

Murata **Timing Device & Sounder**

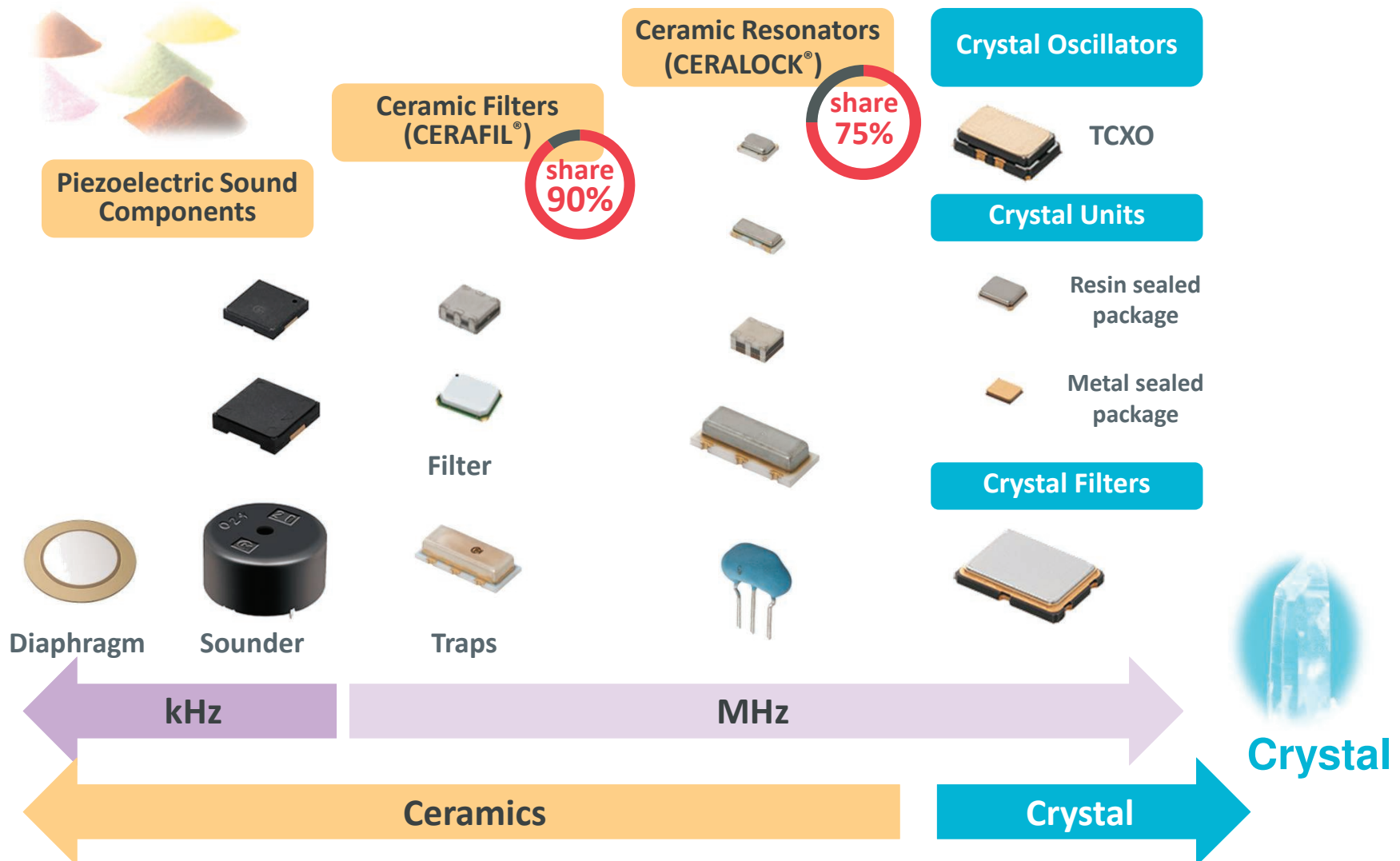
May 2018
Planning & Sales Promotion Dept.
Timing Device Division
Murata Manufacturing Co., Ltd.



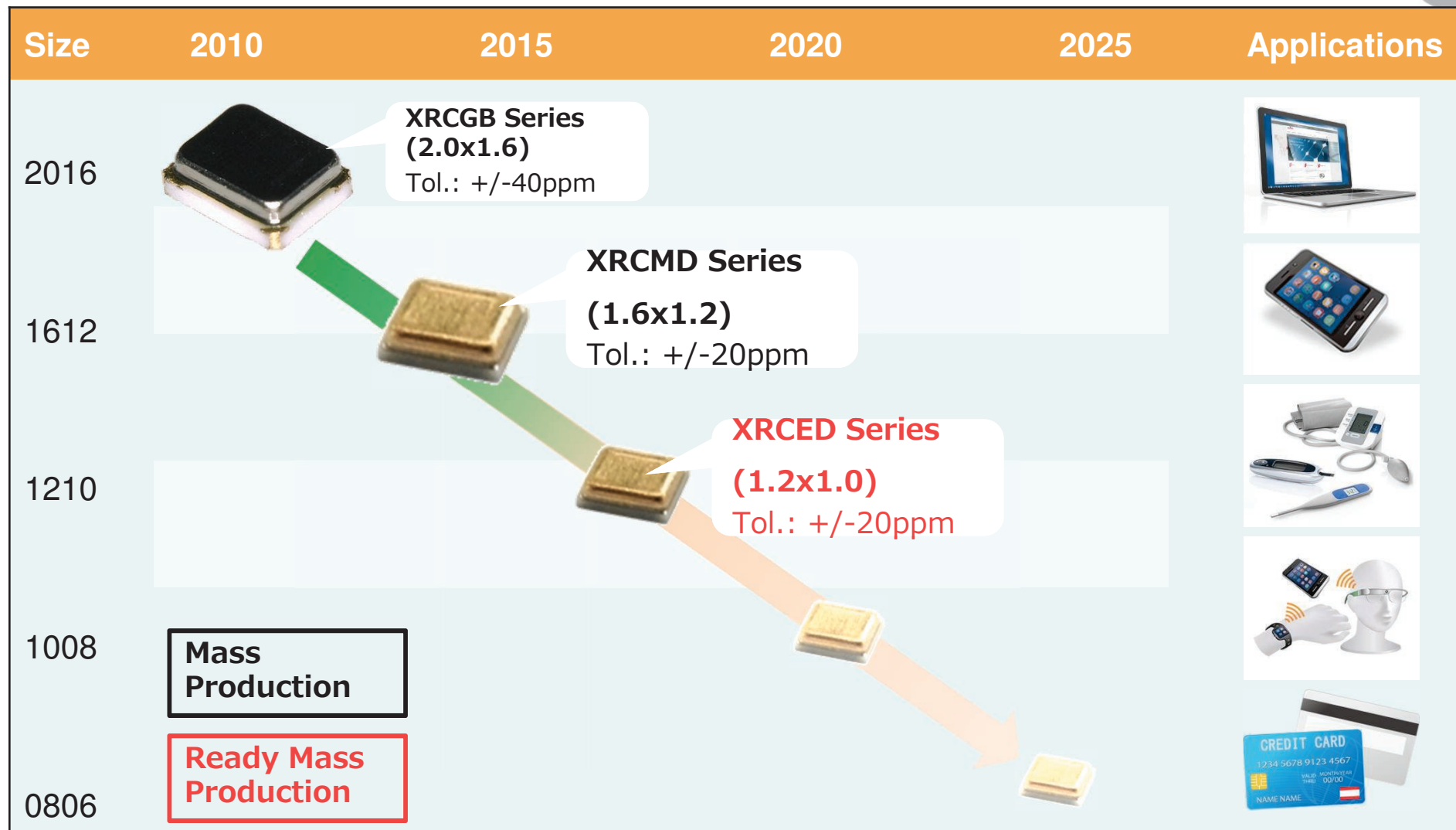
Products of Timing Device Division



Piezo Ceramics



Size Trend of Crystal



Line-up for XRCGB (2.0mm x 1.6mm)



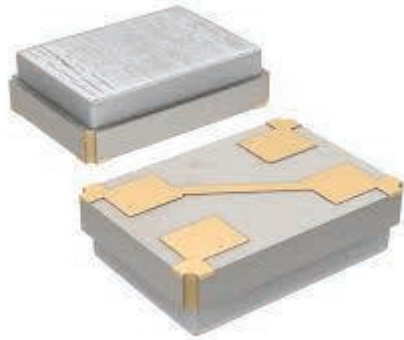
Series	Frequency [MHz]	Initial Freq. Tolerance	Freq. shift by Temp.	
XRCGB-F-L	24 / 24.576 / 25 / 26 / 27 / 27.12	+/-100ppm	+/- 50ppm (-30 to +85°C)	USB, SATA MUC
	30 / 31.25 / 32 / 33.868 / 38 / 40 / 48			
XRCGB-F-M	24 / 24.576 / 25 / 26 / 27 / 27.12	+/- 30ppm	+/- 40ppm (-30 to +85°C)	NFC TV SoC
	30 / 31.25 / 32			
	33.868 / 38 / 40 / 48	+/- 45ppm		
XRCGB-FAN	24 / 24.576 / 25 / 26 / 27 / 27.12	+/- 25ppm	+/- 25ppm (-10 to +70°C)	NFC, Ethernet TV SoC
	30 / 31.25 / 32			
XRCGB-F-P	24 / 25 / 26 / 27 / 27.12/30/31.25/32	+/- 20ppm	+/- 20ppm (-30 to +85°C)	BLE
XRCGB-F-H	24/25/26/32/(38.4)/(40)/(48)	+/- 10ppm	+/- 10ppm (-30 to +85°C)	BT/BLE, Zigbee, Sub 1GHz, WiFi

New!

