End Device Module

Low-Power Wide Area Network Technology: Weightless®

General Features

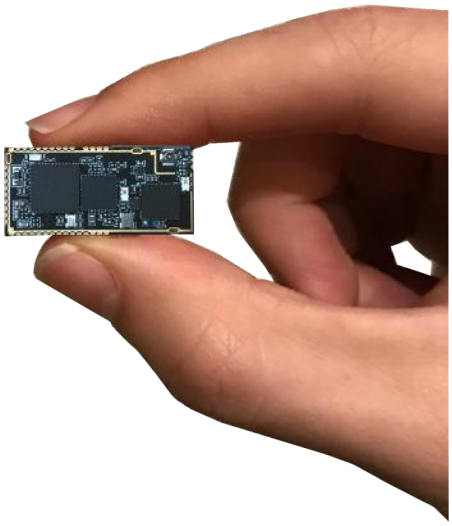
• On-board Weightless™ protocol stack
• AT command interface over UART / GPIO
• Compact form factor: 28 x 13mm
• Environmentally friendly, RoHS compliant
• FCC, CE compliant
• Device Firmware Upgrade (DFU) over UART
• Device Firmware Upgrade (OTA) over-the-air
• ARM® Cortex®-M3@40MHz running FreeRTOS
• 256kB Flash / 32kB RAM

Operational

• Single operating voltage: 2.1V to 3.6V (3.3V typical)
• Temperature range:
Operating: -10°C to 50°C
Storage: -20°C to 60°C
• Low-power consumption
• Programmable data rate from 625bps to 100kbps with PSK/GMSK modulation
• High-performance low-power ARM® Cortex®-M3 running at 40 MHz

RF/Analog Features

• Low-Power Long Range Transceiver operating in the 868/915/923MHz frequency bands
• High Receiver Sensitivity: -124 dBm @ 6.25 kbps
• Transmit Power: adjustable up to +12 dBm high efficiency PA
• PSK/GMSK modulation
• Over 2 km range in urban environment



Description

Ubiik's End Device Module is a Low-Power Long Range module with a full Weightless protocol stack up to the AT command interface. The AT command interface offers rapid time to market. The module is an easy to use, low-power solution for long range bi-directional wireless communication of data. The End Device module complies with the open, license-free Weightless protocol specifications.

Applications

• Automated Meter Reading
• Home and Building Automation
• Wireless Alarm and Security Systems
• Industrial Monitoring and Control
• Machine to Machine (M2M)
• Internet of Things (IoT)

Revision History

Revision Code	Date	Description	Comments
1.1	Mar. 13, 2018	Initial Release	

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TO OUR VALUED CUSTOMERS AND PARTNERS

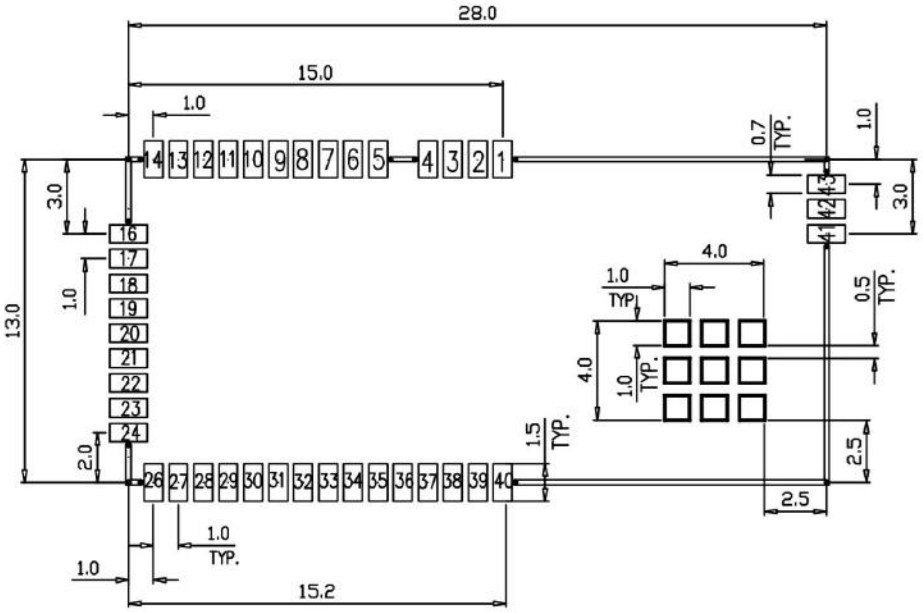
It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Ubiik products. We will strive to improve publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced. If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at info@ubiik.com. We welcome your feedback. For more information, please visit our website www.ubiik.com

1.0 Features

Specification	Description
Host Interface	AT command interface over UART
MCU	ARM® Cortex®-M3
Clock	40MHz
Flash	256kB
RAM	32kB
Frequency Band	863- 870MHz; 902-928MHz
Modulation Method	PSK and GMSK
Max. Over-the-Air Data Rate	100kbps
Interface	UART GPIO
Operation Range	>2km in urban
Transmit Power	12 dBm
Temperature (operating)	-40°C to +85°C
Temperature (storage)	-50°C to +150°C
Dimensions	20 x 13 mm

