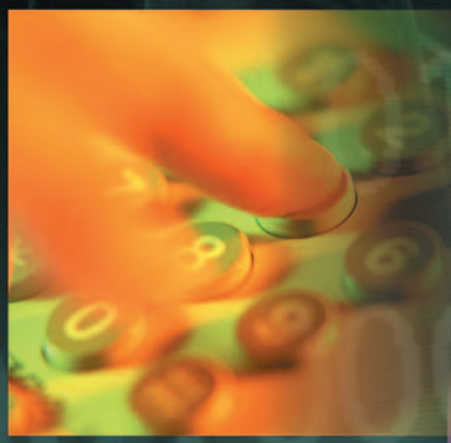
star PRODUCTS

"Magnetic Sounder & Buzzer" Catalog (RoHS Compliant Products)

"Magnetic So

The culmination of over fifty years of manuf expertise has resulted in a wide range of audio providing high quality and reliabl

Star Micronics is one of the world's largest manuf sounders, magnetic buzzers, speakers, receivers a products are manufactured in facilities throughout the latest factory automation and computer integ systems. This system ensures high productivity and products that are sold worldwide and backed by an marketing network that stretches across the globe.



- Star ensures the highest possible standards of manufacture, product quality and reliability. Our audio products have acquired the ISO9001, ISO14001 and QS9000 certification.

QS 9000 ISO 9001 ISO 14001

- Star audio products are sold into applications such as automotive, wireless communications, medical instrumentation, test equipment, computer peripherals, appliances, general industrial, alarms and more.

G U I D A N C E ■ How to View the Overall Product Catalog

Reflow	Reflow type -Durable to lead- free oven.	Wide Frequency	Wide frequency band	Sound Po	
Auto Mounting	Tape and reel packaging for auto mounting	Low Frequency	Low frequency band	Low Consump	
Automatic Insertion	Delivered in magazine for automatic insertion	Pin/Lead	Pin terminals or lead wire type	Control Term	
Dip	Dip-solder type	Heat Resistant	High heat resistant	Square	Correspond to
RoHS	RoHS compliant	Patent	Design right or patent already registered by Star Micronics		
High SPL	High sound pressure evel	Adhesive-less	Adhesive-less type		

under & Buzzer, Dynamic Speaker"Series

acturing products e output.

acturers of magnetic nd microphones. Our the world, featuring rated manufacturing competitive prices on integrated sales and

rt Side or upper sound port

tion Low current consumption type

inal Equipped with control terminals for small input signal use

/Sin Wave Drive

square or sin wave drive

C O N T E N T S

Applications

- Mobile Devices・・・Mobile phone, PDA, Portable Audio player
- Kitchen・・・・・・Electronic oven, Timers
- Shop Appliance・・・Electronic registers, POS
- IT Equipment・・・・Computer terminal, Keyboard, Printer peripheral, Digital camera
- Automobile・・・・・Automobile safety systems, Automobile phone, ETC, Car Navigation
- Medical, etc.・・・・Electronic sphygmomanometers, Disaster / Crime prevention equipment,Alarm clock, Various kinds of alarms

Magnetic Sounder

◆Reflow type (Non-washable) (Note 1)

Type	Model	Dimensions (mm)	Rated Voltage (V)	Operating Voltage (V)	Rated Frequency (Hz)	(Note 2) Sound Pressure Level (dBA) 〈MIN(10cm)〉	Mean Current Consumption (mA) 〈MAX〉	Operating Temperature (℃)	Mass (g)	Page
NFT	NFT-03C	5×5×3	3.0	~4.0	4,000	78	100	−30~+70	0.3	7
MRT	MRT-03A	7.5×7.5×2.8	3.6	~4.5	2,670	86	100	−30~+70	0.4	7
MLT	MLT-03C	8.5×8.5×3	3.6	~4.5	2,700	88	100	−30~+70	0.5	8
	MLT-03GC	8.5×8.5×4	3.6	~4.5	2,700	94	100	−30~+70	0.5	8
MZT-A	MZT-03A-BLK	10×12×2	3.6	~4.2	2,670	83	70	−30~+70	0.5	9


NFT-03C


MRT-03A


MLT-03C


MLT-03GC


MZT-03A-BLK

◆Reflow type for Automobile (Non-washable)

Type	Model	Dimensions (mm)	Rated Voltage (V)	Operating Voltage (V)	Rated Frequency (Hz)	SPL (dBA) 〈MIN(10cm)〉	Frequency Band (Hz) 〈MIN80dB〉	Mean Current Consumption (mA) 〈MAX〉	Operating Temperature (℃)	Mass (g)	Page
NAT	NAT-05A	15×17×12	5	~7	2,000	88	1,700~2,300	80	−40~+85	3	9
	NAT-12A		12	~16	2,000	88	1,700~2,300	55	−40~+85	3	9
NBT	NBT-05	22×23.5×11	5	~5	730	85	—	80	−40~+85	5	10


NAT-05A
NAT-12A


NBT-05

◆Non-washable type

Type	Model	Dimensions (mm)	Rated Voltage (V)	Operating Voltage (V)	Rated Frequency (Hz)	SPL (dBA) 〈MIN(10cm)〉	Frequency Band (Hz) 〈MIN80dB〉	Mean Current Consumption (mA) 〈MAX〉	Operating Temperature (℃)	Mass (g)	Page
QMB-105	QMB-105P	φ12×5.4	1.5	~2	2,048	70	—	10	−20~+60	2	11
QMB-108	QMB-108P	φ12×7.5	1.5	~2	2,743	85	—	60	−20~+60	1.6	11
QMB-111	QMB-111PN	φ12×8.5	1.5	~2	2,048	80	—	10	−20~+60	2	12
	QMB-111GPN		1.5	~2	2,048	85	—	35	−20~+60	2	12
	QMB-111PC		5	~5	2,000	85	—	40	−20~+60	2	12
PMX-06	PMX-06B	φ12×5.8	1.5	~2	2,731	83	—	70	−20~+60	2	12
PMX-04B	PMX-04B	φ12×7.5	1.5	~2	2,731	85	—	70	−20~+60	2	13


QMB-105P


QMB-108P


QMB-111PN
QMB-111GPN
QMB-111PC


PMX-06B


PMX-04B

◆Washable type (Note 3)

Type	Model	Dimensions (mm)	Rated Voltage (V)	Operating Voltage (V)	Rated Frequency (Hz)	SPL (dBA) 〈MIN(10cm)〉	Frequency Band (Hz) 〈MIN80dB〉	Mean Current Consumption (mA) 〈MAX〉	Operating Temperature (℃)	Mass (g)	Page
QMX	QMX-05	φ12×9	5	~8	2,400	85	—	40	−40~+85	2	14
	QMX-12		12	~15	2,400	85	—	40	−40~+85	2	14
HGP	HGP-05AM	φ16×12	5	~8	—	85	1,700~2,200	70	−40~+90	4	14
	HGP-12AM		12	~15	—	85	1,700~2,200	50	−40~+90	4	14
RMX	RMX-06	φ16×14	6	~12	2,048	85	2,000~3,000	40	−40~+85	5	15
	RMX-12Y		12	~18	2,048	85	2,000~3,000	40	−40~+85	5	15
QMB	QMB-06S/L	φ16×14	6	~12	2,048	85	—	40	−40~+100	7	15
	QMB-12S/L		12	~18	2,048	85	—	40	−40~+85	7	15
TMX	TMX-12F	φ25×18	12	~16	850	95	—	40	−40~+85	9	16
	TMX-03H	φ25×12.5	3.6	~5	1,500	106	—	300	−40~+80	10	16
	TMX-05H	φ25×12.5	5	~6	1,500	104	—	80	−40~+85	9	16
	TMX-12H	φ25×12.5	12	~16	1,500	104	—	55	−40~+85	9	16
TMX-A3	TMX-05A3	φ25×12.5	5	~5	730	85	—	80	−40~+85	9	17
TMX-S3	TMX-06S3	φ25×12.5	6	~8	1,000	85	1,000~1,500	75	−40~+85	9	17
	TMX-12S3		12	~14	1,000	85	1,000~1,500	55	−40~+85	9	17


QMX-05
QMX-12


HGP-05AM
HGP-12AM


RMX-06
RMX-12Y


QMB-06S/L
QMB-12S/L


TMX-12F


TMX-03H
TMX-05H
TMX-12H


TMX-05A3


TMX-06S3
TMX-12S3

Note 1 : Please contact us for conditions. These are Non-washable.
Note 2 : (dBA) = dB(A-weighting)
Note 3 : Please refer to page 27.

SOUNDER

Buzzer (Self-contained drive circuitry)

◆Electric sound type (Washable) (Note 1)

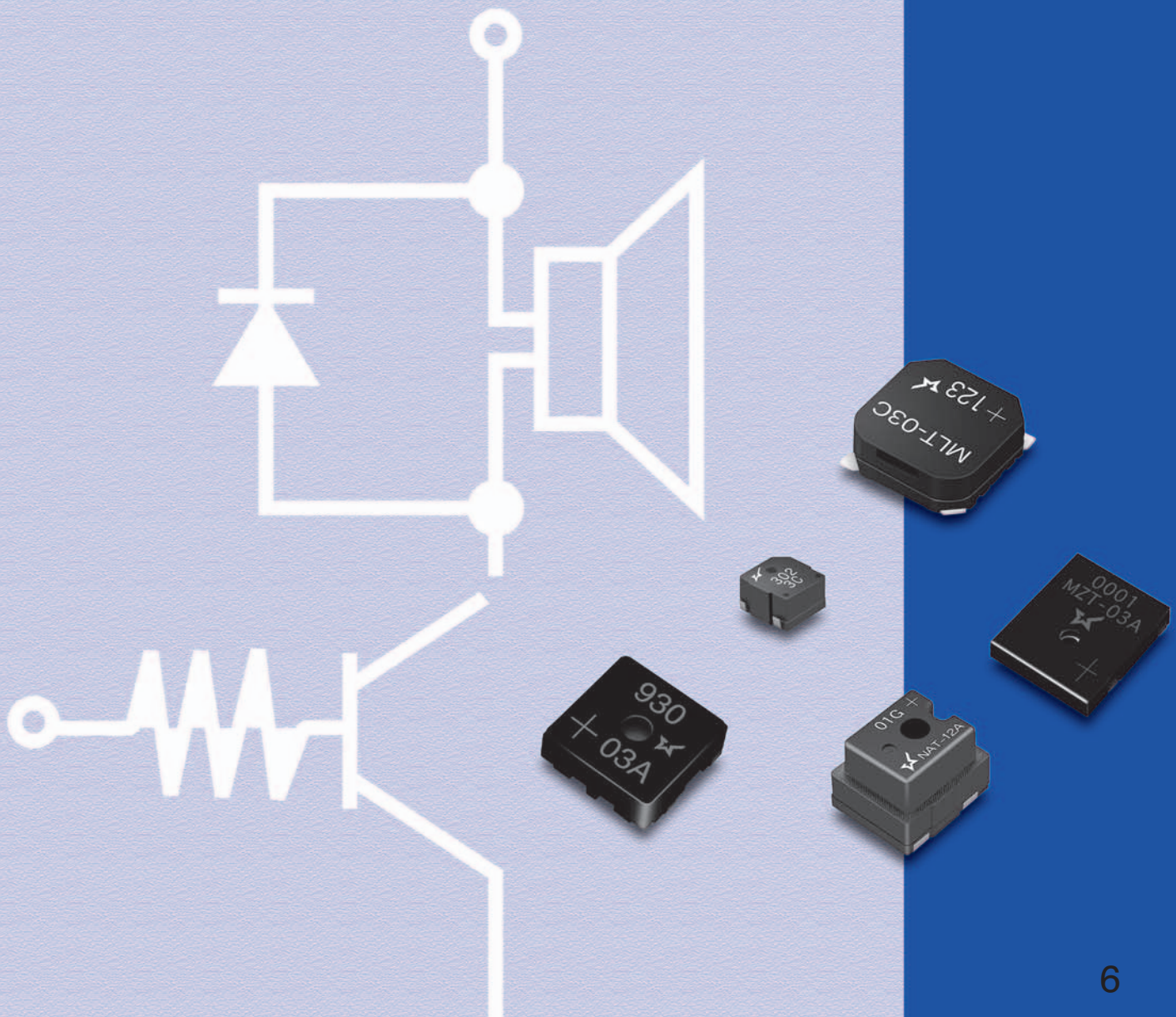
Type	Model	Dimensions (mm)	Rated Voltage (V)	Operating Voltage (V)	Rated Frequency (Hz)	Sound Pressure Level (dBA) 〈MIN(10cm)〉	Mean Current Consumption (mA) 〈MAX〉	Operating Temperature (℃)	Mass (g)	Page
TMB	TMB-05	φ12×9.5	5	4～6.5	2,300±300	85	30	−40～+85	2	19
	TMB-12		12	8～16	2,300±300	85	30	−40～+85	2	19
HMB	HMB-06	φ16×14.5	6	4～7	2,200±300	85	30	−40～+85	5	19
	HMB-12		12	8～16	2,200±300	85	30	−40～+85	5	19

