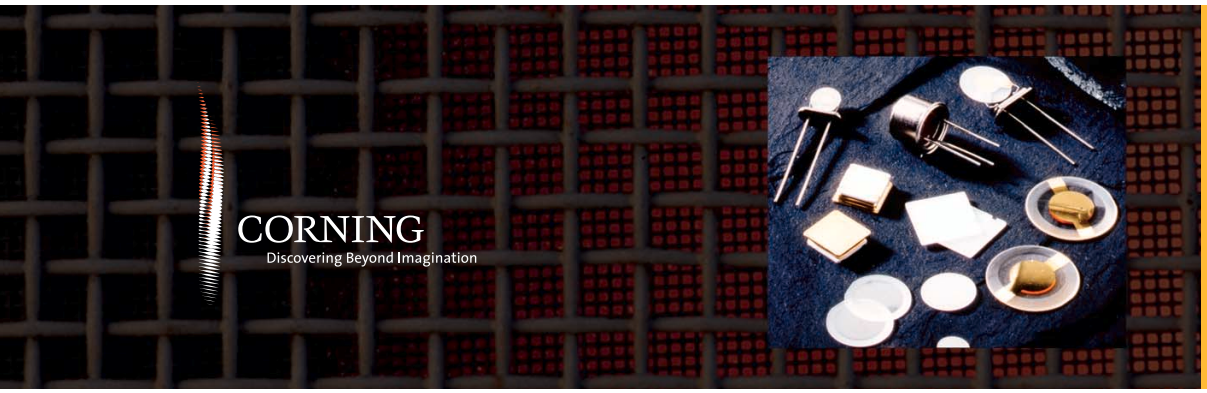
2003 Product Data

Quartz Crystal Resonators



Corning
Frequency
Control

Crystal Product Line

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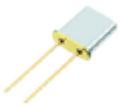
CORNING

Discovering Beyond Imagination

Quartz Crystals



What is a Quartz Crystal? In a quartz crystal, a thin slice of quartz is placed between two electrodes. An alternating voltage applied to these electrodes causes the quartz to vibrate, or oscillate, at a particular frequency. The frequency is a function of the thickness of the crystal. By carefully preparing a crystal, it can be made to oscillate at any frequency.

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CORNING
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Crystal Overview

Application	Enclosure	Height / length		Frequency		Holder	Blank	Aging 1st year
		inches	mm	Range	Overtone	Type	Cut	
Data Telemetry	HC-35/U	0.265	6.7	43-55 MHz	3rd	CW	AT	<1 ppm
		0.220	5.6	90-155 MHz	5th	CW	AT	<1 ppm
Oscillator	HC-35/U	0.265	6.7	40-125 MHz	5th	CW	SC	<1 ppm
	HC-35/U	0.265	6.7	20-50 MHz	3rd	CW	SC	<1 ppm
	HC-43/U	0.530	13.5	50-125 MHz	5th	CW	AT	<1 ppm
	HC-40	0.460	11.7	5-10 Mhz	Fund	CW	SC	<.5 ppm
Microwave	HC-43/U	0.530	13.5	3 to 30 MHz	Fund	CW	AT	<1 ppm
	HC-43/U	0.530	13.5	70-130 MHz	5th	CW	AT	<1 ppm
	HC-35/U	0.265	6.7	70-130 MHz	5th	CW	AT	<1 ppm
Telecom	HC-35/U	0.265	6.7	50-145 MHz	5 th	CW	AT	<1 ppm
Military	HC-43/U	0.530	13.5	4-25 MHz	Fund	CW	AT	<2 ppm
	HC-43/U	0.530	13.5	24-61 Mhz	3rd	CW	AT	<2 ppm
	HC-43/U	0.530	13.5	50-125 Mhz	5th	CW	AT	<2 ppm
Test & Measurement	HC-35/U	0.265	6.7	90-125 MHz	5th	CW	AT	<1 ppm
	HC-43/U	0.530	13.5	90-125 Mhz	5th	CW	AT	<1 ppm
GPS (weather balloon, traffic control)	HC52/U	0.346	8.8	10,949292	Fund	RW	AT	<2ppm
		0.315	8.0	16,368 21,05 24,553				
Pet finder	HC52/SL	0.201	5.1	144,0-151,0	5th	RW	AT	<2ppm
Pager	HC52/U	0.346	8.8	3,5- 50,0	Fund	RW	AT	<2ppm
				22,0-120,0	3rd			
		0.315	8.0	60,0-200,0	5th			
	HC52/U	0.236	6.0	8,0- 50,0	Fund			
				22,0-120,0	3rd			
				60,0-200, 0	5th			
Pager	HC52/SL	0.315	8.0	3,5-50,0	Fund	RW	AT	<2ppm
				22,0-120,0	3rd			
				60,0-200,0	5th			
	HC52/SL	0.236	6.0	8,0- 50,0	Fund			
				22,0-120,0	3rd			
				60,0-200,0	5th			
ADSL	HC52/U	0.346	8.8	35,328	Fund	RW	AT	<2ppm
		0.315	8.0	>30				
		0.236	6.0					
ADSL	HC49/U	0.449	11.4	13.248	Fund	RW	AT	<3ppm
ADSL	HC49/U	0.154	3.9	12	Fund	CW	AT	<2ppm
Alarm application	HC52/U	0.236	6.0	10,245 13,5664 13,992	Fund	RW	AT	<2ppm
				50,0-75,0 *2	3rd	RW	AT	<2ppm
Wireless (Dect)	HC52/U/	0.346	8.8	10.368	Fund	RW	AT	<3ppm
		0.315	8.0					
		0.236	6.0					
Wireless (radio link)	HC52/U	0.346	8.8	93,0-120,0	5th	RW	AT	<2ppm
Wireless earpiece	ceramic 5 x 3.2	0.039370079	1.0		5th	seam weld	AT	< 3ppm
	HC49/U	0.196850394	5.0	4 to 20	Fund	RW	AT	<5ppm
Wireline	HC52/U	0.346	8.8	3,5- 50,0	Fund	RW	AT	<2ppm
		0.315	8.0	22,0-120,0	3rd			
		0.236	6.0	8,0- 50,0	Fund	RW	AT	<2ppm
				22,0-120,0	3rd			
ISDN	HC49/U	0.197	5.0	4 to 20	Fund	CW	AT	<5ppm
Auto Data collection (gas, water)	HC49/U	0.449	11.4	9,859545 *2	Fund	RW	AT	<1ppm
	HC52/U	0.315	8.0	72.30333	3rd	RW	AT	<2ppm
Automotive **- type M: engine, safety**	HC49/U	0.201	5.1	4,0-18,0 *3 Standard frequencies: (4.0296) 8.0; 10.0; 10.24 12.0; 16.0;18.0	Fund	RW	AT	<3ppm
- type K: body electronics				4,0-20,0 *2				
Automotive **- type K: engine, safety** **- type K: body electronics**	HC52/U	0.315	8.0	4,194 -18,0	Fund	RW	AT	<3ppm
		0.236220472	6.0	8,0 - 18,0				
Telematic	HC52/U	0.315	8.0	19.23055	Fund	RW	AT	<3ppm
				20.945	Fund			
				50.5583	3rd			
Microprocessor	HC49/U	0.197	5.0	4 to 20	Fund	RW	AT	<5ppm
Microprocessor	HC49/U	0.142	3.6	4 to 20	Fund	RW	AT	<5ppm
100Hz-TV	HC49/U	0.535	13.6	4	Fund	RW	AT	<5ppm
TV	HC49/U	0.535	13.6	3.579545	Fund	RW	AT	<5ppm
TV	HC49/U	0.197	5.0	3.579545	Fund	RW	AT	<5ppm
Watch crystals **low power consumption appl**	TC38	0.315	8.0	0,032768 (32 kHz)	Fund	CW	AT	<5ppm

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Quartz crystals with the following specifications (PIN numbers) can be supplied as COTS (Commercial Of The Shelf) products. They are manufactured on our ISO-9001 and QS-9000 certified production line and meet all requirements defined in MIL-PRF-3098H.

PIN	Frequency range	Overtone	Load [pF] (S=series)	Temp range	Enclosure
CR-18/U	0.8 – 20 MHz	1	32	-55°C to +105°C	HC-48/U *
CR-19/U	0.8 – 20 MHz	1	S	-55°C to +105°C	HC-48/U *
CR-26/U	0.8 – 20 MHz	1	32	+75°C± 5°C	HC-48/U *
CR-28/U	0.8 – 20 MHz	1	S	+75°C± 5°C	HC-48/U *
CR-33/U	10 – 30 MHz	3	32	-55°C to +105°C	HC-48/U *
CR-35/U	0.8 – 20 MHz	1	S	+85°C± 5°C	HC-48/U *
CR-36/U	0.8 – 20 MHz	1	32	+85°C± 5°C	HC-48/U *
CR-52/U	10 – 61 MHz	3	S	-55°C to +105°C	HC-48/U *
CR-54/U	50 –125 MHz	5	S	-55°C to +105°C	HC-48/U *
CR-55/U	17 – 62 MHz	3	S	-55°C to +105°C	HC-49/U
CR-56/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-49/U
CR-59/U	50 – 125 MHz	5	S	+85°C± 5°C	HC-49/U
CR-60/U	5 – 20 MHz	1	S	-55°C to +105°C	HC-49/U
CR-61/U	17 – 61 MHz	3	S	+85°C± 5°C	HC-49/U
CR-62/U	0.8 – 20 MHz	1	32	+75°C± 5°C	HC-48/U *
CR-64/U	2.9 – 20 MHz	1	30	-55°C to +105°C	HC-49/U
CR-65/U	10 – 61 MHz	3	S	+75°C± 5°C	HC-48/U *
CR-67/U	17 – 62 MHz	3	S	-55°C to +105°C	HC-49/U
CR-69/U	2.9 –25 MHz	1	30	-40°C to +90°C	HC-49/U
CR-74/U	45 – 125 MHz	5	S	+85°C± 5°C	HC-49/U
CR-75/U	50 – 125 MHz	5	S	+75°C± 5°C	HC-48/U *
CR-76/U	16 – 61 MHz	3	S	-55°C to +105°C	HC-49/U
CR-77/U	17 – 62 MHz	3	S	-55°C to +105°C	HC-50/U *
CR-78/U	2.9 – 20 MHz	1	30	-55°C to +105°C	HC-50/U *
CR-79/U	2.9 – 20 MHz	1	S	-55°C to +105°C	HC-50/U *
CR-80/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-49/U
CR-81/U	17 – 65 MHz	3	S	-55°C to +105°C	HC-50/U *
CR-82/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-50/U *
CR-83/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-50/U *
CR-84/U	17 – 61 MHz	3	S	+85°C± 5°C	HC-50/U *
CR-97/U	8 – 10 MHz	1	32	-40°C to +85°C	HC-49/U
CR-98/U	50 – 134 MHz	5	S	-30°C to +71°C	HC-50/U *
CR-105/U	48 – 125 MHz	5	S	-40°C to +90°C	HC-49/U
CR-106/U	10.5 – 11.5 MHz	1	32	-55°C to +105°C	HC-49/U
CR-107/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-49/U
CR-108/U	50 – 93 MHz	5	S	+85°C± 5°C	HC-49/U

