

Differential LVPECL Crystal Clock Oscillators

HPK5361 Series 200 fsec Jitter +2.5V +3.3V "K" Family

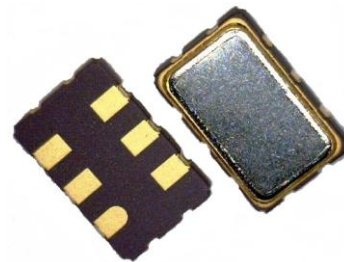


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Since 1973

- ◆ Femto second integrated phase jitter (200 fs typical, 12 KHz to 20 MHz)
- ◆ Superior phase noise (-138 dBc/Hz at 10 KHz and -144 dBc/Hz at 100 KHz offset).
- ◆ High performance with surprisingly low price.
- ◆ 2.5V or 3.3V supply voltage.



RoHS Compliant Product
by Mercury



General Specifications

Product Series		HPK5361; “K” family characteristics. Tri-State on pad 1						
Frequency Range		40 MHz ~ 200 MHz.						
Output Logic		Differential PECL square wave						
Frequency Stability vs Operating Temperature Range	Stability Code		Commercial “C”:: -10°C to +70°C			Industrial “I”:: -40°C to +85°C		
	±25 ppm		A			D		
	±50 ppm		B			E		
	±100 ppm		C			F		
	Custom ±xx ppm		Cxx			Ixx		
	If custom, use “temperature range code + desired stability in ppm” for the stability code. Example: “C20” (±20 ppm over -10 to +70°C).							
Supply Voltage V _{cc}		+2.5 V ± 5 % (Voltage code is “25”); or +3.3 V ± 5 % (Voltage code is “3”)						
Output Voltage HIGH “1”, V _{OH}		V _{DD} -1.025 V min.; V _{DD} -0.95 V typical; V _{DD} -0.88 V max. Condition: 50 ohms to V _{DD} -2V						
Output Voltage LOW “0”, V _{OL}		V _{DD} -1.810 V min.; V _{DD} -1.70 V typical; V _{DD} -1.62 V max. Condition: 50 ohms to V _{DD} -2V						
Output Swing		595 mV min; 750 mV typical; 930 mV max.						
Current Consumption		35 mA typical; 50 mA max.						
Load		50 ohms into V _{cc} -2V or Thevenin equivalent (terminating resistors required on all outputs).						
Rise Time (Tr)		0.3 n sec. typ; 0.5 n sec. max. 20%→80% of waveform						
Fall Time (Tf)		0.3 n sec. typ; 0.5 n sec. max. 80%→20% of waveform						
Duty Cycle		50% ± 5% max. measured at 50% waveform						
Tri-state Function on pad No. 1		If no connection or V _{DD} *70% min is applied: Output. Internal pull-up						
		Oscillation disable time is 0.2 u sec max.						
		If V _{DD} *30% max is applied: High impedance.						
		Current consumption is 10 uA typical						
		Oscillation enable time is 2 m sec. max.						
Phase Jitter (RMS)		200 fs typical (12 KHz to 20 MHz integrated)						
SSB Phase Noise (dBc/Hz). Typical	Offset	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
	125 MHz	-50	-82	-116	-138	-144	-149	-155
Start-up Time		3 ms typical; 10 m sec. max.						
Aging		±3 ppm / year max.						
Packaging		180 mm reel; 16 mm tape, 7.8 mm pitch. 1000 pcs per reel.						

⁽¹⁾Inclusive of 25°C tolerance, operating temperature range, ±10% input voltage variation, load change, aging at +25°C, shock and vibration

MERCURY www.mercury-crystal.com

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Absolute Maximum Rating Permanent damage may be created if operate beyond limits specified **Ta=25°C, Vss=0V**

Parameters	Rating	
	Min.	Max.
Supply Voltage	Vss-0.5V	5.0V
Input Voltage	Vss-0.5V	V _{DD} +0.5V
Output Voltage	Vss-0.5V	V _{DD} +0.5V