TMB-05
TMB-12

HMB-06
HMB-12

Note 1 : Please refer to page 27

Magnetic Sounder



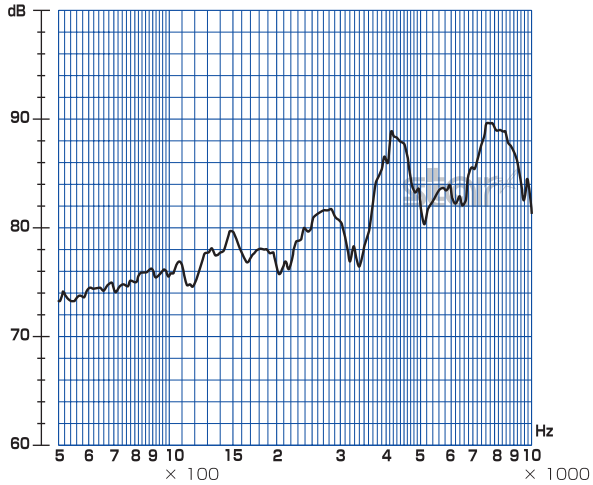
Non-washable

NFT series

NFT-03C

Reflow | Auto Mounting | Ultra Small | Patent | RoHS

Frequency Response



applied voltage : 3V, square wave : ½ duty,
distance for measurement : 10cm with recommended cavity

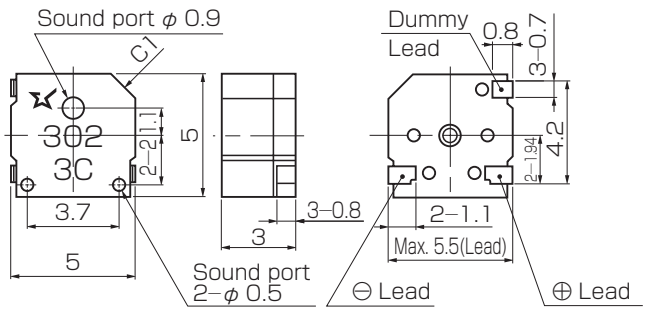
Specifications

Type		NFT-03C
Rated Voltage	(V)	3.0
※ Mean Current Consumption	(mA)	MAX100
Coil Resistance	(Ω)	12±2Ω
※ SPL at MIN10cm	(dBA)	MIN78(TYP84)
Rated Frequency	(Hz)	4,000
Operating Voltage	(V)	MAX4.0
Operating Temperature	(℃)	−30～+70
Storage Temperature	(℃)	−40～+85
Mass	(g)	0.3

※Value applying rated voltage(4,000Hz, ½ duty, square wave)

Dimensions [size :5×5×3mm]

unit : mm／housing material : LCP



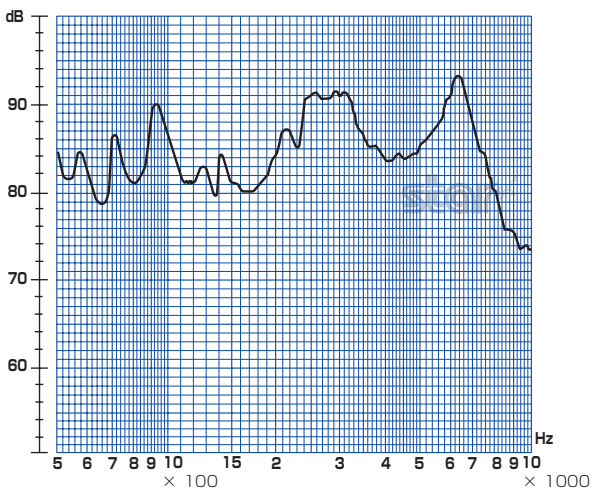
Non-washable

MRT-A series

MRT-03A

Reflow | Auto Mounting | Upper Sound Port | Patent | RoHS

Frequency Response



applied voltage : 3.6V, square wave : ½ duty,
distance for measurement : 10cm with recommended cavity

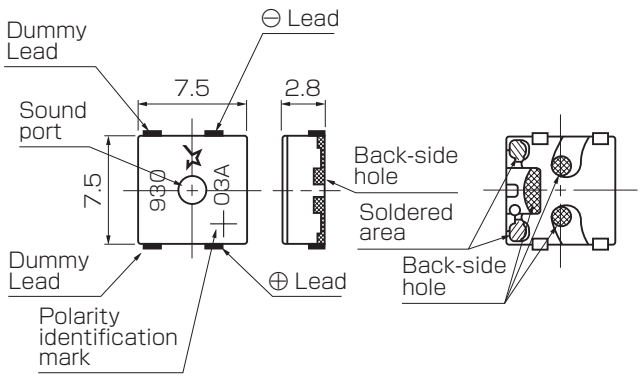
Specifications

Type		MRT-03A
Rated Voltage	(V)	3.6
※ Mean Current Consumption	(mA)	MAX100
Coil Resistance	(Ω)	16±3
※ SPL at MIN10cm	(dBA)	MIN86(TYP92)
Rated Frequency	(Hz)	2,670
Operating Voltage	(V)	MAX4.5
Operating Temperature	(℃)	−30～+70
Storage Temperature	(℃)	−40～+85
Mass	(g)	0.4

※Value applying rated voltage(2,670Hz, ½ duty, square wave)

Dimensions [size : 7.5×7.5×2.8mm]

unit : mm／housing material : LCP



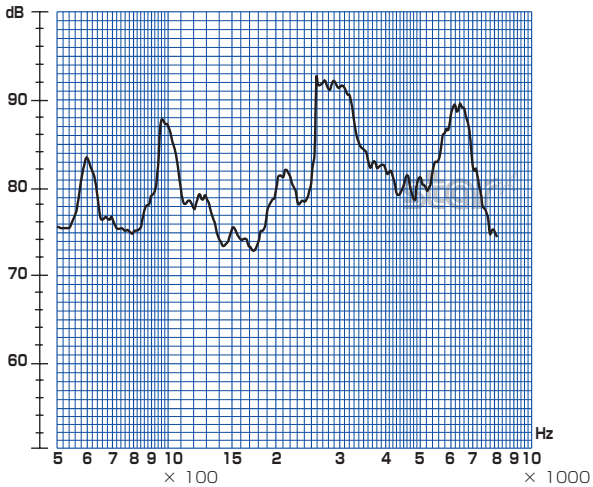
Non-washable

MLT-C series

MLT-03C

Reflow | Auto Mounting | Upper Sound Port | Patent | RoHS

Frequency Response



applied voltage : 3.6V, square wave : ½ duty,
distance for measurement : 10cm with recommended cavity

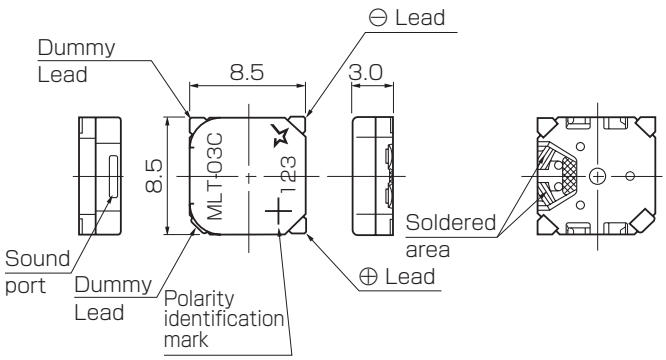
Specifications

Type	MQT-03HX
Rated Voltage (V)	3.6
※ Mean Current Consumption (mA)	MAX100
Coil Resistance (Ω)	17±3
※ SPL at MIN10cm (dBA)	MIN88(TYP92)
Rated Frequency (Hz)	2,700
Operating Voltage (V)	MAX4.5
Operating Temperature (℃)	−30~+70
Storage Temperature (℃)	−40~+85
Mass (g)	0.5

※Value applying rated voltage(2,670Hz, ½ duty, square wave)

Dimensions [size : 8.5×8.5×4mm]

unit : mm／housing material : LCP



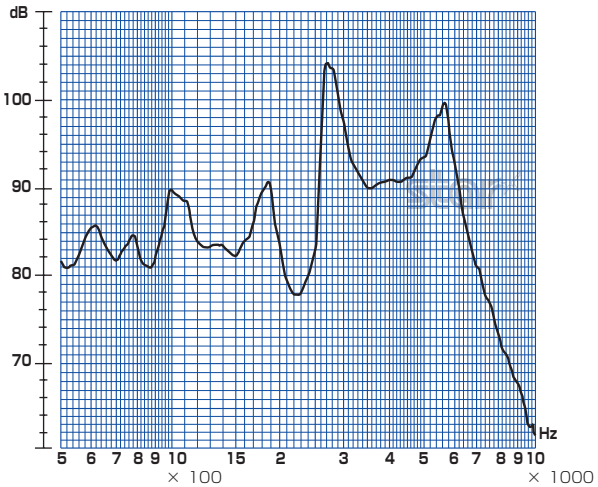
Non-washable

MLT-G series

MLT-03GC

Reflow | Auto Mounting | Side Sound Port | Patent | RoHS

Frequency Response



applied voltage : 3.6V, square wave : ½ duty,
distance for measurement : 10cm with recommended cavity

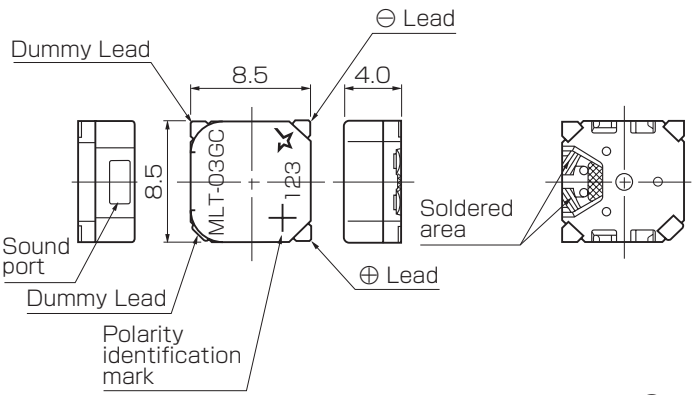
Specifications

Type	MLT-03G
Rated Voltage (V)	3.6
※ Mean Current Consumption (mA)	MAX100
Coil Resistance (Ω)	17±3
※ SPL at MIN10cm (dBA)	MIN94(TYP103)
Rated Frequency (Hz)	2,700
Operating Voltage (V)	MAX4.5
Operating Temperature (℃)	−30~+70
Storage Temperature (℃)	−40~+85
Mass (g)	0.5

※Value applying rated voltage(2,700Hz, ½ duty, square wave)

Dimensions [size : 8.5×8.5×4mm]

unit : mm／housing material : LCP



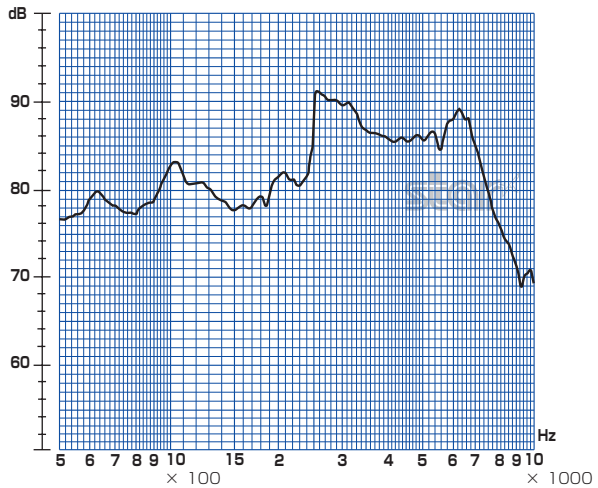
Non-washable

MZT-A series

MZT-03A-BLK

Reflow | Auto Mounting | Upper Sound Port | Patent | RoHS

Frequency Response



applied voltage : 3.6V, square wave : 1/2 duty,
distance for measurement : 10cm

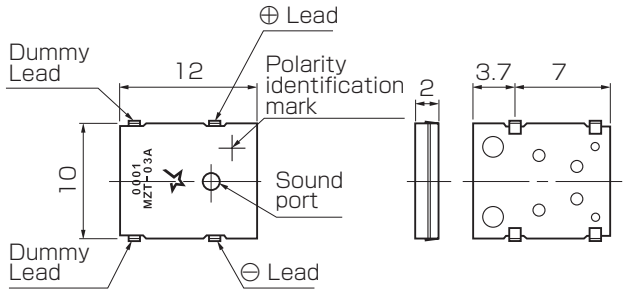
Specifications

Type	MZT-03A-BLK
Rated Voltage (V)	3.6
※ Mean Current Consumption (mA)	MAX70(TYP60)
Coil Resistance (Ω)	24±3
※ SPL at MIN10cm (dBA)	MIN83(TYP88)
Rated Frequency (Hz)	2,670
Operating Voltage (V)	MAX4.2
Operating Temperature (℃)	−30～+70
Storage Temperature (℃)	−40～+85
Mass (g)	0.5

※Value applying rated voltage(2,670Hz, 1/2 duty, square wave)

