

**Measurement Certificate / Material Test**

Item Name **Head Tissue Simulating Liquid (HSL750V2)**  
 Product No. SL AAH 075 AA (Batch: 170612-4)  
 Manufacturer **SPEAG**

**Measurement Method**

TSL dielectric parameters measured using calibrated DAK probe.

**Setup Validation**

Validation results were within  $\pm 2.5\%$  towards the target values of Methanol.

**Target Parameters**

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

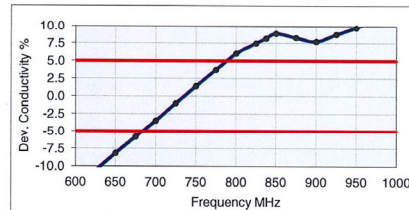
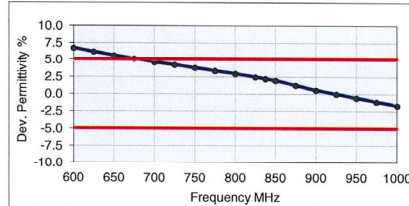
**Test Condition**

Ambient Environment temperatur ( $22 \pm 3^\circ\text{C}$  and humidity  $< 70\%$ ).  
 TSL Temperature  $22^\circ\text{C}$   
 Test Date 20-Jun-17  
 Operator CL

**Additional Information**

TSL Density  $1.284 \text{ g/cm}^3$   
 TSL Heat-capacity  $2.701 \text{ kJ/(kg}^\circ\text{K)}$

| f [MHz] | Measured |       |       | Target |       | Diff.to Target [%]  |                       |
|---------|----------|-------|-------|--------|-------|---------------------|-----------------------|
|         | e'       | e''   | sigma | eps    | sigma | $\Delta\text{-eps}$ | $\Delta\text{-sigma}$ |
| 600     | 45.6     | 22.97 | 0.77  | 42.7   | 0.88  | 6.7                 | -13.1                 |
| 625     | 45.2     | 22.73 | 0.79  | 42.6   | 0.88  | 6.2                 | -10.6                 |
| 650     | 44.9     | 22.49 | 0.81  | 42.5   | 0.89  | 5.6                 | -8.2                  |
| 675     | 44.5     | 22.27 | 0.84  | 42.3   | 0.89  | 5.1                 | -5.8                  |
| 700     | 44.2     | 22.05 | 0.86  | 42.2   | 0.89  | 4.6                 | -3.5                  |
| 725     | 43.8     | 21.88 | 0.88  | 42.1   | 0.89  | 4.2                 | -1.0                  |
| 750     | 43.5     | 21.72 | 0.91  | 41.9   | 0.89  | 3.8                 | 1.4                   |
| 775     | 43.2     | 21.55 | 0.93  | 41.8   | 0.90  | 3.4                 | 3.7                   |
| 800     | 42.9     | 21.38 | 0.95  | 41.7   | 0.90  | 2.9                 | 6.0                   |
| 825     | 42.6     | 21.24 | 0.97  | 41.6   | 0.91  | 2.4                 | 7.5                   |
| 838     | 42.5     | 21.17 | 0.99  | 41.5   | 0.91  | 2.2                 | 8.2                   |
| 850     | 42.3     | 21.09 | 1.00  | 41.5   | 0.92  | 2.0                 | 8.9                   |
| 875     | 42.0     | 20.98 | 1.02  | 41.5   | 0.94  | 1.2                 | 8.3                   |
| 900     | 41.7     | 20.87 | 1.05  | 41.5   | 0.97  | 0.5                 | 7.7                   |
| 925     | 41.5     | 20.76 | 1.07  | 41.5   | 0.98  | 0.0                 | 8.7                   |
| 950     | 41.2     | 20.64 | 1.09  | 41.4   | 0.99  | -0.6                | 9.7                   |
| 975     | 40.9     | 20.55 | 1.11  | 41.4   | 1.00  | -1.1                | 10.9                  |
| 1000    | 40.6     | 20.46 | 1.14  | 41.3   | 1.01  | -1.7                | 12.1                  |



**Figure D-3**  
**750MHz Head Tissue Equivalent Matter**

|                                    |                                                                                     |                       |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ720PS                  |  | SAR EVALUATION REPORT |  | Approved by:<br>Quality Manager |
| Test Dates:<br>04/21/19 - 05/15/19 | DUT Type:<br>Portable Handset                                                       |                       |                                                                                       | APPENDIX D:<br>Page 3 of 6      |

### 3 Composition / Information on ingredients

The Item is composed of the following ingredients:

|                      |              |                                     |
|----------------------|--------------|-------------------------------------|
| Water                | 50 – 73 %    |                                     |
| Non-ionic detergents | 25 – 50 %    | polyoxyethylenesorbitan monolaurate |
| NaCl                 | 0 – 2 %      |                                     |
| Preservative         | 0.05 – 0.1 % | Preventol-D7                        |

Safety relevant ingredients:

|                    |         |                                                                                                        |
|--------------------|---------|--------------------------------------------------------------------------------------------------------|
| CAS-No. 55965-84-9 | < 0.1 % | aqueous preparation, containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone |
| CAS-No. 9005-64-5  | < 50 %  | polyoxyethylenesorbitan monolaurate                                                                    |

According to international guidelines, the product is not a dangerous mixture and therefore not required to be marked by symbols.