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PIN	Frequency range	Overtone	Load [pF] (S=series)	Temp range	Enclosure
CR-110/U	62.5 – 75 MHz	5	S	-40°C to +85°C	HC-49/U
CR-111/U	17 – 62 MHz	3	S	-55°C to +105°C	HC-49/U
CR-112/U	5 – 20 MHz	1	S	-55°C to +105°C	HC-49/U
CR-113/U	10 – 61 MHz	3	S	+85°C± 5°C	HC-49/U
CR-114/U	2.9 – 3.85 MHz	1	32	-55°C to +105°C	HC-50/U *
CR-116/U	50 – 125 MHz	5	S	-55°C to +105°C	HC-49/U
CR-117/U	30 – 63 MHz	3	S	-40°C to +65°C	HC-50/U *
CR-122/U	50 – 125 MHz	5	S	+85°C± 5°C	HC-49/U
CR-123/U	50 – 125 MHz	5	S	+85°C± 5°C	HC-49/U
CR-124/U	2.9 – 3.8 MHz	1	32	-55°C to +100°C	HC-49/U
CR-125/U	1.85 – 3.05 MHz	1	32	-55°C to +105°C	HC-48/U *
CR-127/U	10 – 61 MHz	3	S	-55°C to +90°C	HC-48/U *
CR-128/U	17 – 61 MHz	3	S	-55°C to +105°C	HC-49/U
CR-129/U	9 – 12 MHz	1	32	-55°C to +90°C	HC-49/U
CR-131/U	0.8 – 20 MHz	1	30	+75°C± 5°C	HC-48/U *
CR-135/U	10 – 12 MHz	1	32	+85°C± 5°C	HC-50/U *
CR-136/U	8 – 10 MHz	1	32	-40°C to +90°C	HC-49/U
CR-137/U	8.5 – 19 MHz	1	32	-20°C to +70°C	HC-49/U
CR-139/U	20 – 22 MHz	1	30	-55°C to +105°C	HC-49/U
CR-141/U	48 – 90 MHz	5	S	-30°C to +55°C	HC-49/U
CR-149/U	46 – 100 MHz	5	S	-40°C to +90°C	HC-49/U
CR-151/U	50 – 100 MHz	5	S	-40°C to +90°C	HC-49/U
CR-152/U	16 – 61 MHz	3	S	-55°C to +105°C	HC-49/U
CR-153/U	10 – 30 MHz	1	20	0°C to +60°C	HC-50/U *
CR-157/U	0.8 – 20 MHz	1	S	-55°C to +105°C	HC-51/U

* Discontinued model

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CORNING
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Further Crystals
Temperature Codes

Temperature range [°C]	Codes for the temperature stability [ppm]											
	± 2	± 3	± 4	± 5	± 7	± 10	± 15	± 20	± 25	± 30	± 40	± 50
+ 15 to + 35	105	106	107	108	109	110	111	112	113	114	115	116
+ 10 to + 40	117	118	119	120	121	122	123	124	125	126	127	128
+ 5 to + 45	129	130	131	132	133	134	135	136	137	138	139	140
+ 0 to + 50	141	142	143	29	144	37	145	146	147	148	149	150
- 5 to + 55	151	152	153	154	155	156	157	158	159	160	161	162
- 10 to + 60	163	26	164	165	166	28	167	168	169	170	171	172
- 15 to + 65		173	174	175	176	177	178	179	180	181	182	183
- 20 to + 70			25	18	184	14	185	12	186	187	188	10
- 25 to + 75				189	190	191	192	193	194	195	196	197
- 30 to + 80					198	32	31	199	33	200	201	202
- 40 to + 90						203	34	204	35	205	206	36
- 55 to + 105								207	24	208	209	22

= not applicable for :

Enclosures	Frequency range
HC-35/RW	7,000 - 8,499 MHz
HC-36/U & HC-47/U	1,000 - 1,599 MHz
HC-37/U	2,500 - 3,999 MHz
HC-42/U & HC-43/U	2,500 - 3,999 MHz
HC-45/U	9,000 - 10,999 MHz

Temperature codes for oven crystals

Turn over point (TOP) * [°C]	Codes for the Temperature Stability [ppm]					
	± 1.5	± 2	± 2.5	± 3	± 4	± 5
55	30	101	21	102	103	20
60						
65						
70						
75						
80						
85						
90						
95						

* Turn over point ± 5°C of the oven temperature

Other temperature stabilities on request.

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CORNING
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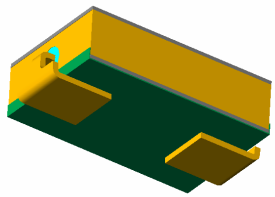
C7210

Crystal

Typical Applications
Automotive
CPU clock

Features
Small Size 3,5x5 mm
Low Profile



Frequency range 12 MHz –24 MHz

Overtone fundamental

Standard frequencies 12; 16; 18; 20; 24 MHz

Frequency stabilities[1]

Parameter	Min	Typ	Max.	Units	Operating temp range	Ordering Code[4]
vs. operating temperature range	-180		180	ppm	-40 ..+150°C	
Parameter	**Min**	**Typ**	**Max.**	**Units**	**Condition**	
Initial tolerance	- 50		+50	ppm		

electrical parameter

Parameter	Min	Typ	Max.	Units	Condition
Resonance resistance R1			120	Ω	12.20 MHZ @ 25 °C
			70	Ω	20.24 MHZ @ 25 °C
Load capacitance CL		8		pF	
Drive level		50		µW	

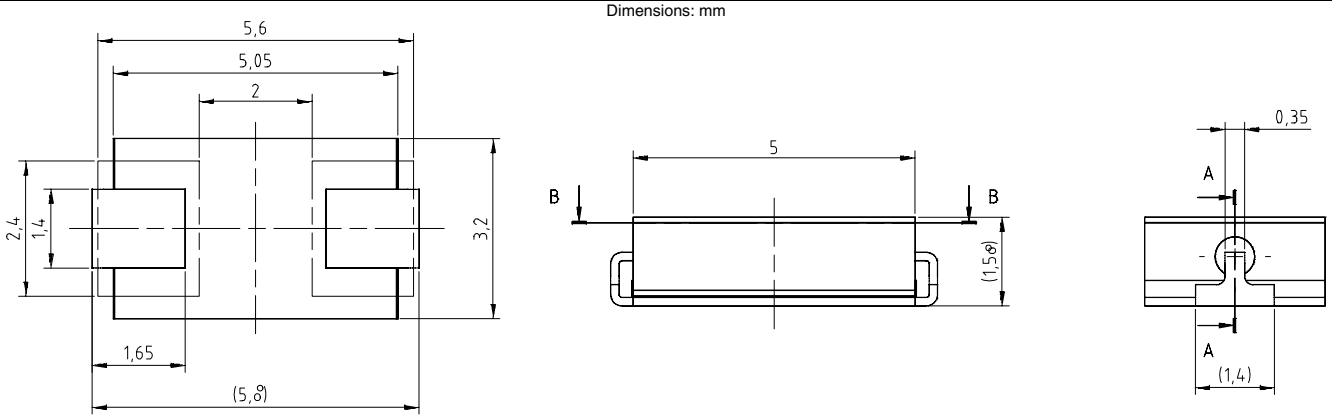
Enclosures

A1

Package Codes:

Code	Height "H"
A1	1.6

Dimensions: mm



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Absolute Maximum Ratings

Operable temperature range	-40		+150	℃	
Storage temperature range	-55		+150	℃	

How to Order this Product:

Step 1

Model	Stability Code	Package Code
C7200		

Example: C7200 A1

Step 2	**The factory representative will then respond with a Corning Model Number in the following Configuration:**		
Model	**Package Code**	**Dash**	**Dash Number**
C7200	[Customer Specified Package Code]	-	[Factory Generated 4 digit number]

Typical P/N = C7200A1-0001

Notes:

1 Contact factory for improved stabilities or additional product options. .
2 Not all options and codes are available at all frequencies
3 Subject to technical modification.
4 Contact factory for availability.

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CORNING
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C7230

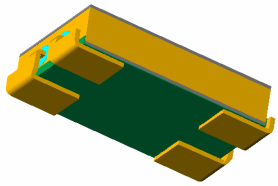
Crystal

Typical Applications

DECT
CPU clock

Features

Small Size 3,5 x 6 mm
Low Profile



Frequency range

10 MHz –150 MHz

Overtone

Fundamental; 3rd overtone
5rd overtone

Standard frequencies

10.368; 20.736 MHz

Frequency Stabilities[1]

Parameter	Min	Typ	Max.	Units	Operating temp range	Ordering Code[4]
vs. operating temperature range	-10		+10	ppm	-10 ..+70℃	
Parameter	**Min**	**Typ**	**Max.**	**Units**	**Condition**	
Initial tolerance	- 10		+10	ppm		

Electrical Parameters

Parameter	Min	Typ	Max.	Units	Condition
Resonance resistance R1			60	Ω	10.80 MHz @ 25 ℃
			100	Ω	40.150 MHZ @ 25 ℃
Load capacitance CL		12		pF	
Drive level		10	100	µW	

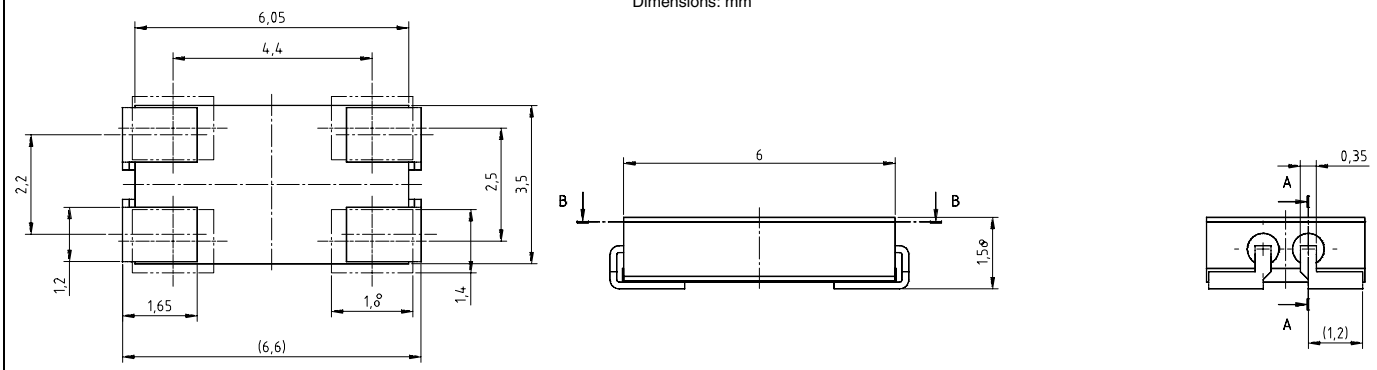
Enclosures

A1

Package Codes:

Code	Height "H"		
A1	1.6		

Dimensions: mm



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Absolute Maximum Ratings

Operable temperature range	-40		+85	℃	
Storage temperature range	-55		+125	℃	

How to Order this Product:

Step 1

Model	Stability Code	Package Code
C7230		

Example: C7230 *A1*

Step 2	**The factory representative will then respond with a Corning Model Number in the following configuration:**		
Model	**Package Code**	**Dash**	**Dash Number**
C7230	[Customer Specified Package Code]	-	[Factory Generated 4 digit number]

Typical P/N = C7230A1-0001

Notes:

1 Contact factory for improved stabilities or additional product options.
2 Not all options and codes are available at all frequencies.
3 Subject to technical modification.
4 Contact factory for availability.

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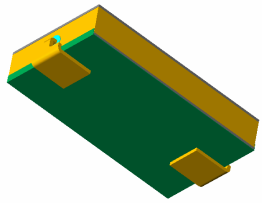
CORNING
Discovering Beyond Imagination

C7240

Crystal

Typical Applications
Automotive
CPU clock

Features
Small Size 4,5 x 8 mm
Low Profile



Frequency range 12 MHz –24 MHz

Overtone fundamental

Standard frequencies 12; 16; 18; 20; 24 MHz

Frequency stabilities[1]

Parameter	Min	Typ	Max.	Units	Operating temp range	Ordering Code[4]
vs. operating temperature range	-180		180	ppm	-40 ..+150°C	
Parameter	**Min**	**Typ**	**Max.**	**Units**	**Condition**	
Initial tolerance	- 50		+50	ppm		

electrical parameter

Parameter	Min	Typ	Max.	Units	Condition
Resonance resistance R1			120	Ω	12.24 MHz @ 25 °C
Load capacitance CL		8		pF	
Drive level		50		µW	

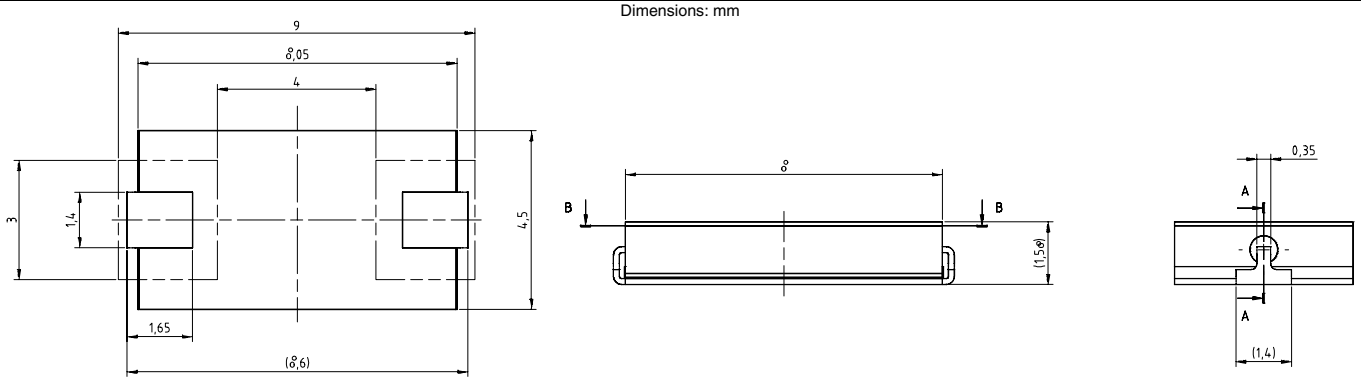
Enclosures

A1

Package Codes:

