



Frequency  
Control Products

**Intertec**<sup>TM</sup>  
C o m p o n e n t s

# Quartz Crystal Units Quartz Crystal Oscillators Ceramic Resonators SAW Components



Intertec Components GmbH  
Erdinger Straße 45  
85356 Freising/Germany

Tel: +49-8161-9913-0  
Free-Call: 0800-9913-000  
Fax: +49-8161-9913-20

service@intertec-components.de  
www.intertec-components.de  
Edition June 2011



# Contents

Quartz Crystal Overview	4
Oscillators Overview	5
Resonators Overview	6
SAW Overview	7
IC 5	8
IC 6	9
IC 7	10
IC 8	11
IC 9	12
IC 10	13
IC 11	14
IC 12	15
IC 13	16
IC 14	17
IC 15	18
IC 16	19
IC 17	20
IC 18	21
IC 19	22
IC 20	23
IC 21	24
IC 22	25
IC 23	26
IC 24	27
IC 25	28
IC 26	29
IC 27	30
IC 28	31
IO 10	32
IO 11	33
IO 12	34
IO 13	35
IO 14	36





Frequency  
Control Products

**Intertec**<sup>TM</sup>  
C o m p o n e n t s

# Contents

IO 15	37
IO 16	38
IO 17	39
IO 18	40
IO 19	41
IO 20	42
IO 21	43
IO 22	44
IO 23	45
IO 24	46
IO 25	47
IO 26	48
IO 27	49
IO 28	50
IO 29	51
IO 30	52
IR ZTA	53
IR ZTT	54
IS IF	55
IS RF	56
IS SR	57



Intertec Components GmbH  
Erdinger Straße 45  
85356 Freising/Germany

Tel: +49-8161-9913-0  
Free-Call: 0800-9913-000  
Fax: +49-8161-9913-20

service@intertec-components.de  
www.intertec-components.de  
Edition June 2011



# Quartz Crystal Overview

<b>DIMENSIONS</b> l/w/h in mm (max)	<b>FREQUENCY RANGE</b>	<b>PARTNUMBER</b>	<b>OPERATING TEMPERATURE RANGE</b> A = 0 to +70 °C B = -20 °C to + 70 °C C = -40 °C to +85 °C D = -40 to +105 °C
2,0 / 1,2 / 0,6	32,768 KHz	IC 5	A, B, C
3,2 / 1,5 / 0,8	32,768 KHz	IC 6	A, B, C
4,9 / 1,8 / 0,9	32,768 KHz	IC 7	A, B, C
7,0 / 1,5 / 1,4	32,768 KHz	IC 8	A, B, C
8,2 / 3,8 / 2,5	32,768 KHz	IC 9	A, B, C
1,6 / 1,2 / 0,3	26,0 to 80,0 MHz	IC 10	A, B, C
2,1 / 1,7 / 0,5	24,0 to 50,0 MHz	IC 11	A, B, C
2,6 / 2,1 / 0,65	16,0 to 80,0 MHz	IC 12	A, B, C
3,4 / 2,7 / 0,75	10,0 to 125,0 MHz	IC 13	A, B, C, D
5,2 / 3,4 / 1,0	8,0 to 250,0 MHz	IC 14	A, B, C, D
5,2 / 3,4 / 1,1	8,0 to 52,0 MHz	IC 15	A, B, C, D
6,2 / 3,7 / 1,2	8,0 to 150,0 MHz	IC 16	A, B, C, D
6,2 / 3,7 / 1,2	8,0 to 150,0 MHz	IC 17	A, B, C, D
7,2 / 5,2 / 1,2	6,0 to 160,0 MHz	IC 18	A, B, C, D
8,2 / 4,7 / 1,6	4,00 to 50,0 MHz	IC 19	A, B, C, D
12,0 / 5,7 / 1,6	3,57 to 30,0 MHz	IC 20	A, B, C, D
13,3 / 5,0 / 3,8	3,20 to 70,0 MHz	IC 21	A, B, C, D
13,3 / 5,0 / 3,0	3,20 to 70,0 MHz	IC 22	A, B, C, D
11,5 / 5,0 / 3,6	3,20 to 70,0 MHz	IC 23	A, B, C, D
11,5 / 5,0 / 2,8	3,20 to 70,0 MHz	IC 24	A, B, C, D
11,5 / 4,6 / 13,2	1,80 to 150,0 MHz	IC 25	A, B, C, D
8,3 / 3,1	20,0 to 200,0 KHz	IC 26	A, B, C
6,2 / 2,1	20,0 to 200,0 KHz	IC 27	A, B, C
6,5 / 2,2	20,0 to 200,0 KHz	IC 28	A, B, C





# Oscillators Overview

<b>DIMENSIONS</b> l/w/h in mm (max)	<b>FREQUENCY RANGE</b>	<b>PART NUMBER</b>	<b>POWER SUPPLY</b>	<b>OUTPUT</b>
<b>Quartz Crystal Oscillator</b>				
2,5 / 2,0 / 0,9	2,0 to 50,0 MHz	IO 10	+1,8V/2,5V/3,3V	CMOS
2,6 / 2,1 / 1,0	32,768 KHz	IO 11	+1,8V/2,5V/3,3V	CMOS
3,2 / 2,5 / 1,2	2,0 to 50,0 MHz	IO 12	+1,8V/2,5V/3,3V	CMOS
3,2 / 2,5 / 1,2	32,768 KHz	IO 13	+1,8V/2,5V/3,3V	CMOS
5,2 / 3,2 / 1,2	0,5 to 156,0 MHz	IO 14	+1,8V/2,5V/3,3V	CMOS
5,2 / 3,2 / 1,2	32,768 KHz	IO 15	+3,3V	CMOS
5,2 / 3,2 / 1,2	0,5 to 156,0 MHz	IO 16	+5,0V	CMOS /TTL
5,2 / 3,2 / 1,2	13,0 to 160,0 MHz	IO 17	+2,5V/3,3V	CMOS(LOW EMI)
5,2 / 3,2 / 1,2	40,0 to 160,0 MHz	IO 18	+2,5V/3,3V	LVPECL
7,2 / 5,2 / 1,4	0,5 to 156,0 MHz	IO 19	+1,8V/2,5V/3,3V	CMOS/TTL
7,2 / 5,2 / 1,4	32,768 KHz	IO 20	+3,3V	CMOS
7,2 / 5,2 / 1,4	0,5 to 156,0 MHz	IO 21	+5,0V	CMOS /TTL
7,2 / 5,2 / 1,4	13,0 to 160,0 MHz	IO 22	+2,5V/3,3V	CMOS(LOW EMI)
7,2 / 5,2 / 2,0	25,0 to 800,0 MHz	IO 23	+2,5V/3,3V	LVPECL
7,2 / 5,2 / 1,4	40,0 to 800,0 MHz	IO 24	+2,5V/3,3V	LVDS
<b>VCTCXO / TCXO</b>				
3,2 / 2,5 / 1,3	10,0 to 30,0 MHz	IO 25	+2,7V/3,3V	
5,0 / 3,2 / 1,4	10,0 to 26,0 MHz	IO 26	+2,7V/3,3V	
7,0 / 5,0 / 2,0	12,0 to 20,0 MHz	IO 27	+3,0V	
<b>VCXO</b>				
5,2 / 3,4 / 1,2	1,0 to 52,0 MHz	IO 28	+3,3V/5,0V	CMOS
7,2 / 1,2 / 1,8	1,0 to 52,0 MHz	IO 29	+3,3V/5,0V	CMOS
<b>OCXO</b>				
25,04 / 25,04 / 15,0	1,0 to 100,0 MHz	IO 30	+3,3V/5,0V/12,0V	TTL/HC/AC MOS





# Resonators Overview

<b>DIMENSIONS</b> l/w/h in mm (max)	<b>FREQUENCY RANGE</b>	<b>PART NUMBER</b>	<b>OPERATING TEMP. RANGE</b> A = 0 to +70 °C B = -20 °C to + 80 °C C = -40 °C to +85 ° D = -40 to +105 °C
--	------------------------	--------------------	---

## IR ZTA (None Capacitor)

7,4 / 3,4 / 1,8	2,0 to 8,0 MHz	IR ZTA CC MG	B
4,5 / 2,0 / 1,2	4,0 to 8,0 MHz	IR ZTA CR MG	B
4,7 / 4,1 / 1,2	6,0 to 13,0 MHz	IR ZTA CS MT	B
4,7 / 4,1 / 1,2	13,0 to 60,0 MHz	IR ZTA CS MX	B
3,7 / 3,1 / 1,0	8,0 to 13,0 MHz	IR ZTA CV MT	B
3,7 / 3,1 / 1,0	16,0 to 60,0 MHz	IR ZTA CV MX	B
2,5 / 2,0 / 1,2	20,0 to 60,0 MHz	IR ZTA CW MX	B

## IR ZTT (Built-in capacitor)

7,4 / 3,4 / 1,8	2,0 to 8,0 MHz	IR ZTT CC MG	B
4,5 / 2,0 / 1,2	4,0 to 8,0 MHz	IR ZTT CR MG	B
4,7 / 4,1 / 1,2	6,0 to 13,0 MHz	IR ZTT CS MT	B
4,7 / 4,1 / 1,2	13,0 to 60,0 MHz	IR ZTT CS MX	B
3,7 / 3,1 / 1,0	8,0 to 13,0 MHz	IR ZTT CV MT	B
3,7 / 3,1 / 1,0	16,0 to 60,0 MHz	IR ZTT CV MX	B
2,5 / 2,0 / 1,2	20,0 to 60,0 MHz	IR ZTT CW MX	B





# SAW Overview

## IS SR

### SAW Resonator

Dimensions l/w/h in mm (max)

3,0 x 3,0  
3,8 x 3,8  
5,0 x 5,0  
7,0 x 5,0  
F11 or TO39  
35.46MHz ~ 1100MHz

Frequency Range

## IS RF

### RF SAW FILTER

Dimensions l/w/h in mm (max)

3,0 x 3,0  
3,8 x 3,8  
5,0 x 5,0  
7,0 x 5,0  
F11 or TO39  
139 ~ 2650 MHz

Frequency Range

## IS IF

### IF SAW FILTER

Dimensions l/w/h in mm (max)

3,0 x 3,0  
3,8 x 3,8  
5,0 x 5,0  
7,0 x 5,0  
F11 or TO39  
35.46MHz ~ 666.667MHz

Frequency Range

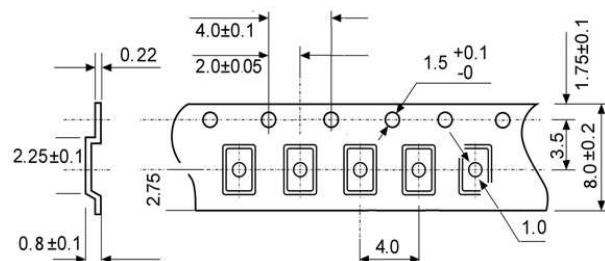
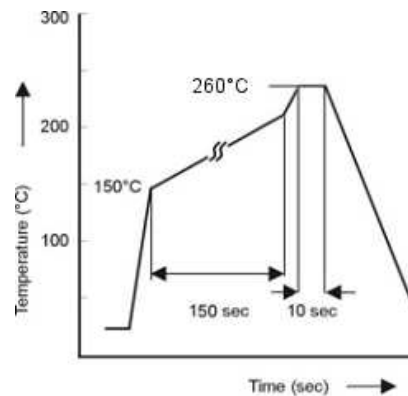
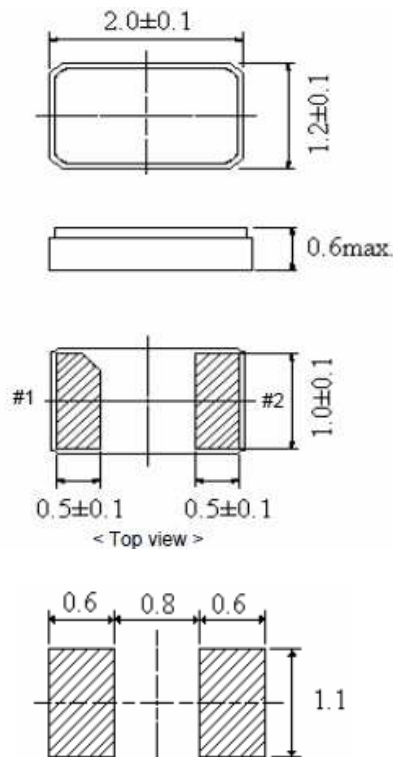




# IC 5

## Clock Crystal

Dimensions l/w/h in mm (max)	<b>2,0 x 1,2 x 0,6</b>
Frequency	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 20 ppm (±0,002%)
Frequency Stability at -40°C to +85°C	-0,03 ppm ± 0 ,01/°C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Motional Capacitance (C1)	7,0pF typ.
Shunt Capacitance (C0)	1,3pF typ.
Series Resonance (R1)	60KOhm typ., 90KOhm max.
Drive Level μW max.	0,5 typ.
Aging (df/F) first year at 25°C	± 5 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	3000pcs
Part Number	

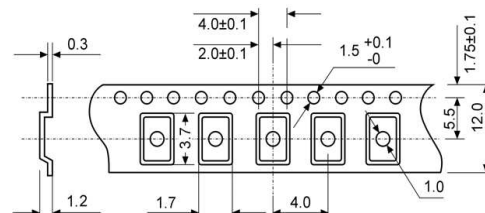
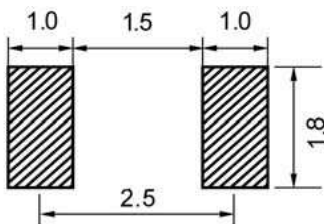
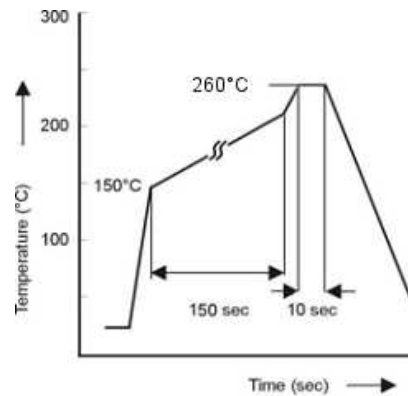
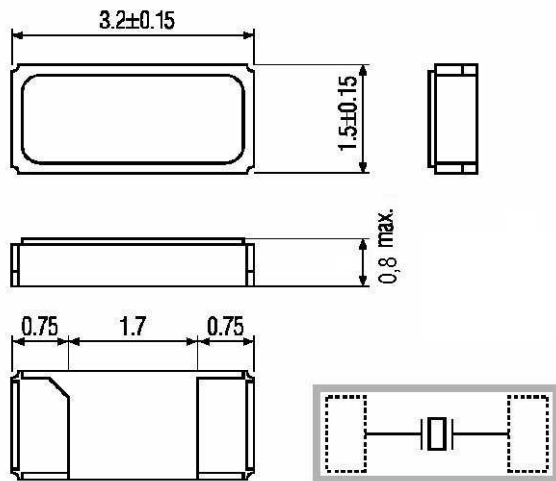




# IC 6

## Clock Crystal

Dimensions l/w/h in mm (max)	<b>3,2 x 1,5 x 0,8</b>
Frequency	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 20 ppm (±0,002%)
Frequency Stability at -40°C to +85°C	-0,035 ppm ± 0,01/°C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Motional Capacitance (C1)	0,0036pF typ.
Shunt Capacitance (C0)	1,6pF typ.
Series Resonance (R1)	80KOhm typ., 90KOhm max.
Drive Level µW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	3000pcs
Part Number	

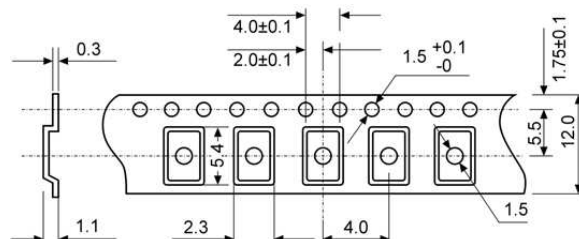
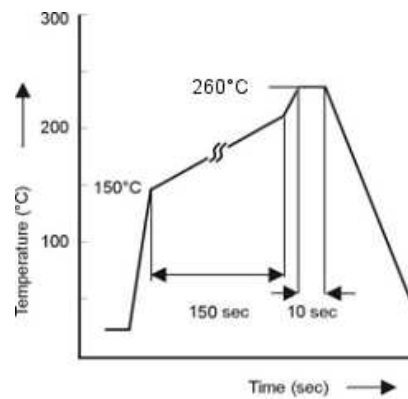
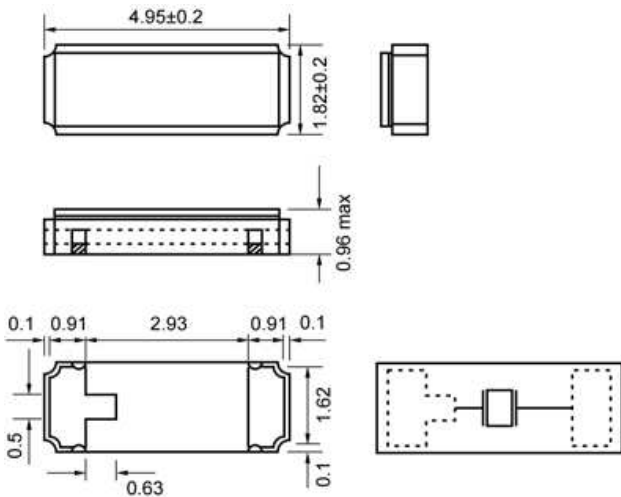




# IC 7

## Clock Crystal

Dimensions l/w/h in mm (max)	<b>4,95 x 1,82 x 0,96</b>
Frequency	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 30 ppm (±0,002%)
Frequency Stability at -40°C to +85°C	-0,034 ppm ± 0,06/°C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF ±1,0 pF
Shunt Capacitance (C0)	2,0pF max.
Series Resonance (R1)	80KOhm typ., 90KOhm max.
Drive Level μW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 5 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	3000pcs
Part Number	

