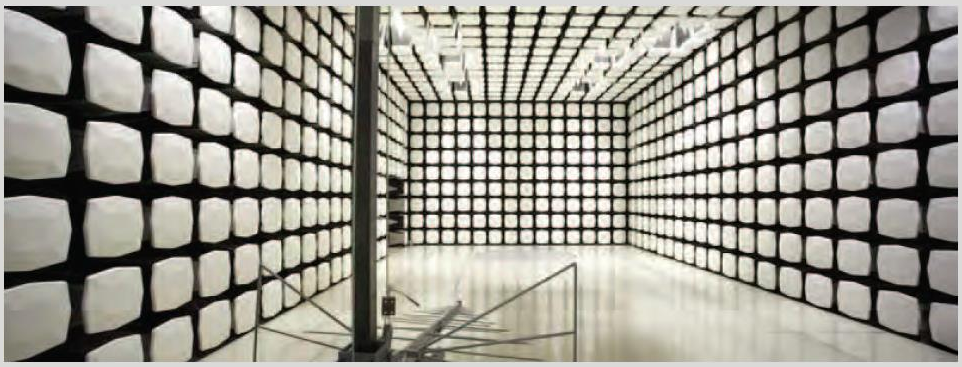
WatchGuard Video

V300

802.11bgn radio

SAR Evaluation Report # WTVD0027.13

Evaluated to the following SAR specification:
FCC 2.1093:2019



NVLAP Lab Code: 200881-0
NVLAP Lab Code: 201049-0

CERTIFICATE OF TEST

Last Date of Test: December 5, 2019
WatchGuard Video
EUT: V300

Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 15.247:2019 FCC 2.1093:2019	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 V02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013	Pass

Highest SAR Values:

Frequency Bands (GHz)	Body (W/kg)	Limit (W/kg)	Exposure Environment
	1g	1g	
2.4	0.06	1.6	General Population

Deviations From Test Standards

None

Approved By:

Don Facteau, Systems Architect

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

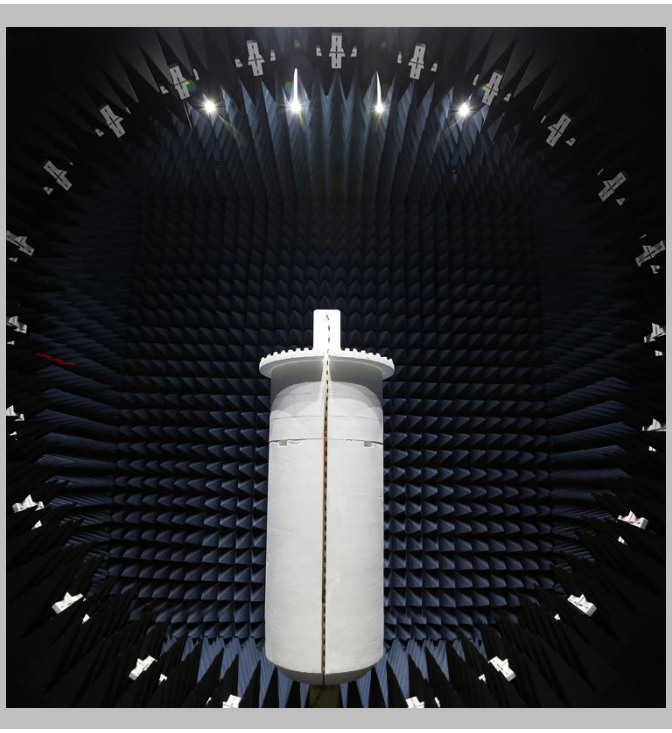
MIC – Recognized by MIC as a CAB for the acceptance of test data.

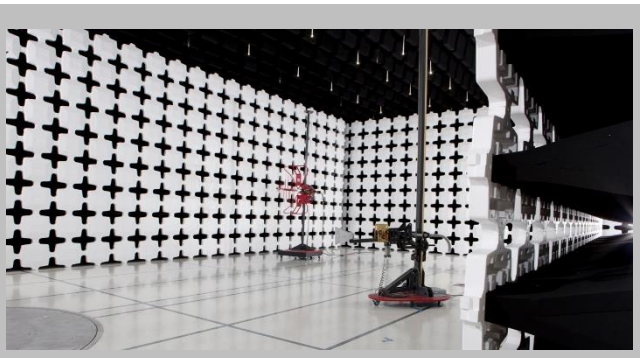
SCOPE

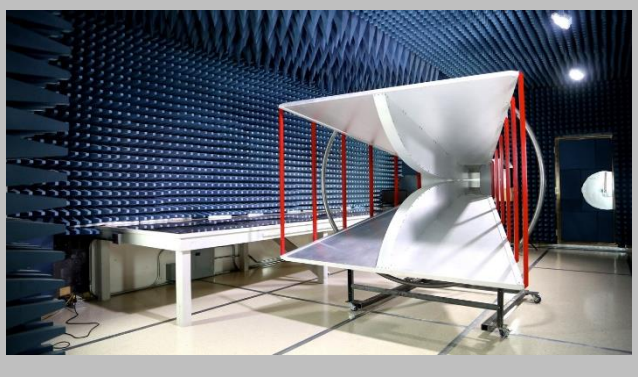
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







PRODUCT DESCRIPTION

2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	WatchGuard Video
Address:	415 East Exchange Pkwy
City, State, Zip:	Allen, TX 75002
Test Requested By:	Navaid Karimi
Model:	V300
First Date of Test:	August 11, 2019
Last Date of Test:	December 5, 2019
Receipt Date of Samples:	August 11, 2019
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The device is a chest-worn camera containing a combination radio modules with 802.11bgn and Bluetooth capability. The Bluetooth supports both BR/EDR and LE usage cases.

