



**ABRACON Crystal Specification for
Micrel Semiconductor MICRF Series RF Transceiver**

| ABRACON P/N for MICRF Chip | For use with Micrel Chip P/N |
|----------------------------|------------------------------|
| ABLS-6.7458MHz-20-R60-D | MICRF011-002-007 |
| ABLS-13.560MHz-10-R20-D | MICRF102 |
| ABLS-4.897MHz-20-R70-D | MICRF011-002-007 |
| ABLS-9.84375MHz-10-R20-D | MICRF102 |
| ABLS-9.7941MHz-10-R20 | MICRF009-010 |
| ABLS-13.94916MHz-10-R20 | MICRF009-010 |
| ABLS-12.1875MHz-10-R20 | MICRF112 |
| ABLS-13.0625MHz-10-R20 | MICRF112 |
| ABLS-13.6050MHz-20-R50-D | MICRF505 |
| ABLS-13.94916MHz-10-R20-D | MICRF009-010 |
| ABLS-14.3359MHz-20-R50 | MICRF505 |
| ABM9-16.000MHz-10-D-1-U | MICRF505-509 |
| ABM3B-12.1875MHz-10-D4 | MICRF112 |
| ABM3B-13.0625MHz-10-D4 | MICRF112 |


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WARNING: ESD SENSITIVE PRODUCT

| | | | | | | |
|---|-------------------|-------------|-------------------|---|--------------------------|---------------|
|  | | | | TITLE ABRACON Crystal Specification for Micrel Semiconductor MICRF Series RF Transceiver | | |
| PREP. YH | DATE 8/27/2012 | ENGR. SR | DATE 8/27/2012 | SCALE None | DRAWING NO. ----- | REV. 5 |
| CKD --- | DATE --- | APP'D CP | DATE 8/27/2012 | PAGE OF 1 7 | | |

1.0 SCOPE

This specification describes specifications of ABRACON's crystals for Micrel Semiconductor's IC's.

2.0 ELECTRICAL SPECIFICATIONS

2.1 Individual Specifications

| ABRACON P/N | Frequency (MHz) | Load Cap. (pF) | Operating Temp. (°C) | Storage Temp. (°C) | ESR (ohms) | Frequency Tolerance (ppm) | Temperature Stability (ppm) |
|---------------------------|-----------------|----------------|----------------------|--------------------|------------|---------------------------|-----------------------------|
| ABLS-6.7458MHz-20-R60-D | 6.74580 | 20 | -40 to +85 | -40 to +85 | 60 | ±50 | ±50 |
| ABLS-13.560MHz-10-R20-D | 13.56000 | 10 | -40 to +85 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-4.897MHz-20-R70-D | 4.89700 | 20 | -40 to +85 | -40 to +85 | 70 | ±50 | ±50 |
| ABLS-9.84375MHz-10-R20-D | 9.84375 | 10 | -40 to +85 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-9.7941MHz-10-R20 | 9.79410 | 10 | 0 to +70 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-13.94916MHz-10-R20 | 13.94916 | 10 | 0 to +70 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-12.1875MHz-10-R20 | 12.18750 | 10 | 0 to +70 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-13.0625MHz-10-R20 | 13.06250 | 10 | 0 to +70 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-13.6050MHz-20-R50-D | 13.60500 | 20 | -40 to +85 | -40 to +85 | 50 | ±50 | ±50 |
| ABLS-13.94916MHz-10-R20-D | 13.94916 | 10 | -40 to +85 | -40 to +85 | 20 | ±50 | ±50 |
| ABLS-14.3359MHz-20-R50 | 14.33590 | 20 | 0 to +70 | -40 to +85 | 50 | ±50 | ±50 |
| ABM9-16.000MHz-10-D-1-U | 16.00000 | 10 | -40 to +85 | -40 to +105 | 80 | ±10 | ±20 |
| ABM3B-12.1875MHz-10-D4 | 12.18750 | 10 | -40 to +85 | -40 to +85 | 70 | ±30 | ±50 |
| ABM3B-13.0625MHz-10-D4 | 13.06250 | 10 | -40 to +85 | -40 to +85 | 70 | ±30 | ±50 |

Note: Over temperature specification for Part# ABM9-16.000MHz-D-1-U revised from ±10 ppm to ±20 ppm (-40°C to +85°C) on 08/27/2012.

2.2 Common Specifications

Shunt capacitance C0:

7 pF max.

Operation mode:

AT-cut Fundamental

Drive level:

1 mW max., 100µW Typical (ABLS)

100 uW max., 10µW Typical (AM9 and

Aging @ 25° C per a year :

± 5 ppm max.

Insulation resistance:

500 MΩ min. at 100Vdc ± 15V

Spurious responses:

-3dB max.

