



Introduces

## M310x Series PECL/LVDS/CML VCXO

Featuring **QiK Chip™** Technology

### Features:

- Superior Jitter Performance (comparable to SAW based)
- Frequencies from 150 MHz to 1.4 GHz
- Designed for a short 2 week cycle time

### Phase Lock Loop Applications:

- Telecommunications such as SONET / SDH / DWDM / FEC / SERDES / OC-3 thru OC-192
- Wireless base stations / WLAN / Gigabit Ethernet
- Avionic flight controls and military communications

### MtronPTI

Corporate Headquarters  
100 Douglas Avenue  
PO Box 630  
Yankton, SD 57078-0630  
1-800-762-8800  
[www.mtronpti.com](http://www.mtronpti.com)





## M310x Series

PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm

### Product Specifications

#### Product Features:

- Superior *Jitter Performance* comparable to SAW-based VCXO products (0.50 pS typical at 622.08 MHz)
- *Frequencies from 150.0000MHz to 1.4000GHz*
- *APR (Absolute Pull Range) of ±50 or ±100ppm over industrial temperature range*
- *Crystal resonator based product offering far better Stability than SAW*
- *Designed for Short Cycle Time manufacturing (2 weeks or less)*
- *0.01 µF bypass capacitor from Vcc to ground built into the 5x7 mm package*

#### Description:

The M310x series voltage controlled crystal oscillator is designed specifically for high performance PLL applications. The M310x is available in PECL, LVDS, and CML output while featuring MtronPTI's *QiK Chip™* Technology offering significantly reduced cycle time.

#### Applications:

- Telecommunications such as SONET / SDH / DWDM / FEC / SERDES / OC-3 thru OC-192
- Wireless base stations / WLAN / Gigabit Ethernet
- Avionic flight controls and communications
- Test Equipment and Instrumentation

#### Ordering Information:

Part Number Example: **M310x**

**0      6      A      G      P      N      1000.000000MHz**

|                |                               |                                      |                           |   |                           |                                       |                            |           |
|----------------|-------------------------------|--------------------------------------|---------------------------|---|---------------------------|---------------------------------------|----------------------------|-----------|
| M310           | 0                             | 6                                    | A                         | G   | P                         | N                                     | 1000.000000 MHz            |           |
| Product Family | Supply Voltage                | Operating Temperature                | Absolute Pull Range (APR) | Output Type   |                           | Logic Type                            | Package/Lead Configuration | Frequency |
|                | 0 3.3 V<br>1 2.5 V<br>2 1.8 V | 6 -20°C to +70°C<br>2 -40°C to +85°C | A ±50ppm<br>B ±100ppm     | G Complementary Enable High (Pad 2)<br>M Complementary Enable Low (Pad 2)<br>U Complementary Output | P PECL<br>L LVDS<br>M CML | N 5x7 mm Leadless<br>J 9x14 mm J-Lead | 150 – 1400 MHz             |           |

**Part Number Example: M31006ABPN – 1000.000000 MHz**

## M310x Series PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm

### Applications Note:

The MtronPTI M310x series of voltage controlled crystal oscillators, featuring *QiK Chip™* technology, provides for extremely low jitter of 0.50 ps RMS, typical at 622.08 MHz. For applications requiring low jitter, frequencies from 150 MHz to 1.4 GHz are available. LVPECL, LVDS, or CML compatible outputs, as well as operating voltage of 1.8 V, 2.5 V, and 3.3 V are also options on the M310x.

The M310x is available with a standard APR of  $\pm 50$  ppm and  $\pm 100$  ppm, over the industrial operating temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . The M310x achieves this level of performance by utilizing an AT-cut crystal. An enable/disable function is also an available option on the M310x. An internal 0.01  $\mu\text{F}$  by-pass capacitor also assures optimum noise suppression on the supply voltage pad.

