

# JYJE9122

## 220-625 MHz High Performance Differential Oscillator



### Features

- Any frequency between 220 MHz and 625 MHz accurate to 6 decimal places
- LVPECL and LVDS output signaling types
- 0.6ps RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- Frequency stability as low as  $\pm 10$  ppm
- Industrial and extended commercial temperature ranges
- Industry-standard packages: 3.2x2.5, 5.0x3.2 and 7.0x5.0 mmxmm
- For frequencies lower than 220 MHz, refer to JYJE9121 datasheet

### Applications

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

### Electrical Characteristics

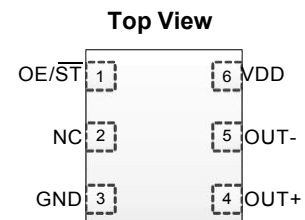
Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>LVPECL and LVDS, Common Electrical Characteristics</b>						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
		2.25	–	3.63	V	Termination schemes in Figures 1 and 2 - XX ordering code
Output Frequency Range	f	220	–	625	MHz	
Frequency 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	–	+2	ppm	25°C
10-year Aging	F_aging10	-5	–	+5	ppm	25°C
Operating Temperature Range	T_use	-40	–	+85	°C	Industrial
		-20	–	+70	°C	Extended Commercial
Input Voltage High	VIH	70%	–	–	Vdd	Pin 1, OE or ST
Input Voltage Low	VIL	–	–	30%	Vdd	Pin 1, OE or ST
Input Pull-up Impedance	Z_in	–	100	250	k $\Omega$	Pin 1, OE logic high or logic low, or ST logic high
		2	–	–	M $\Omega$	Pin 1, ST logic low
Start-up Time	T_start	–	6	10	ms	Measured from the time Vdd reaches its rated minimum value.
Resume Time	T_resume	–	6	10	ms	In Standby mode, measured from the time ST pin crosses 50% threshold.
Duty Cycle	DC	45	–	55	%	Contact JYJE for tighter duty cycle
<b>LVPECL, DC and AC Characteristics</b>						
Current Consumption	Idd	–	61	69	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	I_OE	–	–	35	mA	OE = Low
Output Disable Leakage Current	I_leak	–	–	1	$\mu$ A	OE = Low
Standby Current	I_std	–	–	100	$\mu$ A	ST = Low, for all Vdds
Maximum Output Current	I_driver	–	–	30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	Vdd-1.1	–	Vdd-0.7	V	See Figure 1(a)
Output Low Voltage	VOL	Vdd-1.9	–	Vdd-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	Tr, Tf	–	300	500	ps	20% to 80%, see Figure 1(a)
OE Enable/Disable Time	T_oe	–	–	115	ns	f = 220 MHz - For other frequencies, T_oe = 100ns + 3 period
RMS Period Jitter	T_jitt	–	1.2	1.7	ps	f = 266 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 312.5 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 622.08 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj	–	0.6	0.85	ps	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds
<b>LVDS, DC and AC Characteristics</b>						
Current Consumption	Idd	–	47	55	mA	Excluding Load Termination Current, Vdd = 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
<b>LVDS, DC and AC Characteristics (continued)</b>						
Output Disable Leakage Current	I <sub>leak</sub>	–	–	1	μA	OE = Low
Standby Current	I <sub>std</sub>	–	–	100	μA	$\overline{ST}$ = Low, for all V <sub>dds</sub>
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 <sub>r</sub> , T <sub>f</sub>	–	495	600	ps	20% to 80%, see Figure 2
OE Enable/Disable Time	T <sub>oe</sub>	–	–	115	ns	f = 220 MHz - For other frequencies, T <sub>oe</sub> = 100ns + 3 period
RMS Period Jitter	T <sub>jitt</sub>	–	1.4	1.7	ps	f = 266 MHz, VDD = 3.3V or 2.5V
		–	1.4	1.7	ps	f = 312.5 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 622.08 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T <sub>phj</sub>	–	0.6	0.85	ps	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all V <sub>dds</sub>

### 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 <sub>std</sub> .
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	V
Electrostatic Discharge (HBM)	–	2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C

