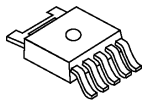
2ch LOW DROPOUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJM2895/96 is a 2ch low dropout voltage regulator with ON/OFF control.

Advanced Bipolar technology achieves low noise, high ripple rejection and low quiescent current.

■ PACKAGE OUTLINE

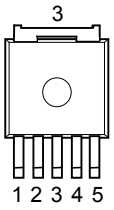


NJM2895/96DL3

■ FEATURES

- High Ripple Rejection 75dB typ. (f=1kHz Vo=3V version)
- Output Noise Voltage Vno=40μVrms typ.
- Output capacitor with 1.0μF ceramic capacitor (Vo≥2.5V)
- Output Current Io(max.)=500mA x 2ch
- High Precision Output Vo±1.0%
- Low Dropout Voltage 0.18V typ. (Io=300mA)
- ON/OFF Control (NJM2895 : ch1/ch2 common, NJM2896 ch2 only)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252-5

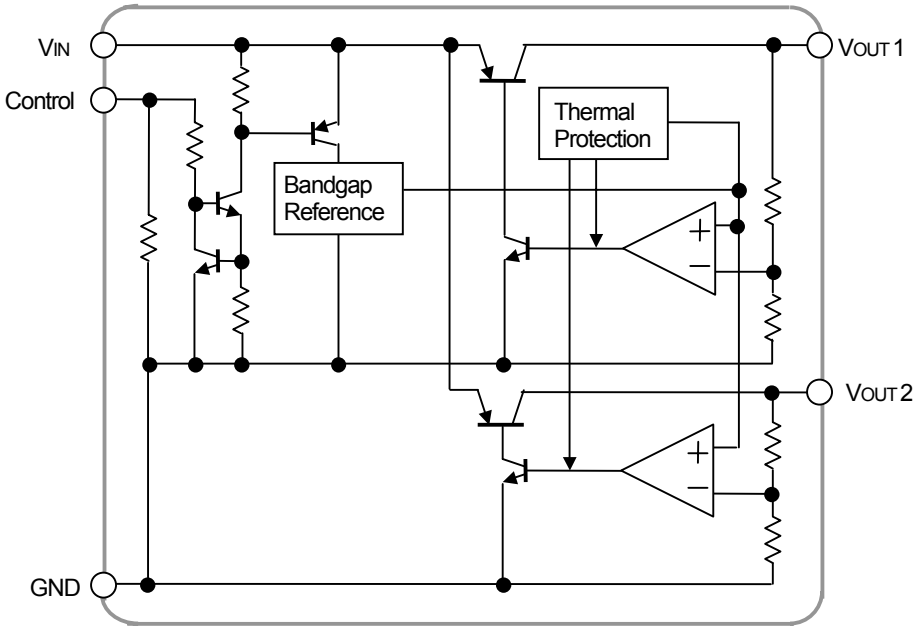
■ PIN CONFIGURATION



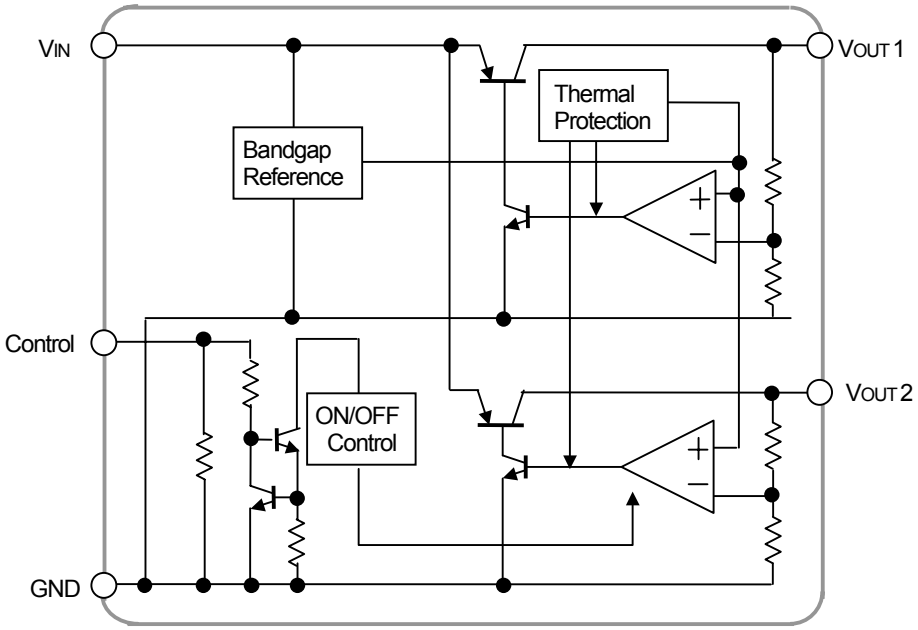
1. V_{OUT} 1
2. V_{IN}
3. GND
4. V_{OUT} 2
5. CONTROL (Active High)

NJM2895/96DL3

■ EQUIVALENT CIRCUIT



NJM2895



NJM2896

■ OUTPUT VOLTAGE RANK LIST

Device Name	V_{OUT}	
	Ch 1	Ch 2
NJM289*DL3-2121	2.1V	2.1V
NJM289*DL3-0303	3.0V	3.0V
NJM289*DL3-0533	5.0V	3.3V
NJM289*DL3-0505	5.0V	5.0V

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+14	V
Control Voltage	V_{CONT}	+14(*1)	V
Power Dissipation	P_D	8(Tc=25°C) 0.8(Ta≤25°C)	W
Operating Temperature	Topr	–40 ~ +85	°C
Storage Temperature	Tstg	–40 ~ +125	°C

(*1): When input voltage is less than +14V, the absolute maximum control voltage is equal to the input voltage.