Dimensions [size : 10×12×2mm]

unit : mm／housing material : LCP



Non-washable

NAT series

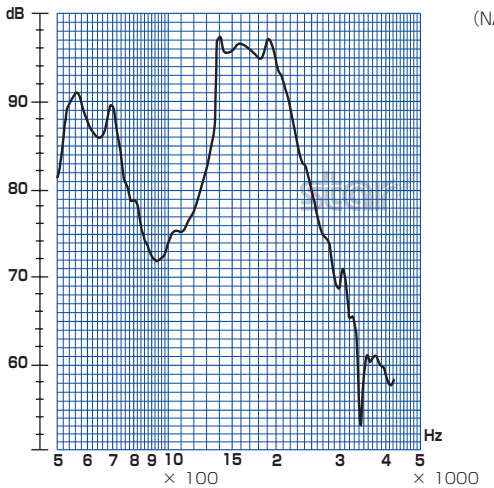
Reflow type buzzer for Automobile

NAT-05A NAT-12A

Reflow | Auto Mounting | Upper Sound Port | Patent | RoHS

Frequency Response

(NAT-12A)



applied voltage : 8V, square wave : 1/2 duty,
distance for measurement : 10cm

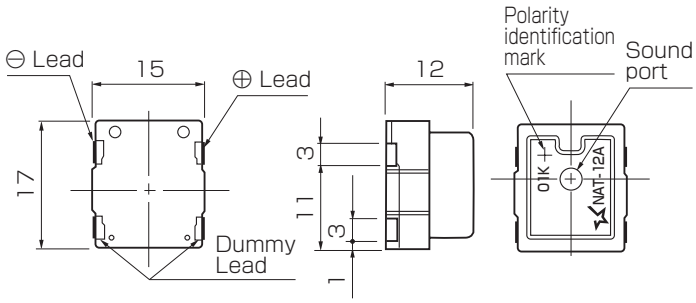
Specifications

Type	NAT-05A	NAT-12A
Rated Voltage (V)	5	12
※ Mean Current Consumption (mA)	MAX80	MAX55
Coil Resistance (Ω)	30±5	120±10
※ SPL at MIN10cm (dBA)	MIN88(TYP95)	MIN88(TYP95)
Rated Frequency (Hz)	2,000	
Frequency Band (Hz)	1,700～2,300	
Operating Voltage (V)	MAX7	MAX16
Operating Temperature (℃)	−40～+85	
Storage Temperature (℃)	−40～+85	
Mass (g)	3	

※Value applying rated voltage(①600Hz ②2000Hz, 1/2 duty, square wave)

Dimensions [size : 15×17×12mm]

unit : mm／housing material : PA6T (NAT-12A)



Non-washable

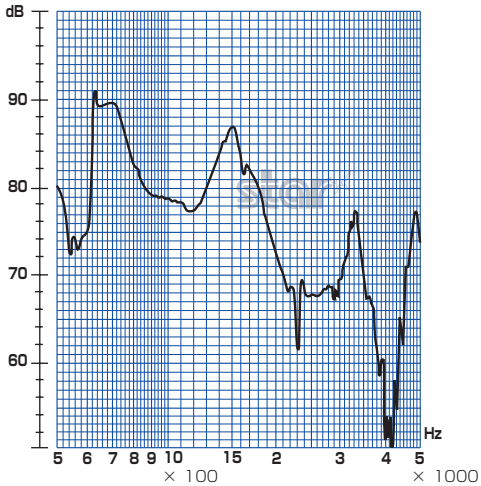
NBT series

Reflow type buzzer for Automobile

NBT-05

Reflow | Auto Mounting | Upper Sound Port | RoHS

Frequency Response



applied voltage : 5V, square wave : 1/2 duty,
distance for measurement : 10cm

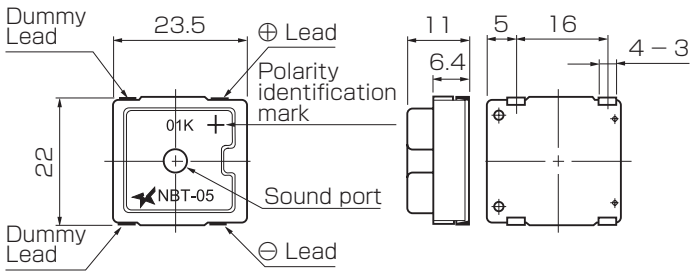
Specifications

Type	NBT-05
Rated Voltage (V)	5
※ Mean Current Consumption (mA)	MAX80
Coil Resistance (Ω)	30±5
※ SPL at MIN10cm (dBA)	MIN85(TYP89)
Rated Frequency (Hz)	730
Operating Voltage (V)	MAX5
Operating Temperature (℃)	−40～+85
Storage Temperature (℃)	−40～+85
Mass (g)	5

※Value applying rated voltage(730Hz, 1/2 duty, square wave)

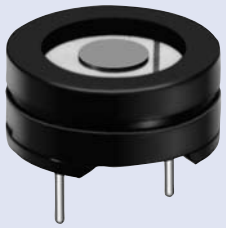
Dimensions [size : 22×23.5×11mm]

unit : mm／housing material : PA6T



Non-washable

QMB-105 series

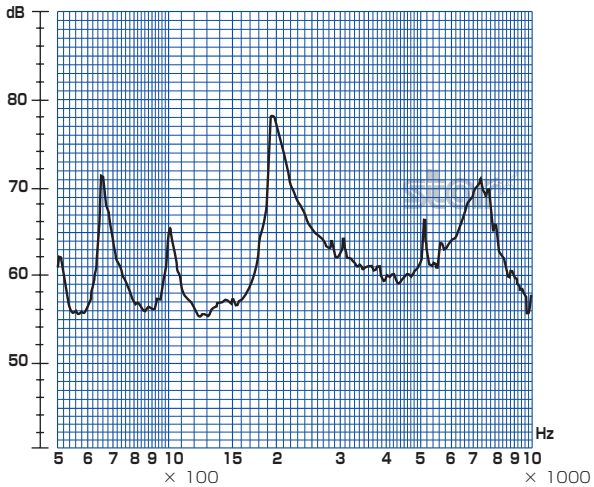


QMB-105P

※) With lead wire is available
(Standard length : 110mm, 60mm)

Thin Type　RoHS

Frequency Response



applied voltage : 1.5V, square wave : ½ duty,
distance for measurement : 10cm

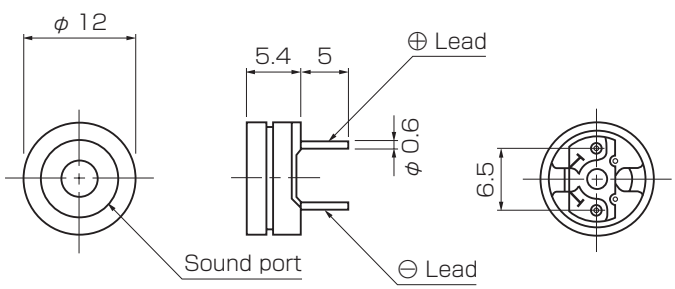
Specifications

Type		QMB-105P
Rated Voltage	(V)	1.5
※ Mean Current Consumption	(mA)	MAX10(TYP9.1)
Coil Resistance	(Ω)	50±7.5
※ SPL at MIN10cm	(dBA)	MIN70(TYP77)
Rated Frequency	(Hz)	2,048
Operating Voltage	(V)	MAX2
Operating Temperature	(℃)	−20～+60
Storage Temperature	(℃)	−30～+70
Mass	(g)	2

※Value applying rated voltage(2,048Hz, ½ duty, square wave)

Dimensions [size : φ12×5.4mm]

unit : mm／housing material : PPE-M



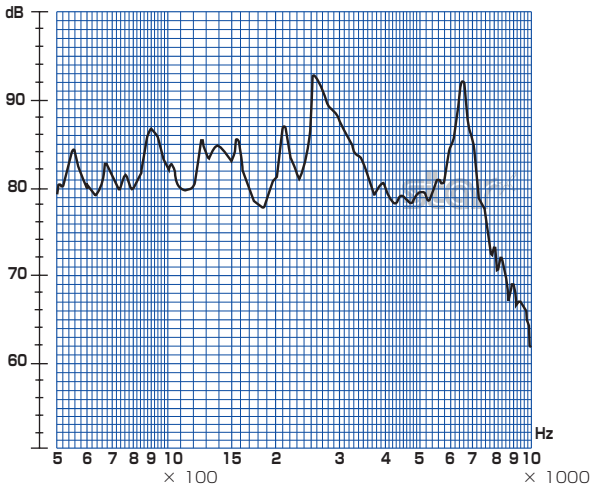
Non-washable

QMB-108 series

QMB-108P

2.7KHz Spec　RoHS

Frequency Response



applied voltage : 1.5V, square wave : ½ duty,
distance for measurement : 10cm

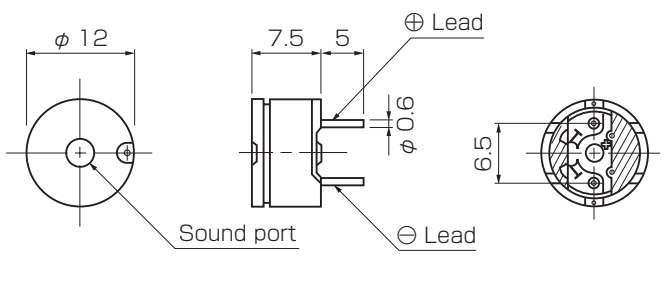
Specifications

Type		QMB-108P
Rated Voltage	(V)	1.5
※ Mean Current Consumption	(mA)	MAX60(TYP51)
Coil Resistance	(Ω)	6.5±1
※ SPL at MIN10cm	(dBA)	MIN85(TYP90)
Rated Frequency	(Hz)	2,743
Operating Voltage	(V)	MAX2
Operating Temperature	(℃)	−20～+60
Storage Temperature	(℃)	−30～+70
Mass	(g)	1.6

※Value applying rated voltage(2,743Hz, ½ duty, square wave)

Dimensions [size : φ12×7.5mm]

unit : mm／housing material : PPE-M



Non-washable

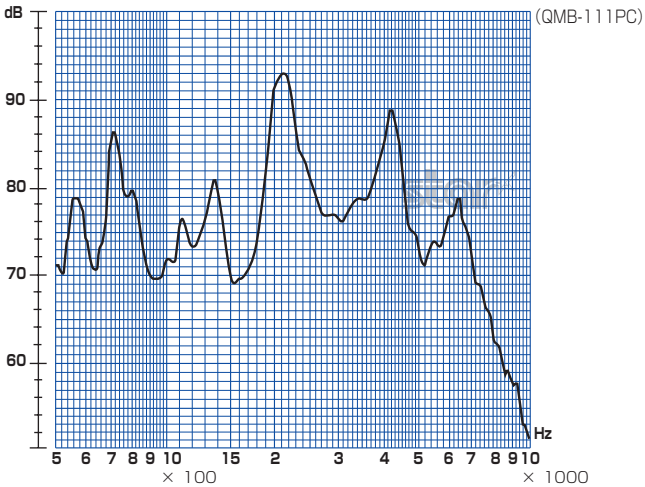
QMB-111 series

QMB-111PN **QMB-111GPN** **QMB-111PC**

※) With lead wire is available (Standard length : 110mm, 60mmPN, GPN type)

Patent RoHS

Frequency Response



applied voltage : 5V, square wave : ½ duty,
distance for measurement : 10cm

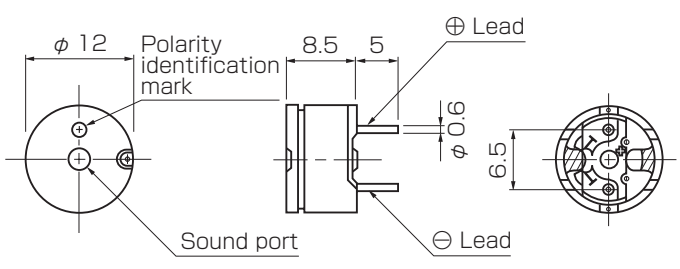
Specifications

Type	QMB-111PN	QMB-111GPN	QMB-111PC
Rated Voltage (V)	1.5		5
※ Mean Current Consumption (mA)	MAX10(TYP8.3)	MAX35(TYP26)	MAX40(TYP31)
Coil Resistance (Ω)	50±7.5	16±4.5	50±7.5
※ SPL at MIN10cm (dBA)	MIN80(TYP87)	MIN85(TYP91)	MIN85(TYP92)
Rated Frequency (Hz)	2,048		2,000
Operating Voltage (V)	MAX2		MAX5
Operating Temperature (℃)	−20～+60		
Storage Temperature (℃)	−30～+70		
Mass (g)	2		

※Value applying rated voltage(rated frequency, ½ duty, square wave)

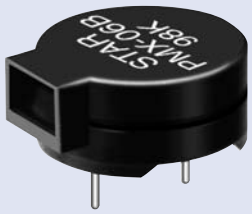
Dimensions [size : φ12×8.5mm]

unit : mm／housing material : PPE-M



Non-washable

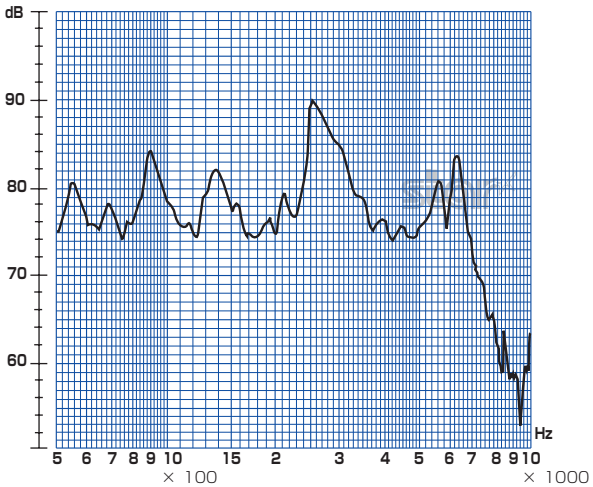
PMX-06 series



PMX-06B

Side Sound Port RoHS

Frequency Response



applied voltage : 1.5V, square wave : ½ duty,
distance for measurement : 10cm

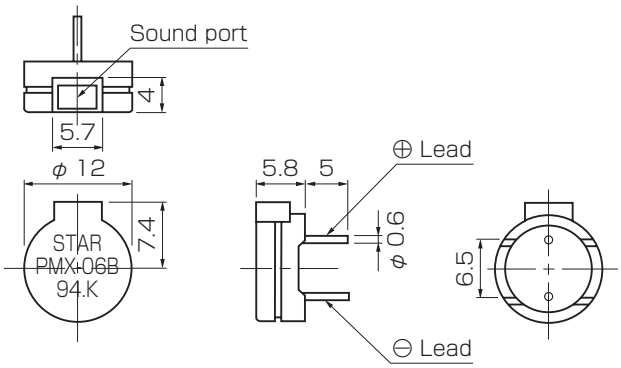
Specifications

Type	PMX-06B
Rated Voltage (V)	1.5
※ Mean Current Consumption (mA)	MAX70(TYP50)
Coil Resistance (Ω)	6.5±1
※ SPL at MIN10cm (dBA)	MIN83(TYP88)
Rated Frequency (Hz)	2,731
Operating Voltage (V)	MAX2
Operating Temperature (℃)	−20～+60
Storage Temperature (℃)	−30～+70
Mass (g)	2

