GALTRONICS Co. Ltd

PRELIMINARY DESIGN SPECIFICATION

GATEWAY CYCLOPS
(CDMA/PCS/WLAN/4.9~5.8GHz)

INTERNAL ANTENNA FOR LAPTOP
MoABLE TECHNOLOGY
P/N: 021020175NC3425

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REFERENCE FOR FIGURES CONTAINED WITHIN THIS SPECIFICATION:

Figure 1. Thermal Cycling Test
Figure 2. Property Verification test Flow Chart

1.0 PURPOSE AND SCOPE;

The purpose of this document is to establish a *design* specification for the antenna products that Galtronics is developing for GATEWAY. Any changes or additions to this specification can affect schedule and/or cost of the product and should be negotiated between Galtronics and GATEWAY before being incorporated into the specification. Upon agreement of this specification Galtronics will make no changes without written approval from GATEWAY. Any changes requested by GATEWAY will be given to Galtronics with sufficient time frame to evaluate the cost impact and react as required.
The development of this product within Galtronics was conducted according to the Design Control Procedure SOP-006E.

2.0 RELATED DOCUMENTS:

SOP006E	Product Launch Procedure (Design Control)
EN006E	Reliability Guidelines
EIA-STD-556	Outer Shipping Container Bar Code Label Standard

3.0 ABBREVIATIONS AND DEFINITIONS

Ω	Ohm
°	Degree
°C	Celsius (degrees Centigrade)
AUX	Auxiliary
cm	Centimetre
g	Grams
GHz	Gigahertz
Hz	Hertz
kg	Kilograms
LCD	Liquid Crystal Display
MHz	Mega/hertz
M	Metre/
mm	Millimetre
N	Newton
PCB	Printed Circuit Board
RH	Relative Humidity
VSWR	Voltage Standing Wave Ratio
W	Watt
WiFi	Wireless Fidelity
WLAN	Wireless Local Area Network
WWAN	Wireless Wide Area Network

Design Specification: A preliminary target specification to guide the design process.
Product Specification: A final specification for the qualified product.

4.0 DESCRIPTIONS AND PART NUMBER;

4.1 DESCRIPTION;

There are two antennas for this application:
Antenna Main contains following parts: Bracket, Stamped Element, two Plastic carriers, Foil, Coax Cable; and embedded WiFi antenna, that consist of Wire Element, PCB and Coax Cable.
Antenna AUX contains following parts: Bracket, Wire Element, PCB with two components Matching Circuit, Plastic carrier, Coax Cable and Foil.

4.2 PART NUMBER

Galtronics Part number	Frequency Band	Gateway Part number
021020175NC3424	CDMA/PCS/WLAN (2.4,5GHz)	TBD

5.0 ELECTRICAL SPECIFICATIONS;

5.1 FREQUENCY BAND

	CDMA	PCS	2.4GHz	5GHz
WWAN MAIN	Tx: 824-849MHz Rx: 869-894MHz	Tx: 1850-1910MHz Rx: 1930-1990MHz		
WWAN Diversity	Rx: 869-894MHz	Rx: 1930-1990MHz		
WLAN			2.4-2.5GHz	4.9-5.8GHz

5.2 IMPEDANCE - Nominal impedance: 50Ω

5.3 MATCHING REQUIREMENTS.

In order to assure the best performance of the antenna, the matching shall be evaluated in free space while the LCD tilted at 110 degrees from keyboard. The antenna shall comply with the Electrical Specification requirements, as set out below, while mounted on the customer supplied Laptop. The Laptop is to be supplied by the customer and should be representative of the production parts. Any modifications in the Laptop can affect the performance of the antenna and should be discussed with Galtronics to determine the affect of such changes on antenna performance and delivery requirements.

5.4 INPUT Return Loss

5.4.1 MAXIMUM VALUES OF Return Loss [dB] IN FREQUENCY BAND

WWAN MAIN			
CDMA		PCS1900	
Tx1	Rx1	Tx2	Rx2
824-849MHz	869-894MHz	1850-1910MHz	1930-1990MHz
-6.0[dB]	-6.5 [dB]	-6.0[dB]	-6.0[dB]
WWAN DIVERSITY			
CDMA		PCS1900	
Rx3		Rx4	
869-894MHz		1930-1990MHz	
-7.0[dB]		-8.5[dB]	

Note: The maximum values of Return Loss were accepted by testing the Antenna connected with coaxial cable.