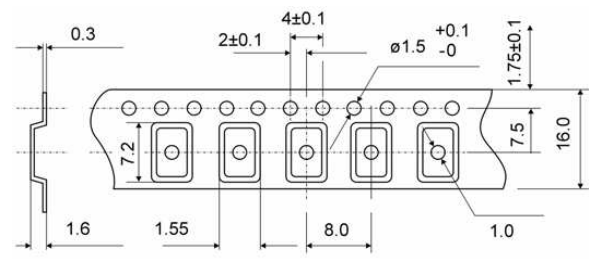
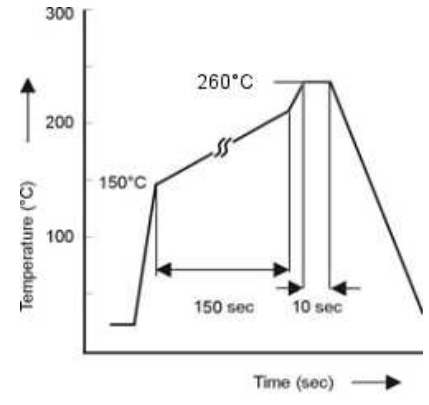
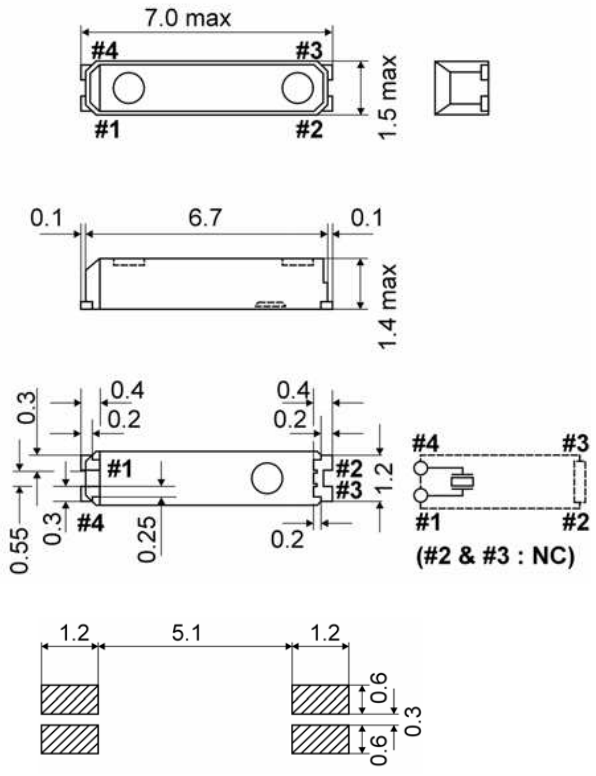




# IC 8

## Clock Crystal

Dimensions l/w/h in mm (max)	<b>7,0 x 1,5 x 1,4</b>
Frequency	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability at -40°C to +85°C	-0,034 ppm ± 0,008/°C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	0,8pF typ.
Series Resonance (R1)	65KOhm
Drive Level μW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	3000pcs
Part Number	

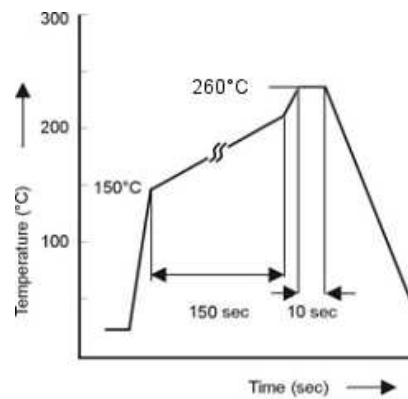
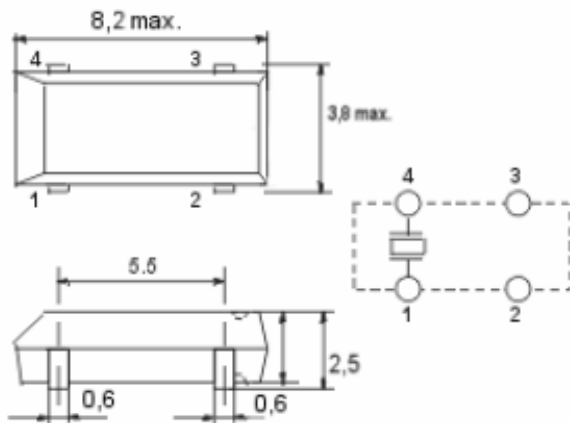




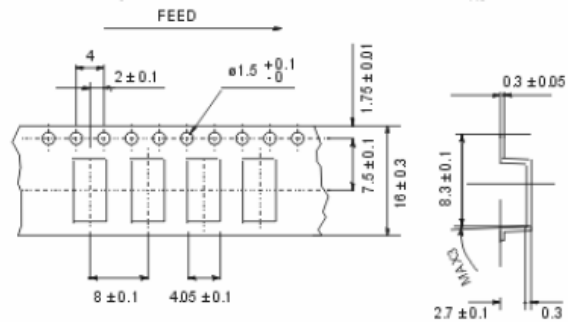
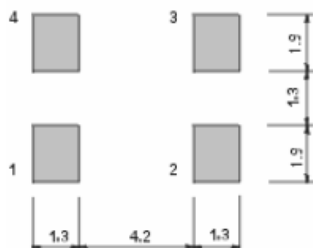
# IC 9

## Clock Crystal

Dimensions l/w/h in mm (max)	<b>8,2 x 3,8 x 2,5</b>
Frequency	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability at -40°C to +85°C	-0,034 ppm /° C <sup>2</sup> typ.± 0,008/°C <sup>2</sup> max
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	2,0pF typ.
Series Resonance (R1)	65KOhm
Drive Level μW max.	0,1 typ. 1,0 max
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	3000pcs
Part Number	



### SUGGESTED SOLDERING PAD

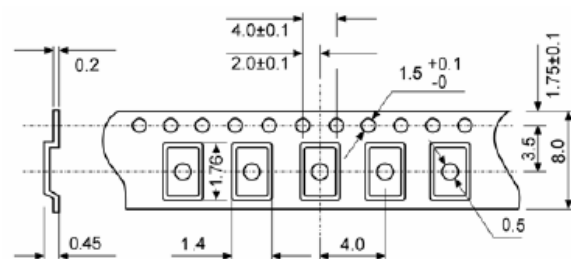
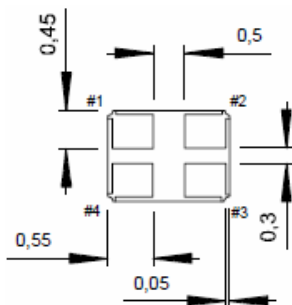
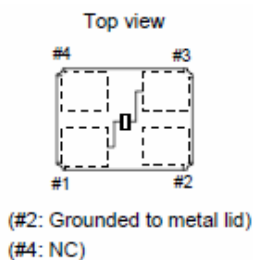
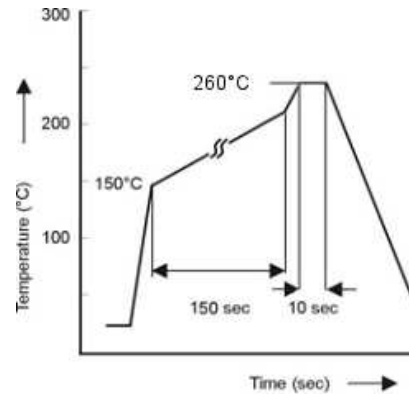
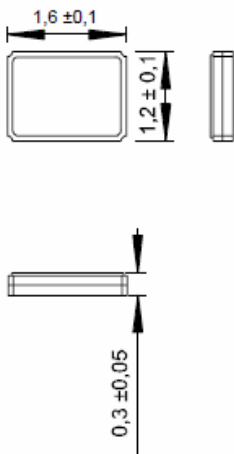




# IC 10

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>1,6 x 1,2 x 0,3</b>	
Frequency	26,0MHz to 80,0MHz	
Operating Temperature	-40°C to +85°C	
Frequency Tolerance at 25°C	± 30 ppm	
Frequency Stability at -40°C to +85°C	± 50 ppm	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	8 pF	
Shunt Capacitance (C0)	2,0pF typ.	
Series Resonance (R1)	26,0MHz ~ 31,99MHz	150 Ohm
	32,0MHz ~ 37,99MHz	100 Ohm
	38,0MHz ~ 80,0MHz	80 Ohm
Drive Level μW max.	200	
Aging (df/F) first year at 25°C	± 3 ppm	
Reflow Condition	10 seconds at +260°C max.	
Contents Of Reel	3000pcs	
Part Number		

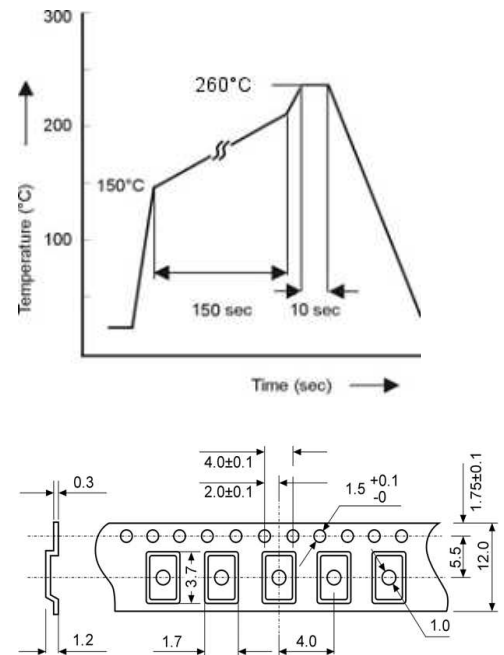
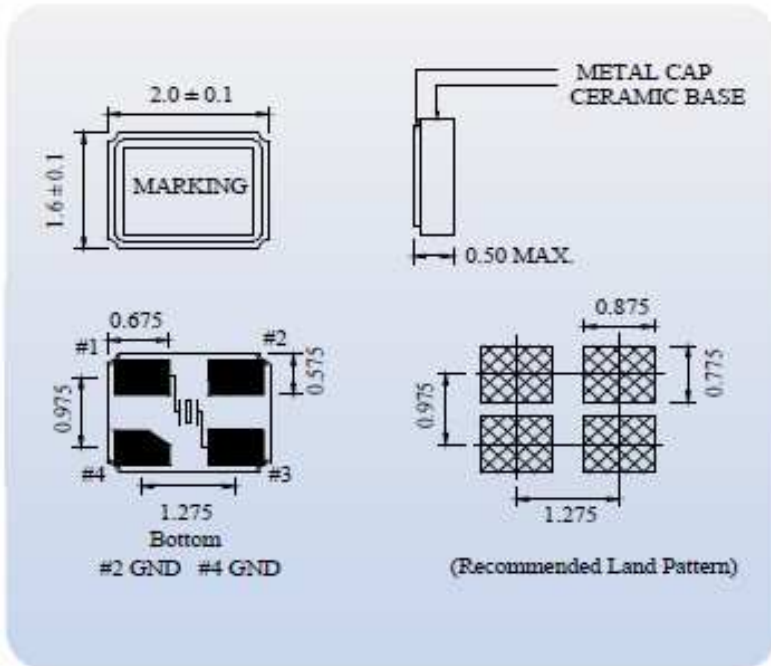




# IC 11

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>2,1 x 1,7 x 0,5</b>	
Frequency	24,0MHz to 50,0MHz	
Operating Temperature	-40°C to +85°C	
Frequency Tolerance at 25°C	± 30 ppm	
Frequency Stability at -40°C to +85°C	± 50 ppm	
Storage Temperature	-55°C to +125°C	
Load Capacitance (CL)	8 pF	
Shunt Capacitance (C0)	2,0pF typ.	
Series Resonance (R1)	24,0MHz ~ 29,99MHz	100 Ohm
	30,0MHz ~ 37,99MHz	80 Ohm
	38,0MHz ~ 50,0MHz	60 Ohm
Drive Level μW max.	50	
Aging (df/F) first year at 25°C	± 3 ppm	
Reflow Condition	10 seconds at +260°C max.	
Contents Of Reel	3000pcs	
Part Number		

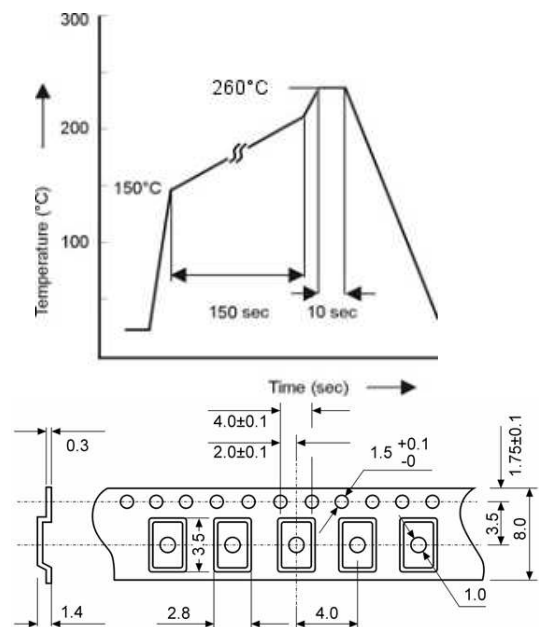
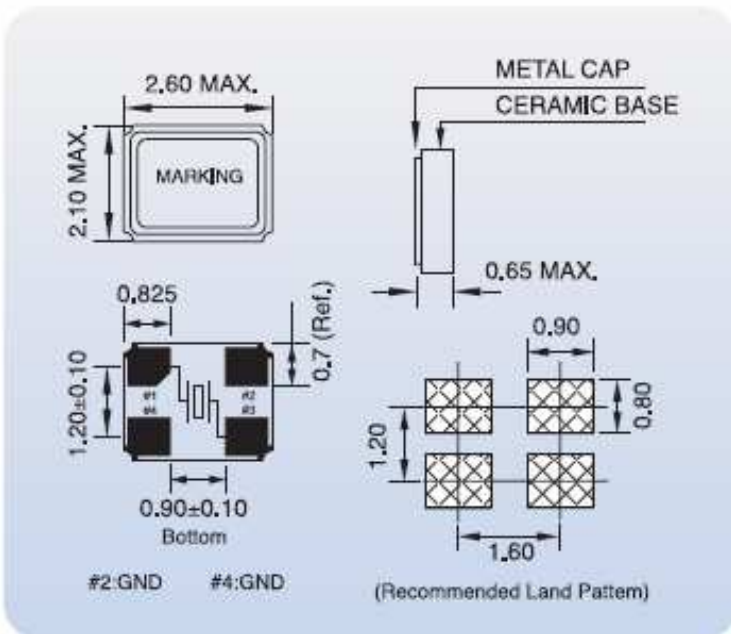




# IC 12

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>2,6 x 2,1 x 0,65</b>
Frequency	16,0 MHz to 80,0 MHz
Operating Temperature	-40°C to +85°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	10,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	16,0 ~ 30,0 MHz 100 Ohm 30,1 ~ 80,0 MHz 80 Ohm
Drive Level µW max.	50 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

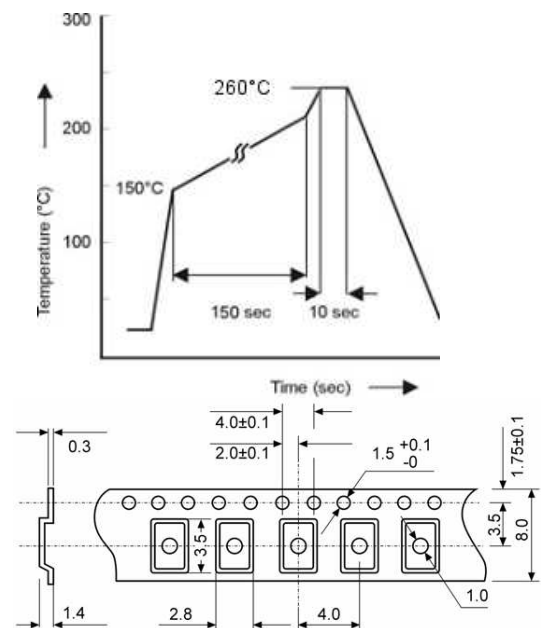
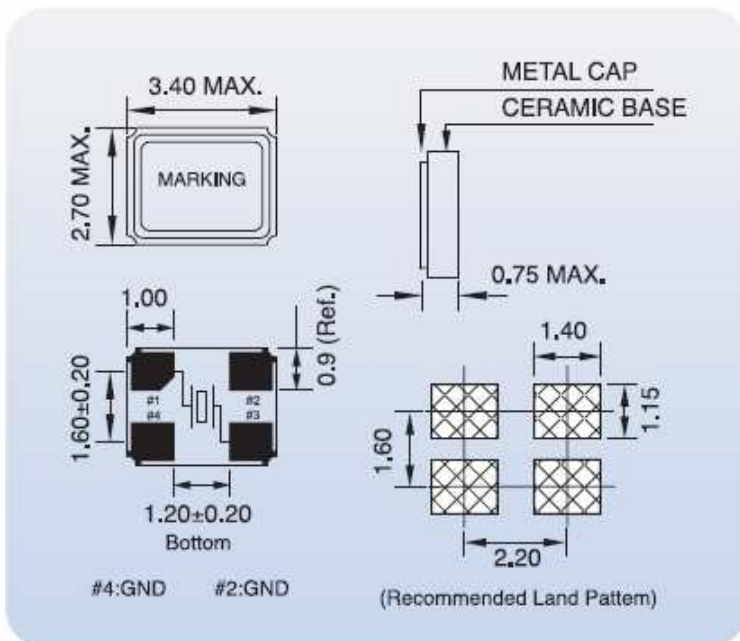




# IC 13

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>3,4 x 2,7 x 0,75</b>
Frequency	10,0 MHz to 125,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	10,0 ~ 12,0 MHz 100 Ohm 12,001 ~ 16,0 MHz 80 Ohm 16,001 ~ 25,0 MHz 60 Ohm 25,001 ~ 50,0 MHz 40 Ohm 50,001 ~ 125,0 MHz 80 Ohm (3 <sup>rd</sup> OT)
Drive Level µW max.	50 max.
Aging (df/F) first year at 25°C	± 5 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

