Op-Amp and Comparator ICs Selection Guide

New Japan Radio Co.,Ltd.

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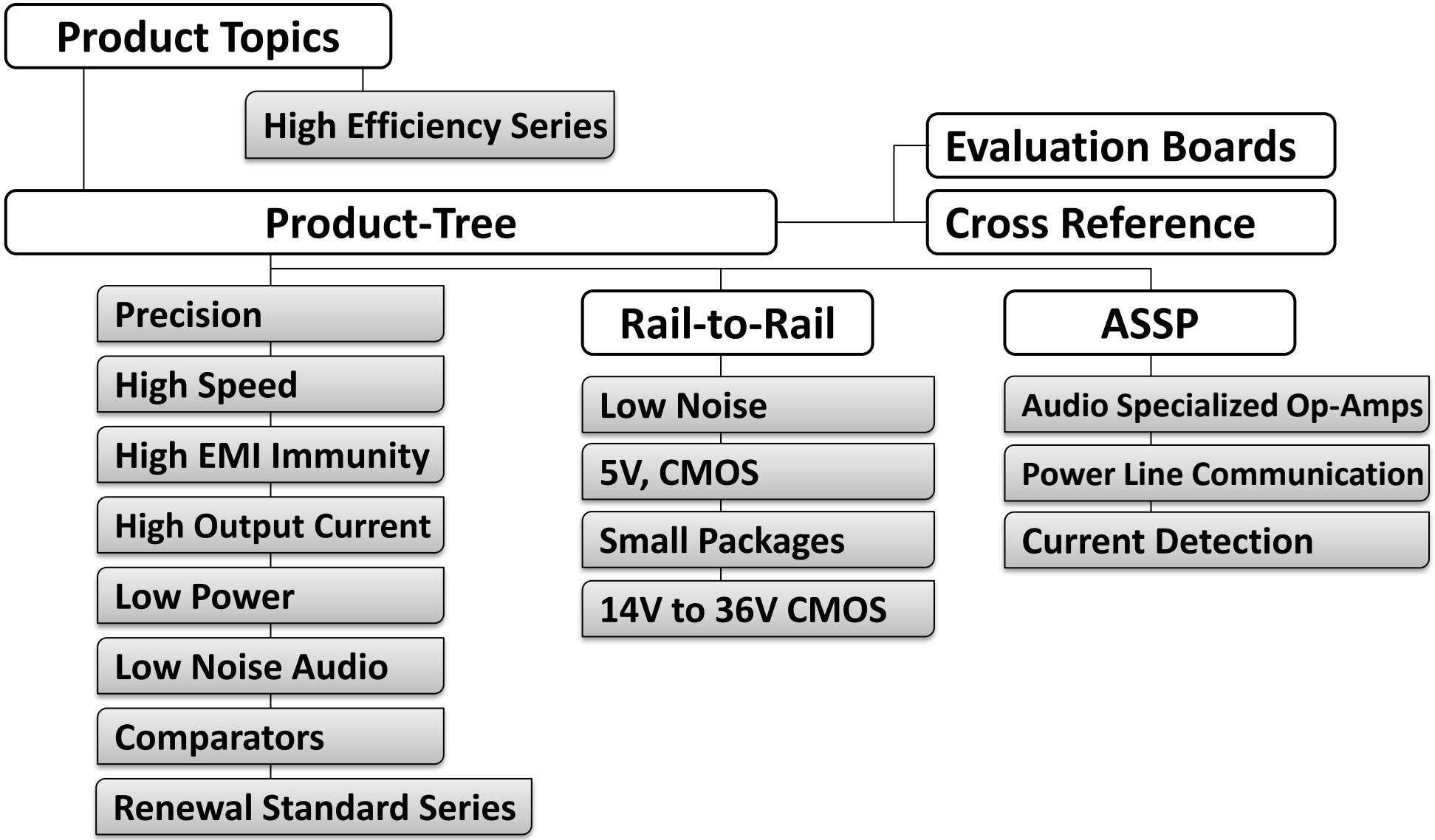
Microwave & Microelectronics

Contents



High Efficiency Op-Amps -NJU775xx Series-

Contents

Low Power
(GBW < 1MHz)

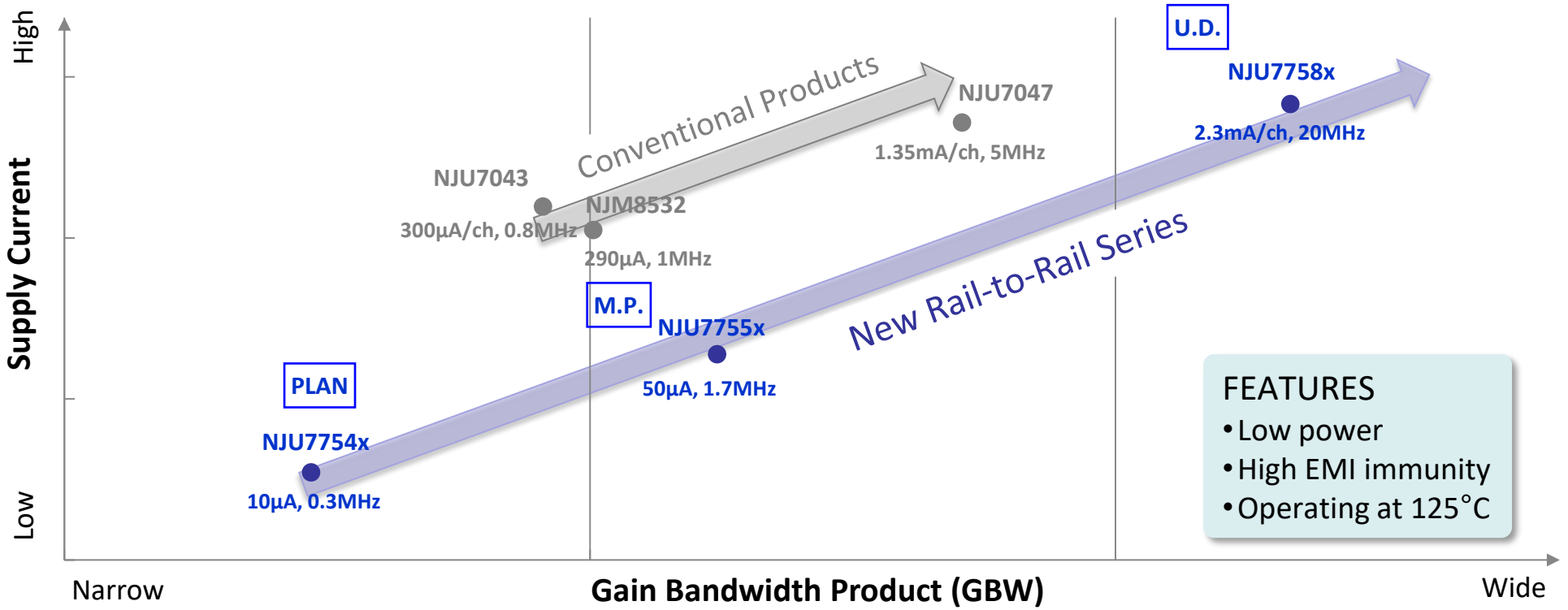
Battery-powered instruments, pressure/gas sensors & fire alarms

General-Purpose
(GBW 1MHz to 10MHz)

Industrial equipment, automotive accessories, current detectors & audio

High Speed
(GBW > 10MHz)

Ultrasonic/photoelectric sensors, motor controllers & measuring instruments



Features of NJU775xx Series

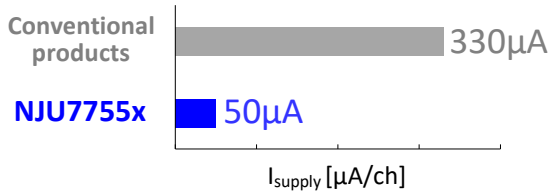
Contents

High Efficiency

✓ Low power and wide GBW

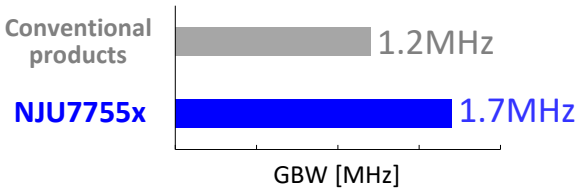
$$\text{Efficiency} = \frac{\text{GBW}}{I_{supply}}$$

Supply current



85% less supply current

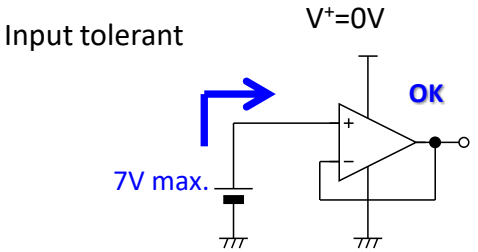
Gain bandwidth product



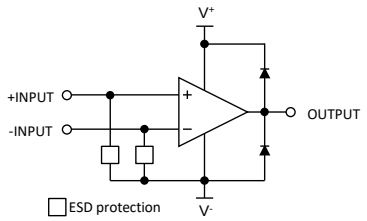
1.4 times wider GBW

Input tolerant

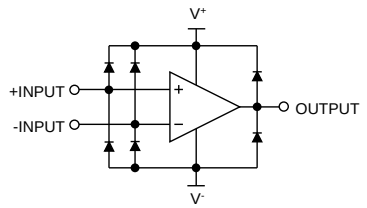
✓ Protects Op-amps from excessive input



BLOCK DIAGRAM COMPARISON



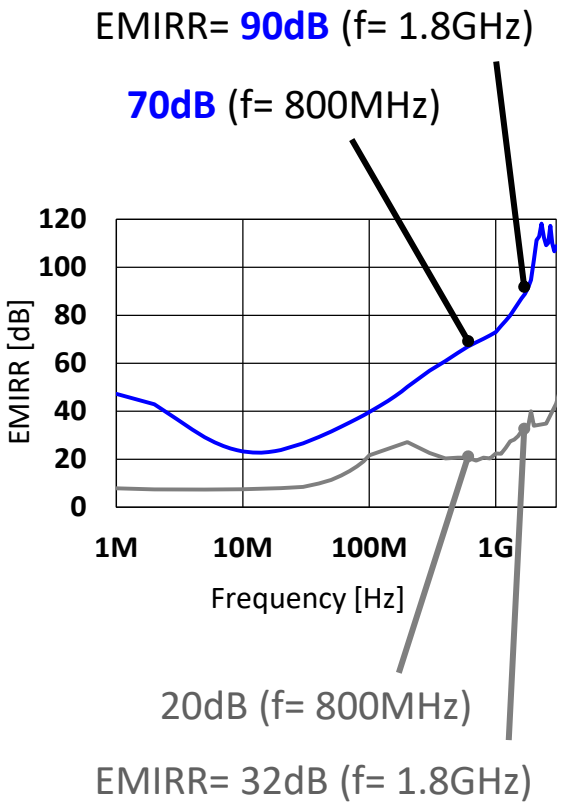
High efficiency series



Standard op-amp

High EMI Immunity

✓ Tolerance to RF noise



Precision Op-Amps

: U.D.
: M.P.

Contents

5V SUPPLY

Low Power

150µV, 1µV/°C max.

- NJU77600 [1ch]
- NJU77602 [2ch]
- NJU77604 [4ch]

I_{supply}=12µA/ch
R-R I/O

Low Noise

150µV, 5µV/°C max.

- NJU7076 [1ch]
- NJU7077 [2ch]
- NJU7078 [4ch]

e_n=10nV/√Hz
R-R Output

500µV, 10µV/°C max.

New
- NJU7066 [2ch]

e_n=10nV/√Hz
R-R Output

Zero-Drift

15µV, 0.05µV/°C max.

- NJU7098AF1-C [1ch]

R-R Output

36V SUPPLY

20V/µs High Speed

800µV, 9µV/°C max.

- NJM8512A [2ch]
- NJM8513A [4ch]

400µV, 5µV/°C max.

- NJM8512B [2ch]
- NJM8513B [4ch]

Single Supply

450µV, 4µV/°C typ.

- NJM2119 [2ch]

Low Noise

50µV, 0.6µV/°C max.

- NJMOP277 [1ch]
- NJMOP2277 [2ch]

60µV, 1.2µV/°C max.

- NJMOP177 [1ch]
- NJMOP1772 [2ch]

Precision Op-Amps

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Characteristics / Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	V_{IO} (25°C) max. µV	V_{IO} (All Temp.) max. µV	V_{IO} Drift max. µV/°C	I_B typ. nA	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat V_{OL}-V^- max. V	+Vsat V^+-V_{OH} max. V	CMR typ. dB	SR typ. V/µs	f_T typ. MHz	Voltage Noise typ. nV/√Hz	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT-23	SC88A	DFN	SPICE Model	Notes
NJMOP177G			1	6 to 36	1.6	60	100	1.2	1.2	(V^-) +2	(V^+) -2	3	3	140	0.3	1.1	8		8						✓	
NJMOP1772			2	6 to 36	1.3	60	100	1.2	1.2	(V^-) +2	(V^+) -2	3	3	135	0.3	1.1	8		8						✓	
NJMOP277G		Yes	1	4.5 to 36	0.76	50	100	0.6	0.5	(V^-) +2	(V^+) -2	1.5	0.5	140	0.7	1	8		8		8				✓	
NJMOP2277G		Yes	2	4.5 to 36	0.76	50	100	0.6	0.5	(V^-) +2	(V^+) -2	1.5	0.5	140	0.7	1	8		8		8				✓	
NJMOP277F		Yes	1	4.5 to 36	0.76	20	50	0.15	0.5	(V^-) +2	(V^+) -2	1.5	0.5	140	0.7	1	8		8		8				✓	
NJMOP2277F		Yes	2	4.5 to 36	0.76	20	50	0.15	0.5	(V^-) +2	(V^+) -2	1.5	0.5	140	0.7	1	8		8						✓	
NJM2119			2	4 to 36	0.5	450	-	-	18	(V^-)	(V^+) -1.5	0.01	1.6	100	0.3	1	-	8							✓	
NJM8512A		Yes	2	9 to 32	1.3	800	1400	9	0.025	(V^-) +2.5	(V^+) -2.5	1.2	1.5	108	20	7	10		8		8				✓	
NJM8512B		Yes	2	9 to 32	1.3	400	700	5	0.025	(V^-) +2.5	(V^+) -2.5	1.2	1.5	108	20	7	10		8		8				✓	
NJM8513A		Yes	4	9 to 32	1.3	800	1400	9	0.025	(V^-) +2.5	(V^+) -2.5	1.2	1.5	108	20	7	10			14					✓	
NJM8513B		Yes	4	9 to 32	1.3	400	700	5	0.025	(V^-) +2.5	(V^+) -2.5	1.2	1.5	108	20	7	10			14					✓	
NJU7076	Out	Yes	1	2.2 to 5.5	0.6	150	400	5	0.001	(V^-)	(V^+) -1	0.15	0.15	90	0.5	1.3	10					5			✓	
NJU7076B	Out	Yes	1	2.2 to 5.5	0.6	300	400	5	0.001	(V^-)	(V^+) -1	0.15	0.15	90	0.5	1.3	10						5		✓	
NJU7066	Out	Yes	2	2.2 to 5.5	0.6	500	800	10	0.001	(V^-)	(V^-)-1	0.15	0.15	90	0.5	1.3	10				8					
NJU7077	Out	Yes	2	2.2 to 5.5	0.6	150	400	5	0.001	(V^-)	(V^+) -1	0.15	0.15	90	0.5	1.3	10				8				✓	
NJU7078	Out	Yes	4	2.2 to 5.5	0.575	200	400	5	0.001	(V^-)	(V^+) -1	0.15	0.15	90	0.5	1.3	10			14						
NJU7098AF1-C	Out	Yes	1	3 to 10	0.6	15	15	0.05	0.02	(V^-)	(V^+) -1.5	0.01	0.15	130	3	3	120					6			✓	
NJU77600 (U.D.)	I/O	Yes	1	2.3 to 5.5	12	150	400	1	0.001	(V^-)	(V^+)	0.15	0.15	-	0.04	0.08	-					5				
NJU77602 (U.D.)	I/O	Yes	2	2.3 to 5.5	12	150	400	1	0.001	(V^-)	(V^+)	0.15	0.15	-	0.04	0.08	-		8		8			8		
NJU77604 (U.D.)	I/O	Yes	4	2.3 to 5.5	12	200	400	1	0.001	(V^-)	(V^+)	0.15	0.15	-	0.04	0.08	-			14						

