

# TWICE PROGRAMMABLE CLOCK OSCILLATORS

## "HB" series



**MERCURY**  
Since 1973

"HB" and "SBO" series are EPROM based PLL specifically designed for crystal oscillators. Its high accuracy programmability makes crystal oscillators of any frequency in the 1 to 133 MHz range to ship the same day of order possible. These oscillator blanks are twice programmable with Tri-State or power-down option. Great for prototypes, design changes and sudden demands especially when time-to-market is critical. They are available in seven different package styles.

### Product Summary

Package Code	Frequency Range	Assembly Technique	Package Size (mm) [inches], seat height
<b>Thru-Hole Types</b>			
HB14	1.0 ~ 133.0 MHz	4 pin DIL full size	12.8 x 20.2 x 5.88 [0.504 x 0.795 x 0.231]
HB8	1.0 ~ 133.0 MHz	4 pin DIL half size	12.8 x 12.8 x 5.88 [0.504 x 0.504 x 0.231]
<b>Surface Mount Types – Gull Wing</b>			
HB24	1.0 ~ 133.0 MHz	Gull wing version of H14	12.8 x 20.2 x 7.60 [0.504 x 0.795 x 0.300]
HB18	1.0 ~ 133.0 MHz	Gull wing version of H8	12.8 x 12.8 x 7.60 [0.504 x 0.504 x 0.300]
<b>Surface Mount Types – Leadless</b>			
HB42	1.0 ~ 133.0 MHz	4 pad Leadless	9.6 x 11.4 x 2.5 [0.378 x 0.449 x 0.098]
HB44	1.0 ~ 133.0 MHz	4 pad Leadless	9.6 x 11.4 x 4.7 [0.378 x 0.449 x 0.185]
HB57	1.0 ~ 133.0 MHz	4 pad ceramic Leadless	5 x 7 x 1.4 [0.197 x 0.276 x 0.055]

### Absolute Maximum Ratings

The device will be damaged if the maximum ratings are exceeded.

Parameter	Maximum Rating
Supply Voltage	-0.5V to +7.0V
Input Voltage	-0.5V to VDD+0.5
Storage Temperature (non-condensing)	55°C to +150°C
Junction Temperature	-40°C to +100°C
Static Discharge Voltage (per MIL-STD-883, method 3015)	> 2000 V

**MERCURY** [www.mercury-crystal.com](http://www.mercury-crystal.com)

Taiwan: TEL (886)-2-2695-7099, FAX (886)-2-2695-7473, e-mail: sales-tw@mercury-crystal.com  
U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: sales-us@mercury-crystal.com

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### “HB” Series General Specifications

$T_A = +25^\circ\text{C}$ ,  $V_{DD}$  at specified voltage,  $CL = 15\text{ pF}$

