

WCDMA Band 5

WCDMA Band 5 REL99	UL Verification Services, Inc. High Frequency Substitution Measurement																																																																																										
	Company: Samsung Project #: 4788805451 Date: 2019-01-15 Test Engineer: 47989 Configuration: EUT / Z-Position Location: Chamber 1 Mode: Rel99 Band 5 Fundamentals Test Equipment: Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable																																																																																										
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WCDMA Band 2

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	Company: Samsung Project #: 4788805451 Date: 2019-01-15 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: Rel99 Band 2 Fundamentals <u>Test Equipment:</u> Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-type Cable																																																																																										
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LTE Band 5

LTE Band 5 10MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT / Z-Position Location: Chamber 2 Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	829.00	22.47	V	3.0	-1.5	17.99	38.5	-20.5	
	829.00	8.76	H	3.0	-1.5	4.28	38.5	-34.2	
	Mid Ch								
	836.50	22.31	V	3.0	-1.4	17.85	38.5	-20.7	
	836.50	7.94	H	3.0	-1.4	3.47	38.5	-35.0	
High Ch									
844.00	22.33	V	3.1	-1.4	17.88	38.5	-20.6		
844.00	8.51	H	3.1	-1.4	4.06	38.5	-34.4		
LTE Band 5 10MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT / Z-Position Location: Chamber 2 Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	829.00	21.14	V	3.0	-1.5	16.66	38.5	-21.8	
	829.00	7.58	H	3.0	-1.5	3.10	38.5	-35.4	
	Mid Ch								
	836.50	21.50	V	3.0	-1.4	17.04	38.5	-21.5	
	836.50	6.93	H	3.0	-1.4	2.46	38.5	-36.0	
High Ch									
844.00	20.87	V	3.1	-1.4	16.42	38.5	-22.1		
844.00	7.08	H	3.1	-1.4	2.63	38.5	-35.9		

LTE Band 5 5MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT, Z-Position Location: Chamber 2 Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	826.50	22.14	V	3.0	-1.5	17.65	38.5	-20.8	
	826.50	9.29	H	3.0	-1.5	4.81	38.5	-33.7	
	Mid Ch								
	836.50	22.10	V	3.0	-1.4	17.64	38.5	-20.9	
	836.50	8.43	H	3.0	-1.4	3.96	38.5	-34.5	
High Ch									
846.50	22.88	V	3.1	-1.4	18.43	38.5	-20.1		
846.50	9.70	H	3.1	-1.4	5.25	38.5	-33.2		
LTE Band 5 5MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT, Z-Position Location: Chamber 2 Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
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	Low Ch								
	826.50	20.13	V	3.0	-1.5	15.64	38.5	-22.9	
	826.50	8.30	H	3.0	-1.5	3.82	38.5	-34.7	
	Mid Ch								
	836.50	20.66	V	3.0	-1.4	16.20	38.5	-22.3	
	836.50	6.99	H	3.0	-1.4	2.52	38.5	-36.0	
High Ch									
846.50	21.43	V	3.1	-1.4	16.98	38.5	-21.5		
846.50	8.01	H	3.1	-1.4	3.56	38.5	-34.9		

LTE Band 5 3MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
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	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	825.50	21.86	V	3.0	-1.5	17.38	38.5	-21.1	
	825.50	9.09	H	3.0	-1.5	4.60	38.5	-33.9	
	Mid Ch								
	836.50	21.95	V	3.0	-1.4	17.49	38.5	-21.0	
	836.50	8.08	H	3.0	-1.4	3.61	38.5	-34.9	
High Ch									
847.50	22.54	V	3.1	-1.4	18.10	38.5	-20.4		
847.50	9.46	H	3.1	-1.4	5.02	38.5	-33.5		
LTE Band 5 3MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
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	Low Ch								
	825.50	20.64	V	3.0	-1.5	16.16	38.5	-22.3	
	825.50	7.58	H	3.0	-1.5	3.10	38.5	-35.4	
	Mid Ch								
	836.50	21.26	V	3.0	-1.4	16.80	38.5	-21.7	
	836.50	8.03	H	3.0	-1.4	3.57	38.5	-34.9	
High Ch									
847.50	21.64	V	3.1	-1.4	17.20	38.5	-21.3		
847.50	9.03	H	3.1	-1.4	4.58	38.5	-33.9		

