

## 1ch VIDEO DRIVER WITH SHORT-to-BATTERY PROTECTION

### FEATURES

- Operating Voltage                    2.65 to 3.45V
- Operating Temperature            -40 to +125
- Short-to-Battery Protection Circuit of up to 18V
- Output Capacitor is unnecessary
- 6dB Amp. , 75Ω Driver
- LPF Characteristics                0dB at 6.75MHz  
    -40dB at 27MHz
- CMOS Technology
- Package Outline                    DFN8-U1 (ESON8-U1 2mm\*2mm)

### GENERAL DESCRIPTION

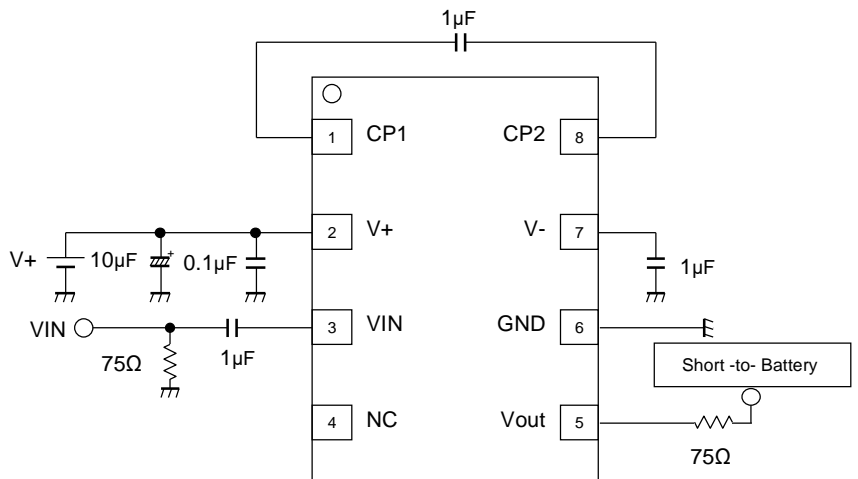
NJU71091 is 1ch video driver that built in short-to-battery protection circuit of up to 18V. Output capacitor is unnecessary because it built in charge-pump circuit. Therefore, NJU71091 can protect from more than voltage of IC's operating voltage, and is suitable to CAR CAMERA, CAR AV system and so on.

### APPLICATION

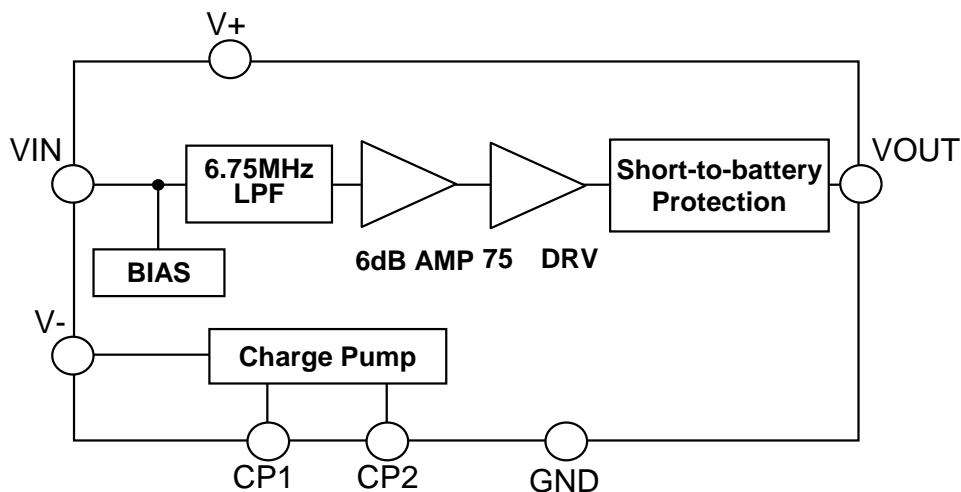
- Car Camera
- Car Navigation

### APPLICATION CIRCUIT

(At short-to-battery measurement)



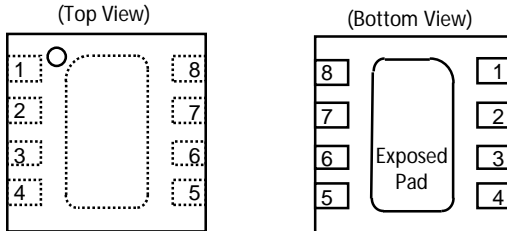
### EQUIVALENT CIRCUIT · BLOCK DIAGRAM



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

Output type	Part No.
Differential	NJU71094-T1

■ PIN CONFIGURATION

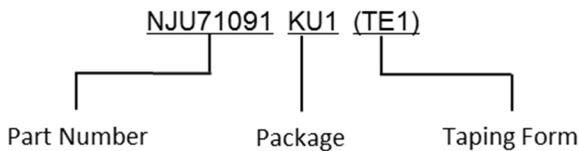


PIN NO.	SYMBOL	DESCRIPTION
1	CP1	Flying Capacitor Terminal
2	V+	Power Supply Terminal
3	VIN	Video Signal Input Terminal
4	N.C.	-
5	VOUT	Video Signal Output Terminal
6	GND	GND Terminal
7	V-	Flying Capacitor Terminal
8	CP2	Flying Capacitor Terminal

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)
NJU71091KU1-T1	ESON8-U1	Yes	Yes	Sn-2Bi	71091T	5.3	3,000

## ■ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	3.5	V
Power Dissipation (Ta=25°C) <sup>(4)</sup>	P <sub>D</sub>	1500 (1)	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to 125	°C
Storage Temperature Range	T <sub>stg</sub>	-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)

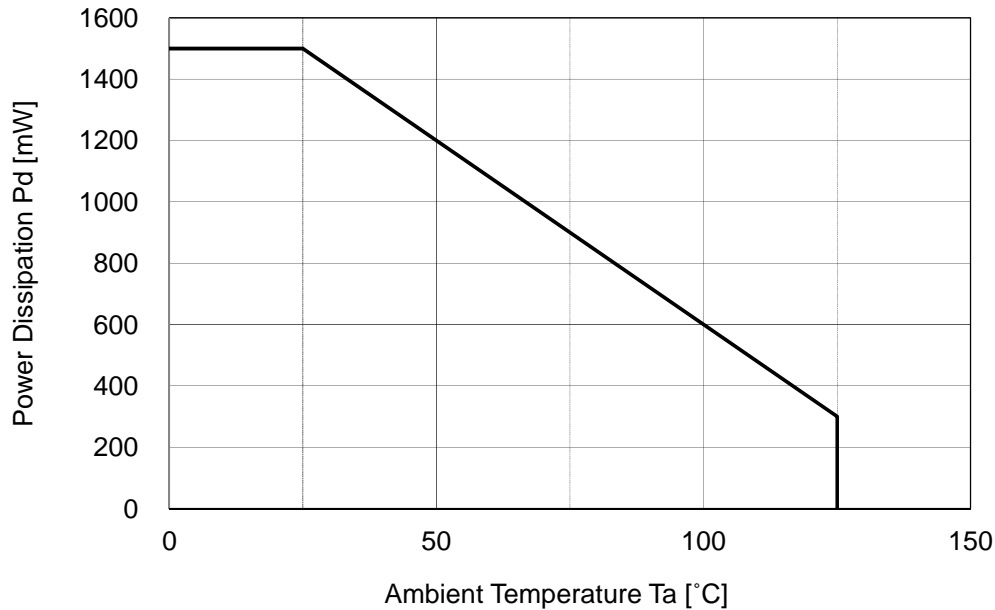
## ■RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	2.65 to 3.45	V
VIN Input Voltage 1	VIN1	-1.0 to 1.0 (2)	V
VIN Input Voltage 2	VIN2	-0.9 to 0.9 (3)	V

