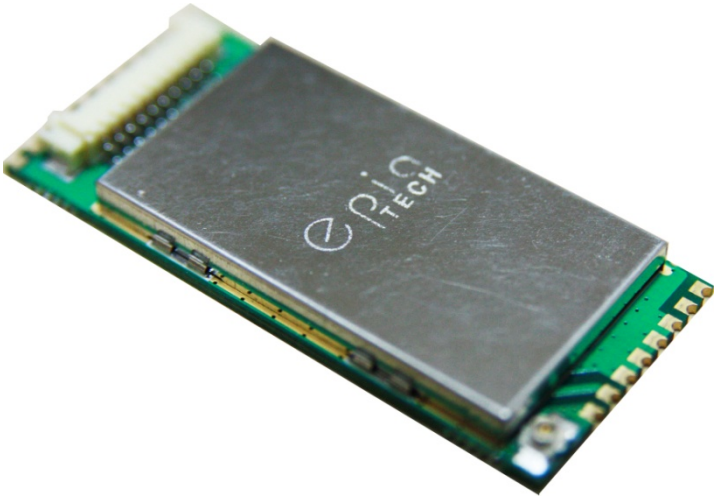
Model：IRF-90E

User Manual V1.0



SAFETY

The following guidelines protect the safety of the users and prevent damage to the product. Please be sure to read these instructions and follow all instructions for correct usage.

☞ **A grade equipment**
(Telecommunications equipment for business use)
"This equipment is for business use (A grade) complies with the Electromagnetic Compatibility. The user should not use the equipment for home use.

☞ Protect the product from falls, strong shocks, or strong vibrations.
※ It may damage the components inside and the appearance of the product.

☞ Do not keep and use in locations exposed to high temperature and humidity.
※ It may cause a fatal damage to the product.

☞ Do not put by electric heating appliances.
※ It may cause fire.

☞ Do not use excessive force when connecting cable.
※ Damage of the connecting part may cause malfunction.

☞ Do not fold the cable inside and avoid the cable laid under heavy items.
※ Damage of the cable may cause malfunction.

☞ Always use or store in a clean place.
※ The dust may cause malfunction.

☞ Directly contact to software suppliers for applications and business programs.

☞ Do not disassemble the product and do not insert any foreign substances.
※ Always use a service center for repairs
※ A fee will be charged when malfunctions are due to mishandling by the users.

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www.e-pia.co.kr

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1 OUTLINE

1.1 General Description

The IRF-90E is a highly integrated RF transceiver capable of operation 902 ~ 928MHz license-free ISM (Industry Scientific and Medical) frequency bands. Its highly integrated architecture allows for a minimum of external components whilst maintaining maximum design flexibility. All major RF communication parameters are programmable and most of them can be dynamically set. The IRF-90E offers the unique advantage of programmable narrow-band and wide-band communication modes without the need to modify external components. The IRF-90E is optimized for low power consumption while offering high RF output power and channelized operation. TrueRF™ technology enables a low cost external component count (elimination of the SAW filter) whilst still satisfying ETSI and FCC regulations.

[Figure 1-1] System Diagram

1.2 APPLICATIONS

- Automated Meter Reading
- Wireless Sensor Networks
- Home and Building Automation
- Wireless Alarm and Security Systems
- Industrial Monitoring and Control

2 SPCIFICATIONS

2.1 Electrical specifications

[Table 2-1] Electrical specifications

ITEM	SPECIFICATION	REMARK
Operating voltage	DC 3.6 V	
Consumption current	5 W (Max.)	
Connector	12505WR-10 or PCB PAD	
RF Connector	U.FL or PCB PAD	

2.2 RF specifications

[Table 2-2] RF specifications

ITEM	SPECIFICATION	REMARK
Frequency range	902.250 MHz ~ 927.750 MHz	
Modulation type	GFSK	
Support type	LBT	
Number of channels	52 Channel	
Channel bandwidth	250 kHz	
Data rate	1.2 kbps ~ 38.4 kbps	
Data Mechanism	Manchester	
Frequency Error	± 7 ppm (Max.)	
Receiver sensitivity	-116 dBm at 1.2 kbps	

2.3 Environmental specifications

[Table 2-3] Environmental specifications

ITEM	SPECIFICATION	REMARK
Dimensions	49 mm (L) × 22 mm (W) × 4 mm (H)	
Weight	30 g	
Operating temperature	(20 ± 50) ℃	
Storage temperature	(42.5 ± 107.5) ℃	
Humidity	(47.5 ± 47.5) % R.H.	
Drop specification	concrete 1.5 M drop to concrete, 6 drops per 6 sides 3 angles over operating temperature range	

2.4 Antenna specifications

[Table 2-4] Antenna specifications

ITEM	SPECIFICATION	REMARK
Antenna type	Dipole Antenna (Unique)	
Frequency range	902.250 MHz ~ 927.750 MHz	
Impedance	50 Ω ± Normal	
VSWR	Less Than 2.7:1	
Peak Gain	1.8 dBi@Max.	
Radiation pattern	Omni-Directional	
Polarization	Vertical	
Operating temperature	(25 ± 45) ℃	

