Specifications

1. Overall

Type	Pulse compression radar (Solid State Radar)
Transmitting frequency	13.65 GHz, 13.75 GHz, 13.85 GHz, 13.95 GHz
Pulse width	0.1μs to 12.2μs

2. Antenna and Turning Unit

Type	Slotted array	
Antenna Length	18ft	9ft
Polarization	Horizontal Polarization	
Antenna gain	≧36dBi	≧30dBi
Rotation speed	10rpm	18rpm
Beam-width(-3dB)		
Horizontal	0.25°	0.5°
Vertical	15°	20°
Azimuth side-lobe levels	≦-23dB	
Weight	≦275kg	≦230kg
Height x Length x Depth	860 x 5750 x 1200mm	840 x 3,360 x 530mm
Swinging radius	5,800mm	3,400mm
Power Supply	3φ AC 200 - 240V 50/60Hz	
Temperature	-10°C to 50°C:(Operational), -25°C to 70°C:(Storage)	
Humidity	40%RH to 90%RH	
Wind Resistance	40m/s, 144km/h:(Operational), 60m/s, 216km/h:(Survival)	

3. Transceiver Unit

Type	Solid State Power Amplifier-SSPA
Output peak power	200W (Optional)
Pulse compression ratio	up to 29dB (794:1)
Clutter suppression and discrimination	STC, CFAR, Combination of pulse Doppler processing
Minimum detection level	≦-96dBm, before pulse compression
Weight	≦70kg (Single System)
Height x Length x Depth	700x600x300mm
Power supply	1φ AC 100 - 240V, 50/60Hz
Radio spectrum	
Unwanted emissions in the out-of band domain	ITU-R SM.1541-3
Unwanted emissions in the spurious domain	ITU-R SM.329-11
Temperature	Operational:0°C to 40°C
	Storage:-25°C to 70°C
Humidity	40%RH to 90%RH

4. Interface

Signal output	Analog video, IP(Asterisk, Optional)

Design and specifications are subject to change without prior notice, and without any obligation on the part of the manufacturer.

CAUTION Before operating this equipment, you should first thoroughly read the operator's manual.

TOKYO KEIKI INC.

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TOKYO KEIKI

SeaKu

SeaKu-1400

Ku Band Solid State Radar Systems for
VTS and Coastal Surveillance

PIONEERING RADAR TECHNOLOGY

TOKYO KEIKI INC.

Tokyo Keiki introduces new standard of Ku Band (13.65 to 13.95 GHz) solid state radar (SSR) systems that greatly enhance resolution and target detection in radar systems utilized in advanced VTS and coastal surveillance systems. The exceptional performance and features of Tokyo Keiki's Ku Band radar systems greatly expand the limitations of conventional X Band radar systems.

Missions enhanced with Tokyo Keiki Ku Band solid state radar systems:

- VTS(Vessel Traffic Service)
- Coastal Surveillance
- Oil & Gas Offshore Infrastructure
- Critical Infrastructure and Asset Protection
- Ocean Resource Development Infrastructure
- Port Management
- Border and Homeland Security
- Search and Rescue

The Possibilities of Ultra High Definition

The Ku Band SSR systems with enhanced ability to detect very small objects will increase target detection and resolution to a much higher level. Compared to conventional X Band radar systems, Ku Band with high gain and narrower horizontal beamwidth antennas will achieve much higher detection and resolutions.