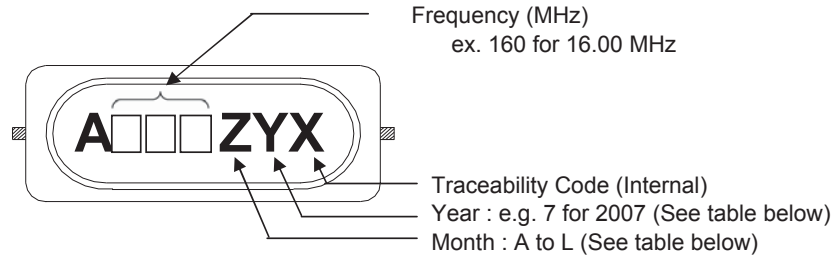
3.0 SPECIAL REQUIREMENT

This product is RoHS compliant and Pb free.

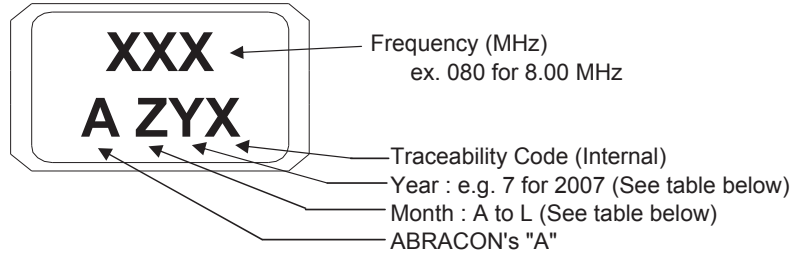
4.0 MARKING

Marking Method : Laser Marking

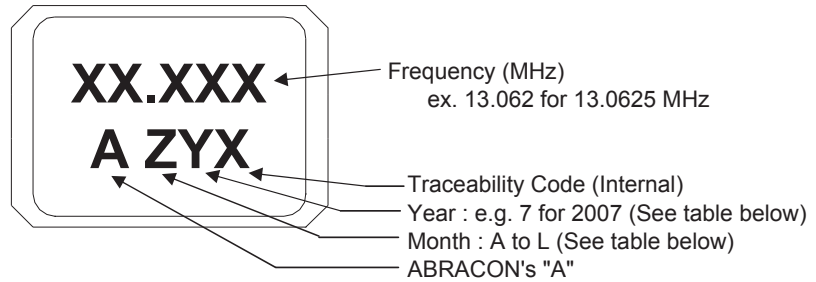
4.1 ABL5 Series



4.2 ABM9 Series



4.3 ABM3B Series



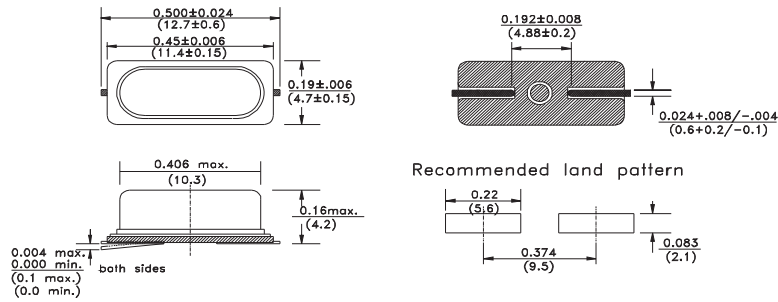
4.2.1 Marking Method : Laser Marking

Date Code

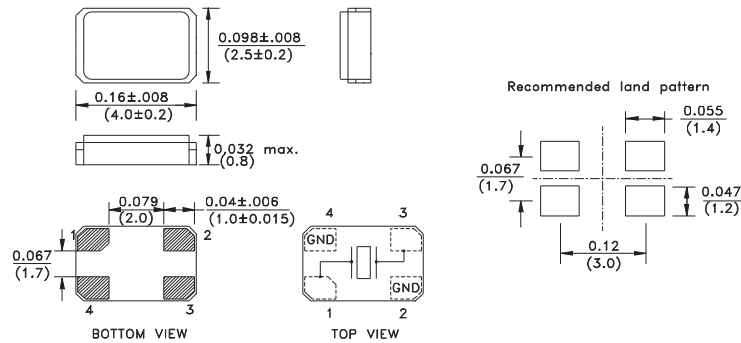
| Month | Code |
|-----------|------|
| January | A |
| February | B |
| March | C |
| April | D |
| May | E |
| June | F |
| July | G |
| August | H |
| September | I |
| October | J |
| November | K |
| December | L |

