

LDO with Reverse Current Protection / Discharge Function

■ FEATURES

- AEC-Q100 Grade 1
- Operating Voltage Range 2.3V to 6.5V
- Output Voltage Accuracy $V_O \pm 2.0\%$
- Output Current $I_O(\text{min.}) = 200\text{mA}$
- Reverse Current Protection
- Discharge Function
- ON/OFF Control
- Correspond to Low ESR capacitor (MLCC)
- Thermal Shutdown Circuit
- Over Current Protection Circuit
- Package SOT-23-5

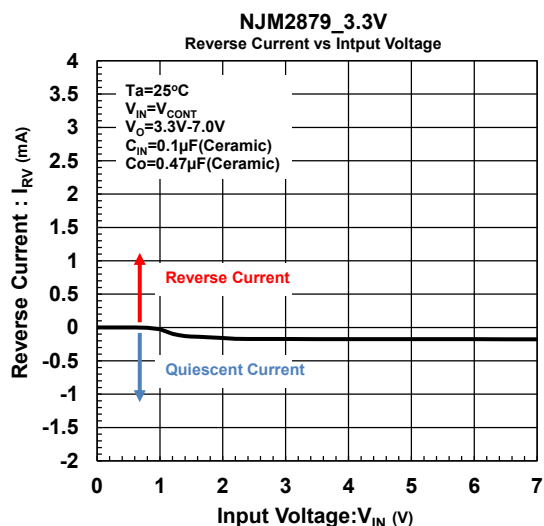
■ APPLICATION

- Automotive infotainment
- Automotive ECU unit
- Industrial equipment

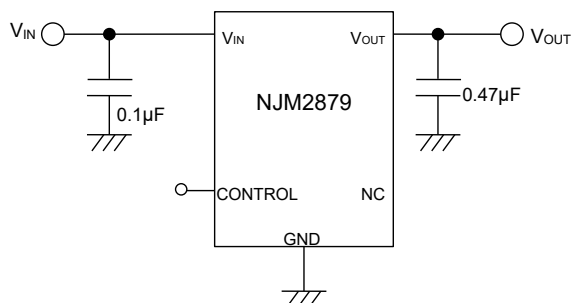
■ GENERAL DESCRIPTION

The NJM2879 is a low dropout regulator which achieves high ripple rejection, low noise and high speed response with the bipolar technology. Small packaging and 0.47 μF decoupling capacitor make the NJM2879 suitable for space conscious applications. Moreover, the NJM2879 is not required noise reduction capacitor. In addition, the reverse current protection makes external SBD unnecessary.

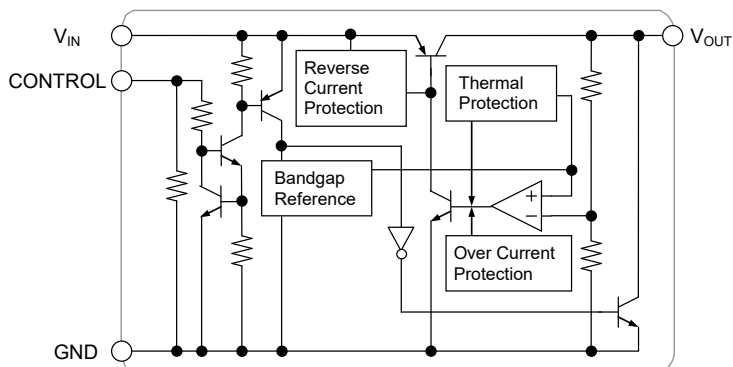
■ REVERSE CURRENT PROTECTION CHARACTERISTICS



■ TYPICAL APPLICATION



■ BLOCK DIAGRAM



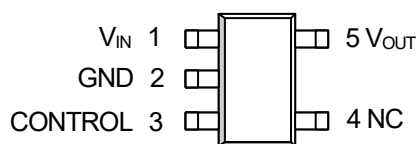
■ OUTPUT VOLTAGE RANK

SOT-23-5

STATUS	PART NUMBER	OUTPUT VOLTAGE	STATUS	PART NUMBER	OUTPUT VOLTAGE
PLAN	NJM2879F15-H	1.5V	M.P.	NJM2879F33-H	3.3V
M.P.	NJM2879F18-H	1.8V	PLAN	NJM2879F05-H	5.0V
PLAN	NJM2879F25-H	2.5V			

■ PIN CONFIGURATION

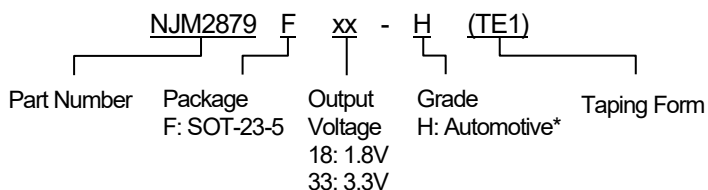
SOT-23-5



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

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.

■ PRODUCT NAME INFORMATION



■ ORDERING INFORMATION

PART NUMBER	OUTPUT VOLTAGE	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	QUANTITY PER REEL (pcs)
NJM2879F18-H (TE1)	1.8V	SOT-23-5	Yes	Yes	Sn2Bi	AU2	15	3000
NJM2879F33-H (TE1)	3.3V	SOT-23-5	Yes	Yes	Sn2Bi	AU1	15	3000

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS		UNIT
Input Voltage	V_{IN}	-0.3 to 7		V
Control Pin Voltage	V_{CONT}	-0.3 to 7		V
Output Voltage	V_{OUT}	$V_O \leq 1.8V$	-0.3 to 5.5	V
		$V_O > 1.8V$	-0.3 to 7	V
Power Dissipation($T_a=25^\circ C$) SOT-23-5	P_D	2-Layer / 4-Layer 480 ⁽¹⁾ / 650 ⁽²⁾		mW
Junction Temperature	T_J	-40 to 150		$^\circ C$
Operating Temperature	T_{opr}	-40 to 125		$^\circ C$
Storage Temperature	T_{stg}	-50 to 150		$^\circ C$

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

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

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Operating Voltage Range	V_{IN}	2.3 to 6.5	V
Control Voltage	V_{CONT}	0 to 6.5	V