Environmental Performance Specifications

Green Requirement	RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) compliant
MSL Level	Level 1 per IPC/JEDEC J-STD-020D.1
Storage temp. range	-55°C to +125°C
Humidity	85% RH, 85°C, 48 hours
Hermetic seal	Leak rate 2x10 ⁻⁸ ATM-cm ³ /sec max.
Solderability	MIL-STD-202F method 208E
Reflow	260°C for 10 sec max.. 2 times max.
Vibration	MIL-STD-202F method 204, 35G, 50 to 2000 Hz
Shock	MIL-STD-202F method 213B, test condi. E, 1000GG ½ sine wave
ESD Protection	2KV max. Human body model.
Contact pad surface finish	Gold (0.3~1.0 um) on nickel (1.27~8.89 um)
Weight per unit	160 mg typical

Part Number Format and Examples:

Example: 3HPK5361-A-155.520; 25HPK5361-A-155.520

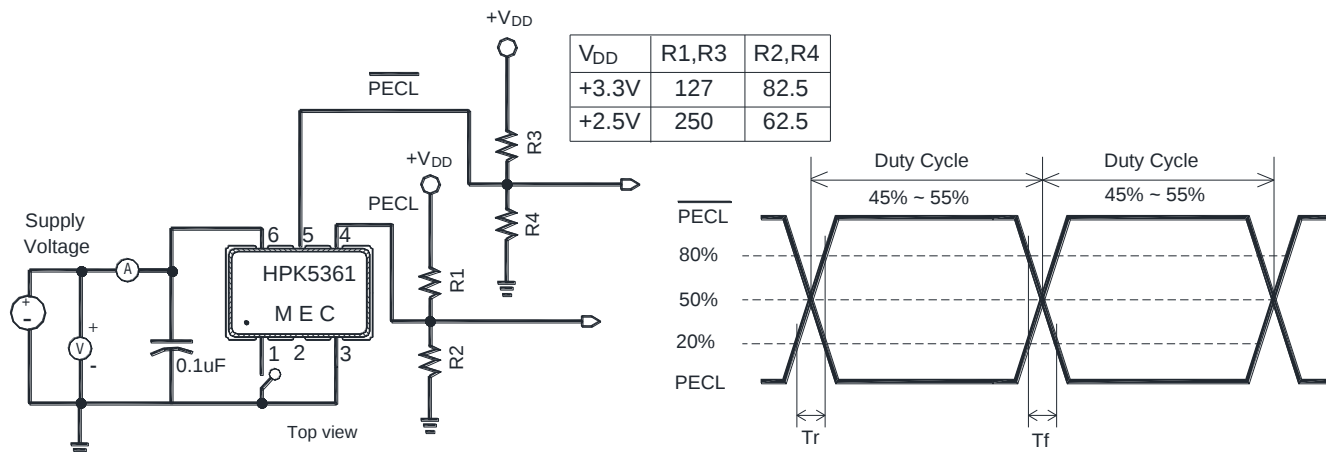
Explanation: +3.3V HPK5361 series LVPECL output clock oscillator, frequency stability is ±25 ppm over -10°C to +70°C, 155.520 MHz

						⌀: customer to specify
3	HPK5361	—	A	—	155.520	
①	②		③		④	

①: V_{DD} voltage codes: “3” for +3.3 V; “25” for +2.5 V ②: HPK5361 product series. ‘H’ for clock; ‘P’ for PECL; ‘K’: for “K” family characteristics. “536” for 3.2x5 mm SMD with 6 pads. ‘1’ for Tri-State on pad 1.

③: Frequency stability code: “A” ~ “F” or custom. See table above. ④: Frequency in MHz

25HPK5361 and 3HPK5361 Test Circuit and Waveform:



