

WE865-DUAL Product Description

80312ST10046A Rev. 1 - 03/10/08



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This document is relating to the following products:

Short range	
Wi-Fi 802.11 b+g	
WE 865-DUAL Accessory for GE863-PRO ³	
WE865DUA000-001	



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Some of the main features of WE865-DUAL are:

- Dual-mode IEEE 802.11 b and g
 - 9 different regulatory domain configurations supported
 - USA (channel 1 – 11)
 - Canada (channel 1 – 11)
 - Europe (channel 1 – 13)
 - China (channel 1-13)
 - Spain (channel 10-11)
 - France (channel 10-13)
 - Japan 1 (channel 1- 13)
 - Japan 2 (channel 14)
 - Japan-hybrid (channel 1-14)
- Only one external voltage required
- Full RF and Power Supply components included
 - On-board power amplifier (PA)
 - On-board low noise amplifier (LNA)
 - On-board filter to protect against cellular frequency harmonics
 - On-board crystal
 - On-board EEPROM for internal use (RF parameters stored inside)
 - On-board switching DC/DC and LDO
- Low power consumption mode supported
 - Automatic power saving mode supported
 - Shut-down for a very low current consumption
- SDIO interface standard
- Hardware support for multi-mode encryption (WEP 40/64, WEP 104/128, AES, TKIP)
- Full software package
 - Linux driver
 - WiFi configuration and management library
 - WiFi authentication and security library
- Package and form-factor
 - Telit unified form factor
 - 63 Ball Grid Array
 - -20°C up to +85°C
 - RoHS compliant

As a part of Telit’s corporate policy of environmental protection, all products comply to the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2002/95/EG). In order to meet the competitive OEM and vertical market stringent requirements, Telit supports its customers with a dedicated Technical Support Policy with:

- **Telit WE865-DUAL Interface board and Evaluation Kit for GE863-PRO³** to help you to develop your application;
- a Website with all updated information available;
- a high level technical support to assist you in your development;

For more updated information concerning product Roadmap and availability, technical characteristics, commercial and other issues, please check on the Telit website www.telit.com > Products > Modules.



1.1 Related documents

The following documents are related to this user guide:

- [1] Telit WE865-DUAL Hardware User Guide 1vv0300787
- [2] Telit WE865-DUAL Software User Guide 1vv0300788
- [3] Telit GE863-PRO³ Hardware User Guide 1vv0300773a
- [4] Telit GE863-PRO³ Software User Guide 1vv0300788
- [5] Telit GE863PRO³ EVK User Guide 1vv0300776
- [6] Telit GE863PRO³ Linux SW User Guide 1vv0300781
- [7] Telit GE863PRO3Linux Development Environment User Guide1vv0300780

All documentation can be downloaded from Telit's official web site www.telit.com if not otherwise indicated.

