

PORTABLE/TERMINAL ANTENNAS

MAIN APPLICATIONS & OPPORTUNITIES

Nearly half the commercial communications radios sold today are portables. With the installed base increasing at an extraordinary rate, the demand for replacement antennas is growing fast. Unlike mobile and base antennas, portable radio antennas are subject to a variety of abuses leading to premature failure. Antennas are twisted off, sat on, slammed in the door and used to pull the radios out of their holsters! The result is an average need for replacement every four years.

Portable radio antennas cover a broad range of applications including:

- Cellular/PCS fixed and telescoping masts
- LMR/SMR fixed, flexible rubber antennas
- Rigid, rotating, flexible and telescoping antennas for portable data terminals
- Various other communications and telemetry applications.

In addition, there are several antenna types to fit a specific radio. The type selected depends on exact customer requirements including:

- Radio model
- Connector type
- Frequency range
- Performance desired
- Size constraints
- Budget

A proper replacement can restore or improve radio performance. With a good understanding of portable radio antennas, a sales associate or technician can make the right choice the first time and assure a happy customer.

PORTABLE ANTENNA PERFORMANCE

Portable antennas must endure a tough environment of physical abuse and poor performance conditions. The portable radio provides a typically small ground plane. Performance characteristics are further complicated by proximity to the hand, head and body as well as variations in antenna polarization.

Portable antennas typically operate in a highly variable, uncontrolled environment of high multipath due to structures or use in or near an automobile. When used inside a vehicle, performance can be reduced by as much as 80 percent.

Actual electrical performance (resulting in improved clarity and longer talk distance) can vary significantly between antenna types. A good knowledge of these basic electrical types helps in the selection process.

A general rule of thumb for portable antenna performance is “longer is better.” Quarter wave whip antennas perform better than helical types. Half-wave antennas perform better than whips. “Short” antennas deliver the poorest electrical performance, but are often selected when physical size and durability are more important than absolute gain.

The best antenna performance is found in a ground plane independent, true center fed half wave dipole. The availability of different electrical types is dependent on frequency and connector types.



PORTABLE/TERMINAL ANTENNAS

The following chart summarizes performance, size and cost parameters for various antenna types.

ANTENNA PERFORMANCE CHART

Type	Bandwidth	Performance	Length	Connector	Frequency	Pricing
Helical Short	6%	Poor (**)	Short	All	VHF/UHF	\$\$
Helical	8%	Average (***)	Shorter	All	Low/Mid/VHF/UHF	\$\$
Helical Quarter Wave	12%	Good (***)	Longer	All except SMA	VHF	\$\$
Whip	12%	Good (***)	Mid	All	UHF+	\$
End Fed Half Wave	10%	Better (****)	Longer	Coxial	800+	\$\$\$
Half Wave Dipole	10%	Best (*****)	Longer	Coaxial	800+	\$\$\$\$
Wide Band	25%+	Good (***)	Longer	Coaxial	All	\$\$\$\$\$
Dual Band	2x8%	Average (***)	Mid	Coaxial	VHF/UHF	\$\$

Due to the high variability of use, measurements are difficult to make on portable antennas. All Larsen portable antenna designs are tested for gain and VSWR using a standard fixture for portable antennas. Gain measurements are determined based on range or chamber measurements. Performance ratings are determined using a VSWR standard of less than 2.0:1.

PORTABLE/TERMINAL ANTENNAS

PORTABLE ANTENNA ELECTRICAL TYPES



Quarter Wave Whip

Whip antennas are typically produced from a single piece of durable braided steel with a conductive coating for improved electrical performance. The Quarter Wave Whip is generally used for frequencies above 400 MHz due to the length required. Properties include broad banded (10 to 12 percent), simple and low priced. Gain performance is average.



End Fed Half Wave

End Fed Half Wave antennas utilize a micro matching circuit to allow a full half wave antenna design. The antenna can be a whip or helical depending on antenna size and performance objectives. End Fed Half Waves are typically available in frequencies above 800 MHz. These antennas provide higher performance with a 10 percent band width and improved gain over whip antennas.



Center Fed Dipole

The Center Fed Dipole is a true 1/2 wave dipole antenna, providing the highest gain performance in a portable antenna. The dipole, a ground plane independent design, is not hampered by the small mass of the portable radio.



Dual Band

Dual Band antennas feature two operating frequencies matching popular dual band radio types. Although dual band antennas do not offer maximum antenna performance, they do offer the convenience of multi-band operation with a single antenna.



PORTABLE/TERMINAL ANTENNAS

PORTABLE ANTENNA ELECTRICAL TYPES



Helical Quarter Wave

Helical antennas are produced using a coiled piece of wire coated with a conductive material. The pitch and diameter of the coil determines the overall antenna length. Helical designs are usually used in Low, Mid and VHF applications due to its shorter length. Helicals are more narrow banded than whips and deliver less gain.



Stealth Blade

Stealth Blade antennas utilize printed circuit technology. The ultra-slim design allows it to be mounted virtually anywhere without obstruction - in vehicles for voice and data, mobile computing or other mobile and portable terminal applications. The antenna is encased in adhesive-lined polyolefin tubing. This encapsulated tubing provides added strain relief at the coaxial connection.

PORTABLE/TERMINAL ANTENNAS

EXTERNAL CONSTRUCTION

Special characteristics of portable antennas include:

- Flexibility - Is the antenna more rigid or more flexible?
- Memory - When deflected, does the antenna return to a straight and upright position?
- Abrasion resistance - Is the cover material easily cut or scarred?
- Identification - Is the antenna easily identified by frequency application?

