SingularXYZ

SAGRO10

GNSS Guidance System

User Manual

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Corporate Office

SingularXYZ Intelligent Technology Ltd.

Address: Floor 2, Building A, No. 599 Gaojing Road, 201702 Shanghai, China

Tel: +86-21-60835489

Fax: +86-21-60835497

Website: https://www.singularxyz.com

E-mail: singularxyz@singularxyz.com

Technical Assistant

If you have any questions that can't be solved in this manual, please contact your local SingularXYZ distribution partner. Alternatively, request technical support from SingularXYZ Intelligent Technology Ltd.

Support Email: support@singularxyz.com
Support Skype: Support.SingularXYZ

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Chapter 1 Introduction

1.1 Overview

The SAgro10 guidance system consists of a tablet integrated with a high-precision GNSS module, a geodetic antenna and the guidance software that can intelligently manage the working field and simplify the operation of users, including the recording of the completed work area, the planning and navigation of the work route, etc., which greatly reduces manual mistakes and improves work efficiency. It can be widely used for sowing, cultivating, trenching, ridging, spraying pesticide, transplanting, land consolidation, harvesting and other work scenarios.

The SAgro10 guidance system is compatible with most agricultural tractors, and all components can be easily installed within 20 minutes. Moreover, the SAgro10 guidance system can be easily upgraded to an auto-steering system. On the basis of keeping all components unchanged, only need to add a SEM1(SingularXYZ Electric Motor) to the SAgro10 guidance system to easily upgrade it to auto-steering system, freeing users' hands and improving work efficiency.

This manual will introduce how to install and how to use the SAgro10 guidance system.

1.2 System Composition

The SAgro10 guidance system mainly includes one T10 Control Tablet and one SA100 GNSS antenna. The detailed packing list is shown in the table below.

Table 1: Packing list of SAgro10 automated steering system

No.	Name	Quantity	Figure
1	T10 Tablet	1	
2	SA100 GNSS Antenna	1	
3	Main Transmission Cable	1	
4	Power Cable	1	

5	GNSS Antenna Cable	1	
6	RAM Bracket	1	
7	Antenna Bracket	1	
8	Accessories	1	
9	4G Antenna	1	

Chapter 2 Equipment Assembly

This chapter introduces how to install the SAgro10 system.

2.1 Antenna Installation

When installing the SA100 GNSS antenna, it needs to be installed on the centerline on the top of the tractor.

Figure 2.1 Antenna installation-1

The SA100 GNSS antenna should be connected to the GNSS connector (ANT1) on the back of the T10 tablet via a GNSS antenna cable.

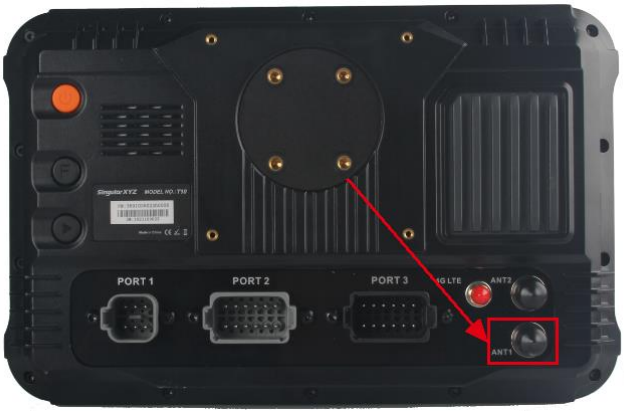


Figure 2.2 Antenna installation-2

2.2 Tablet Installation

The T10 tablet should be installed in the driver cab of the tractor on the RAM bracket, which is shown as

below.

Figure 2.3 Tablet installation-1

Figure 2.4 Tablet installation-2

2.3 Cable Installation

The cable connection is shown in the figures below.

Figure 2.5 Cable installation

1. The 4G antenna is connected to the 4G connector on the right side of the T10 tablet back.

2. The main transmission cable should be connected to PORT 2 on the back of the T10 tablet.

Figure 2.6 Main transmission cable

3. The power cable are connected to the main transmission cable, which has Power label on it.

4. The power supply cable should connect to the vehicle battery. (Support both 12V and 24V)

Chapter 3 System Operations

3.1 Main Interface

For the SAgro10 guidance software, there are 3 main interfaces including Start Job, Job List and Setup interface.

