



INNOVATIVE COMMUNICATION SOLUTIONS

TRANSPORTATION COMMUNICATION SOLUTIONS

SINCLAIR[®]
Superior then, Superior now.

A Division Of



Norsat
International Inc.



THE SINCLAIR STANDARD

Sinclair Technologies is Norsat International's RF antenna and conditioning products solutions division. Sinclair is a designer and manufacturer of antennas and RF conditioning products such as filters, receiver multicouplers, combiners, tower top amplifiers and accessories. Sinclair's Systems Engineering Group offers customers unique and project specific designs.

Sinclair products are available from low band into the GHz ranges. Sinclair's industry leading designs set the standard for quality, innovation and durability.

Sinclair sets industry performance standards based on the following cornerstones:

- > A Broad Range of Products in the low Bands, VHF, UHF, and up to 6000 MHz Bands
- > Providing technical assistance to help our customers select the right products
- > Ability to customize products fast to satisfy our customer's unique requirements

EXPERIENCE IN THE TRANSPORTATION INDUSTRY

Sinclair Technologies was founded in 1951 and has maintained its leadership position in the telecommunications industry with a commitment to product innovation through an ongoing investment in R&D. Our antenna and wireless RF products are used in every area of transportation globally.

Automotive and Heavy Transportation Solutions - Our extensive line of automotive antennas range from covert, low profile models to versatile units to connect your entire transport fleet. The SM Series antennas have been deployed successfully in massive urban transit companies.

Rail Solutions - Sinclair's rail antennas are built to operate in extreme conditions like harsh weather, high-speed travel and vibration. Sinclair is the inventor of the Excaliber model of rail antennas which are recognized as the standard component for railway communications worldwide. We've maintained a dominant position by supplying the ST Series antennas in large-scale railway communication systems worldwide.

Aviation Solutions - For your aviation requirements, we have developed a line of rugged and durable collinear, dipole and base station antennas, as well as combining and multicoupling solutions.



This multi-band, multi-port transport antenna platform is designed to provide the full access to multiple wireless networks simultaneously. The SM2601D comes with 5 ports, one for PTC band, one for GNSS, one for WiFi and two broadband ports for 694-2700 MHz full band. They feature a low profile and unobtrusive black housing that is perfect for mounting to a typical metal vehicle rooftop with minimal visual impact.

KEY FEATURES

- > **Broadband/Multi-Band**
From VHF throughout to 6000 MHz
- > **Durable**
Heavy duty base plate equipped with a weather resistant and fire tested radome
- > **Easy Installation**
A single side/bottom exit point to avoid multiple access holes
- > **Low Profile**
Fits tight height constraints on vehicles & other applications

MULTIPLE SERVICES

- > PTC
- > LTE
- > WiFi/WiMax
- > LMR
- > Cellular Services
- > GPS, GNSS



CUSTOMIZABLE OPTIONS

- > Combinations of PTC, GNSS, cellular, WiFi/WiMax, GPS elements are available
- > Bottom or side port exit options for ease of installation
- > 220 MHz or 256 MHz frequencies for PTC
- > Dual 694-2700 MHz elements for diversity, LTE MIMO or different radios
- > Expandable to support additional radio systems using Sinclair's combining solutions
- > Custom feed cable lengths and connectors are available

- The two broadband ports have identical broadband radiation element, which can be used for diversity or MIMO purpose. They can also be used for different radios providing maximal flexibility for a multiple radio system.
- It can also be expanded for multiple uses quickly without interference with the existing service.
- The PTC port covers 219-223MHz. WiFi port covers 2400-6000MHz full band applicable for various WiFi systems. The GNSS module features a high-gain low noise amplifier and a saw filter, and it supports GPS, Galileo, GLONASS, and Beidou.

SM300, SM600 & SM700

The compact and low profile broadband SM300, SM600 and SM700 are ideal for vehicle roof-top mounting, covers all the bands for 2G, 2.5G, 3G and 4G cellular, LTE 700 MHz and LTE 2600 MHz, as well as ISM, GPS, WLAN, and broadband internet access. The SM300 covers additional UHF bands for TETRA, NMT 450, TV and DVB applications and SM700 extends the band coverage to 6000 MHz. They are designed to withstand harsh environments and constant vibration without compromising performance.



