

DIFFERENTIAL OUTPUT VIDEO DRIVER WITH SHORT to BATTERY PROTECTION

FEATURES

- Operating Voltage 2.65 to 3.45V
- Operating Temperature -40 to +125°C
- Short to Battery Protection Circuit of up to 18V
- Output Capacitor is unnecessary
- Differential Output, 6dB Amp. , 75Ω Driver
- LPF Characteristics 0dB at 6.75MHz
- 40dB at 27MHz

- CMOS Technology
- Package Outline DFN8-W2
(ESON8-W2 3mm*3mm)

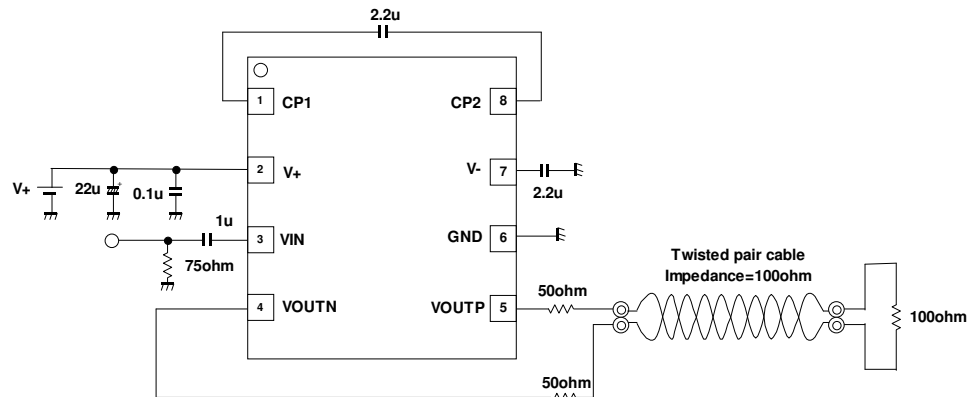
GENERAL DESCRIPTION

NJU71094 is differential output video driver that built in short to battery protection circuit of up to 18V. Output capacitor is unnecessary because it built in charge-pump circuit. Therefore, NJU71094 can protect from more than voltage of IC's operating voltage, and is suitable to CAR CAMERA, CAR AV system and so on.

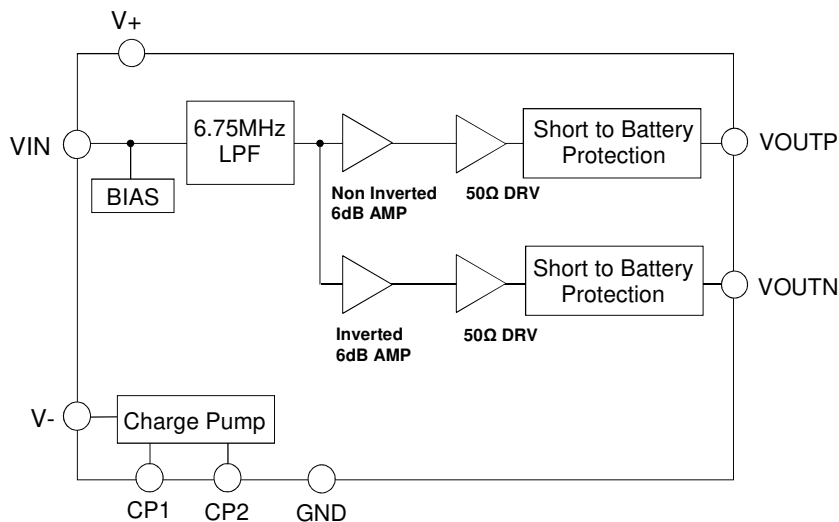
APPLICATION

- Car Camera
- Car Navigation

APPLICATION CIRCUIT



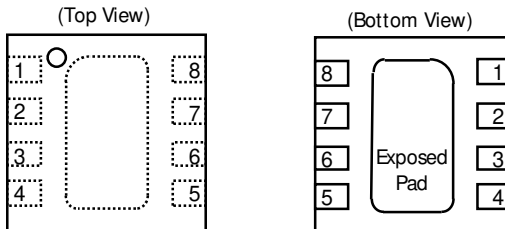
EQUIVALENT CIRCUIT BLOCK DIAGRAM



■ Built in short to battery protection circuit video driver

Output type	Part No.
Single-end	NJU71091-T1

■ PIN CONFIGURATION

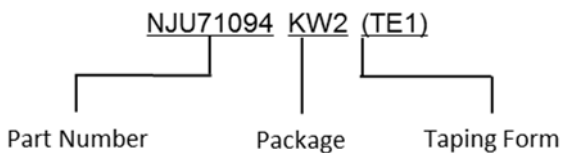


PIN NO.	SYMBOL	DESCRIPTION
1	CP1	Flying Capacitor Terminal
2	V+	Power Supply Terminal
3	VIN	Video Signal Input Terminal
4	VOUTN	Negative Video Signal Output Terminal
5	VOUTP	Positive Video Signal Output Terminal
6	GND	GND Terminal
7	V-	Flying Capacitor Terminal
8	CP2	Flying Capacitor Terminal

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)
NJU71094KW2-T1	ESON8-W2	Yes	Yes	Sn-2Bi	71094T	18.0	3,000

■ ABSOLUTE MAXIMUM RATINGS

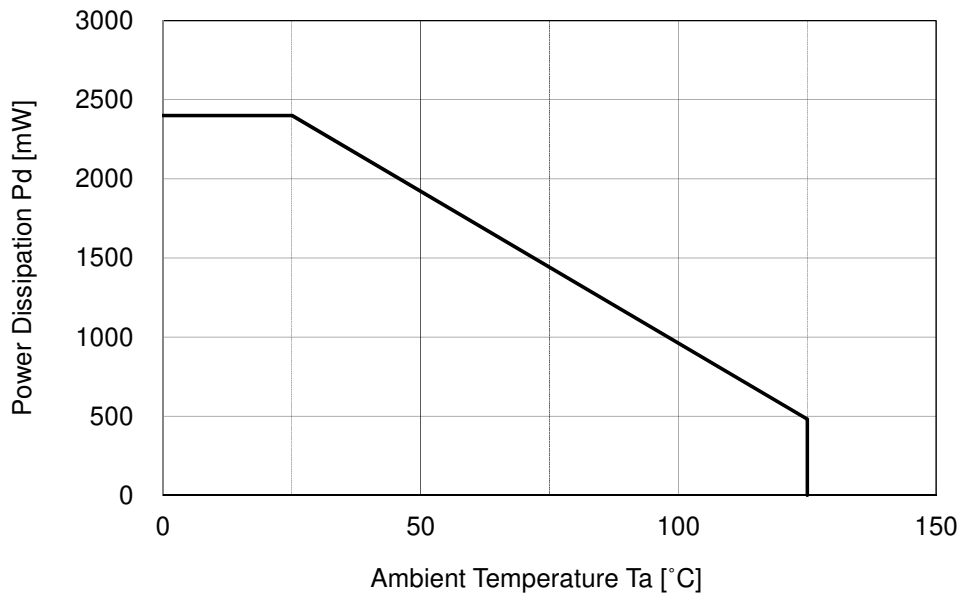
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	3.5	V
Power Dissipation (Ta=25°C)	P _D	2400 (1)	mW
Operating Temperature Range	T _{opr}	-40 to 125	°C
Storage Temperature Range	T _{stg}	-55 to 150	°C

