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Product Specification & User's Manual: IRISt-03A



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1. Overview

1.1 General Description

IRISt-03A is an innovative product designed for industrial & automotive market segment. It serves as the sensor for environment detection to detect human, vehicle or objects around the object. It is the reliable guardian for a car which can be used to remove blind spots, to detect front or rear crossing traffics, to recognize objects, etc. IRISt-03A consists of two RM14-03A radar modules installed at the right angle as well as its housing part of the product. Using millimeter radio waves, the RM14-03A provides the ability to effectively detect objects in areas close to the vehicle and alert the vehicle driver. Relatively compact RM14-03A is provided with tiny form-factor to feature its usage performance for designated industrial vehicles market.

RM14-03A refers to a module in which AWR1443 radar IC is mounted on an RM1403 PCB. The AWR1443, TI's integrated single-chip mmWave sensor which integrates radar front end, hardware accelerators, ARM, and DSP in one CMOS chip, can embed the application software on the radar module. SRS's unique antenna design technology and algorithms using the device have enabled the reliable detection performance under various environments.

Smart Radar System provides the RM14-03A module in different form factors according to customer's needs. RM14-03A can be provided with a carrier board for easy PC-based testing. But when the customer decides the actual use cases for the adoption of the radar, RM14-03A will be included inside the actual product formfactor, so differentiated as IRISc (Intelligent Radar for Immersive Sensing for Construction) & IRISt (Intelligent Radar for Immersive Sensing for Twin). The housing both has its advantages and purpose.

1.2 Features

- Innovative industrial vehicle product
- Max 4 GHz bandwidth (77-81 GHz), FMCW (Frequency Modulated Continuous Wave)
- 180° azimuth FOV
- Communication with a vehicle or hosts through CAN interface
- 12V / 24V to power the Sensor

1.3 Product Appearance



IRISt-03A



<Top>



<Bottom>

RM14-03A Radar Module



IRISt-03A Front



IRISt-03A Back

2. Product

2.1 Absolute Maximum Ratings

Parameters	Conditions	Spec.			Notes
		Min	Max	Unit	
Operating Temperature	Complete Sensor	-40	+85	°C	
Storage Temperature	Complete Sensor	-40	+105	°C	
Voltage	Supply Voltage to the Sensor	7	36	V	

2.2 Operating Conditions

Parameters		Spec.	Notes
Frequency	Range	77 ~ 81 GHz	
	Bandwidth	Max 3.9 GHz	
Antenna Power		Max 10dBm	≤ 10mW
Transmitted Antenna Gain		Max 12.9dBi	≤ 35dBi
Main Power Supply		12V or 24V power system	
Power Consumption		Ave.:3.5W, Peak.: 6W	
Protection Rating		IP68	

2.3 Performance Specifications

(@ 25°C unless otherwise noted)

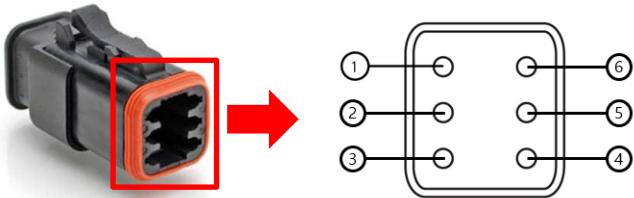
Parameters		Spec.	Notes		
		Min	Typ	Max	
Detection Range				10m	Vehicle / pedestrian
Range Resolution			0.5		
Azimuth Angle (H. FOV)	Vehicle	180°@ 10m			
	Pedestrian	180°@ 6m			
Azimuth Resolution		18°			
Elevation Angle (V. FOV)		30° (±15°)			
Elevation Resolution			18°		
Cycle Time			100ms		Configurable

※ Specifications in this datasheet are subject to change without notice.