■ ELECTRICAL CHARACTERISTICS

(Unless other noted, $V_{IN} = V_O + 1V$, $C_{IN} = 0.1\mu F$, $C_O = 0.47\mu F$ ($C_O = 1.0\mu F$: $1.8V < V_O \leq 2.6V$, $C_O = 2.2\mu F$: $V_O \leq 1.8V$), $T_a = 25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Output Voltage	V_O	$I_O = 30mA$	-1.0%	-	+1.0%	V
		$I_O = 30mA$, $T_a = -40^\circ C$ to $125^\circ C$	-2.0%	-	+2.0%	
Quiescent Current	I_Q	$I_O = 0mA$, except I_{CONT}	-	150	200	μA
		$I_O = 0mA$, except I_{CONT} , $T_a = -40^\circ C$ to $125^\circ C$	-	-	250	
Quiescent Current at OFF-state	$I_{Q(OFF)}$	$V_{CONT} = 0V$	-	-	10	μA
		$V_{CONT} = 0V$, $T_a = -40^\circ C$ to $125^\circ C$	-	-	20	
Output Current	I_O	$V_O \times 0.9V$	200	-	-	mA
		$V_O \times 0.9V$, $T_a = -40^\circ C$ to $125^\circ C$	200	-	-	
Line Regulation	$\Delta V_O / \Delta V_{IN}$	$V_{IN} = V_O + 1V$ to $6.5V$, $I_O = 30mA$	$V_O = 1.8V$	-	-	mV
			$V_O = 3.3V$	-	-	
		$V_{IN} = V_O + 1V$ to $6.5V$, $I_O = 30mA$, $T_a = -40^\circ C$ to $125^\circ C$	$V_O = 1.8V$	-	-	
			$V_O = 3.3V$	-	-	
Load Regulation	$\Delta V_O / \Delta I_O$	$I_O = 0mA$ to $200mA$	$V_O = 1.8V$	-	-	mV
			$V_O = 3.3V$	-	-	
		$I_O = 0mA$ to $200mA$, $T_a = -40^\circ C$ to $125^\circ C$	$V_O = 1.8V$	-	-	
			$V_O = 3.3V$	-	-	
Dropout Voltage ⁽³⁾	ΔV_{IO}	$I_O = 100mA$	-	0.12	0.20	V
		$I_O = 100mA$, $T_a = -40^\circ C$ to $125^\circ C$	-	-	0.37	
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/ $^\circ C$
Ripple Rejection	RR	$e_{in} = 200mV_{rms}$, $f = 1kHz$, $I_O = 10mA$	$V_O = 1.8V$	-	70	dB
			$V_O = 3.3V$	-	66	
Output Noise Voltage	V_{NO}	$f = 10Hz$ to $80kHz$, $I_O = 10mA$	$V_O = 1.8V$	-	34	μV_{rms}
		$f = 10Hz$ to $80kHz$, $I_O = 10mA$	$V_O = 3.3V$	-	48	
Control Current	I_{CONT}	$V_{CONT} = 1.6V$	-	3	12	μA
		$V_{CONT} = 1.8V$, $T_a = -40^\circ C$ to $125^\circ C$	-	-	20	
Control Voltage at ON-state	$V_{CONT(ON)}$		1.6	-	-	V
		$T_a = -40^\circ C$ to $125^\circ C$	1.8	-	-	
Control Voltage at OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V
		$T_a = -40^\circ C$ to $125^\circ C$	-	-	0.5	
Discharge Current at OFF-state	I_{DIS}	$V_{IN} = 2.3V$, $V_{CONT} = 0V$, $V_O = 0.5V$	2	9	-	mA
		$V_{IN} = 6.5V$, $V_{CONT} = 0V$, $V_O = 0.5V$	15	25	-	

(3) Except Output Voltage Rank less than 2.1V

The above specifications are common specifications for all output voltages. Therefore, it may be different from the individual specification for a specific output voltage.

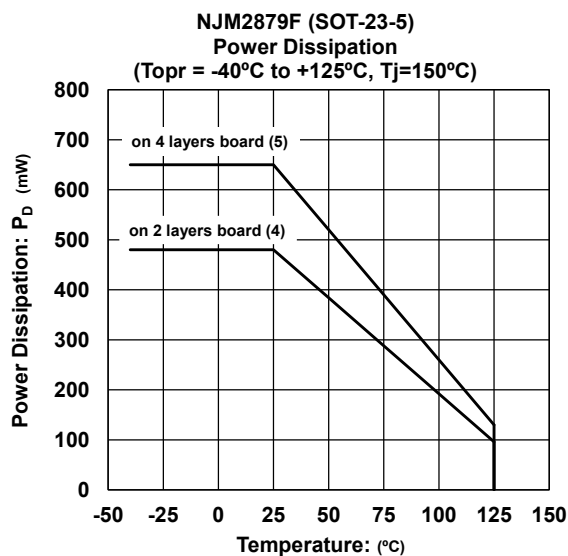
■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE	UNIT
Junction-to-Ambient Thermal Resistance SOT-23-5	θ_{ja}	2-Layer / 4-Layer 260 ⁽⁴⁾ / 192 ⁽⁵⁾	°C/W
Junction-to-Top of Package Characterization Parameter SOT-23-5	ψ_{jt}	2-Layer / 4-Layer 70 ⁽⁴⁾ / 60 ⁽⁵⁾	°C/W

