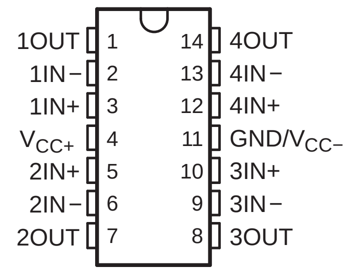
LMV821 SINGLE, LMV822 DUAL, LMV824 QUAD LOW-VOLTAGE RAIL-TO-RAIL OUTPUT OPERATIONAL AMPLIFIERS

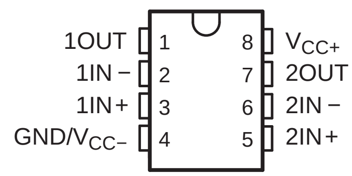
FEATURES

- **2.5-V, 2.7-V, and 5-V Performance**
- **–40°C to 125°C Operation**
- **No Crossover Distortion**
- **Low Supply Current at V_{CC+} = 5 V:**
  - **– LMV821 0.3 mA Typ**
  - **– LMV822 0.5 mA Typ**
  - **– LMV824 1 mA Typ**
- **Rail-to-Rail Output Swing**
- **Gain Bandwidth of 6 MHz Typ at 5 V**
- **Slew Rate of 1.9 V/µs Typ at 5 V**

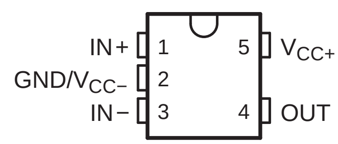
LMV824 D, DGV, OR PW PACKAGE (TOP VIEW)



LMV822 D OR DGK PACKAGE (TOP VIEW)



LMV821 DBV OR DCK PACKAGE (TOP VIEW)



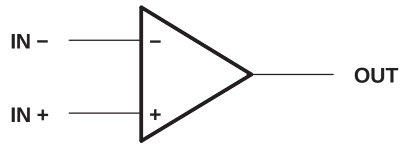
DESCRIPTION

The LMV821 single, LMV822 dual, and LMV824 quad devices are low-voltage (2.5 V to 5.5 V), low-power commodity operational amplifiers. Electrical characteristics are very similar to the LMV3xx operational amplifiers (low supply current, rail-to-rail outputs, input common-mode range that includes ground). However, the LMV8xx devices offer a higher bandwidth (6 MHz typical) and faster slew rate (1.9 V/µs typical).

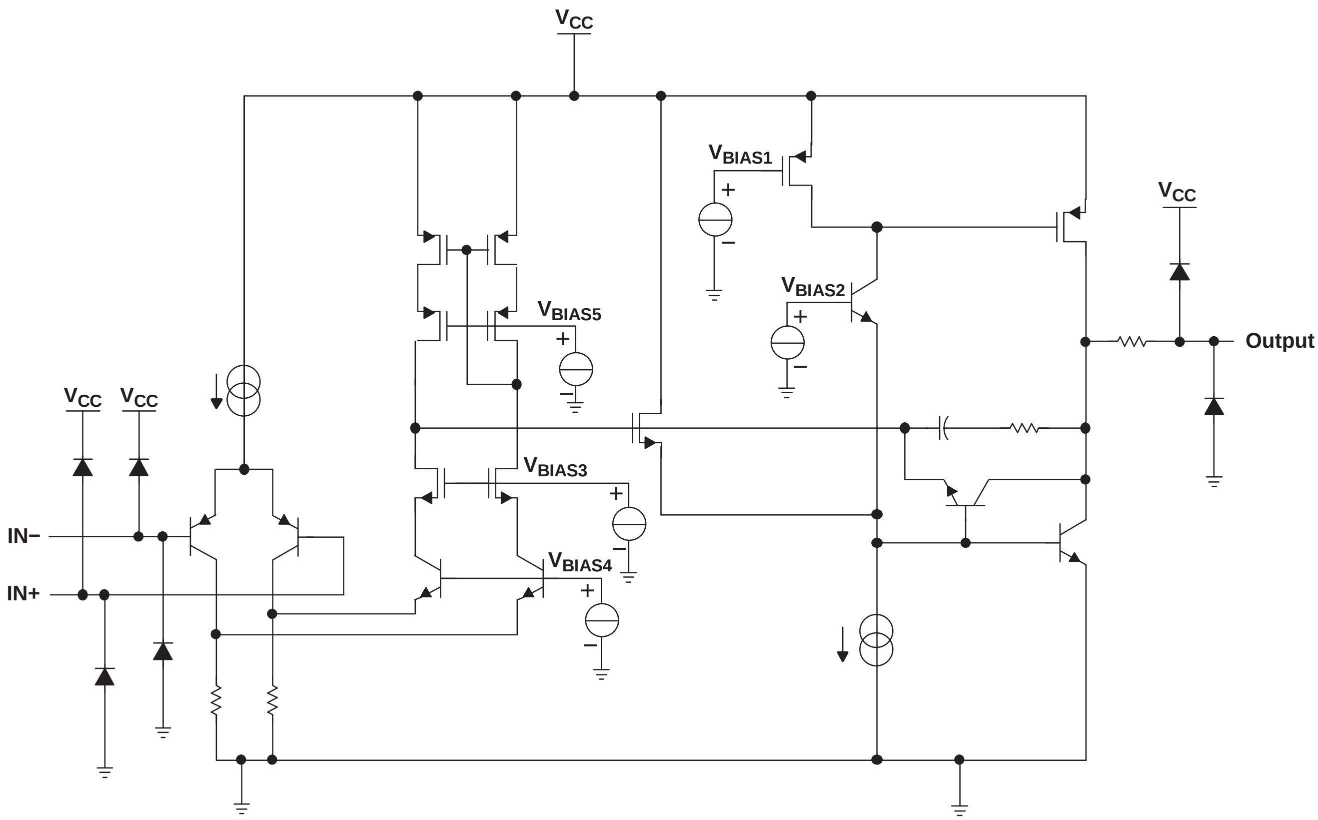
The LMV8xx devices are cost-effective solutions for applications requiring low-voltage/low-power operation and space-saving considerations. The LMV821 is available in the ultra-small DCK package, which is approximately half the size of SOT-23-5. The DCK package saves space on printed circuit boards and enables the design of small portable electronic devices (cordless and cellular phones, laptops, PDAs, PCMIA). It also allows the designer to place the device closer to the signal source to reduce noise pickup and increase signal integrity.

