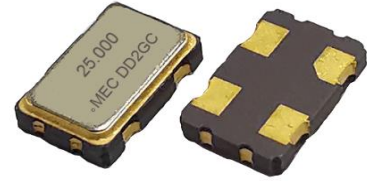


Crystal Oscillators CMOS output

Surface Mount type				
H21	H22	H32	H53	SWO
2.0 * 1.6 * 0.8	2.5 * 2.0 * 0.9	3.2 * 2.5 * 1.0	5.0 * 3.2 * 1.2	7.0 * 5.0 * 1.4

CMOS	1.0 V	1.8 V	3.3 V	Min.	Max.
	1.2 V	2.5 V	5.0 V	50 KHz	160 MHz

- Applications**
- CPU , Graphics , Multimedia A / V clocks
 - MPEG / DVD / HDTV clocks
 - Laser engine pixel / set - top clocks
 - SONET / SDH / ATM clocks
 - Fast Ethernet and Gigabit Ethernet clocks
 - NTSC / PAL encoder / decoder clocks
 - PLL / synthesizer clocks
 - Fibre channel and ADSL clocks



General Specifications [Ta = +25°C , V_{DD}= at specified voltage , Load : 15 pF]

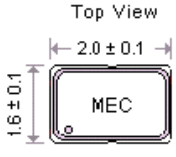
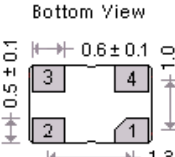
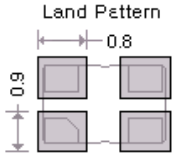
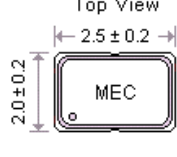
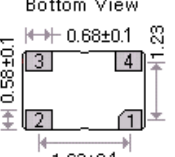
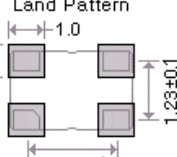
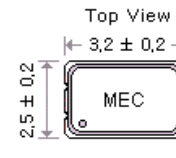
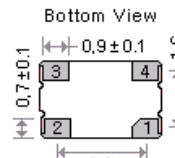
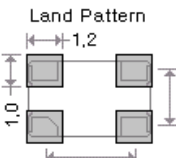
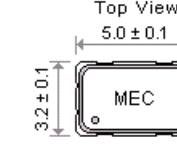
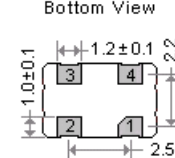
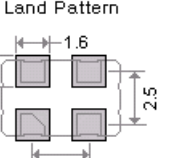
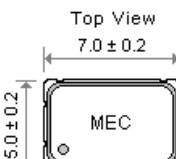
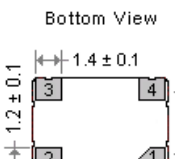
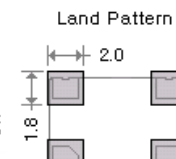
Model		" H21 " ; " H22 " ; " H32 " ; " H53 " and " SWO " series				
Type		" H21 " series	" H22 " series	" H32 " series	" H53 " series	" SWO " series
Dimensions		2.0 x 1.6 x 0.8 mm	2.5 x 2.0 x 0.9 mm	3.2 x 2.5 x 1.0 mm	5.0 x 3.2 x 1.2 mm	7.0 x 5.0 x 1.4 mm
Available Frequency Range by Voltage	1.0 V	----	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz
	1.2 V	----	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz	0.75 MHz ~ 50 MHz
	1.8 V	1 MHz ~ 60 MHz	0.0625 MHz ~ 160 MHz	0.0625 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz
	2.5 V	1 MHz ~ 60 MHz	0.0625 MHz ~ 160 MHz	0.0625 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz
	3.3 V	1 MHz ~ 60 MHz	0.0625 MHz ~ 160 MHz	0.0625 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz	0.05 MHz ~ 160 MHz
5.0 V	----	1 MHz ~ 50 MHz	1 MHz ~ 50 MHz	0.05 MHz ~ 135 MHz	0.05 MHz ~ 135 MHz	

