

Differential Crystal Oscillators with No PLL

Differential

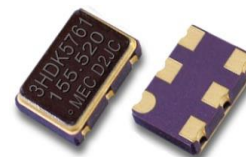
HPK	HDK	HCK	HCLK	SMD	1.8 V	2.5 V	3.3 V	Min.	Max.
LVPECL Differential	LVDS Differential	HCSL Differential	LPHCSL Differential					13.5 MHz	220 MHz

Features

Jitter 0.2 pS (typical)

- Femtosecond integrated phase jitter (200 fs (typ.) , 12 KHz to 20 MHz)
- Superior phase noise (-138 dBc/Hz at 10 KHz and -144 dBc/Hz at 100 KHz offset)

General specifications , at Ta=+25°C



Model	HPK	HDK	HCK	HCLK
Output Logic	LVPECL	LVDS	HCSL	LPHCSL
Package (dimensions) unit : mm	HPK2261 (2.5 * 2.0 * 1.0) HPK3261 (3.2 * 2.5 * 1.0) HPK5361 (5.0 * 3.2 * 1.2) HPK5761 (7.0 * 5.0 * 1.7)	HDK2261 (2.5 * 2.0 * 1.0) HDK3261 (3.2 * 2.5 * 1.0) HDK5361 (5.0 * 3.2 * 1.2) HDK5761 (7.0 * 5.0 * 1.7)	HCK2261 (2.5 * 2.0 * 1.0) HCK3261 (3.2 * 2.5 * 1.0) HCK5361 (5.0 * 3.2 * 1.2) HCK5761 (7.0 * 5.0 * 1.7)	HCLK2261 (2.5 * 2.0 * 1.0) HCLK3261 (3.2 * 2.5 * 1.0) HCLK5361 (5.0 * 3.2 * 1.2) HCLK5761 (7.0 * 5.0 * 1.7)
Available Frequency Range	13.5 MHz ~ 220 MHz	13.5 MHz ~ 220 MHz	13.5 MHz ~ 220 MHz	95 MHz ~ 180.0 MHz
Supply Voltage (V _{DD})	--	+1.8 V ± 5%	+1.8 V ± 5%	+1.8 V ± 5%
	+2.5 V ± 5%	+2.5 V ± 5%	+2.5 V ± 5%	+2.5 V ± 5%
	+3.3 V ± 10%	+3.3 V ± 10%	+3.3 V ± 10%	+3.3 V ± 10%
Current Consumption (V _{DD} = + 3.3V)	30 mA (typ.) 50 mA (max.)	16 mA (typ.) 27 mA (max.)	17 mA (typ.) 30 mA (max.)	11 mA (typ.) 20 mA (max.)
Output Logic " High " , " 1 "	V _{DD} - 1.03 (min.) V _{DD} - 0.6 (max.)	1.4 V (typ.) 1.6 V (max.)	550 mV (min.) 850 mV (max.)	550 mV (min.) 900 mV (max.)
Output Logic " Low " , " 0 "	V _{DD} - 1.85 (min.) V _{DD} - 1.6 (max.)	0.9 V (min.) 1.1 V (typ.)	-150 mV (min.) 150 mV (max.)	-150 mV (min.) 150 mV (max.)
Rise Time / Fall Time (20%↔80% of waveform)	0.3 nsec. (typ.) 0.6 nsec. (max.)	0.3 nsec. (typ.) 0.5 nsec. (max.)	0.3 nsec. (typ.) 0.6 nsec. (max.)	0.4 nsec. (typ.) 0.7 nsec. (max.)
Output Voltage Swing	595 mV (min.) , 750 mV (typ.) , 930 mV (max.)	250 mV (min.) , 350 mV (typ.) , 450 mV (max.)	400 mV (min.)	550 mV (min.)
Output Load	50 Ω into Vcc - 2V or Thevenin equivalent	100 Ω between output and complimentary output	50 Ω to ground on each output	None

Start-up Time	5.0 msec. (typ.) , 10 msec. (max.)						
Duty Cycle	50% ± 5%						
Storage Temperature	-55°C to +150°C						
Aging at Ta = +25°C	± 3 ppm (max.) first year ; ± 2 ppm (max.) per year thereafter						
RMS Jitter (12 KHz to 20 MHz)	0.2 psec (typ.) ; 0.5 psec (max.) [For 156.250 MHz] ; 0.18 psec (typ.) [For HCLK]						
SSB Phase Noise [dBc / Hz (typ.)]	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz
	62.5 MHz	-50	-82	-116	-138	-144	-149
	156.250 MHz	-50	-80	-115	-135	-142	-147
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 .	
	Commercial (-20°C to +70°C)		A	B	C	For example : " C20 " ± 20 ppm over -20°C to +70°C ; " F30 " ± 30 ppm over -40°C to +85°C	
	Industrial (-40°C to +85°C)		D	E	F		
Output Enable / Disable Function	Enable	When 70% min. of V _{DD} to Enable Output. Enable time : 10 msec (max.)					
	Disable	When 30% max. of V _{DD} to Disable Output. Disable current : 10 uA (max.)(OE ≤ 0.3V) , Disable time : 0.2 usec. (max.)					

