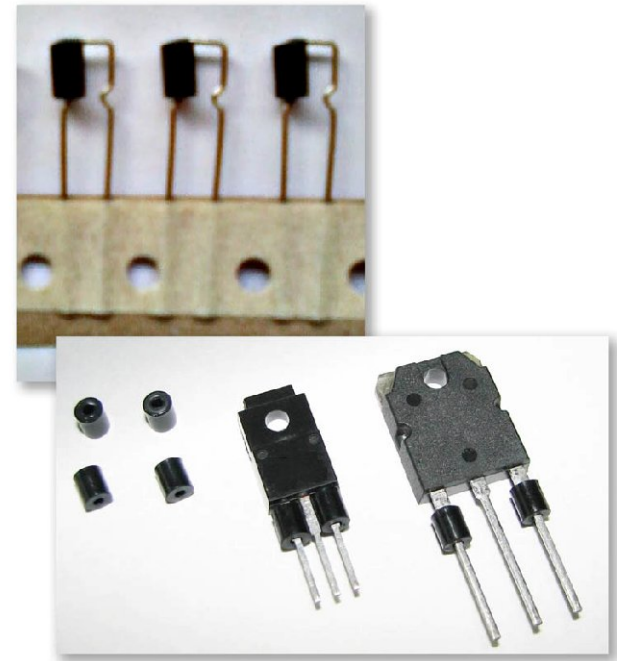
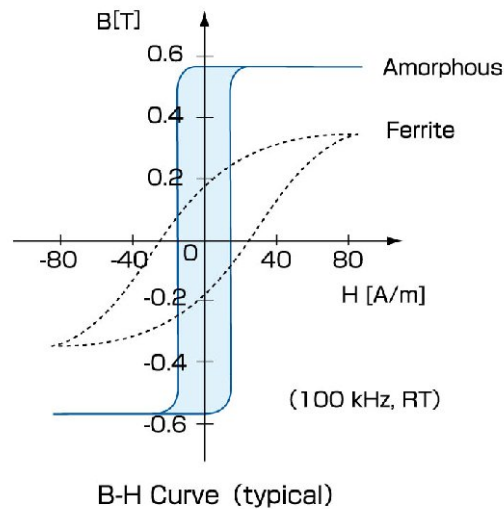


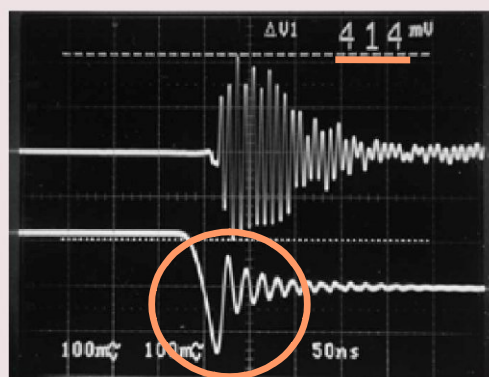
# Amorphous Noise Suppression Devices

“AMOBEBADS®”



“AMOBEBADS®” suppresses directly the rapid change of current or voltage as the origin of noise, which reduces circuit noise. It differs Ferrite beads as absorbing noise occurred.

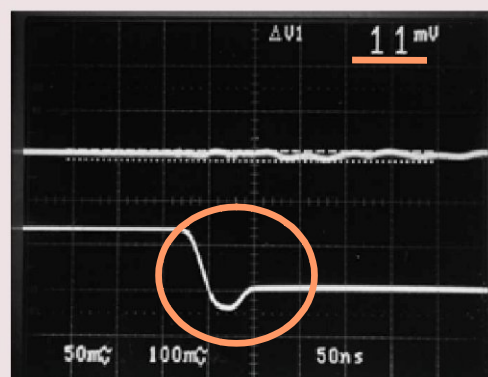
☆ Example of the noise suppression on a Chopper Converter



