

## OUTPUT COUPLING CAPACITOR-LESS LOW VOLTAGE VIDEO AMPLIFIER WITH LPF

### ■ GENERAL DESCRIPTION

The NJU71031 is a Low Voltage Video Amplifier with LPF circuit. By the internal charge pump circuit, output capacitor is unnecessary.

The NJU71031 features low power and small package, and is suitable for low power design on downsizing of portable video system and system with video output.

### ■ PACKAGE OUTLINE



**NJU71031RB1**  
MSOP8(TVSP8)



**NJU71031KU1**

### ■ FEATURES

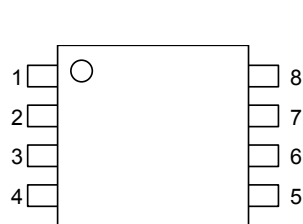
- Operating Voltage 2.5 to 3.45V
- Output coupling capacitor-less
- 6dB amplifier
- Internal 75Ω Driver Circuit (2-system drive)
- Internal LPF 0dB at 6.75MHz typ  
-40dB at 54MHz typ

- Power Save Circuit
- CMOS Technology
- Package Outline

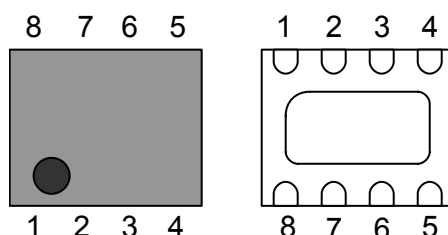
MSOP8(TVSP8)\*, ESON8-U1

\*MEET JEDEC MO-187-DA / THIN TYPE

### ■ PIN CONFIGURATION



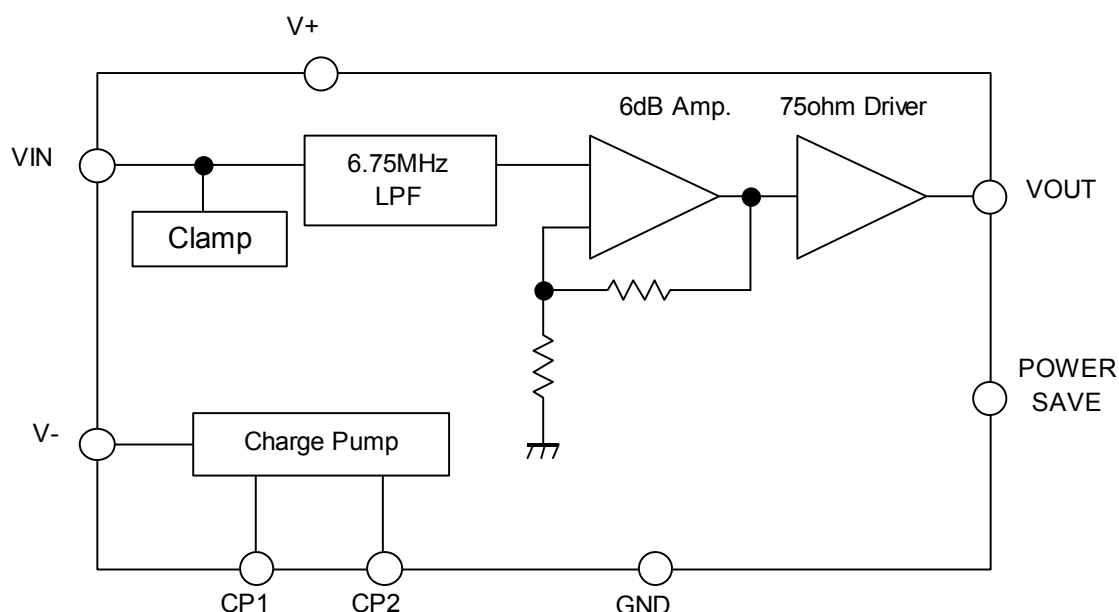
NJU71031RB1



NJU71031KU1

- 1: CP1
- 2: V+
- 3: VIN
- 4: Power Save
- 5: VOUT
- 6: GND
- 7: V-
- 8: CP2

### ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER                   | SYMBOL         | RATINGS                                            | UNIT |
|-----------------------------|----------------|----------------------------------------------------|------|
| Supply Voltage              | V <sup>+</sup> | 3.55                                               | V    |
| Power Dissipation           | P <sub>D</sub> | MSOP8(TVSP8): 580 (Note1)<br>ESON8-U1: 940 (Note2) | mW   |
| Operating Temperature Range | Topr           | -40 to +85                                         | °C   |
| Storage Temperature Range   | Tstg           | -55 to +150                                        | °C   |

(Note 1) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm 2 layers, FR-4)

(Note 2) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm 4 layers, FR-4)

## ■ RECOMMENDED OPEARATING CONDITION (Ta=25°C)

| PARAMETER         | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------|--------|----------------|------|------|------|------|
| Operating Voltage | Vopr   |                | 2.5  | -    | 3.45 | V    |

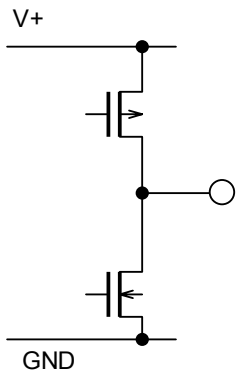
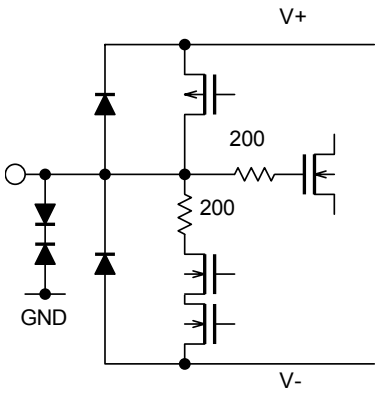
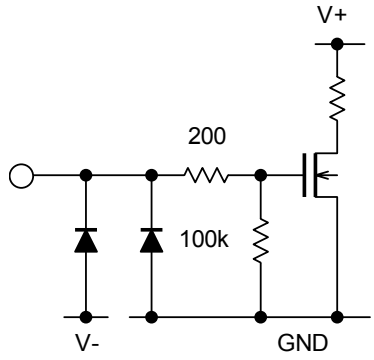
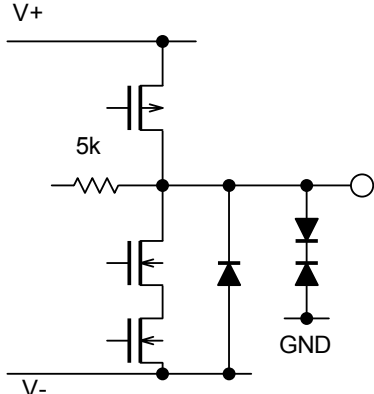
## ■ ELECTRICAL CHARACTERISTICS (V<sup>+</sup>=3.0V, R<sub>L</sub>=150Ω, Ta=25°C)

