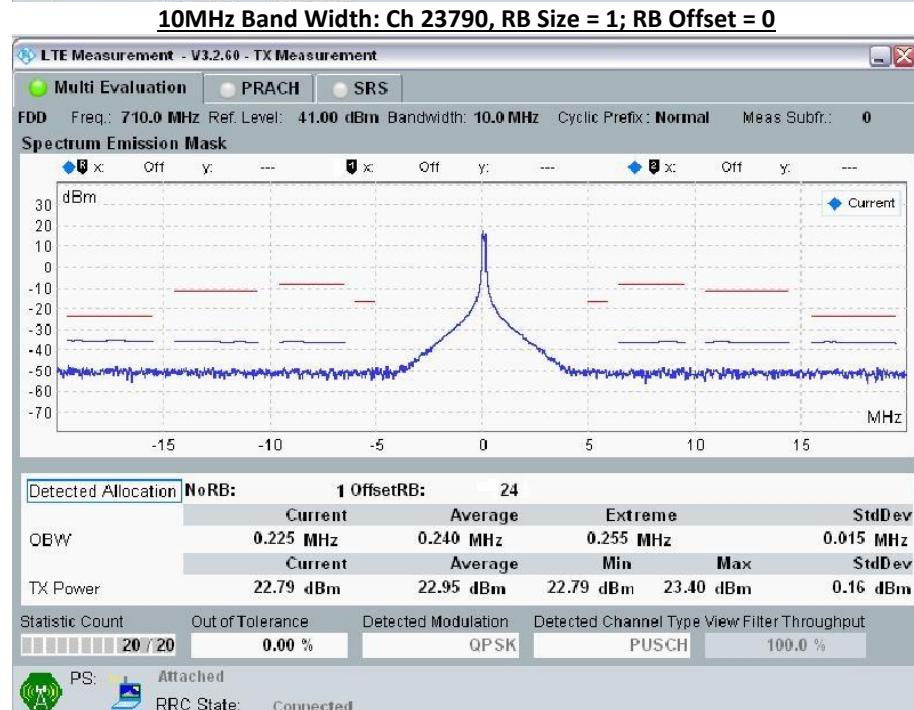
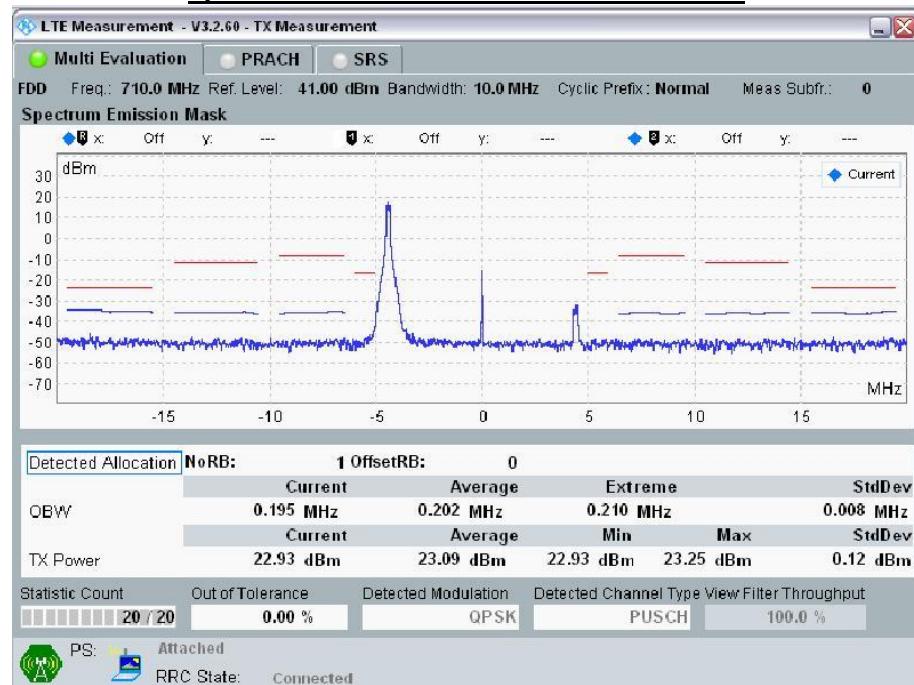


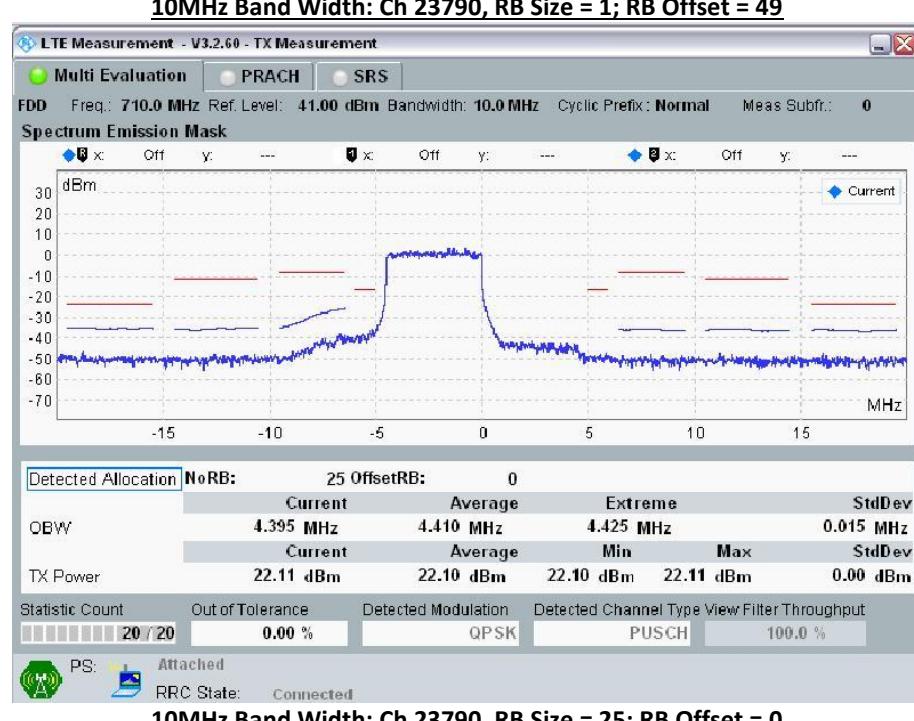
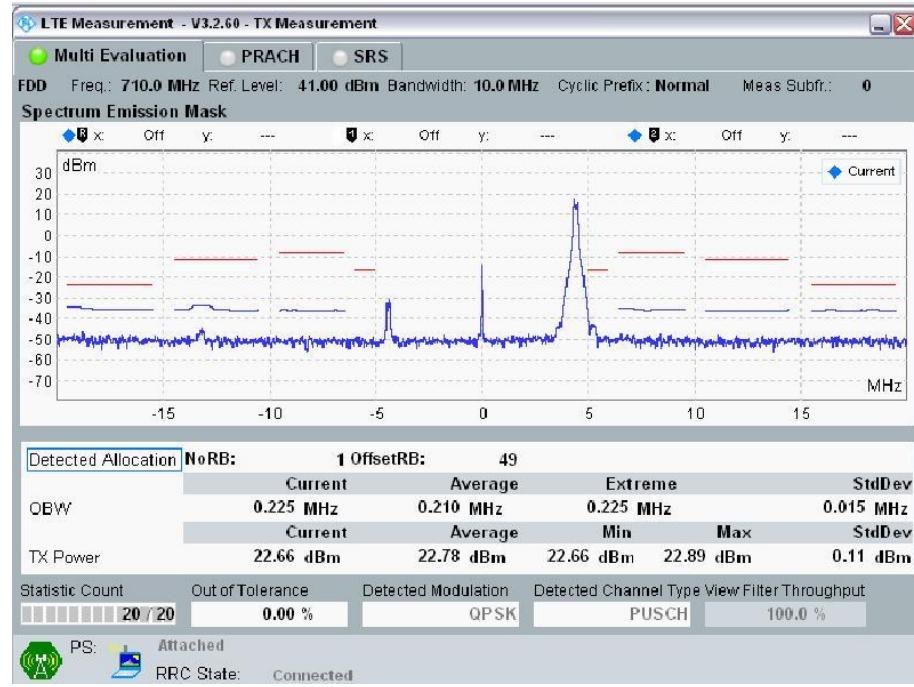
## 10.7.5 LTE Band 17