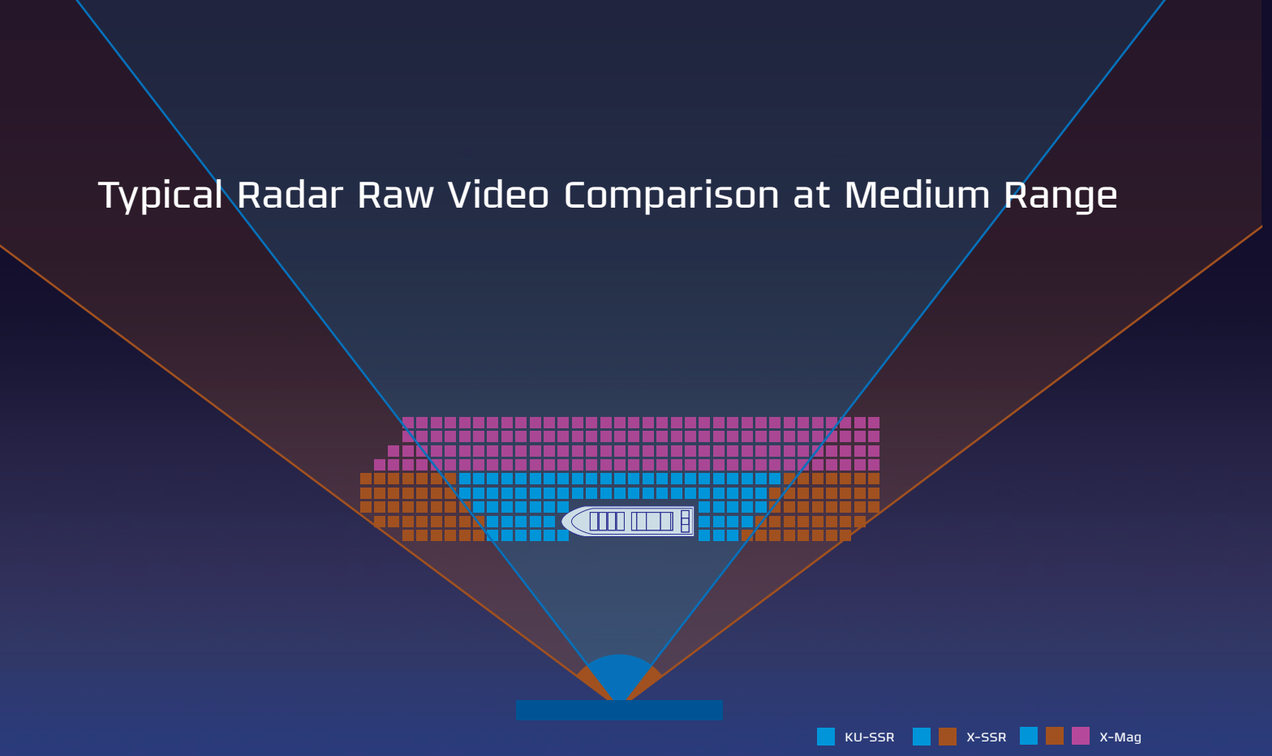
Radar Investment Efficiency

Ku Band high gain antennas provide 1.48 times better azimuth resolution compared to conventional X Band antennas of the same size. Ku Band antennas effectively address the critical requirements and limitations of the radar site. It provides much improved target resolution at medium range. This will be an overall better and more efficient investment.

Superior Performance in Bad Weather

Higher frequency radars are generally more sensitive to clutter and attenuation. Tokyo Keiki's proprietary signal processing technologies (Doppler processing, Digital STC, FTC, etc.) suppresses sea clutter even under extreme weather conditions like typhoon season in the Pacific.

Typical Radar Raw Video Comparison at Medium Range



Tokyo Keiki Ku Band SSR systems' superior detection capabilities and higher resolutions are designed to satisfy the critical requirements of advanced monitoring and surveillance missions.

The capabilities and performance of the high azimuth resolution and high gain Ku Band antennas are superior to conventional X Band radars. The differences in detection and resolution are more remarkable at greater distances.

Optimized to provide sharper pulse waveforms and sophisticated signal processing technology, the Tokyo Keiki SSR systems provide improved range resolutions compared to Magnetron-based systems.

Benefits

Antenna
- High gain Ku Band antenna
- Antenna length efficiencies
- Maintenance free (lubrication not required)

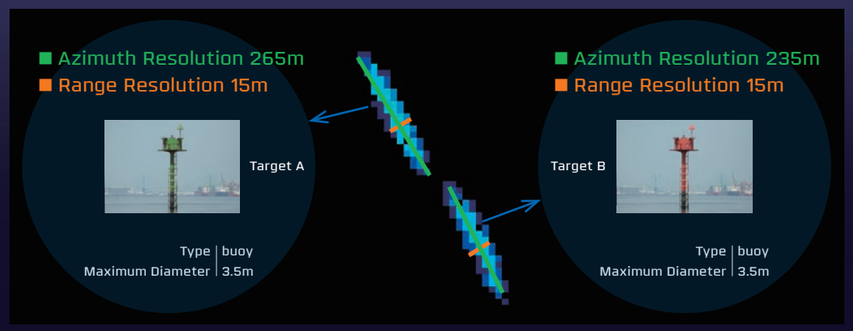
Transceiver
- Tokyo Keiki-designed solid state power amplifiers
- High Power and Robust Ku Band transceivers
- Single and dual system (for redundancy)
- Maintenance free (no magnetron)

