

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.3 ± 6 %	5.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	78.8 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.3 W/kg ± 19.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	48.3 Ω - 3.8 j Ω
Return Loss	- 27.5 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	51.1 Ω + 0.7 j Ω
Return Loss	- 38.1 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.1 Ω + 2.8 j Ω
Return Loss	- 27.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns
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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
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DASY5 Validation Report for Head TSL

Date: 18.01.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1262

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.51$ S/m; $\epsilon_r = 35$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5600$ MHz; $\sigma = 4.86$ S/m; $\epsilon_r = 34.5$; $\rho = 1000$ kg/m³,Medium parameters used: $f = 5750$ MHz; $\sigma = 5.02$ S/m; $\epsilon_r = 34.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz, ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 72.86 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.2 W/kg

SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.3 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 70.7%

Maximum value of SAR (measured) = 18.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.28 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 30.8 W/kg

SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.37 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 68%

Maximum value of SAR (measured) = 19.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.45 V/m; Power Drift = 0.09 dB

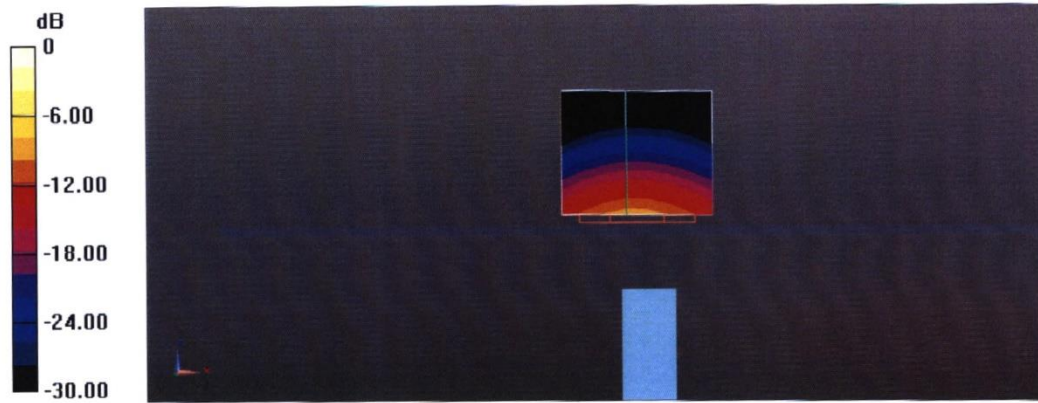
Peak SAR (extrapolated) = 30.8 W/kg

SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.25 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

