

# High-accuracy detection voltage Low current consumption CMOS RESET IC

## BD48XXG/FVE series BD49XXG/FVE series

### ●Description

BD48XXG/FVE, BD49XXG/FVE are series of high-accuracy detection voltage and low current consumption RESET ICs adopting CMOS process. Total 152 types of RESET ICs including BD48XXG/FVE series (Nch output drain output) and BD49XXG/FVE series (CMOS output), each of which has 38 kinds in every 0.1V step (2.3~6.0V) have developed.

### ●Features

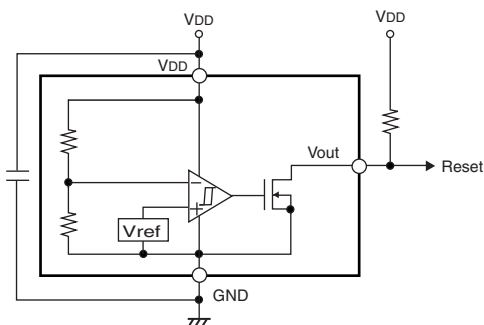
- 1) Detection voltage: 0.1V step line-up 2.3~6.0V (Typ.)
- 2) High-accuracy detection voltage:  $\pm 1.5\%$  Max.
- 3) Ultra low current consumption: 0.8 $\mu$ A typ.
- 4) Nch open drain output (BD48XXG/FVE series),  
CMOS output (BD49XXG/FVE series)
- 5) Small EMP5, SMP5C2 package

### ●Applications

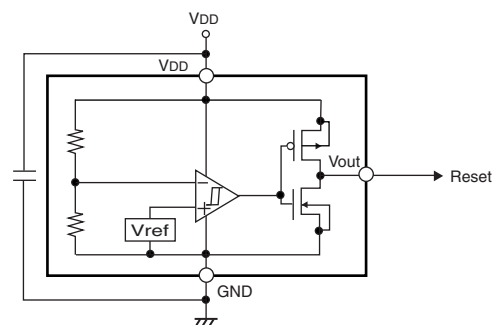
Every kind of appliances with microcontroller and logic circuit

### ●Application Circuit

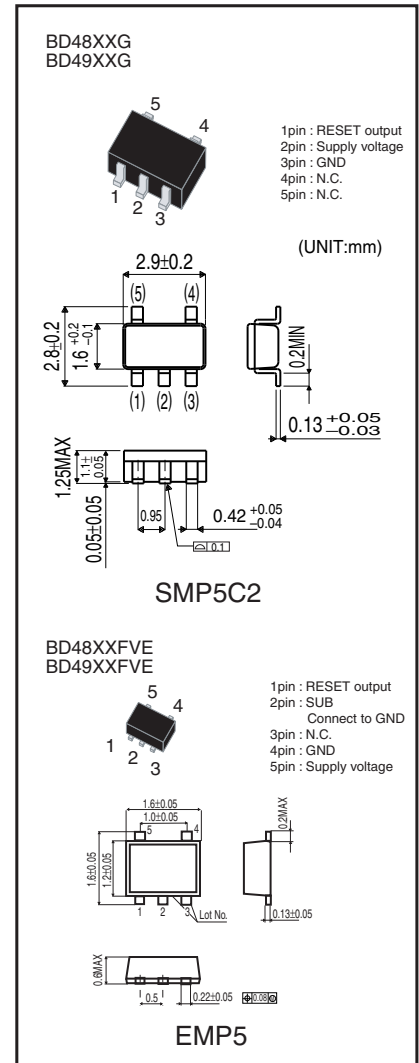
BD48XXG/FVE



BD49XXG/FVE



| Pin No. | 1    | 2               | 3   | 4   | 5               |
|---------|------|-----------------|-----|-----|-----------------|
| SMP5C2  | Vout | V <sub>DD</sub> | GND | NC. | NC.             |
| EMP5    | Vout | SUB             | NC. | GND | V <sub>DD</sub> |



