

Mark Hill

From: Adam Alevy [Adam.Alevy@lairdtech.com]
Sent: Tuesday, July 12, 2011 7:22 AM
To: Maske, Rudolph (Rudolph); Mark Miller
Cc: Doug Kerr

Subject: AP EXT ANT Laird 70o gains - lower gain is correct

Hi Rudy, We have confirmed that the higher gain data (10 to 11+ dBi at 5 GHz) is NOT valid. The gains below are valid for this antenna with a 36 inch cable. I apologize for the delay and the confusion this has caused you. We often measure different data sets with varying configurations, and this early data set that was not clearly labeled has caused us confusion as well. We are currently reviewing why it was documented that way and will make the necessary changes to be sure this does not occur again.

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Monday, July 11, 2011 12:04 PM
To: Adam Alevy; Mark Miller
Cc: Doug Kerr

We expect to finish testing this week, and release the product to production. Generating a new set of data would delay things significantly. The best thing is to confirm that the lower gain data is or isn't valid, compared to the higher gain data.

Peak Gain (dBi)	P1 (V-Pol)	P2 (H-Pol)	P3 (V-Pol)
2.4 - 2.5 GHz	6.65	6.75	7.13
5.15 - 5.35 GHz	8.66	7.68	8.66
5.5 GHz	8.76	7.54	8.76
5.9 GHz	8.84	7.65	8.76

<< File: Laird_MIMO_70o_S24517PT36RSM Patterns.pptx >>

From: Adam Alevy [<mailto:Adam.Alevy@lairdtech.com>] **Sent:** Thursday, July 07, 2011 6:29 PM
To: Maske, Rudolph (Rudolph); Mark Miller
Cc: Doug Kerr

Rudy, I know you indicated that you have discussed this issue with the chipset/radio supplier and your test lab. What is the current status of the testing right now?

What I would propose is that you allow us to measure another unit to confirm the gains for you. I don't want to hold you up any longer, but I think this is the best course of action to be clear that we are giving you the most accurate data. I'm checking now on how long this will take.

Please call me or Mark if you'd like to discuss this in more detail. My mobile is 781-929-2662.

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Thursday, July 07, 2011 6:24 PM
To: Mark Miller
Cc: Adam Alevy
 thanks

From: Mark Miller [<mailto:Mark.Miller@lairdtech.com>] **Sent:** Thursday, July 07, 2011 3:20 PM
To: Maske, Rudolph (Rudolph)
Cc: Adam Alevy
 Rudy, We are checking this. Adam will give you a call.

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Thursday, July 07, 2011 6:13 PM
To: Mark Miller
 You stated earlier that he was director of engineering. Does this mean that the data sheet spec of 10.7dB is for the antenna without the pigtail?

From: Mark Miller [<mailto:Mark.Miller@lairdtech.com>] **Sent:** Thursday, July 07, 2011 3:09 PM
To: Maske, Rudolph (Rudolph); Doug Kerr; Adam Alevy; Rose, Thomas H (Thomas)
Cc: Santos, Curtis (Curtis); Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher
 Rudy, Higher management in this case is Adam Alevy, VP of engineering. Adam has confirmed that the lower gain data is correct for the production antenna with 36 inch pigtail. How would you like to proceed at this time?

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Thursday, July 07, 2011 5:31 PM

To: Mark Miller; Doug Kerr; Adam Alevy; Rose, Thomas H (Thomas)
Cc: Santos, Curtis (Curtis); Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher
 What is going on! Are you serious? I don't believe this.
 Can you escalate this to higher management and reply with a confirmation.

From: Mark Miller [<mailto:Mark.Miller@lairdtech.com>] **Sent:** Thursday, July 07, 2011 2:09 PM

Rudy, Today our engineers reviewed all the test data for the S24517PT. It turns out that the lower gain measurements are the correct ones for the 36 inch pigtail configuration for production antennas. The high gain measurements were made with a short pigtail, and also in the early stages of the design when we were using a lower loss board material. The lower loss board material was too expensive for production at the price point for this antenna.

