



SAR EVALUATION REPORT

Applicant Name:

Samsung Electronics Co., Ltd.
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Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:

03/23/17 - 03/30/17

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

1M1703220119-01.A3L

FCC ID:

A3LSMC5010

APPLICANT:

SAMSUNG ELECTRONICS CO., LTD.

DUT Type:

Portable Handset

Application Type:

Class II Permissive Change

FCC Rule Part(s):

CFR §2.1093

Model:

SM-C5018

Test Device Serial No.:

[S/N: 16001, 36082]

Permissive Change(s):

Adding 64QAM Uplink Operations

Original Grant Date:

01/17/2017

Note: The following test data was evaluated for the current test report. Please refer to RF Exposure Technical Report S/N 0Y1612131930.A3L for original compliance evaluation.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.5 of this report; for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.


 Randy Ortanez
 President


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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 41	Voice/Data	2557.5 - 2652.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

This device utilizes power reduction mechanisms for SAR compliance for the licensed transmitter Antenna C transmitter for held-to-ear exposure conditions as outlined in Section 1.3. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013.

The reduced powers for the power reduction mechanisms were confirmed via conducted power measurements at the RF port (See Section 4). Detailed descriptions of the mechanisms are included in the operational description.

1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

1.3.1 Maximum PCE Power – Ant B

Mode / Band		Modulated Average (dBm)
LTE Band 5 (Cell)	Maximum	24.0
	Nominal	23.5

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1.3.2 Maximum PCE Power Ant C

Mode / Band		Modulated Average (dBm)
LTE Band 5 (Cell)	Maximum	24.0
	Nominal	23.5
LTE Band 41	Maximum	24.0
	Nominal	23.5

1.3.3 Reduced PCE Power Ant C (Held to Ear)

Mode / Band		Modulated Average (dBm)
LTE Band 5 (Cell)	Maximum	21.0
	Nominal	20.5
LTE Band 41	Maximum	22.5
	Nominal	22.0

1.4 SAR Test Exclusion

This device supports 64QAM on the uplink and 256QAM on the downlink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per Section 5.1 of FCC KDB Publication 941225 D05v02r05. SAR was not required for 64QAM since the highest maximum output power for 64 QAM is $\leq \frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05. See RF Exposure Technical Report S/N 0Y1612131930.A3L for SAR compliance evaluation and complete RF conducted output power measurements.

1.5 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D05v02r04, D05Av01r02 (4G)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

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LTE INFORMATION

LTE Information			
FCC ID	A3LSMC5010		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 5 (Cell) (824.7 - 848.3 MHz)		
	LTE Band 41 (2557.5 - 2652.5 MHz)		
Channel Bandwidths	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
LTE Band 41: 5 MHz	2557.5 (40625)	2605 (40740)	2652.5 (41215)
LTE Band 41: 10 MHz	2560 (40290)	2605 (40740)	2650 (41190)
LTE Band 41: 15 MHz	2562.5 (40315)	2605 (40740)	2647.5 (41165)
LTE Band 41: 20 MHz	2565 (40340)	2605 (40740)	2645 (41140)
UE Category	6		
Modulations Supported in UL	QPSK, 16QAM, 64QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations		
LTE Release 10 Additional Information	This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eCIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.		

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3 RF CONDUCTED POWERS

3.1 LTE Conducted Powers

3.1.1 LTE Band 5 (Cell)

Table 3-1
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth – Ant B

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20525 (836.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	23.22	0	0
	1	25	23.40		0
	1	49	23.34		0
	25	0	21.51	0-1	1
	25	12	21.54		1
	25	25	21.66		1
16QAM	50	0	21.55	0-1	1
	1	0	22.33		1
	1	25	22.21		1
	1	49	22.40	0-2	1
	25	0	20.55		2
	25	12	20.57		2
64QAM	25	25	20.69	0-2	2
	50	0	20.54		2
	1	0	20.75	0-2	2
	1	25	20.58		2
	1	49	20.99		2
	25	0	19.66	0-3	3
64QAM	25	12	19.69		3
	25	25	19.87		3
	50	0	19.65		3

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 3-2
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth– Ant B