FCC ID: YJV-VST400

Frequency Ranges:

a) Bluetooth: 2402-2480
b) 802.11bgn: 2412-2462 (SISO, 20 MHz channel bandwidth)

Location of transmit antenna(s):

PRODUCT DESCRIPTION

2014-12-10

Testing Locations

Testing was performed on the front and the back side of the EUT. In normal operation the EUT will be mounted with the back side being closest to the human body. The EUT will sit in a chest mount assembly when in close proximity to the body for non-transient periods of time. It is not possible to mount the EUT to be seated in the chest mount assembly in any other orientations. The chest mount assembly contains metal. Testing was done with 0 cm of spacing between the chest mount assembly and the phantom.

Simultaneous Transmission

The EUT cannot simultaneously transmit from the 802.11bgn and Bluetooth radios.

Testing Objective:

To demonstrate compliance of the 802.11bgn radio with the SAR requirements of FCC 2.1093:2019.

The RF exposure compliance of the Bluetooth radio is documented in a separate report, Element Report # WTVD0027.17.

Scaling:

Max Power:

The EUT was transmitting near 100% duty cycle.

Per FCC KDB 447498, the measured SAR values were scaled to the maximum tune-up tolerance limit. The results are referred to as the “Reported SAR” values. The following formula was used to calculate the linear SAR scaling factor:

SAR scaling factor = 10^((Maximum Rated Power (dBm) - Measured Power (dBm)) / 10)

802.11bgn SAR scaling factor = 10^ ((12.5 – 12.5) / 10) = 1.00

802.11bgn Test Reduction:

The highest reported SAR for DSSS was adjusted by the ratio of OFDM to DSSS specified maximum output power. If this adjusted SAR is ≤ 1.2 W/kg, test exclusion applies.

(DSSS Value) * (OFDM specified maximum output power)/(DSSS specified maximum output power) ≤ 1.2 W/kg

0.024 W/kg * 3.55 mW / 17.78 mW = 0.005 W/kg

0.005 W/kg ≤ 1.2 W/kg is true, therefore OFDM test exclusion applies.

Duty Cycle

The operational duty cycle can be up to 100%.

CONFIGURATIONS

Configuration WTVD0027- 3

Software/Firmware Running during test	
Description	**Version**
WiFi Test Firmware	20190829161925

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Body Camera (Direct Connect)	WatchGuard Video	V300	63

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Charging Base	WatchGuard Video	V300 USB Base	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter (Base)	GlobeTek, Inc.	GT-21089-1512-W3	931657108-11
Laptop Computer	Dell	Latitude E5570	3VX20G2
AC/DC Power Adapter (Laptop)	Dell	DA130PE1-00	CN-0JU012-48661-136-JIMY-A04

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power (Base)	No	1m	No	AC Adapter (Base)	Charging Base
AC Power (Laptop)	No	.6m	No	AC Mains	AC/DC Power Adapter (Laptop)
DC Power (Laptop)	No	1m	Yes	AC/DC Power Adapter (Laptop)	Laptop Computer
USB	Yes	1m	Yes	Laptop Computer	Charging Base

Configuration WTVD0027- 10

Software/Firmware Running during test	
Description	**Version**
WiFi Test Firmware	20190829161925

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Body Camera (Radiated Unit)	WatchGuard Video	V300	55

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Chest Mount Assembly	WatchGuard Video	WFO02798-200 Rev B	None

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-08-11	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2019-12-05	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

TISSUE – EQUIVALENT LIQUID DESCRIPTION

Characterization of tissue-equivalent liquid dielectric properties

Per IEEE 1528: 2003, Section 5.2.2, the permittivity and conductivity of the tissue material should be measured at least within 24 hours of any full-compliance test. The measured values must be within +/- 5% of the target values or +/- 10% as long as SAR error compensation algorithms documented in IEEE Std 1528-2013 are implemented for upward correction purposes only. The temperature variation in the liquid during SAR measurements must be within +/- 2 degrees C of that recorded when the dielectric properties were measured.

The dielectric parameters of the tissue-equivalent liquids were measured within 24 hours of the start of testing using the SPEAG DAKS:200 dielectric assessment kit. The dielectric measurements were made across the frequency range of the liquid. The attached data sheets show that the dielectric parameters of the liquid were within the required 10% tolerances.

Target values of dielectric parameters

Per KDB 865664 D01 v01r04, Appendix A:

"The head tissue dielectric parameters recommended by IEEE Std 1528-2013 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE Std 1528 are derived from tissue dielectric parameters computed from the 4-Cole-Cole equations described above and extrapolated according to the head parameters specified in IEEE Std 1528."

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

TISSUE – EQUIVALENT LIQUID DESCRIPTION

Composition of Ingredients for Liquid Tissue Phantoms

Element uses broadband tissue equivalent liquids prepared by SPEAG and confirmed by Element to be within +/- 10% of target values. If the liquids prepared are between +/- 5% and +/- 10% of their target values, SAR error compensation algorithms documented in IEEE Std 1528-2013 are implemented for upward correction purposes only. Their recipes are based upon the following formulations as found in IEEE 1528:2013 Annex C (head) and IEC 62209-2:2010 Annex E (body):

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation:

HEAD

Table C.1—Suggested recipes for achieving target dielectric parameters: 300 MHz to 900 MHz

Frequency (MHz)	300	450	450	450	835	835	900	900	900	900
Reference	[B118]	[B118]	[B172]	[B74]	[B118]	[B74]	[B118]	[B196]	[B172]	[B74]
Ingredients (% by weight)										
1,2-Propanediol	—	—	—	—	—	—	—	64.81	—	—
Bactericide	0.19	0.19	0.50	—	0.10	—	0.10	—	0.50	—
Diacetin	—	—	48.90	—	—	—	—	—	49.20	—
DGBE	—	—	—	—	—	—	—	—	—	—
HEC	0.98	0.98	—	—	1.00	—	1.00	—	—	—
NaCl	5.95	3.95	1.70	1.96	1.45	1.25	1.48	0.79	1.10	1.35
Sucrose	55.32	56.32	—	—	57.00	—	56.50	—	—	—
Triton X-100	—	—	—	—	—	—	—	—	—	—
Tween 20	—	—	—	49.51	—	48.39	—	—	—	48.34
Water	37.56	38.56	48.90	48.53	40.45	50.36	40.92	34.40	49.20	50.31

