
**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549**

POST-EFFECTIVE AMENDMENT NO. 1

to

FORM S-8

REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933

AXCELIS TECHNOLOGIES, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation)

34-1818596
(I.R.S. Employer Identification No.)

108 Cherry Hill Drive, Beverly, Massachusetts 01915
(Address of Principal Executive Offices and Zip Code)

**2000 STOCK PLAN
2012 EQUITY INCENTIVE PLAN**
(Full title of the plan)

**LYNNETTE C. FALLON
Axcelis Technologies, Inc.
108 Cherry Hill Drive
Beverly, Massachusetts 01915
(617) 787-4000**
(Name, address and telephone number of agent for service)

with copies to:

MATTHEW C. DALLETT
Edwards Wildman Palmer LLP
111 Huntington Avenue
Boston, Massachusetts 02199-7613
(617) 239-0100

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer

Accelerated filer

Non-accelerated filer (Do not check if a smaller reporting company)

Smaller reporting company

EXPLANATORY NOTE

This Registration Statement relates to 14,673,367 shares of the Registrant's Common Stock, \$0.001 par value per share, that may be issued pursuant to the Axcelis Technologies, Inc. 2000 Stock Plan, as amended (the "2000 Plan"), or, to the extent not issued under the 2000 Plan, under the Axcelis Technologies, Inc. 2012 Equity Incentive Plan (the "2012 Plan"). No additional securities are being registered hereby.

No further awards may be made under the 2000 Plan. To the extent existing awards under the 2000 Plan expire, are terminated unexercised, or are forfeited without shares of Common Stock being issued thereunder, awards with respect to the shares previously subject to such awards may be made under the 2012 Plan. This Post-Effective Amendment No. 1 has been filed to add the 2012 Plan to this Registration Statement.

Item 3. Incorporation of Documents by Reference

The following documents filed by the Registrant with the Securities and Exchange Commission (the "Commission") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), or the Securities Exchange Act of 1934, as amended (the "Exchange Act"), are incorporated by reference into this Registration Statement: (i) the Registrant's annual report on Form 10-K for the year ended December 31, 2012, which contains audited financial statements for the fiscal year ended December 31, 2012; (ii) all other reports filed pursuant to Section 13(a) or 15(d) of the Exchange Act since the end of the fiscal year ended December 31, 2012; and (iii) the description of the Registrant's Common Stock contained in the Registrant's Registration Statement on Form 8-A filed with the Commission on July 3, 2000.

All documents subsequently filed by the Registrant with the Commission pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act after the date of this Registration Statement, but prior to the filing of a post-effective amendment to this Registration Statement which indicates that all securities offered by this Registration Statement have been sold or which deregisters all such securities then remaining unsold, shall be deemed to be incorporated by reference into this Registration Statement. Each document incorporated by reference into this Registration Statement shall be deemed to be a part of this Registration Statement from the date of filing of such document with the Commission until the information contained therein is superseded or updated by any subsequently filed document which is incorporated by reference into this Registration Statement or by any document which constitutes part of the prospectus relating to the 2000 Plan or the 2012 Plan meeting the requirements of Section 10(a) of the Securities Act.

Item 4. Description of Securities.

The class of securities to be offered under this Registration Statement is registered under Section 12 of the Exchange Act.

Item 5. Interests of Named Experts and Counsel.

None.

Item 6. Indemnification of Directors and Officers.

Section 102(b)(7) of the Delaware General Corporation Law (the "DGCL") permits a Delaware corporation, in its certificate of incorporation, to limit or eliminate, subject to certain statutory limitations, the liability of a director to the corporation or its stockholders for monetary damages for breach of fiduciary duty, except for liability (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 174 of the DGCL, or (iv) for any transaction from which the director derived an improper personal benefit. Article 10 of the Registrant's Amended and Restated Certificate of Incorporation provides that no director of the Registrant shall be personally liable to the Registrant or its stockholders in accordance with the foregoing provisions of Section 102(b)(7).

