

Introduction to Flat Panel Speaker

R&D : Authentic Ltd.

Patent : New Transducers Limited (NXT)

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Fujitsu Components Limited

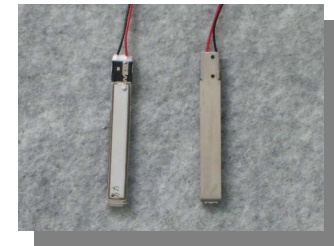
Dec. 2008

■ Partnership of co-develop, sales, and manufacturing actuators

1. DMA (Piezo: Distributed Mode Actuator)

- Sales current 2nd generation and co-develops and sales smaller next generation
- Sales Panel Speaker Units (PSU)

World Smallest
Only One



<DMA (2nd Gen)>

2. EMA (Electro-Magnetic Actuator)

- Sales current EMA and co-develops and sales smaller next generation
- Sales Panel Speaker Units (PSU)



<EMA>

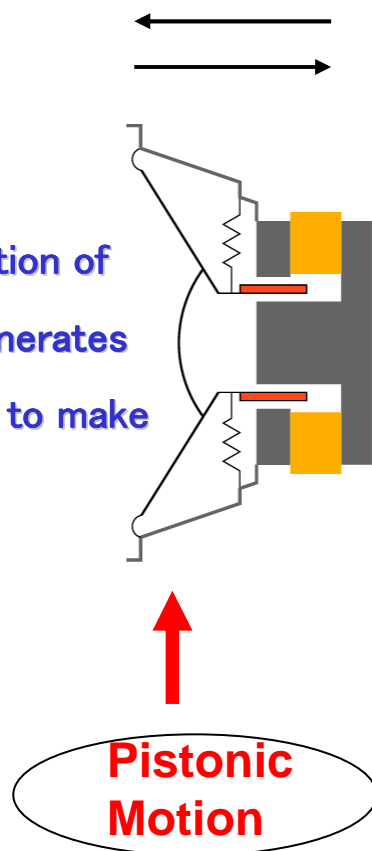
3. Capital Alliance

●What's different from conventional cone speaker

■ 【Conventional Cone Speaker】

⇒ Beaming Sound

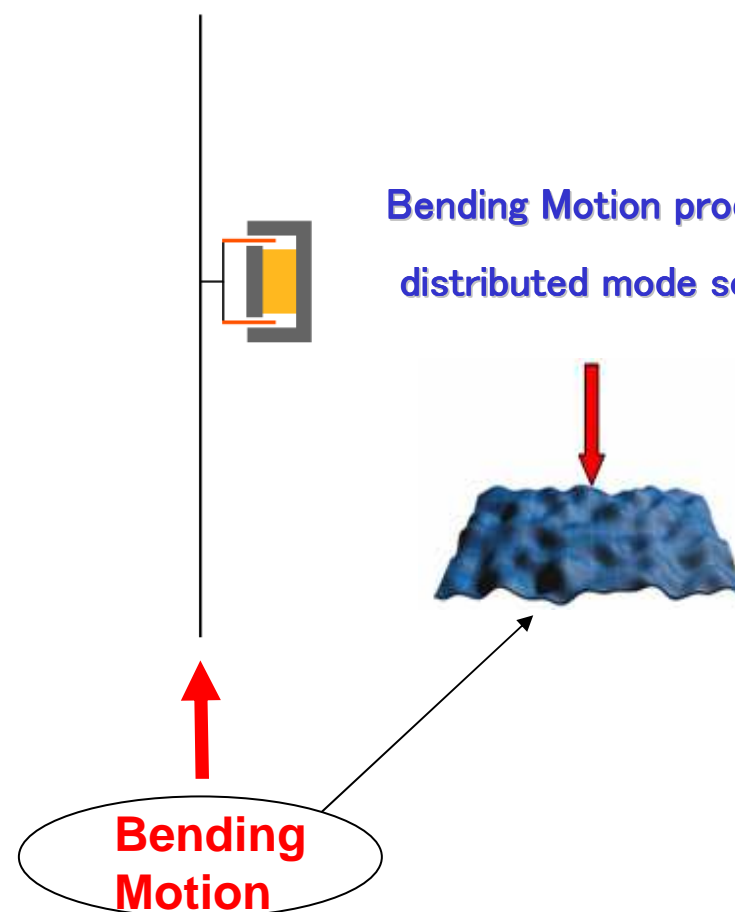
Pistonic Motion of
the cone generates
air vibration to make
sound



