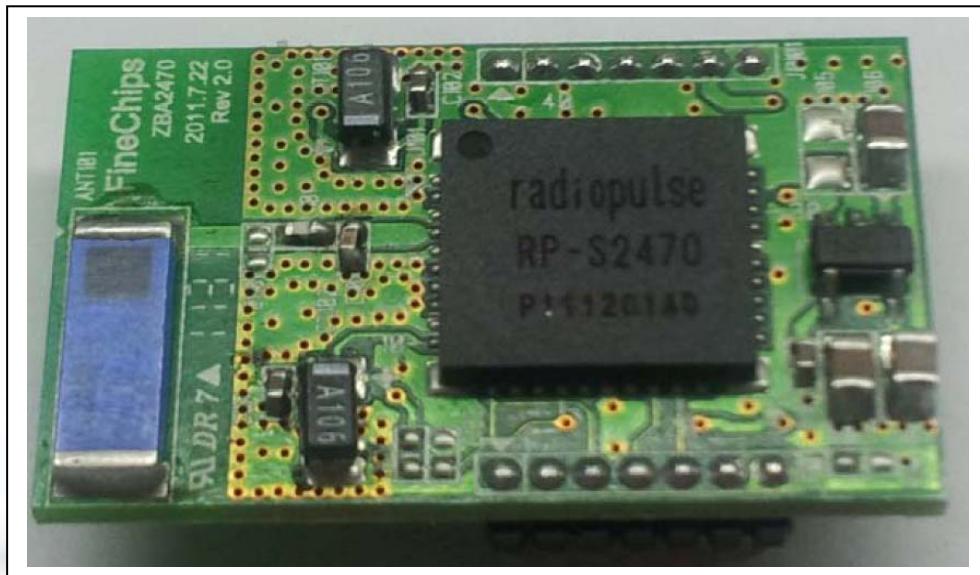


DRI-0007

Zigbee Module

User Manual



RF Transceiver

- ▶ Single-chip 2.4GHz RF Transceiver
- ▶ Low Power Consumption
- ▶ No External T/R Switch or Filter needed
- ▶ On-chip VCO, LNA, and PA
- ▶ Programmable Output Power up to +10dBm
- ▶ Direct Sequence Spread Spectrum
- ▶ O-QPSK Modulation
- ▶ Scalable Data Rate including 250Kbps specified in IEEE802.15.4: 31.25Kbps ~ 1Mbps
- ▶ RSSI Measurement
- ▶ Compliant to IEEE802.15.4

Hardwired MAC

- ▶ Two 256-byte circular FIFOs
- ▶ FIFO management
- ▶ AES Encryption/Decryption Engine(128 bit)
- ▶ CRC-16 Computation and Check

8051-Compatible MCU

- ▶ 8051 Compatible (single cycle execution)
- ▶ 64KB Embedded Flash Memory
- ▶ 6KB Data Memory
- ▶ 128-byte CPU dedicated Memory
- ▶ 1KB Boot ROM
- ▶ Dual DPTR Support
- ▶ I2S/PCM Interface with two 256-byte FIFOs
- ▶ μ-law/a-law/ADPCM Voice Encoder/Decoder
- ▶ Two High-Speed UARTs with Two 16-byte FIFOs(up to 1Mbps)
- ▶ Two Timer/Counters
- ▶ 5 PWM channels
- ▶ Watchdog Timer
- ▶ Sleep Timer using the 32kHz RC-OSC clock
- ▶ Quadrature Signal Decoder
- ▶ 22 General Purpose I/Os for MG2470-F48
- ▶ Internal 32kHz RC oscillator for Sleep Timer
- ▶ 16 MHz High Speed RC oscillator for the fast start-up from reset & power-down mode
- ▶ On-chip Power-on-Reset and Brown-out detector
- ▶ 4-channel 12-bit ADC(ENOB > 10-bit)
- ▶ SPI Master/Slave Interface with two 16-byte FIFOs
- ▶ I2C Master/Slave with 16-byte FIFO
- ▶ Programmable IR(Infra-Red) Modulator
- ▶ ISP (In System Programming)
- ▶ External clock output function(500KHz, 1/2/4/8/16/32 MHz selectable)

Clock Inputs

- ▶ 32MHz Crystal for System Clock is included.

