

α -PICO

UHF RFID Reader Module
Datasheet
Ver. 251202

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1. Introduction

α -PICO is an ultra-compact UHF RFID Reader module that provides a complete solution using the ISO 18000-6C/EPC Gen2 protocol application. It is particularly suitable for applications requiring micro size, multi-tag capability, medium read range, and low system cost.

The recognition distance, when using a 3dBic reader antenna with passive tags, is approximately 3–5 meters, and the maximum tag reading speed is more than about 150 tags per second (@baudrate: 460800).

α -PICO's Surface Mount Technology (SMT) package design allows it to be mounted directly onto a PCB without the need for additional connectors or hardware.

α -PICO is the optimal choice for small, low-cost embedded systems requiring UHF RFID reader functionality.

This document includes characteristics such as the interface, functional, performance, mechanical, reliability test data, and packaging specifications of " α -PICO."

2. Application

- Label / Mobile Printer
- Handheld / Mobile Readers
- USB Readers
- Tag Encoders

3. System Block Diagram

Figure 3-1 below shows the electrical connection specifications required to control α -PICO from the HOST for embedded applications.

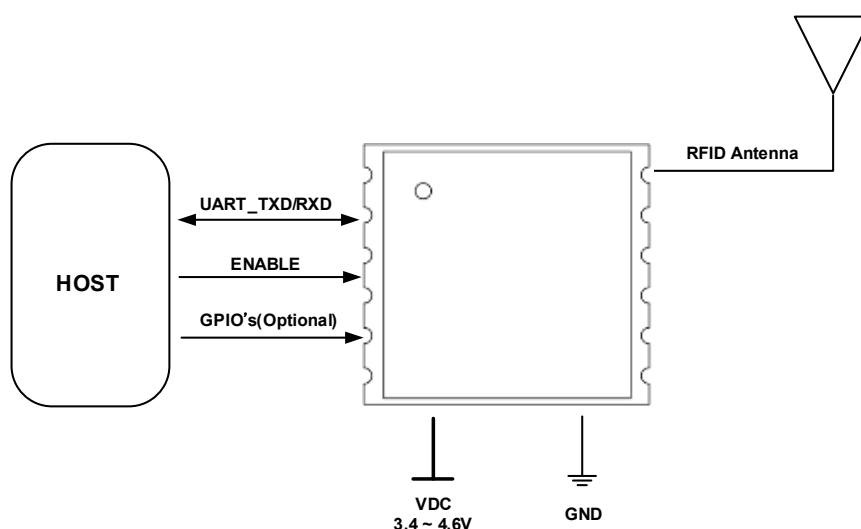


Figure3-1 : SYSTEM Block Diagram

- α -PICO requires a power supply VDC (typical: 4V) and GND.
- An ENABLE signal is required to enable or disable the power supply of α -PICO.

If ENABLE is Low, the power supply is disabled; if ENABLE is High, α -PICO enters standby mode.

- α -PICO provides two GPIO (Digital Input/Output) pins that can be controlled by the user.

4. Configuration

This guide covers the α -PICO series of RFID readers as follows.

4.1 α -PICO Series

[TABLE 4.1] α -PICO RFID Reader

Part Number	Description
α -PICO-G100	Global Reader (KOREA, USA, ETSI Upper band...)
α -PICO-E200	ETSI Reader (Lower band)
α -PICO-J301	JAPAN (1W)
α -PICO-J302	JAPAN (250mW)

4.2 α -PICO Development Kit

[TABLE 4.2] α -PICO Development Kit

Part Number	Description
α -PICO-KIT	α -PICO Module, Antenna, Interface Board, 12V/3A Adaptor, USB Cable

NOTE

If you wish to purchase the product and Development Kit, please refer to the Part Number and request the purchase from your supplier.