## Figure D-4 Composition of 2.4 GHz Head Tissue Equivalent Matter

**Note:** 2.4 GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

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### Measurement Certificate / Material Test

|              |                                                 |
|--------------|-------------------------------------------------|
| Item Name    | Head Tissue Simulating Liquid (HBBL1900-3800V3) |
| Product No.  | SL AAH 196 AB (Batch: 170619-1)                 |
| Manufacturer | SPEAG                                           |

### Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

### Setup Validation

Validation results were within  $\pm 2.5\%$  towards the target values of Methanol.

### Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

### Test Condition

|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| Ambient         | Environment temperature ( $22 \pm 3$ )°C and humidity < 70%. |
| TSL Temperature | 22°C                                                         |
| Test Date       | 20-Jun-17                                                    |
| Operator        | CL                                                           |

### Additional Information

TSL Density 1.054 g/cm<sup>3</sup>

TSL Heat-capacity 3.389 kJ/(kg·K)

| f [MHz] | Measured |      | Target |      | Diff. to Target [%] |           |
|---------|----------|------|--------|------|---------------------|-----------|
|         | e'       | e''  | sigma  | eps  | sigma               | Delta-eps |
| 1900    | 41.8     | 12.2 | 1.3    | 40.0 | 1.4                 | 4.5       |
| 1950    | 41.6     | 12.3 | 1.3    | 40.0 | 1.4                 | 4.0       |
| 2000    | 41.4     | 12.4 | 1.4    | 40.0 | 1.4                 | 3.6       |
| 2050    | 41.2     | 12.6 | 1.4    | 39.9 | 1.4                 | 3.3       |
| 2100    | 41.1     | 12.7 | 1.5    | 39.8 | 1.5                 | 3.1       |
| 2150    | 40.9     | 12.8 | 1.5    | 39.7 | 1.5                 | 2.9       |
| 2200    | 40.7     | 12.9 | 1.6    | 39.6 | 1.6                 | 2.7       |
| 2250    | 40.6     | 13.0 | 1.6    | 39.6 | 1.6                 | 2.5       |
| 2300    | 40.4     | 13.2 | 1.7    | 39.5 | 1.7                 | 2.3       |
| 2350    | 40.2     | 13.3 | 1.7    | 39.4 | 1.7                 | 2.1       |
| 2400    | 40.0     | 13.4 | 1.8    | 39.3 | 1.8                 | 1.8       |
| 2450    | 39.8     | 13.5 | 1.8    | 39.2 | 1.8                 | 1.6       |
| 2500    | 39.7     | 13.7 | 1.9    | 39.1 | 1.9                 | 1.3       |
| 2550    | 39.5     | 13.7 | 2.0    | 39.1 | 1.9                 | 1.1       |
| 2600    | 39.3     | 13.9 | 2.0    | 39.0 | 2.0                 | 0.8       |
| 2650    | 39.1     | 14.0 | 2.1    | 38.9 | 2.0                 | 0.5       |
| 2700    | 39.0     | 14.2 | 2.1    | 38.9 | 2.1                 | 0.2       |
| 2750    | 38.7     | 14.3 | 2.2    | 38.8 | 2.1                 | -0.2      |
| 2800    | 38.6     | 14.4 | 2.2    | 38.8 | 2.2                 | -0.4      |
| 2850    | 38.4     | 14.5 | 2.3    | 38.7 | 2.2                 | -0.8      |
| 2900    | 38.2     | 14.6 | 2.3    | 38.6 | 2.3                 | -1.0      |
| 2950    | 38.1     | 14.7 | 2.4    | 38.6 | 2.3                 | -1.3      |
| 3000    | 37.9     | 14.8 | 2.5    | 38.5 | 2.4                 | -1.7      |
| 3050    | 37.7     | 14.8 | 2.5    | 38.4 | 2.5                 | -2.0      |
| 3100    | 37.5     | 14.9 | 2.6    | 38.4 | 2.5                 | -2.3      |
| 3150    | 37.3     | 15.0 | 2.6    | 38.3 | 2.6                 | -2.6      |
| 3200    | 37.1     | 15.1 | 2.7    | 38.3 | 2.6                 | -3.0      |
| 3250    | 37.0     | 15.1 | 2.7    | 38.2 | 2.7                 | -3.3      |
| 3300    | 36.8     | 15.2 | 2.8    | 38.2 | 2.7                 | -3.6      |
| 3350    | 36.6     | 15.3 | 2.8    | 38.1 | 2.8                 | -3.9      |
| 3400    | 36.4     | 15.3 | 2.9    | 38.0 | 2.8                 | -4.2      |
| 3450    | 36.3     | 15.4 | 3.0    | 38.0 | 2.9                 | -4.5      |
| 3500    | 36.1     | 15.5 | 3.0    | 37.9 | 2.9                 | -4.8      |
| 3550    | 36.0     | 15.5 | 3.1    | 37.9 | 3.0                 | -5.0      |
| 3600    | 35.8     | 15.6 | 3.1    | 37.8 | 3.0                 | -5.3      |
| 3650    | 35.7     | 15.7 | 3.2    | 37.8 | 3.1                 | -5.6      |
| 3700    | 35.5     | 15.7 | 3.2    | 37.7 | 3.1                 | -5.8      |
| 3750    | 35.4     | 15.8 | 3.3    | 37.6 | 3.2                 | -6.1      |
| 3800    | 35.2     | 15.9 | 3.4    | 37.6 | 3.2                 | -6.3      |
| 3850    | 35.1     | 15.9 | 3.4    | 37.5 | 3.3                 | -6.6      |

