

LOW DROPOUT VOLTAGE REGULATOR

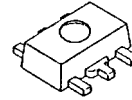
■ GENERAL DESCRIPTION

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

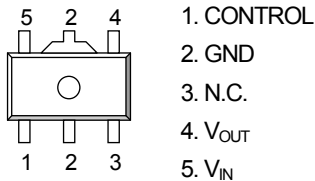


NJU7780/81U1

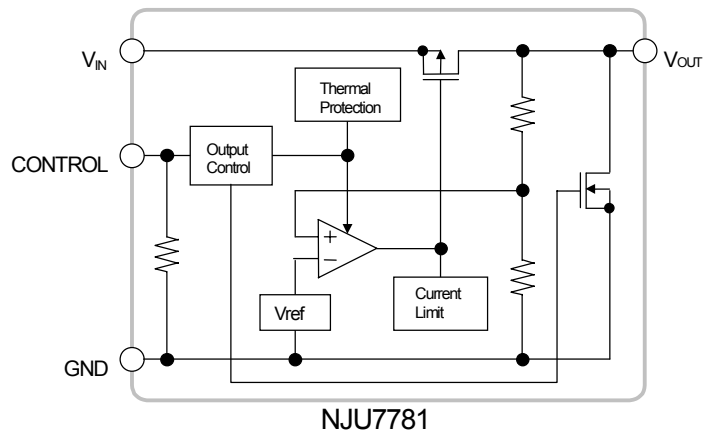
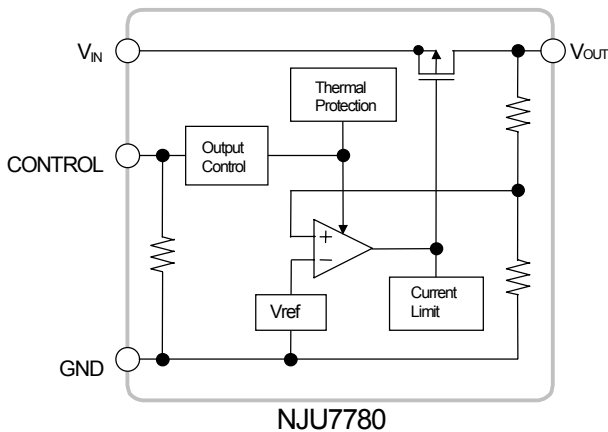
■ FEATURES

- High Ripple Rejection 65dB typ. (f=400Hz, Vo=3V)
- Low quiescent Current Iq=20μA (Io=0mA, V_{CONT}=V_{IN})
- Output capacitor with 1.0μF ceramic capacitor
- Output Current Io(max)=300mA
- High Precision Output Vo±1.0%
- 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



■ EQUIVALENT CIRCUIT



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	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +125	°C
OFF-state Output Sink Current (*3)	I _o	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 V_o<2.1V version)

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V _o	I _o =30mA	-1.0%	-	+1.0%	V	
Input Voltage	V _{IN}		-	-	9	V	
Quiescent Current	I _Q	I _o =0mA, V _{CONT} =V _{IN}	-	20	40	μA	
Quiescent Current at Control OFF	I _{Q(OFF)}	V _{CONT} =0V	-	-	1	μA	
Output Current	I _o	V _o - 0.1V(V _o <2.1V) V _o - 0.3V(V _o ≥2.1V)	300	-	-	mA	
Short Current Limit	I _{LIM}	V _o =0V	-	120	-	mA	
Line Regulation	ΔV _o /ΔV _{IN}	V _{IN} =V _o +1V~V _o +6V(V _o <3.0), V _{IN} =V _o +1V~V _o +9V(V _o ≥3.0), I _o =30mA	-	-	0.10	%/V	
Load Regulation	ΔV _o /ΔI _o	I _o =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	e _{in} =200mVrms, f=400Hz, I _o =10mA, V _o =3.0V	-	65	-	dB	
Average Temperature Coefficient of Output Voltage	ΔV _o /ΔTa	Ta=0~85°C, I _o =10mA	-	±100	-	ppm/ ^o 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	