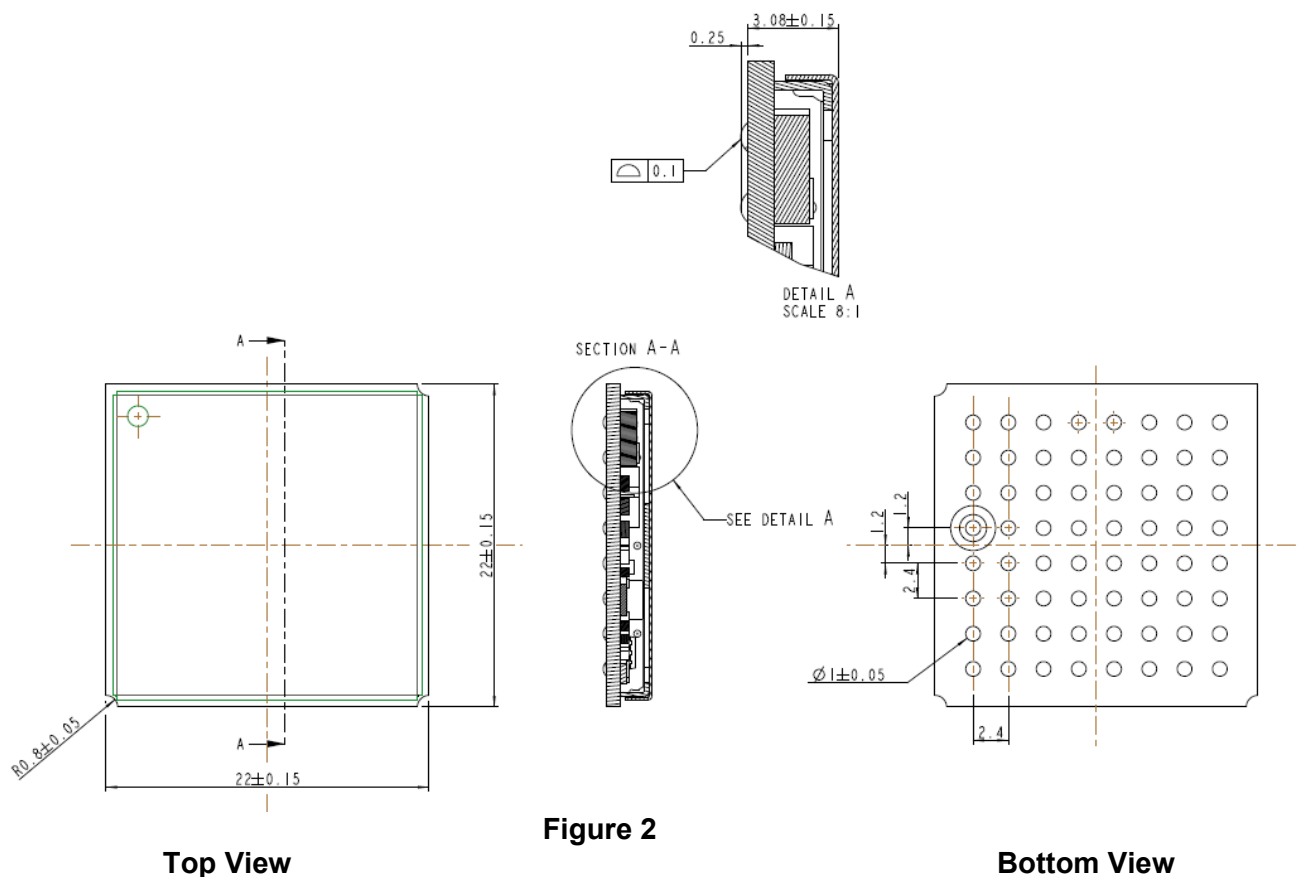


2 General product description

2.1 Dimensions

The **Telit WE865-DUAL module** overall dimensions are:

- **Length:** 22.15 mm (max)
- **Width:** 22.15 mm (max)
- **Thickness:** 3.48 mm (max)
- **Weight** 3.5 g



2.3 Radio performances

The WE865-DUAL is able to support all the 14 channels, either for the 802.11b or the 802.11g mode, as defined by IEEE standards:

Channel ID	Frequency [MHz]
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462
12	2467
13	2472
14	2484

Table 2

The supported data rates for the WE865-DUAL are:

Operating mode	Data rate [Mbps]
802.11g	6, 9, 12, 18, 24, 36, 48, 54
802.11b	1, 2, 5.5, 11

Table 3

The WE865-DUAL supports up to eight different transmission power levels that might be controlled by the host processor via SW (please refer to the WE865-DUAL Software User Guide):

Nominal supply voltage, T _{amb} = 25°C			
Power level ID	Typical output power in 802.11b mode (11Mbps)	Typical output power in 802.11g mode (54Mbps)	Suggested operating condition
1	16.3	14.4 dBm	20°C / 85°C
2	15.3	13.4 dBm	
3	14.3	12.4 dBm	-20°C / 85°C
4	13.3	11.4 dBm	
5	12.3	10.4 dBm	
6	11.3	9.4 dBm	
7	9.3	7.4 dBm	
8	7.3	5.4 dBm	