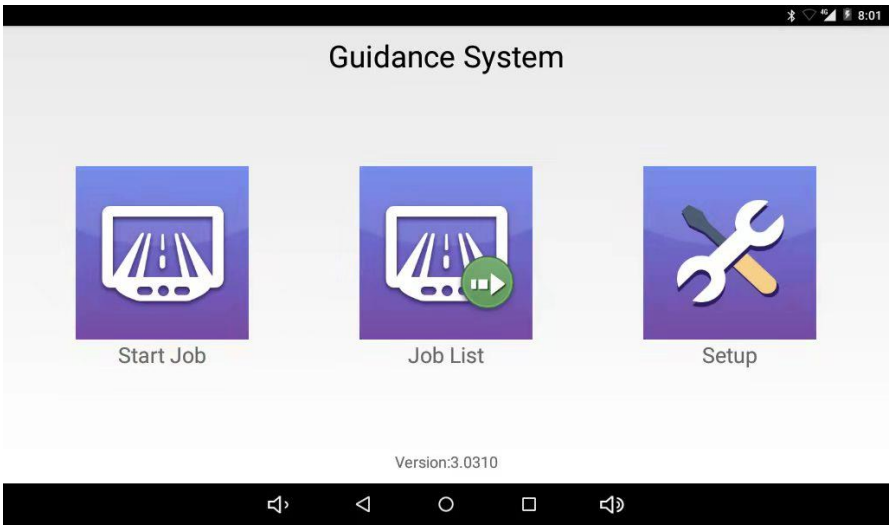


Figure 3.1 Main interface

3.2 Setup Interface

Before starting the guidance task, please setup the related settings first.

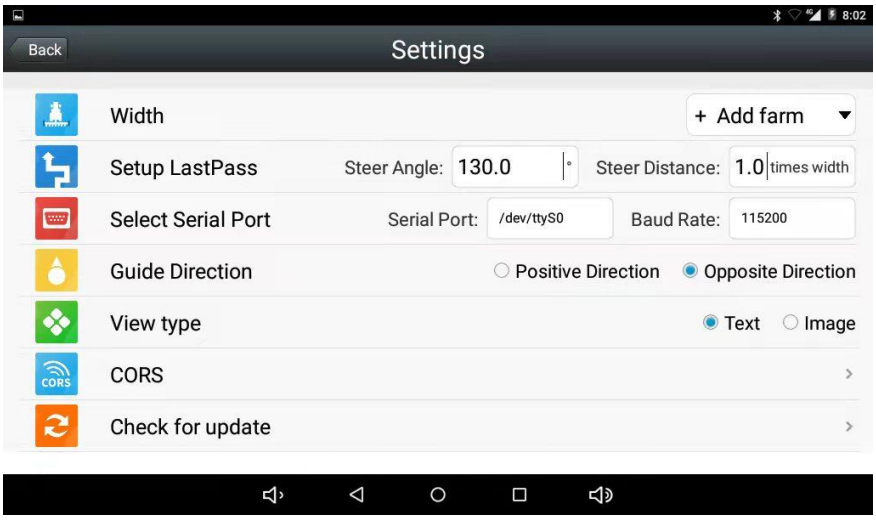


Figure 3.2 Setup interface

1. Width 

Click to add or delete farm tools, including the width and joint width setting.

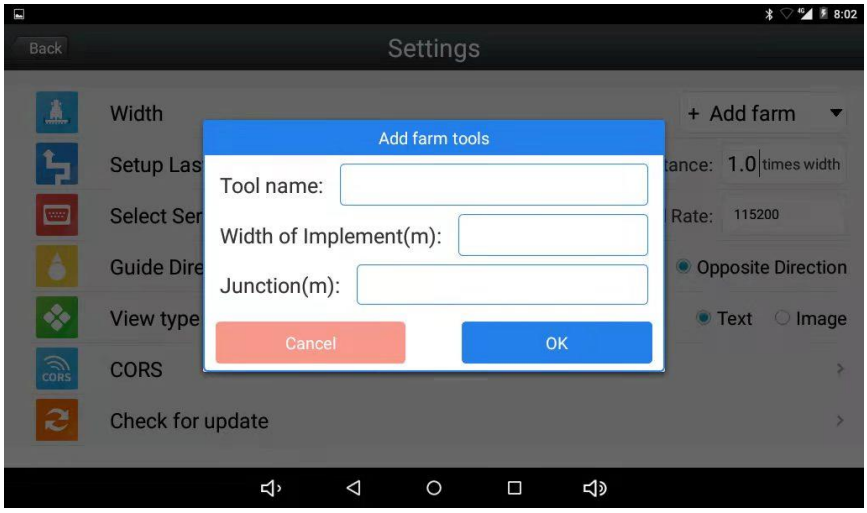
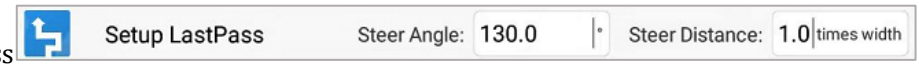