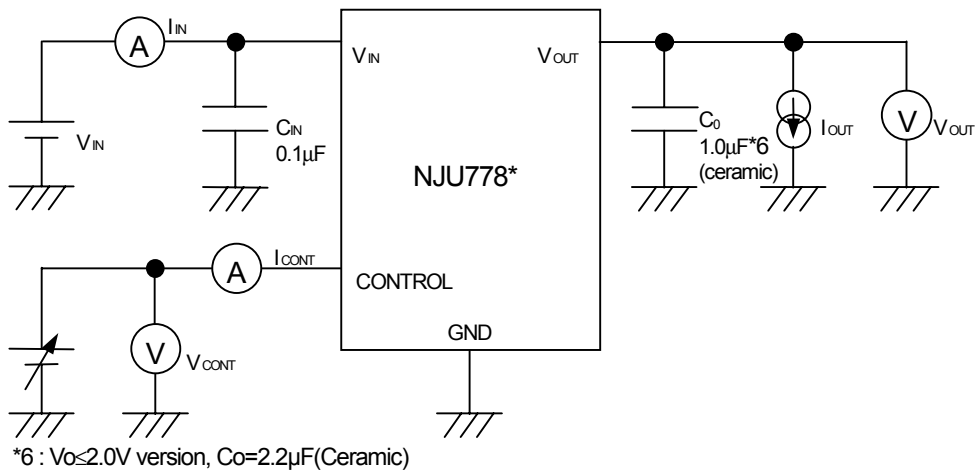
(*4): The output voltage excludes under 2.1V.

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

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

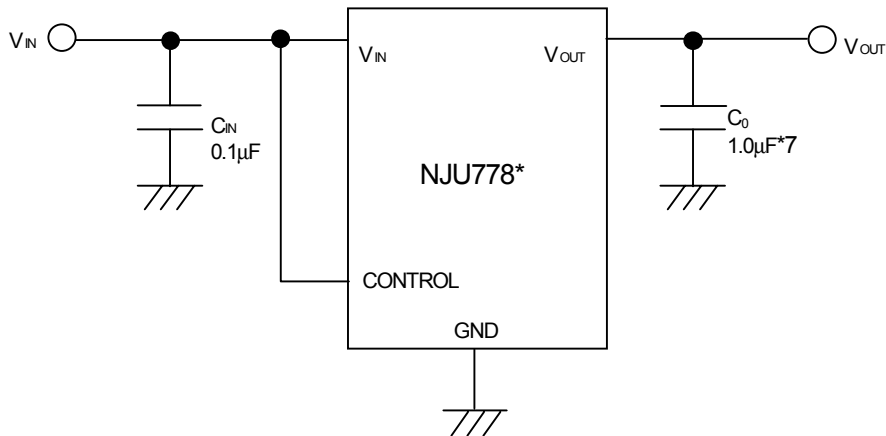
Therefore, it may be different from the individual specification for a specific output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

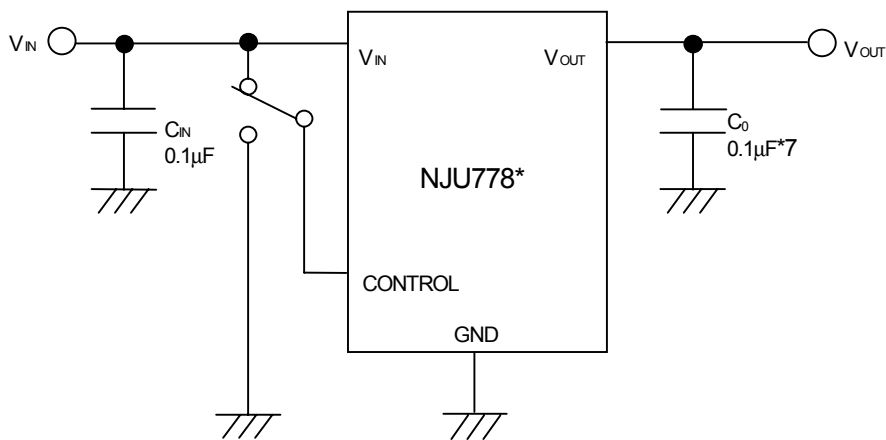
① In the case where ON/OFF Control is not required:



