



RADIO TEST REPORT

Test Report No. : 33FE0016-HO-C

Applicant : SAMSUNG ELECTRONICS CO., LTD.
Type of Equipment : GSM/GPRS 850/1900 and WCDMA850 Phone with
BT v3.0(EDR), 802.11b/g/n, EDGE Rx only and Hotspot
Model No. : GT-S5303B
Test standard : FCC Part 22 Subpart H: 2006
FCC ID : A3LGTS5303B
Test Result : **Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: January 21 to 25, 2013

**Representative
test engineer:**

Yutaka Yoshida
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 33FE0016-HO-C

[illegible]

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SECTION 1: Customer information

Company Name : SAMSUNG ELECTRONICS CO., LTD.
Address : 416, MAETAN 3-DONG, YEONGTONG-GU SUWON-CITY,
GYEONGGI-DO 443-742, SOUTH KOREA

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

2.1 Identification of E.U.T.

Type of Equipment : GSM/GPRS 850/1900 and WCDMA850 Phone with BT v3.0(EDR),
802.11b/g/n, EDGE Rx only and Hotspot
Model No. : GT-S5303B
Serial No. : Refer to Section 4, Clause 4.2
Rating : AC100-240V/50-60Hz (AC Adapter)
DC3.7V/1200mAh (Battery)
Receipt Date of Sample : January 18, 2013
Modification of EUT : No Modification by the test lab

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2.2 Product Description

Radio Specification

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Type	Cap
Antenna Gain	-5.88dBi

WLAN (IEEE802.11b/g/n-20)

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20MHz & 5MHz
Antenna Type	Cap
Antenna Gain	-5.88dBi

GSM

Equipment Type	Transceiver
Frequency of Operation	[Up Link] GSM850: 824 – 849MHz PCS: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS: 1930 – 1990MHz
Type of Modulation	GMSK
Emission Designator	GSM850: 247KGXW PCS: 251KGXW
Antenna Type	PIFA
Antenna Gain	GSM850: -6.7dBi PCS: -8.3dBi

W-CDMA

Equipment Type	Transceiver
Frequency of Operation	[Up Link] Band V: 824 – 849MHz [Down Link] Band V: 869 – 894MHz
Type of Modulation	QPSK
Emission Designator	Band V: 4M17F9W
Antenna Type	PIFA
Antenna Gain	Band V: -6.7dBi

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 22 Subpart H: 2006, final revised on November 29, 2006
Title : FCC 47CFR Part 22 Subpart H
Cellular Radiotelephone Service

3.2 Procedures and results

Item	Test Specification & Procedure	Remarks	Deviation	Worst margin	Results
RF Output Power(Conducted/ Radiated) (Conducted Output Power / Effective radiated power(ERP))	FCC 2.1046 FCC 22.913(a)(2)	Conducted/ Radiated	N/A	-	Complied
Emission Bandwidth, 99% Occupied Bandwidth	FCC 2.1049 FCC 22.917	Conducted	N/A	-	Complied
Band-Edge	FCC 2.1051 FCC 2.1053 FCC 22.917	Conducted/ Radiated	N/A	GSM [Conducted] 0.32dB 849.019MHz [Radiated] 6.2dB 849.02MHz, Vertical W-CDMA [Conducted] 11.02dB 849.000MHz [Radiated] 9.6dB 849.00MHz, Vertical	Complied
Spurious Emission(Conducted)	FCC 2.1051 FCC 22.917	Conducted	N/A	-	Complied
Spurious Emission(Radiated)	FCC 2.1053 FCC 22.917	Radiated	N/A	GSM 25.2dB 1673.20MHz, Vertical W-CDMA 33.3dB 3386.40MHz, Horizontal	Complied
Frequency Stability (Temperature Variation)	FCC 2.1055(a)(1)(b) FCC 22.355	Conducted	N/A	-	Complied
Frequency Stability (Voltage Variation)	FCC 2.1055(d)(1)(2) FCC 22.355	Conducted	N/A	-	Complied
Note: UL Japan's EMI Work Procedures No. 13-EM-W0420					

*These tests were also referred to ANSI/TIA 603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards."

*These tests were performed without any deviations from test procedure except for additions or exclusions.

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3.3 Uncertainty

EMI

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

Radiated Emission (EUT height: 0.8m) (+dB)	
Measurement Distance 3m	
30MHz-300MHz	5.4dB
300MHz-1000MHz	4.0dB
1GHz-12.75GHz	4.4dB

Power meter (+dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Antenna Terminal Conducted emission test

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

Radiated emission test(3m)

The data listed in this test report has enough margin, more than the site margin.

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3.4 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test): 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.5 Test set up, Test instruments and Data of EMI

Refer to APPENDIX.

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

4.1 Operating Modes

<GSM850>

Test	Operating mode	Power Control	Tested frequency	Channel
RF output Power(Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1-4slots, CS-1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Peak to Average power Ratio (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
RF output Power (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Emission Bandwidth, 99% Occupied bandwidth	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=5)	836.6MHz	190
Band Edge (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=5)	824.2MHz 848.8MHz	128 251
Band Edge (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=5)	824.2MHz 848.8MHz	128 251
Spurious Emission (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Spurious Emission (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Frequency Stability (Temperature/Voltage Variation)	Transmitting (Tx) (GSM, GMSK, 1slot)	Max (PCL=5)	836.6MHz	190

[GPRS]

*Single slot (1 slot) which had the highest frame power was tested as a representative.

<W-CDMA Band V>

Test	Operating mode	Power Control	Tested frequency	Channel
RF output Power(Conducted)	Transmitting (Tx) W-CDMA (RMC12.2kbps) Transmitting (Tx) W-CDMA (AMR) Transmitting (Tx) W-CDMA (HSDPA Subtest 1-4) Transmitting (Tx) W-CDMA (HSUPA Subtest 1-5)	See Section 4.1.1	826.4MHz 836.6MHz 846.6MHz	4132 4183 4233
RF output Power (Radiated), Spurious Emission (Conducted/Radiated), Peak to Average power Ratio (Conducted)	Transmitting (Tx) W-CDMA (RMC12.2kbps)	TPC all up bits (MAX)	826.4MHz 836.6MHz 846.6MHz	4132 4183 4233
Band Edge (Conducted/Radiated)	Transmitting (Tx) W-CDMA (RMC12.2kbps)	TPC all up bits(MAX)	826.4MHz 846.6MHz	4132 4233
Emission Bandwidth, 99% Occupied bandwidth, Frequency Stability (Temperature/Voltage Variation)	Transmitting (Tx) W-CDMA (RMC12.2kbps)	TPC all up bits (MAX)	836.6MHz	4183

*The WCDMA and HSPA modes of EUT were verified on each channel and "sub-tests" according to section 4.1.1.
(Also refer to Release-6 procedures in section5.2 of 3GPP TS 34.121.)

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4.1.1 Explanation of the Rel-99 WCDMA and Rel-6 HSPA measurement mode

3GPP defines UE Test Modes and Channel Configurations for Regulatory Testing.

- **UE Test Modes:**
Test Mode 1(Data Loopback Test)
- **Channel Configurations:**
R99 – 12.2kbps Reference Measurement Channel (RMC) channel
HSDPA – Fixed Reference Channel (FRC)
HSUPA – New HSUPA channel configuration (HSDPA data from DL is looped back onto UL)
- **Procedure to configure UE to transmit maximum power:**
Rel99: 3GPP TS 34.121 section 5.2
HSDPA Rel5: 3GPP TS 34.121 section 5.2A
HSDPA Rel6: 3GPP TS 34.121 section 5.2AA
HSUPA Rel6: 3GPP TS 34.121 section 5.2B

* About Rel-99 and HSDPA testing, test equipment sends “all up bits” forcing UE max power

1) Explanation for HSDPA/HSPA Subtests

3GPP TS 34.121 defines test requirements and procedures for testing all variations of WCDMA. 3GPP TS 34.121 defines 4 HSDPA test configurations and 5 HSPA test configurations (“Subtests”) for various RF Conformance tests. The Following table shows Release 5 HSDPA and Release 6 HSPA Subtest Configurations per 3GPP TS 34.121.

[HSDPA]

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

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[HSUPA]

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{oc}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E- TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81
Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$. Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$. Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g. Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.													

2) Maximum Output Power Verification

[HSDPA]

Maximum output power was verified on High, Middle and Low channels according to the Release 5 procedures described in section 5.2 of 3GPP TS 34.121, using an FRC with H-set 1 and 12.2kbps RMC with TPC (transmit power control) set to all "1's". Output power was measured according requirements for HS-DPCCH Sub-test 1-4.

[HSUPA]

Maximum output power was verified on the High, Middle and Low channels according to Release 6 procedures in section 5.2 of 3GPP TS 34.121, using the appropriate RMC, FRC and E-DCH configurations. When E-DCH was active, inner loop power control with power control algorithm 2 was used to maintain E-TFCI requirements. Output power for the applicable HSPA modes was measured for E-DCH Sub-test 1-5.

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3) Test Equipment Setting Summary Table

The following table is the key parameters that was configured in test equipment.

Subtest	Mode	Loopback Mode	Rel99 RMC	HSDPA FRC	HSUPA Test	Common Setting		β_c/β_d	MPR	Power Class 3 limit
						β_c	β_d			
	Rel99	Test Mode 1	12.2kbps RMC	-	-	-	-	8/15	-	24(+1.7/-3.7dB)
1	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	-	2/15	15/15	2/15	0	24(+1.7/-3.7dB)
2	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	-	12/15	15/15	12/15	0	24(+1.7/-3.7dB)
3	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	-	15/15	8/15	15/8	0.5	23.5(+2.2/-3.7dB)
4	Rel6 HSDPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	-	15/15	4/15	15/4	0.5	23.5(+2.2/-3.7dB)
1	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	HSUPA Loopback	11/15	15/15	11/15	0	24(+1.7/-3.7dB)
2	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	HSUPA Loopback	6/15	15/15	6/15	2	22(+3.7/-3.7dB)
3	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	HSUPA Loopback	15/15	9/15	15/9	1	23(+2.7/-3.7dB)
4	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	HSUPA Loopback	2/15	15/15	2/15	2	22(+3.7/-3.7dB)
5	Rel6 HSUPA	Test Mode 1	12.2kbps RMC	H-Set 1 (QPSK)	HSUPA Loopback	15/15	15/15	15/15	0	24(+1.7/-3.7dB)

Subtest	HSDPA Specific Settings						
	ΔACK	$\Delta NACK$	ΔCQI	Ack-Nack repetition factor	CQI Feedback	CQI Repetition Factor	Ahs= β_{hs}/β_c
Rel 6 HSDPA							
1	8	8	8	3	4ms	2	30/15
2	8	8	8	3	4ms	2	30/15
3	8	8	8	3	4ms	2	30/15
4	8	8	8	3	4ms	2	30/15