■ 【NXT Flat Panel Speaker】

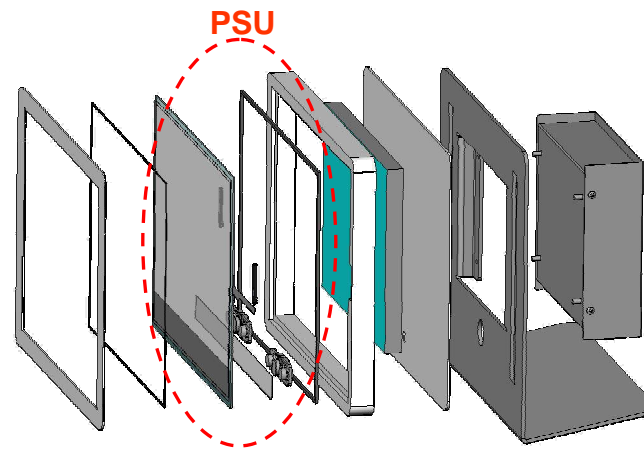
⇒ Widespread Sound

Bending Motion produces
distributed mode sound

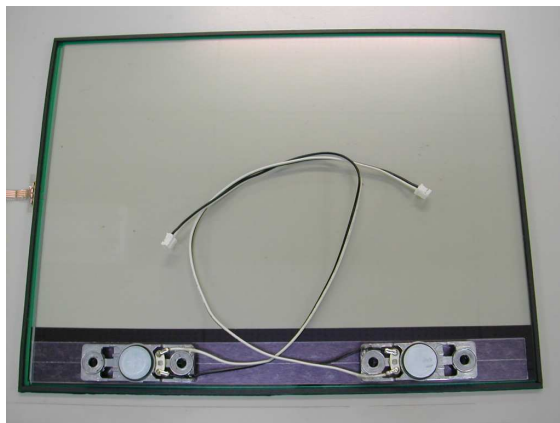


Our Product: Panel Speaker Unit (PSU)

- Assembly of actuator + vibration panel + cushion



PSU (EMA)



PSU (DMA)



Features of Flat Panel Speaker



- Transparent acrylic panel or various types of touch panel in front of LCD generates sound, which unify sound and visual image.
- With wide directional performance, clear & natural with no interference with direct sound, does not feel tired in listening.
- Smaller & thinner than conventional speaker so that can be adopted to the smaller space where conventional speaker cannot be adopted.
- Easy to design water-proof, dust-proof, and oil proof since no grille or hole is required.
- Multi function of input & sound by using touch panel as vibration panel.
- Customization for the best sound solution is supported.

● Two types of NXT flat panel speaker

① SoundVu: Vibrate clear panel in front of LCD

└ SoundVuTR: Cover wide range frequency without woofer



Only One

Currently, only Authentic can design SoundVu technology!

