.

Galtronics Design Specification

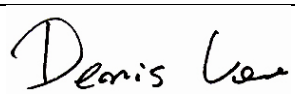
SAMSUNG PEBBLE

HSPA MAIN FOR LAPTOP

Galtronics P/N: 02036180-04145
SAMSUNG P/N: BA42-00245A

MSL LEVEL 1

REV NO.	DATE	DESCRIPTION
P1	2009-04-08	RELEASED FOR CUSTOMER APPROVAL.

DISTRIBUTION LIST: 1. QC 2. SALES	3.SAMSUNG	
APPROVED BY	**SIGNATURE**	**DATE**
Engineering Department Manager Denis.L		2009-04-08
RF Manager James		2009-04-08
RF Engineer Eric		2009-04-08
Mechanical Engineer Kevin		2009-04-08
Approved By Customer(As Required): SAMSUNG		

CONTENTS

REFERENCE FOR FIGURES CONTAINED WHIHIN THIS SPECIFICATION

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 SAMSUNG. Any changes or additions to this specification can affect schedule and/or cost of the product should be negotiated between Galtronics and SAMSUNG before being incorporated into the specification. Upon agreement of this specification Galtronics will make no changes without written approval from SAMSUNG. Any changes request by SAMSUNG will be given to Galtronics with sufficient time frame to evaluate the cost impact and react as required.
The development of the product within Galtronics was conducted according to the Design control Procedure SOP.

2.0 ABBREVIATIONS AND DEFINITIONS

Ω	Ohm
º	Degree
AUX	Auxiliary
Cm	Centimetre
g	Grams
GHz	Gigahertz
Hz	Hertz
Kg	Kilograms
MHz	Megahertz
m	Meter
mm	Millimeter
N	Newton
PCB	Printed Circuit Board
RH	Relative Humidity
VSWR	Voltage Standing Wave Radio
W	Watt
HSPA	High Speed Packet Access

3.0 DESCRIPTIONS AND PART NUMBER

3.1 DESCRIPTION

This antenna is an internal HSPA antenna for laptop.

3.2 PART NUMBER

Galtronics Part Number	Customer P/N
02036180-04145	BA42-00245A

4.0 ELECTRICAL SPECIFICATIONS

4.1 FREQUENCY BAND (MHz)

BAND	FREQUENCY
GSM850	TX(824-849MHz)
	RX(869-894MHz)
GSM900	TX(880-915MHz)
	RX(925-960MHz)
DCS	TX(1710-1785MHz)
	RX(1805-1880MHz)
PCS	TX(1850-1910MHz)
	RX(1930-1990MHz)
W2100	TX(1920-1980MHz)
	RX(2110-2170MHz)

4.2 IMPEDANCE

Normal impedance: 50Ω

4.3 INPUT VSWR

4.3.1 Maximum values of VSWR in frequency band

BAND	FREQUENCY (MHz)	VSWR
GSM850/900	824	5.5
	894	3.0
	960	6.0
DCS1800	1710	4.0
	1880	4.0
PCS1900	1850	4.0
	1990	5.0
WCDMA2100	1920	4.0
	2170	4.5

4.3.2 Test method (Engineering)

The antenna is tested while mounted on the laptop. The laptop is positioned in free space. (Free space means the laptop is held in a non-conductive device and away from any conductive objects).

4.3.3 Test method (Production)

Galtronics will design a representative test fixture for use on the process that requires electrical testing. The results of the test fixture will be correlated to the result obtained on the laptop.

4.4 Gain

4.4.1 Minimum Gain values for average in Azimuth/ Elevation plane

.

(Measured in the A-plus tech chamber in Galtronics Korea)

BAND	FREQUENCY (MHz)	PLANE	Gain (dBi)
GSM850/900	824	H	-11.0
		E1	-9.5
		E2	-8.5
	894	H	-6.5
		E1	-6.0
		E2	-6.0
	960	H	-8.5
		E1	-7.5
		E2	-9.5
DCS1800	1710	H	-6.5
		E1	-5.5
		E2	-6.5
	1880	H	-6.5
		E1	-5.5
		E2	-6.0
PCS1900	1850	H	-6.5
		E1	-5.5
		E2	-6.0
	1990	H	-7.5
		E1	-6.5
		E2	-6.5
WCDMA2100	1920	H	-7.5
		E1	-6.5
		E2	-6.5
	2170	H	-7.0
		E1	-6.5
		E2	-8.0

5.0 MECHANICAL SPECIFICATIONS;

5.1 MECHANICAL CONFIGURATION

The appearance of the antenna is in accordance with drawing of 02036180-04145(PEBBLE MAIN).

6.0 ENVIRONMENTAL SPECIFICATIONS

6.1 Temperature Cycling Test

Place the antenna assembled to back case in an environmental chamber at temperature T1=-10℃. Expose antenna to this temperature during 2 hours. Then increase temperature to value of T2=+60℃ during 2 hours and expose antenna at this temperature during 2 hours. Then decrease temperature to value T1=-10℃ 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.