Subtest	HSDPA Specific Settings							HSUPA Specific Settings			HSUPA Additional Info	
	ΔACK	$\Delta NACK$	ΔCQI	Ack-Nack repetition factor	CQI Feedback	CQI Repetition Factor	Ahs= β_{hs}/β_c	$\Delta E-DPCCH$	$\Delta HARQ$	AG Index	ETFCI (form TS34.121 Table C.11.1.3)	Associated Max UL Data Rate kbps
Rel 6 HSPA												
1	8	8	8	3	4ms	2	30/15	6	0	20	75	242.1
2	8	8	8	3	4ms	2	30/15	8	0	12	67	174.9
3	8	8	8	3	4ms	2	30/15	8	0	15	92	482.8
4	8	8	8	3	4ms	2	30/15	5	0	17	71	205.8
5	8	8	8	3	4ms	2	30/15	7	0	21	81	308.9

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HSUPA Reference E-TFCI Parameters
[Subtest 1,2,4,5]

Information Element	Value/Remark
E-DCH info	Uplink DPCH info
- E-DPDCH info	
- Reference E-TFCIs	5 E-TFCIs
- Reference E-TFCI	11
- Reference E-TFCI PO	4
- Reference E-TFCI	67
- Reference E-TFCI PO	18
- Reference E-TFCI	71
- Reference E-TFCI PO	23
- Reference E-TFCI	75
- Reference E-TFCI PO	26
- Reference E-TFCI	81
- Reference E-TFCI PO	27

[Subtest 3]

Information Element	Value/Remark
E-DCH info	Uplink DPCH info
- E-DPDCH info	
- Reference E-TFCIs	2 E-TFCIs
- Reference E-TFCI	11
- Reference E-TFCI PO	4
- Reference E-TFCI	92
- Reference E-TFCI PO	18

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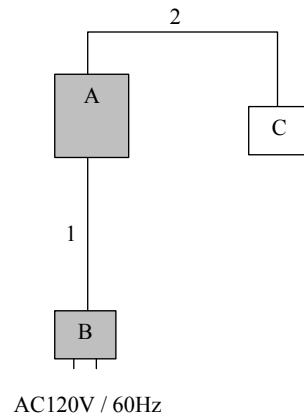
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	GSM/GPRS 850/1900 and WCDMA850 Phone with BT v3.0(EDR), 802.11b/g/n, EDGE Rx only and Hotspot	GT-S5303B	355779050000165 *1) 355779050000170 *2) 355779050000150 *3)	SAMSUNG	EUT
B	AC Adapter	ETA0U10RBS	-	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

*1) Used for Radiated Emission tests

*2) Used for RF Output Power (Conducted) test only

*3) Used for other Conducted tests except for RF Output Power (Conducted) only

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Ear phone Cable	1.6	Unshielded	Unshielded	-

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SECTION 5: RF Output Power (Conducted/Radiated)

[Conducted: Conducted Output Power]

Test Procedure

The RF output power (conducted) was measured with Wireless Communication Test Set and an attenuator at the antenna port.

[Radiated : Effective radiated power(ERP)]

Test Procedure

- 1) EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in a semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
- 2) Exchanged the EUT to the Substitution Antenna, the antenna was set for the same height as EUT on the table. The frequency below 1GHz of the Substitution Antenna was used as the Half wave dipole Antenna, which is harmonized with the measured frequency in 1).
The Substitution Antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.
- 3) Effective radiated power(ERP) was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).

- The carrier level and noise levels were confirmed at each position of X, Y and Z axis of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test data : **APPENDIX 1**

Test result : **Pass**

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SECTION 6: Bandwidth (Conducted)

Test Procedure

The Emission Bandwidth and 99% Occupied Bandwidth was measured with a spectrum analyzer and attenuator connected to the antenna port.

Test data	:	APPENDIX 1
Test result	:	Pass

SECTION 7: Spurious Emission and Band-Edge (Conducted/Radiated)

[Conducted]

Test Procedure

The Spurious Emission and Band-Edge was measured with a spectrum analyzer and attenuator connected to the antenna port.

[Radiated]

Test Procedure

- 1) EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in a semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
- 2) Exchanged the EUT to the Substitution Antenna, the antenna was set for the same height as EUT on the table. The frequency below 1GHz of the Substitution antenna was used as the Half wave dipole antenna and Shorted dipole antenna calibrated with the Half wave dipole antenna, which is harmonized with the measured frequency in 1).
The frequency above 1GHz of the Substitution antenna was used with Horn antenna calibrated with the Half wave dipole antenna.
The Substitution antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution antenna was matched with the one of the measuring antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.
- 3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the antenna (Shorted dipole and Horn antenna) except for the Half wave dipole antenna (2.15dBi) for the Substitution antenna, the Effective radiated power was calculated by compensating the finite difference in the antenna gain of the Half wave dipole antenna, and Substitution antenna.

- The carrier level and noise levels were confirmed at each position of X, Y and Z axis of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test data	:	APPENDIX 1
Test result	:	Pass

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SECTION 8: Frequency Stability(Temperature/Voltage Variation)

Test Procedure

The Frequency Stability was measured with a Radio Communication Analyzer and attenuator connected to the antenna port. The Frequency Drift was measured with the 10 deg. C steps from -30 deg. C to 50 deg. C, and it is presented as the ppm unit. The Frequency Drift was measured with the normal temperature (20 deg. C) and Voltage tolerance (DC3.45V to DC4.2V), and it is presented as the ppm unit.

Temperature : -30deg. C to +50deg. C (10 deg. C step)
Voltage : Vnom:DC3.7V, Vmin:DC3.45V, Vmax:DC4.2V

As the operating input voltage of the EUT is between DC3.45V to 4.2V (nominal voltage: DC3.7V), Frequency Stability test was performed under the above condition.

Test data : **APPENDIX 1**
Test result : **Pass**

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APPENDIX 1: Data of EMI test

RF Output Power (Conducted)

Conducted Output Power GSM850

Test place : Head Office EMC Lab. No.3 Measurement Room
Report No. : 33FE0016-HO
Date : 01/22/2013
Temperature/ Humidity : 24deg. C / 50% RH
Engineer : Hisayoshi Sato
Mode : Tx GSM(GMSK), 1slot, PCL=5
Tx GPRS(GMSK), 1slot, 2slots, 3slots, 4slots, CS-1, PCL=5

Mode		Ch	Frequency [MHz]	Average frame power			
				Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]
GSM	1slot	128	824.2	18.48	9.94	3.85	32.27
		190	836.6	18.77	9.94	3.85	32.56
		251	848.8	18.58	9.94	3.85	32.37
GPRS (CS1)	1slot	128	824.2	18.78	9.94	3.85	32.57
		190	836.6	18.95	9.94	3.85	32.74
		251	848.8	18.82	9.94	3.85	32.61
	2slots	128	824.2	16.48	9.94	3.85	30.27
		190	836.6	16.67	9.94	3.85	30.46
		251	848.8	16.54	9.94	3.85	30.33
	3slots	128	824.2	14.76	9.94	3.85	28.55
		190	836.6	14.92	9.94	3.85	28.71
		251	848.8	14.82	9.94	3.85	28.61
	4slots	128	824.2	13.98	9.94	3.85	27.77
		190	836.6	14.12	9.94	3.85	27.91
		251	848.8	14.05	9.94	3.85	27.84

Results = Reading + Atten. + Cable Loss

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RF Output Power (Conducted)
Conducted Output Power
W-CDMA Band V

Test place : Head Office EMC Lab. No.6 Measurement Room
Report No. : 33FE0016-HO
Date : 01/25/2013
Temperature/ Humidity : 18deg. C / 37% RH
Engineer : Yutaka Yoshida
Mode : Tx W-CDMA

Mode	Ch	Frequency [MHz]	Reading AVG [dBm]	Cable Loss [dB]	Result [dBm]
RMC 12.2kbps	Low	826.4	22.42	0.17	22.59
	Mid	836.6	22.18	0.17	22.35
	High	846.6	22.40	0.17	22.57
AMR	Low	826.4	22.39	0.17	22.56
	Mid	836.6	22.18	0.17	22.35
	High	846.6	22.38	0.17	22.55
HSDPA Subtest 1	Low	826.4	22.11	0.17	22.28
	Mid	836.6	21.88	0.17	22.05
	High	846.6	22.04	0.17	22.21
HSDPA Subtest 2	Low	826.4	22.03	0.17	22.20
	Mid	836.6	21.80	0.17	21.97
	High	846.6	21.94	0.17	22.11
HSDPA Subtest 3	Low	826.4	21.96	0.17	22.13
	Mid	836.6	21.75	0.17	21.92
	High	846.6	21.87	0.17	22.04
HSDPA Subtest 4	Low	826.4	21.94	0.17	22.11
	Mid	836.6	21.73	0.17	21.90
	High	846.6	21.85	0.17	22.02
HSUPA Subtest 1	Low	826.4	21.26	0.17	21.43
	Mid	836.6	21.26	0.17	21.43
	High	846.6	21.00	0.17	21.17
HSUPA Subtest 2	Low	826.4	19.43	0.17	19.60
	Mid	836.6	19.43	0.17	19.60
	High	846.6	19.44	0.17	19.61
HSUPA Subtest 3	Low	826.4	20.45	0.17	20.62
	Mid	836.6	20.56	0.17	20.73
	High	846.6	20.50	0.17	20.67
HSUPA Subtest 4	Low	826.4	19.64	0.17	19.81
	Mid	836.6	19.53	0.17	19.70
	High	846.6	19.17	0.17	19.34
HSUPA Subtest 5	Low	826.4	20.71	0.17	20.88
	Mid	836.6	20.61	0.17	20.78
	High	846.6	20.65	0.17	20.82

Results = Reading + Cable Loss

*The enhanced power reduction may result in around 1dB of variance from the MPR target values depending on HSPA channel configuration (e.g. 34.121 subtest) and characteristics of hardware RF design.

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RF Output Power (Radiated)
Effective radiated power(ERP)
GSM850

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 01/21/2013
Temperature / Humidity 20 deg. C / 37% RH
Engineer Katsunori Okai
Mode Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
824.20	94.6	91.8	39.9	41.0	5.7	2.15	10.0	24.2	25.3	38.4	14.2	13.1	103	263	141	221	
836.60	95.9	93.5	41.2	42.8	5.8	2.15	10.0	25.4	27.0	38.4	13.0	11.4	104	267	138	225	
848.80	95.1	93.3	40.5	42.2	5.8	2.15	10.1	24.6	26.3	38.4	13.8	12.1	105	265	135	137	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A PK (RBW: 3MHz , VBW: 8MHz)

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RF Output Power (Radiated)
Effective radiated power(ERP)
W-CDMA Band V

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 01/21/2013
Temperature / Humidity 20 deg. C / 37% RH
Engineer Katsunori Okai
Mode Tx W-CDMA(RMC12.2kbps), All Up Bits

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
826.40	86.5	84.6	31.3	33.3	5.7	2.15	10.0	15.6	17.6	38.4	22.9	20.9	104	260	140	232	
836.60	86.1	84.4	30.9	32.9	5.8	2.15	10.0	15.1	17.1	38.4	23.3	21.3	102	258	139	241	
846.60	87.7	85.5	32.6	33.3	5.8	2.15	10.1	16.8	17.5	38.4	21.7	21.0	105	83	139	223	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A PK (RBW: 5MHz, VBW: 50MHz)

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Peak to Average power Ratio (Conducted)

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.6 Measurement Room
Date 01/23/2013
Temperature / Humidity 21deg. C / 48% RH
Engineer Yutaka Yoshida
Mode Tx GSM(GMSK), 1slot, PCL=5
Tx GPRS(GMSK), 1slot, CS-1, PCL=5
Tx W-CDMA(RMC12.2kbps), All Up Bits

Mode	Channel	Frequency [MHz]	Peak to Average power Ratio [dB]
GSM *1)	128	824.2	0.030
	190	836.6	0.043
	251	848.8	0.032
GPRS *1)	128	824.2	0.038
	190	836.6	0.038
	251	848.8	0.096
W-CDMA *2)	4132	826.4	3.18
	4183	836.6	3.16
	4233	846.6	3.06

*In order to decide the largest deviation between the average and the peak power of the EUT in a bandwidth,

*1) an average and a peak trace of the spectrum analyzer was used for GSM Signals ;

*2) Complementary Cumulative Distribution Function (CCDF) curves of the spectrum analyzer were used for W-CDMA Signals.