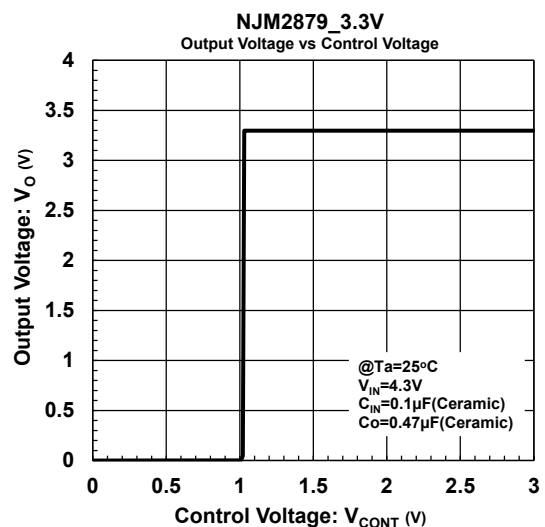
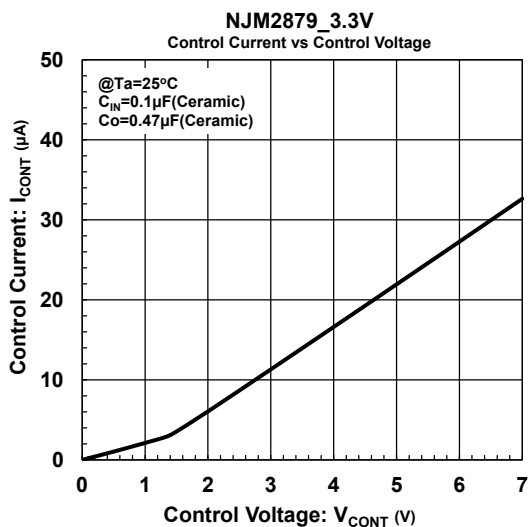
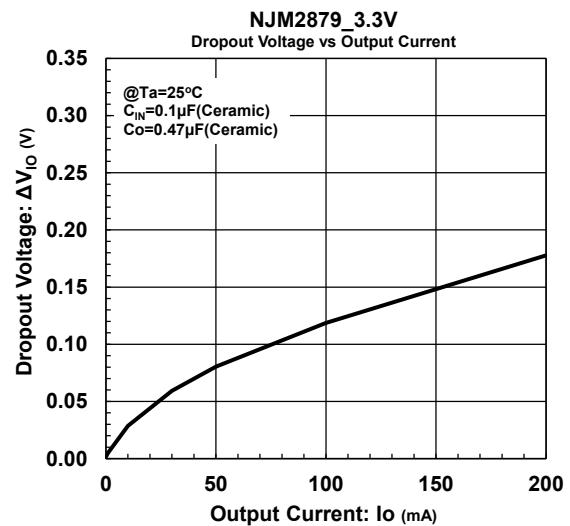
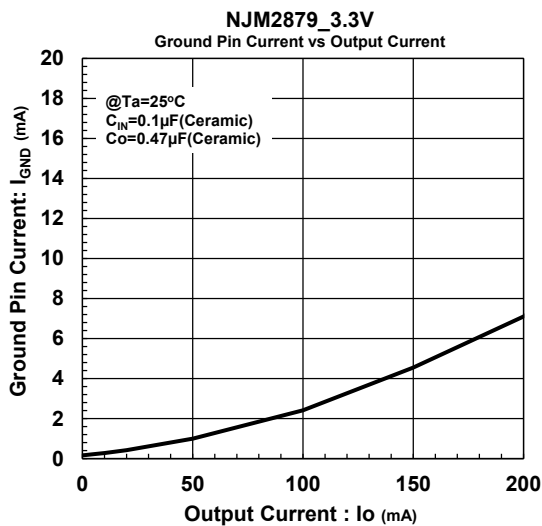
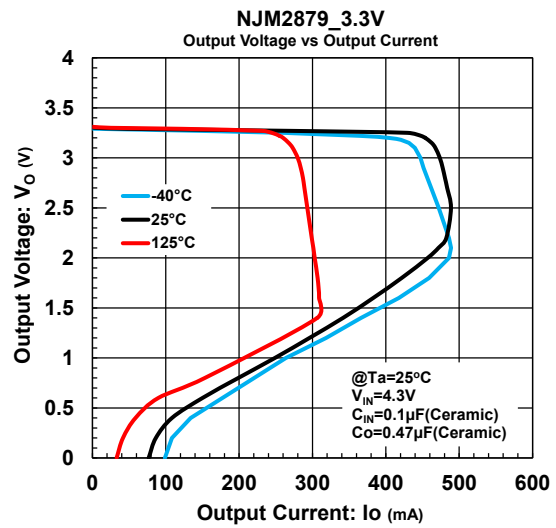
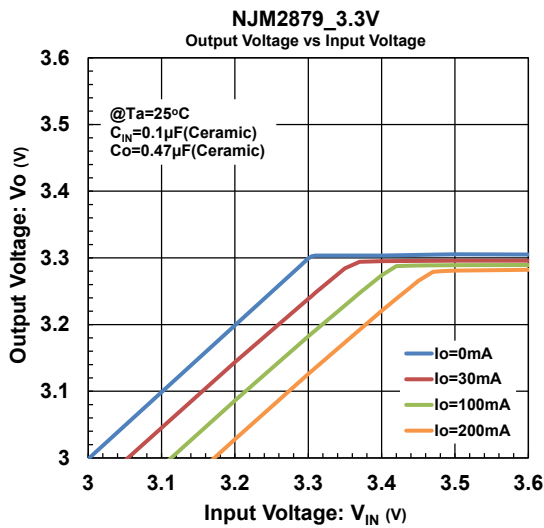
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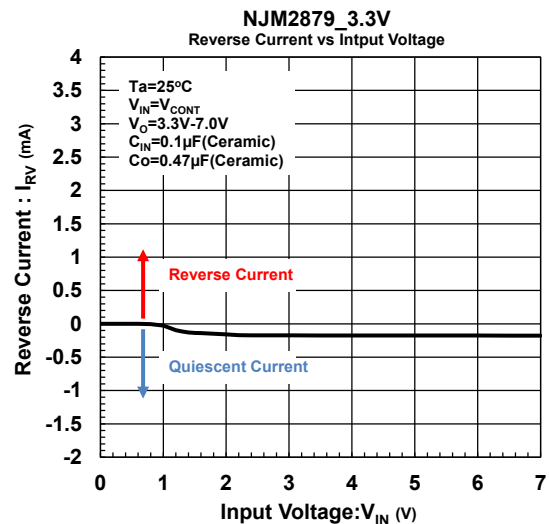
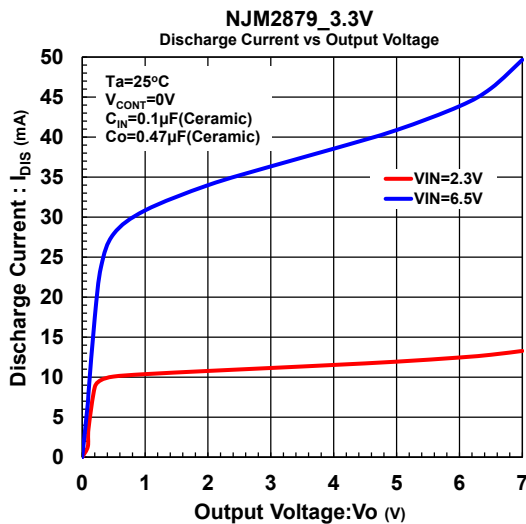
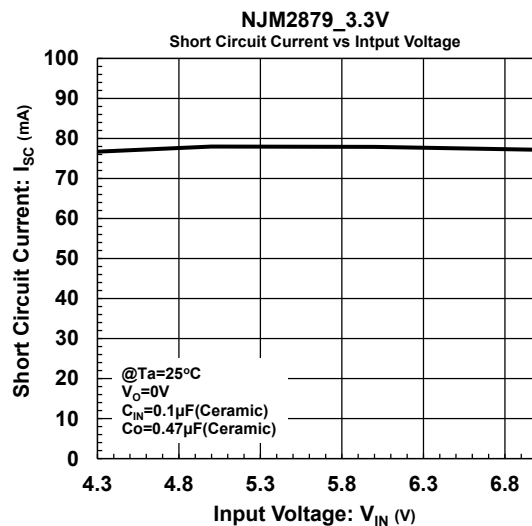
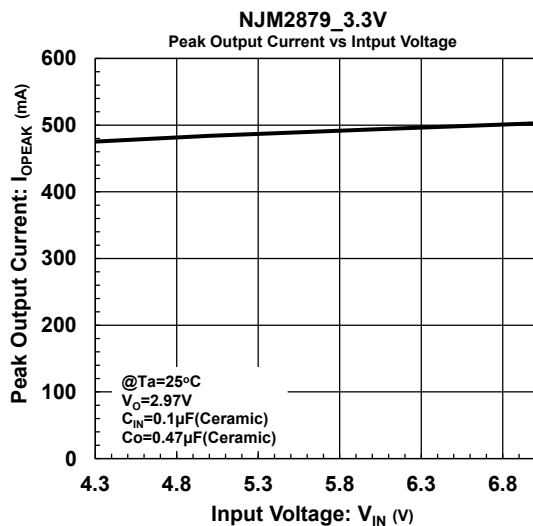
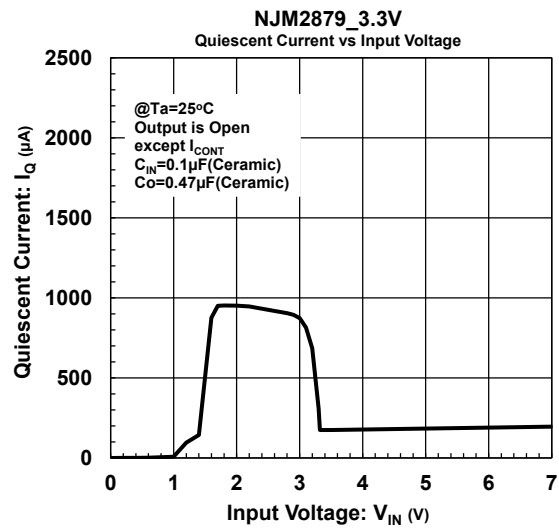
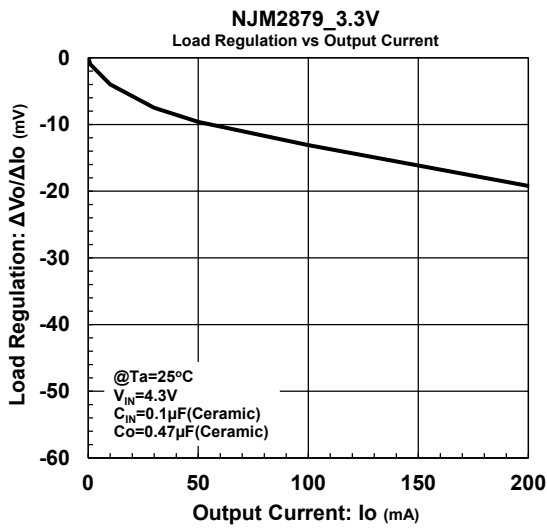
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