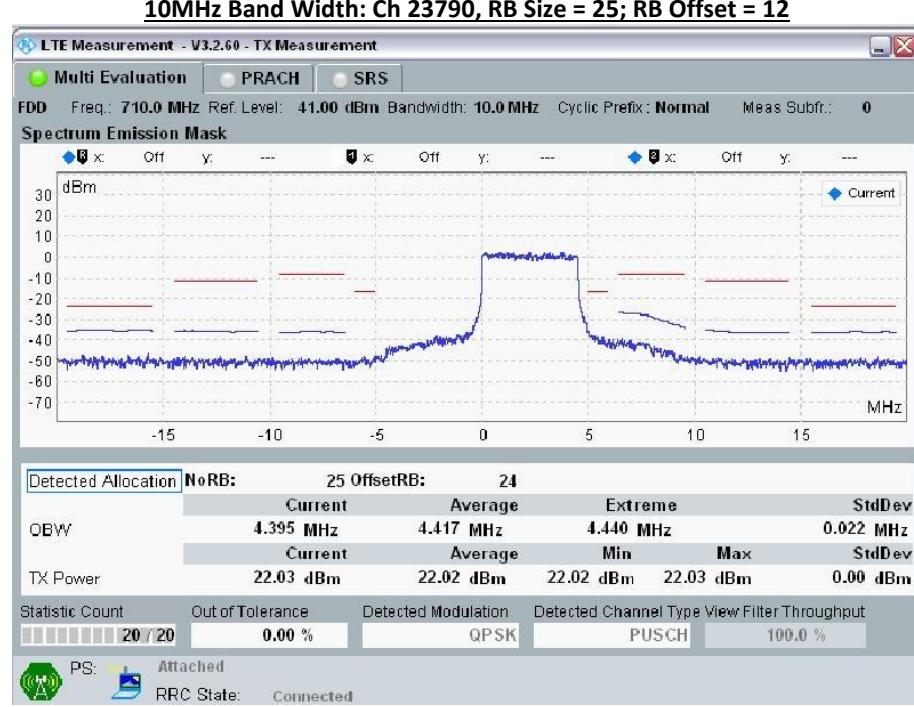
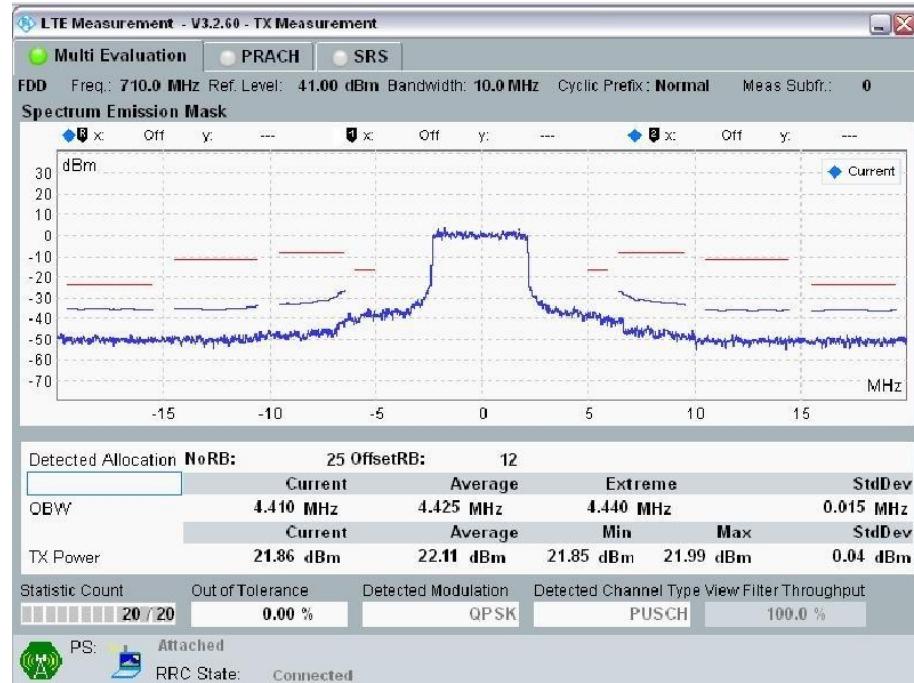
Output power table

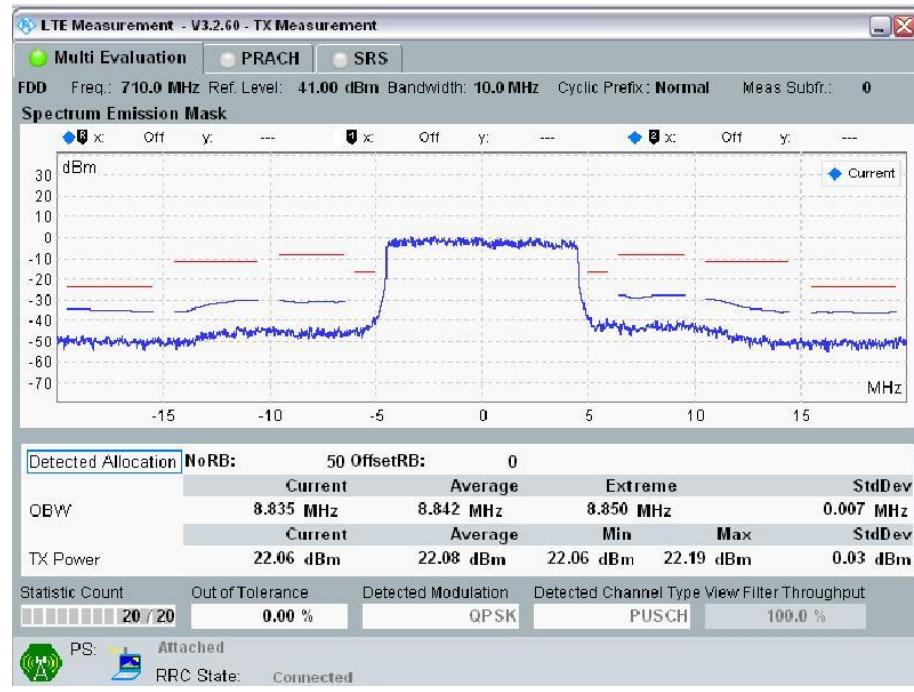
Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	
								W/o Power back-off	W/ Power back-off
17	10	23780	709.0	QPSK	1	0	0	23.0	19.4
					1	24	0	22.8	19.2
					1	49	0	22.7	19.2
					25	0	1	22.0	18.5
					25	12	1	21.9	18.3
					25	24	1	21.7	18.3
					50	0	1	22.0	18.5
		23790	710.0	16QAM	1	0	1	22.1	18.5
					1	24	1	21.8	18.3
					1	49	1	21.8	18.3
					25	0	2	21.0	17.5
					25	12	2	20.8	17.3
					25	24	2	20.8	17.3
					50	0	2	20.9	17.4
		23800	711.0	QPSK	1	0	0	23.1	19.8
					1	24	0	23.0	19.7
					1	49	0	22.8	19.6
					25	0	1	22.1	18.8
					25	12	1	22.1	18.8
					25	24	1	22.0	18.7
					50	0	1	22.1	18.8
				16QAM	1	0	1	22.2	18.8
					1	24	1	22.1	18.8
					1	49	1	21.8	18.6
					25	0	2	21.2	17.8
					25	12	2	21.0	17.7
					25	24	2	20.9	17.7
					50	0	2	21.1	17.8

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power(dBm)	
								W/o Power back-off	W/ Power back-off
17	5	23755	706.5	QPSK	1	0	0	23.0	19.4
					1	12	0	22.8	19.2
					1	24	0	22.7	19.2
					12	0	1	22.0	18.5
					12	6	1	21.9	18.3
					12	11	1	21.7	18.3
					25	0	1	22.0	18.5
		23790	710.0	16QAM	1	0	1	22.1	18.5
					1	12	1	21.8	18.3
					1	24	1	21.8	18.3
					12	0	2	21.0	17.5
					12	6	2	20.8	17.3
					12	11	2	20.8	17.3
					25	0	2	20.9	17.4
		23825	713.5	QPSK	1	0	0	23.1	19.8
					1	12	0	23.0	19.7
					1	24	0	22.8	19.6
					12	0	1	22.1	18.8
					12	6	1	22.1	18.8
					12	11	1	22.0	18.7
					25	0	1	22.1	18.8
		23825	713.5	16QAM	1	0	1	22.2	18.8
					1	12	1	22.1	18.8
					1	24	1	21.8	18.6
					12	0	2	21.2	17.8
					12	6	2	21.0	17.7
					12	11	2	20.9	17.7
					25	0	2	21.1	17.8
		23825	713.5	QPSK	1	0	0	23.0	19.5
					1	12	0	22.9	19.4
					1	24	0	22.7	19.3
					12	0	1	22.1	18.5
					12	6	1	22.0	18.5
					12	11	1	21.9	18.3
					25	0	1	21.8	18.5
		23825	713.5	16QAM	1	0	1	22.0	18.6
					1	12	1	22.0	18.4
					1	24	1	21.8	18.3
					12	0	2	21.0	17.5
					12	6	2	21.0	17.4
					12	11	2	20.8	17.4
					25	0	2	21.0	17.5

**Spectrum Plots for the Test RB allocations**







**10.8 Wi-Fi (2.4GHz Band)**

Band (GHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Avg. Pwr (dBm)	Maximum Tune-up Pwr (dBm)	SAR Test (Yes/No)	Note
2.4	802.11b	1	1	2412	18.0	18.5	Yes	
			6	2437	18.4	18.5		
			11	2462	17.6	18.5		
	802.11g	6	1	2412	Not Required	16.5	No	
			6	2437		16.5		
			11	2462		16.5		
	802.11n HT20	MCS0	1	2412	Not Required	17.5	No	
			6	2437		17.5		
			11	2462		17.5		
	802.11n HT40	MCS0	3	2422	Not Required	17.0	No	
			6	2437		17.0		
			9	2452		17.0		

**Note(s):**

1. Output Power and SAR is not required for 802.11 g/n HT20/n HT40 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

**10.9 Wi-Fi (5GHz Band)**

Band (GHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Avg. Pwr (dBm)	Maximum Tune-up Pwr (dBm)	SAR Test (Yes/No)	Note
5.2 (U-NII 1)	802.11a	6	36	5180	15.5	16.0	Yes	
	802.11a	6	40	5200	15.4	16.0	Yes	
	802.11a	6	44	5220	14.4	16.0	Yes	
	802.11a	6	48	5240	15.8	16.0	Yes	
	802.11n (HT20)	MCS0	36-48	5180-5240	Not Required	15.0	No	
	802.11n (HT40)	MCS0	38-46	5190-5230		14.0	No	
	802.11ac VHT80	VHT0	42	5210		10.5	No	
5.3 (U-NII 2A)	802.11a	6	52	5260	14.9	16.0	No	
		6	56	5280	15.4	16.0	No	
		6	60	5300	15.0	16.0	No	
		6	64	5320	15.1	16.0	No	
	802.11n (HT20)	MCS0	52-64	5260-5320	Not Required	15.0	No	
	802.11n (HT40)	MCS0	54-62	5270-5310		14.0	No	
	802.11ac VHT80	VHT0	58	5290		10.5	No	

Band (GHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Avg. Pwr (dBm)	Maximum Tune-up Pwr (dBm)	SAR Test (Yes/No)	Note
5.5 (U-NII-2C)	802.11a	6	100	5500	16.7	17.0	Yes	
		6	104	5520	16.5	17.0	Yes	
		6	108	5540	16.2	17.0	Yes	
		6	112	5560	16.3	17.0	Yes	
		6	116	5580	16.5	17.0	Yes	
		6	120	5600	16.0	17.0	Yes	
		6	124	5620	15.9	17.0	Yes	
		6	128	5640	15.7	17.0	Yes	
		6	132	5660	16.0	17.0	Yes	
		6	136	5680	15.8	17.0	Yes	
	802.11n (HT20)	MCS0	100-144	5500-5720	Not Required	17.0	No	1
	802.11n (HT40)	MCS0	102-142	5510-5710		15.0	No	1
	802.11ac VHT80	VHT0	106-138	5530-5690		12.0	No	1

**Note(s):**

1. Output Power and SAR measurement is not required for 802.11n HT20/n HT40/802.11ac channels when the specified maximum tune-up powers are less or same with 802.11n HT20/HT40/802.11ac and the measured SAR is  $\leq 1.2 \text{ W/Kg}$ .

