LTE Band 17

LTE Band 17 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 17 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
709.00	16.51	V	0.9	-1.6	14.05	34.8	-20.7	
709.00	-4.47	H	0.9	-1.6	-6.93	34.8	-41.7	
Mid Ch								
710.00	17.63	V	0.9	-1.6	15.16	34.8	-19.6	
710.00	-4.75	H	0.9	-1.6	-7.22	34.8	-42.0	
High Ch								
711.00	17.91	V	0.9	-1.6	15.44	34.8	-19.3	
711.00	-4.45	H	0.9	-1.6	-6.92	34.8	-41.7	

LTE Band 17 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 17 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
709.00	17.75	V	0.9	-1.6	15.29	34.8	-19.5	
709.00	-5.66	H	0.9	-1.6	-8.12	34.8	-42.9	
Mid Ch								
710.00	16.47	V	0.9	-1.6	14.00	34.8	-20.8	
710.00	-5.96	H	0.9	-1.6	-8.43	34.8	-43.2	
High Ch								
711.00	16.68	V	0.9	-1.6	14.21	34.8	-20.6	
711.00	-5.67	H	0.9	-1.6	-8.14	34.8	-42.9	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 17 5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 17 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
706.50	17.31	V	0.9	-1.6	14.85	34.8	-19.9	
706.50	-4.99	H	0.9	-1.6	-7.45	34.8	-42.2	
Mid Ch								
710.00	17.63	V	0.9	-1.6	15.16	34.8	-19.6	
710.00	-4.50	H	0.9	-1.6	-6.97	34.8	-41.7	
High Ch								
713.50	17.90	V	0.9	-1.6	15.43	34.8	-19.3	
713.50	-4.74	H	0.9	-1.6	-7.22	34.8	-42.0	

LTE Band 17 5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 17 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
706.50	16.61	V	0.9	-1.6	14.15	34.8	-20.6	
706.50	-6.06	H	0.9	-1.6	-8.52	34.8	-43.3	
Mid Ch								
710.00	16.46	V	0.9	-1.6	13.99	34.8	-20.8	
710.00	-5.52	H	0.9	-1.6	-7.99	34.8	-42.8	
High Ch								
713.50	16.68	V	0.9	-1.6	14.21	34.8	-20.6	
713.50	-5.98	H	0.9	-1.6	-8.46	34.8	-43.2	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5

LTE Band 5 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	22.47	V	1.0	-1.5	20.06	38.5	-18.4	
829.00	5.56	H	1.0	-1.5	3.15	38.5	-35.4	
Mid Ch								
836.50	21.73	V	1.0	-1.4	19.35	38.5	-19.2	
836.50	5.47	H	1.0	-1.4	3.09	38.5	-35.4	
High Ch								
844.00	21.11	V	1.0	-1.4	18.76	38.5	-19.7	
844.00	4.34	H	1.0	-1.4	1.98	38.5	-36.5	

LTE Band 5 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	20.84	V	1.0	-1.5	18.43	38.5	-20.1	
829.00	4.57	H	1.0	-1.5	2.16	38.5	-36.3	
Mid Ch								
836.50	20.74	V	1.0	-1.4	18.36	38.5	-20.1	
836.50	4.47	H	1.0	-1.4	2.09	38.5	-36.4	
High Ch								
844.00	19.98	V	1.0	-1.4	17.63	38.5	-20.9	
844.00	3.76	H	1.0	-1.4	1.40	38.5	-37.1	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5 5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	22.10	V	1.0	-1.5	19.68	38.5	-18.8	
826.50	4.51	H	1.0	-1.5	2.09	38.5	-36.4	
Mid Ch								
836.50	21.15	V	1.0	-1.4	18.77	38.5	-19.7	
836.50	5.22	H	1.0	-1.4	2.84	38.5	-35.7	
High Ch								
846.50	20.11	V	1.0	-1.4	17.76	38.5	-20.7	
846.50	4.31	H	1.0	-1.4	1.96	38.5	-36.5	

LTE Band 5 5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	21.13	V	1.0	-1.5	18.71	38.5	-19.8	
826.50	3.46	H	1.0	-1.5	1.04	38.5	-37.5	
Mid Ch								
836.50	20.14	V	1.0	-1.4	17.76	38.5	-20.7	
836.50	4.12	H	1.0	-1.4	1.74	38.5	-36.8	
High Ch								
846.50	19.32	V	1.0	-1.4	16.97	38.5	-21.5	
846.50	3.45	H	1.0	-1.4	1.10	38.5	-37.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5 3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
825.50	22.19	V	1.0	-1.5	19.77	38.5	-18.7	
825.50	3.91	H	1.0	-1.5	1.49	38.5	-37.0	
Mid Ch								
836.50	21.22	V	1.0	-1.4	18.84	38.5	-19.7	
836.50	3.53	H	1.0	-1.4	1.15	38.5	-37.4	
High Ch								
847.50	20.08	V	1.0	-1.4	17.74	38.5	-20.8	
847.50	3.25	H	1.0	-1.4	0.90	38.5	-37.6	

LTE Band 5 3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
825.50	21.24	V	1.0	-1.5	18.82	38.5	-19.7	
825.50	3.00	H	1.0	-1.5	0.58	38.5	-37.9	
Mid Ch								
836.50	20.72	V	1.0	-1.4	18.34	38.5	-20.2	
836.50	2.52	H	1.0	-1.4	0.14	38.5	-38.4	
High Ch								
847.50	19.29	V	1.0	-1.4	16.95	38.5	-21.6	
847.50	2.43	H	1.0	-1.4	0.08	38.5	-38.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5 1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	20.06	V	1.0	-1.5	17.63	38.5	-20.9	
824.70	2.84	H	1.0	-1.5	0.41	38.5	-38.1	
Mid Ch								
836.50	18.41	V	1.0	-1.4	16.03	38.5	-22.5	
836.50	3.31	H	1.0	-1.4	0.93	38.5	-37.6	
High Ch								
848.30	17.84	V	1.0	-1.4	15.49	38.5	-23.0	
848.30	2.18	H	1.0	-1.4	-0.17	38.5	-38.7	

LTE Band 5 1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-22
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	19.12	V	1.0	-1.5	16.69	38.5	-21.8	
824.70	2.51	H	1.0	-1.5	0.08	38.5	-38.4	
Mid Ch								
836.50	17.30	V	1.0	-1.4	14.92	38.5	-23.6	
836.50	2.21	H	1.0	-1.4	-0.17	38.5	-38.7	
High Ch								
848.30	17.03	V	1.0	-1.4	14.68	38.5	-23.8	
848.30	0.96	H	1.0	-1.4	-1.39	38.5	-39.9	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 4

LTE Band 4 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	14.62	V	4.3	9.5	19.79	30.0	-10.2	
1720.00	14.44	H	4.3	9.5	19.61	30.0	-10.4	
Mid Ch								
1732.50	14.54	V	4.3	9.5	19.74	30.0	-10.3	
1732.50	15.04	H	4.3	9.5	20.24	30.0	-9.8	
High Ch								
1745.00	12.76	V	4.4	9.6	17.98	30.0	-12.0	
1745.00	15.19	H	4.4	9.6	20.41	30.0	-9.6	

LTE Band 4 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	13.71	V	4.3	9.5	18.88	30.0	-11.1	
1720.00	13.50	H	4.3	9.5	18.67	30.0	-11.3	
Mid Ch								
1732.50	13.55	V	4.3	9.5	18.75	30.0	-11.3	
1732.50	14.05	H	4.3	9.5	19.25	30.0	-10.7	
High Ch								
1745.00	11.80	V	4.4	9.6	17.02	30.0	-13.0	
1745.00	14.23	H	4.4	9.6	19.45	30.0	-10.6	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE
Band 4
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	13.27	V	4.3	9.5	18.44	30.0	-11.6	
1717.50	14.83	H	4.3	9.5	19.99	30.0	-10.0	
Mid Ch								
1732.50	12.70	V	4.3	9.5	17.90	30.0	-12.1	
1732.50	14.31	H	4.3	9.5	19.51	30.0	-10.5	
High Ch								
1747.50	13.58	V	4.4	9.6	18.81	30.0	-11.2	
1747.50	15.18	H	4.4	9.6	20.41	30.0	-9.6	

LTE
Band 4
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	12.27	V	4.3	9.5	17.44	30.0	-12.6	
1717.50	13.84	H	4.3	9.5	19.00	30.0	-11.0	
Mid Ch								
1732.50	11.71	V	4.3	9.5	16.91	30.0	-13.1	
1732.50	15.28	H	4.3	9.5	20.48	30.0	-9.5	
High Ch								
1747.50	12.60	V	4.4	9.6	17.83	30.0	-12.2	
1747.50	14.21	H	4.4	9.6	19.44	30.0	-10.6	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 4 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	12.89	V	4.3	9.5	18.05	30.0	-11.9	
1715.00	14.65	H	4.3	9.5	19.81	30.0	-10.2	
Mid Ch								
1732.50	13.15	V	4.3	9.5	18.35	30.0	-11.7	
1732.50	15.22	H	4.3	9.5	20.42	30.0	-9.6	
High Ch								
1750.00	12.89	V	4.4	9.6	18.12	30.0	-11.9	
1750.00	15.30	H	4.4	9.6	20.53	30.0	-9.5	