Signal Processing
- Combination of pulse-Doppler and clutter removal processing to suppress sea clutter, rain clutter and other interference
- STC, FTC adjustments

Interface
- Analog video, IP (Asterisk, Optional)

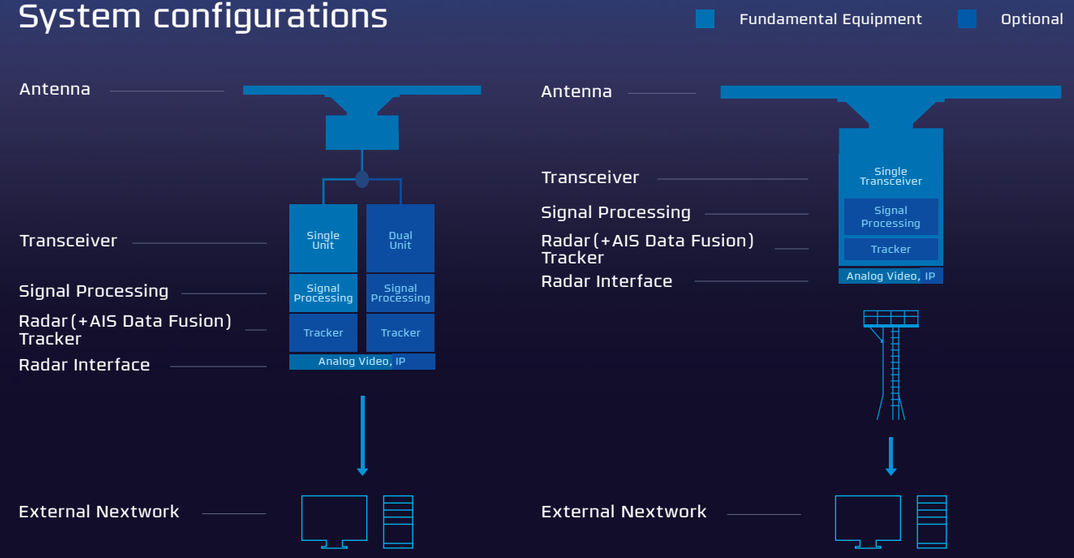
Radar Raw Video Demonstrating High Resolution

Discrimination of targets 350m apart at 32km



This radar raw video of two buoys 350 meters apart at 32 kilometers distance demonstrates the high detection as well as high azimuth and range resolution capabilities of our Ku Band system, utilizing an 18ft antenna and 350W (pulse compression rate:19dB) solid state transceiver.

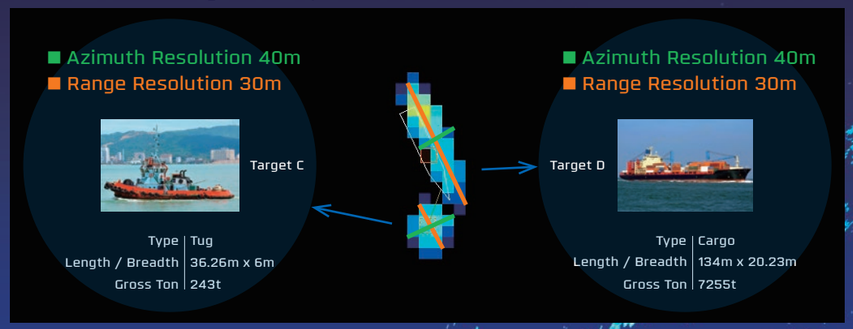
System configurations



Ku Band SSR Raw Video Examples (Distance:Radar Site to Target)

