



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

**How to Order**

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

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

⑤Frequency Tolerance (See Table 1)

⑥Symmetry/ INH Function

E	45/ 55%
N	45/ 55%

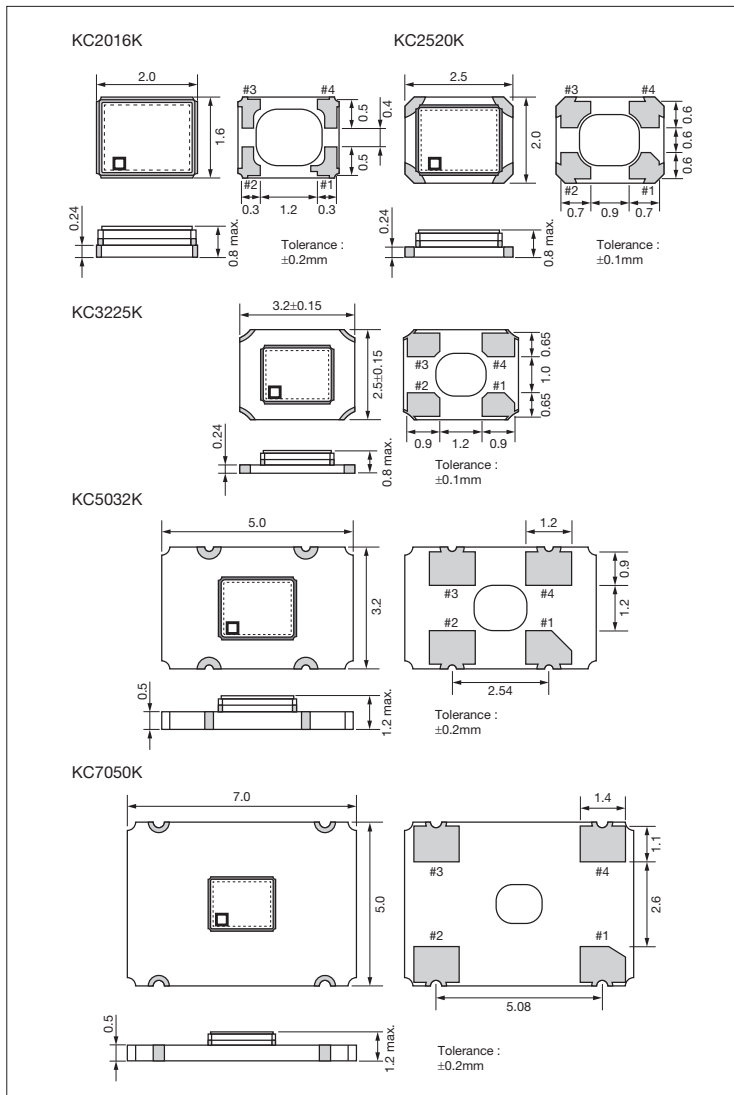
⑦Individual Specification  
(STD Specification is "00".)