LTE Band 5 (Cell) Conducted Power 5 MHz Bandwidth - Air 2							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.14	23.04	23.08	0	0
	1	12	22.88	22.88	22.96		0
	1	24	22.93	23.12	22.93		0
	12	0	21.73	21.64	21.77	0-1	1
	12	6	21.61	21.61	21.71		1
	12	13	21.57	21.67	21.75		1
	25	0	21.54	21.60	21.74		1
16QAM	1	0	22.16	22.54	22.61	0-1	1
	1	12	22.30	22.36	22.57		1
	1	24	22.41	22.47	22.53		1
	12	0	20.65	20.66	20.79	0-2	2
	12	6	20.57	20.67	20.77		2
	12	13	20.63	20.76	20.75		2
	25	0	20.61	20.70	20.77		2
64QAM	1	0	20.80	20.72	21.09	0-2	2
	1	12	20.78	20.80	20.92		2
	1	24	20.73	20.81	20.97		2
	12	0	19.72	19.76	19.86	0-3	3
	12	6	19.69	19.75	19.84		3
	12	13	19.70	19.79	19.83		3
	25	0	19.64	19.68	19.92		3

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Table 3-3
LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth– Ant B

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.27	23.00	23.06	0	0
	1	7	23.03	23.12	23.04		0
	1	14	22.99	23.04	22.99		0
	8	0	21.56	21.61	21.65	0-1	1
	8	4	21.57	21.63	21.98		1
	8	7	21.53	21.67	21.72		1
	15	0	21.55	21.64	21.69		1
16QAM	1	0	22.21	22.40	22.35	0-1	1
	1	7	22.13	22.45	22.36		1
	1	14	22.05	22.47	22.29		1
	8	0	20.38	20.54	20.83	0-2	2
	8	4	20.42	20.56	20.82		2
	8	7	20.40	20.59	20.75		2
	15	0	20.58	20.68	20.74		2
64QAM	1	0	20.53	20.66	20.97	0-2	2
	1	7	20.65	20.53	20.95		2
	1	14	20.59	20.59	20.98		2
	8	0	19.57	19.61	19.97	0-3	3
	8	4	19.61	19.64	19.98		3
	8	7	19.63	19.70	19.87		3
	15	0	19.74	19.66	19.82		3

Table 3-4
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth– Ant B

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.97	22.89	23.06	0	0
	1	2	23.00	22.99	23.03		0
	1	5	22.93	23.01	23.12		0
	3	0	22.93	23.01	23.12		0
	3	2	22.97	23.29	23.02		0
	3	3	22.93	23.12	23.05	0	
	6	0	21.40	21.39	21.56	0-1	1
16QAM	1	0	21.83	22.08	22.27	0-1	1
	1	2	21.98	22.12	22.25		1
	1	5	21.90	22.19	22.43		1
	3	0	21.94	21.89	22.27		1
	3	2	21.99	21.95	22.33		1
	3	3	21.92	22.10	22.29	1	
	6	0	20.53	20.49	20.59	0-2	2
64QAM	1	0	21.12	20.86	21.12	0-2	2
	1	2	21.31	20.92	21.14		2
	1	5	21.02	21.05	21.06		2
	3	0	21.04	21.00	21.10		2
	3	2	21.10	21.00	21.13		2
	3	3	21.06	21.11	21.03	2	
	6	0	19.91	19.97	20.22	0-3	3

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Table 3-5
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth – Ant C Max

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20525 (836.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	23.45	0	0
	1	25	23.39		0
	1	49	23.76		0
	25	0	21.98	0-1	1
	25	12	21.97		1
	25	25	22.02		1
16QAM	50	0	21.98	0-1	1
	1	0	22.97		1
	1	25	22.87		1
	1	49	22.97	0-2	1
	25	0	20.97		2
	25	12	20.98		2
64QAM	25	25	21.02	0-2	2
	50	0	21.00		2
	1	0	21.24	0-2	2
	1	25	21.15		2
	1	49	21.36	0-3	2
	25	0	20.23		3
	25	12	20.27		3
	25	25	20.32		3
	50	0	20.30		3

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 3-6
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth– Ant C Max

