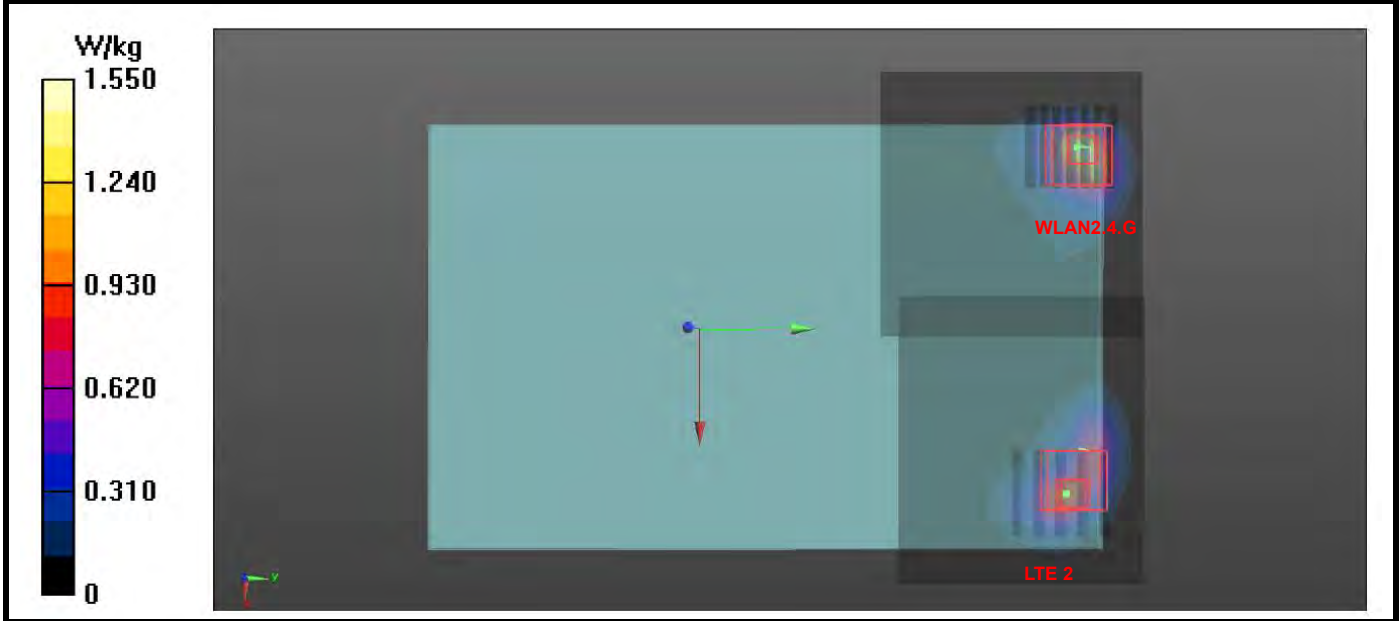


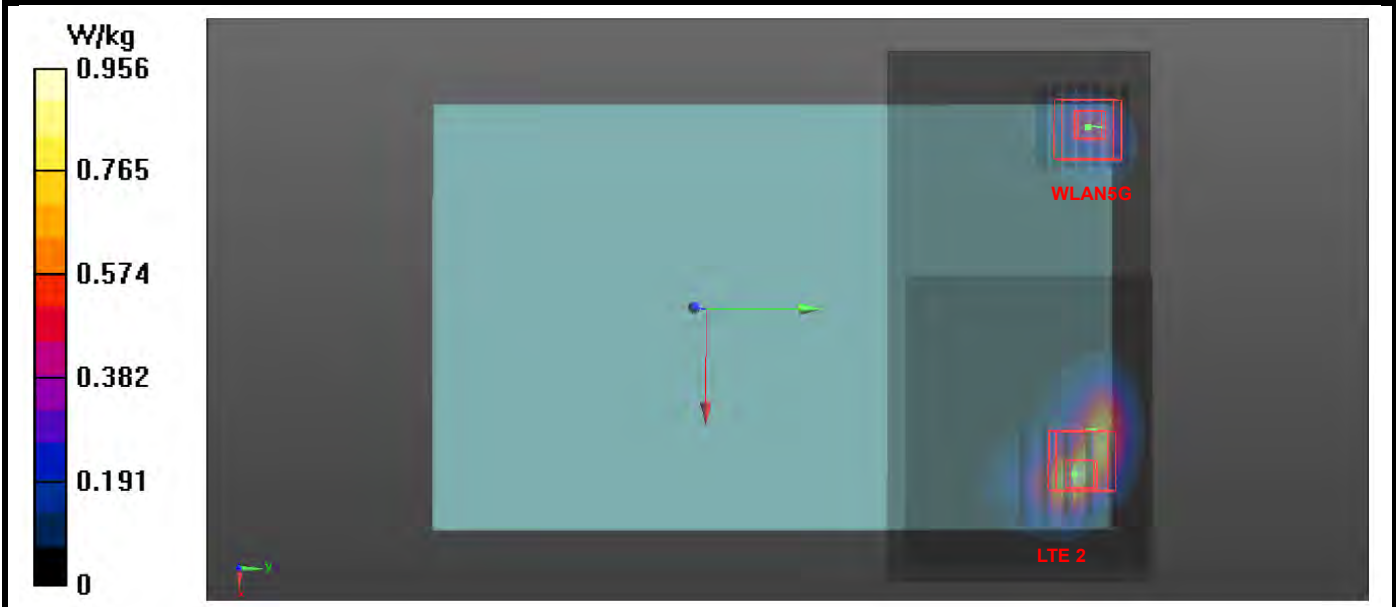
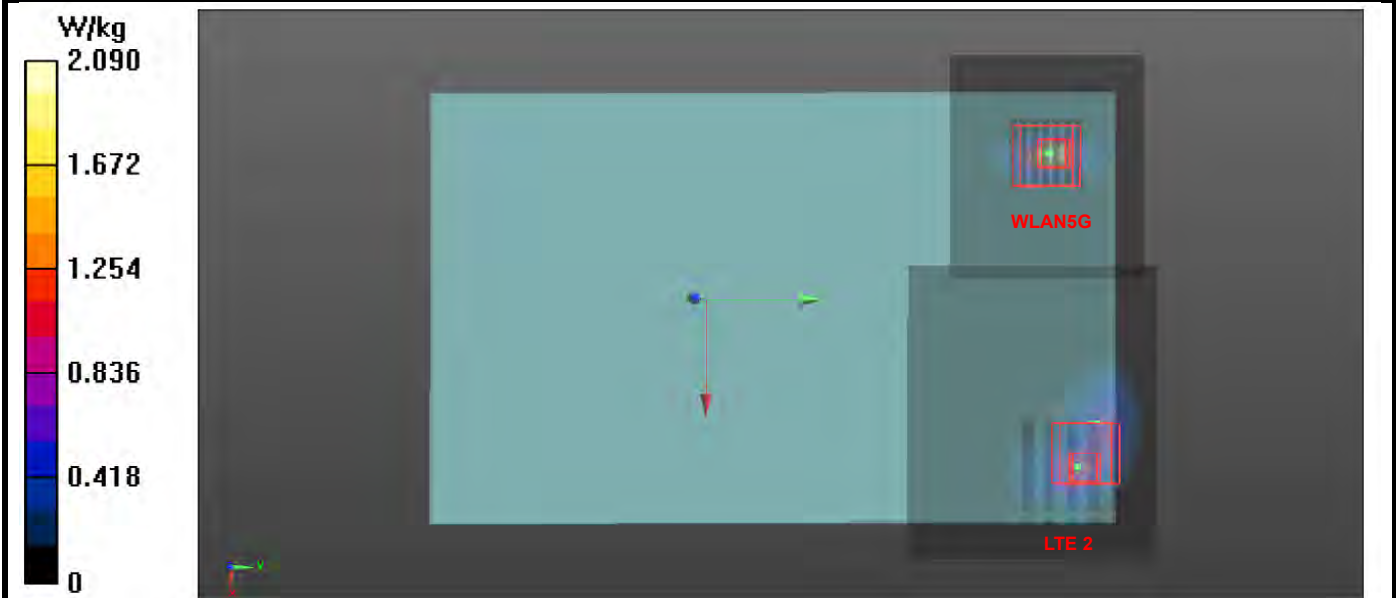
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 2	Rear Face	1.09	0	0.041	0.12	-0.179	109.4	2.18	0.03	Not required
WLAN2.4G		1.09	0	-0.0684	0.12	-0.181				



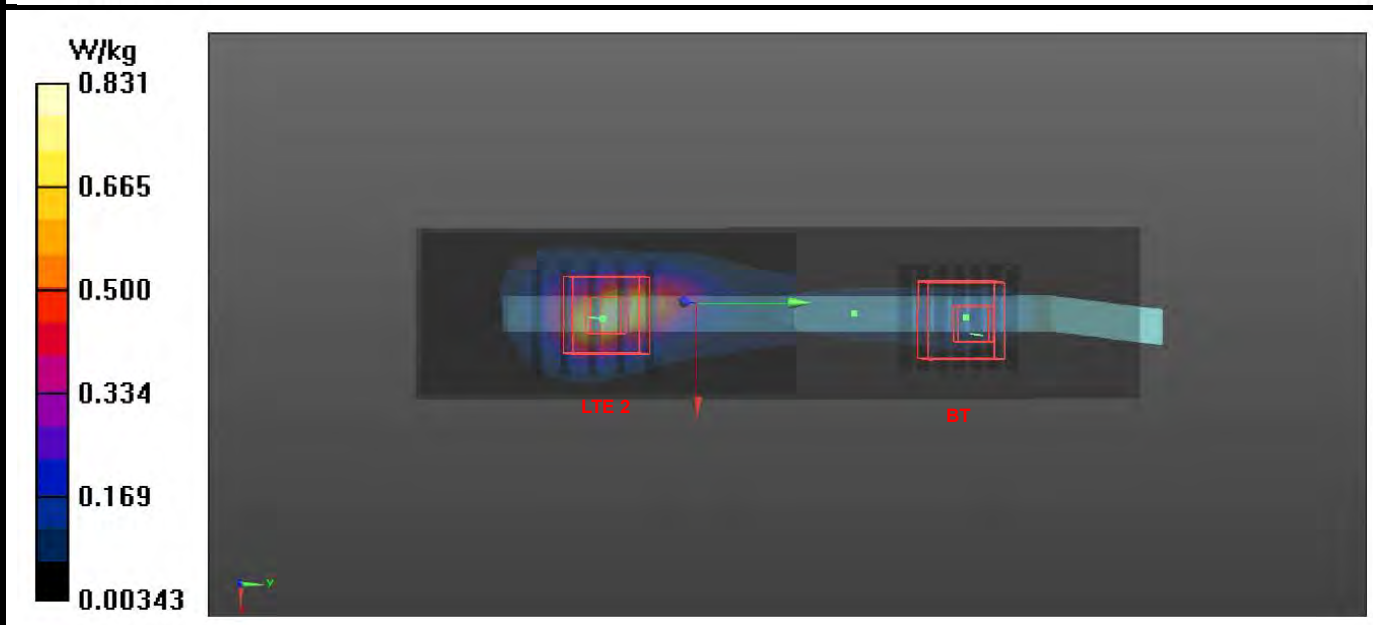
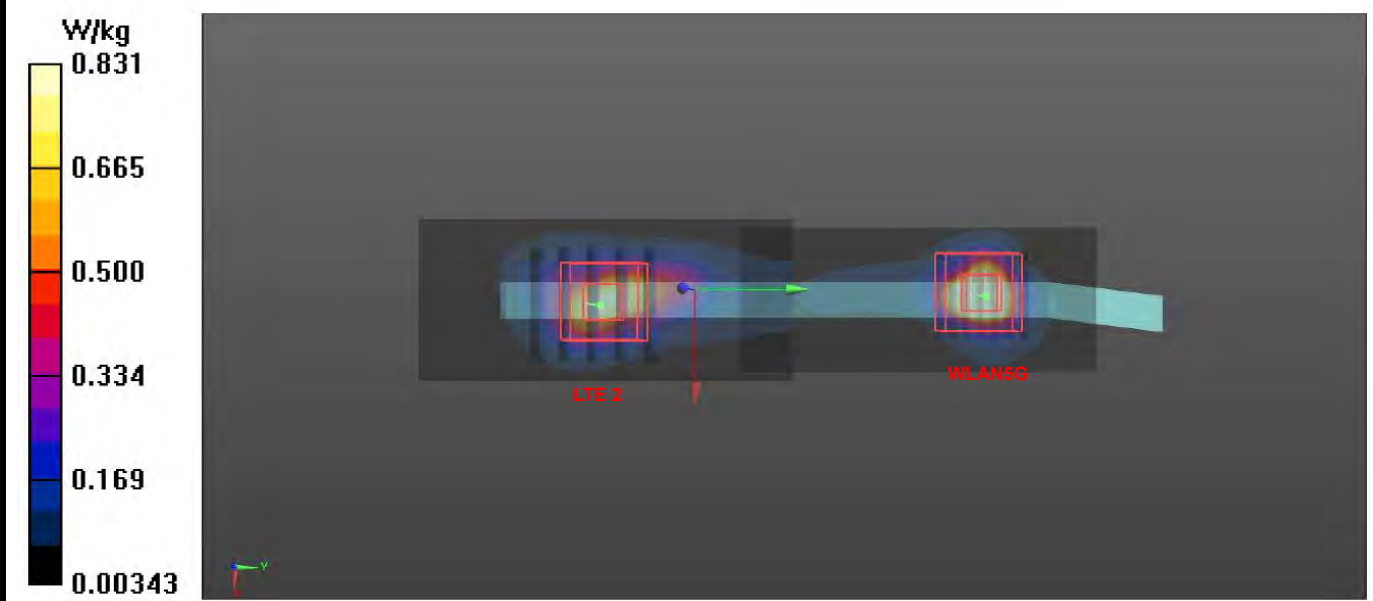
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 2	Rear Face	1.09	0	0.041	0.12	-0.179	97.9	1.75	0.02	Not required
WLAN5G		0.65	0	-0.055	0.101	-0.181				
LTE 2	Rear Face	1.09	0	0.041	0.12	-0.179	109.4	1.42	0.02	Not required
BT		0.32	0	-0.0684	0.121	-0.182				



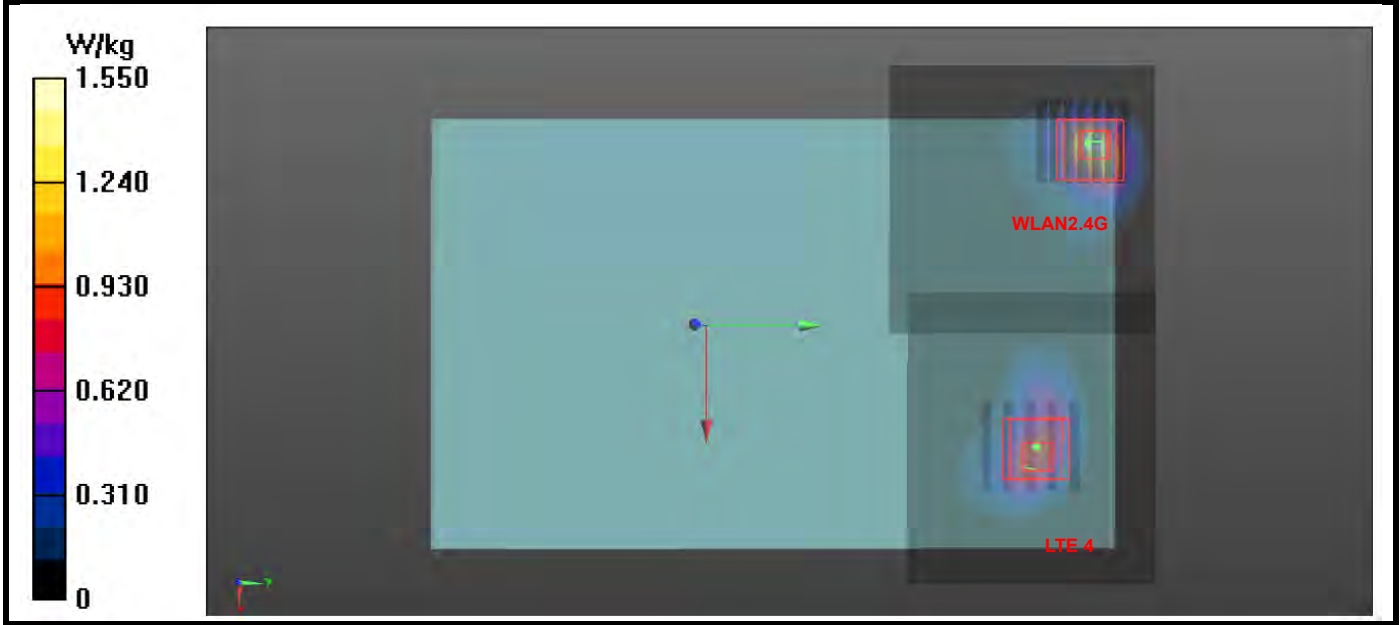
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 2	Top Side	0.98	0	0.0015	-0.049	-0.18	108.0	2.04	0.03	Not required
WLAN5G		1.06	0	-0.001	0.059	-0.182				
LTE 2	Top Side	0.98	0	0.0015	-0.049	-0.18	106.9	1.14	0.01	Not required
BT		0.16	0	0.0062	0.0578	-0.182				



