

## VOLTAGE CONVERTER FOR GaAs FET

### ■ GENERAL DESCRIPTION

The **NJU7664** is a voltage converter for GaAs FET, which contains CR oscillation circuit and dual operational amplifiers.

The voltage converter is a circuit operated by the charge pumping system, and it generates the negative voltage from the positive power supply. Furthermore the charge pumping capacitor is incorporated.

Both of two operational amplifiers with the gain resistance which is set up at -0dB output the negative voltage by the inverted input voltage.

The NJU7664 realizes to operate the GaAs FET requiring the negative gate biasing.

### ■ PACKAGE OUTLINE

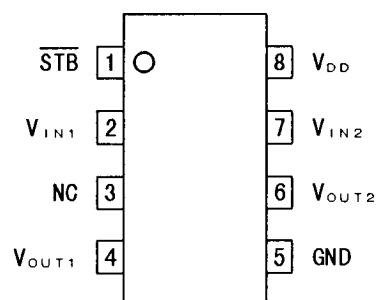


**NJU7664R**

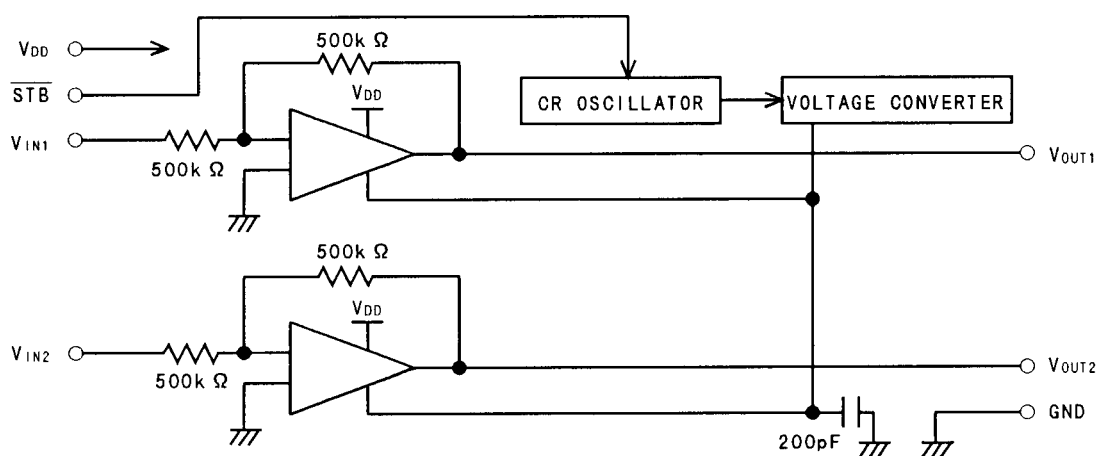
### ■ FEATURES

- Voltage Converter Operated With The Charge Pumping System
- Charge Pump Capacitor Incorporated
- CR Oscillation Circuit Incorporated
- Wide Operating Voltage  $V_{DD} = 2.7V$  to  $5.2V$
- Output Voltage  $0$  to  $-4.0V$  ( $V_{DD} = 5.2V$ )
- Low Operating Current  $1.25mA$  MAX( $V_{DD} = 2.7V$ )
- Stand-by Function
- C-MOS Technology
- Package Outline VSP-8

### ■ PIN CONFIGURATION



### ■ BLOCK DIAGRAM



## ■ TERMINAL DESCRIPTION

No.	SYMBOL	FUNCTION
1	$\overline{\text{STB}}$	Stand-by input terminal H : oscillating L : stop oscillating
2	$V_{\text{IN1}}$	Positive voltage input terminal 1
3	NC	No connection (Electrically open)
4	$V_{\text{OUT1}}$	Negative voltage output terminal 1
5	GND	Ground terminal
6	$V_{\text{OUT2}}$	Negative voltage output terminal 2
7	$V_{\text{IN2}}$	Positive voltage input terminal 2
8	$V_{\text{DD}}$	Power supply terminal

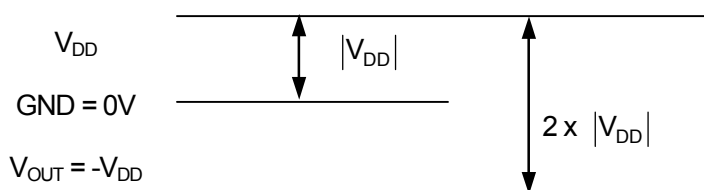
## ■ FUNCTIONAL DESCRIPTION

### • Voltage Converter

The voltage converter is a circuit designed for generating the negative voltage ( $-V_{\text{DD}}$ ) from the positive power supply ( $V_{\text{DD}}$ ).