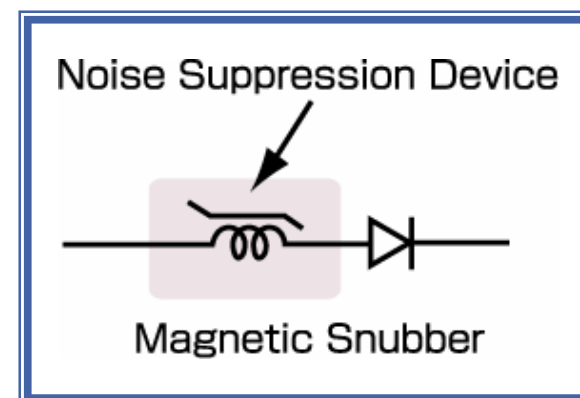
Without Countermeasure

Output Noise

Diode Current  
1 A/div



With AMOBEBADS®



☆ Effective suppression of noise

Minimize directly the rapid change of current or voltage

☆ Low loss and temperature rise

Cobalt based amorphous material has low loss at high frequency

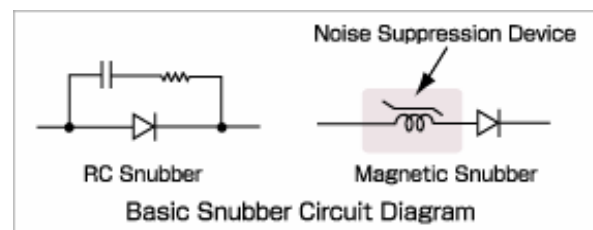
☆ Low influence against circuit parts

High rectangular ratio means low influences such as surge voltage.



## FEATUERS

- ☆ Improvement in **Cost Performance** over conventional "AMOBEADS®" by optimizing new case material and the structure.
- ☆ **Superior Noise Suppression** over RC Snubbers and Ferrite Beads. Can be used to reduce parts, reduce cost, and save circuit board space.



## STANDARD SPECIFICATION

\*New size AB2.8X4.5DY

RoHS compliant products

| TYPE                       | Finished Dimensions [mm] <sup>1)</sup> |               | Total Flux<br>$\Phi_c [\mu \text{Wb}]$ | Reference                                      |
|----------------------------|----------------------------------------|---------------|----------------------------------------|------------------------------------------------|
|                            | O.D.                                   | H.T.          |                                        |                                                |
| <b>New</b> AB 2.8 x 4.5 DY | $4.0 \pm 0.2$                          | $5.7 \pm 0.3$ | min. 0.9 <sup>2)</sup>                 | Casing : Black PBT<br>packing unit : 10kp/pack |
| AB 3 x 2 x 3 W             | $4.0 \pm 0.2$                          | $4.2 \pm 0.3$ | min.0.9                                | Casing : Blue PBT                              |

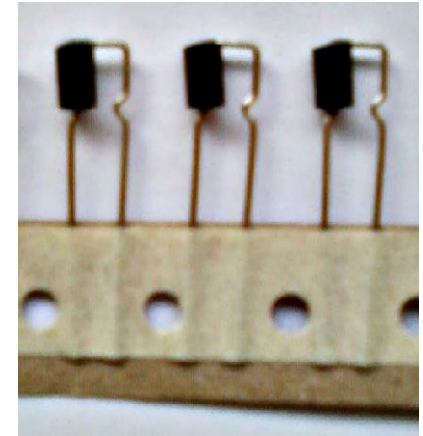
1) The Inner Diameter is such that a lead of 1.2mm x 0.7mm can be inserted.

2) Converted from Inductance Value L1 at 1kHz, 100mA(sine wave), RT.



## FEATUERS

- ☆ Possible to supply AMOB EADS<sup>®</sup> with taping radial lead
- ☆ Easily replacement from ferrite beads with lead
- ☆ Simple structure succeed high cost performance



## STANDARD SPECIFICATION

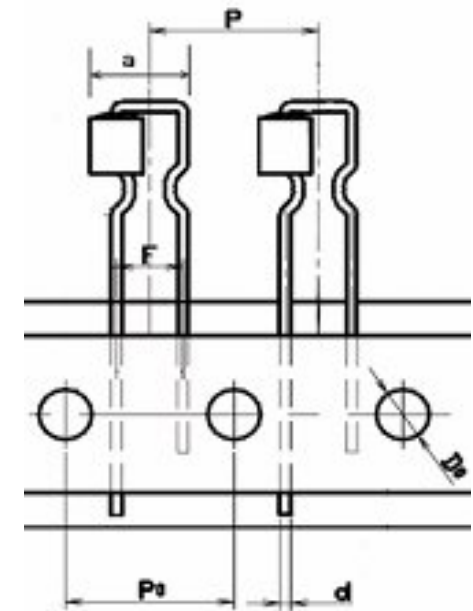
RoHS compliant products

| TYPE           | Current <sup>1)</sup><br>I [A] | Total Flux <sup>1)</sup><br>$\Phi_c [\mu \text{Wb}]$ | Packing unit<br>(p/pack) |
|----------------|--------------------------------|------------------------------------------------------|--------------------------|
| LB 2.8 x 4.5 U | ( 5 )                          | min.0.9                                              | 3,000                    |

1) Converted from Inductance Value L1 at 1kHz, 100mA (sine wave), RT.