(1) 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+	2.65 to 3.45	V

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ **ELECTRICAL CHARACTERISTICS** ($T_a=25^\circ\text{C}$, $V^+=3.0\text{V}$, $R_L=150\Omega$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Characteristics						
Supply Current	I _{cc}	No input signal	-	27.0	42.0	mA
		No input signal, T _a =-40°C to 125°C	-	-	42.0	
Video Amplifier Characteristics						
Maximum Output Voltage Swing	V _{om}	V _{in} =100kHz, THD=1%, V _{in} =100kHz, THD=1%, T _a =-40°C to 125°C	3.6	-	-	V _{p-p}
			3.6	-	-	
Voltage Gain	G _v	V _{in} =100kHz, 1.0V _{p-p} Sine wave	5.6	6.0	6.4	dB
		V _{in} =100kHz, 1.0V _{p-p} Sine wave, T _a =-40°C to 125°C	5.6	-	6.4	
LPF Characteristics	G _{f6.75M}	V _{in} =6.75MHz/1MHz, 1.0V _{p-p}	-1.0	0	1.0	dB
		V _{in} =6.75MHz/1MHz, 1.0V _{p-p} T _a =-40°C to 125°C	-1.0	-	1.0	
	G _{f27M}	V _{in} =27MHz/100kHz, 1.0V _{p-p}	-	-40.0	-24.0	
		V _{in} =27MHz/100kHz, 1.0V _{p-p} T _a =-40°C to 125°C	-	-	-24.0	
Differential Gain	DG	V _{in} =1.0V _{p-p} , 10step Video signal	-	0.5	-	%
Differential Phase	DP	V _{in} =1.0V _{p-p} , 10step Video signal	-	0.5	-	deg
S/N Ratio	SN	R _L =75Ω, 1.0V _{p-p} , 100% White video signal input, BW=100kHz to 6MHz	-	70	-	dB
Switching Noise Level	N _{swpl}	10% White video signal input	-	4.0	7.0	mV _{p-p}
Shot to Battery Protection						
Protected Maximum Input Voltage (2)	V _{stbm}	Connected 75Ω to V _{out} (pin5)	-	-	18	V
		Connected 75Ω to V _{out} (pin5) T _a =-40°C to 125°C	-	-	18	
Detect Protected Input Voltage (3)	V _{th}	Connected 75Ω to V _{out} (pin5)	-	6.0	9.0	V
		Connected 75Ω to V _{out} (pin5) T _a =-40°C to 125°C	-	-	9.0	
Input Current	I _{stb}	V _{out} =18V, Connected 75Ω to V _{out} (pin5)	-	5.4	-	mA

(2) Maximum input voltage of destination of output resistance 75Ω

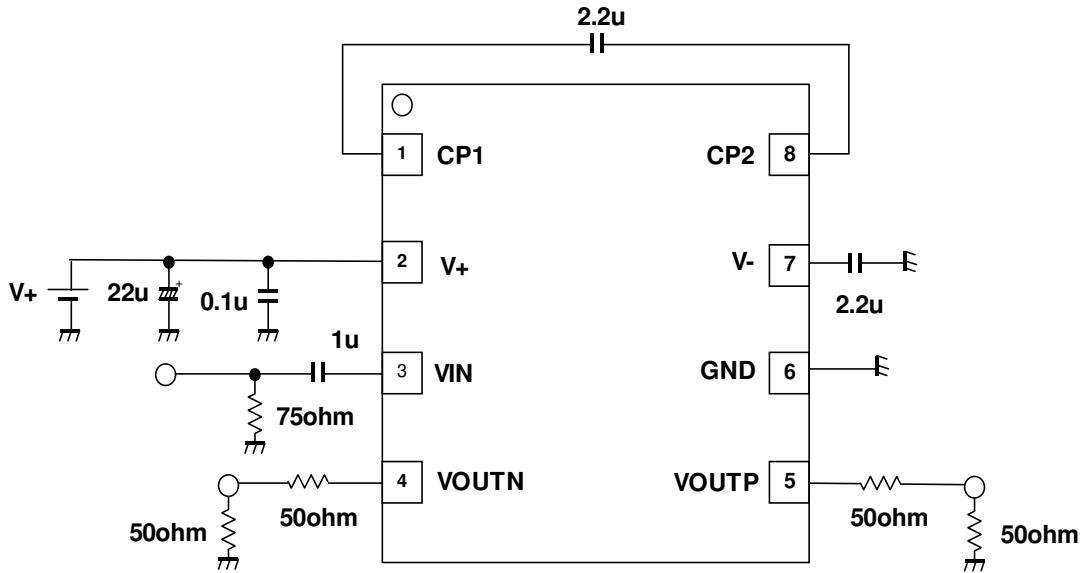
(3) It is become protect mode at more than this voltage against input voltage of destination of output resistance 75ohm.

(4) If supply voltage is OFF, you must not input the short to battery voltage. IC is broken in the worst case.

(5) Guaranteed range of Short to Battery voltage is 9V to 18V.

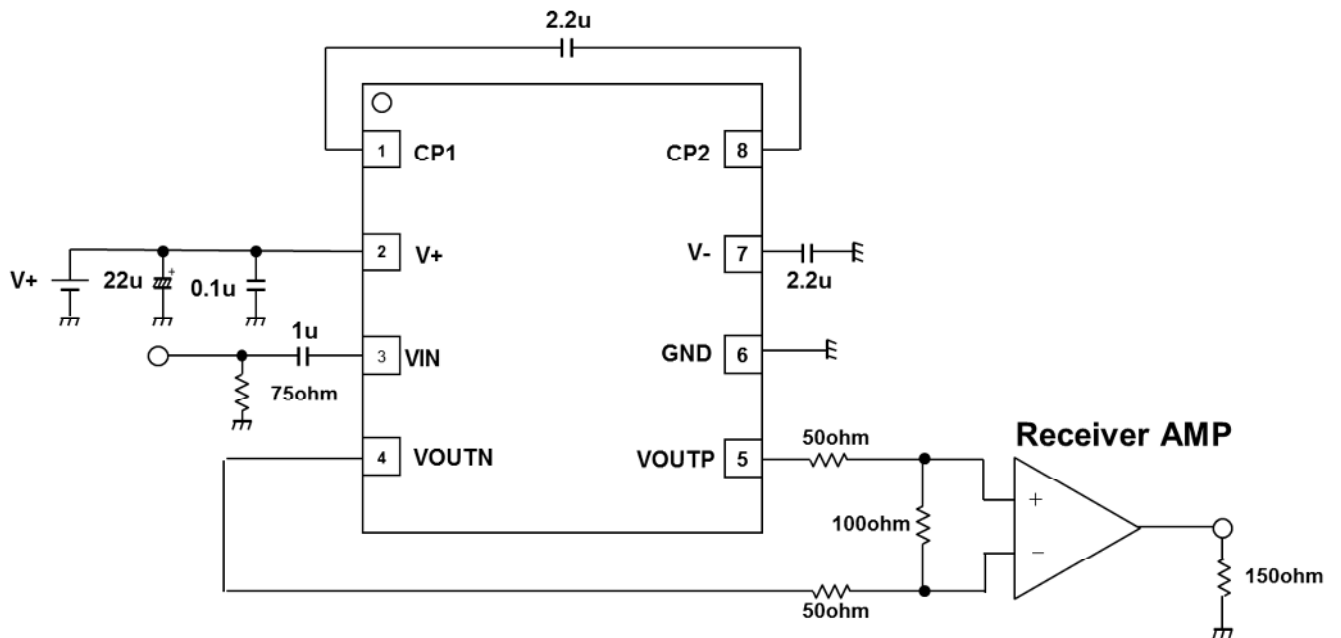
■TEST CIRCUIT 1

(Supply current, Maximum output level)