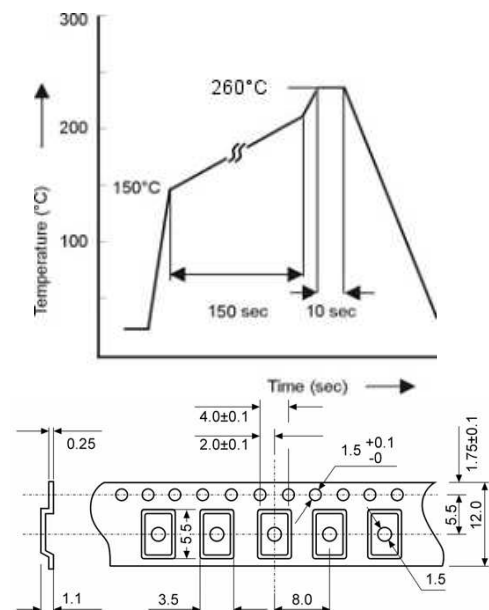
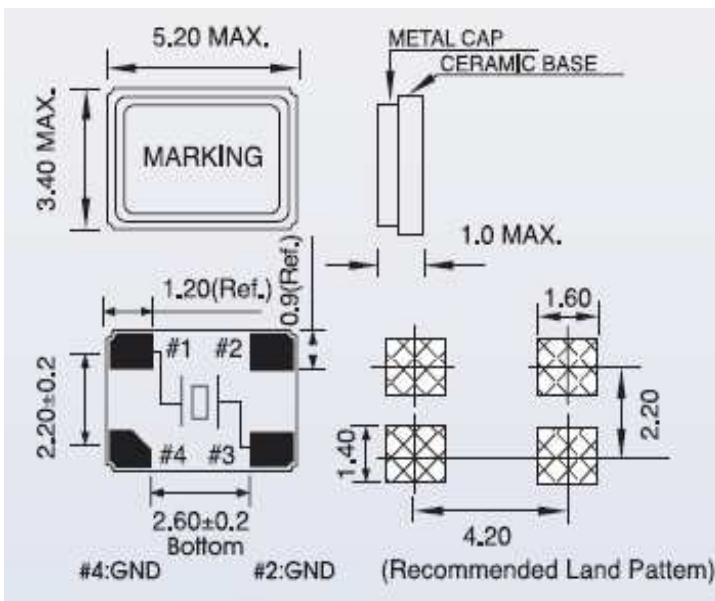




# IC 14

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>5,2 x 3,4 x 1,0</b>
Frequency	8,0 MHz to 250,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	10,0 ~ 12,0 MHz 100 Ohm 12,001 ~ 16,0 MHz 80 Ohm 16,001 ~ 25,0 MHz 60 Ohm 25,001 ~ 50,0 MHz 40 Ohm 50,001 ~ 125,0 MHz 80 Ohm (3 <sup>rd</sup> OT) 125,001 ~ 250,0 MHz 80 Ohm (5 <sup>th</sup> OT)
Drive Level µW max.	50 max.
Aging (df/F) first year at 25°C	± 2 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

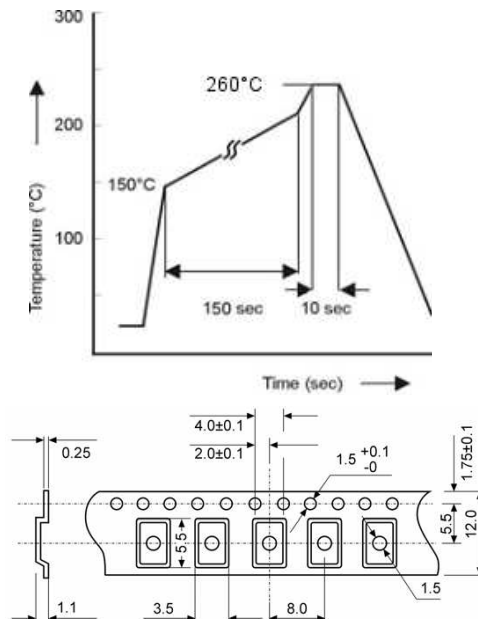
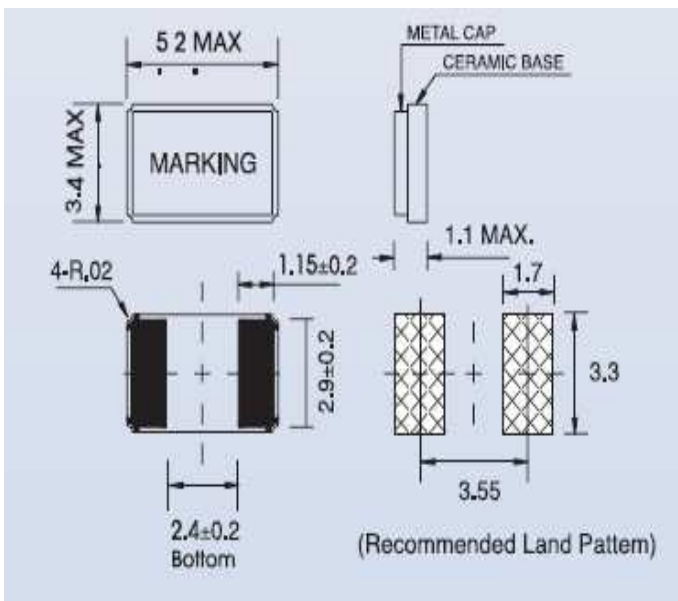




# IC 15

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>5,2 x 3,4 x 1,1</b>
Frequency	8,0 MHz to 52,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	10,0 ~ 12,0 MHz 100 Ohm 12,001 ~ 16,0 MHz 80 Ohm 16,001 ~ 25,0 MHz 60 Ohm 25,001 ~ 50,0 MHz 40 Ohm 50,001 ~ 125,0 MHz 80 Ohm (3 <sup>rd</sup> OT) 125,001 ~ 250,0 MHz 80 Ohm (5 <sup>th</sup> OT)
Drive Level µW max.	50 max.
Aging (df/F) first year at 25°C	± 2 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

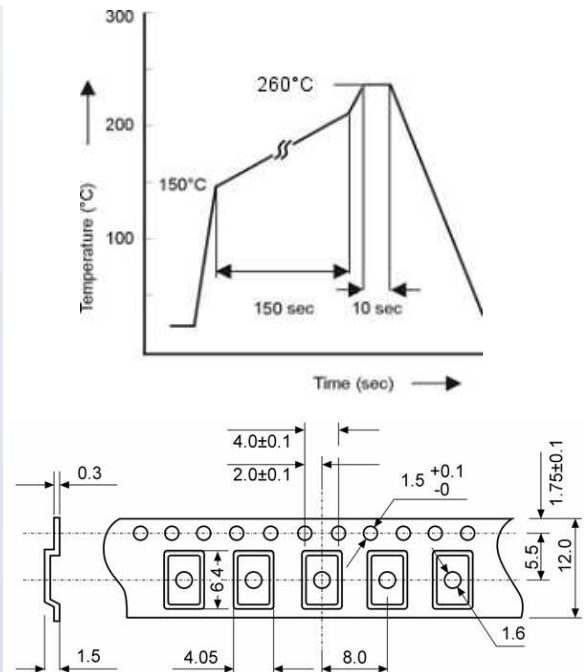
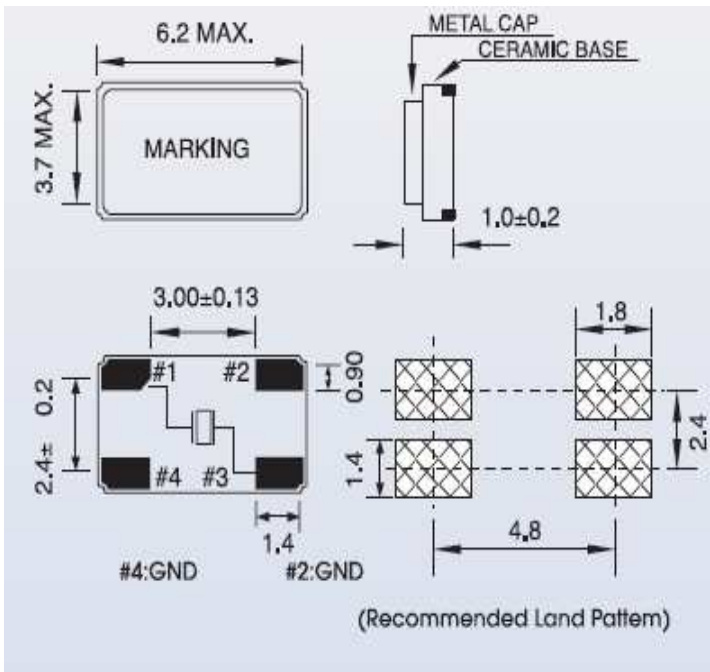




# IC 16

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>6,2 x 3,7 x 1,2</b>
Frequency	8,0 MHz to 150,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	8,0 ~ 12,0 MHz 80 Ohm 12,001 ~ 80,0 MHz 50 Ohm 80,001 ~ 150,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level μW max.	100 max.
Aging (df/F) first year at 25°C	± 2 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

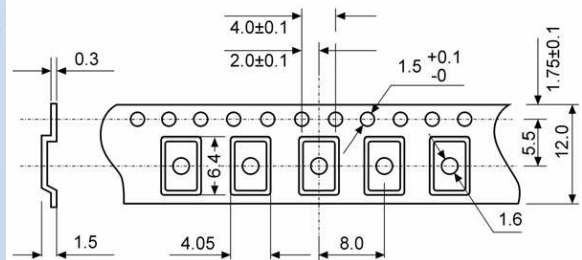
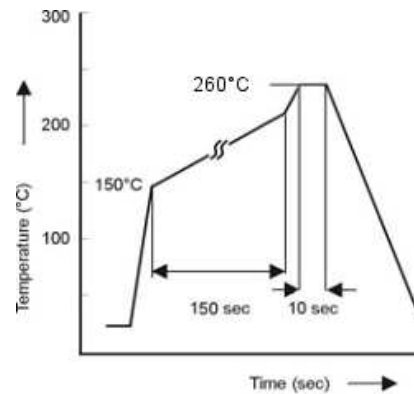
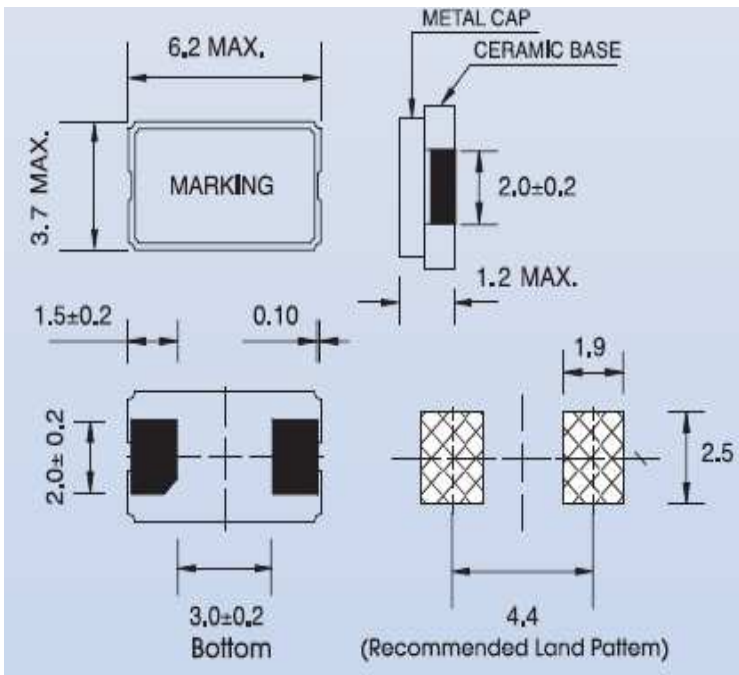




# IC 17

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>6,2 x 3,7 x 1,2</b>
Frequency	8,0 MHz to 150,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	8,0 ~ 12,0 MHz 80 Ohm 12,001 ~ 80,0 MHz 50 Ohm 80,001 ~ 150,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level μW max.	100 max.
Aging (df/F) first year at 25°C	± 2 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

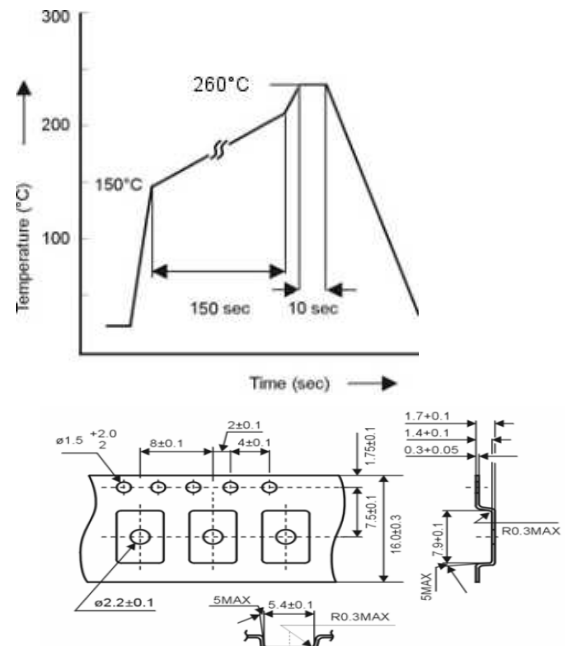
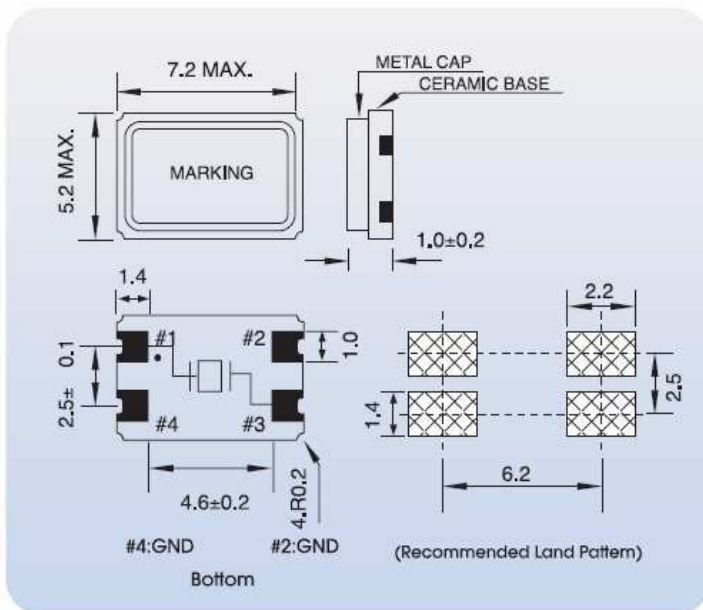




# IC 18

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>7,2 x 5,2 x 1,2</b>
Frequency	6,0 MHz to 150,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	6,000 ~ 8,0 MHz 80 Ohm 8,001 ~ 12,0 MHz 60 Ohm 12,001 ~ 20,0 MHz 40 Ohm 20,001 ~ 50,0 MHz 30 Ohm 50,001 ~ 125,0 MHz 60 Ohm (3 <sup>rd</sup> OT) 125,001 ~ 160,0 MHz 120 Ohm (5 <sup>th</sup> OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Part Number	

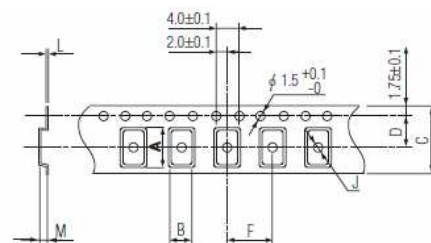
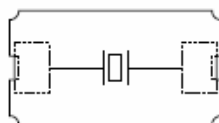
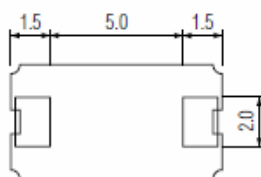
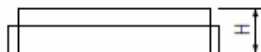
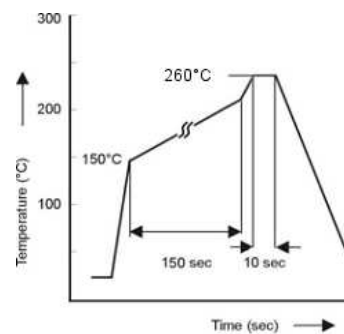
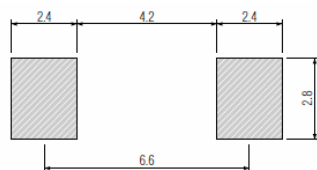
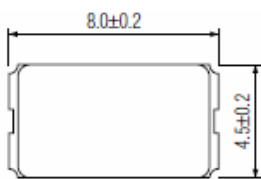




# IC 19

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>8,2 x 4,7 x 1,6</b>
Frequency	4,0 MHz to 50,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 50 ppm
Frequency Stability at -40°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	4,0 ~ 4,99 MHz 300 Ohm 5,0 ~ 7,99 MHz 250 Ohm 8,0 ~ 9,49 MHz 200 Ohm 9,5 ~ 9,99 MHz 120 Ohm 10,0 ~ 11,99 MHz 100 Ohm 12,0 ~ 12,99 MHz 80 Ohm 13,0 ~ 48,0 MHz 50 Ohm 49,0 ~ 60,0 MHz 60 Ohm
Reflow Condition	10 seconds at +260°C max.
Contents Of Reel	1000pcs
Drive Level μW max.	100 max.
Aging (df/F) first year at 25°C	± 5 ppm
Part Number	

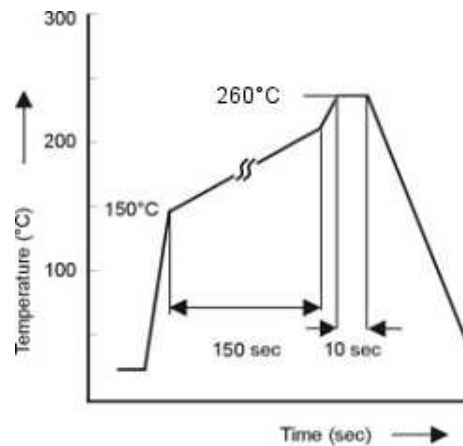
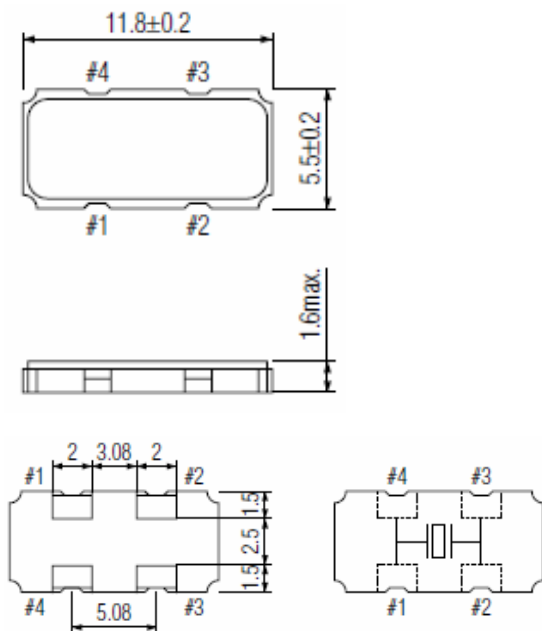




# IC 20

## Quartz Crystal Unit

Dimensions l/w/h in mm (max)	<b>12,0 x 5,7 x 1,6</b>
Frequency	3,579545 MHz to 30,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 50 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	5,0pF max.
Series Resonance (R1)	3,5 ~ 3,9 MHz 150 Ohm 4,0 ~ 5,99 MHz 120 Ohm 6,0 ~ 7,99 MHz 80 Ohm 8,0 ~ 9,99 MHz 60 Ohm 10,0 ~ 45,0 MHz 50 Ohm 45,0 ~ 70,0 MHz 100 Ohm (3OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 5 ppm
Reflow Condition	10 seconds at +260°C max
Contents of reel	2000pcs
Part Number	