Unit : mm

| P    | PO   | D0         | a     | d          |
|------|------|------------|-------|------------|
| 12.7 | 12.7 | $\phi 4.0$ | 9.0以下 | $\phi 0.8$ |



**Radial Taping**

# Application Examples

## Replacement from Ferrite beads

### ☆ Output noise reduction (Forward converter)

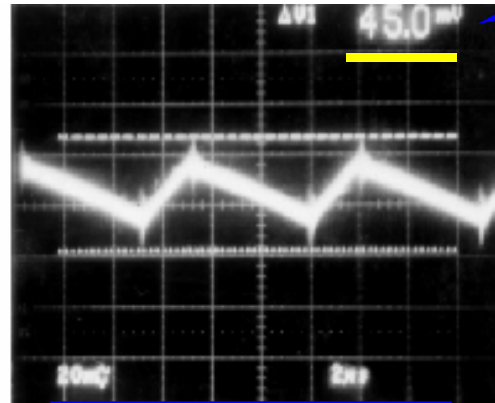
**Noise Reduction**



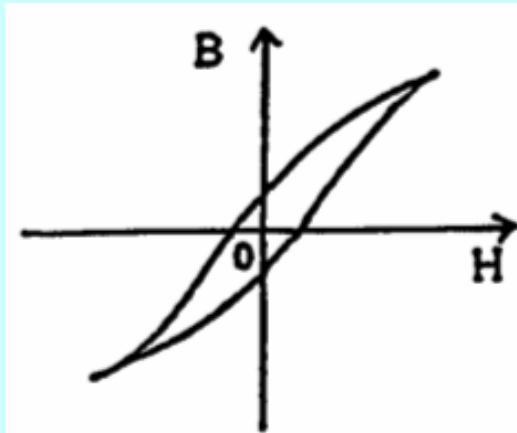
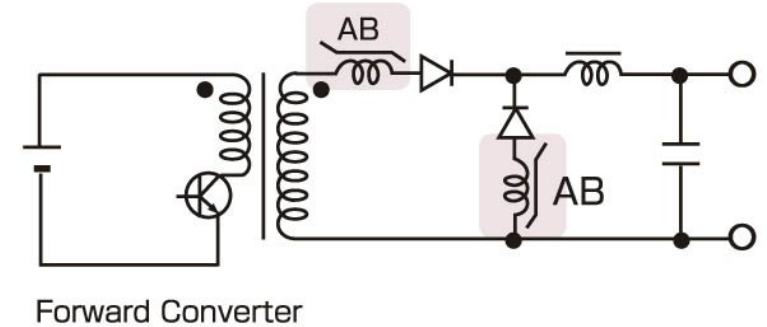
Output Noise  $V_N$   
20mV/div

CR snubber + ferrite beads

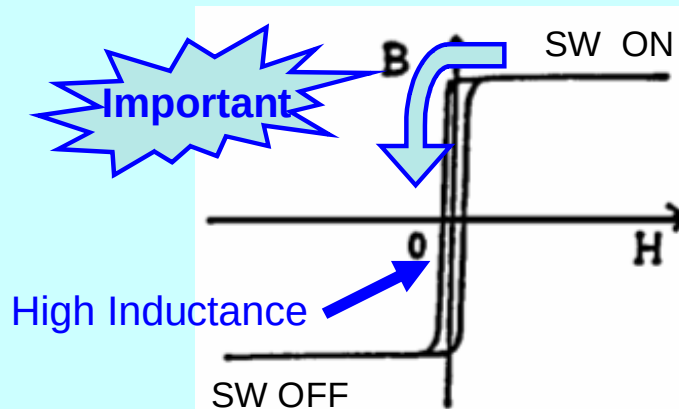
15V / 10A



**AMOBEADS®**



ferrite beads



**AMOBEADS®**

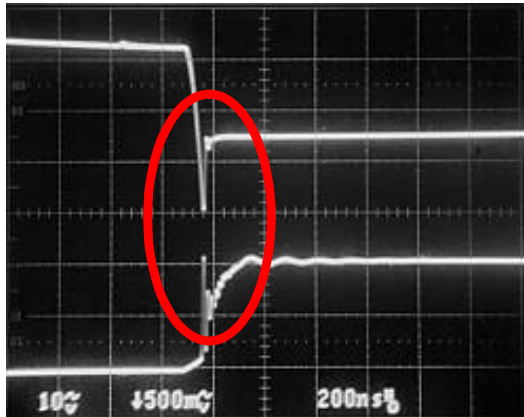
High inductance, during zero crossing of current, makes spike current reduce and suppress the noise.