● Absolute Maximum Ratings (Ta=25°C)

| Parameter                     |                       | Symbol    | Limits                | Unit |
|-------------------------------|-----------------------|-----------|-----------------------|------|
| Power supply voltage          |                       | VDD – GND | – 0.3 ~ + 10          | V    |
| Output voltage                | Nch open drain output | VOUT      | GND – 0.3 ~ + 10      | V    |
|                               | CMOS output           |           | GND – 0.3 ~ VDD + 0.3 |      |
| Power dissipation (SMP5C2) *1 |                       | Pd        | 150                   | mW   |
| Power dissipation (EMP5) *2   |                       | Pd        | 100                   | mW   |
| Operating temperature range   |                       | Topr      | – 40 ~ + 85           | °C   |
| Storage temperature range     |                       | Tstg      | – 55 ~ + 125          | °C   |

\*1 Derating: 1.5mW/°C for operation above Ta=25°C.

\*2 Derating: 1.0mW/°C for operation above Ta=25°C.

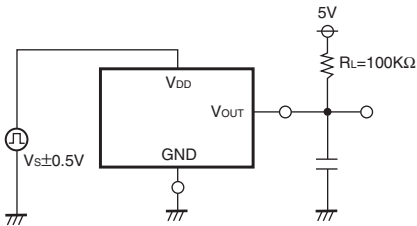
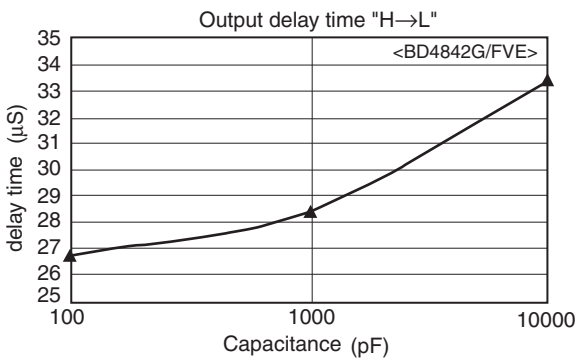
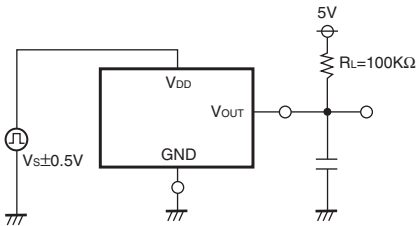
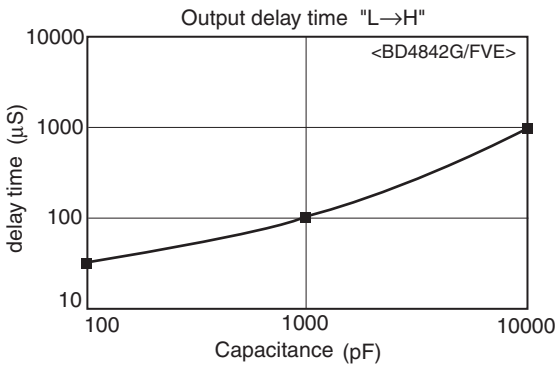
● Electrical characteristics (Unless otherwise noted; Ta=25°C)

| Parameter                                 | Symbol | Min. | Typ.  | Max. | Unit   | Conditions                            |
|-------------------------------------------|--------|------|-------|------|--------|---------------------------------------|
| Detection voltage temperature coefficient | Vs/ΔT  | —    | ±0.01 | —    | % / °C | (–40°C ≤ Ta ≤ 85°C) *1                |
| Hysteresis voltage                        | ΔVs    | 3.0  | 5.0   | 8.0  | %      | RL=470KΩ, VDD=L→H→L                   |
| "H" propagation delay time                | TPLH   | —    | —     | 100  | μS     | CL=100pF, RL=100KΩ *2<br>Vout=GND→50% |
| Circuit current when ON                   | Icc1   | —    | 0.51  | 1.53 | μA     | VDD=Vs–0.2V                           |
|                                           |        | —    | 0.56  | 1.68 |        |                                       |
|                                           |        | —    | 0.60  | 1.80 |        |                                       |
|                                           |        | —    | 0.66  | 1.98 |        |                                       |
| Circuit current when OFF                  | Icc2   | —    | 0.75  | 2.25 | μA     | VDD=Vs+2V                             |
|                                           |        | —    | 0.80  | 2.40 |        |                                       |
|                                           |        | —    | 0.85  | 2.55 |        |                                       |
|                                           |        | —    | 0.90  | 2.70 |        |                                       |
| Min. operating voltage                    | VOPL   | 0.95 | —     | —    | V      | RL=470KΩ, VOL ≤ 0.4V                  |
| "L" output current                        | IOL    | 0.4  | 1     | —    | mA     | VDS=0.5V, VDD=1.2V                    |
|                                           |        | 2.0  | 4     | —    |        | VDS=0.5V, VDD=2.4V (Vs ≤ 2.7V)        |
| "H" output current                        | IOH    | 0.7  | 1.4   | —    | mA     | VDS=0.5V, VDD=4.8V Vs=2.3~4.2V        |
|                                           |        | 0.9  | 1.8   | —    |        | VDS=0.5V, VDD=6.0V Vs=4.3~5.2V        |
|                                           |        | 1.1  | 2.2   | —    |        | VDS=0.5V, VDD=8.0V Vs=5.3~6.0V        |
| Output leak current                       | Ileak  | —    | —     | 0.1  | μA     | VDD=VDS=10V                           |

