



Features / 特点

- High Reliability & Low Cost Unit  
高性价比产品
- Tight Stability & Extended Temperature available  
可提供更高频率稳定性及温度要求产品
- Lead-free type  
无铅
- RoHS Compliant  
符合RoHS规格要求



M3



2T



3T



2T-ST



2T-SJ



Standard Specifications /规格

| Item                               | M3  |              | 2T(2×6)/ ST /SJ |                 | 3T(3×8)   |                 |
|------------------------------------|---|--------------|-----------------|-----------------|-----------|-----------------|
|                                    | 32.768kHz   | 20.0~75.0kHz | 32.768kHz       | 20.0 to 75.0kHz | 32.768kHz | 20.0 to 75.0kHz |
| Equivalent Series Resistance (ESR) | 50kΩ Max  | 55kΩ Max     | 40kΩ Max        | 50kΩ Max        | 40kΩ Max  | 50kΩ Max        |
| Frequency Tolerance @ 25 °C        | ±20ppm (tighter tolerance also available)               |              |                 |                 |           |                 |
| Temperature Coefficient            | -0.034±0.006ppm /°C <sup>2</sup>                        |              |                 |                 |           |                 |
| Operating Temperature Range        | -20 °C to +70 °C (other operating range also available) |              |                 |                 |           |                 |
| Operable Temperature Range         | -40 °C to +85 °C  |              |                 |                 |           |                 |
| Load Capacitance                   | 6.0pF , 8.0pF , 12.5pF is standard                      |              |                 |                 |           |                 |
| Drive Level                        | 0.2μW Max   |              |                 |                 |           |                 |
| Shunt Capacitance                  | 2.5pF Max   |              |                 |                 |           |                 |
| Aging                              | ±5ppm/year  |              |                 |                 |           |                 |

Please contact our Sales Representative for tighter Frequency Tolerance, Operating Temperature Range or/and other specifications.

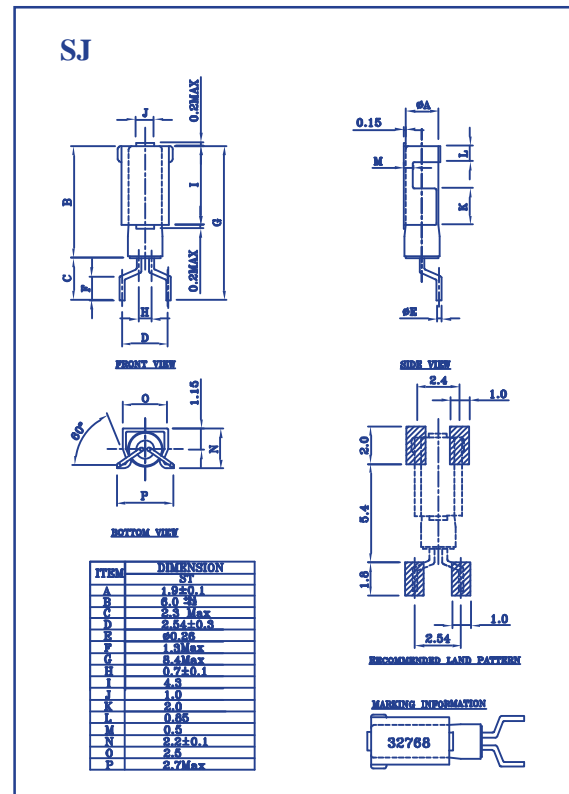
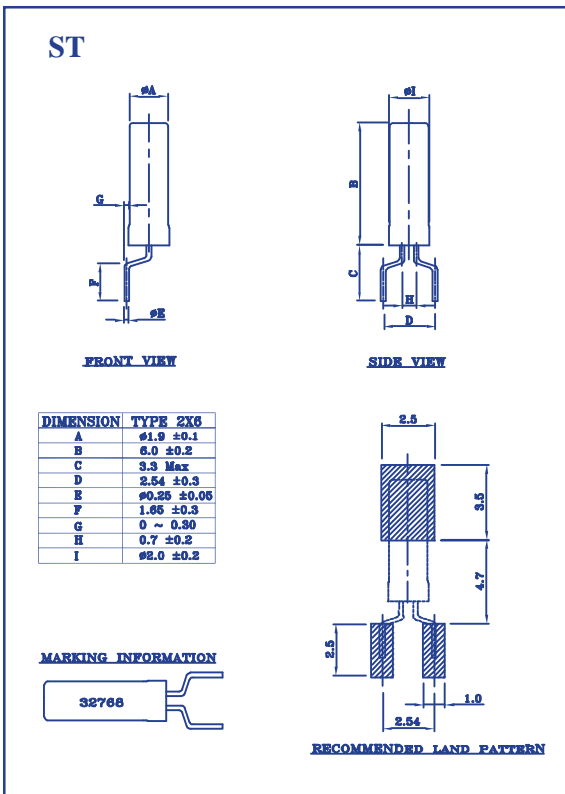
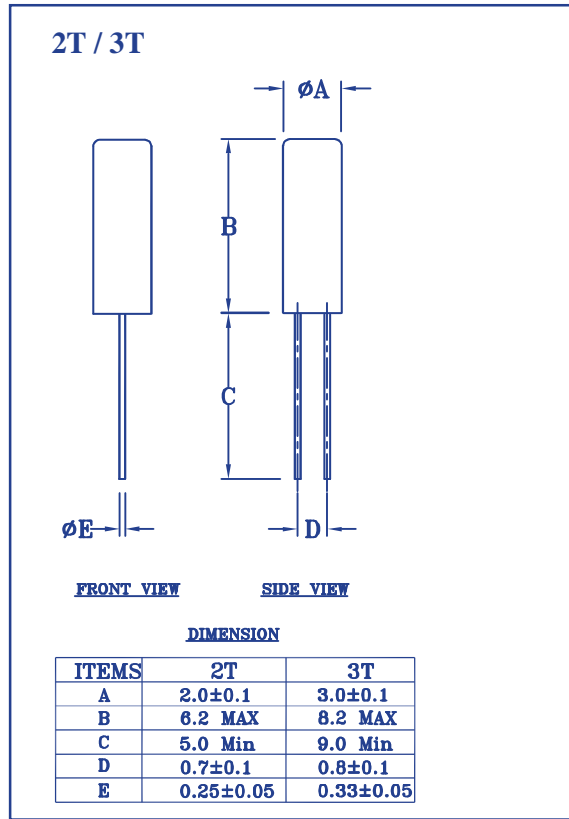
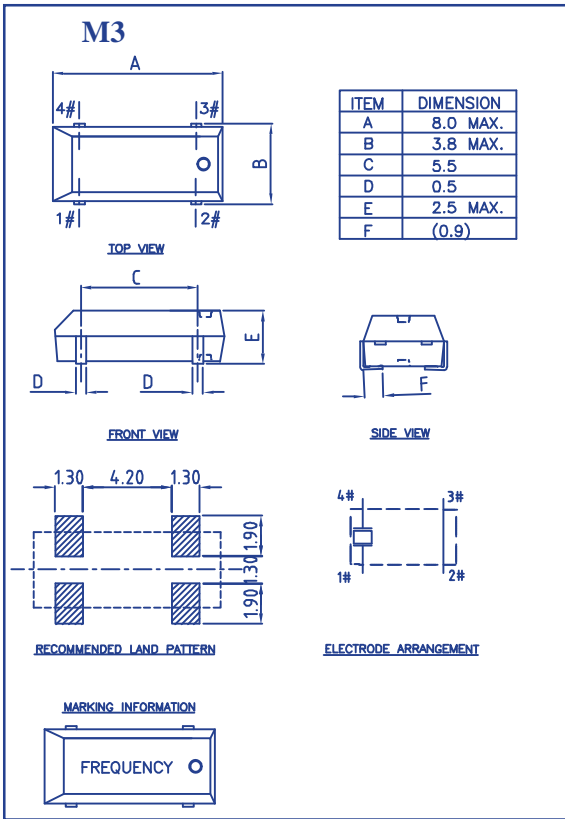
如阁下对上述产品之频差范围, 使用温度范围等参数有特殊要求, 欢迎联系我们的销售代表。

