

45V $I_o=300\text{mA}$ LDO

■FEATURES

- Fast Transient Response
- Operating Voltage 4.0V to 40V
- Operating Temperature $T_a=-40^\circ\text{C}$ to 125°C
- Output Voltage Accuracy $V_o \pm 1.0\%$ ($T_a=25^\circ\text{C}$)
 $V_o \pm 1.5\%$ ($T_a=-40^\circ\text{C}$ to 125°C)
- Output Current $I_o(\text{min.})=300\text{mA}$
- ON/OFF Control A ver. only
- Correspond to MLCC
- Under Voltage Lock Out circuit
- Thermal Shutdown Circuit
- Over Current Protection Circuit
- Package Outline A ver. SOT-89-5-2
B ver. SOT-89-3

■APPLICATION

- Automotive infotainment
- Automotive ECU unit
- Industrial equipment

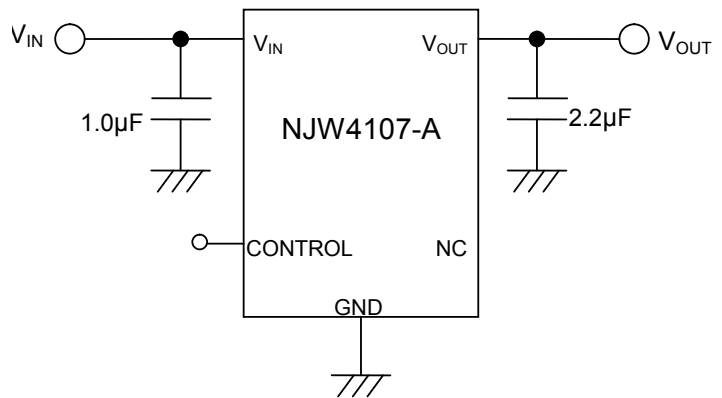
■GENERAL DESCRIPTION

The NJW4107 is a 45V, $I_o=300\text{mA}$ fast response low dropout regulator. It achieves fast transient response, therefore it provides stable output voltage at line/load fluctuations.

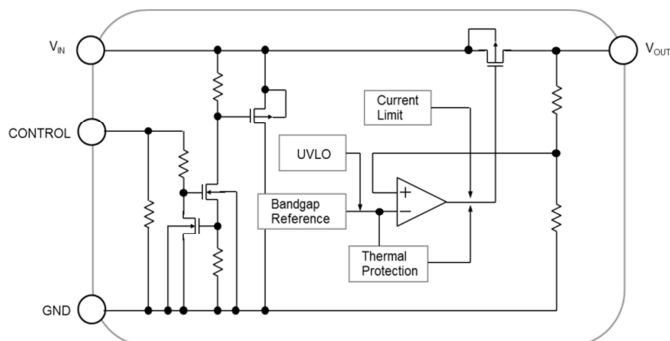
Output voltage accuracy is guaranteed $\pm 1.5\%$ under wide range conditions: $V_{IN}=V_o+1\text{V}$ to 40V , $I_o=0\text{mA}$ to 300mA and $T_a=-40^\circ\text{C}$ to 125°C .

Because of wide input voltage range and wide operating temperature range, the NJW4107 is suitable for various applications including automotive applications.

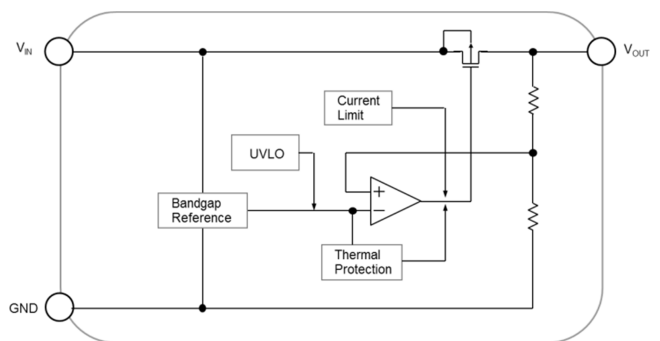
■TYPICAL APPLICATION



■BLOCK DIAGRAM



A version



B version

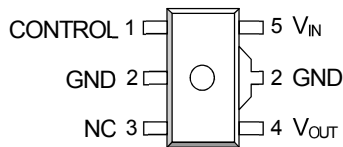
■OUTPUT VOLTAGE RANK

SOT-89-5-2

SOT-89-3

PART NUMBER	OUTPUT VOLTAGE	PART NUMBER	OUTPUT VOLTAGE
NJW4107U2-33A / -T1	3.3V	NJW4107U3-33B / -T1	3.3V
NJW4107U2-05A / -T1	5.0V	NJW4107U3-05B / -T1	5.0V

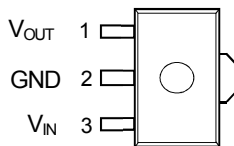
■PIN CONFIGURATION



SOT-89-5-2

PIN NO.	SYMBOL	DESCRIPTION
1	CONTROL	ON/OFF Control
2	GND	Ground
3	NC	No Connection*
4	V _{OUT}	Output
5	V _{IN}	Input

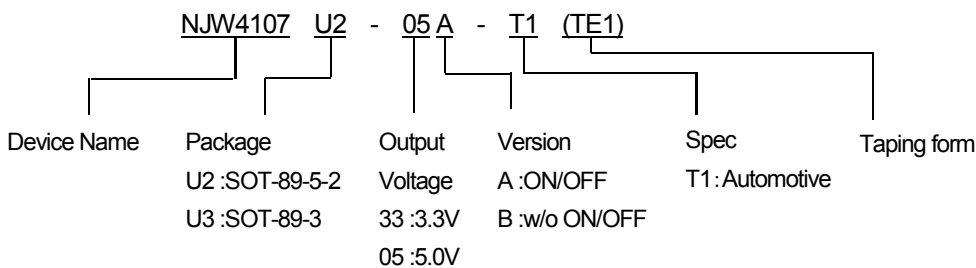
*Note) NC pin is not connect to internally circuit. This pin can be open or connected to ground. Connecting to ground is recommended to improve thermal dissipation.



SOT-89-3

PIN NO.	SYMBOL	DESCRIPTION
1	V _{OUT}	Output
2	GND	Ground
3	V _{IN}	Input

■MARK INFORMATION



■ORDERING INFORMATION

PART NUMBER	OUTPUT VOLTAGE	PACKAGE OUTLINE	AUTOMOTIVE SPEC	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ (pcs)
NJW4107U2-33A	3.3V	SOT-89-5-2		yes	yes	Sn-2Bi	131	61	1000
NJW4107U2-05A	5.0V	SOT-89-5-2		yes	yes	Sn-2Bi	141	61	1000
NJW4107U2-33A-T1	3.3V	SOT-89-5-2	yes	yes	yes	Sn-2Bi	151	61	1000
NJW4107U2-05A-T1	5.0V	SOT-89-5-2	yes	yes	yes	Sn-2Bi	161	61	1000
NJW4107U3-33B	3.3V	SOT-89-3		yes	yes	Sn-2Bi	33D	61	1000
NJW4107U3-05B	5.0V	SOT-89-3		yes	yes	Sn-2Bi	50D	61	1000
NJW4107U3-33B-T1	3.3V	SOT-89-3	yes	yes	yes	Sn-2Bi	33R	61	1000
NJW4107U3-05B-T1	5.0V	SOT-89-3	yes	yes	yes	Sn-2Bi	50R	61	1000

Note) "-" is non-evaluation. Please contact your sales representative for more information.

■ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	-0.3 to +45	V
Control Pin Voltage ⁽¹⁾	V_{CONT}	-0.3 to +45	V
Output Voltage	V_{OUT}	-0.3 to $V_{IN} \leq +17$	V
Power Dissipation($T_a=25^\circ\text{C}$) SOT-89	P_D	(2-layer / 4-layer) 625 ⁽²⁾ / 2400 ⁽³⁾	mW
Junction Temperature Range	T_j	-40 to +150	$^\circ\text{C}$
Operating Temperature Range	T_{opr}	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-50 to +150	$^\circ\text{C}$

(1): Applied for A version.

(2): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 2Layers)

(3): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 4Layers), internal Cu area: 74.2x74.2mm
(For 4Layers :Applying 74.2 x 74.2mm inner Cu area and thermal via hole to board based on JEDEC standard JESD51-5)

■RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Operating Voltage Range	V_{IN}	4.0 to 40	V
Control Voltage	V_{CONT}	0 to 40	V

■ELECTRICAL CHARACTERISTICS

 Unless other noted, $V_{IN}=V_O+1V$, $C_{IN}=1.0\mu F$, $C_O=2.2\mu F$, $T_a=25^\circ C$

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_O	$V_{IN} = V_O + 1V$ to 40V, $I_O = 0mA$ to 300mA,	-1.0%	-	+1.0%	V	
		$V_{IN} = V_O + 1V$ to 40V, $I_O = 0mA$ to 300mA, $T_a = -40^\circ C$ to $+125^\circ C$	-1.5%	-	+1.5%		
Quiescent Current	I_Q	A version, $I_O = 0mA$, except I_{CONT}	-	75	125	μA	
		A version, $I_O = 0mA$, except I_{CONT} , $T_a = -40^\circ C$ to $+125^\circ C$	-	-	135		
		B version, $I_O = 0mA$	-	70	120		
		B version, $I_O = 0mA$, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	130		
Quiescent Current at Control OFF ⁽⁴⁾	$I_{Q(OFF)}$	$V_{CONT}=0V$	-	-	1	μA	
		$V_{CONT}=0V$, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	1		
Output Current	I_O	$V_O \times 0.9$	300	-	-	mA	
		$V_O \times 0.9$, $T_a = -40^\circ C$ to $+125^\circ C$	300	-	-		
Line Regulation	$\Delta V_O / \Delta V_{IN}$	$V_{IN} = V_O + 1V$ to 40V, $I_O = 30mA$	$V_O = 3.3V$	-	-	23.5	mV
			$V_O = 5.0V$	-	-	34.0	
		$V_{IN} = V_O + 1V$ to 40V, $I_O = 30mA$, $T_a = -40^\circ C$ to $+125^\circ C$	$V_O = 3.3V$	-	-	35.3	
			$V_O = 5.0V$	-	-	51.0	
Load Regulation	$\Delta V_O / \Delta I_O$	$I_O = 0mA$ to 300mA	$V_O = 3.3V$	-	-	14.8	mV
			$V_O = 5.0V$	-	-	22.5	
		$I_O = 0mA$ to 300mA, $T_a = -40^\circ C$ to $+125^\circ C$	$V_O = 3.3V$	-	-	29.7	
			$V_O = 5.0V$	-	-	45.0	
Ripple Rejection	RR	$V_{IN} = V_O + 1V$, $e_{in} = 200mV_{rms}$, $f = 1kHz$, $I_O = 10mA$	$V_O = 3.3V$	-	56	-	dB
			$V_O = 5.0V$	-	53	-	
Dropout Voltage ⁽⁵⁾	ΔV_{IO}	$I_O = 100mA$	-	0.12	0.20	V	
		$I_O = 100mA$, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	0.40		
Control Current ⁽⁴⁾	I_{CONT}	$V_{CONT} = 1.6V$	-	0.5	2	μA	
		$V_{CONT} = 1.8V$, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	3		
Control Voltage for ON-state ⁽⁴⁾	$V_{CONT(ON)}$		1.6	-	-	V	
		$T_a = -40^\circ C$ to $+125^\circ C$	1.8	-	-		
Control Voltage for OFF-state ⁽⁴⁾	$V_{CONT(OFF)}$		-	-	0.6	V	
		$T_a = -40^\circ C$ to $+125^\circ C$	-	-	0.6		
UVLO Release Voltage	V_{UVLO}	$V_{IN} = L \rightarrow H$	2.4	2.8	3.2	V	
		$V_{IN} = L \rightarrow H$, $T_a = -40^\circ C$ to $+125^\circ C$	2.3	-	3.3		
UVLO Hysteresis Voltage	V_{HYS}	$V_{IN} = H \rightarrow L$	100	350	-	mV	
		$V_{IN} = H \rightarrow L$, $T_a = -40^\circ C$ to $+125^\circ C$	100	-	-		
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T_a$	$T_a = -40^\circ C$ to $125^\circ C$, $I_O = 30mA$	-	± 50	-	ppm/ $^\circ C$	

(4): Applied for A version.

(5): Except Output Voltage Rank less than 3.8V

 Characteristics value of under $T_a = -40^\circ C$ to $+125^\circ C$ applied only "T1" spec.

■ THERMAL CHARACTERISTICS

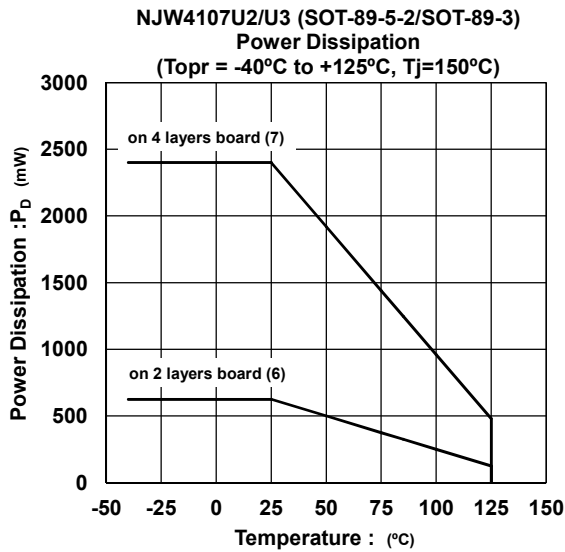
PARAMETER	SYMBOL	VALUE	UNIT
Junction-to-ambient thermal resistance	θ_{ja}	SOT-89-3/-5-2 200 ⁽⁶⁾ 52 ⁽⁷⁾	$^{\circ}\text{C/W}$
Junction-to-Top of package characterization parameter	ψ_{jt}	SOT-89-3/-5-2 43 ⁽⁶⁾ 19 ⁽⁷⁾	$^{\circ}\text{C/W}$

(6): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 2Layers)