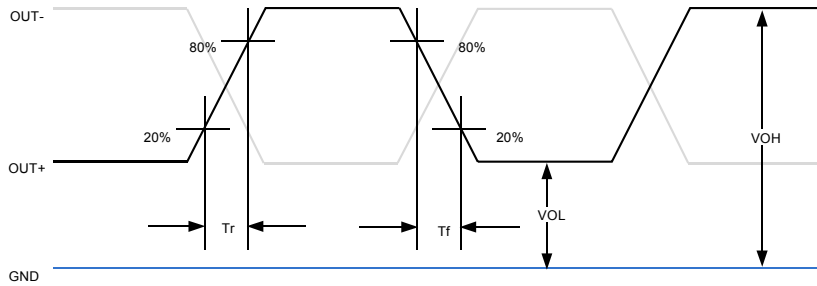
### Thermal Consideration

Package	θ <sub>JA</sub> , 4 Layer Board (°C/W)	θ <sub>JC</sub> , Bottom (°C/W)
7050, 6-pin	142	27
5032, 6-pin	97	20
3225, 6-pin	109	20

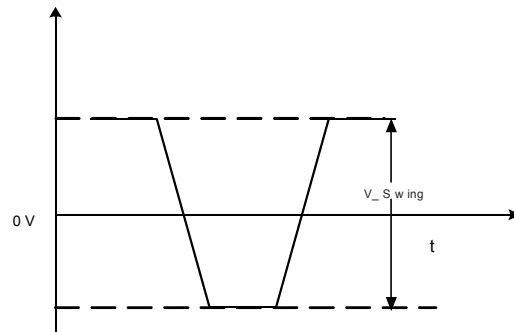
### Environmental Compliance

Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002
Mechanical Vibration	MIL-STD-883F, Method 2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method 2003
Moisture SenJYJEivity Level	MSL1 @ 260°C

