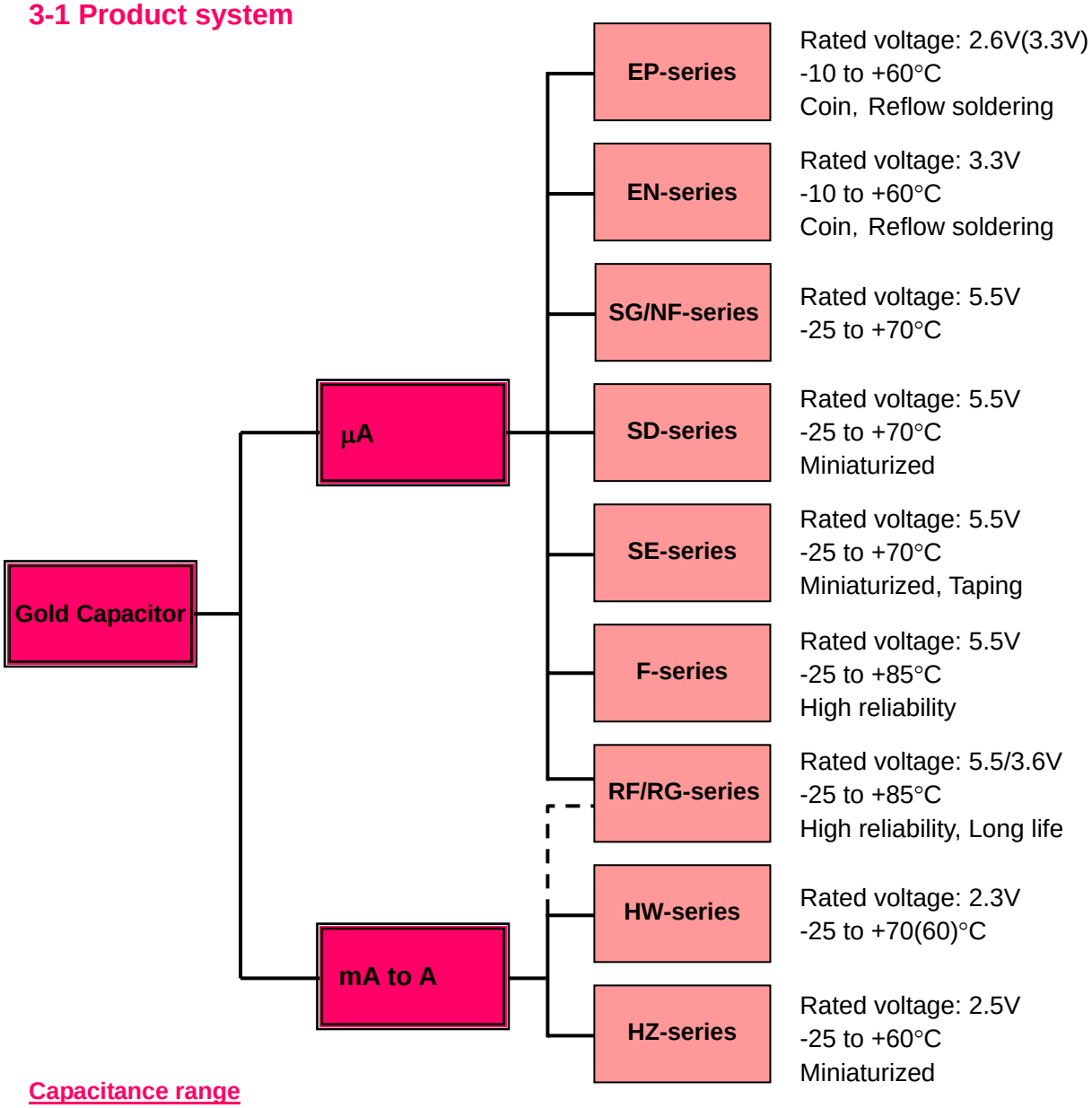
3.Product type & selecting method of Gold Capacitors

3-1 Product system



Capacitance range

Series		Capacitance code																
		223	333	473	104	224	334	474	684	105	155	335	475	106	226	306	506	706
EN	3.3V					○*												
EP	3.3V		○															
SG	5.5V							○		○	○							
SD	5.5V	○		○	○	○	○											
SE	5.5V	○		○	○	○												
NF	5.5V	○		○	○	○		○		○	○							
F	5.5V		○	○	○			○	○	○								
RG	3.6V									○								
RF	5.5V								○									
HW	2.3V									○		○	○	○	○	○	○	○**
HZ	2.5V											○	○	○				

