IB Docket 11-109

FILED/ACCEPTED

OCT 18 2011

Federal Communications Commission
Office of the Secretary

September 1, 2011

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: Notice of *Ex Parte* Presentation in LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component, IB Docket No. 11-109; IBFS File No. SATMOD-20101118-00239

Dear Ms. Dortch:
On September 31, 2011,at the request of Michael Ha, I met with Brett Greenwalt, Bob Weller, Chip Fleming, Michael Ha and Ron Repasi of the FCC by phone to discuss technical details of an FBAR filter design simulation study for GPS receivers that was included in the TWG Final Report.1

Avago Technologies offers Film Bulk Acoustic Resonator (FBAR) filters for various wireless communications applications, including GPS. Our business model is based primarily on supplying low-cost filter and integrated filter/LNA solutions for high volume applications, and wireless phones have therefore been a primary focus. The filter simulation study has highlighted various tradeoffs including insertion loss, width of the pass band, adjacent band rejection, and group delay. Design criteria for the simulation included i)rejection bands of 1525-1555MHz and 1626.5-1660.5MHz, ii) pass band of GPS + GLONASS (1565 – 1606MHz for wideband GPS and 1574 – 1606MHz for narrow band GPS), iii) target insertion loss of 1 to 1.5 dB, and iv) 40dB attenuation in the rejection bands.

The simulation result noted that, given the pass band and rejection band criteria, the GPS L1 frequency of 1575MHz falls at the lower edge of filter and therefore affects the insertion loss. If GLONASS support is not required, the pass band can be adjusted so that the L1 frequency is near the center and therefore reduces (improves) the insertion loss.2

Avago has also conducted a feasibility study with i) rejection band of 1525-1536MHz ("lower 10MHz") and 1626.5-1660MHz, ii) pass band of 1559.47 – 1591.47MHz, iii) group delay variation of 6 ns over 1575.42 ±10MHz including temperature and manufacturing tolerances. Avago stated that this study has been provided to TWG but was not included in the TWG Final Report. The lower 10MHz feasibility study presentation is attached to this filing in Attachment A.

Sincerely,

William Mueller
Strategic Marketing Manager
Avago Technologies
350 W Trimble Road
San Jose. CA 95131

Attachment A:
GPS (L1 P-Code) Filter for LightSquared LTE Coexistence
Feasibility Study

1 *See TWG Final Report. Appendix C.2*
(http://licensing.fcc.gov/myibfs/download.do?attachment_key=900850)
2 *See page 9 of Appendix C.2*

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GPS (L1 P-Code) Filter for LightSquared LTE Coexistence

Feasibility Study

AVAGO TECHNOLOGIES

Target Spec provided by Greenwood/LightSquared, July 15th, 2011

Precision filter requirement

Parameter	Frequency	Requirement
band reject	1525-1536 MHz	40dB over temp and manufacturing
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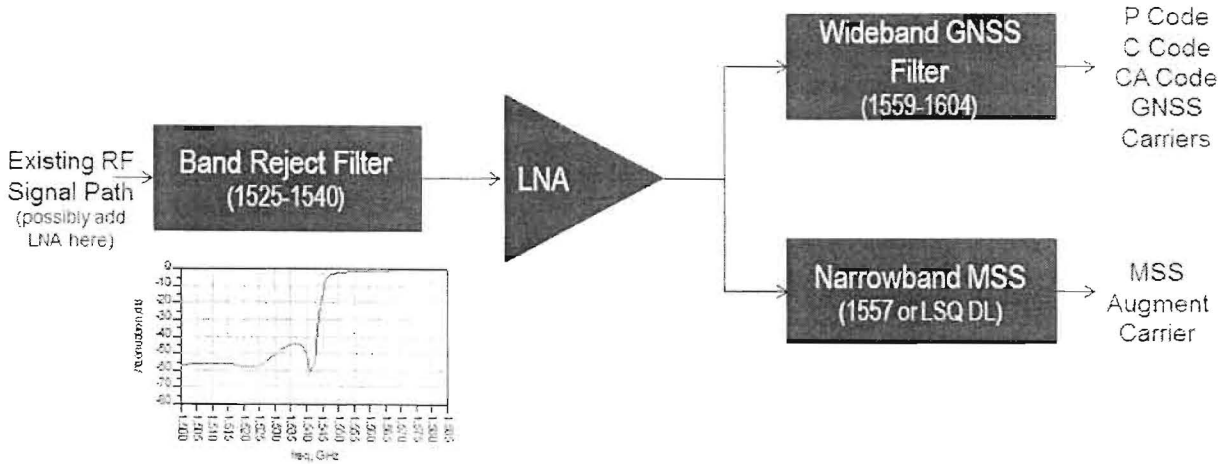
Pass band gain flatness	1559.47-1591.47	Best effort
Pass band group delay distortion	1575.42+/-10MHz	6ns over temp and manufacturing
Noise figure	Standard Avago Practice	Standard Avago Practice



