

TECHNICAL CRYSTAL CHINA LTD.

Ceramic

- resonator
- filter
- discriminator
- trap

Crystal

- resonator
- filter

SAW

- resonator
- filter

SAW

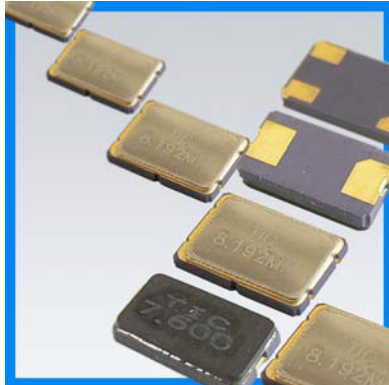
- sip resonator

Oscillator

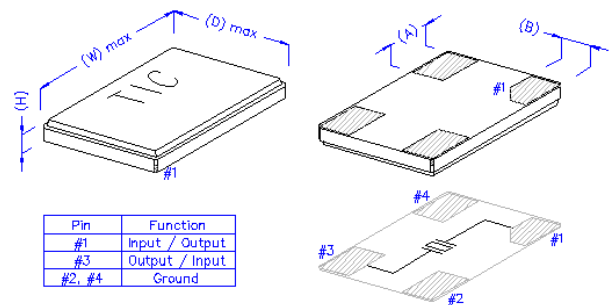


Crystal Unit

SMD Chip Type (4 Pads)



Five Types for different size of product
Light weight and low profile
High density mounting type
Excellent reliability and environmental characteristics
Suitable for various applications and miniature equipment



	70504	60354	50324	40254	32254
W	7.0	6.02	5.02	4.0	3.2
D	5.0	3.53	3.4	2.5	2.5
H	1.1	1.0	0.9	0.7	0.65
A	1.2	1.3	1.3	0.9	0.8
B	1.0	0.85	0.85	0.8	0.7

Standard Parameter

	70504	60354	50324	40254	32254	25204
	6.000 MHz ~ 100.000 MHz	8.000 MHz ~ 48.000 MHz	10.000 MHz ~ 40.000 MHz	12.000 MHz ~ 40.000 MHz	16.000 MHz ~ 40.000 MHz	16.000 MHz ~ 50.000 MHz
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm					
Load Capacitance	12pF / 20pF / upon request					
Frequency Stability	±10ppm / ±30ppm / ±50ppm					
Operating Temperature Range	-20 °C ~ +70 °C / -40 °C ~ +85 °C					
Storage Temperature Range	-40 °C ~ +85 °C / -55 °C ~ +125 °C					
Equivalent Resistance	Refer to the following table					
Shunt Capacitance	7 pF max					
Drive Level	100 µW max					
Insulation Resistance	500MΩ min at DC100V ±15V					
Aging (at 25 °C per year)	±5ppm					

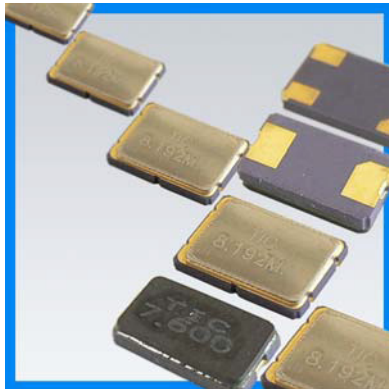
Equivalent Series Resistance

		Series Resistance				
		70504	60354	50324	40254	32254
6.000 MHz ~ 7.3728 MHz	Fundamental	100 Ω				
7.3729 MHz ~ 7.999 MHz		80 Ω				
8.000 MHz ~ 9.999 MHz		60 Ω	100 Ω			
10.000 MHz ~ 11.999 MHz		50 Ω	80 Ω	100 Ω		
12.000 MHz ~ 13.000 MHz		50 Ω	80 Ω	80 Ω	80 Ω	80 Ω
13.001 MHz ~ 13.999 MHz		50 Ω	50 Ω	80 Ω	80 Ω	80 Ω
14.000 MHz ~ 15.999 MHz		40 Ω	40 Ω	60 Ω	80 Ω	80 Ω
16.000 MHz ~ 19.999 MHz		40 Ω	40 Ω	50 Ω	50 Ω	50 Ω
20.000 MHz ~ 29.999 MHz		40 Ω	40 Ω	50 Ω	50 Ω	50 Ω
30.000 MHz ~ 40.000 MHz		40 Ω	40 Ω	40 Ω	50 Ω	50 Ω
40.001 MHz ~ 48.000 MHz	3 rd Overtone	40 Ω	40 Ω	40 Ω	40 Ω	40 Ω
40.000 MHz ~ 48.000 MHz		80 Ω	80 Ω	80 Ω		
48.001 MHz ~ 100.000 MHz		80 Ω	100 Ω	100 Ω		