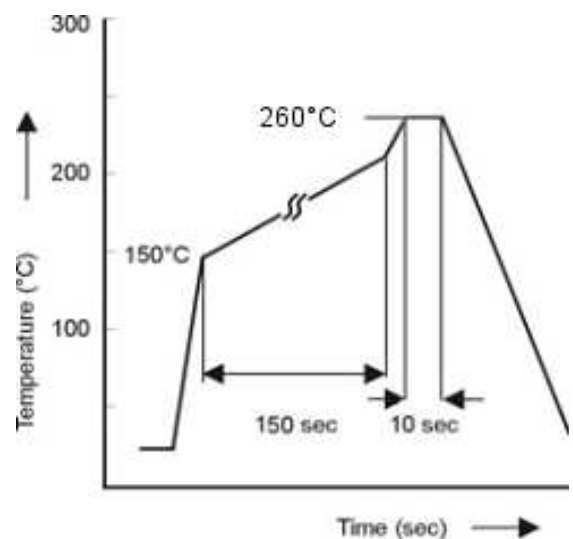
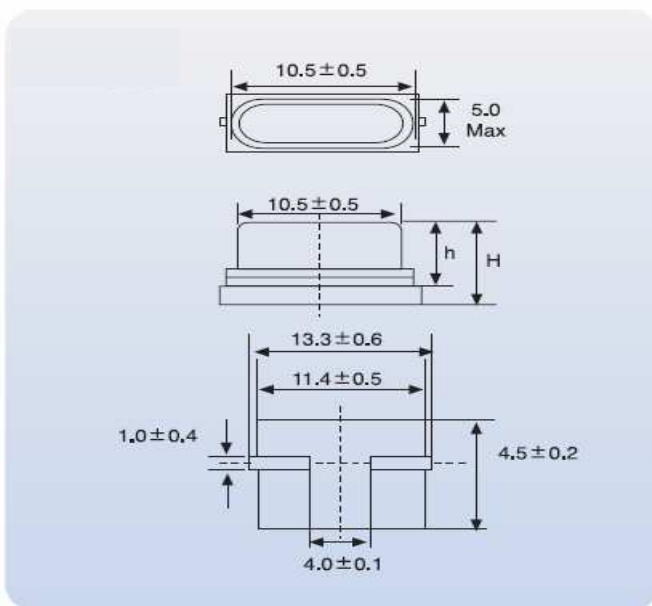


# IC 21

## Quartz Crystal Unit

## HC 49 US

Dimensions l/w/H in mm (max)	<b>13,3 x 5,0 x 4,0</b>
Frequency	3,20 MHz to 70,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	3,2 ~ 4,99 MHz 150 Ohm 5,0 ~ 6,99 MHz 100 Ohm 7,0 ~ 8,99 MHz 80 Ohm 9,0 ~ 12,99 MHz 60 Ohm 13,0 ~ 19,99 MHz 40 Ohm 20,0 ~ 33,0 MHz 30 Ohm 27,0 ~ 70,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max
Contents of reel	1000pcs
Part Number	



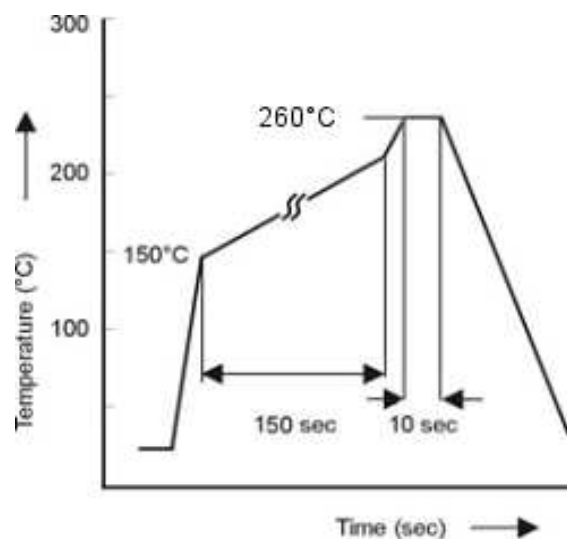
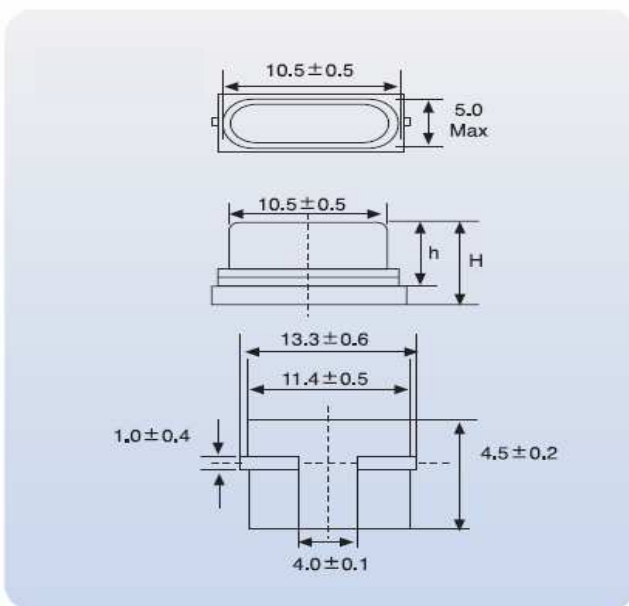


# IC 22

## Quartz Crystal Unit

## HC 49 US

Dimensions l/w/H in mm (max)	<b>13,3 x 5,0 x 3,0</b>
Frequency	3,20 MHz to 70,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	3,2 ~ 4,99 MHz 150 Ohm 5,0 ~ 6,99 MHz 100 Ohm 7,0 ~ 8,99 MHz 80 Ohm 9,0 ~ 12,99 MHz 60 Ohm 13,0 ~ 19,99 MHz 40 Ohm 20,0 ~ 33,0 MHz 30 Ohm 27,0 ~ 70,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level μW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max
Contents of reel	1000pcs
Part Number	



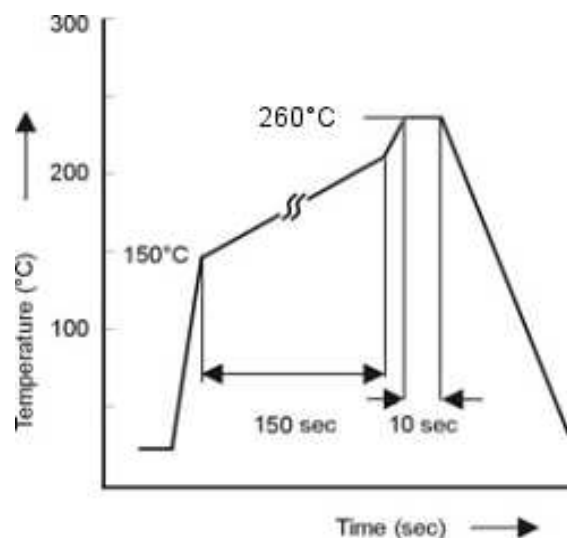
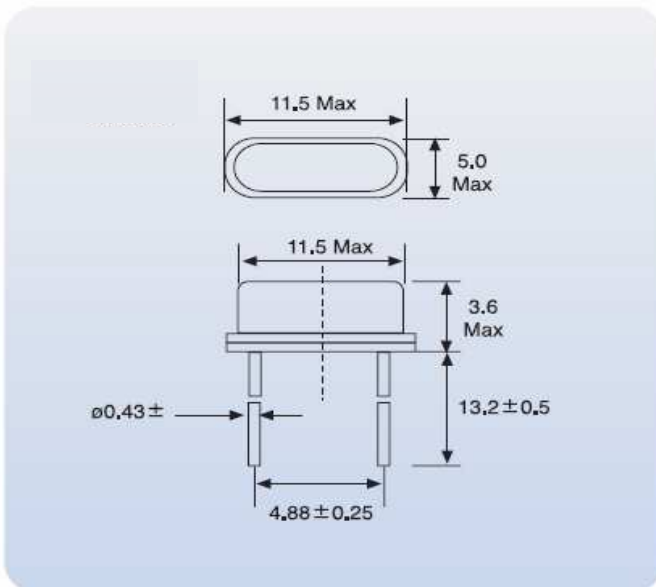


# IC 23

## Quartz Crystal Unit

## HC 49 US Thru-Hole

Dimensions l/w/h in mm (max)	11,5 x 5,0 x 3,6
Frequency	3,20 MHz to 70,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	3,2 ~ 4,99 MHz 150 Ohm 5,0 ~ 6,99 MHz 100 Ohm 7,0 ~ 8,99 MHz 80 Ohm 9,0 ~ 12,99 MHz 60 Ohm 13,0 ~ 19,99 MHz 40 Ohm 20,0 ~ 33,0 MHz 30 Ohm 27,0 ~ 70,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max
Contents of reel	1000pcs
Part Number	



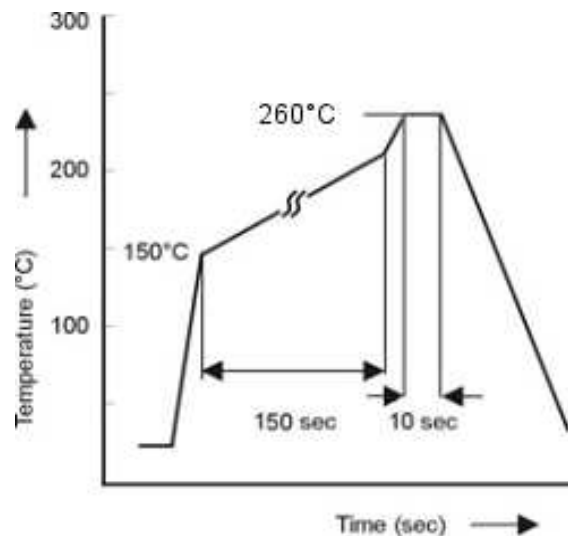
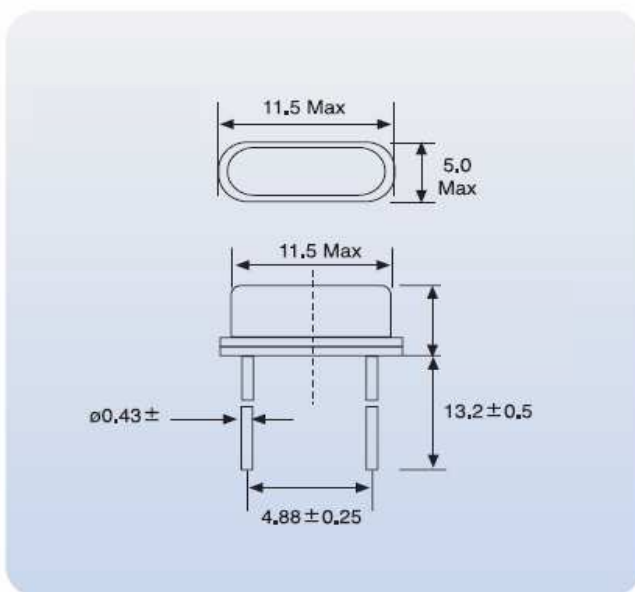


# IC 24

## Quartz Crystal Unit

## HC 49US Thru-Hole Ultra Low

Dimensions l/w/h in mm (max)	11,5 x 5,0 x 2,8
Frequency	3,20 MHz to 70,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	3,2 ~ 4,99 MHz 150 Ohm 5,0 ~ 6,99 MHz 100 Ohm 7,0 ~ 8,99 MHz 80 Ohm 9,0 ~ 12,99 MHz 60 Ohm 13,0 ~ 19,99 MHz 40 Ohm 20,0 ~ 33,0 MHz 30 Ohm 27,0 ~ 70,0 MHz 100 Ohm (3 <sup>rd</sup> OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max
Contents of reel	1000pcs
Part Number	



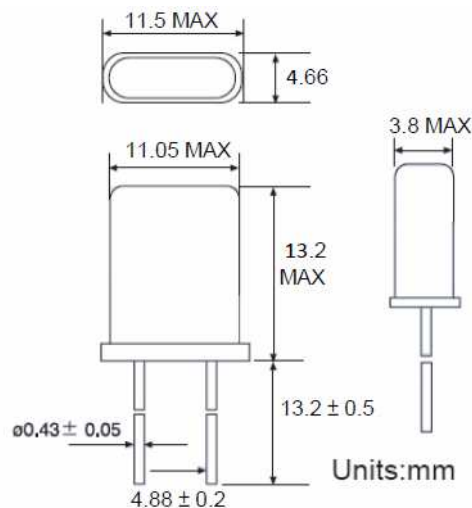


# IC 25

## Quartz Crystal Unit

## HC 49U Thru-Hole

Dimensions l/w/h in mm (max)	<b>11,5 x 4,6 x 13,2</b>
Frequency	1,80 MHz to 150,0 MHz
Operating Temperature	-40°C to +105°C
Frequency Tolerance at 25°C	± 30 ppm
Frequency Stability at -20°C to +70°C	± 50 ppm
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	16,0 pF
Shunt Capacitance (C0)	7,0pF max.
Series Resonance (R1)	1,8 ~ 1,99 MHz 750 Ohm 2,0 ~ 2,399 MHz 500 Ohm 2,4 ~ 3,1999 MHz 300 Ohm 3,2 ~ 4,199 MHz 100 Ohm 4,200 ~ 4,899 MHz 70 Ohm 6,00 ~ 9,999 MHz 40 Ohm 10,00 ~ 15,999 MHz 30 Ohm 16,00 ~ 35,0 MHz 20 Ohm 20,00 ~ 24,999 MHz 60 Ohm (3 <sup>rd</sup> OT) 25,00 ~ 100,00 MHz 40 Ohm (3 <sup>rd</sup> OT) 60,00 ~ 79,999 MHz 80 Ohm (5 <sup>th</sup> OT) 80,00 ~ 150,00 MHz 60 Ohm (5 <sup>th</sup> OT)
Drive Level µW max.	100 max.
Aging (df/F) first year at 25°C	± 3 ppm
Reflow Condition	10 seconds at +260°C max
Part Number	





# IC 26

## Quartz Crystal Unit

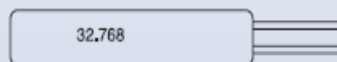
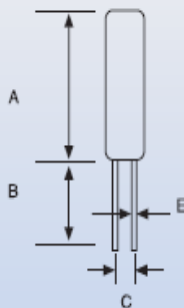
## KHz Range Thru-Hole

Dimensions l/d in mm (max)	<b>8,3 x 3,1</b>
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	-20°C to +70°C
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability over Temperature	-0.042ppm / °C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	1,25pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm(Max.)
Drive Level µW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm
Part Number	

A	B	C	D	E
8.2 Max	10 Min.	1,3 Max.	3,1 Max.	ø0,35

AS308

• Marking Rule





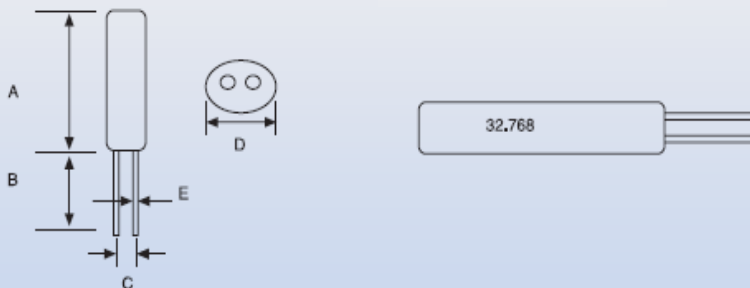
# IC 27

## Quartz Crystal Unit

## KHz Range Thru-Hole

Dimensions l/d in mm (max)	6,2 x 2,1
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	-20°C to +70°C
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability over Temperature	-0.042ppm / °C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	1,25pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm(Max.)
Drive Level μW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm
Part Number	

A	B	C	D	E
6.2 Max.	6 Min.	0,7 Max.	2,1 Max.	ø0,26





# IC 28

## Quartz Crystal Unit

## KHz Range SMD

Dimensions l/d in mm (max)	6,5 x 2,2
Frequency	20,0 KHz to 200,0 KHz
Operating Temperature	-20°C to +70°C
Frequency Tolerance at 25°C	± 20 ppm
Frequency Stability over Temperature	-0.042ppm / °C <sup>2</sup> typ.
Storage Temperature	-55°C to +125°C
Load Capacitance (CL)	12,5 pF
Shunt Capacitance (C0)	1,25pF typ.
Series Resonance (R1)	35 KOhm (Typ.) / 50 KOhm(Max.)
Drive Level μW max.	1,0 max.
Aging (df/F) first year at 25°C	± 3 ppm
Part Number	

A	B	C	D	E	F
6.5 Max.	2.3 Min	0,9 Max,	2,2 Max,	ø0,23	2.7 Max.