Notes on the Simulatons

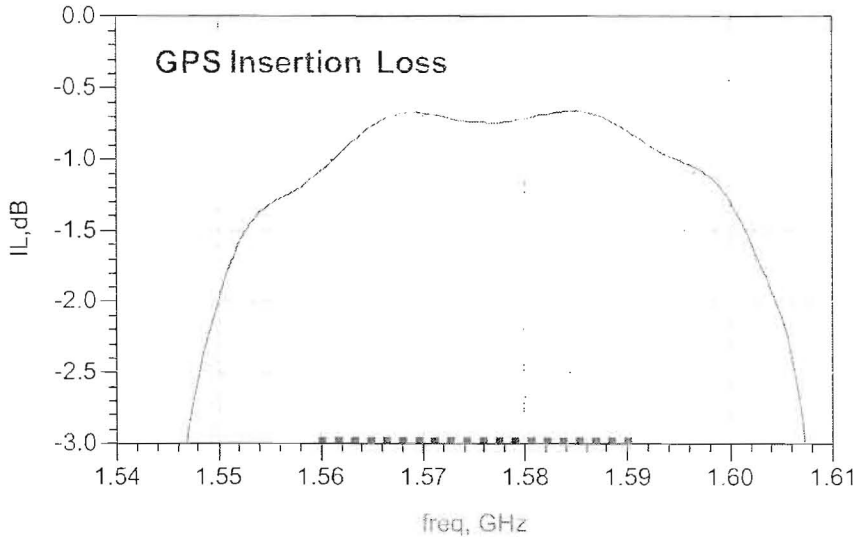
The simulations provided express capability of the Avago FBAR filtering process. There is no intention to imply existence of a product or future existence of a product.

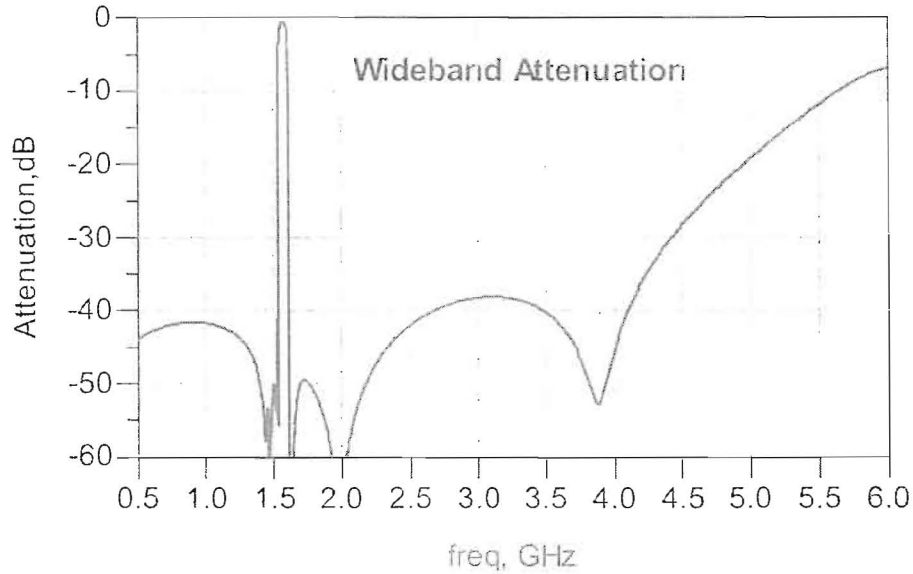
The simulations are relatively simple linear lumped element simulations, not accounting for field interaction and other complex real-life contingencies. It is the experience of Avago that these simulations predict with good accuracy the overall gross aspects of filter response, including rejection. Insertion loss predictions tend to be slightly optimistic, typically by a few tenths of a dB.

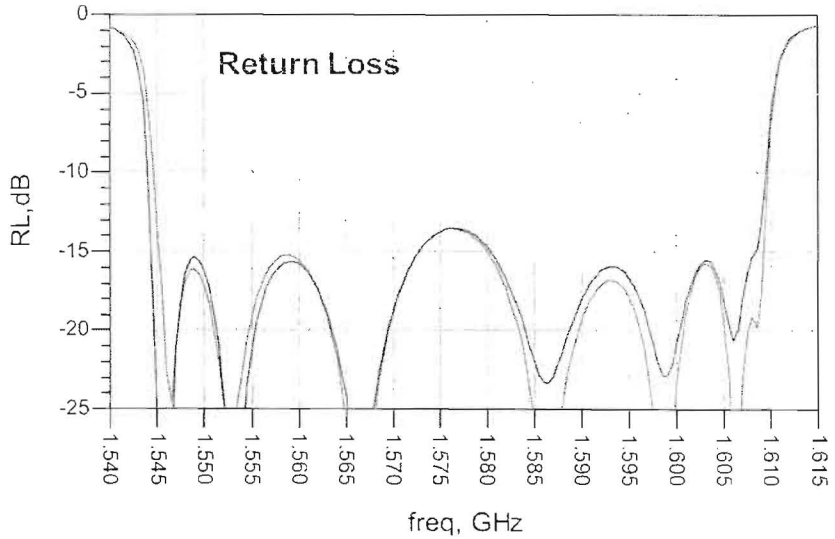
The simulations unless otherwise noted show typical expected performance at room temperature.