Supply Voltage (V _{DD})		+1.0 V ± 5%	+1.2 V ± 5%	+1.8 V ± 10%	+2.5 V ± 10%	+3.3 V ± 10%	+5.0 V ± 10%
		code is " 10 "	code is " 12 "	code is " 18 "	code is " 25 "	code is " 3 "	code is " 5 "
Output Logic " High " , " 1 "		0.9 V (min.)	1.08 V (min.)	1.62 V (min.)	2.25 V (min.)	2.97 V (min.)	4.5 V (min.)
Output Logic " Low " , " 0 "		0.1 V (max.)	0.12 V (max.)	0.18 V (max.)	0.25 V (max.)	0.33 V (max.)	0.5 V (max.)
Current Consumption	< 25 MHz	4 mA (max.)	4 mA (max.)	5 mA (max.)	5 mA (max.)	5 mA (max.)	5 mA (max.)
	25 ~ 50 MHz	5 mA (max.)	5 mA (max.)	8 mA (max.)	10 mA (max.)	12 mA (max.)	10 mA (max.)
	51 ~ 100 MHz	---	---	10 mA (max.)	15 mA (max.)	30 mA (max.)	30 mA (max.)
	101 ~ 160 MHz	---	---	15 mA (max.)	20 mA (max.)	40 mA (max.)	40 mA (max.)
Rise Time (Tr) / Fall Time (Tf)		6 nsec. (max.)					
		Measured between 10% ↔ 90% of wave form (CL = 15pF)					

Frequency Stability Codes	Frequency Stability over Operating Temperature Range	± 25 ppm	± 50 ppm	± 100 ppm	If non-standard , please enter the desired stability after the " C " or " I " . For example : " C20 " ±20 ppm over -10°C to +70°C ; " I30 " ± 30 ppm over -40°C to +85°C
	Commercial (-10°C to +70°C)	A	B	C	
	Industrial (-40°C to +85°C)	D	E	F	

Output Load	15 pF ; (30 pF and 50 pF load are also available for +3.3V and +5.0V V _{DD})
Duty Cycle	Standard: 50% ± 10%; Option: 50% ± 5%. Please add "-S" at the end of the part number for ± 5% .
Start - up Time	1.0 ~ 32.0 MHz : 5 msec. (max.) ; 32.1 ~ 160.0 MHz : 10 msec. (max.)
Storage Temperature	- 55°C to 125°C
Aging at Ta=+25°C	± 3 ppm per year (max.)
Output Enable / Disable Function	70% of V _{DD} (min.) to enable output.
	30% of V _{DD} (max.) to disable output.
	Disable current : 10 uA max. for OE ≤ 0.3V

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[H21]	[H22 ; H_22]
   <p>Top View</p> <p>Bottom View</p> <p>Land Pattern</p> <p>Side View</p> <p>Pad Connections : Pad 1 : OE Pad 3 : Output Pad 2 : Ground Pad 4 : Supply Voltage</p>	   <p>Top View</p> <p>Bottom View</p> <p>Land Pattern</p> <p>Side View</p> <p>Pad Connections : Pad 1 : OE Pad 3 : Output Pad 2 : Ground Pad 4 : Supply Voltage</p>
[H32 ; H_32]	[H53 ; H_53]
   <p>Top View</p> <p>Bottom View</p> <p>Land Pattern</p> <p>Side View</p> <p>Pad Connections : Pad 1 : OE Pad 3 : Output Pad 2 : Ground Pad 4 : Supply Voltage</p>	   <p>Top View</p> <p>Bottom View</p> <p>Land Pattern</p> <p>Side View</p> <p>Pad Connections : Pad 1 : OE Pad 3 : Output Pad 2 : Ground Pad 4 : Supply Voltage</p>
[SWO ; H_57]	
   <p>Top View</p> <p>Bottom View</p> <p>Land Pattern</p> <p>Side View</p> <p>Pad Connections : Pad 1 : OE Pad 3 : Output Pad 2 : Ground Pad 4 : Supply Voltage</p>	

Thru - Hole

H8

H14

CMOS

1.0 V

1.2 V

1.8 V

2.5 V

3.3 V

5.0 V

Min.

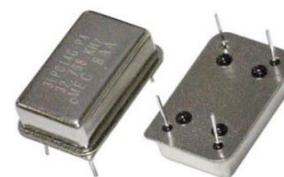
50 KHz

Max.

