



CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

### Features

- Frequency Range 1.5 to 160MHz
- CMOS output
- Wide Supply Voltage
  - 1.6 to 3.63V (Ver.E)
  - 2.5, 3.3, 5.0V (Ver.N)
- Low current consumption
- Option: Low Phase Noise Version

### Applications

- Consumer/ Networking/ Industrial/ Audio Codec/ Amuse

Table 1

| Freq. Tol.<br>Code | $\times 10^{-6}$ | Operating<br>Temperature<br>Range (°C) | Note                          |
|--------------------|------------------|----------------------------------------|-------------------------------|
| 0                  | $\pm 50$         | -10 to +70                             | Standard specifications       |
| S                  | $\pm 30$         |                                        |                               |
| U                  | $\pm 25$         |                                        |                               |
| G                  | $\pm 50$         | -40 to +85                             | With only certain frequencies |
| 6                  | $\pm 50$         | -40 to +105                            |                               |

### How to Order

KC2520K 25.0000 C □ □ □ 00  
① ② ③ ④ ⑤ ⑥ ⑦

- ① Series
- ② Output Frequency (25.0000: 25MHz)
- ③ Output Type (C: CMOS)
- ④ Supply Voltage  
Standard : Version E

|   |                             |
|---|-----------------------------|
| 1 | 1.8V/ 2.5V/ 3.3V compatible |
| 2 | 2.5V/ 3.3V compatible       |

Low Phase Noise : Version N

|   |      |   |      |
|---|------|---|------|
| 2 | 2.5V | 3 | 3.3V |
| 5 | 5.0V |   |      |

- ⑤ Frequency Tolerance (See Table 1)
- ⑥ Symmetry/ INH Function

|   |         |
|---|---------|
| E | 45/ 55% |
| N | 45/ 55% |

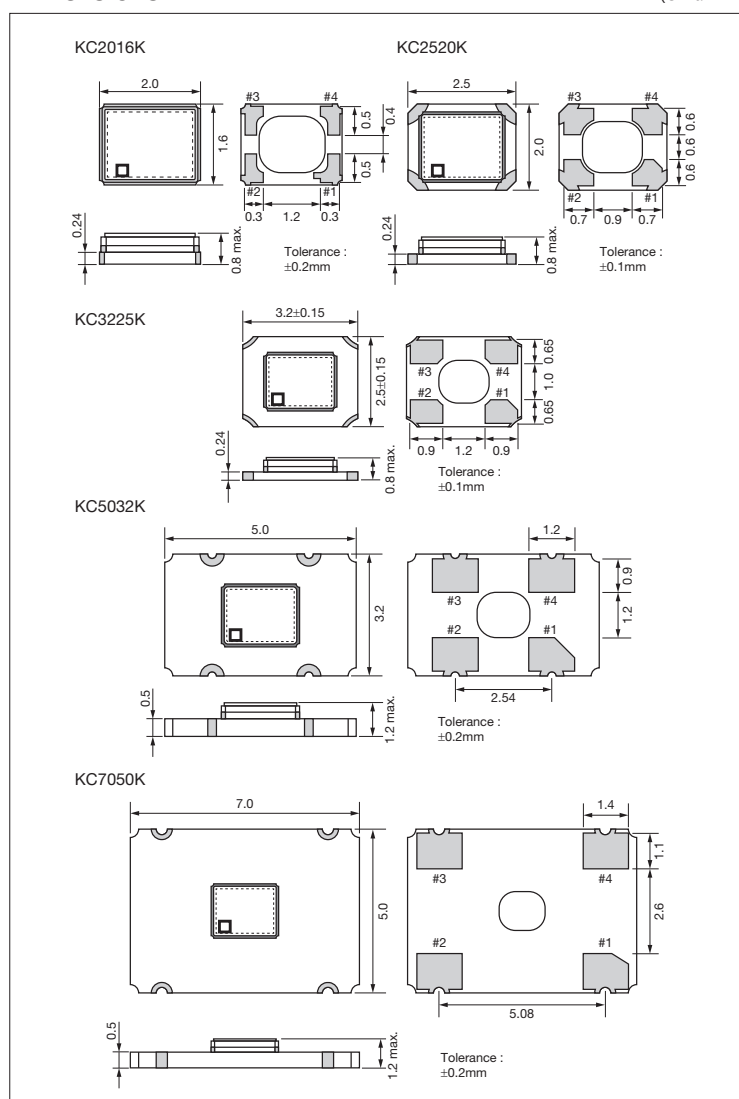
- ⑦ Individual Specification  
(STD Specification is "00".)

