

Full-Swing Input and Output type Quad Operational Amplifier

■ GENERAL DESCRIPTION

NJM2734 is single supply quad operational amplifier with full swing input and output, operates from 1.8V.

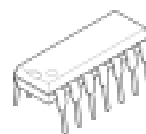
Input and Output Full Swing provides wide dynamic range, is from ground to power supply level. In addition to ground sensing applications, **NJM2734** enable to be applied to Hi-side sensing applications.

The features are low noise and low operating voltage for battery management, portable audio applications, and others.

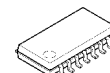
■ FEATURES

- Operating Voltage : 1.8 to 6.0V
- Input Full-Swing : $V_{ICM} = 0$ to 5.0V, at $V^+ = 5V$
- Output Full-Swing : $V_{OH} \geq 4.9V$ / $V_{OL} \leq 0.1V$, at $V^+ = 5V$, $R_L = 20k\Omega$
- Load Drivability : $V_{OH} \geq 4.75V$ / $V_{OL} \leq 0.25V$, at $V^+ = 5V$, $R_L = 2k\Omega$
- Offset Voltage : 5mV max.
- Slew Rate : 0.4V/ μ s typ.
- Low Input Voltage Noise : 10nV/ $\sqrt{Hz}$ typ.
- Adequate phase margin : $\Phi_M = 75\text{deg.}$ typ., at $R_L = 2k\Omega$
- Bipolar Technology
- Package Outline : DIP14, DMP14, EMP14, SSOP14

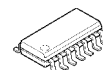
■ PACKAGE OUTLINE



NJM2734D



NJM2734M

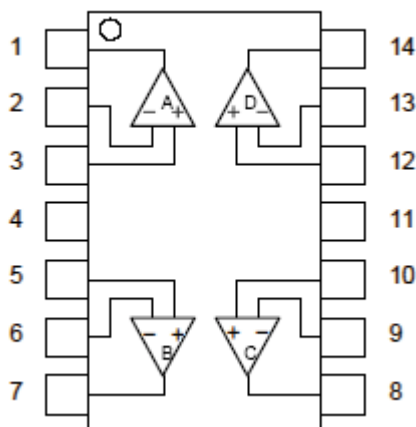


NJM2734E



NJM2734V

■ PIN CONFIGURATION



PIN FUNCTION

1. A OUTPUT	8. C OUTPUT
2. A -INPUT	9. C -INPUT
3. A +INPUT	10. A +INPUT
4. V^+	11. GND
5. B +INPUT	12. D +INPUT
6. B -INPUT	13. D -INPUT
7. B OUTPUT	14. D OUTPUT

NJM2734D

NJM2734M

NJM2734E

NJM2734V

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■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	7.0	V
Differential Input Voltage Range	V_{ID}	± 1.0 (Note1)	V
Common Mode Input Voltage Range	V_{IC}	0 ~ 7.0 (Note1)	V
Power Dissipation	P_D	(DIP14) 700 (DMP14) 520 (Note2) (EMP14) 720 (Note2) (SSOP14) 450 (Note2)	mW
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

(Note1) For supply voltage less than 7V, the absolute maximum input voltage is equal to the supply voltage.

(Note2) On the PCB “EIA/JEDEC (76.2×114.3×1.6mm, two layers, FR-4) “

■ RECOMMENDED OPERATING CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	1.8 to 6.0	V

■ ELECTRICAL CHARACTERISTICS ($V^+=5V$, Ta=25°C)

●DC CHARACTERISTICS

($V^+=5V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	1.2	1.8	mA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	$R_L=2k\Omega$ to 2.5V	60	85	-	dB
Common Mode Rejection Ratio	CMR	CMR+: $2.5V \leq V_{CM} \leq 5V$ (Note3) CMR -: $0V \leq V_{CM} \leq 2.5V$ (Note3)	55	70	-	dB
Supply Voltage Rejection Ratio	SVR	$V^+V^- = \pm 2.0V \sim \pm 3.0V$	70	85	-	dB
Maximum Output Voltage 1	V_{OH1}	$R_L=20k\Omega$ to 2.5V	4.9	4.95	-	V
	V_{OL1}	$R_L=20k\Omega$ to 2.5V	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	$R_L=2k\Omega$ to 2.5V	4.75	4.85	-	V
	V_{OL2}	$R_L=2k\Omega$ to 2.5V	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR ≥ 55 dB	0	-	5	V

(Note3) CMR is represented by either CMR+ or CMR- has lower value.

CMR+ is measured with $2.5V \leq V_{CM} \leq 5.0$ and CMR- is measured with $0V \leq V_{CM} \leq 2.5V$.

●AC CHARACTERISTICS

($V^+=5V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	$R_L=2k\Omega$ to 2.5V	-	1	-	MHz
Phase Margin	Φ_M	$R_L=2k\Omega$ to 2.5V	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	f=1kHz	-	10	-	nV/ $\sqrt{Hz}$
Amp to Amp Separation	CS	f=1kHz $R_L=2k\Omega$ to 2.5V, $V_O=1.2V_{rms}$	-	133	-	dB

●TRANSIENT CHARACTERISTICS

($V^+=5V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	$R_L=2k\Omega$ to 2.5V	-	0.4	-	V/ μs

■ ELECTRICAL CHARACTERISTICS ($V^+=3V$, $T_a=25^\circ C$)

●DC CHARACTERISTICS

($V^+=3V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	1	1.8	mA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	$R_L=2k\Omega$ to 1.5V	60	84	-	dB
Common Mode Rejection Ratio	CMR	CMR+: $1.5V \leq V_{CM} \leq 3V$ (Note4) CMR -: $0V \leq V_{CM} \leq 1.5V$ (Note4)	48	63	-	dB
Supply Voltage Rejection Ratio	SVR	$V^+/V^- = \pm 1.2V \sim \pm 2.0V$	68	83	-	dB
Maximum Output Voltage 1	V_{OH1}	$R_L=20k\Omega$ to 1.5V	2.9	2.95	-	V
	V_{OL1}	$R_L=20k\Omega$ to 1.5V	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	$R_L=2k\Omega$ to 1.5V	2.75	2.85	-	V
	V_{OL2}	$R_L=2k\Omega$ to 1.5V	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR $\geq$ 48dB	0	-	3	V

(Note4) CMR is represented by either CMR+ or CMR- has lower value.

CMR+ is measured with $1.5V \leq V_{CM} \leq 3.0$ and CMR- is measured with $0V \leq V_{CM} \leq 1.5V$.