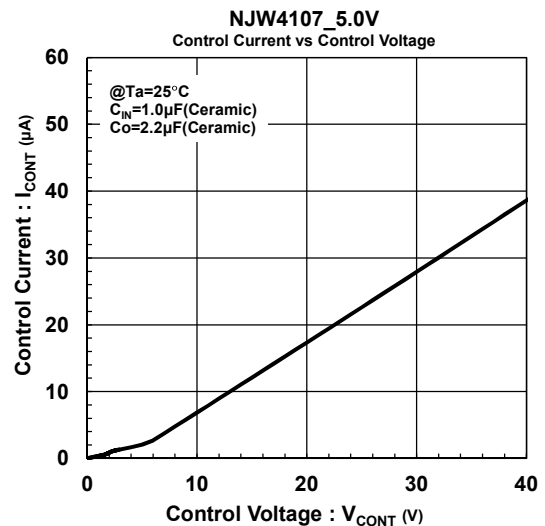
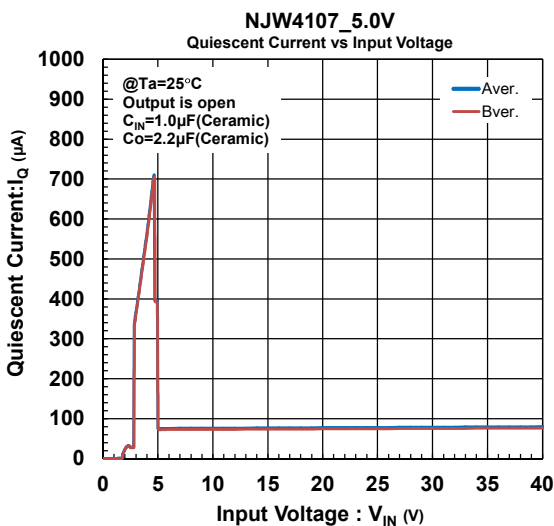
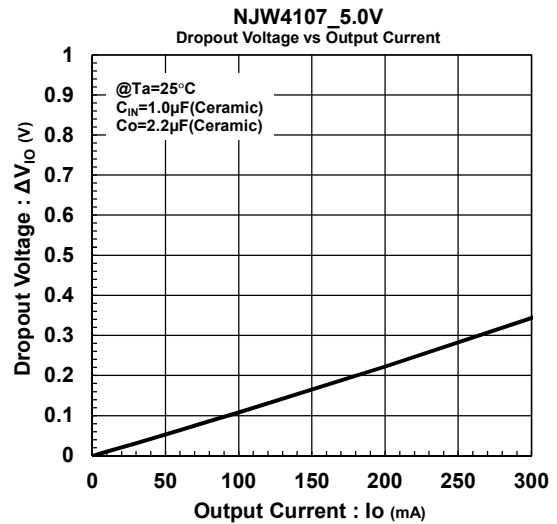
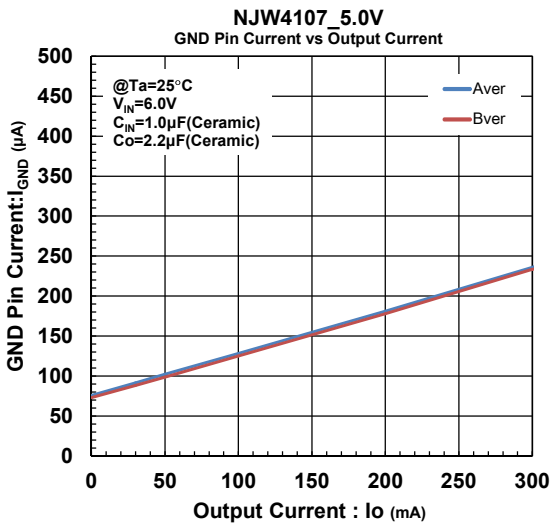
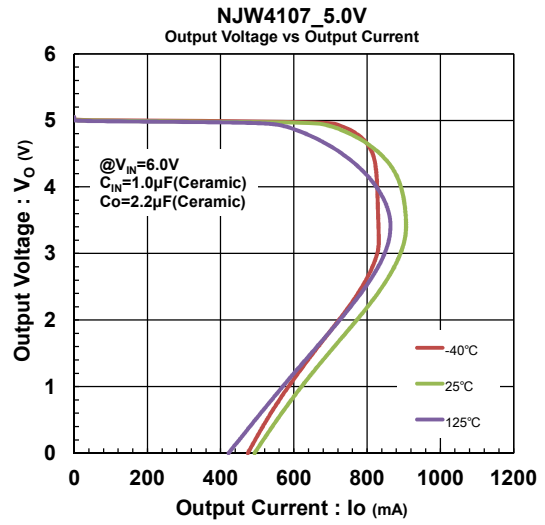
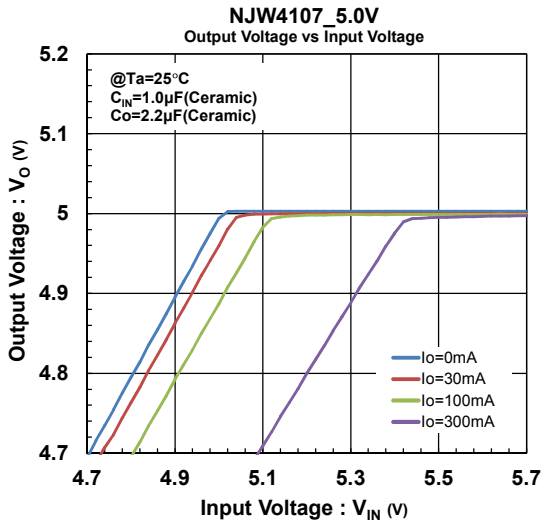
(7): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JEDEC standard, 4Layers), internal Cu area: 74.2x74.2mm

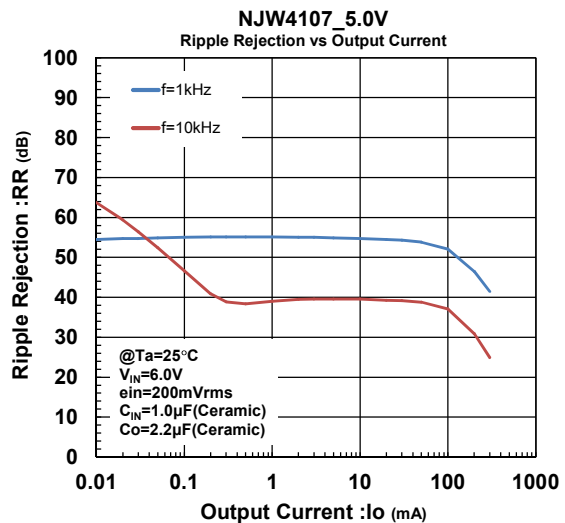
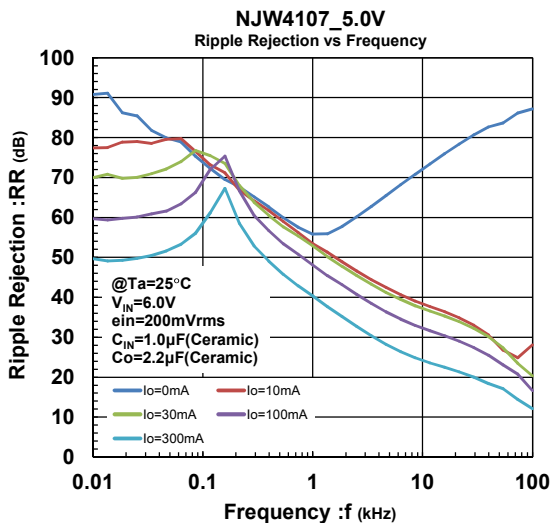
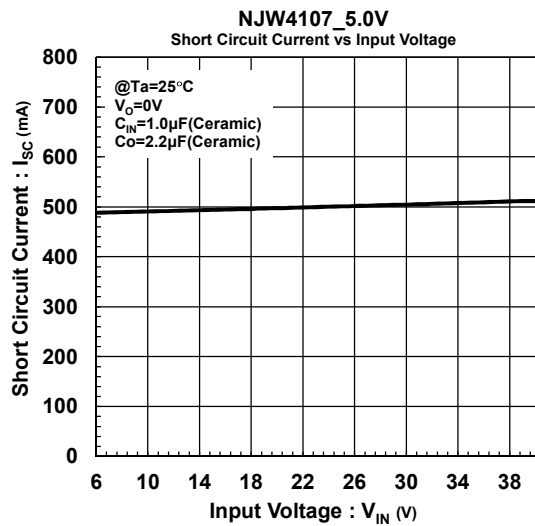
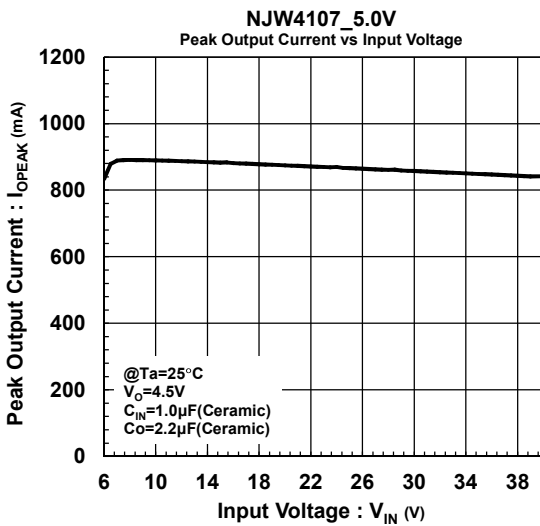
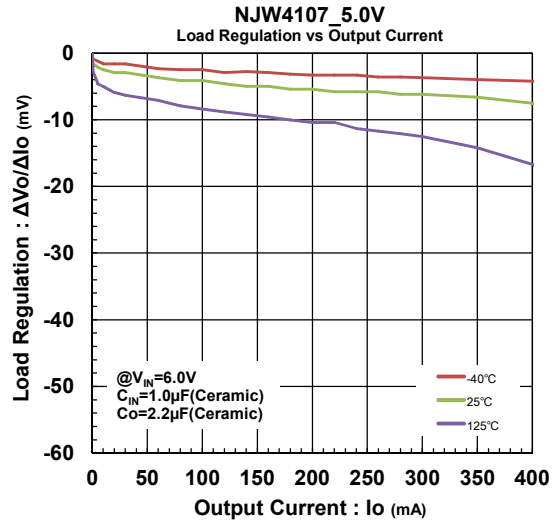
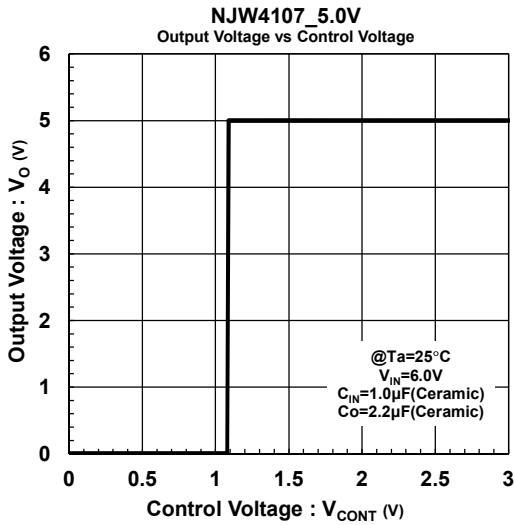
(For 4Layers :Applying 74.2 x 74.2mm inner Cu area and thermal via hole to board based on JEDEC standard JESD51-5)