XRCGB-F1H series

NEW

+/-10ppm small size & low price Crystal



RoHS

Lead free

Specifications

Item	XRCGB-F-H series
Size	2.0 x 1.6 x 0.7mm
Frequency	24.0/25.0/26.0/27.0/32.0MHz
Frequency tolerance (at 25°C)	+/-10ppm
Temperature characteristics	+/-10ppm
Operating Temp.	-20 to 70deg.C

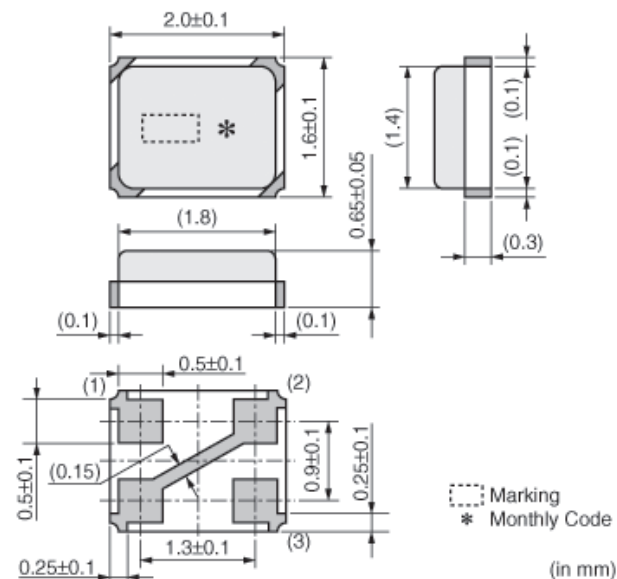
Application

Wireless devices (Wi-Fi, Bluetooth, BLE, ZigBee, NFC)

Wired Interface (Ethernet, USB2.0/3.0)

Medical/Healthcare devices

Dimensions



XRCGB-F1H series Specification

In MP

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Item	XRCGB 24MHz	XRCGB 25MHz	XRCGB 26MHz	XRCGB 27MHz	XRCGB 32MHz
Freq. [MHz]	24	25	26	27	32
Initial [ppm]	±10	±10	±10	±10	±10
T.C [ppm]	±10 (±20)	±10 (±20)	±10 (±20)	±10 (±20)	±10 (±20)
Aging [ppm /year]	±2	±2	±2	±2	±2
Lower temp. [°C]	-20 (-40)	-20 (-40)	-30 (-40)	-30 (-40)	-30 (-40)
Upper temp. [°C]	70 (105)	70 (105)	85 (105)	85 (105)	85 (105)
ESR [ohm]	80 max.	80 max.	60 max.	60 max.	60 max.
Drive level (typ) [uW]	150	150	150	150	150
Drive level (max) [uW]	300	300	300	300	300
Height [mm]	0.65±0.05	0.65±0.05	0.65±0.05	0.65±0.05	0.65±0.05



NEW
Products

1612 / 1210 size - Small package Crystal Unit



Product concept

Advantages of MCR1612 & MCR1210 (Metal Seal Type)

✓ *Economic Design*

- Simple structure using Murata's proven package technology

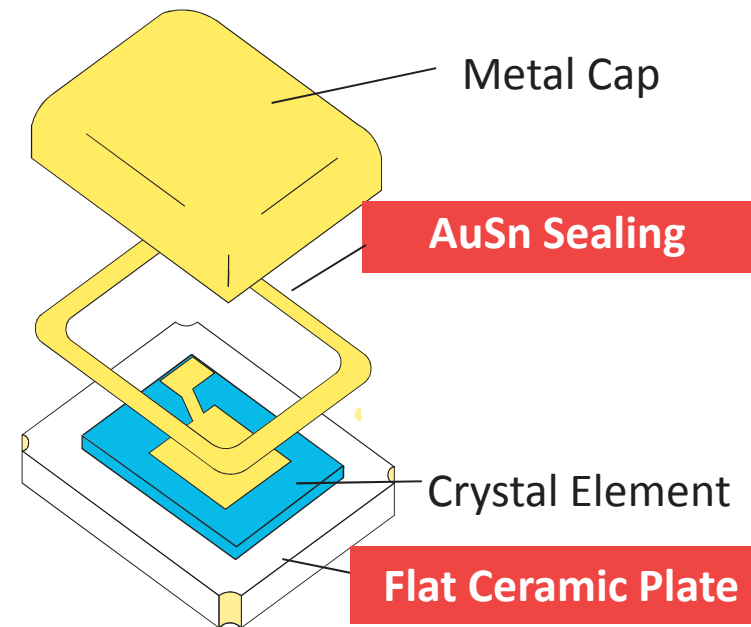
✓ *Robust Design*

- Performance likes ESR is better than conventional crystal. Murata package can use bigger crystal blank than competitor's.
- High drive level acceptance

✓ *Secure Delivery*

- Murata original structure free from conventional PKG material supply chain

Murata Crystal (1.6 x 1.2 mm)



Murata is already No.1 share holder in WiFi/BT Module using 1612 package.

Module, BT headset and audio equipment, ...etc



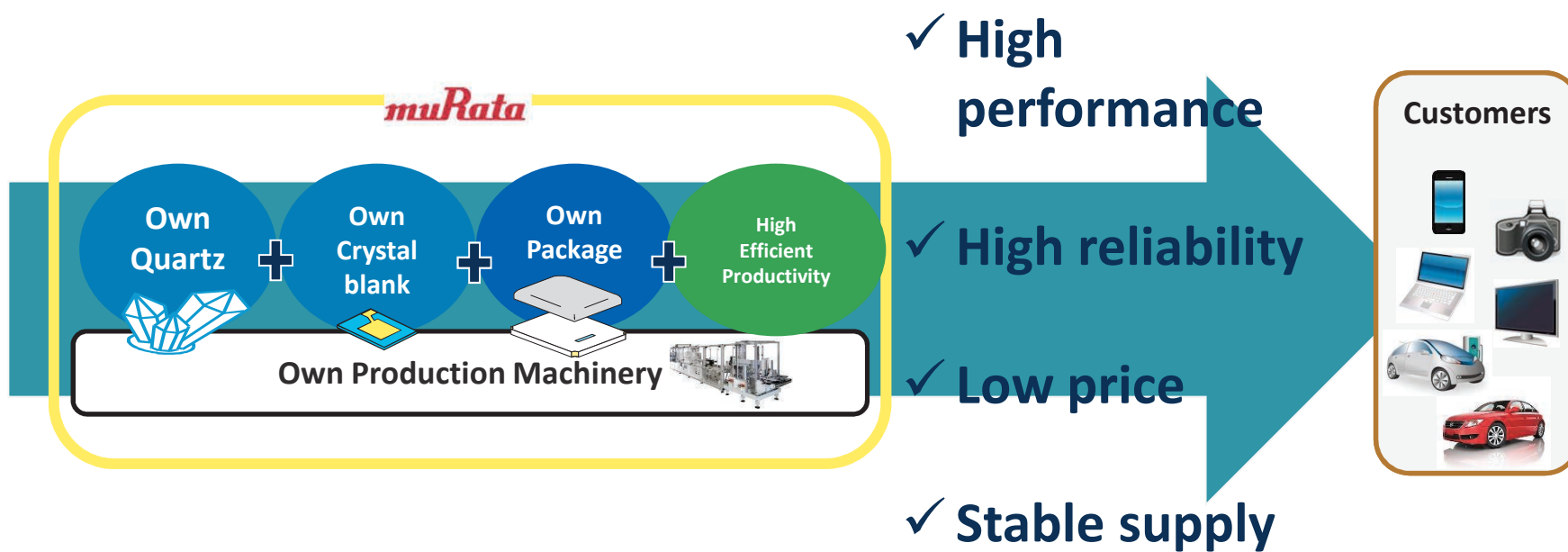
What is strength of XRCGB?