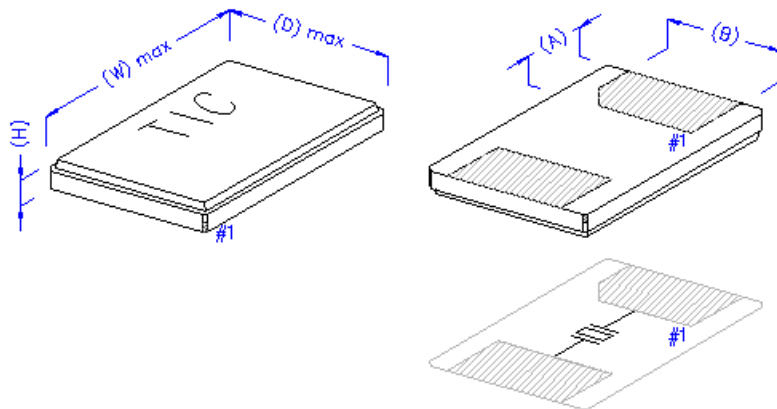


Crystal Unit

SMD Chip Type (2 Pads)



Two Types for different size of product
 Light weight and low profile
 High density mounting type
 Excellent reliability and environmental characteristics
 Suitable for various applications and miniature equipment



	60352	50322
W	6.02	5.02
D	3.53	3.4
H	1.0	1.0
A	1.5	1.35
B	2.2	2.2

Standard Parameter

	60352	50322	80452G
Frequency Range	10.000 MHz ~ 32.000 MHz	10.000 MHz ~ 32.000 MHz	8.000 MHz ~ 48.000 MHz
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm		
Load Capacitance	12pF / 20pF / upon request		
Frequency Stability	±10ppm / ±30ppm / ±50ppm		
Operating Temperature Range	-20 °C ~ +70 °C		
Storage Temperature Range	-40 °C ~ +85 °C		
Equivalent Resistance	Refer to the following table		
Shunt Capacitance	7 pF max		
Drive Level	100 µW max		
Insulation Resistance	500MΩ min at DC100V ±15V		
Aging (at 25 °C per year)	±5ppm		

Equivalent Series Resistance

	Mode of Oscillation	Series Resistance	
		60352	50322
10.000 MHz ~ 11.999 MHz	Fundamental	80 Ω	
12.000 MHz ~ 15.999 MHz		60 Ω	
16.000 MHz ~ 19.999 MHz		40 Ω	
20.000 MHz ~ 32.000 MHz		30 Ω	

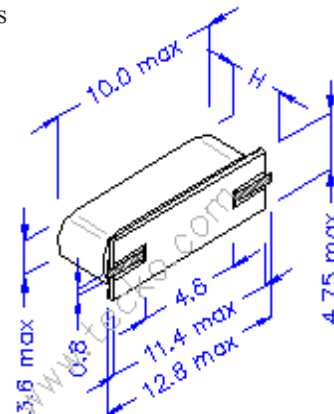


Crystal Unit

HC-49S/SMD . HC-49SS/SMD



Two heights available
Low profile
Both tape & reel package and bulk package available
Suitable for various applications



(mm)	HC-49S/SMD	HC-49SS/SMD
H	4.1	3.2

Standard Parameter

Frequency Range	3.2768 MHz ~ 80.000 MHz	
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm	
Load Capacitance	16Pf / 20Pf / upon request	
Frequency Stability	±10ppm / ±30ppm	±50ppm
Operating Temperature Range	-20 °C ~ +70 °C	-40 °C ~ +85 °C
Storage Temperature Range	-40 °C ~ +85 °C	-55 °C ~ +125 °C
Equivalent Resistance	Refer to the following table	
Shunt Capacitance	7 Pf max	
Drive Level	100 Mw max	
Insulation Resistance	500MΩ min at DC100V ±15V	
Aging (at 25 °C per year)	±5ppm	

Frequency Range	Fundamental / 3 rd Overtone	Series Resistance	
		C-4S	C-4SS
3.2768	Fundamental	200 Ω	
3.57545 ~ 3.0000		150 Ω	150 Ω
4.000 ~ 4.0000		120 Ω	120 Ω
5.000 ~ 5.0000		100 Ω	120 Ω
6.000 ~ 7.0000		80 Ω	80 Ω
8.000 ~ 0.0000		60 Ω	80 Ω
10.000 ~ 11.0000		50 Ω	50 Ω
12.000 ~ 13.0000		40 Ω	50 Ω
14.000 ~ 15.0000		40 Ω	40 Ω
16.000 ~ 10.0000		35 Ω	40 Ω
20.000 ~ 35.000		30 Ω	40 Ω
27.000 ~ 31.0000	3 rd Overtone	100 Ω	100 Ω
32.000 ~ 75.000		80 Ω	80 Ω
75.001 ~ 80.000		100 Ω	