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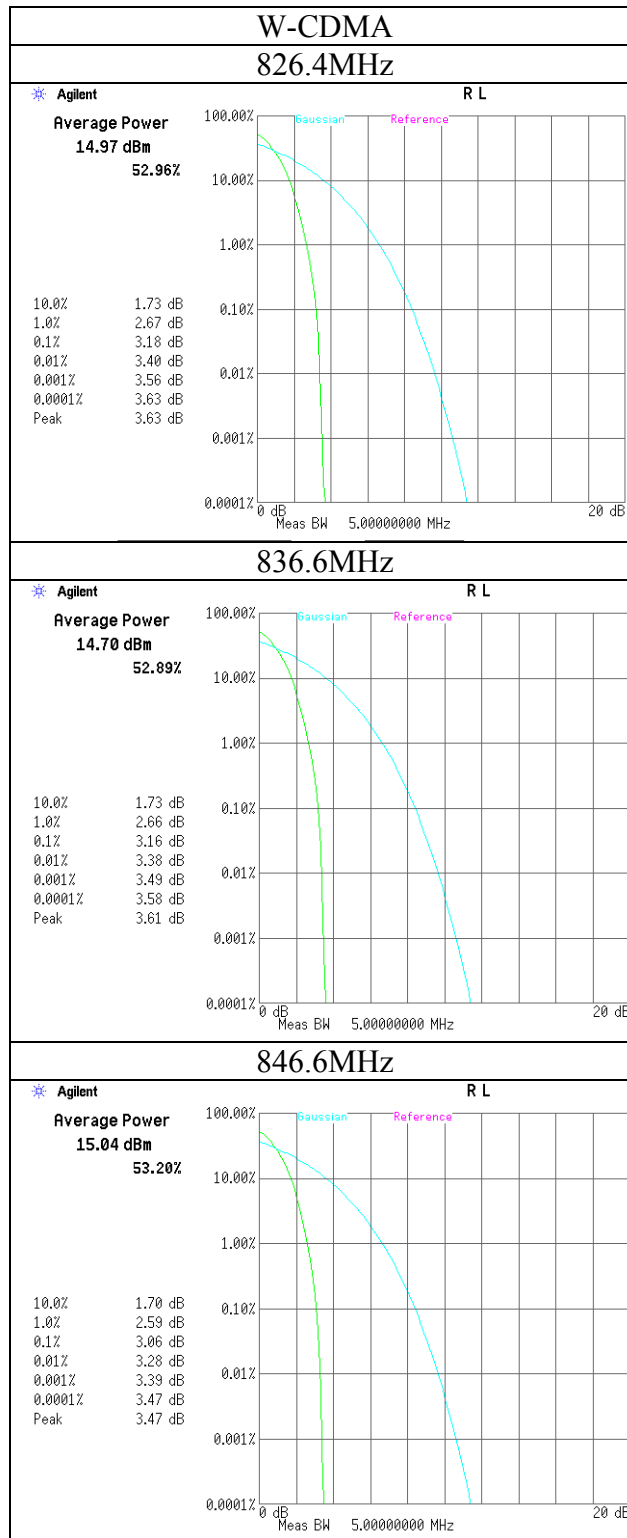
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Peak to Average power Ratio (Conducted)
W-CDMA Band V

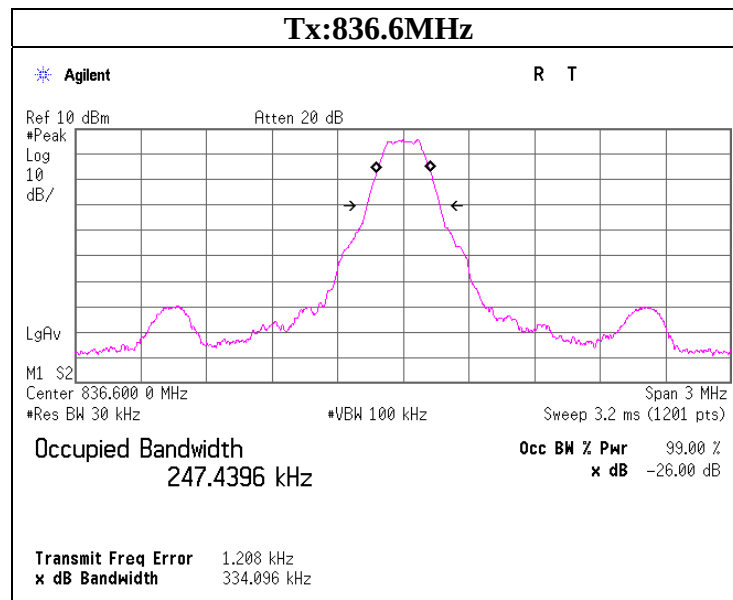


*Set the spectrum analyzer radio mode to 3GPP WCDMA (CCDF)

Bandwidth(Conducted) GSM850

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=5

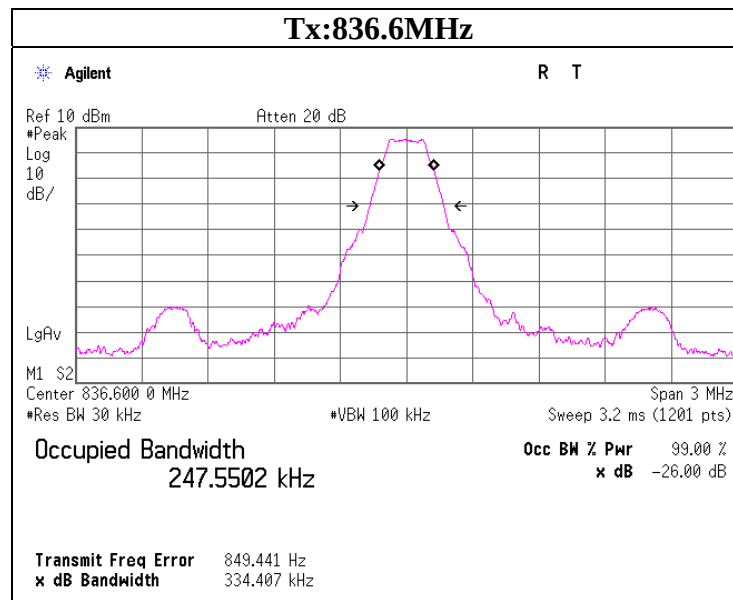
CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[kHz]	[kHz]	[kHz]
Mid	836.6	334.096	247.440	-



Bandwidth(Conducted) GSM850

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GPRS(GMSK), 1slot, CS-1, PCL=5

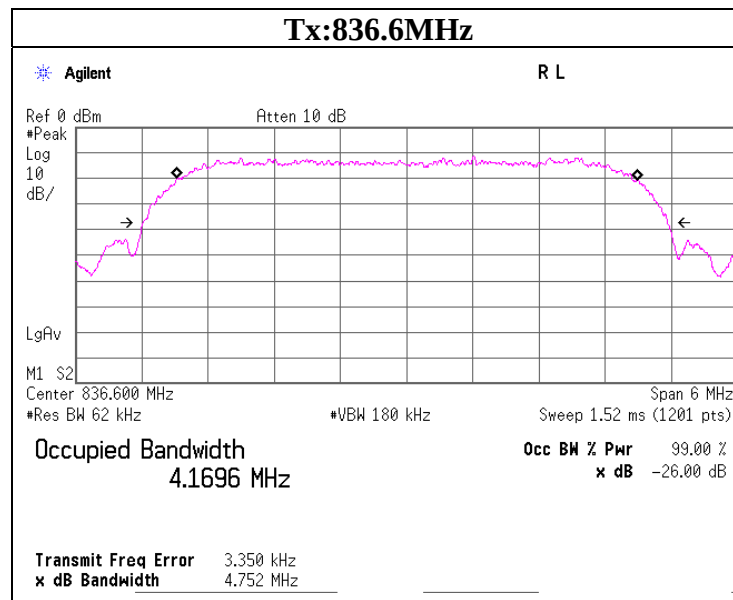
CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[kHz]	[kHz]	[kHz]
Mid	836.6	334.407	247.550	-



Bandwidth(Conducted) W-CDMA Band V

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[MHz]	[MHz]	[MHz]
Mid	836.6	4.752	4.170	-



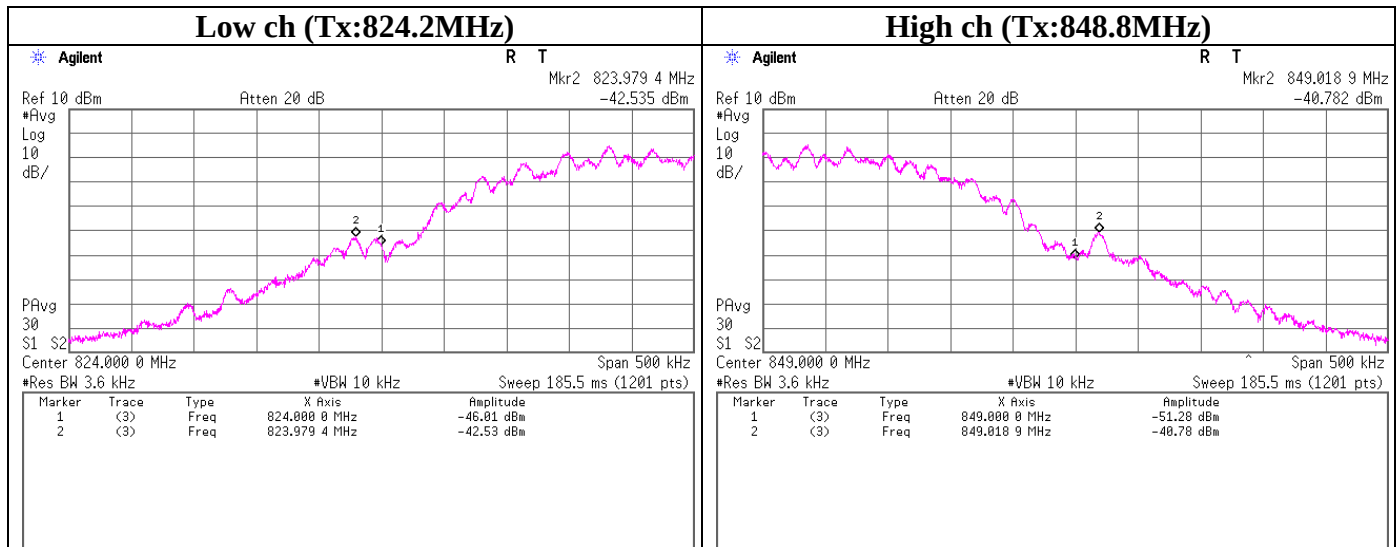
Band-Edge(Conducted) GSM850

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.979	-42.53	20.00	7.46	-15.07	-13.0	2.07
824.000	-46.01	20.00	7.46	-18.55	-13.0	5.55
849.000	-51.28	20.00	7.46	-23.82	-13.0	10.82
849.019	-40.78	20.00	7.46	-13.32	-13.0	0.32

