VOLTAGE CONVERTER

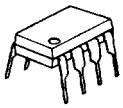
■ GENERAL DESCRIPTION

The NJU7662 is a voltage converter incorporated CR oscillator, voltage-level-shifter and power-MOS, which generates a polarity-converted negative voltage or twofold voltage of an operating voltage ranging from +1.5 to +10V.

The application circuit of negative voltage converter requires only two capacitors, and positive twofold voltage converter requires two capacitors, two resistors and one diode as external components.

The oscillation frequency of the internal oscillator is 10kHz and the negative voltage converter (on no-load condition) achieves extremely high-efficiency voltage conversion rate of 99.9%.

■ PACKAGE OUTLINE



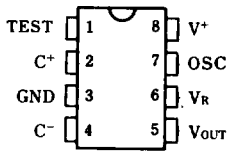
NJU7662D

NJU7662M

■ FEATURES

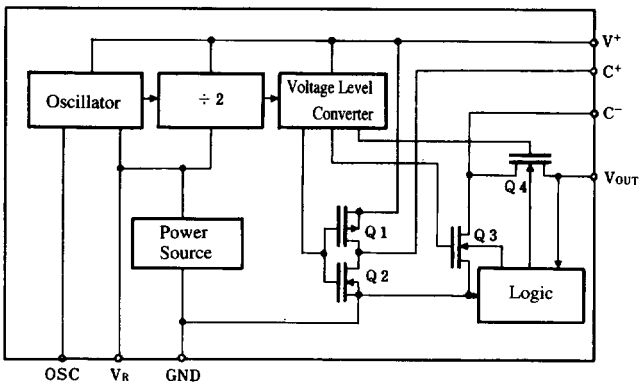
- Polarity-converted Negative Voltage Output
- Twofold Positive Voltage Output
- Operating Voltage --- + 4.5 to +20.0V
- High-efficiency Voltage Conversion Rate-- 99.9%
  (No-load, Negative Voltage Converter)
- High-efficiency Power Conversion Rate-- 96%
  (Negative Voltage Converter)
- Cascade Connection Available
  2n-1 times voltage outputs for negative voltage
  2n times voltage outputs for positive voltage
- Few External Components
  --- 2 Capacitors, (Negative Voltage Converter)
  --- 2 Capacitors, 2 Resistors and 1 Diode
  (Positive Voltage Converter)
- Package Outline DIP / DMP 8
- C-MOS Technology

■ PIN CONFIGURATION



NJU7662

■ BLOCK DIAGRAM



■ TERMINAL DESCRIPTION

NO.	SYMBOL	FUNCTION
1	TEST	Testing Terminal (Normally,non connection)
2	C^+	Charge Pump Capacitor (+) Connecting Terminal
3	GND	Ground Terminal
4	C^-	Charge Pump Capacitor (−) Connecting Terminal
5	V_{OUT}	Voltage Output Terminal
6	V_R	Voltage Regulator Control Terminal
7	OSC	Oscillation Capacitor Connecting Terminal
8	V^+	Power Supply Terminal (+)

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	22	V
Input Voltage	V_{IN}	−0.3～ (V^++0.3) @V^+<7 (V^+−7)～(V^++0.3) @V^+>7	V
Output Short		CONTINUITY @V^+<5.5	
Power Dissipation	P_D	(DIP−8) 500 (DMP−8) 300	mW
Operating Temperature Range	T_{opr}	−20～+70	℃
Storage Temperature Range	T_{stg}	−65～+150	℃

■ ELECTRICAL CHARACTERISTICS (Negative Voltage Output)

(Ta=25℃, V^+=15V, C_{OSC}=0)