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type

High Speed Op-Amps

: U.D. : Rail-to-rail output
: M.P. : Rail-to-rail I/O

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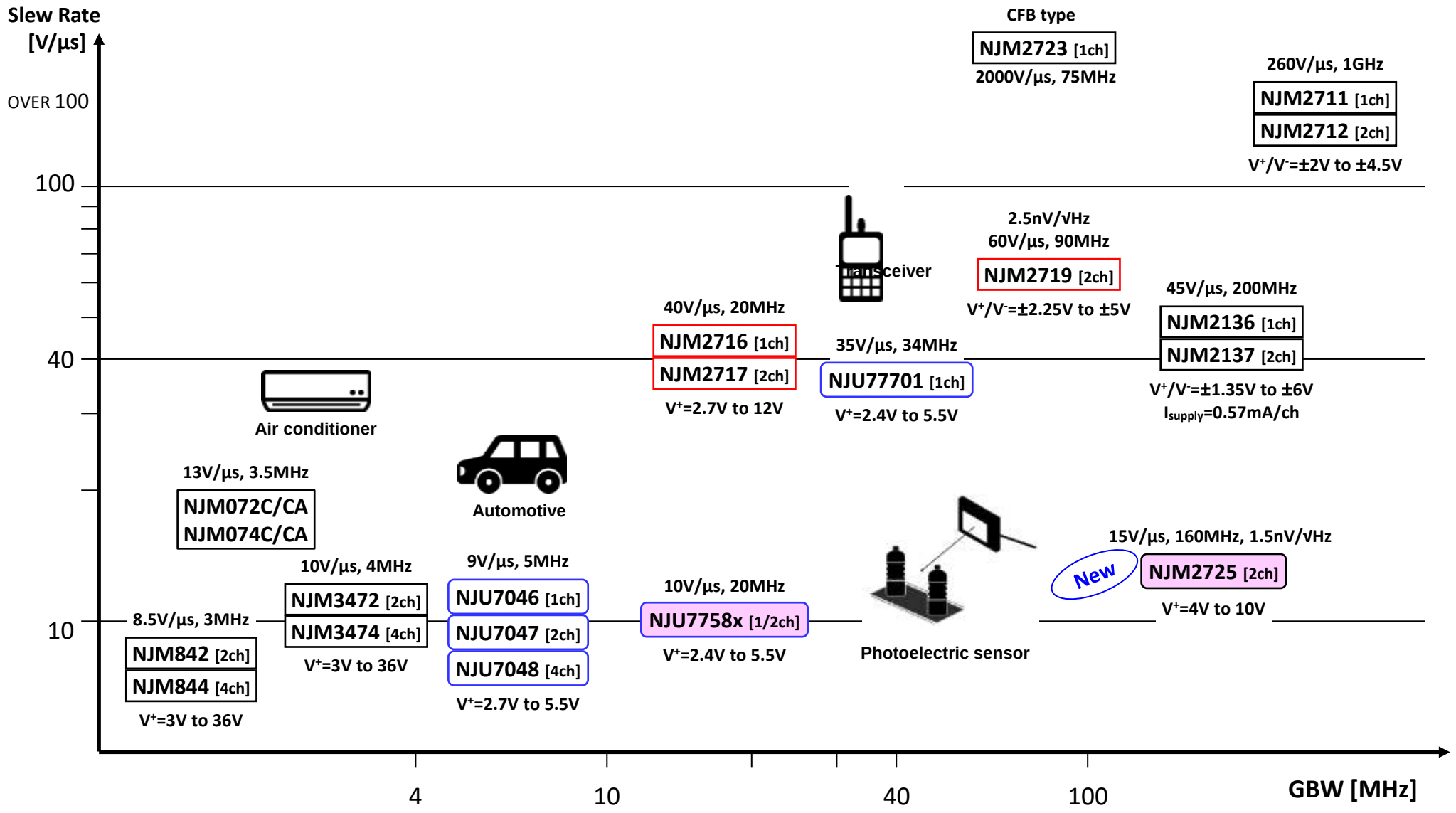

High Speed Op-Amps

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Characteristics / Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	SR typ. V/µs	GBW typ. MHz	f_T typ. MHz	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat $V_{OL}-V^-$ max. V	+Vsat V^+-V_{OH} max. V	R_L Ω	Io^{*3} typ. mA	Voltage Noise typ. nV/√Hz	V_{IO} max. mV	Topr °C	Package / Pin DMP	SOP*1	SSOP	MSOP*2	DFN	SOT-23	SC88A	SPICE Model	Notes
NJM072C/CA			2	8 to 36	1.4	13	3.5	3	(V^-) +4	(V^+) -4	3	3	10k	50	18	10/6	-40 to 85		8	8					✓	
NJM074C/CA			4	8 to 36	1.4	13	3.5	3	(V-) +4	(V+) -4	3	3	10k	50	18	10/6	-40 to 85		14	14					✓	
NJM2136			1	2.7 to 12	0.63	45	200	40	(V^-) +1.3	(V^+) -1.3	1.6	1.4	1k	3	-	5	-40 to 85	8		8					✓	
NJM2137			2	2.7 to 12	0.57	45	200	40	(V^-) +1.3	(V^+) -1.3	1.6	1.4	1k	3	-	5	-40 to 85	8		8					✓	
NJM2711			1	4 to 9	1.9	260	1000	180	(V^-) +1.2	(V^+) -1.2	1.3	1.3	1k	23	6.8	7	-40 to 85						5			
NJM2712			2	4 to 9	1.9	260	1000	180	(V^-) +1.2	(V^+) -1.2	1.3	1.3	1k	23	6.8	7	-40 to 85	8			8					
NJM2716	Out		1	2.7 to 12	4.2	40	-	30	(V^-)	(V^+) -1.2	0.5	0.5	4k	2.5	40	10	-40 to 85						5		✓	
NJM2717	Out		2	2.7 to 12	4	40	-	20	(V^-)	(V^+) -1.2	0.5	0.5	4k	2.5	40	11	-40 to 85	8		8	8				✓	
NJM2719	Out		2	4.5 to11	7	60	-	100	(V^-) +0.5	(V^+) -1.3	0.3	0.4	1k	18	2.5	9	-40 to 85			8	8				✓	
NJM2723			1	7 to 35	2.9	2000	75	-	(V^-) +4	(V^+) -4	3.5	3.5	1k	30	5	20	-40 to 85		8							CFB typ
NJM2725 (U.D.)			2	4 to10	4	15	160	-	(V^-) +1.5	(V^+) -1	1.3	1.5	1k	30	1.5	1	-40 to 125		8		8					
NJM3472		Yes	2	3 to36	2	10	3	3.6	(V^-)	(V^+) -2.0	0.7	1.3	10k	30	-	5.5	-40 to 125		8	8	8				✓	
NJM3474		Yes	4	3 to 36	2	10	3	3.6	(V^-)	(V^+) -2.0	0.7	1.3	10k	30	-	5.5	-40 to 125		14	14						
NJM842		Yes	2	3 to36	1.65	8.5	3.5	-	(V^-)	(V^+) -1.8	0.01	1.3	2k	30	-	3.5	-40 to 125		8	8	8				✓	
NJM844		Yes	4	3 to 36	1.65	8.5	3.5	-	(V^-)	(V^+) -1.8	0.01	1.3	2k	30	-	3.5	-40 to 125		14	14					✓	
NJU7046	I/O	Yes	1	2.7 to 5.5	1.4	9	5	5	(V^-)	(V^+)	0.05	0.05	10k	100	20	5	-40 to 125						5	5	✓	
NJU7047	I/O	Yes	2	2.7 to 5.5	1.35	9	5	5	(V^-)	(V^+)	0.05	0.05	10k	100	20	5	-40 to 125		8		8	8			✓	
NJU7048	I/O	Yes	4	2.7 to 5.5	1.325	9	5	5	(V^-)	(V^+)	0.05	0.05	10k	100	20	5	-40 to 125		14	14					✓	
NJU7758x (U.D.)	I/O	Yes	1/2	2.4 to 5.5	1.8	10	20	-	(V^-) -0.2	(V^+) +0.2	0.025	0.025	-	-	8	4	-55 to 125		8		8	8	5			
NJU77701	I/O	Yes	1	2.4 to 5.5	3.8	35	34	25	(V^-)	(V^+)	0.08	0.1	600	110	6	1.5	-40 to 125						5		✓	Stable Gain ≥ 14dB

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

Voltage Noise ≤ 15nV/√Hz

Low Noise, Rail-to-Rail Op-Amps

: U.D. : M.P. : Rail-to-rail output : Rail-to-rail I/O

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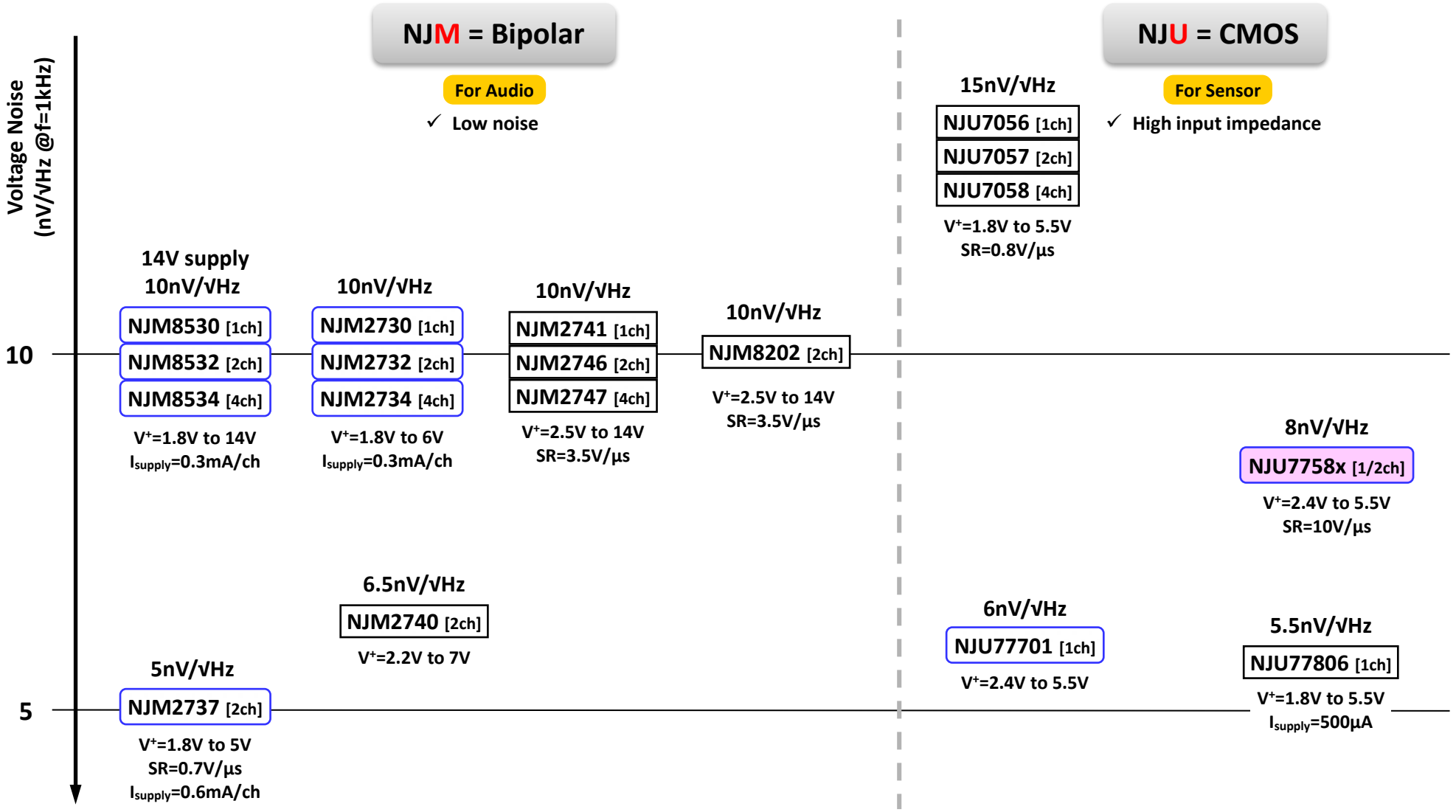

Low Noise, Rail-to-Rail Op-Amps

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Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat $V_{OL}-V^-$ max. V	+Vsat V^+-V_{OH} max. V	R_L Ω	Io^{*3} typ. mA	SR typ. V/µs	GBW typ. MHz	Voltage Noise typ. nV/√Hz	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	PCSP	DFN	SPICE Model	Notes
NJM2730	I/O		1	1.8 to 5	0.32	5	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10					5				✓	
NJM2732	I/O		2	1.8 to 6	0.29	5	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10	8	8	8	8			20		✓	
NJM2734	I/O		4	1.8 to 6	0.3	5	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10	14		14				20		✓	
NJM2737	I/O		2	1.8 to 6	0.6	5	(V^-)	(V^+)	0.15	0.1	20k	10	0.7	3.1	5	8		8	8					✓	
NJM2740	Out		2	2.2 to 7	1.75	6	(V^-) +1.1	(V^+) -1	0.5	0.5	2.5k	1	4	12	6.5	8		8	8					✓	
NJM2741	Out		1	2.5 to 14	2.2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10					5	5			✓	
NJM2746	Out		2	2.5 to 14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	8	8	8	8				8	✓	
NJM2747	Out		4	2.5 to 14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	14		14				20		✓	
NJM8202	Out	Yes	2	2.5 to 14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	8	8	8	8					✓	
NJM8530	I/O		1	1.8 to 14	0.32	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10					5				✓	
NJM8532	I/O		2	1.8 to 14	0.29	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10	8		8	8					✓	
NJM8534	I/O		4	1.8 to 14	0.3	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10			14						✓	
NJU7046	I/O	Yes	1	2.7 to 5.5	1.4	5	(V^-)	(V^+)	0.05	0.05	10k	100	9	5	20					5	5			✓	
NJU7047	I/O	Yes	2	2.7 to 5.5	1.35	5	(V^-)	(V^+)	0.05	0.05	10k	100	9	5	20		8		8				8	✓	
NJU7048	I/O	Yes	4	2.7 to 5.5	1.325	5	(V^-)	(V^+)	0.05	0.05	10k	100	9	5	20		14	14						✓	
NJU7056	Out	Yes	1	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	0.1	10k	45	0.8	2.1	15					5	5			✓	
NJU7057	Out	Yes	2	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	0.1	10k	45	0.8	2.1	15				8				8	✓	
NJU7058	Out	Yes	4	1.8 to 5.5	0.275	4	(V^-)	(V^+) -0.9	0.1	0.1	10k	45	0.8	2.1	15			14						✓	
NJU7758x (U.D.)	I/O	Yes	1/2	2.4 to 5.5	1.8	4	(V^-) -0.2	(V^+) +0.2	0.025	0.025	-	-	10	20	8		8		8	5			8		
NJU77701	I/O	Yes	1	2.4 to 5.5	3.8	1.5	(V^-)	(V^+)	0.08	0.1	600	110	35	34	6					5				✓	Stable Gain ≥ 14dB
NJU77806	Out	Yes	1	1.8 to 5.5	0.5	2	(V^-)-0.1	(V^+) -0.9	0.1	0.1	10k	70	1.1	4.4	5.5						5			✓	Stable Gain ≥ 14dB

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

5.5V, Rail-to-Rail CMOS Op-Amps

: PLAN
: U.D.
: M.P.
: Rail-to-rail output
: Rail-to-rail I/O

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High Efficiency (Wide GBW & Low Power)