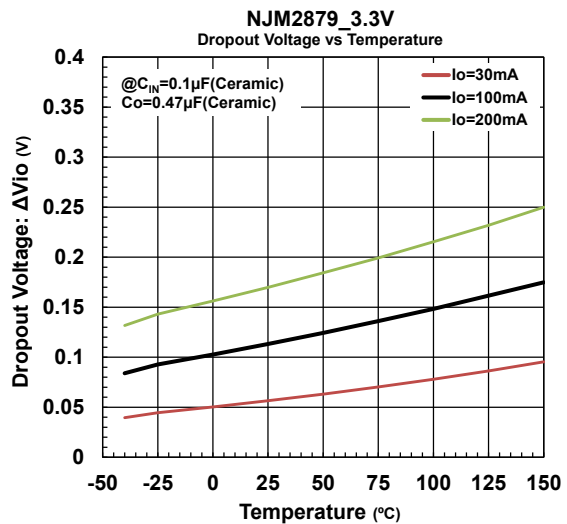
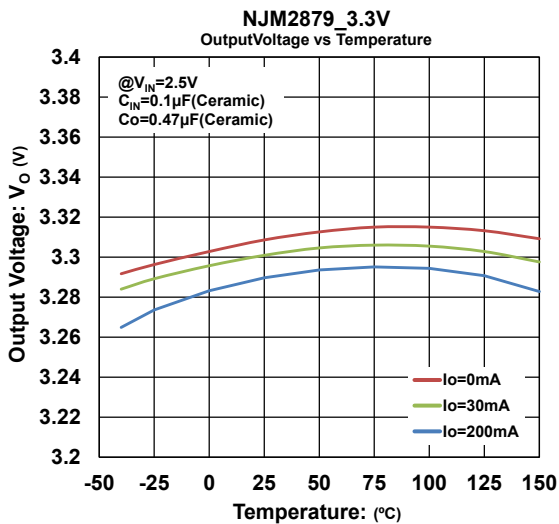
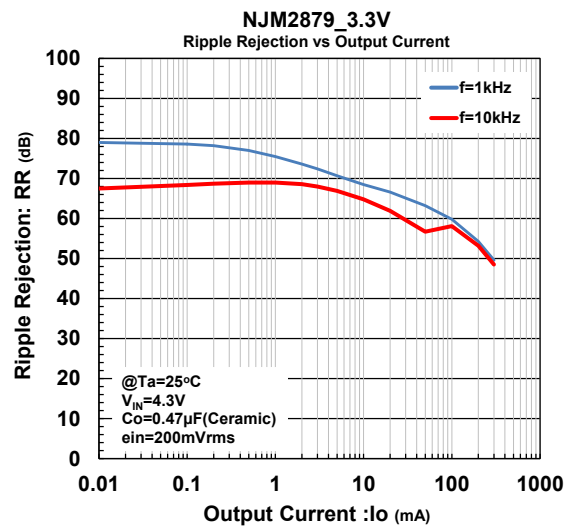
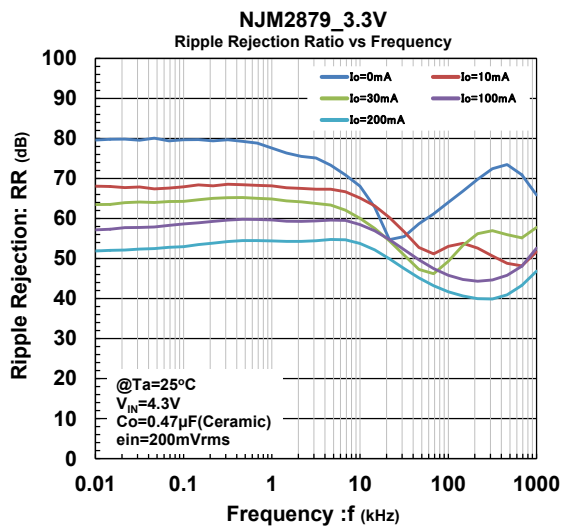
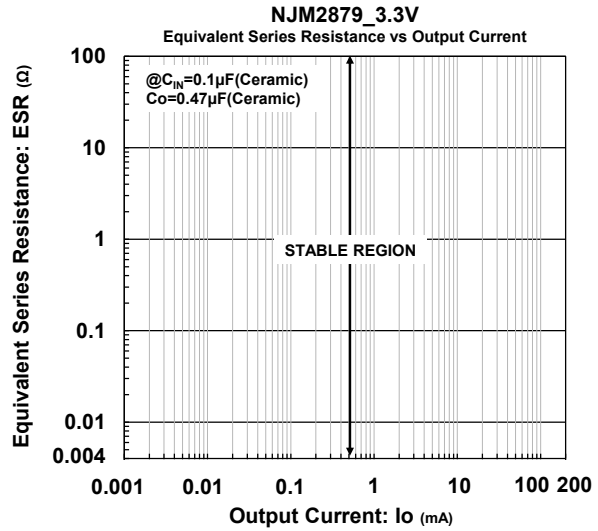
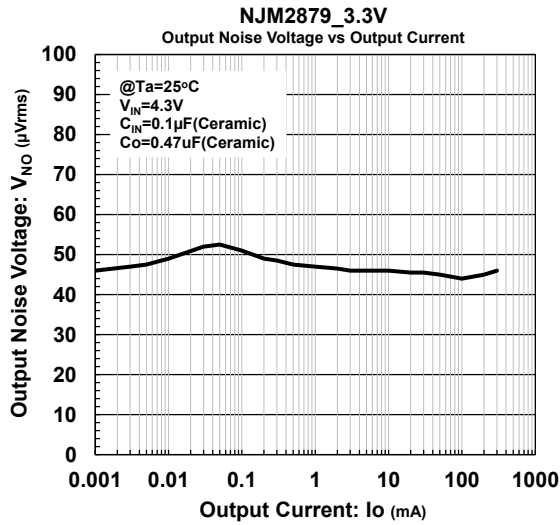
■ TYPICAL CHARACTERISTICS



