

Production Specifications

Model Name: DRMR-H01

Part Number:

81DRMRH11 (General sku)

Customer Part Number:

Author: Wistron NeWeb Corporation

Revision: 1.1

Revision Date: 2025/03/13

Introduction

The DRMR-H01 M.2 module is a generic multi-purpose project reference intended to facilitate and expedite OEM designs. It operates in conjunction with a host board that provides power and control for the various applications. The module's chipset supports 3G, 4G, and 5G technologies and is designed with an advanced 4 nm process for superior performance and power efficiency.

The module is able to support a variety of services including wide coverage, high throughput, enhanced capacity and low power consumption. It also supports the I2C interface for IoT applications and sensors.

In addition to supporting a wide range of services, it supports a wide array of spectrum available across regulatory standards and spectrum including low-bands below 1 GHz, and JB/MB/HB/UHB/LAA bands between 1.4 GHz to 5.9 GHz, which will open up vast amount of bandwidths for extreme data rates and capacity that were previously not usable for wide-area mobile communications.

This document consists of several technical sections including, Electrical Specifications, RF Specifications, Power, SW Features and Tools, SW Guideline, Mechanical concept, Thermal considerations, Regulatory Compliance and Certification, Environmental Requirements, Packaging and Safety Recommendation.

Environmental Specifications and Certifications

Environmental Specifications

The environmental specifications for both operating and storage conditions are defined in the Table below.

Condition	Temperature Range	Remark
Normal operating temperature range	–15 °C to 55°C	Fully functional and in compliance with 3GPP specifications
Extended operating temperature range	–20 °C to 70°C	RF performance may be affected outside the normal range, but the module will still function.
Storage temperature	–40 °C to 85 °C	Storage Conditions (recommended): Temperature is $23 \pm 5^{\circ}\text{C}$, relative humidity is less than RH 60%. Storage period: Under the recommended storage conditions, the storage life is 12 months.

Note: All temperatures above refer to ambient temperatures.

Certifications

The DRMR-H01 module is certified to be compliant with CE/ FCC/ ICC/ JRF/ JPA/ KCC/ NCC/ CCC/ SRRC/ NAL regulations and major Tier1 MNO of worldwide standards. Tier1 MNO operators are Verizon, AT&T, T-mobile, Vodafone, Telefonica-O2, Deutsche Telekom AG, Swisscom, Telstra, Optus Australia, KDDI, DoCoMo and Softbank Mobile.

Green Product Compliance

The product will comply with HP GSE specifications:

- HP Standard 011 General Specification for the Environment.
- HP Standard 011-01 General Specification for the Environment – Substances and Materials

M.2 Pin Definitions

M.2 Module Pin Diagram

The DRMR-H01 M.2 module pins layout are illustrated below.

Pin	Signal		Signal	Pin
74	VCC		CONFIG_2	75
72	VCC		NC	73
70	VCC		GND	71
68	N.C.		CONFIG_1	69
66	SIM DETECT		RESET	67
64	COEX_TXD		ANTCTL3	65
62	COEX_RXD		ANTCTL2	63
60	COEX3		ANTCTL1	61
58	MIPI_DATA		ANTCTL0	59
56	MIPI_CLK		GND	57
54	PEWAKE		REFCLKP	55
52	CLKREQ		REFCLKN	53
50	PERST		GND	51
48	N.C		PERp0	49
46	N.C		PERn0	47
44	I2C_INT		GND	45
42	I2C_SDA		PETp0	43
40	I2C_SCL		PETn0	41
38	N.C		GND	39
36	UIM1-PWR		USB_SS_RX_P	37
34	UIM1-DATA		USB_SS_RX_M	35
32	UIM1-CLK		GND	33
30	UIM1-RESET		USB_SS_TX_P	31
28	GPIO for DPR2		USB_SS_TX_M	29
26	W_DISABLE2		GND	27
24	ANT_TUNER_1V8/GPIO		DPR	25
22	GPIO/FORCE_USB_BOOT		WoWWAN	23
20	GPIO(1.8V)		CONFIG_0	21
	Module Key		Module Key	
	Module Key		Module Key	
	Module Key		Module Key	
	Module Key		Module Key	

10	LED		GND	11
8	W_DISABLE1		USB_DM	9
6	FULL_CARD_POWER_OFF		USB_DP	7
4	VCC		GND	5
2	VCC		GND	3
			CONFIG_3	1

Table. 2-1 PCIE M.2 pins definition

M.2 Module Pin Definitions

I/O type description:

- AO: Analog Output
- AI: Analog Input
- AIO: Analog bi-direction
- DO: Digital Output
- DI: Digital Input
- DIO: Digital bi-direction
- P: Power
- PI: Power input
- PO: Power output
- GND
- NC

Table 2-2 Pin Interface Family

Signal				
M.2 Specification Socket, Key B				
Pin Number	Pin Name	Function	Type	Voltage Level (V)
1	CONFIG_3	NC, DRMR-H01 M.2 module is configured as the WWAN – PCIe Gen3/Gen1, USB3.0 interface type	O	Not connect
2	VCC	Power Supply for module	PI	Vmin= 3.135V Vnormal= 3.3V Vmax= 4.4V

3	GND	Ground	GND	
4	VCC	Power Supply for module	PI	Vmin= 3.135V Vnormal= 3.3V Vmax= 4.4V
5	GND	Ground	GND	
6	FULL_CARD_POWER_OFF	Turn on/off the module High level: Turn on Low level: Turn off	DI	3.3V/1.8V
7	USB_DP	USB2.0 Data plus	AIO	
8	W_DISABLE1	WWAN mode control Active low	DI	3.3V/1.8V.
9	USB_DM	USB2.0 Data minus	AIO	-
10	LED_WWAN	System status LED indicator, Active low	DO	VCC
11	GND	Ground	GND	
12	Module Key	Notch		
13	Module Key	Notch		
14	Module Key	Notch		
15	Module Key	Notch		
16	Module Key	Notch		
17	Module Key	Notch		
18	Module Key	Notch		
19	Module Key	Notch		
20	GPIO	GPIO. Reserved	I/O	1.8V
21	CONFIG_0	NC, DRMR-H01 M.2 module is configured as the WWAN – PCIe Gen3/Gen1, USB3.0 interface type	O	Not connect
22	GPIO	GPIO. Multi-function for Force USB Boot		1.8V
23	WAKE_ON_WAN	Wake up host	DO	1.8V
24	ANT_TUNER_1V8	1.8V power output for antenna tuner	O	1.8V
25	DPR	Dynamic power reduction	DI	3.3V/1.8V
26	W_DISABLE2	GNSS Control Active low	DI	3.3V/1.8V
27	GND	Ground	GND	
28	GPIO	Reserved for DPR2		1.8V

29	USB_SS_TX_M	USB 3.0 super speed transmit (-)	AO	-
30	UIM1_RESET	SIM card reset	DO	1.8V/3.0V
31	USB_SS_TX_P	USB 3.0 super speed transmit (+)	AO	
32	UIM1_CLK	SIM card clock	DO	1.8/3.0V
33	GND	Ground	GND	
34	UIM1_DATA	SIM card data	DIO	1.8/3.0V
35	USB_SS_RX_M	USB 3.0 super speed receiver (-)	AI	
36	UIM1_VDD	SIM card power supply	PO	1.8/3.0V
37	USB_SS_RX_P	USB 3.0 super speed receiver (+)	AI	
38	NC	NC		NC
39	GND	Ground	GND	
40	I2C_SCL	I2C serial clock	DO	1.8V
41	PCIE_TX_M	PCle transmit (-)	DO	
42	I2C_SDA	I2C serial data	DIO	1.8V
43	PCIE_TX_P	PCle transmit (+)	DO	
44	I2C_INT	I2C interrupt	DIO	1.8V
45	GND	Ground	GND	
46	N.C	NC		NC
47	PCIE_RX_M	PCle receiver (-)	DI	
48	N.C	NC		NC
49	PCIE_RX_P	PCle receiver (+)	DI	

50	PCIE_RST_N	Asserted to reset module PCIe interface default. If module went into core dump, it will reset whole module, not only PCIe interface. Active low, internal pull up(10KΩ). Open drain output and should add external pull up on platform	DI	3.3V/1.8V
51	GND	Ground	GND	
52	PCIE_CLKREQ_N	Asserted by device to request a PCIe reference clock be available (active clock state) in order to transmit data. It also used by L1 PM Sub states mechanism, asserted by either host or device to initiate an L1 exit. Active low, open drain output and should add external pull up on platform	DO	3.3V/1.8V
53	PCIE_REFCLK_M	PCIe reference clock (-)	AIO	
54	PCIE_WAKE_N	Asserted to wake up system and reactivate PCIe link from L2 to L0, it depends on system whether supports wake up functionality. Active low, open drain output and should add external pull up on platform	DO	3.3V/1.8V
55	PCIE_REFCLK_P	PCIe reference clock (+)	AIO	
56	MIPI_CLK	Use for external MIPI clock	DO	1.8V
57	GND	Ground	GND	
58	MIPI_DATA	Use for external MIPI data	DIO	1.8V
59	ANTCTL0	Antenna tuning control	DO	1.8V
60	COEX3	SDR to WLAN when n79 transmitting	DO	1.8V
61	ANTCTL1	Antenna tuning control	DO	1.8V
62	COEX_RXD	LTE and WLAN coexistence receiver	DI	1.8V
63	ANTCTL2	Antenna tuning control	DO	1.8V