0.3MHz
NJU7754X [1/2/4ch]
I_{supply}=10µA/ch

1.7MHz, 0.8V/µs
NJU77551 [1ch]
NJU77552 [2ch]
NJU77554 [4ch]
I_{supply}=50µA/ch

20MHz, 10V/µs
NJU7758x [1/2ch]
I_{supply}=1800µA/ch

Low Power

NJU77001 [1ch]
NJU77002 [2ch]
NJU77004 [4ch]
I_{supply}=0.23µA/ch

NJU7026 [1ch]
NJU7027 [2ch]
NJU7028 [4ch]
I_{supply}=13µA/ch

Low Noise

15nV/√Hz
NJU7056 [1ch]
NJU7057 [2ch]
NJU7058 [4ch]
I_{supply}=260µA/ch

High Speed

9V/µs, 5MHz
NJU7046 [1ch]
NJU7047 [2ch]
NJU7048 [4ch]
I_{supply}=1.3mA/ch

35V/µs, 34MHz
NJU77701 [1ch]
I_{supply}=3.8mA

Precision

150µV,1µV/°C max.
NJU77600 [1ch]
NJU77602 [2ch]
NJU77604 [4ch]
I_{supply}=12µA/ch

10nV/√Hz
150µV, 5µV/°C max.
NJU7076 [1ch]
NJU7077 [2ch]
NJU7078 [4ch]
I_{supply}=600µA/ch

New
500µV, 10µV/°C max.
NJU7066 [2ch]

5.5V, Rail-to-Rail CMOS Op-Amps

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Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	V_{IO} max. mV	V_{IO} Drift typ. µV/°C	SR typ. V/µs	GBW typ. MHz	Voltage Noise typ. nV/√Hz	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat V_{OL}-V^- max. V	+Vsat V^+-V_{OH} max. V	Io *3 typ. mA	Package / Pin SOP *1	SSOP	MSOP *2	SOT23	SC88A	DFN	SPICE Model	Notes
NJU7026	Out	Yes	1	1.8 to 5.5	0.013	4	1.5	0.05	0.16	50	(V^-)	(V^+) -0.9	0.1	0.1	15				5	5		✓	
NJU7027	Out	Yes	2	1.8 to 5.5	0.013	4	1.5	0.05	0.16	50	(V^-)	(V^+) -0.9	0.1	0.1	15			8			8	✓	
NJU7028	Out	Yes	4	1.8 to 5.5	0.012	4	1.5	0.05	0.16	50	(V^-)	(V^+) -0.9	0.1	0.1	15		14					✓	
NJU7046	I/O	Yes	1	2.7 to 5.5	1.4	5	2	9	5	20	(V^-)	(V^+)	0.05	0.05	100				5	5		✓	
NJU7047	I/O	Yes	2	2.7 to 5.5	1.35	5	2	9	5	20	(V^-)	(V^+)	0.05	0.05	100	8		8			8	✓	
NJU7048	I/O	Yes	4	2.7 to 5.5	1.325	5	2	9	5	20	(V^-)	(V^+)	0.05	0.05	100	14	14					✓	
NJU7056	Out	Yes	1	1.8 to 5.5	0.26	4	0.7	0.8	2.1	15	(V^-)	(V^+) -0.9	0.1	0.1	45				5	5		✓	
NJU7057	Out	Yes	2	1.8 to 5.5	0.26	4	0.7	0.8	2.1	15	(V^-)	(V^+) -0.9	0.1	0.1	45			8			8	✓	
NJU7058	Out	Yes	4	1.8 to 5.5	0.275	4	0.7	0.8	2.1	15	(V^-)	(V^+) -0.9	0.1	0.1	45		14					✓	
NJU7076	Out	Yes	1	2.2 to 5.5	0.6	0.15	0.5	0.5	1.3	10	(V^-)	(V^+) -1	0.15	0.15	100				5			✓	
NJU7076B	Out	Yes	1	2.2 to 5.5	0.6	0.3	0.5	0.5	1.3	10	(V^-)	(V^+) -1	0.15	0.15	100					5		✓	
NJU7066	Out	Yes	2	2.2 to 5.5	0.6	0.5	0.5	0.5	1.3	10	(V^-)	(V^+) -1	0.15	0.15	100			8					
NJU7077	Out	Yes	2	2.2 to 5.5	0.6	0.15	0.5	0.5	1.3	10	(V^-)	(V^+) -1	0.15	0.15	100			8				✓	
NJU7078	Out	Yes	4	2.2 to 5.5	0.575	0.2	0.5	0.5	1.3	10	(V^-)	(V^+) -1	0.15	0.15	100		14						
NJU77000/A	I/O	Yes	1	1.5 to 5.5	0.00029	1.8/1.0	0.65	0.0008	0.0011	600	(V^-)	(V^+)	0.1	0.1	10				5			✓	
NJU77001/A	I/O	Yes	1	1.5 to 5.5	0.00029	1.8/1.0	0.65	0.0008	0.0011	600	(V^-)	(V^+)	0.1	0.1	10				5	5		✓	
NJU77002/A	I/O	Yes	2	1.5 to 5.5	0.00023	2.0/1.3	0.65	0.0007	0.001	700	(V^-)	(V^+)	0.1	0.1	10	8		8			8	✓	
NJU77004/A	I/O	Yes	4	1.5 to 5.5	0.00023	2.2/1.5	0.65	0.0007	0.001	700	(V^-)	(V^+)	0.1	0.1	10		14					✓	
NJU7754x (Plan)	I/O	Yes	-	1.8 to 5.5	0.01	4	1	-	0.3	-	(V^-) -0.2	(V^+) +0.2	0.025	0.025	40	x	x	x	x	x	x		
NJU77550	I/O	Yes	1	1.8 to 5.5	0.055	5	1	0.8	1.7	24	(V^-) -0.2	(V^+) +0.2	0.025	0.025	40				5	5			
NJU77551	I/O	Yes	1	1.8 to 5.5	0.055	5	1	0.8	1.7	24	(V^-) -0.2	(V^+) +0.2	0.025	0.025	40				5	5			
NJU77552	I/O	Yes	2	1.8 to 5.5	0.05	5	1	0.8	1.7	24	(V^-) -0.2	(V^+) +0.2	0.025	0.025	40	8		8			8	✓	
NJU77554	I/O	Yes	4	1.8 to 5.5	0.05	5	1	0.8	1.7	24	(V^-) -0.2	(V^+) +0.2	0.025	0.025	40		14						
NJU7758x (U.D.)	I/O	Yes	1/2	2.4 to 5.5	1.8	4	1	10	20	8	(V^-) -0.2	(V^+) +0.2	0.025	0.025	-	8		8	5		8		
NJU77600 (U.D.)	I/O	Yes	1	2.3 to 5.5	0.012	0.15	-	0.04	0.08	-	(V^-)	(V^+)	0.025	0.025	-				5				
NJU77602 (U.D.)	I/O	Yes	2	2.3 to 5.5	0.012	0.15	-	0.04	0.08	-	(V^-)	(V^+)	0.025	0.025	-	8		8			8		
NJU77604 (U.D.)	I/O	Yes	4	2.3 to 5.5	0.012	0.15	-	0.04	0.08	-	(V^-)	(V^+)	0.025	0.025	-		14						
NJU77701	I/O	Yes	1	2.4 to 5.5	3.8	1.5	0.5	35	34	6	(V^-)	(V^+)	0.08	0.1	110				5			✓	Stable Gain ≥ 14dB

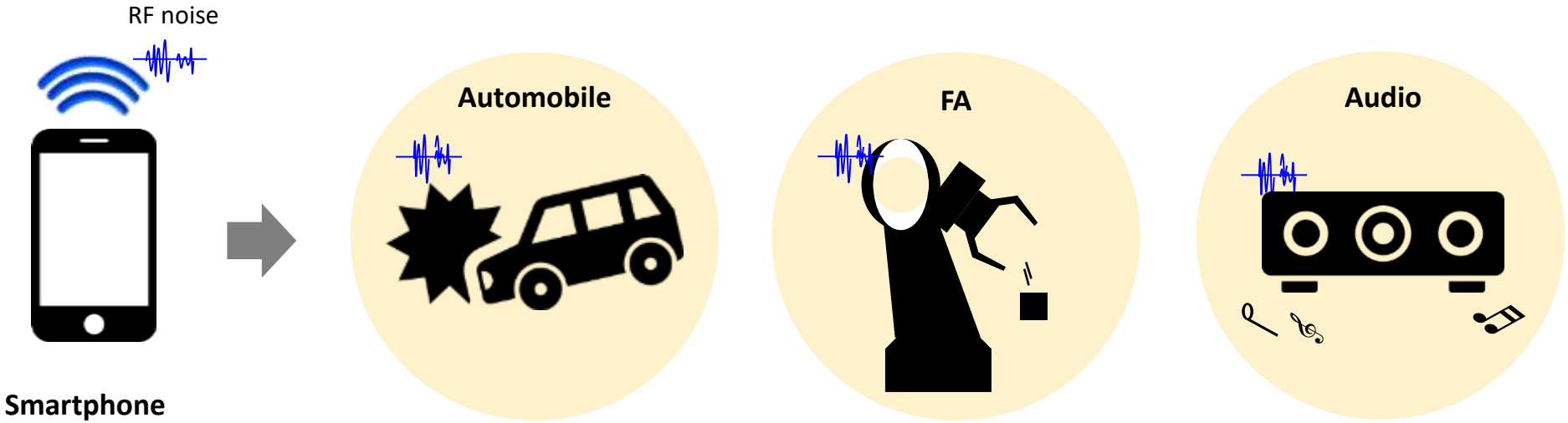
*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

High EMI Immunity of Op-Amps

■ What is “High EMI Immunity”?

- Prevent malfunction due to RF noise*.
- RF noise is emitted from wireless communication devices, e.g., smartphone.
- Essential to the aircraft and cars involved in human life.

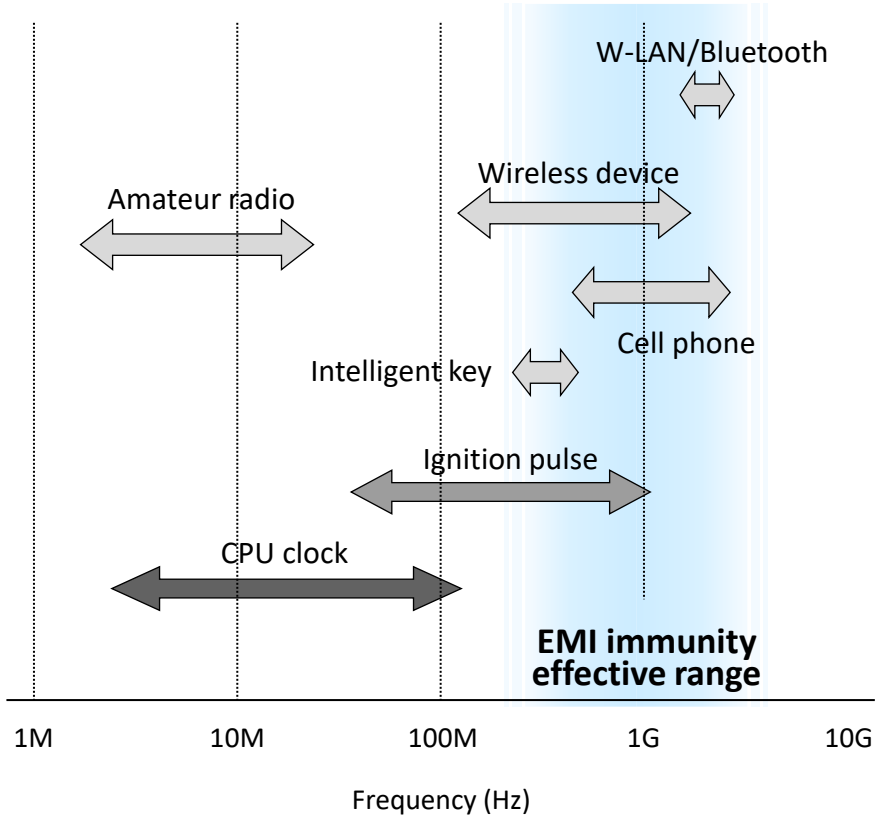
*RF noise: High frequency interface signal



High EMI Immunity

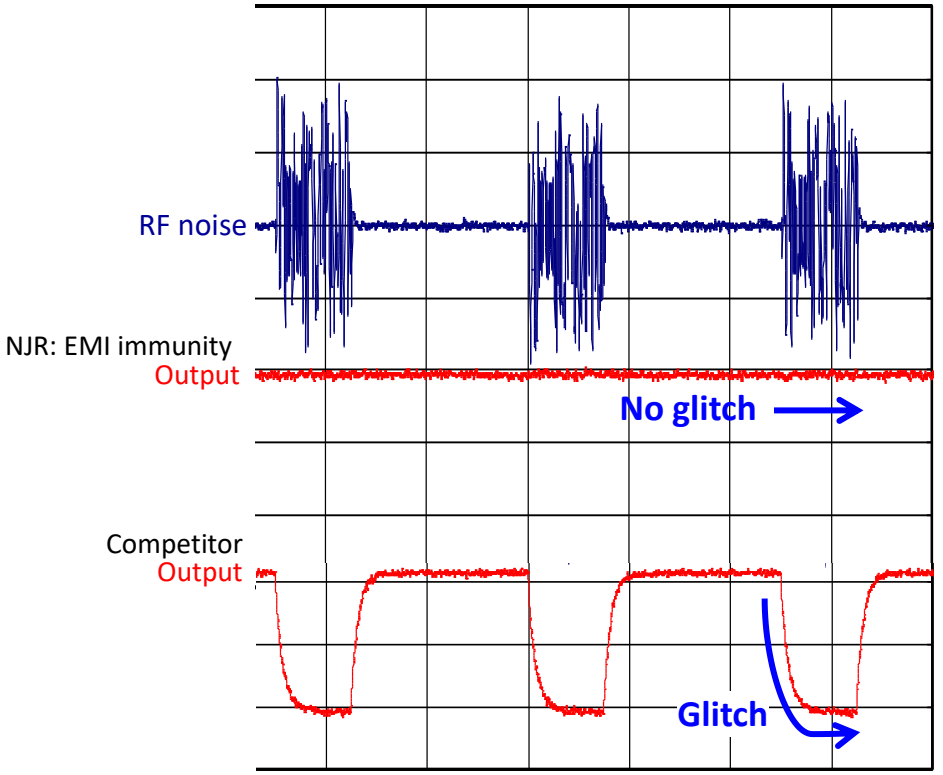
EMI Immunity Effective Range

- Effective to 300MHz to 5GHz



Bluetooth (2.4GHz) Irradiation Test

- EMI immunity product waveform in straight
  ⇨ Low impact of RF noise



High EMI Immunity Op-Amps

: U.D.
: M.P.
: Rail-to-rail I/O

Contents

Low Power

✓ I_{supply}=0.23µA/ch
✓ V^+=1.5V to 36V

Alarm units, testers, & long life battery equipment.

Low Power

NJU7026 [1ch]
NJU7027 [2ch]
NJU7028 [4ch]

V^+=1.8V to 5.5V
I_{supply}=13µA/ch

Ultra-Low Power

Lowest Power
I_{supply}=0.23µA/ch

NJU77001 [1ch]
NJU77002 [2ch]
NJU77004 [4ch]

V^+=1.5V to 5.5V

16V Supply

NJU7067 [2ch]
NJU7068 [4ch]

V^+=4V to 16V
I_{supply}=14µA/ch

36V Supply

Overvoltage protection

NJM8524 [4ch]

V^+=3V to 36V
I_{supply}=25µA/ch

Standard

✓ Low noise
✓ 14V operation (bipolar)

Audio amplifiers & general sensors.

Low Noise

NJU7056 [1ch]
NJU7057 [2ch]
NJU7058 [4ch]

V^+=1.8V to 5.5V
en=15nV/√Hz

1.7Mhz, 50µA/ch

NJU77551 [1ch]
NJU77552 [2ch]
NJU77554 [4ch]

V^+=1.8V to 5.5V
GBW=1.7MHz

High Speed

NJU7046 [1ch]
NJU7047 [2ch]
NJU7048 [4ch]

V^+=2.7V to 5.5V
SR=9V/µs

Low Noise

For Audio

SR=3.5V/µs

NJM8202 [2ch]

V^+=2.5V to 14V
en=10nV/√Hz

Precision

✓ Low input offset
✓ Low input offset drift

Tolerant to temperature changes. Measuring & industrial equipment.

