FCC WLAN 6GHz RF Exposure

Applicant	:	**Zebra Technologies Corporation**
Equipment	:	**Enterprise Mobile**
Brand Name	:	**Zebra**
Model Name	:	**EM45A1**
FCC ID	:	**UZ7EM45A1**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Approved by: Si Zhang

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

Sporton International Inc. (Kunshan)
TEL : +86-512-57900158
FCC ID : UZ7EM45A1

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History of this test report

Report No.	Version	Description	Issued Date
FA460505-02A	01	Initial issue of report	Dec. 16, 2024

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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Zebra Technologies Corporation, Enterprise Mobile, EM45A1,** are as follows.

Band	Tx Frequency (MHz)	Scaled PD
		psPD (W/m^2)
WLAN 6GHz	5925-7125	7.40
Date of Testing:		2024/10/15 ~ 2024/10/17

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Power density exposure limits (1 mW/cm^2 = 10 W/m^2) specified in FCC 47 CFR part 2 (2.1093), ANSI/IEEE C95.1-1992 and FCC 47 CFR Part1.1310, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

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2. *Administration Data*

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	SAR04-KS	CN1257	314309

Applicant	
Company Name	Zebra Technologies Corporation
Address	3 Overlook Point, Lincolnshire, IL 60069 USA

Manufacturer	
Company Name	Zebra Technologies Corporation
Address	3 Overlook Point, Lincolnshire, IL 60069 USA

3. *Guidance Applied*

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards.

· FCC 47 CFR Part 2 (2.1093)
· ANSI/IEEE C95.1-1992
· IEEE 1528-2013
· IEC TR 63170:2018
· IEC 62479:2010
· FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
· FCC KDB 865664 D02 SAR Reporting v01r02
· FCC KDB 447498 D01 General RF Exposure Guidance v06
· FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
· SPEAG DASY6 Application Note (Interim Procedure for Device Operation at 6GHz-10GHz)

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4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Enterprise Mobile
Brand Name	Zebra
Model Name	EM45A1
FCC ID	UZ7EM45A1
IMEI Code	IMEI1: 354708620060483 IMEI2: 354708620063495
Wireless Technology and Frequency Range	WLAN U-NII 5: 5925 MHz ~ 6425 MHz WLAN U-NII 6: 6425 MHz ~ 6525 MHz WLAN U-NII 7: 6525 MHz ~ 6875 MHz WLAN U-NII 8: 6875 MHz ~ 7125 MHz
Mode	WLAN 6GHz 802.11a/ax HE20/HE40/HE80/HE160
HW Version	DV
SW Version	14-24-09.00-UG-U00-PRD-ATH-04
MFD	09DEC24
EUT Stage	Identical Prototype

Remark:
1. The device does not support UNII-8_CH233 (BW=20M, Center Frequency = 7115MHz).
2. The device supports 1S2T (CDD & Tx Beamforming) and 2S2T (SDM) mode; 1S2T: Nss=1, MIMO 2Tx; 2S2T: Nss=2, MIMO 2Tx.
3. The device implements receiver detect mechanism trigger reduced power for SAR compliance at different exposure conditions (head, body-worn, extremity) will manage to ensure the power level not exceeding the associated power table. Details about the power management decision and receiver detection are provided in the operational description.
4. For WLAN when transmit simultaneous with WWAN, power reduction will be activated to head exposure condition.
5. The device support DBS (Dual Band Simultaneous) function, when the device WLAN 2.4GHz and WLAN 5GHz or WLAN 6GHz transmit at the same time the device will limit different output power for simultaneous transmission compliance.