② SurfaceSound: Vibrate some part beneath or beside LCD

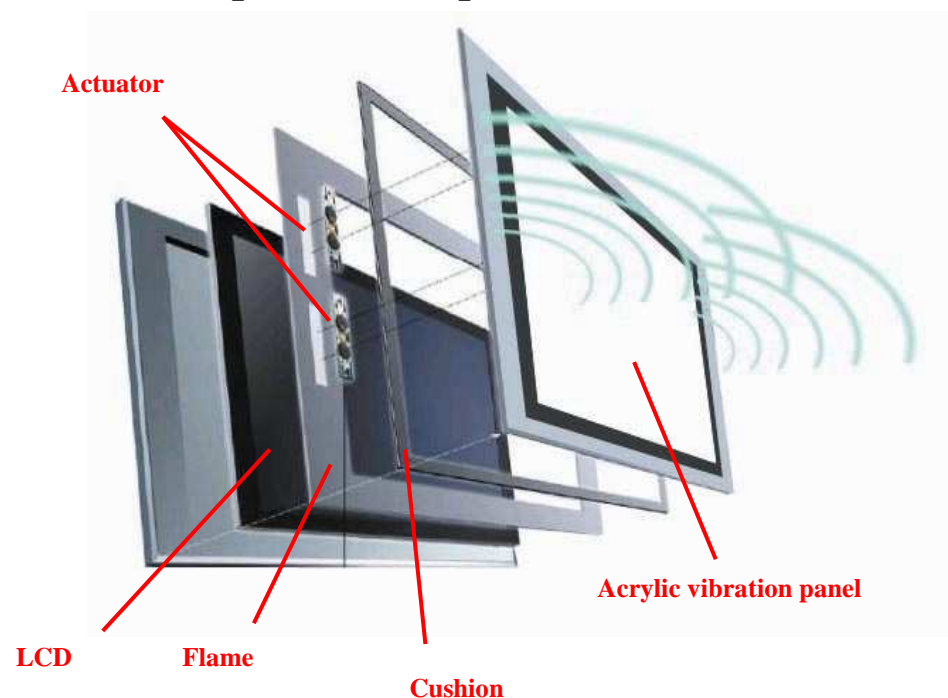
Around 50 companies has general license to design SurfaceSound worldwide

Marriage of Visual Image and Sound

Special feature of the SoundVu speaker

- * Presence of Cinema
- * Wide directional performance
- * Clearness / Natural sound & comfortable hearing

