



## 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                     |

### PROPRIETARY NOTICE

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**WARNING: ESD SENSITIVE PRODUCT**

|                                                                                     |                   |             |                   |                                                                                               |                          |               |
|-------------------------------------------------------------------------------------|-------------------|-------------|-------------------|-----------------------------------------------------------------------------------------------|--------------------------|---------------|
|  |                   |             |                   | <b>ABRACON Crystal Specification for<br/>Micrel Semiconductor MICRF Series RF Transceiver</b> |                          |               |
| PREP.<br>YH                                                                         | DATE<br>8/27/2012 | ENGR.<br>SR | DATE<br>8/27/2012 | SCALE<br>None                                                                                 | DRAWING NO.<br><br>----- | REV.<br><br>A |
| CKD<br>---                                                                          | DATE<br>---       | APP'D<br>CP | DATE<br>8/27/2012 | PAGE<br>1 OF<br>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-10-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:

Operation mode:

Drive level:

Aging @ 25° C per a year :

Insulation resistance:

Spurious responses:

7 pF max.

AT-cut Fundamental

1 mW max., 100µW Typical (ABLS)

100 uW max., 10µW Typical (AM9 and

± 5 ppm max.

500 MΩ min. at 100Vdc ± 15V

-3dB max.

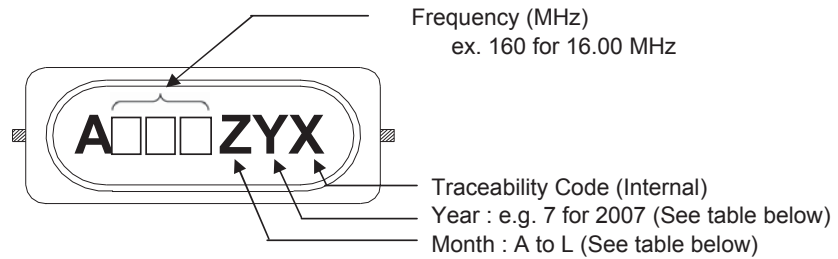
### 3.0 SPECIAL REQUIREMENT

This product is RoHS compliant and Pb free.