Power RMS Average 30 times

Sample Calculation : Result = Reading + Atten. + Cable Loss



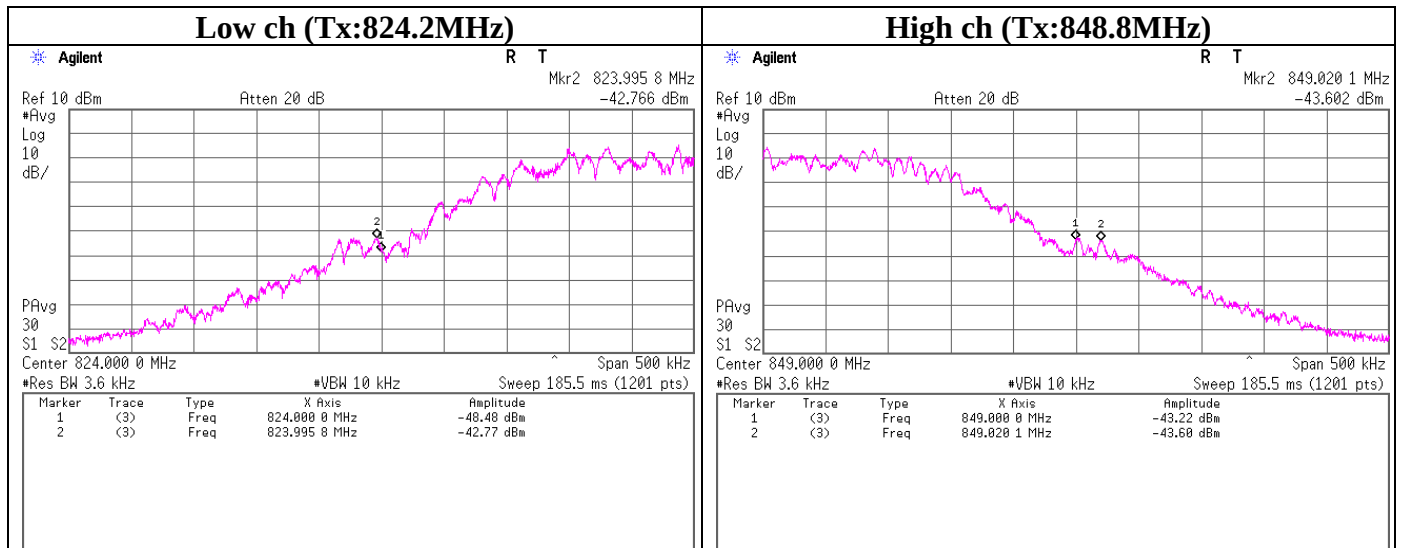
Band-Edge(Conducted) GSM850

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx GPRS(GMSK), 1slot, CS-1, PCL=5

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.996	-42.77	20.00	7.46	-15.31	-13.0	2.31
824.000	-48.48	20.00	7.46	-21.02	-13.0	8.02
849.000	-43.22	20.00	7.46	-15.76	-13.0	2.76
849.020	-43.60	20.00	7.46	-16.14	-13.0	3.14

Power RMS Average 30 times

Sample Calculation : Result = Reading + Atten. + Cable Loss



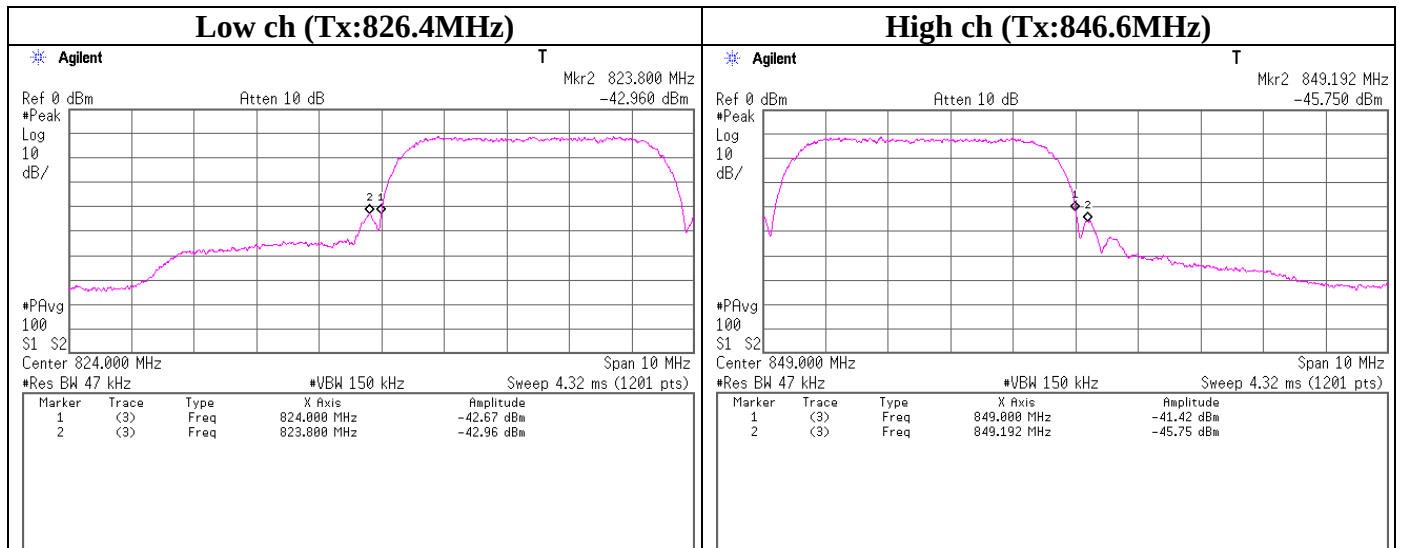
Band-Edge(Conducted) W-CDMA Band V

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/23/2013
Temperature/ Humidity	21deg. C / 48% RH
Engineer	Yutaka Yoshida
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.800	-42.96	9.94	7.46	-25.56	-13.0	12.56
824.000	-42.67	9.94	7.46	-25.27	-13.0	12.27
849.000	-41.42	9.94	7.46	-24.02	-13.0	11.02
849.192	-45.75	9.94	7.46	-28.35	-13.0	15.35

Power RMS Average 100 times

Sample Calculation : Result = Reading + Atten. + Cable Loss



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Band-Edge (Radiated) GSM850

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 01/21/2013
Temperature / Humidity 20deg. C / 37% RH
Engineer Katsunori Okai
Mode Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
823.98	46.2	43.4	-7.6	-5.8	5.7	2.15	10.0	-23.3	-21.5	-13.0	10.3	8.5	103	263	141	221	
824.00	39.6	40.1	-14.2	-9.1	5.7	2.15	10.0	-29.9	-24.8	-13.0	16.9	11.8	103	263	141	221	
849.00	41.4	37.8	-11.9	-12.5	5.8	2.15	10.1	-27.8	-28.4	-13.0	14.8	15.4	105	265	135	137	
849.02	48.6	47.0	-4.7	-3.3	5.8	2.15	10.1	-20.6	-19.2	-13.0	7.6	6.2	105	265	135	137	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A PK (RBW: 3.6kHz, VBW: 10kHz)

Band-Edge (Radiated) W-CDMA Band V

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 01/21/2013
Temperature / Humidity 20deg. C / 37% RH
Engineer Katsunori Okai
Mode Tx W-CDMA(RMC12.2kbps), All Up Bits

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
													Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
824.00	43.2	39.8	-10.9	-9.9	5.7	2.15	10.0	-26.6	-25.6	-13.0	13.6	12.6	104	260	140	232	
849.00	45.7	43.9	-8.1	-6.7	5.8	2.15	10.1	-24.0	-22.6	-13.0	11.0	9.6	105	83	139	223	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

Detector : S/A PK (RBW: 47kHz, VBW: 150kHz)

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Spurious Emission (Conducted)
GSM850

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33FE0016-HO
Date 01/23/20123
Temperature/ Humidity 21deg. C / 48% RH
Engineer Yutaka Yoshida
Mode Tx GSM(GMSK), 1slot, PCL=5

Limit Line

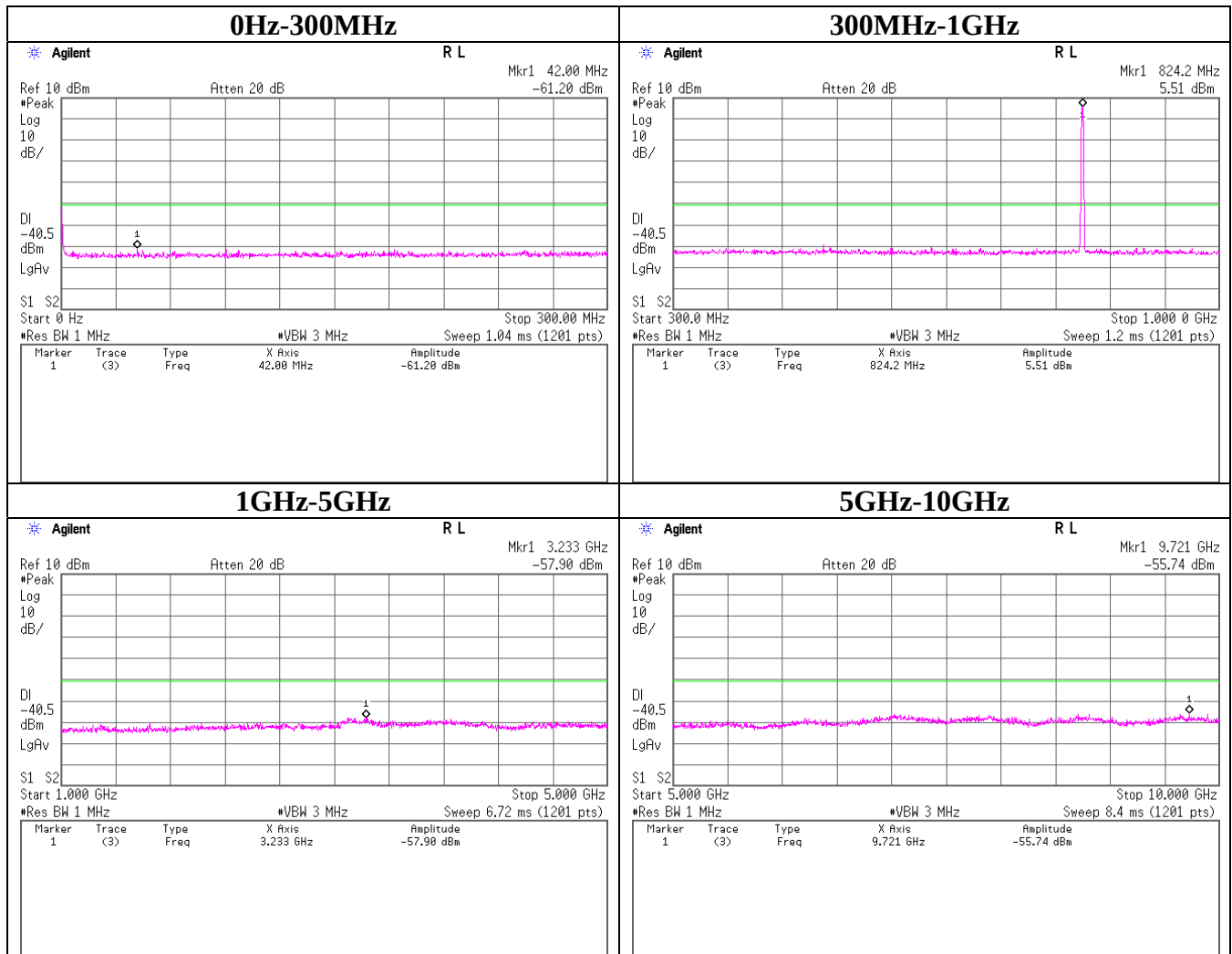
Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
824.2	-13.0	20.00	7.46	-40.5
836.6	-13.0	20.00	7.46	-40.5
848.8	-13.0	20.00	7.46	-40.5