Table C.2—Suggested recipes for achieving target dielectric parameters: 1450 MHz to 2000 MHz

Frequency (MHz)	1450	1800	1800	1800	1800	1800	1900	1900	1950	2000
Reference	[B118]	[B118]	[B196]	[B196]	[B172]	[B74]	[B118]	[B196]	[B74]	[B118]
Ingredients (% by weight)										
1,2-Propanediol	—	—	—	—		—	—	—	—	—
Bactericide	—	—	—	—	0.50	—	—	—	—	—
Diacetin	—	—	—	—	49.43	—	—	—	—	—
DGBE	45.51	47.00	13.84	44.92	—	—	44.92	13.84	45.00	50.00
HEC	—	—	—	—	—	—	—	—	—	—
NaCl	0.67	0.36	0.35	0.18	0.64	0.50	0.18	0.35	—	—
Sucrose	—	—	—	—	—	—	—	—	—	—
Triton X-100	—	—	30.45	—	—	—	—	30.45	—	—
Tween 20	—	—	—	—	—	45.27	—	—	—	—
Water	53.82	52.64	55.36	54.90	49.43	54.23	54.90	55.36	55.00	50.00

TISSUE – EQUIVALENT LIQUID DESCRIPTION

element VERSION

Table C.3—Suggested recipes for achieving target dielectric parameters: 2100 MHz to 5800 MHz

Frequency (MHz)	2100	2100	2450	2450	3000	5200	5800
Reference	[B118]	[B196]	[B196]	[B172]	[B196]		
Ingredients (% by weight)							
1,2-Propanediol	—	—	—		—	—	—
Bactericide	—	—	—	0.50	—	—	—
Diacetin	—	—	—	49.75	—	—	—
DGBE	50.00	7.99	7.99	—	7.99	—	—
HEC	—	—	—	—	—	—	—
NaCl	—	0.16	0.16	—	0.16	—	—
Sucrose	—	—	—	—	—	—	—
Triton X-100	—	19.97	19.97	—	19.97	17.24	17.24
Diethylenglycol monohexylether	—	—	—	—	—	17.24	17.24
Water	50.00	71.88	71.88	49.75	71.88	65.52	65.52

BODY

Frequency (MHz)	30	50		144		450		835	900	
Recipe source number	3	3	2	2	3	2	4	2	2	4
Ingredients (% by weight)										
Deionised water	48,30	48,30	53,53	55,12	48,30	48,53	56	50,36	50,31	56
Tween			44,70	43,31		49,51		48,39	48,34	
Oxidised mineral oil							44			44
Diethylenglycol monohexylether										
Triton X-100										
Diacetin	50,00	50,00			50,00					
DGBE										
NaCl	1,60	1,60	1,77	1,57	1,60	1,96		1,25	1,35	
Additives and salt	0,10	0,10			0,10					

Frequency (MHz)	1 800		2 450	4 000	5 000	5 200	5 800	6 000
Recipe source number	2	4	4	4	4	1	1	4
Ingredients (% by weight)								
Deionised water	54,23	56	56	56	56	65,53	65,53	56
Tween	45,27							
Oxidised mineral oil		44	44	44	44			44
Diethylenglycol monohexylether						17,24	17,24	
Triton X-100						17,24	17,24	
Diacetin								
DGBE								
NaCl	0,50							
Additives and salt								

TISSUE – EQUIVALENT LIQUID

element
WSTE.2016.12.19

Date:	12/05/2019	Temperature:	20.9°C
Tissue:	Body, MBBL600-6000V6, 2450MHz	Liquid Temperature:	21.3°C
Tested By:	Kyle McMullan	Relative Humidity:	35.2%
Job Site:	MN11	Bar. Pressure:	1012.5 mb

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2019 FCC 2.1093:2019	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
2450	52.36	2.03	52.7	1.95	0.65	-3.85

Freq (MHz)	Relative Perm.	Cond. (S/m)
600	55.39	0.89
650	55.32	0.91
700	55.16	0.93
750	55.04	0.94
800	54.89	0.96
850	54.75	0.98
900	54.66	1.00
950	54.56	1.02
1000	54.48	1.04
1050	54.44	1.07
1100	54.31	1.09
1150	54.19	1.11
1200	54.13	1.14
1250	54.04	1.17
1300	53.99	1.19
1350	53.89	1.22
1400	53.83	1.24
1450	53.76	1.28
1500	53.68	1.30
1550	53.60	1.34
1600	53.51	1.37
1650	53.46	1.40
1700	53.35	1.43
1750	53.30	1.47
1800	53.24	1.50
1850	53.12	1.53
1900	53.09	1.57
1950	53.04	1.60
2000	52.98	1.64
2050	52.90	1.68
2100	52.86	1.72
2150	52.76	1.76
2200	52.74	1.80
2250	52.67	1.85
2300	52.63	1.88
2350	52.53	1.93
2400	52.47	1.98

Freq (MHz)	Relative Perm.	Cond. (S/m)
2450	52.36	2.03
2500	52.31	2.08
2550	52.25	2.12
2600	52.14	2.17
2650	52.04	2.22
2700	51.99	2.27
2750	51.87	2.31
2800	51.79	2.37
2850	51.66	2.42
2900	51.59	2.47
2950	51.51	2.52
3000	51.41	2.57
3050	51.32	2.62
3100	51.20	2.69
3150	51.13	2.73
3200	50.98	2.79
3250	50.94	2.84
3300	50.85	2.90
3350	50.74	2.94
3400	50.64	3.00
3450	50.56	3.04
3500	50.39	3.11
3550	50.40	3.16
3600	50.33	3.22
3650	50.23	3.28
3700	50.14	3.34
3750	50.05	3.41
3800	50.02	3.46
3850	49.93	3.52
3900	49.90	3.58
3950	49.74	3.64
4000	49.71	3.71
4050	49.63	3.77
4100	49.54	3.84
4150	49.49	3.90
4200	49.33	3.97
4250	49.23	4.03