The LMV8xx devices are characterized for operation from –40°C to 85°C. The LMV8xxI devices are characterized for operation from –40°C to 125°C.

SYMBOL (EACH AMPLIFIER)



LMV824 SIMPLIFIED SCHEMATIC



Absolute Maximum Ratings[1]

over operating free-air temperature range (unless otherwise noted)

				MIN	MAX	UNIT
V_{CC}	Supply voltage[2]				5.5	V
V_{ID}	Differential input voltage[3]				$\pm V_{CC}$	V
V_I	Input voltage range (either input)			V_{CC-}	V_{CC+}	V
	Duration of output short circuit (one amplifier) to ground[4]	At or below T_A = 25°C, $V_{CC} \leq$ 5.5 V			Unlimited	
θ_{JA}	Package thermal impedance[5][6]	D package	8 pin		97	°C/W
			14 pin		86	
		DBV package			206	
		DCK package			252	
		DGK package			172	
		DGV package			127	
		PW package			113	
T_J	Operating virtual junction temperature				150	°C
T_{stg}	Storage temperature range			–65	150	°C

(1) Stresses beyond those listed under “absolute maximum ratings ”may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions ”is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltage values (except differential voltages and V_{CC} specified for the measurement of I_{OS}) are with respect to the network GND.
(3) Differential voltages are at IN+ with respect to IN–.
(4) Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.
(5) Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
(6) The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions

			MIN	MAX	UNIT
V_{CC}	Supply voltage (single-supply operation)		2.5	5	V
T_A	Operating free-air temperature	LMV8xxI	–40	125	°C
		LMV8xx	–40	85	

LMV8xx 2.5-V Electrical Characteristics

V_{CC+} = 2.5 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.25 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 85°C			4	
V_O	Output swing	V_{CC+} = 2.5 V, R_L = 600 Ω to 1.25 V	High level	25°C	2.3	2.37		V
				–40°C to 85°C	2.2			
			Low level	25°C		0.13	0.2	
				–40°C to 85°C			0.3	
		V_{CC+} = 2.5 V, R_L = 2 kΩ to 1.25 V	High level	25°C	2.4	2.46		
				–40°C to 85°C	2.3			
			Low level	25°C		0.08	0.12	
				–40°C to 85°C			0.2	

LMV8xxI 2.5-V Electrical Characteristics

V_{CC+} = 2.5 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.25 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 125°C			5.5	
V_O	Output swing	V_{CC+} = 2.5 V, R_L = 600 Ω to 1.25 V	High level	25°C	2.28	2.37		V
				–40°C to 125°C	2.18			
			Low level	25°C		0.13	0.22	
				–40°C to 125°C			0.32	
		V_{CC+} = 2.5 V, R_L = 2 kΩ to 1.25 V	High level	25°C	2.38	2.46		
				–40°C to 125°C	2.28			
			Low level	25°C		0.08	0.14	
				–40°C to 125°C			0.22	