Band (GHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Avg. Pwr (dBm)	Maximum Tune-up Pwr (dBm)	SAR Test (Yes/No)	Note
5.8 (U-NII-3)	802.11a	6	149	5745	15.9	16.0	Yes	
		6	153	5765	15.3	16.0	Yes	
		6	157	5785	15.7	16.0	Yes	
		6	161	5805	15.5	16.0	Yes	
		6	165	5825	15.7	16.0	Yes	
	802.11n (HT20)	MCS0	149-165	5745-5825	Not Required	16.0	No	1
	802.11n (HT40)	MCS0	151-159	5755-5795		15.5	No	1
	802.11ac VHT80	VHT0	155	5775		13.0	No	1

**Note(s):**

2. Output Power and SAR measurement is not required for 802.11n HT20/n HT40/802.11ac channels when the specified maximum tune-up powers are less or same with 802.11n HT20/HT40/802.11ac and the measured SAR is  $\leq$  1.2 W/Kg.

**10.10 Bluetooth**

Per exclusion calculations in Section 11, SAR testing for Bluetooth is not required.

## 11 Summary of SAR Test Exclusion Configurations

### 11.1 Standalone SAR Test Exclusion Calculations

Since the Dedicated Host Approach is applied, the standalone SAR test exclusion procedure in KDB 447498 section 4.3.1 is applied in conjunction with KDB 616217 section 4.3 to determine the minimum test separation distance:

1. According to KDB 447498 Section 4.1.5 if the antenna is at close proximity to user then the outer surface of the DUT should be treated as the radiating surface. The test separation distance is then determined by the smallest distance between the outer surface of the device and the user. For the purposes of this report close proximity has been defined as closer than 50 mm. For antennas <50 mm from the rear or edge the separation distance used for the estimated SAR calculations is 0 mm.
2. When the minimum test separation distance is < 5mm, a distance of 5mm is applied to determine SAR test exclusion.
3. When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.
4. If the antenna to DUT adjacent edge or bottom separation distance >50mm the actual antenna to user separation distance is used to determine SAR exclusion and estimated SAR value.

Refer to Appendix for the specific details on the antenna-to-antenna and antenna-to-edge distances used for test exclusion calculations.

### 11.1.1 SAR Exclusion Calculations for Wi-Fi Antenna < 50mm from the User

According to KDB 447498 v06 r02 in section 4.3.1, if the calculated threshold value is > 3 then SAR testing is required.

#### For WWAN

Full Power, Proximity Sensor Off.

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
WWAN	GPRS 850	836.0	26.5	447	4.4	19.0	224.1	42.0	7.9	92.89	21.51	>200mm	9.73	51.73
	GPRS 1900	1910.0	23.0	200	4.4	19.0	224.1	42.0	7.9	62.82	14.55	>200mm	6.58	34.99
	CDMA BC0	849.0	25.0	316	4.4	19.0	224.1	42.0	7.9	66.17	15.32	>200mm	6.93	36.86
	CDMA BC1	1909.0	25.0	316	4.4	19.0	224.1	42.0	7.9	99.23	22.98	>200mm	10.40	55.27
	CDMA BC10	824.0	25.0	316	4.4	19.0	224.1	42.0	7.9	65.19	15.10	>200mm	6.83	36.31
	WCDMA Band II	1852.4	24.0	251	4.4	19.0	224.1	42.0	7.9	77.64	17.98	>200mm	8.13	43.24
	WCDMA Band IV	1712.4	24.0	251	4.4	19.0	224.1	42.0	7.9	74.65	17.29	>200mm	7.82	41.58
	WCDMA Band V	826.4	24.0	251	4.4	19.0	224.1	42.0	7.9	51.86	12.01	>200mm	5.43	28.88
	LTE Band 2	1860.0	24.0	251	4.4	19.0	224.1	42.0	7.9	77.80	18.02	>200mm	8.15	43.33
	LTE Band 4	1720.0	24.0	251	4.4	19.0	224.1	42.0	7.9	74.81	17.33	>200mm	7.84	41.67
	LTE Band 5	829.0	24.0	251	4.4	19.0	224.1	42.0	7.9	51.94	12.03	>200mm	5.44	28.93
	LTE Band 13	782.0	24.0	251	4.4	19.0	224.1	42.0	7.9	50.45	11.68	>200mm	5.28	28.10
	LTE Band 17	710.0	24.0	251	4.4	19.0	224.1	42.0	7.9	48.07	11.13	>200mm	5.04	26.77

Power back off, Proximity Sensor On.

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
WWAN	GPRS 850	836.0	21.0	126	4.4	19.0	224.1	42.0	7.9	26.18	6.06	>200mm	2.74	14.58
	GPRS 1900	1910.0	20.0	100	4.4	19.0	224.1	42.0	7.9	31.41	7.27	>200mm	3.29	17.49
	CDMA BC0	849.0	21.0	126	4.4	19.0	224.1	42.0	7.9	26.39	6.11	>200mm	2.76	14.70
	CDMA BC1	1909.0	20.0	100	4.4	19.0	224.1	42.0	7.9	31.40	7.27	>200mm	3.29	17.49
	CDMA BC10	824.0	21.0	126	4.4	19.0	224.1	42.0	7.9	25.99	6.02	>200mm	2.72	14.48
	WCDMA Band II	1852.4	20.0	100	4.4	19.0	224.1	42.0	7.9	30.93	7.16	>200mm	3.24	17.23
	WCDMA Band IV	1712.4	20.0	100	4.4	19.0	224.1	42.0	7.9	29.74	6.89	>200mm	3.12	16.56
	WCDMA Band V	826.4	21.0	126	4.4	19.0	224.1	42.0	7.9	26.03	6.03	>200mm	2.73	14.50
	LTE Band 2	1860.0	20.0	100	4.4	19.0	224.1	42.0	7.9	31.00	7.18	>200mm	3.25	17.26
	LTE Band 4	1720.0	20.0	100	4.4	19.0	224.1	42.0	7.9	29.81	6.90	>200mm	3.12	16.60
	LTE Band 5	829.0	21.0	126	4.4	19.0	224.1	42.0	7.9	26.07	6.04	>200mm	2.73	14.52
	LTE Band 13	782.0	20.0	100	4.4	19.0	224.1	42.0	7.9	20.10	4.65	>200mm	2.11	11.19
	LTE Band 17	710.0	20.0	100	4.4	19.0	224.1	42.0	7.9	19.15	4.43	>200mm	2.01	10.67

**For WLAN**

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
Wi-Fi Main	2.4GHz	2437	18.5	71	4.4	8.0	93.5	129.0	121.5	25.19	13.85	>50mm	>50mm	>50mm
Wi-Fi Main	5.2GHz	5210	16.0	40	4.4	8.0	93.5	129.0	121.5	20.75	11.41	>50mm	>50mm	>50mm
Wi-Fi Main	5.3GHz	5290	15.5	35	4.4	8.0	93.5	129.0	121.5	18.30	10.06	>50mm	>50mm	>50mm
Wi-Fi Main	5.5GHz	5530	17.0	50	4.4	8.0	93.5	129.0	121.5	26.72	14.70	>50mm	>50mm	>50mm
Wi-Fi Main	5.8GHz	5775	16.0	40	4.4	8.0	93.5	129.0	121.5	21.85	12.02	>50mm	>50mm	>50mm
Wi-Fi Main	Bluetooth	2440	2.0	2	4.4	8.0	93.5	129.0	121.5	0.71	0.39	>50mm	>50mm	>50mm

### 11.1.2 SAR Exclusion Calculations for Wi-Fi Antenna > 50mm from the User

According to KDB 447498 v06 r02, if the calculated Power threshold is less than the output power then SAR testing is required.

#### For WWAN

Full Power, Proximity Sensor Off.

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
WWAN	GPRS 850	836.0	26.5	501	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1905.05	<50mm	<50mm
	GPRS 1900	1910.0	23.0	398	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1849.54	<50mm	<50mm
	CDMA BC0	849.0	25.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1903.79	<50mm	<50mm
	CDMA BC1	1909.0	25.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1849.56	<50mm	<50mm
	CDMA BC10	824.0	25.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1906.24	<50mm	<50mm
	WCDMA Band II	1852.4	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1851.21	<50mm	<50mm
	WCDMA Band IV	1712.4	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1855.63	<50mm	<50mm
	WCDMA Band V	826.4	24.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1906.00	<50mm	<50mm
	LTE Band 2	1860.0	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1850.99	<50mm	<50mm
	LTE Band 4	1720.0	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1855.37	<50mm	<50mm
	LTE Band 5	829.0	24.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1905.75	<50mm	<50mm
	LTE Band 13	782.0	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1910.62	<50mm	<50mm
	LTE Band 17	710.0	24.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1919.02	<50mm	<50mm

Power back off, Proximity Sensor On.