(2) V+≒2.65 to 3.15V

(3) 3.15V<V+≦3.45V

## ■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 <sub>cc</sub>	No input signal	-	14	27	mA
		No input signal, T <sub>a</sub> =-40°C to 125°C	-	-	27	
Video Amplifier Characteristics						
Maximum Output Voltage Swing	V <sub>om</sub>	V <sub>in</sub> =100kHz, THD=1%, V <sub>in</sub> =100kHz, THD=1%, T <sub>a</sub> =-40°C to 125°C	3.6	-	-	V <sub>p-p</sub>
			3.6	-	-	
Voltage Gain	G <sub>v</sub>	V <sub>in</sub> =100kHz, 1.0V <sub>p-p</sub> Sine wave	5.6	6.0	6.4	dB
		V <sub>in</sub> =100kHz, 1.0V <sub>p-p</sub> Sine wave, T <sub>a</sub> =-40°C to 125°C	5.6	-	6.4	
LPF Characteristics	G <sub>f6.75M</sub>	V <sub>in</sub> =6.75MHz/1MHz, 1.0V <sub>pp</sub>	-1.0	0	1.0	dB
		V <sub>in</sub> =6.75MHz/1MHz, 1.0V <sub>pp</sub> T <sub>a</sub> =-40°C to 125°C	-1.0	-	1.0	
	G <sub>f27M</sub>	V <sub>in</sub> =27MHz/100kHz, 1.0V <sub>pp</sub>	-	-40	-24	
		V <sub>in</sub> =27MHz/100kHz, 1.0V <sub>pp</sub> T <sub>a</sub> =-40°C to 125°C	-	-	-24	
Differential Gain	DG	V <sub>in</sub> =1.0V <sub>p-p</sub> , 10step Video signal	-	0.9	-	%
Differential Phase	DP	V <sub>in</sub> =1.0V <sub>p-p</sub> , 10step Video signal	-	1.0	-	deg
S/N Ratio	SN	R <sub>L</sub> =75Ω, 1.0V <sub>pp</sub> , 100% White video signal input, BW=100kHz to 6MHz	-	70	-	dB
Switching Noise Level	N <sub>swpl</sub>	R <sub>L</sub> =75Ω, 10% White video signal input	-	4.0	7.0	mV <sub>p-p</sub>
Shot-to- Battery Protection						
Protected Maximum Input Voltage (4)	V <sub>stbm</sub>	Connected 75Ω to V <sub>out</sub> (pin5)	-	-	18	V
		Connected 75Ω to V <sub>out</sub> (pin5) T <sub>a</sub> =-40°C to 125°C	-	-	18	
Detect Protected Input Voltage (5)	V <sub>th</sub>	Connected 75Ω to V <sub>out</sub> (pin5)	-	-	6.0	V
		Connected 75Ω to V <sub>out</sub> (pin5) T <sub>a</sub> =-40°C to 125°C	-	-	6.0	
Input Current	I <sub>stb</sub>	V <sub>out</sub> =18V, Connected 75Ω to V <sub>out</sub> (pin5)	-	2.0	-	mA

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

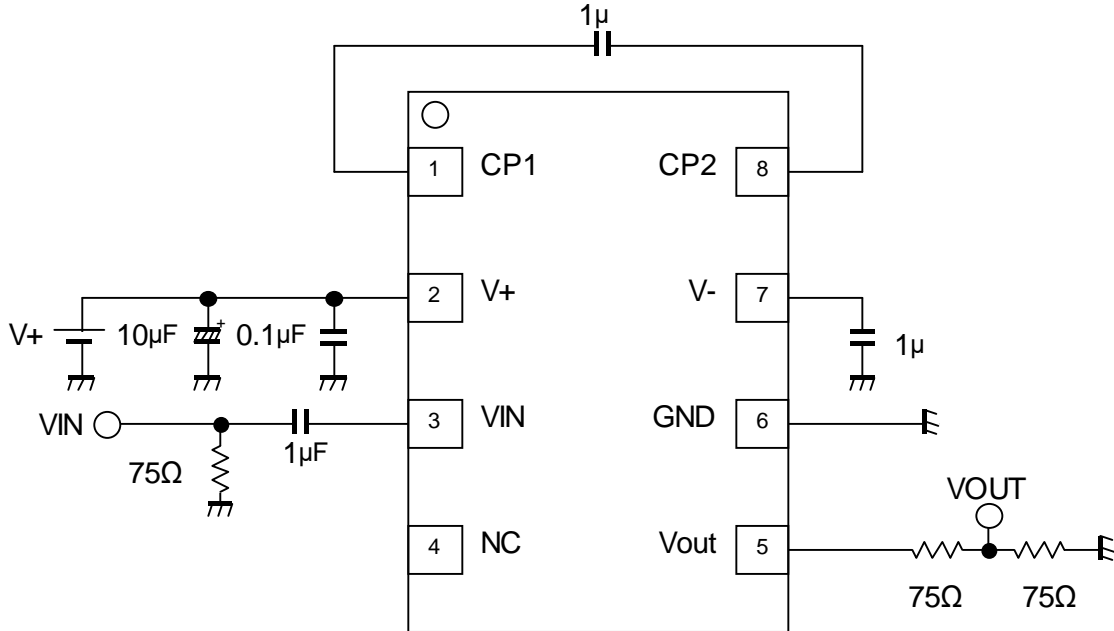
(5) It is become protect mode at more than this voltage against input voltage of destination of output resistance 75ohm.

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

(7) Guaranteed range of Short to Battery voltage is 6V to 18V.