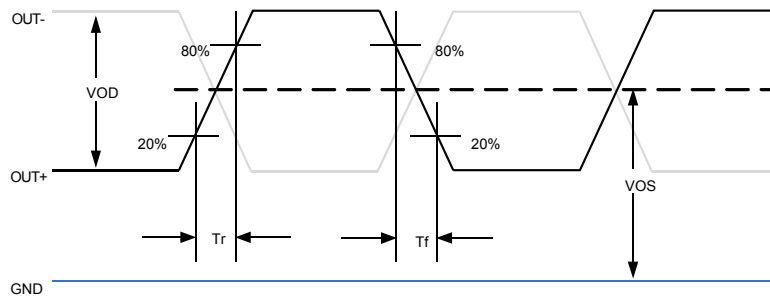
**Waveform Diagrams**



**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:

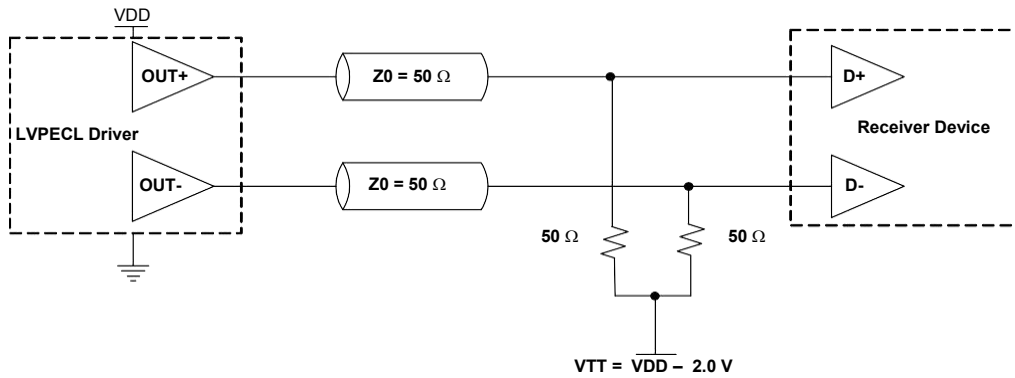


Figure 3. LVPECL Typical Termination

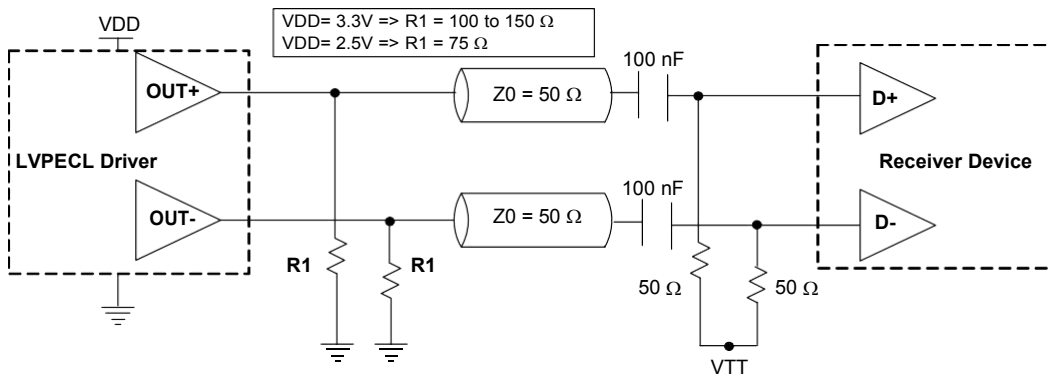


Figure 4. LVPECL AC Coupled Termination

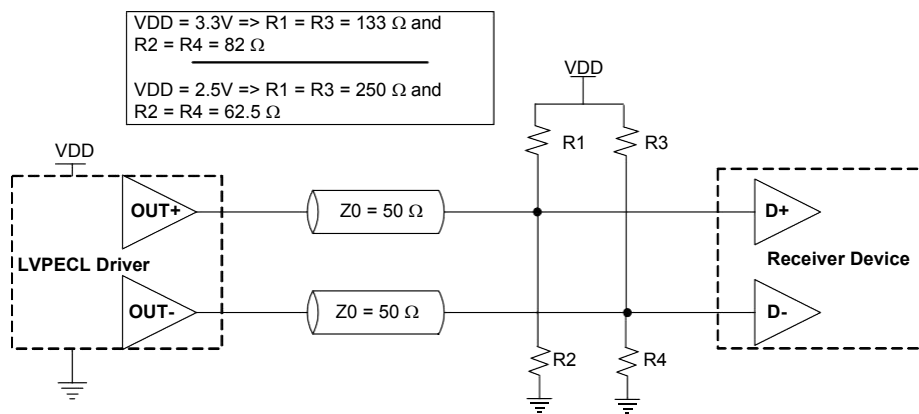


Figure 5. LVPECL with Thevenin Typical Termination

LVDS:

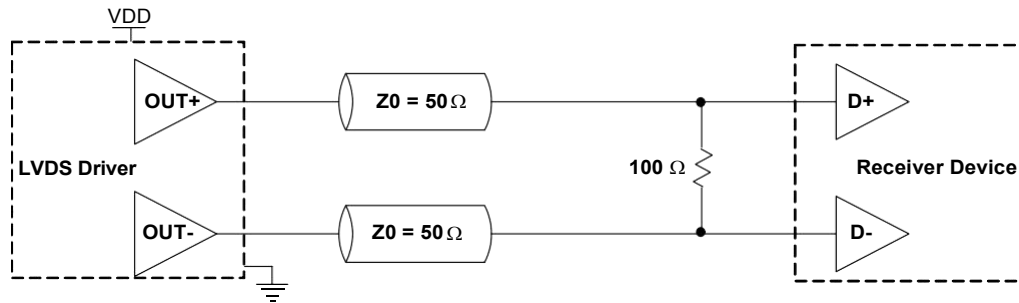
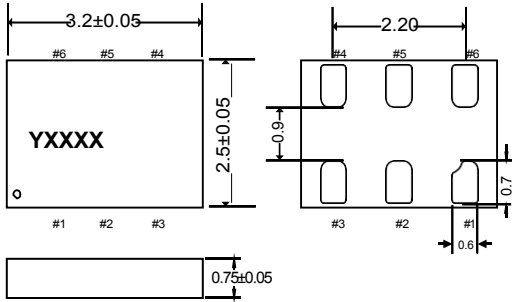
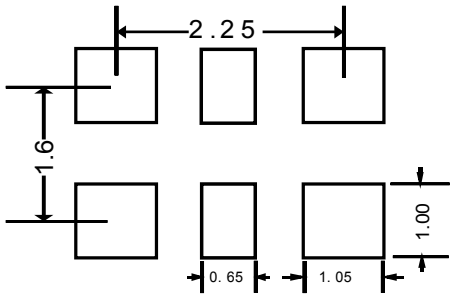
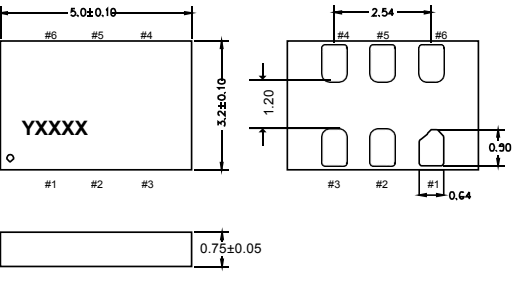
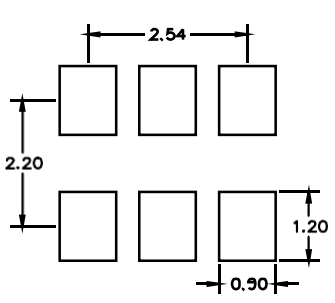
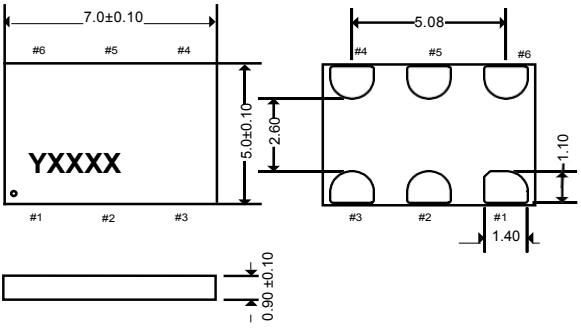
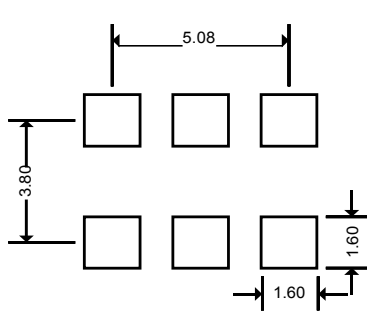