Table 4



2.3.1 Receiver characteristics

Nominal supply voltage, $T_{amb} = -20^{\circ}\text{C}$ to 85°C , typical values at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated

Parameter	Conditions	min	typ	max	Unit
Sensitivity in 802.11b mode (11Mbps)	PER < 8%	-	-87	-83	dBm
Sensitivity in 802.11g mode (54Mbps)	PER < 10%	-	-72	-68	dBm
Maximum input level in 802.11b mode (11Mbps)	PER < 8%	-4	-	-	dBm
Maximum input level in 802.11g mode (54Mbps)	PER < 10%	-10	-	-	dBm

Table 5

2.3.2 Transmit characteristics

Nominal supply voltage, $T_{amb} = -20^{\circ}\text{C}$ to 85°C , typical values at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated

Parameter	min	typ	max	Unit
Maximum output power in 802.11b mode (11Mbps)	11	16	18	dBm
Maximum output power in 802.11g mode (54Mbps)	9	14	16	dBm
Modulation accuracy peak in 802.11b mode (11Mbps)	-	-	35	%
Modulation accuracy RMS in 802.11g mode (54Mbps)	-	-	-25	dB

Table 6

2.4 Antenna

2.4.1 Wi-Fi antenna

The antenna that the customer chooses to use, should fulfil the following requirements:

Antenna requirements	
Frequency range [MHz]	2400-2500
Gain [dBi]	≤ 2
Impedance [Ohm]	50
Maximum Input Power [mW]	>100
VSWR recommended	≤ 2

Table 7

For further information please refer to the WE865-DUAL Hardware User Guide.



3 Software features

Linux Operating System and Linux WiFi Software Framework are used to configured and controlled WE865-DUAL and help interfacing it with the GE863-PRO³.

3.1 Software features

- Active scan for networks in the local area
- Connection to infrastructure (access point) or independent (ad-hoc) networks
- Starting an unsecured or security-enabled (WEP encrypted) independent (ad-hoc) network.
- Connection to security-enabled (WPA/WPA2 encrypted) networks
- EAP Method supported:
 - EAP-TLS
 - EAP-PEAP/MSCHAPv2 (both PEAPv0 and PEAPv1)
 - EAP-PEAP/TLS (both PEAPv0 and PEAPv1)
 - EAP-PEAP/GTC (both PEAPv0 and PEAPv1)
 - EAP-PEAP/OTP (both PEAPv0 and PEAPv1)
 - EAP-PEAP/MD5-Challenge (both PEAPv0 and PEAPv1)
 - EAP-TTLS/EAP-MD5-Challenge
 - EAP-TTLS/EAP-GTC
 - EAP-TTLS/EAP-OTP
 - EAP-TTLS/EAP-MSCHAPv2
 - EAP-TTLS/EAP-TLS
 - EAP-TTLS/MSCHAPv2
 - EAP-TTLS/MSCHAP
 - EAP-TTLS/PAP
 - EAP-TTLS/CHAP
 - EAP-PSK
- Operation as an independent station (in infrastructure and ad hoc networks)
- A Management Information Base (MIB), used mainly for system configuration, such as setting the MAC address, with values downloaded from the host or from non-volatile memory during system initialisation
- 802.11i security enhancements (except STAKey)
- The firmware's default MIB contents can be initialised from an EEPROM. This can be used to set basic per-design and per-device data, such as the radio's MAC address.
- Basic receive radio strength and signal quality data are available via the MIB
- Basic power saving (both IEEE 802.11 protocol and chip sleep modes)
- Host wake up signalling
- Host handshaking for deep sleep



- Automatic keep alive packets
- Autonomous scanning

3.2 Linux WiFi software framework

WE865-DUAL Linux package is made up of different components:

- WiFi Driver – WE865-Dual Linux WiFi device driver
- Wireless Tools – Set of tools for configuring and managing WE865-Dual
- Wpa Supplicant – Tool for configuring and managing WPA/WPA2 security

WE865-Dual WiFi module is controlled, under Linux OS, by the means of a WiFi device driver loaded into Kernel Space.