Power

- ▶ 1.8V(Core)/2.0~3.6V(I/O) Operation
- ▶ Power Management Scheme with Deep Sleep Mode
- ▶ Separate On-chip Regulators for Analog and Digital Circuitry.
- ▶ Power Supply Range for Internal Regulator(2.0V(Min) ~ 3.6V(Max))

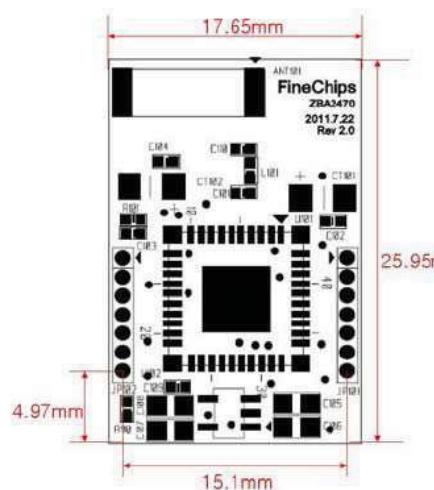
Package

- ▶ 44-pin LGA Package (9mm x 9mm)

Applications

- Home automation and security
- Automatic Meter Reading
- Factory automation and motor control
- Replacement for legacy wired UART
- Voice application
- Energy management
- Remote entry with acknowledgement
- Low power Telemetry
- Health-care equipments
- PC peripherals
- Toys

JP102	
N o	Pin Assignment
1	P3.2/INT0
2	VDD3.3(LDO_OUT)
3	nRESET
4	P1.1/UTX1
5	P1.0/URX1
6	ISP
7	GND