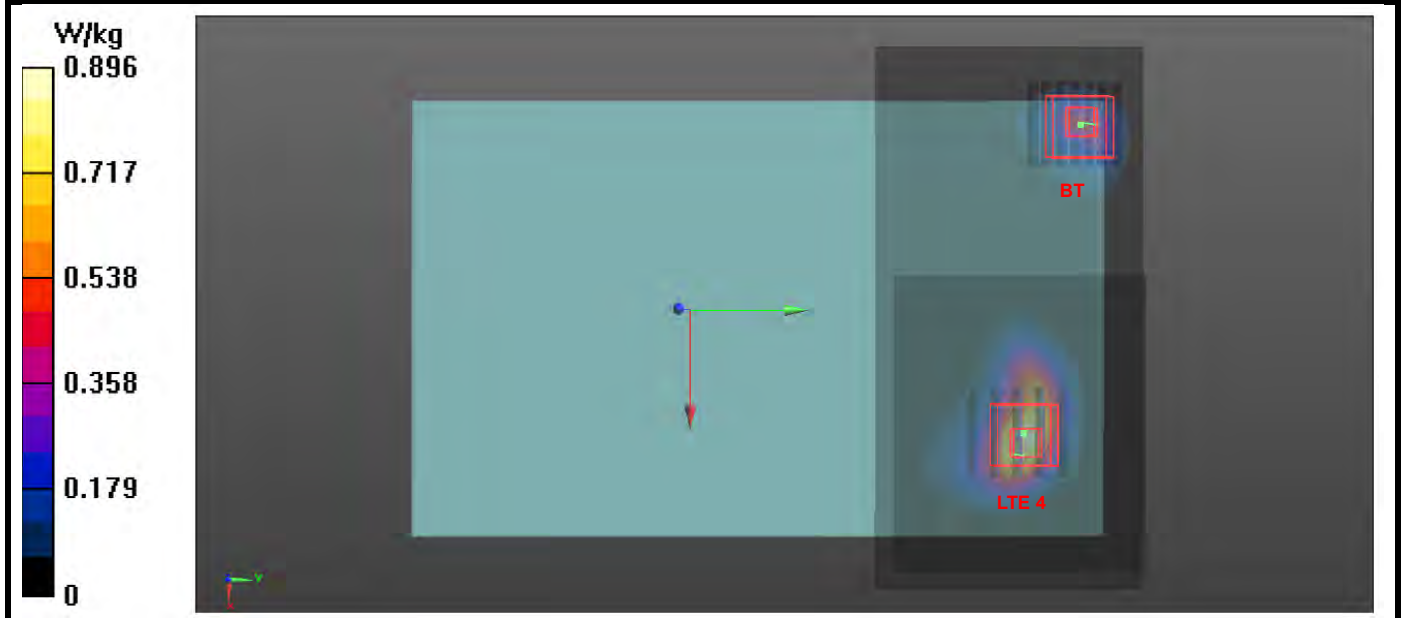
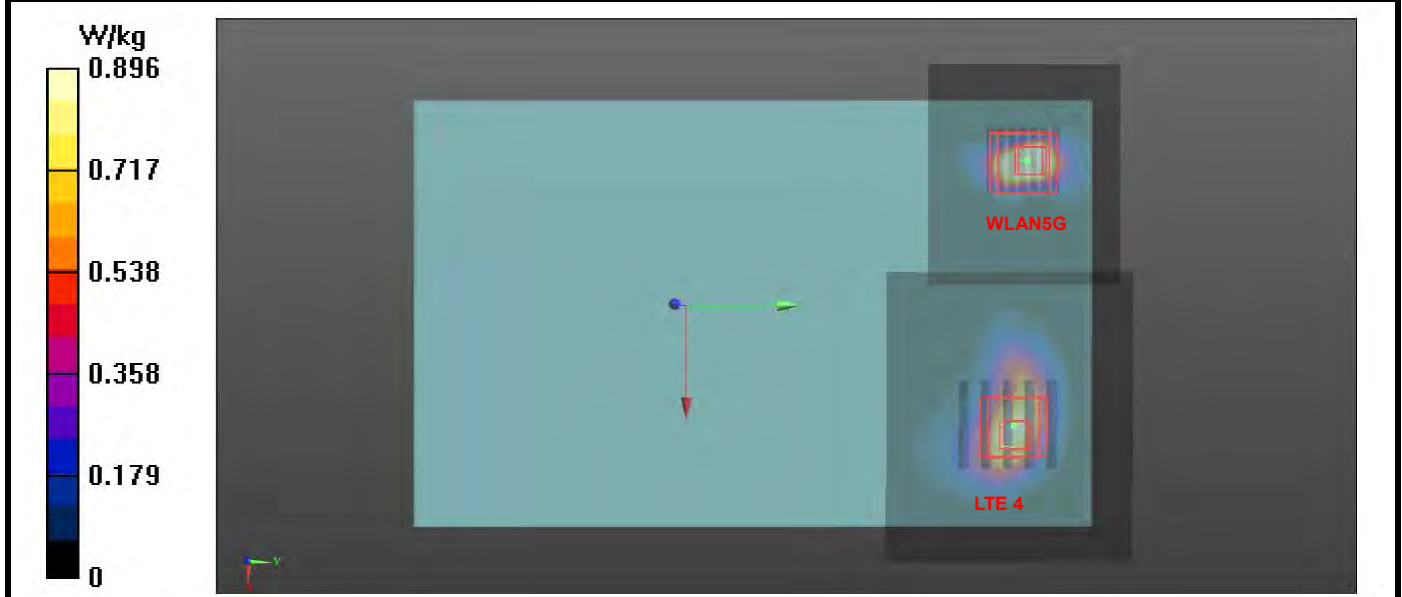
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 4	Rear Face	1.07	0	0.0485	0.0965	-0.179	119.3	2.16	0.03	Not required
WLAN2.4G		1.09	0	-0.0684	0.12	-0.181				



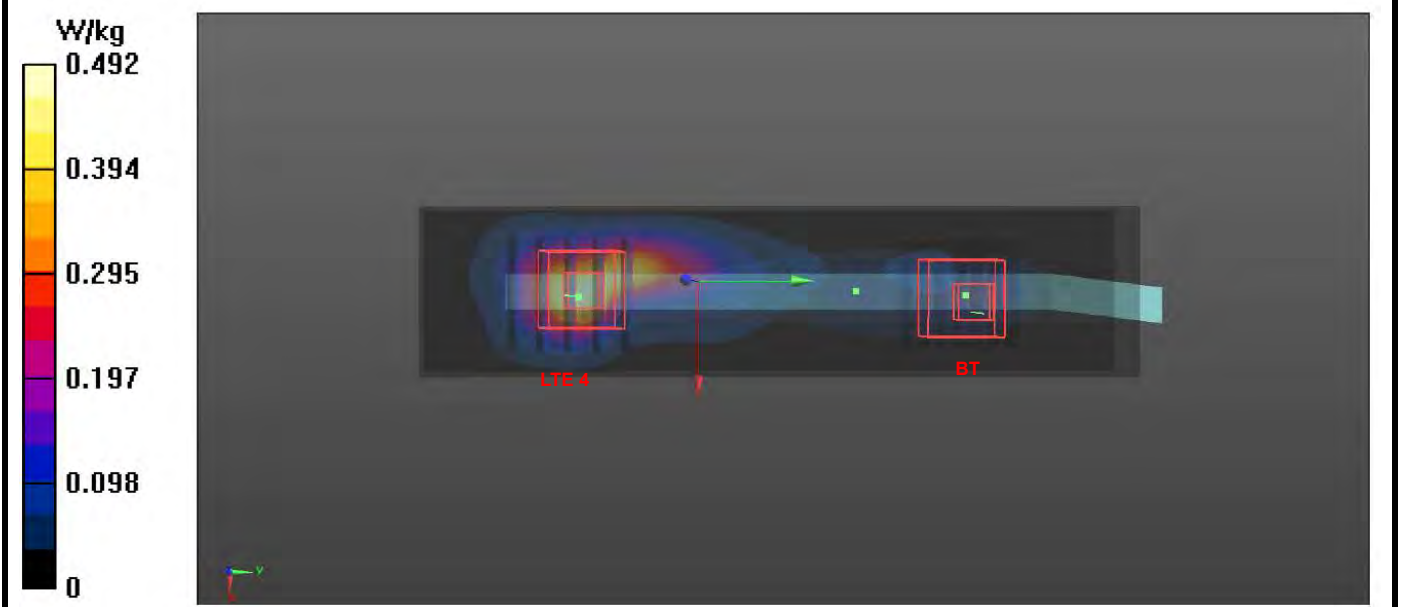
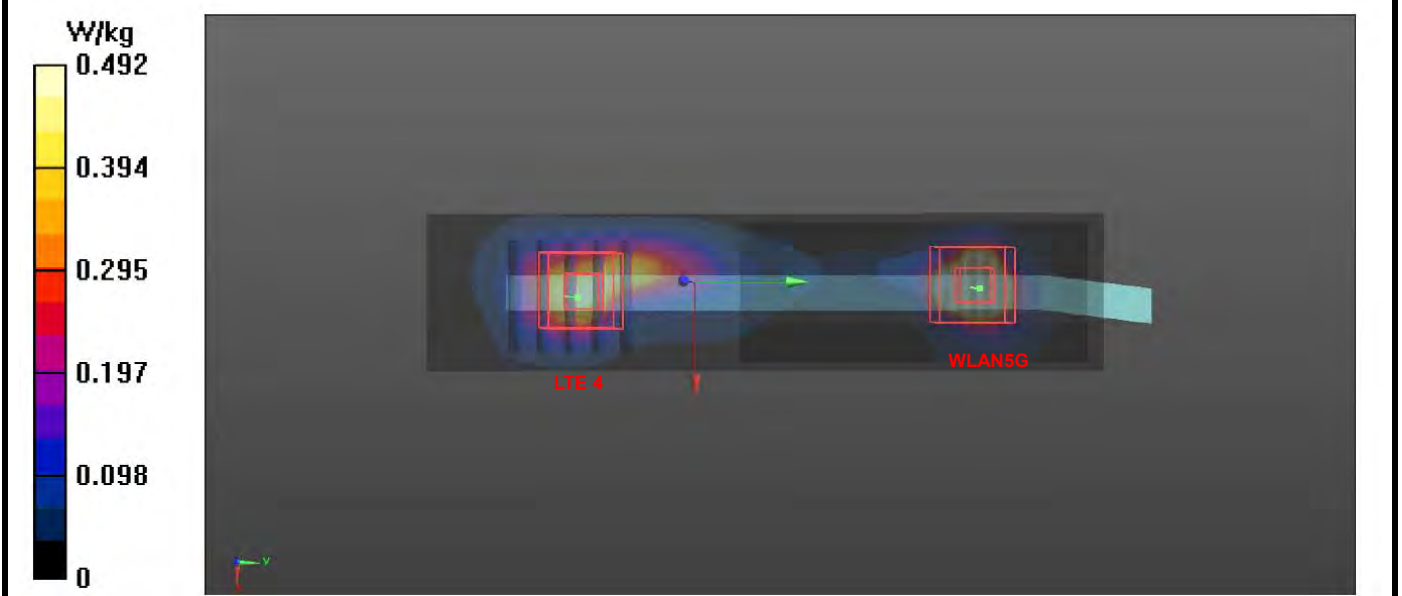
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 4	Rear Face	1.07	0	0.0485	0.0965	-0.179	103.6	1.73	0.02	Not required
WLAN5G		0.65	0	-0.055	0.101	-0.181				
LTE 4	Rear Face	1.07	0	0.0485	0.0965	-0.179	119.5	1.40	0.01	Not required
BT		0.32	0	-0.0684	0.121	-0.182				



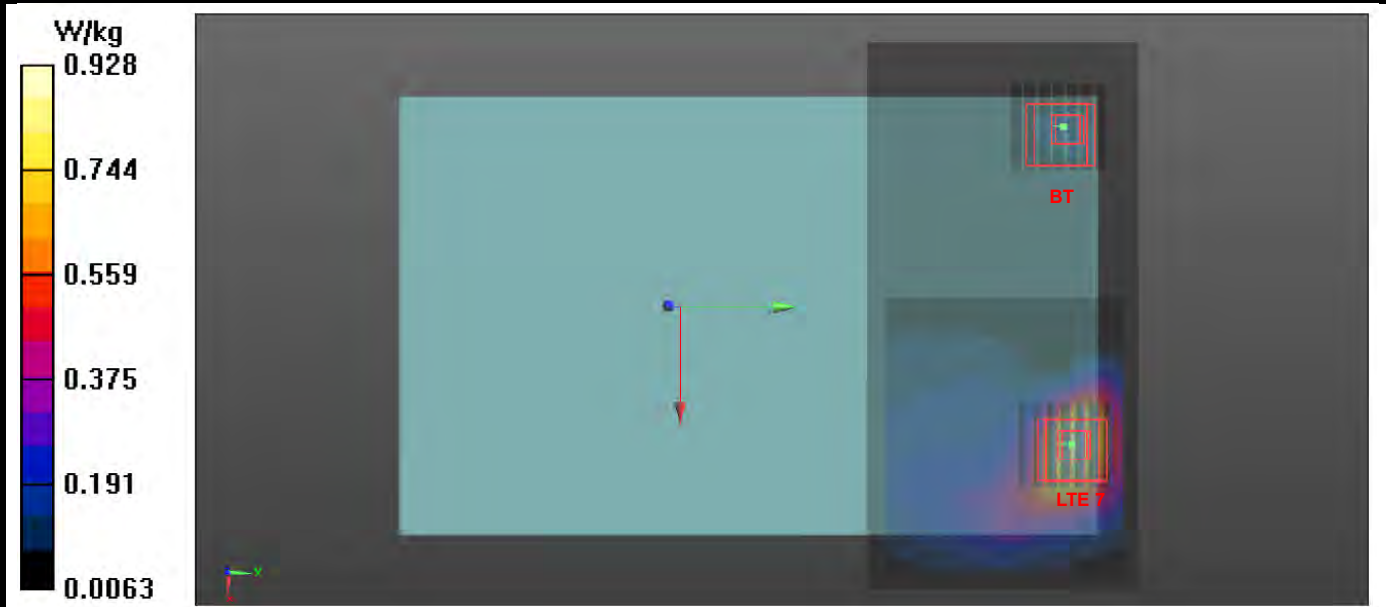
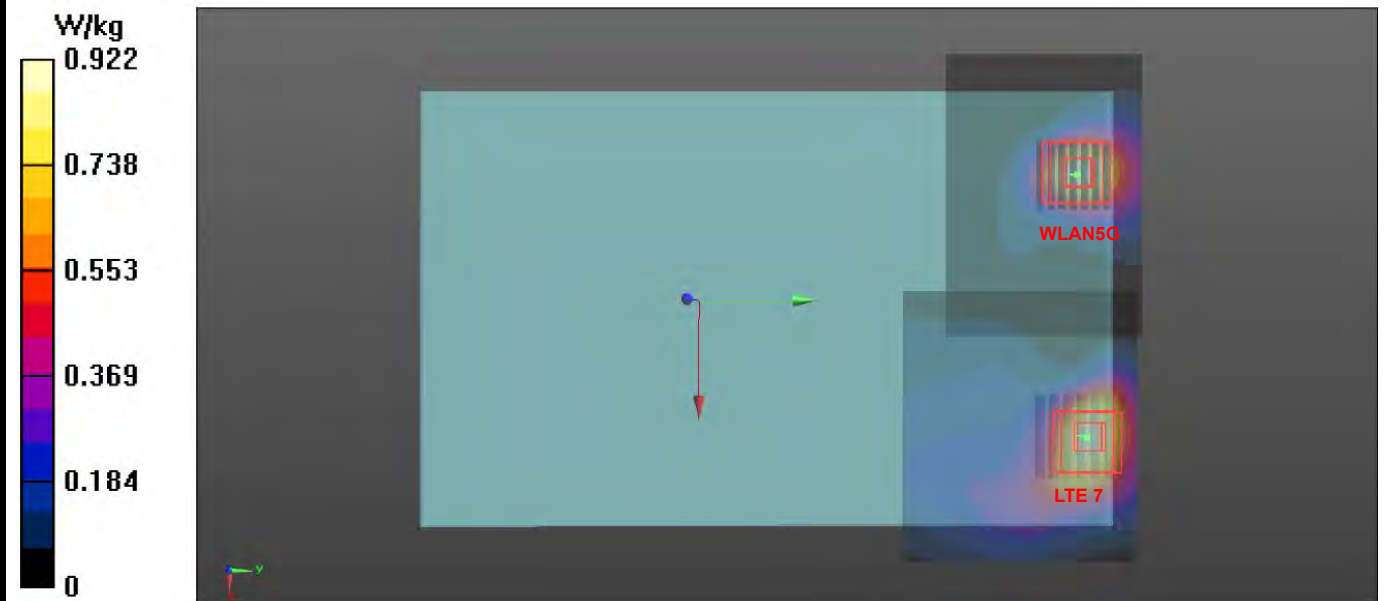
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 4	Top Side	0.68	0	0.0015	-0.0565	-0.18	115.5	1.74	0.02	Not required
WLAN5G		1.06	0	-0.001	0.059	-0.182				
LTE 4	Top Side	0.68	0	0.0015	-0.0565	-0.18	114.4	0.85	0.01	Not required
BT		0.16	0	0.0062	0.0578	-0.182				



