

BS EN 62479: 2010 human exposure to electromagnetic fields report

	FOR		
Product Name:	TomTom Cardio GPS Watch		
Brand Name:	TomTom		
Model No.:	8RA0		
Model Differences:	N/A		
Report No.:	ER/2014/10097		
Issue Date:	Feb. 27, 2014		
Prepared for:	TomTom International BV Rembrandtplein 35 1017 CT Amsterdam The Netherlands		
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial		
	Park, Wuku District, New Taipei City, Taiwan 24803		

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CERTIFICATION OF COMPLIANCE

Applicant:	TomTom International BV Rembrandtplein 35 1017 CT Amsterdam The Netherlands
Product Name:	TomTom Cardio GPS Watch
Brand Name:	TomTom
Model No.:	8RA0
Model Difference:	N/A
Report No.:	ER/2014/10097
Date of test:	Feb. 21, 2014 ~ Feb. 27, 2014
Date of EUT Received	• Feb. 21, 2014

APPLICABLE STANDARDS					
STANDARD TEST RESULT					
BS EN 62479: 2010	Complied				

The above equipment was tested by SGS Taiwan Ltd. for compliance with the requirements set forth in the British Standard EN 62479: 2010 derived from IEC6 2479: 2010. The results in this report apply to the product system that was used only.

Test By:	Marcus Tseng	Date:	Feb. 27, 2014
Prepared By:	Marcus Tseng/Engineer Julia Chang	Date:	Feb. 27, 2014
Approved By:	Julia Chang / Clerk Jim Chang Jim Chang / Supervisor	Date:	Feb. 27, 2014

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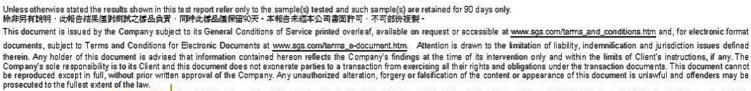
DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 1.

General:

Product Name:	TomTom Cardio GPS Watch
Brand Name:	TomTom
Model No.:	8RA0
Model difference:	N/A
Hardware Version:	1.0
Software Version:	1.5
USB Dock: (1.5mm & 1.0mm)	Model No.: 4UJ0, Brand Name: TomTom
Power Supply:	3.7Vdc (0.7Wh) Rechargeable Lithium Ion battery

Bluetooth 4.0(BLE mode):

Didetootii 4.0(DLL inode)•	
Bluetooth Version:	V4.0	C C C
Channel number:	40 channels	24
Modulation type:	GFSK	2
Transmit Power:	-5.14dBm EIRP	
Frequency Range:	2.402GHz - 2.480GHz	
Antenna Designation	Mono-pole Antenna, -5.82dBi	



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DESCRIPTION OF TEST MODES 2.

Annex A approach: Pmax:

The EUT has been tested under Operating condition. And used to control the EUT for staying in continuous transmitting mode is programmed. Channel lowest, mid and highest of E2 plane were chosen for testing.

Annex B approach:

Pmax::

The EUT has been tested under Operating condition. And used to control the EUT for staying in continuous transmitting mode is programmed. Channel lowest, mid and highest of E2 plane were chosen for testing.

|S11| <= -7dB:

The EUT has been tested under Operating condition. And used to control the EUT for staying in continuous transmitting mode is programmed. Channel lowest, mid and highest will chosen to measured in obtaining free-space antenna bandwidth.

GENERAL DESCRIPTION OF APPLIED STANDARDS 3.

The EUT according to the specifications, it must comply with the requirements of the following standards:

EN 62479: 2010 – Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10MHz- 300GHz).

If such equipment cannot be shown to comply with the applicable EMF exposure requirements using the methods included in this standard for EMF assessment, then other standards, including IEC 62311 or other (EMF) product standards, may be used and selected to demonstrate the product's compliance with rf exposure pursuant for R&TTE.

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GENERAL CONSIDERATIONS 4.

The electronic and electro technical apparatus shall comply with the basic restriction as specified in Council Recommendation 1999/519/EC based on the ICNIRP guidelines. For transmitters intended for use with more than one antenna configuration option, the combination of transmitter and antenna(s) which generates the highest available antenna power and/or average total radiated power shall be assessed.