Portable antennas also come in a variety of construction types to meet customer preferences.

Molded Portable Antennas

The most popular construction type is the molded antenna. This is the style found on most commercial radios delivered today. Molded antennas offer attractive styling and extreme durability.

Most **SPOTS!** antennas are overmolded. Once the radiator is assembled, the complete electrical design is placed in a mold and injected under high pressure with a high-grade polyurethane compound. The result is a single, fused unit. The antenna is then tuned to frequency and capped with the trademarked **SPOTS!** color spot cap.

Some antennas are constructed with a molded sleeve design. In this case the sleeve is molded independently and glued over the radiator. Sleeve designs offer greater styling flexibility. Sleeving is required for antennas with micro-circuit networks. Generally, sleeve designs are considered less durable than overmolded antennas.

PVC Coated and Polyolefin Tube Antennas

Some antennas are constructed using a PVC dip or Polyolefin Shrink Tube cover construction. Generally these antenna types are produced for specialty products or low volume designs. The high flexibility of the process requires no special tooling so very short production runs can be made. Larsen's ExacTune Kulduckies® are hand-built, tuned to the exact customer specification and coated with a heavy-duty PVC cover. Kulduckies® will offer higher electric performance but a slightly lower durability than molded **SPOTS!** antennas.



PORTABLE/TERMINAL ANTENNAS

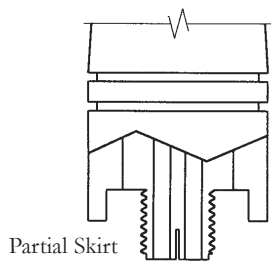
ANTENNA CONNECTORS

Antenna / radio interface is one of the greatest challenges for portable antenna applications. The interface is affected by the connector type as well as the mechanical or design features of the radio. For example, some radios have recessed antenna ports and other radios have antenna ports which fit into recessed antennas! We have identified 11 interface types referenced below by the **SPOTS!** connector codes:

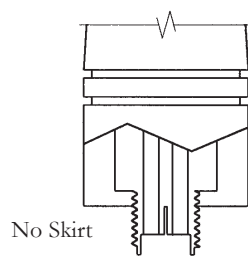
Types 10 and 14 are simple male stud antenna connectors.

Types 15 - 18 are TNC and BNC connectors. Each is available with the connector exposed or covered by the antenna cover.

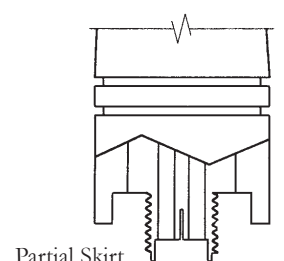
Types 20 - 24 are SMA-type connectors. SMA-types are generally the most confusing; we have included these technical drawings to take the “guess work” out of selecting the correct SMA-type connector.



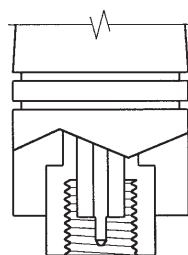
Flush Insulator
SMA FT1



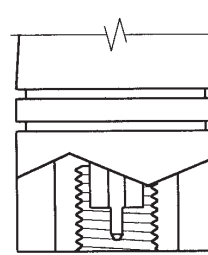
Recessed Insulator
SMA FT2



Recessed Insulator
SMA FT3



Extended Base
SMA MT1



Flush Base
SMA MT2

PORTABLE/TERMINAL ANTENNAS

PORTABLE ANTENNA STYLES

VHF (136 - 225 MHz)

1. Style: SPHL (136 - 221 MHz) Injection Molded
Approximate Length: 8"
Frequency Bands: See chart on Page 23
Connector Types: 10, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24
2. Style: SPHS (152-172 MHz) Injection Molded
Approximate Length: 4"
Frequency Bands: See chart on Page 23
Connector Types: 10, 21
Helical short
3. Style: KDVHF (136 - 174 MHz) or KDUHF (406-512 MHz) PVC "Dipped"
Approximate Length: 8"
Frequency Bands: Factory ExacTune™, specify frequency
Connectors: All standard Kulduckie® connectors
4. Style: KDFREQHQ (136-222 MHz) PVC "Dipped"
Approximate Length: 9 1/2"
Frequency Bands: Factory ExacTune™, specify frequency
Connectors: All standard Kulduckie® connectors.
Helical 1/4 wave
5. Style: SPWB (136 - 174 MHz) Injection Molded
Approximate Length: 7"
Connector Types: 21, 22
6. Style: "Q" (136 - 512 MHz) Stainless Steel
Approximate Length: 20" VHF
Frequency Bands: Field tunable from 136 - 512 MHz
Connectors: BNC, TNC, PL-259
1/4 wave



1



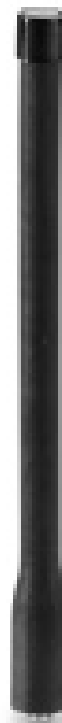
2



3



4



5



6

NOTE: Antennas are not to scale

1 800 ANTENNA



PORTABLE/TERMINAL ANTENNAS

PORTABLE ANTENNA STYLES

UHF (406 - 512 MHZ)