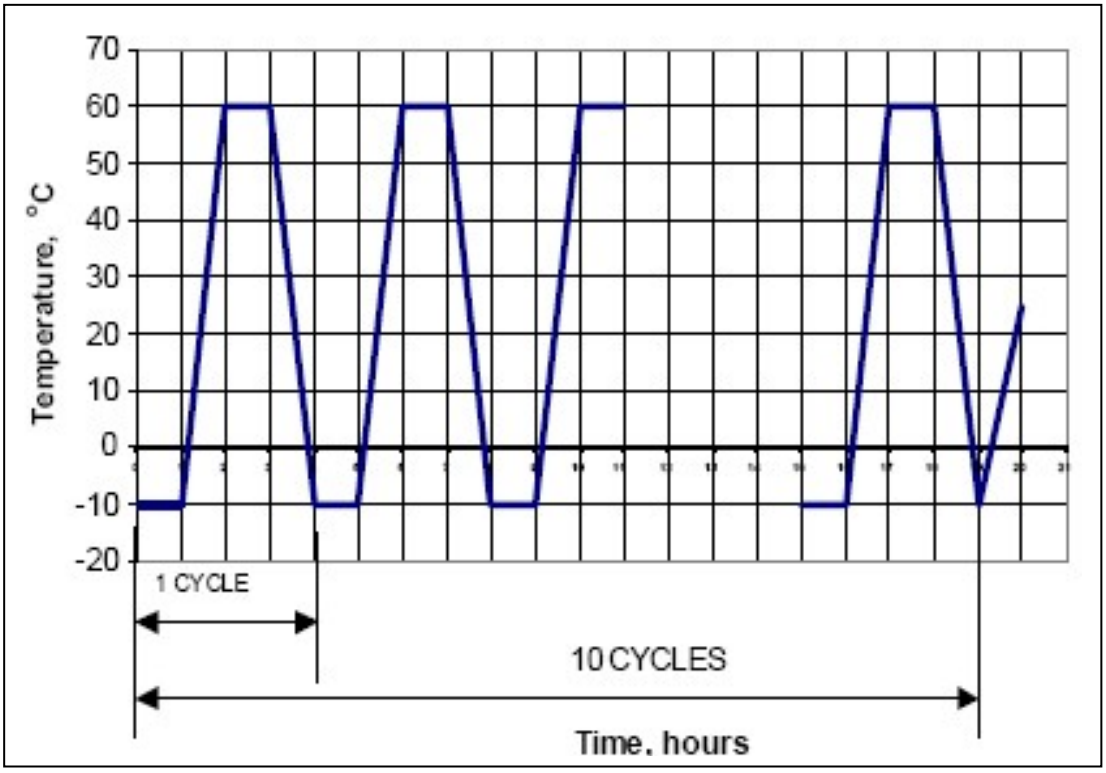


Figure 1. Thermal Cycling Test

6.2 Static Humidity Test

Place the complete antenna assembled to back case in an environmental chamber at +20℃. Then increase temperature during 2 hours t to +55℃ with humidity increasing to 95%RH. Keep antenna with these parameters for 24 hours. After the finish initial ambient parameters should be achieved during 1 hour.

After test is complete, there shall be no visual deterioration or damage. Electrical characteristics should be within the specified range.

6.3 Operating Temperature Range Test

The operational temperature range is: -10℃ to +60℃ at 50% RH. The antenna assembled to back case, should be checked immediately after 1 hour keeping 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.

6.4 Storage Temperature Test

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

7.0 QUALIFICATION

The mechanical and environmental tests mentioned above are performed according to the flow chart shown in Figure 2 below.

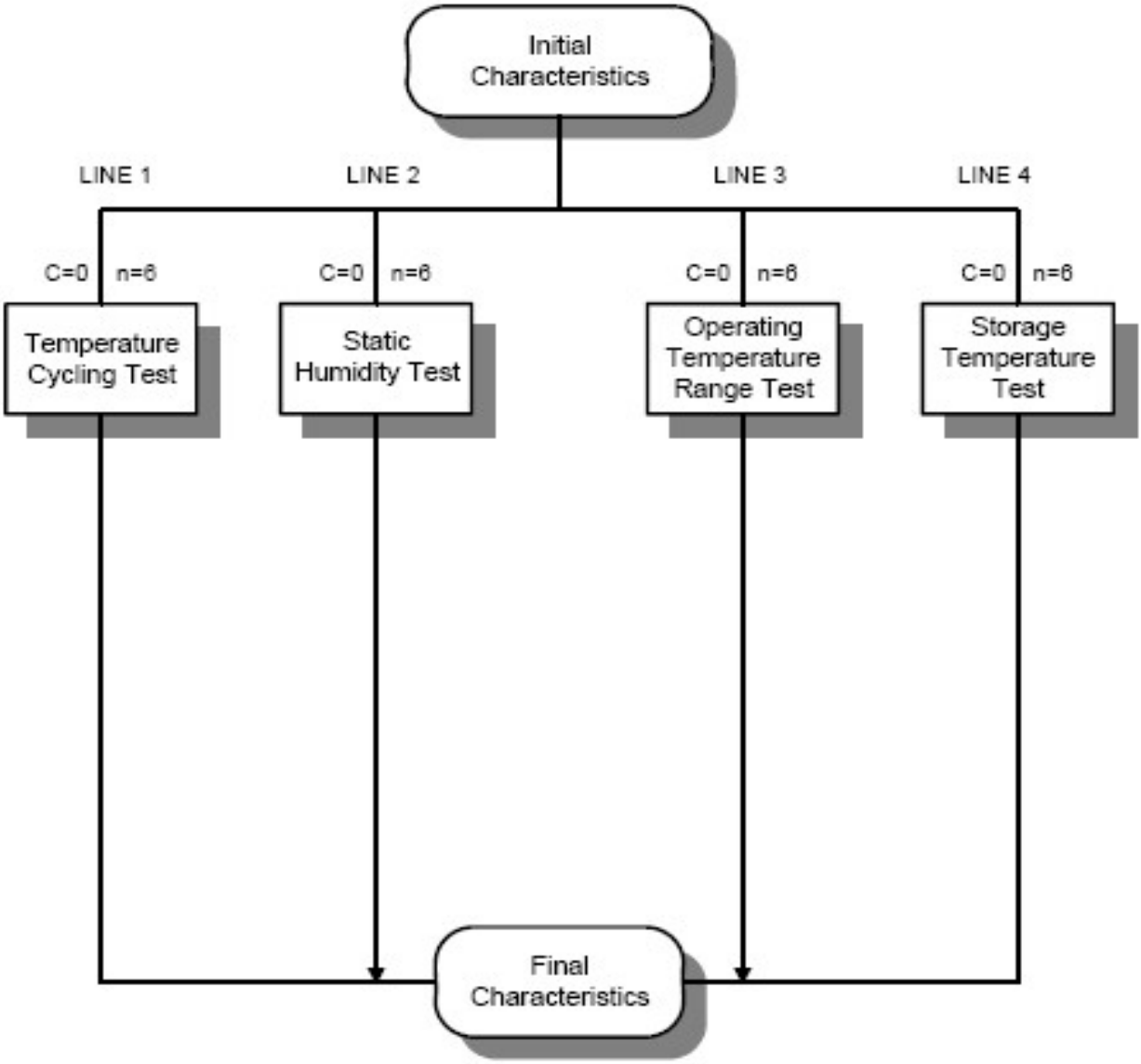
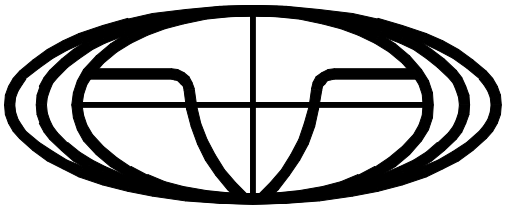