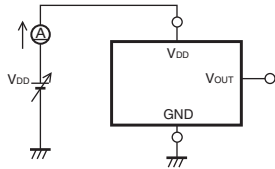
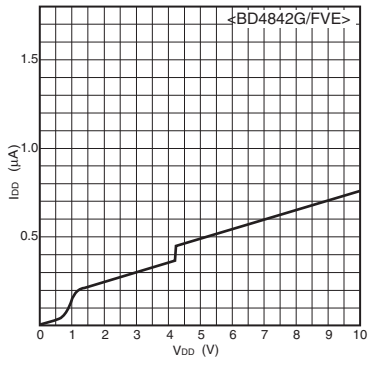
\*1 Since products are not screened by high and low temperatures, the specification for this temperature range is guaranteed by design, not production tested.

\*2 TPLH : VDD=(Vs typ.–0.5V)→(Vs typ.+0.5V).  
Note) RL is not necessary for CMOS output type.

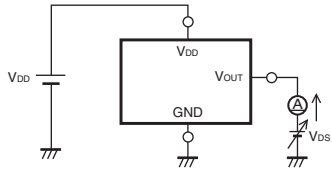
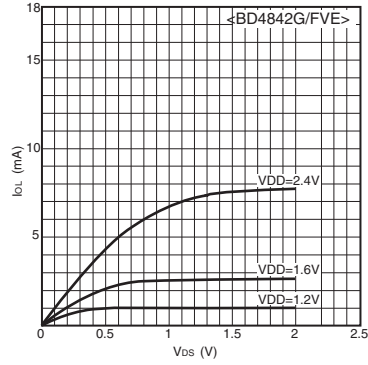
● Characteristic diagram and Measurement circuit



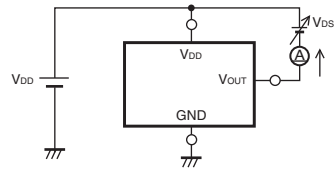
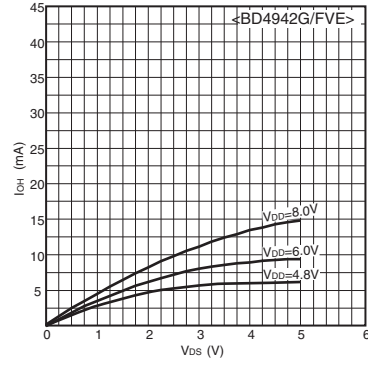
Circuit current



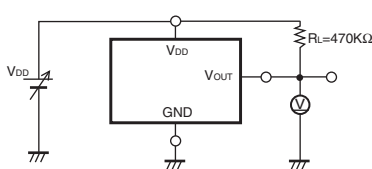
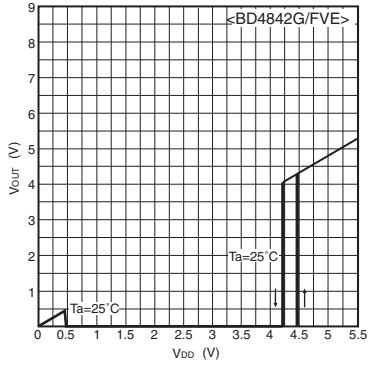
"L" output current



