VOLTAGE CONVERTER

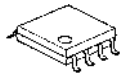
■ GENERAL DESCRIPTION

NJU7660A is a CMOS switched capacitor, voltage converter designed to be an Improved direct replacement of popular 7660/1044.

NJU7660A provides several voltage conversion functions.

The application circuit of negative voltage (V_{OUT}= -V_{IN}) converter requires only two capacitors, and positive twofold voltage(V_{OUT}=2V_{IN}) converter requires two capacitors and two diodes as external components.

■ PACKAGE OUTLINE



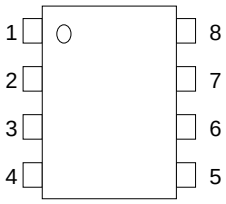
NJU7660AM

NJU7660AV

■ FEATURES

- Full Compatible with NJU7660
- Correspond to MLCC and electrolytic capacitor
- Twofold positive Output
- Polarity-converted Negative voltage Output
- Operating voltage range :+1.5V to +10V(for Negative voltage converter)
  :+3.0V to +10V(for Twofold voltage converter)
- High-efficiency voltage conversion rate :99.9%(No load, Negative voltage converter)
- Few external components :2 capacitors(Negative voltage converter)
  :2 capacitors, 2diode(Twofold voltage converter)
- Package Outline :DMP8, SSOP8
- CMOS Technology

■ PIN CONFIGURATION



NJU7660AM
NJU7660AV

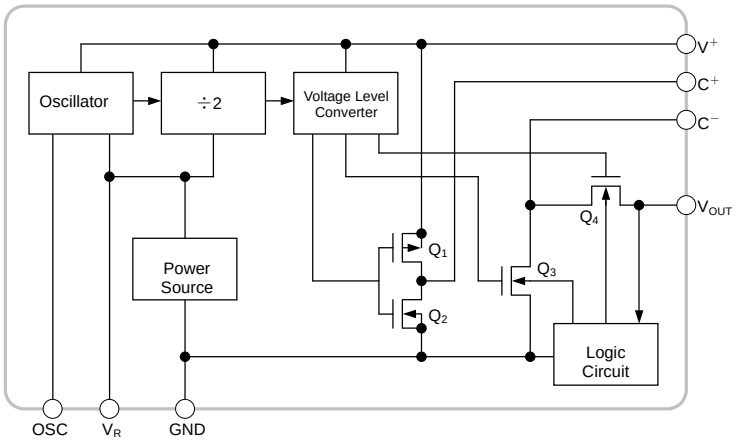
PIN FUNCTION

1. N.C. :Non Connection
2. C^+ :Charge pump Capacitor(+) Connecting pin
3. GND :Ground pin
4. C^- :Charge pump Capacitor(-) Connecting pin
5. V_{OUT} :Voltage Output pin
6. V_R :Voltage Regulator Control pin
7. OSC :Oscillation Capacitor Connecting pin
8. V^+ :Power Supply pin

■ PRODUCT CLASSIFICATION

Device Name	Oscillation Frequency	Output Resistance	Operating Current	C1/C2 capacitor	Status
NJU7660A	5kHz typ.	55Ω typ.	40μA typ.	10μF	M.P
NJU7660B	200kHz typ.	30Ω typ.	800μA typ.	1μF	PLAN

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYNBOL	RATINGS		UNIT
Supply Voltage	V^+	10.5		V
OSC Pin Voltage	V_{OSC}	-0.3 ~ (V^+ +0.3) @ V^+ < 5.5 (V^+ -5.5) ~ (V^+ +0.3) @ V^+ > 5.5		V
V_R Pin Voltage	V_{VR}	-0.3 ~ (V^+ +0.3) @ V^+ < 5.5 (V^+ -5.5) ~ (V^+ +0.3) @ V^+ > 5.5		V
V_R Pin Current (*3)	I_{VR}	20		μA
Output Short		CONTINUITY @ V^+ < 5.5		
Power Dissipation	P_D	DMP8	470(*1) 600(*2)	mW
		SSOP8	410(*1) 510(*2)	
Junction Temperature Range	Tj	- 40 ~ +150		°C
Operating Temperature Range	Topr	- 40 ~ + 85		°C
Storage Temperature Range	Tstg	- 40 ~ +150		°C

(*1): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 2Layers)