Sample Calculation : Limit Line = Limit - Atten. - Cable Loss

Spurious Emission (Conducted)

GSM

Tx:824.2MHz



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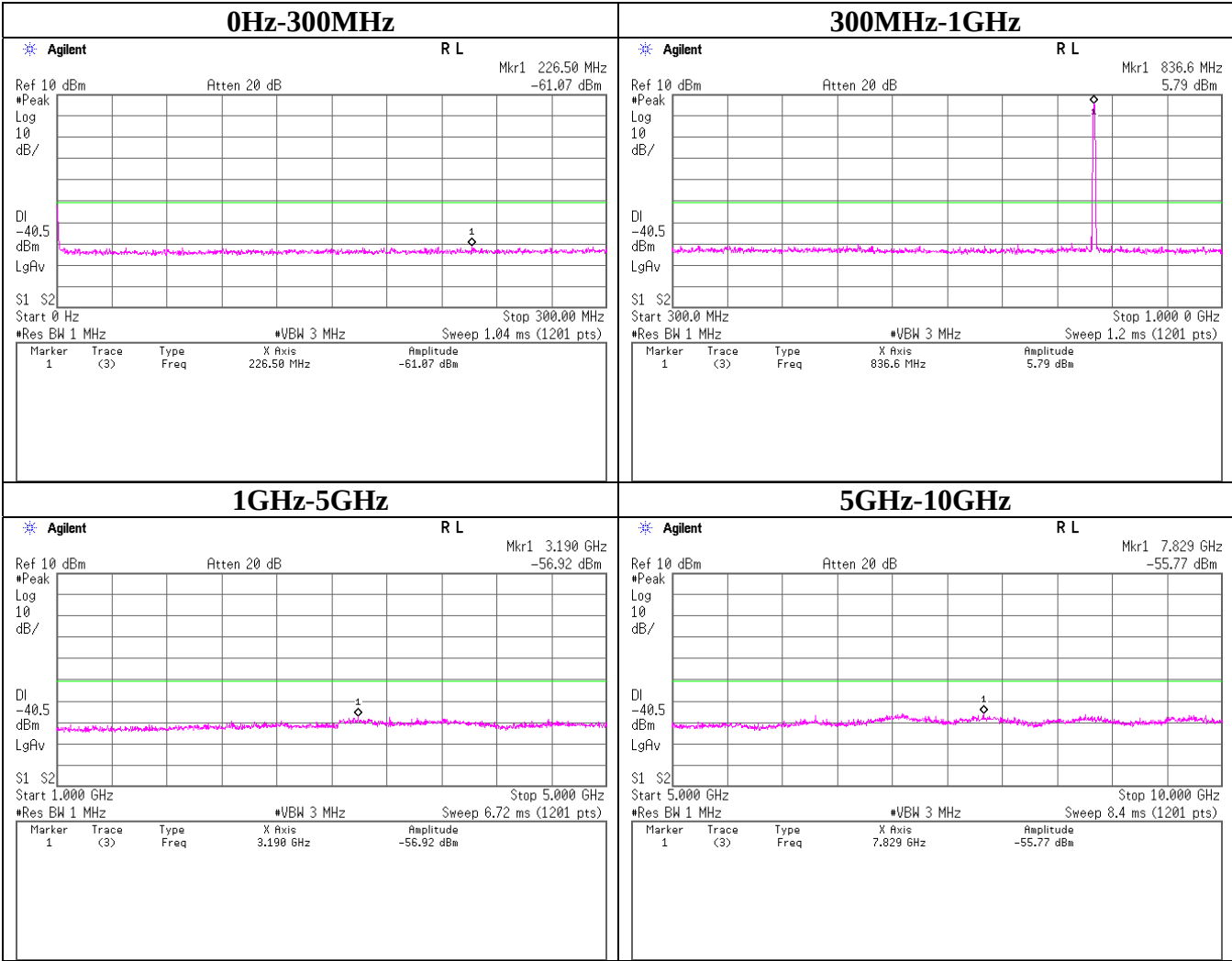
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Spurious Emission (Conducted)

GSM

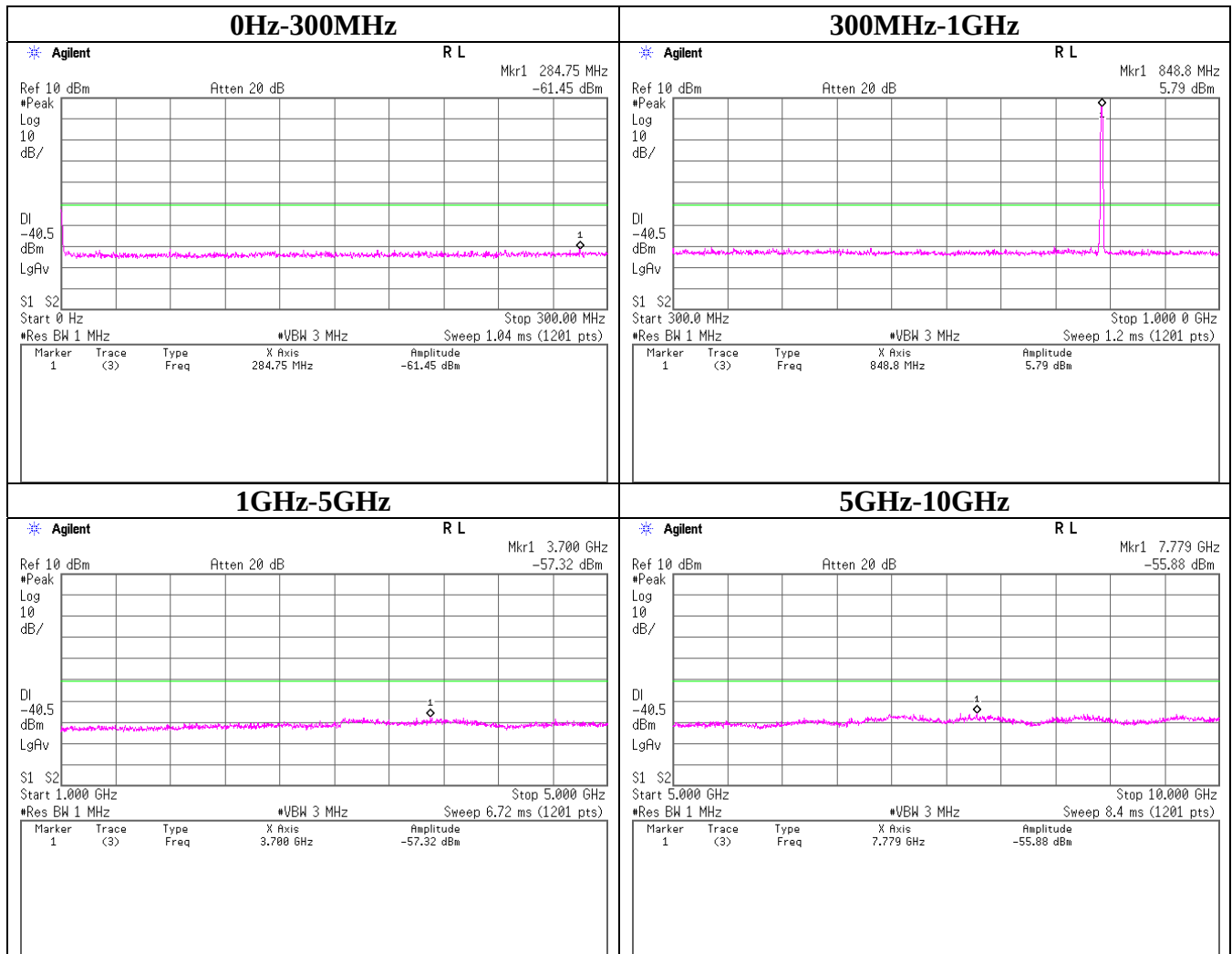
Tx:836.6MHz



Spurious Emission (Conducted)

GSM

Tx:848.8MHz



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Spurious Emission (Conducted)
GSM850

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33FE0016-HO
Date 01/23/2013
Temperature/ Humidity 21deg. C / 48% RH
Engineer Yutaka Yoshida
Mode Tx GPRS(GMSK), 1slot, CS-1, PCL=5