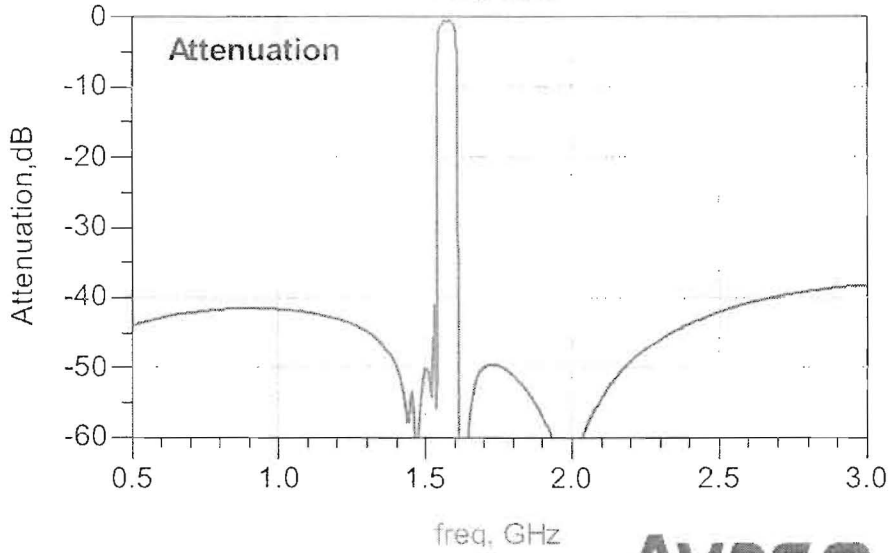
As temperature has the effect of shifting the filter response down in frequency, over temperature performance can be investigated by looking at performance at a frequency offset corresponding to the expected temperature motion. In general the motion will be less than -35 ppm/C. This corresponds to 5.5 MHz motion for a 100 degree C temperature shift at 1575 MHz.

Simulation of Typical Performance (Lumped Element)