2.0 Dimensions, Marking and Pin Configurations

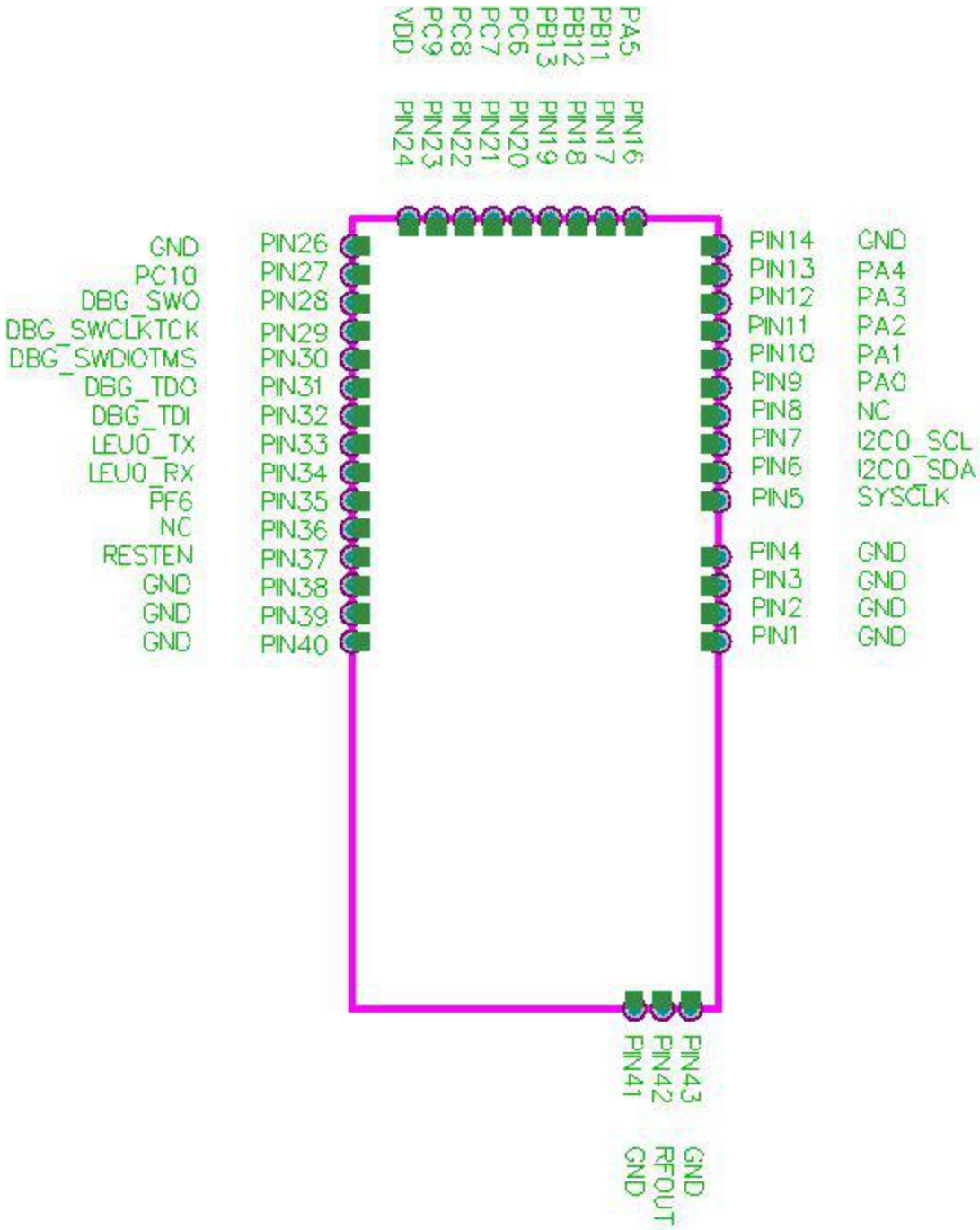
Dimensions



Pin(s)	Symbol	Type	Description
Thermal pad	GND	P	9 thermal pads on bottom of module, must be connected.

TOLERANCE UNLESS OTHERWISE SPECIFIED (±)	
L <= 3 mm	0.05
3 < L <= 15 mm	0.08
15 < L <= 30 mm	0.1
30 < L <= 70 mm	0.15
70 < L <= 120 mm	0.2
> 120 mm	0.3
ANGLE (degree)	1.0

Pin Configurations



Pin Description

Pin(s)	Symbol	Type	Description			
1	GND	P	Ground			
2	GND	P	Ground			
3	GND	P	Ground			
4	GND	P	Ground			
5	SYSCLK	I/O	Default functionality: Crystal oscillator (or divided) clock output Can be programmed to be used as a general purpose I/O pin Selectable internal 65k pull−up resistor			
6	I2C0_SDA	I/O	PD13 - I2C0 Serial Data input / output.			
7	I2C0_SCL	I/O	PD14 - I2C0 Serial Clock Line input / output			
8	NA	NA	No Connect			
9	PA0	I/O	Analog	Timers	Communication	Other
			ADC0_EXTN BUSCX [ADC0: APORT3XCH8 ACMP0: APORT3XCH8 ACMP1: APORT3XCH8 IDAC0: APORT1XCH8] BUSDY [ADC0: APORT4YCH8 ACMP0: APORT4YCH8 ACMP1: APORT4YCH8	TIM0_CC0 #0 TIM0_CC1 #31 TIM0_CC2 #30 TIM0_CDTI0 #29 TIM0_CDTI1 #28 TIM0_CDTI2 #27 TIM1_CC0 #0 TIM1_CC1 #31 TIM1_CC2 #30 TIM1_CC3 #29 LE- TIM0_OUT0 #0 LE- TIM0_OUT1 #31 PCNT0_S0IN #0 PCNT0_S1IN #31	US0_TX #0 US0_RX #31 US0_CLK #30 US0_CS #29 US0_CTS #28 US0_RTS #27 US1_TX #0 US1_RX #31 US1_CLK #30 US1_CS #29 US1_CTS #28 US1_RTS #27 LEU0_TX #0 LEU0_RX #31 I2C0_SDA #0 I2C0_SCL #31	CMU_CLK1 #0 PRS_CH6 #0 PRS_CH7 #10 PRS_CH8 #9 PRS_CH9 #8 ACMP0_O #0 ACMP1_O #0
10	PA1	I/O	Analog	Timers	Communication	Other
			ADC0_EXTP BUSCY [ADC0: APORT3YCH9 ACMP0: APORT3YCH9 ACMP1: APORT3YCH9 IDAC0: APORT1YCH9] BUSDX [ADC0: APORT4XCH9 ACMP0:	TIM0_CC0 #1 TIM0_CC1 #0 TIM0_CC2 #31 TIM0_CDTI0 #30 TIM0_CDTI1 #29 TIM0_CDTI2 #28 TIM1_CC0 #1 TIM1_CC1 #0 TIM1_CC2 #31 TIM1_CC3 #30 LE-	US0_TX #1 US0_RX #0 US0_CLK #31 US0_CS #30 US0_CTS #29 US0_RTS #28 US1_TX #1 US1_RX #0 US1_CLK #31 US1_CS #30 US1_CTS #29	CMU_CLK0 #0 PRS_CH6 #1 PRS_CH7 #0 PRS_CH8 #10 PRS_CH9 #9 ACMP0_O #1 ACMP1_O #1

