

RF Exposure Report

Application No.: SZCR2306001852ME
Applicant: NormaTec Industries LP
Address of Applicant: 480 Pleasant St. Ste A200 Watertown Massachusetts 02472 United States
Manufacturer: NormaTec Industries LP
Address of Manufacturer: 480 Pleasant St. Ste A200 Watertown Massachusetts 02472 United States
Factory: Ryder Electronics (XinFeng) Ltd.
Address of Factory: East Shuidong Avenue, Industrial Park, Xinfeng County, Ganzhou City, Jiangxi Province, China 341600

Equipment Under Test (EUT):

EUT Name: Normatec Elite
Model No.: JPN11-SH, JPN11-ST, JPN11-TL, JPN11-PH, JPN11-PS, JPN11-PT ✪
✪ Please refer to section 4 of this report which indicates which model was actual tested and which were electrically identical.

Trade Mark:



FCC ID: 2AY3Y-NTE
Standards: FCC Rules 47 CFR §2.1093
KDB 447498 D04 interim General RF Exposure Guidance v01
Date of Receipt: 2023-10-30
Date of Test: 2023-11-02 to 2023-11-15
Date of Issue: 2023-11-17

Test Result :	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager





SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-11-17		Original

Authorized for issue by:			
		Leo Li/Project Engineer	
		Eric Fu/Reviewer	



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4 General Information

4.1 General Description of E.U.T.

Product Type:	<input checked="" type="checkbox"/> Portable device
	<input type="checkbox"/> Mobile device
	<input type="checkbox"/> Fixed device

4.2 Details of EUT

Power supply:	BPI Lithium Ion Battery: DC 7.2V 5000mAh rechargeable battery Hixon Lithium Ion Battery: DC 7.38V 4800mAh rechargeable battery DC 12V from adapter input AC 120V/60Hz Adapter 1 Model: DZ048CHL120400H Input:100-240V~50-60Hz 1.5A Output:12.0V = 4.0A 48.0W Adapter 2 Model: SMS-01120400-S68 Input:100-240V ~ 50-60Hz 1.5A MAX Output:12.0V = 4.0A 48.0W MAX
Cable(s):	Adapter 1 DC cable: 310cm unshielded Adapter 2 DC cable: 300cm unshielded
For BT:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PCB Antenna
Antenna Gain:	-2.99dBi
For 433MHz:	
Operation Frequency	433.92MHz
Channel Numbers:	1
Modulation Type:	GFSK
Antenna Type:	Helical Antenna
Antenna Gain:	-8.94dBi



Declaration of EUT Family Grouping:

Model No.: JPN11-SH, JPN11-ST, JPN11-TL, JPN11-PH, JPN11-PS, JPN11-PT

Only the model JPN11-ST was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with difference on Model No. and the leg sizes.

Remark: The product comes with different Air compressor, Solenoid Valves, adapters, pressure sensor and batteries, all the Configurations have been pre-tested, and only record the worst case in the report, here are the different configurations:



Component	Manufacturer	Type	Specification
Internal battery (BPI 21700 2S1P)	Shenzhen BetterPower Battery Co., Ltd.	BPI 21700 2S1P	7.2V, 5000mAh
Internal battery (J1025)	Hixon (Shenzhen) Technology Limited.	J1025	7.38V,4800mAh
Solenoid Valve	Shenzhen Wei Shengtai Electronics Co., Ltd	WQF6-12A	DC12V
	Dongguan Jing Bofang Precision Electronics Co., LTD	JQF1320-12A	DC12V
Air compressor	DONG GUAN ZHEN TIAN PRECISION ELECTRONIC CO.,LTD	ZTQB12095016	DC12V Flow rate: ≥6L/min, Pressure: >90Kpa
	Dongguan Jing Bofang Precision Electronics Co., LTD	JQB095-12B	DC12V Flow rate: ≥6L/min, Pressure: >80Kpa
Power adapter	Guangdong Shanmusen Technology Co.,Ltd	SMS-01120400-S68	Input:100-240Vac,1.5A,50-60Hz; Output:12V,4A
	GUANGDONG KEERDA ELECTRONICS CO., LTD	DZ048CHL120400 H	Input:100-240Vac,1.5A,50-60Hz; Output:12V,4A
Pressure sensor	Suzhou Novosense Microelectronics Co., Ltd.	MSPDS5F035DT2 4	Operating pressure range:3-3.6V Operating pressure range:0-35KPA
	Shenzhen Hope Microelectronics Co.,Ltd.	HCS40D	Operating pressure range: 2.7-5.5V Operating pressure range: 0-40KPA