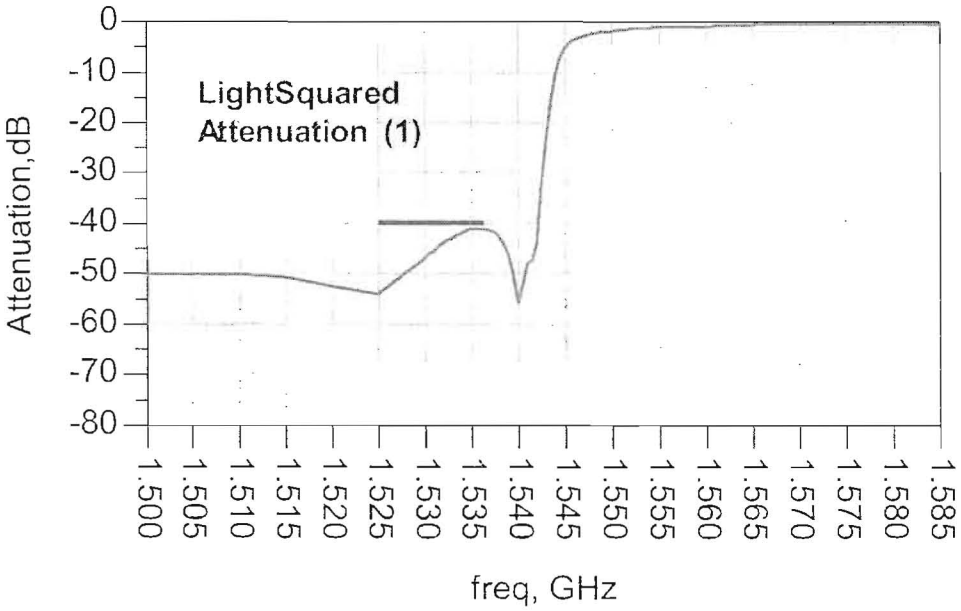


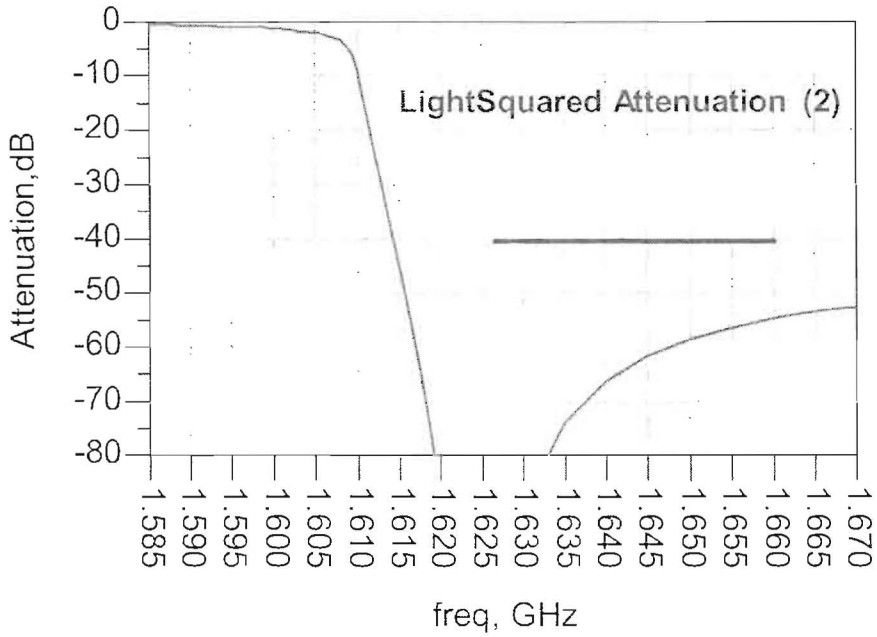




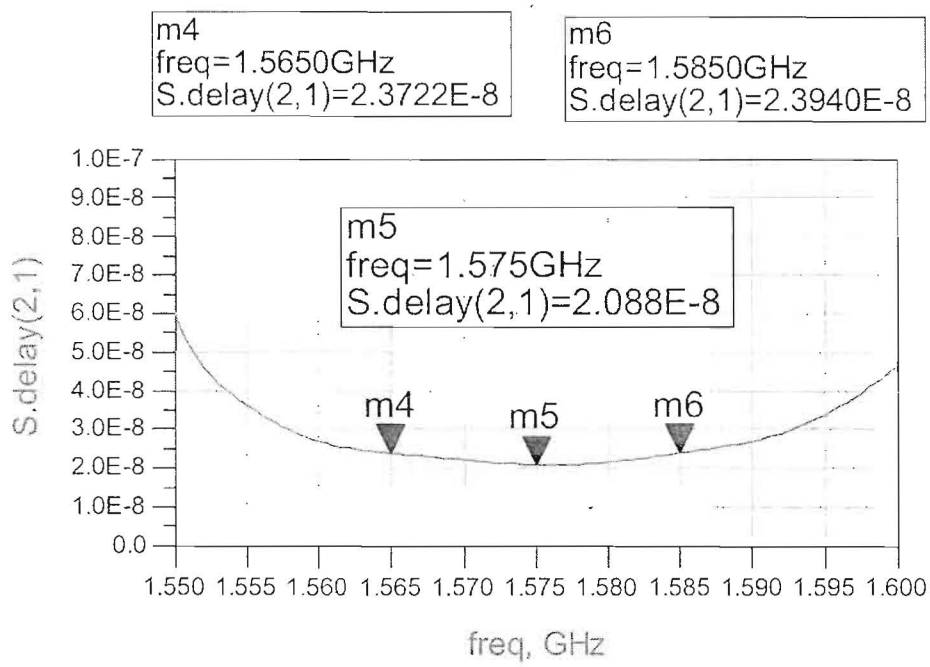


Simulation of Typical Performance (Lumped Element) Rejection at LightSquared Spectrum



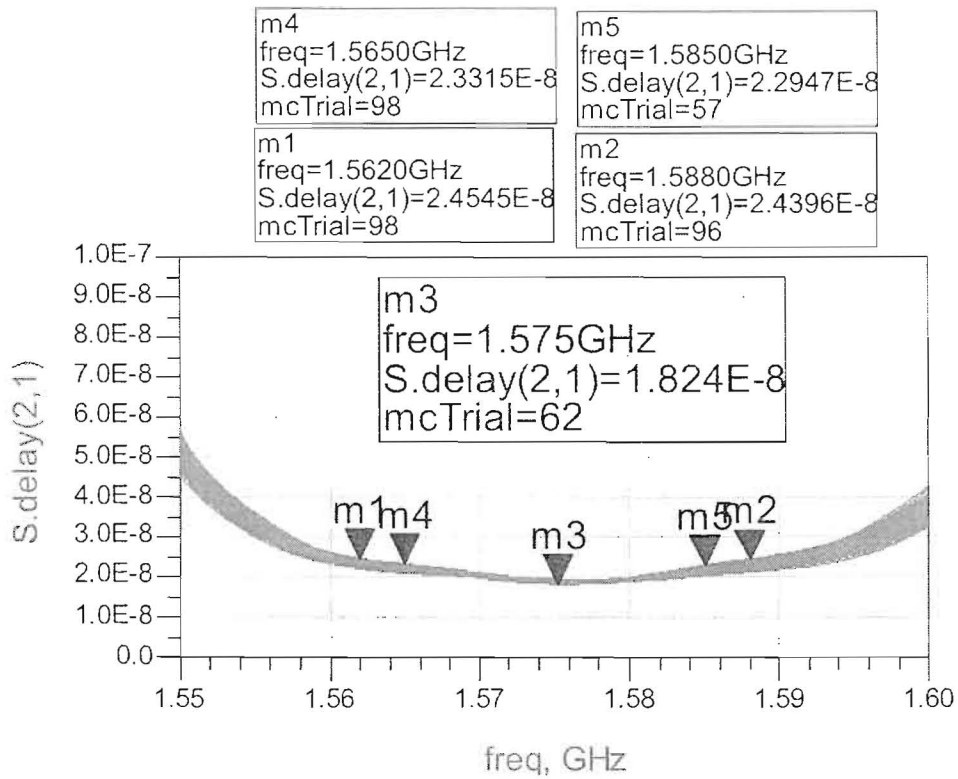


Simulation of Typical Performance (Lumped Element) Group Delay Distortion



Typical group delay variation at room temperature ~4ns

Simulation of Performance Including Production Variation



Max. group delay variation at Room Temperature incl. production variation ~5ns
Max. group delay variation incl. Temperature and production variation ~7ns

September 1, 2011

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Secretary
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July 2011

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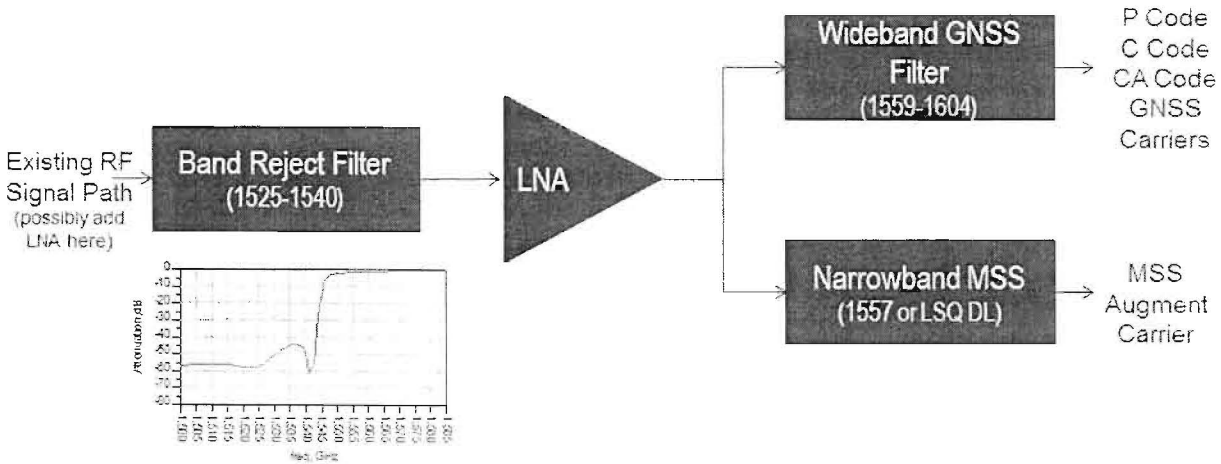

