Differential Crystal Oscillators with No PLL

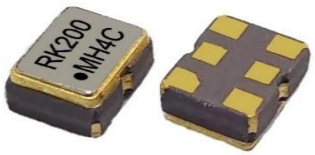
Differential

HPRK	HDRK	HCRK	SMD	1.8 V	2.5 V	3.3 V	Min.	Max.
LVPECL Differential	**LVDS** Differential	**HCSL** Differential					10.0 MHz	250 MHz

Features

Jitter 0.1 pS (typical)

- Femtosecond integrated phase jitter (84 fs (typ.) , 12 KHz to 20 MHz)
- Superior phase noise (-139 dBc/Hz at 10 KHz and -148 dBc/Hz at 100 KHz offset)
- Package size : 2.5x2.0mm , 3.2x2.5mm , 5.0x3.2mm , 7.0x5.0mm



General specifications , at Ta=+25°C

Model	HPRK	HDRK		HCRK	
Output Logic	LVPECL	LVDS		HCSL	
Available Frequency Range	10 MHz ~ 250 MHz	10 MHz ~ 250 MHz	10 MHz ~ 160 MHz 180 MHz ~ 250 MHz	20 MHz ~ 50 MHz 60 MHz ~ 220 MHz	100 MHz ~ 160 MHz
Supply Voltage (V_{DD})	--	--	+1.8 V ± 5%	--	+1.8 V ± 5%
	+2.5 V ± 10%	+2.5 V ± 10%	--	+2.5 V ± 10%	--
	+3.3 V ± 10%	+3.3 V ± 10%	--	+3.3 V ± 10%	--
Current Consumption (V_{DD} = + 3.3V)	32 mA (typ.) 60 mA (max.)	10 mA (typ.) 25 mA (max.)	8 mA (typ.) 16 mA (max.)	17 mA (typ.) 35 mA (max.)	
Output Logic " High " , " 1 "	V_{DD} - 1.03 (min.) V_{DD} - 0.6 (max.)	1.4 V (typ.) 1.6 V (max.)	0.8 V (typ.) 1.0 V (max.)	550 mV (min.) 1.0 V (max.)	
Output Logic " Low " , " 0 "	V_{DD} - 1.85 (min.) V_{DD} - 1.6 (max.)	0.9 V (min.) 1.1 V (typ.)	0.3 V (min.) 0.5 V (typ.)	-150 mV (min.) 150 mV (max.)	
Rise Time / Fall Time (20%↔80% of waveform)	0.3 nsec. (typ.) 0.5 nsec. (max.)	0.2 nsec. (typ.) 0.35 nsec. (max.)	0.2 nsec. (typ.) 0.35 nsec. (max.)	0.2 nsec. (typ.) 0.35 nsec. (max.)	
Output Voltage Swing	500 mV (min.) 750 mV (typ.)	300 mV (min.) , 400 mV (typ.) , 480 mV (max.)	200 mV (min.) , 300 mV (typ.) , 400 mV (max.)	500 mV (min.)	
Output Load	50 Ω into Vcc - 2V or Thevenin equivalent	100 Ω between output and complimentary output		50 Ω to ground oneach output	

Start-up Time	0.75 msec. (typ.) , 2.0 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)	84 fsec (typ.) ; For 156.250 MHz , LVPECL 3.3V						
SSB Phase Noise [dBc / Hz (typ.)]	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz
	156.250 MHz	-63	-97	-134	-139	-148	-153

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 ; " J40 " ± 40 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 Enable / Disable Function		
	Enable	When 70% min. of V_{DD} to Enable Output. Enable time : 2 msec (max.)
	Disable	When 30% max. of V_{DD} to Disable Output. Disable current : 30 uA (max.)(OE≦0.3V) , Disable time : 0.2 usec. (max.)

Differential Crystal Oscillators with No PLL

Differential

HPRK [LVPECL Differential] | HDRK [LVDS Differential] | HCRK [HCSL Differential]

Part Number Format and Example

[1]	[2]	[3]	–	[4]	–	[5]
Supply Voltage	Holder Type	1 or 2		Frequency Stability		Center Frequency
Example (1)	25V3	HDRK576	1	–	E	–	100.000
(2)	18	HPRK326	1	–	D	–	156.250

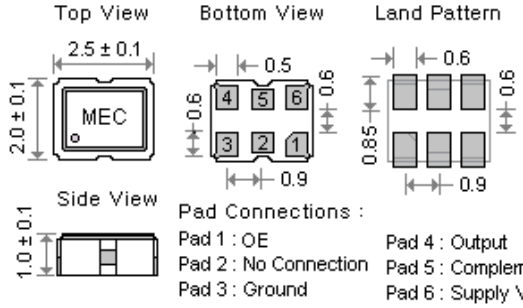
Ex (1) : 25V3HDRK5761 - E - 100.000 [+2.5 ~ +3.3V, HDRK type, LVDS output, 7.0 x 5.0mm size, OE on pad 1, ±50 ppm from -40°C to 85°C, 100.000MHz]