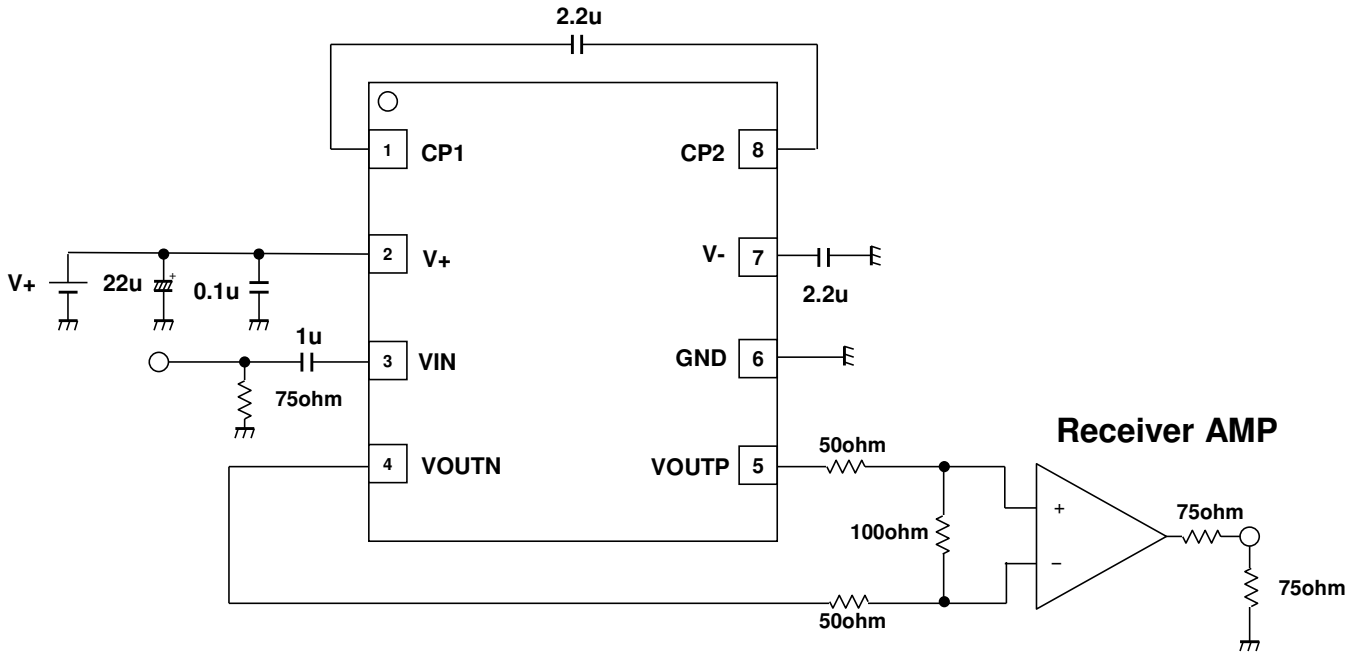
■TEST CIRCUIT 2

(Voltage gain, LPF characteristics, Switching Noise Level)



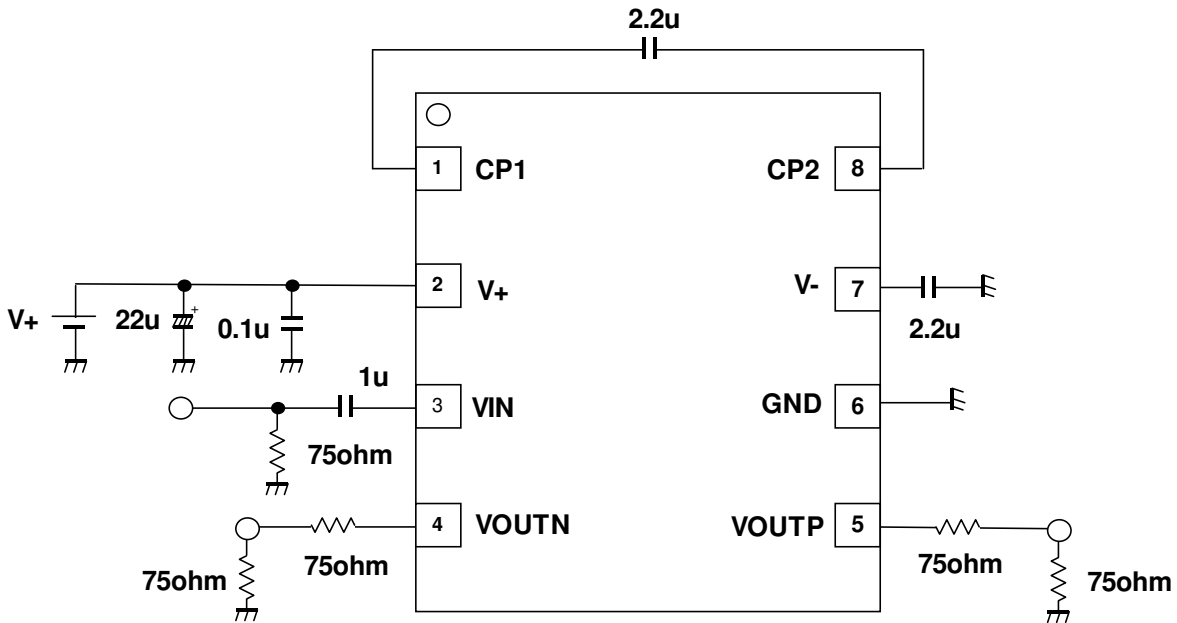
TEST CIRCUIT 3

(Differential gain, Differential phase, S/N Ratio)

