



RADIO TEST REPORT

Test Report No. : 33BE0179-HO-G

Applicant : SAMSUNG ELECTRONICS CO., LTD.
Type of Equipment : Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900, BT(EDR, LE), NFC, 802.11a/b/g/n(mobile hot spot)
Model No. : GT-I9105P
Test standard : FCC Part 22 Subpart H: 2006
FCC ID : A3LGTI9105P
Test Result : Complied

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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.
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Date of test: October 30 to November 8, 2012

Representative test engineer:

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Takahiro Hatakeda
Leader of WiSE Japan,
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NVLAP LAB CODE: 200572-0

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13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	5
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: RF Output Power (Conducted/Radiated).....	14
SECTION 6: Bandwidth (Conducted)	15
SECTION 7: Spurious Emission and Band-Edge (Conducted/Radiated)	15
SECTION 8: Frequency Stability(Temperature/Voltage Variation).....	16
APPENDIX 1: Data of EMI test	17
RF Output Power (Conducted).....	17
RF Output Power (Radiated).....	19
Peak to Average power Ratio (Conducted)	21
Bandwidth(Conducted)	23
Band-Edge(Conducted)	26
Band Edge (Radiated).....	29
Spurious Emission (Conducted)	30
Spurious Emission (Radiated)	42
Frequency Stability(Temperature/Voltage Variation).....	46
APPENDIX 2: Test instruments	48
APPENDIX3: Photographs of test setup.....	49
Radiated Spurious Emission	49
Worst Case Position (Horizontal: X-axis/ Vertical: Y-axis)	50

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 : Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900,
BT(EDR, LE), NFC, 802.11a/b/g/n(mobile hot spot)
Model No. : GT-I9105P
Serial No. : Refer to Section 4, Clause 4.2
Rating : AC120V/60Hz (AC Adapter)
DC3.7V/1650mAh, 6.11Wh (Battery)
Receipt Date of Sample : October 29, 2012
Modification of EUT : No Modification by the test lab

2.2 Product Description

Radio Specification

NFC

Equipment Type	Transceiver
Frequency of Operation	13.56MHz
Type of Modulation	ASK
Antenna Type	FPCB

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Type	LDS
Antenna Gain	-1.2dBi

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	DSSS
Bandwidth & Channel spacing	1MHz & 2MHz
Antenna Type	LDS
Antenna Gain	-1.2dBi

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

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz
Type of Modulation	DSSS, OFDM	OFDM
Bandwidth & Channel spacing	20MHz & 5MHz	20MHz & 20MHz
Antenna Type	LDS	
Antenna Gain	2.4G: -1.2dBi	5G: 0.68dBi

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 , 8PSK	
Emission Designator	GSM850: 248KGXW, 254KG7W PCS: 248KGXW, 257KG7W	
Antenna Type	MID	
Antenna Gain	GSM850: -7.11dBi PCS: -4.38dBi	

W-CDMA

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band V: 824 – 849MHz Band II: 1850 – 1910MHz [Down Link] Band V: 869 – 894MHz Band II: 1930 – 1990MHz	
Type of Modulation	QPSK	
Emission Designator	Band V: 4M15F9W Band II: 4M14F9W	
Antenna Type	MID	
Antenna Gain	Band V: -7.11dBi Band II: -4.38dBi	

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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] 0.56dB 849.0172MHz [Radiated] 4.1dB 849.02MHz, Vertical W-CDMA [Conducted] 8.16dB 824.0000MHz [Radiated] 4.7dB 824.00MHz, 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 14.5dB 8488.00MHz, Vertical W-CDMA 38.1dB 1693.20MHz, 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.

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 report meets the limits unless the uncertainty is taken into consideration.

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), Peak to Average power Ratio (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (GPRS, GMSK, 1slot, CS-1) Transmitting (Tx) (EGPRS, 8PSK, 1slot, MCS-5)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
RF output Power (Radiated)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (EGPRS, 8PSK, 1slot, MCS-5)	Max (PCL=5)	824.2MHz 836.6MHz 848.8MHz	128 190 251
Emission Bandwidth, 99% Occupied bandwidth	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (EGPRS, 8PSK, 1slot, MCS-5)	Max (PCL=5)	836.6MHz	190
Band Edge (Conducted)	Transmitting (Tx) (GSM, GMSK, 1slot) Transmitting (Tx) (EGPRS, 8PSK, 1slot, MCS-5)	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) (EGPRS, 8PSK, 1slot, MCS-5)	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,EGPRS]

*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 section 5.2 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 – 12.2kpbs 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 DPCCH, DPCCCH 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 $\beta_{bs} = 30/15 * \beta_c$. Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{oc}/\beta_c = 24/15$. 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

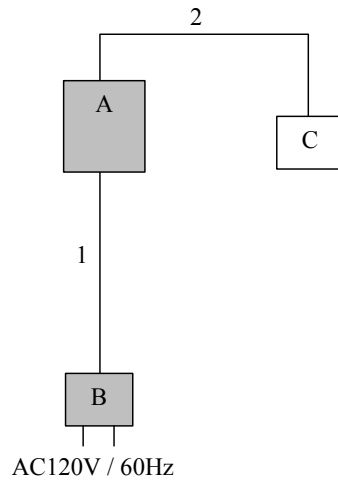
HSUPA Reference E-TFCI Parameters
[Subtest 1,2,4,5]

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

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	Smart phone with GSM/GPRS/EDGE850/1900 and WCDMA850/1900, BT(EDR, LE), NFC, 802.11a/b/g/n (mobile hot spot)	GT-I9105P	RJ-289-C *1) RJ-289-B *2)	SAMSUNG	EUT
B	AC Adapter	ETA0U10EBE	-	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

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

*2) Used for other 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	1.2	Unshielded	Unshielded	-

UL Japan, Inc.

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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 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 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 Wideband Radio Communication Tester 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 (DC3.7V to DC4.2V), and it is presented as the ppm unit.

Temperature	: -30deg.C to +50deg.C (10 deg. C. step)
Voltage	: Vnom:DC3.8V, Vmin:DC3.5V, Vmax:DC4.2V

As the operating input voltage of the EUT is between DC3.5V to 4.2V (nominal voltage: DC3.8V), Frequency Stability test was performed under the above condition.

Test data	:	APPENDIX 1
Test result	:	Pass

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. 33BE0179-HO
Date 10/30/2012
Temperature/ Humidity 24deg.C / 54% RH
Engineer Hisayoshi Sato
Mode Tx GSM(GMSK), 1slot, PCL=5
Mode Tx GPRS(GMSK), 1slot, CS-1, PCL=5
Mode Tx EGPRS(8PSK), 1slot, MCS-5, PCL=5

Mode	Ch	Frequency [MHz]	Reading Average frame power [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]
GSM	128	824.2	18.85	9.94	3.91	32.70
	190	836.6	18.91	9.94	3.91	32.76
	251	848.8	18.91	9.94	3.91	32.76
GPRS	128	824.2	18.84	9.94	3.91	32.69
	190	836.6	18.89	9.94	3.91	32.74
	251	848.8	18.90	9.94	3.91	32.75
EGPRS	128	824.2	13.49	9.94	3.91	26.57
	190	836.6	13.55	9.94	3.91	26.46
	251	848.8	13.56	9.94	3.91	26.42

Results = Reading + Atten. + Cable Loss

RF Output Power (Conducted)

Conducted Output Power W-CDMA Band V

Test place	Head Office EMC Lab. No.3 Measurement Room
Report No.	33BE0179-HO
Date	10/30/2012
Temperature/ Humidity	24deg.C / 54% RH
Engineer	Hisayoshi Sato
Mode	Tx W-CDMA

Mode	Ch	Frequency [MHz]	Reading AVG [dBm]	Cable Loss [dB]	Result [dBm]
RMC 12.2kbps	Low	826.4	23.37	0.29	23.66
	Mid	836.6	23.15	0.29	23.44
	High	846.6	22.71	0.29	23.00
AMR	Low	826.4	22.46	0.29	22.75
	Mid	836.6	22.47	0.29	22.76
	High	846.6	21.90	0.29	22.19
HSDPA Subtest 1	Low	826.4	23.33	0.29	23.62
	Mid	836.6	22.93	0.29	23.22
	High	846.6	22.60	0.29	22.89
HSDPA Subtest 2	Low	826.4	22.60	0.29	22.89
	Mid	836.6	22.48	0.29	22.77
	High	846.6	22.11	0.29	22.40
HSDPA Subtest 3	Low	826.4	21.83	0.29	22.12
	Mid	836.6	21.84	0.29	22.13
	High	846.6	21.95	0.29	22.24
HSDPA Subtest 4	Low	826.4	21.68	0.29	21.97
	Mid	836.6	21.40	0.29	21.69
	High	846.6	21.42	0.29	21.71
HSUPA Subtest 1	Low	826.4	21.27	0.29	21.56
	Mid	836.6	20.30	0.29	20.59
	High	846.6	21.31	0.29	21.60
HSUPA Subtest 2	Low	826.4	20.87	0.29	21.16
	Mid	836.6	22.18	0.29	22.47
	High	846.6	20.36	0.29	20.65
HSUPA Subtest 3	Low	826.4	19.64	0.29	19.93
	Mid	836.6	20.32	0.29	20.61
	High	846.6	20.13	0.29	20.42
HSUPA Subtest 4	Low	826.4	21.25	0.29	21.54
	Mid	836.6	19.91	0.29	20.20
	High	846.6	19.12	0.29	19.41
HSUPA Subtest 5	Low	826.4	19.79	0.29	20.08
	Mid	836.6	19.63	0.29	19.92
	High	846.6	20.66	0.29	20.95

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.