(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 4Layers,internal Cu area: 74.2×74.2mm)

(*3): Connecting any input terminal to voltages greater than V+ or less than GND may cause destructive latchup. It is recommended that no inputs from sources operating from external supplies be applied prior to “power-up” of the NJU7660A

■ INPUT VOLTAGE RANGE

V^+=1.5V to 10V (for Negative Voltage Converter)

V^+=3.0V to 10V (for Twofold Voltage Converter)

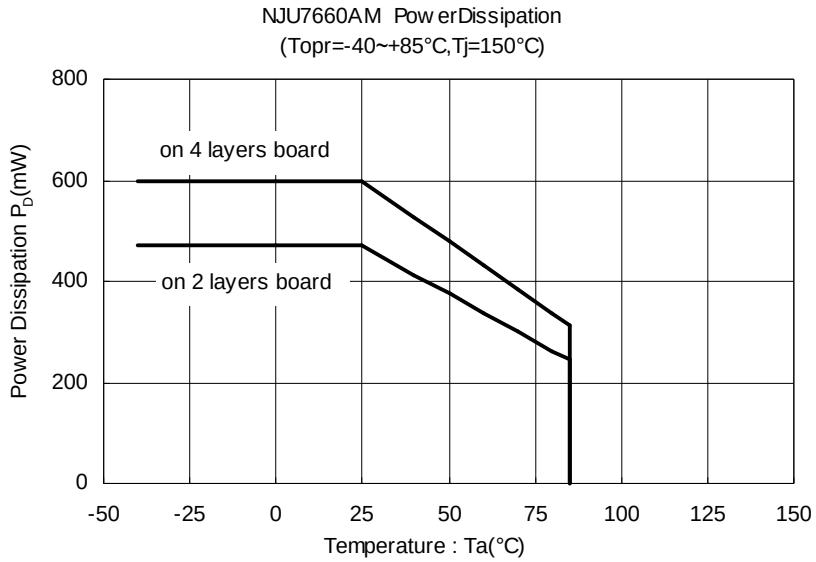
■ ELECTRICAL CHARACTERISTICS

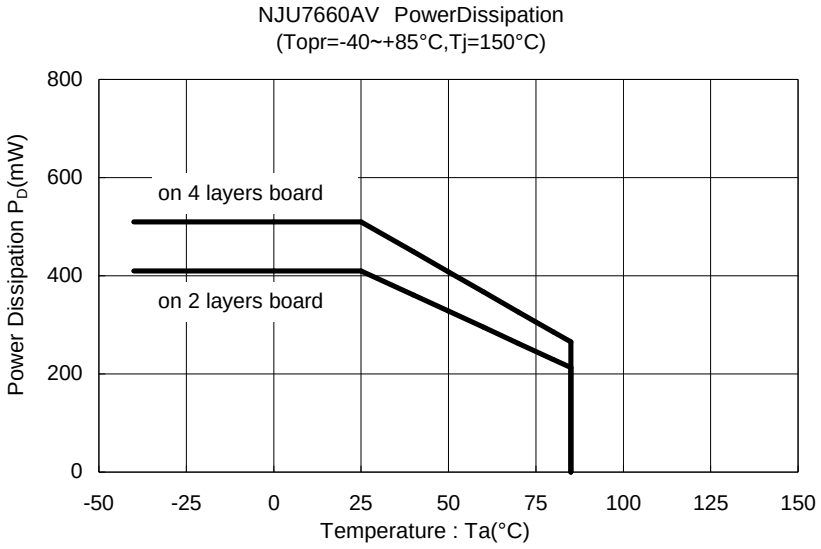
(Unless otherwise noted, V^+=5.0V, C_{OSC}=0, Ta=25°C

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Operating Current	I^+	R_L=∞		-	40	130	μA
Operating Voltage 1 (Without Dx)	V^+_{H1}	R_L=10kΩ	V_R=OPEN	3.0	-	6.5	V
	V^+_{L1}		V_R=GND	1.5	-	3.5	V
Operating Voltage 2 (With Dx)	V^+_{H2}	R_L=10kΩ	V_R=OPEN	3.0	-	10	V
	V^+_{L2}		V_R=GND	1.5	-	3.5	V
Output Resistance	Ro	I_{OUT}=20mA		-	55	100	Ω
		V^+=2V, I_{OUT}=3mA, V_R=GND		-	-	300	Ω
Oscillation Frequency	Fo			-	5	-	kHz
Power Conversion Rate	P_{EF}	R_L=5kΩ		90	98	-	%
Voltage Conversion Rate	V_{EF}	R_L=∞		97	99.9	-	%
Oscillation Circuit Impedance	Zosc	V^+=2V		-	1.0	-	MΩ
		V^+=5V		-	0.1	-	