| PARAMETER                       | SYMBOL                | TEST CONDITION                                                                                       | MIN. | TYP. | MAX.           | UNIT             |
|---------------------------------|-----------------------|------------------------------------------------------------------------------------------------------|------|------|----------------|------------------|
| Operating Current               | I <sub>CC</sub>       | No Signal                                                                                            | -    | 14   | 22             | mA               |
| Operating Current at Power Save | I <sub>save</sub>     | No Signal, Power Save Mode                                                                           | -    | 0.1  | 10             | μA               |
| Maximum Output Voltage Swing    | V <sub>om</sub>       | f=100kHz, THD=1%                                                                                     | 2.4  | 3.0  | -              | V <sub>p-p</sub> |
| Voltage Gain                    | G <sub>v</sub>        | V <sub>in</sub> =100kHz, 1.0V <sub>p-p</sub> ,<br>Input Sine Signal                                  | 5.6  | 6.0  | 6.4            | dB               |
| Low Pass Filter Characteristic  | G <sub>fy</sub> 6.75M | V <sub>in</sub> =6.75MHz/100kHz, 1.0V <sub>p-p</sub>                                                 | -1.0 | 0    | 1.0            | dB               |
|                                 | G <sub>fy</sub> 54M   | V <sub>in</sub> =54MHz/100kHz, 1.0V <sub>p-p</sub>                                                   | -    | -40  | -24            |                  |
| Differential Gain               | DG                    | V <sub>in</sub> =1.0V <sub>p-p</sub> , 10step Video Signal                                           | -    | 0.5  | -              | %                |
| Differential Phase              | DP                    | V <sub>in</sub> =1.0V <sub>p-p</sub> , 10step Video Signal                                           | -    | 0.5  | -              | deg              |
| S/N Ratio                       | SN <sub>v</sub>       | 100kHz to 6MHz, V <sub>in</sub> =1.0V <sub>p-p</sub><br>100% White Video Signal, R <sub>L</sub> =75Ω | -    | +70  | -              | dB               |
| Switching Noise Level           | N <sub>swpl</sub>     | R <sub>L</sub> =75Ω,<br>V <sub>out</sub> =10% White Video Signal                                     | -    | 4    | 7              | mV <sub>pp</sub> |
| SW Change Voltage High Level    | V <sub>thPH</sub>     | Active                                                                                               | 1.25 | -    | V <sup>+</sup> | V                |
| SW Change Voltage Low Level     | V <sub>thPL</sub>     | Non-active                                                                                           | 0    | -    | 0.45           |                  |

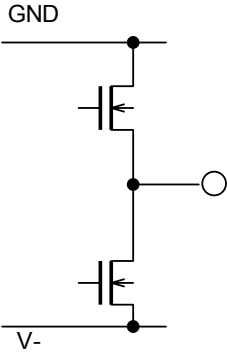
## ■ CONTROL TERMINAL

| PARAMETER  | STATUS | NOTE                  |
|------------|--------|-----------------------|
| Power Save | H      | Power Save: OFF       |
|            | L      | Power Save: ON (Mute) |
|            | OPEN   | Power Save: ON (Mute) |

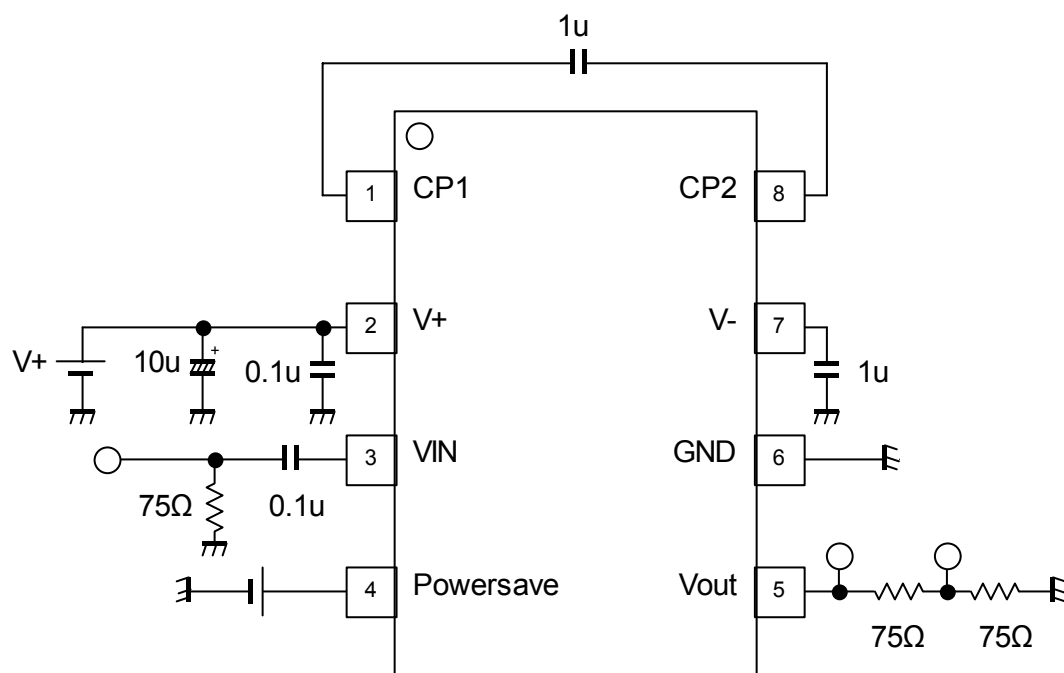
## ■ TERMINAL FUNCTION

| PIN No. | PIN NAME   | FUNCTION                  | EQUIVALENT CIRCUIT                                                                   | DC VOLTAGE |
|---------|------------|---------------------------|--------------------------------------------------------------------------------------|------------|
| 1       | CP1        | Flying Capacitor Terminal |    | -          |
| 2       | V+         | V+ Power Supply           | -                                                                                    | -          |
| 3       | VIN        | Input                     |   | 0V         |
| 4       | Power Save | Power Save                |  | -          |
| 5       | VOUT       | Output                    |  | 0V         |

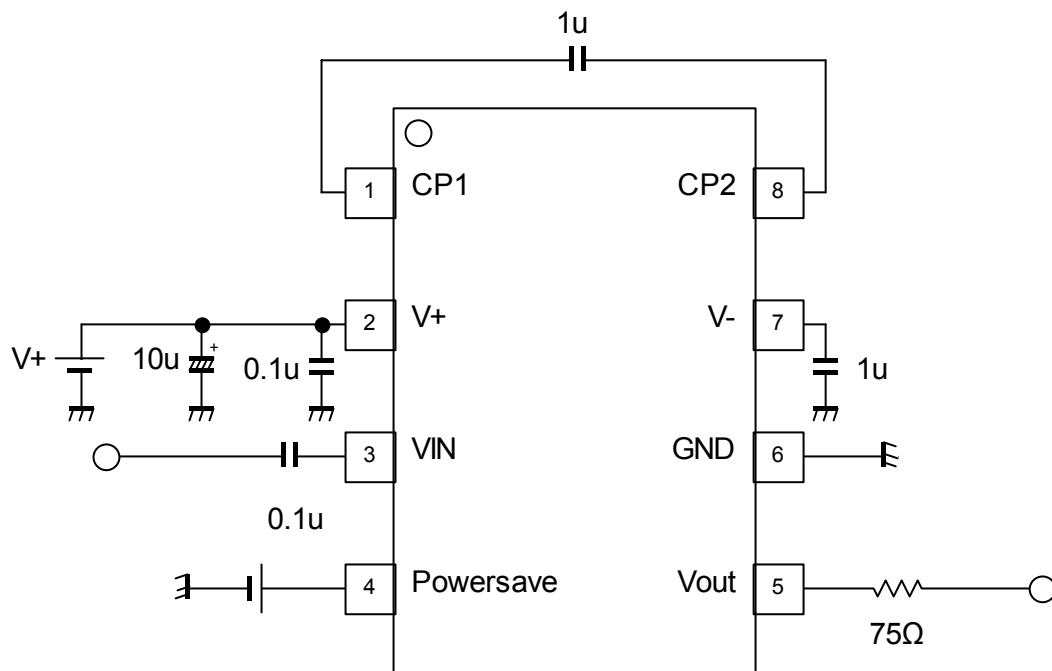
Ver.6.3

| PIN No. | PIN NAME | FUNCTION                  | EQUIVALENT CIRCUIT                                                                 | DC VOLTAGE |
|---------|----------|---------------------------|------------------------------------------------------------------------------------|------------|
| 6       | GND      | Ground                    | -                                                                                  | -          |
| 7       | V-       | V- Power Supply           | -                                                                                  | -          |
| 8       | CP2      | Flying Capacitor Terminal |  | -          |

