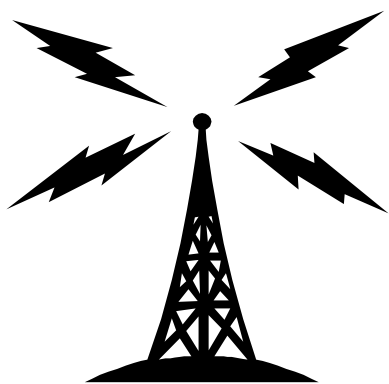


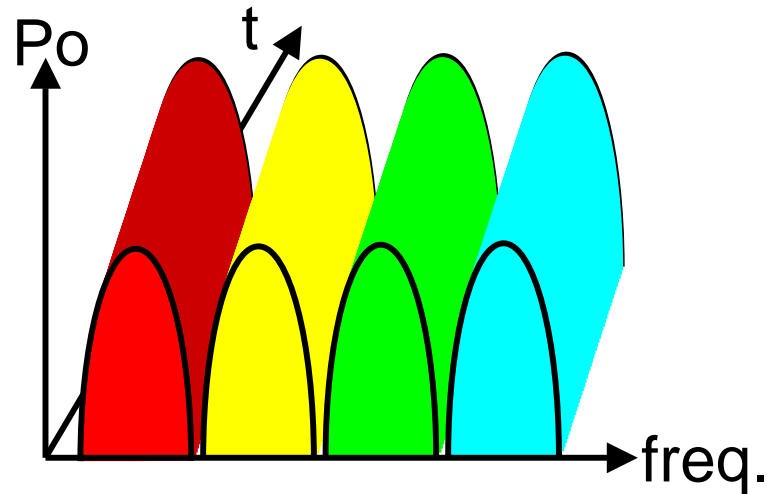
减噪对策(EMI)和抗静电对策(ESD)



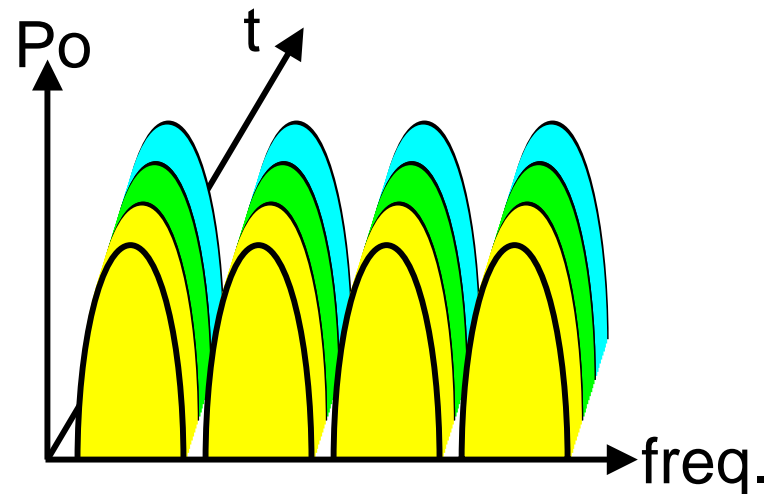
Yin,Zhiming
Panasonic(Japan)



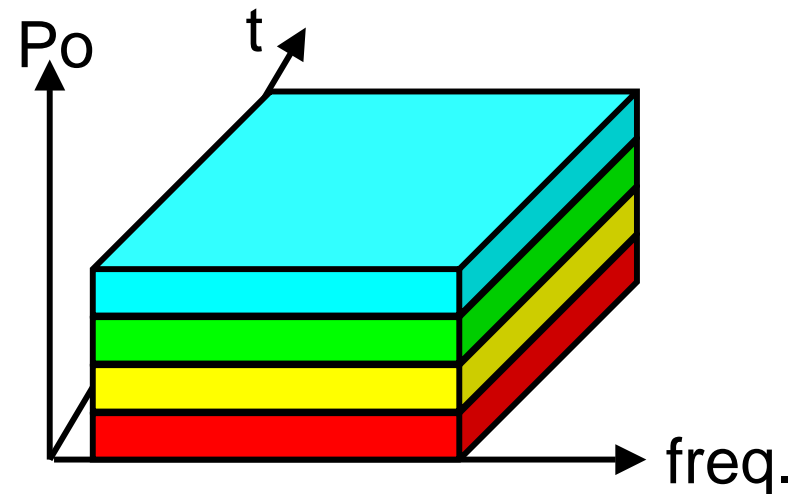
FDMA(Frequency Division Multiple Access)



TDMA(Time Division Multiple Access)

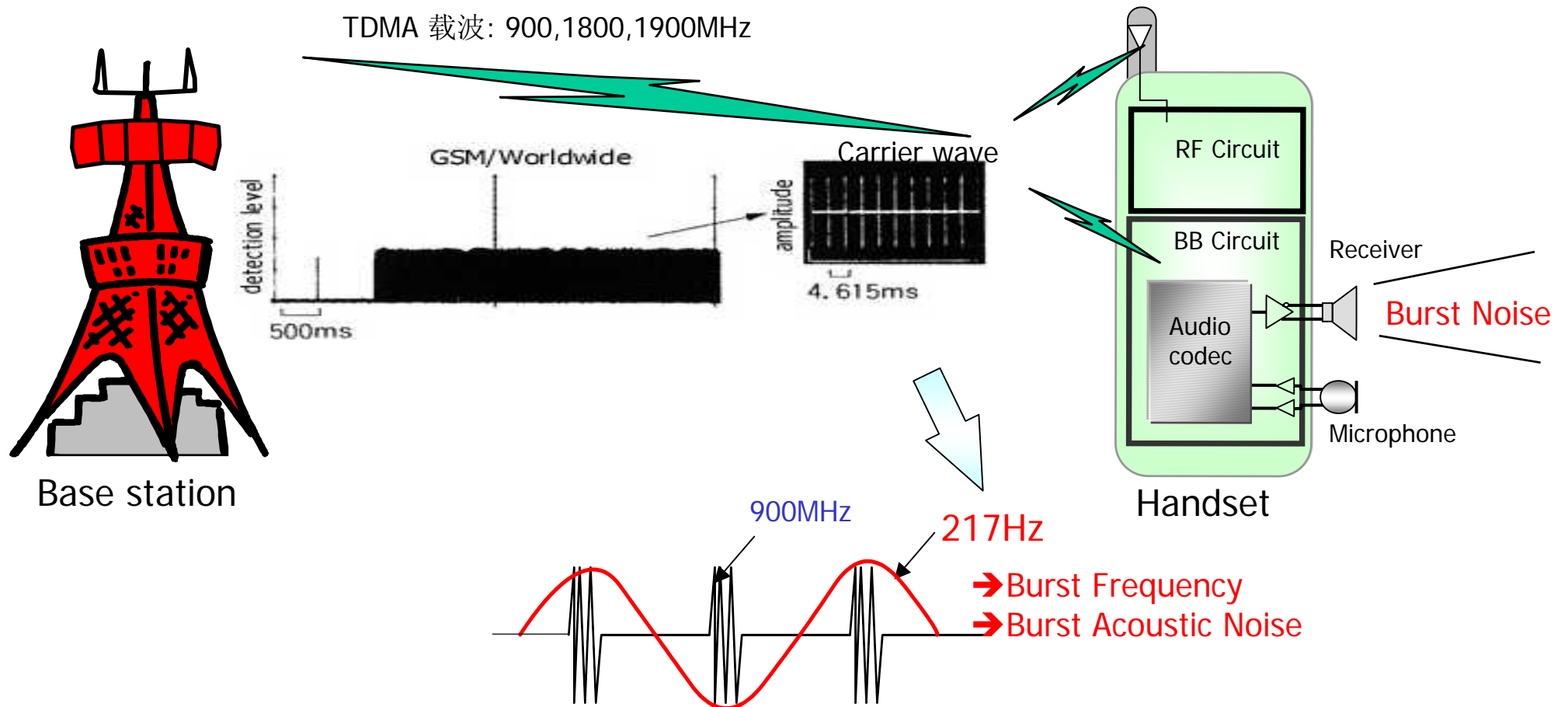


CDMA(Code Division Multiple Access)