1. Style: SPHS (403 - 512 MHz) Injection Molded
Approximate Length: 3"
Frequency Bands: See chart on Page 23
Connector Types: 10, 15, 21, 22, 23
Helical short
2. Style: SPWH (400 - 512 MHz) Injection Molded
Approximate Length: 6"
Frequency Bands: See chart on Page 23
Connector Types: 10, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24
1/4 wave whip (broad band)
3. Style: KD FREQ (406 - 512 MHz) PVC "Dipped"
Approximate Length: 6"
Frequency Bands: Factory ExacTune™, specify frequency
Connectors - all standard Kulduckie® connectors.
1/4 wave whip
4. Style: KD FREQ HW (406-512 MHz)
PVC "Dipped"
Approximate Length: 16.5"
Frequency Bands: Factory ExacTune™, specify frequency
Connectors: BNC
1/2 wave whip
5. Style: SB (450 - 470 MHz)
Approximate Length: 10"
Frequency Bands: 450-470 MHz
Connectors: FME
Printed circuit dipole
6. Style: "Q" (136 - 512 MHz) Stainless Steel
Approximate Length: 7" UHF
Frequency Bands - Field tunable from 136 - 512 MHz
Connectors: BNC, TNC, PL259
1/4 wave whip



1



2



3



4



5



6

PORTABLE/TERMINAL ANTENNAS

PORTABLE ANTENNA STYLES

800 - 2500 MHZ TRUNKING, CELLULAR, PCS, DCS, GSM, ISM, DATA

1. Style: SPHS (806 - 960 MHz) Injection Molded
Approximate Length: 2.75"
Frequency Bands: 800 - 864, 872 - 954 MHz
Connector Types: 20, 21, 22, 23, 24
Helical short
2. Style: SPWH (806 - 960 MHz) Injection Molded
Approximate Length: 4"
Frequency Bands: 782 - 882, 863 - 974 MHz
Connector Types: 14, 20, 21, 22, 23, 24
1/4 wave whip (broad band)
3. Style: SPEN (806 - 960 MHz)
Approximate Length: 6.5"
Frequency Bands: 806 - 866 MHz
Connector Type: 14
End fed 1/2 wave
4. Style: SPDA (806 - 2400 MHz)
Approximate Length: 8"
Frequency Bands: 824-894, 890-960, 1710-1880, 1850-1990, 2400-2500 MHz
Connector Types: 17, 24. For reverse thread or reverse pin, contact factory.
Center Fed Dipole
5. Style: KD FREQ (806 - 960 MHz) PVC "Dipped"
Approximate Length: 4"
Frequency Bands: Factory ExacTune™, specify frequency
Connectors - All standard Kulduckie® connectors.
1/4 wave whip (broad band)
6. Style: SB (806 - 960 MHz)
Approximate Length: 5.2"
Frequency Bands: 806 - 896, 890 - 960 MHz
Connectors: FME, MPL, TNC, SMA
Printed circuit dipole
7. Style: SB (2400 - 2500 MHz)
Approximate Length: 2"
Frequency Bands: 2400 - 2500 MHz
Connectors: SMA, SMB, MMCX
Printed circuit dipole



NOTE: Antennas are not to scale

1 800 ANTENNA



KuL DUCKIE® ANTENNAS

EXACTUNE™ HIGH PERFORMANCE KUL DUCKIE® ANTENNAS

The Larsen KuL DUCKIE® (KD) is recognized around the world as the ultimate in high-performance portable antennas! Each antenna is constructed of superior conductive materials and hand-tuned to the frequency specified by the customer. Each portable antenna is tuned to frequency using a mechanical radio body simulator to give the most accurate frequency response. As most portable antennas are ground plane dependent, it is important to specify the application the antennas will be used on to ensure accurate factory tuning.

KDs feature a rugged coating of Polyolefin and PVC to assure superior performance under the most demanding conditions.

“Hand-built”, high-performance KDs deliver greater transmit range and long life due to these unique features:

- Copper / brass radiators
- Exclusive ExacTune™ process individually scope tunes each antenna to the exact frequency specified
- 2.0:1 or less VSWR
- Fully soldered (not crimped) construction
- Fully sealed, Plastisol coated
- Injection molded housings
- Silver plated contact pins
- Larsen designed “super BNC” uses a Teflon™ insulator, silver plated pin and double spring design to prevent connector failure



KUL DUCKIE® FREQUENCY COLOR CODE

VHF FREQUENCY	COLOR	UHF FREQUENCY	COLOR
136 - 140 MHz	Blue	406 - 420 MHz	Black
142 - 149 MHz	Green	450 - 469 MHz	Black
150 - 160 MHz	Yellow	470 - 512 MHz	Black
162 - 174 MHz	Red	150 / 450 MHz	Blue

KuL DUCKIE® ANTENNAS



1/4 WAVE WHIP

- Attractive and durable PVC finish
- Brass wound cable radiator for conductivity, flexibility and strength
- Fully soldered, not just crimped, for best electrical performance and long life
- Silver-plated contact pin or durable brass connection provides excellent electrical contact and long life

Available for UHF / 800 / 900
Approximate length: 6"



HELICAL

- Attractive and durable PVC finish
- Special low-loss heat-shrink Polyolefin tubing separates radiating element from outer PVC coating to minimize dielectric loss
- Highly efficient .50 steel and copper-plated radiating element means improved conductivity and performance
- Soldered electrical connection is covered with a copper jacket then flooded with solder to give double protection at the point of maximum stress
- Silver-plated contact pin or durable brass connection provides excellent electrical contact and long life

Available for VHF / UHF
Approx length: VHF - 8"
UHF - 3"