●AC CHARACTERISTICS

($V^+=3V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	$R_L=2k\Omega$ to 1.5V	-	1	-	MHz
Phase Margin	Φ_M	$R_L=2k\Omega$ to 1.5V	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	$f=1kHz$	-	10	-	nV/ $\sqrt{Hz}$
Amp to Amp Separation	CS	$f=1kHz$ $R_L=2k\Omega$ to 1.5V, $V_o=0.7V_{rms}$	-	130	-	dB

●TRANSIENT CHARACTERISTICS

($V^+=3V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	$R_L=2k\Omega$ to 1.5V	-	0.35	-	V/ μs

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■ ELECTRICAL CHARACTERISTICS ($V^+=1.8V$, $T_a=25^\circ C$)

●DC CHARACTERISTICS

($V^+=1.8V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal applied	-	0.9	1.6	mA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Large Signal Voltage Gain	A_V	$R_L=2k\Omega$ to 0.9V	60	83	-	dB
Common Mode Rejection Ratio	CMR	CMR+: $0.9 \leq V_{CM} \leq 1.8V$ (Note5) CMR-: $0V \leq V_{CM} \leq 0.9V$ (Note5)	40	55		dB
Supply Voltage Rejection Ratio	SVR	$V^+/V^- = \pm 0.9V \sim \pm 1.2V$	65	80	-	dB
Maximum Output Voltage 1	V_{OH1}	$R_L=20k\Omega$ to 0.9V	1.7	1.75	-	V
	V_{OL1}	$R_L=20k\Omega$ to 0.9V	-	0.05	0.1	V
Maximum Output Voltage 2	V_{OH2}	$R_L=2k\Omega$ to 0.9V	1.55	1.65	-	V
	V_{OL2}	$R_L=2k\Omega$ to 0.9V	-	0.15	0.25	V
Input Common Mode Voltage Range	V_{ICM}	CMR ≥ 40 dB	0	-	1.8	V

(Note5) CMR is represented by either CMR+ or CMR- has lower value.

CMR+ is measured with $0.9V \leq V_{CM} \leq 1.8$ and CMR- is measured with $0V \leq V_{CM} \leq 0.9V$.

●AC CHARACTERISTICS

($V^+=1.8V$, $T_a=25^\circ C$)

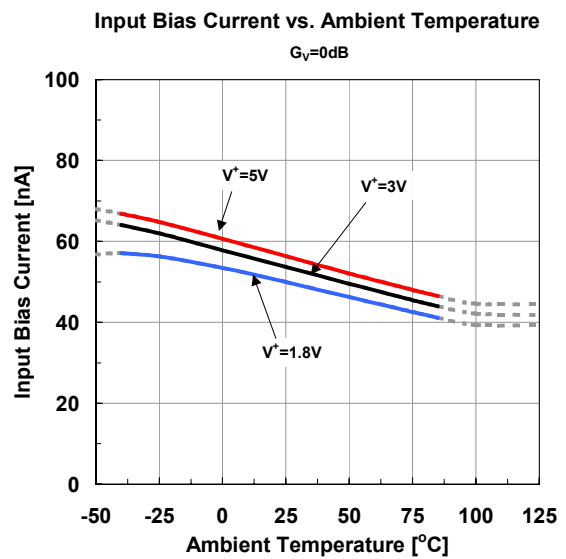
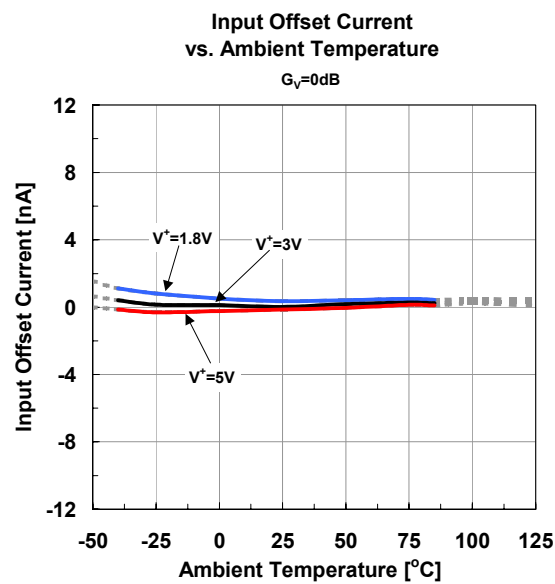
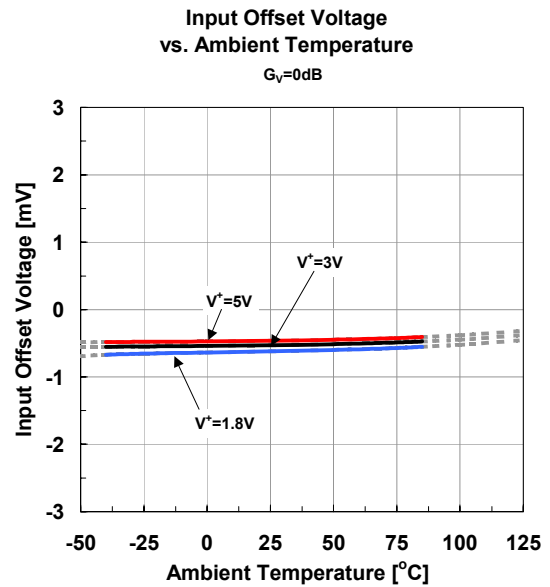
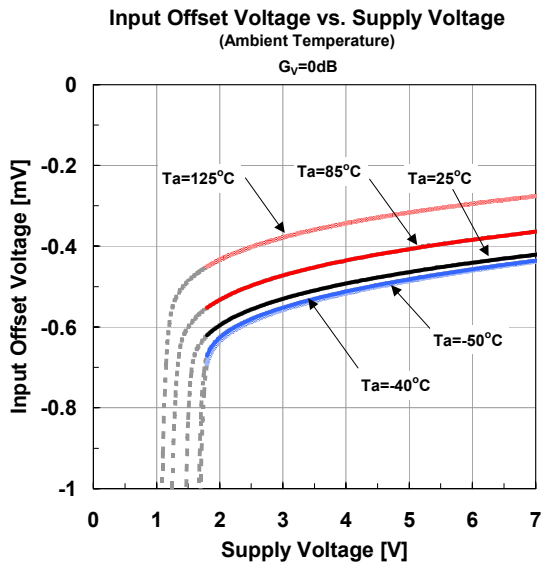
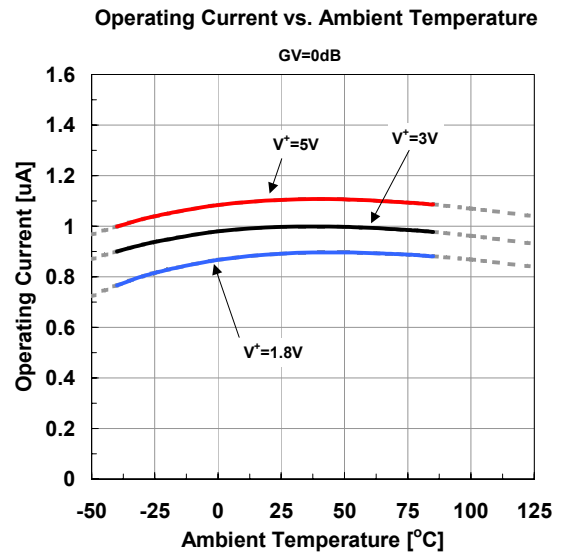
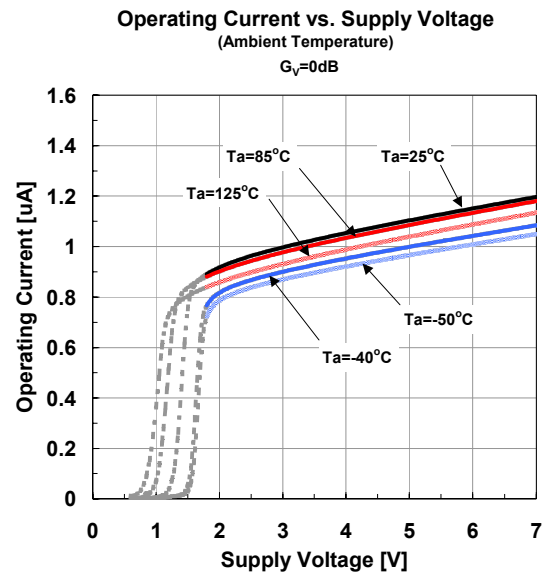
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	$R_L=2k\Omega$ to 0.9V	-	1	-	MHz
Phase Margin	Φ_M	$R_L=2k\Omega$ to 0.9V	-	75	-	Deg
Equivalent Input Noise Voltage	V_{NI}	$f=1kHz$	-	10	-	nV/ $\sqrt{Hz}$
Amp to Amp Separation	CS	$f=1kHz$ $R_L=2k\Omega$ to 0.9V, $V_o=0.4V_{rms}$	-	125	-	dB