Crystal Oscillators

HP_ [PECL Differential] HD_ [LVDS Differential] HC_ [HCSL Differential] HCL_ [LPHCSL Differential]

Part Number Format and Example

	[1]	[2]	[3]	-	[4]	-	[5]
	Supply Voltage	Holder Type	1 or 2		Frequency Stability		Center Frequency
Example	(1) 25	HCK536	1	-	C15	-	125.000
	(2) 18	HDJK576	2	-	D	-	156.250

Ex (1) : 25HCK5361 - C15 - 125.000 [+2.5V , HCK type , HCSL output , 5.0 x 3.2 mm size , OE on pad 1 , ±15 ppm from -20°C to 70°C , 125.000MHz]

Ex (2) : 18HDJK5762 - D - 156.250 [+1.8V , HDJK type , LVDS output , 7.0 x 5.0 mm size , OE on pad 2 , ±25 ppm from -40°C to 85°C , 156.250MHz]

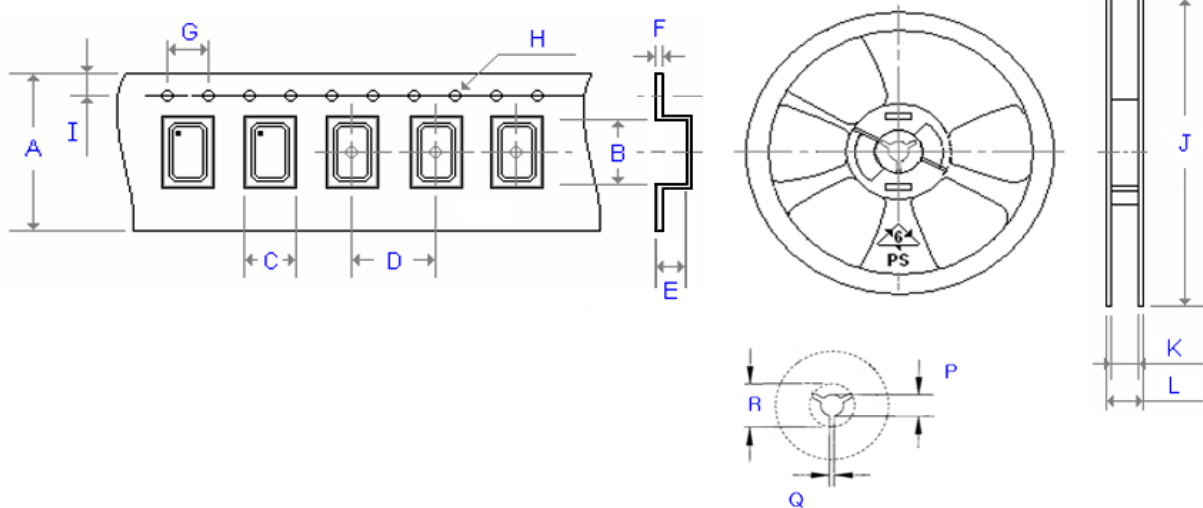
[1]	Supply voltage , " 18 " for +1.8V ; " 25 " for +2.5V ; " 3 " for +3.3V		
[2]	Holder Type		
[3]	" 1 " : OE function on pad # 1 , " 2 " : OE function on pad # 2		
[4]	-20°C ~ 70°C	" A " ± 25ppm ; " B " ± 50ppm ; " C " ± 100ppm ; If non-standard please enter the desired stability after " C " , for example " 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 " , for example " F30 " : represents ± 30ppm over -40 to +85°C	
[5]	Frequency in MHz		

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

H_K226 Top View Bottom View Land Pattern Side View Pad Connections : Pad 1 : OE Pad 2 : No Connection Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply Voltage	H_K326 Top View Bottom View Land Pattern Side View Pad Connections : Pad 1 : OE Pad 2 : No Connection Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply Voltage
H_K536 Top View Bottom View Land Pattern Side View Pad Connections : Pad 1 : OE Pad 2 : No Connection Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply Voltage	H_K576 Top View Bottom View Land pattern Side View Pad Connections : Pad 1 : OE Pad 2 : No Connection Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply Voltage
LVPECL Test Circuit V_{DD} = 3.3V ; R₁ = R₃ = 127 Ω ; R₂ = R₄ = 82.5 Ω V_{DD} = 2.5V ; R₁ = R₃ = 250 Ω ; R₂ = R₄ = 62.5 Ω	LVDS Test Circuit
HCSL Test Circuit Rs = 0 to 33Ω to minimize ringing in application.	LPHCSL Test Circuit for HCLK only

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