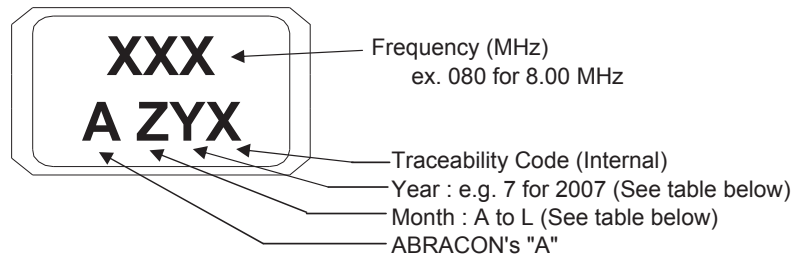
#### 4.0 MARKING

Marking Method : Laser Marking

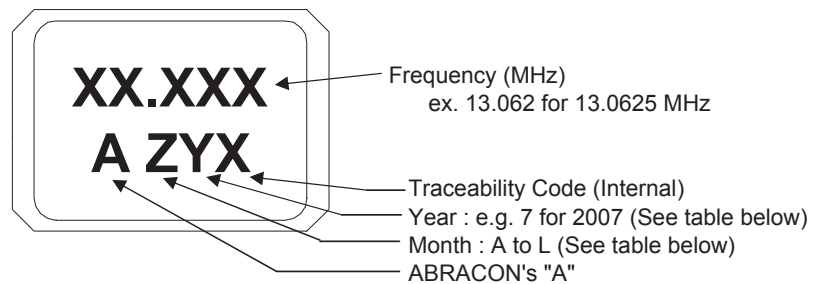
##### 4.1 ABL Series



##### 4.2 ABM9 Series



##### 4.3 ABM3B Series



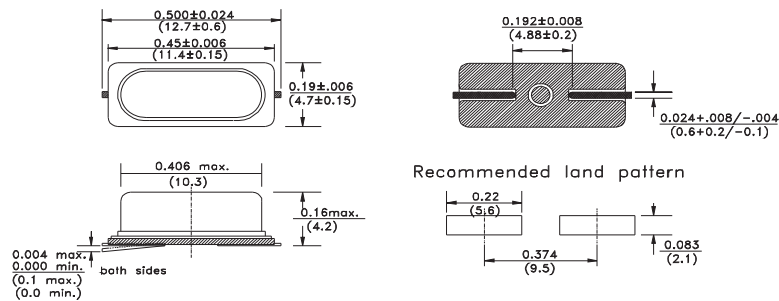
##### 4.2.1 Marking Method : Laser Marking

Date Code

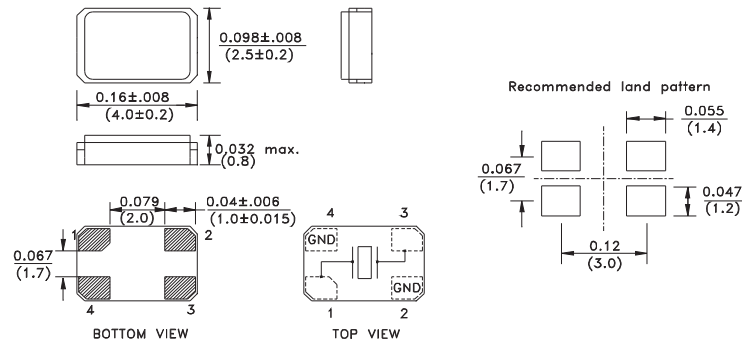
| Month     | Code |
|-----------|------|
| January   | A    |
| February  | B    |
| March     | C    |
| April     | D    |
| May       | E    |
| June      | F    |
| July      | G    |
| August    | H    |
| September | I    |
| October   | J    |
| November  | K    |
| December  | L    |