U.D.

Vio=150µV max.
Vio drift=1µV/°C max.

NJU77600 [1ch]
NJU77602 [2ch]
NJU77604 [4ch]

V^+=2.3V to 5.5V
I_{supply}=12µA/ch

Grand Sensing

Vio=150µV max.
Vio drift=5µV/°C max.

NJU7076 [1ch]
NJU7077 [2ch]
NJU7078 [4ch]

500µV, 10µV/°C max.

New
NJU7066 [2ch]

High Speed

Vio=1.5mV max.
Vio drift=0.5µV/°C typ.

NJU77701 [1ch]

V^+=2.4V to 5.5V
SR=35V/µs

J-FET Input

Vio=400µV max.
Vio drift=0.8µV/°C typ.

NJM8512A/B [2ch]
NJM8513A/B [4ch]

V^+/V^-=±4.5V to ±16V

There are part of our op-amps. Please contact us for other products.

High EMI Immunity Op-Amps

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Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	Vsat min. V	R_L Ω	Io*3 typ. mA	SR typ. V/µs	GBW typ. MHz	en typ. nV/√Hz	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	DFN	SPICE Model	Notes
NJM8202	Out	Yes	2	2.5 to 14	2	6	(V^-)	(V^+) -1	0.25	5k	1	3.5	10	10	8	8	8	8				✓	
NJM8512A/B	-	Yes	2	9 to 32	1.3	0.8/0.4	(V^-) +2.5	(V^+) -2.5	1.2	600	30	20	7	10		8		8				✓	
NJM8513A/B	-	Yes	4	9 to 32	1.3	0.8/0.4	(V^-) +2.5	(V^+) -2.5	1.2	600	30	20	7	10			14					✓	
NJM8524	Out	Yes	4	3 to 36	0.025	1.8	(V^-)	(V^+) -1.6	0.2	20k	10	0.025	0.06	80			14					✓	Overvoltage Protection
NJU7026	Out	Yes	1	1.8 to 5.5	0.013	4	(V^-)	(V^+) -0.9	0.1	100k	15	0.05	0.16	50					5	5		✓	
NJU7027	Out	Yes	2	1.8 to 5.5	0.013	4	(V^-)	(V^+) -0.9	0.1	100k	15	0.05	0.16	50				8			8	✓	
NJU7028	Out	Yes	4	1.8 to 5.5	0.012	4	(V^-)	(V^+) -0.9	0.1	100k	15	0.05	0.16	50			14					✓	
NJU7046	I/O	Yes	1	2.7 to 5.5	1.4	5	(V^-)	(V^+)	0.05	10k	100	9	5	20					5	5		✓	
NJU7047	I/O	Yes	2	2.7 to 5.5	1.35	5	(V^-)	(V^+)	0.05	10k	100	9	5	20		8		8			8	✓	
NJU7048	I/O	Yes	4	2.7 to 5.5	1.325	5	(V^-)	(V^+)	0.05	10k	100	9	5	20		14	14					✓	
NJU7056	Out	Yes	1	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	10k	45	0.8	2.1	15					5	5		✓	
NJU7057	Out	Yes	2	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	10k	45	0.8	2.1	15				8			8	✓	
NJU7058	Out	Yes	4	1.8 to 5.5	0.275	4	(V^-)	(V^+) -0.9	0.1	10k	45	0.8	2.1	15			14					✓	
NJU7067	Out	Yes	2	4 to 16	0.014	4	(V^-)	(V^+) -1.6	0.05	10k	12	0.03	0.06	45	8		8					✓	
NJU7068	Out	Yes	4	4to 16	0.014	4	(V^-)	(V^+) -1.6	0.05	10k	12	0.03	0.06	45	14		14					✓	
NJU7076		Yes	1	2.2 to 5.5	0.6	0.15	(V^-)	(V^+) -1	0.15	600	100	0.5	1.3	10					5			✓	
NJU7076B		Yes	1	2.2 to 5.5	0.6	0.3	(V^-)	(V^+) -1	0.15	600	100	0.5	1.3	10						5		✓	
NJU7066	Out	Yes	2	2.2 to 5.5	0.6	0.5	(V^-)	(V^+) -1	0.15	600	100	0.5	1.3	10				8					
NJU7077		Yes	2	2.2 to 5.5	0.6	0.15	(V-)	(V^+) -1	0.15	600	100	0.5	1.3	10				8				✓	
NJU7078		Yes	4	2.2 to 5.5	0.575	0.2	(V-)	(V^+) -1	0.15	600	100	0.5	1.3	10			14						
NJU77000/A	I/O	Yes	1	1.5 to 5.5	0.00029	1.8/1.0	(V^-)	(V^+)	0.1	100k	10	0.0008	0.0011	600					5			✓	
NJU77001/A	I/O	Yes	1	1.5 to 5.5	0.00029	1.8/1.0	(V^-)	(V^+)	0.1	100k	10	0.0008	0.0011	600					5	5		✓	
NJU77002/A	I/O	Yes	2	1.5 to 5.5	0.00023	2.0/1.3	(V^-)	(V^+)	0.1	100k	10	0.0007	0.001	700		8		8			8	✓	
NJU77004/A	I/O	Yes	4	1.5 to 5.5	0.00023	2.2/1.5	(V^-)	(V^+)	0.1	100k	10	0.0007	0.001	700			14					✓	
NJU77550/1	I/O	Yes	1	1.8 to 5.5	0.055	5	(V^-)-0.2	(V^+) +0.2	0.025	10k	40	0.8	1.7	24					5	5			
NJU77552	I/O	Yes	2	1.8 to 5.5	0.05	5	(V^-)-0.2	(V^+) +0.2	0.025	10k	40	0.8	1.7	24		8		8			8	✓	Overvoltage Input Protection
NJU77554	I/O	Yes	4	1.8 to 5.5	0.05	5	(V^-)-0.2	(V^+) +0.2	0.025	10k	40	0.8	1.7	24			14						
NJU77600 (U.D.)	I/O	Yes	1	2.3 to 5.5	0.012	0.15	(V^-)	(V^+)	0.025	100k	-	0.04	0.08	-					5				
NJU77602 (U.D.)	I/O	Yes	2	2.3 to 5.5	0.012	0.15	(V^-)	(V^+)	0.025	100k	-	0.04	0.08	-		8		8			8		
NJU77604 (U.D.)	I/O	Yes	4	2.3 to 5.5	0.012	0.15	(V^-)	(V^+)	0.025	100k	-	0.04	0.08	-			14						
NJU77701	I/O	Yes	1	2.4 to 5.5	3.8	1.5	(V^-)	(V^+)	0.08	600	110	35	34	6					5			✓	recommended Gain ≥ 14dB

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

14V to 36V, Rail-to-Rail Op-Amps

: Rail-to-rail output
: Rail-to-rail I/O

Contents

1.8V to 14V

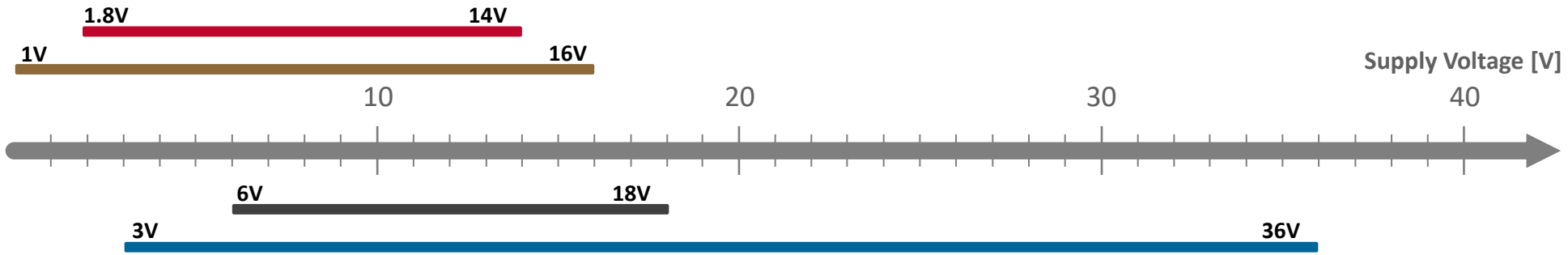
10nV/√Hz
NJM8530 [1ch]
NJM8532 [2ch]
NJM8534 [4ch]
V^+=1.8V to 14V
SR=0.4V/µs
I_{supply}=0.3mA/ch

10nV/√Hz
NJM2741 [1ch]
NJM2746 [2ch]
NJM2747 [4ch]
V^+=2.5V to 14V
SR=3.5V/µs
I_{supply}=2mA/ch

High EMI immunity
NJM8202 [2ch]
V^+=2.5V to 14V
SR=3.5V/µs
I_{supply}=2mA/ch

1V to 16V

Low power
NJU7067 [2ch]
NJU7068 [4ch]
I_{supply}=14µA/ch
SR=0.03V/µs
*Io=3mA



6V to 18V

NJU77902 [2ch]
V^+=6V to 18V
SR=9V/µs
I_{supply}=3.5mA/ch

3V to 36V

High output current
NJU77903 [1ch]
V^+=6.8V to 36V
SR=3V/µs
I_{supply}=9.5mA/ch
Io=400mA

Low power
NJM8524 [4ch]
V^+=3V to 36V
SR=0.03V/µs
I_{supply}=25µA/ch

*Io: short-circuit output current

14V to 36V, Rail-to-Rail Op-Amps

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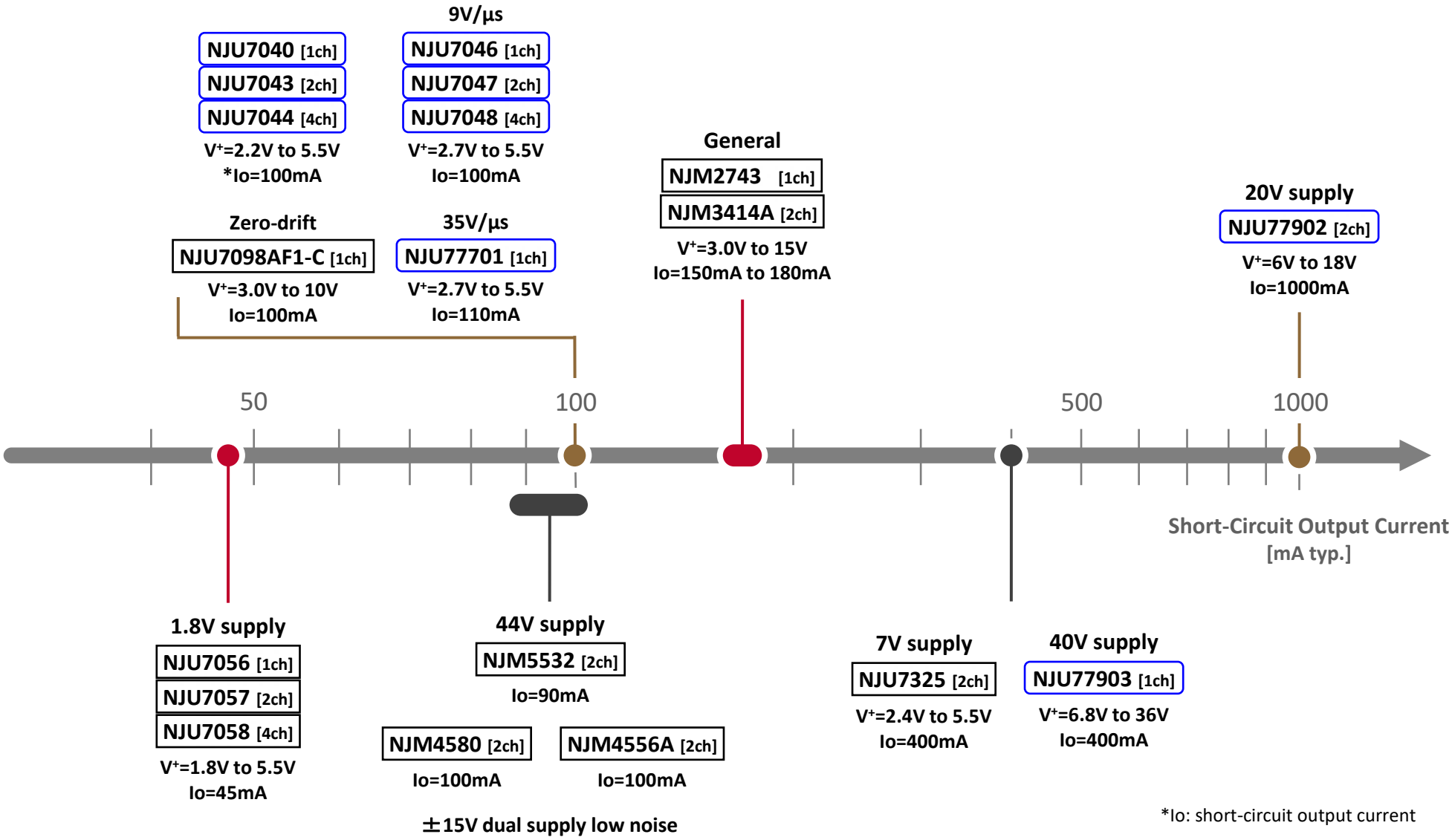
Characteristics / Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ (V)		I_{SUPPLY} (per Ch.) typ. (mA)	V_{IO} max. (mV)	Common-Mode Input Voltage Range min. (V)	Common-Mode Input Voltage Range max. (V)	-Vsat V_{OL}-V^- max. (V)	+Vsat V^+-V_{OH} max. (V)	R_L (Ω)	Io*3 typ. (mA)	SR typ. (V/µs)	GBW typ. (MHz)	Voltage Noise typ. (nV/√Hz)	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	DFN	TO-252	PCSP	SPICE Model	Notes
NJM2741	Out		1	2.5	14	2.2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10					5	5				✓	
NJM2746	Out		2	2.5	14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	8	8	8	8			8			✓	
NJM2747	Out		4	2.5	14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	14		14						20	✓	
NJM8202	Out	Yes	2	2.5	14	2	6	(V^-)	(V^+) -1	0.25	0.25	5k	1	3.5	10	10	8	8	8	8						✓	
NJM8524	Out	Yes	4	3	36	0.025	1.8	(V^-)	(V^+) -1.6	0.2	0.2	20k	10	0.025	0.06	80			14							✓	
NJM8530	I/O		1	1.8	14	0.32	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10					5					✓	
NJM8532	I/O		2	1.8	14	0.29	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10	8		8	8						✓	
NJM8534	I/O		4	1.8	14	0.3	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	1	10			14							✓	
NJU7067	Out	Yes	2	4	16	0.014	4	(V^-)	(V^+) -1.6	0.05	0.05	10k	12	0.03	0.06	45	8		8							✓	
NJU7068	Out	Yes	4	4	16	0.014	4	(V^-)	(V^+) -1.6	0.05	0.05	10k	12	0.03	0.06	45	14		14							✓	
NJU77902	I/O	Yes	2	6	18	3.5	10	(V^-)	(V^+)	0.2	0.2	-	1000	9	3	80							8			✓	
NJU77903	I/O	Yes	1	6.8	36	9.5	6	(V^-)	(V^+)	0.6	0.6	-	400	3.5	1.5	50							8	5		✓	

