RF Safety Laboratory, LLC
5520 Research Park Drive, Suite 140
Catonsville, Maryland 21228 USA
Lab Code: 32002
+1 202 240 9240
info@rfsafetylab.com

SAR EVALUATION REPORT

FCC ID:	2BNHH01
IC:	33491-01
HVIN:	VitalPro-01
Model:	VitalPro
Model Number:	01
Device Type:	Portable Device
Report Issue Date:	March 14, 2025

Tyme Wear, Inc.
450 Artisan Way, Suite 310
Somerville, MA 02145, United States

Certification

Band / Mode	**Body SAR [W/kg]**
2.4 GHz Bluetooth LE	0.18
FCC/ISED Limit	**1.6**

The measurement evaluations presented in this report are based on the maximum performance of the tested device(s), which has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment / general population exposure federal limits in 47CFR § 1.1310 and Health Canada Safety Code 6 and has been tested in accordance with the measurement procedures specified within this report.

This document has been revised and replaces all previously issued versions of this document with the same Test Report S/N.

Steve Liu
President

Table of Contents

1. DUT Specifics

1.1. Device under Test

The device under test is attached on the shirt, incorporating wireless data transfer. The manufacturer has confirmed that the device is within operational tolerances expected for production units and has the same physical, mechanical, and thermal characteristics expected for production units. The serial number of the device used for each test is indicated alongside the results.

1.2. Maximum Output Power From Manufacturer

The manufacturer has confirmed that this device follows the below target output power specifications and tolerances. SAR values were scaled to the maximum allowed power (including tolerance) to determine compliance per KDB Publication 447498 D04v01.

Table 1-1 2.4 GHz Bluetooth LE Maximum RF Output Power

2.4 GHz Bluetooth LE Maximum Allowed Power [dBm]			
Power Level	Mode	Data Rate	Patch Antenna
Max	BLE	1Mbps	8
	BLE	2Mbps	8
Upper Tolerance: +0 dB			

1.3. Test Guidance Applied

- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- RSS-102 Issue 6
- RSS-102.SAR.MEAS
- Health Canada Safety Code 6
- FCC KDB Publication 447498 D04v01 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

2. DUT Conducted Powers

2.1. Bluetooth LE Conducted Powers

Table 2-1

2.4 GHz Bluetooth LE Conducted Power [dBm]			
Power Level / Mode	Channel	Freq [MHz]	Patch Antenna
Max / BLE	0	2402	7.69
	39	2440	7.89
	80	2480	8.00

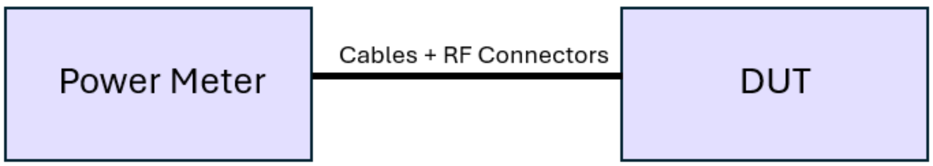
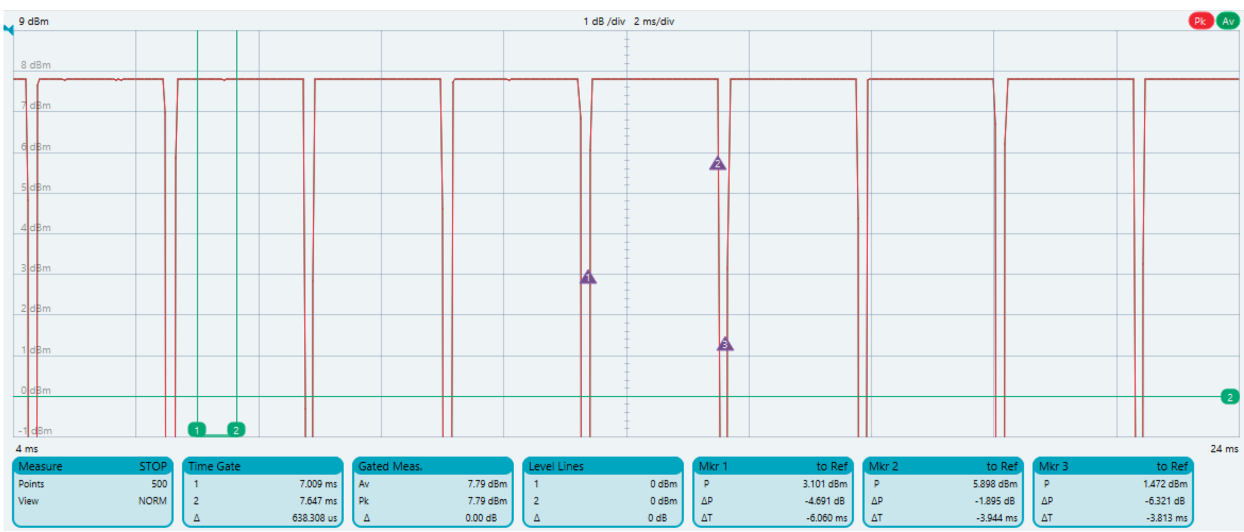