			APORT4XCH9 ACMP1: APORT4XCH9]	TIM0_OUT0 #1 LE- TIM0_OUT1 #0 PCNT0_S0IN #1 PCNT0_S1IN #0	US1_RTS #28 LEU0_TX #1 LEU0_RX #0 I2C0_SDA #1 I2C0_SCL #0	
11	PA2	I/O	Analog	Timers	Communication	Other
			BUSCX [ADC0: APORT3XCH10 ACMP0: APORT3XCH10 ACMP1: APORT3XCH10 IDAC0: APORT1XCH10] BUSDY [ADC0: APORT4YCH10 ACMP0: APORT4YCH10 ACMP1: APORT4YCH10]	TIM0_CC0 #2 TIM0_CC1 #1 TIM0_CC2 #0 TIM0_CDTI0 #31 TIM0_CDTI1 #30 TIM0_CDTI2 #29 TIM1_CC0 #2 TIM1_CC1 #1 TIM1_CC2 #0 TIM1_CC3 #31 LE- TIM0_OUT0 #2 LE- TIM0_OUT1 #1 PCNT0_S0IN #2 PCNT0_S1IN #1	US0_TX #2 US0_RX #1 US0_CLK #0 US0_CS #31 US0_CTS #30 US0_RTS #29 US1_TX #2 US1_RX #1 US1_CLK #0 US1_CS #31 US1_CTS #30 US1_RTS #29 LEU0_TX #2 LEU0_RX #1 I2C0_SDA #2 I2C0_SCL #1	PRS_CH6 #2 PRS_CH7 #1 PRS_CH8 #0 PRS_CH9 #10 ACMP0_O #2 ACMP1_O #2
12	PA3	I/O	Analog	Timers	Communication	Other
			BUSCY [ADC0: APORT3YCH11 ACMP0: APORT3YCH11 ACMP1: APORT3YCH11 IDAC0: APORT1YCH11] BUSDX [ADC0: APORT4XCH11 ACMP0: APORT4XCH11 ACMP1: APORT4XCH11]	TIM0_CC0 #3 TIM0_CC1 #2 TIM0_CC2 #1 TIM0_CDTI0 #0 TIM0_CDTI1 #31 TIM0_CDTI2 #30 TIM1_CC0 #3 TIM1_CC1 #2 TIM1_CC2 #1 TIM1_CC3 #0 LE- TIM0_OUT0 #3 LE- TIM0_OUT1 #2 PCNT0_S0IN #3 PCNT0_S1IN #2	US0_TX #3 US0_RX #2 US0_CLK #1 US0_CS #0 US0_CTS #31 US0_RTS #30 US1_TX #3 US1_RX #2 US1_CLK #1 US1_CS #0 US1_CTS #31 US1_RTS #30 LEU0_TX #3 LEU0_RX #2 I2C0_SDA #3 I2C0_SCL #2	PRS_CH6 #3 PRS_CH7 #2 PRS_CH8 #1 PRS_CH9 #0 ACMP0_O #3 ACMP1_O #3 GPIO_EM4WU8
13	PA4	I/O	Analog	Timers	Communication	Other
			BUSCX [ADC0: APORT3XCH12 ACMP0: APORT3XCH12 ACMP1: APORT3XCH12 IDAC0: APORT1XCH12] BUSDY [ADC0: APORT4YCH12 ACMP0: APORT4YCH12	TIM0_CC0 #4 TIM0_CC1 #3 TIM0_CC2 #2 TIM0_CDTI0 #1 TIM0_CDTI1 #0 TIM0_CDTI2 #31 TIM1_CC0 #4 TIM1_CC1 #3 TIM1_CC2 #2 TIM1_CC3 #1 LE- TIM0_OUT0 #4 LE- TIM0_OUT1 #3	US0_TX #4 US0_RX #3 US0_CLK #2 US0_CS #1 US0_CTS #0 US0_RTS #31 US1_TX #4 US1_RX #3 US1_CLK #2 US1_CS #1 US1_CTS #0	PRS_CH6 #4 PRS_CH7 #3 PRS_CH8 #2 PRS_CH9 #1 ACMP0_O #4 ACMP1_O #4