●TRANSIENT CHARACTERISTICS

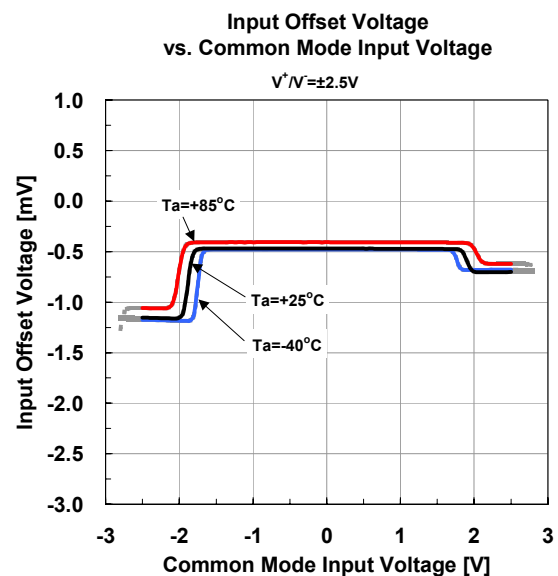
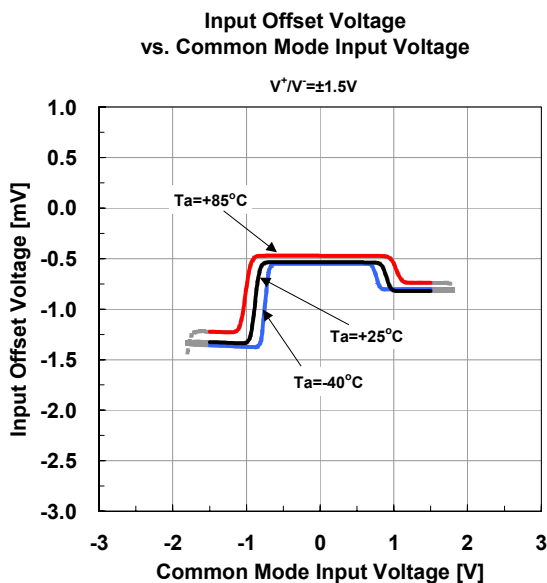
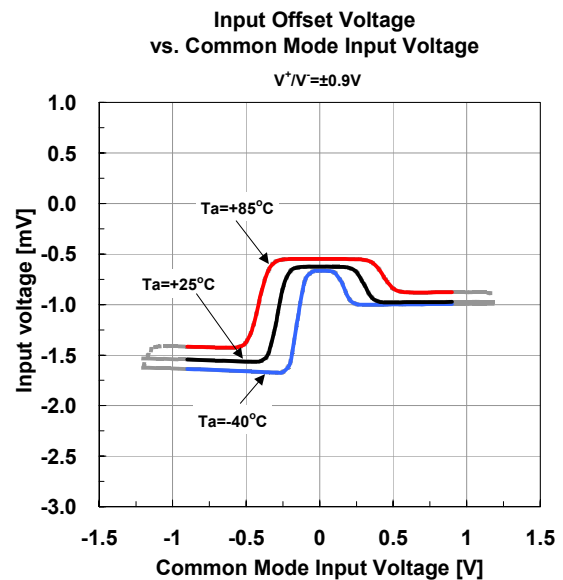
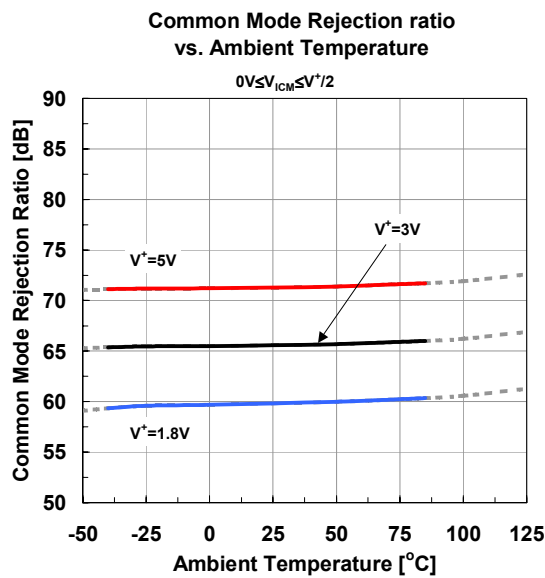
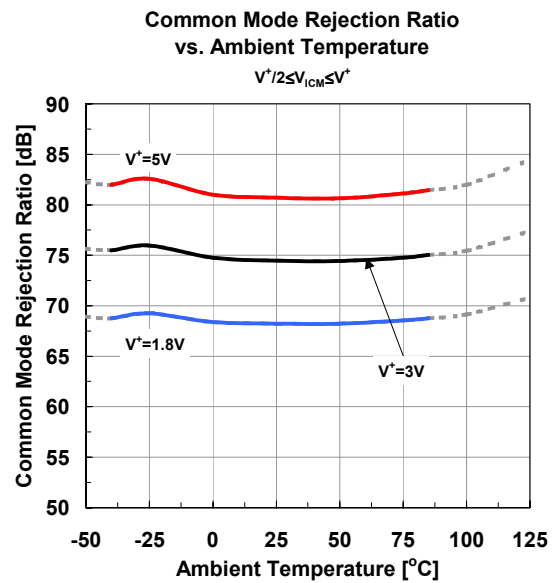
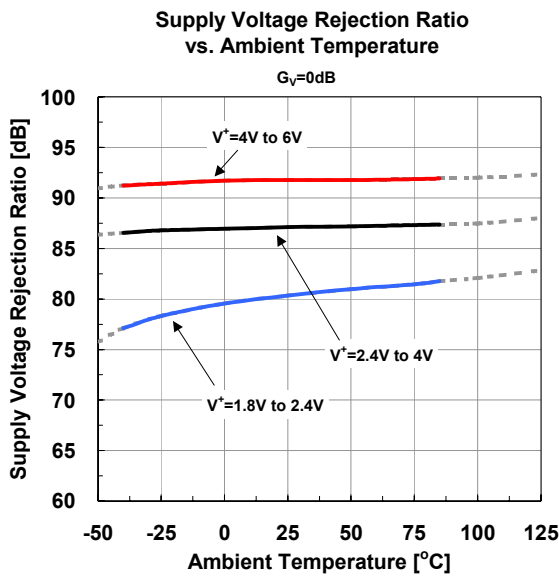
($V^+=1.8V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	$R_L=2k\Omega$ to 0.9V	-	0.3	-	V/ μs