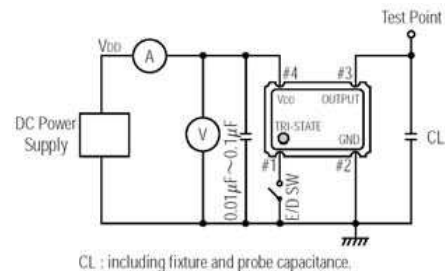
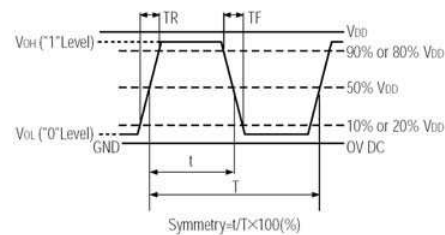
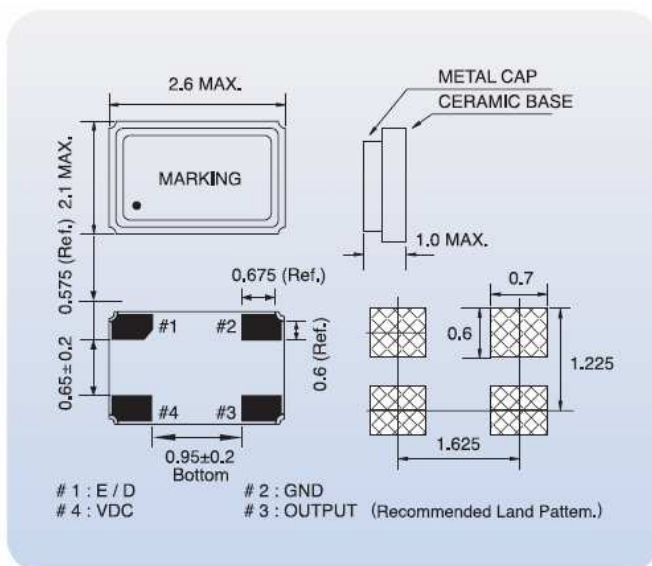




# IO 10

## Clock Oscillator 2,5V

Dimensions l/w/h (max)	<b>2,6mm x 2,1mm x 1,0mm</b>
Frequency range	2,0 MHz to 50,0 MHz
Operating Temperature	-40°C to +85°C
Frequency Stability at -20°C ~ +70°C	± 50 ppm
Power supply voltage	+2,5V
Storage Temperature	-55°C to +125°C
Output level	CMOS
Output symmetry	40-60% (45-55% avail.) at 50%VDD
Rise & Fall Time	1,99 to 19,99MHz 7nS 20,0 to 50,0MHz 6nS
Input current max.	1,0 to 1,99 MHz 6mA 10,0 TO 31,99 MHz 8mA 32,0 to 50,0 MHz 20mA
Output load	15pF
Standby current	50µA
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max
Aging	±2ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	

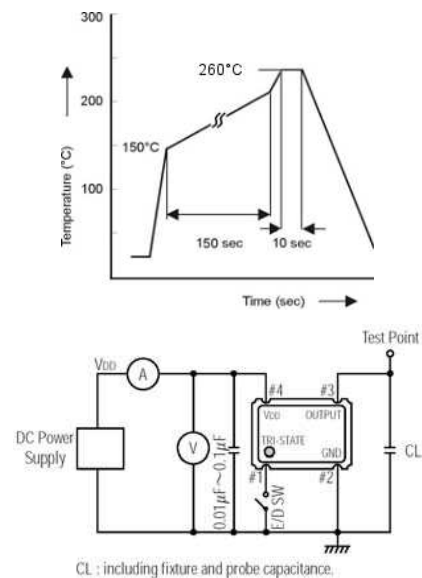
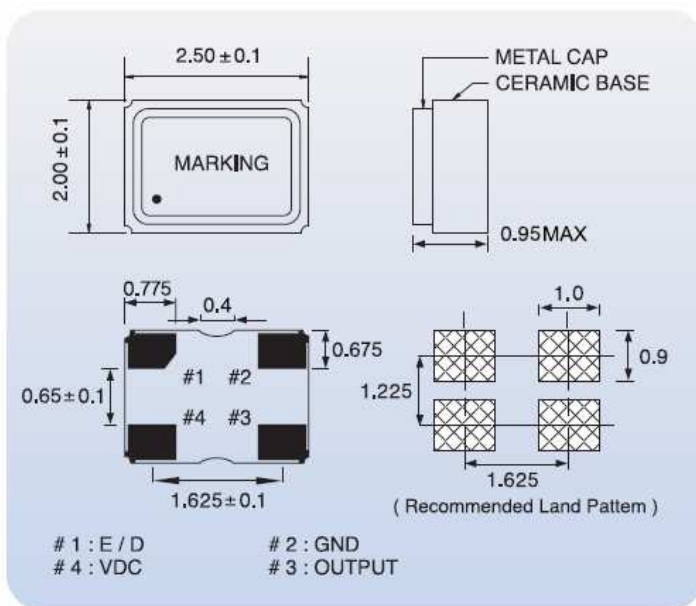




# IO 11

## Clock Oscillator 1,8V/2,5V/3,3V 32,768KHz

Dimensions l/w/h (max)	<b>2,5mm x 2,0mm x 0,9mm</b>		
Frequency	32,768 KHz		
Operating Temperature	-40°C to ~ 85°C		
Frequency Stability at -20°C ~ +70°C	± 50 ppm		
Rise & Fall time	50nS		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% (45-55% avail.) at 50%VDD		
Power supply voltage	+1,8V	+2,5V	+3,3V
Input current	1,5mA	2,5mA	3,5mA
Standby current	50µA		
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			

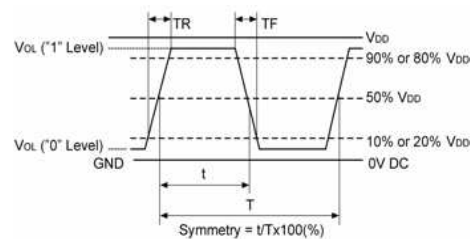
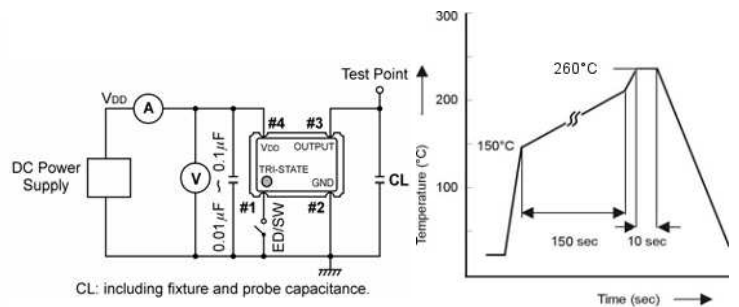
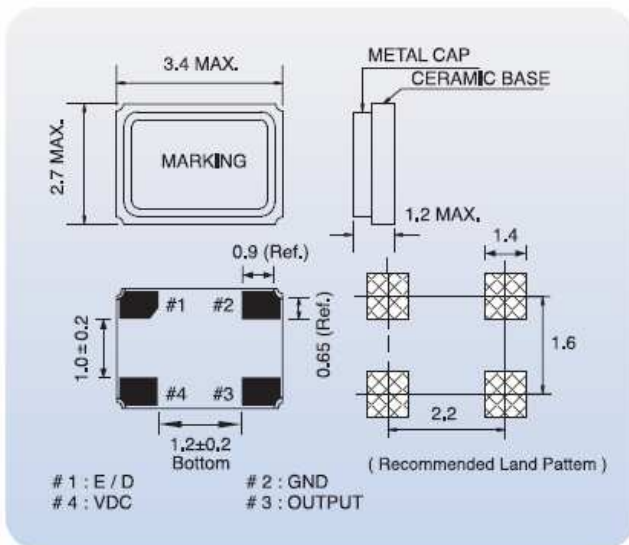




# IO 12

## Clock Oscillator

Dimensions l/w/h (max)	<b>3,4mm x 2,7mm x 1,2mm</b>	
Frequency range	2,0 MHz to 50,0 MHz	
Operating Temperature	-40°C to ~ 85°C	
Frequency Stability at -20°C ~ +70°C	± 50 ppm	
Rise & Fall time	5nS	
Storage Temperature	-55°C to +125°C	
Output level	CMOS	
Output symmetry	40-60% (45-55% avail.) at 50%VDD	
Power supply voltage	+1,8V/+2,5V/+3,3V ±5%	
Input current	1,0 ~ 9,99MHz	5mA
	10,0 ~ 31,99MHz	8,0mA
	32,0 ~ 50,0MHz	15mA
Standby current	50µA	
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max	
Aging	±3ppm	
Reflow condition	10 seconds at +260°C max.	
Contents of reel	1000pcs	
Part Number		



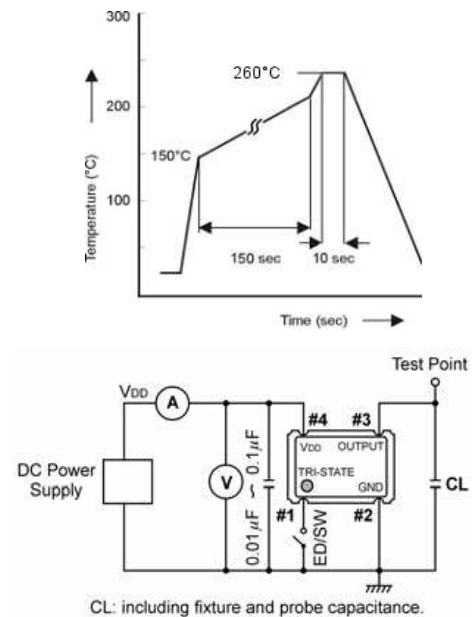
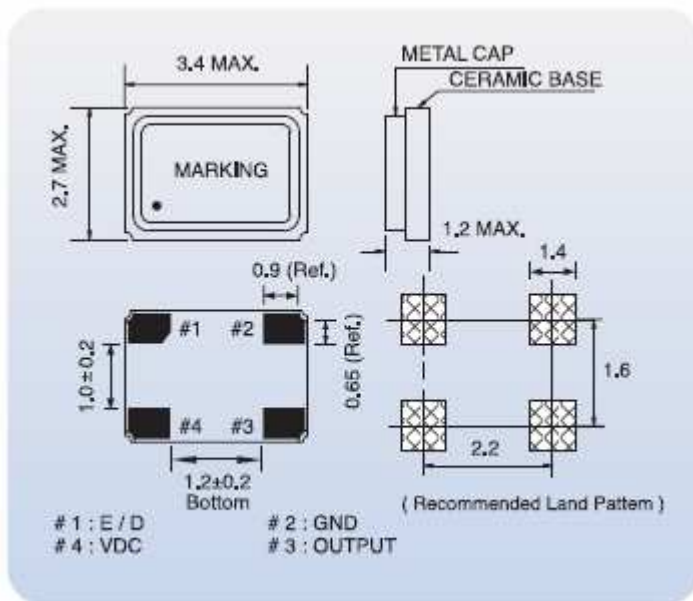


# IO 13

## Clock Oscillator 1,8V/2,5V/3,3V

## 32,768KHz

Dimensions l/w/h (max)	3,4mm x 2,7mm x 1,2mm		
Frequency	32,768 KHz		
Operating Temperature	-40°C to ~ 85°C		
Frequency Stability at -20°C ~ +70°C	± 50 ppm		
Rise & Fall time	50nS		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% (45-55% avail.) at 50%VDD		
Power supply voltage	+1,8V	+2,5V	+3,3V
Input current	1,5mA	2,5mA	3,5mA
Standby current	50µA		
Tristate controlvoltage	VIH: VDD x 0,7min VIL: VDD x 0,3 max		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			

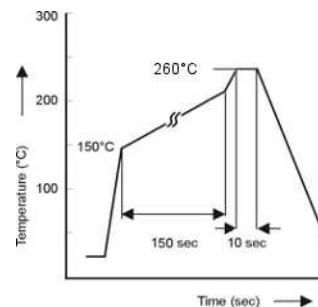
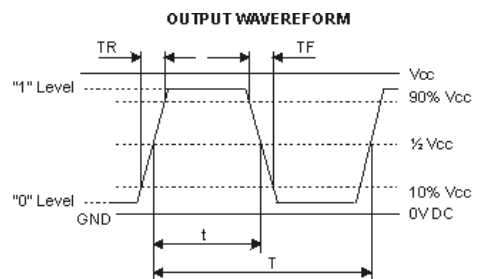
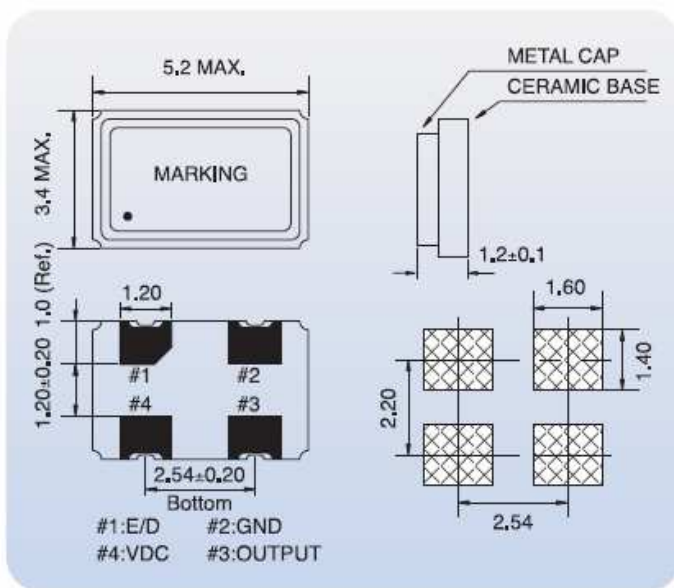




# IO 14

## Clock Oscillator 1,8V/2,5V/3,3V

Dimensions l/w/h (max)	<b>5,2mm x 3,4mm x 1,2mm</b>	
Frequency range	0,5 MHz to 156,0 MHz	
Operating Temperature	-40°C to +85°C	
Frequency Stability at -20°C ~ +70°C	± 50 ppm	
Power supply voltage	+1,8V/+2,5V/+3,3V	
Storage Temperature	-55°C to +125°C	
Output level	CMOS	
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD	
Rise & Fall Time	0,5 to 79,99MHz 5nS 80,0 to 156,0MHz 3nS	
Input current max.	0,5 to 31,99 MHz	8mA
	32,0 to 79,99 MHz	20mA
	80,0 to 156,0 MHz	30mA
Output load	15pF	
Standby current	10µA max.	
Tristate	Yes	
Aging	±3ppm	
Reflow condition	10 seconds at +260°C max.	
Contents of reel	1000pcs	
Part Number		



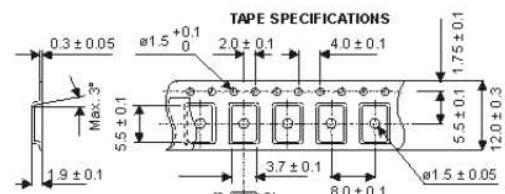
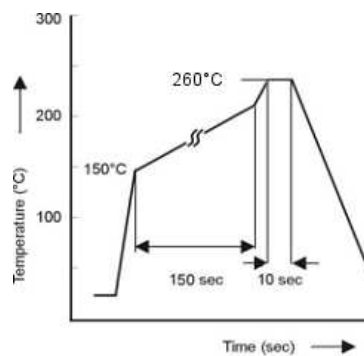
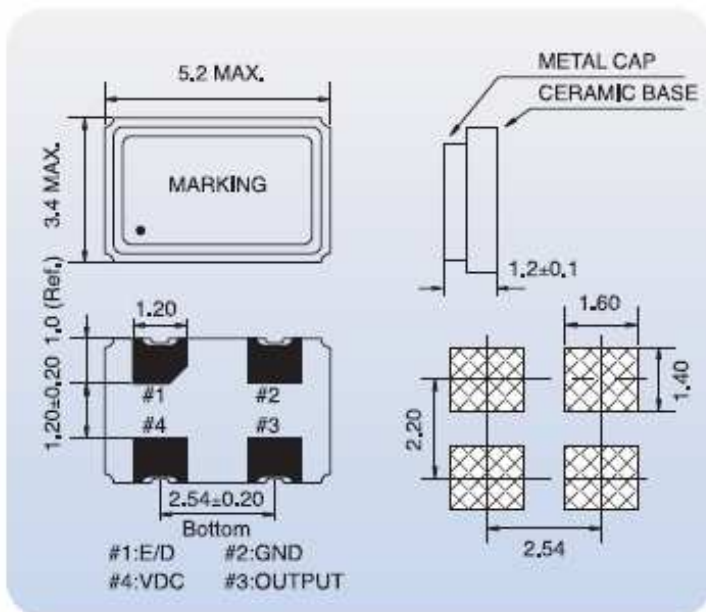


# IO 15

## Clock Oscillator 3,3V

## 32,768KHz

Dimensions l/w/h (max)	5,2mm x 3,4mm x 1,2mm
Frequency range	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Stability at -20°C ~ +70°C	± 50 ppm
Power supply voltage	+3,3V ±10%
Storage Temperature	-55°C to +125°C
Output level	CMOS
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD
Rise & Fall Time	200nS
Input current max.	1,0mA
Output load	15pF
Standby current	10µA max.
Tristate	Yes
Aging	±3ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	

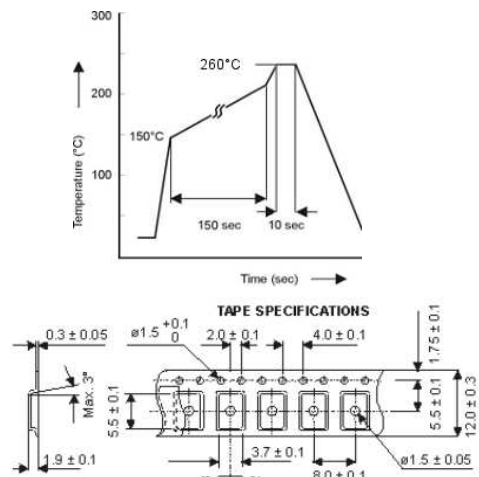
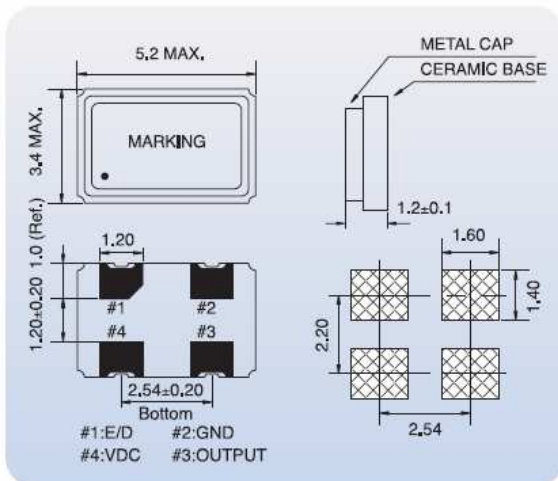




# IO 16

## Clock Oscillator 5,0V

Dimensions l/w/h (max)	<b>5,2mm x 3,4mm x 1,2mm</b>		
Frequency range	0,5 MHz to 156,0 MHz		
Operating Temperature	-40°C to +85°C		
Frequency Stability at -20°C ~ +70°C	± 50 ppm		
Power supply voltage	+5,0V		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		TTL
Output symmetry	40-60% at 50%VDD		40-60% at 1,4VDC
Rise & Fall Time	0,5 -31,99MHz	10nS	10nS
	32,0-99,99MHz	6nS	5nS
	100-156MHz	4nS	4nS
Input current max.	0,5 -9,99MHz	10mA	15mA
	10,0-19,99MHz	15mA	20mA
	20,0-31,99MHz	25mA	30mA
	32,0-49,99MHz	35mA	40mA
	50,0-79,99MHz	50mA	50mA
	80,0-99,99MHz	60mA	60mA
	100,0 -156,0 MHz	80mA	80mA
Tristate	Yes		
Output load	15pF		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