Note:

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■ Dimensions (mm) and Solder Pad Layout (mm) / 尺寸





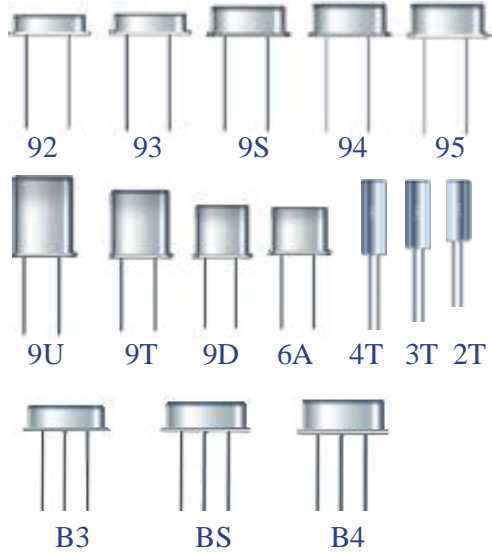
**MHz Crystal Units-Leaded**

**MHz 石英晶振-插件型**

■ **Features / 特点**

- High Reliability & Low Cost Unit  
高性价比产品
- Lead-free Type  
无铅
- RoHS compliant  
符合RoHS要求
- Tight Stability & Extended Temperature Available  
可提供更高稳定性及温度范围产品
- For automotive applications, please contact our sales rep.  
汽车级产品请向销售代表垂询

■ **Holder Type:**



■ **Standard Specifications /规格**

| Item                                       | 92 / 93 / 9S / 94 / 95 B3 / BS / B4                     | 9U / 9T / 9D / 6A    |
|--|---|----------------------|
| Frequency Range                            | 3.01 to 100.00 MHz                                      | 1.8432 to 700.00 MHz |
| Frequency Tolerance@ 25 °C                 | ±30ppm (tighter tolerance also available)               |                      |
| Frequency Tolerance over Temperature range | ±50ppm (tighter tolerance also available)               |                      |
| Operating Temperature Range                | -10 °C to +60 °C (other operating range also available) |                      |
| Operable Temperature Range                 | -40 °C to +85 °C  |                      |
| Equivalent Series Resistance (ESR)         | Please refer to the ESR table                           |                      |
| Drive Level                                | 50µW (0.001µW to 1000µW also available)                 |                      |
| Load Capacitance                           | 12pF (3pF, 4.5pF, 6pF and series also available)        |                      |
| Aging                                      | ±5ppm/year  |                      |

| Item                                       | 2T (2×6)  |           | 3T(3×8) |           | 4T (3×9) |           |
|--|---|-----------|---------|-----------|----------|-----------|
|  | 4~32MHz   | 30~100MHz | 4~32MHz | 30~100MHz | 4~32MHz  | 30~100MHz |
| Mode                                       | FUND.   | 3OT       | FUND.   | 3OT       | FUND.    | 3OT       |
| Equivalent Series Resistance (ESR)         | 70~250Ω   | 150~200Ω  | 50~200Ω | 100~150Ω  | 30~150Ω  | 80~100Ω   |
| Frequency Tolerance@ 25 °C                 | ±30ppm (tighter tolerance also available)               |           |         |           |          |           |
| Frequency Tolerance over Temperature Range | ±50ppm (tighter tolerance also available)               |           |         |           |          |           |
| Operating Temperature Range                | -10 °C to +60 °C (other operating range also available) |           |         |           |          |           |
| Operable Temperature Range                 | -40 °C to +85 °C  |           |         |           |          |           |
| Drive Level                                | 50µW (0.001µW to 1000µW also available)                 |           |         |           |          |           |
| Load Capacitance                           | 12pF (3pF, 4.5pF, 6pF and series also available)        |           |         |           |          |           |
| Shunt Capacitance                          | 7.0pF MAX   |           |         |           |          |           |
| Aging                                      | ±5ppm/year  |           |         |           |          |           |

**Please contact our Sales Representative for tighter Frequency Tolerance, Operating Temperature Range or/and other specifications.**

如阁下对上述产品之频差范围, 使用温度范围等参数有特殊要求, 欢迎联系我们的销售代表。

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■ ESR Table / 等效电阻表

| Type                          | Frequency Range (MHz) | Mode         | Standard ESR (Ohm) |
|-------------------------------|-----------------------|--------------|--------------------|
| 9U/9T/<br>9D/6A               | 1.8432 to 2.4         | AT Cut Fund. | 550                |
|                               | 2.4 to 3.0            | AT Cut Fund. | 300                |
|                               | 3.0 to 3.5            | AT Cut Fund. | 150                |
|                               | 3.5 to 4.0            | AT Cut Fund. | 100                |
|                               | 4.0 to 5.5            | AT Cut Fund. | 80                 |
|                               | 5.5 to 6.0            | AT Cut Fund. | 60                 |
|                               | 6.0 to 8.0            | AT Cut Fund. | 50                 |
|                               | 8.0 to 11.0           | AT Cut Fund. | 40                 |
|                               | 11.0 to 13.0          | AT Cut Fund. | 35                 |
|                               | 13.0 to 16.0          | AT Cut Fund. | 30                 |
|                               | 16.0 to 50.0          | AT Cut Fund. | 25                 |
|                               | 27.0 to 100.0         | BT Cut       | 30                 |
| 26.0 to 100.0                 | 3rd Overtone          | 40           |                    |
| 100.0 to 500.0                | 5rd Overtone          | 100          |                    |
| 100.0 to 700.0                | 7rd Overtone          | 150          |                    |
| 92/93<br>9S/94/95/<br>B3/BSB4 | 3.01 to 3.5           | AT Cut Fund. | 300                |
|                               | 3.5 to 4.0            | AT Cut Fund. | 150                |
|                               | 4.0 to 4.5            | AT Cut Fund. | 130                |
|                               | 4.5 to 5.0            | AT Cut Fund. | 110                |
|                               | 5.0 to 6.0            | AT Cut Fund. | 80                 |
|                               | 6.0 to 7.0            | AT Cut Fund. | 60                 |
|                               | 7.0 to 10.0           | AT Cut Fund. | 50                 |
|                               | 10.0 to 13.0          | AT Cut Fund. | 40                 |
| 13.0 to 50.0                  | AT Cut Fund.          | 30           |                    |
| 27.0 to 100.0                 | BT Cut                | 40           |                    |
| 26.0 to 100.0                 | 3rd Overtone          | 100          |                    |

