PL133-37

Low-Power, 1.62V to 3.63V, 1MHz to 150MHz, 1:3 Fanout Buffer IC

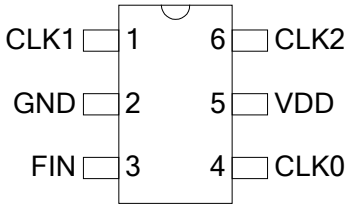
FEATURES

- 3 LVCMOS Outputs
- 12mA Output Drive Strength
- Input/Output Frequency:
  - o Reference Clock: 1MHz to 150MHz
- Supports LVCMOS or Sine Wave Input Clock
- Very Low Jitter and Phase Noise
- Low Current Consumption
- Single 1.8V, 2.5V, or 3.3V, ±10% Power Supply
- Operating Temperature Range
  - o 0°C to 70°C (Commercial)
  - o -40°C to 85°C (Industrial)
- Available in SOT23-6L GREEN/RoHS Compliant Packages

DESCRIPTION

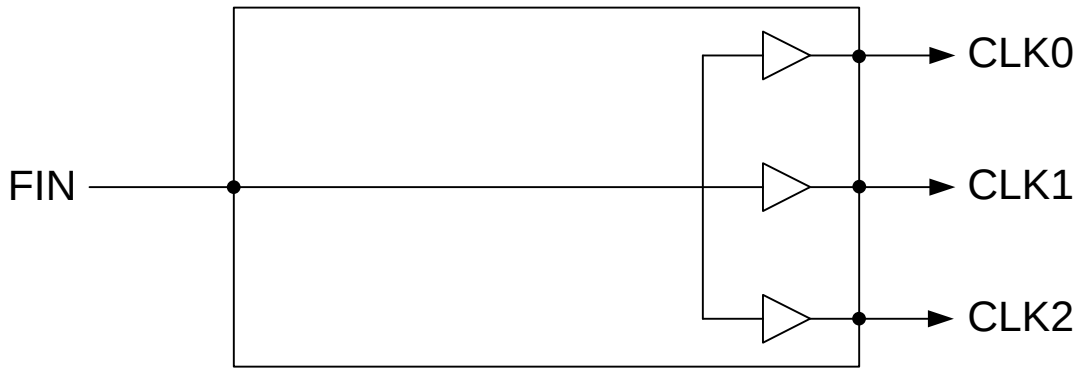
The PL133-37 is an advanced fanout buffer design for high performance, low-power, small form-factor applications. The PL133-37 accepts a reference clock input of 1MHz to 150MHz and produces three outputs of the same frequency. Reference clock inputs may be LVCMOS or sine-wave signals (the inputs are internally AC-coupled). Offered in a small 3mm x 3mm SOT23, the PL133-37 offers the best phase noise and jitter performance and lowest power consumption of any comparable IC.

PACKAGE PIN CONFIGURATION



SOT23-6L

BLOCK DIAGRAM



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PIN DESCRIPTION

Name	Package Pin # SOT23-6L	Type	Description
CLK1	1	O	Output clock
GND	2	P	Ground connection
FIN	3	I	Reference clock input
CLK0	4	O	Output clock
VDD	5	P	Power supply
CLK2	6	O	Output clock

LAYOUT RECOMMENDATIONS

The following guidelines are to assist you with a performance optimized PCB design:

Signal Integrity and Termination Considerations

- Keep traces short!

- Trace = Inductor. With a capacitive load this equals ringing!

- Long trace = Transmission Line. Without proper termination this will cause reflections (looks like ringing).

- Design long traces as “striplines” or “microstrips” with defined impedance.

- Match trace at one side to avoid reflections bouncing back and forth.

Decoupling and Power Supply Considerations

- Place decoupling capacitors as close as possible to the V_{DD} pin(s) to limit noise from the power supply

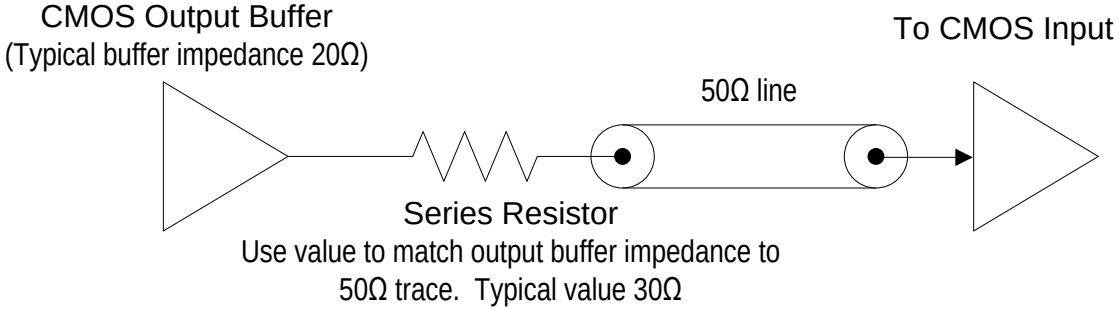
- Multiple V_{DD} pins should be decoupled separately for best performance.