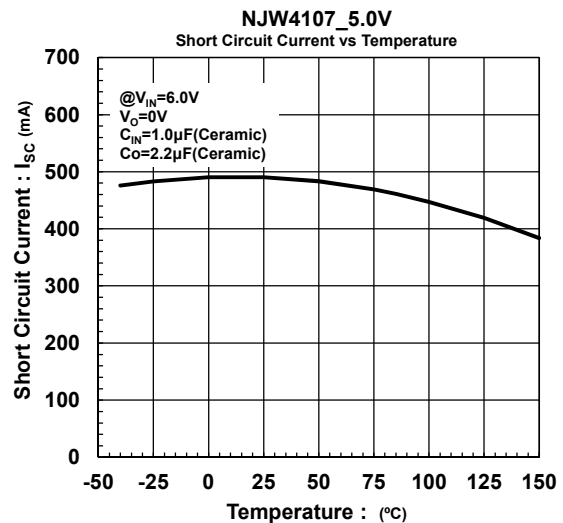
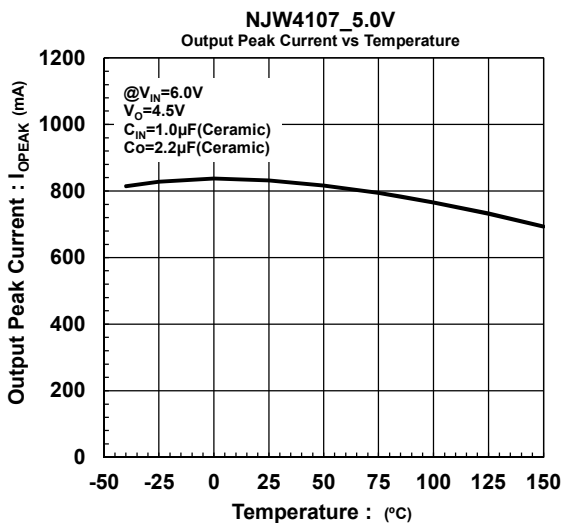
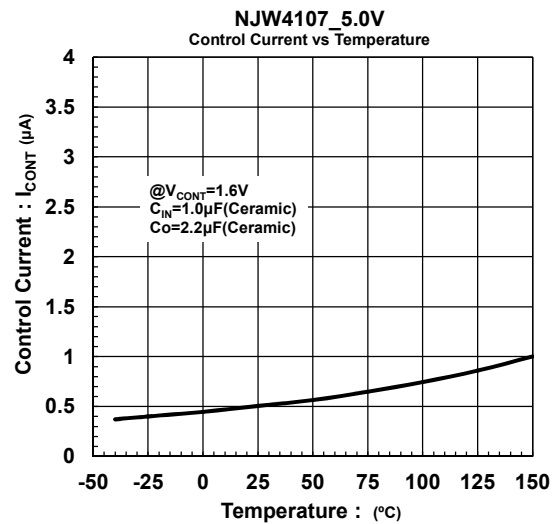
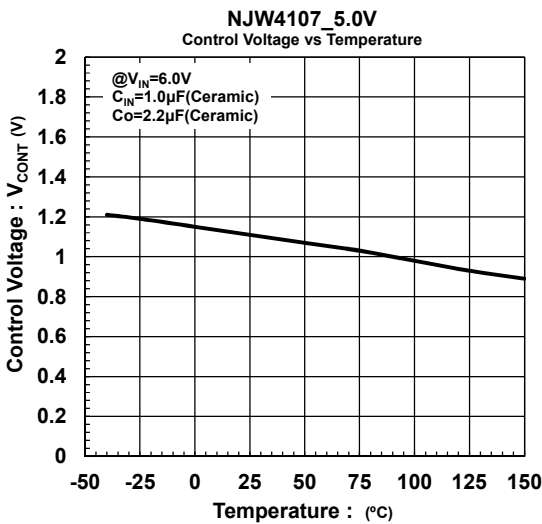
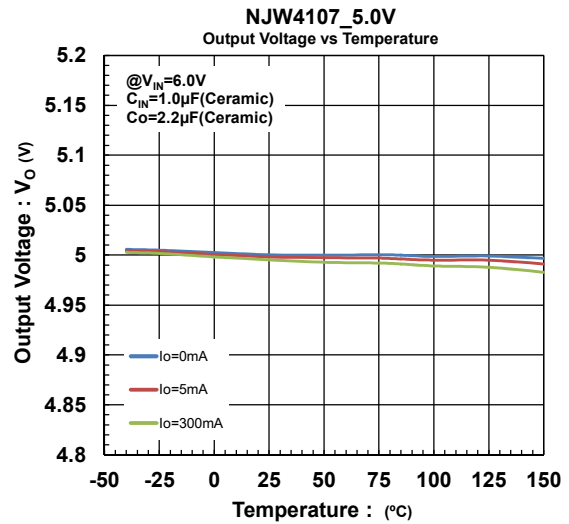
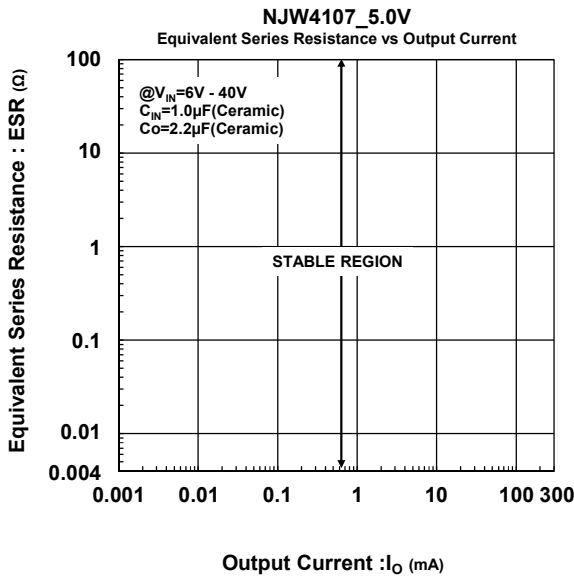
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE

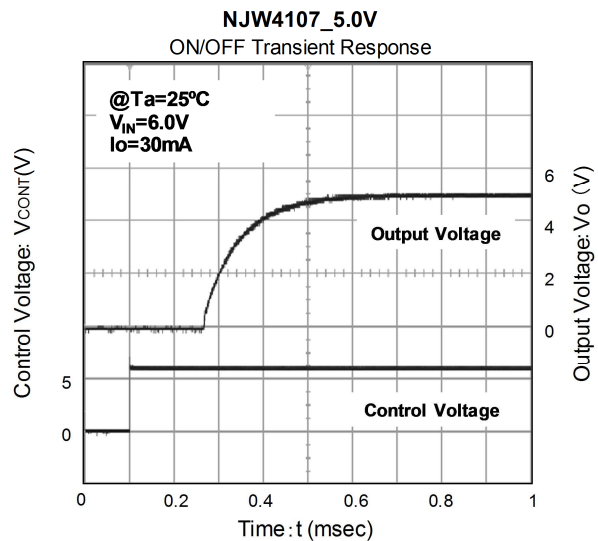
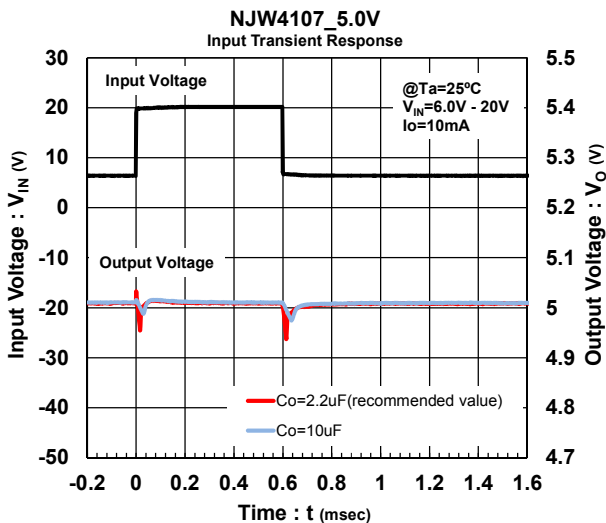
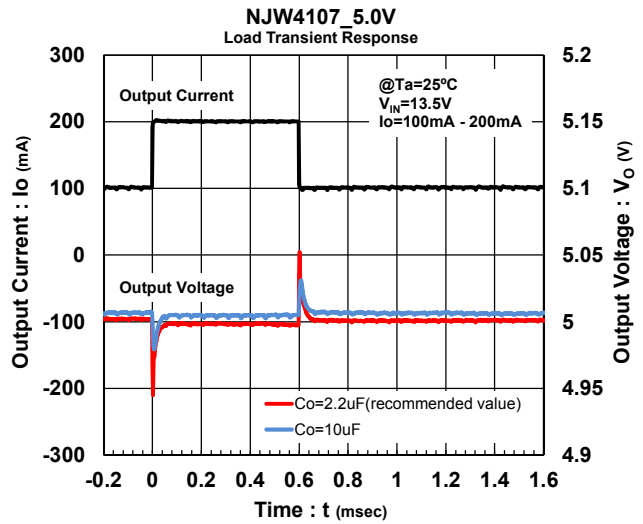
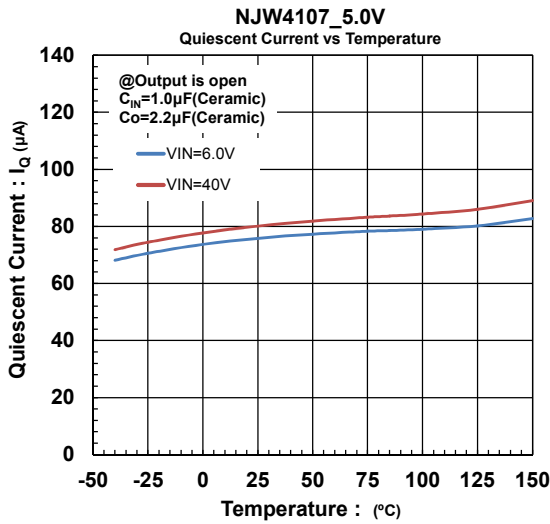
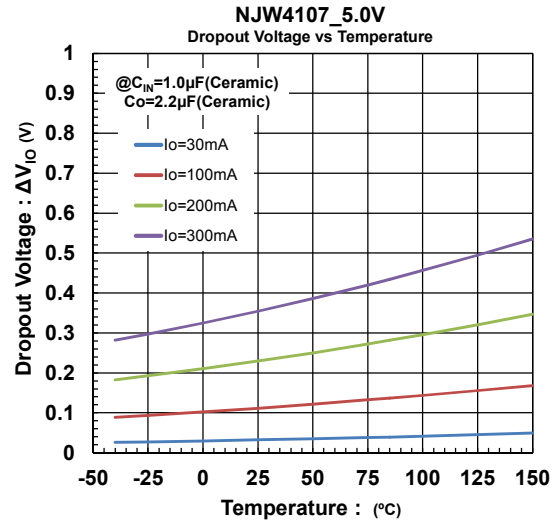
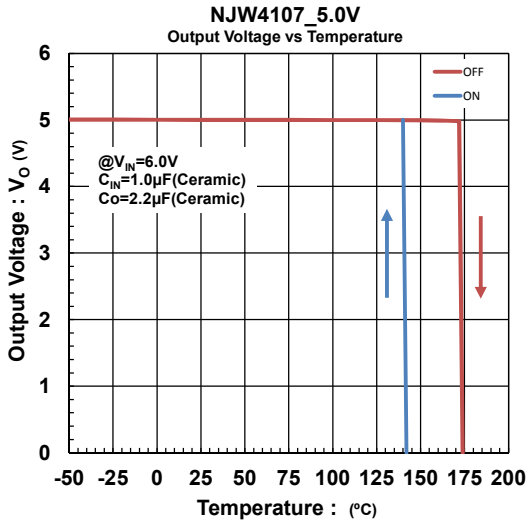


