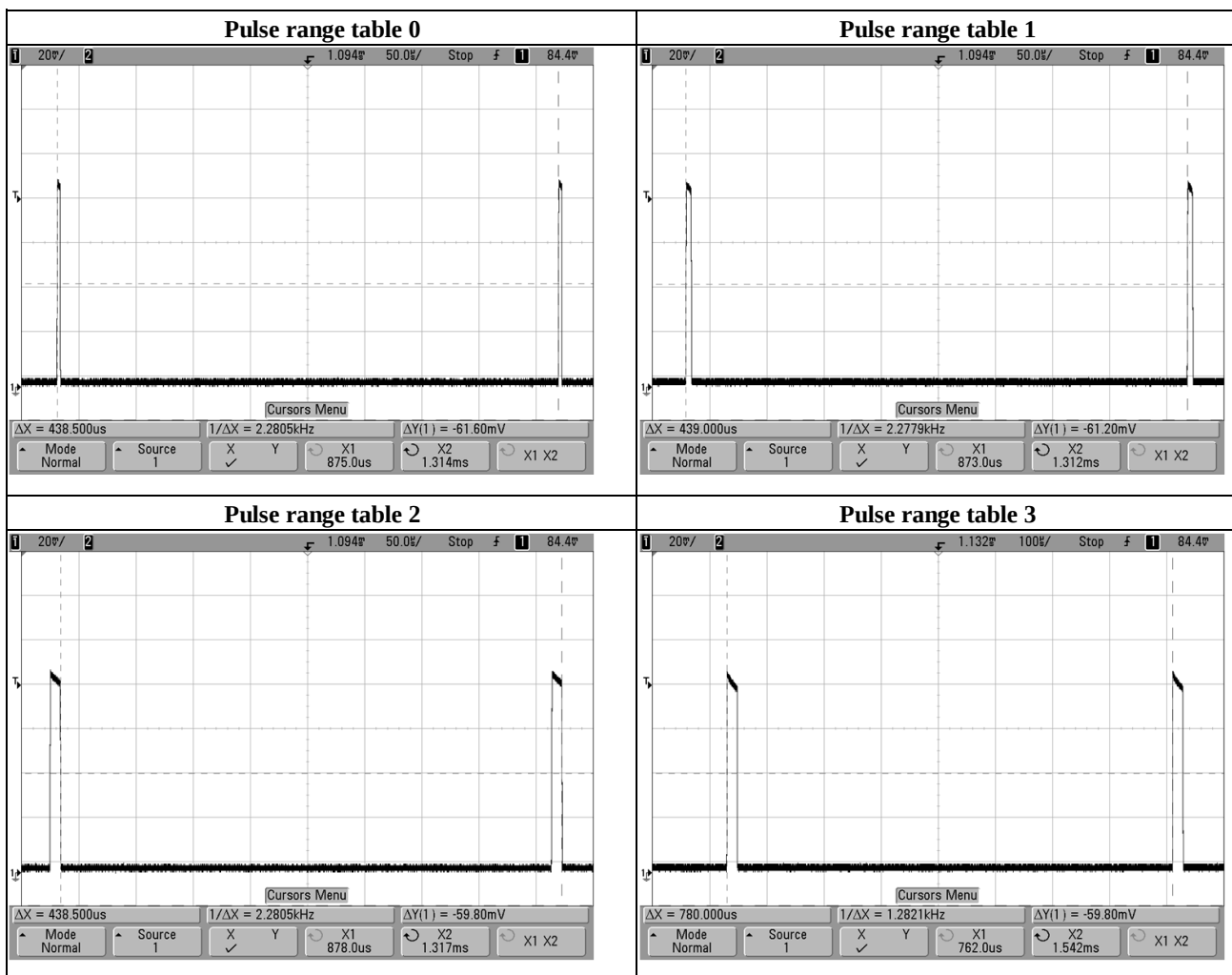
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Modulation Characteristics (Pulse chart 1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Pulse 1 cycle time [us]	Pulse Repetition rate [Hz]	1.5 / T [MHz]
0	438.500	2280.502	0.003
1	439.000	2277.904	0.003
2	438.500	2280.502	0.003
3	780.000	1282.051	0.002



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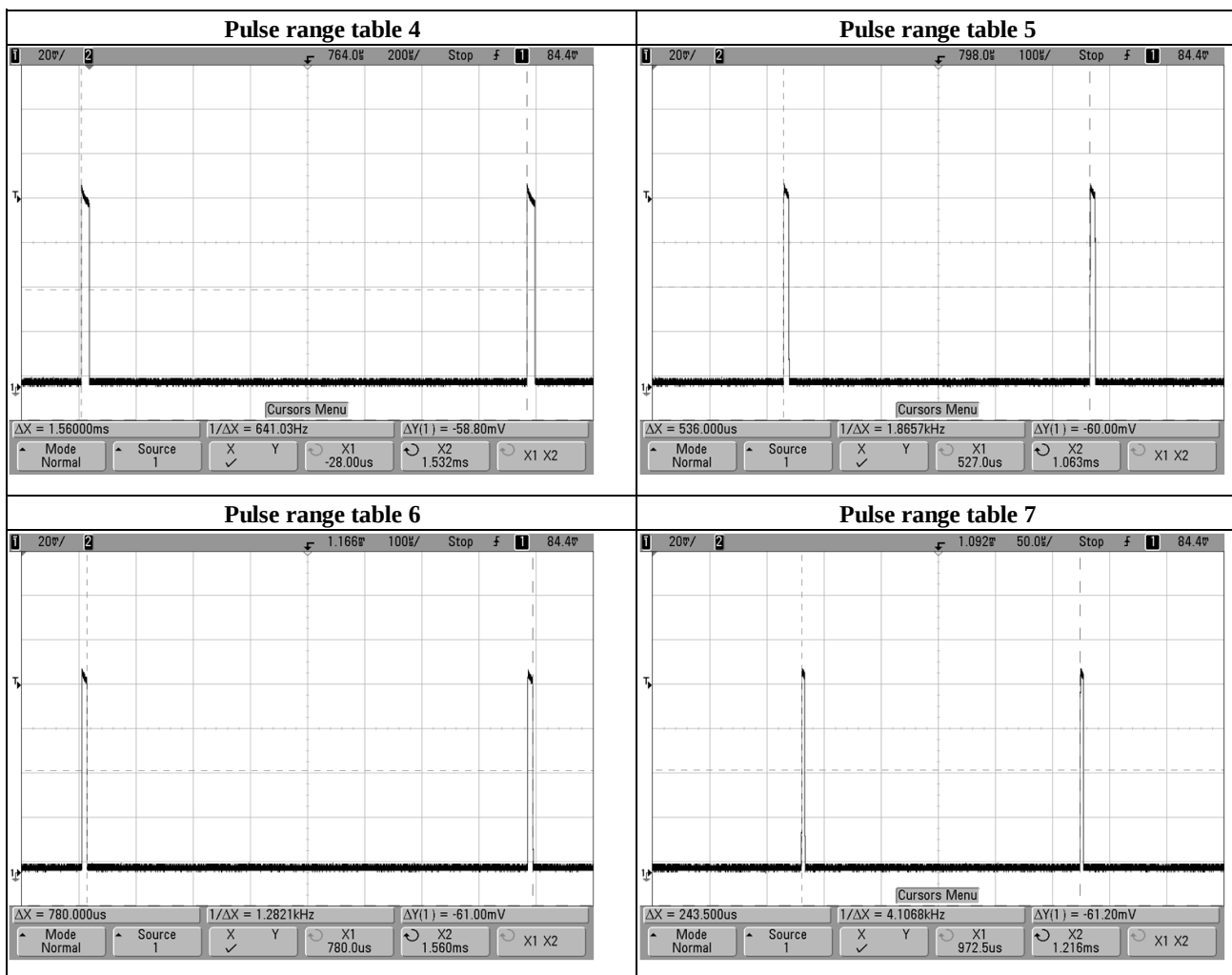
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Modulation Characteristics (Pulse chart 1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Pulse 1 cycle time [us]	Pulse Repetition rate [Hz]	1.5 / T [MHz]
4	1560.000	641.026	0.001
5	536.000	1865.672	0.003
6	780.000	1282.051	0.002
7	243.500	4106.776	0.006



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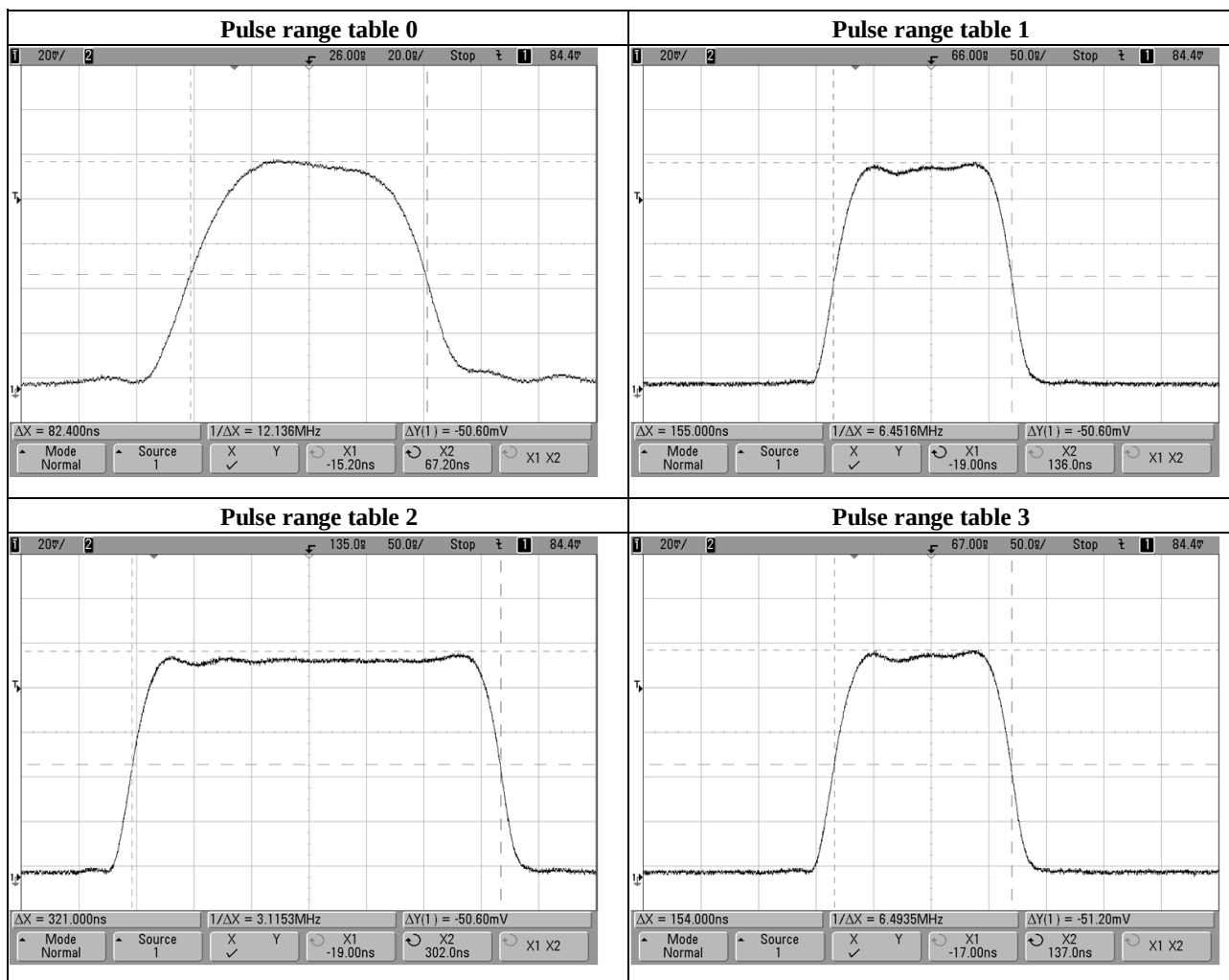
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Modulation Characteristics (Pulse chart 2)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Pulse 50 % length [us]	Duty *1) [%]	Duty factor [dB]
0	0.082	0.019	37.260
1	0.155	0.035	34.521
2	0.321	0.073	31.360
3	0.154	0.020	37.046

*1) Refer to "Modulation Characteristics (Pulse chart 1)".



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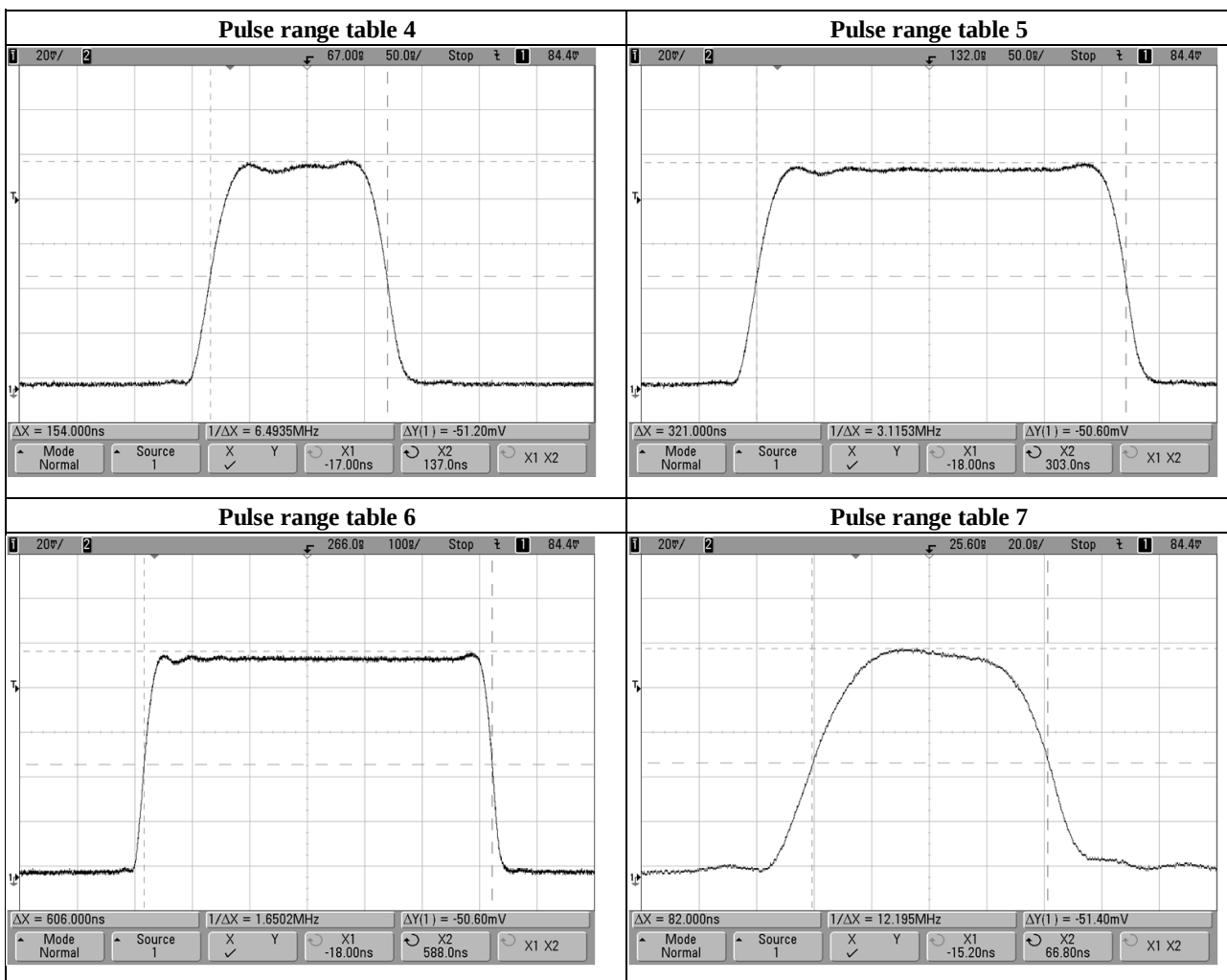
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Modulation Characteristics (Pulse chart 2)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Pulse 50 % length [us]	Duty *1) [%]	Duty factor [dB]
4	0.154	0.035	34.544
5	0.321	0.073	31.360
6	0.606	0.138	28.600
7	0.082	0.011	39.783

*1) Refer to "Modulation Characteristics (Pulse chart 1)".



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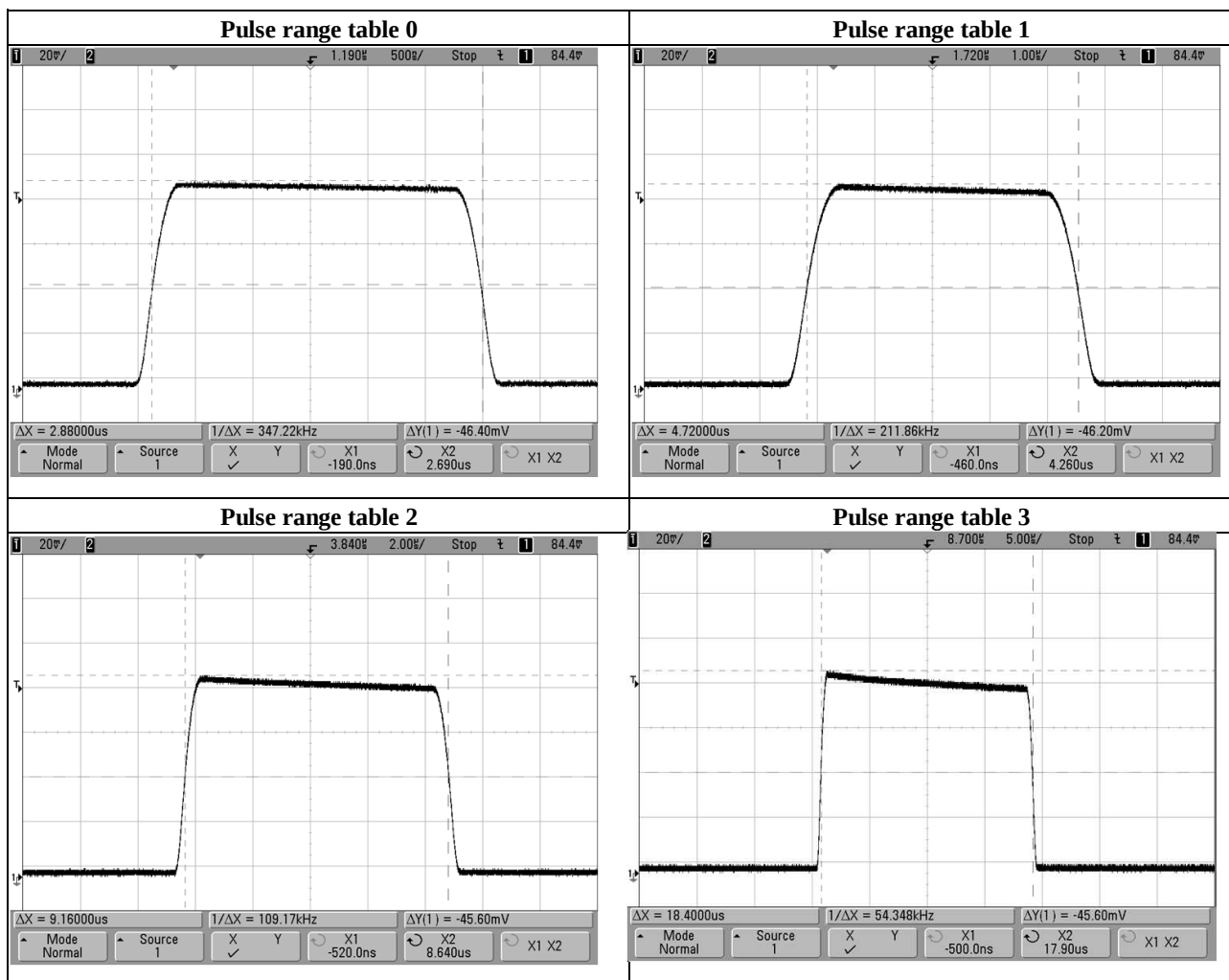
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Modulation Characteristics (Pulse chart 2)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Pulse 50 % length [us]	Duty *1) [%]	Duty factor [dB]
0	2.880	0.657	21.826
1	4.720	1.075	19.685
2	9.160	2.087	16.806
3	18.400	2.359	16.273

*1) Refer to "Modulation Characteristics (Pulse chart 1)".