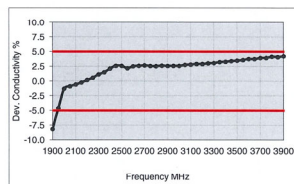
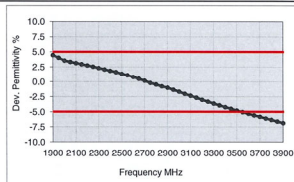


Figure D-5  
2.4 GHz Head Tissue Equivalent Matter

|                                    |                                                                                     |                            |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ720PS                  |  | SAR EVALUATION REPORT      |  | Approved by:<br>Quality Manager |
| Test Dates:<br>04/21/19 - 05/15/19 | DUT Type:<br>Portable Handset                                                       | APPENDIX D:<br>Page 4 of 6 |                                                                                       |                                 |

## 2 Composition / Information on ingredients

The Item is composed of the following ingredients:

|             |          |
|-------------|----------|
| Water       | 50 – 65% |
| Mineral oil | 10 – 30% |
| Emulsifiers | 8 – 25%  |
| Sodium salt | 0 – 1.5% |

Figure D-6

### Composition of 5 GHz Head Tissue Equivalent Matter

**Note:** 5 GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

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#### Measurement Certificate / Material Test

Item Name Head Tissue Simulating Liquid (HBBL3500-5800V5)  
Product No. SL AAH 502 AG (Batch: 170613-1)  
Manufacturer SPEAG

#### Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

#### Setup Validation

Validation results were within  $\pm 2.5\%$  towards the target values of Methanol.

#### Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

#### Test Condition

Ambient Environment temperatur ( $22 \pm 3^\circ\text{C}$  and humidity  $< 70\%$ ).  
TSL Temperature  $22^\circ\text{C}$   
Test Date 20-Jun-17  
Operator CL

#### Additional Information

TSL Density  $0.985 \text{ g/cm}^3$   
TSL Heat-capacity  $3.383 \text{ kJ/(kg}^\circ\text{K)}$

