



Integrated  
Circuit  
Systems, Inc.

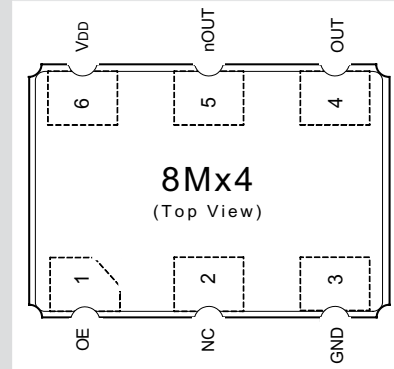
**PRELIMINARY**

**ICS8Mx4**  
LVDS CLOCK OSCILLATOR

**ICS8Mx4**

**LOW JITTER, HIGH FREQUENCY XTAL OSCILLATOR**

- Stable, ultra low jitter, LVDS clock generation
- For Gigabit Ethernet, Fibre Channel, PCI-Express™, other applications
- Clock output frequencies from 75MHz to 750MHz
- One differential LVDS clock output
- Output Enable (OE) pin (high impedance – when low)
- Small 6-pin 5mm x 7mm x 1.5mm SMT ceramic package
- Low profile package allows back-side PCB mounting
- Pb-free RoHS compliant (by default; no additional code required)
- 3.3V or 2.5V device power supply options
- Commercial (0 to +70 °C) and Industrial (-40 to +85 °C) temperatures
- Frequency stability of ±50ppm or ±100ppm  
(including initial accuracy, operating temperature variation, supply voltage variation, load variation, reflow drift, and aging for 10 years)
- Low phase jitter < 1 ps rms maximum (12kHz to 20MHz)



6-pin CERHERMETIC 5mm x 7mm x 1.5mm SMT

**ELECTRICAL SPECIFICATIONS**

Unless stated otherwise,  $V_{DD} = 3.3V \pm 5\%$  or  $2.5V \pm 5\%$ ,  $T_A = 0^\circ C$  to  $+70^\circ C$  (commercial),  $T_A = -40^\circ C$  to  $+80^\circ C$  (industrial)

Item	Symbol	Specifications				Test Conditions		
		Min.	Typ.	Max.	Units			
<b>DC Characteristics</b>								
Power Supply ( $V_{DD}$ , GND pins)	Power Supply Voltage	$V_{DD}$	3.135	3.3	3.465	V	3.3V operation	
			2.375	2.5	2.625	V	2.5V operation (8MJ4 and 8MK4 only)	
	Power Supply Current	$I_{DD}$		83		mA	$OE = V_{DD}$	
	Current w/Output Disabled	$I_{OED}$			<0.6	mA	$OE = GND$	
	Input Capacitance	$C_{IN}$		4		pF		
Output Enable (OE pin) LVCMOS/LVTTL	Input High Voltage	$V_{IH}$	$0.7 * V_{DD}$			V		
	Input Low Voltage	$V_{IL}$			$0.3 * V_{DD}$	V		
	Input High Current	$I_{IH}$			5	µA	$V_{DD} = V_{IN} = 3.465V$ or $2.625V$	
	Input Low Current	$I_{IL}$	-150			µA	$V_{DD} = 3.465V$ or $2.625V$ , $V_{IN} = 0V$	
	Internal Pullup Resistor	$R_{PULLUP}$		51		kΩ		
Clock Output Level (OUT, nOUT) LVDS	Differential Output Voltage	$V_{OD}$		350		mV	100Ω termination between OUT and nOUT. See Parameter Measurement Information.	
	$V_{OD}$ Magnitude Change	$\Delta V_{OD}$			50	mV		
	Offset Voltage	$V_{OS}$		1.25		V		
	$V_{OS}$ Magnitude Change	$\Delta V_{OS}$			150	mV		
<b>AC Characteristics</b>								
Output (OUT, nOUT)	Output Frequency Range		75		750	MHz	All conditions	
	Frequency Stability Error	$\Delta f/f_0$			±100	ppm p-p	8MH4 & 8MK4 Includes frequency set, $V_{DD}$ , $T_A$ and load variation, reflow drift, 10 yr. aging	
					±50	ppm p-p	8MG4 & 8MJ4	
	Output Duty Cycle	odc		50		%	See Output Duty Cycle Diagram and Rise/Fall Time Diagram in Parameter Measurement Information	
	Output Rise Time	$t_R$			600	ps	20% to 80% of $V_{OD}$	
	Output Fall Time	$t_F$			600	ps		
	Oscillator Start-up Time	$t_{OSC}$			10	ms	Time at Min. $V_{DD}$ (3.135V or 2.375V) to be 0s	
	RMS Phase Jitter, Random <sup>1</sup>	$f_{jit}(\emptyset)$			<1	ps rms	design target	
	Jitter	$t_{DS}^2$		0.2			ps	Deterministic
		$t_{RS}^2$		3			ps	Random, $\sigma$ of random jitter
$t_{RMS}^2$			3			ps	Root Mean Square, $\sigma$ of total jitter distribution	
$t_{P-P}^2$			25			ps	Peak-to-Peak	
	$t_{acc}^2$		4			ps	Accumulated Jitter, n = 2 to 50,000 cycles	

