**Project Documentation** | EKTSDG-010101 Target Simulator Doppler Generator

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**SMS Project Number:**

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Handheld Radar Target Simulator Doppler Generator

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EKTSDG-010101 Electronic K-band Target Simulator Doppler Generator Data Sheet.doc

**Document state:**
- In progress
- Ready for review
- Released
- Outdated
1 User Safety Warning Information

Read the instructions carefully before you start to work.

Installation
Please observe the following advices when installing and connecting the devices:
- Read the user manual carefully and follow all instructions for installation given there.
- Only skilled and instructed persons shall install and connect the devices.
- All connectors are pin-coded and fit in only one position.

Technical service
Only use provided or approved equipment for operation.
Do not attempt to service or repair this unit.
- No user-maintainable parts are contained within the device.
- To avoid electrical shock, do not remove or open the cover.
- Unauthorized opening will void all warranties.
- Smartmicro is not liable for any damages or harms caused by unauthorized attempts to open or repair the device.

Radiation
This device generates radio frequency energy.
There are strict limits on continuous emission power levels. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
- Human exposure to transmitted waves from this device is generally considered as safe.
- Nevertheless, it is considered good practice that humans are not subject to higher radiation levels than necessary.
This device may interfere with other devices using the same frequency band.

Operation
Transmission of radio frequency waves starts after the device is switched on and stops after switching off.
For testing purposes, the device may be laid on its face when it is powered up, given that the surface or connectors will not be damaged by doing so. Please note that this position is not intended for permanent use.
Do not operate the device if the device itself or any cables are damaged.
Use caution when using the device on or around active roadways. Pay attention to moving traffic.
Make sure that your test procedures are in accordance with local safety policy and procedures and company practices.
The devices are not waterproof. See to proper rain coverage when working outside.
2 Data Sheet

The EKTSDG-010101 (Elektronik K-band Target Simulator/ Doppler Generator) is a battery powered handheld portable moving target simulator for K-band (24GHz) Radar sensors.

It can be used for:
- Alignment of sensors in the field at installation time
- Field or lab calibration and year-by-year inspection
- General functional testing in the field and in the lab

This device was specifically developed to work with Smartmicro 24GHz sensors. It is capable to simulate a moving target in static distances up to 100m and can for instance be placed close to a stop line of an intersection to check the alignment of one or multiple radar sensors.

A software generated modulation signal allows generation of low distortion and directional Doppler signals from 44Hz to 13,4kHz corresponding to any speeds from 1km/h to 300km/h.

2.1 Features

- Handheld K-Band Target Simulator Doppler Generator
- Programmable Speed Interval 1 ... 300km/h
- Programmable Movement Direction
- Programmable Signal Level
- Programmable Presets
- Rechargeable Accumulator
- Standalone or Hosted Operation
- USB Interface to Hostcomputer
- Compact and Rugged Construction
- EKTSDG-Remote PC Software included

2.2 Applications

- Mobile Test Equipments
- Production Final Inspection
- Incoming Components Inspection
- System Tuning and Adjustment
2.3 Device Photograph

![Figure 1: EKTSDG-010100]

2.4 Configuration Software

The EKTSDG may be connected via USB to any Windows PC. The included Configuration Software allows real time remote controlling and configuring the presets of the EKTSDG.

![Figure 2: Configuration Software.]

PROPRIETARY
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The information contained in this document shall remain the sole exclusive property of s.m.s smart microwave sensors GmbH.
### 2.5 EKTSDG-010101 Characteristics

