



SP88W8782UMA0 2.4 GHz v2.0 (SDGOB-1291, 1150-7959)




WLAN Module

IEEE 802.11n/g/b

User Guide

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Document Conventions

	<p>Note: Provides related information or information of special importance.</p>
	<p>Caution: Indicates potential damage to hardware or software, or loss of data.</p>
	<p>Warning: Indicates a risk of personal injury.</p>

Document Status

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SP88W8782UMA0 2.4 GHz v2.0 (SDGOB-1291, 1150-7959) WLAN Module

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PRODUCT OVERVIEW

The Marvell® SP88W8782UMA0 2.4 GHz v2.0 (SDGOB-1291, 1150-7959) is an embedded WLAN 802.11n/g/b radio module. It is designed to be fixed inside a printer product through a multi-pin digital interface connector and mounting brackets.

The module is intended to be factory installed into an enclosed product. The module is a PCB consisting of the Marvell 88W8782U 1x1 SISO IEEE 802.11n/g/b WLAN SoC, host connector interface, RFIC switches, passive discrete components, and integrated passive printed circuit antennas.

The embedded module operates under the control of the host printer in order to provide wireless network connectivity to other compatible devices using the IEEE 802.11n/g/b Wi-Fi standards. It is capable of operating in the 2.412–2.472 GHz frequency band.

The module requires DC power and configuration from the host printer in order to operate. Please refer to the printer's user's manual for more details.

This product is for indoor use only.

General Features

- IEEE 802.11n/g/b compliant
- Dual antenna supporting diversity
- USB 2.0 host interface

Chipset

- Marvell 88W8782U

Security

- WEP 64- and 128-bit encryption with hardware TKIP processing (WPA)
- AES-CCMP hardware implementation as part of 802.11i security standard (WPA2)

Radio Characteristics

- 802.11n
 - Up to 13 channels (HT20)
 - Up to 9 channels (HT40)
 - MCS0–MCS7 (OFDM)
- 802.11g
 - Up to 13 channels
 - 64QAM/16QAM/QPSK/BPSK/CCK (OFDM, DSSS)
- 802.11b
 - Up to 14 channels (Japan)
 - 64QAM/16QAM/QPSK/BPSK/CCK (OFDM, DSSS)

Software

- Linux supported with drivers based on Fedora Core 13



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1 Signal Description

1.1 Pinout

Figure 1: Pin Diagram

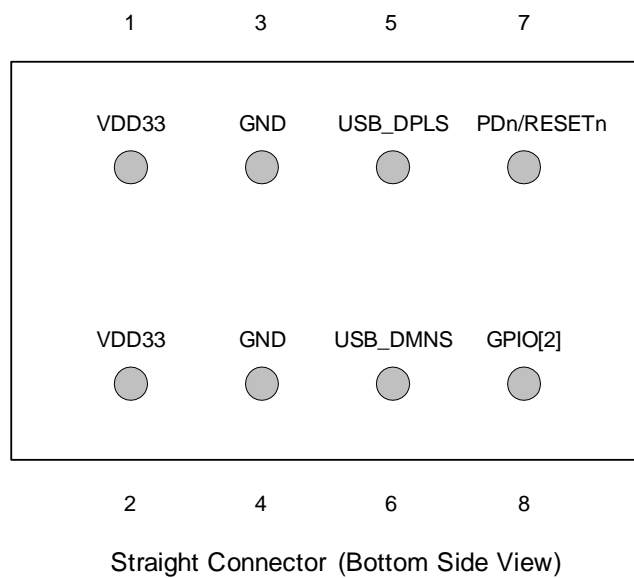


Table 1: Pin List

Pin#	Pin Name
1	VDD33
2	VDD33
3	GND
4	GND
5	USB_DPLS
6	USB_DMNS
7	PDn/RESETn
8	GPIO[2]

2 Electrical Specifications

2.1 Absolute Maximum Ratings

Table 2: Absolute Maximum Ratings

Symbol	Parameter	Min	Typ	Max	Units
VDD33	USB 2.0 Power Supply	--	3.3	4.1	V
IDD33	VDD33 Max Current Rating	--	--	500	mA
T _{STORAGE}	Storage Temperature	-55	--	125	°C
H _{STORAGE}	Storage Humidity	90%	--	95%	RH