Figure 2-1 Power Measurement Setup



$$\text{Duty Cycle} = \frac{Pulse\ Width}{Period} * 100\% = \frac{-3.944-(-6.06)}{-3.813-(-6.06)} * 100\% = 94.2\%$$

Figure 2-2 2.4 GHz Bluetooth LE Duty Cycle Plot and Calculation

3. DUT SAR Test Results

3.1. Bluetooth LE SAR Data

Table 3-1

Exposure Condition	Band/Mode	Antenna	DUT SN	Power Drift [dB]	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Data Rate (Mbps)	Maximum Allowed Power [dBm]	Measured Conducted Power [dBm]	Separation Distance [mm]	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	2.4 GHz Bluetooth LE	Patch Antenna	00006	-0.05	99.0%	94.2%	2402	0	DSSS	1	8	7.69	0	Back	0.064	0.072	-
Body	2.4 GHz Bluetooth LE	Patch Antenna	00006	0.03	99.0%	94.2%	2440	39	DSSS	1	8	7.89	0	Back	0.164	0.177	1
Body	2.4 GHz Bluetooth LE	Patch Antenna	00006	0.07	99.0%	94.2%	2480	80	DSSS	1	8	8.00	0	Back	0.118	0.124	-

3.2. General SAR Testing Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, IEC/IEEE 62209-1528, RSS-102.SAR.MEAS and FCC KDB Publication 447498 D04v01.
2. Per IEC/IEEE 62209-1528, SAR testing was performed using probes calibrated for the modulation specific signal.
3. SAR evaluations were made in accordance with the latest version of RSS-102 Issue 6 and RSS-102.SAR.MEAS, then IEC/IEEE 62209-1528. FCC KDB Publications listed in RSS-102 can be used as supplementary procedures due to limitation of technology specific testing protocols in the international standards.
4. Liquid tissue depth was at least 15.0 cm for all frequencies.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
6. Batteries are fully charged at the beginning of the SAR measurements.

3.3. Bluetooth LE Note:

1. The device was configured to transmit continuously at the required data rate and signal modulation, using the highest transmission duty factor supported by the test mode tools. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 99% transmission duty factor for Bluetooth LE to determine compliance. See Section 2.1 for the time domain plot and calculation for the duty factor of the device.

4. DUT SAR Measurement Variability Requirement

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was not required since the measured SAR results for a frequency band were less than 0.8 W/kg for 1g SAR.

5. General Introduction

Title 47 of the Code of Federal Regulations (CFR) pertains to United States Federal regulation for Telecommunications. The **Federal Communications Commission (FCC)** is the agency responsible for implementing and enforcing these regulations. The rules define a **radiofrequency device** as any device which in its operation is capable of emitting radiofrequency energy by radiation, conduction, or other means.

47CFR §2.1093(b) states, "A **portable device** is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source's radiating structure(s) **is/are within 20 centimeters of the body of the user**."

Also, 47CFR §2.1093(d)(6) states, that General population/uncontrolled exposure limits defined in §1.1310 "apply to portable devices intended for use by consumers or persons who are exposed as a consequence of their employment and may not be fully aware of the potential for exposure or cannot exercise control over their exposure."

47CFR §2.1093(d)(2) states that evaluation of compliance within FCC's SAR limits can be demonstrated by laboratory measurements. This test report serves this purpose.

6. Background on Radiofrequency (RF) Exposure Limits

6.1. Controlled Environment

Controlled environments are defined as locations where the RF field intensities have been adequately characterized by means of measurement or calculation and exposure is incurred by persons who are: aware of the potential for RF field exposure, cognizant of the intensity of the RF fields in their environment, aware of the potential health risks associated with RF field exposure and able to control their risk using mitigation strategies. 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. This 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.

6.2. Uncontrolled Environment

Uncontrolled environments are defined as locations where either insufficient assessment of RF fields have been conducted or where persons who are allowed access to these areas have not received proper RF field awareness/safety training and have no means to assess or, if required, to mitigate their exposure to RF fields. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed, or in which persons who may not be made fully aware of the potential for exposure, or cannot exercise control over their exposure. Members of the general public would fall under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

6.3. RF Exposure Limits for 100kHz – 6 GHz

Per FCC 47 CFR §1.1310 and Health Canada Safety Code 6, the SAR limits are applied for frequencies 100kHz ~ 6 GHz as shown below.