1. **Total Management** 
2. **Independent from supply chain issue** 
3. **Price** 
4. **No. 1 share in 2016 or less size market** 
5. **Reference design** 
6. **Matching test service** 

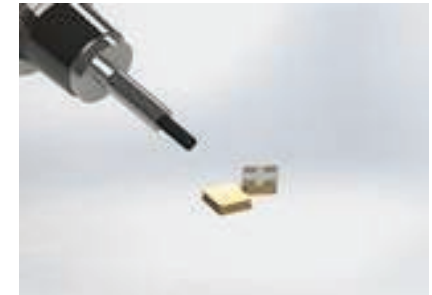
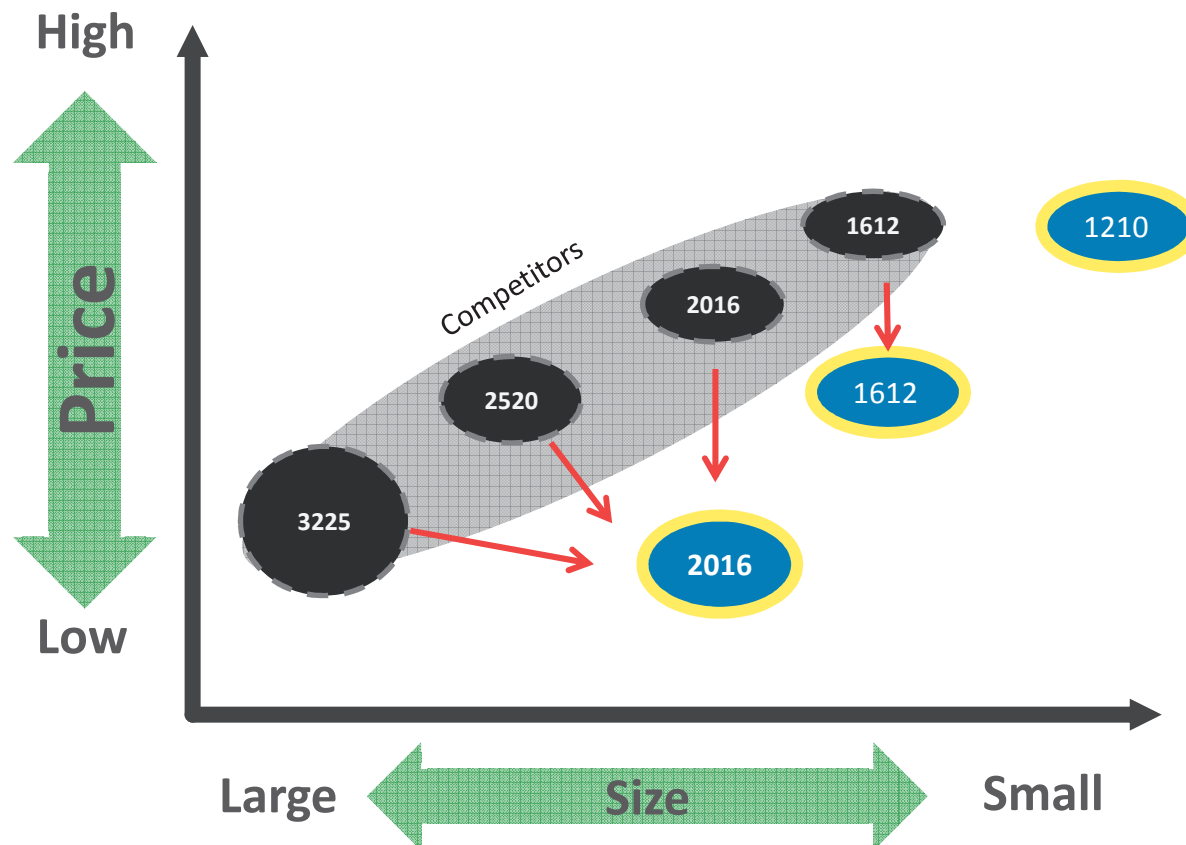


Everything by Murata !!





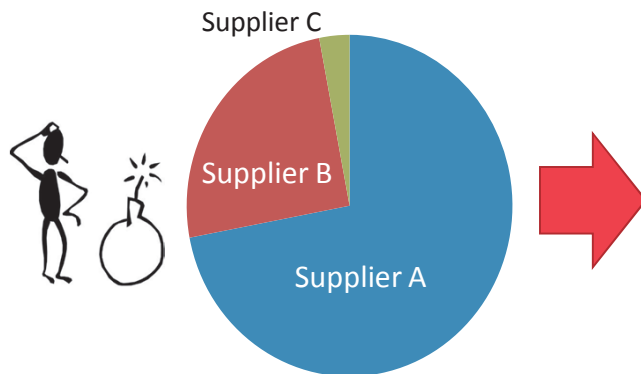
Small size Crystal with reasonable price !!





The cost of cavity ceramic is relatively high!

◆ Market share of Ceramic Cavity Package Venders



There are only three suppliers.

One Supplier decided to withdraw from package business due to the deficit operation.

**This situation is hard to decrease material cost due to the monopoly by limited suppliers.
And also there is risk of stable supply.**

**Murata crystal is independent of these suppliers.
This is the reason why we can provide the competitive price.**

Reference P/N and spec summary for BLE



IC maker	IC P/N or series	Murata Crystal Unit									
		P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temp. (max.)	Frequency Aging (max./year)	Operating Temp. Range	Load Cap.	ESR (max.)	Drive Level (max.)
Nordic	nRF51xxx nRF52xxx	XRCGB32M000F2P10R0	32MHz	2.0 x 1.6 x 0.7	±20ppm	±20ppm	±5ppm	-30°C to 85°C	6pF	70Ω	300μW
		XRCMD32M000FXP54R0	32MHz	1.6 x 1.2 x 0.33	±35ppm (Total)		±1ppm	-40°C to 105°C	6pF	80Ω	100μW
TI	CC26xx	XRCGB24M000FBP12R0	24MHz	2.0 x 1.6 x 0.7	±15ppm	±20ppm	±2ppm	-30°C to 85°C	6pF	80Ω	300μW
Dialog	DA14682/3	XRCGB32M000F2P29R0	32MHz	2.0 x 1.6 x 0.7	±20ppm	±20ppm	±2ppm	-30°C to 85°C	6pF	100Ω	300μW
Qualcomm	QCC51xx	XRCGB32M000F1H19R0	32MHz	2.0 x 1.6 x 0.7	±10ppm	±10ppm	±2ppm	-30°C to 85°C	6pF	50Ω	300μW
NXP	QN9080A	XRCGB32M000F2N13R0	32MHz	2.0 x 1.6 x 0.7	±20ppm	±30ppm	±5ppm	-40°C to 85°C	10pF	60Ω	300μW
	NxH2003	XRCMD32M000FXP52R0	32MHz	1.6 x 1.2 x 0.33	±30ppm (Total)			-30°C to 85°C	6pF	60Ω	100μW
Renesas	RL78/G1D	XRCGB32M000F2P26R0	32MHz	2.0 x 1.6 x 0.7	±20ppm	±20ppm	±5ppm	-30°C to 85°C	5pF	70Ω	300μW
		XRCMD32M000FZQ52R0	32MHz	1.6 x 1.2 x 0.33	±30ppm (Total)		±1ppm	-40°C to 85°C	6pF	60Ω	100μW
STMicro	BlueNRG	XRCMD32M000F1P00R0	32MHz	1.6 x 1.2 x 0.33	±10ppm	±20ppm	±1ppm	-30°C to 85°C	6pF	80Ω	100μW
Toshiba	TZ1001 TZ1011 TZ1031 TZ1041	XRCFD26M000FYQ01R0	26MHz	1.6 x 1.2 x 0.35	±20ppm (Total)			-30°C to 85°C	8pF	150Ω	100μW

※Please contact Murata when more detailed information needed.

Reference P/N and spec summary for NFC IC



IC maker	IC P/N or series	Murata Crystal Unit									
		P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temp. (max.)	Frequency Aging (max./year)	Operating Temp. Range	Load Capacitance	ESR (max.)	Drive Level (max.)
NXP	PN544 PN65N PN547 CR95HF CLRC663	XRCGB27M120F3M10R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	10pF	80Ω	300μW
MediaTek	MT6605	XRCGB27M120F3M13R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	10pF	60Ω	300μW
SONY	CXD2235AGG	XRCGB27M120F3M00R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
	CXD2245CG CXD2246CG	XRCGB27M120F3P00R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±20ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
Samsung LSI	S3FNRN3 S3FWRN5	XRCGB27M120F3M10R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	10pF	80Ω	300μW
STMicro (AMS)	AS3911	XRCGB27M120F3M00R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
	AS3916	XRCGB27M120F3M00R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
		XRCGB27M120F2P00R0	27.12MHz	2.0 x 1.6 x 0.7	±20ppm	±20ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
Renesas	RS46NXXXBG	XRCGB27M120F3M00R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
STMicro	ST21NFCA ST21NFCB ST21NFCC	XRCGB27M120F3M10R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	150Ω	300μW
Toshiba	T6NE2XBG	XRCGB27M120F3M16R0	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30° C to 85° C	6pF	120Ω	300μW

※Please contact Murata when more detailed information needed.

Reference P/N and spec summary for SSD



IC maker	IC P/N or series	Murata Crystal Unit									
		P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temperature (max.)	Frequency Aging (max./year)	Operating Temperature Range	Load Capacitance	ESR (max.)	Drive Level (max.)
Seagate (Sandforce)	SF-1xxx series SF-2xxx series	XRCGB30M000F3M00R0	30MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	100Ω	300μW
SiliconMotion	SM2246 SM2256 SM2258	XRCGB50M000F4M00R0	50MHz	2.0 x 1.6 x 0.7	±45ppm	±40ppm	±5ppm	-30 to 85° C	6pF	65Ω	300μW
	SM2260 SM2262 SM2263	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
PHISON	PS3109 PS5006	XRCGB40M000F4M00R0	40MHz	2.0 x 1.6 x 0.7	±45ppm	±40ppm	±5ppm	-30 to 85° C	6pF	100Ω	300μW
	PS3110 PS3111	XRCGB30M000F3M00R0	30MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	100Ω	300μW
	PS5007 PS5008	XRCGB25M000FAM10R0	25MHz	2.0 x 1.6 x 0.7	±25ppm	±40ppm	±5ppm	-40 to 85° C	8pF	80Ω	300μW
Jmicron	JMF606	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
	JMF607										
	JMF608										
	JMF609										
	JMF662										
	JMF665										
	JMF667										
	JMF668										
	JMF670										
	JMF811										
	JMF612	XRCGB30M000F0L00R0	30MHz	2.0 x 1.6 x 0.7	±100ppm	±50ppm	±50ppm	-30 to 85° C	6pF	100Ω	300μW

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Reference P/N and spec summary for USB



IC maker	Function	IC P/N or series	Murata Crystal Unit									
			P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temp. (max.)	Frequency Aging (max./year)	Operating Temp. Range	Load Capacitance	ESR (max.)	Drive Level (max.)
Cypress	USB2.0 (Bridge-IC for mobile)	CYWB0224ABS	XRCGB24M000F0L00R0	24MHz	2.0 x 1.6 x 0.7	±100ppm	±50ppm	±50ppm	-30 to 85° C	6pF	150Ω	300μW
Fujitsu	USB3.0 (SATA bridge-IC)	MB86C31x series	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
Hyperstone	USB3.0 (eUSB Driver-IC)	U9	XRCGB24M000F3M19R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-40 to 85° C	6pF	100Ω	300μW
Microchip (SMSC)	USB (Hub-IC)	USB2513B	XRCGB24M000F0L00R0	24MHz	2.0 x 1.6 x 0.7	±100ppm	±50ppm	±50ppm	-30 to 85° C	6pF	150Ω	300μW
		USB5534	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
		USB5537B										
	USB3.1 (SATA bridge-IC)	SW6316										
Renesas	USB3.0 (Host-IC)	uPD720200F1	XRCGB24M000F3M00R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW

※Please contact Murata when more detailed information needed.