Figure 3.3 Add farm tools

2. LastPass 

Parameters of "LastPass" redirection, please keep the default parameters.

3. Guide Direction 

Set whether the guide arrow in **Start Job** interface is points to the heading direction or deviates from the direction.

4. View Type 

Set the menu display of **Start Job** interface.

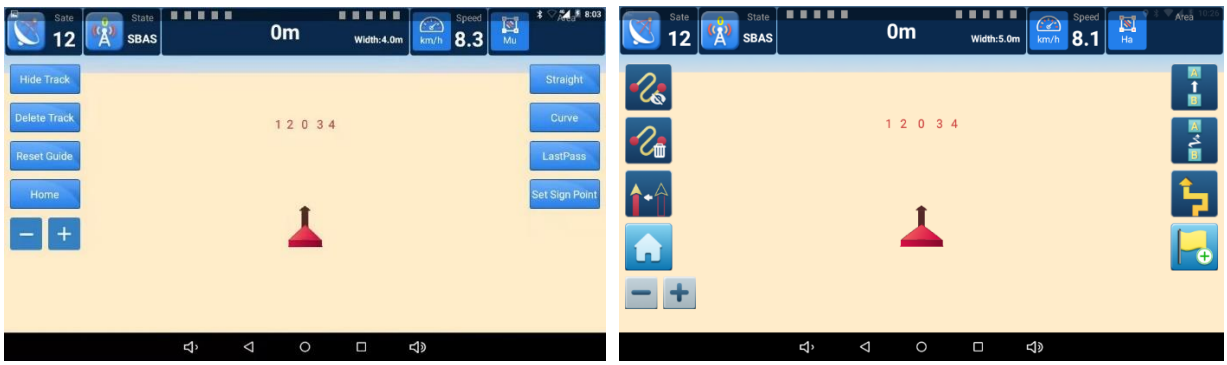


Figure 3.4 View type (Left: Text; Right: Image)

5. CORS 

Set the CORS account, including the IP, port, mountpoint, username and passwords.

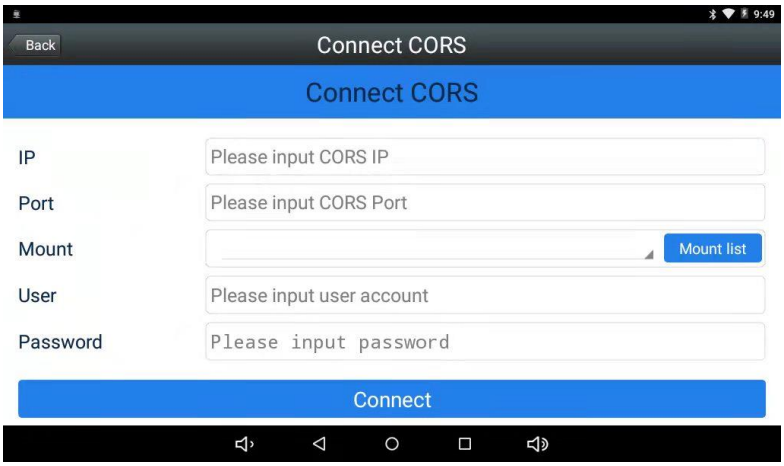


Figure 3.5 CORS setting interface

3.3 Start Job Interface

After configuration setup, users can conduct the guidance task in Start Job interface, which is shown in the figure below.