■ NJM2895

■ ELECTRICAL CHARACTERISTICS (V_{IN}=Vo+1V, C_{IN}=0.33µF, Co=1.0µF (Vo≤2.4V : Co=2.2µF), Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	-	+1.0%	V
Quiescent Current	I_{Q1}	Io=0mA	-	400	600	µA
Quiescent Current at Control OFF	$I_{Q(OFF)}$	V_{CONT}=0V	-	-	100	nA
Output Current	Io	Vo-0.3V	500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6V, Io=30mA	-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA	-	-	0.03	%/mA
Dropout Voltage	ΔV_{I-O}	Io=300mA	-	0.18	0.28	V
Ripple Rejection	RR	ein=200mVrms, f=1kHz, Io=10mA, Vo=3V version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta Vo/\Delta Ta$	Ta=0 ~ 85°C, Io=10mA	-	±50	-	ppm/°C
Output Noise Voltage	V_{NO}	f=10Hz ~ 80kHz, Io=10mA, Vo=3V version	-	40	-	µVrms
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

■ NJM2896

■ ELECTRICAL CHARACTERISTICS (V_{IN}=Vo+1V, C_{IN}=0.33µF, Co=1.0µF (Vo≤2.4V : Co=2.2µF), Ta=25°C)

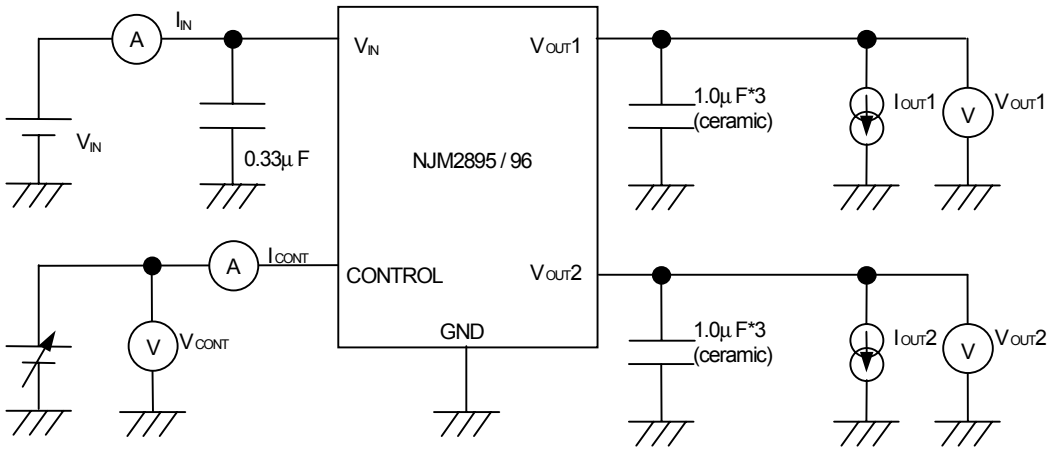
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=30mA	-1.0%	-	+1.0%	V
Quiescent Current 2	I_{Q1}	Io=0mA, V_{CONT}=0V, expect I_{CONT}	-	200	300	µA
Quiescent Current 2	I_{Q2}	Io=0mA, V_{CONT}=0V, expect I_{CONT}	-	400	600	µA
Output Current	Io	Vo-0.3V	500	650	-	mA
Line Regulation	$\Delta Vo/\Delta V_{IN}$	V_{IN}=Vo+1V ~ Vo+6V, Io=30mA	-	-	0.10	%/V
Load Regulation	$\Delta Vo/\Delta Io$	Io=0 ~ 500mA	-	-	0.03	%/mA
Dropout Voltage	ΔV_{I-O}	Io=300mA	-	0.18	0.28	V
Ripple Rejection	RR	ein=200mVrms, f=1kHz, Io=10mA, Vo=3V version	-	75	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta Vo/\Delta Ta$	Ta=0 ~ 85°C, Io=10mA	-	±50	-	ppm/°C
Output Noise Voltage	V_{NO}	f=10Hz ~ 80kHz, Io=10mA, Vo=3V version	-	40	-	µVrms
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

(*2): V_{IN}=Vo+1V means add 1V to higher output voltage.

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.