- Addition of a ferrite bead in series with V_{DD} can help prevent noise from other board sources

- Value of decoupling capacitor is frequency dependant. Typical value to use is 0.1μF.

Typical CMOS termination

Place Series Resistor as close as possible to CMOS output



ELECTRICAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage Range	V_{DD}	-0.5	4.6	V
Input Voltage Range	V_I	-0.5	V_{DD}+0.5	V
Output Voltage Range	V_O	-0.5	V_{DD}+0.5	V
Storage Temperature	T_S	-65	150	°C
Ambient Operating Temperature*		-40	85	°C

Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

*Operating temperature is guaranteed by design. Parts are tested to commercial grade only.

AC SPECIFICATIONS

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input (FIN) Frequency	2.5V and 3.3V operation	1		150	MHz
	1.8V operation	1		100	MHz
Input (FIN) Signal Amplitude	Internally AC coupled, ≤150MHz, VDD=2.5V and 3.3V.	0.8		V_{DD}	V_{PP}
	Internally AC coupled, ≤100MHz, all VDDs	0.5		V_{DD}	V_{PP}
	Internally AC coupled, 3.3V ≤50MHz, 2.5V ≤40MHz, 1.8V ≤15MHz	0.1		V_{DD}	V_{PP}
Output Enable Time	OE Function; Ta=25° C, 15pF Load			10	ns
Output Rise Time	15pF Load, 10/90%V_{DD}, 3.3V		2	3	ns
Output Fall Time	15pF Load, 90/10%V_{DD}, 3.3V		2	3	ns
Duty Cycle	Input Duty Cycle is 50%	45	50	55	%
Output to Output Skew	All outputs equally loaded			250	ps

