# POSITIVE/NEGATIVE 2CH LOW DROPOUT VOLTAGE REGULATOR

## ■ GENERAL DESCRIPTION

The NJM2839 is a positive/negative 2ch low dropout voltage regulator. Advanced bipolar technology achieves low noise, high precision voltage and high ripple rejection. Negative output CH has built into soft-start and shunt SW functions.

Positive/Negative Dual output, 1.0μF Output capacitor and small package can make NJM2839 suitable for power supply for CCD of portable item.

## ■ PACKAGE OUTLINE

NJM2839R

## ■ FEATURES

<Positive CH>

- High Ripple Rejection 75dB typ. (f=1kHz,Vo1=3V Version)
- Low Output Noise Voltage $V_{NO}$1=45μVrms typ.
- Output capacitor with 1.0μF ceramic capacitor. (Vo1≥5.5V)
- Output Current Io1(max.)=100mA
- High Precision Output Vo1±1.5%
- Low Drop Out Voltage 0.10V typ. (Io1=60mA)
- ON/OFF Control
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limit

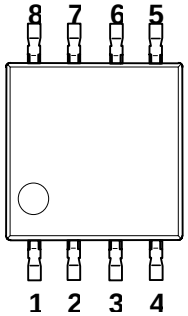
<Negative CH>

- High Ripple Rejection 65dB typ. (f=1kHz,Vo2=-7V Version)
- Low Output Noise Voltage $V_{NO}$2=100μVrms typ
- Output capacitor with 1.0μF ceramic capacitor.
- Output Current Io2(max.)=100mA
- High Precision Output Vo2±1.5%
- Low Drop Out Voltage 0.13V typ. (Io2=60mA)
- ON/OFF Control (with output shunt SW)
- Soft-start Function
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limit

