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March 4, 2009

FILED BY EDGAR

United States Securities and Exchange Commission
Mail Stop 6010
Washington, D.C. 20549
Attn: Brian Cascio, Accounting Branch Chief

Re: Axcelis Technologies, Inc.
Form 10-K for the fiscal year ended December 31, 2007; Filed March 17, 2008
Form 10-Q's for the quarterly periods ended March 31, 2008 and June 30, 2008
No. 000-30941

Dear Sir or Madam:

This letter is in response to your comment letter to the undersigned officer of Axcelis Technologies, Inc. ("Axcelis" or the "company") dated November 10, 2008 signed by Brian Cascio, Accounting Branch Chief (the "Comment Letter"). The responses contained herein are keyed to the headings contained in the Comment Letter and are numbered to correspond to the numbers used in the Comment Letter.

Form 10-K for the fiscal year ended December 31, 2007

Note 9. Other Assets

1. Please tell us why you have not classified the cost and amortization of products manufactured for internal use as Property, Plant and Equipment.
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Response:

Products manufactured for internal use are used for customer demonstration purposes to support worldwide sales efforts, training and research and development.

We have historically classified this investment as other assets because a significant portion of these assets are utilized primarily for customer demonstration and training which supports our worldwide sales efforts. We believe this classification best represents the underlying nature of this investment, similar to deferred charges.

We have also considered that these assets do not necessarily represent permanent capital investments. These assets may from time to time be returned to inventory, refurbished and sold to customers as part of our normal sales process.

The classification as other assets has no impact on our results of operations because while the assets are in use, we recognize amortization of these assets based upon their estimated useful lives (normally 5 years) and such amortization is included as a component of operating expenses. Also, classification does not impact disclosures in the notes to the financial statements as we provide all disclosures required for property, plant and equipment.

While we acknowledge that classification as either property, plant and equipment or other assets could be considered appropriate, as discussed above, we have elected an accounting policy to classify these investments as other assets, and we continue to believe this is appropriate.

Form 10-Q Quarterly Report as of March 31, 2008

Form 10-Q Quarterly Report as of June 30, 2008

Consolidated Balance Sheets, page 4

2. Please tell us why the investment in SEN increased significantly at March 31, 2008 and decreased at June 30, 2008. Tell us where you have disclosed the reason for these changes in the equity investment and related accounting treatment in your filings.

Response:

The increase in our investment in SEN as of March 31, 2008 resulted from a 12% increase in the exchange rate of the Japanese Yen to US dollars during the first quarter of 2008. The decrease in our investment in SEN as of June 30, 2008 resulted from a 6% decrease in the exchange rate of the Japanese Yen to US dollars for the second quarter of 2008. The underlying translation gain or loss is accounted for as a component of other comprehensive income. We disclose in Item 7A: Quantitative and Qualitative Disclosures about Market Risk in our Form 10K for 2007 that our investment in SEN is subject to foreign currency

exchange risks. We will include in our future filings additional commentary regarding the impact of foreign currency fluctuations on the investment in SEN account.

Note 2 – Stock-based Compensation, page 7

3. Please tell us where you have provided the disclosures required paragraphs A240-241 of SFAS 123R.

Response:

We believe the disclosure relating to share-based payments required in paragraphs A240-241 of SFAS 123R applies to annual financial statements and not to financial statements for interim periods. Accordingly, while we disclose total cost related to all share-based awards in our quarterly financial statements, we omit other portions of the required annual disclosures. We believe this abbreviated

interim disclosure is appropriate and in accordance with paragraph 30 of APB 28 as long as in the quarterly period there were no significant changes in the estimates used in calculating this from those disclosed in the last annual financial statements.

Item 2. Management's Discussion and Analysis
Liquidity and Capital Resources, page 18

4. Please revise future filings to clarify how you plan to meet the redemption of your convertible subordinated debt of \$81 Million due on January 15, 2009.

Response:

Disclosure on the status of our convertible subordinated debt was provided in our Form 10-Q for the quarter ended September 30, 2008 in Note 1 to the unaudited consolidated financial statements and in Item 2, Management's Discussion and Analysis of Financial Condition and Results of Operations in the Liquidity and Capital Resources section as well as in our Form 8-K filed January 15, 2009. We will update this disclosure in our Form 10-K for the year ended December 31, 2008 and in all future filings through the period of repayment.

Form 10-Q/A Quarterly Report as of March 31, 2008

5. We note that the certifications required to be filed with the report are incomplete. These only have the first 3 items. Please amend your filing to provide the appropriate certifications. Refer to Item 601 of Regulation S-K.

Response:

Our certifications filed as exhibits to the Form 10-Q/A did not include items 4 and 5 of paragraph (b)(31) of Item 601 of Regulation S-K. We understand that those items are not required to be included in any amended report that does not include an amendment to the Item 307 or 308 disclosures concerning disclosure controls and procedures or internal control over financial reporting (Item 4 of Form 10-Q). See, e.g., the Division of Corporation Finance's Compliance and Disclosure Interpretations (Exchange Act Rules) Question 161.01, which formalized guidance provided by Division staff over the last few years. The Form 10-Q/A did not contain an amendment to Item 4, so we omitted items 4 and 5 of the certification.

Form 10-K/A Annual Report filed on September 29, 2008

6. We note that the amended filing does not contain the entire text of Item 15. Please amend your filing to include the entire content of Item 15 of your annual report. Refer to Rule 12b-15 of the Exchange Act.

Response:

We will file an additional Form 10-K/A to further amend the filing so that it contains the entire text of Item 15.

As requested in the Comment Letter, the company acknowledges that:

- a. the company is responsible for the adequacy and accuracy of the disclosure in the filings discussed in the Comment Letter (the "filings");
- b. staff comments or changes to disclosure in response to staff comments do not foreclose the Commission from taking any action with respect to the filings; and
- c. the company may not assert staff comments as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

If you have any questions or request additional information, please do not hesitate to contact the undersigned at 978-787-4110.

Very truly yours,

/s/ Stephen G. Bassett

Stephen G. Bassett

Executive Vice President and Chief Financial Officer

Courtesy copies:

Kristin Lochhead, SEC Staff

Martin James, Senior Assistant Chief Accountant

Mary G. Puma, Axcelis

Lynnette C. Fallon, Axcelis