※Value applying rated voltage(2,731Hz, ½ duty, square wave)

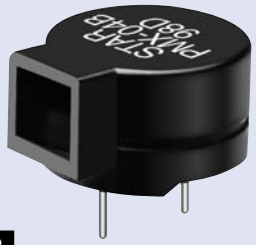
Dimensions [size : φ12×5.8mm]

unit : mm／housing material : PPE-M



Non-washable

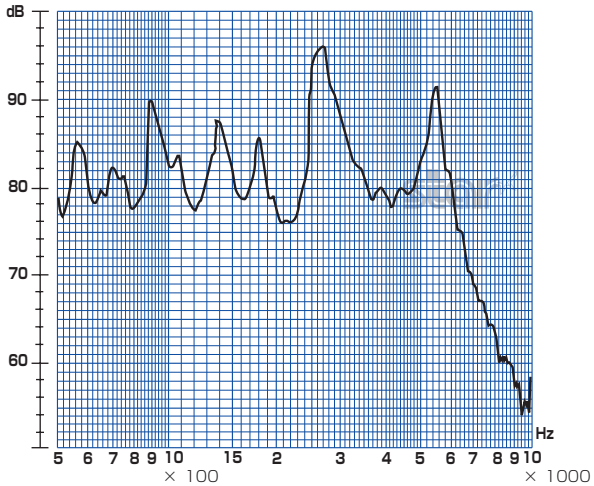
PMX-04B series



PMX-04B

Side Sound Port　RoHS

Frequency Response



applied voltage : 1.5V, square wave : ½ duty,
distance for measurement : 10cm

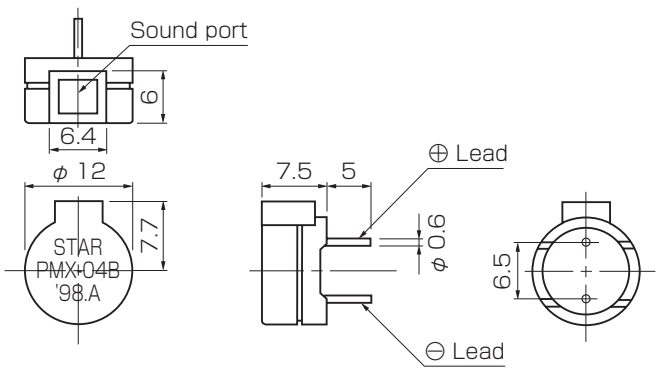
Specifications

Type	PMX-04B
Rated Voltage (V)	1.5
※ Mean Current Consumption (mA)	MAX70(TYP51)
Coil Resistance (Ω)	6.5±1
※ SPL at MIN10cm (dBA)	MIN85(TYP92)
Rated Frequency (Hz)	2,731
Operating Voltage (V)	MAX2
Operating Temperature (℃)	−20～+60
Storage Temperature (℃)	−30～+70
Mass (g)	2

※Value applying rated voltage(2,731Hz, ½ duty, square wave)

Dimensions [size : φ12×7.5mm]

unit : mm／housing material : PPE-M



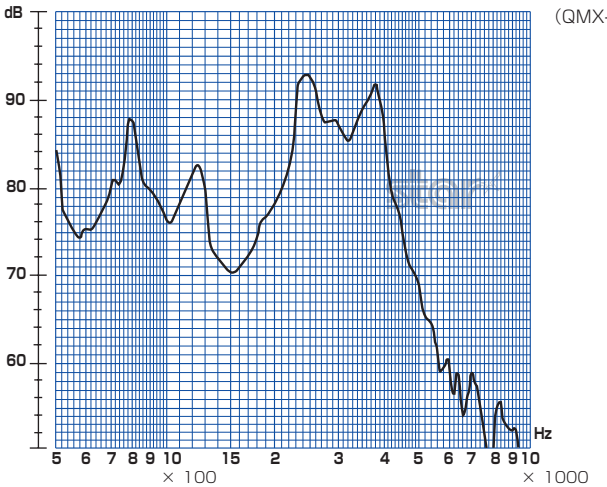
Washable

QMX series

QMX-05 **QMX-12**

Dip | Wide Frequency | RoHS

Frequency Response



applied voltage : 5V, square wave : 1/2 duty,
distance for measurement : 10cm

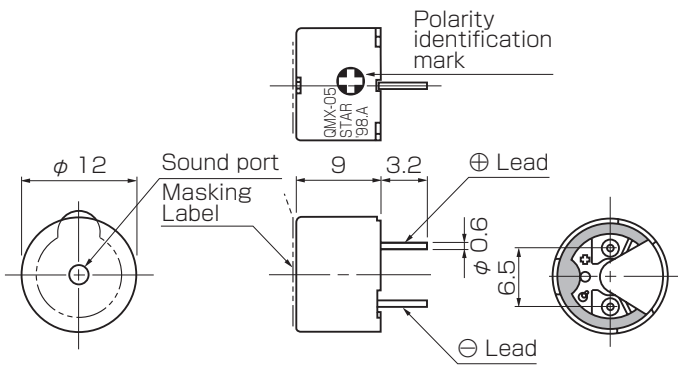
Specifications

Type		QMX-05	QMX-12
Rated Voltage	(V)	5	12
※ Mean Current Consumption	(mA)	MAX40(TYP33)	MAX40(TYP28)
Coil Resistance	(Ω)	47±5	140±14
※ SPL at MIN10cm	(dBA)	MIN85(TYP92)	
Rated Frequency	(Hz)	2,400	
Operating Voltage	(V)	MAX8	MAX15
Operating Temperature	(℃)	−40~+85	
Storage Temperature	(℃)	−40~+85	
Mass	(g)	2	

※Value applying rated voltage(2,400Hz, 1/2 duty, square wave)

Dimensions [size : φ12×9mm]

unit : mm／housing material : PPE-M



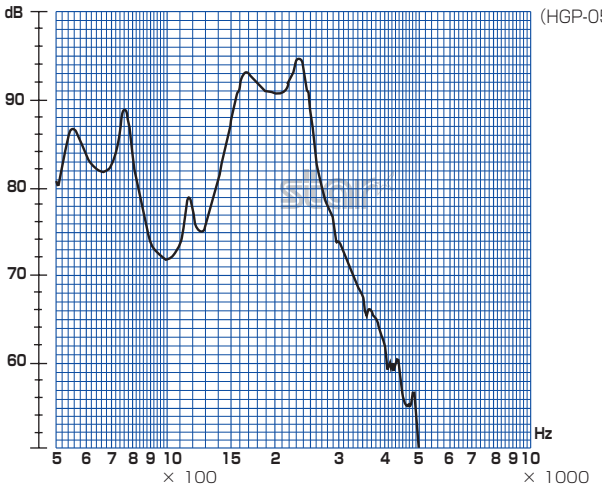
Washable

HGP series

HGP-05AM **HGP-12AM**

Dip | Wide Frequency | Low | Case Color : blue | Patent | RoHS

Frequency Response



applied voltage : 5V, square wave : 1/2 duty,
distance for measurement : 10cm

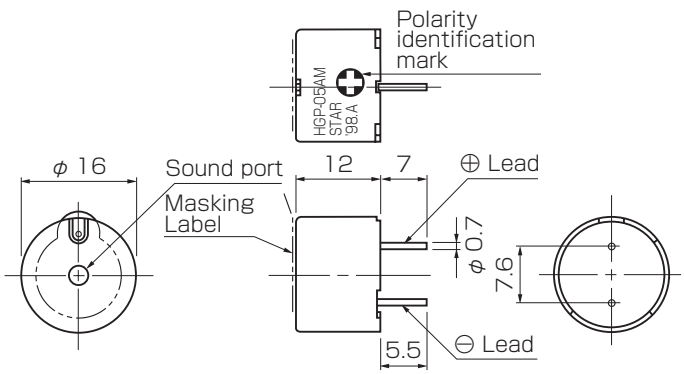
Specifications

Type		HGP-05AM	HGP-12AM
Rated Voltage	(V)	5	12
※ Mean Current Consumption	(mA)	MAX70(TYP55)	MAX50(TYP30)
Coil Resistance	(Ω)	28±6	135±20
※ SPL at MIN10cm	(dBA)	MIN85(TYP90)	MIN85(TYP91)
Frequency Band	(Hz)	1,700~2,200	
Operating Voltage	(V)	MAX8	MAX15
Operating Temperature	(℃)	−40~+90	
Storage Temperature	(℃)	−40~+100	
Mass	(g)	4	

※Value applying rated voltage(2,000Hz, 1/2 duty, square wave)

Dimensions [size : φ16×12mm]

unit : mm／housing material : PPE-M



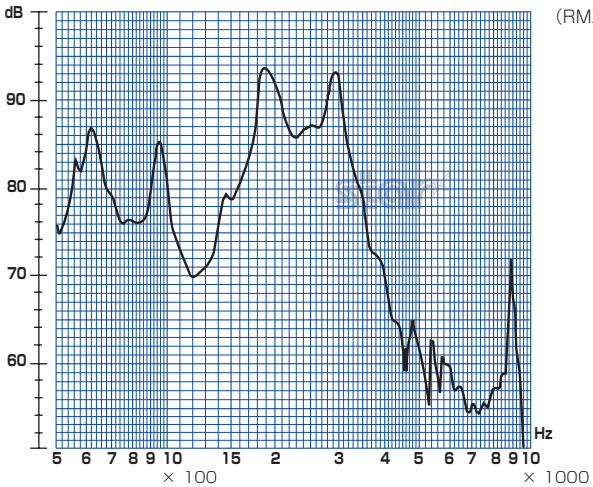
Washable

RMX series

RMX-06 **RMX-12Y**

Dip | Wide Frequency | RoHS

Frequency Response



applied voltage : 6V, square wave : ½ duty,
distance for measurement : 10cm

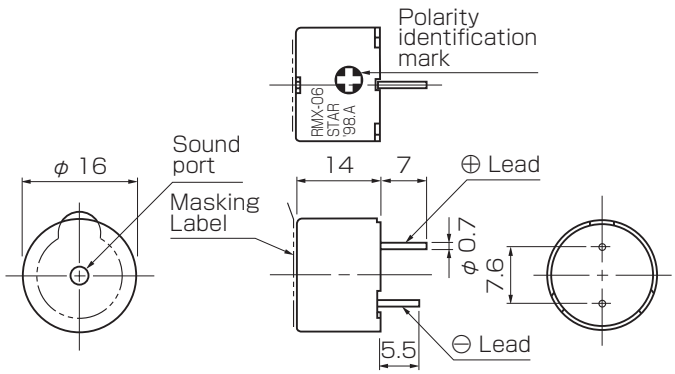
Specifications

Type		PMX-06	PMX-12Y
Rated Voltage	(V)	6	12
※ Mean Current Consumption	(mA)	MAX40(TYP33)	MAX40(TYP32)
Coil Resistance	(Ω)	45±7	115±17
※ SPL at MIN10cm	(dBA)	MIN85(TYP93)	MIN85(TYP96)
Frequency Band	(Hz)	2,048	
Reproduced Frequency	(Hz)	2,000~3,000(80dB以上)	
Operating Voltage	(V)	MAX12	MAX18
Operating Temperature	(℃)	−40~+85	
Storage Temperature	(℃)	−40~+85	
Mass	(g)	5	

※Value applying rated voltage(2,048Hz, ½ duty, square wave)