<Others>

- Bipolar Technology
- Package Outline VSP8

## ■ PIN CONFIGURATION



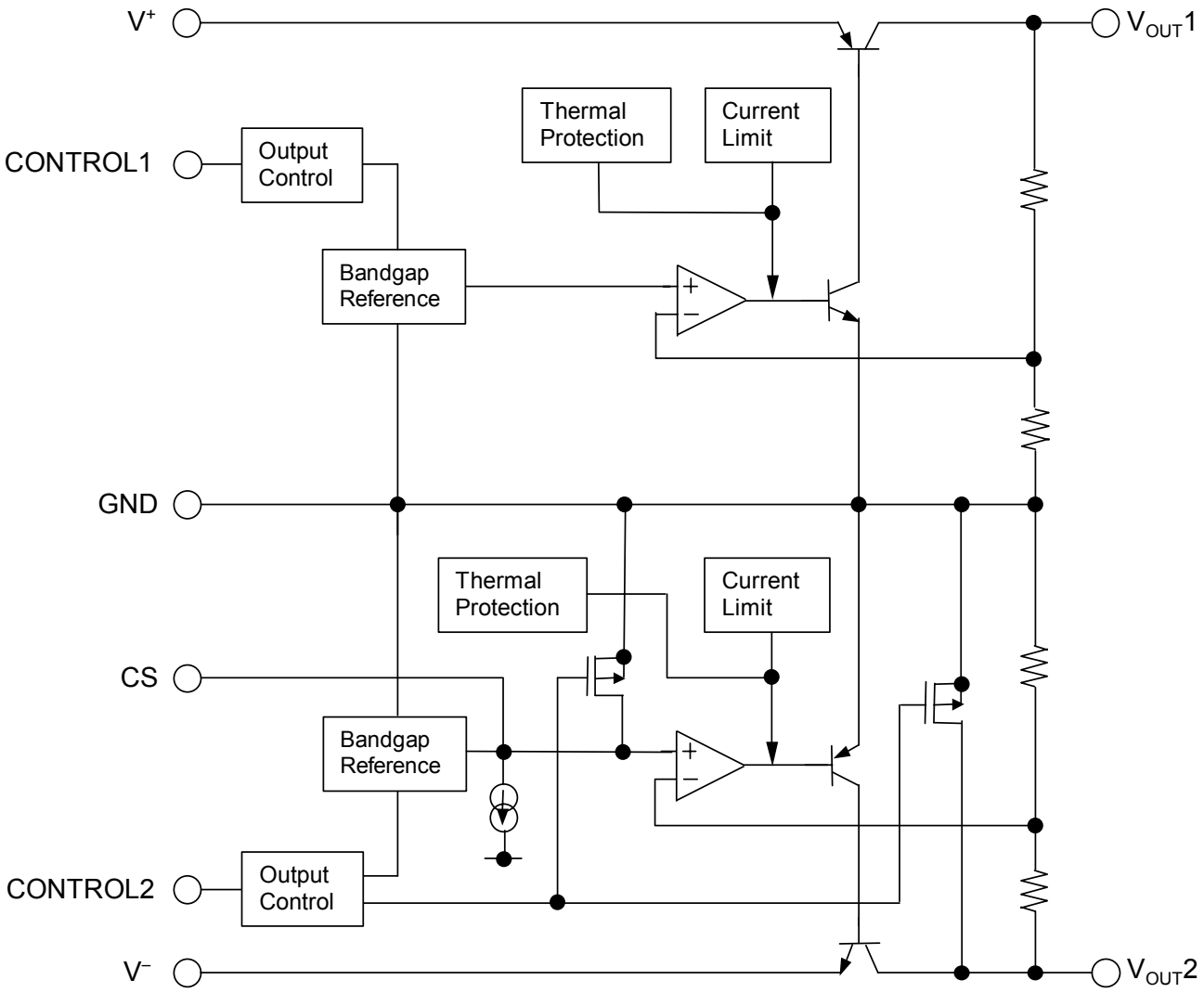

1.CONTROL1
2.$V^+$
3.CS
4.CONTROL2
5.$V^-$
6.$V_{OUT}$2
7.GND
8.$V_{OUT}$1

NJM2839RXXXX

■ OUTPUT VOLTAGE RANK LIST

| Device Name | $V_{OUT}1$ | $V_{OUT}2$ | Device Name | $V_{OUT}1$ | $V_{OUT}2$ |
|---|---|---|---|---|---|
| NJM2839R1575 | 15V | -7.5V | NJM2839R1265 | 12V | -6.5V |
| NJM2839R1375 | 13V | -7.5V | NJM2839R1208 | 12V | -8.0V |
| NJM2839R1275 | 12V | -7.5V | NJM2839R1307 | 13V | -7.0V |
| NJM2839R1263 | 12V | -6.3V | | | |
| NJM2839R1206 | 12V | -6.0V | | | |
| NJM2839R11606 | 11.6V | -6.0V | | | |

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Input Voltage | $V^+$ | +20 | V |
| | $V^-$ | -14 | V |
| Control voltage 1 | $V_{CONT1}$ | +20(*1) | V |
| Control Voltage 2 | $V_{CONT2}$ | +5 | V |
| Power Dissipation | $P_D$ | 380(*2) | mW |
| Operating Temperature | Topr | -40~+85 | °C |
| Storage Temperature | Tstg | -40~+125 | °C |
| Output Sink Current at OFF-state | $T_{SINK(OFF)}$ | 10 | mA |

(*1): When positive input voltage is less than +20V, the absolute maximum control voltage is equal to the positive input voltage.

(*2): Mounted on glass epoxy board. (114.3×76.2×1.6mm : 2layer,FR-4)