LMV8xx 2.7-V Electrical Characteristics

V_{CC+} = 2.7 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.35 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 85°C			4	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C		1		µV/°C
I_{IB}	Input bias current			25°C		30	90	nA
				–40°C to 85°C			140	
I_{IO}	Input offset current			25°C		0.5	30	nA
				–40°C to 85°C			50	
CMRR	Common-mode rejection ratio	V_{IC} = 0 to 1.7 V		25°C	70	85		dB
				–40°C to 85°C	68			
$+k_{SVR}$	Positive supply-voltage rejection ratio	V_{CC+} = 1.7 V to 4 V, V_{CC-} = –1 V, V_O = 0, V_{IC} = 0		25°C	75	85		dB
				–40°C to 85°C	70			
$-k_{SVR}$	Negative supply-voltage rejection ratio	V_{CC+} = 1.7 V, V_{CC-} = –1 V to –3.3 V, V_O = 0, V_{IC} = 0		25°C	73	85		dB
				–40°C to 85°C	70			
V_{ICR}	Common-mode input voltage range	CMRR ≥ 50 dB		25°C	–0.2 to 1.9	–0.3 to 2		V
A_V	Large-signal voltage amplification	R_L = 600 Ω to 1.35 V, V_O = 1.35 V to 2.2 V	Sourcing	25°C	90	100		dB
				–40°C to 85°C	85			
		R_L = 600 Ω to 1.35 V, V_O = 1.35 V to 0.5 V	Sinking	25°C	85	90		
				–40°C to 85°C	80			
		R_L = 2 kΩ to 1.35 V, V_O = 1.35 V to 2.2 V	Sourcing	25°C	95	100		
				–40°C to 85°C	90			
		R_L = 2 kΩ to 1.35 V, V_O = 1.35 V to 0.5 V	Sinking	25°C	90	95		
				–40°C to 85°C	85			
V_O	Output swing	V_{CC+} = 2.7 V, R_L = 600 Ω to 1.35 V	High level	25°C	2.5	2.58		V
				–40°C to 85°C	2.4			
			Low level	25°C		0.13	0.2	
				–40°C to 85°C			0.3	
		V_{CC+} = 2.7 V, R_L = 2 kΩ to 1.35 V	High level	25°C	2.6	2.66		
				–40°C to 85°C	2.5			
			Low level	25°C		0.08	0.12	
				–40°C to 85°C			0.2	
I_O	Output current	V_O = 0 V	Sourcing	25°C	12	16		mA
		V_O = 2.7 V	Sinking	25°C	12	26		
I_{CC}	Supply current	LMV821		25°C		0.22	0.3	mA
				–40°C to 85°C			0.5	
		LMV822 (both amplifiers)		25°C		0.45	0.6	
				–40°C to 85°C			0.8	
		LMV824 (all four amplifiers)		25°C		0.72	1	
				–40°C to 85°C			1.2	

LMV8xx 2.7-V Electrical Characteristics (continued)

V_{CC+} = 2.7 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.35 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	LMV821/822/824			UNIT
				MIN	TYP	MAX	
SR	Slew rate (1)		25°C		1.7		V/µs
GBW	Gain bandwidth product	(2)	25°C		6		MHz
Φ_m	Phase margin	(2)	25°C		60		deg
	Gain margin	(2)	25°C		8.6		dB
	Amplifier-to-amplifier isolation	V_{CC+} = 5 V, R_L = 100 kΩ to 2.5 V (3)	25°C		135		dB
V_n	Equivalent input noise voltage	f = 1 kHz, V_{IC} = 1 V	25°C		45		nV/√Hz
I_n	Equivalent input noise current	f = 1 kHz	25°C		0.18		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = –2, R_L = 10 kΩ, V_O = 4.1 V_{p-p}	25°C		0.01		%

(1) Connected as voltage follower with 1-V step input. Value specified is the slower of the positive and negative slew rates.
(2) 40-dB closed-loop dc gain, C_L = 22 pF
(3) Each amplifier excited in turn with 1 kHz to produce V_O = 3 V_{p-p}