NOTE 1: Measured using an Aeroflex PN9500 with a 12kHz to 20MHz integration range. NOTE 2: Measured using a Wavecrest SIA-3000.

Supply Voltage & Frequency Accuracy		
G =	3.3V / 3.3V	±50 ppm
H =	3.3V / 3.3V	±100 ppm
J =	2.5V / 3.3V	±50 ppm
K =	2.5V / 3.3V	±100 ppm

The Preliminary Information presented herein represents a product in prototyping or pre-production. The noted characteristics are based on initial product characterization. Integrated Circuit Systems, Incorporated (ICS) reserves the right to change any circuitry or specifications without notice.



**PIN DESCRIPTIONS**

Number	Name	Type	Description
1	OE	Input	Output enable pin. High Impedance when LOW. LVCMOS/LVTTL interface levels.
2	nc	Unused	No connect.
3	GND	Power	Power supply ground.
4, 5	OUT, nOUT	Output	Differential clock outputs. LVDS interface levels.
6	V <sub>DD</sub>	Power	Power supply pin.

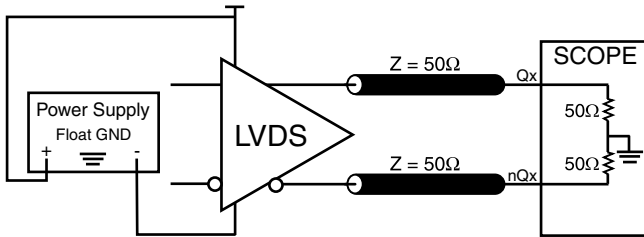
For typical value of internal Pullup resistor, see DC Characteristics.

**ABSOLUTE MAXIMUM RATINGS**

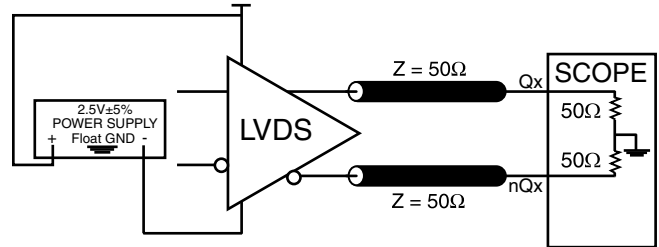
Item	Symbol	Condition	Unit
Input Voltage	V <sub>I</sub>	-0.5 to V <sub>DD</sub> +0.5	V
Output Voltage	V <sub>O</sub>	-0.5 to V <sub>DD</sub> +0.5	V
Positive Supply Voltage	V <sub>DD</sub>	4.6	V
Package Thermal Impedence		TBD	°C/W (0lfpm)
Storage Temperature	T <sub>S</sub>	-40 to +100	°C

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only. Functional operation of product at these conditions or any conditions beyond those listed in DC Characteristics or AC Characteristics is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