Input Voltage ( $V_{DD}$ )		$V_{DD} = +3.3\text{ V D.C. } \pm 10\%$	$V_{DD} = +5.0\text{ V D.C. } \pm 5\%$
Frequency Range (package dependent)		1 ~ 100 MHz 1 ~ 66 MHz if $V_{DD} = +2.7 \sim +3.3\text{ V D.C.}$	1 ~ 133 MHz
Output Logic		TTL / HCMOS	
Output Voltage HIGH “1”	TTL	2.4 V min.	2.4 V min.
	CMOS	2.97 min.	$V_{DD} - 0.4$ min.
Output Voltage LOW “0”	TTL	0.4 V max.	0.4 V max.
	CMOS	0.33 max.	0.5 V max.
Frequency Stability <sup>(1)</sup>	Commercial (0°C to +70°C) Temperature code is ‘C’	±50 ppm over 0°C to +70°C (Stability code is “B”) ±100 ppm over 0°C to +70°C (Stability code is “C”)	
	Industrial (-40°C to +85°C) Temperature code is ‘I’	±50 ppm over -40°C to +85°C (Stability code is “E”) ±100 ppm over -40°C to +85°C (Stability code is “F”)	
Output Load	TTL		50 pF max. (≤ 40 MHz) 25 pF max. (> 40 ~ 133 MHz)
	CMOS	30 pF max. (≤ 40 MHz) 15 pF max. (> 40 ~ 100 MHz) 15 pF max. (≤ 66 MHz and 2.7~3.0V)	50 pF max. (≤ 66.6 MHz) 25 pF max. (> 66.6 ~ 133 MHz)
Rise Time ( $T_r$ ) and Fall Time ( $T_f$ )	Between 0.8 V to 2.0 V		1.8 ns max. at 50 pF load 1.2 ns max. at 25 pF load 0.9 ns max. at 15 pF load
	Between 0.2VDD to 0.8 VDD	4.0 ns max. at 30 pF load	3.4 ns max. at 50 pF load
Duty Cycle	TTL		45~55%, ≤ 40 MHz at 50 pF load 45~55%, 40 ~ 66 MHz at 15 pF load 40~60%, 66 ~ 125 MHz at 25 pF load 40~60%, 125 ~ 133 MHz at 15 pF load
	CMOS (measured at 50% VDD)	45~55%, ≤ 40 MHz at 30 pF load 45~55%, 40~100 MHz at 15 pF load	45~55%, ≤ 66.6 MHz at 25 pF load 40~60%, 66.6 ~ 125 MHz at 25 pF load 40~60%, 125 ~ 133 MHz at 15 pF load
Start-up Time out of power-down( $T_s$ )		2 m Sec. max. 1 m Sec. typical	
Power Up Time		2 m Sec. max. 1 m Sec. typical	
Current Consumption		25 mA max.	45 mA max.
Stand-by Current		10 mA typical, 50 mA max.	
Power-Down Current		20 mA typical at +5.0V	
Option on pin 1		<b>1. TRI-STATE MODE:</b> Output is high impedance when “0” (≤0.8V max. for +5.0V VDD or +0.2VDD max. for +3.3V VDD) is applied to pin 1. Disable time is 150 n sec. max. Please add “T” after the stability code for this option. <b>2. POWER-DOWN MODE</b>	
Storage Temperature		-55°C to +125°C	
Aging		±5 ppm per year max. ( at +25°C, $V_{DD} = 5.0\text{V}$ or +3.3V)	
Jitter (RMS)		±50 ps for ≤ 33 MHz ±30 pS for > 33 MHz	±50 ps for ≤ 33 MHz ±40 pS for > 33 MHz
Jitter (peak-to-peak period)		±250 ps typical for $f_o < 33\text{ MHz}$ , $V_{DD} = 2.7 \sim 5.5\text{ V}$ ±100 ps typical for $f_o > 33\text{ MHz}$ , $V_{DD} = 4.5 \sim 5.5\text{ V}$	

