High Voltage Low current consumption Regulator

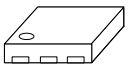
■ GENERAL DESCRIPTION

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

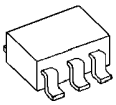
Low current consumption make the NJW4180 possible to supply 2.5 to 5.0 V regulated voltage from high voltage input.

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

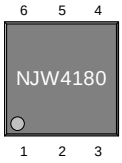


NJW4180F

■ FEATURES

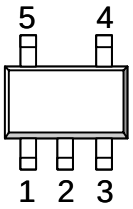
- Operating Voltage Range — 35V (max.)
- Low Current Consumption — 9µA (typ.)
- MLCC correspond
- Output Current — I_O(min.)=20mA
- High Precision Output — V_O ±1.5%
- Internal Thermal Overload Protection
- Internal Over Current Protection
- Internal Reverse Current Protection
- Package Outline — ESON6-G1, SOT23-5

■ PIN CONNECTION



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

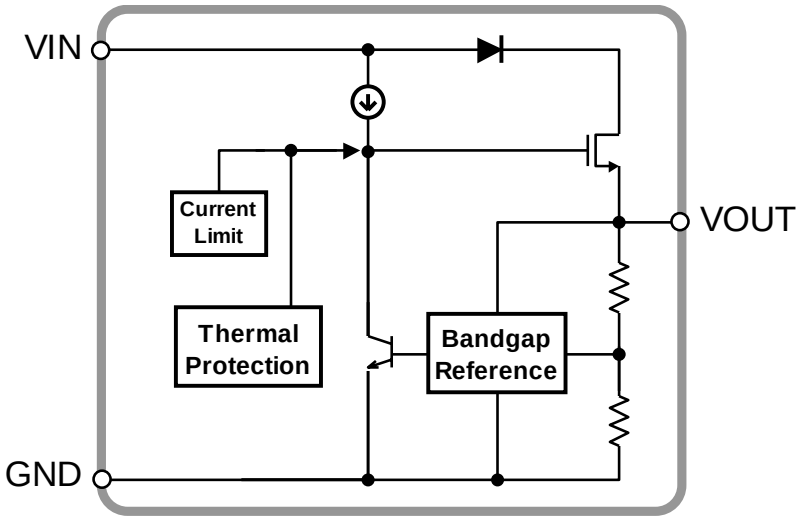
NJW4180KG1



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

NJW4180F

■ BLOCK DIAGRAM



■ OUTPUT VOLTAGE LANK LIST

Device Name	V_{OUT}	Device Name	V_{OUT}
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	SYNBOL	RATINGS		UNIT
Input Voltage	V_{IN}	+40		V
Output Voltage	V_{OUT}	+7		V
Power Dissipation	P_D	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

$V_O \leq 3V$: V_{IN} = +5.5V to +35V
$V_O > 3V$: $V_{IN} = V_O$+2.5V to +35V

■ ELECTRICAL CHARACTERISTICS

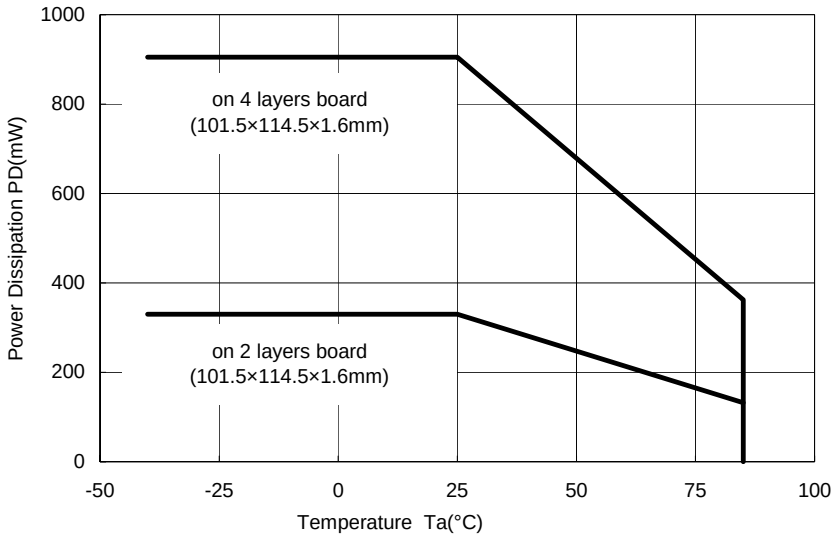
(Unless otherwise specified, V_{IN}=Vo+2.5V (Vo≤3V: V_{IN} =5.5V), C_{IN}=0.1 µF, C_O=1µF, Ta=25°C)