Table 6-1 Human Exposure to RF Radiation Limits in 47 CFR §1.1310 and Health Canada Safety Code 6- SAR Basic Restrictions

Environment	Condition	**SAR**	Averaging volume
Uncontrolled / General Population	Head, Neck Trunk	**1.6 W/kg**	1g cube
	Extremity	**4.0 W/kg**	10g cube
Controlled	Head/Trunk	**8 W/kg**	1g cube
	Extremity / Limbs	**20 W/kg**	10g cube

7. RF Safety Laboratory SAR Measurement System

7.1. SAR Measurement Hardware and Software

Peak spatially averaged SAR (psSAR) measurements are performed using a DASY8 robot system with cDASY8 module SAR software. The DASY8 is made by SPEAG in Switzerland and consists of a 6-axis robot, robot controller, computer, dosimetric probe, probe alignment light beam unit, and various SAR phantoms.

7.2. E-Field Probe

Manufacturer	Schmid & Partner Engineering AG
Model	EX3DV4
Description	Smallest isotropic electric (E-) field probe for high precision specific absorption rate (SAR) measurements
Frequency Range	10 MHz - 10.0 GHz
Dynamic Range	10 µW/g – >100 mW/g
Overall Length (mm)	337
Body Diameter (mm)	12
Tip Length (mm)	337
Tip Diameter (mm)	2.5
Probe Tip to Sensor X Calibration Point (mm)	1
Probe Tip to Sensor Y Calibration Point (mm)	1
Applications	High precision dosimetric measurements in any exposure scenario (e.g. very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%
Compatibility	DASY8 robot + cDASY8 module SAR software

7.3. Peak Spatially Averaged SAR (psSAR) Measurements

SAR Evaluations are performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04, IEEE 1528:2013 and IEC/IEEE 62209-1528:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface, and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04, IEEE 1528:2013 and IEC/IEEE 62209-1528.

2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04, IEEE 1528:2013 and IEC/IEEE 62209-1528. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
    a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than the area scan and zoomscan resolutions specified in FCC KDB Publication 865664 D01v01v04 section 2.7.1, IEEE 1528:2013 table 6, and IEC/IEEE 62209-1528 table 3 & table 4. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
    b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
    c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
    d. The zoom scan is confirmed to meet both of the following parameters if the result is > 0.1 W/kg. If the result does not meet the below parameters, it is re-measured with a finer resolution scan until the below parameters are met.
        (1) The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x- and y-directions.
        (2) The ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (Ml) at the x-y location of the measured maximum SAR value shall be at least 30%
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

7.4. Test Positions

7.4.1. Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

7.4.2. Body SAR Test

Since only back side of the device is in close proximity to the user’s body, body SAR is measured with the back side positioned against a flat phantom, representative of the operating conditions expected by users.

7.5. RF Safety Laboratory SAR System Measurement Uncertainty

SAR Uncertainty for DUTs
According to 62209-1528

(Frequencies: 300 MHz - 3 GHz)