5.4.2 TEST METHOD (Engineering)

The antenna is tested while mounted inside the Laptop.
The Laptop is positioned in free space while the LCD tilted at 110 degrees from keyboard.
(Free space means the Laptop is held in a non-conductive device and away from any conductive objects).

5.4.3 TEST METHOD (Production)

In mass production it is not practical to use the Laptop supplied by customer. Galtronics will design a representative production test fixture for use on the processes that require electrical testing. The results of the test fixture will be correlated to the results obtained on the customer Laptop.

5.5 Antenna Efficiency:

Minimum value of antenna efficiency [%]:

WWAN Main	
CDMA (824-894) MHz	**PCS** (1850-1990 MHz)
40%	35%
WWAN Diversity	
CDMA (824-894) MHz	**PCS** (1850-1990 MHz)
35%	40%

5.6 Typical Gain and Pattern:

See Appendix

6.0 MECHANICAL SPECIFICATIONS;

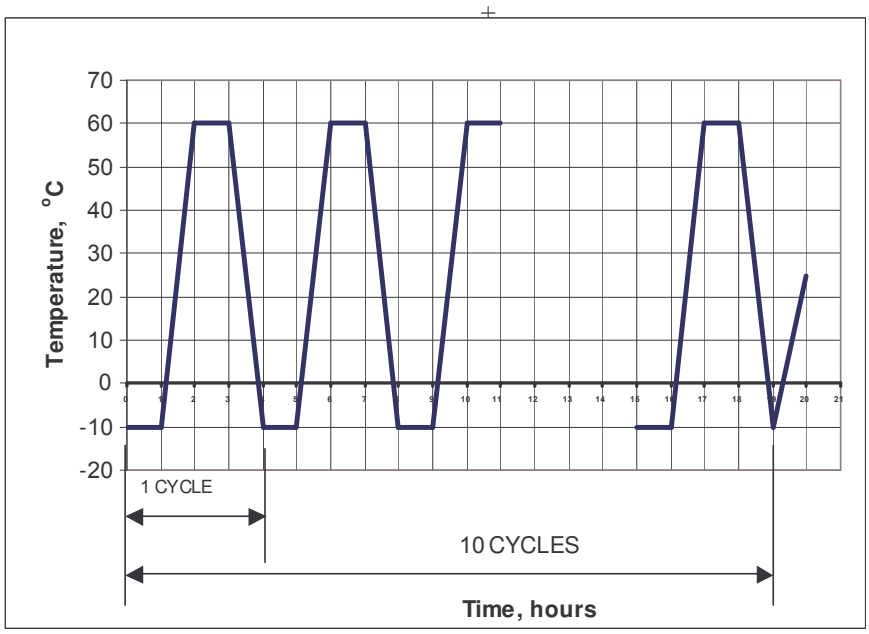
6.1 MECHANICAL CONFIGURATION

The appearance of the antennas is in accordance with drawings
P/N 501020175NC3425 – Main Antenna;
P/N 501020075NC3425 – Diversity Antenna

7.0 ENVIRONMENTAL SPECIFICATIONS

7.1 TEMPERATURE CYCLING TEST

Place the antenna assembled to back case in an environmental chamber at temperature T1=-10°C. Expose antenna to this temperature during 2 hours. Then increase temperature to value of T2=+60°C during 2 hours and expose antenna at this temperature during 2 hours. Then decrease temperature to value T1=-10°C during 2 hours. Relative Humidity must be 50% RH. Repeat this cycle 10 times.
After test is complete, there shall be no visual deterioration or damage. Electrical characteristics should be within the specified range.