PARAMETER	SYMBOL	CONDITIONS		MIN.	TYP.	MAX.	UNIT
Operating Current	I^+_1	R_L∞, V_R=OPEN			250	600	μA
	I^+_2	V^+=5V, R_L∞	V_R=GND		20	150	μA
Operating Voltage	V^+_{HI}	R_L=10kΩ	V_R=OPEN	5.5		20	V
	V^+_{LO}		V_R=GND	4.5		6	V
Output Resistance	R_{O1}	I_{OUT}=20mA	V_R=OPEN		60	100	Ω
(Note 1)	R_{O2}	V^+=5V, I_{OUT}=3mA, V_R=GND			125	200	Ω
Oscillation Frequency	F_O				10		kHz
Power Conversion Rate	P_{EF}	R_L=2kΩ		93	96		%
Voltage Conversion Rate	V_{EF}	R_L=∞		97	99.9		%
Oscillation Terminal	Iosc1	V^+=15V, (V_{OSC}=8～15V)			4.0		μA
Input Current	Iosc2	V^+=5V, (V_{OSC}=0～5)			0.5		μA

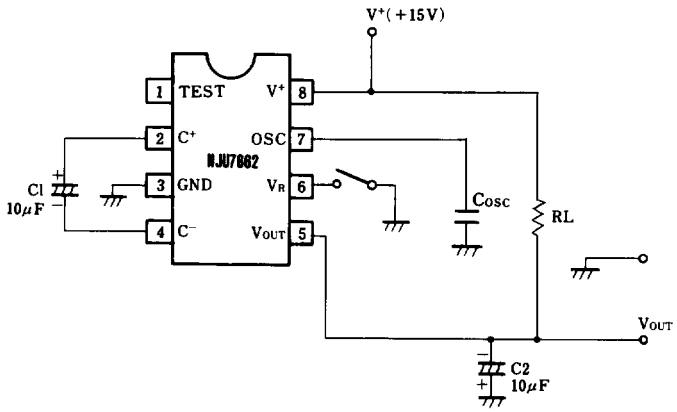
(Note 1) The twofold positive converter requires 100Ω series resistor on power source terminal, therefore the output resistance increases to 200Ω.

■ MEASUREMENT CIRCUIT

The measurement circuit diagram of negative voltage converter is shown bellow.
No. 6 terminal must connect to GND or Open according to the operating voltage as follows :

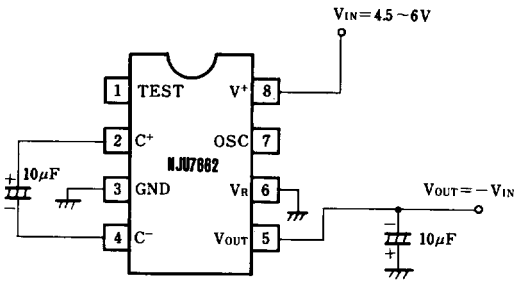
$V^+ < 6V$.....Connect to GND
$V^+ \geqq 6V$.....OPEN

The oscillation frequency can be lowered by connecting external capacitor on the No.7 terminal, furthermore it can be also driven by external clock generator.

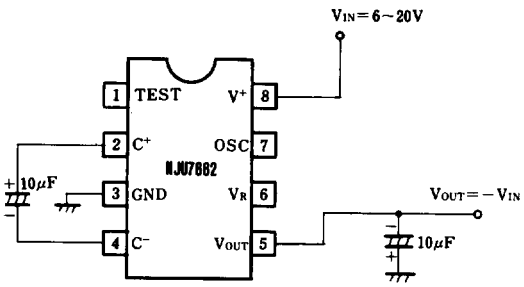


■ APPLICATION CIRCUITS

(1-1) Negative Voltage Output 1
4.5 to 6.0V operation



(1-2) Negative Voltage Output 2
6.0 to 20.0V operation



(Note 2) No.6 terminal must connect to GND or Open according to the operating voltage as follows :

