RF Exposure Antenna Summary

Network Systems Organization

FCC ID: **H9PDM4046** Data Phone DS Module

Output Power: 145 mW Original Equip.

Source Based

Mobile DC Factor: 1.000

Portable DC Factor: 0.108

Portable Antennas (R < 5cm)

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	EIRP (mW)	TR Status	Device Type
01.	Phone Stud	50-21900-043	Monopole	2.0	0.00	21.61	24.7	Tested	Hand Set
02.	Phone PCB	50-21900-045	Dipole	2.0	0.18	21.43	23.7	Tested	Hand Set
03.	Phone Stickon	50-21900-044	Dipole	2.0	0.22	21.40	23.5	Tested	Hand Set

Antenna Gain listed without cable
TR Status refers to weither the antena was tested. If not refer to the directed antenna test data

Duty Cycle Factors are applied to MPE and EIRP

Tx Limited configurations are for low power versions of the radio. See the specific antenna exhibit for detail

RF Exposure Configuration Summary

Network Systems Organization

FCC ID: **H9PDM4046** Data Phone DS Module

Output Power: 145 mW Original Equip.

Ant #	Antenna Model	Terminal Mfgr.	Terminal Model	Use
1	Phone Stud	Symbol	NP-4026	Hand Set
2	Phone PCB	Symbol	DP-4026	Hand Set
3	Phone Stickon	Symbol	DP-4026	Hand Set

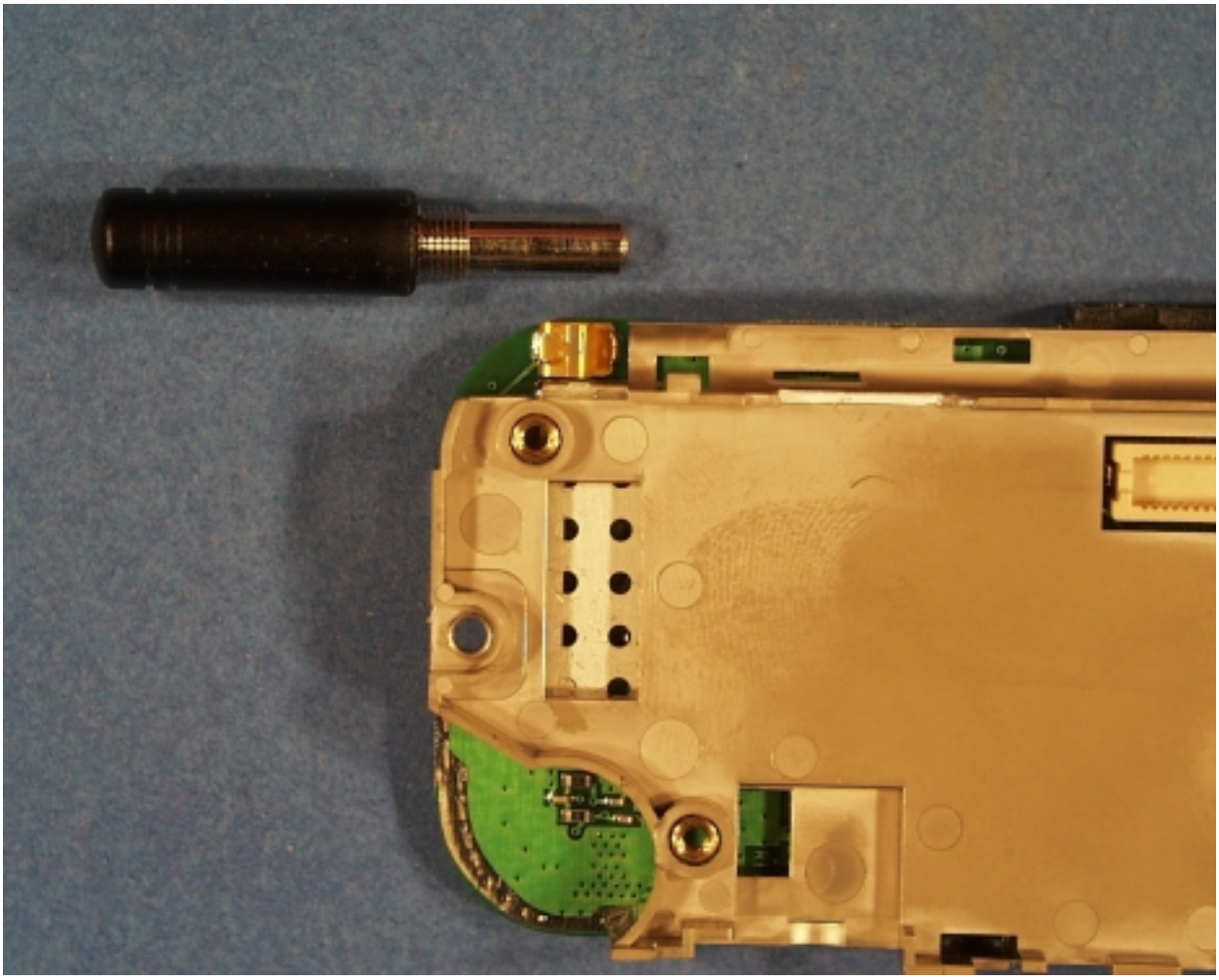
5- R < 5 cm
5+ 5 cm < R < 20 cm
Ocp Ocupational