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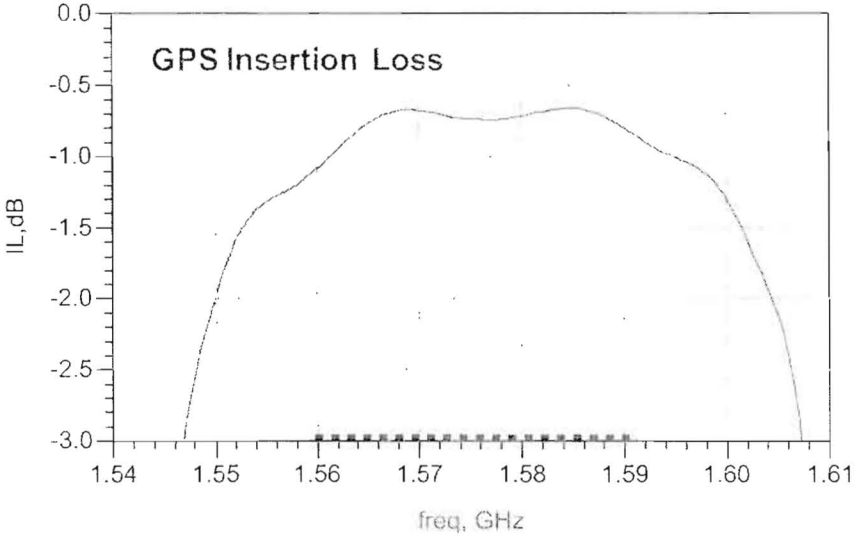