※ Any specifications not determined in the above table are under test and will update for details

2.4 Connections

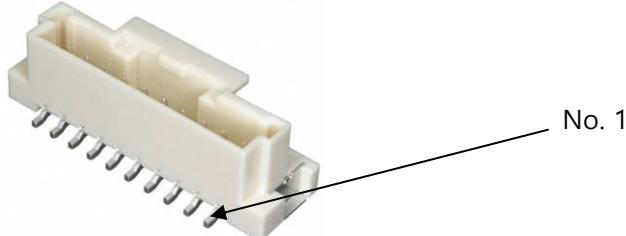
IRISt – Connector Type



Part Number: AT06-6S-SR02BLK (Amphenol)

Pin Number	Name	Electrical spec.	IN/OUT	Description
1	VBAT	+12V	PWR	
2	GND	GND	PWR	
3	CAN_H	2.75 - 4.5	IN/OUT	
4	PWM_OUT	0 ~ +5V	OUT	Not used (Special use case)
5	GND	GND	PWR	
6	CAN_L	0.5 - 2.25	IN/OUT	

RM14-03A (IRISt Internal) – Connector Type



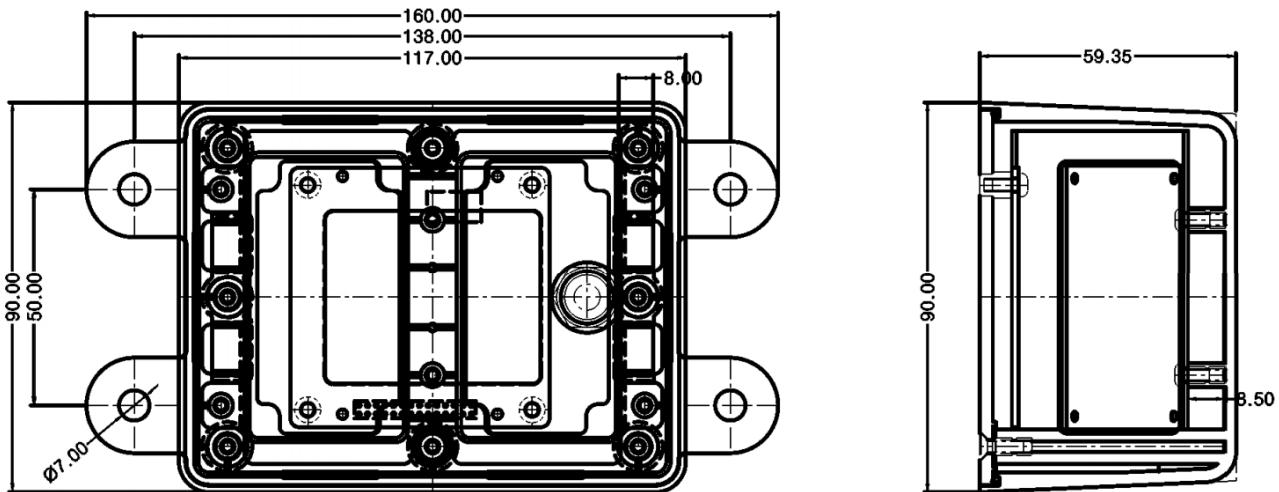
Part Number: SMW200-H10G(YEONHO)

Pin Number	Name	Electrical spec.	IN/OUT	Description
1	VPWR	+5.0V	PWR	
2	GND	GND	PWR	
3	UART1_RX	L:<0.62V H:>2.25V	IN	
4	UART1_TX	L:<0.45V H:>2.85V	OUT	
5	SOP_2	L:<0.3V H:>1.57V	IN	Boot mode selection (default: Low) Internal pull-down
6	RESET_N	L:<0.3V H:>1.57V	IN	Low-Active (Internal pull-up)
7	PWR_EN	L:<0.3V H:>1.57V	IN	High-Active (default: High) Internal pull-up
8	PGOOD	L:<0.45V H:>2.85V	OUT	High-Active (Internal pull-up)
9	UART2_RX	L:<0.62V H:>2.25V	IN	
10	UART2_TX	L:<0.45V H:>2.85V	OUT	

