

## High Voltage Low current consumption Regulator

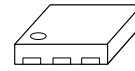
### ■ GENERAL DESCRIPTION

The NJW4180 is a high voltage and low current consumption linear regulator.

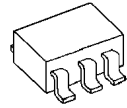
Low current consumption make the NJW4180 possible to supply 2.5 to 5.0 V regulated voltage from high voltage input.

Therefore, it is suitable for a power supply for micro controllers, battery related applications, LED and other applications where low power consumption is essential.

### ■ PACKAGE OUTLINE



NJW4180KG1

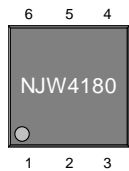


NJW4180F

### ■ FEATURES

- Operating Voltage Range 35V (max.)
- Low Current Consumption 9 $\mu$ A (typ.)
- MLCC correspond
- Output Current  $I_O(\text{min.})=20\text{mA}$
- High Precision Output  $V_O \pm 1.5\%$
- Internal Thermal Overload Protection
- Internal Over Current Protection
- Internal Reverse Current Protection
- Package Outline ESON6-G1, SOT23-5

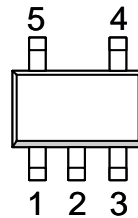
### ■ PIN CONNECTION



NJW4180KG1

#### PIN CONFIGURATION

1. N.C.
2. GND
3. N.C.
4.  $V_{IN}$
5. N.C.
6.  $V_{OUT}$

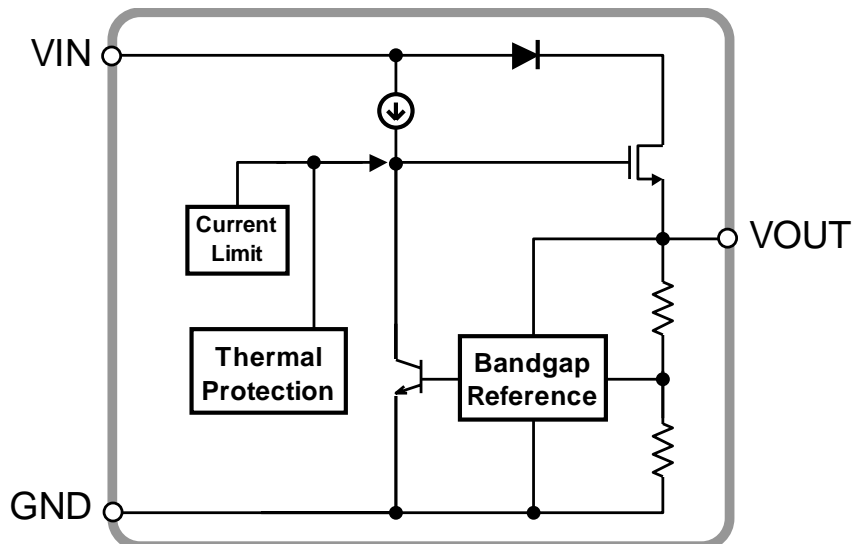


NJW4180F

#### PIN CONFIGURATION

1. N.C.
2. GND
3. N.C.
4.  $V_{OUT}$
5.  $V_{IN}$

### ■ BLOCK DIAGRAM



# NJW4180

## ■ OUTPUT VOLTAGE LANK LIST

Device Name	V <sub>OUT</sub>	Device Name	V <sub>OUT</sub>
NJW4180F25	2.5V	NJW4180KG1-25	2.5V
NJW4180F33	3.3V	NJW4180KG1-33	3.3V
NJW4180F05	5.0V	NJW4180KG1-05	5.0V

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT	
Input Voltage	V <sub>IN</sub>	+40	V	
Output Voltage	V <sub>OUT</sub>	+7	V	
Power Dissipation	P <sub>D</sub>	ESON6-G1	330 (*1)	mW
			905 (*2)	
		SOT-23-5	390 (*3)	
			520 (*4)	
Operating Temperature	Topr	-40 to +85	°C	
Storage Temperature	Tstg	-50 to +125	°C	

(\*1): Mounted on glass epoxy board based on EIA/JEDEC STANDARD.

