OUTPUT COUPLING CAPACITOR-LESS LOW VOLTAGE VIDEO AMPLIFIER WITH LPF

■FEATURES

- ●Operating Voltage 2.5 to 3.45V
- ●Output Capacitor is unnecessary
- ●6dB Amp. , 75Ω Driver (2-System drive)
- ●LPF Characteristics 0dB at 6.75MHz
  -40dB at 54MHz
- ●CMOS Technology
- ●Package Outline MSOP8*,DFN8-U1
  *MEET JEDEC MO-187-DA / THIN TYPE

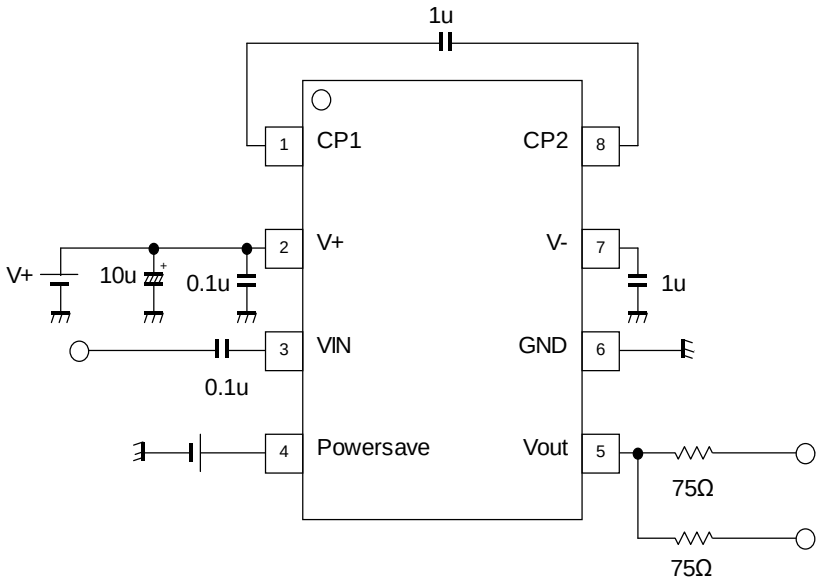
■GENERAL DESCRIPTION

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.

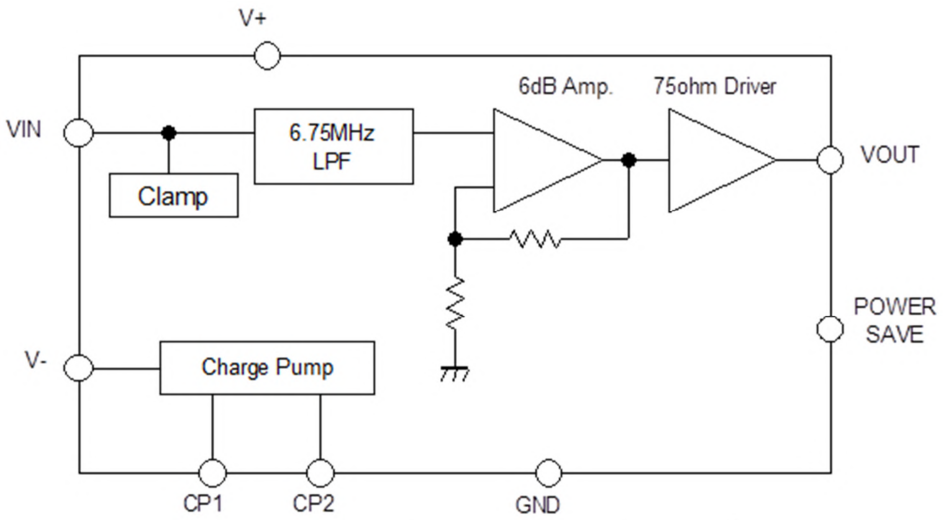
■APPLICATION

- ●Car Camera
- ●Car Navigation
- ●CCTV

■APPLICATION CIRCUIT (2-System drive)



■EQUIVALENT CIRCUIT・BLOCK DIAGRAM



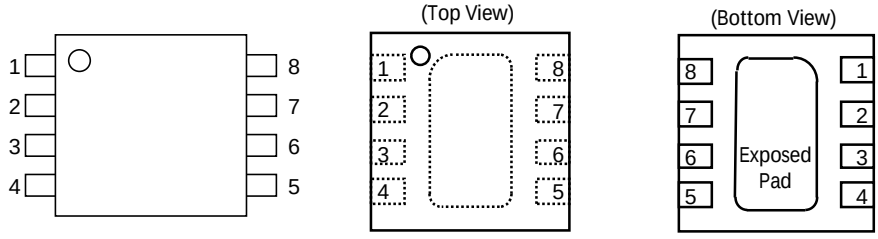
■**Voltage Gain Valuation**

Voltage Gain	Part No.
12dB	NJU71032

■**Built in short to battery protection circuit video driver**

Output type	Part No.
Single-end	NJU71091-T1
Differential	NJU71094-T1

■**PIN CONFIGURATION**

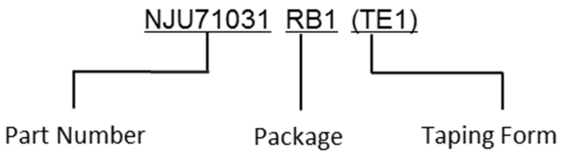


TVSP8 ESON8-U1

PIN NO.	SYMBOL	DESCRIPTION
1	CP1	Flying Capacitor Terminal
2	V+	Power Supply Terminal
3	VIN	Video Signal Input Terminal
4	POWER SAVE	Power save Control Terminal
5	VOUT	Video Signal Output Terminal
6	GND	GND Terminal
7	V-	Flying Capacitor Terminal
8	CP2	Flying Capacitor Terminal

Exposed Pad:
Connect the Exposed Pad on land of float, or connect to be the same potential as the IC of the V- terminal.

■**MARK INFORMATION**



■**ORDERING INFORMATION**

PART NUMBER	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ(pcs)
NJU71031RB1	MSOP8	Yes	Yes	Sn-2Bi	71031	18.0	3,000
NJU71031KU1	DHN8-U1	Yes	Yes	Sn-2Bi	71031	5.3	3,000

■ABSOLUTE MAXIMUM RATINGS

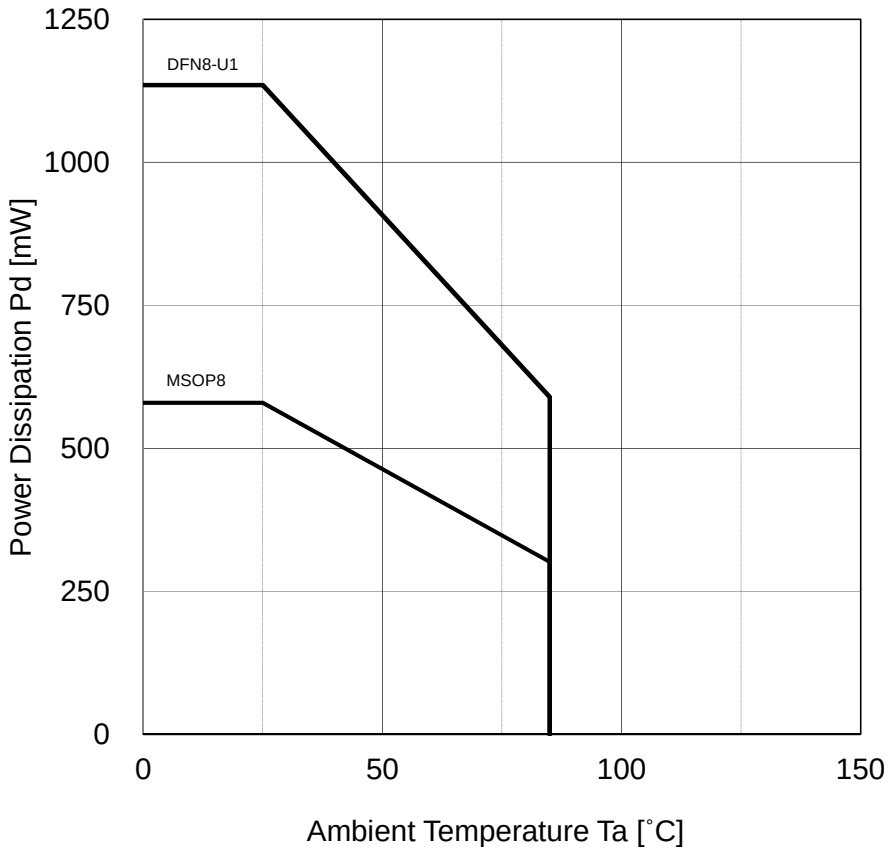
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	3.55	V
Power Dissipation (Ta=25°C)(4)	P_D	MSOP8：580 *1 DFN8-U1：1135 *2	mW
Operating Temperature Range	T_{opr}	-40 to 85	°C
Storage Temperature Range	T_{stg}	-55 to 150	°C

1) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm 2 layers, FR-4)
2) Mounted on glass epoxy board. (101.5×114.5×1.6mm: based on EIA/JEDEC standard, 4Layers FR-4, with Exposed Pad)
(For 4Layers: Applying 99.5×99.5mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5)

■RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	2.5 to 3.45	V

■POWER DISSIPATION vs. AMBIENT TEMPERATURE



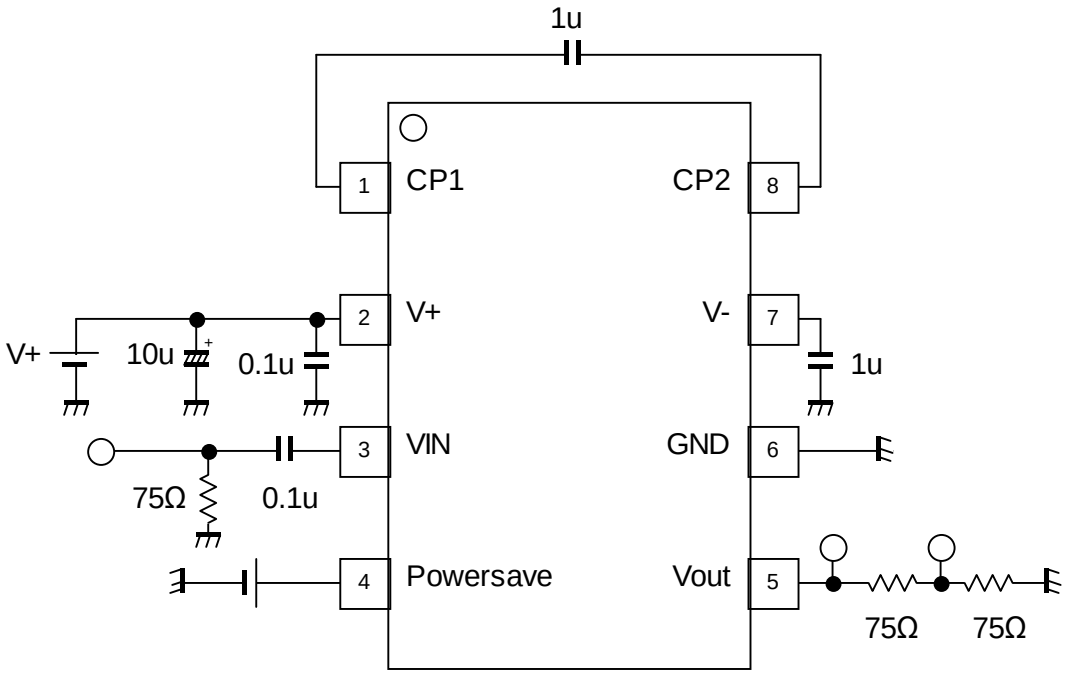
■**ELECTRICAL CHARACTERISTICS** (Ta=25°C, V^+=3.0V, RL=150Ω, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No Signal	-	14	22	mA
Operating Current at Power Save	Isave	No Signal, Power Save Mode	-	0.1	10	μA
Maximum Output Voltage Swing	Vom	f=100kHz,THD=1%	2.4	3.0	-	Vp-p
Voltage Gain	Gv	VIN=100kHz, 1.0Vp-p, Input Sine Signal	5.6	6.0	6.4	dB
Low Pass Filter Characteristic	Gfy6.75M	VIN=6.75MHz/100kHz, 1.0Vp-p	-1.0	0	1.0	dB
	Gfy54M	VIN=54MHz/100kHz, 1.0Vp-p	-	-40	-24	
Differential Gain	DG	VIN=1.0Vp-p, 10step Video Signal	-	0.5	-	%
Differential Phase	DP	VIN=1.0Vp-p, 10step Video Signal	-	0.5	-	deg
S/N Ratio	SNv	100kHz to 6MHz, VIN=1.0Vp-p 100% White Video Signal, R_L=75Ω	-	+70	-	dB
Switching Noise Level	Nswpl	R_L=75Ω, 10% White Video Signal input	-	4	7	mVpp
SW Change Voltage High Level	VthPH	Active	1.25	-	V^+	V
SW Change Voltage Low Level	VthPL	Non-active	0	-	0.45	

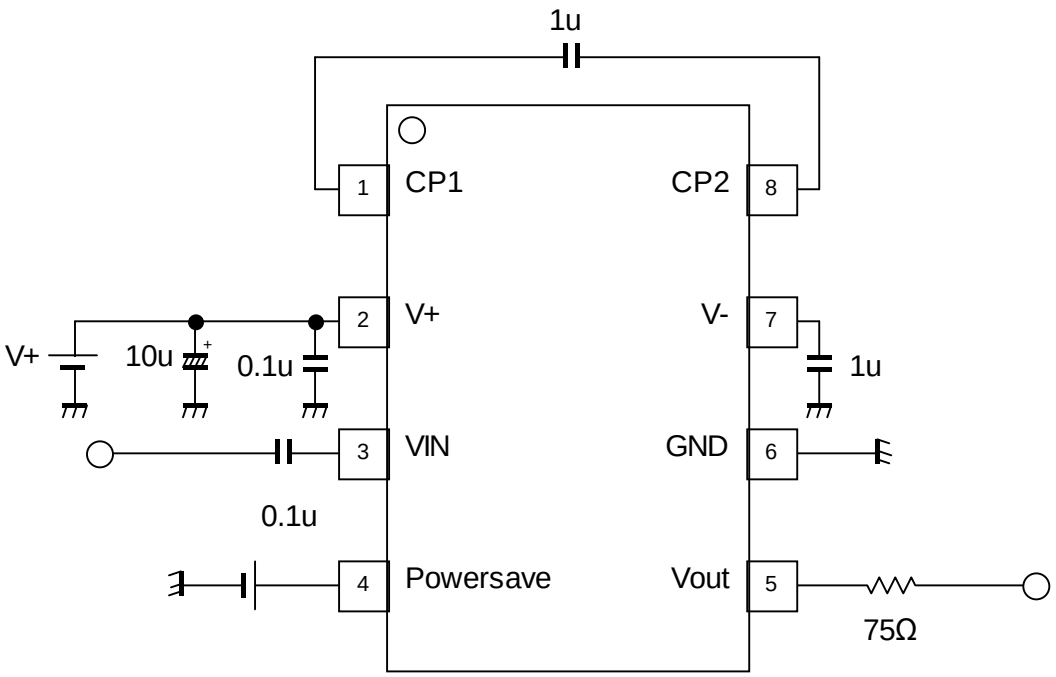
■**CONTROL TERMINAL**

PARAMETER	STATUS	MODE
POWER SAVE	H	Power save: OFF Active mode
	L	Power save: ON Non-Active mode(Mute)
	OPEN	Power save: ON Non-Active mode(Mute)

■TEST CIRCUIT

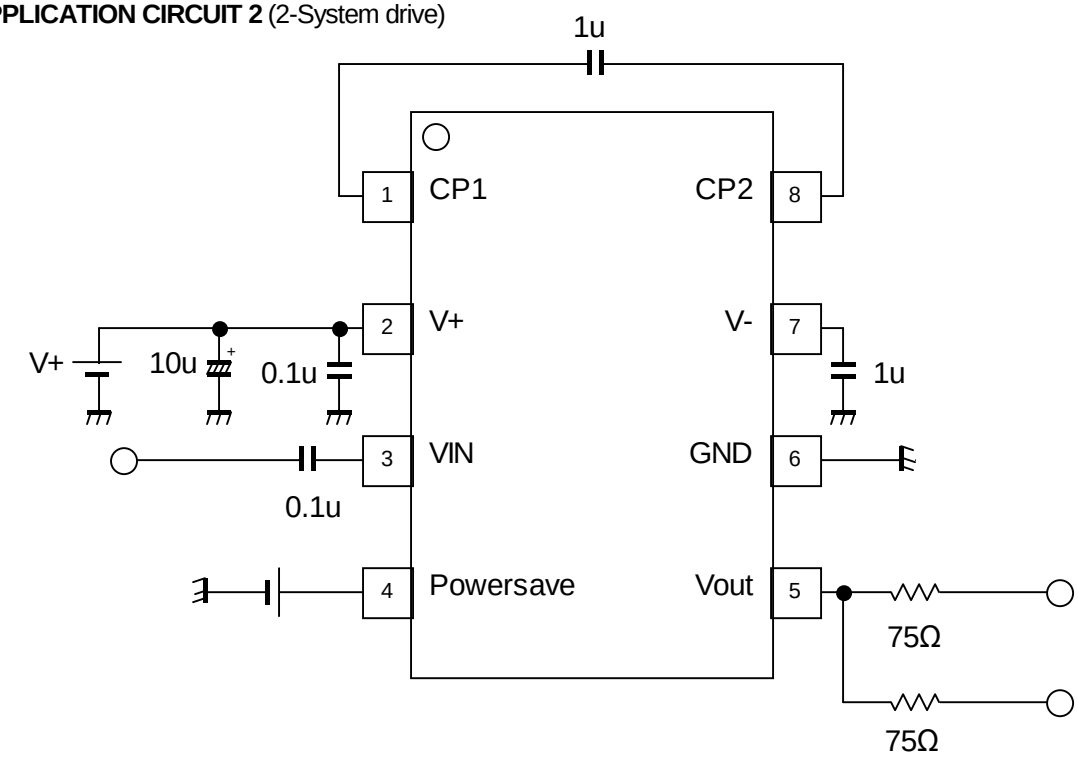


■**APPLICATION CIRCUIT 1**(Standard)



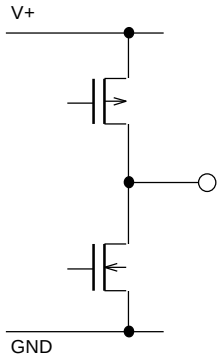
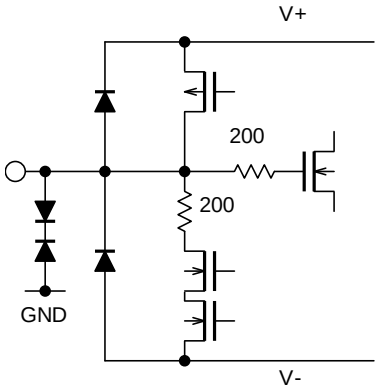
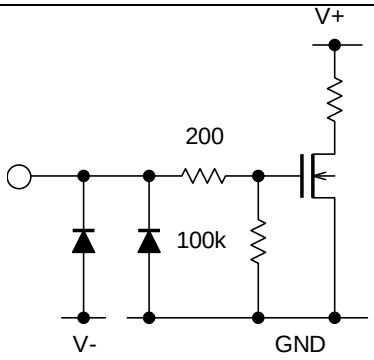
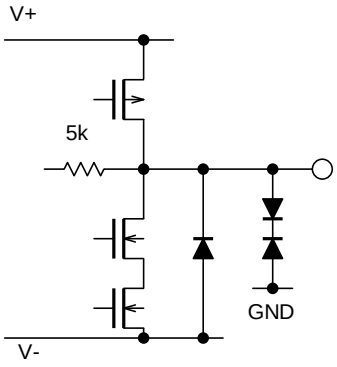
DFN8-U1 Exposed Pad:
Connect the Exposed Pad on land of float, or connect to be the same potential as the IC of the V- terminal.