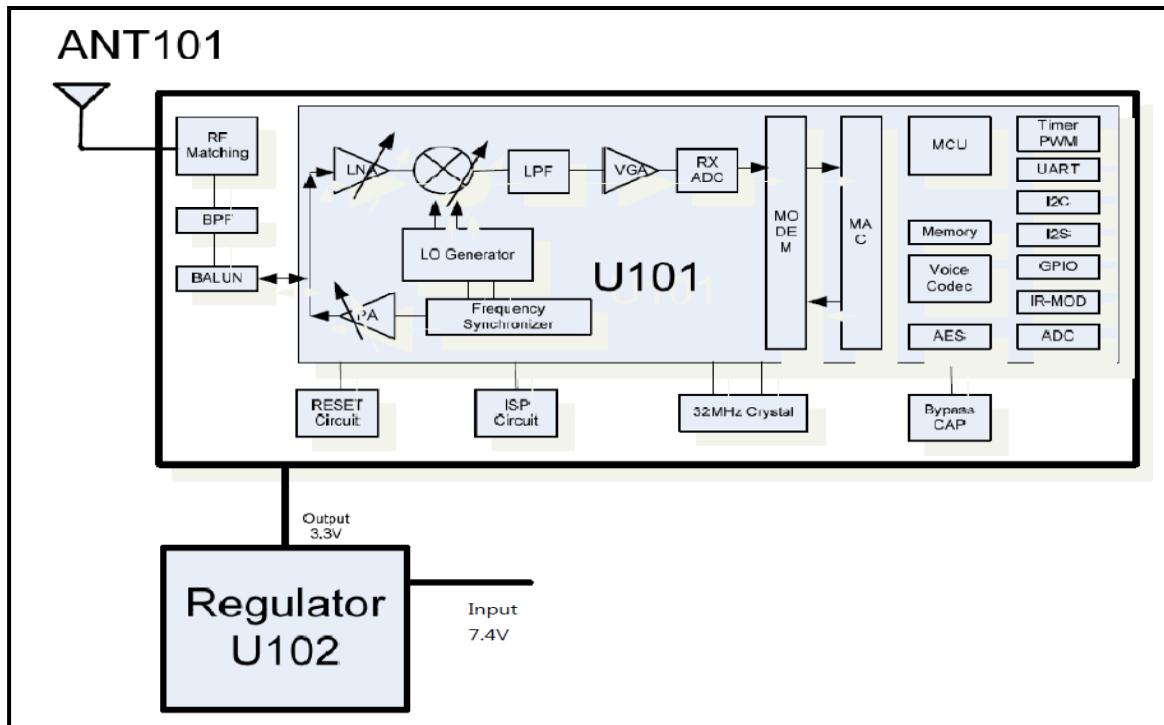


JP101	
No	Pin Assignment
1	P1.6/I2CCLK
2	P1.7/I2CSDA
3	nRESET
4	P3.1/UTX0
5	P3.0/URX0
6	VDD5(LDO_IN)
7	GND

Specification

Model Number	DRI-0007
CPU	RP-S2470(RF System In Package)
Operating Voltage Tolerance Range	4.5V ~ 9V
Serial Speed	115,200 bps
Storage Temperature	-40~85°C
Operating Temperature	-30~75°C
Input Voltage(VDD3.3)	2.7~3.6V
Input Voltage(VDD5)	4.5~9V
Current Consumption(TX, Max Power)	45mA
Current Consumption(RX)	26mA
Max TX Power	9.3dBm
Data Rate	250kbps
Frequency Range	2.4~2.4835 GHz

Block Diagram & Operational description



Dongbu Robot's DRI-0007 is a compact ZigBee module designed to provide easy ZigBee data communication application for communication devices without ZigBee functionality.

By integrating the module into communication devices, it enables the communication device to be used with ZigBee devices within a range of 10m~20m distance.

M5G integrates all the functions needed to replace existing data connection wirelessly and has been designed such that it is possible to control and monitor the functions externally via serial (UART) communication thereby enabling ZigBee functionality to be implemented into devices in a short period of time.

DRI-0007 is small type module that UART to RF converter.

DRI-0007 is compatible with IEEE 802.2.15.4.

It operates in 2400 to 2483.5 MHz band and use Direct sequence spread spectrum method.

The using channel number is 16CH and Channel space is 5MHz.

The data rate is 250Kbps.

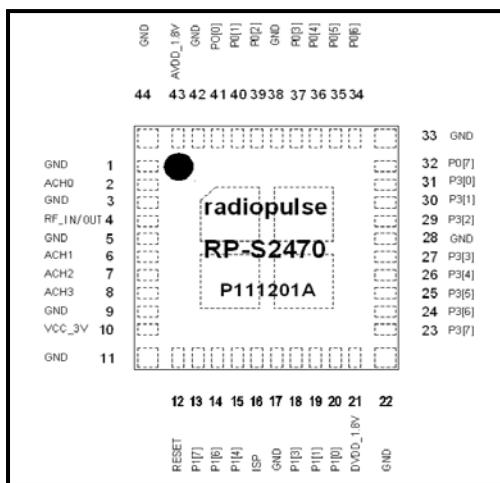
The control signals and data in the ZigBee Chipset are modulated and processed and then pass the PA in it. They will be transmitted from ANT through the Balun filter to another ZigBee device.

The RF signal from other ZigBee devices is received via ANT. And they go through Balun filter into the chip. They are magnified by internal LNA in the chip.

The power settings and crystal trim are stored in internal Flash Memory.

The product is powered by DC +7.4V nominal and has an Inverted F PCB antenna in it.