LTE Band 4 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-02-01
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	11.58	V	4.3	9.5	16.74	30.0	-13.3	
1715.00	13.62	H	4.3	9.5	18.78	30.0	-11.2	
Mid Ch								
1732.50	12.15	V	4.3	9.5	17.35	30.0	-12.7	
1732.50	14.24	H	4.3	9.5	19.44	30.0	-10.6	
High Ch								
1750.00	11.87	V	4.4	9.6	17.10	30.0	-12.9	
1750.00	14.29	H	4.4	9.6	19.52	30.0	-10.5	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 4 5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	11.17	V	4.3	9.5	16.33	30.0	-13.7	
1712.50	13.51	H	4.3	9.5	18.66	30.0	-11.3	
Mid Ch								
1732.50	12.48	V	4.3	9.5	17.68	30.0	-12.3	
1732.50	14.91	H	4.3	9.5	20.11	30.0	-9.9	
High Ch								
1752.50	13.01	V	4.4	9.6	18.24	30.0	-11.8	
1752.50	15.05	H	4.4	9.6	20.29	30.0	-9.7	

LTE Band 4 5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	10.38	V	4.3	9.5	15.54	30.0	-14.5	
1712.50	12.42	H	4.3	9.5	17.57	30.0	-12.4	
Mid Ch								
1732.50	11.30	V	4.3	9.5	16.50	30.0	-13.5	
1732.50	13.95	H	4.3	9.5	19.15	30.0	-10.8	
High Ch								
1752.50	11.98	V	4.4	9.6	17.21	30.0	-12.8	
1752.50	14.03	H	4.4	9.6	19.27	30.0	-10.7	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE
Band 4
3MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	10.91	V	4.3	9.5	16.06	30.0	-13.9	
1711.50	14.10	H	4.3	9.5	19.25	30.0	-10.7	
Mid Ch								
1732.50	12.30	V	4.3	9.5	17.50	30.0	-12.5	
1732.50	14.68	H	4.3	9.5	19.88	30.0	-10.1	
High Ch								
1753.50	12.75	V	4.4	9.6	17.99	30.0	-12.0	
1753.50	15.19	H	4.4	9.6	20.43	30.0	-9.6	

LTE
Band 4
3MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	9.84	V	4.3	9.5	14.99	30.0	-15.0	
1711.50	13.10	H	4.3	9.5	18.25	30.0	-11.7	
Mid Ch								
1732.50	11.27	V	4.3	9.5	16.47	30.0	-13.5	
1732.50	13.64	H	4.3	9.5	18.84	30.0	-11.2	
High Ch								
1753.50	11.74	V	4.4	9.6	16.98	30.0	-13.0	
1753.50	14.10	H	4.4	9.6	19.34	30.0	-10.7	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 4 1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 4 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	11.29	V	4.3	9.5	16.43	30.0	-13.6	
1710.70	11.39	H	4.3	9.5	16.53	30.0	-13.5	
Mid Ch								
1732.50	9.41	V	4.3	9.5	14.61	30.0	-15.4	
1732.50	12.84	H	4.3	9.5	18.04	30.0	-12.0	
High Ch								
1754.30	10.12	V	4.4	9.6	15.36	30.0	-14.6	
1754.30	13.08	H	4.4	9.6	18.31	30.0	-11.7	

LTE Band 4 1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 4 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	10.27	V	4.3	9.5	15.41	30.0	-14.6	
1710.70	10.96	H	4.3	9.5	16.10	30.0	-13.9	
Mid Ch								
1732.50	8.44	V	4.3	9.5	13.64	30.0	-16.4	
1732.50	11.82	H	4.3	9.5	17.02	30.0	-13.0	
High Ch								
1754.30	9.04	V	4.4	9.6	14.28	30.0	-15.7	
1754.30	12.11	H	4.4	9.6	17.34	30.0	-12.7	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2

LTE Band 2 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	12.38	V	4.5	9.4	17.28	33.0	-15.7	
1860.00	14.10	H	4.5	9.4	19.00	33.0	-14.0	
Mid Ch								
1880.00	12.39	V	4.5	9.2	17.07	33.0	-15.9	
1880.00	15.00	H	4.5	9.2	19.68	33.0	-13.3	
High Ch								
1900.00	11.11	V	4.6	9.0	15.57	33.0	-17.4	
1900.00	15.45	H	4.6	9.0	19.91	33.0	-13.1	

LTE Band 2 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	11.48	V	4.5	9.4	16.38	33.0	-16.6	
1860.00	13.15	H	4.5	9.4	18.05	33.0	-15.0	
Mid Ch								
1880.00	11.44	V	4.5	9.2	16.12	33.0	-16.9	
1880.00	14.02	H	4.5	9.2	18.70	33.0	-14.3	
High Ch								
1900.00	10.26	V	4.6	9.0	14.72	33.0	-18.3	
1900.00	14.52	H	4.6	9.0	18.98	33.0	-14.0	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2 15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	12.05	V	4.5	9.4	16.98	33.0	-16.0	
1857.50	15.37	H	4.5	9.4	20.30	33.0	-12.7	
Mid Ch								
1880.00	12.36	V	4.5	9.2	17.04	33.0	-16.0	
1880.00	15.01	H	4.5	9.2	19.69	33.0	-13.3	
High Ch								
1902.50	10.80	V	4.6	9.0	15.22	33.0	-17.8	
1902.50	14.46	H	4.6	9.0	18.87	33.0	-14.1	

LTE Band 2 15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	11.07	V	4.5	9.4	16.00	33.0	-17.0	
1857.50	14.38	H	4.5	9.4	19.31	33.0	-13.7	
Mid Ch								
1880.00	11.40	V	4.5	9.2	16.08	33.0	-16.9	
1880.00	13.99	H	4.5	9.2	18.67	33.0	-14.3	
High Ch								
1902.50	9.86	V	4.6	9.0	14.28	33.0	-18.7	
1902.50	13.55	H	4.6	9.0	17.96	33.0	-15.0	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	12.19	V	4.5	9.5	17.14	33.0	-15.9	
1855.00	15.54	H	4.5	9.5	20.50	33.0	-12.5	
Mid Ch								
1880.00	10.67	V	4.5	9.2	15.35	33.0	-17.7	
1880.00	14.94	H	4.5	9.2	19.62	33.0	-13.4	
High Ch								
1905.00	10.43	V	4.6	8.9	14.80	33.0	-18.2	
1905.00	14.32	H	4.6	8.9	18.70	33.0	-14.3	

LTE Band 2 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	11.21	V	4.5	9.5	16.16	33.0	-16.8	
1855.00	14.52	H	4.5	9.5	19.48	33.0	-13.5	
Mid Ch								
1880.00	9.73	V	4.5	9.2	14.41	33.0	-18.6	
1880.00	13.98	H	4.5	9.2	18.66	33.0	-14.3	
High Ch								
1905.00	9.48	V	4.6	8.9	13.85	33.0	-19.1	
1905.00	13.36	H	4.6	8.9	17.74	33.0	-15.3	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2 5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	11.53	V	4.5	9.5	16.52	33.0	-16.5	
1852.50	15.55	H	4.5	9.5	20.54	33.0	-12.5	
Mid Ch								
1880.00	11.99	V	4.5	9.2	16.67	33.0	-16.3	
1880.00	14.15	H	4.5	9.2	18.83	33.0	-14.2	
High Ch								
1907.50	10.19	V	4.6	8.9	14.53	33.0	-18.5	
1907.50	13.69	H	4.6	8.9	18.03	33.0	-15.0	

LTE Band 2 5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	10.57	V	4.5	9.5	15.56	33.0	-17.4	
1852.50	14.57	H	4.5	9.5	19.56	33.0	-13.4	
Mid Ch								
1880.00	11.08	V	4.5	9.2	15.76	33.0	-17.2	
1880.00	13.22	H	4.5	9.2	17.90	33.0	-15.1	
High Ch								
1907.50	9.22	V	4.6	8.9	13.56	33.0	-19.4	
1907.50	12.73	H	4.6	8.9	17.07	33.0	-15.9	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2 3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-23
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	11.52	V	4.5	9.5	16.52	33.0	-16.5	
1851.50	13.70	H	4.5	9.5	18.70	33.0	-14.3	
Mid Ch								
1880.00	11.09	V	4.5	9.2	15.77	33.0	-17.2	
1880.00	13.17	H	4.5	9.2	17.85	33.0	-15.2	
High Ch								
1908.50	11.43	V	4.6	8.9	15.76	33.0	-17.2	
1908.50	13.89	H	4.6	8.9	18.21	33.0	-14.8	

LTE Band 2 3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-23
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	10.47	V	4.5	9.5	15.47	33.0	-17.5	
1851.50	12.71	H	4.5	9.5	17.71	33.0	-15.3	
Mid Ch								
1880.00	10.02	V	4.5	9.2	14.70	33.0	-18.3	
1880.00	12.07	H	4.5	9.2	16.75	33.0	-16.3	
High Ch								
1908.50	10.42	V	4.6	8.9	14.75	33.0	-18.3	
1908.50	12.86	H	4.6	8.9	17.18	33.0	-15.8	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 2 1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-23
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	8.29	V	4.5	9.5	13.29	33.0	-19.7	
1850.70	11.49	H	4.5	9.5	16.50	33.0	-16.5	
Mid Ch								
1880.00	9.02	V	4.5	9.2	13.70	33.0	-19.3	
1880.00	11.21	H	4.5	9.2	15.89	33.0	-17.1	
High Ch								
1909.30	9.03	V	4.6	8.9	13.34	33.0	-19.7	
1909.30	9.71	H	4.6	8.9	14.02	33.0	-19.0	

LTE Band 2 1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-23
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	7.37	V	4.5	9.5	12.37	33.0	-20.6	
1850.70	10.59	H	4.5	9.5	15.60	33.0	-17.4	
Mid Ch								
1880.00	8.06	V	4.5	9.2	12.74	33.0	-20.3	
1880.00	10.19	H	4.5	9.2	14.87	33.0	-18.1	
High Ch								
1909.30	8.02	V	4.6	8.9	12.33	33.0	-20.7	
1909.30	8.65	H	4.6	8.9	12.96	33.0	-20.0	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27. 53

LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(g),(h) - The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

ANSI / TIA / EIA 603E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = peak (RMS for average measurement);

f) Ensure that the number of measurement points ≥ span/RBW;

g) Trace mode = max hold;

NOTE : Radiated spurious emissions were investigated below 30MHz, 30MHz – 1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz – 1GHz.