■**APPLICATION CIRCUIT 2** (2-System drive)

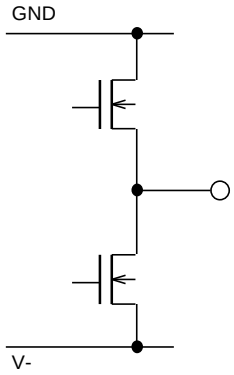


DFN8-U1 Exposed Pad:
Connect the Exposed Pad on land of float, or connect to be the same potential as the IC of the V- terminal.

■TERMINAL FUNCTION

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

■TERMINAL FUNCTION

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

■ APPLICATION

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

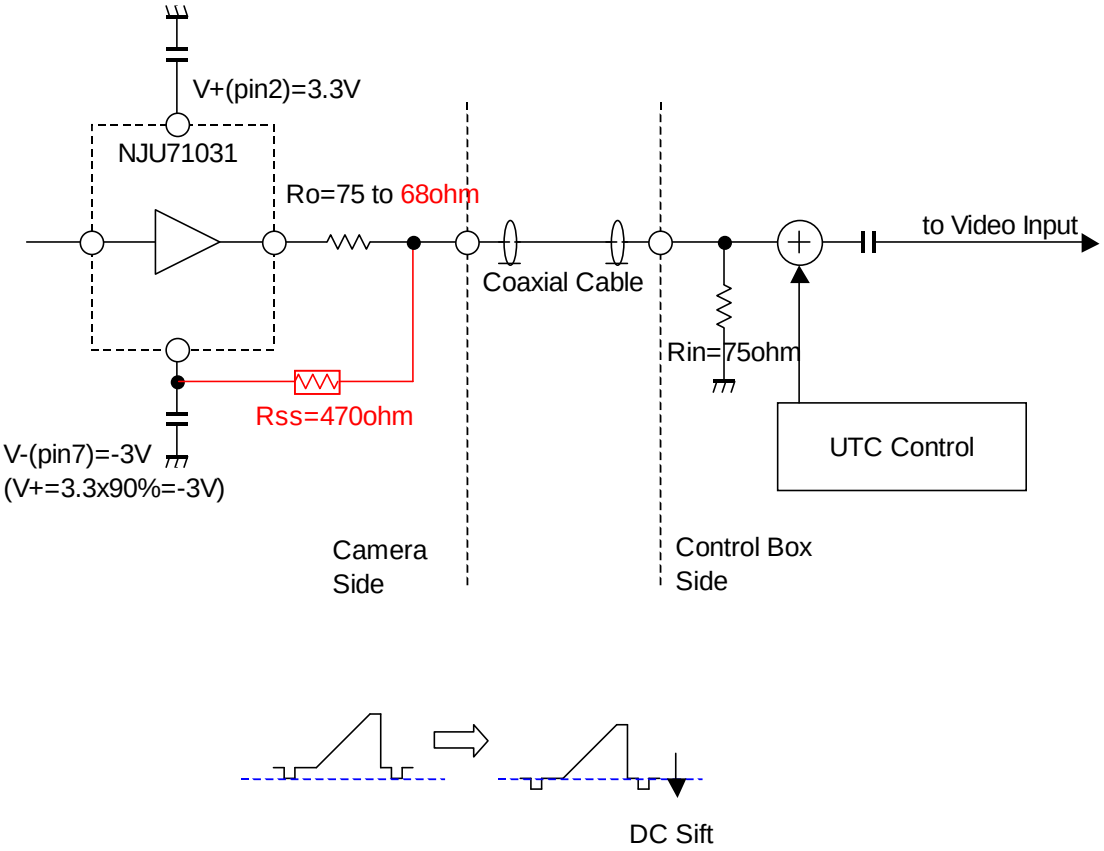


Figure1: How to shift the output DC signal

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.

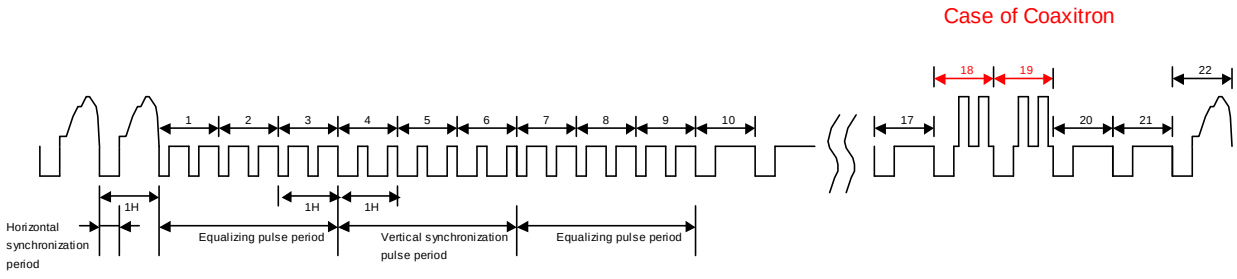


Figure2: A case of UTC

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 (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 swing 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 1and 2 (75Ω for multiplex coaxial system)