■ TYPICAL CHARACTERISTICS





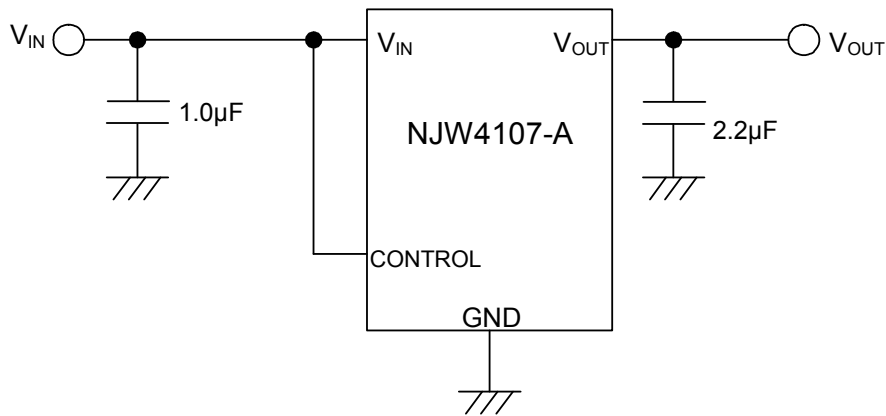




■ TYPICAL APPLICATION

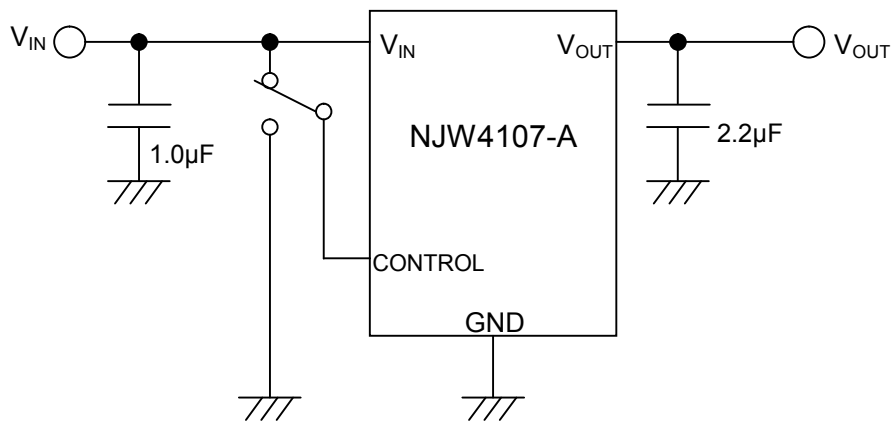
● A version

1. In the case where ON/OFF Control is not required



Connect CONTROL Pin to V_{IN} Pin

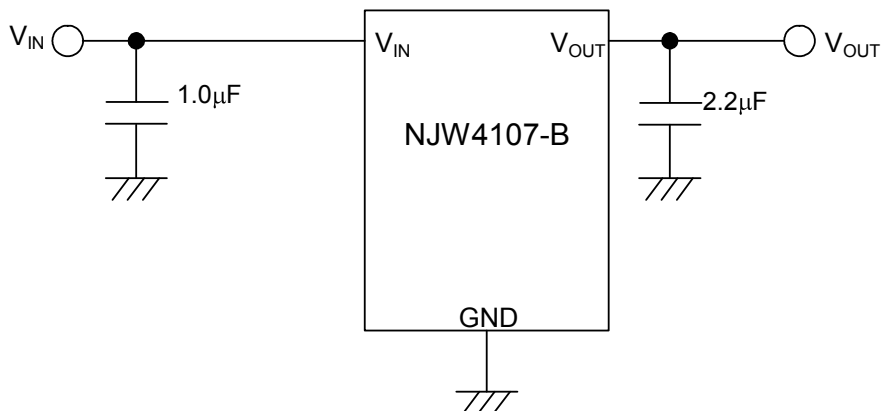
2. In use of ON/OFF CONTROL



State of CONTROL Pin:

“H” → output is enabled. “L” or “open” → output is disabled

● B version



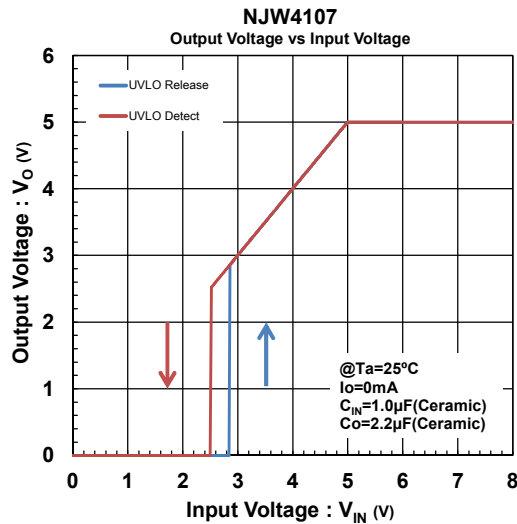
■APPLICATION NOTE / GLOSSARY

*Under Voltage Lockout UVLO

The NJW4107 includes UVLO circuit to prevent malfunction in case of low input voltage.

When the input voltage increases and exceeds the “UVLO Release voltage” (2.8V typ.), UVLO is released and the output voltage rises up.

The UVLO circuit has hysteresis(350mV typ.). Therefore, if the input voltage decreases below the threshold voltage: “UVLO Release voltage” – “UVLO Hysteresis Voltage”, the output voltage shuts down.



*Input Capacitor C_{IN}

The input capacitor C_{IN} is required in order to prevent oscillation and reduce power supply ripple of applications when high power supply impedance or a long power supply line.

Therefore, the recommended capacitance (refer to conditions of ELECTRIC CHARACTERISTIC) or larger input capacitor, connected between V_{IN} and GND as short path as possible, is recommended in order to avoid the problem.

*Output Capacitor C_O

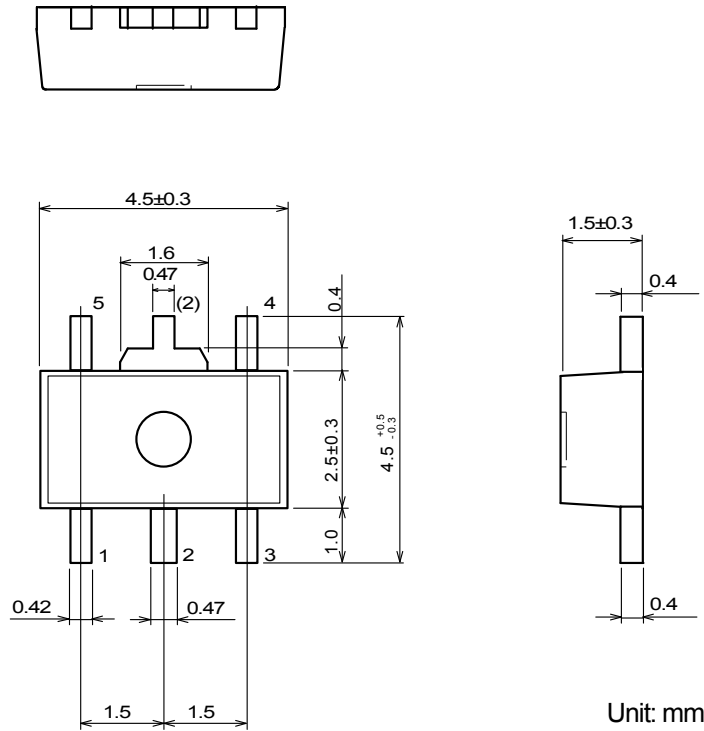
The output capacitor C_O is required for a phase compensation of the internal error amplifier, and the capacitance and the equivalent series resistance (ESR) influence stable operation of the regulator.

If use a smaller output capacitor than the recommended capacitance (refer to conditions of ELECTRIC CHARACTERISTIC), it may cause excess output noise or oscillation of the regulator due to lack of the phase compensation. Therefore, the recommended capacitance or larger output capacitor, connected between V_{OUT} and GND as short path as possible, is recommended for stable operation. The recommended capacitance may be different by output voltage, therefore confirm the recommended capacitance of the required output voltage.