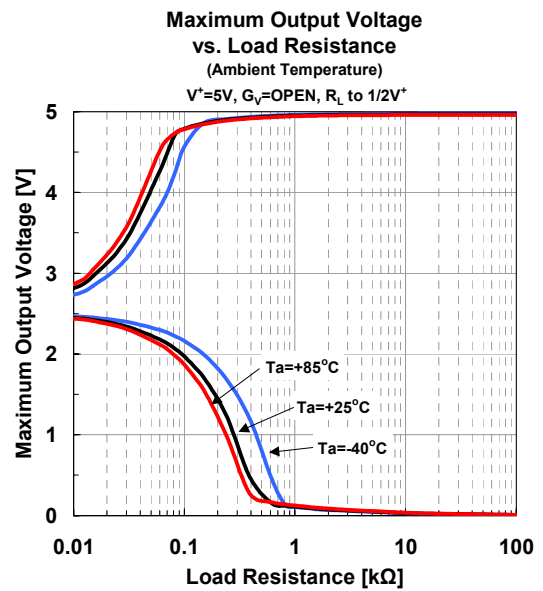
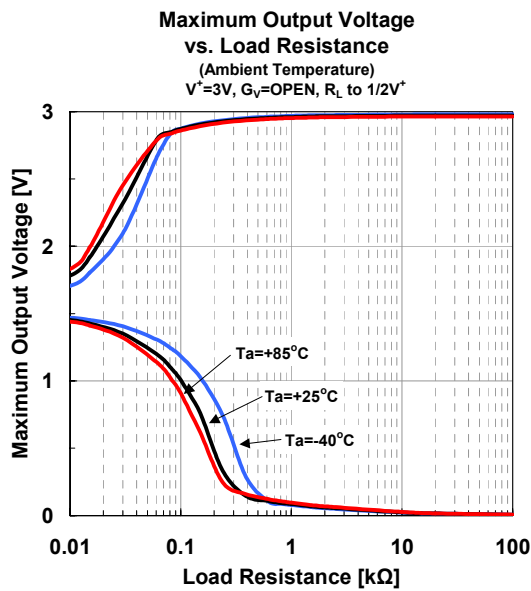
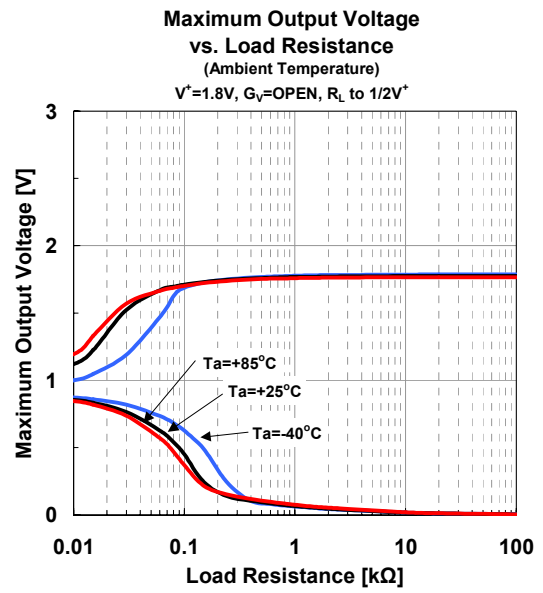
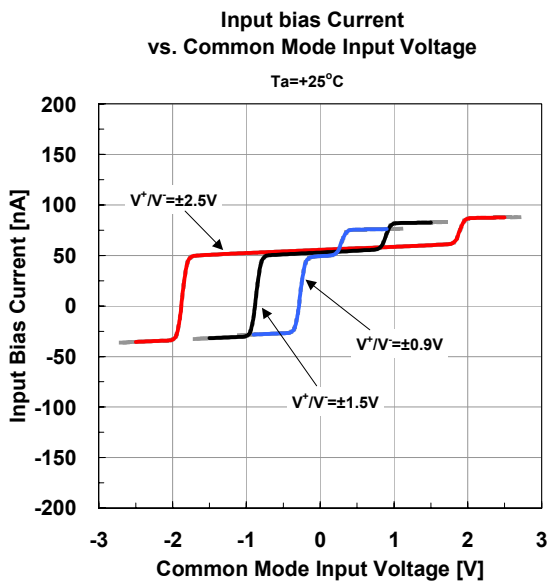
■ Typical Characteristics