<table>
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<td></td>
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<td>5</td>
<td>5.5</td>
<td>V</td>
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<tr>
<td>External Supply current</td>
<td>Operating</td>
<td>I_cc1</td>
<td>200</td>
<td>500</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>Charging</td>
<td>I_cc2</td>
<td>450</td>
<td>500</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Battery Capacity</td>
<td>T=25°C</td>
<td>C_LiPo</td>
<td>1500</td>
<td></td>
<td></td>
<td>mAh</td>
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<tr>
<td>Battery Lifetime</td>
<td>Full charging cycles</td>
<td></td>
<td></td>
<td></td>
<td>500</td>
<td>Cycles</td>
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<tr>
<td>Operating temperature</td>
<td>non condensing</td>
<td>T_top</td>
<td>0</td>
<td></td>
<td>+60</td>
<td>°C</td>
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<tr>
<td>Storage temperature</td>
<td>T_st</td>
<td></td>
<td>-20</td>
<td></td>
<td>+80</td>
<td>°C</td>
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<td><strong>Doppler Simulator</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency range</td>
<td>Transmitter frequency f_TG</td>
<td>24.000</td>
<td>24.250</td>
<td>GHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doppler frequency range</td>
<td>Digitally adjustable f_Doppler</td>
<td>44</td>
<td>14300</td>
<td>Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulated speed range</td>
<td>Digitally adjustable v_Doppler</td>
<td>1</td>
<td>300</td>
<td>km/h</td>
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<tr>
<td>Output power range</td>
<td>Adjustable signal level P_out</td>
<td>1</td>
<td>100</td>
<td>%</td>
<td></td>
<td></td>
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<tr>
<td>Antenna gain</td>
<td>F=24.125GHz G_Ant</td>
<td>15</td>
<td></td>
<td></td>
<td>dBi</td>
<td></td>
</tr>
<tr>
<td>Antenna polarization</td>
<td>Linear, vertical</td>
<td>V</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Horizontal -3dB beamwidth</td>
<td>E_Plane W_φ</td>
<td>24</td>
<td></td>
<td></td>
<td>°</td>
<td></td>
</tr>
<tr>
<td>Vertical -3dB beamwidth</td>
<td>H_Plane W_θ</td>
<td>27</td>
<td></td>
<td></td>
<td>°</td>
<td></td>
</tr>
<tr>
<td>Sidelobe level</td>
<td>E- and H-Plane D</td>
<td>-15</td>
<td></td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Overall gain</td>
<td>For linear polarized transceivers</td>
<td>65</td>
<td></td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Equivalent reflectivity</td>
<td>For linear polarized transceivers</td>
<td>RCS_lin</td>
<td>25</td>
<td></td>
<td>m²</td>
<td></td>
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<tr>
<td>Frequency error</td>
<td>Crystal controlled Δf_Doppler</td>
<td>1</td>
<td></td>
<td></td>
<td>%</td>
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<tr>
<td>Max. drift in overall gain</td>
<td></td>
<td>+/- 3</td>
<td></td>
<td></td>
<td>dB</td>
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<tr>
<td>Harmonics in generated Doppler(^1)</td>
<td>f_doppler = 1kHz H_Doppler</td>
<td>-10</td>
<td></td>
<td></td>
<td>dBC</td>
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<tr>
<td>Harmonics in RF Spectrum</td>
<td>FRF = 24.125GHz H_RF</td>
<td>-30</td>
<td></td>
<td></td>
<td>dBm</td>
<td></td>
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<tr>
<td>Max. radiated Power</td>
<td>EIRP P_sat</td>
<td>20</td>
<td></td>
<td></td>
<td>dBm</td>
<td></td>
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<tr>
<td><strong>Host Interface</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>USB</td>
<td>Serial USB, Mini-USB connector</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Body</strong></td>
<td></td>
<td></td>
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<tr>
<td>Outline Dimensions</td>
<td>68x128x24</td>
<td></td>
<td></td>
<td></td>
<td>mm</td>
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<tr>
<td>Weight</td>
<td>Including LiPo Battery</td>
<td>180</td>
<td></td>
<td></td>
<td>g</td>
<td></td>
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<tr>
<td><strong>Accessories</strong></td>
<td></td>
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<tr>
<td>Protection case, Softcase, USB Cable, Windows Software &quot;EKTSDG-Remote&quot; as Download</td>
<td></td>
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</tbody>
</table>

\(^1\) Above ~200km/h simulated speed, the harmonics level in generated Doppler will degrade.
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4 Contact

Address:
smart microwave sensors GmbH
In den Waashainen 1
38108 Braunschweig
Germany

Phone / Fax numbers:
Phone: +49-531-39023-0
Fax: +49-531-39023-599

Web / Email address:
Web: www.smartmicro.de
Email: info@smartmicro.de