

## LOW DROPOUT VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The NJM2870 is low dropout voltage regulator designed for cellular phone application.

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

### ■ PACKAGE OUTLINE

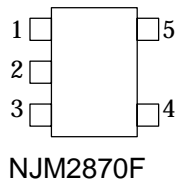


NJM2870F

### ■ FEATURES

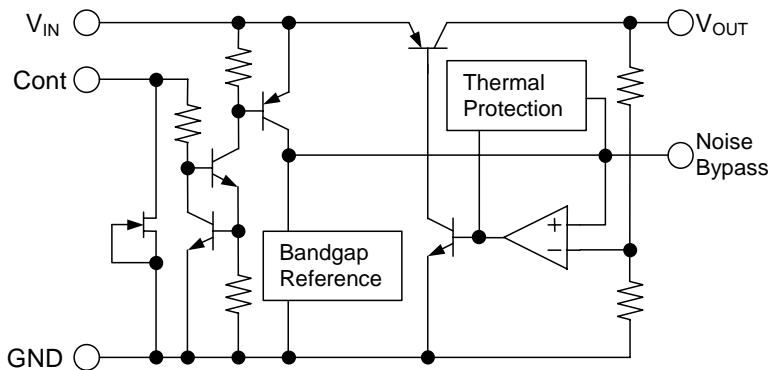
- High Ripple Rejection       $56\text{dB} \leq \text{RR} \text{ (DC} < f < 60\text{kHz)}$   
66dB typ. (f=100Hz)  
60dB typ. (f=1kHz)
- Output Noise Voltage       $V_{no}=30\mu\text{V} \text{ (Cp}=0.01\mu\text{F)}$
- Output Current               $I_o(\text{max.})=150\text{mA}$
- High Precision Output       $V_o \pm 2\%$
- Low Dropout Voltage         $\Delta V_{I-O}=0.12\text{V typ. (I}_o=60\text{mA, } V_o \geq 1.8\text{V)}$
- Input Voltage range        +2~+14V ( $V_o=1.5\text{V}$  Version)
- ON/OFF Control            (Active High)
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline              MTP5 (MTP5: 2.8×2.9×1.1)

### ■ PIN CONFIGURATION



- PIN FUNCTION**
1. CONTROL (Active High)
  2. GND
  3. NOISE BYPASS
  4.  $V_{OUT}$
  5.  $V_{IN}$

### ■ EQUIVALENT CIRCUIT



### ■ OUTPUT VOLTAGE RANK LIST

Device Name	$V_{OUT}$
NJM2870F15	1.5V
NJM2870F18	1.8V
NJM2870F19	1.9V
NJM2870F02	2.0V
NJM2870F21	2.1V
NJM2870F25	2.5V
NJM2870F27	2.7V

Device Name	$V_{OUT}$
NJM2870F28	2.8V
NJM2870F285	2.85V
NJM2870F29	2.9V
NJM2870F03	3.0V
NJM2870F31	3.1V
NJM2870F32	3.2V
NJM2870F33	3.3V

Device Name	$V_{OUT}$
NJM2870F34	3.4V
NJM2870F35	3.5V
NJM2870F38	3.8V
NJM2870F04	4.0V
NJM2870F45	4.5V
NJM2870F46	4.6V
NJM2870F05	5.0V

**■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)**

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	+14	V
Control Voltage	$V_{CONT}$	+14(note 1)	V
Power Dissipation	$P_D$	200	mW
Operating Temperature	$T_{opr}$	-40 ~ +85	°C
Storage Temperature	$T_{stg}$	-40 ~ +125	°C