(101.5×114.5×1.6mm: 2Layers with Exposed Pad FR-4)

(\*2): Mounted on glass epoxy board based on EIA/JEDEC STANDARD.

(101.5×114.5×1.6mm: 4Layers with Exposed Pad FR-4, Internal foil area size: 99.5×99.5mm, Applying a thermal via hole to a board based on JEDEC standard JESD51-5)

(\*3): Mounted on glass epoxy board based on EIA/JEDEC. (114.3×76.2×1.6mm: 2Layers FR-4)

(\*4): Mounted on glass epoxy board based on EIA/JEDEC. (114.3×76.2×1.6mm: 4Layers FR-4)

## ■ PROTECTION CIRCUIT

Over Current Protection

Thermal Shutdown

Reverse Current Protection

## ■ INPUT VOLTAGE RANG

V<sub>O</sub>≤3V: V<sub>IN</sub> = +5.5V to +35V

V<sub>O</sub>>3V: V<sub>IN</sub> = V<sub>O</sub>+2.5V to +35V

## ■ ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $V_{IN}=V_O+2.5V$  ( $V_O \leq 3V$ :  $V_{IN}=5.5V$ ),  $C_{IN}=0.1 \mu F$ ,  $C_O=1 \mu F$ ,  $T_a=25^\circ C$ )

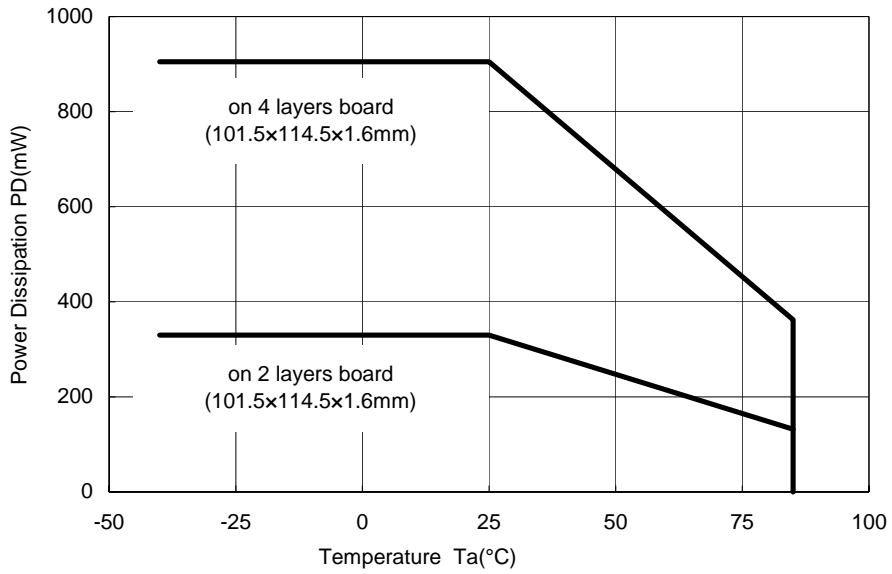
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=10mA$	-1.5%	-	+1.5%	V
Quiescent Current	$I_Q$	$I_O=0mA$	-	9	15	$\mu A$
Output Current	$I_O$	$V_O \times 0.9$	20	30	-	mA
Line Regulation	$\Delta V_O / \Delta V_{IN}$	$V_{IN} = 5.5V$ to $35V$ , $I_O=10mA$ ( $V_O \leq 3V$ ) $V_{IN} = V_O+2.5V$ to $35V$ , $I_O=10mA$ ( $V_O > 3V$ )	-	0.02	0.05	%/V
Load Regulation	$\Delta V_O / \Delta I_O$	$I_O=0mA$ to $20mA$	-	0.005	0.02	%/mA
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T_a$	$T_a=0$ to $85^\circ C$ , $I_O=10mA$	-	$\pm 100$	-	ppm/ $^\circ C$
Sink Current under Reverse Current Protection operating	$I_{REVERSE}$	$V_{IN} = 0V$ , $V_O = 5V$	-	50	75	$\mu A$
Input Voltage	$V_{IN}$	$V_O \leq 3V$	5.5	-	35	V
		$V_O > 3V$	$V_O+2.5$	-	35	

The above specification is a common specification for all output voltages.