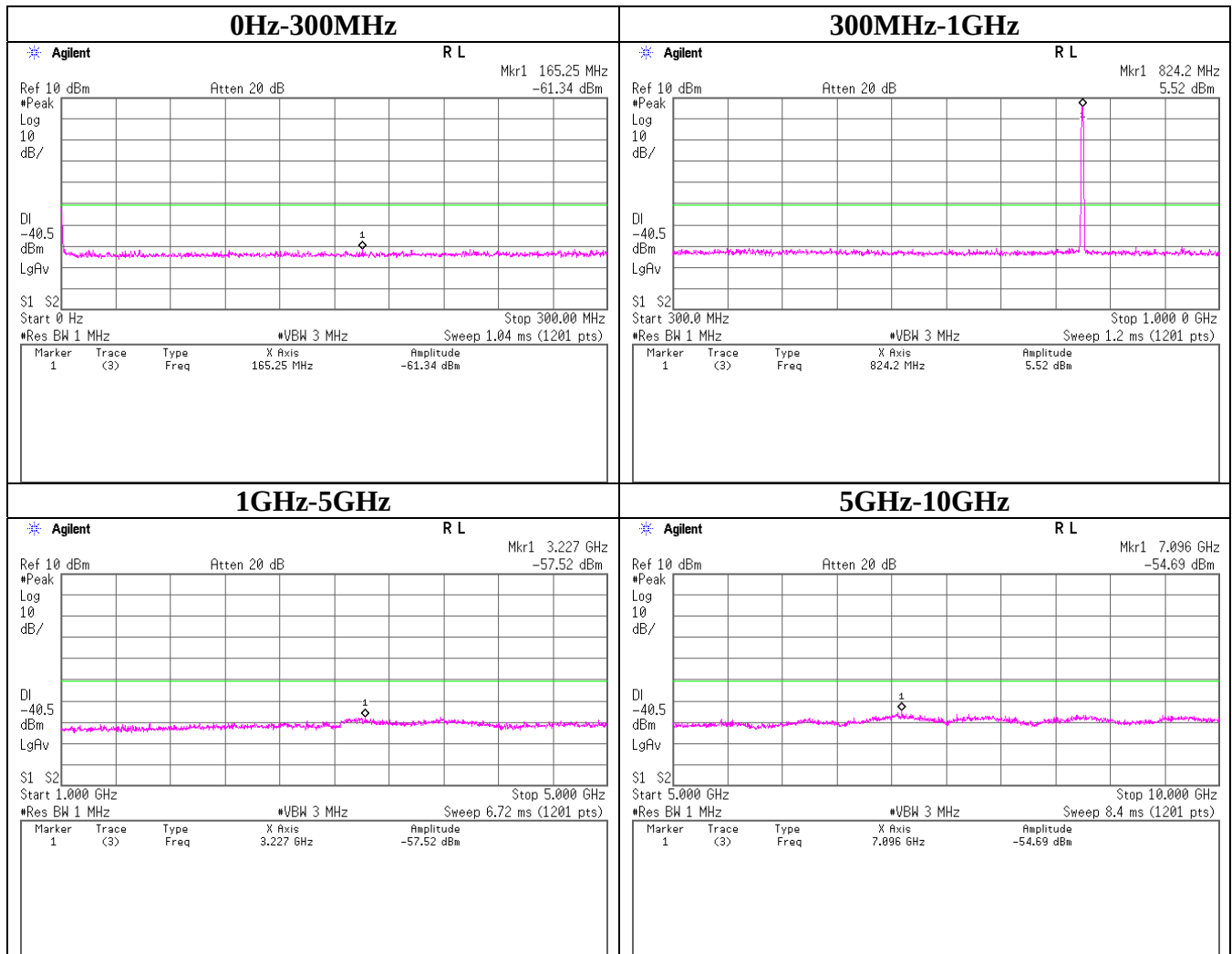
Limit Line

Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
824.2	-13.0	20.00	7.46	-40.5
836.6	-13.0	20.00	7.46	-40.5
848.8	-13.0	20.00	7.46	-40.5

Sample Calculation : Limit Line = Limit - Atten. - Cable Loss

Spurious Emission (Conducted)

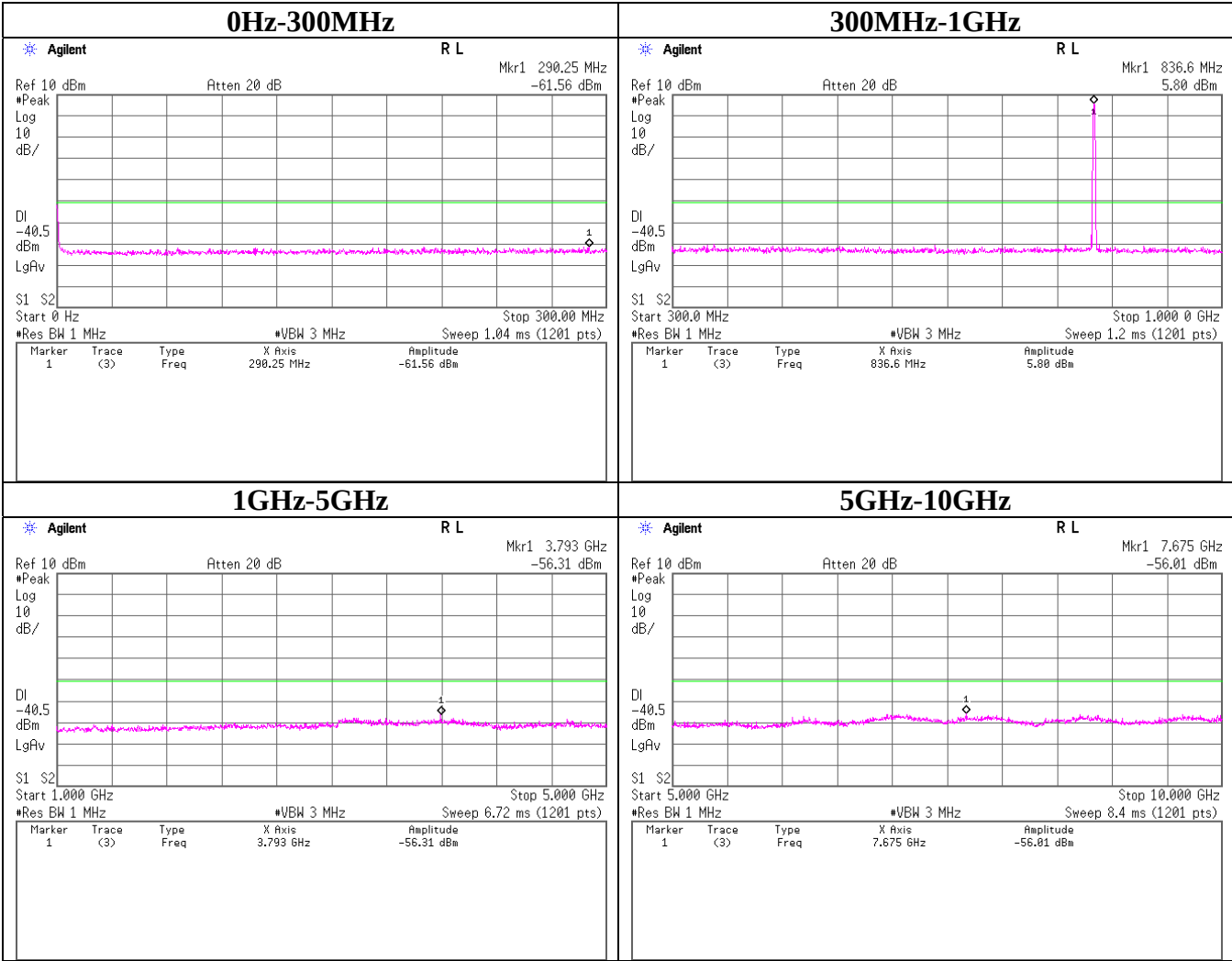
GPRS
Tx:824.2MHz



Spurious Emission (Conducted)

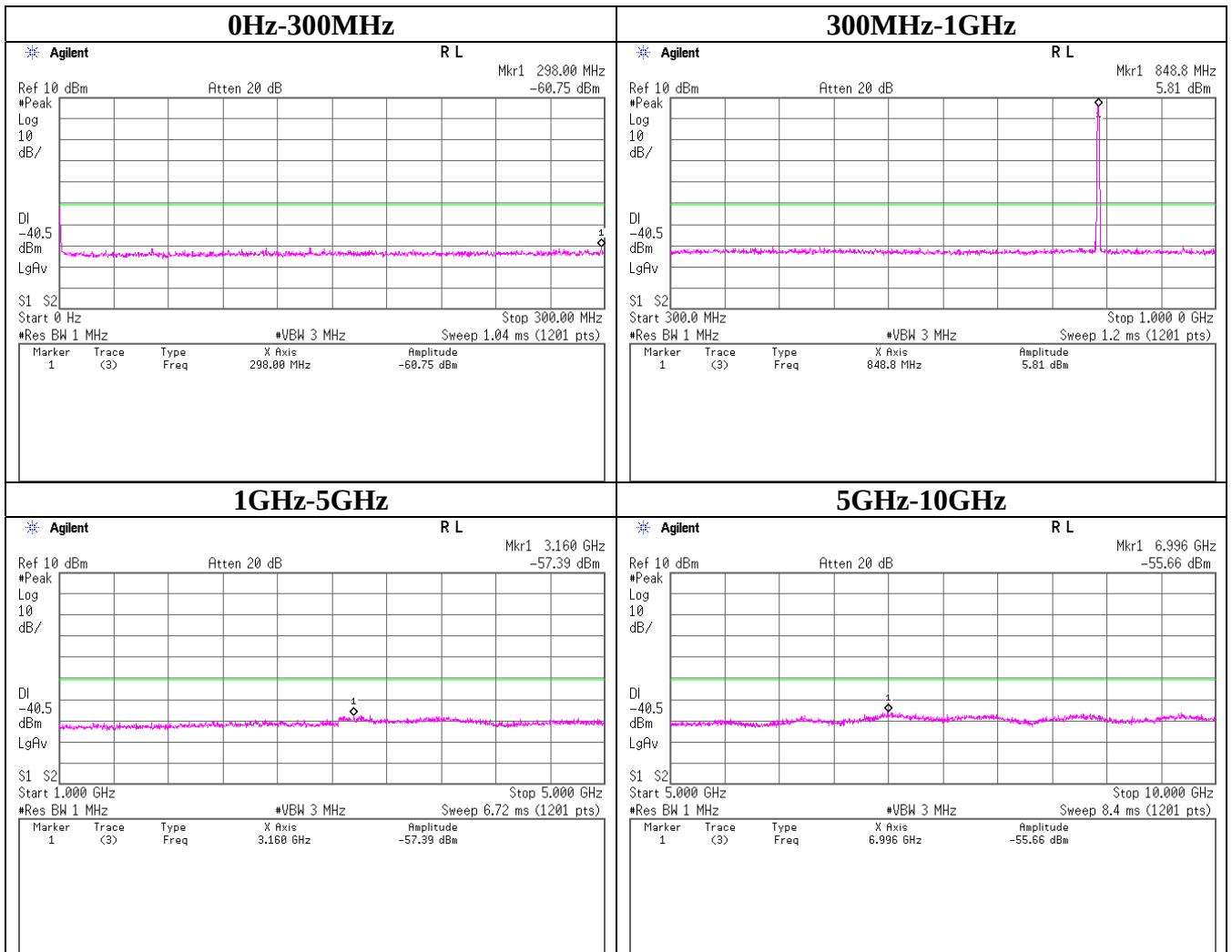
GPRS

Tx:836.6MHz



Spurious Emission (Conducted)

GPRS
Tx:848.8MHz



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Spurious Emission (Conducted)
W-CDMA Band V

Test place : Head Office EMC Lab. No.6 Measurement Room
Report No. : 33FE0016-HO
Date : 01/23/2013
Temperature/ Humidity : 21deg. C / 48% RH
Engineer : Yutaka Yoshida
Mode : Tx W-CDMA Band V, RMC 12.2kbps, All Up Bits

