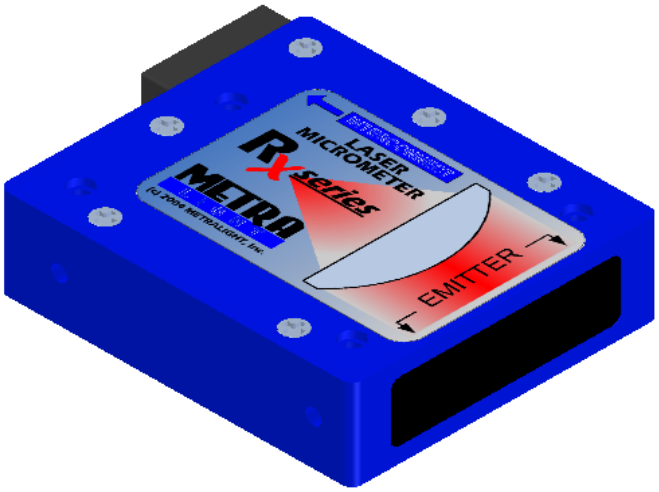
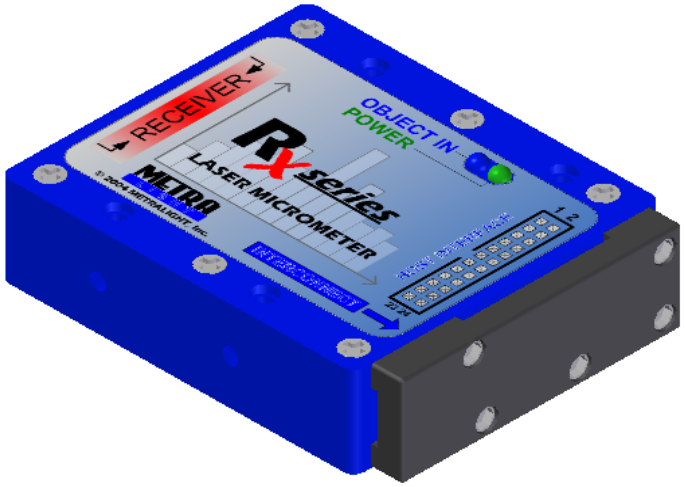


- Compact size
- NON-Contact measurement device
- No External Controllers required to run
- Easy Alignment (CCD based)
- Solid State Class 1 Laser Diode
- Maximum Resolution of 3.5 microns
- Over 2,500 measurements per second



- Parallel | Serial | Analog | USB | Ethernet
- Measurements of EDGE, GAP, DIAMETER, POSITION, THICKNESS, HEIGHT, PROFILE and VIBRATION
- Custom Modes are available (i.e. Centering, Minimum and Maximum thickness, Range of tolerances)

RX sensor Specifications :	
Detection Method	Laser through-beam with CCD element
Light Source	780 (or 670) nm Class I Laser Diode
Measurement Range	140 microns (0.006 in) up to 28 mm (1.10 in)
Resolution	7 microns (RX07), 3.5 microns (RX03)
Repeatability	14 microns (Edge position)
Response Time	0.391 ms
Non-Linearity	0.2% of full range
Power	12 to 24 VDC / 80mA or USB port power
Connections	24 pin double-row, 2mm (SAMTEC) or MINI-B USB
Interface (I/O)	Parallel binary (TTL) or Serial (RS232) or Analog or USB
Indicators	Green LED = Sensor ON ; Blue LED = Object Present
Data Format	12/13 bit parallel or ASCII string or analog voltage
Overall Dimension	58.4 x 50.8 x 15.2mm (2.30 x 2 x 0.60") emitter/receiver
Weight	192g (6.7oz)

The RX sensor is a self contained photoelectric sensor. Output can be in a 12/13 bit parallel/serial data or analog voltage format. The RX is capable of real time data acquisition and processing, and allows fast and accurate measurements. Standard MODES can be set for EDGE 1, EDGE 2, GAP,CENTER, DIAMETER, FIRST EDGE (solid mode) and FIRST DIAMETER (first object that is fully in the scanning line). CUSTOM MODES are available and can be customer defined. For example: minimum diameter, maximum diameter and center position.

The RX series has 4 interface options: parallel (TTL,5V), serial (RS232), analog (voltage 0-5V) or USB (Universal Serial Bus). Other CUSTOM interface can be provided upon request (Parallel - 3.3V, Analog current, Ethernet, RS422, RS485, SPI...).