2.2 Operating Conditions

Table 3: Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units
VDD33	USB 2.0 Power Supply	2.97	3.3	3.63	V
T _A	Ambient Operating Temperature	5	--	60	°C
f _{clock}	Reference Clock Frequency	--	40	--	MHz

2.3 WLAN RF Specifications

2.3.1 Receive Mode Specification—2.4 GHz

Table 4: 802.11n Rx Mode—Receive Sensitivity (2.4 GHz)

Parameter	Condition	Min	Typ	Max	Units
MCS7	802.11n, 20 MHz, PER<10%	-71	--	--	dBm
MCS7	802.11n, 40 MHz, PER<10%	-68	--	--	

Table 5: 802.11g/b Rx Mode—Receive Sensitivity (2.4 GHz)

Parameter	Condition	Min	Typ	Max	Units
1 Mbps	802.11b, PER<8%	-97	--	--	dBm
6 Mbps	802.11g, PER<10%	-90	--	--	
11 Mbps	802.11b, PER<8%	-85	--	--	
54 Mbps	802.11g, PER<10%	-75	--	--	

2.3.2 Transmit Mode Specification—2.4 GHz

Table 6: 802.11n Tx Mode—Transmit Power (2.4 GHz)

Parameter	Condition	Min	Typ	Max	Units
MCS0–2	802.11n, 20 MHz	13.5	15	16.5	dBm
MCS3–5	802.11n, 20 MHz	12.5	14	15.5	
MCS6–7	802.11n, 20 MHz	11.5	13	14.5	
MCS0–2	802.11n, 40 MHz	11.5	13	14.5	
MCS3–5	802.11n, 40 MHz	10.5	12	13.5	
MCS6–7	802.11n, 40 MHz	10.5	12	13.5	

Table 7: 802.11g/b Tx Mode—Transmit Power (2.4 GHz)

Parameter	Condition	Min	Typ	Max	Units
1–11 Mbps	802.11b	16.5	18	19.5	dBm
6–18 Mbps	802.11g	14.5	16	17.5	
24–36 Mbps	802.11g	14.5	16	17.5	
48–54 Mbps	802.11g	13.5	15	16.5	

2.4 WLAN Functions

2.4.1 WLAN Data Rates

Table 8: WLAN Data Rates

Mode	Rates	Units
802.11n	MCS0–MCS7 ¹	Index
802.11g	6, 9, 12, 18, 24, 36, 48, 54	Mbps
802.11b	1, 2, 5.5, 11	Mbps

1. MCS is an index for PHY rates in 802.11n mode which applies to both 2.4 GHz and 5 GHz frequency bands.

Table 9: MCS Index

MCS Index	Modulation	Code Rate	Data Rates (Mbps)			
			HT20		HT40	
			800 ns GI	400 ns GI	800 ns GI	400 ns GI
0	BPSK	1/2	6.5	7.2	13.5	15
1	QPSK	1/2	13	14.4	27	30
2		3/4	19.5	21.7	40.5	45
3	16QAM	1/2	26	28.9	54	60
4		3/4	39	43.3	81	90
5	64QAM	2/3	52	57.8	108	120
6		3/4	58.5	65	121.3	135
7		5/6	65	72.2	135	150

A Regulatory Conformance

A.1 Product Regulatory Compliance

The module is intended to be factory installed into an enclosed product. Final product regulatory testing will be required to satisfy non-intentional radiator compliance, susceptibility and safety standards. The module has been designed not to adversely affect this testing.

A.2 Intentional Radiator Conformance

The module has been tested and certified as an intentional radiator to the following standards:

Region	Standards	Certificates
Europe	EN 300 328 v1.7.1 (2006-10), EN 301 893 v1.5.1	Certificates
United States	FCC Part 15, Subpart C	FCC Verification / FCC Grant
Canada	RSS-210, Issue 6, RSS-GEN	ICES-003 Verification / Industry Canada Certificate
Taiwan	NCC LP0002	NCC Certificate
Japan	Japan MIC Article 2, Clause 1, Item 19	MIC Certificate
Korea	Korea Communication Commission (KCC) Notification No.: 2010-16	KCC Certificate

B Regulatory Statements

B.1 Federal Communication Commission Interface (FCC) Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter, except the built-in collocated transmitters.