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.03	23.24	23.34	0	0
	1	12	23.04	23.16	23.22		0
	1	24	23.10	23.23	23.23		0
	12	0	21.78	21.85	22.04	0-1	1
	12	6	21.72	21.79	21.90		1
	12	13	21.75	21.83	21.99		1
	25	0	21.74	21.82	21.91	1	
16QAM	1	0	22.55	22.77	22.79	0-1	1
	1	12	22.59	22.65	22.81		1
	1	24	22.65	22.68	22.80		1
	12	0	20.80	20.91	21.03	0-2	2
	12	6	20.80	20.86	21.01		2
	12	13	20.83	20.93	20.99		2
25	0	20.81	20.88	21.05	2		
64QAM	1	0	21.15	21.09	21.40	0-2	2
	1	12	21.17	21.00	21.27		2
	1	24	21.18	21.13	21.32		2
	12	0	20.09	20.07	20.27	0-3	3
	12	6	20.09	20.07	20.17		3
	12	13	20.07	20.17	20.19		3
	25	0	20.01	20.01	20.26		3

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Table 3-7
LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth– Ant C Max

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.90	23.05	23.30	0	0
	1	7	23.03	23.10	23.33		0
	1	14	22.98	23.13	23.30		0
	8	0	21.63	21.69	21.87	0-1	1
	8	4	21.65	21.69	21.85		1
	8	7	21.63	21.90	21.86		1
	15	0	21.68	21.75	21.91		1
16QAM	1	0	22.43	22.37	22.64	0-1	1
	1	7	22.46	22.38	22.65		1
	1	14	22.43	22.36	22.37		1
	8	0	20.57	20.81	20.73	0-2	2
	8	4	20.73	20.79	20.77		2
	8	7	20.60	20.92	20.71		2
64QAM	15	0	20.71	20.73	20.91	2	
	1	0	20.92	21.07	21.03	0-2	2
	1	7	20.90	21.07	21.23		2
	1	14	20.90	21.12	21.18		2
	8	0	19.95	20.31	20.10	0-3	3
	8	4	19.96	20.25	20.13		3
	8	7	19.95	20.23	20.08		3
15	0	20.01	20.07	20.31	3		

Table 3-8
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth– Ant C Max

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.15	23.01	23.28	0	0
	1	2	23.03	23.05	23.39		0
	1	5	22.99	23.24	23.40		0
	3	0	23.02	23.35	23.33		0
	3	2	23.07	23.39	23.35		0
	3	3	23.04	23.45	23.29		0
	6	0	21.76	21.60	21.73	0-1	1
16QAM	1	0	22.04	22.29	22.32	0-1	1
	1	2	22.11	22.35	22.26		1
	1	5	22.13	22.44	22.14		1
	3	0	22.19	22.08	22.23		1
	3	2	22.22	22.15	22.37		1
	3	3	22.14	22.20	22.32		1
	6	0	20.75	20.73	20.87	0-2	2
64QAM	1	0	21.13	20.85	20.98	0-2	2
	1	2	21.23	20.87	21.16		2
	1	5	21.09	20.97	21.01		2
	3	0	21.05	20.98	21.11		2
	3	2	21.09	20.94	21.18		2
	3	3	20.94	21.11	21.06		2
	6	0	19.86	19.96	20.25	0-3	3

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Table 3-9
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20525 (836.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	20.35	0	0
	1	25	20.18		0
	1	49	20.53		0
	25	0	20.21	0-1	0
	25	12	20.30		0
	25	25	20.31		0
	50	0	20.27		0
16QAM	1	0	20.58	0-1	0
	1	25	20.57		0
	1	49	20.74		0
	25	0	20.23	0-2	0
	25	12	20.33		0
	25	25	20.36		0
	50	0	20.26		0
64QAM	1	0	20.39	0-2	0
	1	25	20.24		0
	1	49	20.47		0
	25	0	20.33	0-3	0
	25	12	20.34		0
	25	25	20.49		0
	50	0	20.41		0

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 3-10
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	20.30	20.23	20.53	0	0
	1	12	20.25	20.28	20.42		0
	1	24	20.38	20.38	20.52		0
	12	0	20.50	20.38	20.58	0-1	0
	12	6	20.42	20.46	20.57		0
	12	13	20.41	20.41	20.24		0
	25	0	20.42	20.54	20.58		0
16QAM	1	0	20.71	20.72	20.99	0-1	0
	1	12	20.65	20.79	20.87		0
	1	24	20.82	20.76	20.84		0
	12	0	20.47	20.43	20.65	0-2	0
	12	6	20.42	20.51	20.66		0
	12	13	20.38	20.49	20.61		0
	25	0	20.47	20.56	20.58		0
64QAM	1	0	20.15	20.66	20.76	0-2	0
	1	12	20.02	20.49	20.49		0
	1	24	20.08	20.62	20.75		0
	12	0	20.20	20.33	20.45	0-3	0
	12	6	20.28	20.35	20.44		0
	12	13	20.28	20.45	20.51		0
	25	0	20.23	20.28	20.45		0