Freq (MHz)	Relative Perm.	Cond. (S/m)
4300	49.17	4.11
4350	49.06	4.18
4400	48.90	4.24
4450	48.84	4.33
4500	48.82	4.39
4550	48.74	4.46
4600	48.62	4.52
4650	48.50	4.60
4700	48.39	4.66
4750	48.26	4.73
4800	48.11	4.80
4850	48.07	4.88
4900	47.87	4.91
4950	47.85	5.02
5000	47.65	5.11
5050	47.51	5.16
5100	47.53	5.22
5150	47.59	5.28
5200	47.38	5.44
5250	47.29	5.42
5300	47.06	5.47
5350	46.95	5.58
5400	47.08	5.80
5450	47.11	5.81
5500	46.95	5.81
5550	46.73	5.94
5600	46.64	5.96
5650	46.33	6.08
5700	46.09	6.24
5750	46.34	6.19
5800	46.32	6.22
5850	45.80	6.28
5900	45.94	6.18
5950	45.88	6.34
6000	45.54	6.52

SAR SYSTEM VERIFICATION DESCRIPTION

element
WSSV.2017.1.31

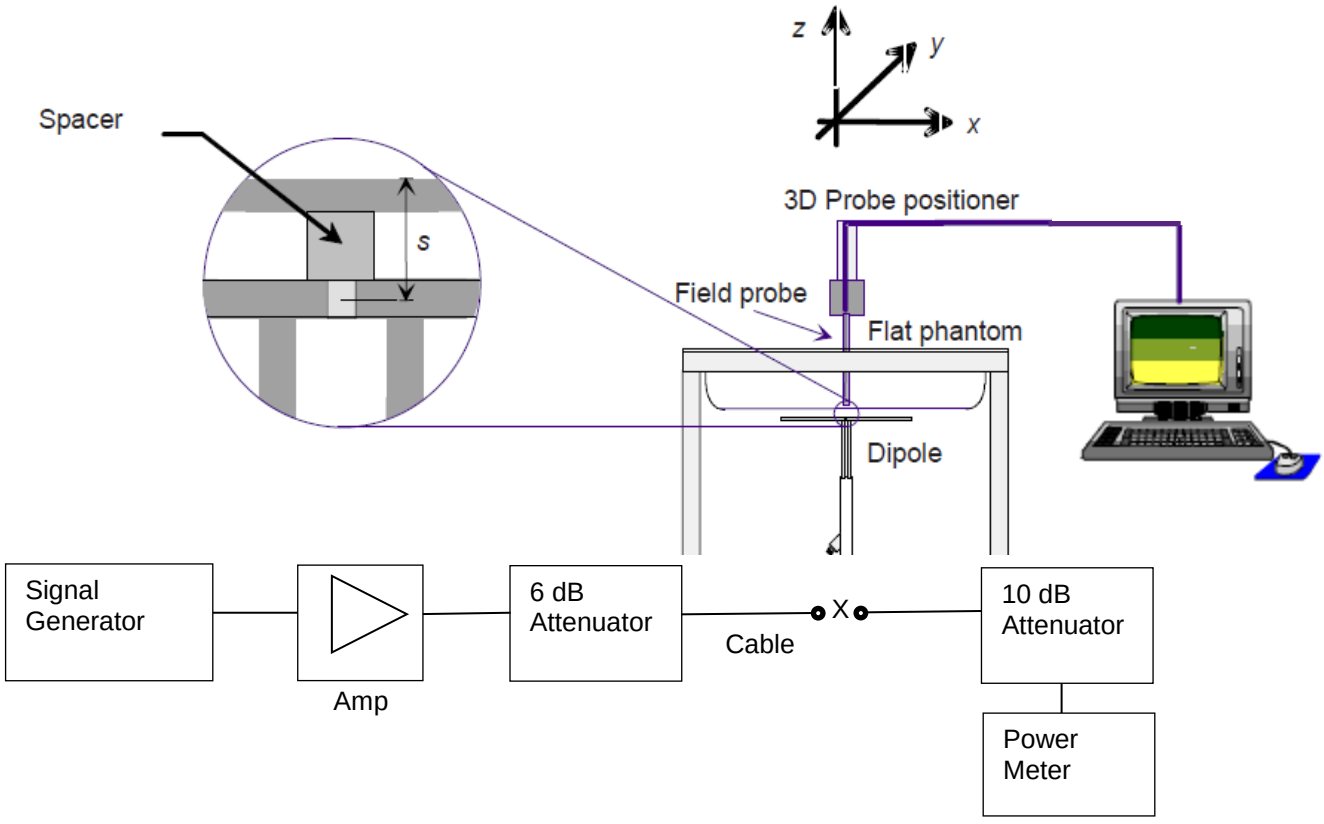
REQUIREMENT
Per IEEE 1528, Section 8.2.1, “System checks are performed prior to compliance tests and the results must always be within ± 10% of the target value corresponding to the test frequency, liquid, and the source used. The target values are 1 g or 10 g averaged SAR values measured on systems having current system validation and calibration status, and using the system check setup as shown in Figure 14. These target values should be determined using a standard source.”

TEST DESCRIPTION
Within 24 hours of a measurement, then every 72 hours thereafter, Element used the system validation kit (calibrated reference dipole) to test whether the system was operating within its specifications. The validation was performed in the indicated bands by making SAR measurements of the reference dipole with the phantom filled with the tissue-equivalent liquid. First, a signal generator and power amplifier were used to produce a 100mW level as measured with a power meter at the antenna terminals of the dipole (X). Then, the reference dipole was positioned below the bottom of the phantom and centered with its axis parallel to the longest side of the phantom. A low loss and low relative permittivity spacer was used to establish the correct distance between the center axis of the reference dipole and the liquid.