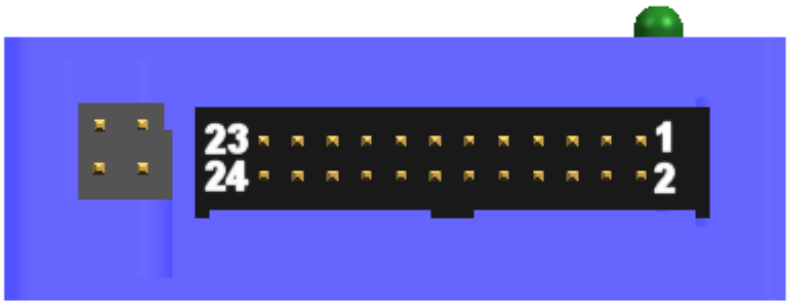


Fig. 1: RX sensor Back View , parallel, serial or analog interface

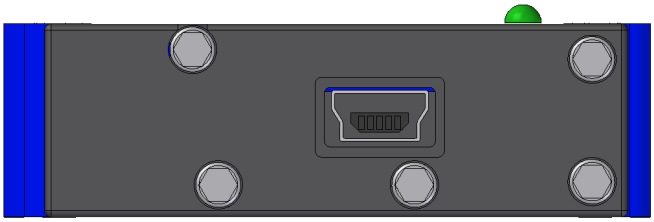


Fig. 2: Mini-B USB connector (USB interface)

The RX sensor processes and sends output data in pixels. Pixel size is 7µm for RX07 and 3.5µm for RX03.

For example: The Rx07 sends out the number 800 : 800x7 = 5600µm = 5.6mm.
Conversion in mm or inches is done with external SW. Serial interface (RS232) or USB (Universal Serial Bus) can be customized for any output units.
Please call if you have any other specific requirements.

Pinout

Table 2: Pinout

PIN	I/O	NAME	DESCRIPTION	PIN	I/O	NAME	DESCRIPTION
1	OUT	DATA0	Data bit 0 (LSB)	13	OUT	DATA12	Data bit 12 (MSB)*
2	OUT	DATA1	Data bit 1	14	OUT	DATA_READY	Data Ready at end of Measurement cycle
3	OUT	DATA2	Data bit 2				
4	OUT	DATA3	Data bit 3	15	IN	TRIGGER	Triggers Meas. Cycle
5	OUT	DATA4	Data bit 4	16	OUT	OBJECT_IN	Object Present
6	OUT	DATA5	Data bit 5	17	IN	M0	Measurement Mode (Edge, Diameter, Gap..), see MODE TABLE
7	OUT	DATA6	Data bit 6	18	IN	M1	
8	OUT	DATA7	Data bit 7	19	IN	M2	
9	OUT	DATA8	Data bit 8	20	IN	FILTER	Filters out small objects (e.g. dust)
10	OUT	DATA9	Data bit 9				
11	OUT	DATA10	Data bit 10	21,22	PWR	+PWR	+12 to +24 VDC
12	OUT	DATA11	Data bit 11(MSB)	23,24	GND	GND	Ground

