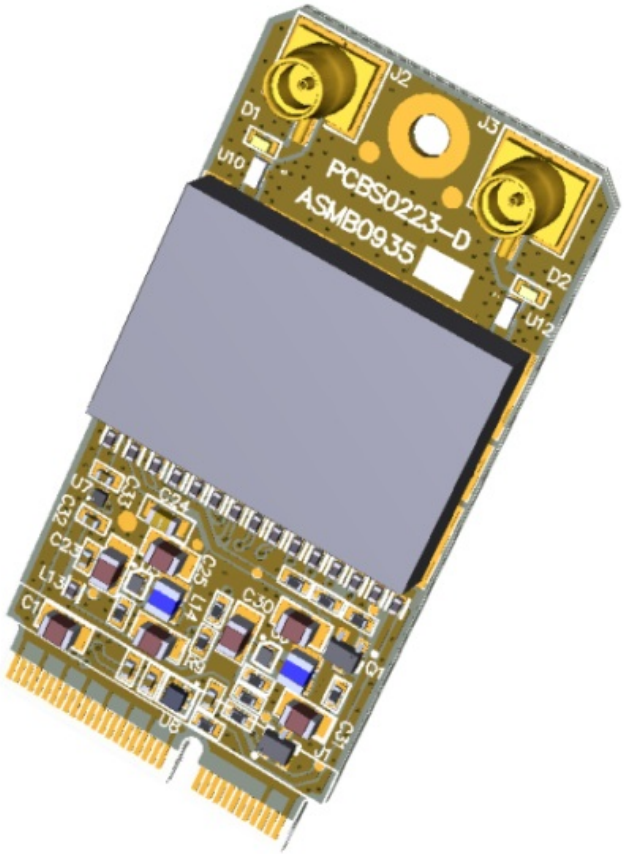
Wabtec CORPORATION

Digital Mining Technology ASMB0935 MINI RF UWB MODULE DW3000 HARDWARE INTEGRATION MANUAL



Contents [hide]

DW3000 Mini RF UWB Module

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MANUFACTURER INFORMATION

1.1. INTRODUCTION

The product or product family described under scope of this document will be henceforth referred to as DEVICE.

This manual provides the information on the DEVICE, its variants, specifications, operation, maintenance, decommission and disposal.

1.2. SAFETY INFORMATION

The safety section includes safety precautions which must be observed when working on items that appear throughout the manual. Examples of safety precautions and labels are outlined below:

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Indicates a potential for equipment damage.

1.3. DISCLAIMER

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These specifications are subject to change without notice.

1.4. COMPANY DETAILS

Manufacturer:

Industrea Mining Technology Pty Ltd (trading as Digital Mining Technology)

3 Co-Wyn Close

Fountaindale, New South Wales, 2258

Australia	
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	dm.fulfilment@wabtec.com
	www.wabteccorp.com

Industrea Mining Technology Pty Ltd is a registered business subsidiary of Wabtec Corporation

OVERVIEW

2.1. GENERAL FEATURES

The ASMB0935 is a digitally controlled radio module implemented on an industry standard M2.xx style circuit board. This module is intended for use in Industrea Mining Technology's host controller board to provide a short range, power limited UWB radio link for point to multi-point radio, providing two-way ranging based on ToF, TDoA and PDoA ranging methods for a variety of CAS applications.

Key features include:

- Qorvo DW3220 digitally controlled radio
- Power supply regulation/conditioning
- Serial interface
- Dual RF antenna connectors

2.2. ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CAS	Collision Awareness System
PDoA	Phase Difference of Arrival
ToF	Time of Flight

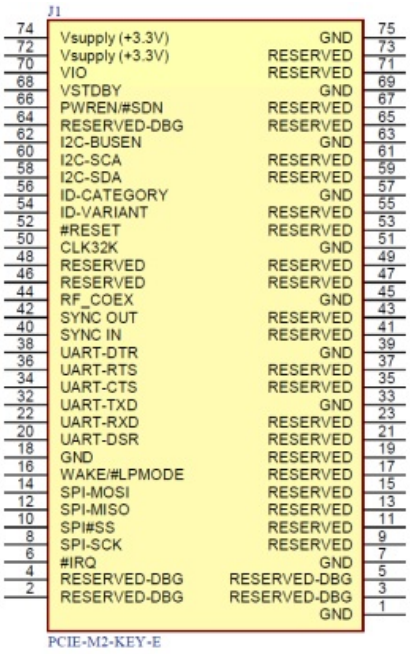
TDoA	Time Difference of Arrival
UWB	Ultra-Wide Band
N/C	Not Connected

2.3. SCOPE & SPECIFICATION

This user manual covers Mini RF UWB Module DW3000 Radio Module, Model No.: ASMB0935.