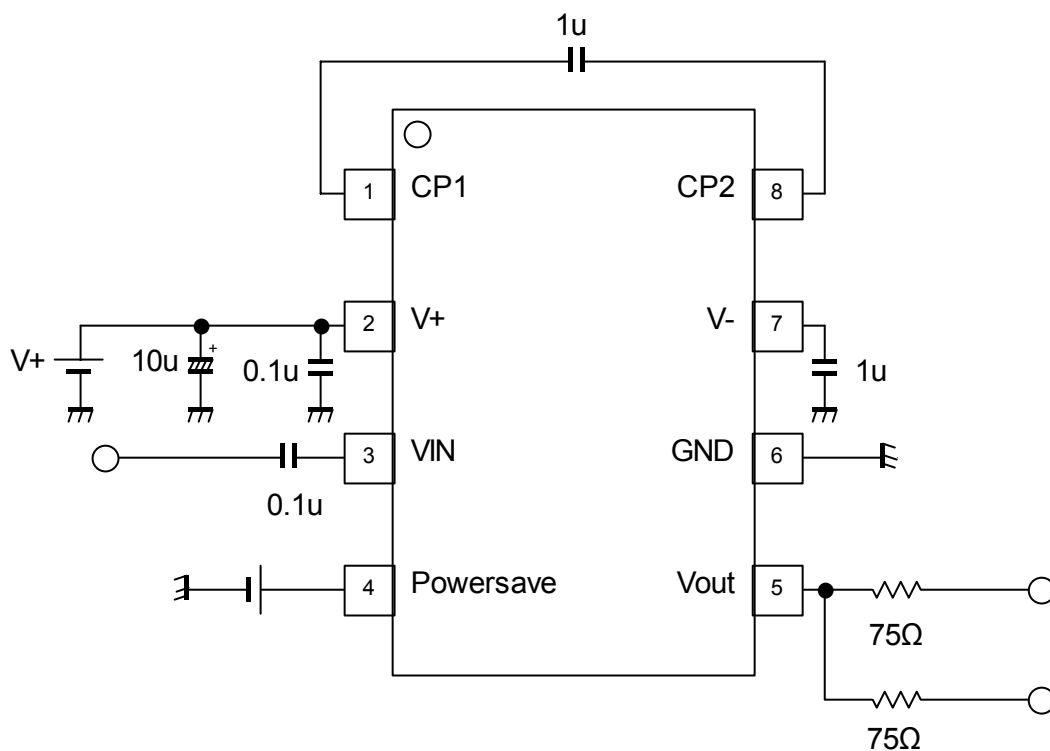
## ■ TEST CIRCUIT



## ■ APPLICATION CIRCUIT 1 (Standard circuit)



## ■ APPLICATION CIRCUIT 2 (Two-line drive circuit)



## APPLICATION

When coax multiplex transmission, we recommend that you adjust the output signal.  
Please refer to figure1.

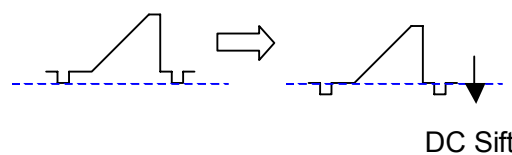
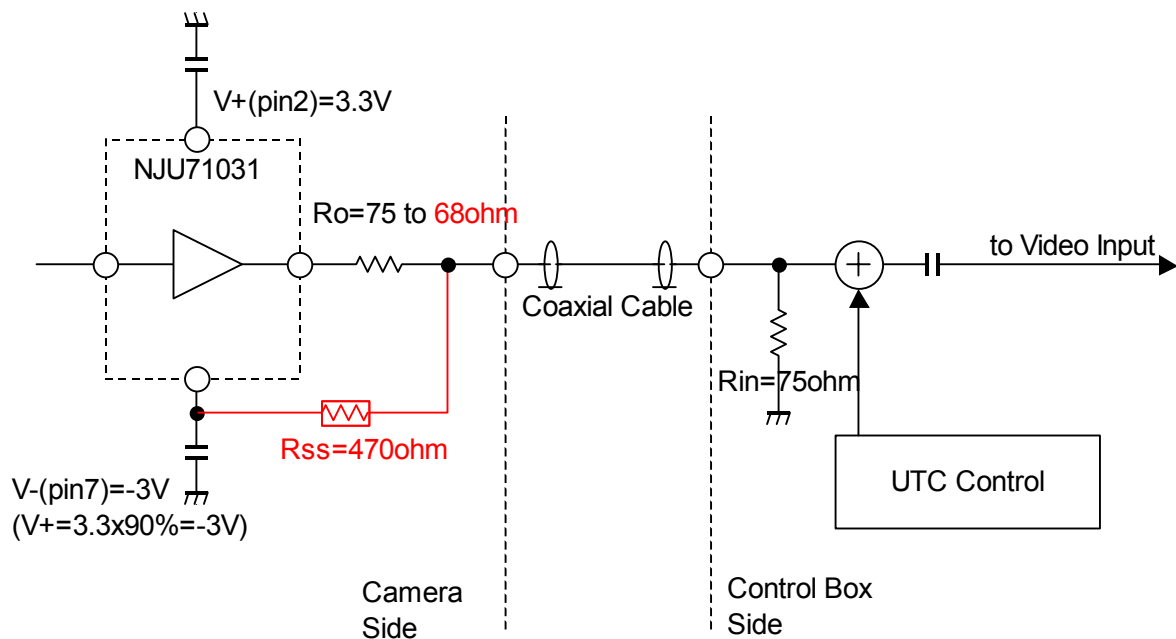


Figure1: How to shift the output DC signal

The rare case, there is to be superimposed the directly DC control signal on the video signal when superimposed a control signal to the video signal by using a coaxial cable.

In that case, the following symptoms will appear.

- The control signal appears on the screen.
- Loss of synchronization of the video signal

Shows the proposed measures on the next page.

### A case of multiple coaxial transmission: UTC(Up The Coaxial)

This is one of a case at the multiplex coaxial transmission used in CCTV.

It is a system that control signals of camera multiplexing to the coaxial cable.

This system is superimposed on the control signal pulse in the vertical blanking period as shown in Figure 2.

This is because do not affect the video signal.