| f (MHz) | Measured $\epsilon'$ | Measured $\epsilon''$ | Measured $\sigma$ | Target $\epsilon'$ | Target $\epsilon''$ | Target $\sigma$ | Diff to Target [%] |
|---------|----------------------|-----------------------|-------------------|--------------------|---------------------|-----------------|--------------------|
| 3400    | 38.6                 | 15.03                 | 2.84              | 38.0               | 2.81                | 1.5             | 1.1                |
| 3500    | 38.5                 | 15.00                 | 2.92              | 37.9               | 2.91                | 1.5             | 0.3                |
| 3600    | 38.3                 | 14.98                 | 3.00              | 37.8               | 3.02                | 1.3             | -0.5               |
| 3700    | 38.2                 | 14.96                 | 3.08              | 37.7               | 3.12                | 1.3             | -1.2               |
| 3800    | 38.1                 | 14.96                 | 3.16              | 37.6               | 3.22                | 1.4             | -1.9               |
| 3900    | 38.0                 | 14.95                 | 3.24              | 37.5               | 3.32                | 1.4             | -2.5               |
| 4000    | 37.9                 | 14.95                 | 3.33              | 37.4               | 3.43                | 1.5             | -2.8               |
| 4100    | 37.8                 | 14.96                 | 3.41              | 37.2               | 3.53                | 1.5             | -3.3               |
| 4200    | 37.6                 | 15.00                 | 3.50              | 37.1               | 3.63                | 1.3             | -3.6               |
| 4300    | 37.5                 | 15.05                 | 3.60              | 37.0               | 3.73                | 1.3             | -3.5               |
| 4400    | 37.4                 | 15.11                 | 3.70              | 36.9               | 3.84                | 1.4             | -3.5               |
| 4500    | 37.2                 | 15.18                 | 3.80              | 36.8               | 3.94                | 1.1             | -3.5               |
| 4600    | 37.1                 | 15.24                 | 3.90              | 36.7               | 4.04                | 1.2             | -3.5               |
| 4700    | 37.0                 | 15.29                 | 4.00              | 36.6               | 4.14                | 1.2             | -3.4               |
| 4800    | 36.8                 | 15.35                 | 4.10              | 36.4               | 4.25                | 1.0             | -3.4               |
| 4850    | 36.8                 | 15.35                 | 4.14              | 36.4               | 4.30                | 1.1             | -3.6               |
| 4900    | 36.7                 | 15.38                 | 4.19              | 36.3               | 4.35                | 1.0             | -3.6               |
| 4950    | 36.6                 | 15.39                 | 4.24              | 36.3               | 4.40                | 0.9             | -3.6               |
| 5000    | 36.5                 | 15.42                 | 4.29              | 36.2               | 4.45                | 0.8             | -3.6               |
| 5050    | 36.5                 | 15.43                 | 4.34              | 36.2               | 4.50                | 0.9             | -3.6               |
| 5100    | 36.4                 | 15.46                 | 4.39              | 36.1               | 4.55                | 0.8             | -3.6               |
| 5150    | 36.3                 | 15.48                 | 4.43              | 36.0               | 4.60                | 0.7             | -3.8               |
| 5200    | 36.2                 | 15.50                 | 4.48              | 36.0               | 4.66                | 0.6             | -3.8               |
| 5250    | 36.1                 | 15.53                 | 4.54              | 35.9               | 4.71                | 0.5             | -3.5               |
| 5300    | 36.1                 | 15.55                 | 4.58              | 35.9               | 4.76                | 0.6             | -3.7               |
| 5350    | 36.0                 | 15.56                 | 4.63              | 35.8               | 4.81                | 0.5             | -3.7               |
| 5400    | 35.9                 | 15.57                 | 4.68              | 35.8               | 4.86                | 0.4             | -3.7               |
| 5450    | 35.9                 | 15.59                 | 4.73              | 35.7               | 4.91                | 0.6             | -3.7               |
| 5500    | 35.8                 | 15.61                 | 4.78              | 35.6               | 4.96                | 0.4             | -3.7               |
| 5550    | 35.7                 | 15.65                 | 4.83              | 35.6               | 5.01                | 0.3             | -3.7               |
| 5600    | 35.6                 | 15.66                 | 4.88              | 35.5               | 5.07                | 0.2             | -3.7               |
| 5650    | 35.6                 | 15.70                 | 4.93              | 35.5               | 5.12                | 0.4             | -3.6               |
| 5700    | 35.5                 | 15.72                 | 4.98              | 35.4               | 5.17                | 0.2             | -3.6               |
| 5750    | 35.4                 | 15.76                 | 5.04              | 35.4               | 5.22                | 0.1             | -3.4               |
| 5800    | 35.4                 | 15.78                 | 5.09              | 35.3               | 5.27                | 0.3             | -3.4               |
| 5850    | 35.3                 | 15.81                 | 5.14              | 35.3               | 5.34                | 0.0             | -3.7               |
| 5900    | 35.3                 | 15.82                 | 5.19              | 35.3               | 5.40                | 0.0             | -3.9               |

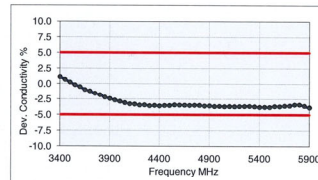
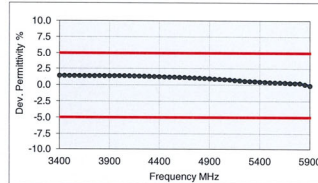


Figure D-7

### 5 GHz Head Tissue Equivalent Matter

|                                    |                                                                                     |                       |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ720PS                  |  | SAR EVALUATION REPORT |  | Approved by:<br>Quality Manager |
| Test Dates:<br>04/21/19 - 05/15/19 | DUT Type:<br>Portable Handset                                                       |                       |                                                                                       | APPENDIX D:<br>Page 5 of 6      |