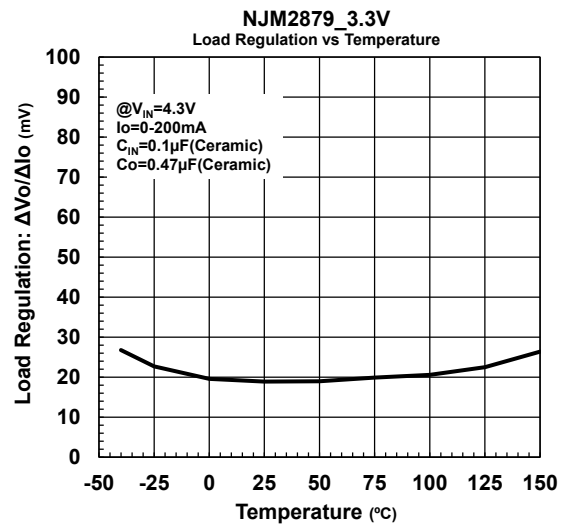
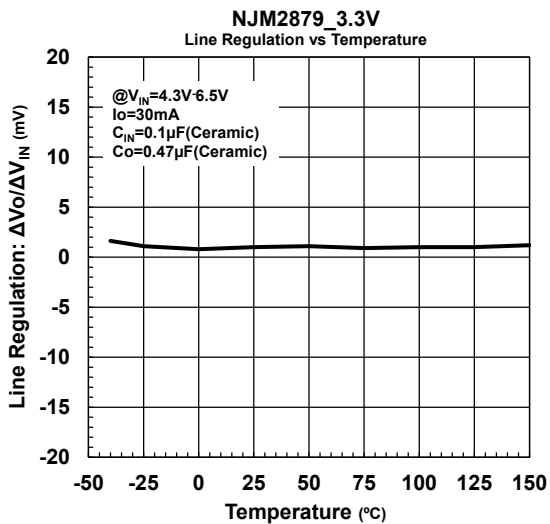
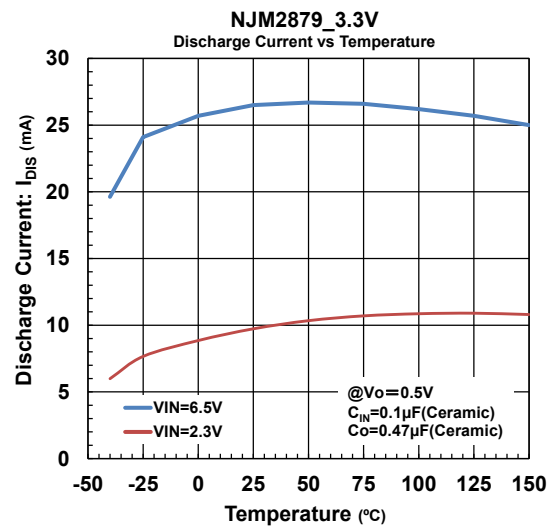
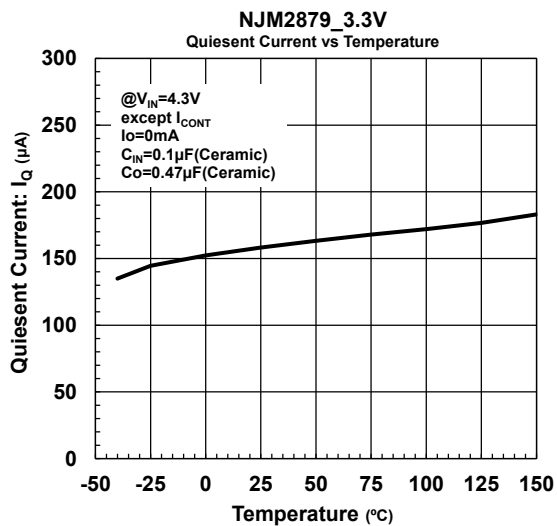
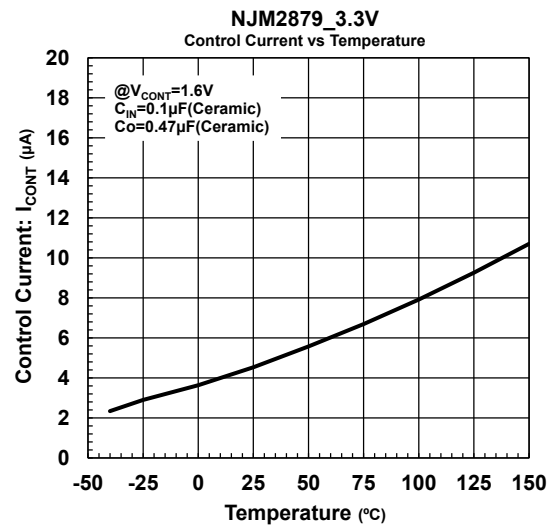
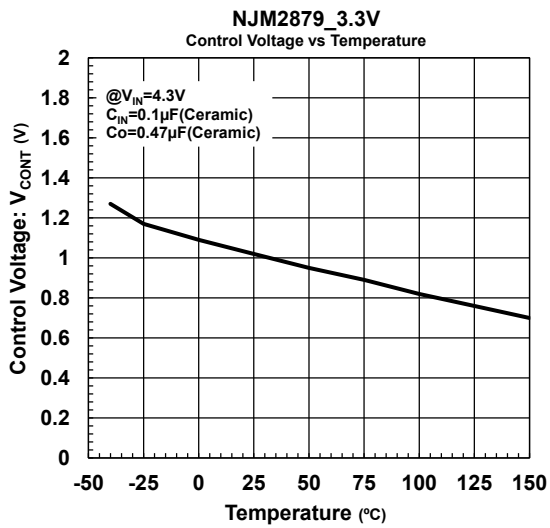
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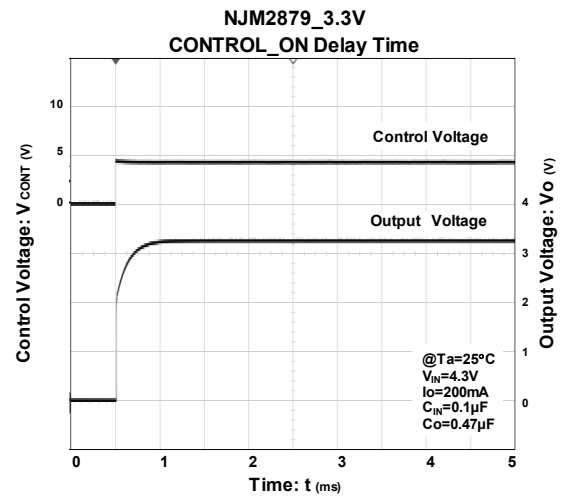
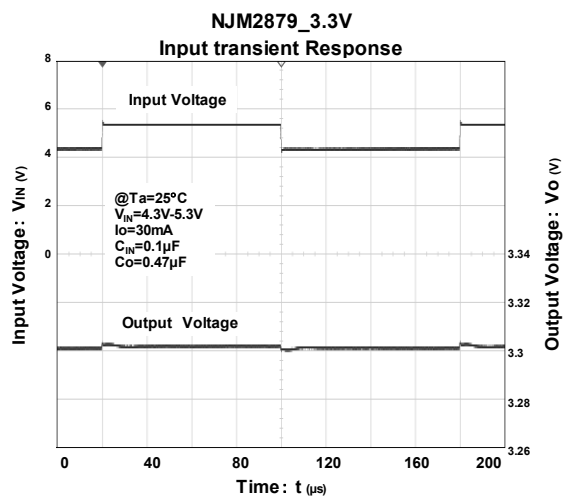
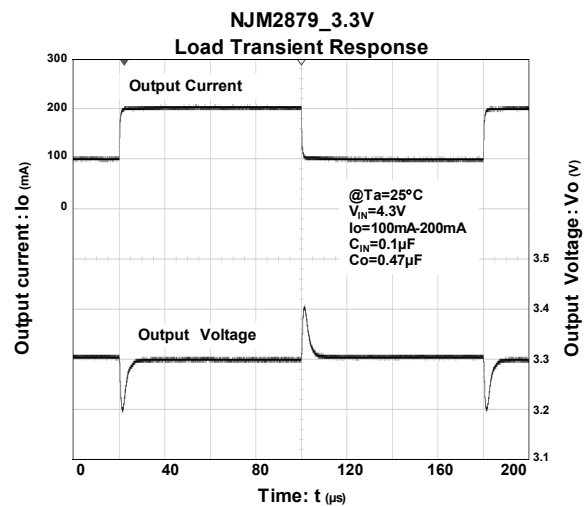
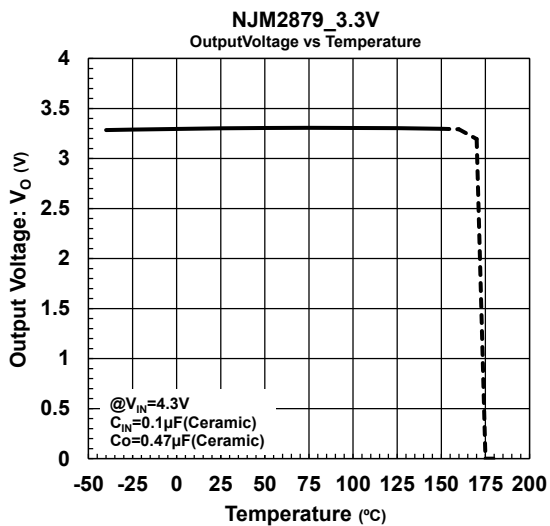
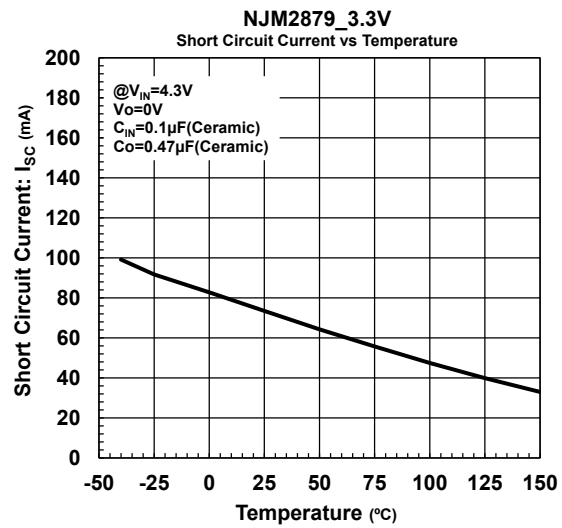
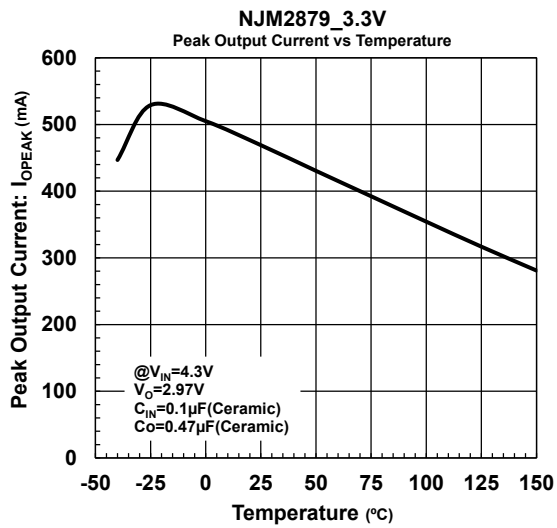
■ TYPICAL CHARACTERISTICS