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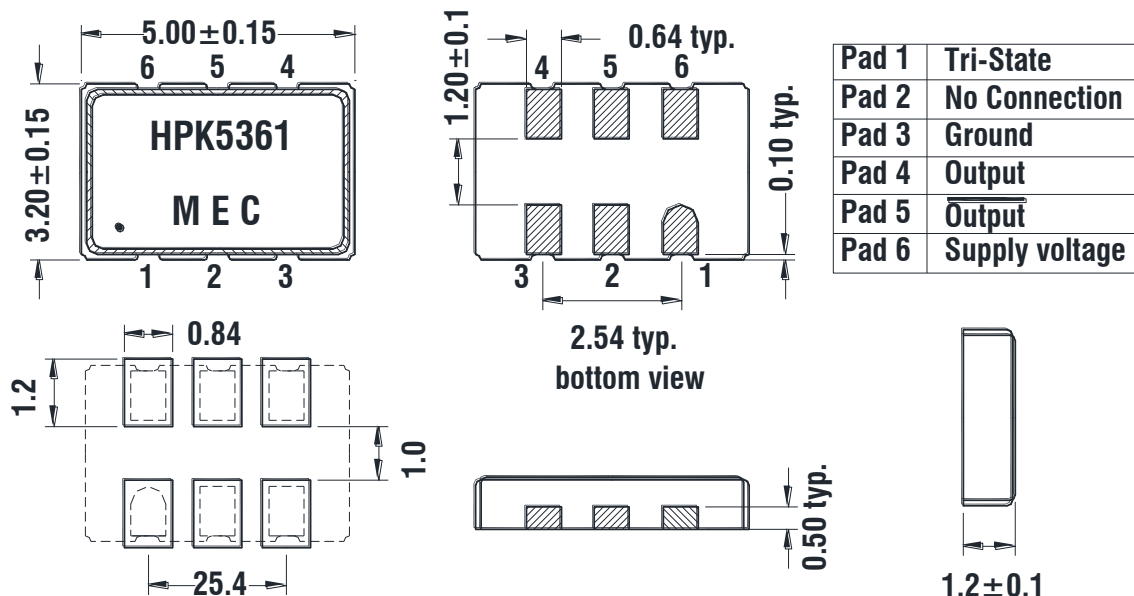
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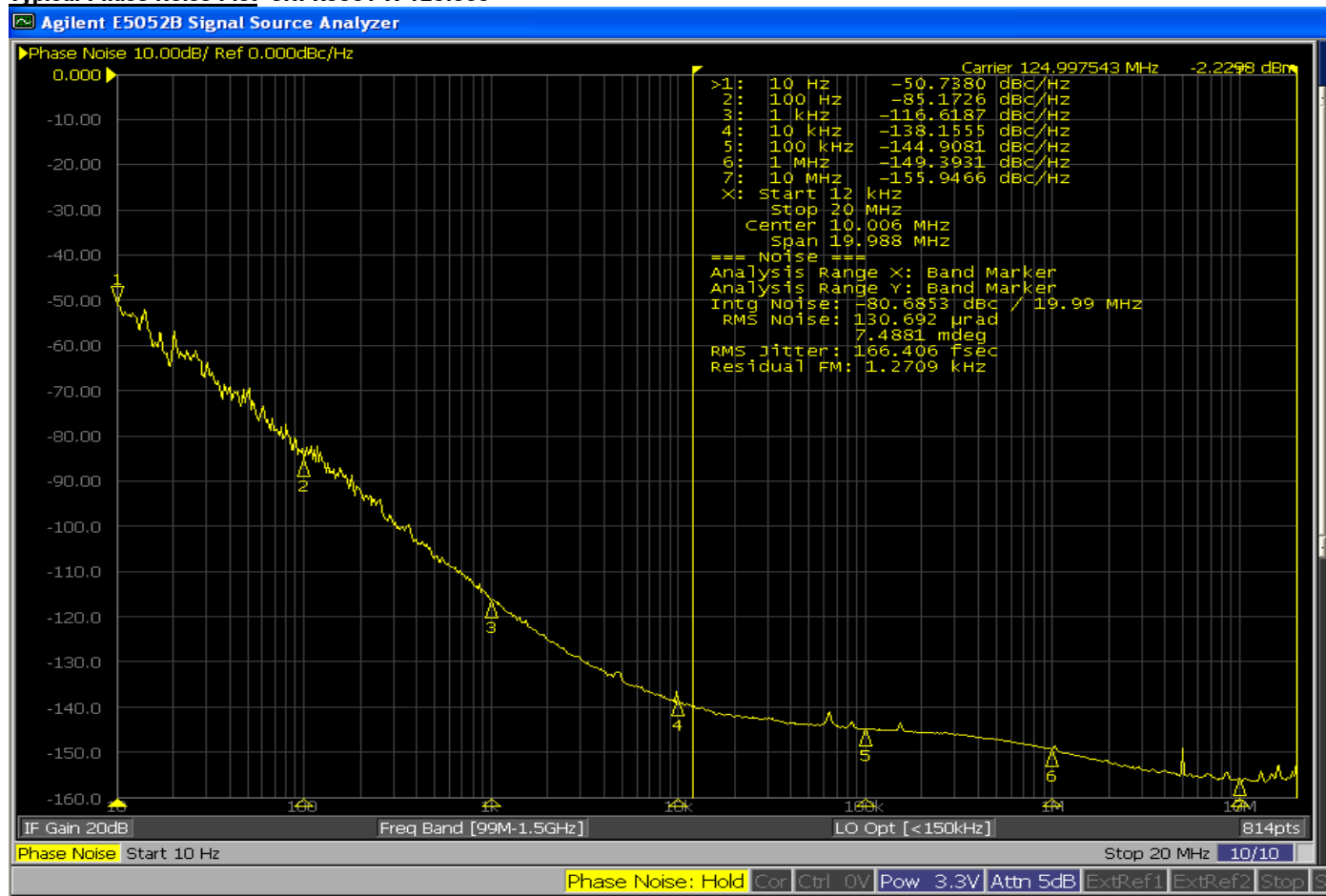
HPK5361 Package Dimensions and Recommended Solder Pad Layout:

unit mm



Rounded pad is pad No. 1. Count counter-clockwise when looking at top view.
Count clockwise when looking at bottom view.

Typical Phase Noise Plot 3HPK5361-A-125.000



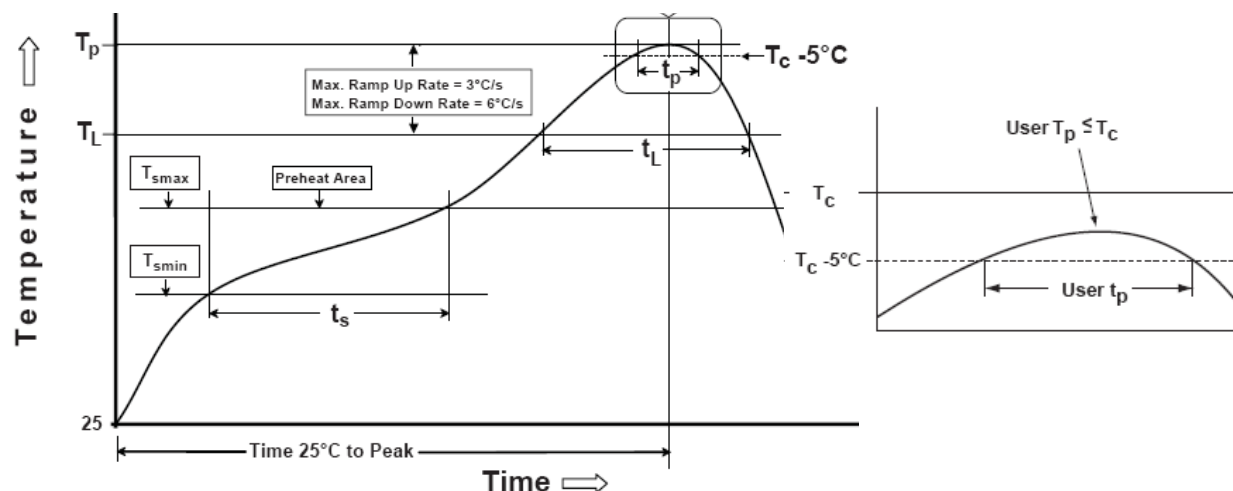
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HPK5361 Recommended Solder Reflow Profile (from IPC/JEDEC J-STD-020D.1)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak		
- Temperature min. (Ts min.)	100°C	150°C
- Temperature max. (Ts max.)	150°C	200°C
- Time (ts) (Ts min. to Ts max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (TL to Tp)	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (TL)	183°C	217°C
Time (tL) maintained above TL	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (Tp)	235°C	260°C
Time (Tp) within 5°C of the classification temperature Tc	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (Tp to TL)	6°C / second max.	6°C / second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

All temperatures refer to topside of the package, measured on the package body surface.