HQ

- Design pioneered at Larsen
- HQ delivers a noticeable improvement in range and sound clarity
- Brass wound cable radiator for conductivity, flexibility and strength
- Attractive and durable PVC finish
- Low-loss Polyolefin protects the helix from the higher loss PVC jacket material
- Highly efficient .50 steel and copper-plated radiating element means improved conductivity and performance
- Soldered electrical connection is covered with a copper jacket then flooded with solder to give double protection at the point of maximum stress
- Silver-plated contact pin or durable brass connection provides excellent electrical contact and long life

Available for VHF
Approx. length: 9 1/2"

PORTALBE /
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KuL DUCKIE® ANTENNAS



HALF WAVE UHF

- Brass wound cable radiator for conductivity, flexibility and strength
- Attractive and durable PVC finish
- Fully soldered, not just crimped, for best electrical performance and long life
- Sturdy polycarbonate transformer housing coil cannot flex and change frequency
- Superior air wound impedance transformer provides higher Q and deeper resonance
- Silver-plated contact pin or durable brass connection provides excellent electrical contact and long life

Available for UHF
Approx. length: 16"



Q-1/4 WAVE

- Flexible 17-7 stainless steel rod provides simplicity and extra durability
- Fully soldered connection for durability and electrical performance
- BNC, TNC or PL-259 connectors only

Approx. length: 4 3/4" to 20"

KuL DUCKIE® ANTENNAS

KuL DUCKIE® SELECTION GUIDE

All factory tuned KuL DUCKIES® are ExacTuned to your specified frequency. To order, replace the FREQ, UHF or VHF designation with your desired center frequency.

PART NUMBER	ELECTRICAL TYPE	FREQUENCY BAND (MHz)	APPROX LENGTH
1/4-32x3/16			
KD2FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD2FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD2FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD2FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"

TNC MALE			
KD3FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD3FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD3FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD3FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"
KD3FREQHQ5	HQ Helical 1/4 Wave	200 - 222	9 1/2"
KD13(freq)	1/4 Wave	406 - 960	6"
TNCQ	Q 1/4 Wave	136 - 512	Varies by freq

BNC MALE			
KD4UHF	Helical	406 - 512	3"
KD4VHF1	Helical	136 - 141	8"
KD4VHF2	Helical	142 - 149	8"
KD4VHF3	Helical	150 - 161	8"
KD4VHF4	Helical	162 - 174	8"
KD4FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD4FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD4FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD4FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"
KD4150T	Helical	130 - 180	Varies by freq
KD14(freq)	1/4 Wave	406 - 960	6"
KD14FREQHW1	HW UHF 1/2 Wave	315 - 409	16 1/2"
KD14FREQHW2	HW UHF 1/2 Wave	416 - 504	16 1/2"
BNCQ	Q 1/4 Wave	136 - 512	Varies by freq

NOTE: Antennas are not to scale

1 800 ANTENNA

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KuL DUCKIE® ANTENNAS

PART NUMBER	ELECTRICAL TYPE	FREQUENCY BAND (MHz)	APPROX LENGTH
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5/16-32x3/8

KD7FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD7FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD7FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD7FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"

PL-259

KD9FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD9FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD9FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD9FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"
KD19(freq)	1/4 Wave	406 - 512	6"
PQ	1/4 Wave	144 - 512	Varies by freq

5/16-24 THDS Female

KD22VHF1	Helical	136 - 141	8"
KD22VHF2	Helical	142 - 149	8"
KD22VHF3	Helical	150 - 161	8"
KD22VHF4	Helical	162 - 174	8"
KD22FREQHQ1	HQ Helical 1/4 Wave	136 - 140	9 1/2"
KD22FREQHQ2	HQ Helical 1/4 Wave	142 - 149	9 1/2"
KD22FREQHQ3	HQ Helical 1/4 Wave	150 - 161	9 1/2"
KD22FREQHQ4	HQ Helical 1/4 Wave	162 - 174	9 1/2"

PORTABLE/TERMINAL ANTENNAS

SPOTS! HIGH PERFORMANCE MOLDED PORTABLE ANTENNAS

Larsen **SPOTS!** represent the leading edge in modern antenna technology. **SPOTS!** are built to the same high standards used in Larsen's OEM antenna production. These antennas are the same design and construction as supplied to many of the top radio producers.

Our fully molded design produces an ultra-tough antenna ready for severe handling and weather conditions.

- Tough OEM-formula polyurethane (PU) fully molded antenna covering to withstand extremes in temperature, shock and humidity
- Hard-drawn steel and three mil copper clad helical radiators for high performance
- Bronze-coated whips for high conductivity
- Mechanically connected and soldered construction
- Attractive OEM-style antenna appearance



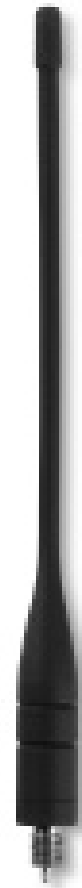
SPOTS!