### ☆ Suppression of reverse recovery current of diode (Inverter of Back Light)

Current  
1A/div

Voltage  
10V/div

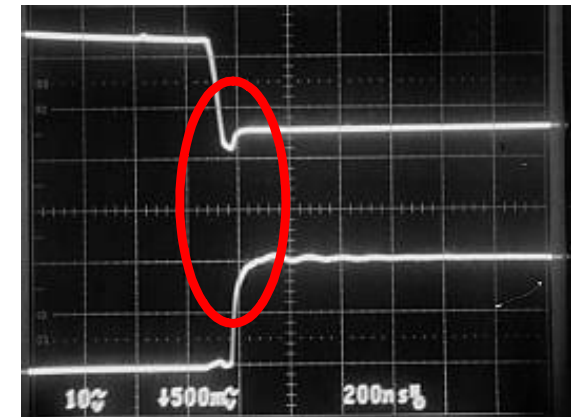


**Without Countermeasure**



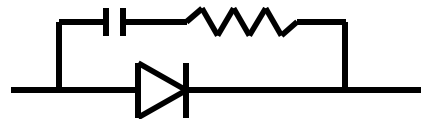
**CR 0.01  $\mu$ F – 10  $\Omega$**

**Low effect by CR snubber**

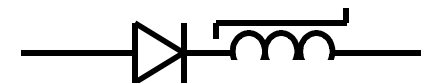


**AMOBEADS®**

**Effective suppression by  
AMOBEADS®**



**CRsnubber**: In parallel to diode.  
Heat loss by absorbing  
change of voltage

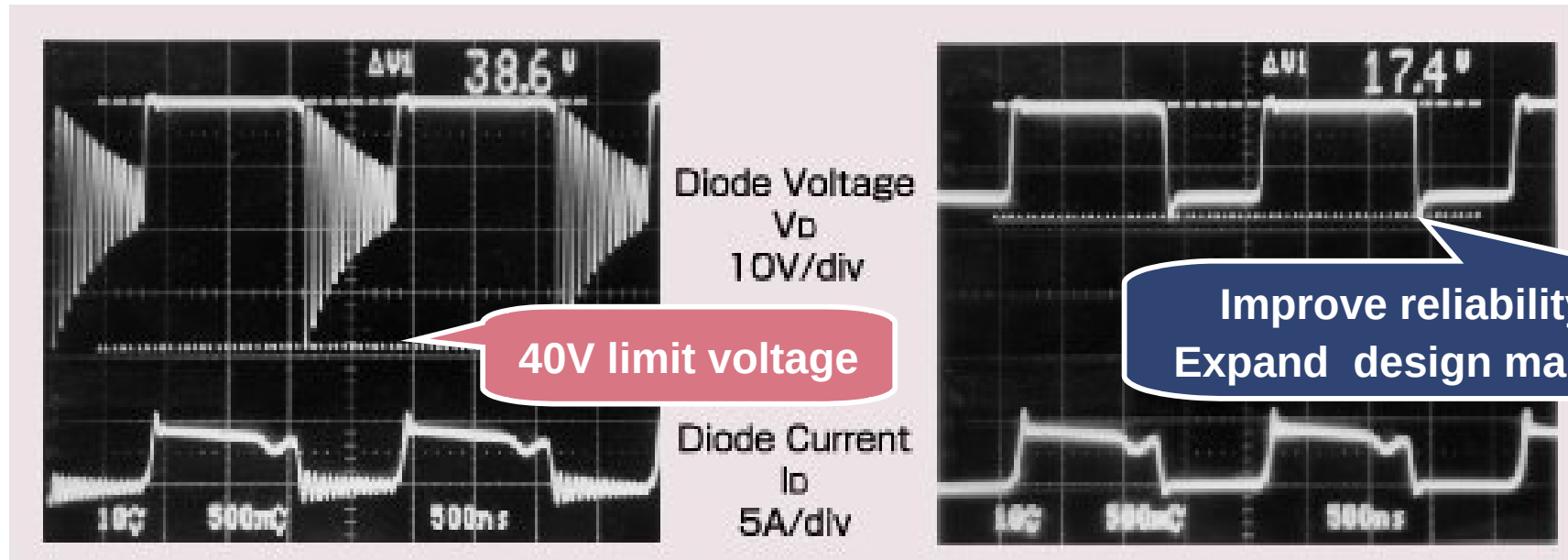


**AMOBEADS®**: In series to diode.  
Suppress rapid current  
change during zero  
crossing.