Reference P/N and spec summary for MCU-IC



IC maker	Function	IC P/N or series	Murata Crystal Unit									
			P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temperature (max.)	Frequency Aging (max./year)	Operating Temperature Range	Load Capacitance	ESR (max.)	Drive Level (max.)
Atheros	Ethernet DTV reference design by Toshiba	AR8032	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
MAXIM	Video processor for TV webcam	MAX64380	XRCGB24M000F3M00R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
MediaTek	TV SoC	MT5565	XRCGB27M000F3P**R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±20ppm	±5ppm	-30 to 85° C	-	150Ω	300μW
ON Semiconductor (Sanyo)	Audio codec for IC recorder	LC823425	XRCGB48M000F0L00R0	48MHz	2.0 x 1.6 x 0.7	±100ppm	±50ppm	±50ppm	-30 to 85° C	6pF	100Ω	300μW
Silicon Image	HDMI receiver	Sil9233A	XRCGB27M000F3M00R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
Silicon Laboratories	TV RF	Si214x series Si215x series Si2170 Si2171 Si2172 Si2173 Si2178 Si2151	XRCGB24M000F3M13R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	8.5pF	120Ω	300μW
Synerchip	Receiver for DiVA	SCP1800	XRCGB27M000F3M00R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	300μW
Trigence	Digital Audio	DU1213	XRCGB24M576F3M12R0	24.576MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85° C	6pF	150Ω	450μW

◆ Crystal

IC maker	Function	IC P/N or series	Murata Crystal Unit									
			P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temperature (max.)	Frequency Aging (max./year)	Operating Temperature Range	Load Capacitance	ESR (max.)	Drive Level (max.)
Freescall	Wireless charger MCU	MWCT1003AVLH With Melexis NFC-IC MLX90132	XRCGB27M120F3G11R0 (for Melexis IC)	27.12MHz	2.0 x 1.6 x 0.7	±30ppm	±50ppm	±5ppm	-40 to 85° C	6pF	80Ω	300μW
Ingenic	MCU	X1000	XRCGB24M000F2N16R0	24MHz	2.0 x 1.6 x 0.7	±20ppm	±25ppm	±5ppm	-40 to 85° C	8pF	150Ω	300μW
	Low Power MCU/CPU	JZ4775 (M200 platform)	XRCGB24M000F3N00R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±30ppm	±5ppm	-20 to 85° C	6pF	150Ω	300μW

Reference P/N and spec summary for Audio/Visual-IC



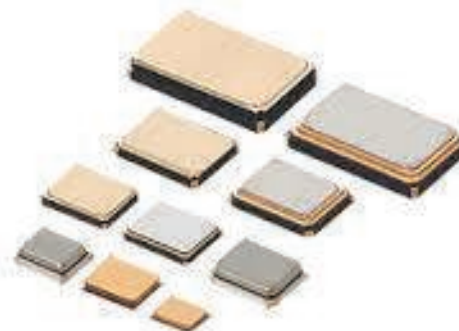
IC maker	Function	IC P/N or series	Murata Crystal Unit									
			P/N	Frequency	Size (mm)	Frequency Tolerance (max.)	Frequency Shift by Temperature (max.)	Frequency Aging (max./year)	Operating Temperature Range	Load Capacitance	ESR (max.)	Drive Level (max.)
Atheros	Ethernet DTV reference design by Toshiba	AR8032	XRCGB25M000F3M00R0	25MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	6pF	150Ω	300μW
MAXIM	Video processor for TV webcam	MAX64380	XRCGB24M000F3M00R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	6pF	150Ω	300μW
MediaTek	TV SoC	MT5565	XRCGB27M000F3P**R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±20ppm	±5ppm	-30 to 85°C	-	150Ω	300μW
ON Semiconductor (Sanyo)	Audio codec for IC recorder	LC823425	XRCGB48M000F0L00R0	48MHz	2.0 x 1.6 x 0.7	±100ppm	±50ppm	±50ppm	-30 to 85°C	6pF	100Ω	300μW
Silicon Image	HDMI receiver	SiI9233A	XRCGB27M000F3M00R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	6pF	150Ω	300μW
Silicon Laboratories	TV RF	Si214x series Si215x series Si2170 Si2171 Si2172 Si2173 Si2178 Si2151	XRCGB24M000F3M13R0	24MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	8.5pF	120Ω	300μW
Synerchip	Receiver for DiiVA	SCP1800	XRCGB27M000F3M00R0	27MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	6pF	150Ω	300μW
Trigence	Digital Audio	DU1213	XRCGB24M576F3M12R0	24.576MHz	2.0 x 1.6 x 0.7	±30ppm	±40ppm	±5ppm	-30 to 85°C	6pF	150Ω	450μW

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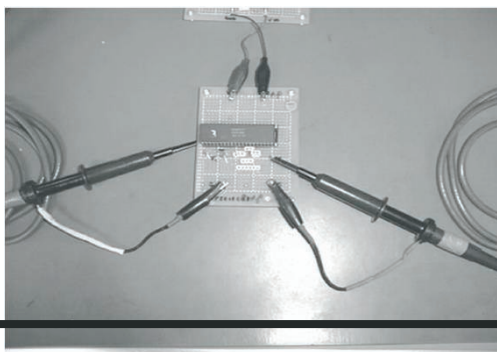
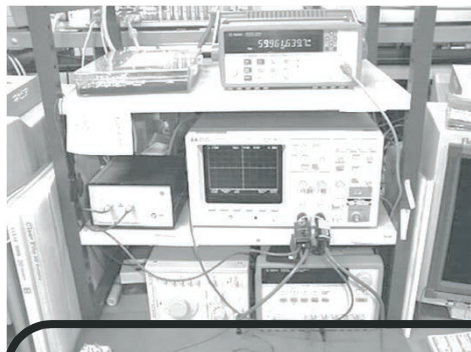
IC - Timing Device



Matching Service

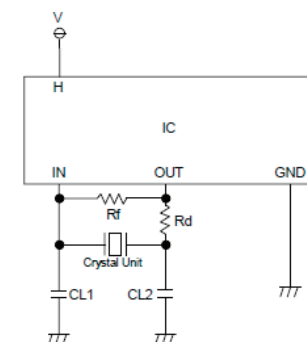
Murata is offering Quartz crystal & Ceramic resonator Matching Service to customers **free of charge** at design center in Japan and China.

Purpose of Matching Service



- 1. Realize optimized circuit condition**
- 2. Prevent Oscillation problems**

Murata can propose optimized circuit condition which realize stable oscillation.



- 3. Offer appropriate part**

Murata can offer appropriate part or customized part which meets your required characteristics.

Your Benefit



Evaluation Report (Example)



muRata
MURATA MFG. CO., LTD

Messrs: [REDACTED]

345, Uwano Toyama-shi
Toyama 939-8195, Japan
TEL (+81)76-429-9972

Evaluation No. :PAS-1605-[REDACTED]

Report No. :PSE-16GQ-[REDACTED]

6 June, 2016

Subject : Evaluation in Crystal Unit with MSD91QV** / Si2151 / M88TS2022**

Project/Application : [REDACTED]

Dear Sirs,

Thank you very much for your usual co-operation to our business.

We would like to report a result of the evaluation for 24.0000M / 27.0000MHz-Crystal Unit with MSD91QV**** / Si2151 / M88TS2022.