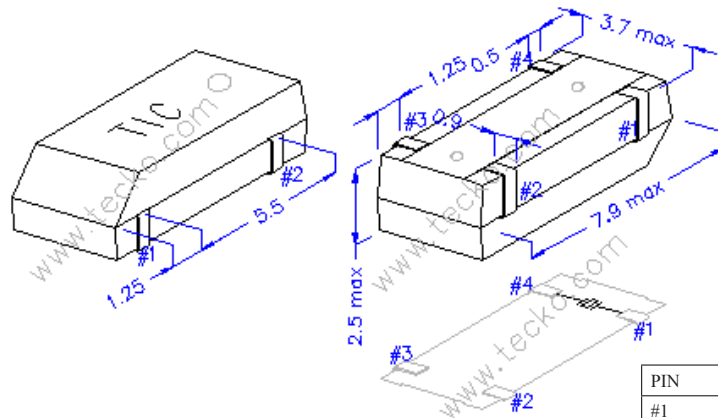


Crystal Unit

Tuning Fork TM200 . TM200A



Reflowable type SMD with embossed tape
 Low current consumption
 Suitable for clock source in digital equipment



PIN	Funktion
#1	Input / Output
#4	Output / Input
#2, #3	Ground

Standard Parameter

	TM200
Frequency Range	32.768 KHz
Frequency Tolerance (at 25 °C)	±20ppm
Load Capacitance	12.5pF
Operating Temperature Range	-10 °C ~ +60 °C
Storage Temperature Range	-40 °C ~ +85 °C
Equivalent Resistance	50kΩ
Shunt Capacitance	2.0 pF max
Drive Level	1 μW max
Insulation Resistance	500MΩ min at DC100V ±15V
Aging (at 25 °C per year)	±5ppm

Standard Parameter

	TM200A
Frequency Range	32.768 KHz
Frequency Tolerance (at 25 °C)	±20ppm
Load Capacitance	12.5Pf
Operating Temperature Range	-40 °C ~ +85 °C
Storage Temperature Range	-55 °C ~ +125 °C
Equivalent Resistance	50kΩ
Shunt Capacitance	2.0 pF max
Drive Level	1 μW max
Insulation Resistance	500MΩ min at DC100V ±15V
Aging (at 25 °C per year)	±5ppm

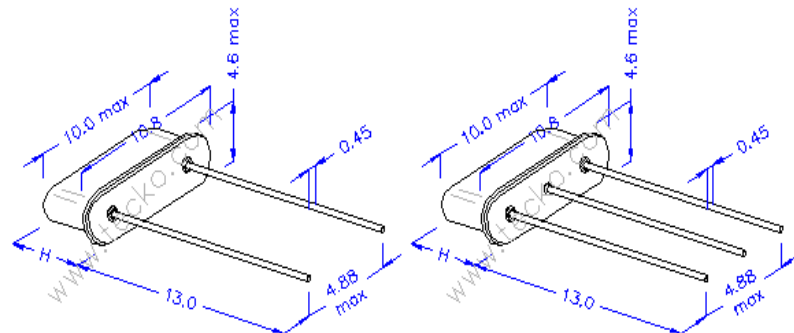


Crystal Unit

HC-49S . HC-49SS



Two heights available
Low profile
Tape and reel package available
Grounded upon request
Suitable for various applications



(mm)	HC-49S	HC-49SS
H	3.5	2.5

Standard Parameter

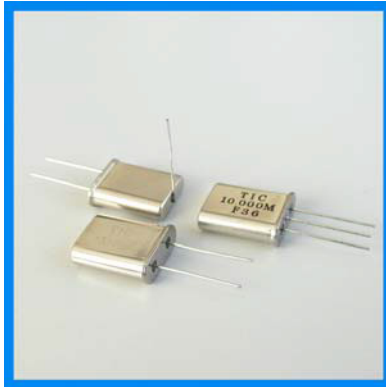
Frequency Range	3.2768 MHz ~ 80.000 MHz	
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm	
Load Capacitance	16pF / 20pF / upon request	
Frequency Stability	±10ppm / ±30ppm	±50ppm
Operating Temperature Range	-20 °C ~ +70 °C	-40 °C ~ +85 °C
Storage Temperature Range	-40 °C ~ +85 °C	-55 °C ~ +125 °C
Equivalent Resistance	Refer to the following table	
Shunt Capacitance	7 pF max	
Drive Level	100 µW max	
Insulation Resistance	500MΩ min at DC100V ±15V	
Aging (at 25 °C per year)	±5ppm	

