Integrated Circuit Systems, Inc.

PRELIMINARY

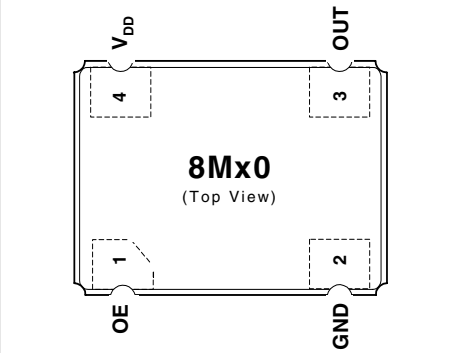
ICS8Mx0

Crystal Oscillator: LVCMOS/LVTTL CLOCK OUTPUT

I C S 8 M x 0

LOW JITTER, HIGH FREQUENCY XTAL OSCILLATOR

- Stable, ultra low jitter, LVCMOS/LVTTL clock generation
- For Gigabit Ethernet, Fibre Channel, PCI-Express, other applications
- Clock output frequencies from 75 to 250 MHz
- One single-ended LVCMOS/LVTTL clock output
- Output Enable (OE) pin (tri-state when low)
- Small 4-pin 5 x 7 x 1.5mm SMT ceramic package
- Low profile package allows back-side PCB mounting
- Pb-free RoHS compliant (by default; no additional code required)
- 2.5V or 3.3V device power supply options
- Commercial (0 to +70 °C) and Industrial (-40 to +85 °C) temperatures
- Frequency stability of ±50 or ±100 ppm
  (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)



4-pin CERHERMETIC 5 x 7 x 1.5mm SMT

ELECTRICAL SPECIFICATIONS

Unless stated otherwise, V_{DD} = 3.3 Volts ± 0.3V or 2.5 Volts ± 5%, T_A = 0 °C to +70 °C (commercial), T_A = -40 °C to +85 °C (industrial), $C_L \leq$ 25pF

Parameter			Min	Typ	Max	Unit	Conditions
***DC* CHARACTERISTICS**							
Power Supply (V_{DD} pin)	Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	***3.3V operation***
			2.375	2.5	2.625	V	***2.5V operation*** in 8MJ0 and 8MK0 only
	Power Supply Current	I_{DD}		75		mA	OE = V_{DD}
	Current with Output Disable	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 x V_{DD}			V	
	Input Low Voltage	V_{IL}			0.3 x V_{DD}	V	
	Input High Current	I_{IH}			5	µA	V_{DD} = V_{IN} = 3.6V or 2.625V
	Input Low Current	I_{IL}	-150			µA	V_{DD} = 3.6V or 2.625V, V_{IN} = 0V
	Internal Pull-up Resistor	R_{PULLUP}		51		kΩ	
Clock Output Level (OUT pin) LVCMOS/LVTTL	Output High Voltage[1]	V_{OH}	V_{DD} - 0.4			V	V_{DD} = 3.3V ± 0.3V or 2.5V ± 5%
	Output Low Voltage[1]	V_{OL}			0.4	V	
	Output Load Condition (fan out)	C_L			25	pF	$f_O \leq$ 250MHz
	Output Impedance	R_{OUT}	5	7	12	Ω	
***AC* CHARACTERISTICS**							
Output (OUT pin)	Output Frequency Range		75		250	MHz	All conditions
	Frequency Stability error	$\Delta f/f_O$			±100	ppm p-p	in 8MH0 and 8MK0 — Includes frequency set, VDD, TA & load variation, reflow drift, 10 yr. aging
					±50	ppm p-p	in 8MG0 and 8MJ0 — Includes frequency set, VDD, TA & load variation, reflow drift, 10 yr. aging
	Output Duty Cycle	odc		50		%	V_{TH} = V_{DD} / 2 , $C_L \leq$ Max. pF
	Output Rise Time	t_R			1.5	ns	20% to 80% of V_{DD} , $C_L \leq$ Max. pF
	Output Fall Time	t_F			1.5	ns	
	Oscillator Start-up Time	t_{OSC}			10	ms	Time at Min. V_{DD} (3.0V or 2.375V) to be 0s
	RMS Phase Jitter, (Random) [2]	*t* jit(Ø)			< 1 *design target*	ps rms	*(design target)*
	Jitter	t_{DS} [2]		0.2		ps	Deterministic
		t_{RS} [3]		3		ps	Random — σ of Random jitter
		t_{RMS} [3]		3		ps	Root Mean Square — σ of Total jitter distribution
		t_{P-P} [3]		25		ps	Peak to Peak
		t_{acc} [3]		4		ps	Accumulated Jitter — n = 2 to 50,000 cycles

Note 1: Outputs terminated with 50Ω to V_{DD} / 2. See PARAMETER MEASUREMENT INFORMATION, Output Load AC Test Circuit diagrams.
Note 2: Measured using an Aeroflex PN9500 with a 12 kHz to 20MHz integration range.
Note 3: Measured using a Wavecrest SIA-3000.