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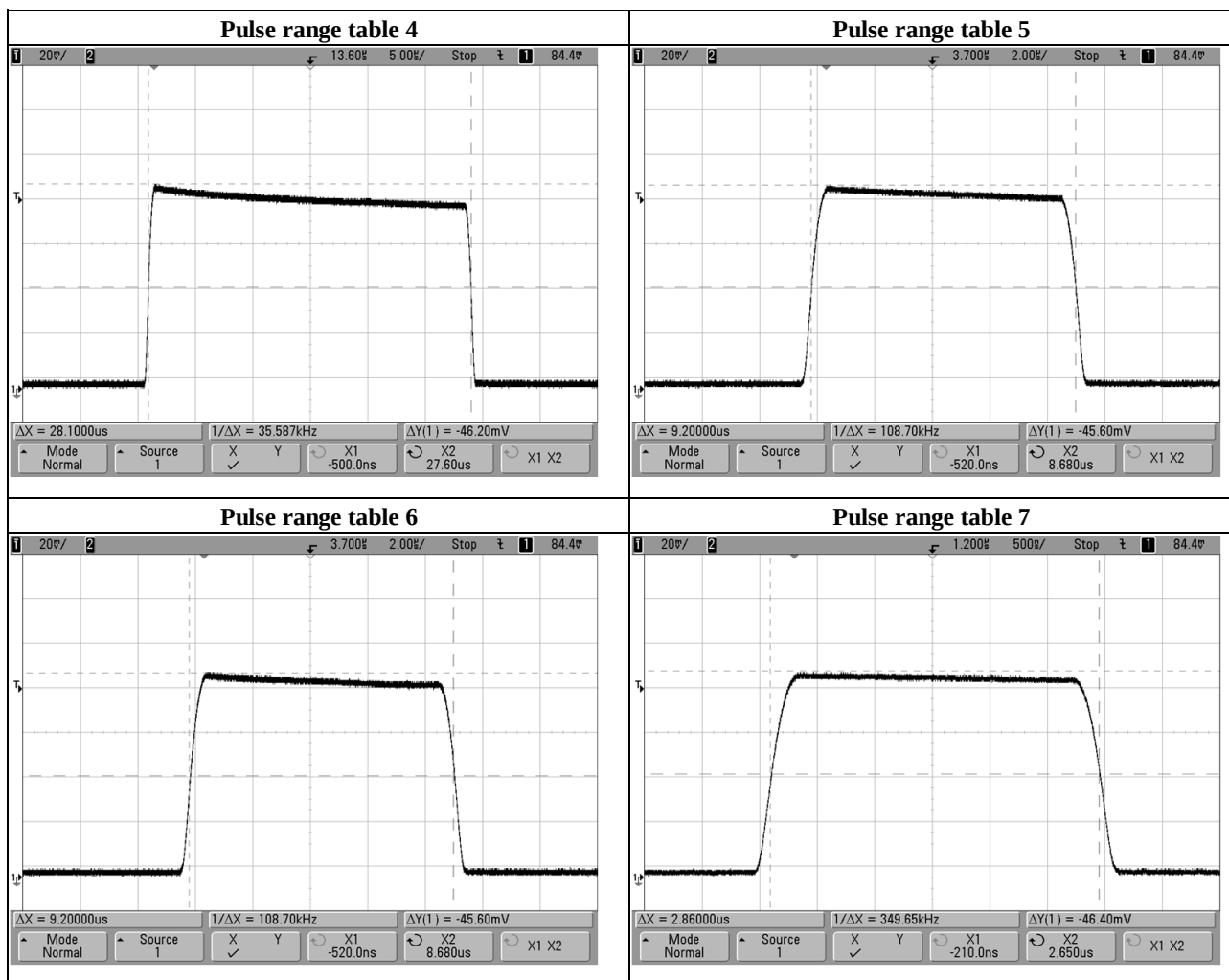
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Modulation Characteristics (Pulse chart 2)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Pulse 50 % length [us]	Duty *1) [%]	Duty factor [dB]
4	28.100	6.408	11.933
5	9.200	2.096	16.787
6	9.200	2.096	16.787
7	2.860	0.367	24.357

*1) Refer to "Modulation Characteristics (Pulse chart 1)".



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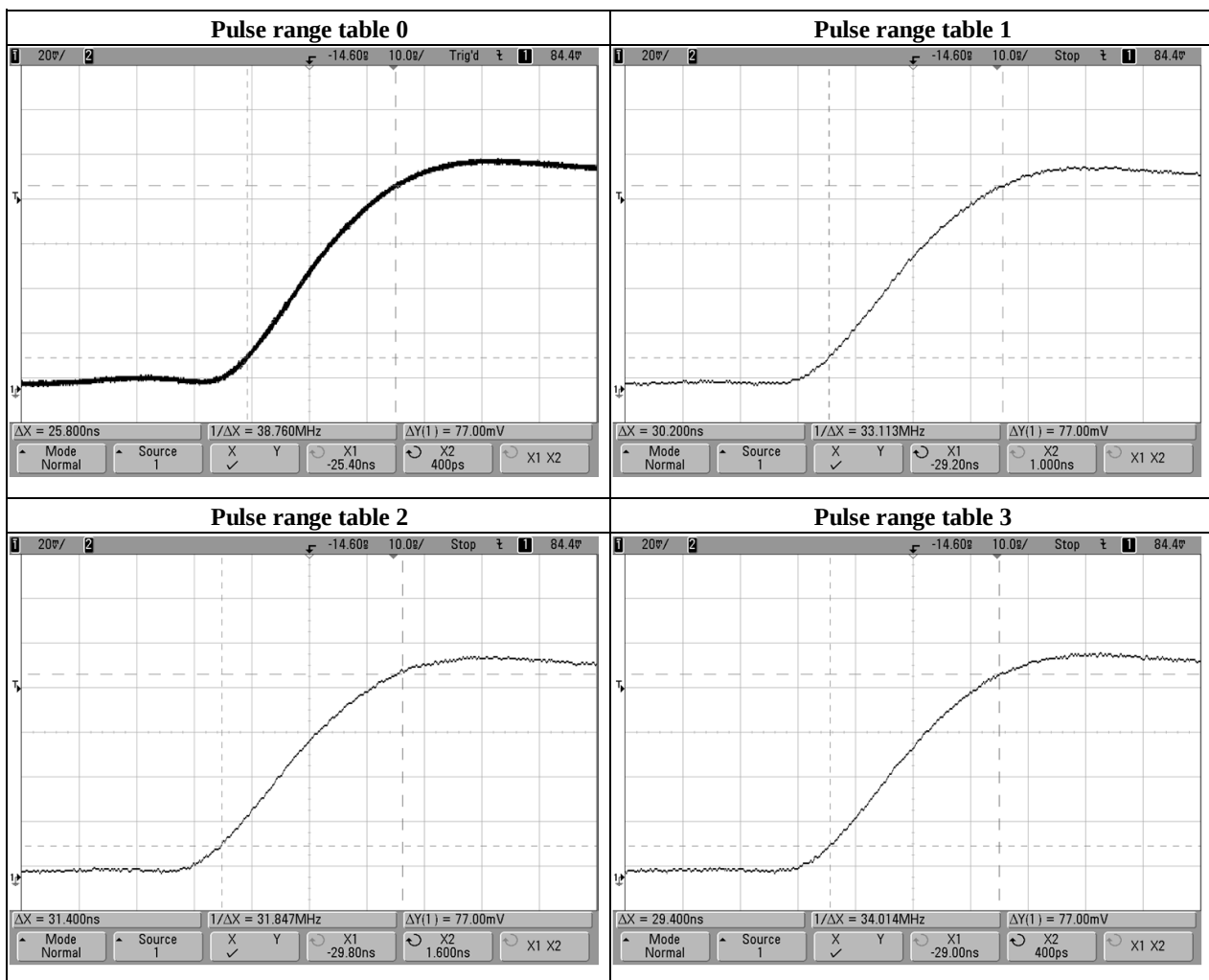
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Modulation Characteristics (Pulse chart 3)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Rise time [ns]
0	25.80
1	30.20
2	31.40
3	29.40



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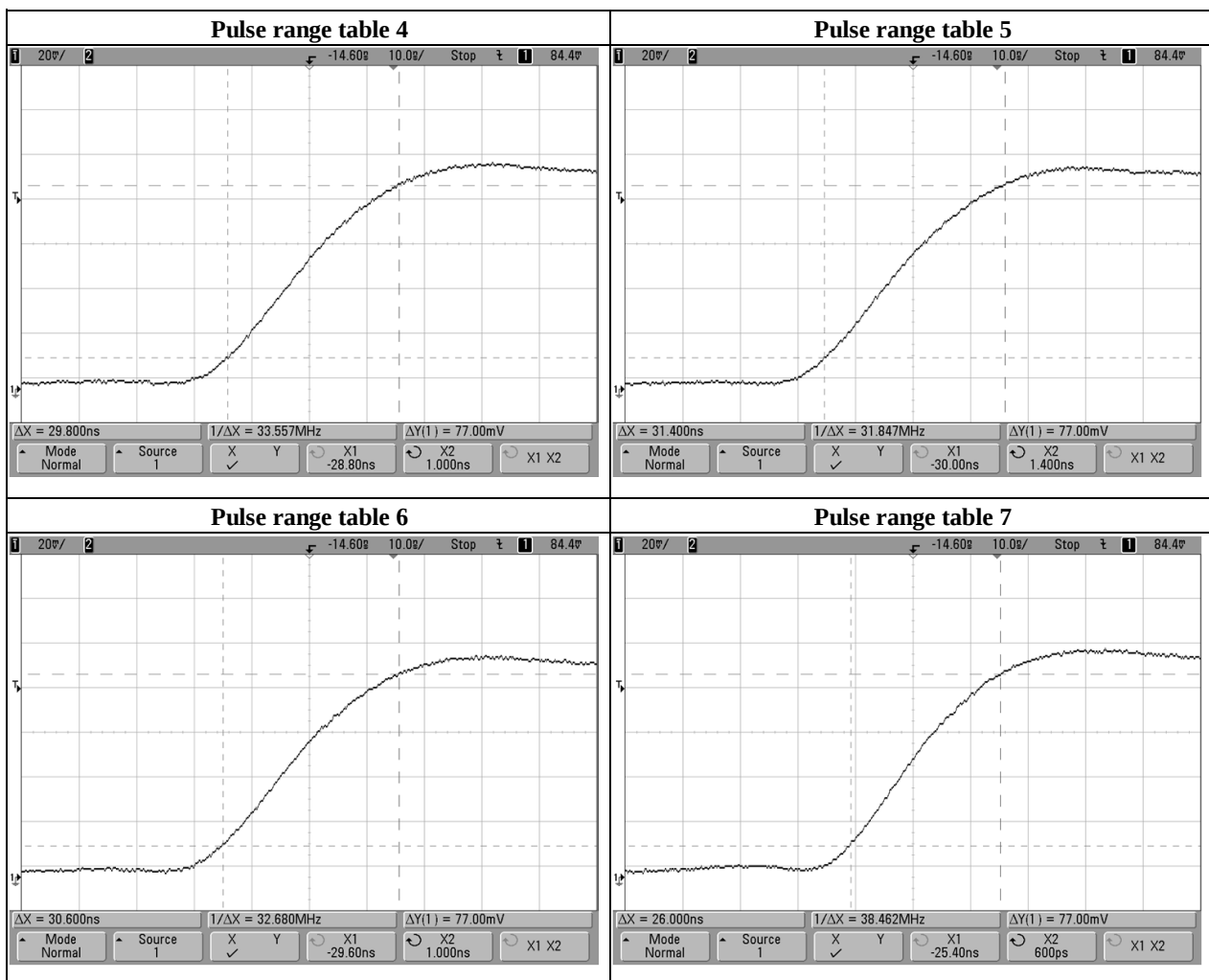
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Modulation Characteristics (Pulse chart 3)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Rise time [ns]
4	29.80
5	31.40
6	30.60
7	26.00



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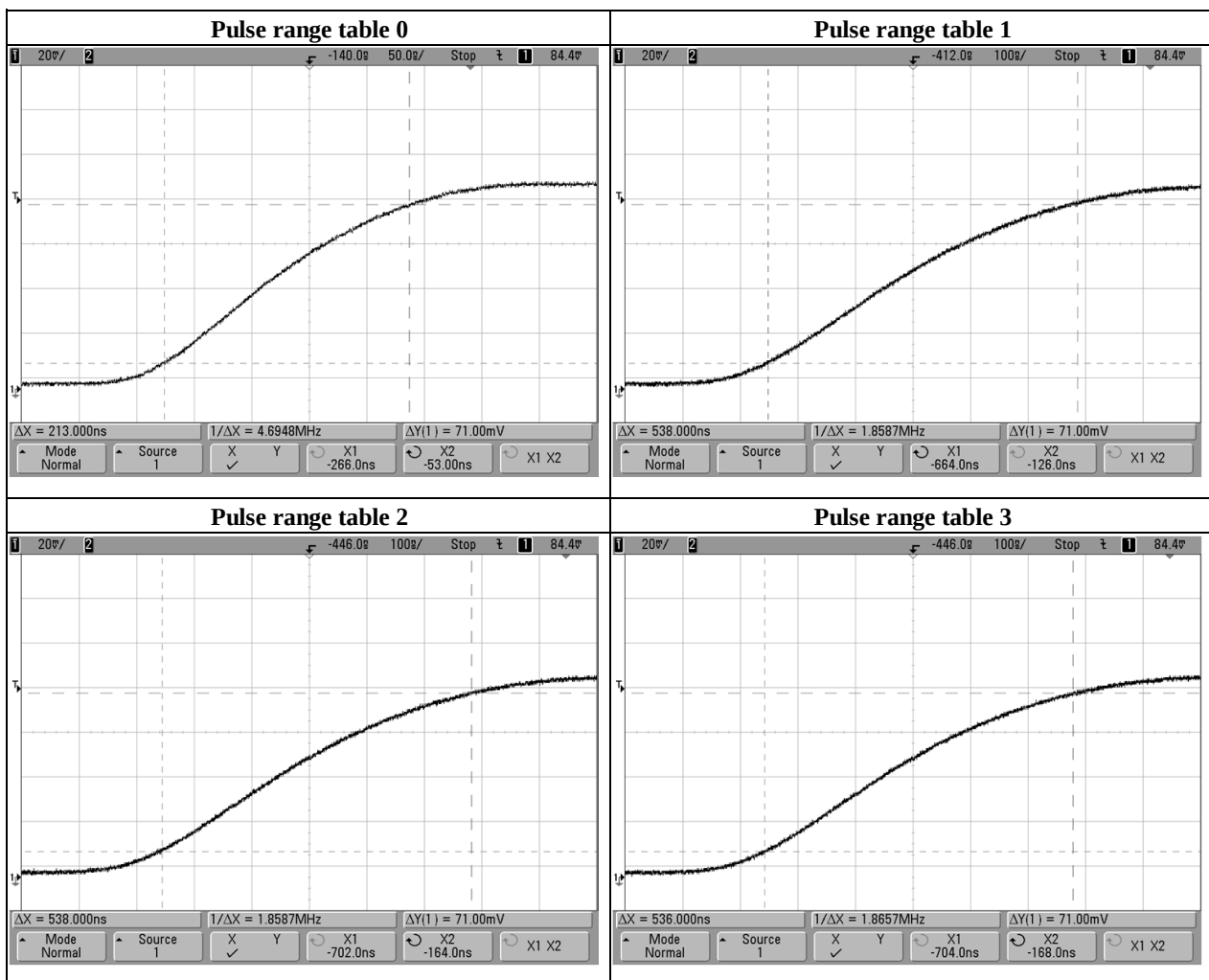
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Modulation Characteristics (Pulse chart 3)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Rise time [ns]
0	213.00
1	538.00
2	538.00
3	536.00



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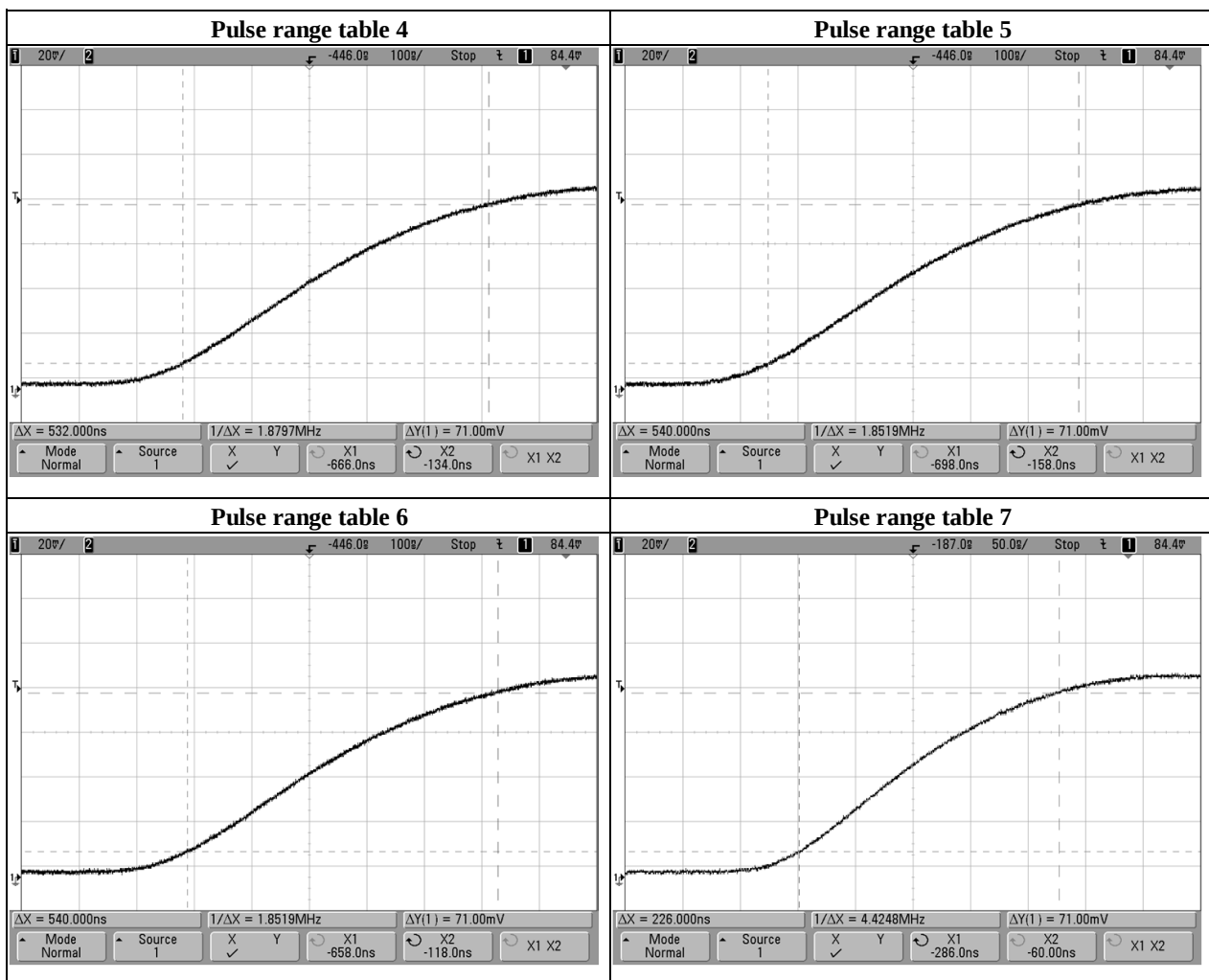
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Modulation Characteristics (Pulse chart 3)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Rise time [ns]
4	532.00
5	540.00
6	540.00
7	226.00



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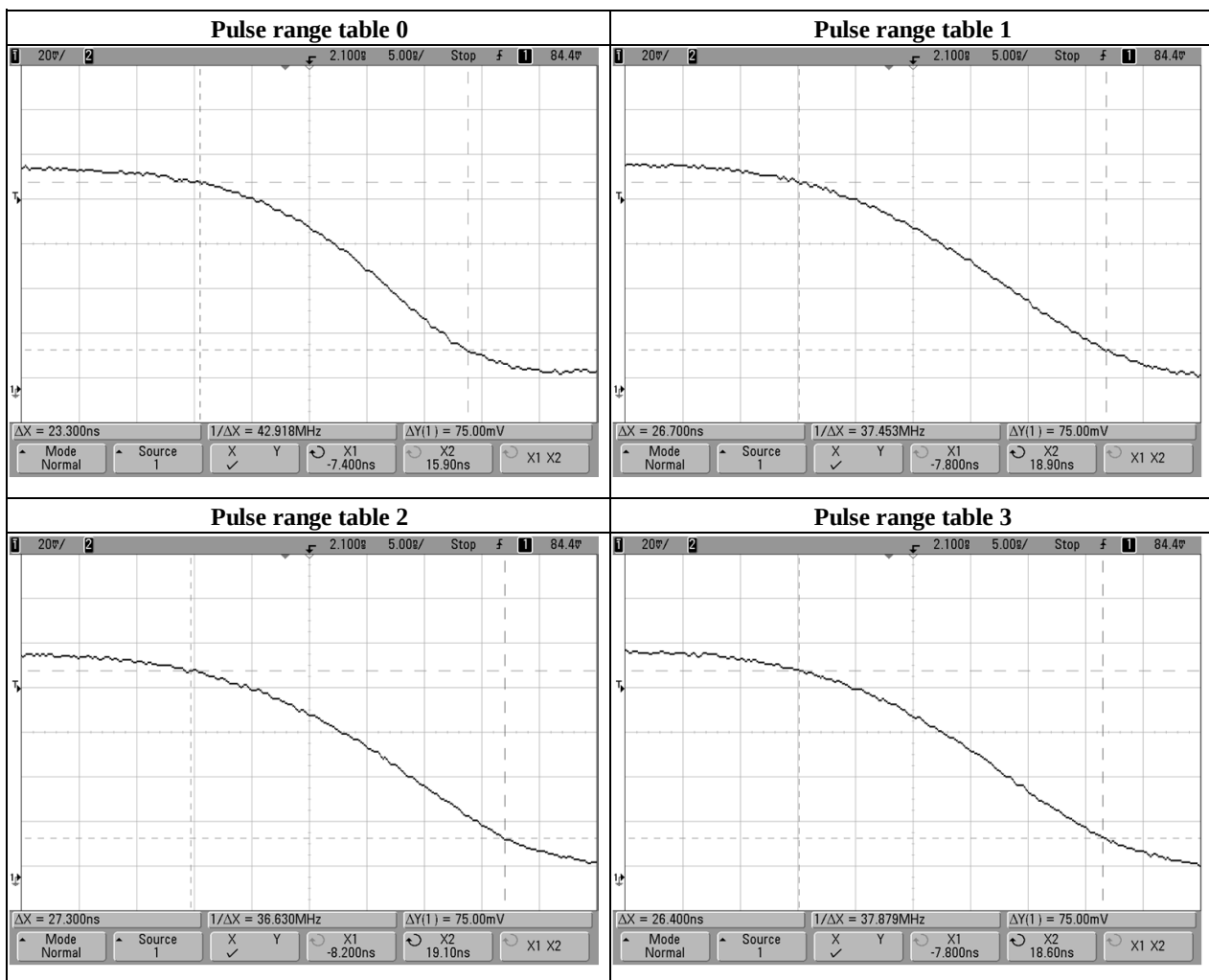
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Modulation Characteristics (Pulse chart 4)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Fall time [ns]
0	23.30
1	26.70
2	27.30
3	26.40