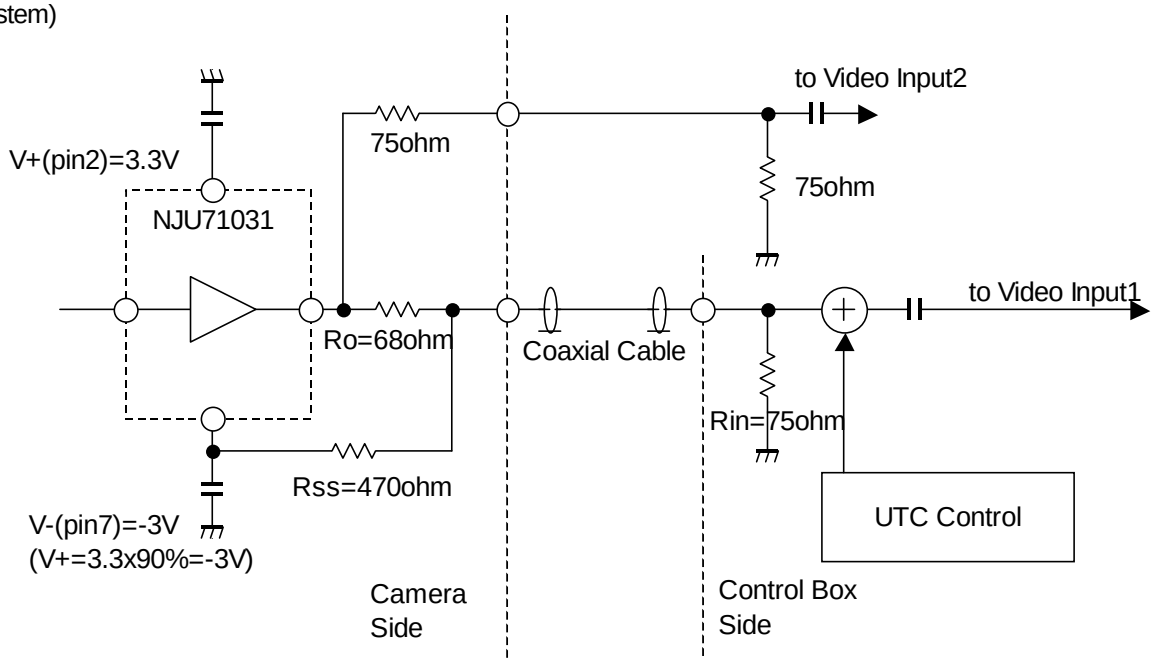


Figure 3: Recommended 2-system drive circuit

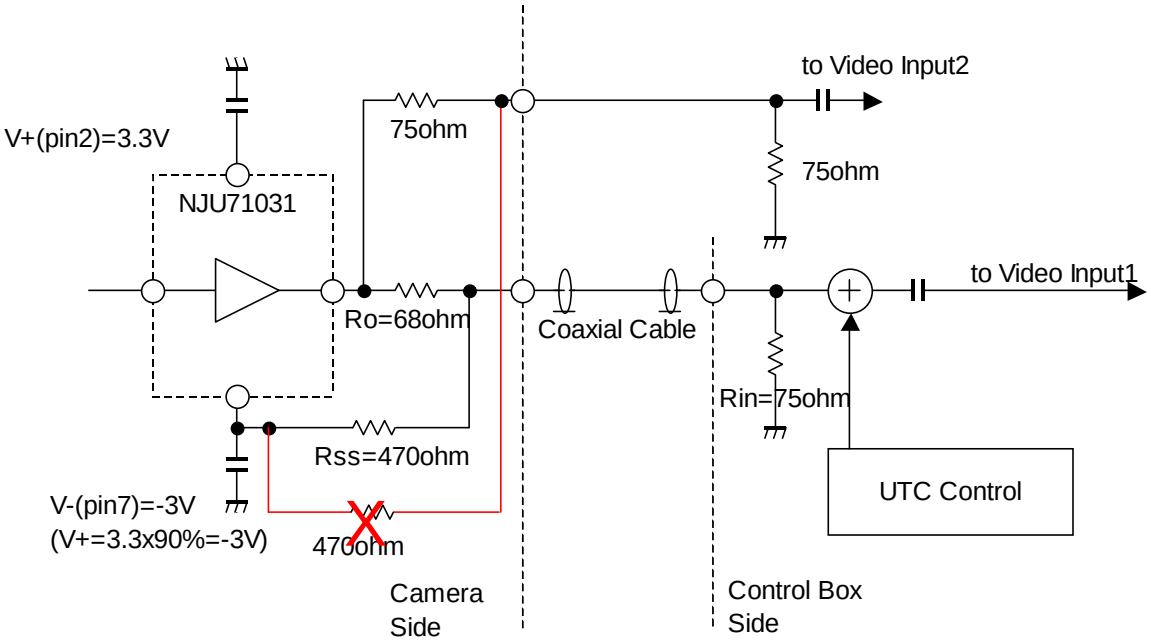
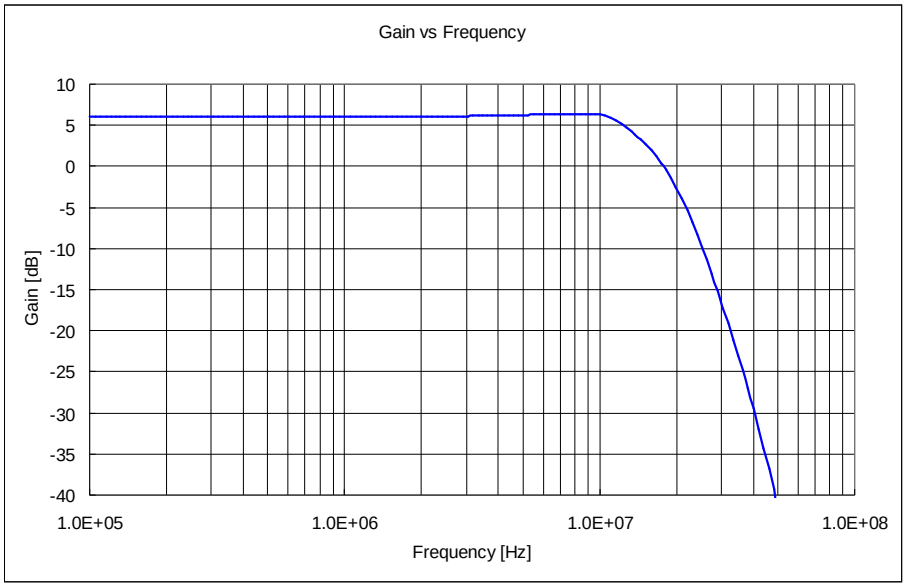
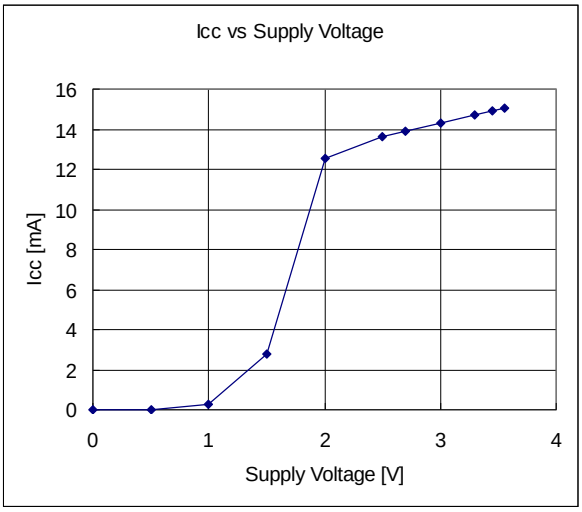
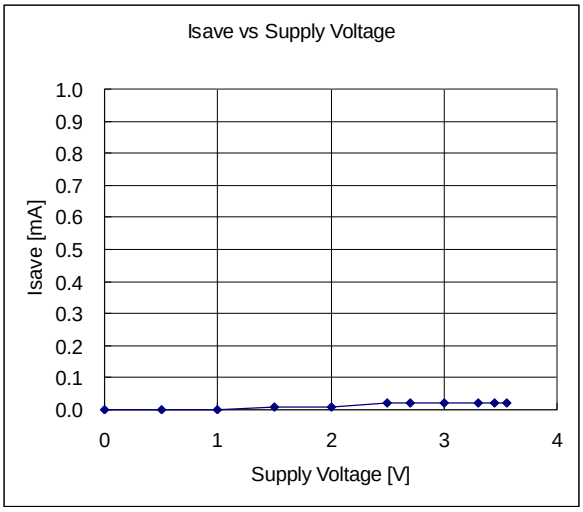


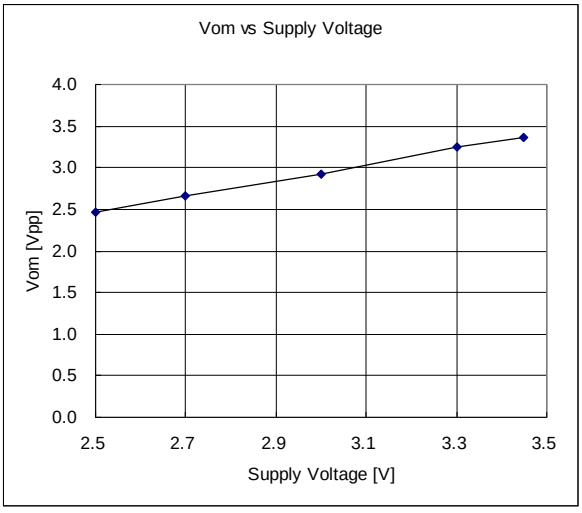
Figure 4: Not recommended 2-system drive circuit