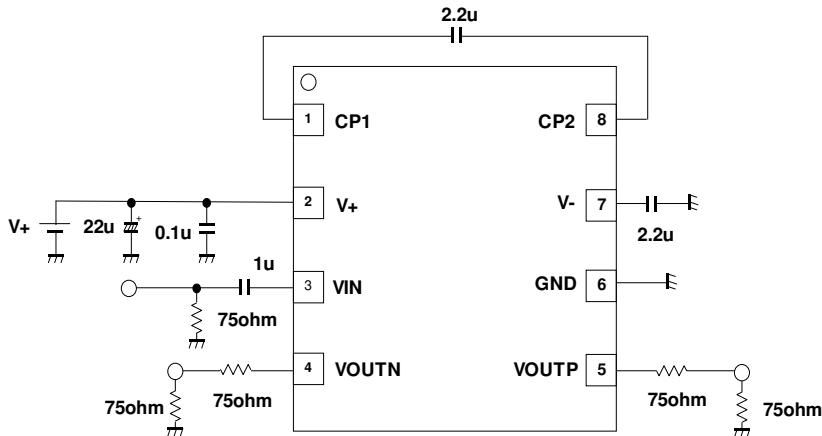


TEST CIRCUIT 4

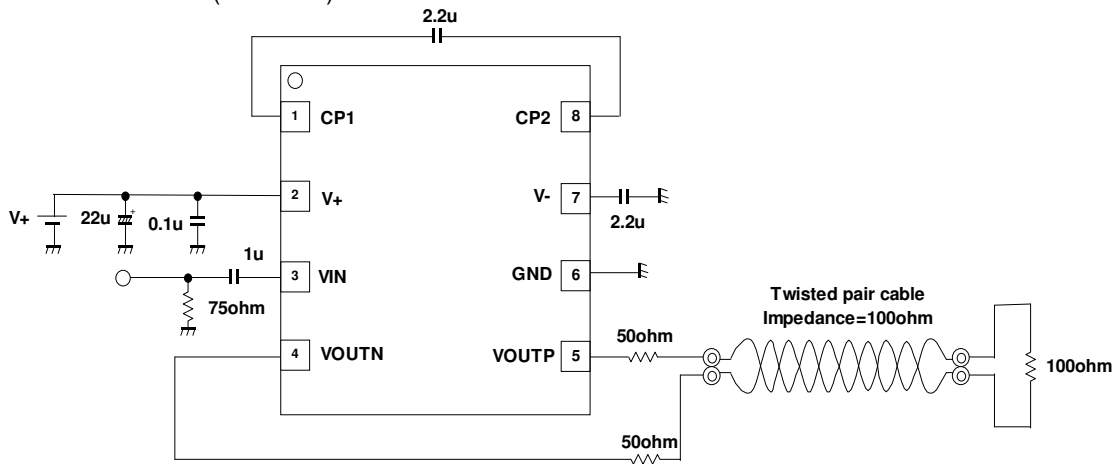
(Detect protected Input voltage)



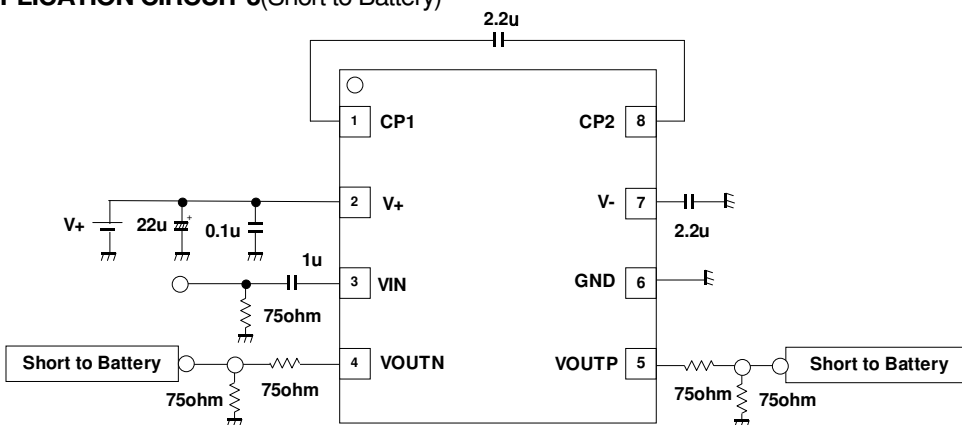
APPLICATION CIRCUIT 1 (RL=150Ω)



APPLICATION CIRCUIT 2 (RL=100Ω)



APPLICATION CIRCUIT 3 (Short to Battery)



Note

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

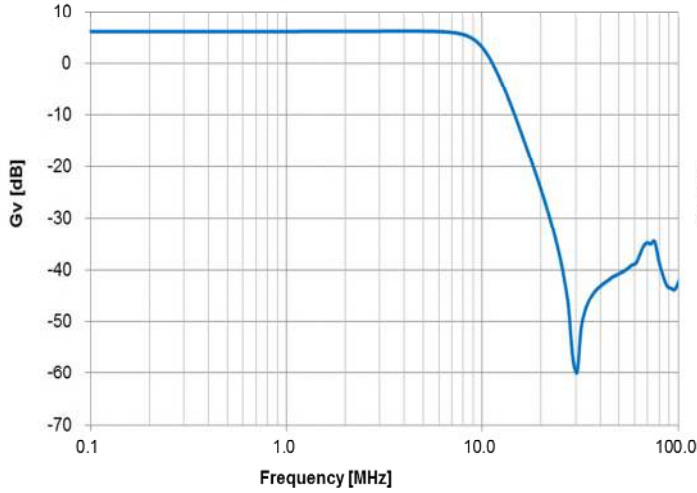
PINNo.	PINNAME	FUNCTION	EQUIVALENT CIRCUIT	DC VOLTAGE
1	CP1	Flying Capacitor Terminal		-
2	V+	V+ Power Supply	-	-
3	VIN	Video Signal Input Terminal		0V
4	VOUTN	Negative Video Signal Output Terminal		0V

■TERMINAL FUNCTION

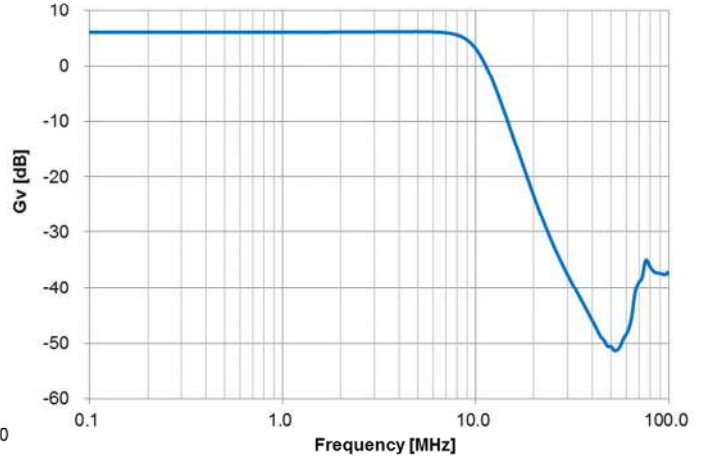
PINNo.	PINNAME	FUNCTION	EQUIVALENTCIRCUIT	DC VOLTAGE
5	VOUTP	Positive Video Signal Output Terminal		0V
6	GND	GND	-	-
7	V-	Flying Capacitor Terminal	-	-
8	CP2	Flying Capacitor Terminal		-

■ TYPICAL CHARACTERISTICS

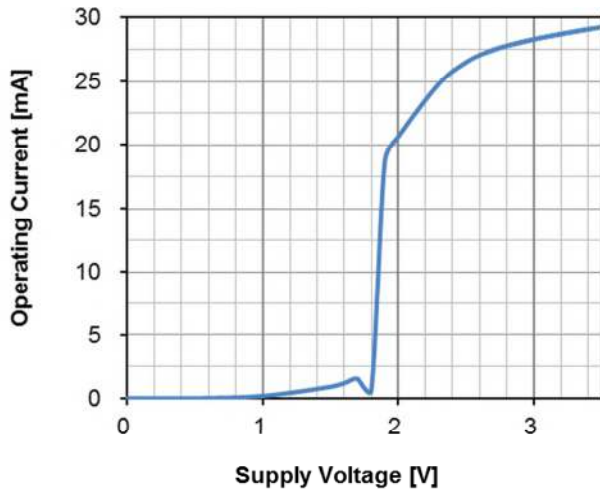
Frequency Response
VOUTP Output
Vin=1.0Vpp, Sine Signal Input