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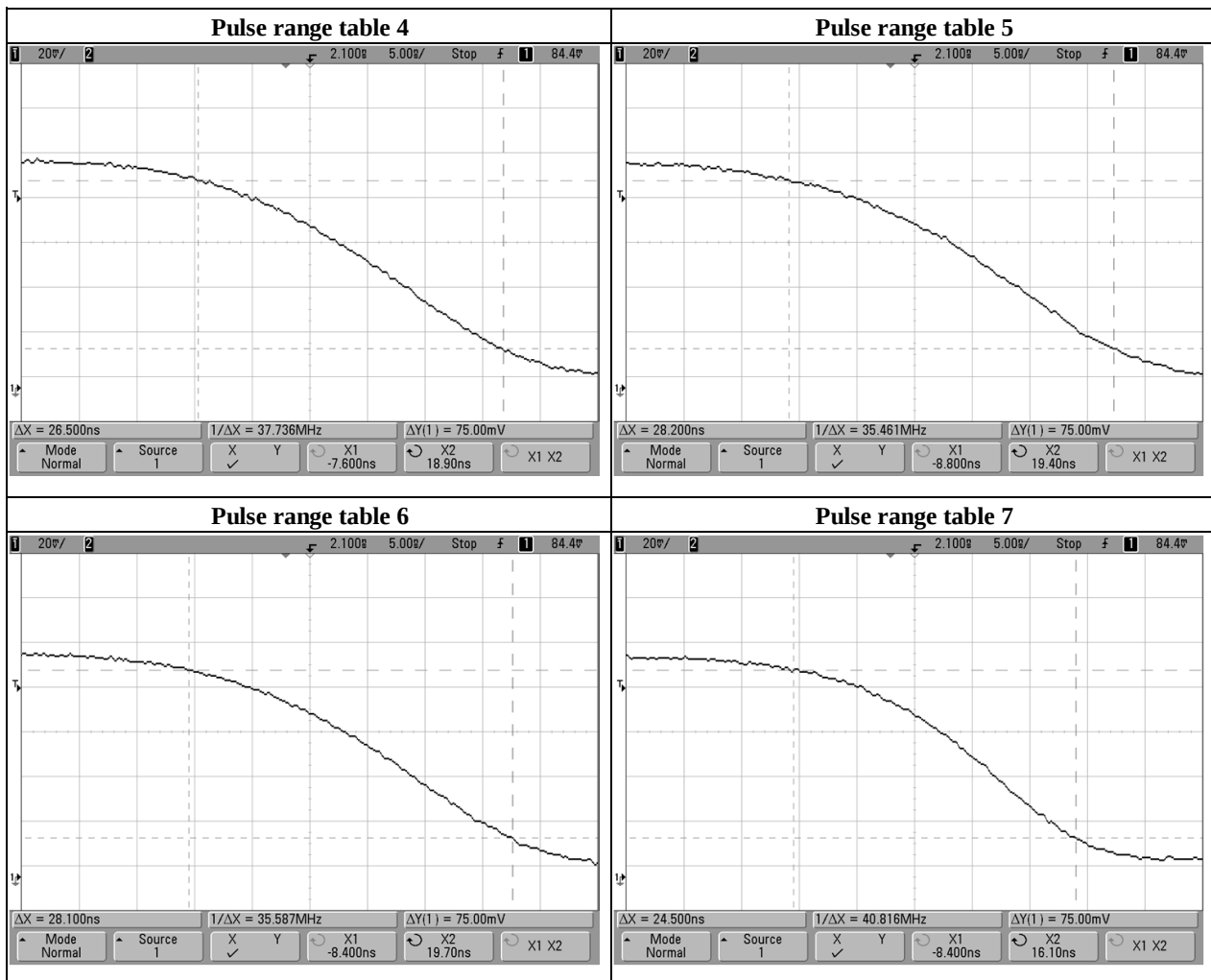
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Modulation Characteristics (Pulse chart 4)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	Fall time [ns]
4	26.50
5	28.20
6	28.10
7	24.50



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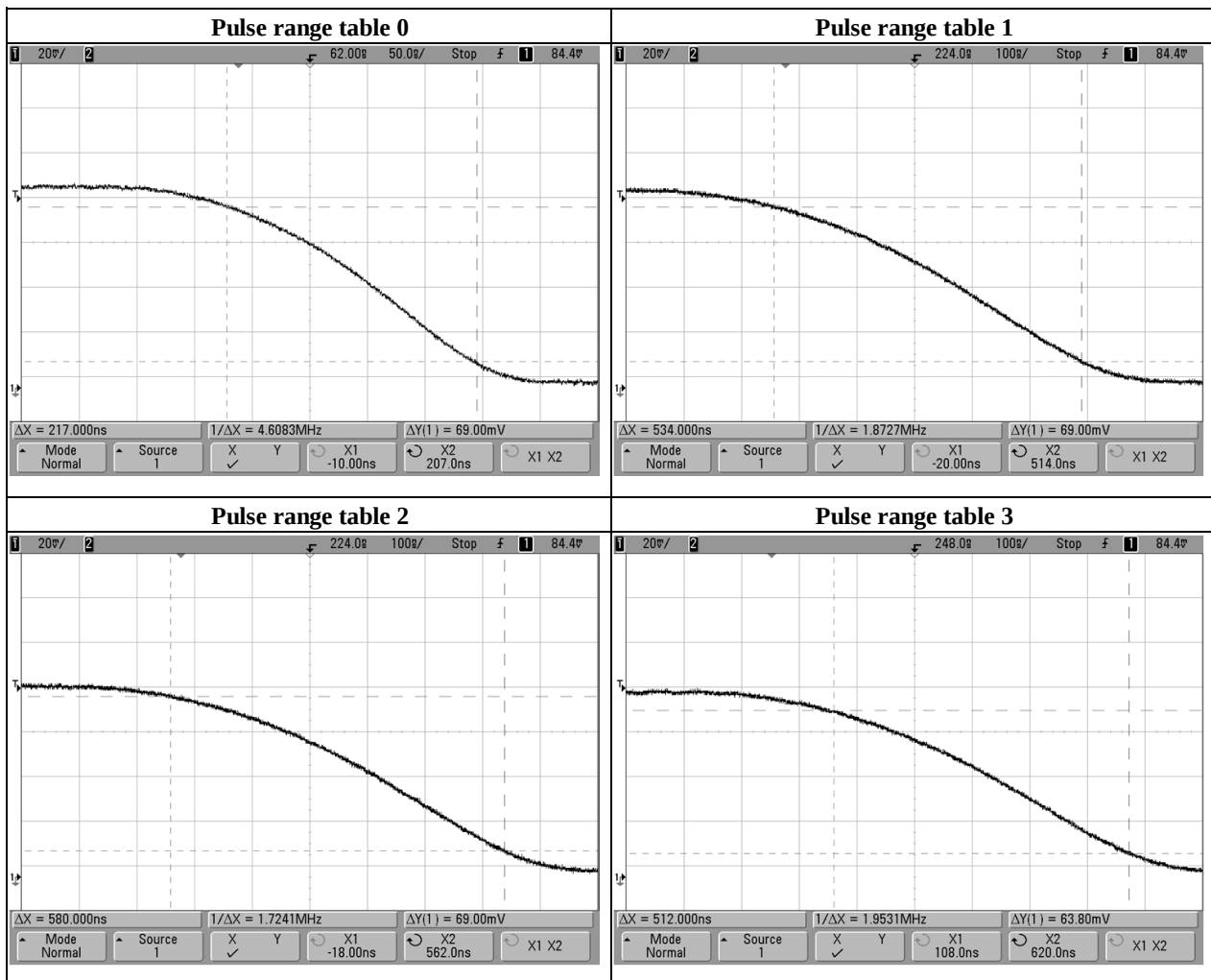
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Modulation Characteristics (Pulse chart 4)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Fall time [ns]
0	217.00
1	534.00
2	580.00
3	512.00



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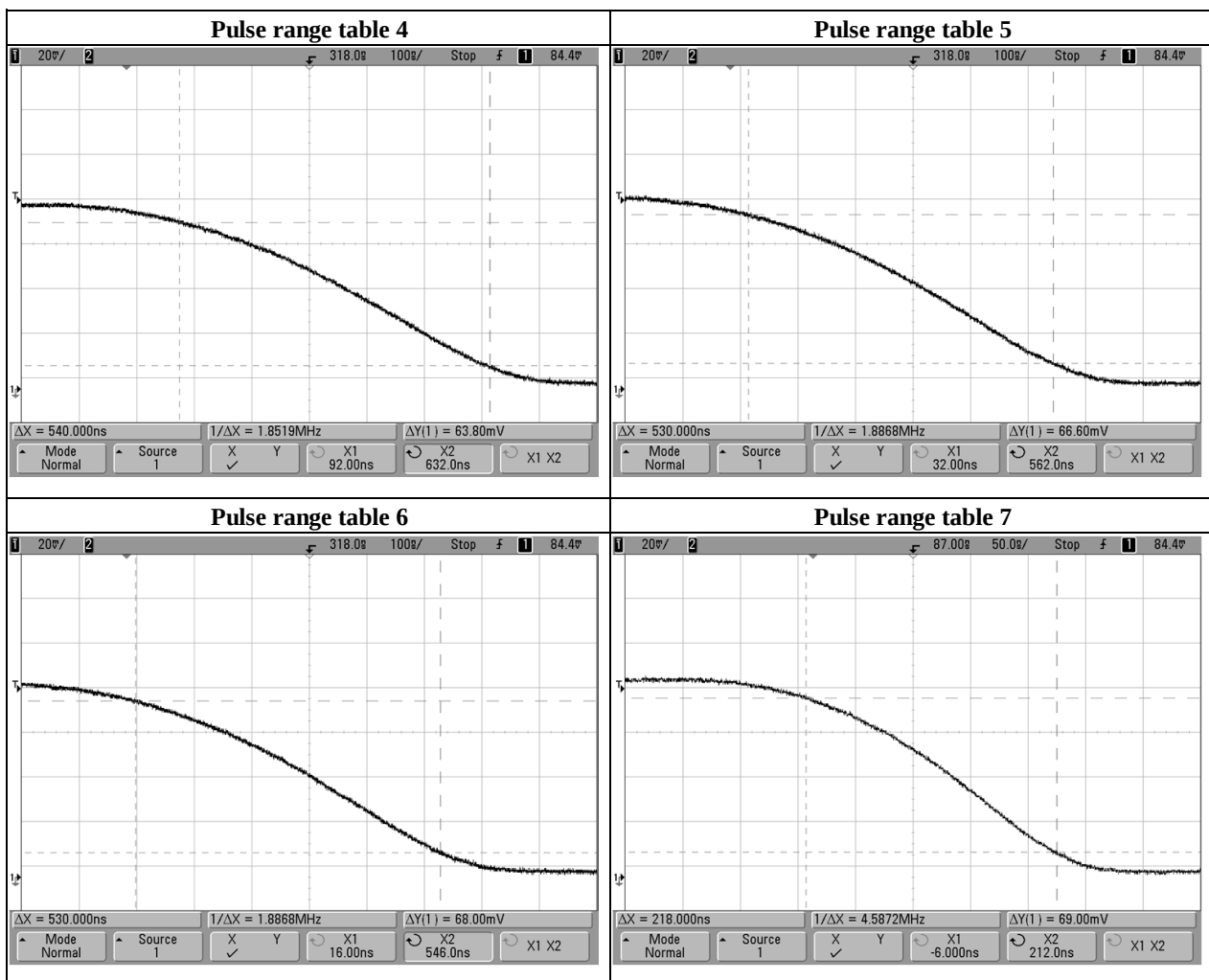
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Modulation Characteristics (Pulse chart 4)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Shielded Room
Date	March 23, 2016	
Temperature / Humidity	23 deg.C , 30 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	Fall time [ns]
4	540.00
5	530.00
6	530.00
7	218.00



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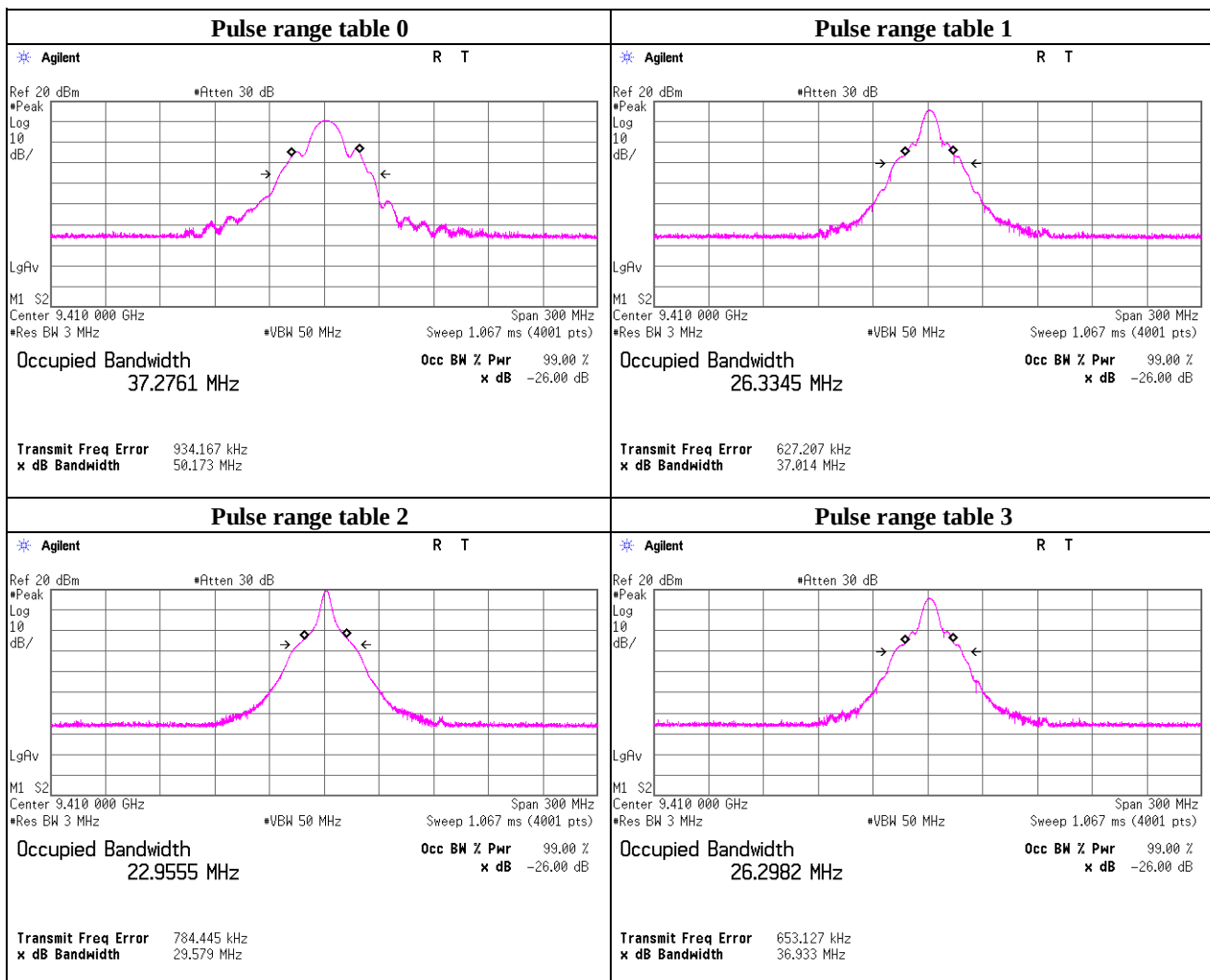
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	-26 dB Bandwidth [MHz]
0	50.173
1	37.014
2	29.579
3	36.933



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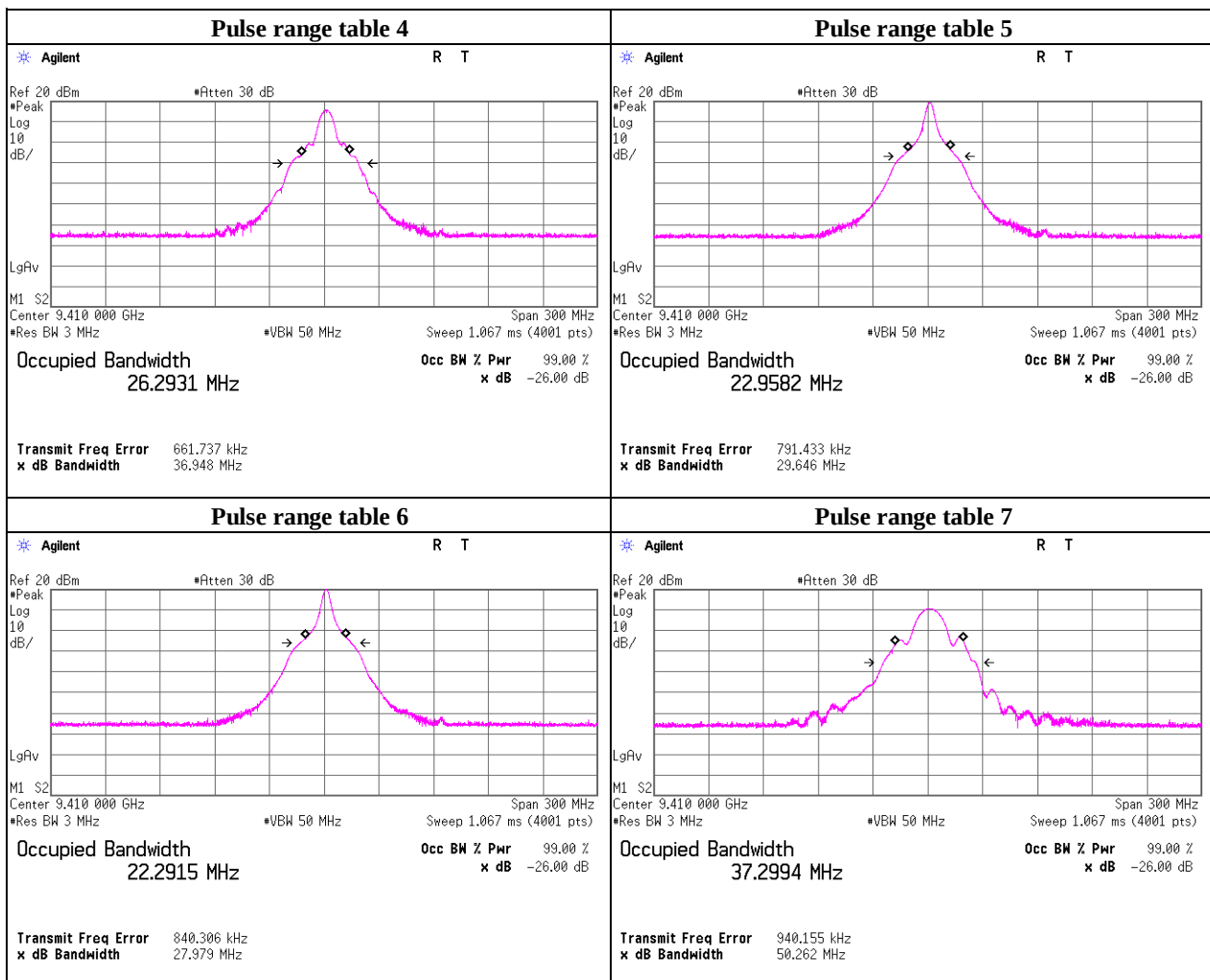
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	-26 dB Bandwidth [MHz]
4	36.948
5	29.646
6	27.979
7	50.262