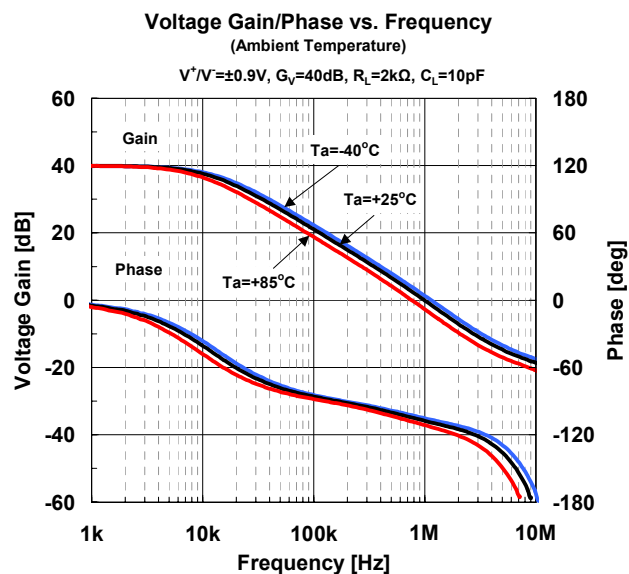
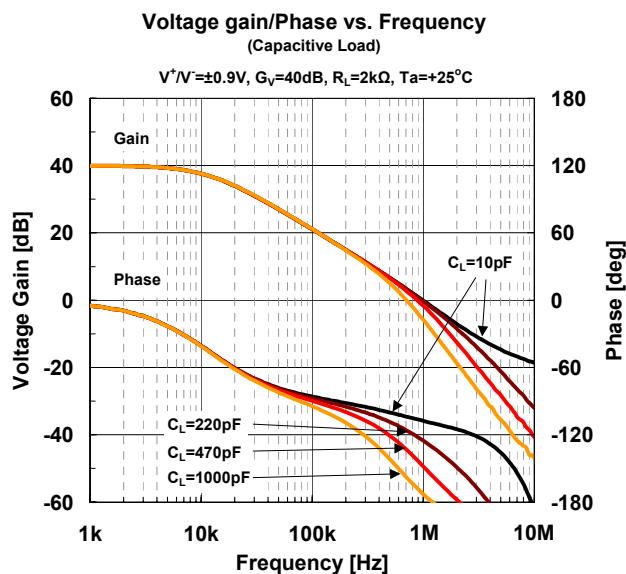
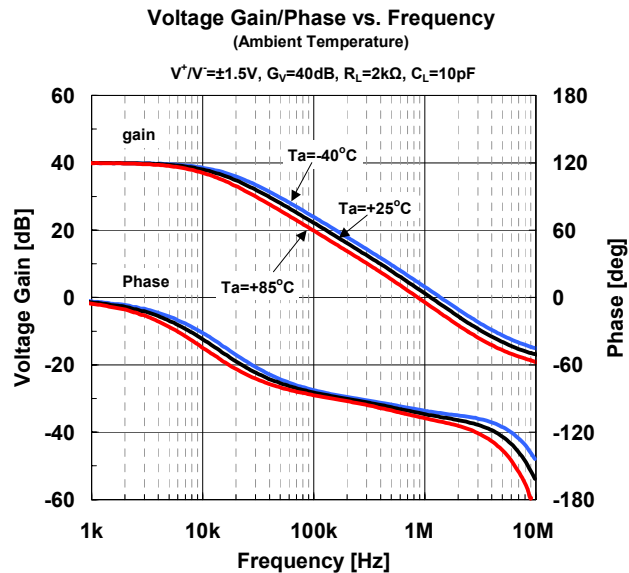
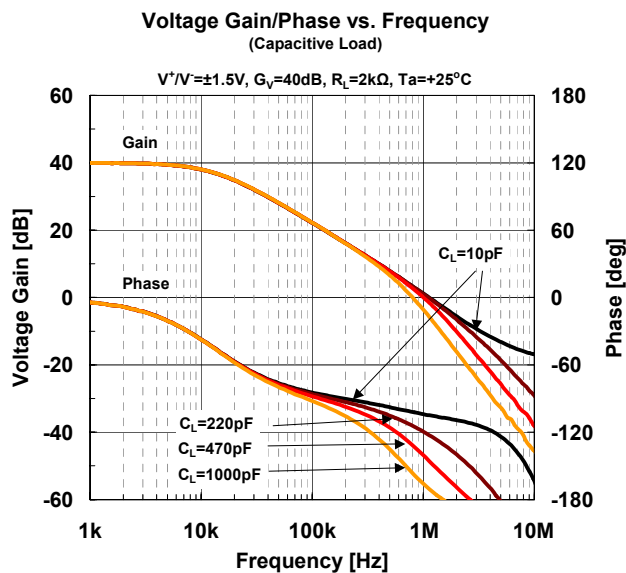
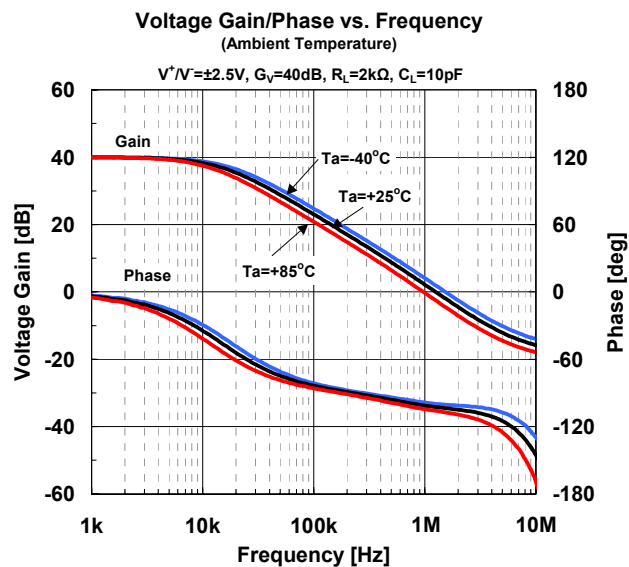
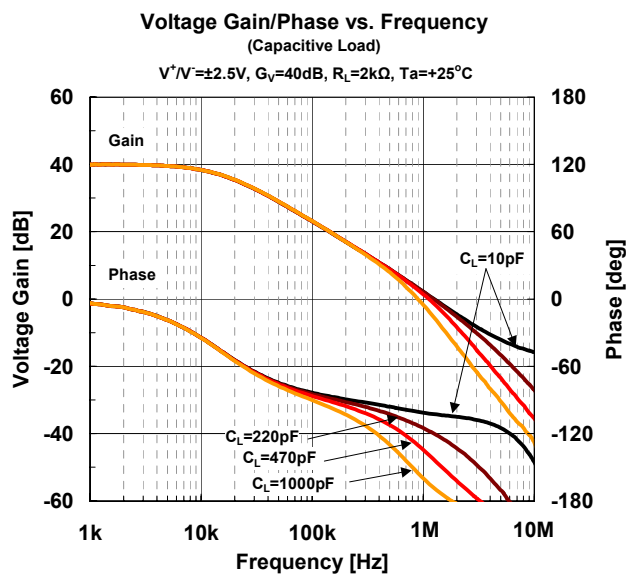
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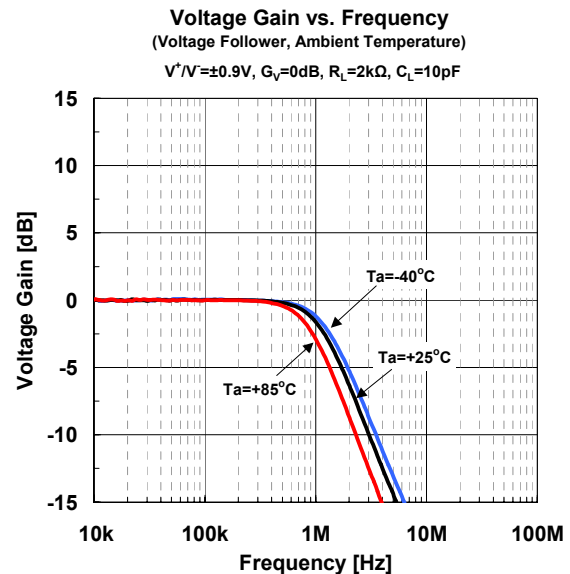
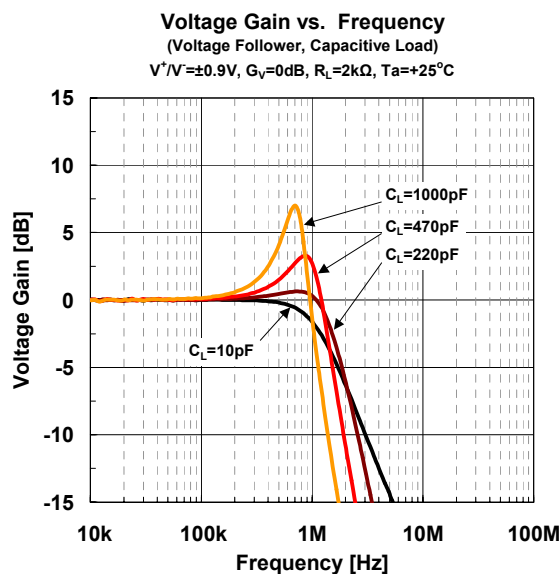