For the reference dipoles, the spacing distance s is given by:

s = 15mm, +/- 0.2mm for 300MHz ≤ f ≥ 1000 MHz:
s = 10mm, +/- 0.2mm for 1000MHz ≤ f ≥ 6000MHz

The measured 1 g and 10 g spatial average SAR values were normalized to a 1W dipole input power for comparison to the calibration data. The results are summarized in the attached table. The deviation is less than 10% in all cases, indicating that the system performance check was within tolerance.



SAR SYSTEM VERIFICATION

element
WSSV.2016.12.19

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2019 FCC 2.1093:2019	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

RESULTS

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	Measured		Normalized to 1W		Target (Normalized to 1W) Get from Dipole Calibration Certificate		% Difference	
				1g	10g	1g	10g	1g	10g	1g	10g
12/5/2019	MBBL600-6000V6 (2450 MHz)	20.00	10.00	4.89	2.29	48.90	22.90	50.80	23.80	-3.74	-3.78

SAR SYSTEM VERIFICATION

element
WSSV.2016.12.19

Tested By:	Kyle McMullan	Room Temperature (°C):	20.3°C
Date:	12/5/2019	Liquid Temperature (°C):	21.3°C
		Humidity (%RH):	34.8%
		Bar. Pressure (mb):	1012.5 mb

MBBL600-6000V6 System Check 12-5-19
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:855
Communication System: UID 10000, CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 2.025 S/m; ε_r = 52.361; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- Probe: EX3DV4 - SN3746; ConvF(7.33, 7.33, 7.33) @ 2450 MHz; Calibrated: 11/19/2019
  - Modulation Compensation:
- Sensor-Surface: 5mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface), z = 1.0, 101.0, 31.0
- Electronics: DAE4 Sn907; Calibrated: 9/12/2019
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

System Check/System Check/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 5.17 W/kg

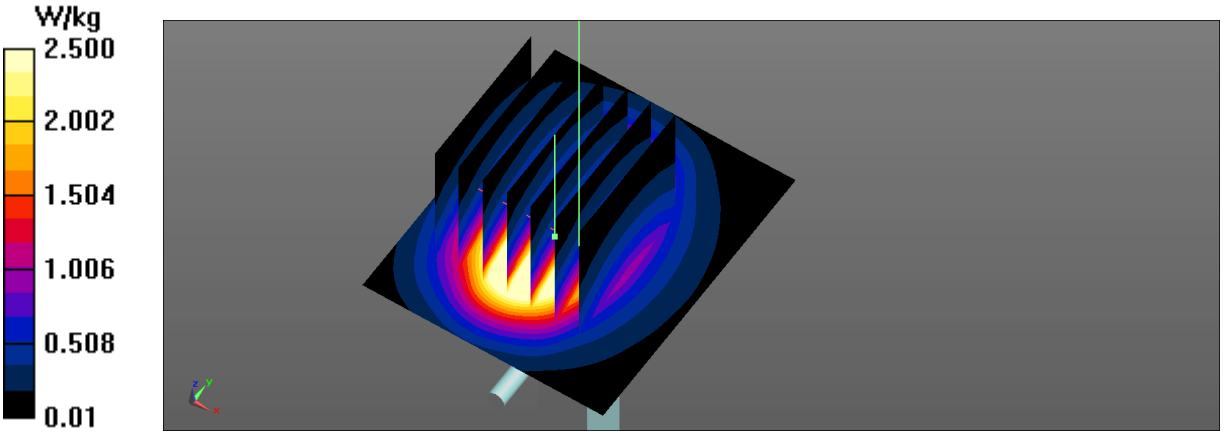
System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 63.47 V/m

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.36 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 9.95 W/kg
SAR(1 g) = 4.89 W/kg; SAR(10 g) = 2.29 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 4.99 W/kg

System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.16 W/kg

Approved By

HSL2450 System Check



OUTPUT POWER

element
WTD.2017.11.22.1

EUT:	V300	Work Order:	WTVD0027
Serial Number:	63	Date:	8/11/2019
Customer:	WatchGuard Video	Temperature:	23 °C
Attendees:	Navaid Karimi	Relative Humidity:	44.5% RH
Customer Project:	None	Bar. Pressure:	1018 mbar
Tested By:	Jonathan Kiefer	Job Site:	TX09
Power:	Battery	Configuration:	WTVD0027-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2019 FCC 2.1093:2019	FCC KDB 248227 D01 V02r02 FCC KDB 447498 D01 V06 FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 IEEE Std 1528:2013

COMMENTS

See the data tables below for the transmitter power setting used for each channel/data rate/band. Output power values come from Element report WTVD0027.1

DEVIATIONS FROM TEST STANDARD

None

OUTPUT POWER

element
WTD.2017.11.22.1

RESULTS

Channel	Frequency (MHz)	Radio Mode	Data Rate (Mbps)	Modulation	Output Power	
					dBm	mW
1	**2412**	**802.11b**	**1**	**BPSK**	**12.5**	**17.78**
			11	CCK	12.5	17.78
		802.11g	6	OFDM	5.5	3.55
			36	OFDM	5.5	3.55
			54	OFDM	5.5	3.55
		802.11n	MCS0	OFDM	4.2	2.63
			MCS7	OFDM	4.3	2.69
6	2437	802.11b	1	BPSK	12	15.85
			11	CCK	11.8	15.14
		802.11g	6	OFDM	5.2	3.31
			36	OFDM	5.2	3.31
			54	OFDM	5.2	3.31
		802.11n	MCS0	OFDM	3.7	2.34
			MCS7	OFDM	4	2.51
11	2462	802.11b	1	BPSK	11.2	13.18
			11	CCK	11.3	13.49
		802.11g	6	OFDM	4.9	3.09
			36	OFDM	5	3.16
			54	OFDM	5	3.16
		802.11n	MCS0	OFDM	3.5	2.24
			MCS7	OFDM	3.8	2.40