Phone Stud Antenna

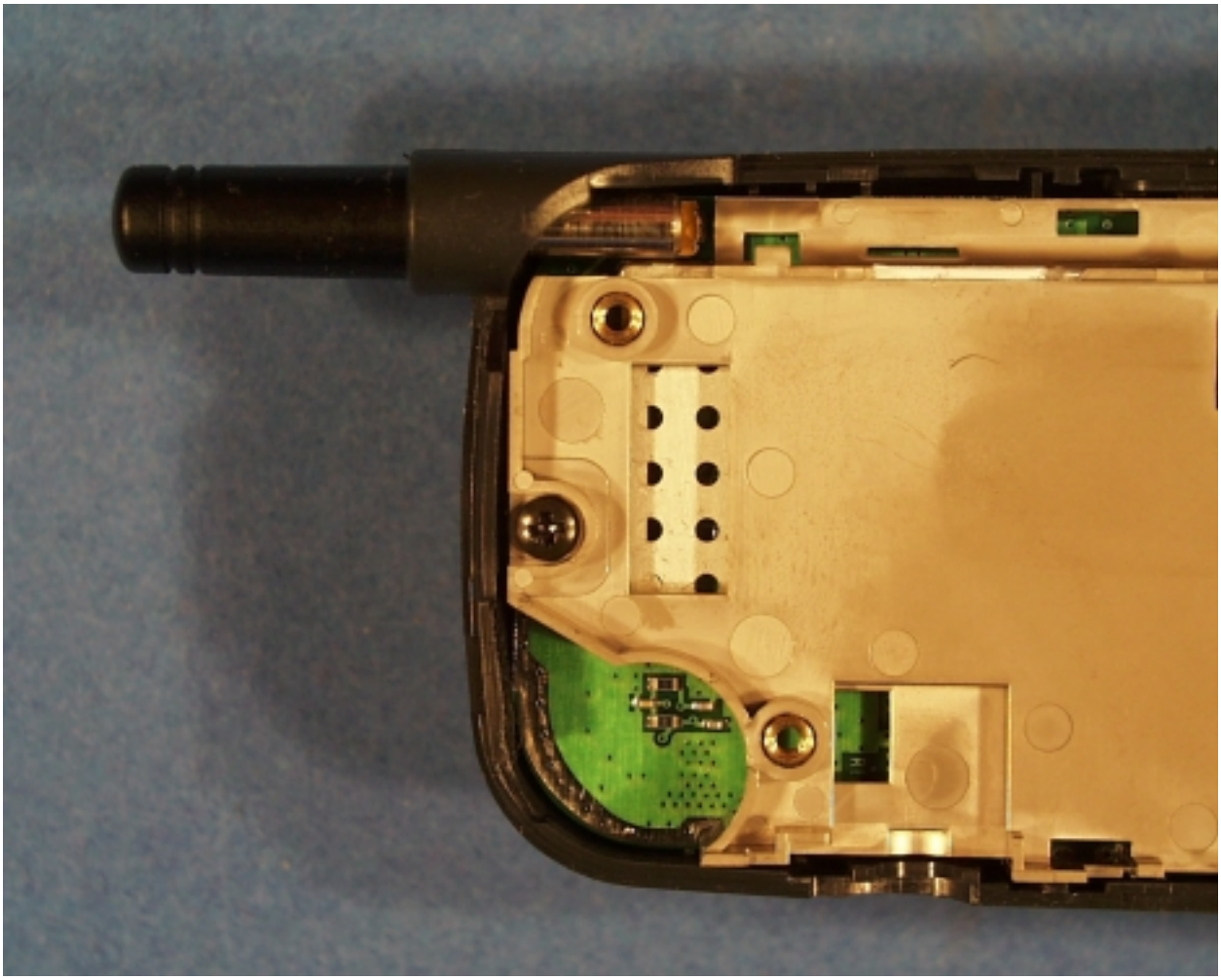
The **Phone Stud** antenna is 2 dBi omni-directional in azimuth plane. It is mounted externally as shown in the attached photo. The **Phone Stud** uses a screw mount with a copper spring contact