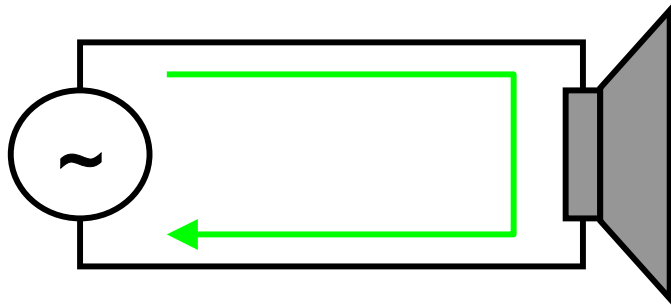


Burst Noise 的产生原理 1

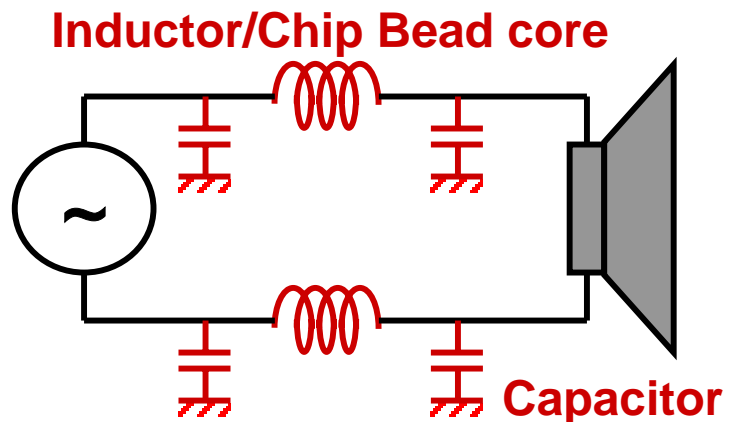
Panasonic
ideals for life



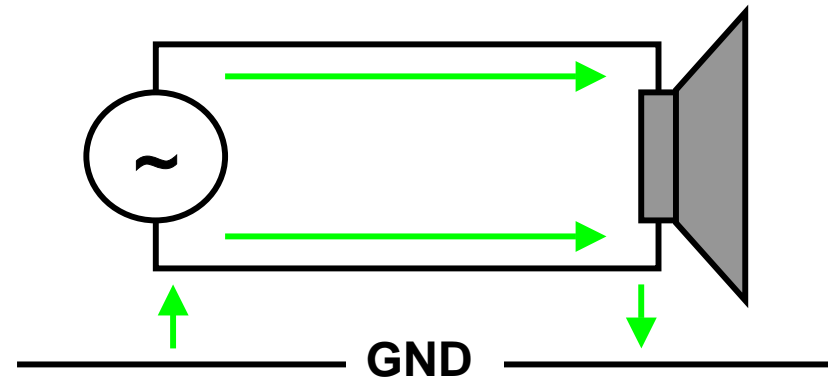
Normal Mode



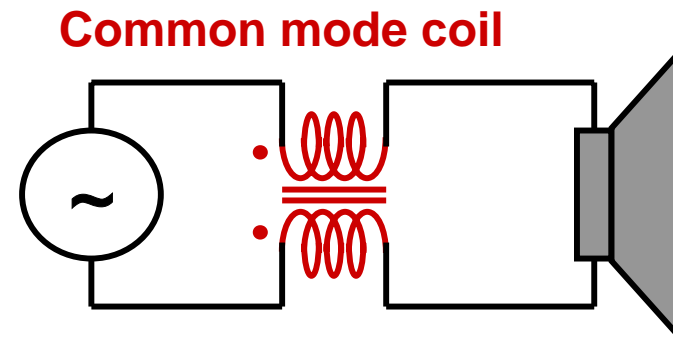
Solution



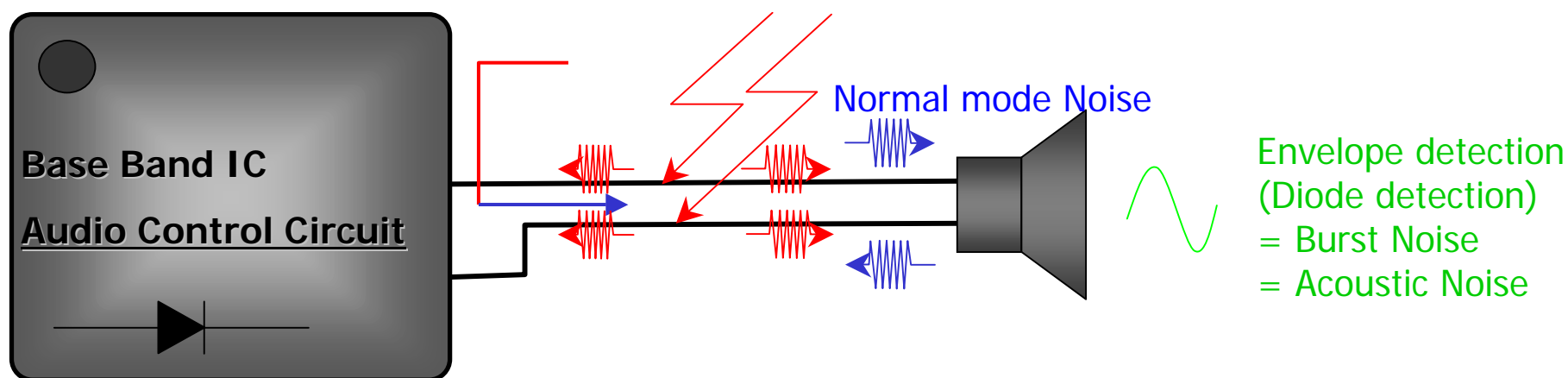
Common Mode



Solution



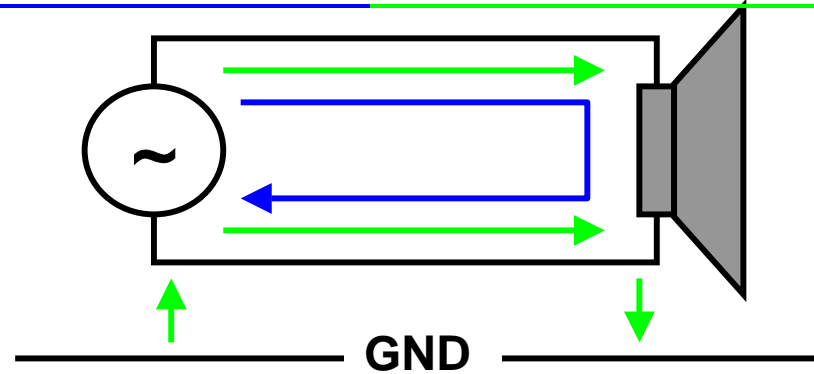
<1> 载波(900MHz/1800MHz)侵入音频线 = Common mode Noise



<2> 经过不平衡电路, The Common mode Noise会生成 the Normal mode noise.

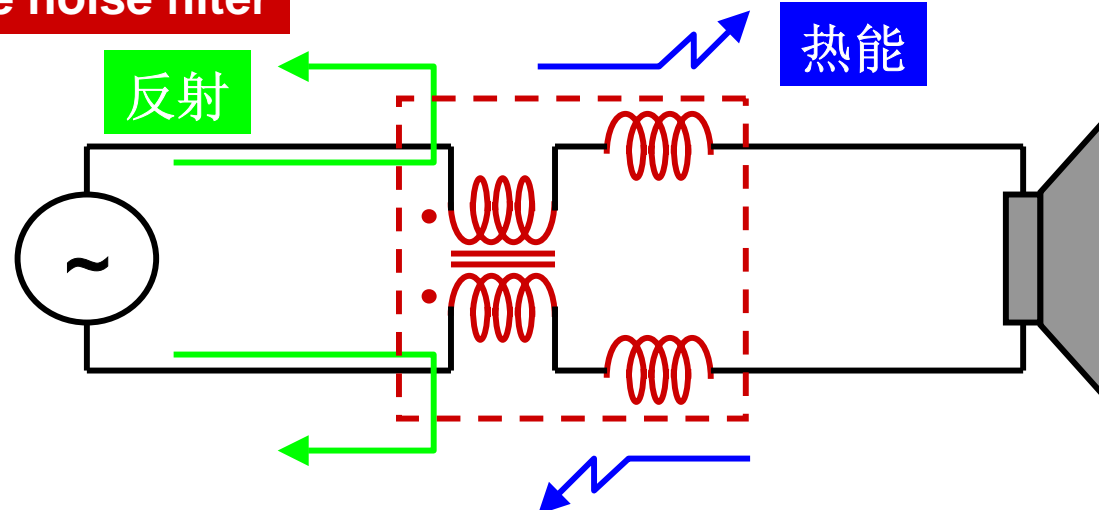
<3> 一旦 the Normal mode noise 被非线性元件(如 二极管)检出,
被检出的这个 burst noise 将导致音声上的噪音。

Normal mode/Common Mode



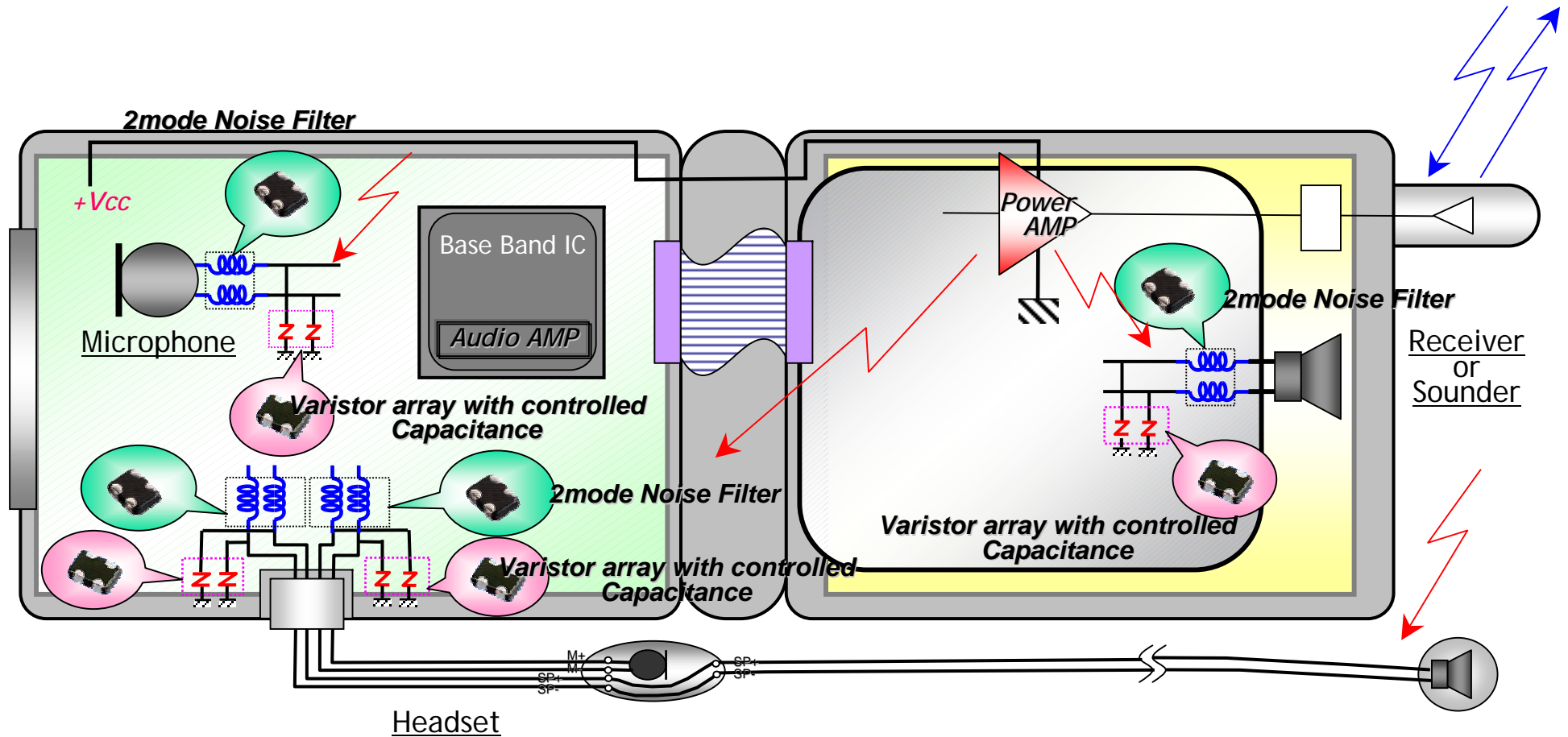
Solution

2 mode noise filter



组合使用

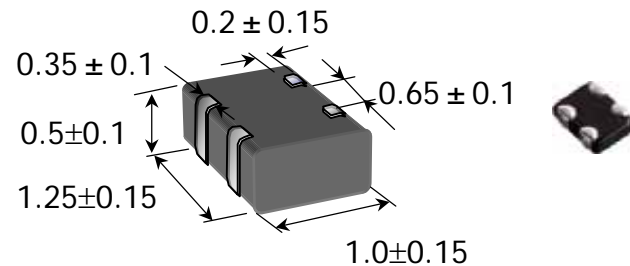
2 mode Noise Filter 和 Varistor array (Controlled Capacitance type)



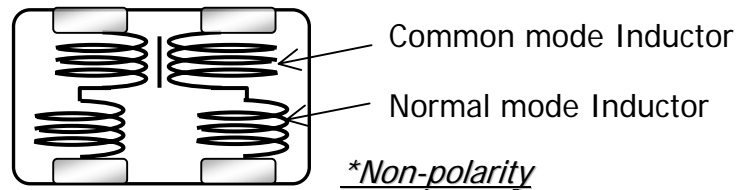
2 mode Noise Filter for Speaker <Receiver & Ringer>