(*4): The twofold voltage converter operates over 3.0V

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



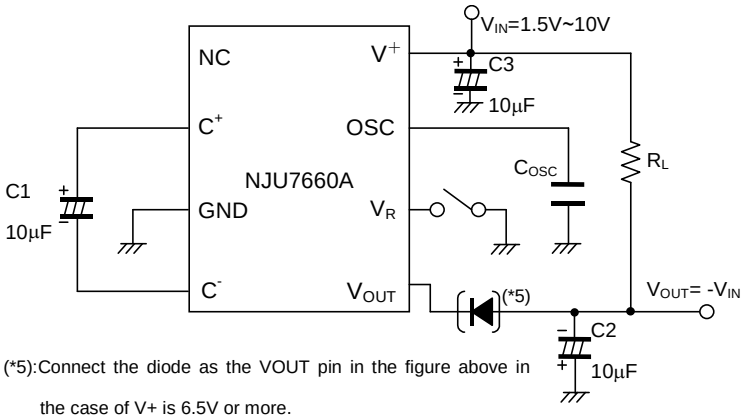


■ TEST CIRCUIT

The measurement circuit diagram of negative voltage is shown below. V_R pin must connect to GND or Open according to the operating voltage as follows:

$V^+ < 3.5V$:Connected to GND
$V^+ \geq 3.5V$:OPEN

The oscillation frequency can be lowered by connected external capacitor to the OSC pin, furthermore it can be also driven by external clock generator.

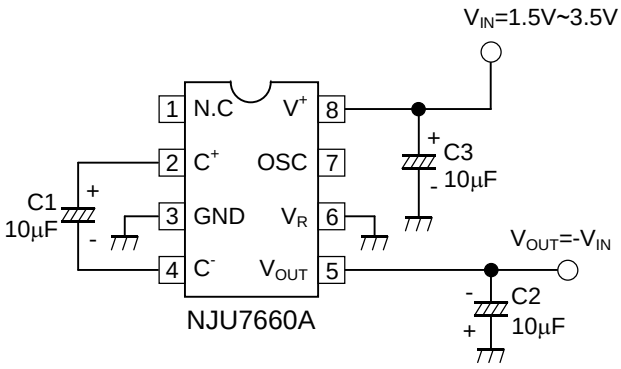


(*5):Connect the diode as the VOUT pin in the figure above in the case of V+ is 6.5V or more.

In the case of lee than 6.5V , V+ does not require this diode.

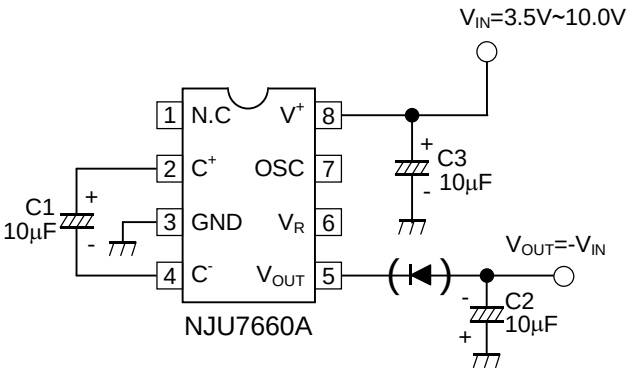
■ TYPICAL APPLICATION

(1-1) Negative Voltage Output 1
1.5V to 3.5V operation



*Its Can also be used ceramic capacitor.(C1,C2,C3)
*Capacitance of C3 is equal to C1,C2 or more.