*7: $V_O \leq 2.0V$ version, $C_O = 2.2 \mu F$

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*7: $V_O \leq 2.0V$ version, $C_O = 2.2 \mu F$

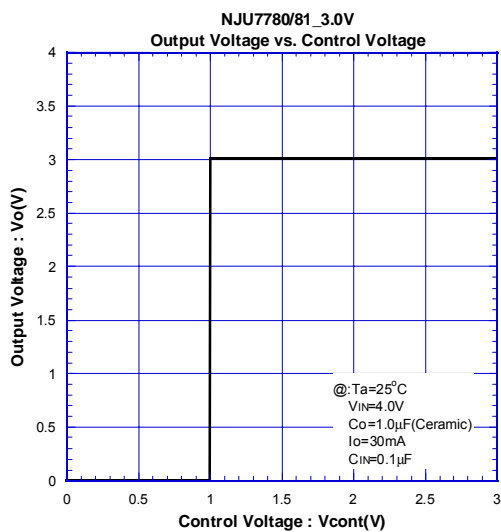
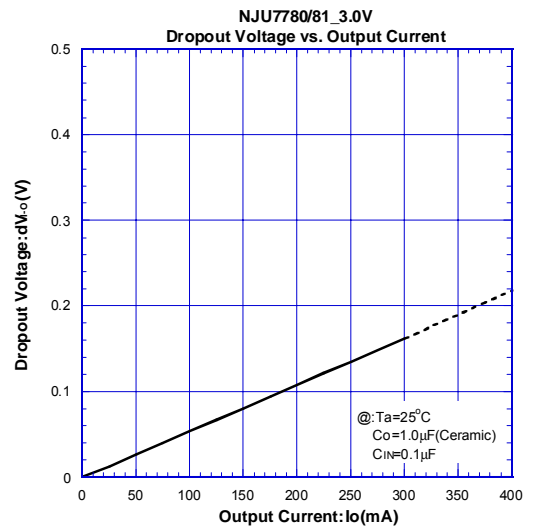
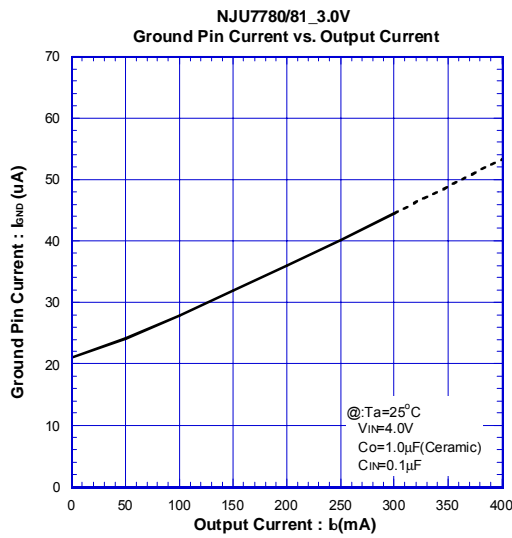
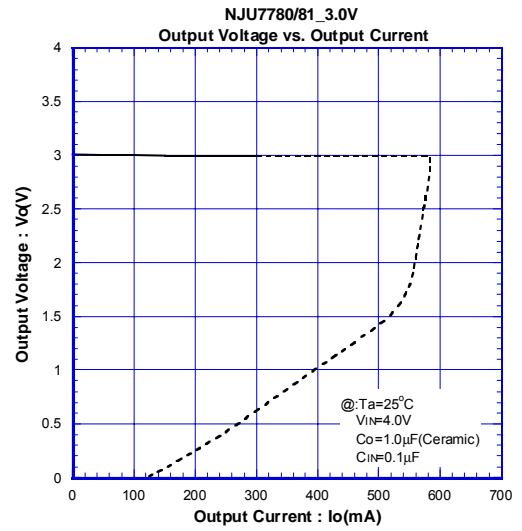
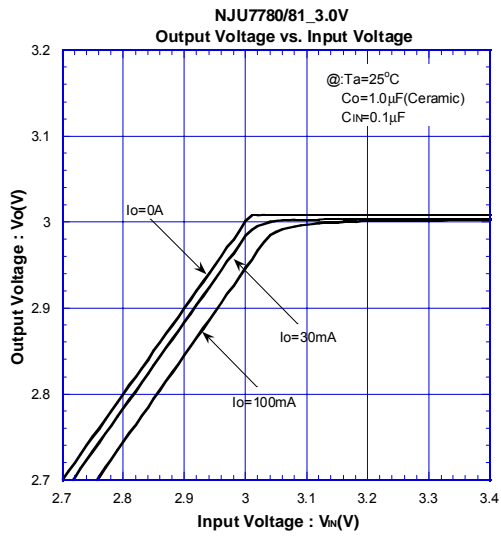
State of control terminal:

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

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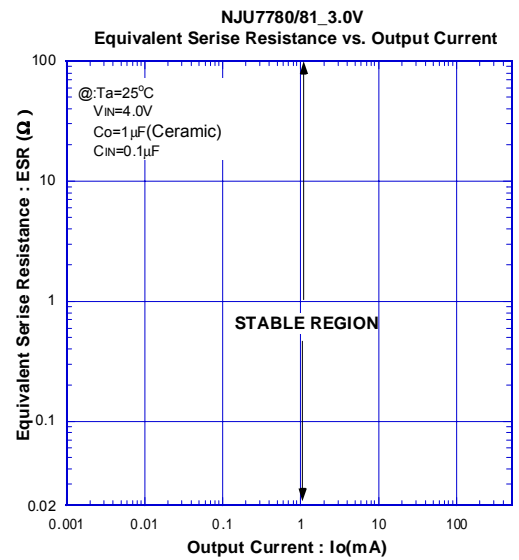
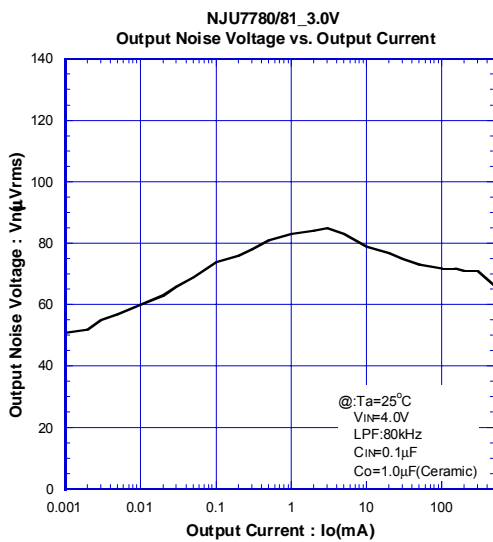
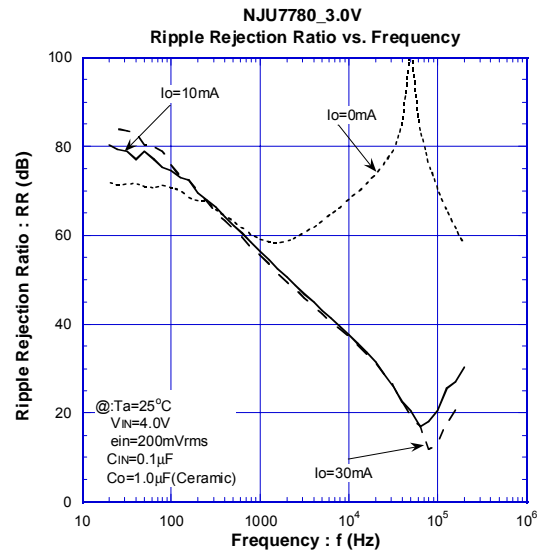
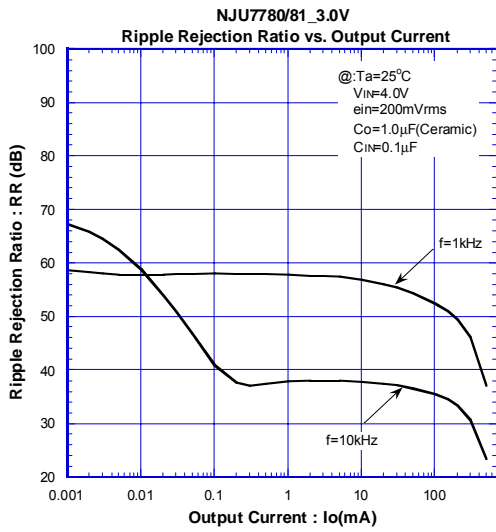
■ ELECTRICAL CHARACTERISTICS