LTE Band 5 1.4MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT, Z-Position Location: Chamber 2 Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	824.70	21.60	V	3.0	-1.5	17.12	38.5	-21.4	
	824.70	9.31	H	3.0	-1.5	4.82	38.5	-33.7	
	Mid Ch								
	836.50	21.97	V	3.0	-1.4	17.51	38.5	-21.0	
	836.50	8.19	H	3.0	-1.4	3.72	38.5	-34.8	
High Ch									
848.30	22.52	V	3.1	-1.4	18.08	38.5	-20.4		
848.30	9.34	H	3.1	-1.4	4.90	38.5	-33.6		
LTE Band 5 1.4MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2018-12-20 Test Engineer: 45585 Configuration: EUT, Z-Position Location: Chamber 2 Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 2.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	824.70	20.27	V	3.0	-1.5	15.79	38.5	-22.7	
	824.70	7.75	H	3.0	-1.5	3.26	38.5	-35.2	
	Mid Ch								
	836.50	20.11	V	3.0	-1.4	15.65	38.5	-22.9	
	836.50	7.14	H	3.0	-1.4	2.67	38.5	-35.8	
High Ch									
848.30	21.43	V	3.1	-1.4	16.99	38.5	-21.5		
848.30	8.06	H	3.1	-1.4	3.62	38.5	-34.9		

LTE Band 41

LTE Band 41 20MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement									
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth									
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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									
	2506.00	8.70	V	5.2	9.9	13.37	33.0	-19.6		
	2506.00	19.30	H	5.2	9.9	23.97	33.0	-9.0		
	Mid Ch									
	2593.00	12.31	V	5.3	9.8	16.77	33.0	-16.2		
	2593.00	19.86	H	5.3	9.8	24.33	33.0	-8.7		
	High Ch									
	2680.00	17.36	V	5.4	9.8	21.73	33.0	-11.3		
2680.00	18.15	H	5.4	9.8	22.52	33.0	-10.5			
LTE Band 41 20MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement									
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth									
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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									
	2506.00	17.46	V	5.2	9.9	22.13	33.0	-10.9		
	2506.00	18.62	H	5.2	9.9	23.29	33.0	-9.7		
	Mid Ch									
	2593.00	10.00	V	5.3	9.8	14.46	33.0	-18.5		
	2593.00	18.72	H	5.3	9.8	23.19	33.0	-9.8		
	High Ch									
	2680.00	16.75	V	5.4	9.8	21.12	33.0	-11.9		
2680.00	17.46	H	5.4	9.8	21.83	33.0	-11.2			

LTE Band 41 15MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2503.50	17.69	V	5.2	9.9	22.37	33.0	-10.6	
	2503.50	19.00	H	5.2	9.9	23.67	33.0	-9.3	
	Mid Ch								
	2593.00	12.54	V	5.3	9.8	17.00	33.0	-16.0	
	2593.00	19.64	H	5.3	9.8	24.11	33.0	-8.9	
High Ch									
2682.50	17.10	V	5.4	9.8	21.48	33.0	-11.5		
2682.50	16.67	H	5.4	9.8	21.04	33.0	-12.0		
LTE Band 41 15MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2503.50	16.94	V	5.2	9.9	21.62	33.0	-11.4	
	2503.50	18.04	H	5.2	9.9	22.71	33.0	-10.3	
	Mid Ch								
	2593.00	11.51	V	5.3	9.8	15.97	33.0	-17.0	
	2593.00	18.49	H	5.3	9.8	22.96	33.0	-10.0	
High Ch									
2682.50	15.85	V	5.4	9.8	20.23	33.0	-12.8		
2682.50	17.64	H	5.4	9.8	22.01	33.0	-11.0		