(1-2) Negative Voltage Output 2
3.5V to 10V operation

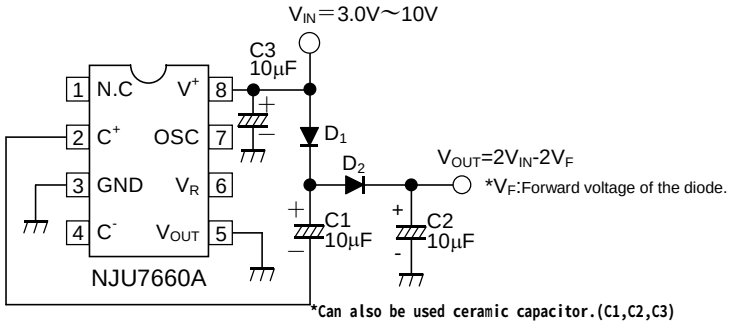


*Can also be used ceramic capacitor.(C1,C2,C3)
*Capacitance of C3 is equal to C1,C2 or more.

(*6): V_R pin must connect to GND or Open according to the operating voltage as follows:
$V^+ < 3.5V$:Connected to GND
$V^+ \geq 3.5V$:OPEN

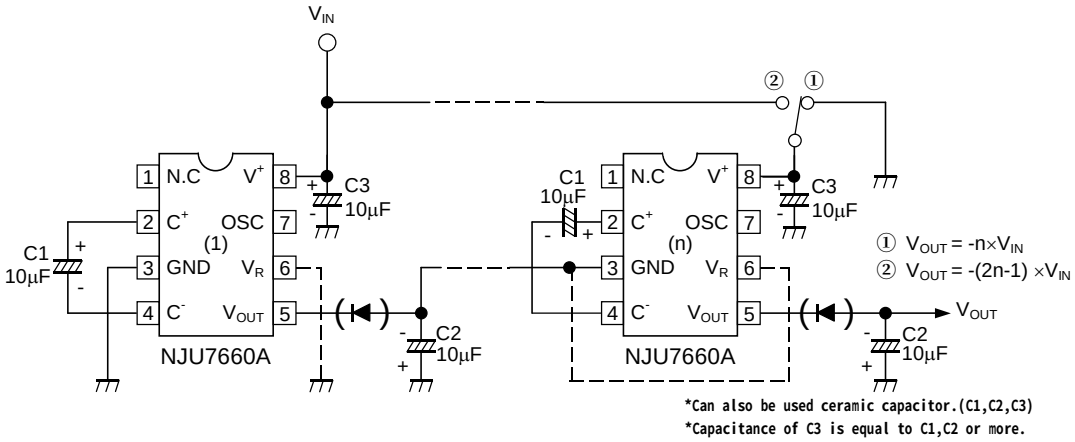
(*7): In case of the operation voltage is 6.5V or more, a Diode must be connected to V_{OUT} pin. If it is less than 6.5V, the Diode is not required

(2) Twofold positive Voltage Output



*Can also be used ceramic capacitor.(C1,C2,C3)
*Capacitance of C3 is equal to C1,C2 or more.

(3) Cascade Connection (Negative Voltage Output)



(*8): V_R pin must connect to GND or Open according to the operating voltage as follows:
$V^+ < 3.5V$:Connected to GND
$V^+ \geq 3.5V$:OPEN

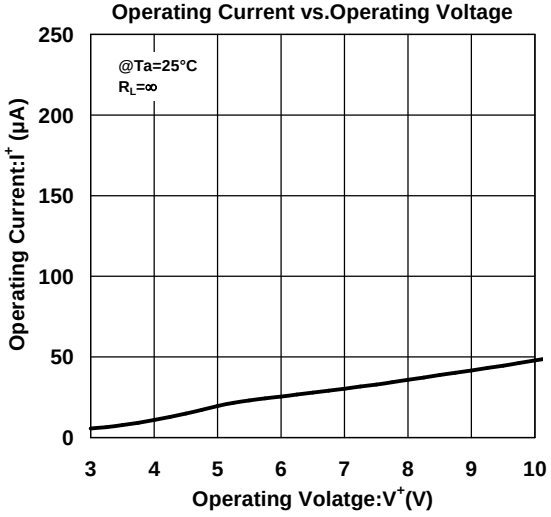
(*9): In case of the operation voltage is 6.5V or more, a Diode must be connected to V_{OUT} pin. If it is less than 6.5V, the Diode is not required

(*10): In case of the cascade connection (Negative Voltage Output), V_R pins (after second IC's) must connect as follows, according to V^+ - GND Voltage.
V^+ - GND < 3.5V :Connected to GND
V^+ - GND ≥ 3.5V :OPEN