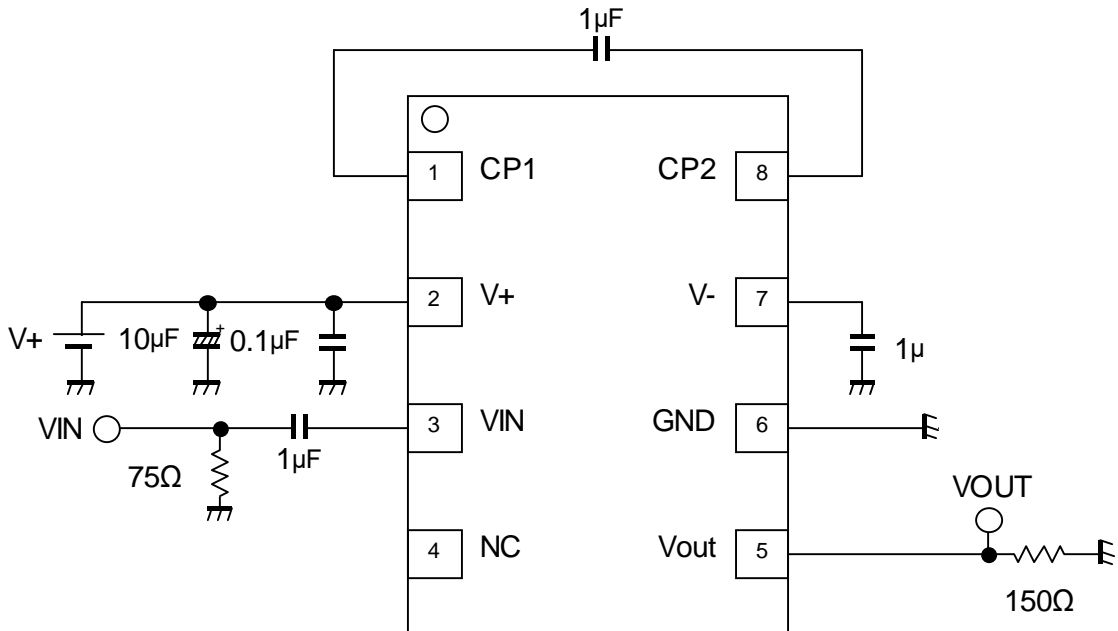
## ■TEST CIRCUIT 1

(Supply current, Differential gain, Differential phase, Switching noise level, Detect protected Input voltage)

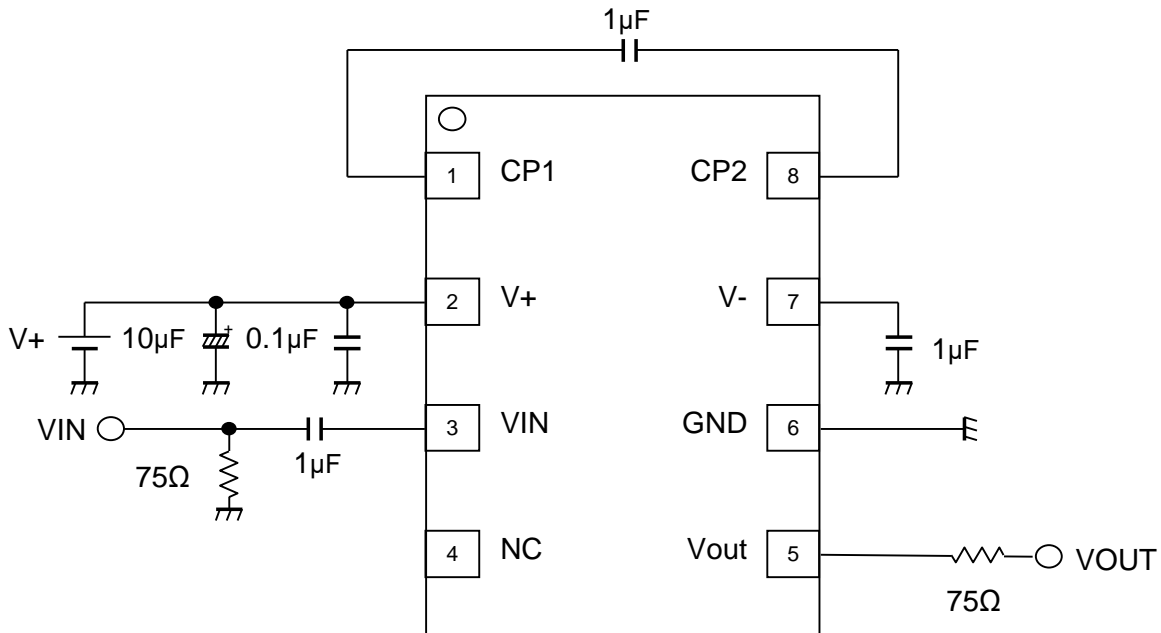


## ■TEST CIRCUIT 2

(Maximum output level, Voltage gain, Frequency characteristics)



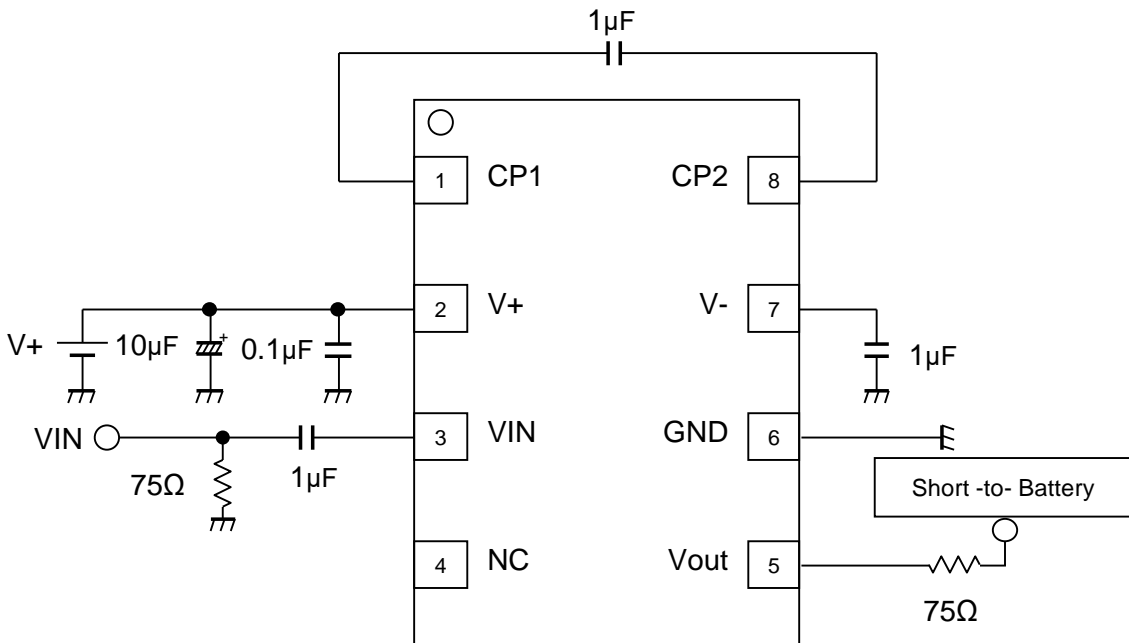
## APPLICATION CIRCUIT 1 (Standard)



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 (At short-to-battery)