WE865-Dual functionalities are made available to User Space applications through Linux Wireless Extensions (WE), kernel space generic APIs allowing a driver to expose to the user space configuration and statistics specific to common Wireless LANs.

Customer applications can access WE865-Dual through simple system calls to shell commands such as Wireless Tools.

For more details see the WE865-DUAL Software User Guide.



4 Mounting the WE865-DUAL on the application board

4.1 General

The **Telit WE865-DUAL module** has been designed in order to be compliant with a standard lead-free SMT process.

4.2 Packing system

The **Telit WE865-DUAL modules** are packed on trays of 50 pieces each.
The size of the tray is:

Length: 329 ± 0.3 [mm]

Width : 176 ± 0.3 [mm]



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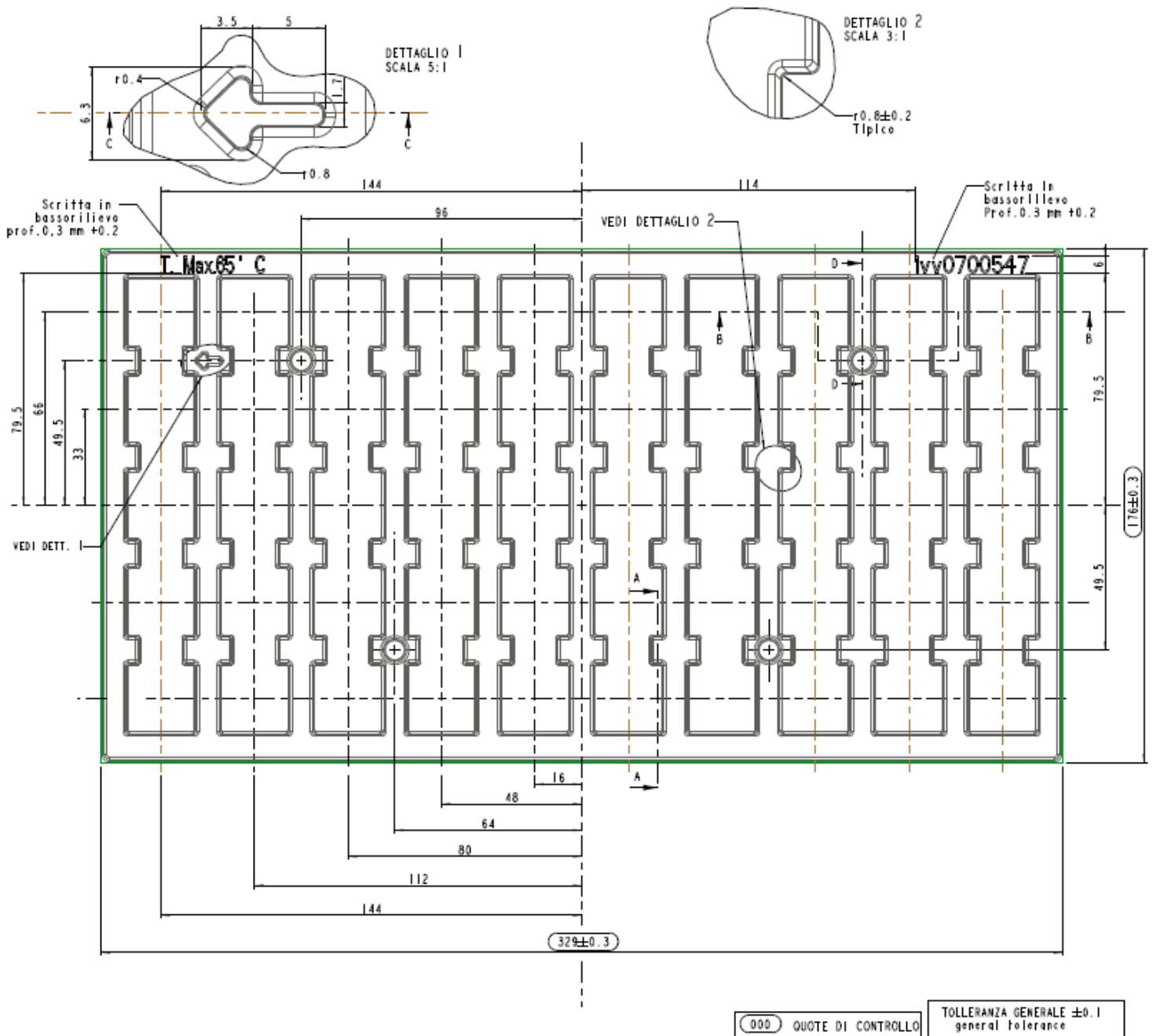