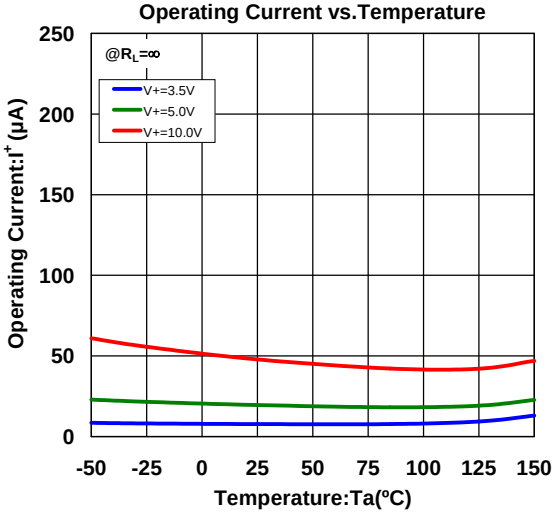
(*11): Output resistance becomes total of the Ro of every NJU7660A

■ TYIPICAL CHARACETRISTICS (Common)

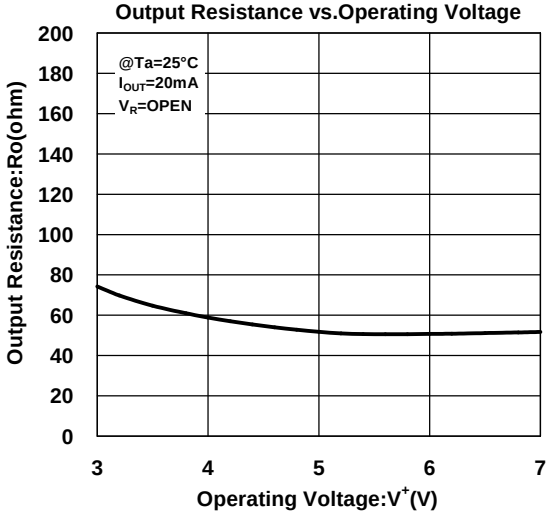
NJU7660A
Operating Current vs.Operating Voltage



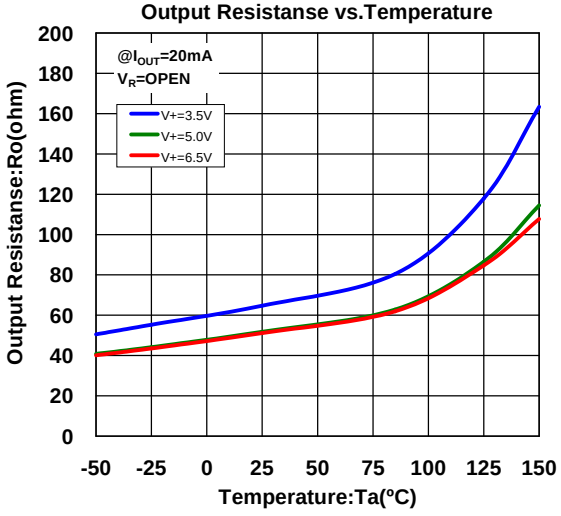
NJU7660A
Operating Current vs.Temperature



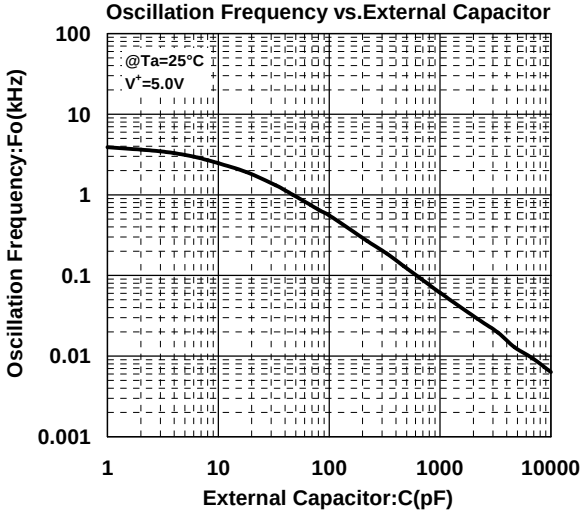
NJU7660A
Output Resistance vs.Operating Voltage