■ ELECTRICAL CHARACTERISTICS

Positive Output Electrical Characteristics

($V^+$=Vo1+1V, $C_{IN}$1= 0.1µF, Co1= 1.0µF(2.8V<Vo1≤5.4V:Co1=2.2µF, Vo1≤2.8V:Co1=4.7µF), Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Output Voltage 1 | Vo1 | Io1=30mA | | -1.5% | – | +1.5% | V |
| Quiescent Current 1 | $I_Q$1 | Io1=0mA, except $I_{CONT}$1 | Vo1≤5V Version | – | 120 | 180 | µA |
| | | | 5V<Vo1≤10V Version | – | 135 | 195 | µA |
| | | | 10V<Vo1≤15V Version | – | 150 | 210 | µA |
| Quiescent Current at OFF-state 1 | $I_{Q(OFF)}$ 1 | $V_{CONT}$1=0V | | – | – | 100 | nA |
| Output Current 1 | Io1 | $V_O$1-0.3V | | 100 | 130 | – | mA |
| Line Regulation 1 | $\Delta Vo/\Delta V^+$ | $V^+$=Vo1+1V~Vo1+6V(Vo1≤12V), $V^+$=Vo1+1V~18V(Vo1>12V), Io1=30mA | | – | – | 0.10 | %/V |
| Load Regulation 1 | $\Delta Vo/\Delta Io1$ | Io1=0~60mA | | – | – | 0.03 | %/mA |
| Dropout Voltage 1 | $\Delta V_{I-O}$1 | Io1=60mA | | – | 0.10 | 0.18 | V |
| Ripple Rejection 1 | RR1 | ein=200mVrms, f=1kHz, Io1=10mA,Vo1=3V Version | | – | 75 | – | dB |
| Average Temperature Coefficient of Output Voltage 1 | $\Delta Vo/\Delta Ta1$ | Ta=0~85°C, Io1=10mA | | – | ±50 | – | ppm/°C |
| Output Noise Voltage 1 | $V_{NO}$1 | f=10Hz~80kHz, Io1=10mA, Vo1=3V Version | | – | 45 | – | µVrms |
| Control Current 1 | $I_{CONT}$1 | $V_{CONT}$1 =1.6V | | – | 3 | 12 | µA |
| Control Voltage for ON-state 1 | $V_{CONT(ON)}$ 1 | | | 1.6 | – | – | V |
| Control Voltage for OFF-state 1 | $V_{CONT(OFF)}$ 1 | | | – | – | 0.6 | V |
| Input Voltage 1 | $V^+$ | | | – | – | 18 | V |

The above specification is a common specification for all output voltages.

Therefore, it may be different from the individual specification for a specific output voltage.

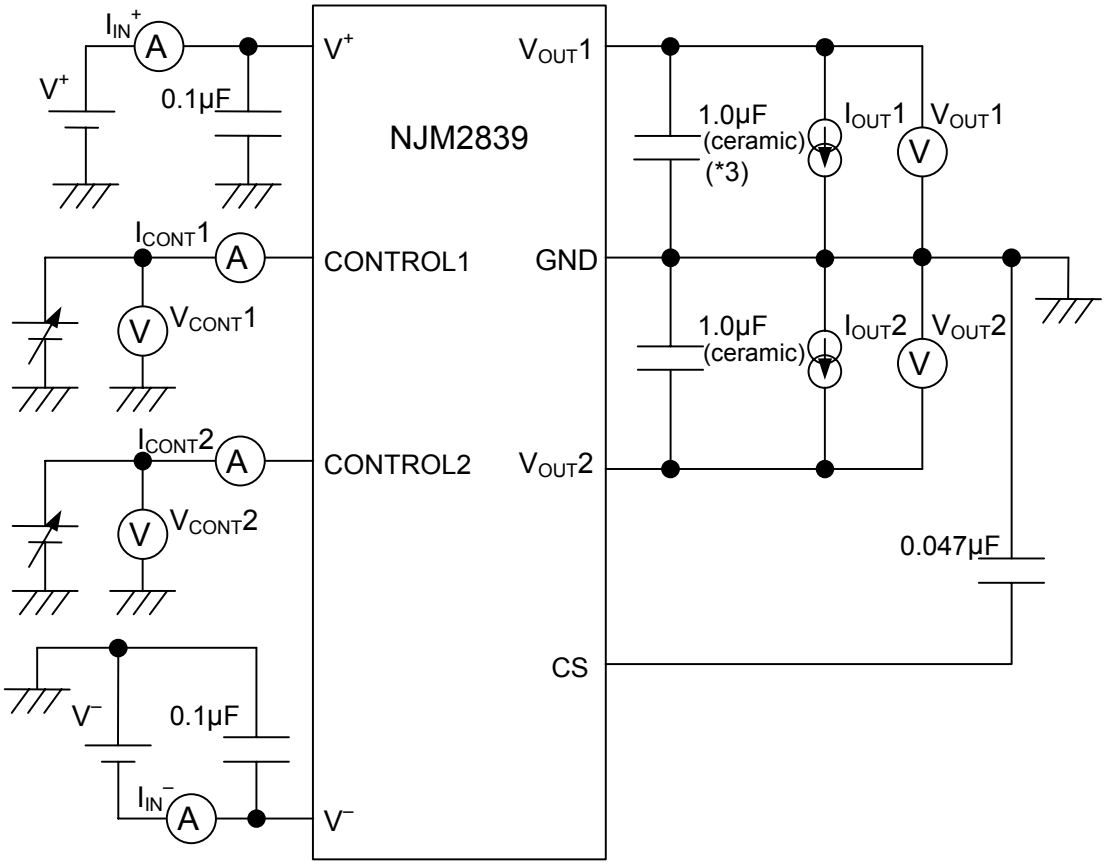
Negative Output Electrical Characteristics