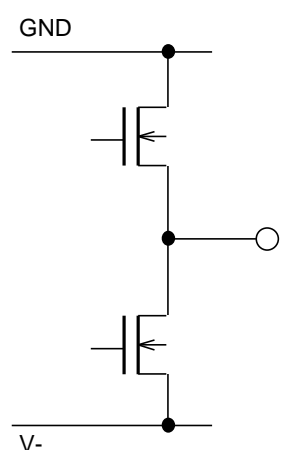
Exposed Pad:

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	EQUIVALENTCIRCUIT	DC VOLTAGE
1	CP1	Flying Capacitor Terminal		-
2	V+	V+ Power Supply	-	-
3	VIN	Video Signal Input Terminal		0V
4	N.C.	-	-	-
5	VOUT	Video Signal Output Terminal		0V

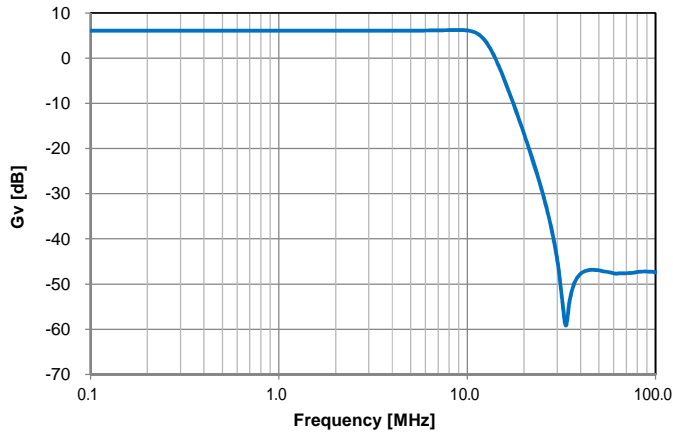
## ■TERMINAL FUNCTION

PINNo.	PINNAME	FUNCTION	EQUIVALENTCIRCUIT	DC VOLTAGE
6	GND	Ground	-	-
7	V-	Flying Capacitor Terminal	-	-
8	CP2	Flying Capacitor Terminal		-

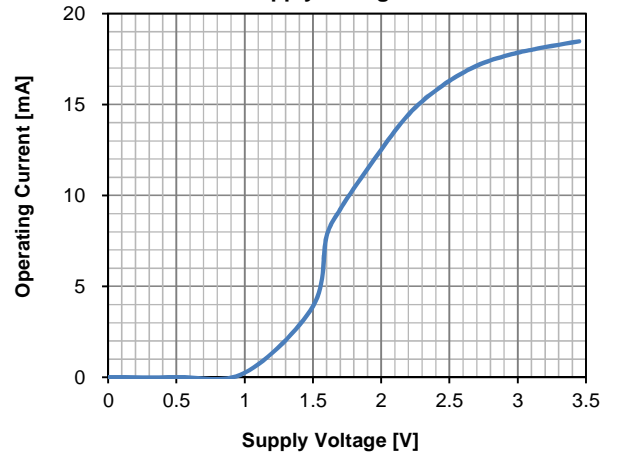


## ■ TYPICAL CHARACTERISTICS

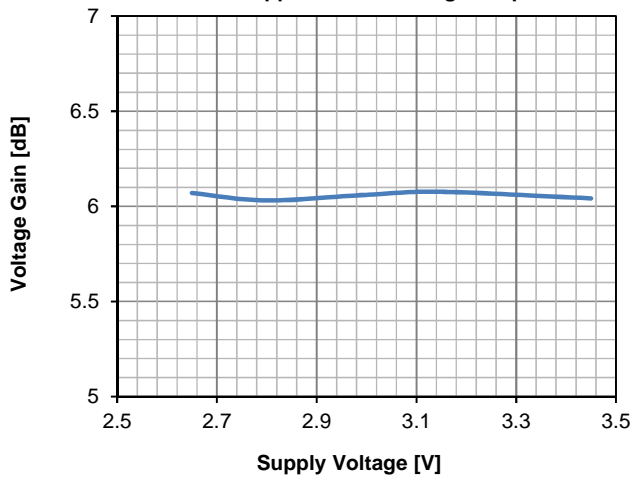
**Frequency Response**  
Vin=1.0Vpp, Sine Signal Input



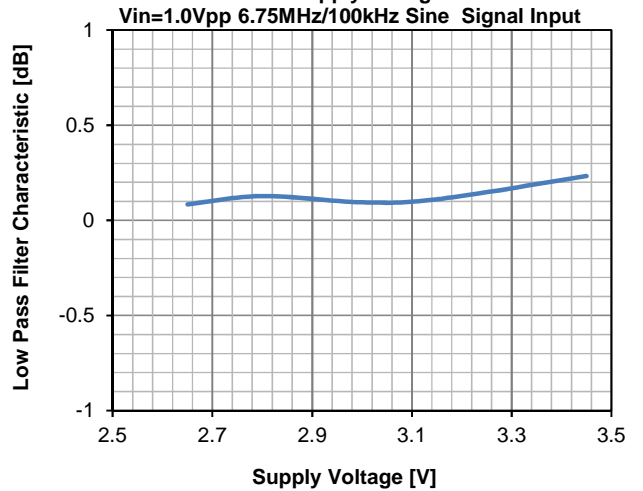
**Operating Current vs. Supply Voltage**



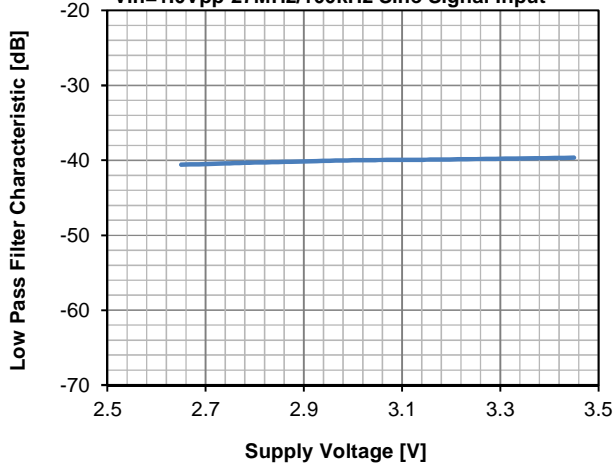
**Voltage Gain vs. Supply Voltage**  
Vin=1.0Vpp 100kHz Sine Signal Input