LMV8xxI 2.7-V Electrical Characteristics

V_{CC+} = 2.7 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.35 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 125°C			5.5	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C		1		µV/°C
I_{IB}	Input bias current			25°C		30	90	nA
				–40°C to 125°C			140	
I_{IO}	Input offset current			25°C		0.5	30	nA
				–40°C to 125°C			50	
CMRR	Common-mode rejection ratio	V_{IC} = 0 to 1.7 V		25°C	70	85		dB
				–40°C to 125°C	68			
$+k_{SVR}$	Positive supply-voltage rejection ratio	V_{CC+} = 1.7 V to 4 V, V_{CC-} = –1 V, V_O = 0, V_{IC} = 0		25°C	75	85		dB
				–40°C to 125°C	70			
$-k_{SVR}$	Negative supply-voltage rejection ratio	V_{CC+} = 1.7 V, V_{CC-} = –1 V to –3.3 V, V_O = 0, V_{IC} = 0		25°C	73	85		dB
				–40°C to 125°C	70			
V_{ICR}	Common-mode input voltage range	CMRR ≥ 50 dB		25°C	–0.2 to 1.9	–0.3 to 2		V
A_V	Large-signal voltage amplification	R_L = 600 Ω to 1.35 V, V_O = 1.35 V to 2.2 V	Sourcing	25°C	90	100		dB
				–40°C to 125°C	85			
		R_L = 600 Ω to 1.35 V, V_O = 1.35 V to 0.5 V	Sinking	25°C	85	90		
				–40°C to 125°C	80			
		R_L = 2 kΩ to 1.35 V, V_O = 1.35 V to 2.2 V	Sourcing	25°C	95	100		
				–40°C to 125°C	90			
		R_L = 2 kΩ to 1.35 V, V_O = 1.35 V to 0.5 V	Sinking	25°C	90	95		
				–40°C to 125°C	85			
V_O	Output swing	V_{CC+} = 2.7 V, R_L = 600 Ω to 1.35 V	High level	25°C	2.5	2.58		V
				–40°C to 125°C	2.4			
			Low level	25°C		0.13	0.2	
				–40°C to 125°C			0.3	
		V_{CC+} = 2.7 V, R_L = 2 kΩ to 1.35 V	High level	25°C	2.6	2.66		
				–40°C to 125°C	2.5			
			Low level	25°C		0.08	0.12	
				–40°C to 125°C			0.2	
I_O	Output current	V_O = 0 V	Sourcing	25°C	12	16		mA
		V_O = 2.7 V	Sinking	25°C	12	26		
I_{CC}	Supply current	LMV821		25°C		0.22	0.3	mA
				–40°C to 125°C			0.5	
		LMV822 (both amplifiers)		25°C		0.45	0.6	
				–40°C to 125°C			0.8	
		LMV824 (all four amplifiers)		25°C		0.72	1	
				–40°C to 125°C			1.2	

LMV8xxI 2.7-V Electrical Characteristics (continued)

V_{CC+} = 2.7 V, V_{CC-} = 0 V, V_{IC} = 1 V, V_O = 1.35 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
SR	Slew rate (1)		25°C		1.7		V/μs
GBW	Gain bandwidth product	(2)	25°C		6		MHz
Φ_m	Phase margin	(2)	25°C		60		deg
	Gain margin	(2)	25°C		8.6		dB
	Amplifier-to-amplifier isolation	V_{CC+} = 5 V, R_L = 100 kΩ to 2.5 V (3)	25°C		135		dB
V_n	Equivalent input noise voltage	f = 1 kHz, V_{IC} = 1 V	25°C		45		nV/√Hz
I_n	Equivalent input noise current	f = 1 kHz	25°C		0.18		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = –2, R_L = 10 kΩ, V_O = 4.1 V_{p-p}	25°C		0.01		%

(1) Connected as voltage follower with 1-V step input. Value specified is the slower of the positive and negative slew rates.
(2) 40-dB closed-loop dc gain, C_L = 22 pF
(3) Each amplifier excited in turn with 1 kHz to produce V_O = 3 V_{p-p}

LMV8xx 5-V Electrical Characteristics

V_{CC+} = 5 V, V_{CC-} = 0 V, V_{IC} = 2 V, V_O = 2.5 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 85°C			4	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C		1		µV/°C
I_{IB}	Input bias current			25°C		40	100	nA
				–40°C to 85°C			150	
I_{IO}	Input offset current			25°C		0.5	30	nA
				–40°C to 85°C			50	
CMRR	Common-mode rejection ratio	V_{IC} = 0 to 4 V		25°C	72	90		dB
				–40°C to 85°C	70			
$+k_{SVR}$	Positive supply-voltage rejection ratio	V_{CC+} = 1.7 V to 4 V, V_{CC-} = –1 V, V_O = 0, V_{IC} = 0		25°C	75	85		dB
				–40°C to 85°C	70			
$-k_{SVR}$	Negative supply-voltage rejection ratio	V_{CC+} = 1.7 V, V_{CC-} = –1 V to –3.3 V, V_O = 0, V_{IC} = 0		25°C	73	85		dB
				–40°C to 85°C	70			
V_{ICR}	Common-mode input voltage range	CMRR ≥ 50 dB		25°C	–0.2 to 4.2	–0.3 to 4.3		V
A_V	Large-signal voltage amplification	R_L = 600 Ω to 2.5 V, V_O = 2.5 V to 4.5 V	Sourcing	25°C	95	105		dB
				–40°C to 85°C	90			
		R_L = 600 Ω to 2.5 V, V_O = 2.5 V to 0.5 V	Sinking	25°C	95	105		
				–40°C to 85°C	90			
		R_L = 2 kΩ to 2.5 V, V_O = 2.5 V to 4.5 V	Sourcing	25°C	95	105		
				–40°C to 85°C	90			
		R_L = 2 kΩ to 2.5 V, V_O = 2.5 V to 0.5 V	Sinking	25°C	95	105		
				–40°C to 85°C	90			
V_O	Output swing	V_{CC+} = 5 V, R_L = 600 Ω to 2.5 V	High level	25°C	4.75	4.84		V
				–40°C to 85°C	4.7			
			Low level	25°C		0.17	0.25	
				–40°C to 85°C			0.3	
		V_{CC+} = 5 V, R_L = 2 kΩ to 2.5 V	High level	25°C	4.85	4.9		
				–40°C to 85°C	4.8			
			Low level	25°C		0.1	0.15	
				–40°C to 85°C			0.2	
I_O	Output current	V_O = 0 V	Sourcing	25°C	20	45		mA
				–40°C to 85°C	15			
		V_O = 5 V	Sinking	25°C	20	40		
				–40°C to 85°C	15			
I_{CC}	Supply current	LMV821		25°C		0.3	0.4	mA
				–40°C to 85°C			0.6	
		LMV822 (both amplifiers)		25°C		0.5	0.7	
				–40°C to 85°C			0.9	
		LMV824 (all four amplifiers)		25°C		1	1.3	
				–40°C to 85°C			1.5	

