LOW DROPOUT VOLTAGE REGULATOR

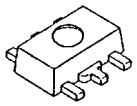
■ GENERAL DESCRIPTION

The NJU7790 is a 500mA output low dropout voltage regulator with ON/OFF control.

Advanced CMOS technology achieves high ripple rejection and low quiescent current.

Small packaging and 2.2μF small decoupling capacitor make the NJU7790 suitable for space conscious applications.

■ PACKAGE OUTLINE

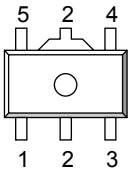


NJU7790U1

■ FEATURES

- High Ripple Rejection 65dB typ. (f=400Hz, Vo=3.0V Version)
- Low quiescent Current Iq=30μA typ.(Io=0mA)
- Output Current Io(max.)=500mA
- High Precision Output Vo±1.0%
- Output capacitor with 2.2μF ceramic capacitor (Vo≥2.1V version)
- Low Dropout Voltage 0.14V typ. (Io=300mA, Vo=3.0V Version)
- ON/OFF Control
- Internal Thermal Overload Protection
- Internal Over Current Protection
- CMOS Technology
- Package Outline SOT-89-5

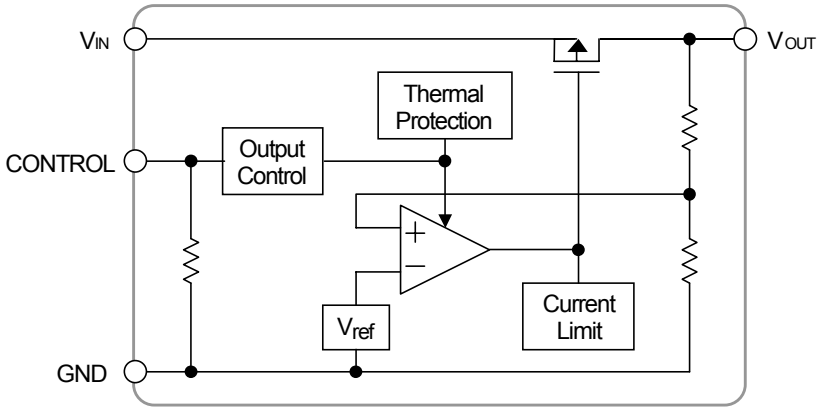
■ PIN CONFIGURATION



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

NJU7790U1

■ EQUIVALENT CIRCUIT



■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}
NJU7790U1-15	1.5V
NJU7790U1-21	2.1V
NJU7790U1-03	3.0V
NJU7790U1-33	3.3V
NJU7790U1-05	5.0V

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+9	V
Control Voltage	V_{CONT}	+9(*1)	V
Power Dissipation	P_D	350(*2)	mW
Operating Temperature	Topr	-40~+85	°C
Storage Temperature	Tstg	-40~+125	°C

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

(*2) : Device itself.

■ Operating voltage

V_{IN}=+2.3 ~ +8V (In case of Vo<2.1V version)

■ ELECTRICAL CHARACTERISTICS (V_{IN}=Vo+1V, C_{IN}=1.0µF, Co=2.2µF(Co=4.7µF: Vo≤2.0V), Ta=25°C)