The superior integrated jitter performance of 0.50 pS RMS, typical at 622.08 MHz, makes the M310x suitable for 10 Gig-E, broadband networks, network switches, SONET, SDH, SERDES, DWDM, FEC, WLAN, and OC-3 thru OC-192 systems. The M310x is available in a nine-pad, 5x7x1.9 mm, leadless, ceramic, surface mount package (see page 4, N package drawing) that is RoHS and  $+260^{\circ}\text{C}$  reflow compatible, (no PCB traces should be located directly under the 5x7 product). Figures 1 and 2 below show load termination conditions for LVPECL and LVDS. The M310x oscillators are backward compatible to many of the existing products in the industry from Vectron, Epson, and others.

For superior performance in a high frequency clock oscillator, the M310x is a logical choice for designers. The unique design architecture allows the M310x fast turn around on engineering design samples, as well as production quantities in 2 weeks or less.

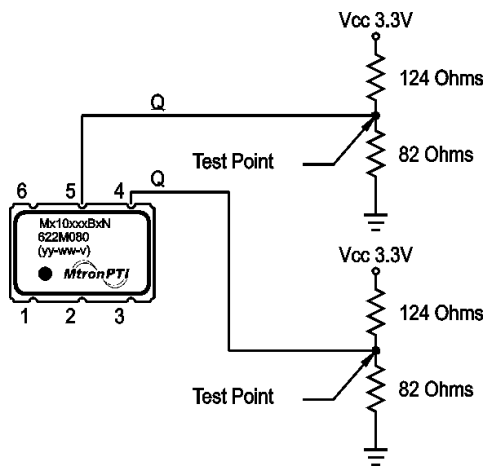


Figure 1. 3.3V LVPECL Load Circuit

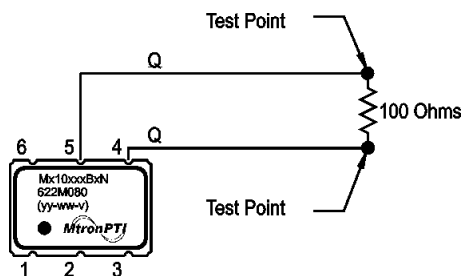


Figure 2. LVDS Load Circuit

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

Please see [www.mtronpti.com](http://www.mtronpti.com) for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.