NJU7660A
Output Resistanse vs.Temperature

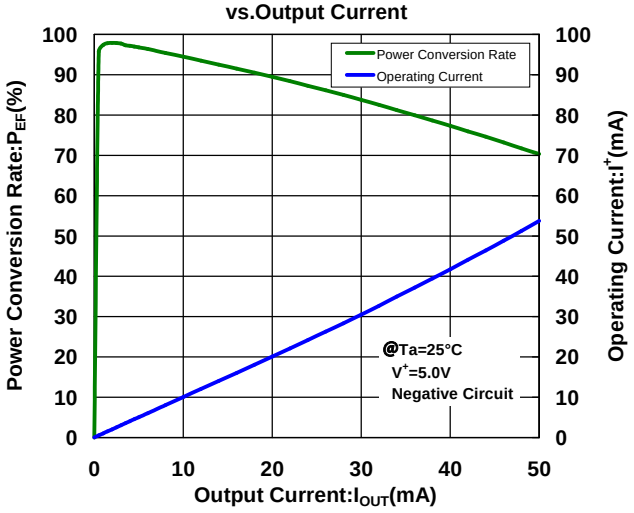


NJU7660A
Oscillation Frequency vs.External Capacitor

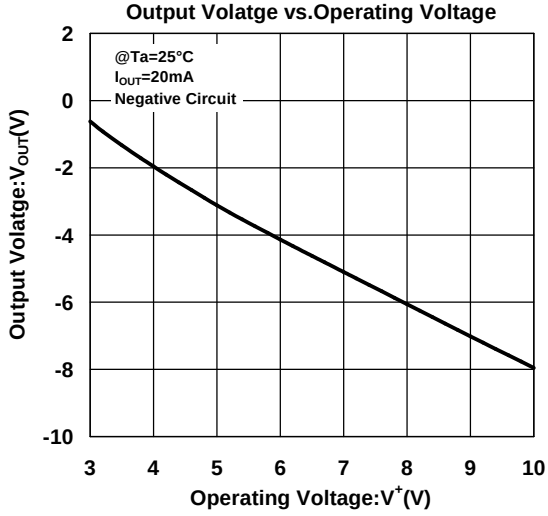


■ TYIPICAL CHARACETRISTICS (Negative Circuit)

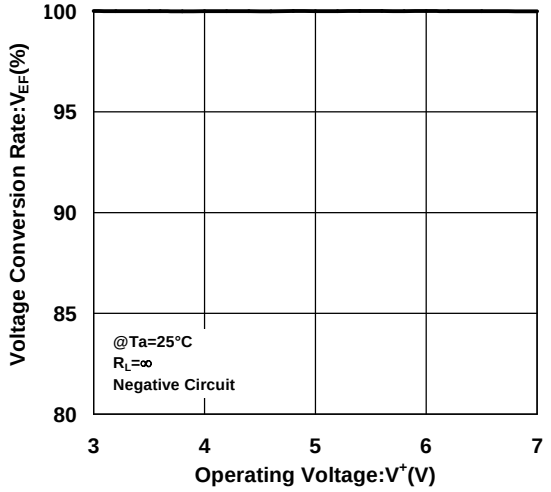
NJU7660A
Power Conversion Rate/Operating Current vs.Output Current



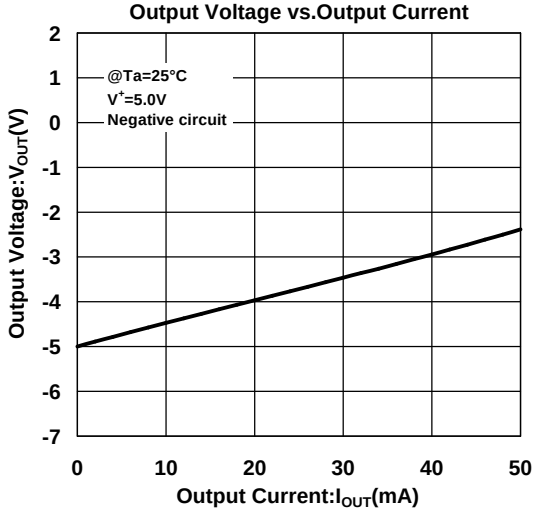
NJU7660A
Output Volatge vs.Operating Voltage