Frequency Range (MHz)	Mode of Oscillation	Series Resistance	
		HC-49S	HC-49SS
3.2768	Fundamental	200 Ω	
3.579545 ~ 3.999		150 Ω	150 Ω
4.000 ~ 4.999		120 Ω	120 Ω
5.000 ~ 5.999		100 Ω	120 Ω
6.000 ~ 7.999		80 Ω	80 Ω
8.000 ~ 9.999		60 Ω	80 Ω
10.000 ~ 11.999		50 Ω	50 Ω
12.000 ~ 13.999		40 Ω	50 Ω
14.000 ~ 15.999		40 Ω	40 Ω
16.000 ~ 19.999		35 Ω	40 Ω
20.000 ~ 35.000		30 Ω	40 Ω
27.000 ~ 31.999		3 rd Overtone	100 Ω
32.000 ~ 75.000	80 Ω		80 Ω
75.001 ~ 80.000	100 Ω		

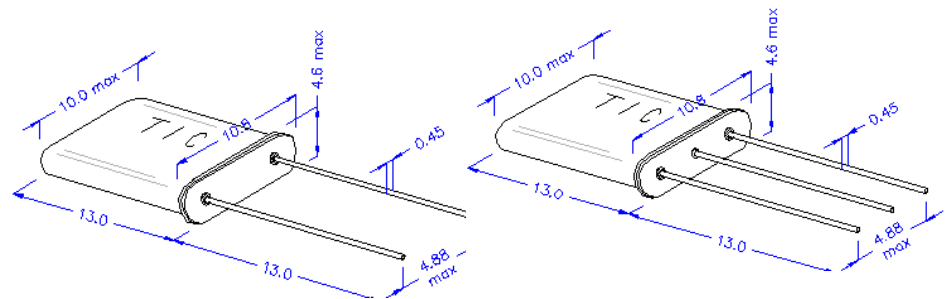


HC-49U

Crystal Unit



Tape and reel package available
Grounded upon request
Suitable for various applications



Standard Parameter

Frequency Range	1.800 MHz ~ 160.000 MHz	
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm	
Load Capacitance	20pF / upon request	
Frequency Stability	±10ppm / ±30ppm / ±50ppm	
Operating Temperature Range	-20 °C ~ +70 °C	-40 °C ~ +85 °C
Storage Temperature Range	-40 °C ~ +85 °C	-55 °C ~ +125 °C
Equivalent Resistance	Refer to the following table	
Shunt Capacitance	7 pF max	
Drive Level	100 µW max	
Insulation Resistance	500MΩ min at DC100V ±15V	
Aging (at 25 °C per year)	±5ppm	

Equivalent Series Resistance

Frequency Range (MHz)	Mode of Oscillation	Series Resistance
1.800 ~ 1.999	Fundamental	600 Ω
2.000 ~ 2.999		500 Ω
3.000 ~ 3.499		150 Ω
3.500 ~ 3.999		100 Ω
4.000 ~ 4.999		80 Ω
5.000 ~ 7.999		60 Ω
8.000 ~ 9.999		40 Ω
10.000 ~ 15.999		35 Ω
16.000 ~ 24.999		30 Ω
25.000 ~ 35.999		40 Ω
25.000 ~ 89.999	3 rd Overtone	40 Ω
75.000 ~ 160.000	5 th Overtone	80 Ω

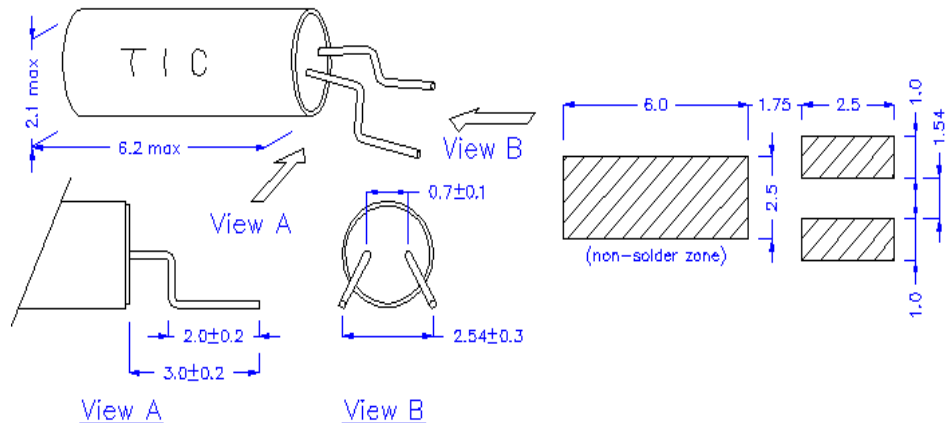


Crystal Unit

Tuning Fork 206SMB



Dip Type SMD with embossed tape
Low current consumption
Suitable for clock source in digital equipment



Standard Parameter

	206SMB
Frequency Range	32.768 KHz
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm
Load Capacitance	12.5pF / upon request
Operating Temperature Range	-10 °C ~ +60 °C
Storage Temperature Range	-20 °C ~ +70 °C
Equivalent Resistance	50kΩ
Shunt Capacitance	1.3 pF max
Drive Level	1 μW max
Insulation Resistance	500MΩ min at DC100V ±15V
Aging (at 25 °C per year)	±5ppm