**M310x Series PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm**

**Performance Characteristics:**

| PARAMETER                    | Symbol          | Min.   | Typ.       | Max.                  | Units  | Condition/Notes                                  |            |
|------------------------------|-----------------|--|------------|-----------------------|--------|--|------------|
| Frequency Range              | F               | 150  |            | 1400                  | MHz    | See Note 1                                       |            |
| Operating Temperature        | T <sub>A</sub>  | (See ordering information)   |            |                       |        |  |            |
| Storage Temperature          | T <sub>S</sub>  | -55  |            | +125                  | °C     |  |            |
| Frequency Stability          | ΔF/F            |  | ±25        |                       | ppm    |  |            |
| Aging                        |                 |  |            |                       |        |  |            |
| 1st Year                     |                 | -3   |            | +3                    | ppm    |  |            |
| Thereafter (per year)        |                 | -1   |            | +1                    | ppm    |  |            |
| Pullability/APR              |                 | (See ordering information)   |            |                       |        |  | See Note 2 |
| Control Voltage              | V <sub>c</sub>  | 0.18   | 0.90       | 1.62                  | V      | @ 1.8V V <sub>cc</sub>                           |            |
|                              |                 | 0.25   | 1.25       | 2.25                  | V      | @ 2.5V V <sub>cc</sub>                           |            |
|                              |                 | 0.30   | 1.65       | 3.0                   | V      | @ 3.3V V <sub>cc</sub>                           |            |
| Linearity                    |                 |  | 1          | 5                     | %      | Positive Monotonic                               |            |
| Modulation Bandwidth         | f <sub>m</sub>  | 20   |            |                       | KHz    | -3 dB bandwidth                                  |            |
| Input Impedance              | Z <sub>in</sub> | 500k   | 1M         |                       | Ohms   | @ DC   |            |
| Supply Voltage               | V <sub>cc</sub> | 1.71   | 1.8        | 1.89                  | V      |  |            |
|                              |                 | 2.375  | 2.5        | 2.625                 | V      |  |            |
|                              |                 | 3.135  | 3.3        | 3.465                 | V      |  |            |
| Input Current                | I <sub>cc</sub> |  |            | 125                   | mA     | PECL/LVDS/CML                                    |            |
| Load                         |                 | 50 Ohms to (V <sub>cc</sub> -2) V <sub>dc</sub><br>100 Ohm differential load                         |            |                       |        | See Note 3<br>PECL Waveform<br>LVDS/CML Waveform |            |
| Symmetry (Duty Cycle)        |                 | 45   |            | 55                    | %      | @ 50% of waveform                                |            |
| Output Skew                  |                 |  | TBD        |                       |        |  |            |
| Differential Voltage         |                 | 350  | 425<br>TBD | 500                   | mVppd  | LVDS<br>CML                                      |            |
| Common Mode Output Voltage   | V <sub>cm</sub> |  | 1.2        |                       | V      | LVDS   |            |
| Logic "1" Level              | V <sub>oh</sub> | V <sub>cc</sub> -1.02  |            |                       | V      | LVPECL   |            |
| Logic "0" Level              | V <sub>ol</sub> |  |            | V <sub>cc</sub> -1.63 | V      | LVPECL   |            |
| Rise/Fall Time               | Tr/Tf           |  | 0.23       | 0.50                  | ns     | @ 20/80% LVPECL                                  |            |
| Enable Function              |                 | 80% V <sub>cc</sub> min. or N/C: output active<br>20% V <sub>cc</sub> max: output disables to high-Z |            |                       |        | Output Option G                                  |            |
|                              |                 | 20% V <sub>cc</sub> max: output active<br>80% V <sub>cc</sub> min: output disables to high-Z         |            |                       |        | Output Option M                                  |            |
| Start up Time                |                 |  | 10         |                       | ms     |  |            |
| Phase Jitter<br>@ 622.08 MHz | φ <sub>J</sub>  |  | 0.50       |                       | ps RMS | Integrated 12 kHz – 20 MHz                       |            |

Electrical Specifications

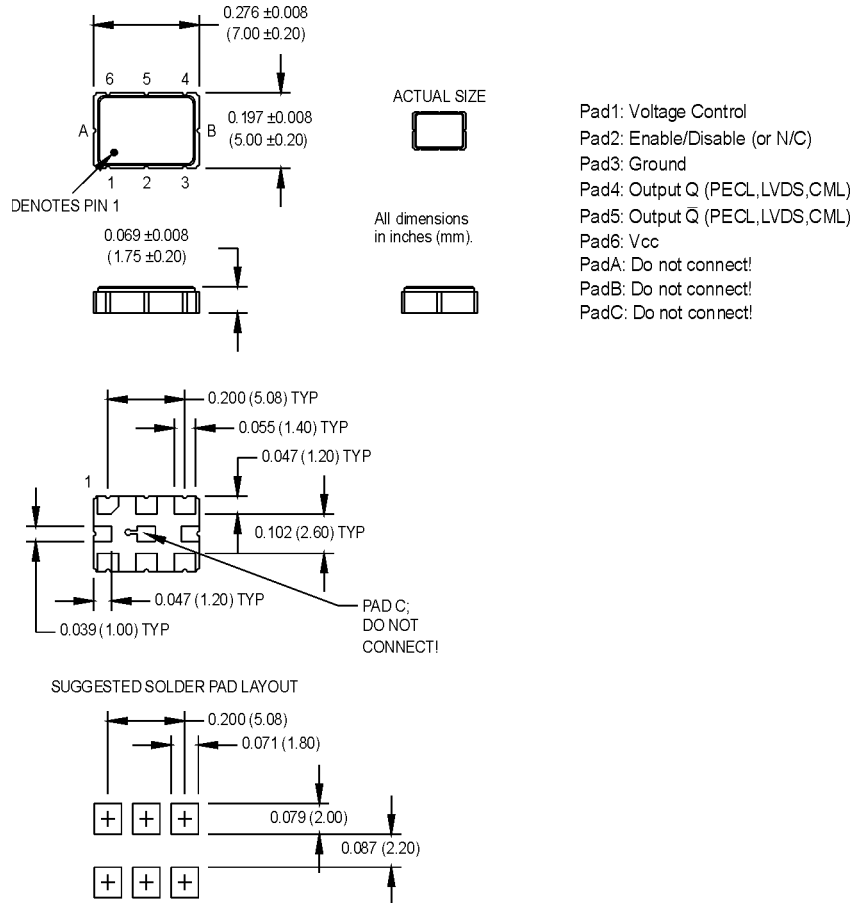
Note 1: Contact factory for exact frequency availability over 945 MHz.