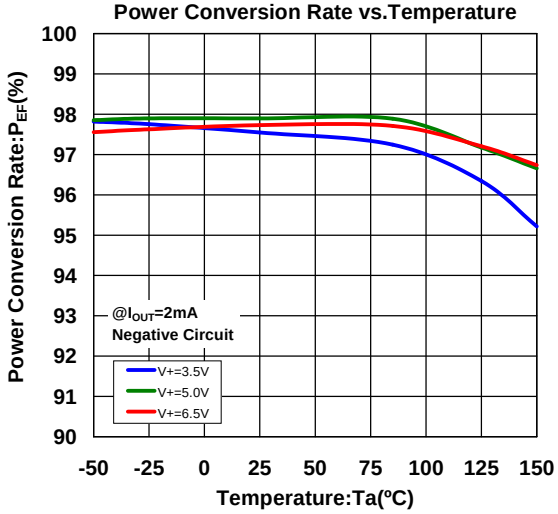
NJU7660A
Voltage Conversion Rate vs.Operating Voltage



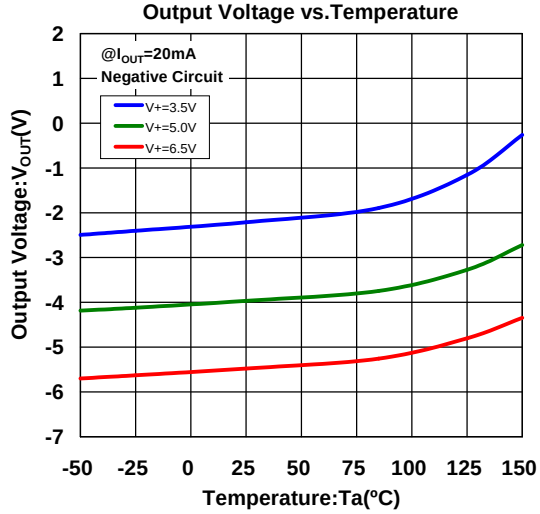
NJU7660A
Output Voltage vs.Output Current



NJU7660A
Power Conversion Rate vs.Temperature

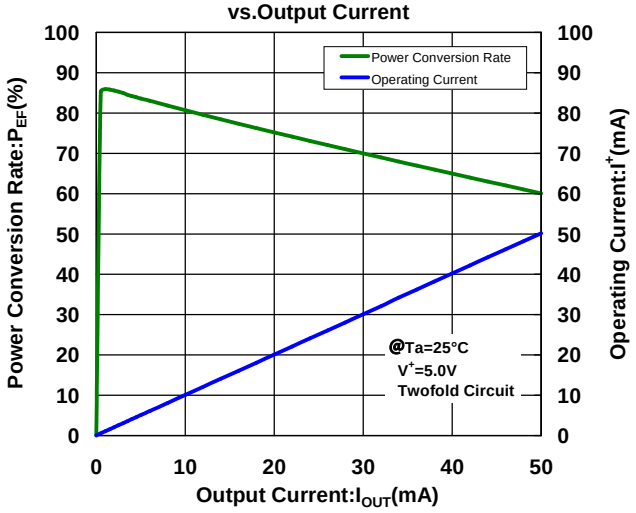


NJU7660A
Output Voltage vs.Temperature

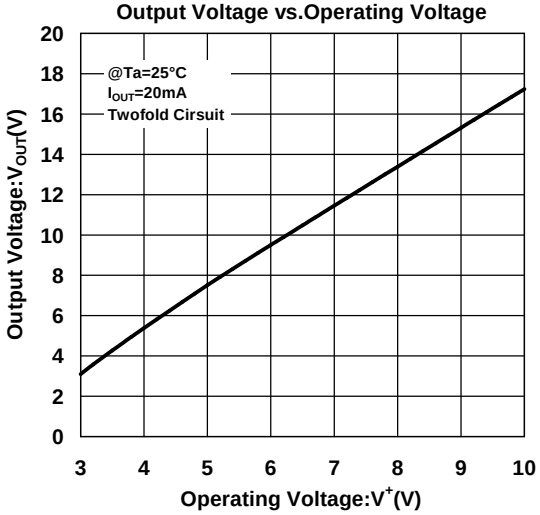


■ TYIPICAL CHARACETRISTICS (Twofold Circuit)