Mark Miller
 Product Manager
 Laird Technologies
 1 Perimeter Road
 Suite 700
 Manchester, NH 03103
 603-935-7409

From: Mark Miller **Sent:** Wednesday, July 06, 2011 4:55 PM

To: 'Maske, Rudolph (Rudolph)'; Doug Kerr; Adam Alevy

Cc: Santos, Curtis (Curtis); Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher

Rudy, As a follow up to our phone conversation here is a summary of the information regarding the gain of the S24517PT36RTN.

- The power point presentation with the higher gain is the correct one for this antenna with a 3-ft cable.
- The presentation with the lower gain had measurements done with a longer cable
- Going forward we suggest that you may want to go with an 8-ft cable length to reduce the 5.1 GHz gain to 10 dBi maximum.

Let us know how you want to proceed.

<< File: Laird_MIMO_70o_S24517PT Patterns 090701.ppt >>

From: Maske, Rudolph (Rudolph) **Sent:** Wednesday, July 06, 2011 11:39 AM

To: 'Doug Kerr'; 'Adam Alevy'

Cc: Santos, Curtis (Curtis); 'Mark Miller'; 'Paul Paul'; 'Kevin Burton'; 'O'Donnell North - Richard Boucher'

I just figured out that part of the confusion is that we received 2 different radiation patterns files from you (see email thread below).

Please tell us which one we should use (preferably the one with lower peak gain).

Thanks

<< File: Laird_MIMO_70o_S24517PT Patterns 090701.ppt >> << File: Laird_MIMO_70o_S24517PT Patterns.pptx >>

From: Maske, Rudolph (Rudolph) **Sent:** Wednesday, July 06, 2011 8:52 AM

Thanks Doug.

Adam, please understand that we need to release this new product to production, and this issue is a blocker. Thanks for your support.

From: Doug Kerr [<mailto:Doug.Kerr@lairdtech.com>] **Sent:** Tuesday, July 05, 2011 2:52 PM

To: Maske, Rudolph; Adam Alevy

Cc: Santos, Curtis; Mark Miller; Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher

Rudy, I've included Adam Alevy, our Director of Engineering, on this email trail. The questions you ask below go beyond what I can answer. Adam - can you provide the requested information below? This is for Avaya and is our P/N S24517PT36RSM. Thanks for your help.

From: Maske, Rudolph (Rudolph) [<mailto:rmask@avaya.com>] **Sent:** Tuesday, July 05, 2011 2:01 PM

To: Doug Kerr

Cc: Santos, Curtis (Curtis); Mark Miller; Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher

Doug, the high antenna gain is causing some pain in trying to complete certification. Our LAB has submitted the following email requests:

"From the data tables it appears that P1 and P2 antennas are cross-polarized.

Is there a way to obtain the cross-polarized gain information because, if

1. P1 and P2 are shifted 90-degrees to each other (one vertically polarized, the other horizontally polarized), **AND**
2. P1 and P2 are the transmit chains (and P3 is receive-only)

Then we should not necessarily have to combine the individual peak antenna gains for MIMO modes, we would only need to combine the cross-polarized gains. This could (if the cross-polarized gain values are much lower than the co-Polar gains) give an increase of about 3dB in allowed output power and get you over the driver-limited, power-per-chain thresholds.

To do this we not only need the correct antenna gain, accounting for cable losses, but also

- a clear description of how the individual antenna elements are arranged in the antenna housing
- detailed information about the co-polar and cross polar gains for antenna 1 and 2
- clear indication that transmit chains are connected to P1 and P2 and receive-only is connected to P3.

	Peak Gain, no cables (dBi)	Peak Gain, with 3' cables (dBi)			
Band	P1 (V-Pol)	P2 (H-Pol)	P3 (V-Pol)	P1 (V-Pol)	P2 (H-Pol)
2.4 - 2.5 GHz	7.35- 7.56	8.29- 8.60	8.43-8.65	6.86	7.90

5.15 - 5.35 GHz	10.91-10.96	9.92- 9.93	10.97-11.15	10.06	9.03
5470-5725 GHz	10.87-10.99	9.91-10.13	11.29	9.99	9.13
5725-5850 GHz	10.80-10.87	10.13-10.26	11.29	9.87	9.26

Band	Loss of 3' Cable
2.4 - 2.5 GHz	0.7dB
5.15 - 5.35 GHz	0.9dB
5470-5725 GHz	1.0dB
5725-5850 GHz	1.0dB

The 700 antenna connectors are labeled as V-Pol (bottom left), H-Pol center top, V-Pol (bottom right), and the 3 elements are different (non-symmetrical). The AP8120-E connectors are labeled 2.4G #1, 2.4G #2, 2.4G #3, 5G #1, 5G #2, 5G #3. Also, there isn't a specified requirement on how to hook them up.