LMV8xx 5-V Electrical Characteristics (continued)

V_{CC+} = 5 V, V_{CC-} = 0 V, V_{IC} = 2 V, V_O = 2.5 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	LMV821/822/824			UNIT
				MIN	TYP	MAX	
SR	Slew rate	V_{CC+} = 5 V (1)	25°C	1.4	1.9		V/μs
GBW	Gain bandwidth product	(2)	25°C		6		MHz
Φ_m	Phase margin	(2)	25°C		64.2		deg
	Gain margin	(2)	25°C		8.7		dB
	Amplifier-to-amplifier isolation	V_{CC+} = 5 V, R_L = 100 kΩ to 2.5 V (3)	25°C		135		dB
V_n	Equivalent input noise voltage	f = 1 kHz, V_{IC} = 1 V	25°C		42		$nV/\sqrt{Hz}$
I_n	Equivalent input noise current	f = 1 kHz	25°C		0.2		$pA/\sqrt{Hz}$
THD	Total harmonic distortion	f = 1 kHz, A_V = –2, R_L = 10 kΩ, V_O = 4.1 V_{p-p}	25°C		0.01		%

(1) Connected as voltage follower with 3-V step input. Value specified is the slower of the positive and negative slew rates.
(2) 40-dB closed-loop dc gain, C_L = 22 pF
(3) Each amplifier excited in turn with 1 kHz to produce V_O = 3 V_{p-p}

LMV8xxI 5-V Electrical Characteristics

V_{CC+} = 5 V, V_{CC-} = 0 V, V_{IC} = 2 V, V_O = 2.5 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	LMV821/822/824 MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage			25°C		1	3.5	mV
				–40°C to 125°C			5.5	
α_{VIO}	Average temperature coefficient of input offset voltage			25°C		1		µV/°C
I_{IB}	Input bias current			25°C		40	100	nA
				–40°C to 125°C			150	
I_{IO}	Input offset current			25°C		0.5	30	nA
				–40°C to 125°C			50	
CMRR	Common-mode rejection ratio	V_{IC} = 0 to 4 V		25°C	72	90		dB
				–40°C to 125°C	70			
$+k_{SVR}$	Positive supply-voltage rejection ratio	V_{CC+} = 1.7 V to 4 V, V_{CC-} = –1 V, V_O = 0, V_{IC} = 0		25°C	75	85		dB
				–40°C to 125°C	70			
$-k_{SVR}$	Negative supply-voltage rejection ratio	V_{CC+} = 1.7 V, V_{CC-} = –1 V to –3.3 V, V_O = 0, V_{IC} = 0		25°C	73	85		dB
				–40°C to 125°C	70			
V_{ICR}	Common-mode input voltage range	CMRR ≥ 50 dB		25°C	–0.2 to 4.2	–0.3 to 4.3		V
A_V	Large-signal voltage amplification	R_L = 600 Ω to 2.5 V, V_O = 2.5 V to 4.5 V	Sourcing	25°C	95	105		dB
				–40°C to 125°C	90			
		R_L = 600 Ω to 2.5 V, V_O = 2.5 V to 0.5 V	Sinking	25°C	95	105		
				–40°C to 125°C	90			
		R_L = 2 kΩ to 2.5 V, V_O = 2.5 V to 4.5 V	Sourcing	25°C	95	105		
				–40°C to 125°C	90			
		R_L = 2 kΩ to 2.5 V, V_O = 2.5 V to 0.5 V	Sinking	25°C	95	105		
				–40°C to 125°C	90			
V_O	Output swing	V_{CC+} = 5 V, R_L = 600 Ω to 2.5 V	High level	25°C	4.75	4.84		V
				–40°C to 125°C	4.6			
			Low level	25°C		0.17	0.25	
				–40°C to 125°C			0.3	
		V_{CC+} = 5 V, R_L = 2 kΩ to 2.5 V	High level	25°C	4.85	4.9		
				–40°C to 125°C	4.8			
			Low level	25°C		0.1	0.15	
				–40°C to 125°C			0.2	
I_O	Output current	V_O = 0 V	Sourcing	25°C	20	45		mA
				–40°C to 125°C	15			
		V_O = 5 V	Sinking	25°C	20	40		
				–40°C to 125°C	15			
I_{CC}	Supply current	LMV821		25°C		0.3	0.4	mA
				–40°C to 125°C			0.6	
		LMV822 (both amplifiers)		25°C		0.5	0.7	
				–40°C to 125°C			0.9	
		LMV824 (all four amplifiers)		25°C		1	1.3	
				–40°C to 125°C			1.5	