In its use it is 2.3 cm from the operators head. It is used in mobile devices.

Location	Phone Handset
Pattern	Omni
Type	Monopole
Max Gain	2 dBi
Physical	1.33” x 0.28”
Cable	N/A
Symbol P/N	50-21900-043



Antenna Photo



Antenna installed in NP4046 Voice communication device

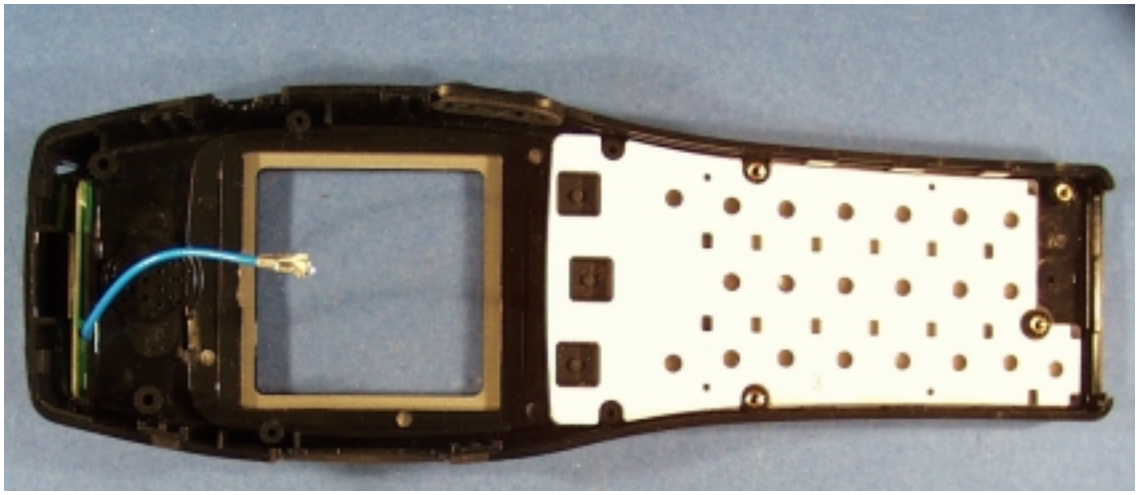
NP4046 Use Photo

Phone PCB Antenna

The **Phone PCB** antenna is 2 dBi omni-directional in azimuth plane. It is mounted internally as shown in the attached photo. The **Phone PCB** uses a Hirose FL series connector. In use it is 1.5 cm from a users head. It is used in mobile devices.

Location	Phone Handset
Pattern	Omni
Type	Dipole
Max Gain	2 dBi
Physical	1.5” x 0.3”
Cable	CO-6F-DSB-CX501X32AWG
Symbol P/N	50-21900-045