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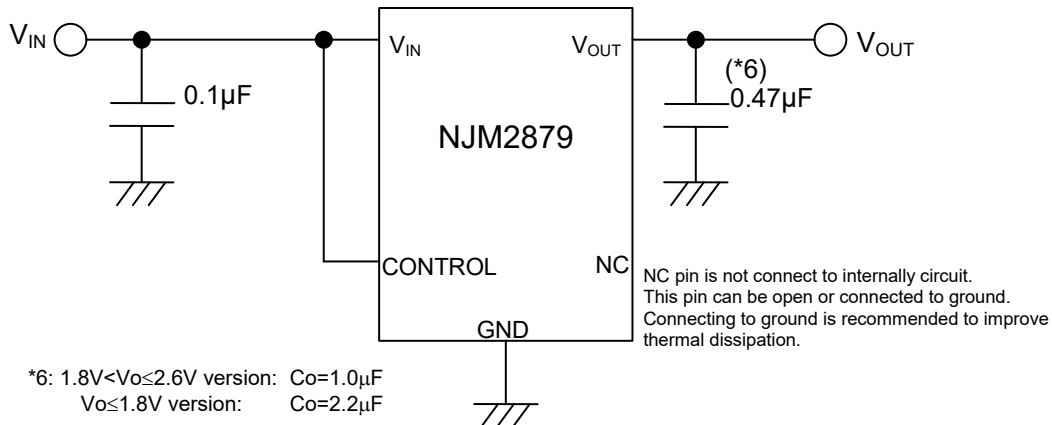


■ TYPICAL CHARACTERISTICS



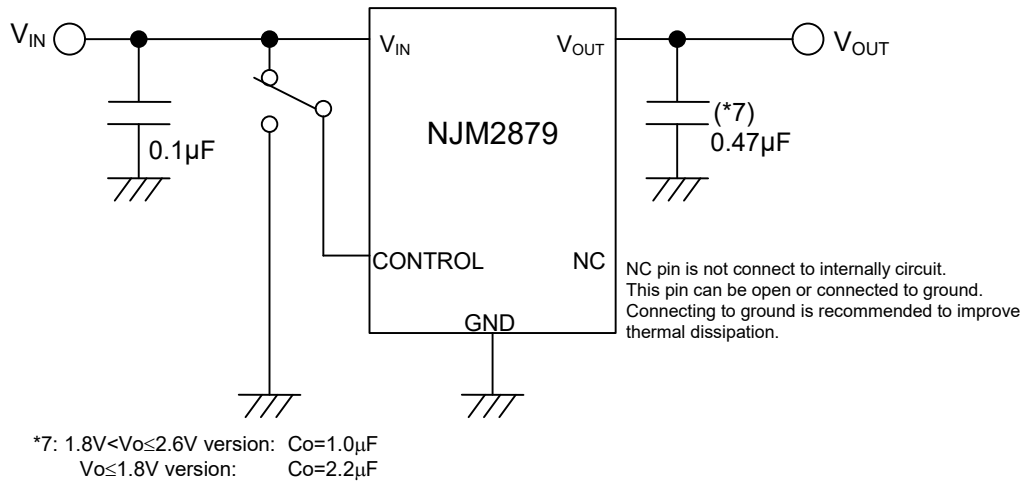
■ TYPICAL APPLICATION

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

■ APPLICATION NOTE / GLOSSARY**Reverse Current Protection**

The NJM2879 has built-in Reverse Current Protection circuit.