LTE Band 41 10MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2501.00	17.49	V	5.2	9.9	22.18	33.0	-10.8	
	2501.00	18.96	H	5.2	9.9	23.64	33.0	-9.4	
	Mid Ch								
	2593.00	13.33	V	5.3	9.8	17.79	33.0	-15.2	
	2593.00	19.61	H	5.3	9.8	24.08	33.0	-8.9	
High Ch									
2685.00	13.93	V	5.4	9.8	18.30	33.0	-14.7		
2685.00	17.35	H	5.4	9.8	21.71	33.0	-11.3		
LTE Band 41 10MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2501.00	17.23	V	5.2	9.9	21.92	33.0	-11.1	
	2501.00	18.75	H	5.2	9.9	23.43	33.0	-9.6	
	Mid Ch								
	2593.00	13.57	V	5.3	9.8	18.03	33.0	-15.0	
	2593.00	19.61	H	5.3	9.8	24.08	33.0	-8.9	
High Ch									
2685.00	13.65	V	5.4	9.8	18.02	33.0	-15.0		
2685.00	17.17	H	5.4	9.8	21.53	33.0	-11.5		

LTE Band 41 5MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2498.50	17.86	V	5.2	9.9	22.55	33.0	-10.5	
	2498.50	19.08	H	5.2	9.9	23.77	33.0	-9.2	
	Mid Ch								
	2593.00	15.56	V	5.3	9.8	20.02	33.0	-13.0	
	2593.00	19.29	H	5.3	9.8	23.76	33.0	-9.2	
High Ch									
2687.50	17.34	V	5.4	9.8	21.71	33.0	-11.3		
2687.50	17.70	H	5.4	9.8	22.07	33.0	-10.9		
LTE Band 41 5MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-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								
	2498.50	16.97	V	5.2	9.9	21.66	33.0	-11.3	
	2498.50	18.46	H	5.2	9.9	23.15	33.0	-9.9	
	Mid Ch								
	2593.00	16.01	V	5.3	9.8	20.47	33.0	-12.5	
	2593.00	18.07	H	5.3	9.8	22.54	33.0	-10.5	
High Ch									
2687.50	17.43	V	5.4	9.8	21.80	33.0	-11.2		
2687.50	18.05	H	5.4	9.8	22.42	33.0	-10.6		

10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(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.

Part 27.53:

(m) (4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01

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 $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace mode = average(WCDMA, LTE), Maxhold(GSM, LTE Band41);;

RESULTS

See the following pages.

NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

10.2.1. SPURIOUS RADIATION PLOTS

GSM850

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4788805451							
Date:		2019-01-15							
Test Engineer:		47989							
Configuration:		EUT / AC Adapter / Earphone, X-Position							
Location:		Chamber 1							
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	-8.7	V	3.0	43.6	1.0	-51.3	-13.0	-38.3	
2472.60	-6.1	V	3.0	43.4	1.0	-48.5	-13.0	-35.5	
3296.80	-9.6	V	3.0	43.6	1.0	-52.2	-13.0	-39.2	
1648.40	-8.1	H	3.0	43.6	1.0	-50.7	-13.0	-37.7	
2472.60	-4.5	H	3.0	43.4	1.0	-46.9	-13.0	-33.9	
3296.80	-9.6	H	3.0	43.6	1.0	-52.2	-13.0	-39.2	
Mid Ch, 836.6MHz									
1673.20	-7.0	V	3.0	43.6	1.0	-49.6	-13.0	-36.6	
2509.80	-5.3	V	3.0	43.4	1.0	-47.8	-13.0	-34.8	
3346.40	-9.6	V	3.0	43.6	1.0	-52.2	-13.0	-39.2	
1673.20	-8.1	H	3.0	43.6	1.0	-50.7	-13.0	-37.7	
2509.80	-6.1	H	3.0	43.4	1.0	-48.5	-13.0	-35.5	
3346.40	-9.5	H	3.0	43.6	1.0	-52.1	-13.0	-39.1	
High Ch, 848.8MHz									
1697.60	-9.7	V	3.0	43.6	1.0	-52.3	-13.0	-39.3	
2546.40	-8.4	V	3.0	43.4	1.0	-50.8	-13.0	-37.8	
3395.20	-9.1	V	3.0	43.7	1.0	-51.7	-13.0	-38.7	
1697.60	-7.5	H	3.0	43.6	1.0	-50.1	-13.0	-37.1	
2546.40	-5.4	H	3.0	43.4	1.0	-47.8	-13.0	-34.8	
3395.20	-9.0	H	3.0	43.7	1.0	-51.7	-13.0	-38.7	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4788805451							
Date:		2019-01-15							
Test Engineer:		47989							
Configuration:		EUT / AC Adapter / Earphone, X-Position							
Location:		Chamber 1							
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	-13.9	V	3.0	43.6	1.0	-56.5	-13.0	-43.5	
2472.60	-11.3	V	3.0	43.4	1.0	-53.7	-13.0	-40.7	
3296.80	-9.5	V	3.0	43.6	1.0	-52.1	-13.0	-39.1	
1648.40	-14.4	H	3.0	43.6	1.0	-57.0	-13.0	-44.0	
2472.60	-11.7	H	3.0	43.4	1.0	-54.1	-13.0	-41.1	
3296.80	-9.8	H	3.0	43.6	1.0	-52.5	-13.0	-39.5	
Mid Ch, 836.6MHz									
1673.20	-11.3	V	3.0	43.6	1.0	-53.9	-13.0	-40.9	
2509.80	-11.5	V	3.0	43.4	1.0	-53.9	-13.0	-40.9	
3346.40	-9.5	V	3.0	43.6	1.0	-52.1	-13.0	-39.1	
1673.20	-14.2	H	3.0	43.6	1.0	-56.7	-13.0	-43.7	
2509.80	-12.0	H	3.0	43.4	1.0	-54.4	-13.0	-41.4	
3346.40	-9.8	H	3.0	43.6	1.0	-52.5	-13.0	-39.5	
High Ch, 848.8MHz									
1697.60	-13.8	V	3.0	43.6	1.0	-56.3	-13.0	-43.3	
2546.40	-11.4	V	3.0	43.4	1.0	-53.9	-13.0	-40.9	
3395.20	-8.8	V	3.0	43.7	1.0	-51.5	-13.0	-38.5	
1697.60	-14.2	H	3.0	43.6	1.0	-56.8	-13.0	-43.8	
2546.40	-11.8	H	3.0	43.4	1.0	-54.2	-13.0	-41.2	
3395.20	-9.2	H	3.0	43.7	1.0	-51.8	-13.0	-38.8	

GSM1900

UL Verification Services, Inc.									
Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4788805451							
Date:		2019-01-15							
Test Engineer:		47989							
Configuration:		EUT / AC Adpater / 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	-8.9	V	3.0	43.8	1.0	-51.7	-13.0	-38.7	
5550.60	-7.3	V	3.0	43.7	1.0	-50.0	-13.0	-37.0	
7400.80	-5.0	V	3.0	42.5	1.0	-46.5	-13.0	-33.5	
3700.40	-6.4	H	3.0	43.8	1.0	-49.2	-13.0	-36.2	
5550.60	-7.4	H	3.0	43.7	1.0	-50.2	-13.0	-37.2	
7400.80	-4.9	H	3.0	42.5	1.0	-46.4	-13.0	-33.4	
Mid Ch, 1880MHz									
3760.00	-7.9	V	3.0	43.8	1.0	-50.7	-13.0	-37.7	
5640.00	-7.4	V	3.0	43.7	1.0	-50.1	-13.0	-37.1	
7520.00	-4.8	V	3.0	42.5	1.0	-46.2	-13.0	-33.2	
3760.00	-7.2	H	3.0	43.8	1.0	-50.0	-13.0	-37.0	
5640.00	-7.5	H	3.0	43.7	1.0	-50.2	-13.0	-37.2	
7520.00	-4.9	H	3.0	42.5	1.0	-46.4	-13.0	-33.4	
High Ch, 1909.8MHz									
3819.60	-7.3	V	3.0	43.8	1.0	-50.2	-13.0	-37.2	
5729.40	-7.3	V	3.0	43.7	1.0	-50.0	-13.0	-37.0	
7639.20	-5.0	V	3.0	42.4	1.0	-46.4	-13.0	-33.4	
3819.60	-4.7	H	3.0	43.8	1.0	-47.5	-13.0	-34.5	
5729.40	-7.8	H	3.0	43.7	1.0	-50.5	-13.0	-37.5	
7639.20	-5.0	H	3.0	42.4	1.0	-46.4	-13.0	-33.4	