Figure 2. Property Verification test Flow Chart
Note: n - sample size; c - allowable amount of critical failures

8.0 PACKAGING

02036180-04145 will be packaged in ESD PE bag, and 5 bags will be bound together. 675 sets will be in one carton.

5pcs/group	14 groups		
			



GALTRONICS (GTK). Ltd

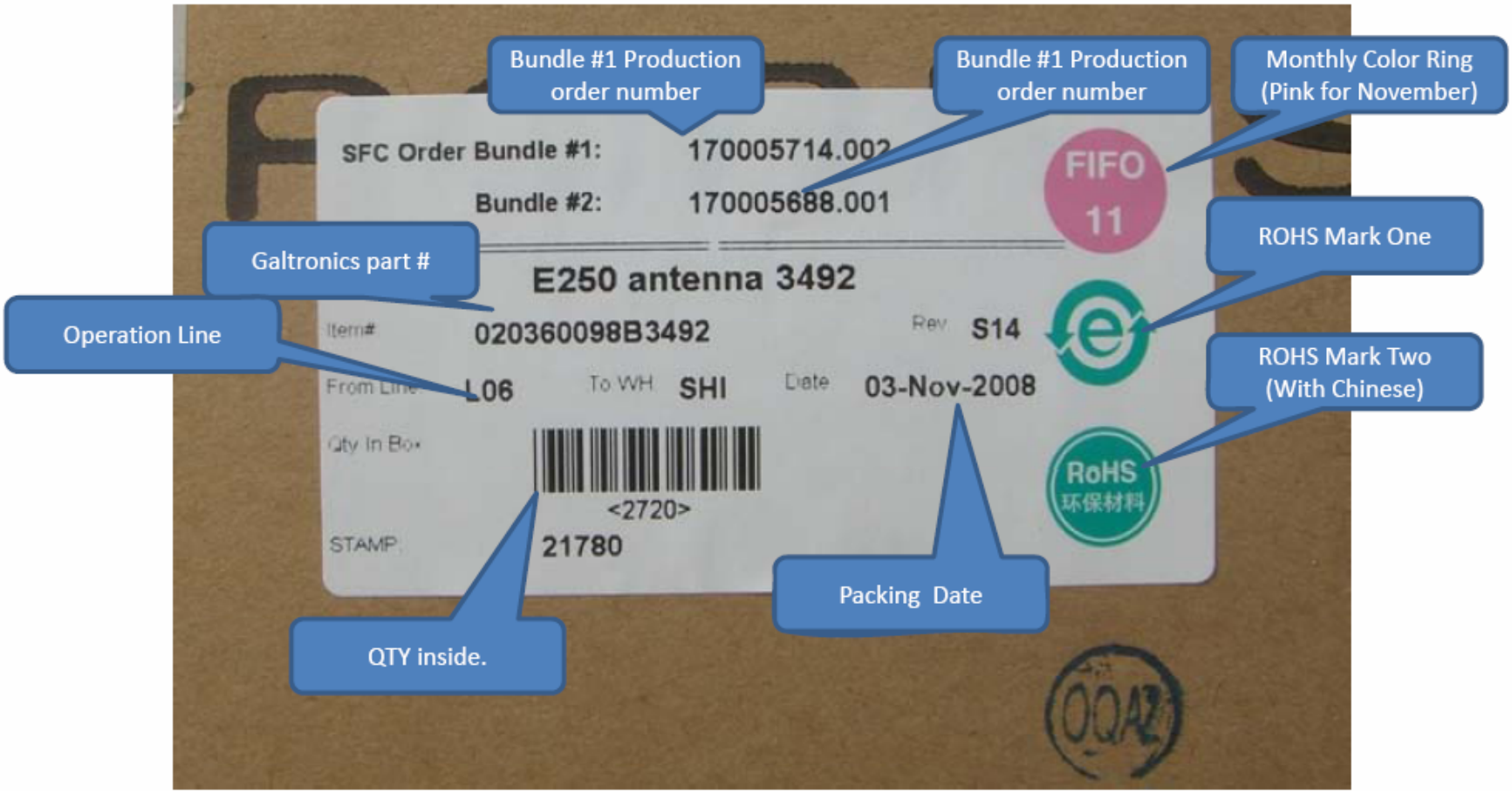
4145_Pebble HSPA Main

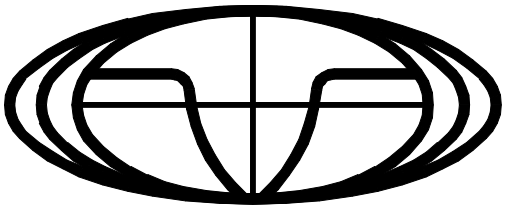
LAPTOP INTERNAL ANTENNA

02036180-04145

Label Information


Ship From
Carton QTY /Carton No. (Barcode Only)
Ship To
Quantity (this carton)
2720
Country of origin, China
Carton# of Total QTY
INTENNA,02036009883492
VENDOR:BYPV
19 OF 37
Galtronics internal project No.
5.6Kg
Ship To
GH42-00985A
Customer item No# and Barcode
Shipping Date Sales Order# Etc.


Bundle #1 Production order number
Bundle #1 Production order number
Monthly Color Ring (Pink for November)
SFC Order Bundle #1: 170005714.002
Bundle #2: 170005688.001
FIFO 11
Galtronics part #
ROHS Mark One
E250 antenna 3492
Operation Line
Item# 020360098B3492
Rev S14
From Line L06
To WH SHI
Date 03-Nov-2008
ROHS Mark Two (With Chinese)
Qty In Bo
<2720>
RoHS 环保材料
STAMP 21780
Packing Date
QTY inside.
QQA



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LAPTOP INTERNAL ANTENNA

02036180-04145

Antenna 2D-Drawing

DWG No
02036180-04145

GALTRONICS