ZigBee Chipset(RP-S2470) Pin Description

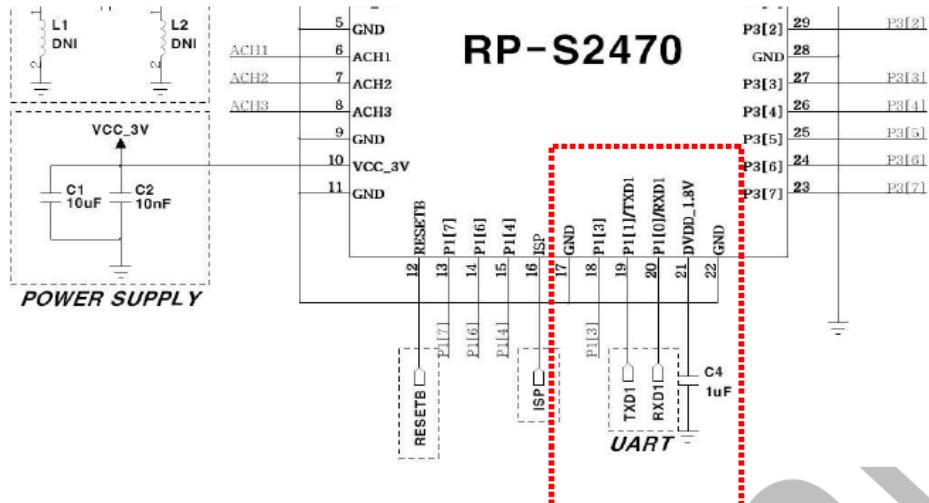


Terminal	NAME	Interface	I/O	Description
1	GND	Ground	-	GROUND
2	ACH0	Analog	I	ADC CH0 Input
3	GND	Ground	-	GROUND
4	RF_IN/OUT	RF	I/O	RF input/output signal to LNA / from PA in receive / TX mode
5	GND	Ground	-	GROUND
6	ACH1	Analog	I	ADC CH1 Input
7	ACH2	Analog	I	ADC CH2 Input
8	ACH3	Analog	I	ADC CH3 Input
9	GND	Ground	-	GROUND
10	VCC_3V	Power	I	2.0V to 3.6V Digital power supply connection
11	GND	Ground	-	GROUND
12	RESETB	Digital	I	Active Low RESET
13	P1[7]	Digital	I/O	Port P1.7 GPIO / I2C_SDA
14	P1[6]	Digital	I/O	Port P1.6 / I2C_SCL
15	P1[4]	Digital	I/O	Port P1.4 / QUADZB / EXT_RTC_CLK / PTC_GATE4
16	ISP		I	Active High In System-Programming Input
17	GND	Ground	-	GROUND
18	P1[3]	Digital	I/O	Port P1.3 / QUADZA / PTC_GATE3 / IR_TX_CLK_OUT
19	P1[1]	Digital	I/O	Port P1.1 / TxD1
20	P1[0]	Digital	I/O	Port P1.0 / RxD1
21	DVDD_1.8V	Power	O	1.8V Digital power supply connection
22	GND	Ground	-	GROUND
23	P3[7]	Digital	I/O	Port P3.7 / CTS1 / SPICSN
24	P3[6]	Digital	I/O	Port P3.6 / RTS1 / SPICLK
25	P3[5]	Digital	I/O	Port P3.5 / CTS0 / QUADYB / SPIDO / T1
26	P3[4]	Digital	I/O	Port P3.4 / RTS0 / QUADYA / SPIDI / T0
27	P3[3]	Digital	I/O	Port P3.3 / INT1 (active low)
28	GND	Ground	-	GROUND
29	P3[2]	Digital	I/O	Port P3.2 / INT0 (active low)
30	P3[1]	Digital	I/O	Port P3.1 / TxD0 / QUADXB
31	P3[0]	Digital	I/O	Port P3.0 / RxD0 / QUADXA
32	P0[7]	Digital	I/O	Port P0.7 / I2STX_MCLK / PTC_GATE2
33	GND	Ground	-	GROUND
34	P0[6]	Digital	I/O	Port P0.6 / I2STX_BCLK / PTC_GATE1
35	P0[5]	Digital	I/O	Port P0.5 / I2STX_LRCLK / PTC_GATE0
36	P0[4]	Digital	I/O	Port P0.4 / I2STX_DO / PWM4, 16mA drive capability
37	P0[3]	Digital	I/O	Port P0.3 / I2SRX_MCLK / PWM3, 16mA drive capability
38	GND	Ground	-	GROUND
39	P0[2]	Digital	I/O	Port P0.2 / I2SRX_BCLK / PWM2, 16mA drive capability
40	P0[1]	Digital	I/O	Port P0.1 / I2SRX_LRCLK / PWM1, 16mA drive capability
41	P0[0]	Digital	I/O	Port P0.0 / I2SRX_DI / PWM0, 16mA drive capability
42	GND	Ground	-	GROUND
43	AVDD_1.8V	Power	O	1.8V RF / Analog power supply connection
44	GND	Ground	-	GROUND