64	COEX_TXD	LTE and WLAN coexistence transmit	DO	1.8V
65	ANTCTL3	Antenna tuning control	DO	1.8V
66	SIM_DETECT	SIM card hot plug detection, active high	DIO	1.8V
67	RESET	WWAN reset input Active low	DI	1.8V
68	N.C			
69	CONFIG_1	GND	DO	Connect to ground
70	VCC	Power Supply for module	PI	Vmin= 3.135V Vnormal= 3.3V Vmax= 4.4V
71	GND	Ground	GND	
72	VCC	Power Supply for module	PI	Vmin= 3.135V Vnormal= 3.3V Vmax= 4.4V
73	VIO_CFG	Configuration of PCIe sideband signals power domain NC: support 1.8V/3.3V; GND: support 3.3V	-	NC
74	VCC	Power Supply for module	PI	Vmin= 3.135V Vnormal= 3.3V Vmax= 4.4V
75	CONFIG_2	N.C	DO	Not connect

Electrical Specifications

Power Supply

The power interface of DRMR-H01 module as shown in the following tables:

Pin	Pin Name	I/O	Pin Description	Minimum Value	Typical Value	Maximum Value
2,4,70,72,74	VCC	PI	Power supply input	3.135V	3.3V	4.4V
36	UIM1_VDD	PO	USIM power supply		1.8V/3.0V	

Table 3-1

The Power rating table is as follows.

Pin	Pin Name	I/O	Pin Description	Current Consumption Limit Max Avg (mA)
2,4,70,72,74	VCC	PI	Power supply input	3500
36	UIM1_VDD	PO	USIM power supply	200

Table 3-2

4.1 Warning Statements

4.1.1 FCC

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.

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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 27, 22, 24, 90, 96

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.6 RF exposure considerations

The host product operating conditions must be such that there is a minimum separation distance of 20 cm (or possibly greater than 20 cm) between the antenna radiating structures and nearby persons. The host manufacturer is obligated to confirm the use conditions of the host product to ensure that the distance specified in the instructions is met. In this case the host product is classified as either a mobile device or a fixed device for RF exposure purposes.

1. If the modular transmitter to be used in a specific type of host platform and installed such that it can be operated at closer than 20 cm to users or nearby persons, please follow below guidance.
 - a. For the host product integrated with this modular transmitter as a stand-alone configuration, the maximum conducted power from the original grant shall be retained in order to meet SAR exemption requirements.
 - b. For configuration with multiple transmitters in the same host, routine evaluation or SAR testing for the simultaneous transmission of the co-located transmitters according to KDB 447498 is required. The portable host product shall be evaluated for ensuring to continue compliance FCC rule part 2.1093 & part 1.1310 by C2PC. The additional guidance for the portable host products is provided in KDB Publication 996369 D02 and D04.
 - c. For the host product is not installed according to this guide, the module certification will be invalid, and a new grant certification will be required for the host product.

2.7 Antennas

This radio transmitter has been approved by the FCC to operate with antenna(s) / the maximum permissible gain indicated below.

Antenna Type	Part No.	Antenna Model No.
PIFA	260-29161	PIFA#12
	260-29158	PIFA#9
	260-29152	PIFA#3
	260-29156	PIFA#7
	260-29159	PIFA#10
	260-29151	PIFA#2
	260-29150	PIFA#1
Monopole	260-29143	Monopole#3
	260-29144	Monopole#4
	260-29147	Monopole#7
	260-29148	Monopole#8
	260-29142	Monopole#2
	260-29146	Monopole#6
	260-29145	Monopole#5
Note: Transmission frequencies in this test report are only available by the above antenna(s).		