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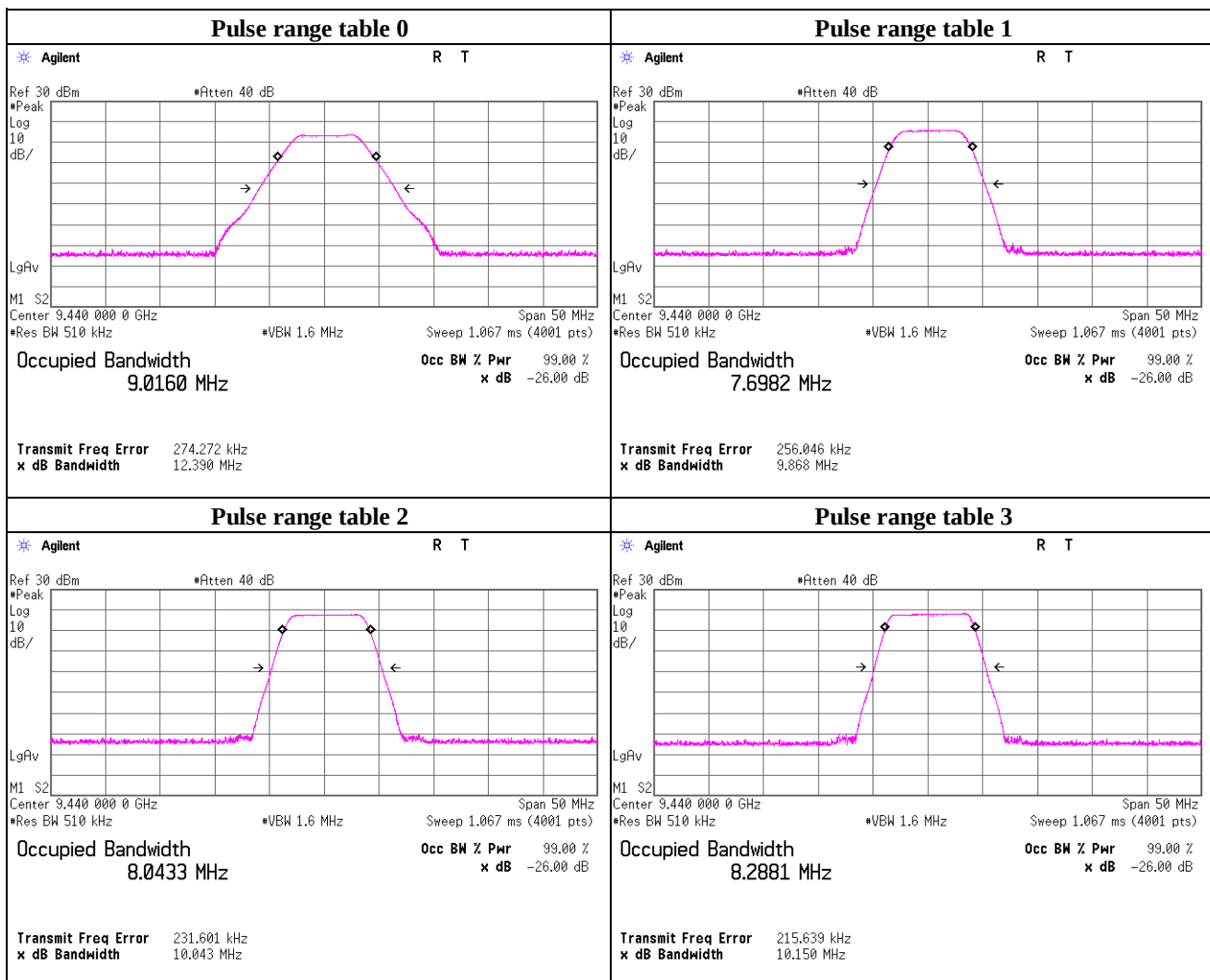
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	-26 dB Bandwidth [MHz]
0	12.390
1	9.868
2	10.043
3	10.150



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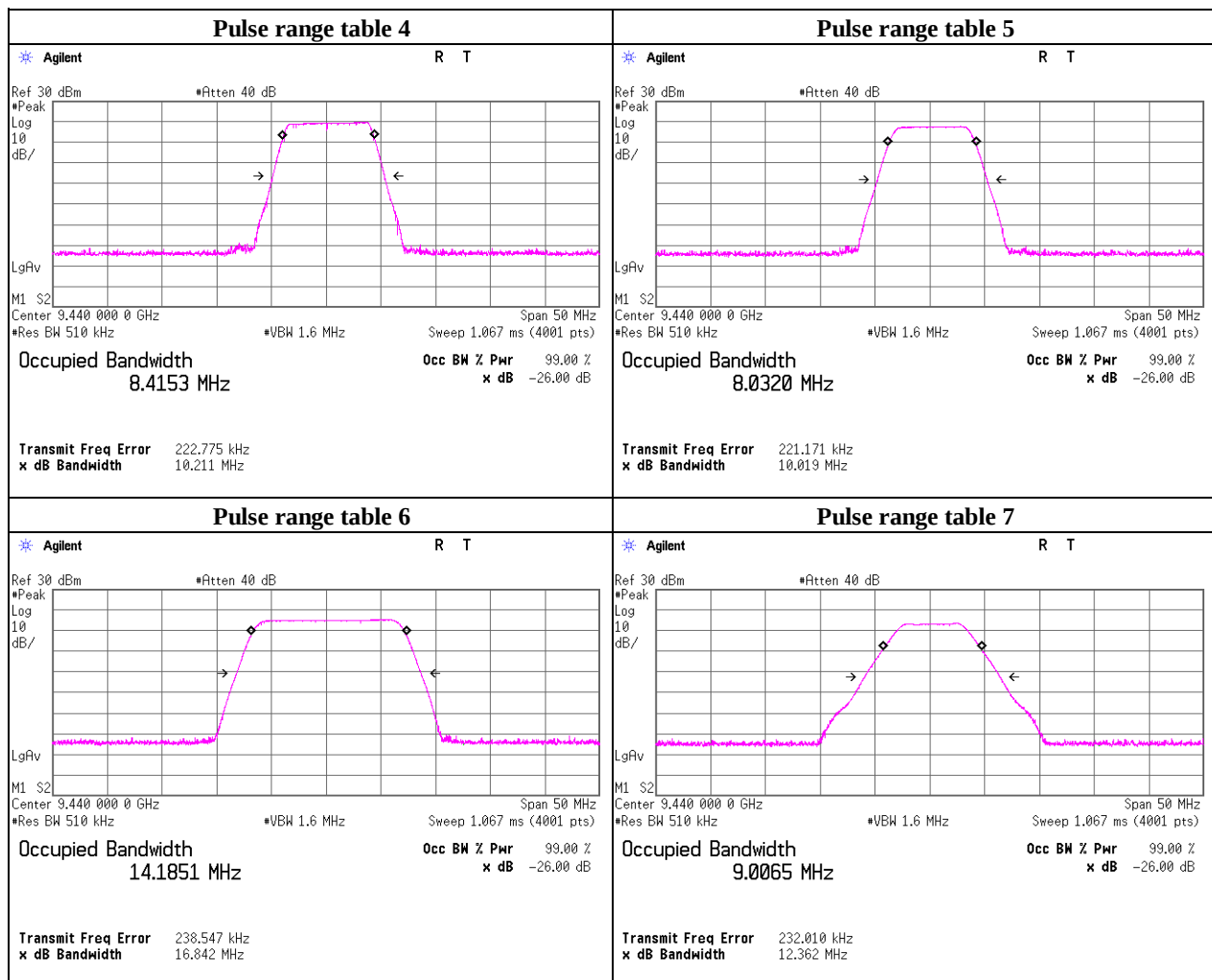
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	-26 dB Bandwidth [MHz]
4	10.211
5	10.019
6	16.842
7	12.362



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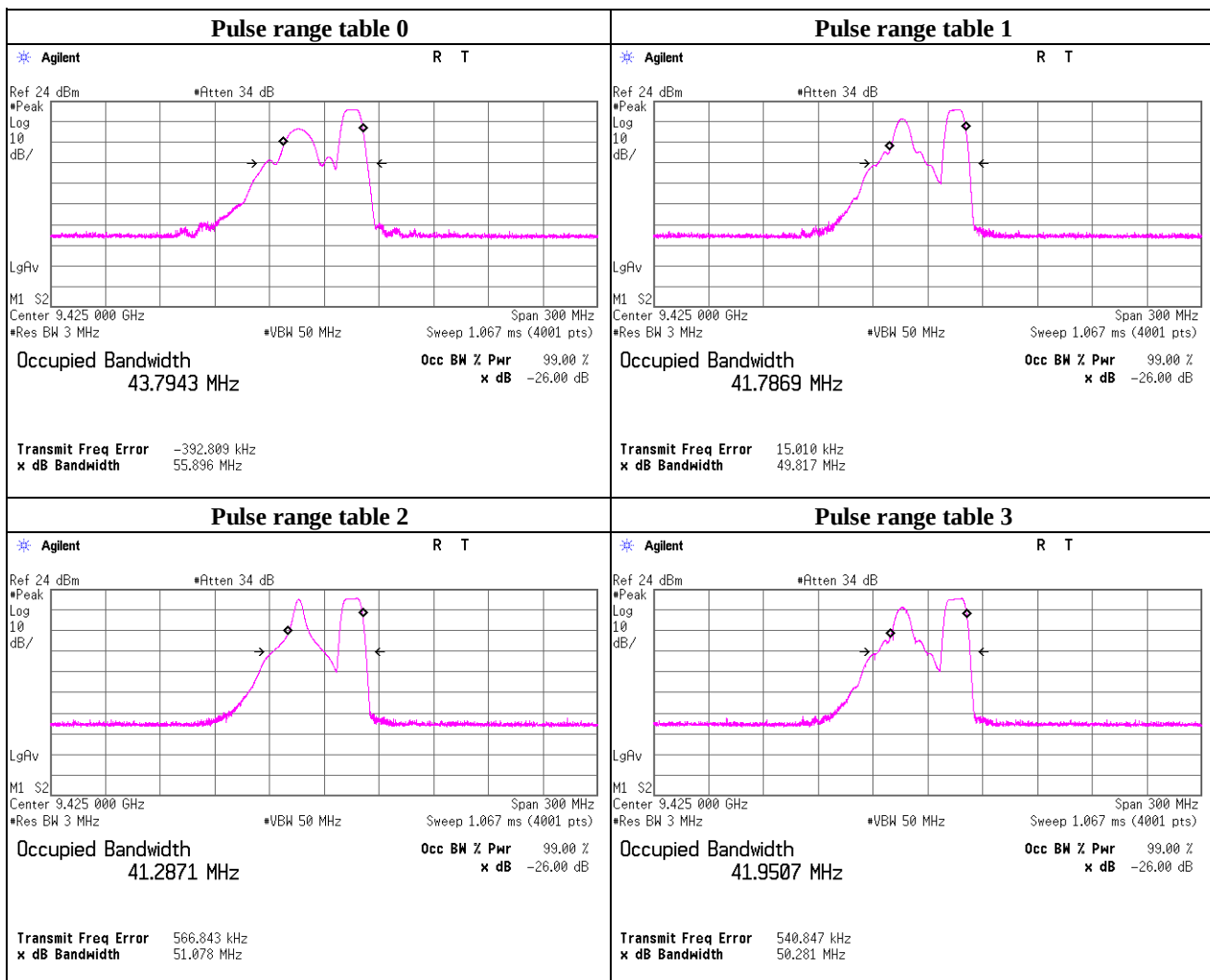
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	-26 dB Bandwidth [MHz]
0	55.896
1	49.817
2	51.078
3	50.281



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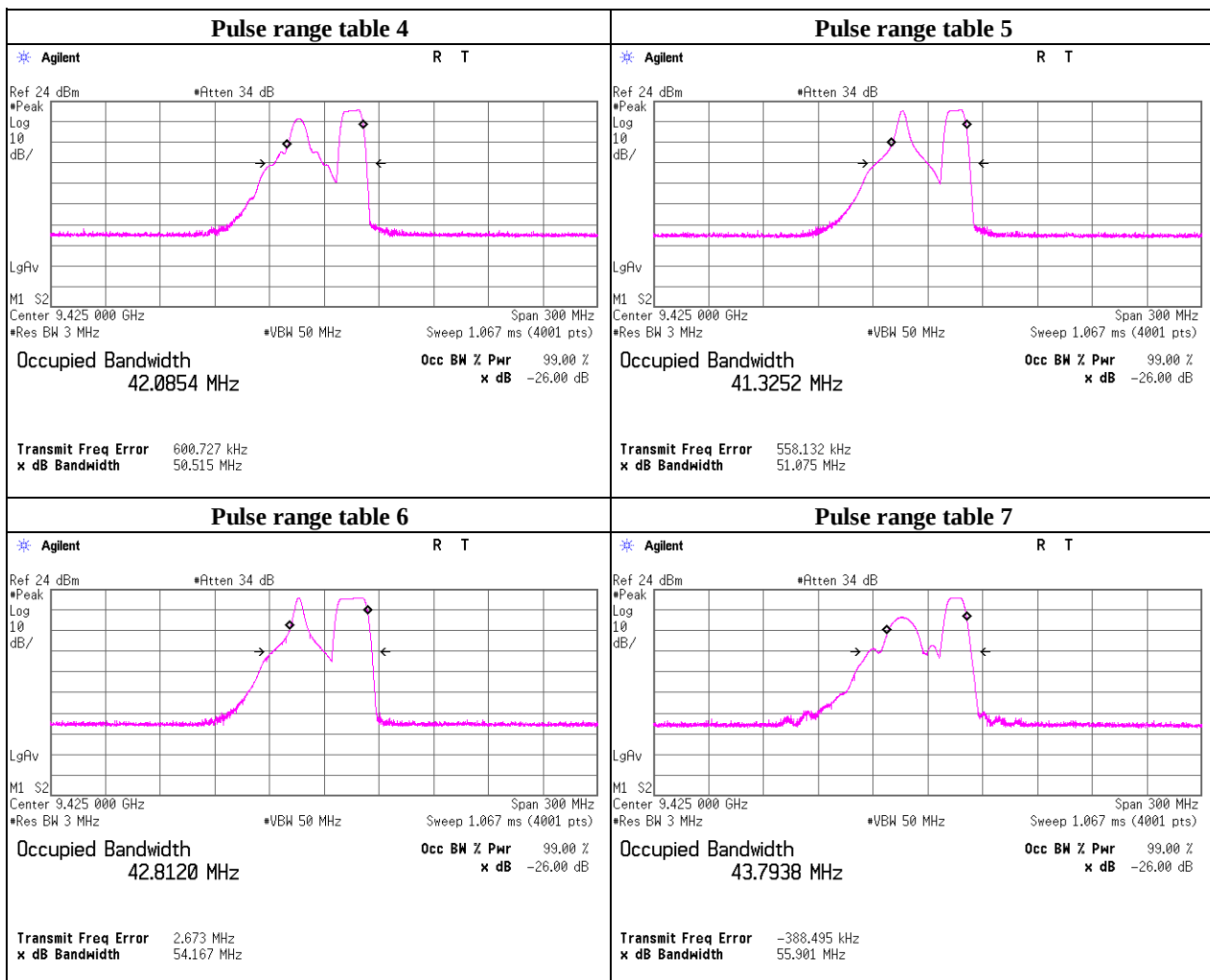
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	-26 dB Bandwidth [MHz]
4	50.515
5	51.075
6	54.167
7	55.901



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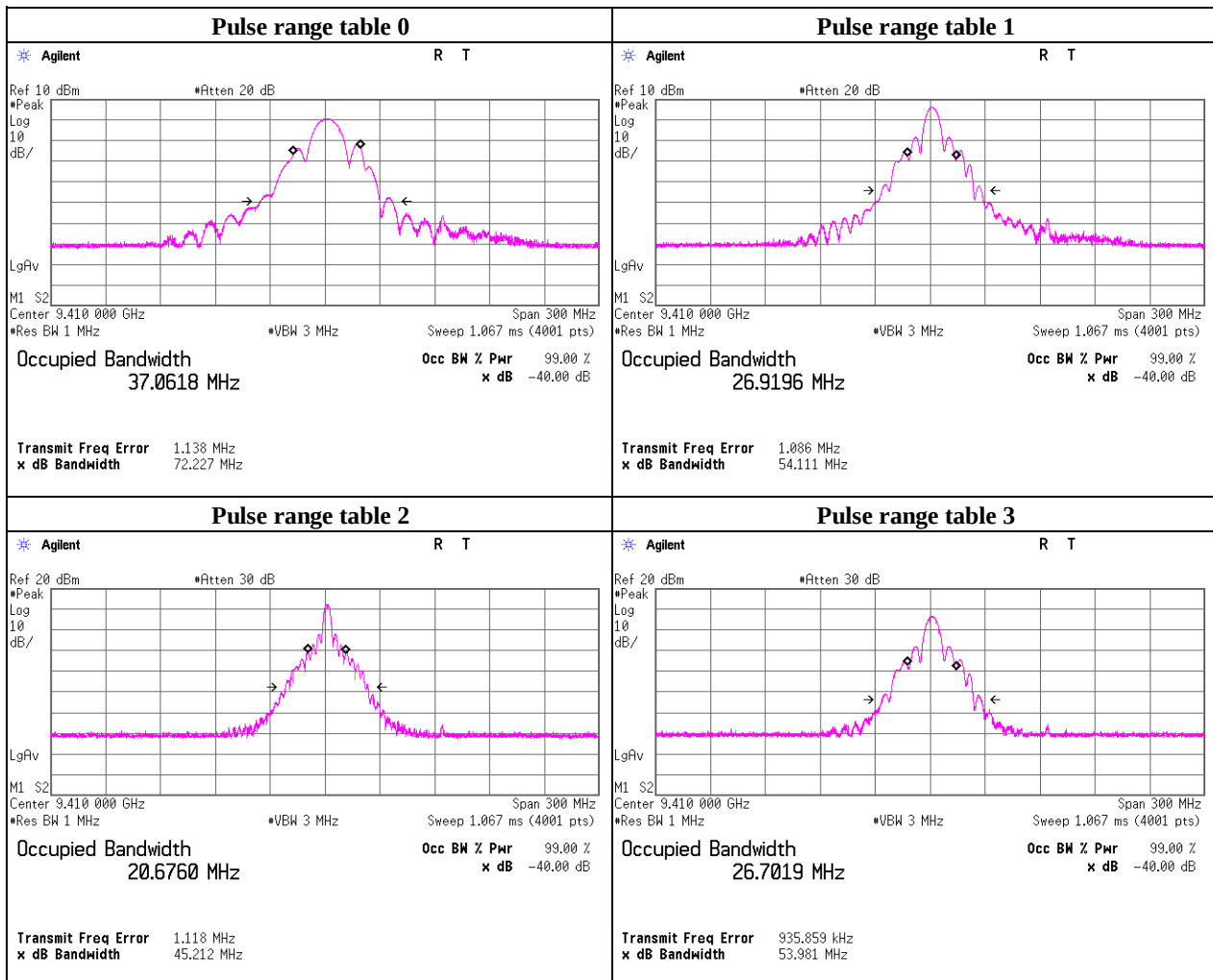
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	-40 dB Bandwidth [MHz]
0	72.227
1	54.111
2	45.212
3	53.981