LMV8xxI 5-V Electrical Characteristics (continued)

V_{CC+} = 5 V, V_{CC-} = 0 V, V_{IC} = 2 V, V_O = 2.5 V, and R_L > 1 MΩ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	LMV821/822/824			UNIT
				MIN	TYP	MAX	
SR	Slew rate	V_{CC+} = 5 V(1)	25°C	1.4	1.9		V/μs
GBW	Gain bandwidth product	(2)	25°C		6		MHz
Φ_m	Phase margin	(2)	25°C		64.2		deg
	Gain margin	(2)	25°C		8.7		dB
	Amplifier-to-amplifier isolation	V_{CC+} = 5 V, R_L = 100 kΩ to 2.5 V(3)	25°C		135		dB
V_n	Equivalent input noise voltage	f = 1 kHz, V_{IC} = 1 V	25°C		42		nV/√Hz
I_n	Equivalent input noise current	f = 1 kHz	25°C		0.2		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = –2, R_L = 10 kΩ, V_O = 4.1 V_{p-p}	25°C		0.01		%

(1) Connected as voltage follower with 3-V step input. Value specified is the slower of the positive and negative slew rates.
(2) 40-dB closed-loop dc gain, C_L = 22 pF
(3) Each amplifier excited in turn with 1 kHz to produce V_O = 3 V_{p-p}

TYPICAL CHARACTERISTICS

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

SUPPLY CURRENT vs SUPPLY VOLTAGE

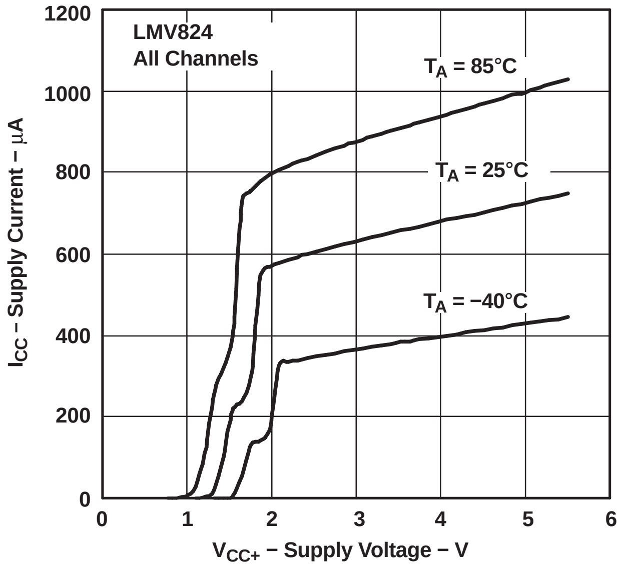


Figure 1.

INPUT CURRENT vs TEMPERATURE

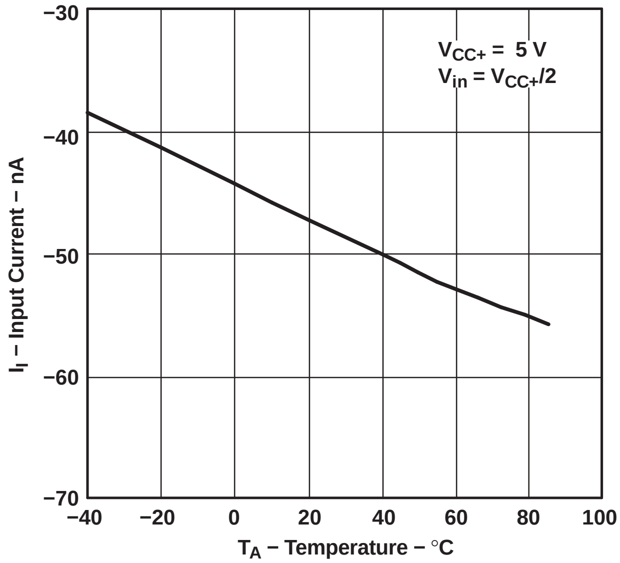


Figure 2.