($V^-$=Vo2-1V, $V_{CONT}$2 =3V , $C_{IN}$2=0.1µF , Co2=1.0µF, Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage 2 | Vo2 | Io2=30mA | +1.5% | – | -1.5% | V |
| Quiescent Current 2 | $I_Q$2 | Io2=0mA, except $I_{CONT}$ 2 | – | 130 | 200 | µA |
| Quiescent Current at OFF-state 2 | $I_{Q(OFF)}$ 2 | $V_{CONT}$2=0V | – | – | 100 | nA |
| Output Current 2 | Io2 | $V_O$2+0.3V | 100 | 130 | – | mA |
| Line Regulation 2 | ΔVo/ΔV$^-$ | V$^-$=Vo2-1V~-12V, Io2=30mA | – | – | 0.10 | %/V |
| Load Regulation 2 | ΔVo/ΔIo2 | Io2=0~60mA | – | – | 0.03 | %/mA |
| Dropout Voltage 2 | $\Delta V_{I-O}$2 | Io2=60mA | – | 0.13 | 0.23 | V |
| Ripple Rejection 2 | RR2 | ein=200mVrms, f=1kHz, Io2=10mA, Vo2=-7V Version | – | 65 | – | dB |
| Average Temperature Coefficient of Output Voltage 2 | ΔVo/ΔTa2 | Ta=0~85°C, Io2=10mA | – | ±50 | – | ppm/°C |
| Output Noise Voltage 2 | $V_{NO}$2 | f=10Hz~80kHz, Io2=10mA, Vo2=-7V Version | – | 100 | – | µVrms |
| CS Terminal Charge Current | Ics | $V_{CS}$=0V | 4 | 5 | 6 | µA |
| Output Resistance at OFF-state | $R_{O(OFF)}$ | $V_{CONT}$2 =0V, Vo=-7V Version | – | 360 | – | Ω |
| Control Current 2 | $I_{CONT}$2 | $V_{CONT}$2 =1.6V | – | 2 | 4 | µA |
| Control Voltage for ON-state 2 | $V_{CONT(ON)}$ 2 | | 1.6 | – | – | V |
| Control Voltage for OFF-state 2 | $V_{CONT(OFF)}$ 2 | | – | – | 0.6 | V |
| Input Voltage 2 | V$^-$ | | -12 | – | – | V |

The above specification is a common specification for all output voltages.
Therefore, it may be different from the individual specification for a specific output voltage.