FEATURE	DETAIL
Operating Frequency band	FCC/ISED: 6.2446 – 6.7346 GHz ETSI EN: 6.1896 – 6.7896 GHz
Bandwidth	FCC/ISED: <500 MHz; ETSI EN: <600 MHz
No. of Channels	Single (Channel No. 5)
Maximum Transmit Power	-41.3 dBm
Chipset	DW3220
Modulation	BPM – BPSK
Antenna Type	External – Two MMCX antenna connectors
Antenna Gain	Dipole type: Peak Gain +3.44 dBi max Monopole type: Peak Gain +3.7 dBi max
Rated Voltage	3.3 Vdc
Operating Temperature	-40°C to +85°C
Module Dimensions	45 mm x 22 mm

2.4. PIN CONFIGURATION AND FUNCTION



PIN	SIGNAL	TYPE	PIN	SIGNAL	TYPE
74	Vsupply (+3.3V)	PWR	75	GND	PWR
72	Vsupply (+3.3V)	PWR	73	RESERVED	N/C
70	VIO	PWR	71	RESERVED	N/C
68	VSTDBY	PWR	69	GND	PWR
66	PWREN/#SDN	CMOS	67	RESERVED	N/C
64	RESERVED-DBG	N/C	65	RESERVED	N/C
62	I2C-BUSEN	CMOS	63	GND	PWR
60	I2C-SCA	CMOS-OD	61	RESERVED	N/C
58	I2C-SDA	CMOS-OD	59	RESERVED	N/C
56	ID-CATEGORY	Passive	57	GND	PWR
54	ID-VARIANT	Passive	55	RESERVED	N/C
52	#RESET	CMOS-OD	53	RESERVED	N/C
50	CLK32K	CMOS	51	GND	PWR

48	RESERVED	N/C	49	RESERVED	N/C
46	RESERVED	N/C	47	RESERVED	N/C
44	RF_COEX	CMOS-OD	45	GND	PWR
42	SYNC OUT	CMOS	43	RESERVED	N/C
40	SYNC IN	CMOS	41	RESERVED	N/C
38	UART-DTR	CMOS	39	GND	PWR
36	UART-RTS	CMOS	37	RESERVED	N/C
34	UART-CTS	CMOS	35	RESERVED	N/C
32	UART-TXD	CMOS	33	GND	PWR
30	MECH E KEY		31	MECH E KEY	
28	MECH E KEY		29	MECH E KEY	
26	MECH E KEY		27	MECH E KEY	
24	MECH E KEY		25	MECH E KEY	
22	UART-RXD	CMOS	23	RESERVED	N/C
20	UART-DSR	CMOS	21	RESERVED	N/C
18	GND	PWR	19	RESERVED	N/C
16	WAKE/#LPMODE	CMOS	17	RESERVED	N/C
14	SPI-MOSI	CMOS	15	RESERVED	N/C
12	SPI-MISO	CMOS(HiZ)	13	RESERVED	N/C
10	SPI#SS	CMOS	11	RESERVED	N/C
8	SPI-SCK	CMOS	9	RESERVED	N/C

6	#IRQ	CMOS-OD	7	GND	PWR
4	RESERVED	N/C	5	RESERVED	N/C
2	RESERVED	N/C	3	RESERVED	N/C
			1	GND	PWR

2.5. APPROVED ACCESSORIES LIST

The below table outlines the accessories that are approved for operation with this Module:

For UWB Radio operation, this module has been tested and approved for use with the antenna listed below. The module may be integrated with other antennas of the same type and antenna gains of less than or equal than the approved.

ANTENNA PART NO.	**HOST EQUIPMENT**	**ANTENNA TYPE**	**PEAK GAIN**
MISC0601 (PCUWB65.4111)	PROD1198 (PRU) PROD1187A (RUA)	Monopole	+3.7 dBi Max
MISC1622 (TU.60.3H31)	PROD1187R (RUR)	Dipole	+3.17 dBi Max
MISC0606 (TU.63.2111)	PROD1182H (PCU)	Dipole	+3.44 dBi Max

2.6. WARNINGS

CAUTION	Keep this Integration Manual for later reference.
⚠ CAUTION	Do not leave this Module in an uncontrolled environment where the storage temperature is below-40°C (-40°F) or above 85°C (176°F). This may damage the DEVICE.