● DC CHARACTERISTICS



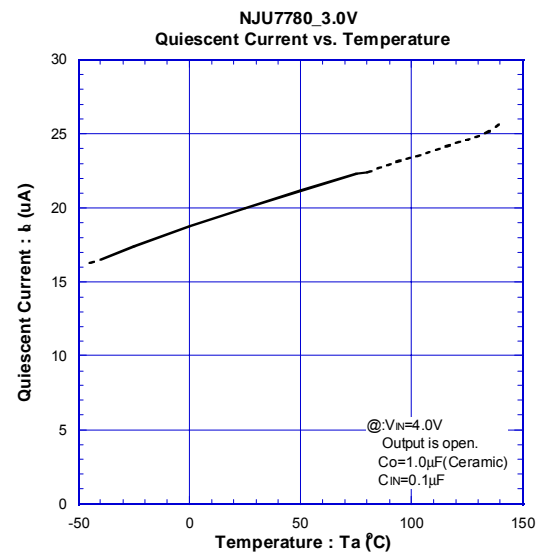
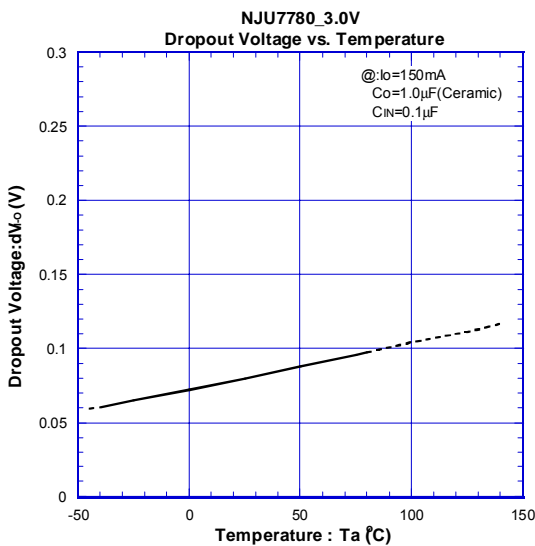
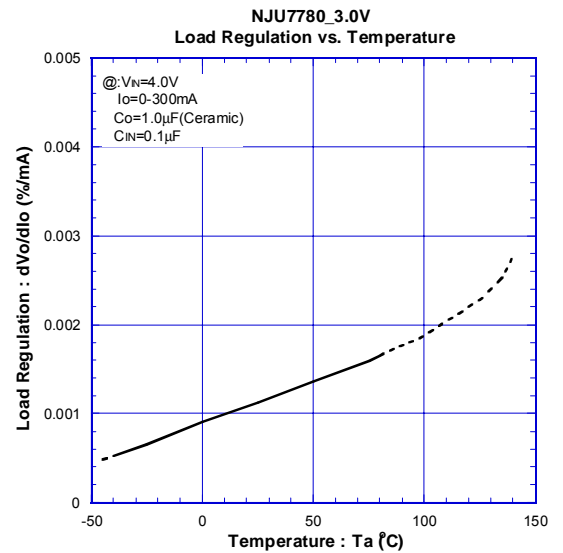