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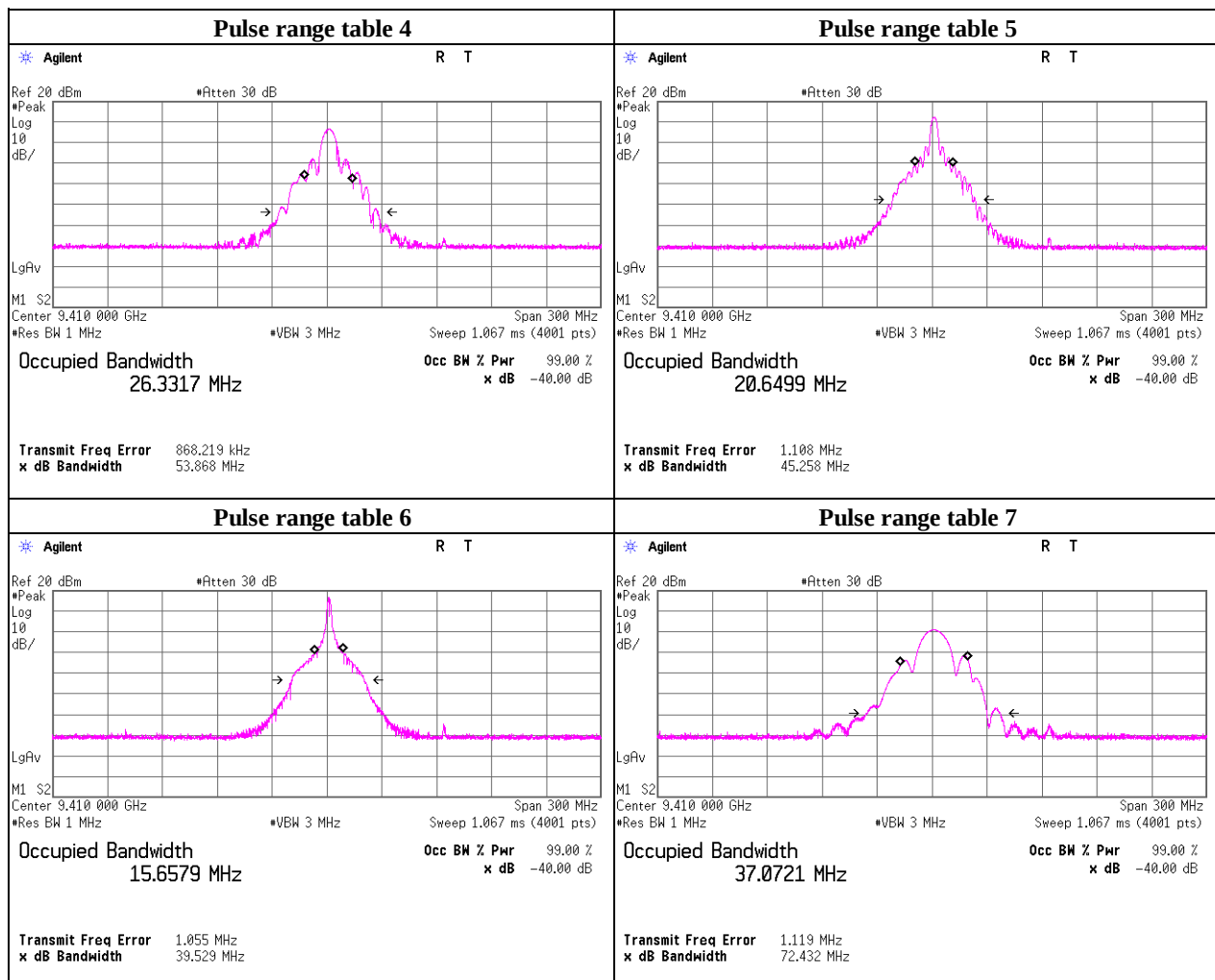
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	-40 dB Bandwidth [MHz]
4	53.868
5	45.258
6	39.529
7	72.432

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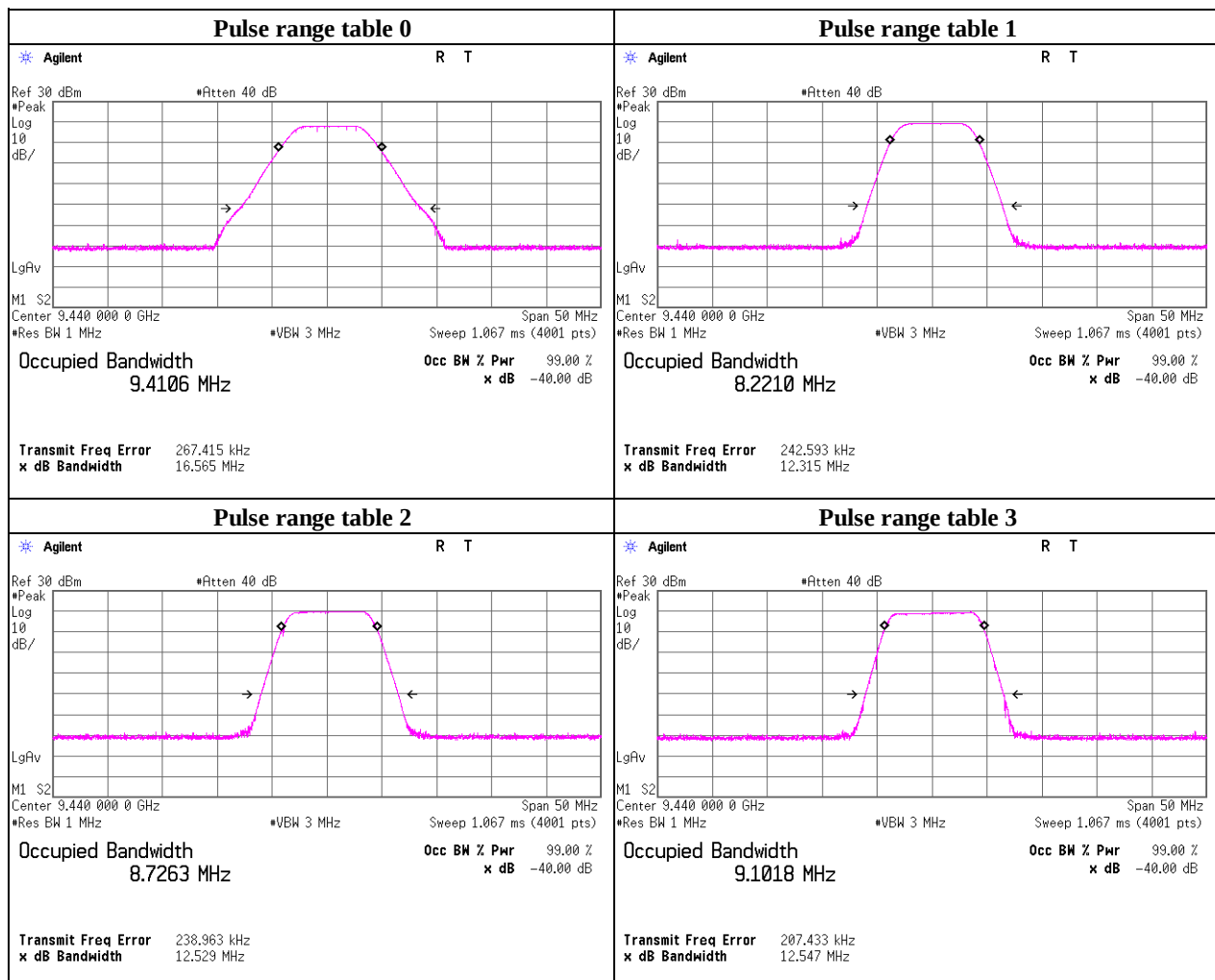
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	-40 dB Bandwidth [MHz]
0	16.565
1	12.315
2	12.529
3	12.547

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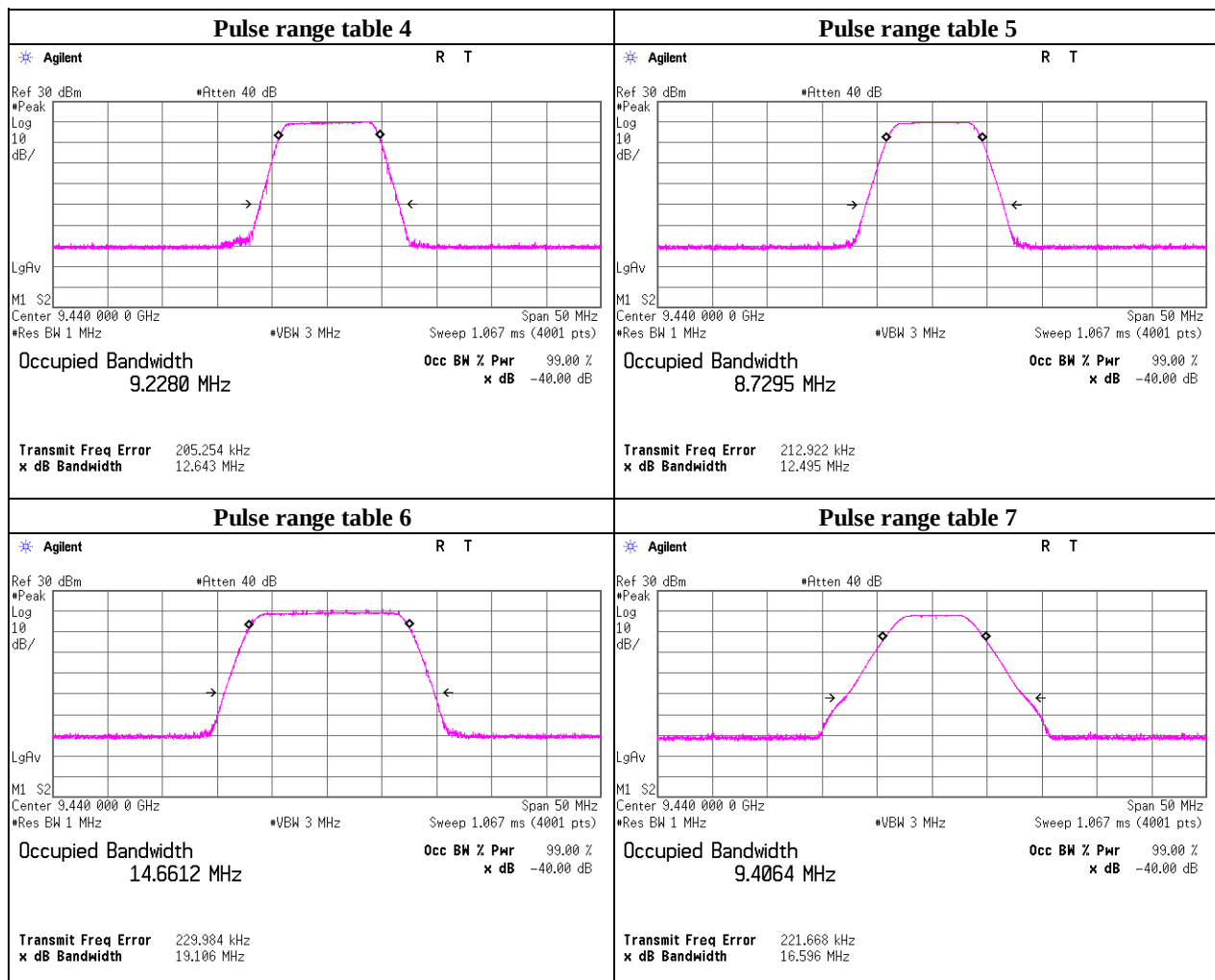
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	-40 dB Bandwidth [MHz]
4	12.643
5	12.495
6	19.106
7	16.596

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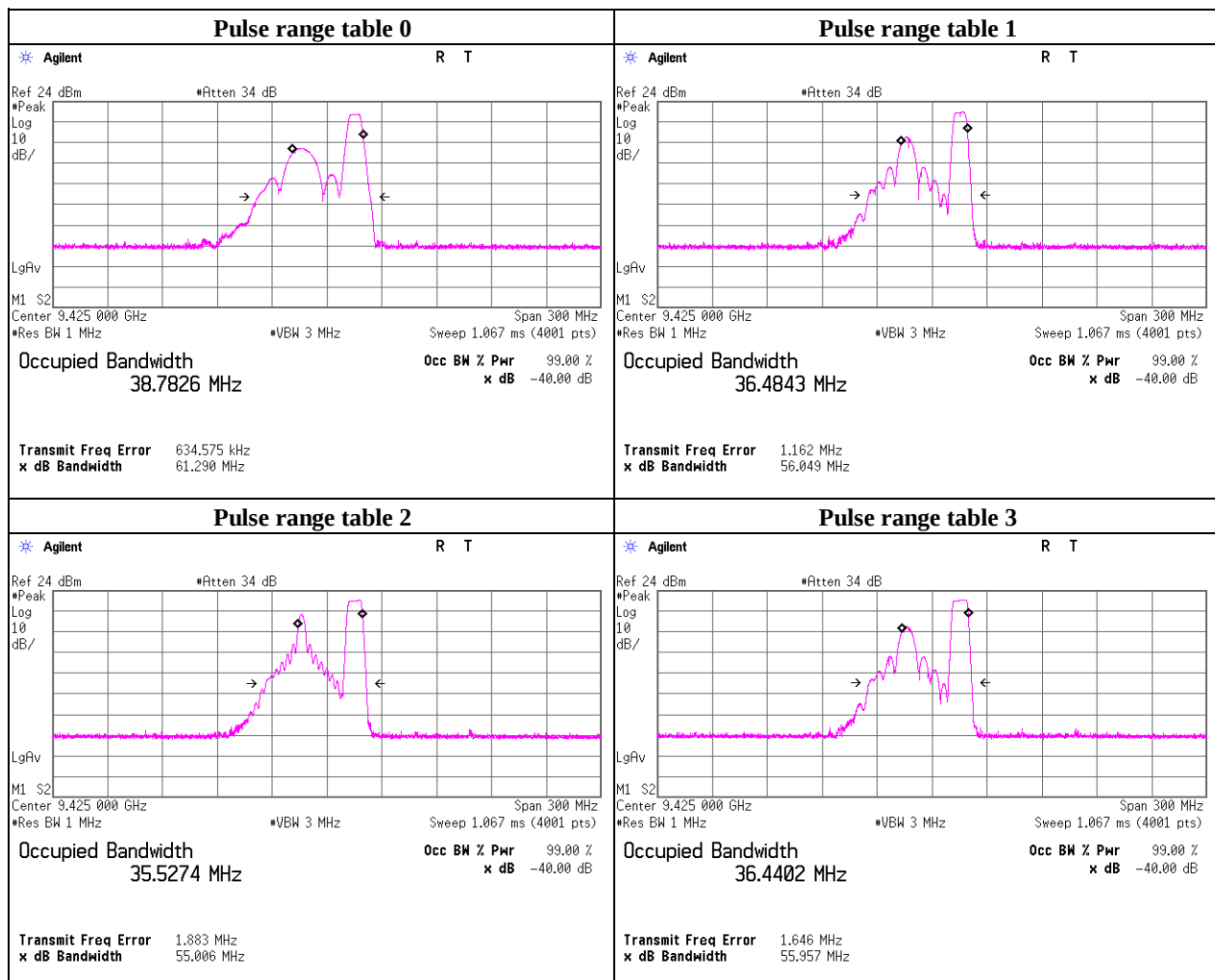
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	-40 dB Bandwidth [MHz]
0	61.290
1	56.049
2	55.006
3	55.957

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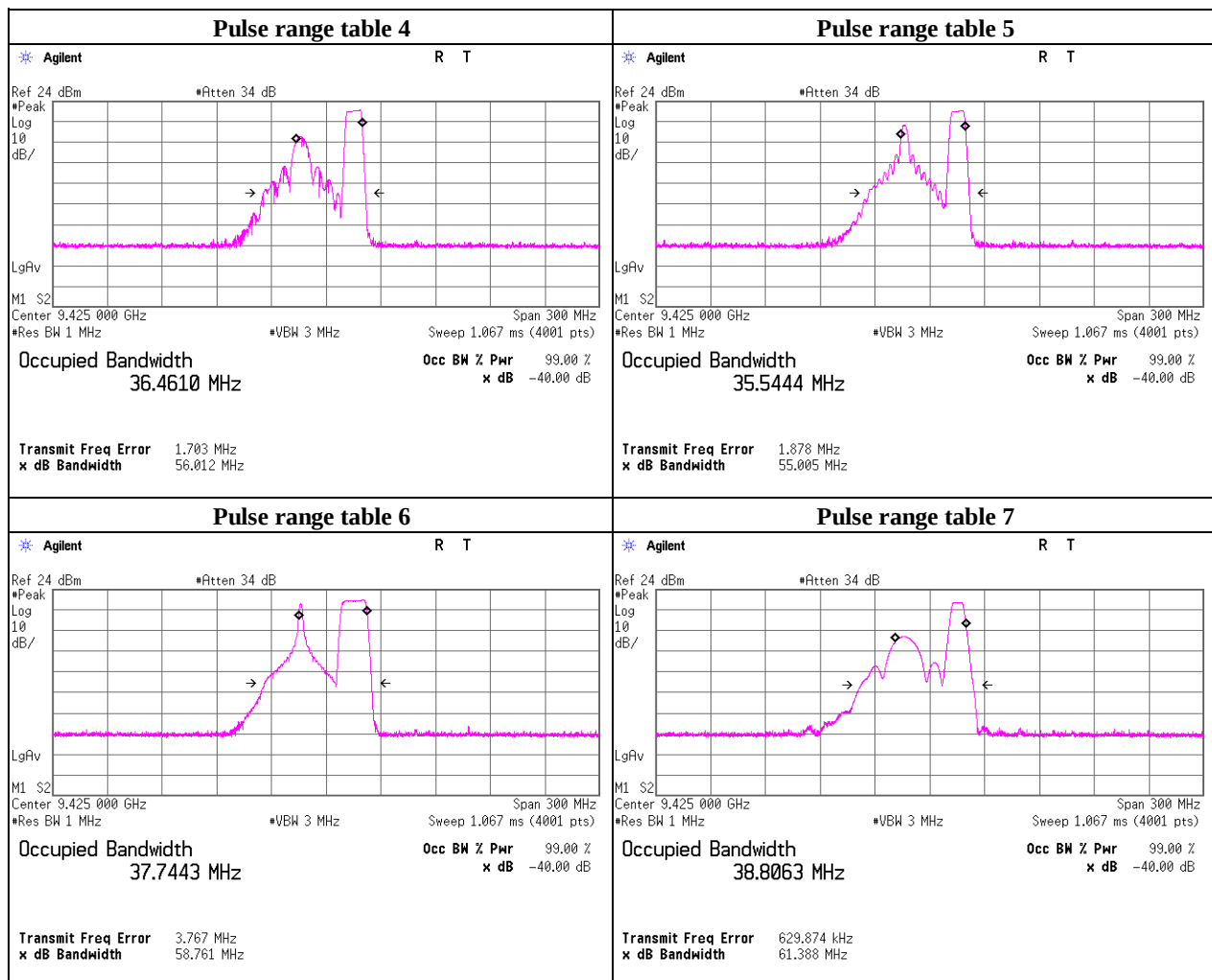
Facsimile : +81 463 50 6401

(Reference data) -40 dB Bandwidth

(This data is reference data tested based on a request of Canadian radio standard RSS-238.)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	March 15, 2016	
Temperature / Humidity	25 deg.C , 48 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	-40 dB Bandwidth [MHz]
4	56.012
5	55.005
6	58.761
7	61.388

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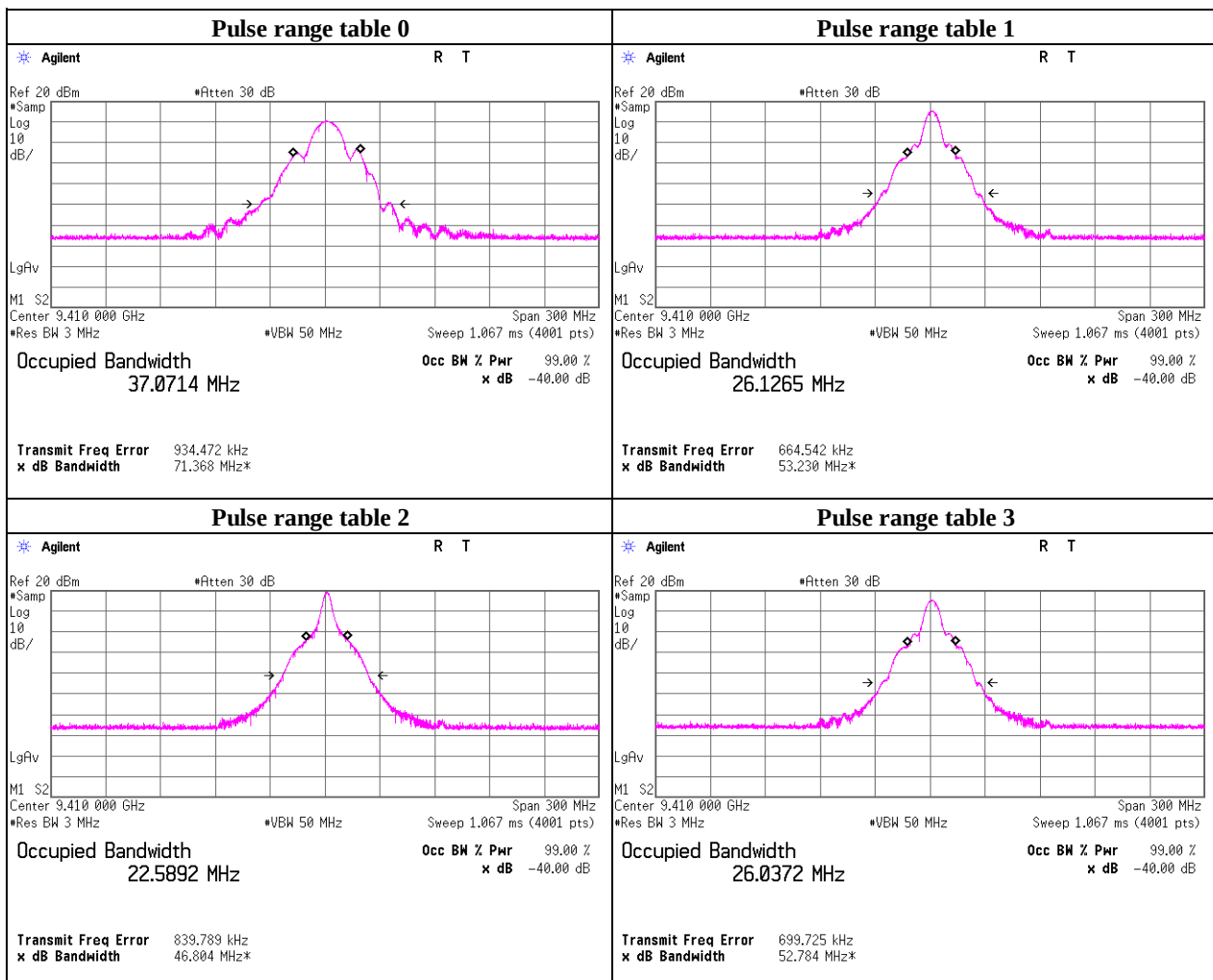
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99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	99 % Occupied Bandwidth [MHz]
0	37.071
1	26.127
2	22.589
3	26.037