DRAWING COVER SHEET

REV	ISSUE DATE	ECO #	DESCRIPTION
S1	09.Mar.09		Released for Samples
S2	19.Mar.09		70.00° was 70.00(A5). Added 46.53°(B7), 10.00+/-1.00(D7), 10.00+/-1.00(E6). Modified the drawing of full assembly. Added part of Shrink tube(18-7005-03,BOM).
S3	01.Apr.09		280.0+/-3.0<CTQ> was 280.0+/-3.0(C2), 70.00+/-0.40 was 70.00°(A5), 36.53° was 46.53°(B8). Added 26.98+/-1.00(B7) Modified the design of copper foil.

APPLICABLE SPEC'S:

INTERNAL DISTRIBUTION

- ☐ PROCESS
- ☐ PURCHASING
- ☐ PRODUCTION
- ☐ PLASTICS
- ☑ QUALITY
- ☑ INCOMING INSPECTION
- ☐ FINAL INSPECTION
- ☐ MARKETING

SURFACE FINISH, MICROMETERS, CLA (UNLESS STATED) 0.8

TOLERANCES UNLESS OTHERWISE SPECIFIED:

NO PLACE	(X)±1	TWO PLACE	(X.XX)±0.1
ONE PLACE	(X.X)±0.2	THREE PLACE	(X.XXX)±0.05

METRIC SCREW THREAD TO ISO STANDARDS 724, 2861, 965-1 AND 965-2 INCHES SCREW THREAD TO ANSI/ASME B1.1. ALL ANGLES TO BE 90° UNLESS OTHERWISE STATED. TOLERANCE ON ANGLES ±1/4° ALL TOLERANCES APPLY AFTER FINISHING. MACHINE CORNER RADS. 0.25 MAX., TO BE FREE FROM BURRS, SHARP EDGES AND ALL FOREIGN MATERIALS. FLASH ALLOWANCE FOR PLASTIC MOLDED PARTS TO BE 0.1mm UNLESS OTHERWISE STATED. DIAMETER MUST BE CONCENTRIC WITHIN 0.08 T.I.R.. ENVIRONMENTAL REQUIREMENTS : COMPLIANCE WITH GALTRONICS STANDARD 'SUPPLIER ENVIRONMENTAL DECLARATION PROCEDURE"(SOPG002E).