** Pin 13 NOT USED for 7µm models*

Timing Diagram

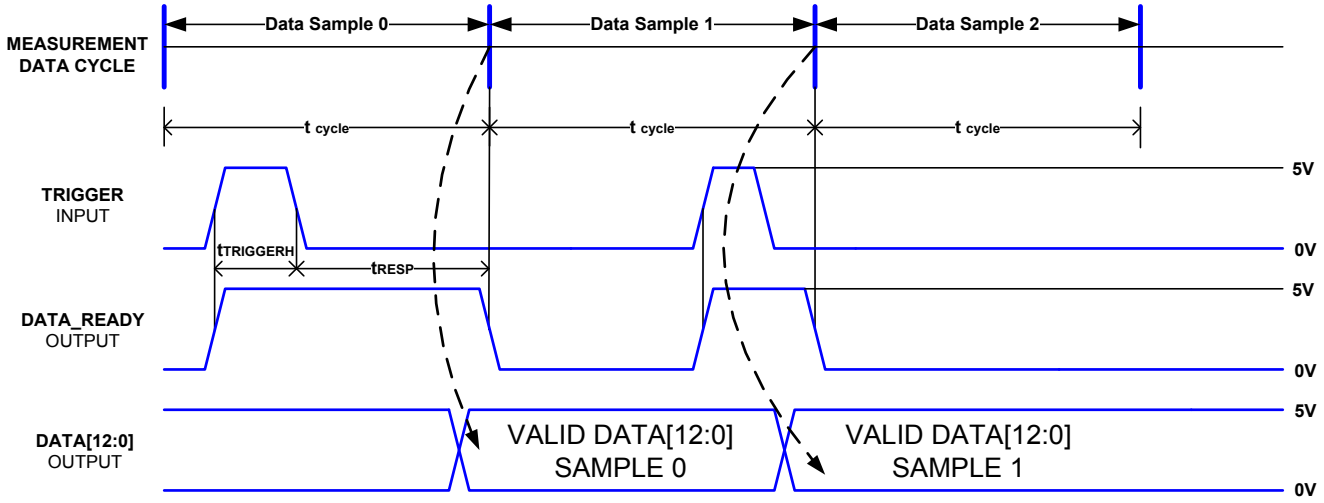


Fig. 3: Timing Diagram

Symbol	Description	Min.	Typ.	Max.
tCYCLE (µs)	1 cycle time	——	——	417
tRESP (µs)	Response time	10	——	415
tTRIGGERH (µs)	TRIGGER HIGH time	2	——	——

Table 3: Timing Diagram

HIGH to LOW transition on the TRIGGER, commences a data output at the end of the current measurement cycle. The HIGH to LOW signal on the DATA_READY confirms a Valid Data event. The maximum response time between the TRIGGER input and the DATA_READY output is 417 µs. This DATA is presented to the output pins and retained until the next TRIGGER event. In the absence of a TRIGGER event, the previous data will be held indefinitely. This process allows slow processing computers to bypass several measurement cycles between measurement readings. MODE changes during measurement will not take effect until the *next measurement cycle*.
See Flowchart on next page for typical operation.

Measurement Modes

MODE #	M2 bit	M1 bit	M0 bit	Sensor Output Mode
0	0	0	0	Edge 1
1	0	0	1	Edge 2
2	0	1	0	Diameter
3	0	1	1	Gap
4	1	0	0	Center
5	1	0	1	First EDGE (position of the first solid edge)
6	1	1	0	First DIAMETER (first full diameter measurement)
7	1	1	1	CUSTOM

Table 4: Measurement Modes

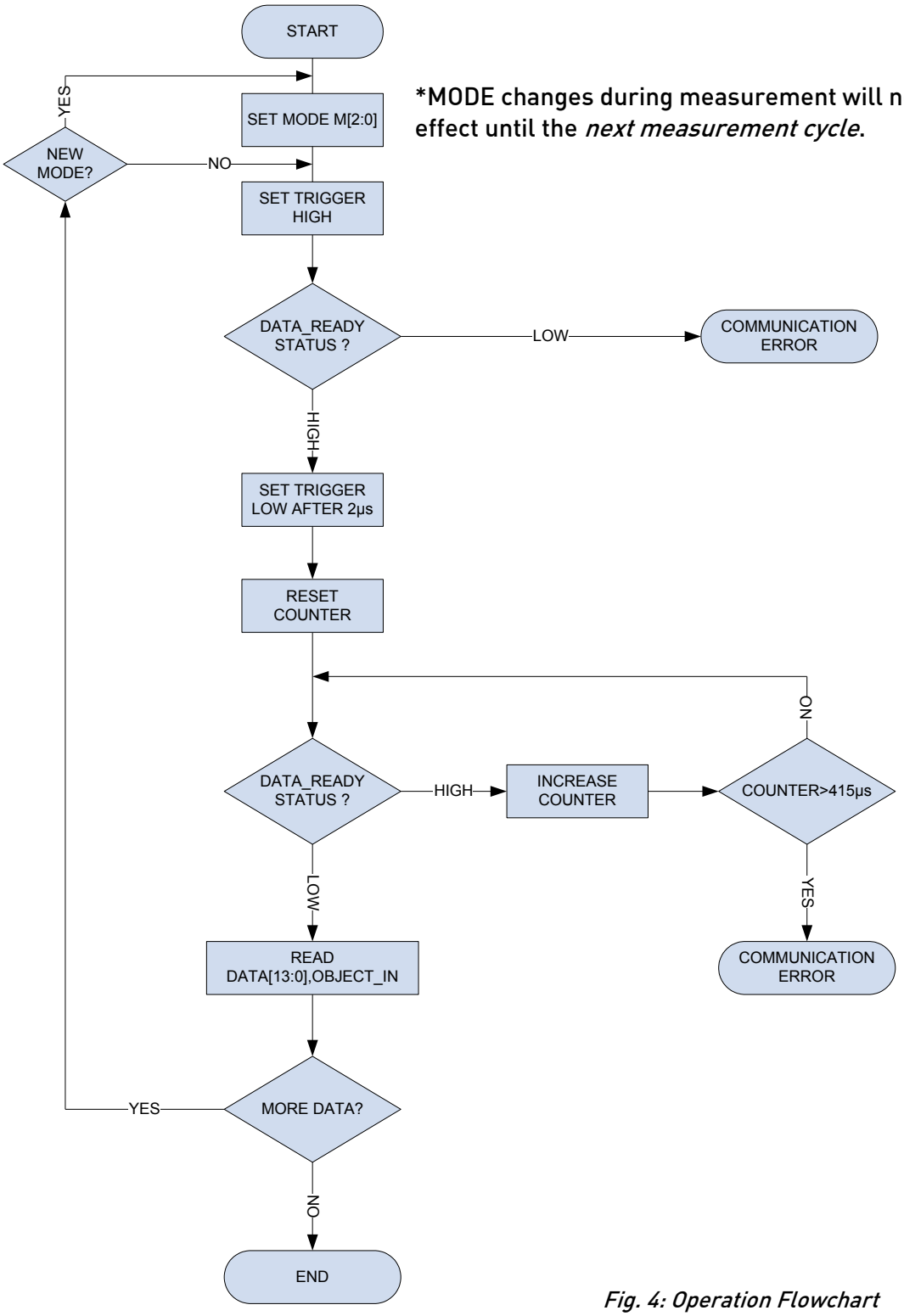
** See Sample Applications page for details*
*** Please see pinout (previous page), for location of M0, M1, M2*
**** 0 is logical "0" (GND), 1 is logical "1" (+5V, VCC), TTL LEVELS*