7.2 STATIC HUMIDITY TEST

Place the complete antenna assembled to back case in an environmental chamber at +20°C. Then increase temperature during 2 hours to +55° C with humidity increasing to 95% RH during 2 hours. Soak antenna with these parameters for 24 hours. After the finish initial ambient parameters should be achieved during 1 hour.
After the test perform an inspection of the tested samples.
After test is complete, there shall be no visual degradation in esthetical and mechanical performance. Electrical characteristics should be within the specified range.

7.3 OPERATING TEMPERATURE RANGE TEST

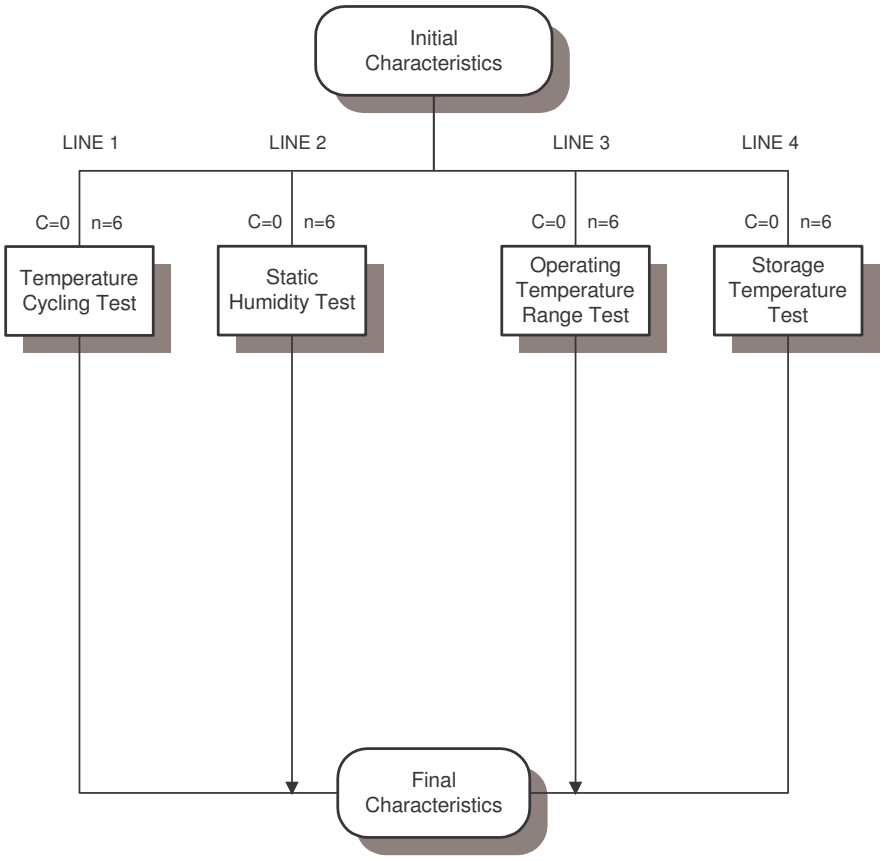
The operational temperature range shall be: -10°C to +60°C at 50% RH.
The antenna assembled to back case, should be checked immediately after 1 hour soaking in each temperature including VSWR data for each. After test is completed, the antenna should function mechanically. Electrical characteristics should be within the specified range.

7.4 STORAGE TEMPERATURE

Place the antenna in an environmental chamber at -10°C during 24 hours. Then increase temperature to value of 60°C at 95±5% RH during 2 hours, and soak the antenna 24 hours. After test is complete, there shall be no visual deterioration or damage. Electrical characteristics should be within the specified range.

8.0 QUALIFICATION

The mechanical and environmental tests mentioned above are performed according to the flow chart shown in Figure 5 below. The entire testing procedure will be conducted according to EN006E. A summary report of the results of the tests will be sent to the customer. Galtronics will not start mass production until the customer will grant the product a qualified status.



2. Property Verification test Flow Chart
Note: n - sample size; c - allowable amount of critical failures

9.0 PACKAGING

Set of two antennas, main and diversity should be [packed in separate bag 15x20 cm.
Five sets (five bags) should be packed in cardboard box of 20x20x5 cm.
The boxes should be packed in over box.
The over box will be labeled for shipping according to the standards outlined in EIA-STD-556.