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**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

SCHEDULE 13D

Under the Securities Exchange Act of 1934
(Amendment No.)*

THERMA-WAVE, INC.

(Name of Issuer)

COMMON STOCK, \$0.01 PAR VALUE

(Title of Class of Securities)

88343A108

(CUSIP Number)

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(Name, Address and Telephone Number of Person Authorized to Receive Notices and Communications)

January 7, 2007

(Date of Event which Requires Filing of this Statement)

If the filing person has previously filed a statement on Schedule 13G to report the acquisition that is the subject of this Schedule 13D, and is filing this schedule because of §§240.13d-1(e), 240.13d-1(f) or 240.13d-1(g), check the following box.

Note: Schedules filed in paper format shall include a signed original and five copies of the schedule, including all exhibits. See §240.13d-7 for other parties to whom copies are to be sent.

* The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter disclosures provided in a prior cover page.

The information required on the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB control number.

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| 1 | NAMES OF REPORTING PERSONS: KLA-TENCOR CORPORATION I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY): 04-2564110 | |
| 2 | CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (SEE INSTRUCTIONS): N/A (a) <input type="checkbox"/> (b) <input type="checkbox"/> | |
| 3 | SEC USE ONLY: | |
| 4 | SOURCE OF FUNDS (SEE INSTRUCTIONS): N/A | |
| 5 | CHECK IF DISCLOSURE OF LEGAL PROCEEDINGS IS REQUIRED PURSUANT TO ITEMS 2(d) OR 2(e) N/A <input type="checkbox"/> | |
| 6 | CITIZENSHIP OR PLACE OF ORGANIZATION: DELAWARE | |
| NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH | 7 | SOLE VOTING POWER: 0 |
| | 8 | SHARED VOTING POWER: 14,609,201¹ |
| | 9 | SOLE DISPOSITIVE POWER: 0 |
| | 10 | SHARED DISPOSITIVE POWER: 14,609,201¹ |
| 11 | AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON: 0 | |
| 12 | CHECK IF THE AGGREGATE AMOUNT IN ROW (11) EXCLUDES CERTAIN SHARES (SEE INSTRUCTIONS): <input checked="" type="checkbox"/> | |
| 13 | PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (11): 30.6%¹ | |
| 14 | TYPE OF REPORTING PERSON (SEE INSTRUCTIONS): CO | |

¹ See Items 4 and 5 of this Schedule. KLA-Tencor may be deemed to have shared voting power of 30.6% of the outstanding Issuer common stock (with options and warrants to purchase Common Shares within 60 days of January 17, 2007 representing 6% of such amount). KLA-Tencor expressly disclaims beneficial ownership of any shares of Issuer common stock covered by the Tender and Support Agreement. The above calculations are based on 37,230,516 shares of common stock outstanding as of January 5, 2007 (as represented in the Merger Agreement discussed in Items 3 and 4 of this Schedule).

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Item 1. Security and Issuer.

The class of equity securities to which this statement relates is the common stock, \$0.01 par value per share (“Common Shares”), of Therma-Wave, Inc., a Delaware corporation (“Issuer”). The principal executive office of Issuer is located at 1250 Reliance Way, Fremont, California 94539.

Item 2. Identity and Background.

This statement is being filed pursuant to Rule 13d-1 under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), by KLA-Tencor Corporation, a Delaware corporation. The address of the principal business and the principal office of KLA-Tencor is 160 Rio Robles, San Jose, California 95134. KLA-Tencor is a leading supplier of process control and yield management solutions for the semiconductor and related microelectronics industries.

The name, business address, present principal occupation or employment and citizenship of each director and executive officer (including a director and officer who may be a controlling person) of KLA-Tencor is set forth on Schedule A.

During the last five years, neither KLA-Tencor nor, to the knowledge of KLA-Tencor, any of the persons listed on Schedule A, has been convicted in a criminal proceeding (excluding traffic violations or similar misdemeanors) or has been a party to a civil proceeding of a judicial or administrative body of competent jurisdiction and as a result of such proceeding was or is subject to a judgment, decree or final order enjoining future violations of, or prohibiting or mandating activities subject to, federal or state securities laws or finding any violation with respect to such laws.

Item 3. Source and Amount of Funds or Other Consideration.