5. Pin Definition

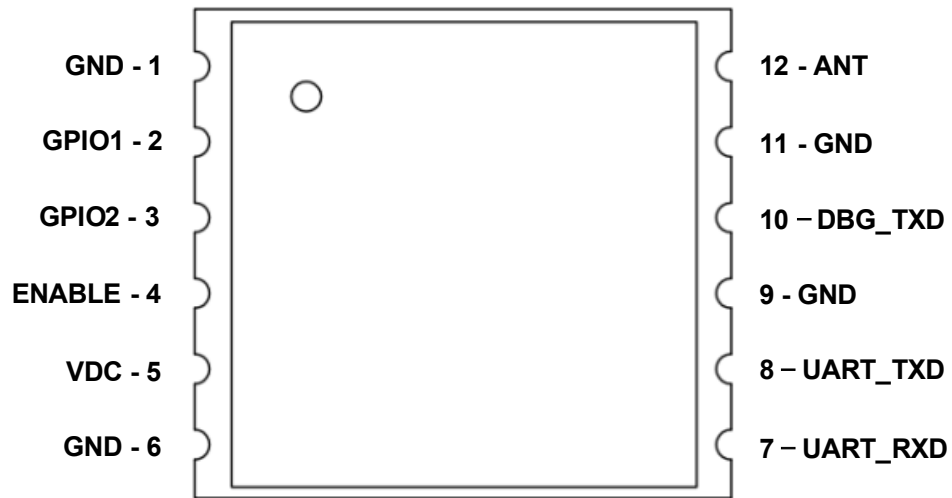


Figure5-1 : Pin Diagram

[TABLE 5.1] Pin Descriptions

No.	Name	Type	Description
1	GND	Power	Ground
2	GPIO1	Digital I/O	General purpose I/O
3	GPIO2	Digital I/O	General purpose I/O
4	ENABLE	Digital Input	Module Enable, Active high
5	VDC	Power	DC voltage supply (3.4 ~ 4.6V)
6	GND	Power	Ground
7	UART_RXD	Digital Input	UART RX from host
8	UART_TXD	Digital output	UART TX to host
9	GND	Power	Ground
10	DBG_TXD	Digital output	Module Debug output
11	GND	Power	Ground
12	ANT	RF	SMT antenna port

6. RFID Reader Software

α -PICO is accompanied by the "nSPACE" GUI Application, which enables evaluation of its features and performance.

6.1 nSPACE

nSPACE is an RFID Reader application that provides access to RFID Readers.

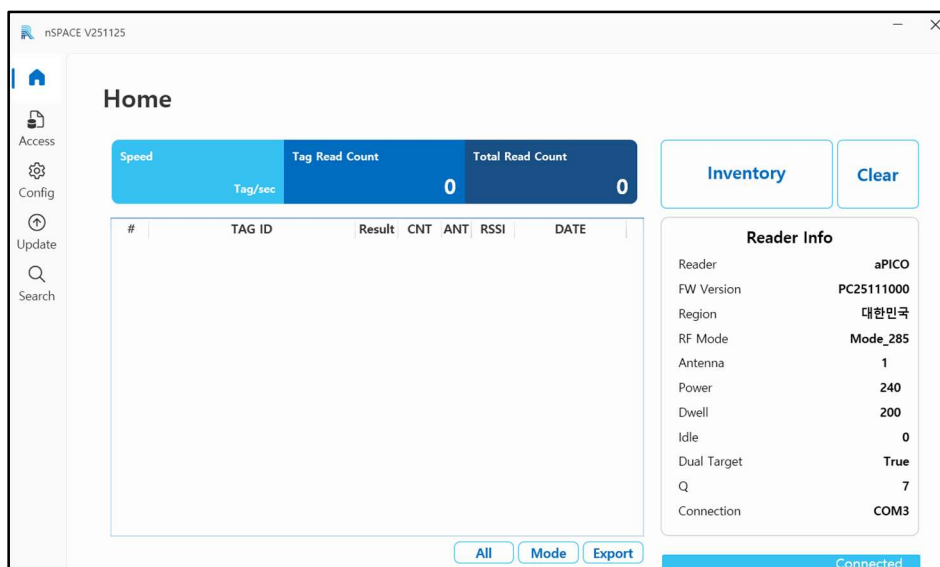
Using the α -PICO-KIT, the RFID Reader can be modified and operated through a USB connection with the HOST PC.

This application offers the capability to configure communication and operational parameters of the RFID Reader.

It also provides functions to read tags, review tag data, and perform diagnostics.

The application is used to verify the functions and performance of α -PICO prior to product design.

For more details, please refer to the "nSPACE User Guide."