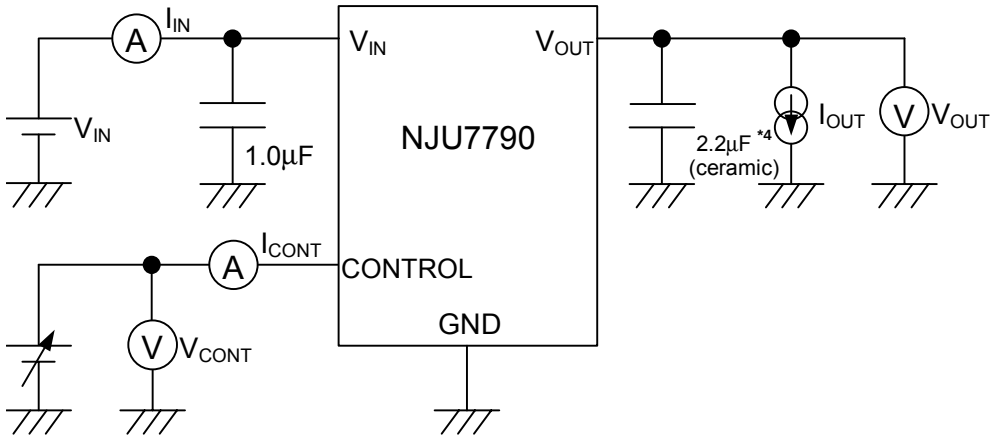
PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA		-1.0%	–	+1.0%	V
Input Voltage	V_{IN}			–	–	8	V
Quiescent Current	I_Q	Io=0mA, V_{CONT}=V_{IN}, Include I_{CONT}		–	30	60	µA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V		–	0.1	1.0	µA
Output Current	Io	Vo - 0.1V(Vo≤2.0V Version) Vo - 0.3V(Vo≥2.1V Version)		500	–	–	mA
Short Current Limit	I_{LIM}	Vo=0V		–	180	–	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6.0V (Vo<2V Version) V_{IN}=Vo+1V ~ 8.0V (Vo≥2V Version), Io=30mA		–	–	0.15	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA		–	–	0.005	%/mA
Dropout Voltage(*3)	ΔV_{I-O}	Io=300mA	2.1V≤Vo<2.5V	–	0.17	0.22	V
			2.5V≤Vo<2.9V	–	0.15	0.19	V
			2.9V≤Vo<3.5V	–	0.14	0.18	V
			3.5V≤Vo≤5.0V	–	0.12	0.16	V
Ripple Rejection	RR	ein=200mVrms,f=400Hz,Io=10mA, Vo=3V Version		–	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, Io=10mA, Vo=3VVersion		–	75	–	µVrms
Pull-down Resistance	R_{CONT}			2	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

(*3): Except output voltage less than 2.1V.

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.

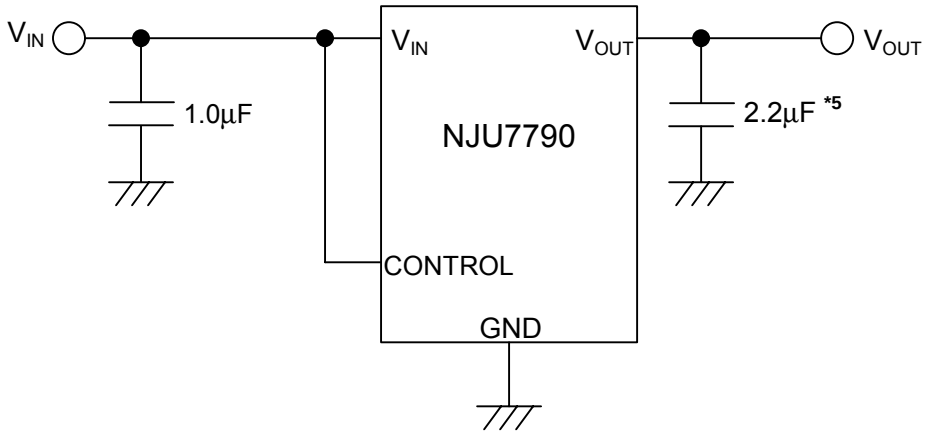
■ TEST CIRCUIT



*4 Vo≤2.0V version: Co=4.7μF(ceramic)