Accesories, Software, Cables

METRALIGHT, Inc. provides an available PCkit package option (i.e. Parallel PCI bus I/O card, PCkit Terminal, a Windows based SW, Source codes in VB or USB kit) for collection, processing and display of data.

Various custom cables (e.g. Sensor to DB25) are also available.
Please call if you have any other specific requirements.

Typical Operation Flowchart



***MODE changes during measurement will not take effect until the *next measurement cycle*.**

Fig. 4: Operation Flowchart

Pinout

PIN	TYPE	NAME	DESCRIPTION
1	OUT	TXD	Data TRANSMIT
2	IN	RXD	Data RECEIVE
3	GND	GND	Ground
4-14	——-	NC	NO CONNECT
15	I/O	MISO	Don't use
16	PWR	VCC	Internal VCC, +5V
17	I/O	SCK	Don't use
18	I/O	MOSI	Don't use
19	I/O	/RESET	Don't use
20	GND	GND	Ground
21-22	PWR	+PWR	+12 to +24 VDC
23,24	GND	GND	Ground

** For normal operation connect only PINS: TXD,RXD,GND,+PWR*

Table 5: RS232 Pinout

COM Port Settings

Baud rate:115200b/s
Data bits:8
Parity:None
Flow control:None
(Baud rate can be changed upon customer request)

Accesories, Software, Cables

Metralight, Inc. provides an available Serial PCkit Package (i.e. Windows based SW; DB9 Cables M-F, power supply) for collection, processing and display of data.
Standard terminals (i.e. Windows HyperTerminal) can be used to communicate.
Various custom cables (e.g. Sensor to DB9, USB) are available.
Please call if you have any specific requirements.

Command Set

The listed serial command sets, can be used for custom application development or for standard terminals like HyperTerminal.
Other Custom processing commands can be added upon request .
(i.e. MIN, MAX limits, CALIBRATION, etc.)
See Appendix C for detail description of commands.

The METRALIGHT RX, USB device is fast and easy to install. The Rx is powered via the USB port. USB drivers create a virtual COM port to communicate with any standard communication software (e.g. HyperTerminal). The USB interface uses the same command sets as the RS232 serial interface. Alternative drivers (DLL library) are also available, please call METRALIGHT, Inc. if you have other requirements.