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
WWAN	GPRS 850	836.0	21.0	501	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1905.05	<50mm	<50mm
	GPRS 1900	1910.0	20.0	398	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1849.54	<50mm	<50mm
	CDMA BC0	849.0	21.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1903.79	<50mm	<50mm
	CDMA BC1	1909.0	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1849.56	<50mm	<50mm
	CDMA BC10	824.0	21.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1906.24	<50mm	<50mm
	WCDMA Band II	1852.4	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1851.21	<50mm	<50mm
	WCDMA Band IV	1712.4	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1855.63	<50mm	<50mm
	WCDMA Band V	826.4	21.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1906.00	<50mm	<50mm
	LTE Band 2	1860.0	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1850.99	<50mm	<50mm
	LTE Band 4	1720.0	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1855.37	<50mm	<50mm
	LTE Band 5	829.0	21.0	126	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1905.75	<50mm	<50mm
	LTE Band 13	782.0	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1910.62	<50mm	<50mm
	LTE Band 17	710.0	20.0	100	4.4	19.0	224.1	42.0	7.9	<50mm	<50mm	1919.02	<50mm	<50mm

**For WLAN**

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Calculated Threshold Value				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
Wi-Fi Main	2.4GHz	2437	18.5	40	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	531.09	886.09	811.09
Wi-Fi Main	5.2GHz	5210	16.0	40	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	500.72	855.72	780.72
Wi-Fi Main	5.3GHz	5290	15.5	35	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	500.22	855.22	780.22
Wi-Fi Main	5.5GHz	5530	17.0	50	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	498.79	853.79	778.79
Wi-Fi Main	5.8GHz	5775	16.0	40	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	497.42	852.42	777.42
Bluetooth	Bluetooth	2440	2.0	1	4.4	8.0	93.5	129.0	121.5	<50mm	<50mm	531.03	886.03	811.03

**11.1.3 SAR Required Test Configuration****For WWAN**

Full Power, Proximity Sensor Off

Test Configurations	Rear	Edge1	Edge2	Edge3	Edge4
GPRS 850	Yes	Yes	No	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes
CDMA BC0	Yes	Yes	No	Yes	Yes
CDMA BC1	Yes	Yes	No	Yes	Yes
CDMA BC10	Yes	Yes	No	Yes	Yes
WCDMA Band II	Yes	Yes	No	Yes	Yes
WCDMA Band IV	Yes	Yes	No	Yes	Yes
WCDMA Band V	Yes	Yes	No	Yes	Yes
LTE Band 2	Yes	Yes	No	Yes	Yes
LTE Band 4	Yes	Yes	No	Yes	Yes
LTE Band 5	Yes	Yes	No	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes
LTE Band 17	Yes	Yes	No	Yes	Yes

**Note(s):**

1. Yes = SAR is required.
2. No = SAR is not required.

Power back off, Proximity Sensor On

Test Configurations	Rear	Edge1	Edge2	Edge3	Edge4
GPRS 850	Yes	Yes	No	No	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes
CDMA BC0	Yes	Yes	No	No	Yes
CDMA BC1	Yes	Yes	No	Yes	Yes
CDMA BC10	Yes	Yes	No	No	Yes
WCDMA Band II	Yes	Yes	No	Yes	Yes
WCDMA Band IV	Yes	Yes	No	Yes	Yes
WCDMA Band V	Yes	Yes	No	No	Yes
LTE Band 2	Yes	Yes	No	Yes	Yes
LTE Band 4	Yes	Yes	No	Yes	Yes
LTE Band 5	Yes	Yes	No	No	Yes
LTE Band 13	Yes	Yes	No	No	Yes
LTE Band 17	Yes	Yes	No	No	Yes

**Note(s):**

1. Yes = SAR is required.
2. No = SAR is not required.

**For WLAN**

Power back off, Proximity Sensor On

Test Configurations	Rear	Edge1	Edge2	Edge3	Edge4
Wi-Fi 2.4GHz	Yes	Yes	No	No	No
Wi-Fi 5.2GHz	Yes	Yes	No	No	No
Wi-Fi 5.3GHz	Yes	Yes	No	No	No
Wi-Fi 5.5GHz	Yes	Yes	No	No	No
Wi-Fi 5.8GHz	Yes	Yes	No	No	No
Bluetooth	No	No	No	No	No

**Note(s):**

1. Yes = SAR is required.
2. No = SAR is not required.

## 12 Exposure Limit

(A). Limits for Occupational/Controlled Exposure (W/kg)

<u>Whole-Body</u>	<u>Partial-Body</u>	<u>Hands, Wrists, Feet and Ankles</u>
0.4	8.0	2.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

<u>Whole-Body</u>	<u>Partial-Body</u>	<u>Hands, Wrists, Feet and Ankles</u>
0.08	1.6	4.0

NOTE: **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. **SAR for hands, wrists, feet and ankles** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

**Population/Uncontrolled Environments:**

are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**Occupational/Controlled Environments:**

are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

**NOTE**

**GENERAL POPULATION/UNCONTROLLED EXPOSURE**

**PARTIAL BODY LIMIT**

**1.6 W/kg**

## 13 Tissue Dielectric Properties

### 13.1 Test Liquid Confirmation

#### Simulating Liquids Parameter Check

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values

The relative permittivity and conductivity of the tissue material should be within  $\pm 5\%$  of the values given in the table below 5% may not be easily achieved at certain frequencies.

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE 1528 2013 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 2013 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE 1528 2013

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

### 13.2 Typical Composition of Ingredients for Liquid Tissue Phantoms

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

alt: 99<sup>+</sup>% Pure Sodium Chloride

Sugar: 98<sup>+</sup>% Pure Sucrose

Water: De-ionized, 16 MΩ<sup>+</sup> resistivity

HEC: Hydroxyethyl Cellulose

DGBE: 99<sup>+</sup>% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra-pure): Polyethylene glycol mono [4-(1, 1, 3, 3-tetramethylbutyl)phenyl]ether

### Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

### 13.3 Simulating Liquids Parameter Check Results

Date	Band	Freq(MHz)	Measured			Standard		Δ		Limit (%)
			e' (εr)	e''	σ	e' (εr)	σ	e' (εr)	σ	
2017/4/24	Body 900	829	57.27	21.29	0.98	55.22	0.97	3.71%	1.14%	±5
		836.5	57.22	21.26	0.99	55.20	0.97	3.66%	1.72%	±5
		844	57.13	21.22	0.99	55.17	0.98	3.56%	1.41%	±5
2017/4/25	Body 900	824.2	55.18	21.24	0.97	55.24	0.97	-0.12%	0.33%	±5
		836.6	55.08	21.20	0.99	55.20	0.97	-0.22%	1.47%	±5
		848.8	54.95	21.15	1.00	55.16	0.99	-0.38%	1.16%	±5
2017/4/25	Body 900	826.4	55.18	21.24	0.97	55.24	0.97	-0.10%	0.58%	±5
		836.6	55.08	21.20	0.99	55.20	0.97	-0.22%	1.47%	±5
		846.6	54.99	21.16	1.00	55.17	0.98	-0.32%	1.19%	±5
2017/4/27	Body 750	782	52.81	22.86	0.99	55.41	0.97	-4.69%	2.82%	±5
2017/4/28	Body 750	709	57.12	23.25	0.92	55.69	0.96	2.57%	-4.63%	±5
		710	57.12	23.25	0.92	55.69	0.96	2.57%	-4.51%	±5
		711	57.12	23.25	0.92	55.68	0.96	2.58%	-4.38%	±5
2017/5/2	Body 2450	2412	51.18	13.89	1.86	52.75	1.91	-2.98%	-2.72%	±5
		2437	51.11	14.01	1.90	52.72	1.94	-3.04%	-2.11%	±5
		2442	51.10	14.02	1.90	52.71	1.94	-3.05%	-2.05%	±5
		2450	51.08	14.05	1.91	52.70	1.95	-3.07%	-1.90%	±5
		2462	51.05	14.11	1.93	52.68	1.97	-3.10%	-1.91%	±5
		2472	51.02	14.14	1.94	52.67	1.98	-3.13%	-1.95%	±5
2017/5/3	Body 5000	5180	48.40	18.29	5.26	49.02	5.28	-1.26%	-0.25%	±5
		5200	48.39	18.24	5.27	49.00	5.30	-1.25%	-0.59%	±5
		5220	48.38	18.20	5.28	48.98	5.32	-1.22%	-0.87%	±5
		5240	48.36	18.26	5.32	48.96	5.35	-1.23%	-0.62%	±5
		5260	48.28	18.34	5.36	48.94	5.37	-1.35%	-0.23%	±5
		5280	48.27	18.40	5.40	48.92	5.40	-1.32%	0.04%	±5
		5300	48.22	18.36	5.41	48.90	5.42	-1.38%	-0.27%	±5
		5320	48.18	18.29	5.41	48.86	5.44	-1.38%	-0.65%	±5
		5500	47.87	18.62	5.69	48.60	5.65	-1.50%	0.72%	±5
		5520	47.87	18.53	5.68	48.58	5.67	-1.47%	0.16%	±5
		5540	47.81	18.41	5.67	48.56	5.70	-1.54%	-0.54%	±5
		5560	47.71	18.42	5.69	48.54	5.72	-1.70%	-0.59%	±5
		5580	47.64	18.56	5.75	48.52	5.75	-1.81%	0.14%	±5
		5600	47.64	18.67	5.81	48.50	5.77	-1.78%	0.67%	±5
		5620	47.69	18.68	5.83	48.46	5.79	-1.59%	0.70%	±5
		5640	47.65	18.55	5.81	48.42	5.81	-1.60%	-0.01%	±5
		5660	47.58	18.48	5.81	48.38	5.84	-1.64%	-0.41%	±5
		5680	47.46	18.56	5.86	48.34	5.86	-1.81%	-0.03%	±5
		5700	47.42	18.72	5.93	48.30	5.88	-1.81%	0.83%	±5
		5745	47.47	18.63	5.95	48.26	5.93	-1.63%	0.20%	±5
		5765	47.41	18.55	5.94	48.24	5.96	-1.72%	-0.29%	±5
		5785	47.30	18.64	5.99	48.22	5.98	-1.91%	0.15%	±5
		5805	47.26	18.75	6.05	48.19	6.01	-1.94%	0.70%	±5
		5825	47.27	18.84	6.10	48.15	6.03	-1.82%	1.09%	±5

Date	Band	Freq(MHz)	Measured			Standard		Δ		Limit (%)
			e' (εr)	e''	σ	e' (εr)	σ	e' (εr)	σ	
2017/5/4	Body 1900	1855	51.05	14.52	1.50	53.30	1.52	-4.22%	-1.53%	±5
		1880	51.00	14.63	1.53	53.30	1.52	-4.32%	0.55%	±5
		1905	50.98	14.67	1.55	53.30	1.52	-4.34%	2.12%	±5
2017/5/5	Body 1900	1850.2	54.31	14.72	1.51	53.30	1.52	1.90%	-0.48%	±5
		1880	54.43	14.57	1.52	53.30	1.52	2.13%	0.08%	±5
		1909.8	54.07	14.62	1.55	53.30	1.52	1.44%	2.02%	±5
2017/5/5	Body 1900	1852.4	54.34	14.72	1.51	53.30	1.52	1.96%	-0.37%	±5
		1880	54.43	14.57	1.52	53.30	1.52	2.13%	0.08%	±5
		1907.6	54.11	14.59	1.55	53.30	1.52	1.52%	1.73%	±5
2017/5/8	Body 1800	1712.4	51.27	15.60	1.48	53.53	1.46	-4.22%	1.32%	±5
		1732.4	51.11	15.66	1.51	53.48	1.48	-4.43%	2.06%	±5
		1752.6	51.06	15.76	1.53	53.43	1.49	-4.43%	3.02%	±5
2017/5/8	Body 1800	1715	51.25	15.60	1.49	53.52	1.47	-4.24%	1.35%	±5
		1732.5	51.17	15.62	1.50	53.48	1.48	-4.32%	1.80%	±5
		1750	51.10	15.68	1.52	53.43	1.49	-4.37%	2.40%	±5

## 14 Measurement Uncertainty

According to KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz section 2.8.2, SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is  $\geq 1.5$  W/kg for 1-g SAR, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

## 15 System Performance Check

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications. The system performance check results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

### System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm
- The DASY5 system with E-field probe EX3DV4 SN:3665 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15 mm (below 1 GHz) and 10 mm (above 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 10mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube integration ( $dx=dy= 5$  mm,  $dz= 5$  mm).
- Distance between probe sensors and phantom surface was set to 3.0 mm.
- The dipole input power (forward power) was  $100$  mW $\pm 3\%$ .
- The results are normalized to 1 W input power.