Dimensions

unit: mm



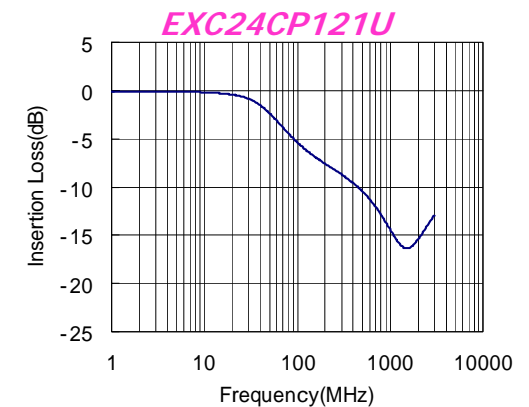
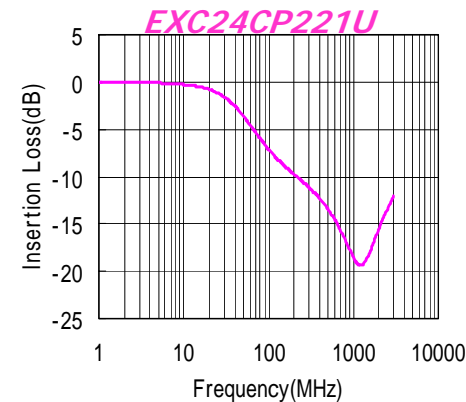
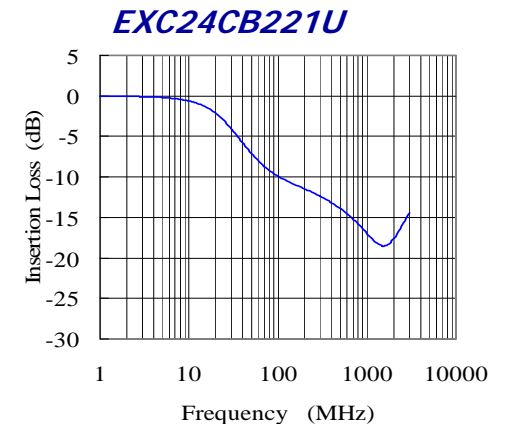
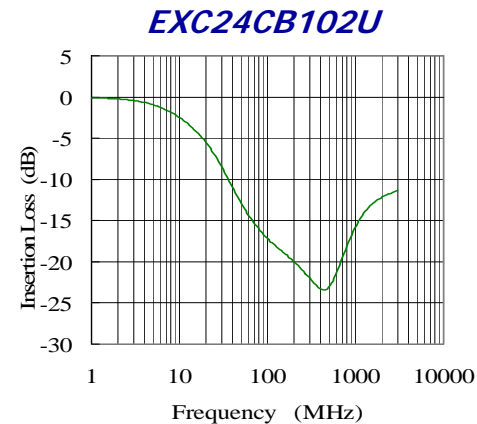
Schematics



Specifications

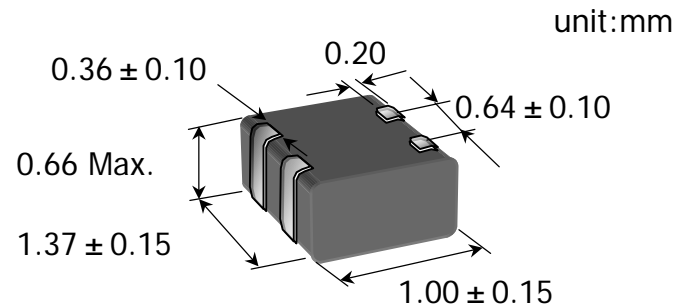
P/N	Impedance (ohm) at 100MHz		Rated Voltage (V DC)	Rated Current (mA)	DC R (ohm) max
	OPEN	Common			
EXC24CB102U	1000 typ.	450 min.	5	50	1.5
EXC24CB221U	220 typ.	100 min.	5	100	0.7
EXC24CP221U	220 typ.	60 min.	5	350	0.4
EXC24CP121U	120 typ.	60 min.	5	500	0.3

Insertion Loss Characteristics

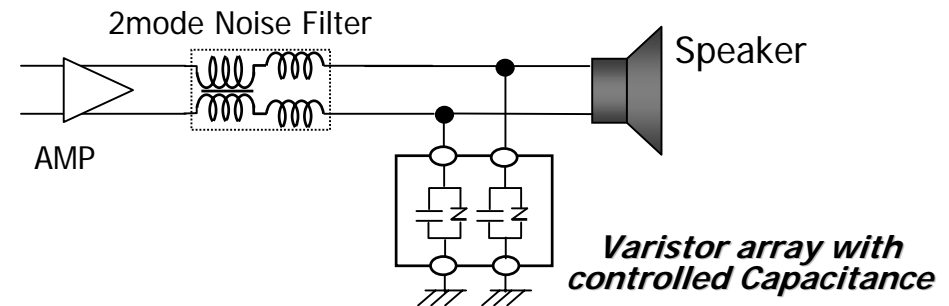


Chip Varistor Array (Controlled Capacitance type)

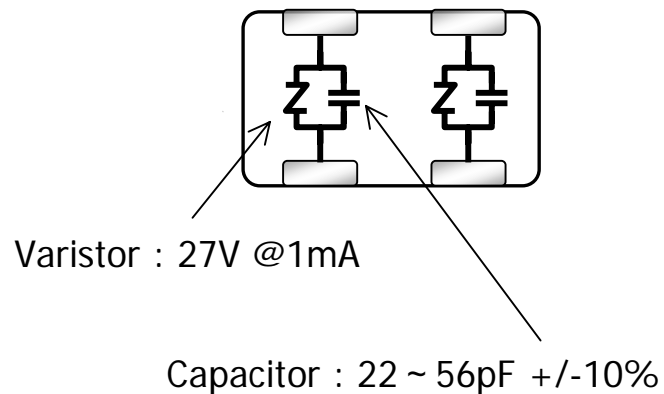
Dimensions



Application



Schematics



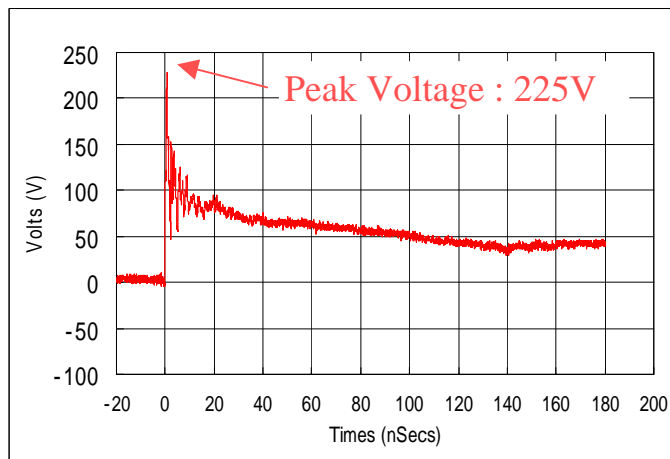
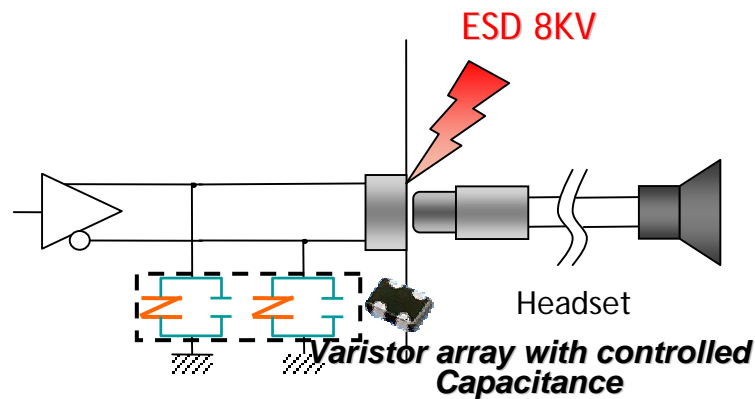
Specifications

Part No.	Capacitance	Varisoyr Voltage	Maxam
	(@1MHz)	(@1mA)	Allowable Voltage
EZJZSV270 CA K	22 pF +/-10%	27V	DC 16V
EZJZSV270 DA K	27 pF +/-10%	27V	DC 16V
EZJZSV270 PA K	33 pF +/-10%	27V	DC 16V
EZJZSV270 SA K	39 pF +/-10%	27V	DC 16V
EZJZSV270 TA K	43 pF +/-10%	27V	DC 16V
EZJZSV270 EA K	47 pF +/-10%	27V	DC 16V
EZJZSV270 WA K	51 pF +/-10%	27V	DC 16V
EZJZSV270 VA K	56 pF +/-10%	27V	DC 16V

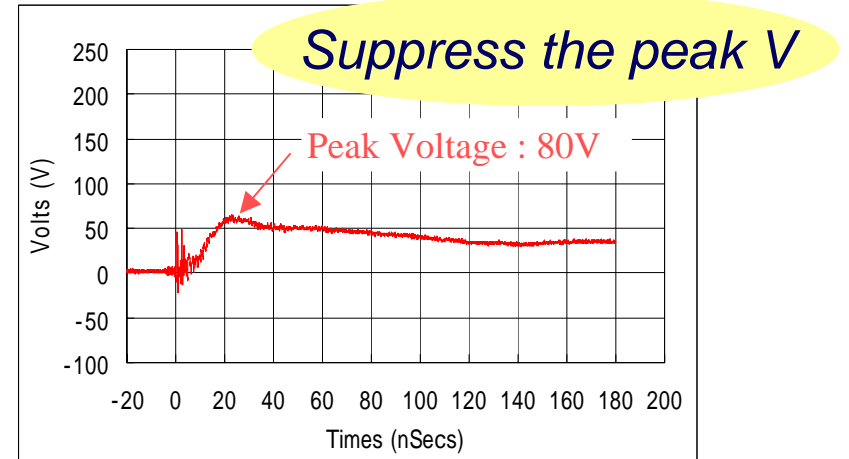
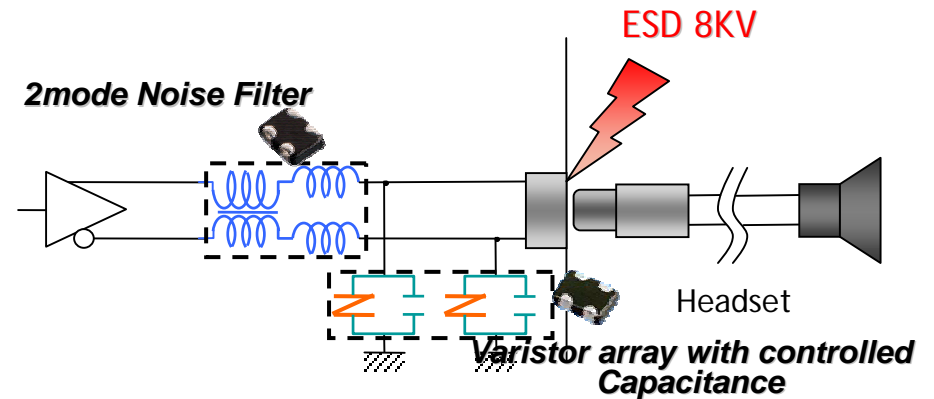
ESD(IEC61000-4-2) :Level 4 contact discharge : 8kV air discharge : 15kV

Combination of 2 mode Noise Filter & Varistor array (Controlled Capacitance type)