From: Doug Kerr [<mailto:Doug.Kerr@lairdtech.com>] **Sent:** Tuesday, July 05, 2011 7:55 AM
To: Maske, Rudolph (Rudolph)
Cc: Santos, Curtis (Curtis); Mark Miller; Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher
Rudy, Our official file for this antenna is attached. Please note that gain was not measured at all the specific frequencies you requested. For those which were not tested, I interpolated the peak gains. The gain is very stable over frequency and therefore, easy to project.
For the cable loss I used the specs on the attached datasheet, again using some interpolation for frequencies not given. This is the best we can do with what we have on file. We would have to retest an antenna to get exact results for exact frequencies. Hopefully the attached is adequate.
<< File: S24517PT Patterns.ppt >> << File: Laird CBL TL-097010.pdf >>

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Saturday, July 02, 2011 8:37 AM
To: Doug Kerr
Cc: Santos, Curtis (Curtis); Mark Miller; Paul Paul; Kevin Burton; O'Donnell North - Richard Boucher
Doug, Elliott Labs is concerned about the various sets of data we've provided. They would like some supporting documentation. Can you please provide it? Thanks.
On Jul 1, 2011, at 1:17 PM, "Doug Kerr" <Doug.Kerr@lairdtech.com> wrote:
Rudy, I don't have measurements at each frequency, but cable and connector loss should be in the following ranges:
2400-2483 MHz 0.7 to 0.9 dB
5150-5850 MHz 1.0 to 1.2 dB

From: Maske, Rudolph [<mailto:rmaske@avaya.com>] **Sent:** Friday, July 01, 2011 11:56 AM
Greatly appreciated for the quick reponse.
What is the 3' cable loss (with connector) at the various frequencies?

From: Doug Kerr [<mailto:Doug.Kerr@lairdtech.com>] **Sent:** Friday, July 01, 2011 11:44 AM
Rudy, All gain measurements are taken at the connector, so include cable loss with 3 foot cables. Even though field tests show the antenna works quite well at 4.9 GHz, this is outside of the specified frequency range for the antenna. We do not have gain data in our records at 4.9 GHz.

Freq	Port 1	Port 2	Port 3
MHz	Gain dBi	Gain dBi	Gain dBi
5850	10.80	10.26	11.29
5725	10.87	10.13	11.29
5500	10.99	9.91	11.29
5350	10.96	9.92	11.15
5150	10.91	9.93	10.97
4900	No data	No data	No data
2483	7.56	8.41	8.43
2440	6.94	8.60	8.65
2400	7.35	8.29	8.46

From: Maske, Rudolph [<mailto:rmaske@avaya.com>] **Sent:** Friday, July 01, 2011 11:30 AM
Another question from our our regulatory testing LAB, is concerning the gain:
Is the gain spec (8 @ 2450 MHz, 10.7 @ 5500 MHz) based on the antenna with the 3' pig-tail?

From: Maske, Rudolph **Sent:** Friday, July 01, 2011 10:00 AM
Doug, we have an urgent request from our regulatory testing LAB on the Laird antenna. Do you have overall peak gain over different frequencies similar to what is in the table below?

From: Doug Kerr [<mailto:Doug.Kerr@lairdtech.com>] **Sent:** Monday, June 20, 2011 6:57 AM
To: Santos, Curtis (Curtis)
Cc: Mark Miller; Paul Paul; Maske, Rudolph (Rudolph); Kevin Burton; O'Donnell North - Richard Boucher
Curtis, Attached is our full test report. The patterns are on slides 5 through 24. Let me know if you need anything further.
<< File: S24517PT data package.pptx >>

From: Santos, Curtis (Curtis) [<mailto:santos2@avaya.com>] **Sent:** Tuesday, June 14, 2011 9:58 AM
To: Doug Kerr
Cc: Mark Miller; Paul Paul; Maske, Rudolph (Rudolph); Kevin Burton
 Doug Can we get a copy of the radiation patterns for the S24517PT? The small brochure included with the antenna shows them, but we need an electronic copy to include in our documentation. Let me know if you can assist.

