

Product Specification for Reference Only

Issued Date: 01 July, 2013

Rev. : I

Part Description: Ultrasonic Sensor

MURATA Part No.: MA40MF14-0B

The product specification in this sheet is for reference only.
The content of this specification is subject to change.

You are requested to receive the latest specification and to return one copy of the specification to us with your receipt signature before going into mass production.

Product Promotion Sec. 1
Sensor Products Dept. 1
Sensor Products Division
Device Unit
Murata MFG. Co.,Ltd.

MURATA MANUFACTURING Co., LTD.

rev.I



Specification of Ultrasonic Transducer

Type : MA40MF14-0B

1. Scope

This product specification is applied to the drip proof type ultrasonic transducer used for an obstacle detection system around a vehicle.

Please contact us when using this product for any other applications than described in the above.

2. Customer Part Number

3. Murata Part Number

MA40MF14-0B

4. Dimension

as per Fig.1

5. Absolute Maximum Ratings

	Items	Specification	Note
5-1	Maximum Input Voltage	160Vp-p	Do not apply D.C. voltage.
5-2	Operating temperature range	-40 to +85 deg C	
5-3	Storage temperature range	-40 to +85 deg C	

6. Specifications (* Temperature 25 ± 3 deg C, 45 to 75 % R.H, unless otherwise noted)

	Items	Specification	Note
6-1	Operation Frequency	40 kHz	
6-2	Sound pressure Level	more than 101 dB	at 40kHz distance is 30cm, input voltage is 10Vrms 0 dB = 20 uPa (per measuring circuit Fig.2)
6-3	Sensitivity	more than -87 dB	at 40 kHz 0 dB = 10V/Pa (per measuring circuit Fig.3)
6-4	Beam pattern (Typical)	(Typical) 110 deg x 50 deg	6dB down angle of overall sensitivity
6-5	Capacitance	2700 pF +/- 20%	at 1kHz
6-6	Insulation Resistance	100 Mohm min.	at 100V D.C.



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7. Environmental tests (Standard Test Condition: 25 ± 3 deg C, 45 to 75 % R.H)**7.1 Shock Test**

The variation of the Sound Pressure Level at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C after following test conditions

Acceleration	:	sine 980 m/s^2 (100G), 6ms
Direction	:	3 directions
Shock time	:	3 times / directions

7.2 Vibration Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C after following test conditions

Vibration frequency:	10 to 200 Hz
Sweep Period	: 15 min.
Acceleration	: 43.12 m/s^2 (4.4G)
Directions	: 3 directions
Time	: 96 hours / direction

7.3 Drop Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C after following test conditions

Height	:	1 meter onto concrete floor
Times	:	3 times

7.4 Pull Strength

There should be no substantial damage after 2.45 N of force.

7.5 High Temperature Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C in 24 hours after following test conditions

Temperature	:	$+85 \pm 2$ deg C
Time	:	1000 hours

7.6 Low Temperature Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C in 24 hours after following test conditions

Temperature	:	-40 ± 3 deg C
Time	:	1000 hours

7.7 Humidity Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C in 24hours after following test conditions

Temperature	:	$+65 \pm 2$ deg C
Humidity	:	90 to 95 % R.H.
Time	:	1000 hours

7.8 Heat Cycle Test

The variation of the S.P.L at 40 kHz is within ± 3 dB compared with initial figures at 25 deg C in 24hours after following test conditions

Temperature	:	$+85 \pm 3$ deg C, 30 min -40 ± 3 deg C, 30 min
Cycles	:	1000 cycles



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8. ⚠ Caution**8-1 Limitation of Applications**

Please do not use for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- 1) Aircraft equipment
- 2) Aerospace equipment
- 3) Undersea equipment
- 4) Power plant control equipment
- 5) Medical equipment
- 6) Transportation equipment (trains, ships, etc.)
- 7) Traffic signal equipment
- 8) Disaster prevention / crime prevention equipment
- 9) Data-processing equipment
- 10) Forklift, road building equipment and other special-purpose vehicles
- 11) Military equipment (regardless of directly/indirectly)
- 12) Security device/system
- 13) Application of similar complexity and/or reliability requirement to the applications listed in the above