[Figure 6.1] nSPACE 실행화면

7. Electrical Specifications

7.1 Absolute Maximum Rating

Stresses beyond those listed in Table 6-1 may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 7-1 : Absolute Maximum Ratings

Parameter	Min.	Max.	Unit	Comments
Supply voltage		4.6	V	
PWR_ENABLE		6	V	
IO Input voltage	-0.3	5.5	V	
Storage temperature	-30	+100	°C	
Humidity		95	%RH	
ESD immunity (Air discharge) (Contact discharge)		±8 ±4	kV kV	EN6100-4-2

7.2 Operating Conditions

Table 7-2 : Operating Conditions

Parameter	Min.	Max.	Unit	Conditions
Supply voltage (VCC)	3.4	4.2	V	Recommend voltage : 4V
Ambient Temperature	-20	+60	°C	
Inner Board Temperature	-20	+80	°C	Note Extended operation at high temperatures may result in reduced performance and material degradation.

7.3 Reader Radio Specifications

VCC=4V, typical values at 25°C, unless otherwise noted.

Table 7-3 : Reader Radio Specifications

Parameter	Min.	Typ.	Max.	Unit	Conditions
Supply Current (Active mode)	370		950	mA	Transmit Power : +5 ~+30dBm
Supply Current (Standby mode)			30.4 10	mA mA	PWR_ENABLE : High PWR_ENABLE : Low
RX input impedance		50		Ω	
RX sensitivity		-74		dBm	
TX Power	+5		+30	dBm	
Frequency	860		930	MHz	See section 8
Channel bandwidth			200	kHz	
Channel Dwell time			0.4	Sec.	
Carrier sensing time	5			ms	Case in Japan
Carrier sensing level		-74		dBm	Case in Japan
Transmission time			4	Sec.	Case in Japan

7.4 Reader Digital Interface Specifications

VCC=4V, typical values at 25°C, unless otherwise noted.

Table 7-4 : Reader Digital Interface Specifications

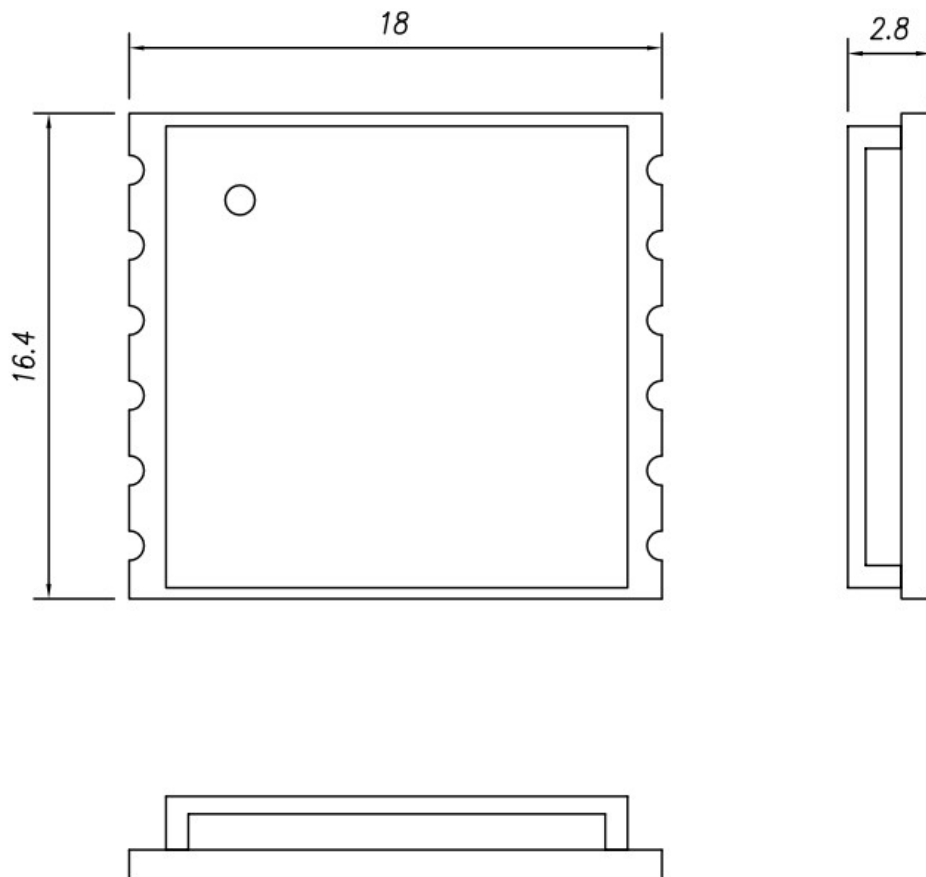
Parameter	Min.	Typ.	Max.	Unit	Conditions
PWR_ENABLE					
V _{IH}	1	3.3	5	V	
V _{IL}	-0.3		0.4	V	
GPIO					
V _{IH}	2.0	3.3	3.6	V	
V _{IL}	-0.3		0.8	V	
UART					
Baud rate	9.6	460.8	921.6	kbaud	
Data bits		8		bit	
Parity		None			
Stop		1		bit	
Flow control		None			