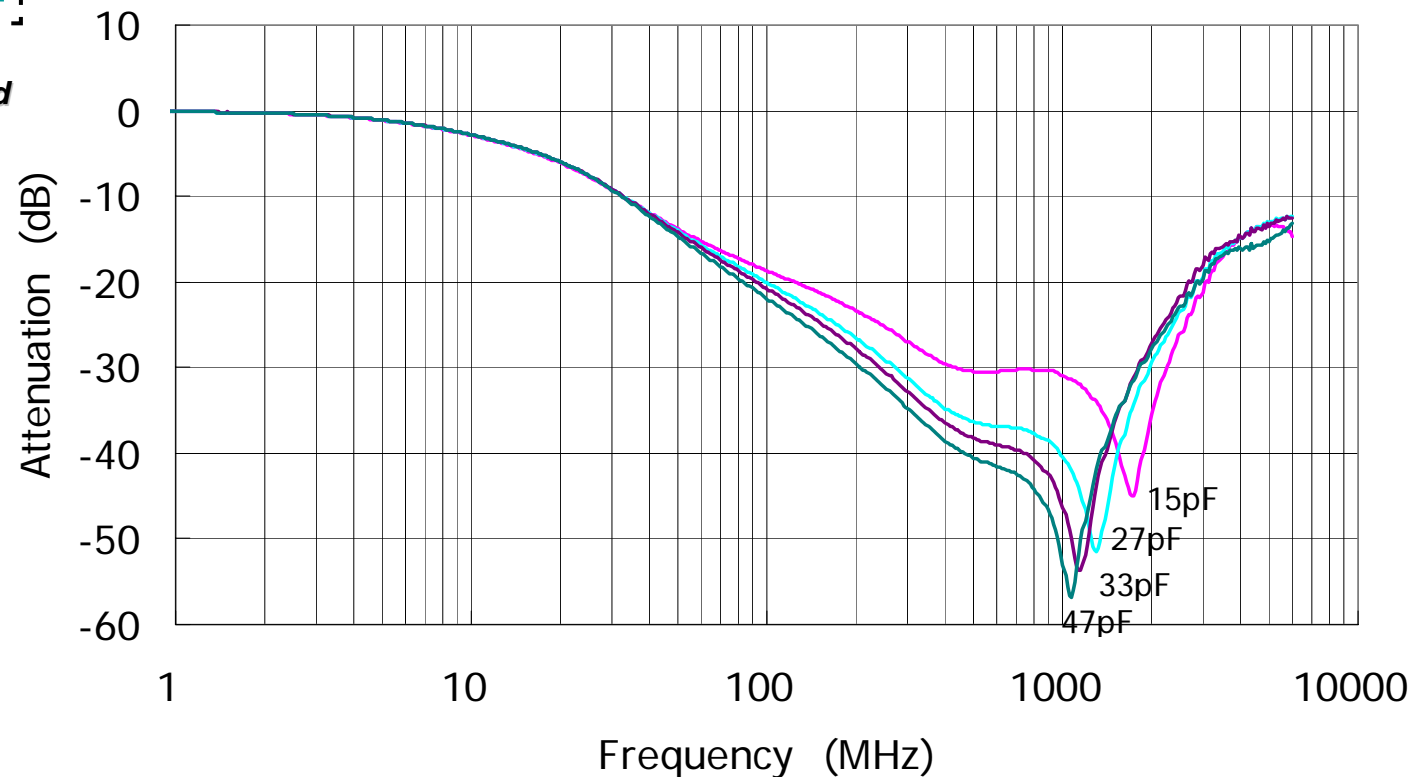
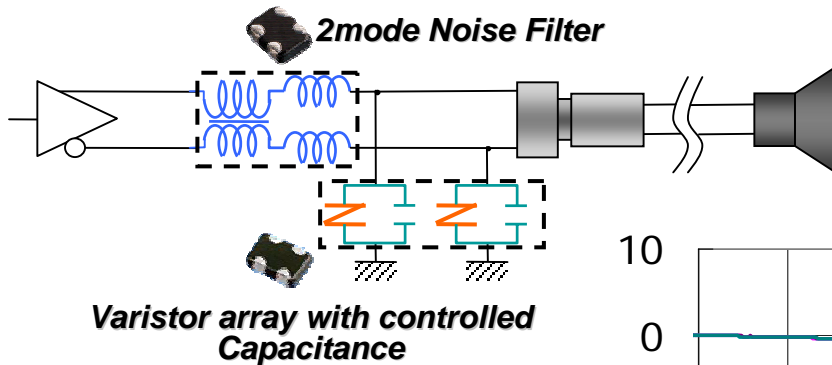
Case1. Varistor array with C



Case2. Varistor array with C+ 2mode Noise Filter



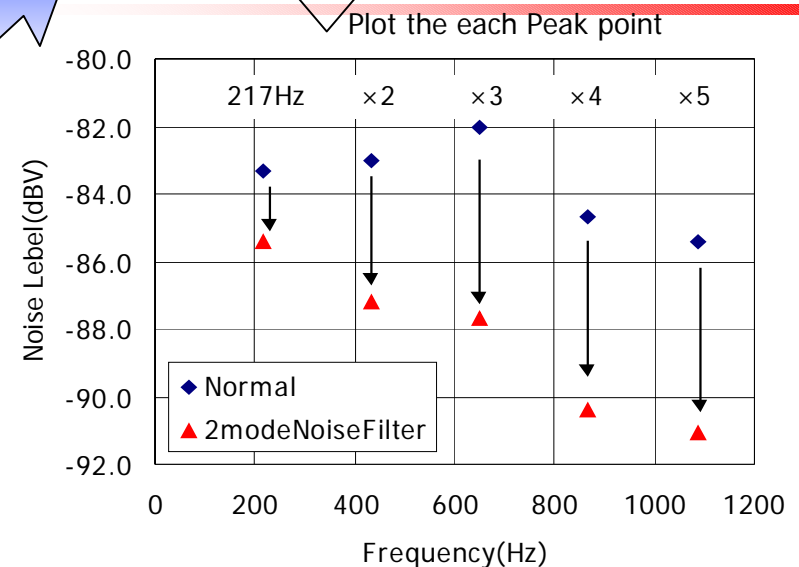
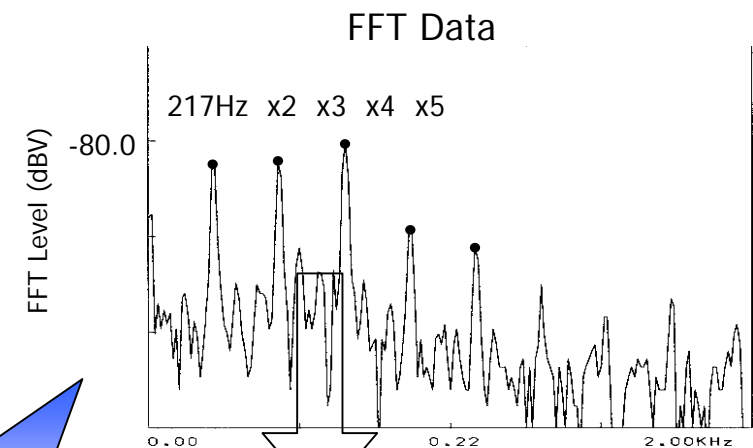
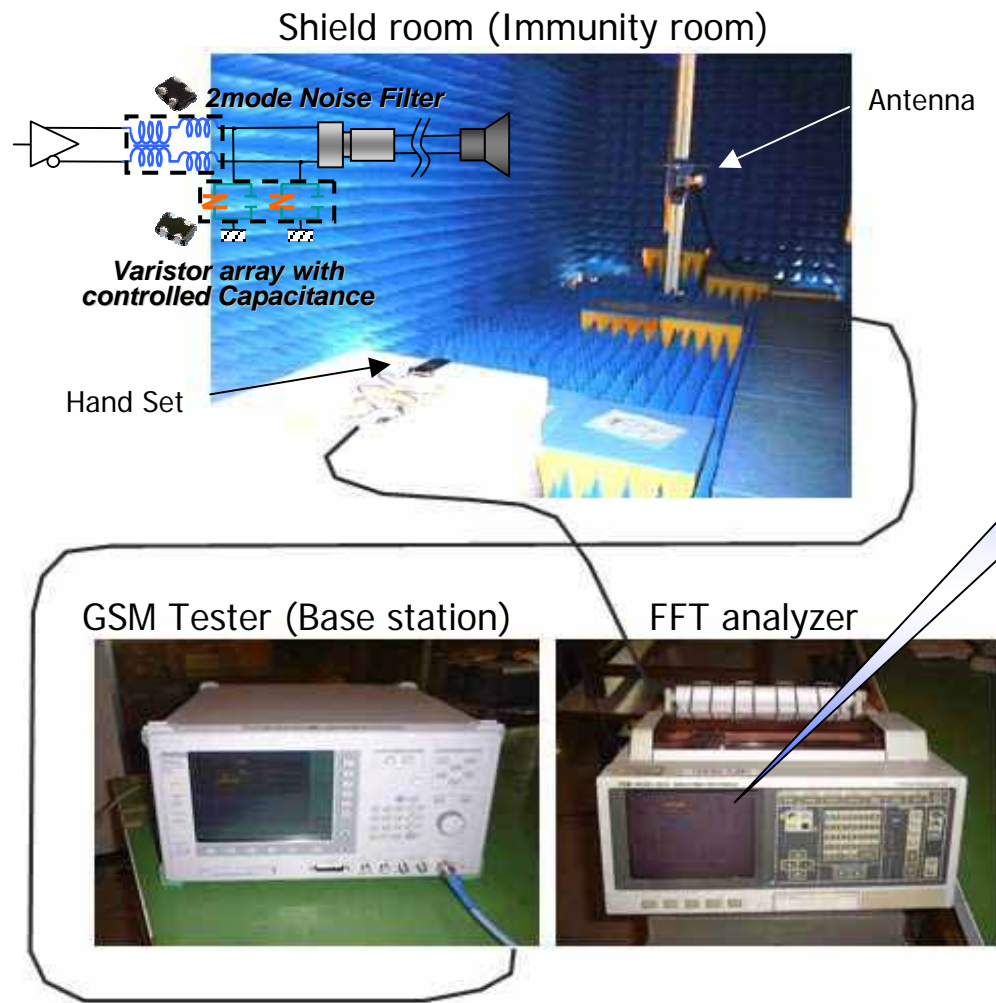
Combination of 2 mode Noise Filter & Varistor array (Controlled Capacitance type)



用与不用“2 mode noise filter”的比

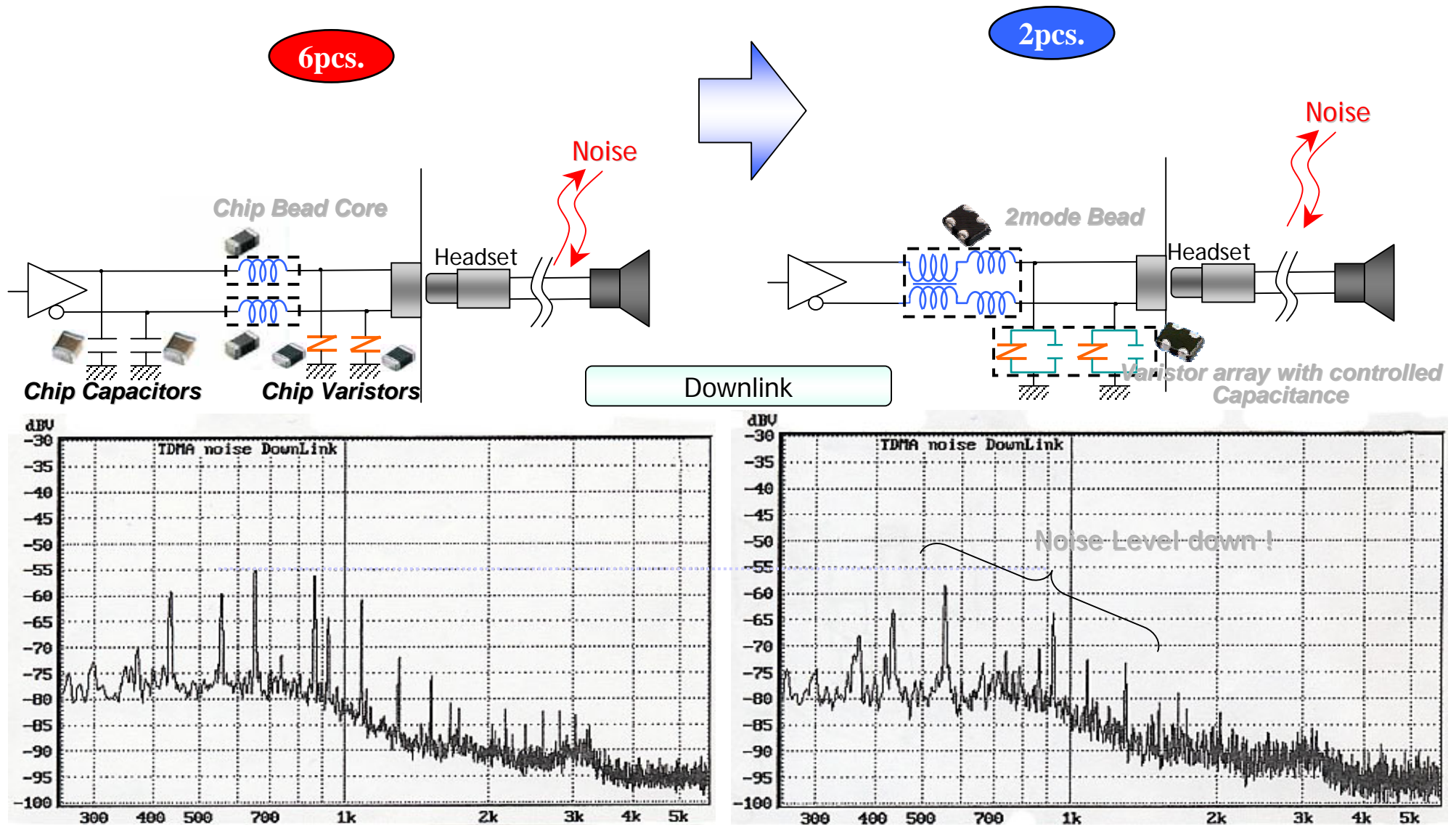
Panasonic
ideals for life

Combination of 2 mode Noise Filter & Varistor array (Controlled Capacitance type)