8-2 Fail-safe

Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

9. Caution in use**9-1. Notice in design and usage**

- 1) The transducer may generate surge voltage by mechanical or thermal shock. Care should be taken to protect from it in designing your application circuit.
- 2) Please do not apply an excessive stress to the transducer because the piezo electric element of the transducer might be damaged or inner cable might be disconnected.
- 3) The piezo electric element of the transducer may be damaged by force pressure from back of the transducer.
- 4) Please do not apply D.C.voltage to the transducer to avoid failure. Electrode of piezo electric element might be shorted out with electronic migration.
- 5) Please do not use the transducer in water.
- 6) Please hold the transducer with soft material such as rubber. The direct holding with hard material will be cause of vibration leakage from, or into the transducer. It will be influenced to decay time and short distance detection.
- 7) Please avoid humid penetration at the rear of the transducer in order to avoid short circuit. Please use the transducer with waterproof design.
- 8) Please do not exceed 95 deg C / 120min in the assembly process and painting process to avoid malfunction.
- 9) The transducer is designed for dual use purpose. Please do not use the transducer only as receiver.
- 10) Care should be taken when select the material to hold, or cover backside of transducer. If it contains sulfur or sulfide, electrode on piezo-electric element may corroded and because of malfunction.

9-2. Notice in storage

- 1) The products should not be used or stored in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali or the like are present. Store the products in the room where is normal temperature and humidity, and avoid the sunlight, sudden changes in temperature and humidity. It may cause of failure or malfunction in such conditions.



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- 2) Store the products where the temperature and relative humidity do not exceed -10 to 40 deg C, and 30 to 80%RH. Please Use the products within 6 months after receiving.

9-3. Notice in soldering and mounting

- 1) Please do not clean the transducer with water or solvent.
- 2) Please do not solder the transducer with flow or reflow soldering. Do not exceed the soldering iron temperature 350 deg C and 3 sec.

10. Note

- 1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2) You are requested not to use our product deviating from the agreed specifications.
- 3) We consider it not to appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.