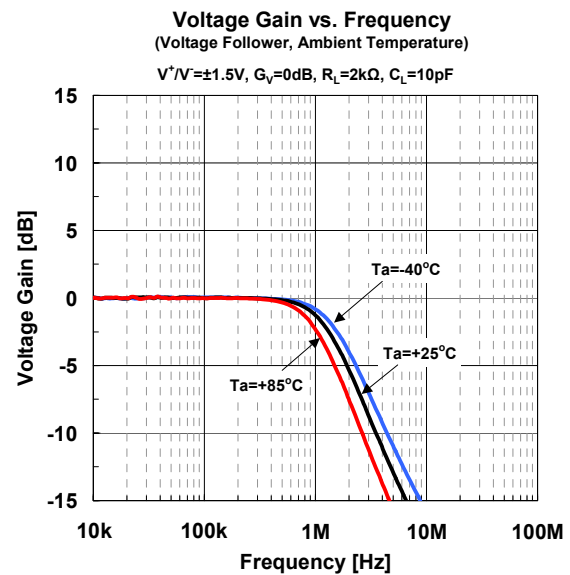
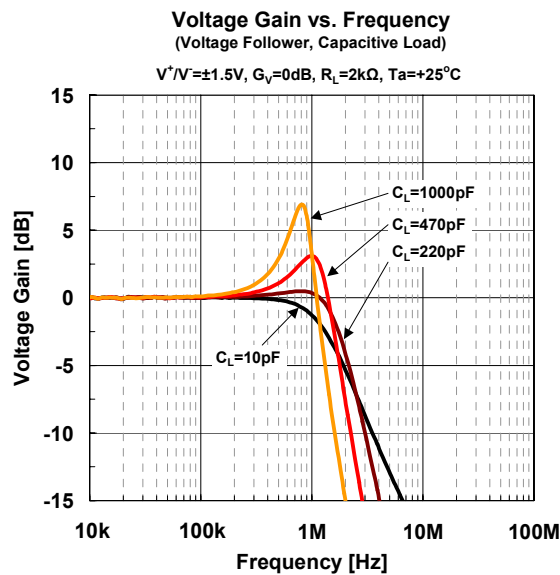
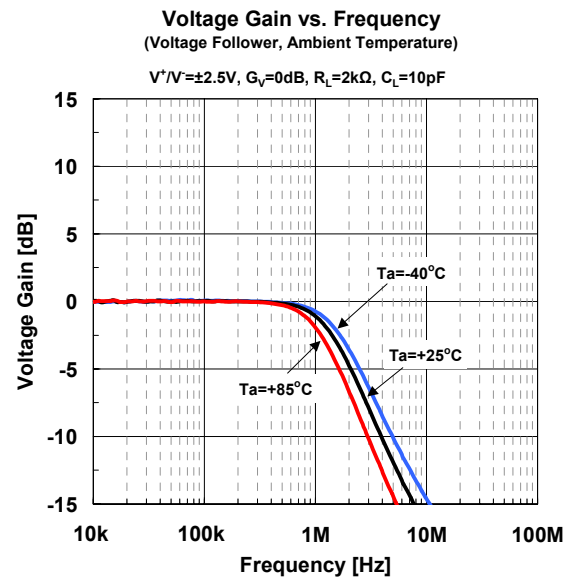
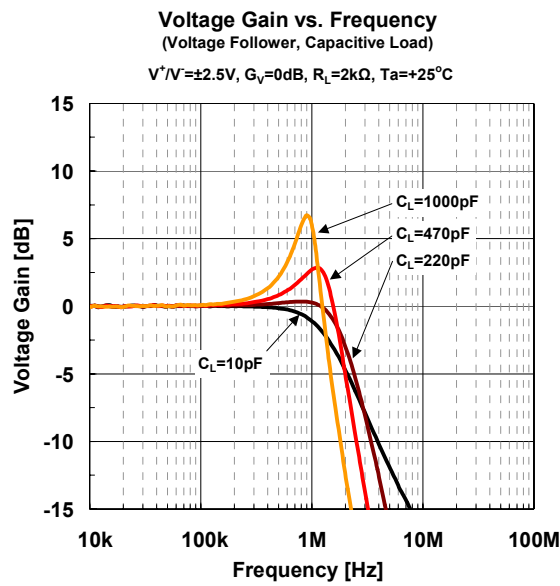
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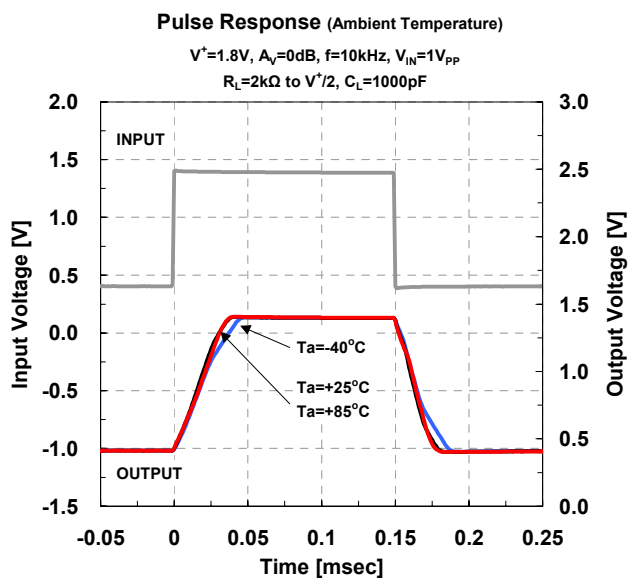
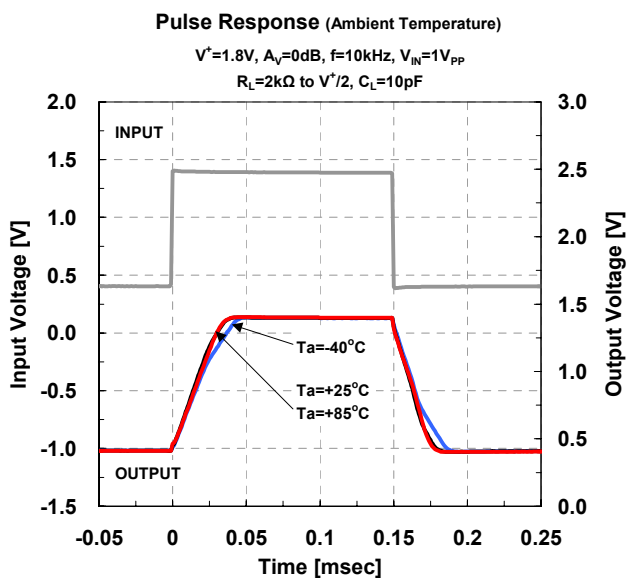
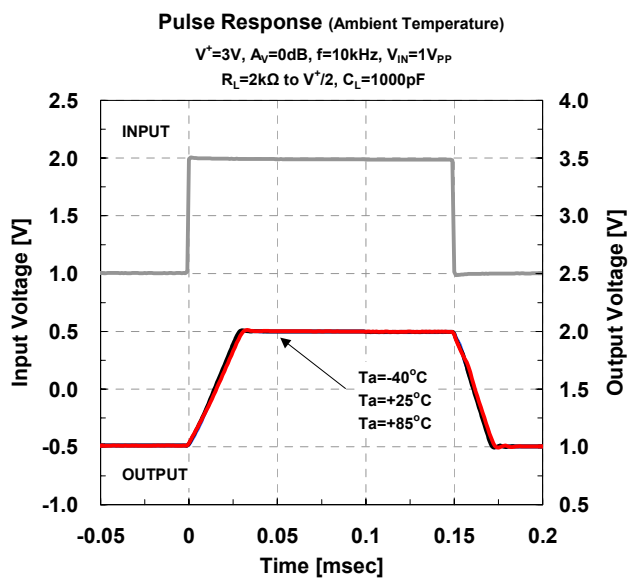