Antenna Photo



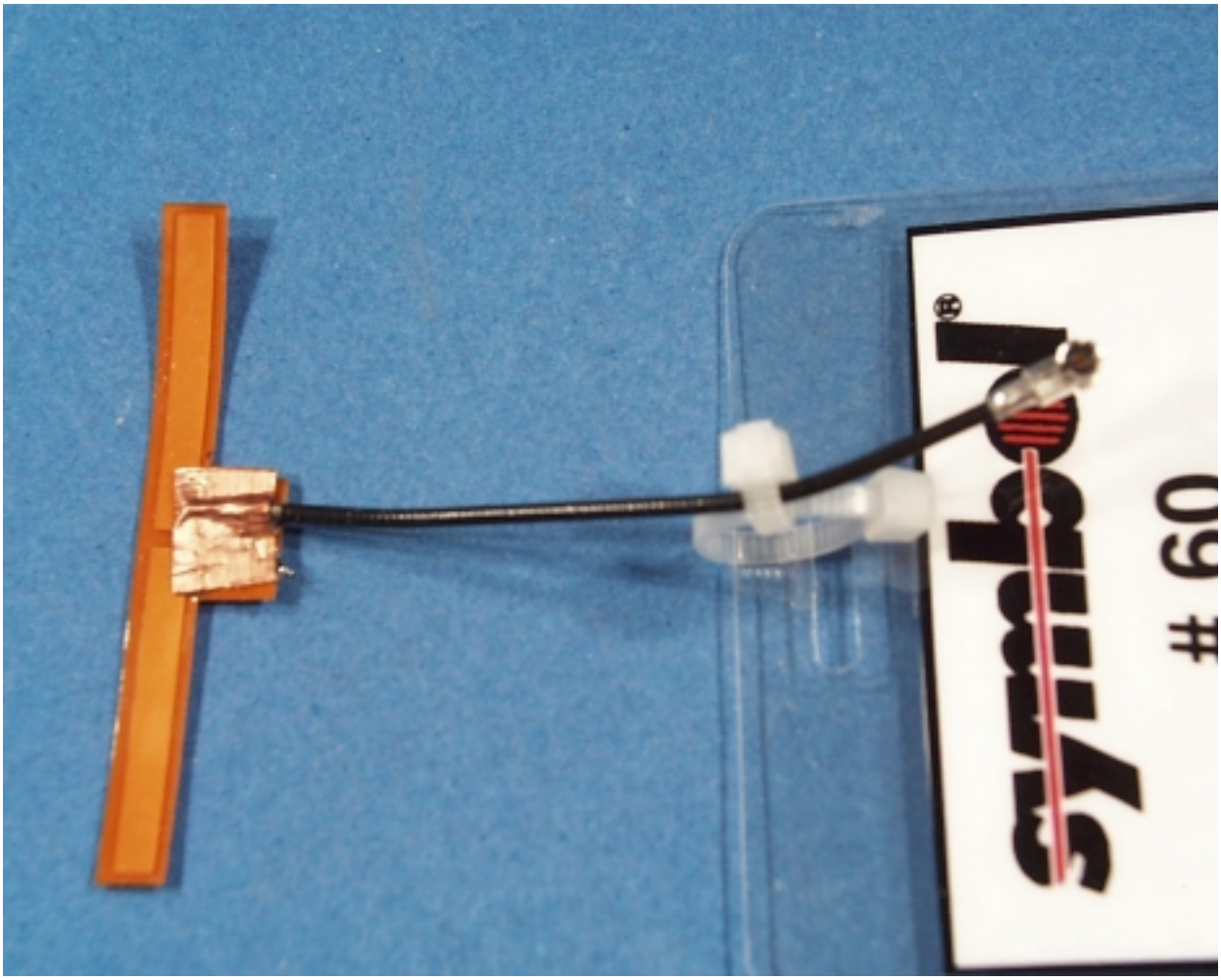
Antenna installed in DP4046 Voice communication device

DP4046 Use Photo

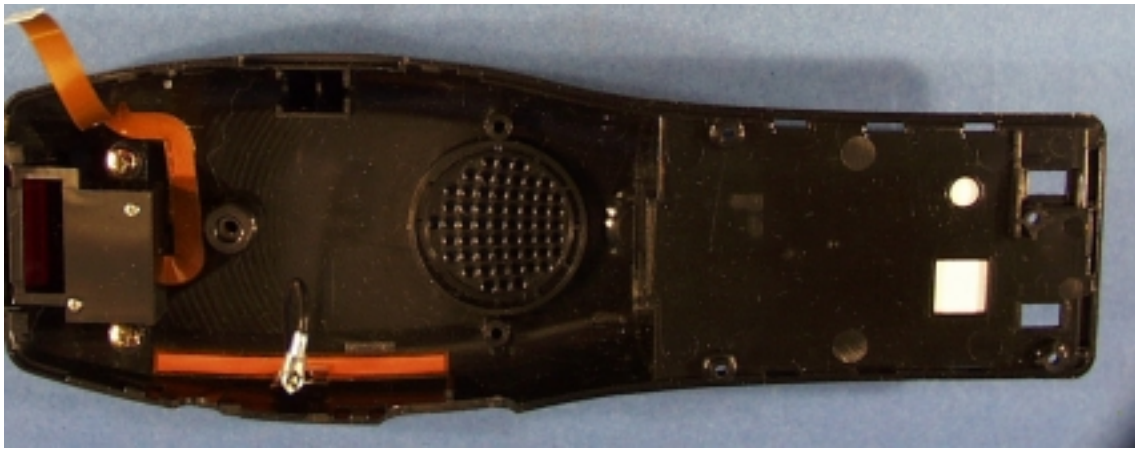
Phone Stick On Antenna

The **Phone** Stick On antenna is 2 dBi omni-directional in azimuth plane. It is mounted internally as shown in the attached photo. The **Phone** Stick On uses a Hirose FL series connector. In use it is 3.4 cm from the users head. It is used in mobile devices.