Note 2: APR specification is inclusive of initial tolerance, deviation over temperature, shock, vibration, supply voltage, and aging for one year at 50°C mean ambient temperature.

Note 3: See Load Circuit Diagram in this Datasheet. Consult factory with nonstandard output load requirements.

## M310x Series PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm

### Product Dimensions & Pinout Information:



### Handling Information:

Although protection circuitry has been designed into the M310 VCXO, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode. Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500, capacitance = 100 pF) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters.

| Model          | ESD Threshold, Minimum | Unit |
|----------------|------------------------|------|
| Human Body     | 1500*                  | V    |
| Charged Device | 1500*                  | V    |

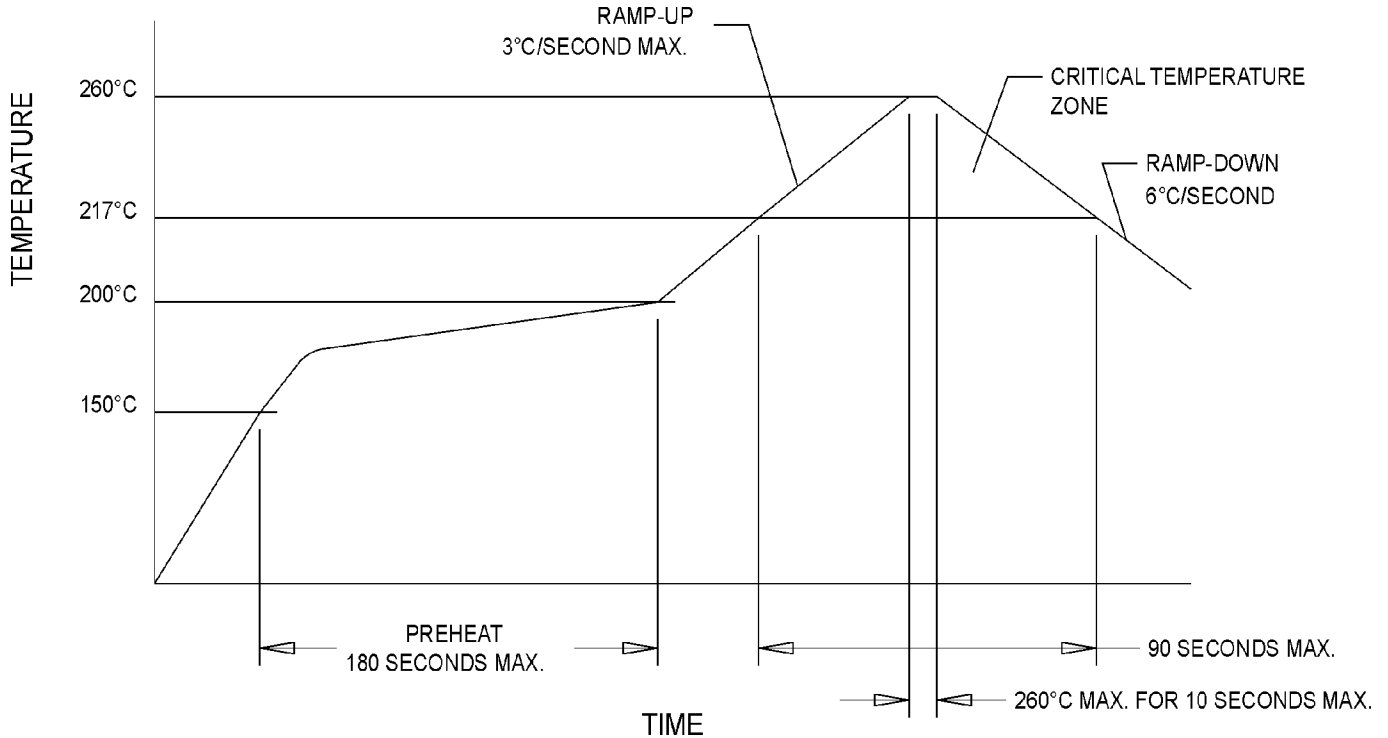
\* MIL-STD-883D, Method 3015, Class 1

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

Please see [www.mtronpti.com](http://www.mtronpti.com) for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.

## M310x Series PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm

### Solder Profile:



### Quality Parameters:

#### Environmental Specifications/Qualification Testing Performed on the M310 VCXO

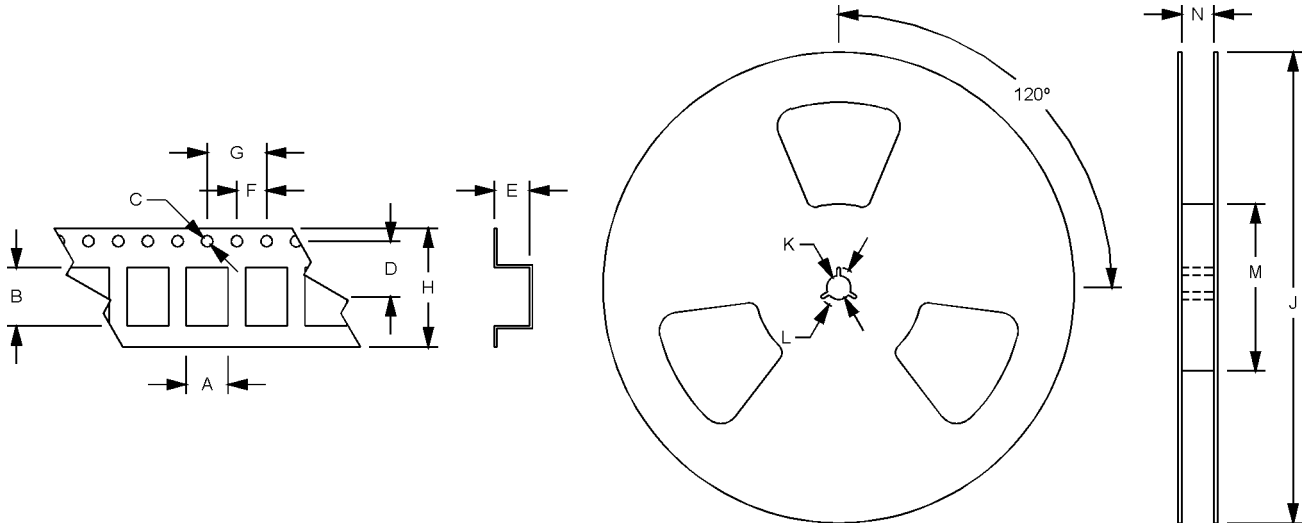
| Test                       | Test Method                  | Test Condition  |
|----------------------------|------------------------------|---|