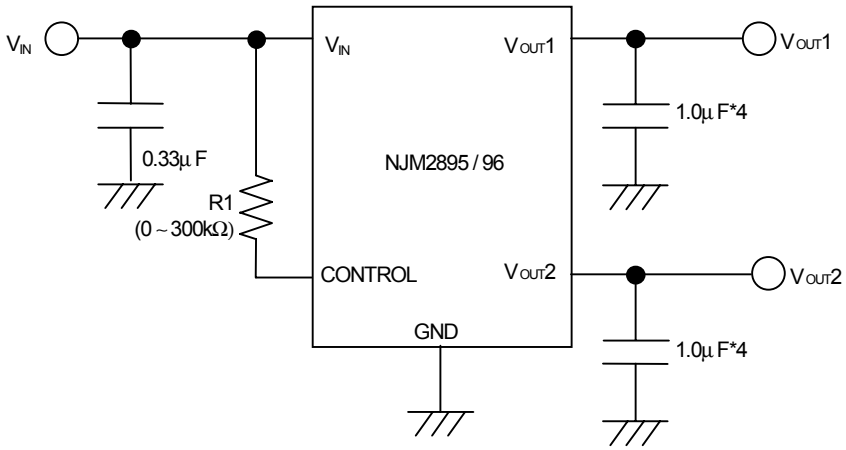
■ TEST CIRCUIT



*3 Vo≤2.4V version: Co=2.2µF(ceramic)

■ TYPICAL APPLICATION

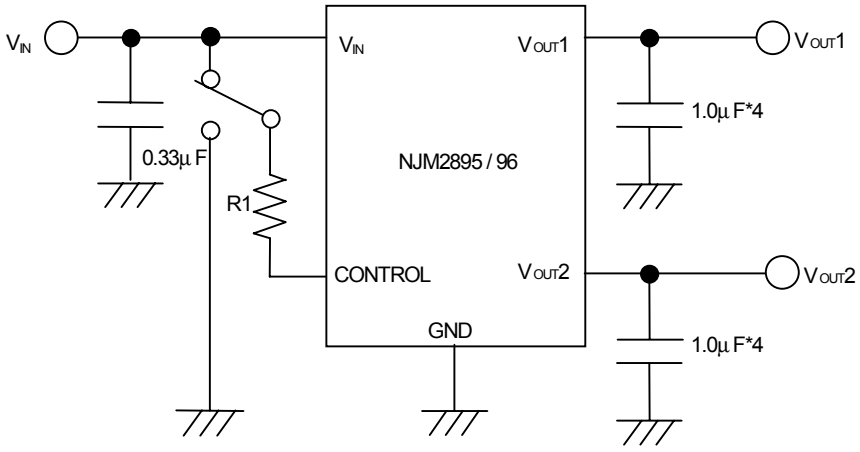
① In the case where ON/OFF Control is not required:



*4 Vo≤2.4V version: Co=2.2µF

Connect control terminal to V_{IN} terminal

② In use of ON/OFF CONTROL:



*4 Vo≤2.4V version: Co=2.2µF

State of control terminal:

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

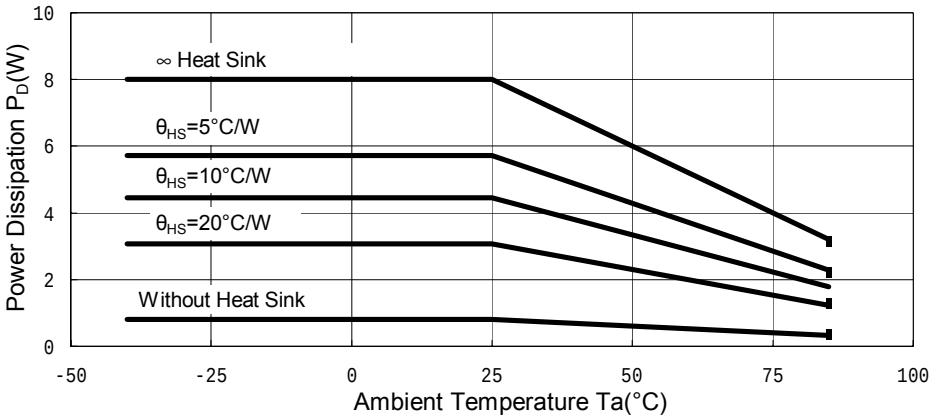
∗In the case of using a resistance "R" between V_{IN} and control.

The current flow into the control terminal while the IC is ON state (I_{CONT}) can be reduced when a pull up resistance "R" is inserted between V_{IN} and the control terminal.

The minimum control voltage for ON state ($V_{CONT\,(ON)}$) is increased due to the voltage drop caused by I_{CONT} and the resistance "R". The I_{CONT} is temperature dependence as shown in the "Control Current vs. Temperature" characteristics. Therefore, the resistance "R" should be carefully selected to ensure the control voltage exceeds the $V_{CONT\,(ON)}$ over the required temperature range.