【Construction】

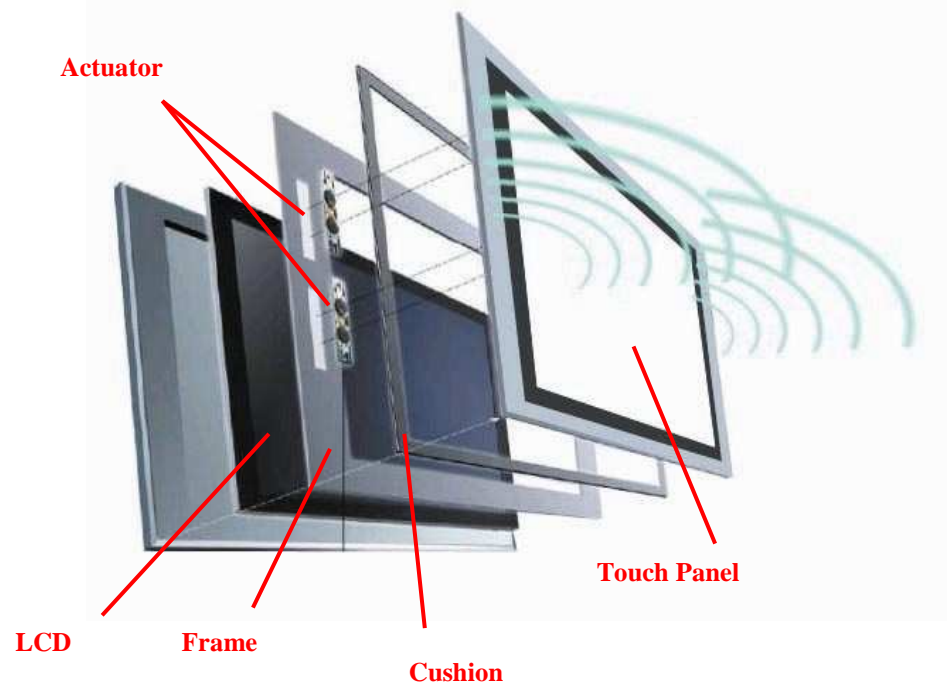


Use touch panel as SoundVu vibration panel

Unify input and sound function

Co-developing force feedback technology

【Constraction】

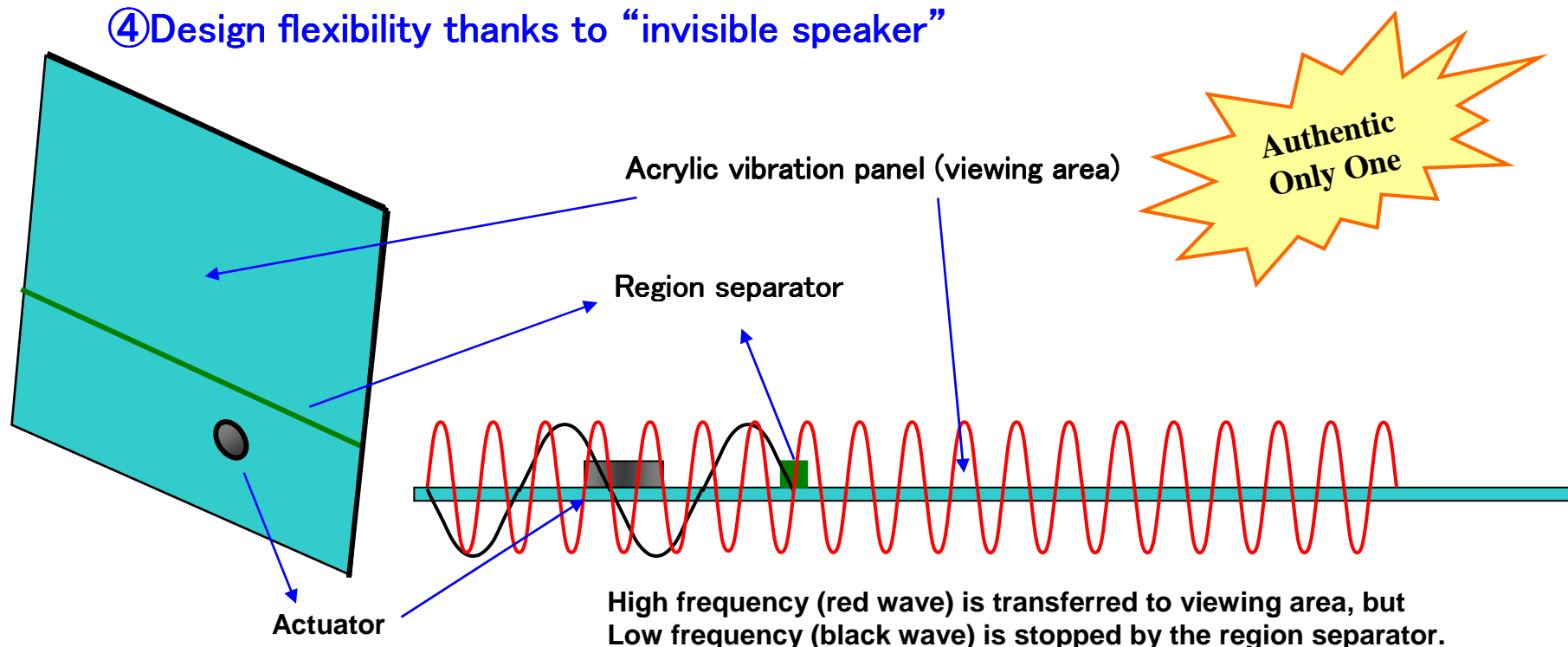


SoundVu TR covers entire audio frequency range without woofer

Allocate two different frequency generators on a single vibration panel, resulted in a big reduction of low frequency movement in viewing area

Advantages obtained through simplicity of SoundVu TR:

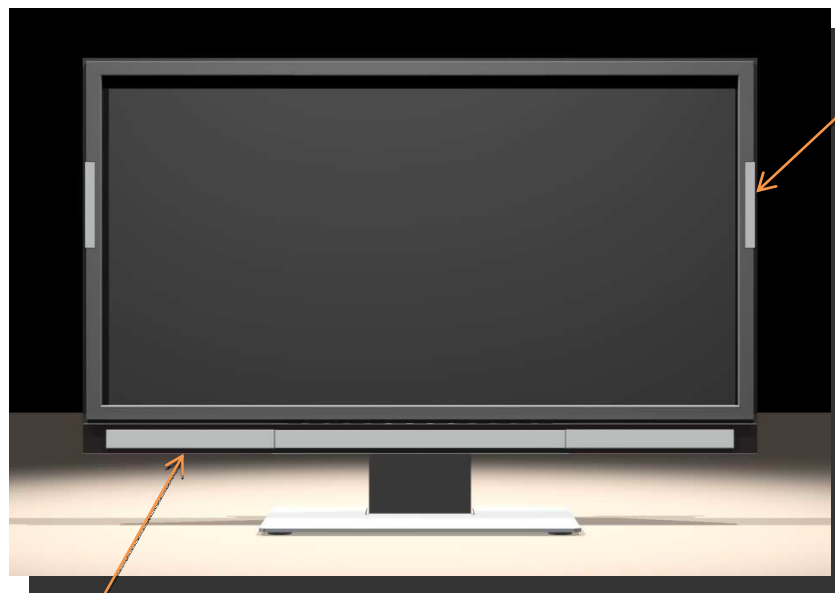
- ① Cost reduction
- ② Space saving
- ③ Elimination of amplifier and 3D filter for subwoofer
- ④ Design flexibility thanks to “invisible speaker”



Do not require vibration panel : Save Cost

Use some part beneath or beside LCD as a vibration panel.

<Proposal for 37" display>



DMA TWEETER





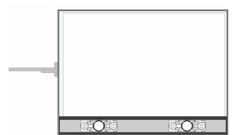

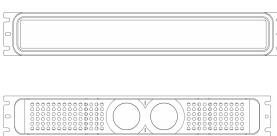
**PS
U**

<Rear Configuration>

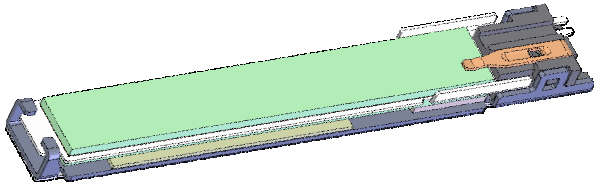
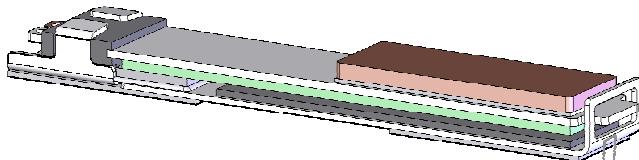
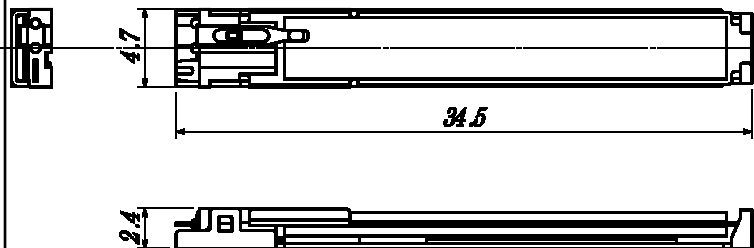
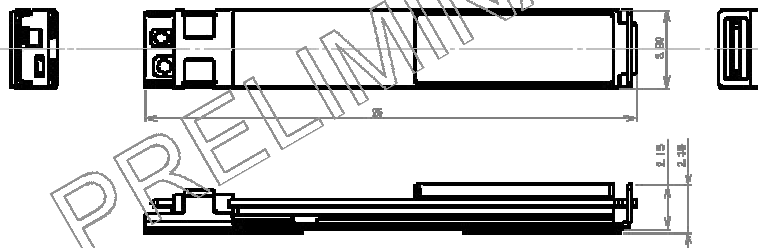


