### 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.

Schmic	d & Par	tner Er	nginee	ring A(	6			s p e a g
Zeugha Phonc info@sj	usstra +41 44 peag.co	sse 43 245 9 om, htt	, 8004 700, F p://wv	Zurich ax +41 vw.spe	, Switz 44 24 ag.con	erland 5 9779 n		<u>_</u>
Meas	uren	nent	Certi	ficat	e/M	ateria	Test	
Item N	ame		Head		ue Sir	nulatin	Liquid	(HBBL3500-5800V5)
Manuf	acture	r	SPE	AG	ZAG	(Batch:	170613-	1)
Measu	ireme	nt Met	hod					
TSL di	electri	c para	meter	s mea	sured	using c	alibrated	DAK probe.
Setup	Valid	ation						
Validat	tion re	sults v	/ere w	ithin ±	2.5%	toward	s the targ	et values of Methanol.
Target	Para	meter	s aa da	fined	n the		00 and 10	
arget	pardi		as de	medi	n une i	LEE 15	≥o and lE	EC 02209 compliance standards.
Ambie	ondit nt	ion	Envir	onme	nt tem	peratur	(22 ± 3)°	C and humidity < 70%.
TSL T	emper	ature	22°C	in 17			/ .	
Operat	tor		CL	an (= 1 /				
Additi	onall	oform	ation					
TSL D	ensity		0.985	5 g/cm	3			
TSL H	eat-ca	pacity	3.383	3 kJ/(k	g*K)			
	Measu	red		Targe	t	Diff.to T	arget [%]	
[MHz] 3400	e' 38.6	e" 15.03	sigma 2.84	eps 38.0	sigma	Δ-eps	∆-sigma	* 7.5
3500	38.5	15.00	2.92	37.9	2.91	1.5	0.3	5.0
3600 3700	38.3	14.98	3.00	37.8	3.02	1.3	-0.5	
3800	38.1	14.96	3.16	37.6	3.22	1.4	-1.9	≥ -2.5 -
4000	38.0	14.95	3.24	37.5	3.32	1.4	-2.5	-5.0
4100	37.8	14.96	3.41	37.2	3.53	1.5	-3.3	-10.0
4300	37.5	15.00	3.60	37.1	3.63	1.3	-3.6	5400 5900 4400 4900 5400 5900 Frequency MHz
4400	37.4	15.11	3.70	36.9	3.84	1.4	-3.5	
4600	37.1	15.24	3.90	36.7	4.04	1.2	-3.5	10.0
4700 4800	37.0	15.29	4.00	36.6	4.14	1.2	-3.4	7.5
4850	36.8	15.35	4.14	36.4	4.30	1.1	-3.6	\$ 5.0 \$ 25
4900 4950	36.7 36.6	15.38	4.19	36.3	4.35	1.0	-3.6	0.0 60
5000	36.5	15.42	4.29	36.2	4.45	0.8	-3.6	§ -2.5
5050 5100	36.5 36.4	15.43	4.34	36.2	4.50	0.9	-3.6 -3.6	-7.5
5150	36.3	15.48	4.43	36.0	4.60	0.7	-3.8	-10.0 3400 3900 4400 4900 5400 5000
5200 5250	36.2	15.50 15.53	4.48	36.0 35.9	4.66	0.6	-3.8 -3.5	Frequency MHz
5300	36.1	15.55	4.58	35.9	4.76	0.6	-3.7	2-4
5350 5400	36.0 35.9	15.56 15.57	4.63	35.8 35.8	4.81 4.86	0.5	-3.7 -3.7	
5450	35.9	15.59	4.73	35.7	4.91	0.6	-3.7	
5550	35.8 35.7	15.61 15.65	4.78	35.6 35.6	4.96 5.01	0.4	-3.7 -3.7	
5600	35.6	15.66	4.88	35.5	5.07	0.2	-3.7	
5700	35.5	15.70	4.93 4.98	35.5 35.4	5.12 5.17	0.4	-3.6 -3.6	
5750	35.4	15.76	5.04	35.4	5.22	0.1	-3.4	
5850	35.4 35.3	15.78 15.81	5.09 5.14	35.3 35.3	5.27 5.34	0.3	-3.4 -3.7	
5900	35.3	15.82	5.19	35.3	5.40	0.0	-3.9	1

Figure D-7 5 GHz Head Tissue Equivalent Matter

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#### 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.