Symbol	Input Quantity (Xi) (Source of Uncertainty)	62209-1528 Ref	Unc. (xi)	Prob. Dist. PDFi	Div(qi)	ci (1g)	ci (10g)	Std Unc (1g)	Std. Unc (10g)	vi
Measurement System Errors										
CF	Probe Calibration	8.4.1.1	12.0%	N (k=2)	2	1	1	6.00%	6.0%	∞
CFdrift	Probe Calibration Drift	8.4.1.2	1.7%	R	√3	1	1	1.0%	1.0%	∞
LIN	Probe Linearity and Detection Limit	8.4.1.3	4.7%	R	√3	1	1	2.7%	2.7%	∞
BBS	Broadband Signal	8.4.1.4	2.8%	R	√3	1	1	1.6%	1.6%	∞
ISO	Probe Isotropy	8.4.1.5	7.6%	R	√3	1	1	4.4%	4.4%	∞
DAE	Other probe and data acquisition errors	8.4.1.6	0.8%	N	1	1	1	0.8%	0.8%	∞
AMB	RF Ambient and Noise	8.4.1.7	1.8%	N	1	1	1	1.8%	1.8%	∞
Δxyz	Probe Positioning Errors	8.4.1.8	0.006 mm	N	1	0.14	0.14	0.1%	0.1%	
DAT	Data Processing Errors	8.4.1.9	1.2%	N	1	1	1	1.2%	1.2%	∞
Phantom and Device Errors										
LIQ(σ)	Measurement of Phantom Conductivity	8.4.2.1	2.5%	N	1	0.78	0.71	2.0%	1.8%	∞
LIQ(Tc)	Temperature Effects (Medium)	8.4.2.2	3.3%	R	√3	0.78	0.71	1.5%	1.4%	∞
EPS	Shell Permittivity	8.4.2.3	14.0%	R	√3	0	0	0.0%	0.0%	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	8.4.2.4	2.0%	N	1	2	2	4.0%	4.0%	∞
Dxyz	Repeatability of Positioning the DUT or source against the phantom	8.4.2.5	1.0%	N	1	1	1	1.0%	1.0%	5
H	Device Holder Effects	8.4.2.6	3.6%	N	1	1	1	3.6%	3.6%	8
MOD	Effect of Operating mode on probe sensitivity	8.4.2.7	2.4%	R	√3	1	1	1.4%	1.4%	∞
RFdrift	Variation in SAR due to Drift in ouptput of DUT	8.4.2.9	2.5%	N	1	1	1	2.5%	2.5%	∞
VAL	Validation Antenna Uncertainty (Validation measurement only)	8.4.2.10	0.0%	N	1	1	1	0.0%	0.0%	∞
Pin	Uncertianty in Accepted Power (Validation Measurement only)	8.4.2.11	0.0%	N	1	1	1	0.0%	0.0%	∞
Correction to the SAR Results										
C(ε′,σ)	Phantom Deviation from Target (ε′,σ)	8.4.3.1	1.9%	N	1	1	0.84	1.9%	1.6%	∞
C(R)	SAR Scaling	8.4.3.2	0.0%	R	√3	1	1	0.0%	0.0%	∞
u(ΔS AR)	Combined Uncertainty							10.9%	10.8%	∞
U	Expanded Uncertainty and Effective Degrees of Freedom (k=2)							21.8%	21.7%	

8. Technology Specific Test Setup Requirements

8.1. Measured and Reported SAR

Per FCC KDB Publication 447498 D04v01, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8.2. Procedures Used to Establish RF Signal for SAR

Devices under test are evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device is tested throughout the SAR test at maximum output power, the SAR measurement system measures a “point SAR” at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation.

9. Equipment List

Manufacturer	Model	Description	Serial Number	Calibration Date	Calibration Due	CBT
Amplifier Research	5S1G4	RF Broadband Amplifier (800 MHz - 4.2 GHz)	331258			✓
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123431	1/13/2025	1/13/2026	
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123500	1/13/2025	1/13/2026	
Anritsu	S820E	Vector Network Analyzer	2348026	11/30/2023	11/30/2025	
Control Company	4040	Ambient Thermometer	230581662	8/28/2023	8/28/2025	
Control Company	4352	Long Stem Liquid Thermometer	230662223	9/28/2023	9/28/2025	
Micro-Coax	UFB205A-0-0240-30x30	SMA M-F RF test Cable (DC - 18 GHz)	-			✓
Mini-Circuits	BW-N20W20+	20dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	BW-S3W2+	3dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	BW-S3W2+	3dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3318			✓
Mini-Circuits	NF-SF50+	RF Adapter N Male to SMA Female (DC - 18 GHz)	-			✓
Mini-Circuits	VLF-3000+	Coaxial Low Pass Filter (DC - 3 GHz)	-			✓
Mitutoyo	CD-4”AX	Digital Caliper	B23243217	9/28/2023	9/28/2025	
Narda	4226-20 (26733)	20 dB SMA Directional Coupler (0.5 - 18 GHz)	0201			✓
Rohde & Schwarz	SMCV100B	R&S SMCV100B Vector Signal Generator (VSG)	103882	12/21/2023	12/19/2025	
SPEAG	D2450V2	2450 MHz System Validation Dipole	1112	11/15/2024	11/15/2025	
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1843	8/14/2024	8/14/2025	
SPEAG	DAK-3.5	DAK-3.5 Dielectric Probe	1349	9/2/2024	9/2/2025	
SPEAG	EX3DV4	SAR Measurement Probe	7872	3/15/2024	3/15/2025	
SPEAG	SE UMS 171 EA	MAIA Modulation and Interference Analyzer	1820			
SPEAG	SE UMS 176 C	ANT Wideband Communication Antenna	1601			

✓Note: Components calibrated before testing. Prior to testing, the measurement paths containing a cable, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator, power sensor, or VNA) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

10. Conclusion

The SAR evaluation indicates that the DUT is capable of compliance with the RF radiation exposure limits of the FCC and ISED, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.