# ANTENNAS

Pulse's wide array of antenna selections provide solutions to GSM, CDMA, WCDMA, WiMax, WiFi™, GPS, ZigBee™, Bluetooth ®, UWB, ISM, DVB-H, MediaFLO™, DMB-S, Satellite Radios, DECT and other custom applications. Please pick antennas from these charts at *http://www.pulsefinland.com/index.php?271.* Click on the part number to access the corresponding data sheet.

Please contact Pulse for additional information on products not covered in this catalog.

## ANTENNAS FOR MOBILE PHONES

### Solutions for Mobile Phone Antennas

Pulse´s customized antennas for mobile phones are based on a thorough knowledge of the design of modern handsets, the antenna requirements, and the challenges of devices functioning in multiradio environments.

Pulse has extensive experience in main antenna design and utilizes technologies such as sheet metals, flex radiators and ceramic solutions. Pulse products offer optimal and well-proven solutions for each application and form factor.

The product range for mobile phones includes main and complementary antennas and integrated antenna modules.

## ANTENNAS FOR WIRELESS DEVICES

### Antennas for Wireless Access Point

Pulse's new line of wireless access point antennas offers flexible and economical solutions for wireless device OEMs. These antennas offer superior transmission and reception between wireless access points. They are compatible with IEEE 802.11a/b/g/n, Bluetooth and ZigBee applications, as well as other products that utilize ISM frequency bands. All wireless access point antennas are RoHS compliant. For high-volume orders, Pulse can custom design antennas for OEMs. This includes alternative frequencies and a variety of cables/connectors for antenna assemblies. Pulse also manufactures build-to-print internal antennas that feature a variety of stamped metal and PCB configurations.

**Single-Band [1, 2]**

| Part Number | Frequency | Max Gain (dBi) | Mechanical Length [3] | Application/Standard |
|---|---|---|---|---|
| W1047 | 900MHz | 1.0 | 6.65/169 | ISM 900MHz |
| W1063 | 900MHz | 3.0 | 6.65/169 | ISM 900MHz |
| W1030 | 2.4GHz | 2.0 | 3.25/82.5 | 802.11b/g/n, Bluetooth, ZigBee |
| W1031 | 2.4GHz | 2.0 | 3.25/82.5 | 802.11b/g/n, Bluetooth, ZigBee |
| W1034 | 2.4GHz | 2.0 | 4.21/107 | 802.11b/g/n, Bluetooth, ZigBee |
| W1037 | 2.4GHz | 3.2 | 6.65/169 | 802.11b/g/n, Bluetooth, ZigBee |
| W1038 | 2.4GHz | 4.9 | 6.65/169 | 802.11b/g/n, Bluetooth, ZigBee |
| W1027 | 2.4GHz | 3.2 | 4.88/124 | 802.11b/g/n, Bluetooth, ZigBee |

1. ***Antennas*** *come standard with R-SMA connectors, unless otherwise specified.*
2. ***These*** *part numbers are lead-free and RoHS compliant. No additional suffix or identifier is required.*
3. ***Inches****/millimeters*

**Dual-Band [1, 2]**

| Part Number | Frequency (GHz) | Max Gain (dBi) | Mechanical Length [3] | Application/Standard |
|---|---|---|---|---|
| W1043 | 2.4 & 5.0 | 2.0 | 4.59/117 | 802.11a/b/g/n, Bluetooth, ZigBee |
| W1045 | 2.4 & 5.0 | 2.0 | 4.13/105 | 802.11a/b/g/n, Bluetooth, ZigBee |
| W1028 | 5.15 & 5.85 | 2.0 | 4.88/124 | 802.11a/b/g/n, ISM 5.8GHz |

1. ***Antennas*** *come standard with R-SMA connectors, unless otherwise specified.*
2. ***These*** *part numbers are lead-free and RoHS compliant. No additional suffix or identifier is required.*
3. ***Inches****/millimeters*

# ANTENNAS

## ANTENNAS FOR WIRELESS DEVICES *(continued)*

*Helical Antennas*

*Ceramic Antennas*

## Internal and Surface Mount Antenna Solutions

Pulse offers a wide range of standardized internal and surface mount antennas (SMD) for wireless device applications. Pulse's ceramic technology results in robust antenna designs that have outstanding performance. These antennas have an inherent immunity to surrounding antenna signals and hand-effect, making them exceptionally suitable solutions for small hand-held devices with multiple antennas. Pulse's helical antenna technology provides high-performance antennas in a small package that can be easily deployed. These ceramic and helical antennas require minimal ground plane removal for operation, which means saved board space and economical implementation. The SMD compatibility of Pulse's antenna products makes them simple and easy to mount.