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Table 3-11

LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	20.23	20.28	20.46	0	0
	1	7	20.17	20.36	20.45		0
	1	14	20.25	20.25	20.39		0
	8	0	20.37	20.33	20.48	0-1	0
	8	4	20.38	20.43	20.52		0
	8	7	20.31	20.38	20.45		0
	15	0	20.34	20.44	20.50		0
16QAM	1	0	20.48	20.62	20.64	0-1	0
	1	7	20.50	20.73	20.78		0
	1	14	20.44	20.62	20.48		0
	8	0	20.43	20.29	20.36	0-2	0
	8	4	20.40	20.35	20.43		0
	8	7	20.41	20.40	20.36		0
	15	0	20.33	20.48	20.51		0
64QAM	1	0	20.25	20.68	20.84	0-2	0
	1	7	20.34	20.71	20.78		0
	1	14	20.24	20.76	20.74		0
	8	0	20.15	20.35	20.49	0-3	0
	8	4	20.22	20.42	20.46		0
	8	7	20.21	20.40	20.47		0
	15	0	20.35	20.24	20.33		0

Table 3-12

LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	20.08	20.32	20.40	0	0
	1	2	20.29	20.43	20.36		0
	1	5	20.16	20.41	20.31		0
	3	0	20.32	20.28	20.38		0
	3	2	20.38	20.43	20.43		0
	3	3	20.52	20.36	20.41	0	
	6	0	20.28	20.42	20.43	0-1	0
16QAM	1	0	20.34	20.28	20.52	0-1	0
	1	2	20.38	20.37	20.56		0
	1	5	20.44	20.32	20.51		0
	3	0	20.22	20.19	20.56		0
	3	2	20.30	20.41	20.64		0
	3	3	20.28	20.31	20.53	0	
	6	0	20.28	20.42	20.35	0-2	0
64QAM	1	0	20.19	20.60	20.71	0-2	0
	1	2	20.25	20.61	20.75		0
	1	5	20.22	20.68	20.70		0
	3	0	20.24	20.14	20.35		0
	3	2	20.26	20.28	20.28		0
	3	3	20.20	20.33	20.36	0	
		6	0	20.26	20.27	20.37	0-3

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3.1.2

LTE Band 41

Table 3-13
LTE Band 41 Conducted Powers - 20 MHz Bandwidth – Ant C

LTE Band 41 20 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40340 (2565.0 MHz)	40740 (2605.0 MHz)	41140 (2645.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.15	23.75	23.78	0	0
	1	50	23.62	23.69	23.61		0
	1	99	23.66	23.50	22.80		0
	50	0	22.32	22.25	22.30	0-1	1
	50	25	22.23	22.28	22.17		1
	50	50	22.42	22.15	22.03		1
	100	0	22.40	22.10	22.18		1
16QAM	1	0	22.32	22.50	22.80	0-1	1
	1	50	22.36	22.55	22.79		1
	1	99	22.39	22.41	22.13		1
	50	0	21.42	21.38	21.36	0-2	2
	50	25	21.43	21.24	21.20		2
	50	50	21.50	21.17	21.13		2
	100	0	21.48	21.21	21.19		2
64QAM	1	0	21.17	21.46	21.30	0-2	2
	1	50	21.64	21.57	21.46		2
	1	99	21.72	21.01	21.26		2
	50	0	20.48	20.44	20.53	0-3	3
	50	25	20.57	20.43	20.48		3
	50	50	20.66	20.41	20.32		3
	100	0	20.53	20.43	20.41		3