UART Interface

P1.0 and P1.1 are UART interface.

If another UART is needed, use P3.0(UART_RXD0) and P3.1(UART_RXD0).



Reliability

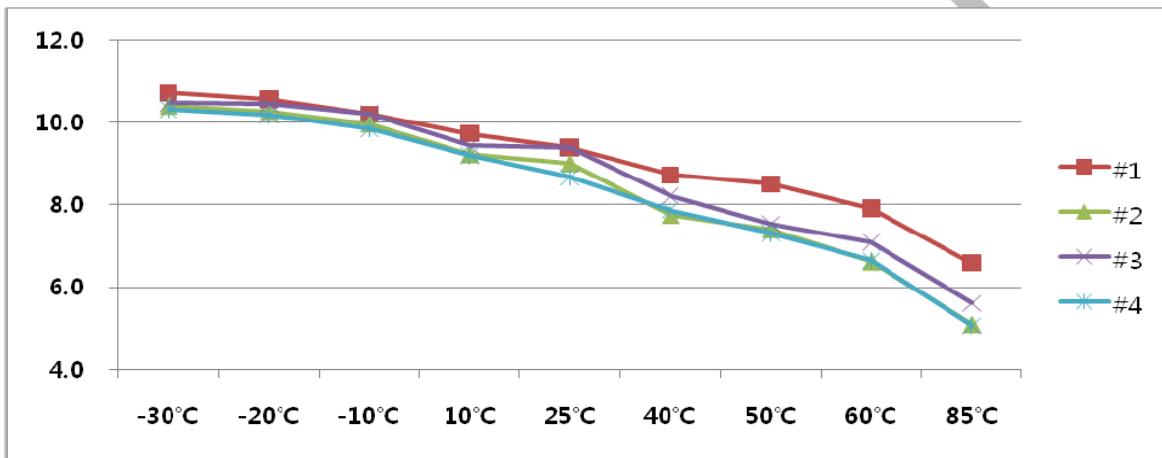
Test Item	Test Condition																																					
Temperature Drift	25 -> 0 -> 30 -> 50 -> 75°C, 2hrs/step																																					
High Temperature Storage	85°C@120hrs																																					
Low Temperature Storage	-40°C@120hrs																																					
High Humidity Storage	80°C/85%RH@120hrs																																					
Thermal Shock	-40°C@1hrs <-> 85°C@1hrs, (50cycles)																																					
Pressure Cooker Test	121°C/100%RH, 2kf/cm2@12hrs																																					
Reflow Test	Step1 : 150 ~ 170°C, 70 ~ 175sec																																					
	Step2 : 230+/-5°C																																					
Electrostatic Discharge (ESD)	<table border="1"> <thead> <tr> <th rowspan="2">Test Model</th> <th colspan="3">Test Stress</th> </tr> <tr> <th>Reference</th> <th>Polarity</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td rowspan="3">H.B.M</td> <td>VDD</td> <td rowspan="3">1(Pos/Neg)</td> <td rowspan="3">2000V</td> </tr> <tr> <td>VSS</td> </tr> <tr> <td>PTOP</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="2">Test Model</th> <th colspan="3">Test Stress</th> </tr> <tr> <th>Reference</th> <th>Polarity</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td rowspan="3">MM</td> <td>VDD</td> <td rowspan="3">1(Po /Ne)</td> <td rowspan="3">150V</td> </tr> <tr> <td>VS</td> </tr> <tr> <td>PTOP</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="2">Test Model</th> <th colspan="3">Test Stress</th> </tr> <tr> <th>Reference</th> <th>Polarity</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td rowspan="2">C.D.M</td> <td rowspan="2">Field Induced Charge</td> <td rowspan="2">3(Pos/Neg)</td> <td rowspan="2">500V</td> </tr> <tr> </tr> </tbody> </table>	Test Model	Test Stress			Reference	Polarity	Level	H.B.M	VDD	1(Pos/Neg)	2000V	VSS	PTOP	Test Model	Test Stress			Reference	Polarity	Level	MM	VDD	1(Po /Ne)	150V	VS	PTOP	Test Model	Test Stress			Reference	Polarity	Level	C.D.M	Field Induced Charge	3(Pos/Neg)	500V
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RF Inspection Specification