Standard Parameter

	206SMB
Frequency Range	32.000 KHz ~ 75 KHz
Frequency Tolerance (at 25 °C)	±20ppm
Load Capacitance	12.5Pf
Operating Temperature Range	-10 °C ~ +60 °C
Storage Temperature Range	-20 °C ~ +70 °C
Equivalent Resistance	50kΩ
Shunt Capacitance	1.3 pF max
Drive Level	1 μW max
Insulation Resistance	500MΩ min at DC100V ±15V
Aging (at 25 °C per year)	±5ppm

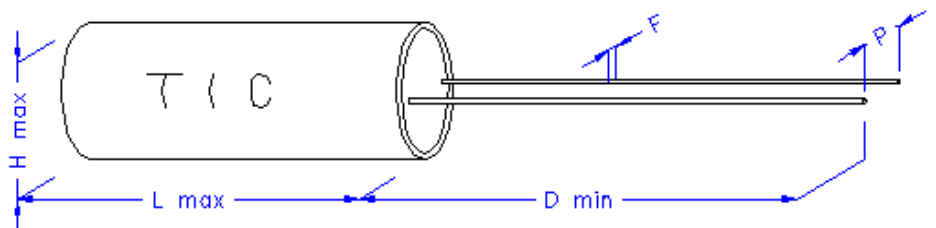


Crystal Unit

Tuning Fork 2x6 . 3x8



Two Types for different size of product
Low current consumption
Suitable for clock source in digital equipment



(mm)	206	308
H	2.1	3.1
L	6.2	8.2
F	0.26	0.35
P	0.7	0.8
D	7.0	10.0

Standard Parameter

	206	308
Frequency Range	32.768 KHz	
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm	
Load Capacitance	8pF / 12.5pF / upon request	
Operating Temperature Range	-10 °C ~ +60 °C	
Storage Temperature Range	-20 °C ~ +70 °C	
Equivalent Resistance	40kΩ 3	5kΩ
Shunt Capacitance	1.4 pF max	1.7 pF max
Drive Level	1 μW max	
Insulation Resistance	500MΩ min at DC100V ±15V	
Aging (at 25 °C per year)	±5ppm	

Standard Parameter

	206
Frequency Range	32.000 KHz ~ 150 KHz
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±100ppm
Load Capacitance	12.5pF / upon request
Operating Temperature Range	-10 °C ~ +60 °C
Storage Temperature Range	-20 °C ~ +70 °C
Equivalent Resistance	40kΩ
Shunt Capacitance	1.4 pF max
Drive Level	1 μW max
Insulation Resistance	500MΩ min at DC100V ±15V
Aging (at 25 °C per year)	±5ppm

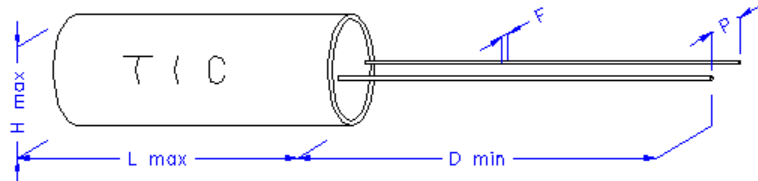


Crystal Unit

Cylinder 206 . 308 . 309 . 310



4 lengths for different size of product
Low current consumption
Bulk package only
Suitable for various applications



(mm)	206	308	309	310
H	2.1		3.1	
L	6.2	8.2	9.1	10.2
F	0.26		0.35	
P	0.7		0.8	
D	7.0		10.0	

Standard Parameter

	206	308	309	310
Frequency Range (MHz)	6.000 ~ 27.000 6	.000 ~ 70.000	4.000 ~ 5.999 3	.500 ~ 3.999
Frequency Tolerance (at 25 °C)	±10ppm / ±20ppm / ±30ppm			
Load Capacitance	16pF / 20pF / upon request			
Operating Temperature Range	-20 °C ~ +70 °C			
Storage Temperature Range	-40 °C ~ +85 °C			
Equivalent Resistance	Refer to the following table			
Shunt Capacitance	5.0 pF max			
Drive Level	10 µW max	50 µW max		
Insulation Resistance	500MΩ min at DC100V ±15V			
Aging (at 25 °C per year)	±3ppm			