$V^+ < 6V$.....Connect to GND
$V^+ \geqq 6V$.....OPEN

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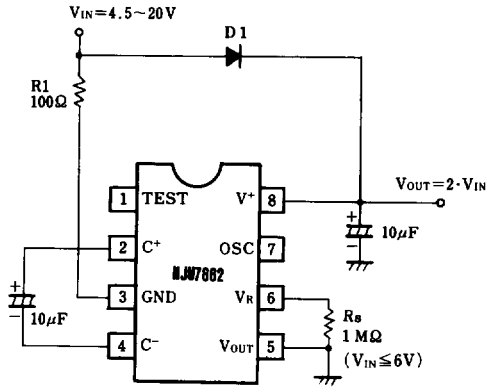
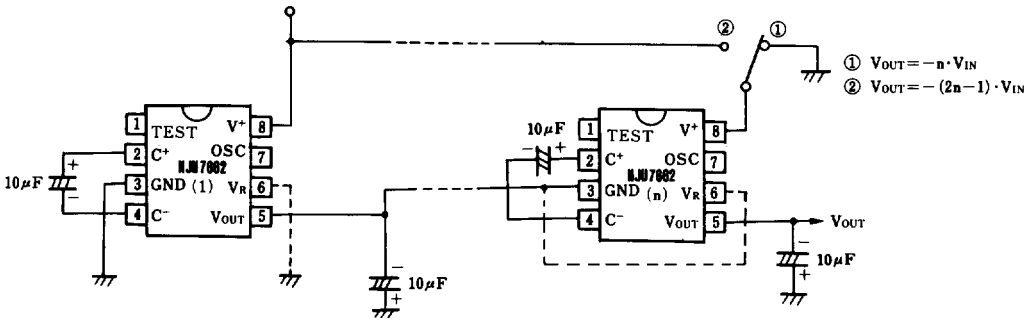
(2) Twofold Positive Voltage Output



(Note 3) In the twofold positive voltage output application, R_1, R_S and D1 are required for start-up.

(3) Cascade Connection (Negative Voltage Output)



(Note 4) No.6 terminal must connect to GND or Open according to the operating voltage as follows :

$V^+ < 6V$.....Connect to GND

$V^+ \geqq 6V$.....OPEN

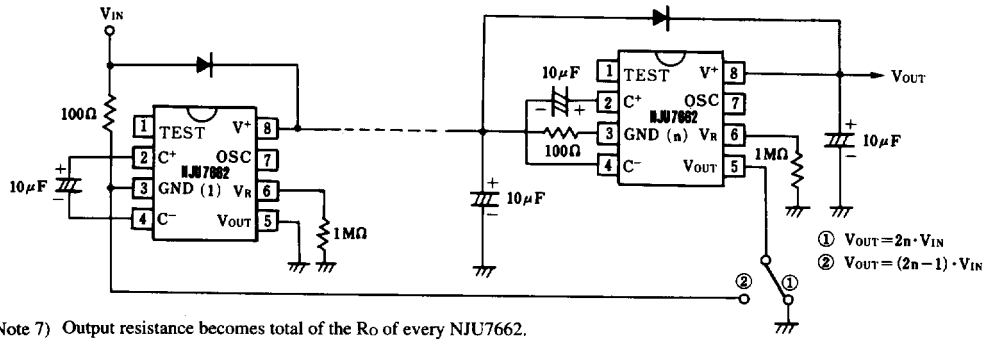
(Note 5) Output resistance becomes total of the Ro of every NJU7662.

(Note 6) In case of the cascade connection (Negative Voltage Output), No.6 terminals (after second IC's) must connect as follows, according to V^+ - GND Voltage.

V^+ - GND< 6.0V.....GND

V^+ - GND≧ 6.0V.....OPEN

(4) Cascade Connection (Positive Voltage Output)

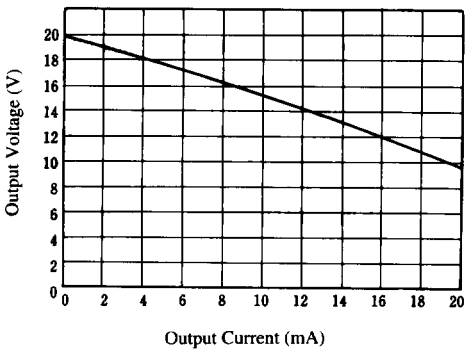


(Note 7) Output resistance becomes total of the Ro of every NJU7662.