### Reference SAR Values for System Performance Check

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1020	2017/01/18	750	1g	8.43	8.67
				10g	5.47	5.66
D835V2	4d015	2017/03/21	835	1g	9.45	9.75
				10g	6.18	6.39
D1750V2	1158	2016/12/07	1800	1g	36.3	36.4
				10g	19.2	19.5
D1900V2	5d056	2017/02/17	1900	1g	39.9	40.2
				10g	20.7	21.1
D2450V2	728	2016/05/24	2450	1g	50.5	50.3
				10g	23.7	23.7
D5GHzV2	1004	2016/11/18	5300	1g	84.6	79.0
				10g	24.2	22.2
D5GHzV2	1004	2016/11/18	5600	1g	84.0	78.7
				10g	23.9	22.0
D5GHzV2	1004	2016/11/18	5800	1g	79.1	75.4
				10g	22.5	20.8

## 15.1 System Performance Check Results

Date	System Dipole			Parameters	Target	Measured	Deviation[%]	Limited[%]
	Type	Serial No.	Liquid					
2017/4/24	D835V2	4d015	Body	1g SAR:	9.75	9.49	-2.67	± 5
				10g SAR:	6.39	6.28	-1.72	± 5
2017/4/25	D835V2	4d015	Body	1g SAR:	9.75	9.47	-2.87	± 5
				10g SAR:	6.39	6.27	-1.88	± 5
2017/4/27	D750V3	1020	Body	1g SAR:	8.67	8.80	1.50	± 5
				10g SAR:	5.66	5.82	2.83	± 5
2017/4/28	D750V3	1020	Body	1g SAR:	8.67	8.74	0.81	± 5
				10g SAR:	5.66	5.78	2.12	± 5
2017/5/2	D2450V2	728	Body	1g SAR:	50.30	49.70	-1.19	± 5
				10g SAR:	23.70	23.20	-2.11	± 5
2017/5/3	D5GHzV2 (5.3GHz)	1004	Body	1g SAR:	79.00	78.60	-0.51	± 5
				10g SAR:	22.20	22.30	0.45	± 5
2017/5/3	D5GHzV2 (5.6GHz)	1004	Body	1g SAR:	78.70	76.60	-2.67	± 5
				10g SAR:	22.00	21.70	-1.36	± 5
2017/5/3	D5GHzV2 (5.8GHz)	1004	Body	1g SAR:	75.40	75.30	-0.13	± 5
				10g SAR:	20.80	21.40	2.88	± 5
2017/5/4	D1900V2	5d056	Body	1g SAR:	40.20	39.70	-1.24	± 5
				10g SAR:	21.10	20.40	-3.32	± 5
2017/5/5	D1900V2	5d056	Body	1g SAR:	40.20	39.60	-1.49	± 5
				10g SAR:	21.10	21.00	-0.47	± 5
2017/5/8	D1750V2	1158	Body	1g SAR:	36.40	37.50	3.02	± 5
				10g SAR:	19.50	19.70	1.03	± 5

## 16 SAR Measurements Results

### GPRS 850

Power back off (On/Off)	Mode	Slot	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Fram Power (dBm)		Meas 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
							Tune up limit	Measured				
On	GPRS 850	2	Edge1	190	836.6	0	23.0	23.0	0.339	0.339		
		2	Edge4	190	836.6	0	23.0	23.0	1.190	1.190		1
		2	Edge4	128	824.2	0	23.0	22.9	1.120	1.146	1	
		2	Edge4	251	848.8	0	23.0	22.9	1.130	1.156	1	
		2	Rear	190	836.6	0	23.0	23.0	0.832	0.832		
		2	Rear	128	824.2	0	23.0	22.9	0.671	0.687	1	
		2	Edge4	190	836.6	0	23.0	23.0	1.140	1.140	2	
Off		2	Edge1	190	836.6	9	26.5	25.9	0.173	0.199		
		2	Edge3	190	836.6	9	26.5	25.9	0.055	0.063		
		2	Edge4	190	836.6	9	26.5	25.9	0.741	0.851		
		2	Rear	190	836.6	9	26.5	25.9	0.987	1.133		
		2	Rear	128	824.2	9	26.5	25.9	0.826	0.948		
		2	Rear	251	848.8	9	26.5	25.8	0.727	0.854	1	

#### Note(s):

1. Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position.
2. Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r01)
  - 2.1 Original SAR = 1.190 W/kg, therefore two times repeat SAR is required.
  - 2.2 Repeat SAR = 1.140 W/kg  $< 1.45$  W/kg
  - 2.3 SAR variation = 4.2 %  $< 20\%$

## GPRS 1900

Power back off (On/Off)	Mode	Slot	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Fram Power (dBm)		Meas 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
							Tune up limit	Measured				
On	GPRS 1900	2	Edge1	661	1880.0	0	20.0	20.0	0.135	0.135		
		2	Edge3	661	1880.0	0	20.0	20.0	0.294	0.294		
		2	Edge4	661	1880.0	0	20.0	20.0	0.384	0.384		
		2	Rear	661	1880.0	0	20.0	20.0	1.050	1.050		2
		2	Rear	512	1860.0	0	20.0	19.9	0.914	0.935	1	
		2	Rear	810	1900.0	0	20.0	19.7	0.869	0.931	1	
		2	Rear	661	1880.0	0	20.0	20.0	0.931	0.931	2	
		2	Edge1	661	1880.0	9	23.0	23.0	0.075	0.075		
Off		2	Edge3	661	1880.0	9	23.0	23.0	0.097	0.480		
		2	Edge4	661	1880.0	9	23.0	23.0	0.480	0.480		
		2	Rear	661	1880.0	9	23.0	23.0	0.371	0.371		

## Note(s):

1. Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position.
2. Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are < 1.45 W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r01)
  - 2.1 Original SAR = 1.050 W/kg, therefore two times repeat SAR is required.
  - 2.2 Repeat SAR = 0.931 W/kg < 1.45W/kg
  - 2.3 SAR variation= 11.33 % < 20%

## CDMA BC0:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Fram Power (dBm)		Meas 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
						Tune up limit	Measured				
On	QPSK	Edge 1	1013	824.7	0	21.0	20.8	0.236	0.247		
		Edge 4	1013	824.7	0	21.0	20.8	0.660	0.691		
		Rear	1013	824.7	0	21.0	20.8	0.791	0.828		3
		Rear	384	836.5	0	21.0	20.6	0.677	0.742	1	
		Rear	777	843.3	0	21.0	20.7	0.686	0.735	1	
Off	QPSK	Edge 1	1013	824.7	9	25.0	24.8	0.078	0.082		
		Edge 3	1013	824.7	9	25.0	24.8	0.070	0.073		
		Edge 4	1013	824.7	9	25.0	24.8	0.660	0.691		
		Rear	1013	824.7	9	25.0	24.8	0.648	0.679		

## Note(s):

- Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position.

## CDMA BC1:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Fram Power (dBm)		Meas 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
						Tune up limit	Measured				
On	QPSK	Edge 1	600	1880.0	0	20.0	19.6	0.076	0.083		
		Edge 3	600	1880.0	0	20.0	19.6	0.134	0.147		
		Edge 4	600	1880.0	0	20.0	19.6	0.893	0.979		
		Edge 4	25	1851.3	0	20.0	19.5	0.806	0.904	1	
		Edge 4	1175	1908.8	0	20.0	19.5	0.595	0.668	1	
		Rear	600	1880.0	0	20.0	19.6	1.030	1.129		4
		Rear	25	1851.3	0	20.0	19.5	0.915	1.027	1	
		Rear	1175	1908.8	0	20.0	19.5	0.978	1.097	1	
		Rear	600	1880.0	0	20.0	19.6	1.030	1.129	2	
		Edge 1	600	1880.0	9	25.0	24.6	0.048	0.052		
Off	QPSK	Edge 3	600	1880.0	9	25.0	24.6	0.048	0.053		
		Edge 4	600	1880.0	9	25.0	24.6	0.695	0.762		
		Rear	600	1880.0	9	25.0	24.6	0.685	0.751		

## Note(s):

- Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position.
- Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are < 1.45 W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r01)
  - Original SAR = 1.030 W/kg, therefore two times repeat SAR is required.
  - Repeat SAR = 1.030 W/kg < 1.45W/kg
  - SAR variation= 0 % < 20%

## CDMA BC10:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Fram Power (dBm)		Meas 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
						Tune up limit	Measured				
On	QPSK	Edge 1	684	823.1	0	21.0	20.5	0.092	0.104		
		Edge 4	684	823.1	0	21.0	20.5	0.790	0.886		5
		Edge 4	476	817.9	0	21.0	20.4	0.784	0.900	1	
		Edge 4	580	820.5	0	21.0	20.4	0.777	0.892	1	
		Rear	684	823.1	0	21.0	20.5	0.641	0.719		
Off		Edge 1	684	823.1	9	25.0	24.1	0.070	0.086		
		Edge 3	684	823.1	9	25.0	24.1	0.022	0.027		
		Edge 4	684	823.1	9	25.0	24.1	0.297	0.365		
		Rear	684	823.1	9	25.0	24.1	0.314	0.386		

## Note(s):

1. Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position.