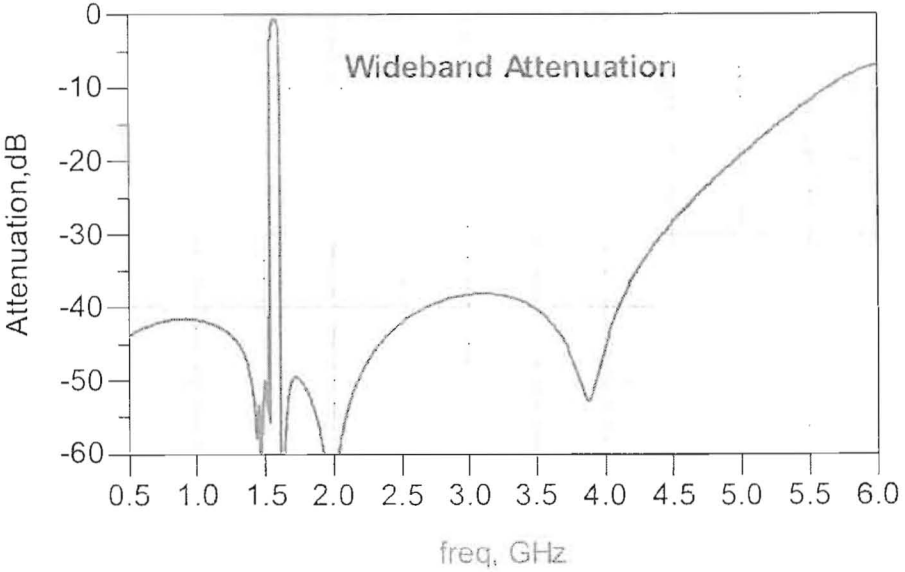

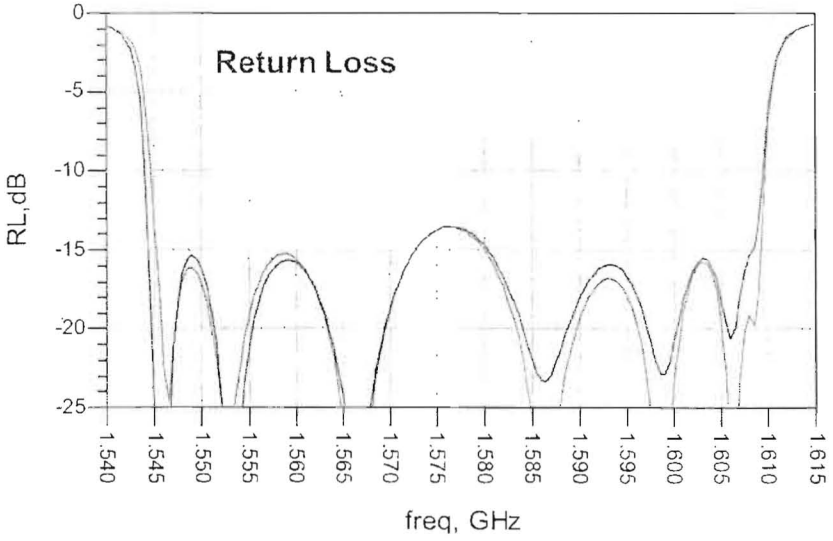

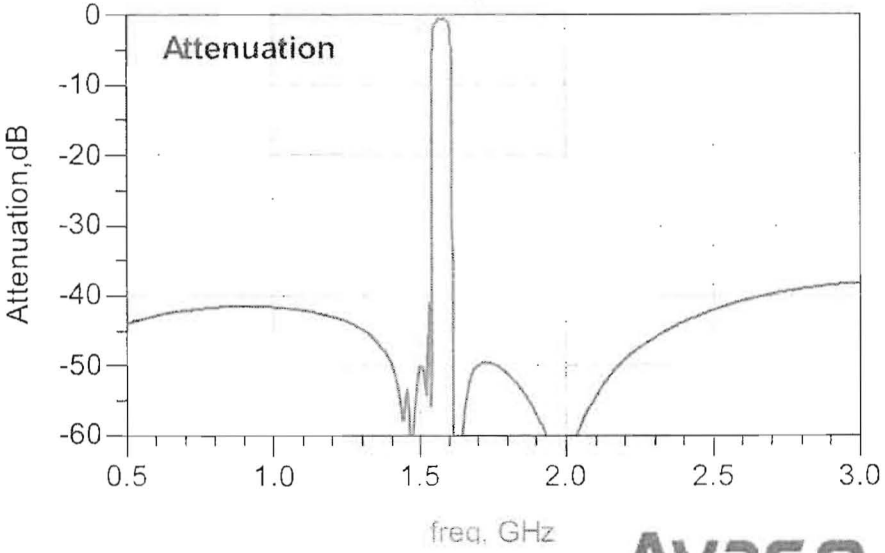

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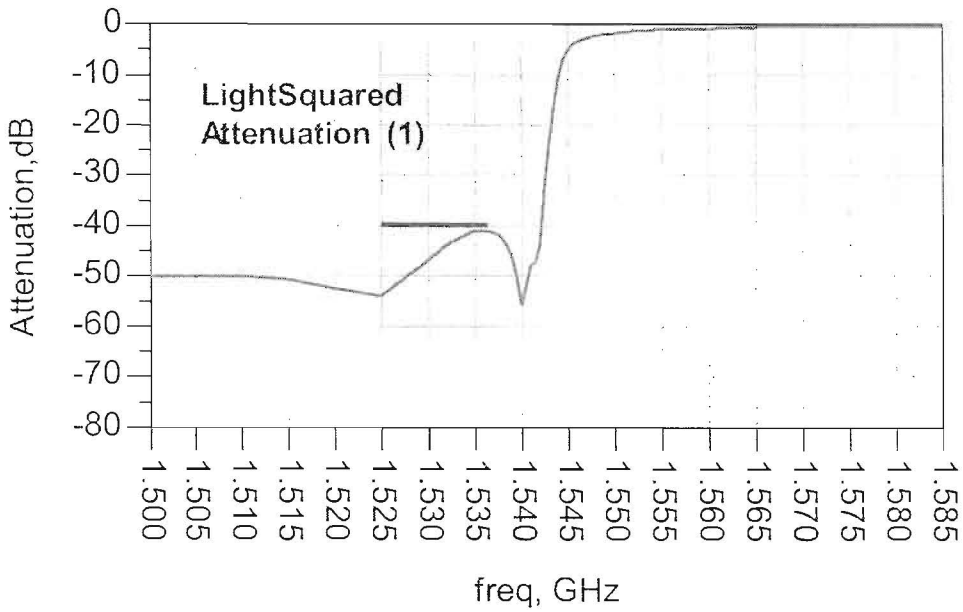