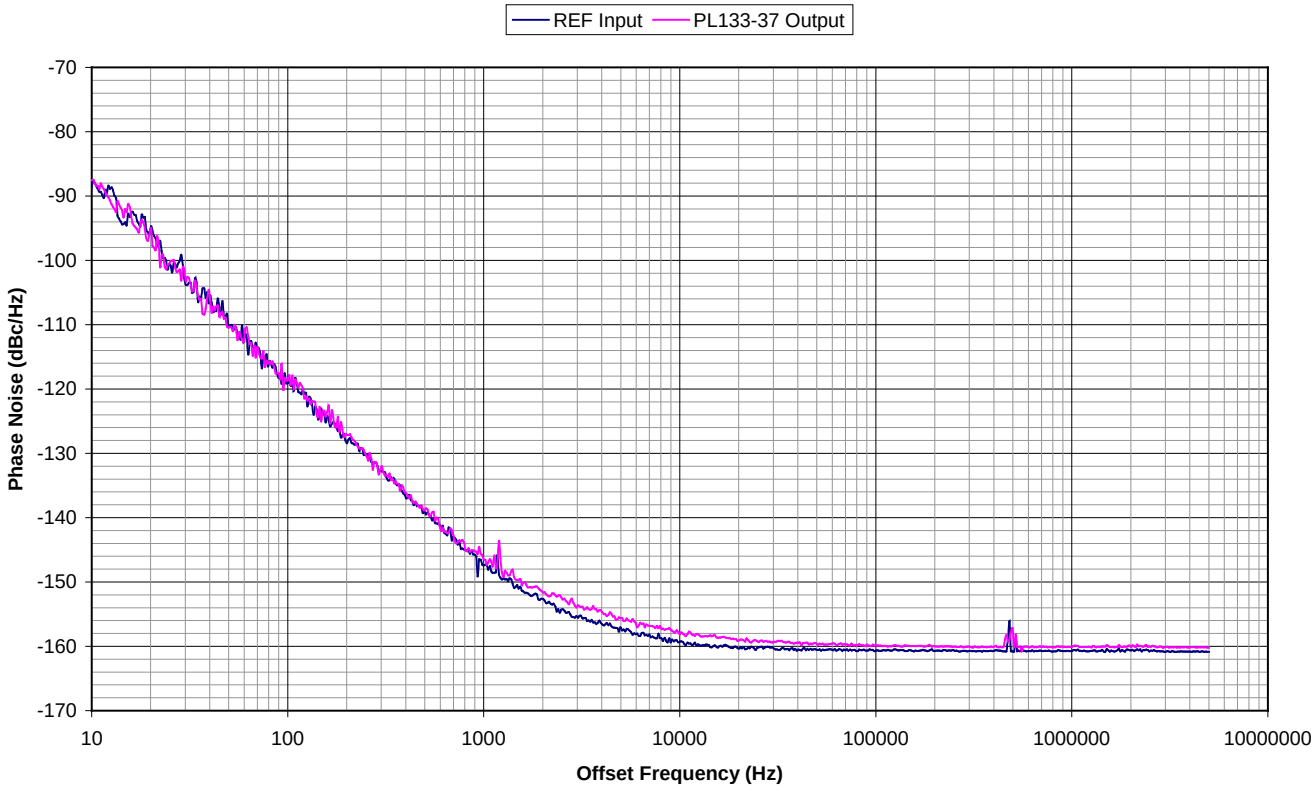
DC SPECIFICATIONS

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current, Dynamic	I_{DD}	V_{DD} = 3.3V, 25MHz, No Load		1.2		mA
		V_{DD} = 2.5V, 25MHz, No Load		0.9		mA
		V_{DD} = 1.8V, 25MHz, No Load		0.6		mA
Supply Current, Standby	I_{DD_SB}	OE Pin Pulled Low, V_{DD} = 3.3V		0.3		mA
Operating Voltage	V_{DD}		1.62		3.63	V
Output Low Voltage	V_{OL}	I_{OL} = +12mA, V_{DD} = 3.3V			0.4	V
Output High Voltage	V_{OH}	I_{OH} = -12mA, V_{DD} = 3.3V	2.4			V
Output Current	I_{OSD}	V_{OL} = 0.4V, V_{OH} = 2.4V, V_{DD} = 3.3V	12			mA

NOISE CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Additive Phase Jitter		V_{DD}=3.3V, Frequency=26MHz Offset=12kHz ~ 5MHz		70		fs
		V_{DD}=3.3V, Frequency=100MHz Offset=12kHz ~ 20MHz		80		fs

PL133-37 Additive Phase Jitter:
VDD=3.3V, CLK=26MHz, Integration Range 12KHz to 5MHz: 0.072ps typical.



When a buffer is used to pass a signal then the buffer will add a little bit of its own noise. The phase noise on the output of the buffer will be a little bit more than the phase noise in the input signal. To quantify the noise addition in the buffer we compare the Phase Jitter numbers from the input and the output. The difference is called "Additive Phase Jitter". The formula for the Additive Phase Jitter is as follows:

$$\text{Additive Phase Jitter} = \sqrt{(\text{Output Phase Jitter})^2 - (\text{Input Phase Jitter})^2}$$

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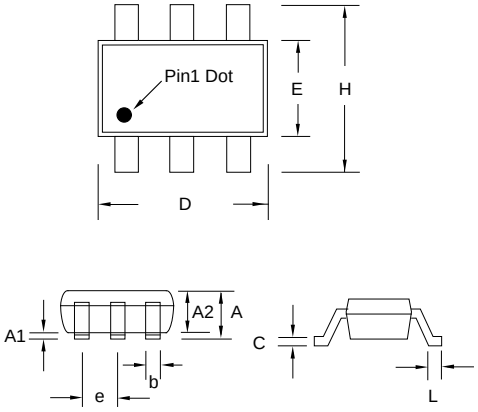
PACKAGE DRAWINGS (GREEN PACKAGE COMPLIANT)

SOT23-6L

Symbol	Dimension in MM	
	Min.	Max.
A	1.05	1.35
A1	0.05	0.15
A2	1.00	1.20
b	0.30	0.50
c	0.08	0.20
D	2.80	3.00
E	1.50	1.70
H	2.60	3.00
L	0.35	0.55
e	0.95 BSC	



ORDERING INFORMATION (GREEN PACKAGE COMPLIANT)

For part ordering, please contact our Sales Department:
2180 Fortune Drive, San Jose, CA 95131, USA
Tel: (408) 944-0800 Fax: (408) 474-1000

PART NUMBER
The order number for this device is a combination of the following:
Part number, Package type and Operating temperature range

PL133-37 X X - X

Part Number

None=Tubes
R=Tape and Reel

Package Type
T = SOT23-6L

Temperature Range
C=Commercial (0°C to 70°C)

Part/Order Number	Marking	Package Option
PL133-37TC-R	H37 LLL	6-Pin SOT23 (Tape and Reel)
PL133-37TI-R		

*Note: LLL designates lot number

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PL133-27GI 9DBV0541AKLF 9DBV0941AKLF MPC962309EJ-1H NB3M8304CDG NB4N121KMNG NB7VQ58MMNG 8T39S11ANLGI 8T73S1802NLGI 9DBV0941AKILF MC10E111FNG MK2308S-1HILF 5PB1216NDGK 6V31024NLG PL133-27GI-R 9DBV0941AKILFT NB3L02FCT2G NB3L03FCT2G NB7VQ58MMNHTBG ZL40203LDG1 ZL40200LDG1 9DMV0141AKILFT ZL40205LDG1 ZL40201LDG1 9DBV0541AKILF PI49FCT32807QE 552-02SPGGI 9FG1200DF-1LF MDB1900ZCQY 9ZXL1530DKILF 8SLVP1102ANLGI/W ZL40223LDG1 5PB1203NTGK8 9FG1001BGLF MDB1900ZBQY 5PB1213NTGK 5PB1214CMGK ZL40202LDG1 8L30205NLGI8 5PB1204CMGK 5PB1214CMGK8 5PB1203NTGK 5PB1206NDGK PI49FCT20802QE MAX9317AECJ+ SL2305SC-1T PI6C10810HE 5P1103A517NLGI 9ZX21901DKLF NB7L1008MNG