Dimensions [size : φ16×14mm]

unit : mm／housing material : PBT



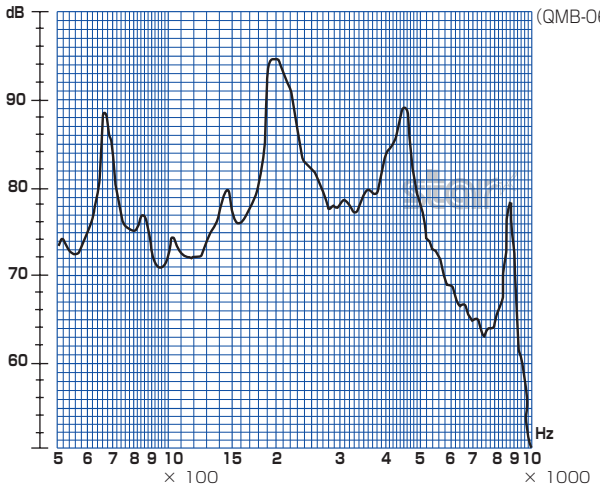
Washable

QMB series

QMB-06S/L **QMB-12S/L**

Dip | RoHS

Frequency Response



applied voltage : 6V, square wave : ½ duty,
distance for measurement : 10cm

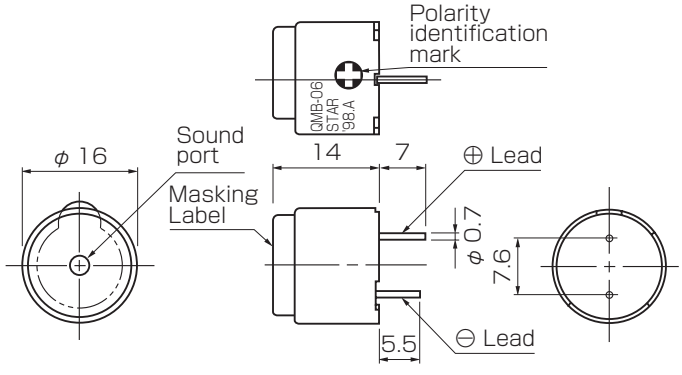
Specifications

Type		QMB-06S/L	QMB-12S/L
Rated Voltage	(V)	6	12
※ Mean Current Consumption	(mA)	MAX40(TYP35)	MAX40(TYP32)
Coil Resistance	(Ω)	47±7	115±17
※ SPL at MIN10cm	(dBA)	MIN85(TYP94)	MIN85(TYP97)
Rated Frequency	(Hz)	2,048	
Operating Voltage	(V)	MAX12	MAX18
Operating Temperature	(℃)	−40~+100	
Storage Temperature	(℃)	−40~+100	
Mass	(g)	7	

※Value applying rated voltage(2,048Hz, ½ duty, square wave)

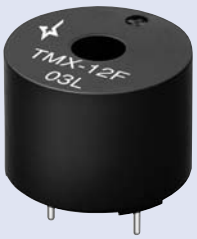
Dimensions [size : φ16×14mm]

unit : mm／housing material : PPE-M



Washable

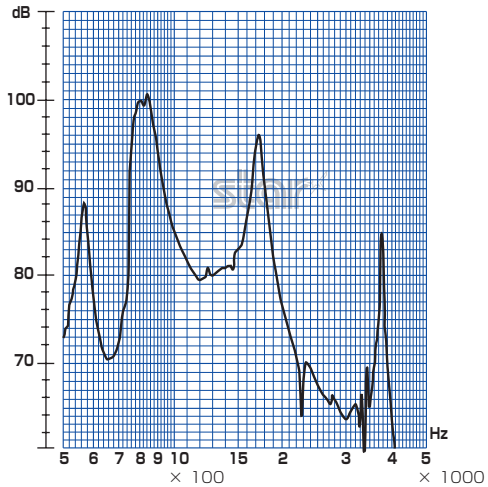
TMX-F series



TMX-12F

Dip | High SPL | Patent | RoHS

Frequency Response



applied voltage : 12V, square wave : ½ duty,
distance for measurement : 10cm

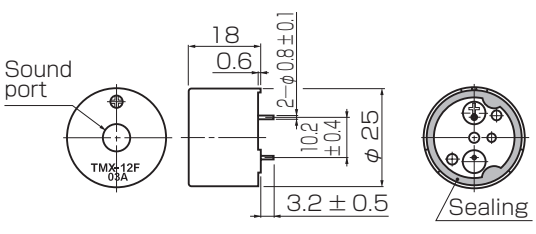
Specifications

Type		TMX-12F
Rated Voltage	(V)	12
※ Mean Current Consumption	(mA)	MAX40
Coil Resistance	(Ω)	180±25
※ SPL at MIN10cm	(dBA)	MIN95(TYP99)
Rated Frequency	(Hz)	850
Operating Voltage	(V)	MAX16
Operating Temperature	(℃)	−40～+85
Storage Temperature	(℃)	−40～+120
Mass	(g)	9

※Value applying rated voltage(850Hz, ½ duty, square wave)

Dimensions [size : φ25×18mm]

unit : mm／housing material : PPE-M



Washable

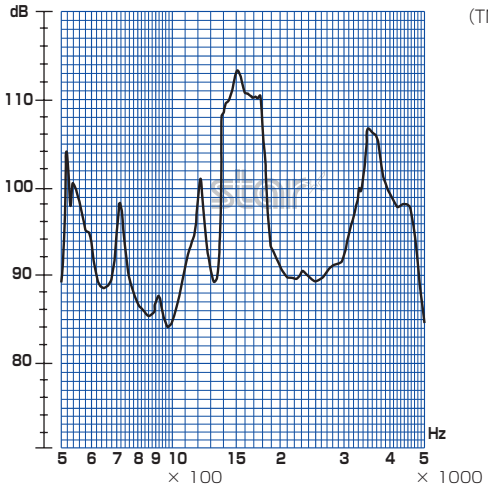
TMX-H series

TMX-03H **TMX-05H** **TMX-12H**

Dip | High SPL | Patent | RoHS

Frequency Response

(TMX-03H)



applied voltage : 12V, square wave : ½ duty,
distance for measurement : 10cm

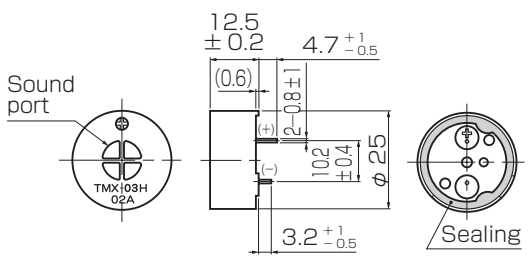
Specifications

Type		TMX-03H	TMX-05H	TMX-12H
Rated Voltage	(V)	3.6	5	12
※ Mean Current Consumption	(mA)	MAX300	MAX80	MAX55
Coil Resistance	(Ω)	4.5±0.5	30±5	120±15
※ SPL at MIN10cm	(dBA)	MIN106(TYP110)	MIN104(TYP110)	
Rated Frequency	(Hz)	1,500		
Operating Voltage	(V)	MAX5	MAX6	MAX16
Operating Temperature	(℃)	−40～+80	−40～+85	
Storage Temperature	(℃)	−40～+80	−40～+120	
Mass	(g)	9		

※Value applying rated voltage(1,500Hz, ½ duty, square wave)

Dimensions [size : φ25×12.5mm]

unit : mm／housing material : PPE-M (TMX-03H)



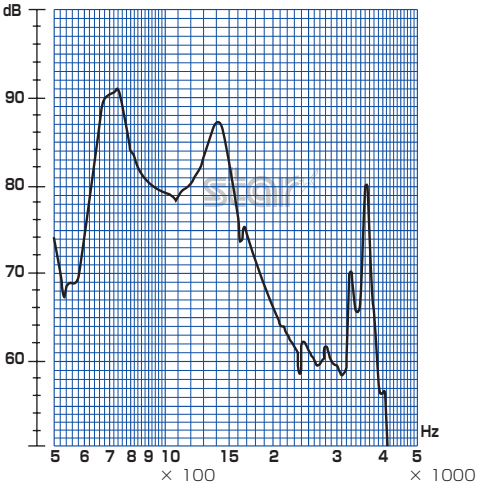
Washable

TMX-A3 series

TMX-05A3

Dip | Low Frequency | Patent | RoHS

Frequency Response



applied voltage : 5V, square wave : ½ duty,
distance for measurement : 10cm

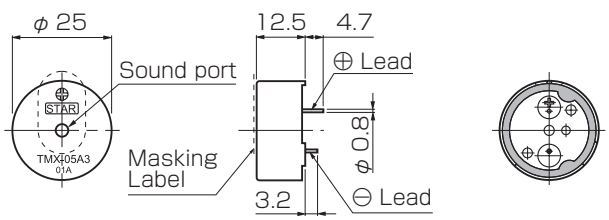
Specifications

Type	TMX-05A3
Rated Voltage (V)	5
※ Mean Current Consumption (mA)	MAX80
Coil Resistance (Ω)	30±4
※ SPL at MIN10cm (dBA)	MIN85(TYP89)
Rated Frequency (Hz)	730
Operating Voltage (V)	MAX5
Operating Temperature (℃)	−40～+85
Storage Temperature (℃)	−40～+85
Mass (g)	9

※Value applying rated voltage(730Hz, ½ duty, square wave)

Dimensions [size : φ25×12.5mm]

unit : mm／housing material : PPE-M



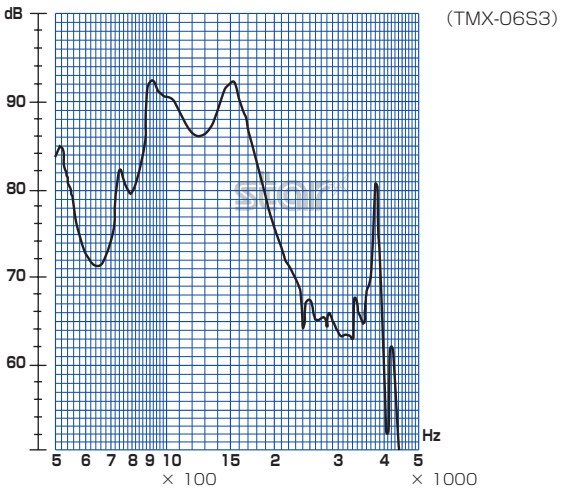
Washable

TMX-S3 series

TMX-06S3 **TMX-12S3**

Dip | Low Frequency | Patent | RoHS

Frequency Response



applied voltage : 6V, square wave : ½ duty,
distance for measurement : 10cm

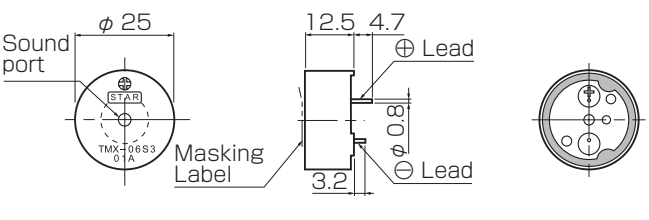
Specifications

Type	TMX-06S3	TMX-12S3
Rated Voltage (V)	6	12
※ Mean Current Consumption (mA)	MAX75	MAX55
Coil Resistance (Ω)	36±5	120±15
※ SPL at MIN10cm (dBA)	MIN85(TYP90)	
Rated Frequency (Hz)	1,000	
Operating Voltage (V)	MAX8	MAX14
Operating Temperature (℃)	−40～+85	
Storage Temperature (℃)	−40～+85	
Mass (g)	9	

※Value applying rated voltage(1,000Hz, ½ duty, square wave)

Dimensions [size : φ25×12.5mm]

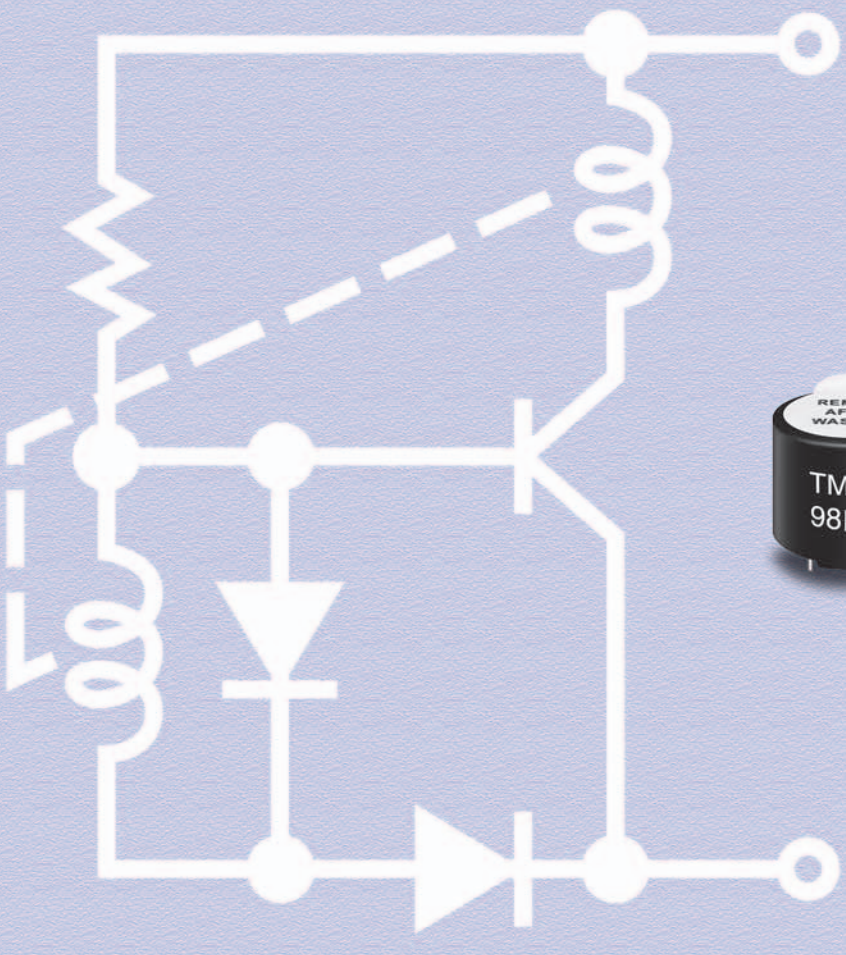
unit : mm／housing material : PPE-M



Magnetic Buzzer

(Self-contained drive circuitry)