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	µA
Output Current	Io	$V_O \times 0.9$	20	30	-	mA
Line Regulation	$\Delta V_O/\Delta V_{IN}$	V_{IN} = 5.5V to 35V, I_O=10mA (V_O≤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	$\Delta V_O/\Delta Ta$	Ta=0 to 85°C, I_O=10mA	-	± 100	-	ppm/°C
Sink Current under Reverse Current Protection operating	$I_{REVERSE}$	V_{IN} = 0V, V_O = 5V	-	50	75	µA
Input Voltage	V_{IN}	V_O≤3V	5.5	-	35	V
		V_O>3V	V_O+2.5	-	35	

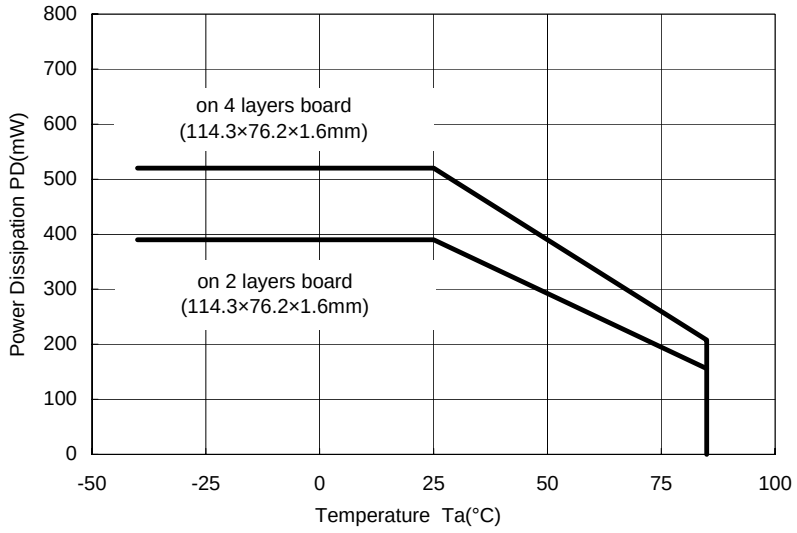
The above specification is a common specification for all output voltages.
Therefore, it may be different from the individual specification for a specific output voltage.

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE

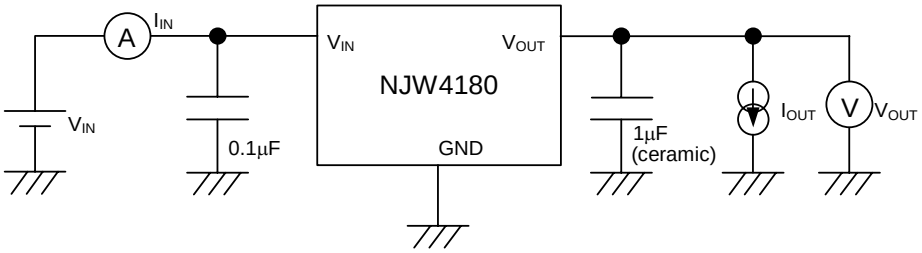
NJW4180KG1 Power Dissipation
(Topr=-40~+85°C,Tj=125°C)



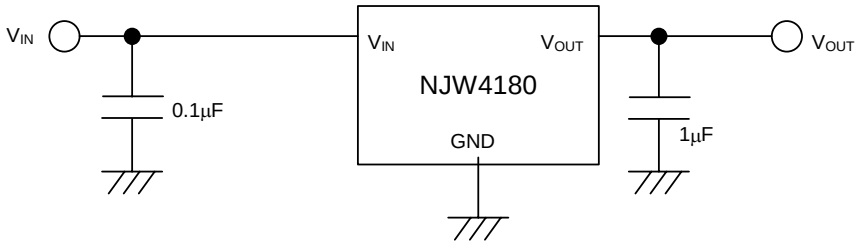
NJW4180F Power Dissipation
(Topr=-40~+85°C,Tj=125°C)



■ 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 0.1μF 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.