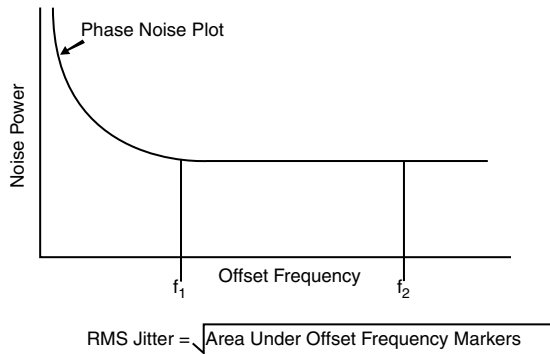
**PARAMETER MEASUREMENT INFORMATION**



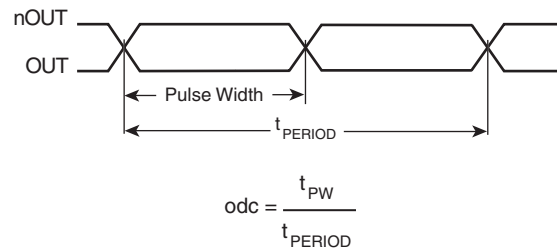
**3.3V OUTPUT LOAD AC TEST CIRCUIT**



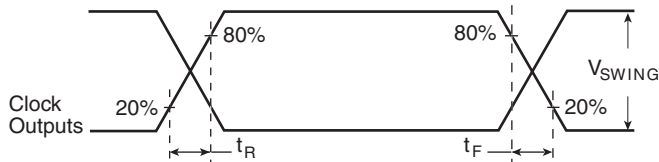
**2.5V OUTPUT LOAD AC TEST CIRCUIT**



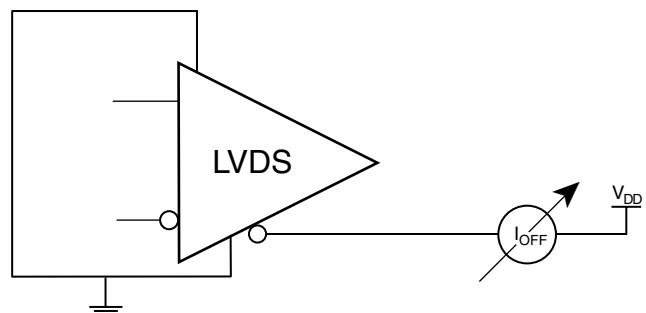
**RMS PHASE JITTER**



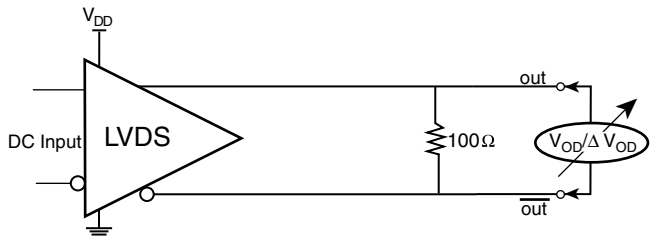
**OUTPUT DUTY CYCLE/PULSE WIDTH/PERIOD**



