

Frequency Switchable Crystal Oscillators [10 ~ 1,500 MHz]

HC_QF

CMOS / Differential

Q family

F series

Frequency

Switchable

**Quick - Turn
Clock Oscillators**

**1.5 psec
RMS Jitter**

SMD

2.5 V

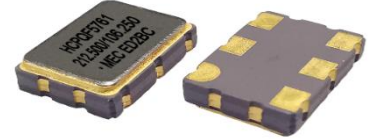
3.3 V

**Min.
10
MHz**

**Max.
1,500
MHz**

Features

- The HCTQF, HCPQF and HCDQF Series are members of Mercury's Q-Family Quick-Turn crystal oscillators
- Output frequency range : 10 MHz to 1,500 MHz
- Package size : 3.2 x 2.5mm , 5.0 x 3.2mm , 7.0 x 5.0mm
- Next-day samples for prototypes



General specifications , at Ta = + 25°C

Model	HCTQF	HCPQF			HCDQF
Output Logic	CMOS	LVPECL			LVDS
Supply Voltage V _{DD} (code)	+ 2.5 V ± 5% (voltage code " 25 ")	+ 2.5 V ± 5% (voltage code " 25 ")			+ 2.5 V ± 5% (voltage code " 25 ")
	+ 3.3 V ± 5% (voltage code " 3 ")	+ 3.3 V ± 5% (voltage code " 3 ")			+ 3.3 V ± 5% (voltage code " 3 ")
Available Frequency Range	10 ~ 250 MHz	10 ~ 1,500 MHz			10 ~ 1,500 MHz
Output Load	15 pF	50 Ω into V _{CC} - 2V or Thevenin equivalent			100 Ω
Output Logic " High " , " 1 "	90 % V _{DD}	V _{DD} - 1.03 (min.) , V _{DD} - 0.6 (max.)			1.4 V (typ.) , 1.6 V (max.)
Output Logic " Low " , " 0 "	10 % V _{DD}	V _{DD} - 1.85 (min.) , V _{DD} - 1.6 (max.)			1.1 V (typ.) , 0.9 V (min.)
Current Consumption (V _{DD} = + 2.5 V)	10 ~ 150 MHz : 30 mA (max.)	10 ~ 750 MHz : 50 mA (max.)			10 ~ 750 MHz : 32 mA (max.)
	151 ~ 250 MHz : 40 mA (max.)	751 ~ 1,500 MHz : 55 mA (max.)			751 ~ 1,500 MHz : 35 mA (max.)
Current with Output Disabie	18 mA (typ.)	18 mA (typ.)			18 mA (typ.)
Current Consumption (V _{DD} = + 3.3 V)	10 ~ 150 MHz : 38 mA (max.)	10 ~ 750 MHz : 55 mA (max.)			10 ~ 750 MHz : 34 mA (max.)
	151 ~ 250 MHz : 48 mA (max.)	751 ~ 1,500 MHz : 60 mA (max.)			751 ~ 1,500 MHz : 40 mA (max.)
Rise Time / Fall Time	10.0 nsec. (max.)	0.5 nsec. (max.)			0.4 nsec. (max.)
	Tr / Tf : 10% ↔ 90% waveform	Tr / Tf : 20% ↔ 80% waveform			Tr / Tf : 20% ↔ 80% waveform
RMS Jitter [12 kHz ~ 20 MHz]	1.5 psec. (typ.)				
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 " F " represents . For example : " C20 " ± 20 ppm over -20°C to +70°C ; " F30 " ± 30 ppm over -40°C to +85°C
	Commercial (-20°C to +70°C)	A	B	C	
	Industrial (-40°C to +85°C)	D	E	F	
Duty Cycle	50% ± 5%				
Start-up Time	10 msec. (max.)				
Aging at Ta = +25°C	± 5 ppm (max.) for first year				
Storage Temperature	-55°C to +150°C				
Output Enable Function on Pad 1					
Output Enable / Disable Function	70% of V _{DD} (min.) to enable output. (Open connection prohibit.)				
	30% of V _{DD} (max.) to disable output				
Output Enable Time / Disable Time	200 nsec. (max.) / 50 nsec. (max.)				
Frequency Selection Function on Pad 2					
Frequency Selection (FSEL)	When FSEL = 0 (0 V or GND) , Output frequency is Freq.1 (f 1) When FSEL = 1 (V _{DD}) , Output frequency is Freq.2 (f 2)			Default FSEL pin has internal pull-up resistor	
FSEL on Pad 2	70% of V _{DD} (min.) For FSEL = 1 , Output frequency is Freq.2 (f2)				
	30% of V _{DD} (max.) For FSEL = 0 , Output frequency is Freq.1 (f1)				
	Frequency switching time : 60 us (typ.)				