SUPPLY VOLTAGE & FREQUENCY ACCURACY		
G =	3.3V	±50 ppm
H =	3.3V	± 100 ppm
J =	3.3/2.5V	± 50 ppm
K =	3.3/2.5V	± 100 ppm

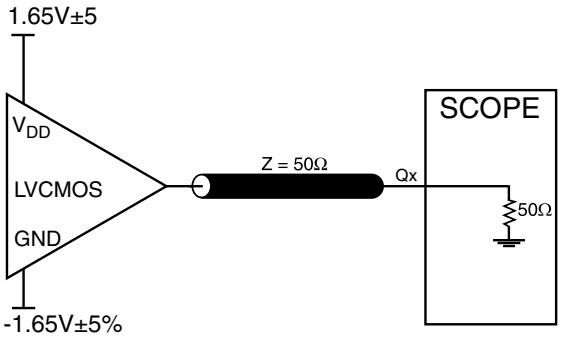
PIN DESCRIPTIONS				
1	OE	Input	Internal pull-up resistor	Output enable pin. LVCMOS/LVTTL interface levels.
2	GND	Power		Power supply ground.
3	OUT	Output	No internal terminator	Single-ended clock output. LVCMOS/LVTTL interface levels.
4	V_{DD}	Power		Power supply pin.

For typical value of internal pull-up resistor, see DC Characteristics.

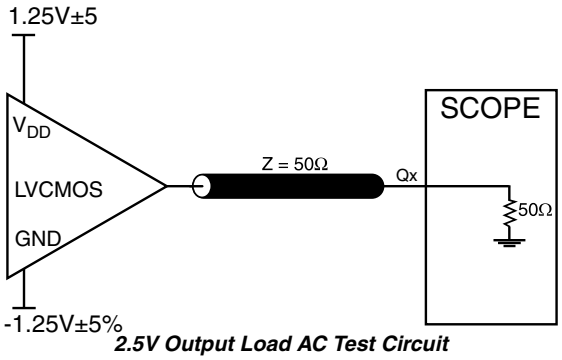
ABSOLUTE MAXIMUM RATINGS			
Inputs	V_I	-0.5 to V_{DD} +0.5	V
Outputs	V_O	-0.5 to V_{DD} +0.5	V
Positive Supply Voltage	V_{DD}	4.6	V
Package Thermal Impedence		TBD	°C/W (0 lfpm)
Storage Temperature	T_S	-40 to +100	ºC

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.