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

High Output Current Op-Amps

: Rail-to-rail output
: Rail-to-rail I/O

Contents



*Io: short-circuit output current

High Output Current Op-Amps

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Product Name / Characteristics	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. mA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	Vsat min. V	Io*3 typ. mA	Vo 100Ω typ. Vp-p	Power 32Ω typ. mW	Power 16Ω typ. mW	Supply Voltage V	SR typ. V/µs	GBW typ. MHz	Voltage Noise typ. nV/√Hz	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	DFN	PCSP	SPICE Model	Notes
NJM2743			1	3 to 15	2	5	(V^-)	(V^+) -2	1.5	150	3.2	37	65	@5V	0.85	0.8	22					5				✓	
NJM3414A			2	3 to 15	2	5	(V^-)	(V^+) -2	1.5	180	3.4	45	85	@5V	1	1.3	18	8		8						✓	
NJM4556A			2	4 to 36	4.5	6	(V^-) +1.5	(V^+) -1.5	4.5	100	18	15	-	@30V	3	8	12	8		8						✓	
NJM4580			2	4 to 36	3	3	(V^-) +3	(V^+) -3	3	100	15	15	-	@30V	5	15	5	8	8	8	8					✓	
NJM5532			2	6 to 44	4.5	4	(V^-) +3	(V^+) -3	3	90	10	15	-	@30V	8	10	5	8									
NJU7036	Out		2	2.7 to 5.5	1.75	10	(V^-)	(V^+) -1.2	0.15	500	4.95	90	180	@5V	0.7	0.4	60								20	✓	
NJU7040	I/O	Yes	1	2.2 to 5.5	0.45	10	(V^-)	(V^+)	0.1	100	4.1	35	37	@5V	0.85	0.8	40					5				✓	
NJU7043	I/O	Yes	2	1.8 to 5.5	0.30	10	(V^-)	(V^+)	0.1	100	4.1	35	37	@5V	0.7	0.8	40	8	8	8	8					✓	
NJU7044	I/O	Yes	4	2.2 to 5.5	0.45	10	(V^-)	(V^+)	0.12	100	4.1	35	37	@5V	0.8	0.8	40	14		14						✓	
NJU7046	I/O	Yes	1	2.7 to 5.5	1.4	5	(V^-)	(V^+)	0.12	100	4.2	35	37	@5V	9	5	20					5	5			✓	
NJU7047	I/O	Yes	2	2.7 to 5.5	1.35	5	(V^-)	(V^+)	0.12	100	4.2	35	37	@5V	9	5	20		8		8			8		✓	
NJU7048	I/O	Yes	4	2.7 to 5.5	1.325	5	(V^-)	(V^+)	0.12	100	4.2	35	37	@5V	9	5	20		14	14						✓	
NJU7056	Out	Yes	1	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	45	3.4	14	-	@5V	0.8	2.1	15					5	5			✓	
NJU7057	Out	Yes	2	1.8 to 5.5	0.26	4	(V^-)	(V^+) -0.9	0.1	45	3.4	14	-	@5V	0.8	2.1	15				8			8		✓	
NJU7058	Out	Yes	4	1.8 to 5.5	0.275	4	(V^-)	(V^+) -0.9	0.1	45	3.4	14	-	@5V	0.8	2.1	15			14						✓	
NJU7098AF1-C	Out	Yes	1	3 to 10	0.6	0.015	(V^-)	(V^+) -1.5	0.15	100	4.1	40	37	@5V	3	3	120					6				✓	
NJU7325	Out		2	2.4 to 5.5	3	15	(V^-) +0.4	(V^+) -1.0	0.45	400	4.88	75	137	@5V	1	1.5	43				8			8			
NJU77701	I/O	Yes	1	2.4 to 5.5	3.8	1.5	(V^-)	(V^+)	0.08	110	4.6	50	55	@5V	35	34	6					5				✓	Stable Gain ≥ 14dB
NJU77902	I/O	Yes	2	6 to 18	3.5	10	(V^-)	(V^+)	0.2	1000	14.5	830	1500	@15V	9	3	80							8		✓	
NJU77903	I/O	Yes	1	6.8 to 36	9.5	6	(V^-)	(V^+)	0.6	400	11.8	513	320	@12V	3.5	1.5	50							8		✓	

【Attention】 **The values of short-circuit output current and output power are reference values. Especially in the CMOS type, the current capability changes depending on the power supply voltage. Please be careful with heat generated by the output current.**

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

Supply Current ≤ 300µA/ch.

Low Supply Current Op-Amps

: U.D.
: M.D.
: Rail-to-rail I/O

Contents

■ 2V, 14V, 36V Operation

Rail-to-rail output	J-FET Input	Single supply, ground sensing	
	SR=3.5V/µs, 1MHz		0.4V/µs, 1MHz
0.025V/µs, 60kHz	NJM062C/CA [2ch]	2.1V/µs, 1.8MHz	NJM8530 [1ch]
NJM8524 [4ch]	NJM064C/CA [4ch]	NJM2132 [2ch]	NJM8532 [2ch]
			NJM8534 [4ch]
V^+=3V to 36V	V^+/V^-=±2V to ±18V	V^+=2.7V to 32V	V^+=1.8V to 14V
I_{supply}=20µA/ch	I_{supply}=200µA/ch	I_{supply}=220µA/ch	I_{supply}=300µA/ch

I_{supply}, SR

■ 5.5V Operation

Lowest power			
0.8V/ms, 1kHz	0.05V/µs, 0.16MHz 150µV, 1µV/°C max.	0.05V/µs, 0.16MHz	0.8V/µs, 1.7MHz
NJU77001 [1ch]	NJU77600 [1ch]	NJU7026 [1ch]	NJU77551 [1ch]
NJU77002 [2ch]	NJU77602 [2ch]	NJU7027 [2ch]	NJU77552 [2ch]
NJU77004 [4ch]	NJU77604 [4ch]	NJU7028 [4ch]	NJU77554 [4ch]
V^+=1.5V to 5.5V	V^+=2.3V to 5.5V	V^+=1.8V to 5.5V	V^+=1.8V to 5.5V
I_{supply}=0.23µA/ch	I_{supply}=12µA/ch	I_{supply}=13µA/ch	I_{supply}=50µA/ch

I_{supply}, SR

Low Supply Current Op-Amps

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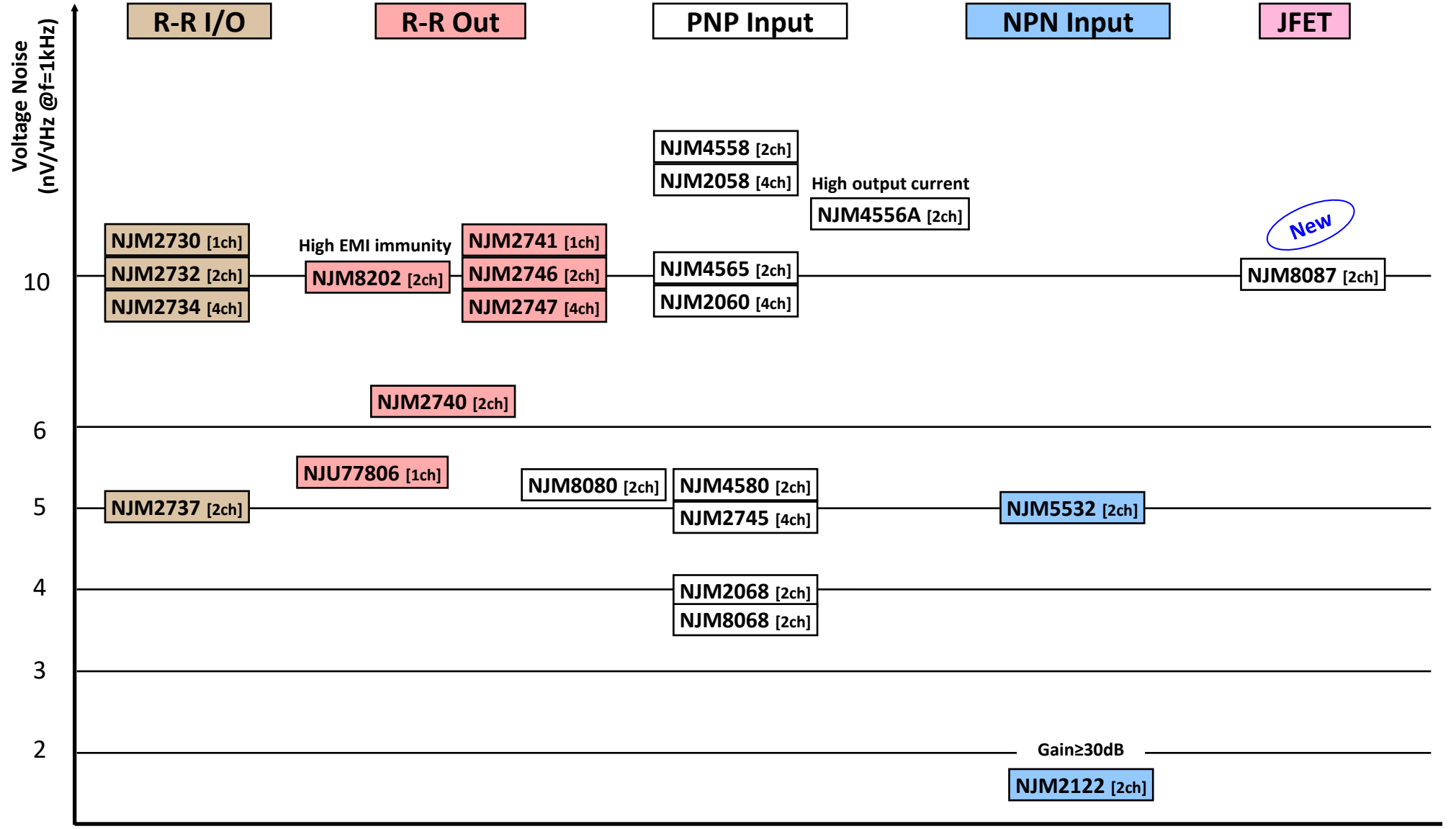
Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V	I_{SUPPLY} (per Ch.) typ. µA	I_{SUPPLY} (per Ch.) max. µA	I_{SUPPLY} (All Amps) max. µA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat V_{OL}-V^- max. V	+Vsat V^+-V_{OH} max. V	R_L Ω	Io^{*3} typ. mA	SR typ. V/µs	f_T typ. MHz	GBW typ. MHz	Voltage Noise typ. nV/√Hz	Package / Pin DMP	Package / Pin SOP*1	Package / Pin SSOP	Package / Pin MSOP*2	Package / Pin SOT23	Package / Pin SC88A	Package / Pin DFN	SPICE Model	Notes
NJM062C/A			2	4 to 36	200	250	500	15/6	(V^-) +2	(V^+) -2	5	5	10k	5	3.5	1	1	35		8	8					✓	
NJM064C/A			4	4 to 36	200	250	1000	15/6	(V^-) +2	(V^+) -2	5	5	10k	5	3.5	1	1	35		14	14					✓	
NJM2132			2	2.7 to 32	220	250	500	4.5	(V^-)	(V^+) -1.5	2	2	10k	4	2.1	1.5	1.8	32	8		8					✓	
NJM8524	Out		4	3 to 36	25	37.5	150	1.8	(V^-)	(V^+) -1.6	0.15	0.1	20k	6.5	0.025		0.06	80			14					✓	
NJM8530	I/O		1	1.8 to 14	320	550	550	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	-	1	10					5			✓	
NJM8532	I/O		2	1.8 to 14	290	450	900	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	-	1	10	8		8	8				✓	
NJM8534	I/O		4	1.8 to 14	300	450	1800	4	(V^-)	(V^+)	0.1	0.1	20k	10	0.4	-	1	10			14					✓	
NJU7026	I/O	Yes	1	1.8 to 5.5	13	20	20	4	(V^-)	(V^+) -0.9	0.1	0.1	100k	20	0.05	0.16	0.16	50					5	5		✓	
NJU7027	I/O	Yes	2	1.8 to 5.5	13	20	40	4	(V^-)	(V^+) -0.9	0.1	0.1	100k	20	0.05	0.16	0.16	50				8			8	✓	
NJU7028	I/O	Yes	4	1.8 to 5.5	12	18	72	4	(V^-)	(V^+) -0.9	0.1	0.1	100k	20	0.05	0.16	0.16	50			14					✓	
NJU77000	I/O	Yes	1	1.5 to 5.5	0.29	0.49	0.49	1.8	(V^-)	(V^+)	0.1	0.1	100k	10	0.0008	0.0011	0.0011	600					5			✓	
NJU77001	I/O	Yes	1	1.5 to 5.5	0.29	0.49	0.49	1.8	(V^-)	(V^+)	0.1	0.1	100k	10	0.0008	0.0011	0.0011	600					5	5		✓	
NJU77002	I/O	Yes	2	1.5 to 5.5	0.23	0.38	0.76	2	(V^-)	(V^+)	0.1	0.1	100k	10	0.0007	0.001	0.001	700		8		8			8	✓	
NJU77004	I/O	Yes	4	1.5 to 5.5	0.23	0.33	1.32	2.2	(V^-)	(V^+)	0.1	0.1	100k	10	0.0007	0.001	0.001	700			14					✓	
NJU77550/1	I/O	Yes	1	1.8 to 5.5	55	75	75	5	(V^-) -0.2	(V^+) +0.2	0.025	0.025	10k	40	0.8	1.2	1.7	24					5	5			
NJU77552	I/O	Yes	2	1.8 to 5.5	50	70	140	5	(V^-) -0.2	(V^+) +0.2	0.025	0.025	10k	40	0.8	1.2	1.7	24		8		8			8	✓	
NJU77554	I/O	Yes	4	1.8 to 5.5	50	70	280	5	(V^-) -0.2	(V^+) +0.2	0.025	0.025	10k	40	0.8	1.2	1.7	24			14						
NJU77600 (U.D.)	I/O	Yes	1	2.3 to 5.5	0.012	0.02	0.02	0.15	(V^-)	(V^+)	0.025	0.025	100k	-	0.04	-	0.08	-					5				
NJU77602 (U.D.)	I/O	Yes	2	2.3 to 5.5	0.012	0.02	0.04	0.15	(V^-)	(V^+)	0.025	0.025	100k	-	0.04	-	0.08	-		8		8			8		
NJU77604 (U.D.)	I/O	Yes	4	2.3 to 5.5	0.012	0.02	0.08	0.15	(V^-)	(V^+)	0.025	0.025	100k	-	0.04	-	0.08	-			14						

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

Low Noise, Audio Op-Amps

Contents



Low Noise, Audio Op-Amps

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Product Name (D): Noise Test Option / Characteristics			EMI-Immunity	Supply Voltage	I_{SUPPLY} (per Ch.)	Voltage Noise	THD	V_{IO}	SR	GBW	Io^{*3}	Common-Mode Input Voltage Range		-Vsat V_{OL}-V^-	+Vsat V^+-V_{OH}	R_L	Package / Pin							SPICE Model	Notes
																	DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	DFN		
Single	Dual	Quad		V^+ - V^- V	typ. mA	typ. nV/√Hz	typ. %	max. mV	typ. V/μs	typ. MHz	typ. mA	min. V	max. V	max. V	max. V	Ω									
NJM2723				7 to 35	2.8	6	-	20	2000	75	30	(V^-) +4	(V^+) -4	11.5	11.5	150		8							Current Feed Back
	NJM4558(D)	NJM2058		8 to 36	1.75	12.5	-	6	1	3	68	(V^-) +3	(V^+) -3	3	3	10k	8/14	8	8/14					✓	
		NJM2060		8 to 36	2.25	10	-	6	4	10	68	(V^-) +3	(V^+) -3	3	3	2k	14		14					✓	
	NJM4565(D)			8 to 36	2.25	9	-	3	4	10	76	(V^-) +3	(V^+) -3	3	3	2k	8	8	8					✓	
	NJM4580(D)			4 to 36	3	5	0.0005	3	5	15	100	(V^-) +3	(V^+) -3	3	3	2k	8	8	8	8				✓	
	NJM8080			4 to 36	3	5	0.0005	3	5	15	100	(V^-) +3	(V^+) -3	3	3	2k		8	8	8				✓	
		NJM2745M/V		4 to 19	3	5	0.001	3	5	15	100	(V^-) +2	(V^+) -2	2	2	2k	14		14					✓	
	NJM2068(D)			8 to 36	2.5	4	0.001	3	6	19	65	(V^-) +3	(V^+) -3	3	3	2k	8		8					✓	
	NJM8068			8 to 36	2.5	3.5	0.001	3	6.8	19	65	(V^-) +3	(V^+) -3	3	3	2k		8		8				✓	
	NJM4556A(D)			4 to 36	4.5	12	-	6	3		100	(V^-) +1.5	(V^+) -1.5	4.5	4.5	150	8		8					✓	High Output Current
	NJM2122			4 to 14	3.5	1.5	-	6	2.4	12	2	(V^-) +1.8	(V^+) -1.8	0.5	0.5	2.5k	8								Stable Gain ≥ 30dB
NJM2741	NJM2746	NJM2747		2.5 to 14	2	10	0.001	6	3.5	10	1	(V^-)	(V^+) -1	0.25	0.25	5k	8/14	8	8/14	8	5	5	8	✓	
	NJM2740			2.2 to 7	1.75	6.5	0.002	6	4	12	1	(V^-) +1.1	(V^+) -1	0.5	0.5	2.5k	8		8	8				✓	
	NJM8202		Yes	2.5 to 14	2	10	0.001	6	3.5	10	1	(V^-)	(V^+) -1	0.25	0.25	5k	8	8	8	8				✓	
NJU77806			Yes	1.8 to 5.5	0.5	5.5	0.005	2	1.1	4.4	70	(V^-) -0.1	(V^+) -0.9	0.1	0.1	10k						5		✓	
NJM2730	NJM2732	NJM2734		1.8 to 5.5	0.32	10	0.01	5	0.4	1	10	(V^-)	(V^+)	0.1	0.1	20k	8/14	8	8/14	8	5			✓	
	NJM2737			1.8 to 6	0.6	5	0.0009	5	0.7	3.1	10	(V^-)	(V^+)	0.15	0.1	20k	8		8	8				✓	