SPOTS! FREQUENCY COLOR CODE (SEE COLOR SPOT ON ANTENNA TOP)

VHF	CENTER FREQUENCY	COLOR
144	(138-150 MHz)	Gray
156	(150 - 162 MHz)	Orange
160	(154 - 166 MHz)	Green
167	(160 - 174 MHz)	Red

UHF	CENTER FREQUENCY	COLOR
420	(403 - 437 MHz)	Blue
450	(432 - 468 MHz)	Yellow
470	(450 - 490 MHz)	Red
490	(470 - 510 MHz)	Green

800 / 900	CENTER FREQUENCY	COLOR
832	(795 - 870 MHz)	Blue
918	(872 - 964 MHz)	Red
1800	(1710 - 1850 MHz)	Black
1900	(1850 - 1990 MHz)	Black
2400	(2400 - 2500 MHz)	Black



NOTE: Antennas are not to scale

1 800 ANTENNA



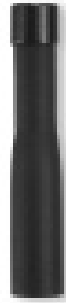
SPOTS! ANTENNAS



HL - VHF HELICAL

- Over-molded helical design for VHF applications
- Hard-drawn steel coil with left hand spiral provides the best structural integrity
- Full three mils of copper coating gives high electrical performance
- **SPOTS!** helicals are over-molded instead of sleeved for longer life and better mechanical memory

Typical Length: 8" max



HS - HELICAL SHORT

- High-pitch helical coil allows shorter antenna at same frequency
- Hard-drawn steel coil with left hand spiral provides the best structural integrity
- Full three mils of copper coating gives high electrical performance
- **SPOTS!** helicals are over-molded instead of sleeved for longer life and better mechanical memory
- Molded 1/4 wave helical "stubby" for less obtrusive antenna, available in VHF and SMR frequencies

Typical 4" VHF

Length: 3" UHF

2 3/4" 800 / 900 MHz



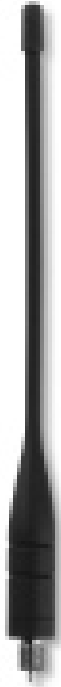
WH - WHIP ANTENNA

- Molded from tough, OEM-specified Polyurethane blend for resistance to water, cracking or permanent bending
- Special whip material is OEM-specification steel braid with bronze coat for improved electrical performance
- For UHF, SMR and data applications

Typical 6" UHF

Length: 3" 800/900 MHz

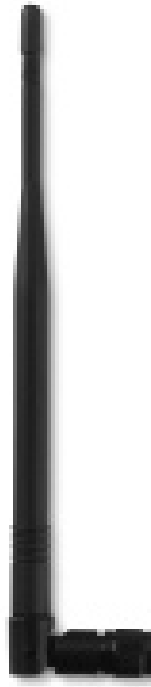
SPOTS! ANTENNAS



EN - HALF WAVE END FED

- 1/2 Wave end fed whip-type antenna
- Improved performance over 1/4 wave whip due to a longer radiator
- Molded from tough, OEM-specified Polyurethane blend for resistance to water, cracking or permanent bending
- Special whip material is OEM-specification steel braid with bronze coat for improved electrical performance
- For SMR and data applications

Typical Length: 7" 800/900 MHz



DA - Dipole

- Articulating right angle
- Full 1/2 wave dipole antenna
- Highest performance antenna for 800 / 900 MHz applications
- Center fed design allows true dipole performance with noticeable improvement in range and quality over standard whip antennas
- Molded from tough, OEM-specified Polyurethane blend for resistance to water, cracking or permanent bending
- For SMR and data applications

Typical Length: 8" 800/900 MHz



SPOTS! ANTENNAS

DECODING SPOTS! PART NUMBERS

Decoding SPOTS! part numbers is a simple “formula” of product line plus antenna type plus connector number plus center frequency.

Typical part number: SPHL10144

SP	HL	10	144
SPOTS! Product Line	Helical Antenna Type	Connector Number	Center Cut Frequency

CODE	ANTENNA TYPE
HL	Helical Type - Standard
HS	Helical Type - Short
WH	Whip
EN	End Fed 1/2 Wave
DA	1/2 Wave Dipole with Articulated Right Angle Connector
DP	1/2 Wave Dipole
WB	Wide Band

CODE	CONNECTOR	CONNECTOR DESCRIPTION	
10	1/4-32x3/16	Threaded Male Stud Connector	(MX Type)
14	M7x1.0	Threaded Male Stud Connector	(MD Type)
15	BNC	BNC Exposed-Chrome	(BN Type)
16	BNC Covered	BNC Covered	(BNX Type)
17	TNC	TNC Exposed - Chrome	(TN Type)
17RP*	TNC	TNC Exposed - Reverse Polarity	
18	TNC Covered	TNC Covered	(TNX Type)
20	SMA Male T1	SMA Male - Extended Base	(SMS Type)
21	SMA F T1	SMA Female - Flush Base	(SF Type)
22	SMA F T2	SMA Female - Recessed Insulator - No Cover Skirt (EFJ Type)	(SFJ Type)
23	SMA F T3	SMA Female - Recessed Insulator - Short Cover Skirt (Uniden Type)	(SFU Type)
24	SMA Male T2	SMA Male - Flush Base	(SM Type)
24RP*	SMA Male T2	SMA Male - Flush Base - Reverse Polarity	

* Special order connector. Contact factory for information.

SPOTS! ANTENNAS

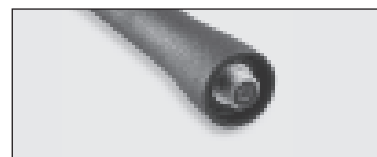
SPOTS! ANTENNA SELECTION GUIDE BY CONNECTOR TYPE

Determine connector type on the following pages and select the proper antenna based on frequency and type below. Field tunable antennas come with a cutting chart and cap to allow for tuning to exact frequency.