Under Section 145 of the DGCL, the Registrant, as a Delaware corporation, has the power to indemnify directors and officers under certain prescribed circumstances and, subject to certain limitations, against certain costs and expenses, including attorneys' fees, actually and reasonably incurred in connection with any action, suit or proceeding, whether civil, criminal, administrative or investigative, to which any of them is a party by reason of being a director or officer of the Registrant if it is

determined that the director or the officer acted in accordance with the applicable standard of conduct set forth in such statutory provision. Article 10 of the Registrant's Restated Certificate of Incorporation provides that any person who was or is made a party or is threatened to be made a party to or is otherwise involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that such person is or was a director or an officer of the Registrant or is or was serving at the request of the Registrant as a director, officer, employee or agent of another corporation or of a partnership, joint venture, trust or other enterprise, including service with respect to an employee benefit plan, whether the basis of such proceeding is alleged action in an official capacity as a director, officer, employee or agent or in any capacity while serving as a director, officer, employee or agent, shall be indemnified and held harmless by the Registrant to the fullest extent authorized by the DGCL. The Registrant's Bylaws reiterate the indemnification obligations and make provisions for determining when a person is entitled to indemnification and advance of litigation expenses.

The Registrant has purchased directors' and officers' liability insurance covering certain liabilities which may be incurred by the officers and directors of the Registrant in connection with the performance of their duties. In addition, the Registrant has entered into indemnity agreements with its directors and executive officers that obligate the Registrant to indemnify such directors and executive officers to the fullest extent permitted by the DGCL.

Item 7. Exemption from Registration Claimed.

Not Applicable.

Item 8. Exhibits.

The exhibits listed after the signature page hereto are filed herewith or incorporated by reference as part of this Registration Statement.

Item 9. Undertakings.

(a) The undersigned Registrant hereby undertakes:

(1) To file, during any period in which offers of sales are being made, a post-effective amendment to this Registration Statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act;

(ii) To reflect in the prospectus any facts or events arising after the effective date of the Registration Statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the Registration Statement;

(iii) To include any material information with respect to the plan of distribution not previously disclosed in the Registration Statement or any material change to such information in the Registration Statement;

Provided, however, that Paragraphs (a)(1)(i) and (a)(1)(ii) of this section do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in periodic reports filed with or furnished to the Commission by the Registrant pursuant to Section 13 or Section 15(d) of the Exchange Act that are incorporated by reference in this Registration Statement.

(2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(b) The undersigned Registrant hereby undertakes that, for purposes of determining any liability under the Securities Act, each filing of the Registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Exchange Act that is incorporated by reference in the Registration Statement shall be deemed to be a new Registration Statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

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Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

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SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the Town of Beverly, Massachusetts, on the 31st day of May, 2013.

AXCELIS TECHNOLOGIES, INC.

By: /s/ Mary G. Puma
Mary G. Puma, *Chairman, Chief Executive Officer and President*

POWER OF ATTORNEY

We, the undersigned officers and directors of Axcelis Technologies, Inc., hereby severally constitute and appoint Mary G. Puma, Jay Zager and Lynnette C. Fallon, and each of them singly, our true and lawful attorneys-in-fact, with full power to them in any and all capacities, to sign any and all amendments to this Registration Statement on Form S-8 (including any post-effective amendments thereto), and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, with respect to the registration of shares under the Axcelis Technologies, Inc. 2000 Stock Plan, hereby ratifying and confirming all that each of said attorneys-in-fact may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, as amended, this Registration Statement has been signed below by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Mary G. Puma</u> Mary G. Puma	Director and Principal Executive Officer	*
<u>/s/ Jay Zager</u> Jay Zager	Principal Accounting and Financial Officer	*
<u>/s/ R. John Fletcher</u> R. John Fletcher	Director	*
<u>/s/ Stephen R. Hardis</u> Stephen R. Hardis	Director	*

<u>/s/ William C. Jennings</u> William C. Jennings	Director	*
<u>/s/ Joseph P. Keithley</u> Joseph P. Keithley	Director	*
<u>/s/ Patrick H. Nettles</u> Patrick H. Nettles	Director	*
<u>/s/ H. Brian Thompson</u> H. Brian Thompson	Director	* *May31, 2013