RESULTS

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

10.2.1. SPURIOUS RADIATION PLOTS

GSM 850

GSM

GSM850
GPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-25
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: GPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-5.8	V	3.0	38.2	1.0	-43.0	-13.0	-30.0	
2472.60	-9.3	V	3.0	38.8	1.0	-47.1	-13.0	-34.1	
3296.80	-12.5	V	3.0	39.4	1.0	-50.9	-13.0	-37.9	
4121.00	-12.1	V	3.0	39.8	2.0	-49.9	-13.0	-36.9	
1648.40	-4.6	H	3.0	38.2	1.0	-41.8	-13.0	-28.8	
2472.60	-7.3	H	3.0	38.8	1.0	-45.1	-13.0	-32.1	
3296.80	-10.6	H	3.0	39.4	1.0	-49.0	-13.0	-36.0	
4121.00	-10.3	H	3.0	39.8	2.0	-48.2	-13.0	-35.2	
Mid Ch, 836.6MHz									
1673.20	-6.2	V	3.0	38.2	1.0	-43.5	-13.0	-30.5	
2509.80	-8.9	V	3.0	38.8	1.0	-46.8	-13.0	-33.8	
3346.40	-13.5	V	3.0	39.5	1.0	-51.9	-13.0	-38.9	
4183.00	-11.1	V	3.0	39.8	2.0	-48.9	-13.0	-35.9	
1673.20	-3.8	H	3.0	38.2	1.0	-41.0	-13.0	-28.0	
2509.80	-12.4	H	3.0	38.8	1.0	-50.2	-13.0	-37.2	
3346.40	-11.2	H	3.0	39.5	1.0	-49.6	-13.0	-36.6	
4183.00	-10.3	H	3.0	39.8	2.0	-48.1	-13.0	-35.1	
High Ch, 848.8MHz									
1697.60	-7.8	V	3.0	38.2	1.0	-45.0	-13.0	-32.0	
2546.40	-6.1	V	3.0	38.9	1.0	-44.0	-13.0	-31.0	
3395.20	-13.2	V	3.0	39.5	1.0	-51.7	-13.0	-38.7	
4244.00	-9.9	V	3.0	39.8	2.0	-47.7	-13.0	-34.7	
1697.60	-5.9	H	3.0	38.2	1.0	-43.2	-13.0	-30.2	
2546.40	-15.3	H	3.0	38.9	1.0	-53.2	-13.0	-40.2	
3395.20	-13.1	H	3.0	39.5	1.0	-51.6	-13.0	-38.6	
4244.00	-8.9	H	3.0	39.8	2.0	-46.7	-13.0	-33.7	

GSM

GSM850
EGPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-25
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: EGPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-7.6	V	3.0	38.2	1.0	-44.8	-13.0	-31.8	
2472.60	-11.5	V	3.0	38.8	1.0	-49.3	-13.0	-36.3	
3296.80	-14.3	V	3.0	39.4	1.0	-52.8	-13.0	-39.8	
4121.00	-13.8	V	3.0	39.8	2.0	-51.6	-13.0	-38.6	
1648.40	-5.6	H	3.0	38.2	1.0	-42.8	-13.0	-29.8	
2472.60	-10.1	H	3.0	38.8	1.0	-47.9	-13.0	-34.9	
3296.80	-12.9	H	3.0	39.4	1.0	-51.4	-13.0	-38.4	
4121.00	-10.6	H	3.0	39.8	2.0	-48.4	-13.0	-35.4	
Mid Ch, 836.6MHz									
1673.20	-9.7	V	3.0	38.2	1.0	-46.9	-13.0	-33.9	
2509.80	-12.6	V	3.0	38.8	1.0	-50.5	-13.0	-37.5	
3346.40	-14.2	V	3.0	39.5	1.0	-52.7	-13.0	-39.7	
4183.00	-12.1	V	3.0	39.8	1.0	-50.9	-13.0	-37.9	
1673.20	-8.6	H	3.0	38.2	1.0	-45.8	-13.0	-32.8	
2509.80	-15.5	H	3.0	38.8	1.0	-53.3	-13.0	-40.3	
3346.40	-14.7	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	
4183.00	-10.3	H	3.0	39.8	1.0	-49.2	-13.0	-36.2	
High Ch, 848.8MHz									
1697.60	-7.7	V	3.0	38.2	1.0	-44.9	-13.0	-31.9	
2546.40	-11.1	V	3.0	38.9	1.0	-49.0	-13.0	-36.0	
3395.20	-13.7	V	3.0	39.5	1.0	-52.2	-13.0	-39.2	
2148.00	-16.1	V	3.0	38.5	1.0	-53.7	-13.0	-40.7	
1697.60	-6.5	H	3.0	38.2	1.0	-43.8	-13.0	-30.8	
2546.40	-11.7	H	3.0	38.9	1.0	-49.6	-13.0	-36.6	
3395.20	-13.9	H	3.0	39.5	1.0	-52.4	-13.0	-39.4	
4244.00	-11.8	H	3.0	39.8	2.0	-49.7	-13.0	-36.7	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

GSM 1900

GSM

GSM1900
GPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-02
Test Engineer:	45585
Configuration:	EUT / Adapter / Earphone, X-Position
Location:	Chamber 1
Mode:	GPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	3.9	V	3.0	43.8	1.0	-38.9	-13.0	-25.9	
5550.60	-3.6	V	3.0	43.7	1.0	-46.3	-13.0	-33.3	
7400.80	-4.4	V	3.0	42.5	1.0	-46.0	-13.0	-33.0	
3700.40	4.1	H	3.0	43.8	1.0	-38.6	-13.0	-25.6	
5550.60	-3.9	H	3.0	43.7	1.0	-46.6	-13.0	-33.6	
7400.80	-3.2	H	3.0	42.5	1.0	-44.7	-13.0	-31.7	
Mid Ch, 1880MHz									
3760.00	4.4	V	3.0	43.8	1.0	-38.4	-13.0	-25.4	
5640.00	-3.4	V	3.0	43.7	1.0	-46.1	-13.0	-33.1	
7520.00	-3.5	V	3.0	42.5	1.0	-45.0	-13.0	-32.0	
3760.00	3.2	H	3.0	43.8	1.0	-39.6	-13.0	-26.6	
5640.00	-4.0	H	3.0	43.7	1.0	-46.7	-13.0	-33.7	
7520.00	-2.9	H	3.0	42.5	1.0	-44.4	-13.0	-31.4	
High Ch, 1909.8MHz									
3819.60	0.4	V	3.0	43.8	1.0	-42.4	-13.0	-29.4	
5729.40	-2.7	V	3.0	43.7	1.0	-45.4	-13.0	-32.4	
7639.20	-4.8	V	3.0	42.4	1.0	-46.2	-13.0	-33.2	
3819.60	0.0	H	3.0	43.8	1.0	-42.8	-13.0	-29.8	
5729.40	-4.3	H	3.0	43.7	1.0	-47.0	-13.0	-34.0	
7639.20	-4.0	H	3.0	42.4	1.0	-45.4	-13.0	-32.4	