1. Request Condition

I C Name	Freq. [Hz]	Part Number	Circuit Condition					Supply Voltage [V]	Temp. Range [°C]
			CL1 [pF]	CL2 [pF]	Rf [ohm]	Rd [ohm]	Rd' [ohm]		
MSD91QV****	24.0000M	XRCGB24M000F3M13R0	27	27	Open	0	0	Set:100	-20 to 80
Si2151	24.0000M	XRCGB24M000F3M13R0	Open	Open	Open	0		Set:100	-20 to 80
M88TS2022	27.0000M	XRCGB27M000F2P31R0	10	10	Open	0		Set:100	-20 to 80

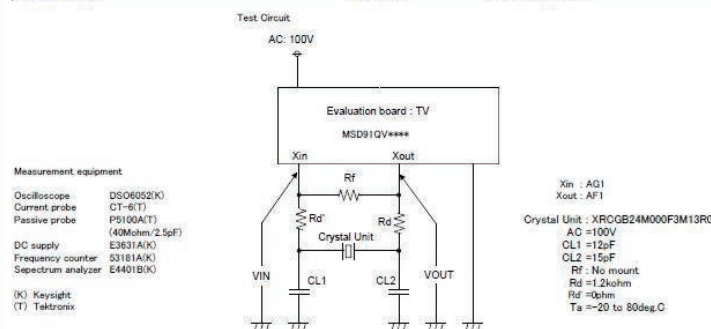
2. Murata's Recommendation

I C Name	Freq. [Hz]	Part Number	Circuit Condition					Supply Voltage [V]	Temp. Range [°C]	DATA Number
			CL1 [pF]	CL2 [pF]	Rf [ohm]	Rd [ohm]	Rd' [ohm]			
MSD91QV****	24.0000M	XRCGB24M000F3M13R0	12	15	Open	1.2k	0	Set:100	-20 to 80	DFR-16-0741
Si2151	24.0000M	XRCGB24M000F3M13R0	Open	Open	Open	0		Set:100	-20 to 80	DFR-16-0742
M88TS2022	27.0000M	XRCGB27M000F2P31R0	8.2	10	Open	0		Set:100	-20 to 80	DFR-16-0743

Test Data (Example)

Murata's recommendation 推奨回路定数

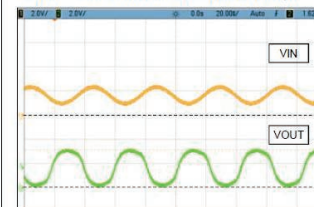
Item	IC名	Condition
IC name	MSD91QV****	
Parts Number of Crystal Unit	品番	XRCGB24M000F3M13R0
Circuit Parameter	External load capacitance	負荷容量 CL1 12pF
	load capacitance	負荷容量 CL2 15pF
	Feedback resistance	帰還抵抗 Rf No mount
	Damping resistance	制振抵抗 Rd 1.2kohm
Supply Voltage Range		電源電圧範囲 100V
Temp. Range		温度範囲 -20 to 80deg.C



Test Data : Characteristics of recommended conditions

Oscillation waveform

MODEL : XRCGB24M000F3M13R0 with MSD91QV****



VIN [V]		VOUT [V]	
High	Low	p-p	p-p
2.3	0.9	1.4	3.0

Typical sample at AC=100V, +25deg.C

[VIN] Vertical: 2V/div., Horizontal: 20ns/div.
Broken line: GND

[VOUT] Vertical: 2V/div., Horizontal: 20ns/div.
Broken line: GND

Oscillation start up waveform

MODEL : XRCGB24M000F3M13R0 with MSD91QV****



Start up time
The time takes to become 90% of steady amplitude of Vout(Xout) after power is applied.

Typical sample at AC=100V, +25deg.C

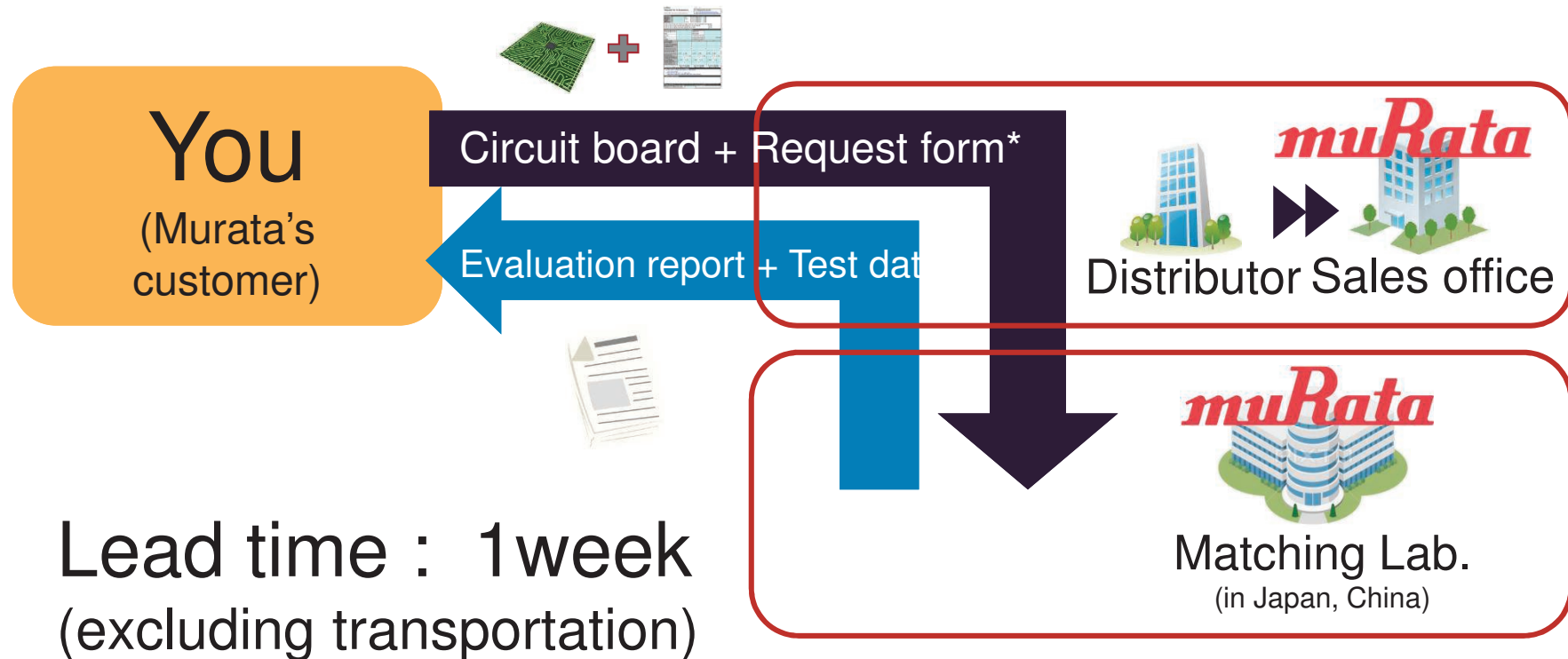
[VOUT] Vertical: 2V/div., Horizontal: 2ms/div.
Broken line: GND

Characteristics of oscillation circuit on above condition 推奨定数での発振回路特性

Circuit Characteristics 特性	Value 測定値	Remarks 備考
Center Frequency and Difference 発振回路における発振周波数とそのずれ量 (*1) (Typical sample at AC=100V, +25deg.C)	24.000129 [MHz]	Oscillating frequency and its shift against nominal frequency 発振回路における発振周波数と標称周波数に対するずれ量
	5 [ppm]	
Load Capacitance on your PCB 負荷容量値 (Typical sample at AC=100V, +25deg.C)	7.8 [pF]	This value shows load capacitance the evaluated circuit has 発振回路において振動子の両端に仮想的に接続される容量
Negative Resistance and Oscillation margin 負性抵抗／発振余裕度 (at AC=100V, +25deg.C)	R 729 [Ω]	The details is explained in page 2 詳細につきましては、次頁をご参照下さい。
	Ratio 6.1 [Times]	
Drive Level ドライブレベル (Typical sample at AC=100V, +25deg.C)	175 [μW]	Drive power of crystal under circuit condition 発振回路が動作している状態において振動子で消費される電力
Oscillating Voltage 発振電圧 (Typical sample at AC=100V, +25deg.C)	VINp-p 1.4 [V]	Swing level at input side 発振入力振幅 (VIN.H - VIN.L)
	VOUTp-p 3.0 [V]	Swing level at output side 発振出力振幅 (VOUT.H - VOUT.L)
Oscillation Start up Time 起動時間 (*2) (Typical sample at AC=100V, +25deg.C)	2.62 [ms]	Time to reach 90% of the oscillation level under steady state 定常状態の発振振幅の90%に達するまでの時間

*1 Frequency difference means the oscillating frequency difference between your PCB and Murata's recommended value.

Flow to receive Evaluation report

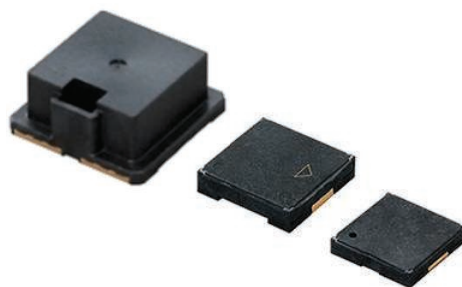


Request form* : You need to fill i

Go to next page

Murata's SMD piezoelectric Sounders

July, 2017
Timing Device Division



Piezoelectric Sound Components Product Lineup

Production site



Thailand



Japan

muRata
INNOVATOR IN ELECTRONICS



Diaphragm External Drive



7BB-15-6



7BB-20-6

Sounder External Drive

Pin type

4kHz / Compact



PKM13EPYH4002-B0 (Bulk)
PKM13EPYH4000-A0 (Taping)

2kHz / Compact



PKM17EPP-2002-B0

4kHz / High SPL



PKM22EPPH4007-B0

2kHz / High SPL



PKM22EPPH2001-B0

SMD type

2kHz / High SPL



PKMCS1818E20A0-R1

4kHz / 12mm



PKLCS1212E4001-R1

2.4kHz / 12mm



PKLCS1212E2400-R1

2.0kHz / 12mm



PKLCS1212E2000-R1

4kHz / Compact



PKMCS0909E4000-R1

Buzzer Built-in circuit



PKB24SPCH3601-B0

*For more details and other lineups are available on [our website](#).