## WCDMA Band II:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
						Tune up limit	Measured				
On	Rel 99 RMC 12.2Kbps	Edge 1	9400	1880.0	0	20.0	19.8	0.053	0.055		
		Edge 3	9400	1880.0	0	20.0	19.8	0.176	0.184		
		Edge 4	9400	1880.0	0	20.0	19.8	0.901	0.943		
		Edge 4	9262	1852.4	0	20.0	19.7	0.859	0.920	1	
		Edge 4	9538	1907.6	0	20.0	19.3	0.666	0.782	1	
		Rear	9400	1880.0	0	20.0	19.8	1.000	1.047		6
		Rear	9262	1852.4	0	20.0	19.7	0.975	1.045	1	
		Rear	9538	1907.6	0	20.0	19.3	0.769	0.903	1	
		Rear	9400	1880.0	0	20.0	19.8	0.982	1.028	2	
Off	Rel 99 RMC 12.2Kbps	Edge 1	9400	1880.0	9	24.0	23.0	0.061	0.077		
		Edge 3	9400	1880.0	9	24.0	23.0	0.093	0.117		
		Edge 4	9400	1880.0	9	24.0	23.0	0.409	0.515		
		Rear	9400	1880.0	9	24.0	23.0	0.492	0.619		

## Note(s):

1. Testing of other required channels within the operating mode of a frequency band is required when the reported 1-g SAR for the mid-band or highest output power channel.  $\geq 0.8$  W/kg and transmission band  $\leq 100$  MHz (Per KDB 447498 D01 v06)
2. Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - 2.1 Original SAR = 1.000 W/kg, therefore two times repeat SAR is required.
  - 2.2 Repeat SAR = 0.982 W/kg  $< 1.45$  W/kg
  - 2.3 SAR variation = 1.8%  $< 20\%$

## WCDMA Band IV:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot
						Tune up limit	Measured				
On	Rel 99 RMC 12.2Kbps	Edge 1	1312	1712.4	0	20.0	19.9	0.109	0.112		
		Edge 3	1312	1712.4	0	20.0	19.9	0.353	0.361		
		Edge 4	1312	1712.4	0	20.0	19.9	0.700	0.716		
		Rear	1312	1712.4	0	20.0	19.9	0.999	1.022		
		Rear	1413	1732.6	0	20.0	19.8	0.994	1.041	1	7
		Rear	1513	1752.6	0	20.0	19.8	0.973	1.019	1	
		Rear	1312	1712.4	0	20.0	19.9	0.987	1.010	2	
Off	Rel 99 RMC 12.2Kbps	Edge 1	1312	1712.4	9	24.0	23.2	0.058	0.070		
		Edge 3	1312	1712.4	9	24.0	23.2	0.162	0.195		
		Edge 4	1312	1712.4	9	24.0	23.2	0.355	0.427		
		Rear	1312	1712.4	9	24.0	23.2	0.535	0.643		

## Note(s):

1. Testing of other required channels within the operating mode of a frequency band is required when the reported 1-g SAR for the mid-band or highest output power channel.  $\geq 0.8$  W/kg and transmission band  $\leq 100$  MHz (Per KDB 447498 D01 v06)
2. Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - 2.1 Original SAR = 0.999 W/kg, therefore two times repeat SAR is required.
  - 2.2 Repeat SAR = 0.987/kg  $< 1.45$  W/kg
  - 2.3 SAR variation = 1.2%  $< 20\%$

## WCDMA Band V:

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot
						Tune up limit	Measured				
On	Rel 99 RMC 12.2Kbps	Edge 1	4182	836.6	0	21.0	20.4	0.194	0.223		
		Edge 4	4182	836.6	0	21.0	20.4	0.626	0.719		
		Rear	4182	836.6	0	21.0	20.4	0.499	0.573		
Off	Rel 99 RMC 12.2Kbps	Edge 1	4182	836.6	9	24.0	23.0	0.097	0.121		
		Edge 3	4182	836.6	9	24.0	23.0	0.040	0.050		
		Edge 4	4182	836.6	9	24.0	23.0	0.743	0.935		
		Edge 4	4132	826.4	9	24.0	23.0	0.741	0.933	1	
		Edge 4	4233	846.6	9	24.0	22.9	0.741	0.955	1	8
		Rear	4182	836.6	9	24.0	23.0	0.598	0.753		

## Note(s):

1. Testing of other required channels within the operating mode of a frequency band is required when the reported 1-g SAR for the mid-band or highest output power channel.  $\geq 0.8$  W/kg and transmission band  $\leq 100$  MHz (Per KDB 447498 D01 v06)

## LTE Band 2 (20MHz Bandwidth):

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	UL RB Allocation	UL RB Start	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot
								Tune up limit	Measured				
On	QPSK	Edge1	18900	1880.0	0	1	0	20.0	19.8	0.129	0.135	1	
			18900	1880.0	0	50	0	19.0	18.9	0.097	0.099	1	
		Edge3	18900	1880.0	0	1	0	20.0	19.8	0.280	0.293	1	
			18900	1880.0	0	50	0	19.0	18.9	0.213	0.218	1	
		Edge4	18900	1880.0	0	1	0	20.0	19.8	0.957	1.002		
			18900	1880.0	0	1	49	20.0	19.8	0.936	0.980	2	
			18900	1880.0	0	1	99	20.0	19.6	0.874	0.958	2	
			18900	1880.0	0	50	0	19.0	18.9	0.918	0.939		
			18900	1880.0	0	50	24	19.0	18.8	0.893	0.935	2	
			18900	1880.0	0	50	49	19.0	18.7	0.873	0.935	2	
			18900	1880.0	0	100	0	19.0	18.8	0.895	0.937	2	
			18700	1860.0	0	1	0	20.0	19.7	0.926	0.992	2	
			18700	1860.0	0	50	0	19.0	18.8	0.883	0.925	2	
			19100	1900.0	0	1	0	20.0	19.7	0.863	0.925	2	
			19100	1900.0	0	50	0	19.0	18.7	0.767	0.822	2	
		Rear	18900	1880.0	0	1	0	20.0	19.8	1.060	1.110		9
			18900	1880.0	0	1	49	20.0	19.8	1.040	1.089	2	
			18900	1880.0	0	1	99	20.0	19.6	0.993	1.089	2	
			18900	1880.0	0	50	0	19.0	18.9	0.997	1.020		
			18900	1880.0	0	50	24	19.0	18.8	0.986	1.032	2	
			18900	1880.0	0	50	49	19.0	18.7	0.959	1.028	2	
			18900	1880.0	0	100	0	19.0	18.8	0.975	1.021	2	
			18700	1860.0	0	1	0	20.0	19.7	1.010	1.082	2	
			18700	1860.0	0	50	0	19.0	18.8	0.989	1.036	2	
			19100	1900.0	0	1	0	20.0	19.7	0.994	1.065	2	
			19100	1900.0	0	50	0	19.0	18.7	0.956	1.024	2	
			18900	1880.0	0	1	0	20.0	19.8	1.050	1.099	3	
Off	QPSK	Edge1	18900	1880.0	9	1	0	24.0	23.3	0.067	0.078	1	
			18900	1880.0	9	50	0	23.0	22.4	0.052	0.060	1	
		Edge3	18900	1880.0	9	1	0	24.0	23.3	0.109	0.128		
			18900	1880.0	9	50	0	23.0	22.4	0.080	0.092		
		Edge4	18900	1880.0	9	1	0	24.0	23.3	0.654	0.768	1	
			18900	1880.0	9	50	0	23.0	22.4	0.631	0.724	1	
		Rear	18900	1880.0	9	1	0	24.0	23.3	0.583	0.685	1	
			18900	1880.0	9	50	0	23.0	22.4	0.420	0.482	1	

## Note(s):

- When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. (Per KDB 941225 D05 v02r05)
- The highest reported SAR for 1 RB and 50% RB allocation are  $\geq 0.8$  W/kg, SAR is required of 100% RB. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg. (Per KDB 941225 D05 v02r05)
- Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - Original SAR = 1.060 W/kg, therefore two times repeat SAR is required.
  - Repeat SAR = 1.050 W/kg  $< 1.45$  W/kg
  - SAR variation = 0.94 %  $< 20\%$

## LTE Band 4 (20MHz Bandwidth):

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	UL RB Allocation	UL RB Start	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plots
								Tune up limit	Measured				
On	QPSK	Edge1	20175	1732.5	0	1	0	20.0	19.8	0.128	0.134	1	
			20175	1732.5	0	50	0	19.0	18.9	0.115	0.118	1	
		Edge3	20175	1732.5	0	1	0	20.0	19.8	0.156	0.163	1	
			20175	1732.5	0	50	0	19.0	18.9	0.135	0.138	1	
		Edge4	20175	1732.5	0	1	0	20.0	19.8	0.772	0.808	1	
			20175	1732.5	0	50	0	19.0	18.9	0.743	0.760	1	
		Rear	20175	1732.5	0	1	0	20.0	19.8	1.020	1.068		10
			20175	1732.5	0	1	49	20.0	19.8	0.985	1.031	2	
			20175	1732.5	0	1	99	20.0	19.8	0.998	1.045	2	
			20175	1732.5	0	50	0	19.0	18.9	0.966	0.989		
			20175	1732.5	0	50	24	19.0	18.8	0.944	0.988	2	
			20175	1732.5	0	50	49	19.0	18.8	0.948	0.993	2	
			20175	1732.5	0	100	0	19.0	18.9	0.964	0.986	2	
			20050	1720.0	0	1	0	20.0	19.8	0.998	1.045	2	
			20050	1720.0	0	50	0	19.0	18.8	0.947	0.992	2	
			20300	1745.0	0	1	0	20.0	19.8	1.020	1.068	2	
			20300	1745.0	0	50	0	19.0	18.9	0.961	0.983	2	
			20175	1732.5	0	1	0	20.0	19.8	1.010	0.983	3	
Off	QPSK	Edge1	20175	1732.5	9	1	0	24.0	23.2	0.072	0.086	1	
			20175	1732.5	9	50	0	23.0	22.3	0.051	0.060	1	
		Edge3	20175	1732.5	9	1	0	24.0	23.2	0.053	0.064	1	
			20175	1732.5	9	50	0	23.0	22.3	0.048	0.056	1	
		Edge4	20175	1732.5	9	1	0	24.0	23.2	0.499	0.600	1	
			20175	1732.5	9	50	0	23.0	22.3	0.401	0.471	1	
		Rear	20175	1732.5	9	1	0	24.0	23.2	0.459	0.552	1	
		20175	1732.5	9	50	0	23.0	22.3	0.357	0.419	1		