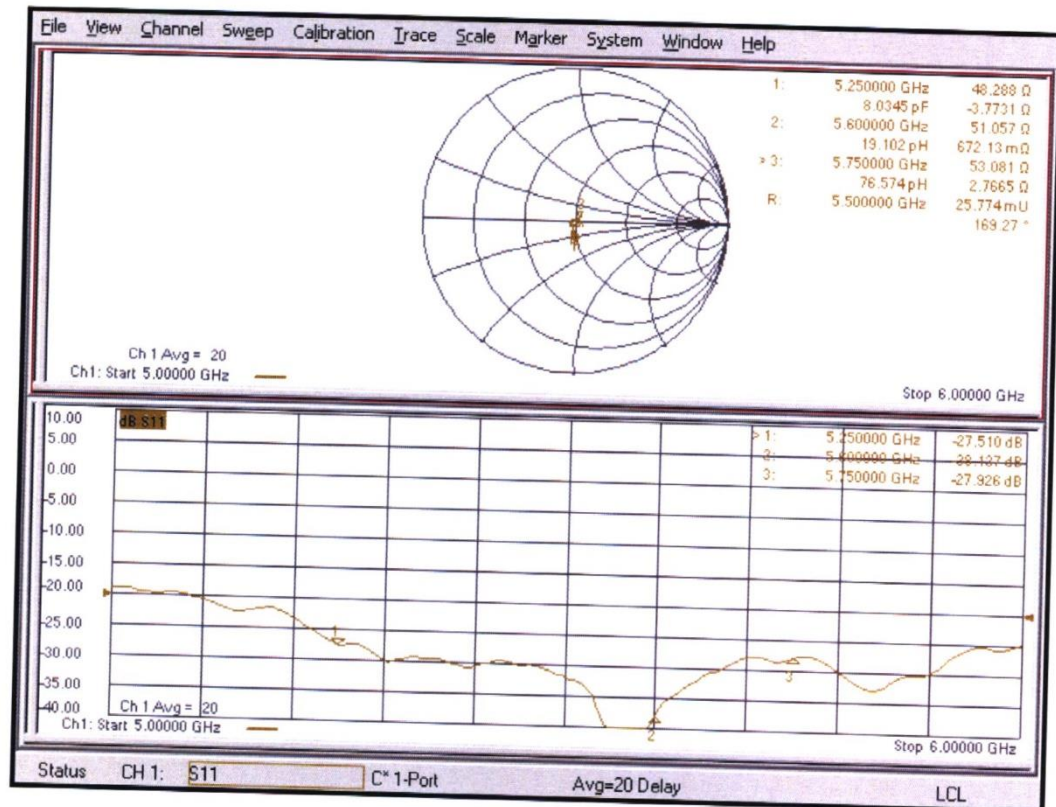
Ratio of SAR at M2 to SAR at M1 = 66.2%

Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

Impedance Measurement Plot for Head TSL



ANNEX I Sensor Triggering Data Summary

P-Sensor Detect	Near	Far
Front	$\leq 13\text{mm}$	$> 13\text{mm}$
Rear	$\leq 18\text{mm}$	$> 18\text{mm}$
Left	$\leq 10\text{mm}$	$\leq 10\text{mm}$
Top	$\leq 19\text{mm}$	$> 19\text{mm}$

According to the above description, this device was tested by the manufacturer to determine the SAR sensor triggering distances for the rear, front, left edge and top edge of the device. The measured power state within $\pm 5\text{mm}$ of the triggering points (or until touching the phantom) is included for rear and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1mm less than the smallest distance from the device and SAR phantom with the device at maximum output power without power reduction.

We tested the power and got the different proximity sensor triggering distances for rear, front ,left and Top edge. But the manufacturer has declared and 18mm (rear) / 19mm (top edge) /13mm (front edge) / 10mm (left edge) . Therefore base on the most conservative triggering distances as above, additional SAR measurements were required at 17mm (rear) / 18mm (top edge) /12mm (front edge) / 9mm (left edge).

Rear

Moving device toward the phantom:

The power state											
Distance [mm]	23	22	21	20	19	18	17	16	15	14	13
Main antenna	Normal	Normal	Normal	Normal	Normal	Low	Low	Low	Low	Low	Low

Moving device away from the phantom:

The power state											
Distance [mm]	13	14	15	16	17	18	19	20	21	22	23
Main antenna	Low	Low	Low	Low	Low	Low	Normal	Normal	Normal	Normal	Normal

Top

The power state											
Distance [mm]	24	23	22	21	20	19	18	17	16	15	14
Main antenna	Normal	Normal	Normal	Normal	Normal	Low	Low	Low	Low	Low	Low

Moving device away from the phantom:

The power state											
Distance [mm]	14	15	16	17	18	19	20	21	22	23	24
Main antenna	Low	Low	Low	Low	Low	Low	Normal	Normal	Normal	Normal	Normal

Front

Moving device toward the phantom:

The power state											
Distance [mm]	18	17	16	15	14	13	12	11	10	9	8
Main antenna	Normal	Normal	Normal	Normal	Normal	Low	Low	Low	Low	Low	Low

Moving device away from the phantom:

The power state											
Distance [mm]	8	9	10	11	12	13	14	15	16	17	18
Main antenna	Low	Low	Low	Low	Low	Low	Normal	Normal	Normal	Normal	Normal