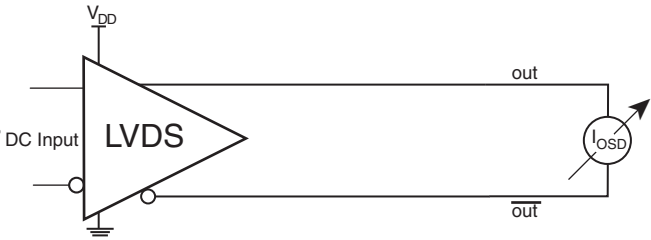
**OUTPUT RISE/FALL TIME**



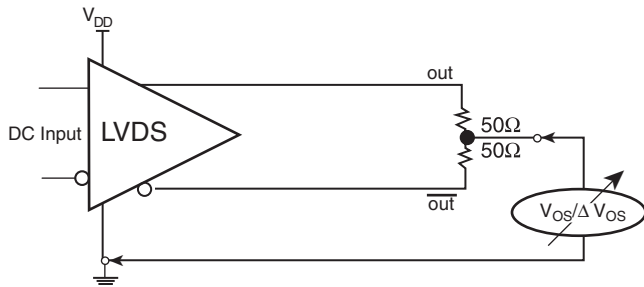
**POWER OFF LEAKAGE SETUP**



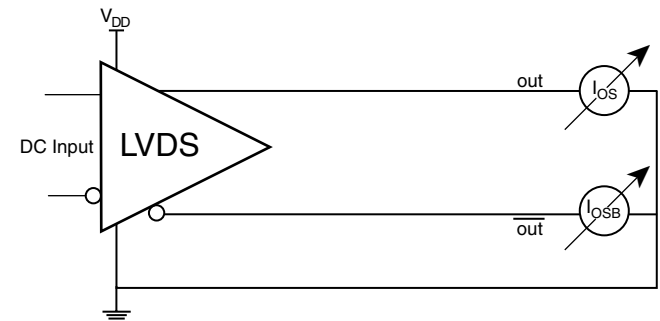
**DIFFERENTIAL OUTPUT VOLTAGE SETUP**



**DIFFERENTIAL OUTPUT SHORT CIRCUIT SETUP**



**OFFSET VOLTAGE SETUP**



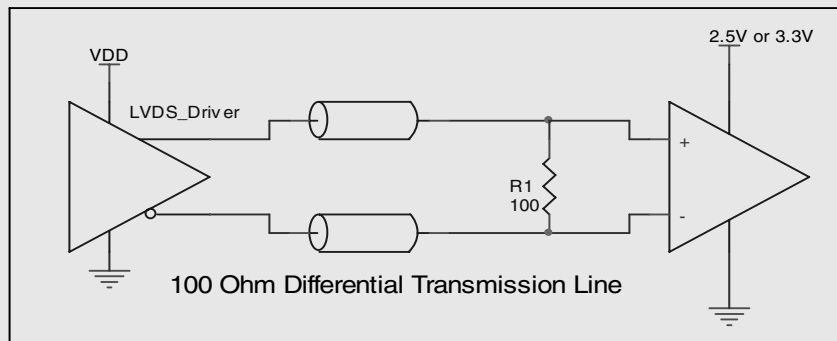
**OUTPUT SHORT CIRCUIT CURRENT SETUP**

## APPLICATION INFORMATION

### 3.3V, 2.5V LVDS DRIVER TERMINATION

A general LVDS interface is shown in *Figure 1*. In a  $100\Omega$  differential transmission line environment, LVDS drivers require a matched load termination of  $100\Omega$  across near

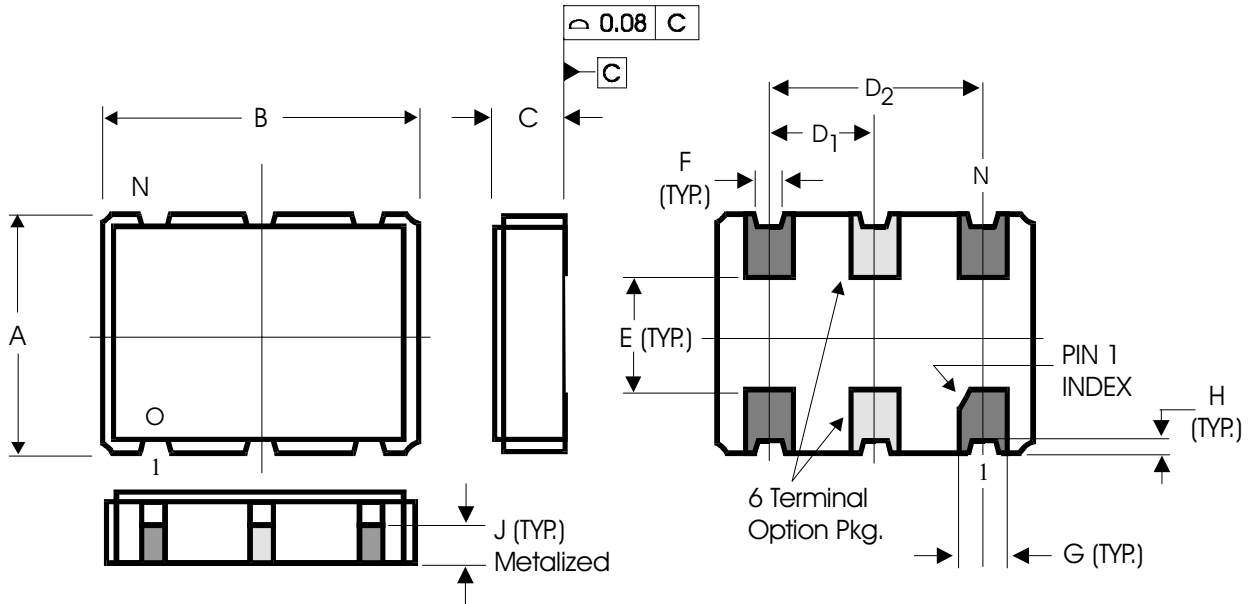
the receiver input. For a multiple LVDS outputs buffer, if only partial outputs are used, it is recommended to terminate the unused outputs.