### Packaging Tape & Reel

|                           |                 |
|---------------------------|-----------------|
| KC7050K/ KC5032K          | 1000 pcs./ reel |
| KC3225K/ KC2520K/ KC2016K | 2000 pcs./ reel |

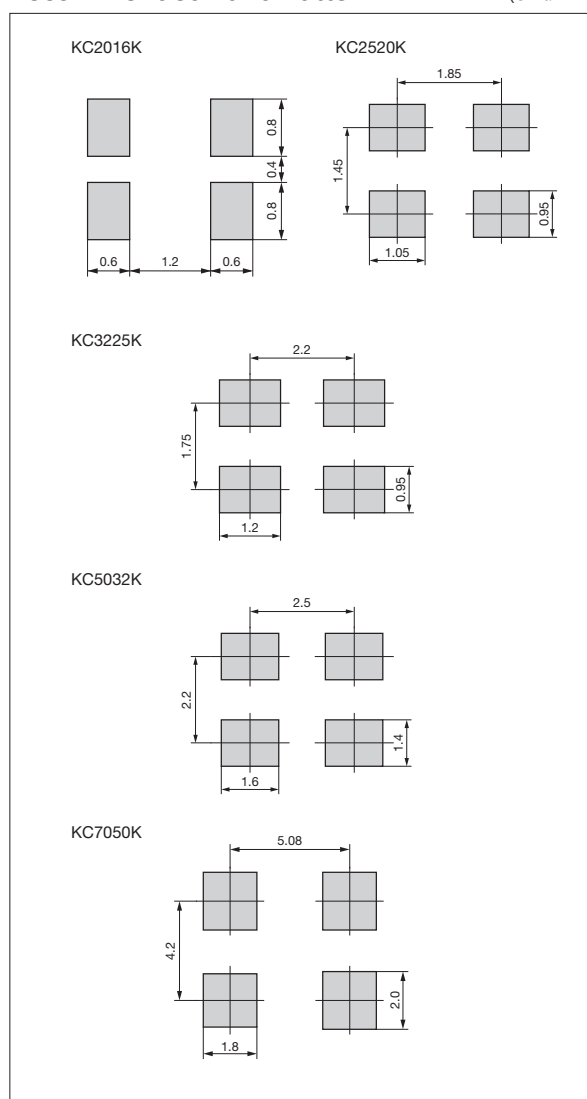
### Dimensions

(Unit: mm)



### Recommended Land Pattern

(Unit: mm)