Code	Height "H"
A1	1.6

Dimensions: mm



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Absolute Maximum Ratings

Operable temperature range	-40		+150	℃	
Storage temperature range	-55		+150	℃	

How to Order this Product:

Step 1

Model	Stability Code	Package Code
C7240		

Example: C7240 A1

Step 2	**The factory representative will then respond with a Corning Model Number in the following Configuration:**		
Model	**Package Code**	**Dash**	**Dash Number**
C7240	[Customer Specified Package Code]	-	[Factory Generated 4 digit number]

Typical P/N = C7240A1-0001

Notes:

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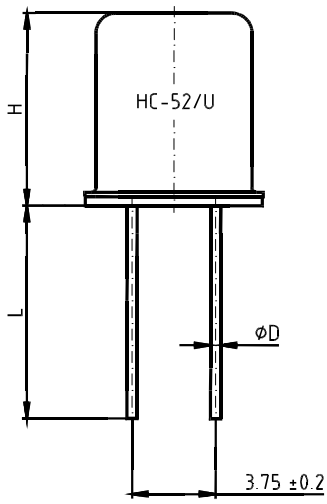
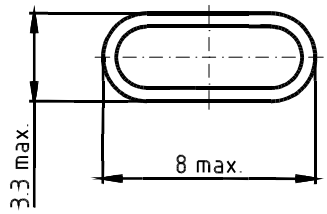
ADSL crystals

Market segment Access

Application ADSL

Enclosure[1]





ØD min.	ØD max.	L min.	H max.
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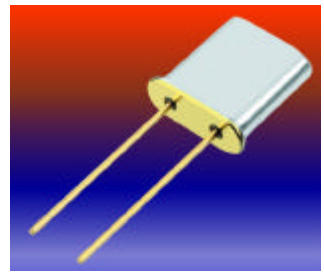
			8.0
0.32	0.38	9.0	6.0



Frequency		35.328 MHz
Overtone		Fundamental
Adjustment tolerance		± 20 ppm @ 25 °C
Load Capacitance	C_L	16 pF others on request
Temperature stability		± 20 ppm from 0 ... + 70 °C
Resonance resistance	R_r max.	30
Motional capacitance	C_1	> 25 fF
Shunt capacitance	C_0	< 8 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_q	0.1 mW
Insulation resistance		> 500 M at 100 V DC
Packing		See handling & processing note.

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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DECT crystals

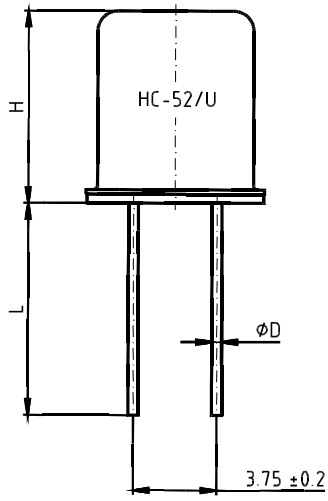
Crystals

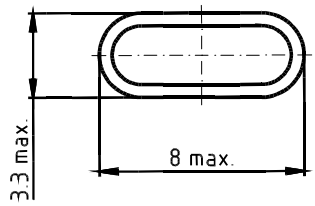
Infineon controller PMB 572X (= Step 5)

Market segment Telecom

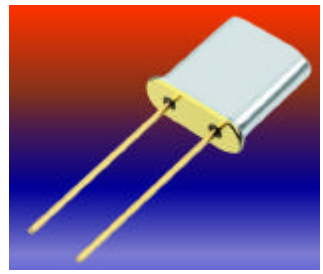
Application DECT Phone (handset and base station)

Enclosure [1]





ΦD min.	ΦD max.	L min.	H max.
0.4	0.48	12.7	8.8
			8.0



Frequency		10.368 MHz
Overtone		Fundamental
Adjustment tolerance		± 10 ppm @ 25 °C
Load Capacitance	C_L	23 pF others on request
Temperature stability		± 10 ppm from - 10 ... + 55 °C ± 5 ppm from + 10 ... + 40 °C
Resonance resistance	R_r max.	60 Ω over temperature
Motional capacitance	C_1	Defined by pulling sensitivity
Shunt capacitance	C_0	Defined by pulling sensitivity
Ageing		< ± 2 ppm / year @ 25 °C
Drive Level	P_q	0.1 mW
Pulling sensitivity		7.5 ppm/ pF ± 30%
Spurious resonances	R_{SP}/ R_r max.	> 2.5
Insulation resistance		> 500 MΩ @ 100 V DC
Packing		See handling & processing note.

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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CORNING
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DECT crystals

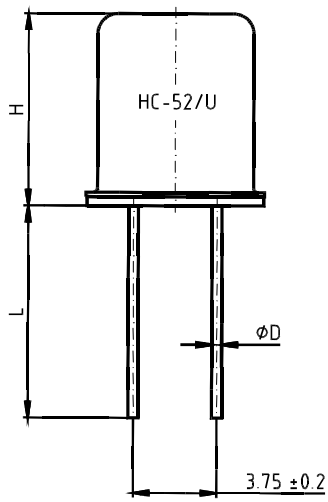
Crystals

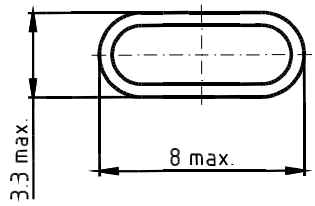
VLSI baseband controller VEGA+

Market segment Telecom

Application DECT Phone (handset and base station)

Enclosure [1]





ΦD min.	ΦD max.	L min.	H max.
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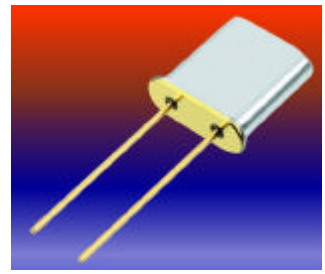
			8.0



Frequency		13.824 MHz
Overtone		Fundamental
Adjustment tolerance		± 10 ppm @ 25 °C
Load Capacitance	C_L	15 pF others on request
Temperature stability		± 10 ppm from - 10 ... + 55 °C ± 5 ppm from + 10 ... + 40 °C
Resonance resistance	R_r max.	30 Ω over temperature
Motional capacitance	C_1	10 fF ± 20 %
Shunt capacitance	C_0	7 pF max.
Ageing		< ± 2 ppm / year @ 25 °C
Drive Level	P_q	0.1 mW
Pulling sensitivity		Defined by C_0 / C_1 ratio
Frequency perturbations		< ± 2 ppm from - 10 ... + 55 °C
Insulation resistance		> 500 MΩ @ 100 V DC
Packing		See handling & processing note.

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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Typical Parameters of Doubly Rotated Cuts (DRAT-Crystals)

Frequency (MHz)	Mode	Holder	Cut	R_1 (Ω) (Max)	C_0 (pF) (Nom)	C_1 (fF) (Nom)	Q (Min)	Also Available in Holder (1)
4,000	fundamental	HC-47	IT	15	5,0	3,7	700,000	HC-40
5,000	fundamental	HC-40	FC	10	4,5	15,0	200,000	HC-40
5,000	fundamental	HC-37	SC	10	3,2	2,5	1300,000	HC-40, HC-47
7,000	fundamental	HC-37	SC	15	2,8	2,4	600,000	HC-40, HC-43, HC-47
10,000	fundamental	HC-37	SC	10	4,3	5,5	800,000	HC-40, HC-47
13,000	fundamental	HC-43	SC	10	4,4	6,8	200,000	HC-37, HC-47
13,000	fundamental	HC-35	FC	20	3,8	11,0	55,000	HC-43
20,000	fundamental	HC-35	SC	30	1,8	2,4	100,000	HC-43
24,000	fundamental	HC-35	SC	15	3,5	5,0	90,000	HC-43
4,5000	3rd overtone	HC-40	SC	130	2,4	0,18	1500,000	HC-47
5,000	3rd overtone	HC-40	SC	130	2,8	0,15	1600,000	HC-37, HC-47
6,000	3rd overtone	HC-47	SC	120	3,8	0,17	1300,000	HC-40
8,192	3rd overtone	HC-37	SC	85	3,4	0,25	900,000	HC-40, HC-47
10,000	3rd overtone	HC-37	SC	80	3,7	0,22	900,000	HC-40, HC-43, HC-47
10,000	3rd overtone	HC-37	IT	80	3,0	0,24	800,000	HC-40, HC-47
13,000	3rd overtone	HC-37	SC	85	4,3	0,21	700,000	HC-40, HC-43, HC-47
15,000	3rd overtone	HC-37	SC	80	2,2	0,28	500,000	HC-40, HC-43, HC-47
16,384	3rd overtone	HC-43	SC	80	3,4	0,23	550,000	HC-37, HC-40, HC-47
20,000	3rd overtone	HC-43	SC	60	3,4	0,44	300,000	HC-35, HC-37, HC-47
25,000	3rd overtone	HC-37	SC	60	2,6	0,38	280,000	HC-35, HC-43
30,000	3rd overtone	HC-43	SC	50	3,9	0,44	250,000	HC-35, HC-37
40,000	3rd overtone	HC-43	SC	40	3,5	0,53	180,000	HC-35, HC-37
50,000	3rd overtone	HC-35	SC	50	3,0	0,42	150,000	HC-37, HC-43
50,000	3rd overtone	HC-35	IT	50	2,2	0,33	200,000	HC-43
80,000	3rd overtone	HC-35	SC	45	3,2	0,45	100,000	HC-43
100,000	3rd overtone	HC-35	SC	50	2,8	0,38	80,000	-
115,000	3rd overtone	HC-35	SC	50	3,2	0,4	70,000	-
40,000	5th overtone	HC-37	SC	100	3,0	0,13	300,000	HC-47
50,000	5th overtone	HC35	SC	90	3,8	0,22	150,000	HC-37, HC-43
60,000	5th overtone	HC-35	SC	90	3,8	0,2	150,000	HC-43
80,000	5th overtone	HC-35	SC	90	3,8	0,2	100,000	HC-43
80,000	5th overtone	HC-35	IT	80	3,2	0,2	120,000	HC-43
100,000	5th overtone	HC-35	SC	100	3,8	0,2	80,000	HC-43
100,000	5th overtone	HC-35	IT	80	3,3	0,22	90,000	HC-43
120,000	5th overtone	HC-35	SC	100	3,8	0,17	70,000	HC-43
120,000	5th overtone	HC-35	IT	90	4,0	0,19	70,000	HC-43
140,000	5th overtone	HC-35	SC	115	4,0	0,14	70,000	HC-43
140,000	5th overtone	HC-35	FC	80	2,8	0,19	75,000	HC-43
160,000	5th overtone	HC-35	SC	120	4,0	0,16	50,000	HC-43

(1) The typical electrical parameters in these holders may be different, consult our engineering staff for data on these and other doubly rotated crystals.