7.5 Reader physical Characteristics

Parameter	Description
Dimensions	18mm(W) × 16.4mm(L) × 2.8mm(H)
Weight	1.5g
Housing Material	Aluminum

8. Mechanical Specifications

8. 1 Drawing and Dimension



9 Packing Information

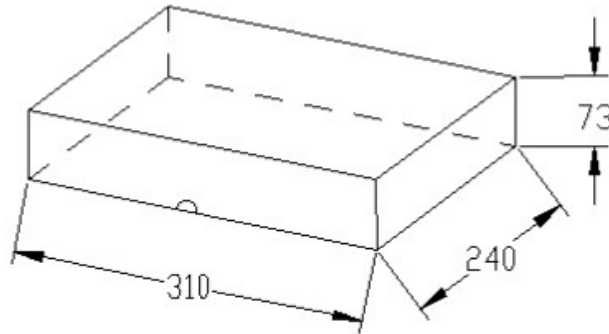
The packing materials for α -PICO shipment consist of an anti-static tray and an outer box, with each box capable of holding up to 250 units of α -PICO.

8. 1 Tray

The tray designed for α -PICO accommodates up to 25 units, with dimensions of approximately 280mm $\times$ 240mm $\times$ 10mm. It is intended to minimize product interference and protect against external static electricity.

8. 2 Outer box

The outer box, manufactured from printed cardboard, provides protection against dust, moisture, and shock, while ensuring ease of transportation. Its approximate dimensions are 310mm $\times$ 240mm $\times$ 73mm.



Appendix A. RFID Reader Frequency

This chapter provides information on the channels and frequencies of the α -PICO RFID Reader.

[단위 : KHz]

	South Korea (KOR)	FCC	China (CHN)	Hong Kong (HKG)	Singapore (SGP)	Taiwan (TWN)	Vietnam (VNM)	Japan FHSS	ETSI Lower
1	917300	902750	920625	920750	920750	920750	918750	916800	865700
2	917900	903250	920875	921250	921250	921250	919250	918000	866300
3	918500	903750	921125	921750	921750	921750	919750	919200	866900
4	919100	904250	921375	922250	922250		920250	920400	867500
5	919700	904750	921625	922750	922750		920750		
6	920300	905250	921875	923250	923250		921250		
7		905750	922125	923750	923750		921750		
8		906250	922375	924250	924250		922250		
9		906750	922625						
10		907250	922875						
11		907750	923125						
12		908250	923375						
13		908750	923625						
14		909250	923875						
15		909750	924125						
16		910250	924375						
17		910750							
18		911250							
19		911750							
20		912250							
21		912750							
22		913250							
23		913750							
24		914250							
25		914750							
26		915250							
27		915750							
28		916250							
29		916750							
30		917250							
31		917750							
32		918250							
33		918750							
34		919250							
35		919750							
36		920250							
37		920750							
38		921250							
39		921750							
40		922250							
41		922750							
42		923250							
43		923750							
44		924250							
45		924750							
46		925250							
47		925750							
48		926250							
49		926750							
50		927250							

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 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.

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.

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

IMPORTANT NOTE:

FCC RF 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 23cm between the radiator & your body.

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

OEM INTEGRATION INSTRUCTIONS:

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

The module must be installed in the host equipment such that 23 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 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 (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot 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. In such cases, please involve a

FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 23 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: 2AWMD-APICO**

- This Module has been tested and should be used with below antennas:

Antenna Type	Peak Gain (dBi)	Part Name
Patch	5.88	MICRO260-919
Patch	5.80	MACRO4016-919
Patch	5.58	MACRO200-919
Patch	3.13	MACRO130-919
Patch	2.65	MACRO100-919
Patch	-17.49	MNFA1010-900L
Patch	-29.12	MNFA1004-900
Patch	-0.09	MQWA60F55SM919-A

Information that must be placed in the end user manual:

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.

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