## Note(s):

1. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. (Per KDB 941225 D05 v02r05)
2. The highest reported SAR for 1 RB and 50% RB allocation are  $\geq 0.8$  W/kg, SAR is required of 100% RB. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg. (Per KDB 941225 D05 v02r05)
3. Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg. If the measured SAR values are  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - 3.1 Original SAR = 1.020 W/kg, therefore two times repeat SAR is required.
  - 3.2 Repeat SAR = 1.010 W/kg  $< 1.45$  W/kg
  - 3.3 SAR variation =  $0.98\% < 20\%$

**LTE Band 5 (10MHz Bandwidth):**

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	UL RB Allocation	UL RB Start	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
								Tune up limit	Measured				
On	QPSK	Edge1	20525	836.5	0	1	0	21.0	20.6	0.216	0.237	1	
			20525	836.5	0	25	0	20.0	19.7	0.174	0.186	1	
		Edge4	20525	836.5	0	1	0	21.0	20.6	0.665	0.729	1	11
			20525	836.5	0	25	0	20.0	19.7	0.566	0.606	1	
			20450	829.0	0	1	0	21.0	20.5	0.569	0.638	2	
			20600	844.0	0	1	0	21.0	20.4	0.606	0.696	2	
		Rear	20525	836.5	0	1	0	21.0	20.6	0.472	0.518	1	
			20525	836.5	0	25	0	20.0	19.7	0.444	0.476	1	
Off	QPSK	Edge1	20525	836.5	9	1	0	24.0	23.1	0.077	0.094	1	
			20525	836.5	9	25	0	23.0	22.2	0.062	0.075	1	
		Edge3	20525	836.5	9	1	0	24.0	23.1	0.025	0.031	1	
			20525	836.5	9	25	0	23.0	22.2	0.019	0.023	1	
		Edge4	20525	836.5	9	1	0	24.0	23.1	0.366	0.450	1	
			20525	836.5	9	25	0	23.0	22.2	0.280	0.337	1	
		Rear	20525	836.5	9	1	0	24.0	23.1	0.477	0.587	1	
			20525	836.5	9	25	0	23.0	22.2	0.367	0.441	1	

**Note(s):**

1. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. (Per KDB 941225 D05 v02r05)
2. According to Notice 2016-DRS001, based on the IEEE 1528 and IEC 62209 requirements, the high, mid and low channels for the configuration with the highest SAR value must be tested regardless of the SAR value measured.

## LTE Band 13 (10MHz Bandwidth):

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	UL RB Allocation	UL RB Start	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
								Tune up limit	Measured				
On	QPSK	Edge1	23230	782.0	0	1	0	20.0	19.6	0.078	0.086	1	
			23230	782.0	0	25	0	19.0	18.6	0.073	0.079	1	
		Edge4	23230	782.0	0	1	0	20.0	19.6	0.658	0.721	1	
			23230	782.0	0	25	0	19.0	18.6	0.625	0.685	1	
		Rear	23230	782.0	0	1	0	20.0	19.6	0.571	0.626	1	
			23230	782.0	0	25	0	19.0	18.6	0.564	0.618	1	
		Edge1	23230	782.0	9	1	0	24.0	23.2	0.030	0.037	1	
			23230	782.0	9	25	0	23.0	22.2	0.026	0.031	1	
		Edge3	23230	782.0	9	1	0	24.0	23.2	0.024	0.029	1	
			23230	782.0	9	25	0	23.0	22.2	0.019	0.023	1	
Off	QPSK	Edge4	23230	782.0	9	1	0	24.0	23.2	0.444	0.534	1	
			23230	782.0	9	25	0	23.0	22.2	0.334	0.402	1	
		Rear	23230	782.0	9	1	0	24.0	23.2	0.634	0.762	1	12
			23230	782.0	9	25	0	23.0	22.2	0.519	0.624	1	

## Note(s):

1. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. (Per KDB 941225 D05 v02r05)
2. The highest reported SAR for 1 RB and 50% RB allocation are  $\geq 0.8$  W/kg, SAR is required of 100% RB. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg. (Per KDB 941225 D05 v02r05)

## LTE Band 17 (10MHz Bandwidth):

Power back off (On/Off)	Mode	Test Position	Channel	Freq. (MHz)	Dist. (mm)	UL RB Allocation	UL RB Start	Power (dBm)		Measured 1g SAR (W/kg)	Reported SAR(W/kg)	Note	Plot.
								Tune up limit	Measured				
On	QPSK	Edge1	23790	710.0	0	1	0	20.0	19.8	0.071	0.074	1	
			23790	710.0	0	25	0	19.0	18.8	0.066	0.069	1	
		Edge4	23790	710.0	0	1	0	20.0	19.8	0.755	0.791	1	13
			23790	710.0	0	25	0	19.0	18.8	0.520	0.545	1	
			23780	709.0	0	1	0	20.0	19.4	0.417	0.479	2	
			23800	711.0	0	1	0	20.0	19.5	0.436	0.489	2	
		Rear	23790	710.0	0	1	0	20.0	19.8	0.665	0.696	1	
			23790	710.0	0	25	0	19.0	18.8	0.651	0.682	1	
Off	QPSK	Edge1	23790	710.0	9	1	0	24.0	23.1	0.053	0.066	1	
			23790	710.0	9	25	0	23.0	22.1	0.046	0.056	1	
		Edge3	23790	710.0	9	1	0	24.0	23.1	0.015	0.018	1	
			23790	710.0	9	25	0	23.0	22.1	0.013	0.016	1	
		Edge4	23790	710.0	9	1	0	24.0	23.1	0.331	0.407	1	
			23790	710.0	9	25	0	23.0	22.1	0.281	0.346	1	
		Rear	23790	710.0	9	1	0	24.0	23.1	0.374	0.460	1	
			23790	710.0	9	25	0	23.0	22.1	0.317	0.390	1	

## Note(s):

1. When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. (Per KDB 941225 D05 v02r05)
2. According to Notice 2016-DRS001, based on the IEEE 1528 and IEC 62209 requirements, the high, mid and low channels for the configuration with the highest SAR value must be tested regardless of the SAR value measured.

**Wi-Fi (2.4GHz Band):**

Band (GHz)	Mode	Dist. (mm)	Test Position	Ch#	Freq. (MHz)	Chain	Power (dBm)		Area Scan 1g SAR (W/kg)	Zoom Scan 1g SAR (W/kg)	Reported SAR (W/kg)	Note	Plot No.
							Tune up limit	Meas.					
2.4GHz	802.11b	0	Edge 1	6	2437	Main	18.5	18.4	0.871	0.849	0.869		
		0	Rear	6	2437	Main	18.5	18.4	0.641	0.575	0.588	1	
		0	Edge 1	1	2412	Main	18.5	18.0	0.809	0.798	0.895	2	14
		0	Edge 1	11	2462	Main	18.5	17.6	0.660	0.697	0.857	2	
		0	Edge 1	6	2437	Main	18.5	18.4	0.828	0.819	0.838	3	

**Note(s):**

1. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR  $\leq$  0.8 W/kg was reported.
2. Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position
3. Repeated measurements are required only when the measured SAR is  $\geq$  0.80 W/kg. If the measured SAR values are < 1.45 W/kg with  $\leq$  20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - 3.1 Original SAR = 0.849 W/kg, therefore second times repeat SAR is required.
  - 3.2 Repeat SAR = 0.819 W/kg < 1.45W/kg
  - 3.3 SAR variation= 3.53% < 20%

## Wi-Fi (5GHz Band):

Test Mode	Band (GHz)	Mode	Dist. (mm)	Test Position	Ch#	Freq. (MHz)	Chain	Power (dBm)		Area Scan 1g SAR (W/Kg)	Zoom Scan 1g SAR (W/kg)	Reported SAR (W/kg)	Note	Plot No.	
								Tune up limit	Meas.						
NB	5.2 (U-NII-1)	802.11a	0	Edge 1	48	5240	Main	16.0	15.8	0.967	1.040	1.089			
			0	Rear	48	5240	Main	16.0	15.8	0.544	0.519	0.543	1		
			0	Edge 1	64	5320	Main	16.0	15.5	1.040	0.838	0.940	2		
			0	Edge 1	48	5240	Main	16.0	15.8	1.010	0.987	1.034	3		
	5.5 (U-NII-2C)		0	Edge 1	100	5500	Main	17.0	16.7	0.924	1.040	1.114			
			0	Rear	100	5500	Main	17.0	16.7	0.998	0.953	1.021	1		
			0	Edge 1	116	5580	Main	17.0	16.5	0.926	1.040	1.167	2	15	
			0	Edge 1	149	5745	Main	16.0	15.9	0.977	1.020	1.044			
	5.8 (U-NII-3)		0	Rear	149	5745	Main	16.0	15.9	0.874	0.934	0.956	1		
			0	Edge 1	165	5825	Main	16.0	15.7	0.975	0.929	0.995	2		

## Note(s):

1. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in this exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
2. Highest reported SAR is > 0.8 W/kg. Added second highest power channel for this test position
3. Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR values are < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. (Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04)
  - 3.4 Original SAR = 1.040 W/kg, therefore second times repeat SAR is required.
  - 3.5 Repeat SAR = 0.987 W/kg < 1.45W/kg
  - 3.6 SAR variation= 5.1% < 20%

## 17 Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance v06, introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / R_i$$

Where:

**SAR<sub>1</sub>** is the highest Reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

**SAR<sub>2</sub>** is the highest Reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

**R<sub>i</sub>** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of  $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

A new threshold of 0.04 is also introduced in the KDB. Thus, in order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR  $> 1.6$  W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / R_i \leq 0.04$$

## 17.1 Estimated SAR for Simultaneous Transmission SAR Analysis

### Considerations for SAR estimation

1. When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
2. Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
  - When the separation distance from the antenna to an adjacent edge is  $\leq 5$  mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
  - When the separation distance from the antenna to an adjacent edge is  $> 5$  mm but  $\leq 50$  mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
  - When the minimum test separation distance is  $> 50$  mm, the estimated SAR value is 0.4 W/kg

### 17.1.1 Estimated SAR for Bluetooth

According to section 11, the Bluetooth must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f_{GHz}}/x] \text{ W/kg}$  for test separation distances  $\leq 50$  mm; where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is  $> 50$  mm.