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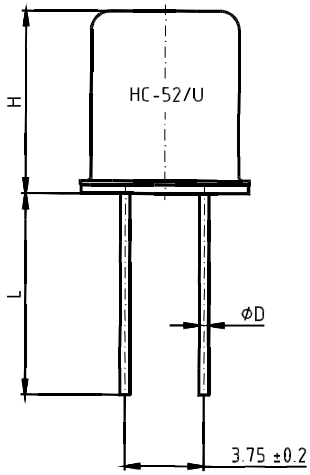
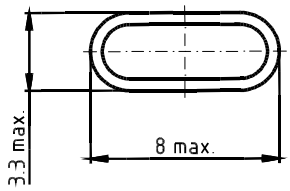
GPS crystals

Market segment	GPS	**Application**	Navigation, guidance, monitoring

Enclosure [1]





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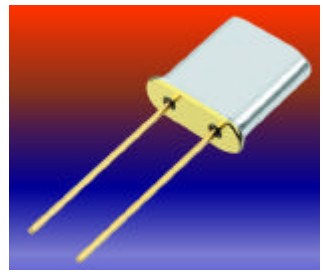
			8.0



Frequency		10.949297 MHz 20.460 MHz 24.55350 MHz
Overtone		Fundamental
Adjustment tolerance		± 5 ... ± 10 ppm @ 25 °C
Load Capacitance	C_L	30 ... 32 pF
Temperature stability		± 15 ppm @ - 40 ... + 85 °C
Resonance resistance	R_r max.	25 Ω @ 10.949297 MHz 20 Ω @ 20.460 MHz 20 Ω @ 24.55350 MHz
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 2 ppm / year @ 25 °C
Drive Level	P_q	0.1 mW
Shock resistivity		5000g in 0.1 ms
g-sensitivity		< 1 ppb/g at 125 Hz
Activity dips		< ± 0.5 ppm @ - 40 ... + 85 °C
Insulation resistance		> 500 MΩ @ 100 V DC
Packing		See handling & processing note.

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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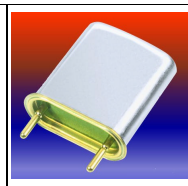
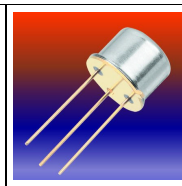
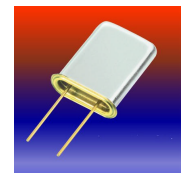
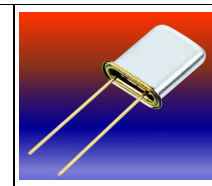
High Precision Crystals in cold-weld enclosure (AT-Cut)

Frequency	Enclosure					
						
	HC-35/U (TO5)	**HC-36/U HC-47/U**	**HC-37/U**	**HC-42/U HC-43/U**	**HC-45/U**	**HC-40/U**
fundamental	7,000 - 35,000	1,000 - 35,000	2,500 - 35,000	2,500 - 35,000	9,000 - 35,000	1,000 - 10,000
3rd overtone	20,000 - 120,000	5,000 - 105,000	15,000 - 60,000	12,000 - 120,000	27,000 - 120,000	5,000 - 30,000
5th overtone	10,000 - 165,000					not available
7th overtone	25,000 - 230,000					not available
9th overtone	162,000 - 300,000					not available
11th overtone	216,000 - 360,000					not available

Temperature range [°C]	Codes for the temperature stability [ppm]											
	± 2	± 3	± 4	± 5	± 7	± 10	± 15	± 20	± 25	± 30	± 40	± 50
+ 15 to + 35	105	106	107	108	109	110	111	112	113	114	115	116
+ 10 to + 40	117	118	119	120	121	122	123	124	125	126	127	128
+ 5 to + 45	129	130	131	132	133	134	135	136	137	138	139	140
+ 0 to + 50	141	142	143	29	144	37	145	146	147	148	149	150
- 5 to + 55	151	152	153	154	155	156	157	158	159	160	161	162
- 10 to + 60	163	26	164	165	166	28	167	168	169	170	171	172
- 15 to + 65		173	174	175	176	177	178	179	180	181	182	183
- 20 to + 70			25	18	184	14	185	12	186	187	188	10
- 25 to + 75				189	190	191	192	193	194	195	196	197
- 30 to + 80					198	32	31	199	33	200	201	202
- 40 to + 90						203	34	204	35	205	206	36
- 55 to + 105								207	24	208	209	22

= not applicable for :

Enclosures	Frequency range
HC-35/RW	7,000 - 8,499 MHz
HC-36/U & HC-47/U	1,000 - 1,599 MHz
HC-37/U	2,500 - 3,999 MHz
HC-42/U & HC-43/U	2,500 - 3,999 MHz
HC-45/U	9,000 - 10,999 MHz

Further information on request.

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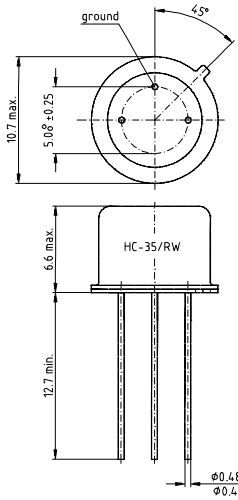
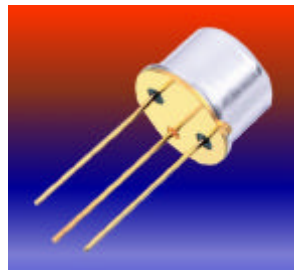
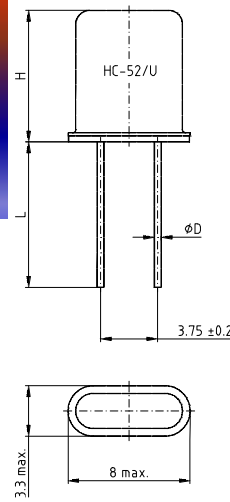
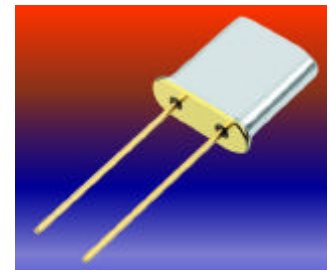






ϕD min.	ϕD max.	L min.	H max.
0.4	0.48	12.7	8.8
			8.0
0.32	0.38	9.0	6.0
			5.1



Height	Overtone	Frequency Range	Type	
			HC-35/RW (TO-5)	HC-52/U
8.8 mm	1.	3.5 MHz ... 50 MHz	not available	71
	3.	22 MHz ... 120 MHz		73
	5.	60 MHz ... 200 MHz		75
	7.	100 MHz ... 280 MHz		77
	9.	150 MHz ... 360 MHz		79
8.0 mm	1.	3.5 MHz ... 50 MHz	not available	81
	3.	22 MHz ... 120 MHz		83
	5.	60 MHz ... 200 MHz		85
	7.	100 MHz ... 280 MHz		87
	9.	150 MHz ... 360 MHz		89
6.6 mm	1.	3.5 MHz ... 50 MHz	111	not available
	3.	22 MHz ... 120 MHz	113	
	5.	60 MHz ... 200 MHz	115	
	7.	100 MHz ... 280 MHz	117	
	9.	150 MHz ... 360 MHz	119	
6.0 mm	1.	8 MHz ... 50 MHz	not available	91
	3.	30 MHz ... 120 MHz		93
	5.	60 MHz ... 200 MHz		95
	7.	100 MHz ... 280 MHz		97
	9.	150 MHz ... 360 MHz		99
5.1 mm	1.	12 MHz ... 50 MHz	not available	271
	3.	30 MHz ... 120 MHz		273
	5.	60 MHz ... 200 MHz		275
	7.	100 MHz ... 280 MHz		277
	9.	150 MHz ... 360 MHz		279

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Adjustment tolerance

D f/f @ 25 °C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L

8, 12, 16, 20, 30 pF fundamental
series overtone
Others on request

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	8.5 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	8.5 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	5.2 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	3.5 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	8.5 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	8.5 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. — Link to graph

Motional capacitance C_1 — Link to graph

Shunt capacitance C_0 — < 7pF

Ageing — < 3 ppm / year @ 25 °C

Drive level P_q — 0.1 mW

Packing — See handling & processing note.

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Ordering Code					
71	02	12	-	30	10.000 kHz
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals						
71	07	12	55	-	30	10.000 kHz
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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Enclosure

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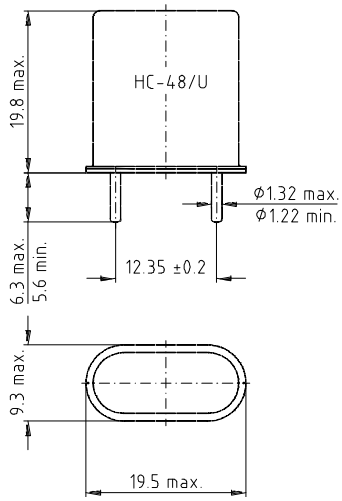

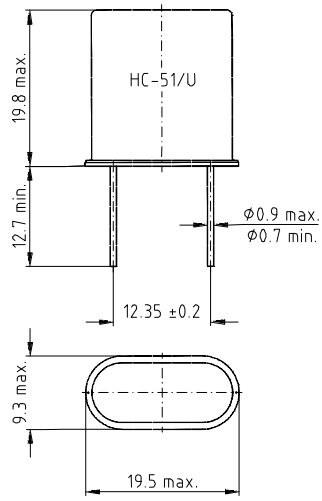

Height	Overtone	Frequency Range	Type	
			HC-48/U [2]	HC-51/U [2]
19.8 mm	1.	0.8 MHz ... 50 MHz	10	11
	3.	16 MHz ... 120 MHz	12	13
	5.	50 MHz ... 200 MHz	14	15
	7.	100 MHz ... 280 MHz	16	17
	9.	150 MHz ... 360 MHz	18	19

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Adjustment tolerance

D f/f @ 25°C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L 12, 16, 20, 30 pF series fundamental overtone

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	4.0 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	4.0 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	1.9 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	0.8 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	4.0 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	4.0 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. Link to graph

Motional capacitance C_1 Link to graph

Shunt capacitance C_0 < 7pF

Ageing < 3 ppm / year @ 25°C

Drive level P_q 0.1 mW

Packing See handling & processing note.

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Ordering Code					
10	02	12	-	30	10 MHz
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals						
10	07	12	55	-	30	10 MHz
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Discontinued model
3 Subject to technical modification
4 Not all options are available at all frequencies. Consult us for details.

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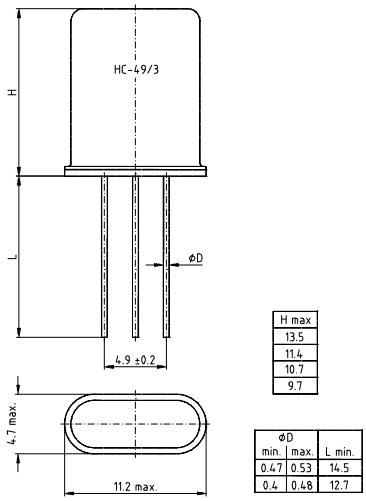
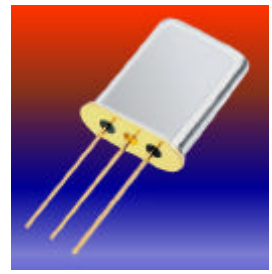
Enclosure [1]



H max.
13.5
11.4
10.7
9.7

ØD min.	ØD max.	L min.
0.47	0.53	14.5
0.4	0.48	12.7



Height	Overtone	Frequency Range	Type HC-49/3
13.5 mm	1.	1.8 MHz ... 50 MHz	F31
	3.	18 MHz ... 120 MHz	F33
	5.	50 MHz ... 200 MHz	F35
	7.	100 MHz ... 280 MHz	F37
	9.	150 MHz ... 360 MHz	F39
11.4 mm	1.	2.1 MHz ... 50 MHz	F41
	3.	18 MHz ... 120 MHz	F43
	5.	50 MHz ... 200 MHz	F45
	7.	100 MHz ... 280 MHz	F47
	9.	150 MHz ... 360 MHz	F49
10.7 mm	1.	4 MHz ... 50 MHz	F51
	3.	18 MHz ... 120 MHz	F53
	5.	50 MHz ... 200 MHz	F55
	7.	100 MHz ... 280 MHz	F57
	9.	150 MHz ... 360 MHz	F59
9.7 mm	1.	5 MHz ... 50 MHz	F61
	3.	18 MHz ... 120 MHz	F63
	5.	50 MHz ... 200 MHz	F65
	7.	100 MHz ... 280 MHz	F67
	9.	150 MHz ... 360 MHz	F69

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Adjustment tolerance

D f/f @ 25 °C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L

12, 16, 20, 30 pF fundamental
series overtone
Others on request

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	6.0 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	6.0 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	6.0 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	1.8 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	6.0 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	6.0 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. — Link to graph

Motional capacitance C_1 — Link to graph

Shunt capacitance C_0 — < 7pF

Ageing — < 3 ppm / year @ 25 °C

Drive level P_q — 0.1 mW

Packing — See handling & processing note.