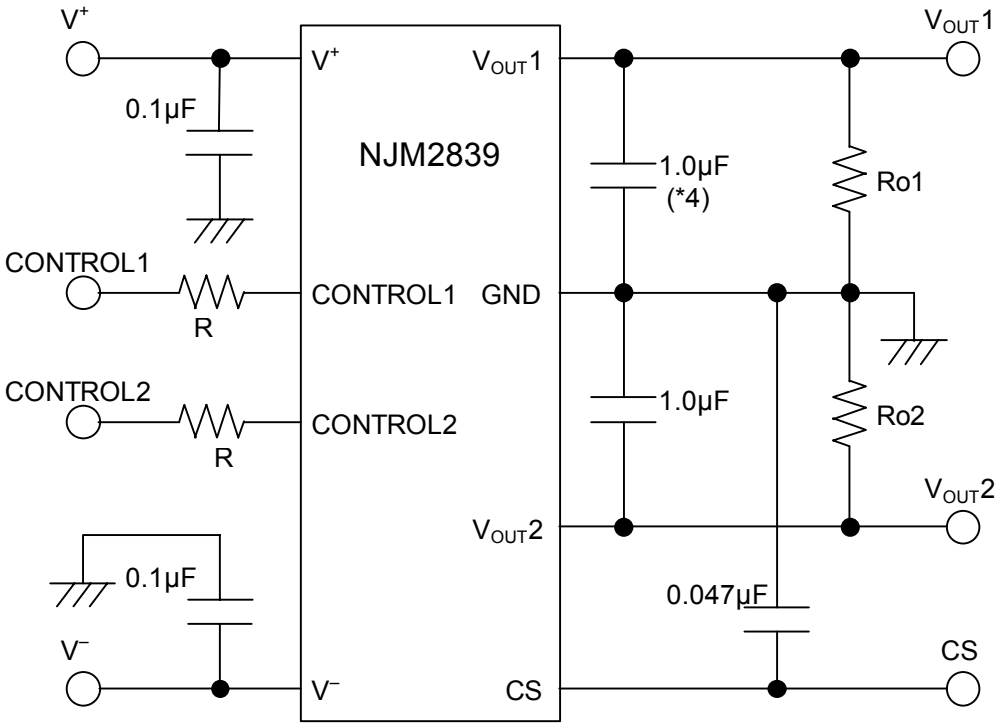
■ TEST CIRCUIT




(*3) 2.8V<Vo1≤5.4V version :Co1=2.2µF(ceramic)
Vo1≤2.8V version :Co1=4.7µF(ceramic)

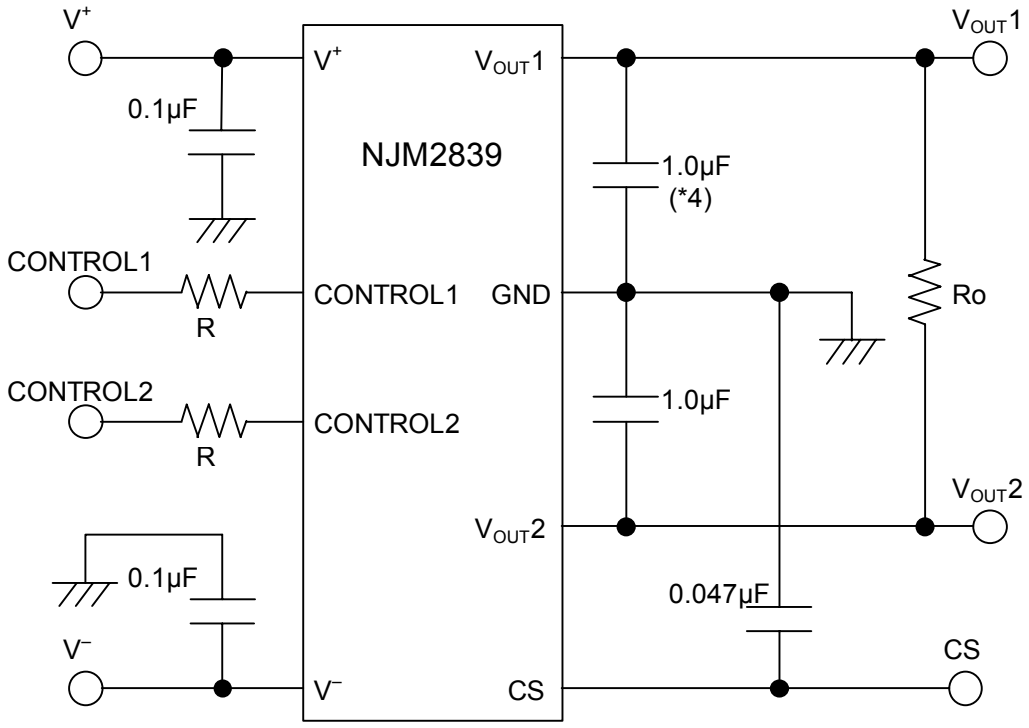
■ TYPICAL APPLICATION

1.In case a load is connected between $V_{OUT}1$ and GND, GND and $V_{OUT}2$, respectively.