**Surface Mount Antennas for Wireless Devices [1, 2]**

| Part Number | Application/Type | Antenna Size [4] | Mount Type/ GC [3] Area | Frequency Range (MHz) | RHCP Gain [5] (dBic) | Max Gain (dBi) | Efficiency (%/dB) | Return Loss (dB) |
|---|---|---|---|---|---|---|---|---|
| W3006 | **WLAN, Dualband** Ceramic | 10.0x3.2x1.5 | SMD 11.00x6.00 | 2400-2483.5 5150-5850 | — | 2,7 (peak) 2,2 (band edges) 4,1 (peak) 3,0 (band edges) | 64/-1,9 (peak) 62/-2,0 (band edges) 68/-1,7 (peak) 57/-2,4 (band edges) | -8 |
| W3008 | **Bluetooth ®** Ceramic | 3.2x1.6x1.1 | SMD 4.00x4.25 | 2400-2483.5 | — | 1,7 (peak) 0,7 (band edges) | 70/-1,6 (peak) 55/-2,6 (band edges) | -8 |
| W3008 | **Bluetooth/ WiFi ™/WLAN** Ceramic | 3.2x1.6x1.1 | SMD 4.00x6.25 | 2400-2483.5 | — | 2,2 (peak) 1,9 (band edges) | 75/-1,3 (peak) 70/-1,6 (band edges) | -11 |
| W3010 | **GPS** Ceramic | 10.0X3.2x2.0 | SMD 10.60X6.25 | 1575.42 ±10 | -0,2 (peak) -0,7 (band edges) | 2,8 (peak) 2,3 (band edges) | 75/-1,25 (peak) 70/-1,55 (band edges) | -18 |
| W3017 | **Satellite Radio** Ceramic | 3.2x1.6x1.1 | SMD 4.00x4.25 | 2320-2345 | — | 2,7 (peak) -2,5 (band edges) | 75/-1,2 (peak) 70/-1,55 (band edges) | -10 |
| W3020 | **WiMAX** Ceramic | 3.2x1.6x1.1 | SMD 4.00x6.25 | 2500-2690 | — | 3 (peak) 0,3 (band edges) | 8/-1 (peak) 50/-3 (band edges) | -5.5 |
| W3108 | **WiFi** Helical | 5.0x2.5x5.5 | SMD 7.50X5.50 | 2400-2483.5 | — | 1,5 | 50/-3 | -8 |
| W3110 | **GPS** Helical | 5.0x2.5x5.5 | SMD 7.50x5.50 | 1575.42 ±10 | -0,9 (peak) -1,1 (band edges) | 1,3 (peak) 1,2 (band edges) | 47/-3,2 (peak) 45/-3,5 (band edges) | -9 |
| W3112 | **ISM900** Helical | 2.5x8.0x8.0 | SMD 6.00x11.00 | 902-928 | — | 0,9 (peak) -0,3 (band edges) | 67/-1,7 (peak) 50/-3 (band edges) | -10 |
| W3113 | **ISM900** Helical | 12.4x8.0x2.5 | SMD 8.00x40.00 | 902-928 | — | 0,8 (peak) -0,3 (band edges) | 66/-1,8 (peak) 51/-2,9 (band edges) | -10 |
| W3018 | **DMB-S** Ceramic | 3.2x1.6x1.1 | SMD 4.00x4.25 | 2605-2655 | — | 3 (peak) 2,5 (band edges | 85/-0,7 (peak) 80/-1 (band edges) | -10 |
| W3024 | **MediaFLO ™** Ceramic | 10x3.2x4 | SMD 10.60x10.25 | 716-722 | — | 2 (peak) 1,5 (band edges | 75/-1,25 (peak) 70/-1,55 (band edges) | -8 |
| W3510 | **DVB-H EU** Planar | 45x7x6 | Clearance to ground 7mm | 470-750 | — | -9 @ 470 MHz -6 @ 750 MHZ | — | -3 |

***1. All** antennas are RoHS Compliant.*
***2. Impedance** 50 Ω, operating temperature -40°C to +85°C*
***3. GC** = Ground Clearance, mm*
***4. Millimeters** (mm)*
***5. —** = NA*

# LARSEN® ANTENNAS

## AUTOMOTIVE

The Larsen antenna product line offers the highest quality, most reliable antennas in the automotive industry. The Larsen antennas combine premium materials with high efficiency designs, which deliver antennas with superior mechanical durability and electrical performance. UV, chemical and impact resistant Makroblend® bases help ensure the highest performance for all your mobile applications. "Traditional-style" mobile antennas are available from 27 MHz to 5.9 GHz, as well as many "multi-band" designs. Whether you need communication interoperability, radio communication, data transmission, increased cellular/PCS coverage or GPS tracking, Larsen antennas are the solution.