GSM

GSM1900
EGPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-02
Test Engineer:	45585
Configuration:	EUT / Adapter / Earphone, X-Position
Location:	Chamber 1
Mode:	EGPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	2.3	V	3.0	43.8	1.0	-40.5	-13.0	-27.5	
5550.60	-5.8	V	3.0	43.7	1.0	-48.5	-13.0	-35.5	
7400.80	-4.3	V	3.0	42.5	1.0	-45.8	-13.0	-32.8	
3700.40	2.5	H	3.0	43.8	1.0	-40.3	-13.0	-27.3	
5550.60	-6.1	H	3.0	43.7	1.0	-48.8	-13.0	-35.8	
7400.80	-4.5	H	3.0	42.5	1.0	-46.0	-13.0	-33.0	
Mid Ch, 1880MHz									
3760.00	2.3	V	3.0	43.8	1.0	-40.5	-13.0	-27.5	
5640.00	-4.6	V	3.0	43.7	1.0	-47.3	-13.0	-34.3	
7520.00	-3.7	V	3.0	42.5	1.0	-45.2	-13.0	-32.2	
3760.00	1.2	H	3.0	43.8	1.0	-41.5	-13.0	-28.5	
5640.00	-5.6	H	3.0	43.7	1.0	-48.3	-13.0	-35.3	
7520.00	-4.0	H	3.0	42.5	1.0	-45.5	-13.0	-32.5	
High Ch, 1909.8MHz									
3819.60	-1.6	V	3.0	43.8	1.0	-44.4	-13.0	-31.4	
5729.40	-4.5	V	3.0	43.7	1.0	-47.2	-13.0	-34.2	
7639.20	-4.6	V	3.0	42.4	1.0	-46.0	-13.0	-33.0	
3819.60	-2.0	H	3.0	43.8	1.0	-44.8	-13.0	-31.8	
5729.40	-4.3	H	3.0	43.7	1.0	-47.0	-13.0	-34.0	
7639.20	-3.9	H	3.0	42.4	1.0	-45.2	-13.0	-32.2	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-25
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: Rel99 Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-14.9	V	3.0	38.2	1.0	-52.2	-13.0	-39.2	
2479.20	-13.8	V	3.0	38.8	1.0	-51.7	-13.0	-38.7	
3305.60	-13.8	V	3.0	39.4	1.0	-52.2	-13.0	-39.2	
1652.80	-15.8	H	3.0	38.2	1.0	-53.0	-13.0	-40.0	
2479.20	-13.2	H	3.0	38.8	1.0	-51.0	-13.0	-38.0	
3305.60	-14.2	H	3.0	39.4	1.0	-52.6	-13.0	-39.6	
Mid Ch, 836.6MHz									
1673.20	-15.0	V	3.0	38.2	1.0	-52.2	-13.0	-39.2	
2509.80	-13.8	V	3.0	38.8	1.0	-51.7	-13.0	-38.7	
3346.40	-14.1	V	3.0	39.5	1.0	-52.6	-13.0	-39.6	
1673.20	-14.3	H	3.0	38.2	1.0	-51.5	-13.0	-38.5	
2509.80	-15.1	H	3.0	38.8	1.0	-53.0	-13.0	-40.0	
3346.40	-14.4	H	3.0	39.5	1.0	-52.8	-13.0	-39.8	
High Ch, 846.6MHz									
1693.20	-13.4	V	3.0	38.2	1.0	-50.7	-13.0	-37.7	
2539.80	-14.2	V	3.0	38.9	1.0	-52.1	-13.0	-39.1	
3386.40	-13.1	V	3.0	39.5	1.0	-51.6	-13.0	-38.6	
1693.20	-13.6	H	3.0	38.2	1.0	-50.8	-13.0	-37.8	
2539.80	-15.0	H	3.0	38.9	1.0	-52.8	-13.0	-39.8	
3386.40	-13.9	H	3.0	39.5	1.0	-52.4	-13.0	-39.4	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-25
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: HSDPA Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-15.4	V	3.0	38.2	1.0	-52.6	-13.0	-39.6	
2479.20	-14.2	V	3.0	38.8	1.0	-52.0	-13.0	-39.0	
3305.60	-13.8	V	3.0	39.4	1.0	-52.3	-13.0	-39.3	
1652.80	-16.3	H	3.0	38.2	1.0	-53.5	-13.0	-40.5	
2479.20	-13.0	H	3.0	38.8	1.0	-50.9	-13.0	-37.9	
3305.60	-14.2	H	3.0	39.4	1.0	-52.6	-13.0	-39.6	
Mid Ch, 836.6MHz									
1673.20	-15.2	V	3.0	38.2	1.0	-52.4	-13.0	-39.4	
2509.80	-14.5	V	3.0	38.8	1.0	-52.3	-13.0	-39.3	
3346.40	-14.2	V	3.0	39.5	1.0	-52.7	-13.0	-39.7	
1673.20	-13.9	H	3.0	38.2	1.0	-51.2	-13.0	-38.2	
2509.80	-15.6	H	3.0	38.8	1.0	-53.5	-13.0	-40.5	
3346.40	-14.5	H	3.0	39.5	1.0	-53.0	-13.0	-40.0	
High Ch, 846.6MHz									
1693.20	-14.3	V	3.0	38.2	1.0	-51.5	-13.0	-38.5	
2539.80	-14.2	V	3.0	38.9	1.0	-52.1	-13.0	-39.1	
3386.40	-13.8	V	3.0	39.5	1.0	-52.3	-13.0	-39.3	
1693.20	-13.9	H	3.0	38.2	1.0	-51.1	-13.0	-38.1	
2539.80	-15.3	H	3.0	38.9	1.0	-53.2	-13.0	-40.2	
3386.40	-13.9	H	3.0	39.5	1.0	-52.4	-13.0	-39.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-26
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X Position
Location: Chamber 2
Mode: Rel99 Band 4 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	-9.2	V	3.0	39.5	1.0	-47.7	-13.0	-34.7	
5137.20	-11.2	V	3.0	39.8	1.0	-50.0	-13.0	-37.0	
6849.60	-6.9	V	3.0	39.7	1.0	-45.6	-13.0	-32.6	
3424.80	-8.0	H	3.0	39.5	1.0	-46.5	-13.0	-33.5	
5137.20	-11.6	H	3.0	39.8	1.0	-50.4	-13.0	-37.4	
6849.60	-8.4	H	3.0	39.7	1.0	-47.1	-13.0	-34.1	
Mid Ch, 1732.6MHz									
3465.20	-9.8	V	3.0	39.5	1.0	-48.3	-13.0	-35.3	
5197.80	-10.9	V	3.0	39.8	1.0	-49.8	-13.0	-36.8	
6930.40	-8.1	V	3.0	39.7	1.0	-46.7	-13.0	-33.7	
3465.20	-9.3	H	3.0	39.5	1.0	-47.8	-13.0	-34.8	
5197.80	-11.0	H	3.0	39.8	1.0	-49.8	-13.0	-36.8	
6930.40	-7.4	H	3.0	39.7	1.0	-46.0	-13.0	-33.0	
High Ch, 1752.6MHz									
3505.20	-11.1	V	3.0	39.5	1.0	-49.7	-13.0	-36.7	
5257.80	-11.2	V	3.0	39.8	1.0	-50.1	-13.0	-37.1	
7010.40	-5.9	V	3.0	39.6	1.0	-44.5	-13.0	-31.5	
3505.20	-10.8	H	3.0	39.5	1.0	-49.3	-13.0	-36.3	
5257.80	-11.7	H	3.0	39.8	1.0	-50.5	-13.0	-37.5	
7010.40	-7.1	H	3.0	39.6	1.0	-45.8	-13.0	-32.8	

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-26
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X Position
Location: Chamber 2
Mode: HSDPA Band 4 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	-9.7	V	3.0	39.5	1.0	-48.2	-13.0	-35.2	
5137.20	-11.2	V	3.0	39.8	1.0	-50.0	-13.0	-37.0	
6849.60	-7.4	V	3.0	39.7	1.0	-46.1	-13.0	-33.1	
3424.80	-7.1	H	3.0	39.5	1.0	-45.6	-13.0	-32.6	
5137.20	-11.3	H	3.0	39.8	1.0	-50.1	-13.0	-37.1	
6849.60	-8.9	H	3.0	39.7	1.0	-47.5	-13.0	-34.5	
Mid Ch, 1732.6MHz									
3465.20	-10.5	V	3.0	39.5	1.0	-49.0	-13.0	-36.0	
5197.80	-11.1	V	3.0	39.8	1.0	-49.9	-13.0	-36.9	
6930.40	-8.4	V	3.0	39.7	1.0	-47.1	-13.0	-34.1	
3465.20	-9.5	H	3.0	39.5	1.0	-48.0	-13.0	-35.0	
5197.80	-11.2	H	3.0	39.8	1.0	-50.0	-13.0	-37.0	
6930.40	-8.2	H	3.0	39.7	1.0	-46.8	-13.0	-33.8	
High Ch, 1752.6MHz									
3505.20	-11.6	V	3.0	39.5	1.0	-50.1	-13.0	-37.1	
5257.80	-11.5	V	3.0	39.8	1.0	-50.4	-13.0	-37.4	
7010.40	-6.4	V	3.0	39.6	1.0	-45.0	-13.0	-32.0	
3505.20	-11.4	H	3.0	39.5	1.0	-49.9	-13.0	-36.9	
5257.80	-11.2	H	3.0	39.8	1.0	-50.1	-13.0	-37.1	
7010.40	-7.2	H	3.0	39.6	1.0	-45.8	-13.0	-32.8	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-30
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X Position
Location: Chamber 2
Mode: Rel99 Band 2 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	-8.5	V	3.0	39.7	1.0	-47.2	-13.0	-34.2	
5557.20	-10.6	V	3.0	39.9	1.0	-49.5	-13.0	-36.5	
7409.60	-7.8	V	3.0	39.4	1.0	-46.3	-13.0	-33.3	
3704.80	-6.9	H	3.0	39.7	1.0	-45.5	-13.0	-32.5	
5557.20	-10.8	H	3.0	39.9	1.0	-49.7	-13.0	-36.7	
7409.60	-7.2	H	3.0	39.4	1.0	-45.6	-13.0	-32.6	
Mid Ch, 1880MHz									
3760.00	-3.7	V	3.0	39.7	1.0	-42.4	-13.0	-29.4	
5640.00	-11.0	V	3.0	40.0	1.0	-49.9	-13.0	-36.9	
7520.00	-8.8	V	3.0	39.4	1.0	-47.2	-13.0	-34.2	
3760.00	-6.5	H	3.0	39.7	1.0	-45.1	-13.0	-32.1	
5640.00	-10.7	H	3.0	40.0	1.0	-49.7	-13.0	-36.7	
7520.00	-8.0	H	3.0	39.4	1.0	-46.4	-13.0	-33.4	
High Ch, 1907.6MHz									
3815.20	-6.9	V	3.0	39.7	1.0	-45.6	-13.0	-32.6	
5722.80	-10.3	V	3.0	40.0	1.0	-49.3	-13.0	-36.3	
7630.40	-6.4	V	3.0	39.3	1.0	-44.7	-13.0	-31.7	
3815.20	-7.3	H	3.0	39.7	1.0	-46.0	-13.0	-33.0	
5722.80	-10.7	H	3.0	40.0	1.0	-49.7	-13.0	-36.7	
7630.40	-7.7	H	3.0	39.3	1.0	-46.1	-13.0	-33.1	