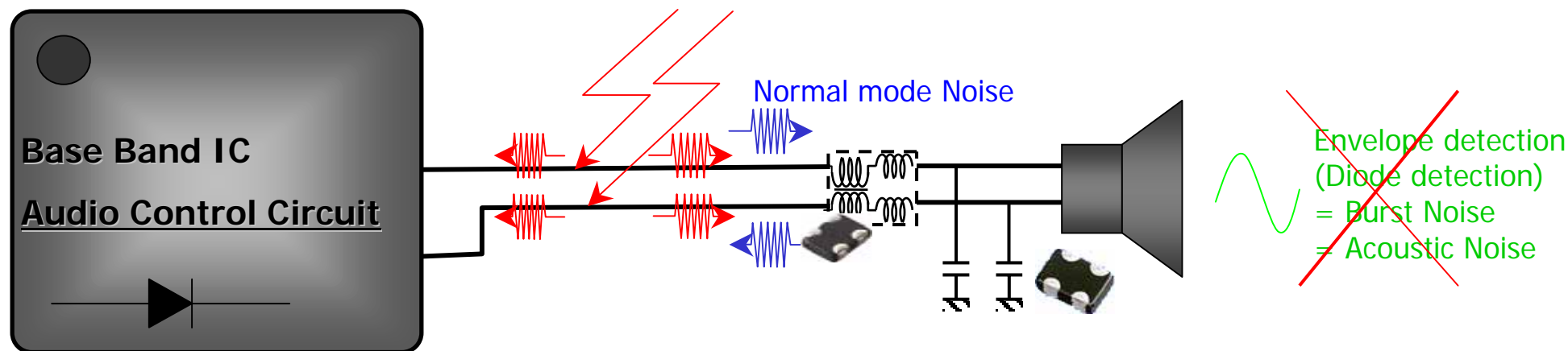
bead和2 mode noise filter的比较

Panasonic
ideals for life



防止Burst Noise的原理

<1> 在音声线上使用2 mode Noise Filter (& MLCC or Varistor array with Cap.)
来除去 Common mode Noise



《 要点! 》

<1> 如果 仅防止噪音

→ 只用 “2 mode Noise Filter”

* 如果需要调整共振频率

→ 用 “2 mode Noise Filter” + “Multilayer Ceramic Capacitor (MLCC)”

<2> 如果要同时实现防止噪音和防止静电

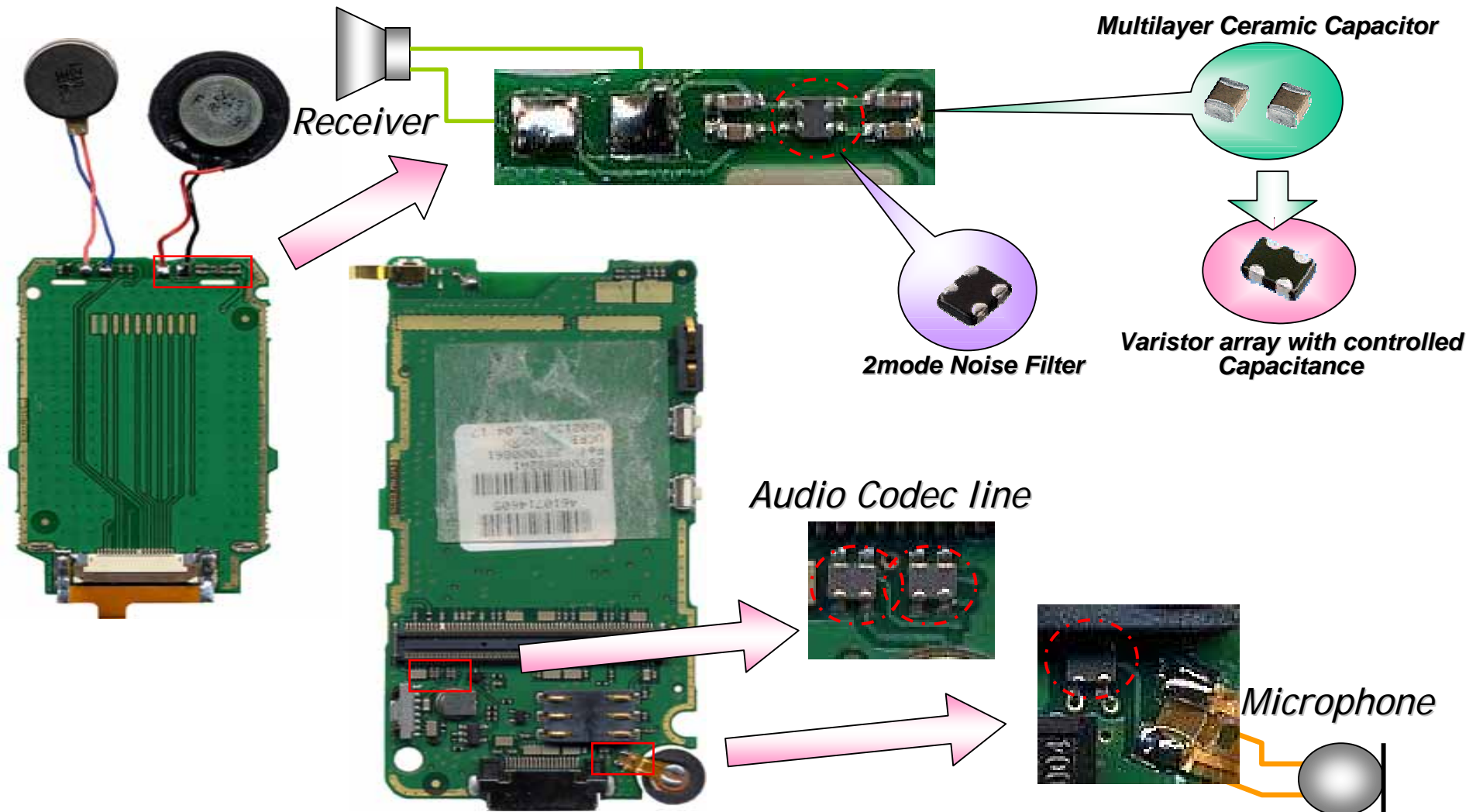
→ 用 (Best Solution!):

“2 mode Noise Filter” + “Chip Varistor array with controlled Capacitance”

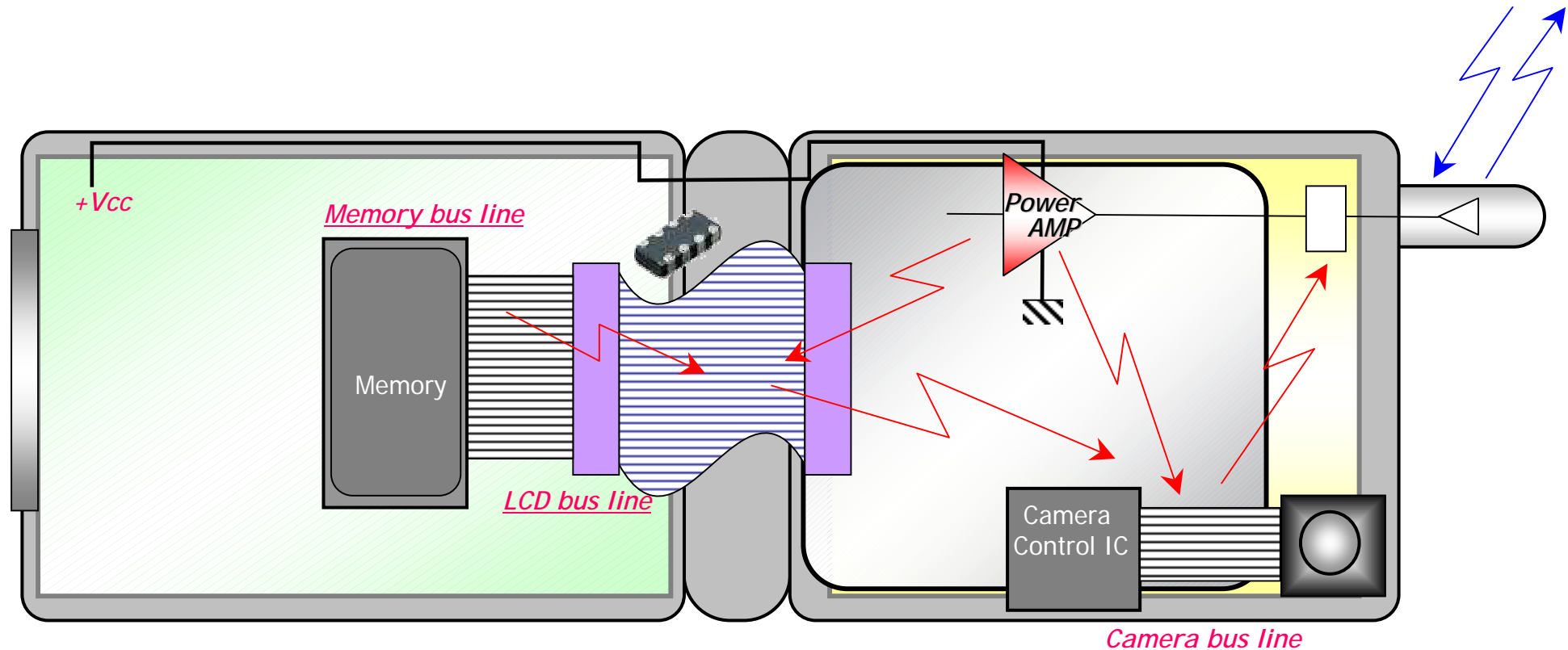
* 不推荐使用齐纳二极管来抗噪

→ 因为齐纳二极管会检出burst noise, 并产生浮游电容值(stray capacity).