QUALITY ASSURANCE NOTES:

NO CHANGE SHALL BE ALLOWED ON PRODUCTION. MATERIAL WITHOUT PRIOR EXPLICIT WRITTEN APPROVAL BY GALTRONICS ENGINEERING AND PURCHASING DEPARTMENTS FOR SPECIAL REQUIREMENTS SEE FM49

- ☒ XR PROCESS CONTROL CHART REQUIRED WITH EACH SHIPMENT!
- ☐ CRITICAL DIMENSION AFFECTS FORM FIT OR FUNCTION

SUFFIX #	DESCRIPTION

MATERIAL	SEE NOTE
FINISH	

TITLE:

RFQ 4145
PEBBLE MAIN ANTENNA

CHKD: Kevin

APRVD: It' Andy

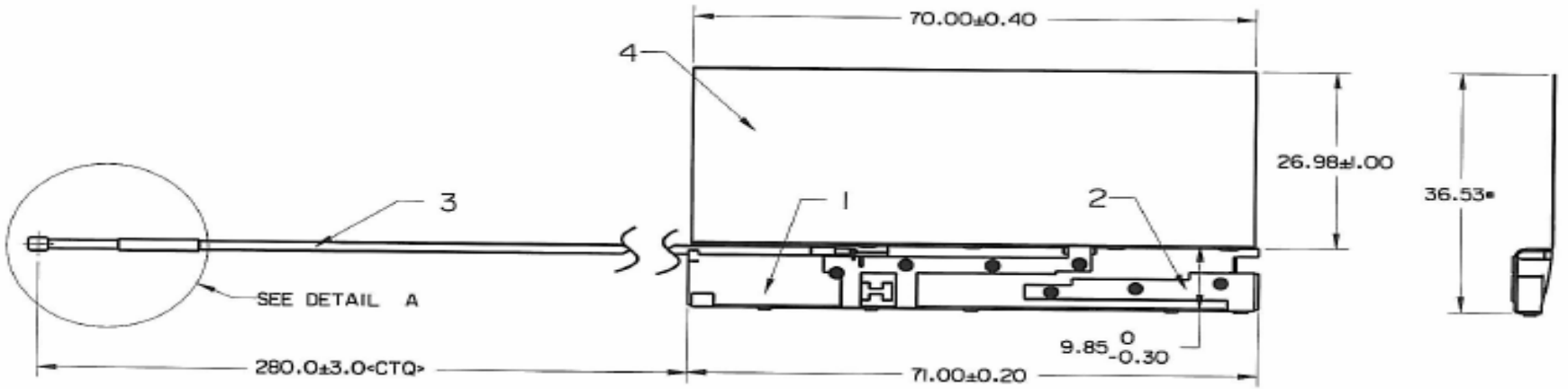
DATE: 01.Apr.2009

DWG. No. 02036180-04145

REV. **S3**

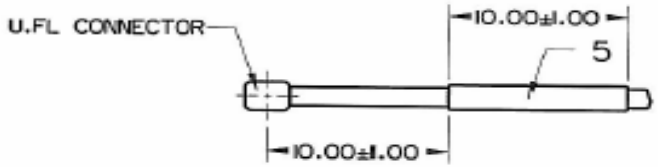
DWG. NO.: A3
02036180-04145

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED. DO NOT SCALE - IF IN DOUBT, ASK!! SEE COVER SHEET FOR PERTINENT INFORMATION



NOTE.
1. UNLESS SPECIFIED ALLOWED MAXIMUM GAP BETWEEN CARRIER AND ELEMENT IS 0.20mm.
2. TOLERANCE UNLESS OTHERWISE SPECIFIED :
   NO PLACE : (X)±1mm TWO PLACE : (X.XX)±0.1mm
   ONE PLACE : (X.X)±0.2mm THREE PLACE : (X.XXX)±0.05mm
3. <CTQ> MEANS CRITICAL DIEMENSION AND '*' MARK MEANS REFERENCE DIEMENSION.

NO	PART NAME	MATERIAL	FINISH
5	SHRINK TUBE	ø1.5	COLOR : RED
4	COPPER FOIL	CONDUCTIVE ADHESIVE TAPE	-
3	U.FL CONNECTOR CABLE ASSEMBLY	-	CABLE COLOR : GRAY
2	ELEMENT	Ni-SLIVER (0.2T)	-
1	CARRIER	CARREIR	COLOR : BLACK



DETAIL A
SCALE 4.000

CAD FILE: 02036180-04145

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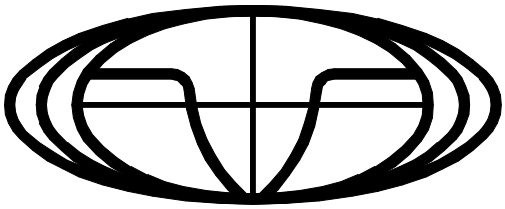
THIS PRINT IS GALTRONICS CONFIDENTIAL

ENGINEER	Kevin	CHECKED	Kevin
DRAWN	Kyoungjin	APPVD.	H. Andy
DATE	01.Apr.09	DATE	01. Apr. 2009