ITEM	UNIT	MIN	TYP	MAX	
Frequency Tolerance	kHz	-40		+40	AT 25°C
Maximum TX Output power	dBm		10.4		AT -30°C
			9		AT 25°C
			7		AT 60°C
			5.5		AT 85°C
TX EVM	%			20	AT -30~85°C

Thermal Characteristics Radio

ITEM		#1	#2	#3	#4
TX OUTPUT POWER (dBm)	-30°C	10.7	10.4	10.5	10.3
	-20°C	10.6	10.3	10.4	10.2
	-10°C	10.2	10.0	10.2	9.9
	10°C	9.7	9.2	9.4	9.2
	25°C	9.4	9.0	9.3	8.7
	40°C	8.7	7.8	8.2	7.9
	50°C	8.5	7.4	7.5	7.3
	60°C, 80%	7.9	6.6	7.1	6.6
	85°C, 90%	6.6	5.1	5.6	5.1



FCC Information to User

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.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : 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 RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

CAUTION

To reduce the risk of electric shock, do not remove the top cover (or the rear section).
No user serviceable parts inside, refer servicing to qualified personnel.



This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure-voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to the important operating and maintenance instructions in the accompanying literature. Please read the manual.

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this equipment near water.
- 6) Do not use near any heat sources such as radiators, heat resistors, stove, or other equipment that produce heat.

CAUTION

**RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS**

European CE notice to users and product statements

This product is CE marked according to the provisions of the R&TTE Directive(99/5/EC). Hereby, Dongbu Robot Co., Ltd. declares that this product is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

For further information, please contact <http://www.dongbu.com>

CE1177

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CONTACT INFORMATION

Manufacturer Address : #235, Singal-ri, Jiksan-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea

To locate in-country Dongbu Robot Co., Ltd., distributors of the Zigbee Module

please refer to the Dongbu Robot Co., Ltd. Website <http://www.dongbu.com>

These distributor(s) represent local contacts for this product.

CORPORATE HEADQUARTERS:

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#235, Singal-ri, Jiksan-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea

Tel: +82-41-590-1700

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Web: <http://www.dongbu.com>

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is Subject to the following two condition: (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.

EUROPEAN UNION “DECLARATION OF CONFORMITY”

DECLARATION OF CONFORMITY

Dongbu Robot Co., Ltd.

#235, Singal-ri, Jiksan-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea

declare under our sole responsibility that the product(s)

Zigbee Module – DRI-0007

to which this declaration relate(s) is in conformance with the following standards:

EN 301 489-1 V1.9.2:2011

EN 301 489-17 V2.2.1 :2012

EN60950-1:2006

EN 300 328 V1.8.1:2012

following the provisions of the 1999/5/EC Directives.