(*4) 2.8V<Vo1≤5.4V version :Co1=2.2μF
Vo1≤2.8V version :Co1=4.7μF

2. In case that a load is connected between $V_{OUT}1$ and $V_{OUT}2$




(*4) 2.8V<Vo1≤5.4V version :Co1=2.2μF
Vo1≤2.8V version :Co1=4.7μF

State of control terminal 1,2:

- "H" → output is enabled.
- "L" or "open" → output is disabled.

Connect control terminal to resistance "R"

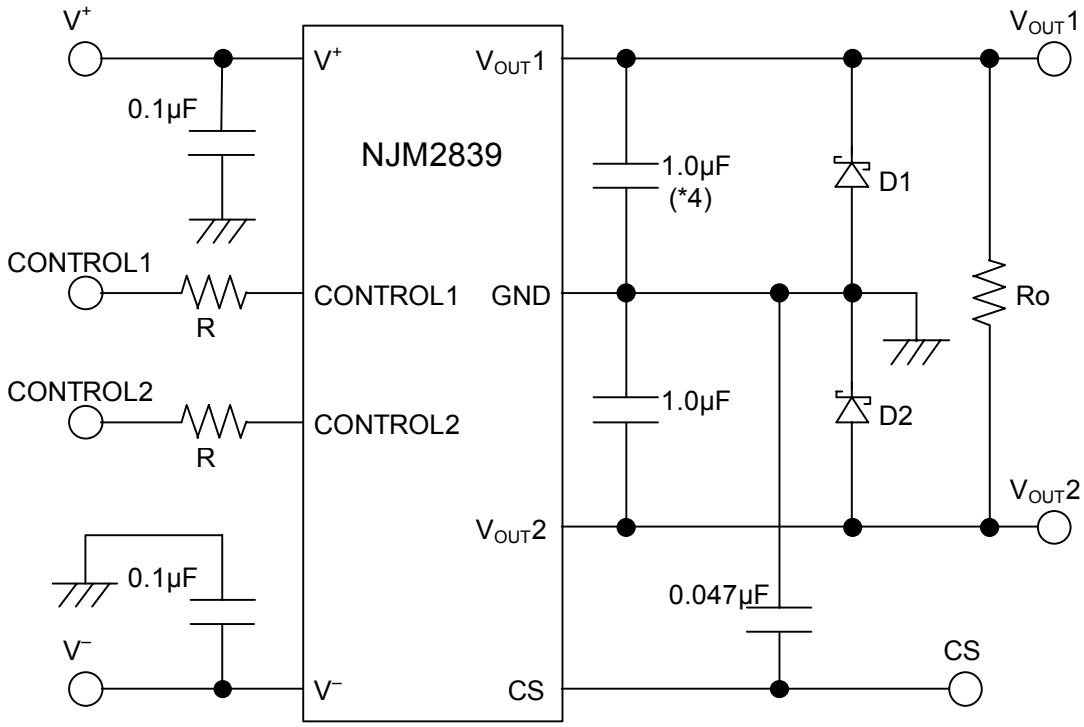
The quiescent current can be reduced by using a resistance "R". Instead, it increases the minimum operating voltage. For further information, please refer to Figure "Output Voltage vs. Control Voltage".

When a load is connected between $V_{OUT}1$ and $V_{OUT}2$, there is a possibility that the error occurs in the following conditions.

·The load is heavy.
·When the control 1 and 2 are turned on indifference sequence.
·When the capacity value of Cs is small.

The error can avoid as following.

·Change in the value of load or value of Cs.
·Change turn on sequence of control 1 and 2.
·Schottky barrier diode is inserted between $V_{OUT}1$ and GND, GND and $V_{OUT}2$ respectively as shown in the figure below.




(*4) 2.8V<Vo1≦5.4V version :Co1=2.2μF
Vo1≦2.8V version :Co1=4.7μF

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE

NJM2839R Power Dissipation
(Topr=-40～+85℃,Tj=125℃,$P_D$=320mW(Ta≦25℃))