Figure 3



5 Evaluation Kit EVK-PRO³

In order to assist you in the development of your **Telit GE863-PRO³ and WE865-DUAL module** based application, Telit can supply an **Evaluation Kit EVK-PRO³** with appropriate power supply, SIM card holder, RS232 serial port level translator and USB host & device, SD Card holder, Ethernet and antenna connection.

The development of the applications utilizing the **Telit GE863-PRO³ and WE865-DUAL module** must present a proper design of all the interfaces towards and from the module (e.g. power supply, audio paths, level translators), otherwise a decrease in the performances will be introduced or, in the worst case, a wrong design can even lead to an operating failure of the modules.

In order to assist the hardware designer in his design phase, the EVK board presents a series of different solutions, which will cover the most common design requirements on the market, and which can be easily integrated in the OEM design as building blocks or can be taken as starting points to develop a specific one.

For a detailed description of the **Telit GE863-PRO³ Evaluation Kit** refer to the documentation provided with the Telit GE863-PRO³ Hardware User Guide, EVK-PRO³ User Guide and WE865-DUAL Hardware User Guide.



7 Safety recommendations

READ CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc
- Where there is risk of explosion such as gasoline stations, oil refineries, etc

It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity.

We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations.

The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself.

The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the external networks or devices or having impact on the security. Should there be any doubt, please refer to the technical documentation and the regulations in force.

Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case of this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation EN 50360.

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information's are available on the European Community website:

<http://europa.eu.int/comm/enterprise/rte/dir99-5.htm>

The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://europa.eu.int/comm/enterprise/electr_equipment/index_en.htm



8 WE865-DUAL technical support

Telit's technical support to **WE865-DUAL** wireless modem customers consists in:

- Technical documentation: available for download into the Website www.telit.com >Products >Modules > selected model.
- Engineering support: accessible via E-Mail service with 48 hr replies assured under normal conditions.



9 List of acronyms

API	Application Programming Interface
AES	Advanced Encryption Standard
BGA	Ball Grid Array (of solder balls on surface mount devices)
GSM	Global System for Mobile communication
EAP	Extensible Authentication Protocol
EEPROM	Electrically Erasable and Programmable Read Only Memory
IEEE	Institute of Electrical and Electronics Engineers
LAN	Local Area Network
OEM	Other Equipment Manufacturer
RoHS	Reduction of Hazardous Substances
SDIO	Secure Digital Input/Output
TKIP	Temporal Key Integrity Protocol
WEP	Wired Equivalent Privacy
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access



10 Document change log

Revision	Date	Changes
ISSUE#0	20/08/08	Preliminary release
ISSUE#1	03/10/08	Updated mechanical dimensions Added extreme and storage temperature ranges Updated radio performances Updated antenna section Updated packing section Added conformity assessment issues Added safety recommendations section