Schmid	d & Par	tner Er	ngineer	ring AC	à				S	p	е	а	q	
Zeugha Phone info@s	eusstra +41 44 peag.c	sse 43 1 245 9 om, htt	, 8004 700, F p://ww	Zurich ax +41 vw.spe	Switz 44 24 ag.con	erland 5 9779 n								
Meas	suren	nent	Certi	ificat	e/M	aterial	Test							
ltern N Produ Manuf	lame ct No. acture	r	Body SL A SPE	y Tiss AM 50 AG	ue Sir 1 EA	nulating (Batch:	g Liquid ( 180423-)	(MBBL 2)	.3500-580	0V5)				
Measu TSL di	electri	nt Met c para	thod meter	s mea	sured	using ca	alibrated I	DAK p	robe.					
Setup Validat	Validation re	ation sults v	vere w	ithin ±	2.5%	towards	the targe	et valu	es of Meth	anol.				
Target	Para	meters	s as de	fined i	n the l	(DB 865	5664 com	pliance	e standarr	1				
Test C	ondit	ion												
Ambie TSL T	nt emper	ature	Envir 22°C	onmer	nt tem	peratur	(22 ± 3)°(	C and I	numidity <	70%.				
Test D Operat	ate		25-Ap WM	pr-18										
Additi	onal li	nform	ation											
TSL D	ensity	nacity	0.996	g/cm	3 (*K)									
	Money	und	0.1 00	Torne		0.4								
f [MHz]	e'	e"	sigma	eps	sigma	∆-eps	Δ-sigma		10.0		-			
3400	50.7	16.46	3.11	51.5	3.20	-1.5	-2.7	% Allo	5.0	100		1810		
3600	50.4	16.56	3.32	51.2	3.43	-1.5	-3.2	ti	2.5					
3700	50.3	16.63	3.42	51.1	3.55	-1.5	-3.6	v. Pe	0.0		*******			10.50
3900	50.1	16.81	3.65	50.8	3.00	-1.4	-3.5	D	-5.0					
4000	49.9	16.93	3.77	50.6	3.90	-1.5	-3.3		-7.5					
4100	49.8	17.05	3.89	50.5	4.01	-1.4	-3.1		-10.0	3900	4400	4900	5400	5900
4300	49.6	17.18	4.14	50.2	4.13	-1.5	-2.9			0000	Frequer	icy MHz	0400	0000
4400	49.3	17.46	4.27	50.1	4.37	-1.6	-2.2	-						
4500	49.2	17.59	4,40	50.0	4.48	-1.5	-1.8		10.0					
4000	49.0	17.73	4.54	49.8	4.60	-1.8	-1.3		7.5					
4800	48.6	17.99	4.80	49.6	4.83	-1.9	-0.7	Æ	5.0				-	-
4850	48.5	18.05	4.87	49.5	4.89	-2.0	-0.4	ducte	2.5					
4900	48.3	18.11	4.94	49.4	4.95	-2.1	-0.2	8	-2.5					
5000	48.2	18.23	5.07	49.3	5.07	-2.2	0.1	Dev.	-5.0			-		-
5050	48.1	18.29	5.14	49.2	5.12	-2.3	0.3	-	-7.5					
5150	47.9	18.39	5.20	49.2	5.24	-2.4	0.3		3400	3900	4400	4900	5400	5900
5200	47.9	18.45	5.34	49.0	5.30	-2.3	0.8				Frequer	vcy MHz		
5250	47.8	18.50	5.40	48.9	5.36	-2.3	0.8							
5350	47.6	18.61	5.54	48.8	5.47	-2.5	1.2							
5400	47.5	18.67	5.61	48.7	5.53	-2.5	1.4							
5450	47.4	18.72	5.68	48.7	5.59	-2.6	1.6							
5550	47.3	18.83	5.81	48.6	5.65	-2.8	1.6							
5600	47.1	18.88	5.88	48.5	5.77	-2.8	2.0							
5650	47.1	18.93	5.95	48.4	5.82	-2.7	2.1							
5700	47.0	18.99	6.02	48.3	5.88	-2.8	2.3							
5800	46.8	19.10	6.16	48.2	6.00	-2.9	2.7							
5850	46.7	19.16	6.23	48.1	6.06	-3.0	2.8							
5900	46.6	19.22	6.31	48.1	6.12	-3.0	3.2							

