

SWL-2900U User Guide

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Samsung Electro-Mechanics

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Summary

This document describes the general User-Guide of SWL-2900U IEEE 802.11b/g Wireless LAN USB 2.0 module.

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Revision History

Revision	Date	Descriptions
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1 General Description

1.1 Functional Description

SWL-2900U is the low power USB 2.0 module for 802.11b/g wireless LAN (WLAN) aimed at embedded applications. SWL-2900U is the USB 2.0 module that adopts a single-chip wireless local area network (WLAN) medium-access controller (MAC) spread-spectrum baseband processor and 2.4 GHz RF radio.

SWL-2900U supports IEEE 802.11b, and 802.11g standards. Data rates up to 54 Mbps can be provided in 802.11g mode of operation.

The main IC of SWL-2900U includes an 80MHz ARM7 core, 384 KB of on-chip SRAM, and 80 KB of on-chip ROM. SWL-2900U is able to host the entire WLAN driver and TCP/IP stack on-chip. This minimizes development time, cost, and burden on the host processor resources making SWL-2900U an ideal WLAN solution for nomadic application.

SWL-2900U provides crucial power management functionality and requires only a single 5.0 V supply voltage.



Figure 1-1 SWL-2900U Picture

1.2 Features

- Wi-Fi compliant
- Security: WEP, WPA-PSK, WPA2-PSK, WMM, WMM-PS, TKIP, and AES hardware acceleration
- Host interface: USB 2.0
- Low power consumption
- Single 5.0 V external supply voltage required

1.3 Applications

- Network printer servers with WLAN connectivity
- Set-top boxes that need WLAN connectivity