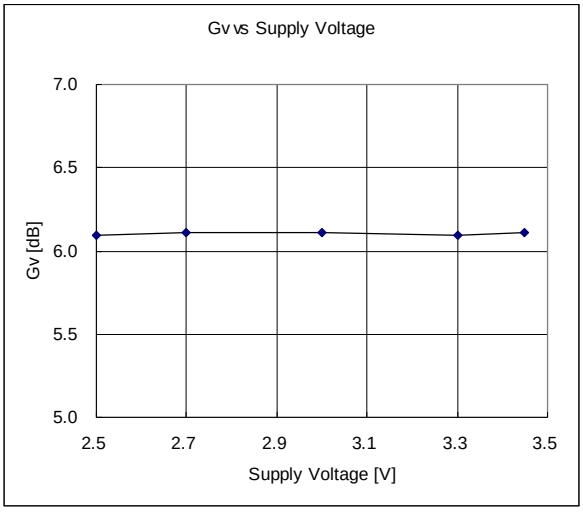
■TYPICAL CHARACTERISTICS



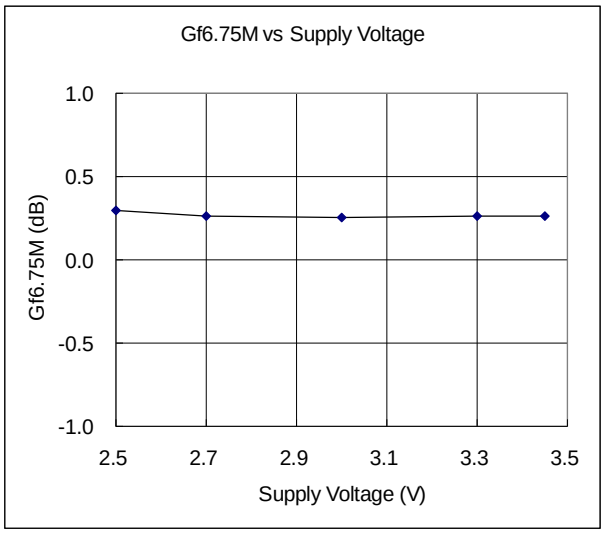


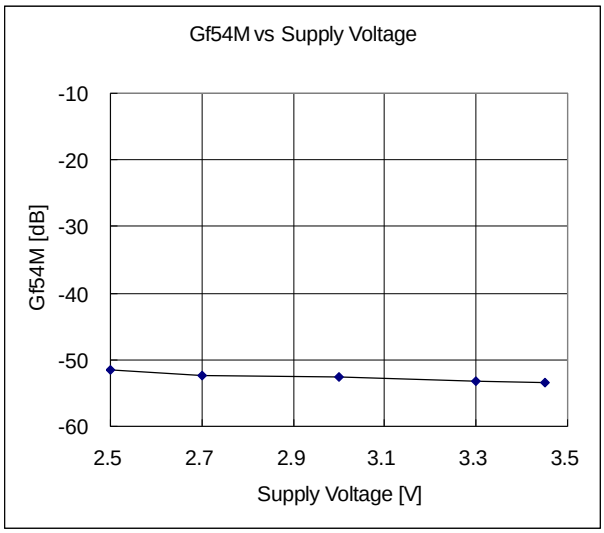


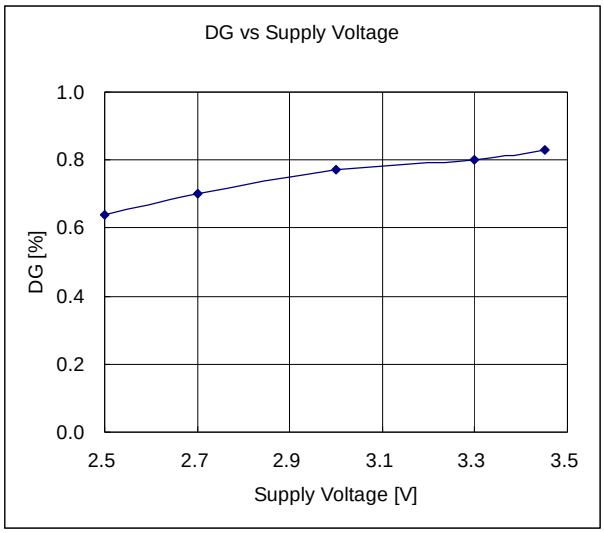


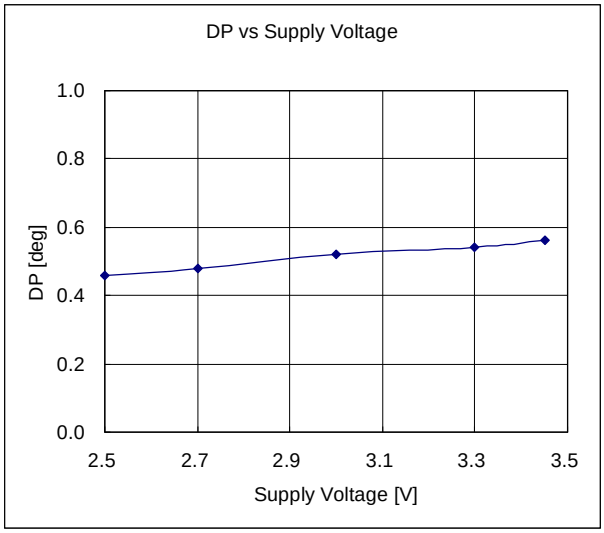


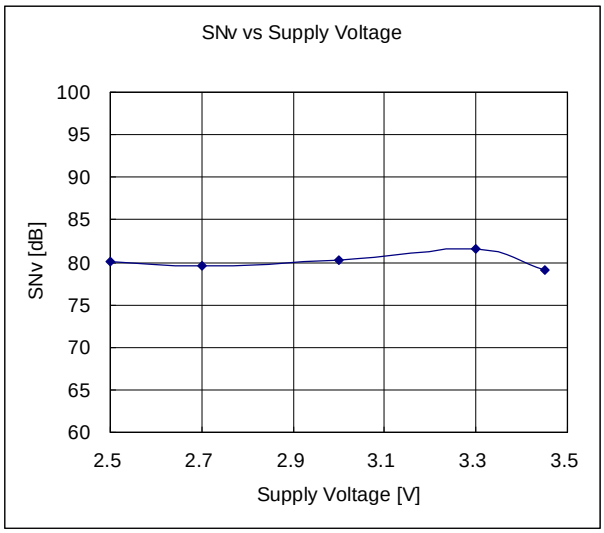
■TYPICAL CHARACTERISTICS

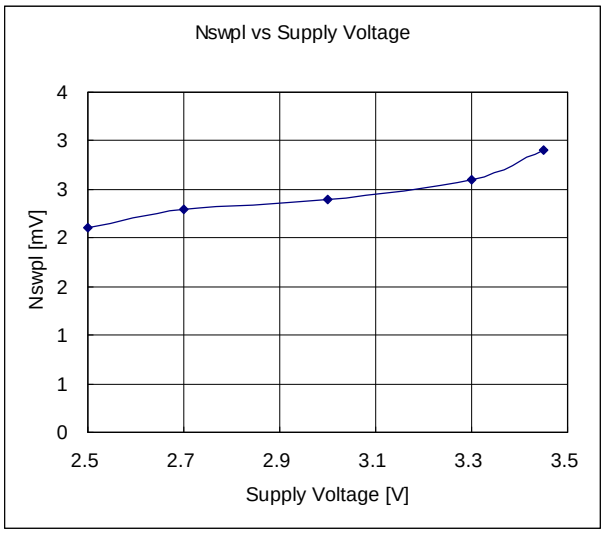




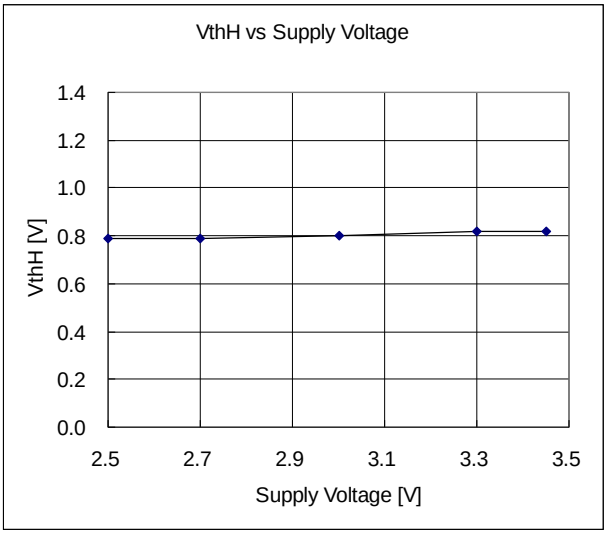


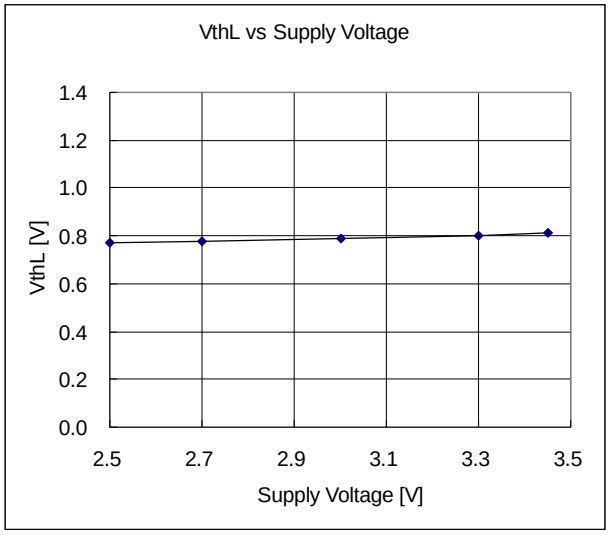




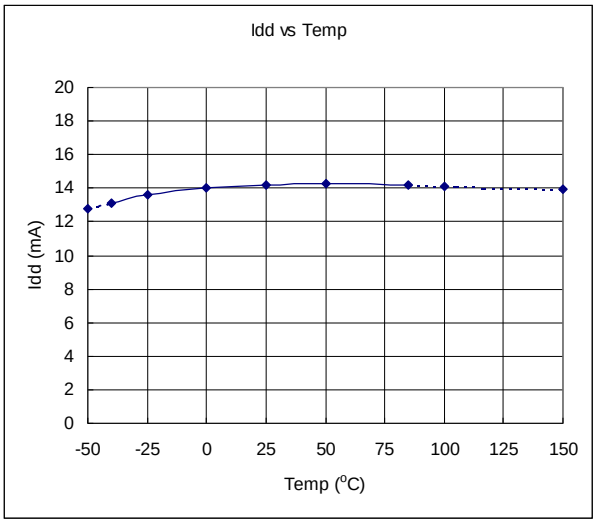


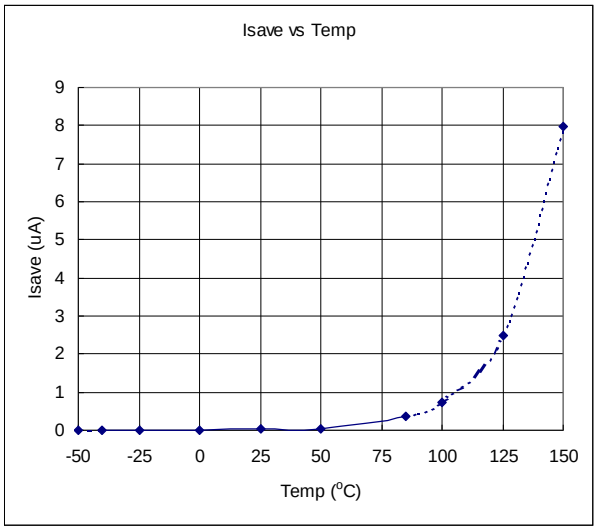