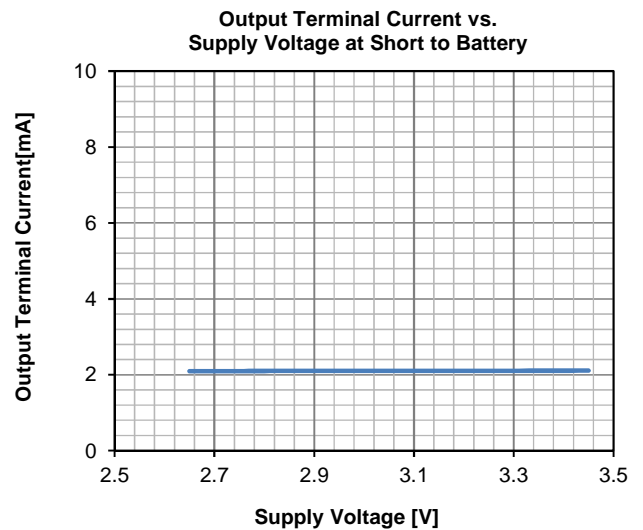
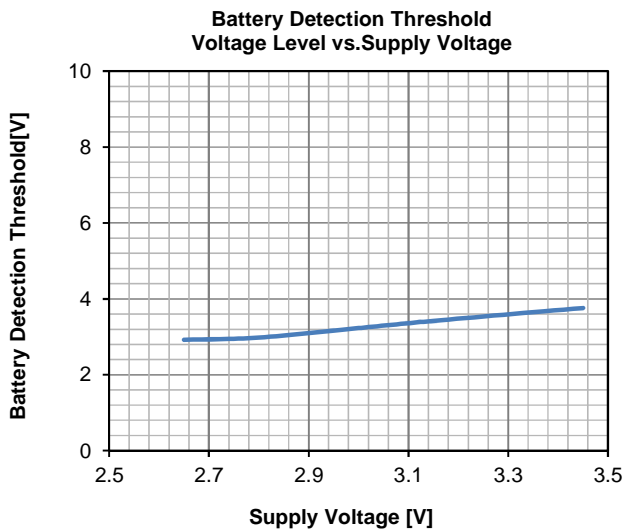
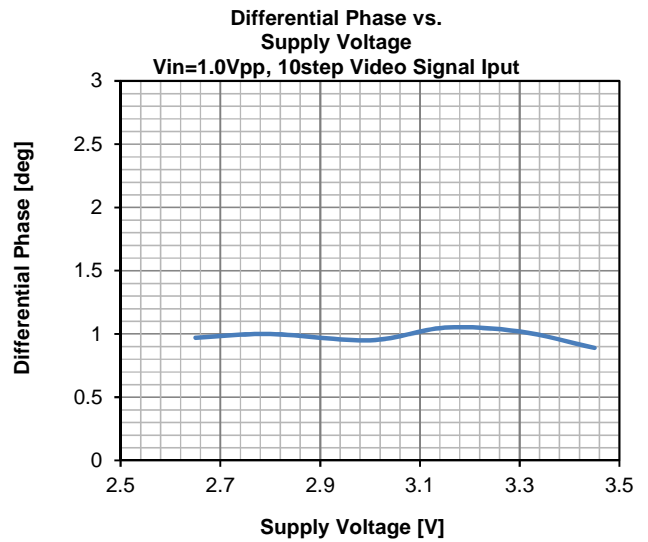
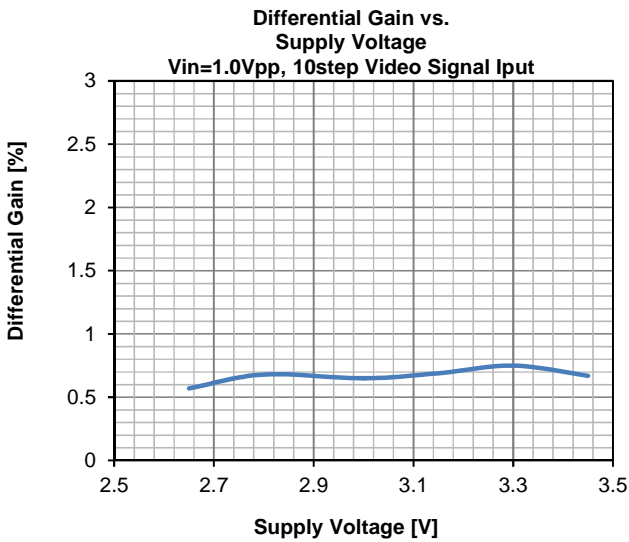
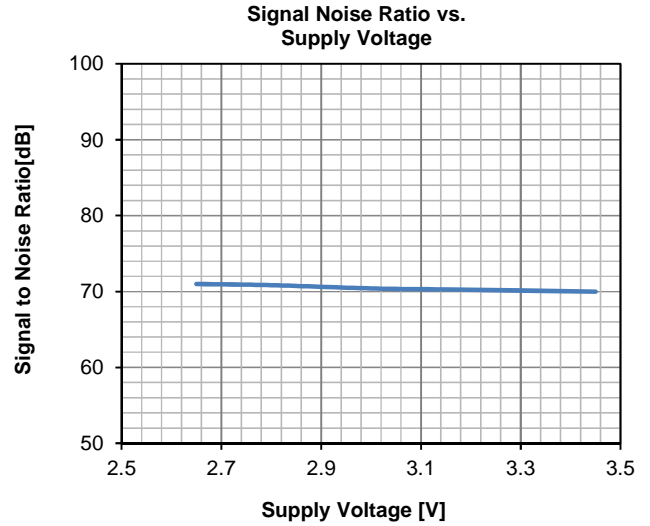
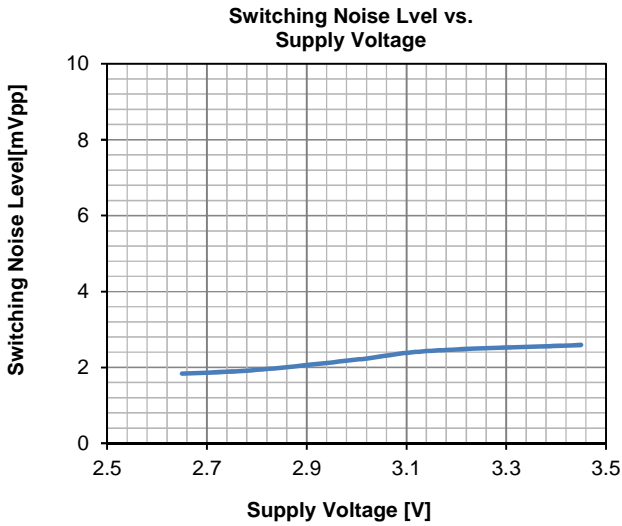
**Low Pass Filter Characteristic vs. Supply Voltage**  
Vin=1.0Vpp 6.75MHz/100kHz Sine Signal Input