This circuit prevents the large reverse current when output voltage is higher than input voltage.

Therefore external schottky-barrier diode (SBD) is not required

Discharge Function

The NJM2879 has a built-in discharge circuit to discharge the charged output capacitors.

Discharge circuit operates when the CONTROL Pin is set in LOW level. The circuit discharges the charged output capacitors rapidly.

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

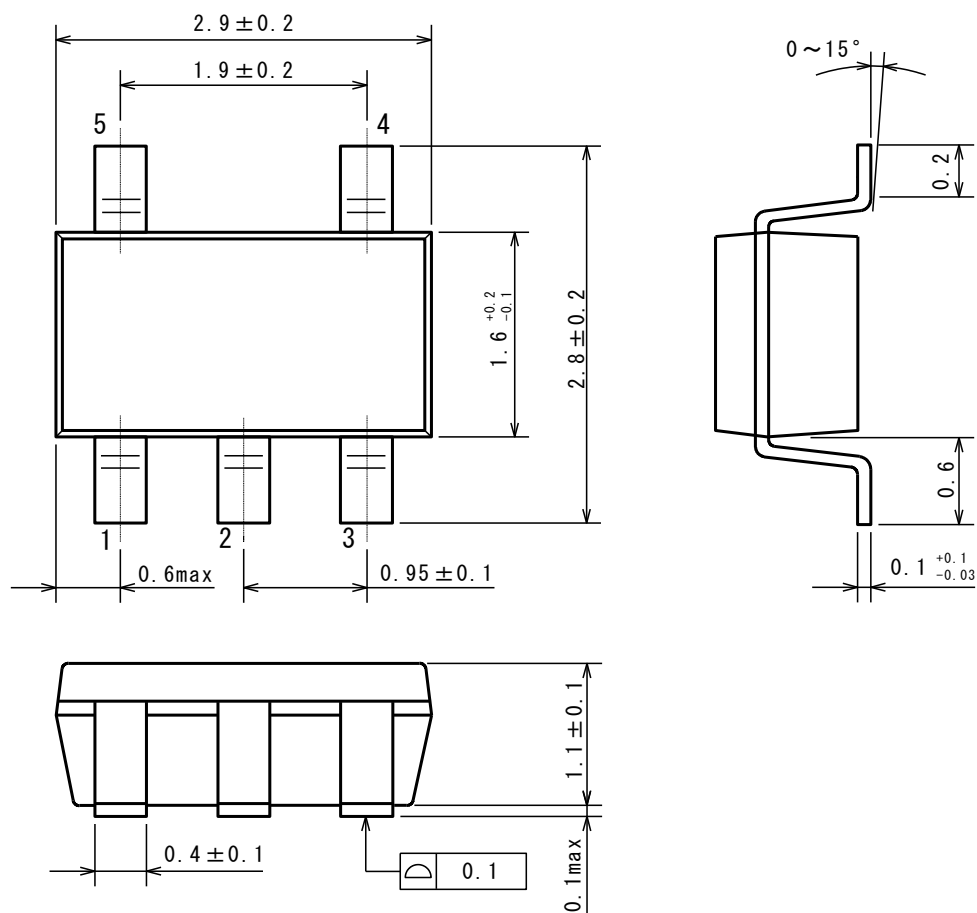
The output capacitor C_O is required for a phase compensation of the internal error amplifier, and the capacitance and the equivalent series resistance (ESR) influence stable operation of the regulator.

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.

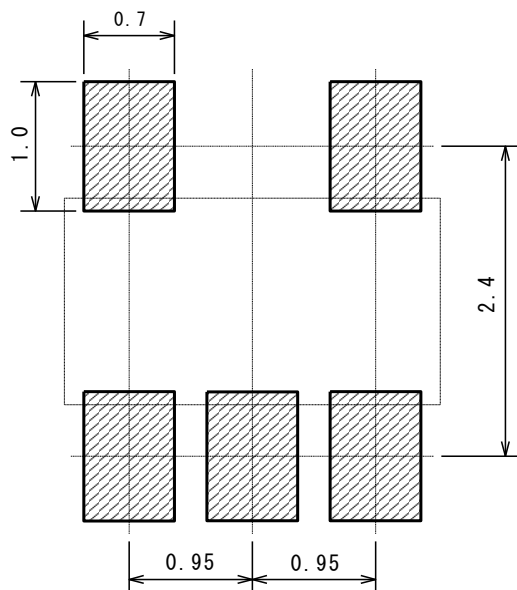
Furthermore, a larger output capacitor reduces output noise and ripple output, and also improves Output Transient Response when a load changes rapidly.