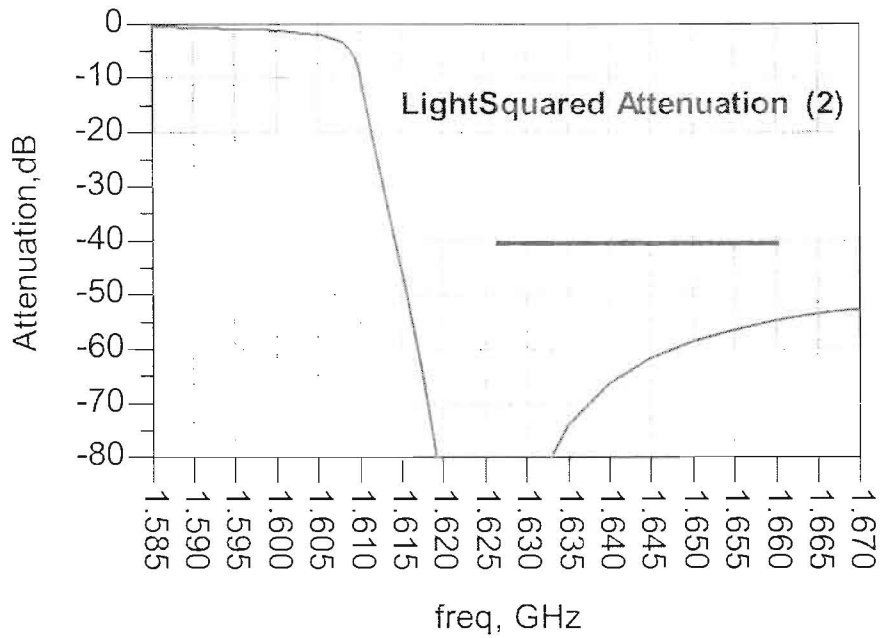

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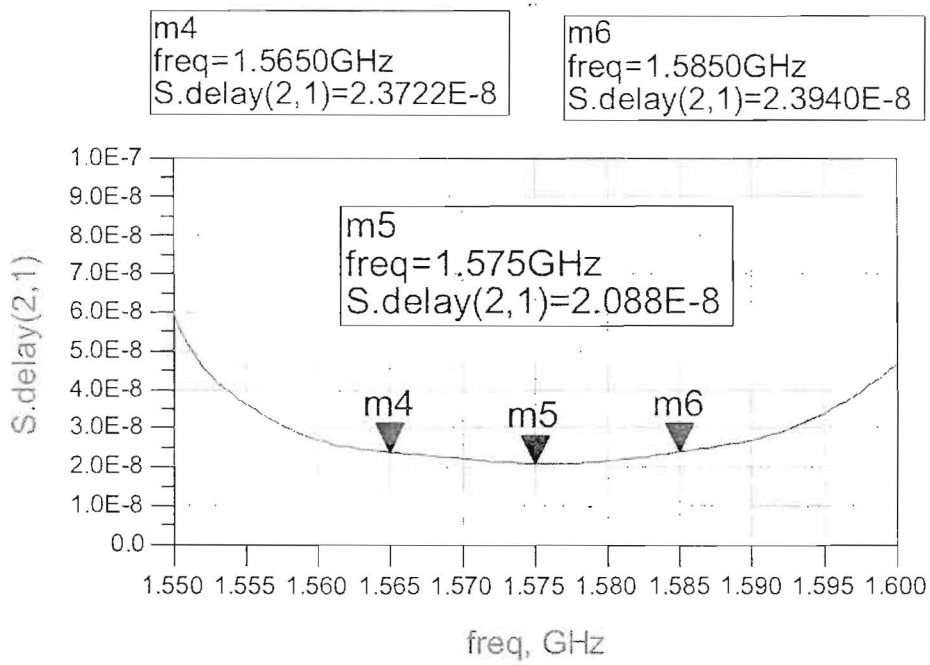

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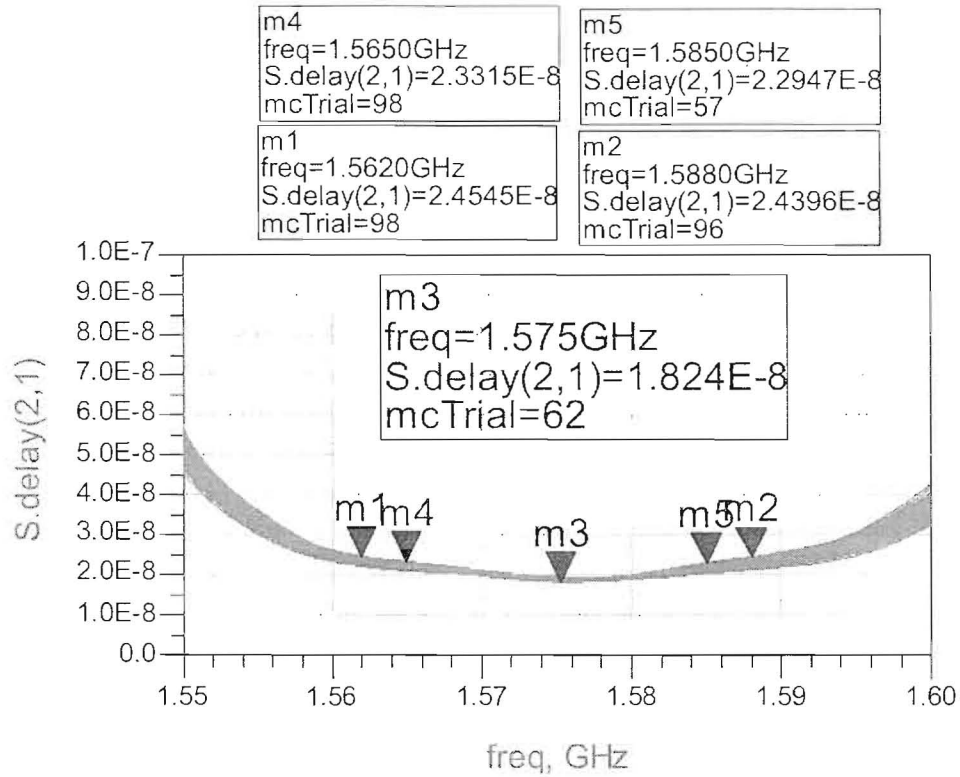

Max. group delay variation at Room Temperature incl. production variation ~5ns
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From: myIBFS
Sent: Thursday, October 13, 2011 5:37 PM
To: Jerry.Ma@fcc.gov; Gerald Mays; Sarita Kale; Siva Appavu; Andrea Kelly; Stephen Duall; Kathyrn Medley; CurTrisha Banks; Stephanie.Shieh@fcc.gov; Kathleen Campbell
Subject: Pleadings and Comments Notification from MyIBFS

Type of Pleading: LETTER

Date filed: 10/13/2011

Filer Information:
A R Goldman
Head and Neck Pain Center

Contact Information:

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Office of the Secretary

Proceedings List

File Number	Callsign	Applicant
SATMOD2010111800239	S2358	LightSquared Subsidiary LLC

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To whom it may concern,

I highly recommend the highest concern and action on this matter.

GPS has become a vital system for aircraft, auto, marine and foot navigation, map making, geology and has a huge effect on safety. Any interference with it's signal for whatever reason will have major effects, including national security as it is, from my information, used extensively by the military.

Please consider the following suggestions:

The FCC should make clear that LightSquared and its investors are proceeding at their own risk in advance of the FCC's assessment of the working group's analysis. While this is the FCC's established policy, the Commission's International Bureau failed to make this explicit in its order.

