

MO9120

Standard Frequency Differential Oscillator

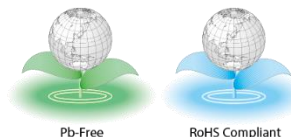


Features

- 31 standard frequencies from 25 MHz to 212.5 MHz
- LVPECL and LVDS output signaling types
- 0.6 ps RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- Frequency stability as low as ± 10 ppm
- Industrial and extended commercial temperature ranges
- Industry-standard packages: 3.2x2.5, 5.0x3.2 and 7.0x5.0 mmxmm
- For any other frequencies between 1 to 625 MHz, refer to MO9121 and MO9122 datasheet

Applications

- 10GB Ethernet, SONET, SATA, SAS, Fibre Channel, PCI-Express
- Telecom, networking, instrumentation, storage, servers



Electrical Characteristics

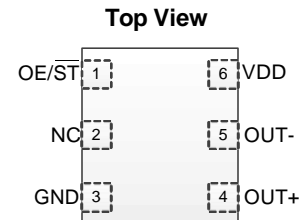
Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVPECL and LVDS, Common Electrical Characteristics						
Supply Voltage	V _{dd}	+2.97	+3.3	+3.63	V	
		+2.25	+2.5	+2.75	V	
		+2.25	–	+3.63	V	Termination schemes in Figures 1 and 2 - XX ordering code
Output Frequency Range	f	25	–	212.5	MHz	See last page for list of standard frequencies
Frequency Stability	F _{stab}	-10	–	+10	ppm	Inclusive of initial tolerance, operating temperature, rated power supply voltage, and load variations
		-20	–	+20	ppm	
		-25	–	+25	ppm	
		-50	–	+50	ppm	
First Year Aging	F _{aging1}	-2.0	–	+2.0	ppm	+25°C
10-year Aging	F _{aging10}	-5.0	–	+5.0	ppm	+25°C
Operating Temperature Range	T _{use}	-40	–	+85	°C	Industrial
		-20	–	+70	°C	Extended Commercial
Input Voltage High	V _{IH}	70%	–	–	V _{dd}	Pin 1, OE or \overline{ST}
Input Voltage Low	V _{IL}	–	–	30%	V _{dd}	Pin 1, OE or \overline{ST}
Input Pull-up Impedance	Z _{in}	–	100	250	k Ω	Pin 1, OE logic high or logic low, or \overline{ST} logic high
		2.0	–	–	M Ω	Pin 1, \overline{ST} logic low
Start-up Time	T _{start}	–	6.0	10	ms	Measured from the time V _{dd} reaches its rated minimum value.
Resume Time	T _{resume}	–	6.0	10	ms	In Standby mode, measured from the time \overline{ST} pin crosses 50% threshold.
Duty Cycle	DC	45	–	55	%	Contact KDS for tighter duty cycle
LVPECL, DC and AC Characteristics						
Current Consumption	I _{dd}	–	+61	+69	mA	Excluding Load Termination Current, V _{dd} = +3.3V or +2.5V
OE Disable Supply Current	I _{OE}	–	–	+35	mA	OE = Low
Output Disable Leakage Current	I _{leak}	–	–	+1.0	μ A	OE = Low
Standby Current	I _{std}	–	–	+100	μ A	\overline{ST} = Low, for all V _{dds}
Maximum Output Current	I _{driver}	–	–	+30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	V _{dd} -1.1	–	V _{dd} -0.7	V	See Figure 1(a)
Output Low Voltage	VOL	V _{dd} -1.9	–	V _{dd} -1.5	V	See Figure 1(a)
Output Differential Voltage Swing	V _{Swing}	+1.2	+1.6	+2.0	V	See Figure 1(b)
Rise/Fall Time	T _r , T _f	–	300	500	ps	20% to 80%, see Figure 1(a)
OE Enable/Disable Time	T _{oe}	–	–	115	ns	f = 212.5 MHz - For other frequencies, T _{oe} = 100ns + 3 period
RMS Period Jitter	T _{jitt}	–	1.2	1.7	ps	f = 100 MHz, V _{dd} = +3.3V or +2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, V _{dd} = +3.3V or +2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, V _{dd} = +3.3V or +2.5V
RMS Phase Jitter (random)	T _{phj}	–	0.6	0.85	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}
LVDS, DC and AC Characteristics						
Current Consumption	I _{dd}	–	+47	+55	mA	Excluding Load Termination Current, V _{dd} = +3.3V or +2.5V
OE Disable Supply Current	I _{OE}	–	–	+35	mA	OE = Low
Differential Output Voltage	VOD	+250	+350	+450	mV	See Figure 2