UL Verification Services, Inc.									
Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4788805451							
Date:		2019-01-15							
Test Engineer:		47989							
Configuration:		EUT / AC 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	-10.5	V	3.0	43.8	1.0	-53.2	-13.0	-40.2	
5550.60	-7.5	V	3.0	43.7	1.0	-50.2	-13.0	-37.2	
7400.80	-4.9	V	3.0	42.5	1.0	-46.4	-13.0	-33.4	
3700.40	-9.7	H	3.0	43.8	1.0	-52.4	-13.0	-39.4	
5550.60	-7.5	H	3.0	43.7	1.0	-50.3	-13.0	-37.3	
7400.80	-4.8	H	3.0	42.5	1.0	-46.3	-13.0	-33.3	
Mid Ch, 1880MHz									
3760.00	-9.7	V	3.0	43.8	1.0	-52.5	-13.0	-39.5	
5640.00	-7.0	V	3.0	43.7	1.0	-49.7	-13.0	-36.7	
7520.00	-4.7	V	3.0	42.5	1.0	-46.1	-13.0	-33.1	
3760.00	-9.5	H	3.0	43.8	1.0	-52.3	-13.0	-39.3	
5640.00	-7.8	H	3.0	43.7	1.0	-50.5	-13.0	-37.5	
7520.00	-4.8	H	3.0	42.5	1.0	-46.3	-13.0	-33.3	
High Ch, 1909.8MHz									
3819.60	-9.2	V	3.0	43.8	1.0	-52.0	-13.0	-39.0	
5729.40	-7.3	V	3.0	43.7	1.0	-50.0	-13.0	-37.0	
7639.20	-5.1	V	3.0	42.4	1.0	-46.5	-13.0	-33.5	
3819.60	-8.4	H	3.0	43.8	1.0	-51.2	-13.0	-38.2	
5729.40	-7.4	H	3.0	43.7	1.0	-50.1	-13.0	-37.1	
7639.20	-5.4	H	3.0	42.4	1.0	-46.7	-13.0	-33.7	