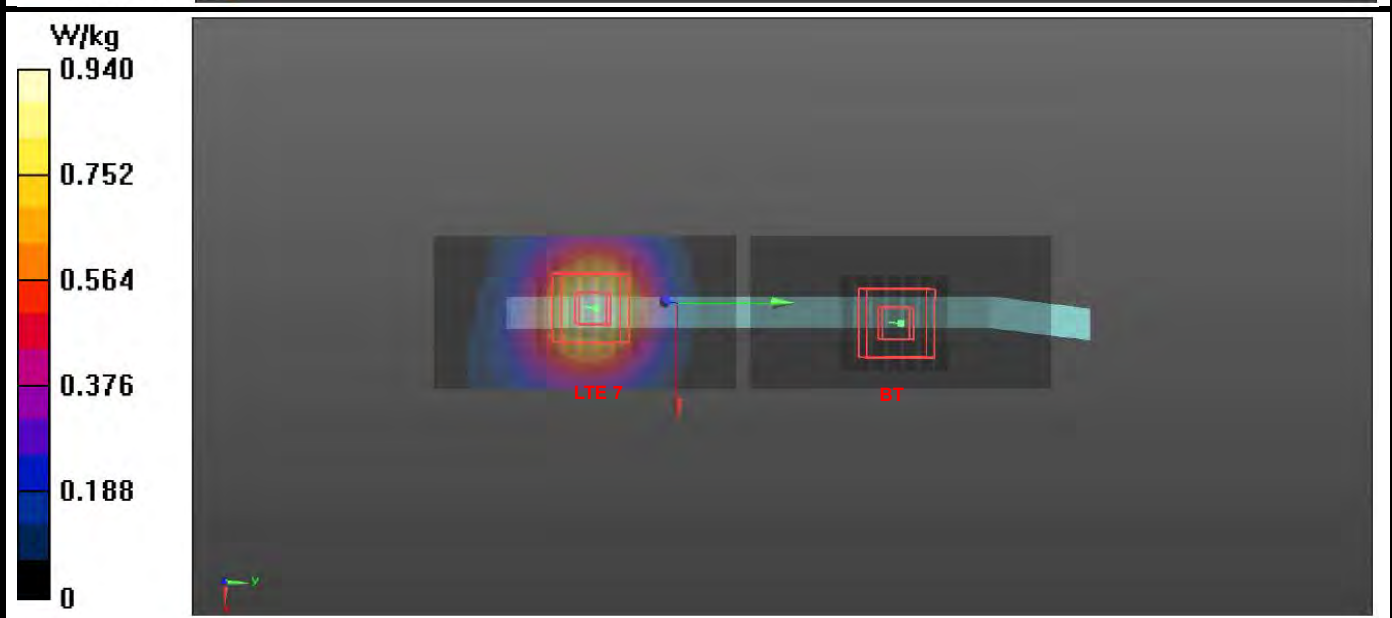
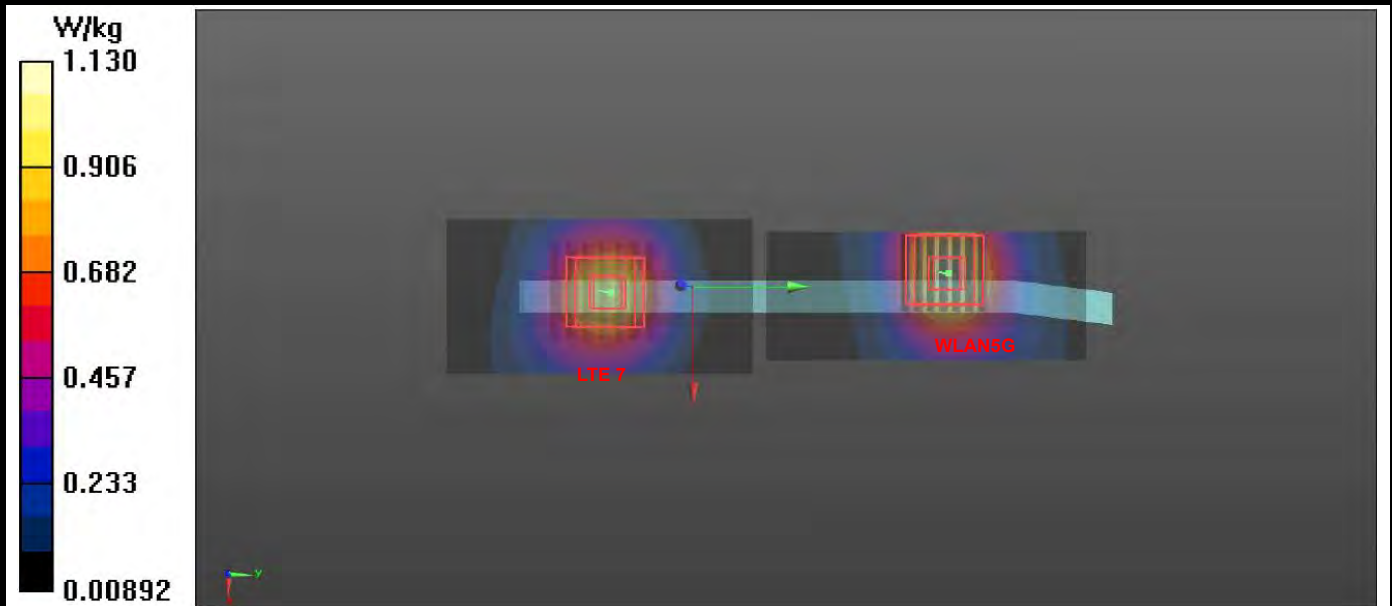
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 7	Rear Face	1.05	15	0.0456	0.116	-0.18	92.7	1.60	0.02	Not required
WLAN5G		0.55	15	-0.047	0.112	-0.182				
LTE 7	Rear Face	1.05	15	0.0456	0.116	-0.18	111.7	1.14	0.01	Not required
BT		0.09	15	-0.066	0.113	-0.182				



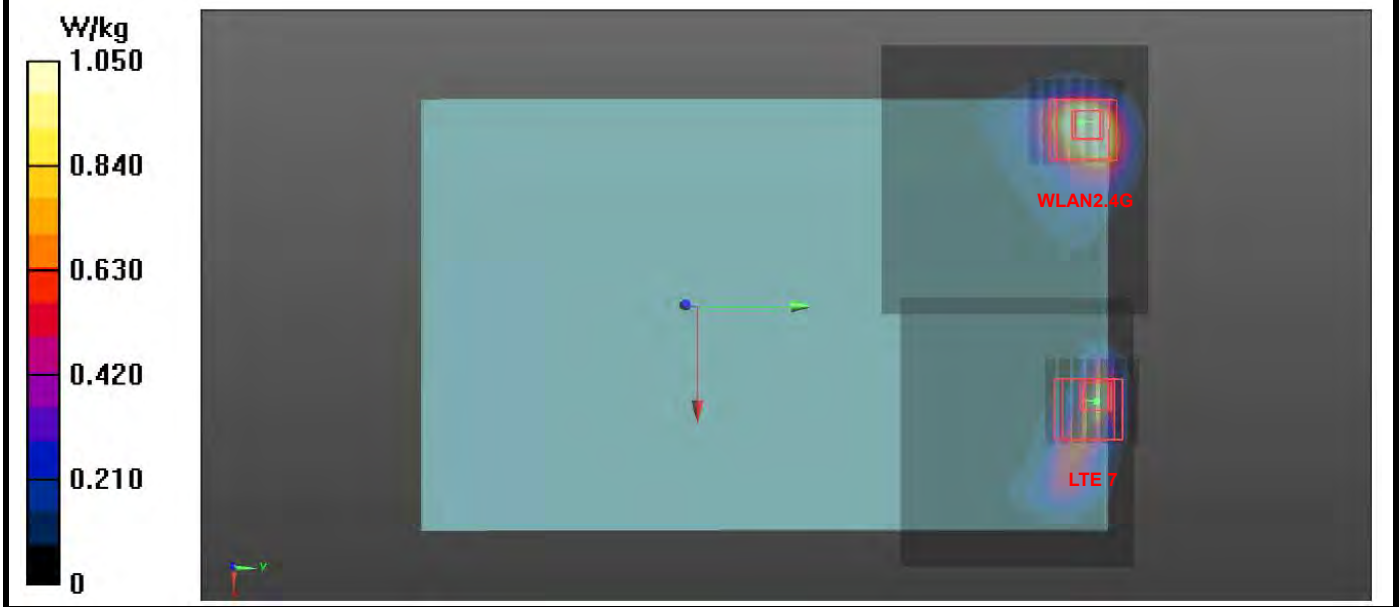
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 7	Top Side	1.09	25	-0.0012	-0.0484	-0.18	105.6	1.79	0.02	Not required
802.11a		0.70	25	-0.007	0.057	-0.183				
LTE 7	Top Side	1.09	25	-0.0012	-0.0484	-0.18	96.6	1.11	0.01	Not required
BT		0.02	25	0.0036	0.048	-0.183				



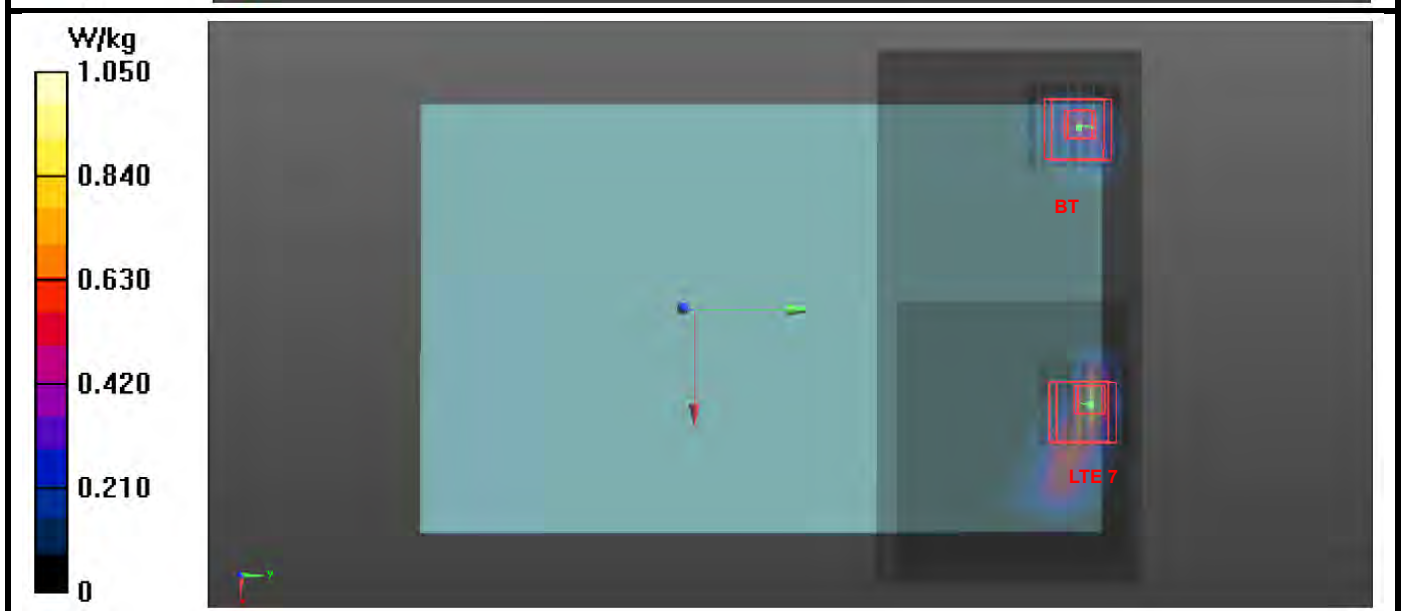
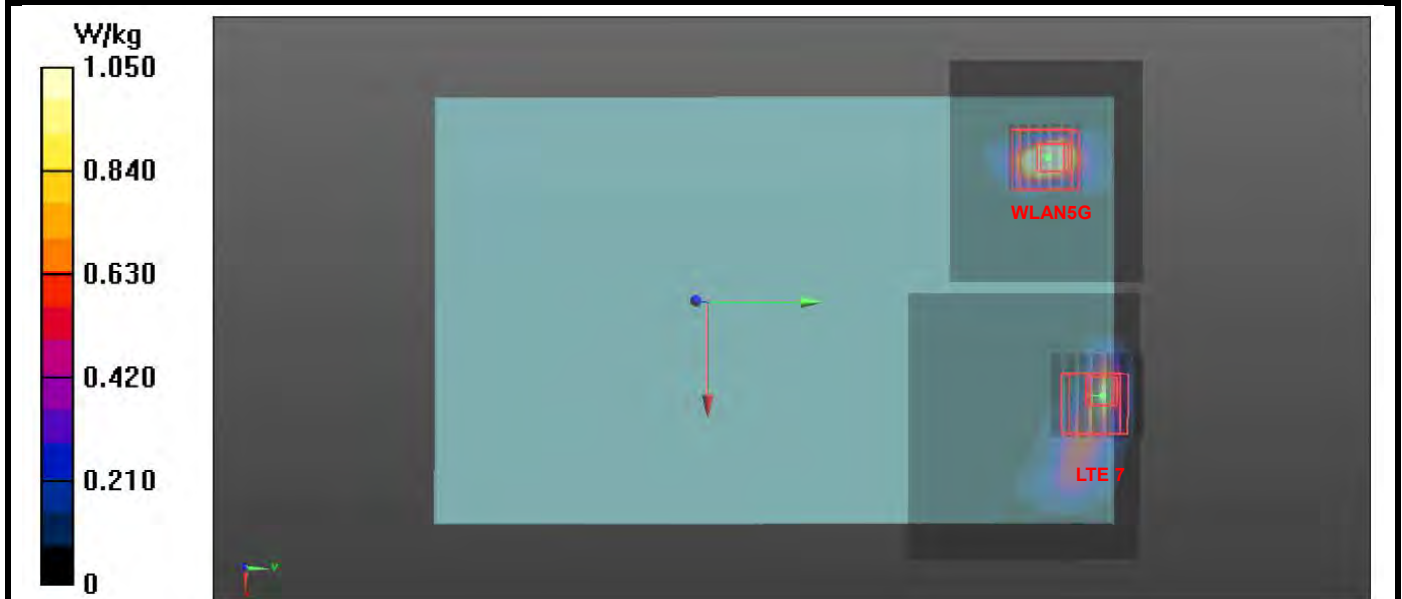
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 7	Rear Face	0.64	0	0.0312	0.121	-0.181	99.6	1.73	0.02	Not required
WLAN2.4G		1.09	0	-0.0684	0.12	-0.181				



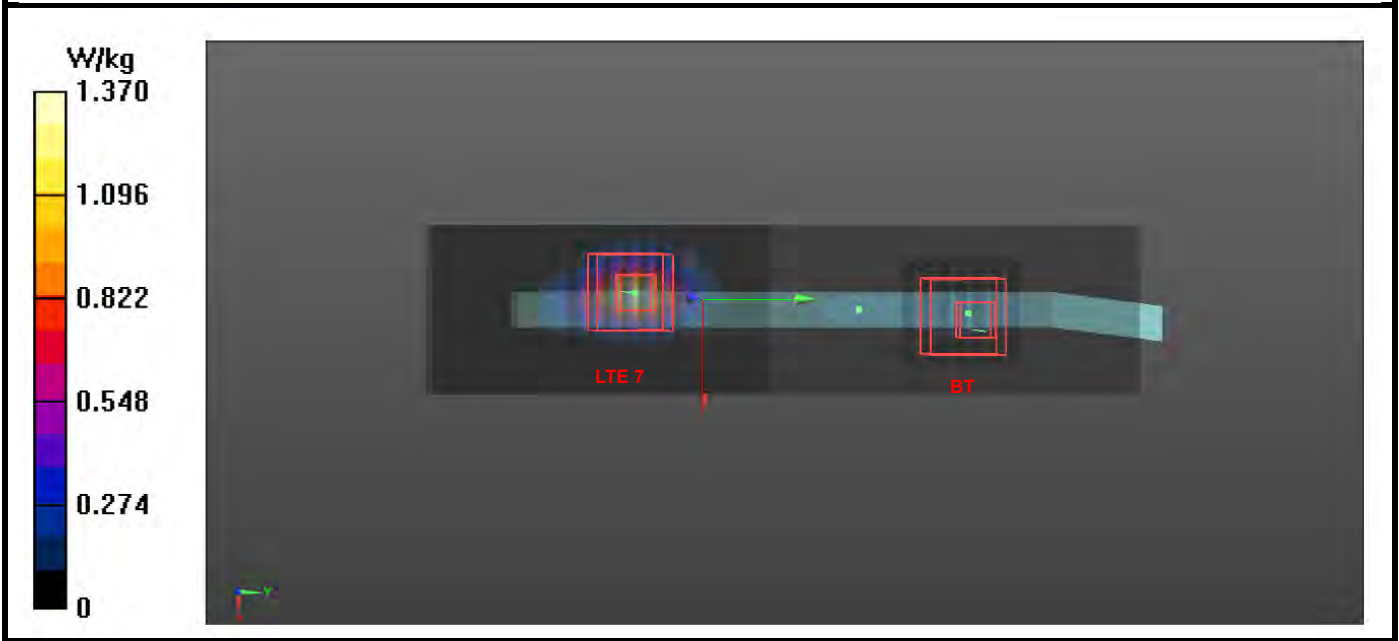
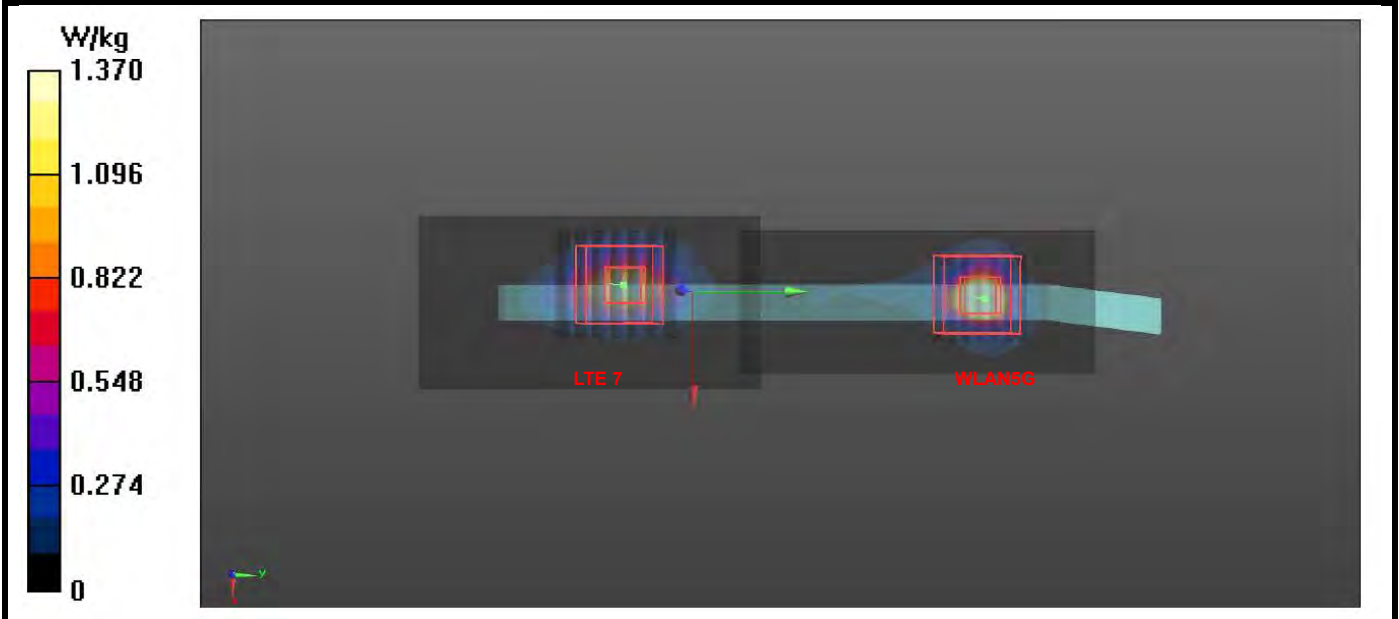
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 7	Rear Face	0.64	0	0.0312	0.121	-0.181	88.5	1.29	0.02	Not required
WLAN5G		0.65	0	-0.055	0.101	-0.181				
LTE 7	Rear Face	0.64	0	0.0312	0.121	-0.181	99.6	0.96	0.01	Not required
BT		0.32	0	-0.0684	0.121	-0.182				