For example : Noise suppression for Audio line



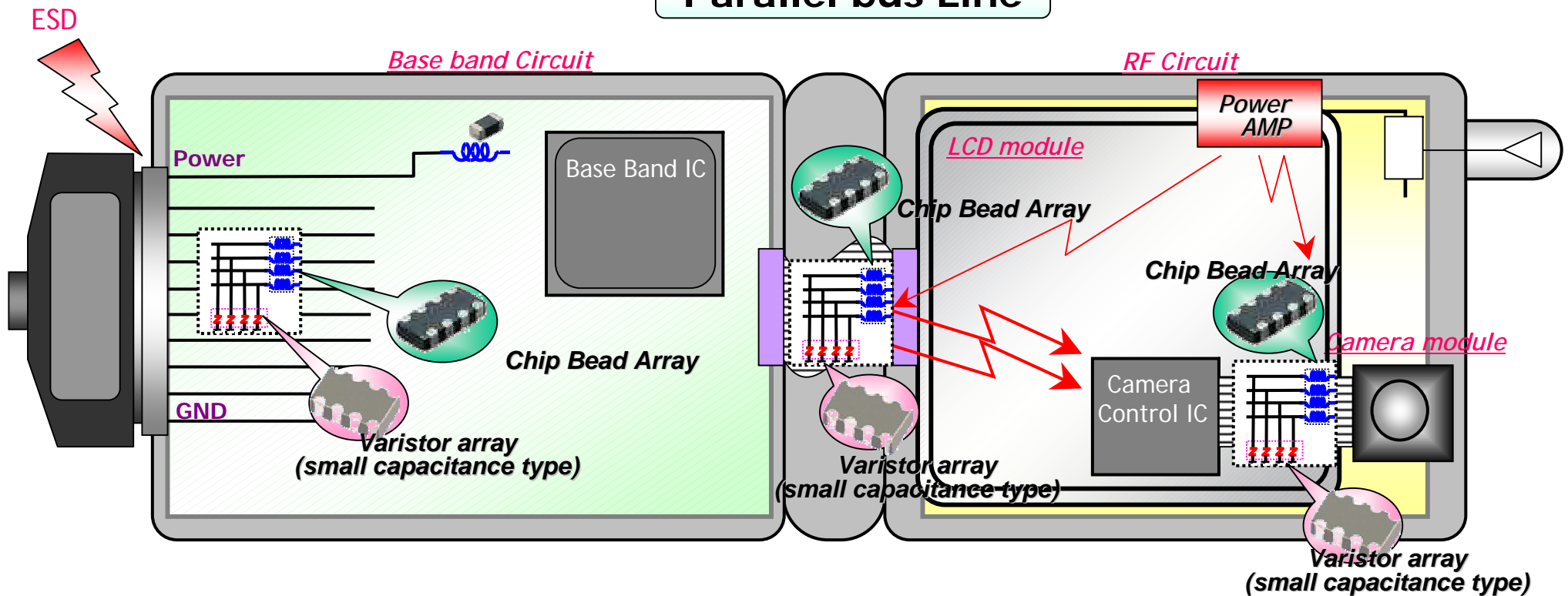
Mechanism of communication quality deterioration



- ➔ Communication quality is deteriorated in the conduction noise of a memory line, or the radiation noise of LCD and camera bus line.
For example, the noise of the same frequency band as a carrier wave may burst into RF circuit from a flexible board of LCD bus line, and may incorrect-operate.

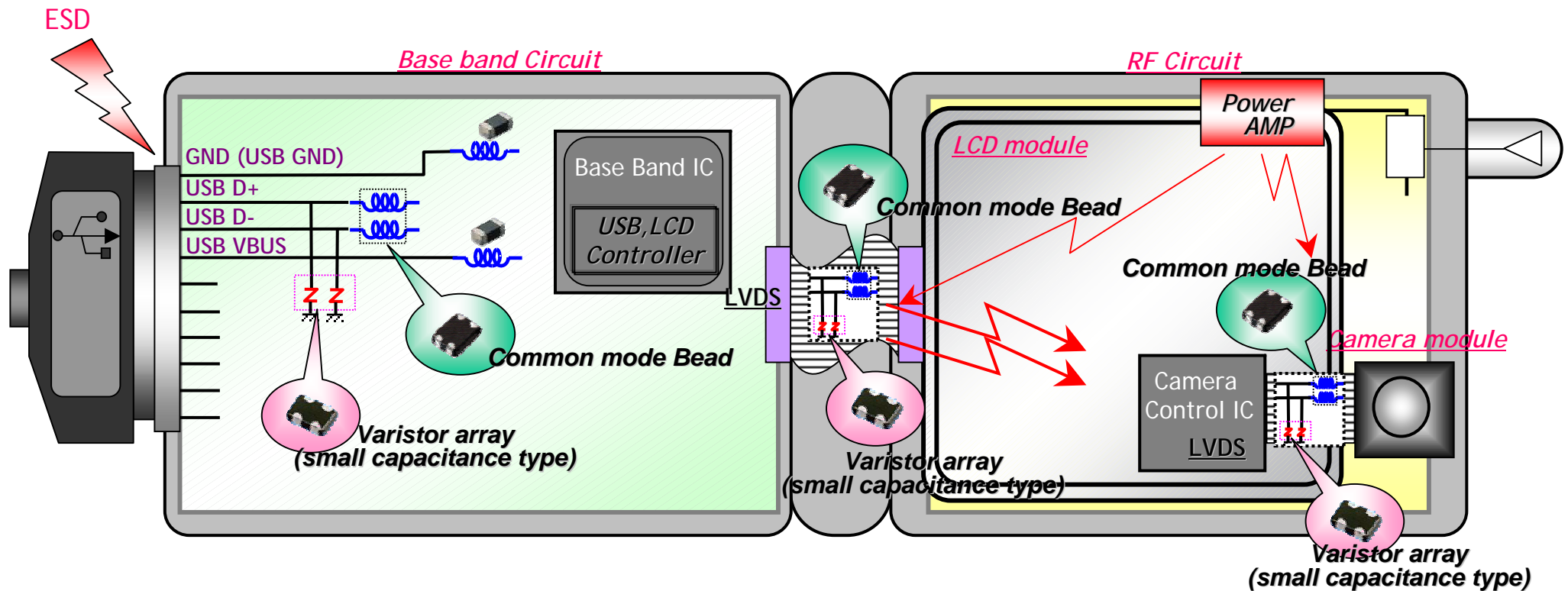
Chip Bead Array & Varistor array (small Capacitance type)

Parallel bus Line



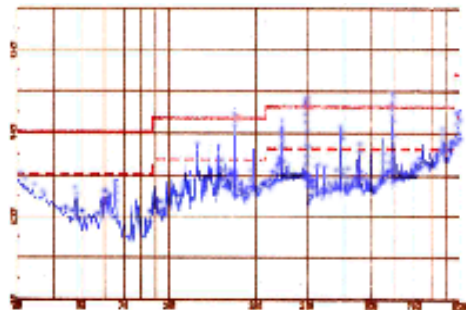
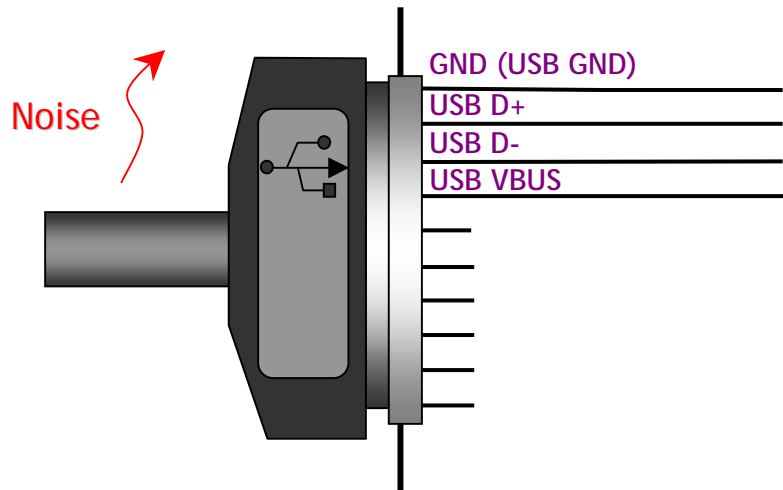
Common mode Bead & Varistor array (small Capacitance type)

Differential Signal bus Line

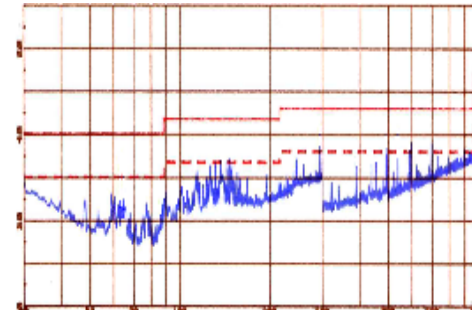
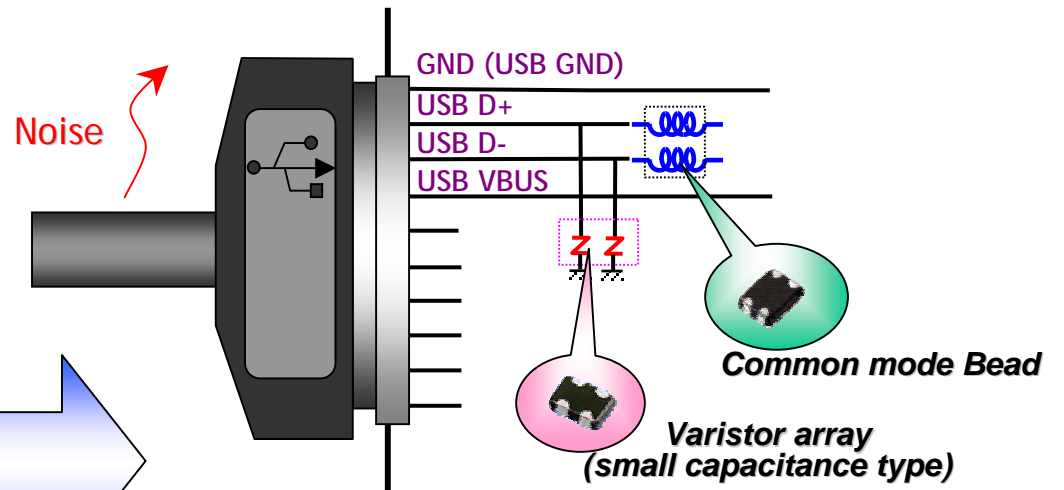
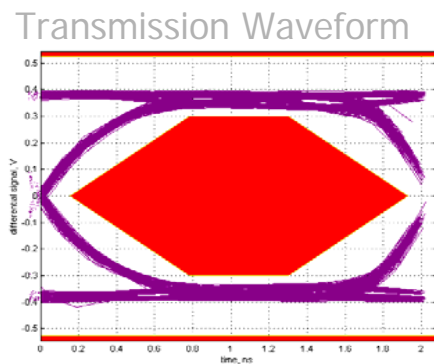


USB总线的抗噪和抗静电对策

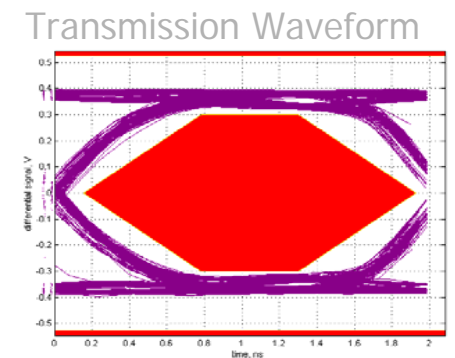
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ideals for life