WCDMA Band 5

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
WCDMA Band 5 REL99		Company: Samsung Project #: 4788805451 Date: 2019-01-15 Test Engineer: 47989 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 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	-14.6	V	3.0	43.6	1.0	-57.2	-13.0	-44.2		
		2479.20	-12.0	V	3.0	43.4	1.0	-54.4	-13.0	-41.4		
		3305.60	-10.5	V	3.0	43.6	1.0	-53.1	-13.0	-40.1		
		1652.80	-15.8	H	3.0	43.6	1.0	-58.4	-13.0	-45.4		
		2479.20	-12.6	H	3.0	43.4	1.0	-55.0	-13.0	-42.0		
		3305.60	-10.9	H	3.0	43.6	1.0	-53.5	-13.0	-40.5		
		Mid Ch, 836.6MHz										
		1673.20	-14.6	V	3.0	43.6	1.0	-57.2	-13.0	-44.2		
		2509.80	-12.0	V	3.0	43.4	1.0	-54.5	-13.0	-41.5		
		3346.40	-10.4	V	3.0	43.6	1.0	-53.1	-13.0	-40.1		
		1673.20	-15.2	H	3.0	43.6	1.0	-57.8	-13.0	-44.8		
		2509.80	-12.9	H	3.0	43.4	1.0	-55.3	-13.0	-42.3		
3346.40	-9.8	H	3.0	43.6	1.0	-52.5	-13.0	-39.5				
High Ch, 846.6MHz												
1693.20	-14.3	V	3.0	43.6	1.0	-56.8	-13.0	-43.8				
2539.80	-12.2	V	3.0	43.4	1.0	-54.7	-13.0	-41.7				
3386.40	-10.2	V	3.0	43.7	1.0	-52.8	-13.0	-39.8				
1693.20	-14.1	H	3.0	43.6	1.0	-56.6	-13.0	-43.6				
2539.80	-13.1	H	3.0	43.4	1.0	-55.6	-13.0	-42.6				
3386.40	-10.3	H	3.0	43.7	1.0	-53.0	-13.0	-40.0				
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
WCDMA Band 5 HSDPA		Company: Samsung Project #: 4788805451 Date: 2015-01-15 Test Engineer: 47989 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 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	-15.2	V	3.0	43.6	1.0	-57.8	-13.0	-44.8		
		2479.20	-11.6	V	3.0	43.4	1.0	-54.1	-13.0	-41.1		
		3305.60	-10.7	V	3.0	43.6	1.0	-53.4	-13.0	-40.4		
		1652.80	-15.8	H	3.0	43.6	1.0	-58.4	-13.0	-45.4		
		2479.20	-13.3	H	3.0	43.4	1.0	-55.7	-13.0	-42.7		
		3305.60	-10.6	H	3.0	43.6	1.0	-53.2	-13.0	-40.2		
		Mid Ch, 836.6MHz										
		1673.20	-14.3	V	3.0	43.6	1.0	-56.8	-13.0	-43.8		
		2509.80	-12.2	V	3.0	43.4	1.0	-54.7	-13.0	-41.7		
		3346.40	-10.7	V	3.0	43.6	1.0	-53.4	-13.0	-40.4		
		1673.20	-15.0	H	3.0	43.6	1.0	-57.6	-13.0	-44.6		
		2509.80	-12.8	H	3.0	43.4	1.0	-55.2	-13.0	-42.2		
3346.40	-10.0	H	3.0	43.6	1.0	-52.7	-13.0	-39.7				
High Ch, 846.6MHz												
1693.20	-14.3	V	3.0	43.6	1.0	-56.8	-13.0	-43.8				
2539.80	-12.1	V	3.0	43.4	1.0	-54.5	-13.0	-41.5				
3386.40	-10.2	V	3.0	43.7	1.0	-52.8	-13.0	-39.8				
1693.20	-14.3	H	3.0	43.6	1.0	-56.8	-13.0	-43.8				
2539.80	-12.5	H	3.0	43.4	1.0	-54.9	-13.0	-41.9				
3386.40	-9.8	H	3.0	43.7	1.0	-52.4	-13.0	-39.4				