Capacitance code: 223=0.022F, 104=0.1F, 106=10F *EN224=0.2F **HW706:2.1V

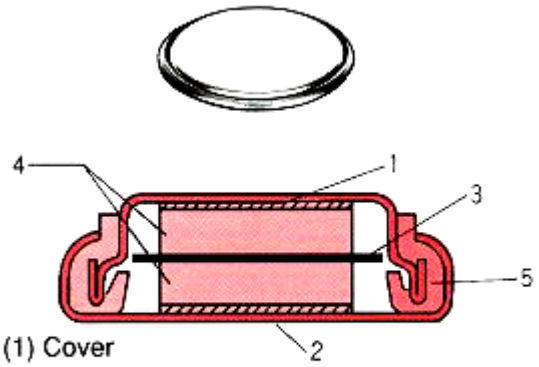
3-2 Construction, features and applications of each type

3-2-1 EN / EP series (Coin type)

(Construction)

The structural drawing of EN/EP series (Coin type) Gold Capacitor is shown in Fig.16.

The activated carbon used as the electrode is solidified in powder activated carbon. This activated carbon is connected with the cover and the case through a conductive point. This separator functions as an insulator but does not restrict the movement of ions through it. Packing is added to seal the cover and case.



(1) Cover
(2) Case
(3) Separator
(4) Activated carbon electrode
(5) Packing

(Fig.16)

(Features)

The physical appearance looks like a Coin type battery. Unlike the battery, Coin type Gold Capacitor does not need charge/discharge control circuit, and it is good for the environment.

(Applications)

1. Memory back-up during battery replacement of mobile phone, DSC and PDA.
2. Secondary power source for solar watches.

EP-series (ϕ3.8)

EN-series (ϕ6.8) :AK and J2 Terminal

(Fig.17)

3-2-2 RF, F & NF series

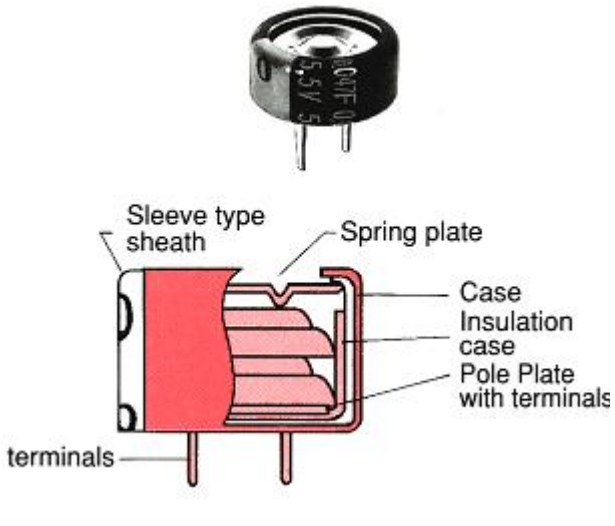
(Construction)

The RF, F and NF series capacitor is constructed with 2 or 3 coin style cells series, and connected with a spring plate. (Fig.18)

(Features)

The maximum operating temperature of RF/F series is 85°C, and suitable for conditions at relatively high temperatures such as car audio. It can be used for the set which needs long life because it has over double long life compared to 70°C products.

We also have low profile product (70°C guarantee) for NF series.



(Fig.18)

(Application)

RF/F series

1. Memory back-up for equipment used at relatively high temperatures (car audio, industrial robot, etc.)
2. Memory back-up for equipment requiring relatively long life (computer, office apparatus, etc.)

NF series

Memory back-up for equipment requiring low profile (video, audio)

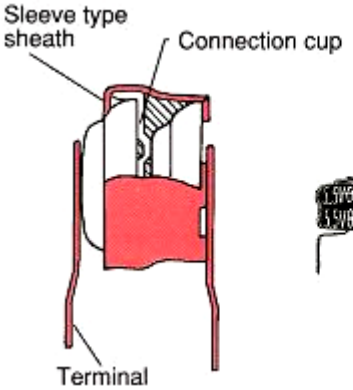
3-2-3 RG, SG, SD and SE series

(Construction)

These series are constructed from two series connected cells in connector cup by laser and welded terminals in it. It is the smallest construction in the series products. (Fig.19)

(Features)

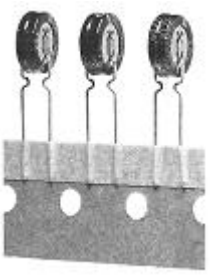
Type SD series are designed for miniaturization. There are type H for low profile (Fig.20) and type V for reduction of mount area (Fig.21). SE series (Fig.22) has a standard packaging format of tape and box for automatic insertion. These products are small and light, can be used for general equipment with 3 series including taping.