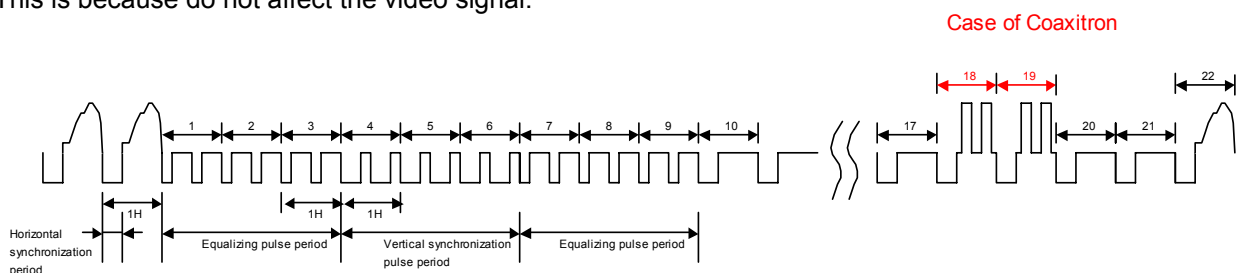


Figure2: A case of UTC

Proposed measures is shift the output DC signal by using the V- terminal (pin 7) of NJU71031.

The steps are as follows:

1. A resistor: Rss add between the Ro (75Ω) and V- terminal (7pin).
2. Reduce Ro (75Ω).

By adding a Rss, level of the video signal is attenuated.

Example: Level of the video signal will be reduced 5% at connected Rss = 470Ω and Ro = 75Ω.

Therefore, increase 5% of video output level by changed to 68Ω the Ro.

\*Table 1 shows an external resistor value and the swing of video output signal at V+ (pin2) = 3.3V, 3V.

3. Please evaluation of S/N.

It is because the noise of the charge pump may change.

|                                      | Value (typ.) |       | UNIT |
|--------------------------------------|--------------|-------|------|
| V+(pin2)                             | 3.3          | 3     | V    |
| V-(pin7) (V+*90%)                    | -2.97        | -2.7  | V    |
| Termination resistance               | 75           | 75    | ohm  |
| Resistance<br>(between Vss and Vout) | 470          | 470   | ohm  |
| Output resistance(Ro)                | 68           | 68    | ohm  |
| Sync. Voltage of Vout                | -0.209       | -0.19 | V    |
| Swing of Vout                        | 0.975        | 0.975 | Vpp  |

Table 1: external resistor value and the swind of video output signal at V+ (pin2) = 3.3V, 3V.

- Case of 2-system 75ohm drive

Shown in Figure 3, 2-system drive will be possible at system 1 (75Ω for multiplex coaxial system) and system -2 (75Ω system for monitoring).

However, shown in Figure 4, 2-system drive is not recommended, case of system 1 and 2 (75Ω for multiplex coaxial system)