KEY FEATURES

- > **Broadband/Multi-Band**
Covers the full frequency band from 350 MHz to 2700 MHz (SM300), 694 MHz to 2700 MHz (SM600) or 6000 MHz (SM700)
- > **Extremely Low Profile**
Ideal for vehicle roof-top mounting with a 1.95 - 3.3" white radome
- > **Easy Installation**
One single 3/4" mounting plate (For the SM600 & SM700 only)
No ground plane required for SM700
- > **Durable**
Excellent design for waterproofing and vibration
Adaptive to curve surfaces (For the SM600 and SM700 only)

CUSTOMIZABLE OPTIONS

- > Various connector options
- > GPS option for the SM300 and SM600

| Models | SM300 | SM600 | SM700 |
|------------------|-----------------|-----------------|-----------------|
| Frequency Range | 350 to 2700 MHz | 694 to 2700 MHz | 694 to 6000 MHz |
| Height | 3.3 in | 1.95 in | 2.6 in |
| Overall Diameter | 9.75 in | 5.75 in | 6.3 in |
| Weight | 2.75 lbs | 0.85 lbs | 1.35 lbs |
| Ground Plane | 24x24 in | 14x14 in | Not Required |

STEALTHWAVE COVERT ANTENNA

Sinclair's StealthWave SHAx11 covert antennas, are designed for covert operations of any kind, such as law enforcement vehicles. StealthWave antennas feature a unique modular design that integrates all the components into a compact waterproof housing, making it possible to install the antenna with minor modifications to the vehicle. A fine-tuning adjustment permits performance optimization during installation. StealthWave series antennas are extensively used and perform well in various applications. Available in VHF, UHF and 700 to 800 MHz ranges.



KEY FEATURES

- > **Low Profile**
Completely hidden, independent to any existing vehicle antennas
- > **Easy Installation**
Easy installation and tuning for optimum performance and durability
- > **Many Applications**
Applicable for both covert and overt law enforcement vehicles, military and non-covert commercial transportation systems etc.
- > **Field Tunable**

CUSTOMIZABLE OPTIONS

- > N male, UHF male and mini UHF male connector options
- > Single or dual configuration
- > Can be adapted to various types of vehicles

| Models | SHA211 | SHA311 | SHA411 |
|-------------------------|----------------------------|----------------------------|----------------------------|
| Frequency Range | 138 to 174 MHz | 380 to 512 MHz | 746 to 869 MHz |
| Bandwidth (Typical) | 3 to 6 MHz | 20 to 50 MHz | 40 to 70 MHz |
| Average Power Input (W) | 150 (single) or 300 (dual) | 150 (single) or 300 (dual) | 150 (single) or 300 (dual) |
| Dimensions (inches) | 2(d)x22(h)x3(l) | 2(d)x19.5(h)x3(l) | 2(d)x10.5(h)x3(l) |

ST221, ST221-LP & ST321

Excaliber ST221 and ST321 series of low profile VHF antennas have become the North American standard antenna for railroad locomotive service. They are designed for a wide range of mobile transportation applications such as trains, taxis, police cars, emergency vehicles, buses and trucks. The rugged cast aluminum design ensures consistent dependable performance, relatively inconspicuous appearance and is resistant to damage.



KEY FEATURES

- > **Low profile**
As low as 2.5 inches and suitable for a wide range of compact mobile transportation applications
- > **Durable**
Made from cast aluminum which is resistant to damage under extreme weather conditions

CUSTOMIZABLE OPTIONS

- > N-Female or UHF-Female connector option
- > Extremely low profile option

| Models | ST221 | | ST221-LP | ST321 |
|-----------------|----------------|----------------|------------------|----------------|
| Frequency Range | 138 to 174 MHz | 217 to 223 MHz | 159.5 to 225 MHz | 380 to 520 MHz |
| Bandwidth | 2.5 MHz | 6 MHz | 2 MHz | 15 to 20 MHz |
| Height | 4 in | 4 in | 2.5 in | 2.5 in |
| Weight | 7 lbs | 6.3 lbs | 3.9 lbs | 3 lbs |

ST221R, ST321R, ST421R



Excaliber ST221R, ST321R and ST421R are rugged radome-enclosed antennas specifically designed for rail and heavy transport applications. The ST421R covers both the public GSM and railway GSM-R frequency bands. The ST221R and the ST321R cover VHF and UHF bands respectively. The low profile makes them ideal for train use where antenna height is limited.



KEY FEATURES

- > Low profile
- > Suitable for both fixed and mobile installations
- > Proven performance in harsh environments

CUSTOMIZABLE OPTIONS

- > N-Female or UHF-Female connector option
- > Fire retardant radome option

| Models | ST221R | ST321R | ST421R |
|-----------------|----------------|----------------|----------------|
| Frequency Range | 132 to 174 MHz | 380 to 512 MHz | 764 to 960 MHz |
| Bandwidth | 1, 1.3, 2 MHz | 14 to 20 MHz | 42, 64, 90 MHz |
| Height | 4.8 in | 3 in | 2.1 in |
| Weight | 3 lbs | 5 lbs | 2.5 lbs |

COMPACT DUPLEXER

The MRx54 and MRx56 series are compact mobile duplexers for use in the VHF, UHF and 800-900 MHz frequency bands. They utilize four or six rugged, temperature-compensated resonators housed in a lightweight, aluminum extrusion. Their size and versatility make them an ideal unit for use where space is limited. Original equipment manufacturers of bi-directional amplifiers and coverage extenders find these products simple to integrate into their product.