| Electrical Characteristics | Internal Specification       | Per Specification                                     |
| Frequency vs. Temperature  | Internal Specification       | Per Specification                                     |
| Mechanical Shock           | MIL-STD-202, Method 213, C   | 100 g's   |
| Vibration                  | MIL-STD-202, Method 201-204  | 10 g's from 10-2000 Hz                                |
| Thermal Cycle              | MIL-STD-883, Method 1010, B  | -55 Deg. C to +125 Deg. C, 15 minute Dwell, 10 cycles |
| Aging                      | Internal Specification       | 168 Hours at 105 Degrees C                            |
| Gross Leak                 | MIL-STD-202, Method 112      | 30 Second Immersion                                   |
| Fine Leak                  | MIL-STD-202, Method 112      | Must meet $1 \times 10^{-8}$                          |
| Solderability              | MIL-STD-883, Method 2003     | 8 Hour Steam Age – Must Exhibit 95% coverage          |
| Resistance to Solvents     | MIL-STD-883, Method 2015     | Three 1 minute soaks                                  |
| Terminal Pull              | MIL-STD-883, Method 2004, A  | 2 Pounds  |
| Lead Bend                  | MIL-STD-883, Method 2004, B1 | 1 Bending Cycle                                       |
| Physical Dimensions        | MIL-STD-883, Method 2016     | Per Specification                                     |
| Internal Visual            | Internal Specification       | Per Internal Specification                            |