(Fig.19)

(Fig.20)

(Fig.21)



(Fig.22)

(Applications)

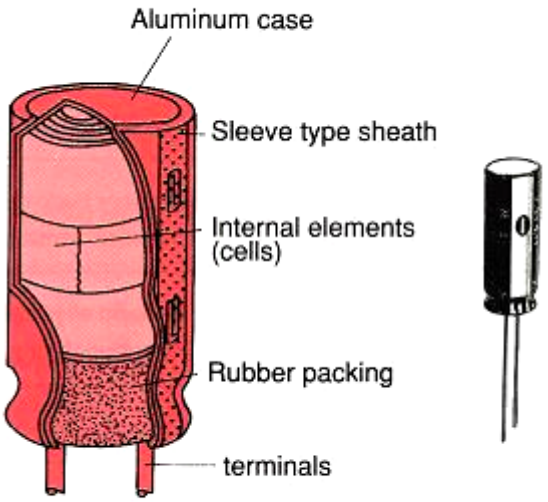
Memory back-up for general equipment (DVD, TV, stereo, etc.).

(RG-series can be used for the same usage as RF/F-series)

3-2-4 HW and HZ series

(Construction)

Series HW and HZ are constructed from activated carbon particles which are mixed with a binder then deposited on strips of aluminum foil. Then, lead wire is connected, and these foil strips are wound together with a separator and inserted into aluminum case. Electrolyte is added, the case is then sealed with a rubber packing and sleeved (Fig.23).



AL series construction

(Fig.23)

(Features)

HW and HZ series are developed for use in applications requiring large current, its internal resistance is less than 1/100 of general products. Due to the development of this product, application of Gold capacitor expanded from memory back-up to motor driving. For example, the motor can work over 3 minutes with charging for a few seconds. Over 100 thousand times of charge/discharge is possible, so that it is suitable for the applications such as toys and LED light.

(Applications)

1. Solar battery circuit (e.g. Road guidance flasher, LED light)
2. Toys (Motor-drive)

3-3 Applications in typical sets and recommended series

Application in typical sets and recommended series

Set	Application	Recommended series
Mobile Phone	At the time of battery exchange. **For RTC Back-up**	EN, EP
PDA	At the time of battery exchange. **For RTC Back-up**	EN, EP
DSC	At the time of battery exchange. **For RTC Back-up**	EN, SD
DVD recorder	At the time of power failure and a power supply off, **For RTC and channel Back Up**	SD, SG
Digital TV	At the time of power failure and a power supply off, **For RTC and channel Back Up**	SD, SG, NF
PC, Server	At the time of power failure and a power supply off, **For RTC and channel Back Up**	RF, F, RG
Mobile phone base station	At the time of power failure and a power supply off, **For RTC and channel Back Up**	RF, F, HW, HZ
Inkjet printer	At the time of power failure and a power supply off, **For the time of intact Back up**	SD, SE, SG, NF
Electric power, Gas, Water meter	At the time of power failure, **For RTC and data Back Up**	RF, F, RG
LED light with solar battery	**For LED lighting in the night** (Charges by the solar cell in daytime)	HW, HZ
Toy (Motor drive)	**For motor drive**	HW, HZ
Toy (Portable game)	At the time of battery exchange. **For RTC Back-up**	EN, EP
FA, Robot, IPC	At the time of power failure and a power supply off, **For RTC and data Back Up**	RF, F
Car audio (Memory)	At the time of battery exchange. **For RTC Back-up**	RF, F, RG
Car audio (HDD drive)	At the time of power failure, **For HDD drive Back Up**	HW, HZ

3-4 Basic idea for product selection

3-4-1 Estimated enough initial back-up time

Back-up time of Gold Capacitors decrease with use and time. Especially, where the applied current is large or the operating condition is severe such as high temperature, back-up time decreases a lot. Therefore, initial back-up time should be considered to have enough margins.

Avoid setting the minimum back-up time. (Refer the life design in details)

3-4-2 Select the optimum Gold capacitor according to applied current

Where the applied current of Gold Capacitors is large, flash voltage drop (IR drop) may occur by the applied current and internal resistance of Gold Capacitors when changing to back-up mode. Therefore, product should be selected according to operating applied current. The amount of applied current (discharge current) has different resistance against product kind, so that we recommend the current shown in chart below. (Please consult Panasonic when the applied current is used beyond recommendation range.)

Series	Maximum operating (discharge) Current				
	0.047F or less	0.1 to 0.33F	0.47 to 1.5F	3.3 to 4.7F	10F to 50F
SG, SD, SE, NF	200μA	300μA	1mA	–	–
F	200μA	300μA	300μA	–	–
RF, RG	–	–	20mA	–	–
EN	–	10μA	–	–	–
EP	5μA				
HW, HZ	–	–	100mA	300mA	1A