Electric Sound type



Electric Sound type (Washable)

TMB series

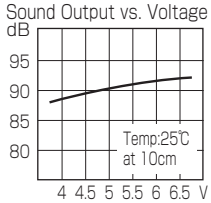
TMB-05 **TMB-12**

Dip | Low Consumption | RoHS

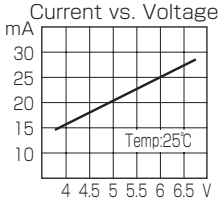
Characteristics

(TMB-05)

Sound Output vs. Voltage

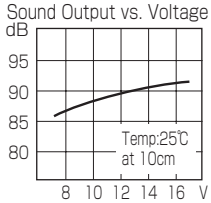


Current vs. Voltage

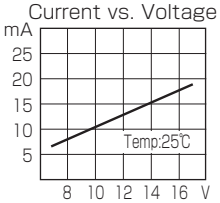


(TMB-12)

Sound Output vs. Voltage



Current vs. Voltage



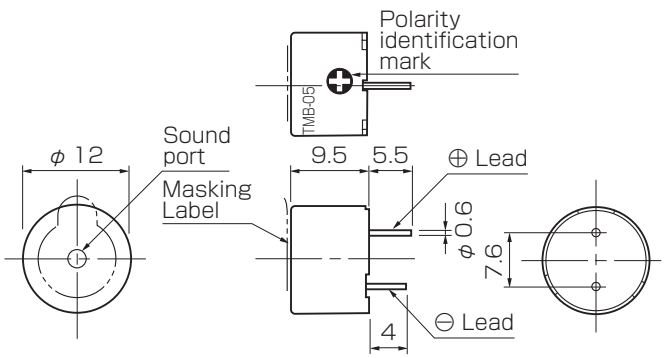
Specifications

Type		TMB-05	TMB-12
Rated Voltage	(V)	5	12
Operating Voltage	(V)	4~6.5	8~16
※ Mean Current Consumption	(mA)	MAX30(TYP22)	MAX30(TYP15)
※ SPL at MIN10cm	(dBA)	MIN85(TYP90)	
※ Basic Frequency	(Hz)	2,300±300	
☆ Response Time	(msec)	MAX50	
Operating Temperature	(℃)	−40~+85	
Storage Temperature	(℃)	−40~+85	
Mass	(g)	2	

※Value applying rated voltage ☆Value applying min. operating voltage

Dimensions [size : φ12×9.5mm]

unit : mm／housing material : PPE-M (※)Longer pin is (+) polarity



Electric Sound type (Washable)

HMB series

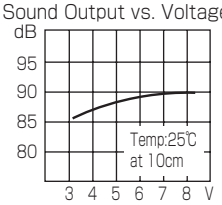
HMB-06 **HMB-12**

Dip | Low Consumption | RoHS

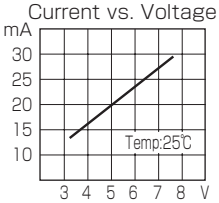
Characteristics

(HMB-06)

Sound Output vs. Voltage

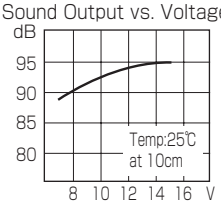


Current vs. Voltage

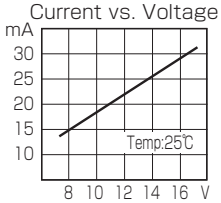


(HMB-12)

Sound Output vs. Voltage



Current vs. Voltage



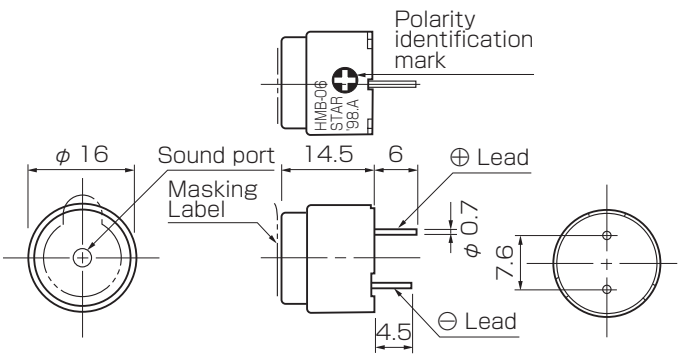
Specifications

Type		HMB-06	HMB-12
Rated Voltage	(V)	6	12
Operating Voltage	(V)	4~7	8~16
※ Mean Current Consumption	(mA)	MAX30(TYP27)	MAX30(TYP25)
※ SPL at MIN10cm	(dBA)	MAX85(TYP90)	MAX85(TYP91)
※ Basic Frequency	(Hz)	2,200±300	
☆ Response Time	(msec)	MAX50	
Operating Temperature	(℃)	−40~+85	
Storage Temperature	(℃)	−40~+85	
Mass	(g)	5	

※Value applying rated voltage ☆Value applying min. operating voltage

Dimensions [size : φ16×14.5mm]

unit : mm／housing material : PPE-M (※)Longer pin is (+) polarity



Technical Data

■Technical data

MAGNETIC SOUNDER

Various Types of Magnetic Sounder Buzzers

Acoustic components generally referred to as buzzers can be classified as ① magnetic sounders, ② electric sound type buzzers, ③ vibrating hammer type buzzers, ④ piezoelectric buzzers, and ⑤ piezoelectric sounders. Star Micronics produces ①, ②, and ③ in our product line. A sounder issues sound by inputting specific electric signals from outside. Therefore, it is necessary to provide an oscillating circuit when utilizing a sounder. A buzzer (electric sound type buzzers, vibrating hammer type buzzers), meanwhile, incorporates a sounder and an oscillating circuit within, so it produces sound only when direct current is applied to it.

Structure and Operating Principle of Magnetic Sounders

The structure of a magnetic sounder is shown in Fig. 1. The operating principle of a magnetic sounder is herein described, based on this figure. The magnetic flux from a magnet produces a bias magnetic field at the tip of the iron core, drawing a diaphragm toward itself by a suitable force. If electric signals (for example, rectangular-shaped voltage with a frequency of 3.2 KHz and 1.5 Vo-p) coming intermittently at a fixed frequency from an external oscillating circuit are input, an electric current will intermittently flow through the coil, generating an intermittent magnetic field at the tip of the iron core.

The magnetic field drives the diaphragm up and down, generating the sound pressure corresponding to the amplitude of the diaphragm. This sound pressure is further multiplied by the resonance effect of the resonator installed on the case. Each product is designed and adjusted based on resonance frequency (fo) and resonance frequency (fv), so that excellent performance is obtained at the standard frequency. Accordingly, the functional composition of a magnetic sounder can be divided into the magnetic circuit unit, and the resonance unit. (Fig. 1)

Characteristics

■Measuring Circuit

We at Star Micronics input electric signals of a specific frequency to a magnetic sounder, using the measuring circuit shown in Fig. 2, to measure the characteristics of the sounder.
Please use this information in measuring your sounders and arranging driving circuits. (Fig. 2)

■Frequency Characteristics

A magnetic sounder emits sound based on the frequency of the electric signals input, and it is the frequency characteristics that determine what degree of sound is caused in relation to input frequency. Frequency characteristics are generally shown as a graph that indicates results of measurement at the sound pressure level (SPL) 10 cm in front of the magnetic sounder, while changing the frequency of input signals from 500 Hz to 10 KHz at the rated voltage. They are referred to as sound pressure level frequency characteristics.

In this catalog. the representative value of the frequency characteristics for each product is shown for reference. Use these values for product selection to match the purpose and input conditions for use, while nothing their difference. Frequency characteristics shown in the catalog are those at a time when rectangular waves (Vo-p) are input. When input is in the form of rectangular waves (Vp-p), sine waves, etc., frequency characteristics will be different. Attention should be paid to this point.

■Reverse Connection

There is polarity in magnetic sounder input. Even if a reverse-polarity connection is made, sound is produced, but it is not certain that sound pressure specifications will be satisfied. In the case of a reverse connection, the operating direction of the magnetic field will change (attraction ⟨=⟩ repulsion), and resonance frequency (fo) will after, so it is possible that sound pressure at the standard frequency will decline or deviation will become larger.

■Frequency characteristics caused by voltage changes

There may be cases in which a magnetic sounder is used at voltages other than the rated voltage. Note that frequency characteristics stated in the catalog are those at the time of the rated voltage. Frequency characteristics during input at voltage other than the rated voltage changes as shown in Fig. 3. As input voltage becomes lower, resonance frequency (fo) of the magnetic sounder rises; as input voltage becomes higher, fo reduces. Because resonance frequency (fv) of the resonator does not change in relation to voltage, the frequency band becomes narrow when voltage is low, while the band widens to the low frequency side when voltage is high. If voltage is too low, fo may rise above the standard frequency, causing a substantial reduction of sound pressure. (Fig. 3)

■Average consumption current

The average consumption current (mA), as set forth in the catalog, is described in the form of MAX.OO. This means that, if the rated voltage is applied without limiting electric current, the average current value will not surpass OOmA. Be careful, as it is not meant that electric current exceeding OOmA must not be applied to the product. In reality, maximum current 2 to 3 times higher than the average current is required as peak current. Therefore, a driving current that can supply sufficient current should be provided. If the peak current is restricted, there can be a case in which sound pressure will not be output as specified.

(Example) In the case of QMB-111PN, whose average current is MAX. 10mA, prepare a driving circuit that can supply the peak current of at least 30mA.

Fig. 1 Construction view of QMX series

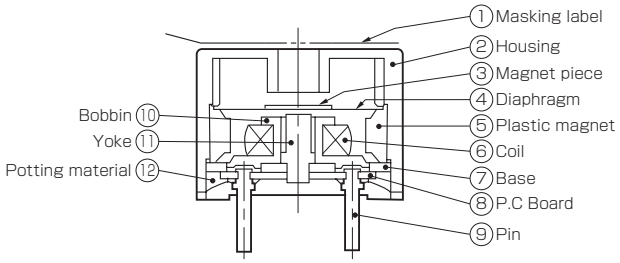


Fig. 2 Measuring Circuit
Our standard circuit for measurement is as shown below:
(VCE=0.15 volts or lower)

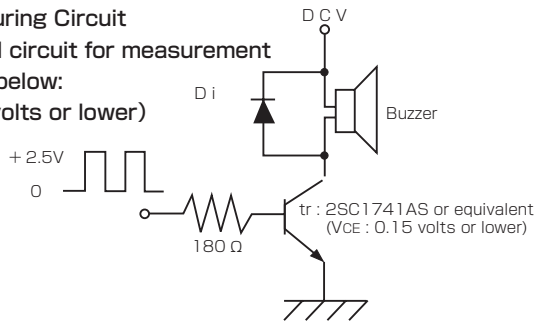
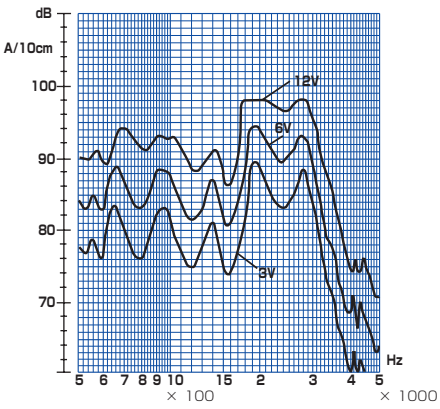
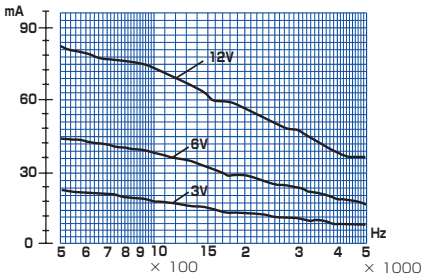


Fig. 3





Resonance Effect of Helmholtz

Sounders are usually built into equipment and used in that state. At that time, users may have various needs, such as "raising sound pressure" or "widening the frequency band." By installing a resonator on the case in which the sounder is contained, etc., it is possible to make sound characteristics closer to these requirements. On this occasion, the "resonance effect of Helmholtz," which can be used for reference purposes, is hereby introduced. To improve the characteristics,, it is possible to widen the frequency band or to raise the sound pressure of the standard frequency or desired frequency by setting the resonance frequency (fv) of the external resonator for the sounder use at a level slightly higher than double the standard frequency, a desired frequency close to it, or the consonance frequency (fo) of the sounder. The resonance effect formula of Helmholtz shown in Fig. 4 represents a theoretical formula that demonstrates the relationship between fv of the external resonator and the size of the resonator. Because the effect of the resonator incorporated in the sounder is not included, it is necessary to take the acoustic combination with the resonator of the sounder in actual setting. The usual method is to incorporate the sounder in the real body of the external resonator and adjust its sound emission hole, etc.,while considering the value, calculated through the formula, and to seek optimization. (Fig. 4)

〈Example of Execution (Experiment)〉

The degree of improvement in the characteristics attained through the addition of a resonator to the outside of the sounder is explained, using the results of an experiment employing the sounder QMB-105P. The standard frequency of this product is 2,048 Hz, while sound pressure specification for the product as a signal unit is min 70 dB (typical 77 dB) in terms of sound pressure at 10 cm. (Fig. 5) Because this sounder has only a small space in front of the diaphragm, it does not have resonance frequency (fv). Therefore, it was considered that, even if it is incorporated, little effect will arise on the external resonator, because its space capacity is small. Dimensional conditions for the external resonator, shall be in accordance with Fig. 6. (Fig. 5 and Fig. 6)

1. Expansion of the band

In order to widen the frequency band to be used to 2,048 Hz - 2,700 Hz, it is considered to set fv for the external resonator in Fig. 6 at around 2,700 Hz.
The theoretical diameter of the sound release hole, obtained by solving the relational expression in Fig. 4, is: D=1.7mm. If the value is slightly reduced to D=1.5mm, for subsequent fine adjustment, the theoretical fv based on the relational expression becomes 2,460 Hz. The fv value resulting from real measurement arises at 1,700 Hz because of the effect of the signal-unit characteristics of the sounder.
The actual measurement value will be equal to the characteristics shown in Fig. 7. Thus, compared with the signal unit case, the frequency band will be expanded. (Fig. 7)

2. Paising the sound pressure

To increase the sound pressure of the standard frequency of 2,048 Hz above that of the single unit, fv for the external resonator in Fig. 6 is assumed to be set at 4,100 Hz, which is twice the standard frequency. If D=3.3 is assumed, the theoretical fv based on the relational expression 4,270 Hz. The fv value resulting from real measurement, however, will generate at around 4,000 Hz due to the single-unit effect, etc., of the sounder.