The FCC must make clear, and the NTIA must ensure, that LightSquared's license modification is contingent on the outcome of the mandated study unequivocally demonstrating that there is no interference to GPS. The study must be comprehensive, objective, and based on correct assumptions about existing GPS uses rather than theoretical possibilities. Given the substantial pre-existing investment in GPS systems and infrastructure, and the critical nature of GPS applications, the results of studies must conclusively demonstrate that there is no risk of interference. If there is conflicting evidence, doubts must be resolved against the LightSquared terrestrial system. The views of LightSquared, as an interested party, are entitled to no special weight in this process.

This is a matter of critical national interest. There must be a reasonable opportunity for public comment of at least 45 days on the report produced by the working group and further FCC actions on the LightSquared modification order should take place with the approval of a majority of the commissioners, not at the bureau level.

Resolution of interference has to be the obligation of LightSquared, not the extensive GPS user community of millions of citizens. LightSquared must bear the costs of preventing interference emanating from their devices, and if there is no way to prevent interference, it should not be permitted to operate. GPS users or providers should not have to bear any of the consequences of LightSquared's actions.

Thank you,
In the spirit of safety

A. Richard Goldman D.D.S.

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Ms. Marlene H. Dortch
Secretary Federal Communications Commission
445 12th Street SW
Washington, DC 20554

September 28, 2011

Re: Notice of Ex Parte Presentation in LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component, IB Docket No. 11-109
IBFS File No. SATMOD2010111800239

Dear Ms. Dortch:

On September 28, 2011, at the request of Michael Ha, Hemisphere GPS attended a teleconference with the following personnel from the FCC:

Michael Ha, Office of Engineering and Technology (OET)
Ron Repasi, OET
Chip Fleming, International Bureau (IB)
Sankar Persaud, IB

From Hemisphere GPS the following personnel attended the call:

Bradley P. Badke PhD, Senior Principal Systems Engineer

Hemisphere GPS designs and manufactures innovative, cost-effective GNSS (GPS, Glonass, Galileo, etc) and complimentary products for positioning, guidance, machine control and agriculture applications. In the last 20 years, we have established numerous patents and other intellectual property. Hemisphere GPS is a global company with sales in more than 35 countries.

The purpose of this teleconference was to discuss the performance of two Hemisphere GNSS receivers in the presence of LightSquared interference at the Pax River Naval Air Station indoor anechoic chamber (also known as the NAVAIR FARM). In particular we discussed the performance of a wideband multi-frequency GPS/Glonass/OmniStar receiver (code name H09956) and a wide bandwidth GPS L1 only (single frequency) receiver (code name H13565). The H13565 was less degraded by the LightSquared signals than the H09956 receiver but it was not immune to LightSquared interference. The reason the H13565 performed better than the H09956 is that it is not as wide-band as the H09956. The testing at NAVAIR covered several signal configurations. They are listed below in order from most degradation to least degradation.

1. 10L+10H (most degradation of L1 GPS)
2. 10H
3. 5L+5H
4. 5H
5. 10L
6. 5L
7. HS (handset) (least degradation of L1 GPS)

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Further, we discussed the fact that Glonass was not tested nor were any of the new wider band GPS, Galileo and Compass signals that would possibly be more degraded than GPS L1.

Hemisphere also discussed the fact that it is important that the FCC not allow a creeping specification for the LightSquared signal. GNSS manufacturers need to have a solid specification before designing any new GNSS receivers for the LightSquared interference environment.

Hemisphere also discussed the fact that many of the precision receivers in question have wideband antennas and an initial wideband filtering stage prior to the first LNA to accommodate what are known as the L-Band signals (OmniStar, for example). This wideband signal then goes through a diplexer or power divider and passes through further filtering at both RF and IF frequencies to select the desired signal of interest (GPS L1, GPS L2, GPS L5, OmniStar, Glonass L1, Glonass L2, Galileo, etc.). This refutes the statement seen in the popular press that GPS manufacturers do not use filtering in their receivers.

Hemisphere's unofficial participation in the Live Air testing in Las Vegas, Nevada was also discussed. Hemisphere tested several more receivers for one night only at the location known as the "rural sight". The "rural sight" was the cell tower located closest to Boulder City, Nevada. The night of Hemisphere's participation in this test, unfortunately, was one of the nights that the LightSquared signal was 3dB low. The Las Vegas, Nevada tests only tested the 5H+5L configuration. The performance of the Hemisphere receivers was about as expected, including the performance of two medium bandwidth GSP L1 only receivers that were designed for a high interference marine environment. These receivers, while not completely immune to the LightSquared interference, were much more jam resistant than wideband multi-frequency GNSS receivers. These receivers had degraded C/N0 while close (<200 meters) to the tower but were never completely jammed so that they would not track GPS L1 signals. The wider band muti-frequency GNSS/OmniStar receivers were completely jammed at various ranges from the LightSquared cell tower.

Sincerely,

Bradley P. Badke PhD
Senior Principal Systems Engineer
Scottsdale, AZ
8444 N. 90th Street, Suite 130
Scottsdale, AZ, USA 85258
Phone: (480) 348-6323

Other Hemisphere GPS Office Locations:

Calgary, AB (Corporate Headquarters, Precision Products Group)

4110 9th Street S.E.
Calgary, Alberta, Canada T2G 3C4
Phone: (403) 259-3311

Hiawatha, KS (Ground Agriculture Group)
2207 Iowa Street
Hiawatha, KS, USA 66434
Phone: (785) 742-2976

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Brisbane, Australia
Phone: + 61 (0) 7 3004-6700