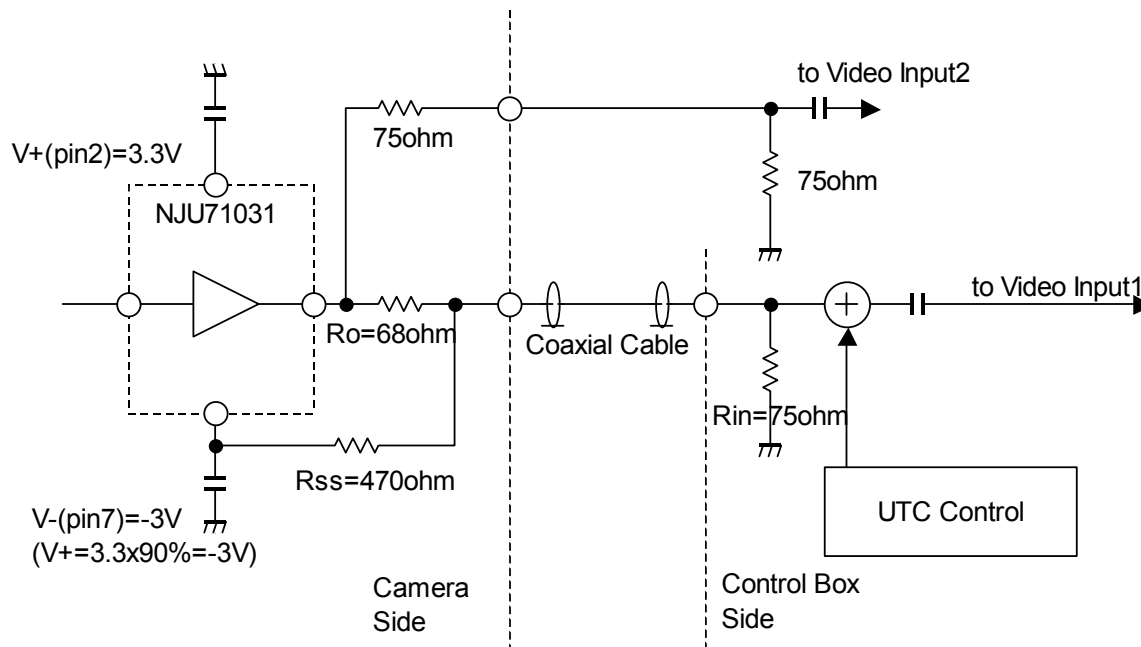


Figure 3: Recommended 2-system drive circuit

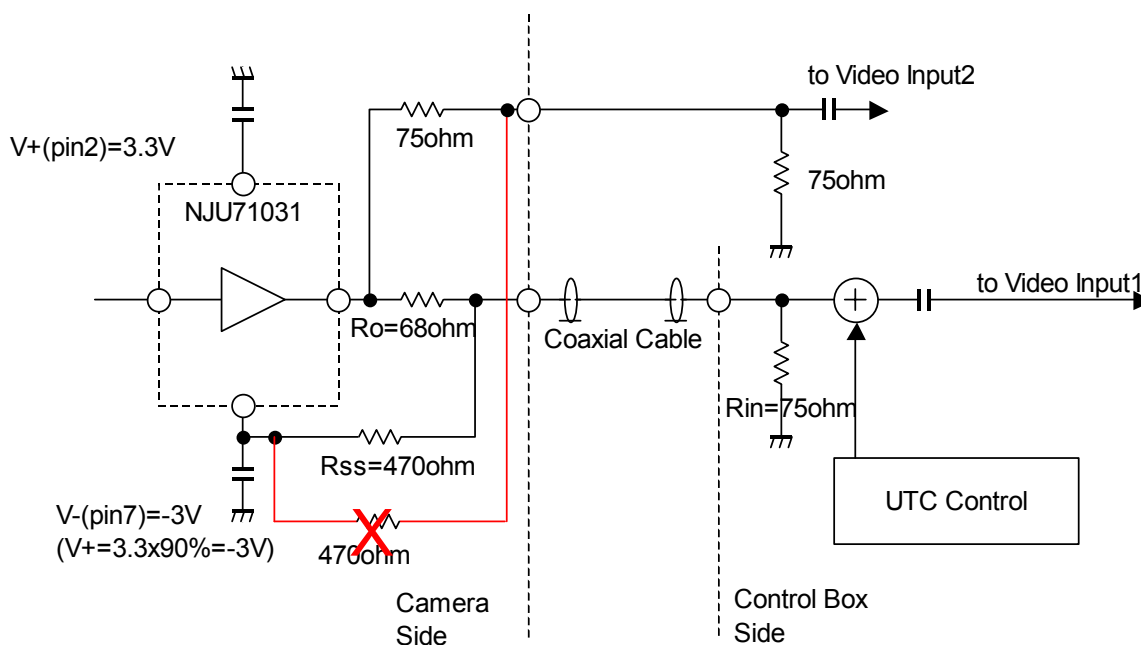
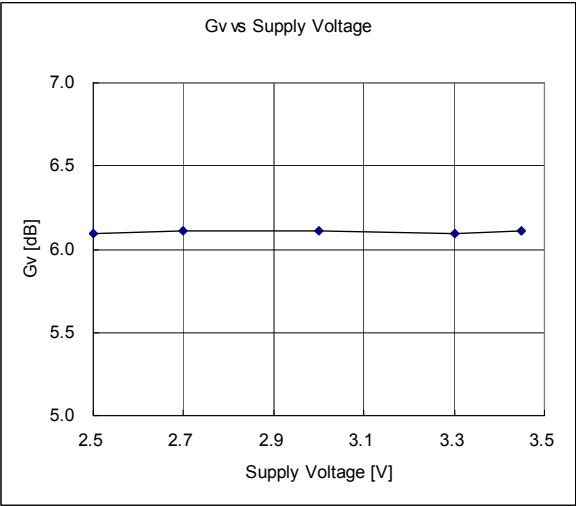
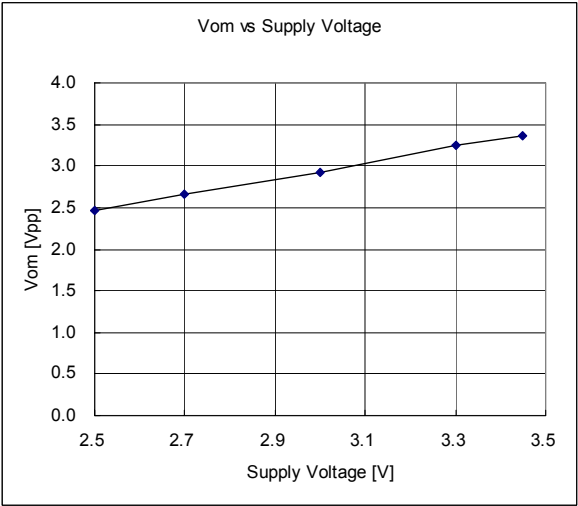
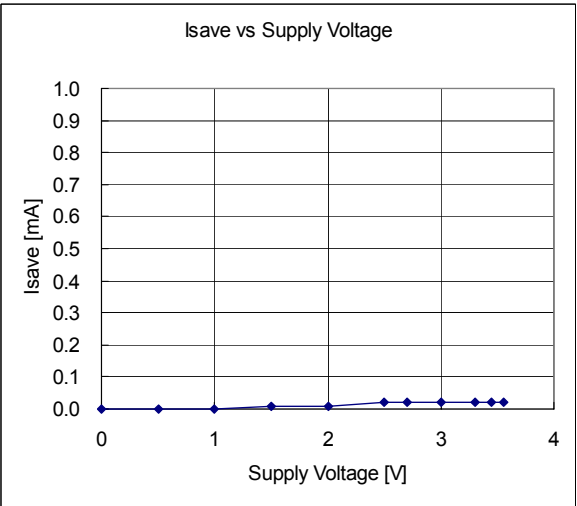
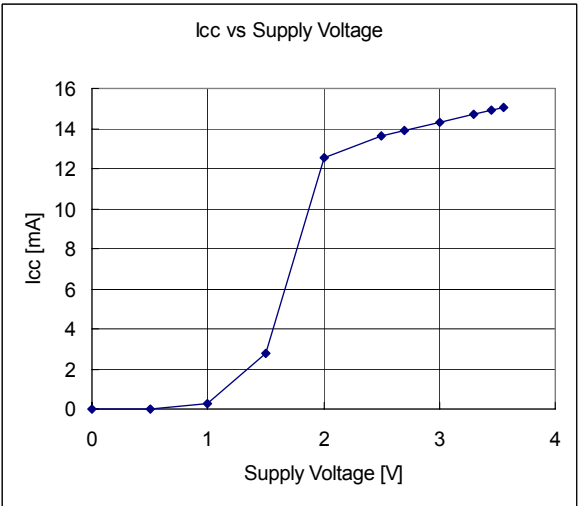
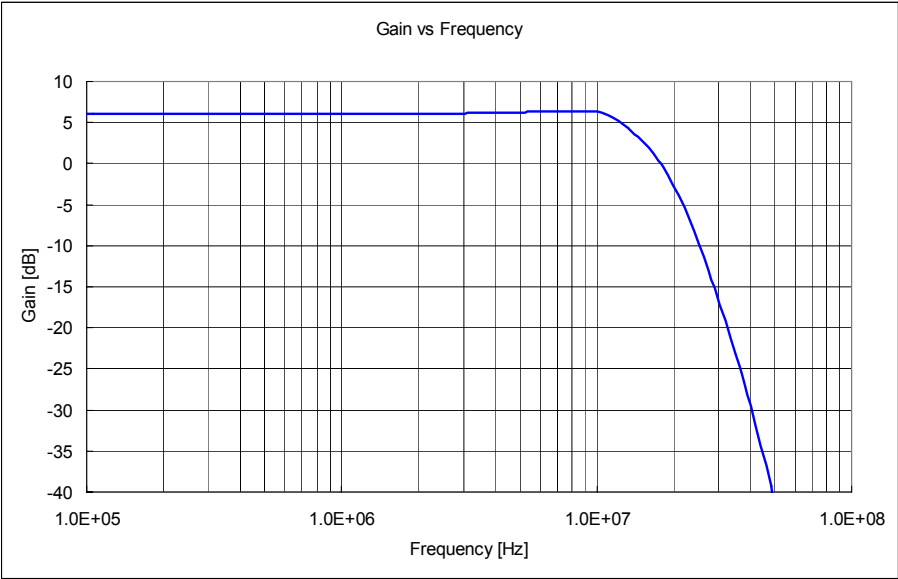
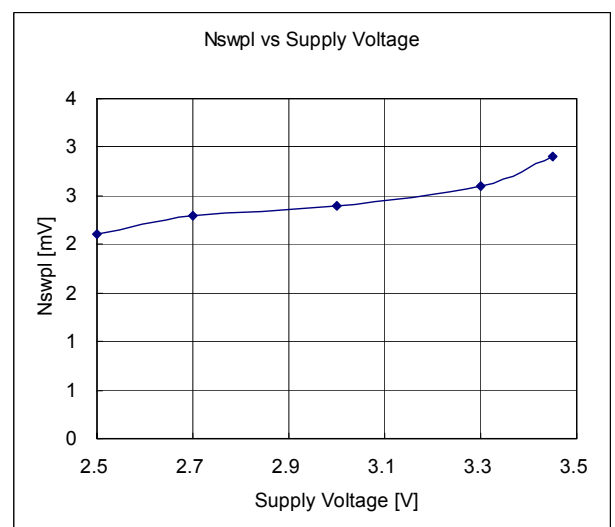
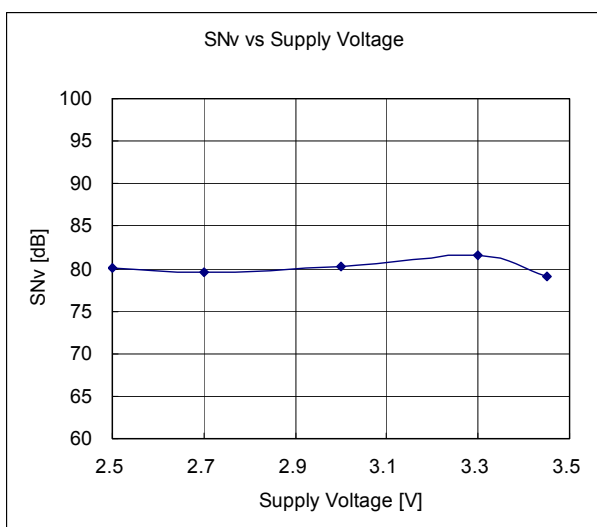
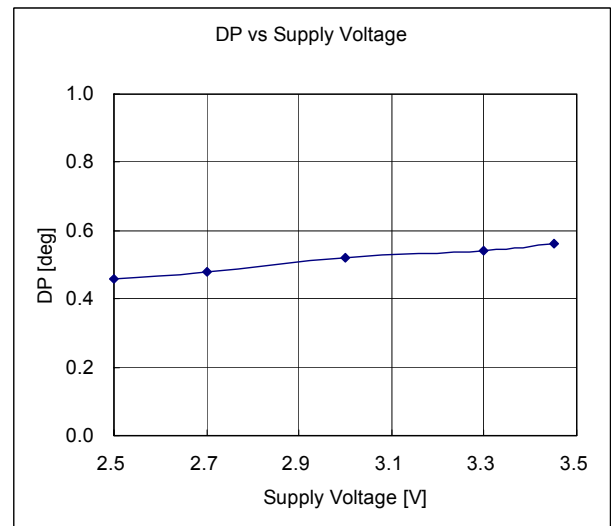
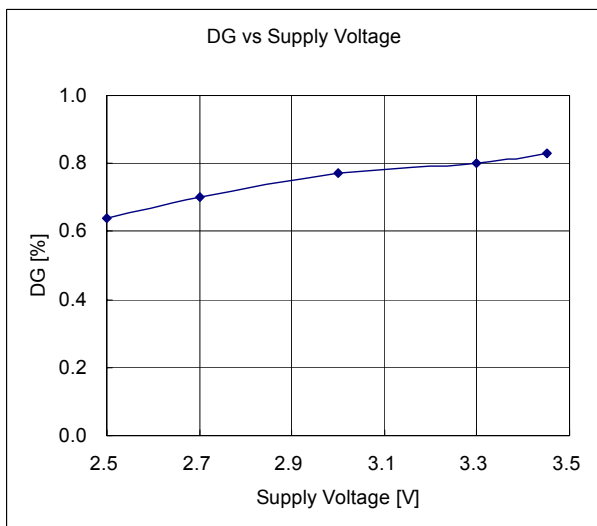
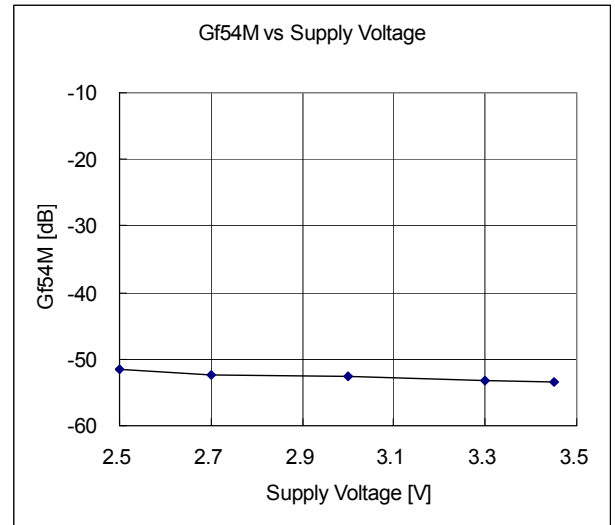
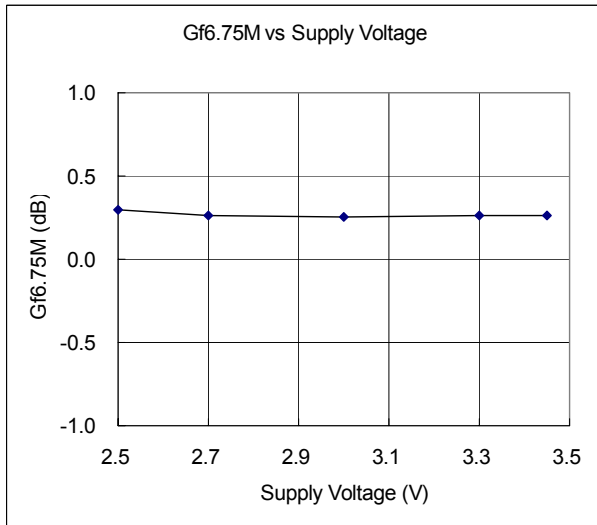