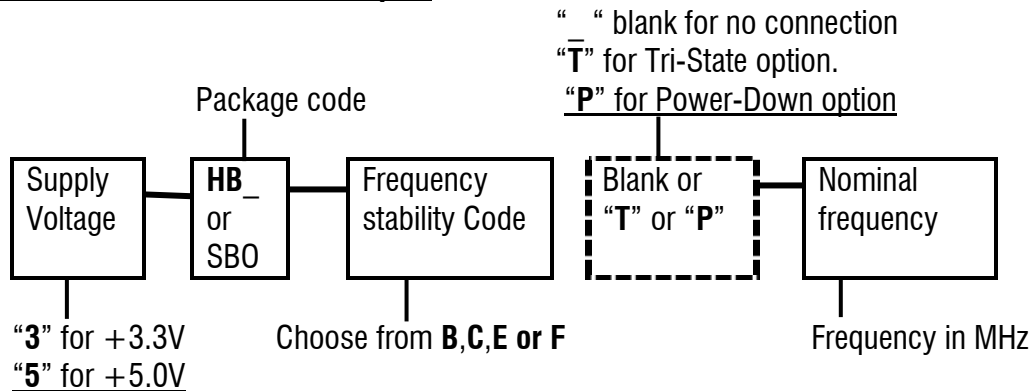
# TWICE PROGRAMMABLE CLOCK OSCILLATORS

## "HB" series



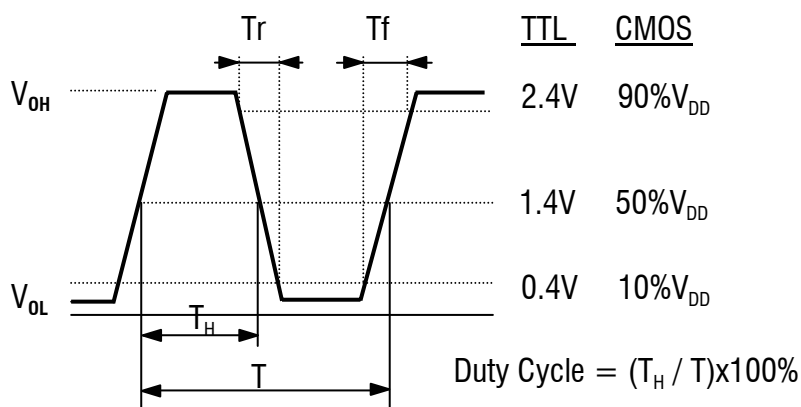
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### Part Number Format and Examples:



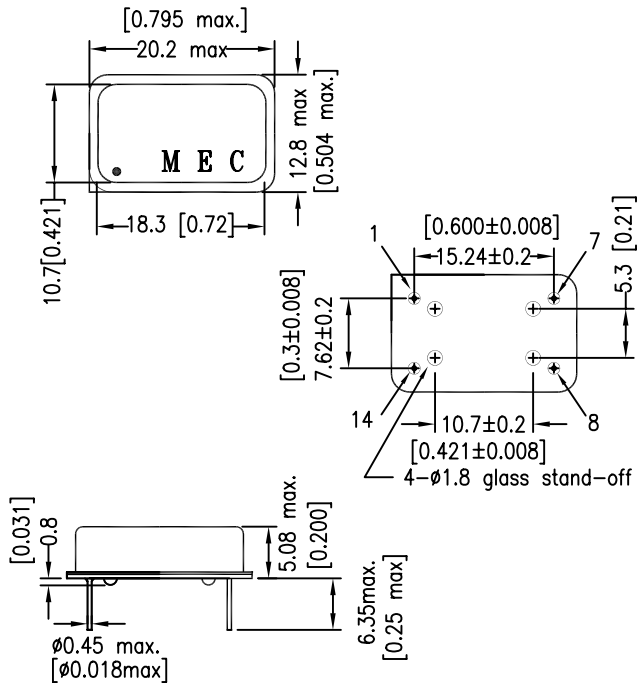
- 3HB8-BT-72.000 represents programmable clock oscillator +3.3V input voltage, half size 4 pin DIP package,  $\pm 50$  ppm over 0 to +70°C frequency stability, Tri-state function on pin 1, 72.000 MHz
- 5HB44-E-1.544 represents programmable clock oscillator, +5.0V input voltage, HF44 package,  $\pm 50$  ppm over -40 to +85°C frequency stability, 1.544 MHz. No connection on pad 1.
- 3HB57-CP-44.000 represents 44.000 MHz surface mount clock oscillator in 5x7 mm SMD package, frequency stability spec. is  $\pm 100$  ppm over 0 to +70°C, supply voltage is +3.3 V. Pad 1 is power down option.

### OUTPUT WAVEFORM:



Package: HB14

Unit: mm [inches]

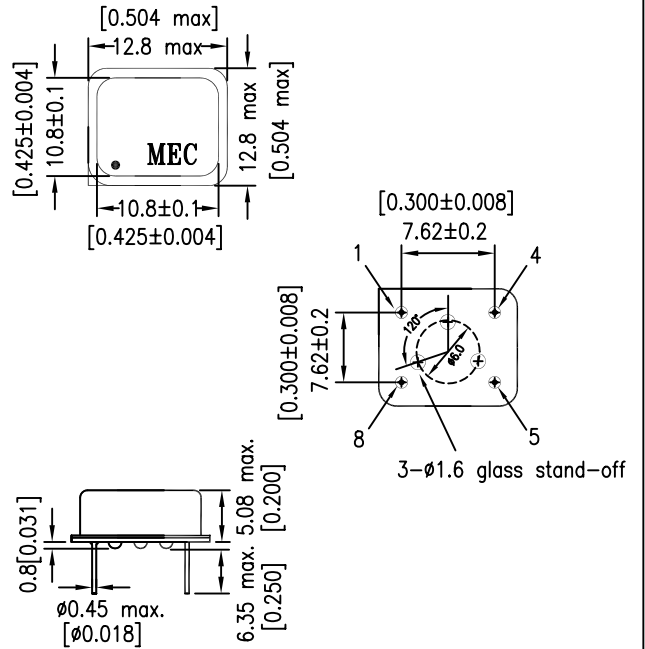


**Pin Connections**

Squared corner is pin No. 1

- Pin 1: No Connection or Output Disabled when Low
- Pin 7: Ground
- Pin 8: Output
- Pin 14: Supply Voltage