			ACMP1: APORT4YCH12]	PCNT0_S0IN #4 PCNT0_S1IN #3	US1_RTS #31 LEU0_TX #4 LEU0_RX #3 I2C0_SDA #4 I2C0_SCL #3	
14	GND	P	Ground			
16	PA5	I/O	Analog	Timers	Communication	Other
			BUSCY [ADC0: APORT3YCH13 ACMP0: APORT3YCH13 ACMP1: APORT3YCH13 IDAC0: APORT1YCH13] BUSDX [ADC0: APORT4XCH13 ACMP0: APORT4XCH13 ACMP1: APORT4XCH13]	TIM0_CC0 #5 TIM0_CC1 #4 TIM0_CC2 #3 TIM0_CDTI0 #2 TIM0_CDTI1 #1 TIM0_CDTI2 #0 TIM1_CC0 #5 TIM1_CC1 #4 TIM1_CC2 #3 TIM1_CC3 #2 LE- TIM0_OUT0 #5 LE- TIM0_OUT1 #4 PCNT0_S0IN #5 PCNT0_S1IN #4	US0_TX #5 US0_RX #4 US0_CLK #3 US0_CS #2 US0_CTS #1 US0_RTS #0 US1_TX #5 US1_RX #4 US1_CLK #3 US1_CS #2 US1_CTS #1 US1_RTS #0 LEU0_TX #5 LEU0_RX #4 I2C0_SDA #5 I2C0_SCL #4	PRS_CH6 #5 PRS_CH7 #4 PRS_CH8 #3 PRS_CH9 #2 ACMP0_O #5 ACMP1_O #5
17	PB11	I/O	Analog	Timers	Communication	Other
			BUSCY [ADC0: APORT3YCH27 ACMP0: APORT3YCH27 ACMP1: APORT3YCH27 IDAC0: APORT1YCH27] BUSDX [ADC0: APORT4XCH27 ACMP0: APORT4XCH27 ACMP1: APORT4XCH27]	TIM0_CC0 #6 TIM0_CC1 #5 TIM0_CC2 #4 TIM0_CDTI0 #3 TIM0_CDTI1 #2 TIM0_CDTI2 #1 TIM1_CC0 #6 TIM1_CC1 #5 TIM1_CC2 #4 TIM1_CC3 #3 LE- TIM0_OUT0 #6 LE- TIM0_OUT1 #5 PCNT0_S0IN #6 PCNT0_S1IN #5	US0_TX #6 US0_RX #5 US0_CLK #4 US0_CS #3 US0_CTS #2 US0_RTS #1 US1_TX #6 US1_RX #5 US1_CLK #4 US1_CS #3 US1_CTS #2 US1_RTS #1 LEU0_TX #6 LEU0_RX #5 I2C0_SDA #6 I2C0_SCL #5	PRS_CH6 #6 PRS_CH7 #5 PRS_CH8 #4 PRS_CH9 #3 ACMP0_O #6 ACMP1_O #6
18	PB12	I/O	Analog	Timers	Communication	Other
			BUSCX [ADC0: APORT3XCH28 ACMP0: APORT3XCH28 ACMP1: APORT3XCH28 IDAC0: APORT1XCH28] BUSDY [ADC0: APORT4YCH28 ACMP0:	TIM0_CC0 #7 TIM0_CC1 #6 TIM0_CC2 #5 TIM0_CDTI0 #4 TIM0_CDTI1 #3 TIM0_CDTI2 #2 TIM1_CC0 #7 TIM1_CC1 #6 TIM1_CC2 #5 TIM1_CC3 #4 LE- TIM0_OUT0 #7 LE-	US0_TX #7 US0_RX #6 US0_CLK #5 US0_CS #4 US0_CTS #3 US0_RTS #2 US1_TX #7 US1_RX #6 US1_CLK #5 US1_CS #4 US1_CTS #3	PRS_CH6 #7 PRS_CH7 #6 PRS_CH8 #5 PRS_CH9 #4 ACMP0_O #7 ACMP1_O #7

			APORT4YCH28 ACMP1: APORT4YCH28]	TIM0_OUT1 #6 PCNT0_S0IN #7 PCNT0_S1IN #6	US1_RTS #2 LEU0_TX #7 LEU0_RX #6 I2C0_SDA #7 I2C0_SCL #6	
19	PB13	I/O	Analog	Timers	Communication	Other
			BUSCY [ADC0: APORT3YCH29 ACMP0: APORT3YCH29 ACMP1: APORT3YCH29 IDAC0: APORT1YCH29] BUSDX [ADC0: APORT4XCH29 ACMP0: APORT4XCH29 ACMP1: APORT4XCH29]	TIM0_CC0 #8 TIM0_CC1 #7 TIM0_CC2 #6 TIM0_CDTI0 #5 TIM0_CDTI1 #4 TIM0_CDTI2 #3 TIM1_CC0 #8 TIM1_CC1 #7 TIM1_CC2 #6 TIM1_CC3 #5 LE-TIM0_OUT0 #8 LE-TIM0_OUT1 #7 PCNT0_S0IN #8 PCNT0_S1IN #7	US0_TX #8 US0_RX #7 US0_CLK #6 US0_CS #5 US0_CTS #4 US0_RTS #3 US1_TX #8 US1_RX #7 US1_CLK #6 US1_CS #5 US1_CTS #4 US1_RTS #3 LEU0_TX #8 LEU0_RX #7 I2C0_SDA #8 I2C0_SCL #7	PRS_CH6 #8 PRS_CH7 #7 PRS_CH8 #6 PRS_CH9 #5 ACMP0_O #8 ACMP1_O #8 DBG_SWO #1 GPIO_EM4WU9
20	PC6	I/O	Analog	Timers	Communication	Other
			BUSAX [ADC0: APORT1XCH6 ACMP0: APORT1XCH6 ACMP1: APORT1XCH6] BUSBY [ADC0: APORT2YCH6 ACMP0: APORT2YCH6 ACMP1: APORT2YCH6]	TIM0_CC0 #11 TIM0_CC1 #10 TIM0_CC2 #9 TIM0_CDTI0 #8 TIM0_CDTI1 #7 TIM0_CDTI2 #6 TIM1_CC0 #11 TIM1_CC1 #10 TIM1_CC2 #9 TIM1_CC3 #8 LE-TIM0_OUT0 #11 LE-TIM0_OUT1 #10 PCNT0_S0IN #11 PCNT0_S1IN #10	US0_TX #11 US0_RX #10 US0_CLK #9 US0_CS #8 US0_CTS #7 US0_RTS #6 US1_TX #11 US1_RX #10 US1_CLK #9 US1_CS #8 US1_CTS #7 US1_RTS #6 LEU0_TX #11 LEU0_RX #10 I2C0_SDA #11 I2C0_SCL #10	CMU_CLK0 #2 PRS_CH0 #8 PRS_CH9 #11 PRS_CH10 #0 PRS_CH11 #5 ACMP0_O #11 ACMP1_O #11
21	PC7	I/O	Analog	Timers	Communication	Other
			BUSAY [ADC0: APORT1YCH7 ACMP0: APORT1YCH7 ACMP1: APORT1YCH7] BUSBX [ADC0: APORT2XCH7 ACMP0: APORT2XCH7 ACMP1: APORT2XCH7]	TIM0_CC0 #12 TIM0_CC1 #11 TIM0_CC2 #10 TIM0_CDTI0 #9 TIM0_CDTI1 #8 TIM0_CDTI2 #7 TIM1_CC0 #12 TIM1_CC1 #11 TIM1_CC2 #10 TIM1_CC3 #9 LE-TIM0_OUT0 #12 LE-TIM0_OUT1 #11	US0_TX #12 US0_RX #11 US0_CLK #10 US0_CS #9 US0_CTS #8 US0_RTS #7 US1_TX #12 US1_RX #11 US1_CLK #10 US1_CS #9 US1_CTS #8 US1_RTS #7	CMU_CLK1 #2 PRS_CH0 #9 PRS_CH9 #12 PRS_CH10 #1 PRS_CH11 #0 ACMP0_O #12 ACMP1_O #12