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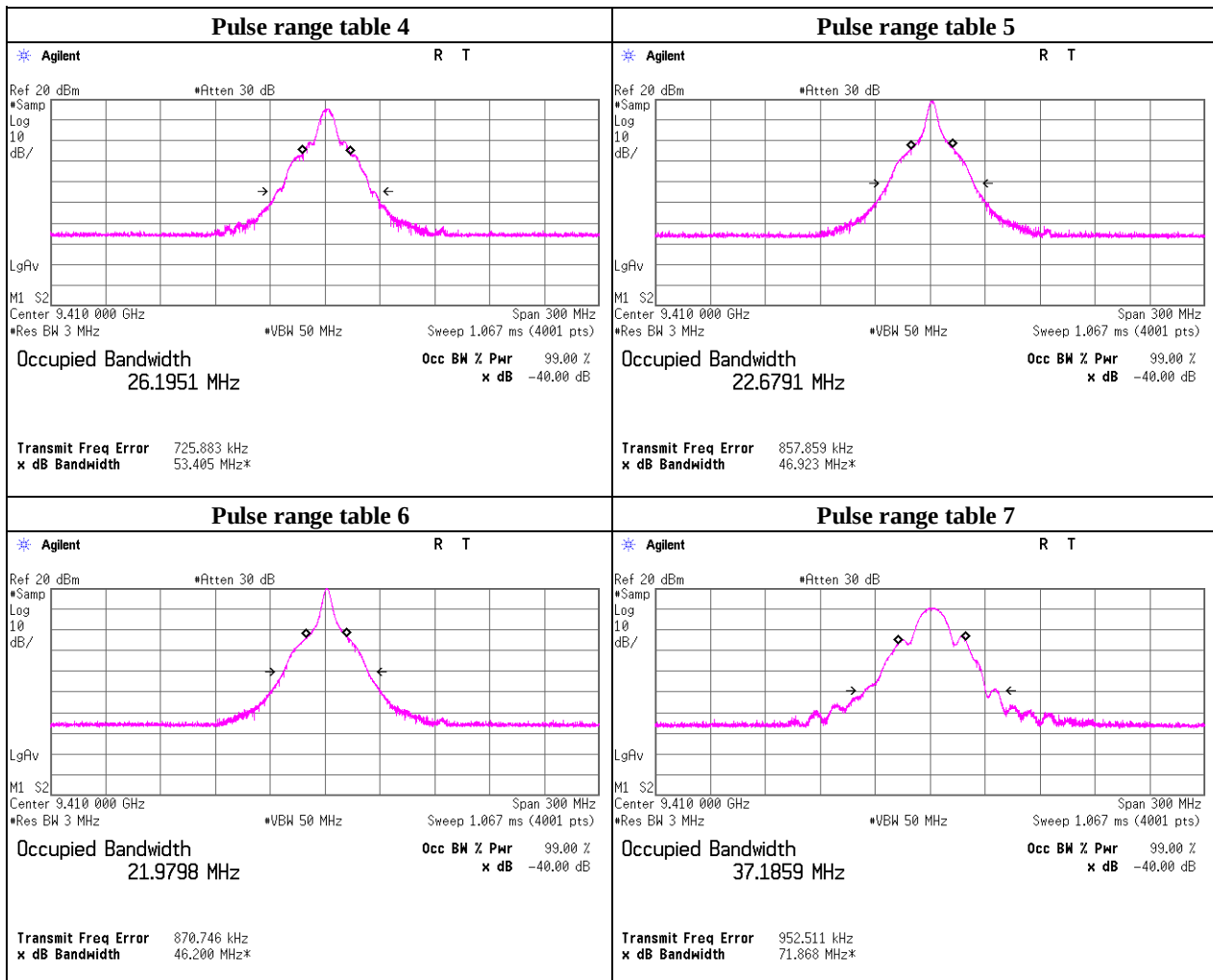
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P)	

Pulse range table	99 % Occupied Bandwidth [MHz]
4	26.195
5	22.679
6	21.980
7	37.186



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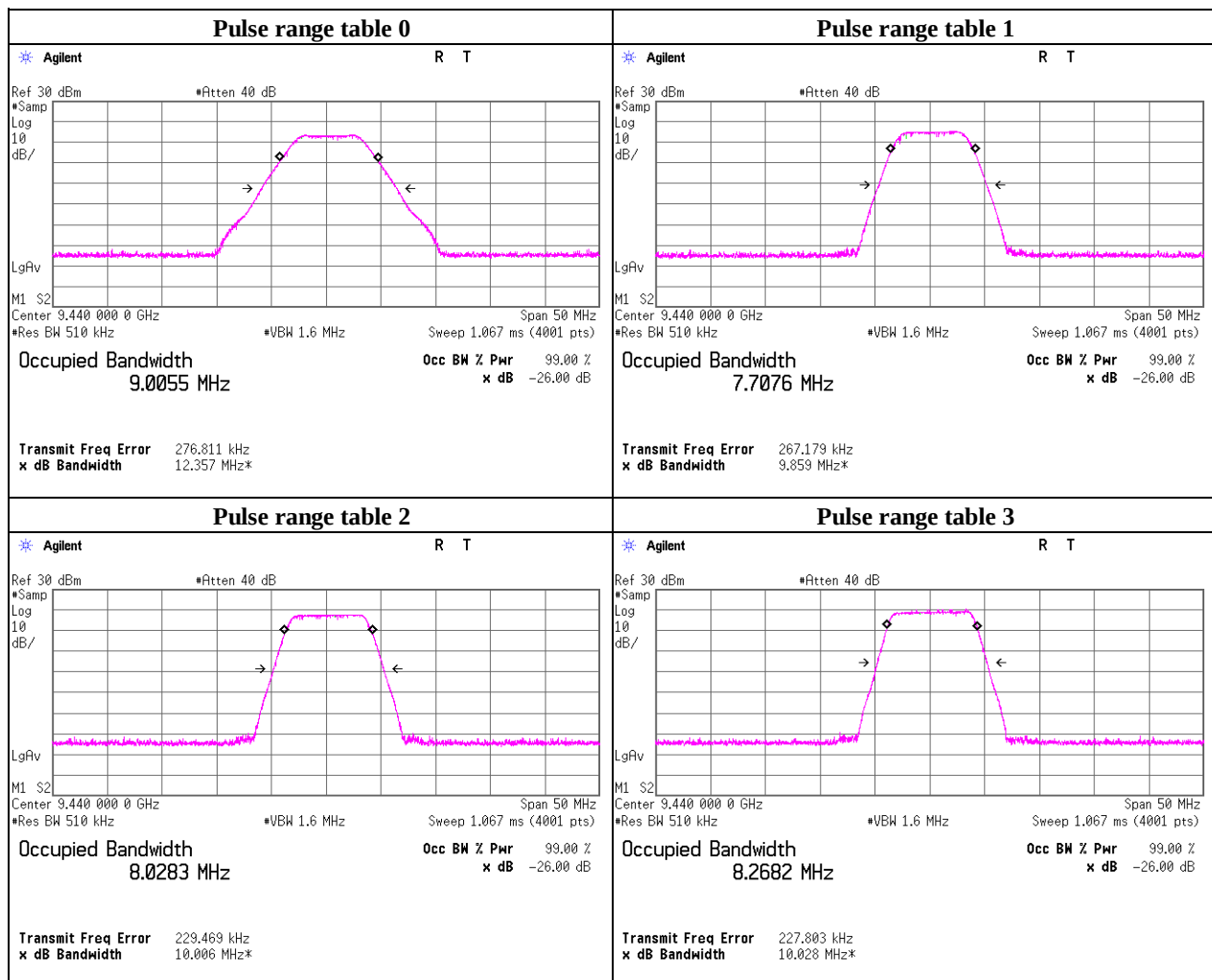
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	99 % Occupied Bandwidth [MHz]
0	9.006
1	7.708
2	8.028
3	8.268



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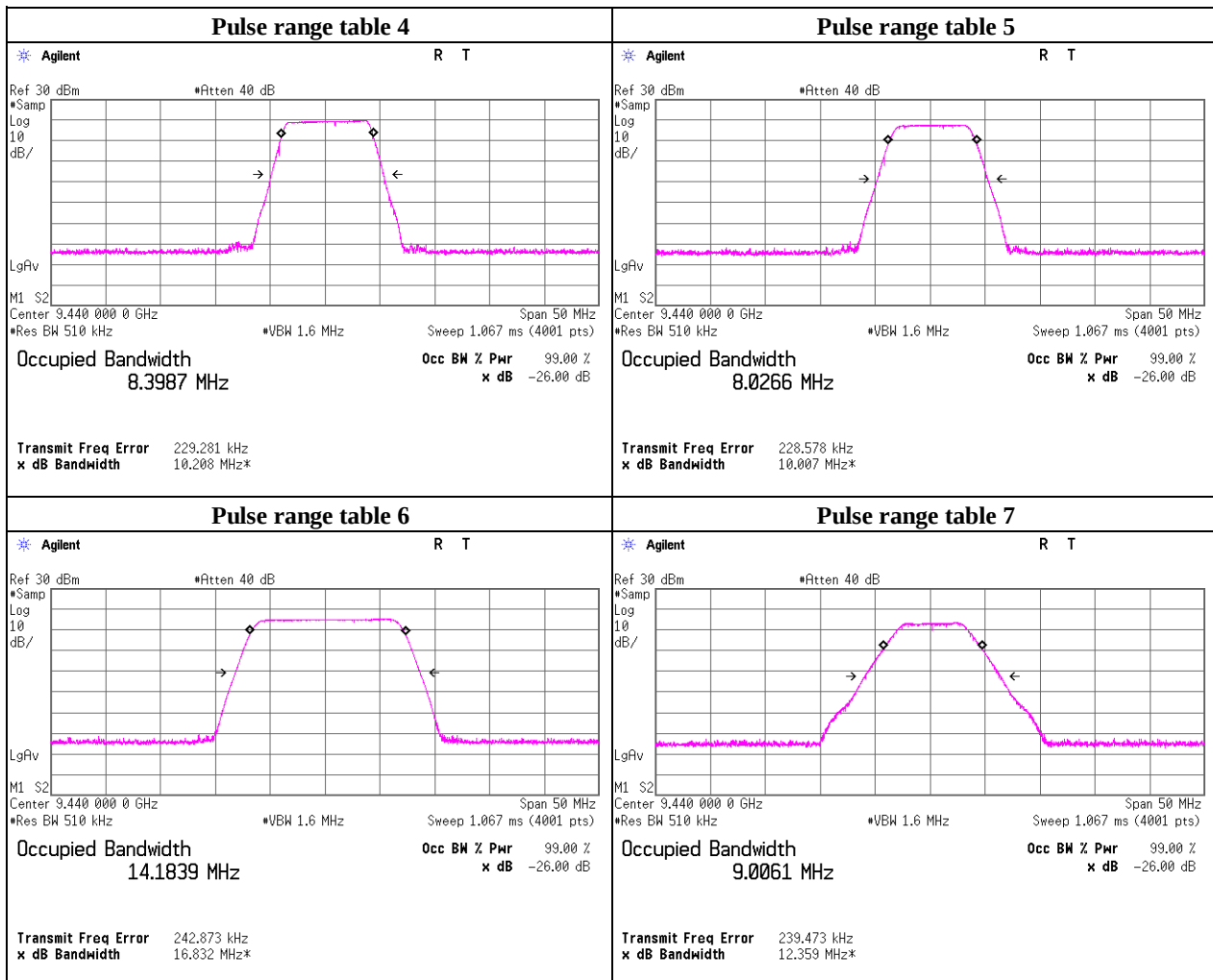
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	April 8, 2016	
Temperature / Humidity	24 deg.C , 56 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9440 MHz (Q)	

Pulse range table	99 % Occupied Bandwidth [MHz]
4	8.399
5	8.027
6	14.184
7	9.006



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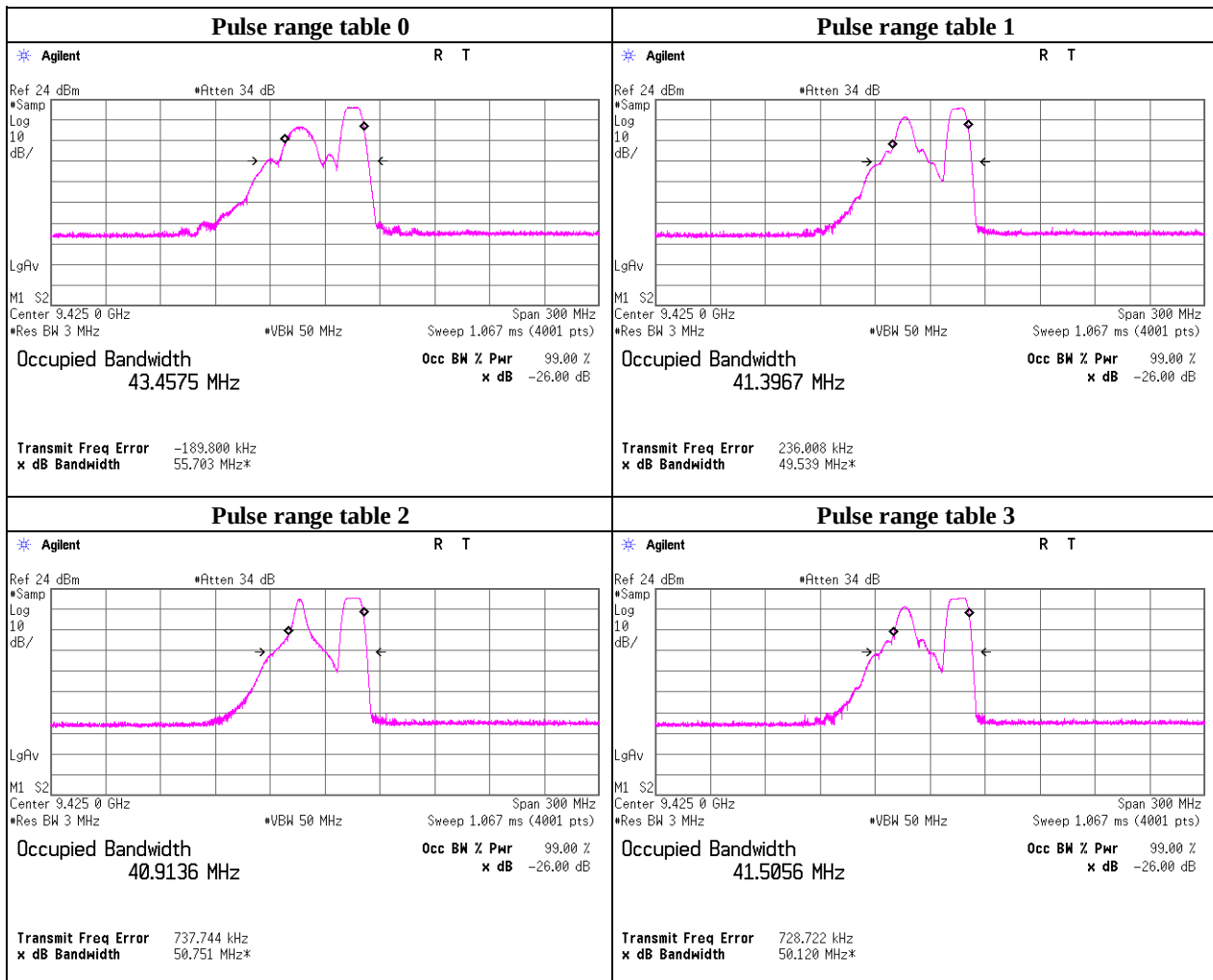
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded room
Date	April 10, 2016	
Temperature / Humidity	24 deg.C , 45 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	99 % Occupied Bandwidth [MHz]
0	43.458
1	41.397
2	40.914
3	41.506



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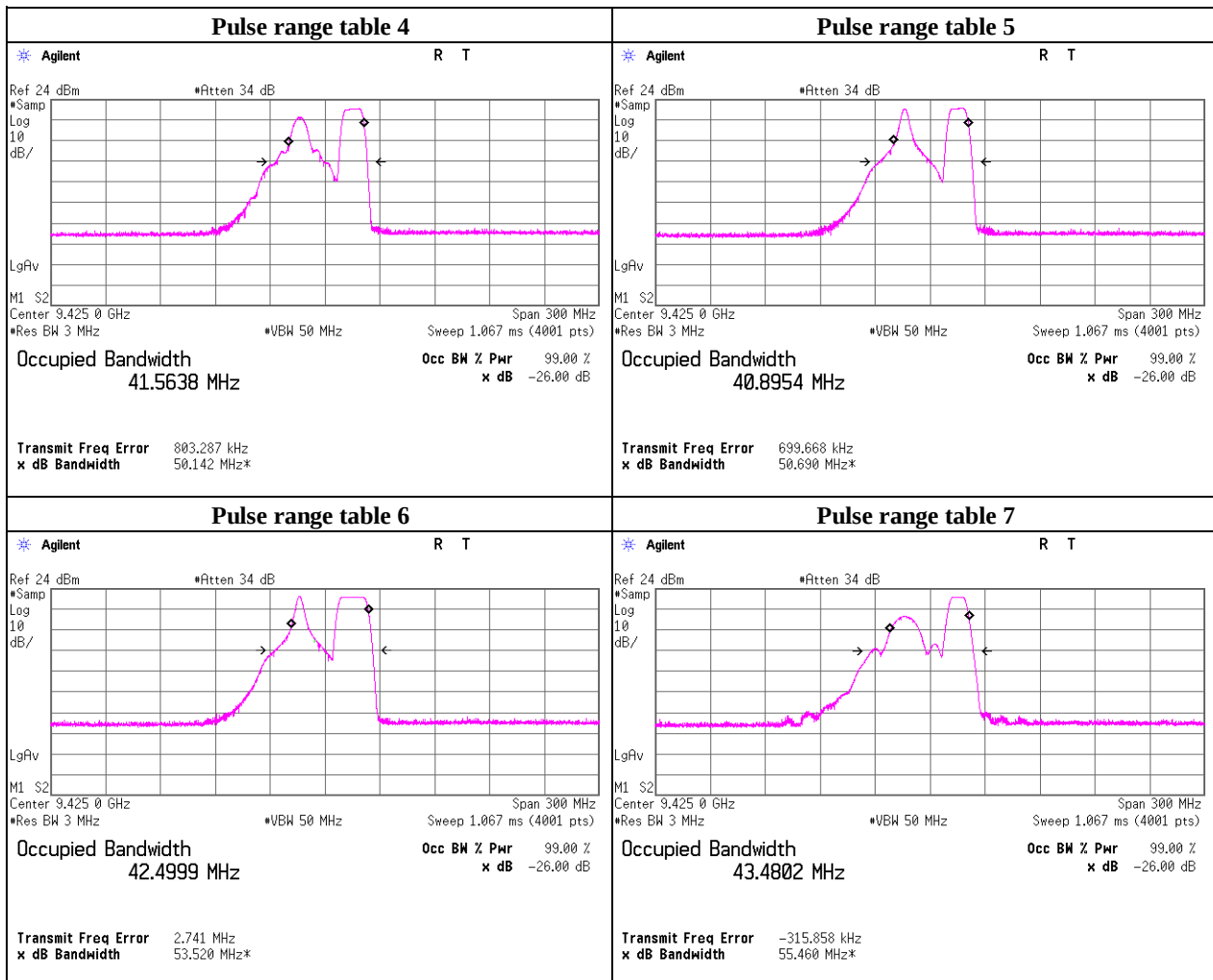
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded room
Date	April 10, 2016	
Temperature / Humidity	24 deg.C , 45 %RH	
Engineer	Kenichi Adachi	
Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

Pulse range table	99 % Occupied Bandwidth [MHz]
4	41.564
5	40.895
6	42.500
7	43.480



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Spurious emission (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	April 10, 2016	
Temperature / Humidity	24 deg.C , 45 %RH	
Engineer	Kenichi Adachi	
(1) Mode	Transmitting 9410 MHz (P)	
(2) Mode	Transmitting 9440 MHz (Q)	
(3) Mode	Transmitting 9410 MHz (P) and 9440 MHz (Q)	