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

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/30/2012
Temperature / Humidity 21 deg. C / 38% 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
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
824.20	96.6	94.0	41.3	42.8	5.7	2.15	10.0	25.6	27.1	38.4	12.8	11.3	100	120	130	200	
836.60	97.2	95.3	42.0	43.8	5.8	2.15	10.0	26.2	28.0	38.4	12.2	10.4	100	110	123	203	
848.80	97.5	96.0	43.1	43.8	5.8	2.15	10.1	27.2	27.9	38.4	11.2	10.5	100	113	122	204	

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)

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/30/2012
Temperature / Humidity 21 deg. C / 38% RH
Engineer Katsunori Okai
Mode Tx EGPRS(8PSK), 1slot, MCS-5, 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
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
824.20	94.3	91.3	39.0	40.1	5.7	2.15	10.0	23.3	24.4	38.4	15.1	14.0	100	88	128	191	
836.60	95.3	91.9	40.1	40.4	5.8	2.15	10.0	24.3	24.6	38.4	14.1	13.8	100	83	126	293	
848.80	95.7	92.5	41.3	40.3	5.8	2.15	10.1	25.4	24.4	38.4	13.0	14.0	100	85	133	300	

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)

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

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/30/2012
Temperature / Humidity 21 deg. C / 38% 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	90.9	85.8	35.3	33.6	5.7	2.15	10.0	19.6	17.9	38.4	18.9	20.5	100	88	119	75	
836.60	90.6	85.6	34.9	33.3	5.8	2.15	10.0	19.1	17.5	38.4	19.3	20.9	100	87	116	58	
846.60	91.2	86.6	36.2	33.8	5.8	2.15	10.1	20.4	17.9	38.4	18.1	20.5	100	80	123	50	

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).

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

Peak to Average power Ratio (Conducted)

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.11 Measurement Room
Date 11/06/2012
Temperature / Humidity 24deg. C / 50% RH
Engineer Hironobu Ohnishi
Mode Tx GSM(GMSK), 1slot, PCL=5
Tx GPRS(GMSK), 1slot, CS-1, PCL=5
Tx EGPRS(8PSK), 1slot, MCS-5, PCL=5
Tx W-CDMA(RMC12.2kbps), All Up Bits

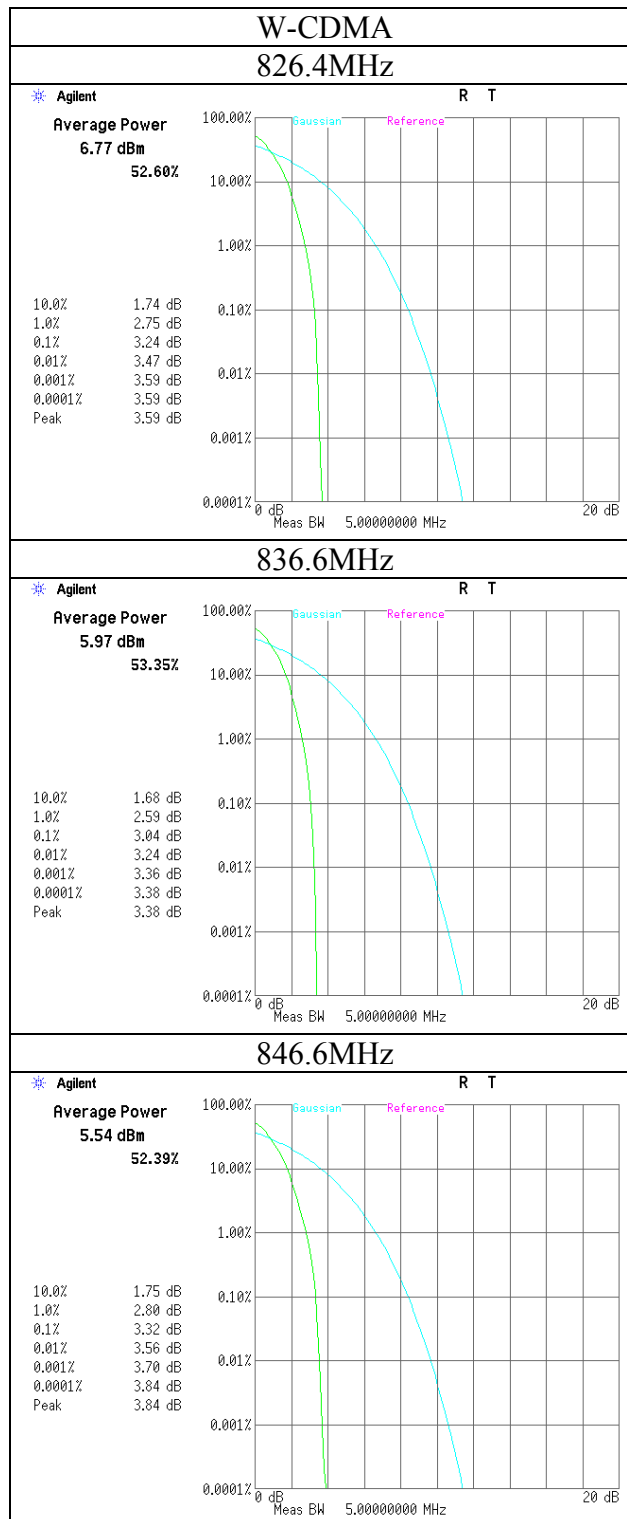
Mode	Channel	Frequency [MHz]	Peak to Average power Ratio [dB]
GSM *1)	128	824.20	0.021
	190	836.60	0.025
	251	848.80	0.032
GPRS *1)	128	824.20	0.028
	190	836.60	0.067
	251	848.80	0.034
EGPRS *1)	128	824.20	2.817
	190	836.60	3.266
	251	848.80	3.170
W-CDMA *2)	4132	826.40	3.24
	4183	836.60	3.04
	4233	846.60	3.32

*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.

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

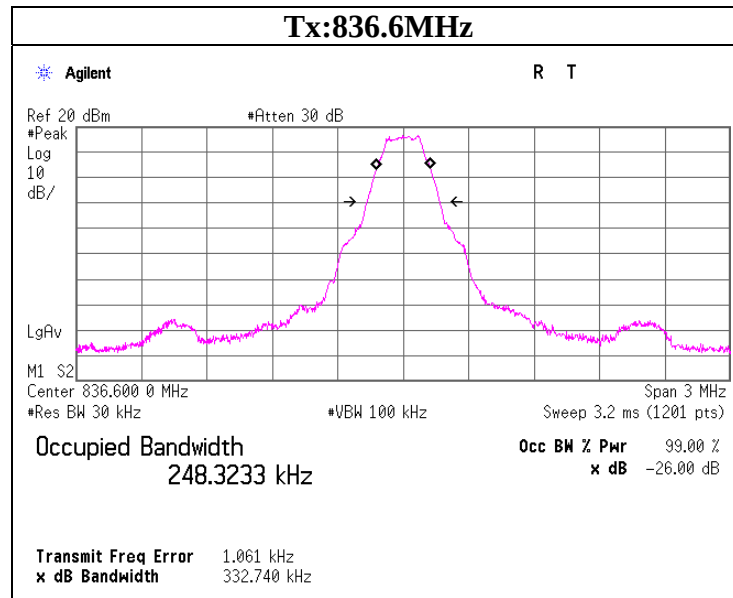


*Set the spectrum analyzer radio mode to 3GPP WCDMA (CCDF)

Bandwidth(Conducted) GSM850

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 33BE0179-HO
Date 11/06/2012
Temperature/ Humidity 24deg.C / 50% RH
Engineer Hironobu Ohnishi
Mode Tx GSM(GMSK), 1slot, PCL=5

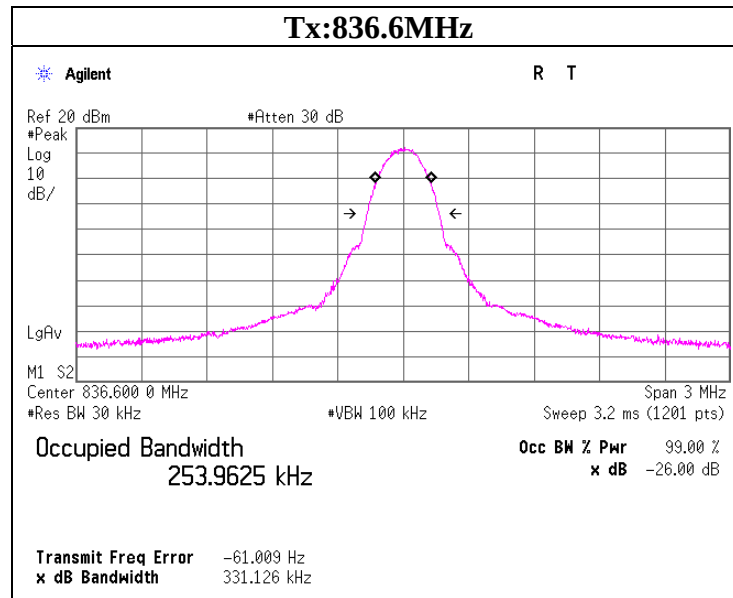
CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[kHz]	[kHz]	[kHz]
Mid	836.6	332.740	248.3233	-



Bandwidth(Conducted)
GSM850

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 33BE0179-HO
Date 11/06/2012
Temperature/ Humidity 24deg.C / 50% RH
Engineer Hironobu Ohnishi
Mode Tx EGPRS(8PSK), 1slot, MCS-5, PCL=5