1.4 Block Diagram

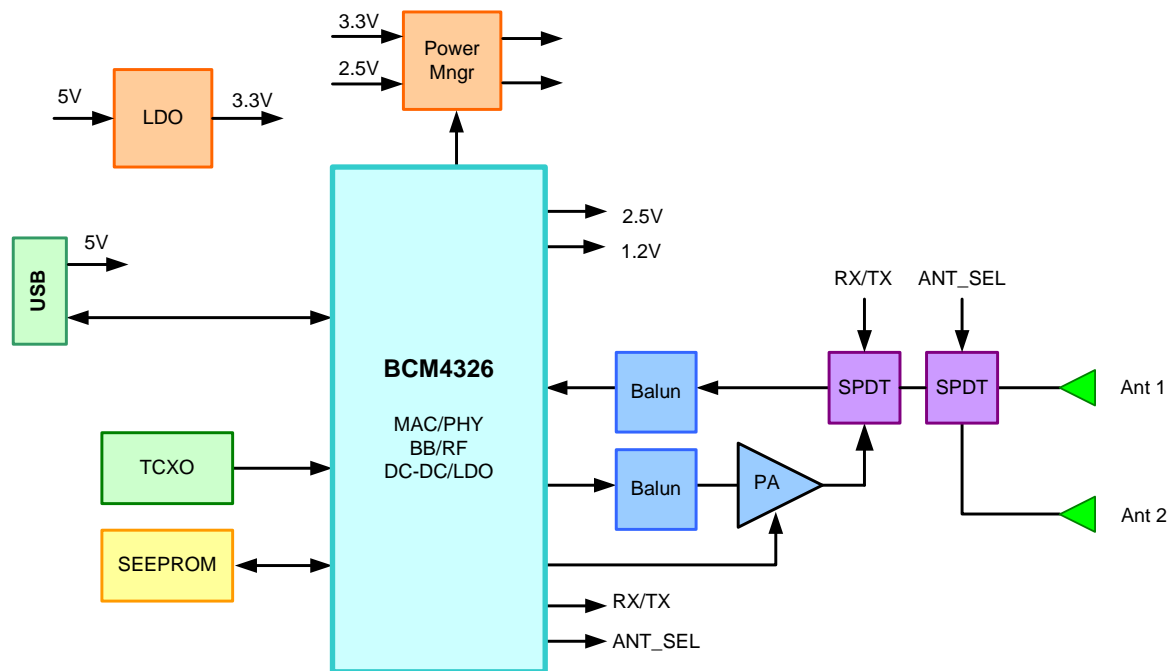


Figure 1-2 SWL-2900U Block Diagram

1.5 Dimension and Pin Assignments

1.5.1 Mechanical Dimension

W X L X H = 45mm X 65mm X 5.1mm

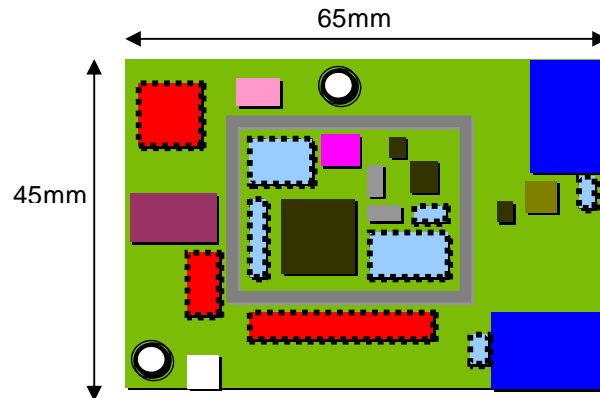


Figure 1-1 SWL-2900U Mechanical Dimension



Figure 1-2 SWL-2900U

1.5.2 HOST Interface

USB Interface : **Molex 53261-0671**, 6pin, Right Angle, SMT

* SIZE : 5.2 x 12.65 x 3.4 mm

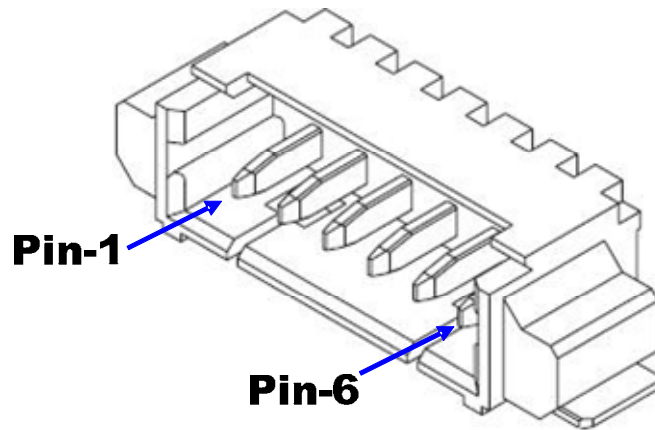


Figure 1-3 SWL-2900U CON1 Connector PIN Assignment

Table 1-1 CON1 PIN Description

No.	Pin Name	Description
1	Shell	Drain wire, to GND
2	VBUS	RED, 5V from HOST
3	D-	White, USB data Negative
4	D+	Green, USB data Positive
5	GND	Black, signal ground
6	Shell	Drain wire, to GND

2 Priority Management

2.1 Maximum Power Supply Rating

The supply Voltage of SWL-2900U is 5V , do follow the Maximum Rating in 3.1.

2.2 Connection to HOST

SWL-2900U will work properly only if connecting to USB2.0 Interface as defined at 1.5.2 .

2.3 Ground Connection

SWL-2900U does not need special ground, but uses the ground wire in HOST Interface.

2.4 Storage Condition

It needs proper condition for protecting the rust.

- Temperature : 0 ~ +50 °C
- Humidity : lower level recommended , 25% ~ 65%RH
- Max Storage Limit : Within 6 Month from Production

2.5 CON2 Pad Discoloration

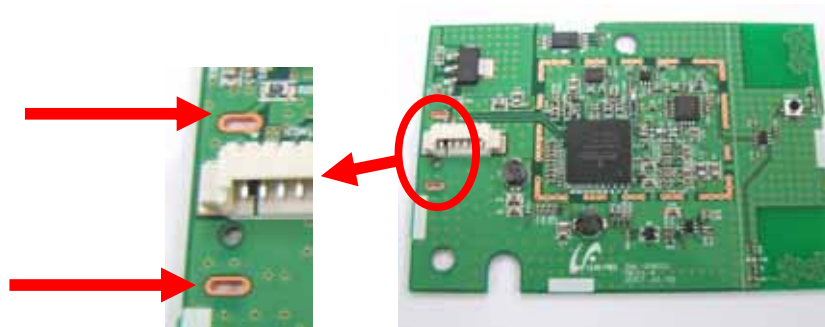
The CON2 pad is open(not soldered) from the request of Customer, so USB Plug A type connector can be attached.