On January 7, 2007, Issuer, KLA-Tencor and Fenway Acquisition Corporation (“Fenway”) entered into an Agreement and Plan of Merger (the “Merger Agreement”) pursuant to which Fenway will commence a tender offer (the “Offer”) to acquire all of the outstanding Common Shares at \$1.65 per Common Share, in cash, and all of the outstanding shares of Series B Convertible Preferred Stock of Issuer, \$0.01 par value per share (“Preferred Shares”, and together with Common Shares, “Shares”), at \$1.65 per Common Share into which each Preferred Share is convertible at the time of the consummation of the Offer, in cash, and, subject to the satisfaction or waiver of the conditions set forth in the Offer and the Merger Agreement, after consummation of the Offer, Fenway will merge with and into Issuer (the “Merger”), whereupon Fenway’s separate corporate existence will cease and Issuer will continue as the surviving corporation and as a direct, wholly-owned subsidiary of KLA-Tencor.

As an inducement to enter into the Merger Agreement, and in consideration thereof, KLA-Tencor, Fenway and Issuer entered into the Tender and Support Agreement (the “Tender and Support Agreement”) dated as of the date of the Merger Agreement with each of the directors and executive officers of Issuer and with the holders of the Preferred Shares, consisting of the following (each a “Stockholder”):

- Larry Tomlinson
- Leonard Baker
- John D’Errico
- Gregory Graves
- Nam Suh
- John Willinge
- Peter Hanley
- David Aspnes
- Papken Der Torossian
- Boris Lipkin
- Joe Passarello
- Brian Renner
- Jon Opsal
- John Mathews

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- Raul Tan
- Noel Simmons
- Lena Nicolaides
- North Run Master Fund
- Deephaven Long Short Equity Trading Ltd.
- Deephaven Relative Value Equity Trading Ltd.

Pursuant to the Tender and Support Agreement, each Stockholder has agreed to tender his or her Shares in the Offer, and not to withdraw such tender unless the Offer shall have been terminated in accordance with its terms.

In addition, pursuant to the Tender and Support Agreement, each Stockholder granted to the officers of KLA-Tencor an irrevocable proxy to, at any meeting of the stockholders of Issuer called to vote upon the Merger and the Merger Agreement, and at any adjournment thereof, or in any other circumstances upon which a vote, consent or other approval with respect to the Merger and the Merger Agreement is sought, vote and exercise all voting and related rights of such Stockholder of its beneficially held Shares in favor of the adoption by Issuer of the Merger and the approval of the Merger Agreement and each of the transactions contemplated thereby.

The proposed transaction is valued at approximately \$74 million. KLA-Tencor expects to fund the consideration payable pursuant to the Offer and the Merger using its internally available cash and securities and cash generated from operations.

Shared voting power with respect to the Shares owned by the Stockholders may be deemed to have been acquired through execution of the Tender and Support Agreement. KLA-Tencor has not expended any funds in connection with the execution of the Tender and Support Agreement.

Schedule B attached hereto contains the names and number of Shares beneficially held by each Stockholder.

The foregoing descriptions of the Merger Agreement and the Tender and Support Agreement do not purport to be complete and are qualified in their entirety by reference to such agreements.

A copy of the Merger Agreement is attached as Exhibit 1 to this Schedule 13D. A copy of the Tender and Support Agreement is attached as Exhibit 2 to this Schedule 13D.

Item 4. Purpose of Transaction.

As described in Item 3 above, this statement is being filed in connection with the Tender and Support Agreement among KLA-Tencor, Fenway, Issuer and each of the Stockholders party thereto in connection with the Offer, the Merger and the related Merger Agreement.

As promptly as practicable after the date of the Merger Agreement, Fenway will commence the Offer. If the Offer is consummated, KLA-Tencor will be entitled to designate a number of persons to Issuer's Board of Directors that reflects KLA-Tencor's proportionate voting interest in Issuer. Subject to the satisfaction or waiver of the conditions set forth in the Offer, after consummation of the Offer, KLA-Tencor shall cause the Merger to occur. Upon the consummation of the Merger, (i) Issuer will become a wholly-owned subsidiary of KLA-Tencor and (ii) each Common Share which has not been purchased pursuant to the Offer will be converted into the right to receive \$1.65 in cash, subject to certain exceptions more fully described in the Merger Agreement.