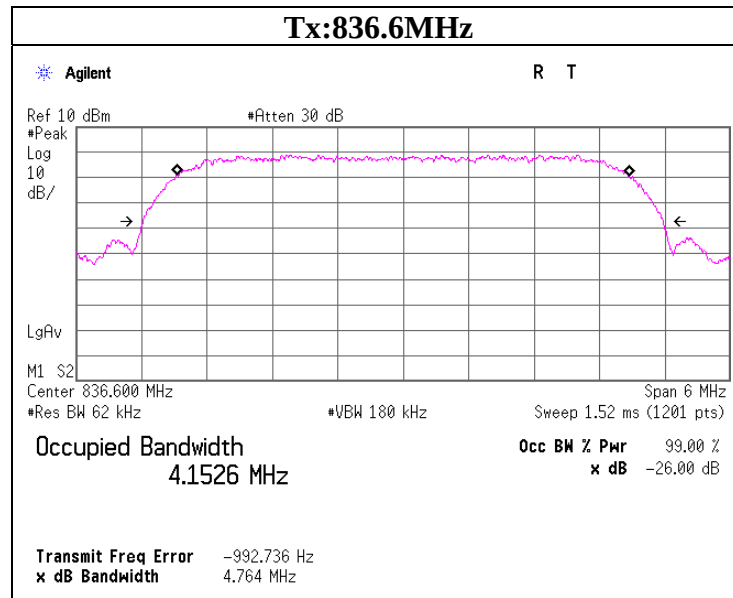
CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[kHz]	[kHz]	[kHz]
Mid	836.6	331.126	253.9625	-



Bandwidth(Conducted) W-CDMA Band V

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

CH	FREQ	26dB Bandwidth	99% OBW	Limit
	[MHz]	[MHz]	[MHz]	[MHz]
Mid	836.6	4.764	4.1526	-



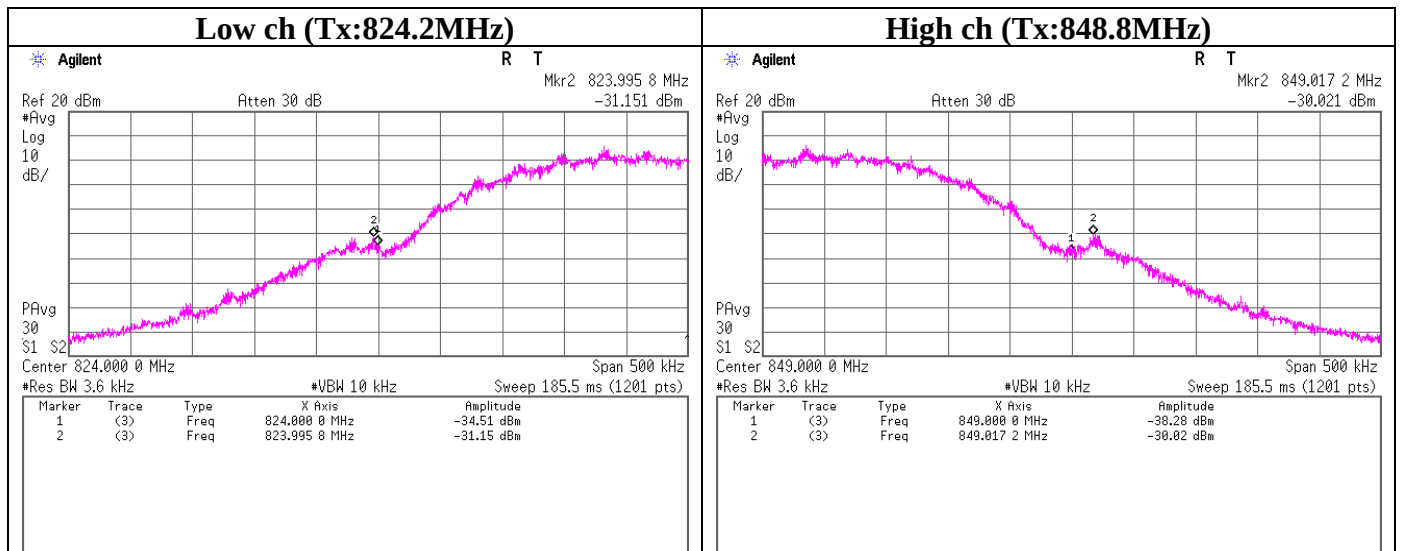
Band-Edge(Conducted) GSM850

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx GSM(GMSK), 1slot, PCL=5

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.9958	-31.15	10.00	6.46	-14.69	-13.0	1.69
824.0000	-34.51	10.00	6.46	-18.05	-13.0	5.05
849.0000	-38.28	10.00	6.46	-21.82	-13.0	8.82
849.0172	-30.02	10.00	6.46	-13.56	-13.0	0.56

Power RMS Average 30 times

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



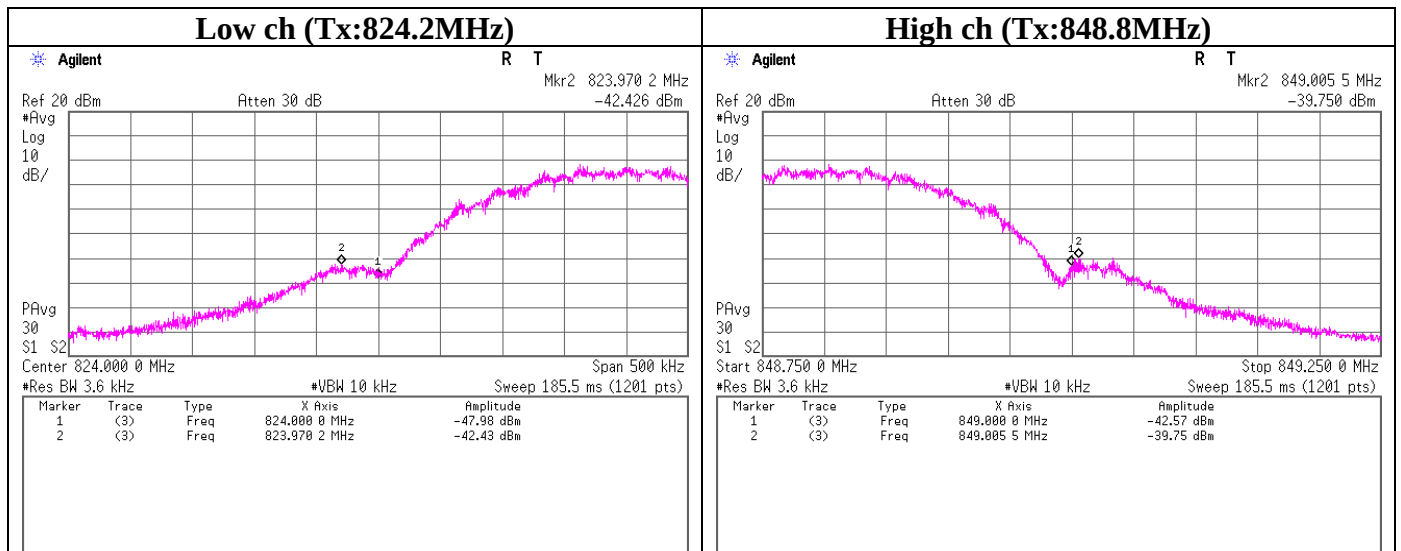
Band-Edge(Conducted) GSM850

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx EGPRS(8PSK), 1slot, MCS-5, PCL=5

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.9702	-42.43	10.00	6.46	-25.97	-13.0	12.97
824.0000	-47.98	10.00	6.46	-31.52	-13.0	18.52
849.0000	-42.57	10.00	6.46	-26.11	-13.0	13.11
849.0055	-39.75	10.00	6.46	-23.29	-13.0	10.29

Power RMS Average 30 times

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



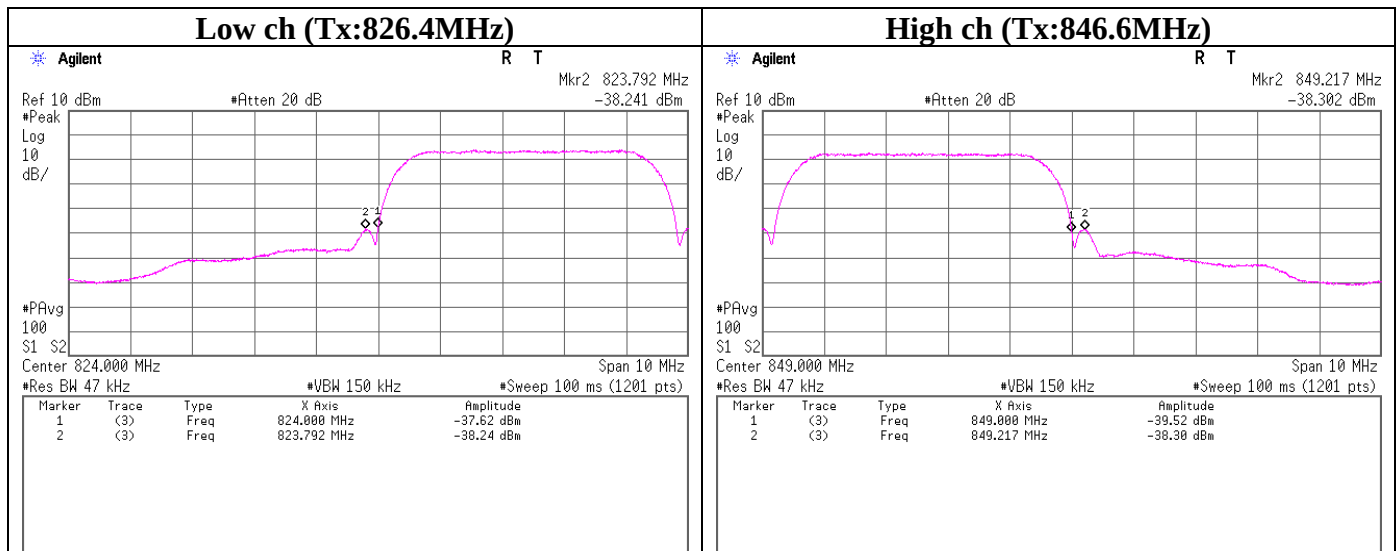
Band-Edge(Conducted) W-CDMA Band V

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
823.792	-38.24	10.00	6.46	-21.78	-13.0	8.78
824.000	-37.62	10.00	6.46	-21.16	-13.0	8.16
849.000	-39.52	10.00	6.46	-23.06	-13.0	10.06
849.217	-38.30	10.00	6.46	-21.84	-13.0	8.84