### ☆ Output Noise reduction (forward converter)



Schottky barrier diode (SBD)



Without Countermeasure

AMOBEDS®

- ☆ Reduce spike voltage and Prevent ringing phenomenon
  - ⇒ The Schottky barrier diode (SBD) can be protected from over-withstand voltage.

**AMOBEDS®** can also be utilized as protection for semiconductors.

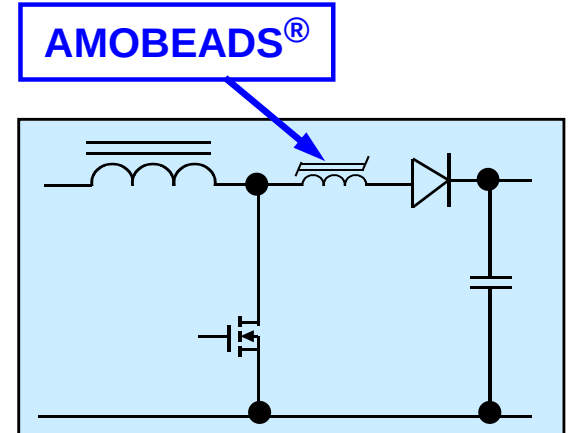
☆ Noise caused by diode : FPD(300W)TV

**CR snubber can not satisfy the spec on 30~100MHz**

**CR snubber + ferrite beads 3 pcs in series**

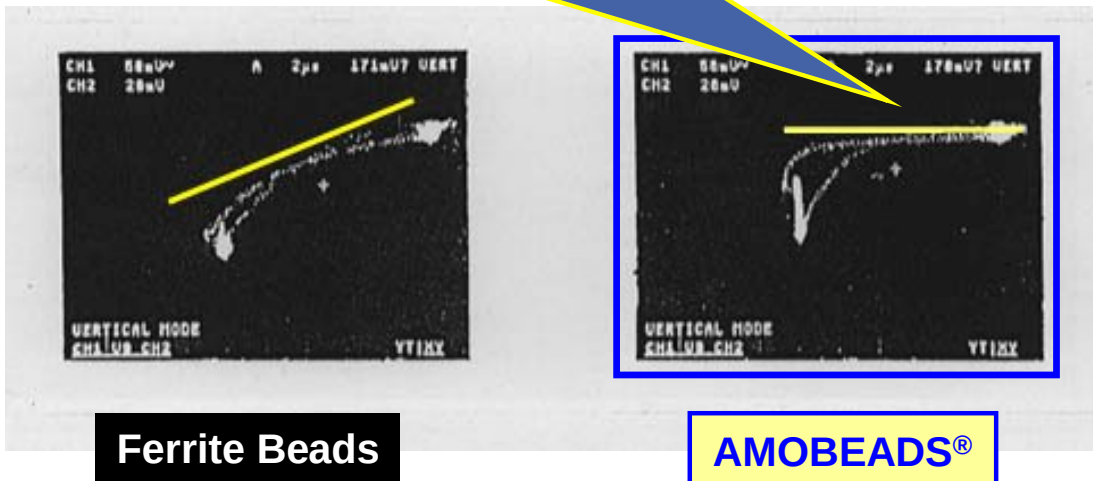
→ **AMOBEDS® 1 piece**

decreases surge voltage of FET  
makes the switching loss reduce  
improves the reliability