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type
*3 Short circuit

Comparators

Contents

Low Power

Push-Pull Output

Rail-to-rail input
T_{RLH}=850ns
NJU77230 [1ch]
NJU77231 [1ch]
NJU77232 [2ch]
V^+=1.8V to 5.5
I_{supply}=10µA/ch

T_{RLH}=540ns
Isink=25mA
NJU7108 [1ch]
V^+=1V to 5.5V
I_{supply}=10µA

T_{RLH}=3300ns
Isink=2mA
NJU7116 [1ch]
V^+=1.8V to 3.6V
I_{supply}=1µA

Open-Drain Output

Rail-to-rail input
T_{RLH}=1100ns
NJU77240 [1ch]
NJU77241 [1ch]
NJU77242 [2ch]
V^+=1.8V to 5.5
I_{supply}=10µA/ch

T_{RLH}=540ns
Isink=25mA
NJU7118 [1ch]
V^+=1V to 5.5V
I_{supply}=10µA

T_{RLH}=900ns
Isink=2mA
NJU7141 [1ch]
V^+=1V to 5.5V
I_{supply}=5µA

Standard

Open-Collector Output

T_{RLH}=1500ns
NJM2903[2ch]
NJM2901[4ch]
V^+=2V to 36V

T_{RLH}=500ns
NJM12903 [2ch]
NJM12901 [4ch]
V^+=2V to 14V
I_{supply}=200µA/ch

T_{RLH}=1300ns
NJM390A [1ch]
NJM391A [1ch]
V^+=2V to 36V

High Speed

Push-Pull Output

T_{RLH}=110ns
Isink=25mA
NJU7109 [1ch]
V^+=1.8V to 5.5V
I_{supply}=100µA

Open-Drain Output

T_{RLH}=160ns
Isink=25mA
NJU7119 [1ch]
V^+=1.8V to 5.5V
I_{supply}=100µA

Comparators

Product Name / Characteristics	Ch.	Output Type	Supply Voltage $V^+ - V^-$ (V)	I_{SUPPLY} (per Ch.) typ. (uA)	V_{IO} max. (mV)	Common-Mode Input Voltage Range min. (V)	Common-Mode Input Voltage Range max. (V)	t_{RLH} typ. (ns)	t_{RHL} typ. (ns)	-Vsat V_{OL}-V^- max. (V)	+Vsat V^+-V_{OH} max. (V)	Package / Pin DMP	SOP*1	SSOP	MSOP*2	SOT23	SC88A	DFN	SPICE Model	Notes
NJM390A	1	O.D.	2 to 36	300	3	(V-)	(V+) -1.5	1300	500	0.4 (Isink=4mA)	-					5	5			
NJM391A	1	O.D.	2 to 36	300	3	(V-)	(V+) -1.5	1300	500	0.4 (Isink=4mA)	-					5	5	6		
NJM2903	2	O.D.	2 to 36	200	7	(V-)	(V+) -1.5	1500	750	0.4 (Isink=3mA)	-	8	8	8	8				✓	
NJM2901	4	O.D.	2 to 36	200	7	(V-)	(V+) -1.5	1500	750	0.4 (Isink=3mA)	-	14		14					✓	
NJM12903	2	O.D.	2 to 14	200	4	(V-)	(V+) -1.5	500	130	0.3 (Isink=3mA)	-	8	8	8	8				✓	
NJM12901	4	O.D.	2 to 14	200	4	(V-)	(V+) -1.5	500	130	0.3 (Isink=3mA)	-	14		14						
NJU7108	1	P.P.	1 to 5.5	10	4	(V-)	(V+) -0.5	500	190	0.3 (Isink=5mA)	0.3 (Isink=5mA)						5		✓	
NJU7109	1	P.P.	1.8 to 5.5	100	7	(V-)	(V+) -0.6	110	70	0.3 (Isink=5mA)	0.3 (Isink=5mA)					5	5		✓	
NJU7116	1	P.P.	1.8 to 3.6	1	2.5	(V-)	(V+) -0.5	3300	1200	0.3 (Isink=2mA)	0.3 (Isink=2mA)					5		6	✓	
NJU7118	1	O.D.	1 to 5.5	10	4	(V-)	(V+) -0.5	540	190	0.3 (Isink=5mA)	-						5			
NJU7119	1	O.D.	1.8 to 5.5	100	7	(V-)	(V+) -0.6	160	70	0.3 (Isink=5mA)	-						5			
NJU7141	1	O.D.	1 to 5.5	5	10	(V-)	(V+) -0.5	900	350	0.3 (Isink=2mA)	-					5			✓	
NJU77230	1	P.P.	1.8 to 5.5	6	6	(V-)	(V+)	780	480	0.3 (Isink=3mA)	0.3 (Isink=3mA)					5	5			
NJU77231	1	P.P.	1.8 to 5.5	6	6	(V-)	(V+)	780	480	0.3 (Isink=3mA)	0.3 (Isink=3mA)					5	5	6	✓	
NJU77232	2	P.P.	1.8 to 5.5	6	6	(V-)	(V+)	780	480	0.3 (Isink=3mA)	0.3 (Isink=3mA)				8			8	✓	
NJU77240	1	O.D.	1.8 to 5.5	6	6	(V-)	(V+)	840	450	0.3 (Isink=3mA)	-					5	5			
NJU77241	1	O.D.	1.8 to 5.5	6	6	(V-)	(V+)	840	450	0.3 (Isink=3mA)	-					5	5	6	✓	
NJU77242	2	O.D.	1.8 to 5.5	6	6	(V-)	(V+)	840	450	0.3 (Isink=3mA)	-				8			8		

O.D.: Open Drain
P.P.: Push-Pull

*1 SOP8: JEDEC 150mil
*2 MSOP8 (VSP8): meet JEDEC MO-187-DA,thin type

Small Package Op-Amps & Comparators

Contents

■ DFN (ESON)

DFN8-U1
2.0x2.0x0.397 mm

Comparators	Low Noise	Low Noise	High Speed
Push-pull output	I_{supply}=13µA/ch	en=10nV/√Hz	9V/µs
NJU77232 [2ch]	NJU7027 [2ch]	NJM2746 [2ch]	NJU7047 [2ch]
Open-drain output	I_{supply}=0.23µA/ch	en=15nV/√Hz	
NJU77242 [2ch]	NJU77002 [2ch]	NJU7057 [2ch]	

DFN6-G1
1.6x1.6x0.397 mm

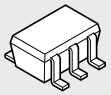
Comparators	
Push-pull output	Push-pull output
NJU77231 [1ch]	NJU7116 [1ch]
Open-drain output	I_{supply}=1µA/ch
NJU77241 [1ch]	

■ QFN

EQFN12-E2
1.8x1.8x0.397 mm
NJM2904C [2ch]

EQFN14-D7
1.6x1.6x0.397 mm
NJM2903C [2ch]

■ SC-88A



1.25x2.0x0.95 mm

Low Power	Low Noise	Comparators
I_{supply}=0.29µA/ch	en=5.5nV/√Hz	NJU77230/31 [1ch]
NJU77001 [1ch]	NJU77806 [1ch]	NJU77240/41 [1ch]
I_{supply}=13µA/ch	en=10nV/√Hz	
NJU7026 [1ch]	NJM2741 [1ch]	NJU7108/18 [1ch]
I_{supply}=80µA/ch, 36V	en=15nV/√Hz	
NJM2130 [1ch]	NJU7056 [1ch]	NJU7109/19 [1ch]

Small Package Op-Amps & Comparators

Back to Category | Contents

Op-Amps

Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V		I_{SUPPLY} (per Ch.) typ. mA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	-Vsat $V_{OL}-V^-$ max. V	+Vsat V^+-V_{OH} max. V	R_L Ω	Io^{*1} typ. mA	SR typ. V/µs	GBW typ. MHz	Voltage Noise typ. nV/√Hz	Package / Pin SC88A (2020)	Package / Pin DFN (2020)	Package / Pin EQFN (1818)	SPICE Model	Notes
NJM2741	Out		1	2.5	14	2.2	6	(V⁻)	(V⁺) -1	0.25	0.25	5k	1	3.5	10	10	5			✓	
NJM2746			2			2												8		✓	
NJM2904C	-		2	3	32	0.35	7	(V⁻)	(V⁺) -1.5	1.5	1.5	2k	40	0.6	1.1	30			12	✓	
NJU7026	Out	Yes	1	1.8	5.5	0.013	4	(V⁻)	(V⁺) -0.9	0.1	0.1	100k	15	0.05	0.16	50	5			✓	
NJU7027		Yes	2															8		✓	
NJU7047	I/O	Yes	2	2.7	5.5	1.35	5	(V⁻)	(V⁺)	0.05	0.05	10k	100	9	5	20		8		✓	
NJU7056	Out	Yes	1	1.8	5.5	0.26	4	(V⁻)	(V⁺) -0.9	0.1	0.1	10k	45	0.8	2.1	15	5			✓	
NJU7057		Yes	2															8		✓	
NJU77001/A	I/O	Yes	1	1.5	5.5	0.00029	1.8/1.0	(V⁻)	(V⁺)	0.1	0.1	100k	10	0.0008	0.0011	600	5			✓	
NJU77002/A		Yes	2			0.00023	2.0/1.3							0.0007	0.001	700		8		✓	
NJU77806	I/O	Yes	1	1.8	5.5	0.5	2	(V⁻) -0.1	(V⁺) -0.9	0.1	0.1	10k	70	1.1	4.4	5.5	5			✓	

Comparators

O.D.: Open Drain
P.P.: Push-Pull

Product Name	Rail-to-Rail	EMI-Immunity	Ch.	Supply Voltage $V^+ - V^-$ V		I_{SUPPLY} (per Ch.) typ. uA	V_{IO} max. mV	Common-Mode Input Voltage Range min. V	Common-Mode Input Voltage Range max. V	t_{RLH} typ. ns	t_{RHL} typ. ns	-Vsat $V_{OL}-V^-$ max. V	+Vsat V^+-V_{OH} max. V	Output Type	Package / Pin SC88A (2020)	Package / Pin DFN (2020)	Package / Pin DFN (1616)	Package / Pin EQFN (1616)	SPICE Model	Notes
NJM2903C	-		2	2	36	225	5	(V⁻)	(V⁺) -1.5	1300	750	0.4 (I_{SINK}=4mA)	-	O.D.				14	✓	
NJU7108	Out		1	1	5.5	10	4	(V⁻)	(V⁺) -0.5	500	190	0.3 (I_{SINK}=5mA)	0.3 (I_{SINK}=5mA)	P.P.	5				✓	
NJU7109	Out		1	1.8	5.5	100	7	(V⁻)	(V⁺) -0.6	110	70	0.3 (I_{SINK}=5mA)	0.3 (I_{SINK}=5mA)	P.P.	5				✓	
NJU7118	-		1	1	5.5	10	4	(V⁻)	(V⁺) -0.5	540	190	0.3 (I_{SINK}=5mA)	-	O.D.	5					
NJU7119	-		1	1.8	5.5	100	7	(V⁻)	(V⁺) -0.6	160	70	0.3 (I_{SINK}=5mA)	-	O.D.	5					
NJU77230		Yes	1	1.8	5.5	6	6	(V⁻)	(V⁺)	780	480	0.3 (I_{SINK}=3mA)	0.3 (I_{SINK}=5mA)	P.P.	5					
NJU77231	In	Yes	1	1.8	5.5	6	6	(V⁻)	(V⁺)	780	480	0.3 (I_{SINK}=3mA)	0.3 (I_{SINK}=5mA)	P.P.	5		6		✓	
NJU77232		Yes	2	1.8	5.5	6	6	(V⁻)	(V⁺)	780	480	0.3 (I_{SINK}=3mA)	0.3 (I_{SINK}=5mA)	P.P.		8			✓	
NJU77240		Yes	1	1.8	5.5	6	6	(V⁻)	(V⁺)	840	450	0.3 (I_{SINK}=3mA)	-	O.D.	5					
NJU77241	In	Yes	1	1.8	5.5	6	6	(V⁻)	(V⁺)	840	450	0.3 (I_{SINK}=3mA)	-	O.D.	5		6			
NJU77242		Yes	2	1.8	5.5	6	6	(V⁻)	(V⁺)	840	450	0.3 (I_{SINK}=3mA)	-	O.D.		8			✓	

*1 Short circuit

Renewal Standard Series OP-Amps / Comparators

Contents

Concept

These OpAmps are **re-designed** as ***"the new standard OpAmps"*** with competitive price and global standard packages.
In addition, some of specifications such as temperature range, ESD are improved.

Features

- ✓ Shrunk Chip by new process, new design
- ✓ Global Standard Package: SOP JEDEC 150mil
  MSOP(TVSP) Meet JEDEC MO-187-DA THIN TYPE
  SSOP
- ✓ Expanded Temperature Range, Spec

Renewal Standard Series

Contents

Dual Supply Bipolar OP-Amp

Dual		
NJM4558C	NJM8065	upper compatible NJM4558 NJM4560 NJM4565

Audio Model	Dual	
NJM4580C	NJM8080	upper compatible NJM4580 NJM4580C

Dual Supply Low Noise OP-Amp

Dual		
NJM5532C	NJM8068	upper compatible NJM2068

Dual Supply JFET OP-Amp

Dual	Quad
NJM062C/CA	NJM064C/CA
NJM072C/CA	NJM074C/CA
NJM082C/CA	NJM084C/CA

Single Supply Bipolar OP-Amp

Single	Dual	Quad
NJM321A	NJM358C/CA	NJM324C/CA
NJM8021	NJM2904C/CA	NJM2902C/CA

Single Supply Bipolar Comparator

Single	Dual	Quad
NJM391A	NJM393C/CA	NJM339C/CA
NJM8191	NJM2903C/CA	NJM2901C/CA

A-Grade <Offset Voltage option>

Contents

Single Supply Bip OP-Amp

Dual	Quad
NJM358C/CA	NJM324C/CA
NJM2904C/CA	NJM2902C/CA

Standard	A-grade (offset voltage)
NJM358C	**NJM358CA**
7mV max.	2mV max.
NJM2904C	**NJM2904CA**
7mV max.	2mV max.
NJM324C	**NJM324CA**
7mV max.	2.5mV max.
NJM2902C	**NJM2902CA**
7mV max.	2.5mV max.