Power RMS Average 100 times

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



Band Edge (Radiated) GSM850

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/30/2012
Temperature / Humidity 21 deg. C / 38% 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.	Turn	Rx Ant.	Turn	
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Height [cm]	Table [deg.]	Height [cm]	Table [deg.]	
823.98	47.5	45.5	-6.6	-4.1	5.7	2.15	10.0	-22.4	-19.8	-13.0	9.4	6.8	100	120	130	200	
824.00	42.4	39.2	-11.7	-10.4	5.7	2.15	10.0	-27.5	-26.1	-13.0	14.5	13.1	100	120	130	200	
849.00	42.6	39.5	-10.5	-11.3	5.8	2.15	10.1	-26.4	-27.2	-13.0	13.4	14.2	100	113	122	204	
849.02	51.2	49.6	-1.9	-1.2	5.8	2.15	10.1	-17.8	-17.1	-13.0	4.8	4.1	100	113	122	204	

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. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/30/2012
Temperature / Humidity 21 deg. C / 38% 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.	Turn	Rx Ant.	Turn	
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Height [cm]	Table [deg.]	Height [cm]	Table [deg.]	
824.00	50.7	47.7	-3.5	-2.0	5.7	2.15	10.0	-19.2	-17.7	-13.0	6.2	4.7	100	88	128	191	
849.00	48.9	40.7	-4.3	-10.2	5.8	2.15	10.1	-20.2	-26.0	-13.0	7.2	13.0	100	80	123	50	
849.18	51.2	44.0	-2.0	-6.9	5.8	2.15	10.1	-17.9	-22.7	-13.0	4.9	9.7	100	80	123	50	

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)

Spurious Emission (Conducted)
GSM850

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx GSM(GMSK), 1slot, PCL=5

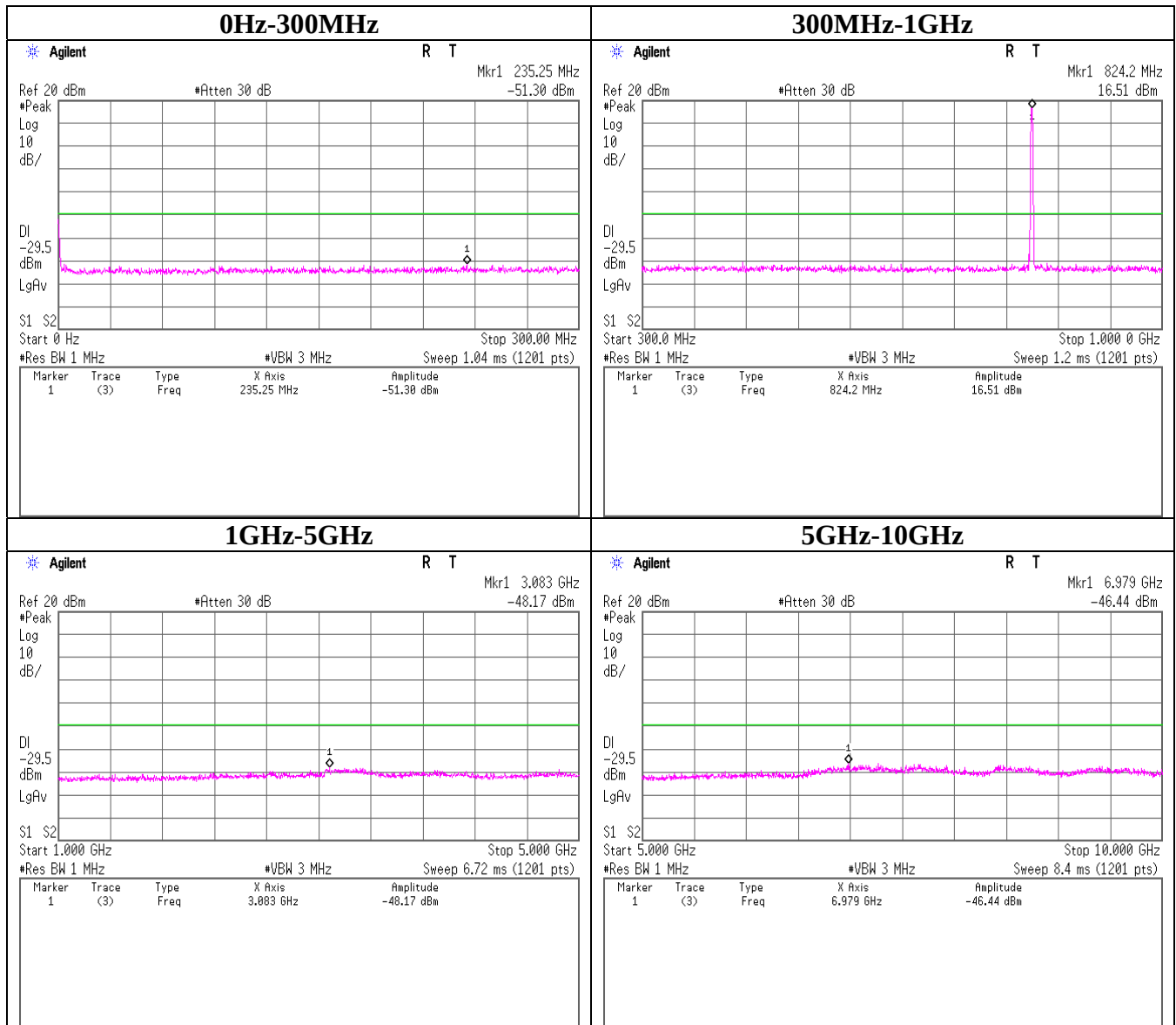
Limit Line

Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
824.2	-13.0	10.00	6.46	-29.5
836.6	-13.0	10.00	6.46	-29.5
848.8	-13.0	10.00	6.46	-29.5

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

Spurious Emission (Conducted)

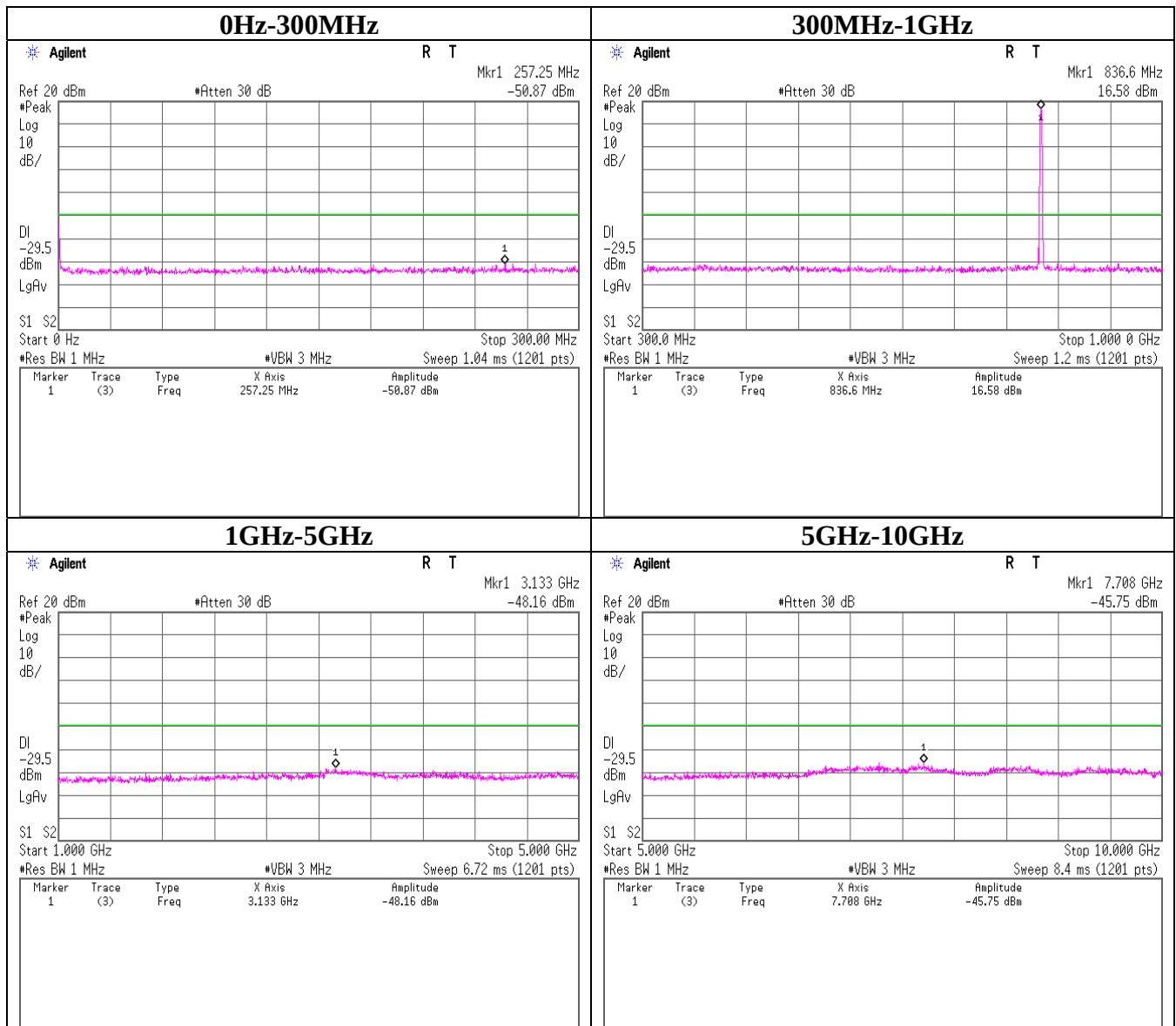
GSM
Tx:824.2MHz



Spurious Emission (Conducted)