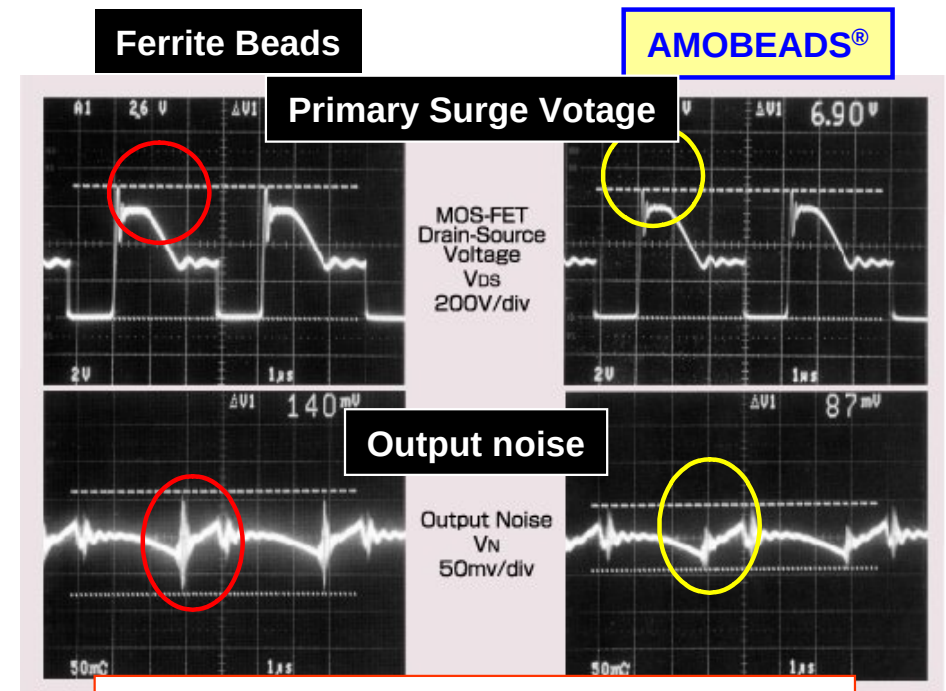


**PFC**

As inductance during "OFF period" is small, the surge voltage is small.



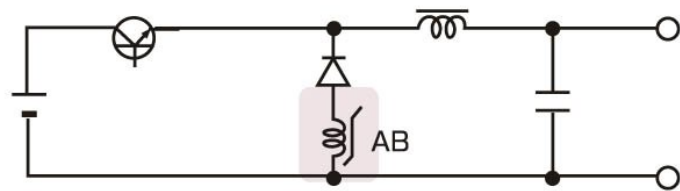
BH curve under operation



forward converter (secondary side)



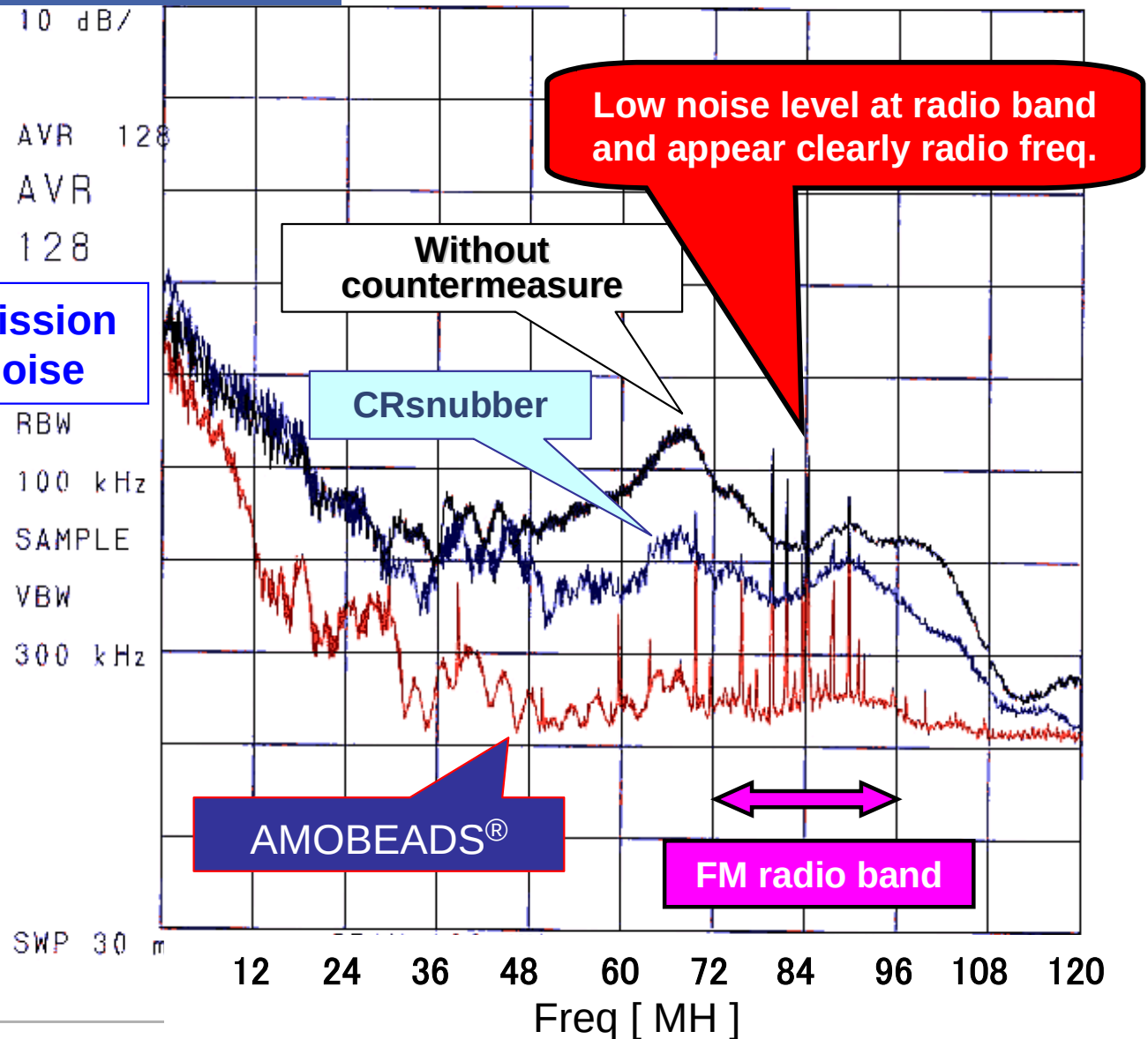
### ☆ Emission noise (chopper converter)

