LOW DROPOUT VOLTAGE REGULATOR
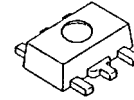
■ **GENERAL DESCRIPTION**

   The NJU7780/81 is a low dropout voltage regulator with ON/OFF Control.

   Advanced CMOS technology achieves low quiescent current.

   It is suitable for battery operating applications.

   NJU7781 features shunt switch which improves turn off response of output voltage when ON/OFF control is used.
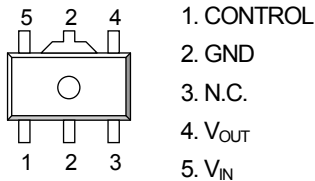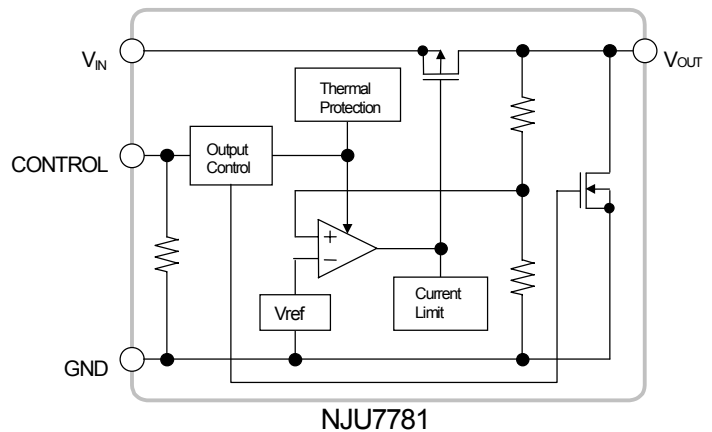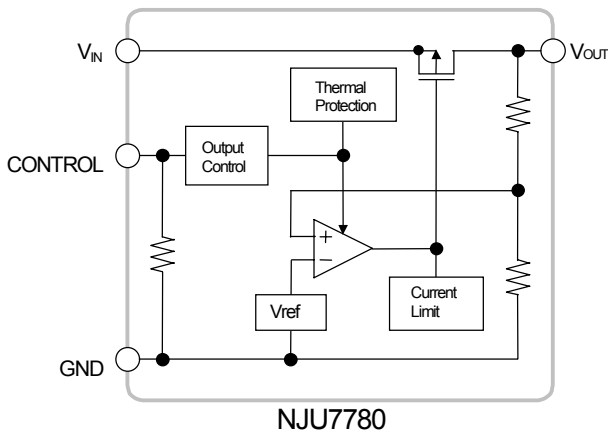
■ **PACKAGE OUTLINE**

NJU7780/81U1

■ **FEATURES**

- ● High Ripple Rejection   65dB typ. (f=400Hz, Vo=3V)
- ● Low quiescent Current $Iq=20\mu A$ (Io=0mA, $V_{CONT}=V_{IN}$)
- ● Output capacitor with $1.0\mu F$ ceramic capacitor
- ● Output Current   Io(max)=300mA
- ● High Precision Output $Vo\pm1.0\%$
- ● Low Dropout Voltage   0.15V typ. (Io=150mA,Vo=3.0V)
- ● ON/OFF Control   (Active High)
- ● Shunt Switch   Only NJU7781
- ● Internal Over Current Protection
- ● Internal Thermal Overload Protection
- ● CMOS technology
- ● Package outline   SOT-89-5

■ **PIN CONFIGURATION**

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

■ **EQUIVALENT CIRCUIT**

NJU7780

NJU7781

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NJU7780/81

■ OUTPUT VOLTAGE RANK LIST (1.5V~5.0V : 0.1V step)

Device Name	V_{OUT}	Device Name	V_{OUT}	Device Name	V_{OUT}
NJU778xU1-15	1.5V	NJU778xU1-28	2.8V	NJU778xU1-04	4.0V
NJU778xU1-18	1.8V	NJU778xU1-29	2.9V	NJU778xU1-05	5.0V
NJU778xU1-21	2.1V	NJU778xU1-03	3.0V		
NJU778xU1-25	2.5V	NJU778xU1-33	3.3V		

■ ABSOLUTE MAXIMUM RATINGS
(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+10	V
Control Voltage	V_{CONT}	+10(*1)	V
Power Dissipation	P_D	350(*2)	mW
Operating Temperature	Topr	−40 ~ +85	°C
Storage Temperature	Tstg	−40 ~ +125	°C
OFF-state Output Sink Current (*3)	Io	10	mA

(*1): When input voltage is less than +10V, the absolute maximum control voltage is equal to the input voltage.

(*2): Device itself.

(*3): This maximum rating is applied to NJU7781.

■ Operating voltage

V_{IN}=+2.3 ~ +9V (In case of Vo<2.1V version)

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=Vo+1V, C_{IN}=0.1μF, Co=0.1μF, Ta=25°C)