Four routes, as illustrated in Figure 1 and described as follows, can be used to demonstrate compliance with this standard:

- (A) Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as incandescent light bulbs and audio/visual (A/V) equipment, information technology equipment (ITE) and multimedia equipment (MME) that does not contain radio transmitters.
- (B) The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 4.2 of BS EN62479.
- (C) The available antenna power and/or the average total radiated power are limited by product standards for transmitters to levels below the low-power exclusion level defined in 4.2.
- (D) Measurements or calculations show that the available antenna power and/or the average total radiated power are below the low-power exclusion level defined in 4.2.

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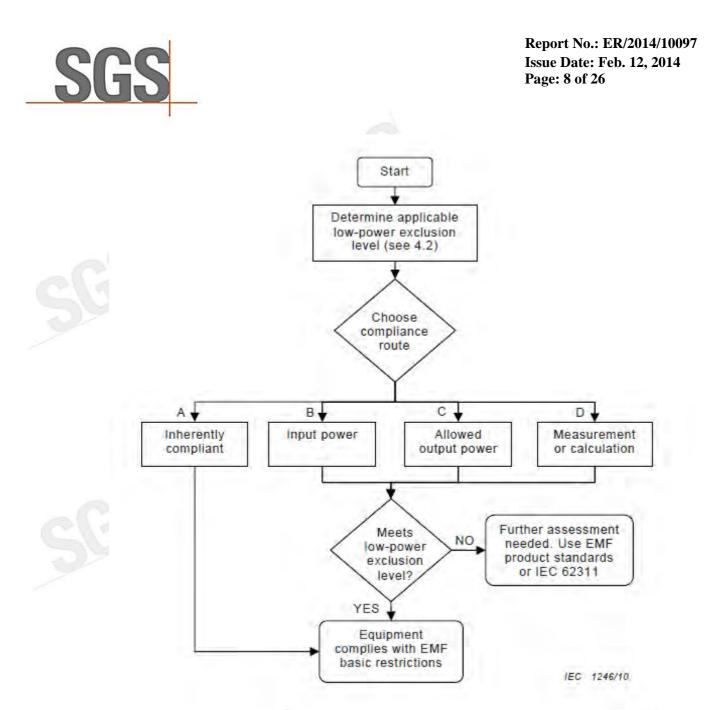


Figure 1 – Routes to show compliance with low-power exclusion level

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5. TEST FACILITY

SGS Taiwan Ltd.

Electronics & Communication Laboratory.

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. A 11m*6m*6m fully anechoic chamber was used for the radiated spurious emissions test.

6. MEASUREMENT EQUIPMENT USED:

Conducted Emission Test Site						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	01/20/2014	01/19/2015	
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014	
Temperature Chamber	TERCHY	MHG-120LF	911009	05/06/2013	05/05/2014	
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014	
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014	
Splitter	Agilent	11636B	51728	02/28/2013	02/27/2014	
DC Power Supply	Agilent	E3640A	KR93300208	07/24/2013	07/23/2014	
Power Sensor	Agilent	U2021X	MY52280003	06/08/2013	06/07/2014	
Power Sensor	Agilent	U2021X	MY52320006	06/08/2013	06/07/2014	



