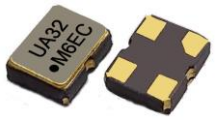
Ultra Low Current Crystal Oscillators [32.768 KHz]

CMOS Output

HUA _ _	32.768 KHz Ultra Low Current Consumption	SMD	CMOS	15pF	1.2 V	1.8 V	2.5 V	3.3 V 1.2 V ~ 3.3 V

Features

- Suitable for wearable devices and clock counting applications.
- Ultra low current crystal oscillator: 6 μA typ. at 1.2V V_{DD} (no load)
- Continuous supply voltage from 1.2V to 3.3V



General specifications of all available packages , at Ta=+25°C , CL=15pF

Type	" HUA " series [SMD Type]			
Model	HUA22	HUA32	HUA53	HUA57
Dimensions	2.5 * 2.0 * 0.9 mm	3.2 * 2.5 * 1.0 mm	5.0 * 3.2 * 1.2 mm	7.0 * 5.0 * 1.4 mm

Frequency Output	32.768 KHz				
Supply Voltage (V_{DD}) ±10% Voltage code	1.2 V " 12 "	1.8 V " 18 "	2.5 V " 25 "	3.3 V " 3 "	+1.2 V ~ +3.3 V " 12V3 "
Current Consumption (32.768 KHz , No Load)	6 uA (typ.) 10 uA (max.)	6 uA (typ.) 10 uA (max.)	7 uA (typ.) 10 uA (max.)	7 uA (typ.) 10 uA (max.)	10 uA (max.)
Output Logic " High " , " 1 "	1.08 V (min.)	1.62 V (min.)	2.25 V (min.)	2.97 V (min.)	V_{DD} * 90% (min.)
Output Logic " Low " , " 0 "	0.12 V (max.)	0.18 V (max.)	0.25 V (max.)	0.33 V (max.)	V_{DD} * 10% (max.)
Rise Time (Tr) / Fall Time (Tf) (10 % ⟷ 90 % waveform)	7 nsec (typ.) 30 nsec (max.)	6 nsec (typ.) 20 nsec (max.)	5 nsec (typ.) 15 nsec (max.)	4 nsec (typ.) 10 nsec (max.)	30 nsec (max.)

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 " ; " F " ; " J " represents . For example : " C20 " ± 20 ppm over -20°C to +70°C ; " F30 " ± 30 ppm over -40°C to +85°C ; " J80 " ± 80 ppm over -40°C to +105°C
	Commercial (*-20°C to +70°C*)	*A*	*B*	*C*	
	Industrial (*-40°C to +85°C*)	*D*	*E*	*F*	
	Extended Industrial (*-40°C to +105°C*)	*G*	*H*	*J*	

Output Load	15 pF
Start-up Time	2.0 msec. (max.)
Duty Cycle	50% ± 5%
Output Enable / Disable Function	70% of V_{DD} (min.) to enable output. 30% of V_{DD} (max.) to disable output. Disable current : 3 uA (max.) for OE = GND , Disable time : 0.2 uS (max.)
Storage Temperature	-55°C to +150°C
Aging at Ta=+25ºC	± 3 ppm (max.) first year ; ± 2 ppm (max.) per year thereafter

Ultra Low Curren Crystal Oscillators — CMOS Output

Part Number Format and Examples

	[1] Supply Voltage	[2] Holder Type	-	[3] Frequency Stability	[4] OE Function	-	[5] Center Frequency
Ex	(1) 12V3	HUA57	-	D	T	-	32.768K
	(2) 3	HUA22	-	E	T	-	32.768K

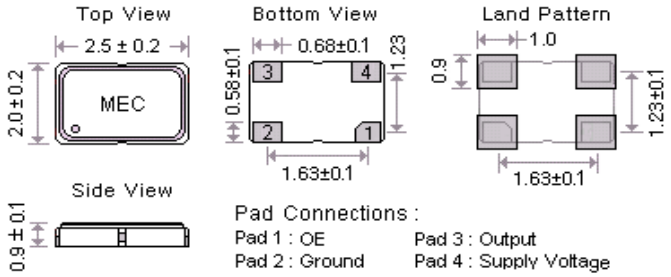
Ex (1) : 12V3HUA57 - DT - 32.768K [+1.2 ~ +3.3V , HUA seires 7050 type , ±25ppm from -40°C to +85°C , OE Function , 32.768 KHz]