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Dimensions

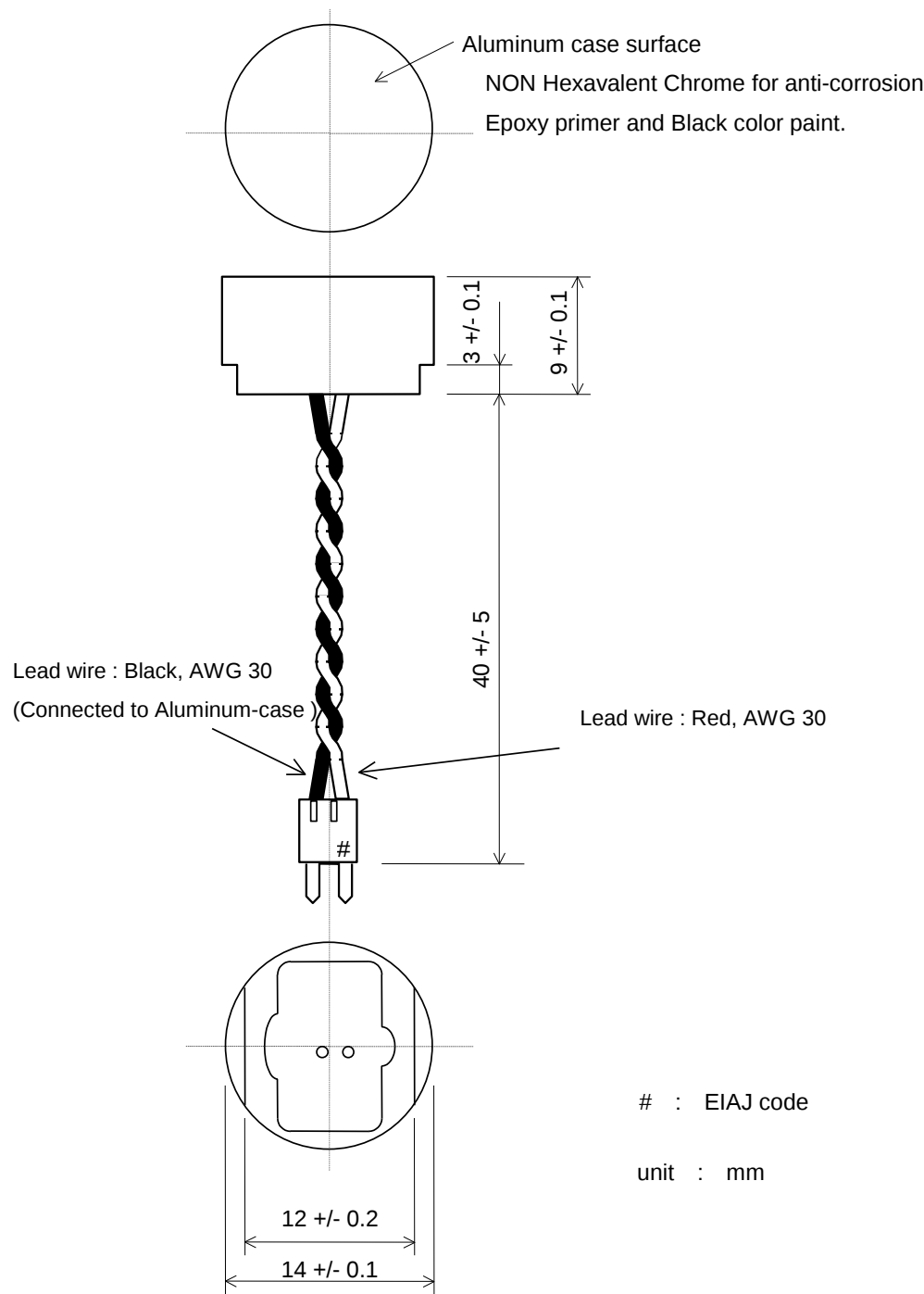


Fig. 1

S.P.L. Test circuit

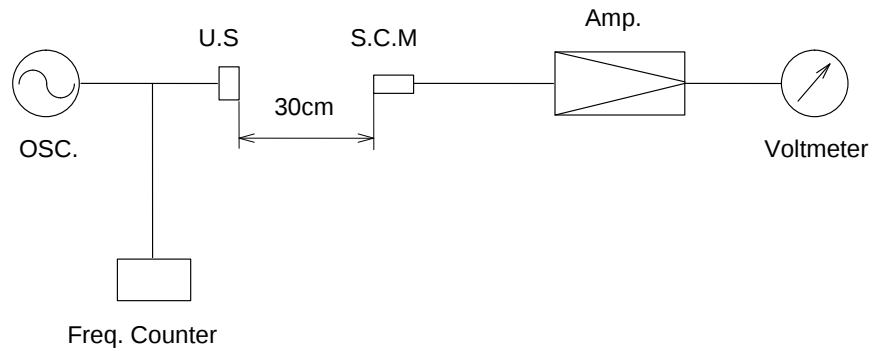


Fig. 2

- OSC. : Oscillator (Brüel & Kjær 1013)
 U.S. : Ultrasonic Sensor
 S.C.M. : Standard Condenser Microphone (Brüel & Kjær 4135)
 Amp. : Amplifier (Brüel & Kjær 2610)

Sensitivity Test circuit

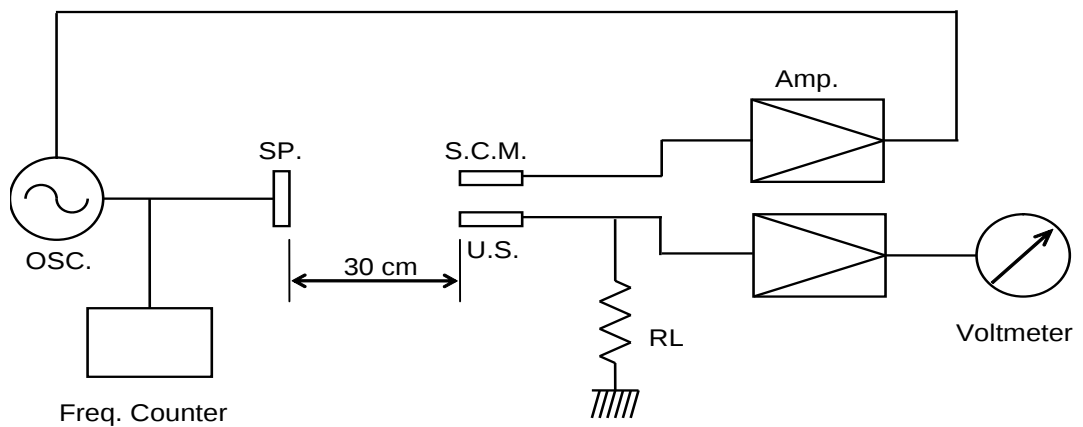


Fig. 3

- OSC. : Oscillator (Brüel & Kjær 1013)
 U.S. : Ultrasonic Sensor
 S.C.M. : Standard Condenser Microphone (Brüel & Kjær 4135)
 Amp. : Amplifier (Brüel & Kjær 2610)
 SP. : Tweeter
 RL : 3.9 k ohm