Specification of Accessory				
AC Adapter 1 **(Type C Wall Charger 1)**	**Brand Name**	Zebra	**Model**	SAWA-102-22520A
			Part Number	PWR-WUA5V45W1US
AC Adapter 2 **(Type A Wall Charger 2)**	**Brand Name**	Zebra	**Model**	SAWA-65-20005A
			Part Number	PWR-WUA5V12W0US
Battery 1	**Brand Name**	Zebra	**Model**	BT-000501
			Part Number	BT-000501-2000
Earphone 1 **(Wired headset USB-C)**	**Brand Name**	Zebra	**Part Number**	HDST-USBC-PTT1-01
Earphone 2 **(Rugged Bluetooth Headset)**	**Brand Name**	Zebra	**Part Number**	HS3100-OTH
Earphone 3 **(3.5mm PTT Headset)**	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTT1-02
Earphone 4 **(Rugged Headset)**	**Brand Name**	Zebra	**Part Number**	HS2100-OTH
3.5mm to 3.5mm audio connector	**Brand Name**	Zebra	**Part Number**	CBL-HS2100-3MS1-01
Type C-Audio Cable **(Type C to 3.5mm)**	**Brand Name**	Zebra	**Part Number**	ADP-USBC-35MM1-01
USB Cable 1 **(USB-C to C Cable)**	**Brand Name**	Zebra	**Part Number**	CBL-EC5X-USBC3A-01
USB Cable 2 **(USB-A to C Cable)**	**Brand Name**	Zebra	**Part Number**	CBL-TC5X-USBC2A-01
EM45 Protective Case	**Brand Name**	Zebra	**Part Number**	SG-EM45EXO2-01

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5. *RF Exposure Limits*

5.1 *Uncontrolled Environment*

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 *Controlled Environment*

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

5.3 *RF Exposure limit for above 6GHz*

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310. The unit of power density evaluation is W/m^2 or mW/cm^2.

Peak Spatially Averaged Power Density was evaluated over a square area of $4cm^2$ per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Note: $1.0 \ mW/cm^2$ is $10 \ W/m^2$

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6. *System Description and Setup*

The DASY system used for performing compliance tests consists of the following items:
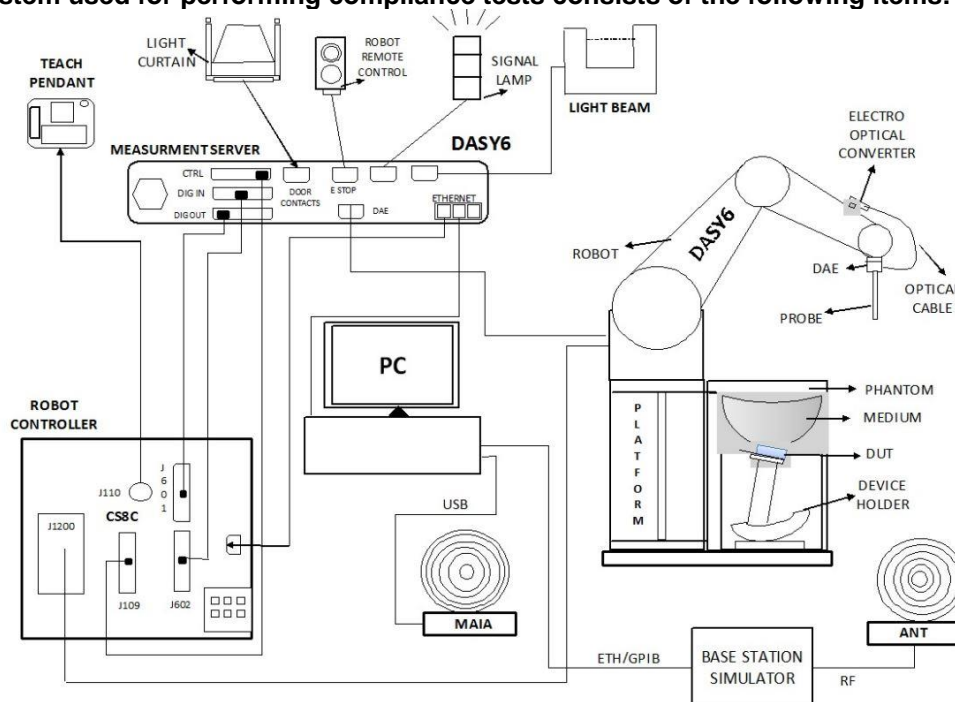
- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Windows 10 and the DASY6[1] software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.
  Note: 1. DASY6 software used: DASY6 mmWave V3.0.0.841 and older generations and used the developed Plane-to-Plane Phase Reconstruction (PTP-PR) Algorithm which was used in PD measurement.