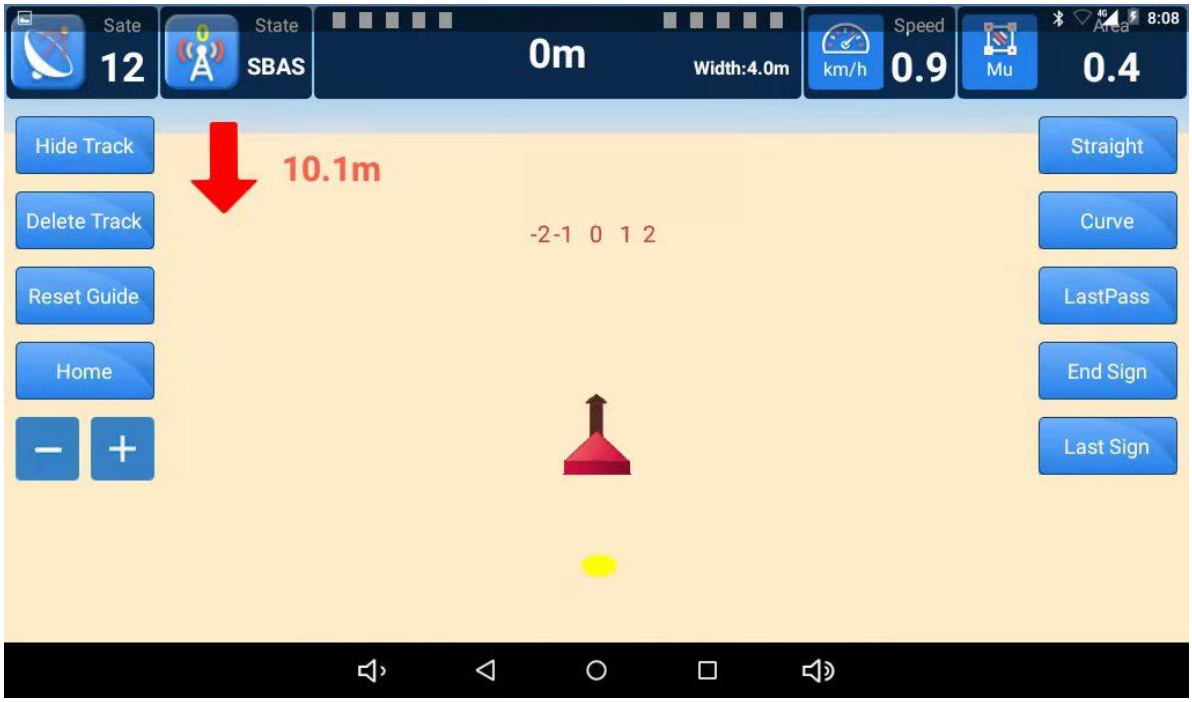


Figure 3.6 Job start interface

3.3.1 Top Status Bar

1. 

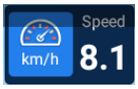
Number of tracking satellites.

2. 

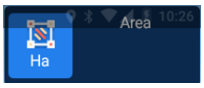
Differential Status, including SBAS, RTK or Smooth during normal operation.

3. 

Deviation distance (unit: meter) in the middle, width setting on the right side.

4. 

Current speed of the tractor (unit: km/h).

5. 

Area of completed operation.

3.3.2 Left Toolbar

1. 
Hide track: Click to hide/show the tractor track.

2. 
Delete track: Click to delete current track.

3. 
Reset track: Click to reset the AB line at the current tractor location.

4. 
Home: Click to return main interface.

5. 
Click to zoom in and zoom out the operating interface.

3.3.3 Operation buttons

On the right side of Start Job interface, you can select work modes and start job.

1. 

Straight line work mode, including AB line and ABC line.

1) AB line: Click Set A and Set B in turn to set point A and B, the straight guidance lines will be generated based on AB two points.

Figure 3.7 AB line

2) ABC line: After setting AB line, click Set C when the tractor reaches the boundary. The boundary will be generated based on point C.

Figure 3.8 ABC line

2.  AB Curve work mode.

Click Set A and Set B in turn to set point A and B, the guidance curve will be generated according to the trajectory between points AB.