■ TYPICAL APPLICATION

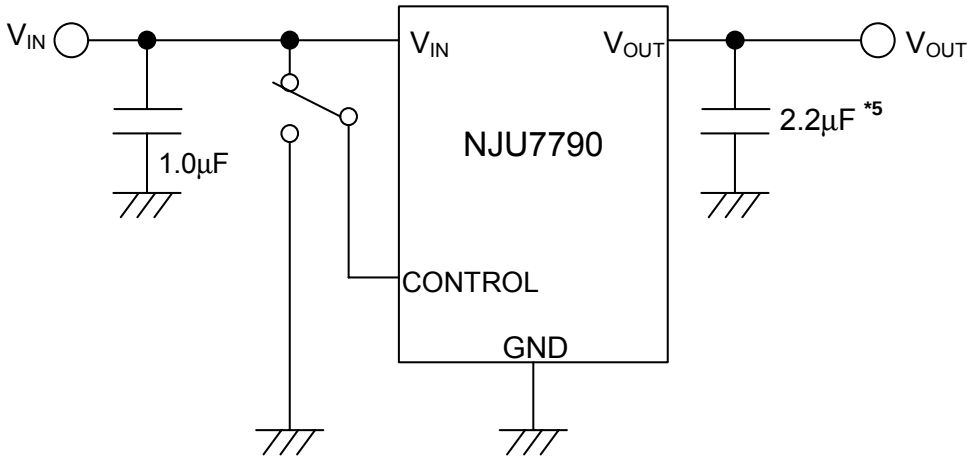
① In case that ON/OFF Control is not required:



*5: Vo≤2.0V version: Co=4.7μF

Connect control terminal to V_{IN} terminal.

② In use of ON/OFF Control



*5: Vo≤2.0V version: Co=4.7μF

State of control terminal:

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

∗Input Capacitance C_{IN}

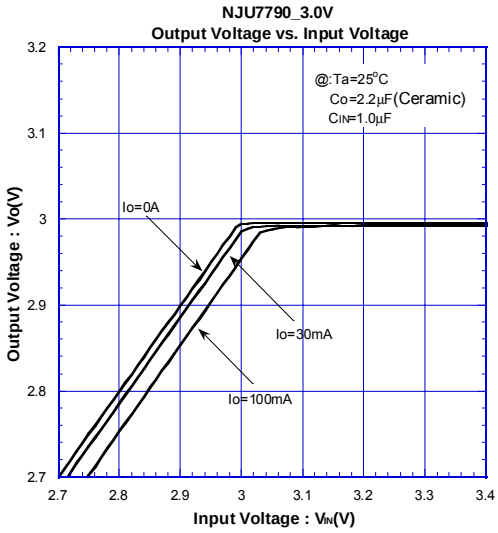
Input Capacitance C_{IN} is required to prevent oscillation and reduce power supply ripple for applications with high power supply impedance or a long power supply line.

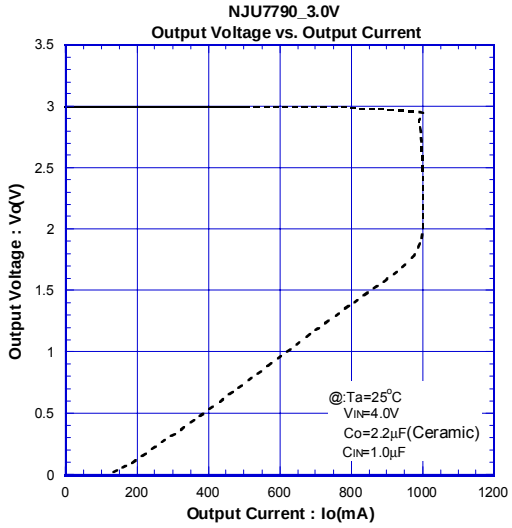
Use the C_{IN} value of 1.0μF greater to avoid the problem.