Pinout

PIN	I/O	NAME	DESCRIPTION
1	OUT	VOUT	Output Voltage
2	GND	AGND	Analog Ground
3	PWR	VCC	Internal +5V
4-13	——	NC	NO CONNECT
14	OUT	DATA_READY	Data Ready at end of measure-ment cycle
15	——	NC	NO CONNECT
16	OUT	OBJECT_IN	Object Present
17	IN	M0	Sets Measurement Mode (Edge, Diameter, Gap..), see MODE TABLE
18	IN	M1	
19	IN	M2	
20	IN	FILTER	Filters out small objects (e.g. dust)
21,22	PWR	+PWR	+12 to +24 VDC
23,24	GND	GND	Ground

** For normal operation connect only PINS: VOUT,AGND,M0,M1,M2,GND,+PWR*

Table 6: Analog interface pinout

Output Voltage, Modes

Analog interface of Rx series uses 12 bit DAC. Mode bits M0,M1,M2 should always be connected to High or Low level (VCC or GND). Analog output voltage: **VOUT= 10V * CODE / 4096**. CODE is internal digital number. Range: 0..4000. Analog voltage range is then: 0 to 9.765625V.

MODE #	M2 bit	M1 bit	M0 bit	Sensor Output Mode
0	0	0	0	Edge 1
1	0	0	1	Edge 2
2	0	1	0	Diameter
3	0	1	1	Gap
4	1	0	0	Center
5	1	0	1	First EDGE (position of the first solid edge)
6	1	1	0	First DIAMETER (first full diameter measurement)
7	1	1	1	CUSTOM

Table 7: Measurement Modes

Installation Notes

- USE APPROPRIATE MOUNTING SCREWS (SEE MECHANICAL DRAWING)
- !!! AVOID DIRECT SUNLIGHT !!! AND OTHER NON VISIBLE LIGHT SOURCES. RX SENSORS USES RG9 FILTERS TO FILTER OUT VISIBLE LIGHT (SEE CHARTS BELOW)
- ALWAYS KEEP OPTICAL WINDOWS CLEAN, FREE FROM DUST AND FINGERPRINTS , AVOID SCRATCHES ON THE OPTICAL WINDOWS.
- APPLY CORRECT VOLTAGE - SEE ELECTRICAL SPECIFICATION