■ Dimensions (mm) / 尺寸

92 / 93 / 9S / 94 / 95

| ITEM | DIMENSION     |  |
|------|---------------|--|
| A    | 10.16 Max.    |  |
| B    | 3.81 Max.     |  |
| C    | TYPE          | HEIGHT                                 |
|      | 92            | 2.25/2.35mm*                           |
|      | 93            | 2.50mm Max.                            |
|      | 9S            | 3.50mm Max.                            |
|      | 94            | 4.00mm Max.                            |
| 95   | 5.00mm Max.   |  |
| D    | 1.LEAD LENGTH | 13.2±0.5(STANDARD)                     |
|      | 2.LEAD LENGTH | (2.8~16)±0.5 REFER TO CUSTOMER REQUEST |
| E    | 4.88 ±0.2     |  |
| F    | 0.45 ±0.05    |  |
| G    | 11.05 Max.    |  |
| H    | 4.7 MAX       |  |

\* >5MHz = 2.25mm MAX  
 <5MHz = 2.35mm MAX

MARKING INFORMATION

XXXXXX = CRYSTAL FREQUENCY  
 BBB - 2~3 DIGITS BATCH CODE

2T / 3T / 4T

MARKING INFORMATION

XXXXXX = CRYSTAL FREQUENCY  
 BBB - 2~3 DIGITS BATCH CODE

| ITEMS | 2T        | 3T        | 4T        |
|-------|-----------|-----------|-----------|
| A     | 2.0±0.1   | 3.0±0.1   | 3.0±0.1   |
| B     | 0.5 Max.  | 0.8 Max.  | 0.8 Max.  |
| C     | 6.0 Min.  | 6.0 Min.  | 6.0 Min.  |
| D     | 0.7±0.1   | 0.8±0.1   | 0.8±0.1   |
| E     | 0.88±0.06 | 0.88±0.06 | 0.88±0.06 |

B3 / BS / B4

| ITEM | DIMENSION     |  |
|------|---------------|--|
| A    | 10.16 Max.    |  |
| B    | 3.81 Max.     |  |
| C    | XTAL TYPE     |  |
|      | B3            | 2.50 Max.                              |
|      | BS            | 3.50 Max.                              |
|      | B4            | 4.00 Max.                              |
| D    | 1.LEAD LENGTH | 13.2±0.5(STANDARD)                     |
|      | 2.LEAD LENGTH | (2.8~16)±0.5 REFER TO CUSTOMER REQUEST |
| E    | 4.88±0.2      |  |
| F    | 0.45±0.05     |  |
| G    | 11.05 Max.    |  |
| H    | 4.7 Max.      |  |

9U / 9T / 9D / 6A

| ITEM | DIMENSION     |  |
|------|---------------|--|
| A    | 10.16 Max.    |  |
| B    | 3.81 Max.     |  |
| C    | BU            | 13.21 Max.                               |
|      | BT            | 11.8 Max.                                |
|      | BD            | 9.8 Max.                                 |
|      | BA            | 8.5 Max.                                 |
| D    | 1.LEAD LENGTH | 13.2±0.5mm(STANDARD)                     |
|      | 2.LEAD LENGTH | (2.8~16)±0.5mm REFER TO CUSTOMER REQUEST |
| E    | 4.88 ±0.2     |  |
| F    | 0.45 ±0.05    |  |
| G    | 11.05 Max.    |  |
| H    | 4.7 Max.      |  |

MARKING INFORMATION

HKC  
 XXXXXX  
 BBB

XXXXXX = CRYSTAL FREQUENCY  
 BBB = 2~3 DIGITS BATCH CODE



MHz Crystal Units-Metal Can-SMD

MHz金属外壳石英晶振-贴片型

Features / 特点

- High Reliability & Low Cost Unit  
高性价比产品
- Tight Stability & Extended Temperature Available  
可提供更高稳定性及温度范围产品
- Lead-free Type  
无铅
- RoHS compliant  
符合RoHS要求
- Case Grounding  
接地结构
- For automotive applications, please contact our sales rep.  
汽车级产品请向销售代表垂询

Standard Specifications / 规格

| Item                                       | S2/S3/SS/S4/S5 N3/NS/N4 F2 / F3 / FS E2 / E3 / ES       |
|--|---|
| Frequency Range                            | 3.01 to 100.00 MHz                                      |
| Frequency Tolerance@ 25 °C                 | ±30ppm (tighter tolerance also available)               |
| Frequency Tolerance over Temperature range | ±50ppm (tighter tolerance also available)               |
| Operating Temperature Range                | -10 °C to +60 °C (other operating range also available) |
| Operable Temperature Range                 | -40 °C to +85 °C  |
| Equivalent Series Resistance (ESR)         | Please refer to the ESR Table                           |
| Drive Level                                | 50µW (0.001µW to 1000µW also available)                 |
| Load Capacitance                           | 12pF (3pF, 4.5pF, 6pF and series also available)        |
| Aging                                      | ±5ppm/year  |

Please contact our Sales Representative for tighter Frequency Tolerance, Operating Temperature Range or/and other specifications. 如阁下对上述产品之频差范围, 使用温度范围等参数有特殊要求, 欢迎联系我们的销售代表。

ESR Table / 等效电阻表

| Frequency Range (MHz) | Mode         | Standard ESR (Ohm) |
|-----------------------|--------------|--------------------|
| 3.01 to 3.5           | AT Cut Fund. | 300                |
| 3.5 to 4.0            | AT Cut Fund. | 150                |
| 4.0 to 4.5            | AT Cut Fund. | 130                |
| 4.5 to 5.0            | AT Cut Fund. | 110                |
| 5.0 to 6.0            | AT Cut Fund. | 80                 |
| 6.0 to 7.0            | AT Cut Fund. | 60                 |
| 7.0 to 10.0           | AT Cut Fund. | 50                 |
| 10.0 to 13.0          | AT Cut Fund. | 40                 |
| 13.0 to 50.0          | AT Cut Fund. | 30                 |
| 27.0 to 100.0         | BT Cut       | 40                 |
| 26.0 to 100.0         | 3rd Overtone | 100                |

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Holder Type:



S2/S3/SS/S4/S5



N3/NS/N4



F2 / F3 / FS



E2 / E3 / ES





■ Dimensions (mm) and Solder Pad Layout (mm)/尺寸

### S2/S3/SS/S4/S5

| ITEM | DIMENSION   |            |
|------|-------------|------------|
| A    | 10.16 Max.  |            |
| B    | 3.81 Max.   |            |
| C    | X'TAL TYPE  |            |
|      | S2          | 2.75/2.85* |
|      | S3          | 3.1 Max.   |
|      | SS          | 4.1 Max.   |
|      | S4          | 4.5 Max.   |
| S5   | 5.5 Max.    |            |
| D    | 4.5 ±0.5    |            |
| E    | 11.3 ±0.2   |            |
| F    | 0.8 ±0.2    |            |
| G    | 4.7 Max.    |            |
| H    | 0.6 ±0.1    |            |
| I    | -0.1 ~ +0.2 |            |
| J    | 0.55 ±0.25  |            |