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## Specifications

| Item                                         | Symbol                          | Conditions                                                                                                                                |                                                                 | Version E<br>(Standard) |                     | Version N<br>(Low Phase Noise) |                     | Unit                 |
|----------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------|---------------------|--------------------------------|---------------------|----------------------|
|                                              |                                 |                                                                                                                                           |                                                                 | Min.                    | Max.                | Min.(codeU)                    | Max.(codeU)         |                      |
| Output Frequency Range <sup>Note1</sup>      | fo                              |                                                                                                                                           |                                                                 | 1.5                     | 160                 | 1.5                            | 80                  | MHz                  |
| Frequency Tolerance                          | f <sub>tol</sub>                | Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration | Temp.: -10 to +70°C/<br>-40 to +85°C/ -40 to +105°C             | -50                     | +50                 | -50                            | +50                 | ×10 <sup>-6</sup>    |
|                                              |                                 |                                                                                                                                           | Temp.: -10 to +70°C                                             | -30                     | +30                 | -30                            | +30                 |                      |
|                                              |                                 |                                                                                                                                           | Temp.: -10 to +70°C                                             | -25                     | +25                 | -25                            | +25                 |                      |
| Frequency Aging                              | f <sub>age</sub>                | @25°C First year                                                                                                                          |                                                                 | -3                      | +3                  | -3                             | +3                  | ×10 <sup>-6</sup> /y |
| Storage Temperature Range                    | T <sub>stg</sub>                |                                                                                                                                           |                                                                 | -55                     | +125                | -55                            | +125                | °C                   |
| Operating Temperature Range                  | T <sub>use</sub>                |                                                                                                                                           |                                                                 | -10                     | +70                 | -10                            | +70                 | °C                   |
|                                              |                                 |                                                                                                                                           |                                                                 | -40                     | +85                 | -40                            | +85                 |                      |
|                                              |                                 |                                                                                                                                           |                                                                 | -40                     | +105                | -40                            | +105                |                      |
| Max. Supply Voltage                          | —                               |                                                                                                                                           |                                                                 | -0.3                    | +4.0                | -0.3                           | +7.0                | V                    |
| Supply Voltage                               | V <sub>cc</sub>                 | CodeⓈ : 1/ E : 1.5≤F0≤125MHz                                                                                                              |                                                                 | +1.60                   | +3.63               | —                              | —                   | V                    |
|                                              |                                 | CodeⓈ : 2/ E : 125<F0≤160MHz                                                                                                              |                                                                 | +2.25                   | +3.63               | —                              | —                   |                      |
|                                              |                                 | CodeⓈ : 2/ N : 1.5≤F0≤80MHz                                                                                                               |                                                                 | —                       | —                   | +2.25(+2.38)                   | +2.75(+2.62)        |                      |
|                                              |                                 | CodeⓈ : 3/ N : 1.5≤F0≤80MHz                                                                                                               |                                                                 | —                       | —                   | +2.97(+3.14)                   | +3.63(+3.46)        |                      |
|                                              |                                 | CodeⓈ : 5/ N : 1.5≤F0≤80MHz                                                                                                               |                                                                 | —                       | —                   | +4.5(+4.75)                    | +5.5(+5.25)         |                      |
| Current Consumption<br>(Maximum Loaded)      | I <sub>cc</sub>                 | 1.5≤F0≤24MHz                                                                                                                              | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 2.5                 | —                              | —                   | mA                   |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V/ N : 2.25≤V <sub>cc</sub> ≤2.75V | —                       | 3.0                 | —                              | 4                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V/ N : 2.97≤V <sub>cc</sub> ≤3.63V | —                       | 3.5                 | —                              | 6                   |                      |
|                                              |                                 |                                                                                                                                           | N : 4.50≤V <sub>cc</sub> ≤5.50V                                 | —                       | —                   | —                              | 24                  |                      |
|                                              |                                 | 24<F0≤40MHz                                                                                                                               | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 3.5                 | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V/ N : 2.25≤V <sub>cc</sub> ≤2.75V | —                       | 4.5                 | —                              | 5                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V/ N : 2.97≤V <sub>cc</sub> ≤3.63V | —                       | 5.0                 | —                              | 7                   |                      |
|                                              |                                 |                                                                                                                                           | N : 4.50≤V <sub>cc</sub> ≤5.50V                                 | —                       | —                   | —                              | 24                  |                      |
|                                              |                                 | 40<F0≤62.5MHz                                                                                                                             | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 5.0                 | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V/ N : 2.25≤V <sub>cc</sub> ≤2.75V | —                       | 5.5                 | —                              | 8                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V/ N : 2.97≤V <sub>cc</sub> ≤3.63V | —                       | 6.0                 | —                              | 11                  |                      |
|                                              |                                 |                                                                                                                                           | N : 4.50≤V <sub>cc</sub> ≤5.50V                                 | —                       | —                   | —                              | 24                  |                      |