Left

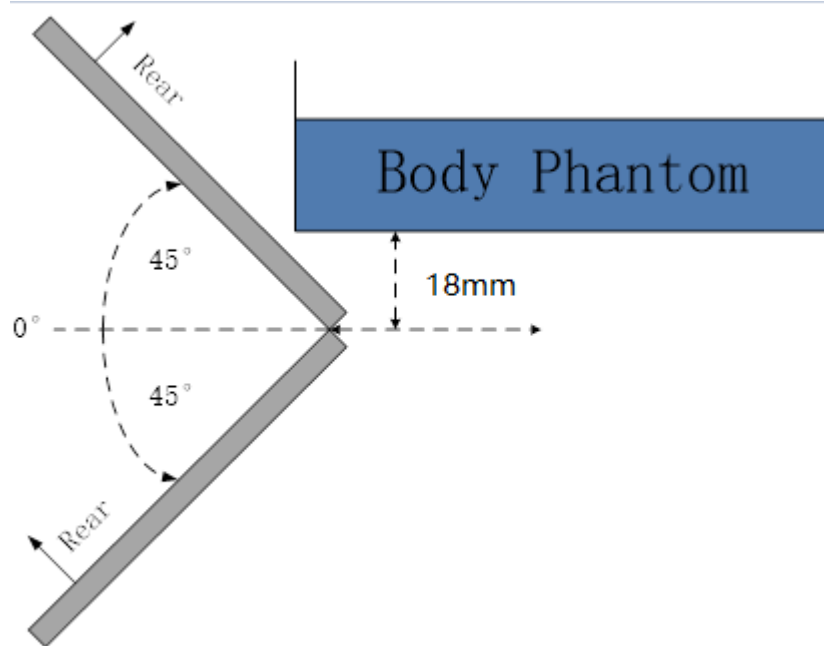
Moving device toward the phantom:

The power state											
Distance [mm]	15	14	13	12	11	10	9	8	7	6	5
Main antenna	Normal	Normal	Normal	Normal	Normal	Low	Low	Low	Low	Low	Low

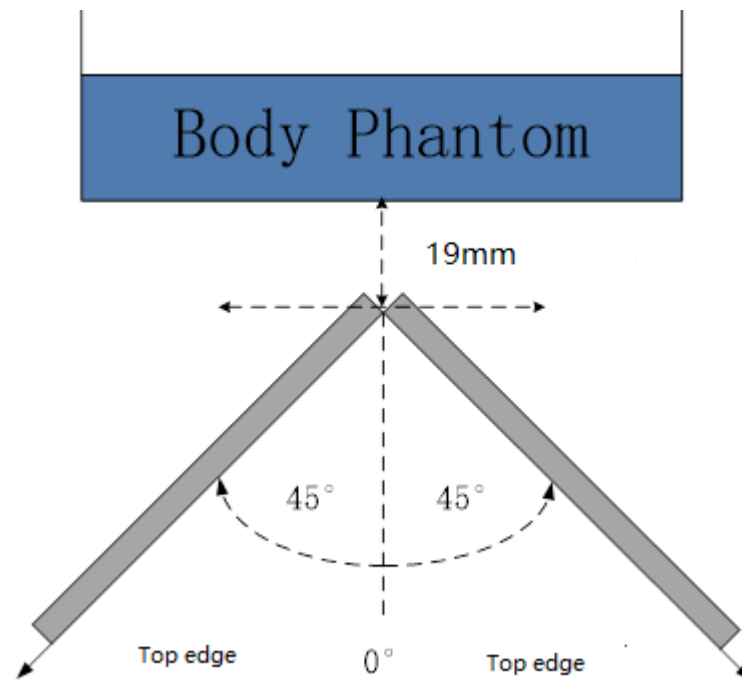
Moving device away from the phantom:

The power state											
Distance [mm]	5	6	7	8	9	10	11	12	13	14	15
Main antenna	Low	Low	Low	Low	Low	Low	Normal	Normal	Normal	Normal	Normal