From: Maske, Rudolph (Rudolph) **Sent:** Tuesday, June 14, 2011 6:23 AM
To: 'Kevin Burton'
Cc: 'Doug Kerr'; 'Mark Miller'; 'Paul Paul'; Santos, Curtis (Curtis); Ravi, Tilak (Tilak); Schweizer, Steven Eric (Steve); Wong, Edwin (Edwin); Zhao, Huiling (Amy); Srinivasan, Jayanthi (Jayanthi)
 Thanks

From: Paul Paul [<mailto:Paul.Paul@lairdtech.com>] **Sent:** Monday, June 13, 2011 10:43 AM
To: Doug Kerr
Cc: Maske, Rudolph (Rudolph)
 Rudolph, Suggest the SP6 series of lightning Arresters as attached above.
 << File: [sp6_DataSheet.pdf](#) >>
 Paul M. Paul
 Field Applications Engineer
 Laird Technologies
 Tel: 1-847-839-6965
www.lairdtech.com

From: Doug Kerr **Sent:** Monday, June 13, 2011 12:28 PM
To: Paul Paul
Cc: Kevin Burton
 Paul, In Kevin's absence can you help recommend a lightning arrestor for Avaya? This will be used with the S24517PT36RSM antenna. Let me know if you need any other information. Thanks for your help.

From: Maske, Rudolph (Rudolph) **Sent:** Friday, June 10, 2011 9:57 AM
To: Kevin Burton
Cc: Doug Kerr; Mark Miller; Paul Paul; Santos, Curtis (Curtis); Ravi, Tilak (Tilak); Schweizer, Steven Eric (Steve); Wong, Edwin (Edwin); Zhao, Huiling (Amy); Srinivasan, Jayanthi (Jayanthi)
 Resend.
 Still need a recommendation on lightning arrestor. Thanks.

From: Maske, Rudolph (Rudolph) **Sent:** Monday, June 06, 2011 3:01 PM
To: 'Kevin Burton'
Cc: Doug Kerr; Mark Miller; Paul Paul; Santos, Curtis (Curtis); Ravi, Tilak (Tilak); Schweizer, Steven Eric (Steve); Wong, Edwin (Edwin); Zhao, Huiling (Amy)
 Thanks, but I have these drawings. I was more interested in the issues concerning the environment - i.e. lightning arrestor.

From: Kevin Burton [<mailto:Kevin.Burton@lairdtech.com>] **Sent:** Monday, June 06, 2011 10:34 AM
To: Maske, Rudolph (Rudolph)
Cc: Doug Kerr; Mark Miller; Paul Paul
 Hi Rudolph- Kevin Burton here, Doug requested I check in with you regarding the S24517PT36RSM antenna. Mounting of this antenna is pretty straight forward. Attached is the antenna mounting outline and the HDMNT spec sheet.
 I will get some details regarding the lightening arrestors and let you know. In the mean time, let me know if you have additional questions.
 Kevin Burton | Field Applications Engineer
 Laird Technologies | Tel: 402-325-3121 | Mobile: 402-770-3580
kevin.burton@lairdtech.com | www.lairdtech.com
 << File: [S24517PT36RSM_mounting_outline.pdf](#) >> << File: [HDMNT_spec.pdf](#) >>

From: Maske, Rudolph (Rudolph) [<mailto:rmaske@avaya.com>] **Sent:** Saturday, June 04, 2011 8:21 AM
To: Doug Kerr; Mark Costa; O'Donnell North - Richard Boucher
Cc: Ravi, Tilak (Tilak); Santos, Curtis (Curtis); Schweizer, Steven Eric (Steve); Wong, Edwin (Edwin); Zhao, Huiling (Amy)
 Doug, we'd like to install the 70o 3-MIMO antenna outside. What would you recommend in terms of installation, documentation, and lightning arrestors?

Part Number	Description	Unit \$
HDMNT	Antenna Mounting Bracket	\$19.00
S24517PT36RSM	D/Band 3x MIMO Outdoor 70o DIR Antenna	\$98.42