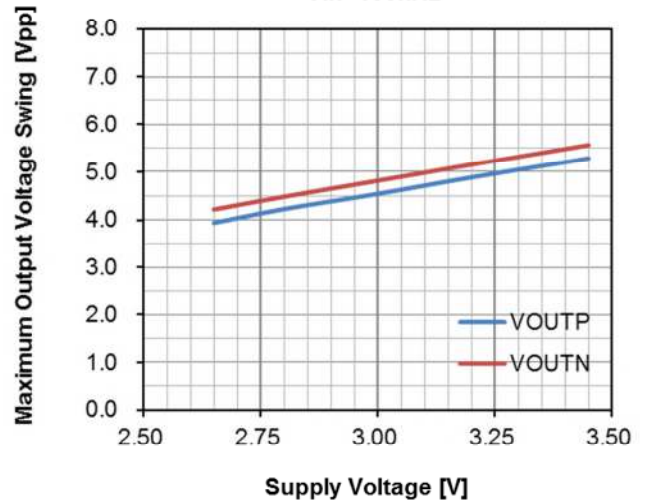
Frequency Response
VOUTN Output
Vin=1.0Vpp, Sine Signal Input



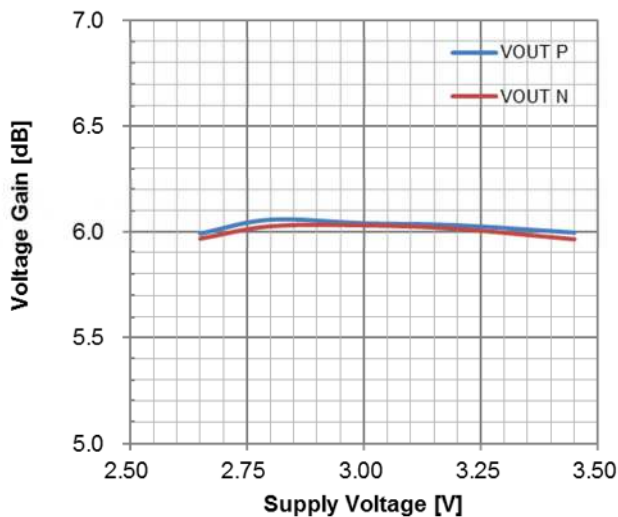
Operating Current vs.
Supply Voltage



Maximum Output Voltage Swing
vs. Supply Voltage
Vin=100kHz

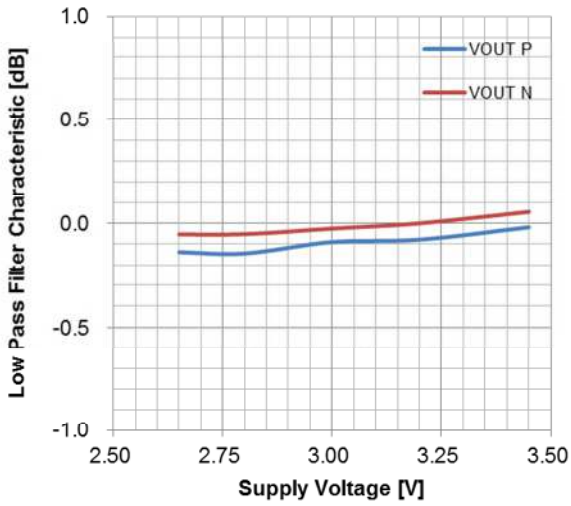


Voltage Gain vs. Supply Voltage
Vin=1.0Vpp 100kHz Sine Signal Input

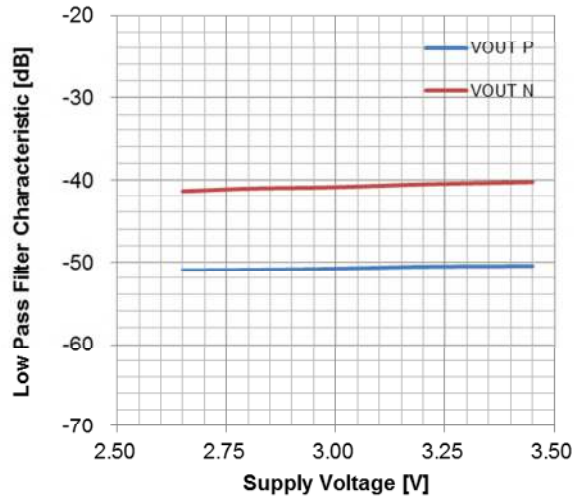


■ TYPICAL CHARACTERISTICS

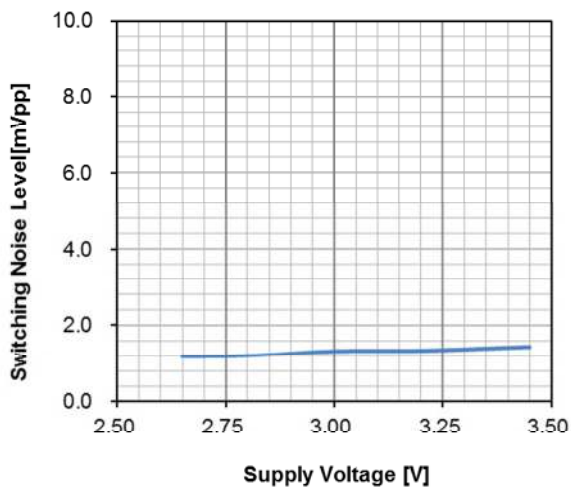
Low Pass Filter Characteristic vs. Supply Voltage
Vin=1.0Vpp 6.75MHz/100kHz Sine Signal Input



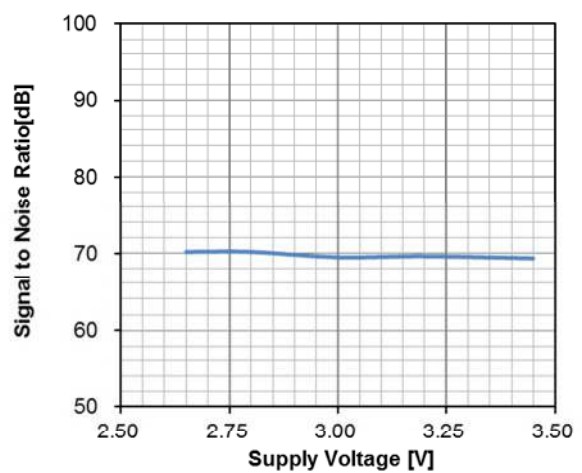
Low Pass Filter Characteristic vs. Supply Voltage
Vin=1.0Vpp 27MHz/100kHz Sine Signal Input



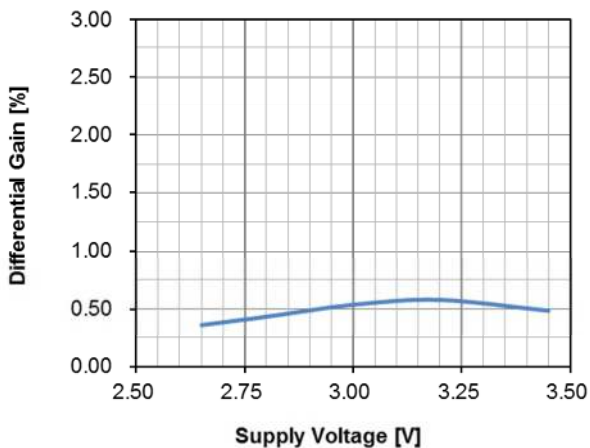
Switching Noise Level vs. Supply Voltage