Packaging Tape & Reel

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

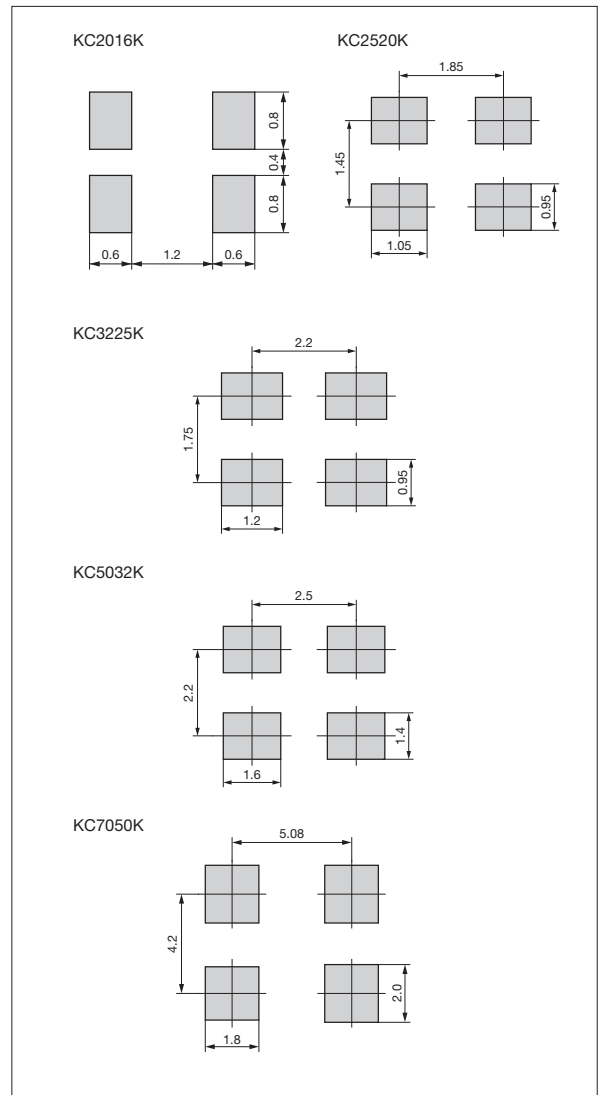
**Dimensions**

(Unit: mm)



**Recommended Land Pattern**

(Unit: mm)





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Specifications

Item	Symbol	Conditions	Version E (Standard)		Version N (Low Phase Noise)		Unit			
			Min.	Max.	Min.(codeU)	Max.(codeU)				
Output Frequency Range <sup>Note1</sup>	f <sub>o</sub>		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/ -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≤F <sub>0</sub> ≤125MHz	+1.60	+3.63	—	—	V			
		CodeⓄ : 2/ E : 125<F <sub>0</sub> ≤160MHz	+2.25	+3.63	—	—				
		CodeⓄ : 2/ N : 1.5≤F <sub>0</sub> ≤80MHz	—	—	+2.25(+2.38)	+2.75(+2.62)				
		CodeⓄ : 3/ N : 1.5≤F <sub>0</sub> ≤80MHz	—	—	+2.97(+3.14)	+3.63(+3.46)				
		CodeⓄ : 5/ N : 1.5≤F <sub>0</sub> ≤80MHz	—	—	+4.5(+4.75)	+5.5(+5.25)				
Current Consumption (Maximum Loaded)	I <sub>cc</sub>	1.5≤F <sub>0</sub> ≤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<F <sub>0</sub> ≤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<F <sub>0</sub> ≤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<F <sub>0</sub> ≤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<F <sub>0</sub> ≤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	—	—			
			E : 2.25<V <sub>cc</sub> ≤2.8V	—	25.0	—	—			
		125<F <sub>0</sub> ≤160MHz	E : 2.8<V <sub>cc</sub> ≤3.63V	—	27.0	—	—			
			E : 2.8<V <sub>cc</sub> ≤3.63V	—	27.0	—	—			
		Stand-by Current	I <sub>std</sub>	1.5≤F <sub>0</sub> ≤80MHz	—	5.0	—		10.0	μA
				80≤F <sub>0</sub> ≤125MHz	—	5.0	—		—	
125≤F <sub>0</sub> ≤160MHz	—			10.0	—	—				
Symmetry	SYM	@50% V <sub>cc</sub>	45	55	45	55	%			
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5≤F <sub>0</sub> ≤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<F <sub>0</sub> ≤125MHz	E : 1.6<V <sub>cc</sub> ≤3.63V	—	4.0	—	—			
125<F <sub>0</sub> ≤160MHz	E : 2.25<V <sub>cc</sub> ≤3.63V	—	2.5	—	—					
Low Level Output Voltage	V <sub>OL</sub>	E : I <sub>OL</sub> = 4mA	—	10% V <sub>cc</sub>	—	10% V <sub>cc</sub>	V			
		N (1.5≤F <sub>0</sub> ≤62.5MHz) : I <sub>OL</sub> = 4mA								
		N (62.5<F <sub>0</sub> ≤80MHz) : I <sub>OL</sub> = 8mA								
High Level Output Voltage	V <sub>OH</sub>	E : I <sub>OH</sub> = -4mA	90% V <sub>cc</sub>	—	90% V <sub>cc</sub>	—	V			
		N (1.5≤F <sub>0</sub> ≤62.5MHz) : I <sub>OH</sub> = -4mA								
		N (62.5<F <sub>0</sub> ≤80MHz) : I <sub>OH</sub> = -8mA								
Output Load	L <sub>CMOS</sub>		15		30		pF			
Low Level Input Voltage	V <sub>IL</sub>		—	30% V <sub>cc</sub>	—	30% V <sub>cc</sub>	V			
High Level Input Voltage	V <sub>IH</sub>		70% V <sub>cc</sub>	—	70% V <sub>cc</sub>	—	V			

Crystal Oscillators





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Item	Symbol	Conditions		Version E (Standard)		Version N (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)