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**Min.
10
MHz**

**Max.
1,500
MHz**

Part Number Format and Example

Example : 3HCTQF576 - E - 30.000 / 120.000

3	HCTQF	576	-	E	-	30.000	/	120.000
Supply Voltage "3" for 3.3V "25" for 2.5V	HCTQF : CMOS HCPQF : LVPECL HCDQF : LVDS	Package Size "576": 7 x 5 mm "536": 5 x 3.2 mm "326": 3 x 2.5 mm	-	Frequency Stability Code "E": ±50 ppm over -40 to +85°C. Other frequency stabilities are available.	-	Custom Frequency 1 FSEL = 0 (MHz)	/	Custom Frequency 2 FSEL = 1 (MHz)

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

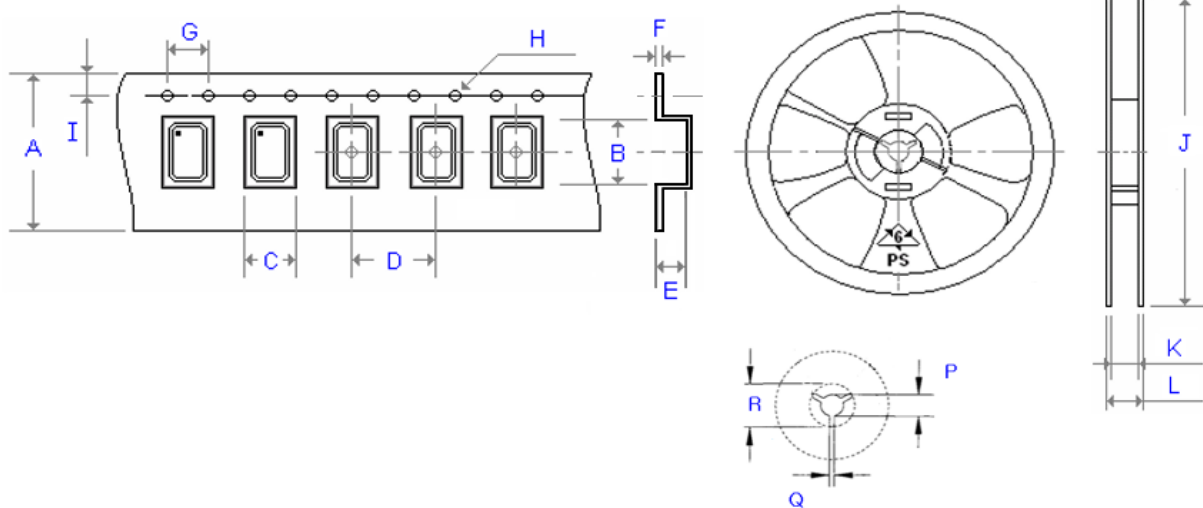
HC_QF576	HC_QF536
Top View Bottom View Land pattern Side View	Top View Bottom View Land Pattern Side View
HC_QF326	Pad Connections
Top View Bottom View Land Pattern Side View	Pad 1 : OE Pad 2 : Frequency Selection [FSEL = 0 (f 1) , FSEL = 1 (f 2)] Pad 3 : Ground Pad 4 : [CMOS : Output , LVPECL or LVDS : Differential] Pad 5 : [CMOS : NC , LVPECL or LVDS : Complementary] Output Pad 6 : Supply Voltage

Test Circuits

CMOS	LVPECL	LVDS
	$V_{DD} = 3.3V$; $R1 = R3 = 127 \Omega$; $R2 = R4 = 82.5 \Omega$ $V_{DD} = 2.5V$; $R1 = R3 = 250 \Omega$; $R2 = R4 = 62.5 \Omega$	

Emboss Taping and Reel Specifications

[Crystal Oscillator Units]



Carrier Type Dimensions (unit : mm) $\pm 0.3\text{mm}$

	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
H_43	24.00	11.80	10.00	16.00	5.00	0.30	4.00	Ø 1.50	1.75	500

Reel Dimensions (unit : mm) $+2.0 / -0.0\text{mm}$

	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
H_43	330.00	24.50	29.10	13.00	2.20	17.30	500