\* >5MHz = 2.75 MAX  
<5MHz = 2.85 MAX

MARKING INFORMATION: XXXXXX = CRYSTAL FREQUENCY  
BBB = 2~3 DIGITS BATCH CODE

### N3/NS/N4

ELECTRODE ARRANGEMENT  
REMARK: #1 #2 -CRYSTAL  
#3 -GND

| ITEM | DIMENSION  |          |
|------|------------|----------|
| A    | 10.16 Max. |          |
| B    | 3.81 Max.  |          |
| C    | X'TAL TYPE |          |
|      | N3         | 3.1 Max. |
|      | NS         | 4.1 Max. |
| N4   | 4.5 Max.   |          |
| D    | 4.5±0.5    |          |
| E    | 11.3±0.2   |          |
| F    | 0.8±0.2    |          |
| G    | 1.1±0.1    |          |
| H    | 0.45±0.05  |          |
| I    | 0.8±0.1    |          |
| J    | 4.7 Max.   |          |
| K    | 0.6±0.05   |          |
| L    | -0.1~+0.2  |          |
| M    | 0.5±0.2    |          |

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BBB = 2~3 DIGITS BATCH CODE

### F2 / F3 / FS

| ITEM | DIMENSION  |          |
|------|------------|----------|
| A    | 10.16 Max. |          |
| B    | 3.8 Max.   |          |
| C    | X'TAL TYPE |          |
|      | F2         | 4.1 Max. |
|      | F3         | 4.5 Max. |
| FS   | 5.5 Max.   |          |
| D    | 1.9 Max.   |          |
| E    | 13.1 Max.  |          |
| F    | 4.6        |          |
| G    | 9.4        |          |
| H1   | 1.6        |          |
| H2   | 3.0        |          |
| I    | 0.2±0.1    |          |
| J    | 5.0 Max.   |          |
| K    | 1.0        |          |

Terminals  
#1 #4 X-tal  
#2 #3 N.C.

MARKING INFORMATION: XXXXXX = CRYSTAL FREQUENCY  
BBB - 2~3 DIGITS BATCH CODE

### E2 / E3 / ES

| ITEM | DIMENSION    |          |
|------|--------------|----------|
| A    | 10.16 Max.   |          |
| B    | 3.8 Max.     |          |
| C    | X'TAL HEIGHT |          |
|      | E2           | 4.1 Max. |
|      | E3           | 4.5 Max. |
| ES   | 5.5 Max.     |          |
| D    | 1.9 Max.     |          |
| E    | 13.1 Max.    |          |
| F    | 4.6          |          |
| G    | 9.4          |          |
| H1   | 1.6          |          |
| H2   | 3.0          |          |
| I    | 0.2±0.1      |          |
| J    | 5.0 Max.     |          |
| K    | 1.0          |          |

Terminals  
#1 #4 X-tal  
#2 #3 GND

MARKING INFORMATION: XXXXXX = CRYSTAL FREQUENCY  
BBB - 2~3 DIGITS BATCH CODE



MHz Crystal Units-SMD

MHz 石英晶振-贴片型

■ Features / 特点

- High Reliability & Low Cost Unit  
高性价比产品
- Tight Stability & Extended Temperature Available  
可提供更高稳定性及温度范围产品
- RoHS compliant  
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- Case Grounding  
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■ Holder Type: C7/C1/CA/C3/C5  
CE/CC/CG/C9



- C7 (4 pads 3.2×2.5)
- C1 (4 pads 4.0×2.5)
- CA (4 pads 5.0×3.2)
- C3 (4 pads 6.0×3.5)
- C5 (4 pads 7.0×5.0)
- CE (2 pads 5.0×3.2)
- CC (2 pads 6.0×3.5)
- CG (2 pads 7.0×5.0)
- C9 (2 pads 8.0×4.5)



■ Standard Specifications / 规格

| Item                                       | C1  | CE / CA          | CC / C3          | C5 / CG / C9     | C7   |
|--|---|------------------|------------------|------------------|--|
| Frequency Range                            | 12.00 to 50.00MHz                                       | 8.00 to 50.00MHz | 7.00 to 80.00MHz | 6.00 to 80.00MHz | 12.00 to 50.00MHz                                |
| Frequency Tolerance                        | ±30ppm (tighter tolerance also available)               |                  |                  |                  |  |
| Frequency Tolerance over Temperature range | ±50ppm (tighter tolerance also available)               |                  |                  |                  |  |
| Operating Temperature Range                | -10 °C to +60 °C (other operating range also available) |                  |                  |                  |  |
| Operable Temperature Range                 | -40 °C to +85 °C  |                  |                  |                  |  |
| Equivalent Series Resistance (ESR)         | Please refer to the ESR table                           |                  |                  |                  |  |
| Drive Level                                | 50µW (0.001µW to 1000µW also available)                 |                  |                  |                  |  |
| Load Capacitance                           | 8pF (3pF, 4.5pF, 6pF and series also available)         |                  |                  |                  | 12pF (3pF, 4.5pF, 6pF and series also available) |
| Aging                                      | ±5ppm/year  |                  |                  |                  |  |

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■ ESR Table / 等效电阻表

| Type  | Frequency Range (MHz) | Mode         | Standard ESR (Ohm) |
|-------|-----------------------|--------------|--------------------|
| C7    | 12 to 13              | AT Cut Fund. | 200                |
|       | 13 to 16              | AT Cut Fund. | 150                |
|       | 16 to 20              | AT Cut Fund. | 80                 |
|       | 20 to 22              | AT Cut Fund. | 60                 |
|       | 22 to 50              | AT Cut Fund. | 50                 |
| C1    | 12 to 20              | AT Cut Fund. | 80                 |
|       | 20 to 50              | AT Cut Fund. | 50                 |
| CE/CA | 8 to 14               | AT Cut Fund. | 150                |
|       | 14 to 20              | AT Cut Fund. | 120                |
|       | 20 to 26              | AT Cut Fund. | 100                |
|       | 26 to 50              | AT Cut Fund. | 60                 |