Package: HB8



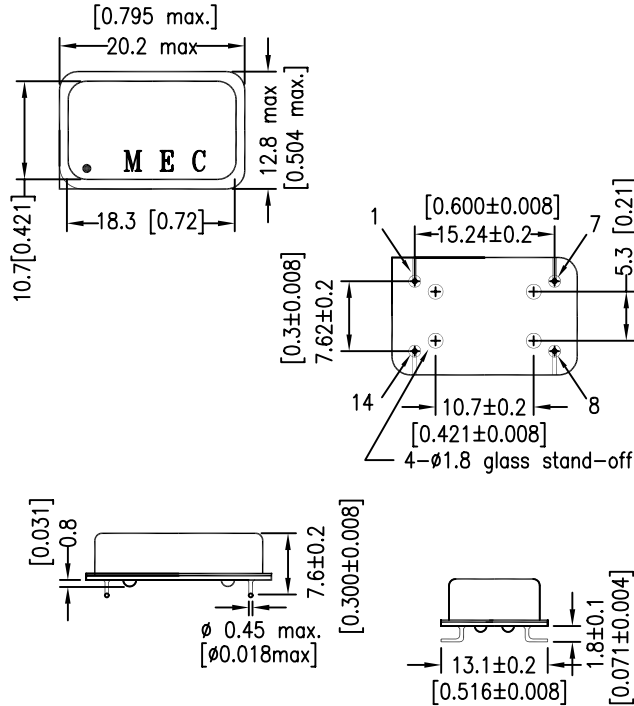
**Pin Connections**

Squared corner is pin No. 1

- Pin 1: No Connection or Output Disabled when Low
- Pin 4: Ground
- Pin 5: Output
- Pin 8: Supply Voltage

**C L O C K**  
**Programmable**

Package: HB24

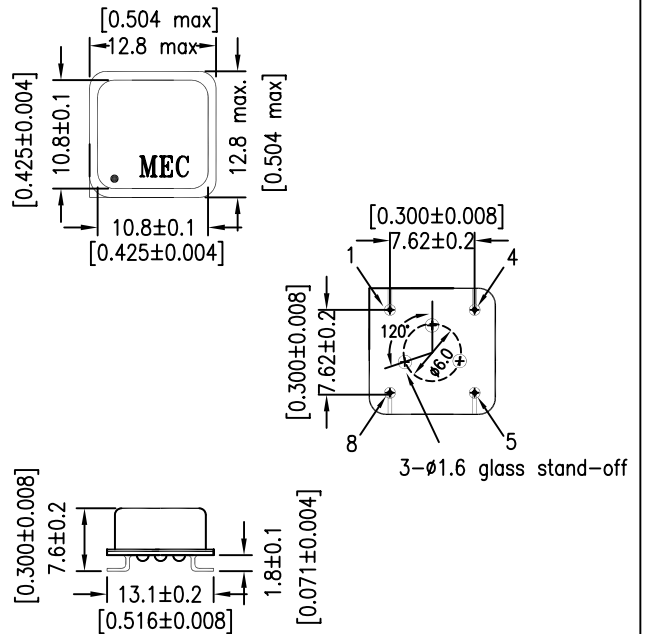


**Pin Connections**

Squared Corner is pin No. 1

- Pin 1: No Connection or Output Disabled when Low
- Pin 7: Ground
- Pin 8: Output
- Pin 14: Supply Voltage