SMD Piezoelectric Sounder 9x9mm



Product ID	Type	Size	Drive	Frequency	Individual Specification	Packing
PK	MCS	0909	E	40	00	-R1

Product ID Type Size Drive Frequency Individual Specification Packing

Feature:

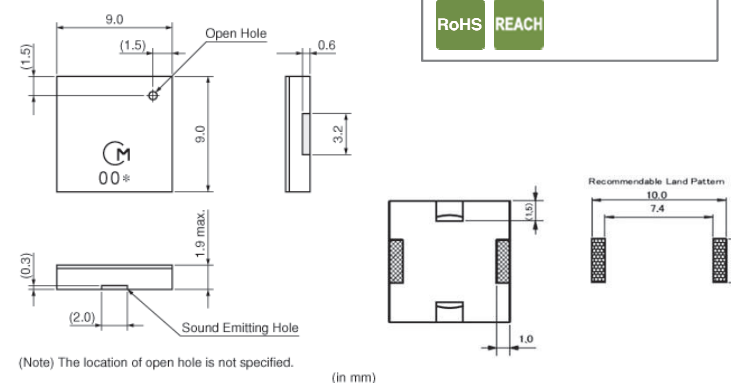
- High Sound Pressure Level : 74dB@10cm
- SMD (Reflowable)
- Small size : 9.0 x 9.0 mm
- Low profile : 1.9 mm
- Easy handling

Application:

Blood glucose meter, Thermometer, Payment terminal, Remo-con etc...



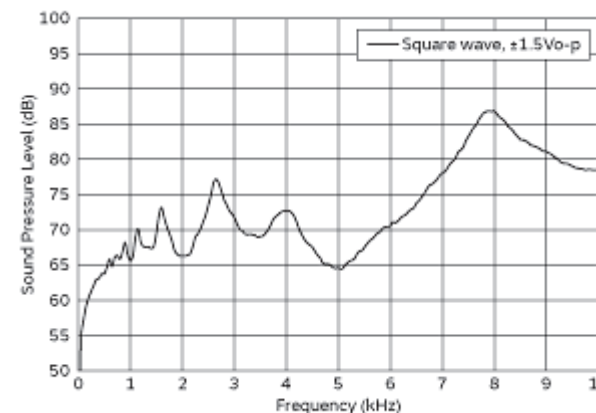
Dimensions:



Specifications:

Part Number	PKMCS0909E4000-R1
Sound Pressure Level	74dB
Measurement condition	+/-1.5Vo-p, 4.0kHz, Square wave, 10cm
Maximum Input Voltage	+/-12.5Vo-p max.
Operating Temperature Range	-40 to +85°C
Storage Temperature Range	-40 to +85°C

SPL Characteristics:



SMD Piezoelectric Sounder 12x12mm



PK	LCS	1212	E	40	01	-R1
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Product ID Type Size Drive Frequency Individual Specification Packing

Feature:

- High Sound Pressure Level : 84dB@10cm
- SMD (Reflowable)
- Small size : 12 x 12 mm
- Low profile : 3.0 mm
- Easy handling

Application:

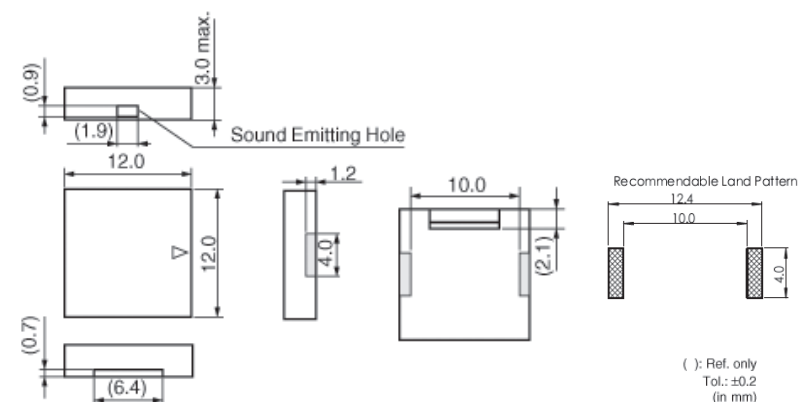
Consumer : Air-con, White goods, Payment terminal, BGM etc...



Automotive: Instrument cluster, Slide door etc...



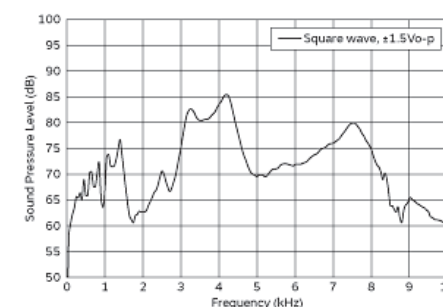
Dimensions:



Specifications:

Application	For Consumer		For Automotive	
Part Number	<u>PKLCS1212E2400-R1</u>	<u>PKLCS1212E4001-R1</u>	<u>PKLCS1212E24A0-R1</u>	<u>PKLCS1212E40A1-R1</u>
Sound Pressure Level	80dB(typ.)		84dB(typ.)	
Measurement condition	±1.5Vo-p, 4.0kHz, Square wave, 10cm			
Maximum Input Voltage	±12.5Vo-p max.	±12.5Vo-p max. or 25.0 Vo-p max.	±12.5Vo-p max.	±12.5Vo-p max. or 25.0 Vo-p max.
Operating Temperature Range	-20 to +70°C		-40 to +85°C	
Storage Temperature Range	-30 to +80°C		-40 to +85°C	

SPL Characteristics:



High SPL SMD Piezoelectric Sounder 18x18mm



PK	MCS	1818	E	20	A0	-R1
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Product ID

Type

Size

Drive

Frequency

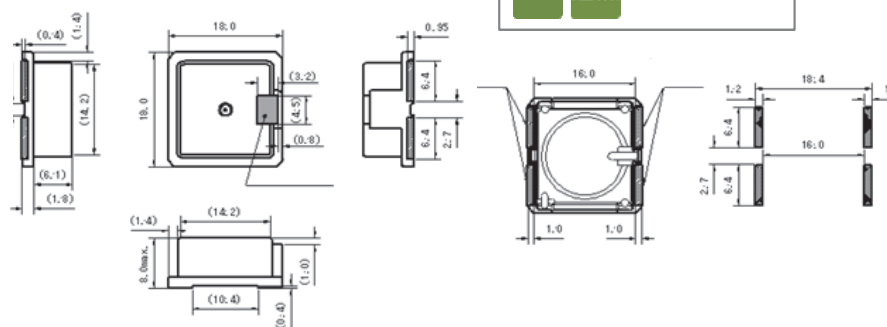
Individual
Specification

Packing

Feature:

- High Sound Pressure Level : 100 dB @10cm
- SMD (Reflowable)
- Easy handling

Dimensions:



RoHS REACH

Application:

Automotive : Cluster, Power slide door,
Parking Assist System



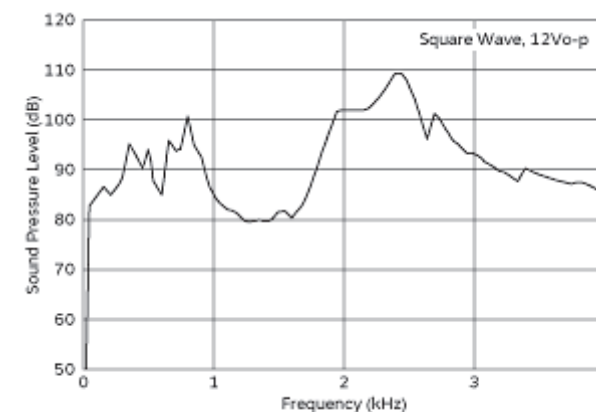
Consumer/ Industrial : White goods, Oven,
Washing machine, FA etc...



Specifications:

Part Number	<u>PKMCS1818E20A0-R1</u>
Sound Pressure Level	100dB(typ.)
Measurement condition	+12Vo-p, 2.0kHz, Square wave, 10cm
Maximum Input Voltage	+18Vo-p max.
Operating Temperature Range	-40 to +105°C
Storage Temperature Range	-40 to +105°C

SPL Characteristics:



Advantage of SMD Sounders



Why do customers prefer Piezoelectric SMD Sounders ?

- 1. Small size & Low profile**
- 2. Low current consumption**
- 3. High sound pressure level**
- 4. Easy assembly**
- 5. Low characteristics fluctuation after reflow**
- 6. For automobile use**
- 7. Enable a driving with IC Directly**

Supported by

- **Optimized structure design**
- **Adopting proper ceramic material**

1. Small size & low profile



Comparison vs Murata's Pin type Sounders

SMD		Pin Type	
<u>PKMCS0909E4000-R1</u>	<u>PKLCS1212E4001-R1</u>	<u>PKM13EPYH4002-B0</u>	<u>PKM22EPPH4007-B0</u>

(Unit : mm)

Thickness: about 70% slimmer

*compared with our products Ideal for compact health care and wearable devices, etc.