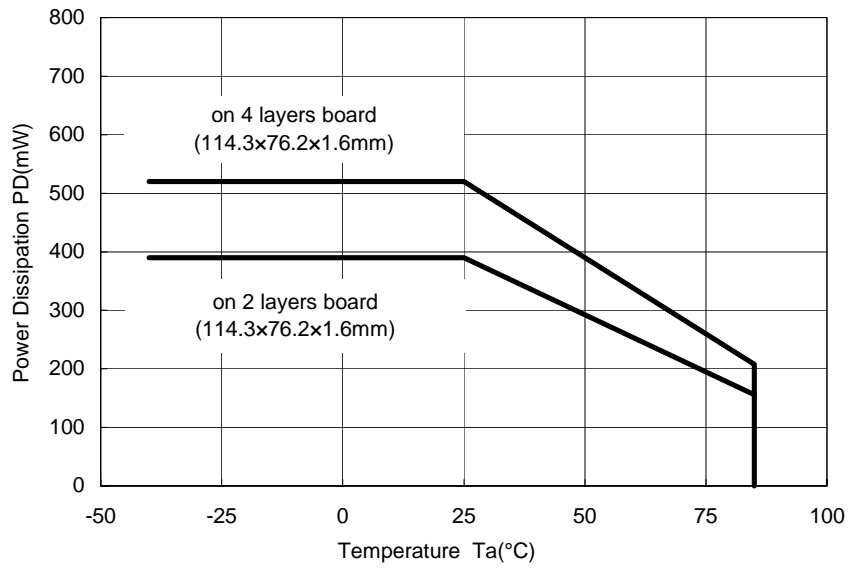
Therefore, it may be different from the individual specification for a specific output voltage.

## POWER DISSIPATION vs. AMBIENT TEMPERATURE

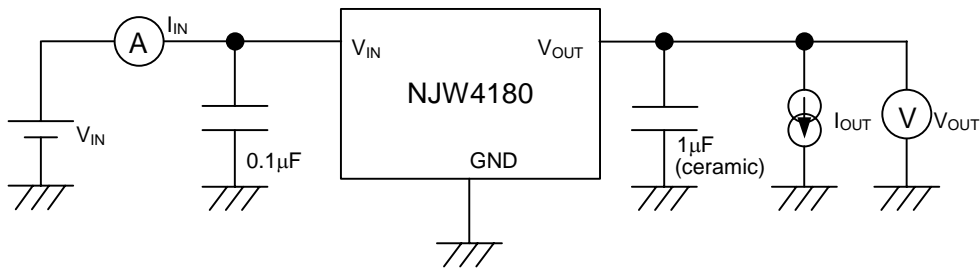
NJW4180KG1 Power Dissipation  
( $T_{opr}=-40\sim+85^{\circ}\text{C}$ ,  $T_j=125^{\circ}\text{C}$ )



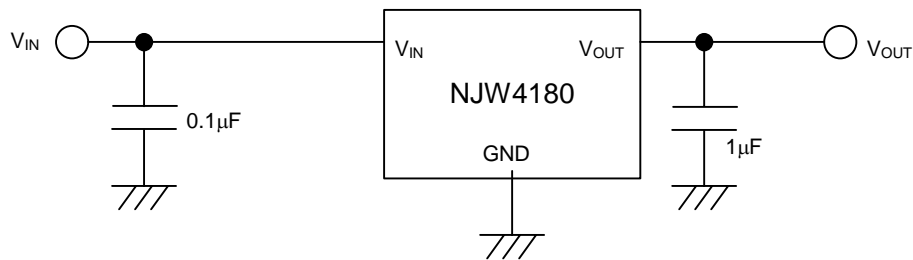
NJW4180F Power Dissipation  
( $T_{opr}=-40\sim+85^{\circ}\text{C}$ ,  $T_j=125^{\circ}\text{C}$ )



## ■ TEST CIRCUIT



## ■ TYPICAL APPLICATION



### \*Input Capacitance $C_{IN}$

Input Capacitance ( $C_{IN}$ ) is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line.