1/4-32X3/16 - MALE STUD CONNECTOR (MX TYPE)

CODE 10

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPHL10156	150 - 162	Helical Standard 1/4 Wave	8"
SPHS10156	152 - 160	Helical Short 1/4 Wave	4"
SPHL10160	154 - 166	Helical Standard - 1/4 Wave	8"
SPHL10160IC**	CC to 157	Helical Standard 1/4 Wave	8"
SPHL10167	160 - 174	Helical Standard 1/4 Wave	8"
SPHL10167IC**	CC to 167	Helical Standard 1/4 Wave	8"
SPWH10420	395 - 445	Whip Standard 1/4 Wave	6"
SPHS10420	403 - 437	Helical Short 1/4 Wave	3"
SPWH10450	425 - 475	Whip Standard 1/4 Wave	6"
SPHS10450	432 - 468	Helical Short 1/4 Wave	3"
SPWH10470	450 - 490	Whip Standard 1/4 Wave	6"
SPHS10470	452 - 488	Helical Short 1/4 Wave	3"
SPHL10FT	Field Tunable 136 - 221	Helical Standard 1/4 Wave	8"



1/4-32X3/16

Male stud type mount with skirt (MX type)

SPOTS! Connector Code 10

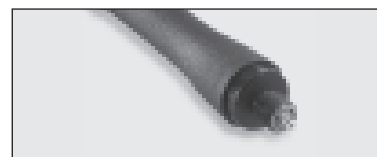
Popular Brands Supported

Motorola, Kenwood, Maxon, Midland, Wilson, G.E., Vertex

M7 X 1.00 METRIC CONNECTOR (MD TYPE)

CODE 14

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPEN14832	806 - 866	Whip - 1/2 Wave End Fed	7"
SPWH14832	782 - 882	Whip - Standard - 1/4 Wave	3"
SPHS14832	800 - 865	Helical - Short - 1/4 Wave	2 3/4"
SPEN14918	890 - 960	Half Wave End Fed	6"
SPHL14FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	7"



M7.0X1.0

Male stud type connector unskirted (MD type)

SPOTS! Connector Code 14

Popular Brands Supported

G.E., Ericsson

** This antenna is designed with a longer "skirt" for use with newer ICOM radios. Minimum order quantities apply. Please contact the factory for more information.

Refer to Antenna Performance Chart on Page 10.

NOTE: Antennas are not to scale

1 800 ANTENNA

PORTRAIT /
TERMINAL

SPOTS! ANTENNAS



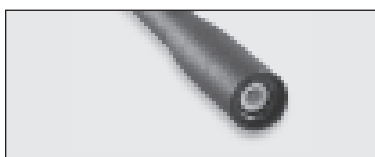
BNC

BNC Male coaxial connector
unskirted

SPOTS! Connector Code 15

Popular Brands Supported

G.E., Kenwood, Motorola,
Maxon, Johnson



BNC-S

BNC Male coaxial connector
fully skirted (BNX type)

SPOTS! Connector Code 16

Popular Brands Supported

Ericsson



TNC

TNC Male coaxial connector
unskirted (TN type)

SPOTS! Connector Code 17

Popular Brands Supported

Icom, Standard

BNC CONNECTOR (BN TYPE)

CODE 15

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPHS15450	432 - 468	Helical - Short - 1/4 Wave	3"
SPHL15FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH15FT	Field Tunable 400 - 512	Whip - Standard - 1/4 Wave	6"

BNC CONNECTOR COVERED TYPE (BNX TYPE)

CODE 16

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPHL16FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH16FT	Field Tunable 400 - 512	Whip - Standard - 1/4 Wave	6"

TNC CONNECTOR - STANDARD (TN TYPE)

CODE 17

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPDA17832	824 - 894	Center Fed Dipole	8"
SPDA17850/1900	824 - 894 / 1850 - 1990	Center Fed Dipole	7 1/2"
SPDA17918	890-960	Center Fed Dipole	8"
SPDA171800	1710 - 1850	Center Fed Dipole	6 1/2"
SPDA171900	1850 - 1990	Center Fed Dipole	6 1/2"
SPDA172400	2400 - 2500	Center Fed Dipole	6"
SPDA17RP2400	2400 - 2500	Center Fed Dipole	6"
SPDA17RP918	890 - 960	Center Fed Dipole	8"
SPHL17FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH17FT	Field Tunable 400 - 512	Whip - Standard - 1/4 Wave	6"

Refer to Antenna Performance Chart on Page 10.

SPOTS! ANTENNAS

TNC CONNECTOR - COVERED (TNX TYPE)

CODE 18

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPHL18FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH18FT	Field Tunable 400 -512	Whip - Standard - 1/4 Wave	6"
SPWH18832	782 - 822	Whip - Standard - 1/4 Wave	2 3/4"



TNC-S

TNC Coaxial connector fully skirted (TNX type)
SPOTS! Connector Code 18

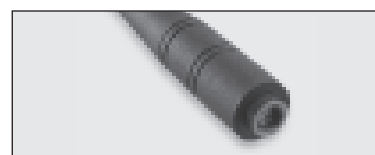
Popular Brands Supported

Vertex

SMA MALE STANDARD - EXTENDED BASE - T1 (SMS TYPE)

CODE 20

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPWH20832	782 - 882	Whip - Standard - 1/4 Wave	3"
SPHS20832	800 - 864	Helical - Short - 1/4 Wave	2 3/4"
SPWH20918	863 - 973	Whip - Standard - 1/4 Wave	3"
SPHS20918	872 - 954	Helical - Short - 1/4 Wave	2 3/4"
SPHL20FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH20FT	Field Tunable 400 -512	Whip - Standard - 1/4 Wave	6"