FCC 80.211(f)(3), FCC 90.210(b)(3) Limit

Frequency [MHz]	outside 250% band [dBm]	Cable Loss [dB]	Atten. Loss [dB]	(Reference) Limit line [dBm]
9410	-13	2.77	39.84	-55.61
9440	-13	2.77	39.69	-55.46

RSS-238 Limit line

outside 250% band [dBm]
-60dBc

* display limit line is RSS-238 Limit, since worst limit is RSS-238 Limit

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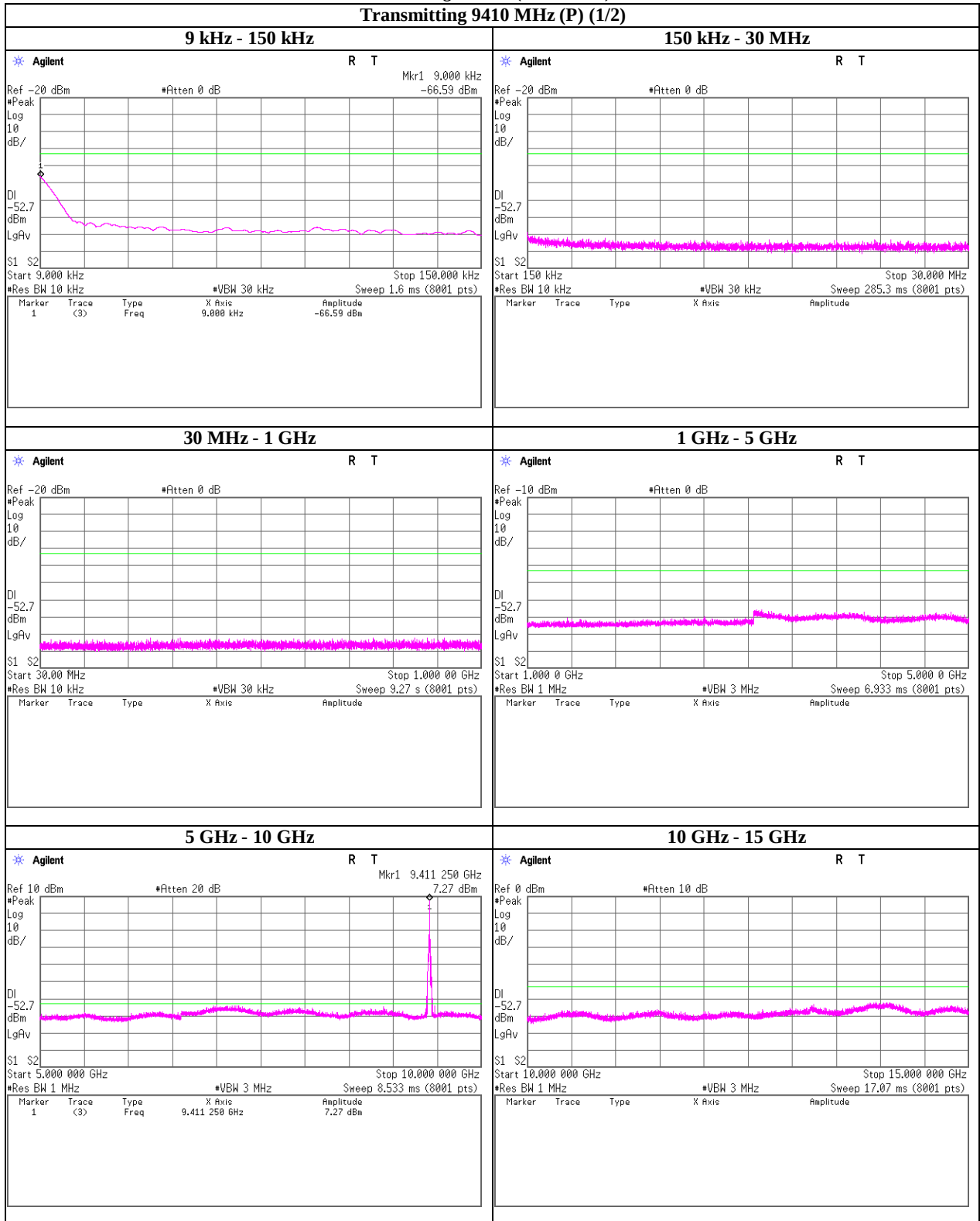
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 10, 2016
 Temperature / Humidity 24 deg.C , 45 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 6 (worst mode)

Transmitting 9410 MHz (P) (1/2)



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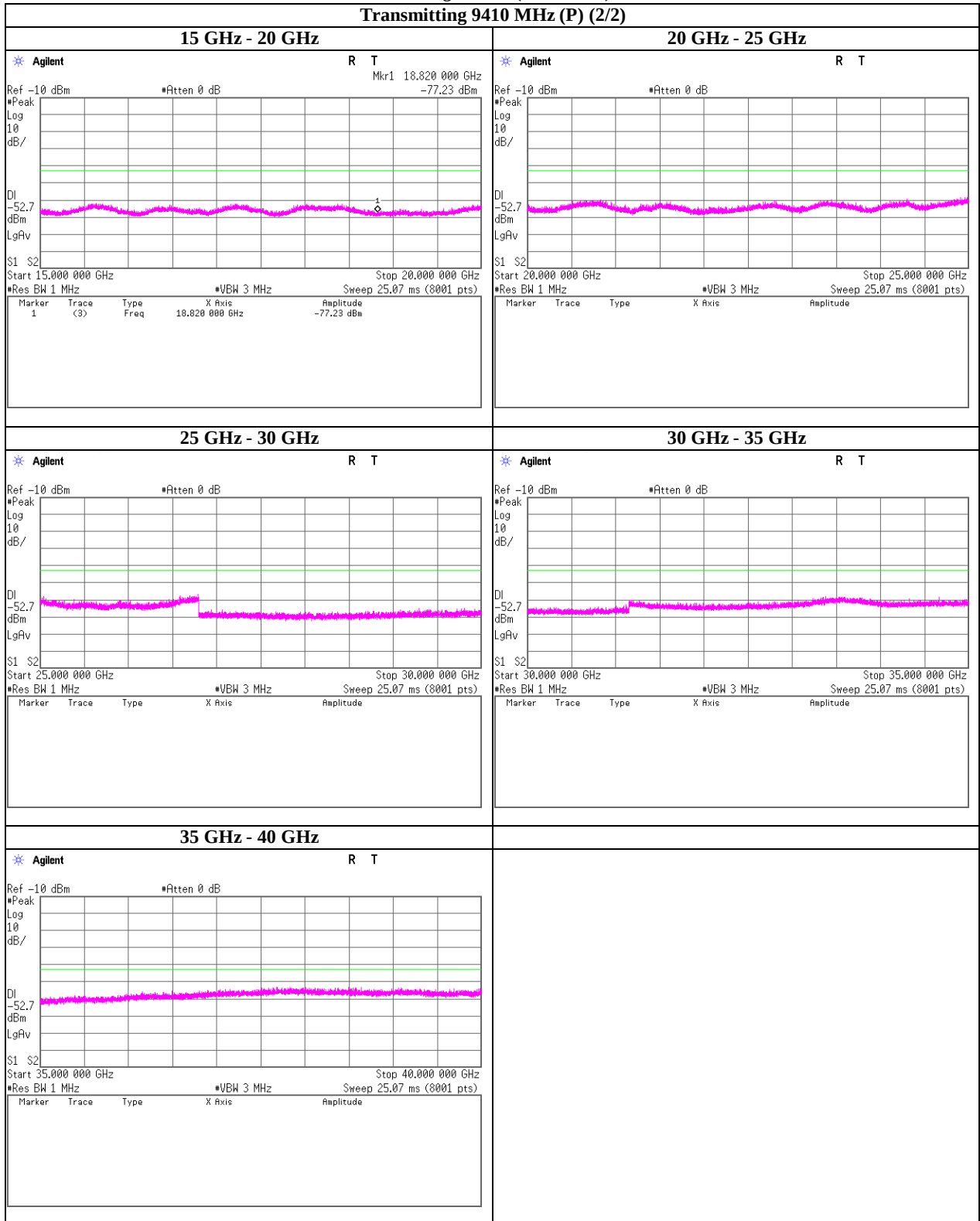
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 10, 2016
 Temperature / Humidity 24 deg.C , 45 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 6 (worst mode)

Transmitting 9410 MHz (P) (2/2)



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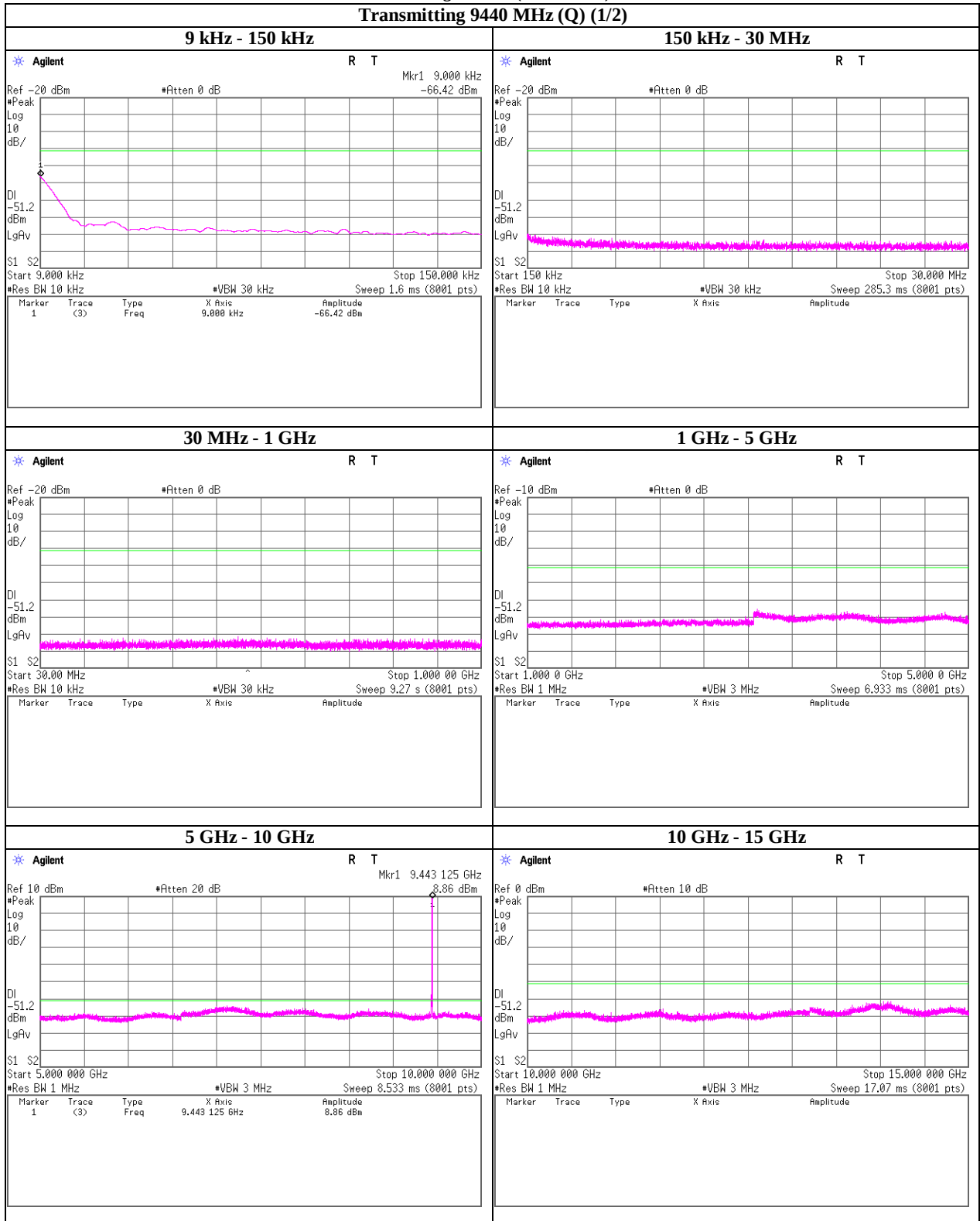
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 10, 2016
 Temperature / Humidity 24 deg.C , 45 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 4 (worst mode)

Transmitting 9440 MHz (Q) (1/2)



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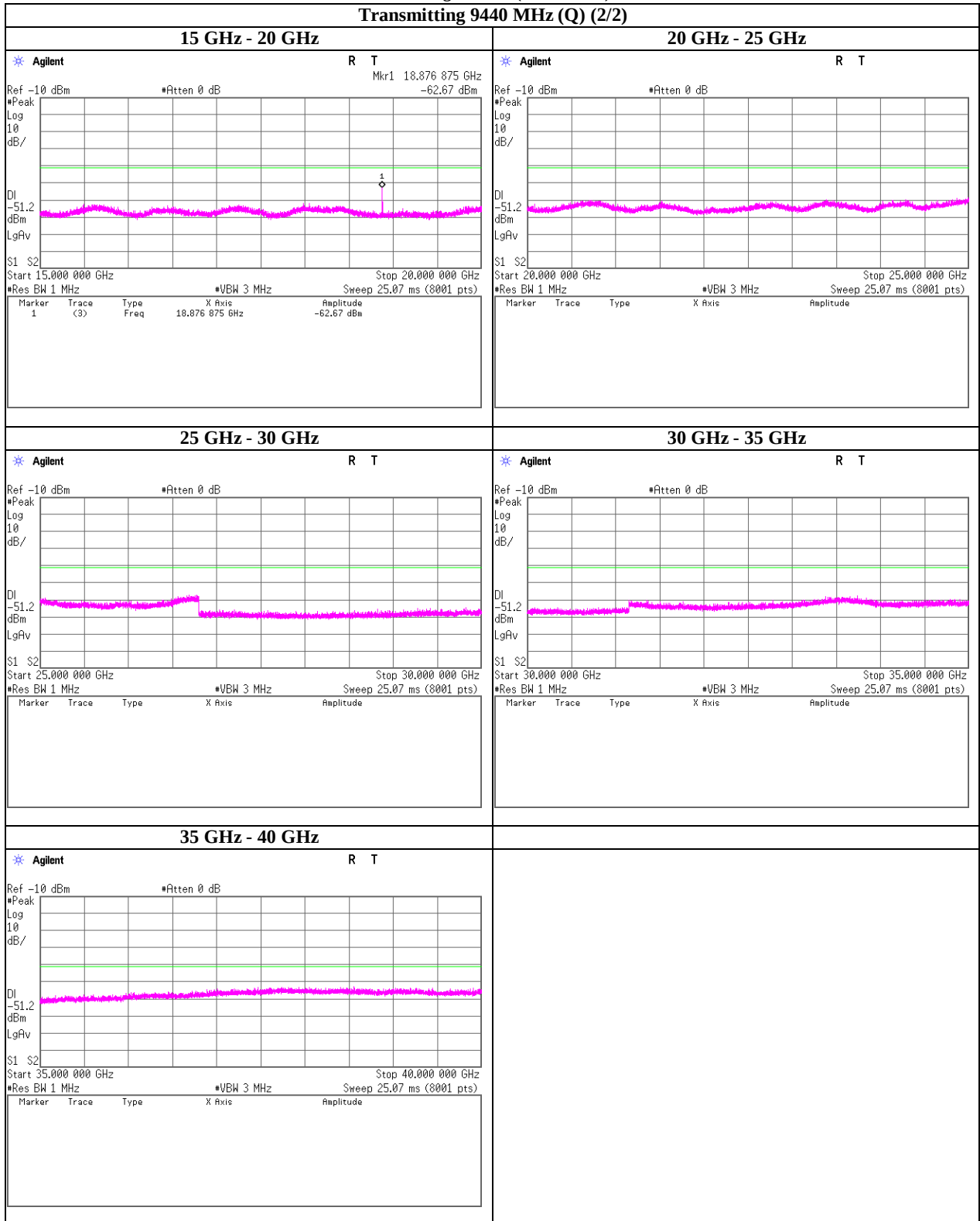
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date April 10, 2016
Temperature / Humidity 24 deg.C , 45 %RH
Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 4 (worst mode)

Transmitting 9440 MHz (Q) (2/2)



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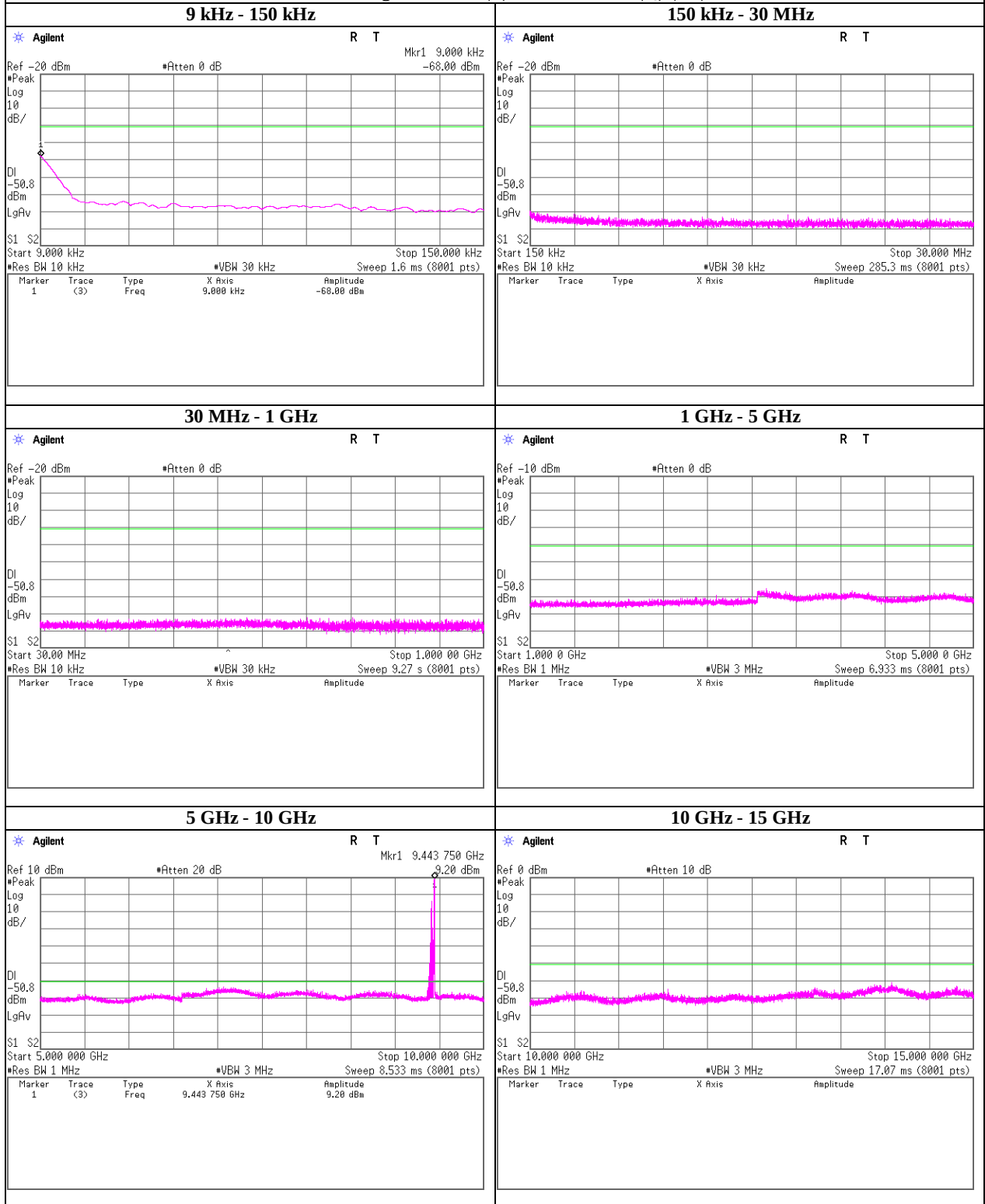
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 10, 2016
 Temperature / Humidity 24 deg.C , 45 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 4 (worst mode)

Transmitting 9410 MHz (P) and 9440 MHz (Q) (1/2)