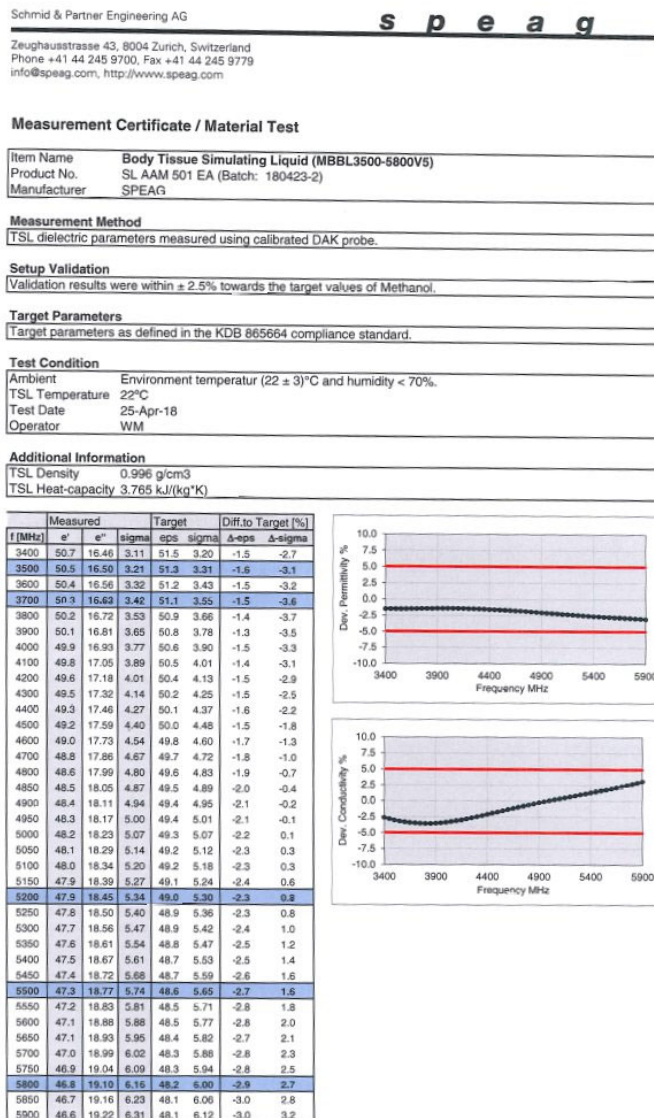
### 3 Composition / Information on ingredients

The Item is composed of the following ingredients:

|                                 |          |
|---------------------------------|----------|
| Water                           | 60 – 80% |
| Esters, Emulsifiers, Inhibitors | 20 – 40% |
| Sodium salt                     | 0 – 1.5% |

**Figure D-8**  
**Composition of 5 GHz Body Tissue Equivalent Matter**

**Note:** 5 GHz Body liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.



**Figure D-9**  
**5 GHz Body Tissue Equivalent Matter**

|                                    |                               |                       |  |                                 |
|------------------------------------|-------------------------------|-----------------------|--|---------------------------------|
| FCC ID: ZNFQ720PS                  |                               | SAR EVALUATION REPORT |  | Approved by:<br>Quality Manager |
| Test Dates:<br>04/21/19 - 05/15/19 | DUT Type:<br>Portable Handset |                       |  | APPENDIX D:<br>Page 6 of 6      |

## APPENDIX D: SAR SYSTEM VALIDATION

Per FCC KDB Publication 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

**Table D-1**  
**SAR System Validation Summary – 1g**

| SAR System | Freq. (MHz) | Date       | Probe SN | Probe Cal Point |      | Cond. ( $\sigma$ ) | Perm. ( $\epsilon_r$ ) | CW VALIDATION |                 |                | MOD. VALIDATION |             |      |
|------------|-------------|------------|----------|-----------------|------|--------------------|------------------------|---------------|-----------------|----------------|-----------------|-------------|------|
|            |             |            |          |                 |      |                    |                        | SENSITIVITY   | PROBE LINEARITY | PROBE ISOTROPY | MOD. TYPE       | DUTY FACTOR | PAR  |
| H          | 750         | 9/5/2018   | 7409     | 750             | Head | 0.887              | 41.85                  | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| D          | 750         | 4/12/2019  | 3914     | 750             | Head | 0.903              | 42.79                  | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| D          | 835         | 4/12/2019  | 3914     | 835             | Head | 0.935              | 42.55                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| H          | 1750        | 7/16/2018  | 7409     | 1750            | Head | 1.331              | 41.19                  | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| G          | 1900        | 8/9/2018   | 7410     | 1900            | Head | 1.429              | 38.61                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| E          | 1900        | 3/11/2019  | 3589     | 1900            | Head | 1.436              | 39.62                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| L          | 2450        | 4/29/2019  | 7308     | 2450            | Head | 1.82               | 37.75                  | PASS          | PASS            | PASS           | OFDM/TDD        | PASS        | PASS |
| E          | 2450        | 2/5/2019   | 3589     | 2450            | Head | 1.825              | 39.84                  | PASS          | PASS            | PASS           | OFDM/TDD        | PASS        | PASS |
| E          | 2600        | 2/7/2019   | 3589     | 2600            | Head | 1.964              | 40.46                  | PASS          | PASS            | PASS           | TDD             | PASS        | N/A  |
| H          | 5250        | 7/5/2018   | 7409     | 5250            | Head | 4.492              | 34.99                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| H          | 5600        | 7/5/2018   | 7409     | 5600            | Head | 4.839              | 34.5                   | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| H          | 5750        | 7/5/2018   | 7409     | 5750            | Head | 4.995              | 34.29                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| L          | 750         | 11/6/2018  | 7308     | 750             | Body | 0.962              | 53.92                  | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| J          | 835         | 3/10/2019  | 7488     | 835             | Body | 0.988              | 53.87                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| D          | 1750        | 4/29/2019  | 3914     | 1750            | Body | 1.529              | 51.89                  | PASS          | PASS            | PASS           | N/A             | N/A         | N/A  |
| I          | 1900        | 4/29/2019  | 7357     | 1900            | Body | 1.584              | 51.77                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| G          | 1900        | 8/10/2018  | 7410     | 1900            | Body | 1.567              | 52.24                  | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| K          | 2450        | 3/6/2019   | 7417     | 2450            | Body | 2.039              | 50.67                  | PASS          | PASS            | PASS           | OFDM/TDD        | PASS        | PASS |
| K          | 2600        | 3/6/2019   | 7417     | 2600            | Body | 2.224              | 50.17                  | PASS          | PASS            | PASS           | TDD             | PASS        | N/A  |
| L          | 5250        | 10/29/2018 | 7308     | 5250            | Body | 5.511              | 48.77                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| L          | 5600        | 10/29/2018 | 7308     | 5600            | Body | 5.994              | 48.2                   | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| L          | 5750        | 10/29/2018 | 7308     | 5750            | Body | 6.219              | 47.96                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |

|                                    |                                                                                     |                       |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: ZNFQ720PS                  |  | SAR EVALUATION REPORT |  | Approved by:<br>Quality Manager |
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**Table D-2**  
**SAR System Validation Summary – 10g**

| SAR System | Freq. (MHz) | Date       | Probe SN | Probe Cal Point |      | Cond. ( $\sigma$ ) | Perm. ( $\epsilon_r$ ) | CW VALIDATION |                 |                | MOD. VALIDATION |             |      |
|------------|-------------|------------|----------|-----------------|------|--------------------|------------------------|---------------|-----------------|----------------|-----------------|-------------|------|
|            |             |            |          |                 |      |                    |                        | SENSITIVITY   | PROBE LINEARITY | PROBE ISOTROPY | MOD. TYPE       | DUTY FACTOR | PAR  |
| G          | 1900        | 8/10/2018  | 7410     | 1900            | Body | 1.567              | 52.239                 | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| I          | 1900        | 4/29/2019  | 7357     | 1900            | Body | 1.584              | 51.771                 | PASS          | PASS            | PASS           | GMSK            | PASS        | N/A  |
| K          | 2450        | 3/6/2019   | 7417     | 2450            | Body | 2.039              | 50.67                  | PASS          | PASS            | PASS           | OFDM/TDD        | PASS        | PASS |
| K          | 2600        | 3/6/2019   | 7417     | 2600            | Body | 2.224              | 50.17                  | PASS          | PASS            | PASS           | TDD             | PASS        | N/A  |
| L          | 5250        | 10/29/2018 | 7308     | 5250            | Body | 5.511              | 48.77                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |
| L          | 5750        | 10/29/2018 | 7308     | 5750            | Body | 6.219              | 47.96                  | PASS          | PASS            | PASS           | OFDM            | N/A         | PASS |

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to FCC KDB Publication 865664 D01v01r04

|                                    |                                                                                     |                              |                                                                                       |                                 |
|------------------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## APPENDIX G POWER REDUCTION VERIFICATION

Per the May 2017 TCBC Workshop Notes, demonstration of proper functioning of the power reduction mechanisms is required to support the corresponding SAR configurations. The verification process was divided into two parts: (1) evaluation of output power levels for individual or multiple triggering mechanisms and (2) evaluation of the triggering distances for proximity-based sensors.

### G.1 Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

### G.2 Distance Verification Procedure

The distance verification procedure was performed according to the following procedure:

1. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
2. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 and FCC Guidance. Each applicable test position was evaluated. The distances were confirmed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
3. Steps 1 and 2 were repeated for low, mid, and high bands, as appropriate (see note below Table G-2 for more details).
4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

|                                    |                                                                                                                                   |                       |                                                                                       |                                 |
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### G.3 Main Antenna Verification Summary

**Table G-1**  
**Power Measurement Verification for Main Antenna**

| Mechanism(s) | Mode/Band             | Conducted Power (dBm) |                        |
|--------------|-----------------------|-----------------------|------------------------|
| 1st          |                       | Un-triggered (Max)    | Mechanism #1 (Reduced) |
| Grip         | UMTS 1900             | 23.76                 | 23.21                  |
| Grip         | PCS CDMA              | 24.03                 | 22.74                  |
| Grip         | LTE FDD Band 2        | 23.66                 | 23.15                  |
| Grip         | LTE FDD Band 25       | 23.78                 | 23.31                  |
| Grip         | LTE TDD Band 41 (PC3) | 24.87                 | 22.99                  |
| Grip         | LTE TDD Band 41 (PC2) | 27.7                  | 25.69                  |