Use the  $C_{IN}$  value of  $0.1\mu\text{F}$  greater to avoid the problem.

$C_{IN}$  should connect between GND and  $V_{IN}$  as short as possible.

### \*Output Capacitance $C_O$

Output capacitor ( $C_O$ ) is required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influences stability of the regulator.

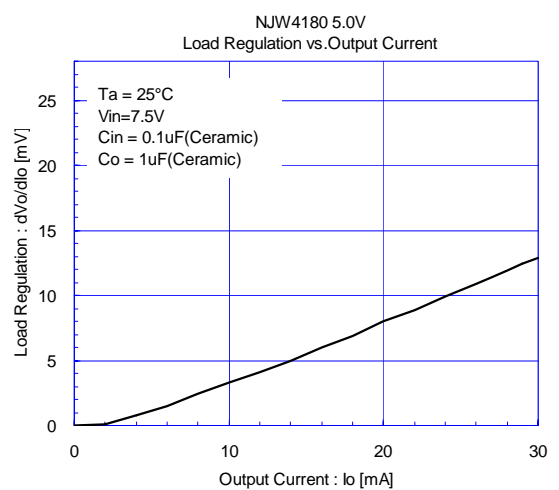
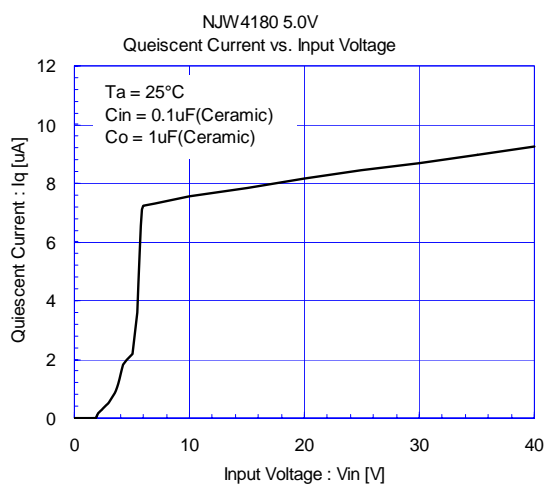
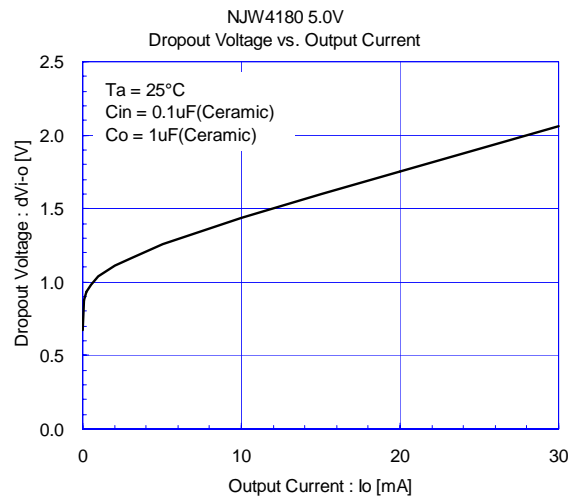
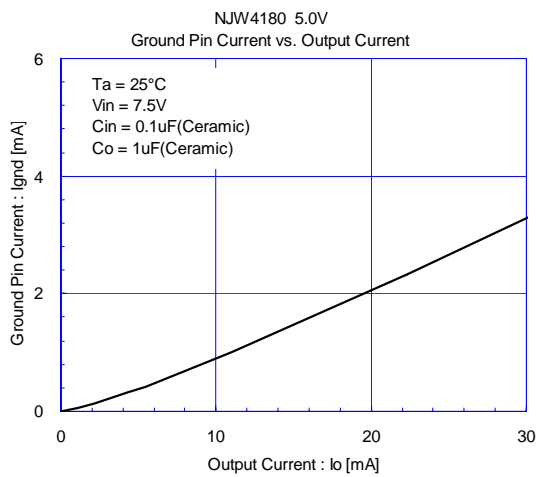
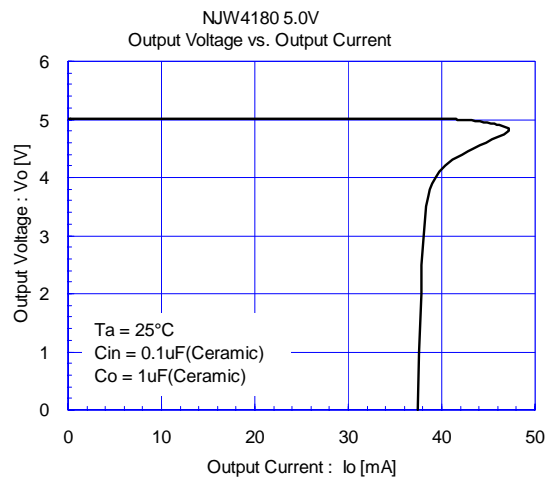
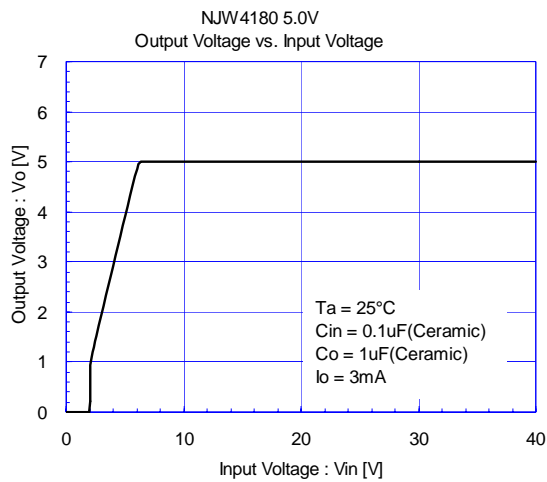
This product is designed to work with a low ESR capacitor for the  $C_O$ ; however, use of recommended capacitance or greater value is essential for stable operation.

