

Dell 5002 Datasheet

REV 0.1

Samsung Electronics

Summary

This datasheet presents the general performance and specifications of Dell 5002 IEEE 802.11b/g WLAN CARD using SWL-2900U.

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1 General Description

1.1 Functional Description

Dell 5002 is the low power USB interface card for 802.11b/g wireless LAN aimed at embedded application. Dell 5002 is the USB interface card that adopts a single-chip wireless LAN MAC(medium-access controller) spread-spectrum baseband processor and 2.4GHz RF radio.

Dell 5002 supports IEEE 802.11b and 802.11g standards. Data rate up to 54MHz can be provided in 802.11g mode of operation.

The main IC of Dell 5002 includes an 80MHz ARM7 core, 384KB of on-chip SRAM, and 80KB of on-chip ROM. Dell 5002 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 Dell 5002 an ideal WLAN solution for emdedded application.

Dell 5002 provides crucial power management functionality and requires only a single 5.0V supply voltage.



Figure 1-1 Dell 5002

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 Block Diagram

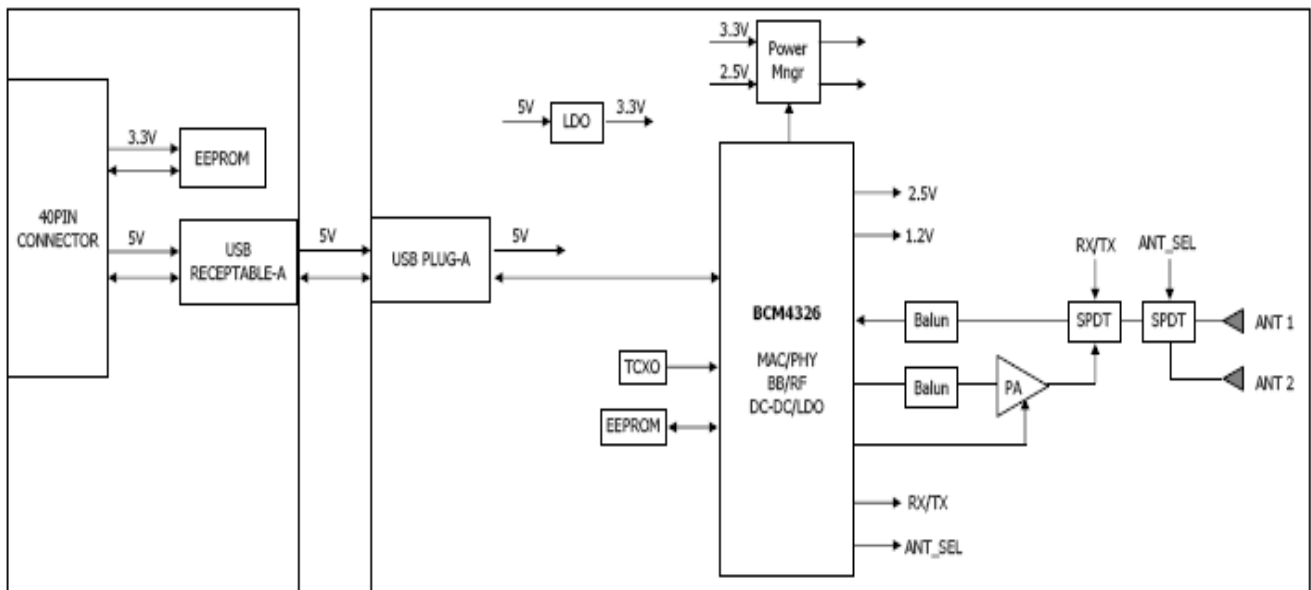


Figure 1-2 Dell 5002 Block Diagram

2 Dimension and Pin Assignments

2.1 Mechanical Dimension

W x L x H = 51mm x 108mm x 18mm

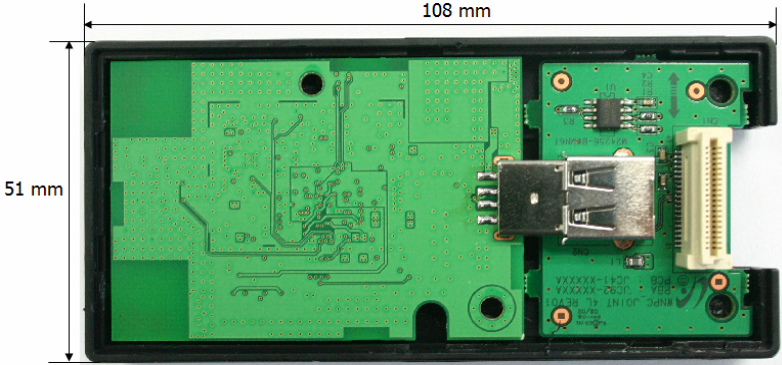


Figure 2-1 Dell 5002 Mechanical Dimension

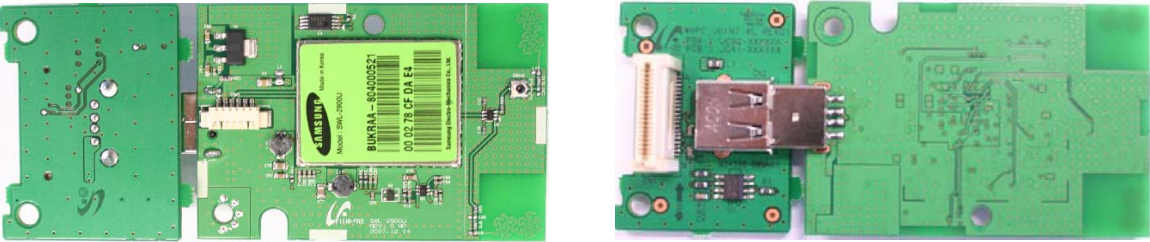


Figure 2-2 Dell 5002 Picture

2.2 HOST Interface

Host Interface : Molex 5084616-1, 40pin, Straight, SMT

* SIZE : 6.5 x 21.5 x 11.5 mm

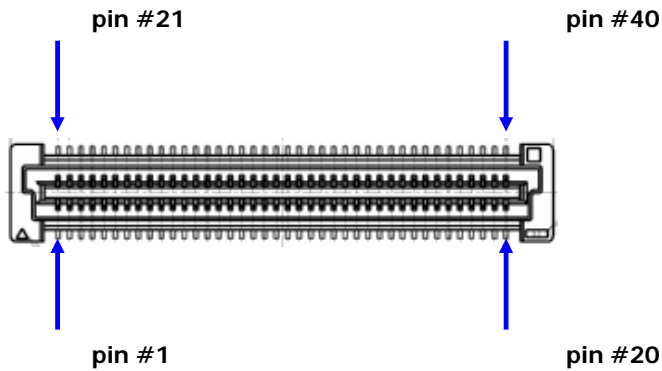


Figure 2-3 Dell 5002 CN1 Connector PIN Assignment