Radiation Noise Level



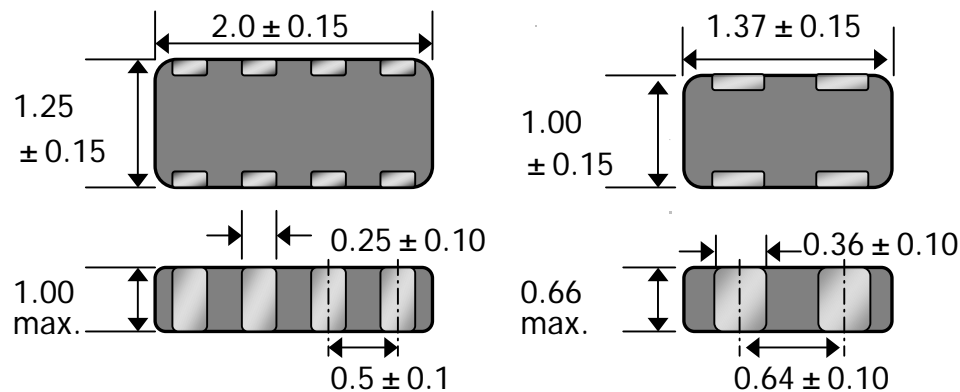
Radiation Noise Level



Chip Varistor array (低电容型)

Dimensions

unit:mm

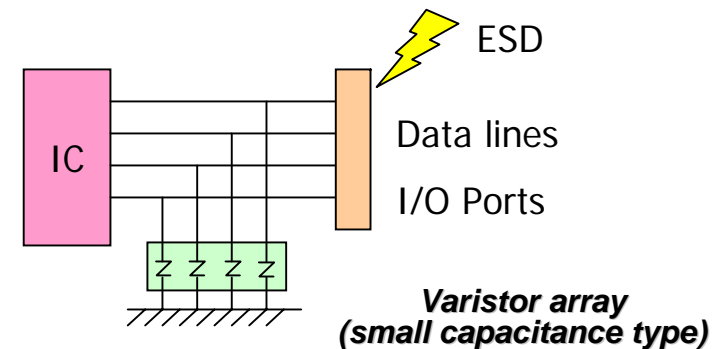


Specifications

Chip Size	2 elements in 0405		4 elements in 0508
Part No.	EZJZSV800AA	EZJZSV171AA	EZJZRV171AA
Max. Allowable Voltage	DC18V	DC18V	DC18V
Varistor voltage @1mA	80V	170V	170V
Capacitance @1MHz	3pFmax.	3pFmax.	3pFmax.
ESD(IEC61000-4-2)	Level 4 contact discharge : 8kV air discharge : 15kV		

Application

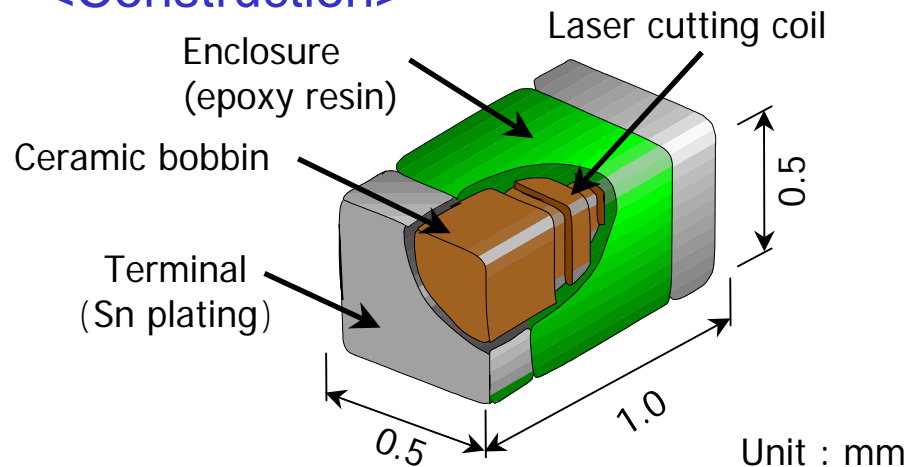
For suppression the pulse noise (ESD etc.) of the electronic equipment.



*4array type MP:Oct./2003

Chip LR composite device

<Construction>

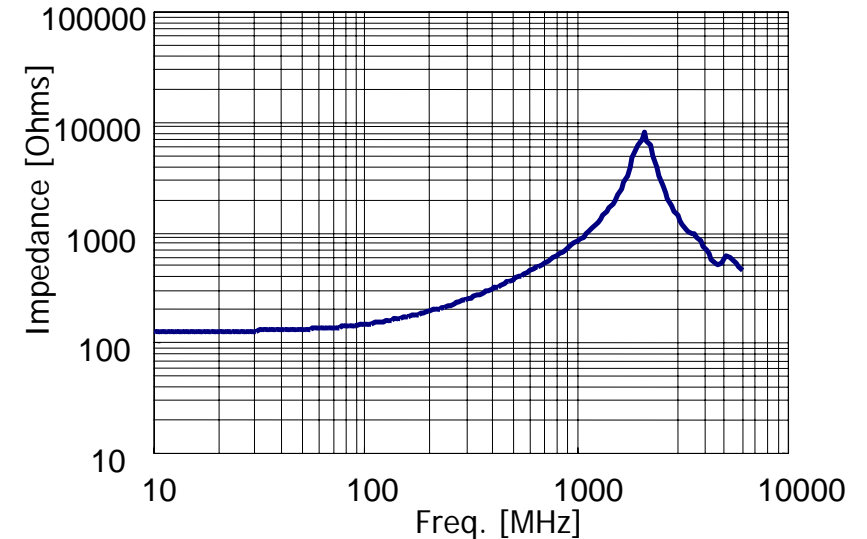


Make Coil conductor by resistive element
L & R are build up at once by laser cutting.

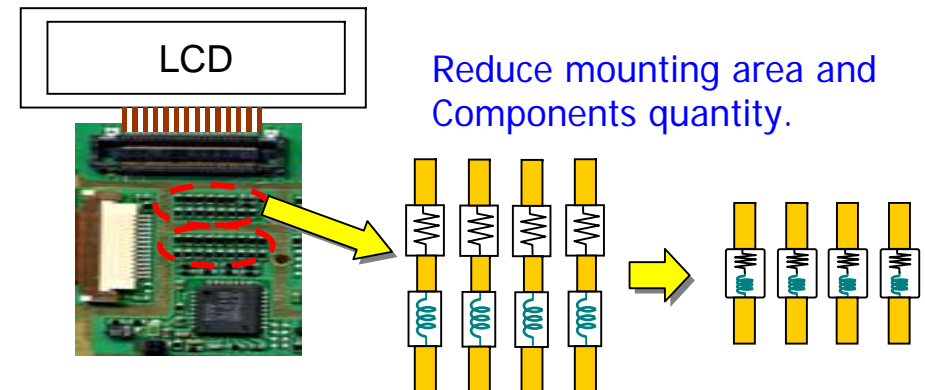
<Specifications>

Resistance	80 to 120 ohm
Rated Power	1/32W (per resistor)
Inductance	100 nH : +/- 25%
Rated Voltage	12 V

<Characteristics>

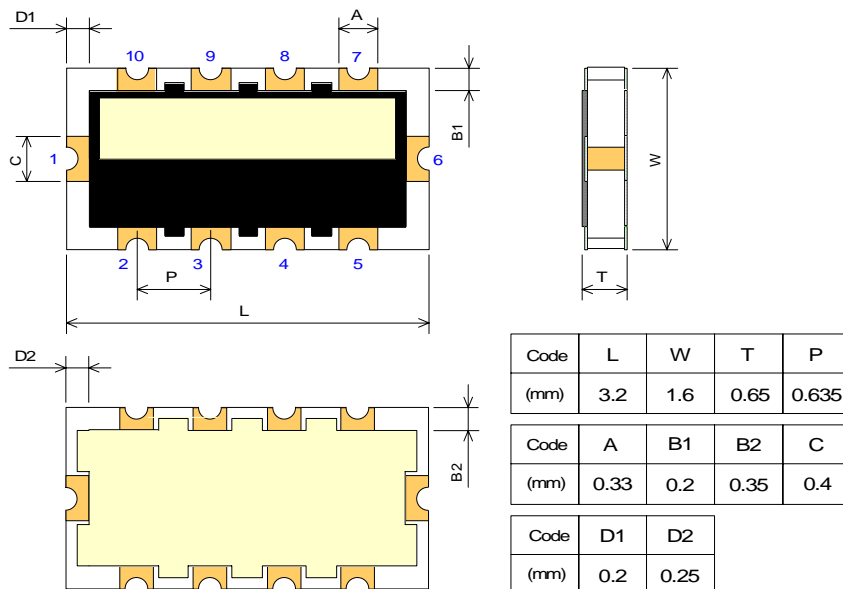


<Application>

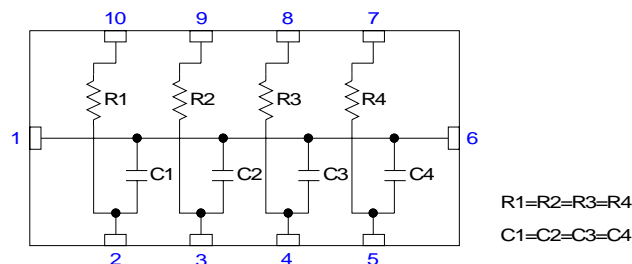


Chip RC Networks

<Dimension>



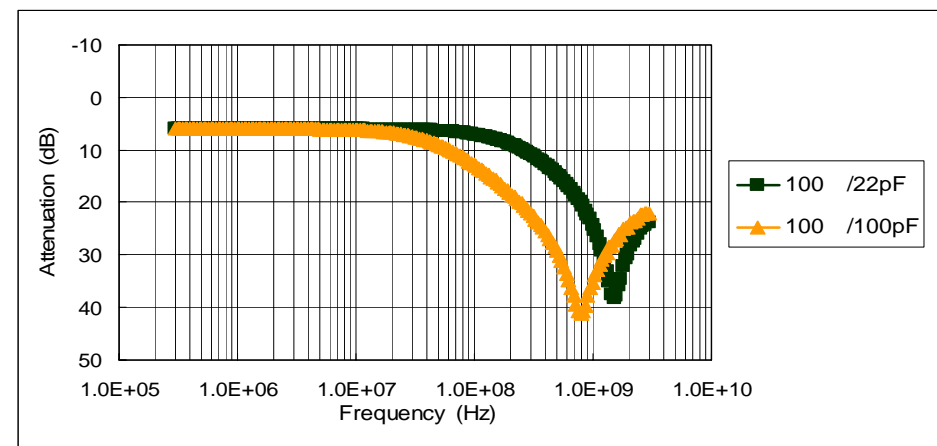
<Circuit>



<Specifications>

Resistance Value	10 ohm to 100k ohm : +/-5% Standard : 22 ohm, 47 ohm, 100 ohm
Rated Power	1/16W (per resisitor)
Capacitance Value	10 pF to 100 pF : +30%/-20% Standard : 22 pF, 47 pF, 100 pF
Rated Voltage	12 V
Temperature Range	-25 deg C to +85 deg C