Figure 4: Not recommended 2-system drive circuit

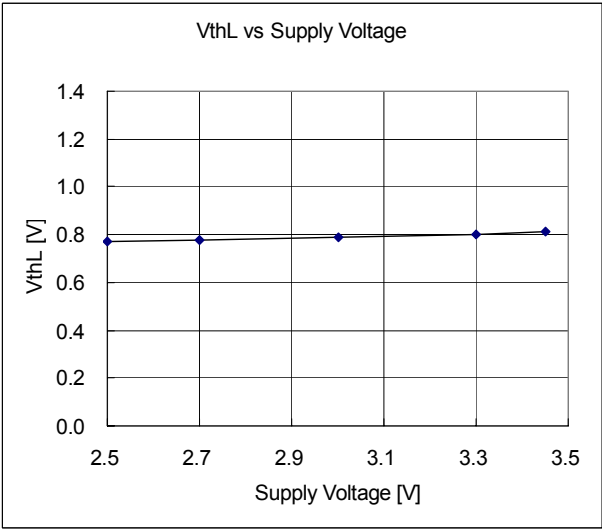
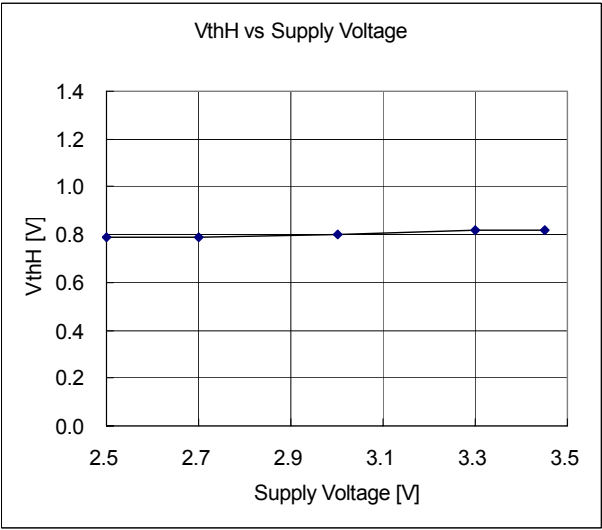
TYPICAL CHARACTERISTICS



