

**RADIOFREQUENCY RADIATION EXPOSURE REPORT****Mobiles /Fixed Base Station  
Maximum Permissible Exposure (MPE)  
OF**

**Product Name:** BREMEN

**Brand Name:** TomTom

**Marketing Name:** TomTom LINK 300

**Model Name:** LINK 300

**FCC ID:** S4LLINK300

**Report No.:** ER/2006/B0033

**Issue Date:** Nov. 20, 2007

**Prepared for** TomTom International B.V.  
Rembrandtplein 35, 1017 CT Amsterdam

**Prepared by** SGS Taiwan Ltd.  
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## VERIFICATION OF COMPLIANCE

**Applicant:** TomTom International B.V.  
Rembrandtplein 35, 1017 CT Amsterdam

**Product Name:** BREMEN

**FCC ID Number:** S4LLINK300

**Brand Name:** TomTom

**Marketing Name:** TomTom LINK 300

**Model No.:** LINK 300

**Model Difference:** N/A

**File Number:** ER/2007/B0033

**Date of test:** Nov. 12, 2007 ~ Nov. 20, 2007

**Date of EUT Received:** Nov. 12, 2007

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091.

The test results of this report relate only to the tested sample identified in this report.

Test By:

Jazz Huang

Date

Nov. 20, 2007

Jazz Huang / Engineer

Prepared By:

Eva Kao

Date

Nov. 20, 2007

Eva Kao / Sr. Engineer

Approved By:

Vincent Su

Date

Nov. 20, 2007

Vincent Su/Manager

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## Version

Version No.	Date
00	Nov. 20, 2007

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## 1. GENERAL INFORMATION

### 1.1 Product Description

Product Name	BREMEN
Marketing Name	TomTom LINK 300
Model Name	LINK 300
Model Difference:	N/A
Brand Name	TomTom
Power Supply:	12Vdc ~ 24Vdc by car battery

#### GSM:

Frequency Range and Power	EGSM 900: 880MHz – 915MHz	33 dBm
	GSM 1800: 1710MHz-1785MHz	30 dBm
	GSM 850: 824MHz –849MHz	33 dBm
	GSM 1900: 1850MHz –1910MHz	30 dBm
Type of Emission	300KGXW	
Antenna Designation	Patch Antenna, 0 dBi	
IMEI	352022007482571	

#### Bluetooth:

Frequency Range	2402 – 2480MHz
Channel number	79 channels
Rated Power	-1.53 dBm E.I.R.P. (peak)
Modulation type	Frequency Hopping Spread Spectrum (GFSK) (FHSS)
Type of Emission	860KF1D
Antenna Designation	Chip Antenna, 0 dBi

#### GPS:

Receiver Frequency	L1 Band, 1575.42MHz
Frequency Conversion oscillator	12MHz and 32.768kHz

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The EUT is compliance with Bluetooth Standard.

This test report applies for GSM850/ GSM1900 and BT.

## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **S4LLINK300** filing to comply with Section Part 22, subpart H and part15.247 of the FCC CFR 47 Rules. For 47 CFR 1.1310 Radiofrequency Radiation Exposure requirement.

## 1.3 Special Accessories

Not available for this EUT intended for grant.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 Limitation

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

\* = Plane-wave equipment power density

## 1.6 Maximum Permissible Exposure (MPE) Evaluation

In this application we seek modular approval to the TomTom LINK 300 GSM/GPRS class10. Based on the FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091, we have concluded that the TomTom LINK 300 will comply with the FCC rules on RF exposure for mobile devices, the antenna gain is 0 dBi for GSM 850 and 1900 bands and 0 dBi for BT. The following analysis will demonstrate such compliance. The analysis will be done in two US bands and 2.4GHz BT.

GSM:

Operation in cellular band (824 – 849 MHz)

The peak conducted output power of TomTom LINK 300 in cellular band is 32.4 dBm at GSM/GPRS mode. Take the worst case as an example, in which an antenna with 0 dBi gain is used. The resulted power density at a distance of 20 cm can be deducted as follows:

$$\text{ERP} = 32.4 + 0 - 2.14 = 30.26 \text{ dBm} = 1061.96 \text{ mW}$$

$$\begin{aligned} \text{Power Density} &= \text{ERP} * \text{Duty Cycle} / (4 \pi R^2) \\ &= 1061.96 * 0.125 / (4 * \pi * 20^2) = 0.0264 \text{ mW/cm}^2 \end{aligned}$$

where Duty Cycle is 0.125 for GPRS class 10 operation (the worst case) and R is 20 cm.

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

$$\text{MPE limit} = 824/1500 = 0.55 \text{ mW/cm}^2$$

### Result:

As we can see this resulted MPE is below  $0.55 \text{ mW/cm}^2$ , therefore routine environmental evaluation for RF exposure prior to equipment authorization or use for TomTom LINK 300 in GPRS 850 band is categorically excluded.