Because the voltage efficiency is 85% (TYP.), the negative voltage ( $-V_{\text{DD}} \times 0.85$ ) is output typically.

This converter uses the charge pumping system which consists of capacitors and switches.



### • Operational Amplifier

As the input and the feedback resistor of the operational amplifier is incorporated, an uni-multiple inverting amplifier is constructed.

### • Stand-by Function

The NJU7664 turns to the stand-by mode when the  $\overline{\text{STB}}$  terminal level is set to "L". During the stand-by mode, the voltage converter outputs GND voltage and the the operating current is lower as the oscillator stop operating.

## ■ ABSOLUTE MAXIMUM RATINGS

(T<sub>a</sub> = 25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>DD</sub>	5.5	V
Input Voltage	V <sub>IN</sub>	GND -0.5 to V <sub>DD</sub> + 0.5	V
Output Voltage	V <sub>OUT</sub>	-5.0	V
Power Dissipation	P <sub>D</sub>	320	mW
Operating Temperature Range	T <sub>opr</sub>	-30 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

Note1) Decoupling capacitor should be connected between V<sub>DD</sub> and GND due to the stabilized operation for the voltage converter.

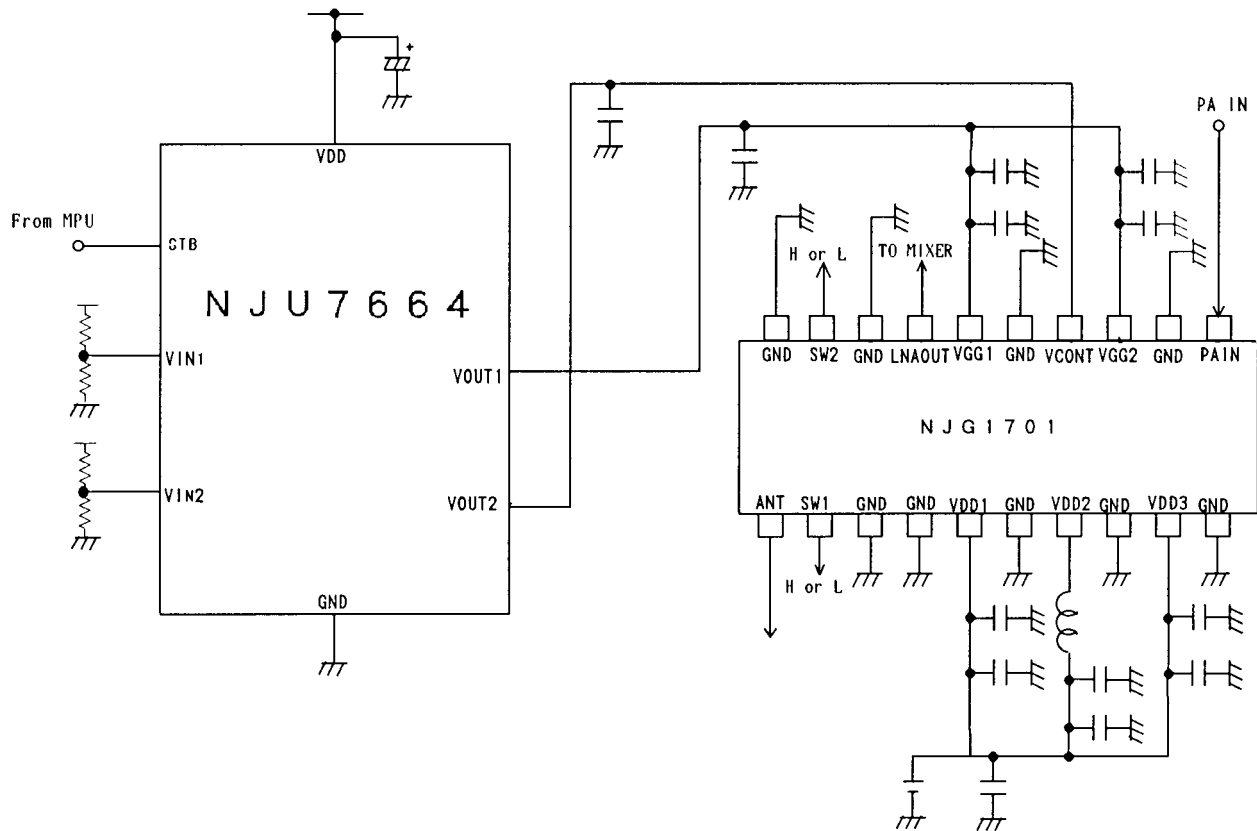
## ■ ELECTRICAL CHARACTERISTICS

### ·DC CHARACTERISTICS

(V<sub>DD</sub> = 2.7V, GND = 0V, T<sub>a</sub> = 25°C)

PARAMETER				SYMBOL	CONDITIONS		MIN.	TYP.	MAX.	UNIT
Operating Voltage				V <sub>DD</sub>			2.7	-	5.2	V
Operating Current				I <sub>DD1</sub>	I <sub>SI1</sub> = -100μA, I <sub>SI2</sub> = -1μA		-	-	1.25	mA
				I <sub>DD2</sub>	No load		-	-	1.0	mA
				I <sub>DD3</sub>	$\overline{\text{STB}}$ = L		-	-	1.0	μA