Table 2-1 CN1 PIN Description

NO.	Pin Name	Description
1~29	DGND	Ground
30	DM_USB	USB D- signal
31	DP_USB	USB D+ signal
32	DGND	Ground
33	SCL	EEPROM clock
34	SDA	EEPROM data
35	3.3V	3.3V from HOST
36~39	5V	5V from HOST
40	NC	Not connect

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	-	+35	°C

* For more detail, see the Reliability Test Report.

3.2 Nominal Main Input Supply Voltage

Symbol	Parameter	Min.	Nom.	Max.	Unit
DC supply	Main input supply through USB Interface		+5.0		V

3.3 Current Consumption

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

* It can be different to test condition.

4 RF Specifications

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

4.1 Receiver RF Specifications

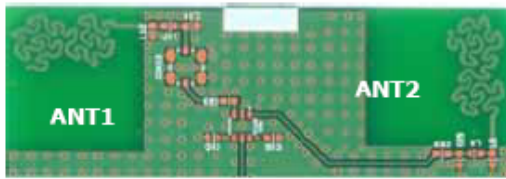
Parameter	Conditions	Min	Nom	Max	Unit
Minimum receiver sensitivity in 802.11b mode					
1Mbps	PER<8%, Packet size= 1024bytes		-		dBm
2Mbps			-		dBm
5.5Mbps			-		dBm
11Mbps			-84	-85	dBm
Minimum receiver sensitivity in 802.11g mode					
6Mbps	PER<10%, Packet size= 1024bytes		-		dBm
9Mbps			-		dBm
12Mbps			-		dBm
18Mbps			-		dBm
24Mbps			-		dBm
36Mbps			-		dBm
48Mbps			-		dBm
54Mbps			-72	-74	dBm
Maximum input level					
Maximum input signal level in 802.11b mode	PER<8%		0		dBm
Maximum input signal level in 802.11g mode	PER<10%		-10		dBm
Adjacent channel rejection (ACR) in 802.11b mode					
1Mbps	PER<8%, Packet size= 1024bytes		35		dB
2Mbps			35		dB
5.5Mbps			35		dB
11Mbps			35		dB
Adjacent channel rejection (ACR) in 802.11g mode					
6Mbps	PER<10%, Packet size= 1024bytes		16		dB
9Mbps			15		dB
12Mbps			13		dB
18Mbps			11		dB
24Mbps			8		dB
36Mbps			4		dB
48Mbps			0		dB
54Mbps			-1		dB