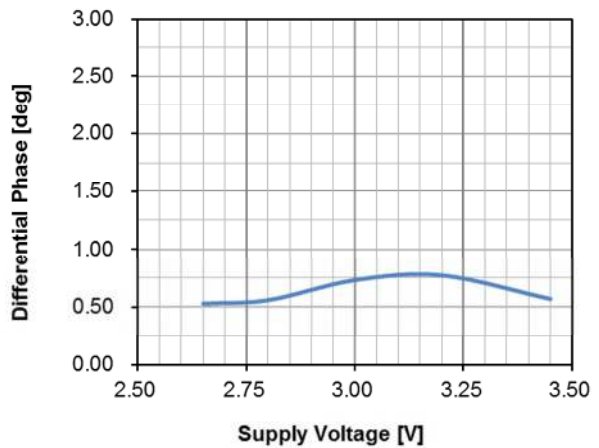
Signal Noise Ratio vs. Supply Voltage



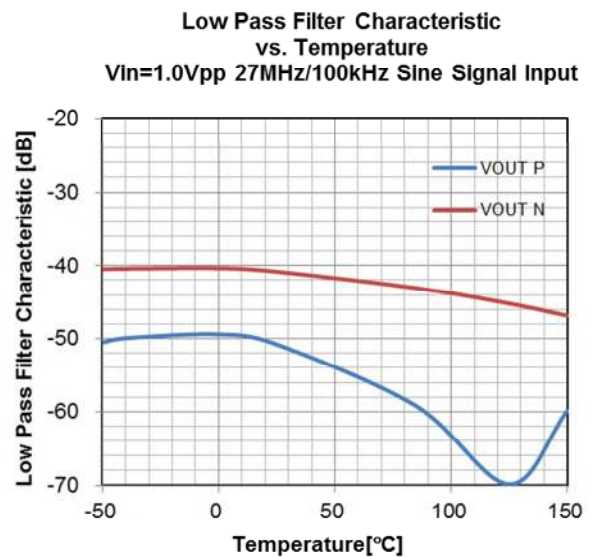
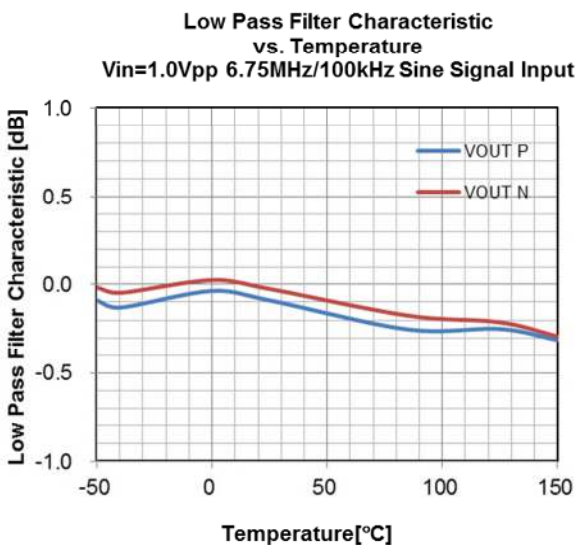
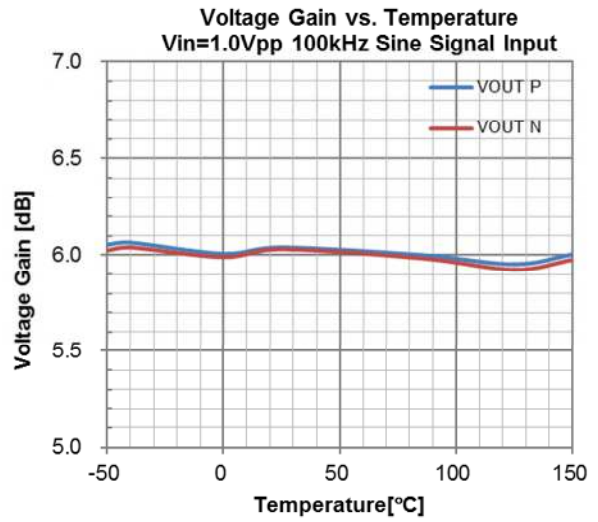
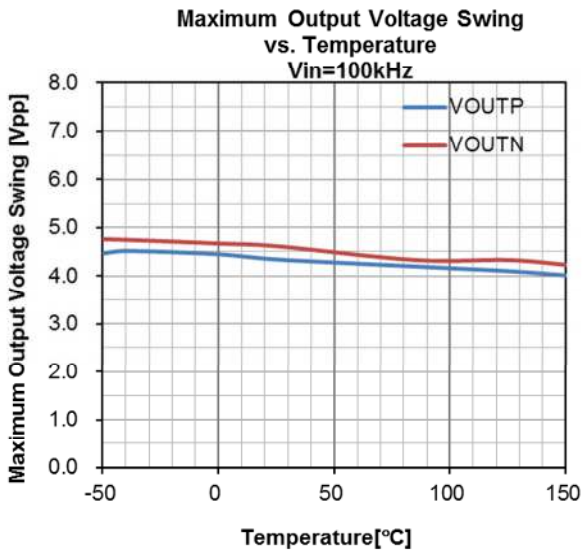
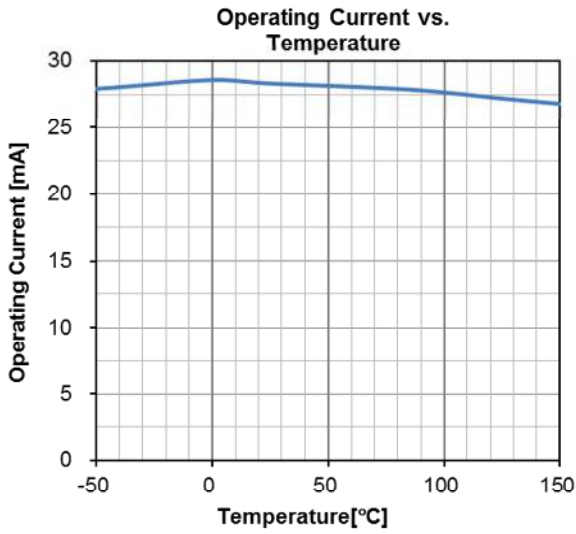
Differential Gain vs. Supply Voltage
Vin=1.0Vpp, 10step Video Signal Input