Larsen antennas consist of over 1000 different automotive antenna options. Please contact the factory for more information or to order an all-inclusive catalog at *info@larsen.pulseeng.com* or call 800-268-3662.

## Automotive Single-Band Solutions

**Single-Band [1]**

| Part Number | Frequency (MHz) | Gain (dBi) | Description | Length (in / mm) | Coax [2] | Connector [3] |
|---|---|---|---|---|---|---|
| NMOWB150C | 135-174 | 2 | NMO Wide Band [4] | 51.75 / 1314 | — | — |
| NMO450C | 450-750 | 5.6 | NMO UHF Field Tunable [4] | 33 / 838 | — | — |
| LP800NMO | 806-960 | 2 | NMO Low Profile [4] | 1.25 / 32 | — | — |
| NMOQW900 | 890-970 | 2 | NMO 1/4 Wave [4] | 3 / 76 | — | — |
| GPSGM | 1575.4 | 5 dBic | GPS Glass Mount | 1.7 / 43 | RG-174 | — |
| NMO5E2400B | 2400-2500 | 5 | NMO Whip [4] | 8.54 / 217 | — | — |

***1. Antennas*** *available in multiple frequencies and mounting options.*
***2. Variety*** *of coax available. Order separately.*
***3. Variety*** *of connectors available. Order separately.*
***4. All*** *NMO antennas require an NMO mount for installation.*

## Automotive Multi-Band Solutions

**Multi-Band [1]**

| Part Number | Frequency (MHz) | Gain (dBi) | Description | Length (in / mm) | Coax [2] | Connector [3] |
|---|---|---|---|---|---|---|
| NMO150/450/800 | 150-165 / 450-470 / 806-940 | -7 / 0 / 1 | NMO Tri Band [4] | 16.5 / 419 | — | — |
| KGC/P3EUD | 824-896 / 1850-1990 | 5.2 / 5.2 | Glass Mount Dual Band | 13 330 | RG-58U Dual Shield | No Conn |
| LPT825/18NMOHF | 806-960 / 1710-1990 / 2400 | 3 / 4 / 3 | Low Profile Transit [4] | 3.5 / 89 | — | — |
| MMC/P3EFME | 824-960 / 1850-1990 | 4 / 4 | Dual Band Magnetic Mount | 5 / 127 | RG-58 Low Loss Dual Shield | FME |
| NMOC/P3E | 824-960 / 1850-1990 | 4 / 4 | Dual Band NMO Mount [4] | 4.7 / 119 | — | — |
| GPSCPOO | 824-960 / 1710-1990 / 1575.42 | 2 / 2 / 4.5dBic | Direct Feed GPS Tri Band | 7.6 / 193 | RG-174 | TNC/SMA |
| GPSCWCPOO | 824-960 / 1710-1990 / 1575.42 | 2 / 1.5 / 4.5dBic | Roof Mount GPS Tri Band | 3.9 / 99 | RG-174 | TNC/SMA |

***1. Antennas*** *available in multiple frequencies and mounting options.*
***2. Variety*** *of coax available. Order separately.*
***3. Variety*** *of connectors available. Order separately.*
***4. All*** *NMO antennas require an NMO mount for installation.*

# LARSEN® ANTENNAS

## AUTOMOTIVE *(continued)*

## NMO Mounting Kits

**NMO Mounting Kits [1]**

| Part Number | Description | Cable Length (ft / m) | Coax Type | Connector |
|---|---|---|---|---|
| NMOKHFUD | NMO Low / High Frequency Mount | 17 / 5.18 | RG-58 / U Dual Shield, Low Loss Cable | NO CONN |
| NMOKHFUDTHK | NMO Low / High Frequency Thick Mount | 17 / 5.18 | RG-58 / U Dual Shield, Low Loss Cable | NO CONN |
| NMOMMRNOCONN | NMO Low / High Frequency Magnetic Mount | 12 / 3.66 | RG-58 A / U cable | NO CONN |

***1. All** NMO mounting kits are available with a variety of cables and connectors.*

## WIRELESS APPLICATIONS

Pulse's Larsen antennas also offer a complete line of portable/terminal antennas for wireless applications. These antenna solutions are perfect for data transmission for various networking applications. Pulse's Larsen antennas also offer portable/terminal antennas for routers and access points in 800/900 MHz, 1700-1900 MHz and 802.11a/b/g frequencies.