				PCNT0_S0IN #12 PCNT0_S1IN #11	LEU0_TX #12 LEU0_RX #11 I2C0_SDA #12 I2C0_SCL #11	
22	PC8	I/O	Analog	Timers	Communication	Other
			BUSAX [ADC0: APORT1XCH8 ACMP0: APORT1XCH8 ACMP1: APORT1XCH8] BUSBY [ADC0: APORT2YCH8 ACMP0: APORT2YCH8 ACMP1: APORT2YCH8]	TIM0_CC0 #13 TIM0_CC1 #12 TIM0_CC2 #11 TIM0_CDTI0 #10 TIM0_CDTI1 #9 TIM0_CDTI2 #8 TIM1_CC0 #13 TIM1_CC1 #12 TIM1_CC2 #11 TIM1_CC3 #10 LE-TIM0_OUT0 #13 LE-TIM0_OUT1 #12 PCNT0_S0IN #13 PCNT0_S1IN #12	US0_TX #13 US0_RX #12 US0_CLK #11 US0_CS #10 US0_CTS #9 US0_RTS #8 US1_TX #13 US1_RX #12 US1_CLK #11 US1_CS #10 US1_CTS #9 US1_RTS #8 LEU0_TX #13 LEU0_RX #12 I2C0_SDA #13 I2C0_SCL #12	PRS_CH0 #10 PRS_CH9 #13 PRS_CH10 #2 PRS_CH11 #1 ACMP0_O #13 ACMP1_O #13
23	PC9	I/O	Analog	Timers	Communication	Other
			BUSAY [ADC0: APORT1YCH9 ACMP0: APORT1YCH9 ACMP1: APORT1YCH9] BUSBX [ADC0: APORT2XCH9 ACMP0: APORT2XCH9 ACMP1: APORT2XCH9]	TIM0_CC0 #14 TIM0_CC1 #13 TIM0_CC2 #12 TIM0_CDTI0 #11 TIM0_CDTI1 #10 TIM0_CDTI2 #9 TIM1_CC0 #14 TIM1_CC1 #13 TIM1_CC2 #12 TIM1_CC3 #11 LE-TIM0_OUT0 #14 LE-TIM0_OUT1 #13 PCNT0_S0IN #14 PCNT0_S1IN #13	US0_TX #14 US0_RX #13 US0_CLK #12 US0_CS #11 US0_CTS #10 US0_RTS #9 US1_TX #14 US1_RX #13 US1_CLK #12 US1_CS #11 US1_CTS #10 US1_RTS #9 LEU0_TX #14 LEU0_RX #13 I2C0_SDA #14 I2C0_SCL #13	PRS_CH0 #11 PRS_CH9 #14 PRS_CH10 #3 PRS_CH11 #2 ACMP0_O #14 ACMP1_O #14
24	VDD	P	Power supply 1.85V – 3.3V			
26	GND	P	Ground			
27	PC10	I/O	Analog	Timers	Communication	Other
			BUSAX [ADC0: APORT1XCH10 ACMP0: APORT1XCH10 ACMP1: APORT1XCH10] BUSBY [ADC0: APORT2YCH10 ACMP0: APORT2YCH10 ACMP1:	TIM0_CC0 #15 TIM0_CC1 #14 TIM0_CC2 #13 TIM0_CDTI0 #12 TIM0_CDTI1 #11 TIM0_CDTI2 #10 TIM1_CC0 #15 TIM1_CC1 #14 TIM1_CC2 #13 TIM1_CC3 #12 LE-	US0_TX #15 US0_RX #14 US0_CLK #13 US0_CS #12 US0_CTS #11 US0_RTS #10 US1_TX #15 US1_RX #14 US1_CLK #13 US1_CS #12 US1_CTS #11 US1_RTS #10	CMU_CLK1 #3 PRS_CH0 #12 PRS_CH9 #15 PRS_CH10 #4 PRS_CH11 #3 ACMP0_O #15 ACMP1_O #15 GPIO_EM4WU12