GSM

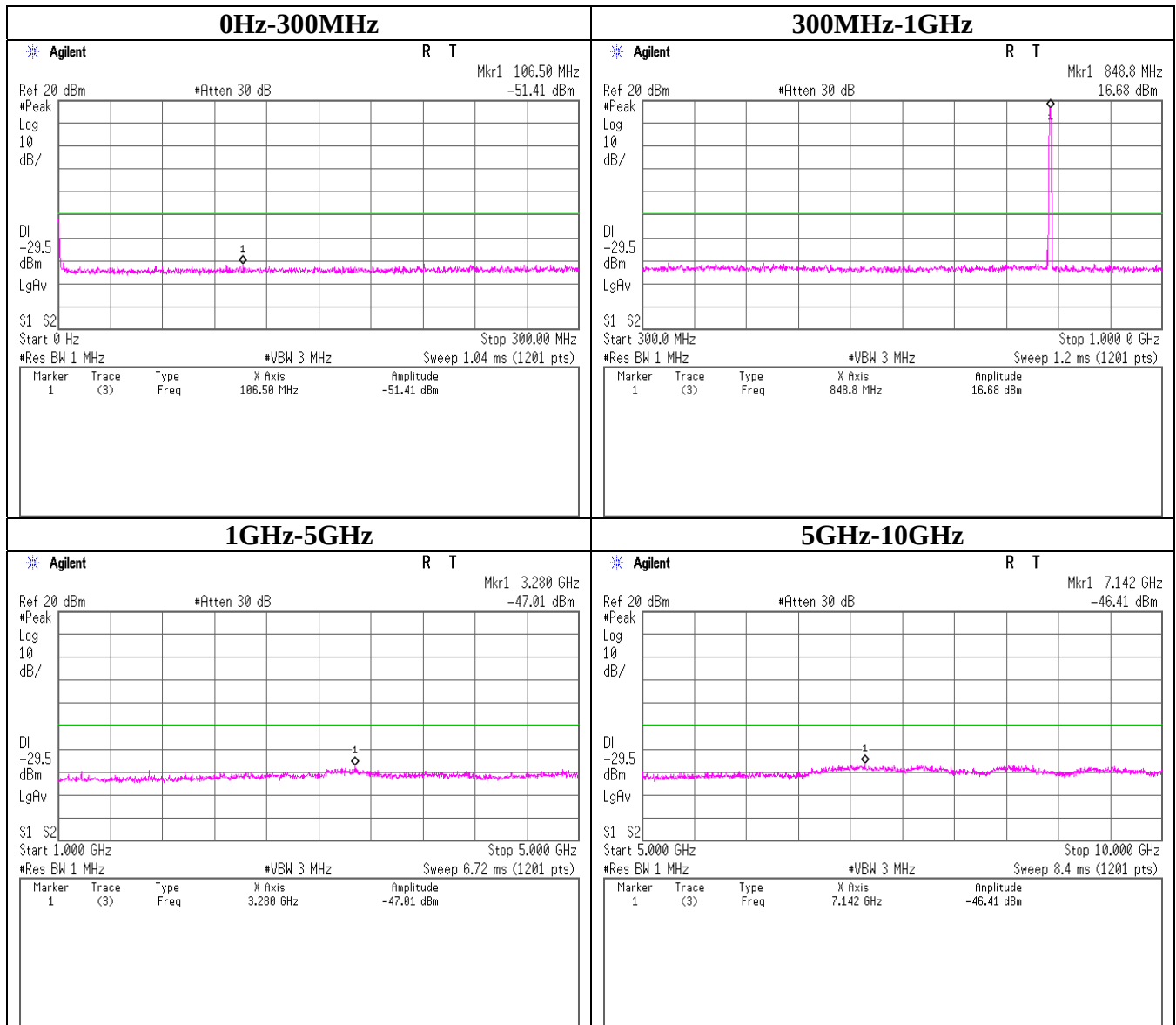
Tx:836.6MHz



Spurious Emission (Conducted)

GSM

Tx:848.8MHz



Spurious Emission (Conducted)
GSM850

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx EGPRS(8PSK), 1slot, MCS-5, PCL=5

Limit Line

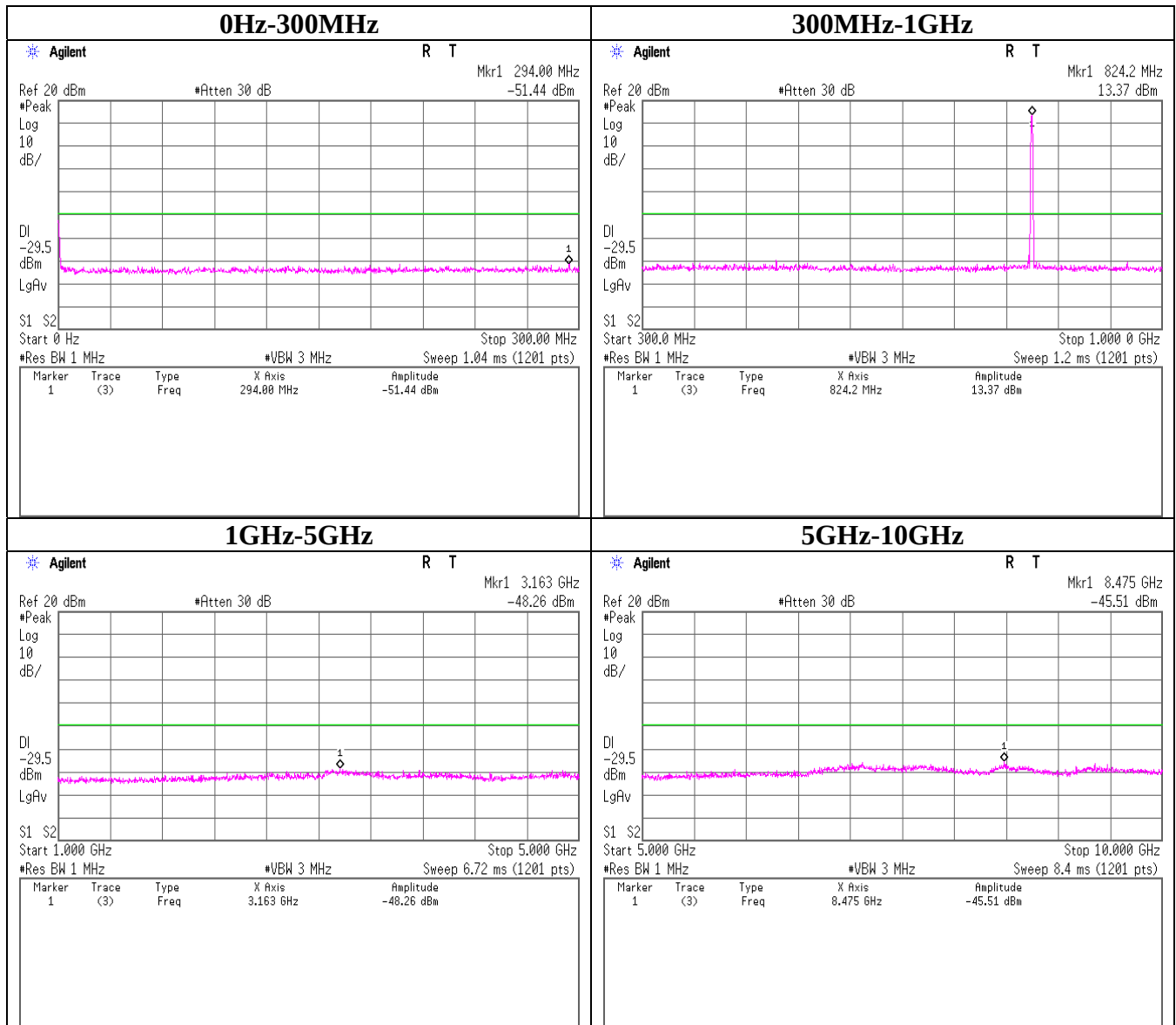
Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
824.2	-13.0	10.00	6.46	-29.5
836.6	-13.0	10.00	6.46	-29.5
848.8	-13.0	10.00	6.46	-29.5