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

**■ ELECTRICAL CHARACTERISTICS ( $V_{IN}=V_o+1V$ ,  $C_{IN}=0.1\mu F$ ,  $C_o=4.7\mu F$ ,  $C_p=0.01\mu F$ ,  $T_a=25^\circ C$ )**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_o$	$I_o=30mA$	-2%	-	+2%	V
Quiescent Current	$I_Q$	$I_o=0mA$ , expect $I_{cont}$	-	200	300	$\mu A$
Quiescent Current at Control OFF	$I_{Q(OFF)}$	$V_{CONT}=0V$	-	-	100	nA
Output Current	$I_o$	$V_o-0.3V$	150	200	-	mA
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=V_o+1V \sim V_o+6V$ , $I_o=30mA$	-	-	0.10	%/V
Load Regulation	$\Delta V_o/\Delta I_o$	$I_o=0 \sim 100mA$	-	-	0.03	%/mA
Dropout Voltage	$\Delta V_{I-O}$	$I_o=60mA$	-	0.12	0.2	V
Ripple Rejection	RR	$e_{in}=200mV_{rms}$ , $f=1kHz$ , $I_o=10mA$ $V_{IN}=V_o+2V$ , $V_o=3V$ Version	-	60	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$	$T_a=0-85^\circ C$ , $I_o=10mA$ , $V_o=3V$ Version	-	0.2	-	mV/°C
Output Noise Voltage	$V_{NO}$	$f=10Hz-80kHz$ , $I_o=10mA$ , $V_o=3V$ Version	-	30	-	$\mu V_{rms}$
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

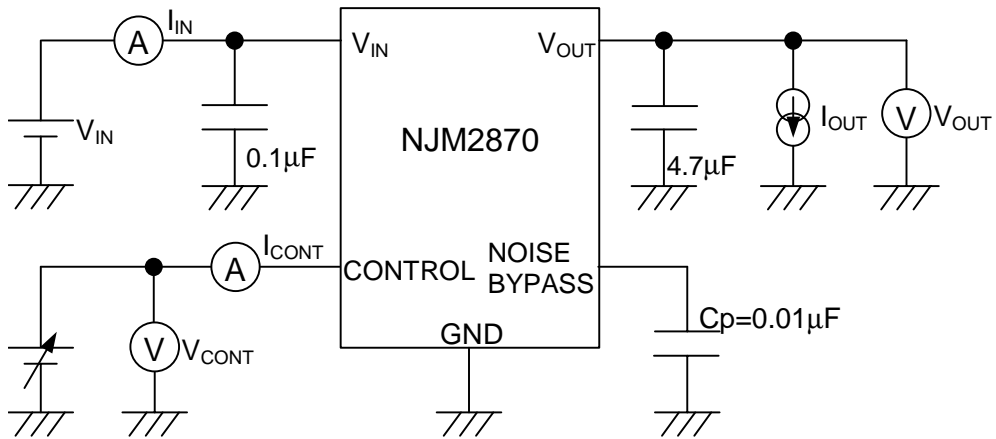
(note 2)Please confirm the specification separately because some parameters depend on output voltage.

**■ ELECTRICAL CHARACTERISTICS**

( $V_o=1.5V$  Version,  $V_{IN}=2.4V$ ,  $C_{IN}=0.1\mu F$ ,  $C_o=4.7\mu F$ ,  $C_p=0.01\mu F$ ,  $T_a=25^\circ C$ )