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Ordering Code

F31	03	14	-	30	10 MHz
⌙	⌙	⌙		⌙	⌙
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals

F31	07	14	55	-	30	10 MHz
⌙	⌙	⌙	⌙		⌙	⌙
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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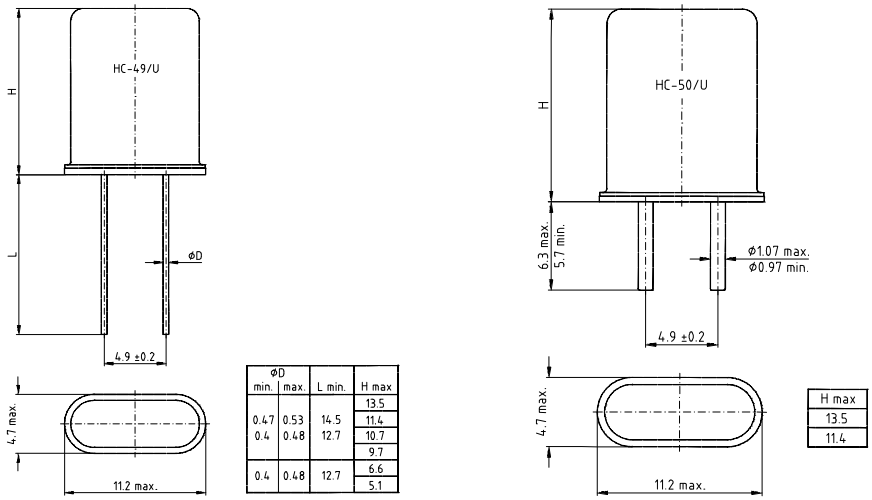
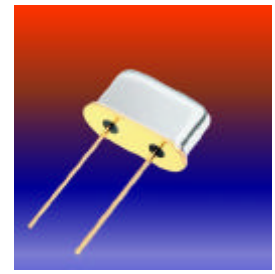


ØD min.	ØD max.	L min.	H max
0.47	0.53	14.5	13.5
0.4	0.48	12.7	11.4
			10.7
			9.7
0.4	0.48	12.7	6.6
			5.1

H max
13.5
11.4



Height	Overtone	Frequency Range	Type	
			HC-49/U	HC-50/U [2]
13.5 mm	1.	1.8 MHz ... 50 MHz	31	30
	3.	18 MHz ... 120 MHz	33	32
	5.	50 MHz ... 200 MHz	35	34
	7.	100 MHz ... 280 MHz	37	36
	9.	150 MHz ... 360 MHz	39	38
11.4 mm	1.	2.1 MHz ... 50 MHz	41	40
	3.	18 MHz ... 120 MHz	43	42
	5.	50 MHz ... 200 MHz	45	44
	7.	100 MHz ... 280 MHz	47	46
	9.	150 MHz ... 360 MHz	49	48
10.7 mm	1.	4 MHz ... 50 MHz	51	not available
	3.	18 MHz ... 120 MHz	53	
	5.	50 MHz ... 200 MHz	55	
	7.	100 MHz ... 280 MHz	57	
	9.	150 MHz ... 360 MHz	59	
9.7 mm	1.	5 MHz ... 50 MHz	61	not available
	3.	18 MHz ... 120 MHz	63	
	5.	50 MHz ... 200 MHz	65	
	7.	100 MHz ... 280 MHz	67	
	9.	150 MHz ... 360 MHz	69	
6.6 mm	1.	8 MHz ... 50 MHz	231	not available
	3.	30 MHz ... 120 MHz	233	
	5.	50 MHz ... 200 MHz	235	
	7.	100 MHz ... 280 MHz	237	
	9.	150 MHz ... 360 MHz	239	
5.1 mm	Only automotive applications ⇒ See *data sheet for automotive crystals.*			

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Adjustment tolerance

D f/f @ 25 °C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L

12, 16, 20, 30 pF Fundamental
series Overtone
Others on request

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	6.0 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	6.0 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	6.0 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	1.8 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	6.0 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	6.0 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. — Link to graph

Motional capacitance C_1 — Link to graph

Shunt capacitance C_0 — < 7pF

Ageing — < 3 ppm / year @ 25 °C

Drive level P_q — 0.1 mW

Packing — See handling & processing note.

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Ordering Code					
31	03	14	-	30	10 MHz
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals						
31	07	14	55	-	30	10 MHz
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Discontinued model
3 Subject to technical modification
4 Not all options are available at all frequencies. Consult us for details.

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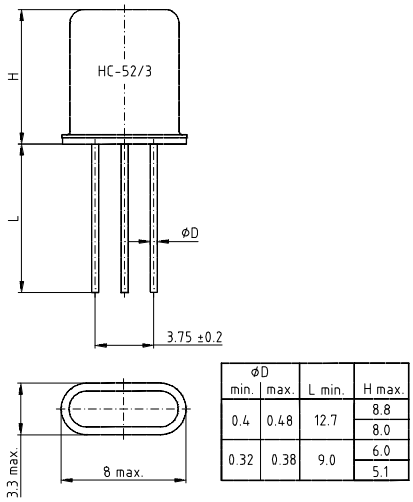
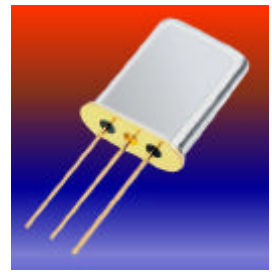
Enclosure [1]



ØD min.	ØD max.	L min.	H max.
0.4	0.48	12.7	8.8
			8.0
0.32	0.38	9.0	6.0
			5.1



Height	Overtone	Frequency Range	Type
			HC-52/3
8.8 mm	1.	3.5 MHz ... 50 MHz	F71
	3.	22 MHz ... 120 MHz	F73
	5.	60 MHz ... 200 MHz	F75
	7.	100 MHz ... 280 MHz	F77
	9.	150 MHz ... 360 MHz	F79
8.0 mm	1.	3.5 MHz ... 50 MHz	F81
	3.	22 MHz ... 120 MHz	F83
	5.	60 MHz ... 200 MHz	F85
	7.	100 MHz ... 280 MHz	F87
	9.	150 MHz ... 360 MHz	F89
6.0 mm	1.	8 MHz ... 50 MHz	F91
	3.	30 MHz ... 120 MHz	F93
	5.	60 MHz ... 200 MHz	F95
	7.	100 MHz ... 280 MHz	F97
	9.	150 MHz ... 360 MHz	F99
5.1 mm	1.	12 MHz ... 50 MHz	F271
	3.	30 MHz ... 120 MHz	F273
	5.	60 MHz ... 200 MHz	F275
	7.	100 MHz ... 280 MHz	F277
	9.	150 MHz ... 360 MHz	F279

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Adjustment tolerance

D f/f @ 25 °C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L

8, 12, 16, 20, 30 pF fundamental
series overtone
Others on request

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	8.5 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	8.5 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	5.2 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	3.5 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	8.5 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	8.5 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. — Link to graph

Motional capacitance C_1 — Link to graph

Shunt capacitance C_0 — < 7pF

Ageing — < 3 ppm / year @ 25 °C

Drive level P_q — 0.1 mW

Packing — See handling & processing note.

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Ordering Code

F71	02	12	-	30	10 MHz
⌙	⌙	⌙		⌙	⌙
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals

F71	07	12	55	-	30	10 MHz
⌙	⌙	⌙	⌙		⌙	⌙
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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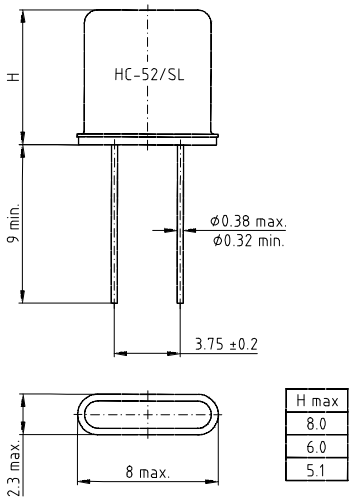

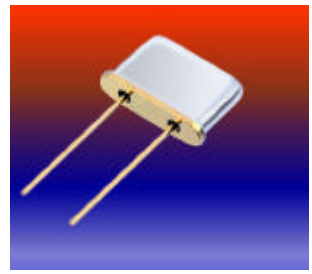

Height	Overtone	Frequency Range	Type
			HC-52/SL
8.0 mm	1.	3.5 MHz ... 50 MHz	SL81
	3.	18 MHz ... 120 MHz	SL83
	5.	60 MHz ... 200 MHz	SL85
	7.	100 MHz ... 280 MHz	SL87
	9.	150 MHz ... 360 MHz	SL89
6.0 mm	1.	8 MHz ... 50 MHz	SL91
	3.	30 MHz ... 120 MHz	SL93
	5.	60 MHz ... 200 MHz	SL95
	7.	100 MHz ... 280 MHz	SL97
	9.	150 MHz ... 360 MHz	SL99
5.1 mm	1.	12 MHz ... 50 MHz	SL271
	3.	30 MHz ... 120 MHz	SL273
	5.	60 MHz ... 200 MHz	SL275
	7.	100 MHz ... 280 MHz	SL277
	9.	150 MHz ... 360 MHz	SL279

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Adjustment tolerance

D f/f @ 25 °C [ppm]	Code I
± 100	01
± 50	02
± 20	03
± 15	04
± 10	05
± 7	06
± 5	07

Load capacitance C_L

8, 12, 16, 20, 30 pF fundamental
series overtone
Others on request

Temperature stability

Δ f/f [ppm]	Temperature range	Code II	Frequency range
± 5	0 °C ... + 50 °C	29	10 MHz ... 360 MHz
± 7.5	- 20 °C ... + 70 °C	16	10 MHz ... 360 MHz
± 10	- 20 °C ... + 70 °C	14	5 MHz ... 360 MHz
± 50	- 20 °C ... + 70 °C	10	3.5 MHz ... 360 MHz
± 25	- 40 °C ... + 90 °C	35	10 MHz ... 360 MHz
± 50	- 55 °C ... + 105 °C	22	10 MHz ... 360 MHz

Further temperature-codes

Resonance resistance R_r max. — Link to graph

Motional capacitance C_1 — Link to graph

Shunt capacitance C_0 — < 7pF

Ageing — < 3 ppm / year @ 25 °C

Drive level P_q — 0.1 mW

Packing — See handling & processing note.

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Ordering Code					
SL71	02	12	-	30	10 MHz
⌙	⌙	⌙		⌙	⌙
Type	Code I	Code II		Load capacitance	Frequency

Ordering Code for oven crystals						
SL71	07	12	55	-	30	10 MHz
⌙	⌙	⌙	⌙		⌙	⌙
Type	Code I**	Code II	Turn over point (TOP) [°C]		Load capacitance	Frequency

** adjustment tolerance refers to the TOP temperature

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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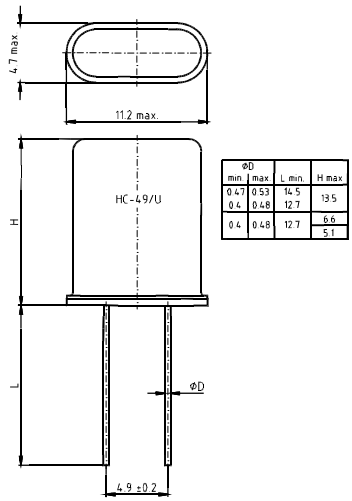
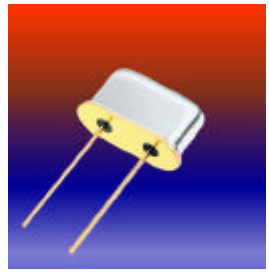
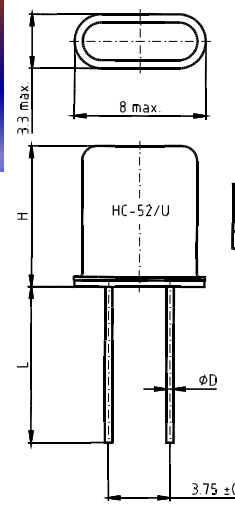
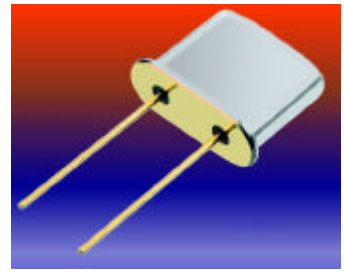


ΦD min.	ΦD max.	L min.	H max.
0.47	0.53	14.5	13.5
0.4	0.48	12.7	
0.4	0.48	12.7	6.6
			5.1





ΦD min.	ΦD max.	L min.	H max.
0.4	0.48	12.7	8.8
0.32	0.38	9.0	6.0



Height	Overtone	Frequency Range	Type	
			HC-49/U	HC-52/U
13.5 mm	1.	3 MHz ... 18 MHz	available	not available
8.8 mm		6 MHz ... 18 MHz	not available	available
6.6 mm (SH66)		6 MHz ... 18 MHz	available	not available
6.0 mm		8 MHz ... 18 MHz	not available	available
5.1 mm (SH51)		3.5 MHz ... 20 MHz	available	not available
13.5 mm	3.	< 20 MHz ... 60 MHz Upon request	available	not available
8.8 mm			not available	available
6.6 mm (SH66)			available	not available
6.0 mm			not available	available
5.1 mm (SH51)			available	not available

Adjustment tolerance ± 50 ppm / ± 30 ppm at 25°C

Load capacitance C_L 12, 18, 20, 30 pF
Others on request

Temperature stability [3]

		< 5 MHz		> 5MHz	
HC-49/U h = 13.5 mm	K	- 40 ... + 85°C		± 40 ppm	
	M	- 40 ... + 125°C		± 80 ppm	
HC-49/U h = 6.6 mm h = 5.1 mm	K	- 40 ... + 85°C	± 80 ppm	- 40 ... + 85°C	± 40 ppm
HC-52/U h = 8.8 mm h = 6.0 mm	M	- 40 ... + 130°C	± 100 ppm	- 40 ... + 130°C	± 80 ppm

Other values on request

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Resonance resistance R_r max.