■TYPICAL CHARACTERISTICS

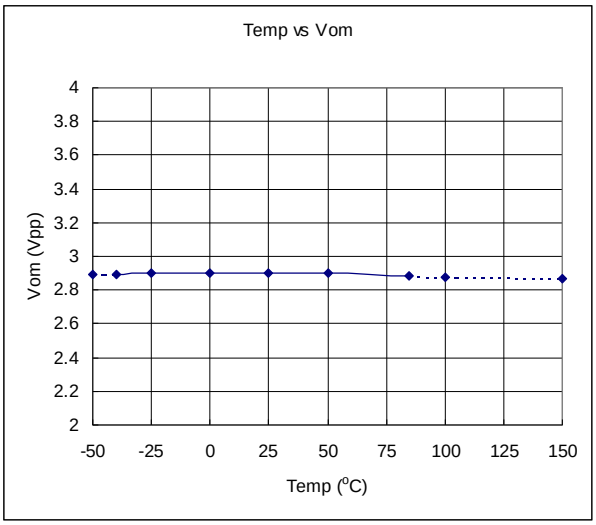


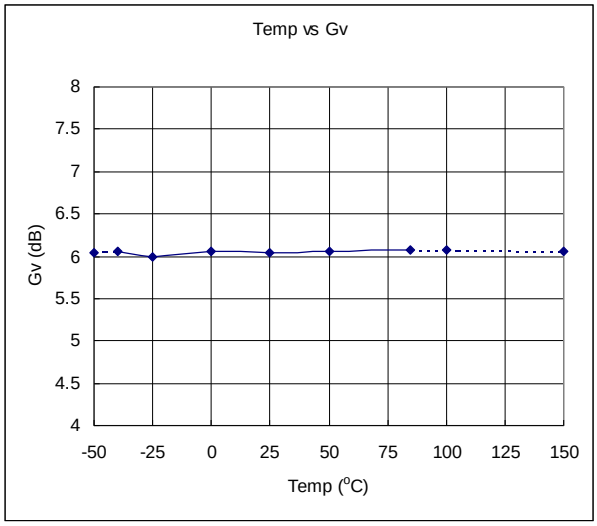


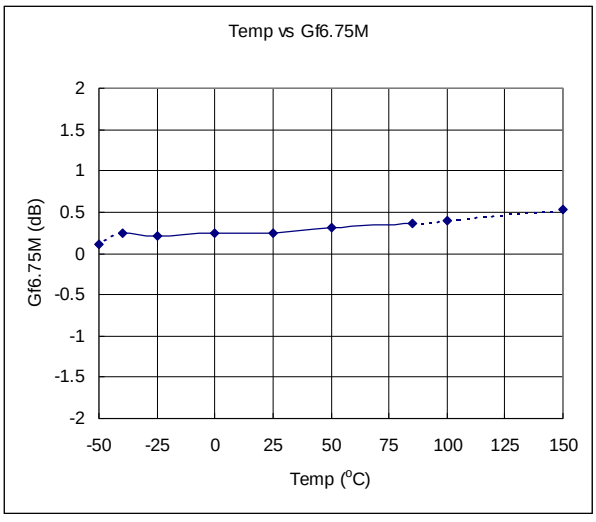
■TYPICAL CHARACTERISTICS

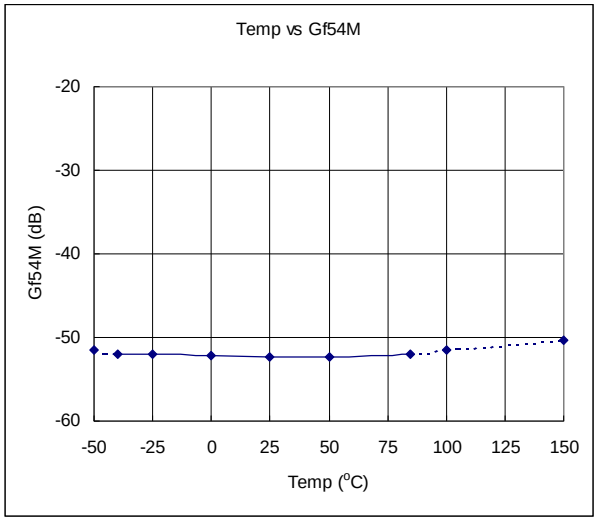












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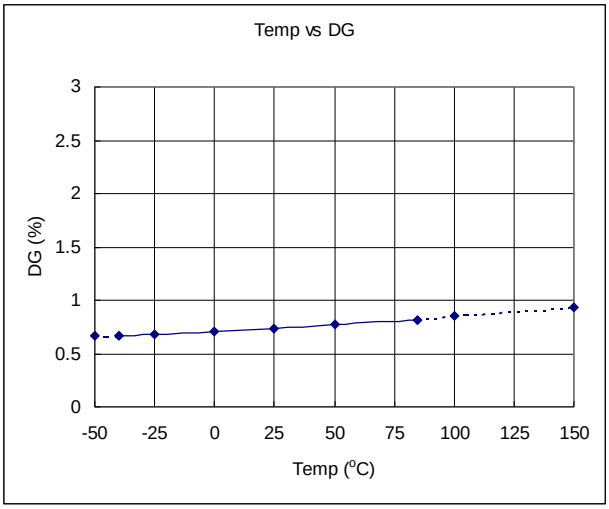
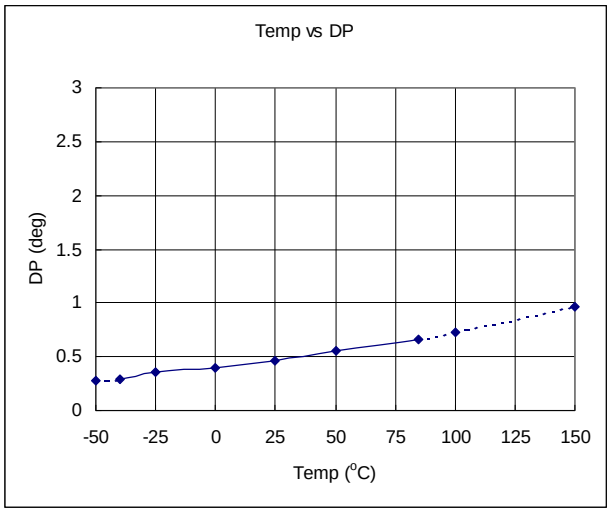
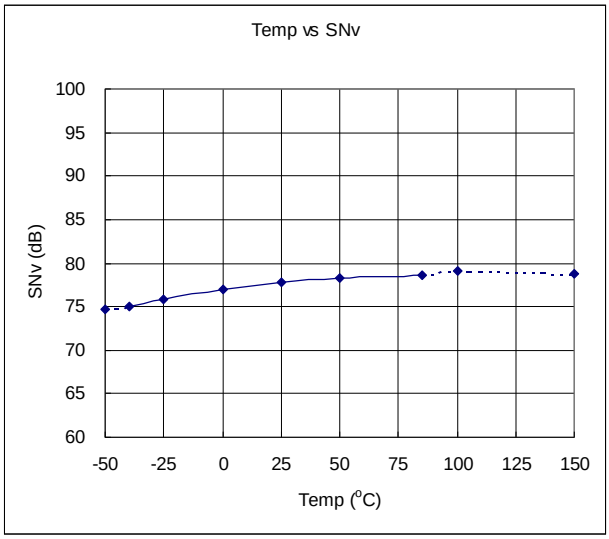
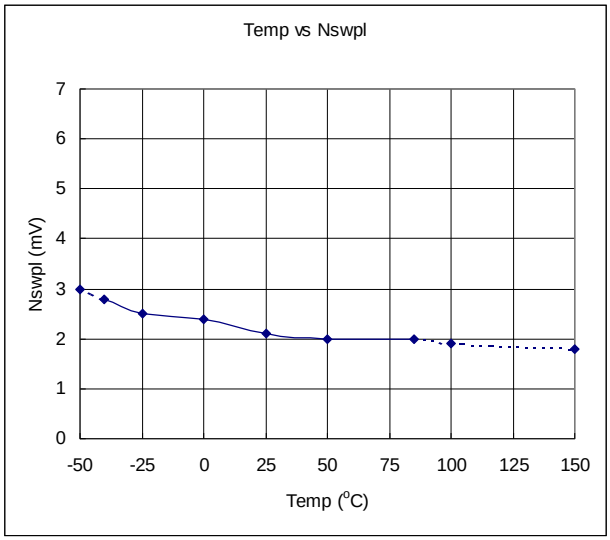
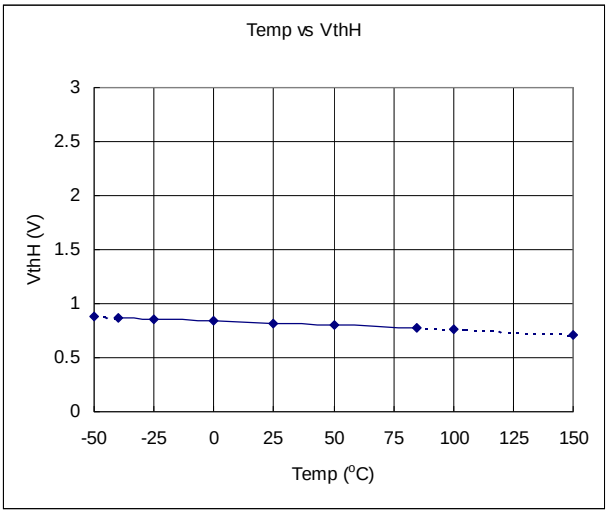
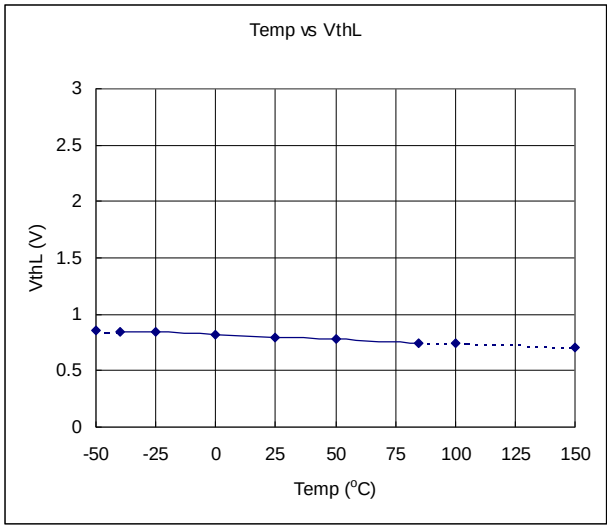