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7. *Test Equipment List*

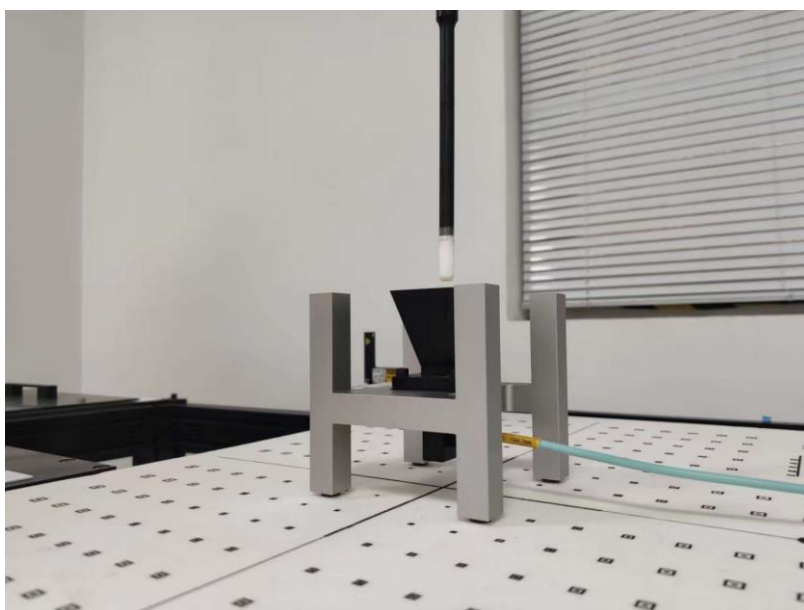| Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	5G Verification Source	10GHz	2005	2023/11/20	2024/11/19
SPEAG	Data Acquisition Electronics	DAE4	1358	2024/5/23	2025/5/22
SPEAG	EUmmWV Probe Tip Protection	EUmmWV4	9553	2023/10/18	2024/10/17
SPEAG	mmWave Phantom	mmWave	1065	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46112129	2024/7/4	2025/7/3
Rohde & Schwarz	Signal Generator	SMB100A	100455	2024/1/2	2025/1/1
Keysight	Preamplifier	83017A	MY57280106	2024/4/18	2025/4/17
Rohde & Schwarz	Power Meter	NRVD	102081	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2024/7/4	2025/7/3
Rohde & Schwarz	Power Sensor	NRP50S	101385	2024/10/15	2025/10/14
Testo	Thermo-Hygrometer	HTC-1	55009	2024/1/4	2025/1/3
TES	DIGITAC THERMOMETER	TYPE-K	220305411	2024/1/4	2025/1/3
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

8. _PD System Verification Results_

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequency (GHz)	5G Verification Source	Probe S/N	DAE S/N	Distance (mm)	Input Power (mW)	Measured 4 cm^2 (W/m^2)	Normalized[1] 4 cm^2 (W/m^2)	Targeted 4 cm^2 (W/m^2)	Deviation (dB)	Date
10	10GHz_2005	9553	1358	10	100	97.7	154.8	161	-0.17	2024/10/15

Note: (1) means the measured PD was normalized to Prad power which can be referred to DASY Calibration Certificate in appendix C.

System Verification Setup Photo

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9. *PD Test Result*

Power Density General Notes:

1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

2. Batteries are fully charged at the beginning of the measurements.

3. Absorbed power density (APD) using a 4cm^2 averaging area is reported based on SAR measurements.

4. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.

5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.

6. Per FCC guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.68 dB (85.4%) was used to determine the psPD measurement scaling factor.