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-30
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X Position
Location: Chamber 2
Mode: HSDPA Band 2 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	-8.6	V	3.0	39.7	1.0	-47.3	-13.0	-34.3	
5557.20	-10.7	V	3.0	39.9	1.0	-49.7	-13.0	-36.7	
7409.60	-8.0	V	3.0	39.4	1.0	-46.4	-13.0	-33.4	
3704.80	-6.4	H	3.0	39.7	1.0	-45.0	-13.0	-32.0	
5557.20	-10.9	H	3.0	39.9	1.0	-49.8	-13.0	-36.8	
7409.60	-7.3	H	3.0	39.4	1.0	-45.7	-13.0	-32.7	
Mid Ch, 1880MHz									
3760.00	-3.9	V	3.0	39.7	1.0	-42.6	-13.0	-29.6	
5640.00	-11.2	V	3.0	40.0	1.0	-50.2	-13.0	-37.2	
7520.00	-8.9	V	3.0	39.4	1.0	-47.3	-13.0	-34.3	
3760.00	-6.6	H	3.0	39.7	1.0	-45.3	-13.0	-32.3	
5640.00	-10.5	H	3.0	40.0	1.0	-49.4	-13.0	-36.4	
7520.00	-8.1	H	3.0	39.4	1.0	-46.5	-13.0	-33.5	
High Ch, 1907.6MHz									
3815.20	-6.5	V	3.0	39.7	1.0	-45.2	-13.0	-32.2	
5722.80	-10.7	V	3.0	40.0	1.0	-49.6	-13.0	-36.6	
7630.40	-6.9	V	3.0	39.3	1.0	-45.2	-13.0	-32.2	
3815.20	-7.0	H	3.0	39.7	1.0	-45.7	-13.0	-32.7	
5722.80	-10.9	H	3.0	40.0	1.0	-49.8	-13.0	-36.8	
7630.40	-8.1	H	3.0	39.3	1.0	-46.4	-13.0	-33.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 17

LTE Band 17 10MHz QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-29
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_QPSK Band 17 Harmonics, 10MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 709MHz									
1418.00	-7.5	V	3.0	38.1	1.0	-44.6	-13.0	-31.6	
2127.00	-14.2	V	3.0	38.5	1.0	-51.7	-13.0	-38.7	
2836.00	-15.5	V	3.0	39.1	1.0	-53.6	-13.0	-40.6	
1418.00	-9.8	H	3.0	38.1	1.0	-46.9	-13.0	-33.9	
2127.00	-15.1	H	3.0	38.5	1.0	-52.6	-13.0	-39.6	
2836.00	-14.7	H	3.0	39.1	1.0	-52.8	-13.0	-39.8	
Mid Ch, 710MHz									
1420.00	-7.6	V	3.0	38.1	1.0	-44.7	-13.0	-31.7	
2130.00	-14.5	V	3.0	38.5	1.0	-52.0	-13.0	-39.0	
2840.00	-14.3	V	3.0	39.1	1.0	-52.4	-13.0	-39.4	
1420.00	-10.5	H	3.0	38.1	1.0	-47.7	-13.0	-34.7	
2130.00	-14.2	H	3.0	38.5	1.0	-51.8	-13.0	-38.8	
2840.00	-14.7	H	3.0	39.1	1.0	-52.8	-13.0	-39.8	
High Ch, 711MHz									
1422.00	-6.9	V	3.0	38.1	1.0	-44.0	-13.0	-31.0	
2133.00	-13.2	V	3.0	38.5	1.0	-50.7	-13.0	-37.7	
2844.00	-14.6	V	3.0	39.1	1.0	-52.7	-13.0	-39.7	
1422.00	-8.1	H	3.0	38.1	1.0	-45.2	-13.0	-32.2	
2133.00	-15.0	H	3.0	38.5	1.0	-52.5	-13.0	-39.5	
2844.00	-15.3	H	3.0	39.1	1.0	-53.4	-13.0	-40.4	

LTE Band 17 10MHz 16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-29
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_16QAM Band 17 Harmonics, 10MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 709MHz									
1418.00	-8.2	V	3.0	38.1	1.0	-45.4	-13.0	-32.4	
2127.00	-13.4	V	3.0	38.5	1.0	-50.9	-13.0	-37.9	
2836.00	-15.4	V	3.0	39.1	1.0	-53.5	-13.0	-40.5	
1418.00	-10.1	H	3.0	38.1	1.0	-47.3	-13.0	-34.3	
2127.00	-14.9	H	3.0	38.5	1.0	-52.4	-13.0	-39.4	
2836.00	-14.9	H	3.0	39.1	1.0	-53.1	-13.0	-40.1	
Mid Ch, 710MHz									
1420.00	-7.6	V	3.0	38.1	1.0	-44.7	-13.0	-31.7	
2130.00	-14.4	V	3.0	38.5	1.0	-51.9	-13.0	-38.9	
2840.00	-14.4	V	3.0	39.1	1.0	-52.5	-13.0	-39.5	
1420.00	-10.2	H	3.0	38.1	1.0	-47.3	-13.0	-34.3	
2130.00	-15.0	H	3.0	38.5	1.0	-52.5	-13.0	-39.5	
2840.00	-14.5	H	3.0	39.1	1.0	-52.7	-13.0	-39.7	
High Ch, 711MHz									
1422.00	-7.0	V	3.0	38.1	1.0	-44.2	-13.0	-31.2	
2133.00	-13.3	V	3.0	38.5	1.0	-50.8	-13.0	-37.8	
2844.00	-14.8	V	3.0	39.1	1.0	-52.9	-13.0	-39.9	
1422.00	-7.5	H	3.0	38.1	1.0	-44.6	-13.0	-31.6	
2133.00	-14.3	H	3.0	38.5	1.0	-51.8	-13.0	-38.8	
2844.00	-14.8	H	3.0	39.1	1.0	-53.0	-13.0	-40.0	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE

Band 17

5MHz

QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-29
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_QPSK Band 17 Harmonics, 5MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 706.5MHz									
1413.00	-8.6	V	3.0	38.1	1.0	-45.7	-13.0	-32.7	
2119.50	-13.5	V	3.0	38.5	1.0	-51.0	-13.0	-38.0	
2826.00	-14.8	V	3.0	39.1	1.0	-52.9	-13.0	-39.9	
1413.00	-11.6	H	3.0	38.1	1.0	-48.7	-13.0	-35.7	
2119.50	-16.4	H	3.0	38.5	1.0	-53.9	-13.0	-40.9	
2826.00	-15.1	H	3.0	39.1	1.0	-53.2	-13.0	-40.2	
Mid Ch, 710MHz									
1420.00	-8.1	V	3.0	38.1	1.0	-45.2	-13.0	-32.2	
2130.00	-13.3	V	3.0	38.5	1.0	-50.8	-13.0	-37.8	
2840.00	-14.7	V	3.0	39.1	1.0	-52.8	-13.0	-39.8	
1420.00	-8.0	H	3.0	38.1	1.0	-45.2	-13.0	-32.2	
2130.00	-13.4	H	3.0	38.5	1.0	-50.9	-13.0	-37.9	
2840.00	-13.9	H	3.0	39.1	1.0	-52.0	-13.0	-39.0	
High Ch, 713.5MHz									
1427.00	-8.1	V	3.0	38.1	1.0	-45.2	-13.0	-32.2	
2140.50	-14.7	V	3.0	38.5	1.0	-52.2	-13.0	-39.2	
2854.00	-15.5	V	3.0	39.1	1.0	-53.6	-13.0	-40.6	
1427.00	-8.0	H	3.0	38.1	1.0	-45.1	-13.0	-32.1	
2140.50	-15.4	H	3.0	38.5	1.0	-52.9	-13.0	-39.9	
2854.00	-14.6	H	3.0	39.1	1.0	-52.7	-13.0	-39.7	