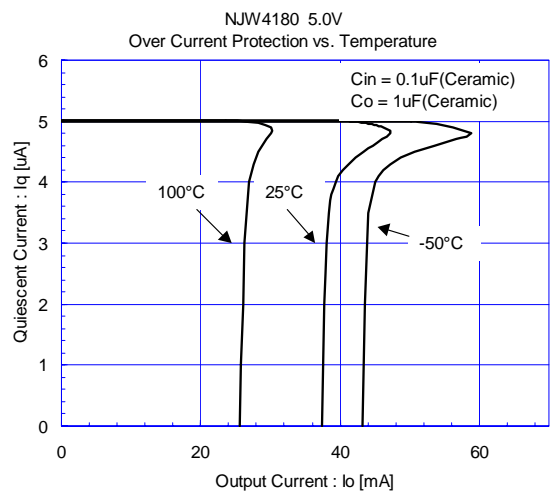
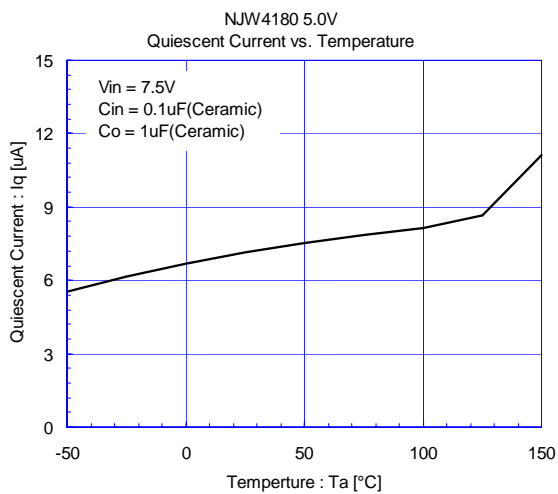
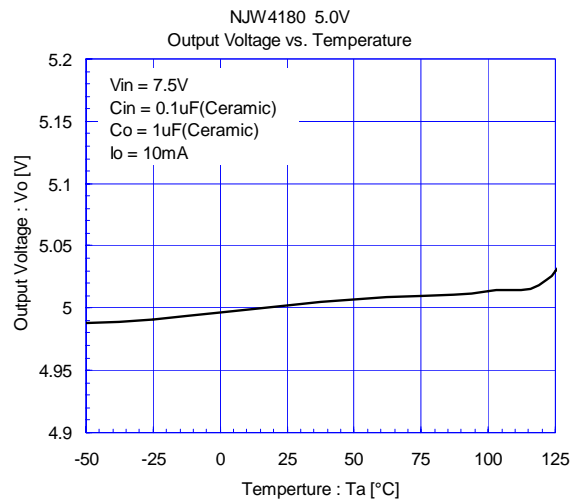
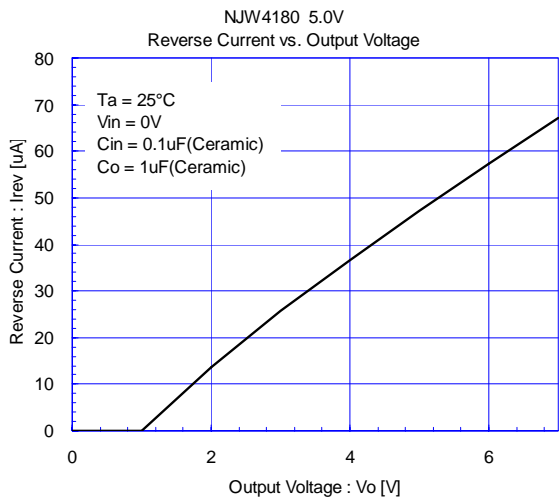
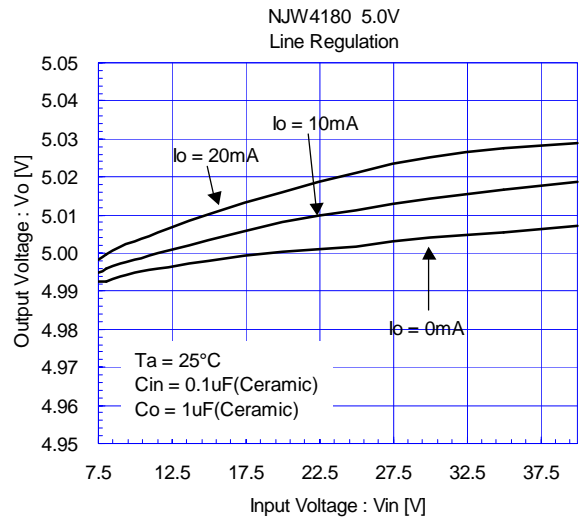
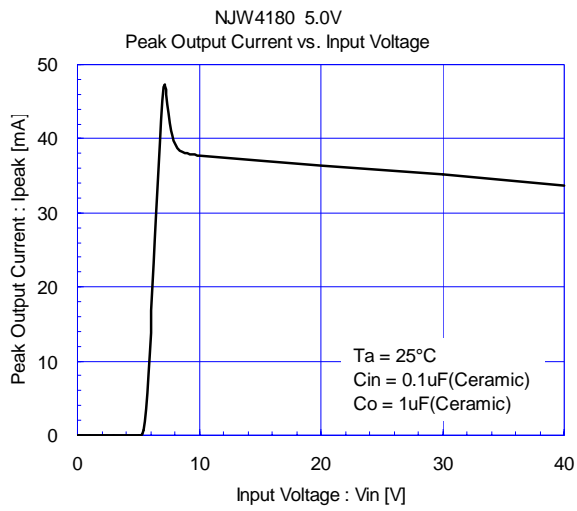
Use of a smaller  $C_O$  may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