**FIGURE 1. TYPICAL LVDS DRIVER TERMINATION**



**PACKAGE OUTLINE - J SUFFIX FOR 6 LEAD SMT CERHERMETIC, 5mm x 7mm x 1.5mm**



DIMENSIONS IN MILLIMETERS		
SYMBOL	Nominal	Tolerance
A	5	±0.15
B	7	±0.15
C	1.5	±0.15
D <sub>1</sub>	2.54	±0.13
D <sub>2</sub>	5.08	±0.13
E	2.6	±0.13
F	0.6	±0.13
G	1.4	±0.13
H	0.15 Ref.	-
J	0.65 Ref.	-

**PART/ORDER NUMBER INFORMATION**

**Part/Order Number:** ICS8M x 4 - fff.fff r p t u

**Device** \_\_\_\_\_

**Supply Voltage & Frequency Accuracy** \_\_\_\_\_

G = 3.3V ±50 ppm  
H = 3.3V ±100 ppm  
J = 2.5/3.3V ±50 ppm  
K = 2.5/3.3V ±100 ppm

**Output Type** \_\_\_\_\_

4 = LVDS

**Output Frequency (MHz)** \_\_\_\_\_

Leading zeroes dropped. Fourth decimal place added if necessary.  
Consult ICS for other frequencies.

**Revision of Product** \_\_\_\_\_

A = Initial Release

**Package Type (individual devices)** \_\_\_\_\_

J = 5x7mm ceramic SMT

**Ambient Temperature Range** \_\_\_\_\_

none = commercial = 0°C to +70°C  
I = industrial = -40°C to +85°C

**Bulk Packaging option** \_\_\_\_\_

none = tube  
T = tape and reel (1000 devices)

Note: Lead-free by default (no addition "LF" code needed).  
(Pb-free and RoHS compliant)



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**PRELIMINARY**

**ICS8Mx4**  
LVDS CLOCK OSCILLATOR

**ORDERING INFORMATION - 0°C TO + 70°C (COMMERCIAL)**

Part/Order Number*	Marking*	Package	Shipping Packaging	Temperature
ICS8Mx4-100.000AJ	ICS8Mx4 100.000	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-100.000AJT	ICS8Mx4 100.000	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-106.250AJ	ICS8Mx4 106.250	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-106.250AJT	ICS8Mx4 106.250	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-125.000AJ	ICS8Mx4 125.000	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-125.000AJT	ICS8Mx4 125.000	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-156.250AJ	ICS8Mx4 156.250	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-156.250AJT	ICS8Mx4 156.250	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-159.375AJ	ICS8Mx4 159.375	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-159.375AJT	ICS8Mx4 159.375	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-187.500AJ	ICS8Mx4 187.500	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-187.500AJT	ICS8Mx4 187.500	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-212.500AJ	ICS8Mx4 212.500	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-212.500AJT	ICS8Mx4 212.500	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-250.000AJ	ICS8Mx4 250.000	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-250.000AJT	ICS8Mx4 250.000	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C
ICS8Mx4-312.500AJ	ICS8Mx4 312.500	6 lead CERHERMETIC	Tube	0°C to 70°C
ICS8Mx4-312.500AJT	ICS8Mx4 312.500	6 lead CERHERMETIC	1000 Tape & Reel	0°C to 70°C

\*See table below for Part/Order Number Information. Where "x" is applied, see *Supply Voltage & Frequency Accuracy* in the Part/Order Number Information table.

**ORDERING INFORMATION - -40°C TO +85°C (INDUSTRIAL)**

Part/Order Number*	Marking*	Package	Shipping Packaging	Temperature
ICS8Mx4-125.000AJI	ICS8Mx4 125.000	6 lead CERHERMETIC	Tube	-40°C to 85°C
ICS8Mx4-125.000AJIT	ICS8Mx4 125.000	6 lead CERHERMETIC	1000 Tape & Reel	-40°C to 85°C
ICS8Mx4-212.500AJI	ICS8Mx4 212.500	6 lead CERHERMETIC	Tube	-40°C to 85°C
ICS8Mx4-212.500AJIT	ICS8Mx4 212.500	6 lead CERHERMETIC	1000 Tape & Reel	-40°C to 85°C
ICS8Mx4-240.000AJI	ICS8Mx4 240.000	6 lead CERHERMETIC	Tube	-40°C to 85°C
ICS8Mx4-240.000AJIT	ICS8Mx4 240.000	6 lead CERHERMETIC	1000 Tape & Reel	-40°C to 85°C
ICS8Mx4-669.326AJI	ICS8Mx4 669.326	6 lead CERHERMETIC	Tube	-40°C to 85°C
ICS8Mx4-669.326AJIT	ICS8Mx4 669.326	6 lead CERHERMETIC	1000 Tape & Reel	-40°C to 85°C

\*See table on page 4 for Part/Order Number Information. Where "x" is applied, see *Supply Voltage & Frequency Accuracy* in the Part/Order Number Information table.

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