Bands	Freq. (MHz)	Peak Antenna Gain (dBi)			
		Gain	PIFA Ant. No.	Gain	Monopole Ant. No.
WCDMA / HSPA+ Band II	1850~1910	3.60	12	3.45	3
WCDMA / HSPA+ Band IV	1710~1755	4.03	9	4.78	4
WCDMA / HSPA+ Band V	824~849	2.88	3	3.42	3
B2 / n2	1850~1910	3.60	12	3.45	3
B4	1710~1755	4.03	9	4.78	4
B5 / n5	824~849	2.88	3	3.42	3
B7 / n7	2500~2570	4.06	7	3.69	7
B12 / n12	698~716	3.08	3	2.82	8
B13	777~787	3.15	3	3.26	2
B14 / n14	788~798	2.94	3	3.32	2
B17	704~716	2.97	3	2.82	8

B25 / n25	1850~1915	3.60	12	3.45	3
B26 / n26	814~849	2.79	10	3.42	3
B30 / n30	2305~2315	1.00	2	1.00	6
B38 / n38	2570~2620	4.06	7	3.74	7
B41 / n41	2496~2690	3.33	1	3.76	7
B48 / n48	3550~3700	1.00	5	1.00	1
B66 / n66	1710~1780	4.03	9	4.86	4
B71 / n71	663~698	3.30	3	3.30	5

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: “Contains FCC ID: NKR-DRMRH01”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This device supports dedicated test mode programs that operate independently from the production firmware, and are intended for compliance testing purposes.

Host integrators are advised to contact the grantee for guidance on configuring appropriate test modes required for evaluating module and host integration in accordance with regulatory requirements.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test 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.

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 OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

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 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.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment

How to make changes

Only Grantees are permitted to make permissive changes, if the module will be used differently than granted conditions, please contact us to ensure modifications will not affect compliance.

Contact Information

Company Name:

Address:

Email:

Tel:

4.1.2 ISED

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with greater than 25cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 25 cm entre le radiateur et votre corps.

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

- 1) The antenna must be installed and operated with greater than 25 cm between the antenna and users
- 2) The transmitter module may not be co-located with any other transmitter or antenna.
- 3) Module approval valid only when the module is installed in the tested host or compatible series of host which have similar RF exposure characteristic with equal or larger antenna separation distance.

As long as 3 conditions above are met, further transmitter test 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.

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

- 1) L'antenne doit être installée et exploitée avec plus de 25 cm entre l'antenne et les utilisateurs
- 2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.
- 3) Approbation du Module valable que lorsque le module est installé dans l'hôte testé ou de la série de l'hôte compatible qui ont même caractéristique de l'exposition aux RF avec la distance égale ou supérieure séparation antenne.

Tant que les 3 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

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 Canada authorization is no longer considered valid and the IC ID can not 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 Canada authorization.

NOTE IMPORTANTE

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considérée comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 25cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 4441A-DRMRH01".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où

l'antenne peut être installée et utilisée à plus de 25 cm entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4441A-DRMRH01".

Manual Information To the End User

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 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.

Manuel d'information à l'utilisateur final

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

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel

DETACHABLE ANTENNA USAGE

This radio transmitter [IC: 4441A-MT2731CBN] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio [IC: 4441A-DRMRH01] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna Type	Part No.	Antenna Model No.
PIFA	260-29161	PIFA#12
	260-29158	PIFA#9
	260-29152	PIFA#3
	260-29156	PIFA#7
	260-29159	PIFA#10
	260-29151	PIFA#2
	260-29150	PIFA#1
Monopole	260-29143	Monopole#3
	260-29144	Monopole#4
	260-29147	Monopole#7
	260-29148	Monopole#8
	260-29142	Monopole#2
	260-29146	Monopole#6
	260-29145	Monopole#5
Note: Transmission frequencies in this test report are only available by the above antenna(s).		

Bands	Freq. (MHz)	Peak Antenna Gain (dBi)			
		Gain	PIFA Ant. No.	Gain	Monopole Ant. No.
WCDMA / HSPA+ Band II	1850~1910	3.60	12	3.45	3
WCDMA / HSPA+ Band IV	1710~1755	4.03	9	4.78	4
WCDMA / HSPA+ Band V	824~849	2.88	3	3.42	3
B2 / n2	1850~1910	3.60	12	3.45	3
B4	1710~1755	4.03	9	4.78	4
B5 / n5	824~849	2.88	3	3.42	3
B7 / n7	2500~2570	4.06	7	3.69	7
B12 / n12	698~716	3.08	3	2.82	8
B13	777~787	3.15	3	3.26	2
B14 / n14	788~798	2.94	3	3.32	2
B17	704~716	2.97	3	2.82	8
B25 / n25	1850~1915	3.60	12	3.45	3
B26 / n26	814~849	2.79	10	3.42	3
B30 / n30	2305~2315	1.00	2	1.00	6
B38 / n38	2570~2620	4.06	7	3.74	7

B41 / n41	2496~2690	3.33	1	3.76	7
B48 / n48	3550~3700	1.00	5	1.00	1
B66 / n66	1710~1780	4.03	9	4.86	4
B71 / n71	663~698	3.30	3	3.30	5