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 DIMENSIONS

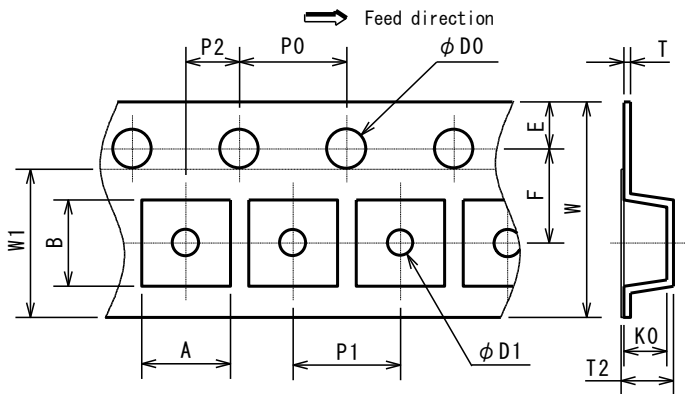


■ EXAMPLE OF SOLDER PADS DIMENSIONS



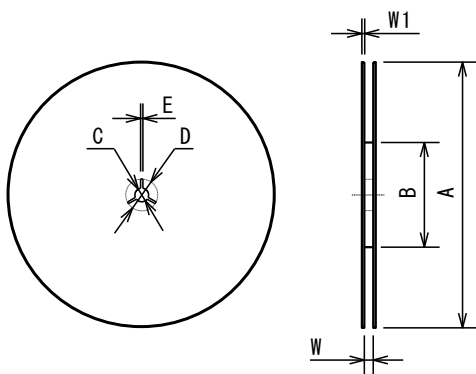
PACKING SPEC
TAPING DIMENSIONS

Unit: mm



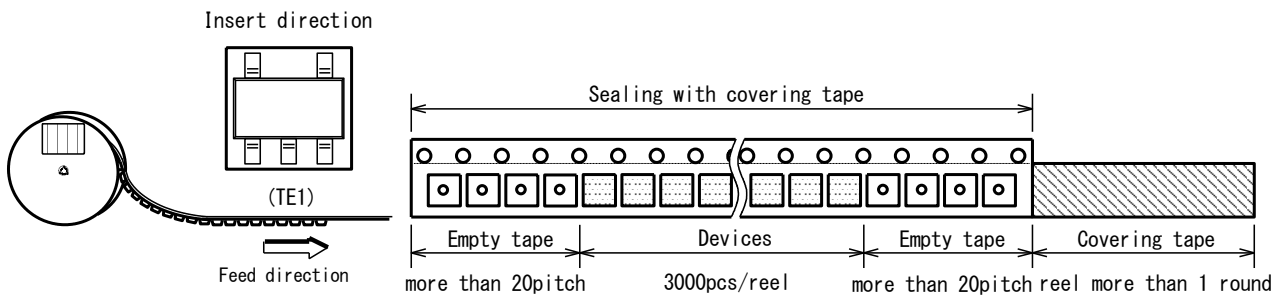
SYMBOL	DIMENSION	REMARKS
A	3.3±0.1	BOTTOM DIMENSION
B	3.2±0.1	BOTTOM DIMENSION
D0	1.55	
D1	1.05	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	1.82	
K0	1.5±0.1	
W	8.0±0.3	
W1	5.5	THICKNESS 0.1MAX

REEL DIMENSIONS

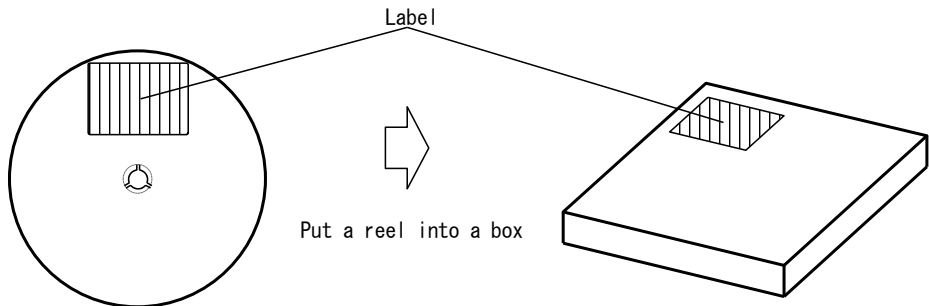


SYMBOL	DIMENSION
A	φ180±1
B	φ60±1
C	φ13±0.2
D	φ21±0.8
E	2±0.5
W	9±0.5
W1	1.2±0.2

TAPING STATE



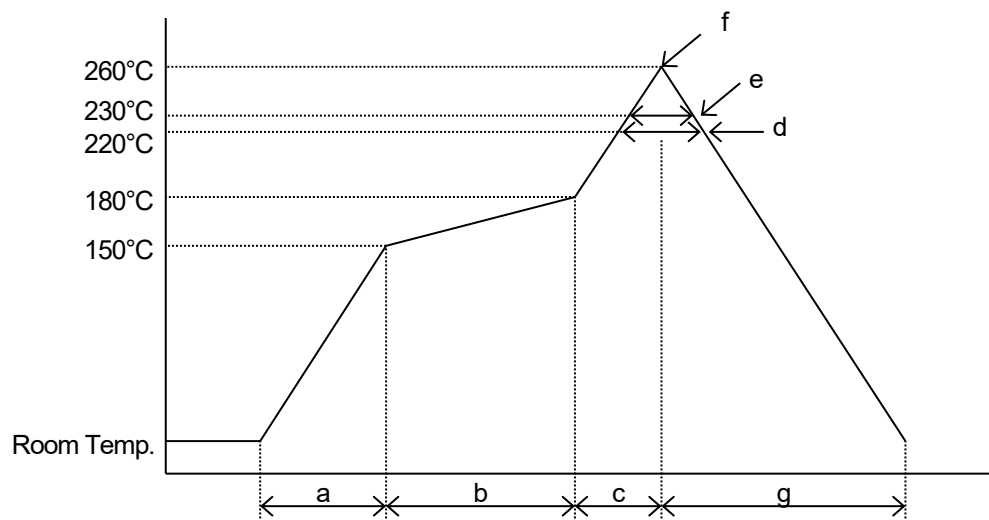
PACKING STATE



■ RECOMMENDED MOUNTING METHOD

INFRARED REFLOW SOLDERING 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.

■ REVISION HYSTORY

DATE	REVISION	CHANGES
8.Aug.2017	Ver.1.0	New Release Automotive "H" spec.
19.Sep.2017	Ver.1.1	Add the Typical Characteristics graphs. Revise the "Load Regulation" spec.
20.Dec.2017	Ver.1.2	Added conformity with AEC-Q100 to FEATURES section
2.Sep.2021	Ver.1.3	Deleted duplicate information of PIN CONFIGURATION Added STATUS in OUTPUT VOLTAGE RANK
31.May.2024	Ver.1.4	Updated for 1.8V output version release. Updated Packing Spec

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 - Power Generator Control Equipment (nuclear, steam, hydraulic, etc.)
 - Life Maintenance Medical Equipment
 - Fire Alarms / Intruder Detectors
 - Vehicle Control Equipment (airplane, railroad, ship, etc.)
 - Various Safety Devices
 - Traffic control system
 - Combustion equipment

In case your company desires to use this product for any applications other than general electronic equipment mentioned above, make sure to contact our company in advance. Note that the important requirements mentioned in this section are not applicable to cases where operation requirements such as application conditions are confirmed by our company in writing after consultation with your company.

6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. The products have been designed and tested to function within controlled environmental conditions. Do not use products under conditions that deviate from methods or applications specified in this datasheet. Failure to employ the products in the proper applications can lead to deterioration, destruction or failure of the products. We shall not be responsible for any bodily injury, fires or accident, property damage or any consequential damages resulting from misuse or misapplication of the products.
8. Quality Warranty
 - 8-1. Quality Warranty Period

In the case of a product purchased through an authorized distributor or directly from us, the warranty period for this product shall be one (1) year after delivery to your company. For defective products that occurred during this period, we will take the quality warranty measures described in section 8-2. However, if there is an agreement on the warranty period in the basic transaction agreement, quality assurance agreement, delivery specifications, etc., it shall be followed.
 - 8-2. Quality Warranty Remedies

When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.

Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
 - 8-3. Remedies after Quality Warranty Period

With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
9. Anti-radiation design is not implemented in the products described in this document.
10. The X-ray exposure can influence functions and characteristics of the products. Confirm the product functions and characteristics in the evaluation stage.
11. WLCSP products should be used in light shielded environments. The light exposure can influence functions and characteristics of the products under operation or storage.
12. Warning for handling Gallium and Arsenic (GaAs) products (Applying to GaAs MMIC, Photo Reflector). These products use Gallium (Ga) and Arsenic (As) which are specified as poisonous chemicals by law. For the prevention of a hazard, do not burn, destroy, or process chemically to make them as gas or power. When the product is disposed of, please follow the related regulation and do not mix this with general industrial waste or household waste.
13. Please contact our sales representatives should you have any questions or comments concerning the products or the technical information.



Nisshinbo Micro Devices Inc.

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