160 MHz

Applications

- CPU , Graphics , Multimedia A / V clocks
- MPEG / DVD / HDTV clocks
- Laser engine pixel / set - top clocks
- SONET / SDH / ATM clocks
- Fast Ethernet and Gigabit Ethernet clocks
- NTSC / PAL encoder / decoder clocks
- PLL / synthesizer clocks
- Fibre channel and ADSL clocks



General Specifications [Ta = +25°C]

Type	Thru - Hole type					
Model (Dimensions)	H8 (12.8 * 12.8 * 6.3 mm)			H14 (20.2 * 12.8 * 5.8 mm)		
Supply Voltage (V _{DD})	+ 1.0 V ± 5%	+ 1.2 V ± 5%	+ 1.8 V ± 10%	+ 2.5 V ± 10%	+ 3.3 V ± 10%	+ 5.0 V ± 10%
	code is " 10 "	code is " 12 "	code is " 18 "	code is " 25 "	code is " 3 "	code is " 5 "
Frequency Range	0.75 ~ 50 MHz			0.05 ~ 160 MHz		0.05 ~ 135 MHz
Output Logic " High " , " 1 "	0.9 V (min.)	1.08 V (min.)	1.62 V (min.)	2.25 V (min.)	2.97 V (min.)	4.5 V (min.)
Output Logic " Low " , " 0 "	0.1 V (max.)	0.12 V (max.)	0.18 V (max.)	0.25 V (max.)	0.33 V (max.)	0.5 V (max.)
Current Consumption	< 25 MHz	4 mA (max.)	4 mA (max.)	5 mA (max.)	5 mA (max.)	5 mA (max.)
	50 MHz	5 mA (max.)	5 mA (max.)	8 mA (max.)	10 mA (max.)	12 mA (max.)
	100 MHz	---	---	10 mA (max.)	15 mA (max.)	30 mA (max.)
	160 MHz	---	---	15 mA (max.)	20 mA (max.)	40 mA (max.)
Disable Current	10 uA (max.) at OE ≤ 0.3V					
Frequency Stability Codes	Frequency Stability over Operating Temperature Range	± 25 ppm	± 50 ppm	± 100 ppm	If non-standard , please enter the desired stability after the " C " or " I " For example : " C20 " ±20 ppm over -10°C to +70°C ; " I30 " ± 30 ppm over -40°C to +85°C	
	Commercial (-10°C to +70°C)	A	B	C		
	Industrial (-40°C to +85°C)	D	E	F		
Output Load	15 pF (max.) ; 30 pF load for frequencies up to 70 MHz ; Contact Mercury for 50 pF load					
Rise Time (Tr)	10 nsec.(max.) ; 3 nsec.(typ.) . Measured between 10% to 90% waveform (CL=15pF)					
Fall Time (Tf)	10 nsec.(max.) ; 3 nsec.(typ.) . Measured between 10% to 90% waveform (CL=15pF)					
Duty Cycle	50% ± 10 % of waveform [50% ± 5% is also available , add " S " at the end of the part number]					
Start - Up Time	10 msec. (max.) ; 5 msec. (typ.)					
Storage Temperature	- 55°C to 150°C					
Aging at Ta=+25°C	± 5.0 ppm per year (max.)					
Output Enable / Disable Function on pin1	70% of V _{DD} (min.) to enable output.					
	30% of V _{DD} (max.) to disable output.					
	Add " T " in part number for OE option					

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[H8 ; H_8]	[H14 ; H_14]
<p style="text-align: center;">Top View: 12.8 ± 0.2, 10.8, 10.8, 12.8 ± 0.2</p> <p style="text-align: center;">Side View: 0.8, 6.3 ± 0.2, 5.5 max., Ø 0.45</p> <p style="text-align: center;">Bottom View: 1, 4, 8, 5, 7.6 ± 0.1, 7.6 ± 0.1</p> <p>3-Ø 1.6 glass stand-off Pin Connections : Pin1 : (1) No connection (2) OE Pin4 : Ground Pin5 : Output Pin8 : Supply voltage</p>	<p style="text-align: center;">Top View: 20.2 ± 0.2, 18.3, 12.8 ± 0.2, 10.7</p> <p style="text-align: center;">Side View: 0.8, 5.8 ± 0.2, 6.3 max., Ø 0.45</p> <p style="text-align: center;">Bottom View: 1, 7, 14, 8, 10.7 ± 0.1, 5.3 ± 0.1, 7.6 ± 0.1, 15.2 ± 0.1</p> <p>4-Ø 1.8 glass stand-off Pin Connections : Pin 1 : (1) No connection (2) Output disabled when low Pin 7 : Ground Pin 8 : Output Pin 14 : Supply voltage</p>