Ex (2) : 3HUA22 - ET - 32.768K [3.3V , HUA seires 2520 type , ±50ppm from -40°C to +85°C , OE Function , 32.768 KHz]

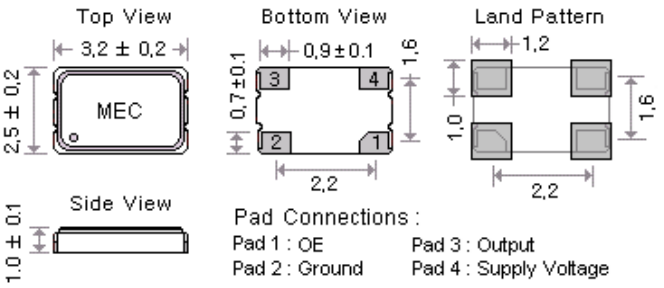
[1]	Supply Voltage , " 12 " for +1.2V ; " 18 " for +1.8V ; " 25 " for +2.5V ; " 3 " for +3.3V ; " 12V3 " for +1.2 ~ +3.3V ±10%	
[2]	Holder Type	
[3]	-20°C ~ 70 °C	" A " ± 25ppm ; " B " ± 50ppm ; " C " ± 100ppm ;
		If non-standard please enter the desired stability after " C " , example " C15 " : represents ±15ppm over -20 to +70°C
	-40°C ~ 85 °C	" D " ± 25ppm ; " E " ± 50ppm ; " F " ± 100ppm ;
		If non-standard please enter the desired stability after " F " , example " F30 " : represents ± 30ppm over -40 to +85°C
	-40°C ~ 105°C	" G " ± 25ppm ; " H " ± 50ppm ; " J " ± 100ppm ;
		If non-standard please enter the desired stability after " J " , example " J80 " : represents ±80ppm over -40 to +105°C
[4]	" T " for OE Function , Leave this space blank if no connection on pad 1.	
[5]	Frequency " K " for KHz	

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

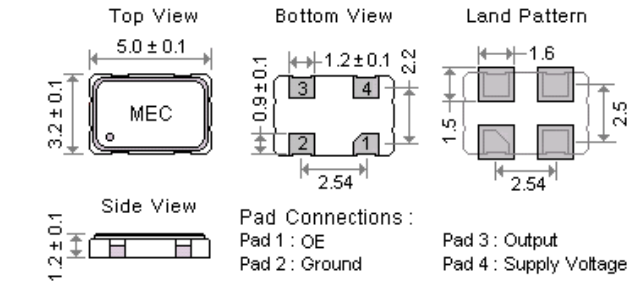
[HUA22]



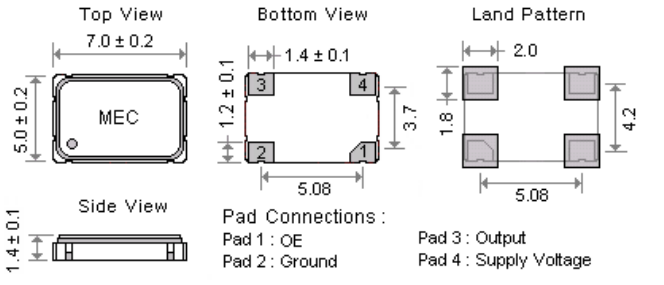
[HUA32]



[HUA53]

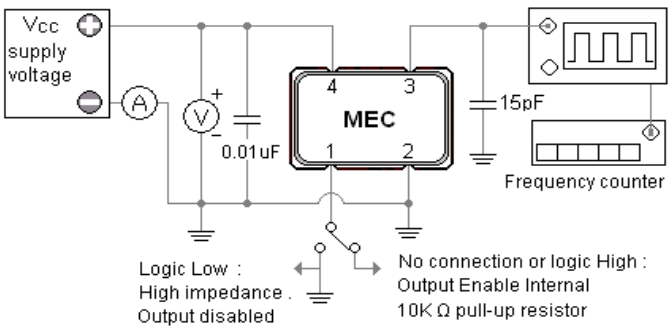


[HUA57]