	Height	Frequency range	R_r max.
HC-49/U	h = 13.5 mm	3.000 MHz ... 5.999 MHz	150 Ω
		6.000 MHz ... 7.999 MHz	120 Ω
		8.000 MHz ... 9.999 MHz	100 Ω
		10.000 MHz ... 18.000 MHz	80 Ω
	h = 6.6 mm	6.000 MHz ... 7.999 MHz	120 Ω
		8.000 MHz ... 9.999 MHz	100 Ω
		10.000 MHz ... 11.999 MHz	80 Ω
		12.000 MHz ... 18.000 MHz	80 Ω
	h = 5.1 mm	3.500 MHz ... 5.999 MHz	180 Ω
		6.000 MHz ... 7.999 MHz	120 Ω
		8.000 MHz ... 9.999 MHz	80 Ω
		10.000 MHz ... 11.999 MHz	70 Ω
		12.000 MHz ... 15.999 MHz	60 Ω
		16.000 MHz ... 20.000 MHz	50 Ω
HC-52/U	h = 8.8 mm	6.000 MHz ... 7.999 MHz	140 Ω
		8.000 MHz ... 9.999 MHz	100 Ω
		10.000 MHz ... 14.999 MHz	80 Ω
		15.000 MHz ... 18.000 MHz	80 Ω
	h = 6.0 mm	8.000 MHz ... 9.999 MHz	100 Ω
		10.000 MHz ... 14.999 MHz	80 Ω
		15.000 MHz ... 18.000 MHz	80 Ω

Motional capacitance C_1 Link to graph

Shunt capacitance C_0 < 7pF

Ageing < 3 ppm / year @ 25 °C

Drive level P_q 0.1 mW standard; actual values to be tested

Shock [3]

K	1000 g / 0.5 ms
M	5000 g / 0.2 ms (DIN) IEC 68-2-27, EA

Vibrations [3]

10 – 69 Hz	± 0.75 amplitude (DIN) IEC 68-2-6	
60 – 1000 Hz	K	10 g acceleration 96 h each axis
	M	20 g acceleration 96 h each axis

Packing See handling & processing note.

Note: 1 Units in mm
2 Subject to technical modification
3 M = engine compartment electronics K = dashboard electronics
4 Not all options are available at all frequencies. Consult us for details.

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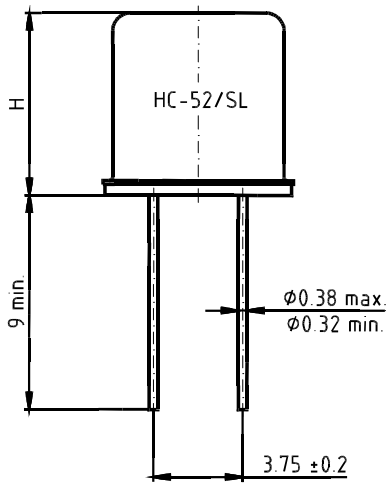
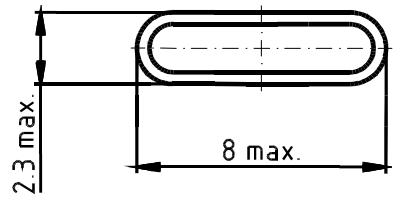
Pager crystals

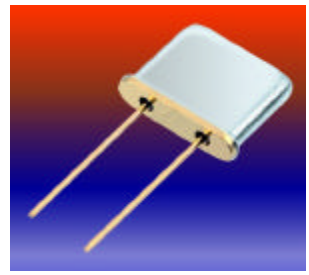
Market segment Paging **Application** Portable UHF/ VHF radio sets

Enclosure [1]





H max
8.0
6.0



Overtone/ Frequency Range		
	1st	10.000 MHz ... 29.999 MHz
	3rd	30.000 MHz ... 89.999 MHz
	5th	90.000 MHz ... 149.999 MHz
	7th	150.000 MHz ... 210.000 MHz
Adjustment tolerance		± 5 ppm @ 25 °C
Load capacitance	C_L	According to customers´ specification
Temperature stability		± 5 ppm - 10 ... + 60 °C
Resonance resistance	R_r max.	
	10.000 MHz ... 14.999 MHz	60 Ω
	15.000 MHz ... 19.999 MHz	45 Ω
	20.000 MHz ... 29.999 MHz	30 Ω
	30.000 MHz ... 89.999 MHz	70 Ω
	90.000 MHz ... 149.999 MHz	100 Ω
	150.000 MHz ... 210.000 MHz	180 Ω
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 2 ppm / year @ 25 °C
Drive Level	P_q	0.01 – 0.1 mW
Shock resistivity		5000g in 0.1 ms
Insulation resistance		> 500 MΩ @ 100 V DC
Packing		See handling & processing note.

Note:

1 Units in mm
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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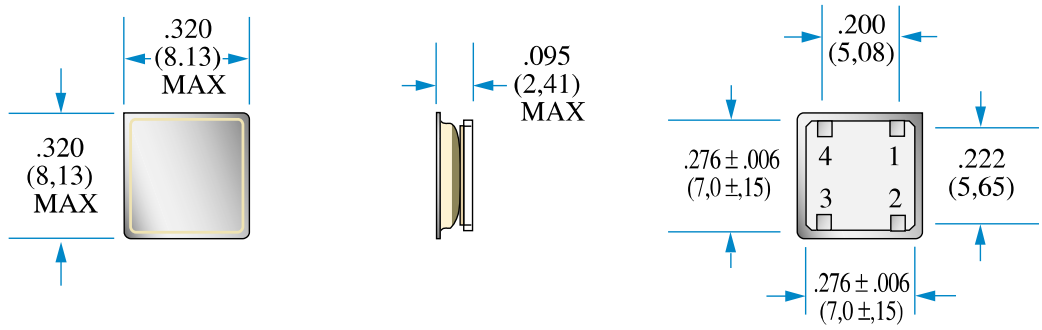
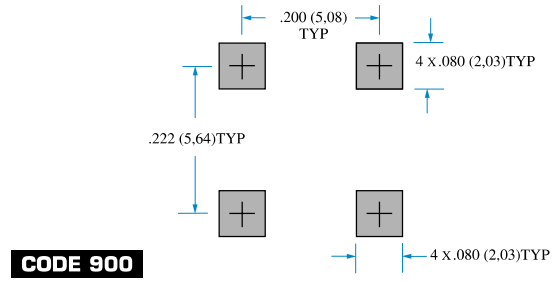


CRYSTAL: 1 and 3
N/C: 2 and 4

Suggested solder pad layout



CODE 900

Overtone/ Frequency Range

1st	8 MHz ... 31 MHz
3rd	25 MHz ... 90 MHz
5th	40 MHz ... 150 MHz
7th	80 MHz ... 200 MHz
9th	130 MHz ... 300 MHz

Adjustment tolerance ± 10 ppm / ± 15 ppm / ± 20 ppm @ 25 °C

Load capacitance C_L Series /10 to 90 pF/ 7th & 9th OT are both series

Temperature stability

Temperature range [°C]	Temperature stability [ppm]
+ 15 ... + 35 °C	± 2 ppm ... ± 50 ppm
+ 10 ... + 40 °C	± 2 ppm ... ± 50 ppm
+ 5 ... + 45 °C	± 2 ppm ... ± 50 ppm
0 ... + 50 °C	± 2 ppm ... ± 50 ppm
- 5 ... + 55 °C	± 3 ppm ... ± 50 ppm
- 10 ... + 60 °C	± 4 ppm ... ± 50 ppm
- 15 ... + 65 °C	± 5 ppm ... ± 50 ppm
- 20 ... + 70 °C	± 7 ppm ... ± 50 ppm
- 25 ... + 75 °C	± 7 ppm ... ± 50 ppm
- 30 ... + 80 °C	± 10 ppm ... ± 50 ppm
- 40 ... + 90 °C	± 15 ppm ... ± 50 ppm
- 55 ... + 105 °C	± 20 ppm ... ± 50 ppm

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Resonance resistance	R_r max.	See table below
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 2 ppm / year @ 25 °C
Drive Level	P_q	0.02 – 0.5 mW
Shock resistivity		5000g in 0.1 ms
Insulation resistance		> 500 MΩ @ 100 V DC
Packing		See handling & processing note.

Ohms [Ω]	Overtone
30 Ω	1st (fundamental)
30 Ω	3rd
60 Ω	5th
100 Ω	7th
150 Ω	9th

Note:

1 Units in inch (mm)
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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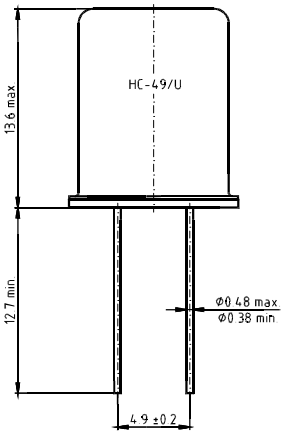
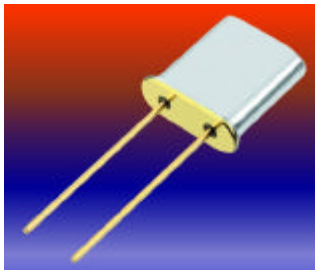
Typical Applications Telecommunications, industrial

Features HC-49/U standard package, resistance welded

Enclosure





all units in mm

Frequency range		1.84320 MHz to 75.000 MHz
Standard frequencies		In MHz

1.843200	4.194304	12.000000	20.000000
2.457600	7.372800	14.318180	24.000000
3.579545	8.000000	15.360000	36.000000
3.686400	10.000000	16.000000	60.000000
4.000000	11.059200	18.432000	

Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	

Resonance resistance & overtone

Frequency range	R_r max.	Overtone
1.8432...1.999 MHz	800	1. (fundamental)
2.000.....2.999 MHz	600	1. (fundamental)
3.000.....3.499 MHz	250	1. (fundamental)
3.500.....4.999 MHz	150	1. (fundamental)
5.000.....6.999 MHz	80	1. (fundamental)
7.000.....9.999 MHz	50	1. (fundamental)
10.000...23.999 MHz	35	1. (fundamental)
24.000...75.000 MHz	60	3.

Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		See handling & processing note.