2. Low current consumption



Comparison vs Magnetic Buzzer

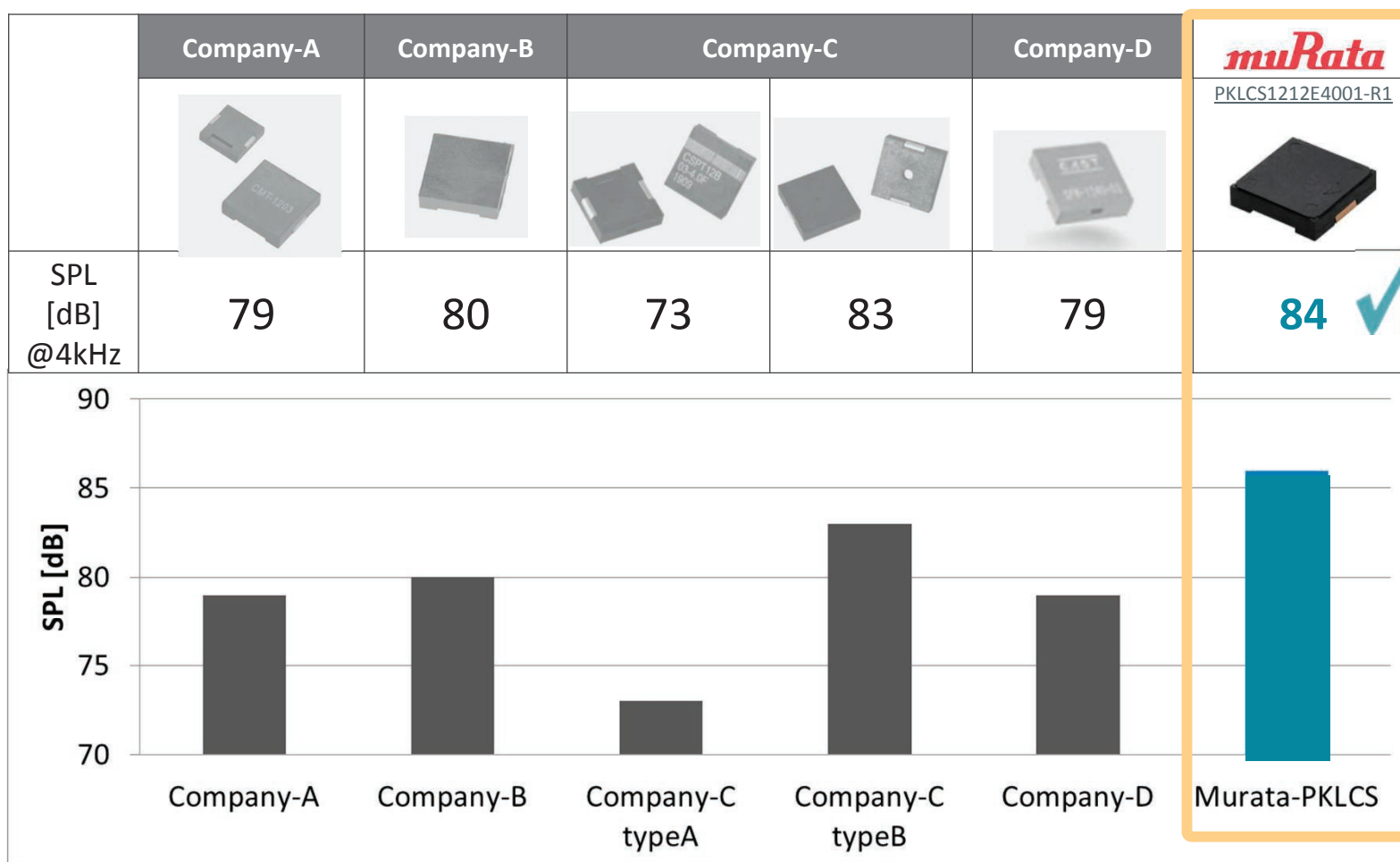
Items	muRata <u>PKMCS0909E4000-R1</u>	muRata <u>PKLCS1212E4001-R1</u>	Competitor's Magnetic Buzzer
Size	9 x 9 x 1.9 mm	12 x 12 x 3 mm	5.2 x 5.2 x 2.5 mm
Construction	Diaphragm + Case	Diaphragm + Case	Metal plate + Magnet + Core + Coil + Case
SPL @4kHz	72 dB	84 dB	79 dB
Impedance @4kHz	4,000 ohm	2,500 ohm	15 ohm
Current Consumption @4kHz	✓ 0.3 mA	✓ 0.5 mA	23.4 mA

Batteries last longer

3. High sound pressure level



Comparison vs Competitor's SMD Sounders (12 x 12mm size)

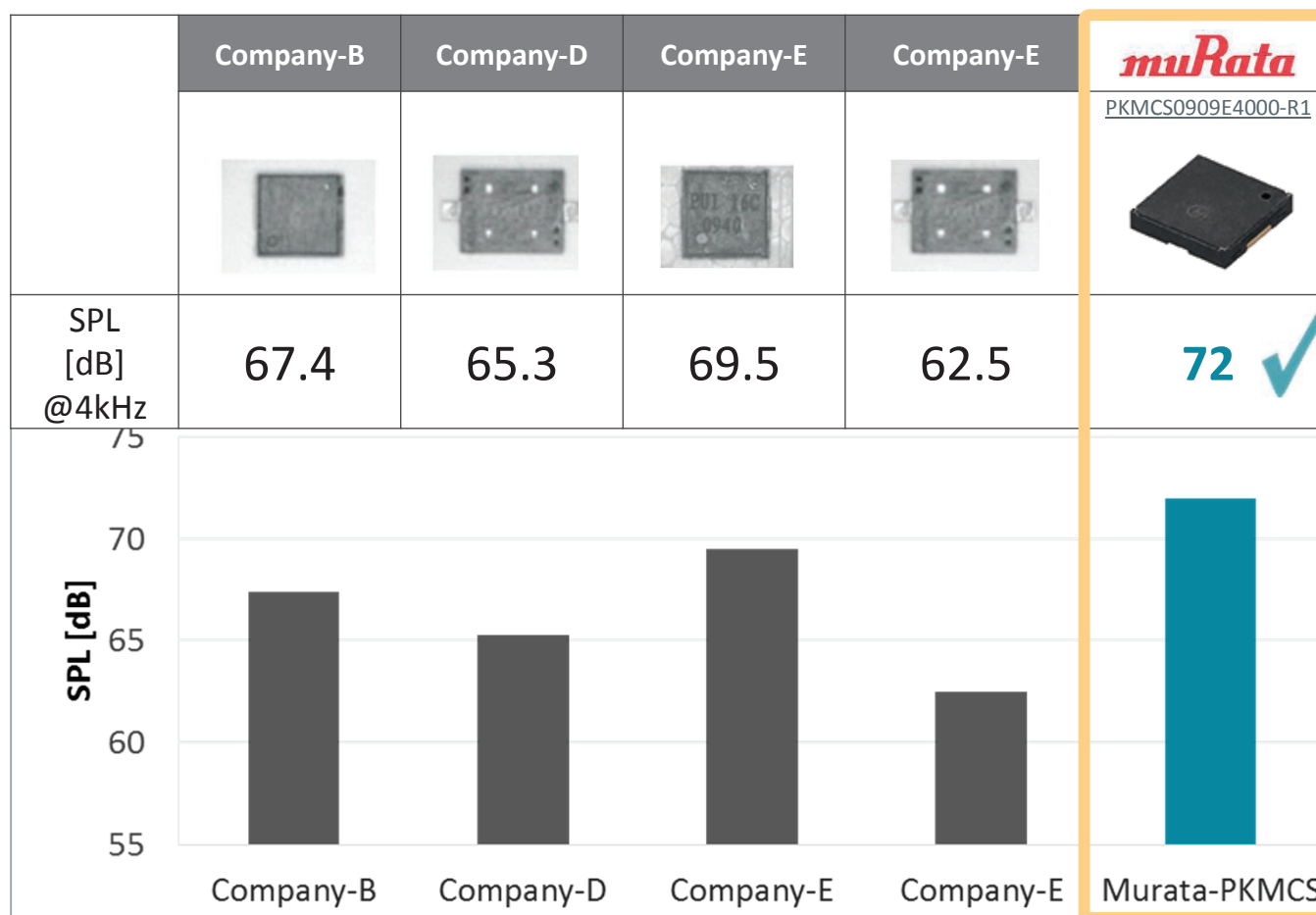


Test condition : 4kHz Square, 3Vpp, 10cm

3. High sound pressure level

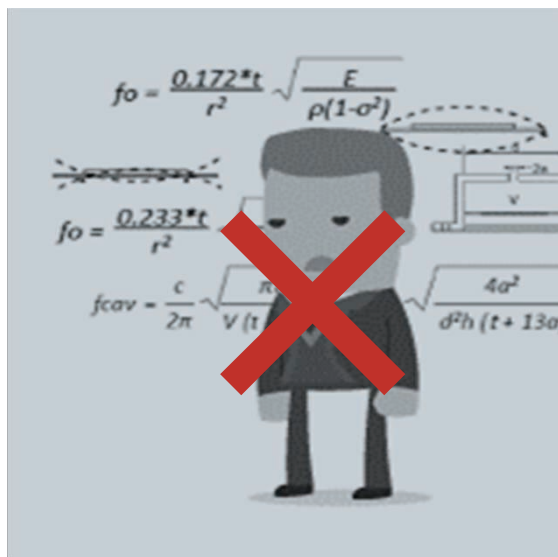


Comparison vs Competitor's SMD Sounders (9 x 9 mm size)

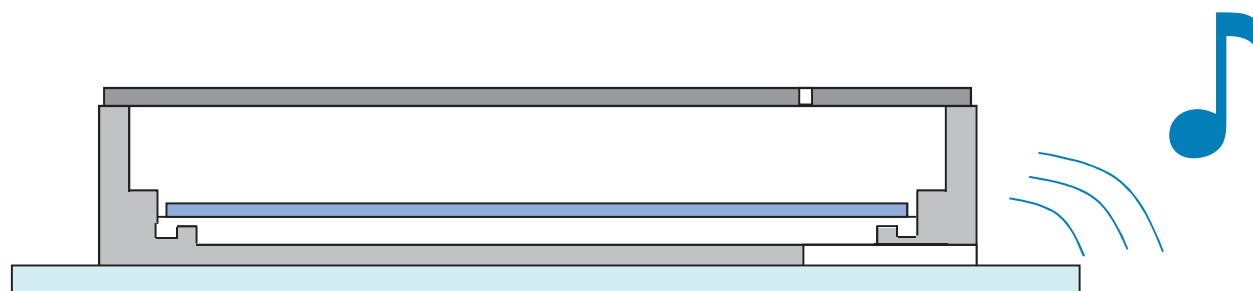


Test condition : 4kHz Square, 3Vpp, 10cm

4. Easy assembly



- **Complicated diaphragms / housing designs are not required.**
- **Murata's SMD sounders are finished with the optimal acoustic design.**



Optimal acoustic design

4. Easy assembly



When full SMD is used, the flow process can be eliminated in the mounting process (including bonding of SMD components).