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EXHIBIT INDEX

Exhibit Number	Description
4.1*	Amended and Restated Certificate of Incorporation of the Registrant, as adopted May 6, 2009. Incorporated by reference to Exhibit 3.1 of the Registrant's Form 8-K filed with the Commission on May 11, 2009.
4.2*	Bylaws of the Registrant, as amended as of August 8, 2007. Incorporated by reference to Exhibit 3.2 of the Registrant's Form 10-Q for the quarter ended June 30, 2007, filed with the Commission on August 9, 2007.
5.1*	Opinion of Palmer & Dodge LLP with respect to the 2000 Plan. Incorporated by reference to Exhibit 5.1 of the Registrant's registration statement on Form S-8 filed with the Commission on November 10, 2004 (File No. 333-120356).
5.2	Opinion of Edwards Wildman Palmer LLP with respect to the 2012 Plan. Filed herewith.
10.1*	Axcelis Technologies, Inc. 2000 Stock Plan, as amended through June 23, 2005. Incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed with the Commission on June 28, 2005.
10.2*	Axcelis Technologies, Inc. 2012 Equity Incentive Plan, as amended through May 14, 2012. Incorporated by reference to Exhibit 10.1 to the Company's registration statement on Form S-8 filed with the Commission on May 31, 2013 (File No. 333-181750).
23.1	Consent of Ernst & Young LLP, independent accountants. Filed herewith.
23.2*	Consent of Palmer & Dodge LLP. Incorporated by reference to Exhibit 23.2 of the Registrant's registration statement on Form S-8 filed with the Commission on November 10, 2004 (File No. 333-120356).
23.3	Consent of Edwards Wildman Palmer LLP (included in opinion filed as Exhibit 5.2).
24.1	Power of Attorney (contained on the signature page hereto).

* Indicates exhibit previously filed with the Securities and Exchange Commission and incorporated herein by reference. Exhibits filed with Forms 10-Q or 8-K of Axcelis Technologies, Inc. were filed under Commission File No. 000-30941.

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EDWARDS WILDMAN PALMER LLP

111 Huntington Avenue
Boston, MA 02199-7613

May 31, 2013

Axcelis Technologies, Inc.
108 Cherry Hill Drive
Beverly, MA 01915

Ladies and Gentlemen:

This opinion is furnished to you in connection with the Post-Effective Amendment No. 1 (the "Amendment") to the Registration Statement on Form S-8 (the "Registration Statement") filed by Axcelis Technologies, Inc., a Delaware corporation (the "Company"), on or about the date hereof with the Securities and Exchange Commission under the Securities Act of 1933, as amended. The Registration Statement as originally filed registered 14,673,367 shares of common stock, \$0.001 par value (the "Shares"), of the Company, reserved for issuance under the Company's 2000 Stock Plan (the "2000 Plan"). The Amendment reflects that a portion of the Shares may become issuable under the Company's 2012 Equity Incentive Plan (the "2012 Plan") pursuant to the terms of the 2012 Plan (the "2012 Plan Shares"). No new shares are being registered pursuant to the Amendment.

We are familiar with the actions taken by the Company in connection with the proposed issuance of the 2012 Plan Shares. For purposes of our opinion, we have examined and relied upon such documents, records, certificates and other instruments as we have deemed necessary.

Based on the foregoing, we are of the opinion that the 2012 Plan Shares have been duly authorized and, when the 2012 Plan Shares have been issued and sold in accordance with the terms of the 2012 Plan, the 2012 Plan Shares will be validly issued, fully paid and nonassessable.

We hereby consent to the filing of this opinion as an exhibit to the Registration Statement.

It is understood that this opinion is to be used only in connection with the offer and sale of the 2012 Plan Shares while the Registration Statement is in effect.

Very truly yours,

/s/ EDWARDS WILDMAN PALMER LLP

Edwards Wildman Palmer LLP

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Post-Effective Amendment No. 1 to the Registration Statement (Post-Effective Amendment No. 1 to Form S-8 filed on May 31, 2013) pertaining to the 2000 Stock Plan of Axcelis Technologies, Inc. of our reports dated March 1, 2013, with respect to the consolidated financial statements and schedule of Axcelis Technologies, Inc. and the effectiveness of internal control over financial reporting of Axcelis Technologies, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2012, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts
May 31, 2013