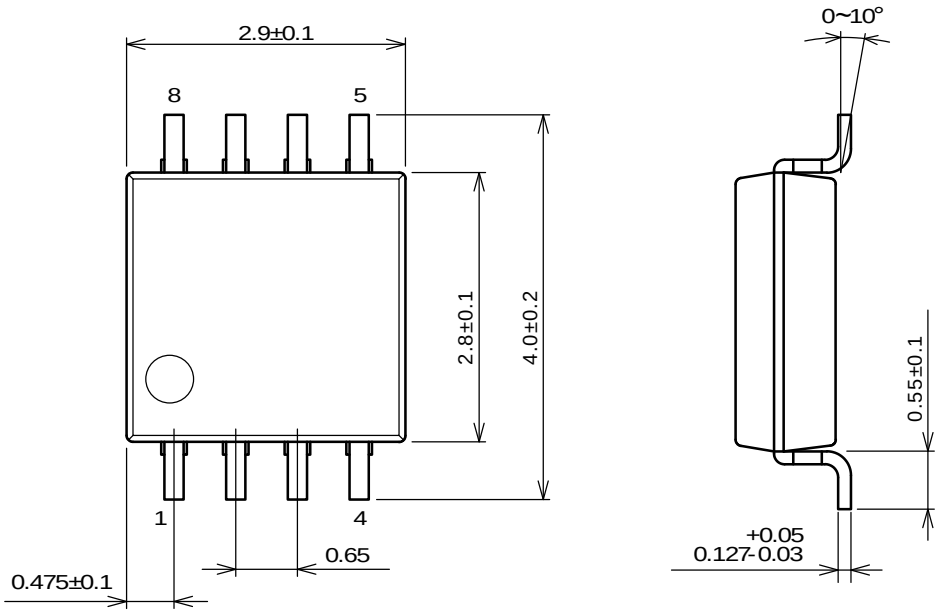


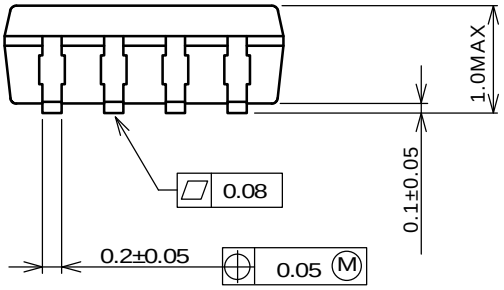






■PACKAGE OUTLINE: MSOP8(TVSP8)*MEET JEDEC MO-187-DA / THIN TYPE



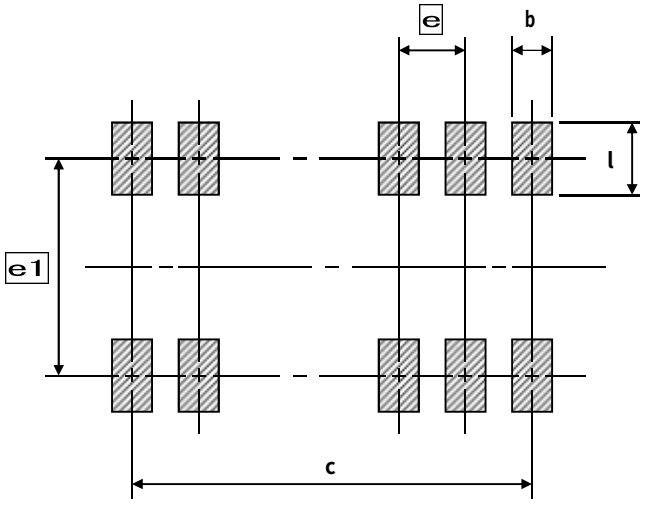


Unit : mm

■SOLDER FOOT PRINT

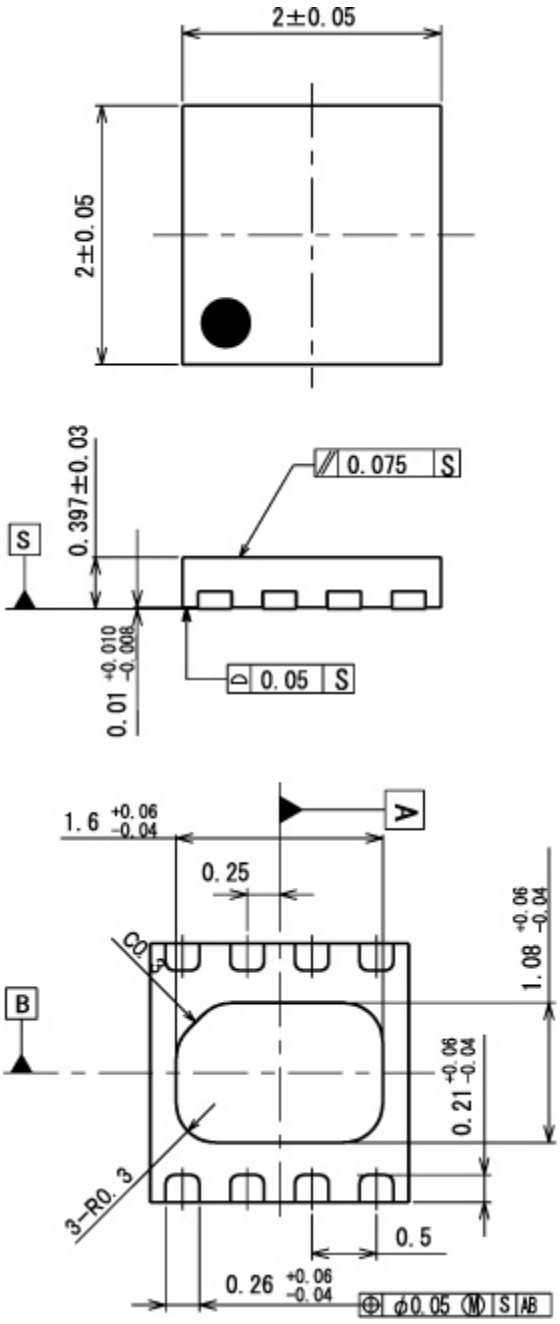
PKG	b	l	c	e1	e
TVSP8	0.23	1.00	1.95	3.50	0.65

Unit : mm



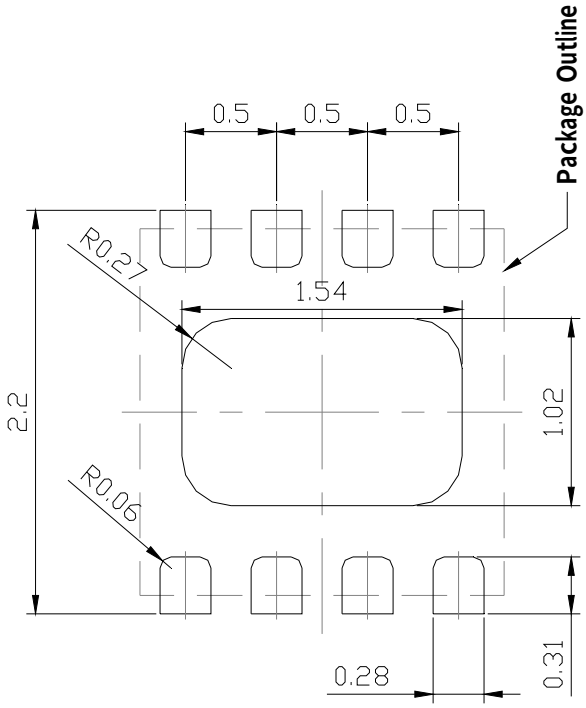
Note : These solder foot print dimensions are just examples.
When designing PCB, please estimate the pattern carefully.

■PACKAGE OUTLINE: DFN8-U1



Unit : mm

■SOLDER FOOT PRINT: DFN8-U1



Unit : mm

Note : These solder foot print dimensions are just examples.
When designing PCB, please estimate the pattern carefully.

■PACKING SPECIFICATION: MSOP8

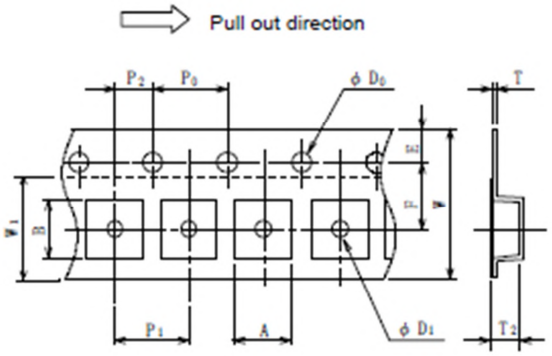
General Description

NJRC delivers ICs in 4 methods, plastic tube container, two kinds of Taping, tray and vinyl bag packing. Except adhesive tape treated anti electrostatic and contain carbon are using as the ESD (Electrostatic Discharge Damage) protection.

MSOP (VSP/TVSP) Emboss Taping (TE1)

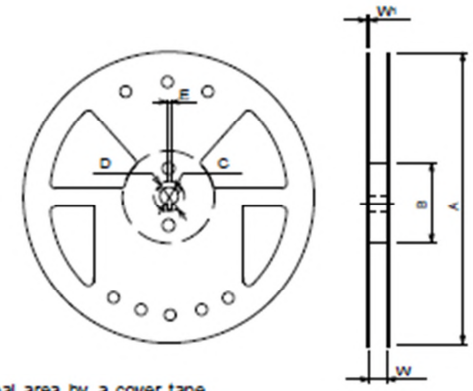
Symbol	MSOP8/10 (TVSP8/10) " "MEETJEDEC MO-187-DA / THIN TYPE	Remark
A	4.4	Bottom size
B	3.2	Bottom size
D_0	1.5+0.1/-0	
D_1	1.5+0.1/-0	
E	1.75±0.1	
F	5.5±0.05	
P_0	4.0±0.1	
P_1	8.0±0.1	
P_2	2.0±0.05	
T	0.3±0.05	
T_2	1.45	
W	12.0±0.3	
W_1	9.5	Thickness 0.1MAX