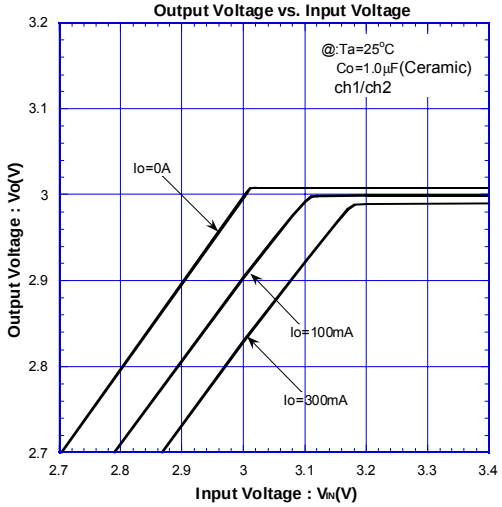
■ POWER DISSIPATION VS. AMBIENT TENPERATURE

NJM2895/96DL3
(Topr=-40~+85°C,Tj=+125°C,P_D=8W(T_C=25°C),P_D=0.8W(Ta≤25°C))

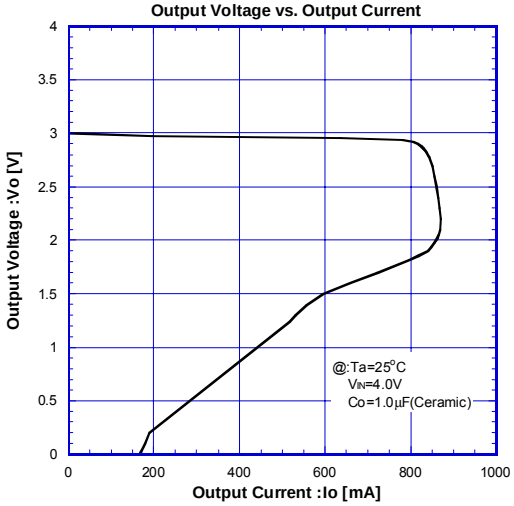


■ ELECTRICAL CHARACTERISTICS

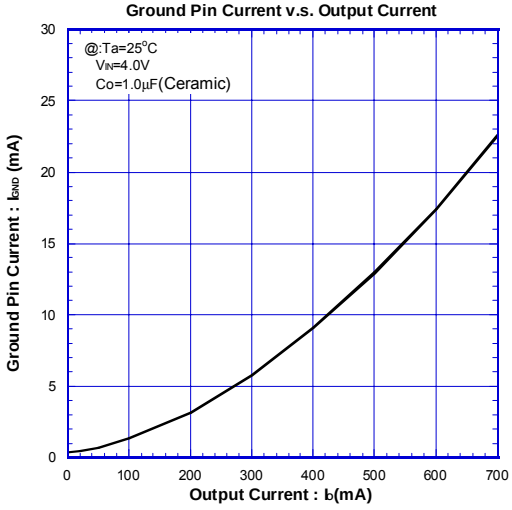
NJM2895/96_3.0V
Output Voltage vs. Input Voltage



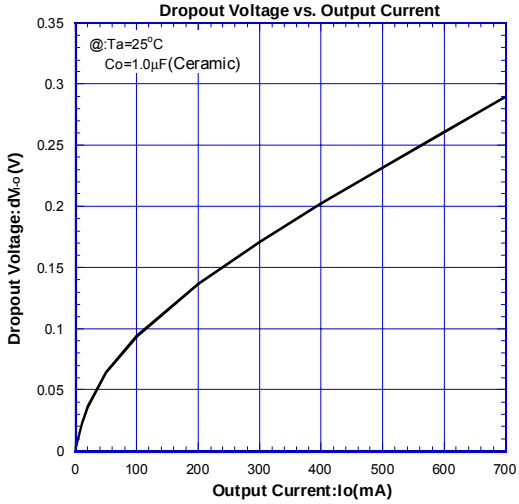
NJM2895/96_3.0V
Output Voltage vs. Output Current



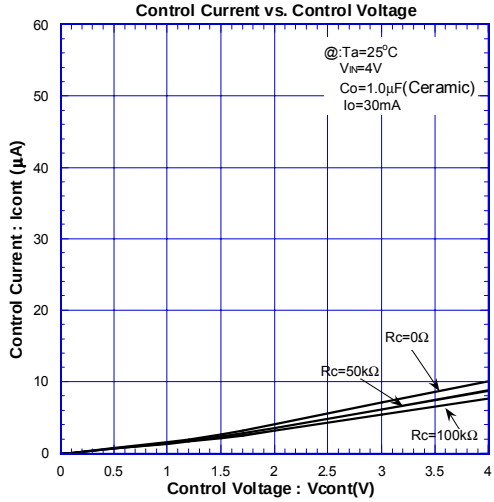
NJM2895/96_3.0V
Ground Pin Current v.s. Output Current



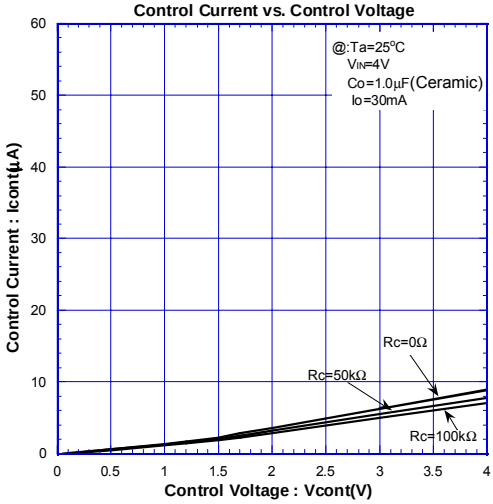
NJM2895/96_3.0V
Dropout Voltage vs. Output Current