The MR2222, MR2332 and MR3332 series are the extreme compact mobile duplexers in VHF and UHF frequency bands, suitable for the situations where space is very limited. Their depth can be as small as 4 inches.



KEY FEATURES

- > Rugged, temperature compensated resonators
- > Lightweight but durable aluminum extrusion enclosure
- > 50 Watts with up to 80 dB Tx to Rx isolation
- > Compact in size, suitable for restricted spaces

CUSTOMIZABLE OPTIONS

- > BNC-Female or N-Female connector options
- > 4 or 6 cavity configurations
- > Field tunable within the sub-band

| Models | MR2222 | MR2332 | MR3332 |
|-------------------------------------|---------------|----------------|---------------|
| Frequency Range (MHz) | 138 to 174 | 148 to 174 | 406 to 512 |
| No. of Cavities | 4 | 6 | 6 |
| Insertion loss (max) Tx to Ant (dB) | 1 to 1.5 | 1.5 to 1.8 | 1.5 |
| Isolation - Min (dB) | 50 | 70 | 65 |
| Dimension (Inch-DxHxL) | 4.06x1.31x4.3 | 4.06x1.31x6.25 | 4.75x1.3x6.25 |
| Weight (lbs) | 1.00 | 1.04 | 1.03 |



| Models | MR254 | MR256 | MR354 | MR356 |
|-------------------------------------|-------------|-------------|------------|------------|
| Frequency Range (MHz) | 138 to 174 | 138 to 174 | 380 to 512 | 350 to 512 |
| No. of Cavities | 4 | 6 | 4 | 6 |
| Insertion loss (max) Tx to Ant (dB) | 1.2 | 1.5 | 1 | 1.4 |
| Isolation - Min (dB) | 60 | 80 | 50 | 75 |
| Dimensions (Inch - DxHxL) | 7x1.31x4.13 | 7x1.31x6.26 | 9x1.3x4.1 | 9x1.3x6.25 |
| Weight (lbs) | 1.8 | 2.0 | 1.8 | 2.5 |

| Models | MR454 | MR456 |
|-------------------------------------|---------------|---------------|
| Frequency Range (MHz) | 806 to 960 | 746 to 960 |
| No. of Cavities | 4 | 6 |
| Insertion loss (max) Tx to Ant (dB) | 1 | 1 |
| Isolation - Min (dB) | 50 | 60 |
| Dimensions (Inch - DxHxL) | 5.75x1.25x4.1 | 5.8x1.31x6.25 |
| Weight | 1.6 lbs | 1.8 lbs |

FP161R-200 & FP220R-161



Sinclair's FPxxxRxxx-(C) series band pass / band reject lumped element filters are compact, making them convenient to be installed with other RF devices. These filters provide superior performance for channel isolation between close frequency bands. They can be used both for transportation vehicle and base station applications.



KEY FEATURES

- > Suitable for close frequency band signal isolation
- > Designed for panel surface mount
- > Compact construction with one N-male connector and one N-female connector
- > 100 Watts power handling capability

| Models | FP161R220/098-NMF | FP220R161/098-NMF |
|---------------------------------|--------------------------------|--------------------------------|
| Frequency Range - Pass Band | 160 to 162 MHz | 217 to 223 MHz |
| Frequency Range - Reject Band 1 | 217 to 223 MHz | 160 to 162 MHz |
| Frequency Range - Reject Band 2 | 88 to 108 MHz | 88 to 108 MHz |
| Bandwidth | 2 MHz | 6 MHz |
| Pass Band Insertion Loss - max | 0.7 dB | 0.7 dB |
| Rejection Level | 70 dB | 70 dB |
| Dimension (inches) | 0.96 (h) x 4.83 (l) x 1.45 (w) | 0.96 (h) x 4.83 (l) x 1.45 (w) |
| Weight | 0.2 lbs | 0.2 lbs |



Sinclair's line of antenna and filter products for the transportation industry are the best in the business. Each antenna is highly configurable depending on the customer's requirements. Our engineering design team will work closely with you to ensure a perfect fit with your application.

Many of our antennas are low profile for discreet implementation and can fit into virtually any type of land mobile, transit or transport vehicles. These antennas are designed to withstand harsh outdoor conditions anywhere in the world ensuring there is no service interruption.

Ultimately, with over 60 years of transportation communications experience on a global scale, we have the product line and technical experience to keep your communications running smoothly.

FIELD SCENARIOS

> Bus/Streetcar

> Train Locomotives

> Subway Cars

> Bus/Train Stations

> Light Rail Transit





Sinclair remains committed to staying at the forefront of innovation by tailoring solutions that meet customer's specific needs.

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