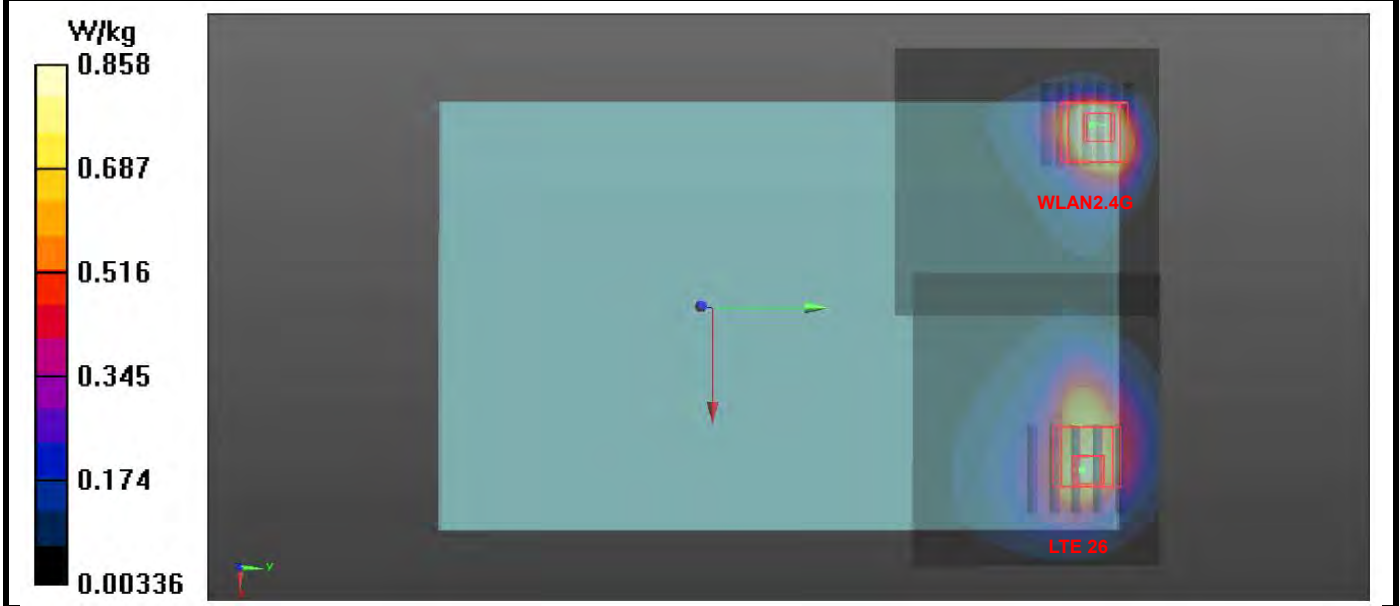
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 7	Top Side	0.92	0	-0.0048	-0.0424	-0.183	101.5	1.98	0.03	Not required
WLAN5G		1.06	0	-0.001	0.059	-0.182				
LTE 7	Top Side	0.92	0	-0.0048	-0.0424	-0.183	100.8	1.08	0.01	Not required
BT		0.16	0	0.0062	0.0578	-0.182				



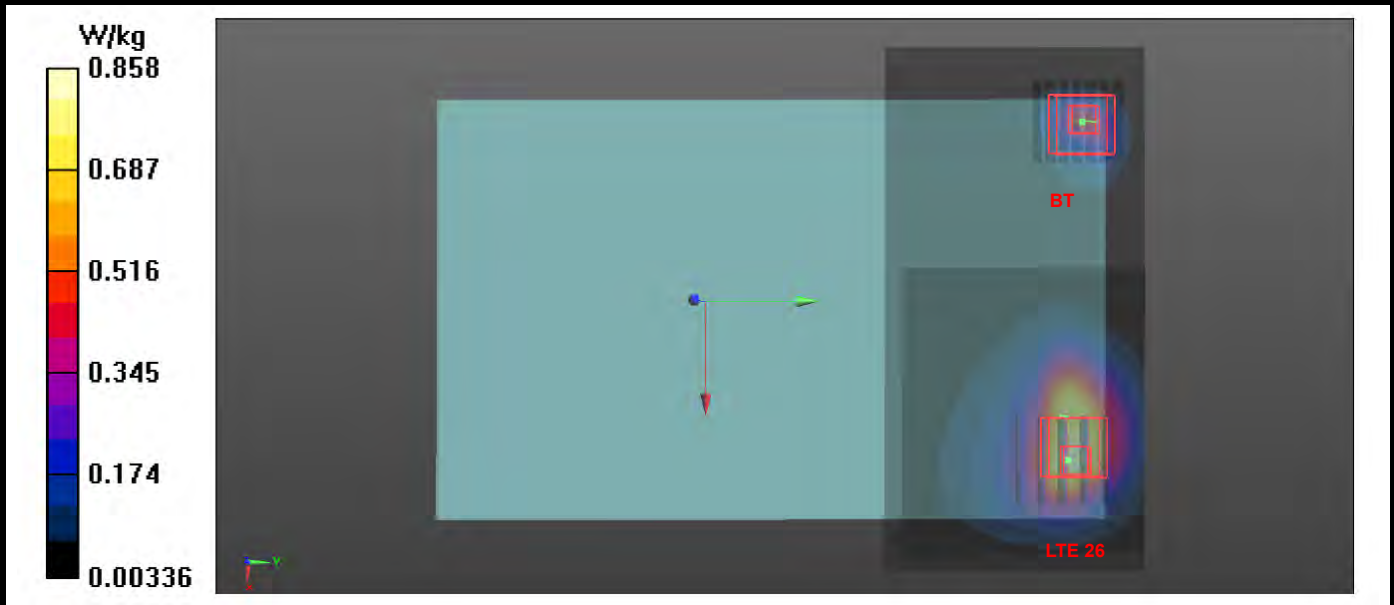
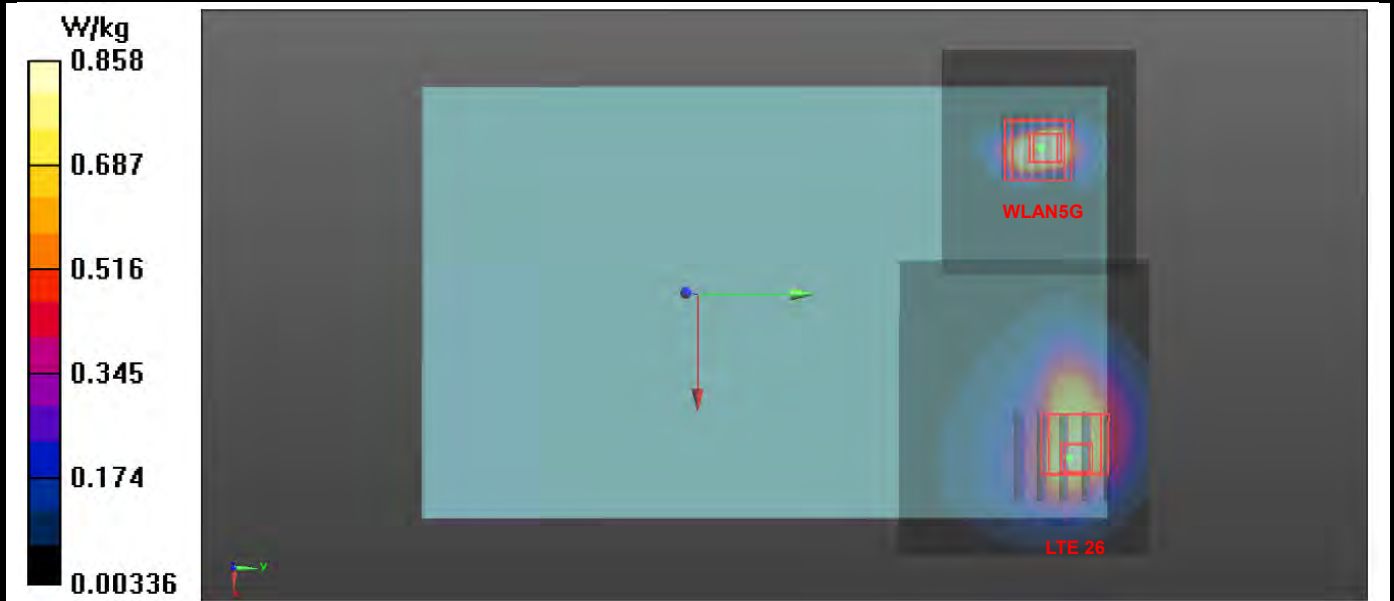
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 26	Rear Face	1.09	0	0.0395	0.112	-0.179	108.2	2.17	0.03	Not required
WLAN2.4G		1.09	0	-0.0684	0.12	-0.181				



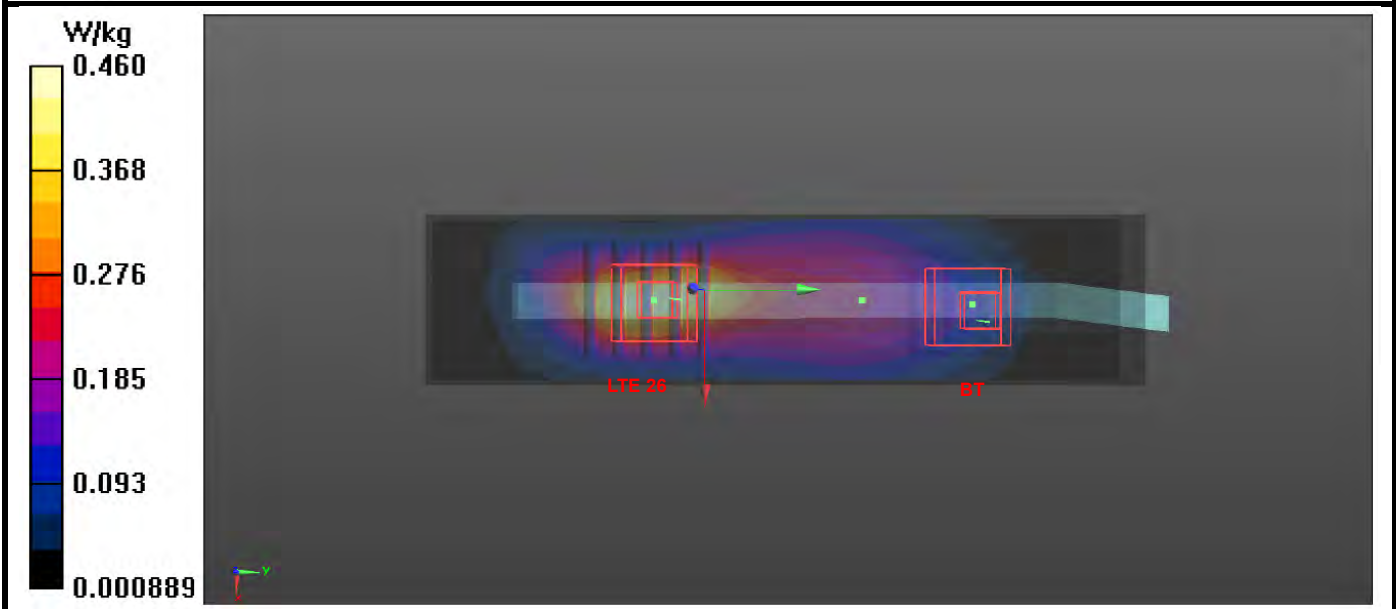
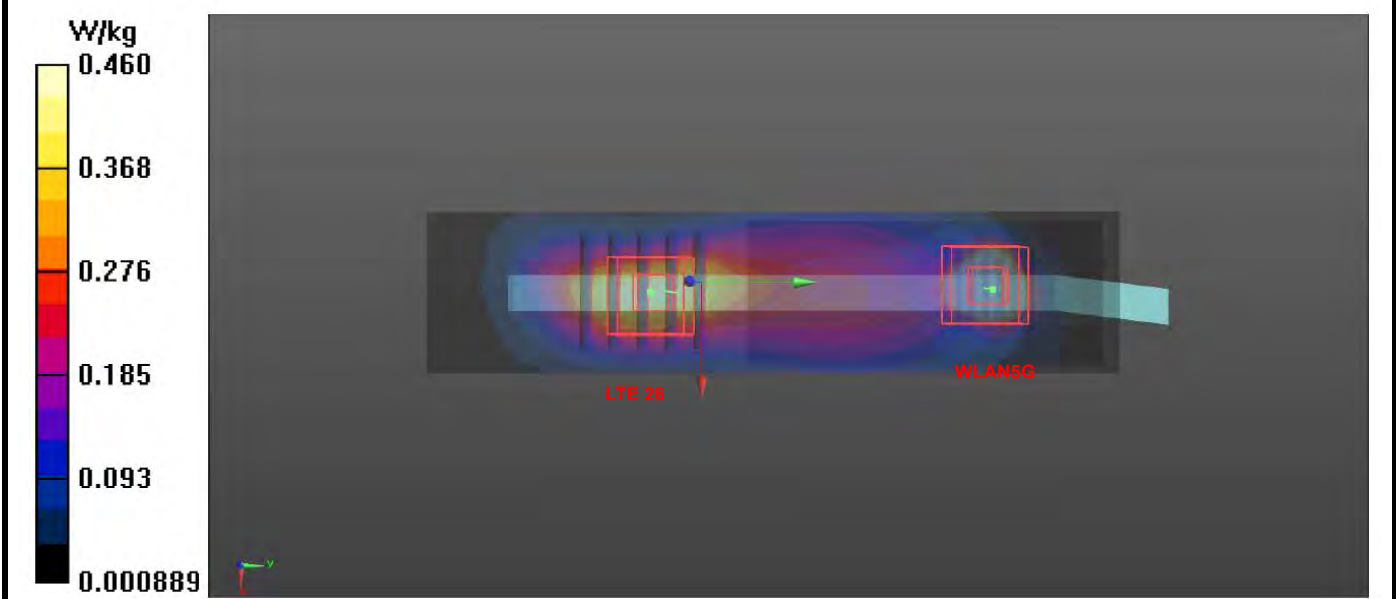
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 26	Rear Face	1.09	0	0.0395	0.112	-0.179	95.2	1.74	0.02	Not required
WLAN5G		0.65	0	-0.055	0.101	-0.181				
LTE 26	Rear Face	1.09	0	0.0395	0.112	-0.179	108.3	1.41	0.02	Not required
BT		0.32	0	-0.0684	0.121	-0.182				



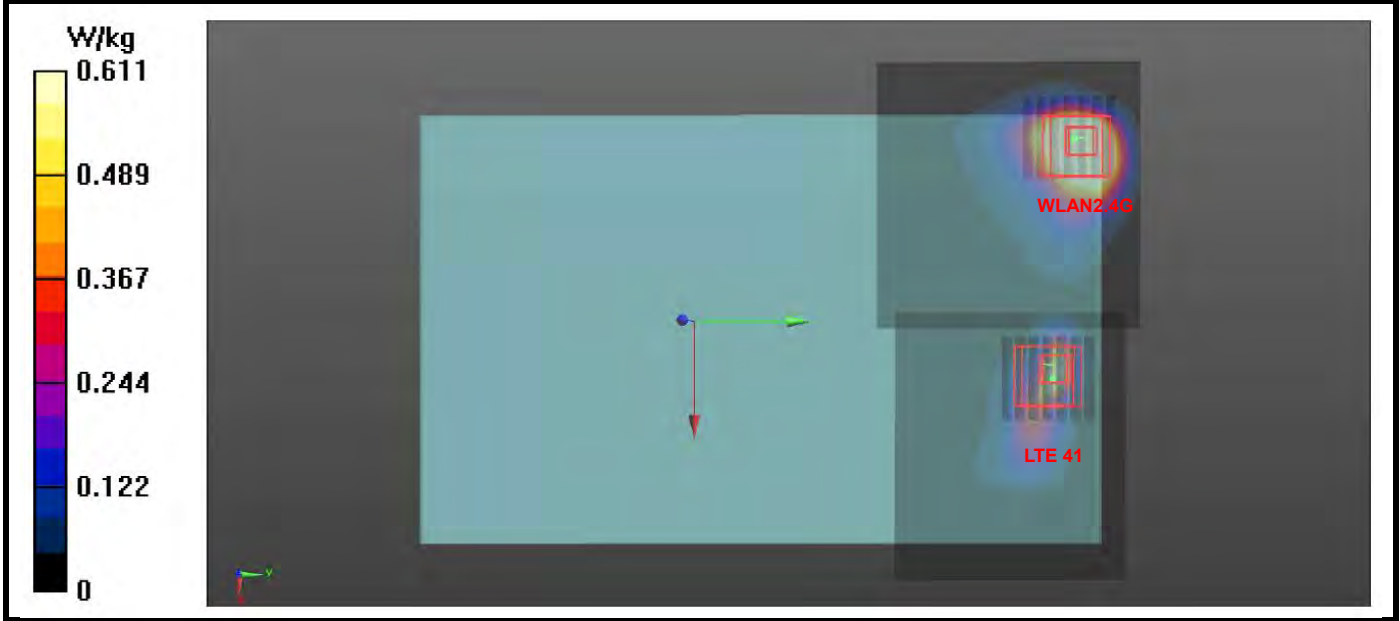
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 26	Top Side	0.67	0	8.74E-11	-0.029	-0.18	88.0	1.73	0.03	Not required
WLAN5G		1.06	0	-0.001	0.059	-0.182				
LTE 26	Top Side	0.67	0	8.74E-11	-0.029	-0.18	87.0	0.83	0.01	Not required
BT		0.16	0	0.0062	0.0578	-0.182				