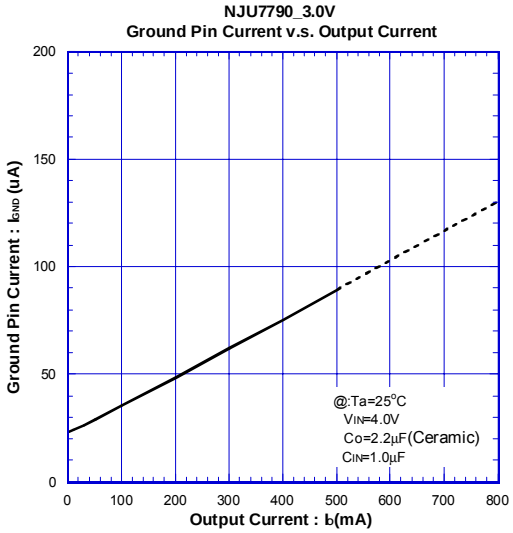
C_{IN} should connect between GND and V_{IN} as short as possible.

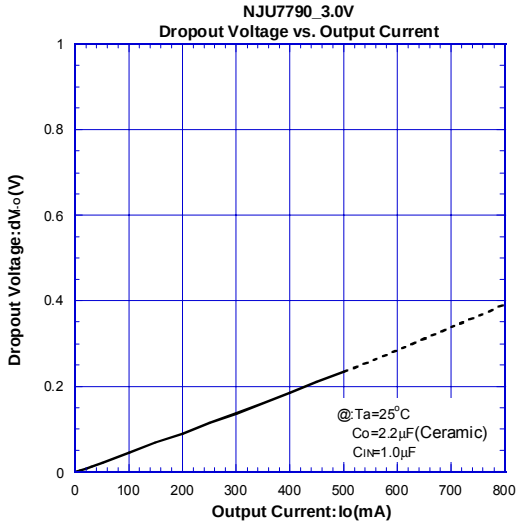
■ TYPICAL CHARACTERISTICS

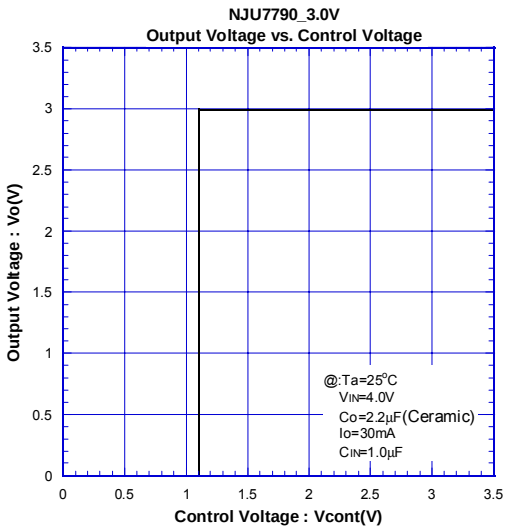
●DC CHARACTERISTICS

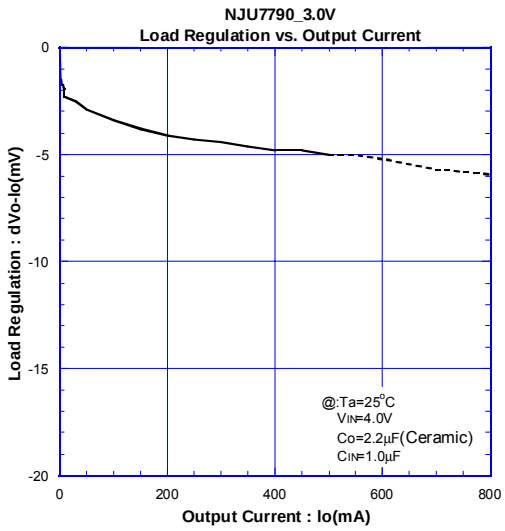