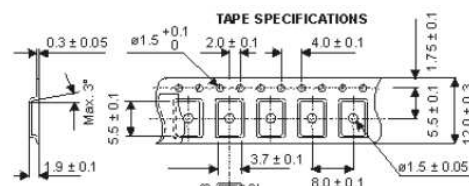
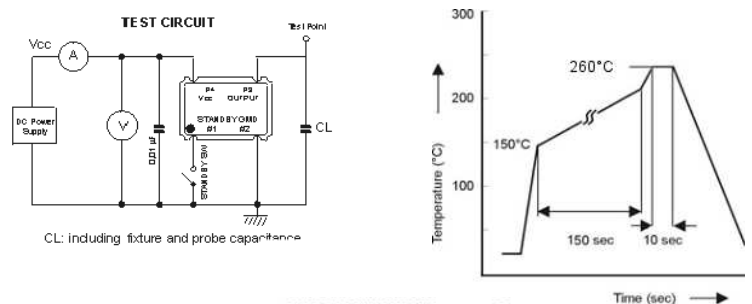
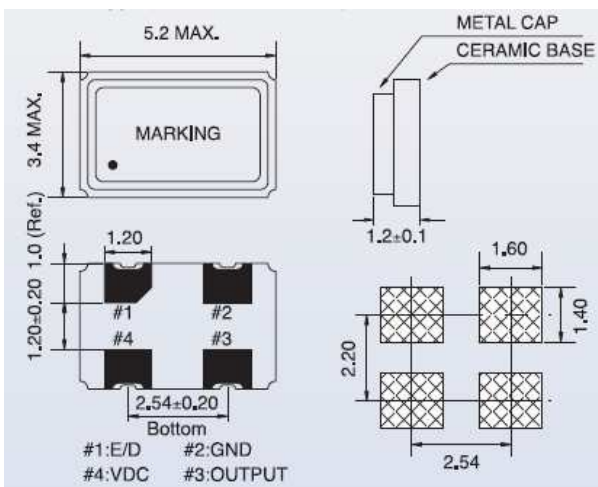


# IO 17

## Clock Oscillator 2,5V/3,3V

## LOW EMI

Dimensions l/w/h (max)	<b>5,0mm x 3,2mm x 1,2mm</b>		
Frequency range	13,0MHz to 160,0MHz		
Operating temperature	-40°C to +85°C		
Frequency stability at -20°C ~ +70°C	± 50 ppm		
Storage temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% at 50%VDD		
Power supply voltage	+2,5V±10%		+3,3V±10%
Rise & Fall Time	13,0 -49,99MHz	5nS	10nS
	50,0-79,99MHz	4nS	8nS
	80,0-99,99MHz	3nS	5nS
	100,0 -160MHz	3nS	4nS
Input current max.	13,0 -49,99MHz	20mA	20mA
	50,0-79,99MHz	20mA	25mA
	80,0-91,99MHz	25mA	30mA
	100,0-160,0MHz	30mA	40mA
Output load	15pF		
Tristate	yes		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



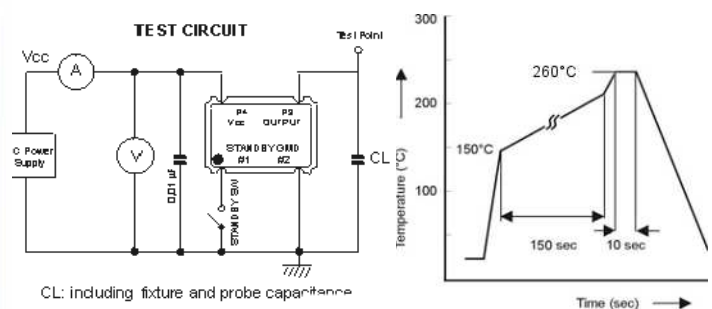
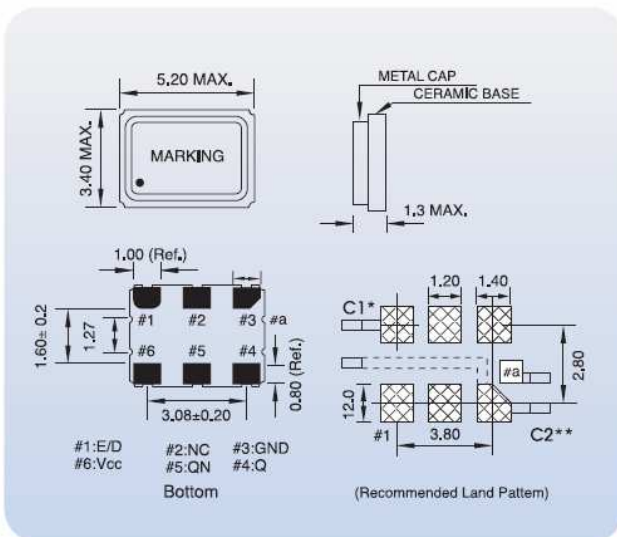


# IO 18

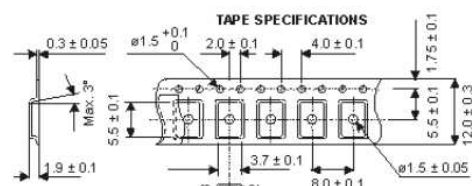
## Clock Oscillator 2,5V/3,3V

## LVPECL

Dimensions l/w/h (max)	5,2mm x 3,4mm x 1,3mm		
Frequency range	40,0MHz to 160,0MHz		
Operating temperature	-40°C to +85°C		
Frequency stability at -20°C ~ +70°C	± 50 ppm		
Storage temperature	-55°C to +125°C		
Output load	50 Ohm		
Output symmetry	45-55% at 50%VDD		
Power supply voltage	+2,5V ±5%		+3,3V ±10%
Rise & Fall Time 20%/80%	40,0 -100,99MHz	1nS	1nS
	101,0-160,00MHz	0,5nS	0,5nS
Input current max.	25,0 -100,99MHz	60mA	60mA
	101,0-160,00MHz	65mA	65mA
Output Voltage High (VOH)	1,475 Vmin		2,275 Vmin
Output Voltage Low (VOL)	1,095 Vmax		1,680 Vmax
Enable High Input Voltage	1,75 Vmin		2,31 Vmin
Tristate	Yes		
Enable Low Input Voltage	0,72 Vmax		0,99 Vmax
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



CL: including fixture and probe capacitance



RoHS conf./Pb free

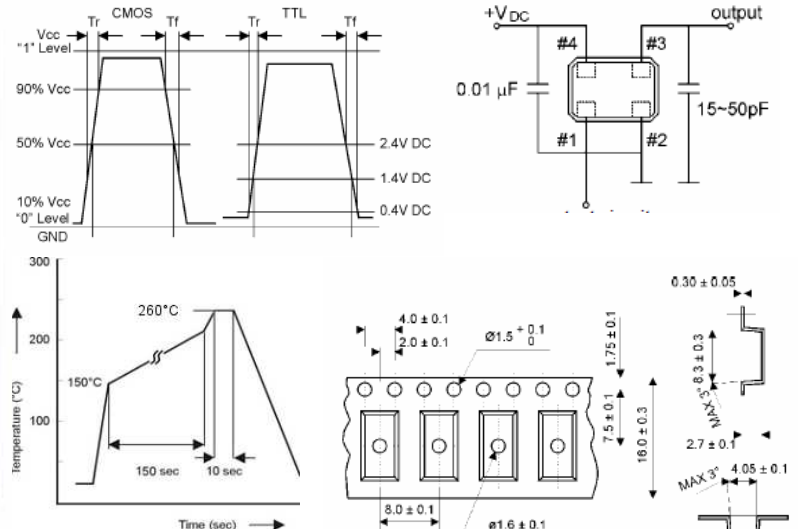
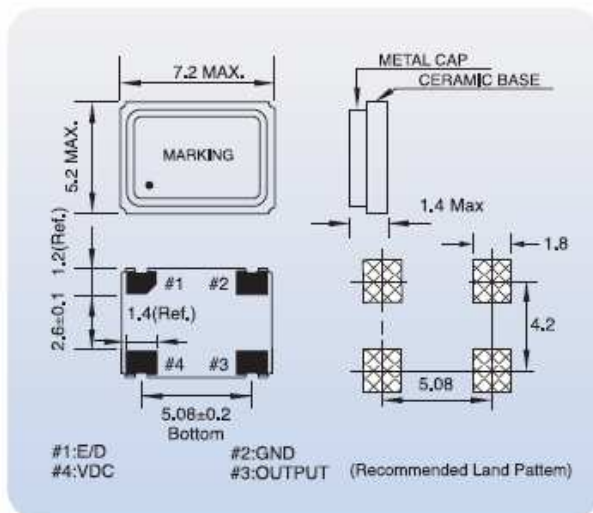




# IO 19

## Clock Oscillator 1,8V/2,5V/3,3V

Dimensions l/w/h (max)	<b>7,2mm x 5,2mm x 1,4mm</b>	
Frequency range	0,5 MHz to 156,0 MHz	
Operating Temperature	-40°C to +85°C	
Frequency Stability at -20°C ~ +70°C	± 50 ppm	
Power supply voltage	+1,8V/+2,5V/+3,3V	
Storage Temperature	-55°C to +125°C	
Output level	CMOS/TTL	
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD	
Rise & Fall Time	0,5 to 79,99MHz	5nS
	80,0 to 156,0MHz	3nS
Input current max.	0,5 to 31,99 MHz	8mA
	32,0 to 79,99 MHz	20mA
	80,0 to 156,0 MHz	30mA
Tristate	Yes	
Output load	15pF	
Standby current	10µA max.	
Aging	±3ppm	
Reflow condition	10 seconds at +260°C max.	
Contents of reel	1000pcs	
Part Number		



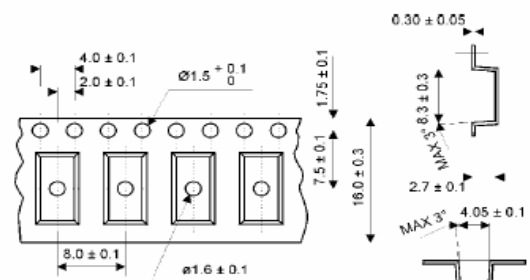
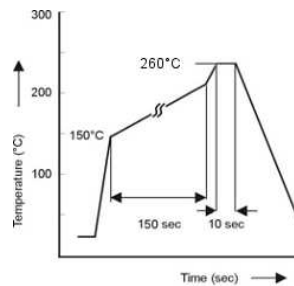
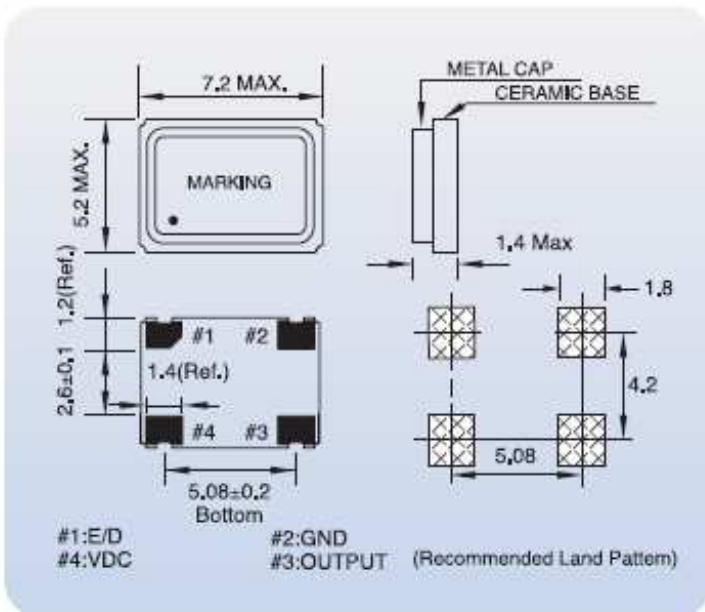


# IO 20

## Clock Oscillator 3,3V

## 32,768KHz

Dimensions l/w/h (max)	7,2mm x 5,2mm x 1,4mm
Frequency range	32,768 KHz
Operating Temperature	-40°C to +85°C
Frequency Stability at -20°C ~ +70°C	± 50 ppm
Power supply voltage	+3,3V ±10%
Storage Temperature	-55°C to +125°C
Output level	CMOS
Output symmetry	40-60% (45-55% avail.) ±10% at 50%VDD
Rise & Fall Time	200nS
Input current max.	1,0mA
Tristate	Yes
Output load	15pF
Standby current	10µA max.
Aging	±3ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	

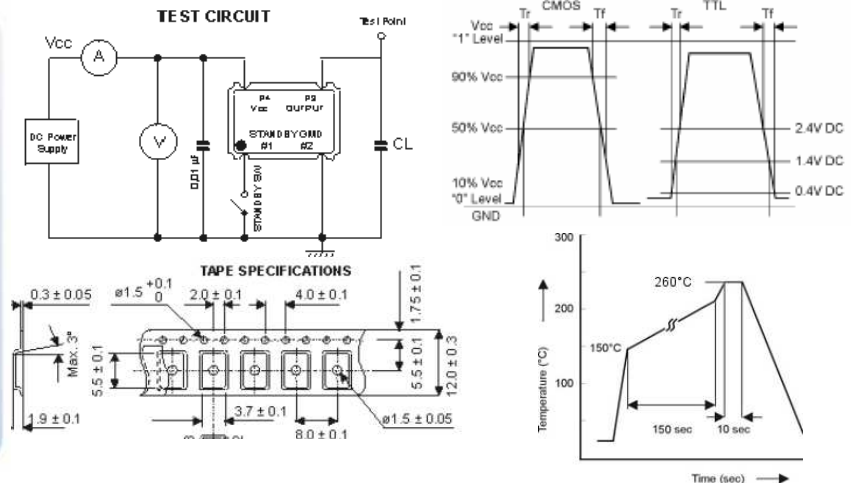
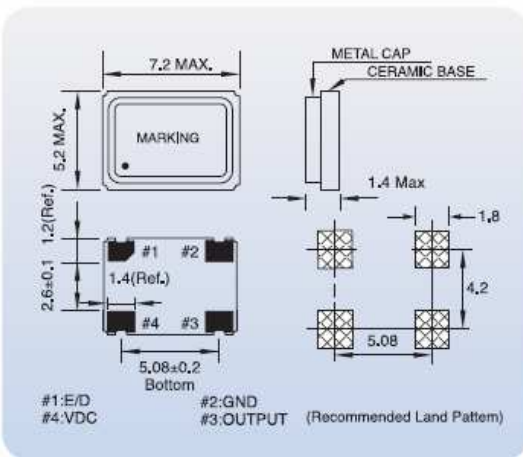




# IO 21

## Clock Oscillator 5,0V

Dimensions l/w/h (max)	<b>7,2mm x 5,2mm x 1,4mm</b>		
Frequency range	0,5 MHz to 156,0 MHz		
Operating Temperature	-40°C to +85°C		
Frequency Stability at -20°C ~ +70°C	± 50 ppm		
Power supply voltage	+5,0V ±10%		
Storage Temperature	-55°C to +125°C		
Output level	CMOS		TTL
Output symmetry	40-60% at 50%VDD		40-60% at 1,4VDC
Rise & Fall Time	0,5 -31,99MHz	10nS	10nS
	32,0-99,99MHz	6nS	5nS
	100-156MHz	4nS	4nS
Input current max.	0,5 -9,99MHZ	10mA	15mA
	10,0-19,99MHz	15mA	20mA
	20,0-31,99MHz	25mA	30mA
	32,0-49,99MHz	35mA	40mA
	50,0-79,99MHz	50mA	50mA
	80,0-99,99MHz	60mA	60mA
	100,0 -156,0 MHZ	80mA	80mA
Output load	15pF		
Tristate	yes		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



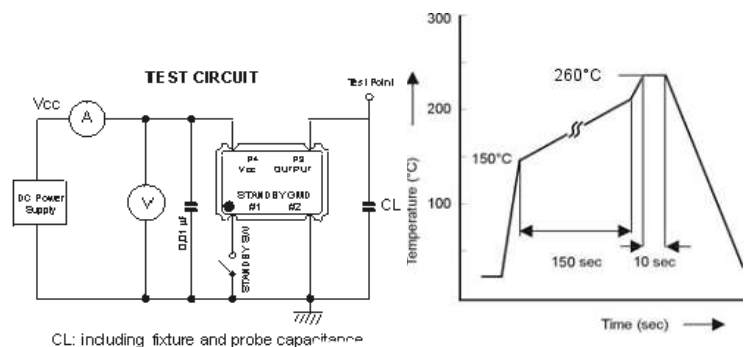
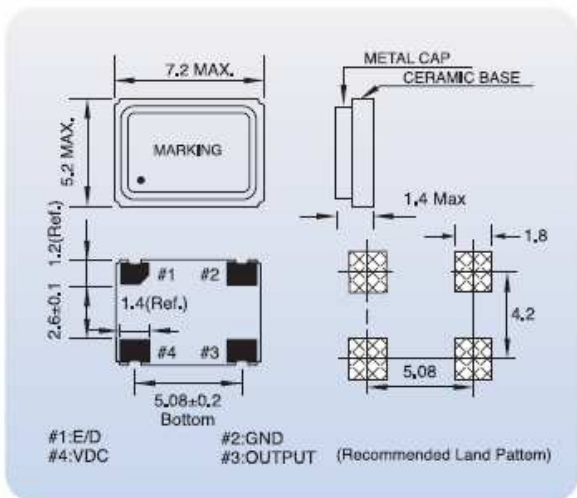


# IO 22

## Clock Oscillator 2,5V/3,3V

## LOW EMI

Dimensions l/w/h (max)	7,2mm x 5,2mm x 1,4mm		
Frequency range	13,0MHz to 160,0MHz		
Operating temperature	-40°C to +85°C		
Frequency stability at -20°C ~ +70°C	± 50 ppm		
Storage temperature	-55°C to +125°C		
Output level	CMOS		
Output symmetry	40-60% at 50%VDD		
Power supply voltage	+2,5V±10%		+3,3V±10%
Rise & Fall Time	13,0 -49,99MHz	5nS	10nS
	50,0-79,99MHz	4nS	8nS
	80,0-99,99MHz	3nS	5nS
	100,0-160MHz	3nS	4nS
Input current max.	13,0 -49,99MHz	20mA	20mA
	50,0-79,99MHz	20mA	25mA
	80,0-91,99MHz	25mA	30mA
	100,0-160,0MHz	30mA	40mA
Output load	15pF		
Tristate	yes		
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