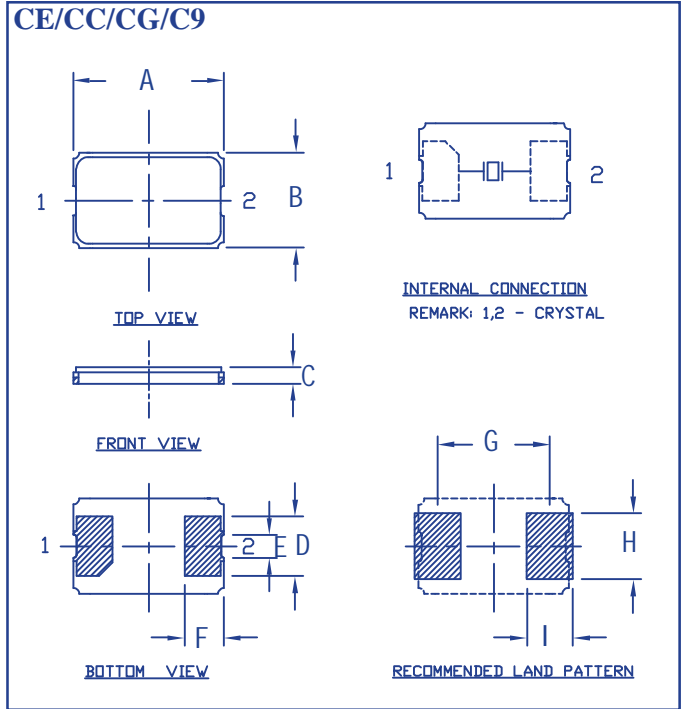
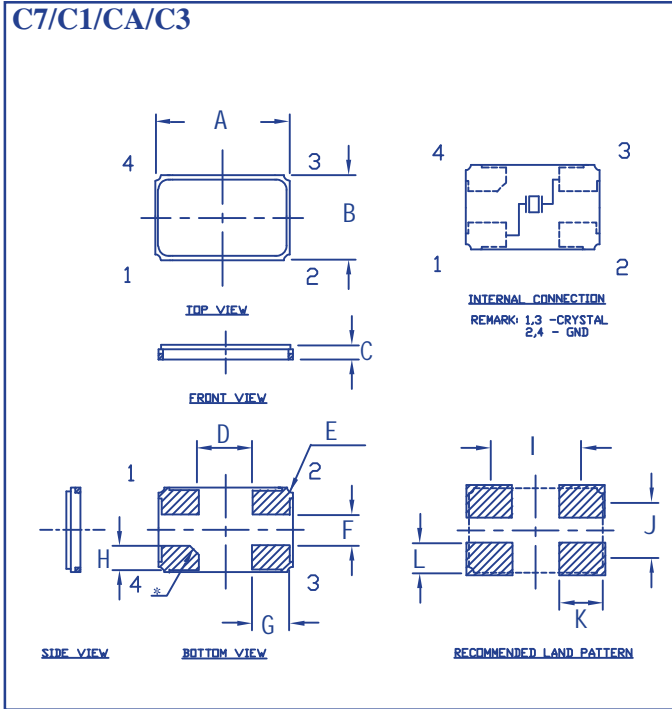
| Type     | Frequency Range (MHz) | Mode          | Standard ESR (Ohm) |
|----------|-----------------------|---------------|--------------------|
| CC/C3    | 7 to 8                | AT Cut Fund.  | 180                |
|          | 8 to 9                | AT Cut Fund.  | 150                |
|          | 9 to 10               | AT Cut Fund.  | 100                |
|          | 10 to 11              | AT Cut Fund.  | 80                 |
|          | 11 to 12              | AT Cut Fund.  | 50                 |
|          | 12 to 14              | AT Cut Fund.  | 40                 |
|          | 14 to 50              | AT Cut Fund.  | 30                 |
|          | 40 to 80              | 3rd Overtone. | 70                 |
| C5/C9/CG | 6 to 8                | AT Cut Fund.  | 150                |
|          | 8 to 9                | AT Cut Fund.  | 100                |
|          | 9 to 10               | AT Cut Fund.  | 60                 |
|          | 10 to 11              | AT Cut Fund.  | 50                 |
|          | 11 to 13              | AT Cut Fund.  | 40                 |
|          | 13 to 50              | AT Cut Fund.  | 30                 |
|          | 26 to 80              | 3rd Overtone. | 100                |

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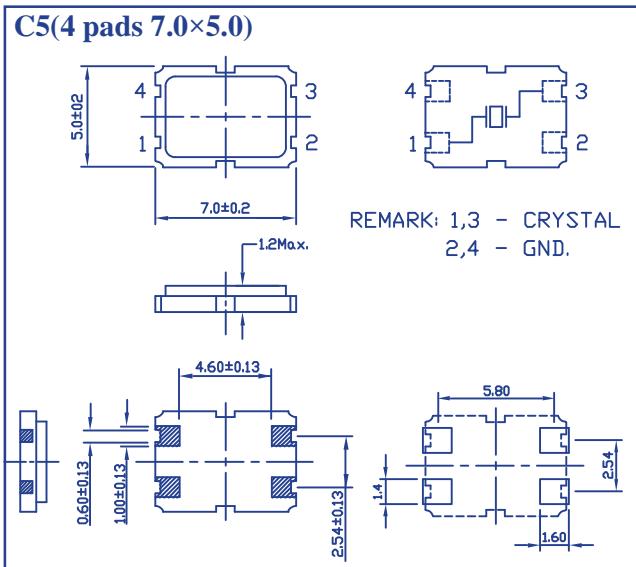


■ Dimensions (mm) and Solder Pad Layout (mm) / 尺寸



| Type | A        | B        | C      | D        | E    | F   | G         | H   | I         | J   | K         | L   |
|------|----------|----------|--------|----------|------|-----|-----------|-----|-----------|-----|-----------|-----|
| C7   | 3.2±0.1  | 2.5±0.1  | 0.8Max | 1.2      | R0.2 | 0.7 | 0.9       | 0.8 | 2.2       | 1.6 | 1.4       | 1.2 |
| C1   | 4.0±0.10 | 2.5±0.1  | 1.0Max | 2.0      | R0.2 | 0.7 | 0.9       | 0.8 | 2.9       | 1.5 | 1.3       | 1.2 |
| CA   | 5.0±0.15 | 3.2±0.15 | 1.0Max | 2.5±0.15 | R0.2 | 1.4 | 1.15±0.15 | 0.8 | 3.65±0.15 | 2.2 | 1.55±0.15 | 1.2 |
| C3   | 6.0±0.10 | 3.5±0.1  | 1.2Max | 3.0      | R0.3 | 1.5 | 1.4       | 0.9 | 4.4       | 2.4 | 1.8       | 1.3 |

| Type | A        | B        | C      | D   | E   | F   | G    | H   | I    |
|------|----------|----------|--------|-----|-----|-----|------|-----|------|
| CE   | 5.0±0.15 | 3.2±0.15 | 1.0Max | 2.0 | 0.8 | 1.5 | 3.5  | 2.4 | 1.9  |
| CC   | 6.0±0.15 | 3.5±0.15 | 1.2Max | 2.0 | 0.8 | 1.4 | 4.4  | 2.4 | 1.8  |
| CG   | 7.0±0.2  | 5.0±0.2  | 1.2Max | 2.0 | 0.6 | 1.5 | 5.56 | 2.4 | 1.55 |
| C9   | 8.0±0.15 | 4.5±0.15 | 1.1Max | 2.0 | 1.4 | 1.5 | 6.5  | 2.4 | 1.9  |







Holder Type: P3 / P5



P3(2 pads 5.0x3.2)



P5(2 pads 8.0x4.5)



Features / 特点

- High Reliability & Low Cost Unit  
高性价比产品
- Tight Stability & Extended Temperature Available  
可提供更高稳定性及温度范围产品
- RoHS Compliant  
符合RoHS要求
- For automotive applications, please contact our sales rep.  
汽车级产品请向销售代表垂询

Standard Specifications / 规格

| Item                                       | P3  | P5               |
|--|---|------------------|
| Frequency Range                            | 8.00 to 50.00MHz  | 6.00 to 80.00MHz |
| Frequency Tolerance                        | ±30ppm (tighter tolerance also available)               |                  |
| Frequency Tolerance over Temperature range | ±50ppm (tighter tolerance also available)               |                  |
| Operating Temperature Range                | -10 °C to +60 °C (other operating range also available) |                  |
| Operable Temperature Range                 | -40 °C to +85 °C  |                  |
| Equivalent Series Resistance (ESR)         | Please refer to the ESR table                           |                  |
| Drive Level                                | 50µW (0.001µW to 1000µW also available)                 |                  |
| Load Capacitance                           | 8pF (3pF, 4.5pF, 6pF and series also available)         |                  |
| Aging                                      | ±5ppm/year  |                  |