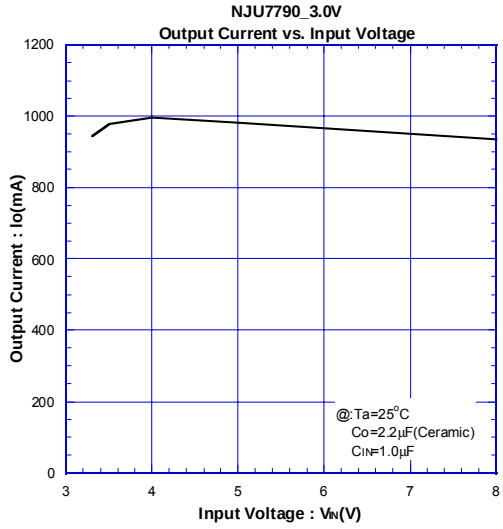


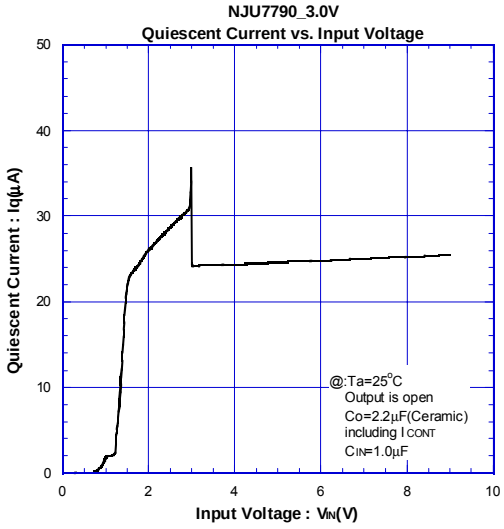




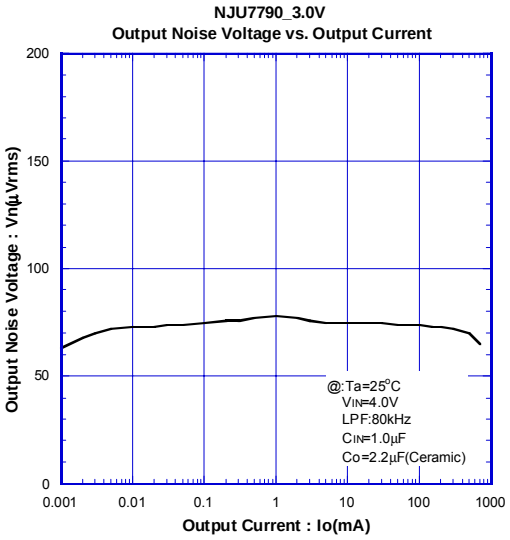
■ TYPICAL CHARACTERISTICS

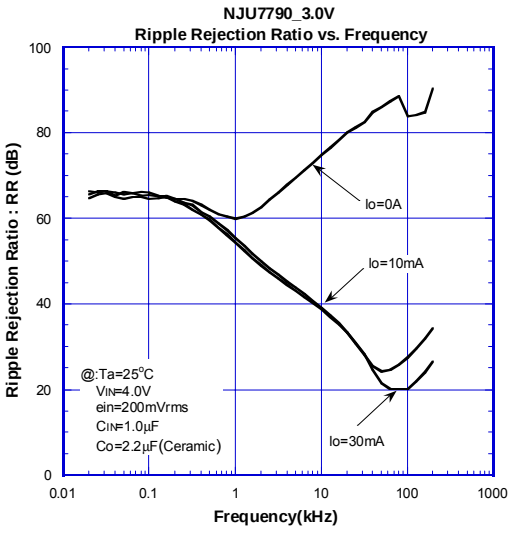
●DC CHARACTERISTICS

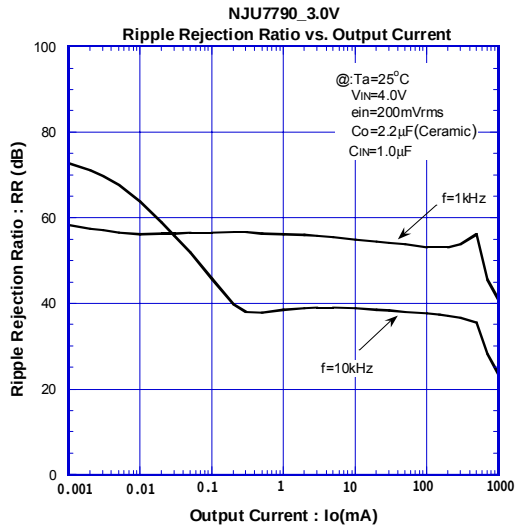