***Demonstrator available in January.**

Authentic Panel Speaker Unit Product Style and Sales Points **FUJITSU**

Type	Product Style	Image	Structure	Sales Points	Target Market
SoundVu	DMA Mobile SoundVu		DMA+Transparent Acrylic Panel+Cushion	Small, Thin, Good SPL in middle and high frequency, Sound come from entire panel without grills.	Cell phone, MP3, PND, PDA, Mobile game, etc
	DMA SoundVu		DMA+Transparent Acrylic Panel+Cushion	Small, Thin, Good SPL in middle and high frequency, lighter than EMA	PND, UMPC, Digital photo frame, etc
	EMA SoundVu		EMA+Transparent Acrylic Panel+Cushion	Wide range frequency, stronger power	PND, Laptop PC, Digital Photo Frame, Medical/Industrial operation panel, etc
	DMA Touch SoundVu		DMA+Touch Panel+Cushion	Small, Thin, Good SPL in middle and high frequency, lighter than EMA, Touch function	Car navigation system, POS terminal, Medical/Industrial operation panel, ATM terminal, Electronic paper, etc
	EMA Touch SoundVu		EMA+Touch Panel+Cushion	Wide range frequency, stronger power, Touch function	Car navigation system, POS terminal, Medical/Industrial operation panel, ATM terminal, Electronic paper, etc
	EMA Glass SoundVu TR		EMA+Separator+Glass	Cover entire audio frequency range without woofer, reduce low frequency movement in viewing area	Flat TV/Monitor, Desktop PC, etc *Bigger than 19-inch application
Surface Sound	EMA Surface Sound		EMA+Honeycomb Layer Panel+Cushion	Hi design capability because of no grills, Thin, do not require additional acrylic panel, save cost, able to standardize	Flat TV/Monitor, Desktop PC, etc

Comparison of DMA model

Model	DMA-AH35T (under MP)	DMA-U25 (under co-develop)
Image		
		
Size	L34.5 × W4.7 × H2.6mm	L25.0 × W3.9 × H2.2mm

Basic specification of DMA-AH35T



General		
Model	DMA-AH35T	
Type	Piezo-Electric Actuator	
Dimensions	L34.5 × W4.7 × H2.6mm	
Weight	1.8grms	
Performance		
Item	Specifications	Conditions
Capacitance	1.55 μ F	Input: 1kHz, 1Vrms
Resonant frequency	450Hz	Input: 1Vrms
Operating temperature	-20 ~ +60°C	
Storage temperature	-40 ~ +85°C	
Receiver mode		
Item	Specifications	Conditions
Rated input voltage	1.0Vrms	Input: 1.0Vrms
Sound pressure level	115dB	B&K Type 4195LL
Speaker mode		
Item	Specifications	Conditions
Rated input voltage	5.0Vrms	
Maximum input voltage	10.0Vrms	Source: Noise*1
Sound pressure level	85dB at 1kHz 90dB at 3kHz	Input: 5.0Vrms Sp-Mic: 10cm