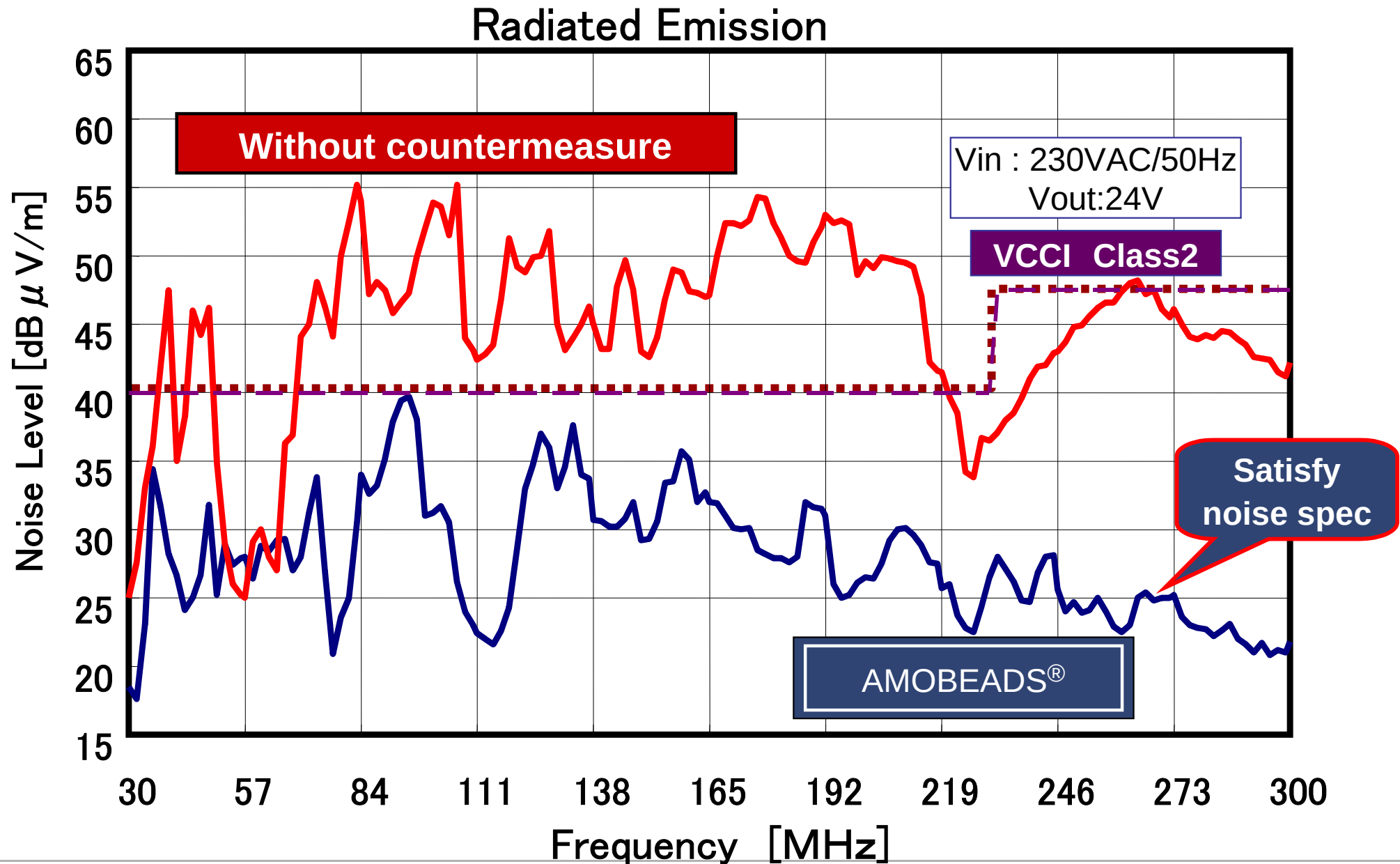


Chopper Converter

**Emission noise**

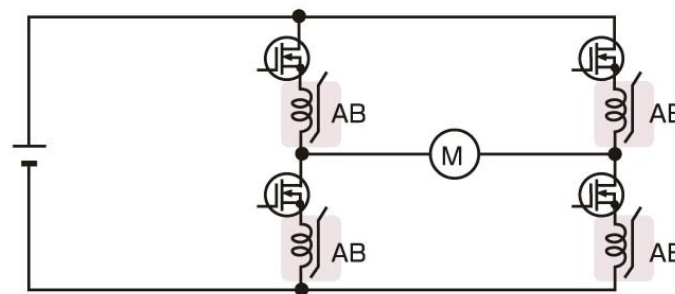
Input : 20V  
Output : 12V-2A  
Operating freq.: 90kHz  
Diode : 10GL2C  
Measurement : loop antenna



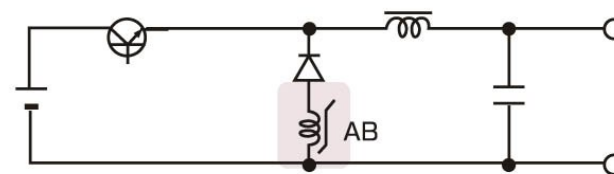


# Applications

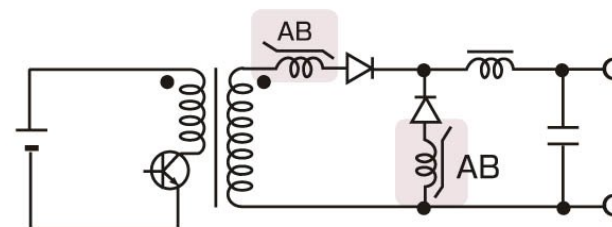
- ☆ Server, Data Storage
- ☆ Mobile Communications
- ☆ Medical apparatus
- ☆ Flat-Panel Display (LCD TV etc)
- ☆ Motor Driving Circuit
- ☆ FAX/COPY machine
- ☆ Battery Charger
- ☆ Home-use Game Console
- ☆ Inverter (AC/AC)
- ☆ Power factor improvement Circuit (PFC)



Motor Driving Circuit



Chopper Converter



Forward Converter

By the trend of increasing the large-scale equipment to home and the movement of the noise restriction, AMOBEADS® is adopted for the displays such as FPD and projectors, and for the high capacity equipment.

# Summary

## ☆ Comparison of noise suppression devises (Our data)

diode reverse recovery current of secondary side

|        | CR snubber | ferrite | AMOBeads<br>(current) | AMOBeads<br>DY series |
|--------|------------|---------|-----------------------|-----------------------|
| Effect | ▲          | ○       | ◎                     | ◎                     |
| Space  | ▲          | ◎       | ◎                     | ◎                     |
| Cost   | ◎          | ○       | ▲                     | ○                     |



### ★ AMOBeads® “DY series”

with new case material and new structure, has high cost performance compared to current AMOBeads®.

### ★ AMOBeads® with lead “LB”

AMOBeads® with lead “LB” is also added to our product lineup, for requirement of automatic mounting, e.g., FPD application.