RFQ 4145
PEBBLE MAIN ANTENNA

DWG. NO.: A3 **02036180-04145**

REV. S3



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4145_Pebble HSPA Main

LAPTOP INTERNAL ANTENNA

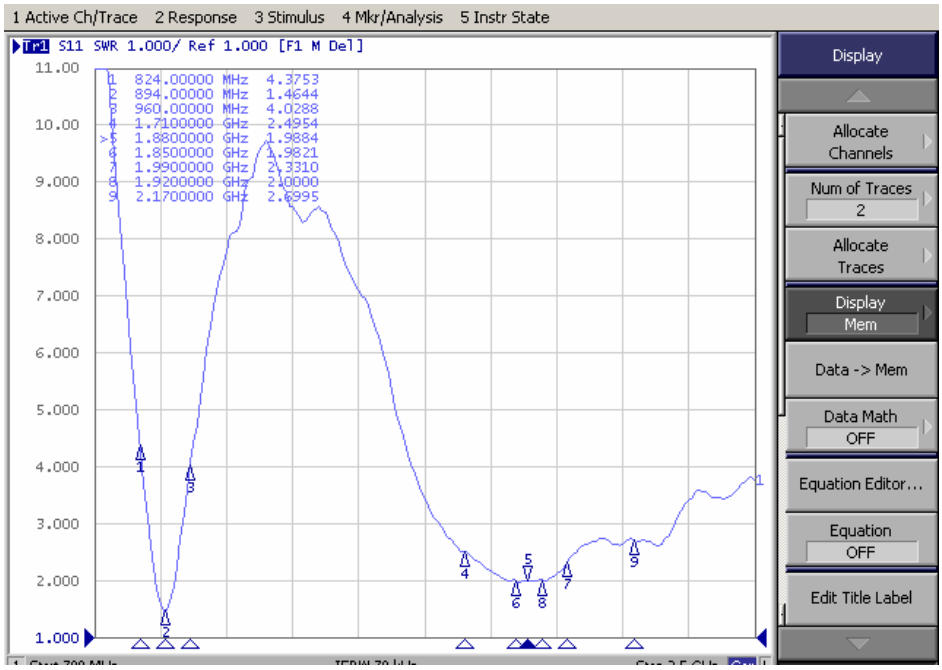
02036180-04145

Electronic Data

ELECTRICAL MEASUREMENTS

1. VSWR

1.1 VSWR GRAPH



1.2 VSWR TEST DATA

VSWR Test Data

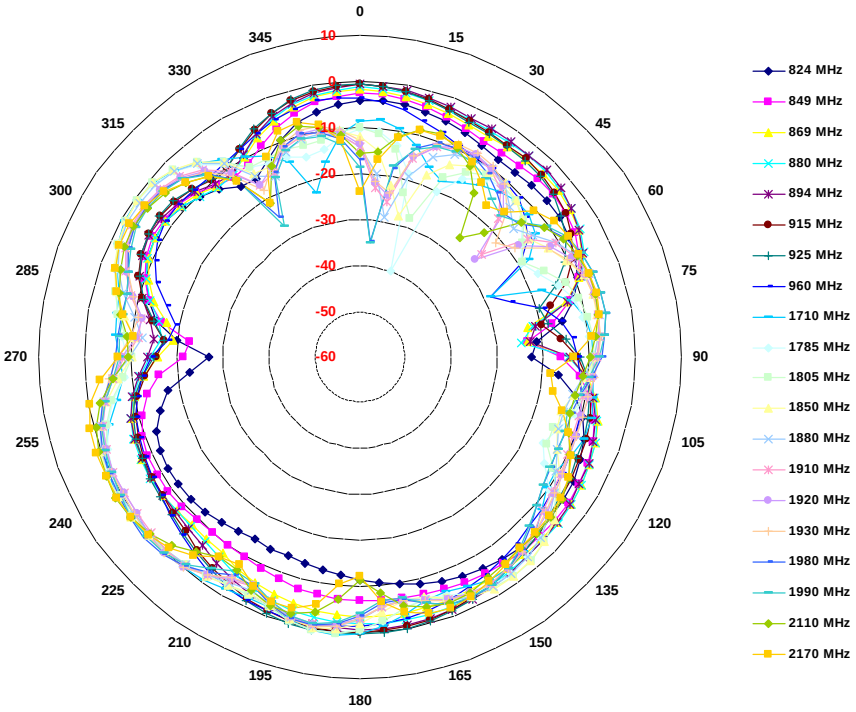
GALTRONICS

SPEC	SLIDER UP					SLIDER DOWN				
	824MHz	960MHz	1710MHz	1850MH	1990MHZ	824MHz	960MHz	1710MHz	1850MH	1990MHZ
	MAX:6.6	MAX:8.2	MAX:6.6	MAX:3.5	MAX:3.1	MAX:6.5	MAX:9.7	MAX:6.5	MAX:3.1	MAX:3.1
1	5.68	7.08	3.95	2.04	2.04	5.47	8.57	5.23	2.39	2.15
2	5.54	6.96	4.00	2.04	2.04	5.43	8.60	5.25	2.39	2.17
3	5.69	7.13	3.91	2.07	2.06	5.51	8.67	5.19	2.38	2.16
4	5.22	6.67	4.05	2.03	2.03	5.19	8.32	5.64	2.78	2.54
5	5.45	6.86	4.00	2.04	2.05	5.52	8.64	5.12	2.37	2.16
6	5.60	7.05	4.01	2.05	2.05	5.47	8.59	5.16	2.36	2.14
7	5.88	7.45	4.57	2.30	2.20	5.50	8.63	5.22	2.39	2.15
8	5.75	7.19	3.97	2.05	2.04	5.38	8.57	5.27	2.42	2.17
9	5.62	7.04	4.02	2.04	2.04	5.05	8.15	5.21	2.42	2.16
10	5.55	6.90	3.99	2.12	2.06	5.52	8.60	5.25	2.38	2.15
11	5.61	6.97	4.04	2.04	2.04	5.32	8.46	5.21	2.40	2.16
12	5.65	6.98	3.95	2.06	2.05	5.53	8.62	5.23	2.40	2.16
13	5.88	7.36	4.58	2.19	2.10	5.48	8.56	5.17	2.39	2.17
14	5.71	7.18	3.88	2.09	2.08	5.46	8.57	5.27	2.41	2.17
15	5.45	6.86	4.00	2.04	2.05	5.52	8.64	5.12	2.37	2.16
16	5.60	7.05	4.01	2.05	2.05	5.47	8.59	5.16	2.36	2.14
17	5.88	7.45	4.57	2.30	2.20	5.50	8.63	5.22	2.39	2.15
18	5.75	7.19	3.97	2.05	2.04	5.38	8.57	5.27	2.42	2.17
19	5.62	7.04	4.02	2.04	2.04	5.05	8.15	5.21	2.42	2.16
20	5.55	6.90	3.99	2.12	2.06	5.52	8.60	5.25	2.38	2.15
21	5.61	6.97	4.04	2.04	2.04	5.32	8.46	5.21	2.40	2.16
22	5.65	6.98	3.95	2.06	2.05	5.53	8.62	5.23	2.40	2.16
23	5.88	7.36	4.58	2.19	2.10	5.48	8.56	5.17	2.39	2.17