7. Per April 2021 TCB Workshop, For the highest SAR test configurations also measure incident PD (total) using power-density reconstruction method in 2 mm closest measurement plane.

8. Since this device is considered a phablet and there is no different PD limit on different exposure conditions, therefore select highest phablet SAR at 0 mm test distance and configurations evaluate power density. Since there is no different PD limit on different exposure conditions, therefore the PD test was performed of a 2mm separation between Probe sensor and EUT surface to cover Head exposure conditions (Front) at head power level and other exposure conditions at body power level of Phone respectively.

9. IPD is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge.

10. Per October 2020 TCB Workshop, PTP-PR algorithm was used during psPD measurement and calculations.

11. The conducted power measurements results are referenced from appendix E in the FCC SAR report (Sporton report no.: FA460505-02).

12. The measurement procedure consists of measuring the PDinc at two different distances: 2 mm (compliance distance) and λ/5. The grid extents should be large enough to fully capture the transmitted energy. The grid step should be fine enough to demonstrate that the integrated Power Density iPDn fulfill the criterion described below. Since iPD ratio between the two distances is≥ -1dB, the grid step (0.0625) was sufficient for determining compliance at d=2mm.

$$10 \cdot log_{10} \frac{iPD_n(2mm)}{iPD_n(\lambda/5)} \geq -1$$

<WLAN PD>

Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Grid Step (λ)	iPDn	iPD ratio (≥ -1)	Normal psPD (W/m^2)	Total psPD (W/m^2)
WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(10)	15	6025	10.54	0.0625	3.08	-0.13	1.93	2.82
WLAN6GHz	802.11ax-HE160 MCS0	Back	8.59mm	Ant 8+10(10)	15	6025	10.54	0.15	3.17		1.68	1.76
WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(10)	207	6985	10.75	0.0625	3.83	0.31	2.48	3.12
WLAN6GHz	802.11ax-HE160 MCS0	Back	10mm	Ant 8+10(10)	207	6985	10.75	0.15	3.57		1.73	1.86

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Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Grid Step (λ)	Scaling Factor for measurement uncertainty	Power Drift (dB)	Normal psPD (W/m^2)	Scaled Normal psPD (W/m^2)	Total psPD (W/m^2)	Scaled Total psPD (W/m^2)
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	47	6185	13.59	15.50	1.552	100	1.000	0.0625	1.5535	-0.07	2.890	6.97	2.850	6.87
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	15	6025	13.57	15.50	1.560	100	1.000	0.0625	1.5535	0.1	2.820	6.83	3.020	7.32
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	111	6505	13.11	13.50	1.094	100	1.000	0.0625	1.5535	-0.02	2.050	3.48	2.120	3.60
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	143	6665	13.13	15.00	1.538	100	1.000	0.0625	1.5535	0.04	2.680	6.40	2.850	6.81
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	207	6985	13.51	14.00	1.119	100	1.000	0.0625	1.5535	0.07	3.130	5.44	3.450	6.00
	WLAN6GHz	802.11ax-HE160 MCS0	Front	2mm	Ant 8+10(10)	Standalone Non DBS	47	6185	10.74	12.50	1.500	100	1.000	0.0625	1.5535	-0.09	1.010	2.35	1.320	3.08
	WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(10)	Standalone Non DBS	47	6185	10.74	12.50	1.500	100	1.000	0.0625	1.5535	0.08	1.670	3.89	2.280	5.31
	WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(10)	Standalone Non DBS	15	6025	10.54	12.50	1.570	100	1.000	0.0625	1.5535	0.01	1.930	4.71	2.820	6.88
	WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(8)	Standalone Non DBS	111	6505	10.81	12.50	1.476	100	1.000	0.0625	1.5535	0.03	2.540	5.82	3.100	7.11
01	WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(8)	Standalone Non DBS	143	6665	10.69	12.50	1.517	100	1.000	0.0625	1.5535	-0.08	2.420	5.70	3.140	**7.40**
	WLAN6GHz	802.11ax-HE160 MCS0	Back	2mm	Ant 8+10(10)	Standalone Non DBS	207	6985	10.75	12.50	1.496	100	1.000	0.0625	1.5535	-0.08	2.480	5.76	3.120	7.25
	WLAN6GHz	802.11ax-HE160 MCS0	Right Side	2mm	Ant 8+10(10)	Standalone Non DBS	47	6185	10.74	12.50	1.500	100	1.000	0.0625	1.5535	0.1	1.810	4.22	2.260	5.27
	WLAN6GHz	802.11ax-HE160 MCS0	Top Side	2mm	Ant 8+10(10)	Standalone Non DBS	47	6185	10.74	12.50	1.500	100	1.000	0.0625	1.5535	-0.18	1.120	2.61	1.250	2.91