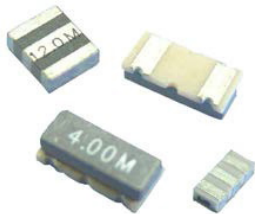
Standard Parameter

		Series Resistance	
		206	308 . 309 . 310
3.500 MHz ~ 3.999 MHz	Fundamental		150 Ω
4.000 MHz			120 Ω
4.001 MHz ~ 5.999 MHz			100 Ω
6.000 MHz ~ 7.599 MHz		150 Ω	
7.600 MHz ~ 8.000 MHz			
8.001 MHz ~ 9.999 MHz			60 Ω
10.000 MHz ~ 12.000 MHz		80 Ω	
12.001 MHz ~ 13.999 MHz			
14.000 MHz ~ 19.999 MHz			40 Ω
20.000 MHz ~ 27.000 MHz			
27.001 MHz ~ 28.999 MHz	3 rd Overtone		50 Ω
28.000 MHz ~ 34.999 MHz			
35.000 MHz ~ 70.000 MHz			80 Ω



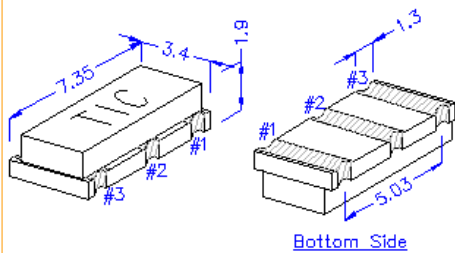
Ceramic Unit

Chip Type Resonator



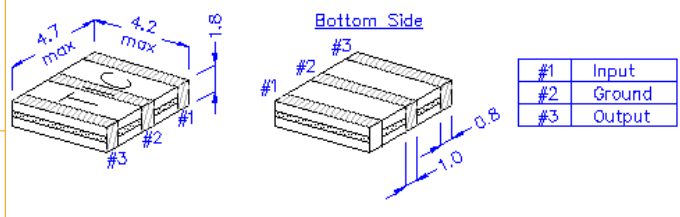
- mini Surface Mount Device
- ZTA (without built-in capacitors) and ZTT (built-in capacitors) available
- used for microprocessor.

CC



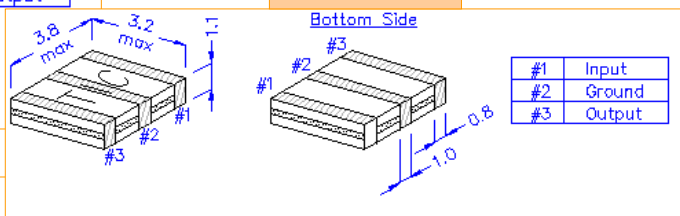
#1	Input
#2	Ground
#3	Output

CS



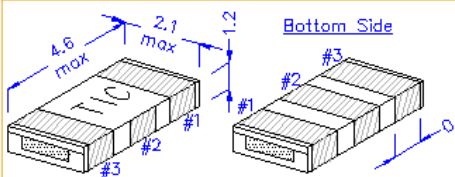
#1	Input
#2	Ground
#3	Output

CV



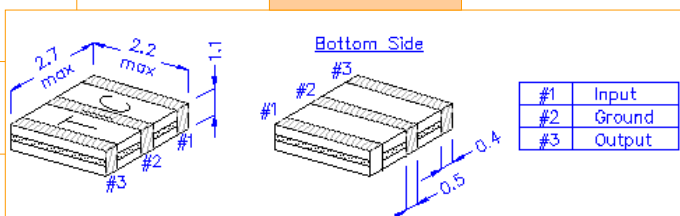
#1	Input
#2	Ground
#3	Output

CR



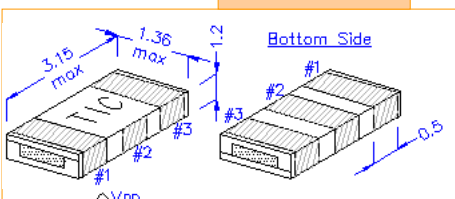
#1	Input
#2	Ground
#3	Output

CW

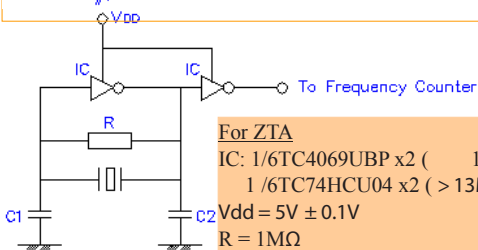


#1	Input
#2	Ground
#3	Output

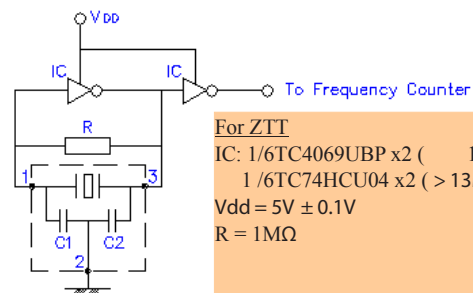
CE



#1	Input
#2	Ground
#3	Output



For ZTA
IC: 1/6TC4069UBP x2 (< 13MHz)
1 /6TC74HCU04 x2 (> 13MHz)
Vdd = 5V ± 0.1V
R = 1MΩ