**Table G-2**  
**Distance Measurement Verification for Main Antenna**

| Mechanism(s) | Test Condition        | Band | Distance Measurements (mm) |             | Minimum Distance per Manufacturer (mm) |
|--------------|-----------------------|------|----------------------------|-------------|----------------------------------------|
|              |                       |      | Moving Toward              | Moving Away |                                        |
| Grip         | Phablet - Back Side   | Mid  | 2                          | 4           | 2                                      |
| Grip         | Phablet - Back Side   | High | 2                          | 4           | 2                                      |
| Grip         | Phablet - Front Side  | Mid  | 2                          | 4           | 2                                      |
| Grip         | Phablet - Front Side  | High | 2                          | 4           | 2                                      |
| Grip         | Phablet - Bottom Edge | Mid  | 5                          | 7           | 4                                      |
| Grip         | Phablet - Bottom Edge | High | 5                          | 7           | 4                                      |

\*Note: Mid band refers to: PCS CDMA, UMTS B2, LTE B2/25; High band refers to: LTE 41 PC3/PC2

### G.4 WIFI Verification Summary

**Table G-3**  
**Power Measurement Verification WIFI**

| Mechanism(s) | Mode/Band                | Conducted Power (dBm) |                        |
|--------------|--------------------------|-----------------------|------------------------|
| 1st          |                          | Un-triggered (Max)    | Mechanism #1 (Reduced) |
| Held-to-Ear  | 802.11b                  | 20.48                 | 18.34                  |
| Held-to-Ear  | 802.11a                  | 17.64                 | 16.83                  |
| Held-to-Ear  | 802.11n (5GHz, 20MHz BW) | 17.72                 | 16.75                  |

|                                           |                                                                                                                                   |                              |                                                                                       |                                        |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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| <b>Test Dates:</b><br>04/21/19 – 05/15/19 | <b>DUT Type:</b><br>Portable Handset                                                                                              |                              |                                                                                       | <b>APPENDIX G:</b><br>Page 2 of 2      |

## APPENDIX H: DOWNLINK LTE CA RF CONDUCTED POWERS

## 1.1 LTE Downlink Only Carrier Aggregation Test Reduction Methodology

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. Per April 2018 TCBC Workshop Notes, the following test reduction methodology was applied to determine the combinations required for conducted power measurements.

### LTE DLCA Test Reduction Methodology:

- The supported combinations were arranged by the number of component carriers in columns.
- Any limitations on the PCC or SCC for each combination were identified alongside the combination (e.g. CA\_2A-2A-4A-12A, but B12 can only be configured as a SCC).
- Power measurements were performed for "supersets" (LTE CA combinations with multiple components carriers) and any "subsets" (LTE CA combinations with fewer component carriers) that were not completely covered by the supersets.
- Only subsets that have the exact same components as a superset were excluded for measurement.
- When there were certain restrictions on component carriers that existed in the superset that were not applied for the subset, the subset configuration was additionally evaluated.
- Both inter-band and intra-band downlink carrier aggregation scenarios were considered.

Table 1 – Example of Exclusion Table for SISO Configurations

[illegible]

## 1.2 LTE Downlink Only Carrier Aggregation Test Selection and Setup

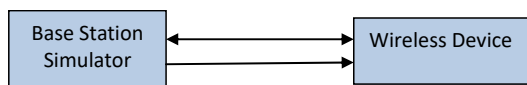
SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by the product implementation. For those configurations required by April 2018 TCBC Workshop Notes, conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the maximum average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive. All bands required for SAR testing per FCC KDB procedures were considered. Based on the measured maximum powers below, no additional SAR tests were required for DLCA SAR configurations.

|                                           |                                                                                                                                                  |                            |                                                                                                 |                                 |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
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## General PCC and SCC configuration selection procedure

- PCC uplink channel, channel bandwidth, modulation and RB configurations were selected based on section C)3)b)ii) of KBD 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
- To maximize aggregated bandwidth, highest channel bandwidth available for that CA combination was selected for SCC. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers.
- All selected PCC and SCC(s) remained fully within the uplink/downlink transmission band of the respective component carrier.