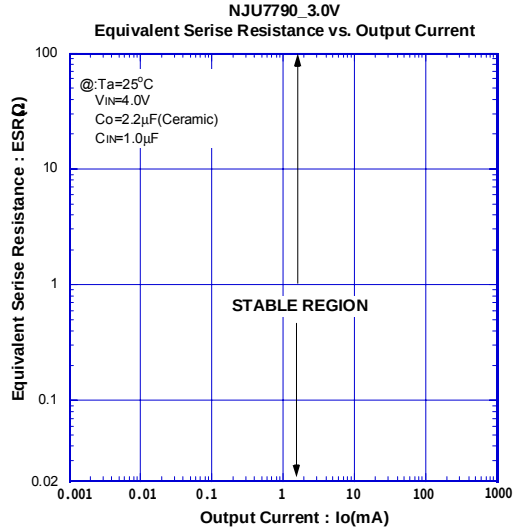


●AC CHARACTERISTICS





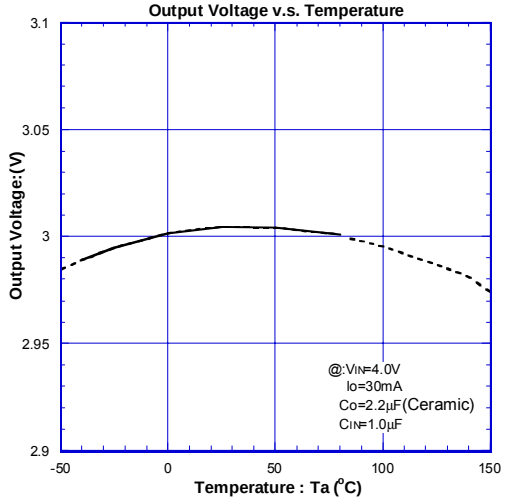




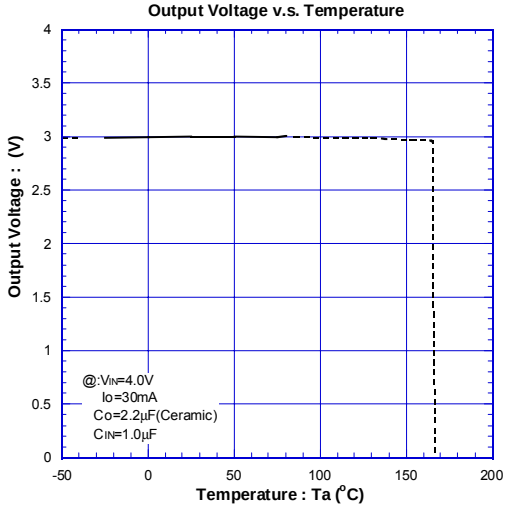
■ TYPICAL CHARACTERISTICS

●TEMPERATURE CHARACTERISTICS

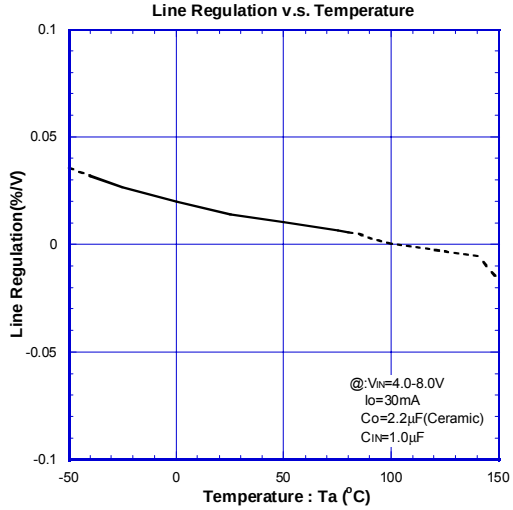
NJU7790_3.0V
Output Voltage v.s. Temperature