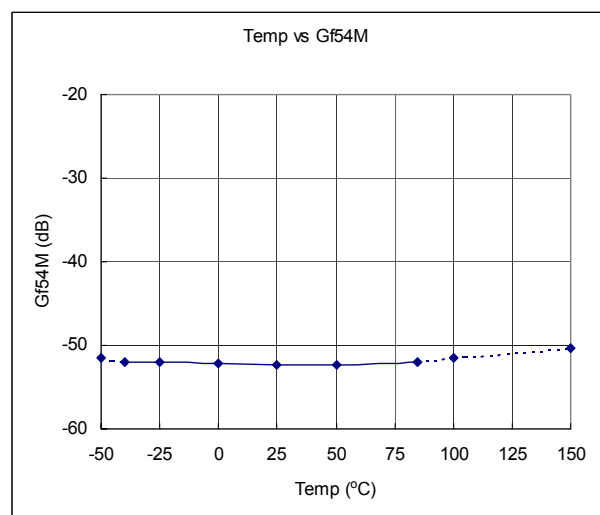
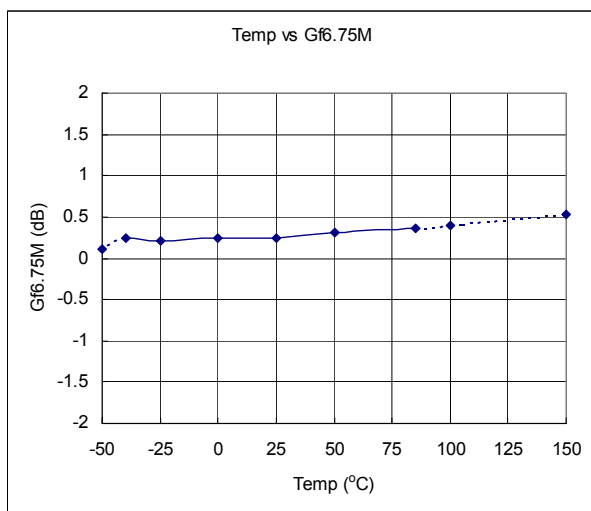
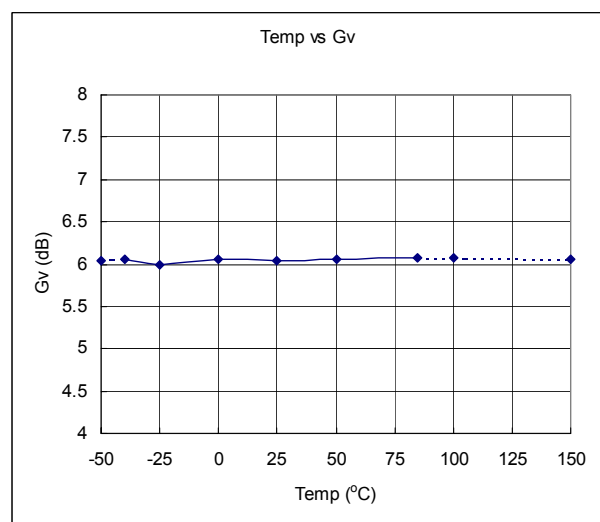
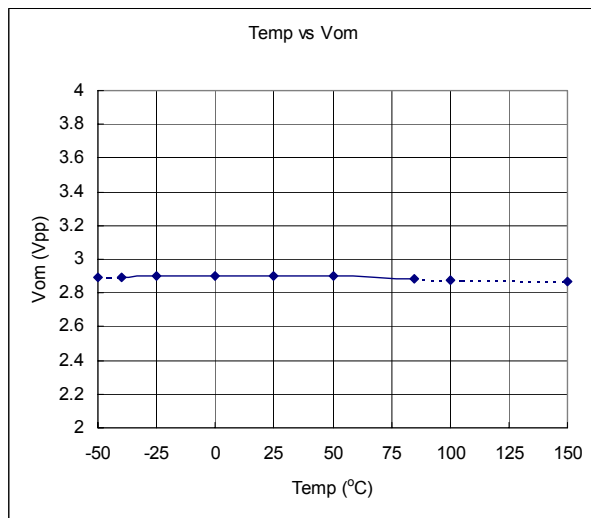
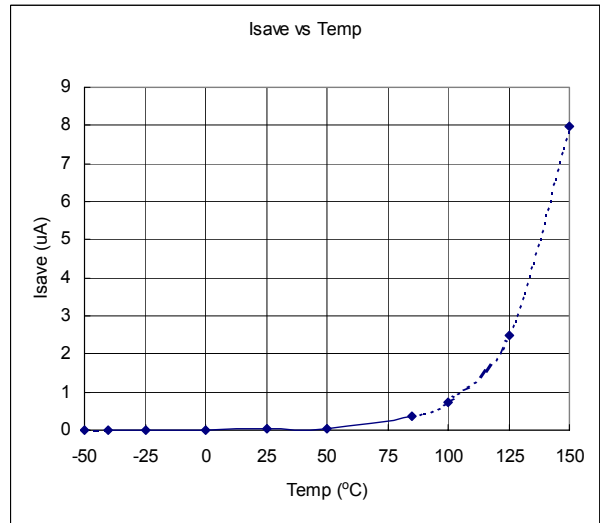
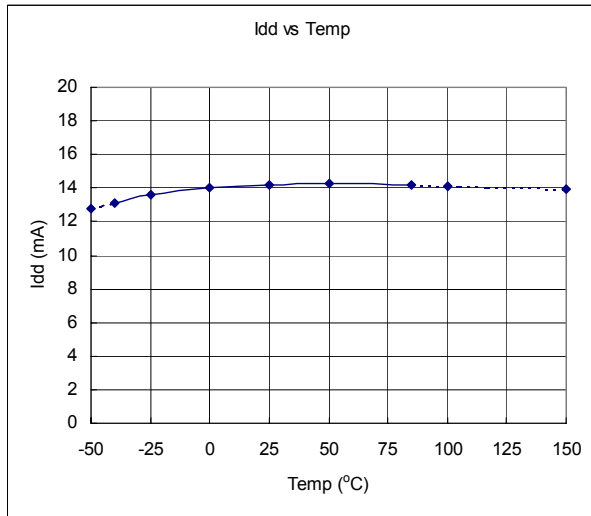
## TYPICAL CHARACTERISTICS