NJM2895_3.0V/3.0V
Control Current vs. Control Voltage

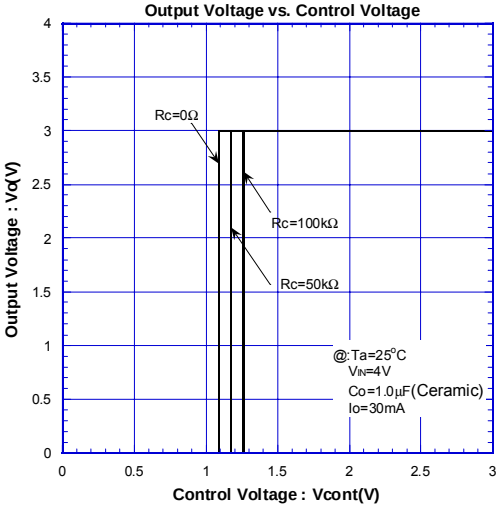


NJM2896_3.0V/3.0V
Control Current vs. Control Voltage

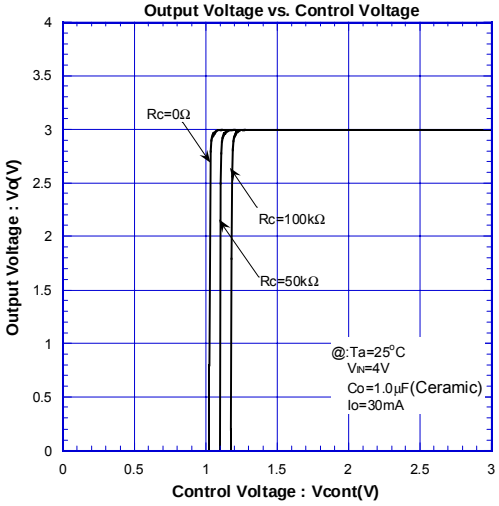


■ ELECTRICAL CHARACTERISTICS

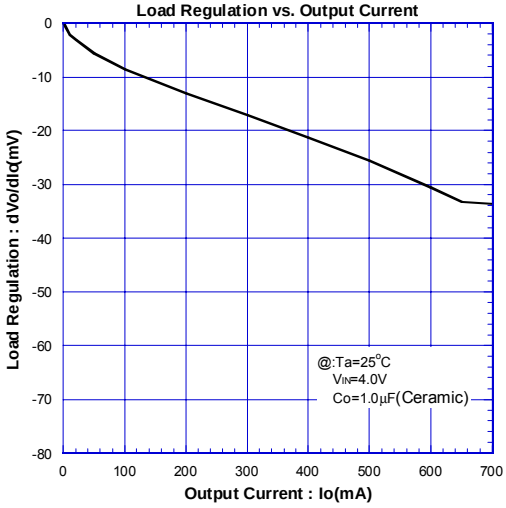
NJM2895_3.0V/3.0V
Output Voltage vs. Control Voltage



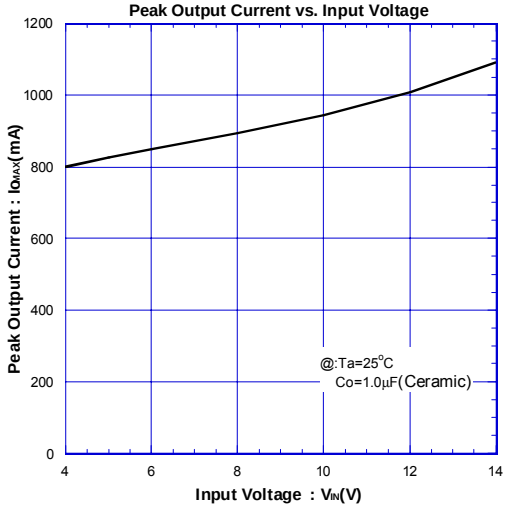
NJM2896_3.0V/3.0V
Output Voltage vs. Control Voltage



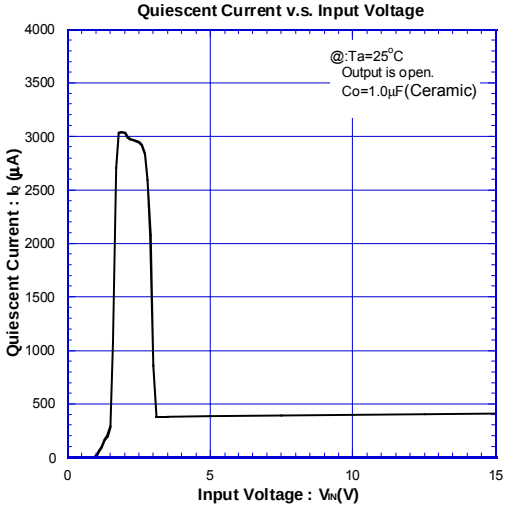
NJM2895/96_3.0V
Load Regulation vs. Output Current



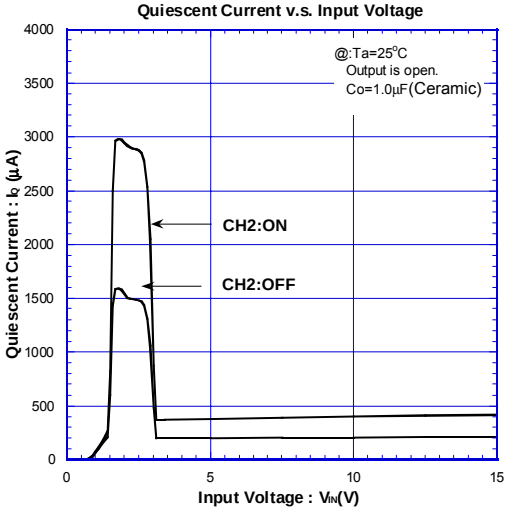
NJM2895/96_3.0V
Peak Output Current vs. Input Voltage