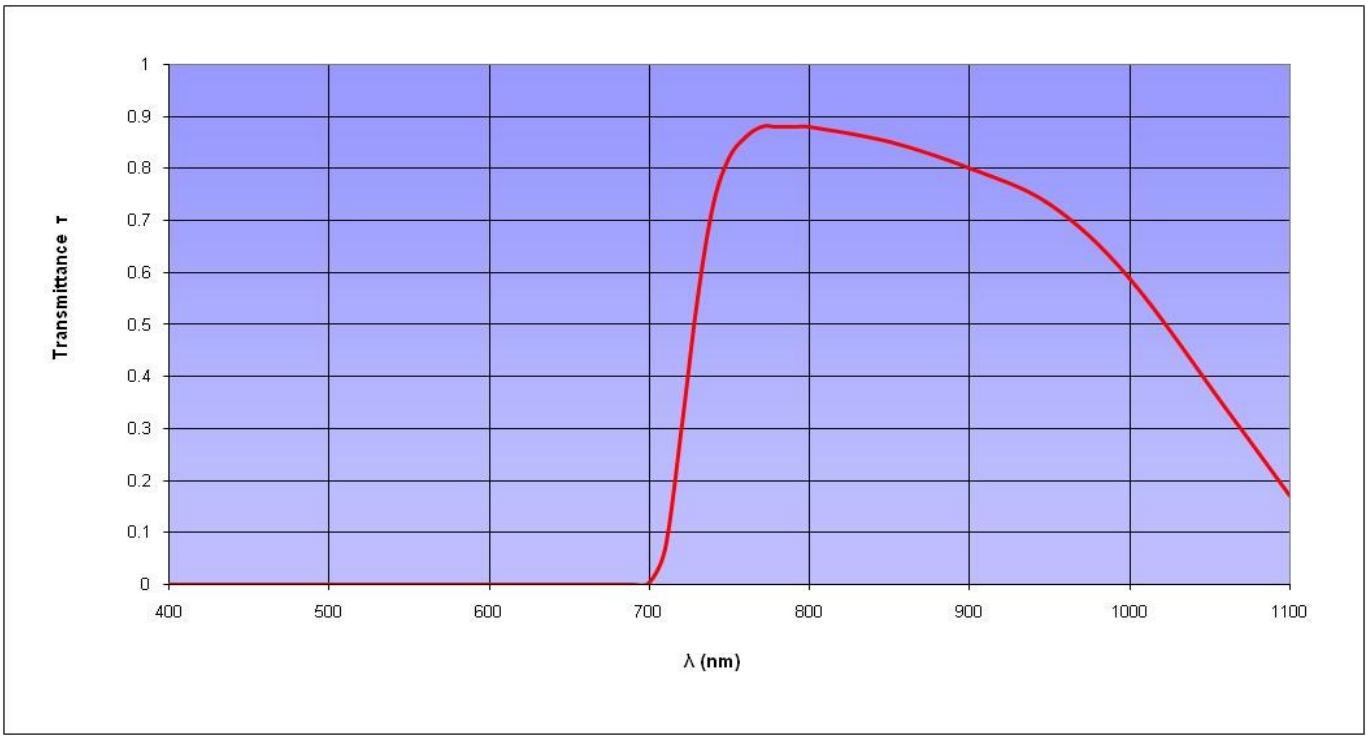


Fig. 5: Transmittance of optical (RG9) filter

Warranty

METRALIGHT provides a ONE YEAR manufacturer's limited warranty against defective materials and workmanship. Please do not attempt to open the unit, as this will void all warranties.

Contacts

METRALIGHT, Inc.
1670 S. Amphlett Blvd., Unit # 214-M
Mailstop # 1008
San Mateo, CA 94402
phone: (650) 581 3088, fax: (650) 808 9830
email: sales@metralight.com
technical support: support@metralight.com
web site: http://www.metralight.com