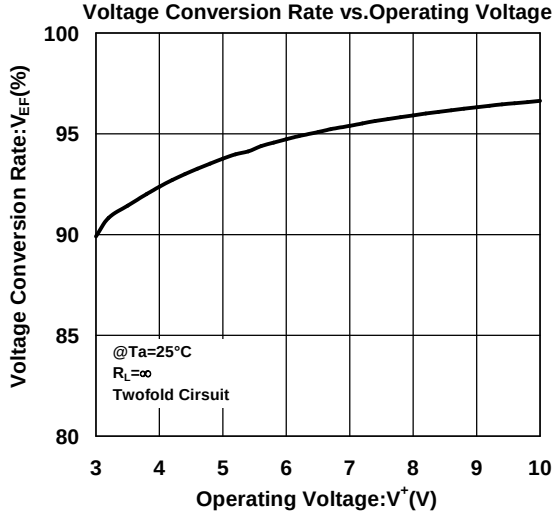
NJU7660A
Power Conversion Rate/Operating Current vs.Output Current



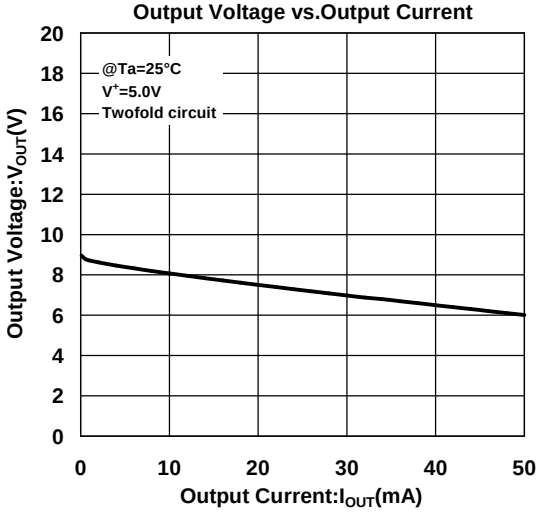
NJU7660A
Output Voltage vs.Operating Voltage



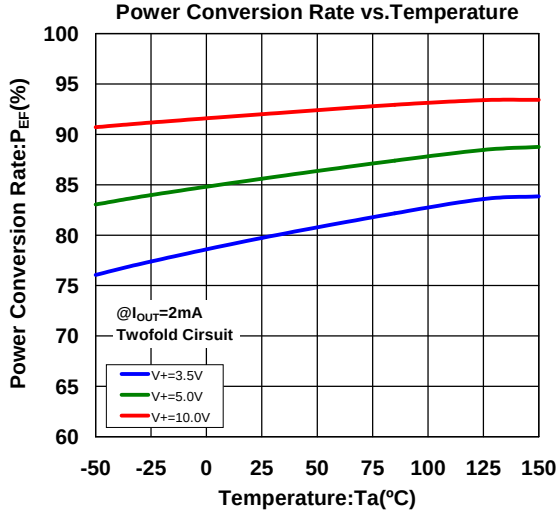
NJU7660A
Voltage Conversion Rate vs.Operating Voltage



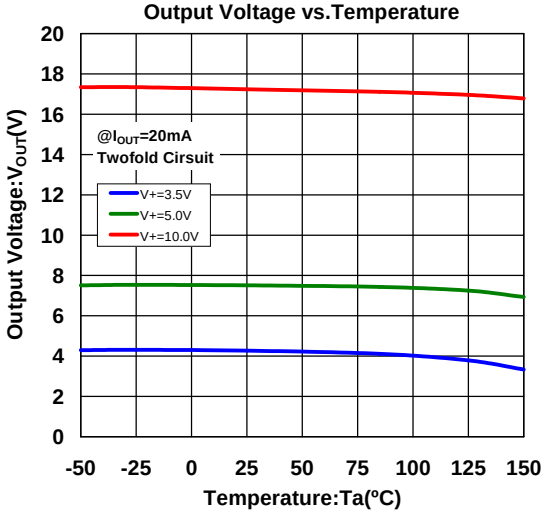
NJU7660A
Output Voltage vs.Output Current



NJU7660A
Power Conversion Rate vs.Temperature



NJU7660A
Output Voltage vs.Temperature



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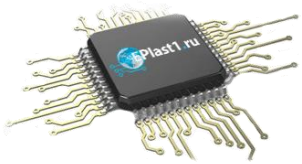
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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