Please contact our Sales Representative for tighter Frequency Tolerance, Operating Temperature Range or/and other specifications. 如阁下对上述产品之频差范围, 使用温度范围等参数有特殊要求, 欢迎联系我们的销售代表。

ESR Table / 等效电阻表

P3

| Frequency Range (MHz) | Mode         | Standard ESR (Ohm) |
|-----------------------|--------------|--------------------|
| 8 to 14               | AT Cut Fund. | 150                |
| 14 to 20              | AT Cut Fund. | 120                |
| 20 to 26              | AT Cut Fund. | 100                |
| 26 to 50              | AT Cut Fund. | 60                 |

P5

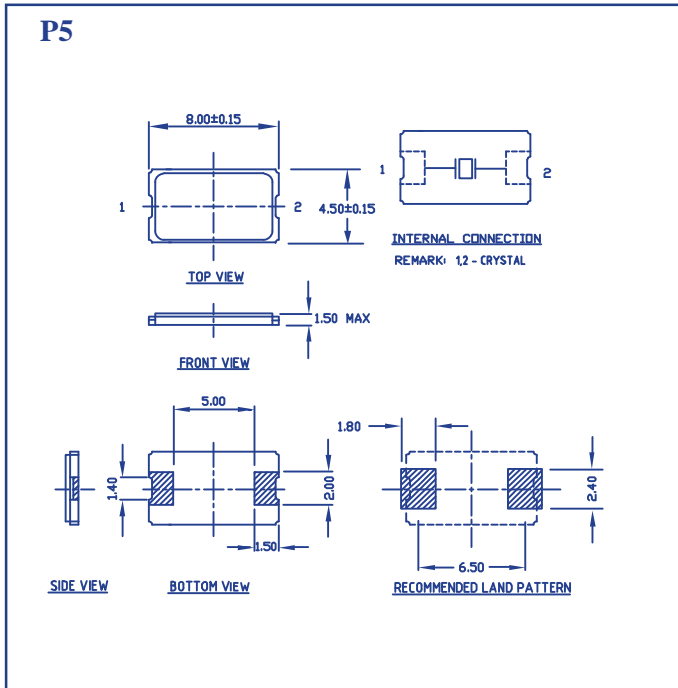
| Frequency Range (MHz) | Mode          | Standard ESR (Ohm) |
|-----------------------|---------------|--------------------|
| 6 to 8                | AT Cut Fund.  | 150                |
| 8 to 9                | AT Cut Fund.  | 100                |
| 9 to 10               | AT Cut Fund.  | 60                 |
| 10 to 11              | AT Cut Fund.  | 50                 |
| 11 to 13              | AT Cut Fund.  | 40                 |
| 13 to 50              | AT Cut Fund.  | 30                 |
| 26 to 80              | 3rd Overtone. | 100                |

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■ Dimensions (mm) and Solder Pad Layout (mm) / 尺寸



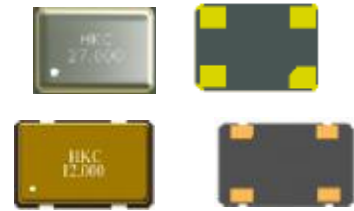


**Clock Oscillator/TCXO/VCXO/LVD**

**有源晶振/TCXO/VCXO/LVD**

■ **Features / 特点**

- High Reliability & Low Cost Unit  
高性价比产品
- Tight Stability & Extended Temperature available  
可提供更高稳定性及温度范围产品
- RoHS Compliant  
符合RoHS要求
- Lead and SMD types available  
插件及贴片型可供选择
- For automotive applications, please contact our sales rep.  
汽车级产品请向销售代表垂询



**C8(3.2×2.5) C2 (5.0×3.2) C4(7.0×5.0)**



**Clock Oscillator-SMD**

| Item                   | C4(7050)   |   | C2(5032)  |   | C8(3225)  |          |
|------------------------|--|---|---|---|---|----------|
| Frequency Range        | 1.50 to 160.00MHz  |   | 1.50 to 110.0MHz                                |   | 4.00 to 110.00MHz   |          |
| Frequency Tol. @ 25 °C | ±25ppm, ±50ppm, ±100ppm (tighter tolerance also available)               |   |   |   |   |          |
| Operating Temp. Range  | 0 °C to +70 °C / -40 °C to +85 °C (other operating range also available) |   |   |   |   |          |
| Operable Temp. Range   | -55 °C to +125 °C  |   |   |   |   |          |
| Operating Voltage      | 3.3V±10% / 5V±10%  |   | 3.0V±10% / 3.3V±10% / 5V±10%                    |   | 3.3V±10% / 5V±10%<br>(0.8~5.5V±10%)                         |          |
| Output Type            | HCMOS  |   | HCMOS   |   | HCMOS   |          |
| Output Load            | 1.5MHz to 50MHz: 50pF Max  | 10TTL   | 15pF/30pF/50pF                                  | 10TTL   | 15pF / 30pF/50pF  |          |
|                        | >50MHz to 80MHz: 30pF Max  |   |   |   |   |          |
|                        | >80MHz to 160MHz: 15pF Max   |   |   |   |   |          |
| Output Symmetry        | HCMOS:40~60%(at 50%V <sub>DD</sub> )<br>45~55% is available              | TTL: 40~60% (at 1.4V V <sub>DD</sub> )<br>45~55% is available | 40~60% at 50%V <sub>DD</sub><br>45~55% optional | 40~60% at 1.4V V <sub>DD</sub><br>45~55% optional | HCMOS:40~60%(at 50%V <sub>DD</sub> )<br>45~55% is available |          |
| "High" Output Voltage  | HCMOS: 90%V <sub>DD</sub> Min  | TTL: 2.4V Min   | 90%V <sub>DD</sub> Min                          | 2.4V Min  | HCMOS: 90%V <sub>DD</sub> Min                               |          |
| "Low" Output Voltage   | HCMOS: 10%V <sub>DD</sub> Max  | TTL: 0.4V Max   | 0%V <sub>DD</sub> Max                           | 0.4V Max  | HCMOS: 10%V <sub>DD</sub> Max                               |          |
| Current Consumption    | 1.50 to 7.00MHz  | 30mA Max  | 50mA Max @ 1.5 to 60.0MHz                       |   | 4.0 to 60.0MHz  | 50mA Max |
|                        | >7.00 to 160.00MHz   | 50mA Max  | 70mA Max @ 60.0 to 110.0 MHz                    |   | 60.00 to 110.00MHz  | 70mA Max |
| Rise and Fall Time     | 1.50 to 160.00MHz  | 6ns Max   | 18ns Max @ 1.5 to 110.0 MHz                     |   | 4.0 to 110.00MHz  | 10ns Max |
| Tri-State              | Yes  |   |   |   |   |          |
| Aging                  | 5ppm Max / year  |   |   |   |   |          |

**TCXO**



**T3 (5.0×3.2)**

| Item                  | T3   |
|-----------------------|--|
| Frequency Range       | 10.00 to 52.00MHz  |
| Operating Temp. Range | -30 °C to + 85 °C (other operating range also available) |
| Operable Temp. Range  | -40 °C to + 85 °C  |
| Operating Voltage     | 2.8V±0.14V   |
| Frequency Tolerance   | ±2.0ppm Max  |
| Frequency aging       | ±1.0ppm Max  |
| Current Consumption   | 2.0mA Max  |
| Output Level          | 0.8V Min   |
| Output Load Condition | 10kΩ // 10pF   |