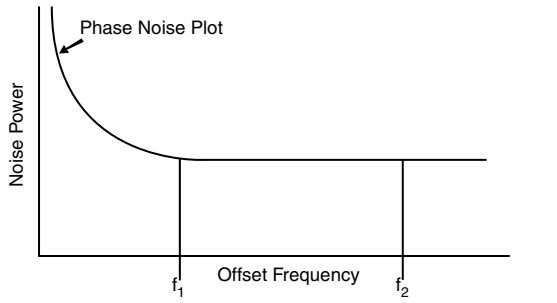
PARAMETER MEASUREMENT INFORMATION



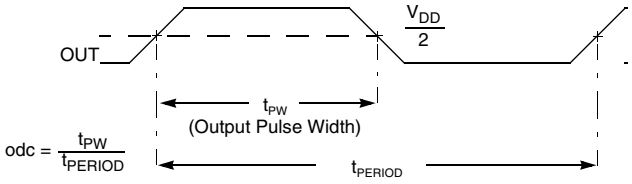
3.3V Output Load AC Test Circuit



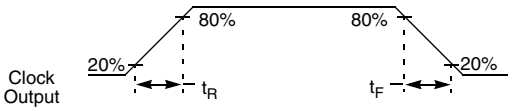
2.5V Output Load AC Test Circuit



RMS Phase Jitter

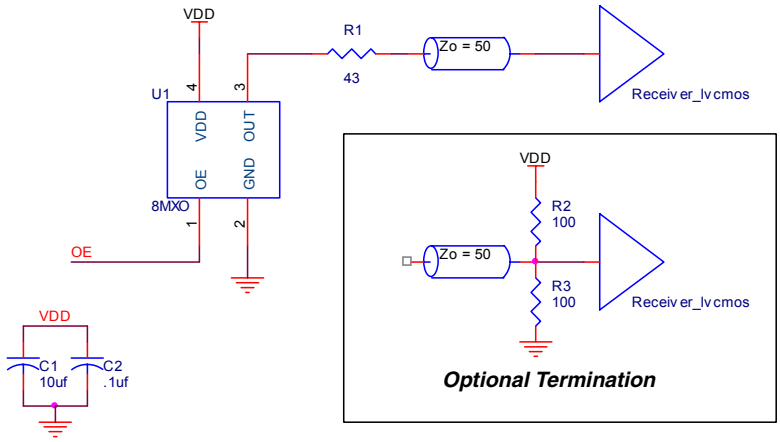


Output Duty Cycle



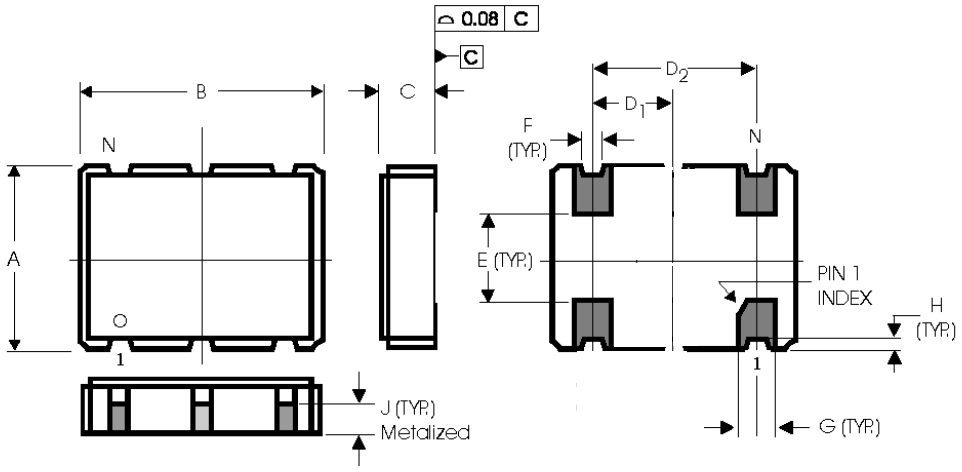
Output Rise and Fall Time

APPLICATION INFORMATION



LVCMOS Application Schematic / Power Supply Filtering (Decoupling Circuit)

DEVICE PACKAGE OUTLINE - *4-pin, 5 x 7 x 1.5mm SMT CERHERMETIC*



SYMBOL	DIMENSION IN MM NOMINAL	TOLERANCE
A	5	± 0.15
B	7	± 0.15
C	1.5	± 0.15
D_1	2.54	± 0.13
D_2	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.	–

Device Package Outline

ORDERING INFORMATION

Part Number: **ICS8M x 0 -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
0 = LVCMOS/LVTTL

Output Frequency (MHz)
Leading zeroes dropped. Fourth decimal place added if necessary. See Standard Output Frequencies on right. 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 to +70 °C
I = industrial = -40 to +85 °C

Bulk Packaging option
none = tube (60 devices per tube)
T = tape and reel (1000 devices)

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

EXAMPLE OUTPUT FREQUENCIES		
75.000	100.000	106.250
125.000	150.000	155.520
156.250	187.500	200.000
212.500	250.000	

Consult ICS for the availability of other frequencies

EXAMPLE PART NUMBERS	
Part/Order Number Marking	**For option ...**
ICS8MG0-106.250AJ 8MG0-106.250	**3.3 V ±50 ppm** **106.25 MHz** (blank) **Commercial** (blank) **Tube (60 per tube)**
ICS8MK0-212.500AJIT 8MK0-212.500	**2.5/3.3 V ±100 ppm** **212.50 MHz** **Industrial** **Tape & Reel (1000)**