SMA MALE T1

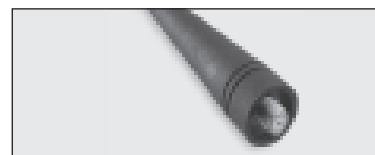
SMA Male extended base (SMS Type)
SPOTS! Connector Code 20

Popular Brands Supported

Standard

SMA FEMALE - NON STANDARD MOTOROLA TYPE (SF TYPE) CODE 21

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPWB21150	136 - 174	Wideband	6 3/4"
SPHL21156	150 - 162	Helical - Standard - 1/4 Wave	8"
SPHS21156	152 - 160	Helical - Short - 1/4 Wave	4"
SPHL21167	160 - 174	Helical - Standard - 1/4 Wave	8"
SPHS21167	162 - 172	Helical - Short - 1/4 Wave	4"
SPWB21425	380 - 470	Wideband	6 1/2"
SPWH21450	425 - 475	Whip - Standard - 1/4 Wave	6"
SPHS21450	432 - 468	Helical - Short - 1/4 Wave	3"
SPHS21490	475 - 512	Helical - Short - 1/4 Wave	3"
SPWH21832	782 - 882	Whip - Standard - 1/4 Wave	3"
SPHS21832	800 - 864	Helical - Short - 1/4 Wave	2 3/4"
SPWH21918	863 - 973	Whip - Standard - 1/4 Wave	3"
SPHS21918	872 - 954	Helical - Short - 1/4 Wave	2 3/4"
SPHL21FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH21FT	Field Tunable 400 -512	Whip - Standard - 1/4 Wave	6"



SMA F T1

SMA Female flush insulator & partial skirt (SF Type)
SPOTS! Connector Code 21

Popular Brands Supported

Motorola

Refer to Antenna Performance Chart on Page 10.

NOTE: Antennas are not to scale

1 800 ANTENNA

PORTALBE /
TERMINAL



SPOTS! ANTENNAS



SMA F T2

SMA Female recessed insulator
& no skirt (SJF type)

SPOTS! Connector Code 22

Popular Brands Supported

EF Johnson, Kenwood

SMA FEMALE STANDARD - FLUSH BASE - T2 (SFJ TYPE)

CODE 22

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPWB22150	136 - 174	Wideband	6 ¾"
SPHL22156	150 - 162	Helical - Standard - 1/4 Wave	8"
SPHL22167	160 - 174	Helical - Standard - 1/4 Wave	8"
SPWH22450	425 - 475	Whip - Standard - 1/4 Wave	6"
SPHS22450	432 - 468	Helical - Short - 1/4 Wave	3"
SPWH22470	450 - 490	Whip - Standard - 1/4 Wave	6"
SPHS22470	452 - 468	Helical - Short - 1/4 Wave	3"
SPHS22490	475 - 512	Helical - Short - 1/4 Wave	3"
SPWH22832	782 - 882	Whip - Standard - 1/4 Wave	3"
SPHS22832	800 - 864	Helical - Short - 1/4 Wave	2 ¾"
SPWH22918	863 - 973	Whip - Standard - 1/4 Wave	3"
SPHS22918	872 - 954	Helical - Short - 1/4 Wave	2 ¾"
SPHL22FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH22FT	Field Tunable 400 - 512	Whip - Standard - 1/4 Wave	6"



SMA F T3

SMA Female recessed insulator
& partial skirt (SFU type)

SPOTS! Connector Code 23

Popular Brands Supported

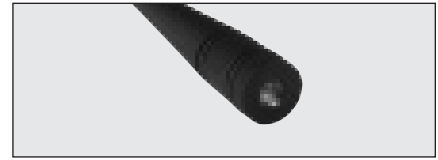
Kenwood (2005 and newer models), Uniden, King

SMA FEMALE STANDARD - HALF SKIRT BASE - T3 (SFU TYPE)

CODE 23

PART NUMBER	FREQUENCY BAND (MHZ)	ANTENNA TYPE	APPROX LENGTH
SPWB23150	136 - 174	Wideband	6 ¾"
SPHL23156	150 - 162	Helical - Standard - 1/4 Wave	8"
SPHL23167	160 - 174	Helical - Standard - 1/4 Wave	8"
SPWH23450	425 - 475	Whip - Standard - 1/4 Wave	6"
SPHS23450	432 - 468	Helical - Short - 1/4 Wave	3"
SPWH23470	450 - 490	Whip - Standard - 1/4 Wave	6"
SPHS23470	452 - 488	Helical - Short - 1/4 Wave	3"
SPWH23490	470 - 512	Whip - Standard - 1/4 Wave	6"
SPHS23490	475 - 512	Helical - Short - 1/4 Wave	3"
SPWH23832	782-882	Whip - Standard - 1/4 Wave	3"
SPWH23918	863 - 973	Whip - Standard - 1/4 Wave	3"
SPHS23918	872 - 954	Helical - Short - 1/4 Wave	2 ¾"
SPHL23FT	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH23FT	Field Tunable 400 - 512	Whip - Standard - 1/4 Wave	6"

Refer to Antenna Performance Chart on Page 10.