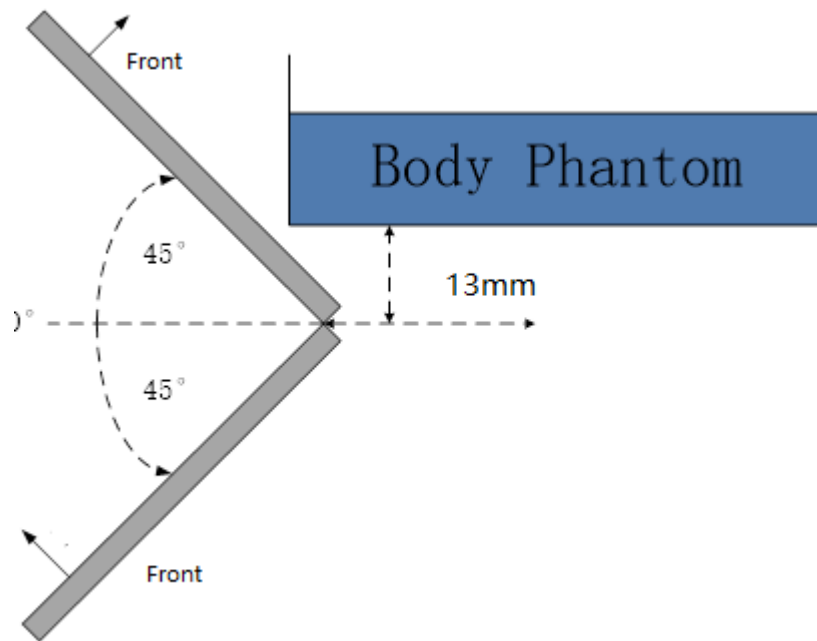
The influence of table tilt angles to proximity sensor triggering is determined by positioning each edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance by rotating the device around the edge next to the phantom in $\leq 10^\circ$ increments until the tablet is $\pm 45^\circ$ or more from the vertical position at 0° .



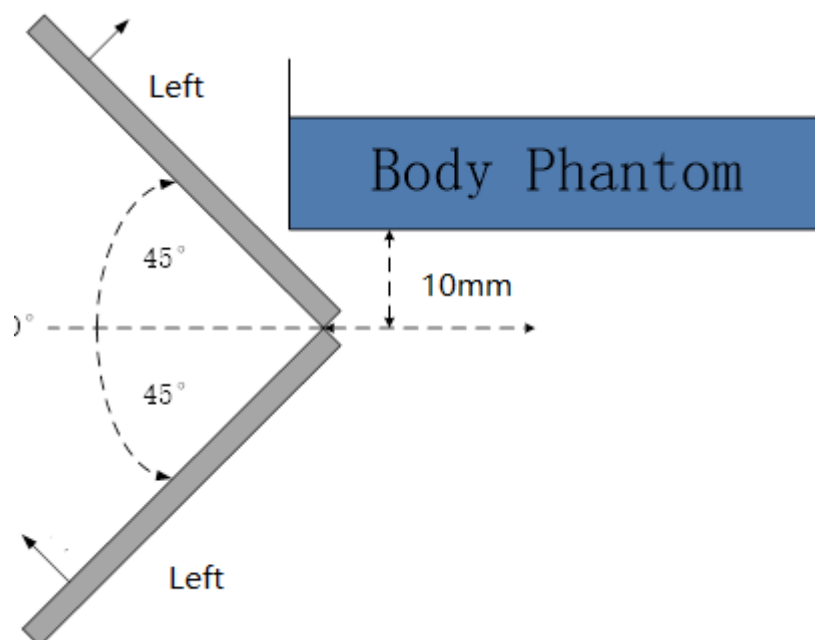
The rear evaluation



The Top evaluation



The Front evaluation



The Left evaluation

Based on the above evaluation, we come to the conclusion that the sensor triggering is not released and normal maximum output power is not restored within the $\pm 45^\circ$ range at the smallest sensor triggering test distance declared by manufacturer.

ANNEX J Accreditation Certificate

<p>United States Department of Commerce National Institute of Standards and Technology</p> <div style="display: flex; justify-content: space-around; align-items: center;"><div style="font-size: 2em; font-weight: bold; letter-spacing: 0.5em;">NVLAP[®]</div><div style="text-align: center;"> ilac-MRA</div></div>	
<hr/> Certificate of Accreditation to ISO/IEC 17025:2017 <hr/>	
<p>NVLAP LAB CODE: 600118-0</p>	
<p>Telecommunication Technology Labs, CAICT Beijing China</p>	
<p><i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i></p>	
<p>Electromagnetic Compatibility & Telecommunications</p>	
<p><i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i></p>	
<hr/> <p>2021-09-29 through 2022-09-30 <i>Effective Dates</i></p>	<div style="display: flex; align-items: center; justify-content: center;"><div style="text-align: center;"> DEPARTMENT OF COMMERCE UNITED STATES OF AMERICA</div><div style="margin-left: 20px;"> _____ <i>For the National Voluntary Laboratory Accreditation Program</i></div></div>