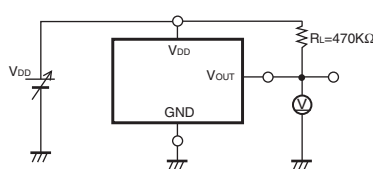
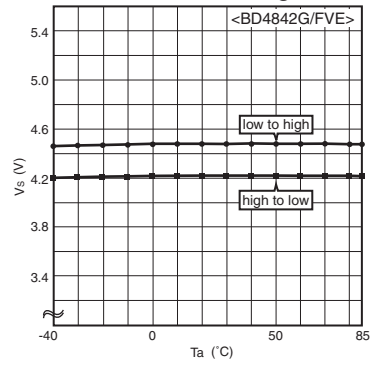
"H" output current



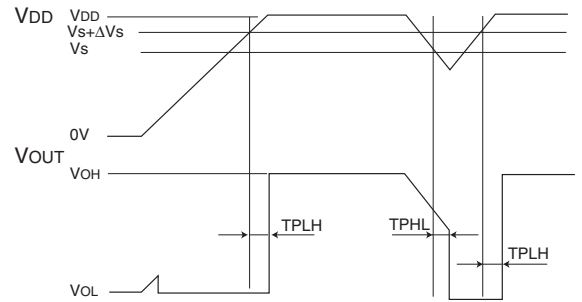
I/O characteristic



Detection voltage



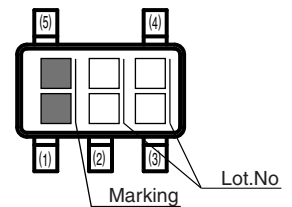
Timing waveform



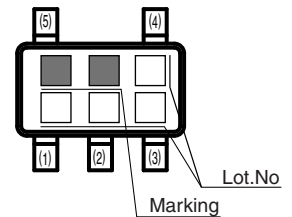
Part number and Marking of samples

| Marking | Voltage | Part No. | Marking | Voltage | Part No. | Marking | Voltage | Part No. | Marking | Voltage | Part No. |
|---------|---------|----------|---------|---------|----------|---------|---------|----------|---------|---------|----------|
| EW      | 6.0V    | BD4860   | EB      | 4.1V    | BD4841   | GW      | 6.0V    | BD4960   | GB      | 4.1V    | BD4941   |
| EV      | 5.9V    | BD4859   | EA      | 4.0V    | BD4840   | GV      | 5.9V    | BD4959   | GA      | 4.0V    | BD4940   |
| EU      | 5.8V    | BD4858   | DV      | 3.9V    | BD4839   | GU      | 5.8V    | BD4958   | FV      | 3.9V    | BD4939   |
| ET      | 5.7V    | BD4857   | DU      | 3.8V    | BD4838   | GT      | 5.7V    | BD4957   | FU      | 3.8V    | BD4938   |
| ES      | 5.6V    | BD4856   | DT      | 3.7V    | BD4837   | GS      | 5.6V    | BD4956   | FT      | 3.7V    | BD4937   |
| ER      | 5.5V    | BD4855   | DS      | 3.6V    | BD4836   | GR      | 5.5V    | BD4955   | FS      | 3.6V    | BD4936   |
| EQ      | 5.4V    | BD4854   | DR      | 3.5V    | BD4835   | GQ      | 5.4V    | BD4954   | FR      | 3.5V    | BD4935   |
| EP      | 5.3V    | BD4853   | DQ      | 3.4V    | BD4834   | GP      | 5.3V    | BD4953   | FQ      | 3.4V    | BD4934   |
| EN      | 5.2V    | BD4852   | DP      | 3.3V    | BD4833   | GN      | 5.2V    | BD4952   | FP      | 3.3V    | BD4933   |
| EM      | 5.1V    | BD4851   | DN      | 3.2V    | BD4832   | GM      | 5.1V    | BD4951   | FN      | 3.2V    | BD4932   |
| EL      | 5.0V    | BD4850   | DM      | 3.1V    | BD4831   | GL      | 5.0V    | BD4950   | FM      | 3.1V    | BD4931   |
| EK      | 4.9V    | BD4849   | DL      | 3.0V    | BD4830   | GK      | 4.9V    | BD4949   | FL      | 3.0V    | BD4930   |
| EJ      | 4.8V    | BD4848   | DK      | 2.9V    | BD4829   | GJ      | 4.8V    | BD4948   | FK      | 2.9V    | BD4929   |
| EH      | 4.7V    | BD4847   | DJ      | 2.8V    | BD4828   | GH      | 4.7V    | BD4947   | FJ      | 2.8V    | BD4928   |
| EG      | 4.6V    | BD4846   | DH      | 2.7V    | BD4827   | GG      | 4.6V    | BD4946   | FH      | 2.7V    | BD4927   |
| EF      | 4.5V    | BD4845   | DG      | 2.6V    | BD4826   | GF      | 4.5V    | BD4945   | FG      | 2.6V    | BD4926   |
| EE      | 4.4V    | BD4844   | DF      | 2.5V    | BD4825   | GE      | 4.4V    | BD4944   | FF      | 2.5V    | BD4925   |
| ED      | 4.3V    | BD4843   | DE      | 2.4V    | BD4824   | GD      | 4.3V    | BD4943   | FE      | 2.4V    | BD4924   |
| EC      | 4.2V    | BD4842   | DD      | 2.3V    | BD4823   | GC      | 4.2V    | BD4942   | FD      | 2.3V    | BD4923   |