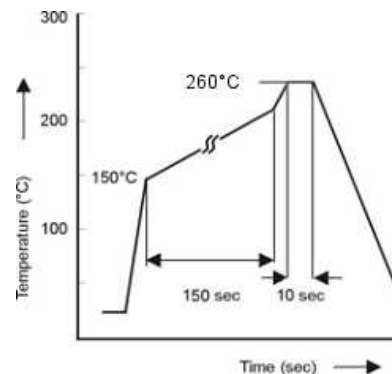
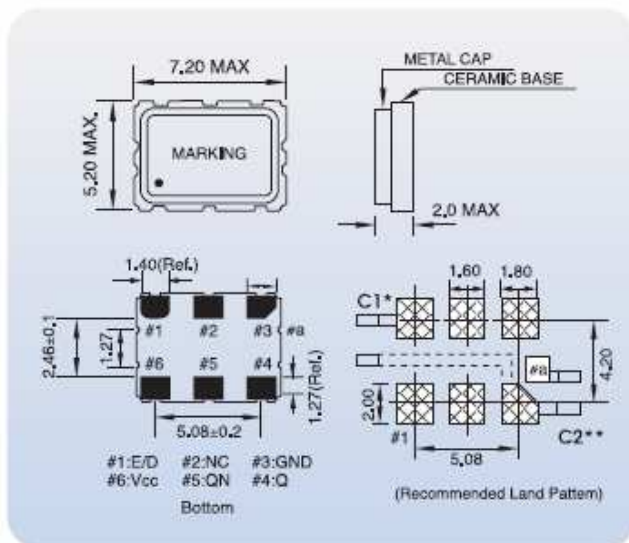


# IO 23

## Clock Oscillator 2,5V/3,3V

## LVPECL

Dimensions l/w/h (max)	<b>7,2mm x 3,2mm x 2,0mm</b>		
Frequency range	25,0MHz to 800,0MHz		
Operating temperature	-40°C to +85°C		
Frequency stability at -20°C ~ +70°C	± 50 ppm		
Storage temperature	-55°C to +125°C		
Output load	50 Ohm		
Output symmetry	45-55% at 50%VDD		
Power supply voltage	+2,5V ±5%		+3,3V ±10%
Rise & Fall Time 20%/80%	40,0 -100,99MHz	1nS	1nS
	101,0 -160,00MHz	0,5nS	0,5nS
	161,0 - 800,00MHz	1,0nS	1,0nS
Input current max.	25,0 -100,99MHz	60mA	60mA
	101,0-160,00MHz	65mA	65mA
	161,0-800,0MHz	100mA	100mA
Output Voltage High (VOH)	1,475 Vmin		2,275 Vmin
Output Voltage Low (VOL)	1,095 Vmax		1,680 Vmax
Enable High Input Voltage	1,75 Vmin		2,31 Vmin
Enable Low Input Voltage	0,75 Vmax		0,99 Vmax
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			



RoHS conf./Pb free



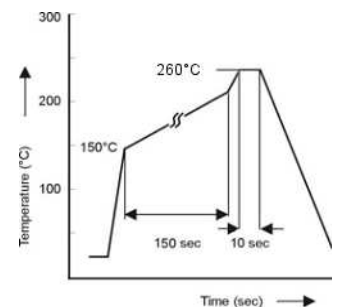
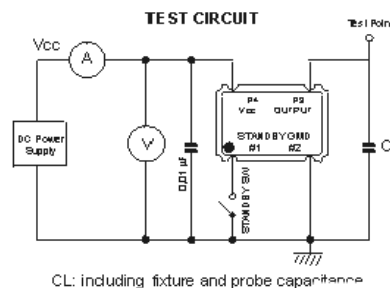
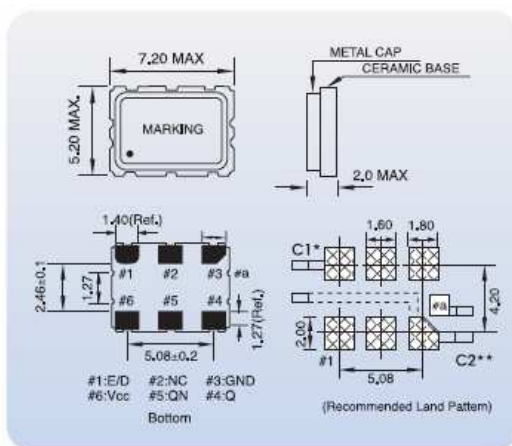


# IO 24

## Clock Oscillator 2,5V/3,3V

## LVDS

Dimensions l/w/h (max)	7,2mm x 3,2mm x 2,0mm		
Frequency range	40,0MHz to 800,0MHz		
Operating temperature	-40°C to +85°C		
Frequency stability at -20°C ~ +70°C	± 50 ppm		
Storage temperature	-55°C to +125°C		
Output load between Q and QN	100 Ohm		
Output symmetry	45-55%		
Power supply voltage	+2,5V ±5%		+3,3V ±10%
Rise & Fall Time 20%/80%	40,0 -100,0MHz	1nS	1nS
	101,0 -160,00MHz	0,5nS	0,5nS
	161,0 - 800,00MHz	1,5nS	1,5nS
Input current max.	40,0 -100,0MHz	60mA	60mA
	101,0-160,00MHz	65mA	65mA
	161,0-800,0MHz	100mA	110mA
Output Voltage High (VOH)	1,6 Vmin		1,6 Vmin
Output Voltage Low (VOL)	0,9 Vmax		0,9 Vmax
Differential Output Voltage (VOD)	247-454mV		247-454mV
Offset Voltage (VOS)	1,125-1,375V		1,125-1,375V
Enable High Input Voltage	1,75 Vmin		2,31 Vmin
Enable Low Input Voltage	0,75 Vmax		0,99 Vmax
Aging	±3ppm		
Reflow condition	10 seconds at +260°C max.		
Contents of reel	1000pcs		
Part Number			

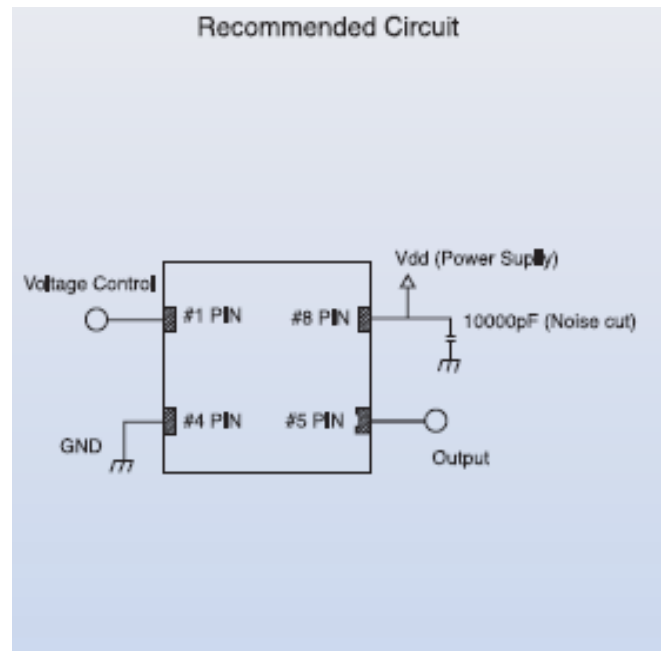
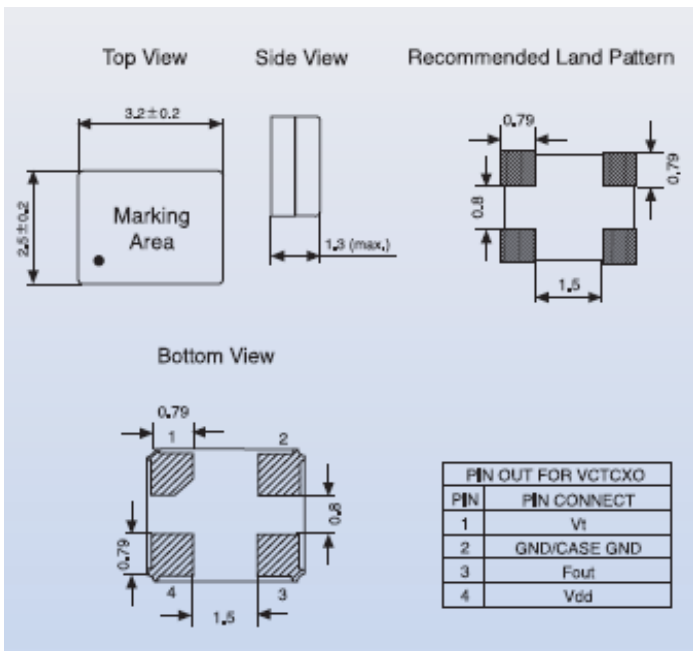




# IO 25

## VCTCXO Voltage Controlled Temperature Compensated Crystal Oscillator 2,7V/3,3V

Dimensions l/w/h (max)	3,2mm x 2,5mm x 1,3mm
Frequency range	10,0MHz to 30,0MHz
Operating temperature	-10°C to +70°C
Storage temperature	-40°C to +85°C
Frequency Tolerance (Vcon=1,5V)	± 2,0ppm max at 25°C
Power supply voltage	+2,7V or +3,3V
Frequency stability	
Over Temperature Range	±2,0ppm
Over Supply Voltage Change (±5%)	±0,2ppm
Over Load Change	±0,2ppm
VCON Frequency Control Range (1.5±1,0V)	±9 ~ ±16ppm / V
Start up Time (90% of final RF level in Vp-p)	3,0msec max.
Harmonics	-7,0dBc max.
SSB Phase Noise (at 1KHz Carrier Offset)	-130dBc/Hz max.
Aging	±1ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	

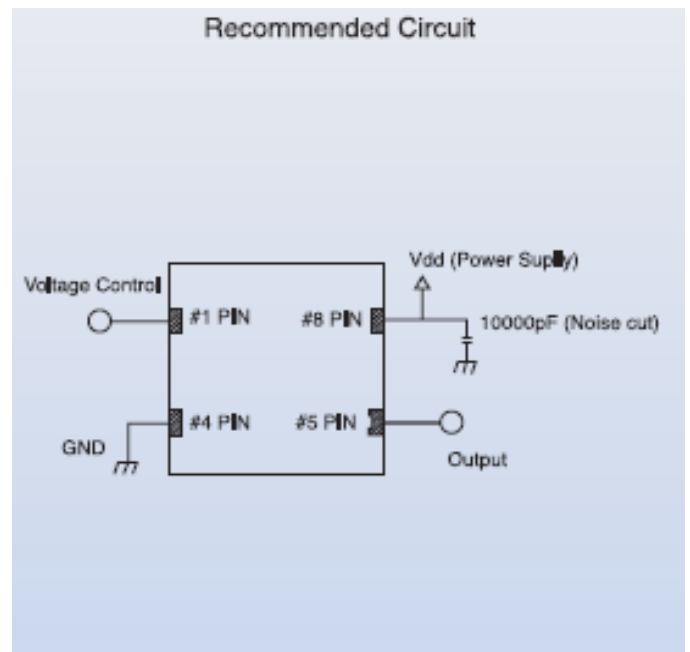
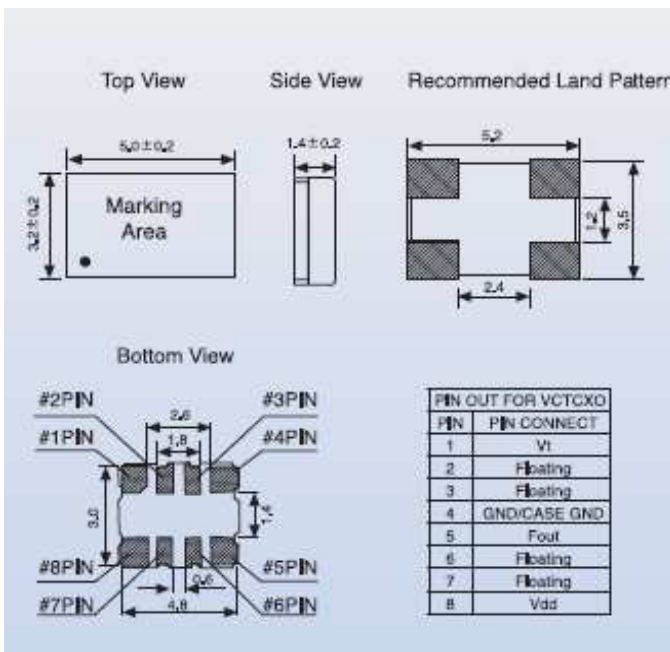




# IO 26

## VCTCXO Voltage Controlled Temperature Compensated Crystal Oscillator 2,7V/3,3V

Dimensions l/w/h (max)	5,0mm x 3,2mm x 1,4mm
Frequency range	10,0MHz to 30,0MHz
Operating temperature	-10°C to +70°C
Storage temperature	-40°C to +85°C
Frequency Tolerance (Vcon=1,5V)	± 2,0ppm max at 25°C
Power supply voltage	+2,7V or +3,3V
Frequency stability	
Over Temperature Range	±2,0ppm
Over Supply Voltage Change (±5%)	±0,2ppm
Over Load Change	±0,2ppm
VCON Frequency Control Range (1.5±1,0V)	±9 ~ ±16ppm / V
Start up Time (90% of final RF level in Vp-p)	3,0msec max.
Harmonics	-7,0dBc max.
SSB Phase Noise (at 1KHz Carrier Offset)	-130dBc/Hz max.
Aging	±1ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	

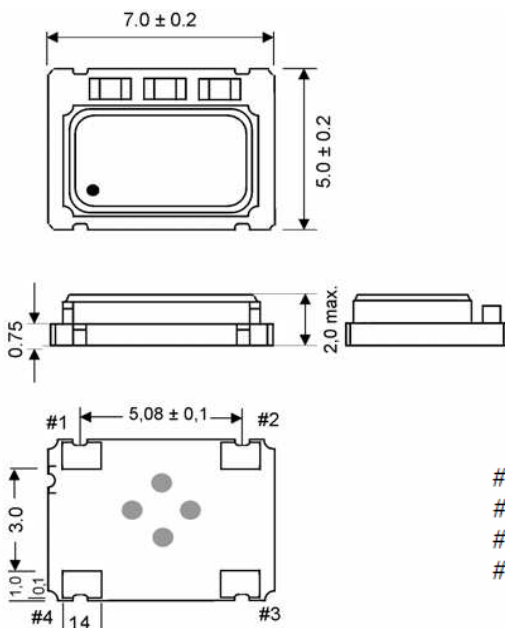




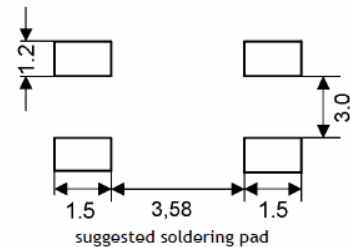
# IO 27

## VCTCXO Voltage Controlled Temperature Compensated Crystal Oscillator

Dimensions l/w/h (max)	7,0mm x 5,0mm x 2,0mm
Frequency range	10,0MHz to 30,0MHz
Operating temperature	-10°C to +70°C
Storage temperature	-40°C to +85°C
Frequency Tolerance (Vcon=1,5V)	± 2,0ppm max at 25°C
Power supply voltage	+3,0V
Frequency stability	
Over Temperature Range	±2,0ppm
Over Supply Voltage Change (±5%)	±0,2ppm
Over Load Change	±0,2ppm
VCON Frequency Control Range (1.5±1,0V)	±9 ~ ±16ppm / V
Start up Time (90% of final RF level in Vp-p)	3,0msec max.
Harmonics	-7,0dBc max.
SSB Phase Noise (at 1KHz Carrier Offset)	-130dBc/Hz max.
Aging	±1ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	



- # 1 : VC
- # 2 : GND
- # 3 : Output
- # 4 : Vcc



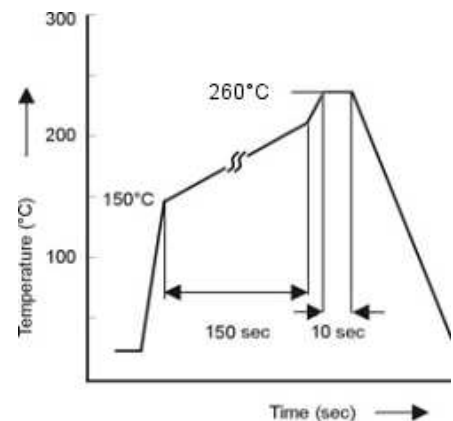
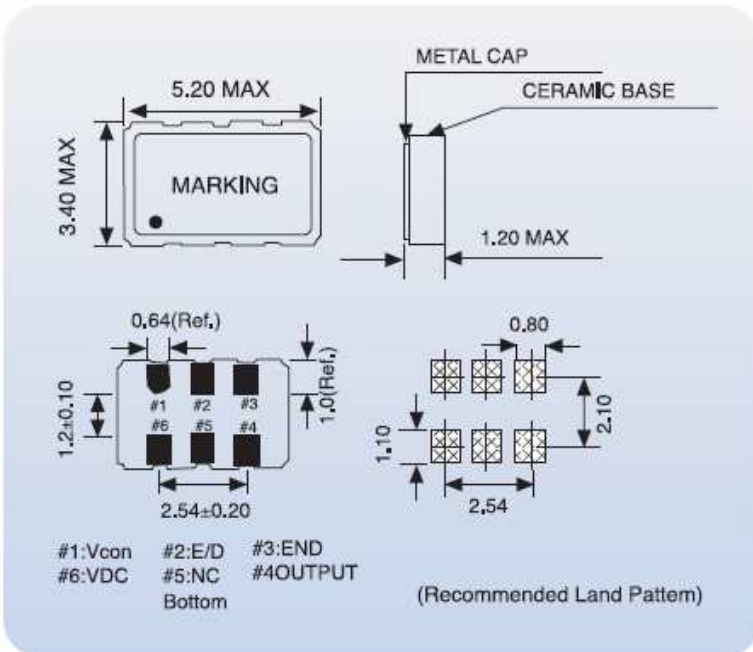


# IO 28

## VCXO Voltage Controlled Crystal Oscillator

**+3,3V/+5,0V**

Dimensions l/w/h (max)	5,0mm x 3,2mm x 1,2mm
Frequency range	1,0MHz to 52,0MHz
Operating temperature	-10°C to +70°C
Storage temperature	-55°C to +125°C
Frequency Control Range	± 30ppm ~ ±150ppm
Power supply voltage	+3,3V /+5,0V ±10%
Output Level	CMOS
Output Symmetry	40-60% (45-55% available)
Input current	30mA max
Rise & Fall Time	5nS max
Output Load	15pF
Aging	±1ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	