Limit Line

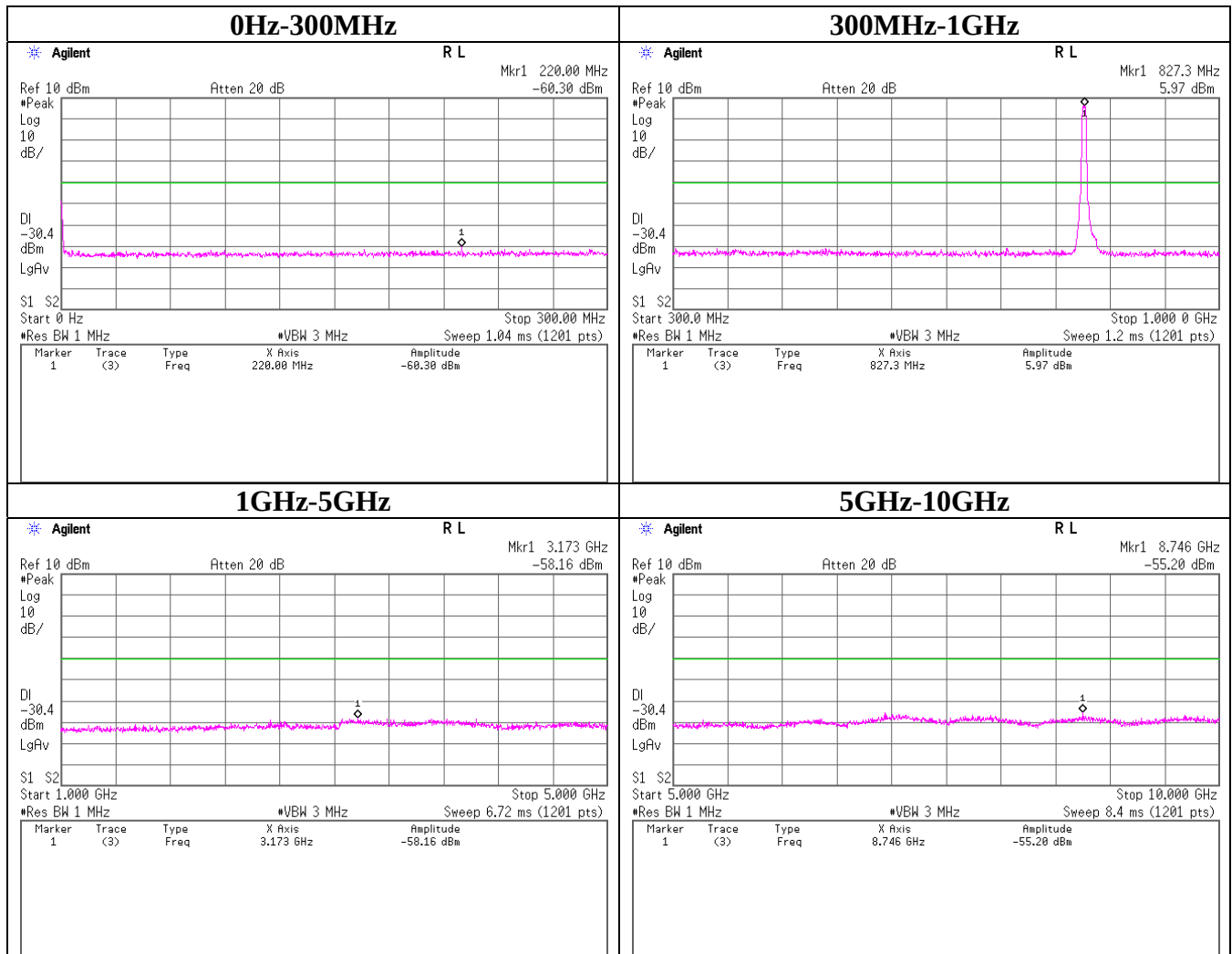
Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
826.4	-13.0	9.94	7.46	-30.4
836.6	-13.0	9.94	7.46	-30.4
846.6	-13.0	9.94	7.46	-30.4

Sample Calculation : Limit Line = Limit - Atten. - Cable Loss

Spurious Emission (Conducted)

W-CDMA Band V

Tx:826.4MHz



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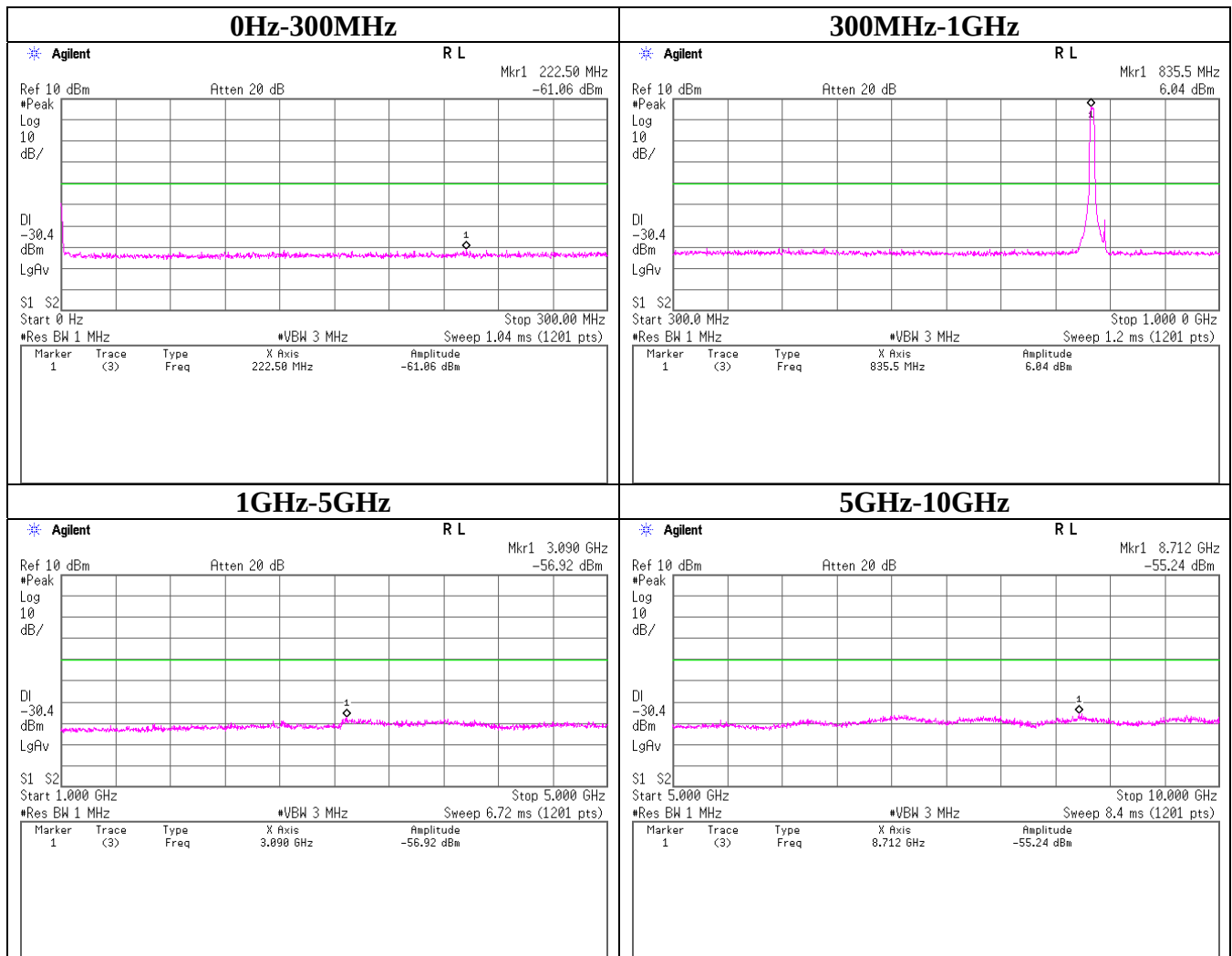
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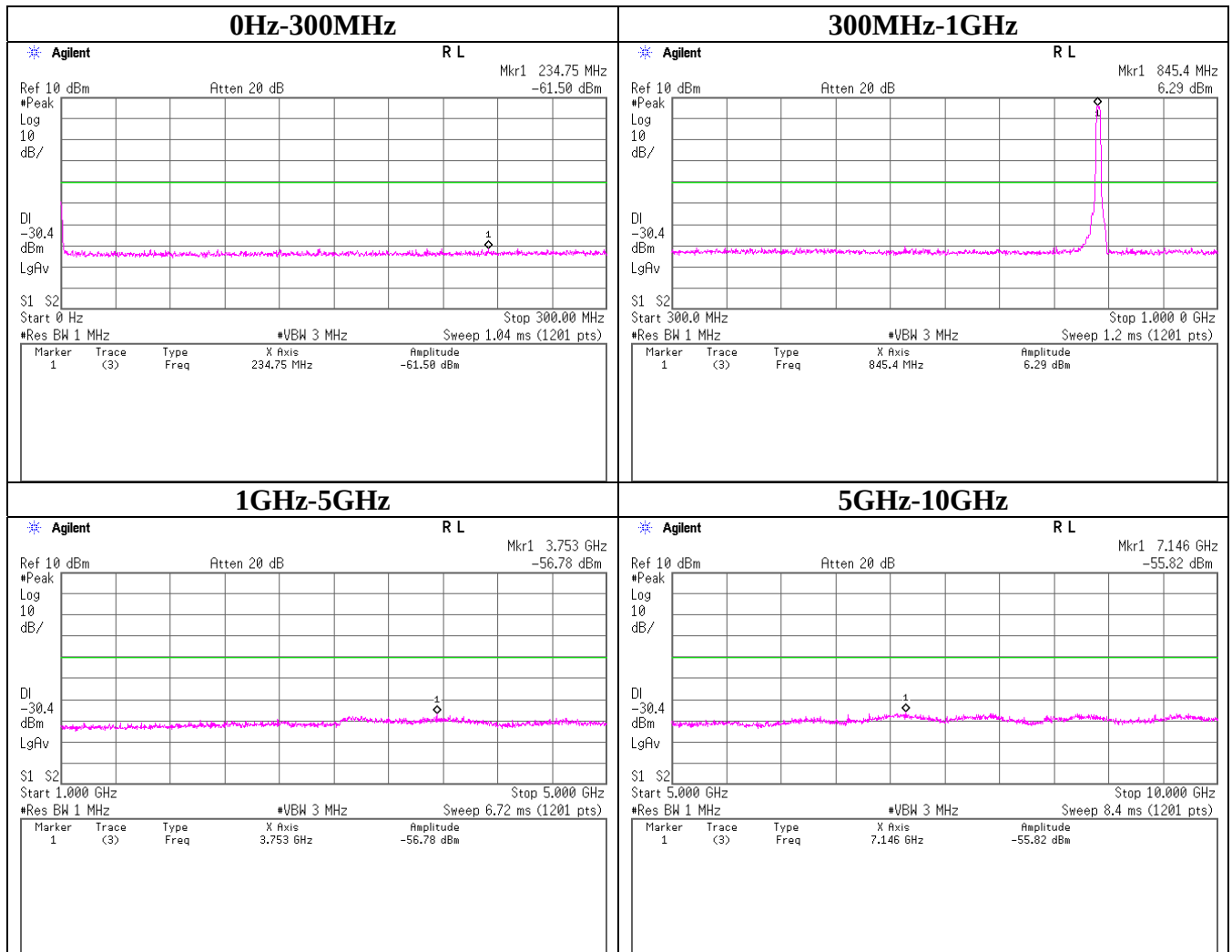
Spurious Emission (Conducted)
W-CDMA Band V
Tx:836.6MHz



Spurious Emission (Conducted)

W-CDMA Band V

Tx:846.6MHz



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Spurious Emission (Radiated) GSM850