BD48XXG/BD49XXG (SMP5C2)



BD48XXFVE/BD49XXFVE (EMP5)



●Line-up

| Detection voltage VS | Nch open drain output ( BD48XXG/FVE ) | CMOS output ( BD49XXG/FVE ) | Detection voltage VS ( V ) |       |       | Hysteresis voltage ( V, Typ. ) | Package     |
|----------------------|---------------------------------------|-----------------------------|----------------------------|-------|-------|--------------------------------|-------------|
|                      |                                       |                             | Min.                       | Typ.  | Max.  |                                |             |
| 6.0V                 | BD4860G/FVE                           | BD4960G/FVE                 | 5.910                      | 6.000 | 6.090 | Vs X 0.05                      | SMP5C2/EMP5 |
| 5.9V                 | BD4859G/FVE                           | BD4959G/FVE                 | 5.812                      | 5.900 | 5.989 |                                | SMP5C2/EMP5 |
| 5.8V                 | BD4858G/FVE                           | BD4958G/FVE                 | 5.713                      | 5.800 | 5.887 |                                | SMP5C2/EMP5 |
| 5.7V                 | BD4857G/FVE                           | BD4957G/FVE                 | 5.615                      | 5.700 | 5.786 |                                | SMP5C2/EMP5 |
| 5.6V                 | BD4856G/FVE                           | BD4956G/FVE                 | 5.516                      | 5.600 | 5.684 |                                | SMP5C2/EMP5 |
| 5.5V                 | BD4855G/FVE                           | BD4955G/FVE                 | 5.418                      | 5.500 | 5.583 |                                | SMP5C2/EMP5 |
| 5.4V                 | BD4854G/FVE                           | BD4954G/FVE                 | 5.319                      | 5.400 | 5.481 |                                | SMP5C2/EMP5 |
| 5.3V                 | BD4853G/FVE                           | BD4953G/FVE                 | 5.221                      | 5.300 | 5.380 |                                | SMP5C2/EMP5 |
| 5.2V                 | BD4852G/FVE                           | BD4952G/FVE                 | 5.122                      | 5.200 | 5.278 |                                | SMP5C2/EMP5 |
| 5.1V                 | BD4851G/FVE                           | BD4951G/FVE                 | 5.024                      | 5.100 | 5.177 |                                | SMP5C2/EMP5 |
| 5.0V                 | BD4850G/FVE                           | BD4950G/FVE                 | 4.925                      | 5.000 | 5.075 |                                | SMP5C2/EMP5 |
| 4.9V                 | BD4849G/FVE                           | BD4949G/FVE                 | 4.827                      | 4.900 | 4.974 |                                | SMP5C2/EMP5 |
| 4.8V                 | BD4848G/FVE                           | BD4948G/FVE                 | 4.728                      | 4.800 | 4.872 |                                | SMP5C2/EMP5 |
| 4.7V                 | BD4847G/FVE                           | BD4947G/FVE                 | 4.630                      | 4.700 | 4.771 |                                | SMP5C2/EMP5 |
| 4.6V                 | BD4846G/FVE                           | BD4946G/FVE                 | 4.531                      | 4.600 | 4.669 |                                | SMP5C2/EMP5 |
| 4.5V                 | BD4845G/FVE                           | BD4945G/FVE                 | 4.433                      | 4.500 | 4.568 |                                | SMP5C2/EMP5 |
| 4.4V                 | BD4844G/FVE                           | BD4944G/FVE                 | 4.334                      | 4.400 | 4.466 |                                | SMP5C2/EMP5 |