WCDMA Band 2

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
WCDMA Band 2 REL99	Company:	Samsung								
	Project #:	4788805451								
	Date:	2019-01-15								
	Test Engineer:	47989								
	Configuration:	EUT / AC Adapter / Earphone, X-Position								
	Location:	Chamber 1								
	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	-10.0	V	3.0	43.8	1.0	-52.7	-13.0	-39.7	
	5557.20	-8.4	V	3.0	43.7	1.0	-51.1	-13.0	-38.1	
	7409.60	-6.0	V	3.0	42.5	1.0	-47.5	-13.0	-34.5	
	3704.80	-7.2	H	3.0	43.8	1.0	-49.9	-13.0	-36.9	
	5557.20	-8.8	H	3.0	43.7	1.0	-51.5	-13.0	-38.5	
	7409.60	-6.0	H	3.0	42.5	1.0	-47.5	-13.0	-34.5	
	Mid Ch, 1880MHz									
	3760.00	-11.4	V	3.0	43.8	1.0	-54.2	-13.0	-41.2	
	5640.00	-8.5	V	3.0	43.7	1.0	-51.2	-13.0	-38.2	
	7520.00	-6.0	V	3.0	42.5	1.0	-47.4	-13.0	-34.4	
	3760.00	-10.0	H	3.0	43.8	1.0	-52.8	-13.0	-39.8	
5640.00	-8.7	H	3.0	43.7	1.0	-51.4	-13.0	-38.4		
7520.00	-5.9	H	3.0	42.5	1.0	-47.3	-13.0	-34.3		
High Ch, 1907.6MHz										
3815.20	-11.5	V	3.0	43.8	1.0	-54.3	-13.0	-41.3		
5722.80	-8.3	V	3.0	43.7	1.0	-51.0	-13.0	-38.0		
7630.40	-5.8	V	3.0	42.4	1.0	-47.2	-13.0	-34.2		
3815.20	-11.4	H	3.0	43.8	1.0	-54.2	-13.0	-41.2		
5722.80	-8.4	H	3.0	43.7	1.0	-51.1	-13.0	-38.1		
7630.40	-6.1	H	3.0	42.4	1.0	-47.5	-13.0	-34.5		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
WCDMA Band 2 HSDPA	Company:	Samsung								
	Project #:	4788805451								
	Date:	2019-01-15								
	Test Engineer:	47989								
	Configuration:	EUT / AC Adapter / Earphone								
	Location:	Chamber 1								
	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	-11.5	V	3.0	43.8	1.0	-54.3	-13.0	-41.3	
	5557.20	-8.4	V	3.0	43.7	1.0	-51.1	-13.0	-38.1	
	7409.60	-6.0	V	3.0	42.5	1.0	-47.5	-13.0	-34.5	
	3704.80	-6.9	H	3.0	43.8	1.0	-49.7	-13.0	-36.7	
	5557.20	-8.7	H	3.0	43.7	1.0	-51.4	-13.0	-38.4	
	7409.60	-5.9	H	3.0	42.5	1.0	-47.4	-13.0	-34.4	
	Mid Ch, 1880MHz									
	3760.00	-11.0	V	3.0	43.8	1.0	-53.8	-13.0	-40.8	
	5640.00	-8.4	V	3.0	43.7	1.0	-51.1	-13.0	-38.1	
	7520.00	-6.0	V	3.0	42.5	1.0	-47.5	-13.0	-34.5	
	3760.00	-9.9	H	3.0	43.8	1.0	-52.7	-13.0	-39.7	
5640.00	-8.6	H	3.0	43.7	1.0	-51.3	-13.0	-38.3		
7520.00	-5.8	H	3.0	42.5	1.0	-47.3	-13.0	-34.3		
High Ch, 1907.6MHz										
3815.20	-11.5	V	3.0	43.8	1.0	-54.3	-13.0	-41.3		
5722.80	-8.3	V	3.0	43.7	1.0	-51.0	-13.0	-38.0		
7630.40	-5.9	V	3.0	42.4	1.0	-47.2	-13.0	-34.2		
3815.20	-11.3	H	3.0	43.8	1.0	-54.1	-13.0	-41.1		
5722.80	-8.5	H	3.0	43.7	1.0	-51.2	-13.0	-38.2		
7630.40	-5.7	H	3.0	42.4	1.0	-47.1	-13.0	-34.1		