Differential Phase vs. Supply Voltage
Vin=1.0Vpp, 10step Video Signal Input

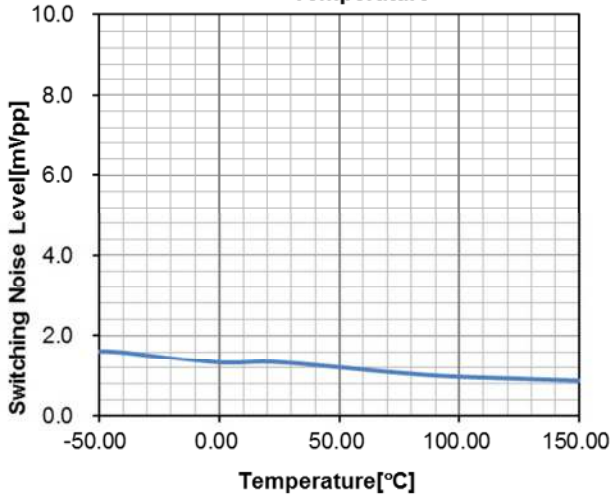


■ TYPICAL CHARACTERISTICS

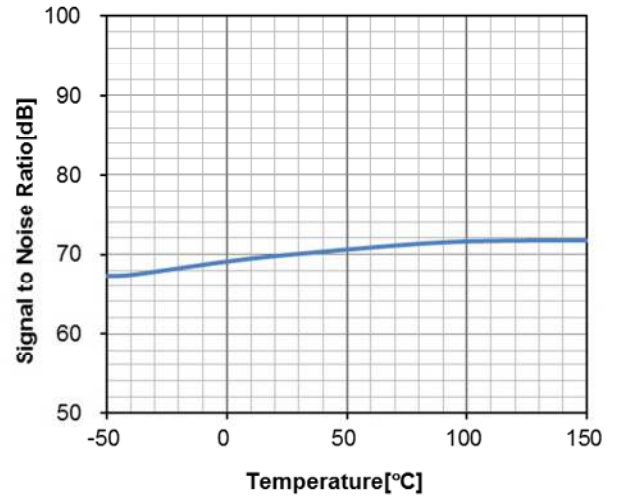


■ TYPICAL CHARACTERISTICS

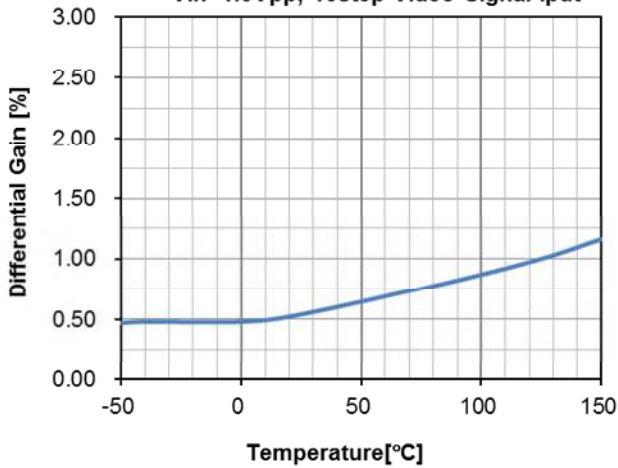
Switching Noise Level vs. Temperature



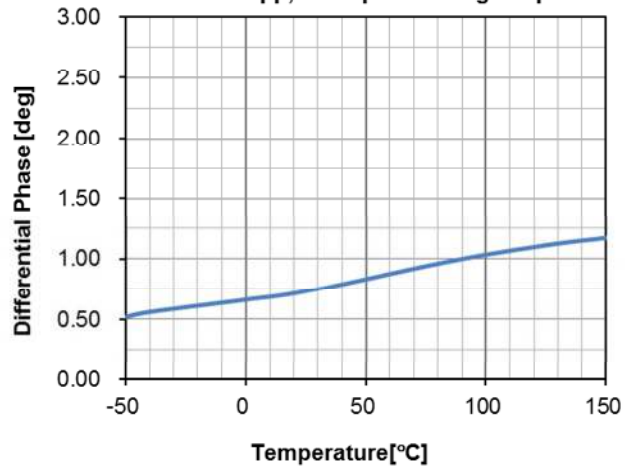
Signal Noise Ratio vs. Temperature



Differential Gain vs. Temperature
Vin=1.0Vpp, 10step Video Signal Input

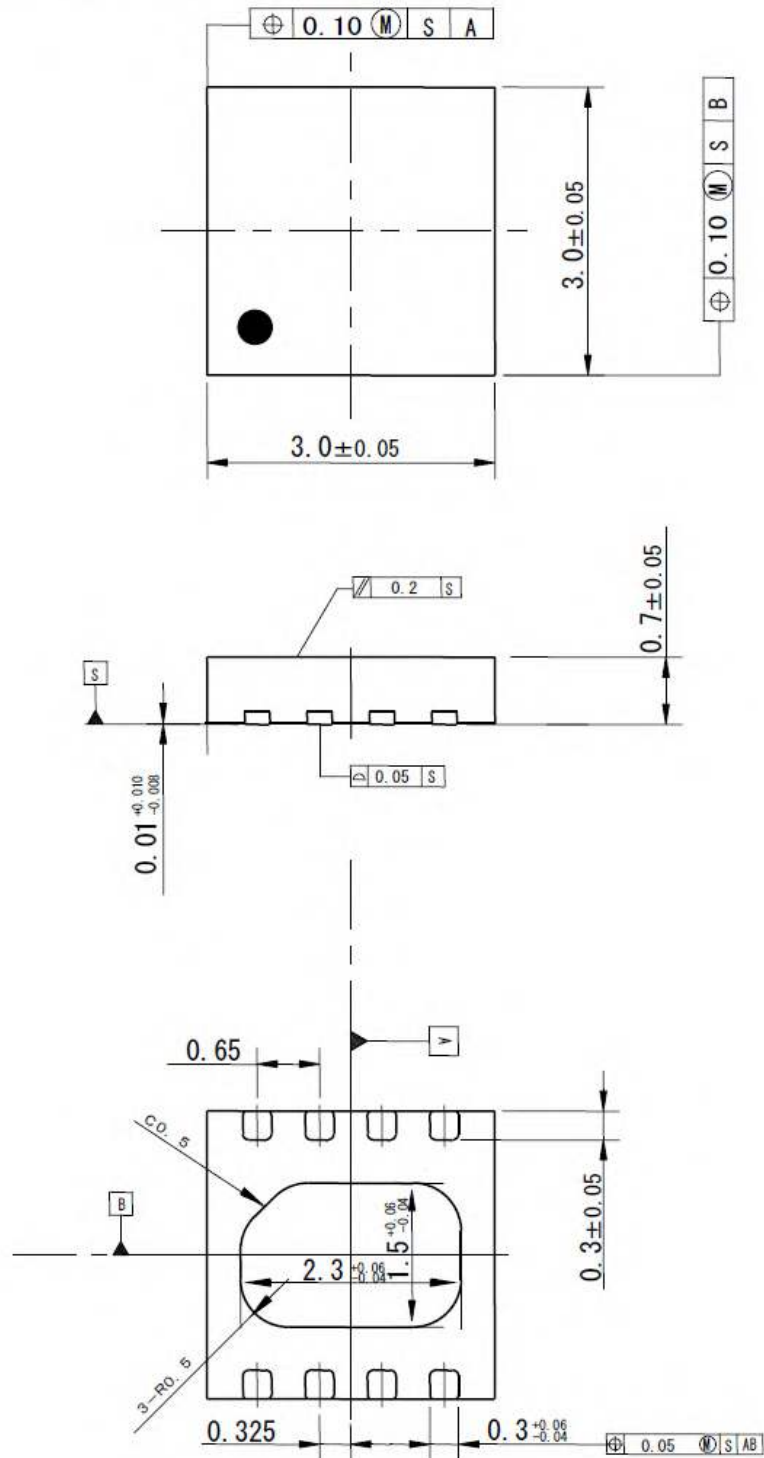


Differential Phase vs. Temperature
Vin=1.0Vpp, 10step Video Signal Input



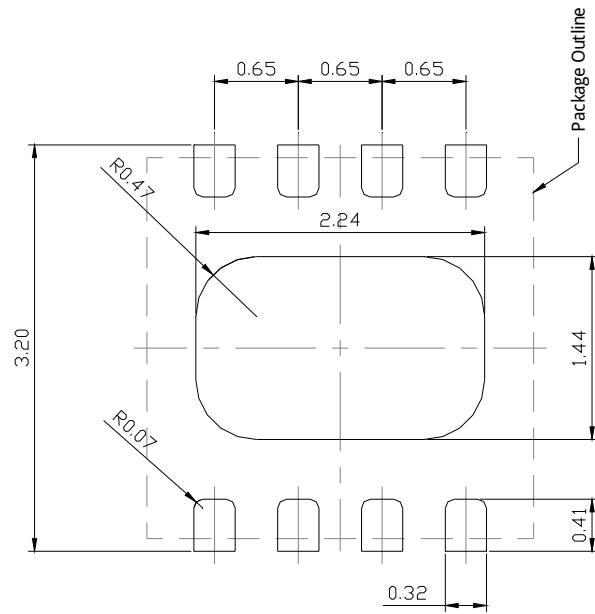
■PACKAGE OUTLINE

DFN8-W2 (ESON8-W2)