**Figure 1**  
**DL CA Power Measurement Setup**

|                                    |                                                                                                                                   |                       |                                                                                       |                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 1.3 Downlink Carrier Aggregation RF Conducted Powers

### 1.3.1 LTE Band 26 as PCC

Table 1  
Maximum Output Powers

| Combination | PCC      |              |              |                      |      |            |                  |                  |                      | SCC 1    |              |                  |                      | Power                                 |                                   |
|-------------|----------|--------------|--------------|----------------------|------|------------|------------------|------------------|----------------------|----------|--------------|------------------|----------------------|---------------------------------------|-----------------------------------|
|             | PCC Band | PCC BW [MHz] | PCC (UL) Ch. | PCC (UL) Freq. [MHz] | Mod. | PCC UL# RB | PCC UL RB Offset | PCC (DL) Channel | PCC (DL) Freq. [MHz] | SCC Band | SCC BW [MHz] | SCC (DL) Channel | SCC (DL) Freq. [MHz] | LTE Tx.Power with DL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_25A-26A  | LTE B26  | 15           | 26865        | 831.5                | QPSK | 1          | 74               | 8865             | 876.5                | LTE B25  | 20           | 8365             | 1962.5               | 25.49                                 | 25.42                             |

### 1.3.2 LTE Band 25 as PCC

Table 2  
Maximum Output Powers

| Combination    | PCC      |              |              |                      |      |            |                  |                  |                      | SCC 1    |              |                  |                      | Power                                 |                                   |
|----------------|----------|--------------|--------------|----------------------|------|------------|------------------|------------------|----------------------|----------|--------------|------------------|----------------------|---------------------------------------|-----------------------------------|
|                | PCC Band | PCC BW [MHz] | PCC (UL) Ch. | PCC (UL) Freq. [MHz] | Mod. | PCC UL# RB | PCC UL RB Offset | PCC (DL) Channel | PCC (DL) Freq. [MHz] | SCC Band | SCC BW [MHz] | SCC (DL) Channel | SCC (DL) Freq. [MHz] | LTE Tx.Power with DL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_25A-25A (1) | LTE B25  | 10           | 26090        | 1855                 | QPSK | 1          | 49               | 8090             | 1935                 | LTE B25  | 20           | 8590             | 1985                 | 24.28                                 | 24.30                             |
| CA_25A-26A     | LTE B25  | 10           | 26090        | 1855                 | QPSK | 1          | 49               | 8090             | 1935                 | LTE B26  | 15           | 8865             | 876.5                | 24.08                                 | 24.30                             |

### 1.3.3 LTE Band 41 PC3 as PCC

Table 3  
Maximum Output Powers

| Combination    | PCC      |              |              |                      |      |            |                  |                  |                      | SCC 1    |              |                  |                      | Power                                 |                                   |
|----------------|----------|--------------|--------------|----------------------|------|------------|------------------|------------------|----------------------|----------|--------------|------------------|----------------------|---------------------------------------|-----------------------------------|
|                | PCC Band | PCC BW [MHz] | PCC (UL) Ch. | PCC (UL) Freq. [MHz] | Mod. | PCC UL# RB | PCC UL RB Offset | PCC (DL) Channel | PCC (DL) Freq. [MHz] | SCC Band | SCC BW [MHz] | SCC (DL) Channel | SCC (DL) Freq. [MHz] | LTE Tx.Power with DL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_41A-41A (1) | LTE B41  | 20           | 40185        | 2549.5               | QPSK | 1          | 0                | 40185            | 2549.5               | LTE B41  | 20           | 41490            | 2680                 | 24.99                                 | 25.00                             |
| CA_41C (1)     | LTE B41  | 20           | 40185        | 2549.5               | QPSK | 1          | 0                | 40185            | 2549.5               | LTE B41  | 20           | 40383            | 2569.3               | 24.99                                 | 25.00                             |

### 1.3.1 LTE Band 41 PC2 as PCC

Table 4  
Maximum Output Powers

| Combination    | PCC         |              |              |                      |      |            |                  |                  |                      | SCC 1       |              |                  |                      | Power                                 |                                   |
|----------------|-------------|--------------|--------------|----------------------|------|------------|------------------|------------------|----------------------|-------------|--------------|------------------|----------------------|---------------------------------------|-----------------------------------|
|                | PCC Band    | PCC BW [MHz] | PCC (UL) Ch. | PCC (UL) Freq. [MHz] | Mod. | PCC UL# RB | PCC UL RB Offset | PCC (DL) Channel | PCC (DL) Freq. [MHz] | SCC Band    | SCC BW [MHz] | SCC (DL) Channel | SCC (DL) Freq. [MHz] | LTE Tx.Power with DL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_41A-41A (1) | LTE B41 PC2 | 15           | 41055        | 2636.5               | QPSK | 1          | 74               | 41055            | 2636.5               | LTE B41 PC2 | 20           | 39750            | 2506                 | 27.68                                 | 27.68                             |
| CA_41C (1)     | LTE B41 PC2 | 15           | 41055        | 2636.5               | QPSK | 1          | 74               | 41055            | 2636.5               | LTE B41 PC2 | 20           | 40884            | 2619.4               | 27.69                                 | 27.68                             |

|                                    |                                                                                                                                   |                       |                                                                                                 |                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
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