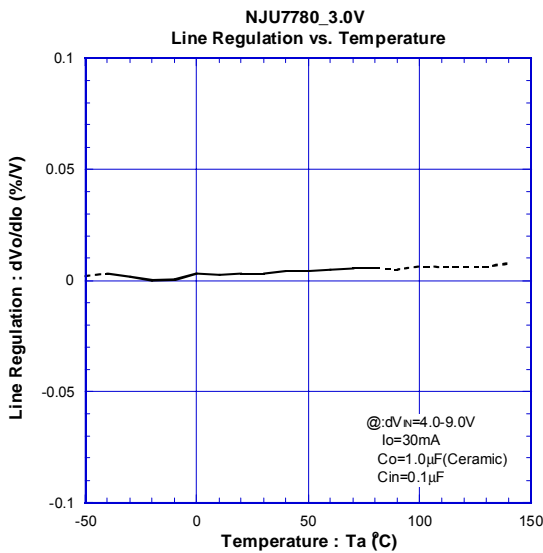
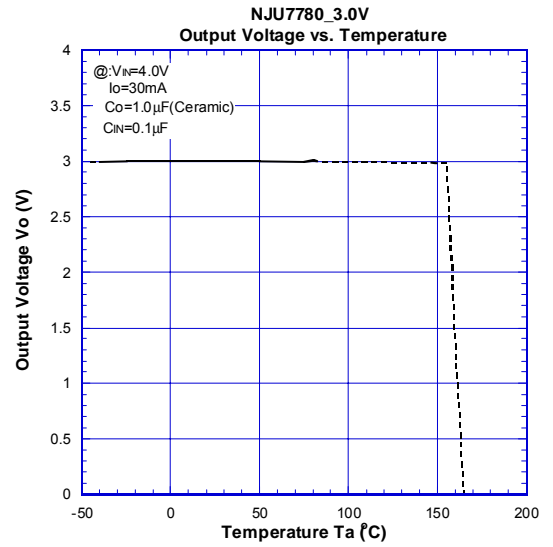
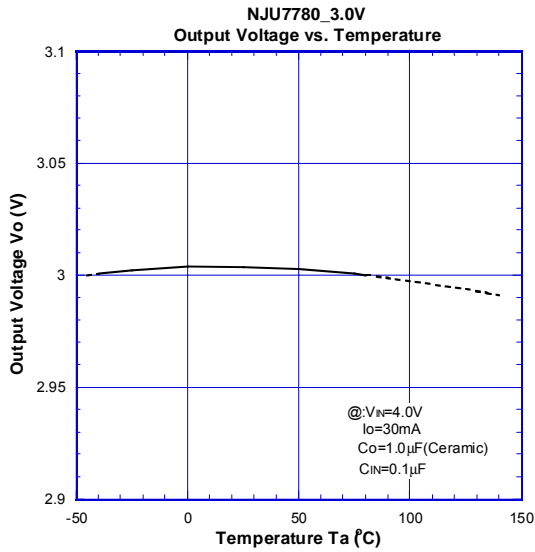
ELECTRICAL CHARACTERISTICS