NJM2895_3.0V/3.0V
Quiescent Current v.s. Input Voltage

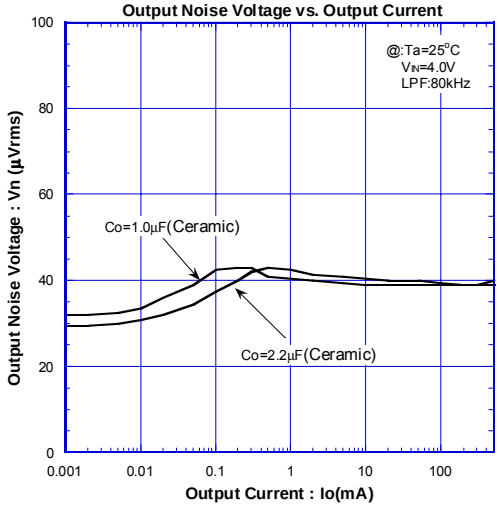


NJM2896_3.0V/3.0V
Quiescent Current v.s. Input Voltage

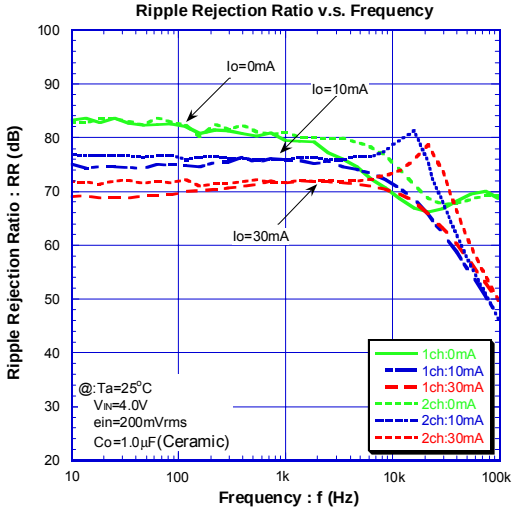


■ ELECTRICAL CHARACTERISTICS

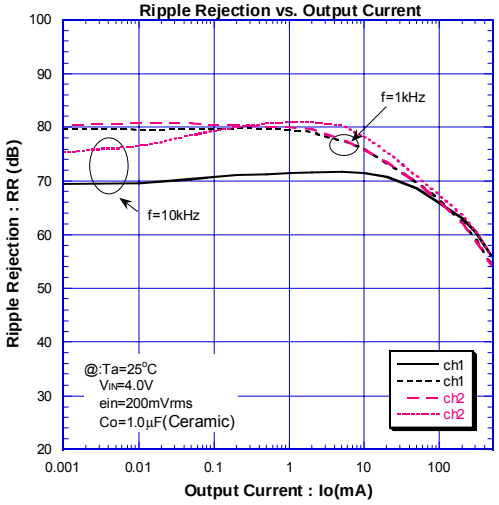
NJM2895/96_3.0V
Output Noise Voltage vs. Output Current



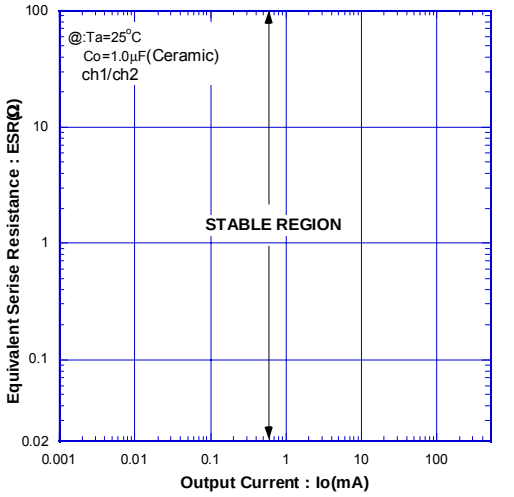
NJM2895/96_3.0V/3.0V
Ripple Rejection Ratio v.s. Frequency



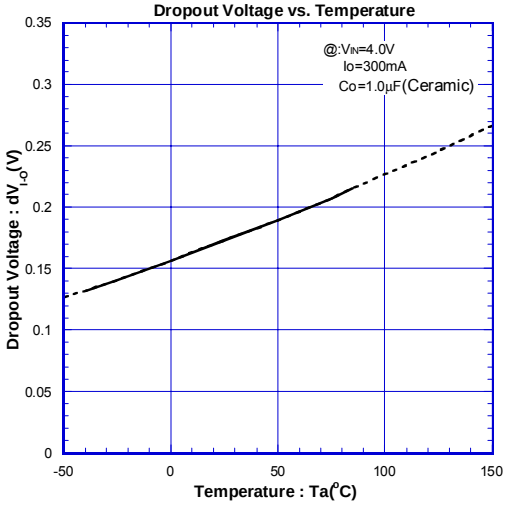
NJM2895/96_3.0V/3.0V
Ripple Rejection vs. Output Current