2.5 Channel Table

[Table 2-5] Channel Table

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	REMARK
01	902.250 MHz	27	915.250 MHz	
02	902.750 MHz	28	915.750 MHz	
03	903.250 MHz	29	916.250 MHz	
04	903.750 MHz	30	916.750 MHz	
05	904.250 MHz	31	917.250 MHz	
06	904.750 MHz	32	917.750 MHz	
07	905.250 MHz	33	918.250 MHz	
08	905.750 MHz	34	918.750 MHz	
09	906.250 MHz	35	919.250 MHz	
10	906.750 MHz	36	919.750 MHz	
11	907.250 MHz	37	920.250 MHz	
12	907.750 MHz	38	920.750 MHz	
13	908.250 MHz	39	921.250 MHz	
14	908.750 MHz	40	921.750 MHz	
15	909.250 MHz	41	922.250 MHz	
16	909.750 MHz	42	922.750 MHz	
17	910.250 MHz	43	923.250 MHz	
18	910.750 MHz	44	923.750 MHz	
19	911.250 MHz	45	924.250 MHz	
20	911.750 MHz	46	924.750 MHz	

21	912.250 MHz	**47**	925.250 MHz	
22	912.750 MHz	**48**	925.750 MHz	
23	913.250 MHz	**49**	926.250 MHz	
24	913.750 MHz	**50**	926.750 MHz	
25	914.250 MHz	**51**	927.250 MHz	
26	914.750 MHz	**52**	927.750 MHz	