Figure 3.9 AB curve

3.  Last Pass: Generate the AB line for the next trip according to the trajectory of the previous trip.

4.  Set Sign Point: Guide the user toward the guidance point according to the set guidance point.

Figure 3.10et Sign Point

3.4 Job List Interface

All guidance job information of is saved in the job list interface

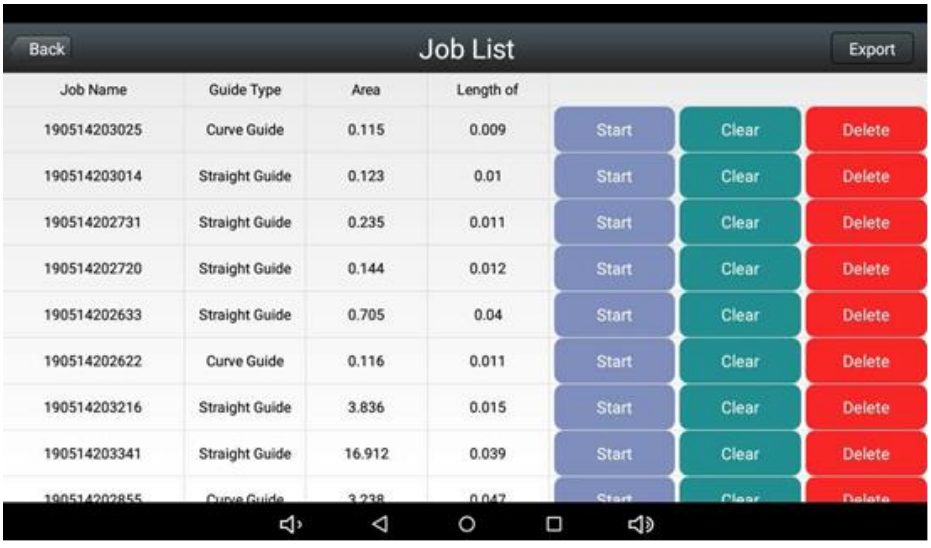


Figure 3.11 Job list interface

3.5 Work Flow

After system installation, you can start your work tasks according to the following steps.

3.5.1 System Setting

Set the farm tools and the width in **Setup** >> **Width**, refer to **chapter 3.2 – 1**.

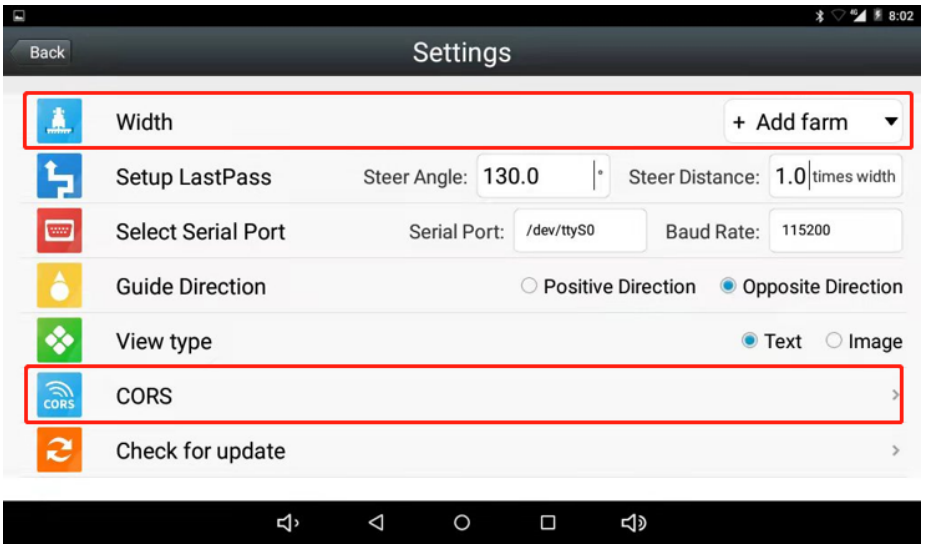


Figure 3.12 Setup interface

Note:

*The default GNSS navigation mode is single-point smooth positioning. If you have additional requirements for higher positioning accuracy, the **RTK** positioning mode is also available in SAgro10 system.*

*Go to **Setup** interface, connect to the **CORS** by entering and applying your CORS account, the detailed instructions please refer to **chapter 3.2 – 5**.*

3.5.2 Create A New Task

After configuration, go to **Start Job** interface and select your working mode on the right side, which includes Straight line, Curve, Last Path and Set sign point 4 modes. The detailed instructions about each work mode please refer to **chapter 3.3.3**.