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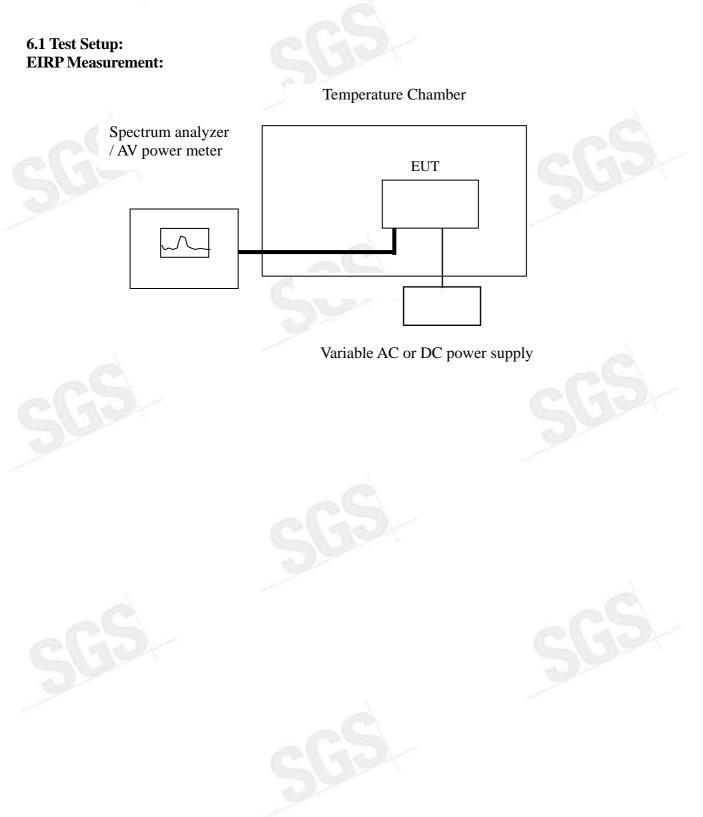
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7. **RF EXPOSURE EVALUATION**

According to section 4.2 of BS EN 62479:2010 and the characteristic of the EUT, compliance route D is suitable for evaluation.

Annex A approach:

Based on the Table A.1 of BS EN62479, ICNIRP guidelines provide maximum radiated output power limits of 20 mW over the 10 MHz to 300 GHz frequency range for general public exposure. If the average power emitted by apparatus operating in the frequency range 10 MHz - 300 GHz is less than or equal to low-power exclusion level, Pmax, as described by the ICNRP guidelines, IEEE Std C95.1-1999, and IEEE Std C95.1-2005, then the apparatus is deemed to comply with the basic restrictions without testing.

Guideline / Standard	SAR limit, S.4R _{max} W/kg	Averaging mass, m	P _{max} mW	Exposure tier*	Region of body*
	2	10	20	General public	Head and trunk
ICNIED (11	4	10	40	General public	Limbs
ICNIRP [1]	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
1	1.6	1	1,6	Uncontrolled environment	Head, trunk, arms, legs
IEEE Std C95.1-1999 [2]	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005 [3]	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled	Extremities and pinnae

Pmax = S X a, where S is the SAR limit as described in the table of above, and a is the averaging mass as described in the table of above.

Pmax = 2 W/kg * (10/1000) kg = 0.02 W = 20mW

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Annex B approach:

Pmax` serves as alternatively low-power exclusion level.

Based upon a systematic study of canonical dipole antenna of different lengths and at different distances from the flat phantom, Pmax' is developed for determining more lenient and higher value of the low-power exclusion level, where emission level as generate by wireless application, excluding wireless devices of having antennas whose directivity is significantly greater than that of a half-wavelength dipole antenna.

Pmax' = exp (As + Bs^2 + C IN(BW) + D), where s represents the nearest separation distance between the wireless device and user's body, BW is the free-space antenna bandwidth, and A, B, C and D are third-order polynomials of frequency. BW is 100% $\triangle f/f0$, where $\triangle f = \text{fmax} - \text{fmin}$, and f0 = (fmin + fmax)/2, and where fmin and fmax are the lowest, and highest frequencies over the range at which |S11| <= -7dB. If device is sought to conform to ICNRP with the limit of SARmax = 2W/kg averaging over m = 10g, then A, B, C, and D are taken as follows:

> $A = (-0.4588 f^{h} 3 + 4,407 f^{h} 2 - 6,112 f + 2,497)/100$ $B = (0.1160 f^{h} 3 - 1,402 f^{h} 2 + 3,504 f - 0,4367)/1000$ $C = (-0.1333 f^{h} 3 + 11,89 f^{h} 2 - 110,8f + 301,4)/1000$ $D = -0.03540 f^{h} 3 + 0,5023 f^{h} 2 - 2,297 f + 6,104$

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Peak and Average Measurement Result:

Test Mode: Bluetooth 4.0 Modulation type: GFSK

Test Date: 02/21/2014

dBi

-5.82

Antenna assembly gain:

EIRP = A (Average Power) + G

TEST CONDITIONS		TRANSMITTER POWER (dBm)				
		Lowest Frequency (CH Low)	Middle Frequency (CH Mid)	Highest Frequency (CH High)		
Temp (-20)°C	Vnom	3.7	v	EIRP = -7.18 dBm	EIRP = -7.27 dBm	EIRP = -6.76 dBm
				Av = -1.36 dBm	Av = -1.45 dBm	Av = -0.94 dBm
Temp (25)°C	Vnom	3.7	v	EIRP = -7.02 dBm	EIRP = -6.81 dBm	EIRP = -7.04 dBm
				Av = -1.20 dBm	Av = -0.99 dBm	Av = -1.22 dBm
Temp (60)°C	Vnom	3.7	v	EIRP = -5.14 dBm	EIRP = -7.01 dBm	EIRP = -7.33 dBm
	v nom	5.7	•	Av = 0.68 dBm	Av = -1.19 dBm	Av = -1.51 dBm
	Limit	t 20dBm				

Note: 1. E.I.R.P.. shall be calculated from the above measured power output A, and the applicable antenna assembly gain "G" in dBi.

2. Av is the Average value at antenna port.

*offset: 2.1dBm being set in compensation for the cable loss

Evaluation Results by Annex A approach:

The max. peak and average measurement value are 0.68dBm (1.17mW) and EIRP is -5.14dBm (0.31mW). Therefore this given device conforms to EN62479 that radiated power is less than 20mW as defined in Annex A.

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APPENDIX 1 PHOTOGRAPHS OF EUT





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All View of EUT



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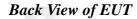
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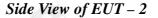
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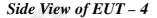


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USB Dock – 1(1.0mm)



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USB Dock -2(1.5mm)



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Open View of EUT – 1



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Open View of EUT – 3



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Internal View of EUT – 1



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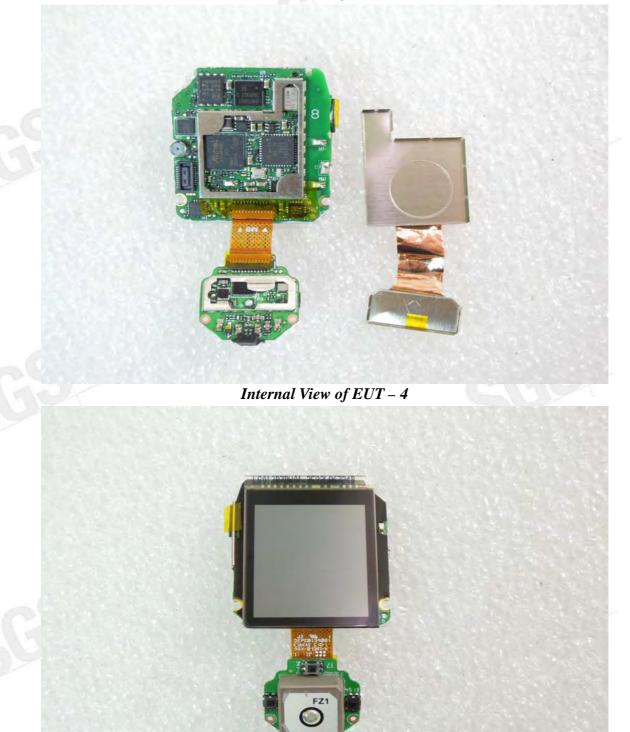
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Internal View of EUT - 3