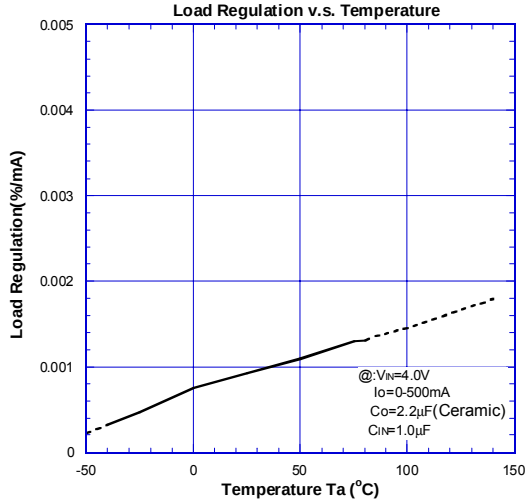
NJU7790_3.0V
Output Voltage v.s. Temperature



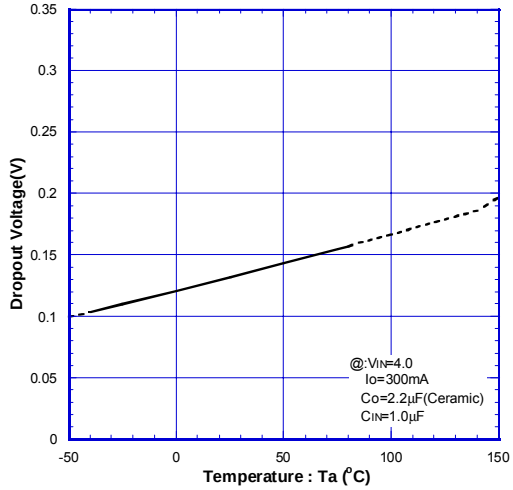
NJU7790_3.0V
Line Regulation v.s. Temperature



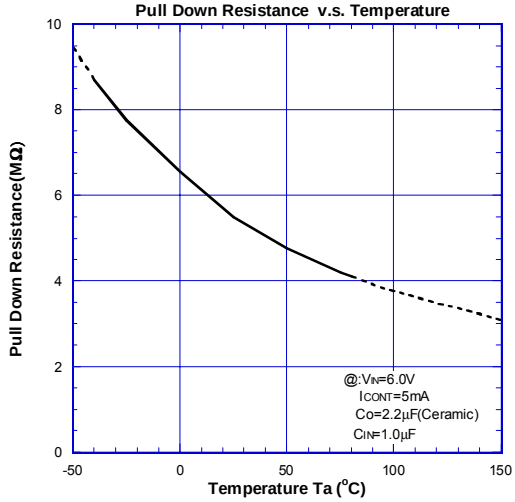
NJU7790_3.0V
Load Regulation v.s. Temperature



