

# CTS CORPORATION

KNIGHTS CRYSTALS AND OSCILLATORS

FREQUENCY CONTROL DIVISION 400 Reimann Ave., Dept. E, Sandwich, IL 60548 • 815/786-8411 • FAX 815-786-9743

## Hybrid Clock Oscillators

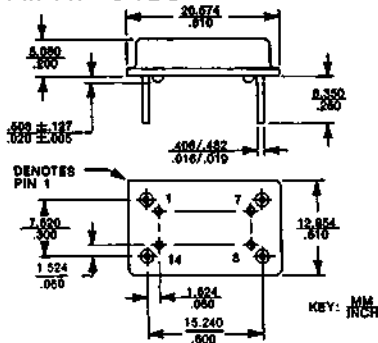
### ORDERING INFORMATION

#### MXO-55 SERIES

True TTL logic outputs  
14 pin DIP compatible  
19.2 KHz to 100 MHz

#### PIN CONNECTIONS

Pin 1: N/C, enable, or output  
Pin 7: Ground/case  
Pin 8: Output  
Pin 14: +5 VDC



FREQUENCY, MODEL & OPTIONS	CODE
4.9152 MHz to 100 MHz Basic oscillator No enable	GA
4.9152 MHz to 70 MHz Basic oscillator with enable (NOTE 3, 5)	GAE
19.2 KHz to 4.9151 MHz Basic oscillator w/dividers	GB
307.2 KHz to 4.9151 MHz Divider output with enable	GBE
2.4576 MHz to 60 MHz Complementary outputs	GC
Dual outputs Pin 8: 307.2 KHz to 1.25 MHz Pin 1: 16X Pin 8	GD16
Dual outputs Pin 8: 814 KHz to 2.5 MHz Pin 1: 8X Pin 8	GD18
Dual outputs Pin 8: 1.228 MHz to 6 MHz Pin 1: 4X Pin 8	GD28
Dual outputs Pin 8: 2.457 MHz to 10 MHz Pin 1: 2X Pin 8	GD48

FREQUENCY TOLERANCE (NOTE 2)	CODE
±.1% (1000 ppm)	1
±.01% (100 ppm)	2
±.005% (50 ppm)	3
±.05% (500 ppm)	4
±.0025% (25 ppm) (0°C to 70°C only)	5

OPERATING TEMP. RANGE	CODE
0°C to +70°C	C
-40°C to +85°C	I
-55°C to +105°C	P
-55°C to +125°C	M

- NOTE:
- When ordering screening similar to MIL-D-55310, Class B, add -MLB after frequency.
  - Tolerances include 25°C accuracy, changes in operating temperature, supply voltage, load, environmental conditions, and aging.
  - ENABLE FUNCTION (50 nsec max response time)  
HI: ENABLES OSCILLATOR  
LO: Disables oscillator (output latches HI)
  - On frequencies below 307.2 KHz the crystal frequency will be on Pin 1.
  - See MX053 Series for TRISTATE Output option.
  - Short Circuit Output current = 100ma max and 5 minutes max duration at RMT.
  - Internal Pull-up Available for Enable option. Consult factory.

### ELECTRICAL SPECIFICATIONS (MXO-55 SERIES)

SPECIFICATION	MODEL	FREQUENCY RANGE	TEMPERATURE RANGE	SYMBOL	MINIMUM	TYPICAL	MAXIMUM	UNITS				
Operating Voltage	A, B, C, D	19.2 KHz to 100 MHz	-55°C to +125°C	V <sub>cc</sub>	4.75	5.00	5.25	V				
			-40°C to +85°C		4.50	5.00	5.50					
Maximum Supply Voltage			-55°C to +125°C	V <sub>cc</sub> Max.			7.00					
Supply Current	A	4.9152 to 25 MHz	-55°C to +125°C	I <sub>cc</sub>		20	35					
		>25 to <70 MHz			33	65						
	70 to 100 MHz	60			110							
	B	2.4576 to <4.9152 MHz			30	50						
		307.2 KHz to <2.4576 MHz			45	75						
	C	19.2 to <307.2 KHz			70	125						
		>12 to 60 MHz			16	22	75					
	D	2.4576 to 12 MHz			30	50						
307.2 KHz to 10 MHz	45	75										
Output Voltage — HI	A, B, C, D	19.2 KHz to 100 MHz	-55°C to +125°C	V <sub>OH</sub>	2.40	3.60		V				
			-40°C to +85°C	V <sub>OL</sub>		0.30	0.50					
Output Voltage — LO						0.25	0.40					
Rise & Fall Time (measured between 0.5V & 2.4V)	A	4.9152 to 25 MHz	-55°C to +125°C	t <sub>r</sub> & t <sub>f</sub>		3	6	ns				
		>25 to 100 MHz			2	4						
	B	2.4576 to <4.9152 MHz			3	5						
		19.2 KHz to <2.4576 MHz			8	18						
	C	2.4576 to 60 MHz			3	5						
	D	307.2 KHz to 10 MHz			8	18						
	Start-up Time	A, B, C, D			19.2 KHz to 25 MHz	-55°C to +125°C	t <sub>s</sub>			2	5	mS
		A			>25 to 100 MHz					8	15	
Duty Cycle (uptime) (measured @ 1.5V)	A	4.9152 to 25 MHz	0°C to +70°C			45	50	55	%			
		>25 to 100 MHz	-55°C to +125°C			40	50	60				
	B	2.4576 to <4.9152 MHz	-55°C to +125°C			35	50	65				
		19.2 KHz to <2.4576 MHz	-55°C to +125°C			45	50	55				
	C	2.4576 to 12 MHz	0°C to +70°C			40	50	60				
		>12 MHz to 60 MHz	-55°C to +125°C			45	50	55				
	D	307.2 KHz to 10 MHz	0°C to +70°C			35	50	65				
			-55°C to +125°C			45	50	55				
	Phase Delay (measured @ 1.5V)	C	>12 to 60 MHz			0°C to +70°C	t <sub>01</sub> & t <sub>02</sub>			6	10	ns
						-55°C to +125°C		6		12		
			2.4576 to 12 MHz			0°C to +70°C		3		5		
						-55°C to +125°C		3		6		
Enable Input Load Factor	AE, BE	4.9152 to 70 MHz	-50°C to +125°C	F <sub>1</sub>			1	8-TTL Gates				
		2.4576 to 70 MHz	-55°C to +125°C				10					
	A, B, C	>70 MHz to 100 MHz	-40°C to +85°C	F <sub>0</sub>					2			
			-55°C to +125°C						5			
Fanout (per output)	B	19.2 KHz to <2.4576 MHz	-55°C to +125°C				10	TTL Gates				
	D	307.2 KHz to 10 MHz	-55°C to +125°C				10	Gates				