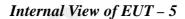
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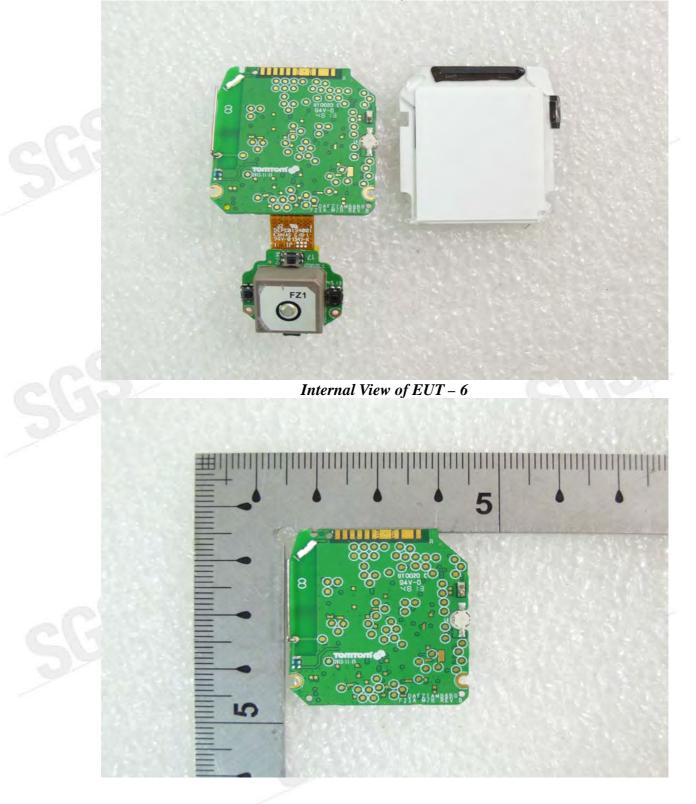
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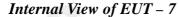
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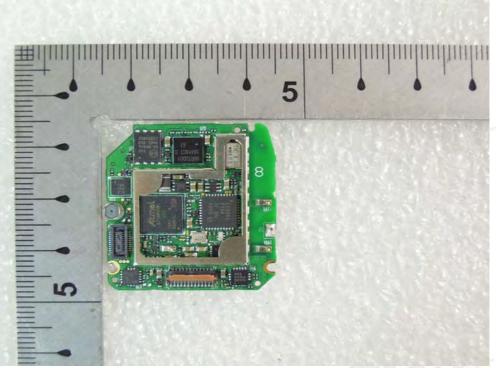
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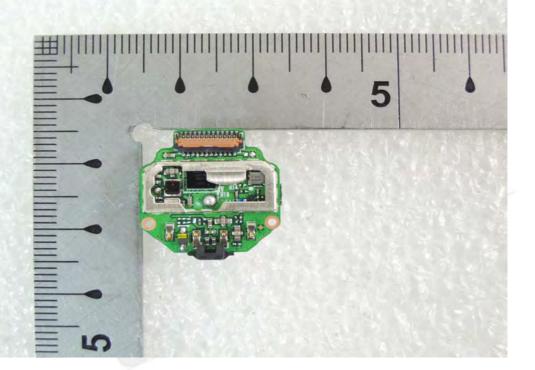


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Internal View of EUT - 8



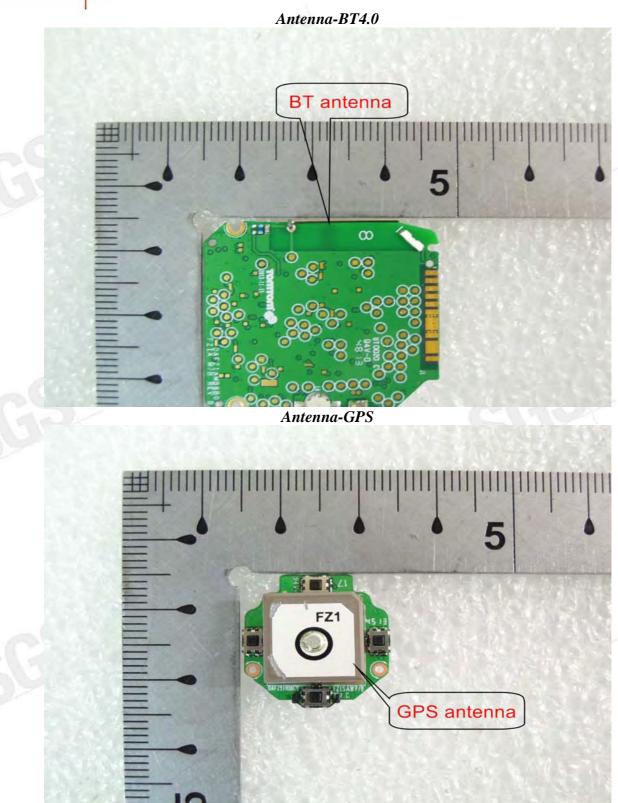
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