The real measurement value proves to be as shown in Fig. 8, and it is clear that the sound pressure level at 2,048 Hz is higher than for the single unit. In this case, however, the sound is audibly high-pitched, because the second harmonic portion will increase.
Based on the aforementioned experimental example, the resonance effect of Helmholtz and its significance are believed to be understood.
Points of attention in setting an external resonator are as follows. ① if the sounder has a resonator of its own, there is a possibility that the theoretical value of the relational expression in Fig. 4 and the real measurement value will be substantially different, as the resonator or the sounder and the external resonator combine acoustically. In this case, it is necessary to adjust the actual equipment of the external resonator, attaining optimization. ② To ensure the resonance effect of the resonator, it is necessary to reduce the sound resistance of the sound emission hole. If the sound emission hole of the external resonator is reduced too much, however, it is possible that no satisfactory outcome will be produced, even if the same frequency is set.

If sufficient resonance space cannot be secured for the external resonator, open a sound issuance hole, a size at least equal or larger than the sound emission hole, of the sounder on the equipment case, to ensure satisfactory characteristics for the single unit of the sounder, then operate the equipment.

Fig. 4

$$fv = \frac{CD}{4}\sqrt{\frac{1}{\pi V(L+0.75D)}}$$

Where
fv : resonant frequency of resonator [Hz]
V : volume of resonance chamber [mm³]
D : diameter of sound emission hole [mm]
L : depth of sound emission hole [mm]
C : speed of sound = approx. 344000 [mm/sec]

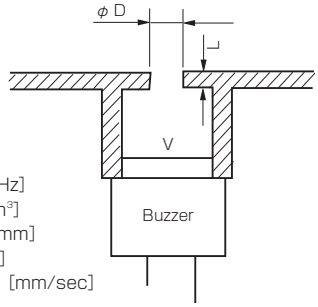


Fig. 5 Frequency response without additional resonator

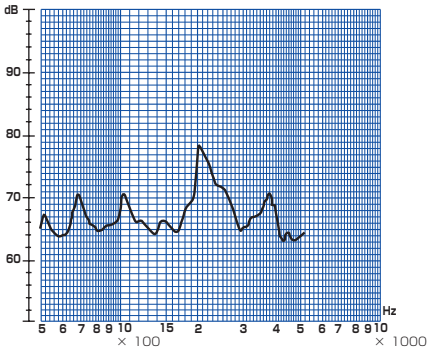


Fig. 6 Geometrical conditions

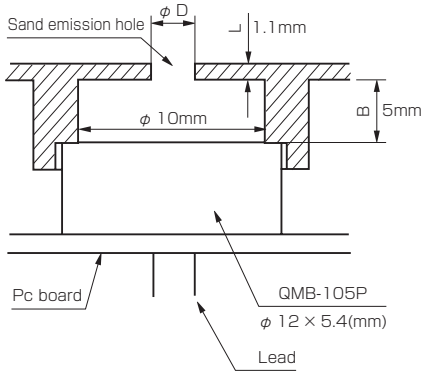


Fig. 7 Frequency response with resonator (Design Ⅰ)

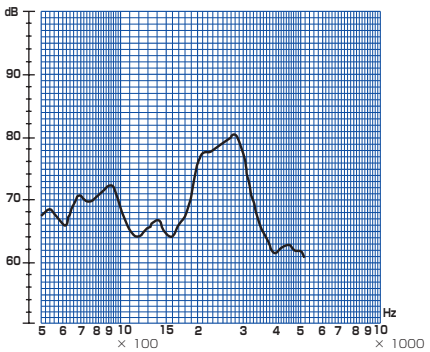
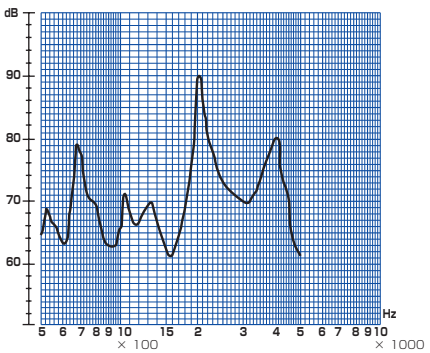


Fig. 8 Frequency response with resonator (Design Ⅱ)



MAGNETIC BUZZER (SELF-CONTAINED DRIVE CIRCUIT)

■ELECTRIC SOUND TYPE BUZZER

Fig. 1 Cut -away view of type TMB

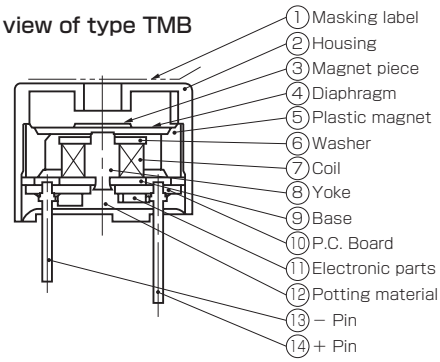
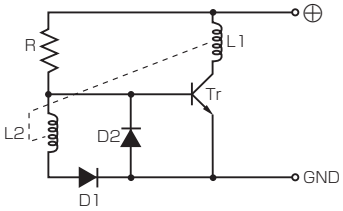
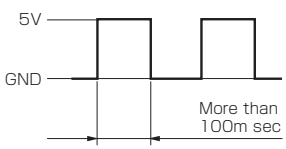


Fig. 2 Circuit diagram of type TMB



■RESPONSE TIME

Fig. 3 Response time



OPERATION PRINCIPLES AND CONSTRUCTION

■ELECTRIC SOUND TYPE BUZZER

These types of electro magnetic buzzers (as pictured in Fig. 1) contain coils which are would in such a manner to produce L1 for driving, and L2 for feedback purposes (as shown in Fig. 2). When current flows through coil L1 and the diaphragm begins to vibrate, coil L2 detects its vibration, providing feedback to the base of the transistor so that the oscillation becomes synchronized with the vibration of the diaphragm.

CHARACTERISTICS

■RESPONSE TIME

The buzzer will take a certain time to produce a sound at its fundamental frequency with its built-in driver. The time required to generate a sound after application of a rated voltage in the respective specifications as a response time. In case it is intended to use the buzzer for producing a pulsed sound output, it must be designed with special attention on the response time. It is recommended to apply the voltage at least for a time twice as much as the response time specified.(Fig. 3)

〈Example〉
For an intermittent operating of the buzzer TMB whose response time is specified as 50 ms, it is recommended to apply the voltage for at least 100 ms.

■Mean Current Consumption

Excessive restriction in the current fed to Miniature audio transducers and Low-pitched buzzers will adversely affect the oscillation and may result in no sound generation. It is therefore required to design the circuit to supply the current sufficient for the peak current needed to generate a sound, two of three times as much as the averagedly consumed current (See Page 4.)

Fig. 4 EX.1 : Fulcron of diaphragm is unstable

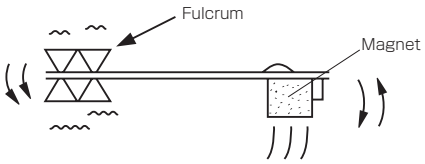


Fig. 5 EX.2 : Fulcron of diaphragm is unstable

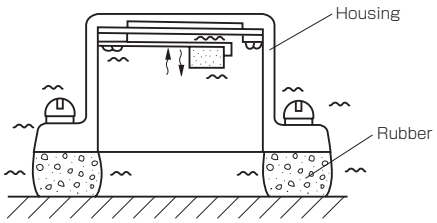
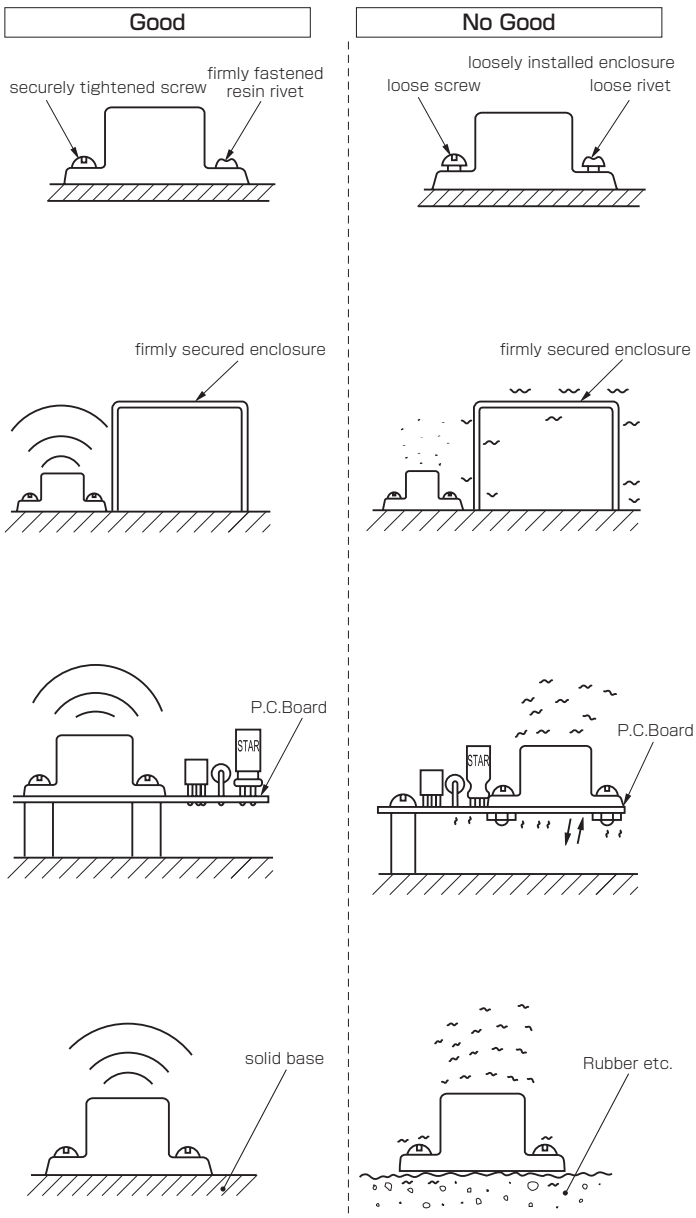


Fig. 6 SUGGESTED INSTALLATION



Buzzer Attachment

Synchronization of a circuit-embedded-type buzzer starts when initial oscillations of the diaphragm (a cantilever diaphragm in the case of an electronic buzzer) are returned to the oscillation circuit by the coil L2. If initial oscillations are disturbed or absorbed, therefore, return will not be sufficiently implemented, so stable synchronization will not be realized; this will be the cause of little sound or non-issuance of sound. The disturbing or absorption of initial oscillations is liable to occur when the supporting point of the diaphragm easily vibrates, absorbing the oscillation of the tip of the diaphragm, as shown in Figure 9. If this is translated to the buzzer attachment state, it is tantamount to the condition in which initial oscillations of a diaphragm, when it is fitted to a soft object, such as rubber, are absorbed by the rubber. Accordingly, attention should be paid to the following points in attaching a buzzer:

(1) **Fix the buzzer firmly.**

(2) **Make sure that the object to which the buzzer is fitted is hard to oscillate.**

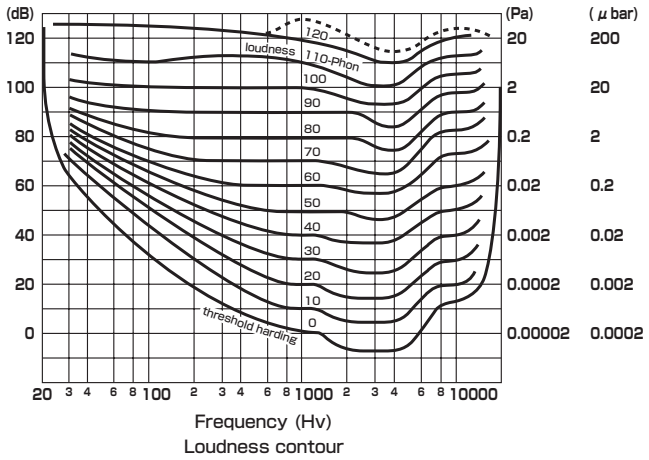
(3) **Make sure that, near the buzzer, there is no object that can be oscillated easily.**

Even if the aforementioned three requirements are satisfied, it does not guarantee there will be no problems. Namely, initial oscillations of the buzzer are absorbed, and synchronization becomes unstable, if the object to which the buzzer is fixed or items around the buzzer have the same resonance frequency as the diaphragm of the buzzer (resonant conditions), or if these conditions are caused by the fitting method. This situation can be rectified by eliminating resonant conditions through changing the fitting or other conditions. Fig. 11 demonstrates examples of good and bad fitting conditions. (Fig. 4, Fig. 5, and Fig. 6)

■Power Source Ripples

If ripples occur on voltage applied to the buzzer, oscillation of the oscillation circuit unit or the frequency of return will be disturbed. This, in turn, will make synchronization with the resonance frequency and synchronized ringing itself unstable, causing the reduction or non-issuance of sound. As for the size of ripples, effects will appear beginning at around 50 mV.
Although, in some cases, the problem can be solved by linking the capacitor with the buzzer in series and smoothing out ripples, it is necessary to make sure that the circuit can provide stable voltage.