Test Engineer :   Martin Li, Varus Wang, Light Wang

Sporton International Inc. (Kunshan)
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10. *Uncertainty Assessment*

Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[a]	$1/k$[b]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

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cDASY6 Module mmWave Uncertainty Budget Evaluation Distances to the Antennas > λ/2π In Compliance with IEC TR 63170				
Error Description	**Uncertainty Value (±dB)**	**Probability**	**Divisor**	**(Ci)**	**Standard Uncertainty (±dB)**
Uncertainty terms dep endent on the measurement system					
Probe Calibration	0.49	N	1	1	0.49
Probe correction	0.00	R	1.732	1	0.00
Frequency response	0.20	R	1.732	1	0.12
Sensor cross coupling	0.00	R	1.732	1	0.00
Isotropy	0.50	R	1.732	1	0.29
Linearity	0.20	R	1.732	1	0.12
Probe scattering	0.00	R	1.732	1	0.00
Probe positioning offset	0.30	R	1.732	1	0.17
Probe positioning repeatability	0.04	R	1.732	1	0.02
Sensor mechanical offset	0.00	R	1.732	1	0.00
Probe spatial resolution	0.00	R	1.732	1	0.00
Field impedance dependence	0.00	R	1.732	1	0.00
Amplitude and phase drift	0.00	R	1.732	1	0.00
Amplitude and phase noise	0.04	R	1.732	1	0.02
Measurement area truncation	0.00	R	1.732	1	0.00
Data acquisition	0.03	N	1	1	0.03
Sampling	0.00	R	1.732	1	0.00
Field reconstruction	2.00	R	1.732	1	1.15
Forward transformation	0.00	R	1.732	1	0.00
Power density scaling	0.00	R	1.732	1	0.00
Spatial averaging	0.10	R	1.732	1	0.06
System detection limit	0.04	R	1.732	1	0.02
Uncertainty terms dep endent on the DUT and environmental factors					
Probe coupling with DUT	0.00	R	1.732	1	0.0
Modulation response	0.40	R	1.732	1	0.2
Integration time	0.00	R	1.732	1	0.0
Response time	0.00	R	1.732	1	0.0
Device holder influence	0.10	R	1.732	1	0.1
DUT alignment	0.00	R	1.732	1	0.0
RF ambient conditions	0.04	R	1.732	1	0.0
Ambient reflections	0.04	R	1.732	1	0.0
Immunity / secondary reception	0.00	R	1.732	1	0.0
Drift of the DUT		R	1.732	1	
Combined Std. Uncertainty					1.34
Expanded STD Uncertainty (95%)					**2.68**

PD Uncertainty Budget

Sporton International Inc. (Kunshan)
TEL : +86-512-57900158
FCC ID : UZ7EM45A1

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11. *References*

[1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"

[2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992

[3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013

[4] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015

[5] FCC KDB 648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 2015.

[6] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[7] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.

[8] IEC 62479:2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

[9] IEC TR 63170: 2018 Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz

[10] SPEAG DASY6 Application Note (Interim Procedures for Devices Operating at 6-10 GHz)

[11] SPEAG DASY System Handbook

------THE END------