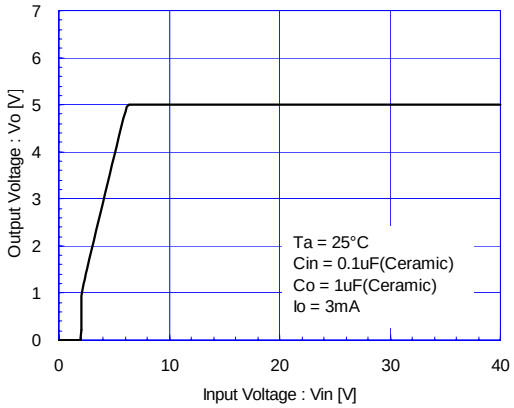
Use of a smaller C_O may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

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.

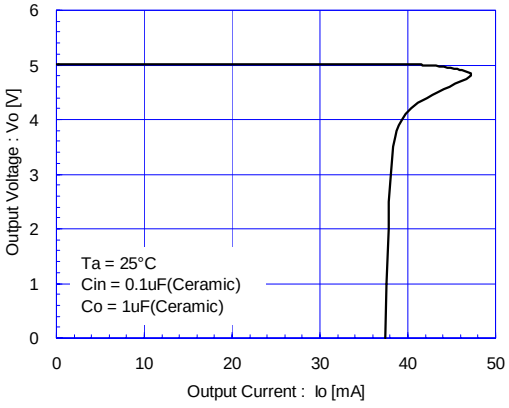
Use of a greater C_O reduces output noise and ripple output, and also improves transient response of the output voltage against rapid load change.

■ TYPICAL CHARACTERISTICS

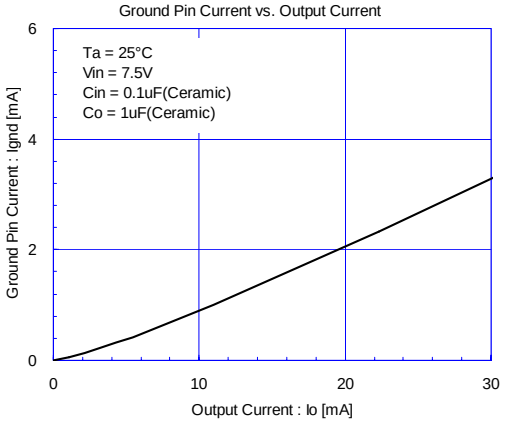
NJW4180 5.0V
Output Voltage vs. Input Voltage



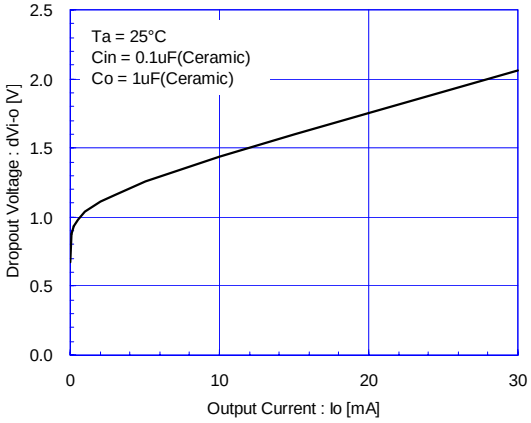
NJW4180 5.0V
Output Voltage vs. Output Current



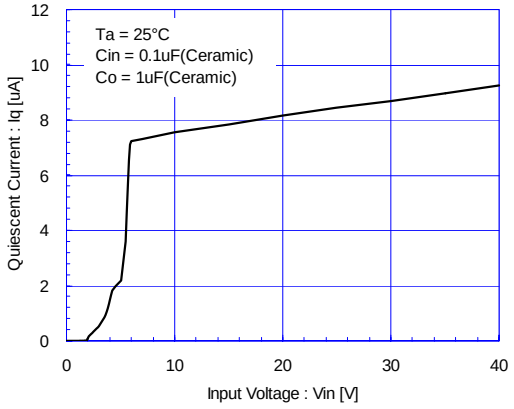
NJW4180 5.0V
Ground Pin Current vs. Output Current



NJW4180 5.0V
Dropout Voltage vs. Output Current



NJW4180 5.0V
Queiscent Current vs. Input Voltage



NJW4180 5.0V
Load Regulation vs.Output Current