SAR TEST DATA

EUT:	V300	Work Order:	WTVD0027
Customer:	WatchGuard Video	Job Site:	MN11
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2019 FCC 2.1093:2019	FCC KDB 248227 D01 V02r02 FCC KDB 447498 D01 V06 FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Transmit Mode	Body-Worn Accessory	Accessory	EUT Position	SAR Drift During Test (dB)	Measured 1g SAR Level (mW/g)	Measured 10g SAR Level (mW/g)	Test#
Body	2.4GHz	2412	1	1	BPSK	Chest	Chest Mount Assembly	Front	0.5	0.06	0.024	1a
Body	2.4GHz	2412	1	1	BPSK	Chest	Chest Mount Assembly	Back	0.2	0.001	0.001	1b

SAR TEST DATA

element
WSTD.2016.12.19

Tested By:	Kyle McMullan	Room Temperature (°C):	20.9°C
Date:	12/5/2019 7:18:21 PM	Liquid Temperature (°C):	21.3°C
Serial Number:	55	Humidity (%RH):	35.2%
Configuration:	WTVD0027-10	Bar. Pressure (mb):	1012.5 mb
Comments:	None		

Test 1a
DUT: V300; Type: Unspecified; Serial: 55
Communication System: UID 0, IEEE 802.11b DSSS 1 Mbps (0); Communication System Band: 2400 MHz ; Frequency: 2412 MHz;Communication System PAR: 1.872 dB; PMF: 1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.988 S/m; ε_r = 52.441; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- Probe: EX3DV4 - SN3746; ConvF(7.33, 7.33, 7.33) @ 2412 MHz; Calibrated: 11/19/2019
  - Modulation Compensation:
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface), z = 31.0, 106.0
- Electronics: DAE4 Sn907; Calibrated: 9/12/2019
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.587 V/m; Power Drift = 0.50 dB
Peak SAR (extrapolated) = 0.139 W/kg
SAR(1 g) = 0.060 W/kg; SAR(10 g) = 0.024 W/kg (SAR corrected for target medium)

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.115 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.137 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 5.062 V/m

Body/Body/Reference scan (41x41x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0916 W/kg

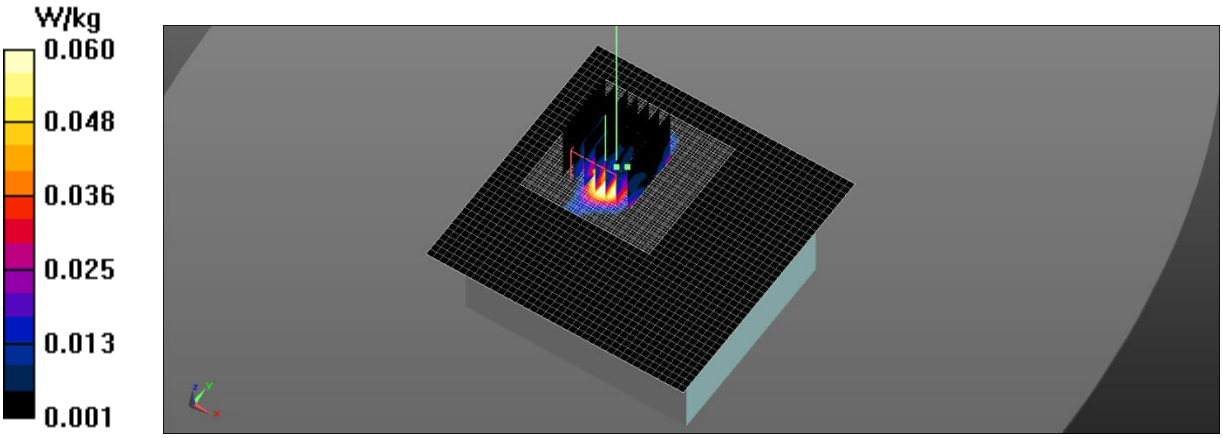
Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0510 W/kg