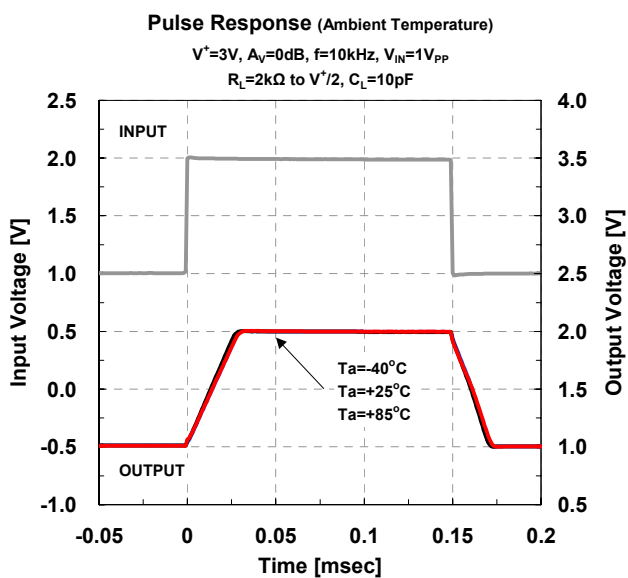
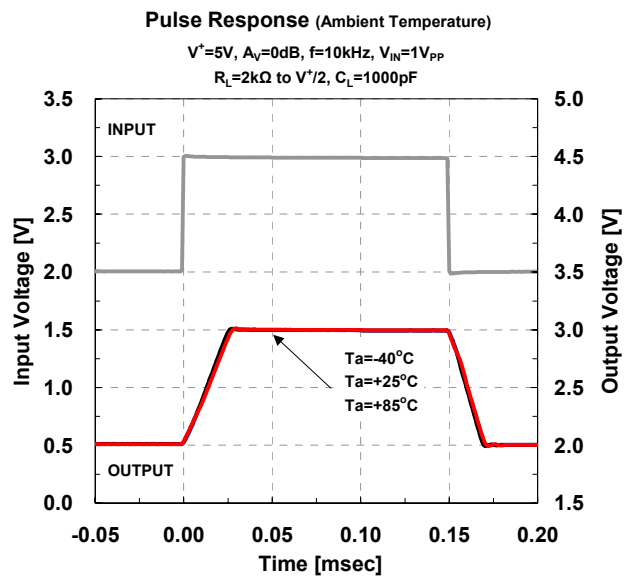
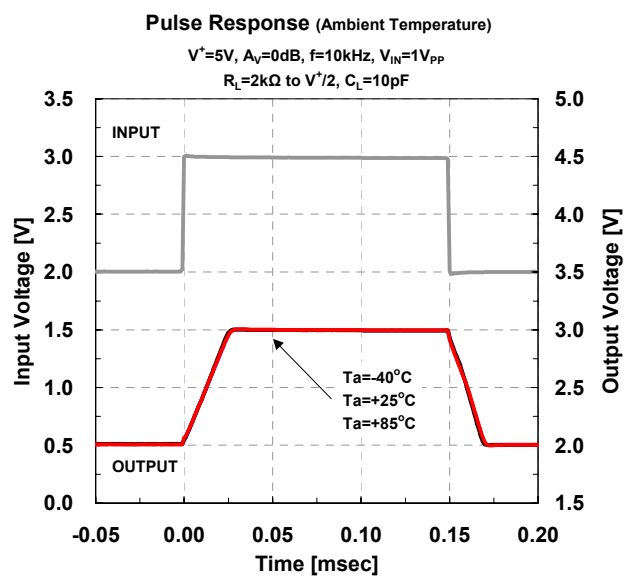
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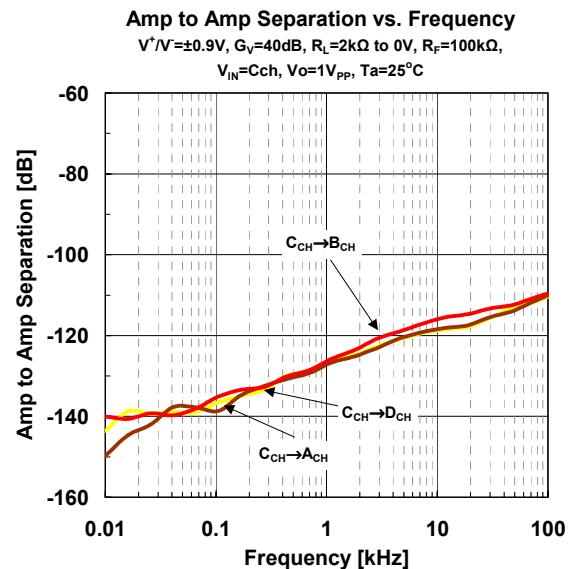
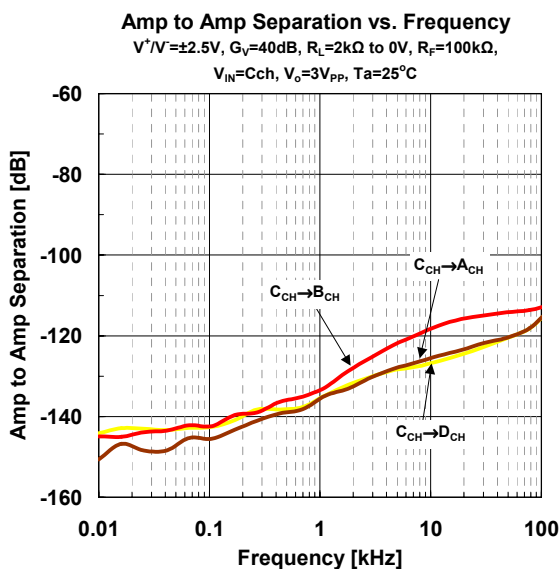
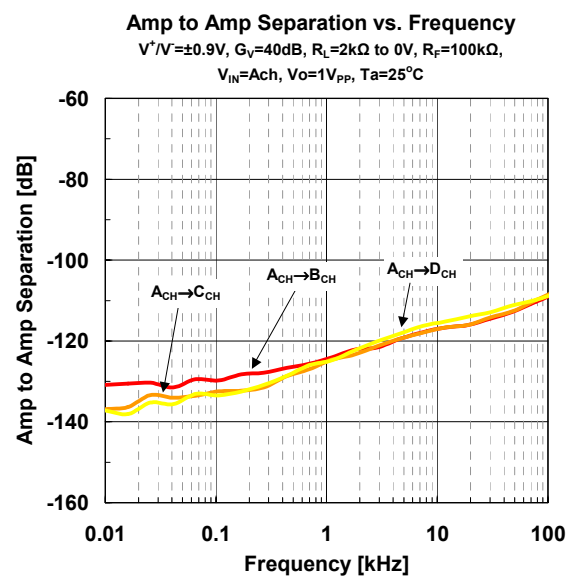
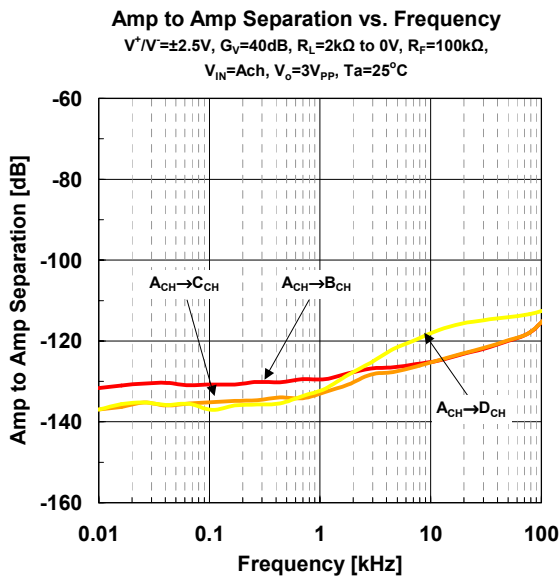
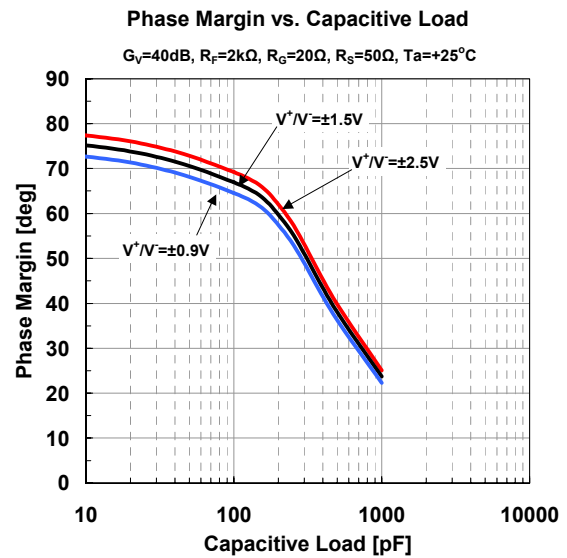