UNIT : mm

■SOLDER FOOT PRINT



Unit : mm

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

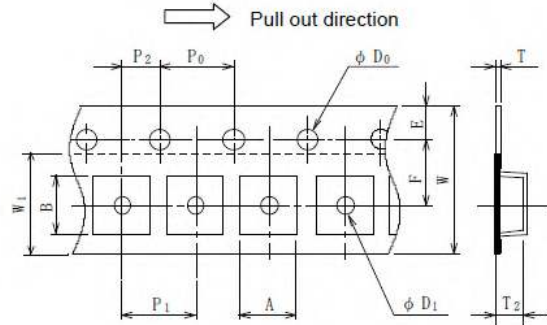
PACKING SPECIFICATION

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.

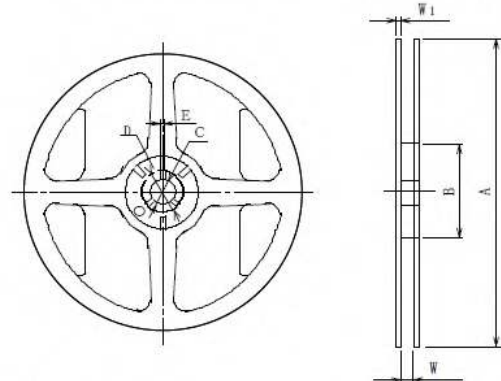
ESON Emboss Taping (TE3)

Symbol	DFN8-W2 (ESON8-W2)	Remark
A	3.30±0.1	Bottom size
B	3.30±0.1	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	0.30±0.05	
T ₂	1.0	
W	12.0+0.3/-0.1	
W ₁	9.5	Thickness 0.1MAX

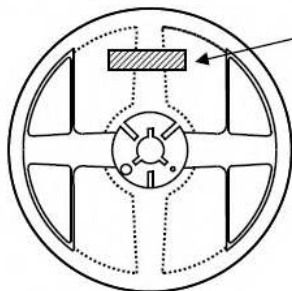
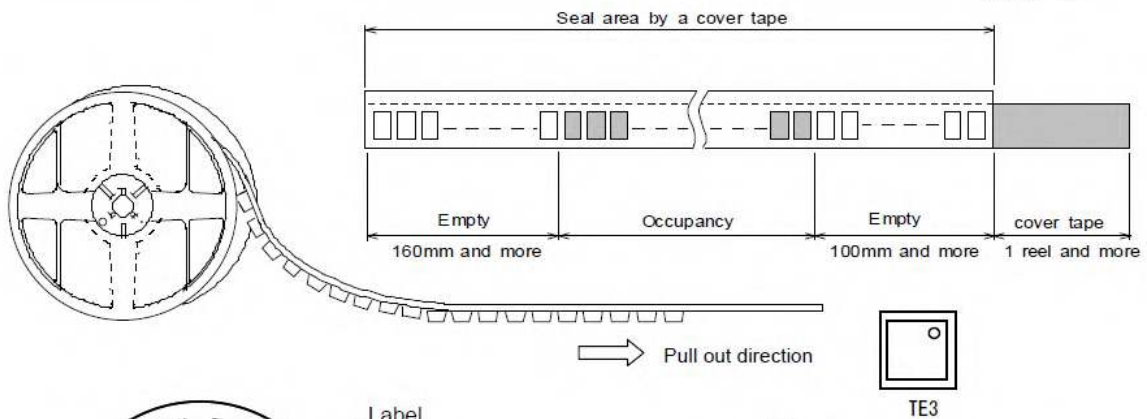


Unit : mm

Symbol	DFN8-W2 (ESON8-W2)
A	φ180 +0/-1.5
B	φ60 +1/-0
C	φ13.0±0.2
D	φ21.0±0.8
E	2.0±0.5
W	13.0+0.3/-0
W ₁	1.2
Contents	1,500pcs



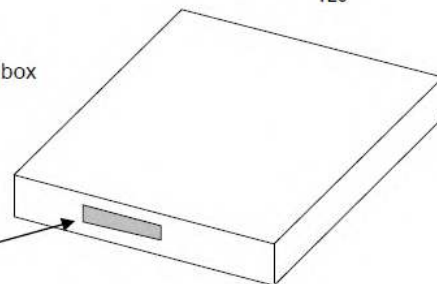
Unit : mm



Put in the outer box

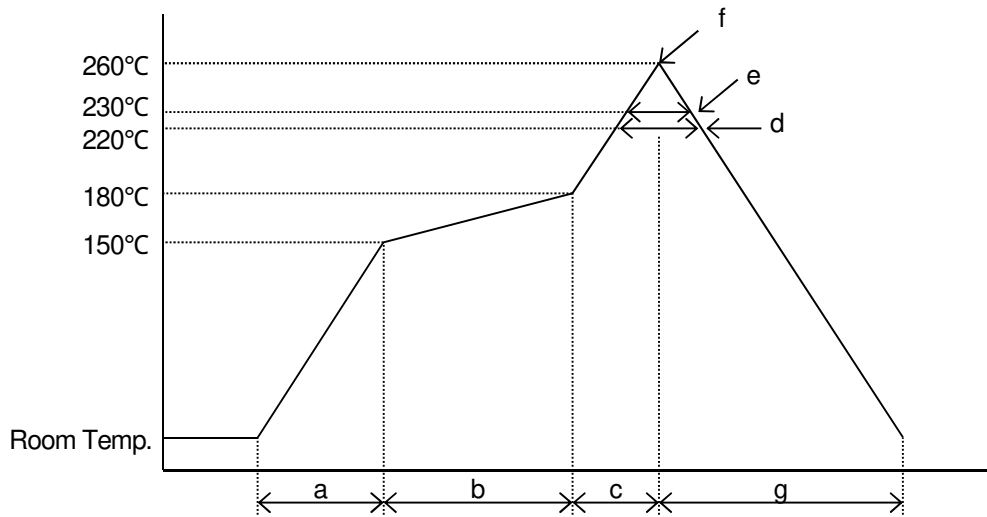


Label



RECOMMENDED MOUNTING METHOD

* Recommended reflow soldering procedure



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

The temperature indicates at the surface of mold package.

[CAUTION]

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Equipment Used in the Deep sea
Power Generator Control Equipment (Nuclear, Steam, Hydraulic)
Life Maintenance Medical Equipment
Fire Alarm/Intruder Detector
Vehicle Control Equipment (airplane, railroad, ship, etc.)
Various Safety devices

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