SMA MALE T2

SMA Male flush base (SM Type)
SPOTS! Connector Code 24

Popular Brands Supported

G.E., Technophone

PART NUMBER	FREQUENCY CONNECTOR	BAND (MHz)	ANTENNA TYPE	APPROX LENGTH
SPDA24832	SMA	824 - 894	Center Fed Dipole	9"
SPDA24850/1900	SMA	806 - 925 / 1800 - 2170	Dual Band Dipole	6 ¾"
SPDS24850/1900W	SMA	806 - 925 / 1800 - 2170	Dual Band Dipole	6 ¾"
SPDA24918	SMA M T2	890 - 960	Center Fed Dipole	8"
SPDA241800	SMA M T2	1710 - 1880	Center Fed Dipole	6 ½"
SPDA241900	SMA M T2	1850 - 1990	Center Fed Dipole	6 ½"
SPDA242400	SMA	2400 - 2500	Center Fed Dipole	6"
SPDA24RP918	SMA M T2 RP	890 - 960	Center Fed Dipole	8"
SPDA24RP2400	SMA M T2 RP	2400 - 2500	Center Fed Dipole	6"
SPDP24832	SMA M T2	824 - 894	Center Fed Dipole	8"
SPDP24918	SMA M T2	890 - 960	Center Fed Dipole	
SPDP242400	SMA M T2	2400 - 2500	Center Fed Dipole	3 ½"
SPDP24RP2400	SMA M T2 RP	2400 - 2500	Center Fed Dipole	3 ½"
SPHS24832	SMA M T2	800 - 864	Helical - Short - 1/4 Wave	2 ¾"
SPWH24918	SMA M T2	863 - 973	Whip - Standard - 1/4 Wave	3"
SPHS24918	SMA M T2	872 - 954	Helical - Short - 1/4 Wave	2 ¾"
SPHL24FT	SMA M T2	Field Tunable 136 - 221	Helical - Standard - 1/4 Wave	8"
SPWH24FT	SMA M T2	Field Tunable 400 -512	Whip - Standard - 1/4 Wave	6"
R380.500.125	SMA M T2 RP	2400 - 2500	Molded - 1/4 Wave	2½"

Refer to Antenna Performance Chart on Page 10.

NOTE: Antennas are not to scale



STEALTH BLADE ANTENNAS

Larsen Stealth Blades utilize printed circuit technology to provide superior performance and impedance bandwidth. Its ultra slim design allows mounting virtually anywhere without obstruction - in vehicles for voice and data, mobile computing or other mobile / portable terminal applications. The antenna can even be concealed inside the lining of garments worn for covert communications operations.



STEALTH BLADES

The following single band Stealth Blade antennas have a gain of 2.14 dBi, a maximum power of 3 Watts and linear polarization.

MODEL	FREQ. RANGE (MHz)	BANDWIDTH @ 1.5:2:1	DIMENSIONS	COAX	CONN
SB450FME12	450-470	20/30	10" x 0.75"	12' RG-316	FME
SB8003	806-896	67/90	5.2" x 0.75"	3' RG-174	NO CONN
SB80012	806-896	67/90	5.2" x 0.75"	12' RG-174	NO CONN
SB800FME3	806-896	67/90	5.2" x 0.75"	3' RG-174	FME
SB800FME12	806-896	67/90	5.2" x 0.75"	12' RG-174	FME
SB800MPL3	806-896	67/90	5.2" x 0.75"	3' RG-174	MPL
SB800MPL12	806-896	67/90	5.2" x 0.75"	12' RG-174	MPL
SB800SMA3	806-896	67/90	5.2" x 0.75"	3' RG-174	SMA
SB800SMA12	806-896	67/90	5.2" x 0.75"	12' RG-174	SMA
SB800TNC3	806-896	67/90	5.2" x 0.75"	3' RG-174	TNC
SB800TNC12	806-896	67/90	5.2" x 0.75"	12' RG-174	TNC
SB9003	890-960	55/70	5.2" x 0.75"	3' RG-174	NO CONN
SB90012	890-960	55/70	5.2" x 0.75"	12' RG-174	NO CONN
SB900SMA3	890-960	55/70	5.2" x 0.75"	3' RG-174	SMA
SB900SMA12	890-960	55/70	5.2" x 0.75"	12' RG-174	SMA
SB24003	2400-2500	60/105	2.7" x 0.75"	3' RG-174	NO CONN
SB24006	2400-2500	60/105	2.7" x 0.75"	6' RG-174	NO CONN
SB2400SMA3	2400-2500	60/105	2.7" x 0.75"	3' RG-174	SMA
SB2400SMA6	2400-2500	60/105	2.7" x 0.75"	6' RG-174	SMA
SB2400SMB3	2400-2500	60/105	2.7" x 0.75"	3' RG-174	SMB
SB2400SMB6	2400-2500	60/105	2.7" x 0.75"	6' RG-174	SMB
SB2400MMCX3	2400-2500	60/105	2.7" x 0.75"	3' RG-174	MMCX
SB2400MMCX6	2400-2500	60/105	2.7" x 0.75"	6' RG-174	MMCX

MULTI BAND STEALTH BLADES

The following multi band Stealth Blade antennas have a gain of 2.14 dBi (Cell) / 2.14 dBi (PCS) and a maximum power of 3 Watts.

MODEL	FREQUENCY RANGE (MHz)	BANDWIDTH (%) (SMR/CELL/PCS)	DIMENSIONS	COAX	CONN
R380.900.323	806 - 960 / 1710 - 1999	39/10/15	5" x .8" x .2"	10' RG-174	FME
R380.900.334	806 - 960 / 1710 - 1999	39/10/15	5" x .8" x .2"	10' RG-174	SMA