	Do not operate this Module outside specified temperature range. Refe r to specification table for further information.

GENERAL INFORMATION

3.1. INTEGRATION

Module Integration should be in accordance with the procedures defined by Digital Mining Technology and only performed by the manufacturer or authorized representative. Host equipment must be configured to the modulation schemes to comply with the modular approval listed in Sec. 2.3 and adhere to all local regulations appropriate for automotive Installations in the end-user geographic region.

Note: ASMB0935 is intended for installation only in Industrea Mining Technology Pty Ltd's host equipment. This device requires professional installation, Industrea Mining Technology Pty Ltd trained Personnel would install this radio module into the specific host equipment. FCC and ISED requirements will be followed by Industrea Mining Technology Pty Ltd

ASMB0935 can be used with optional RF antenna cable, <3m length, eg: ACN01SP-N01SP-L40-250, …

3.2. MAINTENANCE

This equipment is not intended to be maintained by the end user. Opening the enclosure should not be attempted, will void any warranty and could compromise the safe operation of the unit.

No user-serviceable parts.

Contact your local authorized representative for service arrangements.

3.3. DECOMMISSION AND DISPOSAL

 Disposal of electronics should be done in accordance with local regulations.

Power should be disconnected before decommissioning.

The unit must not be treated as general waste. By ensuring that this product is disposed of correctly, you will be helping to prevent potentially negative consequences for the environment and human health which could otherwise be caused by incorrect handling of this product.

Waste Disposal Method: Recycling is encouraged. Dispose of in accordance with local,

state and federal laws and regulations.

USA: Dispose of in accordance with local, state and federal laws and regulations.

Canada: Dispose of in accordance with local, state and federal laws and regulations.

EC: Dispose of in accordance with relevant EC Directives.

3.4. AUTHORIZED REPRESENTATIVES

Australia Wabtec CORPORATION	Industrea Mining Technology Pty Ltd, Trading as Digital Mining Technology 3 Co-Wyn Close Fountaindale, NSW, 2258 Australia	Telephone +61 (2) 8863 4730 dmfulfilment@wabtec.com www.wabteccorp.com
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Canada Wabtec CORPORATION	Wabtec Transportation Canada Inc 84 Terracon Pl. Winnipeg Manitoba, R2J 4G7 Canada	Telephone +1 204-951-4320 www.wabteccorp.com

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Mexico 	Comercializadora Minera Norte, S. A. DE C.V. Ave. H. Colegio Militar No. 2000-B Col. Las Fuentes Piedras Negras, Coahuila México. C.P. 26010	Telephone +52 (878) 783 8215 +1 (830) 352 5519 Fax +52 878-783-8218 www.cominsa.com.mx
North America 	Digital Mining 2901 East Lake Road Erie, Pennsylvania, 16531 USA	Telephone +1 (480) 264 20 63 Fax +1 (480) 264 6402 www.wabteccorp.com
Sub Saharan Africa 	Probe Integrated Mining Technologies (PTY) Ltd 245 Albert Amon Road Meadowdale, Germiston, 1614 South Africa	Telephone +27 (11) 453 09 24 Fax +27 (11) 453 2141 www.probebattery.co.za

PRODUCT APPROVALS AND REGULATORY INFORMATION

ASMB0935 module have modular approval and comply with FCC Part 15 and Canada Innovation, Science and Economic Development Canada (ISED) RSS-210 and RSS-Gen.

FCC ID:	YIY-ASMB0935
IC:	8903A-ASMB0935

⚠ Modifications to this product without written consent from the manufacturer or its designated authorized representatives could void the user's authority to operate the equipment.

4.1. DECLARATION OF CONFORMITY 47 CFR § 2.1077 COMPLIANCE INFORMATION

We, Industrea Mining Technology Pty Ltd, T/A Digital Mining Technology, at 3 Co-Wyn Close, Fountaindale, NSW, 2258, Australia declare under our sole responsibility the products:

Trade Name:	Digital Mining Technology
Model Number:	ASMB0935
Product Name	Mini RF UWB Module DW3000
FCC ID:	YIY-ASMB0935
Responsible Party:	Digital Mining 2901 East Lake Road Erie, PA, 16531 814-875-2234

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.

4.2. MODULE STATEMENT, LABELLING & USER INSTRUCTIONS

The ASMB0935 has single module approval and comply with FCC Part 15 and Canada Innovation, Science and Economic Development Canada(ISED) RSS-210 and RSS-Gen. Single-modular transmitter approval is defined as a complete RF transmission subassembly, designed to be incorporated into another device, that must demonstrate compliance with FCC/IC rules and policies independent of any host. A transmitter with a modular grant can be installed in different end-use products (referred to as a host, host product, or host device) by the grantee or other equipment manufacturer, then the host product may not require additional testing or equipment authorization for the transmitter function provided by that module.