Furthermore, a larger output capacitor reduces output noise and ripple output, and also improves Output Transient Response when a load changes rapidly.

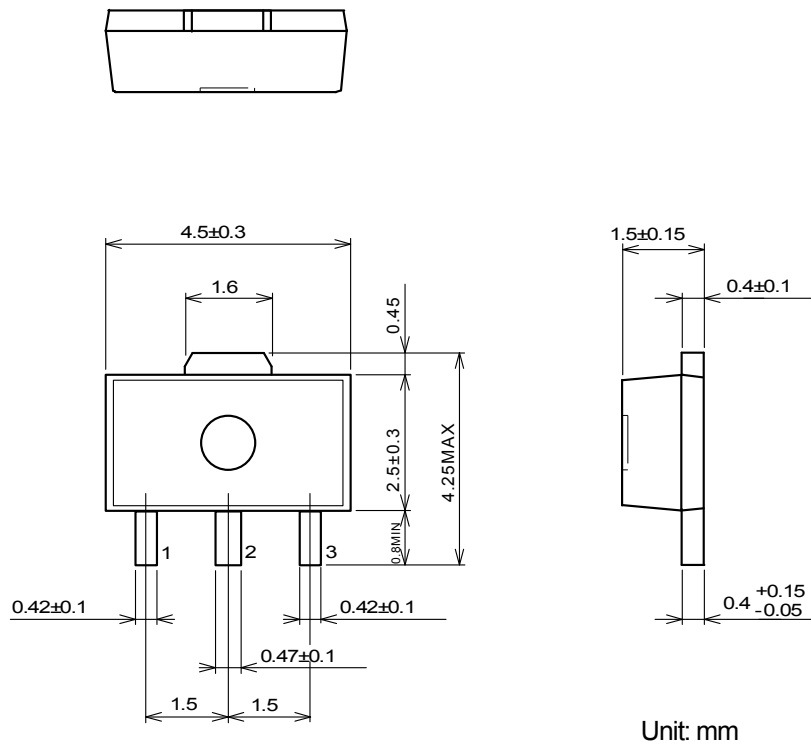
Selecting the output capacitor, should consider varied characteristics of a capacitor: frequency characteristics, temperature characteristics, DC bias characteristics and so on. Therefore, the capacitor that has a sufficient margin of the rated voltage against the output voltage and superior temperature characteristics, is recommended for C_O.

■ PACKAGE OUTLINE
(SOT-89-5-2)



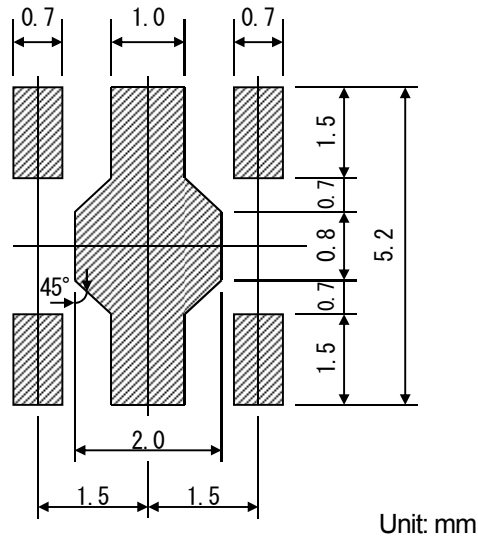
Unit: mm

(SOT-89-3)

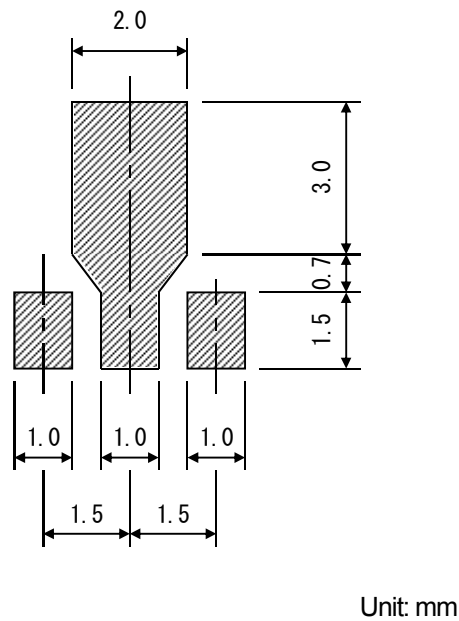


Unit: mm

■SOLDER FOOT PRINT (SOT-89-5-2)



(SOT-89-3)



PACKING SPECIFICATION

General Description

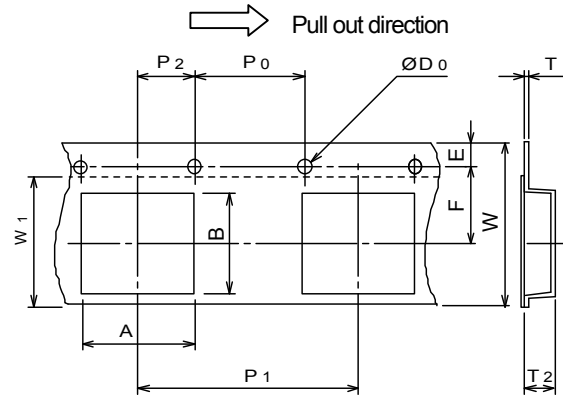
NJRC delivers ICs in 4 methods, plastic tube container, two kinds of Taping, tray and vinyl bag packing.

Except adhesive tape treated anti electrostatic and contain carbon are using as the ESD (Electrostatic Discharge Damage) protection.

SOT-89 Emboss Taping (TE1)

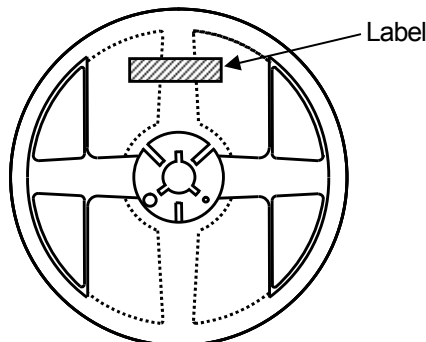
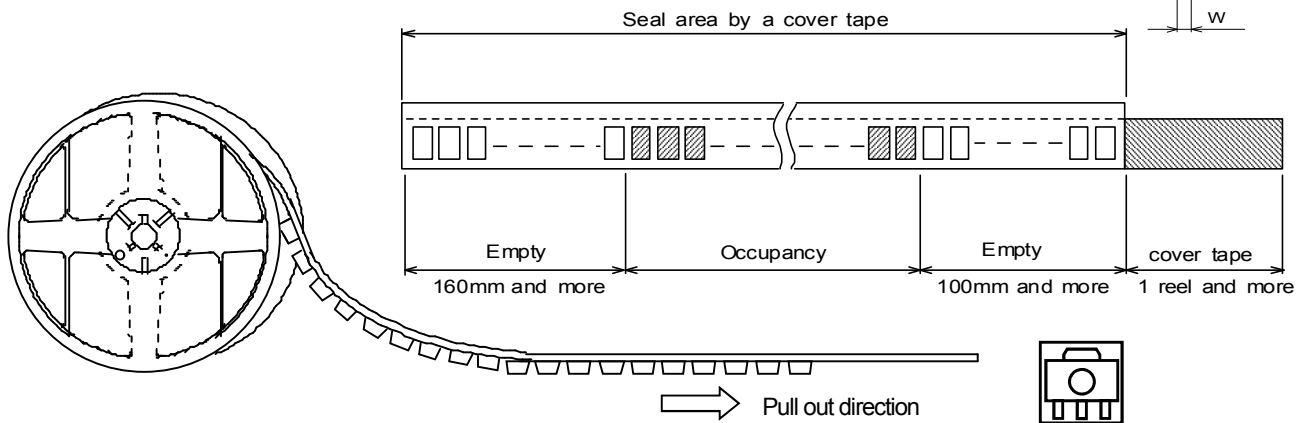
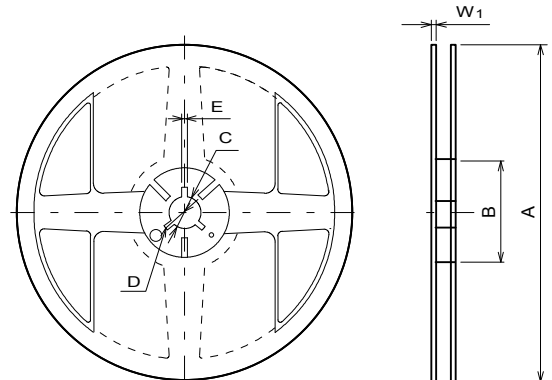
Symbol	SOT-89-3	SOT-89-5-1	SOT-89-5-2	Remark
A	4.9±0.1	4.8±0.1		Bottom size
B	4.5±0.1	4.9±0.1		Bottom size
D ₀	1.5+0.1/-0	1.5+0.1/-0		
E	1.5±0.1	1.6		
F	5.65±0.05	5.65±0.1		
P ₀	4.0±0.1	4.0±0.1		
P ₁	8.0±0.1	8.0±0.1		
P ₂	2.0±0.05	2.0±0.1		
T	0.3±0.05	0.3±0.05		
T ₂	1.8	1.8		
W	12.0±0.3	12.0±0.3		
W ₁	9.5	9.5		Thickness 0.1MAX