AC CHARACTERISTICS



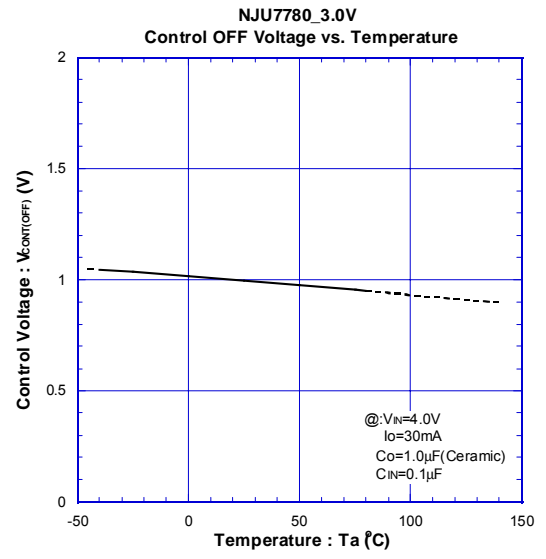
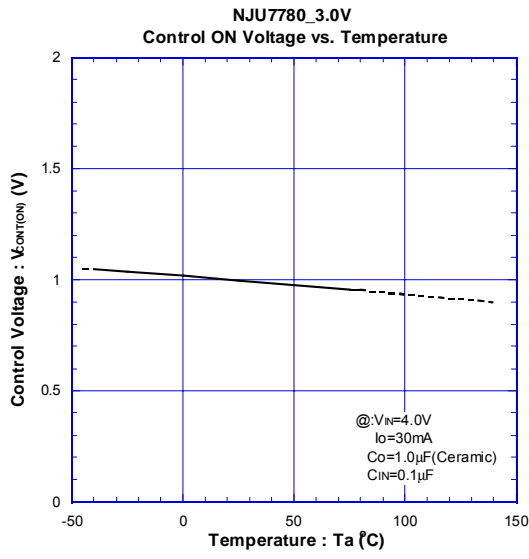
ELECTRICAL CHARACTERISTICS