Package: HB18



**Pin Connections**

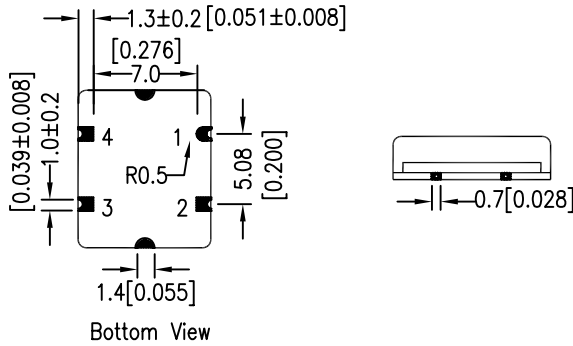
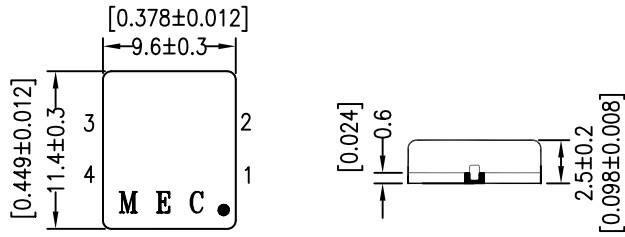
Squared corner is pin No. 1

- Pin 1: No Connection or Output Disabled when Low
- Pin 4: Ground
- Pin 5: Output
- Pin 8: Supply Voltage

**Package: HB42**

**Unit: mm [inches]**

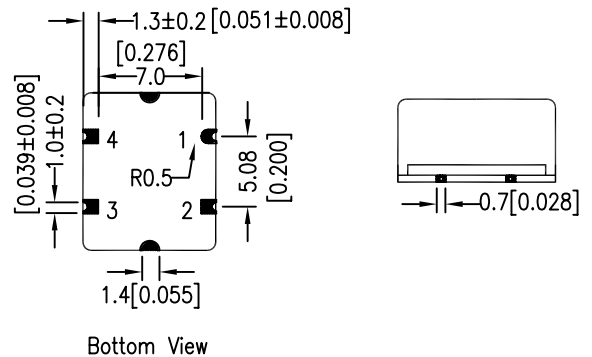
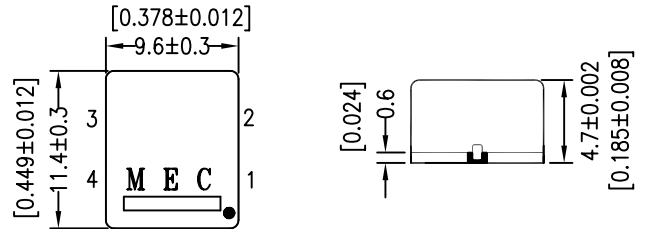
"42" represents 4 pads and 2.5 mm overall height



**Pad Connections:** Rounded pad is pad 1  
 Pad 1: No Connection, or Tri\_state or Power-Down  
 Pad 2: Ground  
 Pad 3: Output  
 Pad 4: Supply Voltage

**Package: HB44**

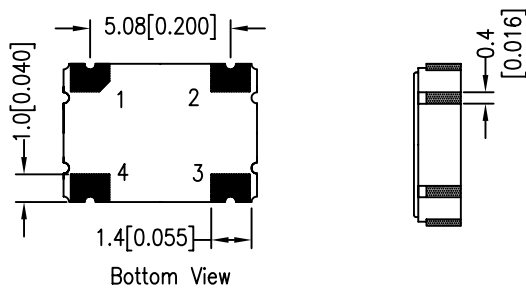
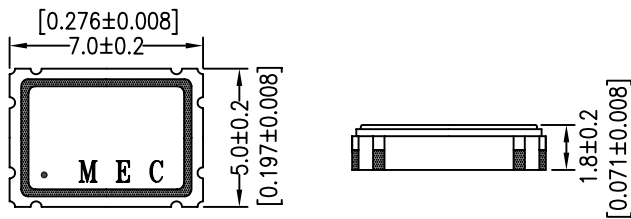
"44" represents 4 pads and 4.7 mm overall height



**Pad Connections:** Rounded pad is pad 1  
 Pad 1: No connection or Tri-State or Power-Down  
 Pad 2: Ground  
 Pad 3: Output  
 Pad 4: Supply Voltage

**C L O C K  
 Programmable**

**Package: HB57**



**Pad Connections:** Chamfered pad is pad 1  
 Pad 1: Tri-State or Power-Down  
 Pad 2: Ground  
 Pad 3: Output  
 Pad 4: Supply Voltage