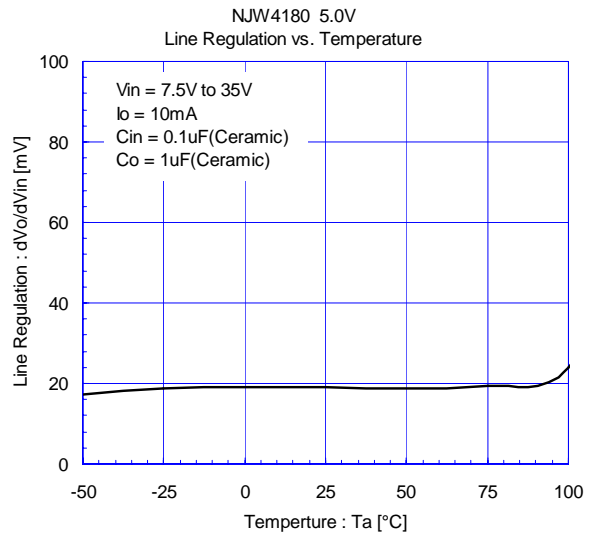
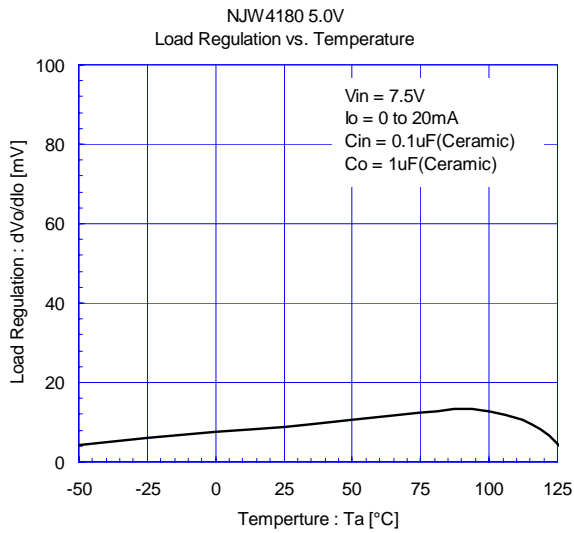
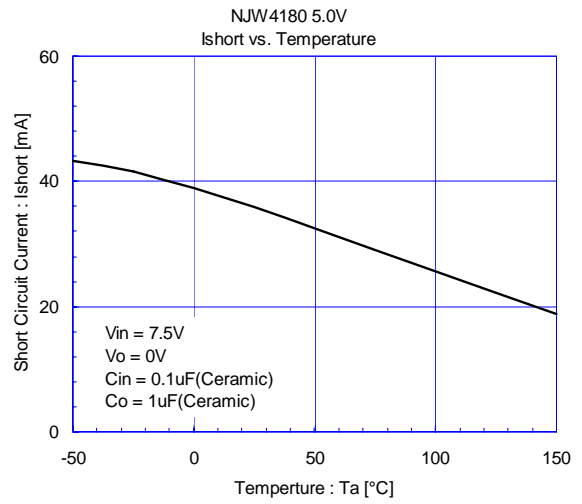
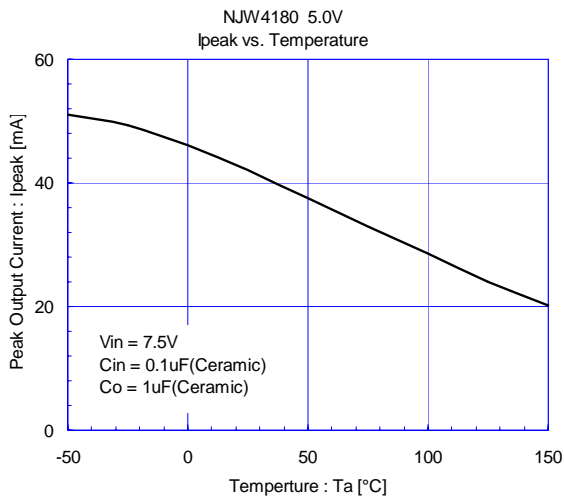
Therefore, use  $C_O$  with the recommended capacitance or greater value and connect between  $V_O$  terminal and GND terminal with minimal wiring. The recommended capacitance depends on the output voltage. Low voltage regulator requires greater value of the  $C_O$ . Thus, check the recommended capacitance for each output voltage.

Use of a greater  $C_O$  reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

## ■ TYPICAL CHARACTERISTICS







**[CAUTION]**

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