Approved By

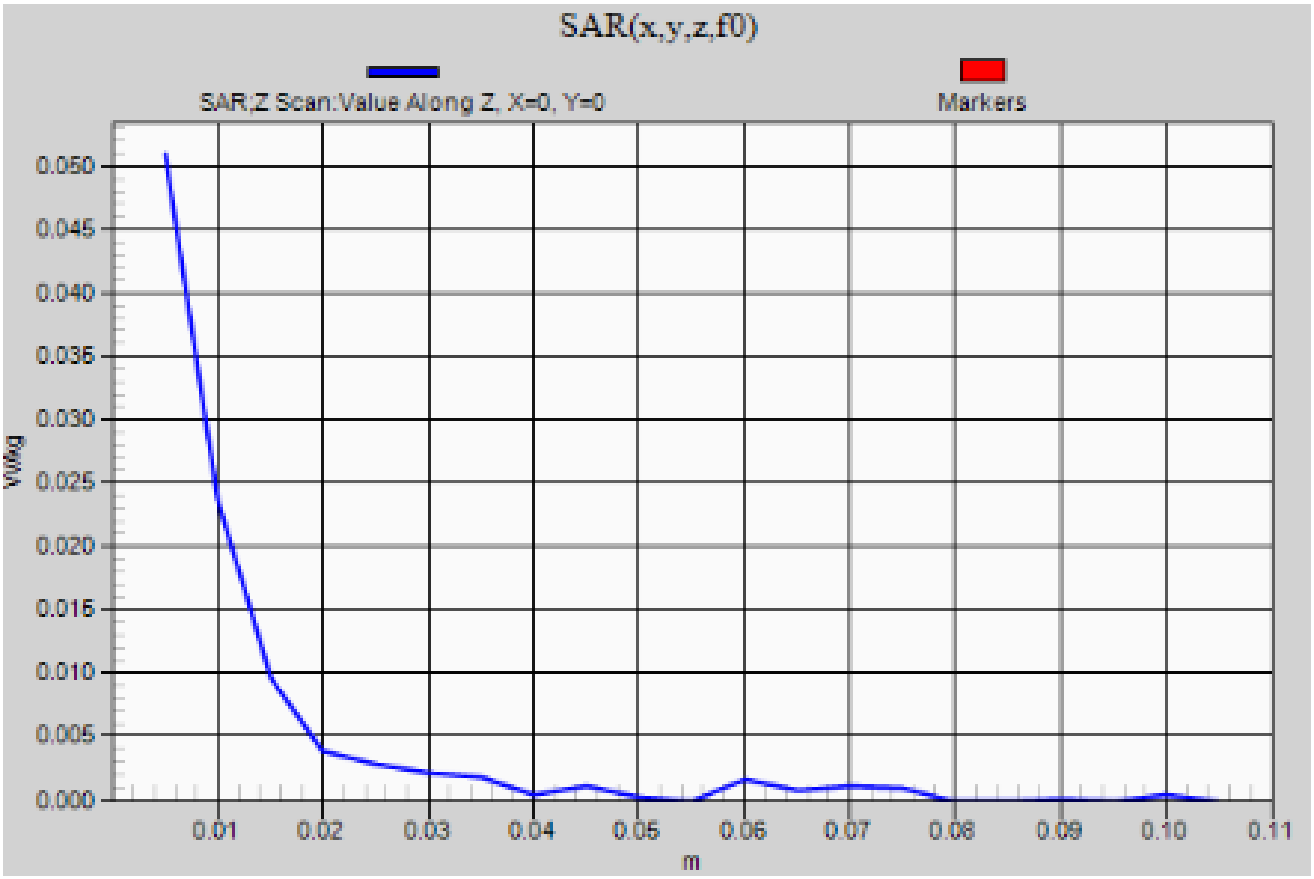
SAR TEST DATA

1a



SAR TEST DATA

-



SYSTEM AND TEST SITE DESCRIPTION

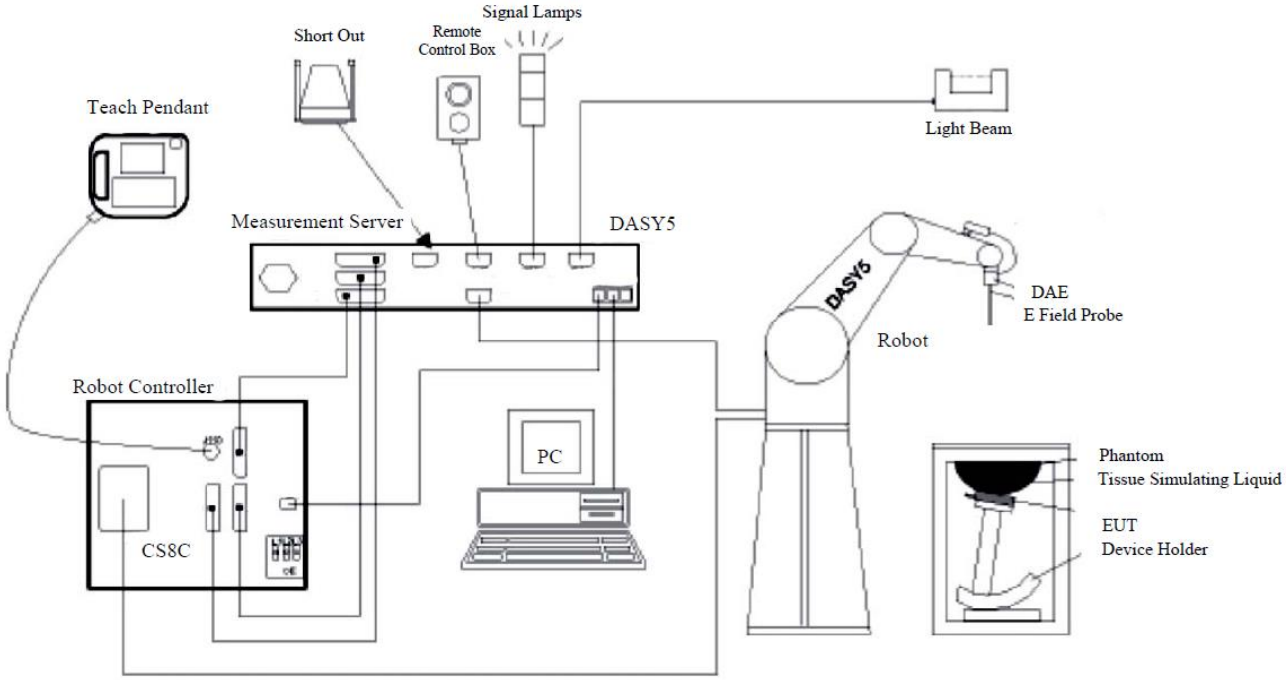
element
WSTD.2017.1.31

SAR MEASUREMENT SYSTEM

Schmid & Partner Engineering AG, DASY52

Element selected the leader in SAR evaluation systems to provide the measurement tools for this evaluation. SPEAG's DASY52 is the fastest and most accurate scanner on the market. It is fully compatible with all world-wide standards for transmitters operating at the ear or within 20cm of the body. It provides full compatibility with IEC 62209-1, IEC 62209-2, IEEE 1528 as well as national adaptations such as FCC OET-65c and Korean Std. MIC #2000-93

The DASY52 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) 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 WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom, oval flat phantom, device holder, tissue simulating liquids, and validation dipole kits.