3 Configurations

3.1 Top view

[Figure 3-1] IRF-90E Top view

3.2 Left view

[Figure 3-2] IRF-90E Left view

3.3 Right view

[Figure 3-3] IRF-90E Right view

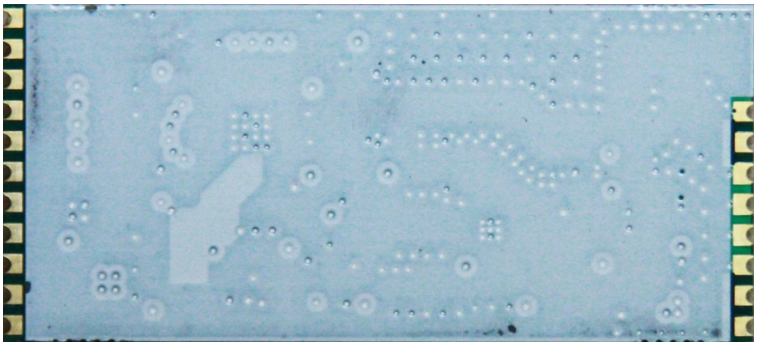
3.4 Front view

[Figure 3-4] IRF-90E Front view

3.5 Rear view

[Figure 3-5] IRF-90E Rear view

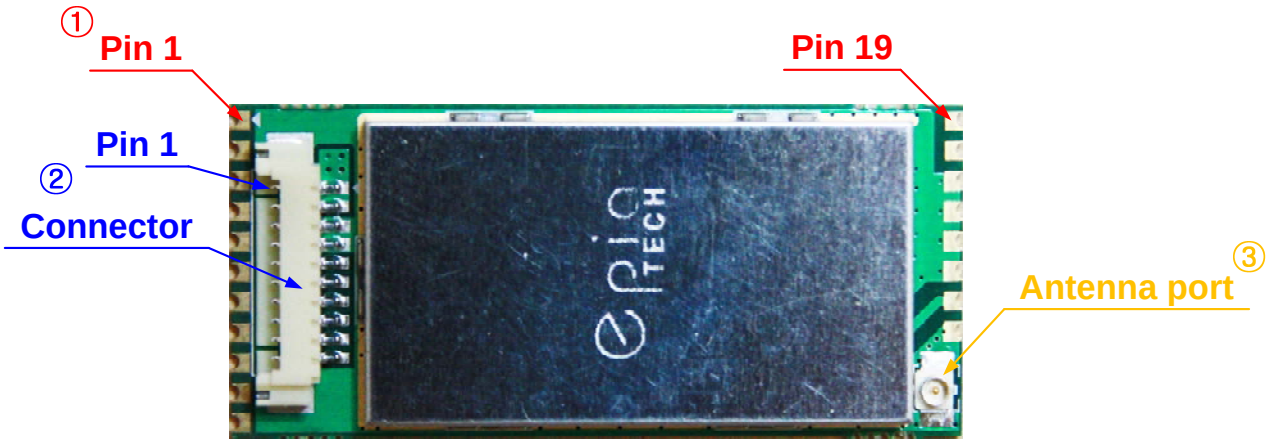
3.6 Bottom view



[Figure 3-6] IRF-90E Bottom view

4 Operation

4.1 IRF-90E Detail Description



[Figure 4-1] IRF-90E Detail Description

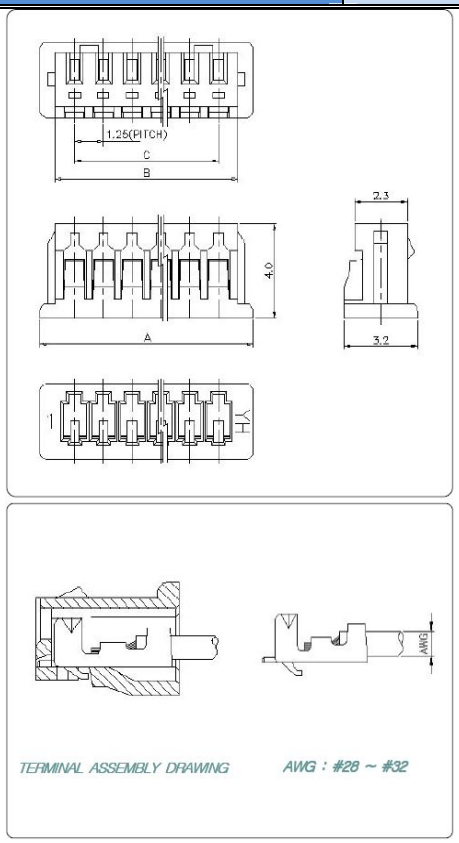
① They are Pin of Power, Interface, GPIO, etc when installed as PCB. Pin is made up of a total of 19. Please, refer 4.2 PIN Descriptions for detailed Pin description..

② As a way fo additional Interface, it is a connector to connect by external cable.
Housing needed for connection is made by Yeonho, Part is “12505HS-10”.
Website "http://www.yeonho.com/en/"
Please, refer to [Figure 4-2] for more information.
In addition, refer to [Table 4-1] for Pin description.

[Table 4-1] Connector Pin Description

PIN	DESCRIPTION	REMARK
1	DC 3.6 V	
2	DC 3.6 V	
3	GROUND	
4	GROUND	

5	nRESET	
6	CLKOUT	
7	SCK	
8	MISO	
9	MOSI	
10	NSS	



Specification

ITEM	SPEC
Voltage Rating	AC/DC 125V
Current Rating	AC/DC 1A
Operating Temperature	-25℃~+85℃
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC250V/1min
Insulation Resistance	100MΩ MIN
Applicable Wire	AWG #28~#32
Applicable P.C.B	0.8 ~ 1.6mm
Applicable FPC/FFC	-
Solder Height	0.15mm
Crimp Tensile Strength	-
UL FILE NO	E108706

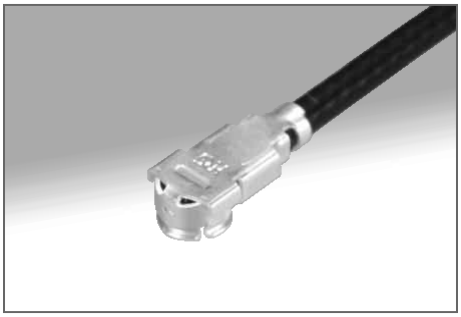
[Figure 4-2] Housing Data

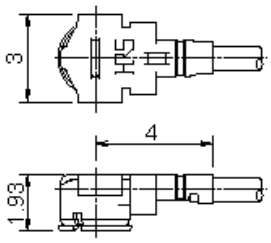
① Port to connect to Antenna and Plug

When connecting, Plug needed is made by Hirose. Part is“U.FL-LP-040”.

Website “http://hirose.com/index.html”

Please, refer to [Figure 4-3] for detailed Plug specification.



Part No.	U.FL-LP-040
	
Mated Height	2.5mm Max. (2.4mm Nom.)
Applicable cable	Dia. 0.81mm Coaxial cable
Weight (mg)	53.7

[Figure 4-3] Plug Data

4.2 Pin Descriptions

[Table 4-2] Pin Descriptions

PIN	NAME	DESCRIPTION	REMARK
1	nRESET	Reset trigger input, Active Low	
2	DIO0	Digital I/O, software configured	
3	DIO1	Digital I/O, software configured	
4	DIO2	Digital I/O, software configured	
5	DIO3	Digital I/O, software configured	
6	DIO4	Digital I/O, software configured	
7	CLKOUT	The reference frequency out, software configured	
8	SCK	SPI Clock input	
9	MISO	SPI Data output	
10	MOSI	SPI Data input	
11	NSS	SPI Chip select input	
12	GND	Ground	
13	ANT	RF Tx/Rx port	
14	GND	Ground	
15	GND	Ground	
16	GND	Ground	
17	GND	Ground	

18	P3.6V	DC Power port, 3.6 V@1.5 A (Max.)	
19	P3.6V	DC Power port, 3.6 V@1.5 A (Max.)	

FCC notice to users and product statements
This device complies with part15 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.

CAUTION : Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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.

Modifications not expressly approved by the manufacturer could void the user's authority to operated the equipment under FCC rules.