Ex (2) : 18HPRK3261 - D - 156.250 [+1.8V, HPRK type, LVPECL output, 3.2 x 2.5mm size, OE on pad 1, ±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 ; " 25V3 " for +2.5 ~ +3.3V ±10%	
[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 " C20 " : represents ±20ppm 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
	-40°C ~ 105°C	" G " ± 25ppm ; " H " ± 50ppm ; " J " ± 100ppm ; If non-standard please enter the desired stability after " J " , for example " J40 " : represents ±40ppm over -40 to +105°C
[5]	Frequency in MHz	

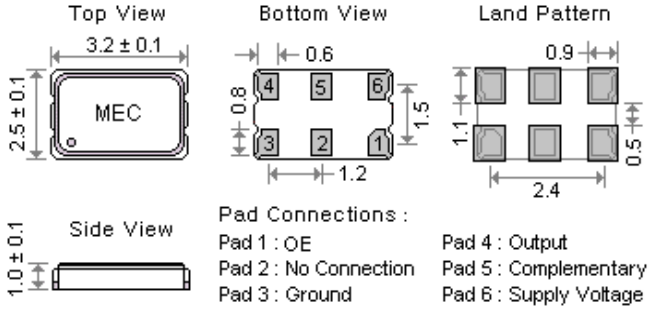
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs , Test Circuits

H_RK226



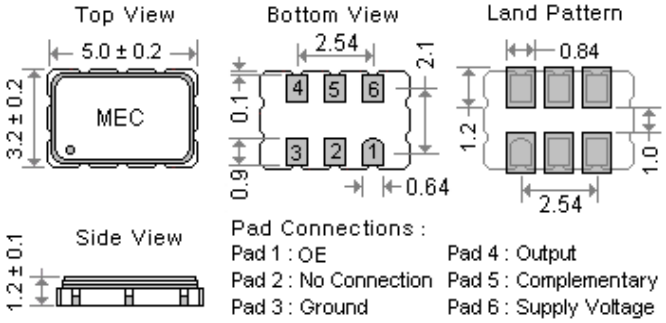
Pad Connections :
Pad 1 : OE
Pad 2 : No Connection
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

H_RK326



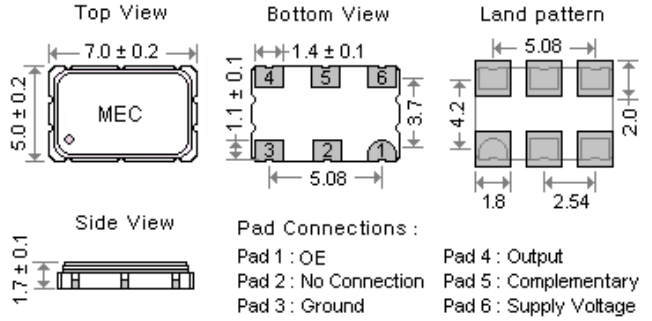
Pad Connections :
Pad 1 : OE
Pad 2 : No Connection
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

H_RK536



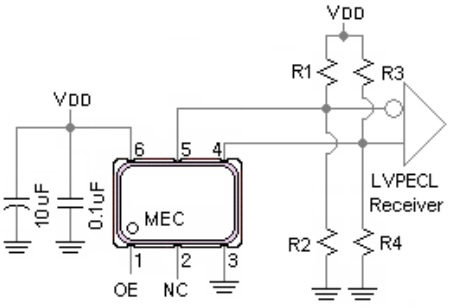
Pad Connections :
Pad 1 : OE
Pad 2 : No Connection
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

H_RK576



Pad Connections :
Pad 1 : OE
Pad 2 : No Connection
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

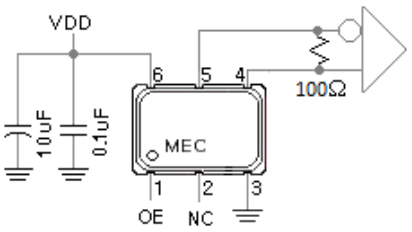
LVPECL Test Circuit



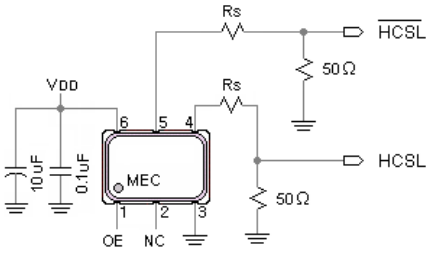
V_{DD} = 3.3V ; R1 = R3 = 127 Ω ; R2 = R4 = 82.5 Ω

V_{DD} = 2.5V ; R1 = R3 = 250 Ω ; R2 = R4 = 62.5 Ω

LVDS Test Circuit



HCSL Test Circuit



Rs = 0 to 33Ω to minmize ringing in application.