High Level Input Voltage				V <sub>IH</sub>	$\overline{\text{STB}}$ terminal		0.8V <sub>DD</sub>		V <sub>DD</sub>	V
Low Level Input Voltage				V <sub>IL</sub>	$\overline{\text{STB}}$ terminal		GND		0.2V <sub>DD</sub>	V
Input Current 1				I <sub>IN1</sub>	$\overline{\text{STB}}$ terminal, V <sub>i</sub> = V <sub>DD</sub> or GND		-	-	1.0	μA
Oscillation Frequency				f <sub>OSC</sub>			-	4.0	-	MHz
O P A M P	Input Voltage	V <sub>IN</sub>	V <sub>IN1</sub> , V <sub>IN2</sub> Terminals	V <sub>DD</sub> = 2.7V	0	-	2.0	V		
				V <sub>DD</sub> = 5.2V	0	-	4.0	V		
	Input Current 2	I <sub>IN2</sub>	V <sub>IN1</sub> , V <sub>IN2</sub> Terminals	V <sub>DD</sub> = 2.7V V <sub>IN</sub> = 2.0V	-	-	10.0	μA		
				V <sub>DD</sub> = 5.2v V <sub>IN</sub> = 4.0V	-	-	20.0	μA		
	Output Voltage	V <sub>OUT</sub>	V <sub>OUT1</sub> , V <sub>OUT2</sub> Terminals	V <sub>DD</sub> = 2.7V I <sub>SI</sub> = -100μA	-2.0	-	0	V		
				V <sub>DD</sub> = 2.7V I <sub>SI</sub> = -100μA	-4.0	-	0	V		
	Output Source Current	I <sub>SO</sub>	V <sub>OUT1</sub> , V <sub>OUT2</sub> Terminals		5.0	-	-	μA		
	Output Sink Current	I <sub>SI</sub>	V <sub>OUT1</sub> , V <sub>OUT2</sub> Terminals		-	-	-100	μA		
		I <sub>SI</sub> TOTAL	Total of V <sub>OUT1</sub> , V <sub>OUT2</sub> Term.		-	-	-105	μA		
	Output Ripple Current	V <sub>RR1</sub>	I <sub>SI</sub> = -100μA, C <sub>L</sub> = 0.1μF		-	0.4	-	mV		
		V <sub>RR2</sub>	I <sub>SI</sub> = -5μA, C <sub>L</sub> = 0.1μF		-	0.4	-	mV		
Gain Error	GER			-10	-	10	%			

## ■ APPLICATION CIRCUITS



### [CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.