The user must comply with all of the instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance. The host product itself is required to comply with all other applicable FCC/IC equipment authorizations regulations, requirements and equipment functions that are not associated with the transmitter module portion. For example, compliance must be demonstrated: to regulations for other transmitter components within a host product; to requirements for unintentional radiators(Part 15 Subpart B, ICES-003), such as digital devices, computer peripherals, radio receivers, etc.; and to additional authorization requirements for the non-transmitter functions on the transmitter module (i.e., Suppliers Declaration of Conformity (SDoC) or certification) as appropriate.

LABELING AND USER INFORMATION REQUIREMENTS:

The ASMB0935 module has been labelled with its own FCC/IC ID number, and if the FCC/IC ID number is not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wordings as follows:

Contains Transmitter Module FCC ID: YIY-ASMB0935 or Contains FCC ID: YIY-ASMB0935

Contains Transmitter Module IC: 8903A-ASMB0935 or Contains IC: 8903A-ASMB0935

PROHIBITION:

- Operation on board an aircraft or a satellite is prohibited.
- Module shall not be employed for the operation of toys.

- Except for operation onboard a ship or a terrestrial transportation vehicle, the use of a fixed outdoor infrastructure is prohibited. A fixed infrastructure includes antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole.

4.3. FCC INTERFERENCE STATEMENT FOR CLASS B DEVICES

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 or more 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.

A shielded type Ethernet cord is required to meet FCC Class B emission limits and prevent interference to the nearby radio and television reception.
This device and its antenna(s) must not be co-located or operate in conjunction with any other antenna or transmitter.
The antenna is considered an integral system component. Use of any antenna other than those specified in the installation manual or supplied with the product may void the product's compliance.

4.4. FCC RADIATION EXPOSURE STATEMENT

⚠ To comply with FCC RF exposure limits for general population / uncontrolled exposure, the antennas 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.

⚠ To comply with FCC RF exposure limits for general population / uncontrolled exposure, the antennas 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.

4.5. INDUSTRY CANADA COMPLIANT

This Class B digital apparatus complies with Canadian ICES-003. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

4.5.1. CONCERNING RADIO TRANSMITTERS

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

4.5.2. INDUSTRY CANADA – RADIATION EXPOSURE STATEMENT

⚠ To comply with Industry Canada RF exposure limits for general population / uncontrolled exposure, the antennas 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.

4.6. AUSTRALIAN RADIO COMMUNICATIONS EQUIPMENT – RADIATION EXPOSURE STATEMENT

The equipment complies with the Radiocommunications Equipment (General) Rules 2021 + Amendment Rules 2023 (No. 1), Electromagnetic Radiation – Human Exposure Standard RPS-1 for General Public Exposure, Non-Aware User, for a Compliance Level

2 Radiocommunications Equipment, when the minimum safety distance is adhered to, and shall bear the RCM.

DOCUMENT REVISION

DOCUMENT NO	REVISION
ASMB0935-HARWARE INTEGRATION MANUAL-A	Original document
ASMB0935-HARWARE INTEGRATION MANUAL-B	Included Prohibited application in Sec. 4.2 & Operating frequency band in Sec. 2.3
ASMB0935-HARWARE INTEGRATION MANUAL-C	Revised Dipole Antenna gain to 3.17 dBi and Included Professional installation note in Sec. 3

DOCUMENT SIGN OFF

DOCUMENT REVISION NO.	
POSITION	**Certification Engineer**
DATE	CREATED: By P C Shivalingam at 12:27 pm, May 20, 2025
POSITION	**Design Engineering**
DATE	REVIEWED: By Rohan Kennedy at 5:09 pm, May 20, 2025
POSITION	**Engineering Manager**
DATE	APPROVED: By Peter O'Donnell at 9:28 am, May 21, 2025

ASMB0935 – Hardware Integration Manual

Rev: C

Documents / Resources

	wabtech DW3000 Mini RF UWB Module [pdf] Instruction Manual DW3000, DW3000 Mini RF UWB Module, Mini RF UWB Module, RF UWB Module, UWB Module, Module

References

- User Manual

wabtech

DW3000, DW3000 Mini RF UWB Module, Mini RF UWB Module, Module, RF UWB Module, UWB Module, wabtech

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