Figure 6. LVDS Single Termination (Load Terminated)

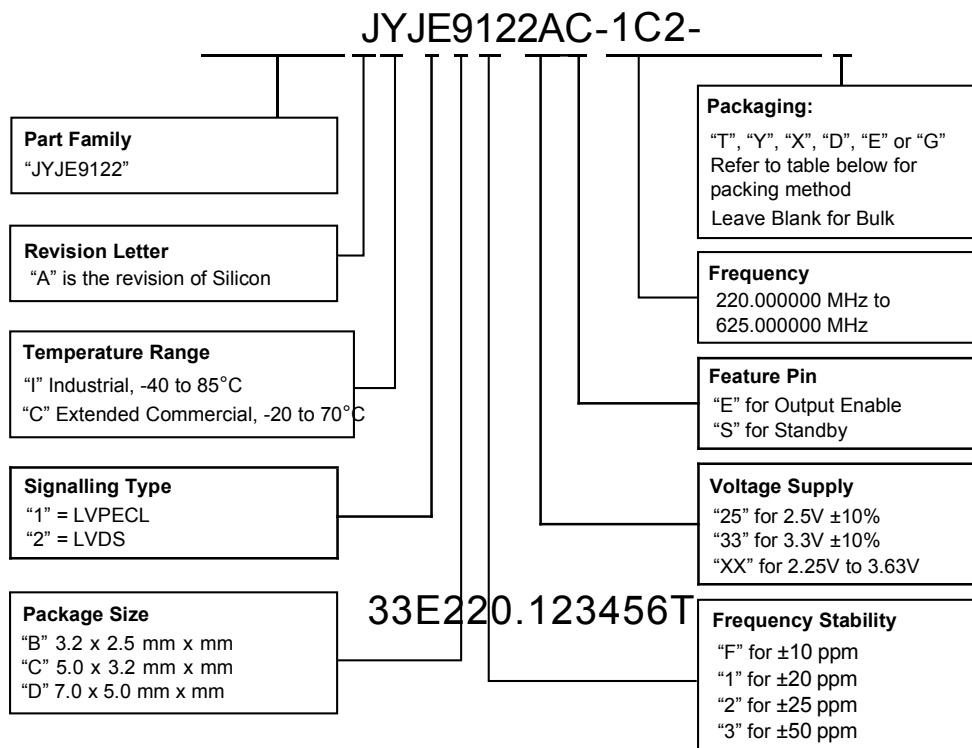
### Dimensions and Patterns

Package Size – Dimensions (Unit: mm) <sup>[1]</sup>	Recommended Land Pattern (Unit: mm) <sup>[2]</sup>
<p><b>3.2 x 2.5x 0.75 mm</b></p> 	
<p><b>5.0 x 3.2 x 0.75 mm</b></p> 	
<p><b>7.0 x 5.0x 0.90 mm</b></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  $\mu$ F between Vdd and GND is recommended.

### Ordering Information



### Frequencies Not Supported

Range 1: From 251.000001 MHz to 263.999999 MHz
Range 2: From 314.000001 MHz to 422.999999 MHz
Range 3: From 502.000001 MHz to 527.999999 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	-	-	-	-	-	-	T	Y	X
5.0 x 3.2 mm	-	-	-	T	Y	X	-	-	-
3.2 x 2.5 mm	D	E	G	T	Y	X	-	-	-

### Revision History

Version	Release Date	Change Summary
1.01	2/20/13	Original
1.02	12/3/13	Added input specifications, LVPECL/LVDS waveforms, packaging T&R options
1.03	2/6/14	Added 8mm T&R option and ±10 ppm
1.04	7/23/14	Include Thermal Consideration Table
1.05	10/6/14	Modified Thermal Consideration values