Electrical Characteristics (continued)

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVDS, DC and AC Characteristics (continued)						
Output Disable Leakage Current	I_{leak}	–	–	+1.0	μA	OE = Low
Standby Current	I_{std}	–	–	+100	μA	\overline{ST} = Low, for all V _{dds}
VOD Magnitude Change	ΔVOD	–	–	+50	mV	See Figure 2
Offset Voltage	VOS	+1.125	+1.2	+1.375	V	See Figure 2
VOS Magnitude Change	ΔVOS	–	–	+50	mV	See Figure 2
Rise/Fall Time	T_r, T_f	–	495	600	ps	20% to 80%, see Figure 2
OE Enable/Disable Time	T_{oe}	–	–	115	ns	f = 212.5 MHz - For other frequencies, T_{oe} = 100ns + 3 period
RMS Period Jitter	T_{jitt}	–	1.2	1.7	ps	f = 100 MHz, V _{dd} = +3.3V or +2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, V _{dd} = +3.3V or +2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, V _{dd} = +3.3V or +2.5V
RMS Phase Jitter (random)	T_{phj}	–	0.6	0.85	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V _{dds}

Pin Description

Pin	Map		Functionality
1	OE	Input	H or Open: specified frequency output L: output is high impedance
	\overline{ST}	Input	H or Open: specified frequency output L: Device goes to sleep mode. Supply current reduces to I_{std} .
2	NC	NA	No Connect; Leave it floating or connect to GND for better heat dissipation
3	GND	Power	VDD Power Supply Ground
4	OUT+	Output	Oscillator output
5	OUT-	Output	Complementary oscillator output
6	VDD	Power	Power supply voltage



Absolute Maximum

Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Min.	Max.	Unit
Storage Temperature	-65	+150	°C
VDD	-0.5	+4.0	V
Electrostatic Discharge (HBM)	–	+2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	+260	°C

Thermal Consideration

Package	θ_{JA} , 4 Layer Board (°C/W)	θ_{JC} , Bottom (°C/W)
7050, 6-pin	142	27
5032, 6-pin	97	20
3225, 6-pin	109	20

Environmental Compliance

Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method2002
Mechanical Vibration	MIL-STD-883F, Method2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method2003
Moisture Sensitivity Level	MSL1 @ 260°C

Waveform Diagrams

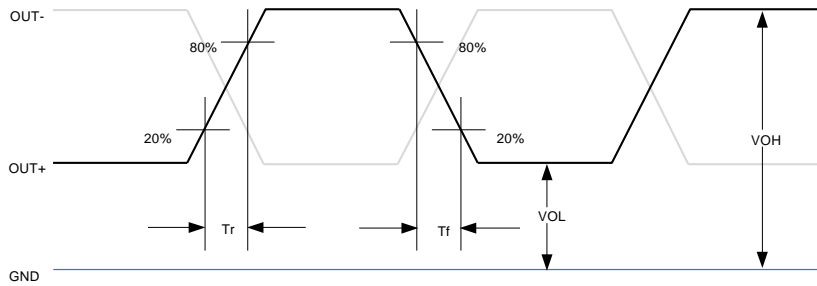


Figure 1(a). LVPECL Voltage Levels per Differential Pin (OUT+/OUT-)

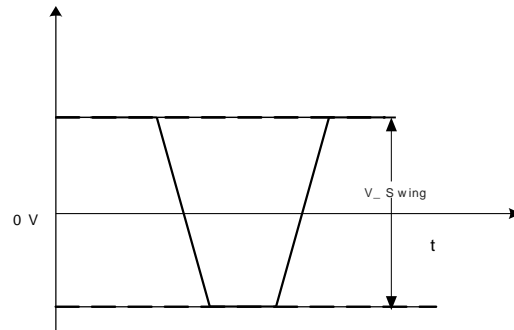


Figure 1(b). LVPECL Voltage Levels Across Differential Pair

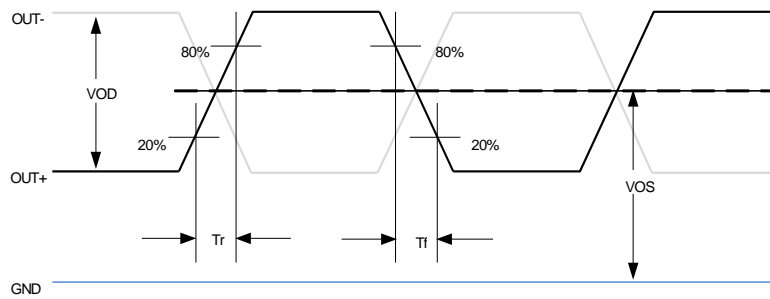


Figure 2. LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

Termination Diagrams

LVPECL:

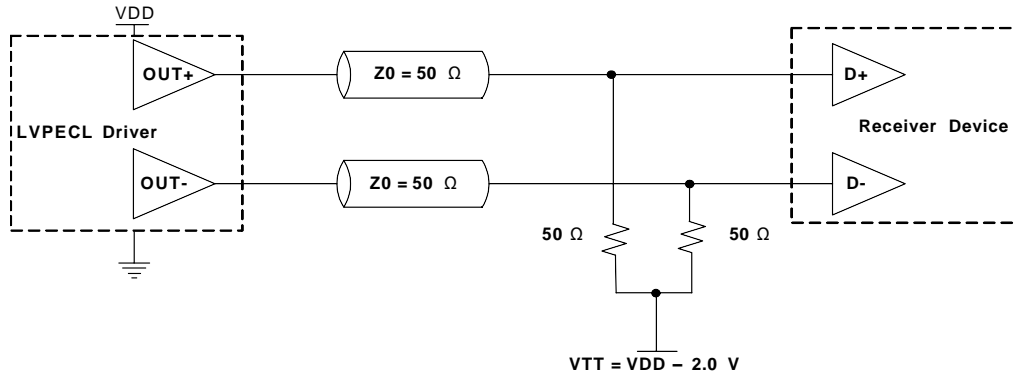


Figure 3. LVPECL Typical Termination

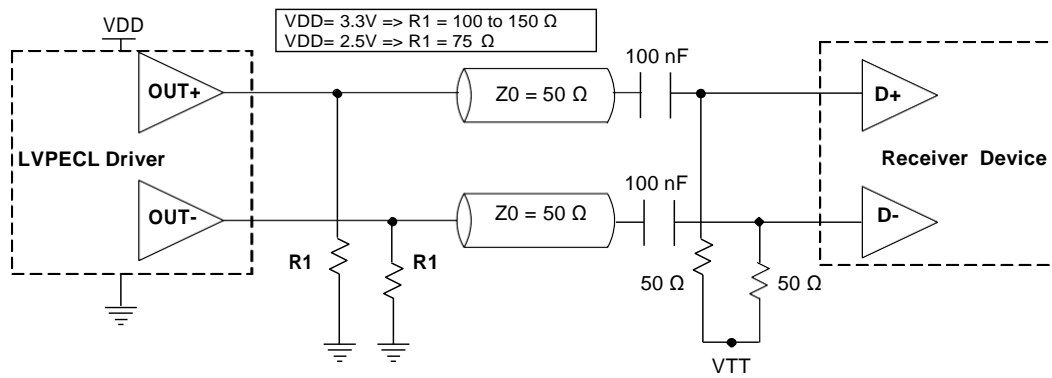


Figure 4. LVPECL AC Coupled Termination

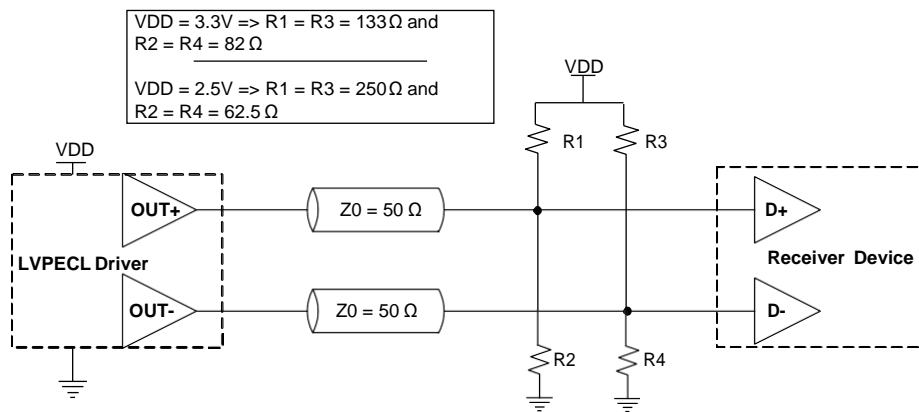


Figure 5. LVPECL with Thevenin Typical Termination

LVDS:

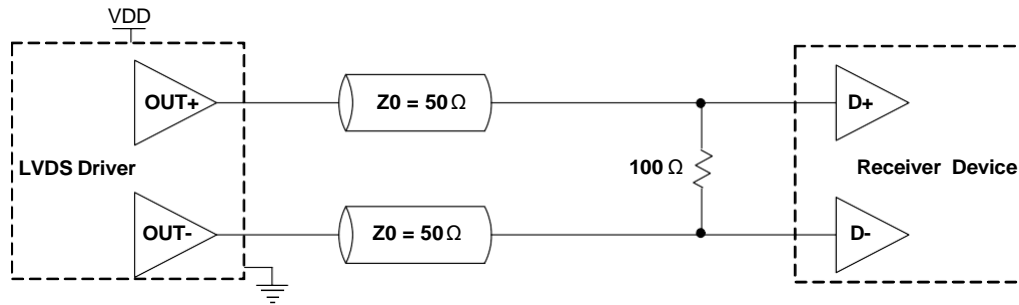


Figure 6. LVDS Single Termination (Load Terminated)

Dimensions and Patterns

Package Size – Dimensions (Unit: mm) ^[1]	Recommended Land Pattern (Unit: mm) ^[2]
<p>3.2 x 2.5x 0.75 mm</p>	
<p>5.0 x 3.2 x 0.75 mm</p>	
<p>7.0 x 5.0x 0.90 mm</p>	

Notes:

1. Top Marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of “Y” will depend on the assembly location of the device.
2. A capacitor of value 0.1 μ F between Vdd and GND is recommended.

Ordering Information

M O 9 1 2 0 D B 6 - B 0 H - 3 3 E 0 - 0 1 2 5 0 0 0 0 0 0 Y

Part Family
"MO9120"

Temperature Range
"D" Extended Commercial -20°C to +70°C
"I" Industrial -40°C to +85°C

Package Size
"D6" 3.2 x 2.5 mm
"B6" 5.0 x 3.2 mm
"A6" 7.0 x 5.0 mm

Signaling Type
"B" LVPECL
"D" LVDS

Signaling Function
"0" Default

Frequency Stability
"F" ±10ppm
"G" ±20ppm
"H" ±25ppm
"K" ±50ppm

Packing
"Y" 12/16mm Tape & Reel, 1ku reel
"X" 12/16mm Tape & Reel, 250u reel
"D" 8mm Tape & Reel, 3ku reel
"E" 8mm Tape & Reel, 1ku reel
"G" 8mm Tape & Reel, 250u reel

Frequency
Refer to the Supported Frequency Table below

Function
"0" No Function

Feature Pin (#1 pin)
"E" Output Enable
"S" Standby

Supply Voltage
"25" +2.5V ±10%
"33" +3.3V ±10%
"XX" +2.25V to +3.63V

Supported Frequencies

25.000000 MHz	50.000000 MHz	74.175824 MHz	74.250000 MHz	75.000000 MHz	98.304000 MHz	100.000000 MHz	106.250000 MHz
125.000000 MHz	133.000000 MHz	133.300000 MHz	133.330000 MHz	133.333000 MHz	133.333300 MHz	133.333330 MHz	133.333333 MHz
148.351648 MHz	148.500000 MHz	150.000000 MHz	155.520000 MHz	156.250000 MHz	161.132800 MHz	166.000000 MHz	166.600000 MHz
166.660000 MHz	166.666000 MHz	166.666600 MHz	166.666660 MHz	166.666666 MHz	200.000000 MHz	212.500000 MHz	

Ordering Codes for Supported Tape & Reel Packing Method

Device Size	8 mm T&R (3ku)	8 mm T&R (1ku)	8 mm T&R (250u)	12 mm T&R (3ku)	12 mm T&R (1ku)	12 mm T&R (250u)	16 mm T&R (3ku)	16 mm T&R (1ku)	16 mm T&R (250u)
7.0 x 5.0 mm	-	-	-	-	-	-	-	Y	X
5.0 x 3.2 mm	-	-	-	-	Y	X	-	-	-
3.2 x 2.5 mm	D	E	G	-	-	-	-	-	-

Revision History

Version	Release Date	Change Summary
1.01	2/20/13	Original
1.02	11/23/13	Added input specifications, LVPECL/LVDS waveforms, packaging T&R options
1.03	2/6/14	Added 8mm T&R option
1.04	3/3/14	Added ± 10 ppm
1.05	7/23/14	Include Thermal Consideration Table
1.06	10/3/14	Modified Thermal Consideration values