| 4.3V                 | BD4843G/FVE                           | BD4943G/FVE                 | 4.236                      | 4.300 | 4.365 |                                | SMP5C2/EMP5 |
| 4.2V                 | BD4842G/FVE                           | BD4942G/FVE                 | 4.137                      | 4.200 | 4.263 |                                | SMP5C2/EMP5 |
| 4.1V                 | BD4841G/FVE                           | BD4941G/FVE                 | 4.039                      | 4.100 | 4.162 |                                | SMP5C2/EMP5 |
| 4.0V                 | BD4840G/FVE                           | BD4940G/FVE                 | 3.940                      | 4.000 | 4.060 |                                | SMP5C2/EMP5 |
| 3.9V                 | BD4839G/FVE                           | BD4939G/FVE                 | 3.842                      | 3.900 | 3.959 |                                | SMP5C2/EMP5 |
| 3.8V                 | BD4838G/FVE                           | BD4938G/FVE                 | 3.743                      | 3.800 | 3.857 |                                | SMP5C2/EMP5 |
| 3.7V                 | BD4837G/FVE                           | BD4937G/FVE                 | 3.645                      | 3.700 | 3.756 |                                | SMP5C2/EMP5 |
| 3.6V                 | BD4836G/FVE                           | BD4936G/FVE                 | 3.546                      | 3.600 | 3.654 |                                | SMP5C2/EMP5 |
| 3.5V                 | BD4835G/FVE                           | BD4935G/FVE                 | 3.448                      | 3.500 | 3.553 |                                | SMP5C2/EMP5 |
| 3.4V                 | BD4834G/FVE                           | BD4934G/FVE                 | 3.349                      | 3.400 | 3.451 |                                | SMP5C2/EMP5 |
| 3.3V                 | BD4833G/FVE                           | BD4933G/FVE                 | 3.251                      | 3.300 | 3.350 |                                | SMP5C2/EMP5 |
| 3.2V                 | BD4832G/FVE                           | BD4932G/FVE                 | 3.152                      | 3.200 | 3.248 |                                | SMP5C2/EMP5 |
| 3.1V                 | BD4831G/FVE                           | BD4931G/FVE                 | 3.054                      | 3.100 | 3.147 |                                | SMP5C2/EMP5 |
| 3.0V                 | BD4830G/FVE                           | BD4930G/FVE                 | 2.955                      | 3.000 | 3.045 |                                | SMP5C2/EMP5 |
| 2.9V                 | BD4829G/FVE                           | BD4929G/FVE                 | 2.857                      | 2.900 | 2.944 |                                | SMP5C2/EMP5 |
| 2.8V                 | BD4828G/FVE                           | BD4928G/FVE                 | 2.758                      | 2.800 | 2.842 |                                | SMP5C2/EMP5 |
| 2.7V                 | BD4827G/FVE                           | BD4927G/FVE                 | 2.660                      | 2.700 | 2.741 |                                | SMP5C2/EMP5 |
| 2.6V                 | BD4826G/FVE                           | BD4926G/FVE                 | 2.561                      | 2.600 | 2.639 |                                | SMP5C2/EMP5 |
| 2.5V                 | BD4825G/FVE                           | BD4925G/FVE                 | 2.463                      | 2.500 | 2.538 |                                | SMP5C2/EMP5 |
| 2.4V                 | BD4824G/FVE                           | BD4924G/FVE                 | 2.364                      | 2.400 | 2.436 |                                | SMP5C2/EMP5 |
| 2.3V                 | BD4823G/FVE                           | BD4923G/FVE                 | 2.266                      | 2.300 | 2.335 |                                | SMP5C2/EMP5 |