24	5.71	7.18	3.88	2.09	2.08	5.46	8.57	5.27	2.41	2.17
25	5.45	6.86	4.00	2.04	2.05	5.52	8.64	5.12	2.37	2.16
26	5.60	7.05	4.01	2.05	2.05	5.47	8.59	5.16	2.36	2.14
27	5.88	7.45	4.57	2.30	2.20	5.50	8.63	5.22	2.39	2.15
28	5.75	7.19	3.97	2.05	2.04	5.38	8.57	5.27	2.42	2.17
29	5.62	7.04	4.02	2.04	2.04	5.05	8.15	5.21	2.42	2.16
30	5.55	6.90	3.99	2.12	2.06	5.52	8.60	5.25	2.38	2.15
31	5.61	6.97	4.04	2.04	2.04	5.32	8.46	5.21	2.40	2.16
32	5.65	6.98	3.95	2.06	2.05	5.53	8.62	5.23	2.40	2.16
33	5.88	7.36	4.58	2.19	2.10	5.48	8.56	5.17	2.39	2.17
34	5.71	7.18	3.88	2.09	2.08	5.46	8.57	5.27	2.41	2.17
35	5.69	7.13	3.91	2.07	2.06	5.51	8.67	5.19	2.38	2.16
36	5.68	6.95	4.10	2.05	2.01	5.48	8.59	5.25	2.38	2.14
37	5.88	7.45	4.57	2.30	2.20	5.50	8.63	5.22	2.39	2.15
38	5.75	7.19	3.97	2.05	2.04	5.38	8.57	5.27	2.42	2.17
39	5.62	7.04	4.02	2.04	2.04	5.05	8.15	5.21	2.42	2.16
40	5.55	6.90	3.99	2.12	2.06	5.52	8.60	5.25	2.38	2.15
41	5.61	6.97	4.04	2.04	2.04	5.32	8.46	5.21	2.40	2.16
42	5.65	6.98	3.95	2.06	2.05	5.53	8.62	5.23	2.40	2.16
43	5.88	7.36	4.58	2.19	2.10	5.48	8.56	5.17	2.39	2.17
44	5.71	7.18	3.88	2.09	2.08	5.46	8.57	5.27	2.41	2.17
45	5.45	6.86	4.00	2.04	2.05	5.52	8.64	5.12	2.37	2.16
46	5.60	7.05	4.01	2.05	2.05	5.47	8.59	5.16	2.36	2.14
47	5.61	6.97	4.04	2.04	2.04	5.32	8.46	5.21	2.40	2.16
48	5.65	6.98	3.95	2.06	2.05	5.53	8.62	5.23	2.40	2.16
49	5.88	7.36	4.58	2.19	2.10	5.48	8.56	5.17	2.39	2.17
50	5.71	7.18	3.88	2.09	2.08	5.46	8.57	5.27	2.41	2.17
USL	6.60	8.20	6.60	3.50	3.10	6.50	9.70	6.50	3.10	3.10
Max	5.88	7.45	4.58	2.30	2.20	5.53	8.67	5.64	2.78	2.54
Min	5.22	6.67	3.88	2.03	2.01	5.05	8.15	5.12	2.36	2.14
Mean	5.66	7.08	4.08	2.09	2.07	5.42	8.54	5.22	2.40	2.17
STD	0.14	0.19	0.23	0.08	0.05	0.14	0.14	0.08	0.07	0.06
CPK	2.19	1.99	3.67	6.06	7.59	2.61	2.80	5.07	3.46	4.83