LTE

Band 17

5MHz

16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-29
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_16QAM Band 17 Harmonics, 5MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 706.5MHz									
1413.00	-8.7	V	3.0	38.1	1.0	-45.9	-13.0	-32.9	
2119.50	-14.2	V	3.0	38.5	1.0	-51.7	-13.0	-38.7	
2826.00	-14.5	V	3.0	39.1	1.0	-52.6	-13.0	-39.6	
1413.00	-11.8	H	3.0	38.1	1.0	-48.9	-13.0	-35.9	
2119.50	-16.8	H	3.0	38.5	1.0	-54.3	-13.0	-41.3	
2826.00	-15.5	H	3.0	39.1	1.0	-53.6	-13.0	-40.6	
Mid Ch, 710MHz									
1420.00	-8.1	V	3.0	38.1	1.0	-45.2	-13.0	-32.2	
2130.00	-14.3	V	3.0	38.5	1.0	-51.8	-13.0	-38.8	
2840.00	-14.6	V	3.0	39.1	1.0	-52.7	-13.0	-39.7	
1420.00	-7.4	H	3.0	38.1	1.0	-44.5	-13.0	-31.5	
2130.00	-15.0	H	3.0	38.5	1.0	-52.5	-13.0	-39.5	
2840.00	-12.9	H	3.0	39.1	1.0	-51.0	-13.0	-38.0	
High Ch, 713.5MHz									
1427.00	-7.3	V	3.0	38.1	1.0	-44.4	-13.0	-31.4	
2140.50	-14.9	V	3.0	38.5	1.0	-52.5	-13.0	-39.5	
2854.00	-15.1	V	3.0	39.1	1.0	-53.2	-13.0	-40.2	
1427.00	-8.8	H	3.0	38.1	1.0	-45.9	-13.0	-32.9	
2140.50	-15.5	H	3.0	38.5	1.0	-53.0	-13.0	-40.0	
2854.00	-14.7	H	3.0	39.1	1.0	-52.8	-13.0	-39.8	

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433
UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5

LTE Band 5 10MHz QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 829MHz									
1658.00	-15.3	V	3.0	38.2	1.0	-52.6	-13.0	-39.6	
2487.00	-8.2	V	3.0	38.8	1.0	-46.0	-13.0	-33.0	
3316.00	-14.2	V	3.0	39.4	1.0	-52.7	-13.0	-39.7	
1658.00	-14.0	H	3.0	38.2	1.0	-51.2	-13.0	-38.2	
2487.00	-8.7	H	3.0	38.8	1.0	-46.5	-13.0	-33.5	
3316.00	-14.4	H	3.0	39.4	1.0	-52.8	-13.0	-39.8	
Mid Ch, 836.5MHz									
1673.00	-12.6	V	3.0	38.2	1.0	-49.8	-13.0	-36.8	
2509.50	-13.2	V	3.0	38.8	1.0	-51.0	-13.0	-38.0	
3346.00	-14.7	V	3.0	39.5	1.0	-53.1	-13.0	-40.1	
1673.00	-10.4	H	3.0	38.2	1.0	-47.6	-13.0	-34.6	
2509.50	-12.9	H	3.0	38.8	1.0	-50.8	-13.0	-37.8	
3346.00	-13.5	H	3.0	39.5	1.0	-52.0	-13.0	-39.0	
High Ch, 844MHz									
1688.00	-8.4	V	3.0	38.2	1.0	-45.6	-13.0	-32.6	
2532.00	-13.1	V	3.0	38.9	1.0	-50.9	-13.0	-37.9	
3376.00	-14.3	V	3.0	39.5	1.0	-52.8	-13.0	-39.8	
1688.00	-9.0	H	3.0	38.2	1.0	-46.2	-13.0	-33.2	
2532.00	-13.0	H	3.0	38.9	1.0	-50.8	-13.0	-37.8	
3376.00	-14.7	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	

LTE Band 5 10MHz 16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Harmonics, 10MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 829MHz									
1658.00	-15.1	V	3.0	38.2	1.0	-52.4	-13.0	-39.4	
2487.00	-8.9	V	3.0	38.8	1.0	-46.7	-13.0	-33.7	
3316.00	-14.3	V	3.0	39.4	1.0	-52.8	-13.0	-39.8	
1658.00	-14.2	H	3.0	38.2	1.0	-51.4	-13.0	-38.4	
2487.00	-8.4	H	3.0	38.8	1.0	-46.2	-13.0	-33.2	
3316.00	-14.9	H	3.0	39.4	1.0	-53.4	-13.0	-40.4	
Mid Ch, 836.5MHz									
1673.00	-12.9	V	3.0	38.2	1.0	-50.1	-13.0	-37.1	
2509.50	-13.9	V	3.0	38.8	1.0	-51.7	-13.0	-38.7	
3346.00	-14.7	V	3.0	39.5	1.0	-53.1	-13.0	-40.1	
1673.00	-10.3	H	3.0	38.2	1.0	-47.6	-13.0	-34.6	
2509.50	-12.9	H	3.0	38.8	1.0	-50.8	-13.0	-37.8	
3346.00	-14.1	H	3.0	39.5	1.0	-52.5	-13.0	-39.5	
High Ch, 844MHz									
1688.00	-8.8	V	3.0	38.2	1.0	-46.0	-13.0	-33.0	
2532.00	-13.2	V	3.0	38.9	1.0	-51.1	-13.0	-38.1	
3376.00	-14.8	V	3.0	39.5	1.0	-53.3	-13.0	-40.3	
1688.00	-9.4	H	3.0	38.2	1.0	-46.6	-13.0	-33.6	
2532.00	-12.8	H	3.0	38.9	1.0	-50.7	-13.0	-37.7	
3376.00	-15.0	H	3.0	39.5	1.0	-53.4	-13.0	-40.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5 5MHz QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Harmonics, 5MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.5MHz									
1653.00	-11.7	V	3.0	38.2	1.0	-48.9	-13.0	-35.9	
2479.50	-10.2	V	3.0	38.8	1.0	-48.0	-13.0	-35.0	
3306.00	-14.1	V	3.0	39.4	1.0	-52.6	-13.0	-39.6	
1653.00	-11.1	H	3.0	38.2	1.0	-48.3	-13.0	-35.3	
2479.50	-13.7	H	3.0	38.8	1.0	-51.5	-13.0	-38.5	
3306.00	0.0	H	3.0	39.4	1.0	-38.4	-13.0	-25.4	
Mid Ch, 836.5MHz									
1673.00	-11.4	V	3.0	38.2	1.0	-48.7	-13.0	-35.7	
2509.50	-12.0	V	3.0	38.8	1.0	-49.9	-13.0	-36.9	
3346.00	-13.1	V	3.0	39.5	1.0	-51.6	-13.0	-38.6	
1673.00	-9.2	H	3.0	38.2	1.0	-46.4	-13.0	-33.4	
2509.50	-13.1	H	3.0	38.8	1.0	-51.0	-13.0	-38.0	
3346.00	-14.5	H	3.0	39.5	1.0	-53.0	-13.0	-40.0	
High Ch, 846.5MHz									
1693.00	-10.6	V	3.0	38.2	1.0	-47.8	-13.0	-34.8	
2539.50	-12.4	V	3.0	38.9	1.0	-50.3	-13.0	-37.3	
3386.00	-13.4	V	3.0	39.5	1.0	-51.9	-13.0	-38.9	
1693.00	-10.2	H	3.0	38.2	1.0	-47.5	-13.0	-34.5	
2539.50	-11.8	H	3.0	38.9	1.0	-49.6	-13.0	-36.6	
3386.00	-14.9	H	3.0	39.5	1.0	-53.4	-13.0	-40.4	

LTE Band 5 5MHz 16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-31
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Harmonics, 5MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.5MHz									
1653.00	-13.1	V	3.0	38.2	1.0	-50.3	-13.0	-37.3	
2479.50	-11.0	V	3.0	38.8	1.0	-48.8	-13.0	-35.8	
3306.00	-14.3	V	3.0	39.4	1.0	-52.7	-13.0	-39.7	
1653.00	-11.7	H	3.0	38.2	1.0	-48.9	-13.0	-35.9	
2479.50	-13.3	H	3.0	38.8	1.0	-51.1	-13.0	-38.1	
3306.00	-14.0	H	3.0	39.4	1.0	-52.4	-13.0	-39.4	
Mid Ch, 836.5MHz									
1673.00	-12.6	V	3.0	38.2	1.0	-49.9	-13.0	-36.9	
2509.50	-13.1	V	3.0	38.8	1.0	-50.9	-13.0	-37.9	
3346.00	-13.4	V	3.0	39.5	1.0	-51.9	-13.0	-38.9	
1673.00	-9.4	H	3.0	38.2	1.0	-46.6	-13.0	-33.6	
2509.50	-13.6	H	3.0	38.8	1.0	-51.4	-13.0	-38.4	
3346.00	-14.4	H	3.0	39.5	1.0	-52.8	-13.0	-39.8	
High Ch, 846.5MHz									
1693.00	-11.2	V	3.0	38.2	1.0	-48.4	-13.0	-35.4	
2539.50	-12.4	V	3.0	38.9	1.0	-50.3	-13.0	-37.3	
3386.00	-13.8	V	3.0	39.5	1.0	-52.3	-13.0	-39.3	
1693.00	-10.2	H	3.0	38.2	1.0	-47.5	-13.0	-34.5	
2539.50	-12.2	H	3.0	38.9	1.0	-50.0	-13.0	-37.0	
3386.00	-14.7	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE

Band 5

3MHz

QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-01-30
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, Z Position
Location:	Chamber 2
Mode:	LTE_QPSK Band 5 Harmonics, 3MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 825.5MHz									
1651.00	-11.9	V	3.0	38.2	1.0	-49.1	-13.0	-36.1	
2476.50	-10.1	V	3.0	38.8	1.0	-47.9	-13.0	-34.9	
3302.00	-13.6	V	3.0	39.4	1.0	-52.0	-13.0	-39.0	
1651.00	-9.1	H	3.0	38.2	1.0	-46.3	-13.0	-33.3	
2476.50	-13.4	H	3.0	38.8	1.0	-51.2	-13.0	-38.2	
3302.00	-13.9	H	3.0	39.4	1.0	-52.3	-13.0	-39.3	
Mid Ch, 836.5MHz									
1673.00	-12.5	V	3.0	38.2	1.0	-49.7	-13.0	-36.7	
2509.50	-12.7	V	3.0	38.8	1.0	-50.6	-13.0	-37.6	
3346.00	-14.2	V	3.0	39.5	1.0	-52.6	-13.0	-39.6	
1673.00	-11.3	H	3.0	38.2	1.0	-48.5	-13.0	-35.5	
2509.50	-14.8	H	3.0	38.8	1.0	-52.7	-13.0	-39.7	
3346.00	-14.8	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	
High Ch, 847.5MHz									
1695.00	-7.1	V	3.0	38.2	1.0	-44.3	-13.0	-31.3	
2542.50	-9.9	V	3.0	38.9	1.0	-47.7	-13.0	-34.7	
3390.00	-13.5	V	3.0	39.5	1.0	-52.0	-13.0	-39.0	
1695.00	-6.5	H	3.0	38.2	1.0	-43.8	-13.0	-30.8	
2542.50	-13.9	H	3.0	38.9	1.0	-51.7	-13.0	-38.7	
3390.00	-13.2	H	3.0	39.5	1.0	-51.7	-13.0	-38.7	

LTE

Band 5

3MHz

16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-01-30
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, Z Position
Location:	Chamber 2
Mode:	LTE_16QAM Band 5 Harmonics, 3MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 825.5MHz									
1651.00	-11.9	V	3.0	38.2	1.0	-49.1	-13.0	-36.1	
2476.50	-10.7	V	3.0	38.8	1.0	-48.5	-13.0	-35.5	
3302.00	-13.7	V	3.0	39.4	1.0	-52.1	-13.0	-39.1	
1651.00	-9.2	H	3.0	38.2	1.0	-46.4	-13.0	-33.4	
2476.50	-13.6	H	3.0	38.8	1.0	-51.4	-13.0	-38.4	
3302.00	-14.2	H	3.0	39.4	1.0	-52.6	-13.0	-39.6	
Mid Ch, 836.5MHz									
1673.00	-13.2	V	3.0	38.2	1.0	-50.4	-13.0	-37.4	
2509.50	-12.7	V	3.0	38.8	1.0	-50.5	-13.0	-37.5	
3346.00	-13.3	V	3.0	39.5	1.0	-51.7	-13.0	-38.7	
1673.00	-12.1	H	3.0	38.2	1.0	-49.3	-13.0	-36.3	
2509.50	-15.1	H	3.0	38.8	1.0	-53.0	-13.0	-40.0	
3346.00	-14.9	H	3.0	39.5	1.0	-53.3	-13.0	-40.3	
High Ch, 847.5MHz									
1695.00	-6.9	V	3.0	38.2	1.0	-44.2	-13.0	-31.2	
2542.50	-10.1	V	3.0	38.9	1.0	-47.9	-13.0	-34.9	
3390.00	-14.1	V	3.0	39.5	1.0	-52.6	-13.0	-39.6	
1695.00	-7.5	H	3.0	38.2	1.0	-44.8	-13.0	-31.8	
2542.50	-14.2	H	3.0	38.9	1.0	-52.1	-13.0	-39.1	
3390.00	-13.3	H	3.0	39.5	1.0	-51.8	-13.0	-38.8	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 5 1.4MHz QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-30
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Harmonics, 1.4MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.7MHz									
1649.40	-14.6	V	3.0	38.2	1.0	-51.8	-13.0	-38.8	
2474.10	-11.7	V	3.0	38.8	1.0	-49.5	-13.0	-36.5	
3298.80	-14.4	V	3.0	39.4	1.0	-52.8	-13.0	-39.8	
1649.40	-15.3	H	3.0	38.2	1.0	-52.5	-13.0	-39.5	
2474.10	-13.4	H	3.0	38.8	1.0	-51.2	-13.0	-38.2	
3298.80	-14.1	H	3.0	39.4	1.0	-52.5	-13.0	-39.5	
Mid Ch, 836.5MHz									
1673.00	-11.2	V	3.0	38.2	1.0	-48.4	-13.0	-35.4	
2509.50	-11.9	V	3.0	38.8	1.0	-49.7	-13.0	-36.7	
3346.00	-13.9	V	3.0	39.5	1.0	-52.4	-13.0	-39.4	
1673.00	-12.0	H	3.0	38.2	1.0	-49.2	-13.0	-36.2	
2509.50	-14.5	H	3.0	38.8	1.0	-52.3	-13.0	-39.3	
3346.00	-13.5	H	3.0	39.5	1.0	-52.0	-13.0	-39.0	
High Ch, 848.3MHz									
1696.60	-7.9	V	3.0	38.2	1.0	-45.1	-13.0	-32.1	
2544.90	-8.6	V	3.0	38.9	1.0	-46.5	-13.0	-33.5	
3393.20	-13.6	V	3.0	39.5	1.0	-52.1	-13.0	-39.1	
1696.60	-6.8	H	3.0	38.2	1.0	-44.0	-13.0	-31.0	
2544.90	-10.8	H	3.0	38.9	1.0	-48.6	-13.0	-35.6	
3393.20	-13.9	H	3.0	39.5	1.0	-52.4	-13.0	-39.4	

LTE Band 5 1.4MHz 16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788312331
Date: 2018-01-30
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Harmonics, 1.4MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.7MHz									
1649.40	-15.1	V	3.0	38.2	1.0	-52.3	-13.0	-39.3	
2474.10	-11.1	V	3.0	38.8	1.0	-48.9	-13.0	-35.9	
3298.80	-14.3	V	3.0	39.4	1.0	-52.7	-13.0	-39.7	
1649.40	-16.1	H	3.0	38.2	1.0	-53.4	-13.0	-40.4	
2474.10	-13.4	H	3.0	38.8	1.0	-51.2	-13.0	-38.2	
3298.80	-14.0	H	3.0	39.4	1.0	-52.4	-13.0	-39.4	
Mid Ch, 836.5MHz									
1673.00	-11.1	V	3.0	38.2	1.0	-48.3	-13.0	-35.3	
2509.50	-12.3	V	3.0	38.8	1.0	-50.2	-13.0	-37.2	
3346.00	-13.2	V	3.0	39.5	1.0	-51.7	-13.0	-38.7	
1673.00	-12.2	H	3.0	38.2	1.0	-49.5	-13.0	-36.5	
2509.50	-14.5	H	3.0	38.8	1.0	-52.3	-13.0	-39.3	
3346.00	-13.8	H	3.0	39.5	1.0	-52.2	-13.0	-39.2	
High Ch, 848.3MHz									
1696.60	-8.6	V	3.0	38.2	1.0	-45.8	-13.0	-32.8	
2544.90	-8.3	V	3.0	38.9	1.0	-46.1	-13.0	-33.1	
3393.20	-13.8	V	3.0	39.5	1.0	-52.2	-13.0	-39.2	
1696.60	-6.8	H	3.0	38.2	1.0	-44.1	-13.0	-31.1	
2544.90	-10.3	H	3.0	38.9	1.0	-48.1	-13.0	-35.1	
3393.20	-13.9	H	3.0	39.5	1.0	-52.4	-13.0	-39.4	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE Band 4

LTE Band 4 20MHz QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-05
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, X Position
Location:	Chamber 2
Mode:	LTE_QPSK Band 4 Harmonics, 20MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1720MHz									
3440.00	-8.6	V	3.0	39.5	1.0	-47.1	-13.0	-34.1	
5160.00	-9.6	V	3.0	39.8	1.0	-48.4	-13.0	-35.4	
6880.00	-4.7	V	3.0	39.7	1.0	-43.4	-13.0	-30.4	
8600.00	-5.3	V	3.0	39.0	1.0	-43.2	-13.0	-30.2	
3440.00	-7.0	H	3.0	39.5	1.0	-45.5	-13.0	-32.5	
5160.00	-10.2	H	3.0	39.8	1.0	-49.1	-13.0	-36.1	
6880.00	-6.3	H	3.0	39.7	1.0	-45.0	-13.0	-32.0	
8600.00	-9.0	H	3.0	39.0	1.0	-46.9	-13.0	-33.9	
Mid Ch, 1732.5MHz									
3465.00	-9.4	V	3.0	39.5	1.0	-47.9	-13.0	-34.9	
5197.50	-11.0	V	3.0	39.8	1.0	-49.9	-13.0	-36.9	
6930.00	-7.6	V	3.0	39.7	1.0	-46.2	-13.0	-33.2	
8662.50	-6.0	V	3.0	38.9	1.0	-43.9	-13.0	-30.9	
3465.00	-7.2	H	3.0	39.5	1.0	-45.7	-13.0	-32.7	
5197.50	-11.3	H	3.0	39.8	1.0	-50.1	-13.0	-37.1	
6930.00	-7.7	H	3.0	39.7	1.0	-46.4	-13.0	-33.4	
8662.50	-6.2	H	3.0	38.9	1.0	-44.1	-13.0	-31.1	
High Ch, 1745MHz									
3490.00	-9.8	V	3.0	39.5	1.0	-48.3	-13.0	-35.3	
5235.00	-10.9	V	3.0	39.8	1.0	-49.7	-13.0	-36.7	
6980.00	-6.7	V	3.0	39.6	1.0	-45.3	-13.0	-32.3	
8725.00	-3.3	V	3.0	38.9	1.0	-41.2	-13.0	-28.2	
3490.00	-9.5	H	3.0	39.5	1.0	-48.1	-13.0	-35.1	
5235.00	-11.7	H	3.0	39.8	1.0	-50.5	-13.0	-37.5	
6980.00	-7.8	H	3.0	39.6	1.0	-46.4	-13.0	-33.4	
8725.00	-5.8	H	3.0	38.9	1.0	-43.7	-13.0	-30.7	