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

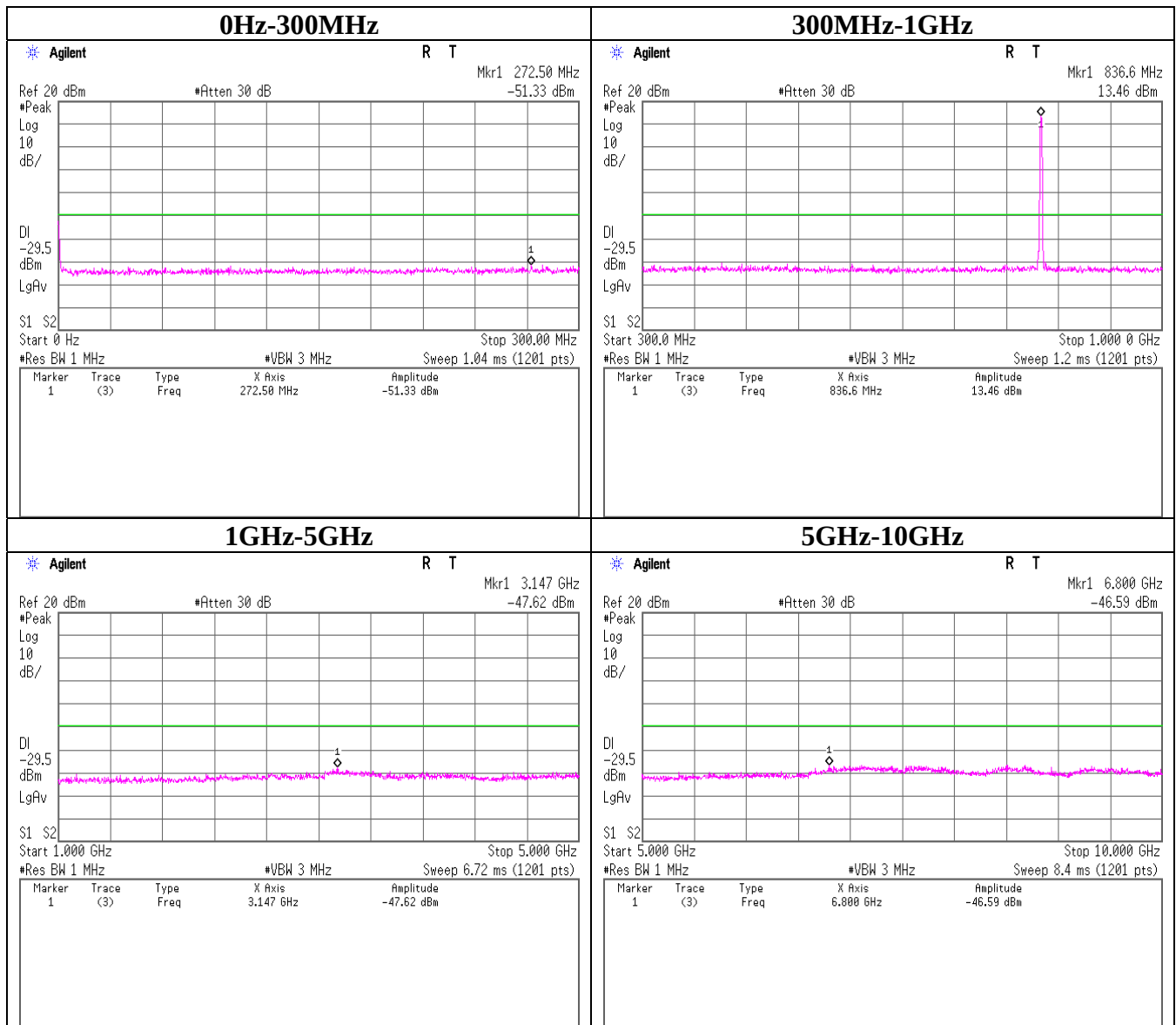
Spurious Emission (Conducted)

EGPRS

Tx:824.2MHz

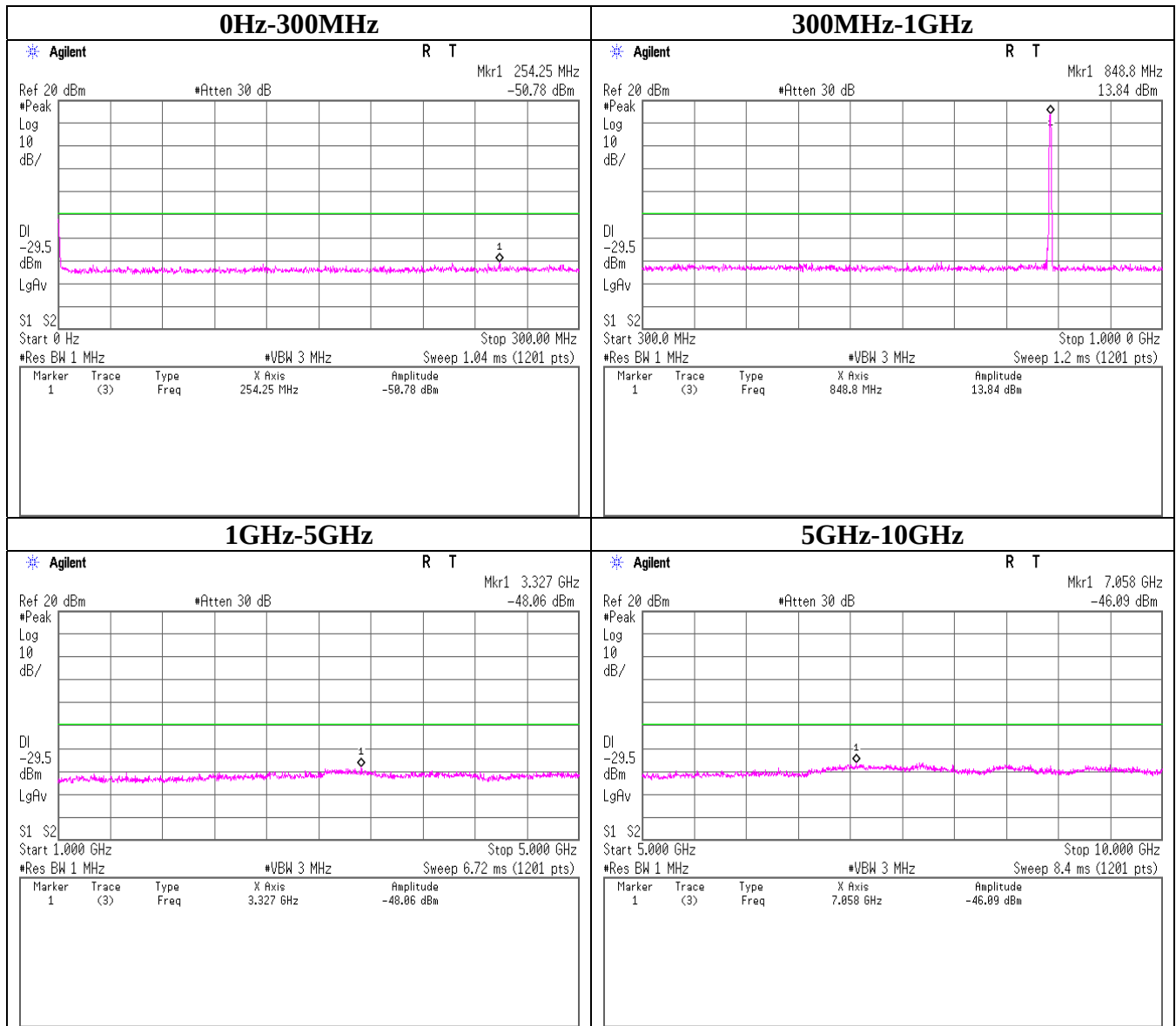


Spurious Emission (Conducted)
EGPRS
Tx:836.6MHz



Spurious Emission (Conducted)

EGPRS
Tx:848.8MHz



Spurious Emission (Conducted)
W-CDMA Band V

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	33BE0179-HO
Date	11/06/2012
Temperature/ Humidity	24deg.C / 50% RH
Engineer	Hironobu Ohnishi
Mode	Tx W-CDMA(RMC12.2kbps), All Up Bits

Limit Line

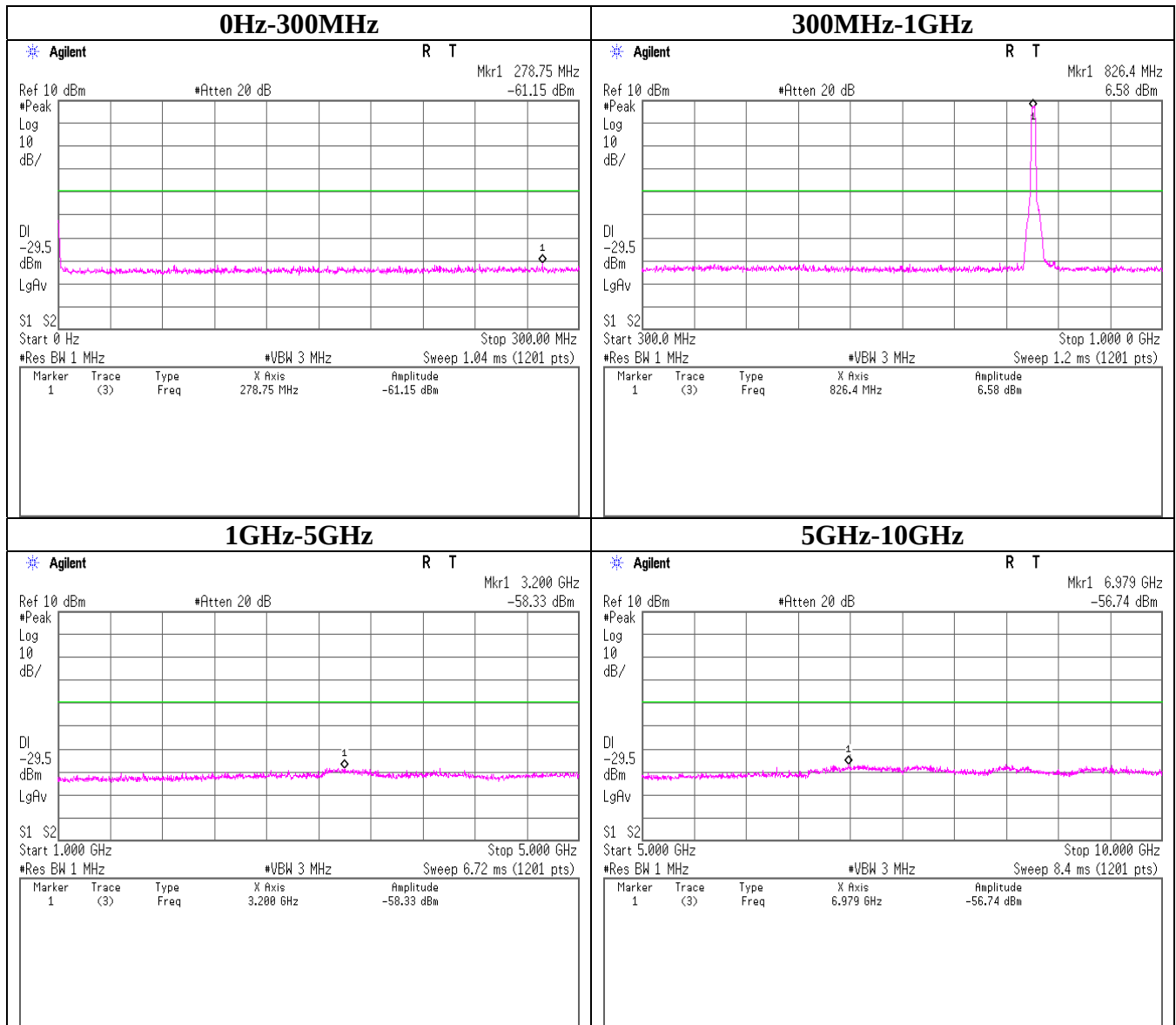
Tx Frequency [MHz]	Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
826.4	-13.0	10.00	6.46	-29.5
836.6	-13.0	10.00	6.46	-29.5
846.6	-13.0	10.00	6.46	-29.5