From and after the effective time of the Merger and pursuant to the Merger Agreement, the directors of Fenway will serve as directors of Issuer until one or more successors are duly elected or appointed and qualified in accordance with applicable law, (ii) the officers of Fenway immediately prior to the effective time of the Merger will be the officers of Issuer until successors are duly elected or appointed and qualified in accordance with applicable law, (iii) the certificate of incorporation of the Issuer will be amended at the effective time of the Merger as set forth in the Merger Agreement and, as so amended, will be the certificate of incorporation of the Issuer as the surviving corporation and (iv) the bylaws of Fenway in effect immediately prior to the effective time of the Merger will be the bylaws of Issuer.

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Following the Merger, the Common Shares will no longer be traded on the Nasdaq, there will be no public market for the Common Shares and registration of the Common Shares under the Exchange Act will be terminated.

Except as set forth in this Statement and in connection with the Merger described above, KLA-Tencor has no plan or proposals that relate to or would result in any of the transactions described in subparagraphs (a) through (j) of Item 4 of Schedule 13D.

Item 5. Interest in Securities of the Issuer.

(a) and (b) Other than those Shares that may be deemed to be beneficially owned in connection with the Tender and Support Agreements, KLA-Tencor has not acquired and, for the purposes of Rule 13d-4 promulgated under the Exchange Act, does not beneficially own any Shares.

As a result of the Tender and Support Agreement, KLA-Tencor may be deemed to have the power to vote up to 14,609,201 Common Shares, which Common Shares represent:

- 4,129,353 Common Shares,
- 6,709,677 Common Shares issuable on the conversion of the Preferred Shares,
- 1,560,000 Common Shares issuable on the conversion of warrants to purchase Common Shares, and
- 2,210,171 Common Shares issuable on the conversion of options to purchase Common Shares exercisable within 60 days of January 7, 2006,

in favor of approval of the Merger Agreement, and thus, for the purpose of Rule 13d-3 promulgated under the Exchange Act, KLA-Tencor may be deemed to be the beneficial owners of an aggregate of 14,609,201 Shares. All Shares that may be deemed to be beneficially owned by KLA-Tencor constitute approximately 30.6% (with options and warrants to purchase Common Shares within 60 days of January 17, 2007 representing 6% of such amount) of the issued and outstanding Shares as of January 7, 2007 (as represented by Issuer in the Merger Agreement) on an as-converted basis.

KLA-Tencor (i) is not entitled to any rights as a stockholder of Issuer as to the Shares covered by the Tender and Support Agreement, except as otherwise expressly provided in the Tender and Support Agreement and (ii) disclaims all beneficial ownership of such Shares.

Except as set forth in this Item 5(a), none of KLA-Tencor and, to the knowledge of KLA-Tencor, any persons named in Schedule A beneficially owns any Shares.

(c) Except for the agreements described above, to the knowledge of KLA-Tencor, no transactions in the class of securities reported have been effected during the past 60 days by any person named in Schedule A or Item 5(a).

(d) To the knowledge of KLA-Tencor, no other person has the right to receive or the power to direct the receipt of dividends from, or the proceeds from the sale of, the securities of Issuer reported herein.

(e) Inapplicable.

Item 6. Contracts, Arrangements, Understandings or Relationships With Respect to Securities of the Issuer.

Except for the agreements described above, to the knowledge of KLA-Tencor, there are no contracts, arrangements, understandings or relationships (legal or otherwise), including, but not limited to, transfer or voting of any of the securities, finder's fees, joint ventures, loan or option arrangements, puts or calls, guarantees of profits, division of profits or loss, or the giving or withholding of proxies, between the persons enumerated in Item 2, and any other person, with respect to any securities of Issuer, including any securities pledged or otherwise subject to a contingency the occurrence of which would give another person voting power or investment power over such securities other than standard default and similar provisions contained in loan agreements.

Item 7. Material to be Filed as Exhibits.

- Exhibit 1 Agreement and Plan of Merger, dated January 7, 2007, among KLA-Tencor Corporation, Fenway Acquisition Corporation and Therma-Wave, Inc. (incorporated by reference to Exhibit (d)(1) to KLA-Tencor's Schedule TO filed on January 18, 2007).
- Exhibit 2 Tender and Support Agreement, dated January 7, 2007, among KLA-Tencor Corporation, Fenway Acquisition Corporation, Therma-Wave, Inc. and each Stockholder party thereto (incorporated by reference to Exhibit (d)(2) to KLA-Tencor's Schedule TO filed on January 18, 2007).

SIGNATURE

After reasonable inquiry and to the best of my knowledge and belief, I certify that the information set forth in this statement is true, complete and correct.