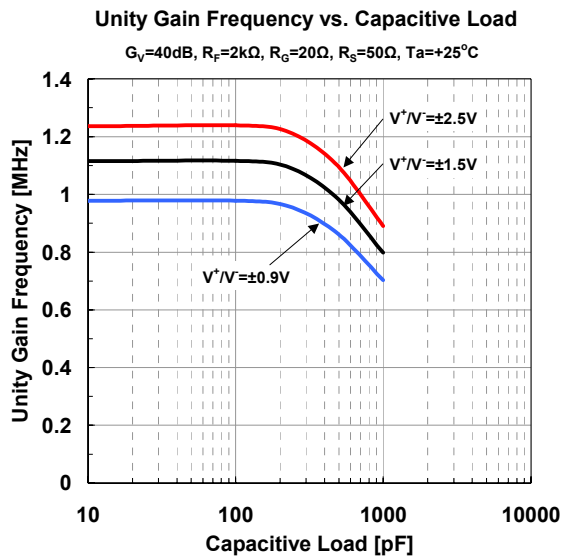
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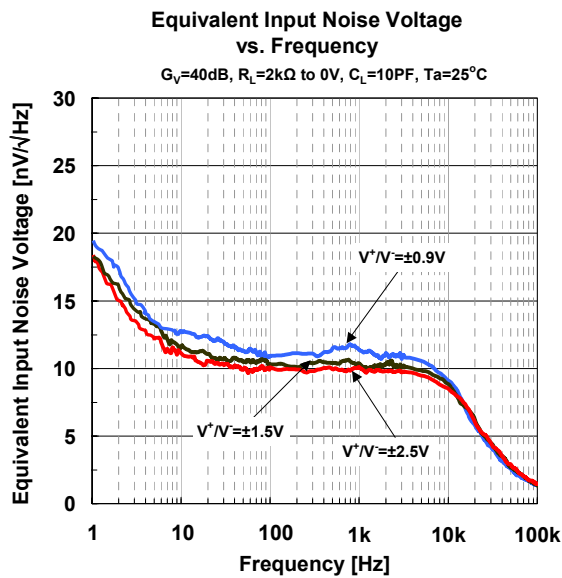
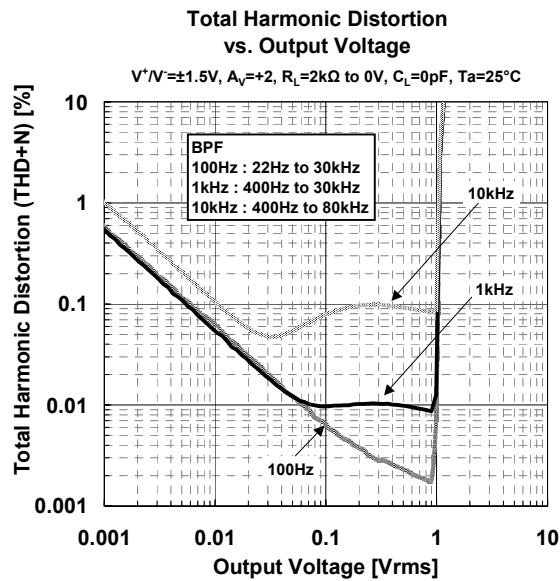
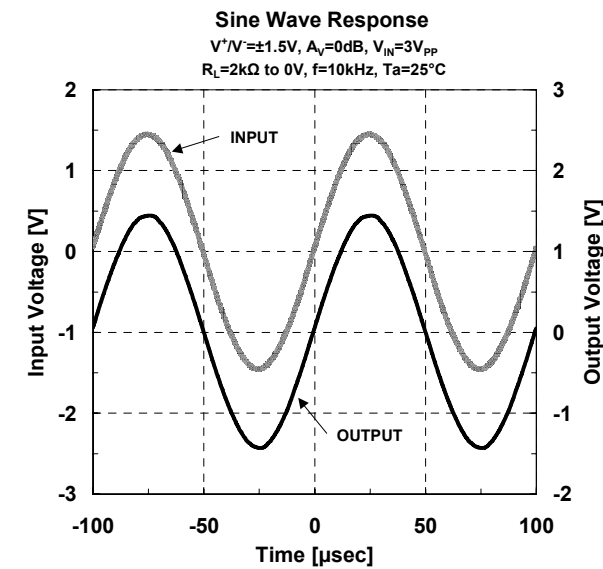
■ Typical Characteristics



■ Typical Characteristics



■ Typical Characteristics



[CAUTION]
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