But the pad can be discoloured from the exposure to air.

The surface treatment type of SWL-2900U is OSP(Organic Solderability Preservative), so Scratching can make discoloration. It required the special care in handling.

The Discoloured product is not inferior goods, if it works as WLAN adaptor.

- The discoloration Point : 2 points of CON2 Top Side & 6 points on Bottom Side



3 Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Conditions	Min.	Nom.	Max.	Unit
DC supply	DC supply voltage from HOST		+4.85	+5.0	+5.25	V
DC for I/O	USB2.0 Compliant		-	-	-	-
ESD*	Electro-static discharge voltage IEC1000-4~2 POINT: CON1, CON12	AIR			12K	V
		Contact			8K	V
T _s	Storage temperature		-20	-	+85	°C
T _o	Operating temperature		0	-	+60	°C

* For more detail, see the Reliability Test Report.

3.2 Current Consumption

Symbol	Parameter	Min.	Nom.	Max.	Unit	
Current consumption *	Transmit current value	11b (Tx pwr: 17 dBm)		260	<500	mA
		11g (Tx pwr: 13 dBm)		204	<500	mA

* It can be different to test condition.

4 RF Specification

All measurements are made under nominal power supply and room temperature 25 °C unless specified.

RF specification of SWL-2900U was defined according to 802.11b/g mandatory

4.1 Supportable Modulation Scheme & Data Rates

	Modulation	Coding rate	Data rates (Mbps)	Remark (20MHz Channel spacing for OFDM)
802.11g OFDM	BPSK	1/2	6	mandatory
	BPSK	3/4	9	optional
	QPSK	1/2	12	mandatory
	QPSK	3/4	18	optional
	16-QAM	1/2	24	mandatory
	16-QAM	3/4	36	optional
	64-QAM	1/2	48	optional
802.11b	64-QAM	3/4	54	optional
	DBPSK	NA	1	-
	DQPSK	NA	2	
	CCK	NA	5.5	
NA		11		

4.2 11b RF Specification

Data Rate / TRx	Item	IEEE 802.11b/g	Min	Nom	Max	Unit
11Mbps/Tx	Power Detect Gap	-		-	1.5	dBm
11Mbps/Tx	Power	18.4.7.1	15	17	20	dBm
11Mbps/Tx	Frequency Error Rate	18.4.7.4	-25		+25	ppm
11Mbps/Tx	EVM	18.4.7.8		13	35	%
11Mbps/Tx	Spectrum Mask 1st Side Lobe	18.4.7.3		40	30	dBr
11Mbps/Tx	Spectrum Mask 2nd Side Lobe	18.4.7.3		60	50	dBr
11Mbps/Rx	Minimum input signal level	18.4.8.1	-85	-84	-76	dBm

4.3 11g RF Specification

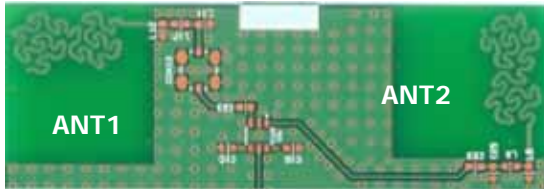
Data Rate / TRx	Item	IEEE 802.11b/g	Min	Nom	Max	Unit
48Mbps/Tx	Power Detect Gap	-		-	1.5	dBm
48Mbps/Tx	Power	19.4.7.1	10	13	15	dBm
48Mbps/Tx	Frequency Error Rate	19.4.7.2	-25	0	+25	ppm
48Mbps/Tx	EVM	17.3.2.2 17.3.8~17.3.9		-27	-22	dB
48Mbps/Tx	Spectrum Mask 1st Side Lobe	19.5.4		40	20	dBr
48Mbps/Tx	Spectrum Mask 2nd Side Lobe	19.5.4		60	28	dBr
48Mbps/Tx	Spectrum Mask 3rd Side Lobe	19.5.4		60	40	dBr
48Mbps/Rx	Minimum input signal level	19.5.1	-76	-74	-65	dBm