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

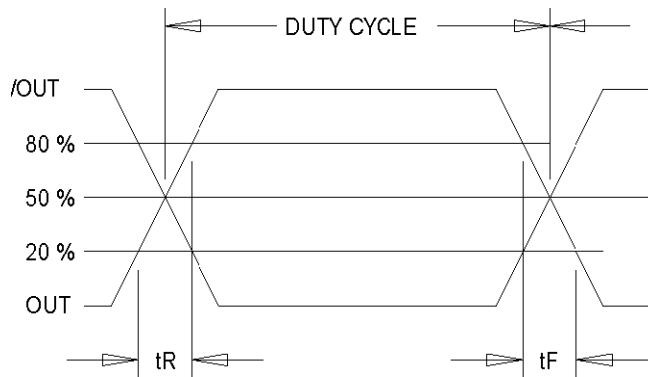
Please see [www.mtronpti.com](http://www.mtronpti.com) for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.

**M310x Series PECL/LVDS/CML Voltage Controlled Crystal Oscillator – 3.3/2.5/1.8 Volt – 5x7 mm**

**Tape and Reel Specifications:**



| Product | A    | B    | C   | D   | E   | F | G    | H  | I       | J  | K  | L      |
|---------|------|------|-----|-----|-----|---|------|----|---------|----|----|--------|
| M310x   | 6.51 | 9.29 | 1.5 | 7.5 | 2.8 | 4 | 8/12 | 16 | 180-330 | 13 | 21 | 60-100 |



**Output Waveform: LVDS/CML/PECL**

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

Please see [www.mtronpti.com](http://www.mtronpti.com) for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.



**Yankton**

PO Box 630  
Yankton, SD 57078-0630 USA  
Phone: 605-665-9321  
Toll Free: 800-762-8800  
Fax: 605-665-1709  
Email: SalesYKT@mtronpti.com

**Orlando**

2525 Shader Rd  
Orlando, FL 32804 USA  
Phone: 407-298-2000  
Fax: 407-293-2979  
Email: SalesORL@mtronpti.com

**Connecticut**

755 Main Street  
Suite 2B, Building 2  
Monroe, CT 06470 USA  
Phone: 800.762.8800  
Fax: 203.452.9435  
Email: MilSales@mtronpti.com

**San Jose**

985 University Ave  
Suite 38  
Los Gatos, CA 95032 USA  
Phone: 408-395-0700  
Fax: 408-395-8074  
Email: SalesCA@mtronpti.com

**Europe**

The Netherlands  
Phone: 31-40-368-6818  
Fax: 011-31-40-368-3501  
Email: SalesEU@mtronpti.com

**Asia Pacific**

1104 Shanghai Industrial  
Investment Building  
48-62 Hennessy Road  
Wanchai, Hong Kong, China  
Phone: 852-2866-8023  
Fax: 852-2529-1822  
Email: SalesHK@mtronpti.com