TEMPERATURE CHARACTERISTICS



■ ELECTRICAL CHARACTERISTICS

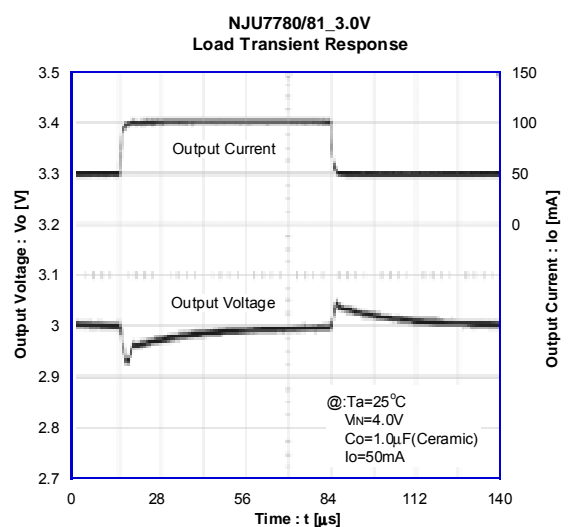
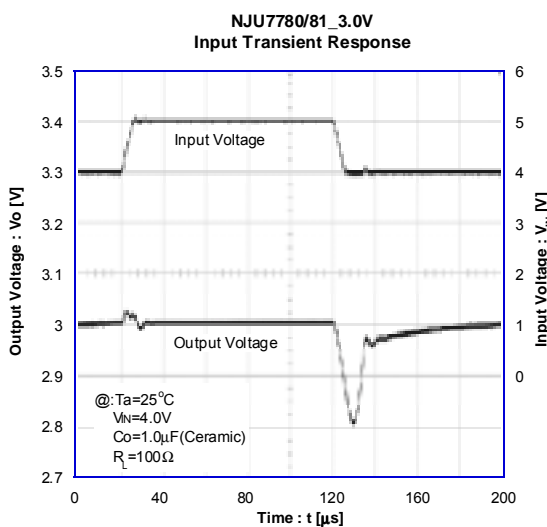
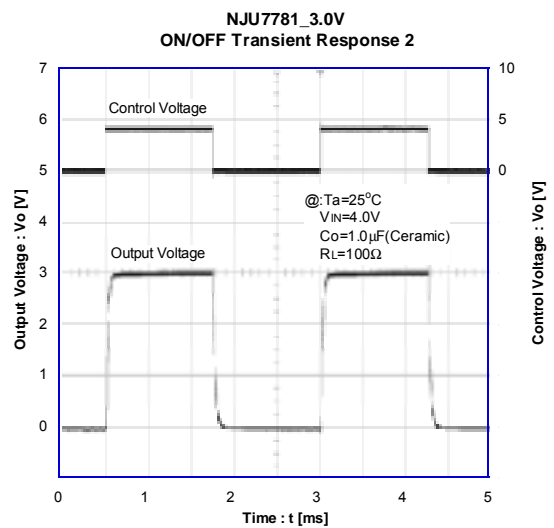
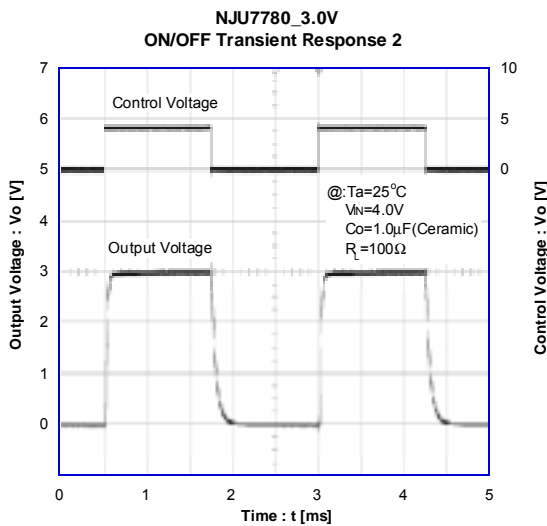
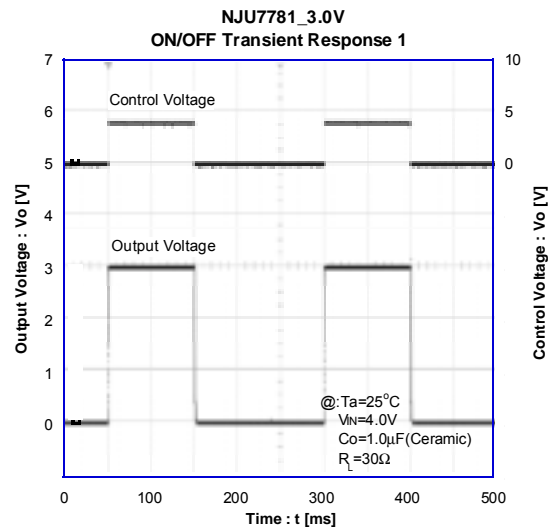
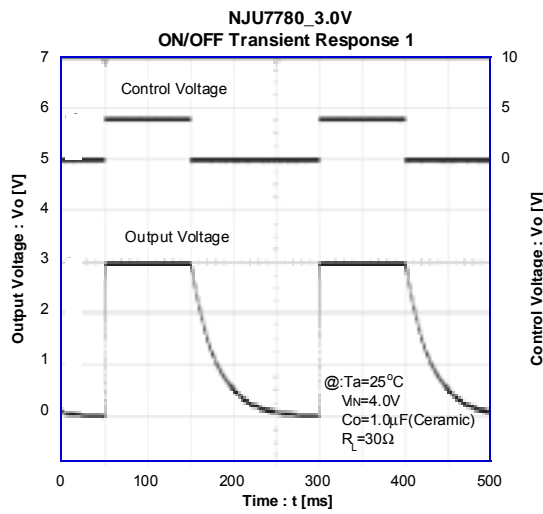
● TEMPERATURE CHARACTERISTICS



NJU7780/81

TYPICAL CHARACTERISTICS

TRANSIENT RESPONSE



[CAUTION]

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