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

Spurious Emission (Conducted)

W-CDMA

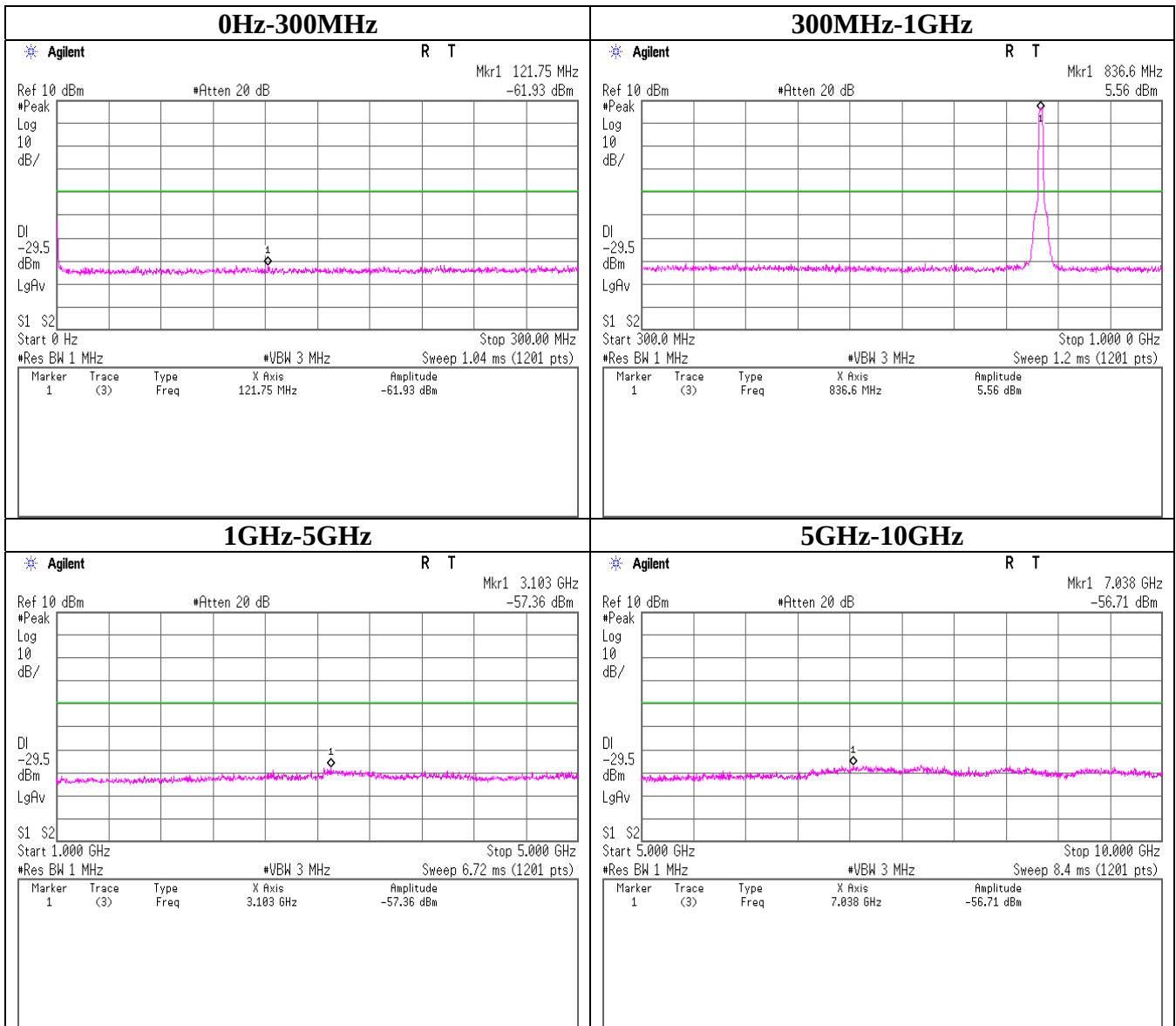
Tx: 826.4MHz



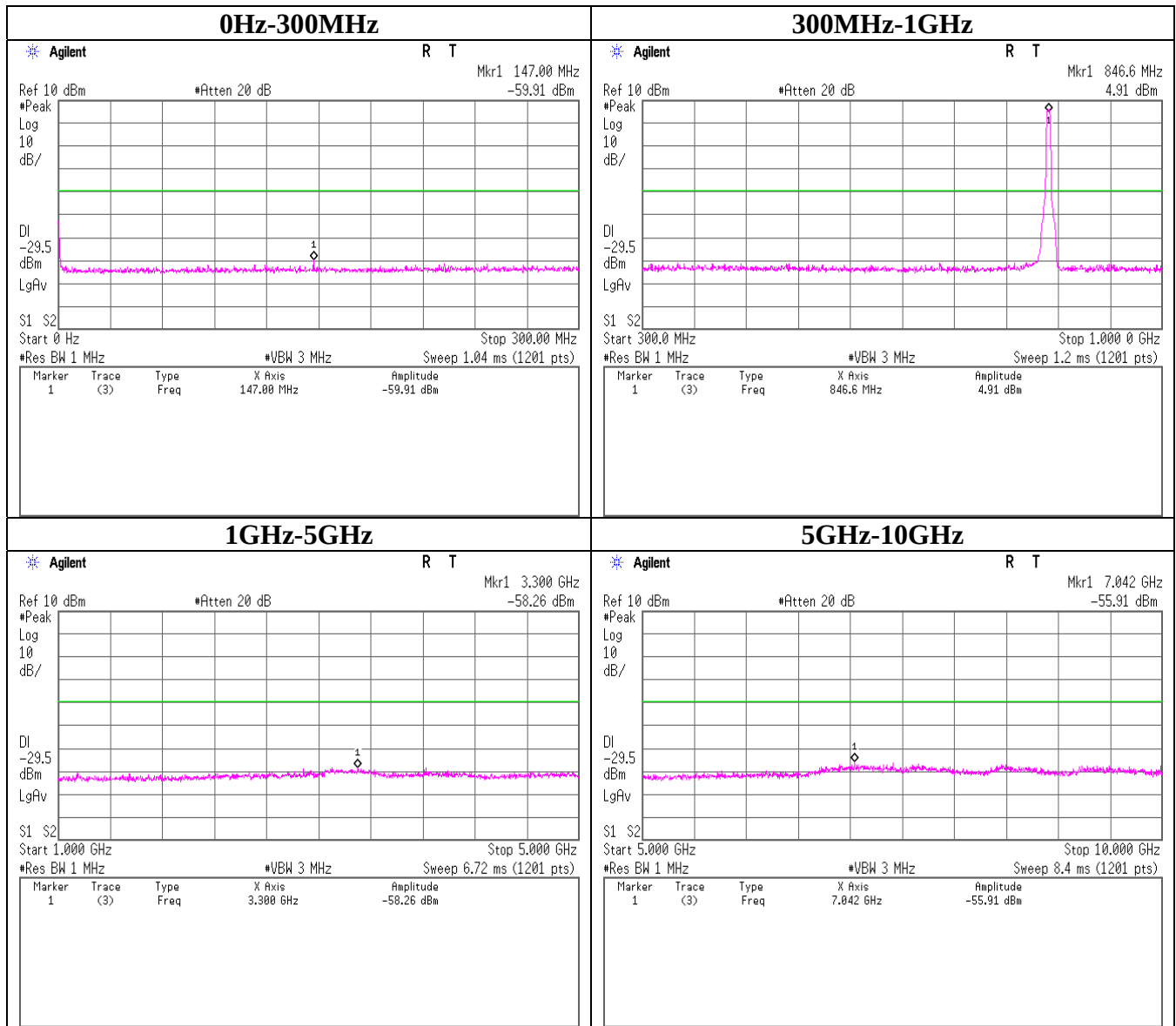
Spurious Emission (Conducted)

W-CDMA

Tx: 836.6MHz



Spurious Emission (Conducted)
W-CDMA
Tx: 846.6MHz



Spurious Emission (Radiated)