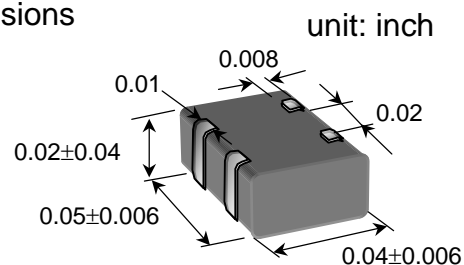
<Characteristics>



Common mode Bead Array : EXC24CC,CD type

for USB1.1

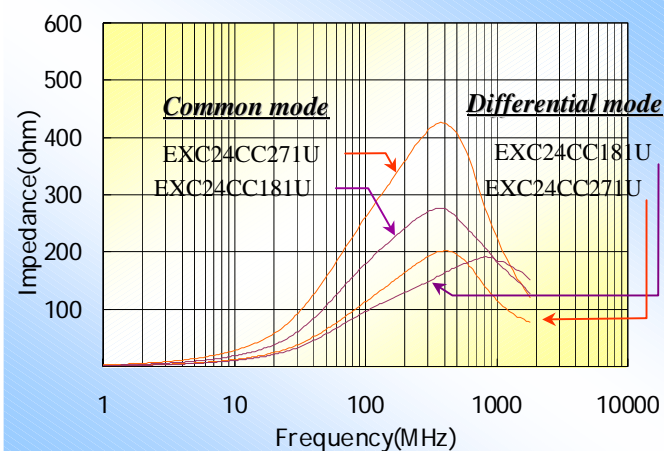
Dimensions



Specifications

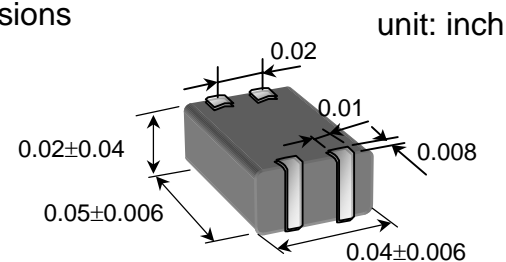
P/N	Impedance (ohm) at 100MHz		Rated Voltage (V DC)	Rated Current (mA)	DC R (ohm) max
	Common	Differential			
EXC24CC271U	270 typ.	160 max.	5	100	1.5
EXC24CC181U	180 typ.	160 max.	5	100	1.2

Impedance Characteristics



for USB2.0,IEEE1394,LVDS,TMDS

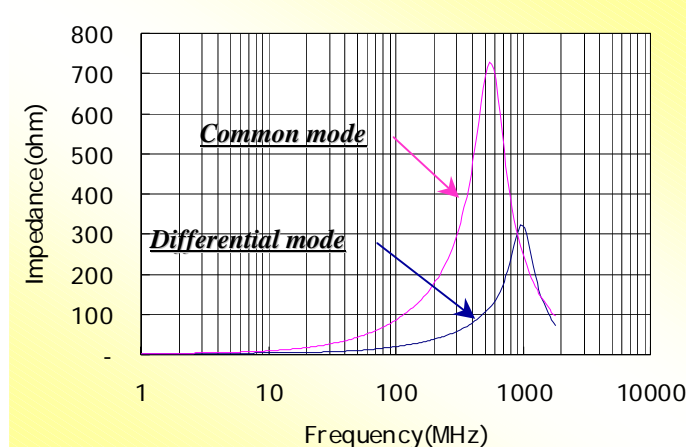
Dimensions



Specifications

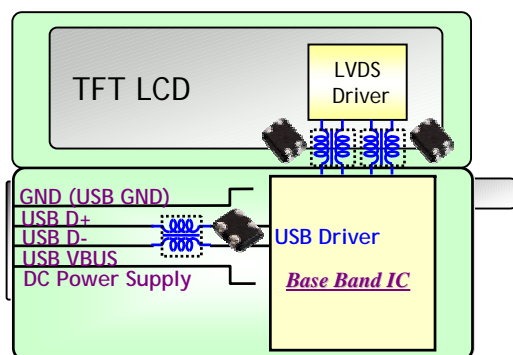
P/N	Impedance (ohm) at 100MHz		Rated Voltage (V DC)	Rated Current (mA)	DC R (ohm) max
	Common	Differential			
EXC24CD900U	90 typ.	30 max.	5	100	2.0

Impedance Characteristics

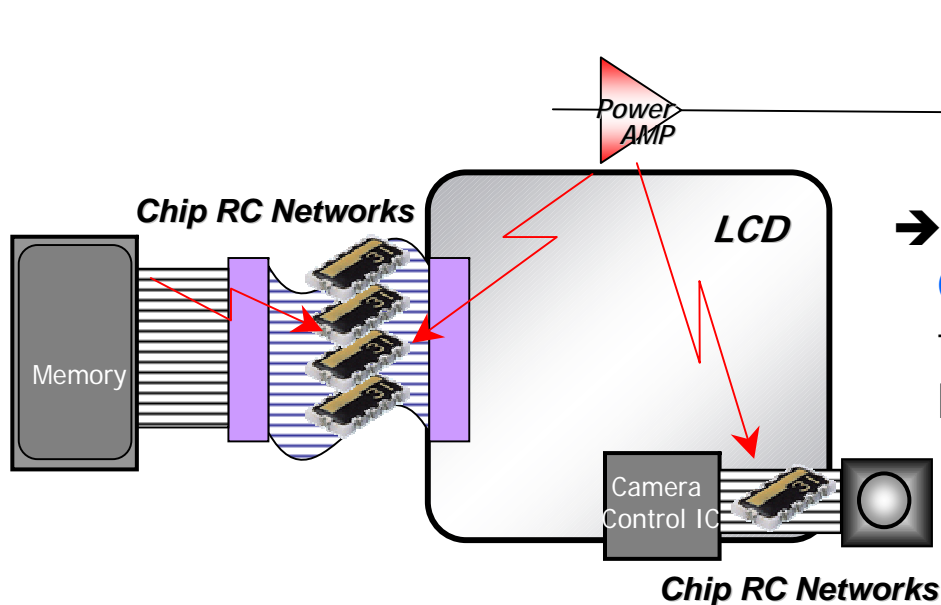


Applications

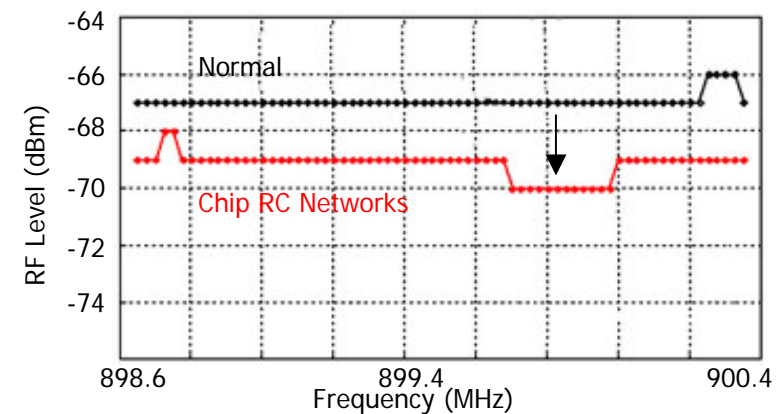
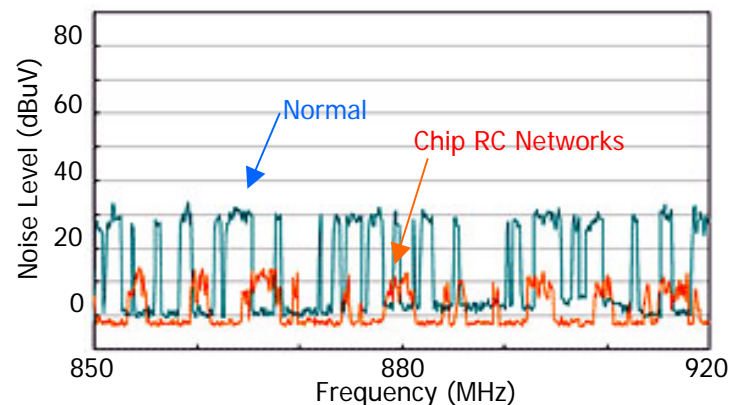
Differential Signaling Line
(USB, IEEE1394, LVDS etc.)

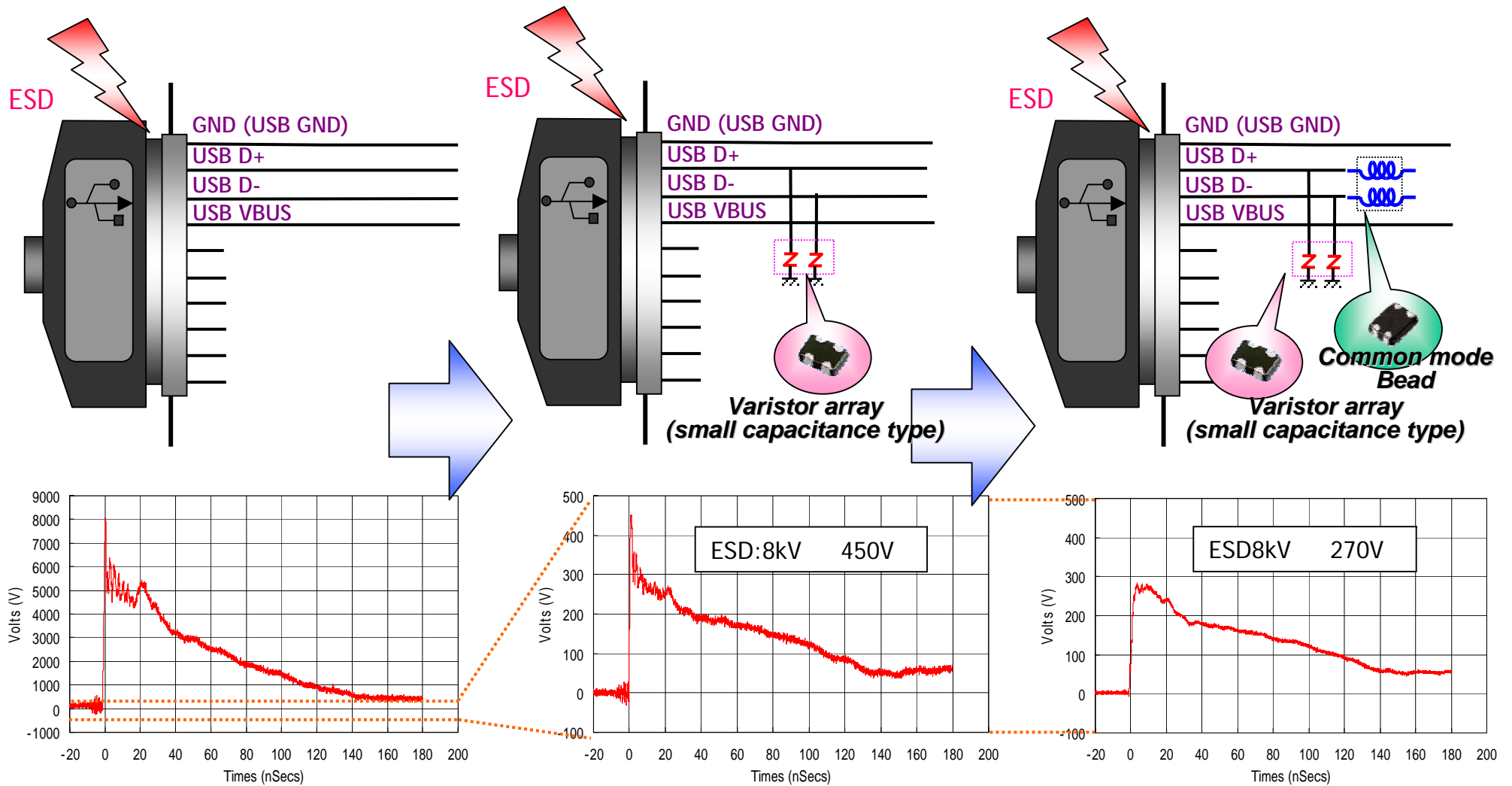


Mechanism of communication quality UP



→ By using **Chip RC network** or **Chip LR Filter** or **Chip Bead Core+ MLCC**, the radiation noise from a flexible board is suppressed and the bit error of RF circuit is reduced.





For example : Noise suppression for LCD bus line