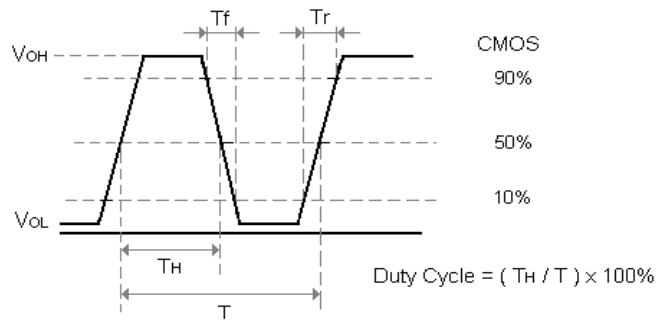


Test Circuit & Test Waveform

HUA - series CMOS Test Circuit

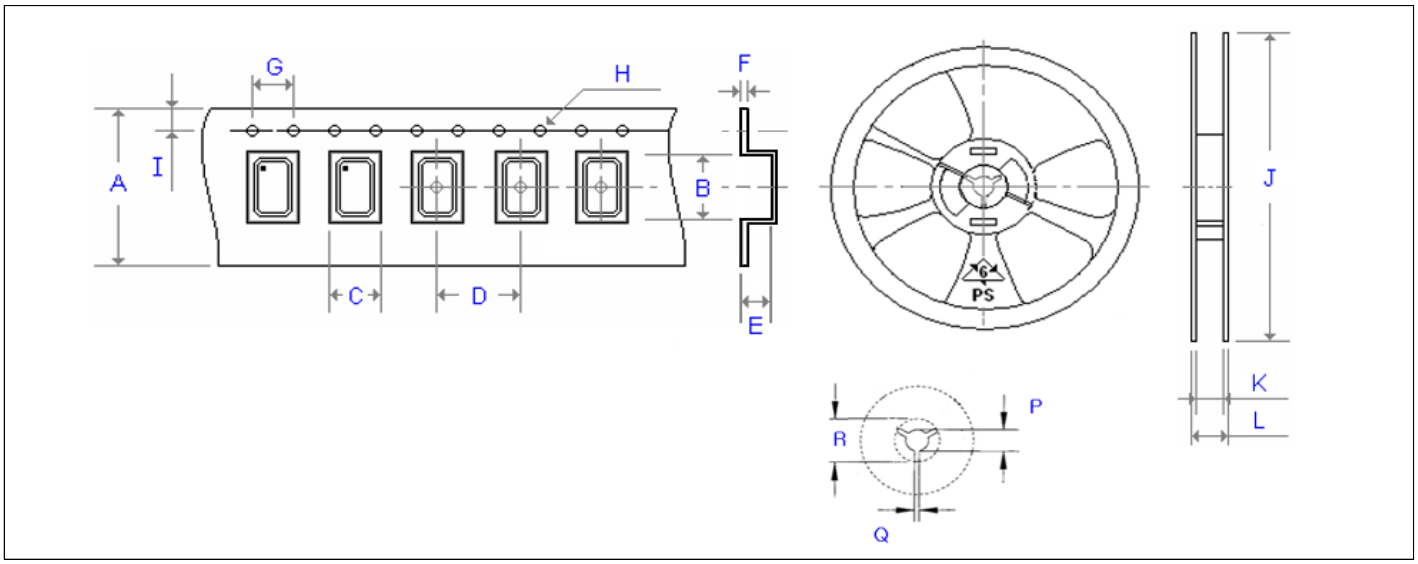


CMOS Output Waveform



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	Ø 1.50	1.75	3000
H_22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
H_32	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
H_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
H_57	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
SWO	16.00	7.20	5.40	8.00	1.80	0.30	4.00	Ø 1.50	1.75	1000
H _ 216	8.00	2.30	1.90	4.00	0.90	0.25	4.00	Ø 1.50	1.75	3000
H _ 226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
H _ 326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
H _ 536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
H _ 576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
H _ 328	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
H _ 538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
H _ 578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	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 _ 216	178.00	8.40	11.40	13.30	2.50	20.50	3000
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