Single Supply Bip Comparator

Dual	Quad
NJM393C/CA	NJM339C/CA
NJM2903C/CA	NJM2901C/CA

Standard	A-grade (offset voltage)
NJM393C	**NJM393CA**
5mV max.	2mV max.
NJM2903C	**NJM2903CA**
5mV max.	2mV max.
NJM339C	**NJM339CA**
5mV max.	2.5mV max.
NJM2901C	**NJM2901CA**
5mV max.	2.5mV max.

Package Line Up of Renewal Standard Series

Part Number	Package										
	SC-88A	SOT-23-5	DFN6 (ESON6)	SOP8	DMP8	MSOP8 (TVSP8)	SSOP8	SOP14	SSOP14	EQFN12	EQFN14
Operational Amplifier											
NJM8020/8021	✓	✓	✓(8021 only)								
NJM320A/321A	✓	✓	✓(321A only)								
NJM358C/CA				✓			✓				
NJM2904C/CA				✓	✓	✓	✓			✓(2904C only)	
NJM324C/CA								✓	✓		
NJM2902C/CA								✓	✓		
NJM4558C				✓			✓				
NJM8065				✓	✓	✓	✓				
NJM4580C				✓			✓				
NJM8080				✓		✓	✓				
NJM5532C				✓							
NJM8068				✓		✓					
NJM062C/CA				✓			✓				
NJM072C/CA				✓			✓				
NJM082C/CA				✓			✓				
NJM064C/CA								✓	✓		
NJM074C/CA								✓	✓		
NJM084C/CA								✓	✓		
Comparator											
NJM8190/8191	✓	✓	✓(8191 only)								
NJM390A/391A	✓	✓	✓(391A only)								
NJM393C/CA				✓			✓				
NJM2903C/CA				✓	✓	✓	✓				✓(2903C only)
NJM339C/CA								✓	✓		
NJM2901C/CA								✓	✓		

Cross-Reference of Renewal Standard Series

Supplier	NJR	ST	TI	ON Semi	ON Semi (ex-Fairchild)	ROHM	Renesas	KEC
Part Number	**NJM358C / CA**	LM358 / 358A	LM358 / 358A	LM358 / 358A	LM358 / -	BA10358 / -	µPC358 / µPC358(5)	KIA358 / -
	NJM324C / CA	LM324 / 324A	LM324 / 324A	LM324 / 324A	LM324 / -	BA10324 / -	-	KIA324 / -
	NJM393C / CA	LM393 / 393A	LM393 / 393A	LM393 / -	LM393 / -	BA10393 / -	µPC393 / µPC393(5)	KIA393 / -
	NJM339C / CA	LM339 / 339A	LM339 / 339A	LM339 / -	LM339 / -	BA10339 / -	µPC339 / µPC339(5)	KIA339 / -
	NJM2904C / CA	LM2904 / 2904A	LM2904 / 2904A	LM2904 / 2904A	LM2904 / -	BA2904S / 2904W	µPC1251 / µPC1251(5)	-
	NJM2902C / CA	LM2902 /2902AW	LM2902 / 2902A	LM2902 / -	LM2902 / -	BA2902S / -	-	-
	NJM2903C / CA	LM2903 / -	LM2903 / 2903A	LM2903 / -	LM2903 / -	BA2903S / 2903W	µPC277 / µPC277(5)	-
	NJM2901C / CA	LM2901 / -	LM2901 / 2901A	LM2901 / -	LM2901 / -	BA2901S / -	µPC177 / µPC177(5)	-
	NJM4558C	MC4558C	RC4558	-	KA4558	BA4558	µPC4558	KIA4558
	NJM4580C	-	RC4580	-	-	BA4580R	µPC4572	-
	NJM062C / CA	TL062C / -	TL062C / AC	-	-	-	µPC4062 / -	-
	NJM064C / CA	TL064C / AC	TL064C / AC	-	-	-	µPC4064 / -	-
	NJM072C / CA	TL072C / AC	TL072C / AC	-	-	-	µPC4072 / -	-
	NJM074C / CA	TL074C / AC	TL074C / AC	-	-	-	µPC4074 / -	-
	NJM082C / CA	TL082C / AC	TL082C / AC	-	-	-	µPC4082 / -	-
	NJM084C / CA	TL084C / AC	TL084C / AC	-	-	-	µPC4084 / -	-
	NJM8065	MC4558C	RC4558	-	KA4558	BA4558 / 4560	µPC4558 / 4560	KIA4558
	NJM8080	-	RC4580	-	-	BA4580R	µPC4572	-
	NJM5532C	-	NE5532	NE5532	NE5532	BA15532	-	-
	NJM8068	LM833	LM833	LM833	-	-	µPC4570	-

Evaluation Boards Support

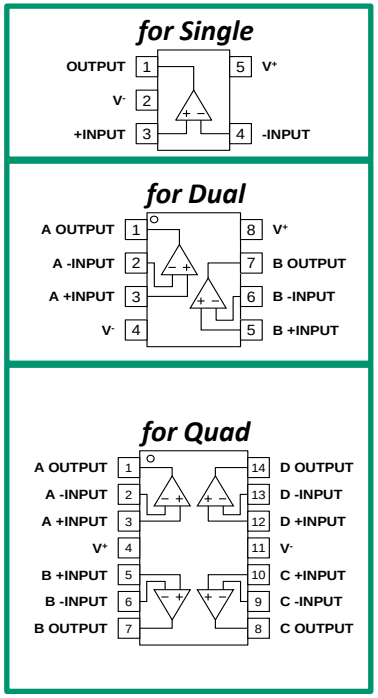
NJR Provides universal evaluation boards

Contents

Features

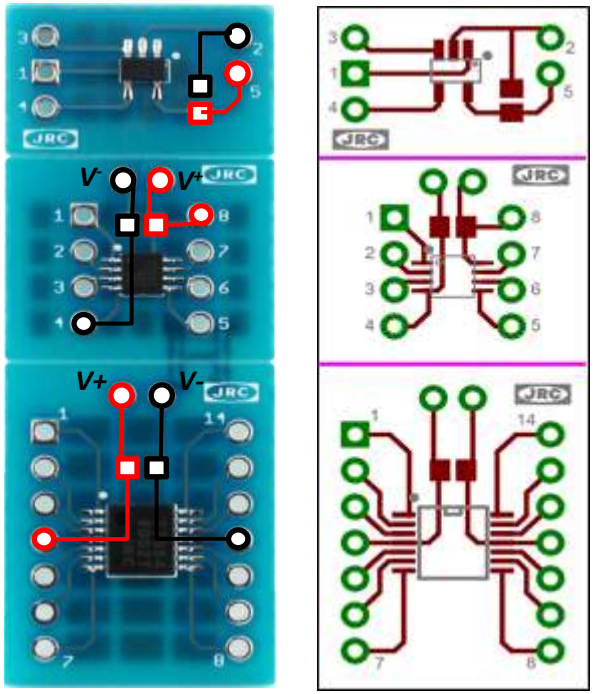
- ✓ The universal board covers Single (SOT-23-5), Dual (MSOP8) and Quad type (SSOP14).
- ✓ Users can add external components according to demand applications.
- ✓ NJR provides the board on request.

Pin functions

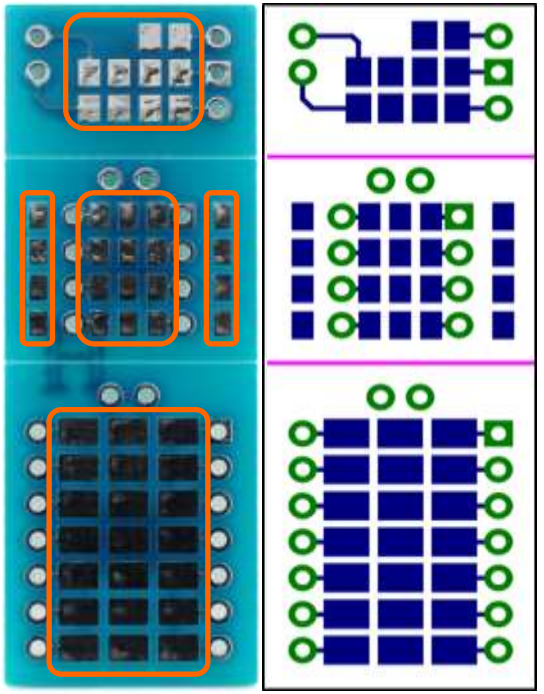


Top view

○ *V- terminal* ○ *V+ terminal*



Bottom view



Ideal pads for additional elements

* Examples are showed in next page

Ideal pad examples

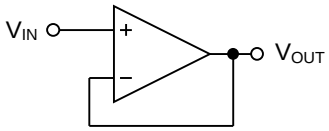
Contents

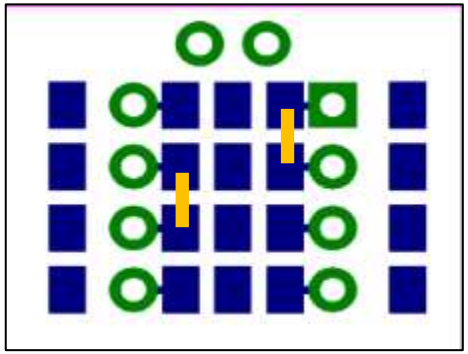
R Resistor

C Capacitor

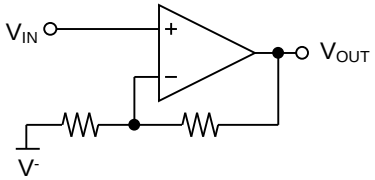
Line

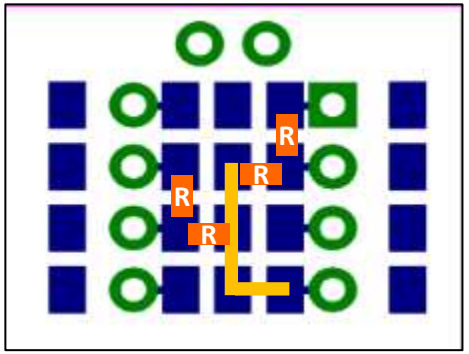
Buffer



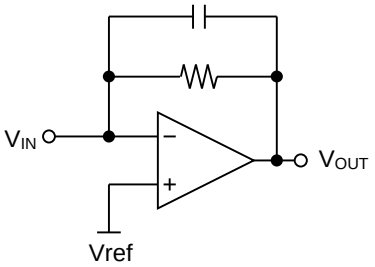


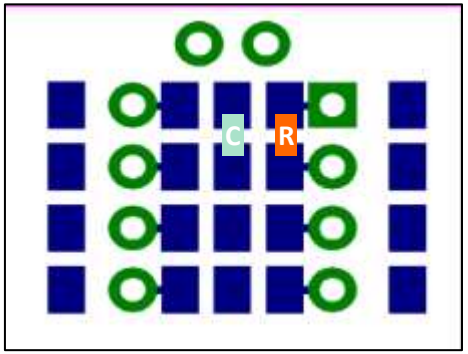
Non-inverting amplifier





Transimpedance amplifier





ASSPs

Audio Specialized Op-Amps

MUSES

: U.D.
: M.P.

Contents

Entry Models

NJM8801
NJM4580

✓For upgrading from conventional products!

Bipolar-input

NJM8801 [2ch]

EMP8 SSOP8-A3

Bipolar-input

NJM4582 [2ch]

SSOP8-A3

Bipolar-input
100mA Output current

NJM8830 [2ch]

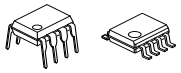
ESON8-W1

Mass Production Models

✓Small ESON8 package
✓Single supply, rail-to-rail output (NJM8832)
✓Middle/high-end audio, portable audio

Bipolar-input

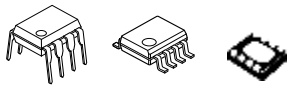
MUSES8820 [2ch]



DIP8 EMP8

JFET-input

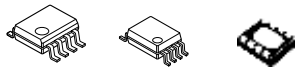
MUSES8920 [2ch]



DIP8 EMP8 ESON8-X7

Bipolar-input
2.1nV/√Hz, 0.0009%

MUSES8832 [2ch]



EMP8 SSOP8-A3 ESON8-W1

Flagship Models

✓ DIP8 package using the OFC*
✓ Circuit design for good sound quality

*Oxygen-Free Copper (99.99%)

JFET-input

MUSES01 [2ch]

DIP8 (OFC)

Bipolar-input

MUSES02 [2ch]

DIP8 (OFC)

JFET-input
Single OpAmp

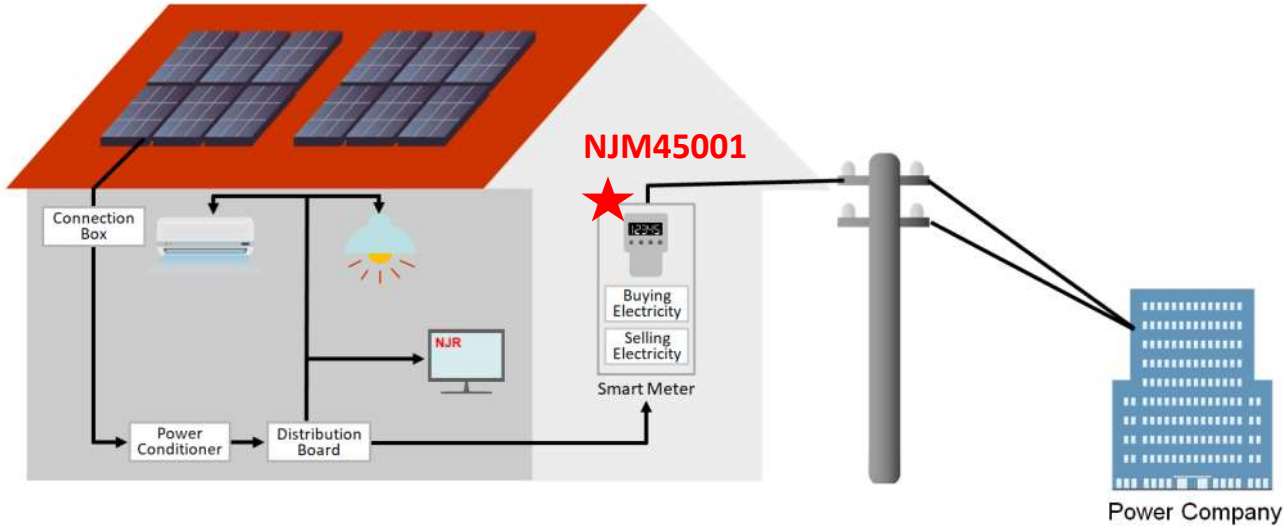
MUSES03 [1ch]

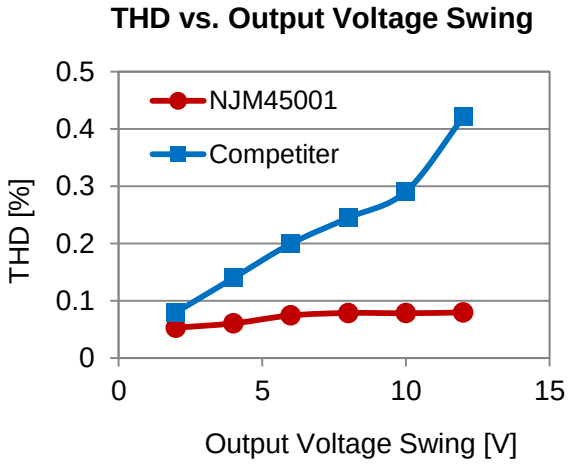
DIP8 (OFC)

Power-Line Communication Solution -NJM45001-

Contents

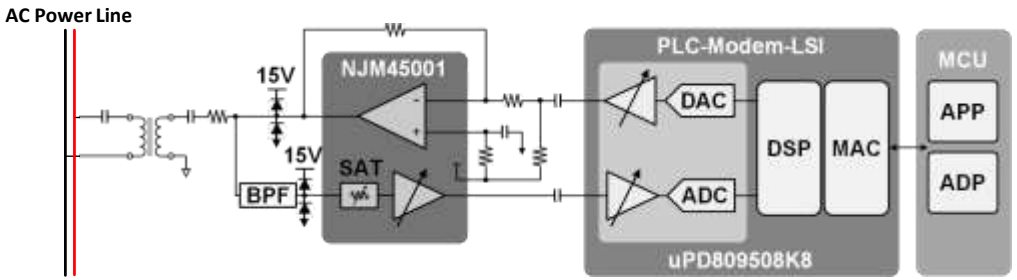
■ Power-Line Communication System for Smart Grid





FEATURES

- High output current (3A)
- TX/RX amplifier built into a single chip
- Supply voltage : 8V to 22V
- Low distortion : 0.08% (at 12Vp-p output)



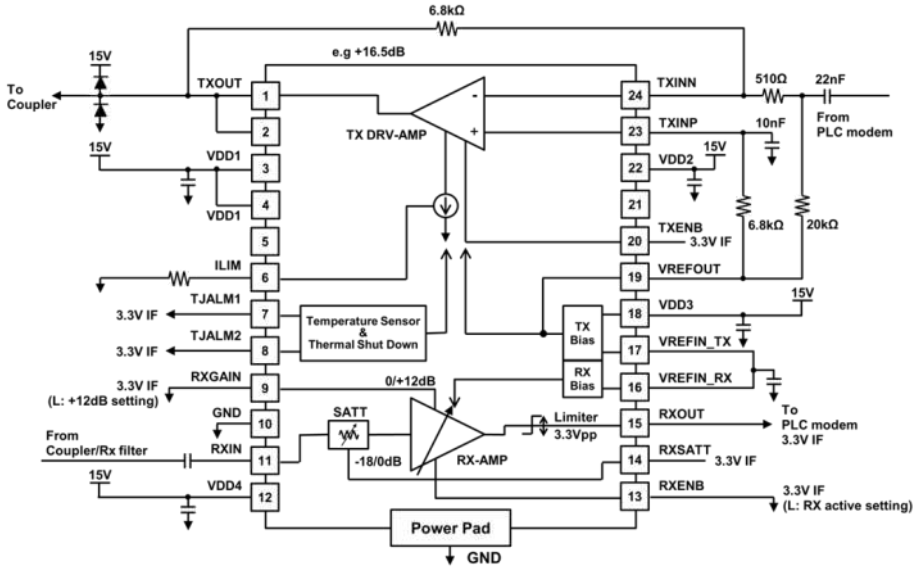
NJM45001

- Analog front-end IC for power-line communication.
- Compatible with Renesas PLC modem ICs (e.g., uPD809508K8).