■ TYPICAL CHARACTERISTICS

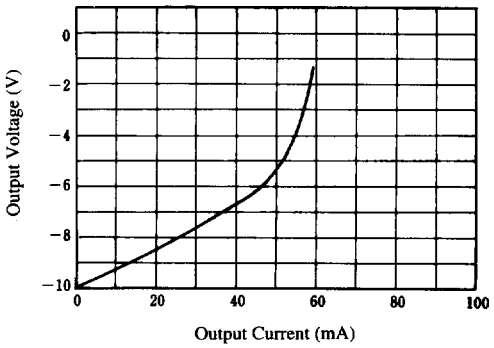
Output Voltage vs. Output Current

V_{IN}=10V (Twofold Voltage)



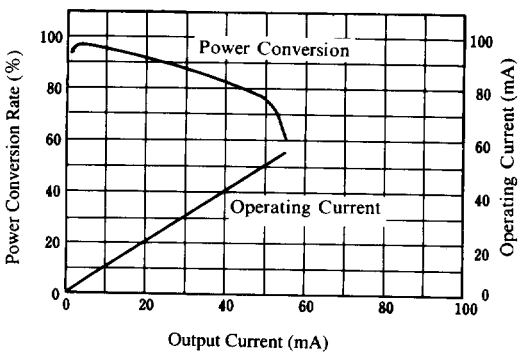
Output Voltage vs. Output Current

V_{IN}=10V (Negative Voltage)



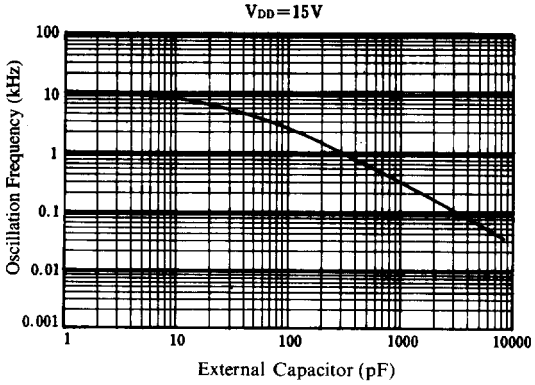
Power Conversion Rate vs. Output Current

V_{IN}=10V



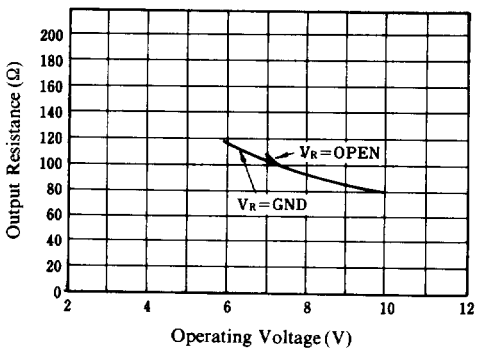
Oscillation Frequency vs. External Capacitor

V_{DD}=15V



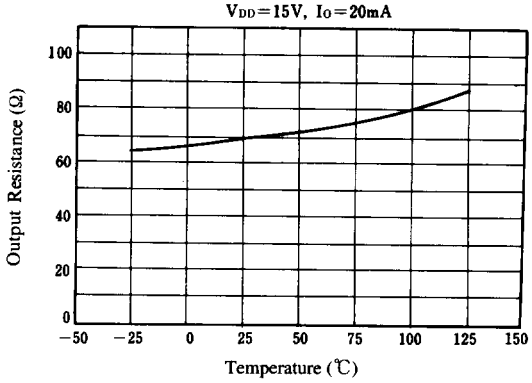
Output Resistance vs. Operating Voltage

I_O=20mA



Output Resistance vs. Temperature

V_{DD}=15V, I_O=20mA



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