NJU7790_3.0V
Dropout Voltage v.s. Temperature

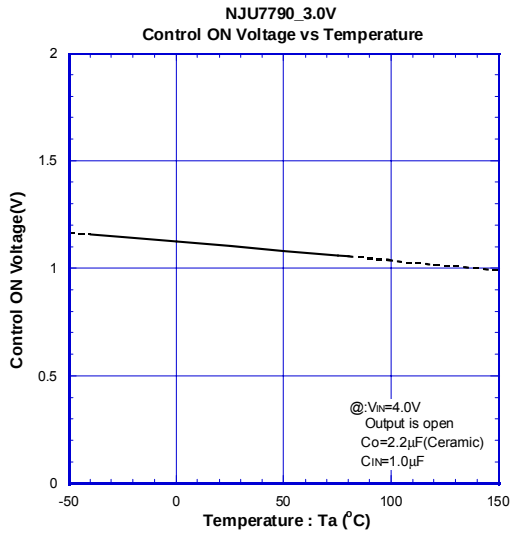


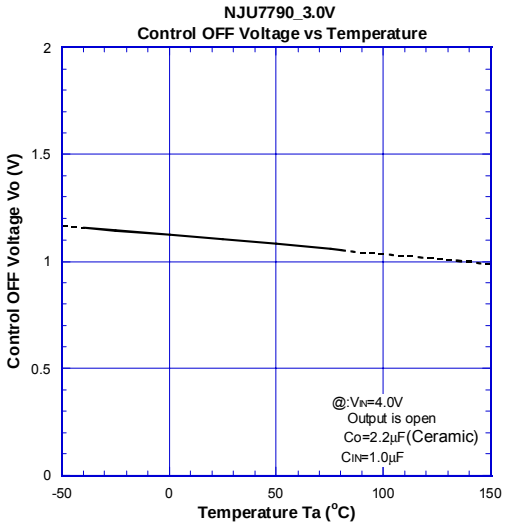
NJU7790_3.0V
Pull Down Resistance v.s. Temperature



■ TYPICAL CHARACTERISTICS

●TEMPERATURE CHARACTERISTICS

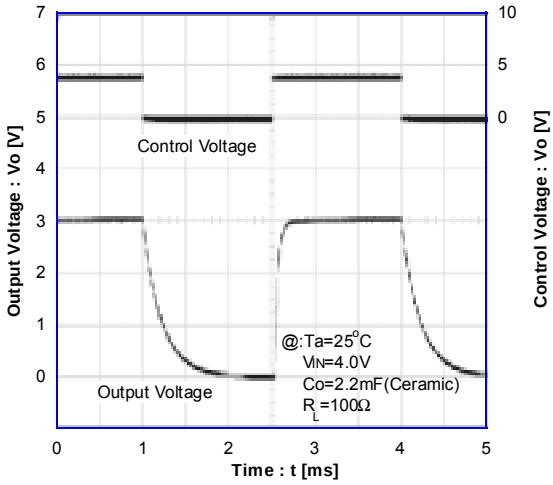




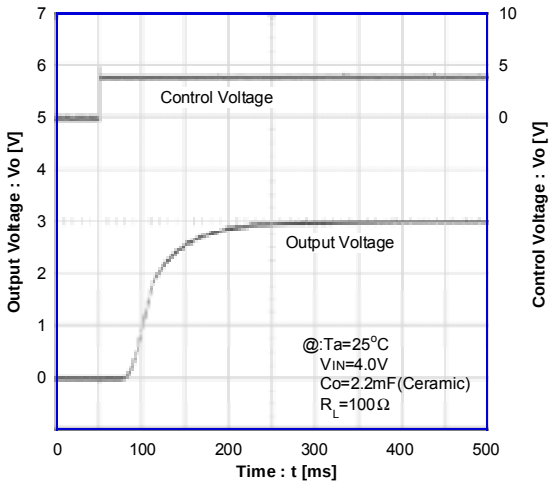
■ TYPICAL CHARACTERISTICS

●TRANSIENT RESPONSE

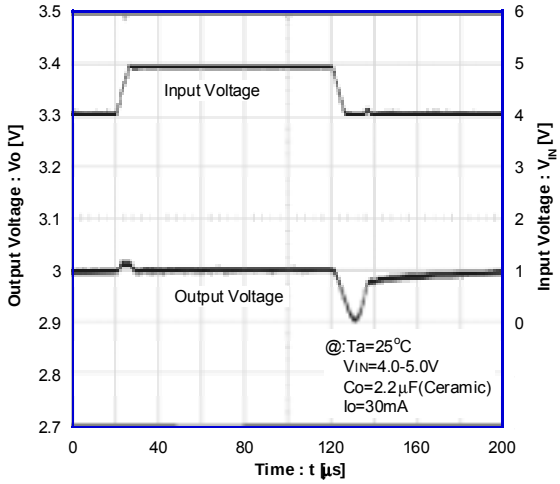
NJU7790_3.0V
ON/OFF Transient Response



NJU7790_3.0V
ON/OFF Transient Response



NJU7790_3.0V
Line Transient Response



NJU7790_3.0V
Load Transient Response