*1: Pink noise(JIS C 5532) with BPF, Crest factor=2




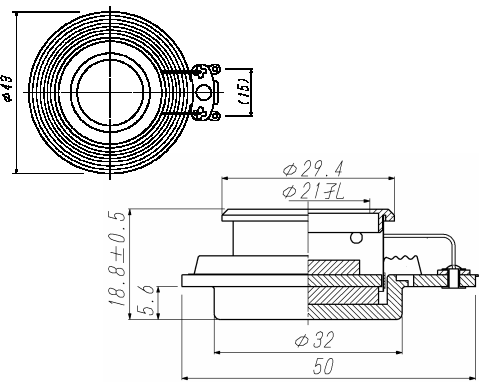
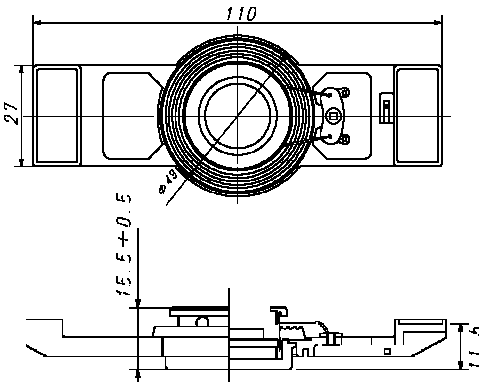
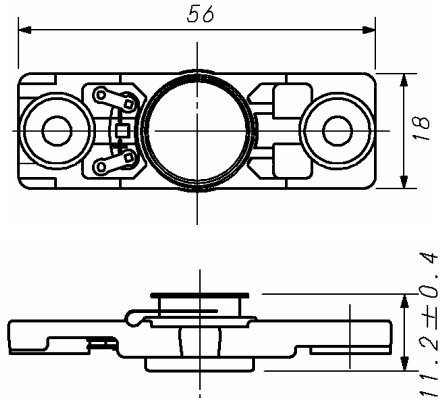
Basic specification of DMA-U25(target)

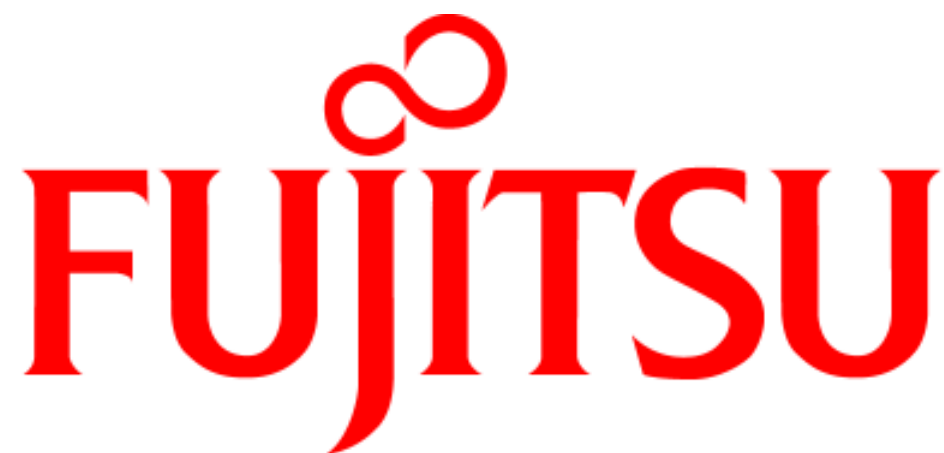
General		
Model	DMA-U25	
Type	Piezoelectric Actuator	
Dimensions	L25.0 × W3.9 × H2.2mm	
Weight	TBD	
Performance		
Item	Specifications	Conditions
Capacitance	780 ± 160nF	Input=1Vrms, 100Hz
Resonant Frequency	700 ± 140Hz	Input=1Vrms
Operating Temperature	-20 ~ +60℃	
Storage Temperature	-40 ~ +85℃	
Receiver Mode		
Item	Specifications	Conditions
Rated Input Voltage	1.0Vrms	Low-Leak B&K Type 4195LL
Sound Pressure Level	TBD	
Speaker Mode		
Item	Specifications	Conditions
Rated Input Voltage	5.0Vrms	
Maximum Input Voltage	10Vrms	Input: Noise*1
Sound Pressure Level	76dB SPL	Input=5Vrms Speaker-Mic: 10cm

*1: Pink noise(JIS C 5532) with BPF, Crest factor=2

Comparison of EMA

*See actuator list for other EMA specification

Model	NX43-03R	NX43-084R	NX1856-014
Image			
Size			
Impedance	6 +/- 0.9 Ω at 1kHz	4 +/- 0.6 Ω at 1kHz	4 +/- 0.6 Ω at 1.5kHz
Rated/Max input power	10W/20W	10W/20W	3W/5W
SPL	70 to 75dB/1m1W	70 to 75dB/1m1W	67 to 72dB/1m1W



THE POSSIBILITIES ARE INFINITE