Production Marking Rules

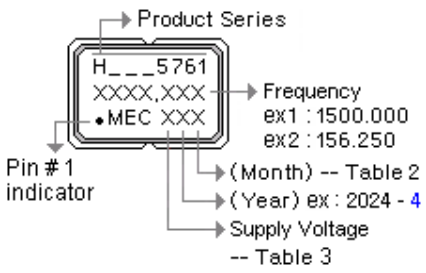
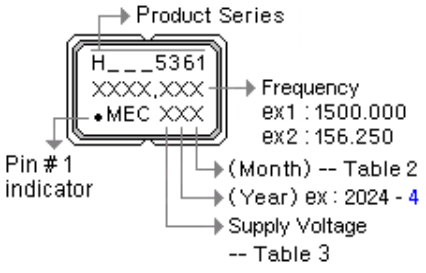
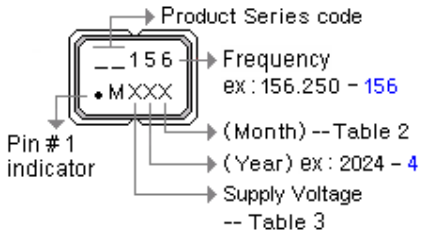
H (P , D , C) RK5761	H (P , D , C) RK5361	H (P , D , C) RK3261 H (P , D , C) RK2261
		

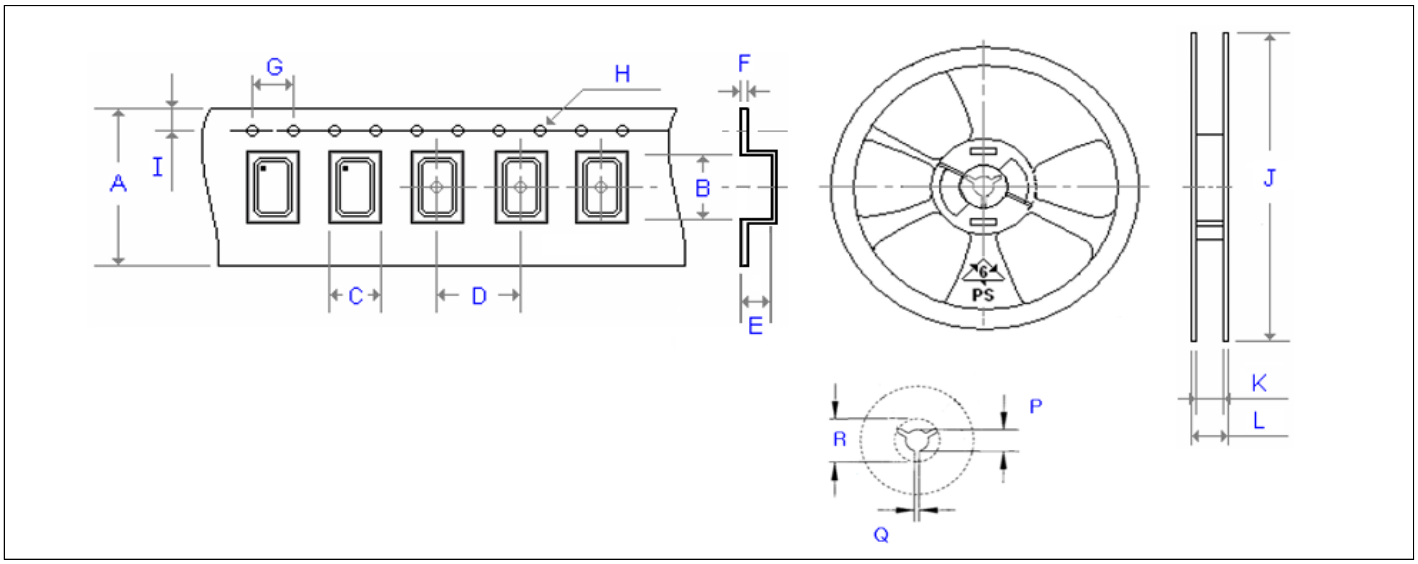
Table 1	-20°C ~ 70°C	" A " ± 25ppm ; " B " ± 50ppm ; " C " ± 100ppm ; If non-standard please enter the desired stability after " C " , for example " C20 " : ± 20ppm
	-40°C ~ 85°C	" D " ± 25ppm ; " E " ± 50ppm ; " F " ± 100ppm ; If non-standard please enter the desired stability after " F " , for example " F30 " : ± 30ppm
	-40°C ~ 105°C	" G " ± 25ppm ; " H " ± 50ppm ; " J " ± 100ppm If non-standard please enter the desired stability after " J " , for example " J40 " : ± 40ppm

Table 2	Month	1	2	3	4	5	6	7	8	9	10	11	12
	Code	A	B	C	D	E	F	G	H	I	J	K	L

Table 3	Supply Voltage	3.3 V	2.5 V	1.8 V	2.5~3.3 V
		D	H	J	W

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
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 / -0.0mm

	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
H_43	330.00	24.50	29.10	13.00	2.20	17.30	500