4.4 Channel & Center Frequency

Channel No	Center Frequency [Mbps]	FCC, IC	ETSI Korea
1	2412	0	0
2	2417	0	0
3	2422	0	0
4	2427	0	0
5	2432	0	0
6	2437	0	0
7	2442	0	0
8	2447	0	0
9	2452	0	0
10	2457	0	0
11	2462	0	0
12	2467	-	0
13	2472	-	0

4.5 ANTENNA Specifications

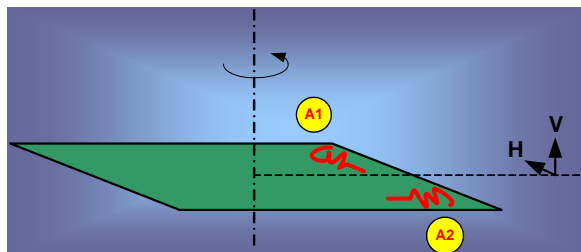
2 Fractal Antennas on PCB that support Diversity



ANTENNA	Polarization	AVG	Max.	Unit
ANT1	Horizontal	-3.3	2.6	dBi
	Vertical	-	-	dBi
ANT2	Horizontal	-2.5	1.8	dBi
	Vertical	-	-	dBi

All measurement is done with bare PCB.

It can be different to ANTENNA direction & measurement set-up.



For better performance, the antennas should be apart more than 5mm from other material.

Regulatory Information

FCC Compliance

⌵ FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

⌵ Caution

Any changes or modifications NOT explicitly APPROVED by Samsung Electronics Co., Ltd. could cause the SWL-2900U module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

⌵ RF-exposure statement

These modular transmitters, SWL-2900U, comply with FCC radiation exposure limits set forth for an uncontrolled environment. The SWL-2900U should be installed and operated with minimum distance 20cm between the antenna and the body of the user or nearby persons.

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the users manual of the end product which integrate this module.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users,
- and 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the 2 conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

↘ **Antenna**

These modular transmitters are for OEM integrations only. The end-user product will be installed in such a manner that only the authorized antennas are used.

↘ **Label and manual requirements for the End Product**

For an end product using the SWL-2900U there must be a label containing, at least, the following information:

FCC ID for model SWL-2900U

This device contains FCC ID: A3LSWL-2900U

The label must be affixed on an exterior surface of the end product such that it will be visible upon inspection in compliance with the modular approval guidelines developed by the FCC.

Where the SWL-2900U will be installed in final products larger than 8cm x 10cm following statements has to be placed ONTO the device.

"This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

In case where the final product will be installed in locations where the end-consumer is not able to see the FCC ID and/or this statement, the FCC ID and the statement shall also be included in the end-product manual.

The users manual for end users must include the following information in a prominent location "IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

EU Compliance

↳ Regulatory compliance of the SWL-2900U

The SWL-2900U are made for OEM integrations only. The European regulations applying to the SWL-2900U is the R&TTE Directive 1999/5/EC.

SWL-2900U meets the following requirements of the R&TTE Directive.

R&TTE Directive article	Test category	Harmonized standard
Article 3.1(a)	Protection of health and safety	EN 60950-1, EN 50385
Article 3.1(b)	EMC	EN 301 489-1/-17
Article 3.2	Effective use of the spectrum	EN 300 328

The conformity assessment for the SWL-2900U were completed in accordance with the R&TTE Directive Annex IV procedures, and the EC Declaration of Conformity is attached to this manual.

↳ Cautions regarding regulatory compliance when integrating the SWL-2900U

The person integrating the SWL-2900U becomes the manufacturer of the final product and is therefore responsible for demonstrating compliance of the product with the essential requirements of the R&TTE Directive.

In all cases assessment of the final product must be made against the Essential requirements of the R&TTE Directive Article 3.1(a) and (b), safety and EMC respectively, and any relevant Article 3.3 requirements

This device is intended only for OEM integrators under the following conditions:

1. This appliance and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
2. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements of the Council recommendation 1999/519/EC of 12 July 1999.