## 5.0 OUTLINE DIMENSIONS

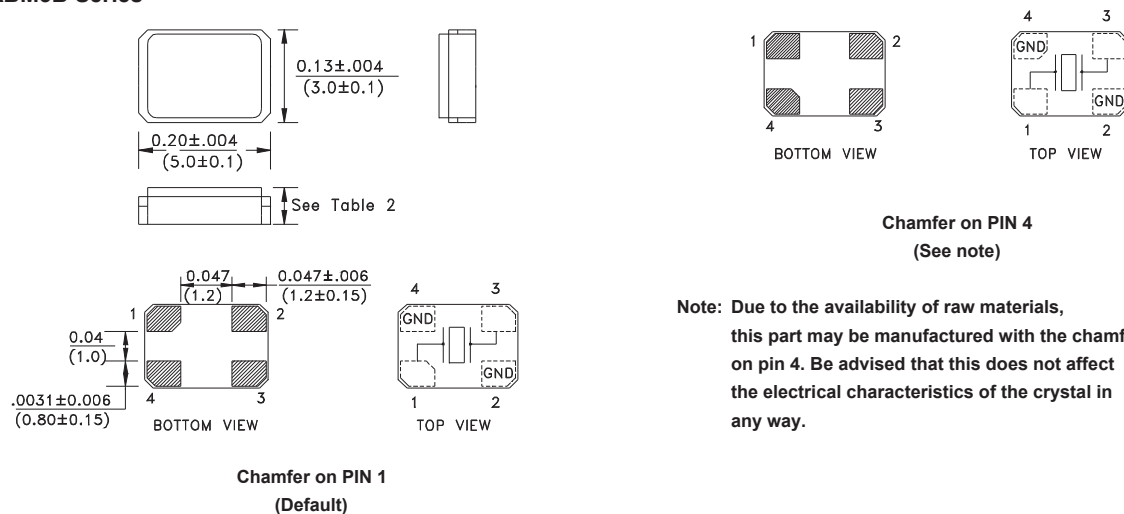
### 5.1 ABL Series



### 5.2 ABM9 Series



### 5.3 ABM3B Series



Dimension : mm

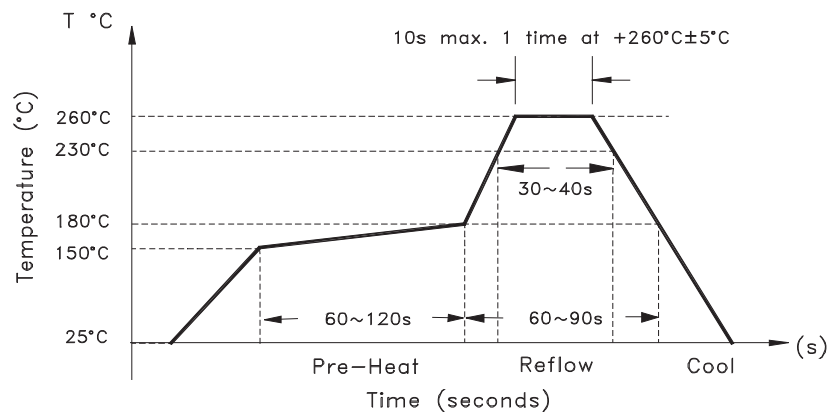
TOLERANCES:

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

## 6.0 RELIABILITY TEST

| No. | Test Items                | Test Conditions                                                                                                                                                                                         |
|-----|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Temperature Cycling:      | The component shall remain within the electrical specification ( $\pm 5$ pp max) after 3 cycles of high and low temperature testing ( $-40^{\circ}\text{C}$ 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 $-40^{\circ}\text{C}$ 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.<br>Max leak rate $2 \times 10^{-8}$ atmcc/s.                                                                                                           |
| 7   | Gross Leak Test:          | Submerge samples in 100% De-ionized water or Perfluorocarbon at $85^{\circ}\text{C}$ 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:<br>(ABLS only) | The component shall withstand maximum bend of $90^{\circ}\text{C}$ reference to base for 2 bends. Solder tinning must be 4 microns thick minimum.                                                       |

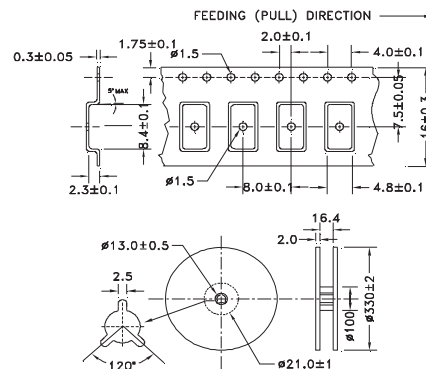
## 6.1 REFLOW PROFILE



## 7.0 PACKING

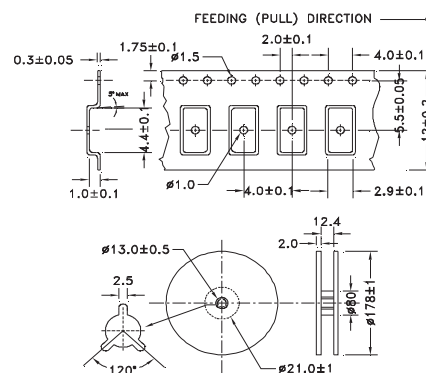
### 7.1 ABL5 Series

T= tape and reel (1,000pcs/reel)



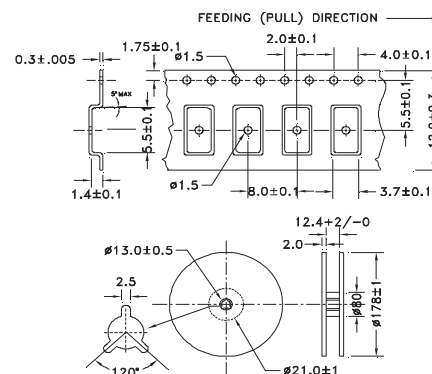
### 7.2 ABM9 Series

T= tape and reel (1,000pcs/reel)



### 7.3 ABM3B Series

T= tape and reel (1,000pcs/reel)



Dimension : mm

TOLERANCES:

UNLESS OTHERWISE SPECIFIED: .X: ± 0.25

.XX: ± 0.025

.XXX: ± 0.013

#### 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.
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