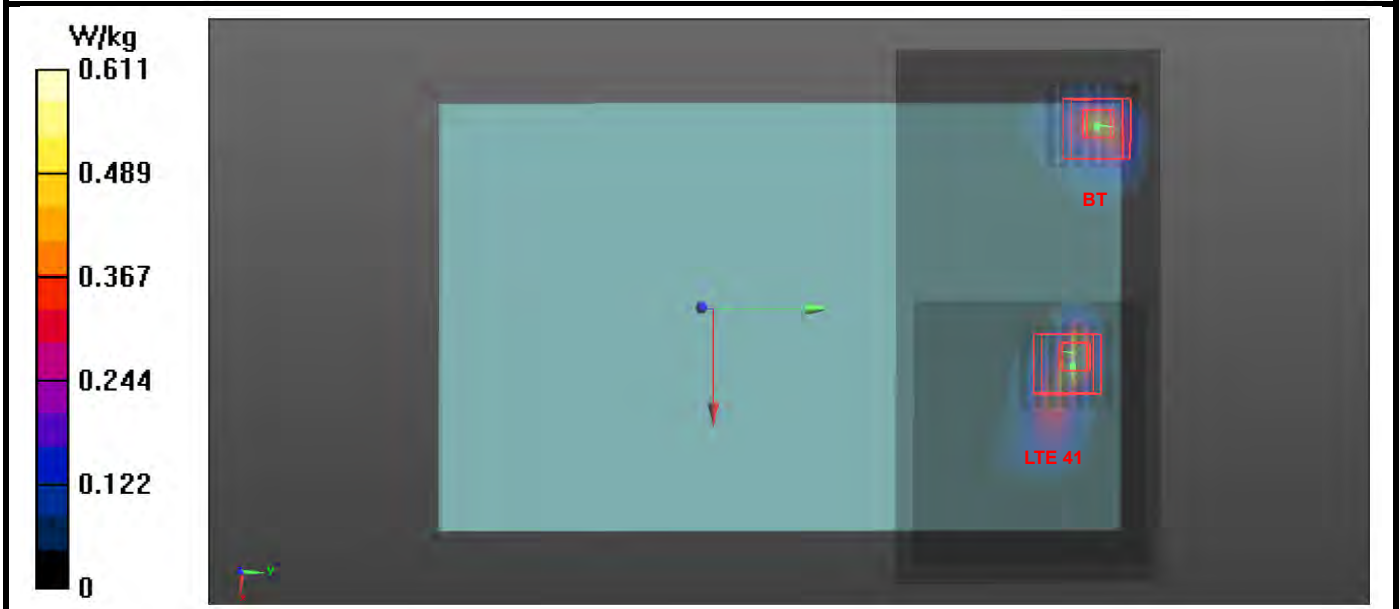
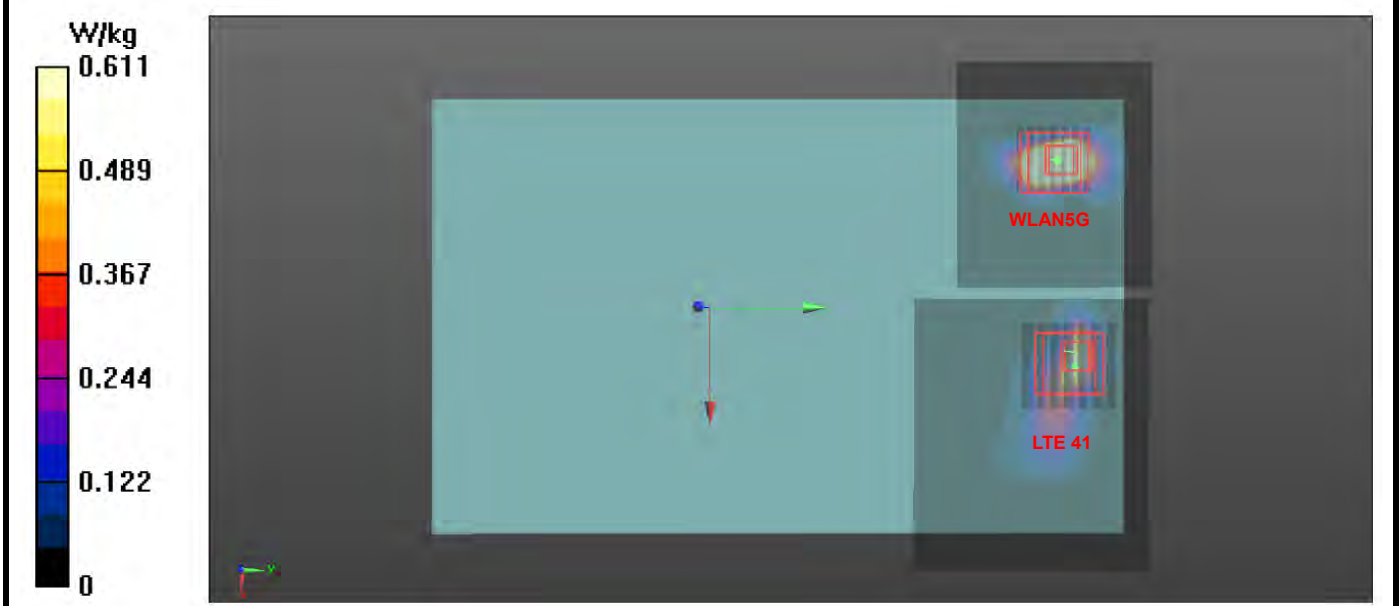
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 41	Rear Face	0.75	0	0.013	0.108	-0.18	82.3	1.84	0.03	Not required
WLAN2.4G		1.09	0	-0.0684	0.12	-0.181				



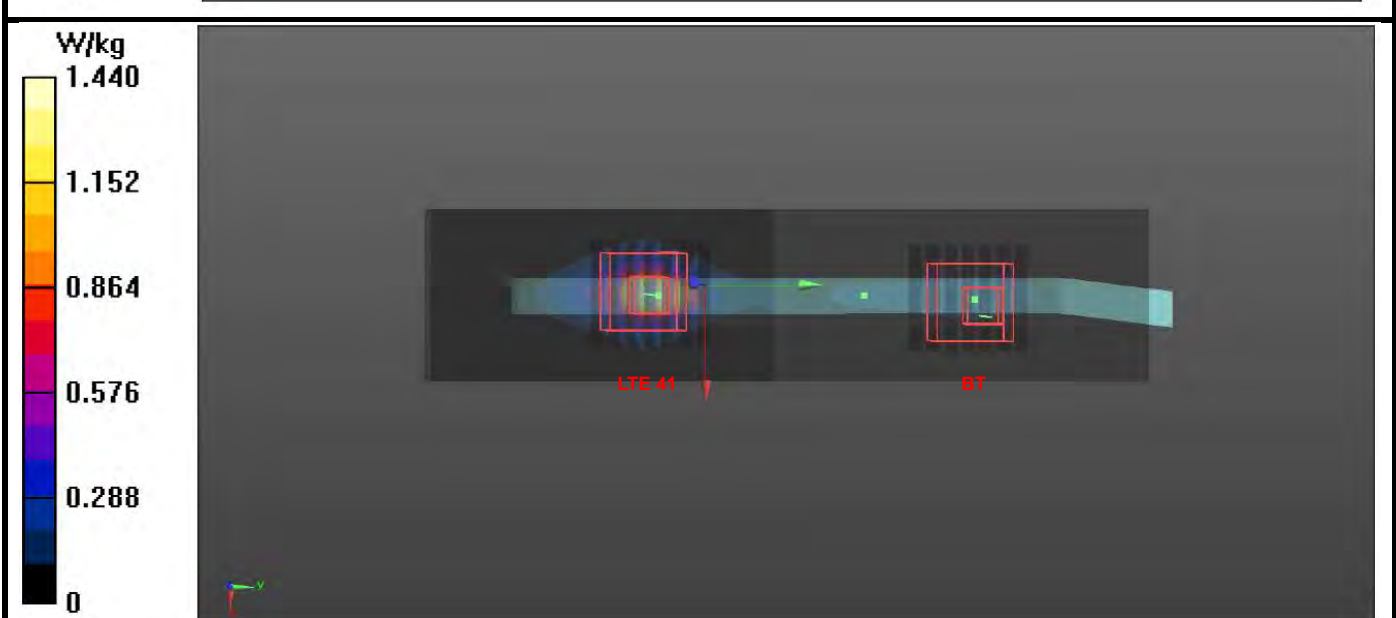
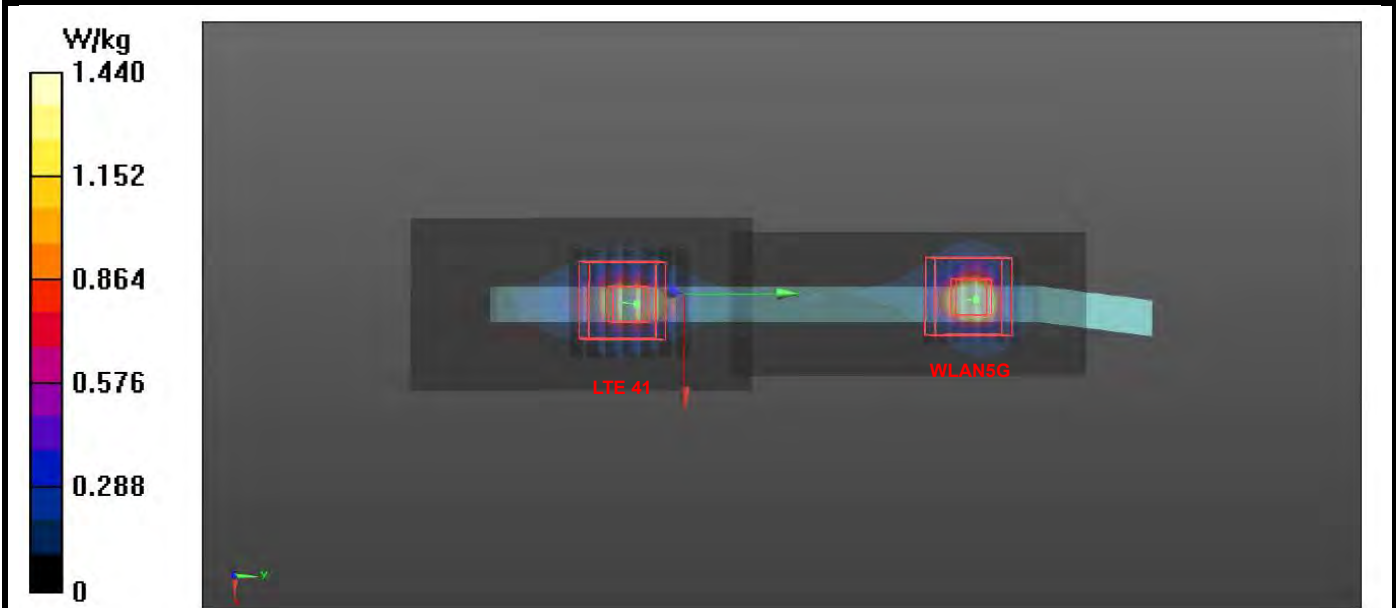
FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 41	Rear Face	0.75	0	0.013	0.108	-0.18	68.4	1.40	0.02	Not required
WLAN5G		0.65	0	-0.055	0.101	-0.181				
LTE 41	Rear Face	0.75	0	0.013	0.108	-0.18	82.5	1.07	0.01	Not required
BT		0.32	0	-0.0684	0.121	-0.182				



FCC SAR Test Report

Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (m)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
LTE 41	Top Side	1.02	0	8.74E-11	-0.0364	-0.183	95.4	2.08	0.03	Not required
WLAN5G		1.06	0	-0.001	0.059	-0.182				
LTE 41	Top Side	1.02	0	8.74E-11	-0.0364	-0.183	94.4	1.18	0.01	Not required
BT		0.16	0	0.0062	0.0578	-0.182				



Test Engineer : Yuyu Lu, and Dennis Ye

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	D835V2	4d139	Aug. 28, 2020	1 Year
System Validation Dipole	SPEAG	D1750V2	1071	Aug. 29, 2020	1 Year
System Validation Dipole	SPEAG	D1900V2	5d159	Aug. 27, 2020	1 Year
System Validation Dipole	SPEAG	D2450V2	893	Aug. 27, 2020	1 Year
System Validation Dipole	SPEAG	D2600V2	1110	Aug. 29, 2020	1 Year
System Validation Dipole	SPEAG	D5GHzV2	1133	Aug. 20, 2020	1 Year
Dielectric Probe Kit	SPEAG	DAK-3.5	1076	Aug. 19, 2020	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3873	Aug. 27, 2020	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1341	Aug. 26, 2020	1 Year
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 25, 2021	1 Year
Wireless Communication Test Set	Agilent	E5515C	MY50260600	Jun. 03, 2020	1 Year
ENA Series Network Analyzer	Agilent	E5071C	MY46214638	Jun. 03, 2020	1 Year
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510355	Jul. 08, 2020	1Year
MXG Analog Signal Generator	KEYSIGHT	N5183A	MY50143024	Mar. 09, 2021	1 Year
Power Sensor	R&S	NRP-Z21	105007	Oct. 14, 2020	1 Year
Power Meter	Agilent	N1914A	MY52180044	Mar. 02, 2021	1 Year
Power Sensor	Agilent	E9304A H18	MY52050011	Feb. 25, 2021	1 Year
Temp. & Humi. Recorder	CLOCK	HTC-1	157248	Jun. 07, 2020	1 Year
Electronic Thermometer	YONGFA	YF-160A	120100323	Jun. 07, 2020	1 Year
Coupler	Woken	0110A056020-10	COM27RW1A3	Jul. 01, 2020	1 Year

6. Measurement Uncertainty

DASY5 Uncertainty Budget								
Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)	(Vi) Veff
Measurement System								
Probe Calibration	6.0	N	1	1	1	6.0	6.0	∞
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9	∞
Boundary Effects	1.0	R	1.732	1	1	0.6	0.6	∞
Linearity	4.7	R	1.732	1	1	2.7	2.7	∞
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6	∞
Modulation Response	3.2	R	1.732	1	1	1.8	1.8	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0.0	R	1.732	1	1	0.0	0.0	∞
Integration Time	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7	∞
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.732	1	1	1.7	1.7	∞
Max. SAR Eval.	2.0	R	1.732	1	1	1.2	1.2	∞
Test Sample Related								
Device Positioning	3.0	N	1	1	1	3.0	3.0	35
Device Holder	3.6	N	1	1	1	3.6	3.6	12
Power Drift	5.0	R	1.732	1	1	2.9	2.9	∞
Power Scaling	0.0	R	1.732	1	1	0.0	0.0	∞
Phantom and Setup								
Phantom Uncertainty	6.1	R	1.732	1	1	3.5	3.5	∞
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0	∞
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1	5
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0	∞
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0	∞
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0	5
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8	∞
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4	∞
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1	∞
Combined Std. Uncertainty						11.4%	11.4%	1013
Coverage Factor for 95 %						K=2	K=2	
Expanded STD Uncertainty						22.9%	22.7%	

Uncertainty budget for frequency range 30 MHz to 3 GHz

FCC SAR Test Report

DASY5 Uncertainty Budget								
Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)	(Vi) Veff
Measurement System								
Probe Calibration	6.55	N	1	1	1	6.5	6.5	∞
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9	∞
Boundary Effects	2.0	R	1.732	1	1	1.2	1.2	∞
Linearity	4.7	R	1.732	1	1	2.7	2.7	∞
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6	∞
Modulation Response	3.2	R	1.732	1	1	1.8	1.8	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0.0	R	1.732	1	1	0.0	0.0	∞
Integration Time	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7	∞
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2	∞
Probe Positioning	6.7	R	1.732	1	1	3.9	3.9	∞
Max. SAR Eval.	4.0	R	1.732	1	1	2.3	2.3	∞
Test Sample Related								
Device Positioning	3.0	N	1	1	1	3.0	3.0	35
Device Holder	3.6	N	1	1	1	3.6	3.6	12
Power Drift	5.0	R	1.732	1	1	2.9	2.9	∞
Power Scaling	0.0	R	1.732	1	1	0.0	0.0	∞
Phantom and Setup								
Phantom Uncertainty	6.6	R	1.732	1	1	3.8	3.8	∞
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0	∞
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1	5
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0	∞
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0	∞
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0	5
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8	∞
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4	∞
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1	∞
Combined Std. Uncertainty						12.5%	12.5%	1458
Coverage Factor for 95 %						K=2	K=2	
Expanded STD Uncertainty						25.0%	24.9%	

Uncertainty budget for frequency range 3 GHz to 6 GHz

7. Information on the Testing Laboratories

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Add: No. B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industry Park, Nanshan District, Shenzhen, Guangdong, China

Tel: 86-755-8869-6566

Fax: 86-755-8869-6577

Email: customerservice.SW@cn.bureauveritas.com

Web Site: www.bureauveritas.com

The road map of all our labs can be found in our web site also.

---END---



Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.



Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

P01 GSM850_GPRS12_Rear Face_0mm_Ch251

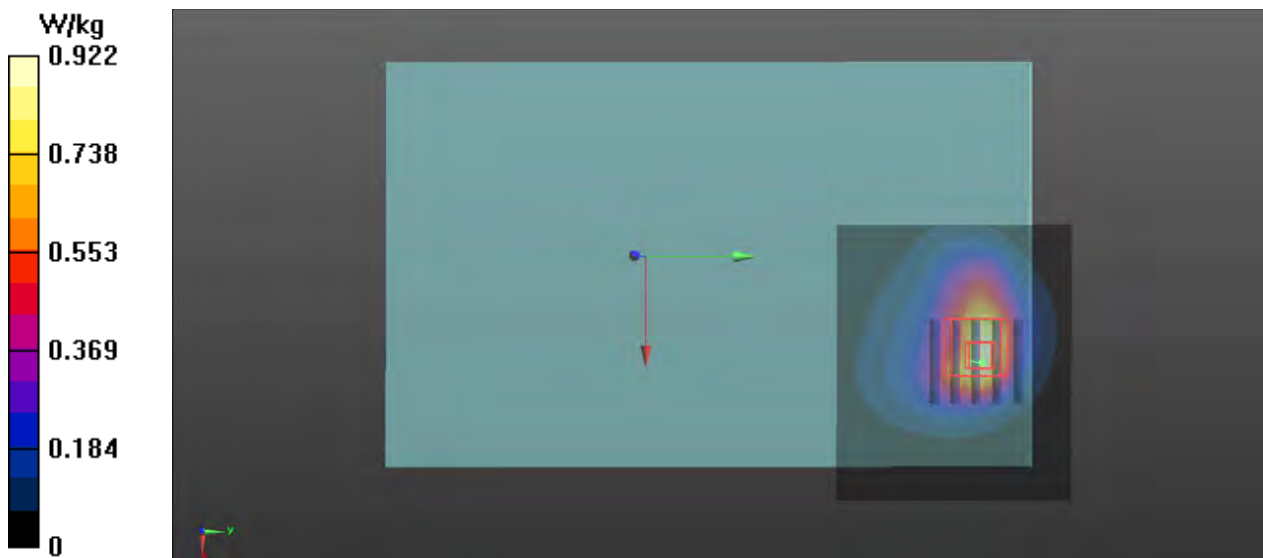
Communication System: GPRS12; Frequency: 848.8 MHz; Duty Cycle: 1:2.08
Medium: HSL835_0322 Medium parameters used: $f = 849$ MHz; $\sigma = 0.912$ S/m; $\epsilon_r = 41.75$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.4°C; Liquid Temperature : 22.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(9.46, 9.46, 9.46); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.922 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.9800 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.583 W/kg; SAR(10 g) = 0.298 W/kg
Maximum value of SAR (measured) = 1.09 W/kg



P02 GSM1900_GPRS12_Rear Face_0mm_Ch661

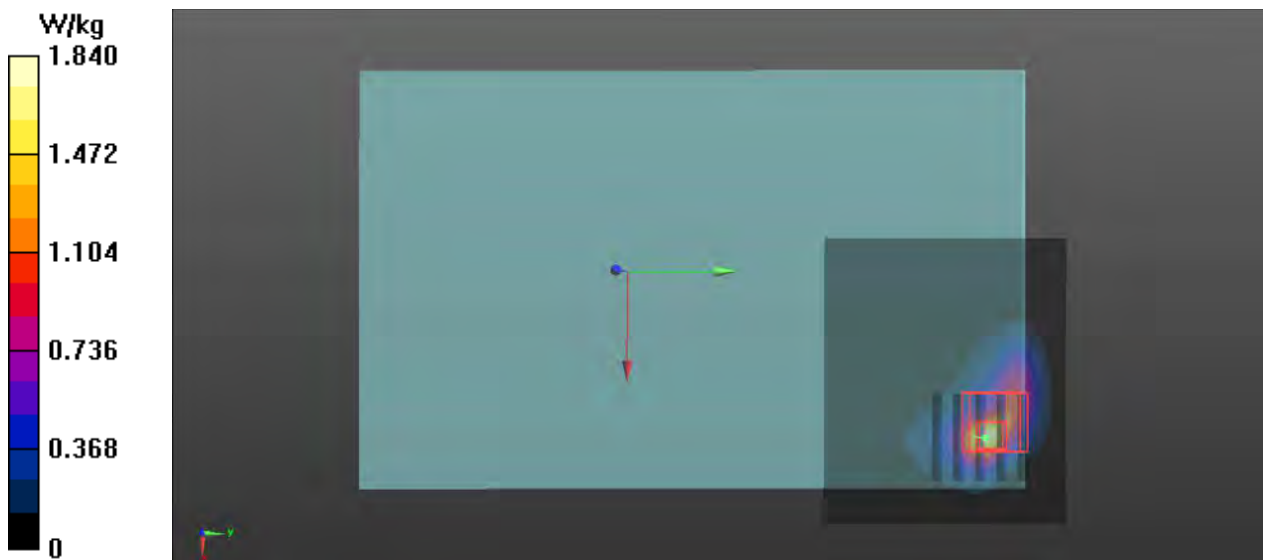
Communication System: GPRS12; Frequency: 1880 MHz; Duty Cycle: 1:2.08
Medium: HSL1900_0326 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 40.301$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.3°C; Liquid Temperature : 22.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.94, 7.94, 7.94); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.84 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 0.916 W/kg; SAR(10 g) = 0.412 W/kg
Maximum value of SAR (measured) = 1.70 W/kg



P03 WCDMA II_RMC12.2K_Rear Face_0mm_Ch9262

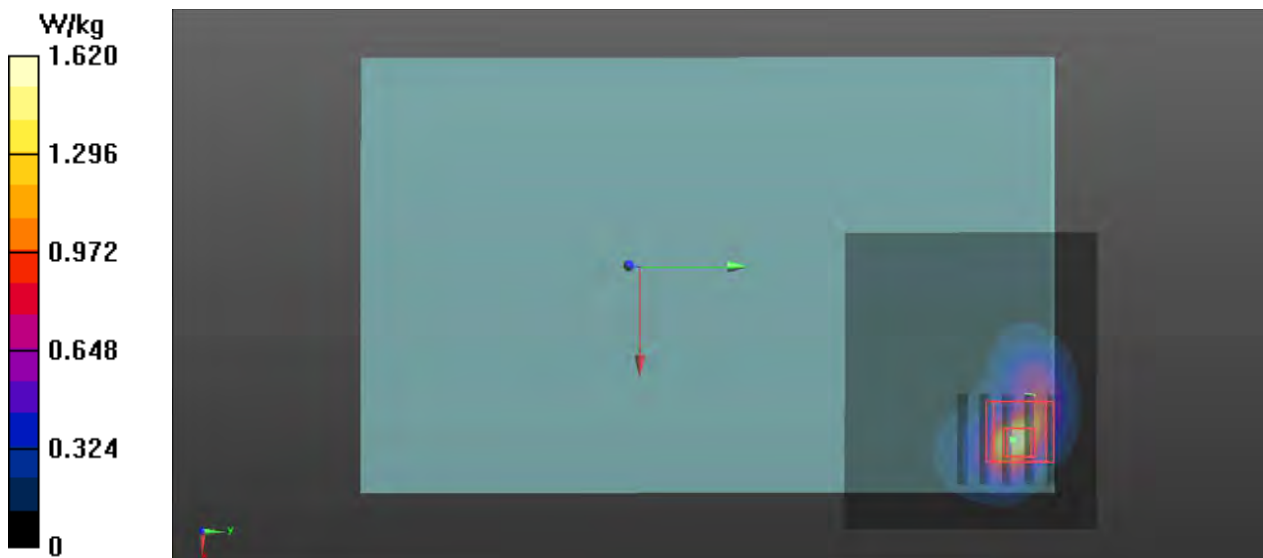
Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium: HSL1900_0326 Medium parameters used: $f = 1852.4 \text{ MHz}$; $\sigma = 1.355 \text{ S/m}$; $\epsilon_r = 40.289$; $\rho = 1000 \text{ kg/m}^3$
Ambient Temperature : 23.3°C ; Liquid Temperature : 22.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.94, 7.94, 7.94); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
Maximum value of SAR (interpolated) = 1.62 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 0 V/m ; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 0.859 W/kg ; SAR(10 g) = 0.387 W/kg
Maximum value of SAR (measured) = 1.47 W/kg



P04 WCDMA IV_RMC12.2K_Rear Face_0mm_Ch1513

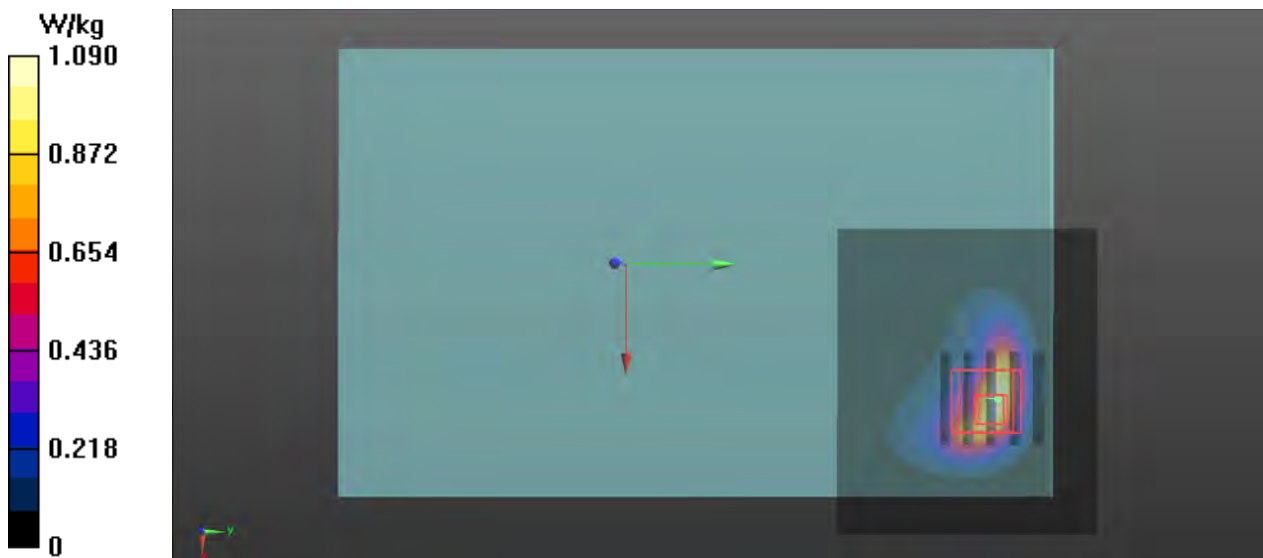
Communication System: WCDMA; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: HSL1750_0324 Medium parameters used: $f = 1753$ MHz; $\sigma = 1.351$ S/m; $\epsilon_r = 40.751$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.5°C; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(8.17, 8.17, 8.17); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.09 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 0.632 W/kg; SAR(10 g) = 0.285 W/kg
Maximum value of SAR (measured) = 1.18 W/kg



P05 WCDMA V_RMC12.2K_Rear Face_0mm_Ch4132

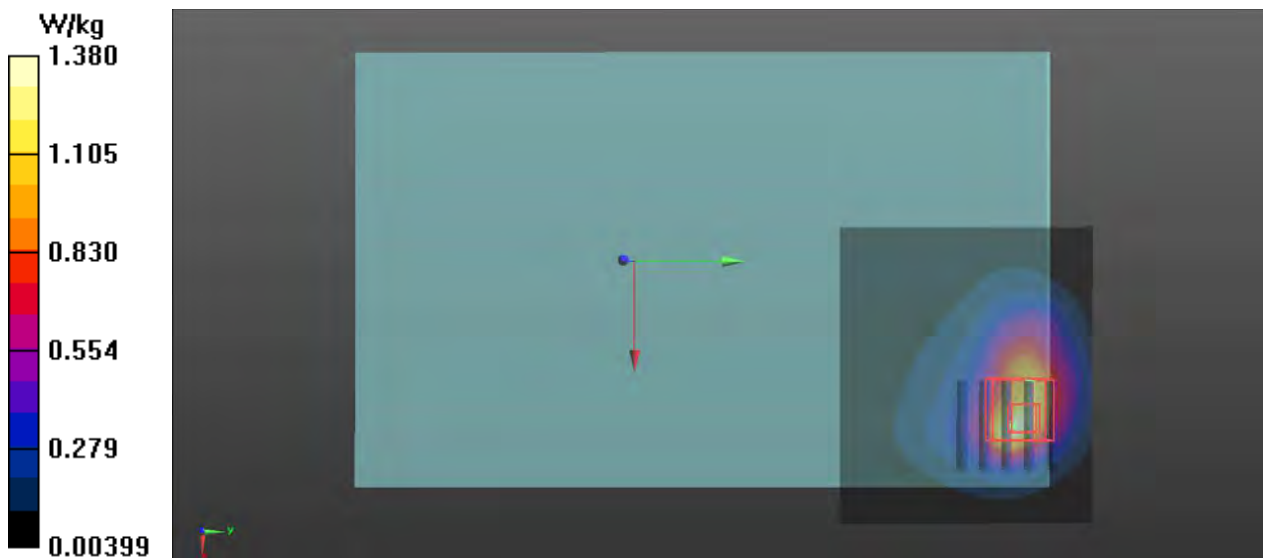
Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1
Medium: HSL835_0322 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.902$ S/m; $\epsilon_r = 41.931$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.4°C; Liquid Temperature : 22.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(9.46, 9.46, 9.46); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.38 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.6620 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.00 W/kg
SAR(1 g) = 0.800 W/kg; SAR(10 g) = 0.415 W/kg
Maximum value of SAR (measured) = 1.38 W/kg



P06 LTE 2_QPSK20M_Rear Face_0mm_Ch18700_1RB_OS50

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: HSL1900_0326 Medium parameters used: $f = 1860$ MHz; $\sigma = 1.356$ S/m; $\epsilon_r = 40.299$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.3°C; Liquid Temperature : 22.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.94, 7.94, 7.94); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 0.956 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm
Reference Value = 0 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 2.06 W/kg
SAR(1 g) = 0.831 W/kg; SAR(10 g) = 0.382 W/kg
Maximum value of SAR (measured) = 0.976 W/kg



P07 LTE 4_QPSK20M_Rear Face_0mm_Ch20300_50RB_OS25

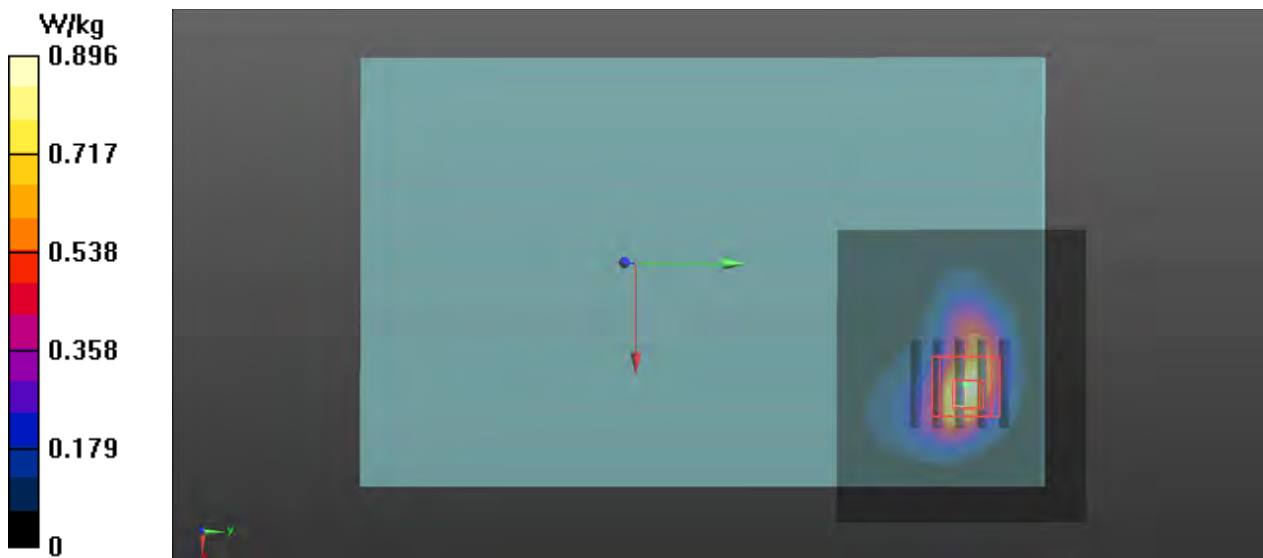
Communication System: LTE; Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: HSL1750_0324 Medium parameters used: $f = 1745 \text{ MHz}$; $\sigma = 1.345 \text{ S/m}$; $\epsilon_r = 40.781$; $\rho = 1000 \text{ kg/m}^3$
Ambient Temperature : 23.5°C ; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(8.17, 8.17, 8.17); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
Maximum value of SAR (interpolated) = 0.896 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 0 V/m ; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.98 W/kg
SAR(1 g) = 0.788 W/kg ; SAR(10 g) = 0.356 W/kg
Maximum value of SAR (measured) = 0.900 W/kg



P08 LTE 7_QPSK20M_Top Side_25mm_Ch20850_1RB_OS50

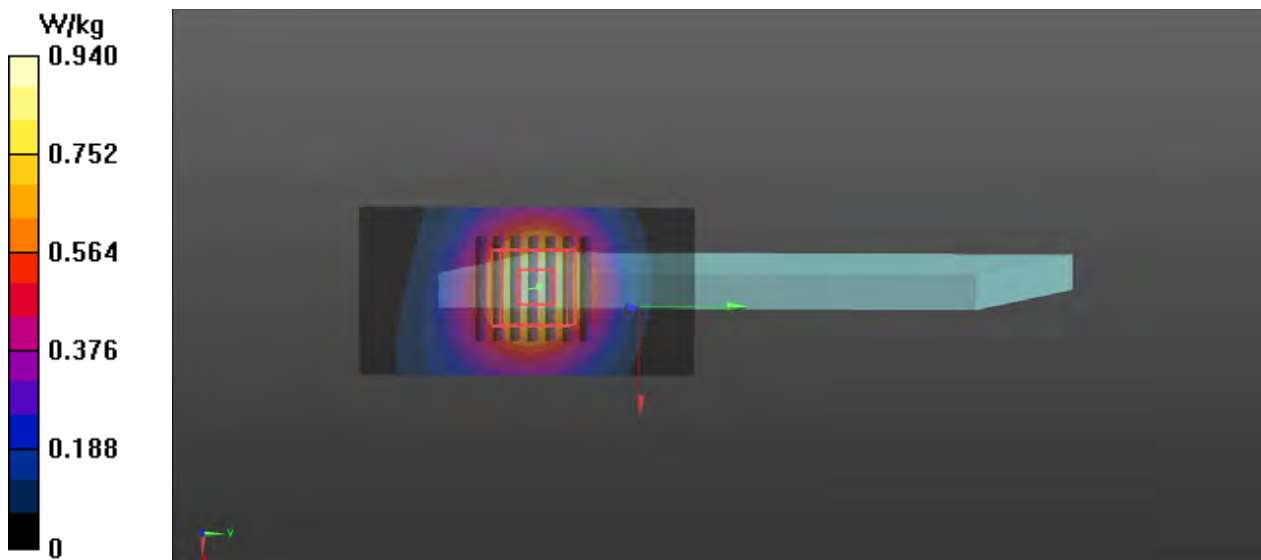
Communication System: LTE; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: HSL2600_0328 Medium parameters used: $f = 2510$ MHz; $\sigma = 1.876$ S/m; $\epsilon_r = 38.959$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.6°C; Liquid Temperature : 22.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.18, 7.18, 7.18); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.940 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.533 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.859 W/kg; SAR(10 g) = 0.471 W/kg
Maximum value of SAR (measured) = 0.939 W/kg