SOURCING CURRENT vs OUTPUT VOLTAGE

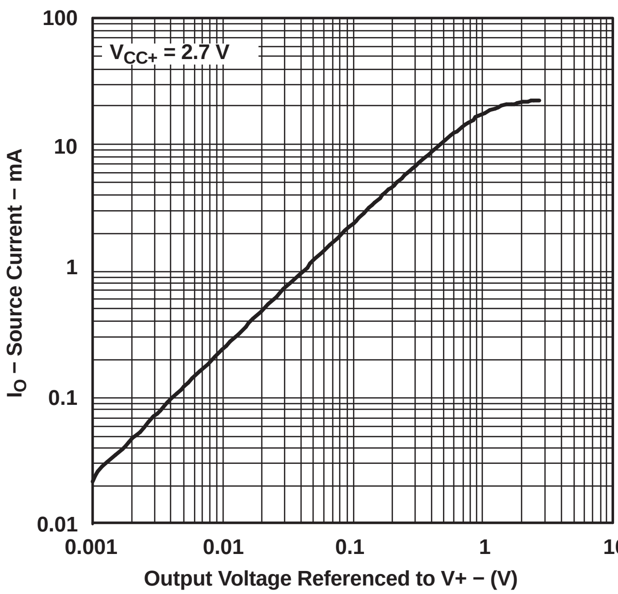


Figure 3.

SOURCING CURRENT vs OUTPUT VOLTAGE

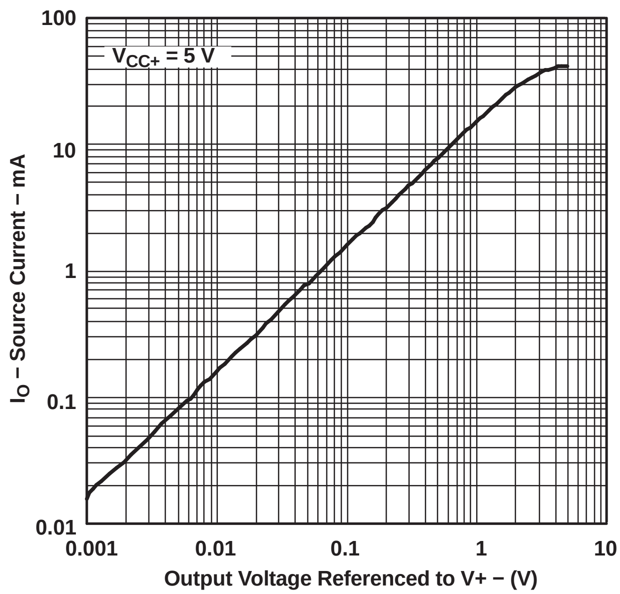


Figure 4.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

SINKING CURRENT vs OUTPUT VOLTAGE

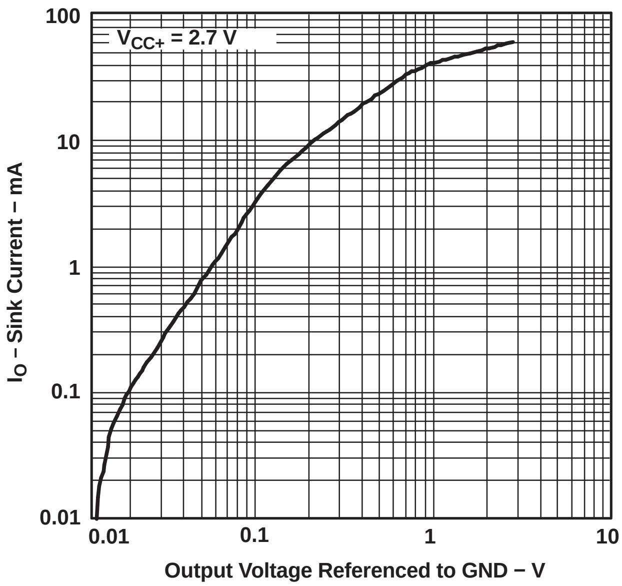


Figure 5.

SINKING CURRENT vs OUTPUT VOLTAGE

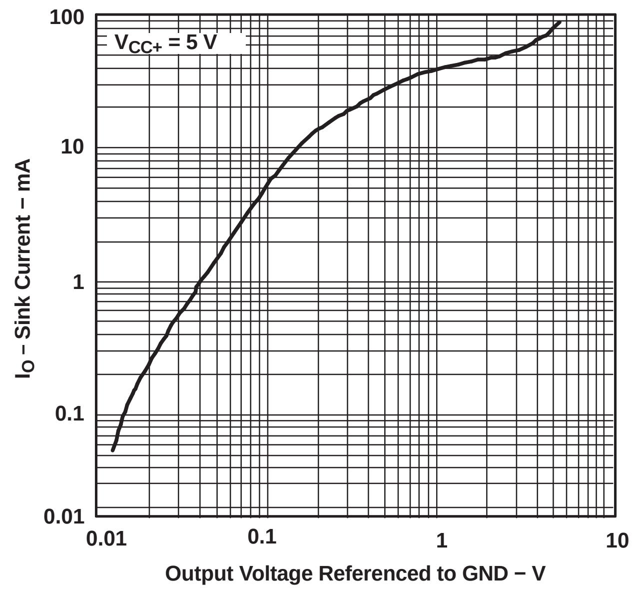


Figure 6.