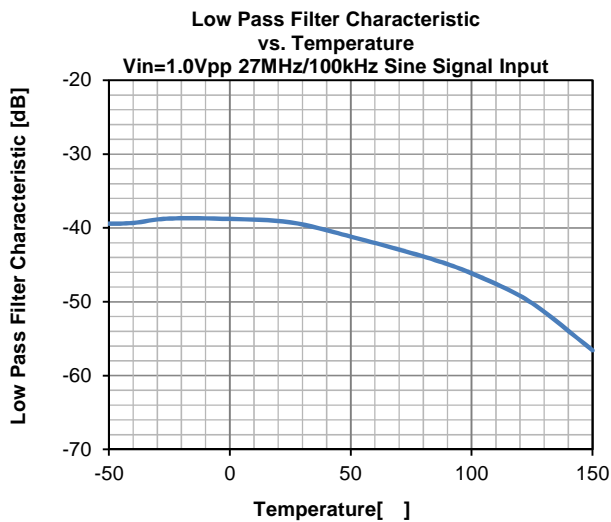
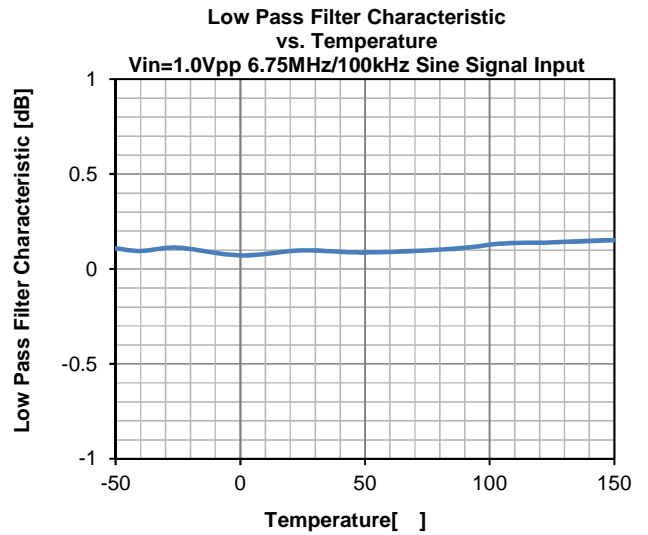
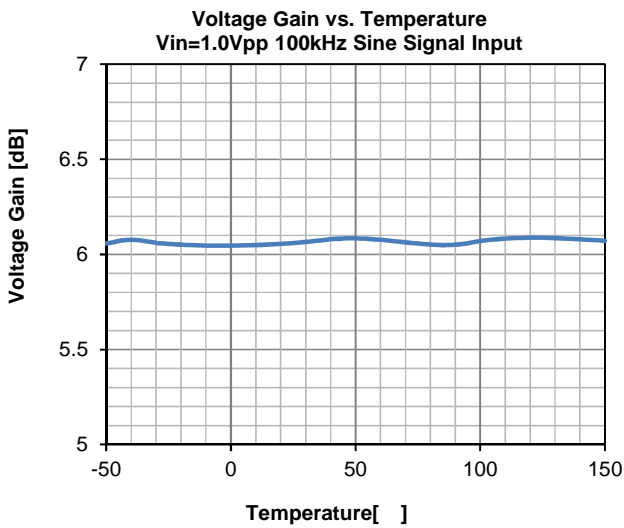
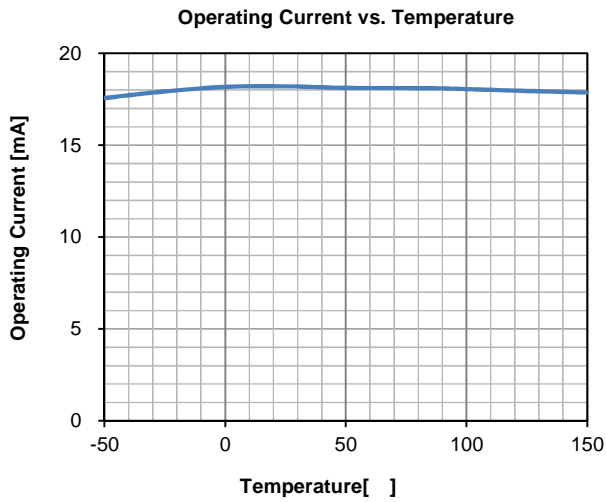
**Low Pass Filter Characteristic vs. Supply Voltage**  
Vin=1.0Vpp 27MHz/100kHz Sine Signal Input