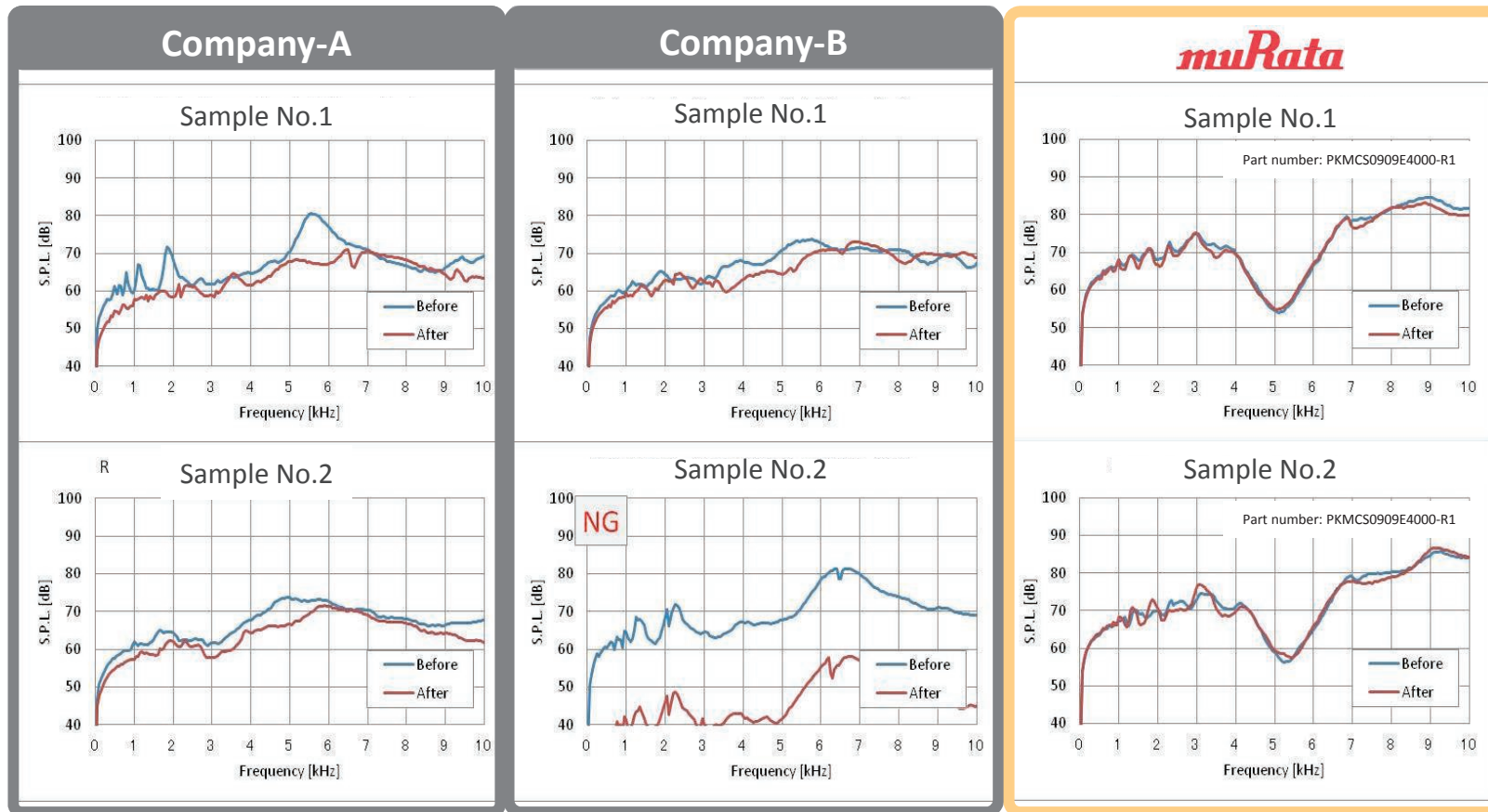
	Full SMD	SMD+THD
Process flow	Solder Paste Printing ↓ SMD Components Mounting ↓ Reflow Soldering   Simple Production flow	Glue Printing for SMD components ↓ SMD Components Mounting ↓ THD Components Mounting ↓ Flow Soldering  Long Production Process

High productivity

5. Low characteristics fluctuation after reflow



Comparison vs Competitor's SMD Sounders



Test condition: Measured after two times of the re-flow soldering with 260°C peak. (n=2pcs), Input signal : +/-1.5Vo-p, Square wave

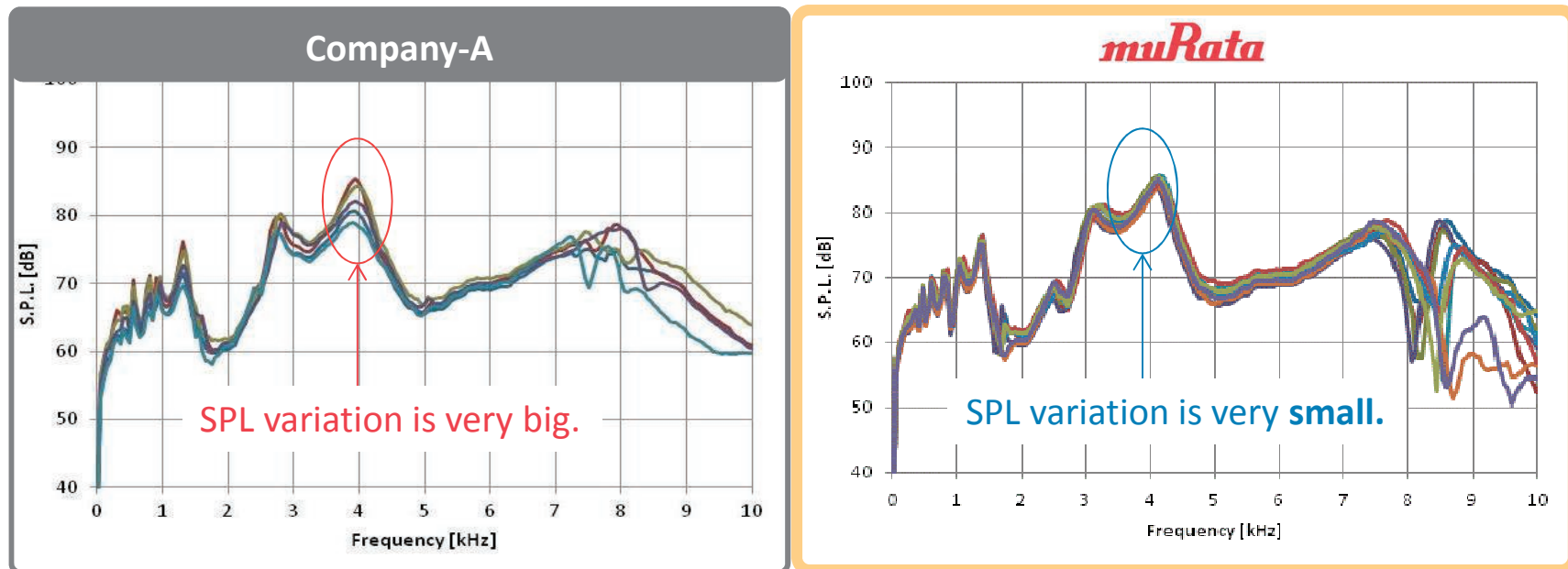


The product can be used reliably with less deterioration in the sound pressure due to the thermal load.



<Reference>

Small initial variation of frequency & SPL



➤ Standard deviation (Std.) of Sound Pressure Level (SPL)

Murata: **0.6 dB** < Competitors: **2.7 dB**

Murata's Std is more than 4 times smaller

Summary



Advantage of Murata SMD Sounder compared with other sounders

vs Competitor's SMD Sounder



- ✓ High Sound Pressure Level(SPL)
- ✓ Stable SPL performance after re-flow soldering

vs Magnetic Buzzer



- ✓ Low current consumption
- ✓ Enable a driving with IC directly

vs THD(PIN type) Buzzer



- ✓ High productivity
- ✓ small size

Target Application Idea



Home Appliance



Lighting



Accessory for mobile



Security



Audio



Healthcare



Metering



Thank you