|                                              |                                 | 62.5<F0≤80MHz                                                                                                                             | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 6.0                 | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V/ N : 2.25≤V <sub>cc</sub> ≤2.75V | —                       | 6.5                 | —                              | 14                  |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V/ N : 2.97≤V <sub>cc</sub> ≤3.63V | —                       | 8.0                 | —                              | 18                  |                      |
|                                              |                                 |                                                                                                                                           | N : 4.50≤V <sub>cc</sub> ≤5.50V                                 | —                       | —                   | —                              | 40                  |                      |
|                                              |                                 | 80<F0≤125MHz                                                                                                                              | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 11.0                | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V                                  | —                       | 14.0                | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V                                  | —                       | 17.0                | —                              | —                   |                      |
|                                              |                                 | 125<F0≤160MHz                                                                                                                             | E : 2.25<V <sub>cc</sub> ≤2.8V                                  | —                       | 25.0                | —                              | —                   |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V                                  | —                       | 27.0                | —                              | —                   |                      |
| Stand-by Current                             | I <sub>std</sub>                | 1.5≤Fo≤80MHz                                                                                                                              |                                                                 | —                       | 5.0                 | —                              | 10.0                | μA                   |
|                                              |                                 | 80≤Fo≤125MHz                                                                                                                              |                                                                 | —                       | 5.0                 | —                              | —                   |                      |
|                                              |                                 | 125≤Fo≤160MHz                                                                                                                             |                                                                 | —                       | 10.0                | —                              | —                   |                      |
| Symmetry                                     | SYM                             | @50% V <sub>cc</sub>                                                                                                                      |                                                                 | 45                      | 55                  | 45                             | 55                  | %                    |
| Rise/ Fall Time<br>(10% to 90% Output Level) | Tr/ Tf                          | 1.5≤F0≤80MHz                                                                                                                              | E : 1.6≤V <sub>cc</sub> ≤2.25V                                  | —                       | 6.0                 | —                              | —                   | ns                   |
|                                              |                                 |                                                                                                                                           | E : 2.25<V <sub>cc</sub> ≤2.8V/ N : 2.25≤V <sub>cc</sub> ≤2.75V | —                       | 5.0                 | —                              | 6.0                 |                      |
|                                              |                                 |                                                                                                                                           | E : 2.8<V <sub>cc</sub> ≤3.63V/ N : 2.97≤V <sub>cc</sub> ≤3.63V | —                       | 4.5                 | —                              | 5.0                 |                      |
|                                              |                                 |                                                                                                                                           | N : 4.50≤V <sub>cc</sub> ≤5.50V                                 | —                       | —                   | —                              | 8.0                 |                      |
|                                              |                                 | 80<F0≤125MHz                                                                                                                              | E : 1.6<V <sub>cc</sub> ≤3.63V                                  | —                       | 4.0                 | —                              | —                   |                      |
| 125<F0≤160MHz                                | E : 2.25<V <sub>cc</sub> ≤3.63V | —                                                                                                                                         | 2.5                                                             | —                       | —                   |                                |                     |                      |
| Low Level Output Voltage                     | VoL                             | E : IoL= 4mA                                                                                                                              |                                                                 | —                       | 10% V <sub>cc</sub> | —                              | 10% V <sub>cc</sub> | V                    |
|                                              |                                 | N (1.5≤Fo≤62.5MHz) : IoL= 4mA                                                                                                             |                                                                 |                         |                     |                                |                     |                      |
|                                              |                                 | N (62.5<Fo≤80MHz) : IoL= 8mA                                                                                                              |                                                                 |                         |                     |                                |                     |                      |
| High Level Output Voltage                    | VoH                             | E : IoH= -4mA                                                                                                                             |                                                                 | 90% V <sub>cc</sub>     | —                   | 90% V <sub>cc</sub>            | —                   | V                    |
|                                              |                                 | N (1.5≤Fo≤62.5MHz) : IoH= -4mA                                                                                                            |                                                                 |                         |                     |                                |                     |                      |
|                                              |                                 | N (62.5<Fo≤80MHz) : IoH= -8mA                                                                                                             |                                                                 |                         |                     |                                |                     |                      |
| Output Load                                  | L <sub>CMOS</sub>               |                                                                                                                                           |                                                                 | 15                      |                     | 30                             |                     | pF                   |
| Low Level Input Voltage                      | ViL                             |                                                                                                                                           |                                                                 | —                       | 30% V <sub>cc</sub> | —                              | 30% V <sub>cc</sub> | V                    |
| High Level Input Voltage                     | ViH                             |                                                                                                                                           |                                                                 | 70% V <sub>cc</sub>     | —                   | 70% V <sub>cc</sub>            | —                   | V                    |





CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm

| Item                | Symbol             | Conditions    |                                         | Version E<br>(Standard) |      | Version N<br>(Low Phase Noise) |             | Unit    |
|---------------------|--------------------|---------------|-----------------------------------------|-------------------------|------|--------------------------------|-------------|---------|
|                     |                    |               |                                         | Min.                    | Max. | Min.(codeU)                    | Max.(codeU) |         |
| Disable Time        | t <sub>dis</sub>   | 1.5≤F0≤80MHz  |                                         | —                       | 200  | —                              | 150         | ns      |
|                     |                    | 80<F0≤125MHz  |                                         | —                       | 200  | —                              | —           |         |
|                     |                    | 125<F0≤160MHz |                                         | —                       | 100  | —                              | —           |         |
| Enable Time         | t <sub>ena</sub>   |               |                                         | —                       | 5    | —                              | 5           | ms      |
| Start-up Time       | t <sub>str</sub>   | 1.5≤F0≤80MHz  | @Minimum operating voltage to be 0 sec. | —                       | 5    | —                              | 5           | ms      |
|                     |                    | 80<F0≤125MHz  |                                         | —                       | 5    | —                              | —           |         |
|                     |                    | 125<F0≤160MHz |                                         | —                       | 10   | —                              | —           |         |
| 1 Sigma Jitter      | J <sub>sigma</sub> | 1.5≤F0≤80MHz  | Measured with Wavecrest SIA-3000        | —                       | 5    | —                              | 4           | ps      |
|                     |                    | 80<F0≤125MHz  |                                         | —                       | 5    | —                              | —           |         |
|                     |                    | 125<F0≤160MHz |                                         | —                       | 3    | —                              | —           |         |
| Peak to Peak Jitter | J <sub>PK-PK</sub> | 1.5≤F0≤80MHz  |                                         | —                       | 50   | —                              | 40          | ps      |
|                     |                    | 80<F0≤125MHz  |                                         | —                       | 50   | —                              | —           |         |
|                     |                    | 125<F0≤160MHz |                                         | —                       | 25   | —                              | —           |         |
| Phase Jitter        | J <sub>Phase</sub> | @25MHz        | BW : 12kHz to 20MHz                     | —                       | 1.0  | —                              | 0.5         | ps      |
| Phase Noise         | —                  | @25MHz        | @10Hz offset                            | Typ. -89                |      | Typ. -92                       |             | dBc/ Hz |
|                     |                    |               | @100Hz offset                           | Typ. -119               |      | Typ. -126                      |             |         |
|                     |                    |               | @1kHz offset                            | Typ. -143               |      | Typ. -151                      |             |         |
|                     |                    |               | @10kHz offset                           | Typ. -157               |      | Typ. -160                      |             |         |
|                     |                    |               | @100kHz offset                          | Typ. -160               |      | Typ. -167                      |             |         |
|                     |                    |               | @1MHz offset                            | Typ. -162               |      | Typ. -170                      |             |         |
|                     |                    |               | @10MHz offset                           | Typ. -162               |      | Typ. -170                      |             |         |

Note: All electrical characteristics are defined at the maximum load and operating temperature range.

Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

| Pad Connections |          |
|-----------------|----------|
| #1              | INH      |
| #2              | Case GND |
| #3              | Output   |
| #4              | Vcc      |

| INH Function |                         |
|--------------|-------------------------|
| Pad1         | Pad3 (Output)           |
| Open         | Active                  |
| "H" Level    | Active                  |
| "L" Level    | High Z (No-Oscillation) |