P09 LTE 26_QPSK15M_Rear Face_0mm_Ch26765_36RB_OS19

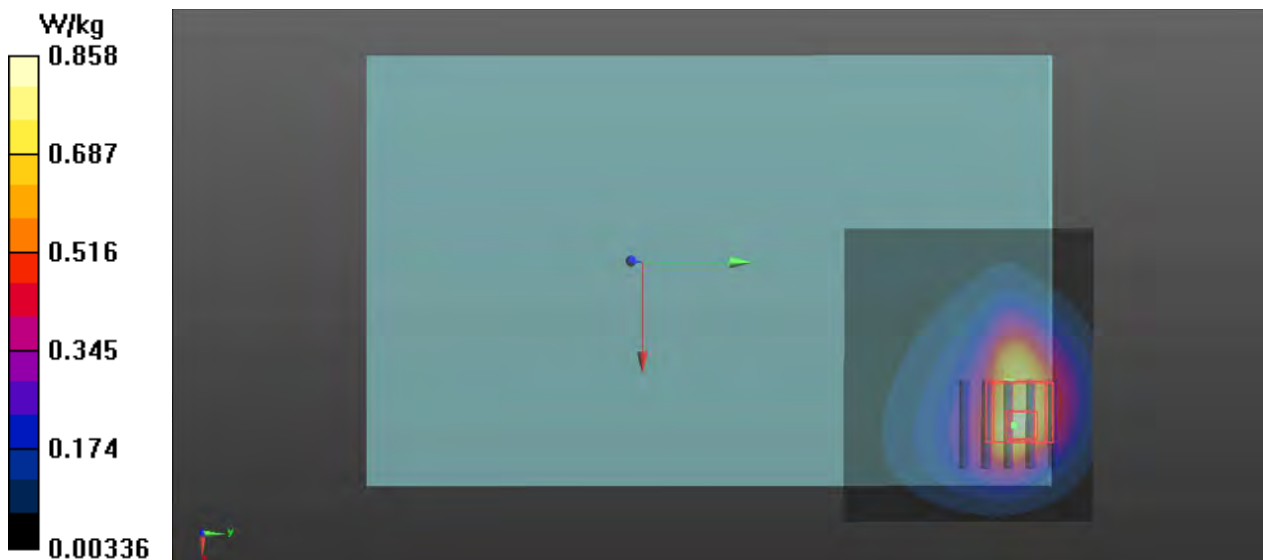
Communication System: LTE; Frequency: 821.5 MHz; Duty Cycle: 1:1
Medium: HSL835_0322 Medium parameters used: $f = 821.5$ MHz; $\sigma = 0.9$ S/m; $\epsilon_r = 41.967$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.4°C; Liquid Temperature : 22.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(9.46, 9.46, 9.46); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.858 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.4050 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 0.756 W/kg; SAR(10 g) = 0.400 W/kg
Maximum value of SAR (measured) = 0.773 W/kg



P10 LTE 41_QPSK20M_Top Side_0mm_Ch41490_50RB_OS0

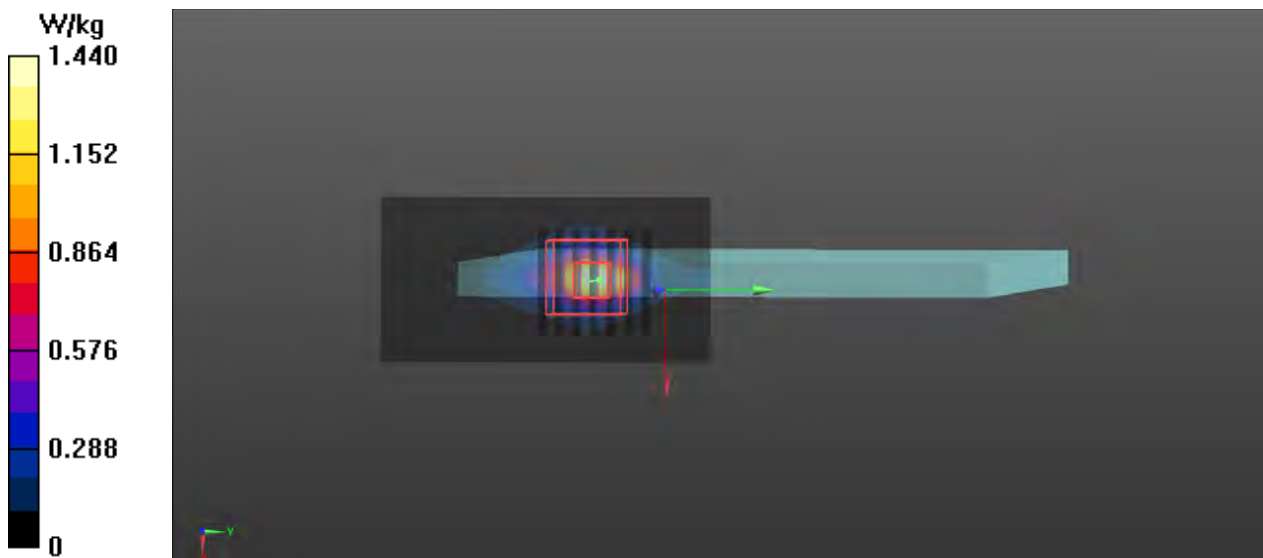
Communication System: LTE; Frequency: 2680 MHz; Duty Cycle: 1:1.59
Medium: HSL2600_0328 Medium parameters used: $f = 2680$ MHz; $\sigma = 2.013$ S/m; $\epsilon_r = 38.705$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.6°C; Liquid Temperature : 22.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.18, 7.18, 7.18); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.44 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.081 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 0.744 W/kg; SAR(10 g) = 0.278 W/kg
Maximum value of SAR (measured) = 1.44 W/kg



P11 WLAN2.4G_802.11b_Rear Face_0mm_Ch6

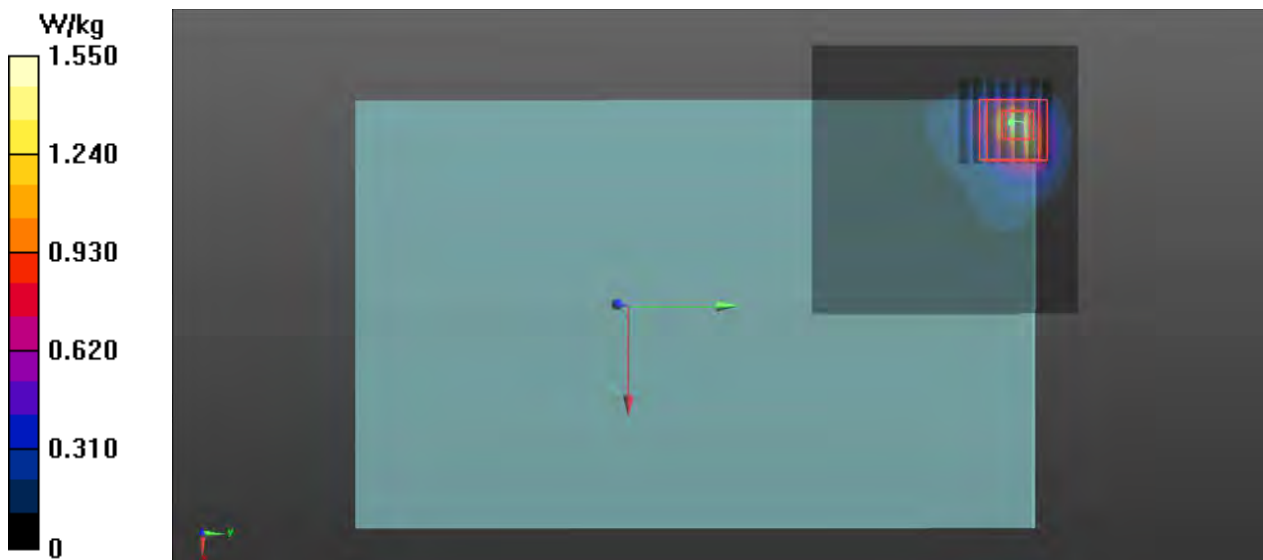
Communication System: 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450_0308 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.762$ S/m; $\epsilon_r = 40.236$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.3°C; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.27, 7.27, 7.27); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.55 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.50 W/kg
SAR(1 g) = 0.877 W/kg; SAR(10 g) = 0.347 W/kg
Maximum value of SAR (measured) = 1.75 W/kg



P12 WLAN5G_802.11a_Top Side_12mm_Ch60

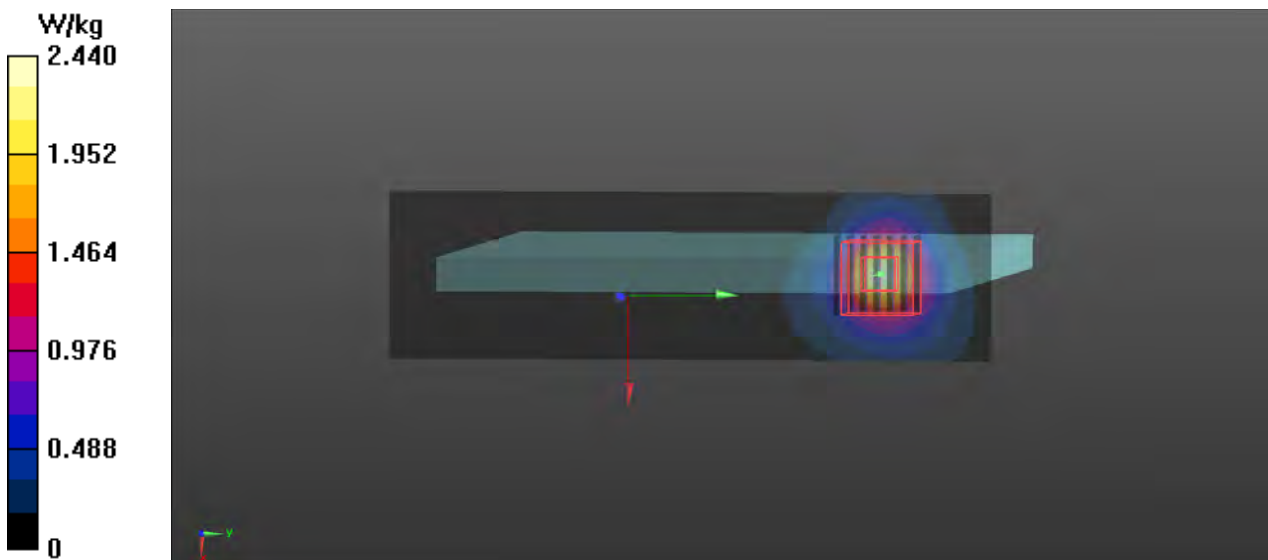
Communication System: 802.11a; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: HSL5G_0310 Medium parameters used: $f = 5300$ MHz; $\sigma = 4.777$ S/m; $\epsilon_r = 37.23$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.5°C; Liquid Temperature : 22.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(4.8, 4.8, 4.8); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.44 W/kg

- **Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.119 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.386 W/kg
Maximum value of SAR (measured) = 2.34 W/kg



P13 WLAN5G_802.11a_Top Side_0mm_Ch144

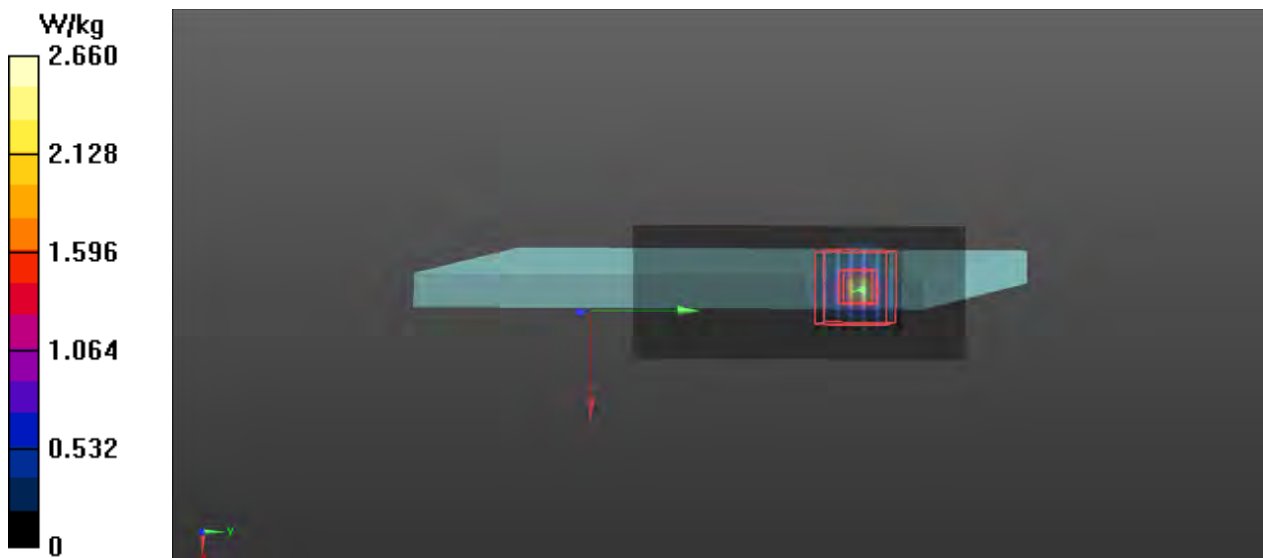
Communication System: 802.11a; Frequency: 5720 MHz; Duty Cycle: 1:1
Medium: HSL5G_0313 Medium parameters used: $f = 5720$ MHz; $\sigma = 5.188$ S/m; $\epsilon_r = 36.672$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.6°C; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(4.49, 4.49, 4.49); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x101x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.66 W/kg

- **Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.217 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 5.51 W/kg
SAR(1 g) = 0.968 W/kg; SAR(10 g) = 0.195 W/kg
Maximum value of SAR (measured) = 2.92 W/kg



P14 WLAN5G_802.11a_Top Side_12mm_Ch165

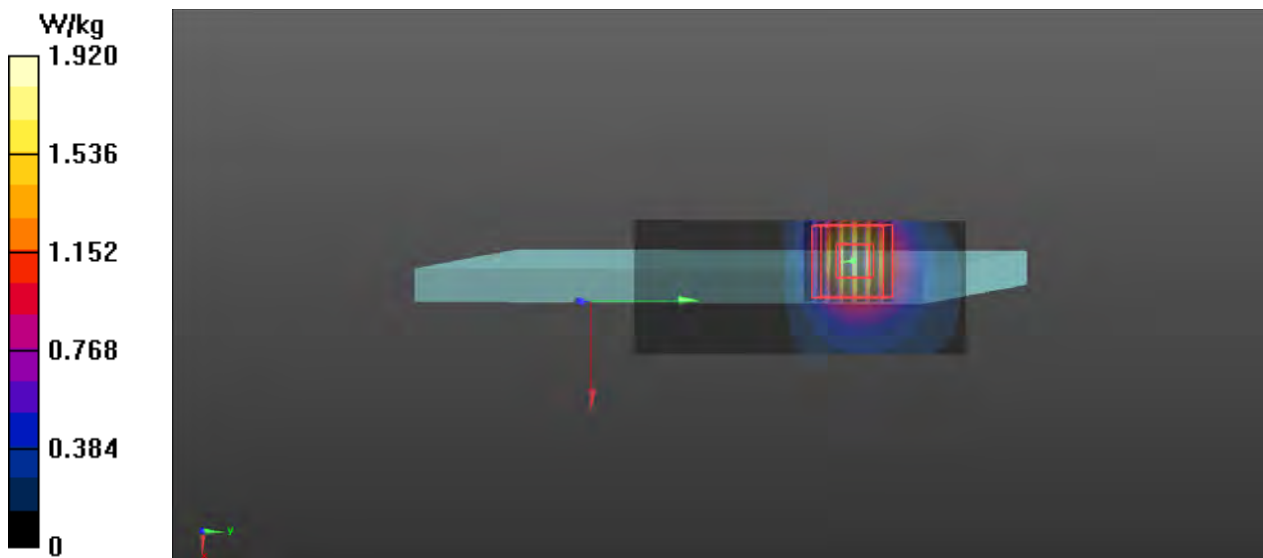
Communication System: 802.11a; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: HSL5G_0316 Medium parameters used: $f = 5825$ MHz; $\sigma = 5.293$ S/m; $\epsilon_r = 36.54$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.2°C; Liquid Temperature : 22.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(4.49, 4.49, 4.49); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x101x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.92 W/kg

- **Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.035 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 0.787 W/kg; SAR(10 g) = 0.305 W/kg
Maximum value of SAR (measured) = 1.87 W/kg



P15 BT_GFSK_Rear Face_0mm_Ch78

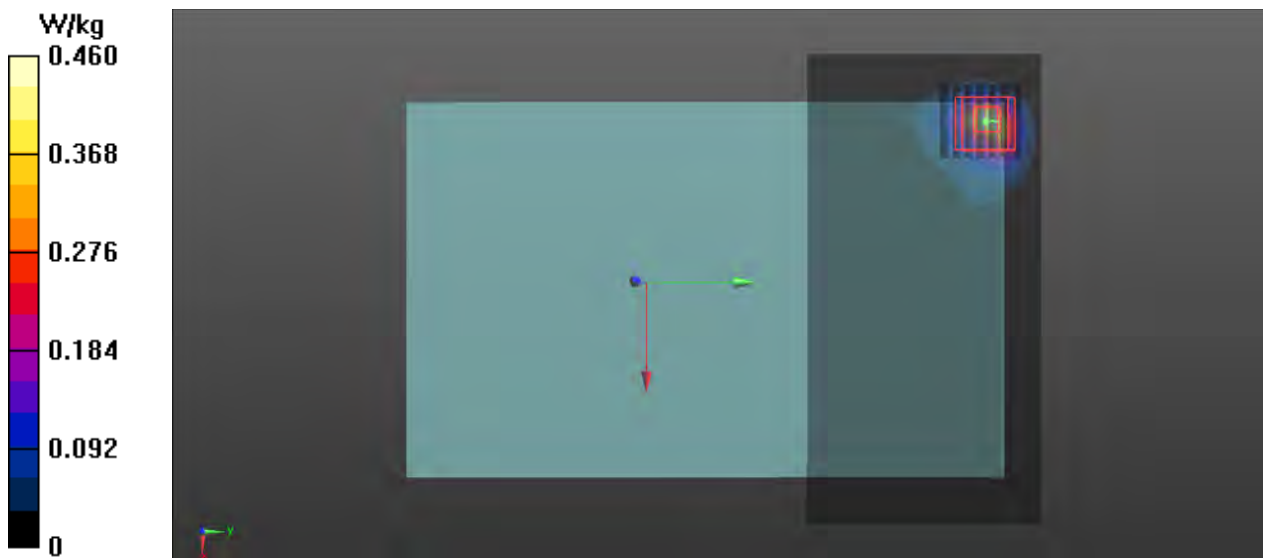
Communication System: BT; Frequency: 2480 MHz; Duty Cycle: 1:1.08
Medium: HSL2450_0308 Medium parameters used: $f = 2480$ MHz; $\sigma = 1.818$ S/m; $\epsilon_r = 40.137$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.3°C; Liquid Temperature : 22.6°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.27, 7.27, 7.27); Calibrated: 2020/08/27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 2020/08/26
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1205
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (161x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.460 W/kg

- **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.668 W/kg
SAR(1 g) = 0.239 W/kg; SAR(10 g) = 0.095 W/kg
Maximum value of SAR (measured) = 0.465 W/kg





Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.