The prompt box for creating a new job will pop up after selecting the work mode, as shown in Figure 3.13. You can start your navigation task after creating tasks.

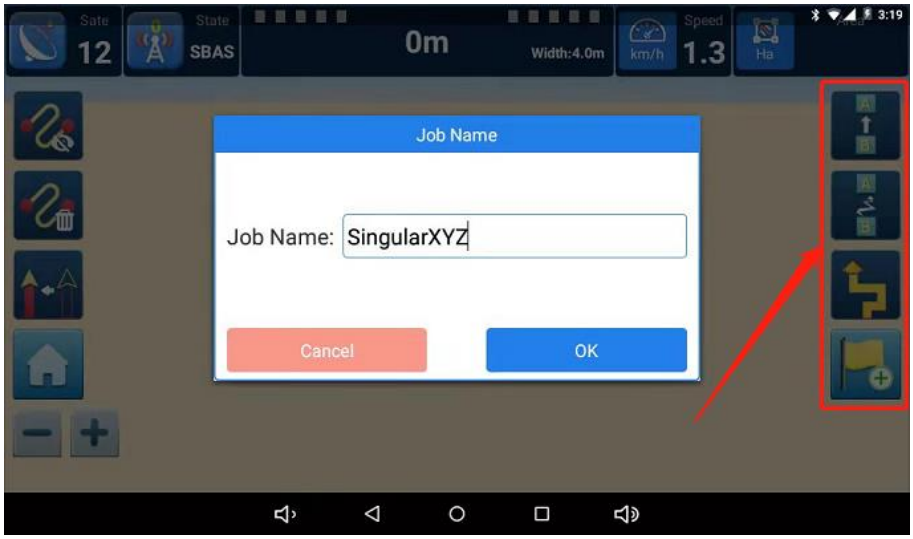


Figure 3.13 Create a new job

Chapter 4 Appendix

4.1 Datasheet

4.1.1 T10 GNSS Tablet

Table 2: T10 Datasheet

System	
Operation System	Android 6.0
CPU	Quad-Core 1.5GHZ
RAM	2GB
ROM	16GB
Flash	T flash, up to 64GB
Display	
LCD	10.1" HD
Brightness	750Nits, sunlight readable
Resolution	1024×600 pixels
Touch Panel	Capacitive screen
GNSS Specifications	
GPS	L1, L2
GLONASS	L1, L2
BDS	B1, B2
Galileo	E1, E5b
QZSS	L1, L5
SBAS	WAAS, EGNOS, MSAS, GAGAN
RTK Accuracy	H: 10mm+1ppm, V: 15mm+1ppm
Heading Accuracy	0.1°
Timing Accuracy	20ns
Velocity Accuracy	0.03m/s
Data Format	RTCM 2.3/3.0/3.2, NMEA0183
Data Update Rate	Maximum 20Hz
Electrical & Physical	

Input voltage	9-36 VDC
Power consumption	≤4.5W
Size	281×181×42mm
Weight	1.5 Kg
Environmental	
Waterproof & dustproof	IP65
Shock	Designed to survive a 2m drop onto concrete
Operating temperature	-20 °C to + 70 °C (-4 °F to 158 °F)
Storage temperature	-40 °C to + 85 °C (-40 °F to 185 °F)
Humidity	100% non-condensing

4.1.2 SA100 GNSS Antenna

Table 3: SA100 GNSS Antenna

Signal Tracking	
GPS	L1, L2, L5
GLONASS	L1, L2
BeiDou	B1, B2, B3
Galileo	E1, E5a/E5b, AltBoc
SBAS	+
L-Band	+
LNA	
Impedance	50 Ohm
Polarization	RHCP
Axial Ratio	⩽3dB
Azimuth Coverage	360°
Gain at Zenith	5.5dBi
Phase Center Accuracy	±2mm
LNA Gain	40dB
Noise Figure	⩽2dB
VSWR Output	⩽2.0
Operation Voltage	3 - 18VDC

Operation Current	⩽45mA
Ripple	±1dB
Group Delay	<5ns
Physical	
Dimension	Φ152x62.2mm
Connector	TNC Female
Weight	374g
Mounting Configuration	5/8"x 11 Threaded
Environmental	
Operating Temperature	-40℃ to +85℃
Environmentally Sealed Type	IP67
Humidity	95% No-condensing