Power-Line Communication AFE -NJM45001-

Contents

■ Block Diagram



NJM45001

High-performance

- Power-line driver with thermal protection and current limiter
- Built-in low noise receiver
- Supply voltage: 8V to 22V

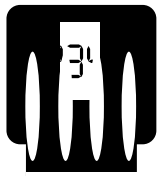
High performance transmission driver

- High output current: 3A typ.
- Low distortion: 60dB typ.

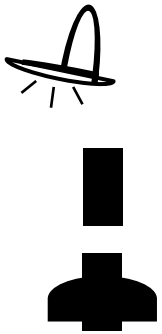
Flexible receive gain control

- -18dB / -6dB / 0dB / 12dB

■ Applications



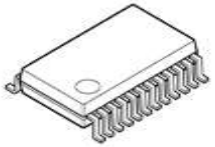
Smart meters



Lightning systems

HEMS

■ Package

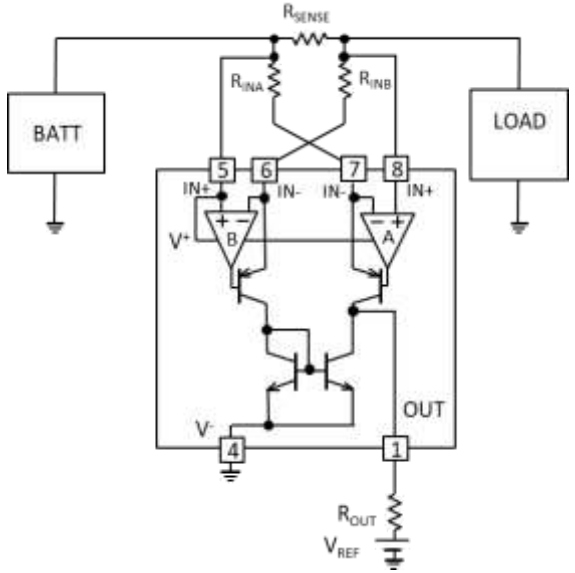


NJM45001VP1
(HTSSOP24)

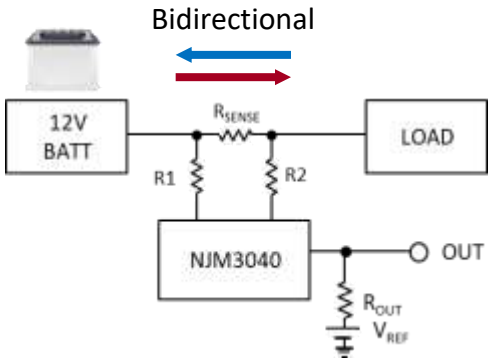
Current Detection Amplifier -NJM3040-

Contents

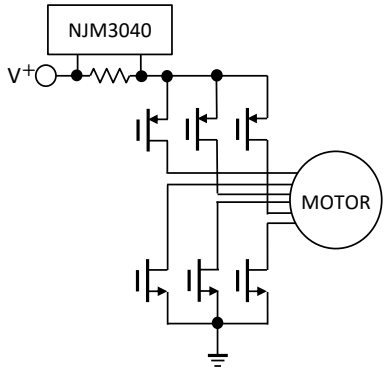
■ Block Diagram



■ Applications



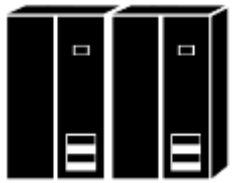
Bidirectional current detection



High-side current detection

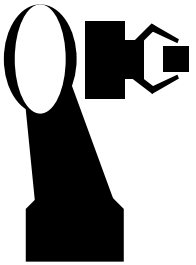
NJM3040

- Input offset voltage: 550µV max.
- Input voltage range: 6V to 36V
- Low power: 0.5mA typ.
- Supply voltage rejection ratio: 120dB typ.
- Operating temperature: -40°C to 125°C
- High EMI immunity
- Package : MSOP8 (VSP8)



Power conditioner

Automotive



Industrial equipment

Cross Reference

OP-Amp Cross Reference - 1 -

Contents

NJR	Renesas	ROHM	ST	TI	KEC	ON Semi	TOSHIBA
NJM2125 NJM321A NJM8021	-	-	-	LM321	KIA75S358S	LM321	TA75S01
NJM320A NJM8020	-	-	TS321	-	-	-	-
NJM2904 NJM2904C	HA17904	BA2904	LM2904	LM2904	-	LM2904	-
NJM358C	µPC1251 µPC358 HA17358	LM358	LM358	LM358	KIA358 LM358	LM358	-
NJM12904	-	-	-	-	-	-	TA75W01
NJM2902 NJM2902C	HA17902	BA2902	LM2902	LM2902	-	LM2902	-
NJM324C	µPC451/µPC324 HA17324	BA10324 LM324	LM324	LM324	KIA324	LM324 LA6324	-
NJM3404A	-	BA3404	-	-	-	-	-
NJM3403A	µPC3403	-	-	MC3403	-	MC3403	-
NJM3414A	-	-	-	TL3414A	-		-
NJM2132	-	-	MC33172	-	-	MC33172	-
NJM2742	µPC842/µPC4742	BA3472	-	TL3472	-	-	-
NJM2744	µPC844/µPC4744	BA3474	-	TL3474	-	-	-
NJM3472	µPC842/µPC4742	BA3472	-	TL3472	-	MC33072	-
NJM3474	µPC844/µPC4744	BA3474	-	TL3474	-	MC33074	-
NJM842	µPC842/µPC4742	BA3472	-	TL3472	-	MC33072	-
NJM844	µPC844/µPC4744	BA3474	-	TL3474	-	MC33074	-

(note) We recommend that you completely review our datasheet to confirm op amp function.

OP-Amp Cross Reference - 2 -

Contents

NJR	Renesas	ROHM	ST	TI	ADI	On Semi	TOSHIBA
NJM3472	µPC842/µPC4742	BA3472	-	TL3472	-	MC33072	-
NJM3474	µPC844/µPC4744	BA3474	-	TL3474	-	MC33074	-
NJM842	µPC842/µPC4742	BA3472	-	TL3472	-	MC33072	-
NJM844	µPC844/µPC4744	BA3474	-	TL3474	-	MC33074	-
NJM4558 **NJM4558C**	µPC258 µPC4558 HA17558	BA4558	MC4558	RC4558	-	KA4558	TA75W558
NJM4565 **NJM8065**	µPC259 µPC4560	BA4560	-	-	-	-	-
NJM4556A	µPC4556	-	-	-	-	-	-
NJM4580 **NJM4580C** **NJM8080**	µPC4572	BA4580	RC4580	RC4580	-	-	-
NJM2068 **NJM8068**	µPC4570	-	LM833	LM833	-	LM833	-
NJM2058 **NJM2059**	µPC458 µPC4741	-	-	-	-	-	-
NJM318	µPC318/µPC159	-	-	LM318	-	-	-
NJM5532 **NJM5532C**	-	BA15532	-	NE5532	-	-	-
NJMOP177	-	-	-	OPA177 OPA277	OP177	OP177 OP07/AD8677	-
NJMOP1772	-	-	-	OPA2277	OP1772	OP2177	-
NJMOP277	-	-	-	OPA277	OP1177	OP1177	-
NJMOP2277	-	-	-	OPA2277	OP2177	OP2177	-

(note) We recommend that you completely review our datasheet to confirm op amp function.

OP-Amp Cross Reference - 3 -

Contents

NJR	Renesas	ST	TI	ADI	ADI (ex-LT)
NJM062C	µPC4062/µPC832	TL062	TL062	-	-
NJM064C	µPC4064/µPC834	TL064	TL064	-	-
NJM072C **NJM082C**	µPC4072/µPC822 µPC4082/µPC803	TL072 TL082	TL072 TL082	-	-
NJM074C **NJM084C**	µPC4074/µPC824 µPC4084/µPC804	TL074 TL084	TL074 TL084	-	-
NJM8512	µPC814 µPC4094	-	OPA2131/2132 OPA2140/OPA2141 TL052 LF412	AD8512	LT1057
NJM8513	-	-	OPA4131/4132 OPA4140/4141	AD8513	-
NJM2748	µPC811 µPC4091	-	-	-	-
NJM2749	µPC812 µPC4092	-	-	-	-

(note) We recommend that you completely review our datasheet to confirm op amp function.

OP-Amp Cross Reference - 4 -

Contents

NJR	Renesas	Renesas (ex-Intersil)	Rohm	ST	TI	MAXIM	ADI	TOSHIBA	MICROCHIP
NJU7076	-	-	-	-	LMV771	-	-	-	-
NJU7077	-	-	-	-	LMV772	-	-	-	-
NJU7078	-	-	-	-	LMV774	-	-	-	-
NJU7046	HA1630S06	-	BU7495	-	LMV721	-	AD8601D	TC75S60	-
NJU7047	HA1630D06	-	-	-	LMV722	-	AD8602D	TC75W60	-
NJU7048	HA1630Q06	-	-	-	-	-	AD8604D	-	-
NJU77701	-	ISL28191	-	-	-	MAX4488	-	-	-
NJU77000 **NJU77001**	-	-	BU7411 BU7265	TSU101	LPV521	MAX4470	-	-	MCP6141
NJU77002	-	-	BU7266	TSU102	-	MAX4471	-	-	MCP6142
NJU77004	-	-	-	TSU104	-	MAX4472	-	-	MCP6144
NJU7056	HA1630S08	-	LMR321 BU7461	TSV851 LMV321L	LMV321	-	-	TC75S54	MCP6L1
NJU7057	HA1630D08	-	LMR358 BU7462	TSV852 LMV358L	LMV358	-	ADA4692-2	TC75W54	MCP6L2
NJU7058	HA1630Q08	-	LMR324 BU7464	TSV854 LMV324L	LMV324	-	ADA4692-4	-	MCP6L4
NJU7026	HA1630S01	-	BU7421	TSV621	LPV321	-	-	TC75S55	-
NJU7027	HA1630D01	-	-	TSV622	LPV358	-	-	TC75W55	-
NJU7028	HA1630Q01	-	-	TSV624	LPV324	-	-	-	-
NJU77806	-	-	-	-	OPA377 LMV771	-	AD8691	TC75S63	MCP6286

(note) We recommend that you completely review our datasheet to confirm op amp function.

OP-Amp Cross Reference - 5 -

Contents

NJR	TI	MAXIM	ADI	MICROCHIP
NJU77551	OPA348	MAX9636	AD8541	MCP6001
NJU77552	OPA2348	MAX9637	AD8542	MCP6002
NJU77554	OPA4348	-	AD8544	MCP6004

NJR	TI	ST
NJU7001	TLC271C(L)*1	TS271C(L)
NJU7021	TLC271C(M)*1	TS271C(M)
NJU7031	TLC271C(H)*1	TS271C(H)
NJU7002	TLC27L2C	TS27L2C
NJU7022	TLC27M2C LMC662C*2	TS27M2C
NJU7032	TLC272C LMC662C*2	TS272C
NJU7004	TLC27L4C	TS27L4C
NJU7024	TLC27M4C LMC660C*2	TS27M4C
NJU7034	TLC274C LMC660C*2	TS274C

NJR	TI	ST
NJU7051	TLC271BC(L)*1	TS271BC(L)*1
NJU7061	TLC271BC(M)*1	TS271BC(M)*1
NJU7071	TLC271BC(H)*1	TS271BC(H)*1
NJU7052	TLC27L2BC	TS27L2BC
NJU7062	TLC27M2BC LMC662AI*3	TS27M2BC
NJU7072	TLC272BC LMC662AI*3	TS272BC
NJU7064	TLC27M4BC LMC660AI*3	TS27M4BC
NJU7074	TLC274BC LMC660AI*3	TS274BC

NJR	TOSHIBA
NJU7011	TC75S55
NJU7012	TC75S54
NJU7013	TC75S54
NJU7007	TC75S55
NJU7008	TC75S54
NJU7014	TC75W55
NJU7015	TC75W54
NJU7016	TC75W54
NJU7019	TC75W55

*1) The characteristics of I_{IB} and IOUT vary with the version of the TLC271
*2) The characteristics of LMC660/662C are medium between NJU702X and NJU703X
*3) The characteristics of LMC660AI/662AI are medium between NJU706X and NJU707X

(note) We recommend that you completely review our datasheet to confirm op amp function.

Comparators Cross Reference

Contents

NJR	Renesas	Rohm	ST	TI	MAXIM	On Semi	TOSHIBA
NJM2903 NJM2903C	HA17903	BA2903 LM2903	LM2903	LM2903	-	LM2903	-
NJM393C	µPC393 µPC277 HA17393	BA10393 LM393	LM393	LM393	-	LM393	TA75W393
NJM2901 NJM2901C	HA17901	BA2901 LM2901	LM2901	LM2901	-	LM2901	-
NJM339C	µPC339 µPC177 HA17339	BA2901 LM2901	LM339	LM339	-	LM339	-
NJM391A NJM8191	-	BA8391	TS391R	TL331	-	-	TS75S393
NJM390A NJM8190	-	-	TS391	-	-	-	-
NJU7109	HA1631S02	-	-	-	-	-	TC75S57
NJU7119	HA1631S04	-	-	-	-	-	TC75S59
NJU7108	HA1631S01	-	-	-	-	-	TC75S56
NJU7118	HA1631S03	-	-	-	-	-	TC75S58
NJU77230 NJU77231	HA1631S01	BU7231 BU7251	-	LMV7271	MAX985	-	TC75S56
NJU77232	HA1631D01	BU7232 BU7252	-	LMV7272	MAX989	-	TC75W56
NJU77240 NJU77241	HA1631S03	BU7230 BU7250	TS331	LMV7275	MAX986	-	TC75S58
NJU77242	HA1631D03	BU7233 BU7253	TS332	-	MAX990	-	TC75W58

(note) We recommend that you completely review our datasheet to confirm op amp function.

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