This product comes in two different combinations.

Combination 1: ZHEN TIAN Air compressor+ Wei Shengtai Valve+BPI Battery+ Novosense Pressure sensor+ Shanmusen Adapter

Combination 2: Jing Bofang Air compressor+ Jing Bofang Valve+ Hixon Battery+ Hope Pressure sensor+ KEERDA Adapter



Only the Combination 1 was tested fully, and the Combination 2 was performed the Conducted Emissions at AC Power Line (150kHz-30MHz)and Radiated Spurious Emissions Below 1GHz test for discrepancy.

4.3 Separation Distance

Minimum test separation distance:	5mm
Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.	



4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd.

Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.



5 FCC Radiofrequency radiation exposure limits

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

5.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

5.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²

Subscripts L and H are low and high; λ is wavelength.
From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at



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separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad \text{(B.1)}$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation			
Frequency range	Frequency (MHz)	$R(\lambda/2\pi)$ (m)	Threshold ERP(W)
300~1500MHz	433.92	0.1101	0.067
1500~10000MHz	2480	0.0193	0.007

5.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$.

As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.



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The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad \text{(B.2)}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance(mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation				
Frequency range(GHz)	Frequency(GHz)	X	Distance(cm)	Pth (mW)
0.3~1.5	0.43392	0.988	0.5	23.166
1.5~6	2.48	1.905	0.5	2.717

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6 Measurement and Calculation

6.1 Maximum transmit power

For BLE:

The Power Data is based on the RF Test Report SZCR230600185202.

Antenna Gain: -2.99dBi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Test Mode	Test Channel	Conducted Power [dBm]	Conducted Power (mW)
BLE	2440	-0.14	0.97

For 433MHz:

The Power Data is based on the RF Test Report SZCR230600185203.

Antenna Gain: -8.94dBi

The Max. power (including tune-up tolerance) is -15.2372dBm on the channel 0.43392GHz(*)

-15.2372dBm logarithmic terms convert to numeric result is nearly 0.0299mW

Note: $EIRP = pt \times gt = (E \times d)^2 / 49.2$ (According to ANSI C63.10 Annex G.2).

$ERP = EIRP - 2.15dB$

where

pt is the transmitter output power in watts

gt is the numeric gain of the transmitting antenna (dimensionless)

E is the electric field strength in V/m

d is the measurement distance in meters (m)

$V/m = 10^{((dBuV/m) - 120) / 20}$

Remark: The applicant declared in the manual that the maximum transmission power is 4dBm(2.51mW).



6.2 RF Exposure Calculation

Remark: we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

	Evaluation method	Exempt Limit(mW)	Verdict
<input type="checkbox"/>	Blanket 1 mW Blanket Exemption	1mW	N/A
<input type="checkbox"/>	MPE-based Exemption(ERP)	7mW(ERP)	N/A
<input checked="" type="checkbox"/>	SAR-based Exemption(P_{th})	2.717mW	Yes

The simultaneous transmission result between of BLE and 433.92MHz:

The SAR Exclusion Threshold Level:

$$=CPD1 / LPD1 + CPD2 / LPD2$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= (2.51/2.717) +(0.0299/23.166) = 0.9249 < 1$$

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

- End of the Report -