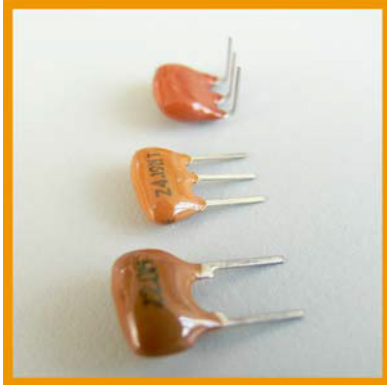
For ZTT
IC: 1/6TC4069UBP x2 (< 13MHz)
1 /6TC74HCU04 x2 (> 13MHz)
Vdd = 5V ± 0.1V
R = 1MΩ

	CC	CR	CE	CS	CV	CW
1.84~ 3.99 MHz						
4.00 ~ 8.00M Hz						
8.00 ~ 12.00 MHz						
12.01 ~ 16.00 MHz						
16.93~ 50.00M Hz						

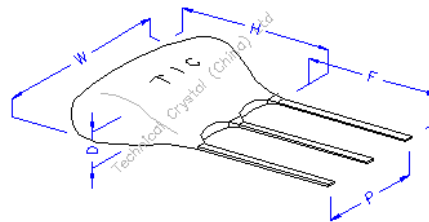


Ceramic Unit

ZTT Series (3-Pin) Resonator



Frequency range from 1.80MHz ~ 50.00MHz
 3 pins for high frequency (MHz)
 With built-in capacitor
 Bulk package only
 Bent leg available

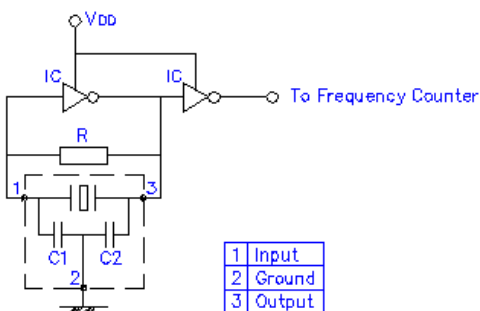


(maximum in mm)	W	D	H	F	P
1.80MHz ~ 6.00MHz	10.0	4.0	6.0	6.0	5.0
8.00MHz ~ 39.99MHz	8.0	4.0	7.0	6.0	5.0
40.00MHz ~ 50.00MHz	7.0	3.5	6.5	5.2	5.0

Standard Parameter

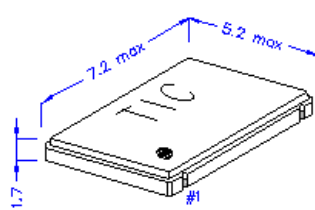
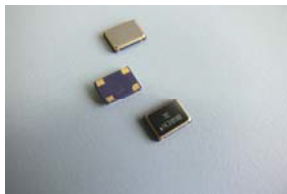
	1.80 ~ 13.00 MHz	13.01 ~ 20.00 MHz	20.01 ~ 25.99 MHz	26.00 ~ 50.00 MHz
Frequency Range (MHz)	1.80MHz ~ 50.00MHz			
Frequency Tolerance (at 25 °C)	±0.5% / upon request			
Load Capacitance = C1 = C2	Built-In			
Operating Temperature Range	-20 °C ~ +80 °C			
Storage Temperature Range	-30 °C ~ +80 °C			
Temperature Stability	±0.3%			
IC Number	1/6TC4069UBP x21		/6TC74HCU04 x2	
Input Voltage	5V ±0.1V			
Insulation Resistance	1MΩ			
Aging (for 10 years)	±0.3%			

Test Circuit for MOS IC

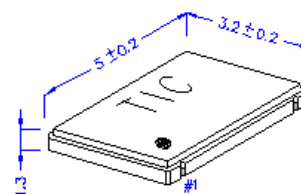
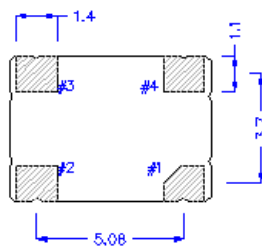