### Operation in PCS band (1850 – 1910 MHz)

The peak conducted output power of TomTom LINK 300 in PCS band is 29.35 dBm. Take the worst case as an example, in which an antenna with 0 dBi gain is used. The resulted EIRP can be expressed as follows:

$$\text{EIRP} = 29.35 + 0 = 29.35 \text{ dBm (0.861 W)} < 3 \text{ W}$$

The FCC OET Bulletin 65 Supplement C states that mobile devices identified in 47 CFR §2.1091 that operate at frequencies above 1.5 GHz with an ERP of 3.0 watts or more are required to perform routine environmental evaluation for RF exposure prior to equipment authorization or use; otherwise, they are categorically excluded.

### **Result:**

As we can see this resulted EIRP is below 3 W, therefore routine environmental evaluation for RF exposure prior to equipment authorization or use for TomTom LINK 300 in GPRS 1900 band is categorically excluded.



Operation in BT 2.4GHz band (2402 – 2480 MHz)

The peak conducted output power of TomTom LINK 300 in 2.4GHz band is -1.53 dBm. Taking the worst case as an example, in which an antenna with 0 dBi gain is used. The resulted EIRP can be expressed as follows:

$$S = PG / 4 \pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	-1.53	(dBm)
Maximum peak output power at antenna input terminal:	0.703072	(mW)
Antenna gain (typical):	0	(dBi)
Maximum antenna gain:	1	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2480	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.000140	(mW/cm <sup>2</sup> )
Measurement Result:		
The predicted power density level at 20 cm is	0.00014	(mW/cm <sup>2</sup> )
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup>	2480	MHz

**Result:**

The predicted power density level at 20 cm is 0.00014 mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2480MHz

## APPENDIX 1

### PHOTOGRPHS OF EUT

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### *All View of EUT*



### *Front View of EUT*



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### *Back View of*



### *Side View of EUT – 1*



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*Side View of EUT – 2*

*Side View of EUT – 3*

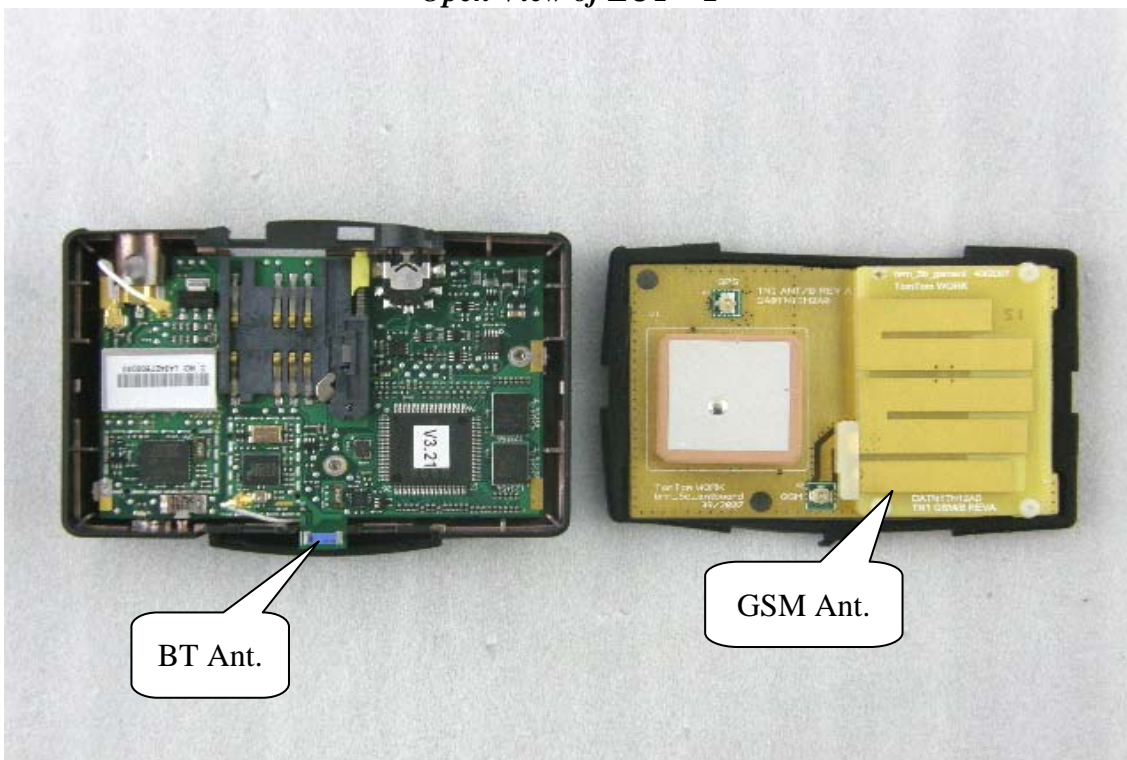

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## Open View of EUT – 1



## Open View of EUT – 2



## ~ End of Report ~

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