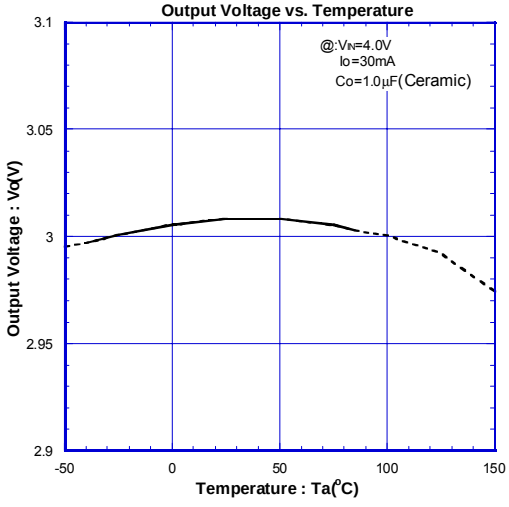
NJM2895/96_3.0V/3.0V
Equivalent Serise Resistance vs. Output Current



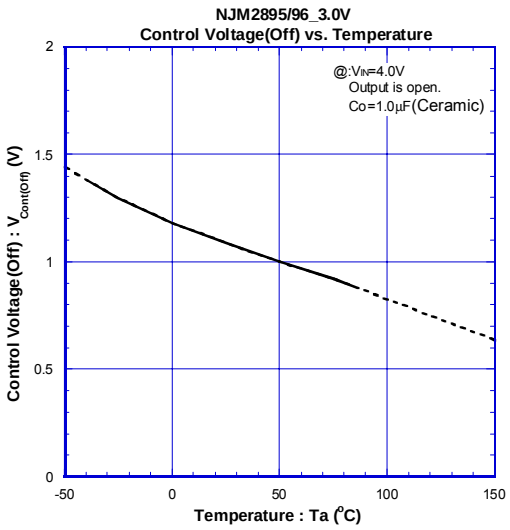
NJM2895/96_3.0V
Dropout Voltage vs. Temperature

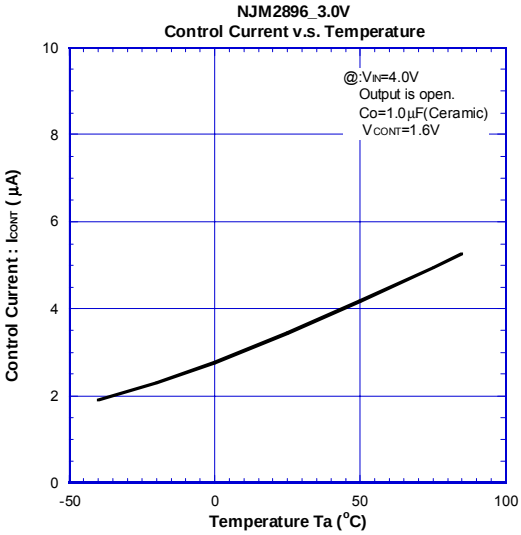


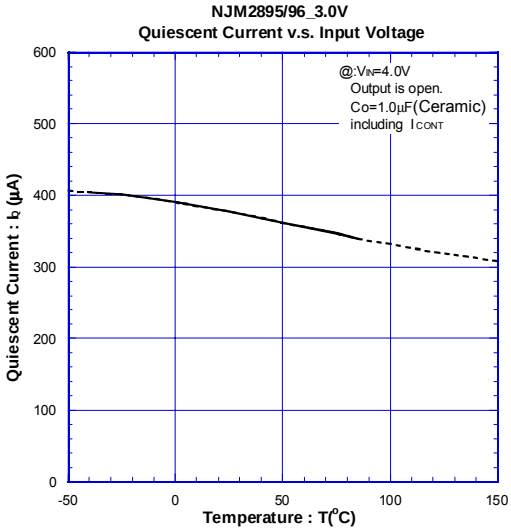
NJM2895/96_3.0V
Output Voltage vs. Temperature

