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