2. GAIN

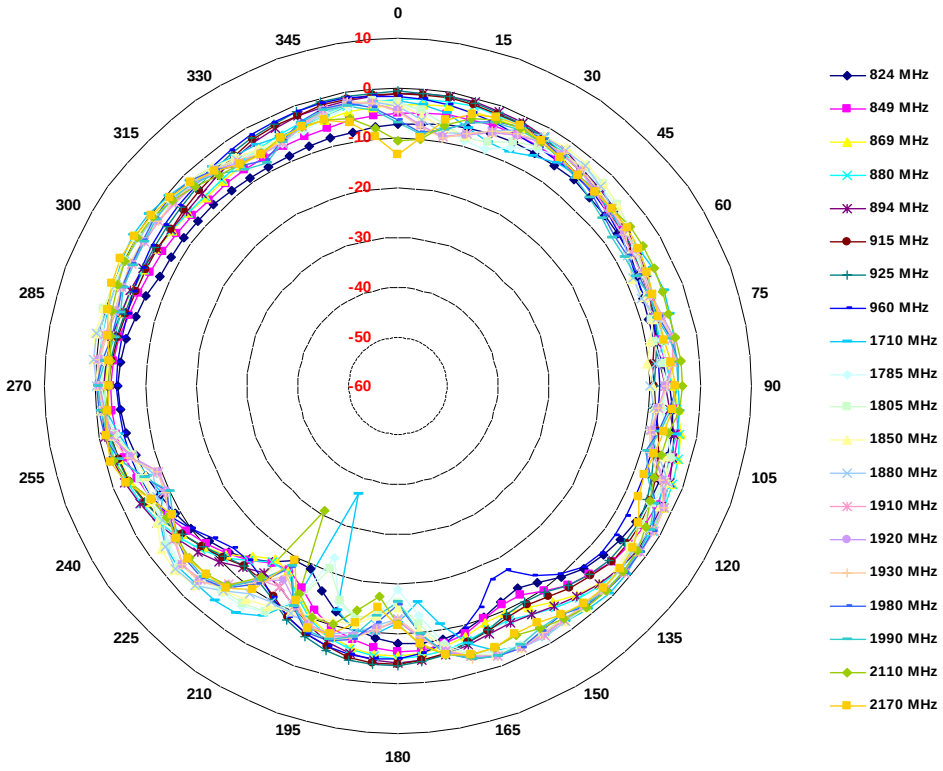
- **H(Azimuth) Pattern**

Freq	Gavg	Gpeak		Gmin		Dev
MHz	*dBi*	*dBi*	deg	*dBi*	deg	*dB*
824	-8.88	-4.04	5	-27.05	270	23.01
849	-7.04	-2.58	0	-23.23	85	20.65
869	-5.67	-1.85	0	-23.21	85	21.37
880	-4.91	-1.28	0	-24.83	85	23.55
894	-4.31	-0.60	180	-22.71	85	22.11
915	-4.47	-0.12	180	-19.77	80	19.64
925	-4.30	0.30	185	-19.49	75	19.79
960	-6.23	-0.89	190	-28.68	65	27.79
1710	-4.28	0.96	240	-28.75	65	29.71
1785	-4.74	0.35	185	-40.16	20	40.50
1805	-4.37	0.49	235	-27.82	20	28.32
1850	-4.38	0.82	240	-28.07	15	28.89
1880	-4.74	0.37	245	-29.14	10	29.51
1910	-5.33	-0.27	225	-25.77	10	25.50
1920	-5.23	0.14	225	-27.05	50	27.19
1930	-5.06	0.49	225	-23.88	10	24.37
1980	-4.87	1.22	230	-35	5	36.22
1990	-5.22	0.82	230	-35.05	5	35.87
2110	-5.34	1.26	240	-26.02	40	27.29
2170	-4.95	1.13	245	-24.13	0	25.26



E1(elevation 1) Pattern

Freq	Gavg	Gpeak		Gmin		Dev
MHz	*dBi*	*dBi*	deg	*dBi*	deg	*dB*
824	-7.53	-4.60	270	-19.44	210	14.84
849	-5.91	-2.99	270	-17.17	210	14.18
869	-4.70	-1.86	265	-17.53	215	15.67
880	-4.17	-1.42	265	-16.77	215	15.35
894	-3.86	-0.90	10	-13.86	215	12.96
915	-4.48	-1.14	0	-12.56	215	11.42
925	-4.24	-0.73	0	-12.55	220	11.82
960	-5.23	-1.10	345	-17.43	150	16.32
1710	-3.52	0.42	300	-36.86	200	37.29
1785	-4.21	-0.19	290	-23.15	200	22.96
1805	-3.96	0.15	285	-20.56	200	20.71
1850	-3.56	0.86	280	-15.31	180	16.18
1880	-3.72	0.63	275	-13.19	180	13.82
1910	-4.17	-0.37	275	-13.45	210	13.07
1920	-4.16	-0.69	275	-14.92	210	14.22
1930	-4.03	-0.49	275	-15.94	210	15.46
1980	-4.09	-0.29	270	-17.92	210	17.63
1990	-4.46	-0.72	270	-18.15	210	17.43
2110	-4.14	-0.33	300	-30.89	210	30.56
2170	-4.23	0.54	295	-19.51	210	20.04



E2(elevation 2) Pattern

Freq	Gavg	Gpeak		Gmin		Dev
MHz	*dBi*	*dBi*	deg	*dBi*	deg	*dB*
824	-6.43	-3.39	305	-13.08	110	9.70
849	-5.14	-2.23	305	-10.78	105	8.55
869	-4.30	-1.38	300	-10.93	100	9.55
880	-4.06	-1.06	300	-11.72	105	10.66
894	-4.07	-0.86	295	-11.91	105	11.05
915	-5.24	-1.90	230	-14.45	105	12.55
925	-5.27	-1.73	225	-14.30	105	12.57
960	-7.24	-3.84	220	-17.11	110	13.27
1710	-4.76	-0.66	185	-14.48	260	13.82
1785	-4.87	-0.65	180	-12.57	285	11.92
1805	-4.34	0.04	180	-11.62	285	11.65
1850	-3.88	0.97	180	-12.73	280	13.70
1880	-3.99	1.14	185	-13.26	275	14.40
1910	-4.42	0.87	185	-13.64	270	14.51
1920	-4.45	0.86	185	-13.34	270	14.20
1930	-4.29	1.23	185	-13.15	270	14.38
1980	-4.18	1.35	190	-16.63	275	17.98
1990	-4.62	0.87	190	-17.47	275	18.34
2110	-5.51	-0.28	195	-30.33	270	30.05
2170	-5.88	-0.20	200	-26.71	95	26.50