SOUND PRESSURE & TONE



Loudness contour

dB AND PHON

1. Sound pressure level is referred to as Sound Output and rated in dB (decibel). DB is defined as the sound pressure level in logarithmic ratio to a sound pressure on the basis of the minimal sound pressure (20 μPa) whose 1 KHz sound that a person in good condition can hear out. The sound pressure level is calculated as shown below in measuring an unspecified sound pressure P (μPa).

Sound pressure level (dB) = 20 log (P/0.0002)

2. The term phon is a unit which describes loudness level as is the case of the decibel. Generally, even the sound level being equal, it is hard for us to hear out the sound clearly due to frequencies. "Loudness contour" is a statistically calculated collection comprising sounds of the same loudness with every frequency based on the 1 KHz sound.
   The phon is formed through corrections of the sound pressure levels, basing the contour.

   For measurement of the sound pressure, the sound level meter possessing the A weighting is employed, which shows relatively corrected values in accordance with the loudness contour. This way the term dB is considered to be phon in specifications.

The formula is :

B=A+20 log(La/Lb)

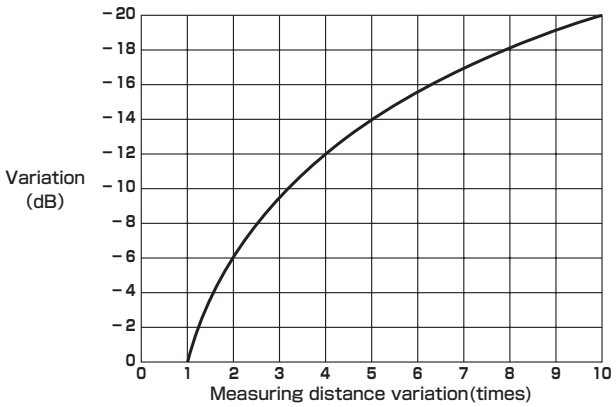
A : sound pressure value at distance La
B : sound pressure value at distance Lb

The table below is to shape up relations between the measuring distance variation and the sound pressure variation for reference.

Measuring distance variation	2 times	3 times	4 times	5 times	6 times	7 times	8 times	9 times	10 times
Sound presure variation (db)	−6.02	−9.54	−12.04	−13.98	−15.56	−16.90	−18.06	−19.08	−20.00

■SOUND PRESSURE AND DISTANCE

As there are differences in the measuring distances when manufacturers make the measurement of sound pressure, the following formula is recommended for calculation on occasions when a buzzer itself is tested or compared with a planned finished product.
However, as for as the calculated is concerned, it is a theoretical one and therefore subject to change, depending upon circumstances and conditions.



〈Example〉 10cm : 80dB → 30cm : 80−9.54=70.46(dB)

Fig. 1 SMB type FFT analysis

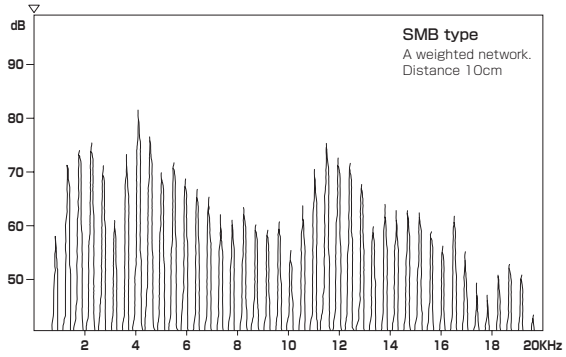


Fig. 2 HMB type FFT analysis

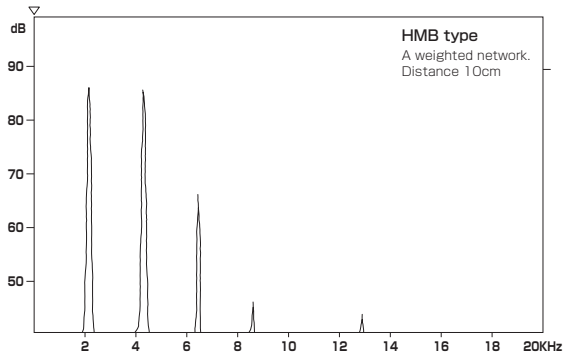
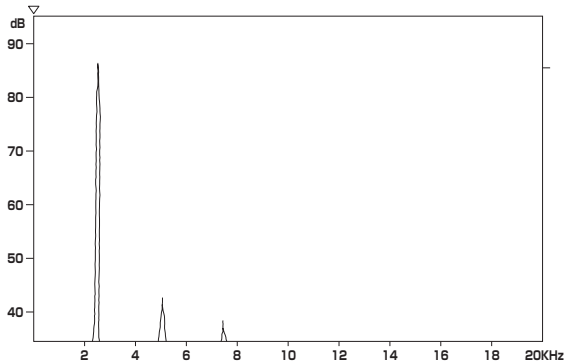


Fig. 3 Piezo type FFT analysis



TONE

The tone output, generated by buzzers, is essential in product design. A recommended way of selecting a desired tone is by listening to the different tones produced by the different buzzer. Additionally, FFT analysis is usuable for visual tone selection method. The sound is not an oscillation of a single frequency, but as a collected body of individual frequencies. The analysis is to diagnose the ratio of constituent frequencies. The following is a sample analysis of our typical buzzer.

① Low pitched buzzer (e.g. SMB type)

As observed in Fig. 1, all frequency elements are evenly included within the audio frequency range in which we can hear out, ranging from approx.20 Hz, and the "beep" sound is produced. As an advantage this tone is easily heard out by the aged and persons having difficulty in hearing (they are said to be weak in listening to high frequencies), and also can be followed without being affected under noisy surroundings. Therefore, the tone is more suitable for alarm, no to mention, the continuous sound can be more effective in emergency situations. Since electro magnetic transducers and piezoelectric transducers catch attention with a single sound at the start, however, in the long run, reduce warning effects after lengthy sounding tend to be converted into intermittent sound producing products.

② Transducer with drive circuit (e.g. HMB type)

Transducer with drive circuit (e.g. HMB type) & without drive circuit Fig. 2 shows how the peep sound is composed of a collected body of the fundamental frequency and its integer fold frequencies. This sound composed of integer fold frequencies is generally refereed to as a single sound which has a clearer tone than the low pitched buzzers have.

③ Piezoelectric transducer

The transducer produces the peep sound closer to the pure sound, which is composed of almost the fundamental frequency. Compared with the transducer, it is likely to sound relatively less mellow.(Fig. 3)

SOLDERING • SUPPORT SERVICE

SOLDERING AND WASHING

■Soldering conditions

The sealed miniature sound transducers by Star should not be exposed to extremely high temperatures for prolonged periods of time. As excessive heat will degrade the sealing performance of the unit, soldering should be conducted as quickly as possible.

Recommended temperature and time for soldering	
250℃	within 5 seconds
350℃	within 1.5 seconds

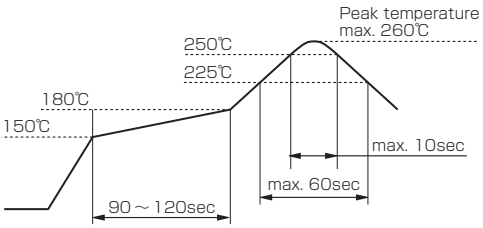
■Dip soldering

Dip soldering may be conducted only in the case of washable products. As for non washable products, dip soldering should not be implemented.

■Recommended reflow oven temperature profile for reflowable transducers

●Recommended temperature profile for lead-free solder

All reflow type buzzer is available by the following condition.



■Washing :

●Washable type transducers.

Along with other electronic components, these transducers may be washed with cleaning solvents after the soldering process. However, some types of solvents can be harmful to these devices.

●Non washable type transducers.

Most cleaning solvents will be damaging to these devices, therefore wave soldering & washing should be avoided.

■FLUX REMOVING SOLVENTS

In view of the recent requirement for total elimination of ozone-depleting chemicals, we recommend our customers to use deionized water for their cleaning process at the conditions given below, instead of CFC that conventionally used.

(Condition for cleaning)

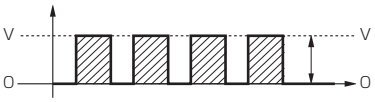
Cleaning solvent ·····	Deionized water
Solvent temperature ···	55±5℃
immersion time ·····	5±0.5 minutes

※Please contact us if there is any question.

■RATED VOLTAGE

The term "Rated Voltage" in the specification of Star's Transducers and Buzzers are described as:

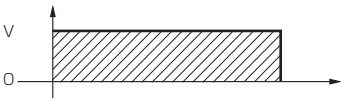
●For Miniature Audio Transducers (External Drive Circuitry)



e.g.
QMB-111PN:rated Voltage is "1.5V".

1.5V=1.5Vo-P

●For Miniature Audio Transducers and Low Pitched Sound Buzzers (Self-Contained Drive Circuitry)

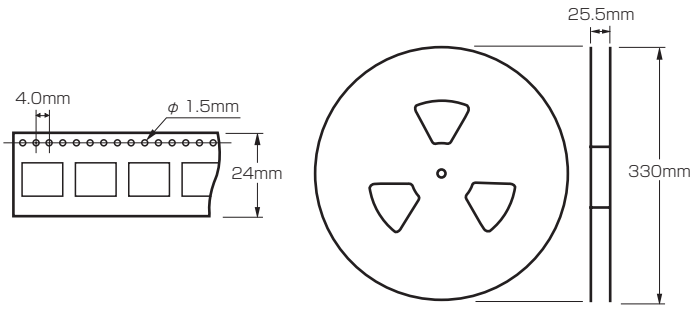


e.g.
HMB-06 is continuous "6V".

6.0V=6.0DCV (continuous)

Packing of reels for surface-mount buzzers

The packing of surface-mount buzzer reels, are by the standard of JIS C 0806. The size of all reels are shown as bellow.



With regard to tapes employed to pack the buzzer, pocket size and pocket pitch vary depending on each product, so please ask about suitable ones. Regarding the size and pitch of emboss holes, all are the same, however.

The numbers of introduced products contained in individual reels are as shown below:

Model	piece
MRT/MZT/MLT	1,000個
NFT	2,000個

⚠ CAUTION

■Safety Precautions

Use these products within the specified operation voltage scope for their correct, safe use.

Read technological data included in this catalog before use of any product.

■Storage / Processing Conditions

●If this buzzer is placed together with other buzzers in a disorderly way in a single box, the bent portion of its pin, the liquid prevention label (washable-type products), and the buzzer proper may be damaged, and the overall equipment may become nonconformant; as such, much care should be taken.

●Install the product in a place not exposed to direct sunlight, and store it in a room where temperature and humidity changes are as little as possible. (Temperature 5℃-30℃ ; humidity 40-60%)

●During storage, the atmosphere should be free of any noxious gas, and it should likewize be relatively dust-free.

●During storage, no weight should be placed on the product that could disfigure or change it.

●The storage period should be limited to one year or less in the packed state.

■Caution about Contents of This Catalog

●For reasons of technological improvement, these specifications may be changed without notice.

●Contents herein may not be used or printed without obtaining prior approval.

●This catalog is effective as of Nov 2005.

Audio products of Star Micronics Co., Ltd are well known for their rich product lineup.
These products are popular throughout the world for their high technology and high productivity.

Global Network

Star Micronics maintains a sales agent system consisting of 12 sales companies and agents in North America, Europe, and Asia.
Please contact Star Micronics Co.,Ltd.
If you would like to obtain information about a near by sales company.

High Technology

- Succeeded in the development and mass production of SMT sounders for the first time in the world.
- Succeeded in developing the world's first super-thin magnetic sounder
- Star holds a great number of patents.
- Product development based on advanced analysis and measurement based on advanced analysis and measurement/CAD methods.
- Accumulation of abundant sound design technology and know-how.

High Productivity

- Thorough quality control system.
- Acquired ISO9001 qualification in July 1997.
- Acquired QS9000 qualification in May 2000.
- Acquired ISO14001 qualification in April 2001.
- Achieved superiority in reliability and competitive power through compounding and automatization of parts.
- Overwhelming production achievements.
- Realization of a three-production-base system that enabled stabilized supply.

QS 9000 ISO 9001 ISO 14001

Support & Service

Hotline

If you have any questions about purchasing our products, please feel free to telephone us for direct, immediate answers.

Sample

Regarding the sounds of our buzzers, we are currently making sample sales.

Homepage

We provide information about all models of our buzzers and magnetic sounders through our homepage on the internet, for customers who want to promptly know specifications of available buzzer.

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