Unit : mm

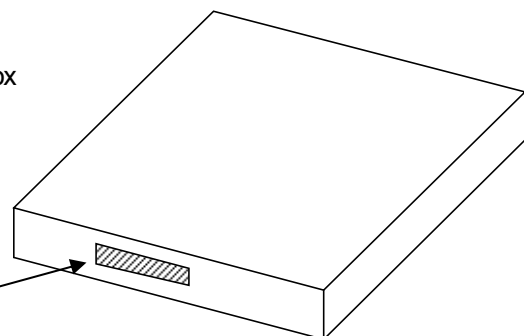
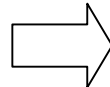


Symbol	SOT-89-3	SOT-89-5-1	SOT-89-5-2
A		Ø180±1	
B		Ø60±1	
C		Ø13±0.2	
D		Ø21±0.8	
E		2±0.5	
W		13±0.5	
W ₁		1.2±0.2	
Contents		1,000pcs	

Unit : mm



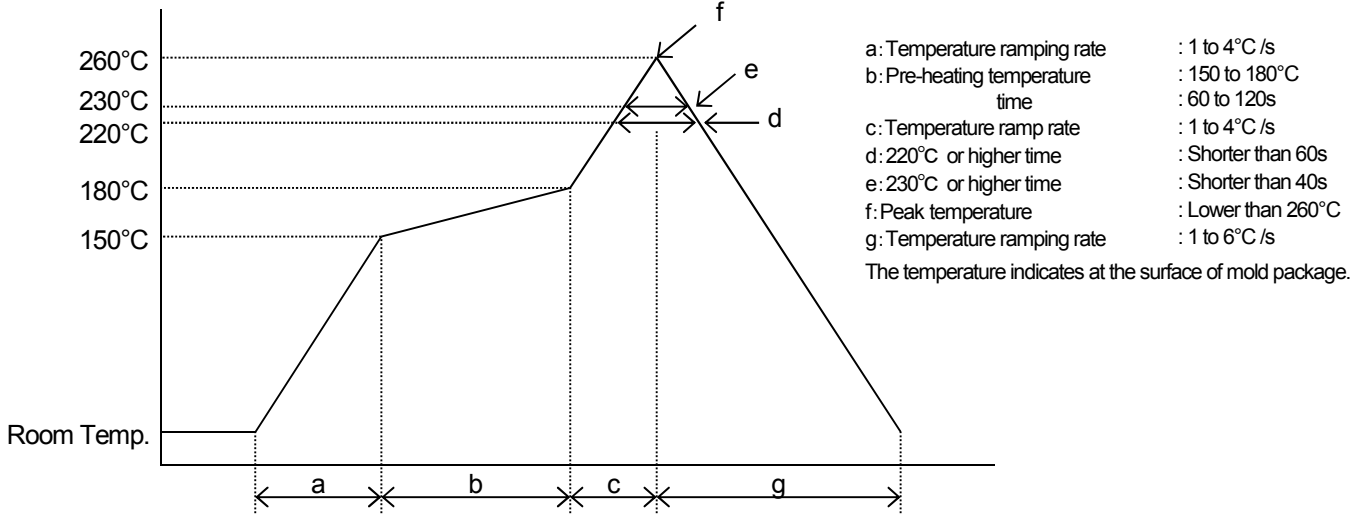
Put in the outer box



RECOMMENDED MOUNTING METHOD

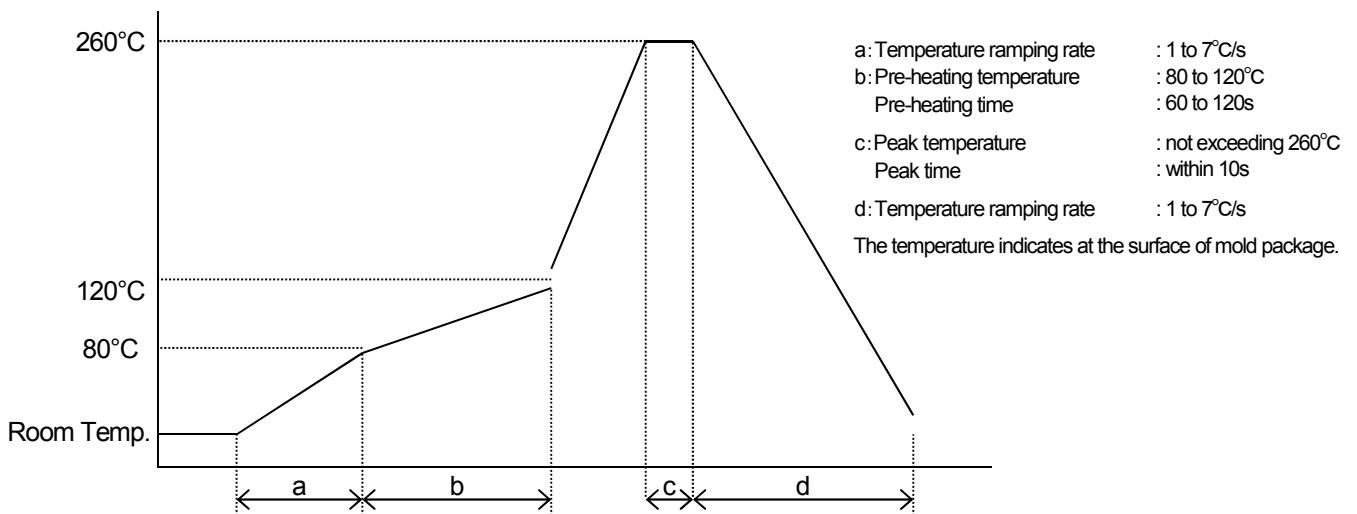
INFRARED REFLOW SOLDERING METHOD

Recommended reflow soldering procedure



INFRARED FLOW SOLDERING METHOD

*flow soldering procedure



■REVISION HISTORY

Date	Revision	Changes
2016.10.20	1.0	New Release

[CAUTION]

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