			APORT2YCH10]	TIM0_OUT0 #15 LE- TIM0_OUT1 #14 PCNT0_S0IN #15 PCNT0_S1IN #14	LEU0_TX #15 LEU0_RX #14 I2C0_SDA #15 I2C0_SCL #14	
28	DBG_SWO	I/O	PC11 - Debug-interface Serial Wire viewer Output. Note that this function is not enabled after reset, and must be enabled by software to be used.			
29	DBG_SWCLKTCK	I/O	Debug-interface Serial Wire clock input and JTAG Test Clock. Note that this function is enabled to the pin out of reset, and has a built-in pull down.			
30	DBG_SWDIOTMS	I/O	Debug-interface Serial Wire data input / output and JTAG Test Mode Select. Note that this function is enabled to the pin out of reset, and has a built-in pull up.			
31	DBG_TDO	I/O	Debug-interface JTAG Test Data Out. Note that this function is enabled to pin out of reset.			
32	DBG_TDI	I/O	Debug-interface JTAG Test Data In. Note that this function is enabled to pin out of reset, and has a built-in pull up.			
33	LEU0_TX	I/O	PF4 - LEUART0 Transmit output. Also used as receive input in half duplex communication.			
34	LEU0_RX	I/O	PF5 - LEUART0 Receive input.			
35	PF6	I/O	Analog	Timers	Communication	Other
			BUSAX [ADC0: APORT1XCH22 ACMP0: APORT1XCH22 ACMP1: APORT1XCH22] BUSBY [ADC0: APORT2YCH22 ACMP0: APORT2YCH22 ACMP1: APORT2YCH22]	TIM0_CC0 #30 TIM0_CC1 #29 TIM0_CC2 #28 TIM0_CDTI0 #27 TIM0_CDTI1 #26 TIM0_CDTI2 #25 TIM1_CC0 #30 TIM1_CC1 #29 TIM1_CC2 #28 TIM1_CC3 #27 LE- TIM0_OUT0 #30 LE- TIM0_OUT1 #29 PCNT0_S0IN #30 PCNT0_S1IN #29	US0_TX #30 US0_RX #29 US0_CLK #28 US0_CS #27 US0_CTS #26 US0_RTS #25 US1_TX #30 US1_RX #29 US1_CLK #28 US1_CS #27 US1_CTS #26 US1_RTS #25 LEU0_TX #30 LEU0_RX #29 I2C0_SDA #30 I2C0_SCL #29	CMU_CLK1 #7 PRS_CH0 #6 PRS_CH1 #5 PRS_CH2 #4 PRS_CH3 #3 ACMP0_O #30 ACMP1_O #30
36	**NC**	**NC**	No Connect			
37	RESETN	I/O	Reset input, active low. To apply an external reset source to this pin, it is required to only drive this pin low during reset, and let the internal pull-up ensure that reset is released.			
38	GND	P	Ground			
39	GND	P	Ground			
40	GND	P	Ground			
41	GND	P	Ground			
42	RFOUT	RF	RF Input / Output			
43	GND	P	Ground			

3.0 Label Information

5-1 Image: End-Device Module Label

Variations of Label:
(1) Model: Lily M868,
(a) this module supports working frequency 824-960 Mhz,
(b) RFIC Transmit power set to 14dbm.
(c) No external PA.

(2) Model: Lily M920,
(a) this module supports working frequency 824-960 Mhz,
(b) RFIC Transmit power set to 27dbm.
(c) Built external PA, PA Band set at 780-960Mhz

(3) Model: Lily M510,
(a) this module supports working frequency 470-510 Mhz,
(b) RFIC Transmit power set to 30dbm.
(c) Built external PA, PA Band set at 470-510Mhz

(4) Model: Lily M450,
(a) this module supports working frequency 450-470 Mhz,
(b) RFIC Transmit power set to 30dbm.
(c) Built external PA, PA Band set at 450-470Mhz

