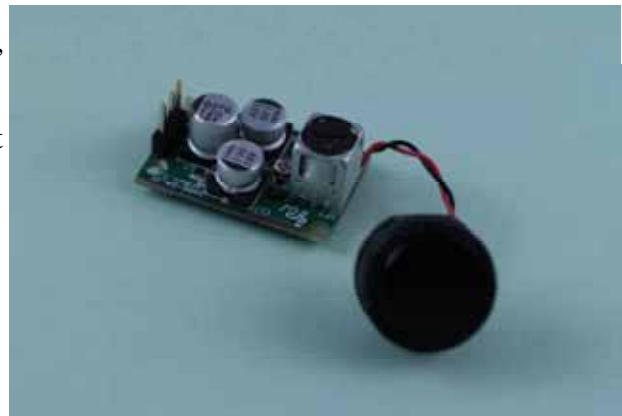


The SRM400 is a sonar ranging module utilizing our newly developed Sonar Custom ASIC, PW-0268. This module is compatible with all PT & EP type transducers, and reduces the product development time for car reversing and other distance measurement systems. Design engineers who are not very familiar with sonar analog circuitry are now free to focus on digital circuitry, software and hardware considerations.



After prototyping and the knowledge gained, the design engineer can develop their own analog circuitry or consult with the factory for assistance with specialized needs.

## Features:

- Operating Voltage: 6 – 10Vdc single source
- Operating Frequency: broadband output ranging up to 250KHz
- Built-in variable RC oscillator matching transducers with different frequencies
- High Gain Amplifier: varies with time over 32 steps
- Integrated Band Pass Filter: reduces external component count,
- Bi-direction I/O Pin: simplifies the control function for transmitting a pulse and receiving an echo
- An adjustable System Clock: enables the control of, the number of pulses transmitted, the slope of the variable gain amplifier, and the pulse repetition rate
- Board size: 27.9 \* 18 mm (L\*W)

## Specification:

Operation voltage	DC6 - 10V
Operation current	<20 mA @DC10V
Oscillation frequency	Variable RC oscillator
Amplifier gain	
Pre-Amplifier	14 dB
2 <sup>nd</sup> Stage Amplifier	30 dB
Time controlled 32 steps main amplifier	35 dB max.
Bandpass filter	Fc: 38 KHz
	Bandwidth: 20KHz
	Insertion loss: 1 dB
Driving voltage (no load)	130Vpp; pulse width 0.5ms
Bi-directional I/O	
Input signal	Open collector pull low
Output	0..05*Vcc to 0.9*Vcc digital echo signals
Measuring distance	25 – 150 cm