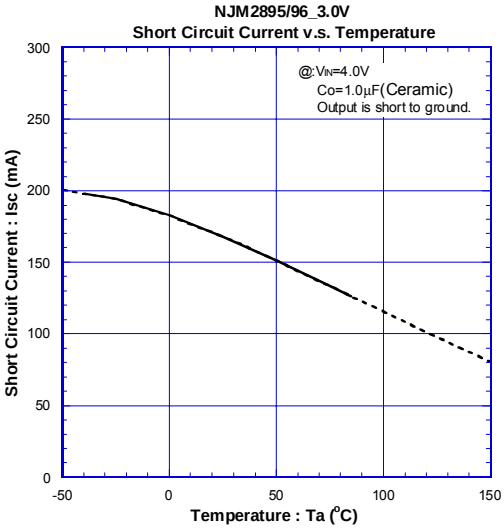


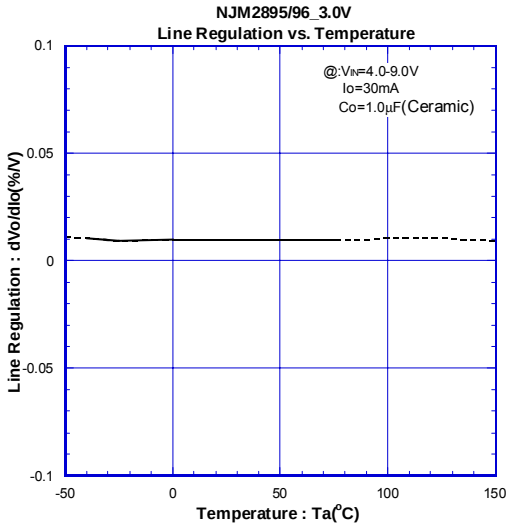
■ ELECTRICAL CHARACTERISTICS

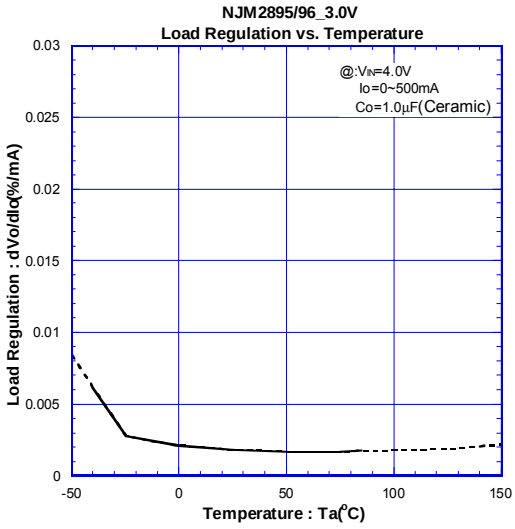






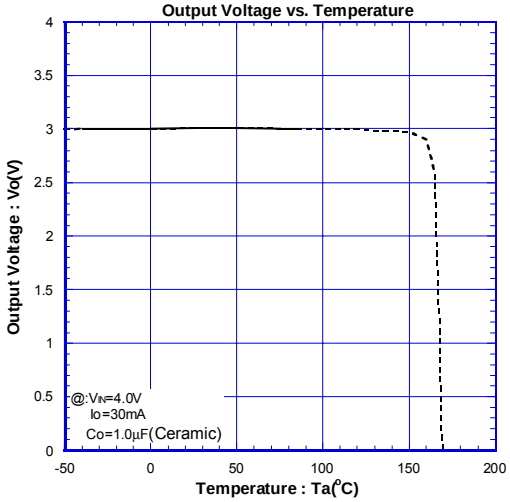




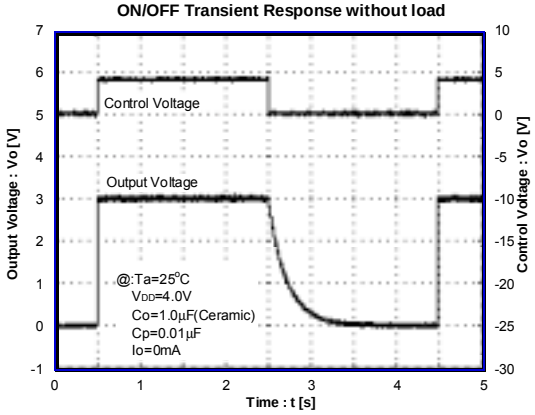


■ ELECTRICAL CHARACTERISTICS

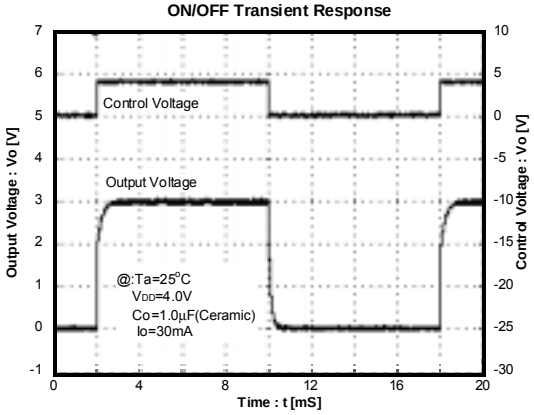
NJM2895/96_3.0V
Output Voltage vs. Temperature



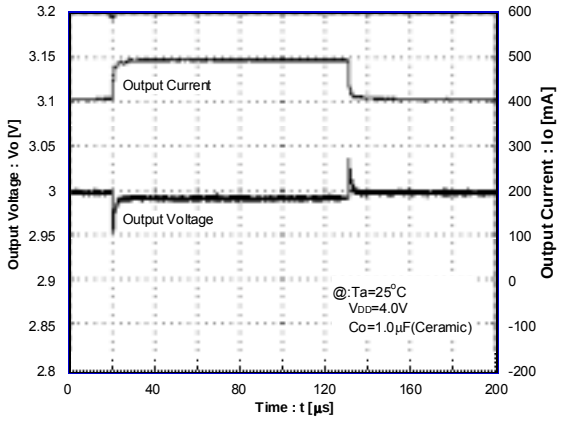
NJM2895/96_3.0V
ON/OFF Transient Response without load



NJM2895/96_3.0V
ON/OFF Transient Response



NJM2895/96_3.0V
Load Transient Response



NJM2895/96_3.0V
Input Transient Response