4.0 Operating Condition

Table 4 Operating Specification

Parameters	Min	Typ	Max	Unit
Operating Temp	-40	25	80	degC

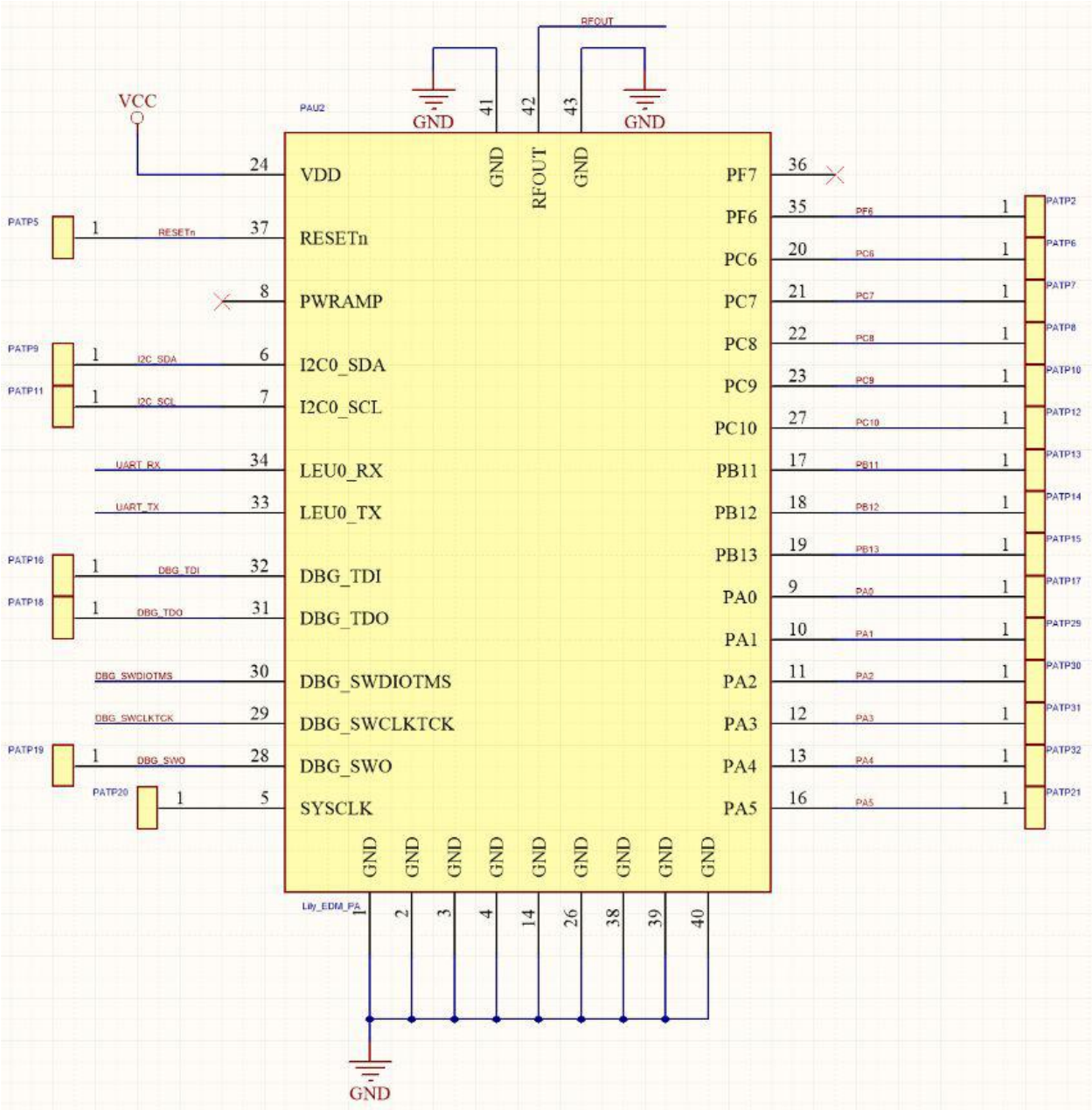
5.0 Electrical Characteristics

7.1 PSK/GMSK Transceiver Specification

Table 7-1 Current Consumption

Mode	**Current Consumption**
TX	45 mA @ 12 dBm / 7.5 mA @ 0 dBm
RX	13 mA
Sleep	<4 uA

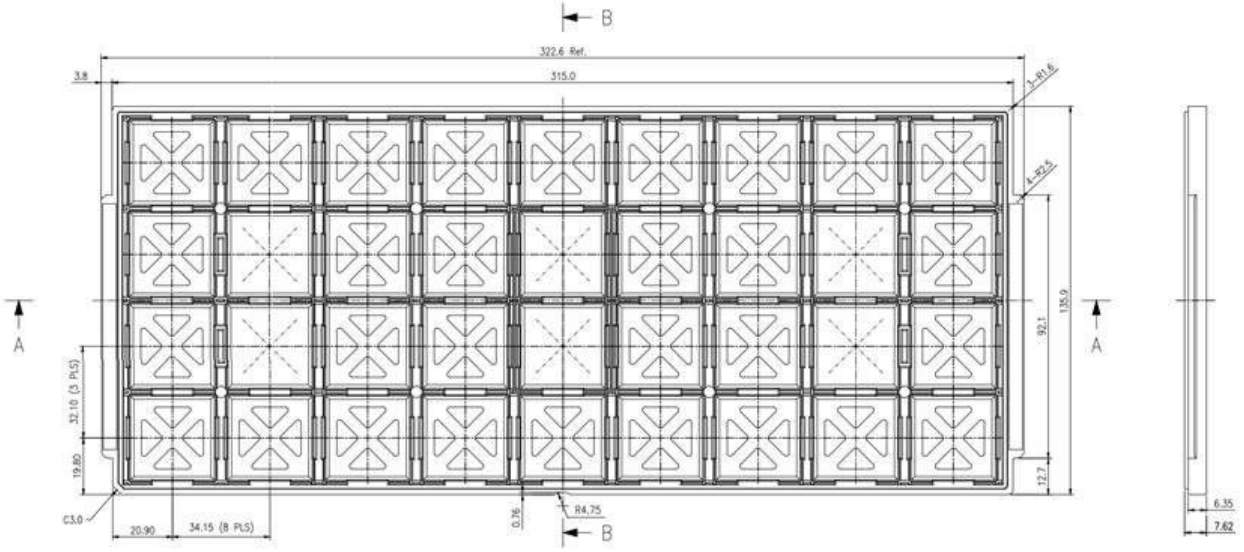
6.0 Reference Circuit



Please Note
VDD Pin: Please add TVS (Reference Product TVS: Nexperia PESD5V0S1BA link)
Reset Pin: Please add TVS (Reference Product TVS: Nexperia PESD5V0S1BA link)

7. Packing Information

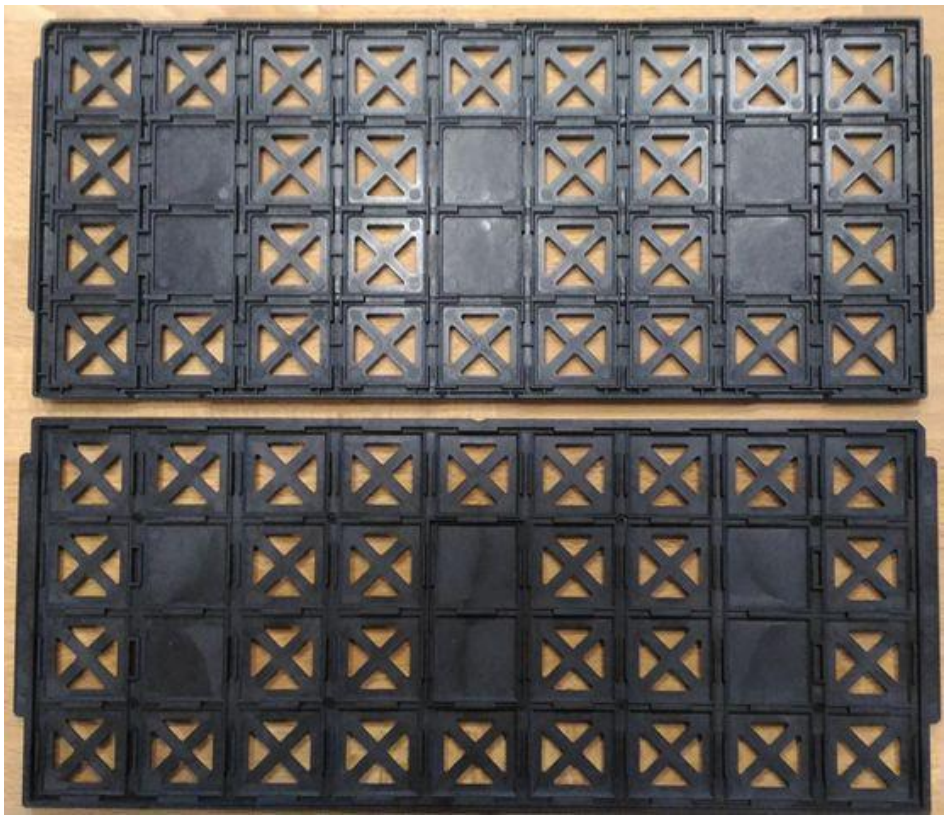
Dimension of the plastic tray for EDM packing is as below:



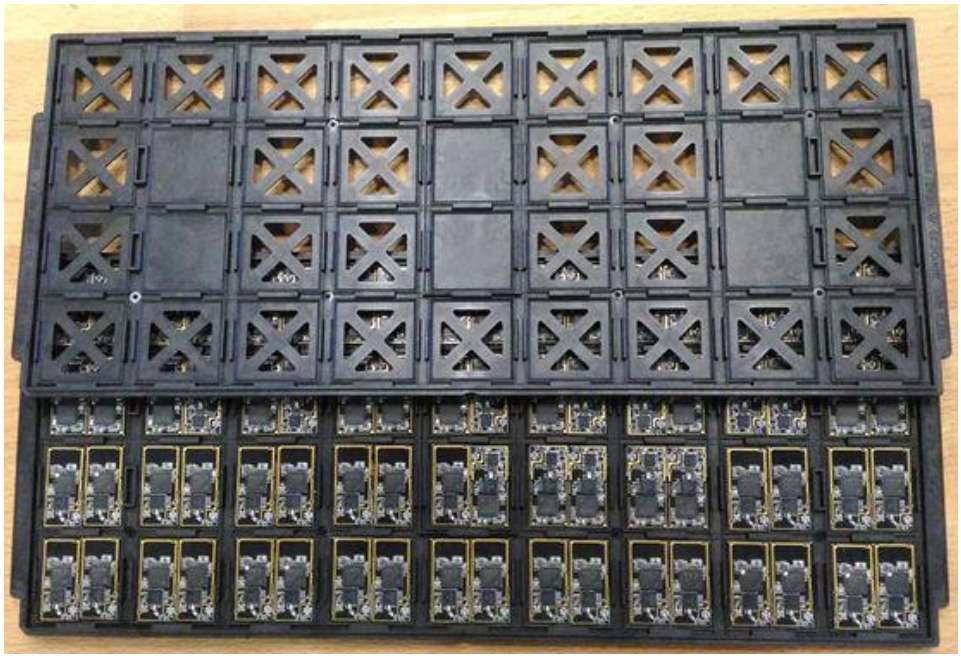
Tray Dimension: 322.6mm(L)*135.9mm(W)*7.62mm(H)

The plastic tray has 36 cells and each cell could be put two EDM. Each plastic tray could be put 72 EDM. There are 5 plastic trays will be packed to a plastic bag with the size 350*600*0.08 (mm). Please refer below pictures (1) ~ (5) for detail.

(1)



(2)



(3)

(4)

(5)

8. Notice

8.1 Storage Conditions

Please use this product within 6 months following receipt.

-The product shall be stored without opening the packing under the ambient temperature from 5 to 35°C and humidity from 20 ~70%RH. (Packing materials, in particular, may be deformed at the temperature over 40°C)

-If the product is left unused for more than 6 months after reception the solderability must be checked before usage.

-Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.

8.2 Handling Conditions

Be careful in handling or transporting products because excessive stress or mechanical shock may break products.

Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bear hands that may result in poor solderability.

8.3 Standard PCB Design(Land Pattern and Dimensions)

All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals. Please refer to the specifications for the standard land dimensions.

The recommended land pattern and dimensions is as Ubiik's standard. The characteristics of products may vary depending on the pattern drawing method, grounding method, land dimensions, land forming method of the NC terminals and the PCB material and thickness. Therefore, be sure to verify the characteristics in the actual set. When using non-standard lands, contact Ubiik beforehand.

8.4 Notice for Chip Placer :

When placing products on the PCB, products may be stressed and broken by uneven forces from a worn-out chucking locating claw or a suction nozzle. To prevent products from damages, be sure to follow the specifications for the maintenance of the chip placer being used. For the positioning of products on the PCB, be aware that mechanical chucking may damage products.

8.5 Soldering Conditions：

The recommendation conditions of soldering are as in the following figure. When products are immersed in solvent after mounting, pay special attention to maintain the temperature difference within 100 °C. Soldering must be carried out by the above mentioned conditions to prevent products from damage.Set up the highest temperature of reflow within 260 °C.

Contact Ubiik before use if concerning other soldering conditions

8.6 Cleaning :
Since this Product is Moisture Sensitive, any cleaning is not permitted.

8.7 Operational Environment Conditions :
Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur.

-In an atmosphere containing corrosive gas (Cl2, NH3, SOx, NOx etc.).
-In an atmosphere containing combustible and volatile gases.
-Dusty place.
-Direct sunlight place.
-Water splashing place.
-Humid place where water condenses.
-Freezing place.

If there are possibilities for products to be used under the preceding clause, consult with Ubiik before actual use. As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

8.8 Input Power Capacity :
Products shall be used in the input power capacity as specified in this specifications.Inform Ubiik beforehand, in case that the components are used beyond such input power capacity range.

Contact

General
info@ubiik.com
Sales:
jay@ubiik.com

END