In Collaboration with
s p e a g
 CALIBRATION LABORATORY



中国认可
 国际互认
 校准
 CALIBRATION
 CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cttl@chinattl.com http://www.chinattl.cn

Client **ADT**

Certificate No: **Z20-60316**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d139**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **August 28, 2020**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 3, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.69 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.37 W/kg ± 18.7 % (k=2)



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3Ω- 2.76jΩ
Return Loss	- 29.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.254 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 08.28.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d139

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835$ MHz; $\sigma = 0.877$ S/m; $\epsilon_r = 41.23$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.66, 9.66, 9.66) @ 835 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.46 V/m; Power Drift = -0.04 dB

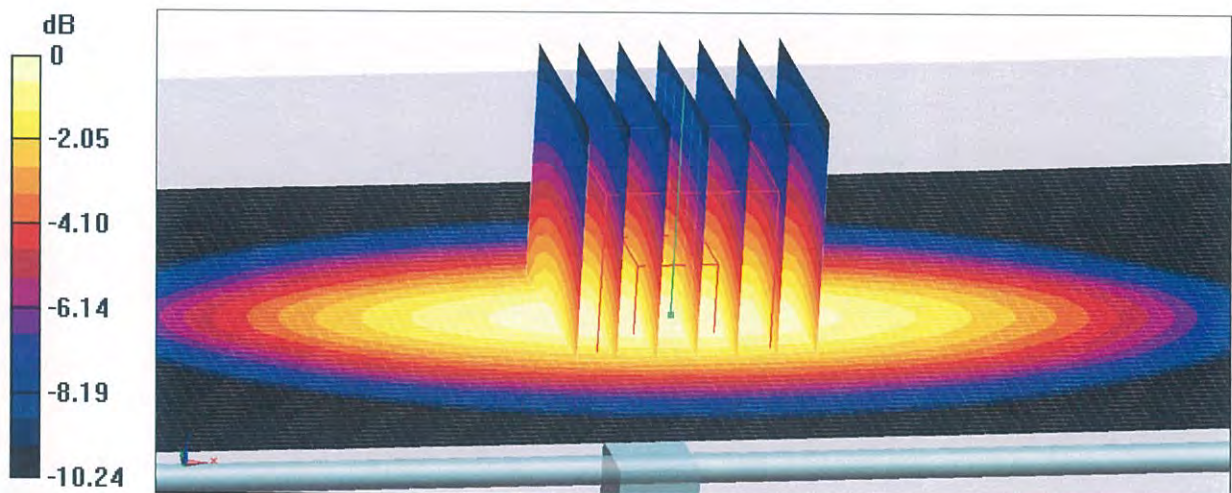
Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.57 W/kg

Smallest distance from peaks to all points 3 dB below = 17.1 mm

Ratio of SAR at M2 to SAR at M1 = 68.2%

Maximum value of SAR (measured) = 3.12 W/kg

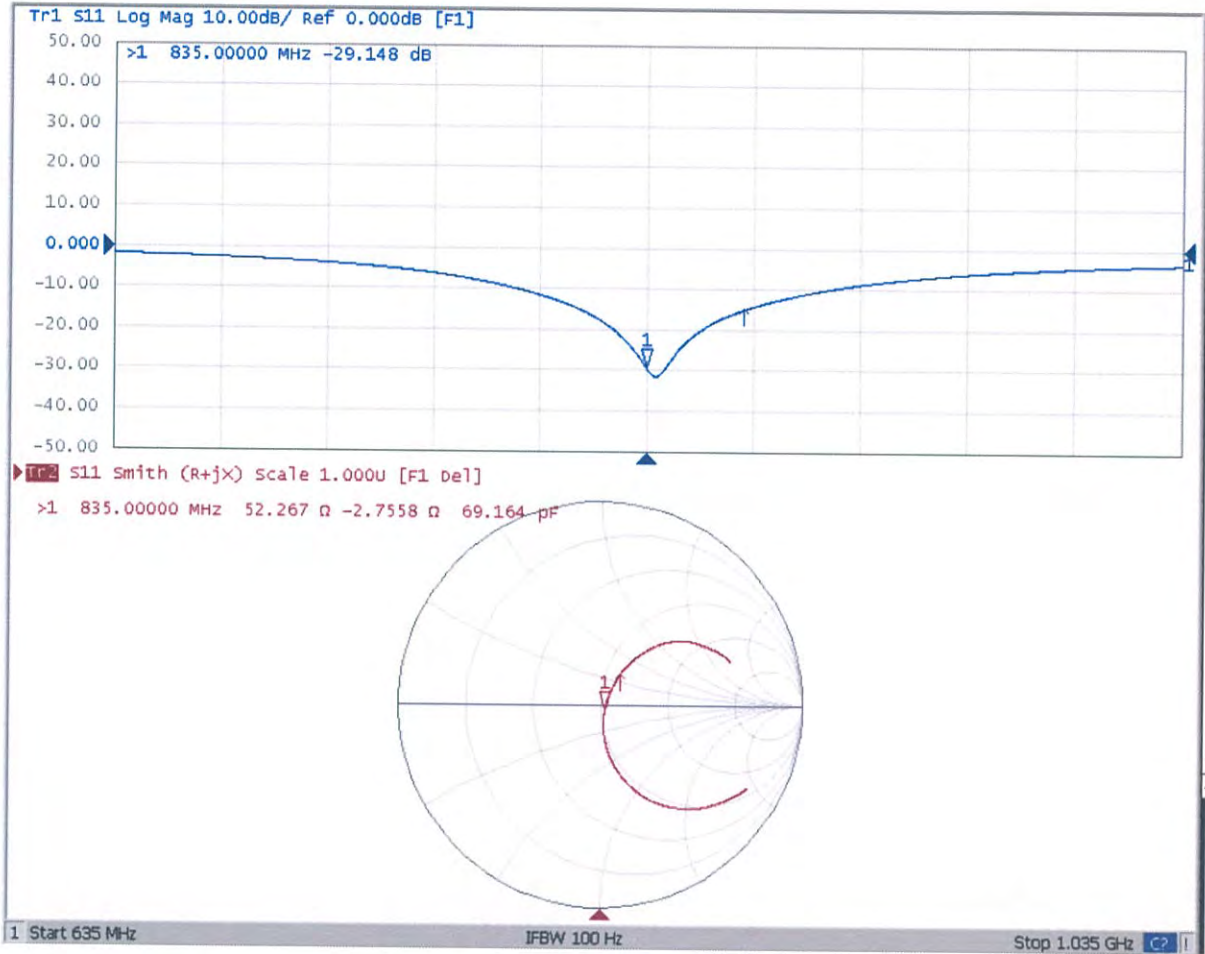


0 dB = 3.12 W/kg = 4.94 dBW/kg



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL





In Collaboration with
s p e a g
 CALIBRATION LABORATORY



中国认可
 国际互认
 校准
 CALIBRATION
 CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cttl@chinattl.com http://www.chinattl.cn

Client **ADT**

Certificate No: **Z20-60318**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1071**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **August 29, 2020**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG, No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG, No.Z20-60017)	Feb-21
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 3, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	35.6 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	18.8 W/kg ± 18.7 % (k=2)



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7Ω- 2.64 jΩ
Return Loss	- 31.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.086 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 08.29.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1071

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.383$ S/m; $\epsilon_r = 39.75$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.41, 8.41, 8.41) @ 1750 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 95.31 V/m; Power Drift = -0.05 dB

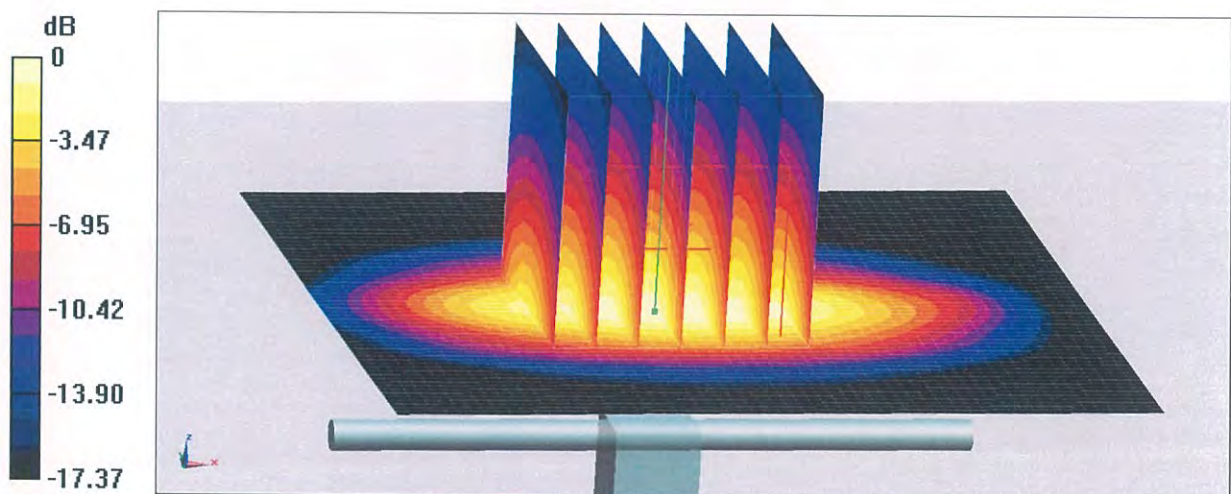
Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 8.98 W/kg; SAR(10 g) = 4.73 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 53%

Maximum value of SAR (measured) = 14.0 W/kg

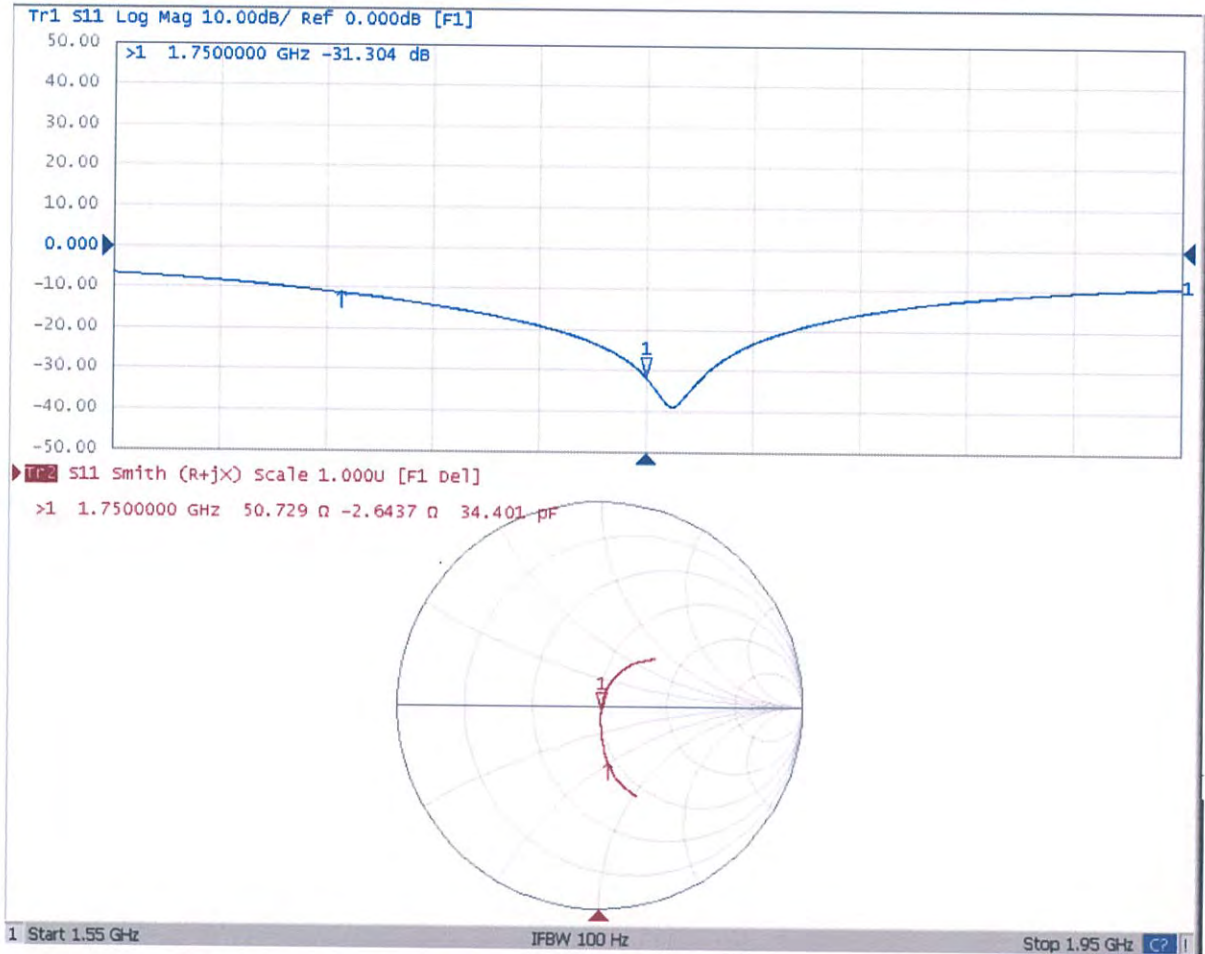


0 dB = 14.0 W/kg = 11.46 dBW/kg



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL





In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Client **ADT**

Certificate No: **Z20-60319**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d159**

Calibration Procedure(s) **FF-Z11-003-01
Calibration Procedures for dipole validation kits**

Calibration date: **August 27, 2020**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
ReferenceProbe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 3, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



lossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
 E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	41.1 \pm 6 %	1.40 mho/m \pm 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.81 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.4 W/kg \pm 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.2 W/kg \pm 18.7 % (k=2)



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5Ω+ 7.59jΩ
Return Loss	- 21.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.064 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 08.27.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d159

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.404$ S/m; $\epsilon_r = 41.12$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.14, 8.14, 8.14) @ 1900 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 98.53 V/m; Power Drift = -0.03 dB

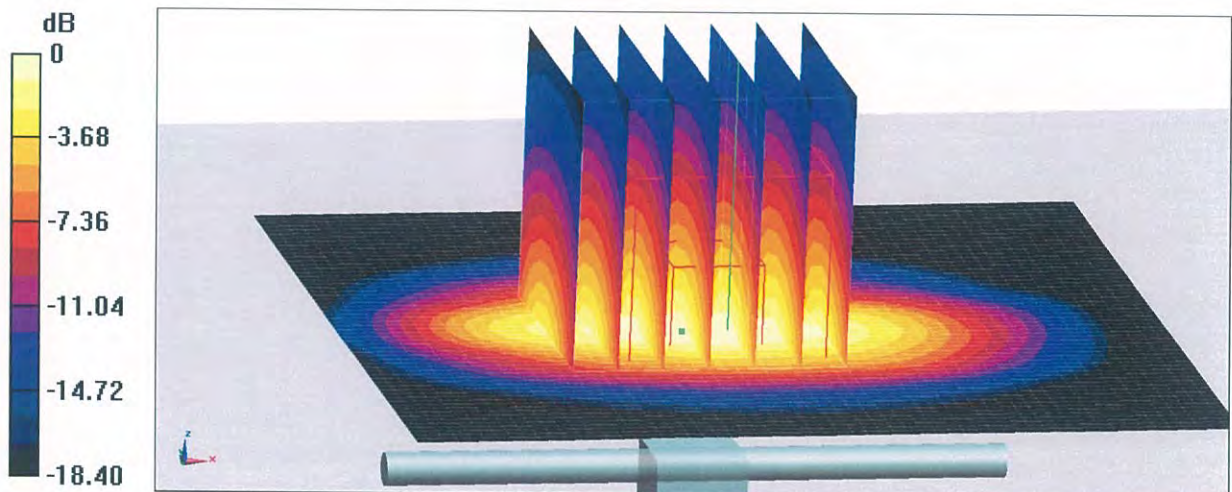
Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 9.81 W/kg; SAR(10 g) = 5.03 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 51.6%

Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL