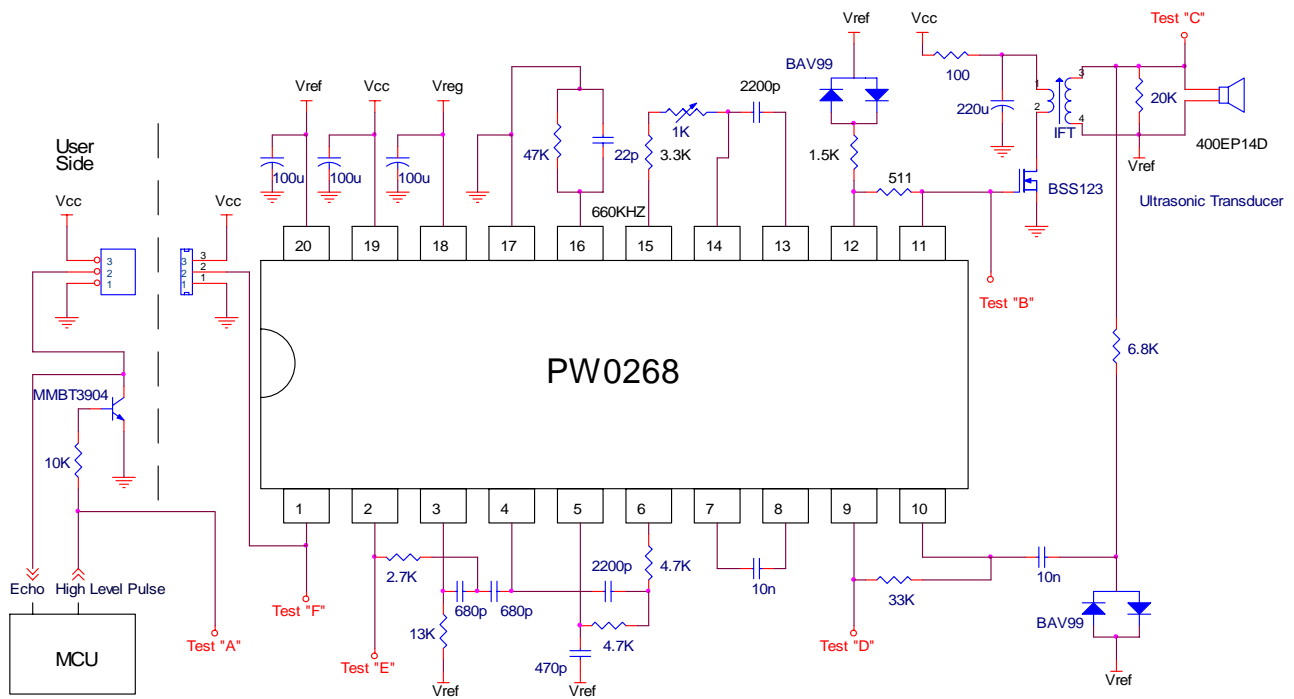
## SRM400 includes:

1. Module board
2. 400EP14D enclosed type transducer of asymmetrical beam patterns, see detail specification of 400EP14D.
3. Detail electrical schematic

# Sonar Ranging Module

## Electronic Circuit Diagram

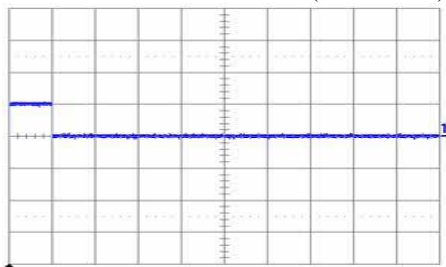
SRM400



### Waveforms at different test points:

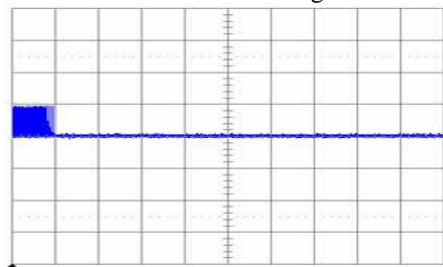
works with transducer model 400EP14D against a hard target of size of 20cmL\*20cmW\*1cmT at distance of 50cm

#### “A” Point: Control Pulse (from MCU)



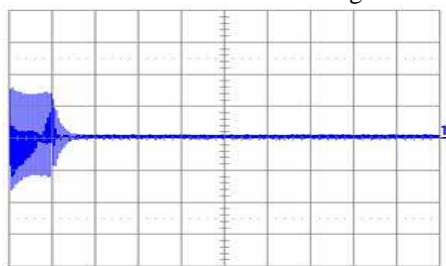
H: 0.5ms/div  
V: 5V/div

#### “B” Point: Tone bursts Signal



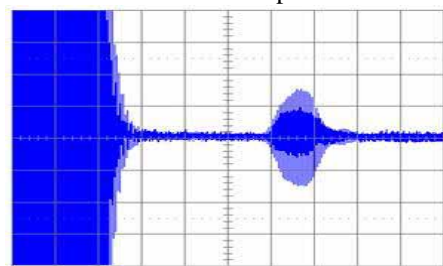
H: 0.5ms/div  
V: 5V/div

#### “C” Point: Transducer loading



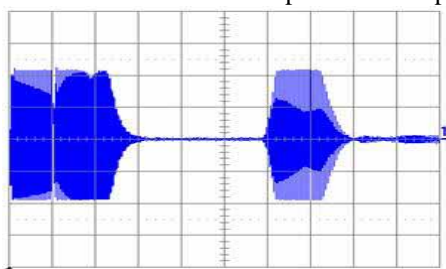
H: 0.5ms/div  
V: 50V/div

#### “D” Point: 1<sup>st</sup> Pre-Amplifier



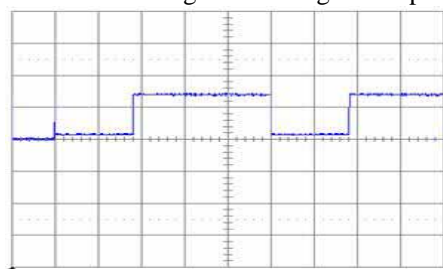
H: 0.5ms/div  
V: 20mV/div

#### “E” Point: Main 32 Steps TCG Amplifier



H: 0.5ms/div  
V: 1V/div

#### “F” Point: Digital Echo signal Output

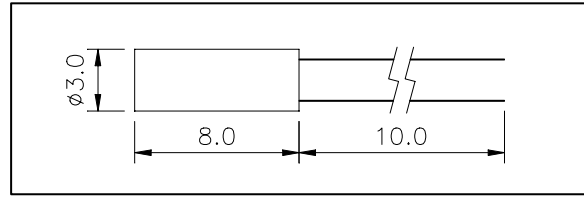


H: 0.5ms/div  
V: 5V/div

Refer to [PW-0268 Sonar Ranging IC](#) for detail information.

## Quartz Crystals & Matching Transformers

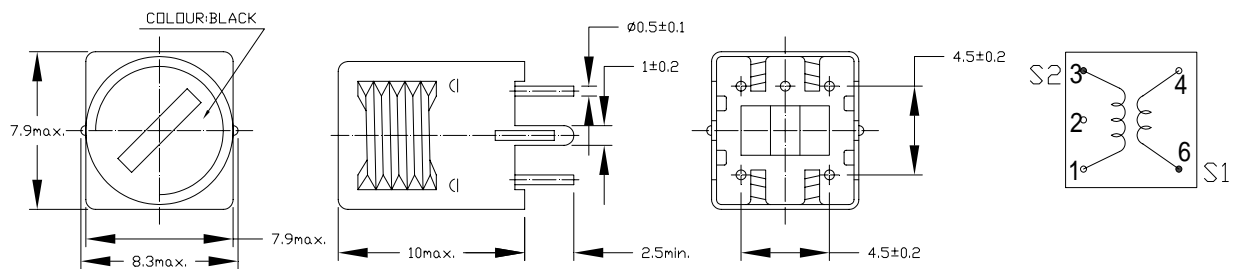
### Miniature Tuning Fork Quartz Crystals



### Specification

Model Number	Nominal Frequency Hz	Tolerance at 25°C PPM	Temperature Stability -10°C to +70°C PPM	Load Capacitance pF	Series Resistance Ohm	Shunt Capacitance pF	Drive Level mW
S40000	40,000	± 60	± 45	12.5	35,000	2.3	0.001
S32768	32,768	± 20	± 30	12.5	35,000	2.3	0.001

### Matching Transformers



### Specification

Parts Number	K4000001	K4000002	K4000003	K4000004
Operating Frequency	40.0 KHz	40.0 KHz	40.0 KHz	40.0 KHz
Variable Inductance (min.)	10.6 mH± 6%	10.6 mH± 6%	10.6 mH± 6%	10.6 mH± 6%
Unloaded Q (min.)	70	100	25	47
Turn Ratio	1:10	1:10	1:10	1:10
Matching Transducer	400EP14D	400EP14D (Temperature Compensated Type)	235SR130	400EP18A