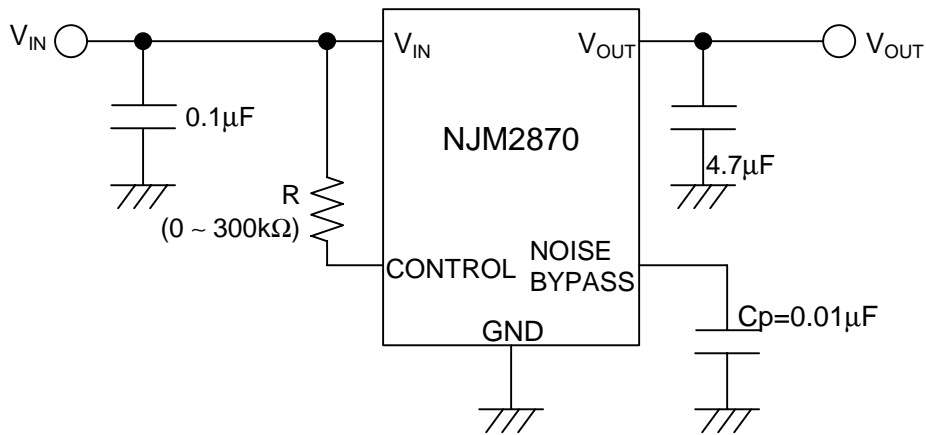
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_o$	$I_o=30mA$	-2%	-	+2%	V
Quiescent Current	$I_Q$	$I_o=0mA$ , expect $I_{cont}$	-	200	300	$\mu A$
Quiescent Current at Control OFF	$I_{Q(OFF)}$	$V_{CONT}=0V$	-	-	100	nA
Output Current	$I_o$	$V_o-0.3V$	150	200	-	mA
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=V_o+1V \sim V_o+6V$ , $I_o=30mA$	-	-	0.10	%/V
Load Regulation	$\Delta V_o/\Delta I_o$	$I_o=0 \sim 100mA$	-	-	0.03	%/mA
Ripple Rejection	RR	$e_{in}=200mV_{rms}$ , $f=1kHz$ , $I_o=10mA$ $V_{IN}=V_o+2V$	-	64	-	dB
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T_a$	$T_a=0-85^\circ C$ , $I_o=10mA$	-	0.13	-	mV/°C
Output Noise Voltage	$V_{NO}$	$f=10Hz-80kHz$ , $I_o=10mA$ ,	-	15	-	$\mu V_{rms}$
Control Voltage for ON-state	$V_{CONT(ON)}$		1.6	-	-	V
Control Voltage for OFF-state	$V_{CONT(OFF)}$		-	-	0.6	V

■ TEST CIRCUIT



■ TYPICAL APPLICATION

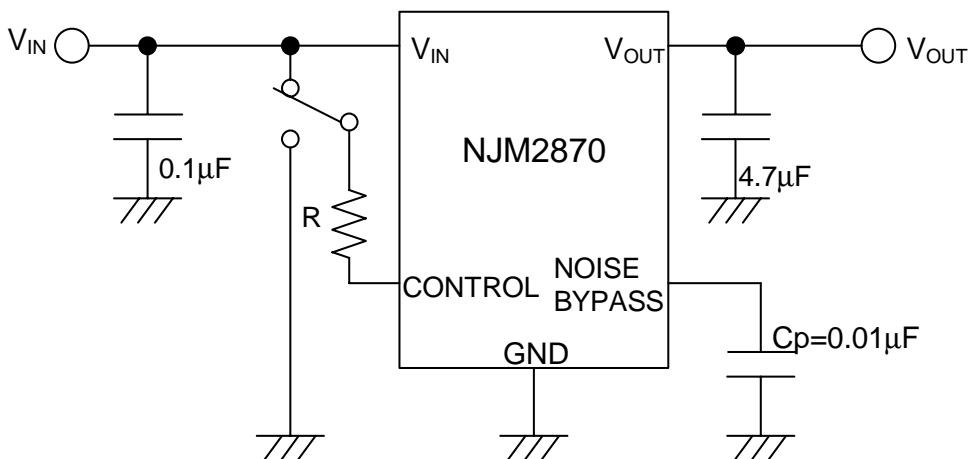
① In the case where ON/OFF Control is not required:



Connect control terminal(1Pin) to V<sub>IN</sub> terminal(5Pin)

In case a resistance “R” is used, the quiescent current will be decreased. However, the but minimum operating voltage will be increase as well. Please refer to a figure of Output Voltage vs. Control Voltage.

② In use of ON/OFF CONTROL:



In case the control terminal is “H”, the output is enabled.

The control terminal is “L” or “open”, the output is disabled.

★Noise bypass Capacitance Cp

Noise bypass capacitance Cp reduces noise generated by band-gap reference circuit.

Noise level and ripple rejection will be improved when larger Cp is used. Please refer to the typical characteristics to determine the value.

Use of smaller Cp value may induce oscillation.

Please make sure to use Cp value of greater than 0.01uF to avoid the problem.

**[CAUTION]**

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