5.0 OUTLINE DIMENSIONS

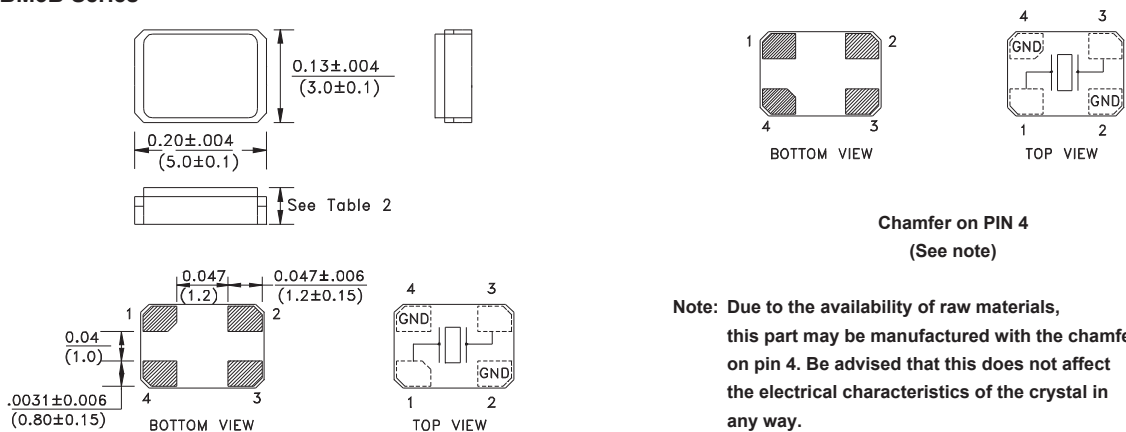
5.1 ABL5 Series



5.2 ABM9 Series



5.3 ABM3B Series



**Chamfer on PIN 1
(Default)**

**Chamfer on PIN 4
(See note)**

Note: Due to the availability of raw materials, this part may be manufactured with the chamfer on pin 4. Be advised that this does not affect the electrical characteristics of the crystal in any way.

Dimension : mm

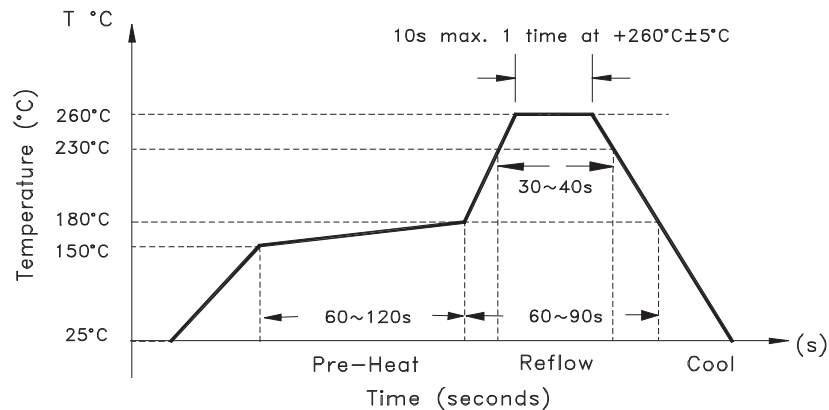
TOLERANCES:

UNLESS OTHERWISE SPECIFIED: .X: ± 0.1 (0.25) .XX: ± 0.01 (0.025) .XXX: ± 0.005 (0.013)

6.0 RELIABILITY TEST

| No. | Test Items | Test Conditions |
|-----|---------------------------|---|
| 1 | Temperature Cycling: | The component shall remain within the electrical specification (± 5 pp max) after 3 cycles of high and low temperature testing (-40°C to $+85^{\circ}\text{C}$) for 2 hours max. |
| 2 | Thermal Shock: | The component shall remain within the electrical specification after exposure at extreme temperature -40°C to $+85^{\circ}\text{C}$ for 5 minutes for 3 cycles. |
| 3 | Vibration: | The component shall remain within the electrical specification after loaded vibration at 10Hz to 55Hz, amplitude 1.5mm, within 1 minute for 2 hours minimum on each axis (X,Y,Z). |
| 4 | Drop Test: | The component shall remain within the electrical specifications after a natural drop (3X) on a hard wooden board at 75 cm. |
| 5 | Humidity: | The component shall remain within the electrical specifications after being kept at a condition of ambient temperature $+85^{\circ}\text{C}$, 85% RH for 96 hours minimum. |
| 6 | Fine Leak Test: | Expose samples to 60PSIG Helium gas for 2 hours. Max leak rate 2×10^{-8} atmcc/s. |
| 7 | Gross Leak Test: | Submerge samples in 100% De-ionized water or Perfluorocarbon at 85°C for at least 1 minute. Check for bubbles. |
| 8 | Solderability: | Solderability of terminals shall be kept at more than 95% after dipped in solder flux at $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 5 seconds. |
| 9 | Lead Bend: (ABLS only) | The component shall withstand maximum bend of 90° reference to base for 2 bends. Solder tinning must be 4 microns thick minimum. |

6.1 REFLOW PROFILE



8.0 NOTE

- (1) The parts are manufactured in accordance with this specification. If other conditions and specifications which are required for this specification, please contact ABRACON for more information.
- (2) ABRACON will supply the parts in accordance with this specification unless we receive a written request to modify prior to an order placement.
- (3) In no case shall ABRACON be liable for any product failure from in appropriate handling or operation of the item beyond the scope of this specification.
- (4) When changing your production process, please notify ABRACON immediately.
- (5) If you intend to use the product for listed application which may possibly cause to loss of life or assets, please notify ABRACON in advance.
(For example, Medical, Aerospace, Aeronautic equipment, Safety control equipment as well as safety related.)
- (6) All specifications and Marking will be subject to change without notice.
- (7) See ABRACON website (www.abracon.com) for additional Terms and Conditions.