Antenna	Band	Frequency (MHz)	Output Power		Separation Distances(mm)					Estimated 1-g SAR (W/Kg)				
			dBm	mW	Rear	Edge1	Edge2	Edge3	Edge4	Rear	Edge1	Edge2	Edge3	Edge4
Bluetooth	2.4GHz	2440	0.0	1	4.40	8.00	93.50	129.00	121.50	0.047	0.026	0.400	0.400	0.400

## 17.2 Sum of the SAR for Simultaneous Transmission Analysis

### 17.2.1 Sum of the SAR for WLAN & WWAN

GRPS 850+WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	GPRS 850	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.133	0.588	0.047	1.021	1.721	1.180	2.154	Yes
Edge 1	0.339	0.895	0.026	1.167	1.234	0.921	1.506	No

Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

GRPS 1900+WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	GPRS 1900	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.050	0.588	0.047	1.021	1.638	1.097	2.071	Yes
Edge 1	0.135	0.895	0.026	1.167	1.030	0.921	1.302	No

Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

CDMA BC0+WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	CDMA BC0	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.828	0.588	0.047	1.021	1.416	0.875	1.849	Yes
Edge 1	0.247	0.895	0.026	1.167	1.142	0.921	1.414	No

Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

CDMA BC1+WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	CDMA BC1	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.129	0.588	0.047	1.021	1.717	1.176	2.150	Yes
Edge 1	0.083	0.895	0.026	1.167	0.978	0.921	1.250	No

Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## CDMA BC10+WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	GPRS 1900	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.907	0.588	0.047	1.021	1.495	0.954	<b>1.928</b>	Yes
Edge 1	0.106	0.895	0.026	1.167	1.001	0.921	1.273	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## WCDMA Band II+ WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	WCDMA Band II	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.047	0.588	0.047	1.021	<b>1.635</b>	1.094	<b>2.068</b>	Yes
Edge 1	0.077	0.895	0.026	1.167	0.972	0.921	1.244	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## WCDMA Band IV+ WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	WCDMA Band IV	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.041	0.588	0.047	1.021	<b>1.629</b>	1.088	<b>2.062</b>	Yes
Edge 1	0.112	0.895	0.026	1.167	1.007	0.921	1.279	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## WCDMA Band V + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	WCDMA Band V	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.753	0.588	0.047	1.021	1.341	0.800	<b>1.774</b>	Yes
Edge 1	0.223	0.895	0.026	1.167	1.118	0.921	1.390	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## LTE Band 2 + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	LTE Band 2	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.110	0.588	0.047	1.021	<b>1.698</b>	1.157	<b>2.131</b>	Yes
Edge 1	0.135	0.895	0.026	1.167	1.030	0.921	1.302	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## LTE Band 4 + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	LTE Band 4	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	1.068	0.588	0.047	1.021	<b>1.656</b>	1.115	<b>2.089</b>	Yes
Edge 1	0.134	0.895	0.026	1.167	1.029	0.921	1.301	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## LTE Band 7 + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	LTE Band 7	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.587	0.588	0.047	1.021	1.175	0.634	<b>1.608</b>	Yes
Edge 1	0.237	0.895	0.026	1.167	1.132	0.921	1.404	No

## Note(s):

As the Sum of the SAR is less than 1.6W/Kg, so SPLSR is not required.

## LTE Band 13 + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	LTE Band 13	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.762	0.588	0.047	1.021	1.350	0.809	<b>1.783</b>	Yes
Edge 1	0.086	0.895	0.026	1.167	0.981	0.921	1.253	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

## LTE Band 17 + WLAN

Test Position	Simultaneous Transmission Scenario				1+2 Summed 1g SAR(W/kg)	1+3 Summed 1g SAR(W/kg)	1+4 Summed 1g SAR(W/kg)	SPLSR (Yes/No)
	1	2	3	4				
	LTE Band 17	Wi-Fi Main 2.4 GHz Band	Bluetooth	Wi-Fi Main 5 GHz Band				
Rear	0.696	0.588	0.047	1.021	1.284	0.743	<b>1.717</b>	Yes
Edge 1	0.074	0.895	0.026	1.167	0.969	0.921	1.241	No

## Note(s):

As the Sum of the SAR is greater than 1.6W/Kg, so SPLSR is required.

### 17.2.2 Sum of the 1g SAR for Body Exposure Condition

#### GPRS 850 + 2.4GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	GPRS 850	Wi-Fi Main 2.4GHz Band				
Rear	1.133	0.588	1.721	12.40	0.02	1

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

#### GPRS 850 + 5GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	GPRS 850	Wi-Fi Main 5 GHz Band				
Rear	1.133	1.021	2.154	13.96	0.02	2

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

#### GPRS 1900 + 2.4GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	GPRS 1900	Wi-Fi Main 2.4 GHz Band				
Rear	1.050	0.588	1.638	12.97	0.02	3

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

#### GPRS 1900 + 5GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	GPRS 1900	Wi-Fi Main 5 GHz Band				
Rear	1.050	1.021	2.071	14.48	0.02	4

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

#### CDMA BC0+ 5GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	CDMA BC0	Wi-Fi Main 5 GHz Band				
Rear	0.828	1.021	1.849	13.73	0.02	5

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

#### CDMA BC1+ 2.4GHz Band

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	CDMA BC1	Wi-Fi Main 2.4 GHz Band				
Rear	1.129	0.588	1.717	12.59	0.02	6

#### Note(s):

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**CDMA BC1+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	CDMA BC1	Wi-Fi Main 5 GHz Band				
Rear	1.129	1.021	2.150	14.13	0.02	7

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**CDMA BC10+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	CDMA BC10	Wi-Fi Main 5 GHz Band				
Rear	0.907	1.021	1.928	6.89	0.04	8

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**WCDMA Band II+ 2.4GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	WCDMA Band II	Wi-Fi Main 2.4 GHz Band				
Rear	1.047	0.588	1.635	12.71	0.02	9

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**WCDMA Band II+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	WCDMA Band II	Wi-Fi Main 5 GHz Band				
Rear	1.047	1.021	2.068	14.24	0.02	10

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**WCDMA Band IV+ 2.4GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	WCDMA Band IV	Wi-Fi Main 5 GHz Band				
Rear	1.041	0.588	1.629	12.65	0.02	11

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**WCDMA Band IV+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	WCDMA Band IV	Wi-Fi Main 5 GHz Band				
Rear	1.041	1.021	2.062	14.18	0.02	12

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**WCDMA Band V+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	WCDMA Band V	Wi-Fi Main 5 GHz Band				
Rear	0.753	1.021	1.774	15.18	0.02	13

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 2+ 2.4GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 2	Wi-Fi Main 2.4 GHz Band				
Rear	1.110	0.588	1.698	12.59	0.02	14

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 2+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 2	Wi-Fi Main 5 GHz Band				
Rear	1.110	1.021	2.131	14.13	0.02	15

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 4+ 2.4GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 4	Wi-Fi Main 2.4 GHz Band				
Rear	1.068	0.588	1.656	12.57	0.02	16

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 4+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 4	Wi-Fi Main 5 GHz Band				
Rear	1.068	1.021	2.089	14.10	0.02	17

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 7+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 7	Wi-Fi Main 5 GHz Band				
Rear	0.587	1.021	1.608	15.01	0.01	18

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 13+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 13	Wi-Fi Main 5 GHz Band				
Rear	0.626	1.021	1.647	13.90	0.02	19

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

**LTE Band 17+ 5GHz Band**

Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/kg)	Calculated distance (cm)	SPLSR	Figure
	LTE Band 17	Wi-Fi Main 5 GHz Band				
Rear	0.696	1.021	1.717	14.06	0.02	20

**Note(s):**

The SPLSR is rounded to two decimal digits and  $\leq 0.04$

## 18 Equipment List & Calibration Status

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Cycle(year)	Calibration Due
Wireless Communication Test Set	Agilent	E5515C 8960	MY48361017	1	2017/08/31
Radio Communication Analyzer	Anritsu	MT8820C	620093800	1	2017/07/25
Wideband Radio communication Tester	R&S	CMW 500	116875	1	2018/04/24
S-Parameter Network Analyzer	Agilent	E5071C	MY46107234	1	2017/10/18
Electronic Probe kit	Hewlett Packard	85070D	N/A	N/A	N/A
Power Meter	Agilent	4416	GB41291611	1	2017/08/30
Power Sensor	Agilent	8481H	MY41091956	1	2017/08/30
Data Acquisition Electronics (DAE)	SPEAG	DAE4	877	1	2018/03/19
Dosimetric E-Field Probe	SPEAG	EX3DV4	3665	1	2017/05/25
750 MHz System Validation Dipole	SPEAG	D750V3	1020	1	2018/01/17
835 MHz System Validation Dipole	SPEAG	D835V2	4d015	1	2018/03/20
1750 MHz System Validation Dipole	SPEAG	D1750V2	1158	1	2017/10/06
1900 MHz System Validation Dipole	SPEAG	D1900V2	5d056	1	2018/02/16
2450 MHz System Validation Dipole	SPEAG	D2450V2	728	1	2017/05/23
5GHz System Validation Dipole	SPEAG	D5GHzV2	1004	1	2017/11/17
Robot	Staubli	RX90L	F02/5T69A1/A/01	N/A	N/A
Amplifier	Mini-Circuit	ZVE-8G	665500309	N/A	N/A
Amplifier	Mini-Circuit	ZHL-1724HLN	D072602#2	N/A	N/A
Thermometer	Comet	53120	12932714	1	2018/02/23

## 19 Facilities

All measurement facilities used to collect the measurement data are located at

- No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
- No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

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## 21 Attachments

Exhibit	Content
1	System Performance Check Plots
2	SAR Test Data Plots
3	SPLSR Plots
4	Calibration Data Report
5	T170406D14-SF PHOTOS

**END OF REPORT**