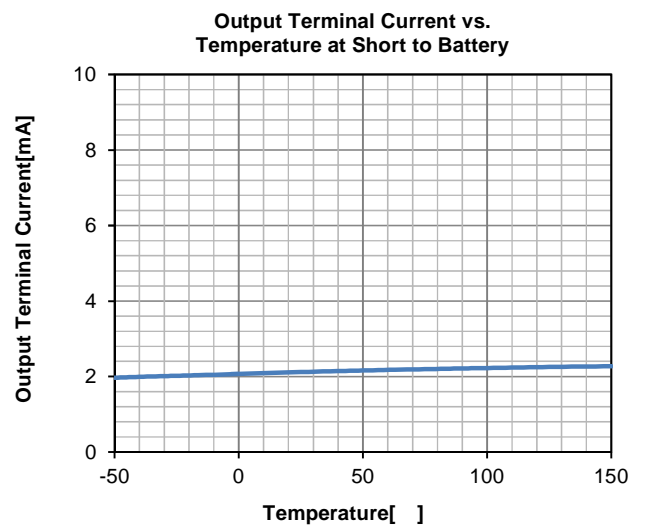
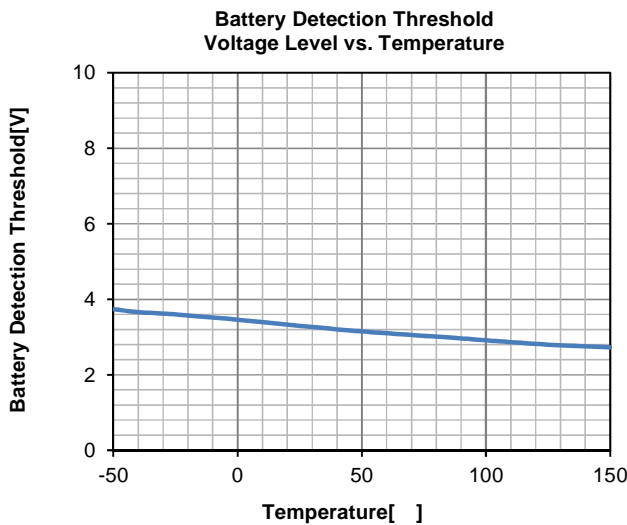
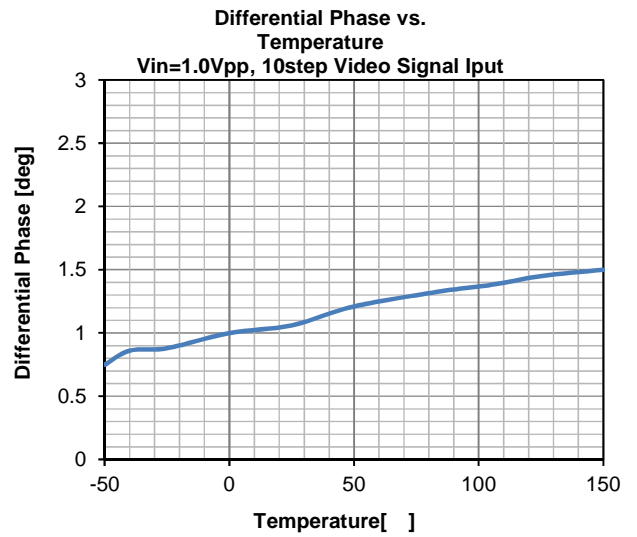
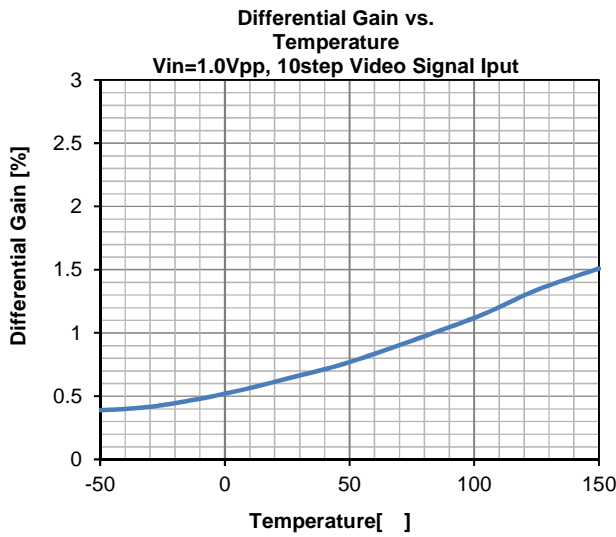
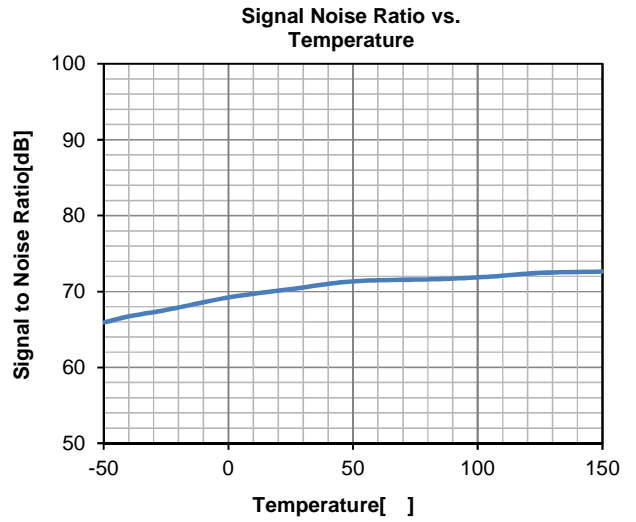
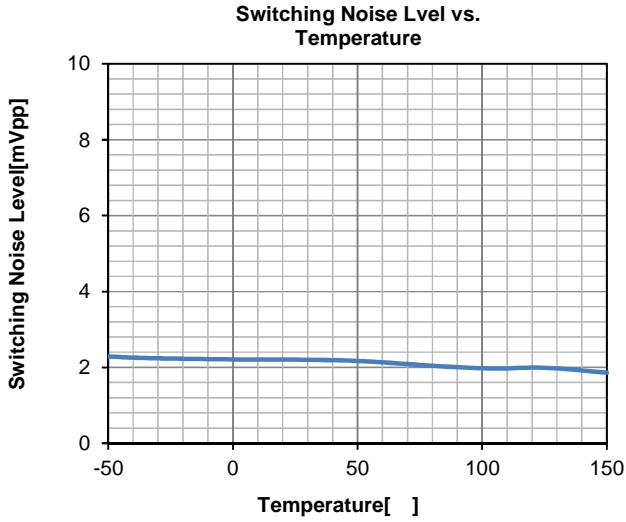
## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS

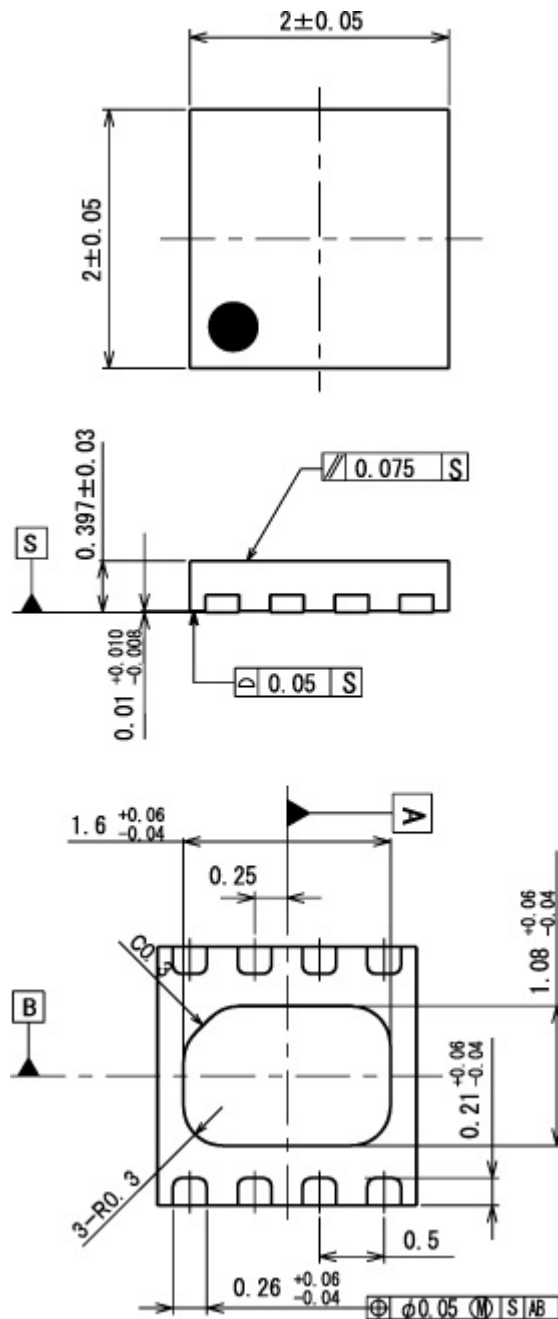


## ■ TYPICAL CHARACTERISTICS



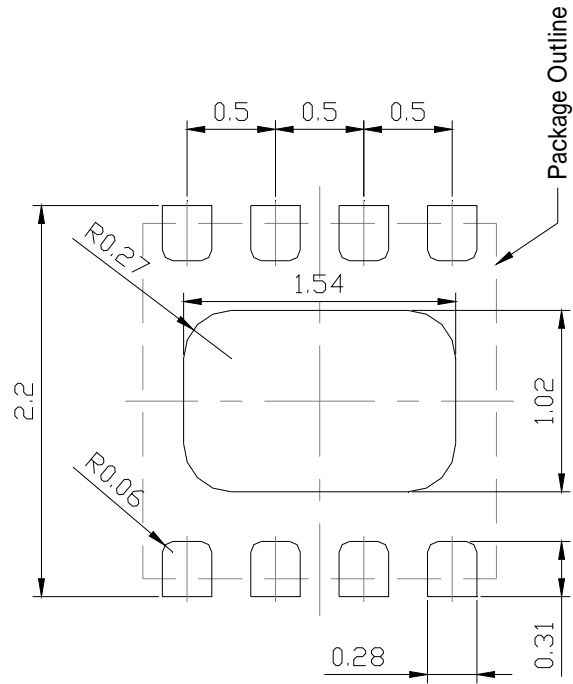
■PACKAGE OUTLINE

## DFN8-U1 (ESON8-U1)



UNIT : mm

## ■SOLDER FOOT PRINT



Unit : mm

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

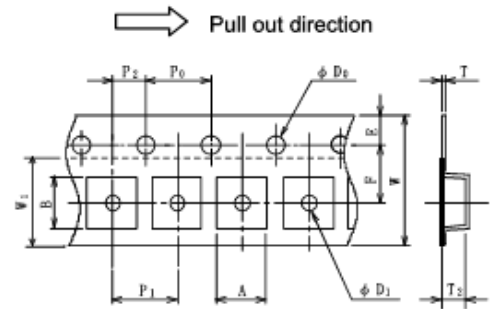
## PACKING SPECIFICATION

### 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.

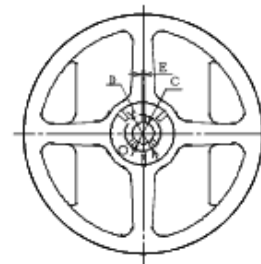
### DFN(ESON) Emboss Taping (TE3)

Symbol	DFN8-U1(ESON8-U1)	Remark
A	2.25±0.05	Bottom size
B	2.25±0.05	Bottom size
D <sub>0</sub>	1.5+0.1/-0	
D1	0.5±0.1	
E	1.75±0.1	
F	3.5 ±0.05	
P <sub>0</sub>	4.0 ±0.1	
P <sub>1</sub>	4.0 ±0.1	
P <sub>2</sub>	2.0 ±0.05	
T	0.25±0.05	
T <sub>2</sub>	0.75	
W	8.0 ±0.2	
W <sub>1</sub>	5.5	Thickness 0.1MAX

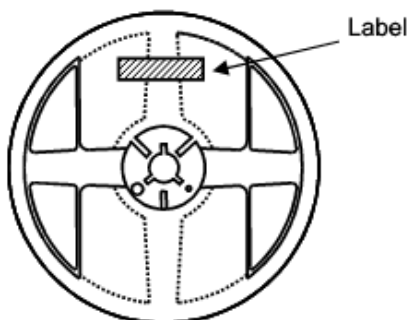
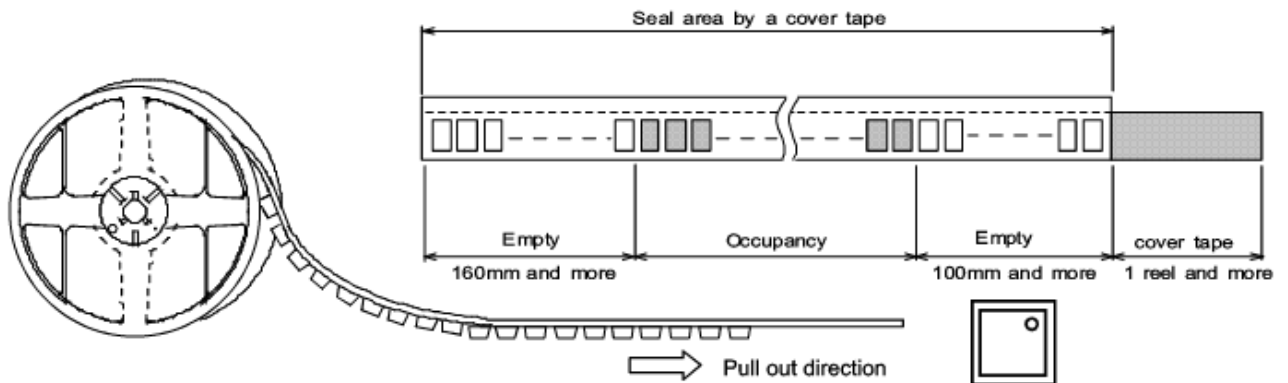
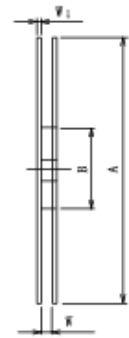


Unit : mm

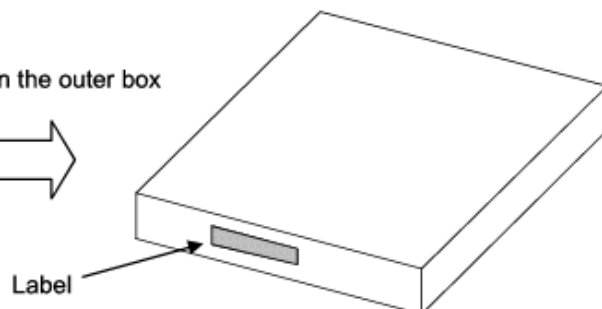
Symbol	DFN8-U1(ESON8-U1)
A	φ180 +0/-1.5
B	φ60 +1/-0
C	φ13.0±0.2
D	φ21.0±0.8
E	2.0±0.5
W	9.0 +0.3/-0
W <sub>1</sub>	1.2
Contents	3,000pcs



Unit : mm

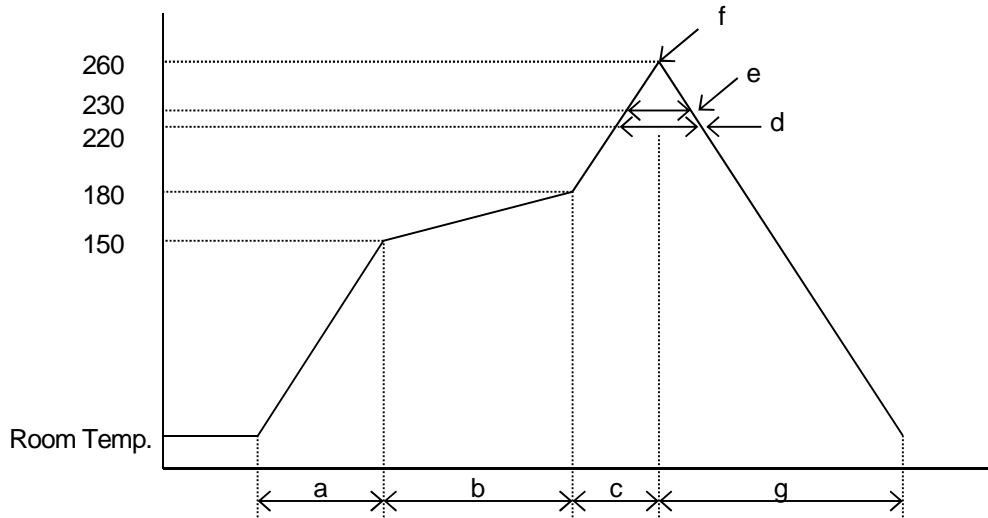


Put in the outer box



## RECOMMENDED MOUNTING METHOD

\* Recommended reflow soldering procedure



a: Temperature ramping rate	: 1 to 4 /s
b: Pre-heating temperature time	: 150 to 180 : 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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Vehicle Control Equipment (airplane, railroad, ship, etc.)  
Various Safety devices

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