As long as the 2 conditions above are met, no further evaluation under Article 3.2 of the R&TTE Directive and do not require further involvement of an R&TTE Directive Notified Body for the final product. In all other cases, or if the manufacturer of the final product is in doubt then the equipment integrating the radio module must be assessed against Article 3.2 of the R&TTE Directive.

Please note that this product, SWL-2900U, uses radio frequency bands not harmonized throughout the Community. This product is classified as Class 2 radio equipment for which some Member States apply restrictions on placing on the market and in use. Any parties putting Class 2 radio equipment on the market must notify the relevant national spectrum management authority of their intention, and the radio equipment must be given a Class Identifier (alert symbol).

↘ **Antenna**

This product, SWL-2900U, is for OEM integrations only. The end-user product will be installed in such a manner that only the authorized antennas are used.

↘ **Enclosure**

This product, SWL-2900U, is made for integrating in another final product. For this reason, there are some parts of the final product on which the SWL-2900U depends for regulatory compliance regarding EMC and safety. The SWL-2900U is mounted on the circuit board of the final product, and must be contained inside the case of the final product. Integrated the SWL-2900U in the final product so that its surfaces are not in contact with the outside.

↘ **Documentation**

In the documentation for the conformity assessment of the final product, state clearly that the SWL-2900U is integrated in the system.

↘ **Conformity Assessment of the Products integrating the SWL-2900U**

The following is a supplementary explanation of conformity assessments for final products integrating the radio modules such as the SWL-2900U, that have passed conformity assessments in accordance with the R&TTE Directive.

The procedures for conformity assessment in accordance with the R&TTE Directive are the responsibility of the manufacturer of the final product. With final products integrating radio modules, the person who integrates the module in the system becomes the manufacturer of the final product, and it is their responsibility to certify that the requirements of the R&TTE Directive are met.

↘ **Exemption from conformity assessment**

However, if radio modules that meet the requirements of the R&TTE Directive and that have passed the conformity assessment are integrated in a final product that follows the cautions concerning integrating radio modules, they are exempted from the conformity assessment for R&TTE Directive Article 3.2 (efficient use of the radio spectrum). For details, refer to the following Guidance and ETSI Technical Report from the R&TTE Compliance Association, and check whether your case applies.

Organization	R&TTE Compliance Association	Document No. TGN 01 Rev 3
Document title	Technical Guidance Note on Requirement for a Final Product that Integrates an R&TTE Directive Assessed Module	
URL	You can download the guidance from the download area of R&TTE Compliance association. http://www.rtteca.com	

Organization	ETSI (Technical report)	Document No. ETSI TR 102 070-2
Document title	Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide to the application of harmonized standards to multi-radio and combined radio and non-radio equipment; Part 2: Effective use of radio frequency spectrum	
URL	You can download the guidance from the ETSI web site by entering TR102 070-2 in the search engine. Before downloading, you will be requested to register. http://www.rtteca.com	

↘ **Conformity assessment procedures for final products exempted from R&TTE Directive Article 3.2**

In every case, the manufacturer of a final product must follow the procedures for conformity assessment of the final product with the requirements of R&TTE Directive Article 3.1(a) and (b), for safety and EMC. The conformity assessment for Article 3.2 is carried out in accordance with the following:

1) Attach the EN 300 328 test report of the assessed radio module and the EC Declaration of Conformity to the conformity assessment of the final product (The Declaration of Conformity is attached to the manual).

2) Specify on the conformity assessment of the end product that the assessed radio module was integrated in the system without any changes, in accordance with the installation directions of the manufacturer.

↘ **Notification of the final product**

Please note that this product, SWL-2900U, uses radio frequency bands not harmonized throughout the Community. The notification required by R&TTE Directive Article 6(4) is necessary. It is the responsibility of the manufacturer of the final product to notify the relevant national spectrum management authority of the intention to place the final product on the market.

↘ **CE marking**

It is necessary to attach the CE mark to the final product to indicate that it conforms with all the directives that apply to the final product. It must be given a Class Identifier (alert symbol) in addition to the CE mark.

↘ **Exemption clause**

Samsung Electronics Co., Ltd. does not guarantee the accuracy of the information above. In case of doubt or uncertainty, we recommend that you check with the authorities or official certification organizations of the relevant countries.