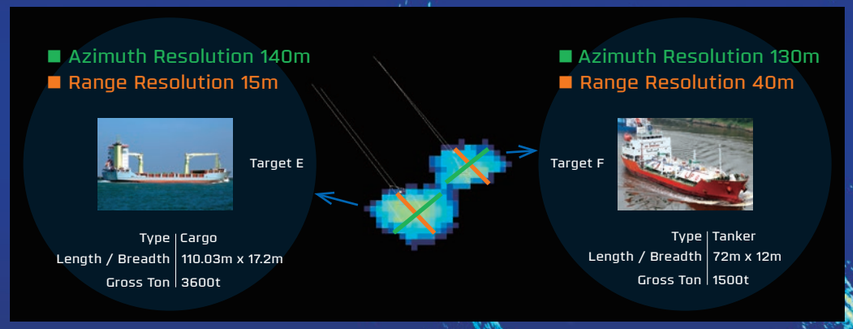
1km Point

Discrimination of targets 15m apart at 1km



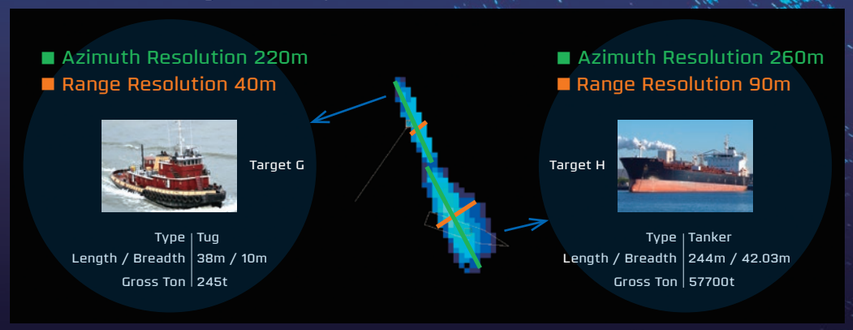
15km Point

Discrimination of targets 140m apart at 15km



30km Point

Discrimination of targets 270m apart at 30km

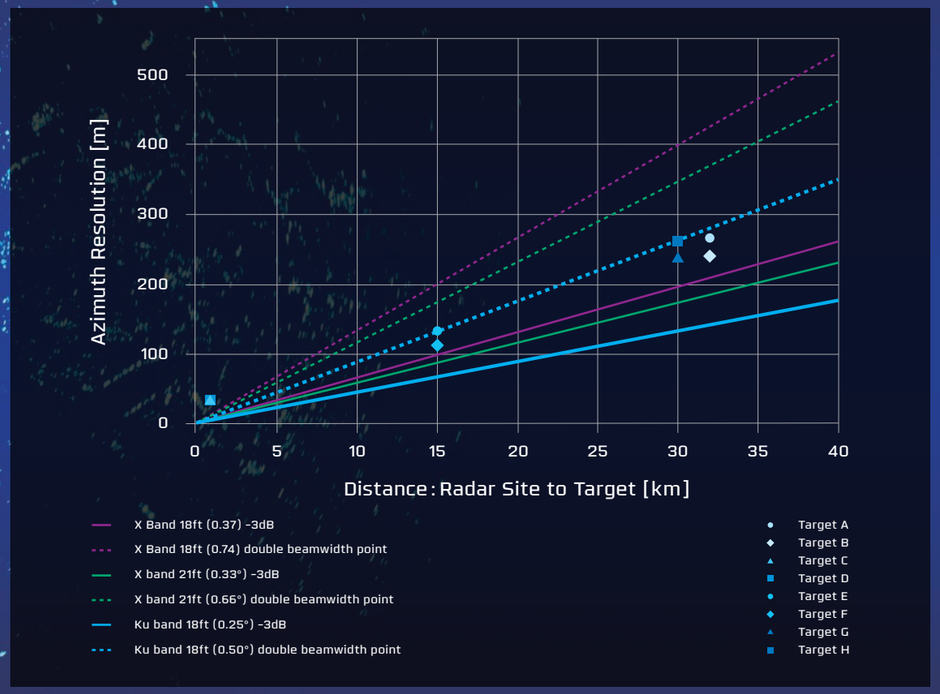


Metrological Info			
Weather	Sea state	Temperature / Humidity	Wind
Fine	1	27.8°C / 76%	3.6m/s or 6.99 knot

Graph of Typical Ku Band SSR Field Performance and Analysis

	18ft Ku Band radar (SeaKu-1400)	18ft X Band radar (COMPANY A)	21ft X Band radar (COMPANY B)
Horizontal Beamwidth -3dB point	0.25	0.37	0.32

The longer the antenna and higher the frequency, the sharper the horizontal beamwidth and the better the azimuth resolution.



The azimuth resolution performance table of Ku Band radar with 18ft antenna and X Band radar with 18ft and 21ft antenna is shown in this graph. It describes azimuth resolution performance by distance. The lower the number, the better the azimuth resolution which means more precise target detection.

Generally, azimuth resolution of radar raw video is described as its typical performance between the value of the horizontal beam pattern (-3dB point) and double the beamwidth.

As indicated in the raw video examples and graph, the Ku Band SSR systems' superiority in azimuth resolution as well as distance resolution has been demonstrated and verified in actual field performance.

Ku Band radar high resolution capabilities enable discrimination of vessels and objects in congested areas and at longer distances, significantly improving mission performance.