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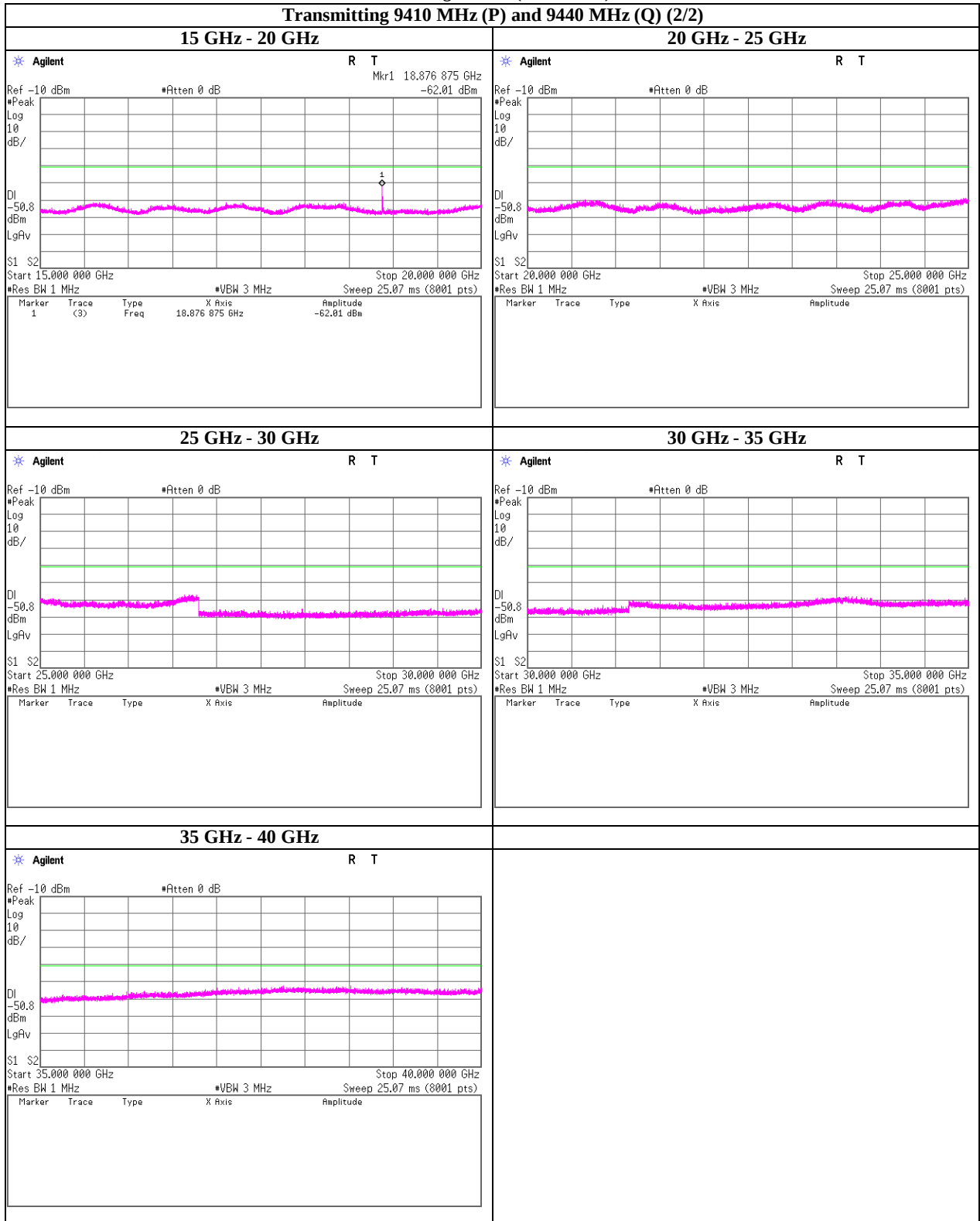
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 10, 2016
 Temperature / Humidity 24 deg.C , 45 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted) (60 dBc)

Pulse range table 4 (worst mode)

Transmitting 9410 MHz (P) and 9440 MHz (Q) (2/2)



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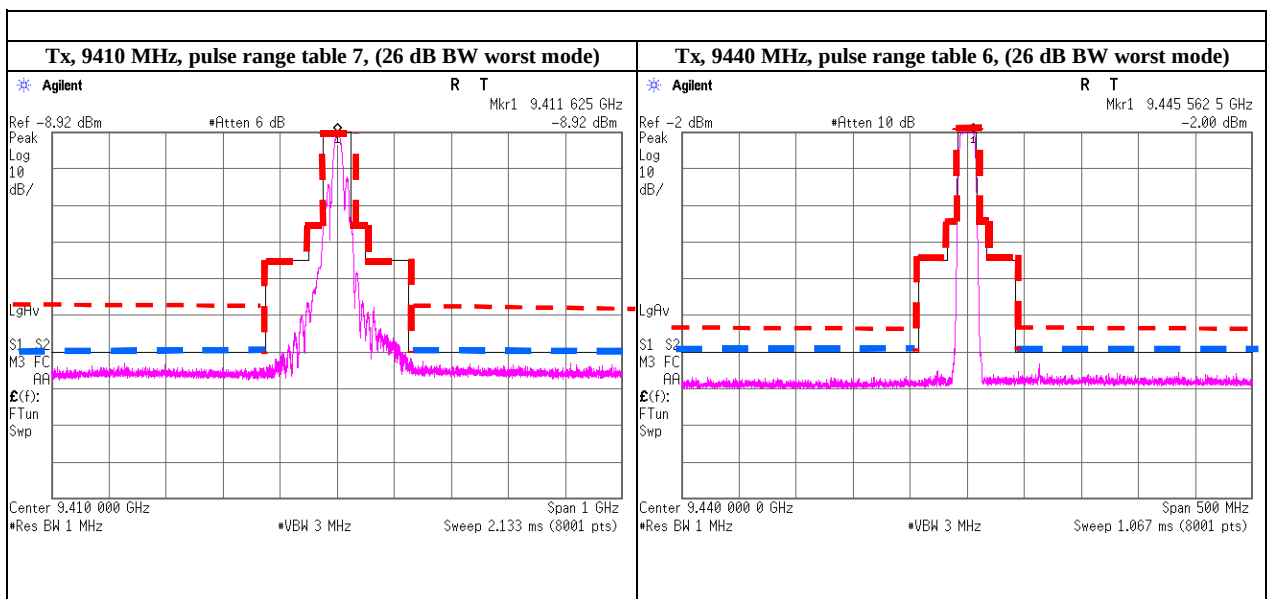
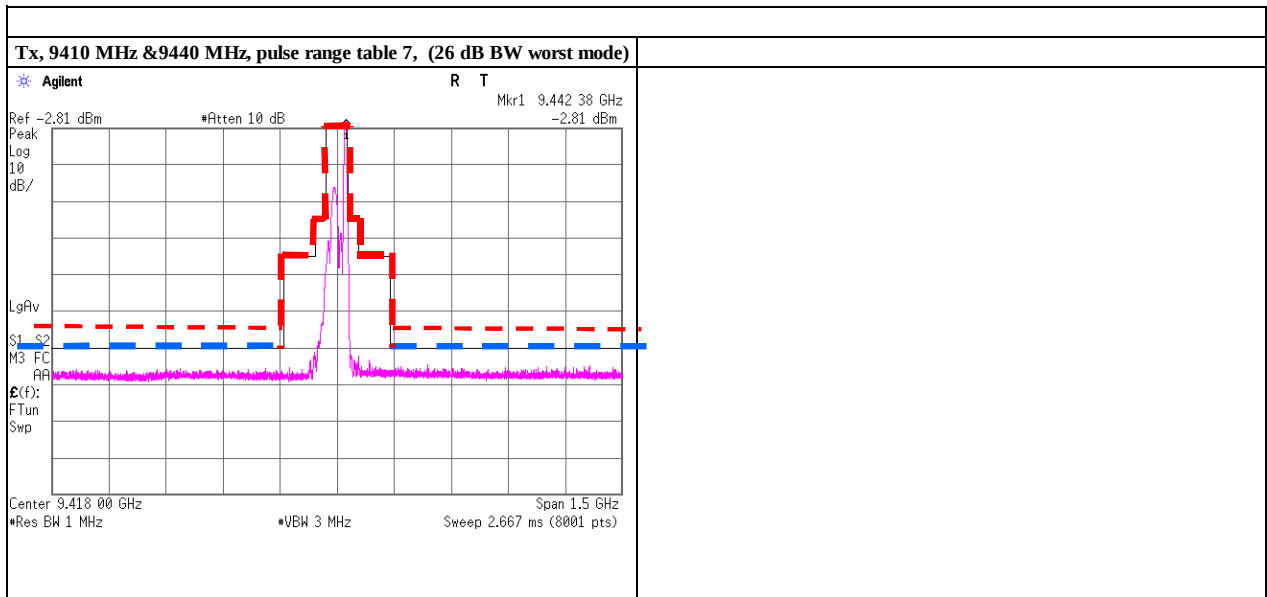
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Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date April 8, 2016
 Temperature / Humidity 24 deg.C , 56 %RH
 Engineer Kenichi Adachi

Spurious emission (Conducted)

Emission mask (Refer to FCC80.211(f) / FCC 90.210(b)(emission mask B))



- * center frequency to 50 % nominal bandwidth (measured maximum 26 dB bandwidth): Reference Level (0 dBc) (*since none-specification)
- * 50 % to 100 % nominal bandwidth : -25 dBc
- * 100 % to 250 % nominal bandwidth : -35 dBc
- *outside of 250 % nominal bandwidth : -13 dBm (Reference line -60 dBc line (Blue))

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date March 23, 2016 March 14, 2016
Temperature, Humidity 23 deg.C , 27 %RH 24 deg.C , 31 %RH
Engineer Kenichi Adachi Shinichi Takano
Mode Tx, 9410 MHz and 9440 MHz
Transmitting 9410 MHz and 9440 MHz, Pulse range table 4 (worst mode)
EUT axis: normal axis

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Result [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	119.268	PK	44.9	12.5	7.4	32.1	32.7	-62.5	-13.0	49.5	145	310	
Hori.	251.999	PK	41.3	17.2	8.4	32.0	34.9	-60.3	-13.0	47.3	139	117	
Hori.	503.997	PK	36.1	17.5	9.6	31.9	31.3	-63.9	-13.0	50.9	100	202	
Hori.	2148.401	PK	50.3	27.3	14.5	40.7	51.4	-43.8	-13.0	30.8	146	167	
Hori.	4296.798	PK	50.2	29.9	16.7	41.8	55.0	-40.2	-13.0	27.2	134	184	
Hori.	9225.000	PK	47.6	37.4	19.3	40.2	64.1	-31.1	-13.0	18.1	258	327	
Hori.	9300.000	PK	47.9	37.5	19.4	40.2	64.6	-30.6	-13.0	17.6	258	327	
Hori.	9347.500	PK	48.2	37.6	19.4	40.2	65.0	-30.2	-13.0	17.2	258	327	
Hori.	9483.750	PK	47.9	37.8	19.4	40.1	65.0	-30.2	-13.0	17.2	258	327	
Hori.	9500.000	PK	47.8	37.9	19.4	40.1	65.0	-30.2	-13.0	17.2	258	327	
Hori.	9503.250	PK	49.6	37.9	19.4	40.1	66.8	-28.4	-13.0	15.4	123	324	
Hori.	18820.000	PK	48.8	40.7	-3.2	45.2	41.1	-54.1	-13.0	41.1	123	324	
Hori.	18880.000	PK	80.9	40.7	-3.2	45.1	73.3	-21.9	-13.0	8.9	114	316	
Hori.	28233.730	PK	73.9	44.1	3.7	69.0	52.7	-42.5	-13.0	29.5	166	320	
Hori.	28320.000	PK	102.6	44.1	3.8	68.7	81.8	-13.4	-13.0	0.4	146	291	
Hori.	28655.750	PK	78.3	44.1	3.8	68.2	58.0	-37.2	-13.0	24.2	146	291	
Hori.	34257.900	PK	72.2	44.1	5.2	66.4	55.1	-40.1	-13.0	27.1	132	293	
Hori.	34374.280	PK	73.0	44.1	5.2	66.7	55.6	-39.6	-13.0	26.6	136	296	
Hori.	37644.750	PK	66.9	44.6	5.9	70.5	46.9	-48.3	-13.0	35.3	138	248	
Hori.	37760.000	PK	98.3	44.6	5.9	70.6	78.2	-17.0	-13.0	4.0	139	308	
Vert.	40.831	PK	58.3	13.6	6.8	32.2	46.5	-48.7	-13.0	35.7	139	308	
Vert.	58.840	PK	56.4	7.6	6.8	32.2	38.6	-56.6	-13.0	43.6	100	214	
Vert.	119.283	PK	54.4	12.5	7.4	32.1	42.2	-53.0	-13.0	40.0	100	79	
Vert.	251.999	PK	40.9	17.2	8.4	32.0	34.5	-60.7	-13.0	47.7	100	179	
Vert.	587.997	PK	35.5	18.8	9.9	31.9	32.3	-62.9	-13.0	49.9	100	218	
Vert.	2148.401	PK	51.2	27.3	14.5	40.7	52.3	-42.9	-13.0	29.9	100	254	
Vert.	4296.798	PK	51.6	29.9	16.7	41.8	56.4	-38.8	-13.0	25.8	116	351	
Vert.	9225.000	PK	47.6	37.4	19.3	40.2	64.1	-31.1	-13.0	18.1	118	0	
Vert.	9300.000	PK	48.0	37.5	19.4	40.2	64.7	-30.5	-13.0	17.5	246	337	
Vert.	9347.500	PK	48.5	37.6	19.4	40.2	65.3	-29.9	-13.0	16.9	246	337	
Vert.	9483.750	PK	47.9	37.8	19.4	40.1	65.0	-30.2	-13.0	17.2	246	337	
Vert.	9500.000	PK	47.8	37.9	19.4	40.1	65.0	-30.2	-13.0	17.2	246	337	
Vert.	9503.250	PK	53.5	37.9	19.4	40.1	70.7	-24.5	-13.0	11.5	246	337	
Vert.	18820.000	PK	49.3	40.7	-3.2	45.2	41.6	-53.6	-13.0	40.6	170	273	
Vert.	18880.000	PK	84.9	40.7	-3.2	45.1	77.3	-17.9	-13.0	4.9	170	273	
Vert.	28233.730	PK	69.4	44.1	3.7	69.0	48.2	-47.0	-13.0	34.0	100	333	
Vert.	28320.000	PK	91.7	44.1	3.8	68.7	70.9	-24.3	-13.0	11.3	100	341	
Vert.	28655.750	PK	70.7	44.1	3.8	68.2	50.4	-44.8	-13.0	31.8	172	268	
Vert.	34257.900	PK	64.1	44.1	5.2	66.4	47.0	-48.2	-13.0	35.2	172	268	
Vert.	34374.280	PK	63.9	44.1	5.2	66.7	46.5	-48.7	-13.0	35.7	147	264	
Vert.	37644.750	PK	67.3	44.6	5.9	70.5	47.3	-47.9	-13.0	34.9	168	291	
Vert.	37760.000	PK	87.8	44.6	5.9	70.6	67.7	-27.5	-13.0	14.5	163	260	

Result [dBuV/m] = Reading[dBuV] + Ant Factor [dB/m] + Loss (Cable+Attenuator+Filter-Distance factor(above 18 GHz))[dB] - Gain(Amplifier) [dB]

Distance factor : 18 GHz - 40 GHz : $20 \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

Result [dBm] = $10 \times \log (((10 ^ { (\text{Result [dBuV/m]} - 120) / 20) } [\text{V/m}] \times (\text{distance [m]}) ^ { 2 }) / (30 \times 10 ^ { ((\text{Gain} = 0 [\text{dB}]) / 10) }) \times 10 ^ { 3 })$

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Limit: -13 [dBm] = $10 \times \log (\text{mean power (W)} \times 10 ^ { 3 }) - (43 + 10 \times \log (\text{mean power (W)}))$ (FCC 80.211(f)(3), FCC 90.210(b)(3))

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Frequency Stability

Test place UL Japan, Inc. Shonan EMC Lab.
 No.6 Shielded Room
 Date April 11, 2016
 Temperature / Humidity 26 deg.C , 36 %RH
 Engineer Kenichi Adachi
 Mode Transmitting 9410 MHz pulse range table 5
 (used frequency error function with occupied bandwidth function (spectrum analyzer))

Test Condition [deg.C] [V]		Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	(RSS-238) *1) Limit [+/- ppm]	Margin [ppm]
20 deg.C	DC 48 V	Power on	9410.882041	0.882041	93.73	1250.00	1156.27
		on 2 min.	9411.155000	1.155000	122.74	1250.00	1127.26
		on 5 min.	9411.245000	1.245000	132.31	1250.00	1117.69
		on 10 min.	9411.220000	1.220000	129.65	1250.00	1120.35
20 deg.C	DC 40.8 V	Power on	9411.137000	1.137000	120.83	1250.00	1129.17
		on 2 min.	9410.948522	0.948522	100.80	1250.00	1149.20
		on 5 min.	9411.246000	1.246000	132.41	1250.00	1117.59
		on 10 min.	9411.524000	1.524000	161.96	1250.00	1088.04
20 deg.C	DC 55.2 V	Power on	9410.720965	0.720965	76.62	1250.00	1173.38
		on 2 min.	9411.239000	1.239000	131.67	1250.00	1118.33
		on 5 min.	9411.996000	1.996000	212.11	1250.00	1037.89
		on 10 min.	9411.161000	1.161000	123.38	1250.00	1126.62

Limit : 9410.0000 MHz +/-1250 ppm = +/- 11.762500 MHz

*1) (FCC) Frequency Lower Limit = $9300 + 1.5/T = 9300.00616$ MHz, Upper Limit = $9500 - 1.5/T = 9499.99384$ MHz. (FCC part 80)

Mode Transmitting 9440 MHz pulse range table 5
 (used frequency error function with occupied bandwidth function (spectrum analyzer))

Test Condition [deg.C] [V]		Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	(RSS-238) *1) Limit [+/- ppm]	Margin [ppm]
20 deg.C	DC 48 V	Power on	9440.504222	0.504222	53.41	1250.00	1196.59
		on 2 min.	9440.377160	0.377160	39.95	1250.00	1210.05
		on 5 min.	9440.345922	0.345922	36.64	1250.00	1213.36
		on 10 min.	9440.338244	0.338244	35.83	1250.00	1214.17
20 deg.C	DC 40.8 V	Power on	9440.242432	0.242432	25.68	1250.00	1224.32
		on 2 min.	9440.219723	0.219723	23.28	1250.00	1226.72
		on 5 min.	9440.255837	0.255837	27.10	1250.00	1222.90
		on 10 min.	9440.304826	0.304826	32.29	1250.00	1217.71
20 deg.C	DC 55.2 V	Power on	9440.331128	0.331128	35.08	1250.00	1214.92
		on 2 min.	9440.299961	0.299961	31.78	1250.00	1218.22
		on 5 min.	9440.303004	0.303004	32.10	1250.00	1217.90
		on 10 min.	9440.283830	0.283830	30.07	1250.00	1219.93

Limit : 9440.0000 MHz +/-1250 ppm = +/- 11.800000 MHz

*1) (FCC) Frequency Lower Limit = $9300 + 1.5/T = 9300.00616$ MHz, Upper Limit = $9500 - 1.5/T = 9499.99384$ MHz. (FCC part 80)

APPENDIX 2

Test Instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2016/04/01 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2016/04/01 * 12
SRENT-05	Spectrum Analyzer	KEYSIGHT	E4440A	MY46187752	AT	2015/10/05 * 12
SCC-G32	Coaxial Cable	Junkosha	MWX241-02000KM SKMS	OCT-09-13-00 5	AT, Freq	2015/10/08 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2015/12/07 * 12
KTS-08	Digital Tester	SANWA	PC500	7019224	AT	2016/03/15 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2015/07/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2015/10/11 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2015/10/11 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2015/08/31 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/ Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE/ 141PE/NS4906	-/0901-271(RF Selector)	RE	2015/04/17 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2016/02/25 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	RE, AT, Freq	2015/09/16 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RF,LF)	-	RE	-
SJM-15	Measure	ASKUL	-	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2015/11/18 * 12
SCC-03	Coaxial Cable	Fujikura	5D2W	-	RE	2015/06/23 * 12
STM-13	Terminator	TME	CT-01 BP	-	RE	2015/12/18 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2015/07/13 * 12
SHA-06	Horn Antenna	ETS LINDGREN	3160-10	LM3459	RE	2016/03/24 * 12
SAF-10	Pre Amplifier	TOYO Corporation	HAP26-40W	00000010	RE	2016/03/23 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2015/11/06 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2016/03/24 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2015/09/07 * 12
SCC-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-00 3	RE	2015/04/30 * 12
SCC-01	Coaxial Cable	Fujikura	5D2W	-	RE, AT	2016/01/12 * 12
STM-02	Terminator	TME	CT-01 BP	-	RE	2015/12/18 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2015/10/22 * 12
SJM-16	Measure	ASKUL	-	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2015/11/18 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2015/08/10 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2015/04/17 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE, AT	2015/11/04 * 12

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item : RE: Radiated emission,
Frequency stability test

AT: Antenna terminal conducted tests ,

Freq:

APPENDIX 2

Test Instruments

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2016/03/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2015/05/19 * 12
KST-08	Oscilloscope	Agilent	DSO6052A	MY44001066	AT	2015/10/14 * 12
SDT-01	Coaxial Crystal Detector	Agilent	8473C	MY42240890	AT	Pre Check
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	AT	2015/12/07 * 12
SAT20-07	Attenuator	Weinschel Corp.	54A-20	31484	AT	2015/04/09 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT, Freq	2015/04/09 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	AT, Freq	2015/11/18 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT, Freq	2015/10/22 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT, Freq	2016/03/22 * 12

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

RE: Radiated emission,

AT: Antenna terminal conducted tests

Freq: Frequency stability test