2.5 Mechanical Specifications

IRISt-03A Mechanical Specification

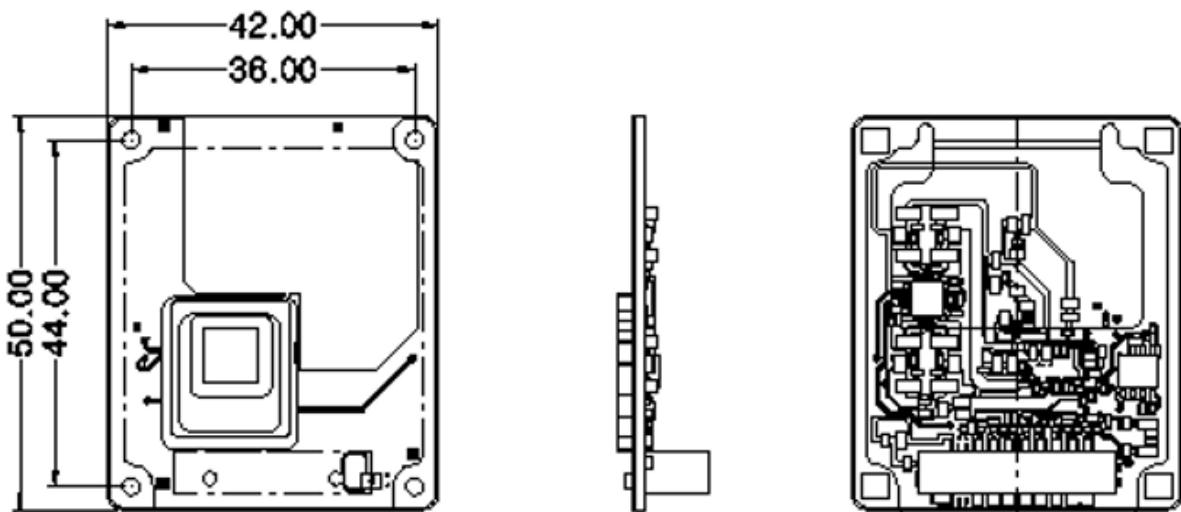
Items	Spec.	Notes
Dimension	90 x 117 x 59.35	(W x L x H) (mm)
Weight	377	RM14-03A + IRISt, (Ext. Cable 27g) (g)



IRISt-03A

RM14-03A Mechanical Specification

Items	Spec.	Notes
Dimension	42 x 50 x 8	Module only (W x L x H) (mm)
Weight	11	Module only (g)



RM14-03A

2.6 CAN Protocol

The rear radar uses CAN protocol to communicate with the host system.

- CAN version: Supports CAN 2.0 A, B
- Speed: 1Mbps
- Data structure:

Standard CAN ID	DATA[0]	DATA[1]	DATA[2]	DATA[3]	DATA[4]	DATA[5]	DATA[6]	DATA[7]	Meaning
Start CAN ID	OBJECT_X		OBJECT_Y		OBJECT_Power		RESERVED		info. Of the 1-st detected object
Start CAN ID + 1	OBJECT_X		OBJECT_Y		OBJECT_Power		RESERVED		info. Of the 2-nd detected object
Start CAN ID + i		info. Of the i-th detected object
End CAN ID	OBJECT_X		OBJECT_Y		OBJECT_Power		RESERVED		info. Of the 20-th detected object

	name	field	option	unit	meaning
PAYLOAD	OBJECT_X	DATA[0,1]	INT16	cm	x-direction position of the i-th detected object
	OBJECT_Y	DATA[2,3]	INT16	cm	x-direction position of the i-th detected object
	OBJECT_Power	DATA[4,5]	UINT16		power of the i-th detected object
	RESERVED	DATA[6,7]	RESERVED		RESERVED

3. Notice

3.1 FCC

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.

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.

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

This device should be installed and operated with minimum 20 cm between the radiator and your body.

3.2 IC

This device contains licence-exempt transmitter(s)/receiver that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:(1) This device may not cause interference.(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:(1) Cet appareil ne doit pas provoquer d'interférences.(2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

This equipment should be installed and operated with minimum 20 cm between the radiator and your body.

Cet appareil doit être installé et utilisé avec un minimum de 20 cm entre le radiateur et votre corps.