Location	Phone Handset
Pattern	Omni
Type	Dipole
Max Gain	2 dBi
Physical	2.12” x 0.2”
Cable	CO-6F-DSB-CX501X32AWG
Symbol P/N	50-21900-044



Antenna Photo



Antenna installed in DP4046 Voice communication device

DP4046 Use Photo

Duty Cycle Calculations

The maximum duty cycle of a 802.11 compliant transmitter is dependent on the data rate and the processing speed of the device the transmitter is installed in. The duty cycle is the ratio of the maximum transmitter on time divided by the total cycle time which is composed of the maximum on time and the minimum off time. The maximum on time is dependent on the data rate. The 802.11 spec mandates what the maximum data payload for a packet may be. The data pay load along with packet addressing and other network overhead information determine the maximum size of a packet. The maximum transmitter on time is the longest time that it will take the radio to transmit the packet. In the case of Symbol's Spectrum 24 products the 1 Mbps data rate is the slowest.

For the cycle time the minimum off time consists of an acknowledgement from the receiver, the shortest carrier sense time and the shortest packet construction time. The acknowledgment and carrier sense times are driven by the 802.11 protocol while the packet construction time is driven by the processing power of the radio host. For access points , laptops, and workstations with fast processors the construction time is fairly short. While for hand held battery powered terminals with slower processors the construction time can be really significant.

Directly related to the duty cycle is data throughput of a link. The lower the duty cycle the lower the data throughput.

Longest On Time

N = Maximum # of data bytes / packet
OP = Overhead bytes/packet
Ton = ((N + OP) * 8 bits/byte) / 10^6 bits/sec = 4.872 mS

Maximum Duty Cycle Factor
DCF = Ton / (Ton + Toff)

Shortest Off Time

CST = Carrier Sense Time
APA = AP Ack time
PCT = Packet Construction Time
Toff = CST + APA + PCT

Radios

LA2400	CR-1	1Mbps	FH
LA3020	Duo	2Mbps	FH
LA3021	Proj C	2Mbps	FH
LA4111	T1	11Mbps	DS
LA4121	T2	11Mbps	DS
XX3010	FH Phone	1Mbps	FH
DM4026	DS Phone	11Mbps	DS

Duty Cycle Variables

Radio	N		OP		CST (uS)		APA (uS)		PCT (uS)	
	AP	Rmt	AP	Rmt	AP	Rmt	AP	Rmt	AP	Rmt
LA2400	548	548	61	61	100	100	220	220	3000	10000
LA3020	548	548	61	61	100	100	220	220	2000	2000
LA3021	548	548	61	61	100	100	220	220	2280	2370
LA4111	548	548	61	61	100	100	220	220	1640	1660
LA4121	548	548	61	61	100	100	220	220	1600	1690
NP3010	N/A	32	N/A	80	N/A	100	N/A	220	N/A	7119
DP3010	N/A	32	N/A	80	N/A	100	N/A	220	N/A	7119
DM4026	N/A	32	N/A	80	N/A	100	N/A	220	N/A	7119

Duty Cycle Calculations

Duty Cycle Factors			
Radio	**Data Rate**	**AP**	**Remote**
LA2400	1 Mbps	60% / -4.4 dB	32 % / -9.9 dB
LA3020	1 Mbps	68% / -3.4 dB	68% / -3.4 dB
LA3021	1 Mbps	65% / -3.7 dB	64% / -3.9 dB
LA4111	1 Mbps	71.3% / -2.9 dB	71.1% / -3.0dB
LA4121	1 Mbps	71.8% / -2.9 dB	70.8% / -3.0dB
NP3010	1 Mbps	N/A	10.75% / -19.4 dB
DP3010	1 Mbps	N/A	10.75% / -19.4 dB
DM4026	1 Mbps	N/A	10.75% / -19.4 dB