Table 3-14
LTE Band 41 Conducted Powers - 15 MHz Bandwidth – Ant C

LTE Band 41 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40315 (2562.5 MHz)	40740 (2605.0 MHz)	41165 (2647.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.74	23.41	23.26	0	0
	1	36	22.96	23.17	23.04		0
	1	74	23.20	23.24	22.75		0
	36	0	22.15	22.10	22.24	0-1	1
	36	18	22.26	22.11	22.14		1
	36	37	22.37	22.26	22.06		1
	75	0	22.34	22.17	22.20		1
16QAM	1	0	22.31	22.77	22.60	0-1	1
	1	36	22.46	22.43	22.42		1
	1	74	22.71	22.57	21.75		1
	36	0	21.21	21.28	21.33	0-2	2
	36	18	21.28	21.14	21.28		2
	36	37	21.46	21.18	21.26		2
	75	0	21.21	21.21	21.25		2
64QAM	1	0	21.13	21.48	21.06	0-2	2
	1	36	21.23	21.37	21.25		2
	1	74	21.49	21.13	20.82		2
	36	0	20.44	20.53	20.38	0-3	3
	36	18	20.55	20.48	20.37		3
	36	37	20.61	20.54	20.52		3
	75	0	20.53	20.53	20.31		3

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Table 3-15
LTE Band 41 Conducted Powers - 10 MHz Bandwidth – Ant C

LTE Band 41 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40290 (2560.0 MHz)	40740 (2605.0 MHz)	41190 (2650.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.94	23.80	23.12	0	0
	1	25	23.05	23.74	22.92		0
	1	49	23.06	23.38	22.80		0
	25	0	22.61	23.00	22.67	0-1	1
	25	12	22.77	22.95	22.57		1
	25	25	22.66	22.83	22.18		1
	50	0	22.62	22.97	22.46		1
16QAM	1	0	22.13	22.99	22.55	0-1	1
	1	25	22.54	22.88	22.43		1
	1	49	22.51	22.25	21.81		1
	25	0	21.84	21.99	21.80	0-2	2
	25	12	21.90	21.97	21.80		2
	25	25	21.89	22.00	21.40		2
	50	0	21.88	21.95	21.62		2
64QAM	1	0	21.56	21.87	21.66	0-2	2
	1	25	21.60	21.96	21.75		2
	1	49	21.55	21.57	21.36		2
	25	0	20.52	20.96	20.47	0-3	3
	25	12	20.67	20.94	20.59		3
	25	25	20.66	20.82	20.25		3
	50	0	20.51	20.92	20.47		3

Table 3-16
LTE Band 41 Conducted Powers - 5 MHz Bandwidth – Ant C

LTE Band 41 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40265 (2557.5 MHz)	40740 (2605.0 MHz)	41215 (2652.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.57	23.24	22.70	0	0
	1	12	22.59	23.25	22.43		0
	1	24	22.64	23.29	22.22		0
	12	0	22.16	22.71	21.97	0-1	1
	12	6	22.30	22.69	21.86		1
	12	13	22.26	22.67	21.63		1
	25	0	22.23	22.72	22.04		1
16QAM	1	0	21.66	22.43	21.87	0-1	1
	1	12	21.85	22.46	21.59		1
	1	24	21.89	22.42	21.20		1
	12	0	21.46	21.94	21.19	0-2	2
	12	6	21.53	21.87	21.12		2
	12	13	21.54	21.83	20.86		2
	25	0	21.44	21.83	20.99		2
64QAM	1	0	21.26	21.69	20.79	0-2	2
	1	12	21.31	21.74	20.75		2
	1	24	21.33	21.57	20.56		2
	12	0	20.43	20.98	19.96	0-3	3
	12	6	20.52	21.00	19.97		3
	12	13	20.53	20.93	19.90		3
	25	0	20.44	20.93	19.84		3

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Table 3-17
LTE Band 41 Conducted Powers - 20 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 41 20 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40340 (2565.0 MHz)	40740 (2605.0 MHz)	41140 (2645.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.63	21.87	21.78	0	0
	1	50	21.82	21.71	21.75		0
	1	99	21.83	21.51	21.51		0
	50	0	21.86	21.73	21.76	0-1	0
	50	25	21.92	21.72	21.68		0
	50	50	21.93	21.55	21.57		0
	100	0	21.85	21.67	21.64		0
16QAM	1	0	21.44	21.86	21.80	0-1	0
	1	50	21.76	21.85	21.90		0
	1	99	21.85	21.62	21.46		0
	50	0	21.50	21.36	21.28	0-2	0.5
	50	25	21.49	21.29	21.23		0.5
	50	50	21.56	21.20	21.12		0.5
	100	0	21.42	21.28	21.24		0.5
64QAM	1	0	21.18	21.29	21.18	0-2	0.5
	1	50	21.27	21.30	20.99		0.5
	1	99	21.40	21.26	20.80		0.5
	50	0	20.58	20.36	20.36	0-3	1.5
	50	25	20.36	20.24	20.27		1.5
	50	50	20.53	20.09	20.24		1.5
	100	0	20.36	20.30	20.27		1.5