Figure D-9 5 GHz Body Tissue Equivalent Matter

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## APPENDIX E: 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.

					-			CW VALIDATION			MOD. VALIDATION			
SAR System	Freq. (MHz)	Date	Probe SN	Probe C	al Point	Cond. (σ)	Perm. (εr)	SENSITI VITY	PROBE LINEARIT Y	PROBE ISOTROP Y	MOD. TYPE	DUTY FACTOR	PAR	
G	750	8/9/2018	7410	750	Head	0.898	41.769	PASS	PASS	PASS	N/A	N/A	N/A	
G	835	8/9/2018	7410	835	Head	0.889	40.915	PASS	PASS	PASS	GMSK	PASS	N/A	
D	1750	10/26/2018	7357	1750	Head	1.345	39.703	PASS	PASS	PASS	N/A	N/A	N/A	
D	1900	10/25/2018	7357	1900	Head	1.433	39.444	PASS	PASS	PASS	GMSK	PASS	N/A	
Н	2450	8/8/2018	7409	2450	Head	1.844	40.474	PASS	PASS	PASS	OFDM/TDD	PASS	PASS	
E	2450	2/5/2019	3589	2450	Head	1.825	39.836	PASS	PASS	PASS	OFDM/TDD	PASS	PASS	
Н	5250	7/5/2018	7409	5250	Head	4.492	34.994	PASS	PASS	PASS	OFDM	N/A	PASS	
Н	5600	7/5/2018	7409	5600	Head	4.839	34.496	PASS	PASS	PASS	OFDM	N/A	PASS	
Н	5750	7/5/2018	7409	5750	Head	4.995	34.288	PASS	PASS	PASS	OFDM	N/A	PASS	
E	750	2/6/2019	3589	750	Body	0.984	54.096	PASS	PASS	PASS	N/A	N/A	N/A	
D	835	8/15/2018	7357	835	Body	1	53.368	PASS	PASS	PASS	GMSK	PASS	N/A	
G	1750	8/29/2018	7410	1750	Body	1.464	52.807	PASS	PASS	PASS	N/A	N/A	N/A	
J	1900	2/8/2019	7488	1900	Body	1.571	52.538	PASS	PASS	PASS	GMSK	PASS	N/A	
K	2450	4/3/2018	3319	2450	Body	2.043	51.13	PASS	PASS	PASS	OFDM/TDD	PASS	PASS	
L	2450	11/6/2018	7308	2450	Body	2.022	51.315	PASS	PASS	PASS	OFDM/TDD	PASS	PASS	
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	

 Table E-1

 SAR System Validation Summary – 1g

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 for more details).
- 4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

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# G.3 WIFI Verification Summary

Power Measurement Verification WiFi											
Mechanism(s)	Mode/Band	Conducted I	Power (dBm)								
		Un-triggered (Max)	Mechanism #1 (Reduced)								
Held-to-Ear	802.11b	18.29	15.06								
Held-to-Ear	802.11g	16.11	14.95								
Held-to-Ear	802.11n (2.4GHz)	15.89	14.78								
Held-to-Ear	802.11a	14.82	11.71								
Held-to-Ear	802.11n (5GHz, 20MHz BW)	15.08	11.98								

Table G-1 Power Measurement Verification WIFI

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