LTE Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4788805451							
Date:		2018-12-21							
Test Engineer:		45585							
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	-15.2	V	3.0	38.2	1.0	-52.4	-13.0	-39.4	
2474.10	-12.4	V	3.0	38.8	1.0	-50.2	-13.0	-37.2	
3298.80	-10.1	V	3.0	39.4	1.0	-48.6	-13.0	-35.6	
4123.50	-10.3	V	3.0	39.8	1.0	-49.1	-13.0	-36.1	
4948.20	-9.0	V	3.0	39.8	1.0	-47.8	-13.0	-34.8	
1649.40	-16.0	H	3.0	38.2	1.0	-53.2	-13.0	-40.2	
2474.10	-13.2	H	3.0	38.8	1.0	-51.0	-13.0	-38.0	
3298.80	-10.3	H	3.0	39.4	1.0	-48.7	-13.0	-35.7	
4123.50	-10.6	H	3.0	39.8	1.0	-49.4	-13.0	-36.4	
4948.20	-9.6	H	3.0	39.8	1.0	-48.4	-13.0	-35.4	
Mid Ch, 836.5MHz									
1673.00	-15.1	V	3.0	38.2	1.0	-52.3	-13.0	-39.3	
2509.50	-12.4	V	3.0	38.8	1.0	-50.2	-13.0	-37.2	
3346.00	-10.0	V	3.0	39.5	1.0	-48.5	-13.0	-35.5	
4182.50	-10.0	V	3.0	39.8	1.0	-48.9	-13.0	-35.9	
5019.00	-8.7	V	3.0	39.8	1.0	-47.5	-13.0	-34.5	
1673.00	-16.1	H	3.0	38.2	1.0	-53.3	-13.0	-40.3	
2509.50	-13.0	H	3.0	38.8	1.0	-50.8	-13.0	-37.8	
3346.00	-10.3	H	3.0	39.5	1.0	-48.7	-13.0	-35.7	
4182.50	-10.3	H	3.0	39.8	1.0	-49.1	-13.0	-36.1	
5019.00	-9.4	H	3.0	39.8	1.0	-48.2	-13.0	-35.2	
High Ch, 848.3MHz									
1696.60	-15.0	V	3.0	38.2	1.0	-52.3	-13.0	-39.3	
2544.90	-12.2	V	3.0	38.9	1.0	-50.1	-13.0	-37.1	
3393.20	-9.4	V	3.0	39.5	1.0	-47.9	-13.0	-34.9	
4241.50	-10.1	V	3.0	39.8	1.0	-48.9	-13.0	-35.9	
5089.80	-8.8	V	3.0	39.8	1.0	-47.6	-13.0	-34.6	
1696.60	-15.8	H	3.0	38.2	1.0	-53.1	-13.0	-40.1	
2544.90	-12.7	H	3.0	38.9	1.0	-50.6	-13.0	-37.6	
3393.20	-9.6	H	3.0	39.5	1.0	-48.1	-13.0	-35.1	
4241.50	-10.3	H	3.0	39.8	1.0	-49.1	-13.0	-36.1	
5089.80	-9.4	H	3.0	39.8	1.0	-48.2	-13.0	-35.2	

LTE
 Band 5
 1.4MHz
 QPSK

LTE Band 41

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
LTE Band 41 10MHz QPSK		Company: Samsung Project #: 4788805451 Date: 2019-01-22 Test Engineer: 47989 Configuration: EUT / AC Adapter / Earphone, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 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, 2501MHz									
		5002.00	-2.5	V	3.0	43.8	1.0	-45.2	-25.0	-20.2	
		7503.00	10.0	V	3.0	42.5	1.0	-31.4	-25.0	-6.4	
		10004.00	-1.7	V	3.0	40.6	1.0	-41.2	-25.0	-16.2	
		5002.00	0.0	H	3.0	43.8	1.0	-42.8	-25.0	-17.8	
		7503.00	6.7	H	3.0	42.5	1.0	-34.8	-25.0	-9.8	
		10004.00	-6.1	H	3.0	40.6	1.0	-45.7	-25.0	-20.7	
		Mid Ch, 2593MHz									
5186.00	-2.6	V	3.0	43.8	1.0	-45.4	-25.0	-20.4			
7779.00	6.4	V	3.0	42.3	1.0	-34.9	-25.0	-9.9			
10372.00	-0.5	V	3.0	40.7	1.0	-40.1	-25.0	-15.1			
5186.00	0.9	H	3.0	43.8	1.0	-41.9	-25.0	-16.9			
7779.00	3.9	H	3.0	42.3	1.0	-37.4	-25.0	-12.4			
10372.00	-0.8	H	3.0	40.7	1.0	-40.4	-25.0	-15.4			
High Ch, 2685MHz											
5370.00	-3.0	V	3.0	43.7	1.0	-45.8	-25.0	-20.8			
8055.00	8.3	V	3.0	42.2	1.0	-32.9	-25.0	-7.9			
10740.00	-2.1	V	3.0	40.8	1.0	-41.9	-25.0	-16.9			
5370.00	1.0	H	3.0	43.7	1.0	-41.8	-25.0	-16.8			
8055.00	7.8	H	3.0	42.2	1.0	-33.4	-25.0	-8.4			
10740.00	-1.2	H	3.0	40.8	1.0	-41.0	-25.0	-16.0			