4.2 Transmitter RF Specifications

Parameter	Conditions	Min.	Nom.	Max.	Unit
Linear output power					
Maximum output power in 802.11b mode	As specified in IEEE802.11 Chap.17~19	15	17	20	dBm
Maximum output power in 802.11g mode		10	13	15	dBm
Transmit spectrum mask					
Margin to 802.11b spectrum mask	Maximum output power	0			dBr
Margin to 802.11g spectrum mask		0			dBr
Transmit modulation accuracy in 802.11b mode					
1Mbps	As specified in IEEE802.11b			35	%
2Mbps				35	%
5.5Mbps				35	%
11Mbps				35	%
Transmit modulation accuracy in 802.11g mode					
6Mbps	Mandatory			-5	dB
9Mbps	Option			-8	dB
12Mbps	Mandatory			-10	dB
18Mbps	Option			-13	dB
24Mbps	Mandatory			-16	dB
36Mbps	Option			-19	dB
48Mbps	Option			-22	dB
54Mbps	Option			-24	dB
Transmit power-on and power-down ramp time in 802.11b mode					
Transmit power-on ramp time from 10% to 90% output power				2	usec
Transmit power-down ramp time from 90% to 10% output power				2	Usec
Other spectral parameters					
Spurious emissions at the antenna port including 2 nd & 3 rd harmonics	30MHz~1GHz BW=100kHz			-56	dBm
	1GHz~26.5GHz		-40		dBm

4.5 ANTENNA Specifications

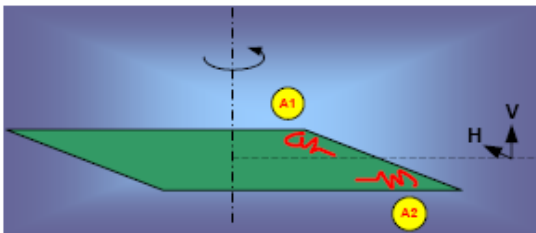
2 Fractal Antennas on PCB that support Diversity



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

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.

In the case of measurement with Case, Antenna specification is like below.

ANTENNA	Polarization	AVG	Max.	Unit
ANT1	Horizontal	-3.98	1.24	dBi
	Vertical			
ANT2	Horizontal	-3.53	0.5	dBi
	Vertical			

Revision History

Revision	Date	Descriptions
0.1	2008.02.18	First released

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 DELL5002 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, Dell5002, comply with FCC radiation exposure limits set forth for an uncontrolled environment. The Dell5002 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 Dell5002 there must be a label containing, at least, the following information:

FCC ID for model Dell5002

This device contains FCC ID: A3LDELL5002

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 Dell5002 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 Dell5002

The Dell5002 are made for OEM integrations only. The European regulations applying to the Dell5002 is the R&TTE Directive 1999/5/EC.

Dell5002 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 Dell5002 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 Dell5002

The person integrating the Dell5002 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, Dell5002, 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, Dell5002, 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, Dell5002, is made for integrating in another final product. For this reason, there are some parts of the final product on which the Dell5002 depends for regulatory compliance regarding EMC and safety. The Dell5002 is mounted on the circuit board of the final product, and must be contained inside the case of the final product. Integrated the Dell5002 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 Dell5002 is integrated in the system.

↘ Conformity Assessment of the Products integrating the Dell5002

The following is a supplementary explanation of conformity assessments for final products integrating the radio modules such as the Dell5002, 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.rteca.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.rteca.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, Dell5002, 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.

EC Declaration of Conformity

We, Samsung Electronics Co., Ltd.

of Samsung Electronics Co., Ltd.
#259, Gongdan-Dong, Gumi-City,
Gyeongsangbuk-Do, 730-030 Korea

of Samsung Electronics(Shandong)
Digital Printing Co., Ltd.
264209, Samsung Road, Weihai Hi-Tech
IDZ, Shandong Province, China

declare under our sole responsibility that the
product

WLAN Module

model " Dell5002 "

to which this declaration relates is in conformity
with

R&TTE Directive 1999/5/EC

By application of the following standards

Article 3.1(a)	Health	EN 50385:2002
Article 3.1(a)	Safety	EN 60950-1:2001
Article 3.1(b)	EMC	EN 301 489-1 V1.7.1(2006-10), EN 301 489-17 V1.2.1(2002-08)
Article 3.2	Radio	EN 300 328 V1.7.1 (2006-10)

Notified Body UL Apex Co., Ltd.

4383-326, Asama-cho, Ise-shi,
Mie 516-0021, JAPAN
EU Identification Number: 1731

Documentary evidence to demonstrate
conformity

Description	Report or Certificate No.	Issue Date	Issued by
Health			Declaration of Conformity issued by Samsung Electronics Co., Ltd.
Safety			SK Tech Co., LTD.
EMC			SK Tech Co., LTD.
Radio			SK Tech Co., LTD.

Manufacturer

Samsung Electronics Co., Ltd.
#259, Gongdan-Dong, Gumi-City
Gyungbuk, Korea 730-030

CE 1731

(Sang youp Hyoun) / 17th ,January ,2008