Ordering Code

EA1.	30		18432.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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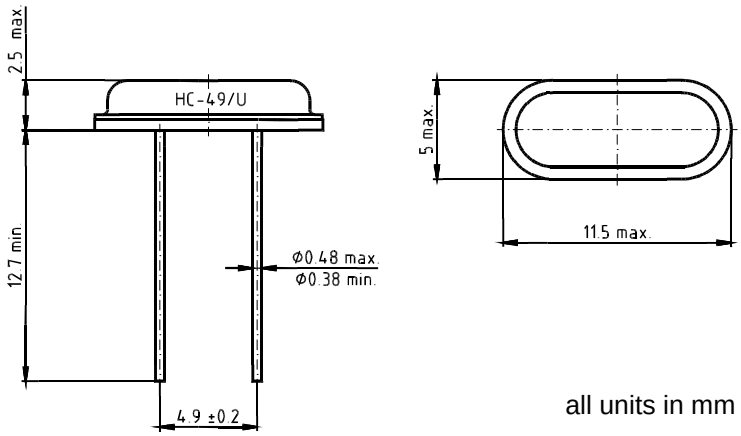
Typical Applications	Telecom, industrial, micro processor crystals	**Features**	HC-49/U low profile, leaded, height : 2.5 mm max.

Enclosure



all units in mm

Frequency range		3.579545 MHz to 60.000 MHz
Standard frequencies		In MHz

3.579545	7.372800	12.000000	20.000000
3.686400	8.000000	14.318180	24.000000
4.000000	9.830400	15.360000	32.000000
4.194304	10.000000	16.000000	40.000000
4.433619	11.059200	18.432000	60.000000

Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	

Resonance resistance & overtone

Frequency range	R_r max.	Overtone
3.579545...3.999 MHz	200	1. (fundamental)
4.000.....4.999 MHz	150	1. (fundamental)
5.000.....7.999 MHz	120	1. (fundamental)
8.000.....11.999 MHz	80	1. (fundamental)
12.000.....13.999 MHz	60	1. (fundamental)
14.000.....23.999 MHz	50	1. (fundamental)
24.000.....27.000 MHz	40	1. (fundamental)
27.000.....60.000 MHz	80	3.

Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		See handling & processing note.

Ordering Code

EB1.	S		11059.2 kHz
⌣	⌣	⌣	⌣
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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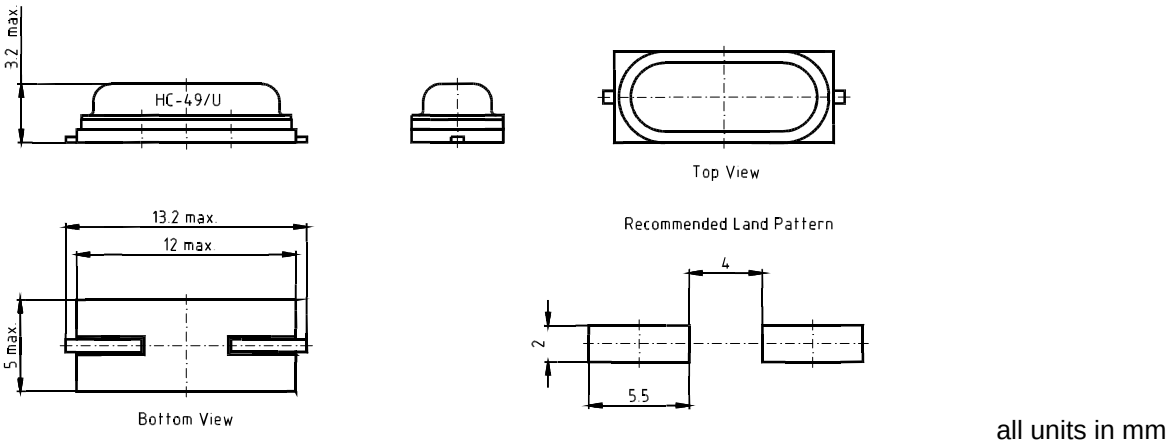
Typical Applications	Telecom, industrial, micro processor crystals	**Features**	HC-49/U low profile, SMD, height : 3.2 mm max.

Enclosure



all units in mm

Frequency range 3.579545 MHz to 60.000 MHz

Standard frequencies

In MHz			
3.579545	7.372800	12.000000	20.000000
3.686400	8.000000	14.318180	24.000000
4.000000	9.830400	15.360000	32.000000
4.194304	10.000000	16.000000	40.000000
4.433619	11.059200	18.432000	60.000000

Adjustment tolerance ± 30 ppm @ 25 °C

Load Capacitance C_L 30 pF or series (S)

Temperature stability ± 50 ppm from -20 ... + 70 °C

Resonance resistance R_r max.

Resonance resistance & overtone

Frequency range	R_r max.	Overtone
3.579545...3.999 MHz	200	1. (fundamental)
4.000.....4.999 MHz	150	1. (fundamental)
5.000.....7.999 MHz	120	1. (fundamental)
8.000.....11.999 MHz	80	1. (fundamental)
12.000.....13.999 MHz	60	1. (fundamental)
14.000.....23.999 MHz	50	1. (fundamental)
24.000.....27.000 MHz	40	1. (fundamental)
27.000.....60.000 MHz	80	3.

Shunt capacitance C_0 < 7 pF

Ageing < ± 5 ppm / year @ 25 °C

Drive Level P_d 0.1 mW

Packing Taped, see handling & processing note.

Ordering Code

EC3.	S		40000.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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CORNING
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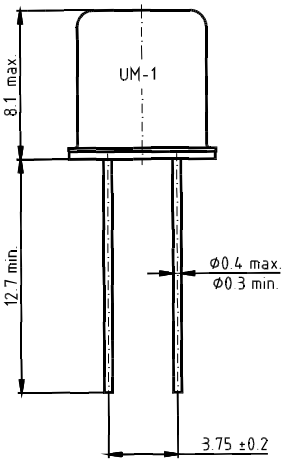
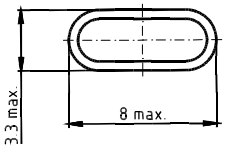
ED

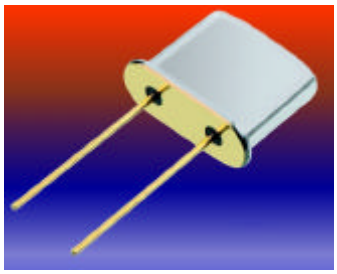
Crystals

Typical Applications	Telecommunications, industrial	**Features**	UM-1, leaded, resistance welded

Enclosure







all units in mm

Frequency range 7.000 MHz to 80.000 MHz

Standard frequencies

In MHz			
7.372800	12.000000	18.432000	24.000000
8.000000	14.318180	19.660800	25.000000
9.830400	14.745600	20.000000	32.000000
10.000000	15.000000	20.945000	40.000000
11.059200	16.000000	22.118400	60.000000

Adjustment tolerance ± 30 ppm @ 25 °C

Load Capacitance C_L 30 pF or series (S)

Temperature stability ± 50 ppm from -20 ... + 70 °C

Resonance resistance R_r max.

Resonance resistance & overtone		
Frequency range	R_r max.	Overtone
7.000.....7.999 MHz	100	1. (fundamental)
8.000.....9.999 MHz	80	1. (fundamental)
10.000.....15.999 MHz	60	1. (fundamental)
16.000.....31.999 MHz	30	1. (fundamental)
32.000.....80.000 MHz	80	3.

Shunt capacitance C_0 < 7 pF

Ageing < ± 5 ppm / year @ 25 °C

Drive Level P_d 0.1 mW

Packing See handling & processing note.

Ordering Code

ED1.	30		20945.0 kHz
⌄	⌄	⌄	⌄
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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CORNING
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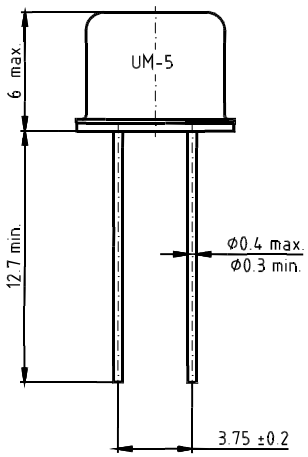
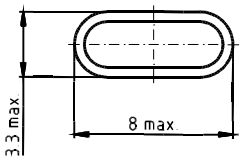
EE

Crystals

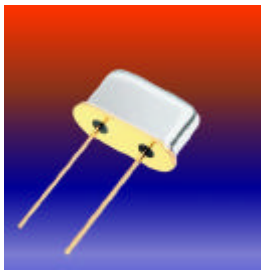
Typical Applications	Telecommunications, industrial	**Features**	UM-5, leaded, resistance welded

Enclosure





all units in mm



Frequency range		12.000 MHz to 80.000 MHz
Standard frequencies		In MHz 12.000000 18.000000 22.118400 48.000000 14.318180 18.432000 24.000000 60.000000 14.745600 19.660800 25.000000 80.000000 15.000000 20.000000 32.000000 16.000000 20.945000 40.000000
Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	Resonance resistance & overtone Frequency range / R_r max. / Overtone 12.000.....19.999 MHz / 60 / 1. (fundamental) 20.000.....31.999 MHz / 40 / 1. (fundamental) 32.000.....80.000 MHz / 70 / 3.
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		See handling & processing note.

Ordering Code

EE1.	30		14318.18 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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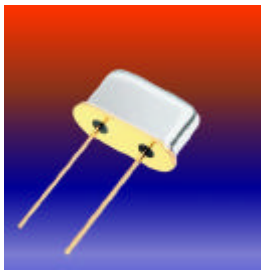
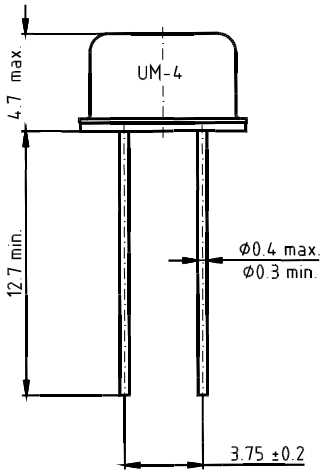
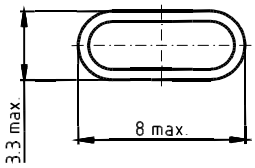
Typical Applications	Telecommunications, industrial	**Features**	UM-4, leaded, resistance welded

Enclosure







all units in mm

Frequency range		12.000 MHz to 80.000 MHz
Standard frequencies		In MHz 12.000000 18.000000 22.118400 48.000000 14.318180 18.432000 24.000000 60.000000 14.745600 19.660800 25.000000 80.000000 15.000000 20.000000 32.000000 16.000000 20.945000 40.000000
Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	Resonance resistance & overtone Frequency range / R_r max. / Overtone 12.000.....19.999 MHz / 60 / 1. (fundamental) 20.000.....31.999 MHz / 40 / 1. (fundamental) 32.000.....80.000 MHz / 70 / 3.
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		See handling & processing note.

Ordering Code

EF1.	S		25000.0 kHz
type + overtone	load capacitance	blank	frequency

Note:
1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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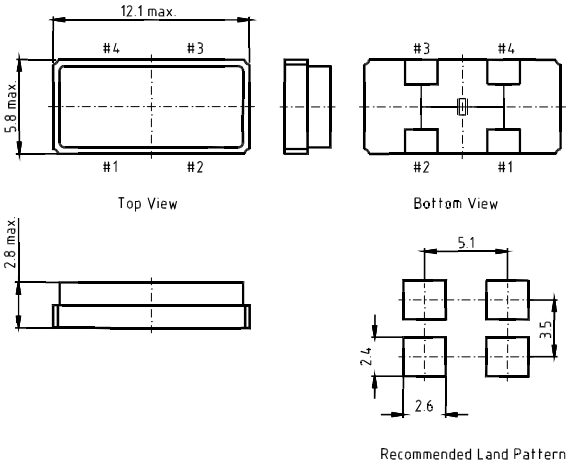
Typical Applications	Telecommunications, industrial,	**Features**	11.8 x 5.5, leadless ceramic package , glass sealed

Enclosure



all units in mm

Frequency range		3.579545 MHz to 60.000 MHz
Standard frequencies		In MHz

3.579545	7.372800	12.000000	18.432000
3.686400	8.000000	14.318180	20.000000
4.000000	9.830400	14.745600	24.000000
4.194304	10.000000	15.360000	24.576000
4.608000	10.240000	16.000000	25.000000
4.915200	11.059200	16.384000	32.000000

Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	16 pF or series (S)
Temperature stability		± 50 ppm from -10 ... + 60 °C
Resonance resistance	R_r max.	Resonance resistance & overtone

Frequency range	R_r max.	Overtone
3.579545.....3.999 MHz	200	1. (fundamental)
4.000.....5.999 MHz	150	1. (fundamental)
6.000.....9.999 MHz	100	1. (fundamental)
10.000...14.999 MHz	80	1. (fundamental)
15.000...29.999 MHz	50	1. (fundamental)
27.000...60.000 MHz	100	3.

Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		Taped, see handling & processing note.

Ordering Code

EG1.	16		18432.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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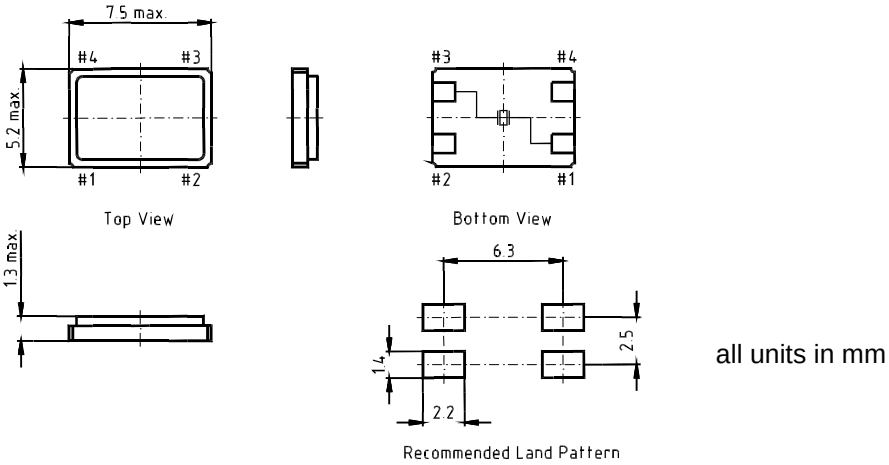
Typical Applications	Telecommunications, industrial,	**Features**	7.0 x 5.0, leadless ceramic package , seam sealed

Enclosure



all units in mm

Frequency range 10.000 MHz to 80.000 MHz

Standard frequencies

In MHz			
10.000000	15.360000	22.118400	32.000000
10.240000	16.000000	24.000000	40.000000
11.059200	16.384000	24.576000	44.236800
12.000000	16.934400	25.000000	48.000000
12.288000	18.432000	27.000000	50.000000
14.318180	20.000000	28.224000	56.448000
14.745600	20.480000	30.000000	

Adjustment tolerance ± 20 ppm @ 25 °C

Load Capacitance C_L 20 pF or series (S)

Temperature stability ± 20 ppm from -20 ... + 70 °C

Resonance resistance R_r max.

Resonance resistance & overtone		
Frequency range	R_r max.	Overtone
10.000...21.999 MHz	60	1. (fundamental)
22.000...44.239 MHz	50	1. (fundamental)
34.000...80.000 MHz	80	3.

Shunt capacitance C_0 < 7 pF

Ageing < ± 5 ppm / year @ 25 °C

Drive Level P_d 0.1 mW

Packing Taped, see handling & processing note.

Ordering Code

EH1.	20		18432.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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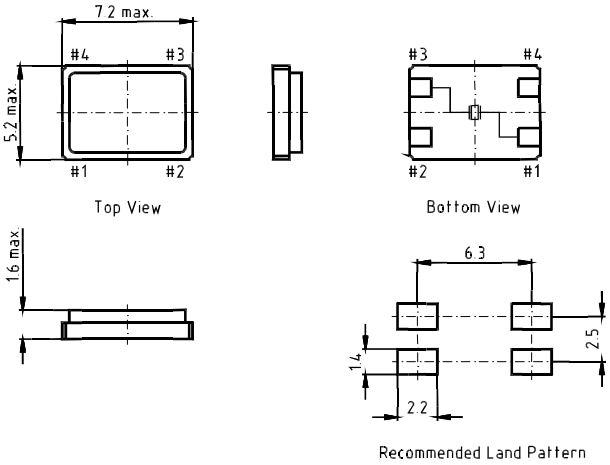
Typical Applications	Telecommunications, industrial,	**Features**	7.0 x 5.0, leadless ceramic package , glass sealed

Enclosure



all units in mm

Frequency range 10.000 MHz to 60.000 MHz

Standard frequencies

In MHz			
10.000000	15.360000	22.118400	32.000000
10.240000	16.000000	24.000000	40.000000
11.059200	16.384000	24.576000	44.236800
12.000000	16.934400	25.000000	48.000000
12.288000	18.432000	27.000000	50.000000
14.318180	20.000000	28.224000	56.448000
14.745600	20.480000	30.000000	

Adjustment tolerance ± 50 ppm @ 25 °C

Load Capacitance C_L 20 pF or series (S)

Temperature stability ± 50 ppm from -20 ... + 70 °C

Resonance resistance R_r max.

Resonance resistance & overtone		
Frequency range	R_r max.	Overtone
10.000...21.999 MHz	60	1. (fundamental)
22.000...44.239 MHz	50	1. (fundamental)
40.000...60.000 MHz	80	3.

Shunt capacitance C_0 < 7 pF

Ageing < ± 5 ppm / year @ 25 °C

Drive Level P_d 0.1 mW

Packing Taped, see handling & processing note.

Ordering Code

EI1.	S		15360.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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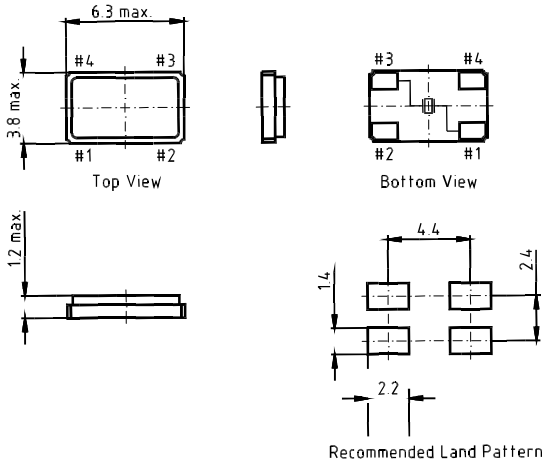
Typical Applications	Telecommunications, industrial,	**Features**	6.0 x 3.5, leadless ceramic package , seam sealed

Enclosure



all units in mm

Frequency range		13.000 MHz to 60.000 MHz
Standard frequencies		In MHz 14.318180 19.660800 30.000000 50.000000 14.745600 20.000000 32.000000 15.000000 24.000000 36.000000 16.000000 24.576000 40.000000 18.432000 29.491200 40.320000
Adjustment tolerance		± 20 ppm @ 25 °C
Load Capacitance	C_L	20 pF or series (S)
Temperature stability		± 20 ppm from -10 ... + 60 °C
Resonance resistance	R_r max.	Resonance resistance & overtone Frequency range / R_r max. / Overtone 13.000...21.999 MHz / 60 / 1. (fundamental) 22.000...40.000 MHz / 40 / 1. (fundamental) 40.001...60.000 MHz / 70 / 3.
Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		Taped, see handling & processing note.

Ordering Code

EK1.	20		18432.0 kHz
type + overtone	load capacitance	blank	frequency

Note:
1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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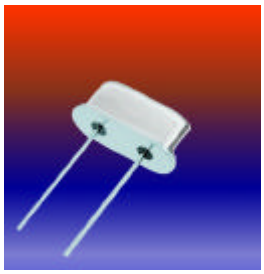
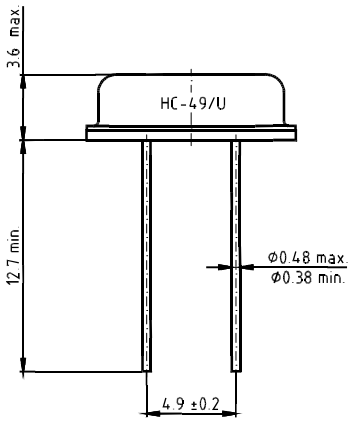
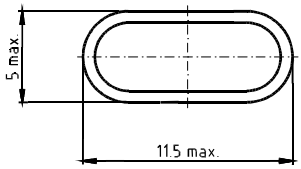
Typical Applications	Telecom, industrial, micro processor crystals	**Features**	HC-49/U low profile, leaded, height : 3.6 mm max.

Enclosure







all units in mm

Frequency range		3.579545 MHz to 60.000 MHz
Standard frequencies		In MHz

3.579545	7.372800	12.000000	20.000000
3.686400	8.000000	14.318180	24.000000
4.000000	9.830400	15.360000	32.000000
4.194304	10.000000	16.000000	40.000000
4.433619	11.059200	18.432000	60.000000

Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	Resonance resistance & overtone

Frequency range	R_r max.	Overtone
3.579545...3.999 MHz	200	1. (fundamental)
4.000.....4.999 MHz	150	1. (fundamental)
5.000.....7.999 MHz	120	1. (fundamental)
8.000.....11.999 MHz	80	1. (fundamental)
12.000.....13.999 MHz	60	1. (fundamental)
14.000.....23.999 MHz	50	1. (fundamental)
24.000.....27.000 MHz	40	1. (fundamental)
27.000.....60.000 MHz	80	3.

Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		See handling & processing note.

Ordering Code

EN1.	30		16000.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
3 Not all options are available at all frequencies. Consult us for details.

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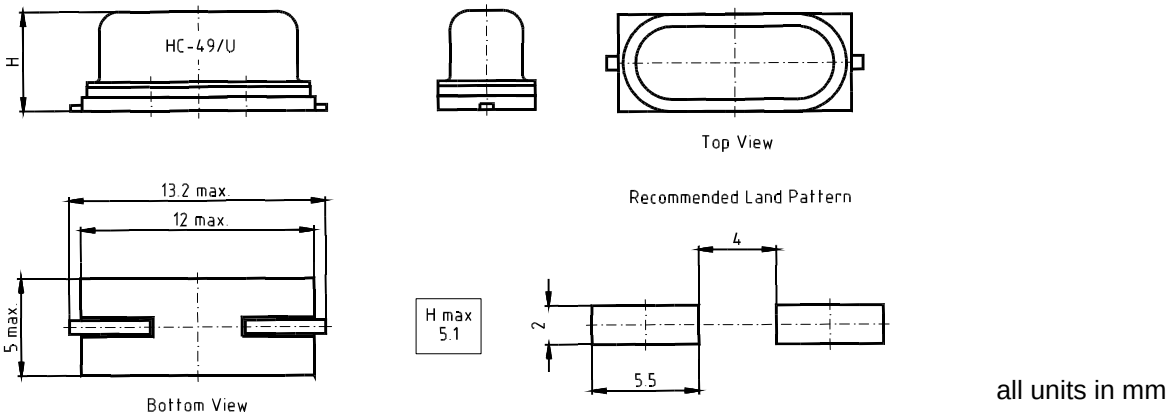
Typical Applications	Telecom, industrial, micro processor crystals	**Features**	HC-49/U low profile, SMD, height : 5.1 mm max.

Enclosure



all units in mm

Frequency range		3.579545 MHz to 60.000 MHz
Standard frequencies		In MHz

3.579545	7.372800	12.000000	20.000000
3.686400	8.000000	14.318180	24.000000
4.000000	9.830400	15.360000	32.000000
4.194304	10.000000	16.000000	40.000000
4.433619	11.059200	18.432000	60.000000

Adjustment tolerance		± 30 ppm @ 25 °C
Load Capacitance	C_L	30 pF or series (S)
Temperature stability		± 50 ppm from -20 ... + 70 °C
Resonance resistance	R_r max.	Resonance resistance & overtone

Frequency range	R_r max.	Overtone
3.579545...3.999 MHz	200	1. (fundamental)
4.000.....4.999 MHz	150	1. (fundamental)
5.000.....7.999 MHz	120	1. (fundamental)
8.000.....11.999 MHz	80	1. (fundamental)
12.000.....13.999 MHz	60	1. (fundamental)
14.000.....23.999 MHz	50	1. (fundamental)
24.000.....27.000 MHz	40	1. (fundamental)
27.000.....60.000 MHz	80	3.

Shunt capacitance	C_0	< 7 pF
Ageing		< ± 5 ppm / year @ 25 °C
Drive Level	P_d	0.1 mW
Packing		Taped, see handling & processing note.

Ordering Code

EO1.	30		4000.0 kHz
type + overtone	load capacitance	blank	frequency

Note: 1 Additional parameters : see frame specification TQE 9000
2 Subject to technical modification
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