GSM850
Tx:824.2MHz

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/31/2012
Temperature / Humidity 22deg. C / 42% 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 Rx Ant. Turn Height Table [cm] [deg.]		Vertical Rx Ant. Turn Height Table [cm] [deg.]		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER					
1648.40	66.0	65.8	-45.9	-46.3	3.8	9.1	0.0	-42.7	-43.1	-13.0	29.7	30.1	131	191	100	135	
2472.60	55.4	54.1	-55.4	-56.6	4.4	10.9	0.0	-51.1	-52.3	-13.0	38.1	39.3	116	197	100	119	
3296.80	49.2	47.4	-61.7	-65.9	4.4	11.9	0.0	-56.3	-60.5	-13.0	43.3	47.5	152	194	100	236	
4121.00	58.5	60.1	-46.2	-43.7	5.0	12.1	0.0	-41.2	-38.7	-13.0	28.2	25.7	100	192	103	179	
4945.20	51.5	48.7	-51.6	-56.6	5.4	12.0	0.0	-47.1	-52.1	-13.0	34.1	39.1	108	214	131	153	
5769.40	49.6	50.0	-52.7	-53.0	5.8	13.4	0.0	-47.3	-47.6	-13.0	34.3	34.6	100	65	100	196	
6593.60	45.9	49.2	-58.0	-51.0	6.3	12.3	0.0	-54.2	-47.2	-13.0	41.2	34.2	100	210	124	146	
7417.80	49.5	48.9	-48.8	-51.0	6.7	11.3	0.0	-46.4	-48.6	-13.0	33.4	35.6	100	263	100	187	
8242.00	60.5	62.6	-35.2	-32.1	7.1	11.8	0.0	-32.6	-29.5	-13.0	19.6	16.5	107	260	105	171	

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)

Spurious Emission (Radiated)
GSM850
Tx:836.6MHz

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/31/2012
Temperature / Humidity 22deg. C / 42% 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
	HOR	VER	HOR	VER				HOR	VER		Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]			
1673.20	65.3	64.5	-46.4	-48.0	3.8	9.2	0.0	-43.1	-44.7	-13.0	30.1	31.7	128	196	100	89	
2509.80	49.5	48.6	-64.4	-64.7	4.4	10.9	0.0	-60.1	-60.4	-13.0	47.1	47.4	108	205	100	125	
3346.40	50.5	48.2	-60.0	-64.3	4.5	12.0	0.0	-54.6	-58.9	-13.0	41.6	45.9	121	188	100	234	
4183.00	55.4	60.0	-49.9	-43.4	5.0	12.1	0.0	-45.0	-38.5	-13.0	32.0	25.5	100	145	100	174	
5019.60	49.9	47.6	-53.3	-58.3	5.5	12.1	0.0	-48.8	-53.8	-13.0	35.8	40.8	116	218	115	164	
5856.20	49.7	50.8	-53.2	-52.9	5.9	13.4	0.0	-47.8	-47.5	-13.0	34.8	34.5	100	74	100	191	
6692.80	46.2	48.8	-57.2	-52.4	6.4	12.1	0.0	-53.6	-48.8	-13.0	40.6	35.8	100	213	100	154	
7529.40	50.6	49.6	-47.4	-49.0	6.8	11.2	0.0	-45.1	-46.7	-13.0	32.1	33.7	100	264	100	186	
8366.00	62.5	62.5	-33.2	-33.7	7.2	12.0	0.0	-30.5	-31.0	-13.0	17.5	18.0	100	261	114	174	

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)

Spurious Emission (Radiated)
GSM850
Tx:848.8MHz

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/31/2012
Temperature / Humidity 22deg. C / 42% 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
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
1697.60	67.2	64.8	-43.4	-48.1	3.8	9.4	0.0	-40.0	-44.7	-13.0	27.0	31.7	130	196	100	85	
2546.40	51.5	46.8	-61.1	-70.0	4.4	10.9	0.0	-56.8	-65.7	-13.0	43.8	52.7	110	200	100	159	
3395.20	48.2	46.3	-63.8	-68.3	4.5	12.1	0.0	-58.3	-62.8	-13.0	45.3	49.8	100	190	100	233	
4244.00	54.9	59.3	-49.7	-43.6	5.0	12.1	0.0	-44.8	-38.7	-13.0	31.8	25.7	111	150	100	177	
5092.80	53.8	49.0	-47.8	-56.5	5.5	12.3	0.0	-43.2	-51.9	-13.0	30.2	38.9	103	211	105	184	
5941.60	51.4	51.9	-49.9	-49.7	5.9	13.4	0.0	-44.6	-44.4	-13.0	31.6	31.4	100	71	100	200	
6790.40	47.2	49.2	-55.4	-52.0	6.4	12.0	0.0	-51.9	-48.5	-13.0	38.9	35.5	100	288	100	160	
7639.20	45.8	45.7	-57.5	-57.4	6.8	11.3	0.0	-55.2	-55.1	-13.0	42.2	42.1	100	270	100	189	
8488.00	63.9	64.9	-30.7	-30.4	7.2	12.2	0.0	-27.8	-27.5	-13.0	14.8	14.5	106	184	100	165	

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)

Spurious Emission (Radiated) W-CDMA Band V

Report No. 33BE0179-HO
Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date 10/31/2012
Temperature / Humidity 22deg. C / 42% RH
Engineer Katsunori Okai

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		Vertical		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
1652.80	58.4	55.2	-54.7	-59.1	3.8	9.1	0.0	-51.5	-55.9	-13.0	38.5	42.9	128	182	100	224	
2479.20	54.0	50.4	-57.4	-62.1	4.4	10.9	0.0	-53.1	-57.8	-13.0	40.1	44.8	116	353	100	185	
3305.60	52.3	51.1	-57.2	-59.0	4.4	12.0	0.0	-51.8	-53.6	-13.0	38.8	40.6	100	191	112	196	

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		Vertical		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
1673.20	55.5	54.3	-56.2	-58.2	3.8	9.2	0.0	-52.9	-54.9	-13.0	39.9	41.9	100	175	100	233	
2509.80	56.2	48.8	-57.7	-64.5	4.4	10.9	0.0	-53.4	-60.2	-13.0	40.4	47.2	110	6	100	156	
3346.40	45.6	44.5	-64.9	-68.0	4.5	12.0	0.0	-59.5	-62.6	-13.0	46.5	49.6	100	0	100	0	

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		Vertical		Remarks
	HOR	VER	HOR	VER				HOR	VER		HOR	VER	Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
1693.20	57.7	55.9	-54.4	-58.3	3.8	9.3	0.0	-51.1	-55.0	-13.0	38.1	42.0	100	174	100	204	
2539.80	49.2	47.2	-64.8	-68.0	4.4	10.9	0.0	-60.5	-63.7	-13.0	47.5	50.7	107	13	100	158	
3386.40	48.0	46.1	-64.0	-69.5	4.5	12.1	0.0	-58.5	-64.0	-13.0	45.5	51.0	100	195	100	175	

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)

Frequency Stability(Temperature/Voltage Variation)

GSM850

Tx:836.6MHz

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33BE0179-HO
Date 11/08/2012
Temperature/ Humidity 18deg.C./ 50% 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	3.80	836.59997404	0.39	0.0005	2.5
-20	3.80	836.59998066	7.01	0.0084	2.5
-10	3.80	836.60002308	49.43	0.0591	2.5
0	3.80	836.59998421	10.56	0.0126	2.5
10	3.80	836.59998240	8.75	0.0105	2.5
20	3.80	836.59997365	0.00	0.0000	Reference
30	3.80	836.59997882	5.17	0.0062	2.5
40	3.80	836.59997779	4.14	0.0049	2.5
50	3.80	836.60002612	52.47	0.0627	2.5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20	3.50	836.59997553	1.88	0.0022	2.5
20	3.80	836.59997365	0.00	0.0000	Reference
20	4.20	836.59997508	1.43	0.0017	2.5

Frequency Stability(Temperature/Voltage Variation)

W-CDMA Band V

Tx: 836.6MHz

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 33BE0179-HO
Date 11/08/2012
Temperature/ Humidity 18deg.C./ 50% 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	3.80	836.59999150	1.65	0.002	2.5
-20.0	3.80	836.59999185	1.30	0.002	2.5
-10.0	3.80	836.59999072	2.43	0.003	2.5
0.0	3.80	836.59999202	1.13	0.001	2.5
10.0	3.80	836.59999005	3.10	0.004	2.5
20.0	3.80	836.59999315	0.00	0.000	Reference
30.0	3.80	836.59999196	1.19	0.001	2.5
40.0	3.80	836.59999028	2.87	0.003	2.5
50.0	3.80	836.59999194	1.21	0.001	2.5

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20.0	3.50	836.59999396	0.81	0.001	2.5
20.0	3.80	836.59999315	0.00	0.000	Reference
20.0	4.20	836.59999393	0.78	0.001	2.5

APPENDIX 2: Test instruments

EMI test equipment

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
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2012/09/05 * 12
MDA-04	Dipole Antenna	Schwarzbeck	UHAP	992	RE	2012/10/21 * 12
MCC-125	Coaxial Cable	UL Japan	-	-	RE	2012/07/23 * 12
YTSSG03	Signal Generator	Rohde & Schwarz	SMT02	51400043	RE	2012/08/01 * 12
MRF-04	Band Rejection Filter(824-849MHz)	TOKYO KEIKI	824-849MHz		RE	2012/07/25 * 12
MHF-03	High pass Filter 1.4-5.0GHz	Mini-Circuit	VHF-1320	10411	RE	2012/08/28 * 12
MURC-03	Radio Communication Analyzer	Anritsu	MT8815B	6200711471	RE/AT	2011/11/26 * 12
KSG-05	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2012/07/23 * 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
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2012/05/25 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2011/12/09 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2011/11/23 * 12
MAT-25	Attenuator(10dB) (above1GHz)	Agilent	8493C	71642	AT	2012/06/27 * 12
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	52258	AT	2012/03/27 * 12
MCC-99	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	30820/2	AT	2012/05/09 * 12
MURC-05	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	127576	AT	2012/10/04 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2012/10/17 * 12
MMM-11	Digital HiTESTER	Hioki	3805	060100600	AT	2012/05/18 * 12
MURC-02	Wireless Communication Test Set	Agilent	E5515C	GB47050683	AT	2011/11/26 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	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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