Oscillator Unit

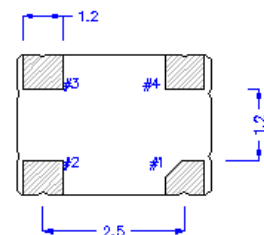
Chip Type



Pin	Function
#1	N/C or Tri-state
#2	Ground
#3	Output
#4	VDD



Pin	Function
#1	N/C or Tri-state
#2	Ground
#3	Output
#4	VDD



SMD7x5

SMD5x3.2

Standard Parameter

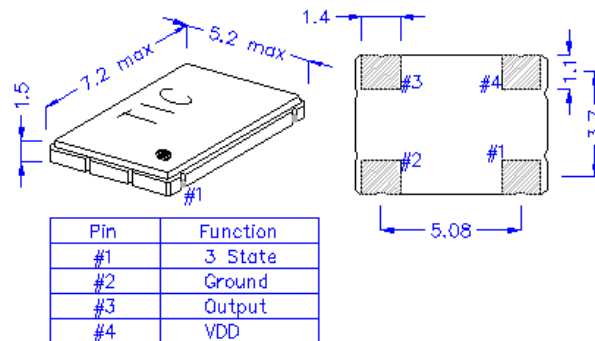
Frequency Range	1.000 MHz ~ 125.000 MHz
Frequency Stability	±25ppm / ±50ppm / ±100ppm
Output Load	15pF
Input Voltage	3.3V / 5.0V
Operating Temperature Range	0°C ~ +70°C
Storage Temperature Range	-40°C ~ +85°C / -55°C ~ +125°C
Input Current	Refer to the following table
Symmetry	60 / 40% to 40 / 60%
Rise / Fall Time	10ns max
StartUp time	10ms max (1.000 MHz ~ 49.999 MHz) 5ms max (50.000 MHz ~ 125.000 MHz)
Aging per year	±5ppm

Equivalent Input Current

Frequency Range	3.3 ± 0.33V	5.0 ± 0.5V
1.000 MHz ~ 35.999 MHz	20mA max	25mA max
36.000 MHz ~ 39.999 MHz		60mA max
40.000 MHz ~ 69.999 MHz	40mA max	80mA max
70.000 MHz ~ 100.000 MHz	60mA max	
100.001 MHz ~ 125.000 MHz	80mA max	

Oscillator Unit

Chip Type for 32.768KHz

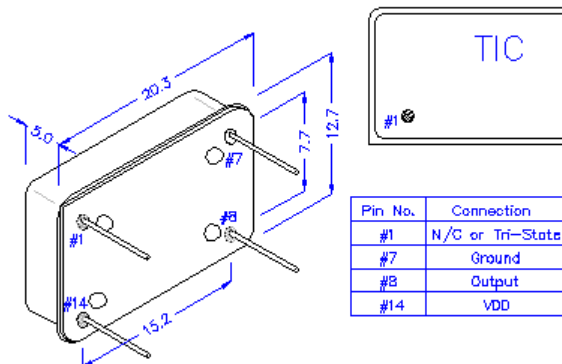


Standard Parameter

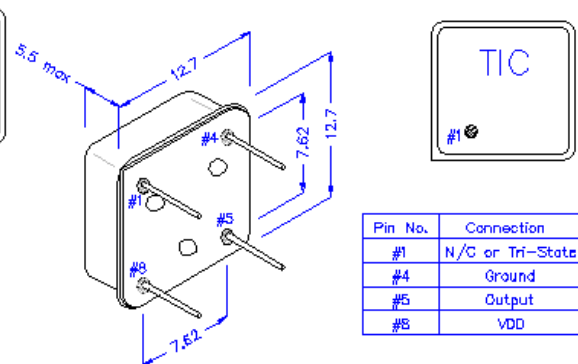
Frequency Range	32.768 KHz
Frequency Stability	±25ppm / ±50ppm / ±100ppm
Output Load	15pF
Input Voltage	3.3V / 5.0V
Operating Temperature Range	0°C ~ +70°C
Storage Temperature Range	-40°C ~ +85°C / -55°C ~ +125°C
Input Current	1.5mA max
Symmetry	45% / 55% at 1/2 VDD
Rise / Fall Time	200ns max
StartUp Time	2ms max
Aging per year	±5ppm

Oscillator Unit

Dip Type



Full Size



Half Size

Standard Parameter

Frequency Range	30.000 KHz ~ 220.000 MHz
Frequency Stability	±25ppm / ±50ppm / ±100ppm
Output Load	TTL / 15pF
Input Voltage	1.8V / 2.5V / 3.3V / 5.0V
Operating Temperature Range	0°C ~ +70°C
Storage Temperature Range	-40°C ~ +85°C / -55°C ~ +125°C
Input Current	Refer to the following table
Symmetry	60 / 40% to 40 / 60%
Rise / Fall Time	10ns max
StartUp time	15ms max (30.000 KHz ~ 7.999 MHz) 10ms max (8.000 MHz ~ 220.000 MHz)
Aging per year	±5ppm

Equivalent Input Current

Frequency Range	3.3 ± 0.33V	5.0 ± 0.5V
30.000 KHz ~ 3.999 MHz	10mA max	
4.000 MHz ~ 9.999 MHz	15mA max	
10.000 MHz ~ 39.999 MHz	20mA max	0mA max
40.000 MHz ~ 59.999 MHz	30mA max	60mA max
60.000 MHz ~ 89.999 MHz	40mA max	
90.000 MHz ~ 99.999 MHz	60mA max	80mA max
100.000 MHz ~ 220.000 MHz		

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Technische Änderungen vorbehalten.
Subject to change without prior notice.