RoHS conf./Pb free



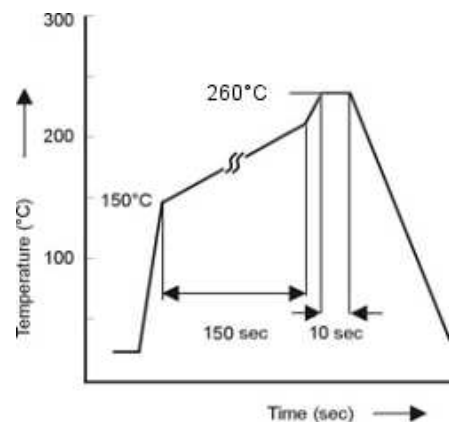
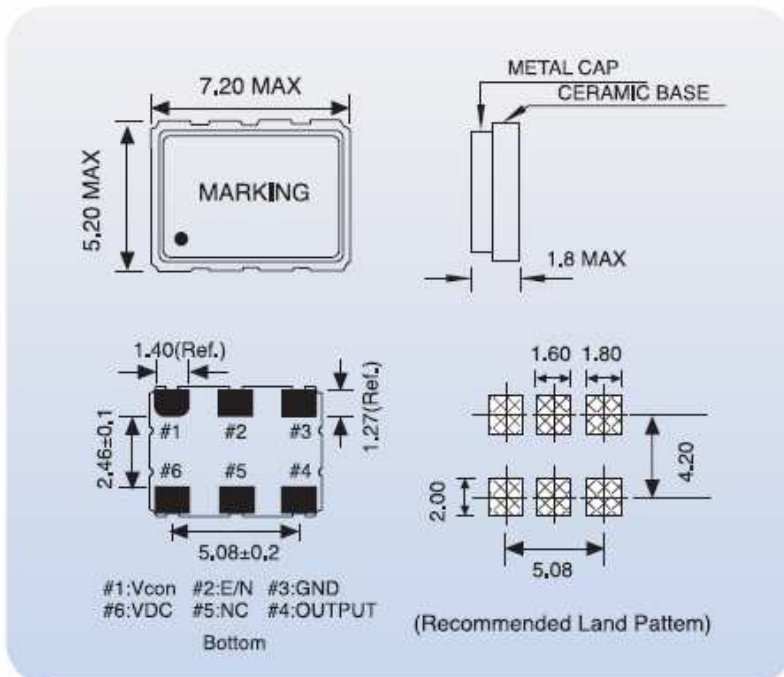


# IO 29

## VCXO Voltage Controlled Crystal Oscillator

**+3,3V/+5,0V**

Dimensions l/w/h (max)	7,2mm x 5,2mm x 1,8mm
Frequency range	1,0MHz to 52,0MHz
Operating temperature	-10°C to +70°C
Storage temperature	-55°C to +125°C
Frequency Control Range	± 30ppm ~ ±150ppm
Power supply voltage	+3,3V /+5,0V ±10%
Output Level	CMOS
Output Symmetry	40-60% (45-55% available)
Input current	30mA max
Rise & Fall Time	5nS max
Output Load	15pF
Aging	±1ppm
Reflow condition	10 seconds at +260°C max.
Contents of reel	1000pcs
Part Number	





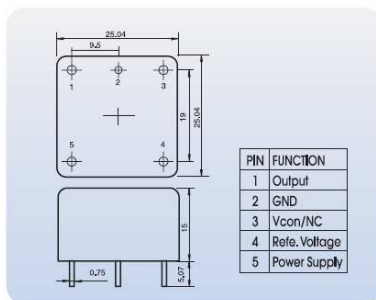
# IO 30

## OCXO Oven Controlled Crystal Oscillator

DIP/SMD

Dimensions l/w/h (max)	<b>25,04mm x 25,04mm x 15,0mm</b>	
Frequency range	1,0MHz to 100,0MHz	
Operating temperature	-30°C to +75°C	
Storage temperature	-40°C to +100°C	
Frequency Accuracy	Center control voltage: $\pm 0,1$ ppm	
Power supply voltage	+3,3V /+5,0V/+12V	
Frequency Stability vs Temperaturure	See Table	
Frequency Stability vs. Load	$\pm 0,02$ ppm vs. $\pm 10\%$ /Load change	
Frequency Stability vs. Voltage	$\pm 0,02$ ppm vs. $\pm 5\%$ /Voltage change	
Supply Consumption	3,6W (max.) when warm-up	
Warm-up Time	1,2W (max.) when static $\pm 0,5$ ppm < 3 minutes (AT) $\pm 0,3$ ppm < 3minutes (SC)	
Adjustable Frequency Range	AT: $\pm 5$ ppm SC: $\pm 1$ ppm	
Slope	Positive	
Linearity	$\pm 10\%$	
Control Voltage Range	0V ~ 5V	
Phase Noise (10,0 MHz)	1Hz: -80dB/Hz      10Hz: -120dB/Hz 100Hz: -140dB/Hz    1KHz: -145dB/Hz 10KHz: -150dB/Hz	
Aging	AT Cut: $\pm 0,003$ ppm/day $\pm 0,5$ ppm/1 <sup>st</sup> Y $\pm 3$ ppm/10Years SC Cut: $\pm 0,003$ ppm/day $\pm 0,1$ ppm/1 <sup>st</sup> Y $\pm 0,5$ ppm/10Years	

### Part Number



Code	Frequency Stability vs. Temperature	Temperature Range
A	$\pm 0,1$ ppm (At Cut)	0 ~ +50°C
B	$\pm 0,05$ ppm (SC Cut)	
C	$\pm 0,2$ ppm (At Cut)	-20 ~ +70°C
D	$\pm 0,1$ ppm (SC Cut)	
E	$\pm 0,5$ ppm (At Cut)	-30 ~ +75°C
F	$\pm 0,3$ ppm (SC Cut)	

Output Waveform	Output Type Code	Frequency Range	Oscillation State	Output Characteristics
Clipping Sine Wave	0	8,00-30,00MHz 10,00-100,00MHz	F: Fundamental O: Overtone	Load: 10K $\Omega$ // 10PF Output Level: >1Vpp
TTL	1	1,00-30,00MHz 10,00-100,00MHz	F: Fundamental O: Overtone	(Load: Max 10 Low power consumption TTL gates) "1" Level: >+2,4VDC "0" Level: <+0,2VDC Duty Cycle: 45/55 Rise/Fall time: <6ns
HCMOS	2	1,00-30,00MHz 10,00-100,00MHz	F: Fundamental O: Overtone	(Load: Max 10 Low power consumption TTL gates) "1" Level: >+4,5VDC "0" Level: <+0,5VDC Duty Cycle: 45/55 Rise/Fall time: <6ns
ACMOS	3	1,00-30,00MHz 10,00-100,00MHz	F: Fundamental O: Overtone	(Load: Max 10 Low power consumption TTL gates) "1" Level: >+4,5VDC "0" Level: <+0,5VDC Duty Cycle: 45/55 Rise/Fall time: <6ns



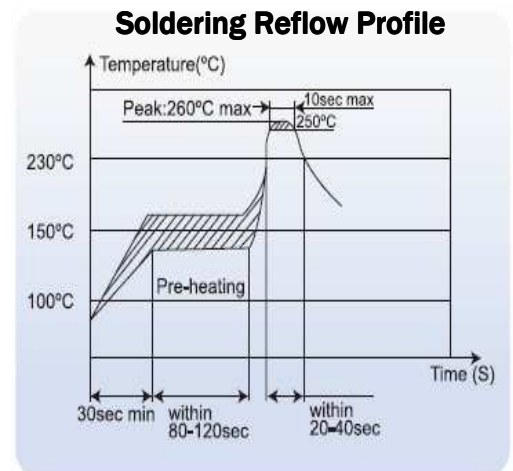
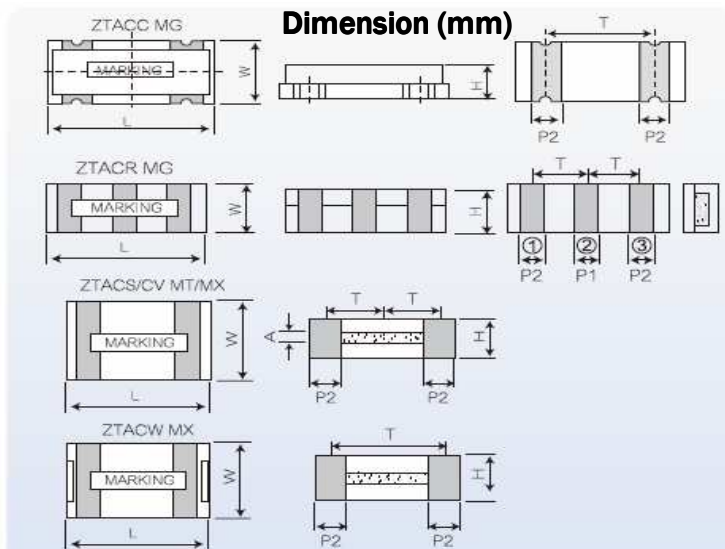


# IR ZTA

## Ceramic Resonator

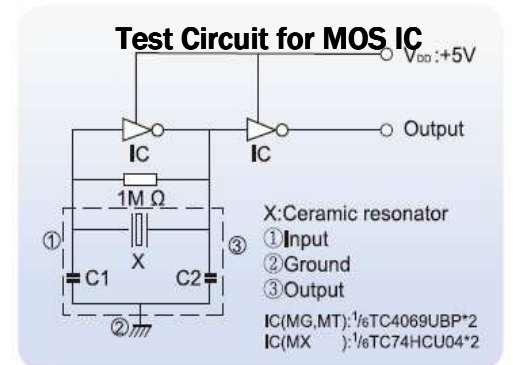
### Specification

MODEL		ZTACC MG	ZTACR MG	ZTACS MT	ZTACV MT	ZTACS MX	ZTACV MX	ZTACW MX
Nominal Frequency	MHz	2,00-8,00	4,00-8,00	6,00-13,00	8,00-13,00	13,01-60,00	16,00-60,00	20,00-60,00
Frequency Tolerance ( 25 °C )	%	±0,5						
Frequency Stability (-20~+80°C)	%	±0,3	±0,3	± 0,4	±0,4	±0,3	±0,3	±0,3
Operating Temperature Range	°C	-20 to +80						
Storage Temperature Range	°C	-55 to +85						
Aging for 10 years	%	±0,3						
Test Circuit for MOS IC	MG Series	1/6TC4069UBP x2						
	MT Series	1/6TC4069UBP x2						
	MX Series	1/6TC74HCU04 x2						
External capacitance C1, C2	2,00~20,00MHz	30pF						
	20,01~25,99MHz	15pF						
	26,00~60,00MHz	5pF						



Part Number	L	W	H	P2	T
ZTACC MG	7.4±0.2	3.4±0.2	1.8±0.2	1.2±0.2	5±0.2
ZTACR MG	4.5±0.2	2.0±0.2	1.2max.	0.8±0.2	3.0±0.2
ZTACS MT/MX	4.7±0.2	4.1±0.2	(1.2+A*)±0.2	0.8±0.2	3.9±0.2
ZTACV MT/MX	3.7±0.2	3.1±0.2	(1.0+A*)±0.2	0.7±0.2	3.0±0.2
ZTACW MX	2.5±0.2	2.0±0.2	1.2max.	0.4±0.2	2.0±0.2

\*A stands for thickness, which varies with the frequency. The range of the thickness is 0,1 to 0,7mm.



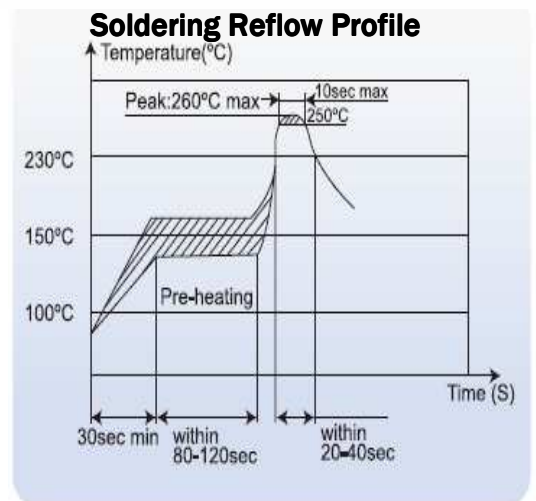
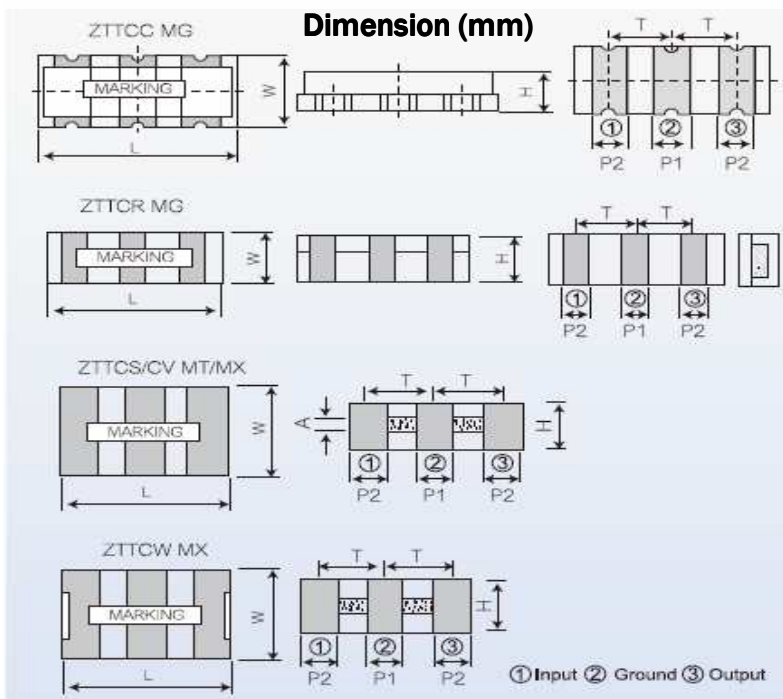


# IR ZTT

## Ceramic Resonator Build-in Capacitor

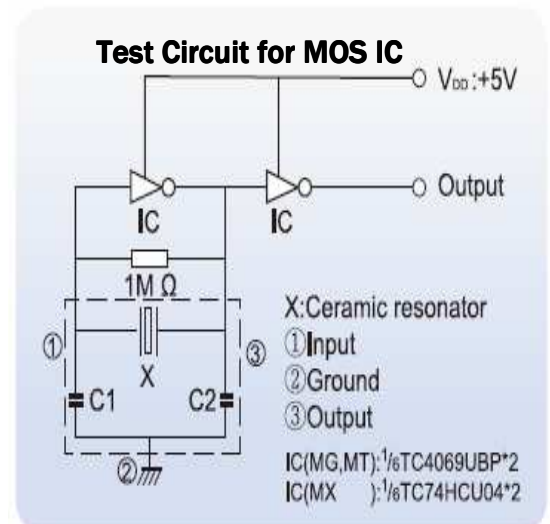
### Specification

MODEL		ZTCC MG	ZTTCR MG	ZTTC S MT	ZTTCV MT	ZTTC S MX	ZTTCV MX	ZTTCW MX
Nominal Frequency	MHz	2.00-8.00	4.00-8.00	6.00-13.00	8.00-13.00	13.01-60.00	16.00-60.00	20.00-60.00
Frequency Tolerance ( 25°C )	%	±0.5						
Frequency Stability (-20~+80°C)	%	±0.3	±0.3	± 0.4	±0.4	±0.3	±0.3	±0.3
Operating Temperature Range	°C	-20 to +80						
Storage Temperature Range	°C	-55 to +85						
Aging for 10 years	%	±0.3						



Part Number	L	W	H	P1	P2	T
ZTCC MG	7.4±0.2	3.4±0.2	1.8±0.2	1.2±0.2	1.2±0.2	2.5±0.2
ZTTCR MG	4.5±0.2	2.0±0.2	1.2max.	0.8±0.2	0.8±0.2	1.5±0.2
ZTTC S MT/MX	4.7±0.2	4.1±0.2	(1.2+A*)±0.2	1.0±0.2	0.8±0.2	1.95±0.2
ZTTCV MT/MX	3.7±0.2	3.1±0.2	(1.0+A*)±0.2	0.9±0.2	0.7±0.2	1.5±0.2
ZTTCW MX	2.5±0.2	2.0±0.2	1.2max.	0.5±0.2	0.4±0.2	1.0±0.2

\* A stands for thickness, which varies with the frequency.  
The range of the thickness is 0.1 to 0.7mm.





# IS IF

## IF SAW FILTER

Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	35.46MHz ~ 666.667MHz
Operating Temperature	-20°C to +70°C
Input Power Level	0~10dBm
Pass Band	0 ~ 400MHz
Storage Temperature	-40°C to +85°C
Insertion Loss (IL)	30dB max.
Bandwidth (1dB ~ 30dB )	15,0MHz max.
Attenuation (Reference level from Min IL)	10dB min.
Applications	DAB, Cable Modem, Remote Control, WLL, Satellite TV,WLAN,Cellulare phones, PHS, DECT
Part Number	





# IS RF

## RF SAW FILTER

Dimensions l/w/h in mm (max)	3,0 x 3,0 3,8 x 3,8 5,0 x 5,0 7,0 x 5,0 F11 or TO39
Frequency Range	139 ~ 2650 MHz
Operating Temperature	-20°C to +70°C
DC Voltage	0 ~ 10 V
Input Power Level	0~10dBm
Pass Band	0 ~ 100MHz
Storage Temperature	-40°C to +85°C
Insertion Loss (IL)	7,0dB max.
Amplitude Ripple	3,0dB max.
Bandwidth (1dB ~ 30dB )	15,0MHz max.
Attenuation (Reference level from Min IL)	15dB min.
Applications	DAB, Cable Modem, Remote Control, Pager, Sat.TV, FRS,Cellulare phones, GPS, ISM Band, Bluetooth
Part Number	





# IS SR

## SAW Resonator

Dimensions l/w/h in mm (max)

3,0 x 3,0  
3,8 x 3,8  
5,0 x 5,0  
7,0 x 5,0  
F11 or TO39

Frequency Range	35.46MHz ~ 1100MHz
Frequency Tolerance	25,0 ~ 200KHz
DC Voltage	+3V, +5V, +12V
Operating Temperature	-40°C to +85°C
Input Power Level	0~10dBm
Storage Temperature	-40°C to +85°C
Insertion Loss (IL)	0,10 ~ 10,0dB
Aging of $f_c$	10ppm/year max.
Motional Capacitance, C1	0,10 ~ 5,0 fF
Motional Inductance, L1	20.00 ~ 120.00 uH
Motional Resistance, R1	10.00 ~ 180.00 Ohm
Bandwidth (1dB ~ 30dB )	15,0MHz max.
Parallel Capacitance, C0	2.0 ~ 5.0 pF
Temp Coeff.	0.032 ppm/°C <b>2</b>
Turnover Temperature, To	25 °C typ.
Applications	CDMA,GSM,GPS
Part Number	