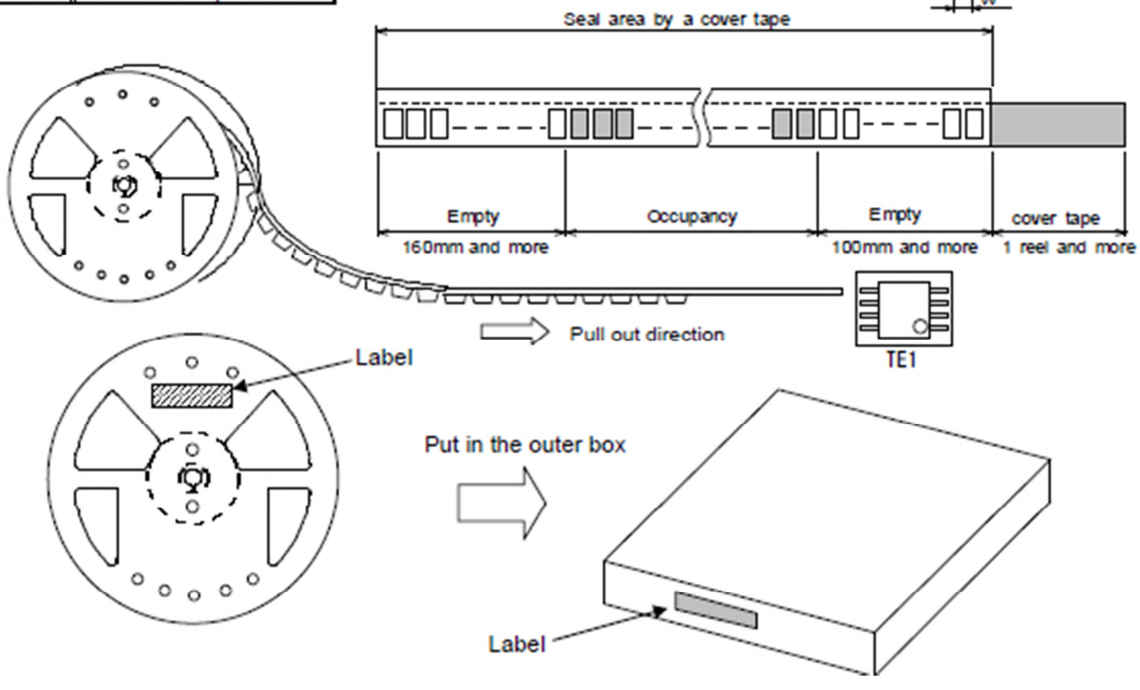
Unit : mm



Symbol	MSOP8/10 (TVSP8/10) " "MEETJEDEC MO-187-DA / THIN TYPE
A	Ø254±2
B	Ø100±1
C	Ø13±0.2
D	Ø21±0.8
E	2±0.5
W	13.5±0.5
W_1	2±0.2
Contents	2,000 pcs

Unit : mm





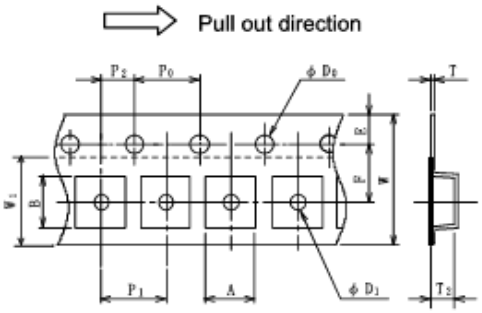
■PACKING SPECIFICATION: DFN8-U1

General Description

NJRC delivers ICs in 4 methods, plastic tube container, two kinds of Taping, tray and vinyl bag packing. Except adhesive tape treated anti electrostatic and contain carbon are using as the ESD (Electrostatic Discharge Damage) protection.

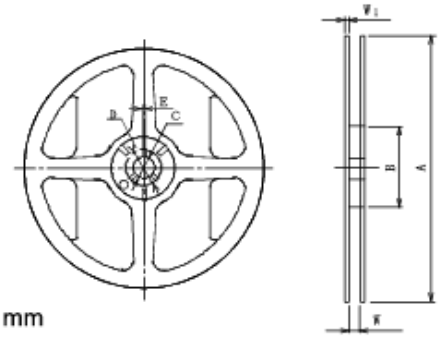
DFN(ESON) Emboss Taping (TE3)

Symbol	DFN8-U1(ESON8-U1)	Remark
A	2.25±0.05	Bottom size
B	2.25±0.05	Bottom size
D_0	1.5+0.1/-0	
D1	0.5±0.1	
E	1.75±0.1	
F	3.5 ±0.05	
P_0	4.0 ±0.1	
P_1	4.0 ±0.1	
P_2	2.0 ±0.05	
T	0.25±0.05	
T_2	0.75	
W	8.0 ±0.2	
W_1	5.5	Thickness 0.1MAX

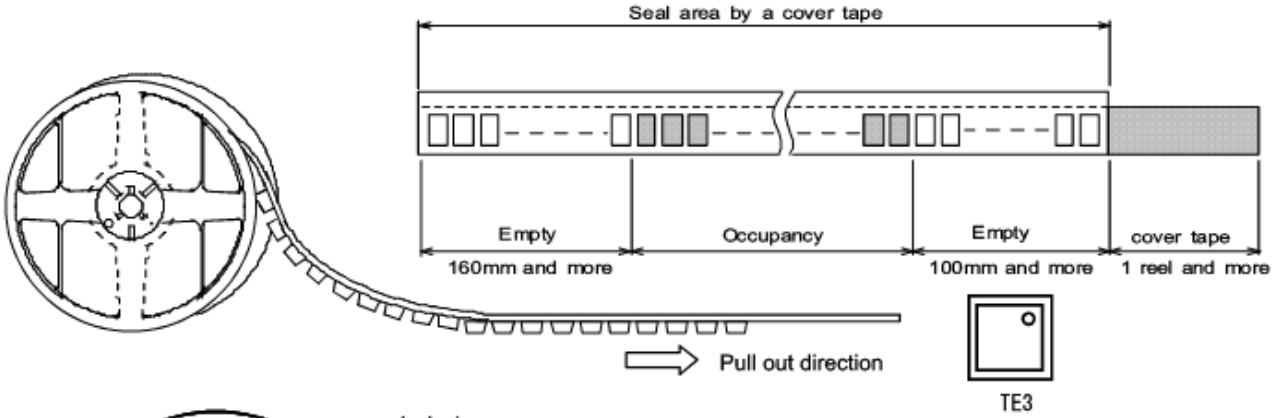


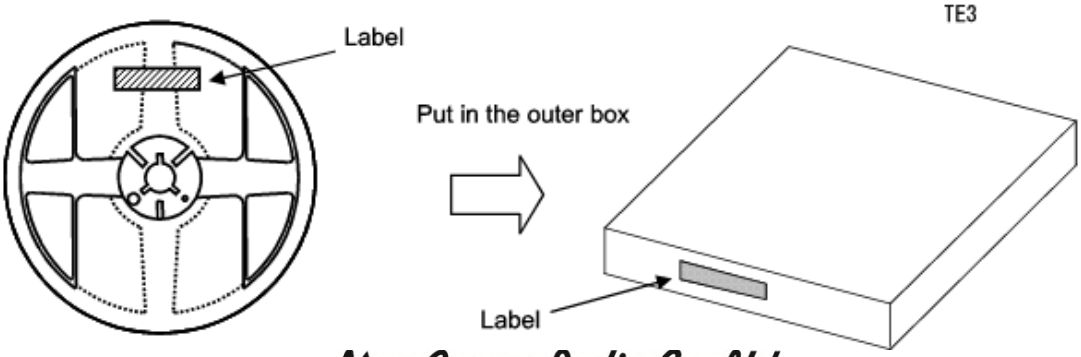
Unit : mm

Symbol	DFN8-U1(ESON8-U1)
A	φ180 +0/-1.5
B	φ 60 +1/-0
C	φ13.0±0.2
D	φ21.0±0.8
E	2.0±0.5
W	9.0 +0.3/-0
W_1	1.2
Contents	3,000pcs



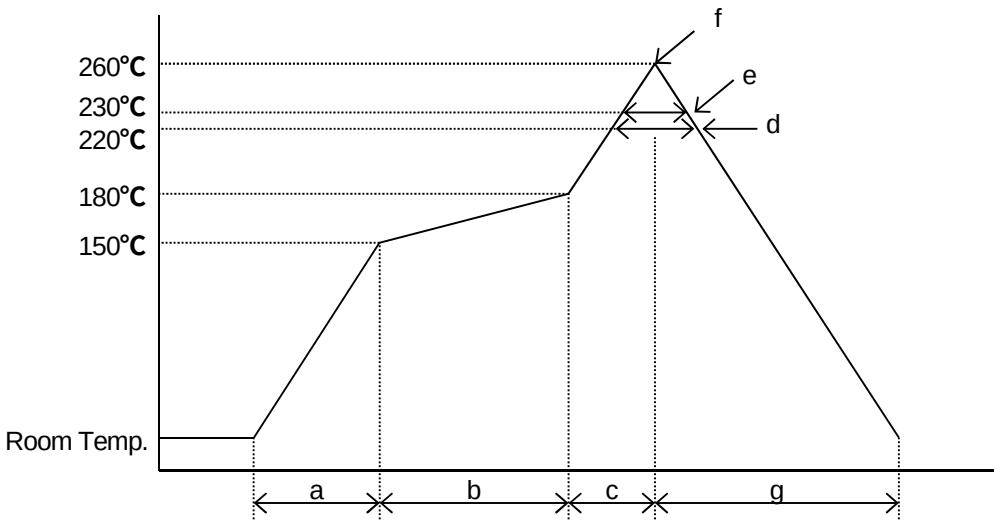
Unit : mm





■RECOMMENDED MOUNTING METHOD

＊Recommended reflow soldering procedure



a：Temperature ramping rate	: 1 to 4℃/s
b：Pre-heating temperature	: 150 to 180℃
time	: 60 to 120s
c：Temperature ramp rate	: 1 to 4℃/s
d：220℃ or higher time	: Shorter than 60s
e：230℃ or higher time	: Shorter than 40s
f：Peak temperature	: Lower than 260℃
g：Temperature ramping rate	: 1 to 6℃/s

The temperature indicates at the surface of mold package.

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