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## VCXO

| Item                        | V5  |
|-----------------------------|---|
| Frequency Range             | 10.00 to 88.00MHz   |
| Frequency Tolerance @ 25 °C | ±50ppm (tighter tolerance also available)                                 |
| Operating Temp. Range       | -40 °C to +85 °C (other operating range also available)                   |
| Operable Temp. Range        | -45 °C to +90 °C  |
| Output Type                 | CMOS Output   |
| Operating Voltage           | 3.3V±10% / 5V±10%   |
| Frequency Adjustment        | ±80ppm , ±100ppm standard, ±120ppm , ±150ppm optional                     |
| Frequency control voltage   | For 3.3V type 1.62±1.65V / For 2.5V type 1.25±1.25V /For 5V type 2.5±2.5V |
| Current Consumption         | 15mA typical, 40mA Max  |
| Duty Cycle                  | 40 / 60 at 50% V <sub>DD</sub>  |
| “High” Output Voltage       | 90% V <sub>DD</sub> Min   |
| “Low” Output Voltage        | 10% V <sub>DD</sub> Max   |
| Rise and Fall Time          | 6ns Max   |
| Output Load                 | 15pF Typical  |



V5(7.5×5.0)

## LVDS



L4 (7.0×5.0)

| Item                           | L4 Min  | L4 max |
|--------------------------------|---|--------|
| Frequency Range                | 72.5MHz   | 750MHz |
| Frequency Tolerance @ 25 °C    | ±25 , ±50 , ±100ppm (tighter tolerance also available)  |        |
| Operating Temperature Range    | -40°C to + 85 °C (other operating range also available) |        |
| Operable Temperature Range     | -55°C to + 120 °C                                       |        |
| Operating Voltage              | 2.9V±0.4V   |        |
| Current                        | 35m A   | 100mA  |
| Jitter                         | <1ps (Typical)  |        |
| Output                         | Differential output                                     |        |
| Symmetry                       | 45%   | 50%    |
| Rise and fall time(20% to 80%) | 100ps   | 1000ps |
| Differential output voltage    | 0.35V (Typical)   |        |
| Vol                            | 1.08V(Typical)  |        |
| Voh                            | 1.43V(Typical)  |        |
| Offset voltage                 | 1.25 V(Typical)   |        |

## Clock Oscillator

| Item                        | CF/CH  |   |
|-----------------------------|--|---|
| Frequency Range             | 1.00 to 125.00MHz  |   |
| Frequency Tolerance @ 25 °C | ±25ppm, ±50ppm, ±100ppm (tighter tolerance also available)                 |   |
| Operating Temperature Range | -10 °C to +70 °C / -40 °C to +85 °C (other operating range also available) |   |
| Operable Temperature Range  | -55 °C to +125 °C  |   |
| Output Type                 | HCMOS  | TTL   |
| Output Load                 | 15pF / 30pF / 50pF   | 10TTL   |
| Operating Voltage           | 3.3V±10% / 5V±10%  |   |
| Output Symmetry             | HCMOS:40~60%(at 50% V <sub>DD</sub> )<br>45~55% is available               | TTL: 40~60% (at 1.4V V <sub>DD</sub> )<br>45~55% is available |
| “High” Output Voltage       | HCMOS: 90% V <sub>DD</sub> Min   | TTL: 2.4V Min   |
| “Low” Output Voltage        | HCMOS: 10% V <sub>DD</sub> Max   | TTL: 0.4V Max   |
| Current Consumption         | 1.000 to 20.000MHz   | 10mA Max  |
|                             | 20.001 to 35.000MHz  | 20mA Max  |
|                             | 35.001 to 50.000MHz  | 30mA Max  |
|                             | 50.001 to 100.000MHz   | 40mA Max  |
|                             | 100.001 to 125.000MHz  | 50mA Max  |
| Rise and Fall Time          | 1.000 to 50.000MHz   | 10ns Max  |
|                             | 50.001 to 125.000MHz   | 6ns Max   |
| Aging                       | 5ppm Max / year  |   |



CF



CH



Ultrasonic Sensor  
超声波传感器

Holder Type: PS-S / PS-N

Features / 特点

- Compact and light weight  
小型化、重量轻
- High sensitivity  
灵敏度高
- High reliability  
可靠性高

Applications / 应用领域:

- Back sonar of automobiles, Parking meters. Water level meters...  
倒车雷达、停车定位、水位计等



PS-S



PS-N

Standard Specifications / 规格

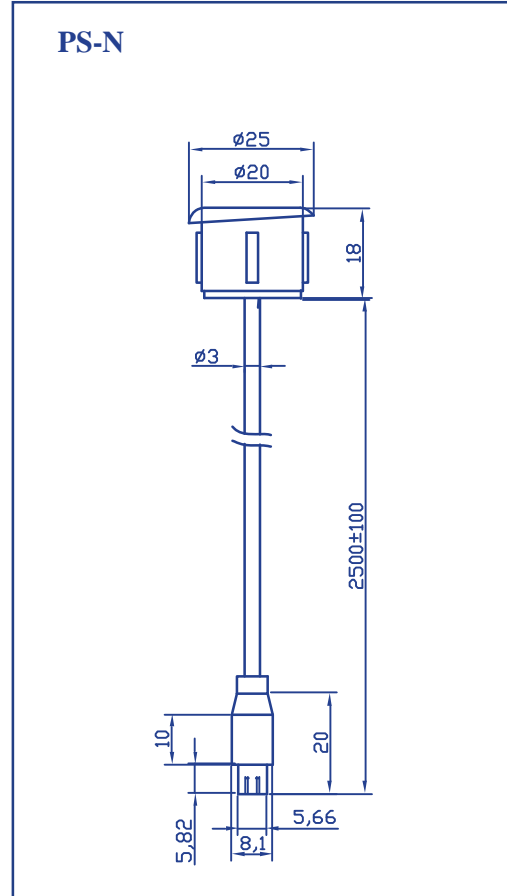
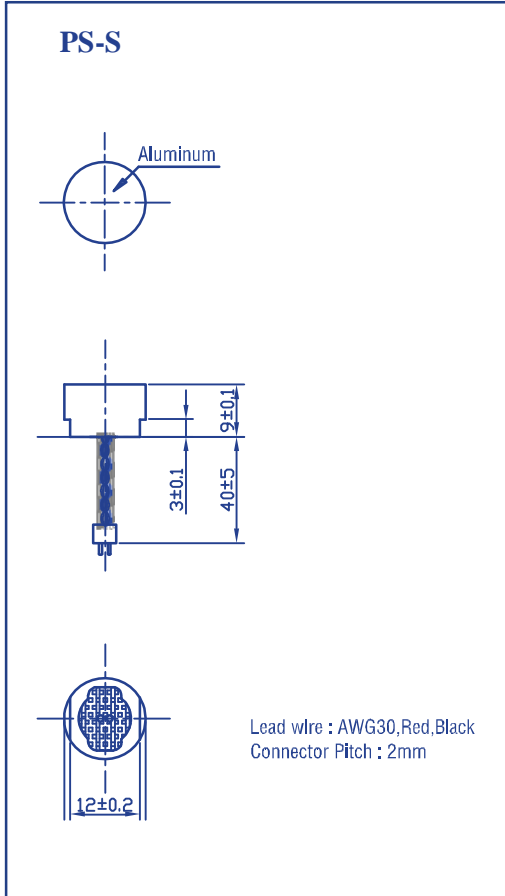
| Item  | PS-S        | PS-N        |
|---|-------------|-------------|
| Frequency Range (kHz)                           | 40±1.0      | 48±1.0      |
| Transmitting Sound Pressure Level (0dB=0.02mPa) | 103 dB Min  | 103 dB Min  |
| Receive Sensitive (0dB=10V/Pa)                  | -74dB Min   | -74dB Min   |
| Directivity (x-y)                               | 110×50°     | 110×50°     |
| Operating Temperature Range (°C)                | -40~+80     | -40~+80     |
| Operable Temperature Range (°C)                 | -40~+85     | -40~+85     |
| Capacitance ( at 25 °C 1kHz) (pF)               | 2000±15%    | 2000±15%    |
| Ringing   | ≤1.2 ms     | ≤1.2 ms     |
| Allowable Input Voltage( at 40kHz / 48kHz)      | 150 Vp-p    | 150 Vp-p    |
| Using Method(Transmitter / Receive)             | Dual Use    | Dual Use    |
| Structure                                       | Water Proof | Water Proof |