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

- 1)The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2)For all products market in US, Applicant has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. Applicant shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 conditions above are met, further transmitter test will not be required. However, the Applicant integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE:

In the event that these conditions can not 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 can not be used on the final product. In these circumstances, the Applicant integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: B94SDGOB1291".

Manual Information To the End User

The Applicant integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in this manual.

B.2 Canadian Regulatory Wireless Notice

B.2.1 English

This device complies with RSS-210 of the Industry Canada Rules. Operation is subject to the following two conditions:

- 1) this device may not cause interference and
- 2) this device must accept any interference, including interference that may cause undesired operation of the device

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) For all products market in IC, Applicant has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. Applicant shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 conditions above are met, further transmitter test will not be required. However, the Applicant integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE:

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

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 466D-SDGOB291".

Manual Information To the End User

The Applicant integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

B.2.2 French

Cet appareil est conforme à la norme RSS-210 des Règles d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- 1) cet appareil ne peut pas provoquer d'interférences et
- 2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil

NOTE IMPORTANTE:

Déclaration IC d'exposition aux radiations:

Cet équipement est conforme à l'exposition aux radiations IC limite définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec distance minimum de 20cm entre le radiateur et votre corps.

Cet appareil est conçu uniquement pour les intégrateurs de demandeur dans les conditions suivantes:

- 1) L'antenne doit être installée de telle sorte que 20 cm est mis à jour entre l'antenne et les utilisateurs, et
- 2) Pour tous les produits du marché dans l'IC, le demandeur doit limiter les canaux de coopération dans CH1 à CH11 pour 2.4G bande par l'outil de programmation du firmware fourni. Demandeur ne doit pas fournir un outil ou d'informations à l'utilisateur final en ce qui concerne le changement de domaine de la réglementation.

Tant que 2 conditions ci-dessus sont remplies, le test autre émetteur ne sera pas nécessaire. Toutefois, l'intégrateur demandeur est toujours responsable pour tester leur produit final pour toutes les exigences de conformité supplémentaires nécessaires avec ce module est installé.

NOTE IMPORTANTE:

Dans le cas où ces conditions ne peuvent pas être respectées (par exemple certaines configurations d'ordinateurs portables ou de co-implantation avec un autre émetteur), puis l'autorisation IC n'est plus considéré comme valide et l'ID de IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur demandeur en sera responsable pour réévaluer le produit final (y compris l'émetteur) et l'obtention d'un IC séparée l'autorisation.

Étiquetage des produits de fin

Ce module émetteur est autorisé uniquement pour une utilisation dans le dispositif où l'antenne peut être installée de telle sorte que 20 cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible par le texte suivant: "Contient des IC: 466D-SDGOB291".

Manuel d'information à l'utilisateur final

L'intégrateur demandeur doit être conscient de ne pas fournir des informations à l'utilisateur final en ce qui concerne la façon d'installer ou de retirer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel utilisateur final doit inclure toutes les informations réglementaires requises / avertissement comme le montrent dans ce manuel.

B.3 Taiwan

警語

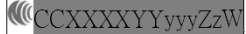
第十二條

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Note:

1. 本模組於取得認證後將依規定於模組本體標示審驗合格標籤
2. 系統廠商應於平台上標示「本產品內含射頻模組: 」字樣

B.4 Europe—EU Declaration of Conformity

This device complies with the essential requirements of the R&TTE Directive 1999/5/EC. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the R&TTE Directive 1999/5/EC:

- **EN 60950-1: 2006**
- Safety of Information Technology Equipment
- **EN 62311: 2008**
- Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz - 300 GHz)
- **EN 300 328 V1.7.1: (2006-10)**
- Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
- **EN 301 489-1 V1.8.1: (2008-04)**
- Electromagnetic compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
- **EN 301 489-17 V1.3.2 (2008-04)**
- Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2.4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment

This device is a 2.4 GHz wideband transmission system (transceiver), intended for use in all EU member states and EFTA countries, except in France and Italy where restrictive use applies.