CTS - QUALITY FREQUENCY CONTROL COMPONENTS FOR RELIABLE ELECTRONICS

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T-96-30  
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## Surface Mount Hybrid Clock Oscillators

■ **SURFACE MOUNT APPLICATIONS**—CTS Knights presently offers a number of options to suit your surface mount needs. Besides the CCXO series, leadless chip carriers, we are offering the MXO-55 style package in an economical surface mountable configuration, through a simple lead formation operation. The surface mount option is specified by adding an "S" to the part number (eg. SMXO-55, SCXO-65).

■ **VAPOR PHASE REFLOW**—CTS Knights' standard hybrid oscillators are capable of withstanding hand and wave soldering processes, but are not manufactured to survive vapor phase reflow profiles without degradation to device reliability. All surface mountable products are built with a special, high-temperature construction process to allow vapor phase reflow.

### Standard DIP SERIES

The Standard DIP surface mount series squarewave crystal oscillator is contained in a rugged, economical .500" x .800", hermetically sealed metal package. The leads are shaped for surface mounting in a fullwing design.

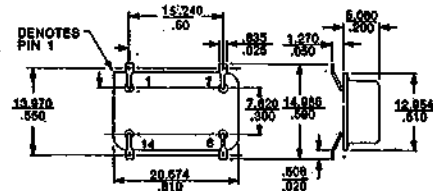


FIG. 6 SMXO-55

### AVAILABLE MODELS:

SURFACE MOUNT	EQUIVALENT STANDARD SERIES	LOGIC	FREQUENCY RANGE
SMX055	MX055	TTL	19.2 KHz TO 100 MHz
SCX055	CX055	CMOS	200 Hz TO 5 MHz
SCX065	CX065	HCMOS	1 MHz TO 70 MHz
SVX055	VX055	TTL VXCO	765 KHz TO 25 MHz
SEX055	EX055	10KH ECL	8 MHz TO 125 MHz
SEX065	EX065	100K ECL	25 MHz TO 150 MHz
SCX063	CX063	HCMOS	1 MHz TO 70 MHz
SMX053	MX053	TTL TRI-STATE	200 Hz TO 70 MHz

### Mini-DIP SERIES

The Mini-DIP surface mount series of squarewave crystal oscillators are contained in a rugged, economical .500" x .500", hermetically sealed metal package. The leads are shaped for surface mounting in a gullwing design.

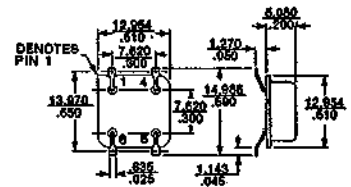


FIG. 6 SMXO-25

### AVAILABLE MODELS:

SURFACE MOUNT	ELECTRICALLY EQUIVALENT STANDARD SERIES	LOGIC	FREQUENCY RANGE
SMX025	MX055	TTL	307.2 KHz TO 70 MHz
SCX025	CX065	HCMOS	307.2 KHz TO 70 MHz

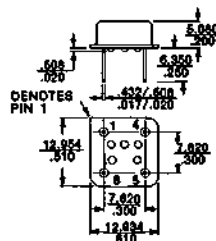
## MINIATURE DUAL-IN-LINE OSCILLATORS

### MX0-25 SERIES

TTL logic output  
 electrically similar to MXO-55  
 310 KHz to 70 MHz

### CX0-25 SERIES

Hi-speed CMOS logic output  
 Electrically similar to CXO-65  
 200 Hz to 50 MHz



Pin 1—N/C  
 Pin 4—Ground/case  
 Pin 5—Output  
 Pin 8—+5 VDC supply

FIG. 5 Mini-DIP PACKAGE

NOTE: Tristate Minidip Oscillators are Also Available. Consult Factory for Info