SYSTEM AND TEST SITE DESCRIPTION

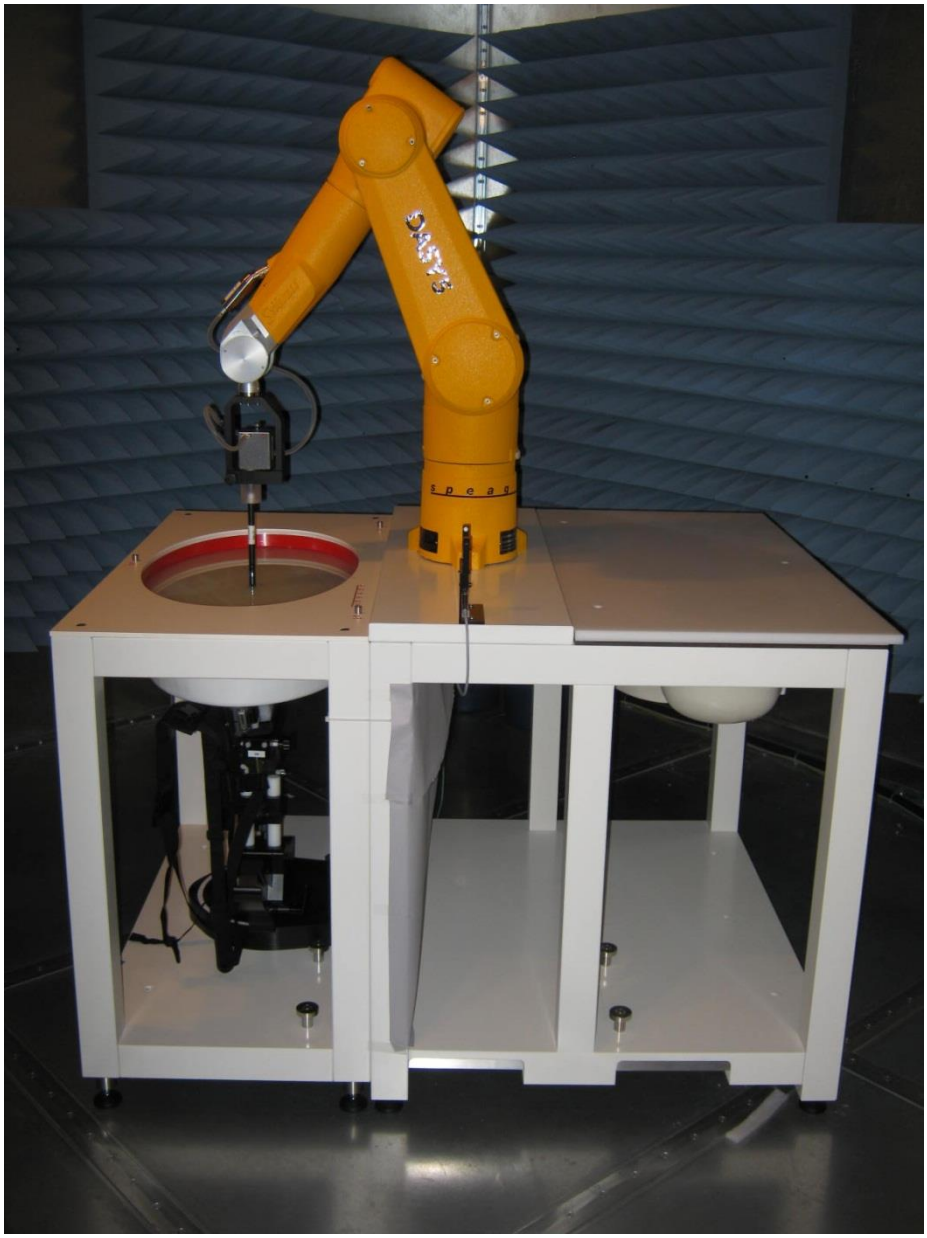
element
WSTD.2017.1.31

TEST SITE

Element, Lab MN11

The SAR measurement system is located in a semi-anechoic chamber. This provides an ambient free environment that also eliminates reflections.

The chamber is 12 ft wide by 16 ft long x 8 ft high. A dedicated HVAC unit provides +/- 1 degree C temperature control.



TEST EQUIPMENT

element
WSEQ.2016.12.19

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier	Mini Circuits	ZVE-3W-83+	TTA	NCR [1]	0 mo
Antenna - Dipole	SPEAG	D2450V2	ADL	11/12/2019	12 mo
DAE	SPEAG	SD 000 D04 BK	R214	9/12/2019	12 mo
Dielectric Assessment Kit	SPEAG	DAKS:200	IPR	4/25/2019	36 mo
Generator - Signal	Agilent	V2920A	TIH	NCR	0 mo
Meter - Power	Agilent	N1913A	SQL	7/13/2019	12 mo
Power Sensor	Agilent	N8481A	SQN	7/13/2019	12 mo
Probe - Dielectric	SPEAG	DAKS-3.5	IPRA	11/12/2019	36 mo
Probe - SAR	SPEAG	EX3DV4	SAG	11/19/2019	12 mo
SAR - Tissue Test Solution	SPEAG	MBBL600-6000V6		At start of testing	
SAR Test System	SPEAG	QD OVA 001 BB	SAC	NCR	0 mo
Thermometer	Omegaette	HH311	DTX	3/29/2018	36 mo
SAR Test System	Staeubli	DASY5	SAK	NCR	NCR

Note 1: The output of the signal generator / amplifier is verified with the calibrated power meter listed above.

MEASUREMENT UNCERTAINTY

MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2013

300-3000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	u_i (1g) (+/-%)	u_i (10g) (+/-%)	v_i
Measurement System								
Probe calibration (k=1)	5.5	normal	1	1	1	5.5	5.5	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.4	rectangular	1.732	1	1	0.2	0.2	∞
Probe positioner with respect to phantom shell	2.9	rectangular	1.732	1	1	1.7	1.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty		RSS				11.2	10.6	387
Expanded Measurement Uncertainty (95% Confidence/		normal (k=2)				22.5	21.2	