Part Number Format and Examples

	[1]	[2]	-	[3]	[4]	-	[5]
	Supply Voltage	Holder Type		Frequency Stability	OE Function		Center Frequency

Examples	(1)	3	SWO	-	D	T	-	25.000
	(2)	3	HY32	-	K50	T	-	24.000
	(3)	18	HA32	-	B	T	-	32.768K
	(4)	3	HJ22	-	E	T	-	49.152

Ex (1) : 3SWO - DT - 25.000 [3.3V , H seires 7050 type , ±25ppm from -40°C to +85°C , OE Function , 25.000MHz]

Ex (2) : 3HY32 - K50T - 24.000 [3.3V , HY seires 3225 type , ±50ppm from -40°C to +125°C , OE Function , 24.000MHz]

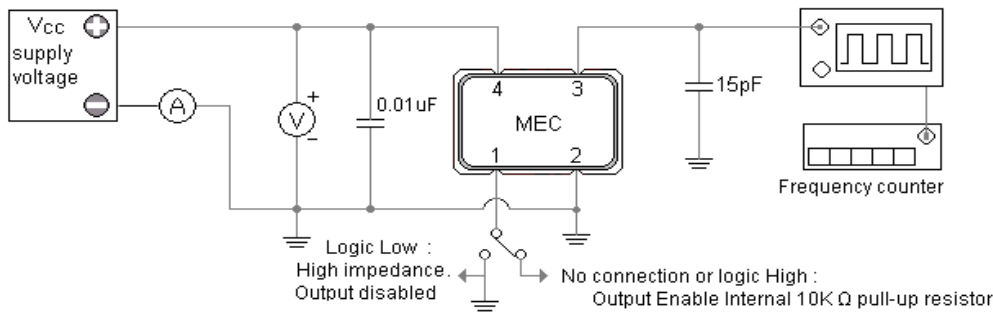
Ex (3) : 18HA32 - BT - 32.768K [1.8V , HA seires 3225 type , ±50ppm from -10°C to +70°C , OE Function , 32.768KHz]

Ex (4) : 3HJ22 - ET - 49.152 [3.3V , HJ seires 2520 type , ±50ppm from -40°C to +85°C , OE Function , 49.152 MHz]

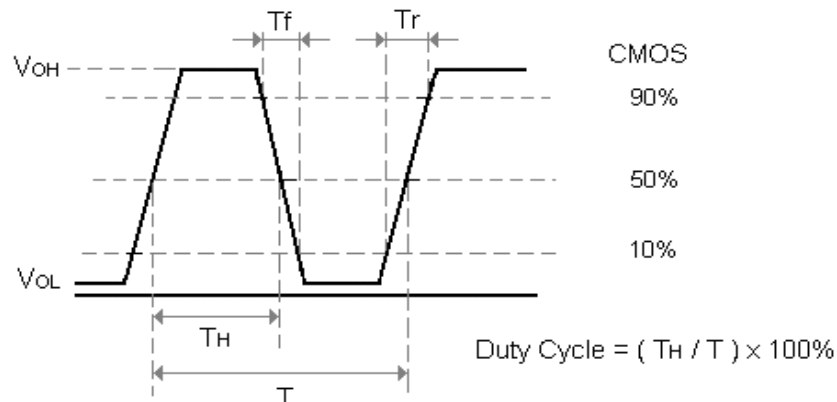
[1]	Supply voltage " 10 " for +1.0V ; " 12 " for +1.2V ; " 18 " for +1.8V ; " 25 " for +2.5V ; " 3 " for +3.3V ; " 5 " for +5.0V	
[2]	Holder Type	
[3]	-10°C ~ 70 °C	" A " ± 25ppm ; " B " ± 50ppm ; " C " ± 100ppm ; If non-standard please enter the desired stability after " C " , example " C15 " : represents ±15ppm over -10 to +70°C
	-40°C ~ 85 °C	" D " ± 25ppm ; " E " ± 50ppm ; " F " ± 100ppm ; If non-standard please enter the desired stability after " I " , example " I30 " : represents ± 30ppm over -40 to +85°C
[4]	" T " for OE Function , Leave this space blank if no connection on pad 1.	
[5]	Frequency in MHz	