Table 3-18
LTE Band 41 Conducted Powers - 15 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 41 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40315 (2562.5 MHz)	40740 (2605.0 MHz)	41165 (2647.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.62	21.80	21.67	0	0
	1	36	22.00	21.52	21.40		0
	1	74	21.92	21.67	21.27		0
	36	0	21.57	21.61	21.44	0-1	0
	36	18	21.67	21.44	21.27		0
	36	37	21.86	21.56	21.32		0
	75	0	21.72	21.53	21.37		0
16QAM	1	0	21.80	21.47	21.69	0-1	0
	1	36	21.99	21.30	21.30		0
	1	74	21.62	21.45	21.38		0
	36	0	21.24	21.24	21.18	0-2	0.5
	36	18	21.33	21.11	21.11		0.5
	36	37	21.46	21.16	20.94		0.5
	75	0	21.25	21.18	20.96		0.5
64QAM	1	0	21.04	21.22	21.14	0-2	0.5
	1	36	20.99	21.23	20.95		0.5
	1	74	21.27	21.21	20.76		0.5
	36	0	20.08	20.54	20.19	0-3	1.5
	36	18	20.03	20.49	20.21		1.5
	36	37	20.23	20.35	20.02		1.5
	75	0	20.00	20.39	20.16		1.5

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Table 3-19
LTE Band 41 Conducted Powers - 10 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 41 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40290 (2560.0 MHz)	40740 (2605.0 MHz)	41190 (2650.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.35	22.29	22.00	0	0
	1	25	22.02	21.91	21.95		0
	1	49	22.03	22.08	21.42		0
	25	0	22.21	22.09	21.74	0-1	0
	25	12	22.12	21.88	21.73		0
	25	25	21.95	22.04	21.44		0
	50	0	21.97	21.80	21.58		0
16QAM	1	0	21.61	21.98	21.63	0-1	0
	1	25	22.03	22.04	21.46		0
	1	49	22.25	22.06	21.11		0
	25	0	21.42	21.52	21.00	0-2	0.5
	25	12	21.58	21.49	21.05		0.5
	25	25	21.56	21.32	21.02		0.5
	50	0	21.51	21.39	21.09		0.5
64QAM	1	0	21.25	21.55	20.52	0-2	0.5
	1	25	21.51	21.54	20.57		0.5
	1	49	21.35	21.37	20.51		0.5
	25	0	20.31	20.56	20.10	0-3	1.5
	25	12	20.24	20.64	20.13		1.5
	25	25	20.22	20.38	19.80		1.5
	50	0	20.21	20.54	19.87		1.5

Table 3-20
LTE Band 41 Conducted Powers - 5 MHz Bandwidth – Ant C Reduced (Held to Ear)

LTE Band 41 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			40265 (2557.5 MHz)	40740 (2605.0 MHz)	41215 (2652.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.90	22.06	21.80	0	0
	1	12	22.34	22.30	22.23		0
	1	24	21.74	21.86	21.80		0
	12	0	22.22	22.36	22.35	0-1	0
	12	6	22.27	22.35	22.29		0
	12	13	22.25	22.32	22.11		0
	25	0	22.25	22.32	22.27		0
16QAM	1	0	21.38	22.25	21.70	0-1	0
	1	12	21.97	22.30	22.30		0
	1	24	21.98	21.85	21.81		0
	12	0	21.49	21.77	21.57	0-2	0.5
	12	6	21.55	21.79	21.53		0.5
	12	13	21.62	21.63	21.36		0.5
	25	0	21.46	21.65	21.48		0.5
64QAM	1	0	21.25	21.38	21.09	0-2	0.5
	1	12	21.37	21.39	21.13		0.5
	1	24	21.30	21.24	20.87		0.5
	12	0	20.41	20.64	20.37	0-3	1.5
	12	6	20.44	20.67	20.30		1.5
	12	13	20.41	20.63	20.10		1.5
	25	0	20.34	20.60	20.15		1.5

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4 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Pasternack	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/10/2017	Annual	2/10/2018	162125

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing an attenuator were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

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5

CONCLUSION

5.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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