In Italy the end-user should apply for a license at the national spectrum authorities in order to obtain authorization to use the device for setting up outdoor radio links and/or for supplying public access to telecommunications and/or network services.


This device may not be used for setting up outdoor radio links in France and in some areas the RF output power may be limited to 10 mW EIRP in the frequency range of 2454 – 2483.5 MHz. For detailed information the end-user should contact the national spectrum authority in France.



Cesky [Czech]	[Jméno výrobce] tímto prohlašuje, že tento [typ zařízení] je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
Dansk [Danish]	Undertegnede [fabrikantens navn] erklærer herved, at følgende udstyr [udstyrets typebetegnelse] overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Deutsch [German]	Hiermit erkläre [Name des Herstellers], dass sich das Gerät [Gerätetyp] in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
Eesti [Estonian]	Käesolevaga kinnitab [tootja nimi = name of manufacturer] seadme [seadme tüüp = type of equipment] vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, [name of manufacturer], declares that this [type of equipment] is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Español [Spanish]	Por medio de la presente [nombre del fabricante] declara que el [clase de equipo] cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ [name of manufacturer] ΔΗΛΩΝΕΙ ΟΤΙ [type of equipment] ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Français [French]	Par la présente [nom du fabricant] déclare que l'appareil [type d'appareil] est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Italiano [Italian]	Con la presente [nome del costruttore] dichiara che questo [tipo di apparecchio] è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo [name of manufacturer / izgatavotāja nosaukums] deklare, ka [type of equipment / iekartas tips] atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuviu [Lithuanian]	Šiuo [manufacturer name] deklaruoja, kad šis [equipment type] atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart [naam van de fabrikant] dat het toestel [type van toestel] in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
Malti [Maltese]	Hawnhekk, [isem tal-manifattur], jiddikjara li dan [il-mudell tal-prodott] jikkonforma mal-htigijiet essenzjali u ma provvedimenti oħrajn rilevanti li hemm fid-Dirrettiva 1999/5/EC.
Magyar [Hungarian]	Alulírott, [gyártó neve] nyilatkozom, hogy a [... típus] megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.
Polski [Polish]	Niniejszym [nazwa producenta] oświadczam, że [nazwa wyrobu] jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
Português [Portuguese]	[Nome do fabricante] declara que este [tipo de equipamento] está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Slovensko [Slovenian]	[Ime proizvajalca] izjavlja, da je ta [tip opreme] v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	[Meno výrobcu] týmto vyhlasuje, že [typ zariadenia] splna základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Suomi [Finnish]	[Valmistaja = manufacturer] vakuuttaa täten että [type of equipment = laitteen tyypimerkintä] tyypinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska [Swedish]	Härmed intygar [företag] att denna [utrustningstyp] står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

B.5 Japan—VCCI (Class B) Compliance Statement for Users

	
Warning	This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.
警告	この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。 取扱説明書に従って正しい取り扱いをして下さい。 <p style="text-align: right;">VCCI-B</p>

B.6 Korea—Notice to Users

<p>A급 기기 (업무용 방송통신기자재)</p>	<p>이 기기는 업무용(A급) 전자파적합기기로서 판매사 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.</p>
<p>Class A (Broadcasting Communication Equipment for Office Use)</p>	<p>As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.</p>
<p>B급 기기 (가정용 방송통신기자재)</p>	<p>이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.</p>
<p>Class B (Broadcasting Communication Equipment for Home Use)</p>	<p>As an electromagnetic wave equipment for home use (Class B), this equipment is intended to use mainly for home use and may be used in all areas.</p>

**** Warning Notice ****

해당 무선설비는 운용 중 전파혼신 가능성이 있음

해당 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다.



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C Revision History

Table 10: Revision History

Document Type	Document Revision
First release.	Rev. –



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