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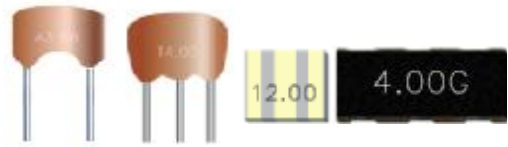
■ Dimensions (mm) / 尺寸





■ Features / 特点

- Ultra compact, light weight design  
超小型、轻量化设计
- Resistance to damage from impact and vibration  
抗振荡及冲击力强
- Excellent Temperature Stability ( $\pm 0.3\%$ )  
优秀的温度频差范围  $\pm 0.3\%$
- Frequency tolerance up to  $\pm 0.1\%$  per customer request  
常温频差可根据客户要求控制  $\pm 0.1\%$
- High frequency resonator up to 60.00MHz  
频点高达60.00MHz
- Built-in capacitor (ZTT series)  
内置电容(ZTT系列)



ZTA ZTT ZTAC... ZTTC...

ZTA

| Item                                  | ZTA-MG      | ZTAW-S-MG | ZTALS-MG | ZTARS-MG | ZTA-MT | ZTA-MX |       |       |
|---------------------------------------|-------------|-----------|----------|----------|--------|--------|-------|-------|
| Frequency Range (MHz)                 | 1.79~6.0    | 1.79~6.0  | 3.0~8.0  | 3.0~10   | 6~13   | 12~20  | 20~26 | 26~60 |
| Frequency Accuracy                    | $\pm 0.5\%$ |           |          |          |        |        |       |       |
| Stability in temperature (-20~+80 °C) | $\pm 0.3\%$ |           |          |          |        |        |       |       |
| Operating Temperature Range (°C)      | -25~+80     |           |          |          |        |        |       |       |
| Aging for Ten Years                   | $\pm 0.3\%$ |           |          |          |        |        |       |       |
| Load Capacitance C1 (pF)              | 30          |           |          |          |        | 15     | 5     |       |
| Load Capacitance C2 (pF)              | 30          |           |          |          |        | 15     | 5     |       |

ZTT

| Item                                  | ZTTC-MG     | ZTTCR-MG    | ZTCS-MT     | ZTTCV-MT    | ZTCS-MX     | ZTTCV-MX    | ZTTCW-MX    |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency Range (MHz)                 | 2.0~8.0     | 4.0~8.0     | 6.0~13      | 8.0~13      | 13.01~60    | 16~60       | 20.0~60     |
| Frequency Accuracy                    | $\pm 0.5\%$ |             |             |             |             |             |             |
| Stability in temperature (-20~+80 °C) | $\pm 0.3\%$ | $\pm 0.3\%$ | $\pm 0.4\%$ | $\pm 0.4\%$ | $\pm 0.3\%$ | $\pm 0.3\%$ | $\pm 0.3\%$ |
| Operating Temperature Range (°C)      | -25~+80     |             |             |             |             |             |             |
| Aging for Ten Years                   | $\pm 0.3\%$ |             |             |             |             |             |             |

ZTAC...

| Item                                  | ZTACC-MG    | ZTACR-MG    | ZTACS-MT    | ZTACV-MT    | ZTACS-MX    | ZTACV-MX    | ZTACW-MX    |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency Range (MHz)                 | 2.0~8.0     | 4.0~8.0     | 6.0~13      | 8.0~13      | 13.01~60    | 16~60       | 20.0~60     |
| Frequency Accuracy                    | $\pm 0.5\%$ |             |             |             |             |             |             |
| Stability in temperature (-20~+80 °C) | $\pm 0.3\%$ | $\pm 0.3\%$ | $\pm 0.4\%$ | $\pm 0.4\%$ | $\pm 0.3\%$ | $\pm 0.3\%$ | $\pm 0.3\%$ |
| Operating Temperature Range           | -25~+80     |             |             |             |             |             |             |
| Aging for Ten Years                   | $\pm 0.3\%$ |             |             |             |             |             |             |

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ZTTC...

| Item                                  | ZTTC-MG | ZTTCR-MG | ZTTC-S-MT | ZTTCV-MT | ZTTC-S-MX | ZTTCV-MX | ZTTCW-MX |
|---------------------------------------|---------|----------|-----------|----------|-----------|----------|----------|
| Frequency Range (MHz)                 | 2.0~8.0 | 4.0~8.0  | 6.0~13    | 8.0~13   | 13.01~60  | 16~60    | 20.0~60  |
| Frequency Accuracy                    | ±0.5%   |          |           |          |           |          |          |
| Stability in temperature (-20~+80 °C) | ±0.3%   | ±0.3%    | ±0.4%     | ±0.4%    | ±0.3%     | ±0.3%    | ±0.3%    |
| Operating Temperature Range           | -25~+80 |          |           |          |           |          |          |
| Aging for Ten Years                   | ±0.3%   |          |           |          |           |          |          |

Filter 滤波器

| Item                  | LT10.7MA5 |
|-----------------------|-----------|
| Center Frequency (F0) | 10700kHz  |
| Insertion Loss        | ≤6dB      |
| 3dB Bandwidth         | 280±50kHz |
| 20dB Bandwidth        | ≤650kHz   |
| Ripple                | <1.0dB    |
| Spurious Response     | ≥30dB     |
| In/Out Impedance      | 330Ω      |



LT10.7MA5

| Item                   | JT10.7M    |
|------------------------|------------|
| Center Frequency (F0)  | 10700kHz   |
| Recovered audio output | 2.5 mv Min |
| Recovered audio 3dB BW | 345kHz Min |
| Distortion             | 1.0% Max   |



JT10.7M

| Standard Rule          |      |        |
|------------------------|------|--------|
| Center Frequency (kHz) | Code | Colour |
| 10700±30               | A    | Red    |
| 10670±30               | B    | Blue   |
| 10730±30               | C    | Orange |
| 10640±30               | D    | Black  |
| 10760±30               | E    | White  |