Dated: January 17, 2007

KLA-TENCOR CORPORATION

By: /s/ Jeffrey L. Hall

Jeffrey L. Hall

Chief Financial Officer

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DIRECTORS AND EXECUTIVE OFFICERS OF KLA-TENCOR CORPORATION

The name, business address, title, present principal occupation or employment of each of the directors and executive officers of KLA-Tencor Corporation are set forth below. Unless indicated below, the business address of each director and executive officer is 160 Rio Robles, San Jose, California 95134. Unless otherwise indicated, each occupation set forth opposite an individual's name refers to KLA-Tencor. All of the persons listed below are citizens of the United States of America.

| Name | Present Principal Occupation or Employment |
|--------------------|--|
| <i>Directors</i> | |
| Edward W. Barnholt | Chairman of the Board |
| H. Raymond Bingham | Director |
| Robert T. Bond | Director |
| Stephen P. Kaufman | Senior Lecturer of the Harvard Business School, Soldiers Field Road, Boston, MA 02163 |
| Linda Urbanek | Director |
| Richard P. Wallace | Chief Executive Officer |
| David C. Wang | President, China of Boeing Co., Tower A, 16/F, Pacific Century Place, No.2A, Worker's Stadium Road, North Chaoyang District, Beijing, 100027, People's Republic of China |

| Name | Present Principal Occupation or Employment |
|---|--|
| <i>Executive Officers (Who Are Not Directors)</i> | |
| Lawrence A. Gross | Executive Vice President-Legal and Interim General Counsel |
| Jeffrey L. Hall | Chief Financial Officer |
| John H. Kispert | President and Chief Operating Officer |
| Jorge Titingier | Executive Vice President and Chief Administrative Officer |
| Ben Tsai | Chief Technology Officer |

SCHEDULE B

| Stockholder | Common Shares Beneficially Owned |
|--|---|
| Larry Tomlinson | 25,416(1) |
| Leonard Baker | 166,015(2) |
| John D'Errico | 55,208(3) |
| Gregory Graves | 6,250(1) |
| Nam Suh | 25,416(1) |
| John Willinge | 6,250(1) |
| Peter Hanley | 25,416(1) |
| David Aspnes | 60,708(4) |
| Papken Der Torossian | 501,583(5) |
| Boris Lipkin | 896,665(6) |
| Joe Passarello | 83,025(7) |
| Brian Renner | 98,828(8) |
| Jon Opsal | 431,247(9) |
| John Mathews | 60,802(10) |
| Raul Tan | 88,916(11) |
| Noel Simmons | 173,726(12) |
| Lena Nicolaides | 27,153(13) |
| North Run Master Fund | 7,741,739(14) |
| Deephaven Long Short Equity Trading Ltd. | 795,161(15) |
| Deephaven Relative Value Equity Trading Ltd. | 3,339,677(16) |

-
- (1) Represents Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
 - (2) Includes 15,208 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007. Does not include 186,631 Common Shares in which Mr. Baker disclaims ownership. Of these 186,631 Common Shares, 69,831 are held in a trust where Mr. Baker is a trustee, and 116,800 are held in a limited partnership of which Mr. Baker is a general partner.
 - (3) Includes 35,208 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.

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- (4) Includes 35,208 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (5) Includes 464,583 Common Shares issuable upon the exercise of options. Does not include 234,733 Common shares in which Mr. Der Torossian disclaims ownership and which are held in a family trust where Mr. Der Torossian is a trustee.
- (6) Includes 866,666 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (7) Includes 68,750 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (8) Includes 93,749 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (9) Includes 270,071 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (10) Includes 55,416 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (11) Includes 71,866 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (12) Includes 129,005 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (13) Includes 15,693 Common Shares issuable upon the exercise of options exercisable within 60 days of January 17, 2007.
- (14) North Run Master Fund directly owns 3,606,900 Common Shares. Includes 780,000 Common Shares issuable on the exercise of warrants to purchase Common Stock and 3,354,839 Common Shares issuable on the conversion of the Preferred Shares.
- (15) Represents 150,000 Common Shares issuable on the exercise of warrants to purchase Common Stock and 645,161 Common Shares issuable on the conversion of the Preferred Shares.
- (16) Represents 630,000 Common Shares issuable on the exercise of warrants to purchase Common Stock and 2,709,677 Common Shares issuable on the conversion of the Preferred Shares.