LTE Band 4 20MHz 16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-05
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, X Position
Location:	Chamber 2
Mode:	LTE_16QAM Band 4 Harmonics, 20MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1720MHz									
3440.00	-8.1	V	3.0	39.5	1.0	-46.6	-13.0	-33.6	
5160.00	-9.4	V	3.0	39.8	1.0	-48.2	-13.0	-35.2	
6880.00	-4.7	V	3.0	39.7	1.0	-43.4	-13.0	-30.4	
8600.00	-5.3	V	3.0	39.0	1.0	-43.2	-13.0	-30.2	
3440.00	-8.5	H	3.0	39.5	1.0	-47.0	-13.0	-34.0	
5160.00	-10.5	H	3.0	39.8	1.0	-49.4	-13.0	-36.4	
6880.00	-6.5	H	3.0	39.7	1.0	-45.1	-13.0	-32.1	
8600.00	-9.1	H	3.0	39.0	1.0	-47.1	-13.0	-34.1	
Mid Ch, 1732.5MHz									
3465.00	-10.0	V	3.0	39.5	1.0	-48.5	-13.0	-35.5	
5197.50	-10.2	V	3.0	39.8	1.0	-49.0	-13.0	-36.0	
6930.00	-7.5	V	3.0	39.7	1.0	-46.2	-13.0	-33.2	
8662.50	-6.4	V	3.0	38.9	1.0	-44.3	-13.0	-31.3	
3465.00	-7.3	H	3.0	39.5	1.0	-45.8	-13.0	-32.8	
5197.50	-11.0	H	3.0	39.8	1.0	-49.9	-13.0	-36.9	
6930.00	-7.7	H	3.0	39.7	1.0	-46.3	-13.0	-33.3	
8662.50	-7.0	H	3.0	38.9	1.0	-44.9	-13.0	-31.9	
High Ch, 1745MHz									
3490.00	-9.5	V	3.0	39.5	1.0	-48.0	-13.0	-35.0	
5235.00	-11.2	V	3.0	39.8	1.0	-50.1	-13.0	-37.1	
6980.00	-6.9	V	3.0	39.6	1.0	-45.5	-13.0	-32.5	
8725.00	-3.0	V	3.0	38.9	1.0	-40.9	-13.0	-27.9	
3490.00	-9.4	H	3.0	39.5	1.0	-47.9	-13.0	-34.9	
5235.00	-12.0	H	3.0	39.8	1.0	-50.8	-13.0	-37.8	
6980.00	-8.0	H	3.0	39.6	1.0	-46.6	-13.0	-33.6	
8725.00	-7.0	H	3.0	38.9	1.0	-44.9	-13.0	-31.9	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.

LTE

Band 4

15MHz

QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-05
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, X Position
Location:	Chamber 2
Mode:	LTE_QPSK Band 4 Harmonics, 15MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1717.5MHz									
3435.00	-7.3	V	3.0	39.5	1.0	-45.8	-13.0	-32.8	
5152.50	-8.9	V	3.0	39.8	1.0	-47.7	-13.0	-34.7	
6870.00	-2.8	V	3.0	39.7	1.0	-41.5	-13.0	-28.5	
8587.50	-5.1	V	3.0	39.0	1.0	-43.0	-13.0	-30.0	
3435.00	-6.9	H	3.0	39.5	1.0	-45.4	-13.0	-32.4	
5152.50	-10.3	H	3.0	39.8	1.0	-49.2	-13.0	-36.2	
6870.00	-5.5	H	3.0	39.7	1.0	-44.2	-13.0	-31.2	
8587.50	-6.4	H	3.0	39.0	1.0	-44.4	-13.0	-31.4	
Mid Ch, 1732.5MHz									
3465.00	-8.4	V	3.0	39.5	1.0	-47.0	-13.0	-34.0	
5197.50	-10.9	V	3.0	39.8	1.0	-49.8	-13.0	-36.8	
6930.00	-5.6	V	3.0	39.7	1.0	-44.2	-13.0	-31.2	
8662.50	-6.2	V	3.0	38.9	1.0	-44.1	-13.0	-31.1	
3465.00	-7.5	H	3.0	39.5	1.0	-46.0	-13.0	-33.0	
5197.50	-11.2	H	3.0	39.8	1.0	-50.0	-13.0	-37.0	
6930.00	-6.6	H	3.0	39.7	1.0	-45.2	-13.0	-32.2	
8662.50	-7.4	H	3.0	38.9	1.0	-45.4	-13.0	-32.4	
High Ch, 1747.5MHz									
3495.00	-11.0	V	3.0	39.5	1.0	-49.5	-13.0	-36.5	
5242.50	-11.2	V	3.0	39.8	1.0	-50.1	-13.0	-37.1	
6990.00	-4.8	V	3.0	39.6	1.0	-43.4	-13.0	-30.4	
8737.50	-1.3	V	3.0	38.9	1.0	-39.2	-13.0	-26.2	
3495.00	-8.5	H	3.0	39.5	1.0	-47.0	-13.0	-34.0	
5242.50	-12.2	H	3.0	39.8	1.0	-51.1	-13.0	-38.1	
6990.00	-7.0	H	3.0	39.6	1.0	-45.7	-13.0	-32.7	
8737.50	-5.5	H	3.0	38.9	1.0	-43.4	-13.0	-30.4	

LTE

Band 4

15MHz

16QAM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4788312331
Date:	2018-02-05
Test Engineer:	47989
Configuration:	EUT / AC Adapter / Earphone, X Position
Location:	Chamber 2
Mode:	LTE_16QAM Band 4 Harmonics, 15MHz Bandwidth

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1717.5MHz									
3435.00	-7.7	V	3.0	39.5	1.0	-46.3	-13.0	-33.3	
5152.50	-9.7	V	3.0	39.8	1.0	-48.5	-13.0	-35.5	
6870.00	-2.2	V	3.0	39.7	1.0	-40.9	-13.0	-27.9	
8587.50	-6.6	V	3.0	39.0	1.0	-44.5	-13.0	-31.5	
3435.00	-7.1	H	3.0	39.5	1.0	-45.6	-13.0	-32.6	
5152.50	-10.3	H	3.0	39.8	1.0	-49.1	-13.0	-36.1	
6870.00	-4.9	H	3.0	39.7	1.0	-43.6	-13.0	-30.6	
8587.50	-6.6	H	3.0	39.0	1.0	-44.5	-13.0	-31.5	
Mid Ch, 1732.5MHz									
3465.00	-8.5	V	3.0	39.5	1.0	-47.1	-13.0	-34.1	
5197.50	-11.3	V	3.0	39.8	1.0	-50.1	-13.0	-37.1	
6930.00	-5.2	V	3.0	39.7	1.0	-43.9	-13.0	-30.9	
8662.50	-7.2	V	3.0	38.9	1.0	-45.1	-13.0	-32.1	
3465.00	-8.8	H	3.0	39.5	1.0	-47.3	-13.0	-34.3	
5197.50	-11.5	H	3.0	39.8	1.0	-50.3	-13.0	-37.3	
6930.00	-7.5	H	3.0	39.7	1.0	-46.1	-13.0	-33.1	
8662.50	-7.7	H	3.0	38.9	1.0	-45.7	-13.0	-32.7	
High Ch, 1747.5MHz									
3495.00	-11.6	V	3.0	39.5	1.0	-50.2	-13.0	-37.2	
5242.50	-11.4	V	3.0	39.8	1.0	-50.2	-13.0	-37.2	
6990.00	-6.2	V	3.0	39.6	1.0	-44.8	-13.0	-31.8	
8737.50	-0.6	V	3.0	38.9	1.0	-38.5	-13.0	-25.5	
3495.00	-9.2	H	3.0	39.5	1.0	-47.7	-13.0	-34.7	
5242.50	-12.0	H	3.0	39.8	1.0	-50.9	-13.0	-37.9	
6990.00	-7.0	H	3.0	39.6	1.0	-45.7	-13.0	-32.7	
8737.50	-3.4	H	3.0	38.9	1.0	-41.3	-13.0	-28.3	

UL Korea, Ltd. Confidential
This report shall not be reproduced except in full, without the written approval of UL Korea, Ltd.