Test Circuit & Test Waveform

H ; H_ - series CMOS Test Circuit

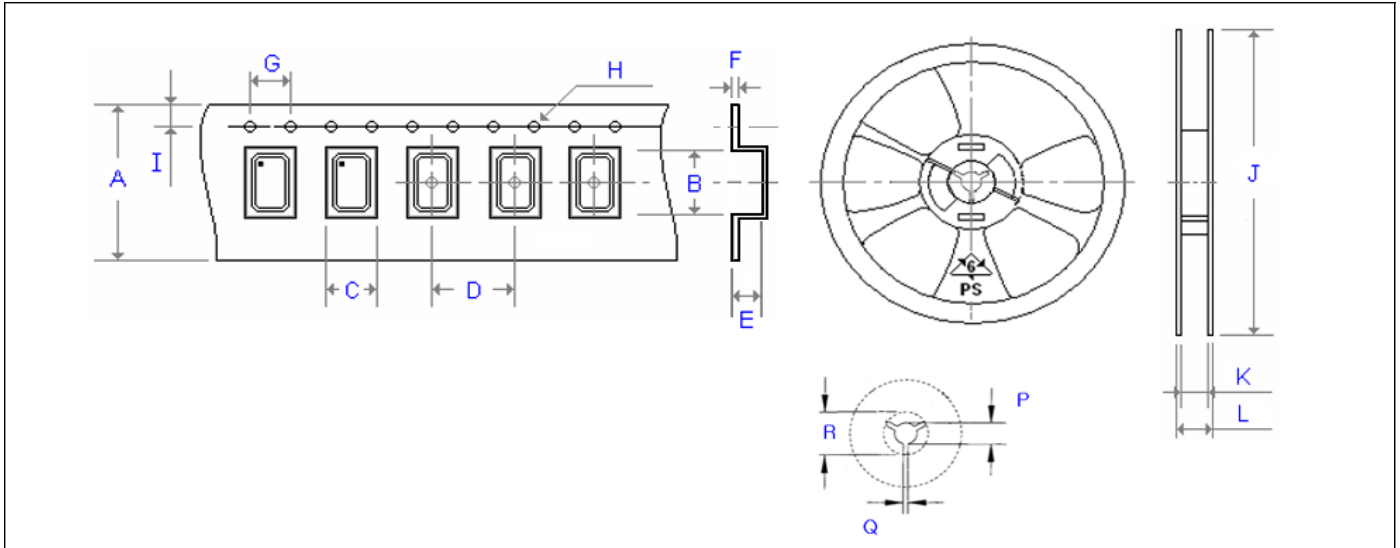


CMOS Output Waveform



Emboss Taping and Reel Specifications

[Crystal Oscillator Units]



Carrier Type Dimensions (unit : mm) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
H21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	∅ 1.55	1.75	3000
H_22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
H_32	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
H_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.55	1.75	1000
H_57	16.00	7.30	5.30	8.00	1.90	0.30	4.00	∅ 1.50	1.75	1000
SWO	16.00	7.20	5.40	8.00	1.80	0.30	4.00	∅ 1.55	1.75	1000
H_226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
H_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
H_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.55	1.75	1000
H_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	∅ 1.50	1.75	1000
H_328	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
H_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	∅ 1.55	1.75	1000
H_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	∅ 1.50	1.75	1000
H_43	24.00	11.80	10.00	16.00	5.00	0.30	4.00	∅ 1.50	1.75	500

Reel Dimensions (unit : mm) ±2mm

	J	K	L	P	Q	R	pcs / reel
H21	180.00	9.00	12.00	13.20	2.10	-	3000
H_22	180.00	9.00	12.00	13.20	2.10	-	3000
H_32	180.00	9.00	12.00	13.20	2.10	-	3000
H_53	180.00	13.00	16.00	13.20	2.50	-	1000
H_57	180.00	17.20	19.30	13.30	2.20	22.00	1000
SWO	180.00	17.20	19.30	13.30	2.20	22.00	1000
H_226	180.00	8.40	11.40	13.20	2.10	-	3000
H_326	180.00	9.00	12.00	13.20	2.10	-	3000
H_536	180.00	13.00	16.00	13.20	2.50	-	1000
H_576	180.00	17.20	19.30	13.30	2.20	22.00	1000
H_328	180.00	8.00	12.00	13.20	2.10	-	3000
H_538	180.00	13.00	16.00	13.20	2.50	-	1000
H_578	180.00	17.20	19.30	13.30	2.20	22.00	1000
H_43	330.00	24.50	29.10	13.00	2.20	17.30	500