The ultra-slim stealth blade allows mounting virtually anywhere without obstruction - in vehicles for voice and data, mobile computing or other mobile/portable terminal applications. SPDA models are true sleeve dipole designs optimized for no-ground-plane environments found in portable and terminal applications. Models have an articulated right angle/360 degree swivel connector. They are ideal for any portable, hand-held terminal or cordless base application such as wireless Point-of-Sale, WLAN or cordless PDX.

Larsen antennas offer a variety of portable/terminal antennas with various terminations for use with most popular radio brands as well as many wireless applications. For more information on these antennas or to order an all-inclusive catalog, please e-mail Pulse, at: *info@larsen.pulseeng.com*, or call 800-268-3662.

## Single-Band Wireless Access Point Solutions

**Single-Band Wireless Access Point Antennas**

| Part Number | Frequency (MHz) | Gain (dBi) | Description | Length (in / mm) | Coax [1] | Connector [1] |
|---|---|---|---|---|---|---|
| R380.500.109 | 2400-2500 | 2 | Cordless Base, Straight Dipole | 3.5 / 89 | NA | SMA Plug |
| SB450FME3 | 450-470 | 2.14 | Stealth Blade | 10 / 254 | 3' RG-316 | FME |
| SB8003 | 806-896 | 2.14 | Stealth Blade | 2.5 / 132 | 3' RG-174 | No Conn |
| SB9003 | 890-960 | 2.14 | Stealth Blade | 2.5 / 132 | 3' RG-174 | No Conn |
| SB24003 | 2400-2500 | 2.14 | Stealth Blade | 2.5 / 132 | 3' RG-174 | No Conn |
| SPDA24832 | 824-894 | — | Center Fed Dipole, Articulating Right Angle | 9 / 229 | NA | SMA |
| SPDA24918 | 890-960 | — | Center Fed Dipole, Articulating Right Angle | 8 / 203 | NA | SMA M T2 |
| SPDA241800 | 1710-1880 | — | Center Fed Dipole, Articulating Right Angle | 6.5 / 165 | NA | SMA M T2 |
| SPDA241900 | 1850-1990 | — | Center Fed Dipole, Articulating Right Angle | 6.5 / 165 | NA | SMA M T2 |
| SPDA242400 | 2400-2500 | — | Center Fed Dipole, Articulating Right Angle | 6 / 152 | NA | SMA |
| SPDP24832 | 824-894 | — | Center Fed Dipole, Straight | 8 / 203 | NA | SMA M T2 |
| SPDP24918 | 890-960 | — | Center Fed Dipole, Straight | 2.75 / 70 | NA | SMA M T2 |
| SPDP242400 | 2400-2500 | — | Center Fed Dipole, Straight | 3.5 / 89 | NA | SMA M T2 |
| SPWB23150 | 136-174 | — | Helical, Standard, 1/4 Wave | 6.75 / 171 | NA | SMA F T3 |
| SPWB23425 | 380-470 | — | Helical, Standard, 1/4 Wave | 6.5 / 165 | NA | SMA F T3 |
| SPWH23832 | 782-882 | — | Whip, Standard, 1/4 Wave | 3 / 76 | NA | SMA F T3 |
| SPWH23918 | 863-973 | — | Whip, Standard, 1/4 Wave | 3 / 76 | NA | SMA F T3 |
| SPHS24832 | 800-864 | — | Helical, Standard, 1/4 Wave | 3 / 76 | NA | SMA F T2 |

***1. UHF** and VHF portable/terminal antennas also available.*

# LARSEN® ANTENNAS

## WIRELESS APPLICATIONS *(continued)*

## Multi-Band Wireless Access Point Solutions

**Multi-Band Wireless Access Point Antennas**

| Part Number | Frequency (MHz) | Gain (dBi) | Description | Length (in / mm) | Coax [1] | Connector [1] |
|---|---|---|---|---|---|---|
| R380.500.314 | 2400-2500/4900-5900 | 1.6 / 5 | Swivel Mount Dipole | 7.15 / 1822 [2] | N/A | RPTNC |
| R380.900.323 | 806-960/1710-1999 | 2 / 2 | Stealth Blade | 5 / 127 | 10' RG-174 | FME |
| SPDA24850/1900 | 824-894/1850/1990 | – | Center Fed Dipole, Articulating Right Angle | 7.5 / 191 | N/A | SMA |

***1. Additional** cable length and connector options available.*
***2. MAX***