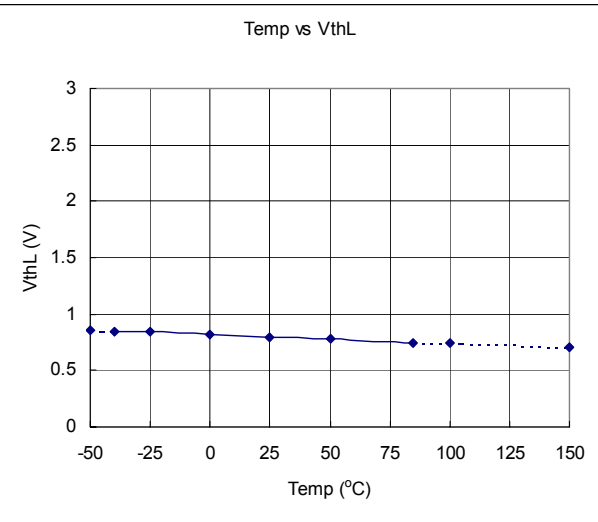
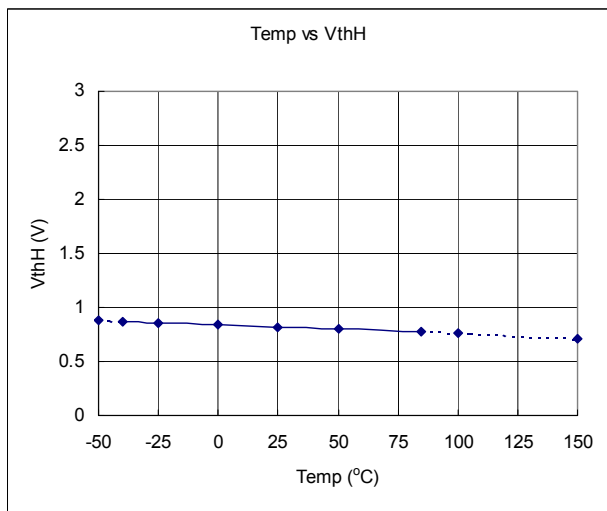
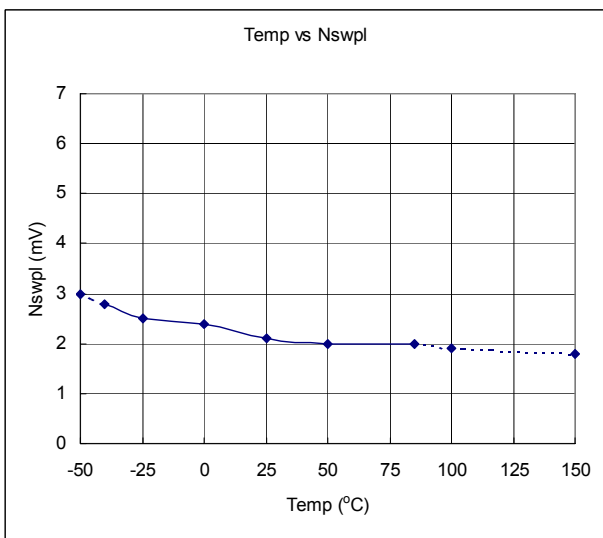
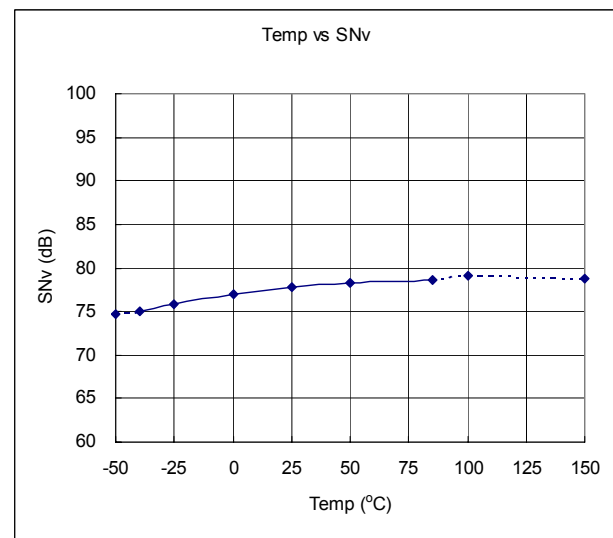
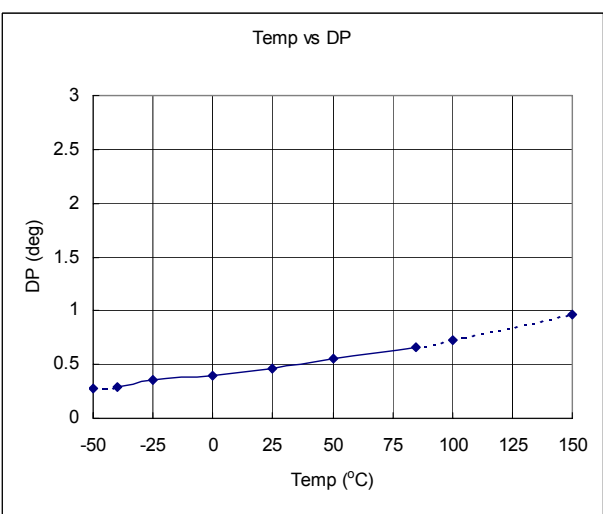
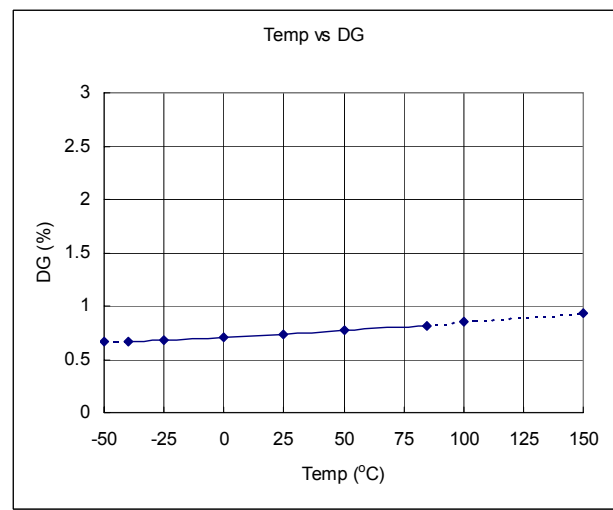
■TYPICAL CHARACTERISTICS



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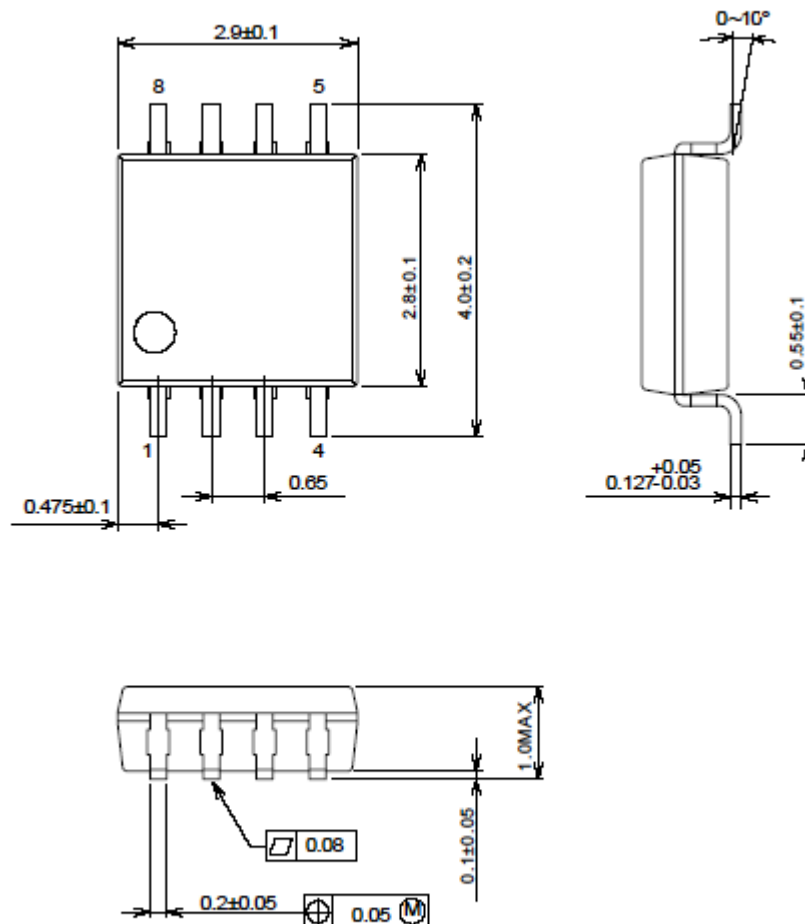


TYPICAL CHARACTERISTICS



■ PACKAGE DIMENSIONS : MSOP8(TVSP8)\*MEET JEDEC MO-187-DA / THIN TYPE

TVSP8



GD-R00802A-3

UNIT : mm