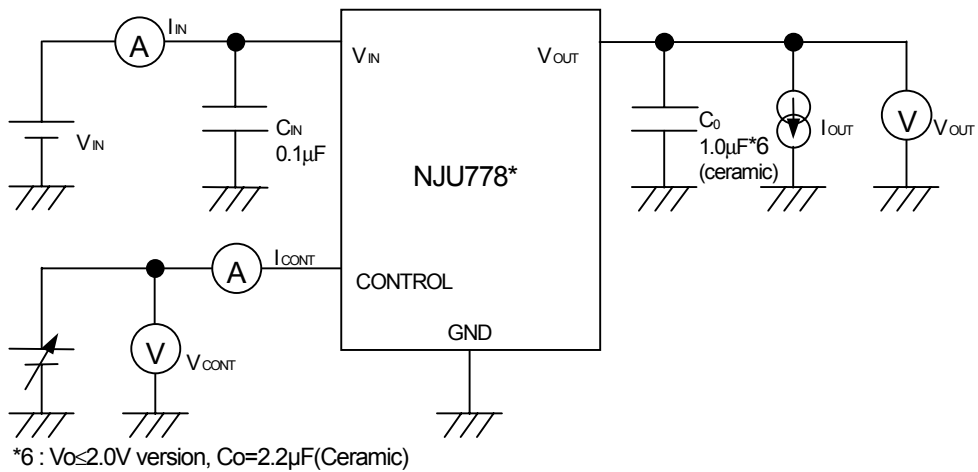| PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA		-1.0%	-	+1.0%	V
Input Voltage	V_{IN}			-	-	9	V
Quiescent Current	I_Q	Io=0mA, V_{CONT}=V_{IN}		-	20	40	μA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V		-	-	1	μA
Output Current	Io	Vo - 0.1V(Vo<2.1V) Vo - 0.3V(Vo≥2.1V)		300	-	-	mA
Short Current Limit	I_{LIM}	Vo=0V		-	120	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V~Vo+6V(Vo<3.0), V_{IN}=Vo+1V~Vo+9V(Vo≥3.0), Io=30mA		-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0~300mA		-	-	0.015	%/mA
Dropout Voltage(*4)	ΔV_{I-O}	I_O=150mA	2.1 ≤ V_O ≤ 2.6V	-	0.18	0.25	V
			2.7 ≤ V_O ≤ 3.3V	-	0.15	0.22	
			3.4 ≤ V_O ≤ 5.0V	-	0.12	0.2	
Ripple Rejection	RR	ein=200mVrms, f=400Hz, I_O=10mA, V_O=3.0V		-	65	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta Vo/\Delta Ta$	Ta=0~85°C, Io=10mA		-	±100	-	ppm/°C
Output Noise Voltage	V_{NO}	F=10Hz~80kHz, I_O=10mA, V_O=3.0V		-	80	-	μVrms
Pull-Down Resistance	R_{CONT}			1.5	5	10	MΩ
Control Voltage for ON-state	$V_{CONT(ON)}$			1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$			-	-	0.3	V
Pull-down Resistance at OFF-state(*5)	$R_{O(OFF)}$	V_{CONT}=0V (V_O=3.0V Version)		–	190	–	Ω

(*4): The output voltage excludes under 2.1V.

(*5) This electrical characteristics is applied to NJU7781.

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.

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■ TEST CIRCUIT

*6 : Vo≤2.0V version, Co=2.2µF(Ceramic)

■ TYPICAL APPLICATION

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

*7: Vo≤2.0V version, Co=2.2µF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:

*7: Vo≤2.0V version, Co=2.2µF

State of control terminal:

- "H"→ output is enabled.
- "L" or "open" → output is disabled.

NJU7780/81

■ ELECTRICAL CHARACTERISTICS
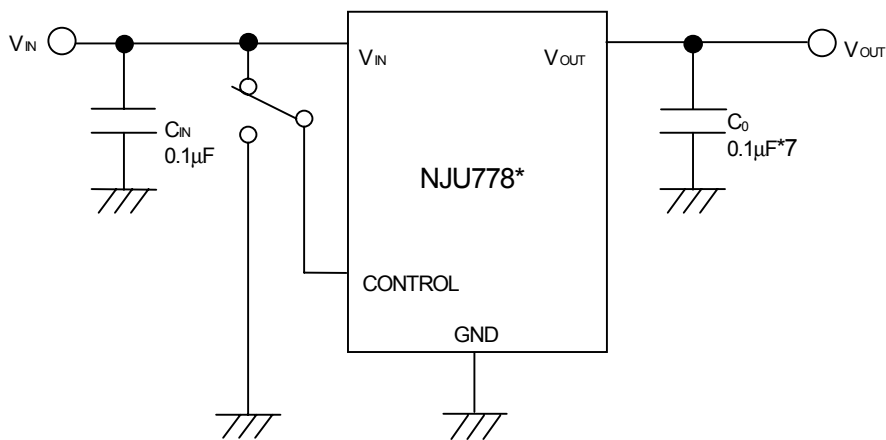 ●DC CHARACTERISTICS

NJU7780/81_3.0V
Output Voltage vs. Input Voltage

@:Ta=25°C
Co=1.0μF(Ceramic)
CIN=0.1μF

Io=0A
Io=30mA
Io=100mA

Output Voltage : Vo(V)
Input Voltage : VIN(V)

NJU7780/81_3.0V
Output Voltage vs. Output Current

@:Ta=25°C
VIN=4.0V
Co=1.0μF(Ceramic)
CIN=0.1μF

Output Voltage : Vo(V)
Output Current : Io(mA)

NJU7780/81_3.0V
Ground Pin Current vs. Output Current

@:Ta=25°C
VIN=4.0V
Co=1.0μF(Ceramic)
CIN=0.1μF

Ground Pin Current : IGND (uA)
Output Current : Io(mA)

NJU7780/81_3.0V
Dropout Voltage vs. Output Current

@:Ta=25°C
Co=1.0μF(Ceramic)
CIN=0.1μF

Dropout Voltage:dVI-O(V)
Output Current:Io(mA)

NJU7780/81_3.0V
Output Voltage vs. Control Voltage

@:Ta=25°C
VIN=4.0V
Co=1.0μF(Ceramic)
Io=30mA
CIN=0.1μF

Output Voltage : Vo(V)
Control Voltage : Vcont(V)

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