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 1/21/2013 1/21/2013
Temperature / Humidity 20deg. C / 37% RH 20deg. C / 37% RH
Engineer Katsunori Okai Keisuke Kawamura
(Below 1GHz) (Above 1GHz)
Mode Tx GSM(GMSK), 1slot, PCL=5

Tx:824.2MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1648.40	67.4	68.0	-43.9	-44.3	3.8	9.0	0.0	-40.9	-41.3	-13.0	27.9	28.3	100	215	100	198	
2472.60	58.3	57.2	-50.6	-51.0	4.4	10.8	0.0	-46.3	-46.7	-13.0	33.3	33.7	167	36	109	254	
3296.80	54.5	53.0	-52.1	-53.9	4.4	11.9	0.0	-46.8	-48.6	-13.0	33.8	35.6	121	9	187	109	
4121.00	50.1	48.5	-53.2	-55.0	5.0	12.4	0.0	-47.9	-49.7	-13.0	34.9	36.7	100	186	100	337	
4945.20	54.2	48.9	-46.1	-52.8	5.4	12.8	0.0	-40.9	-47.6	-13.0	27.9	34.6	111	70	100	211	
5769.40	51.0	45.2	-45.6	-53.5	5.8	13.0	0.0	-40.6	-48.5	-13.0	27.6	35.5	100	73	100	283	
6593.60	48.7	49.0	-45.7	-45.7	6.3	12.1	0.0	-42.0	-42.0	-13.0	29.0	29.0	100	230	100	130	
7417.80	47.9	51.2	-44.6	-42.3	6.7	11.2	0.0	-42.3	-40.0	-13.0	29.3	27.0	100	93	102	126	
8242.00	43.2	47.0	-49.2	-46.2	7.1	11.8	0.0	-46.6	-43.6	-13.0	33.6	30.6	100	347	100	212	

Tx:836.6MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1673.20	69.2	71.0	-41.9	-41.3	3.8	9.1	0.0	-38.8	-38.2	-13.0	25.8	25.2	100	216	100	202	
2509.80	57.8	55.6	-50.7	-52.3	4.4	10.8	0.0	-46.5	-48.1	-13.0	33.5	35.1	200	50	130	200	
3346.40	51.5	48.8	-55.4	-58.3	4.5	12.0	0.0	-50.1	-53.0	-13.0	37.1	40.0	146	50	100	213	
4183.00	49.6	50.0	-54.3	-53.3	5.0	12.4	0.0	-49.0	-48.0	-13.0	36.0	35.0	100	177	100	217	
5019.60	50.5	48.6	-48.2	-52.1	5.5	12.9	0.0	-43.0	-46.9	-13.0	30.0	33.9	108	124	100	331	
5856.20	48.2	46.1	-48.5	-51.5	5.9	13.1	0.0	-43.5	-46.5	-13.0	30.5	33.5	100	73	116	353	
6692.80	47.3	45.7	-46.7	-49.1	6.4	12.0	0.0	-43.2	-45.6	-13.0	30.2	32.6	100	87	100	270	
7529.40	48.0	47.0	-44.8	-46.3	6.8	11.1	0.0	-42.7	-44.2	-13.0	29.7	31.2	100	89	100	230	
8366.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Tx:848.8MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1697.60	68.1	70.7	-42.1	-41.7	3.8	9.3	0.0	-38.8	-38.4	-13.0	25.8	25.4	100	207	109	126	
2546.40	54.1	55.2	-54.4	-52.7	4.4	10.9	0.0	-50.1	-48.4	-13.0	37.1	35.4	122	344	180	349	
3395.20	48.9	48.3	-57.7	-58.3	4.5	12.1	0.0	-52.3	-52.9	-13.0	39.3	39.9	100	36	181	178	
4244.00	49.5	48.0	-52.8	-54.1	5.0	12.4	0.0	-47.6	-48.9	-13.0	34.6	35.9	100	174	102	217	
5092.80	44.1	44.5	-54.0	-55.1	5.5	12.8	0.0	-48.8	-49.9	-13.0	35.8	36.9	106	5	100	335	
5941.60	48.5	49.6	-48.8	-47.9	5.9	13.2	0.0	-43.7	-42.8	-13.0	30.7	29.8	100	56	103	75	
6790.40	48.7	49.9	-45.3	-45.5	6.4	12.0	0.0	-41.9	-42.1	-13.0	28.9	29.1	100	84	111	127	
7639.20	44.4	44.5	-48.1	-48.4	6.8	11.2	0.0	-45.9	-46.2	-13.0	32.9	33.2	100	125	100	124	
8488.00	NS	NS	-	-	-	-	-	-	-	-13.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

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

NS : No signal detect.

Detector : S/A PK (RBW: 1MHz, VBW: 3MHz)

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Facsimile : +81 596 24 8124

Spurious Emission (Radiated) W-CDMA Band V

Report No. 33FE0016-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 1/21/2013 1/21/2013
Temperature / Humidity 20deg. C / 37% RH 20deg. C / 37% RH
Engineer Katsunori Okai Keisuke Kawamura
(Below 1GHz) (Above 1GHz)
Mode Tx W-CDMA(RMC12.2kbps), All Up Bits

Tx: 826.4MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1652.80	48.7	50.3	-62.6	-62.2	3.8	9.0	0.0	-59.6	-59.2	-13.0	46.6	46.2	100	189	100	200	
3305.60	52.6	53.5	-53.8	-53.1	4.4	11.9	0.0	-48.5	-47.8	-13.0	35.5	34.8	108	170	100	216	
4132.00	50.1	45.3	-52.5	-57.8	5.0	12.4	0.0	-47.2	-52.5	-13.0	34.2	39.5	100	159	100	343	

Tx: 836.6MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1673.20	48.6	46.9	-62.5	-65.4	3.8	9.1	0.0	-59.4	-62.3	-13.0	46.4	49.3	100	183	100	62	
3346.40	54.1	54.0	-52.8	-53.1	4.5	12.0	0.0	-47.5	-47.8	-13.0	34.5	34.8	130	171	100	221	
4183.00	48.2	47.6	-55.7	-55.7	5.0	12.4	0.0	-50.4	-50.4	-13.0	37.4	37.4	100	181	139	222	

Tx: 846.6MHz

Frequency [MHz]	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss [dB]	Tx Ant. Gain [dBi]	Tx Ant. Atten. Loss [dB]	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	HOR	VER	HOR	VER	
1693.20	49.2	50.1	-61.0	-62.3	3.8	9.2	0.0	-57.7	-59.0	-13.0	44.7	46.0	100	171	114	126	
3386.40	55.0	53.4	-51.7	-53.4	4.5	12.0	0.0	-46.3	-48.0	-13.0	33.3	35.0	125	167	100	218	
4233.00	48.6	46.7	-54.6	-56.4	5.0	12.4	0.0	-49.4	-51.2	-13.0	36.4	38.2	113	158	139	211	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss -2.15

Rx-ANTENNA : Biconical Antenna(30M-300MHz), Logperiodic Antenna(300M-1000MHz), Horn Antenna(1G-12.75GHz)

Tx-ANTENNA : 120MHz tuned Dipole Antenna(30M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)

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

NS : No signal detect.

Detector : S/A PK (RBW: 1MHz, VBW: 3MHz)

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Head Office EMC Lab.

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Frequency Stability(Temperature/Voltage Variation)

GSM850

Tx:836.6MHz

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/24/2013
Temperature/ Humidity	17deg. C / 40% RH
Engineer	Yutaka Yoshida
Mode	Tx GSM(GMSK), 1slot, PCL=5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
-30	3.70	836.6000417	23.80	0.0284	2.5
-20	3.70	836.6000273	9.40	0.0112	2.5
-10	3.70	836.5999765	41.40	0.0495	2.5
0	3.70	836.5999759	42.00	0.0502	2.5
10	3.70	836.5999761	41.80	0.0500	2.5
20	3.70	836.6000179	0.00	0.0000	Reference
30	3.70	836.5999756	42.30	0.0506	2.5
40	3.70	836.5999220	95.90	0.1146	2.5
50	3.70	836.5999622	55.70	0.0666	2.5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20	3.45	836.6000240	6.10	0.0073	2.5
20	3.70	836.6000179	0.00	0.0000	Reference
20	4.20	836.6000260	8.10	0.0097	2.5

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Frequency Stability(Temperature/Voltage Variation)

W-CDMA Band V

Tx: 836.6MHz

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	33FE0016-HO
Date	01/24/2013
Temperature/ Humidity	17deg. C / 40% RH
Engineer	Yutaka Yoshida
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
-30.0	3.70	836.6000283	13.50	0.016	2.5
-20.0	3.70	836.6000245	17.30	0.021	2.5
-10.0	3.70	836.6000293	12.50	0.015	2.5
0.0	3.70	836.6000542	12.40	0.015	2.5
10.0	3.70	836.6000565	14.70	0.018	2.5
20.0	3.70	836.6000418	0.00	0.000	Reference
30.0	3.70	836.6000385	3.30	0.004	2.5
40.0	3.70	836.6000558	14.00	0.017	2.5
50.0	3.70	836.5999797	62.10	0.074	2.5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20.0	3.45	836.6000282	13.60	0.016	2.5
20.0	3.70	836.6000418	0.00	0.000	Reference
20.0	4.20	836.6000261	15.70	0.019	2.5

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APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2012/06/19 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2012/10/08 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2012/10/08 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2012/09/11 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2012/08/01 * 12
MDA-04	Dipole Antenna	Schwarzbeck	UHAP	992	RE	2012/10/21 * 12
MCC-125	Coaxial Cable	UL Japan	-	-	RE	2012/07/23 * 12
MRF-04	Band Rejection Filter(824-849MHz)	TOKYO KEIKI	824-849MHz		RE	2012/07/25 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	RE	2012/03/22 * 12
MURC-03	Radio Communication Analyzer	Anritsu	MT8815B	6200711471	RE/AT	2012/12/19 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2013/01/10 * 12
MHF-03	High pass Filter 1.4-5.0GHz	Mini-Circuit	VHF-1320	10411	RE	2012/08/28 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2012/09/05 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 12
MCC-130	Microwave Cable (1-33GHz)	HUBER+SUHNER	SF103/ 11PC3.5-31/ 11PC3.5-31/8.0m	54308/3	RE	2012/01/05 * 12
KSG-05	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2012/07/23 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2012/11/26 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2012/11/26 * 12
MAT-24	Attenuator(10dB) (above1GHz)	Agilent	8493C	71389	AT	2012/06/27 * 12
MCC-99	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	30820/2	AT	2012/05/09 * 12

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EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPSC-01	Power splitters/ Combiners	Mini-Circuit	ZFSC-2-2500	0124	AT	2012/09/12 * 12
MURC-02	Wireless Communication Test Set	Agilent	E5515C	GB47050683	AT	2012/12/19 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2012/04/06 * 12
MAT-20	Attenuator(10dB) (above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2013/01/09 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2012/10/19 * 12
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	52258	AT	2012/03/27 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2012/03/23 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Spec	PL-2KP	14015723	AT	2012/08/01 * 12

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

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

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

Test Item:

RE: Radiated Emission

AT: Antenna terminal conducted test

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