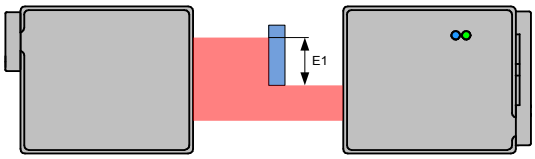


Fig.6: **EDGE1 MODE**, LEADING EDGE

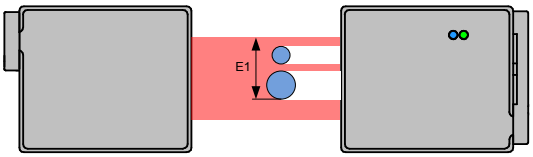


Fig.7: **EDGE1 MODE**, MULTIPLE OBJECTS

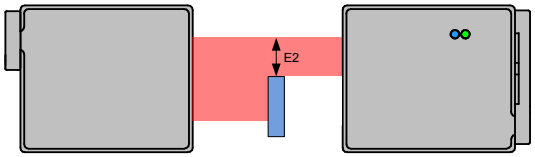


Fig.8: **EDGE2 MODE**, TRAILING EDGE

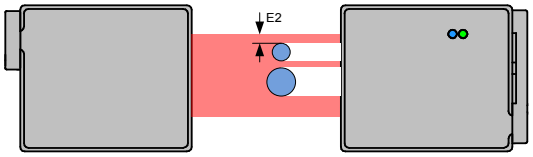


Fig.9: **EDGE2 MODE**, MULTIPLE OBJECTS

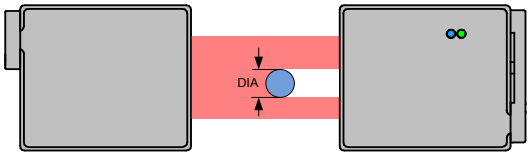


Fig.10: **DIA MODE**

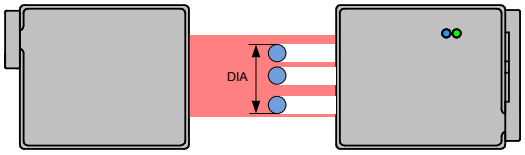


Fig.11: **DIA MODE**, MULTIPLE OBJECTS

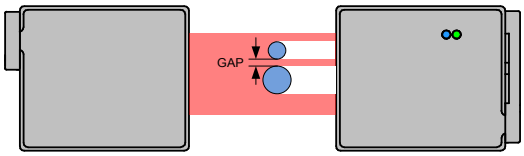


Fig.12: **GAP MODE**

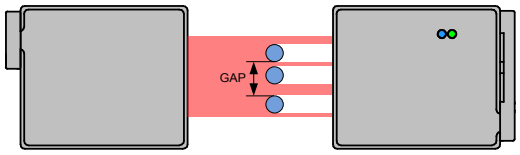


Fig.13: **GAP MODE**, MULTIPLE OBJECTS

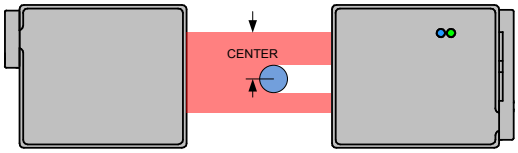


Fig.14: **CENTER MODE**

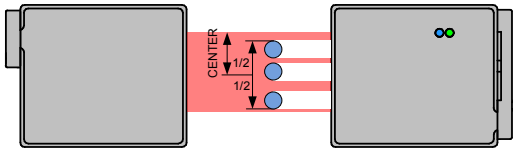


Fig.15: **CENTER MODE**, MULTIPLE OB-

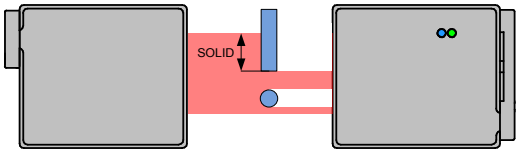


Fig.16: **SOLID MODE**, MULTIPLE OBJECTS

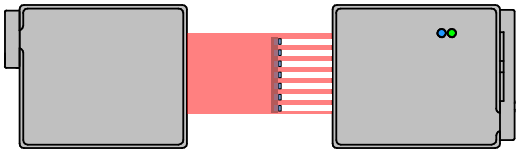
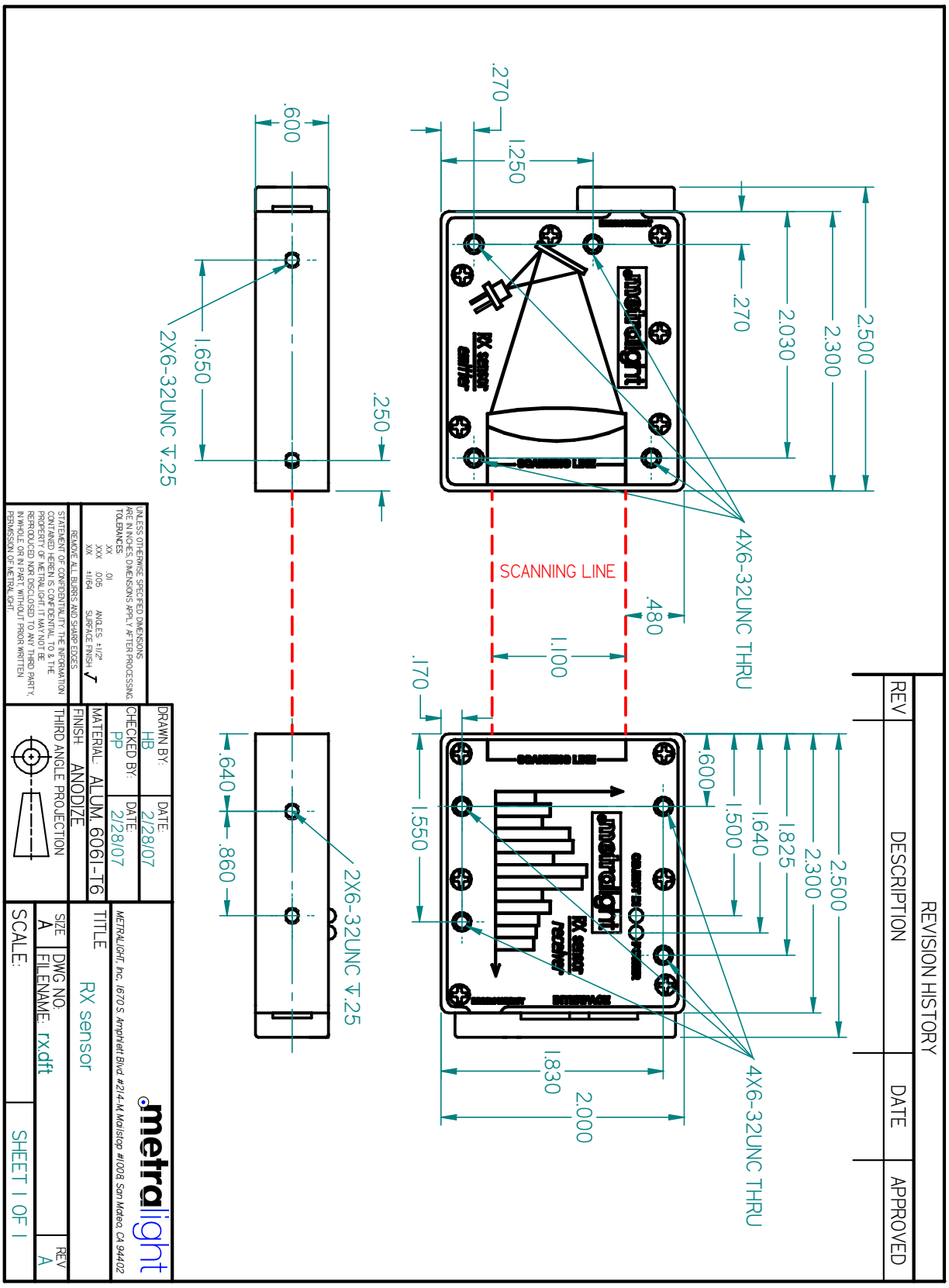


Fig.17: **CUSTOM MODE**, For Example IC LEADS Dimension measurement OR Detects BENT Leads or Missing Leads.


REVISION HISTORY
REV
DESCRIPTION
DATE
APPROVED
.270
1.250
.600
2X6-32UNC ↧.25
1.650
.250
2.500
2.300
2.030
.270
4X6-32UNC THRU
SCANNING LINE
.480
1.100
.170
.600
1.550
1.640
1.825
1.500
2.500
2.300
4X6-32UNC THRU
1.830
2.000
.640
.860
2X6-32UNC ↧.25
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. DIMENSIONS APPLY AFTER PROCESSING.
TOLERANCES:
XX .01
XXX .005
XX ±1/64
ANGLES ±1/2°
SURFACE FINISH √
REMOVE ALL BURRS AND SHARP EDGES
STATEMENT OF CONFIDENTIALITY: THE INFORMATION CONTAINED HEREIN IS CONFIDENTIAL TO & THE PROPERTY OF METRALIGHT. IT MAY NOT BE REPRODUCED NOR DISCLOSED TO ANY THIRD PARTY, IN WHOLE OR IN PART, WITHOUT PRIOR WRITTEN PERMISSION OF METRALIGHT
THIRD ANGLE PROJECTION
DRAWN BY: HB
DATE: 2/28/07
CHECKED BY: PP
DATE: 2/28/07
MATERIAL: ALUM 6061-T6
FINISH: ANODIZE
metralight
METRALIGHT, Inc. 16770 S. Amphlett Blvd. #214-M Mailstop #1008 San Mateo, CA 94402
TITLE
RX sensor
SIZE A
DWG NO.
FILENAME: rx.dft
REV A
SCALE:
SHEET 1 OF 1

USB or RS232 Command Set version [v1.h0]

d<CR><LF>
Description: Data command, returns present number in pixels. Each pixel measure 7µm (or 3.5µm)
Response: d<CR><LF>number<CR><LF>
Example: Host sends: d<CR><LF>, Sensor response: d<CR><LF>2547<CR><LF>

o<CR><LF>
Description: Displays OBJECT_IN status - presence/absence of object in scanning line.
Response: o<CR><LF>object_in_status<CR><LF>; object_in_status=00000 or 00001
Example: Host sends: o<CR><LF>, Sensor response: o<CR><LF>00001<CR><LF>
00001=Object present, 00000=Object not present

a[average_size]<CR><LF>; [average_size] can be set to: 1,2,4,8,16,32 or 64
Description: Set number of data samples being averaged (moving average). If parameter [average_size] is omitted then current average_size is displayed. Overwriting this parameter is protected.
Response: a<CR><LF>average_size<CR><LF>
Example: Host sends: a00064<CR><LF>, Sensor response: a<CR><LF>a00064<CR><LF>
Sensor averages 64 datas.

m[mode_number]<CR><LF>; 0<mode_number<7
Description: Change/display current measurement mode. If parameter [mode_number] is omitted then current mode_number is displayed.
m0=Edge1,m1=Edge2,m2=Diameter,m3=Gap,m4=center,m5=FirstEdge,m6=FirstDiameter,
m7=CustomMode - see Appendix "A" for modes definition
Response: m<CR><LF>mode_number<CR><LF>
Example: Host sends: m1<CR><LF>, Sensor response: m1<CR><LF>m00001<CR><LF>
Edge2 mode is set.

v<CR><LF>
Response: firmware_version<CR><LF>

r<CR><LF>
Description: reset MCU.