OUTPUT VOLTAGE SWING vs SUPPLY VOLTAGE

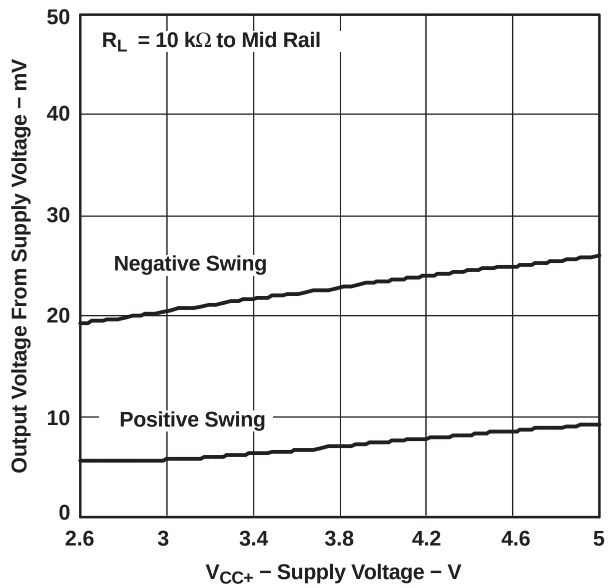


Figure 7.

OUTPUT VOLTAGE SWING vs SUPPLY VOLTAGE

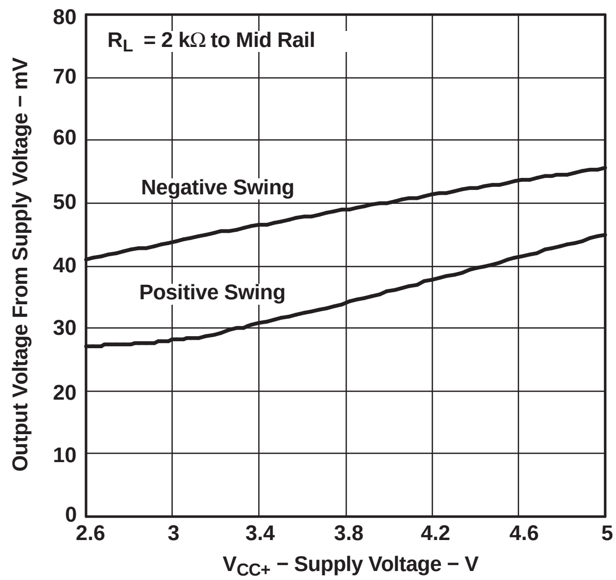


Figure 8.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

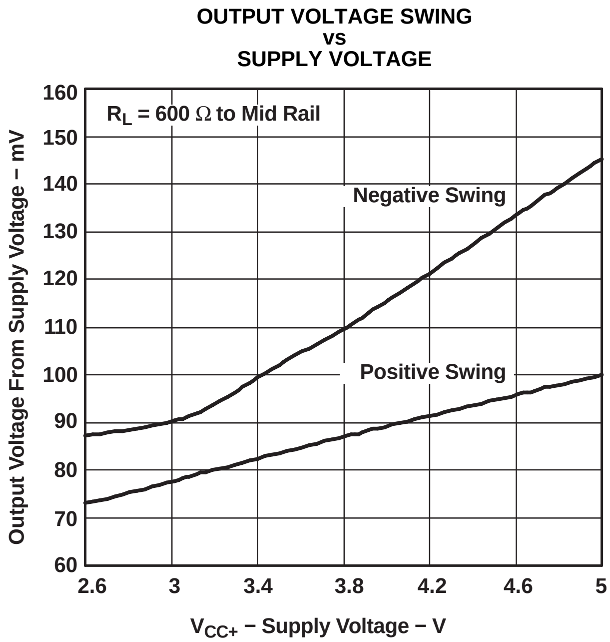


Figure 9.

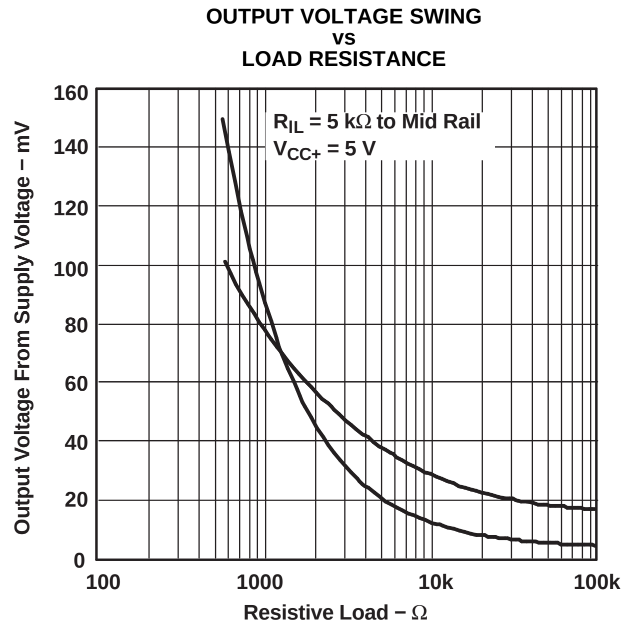


Figure 10.

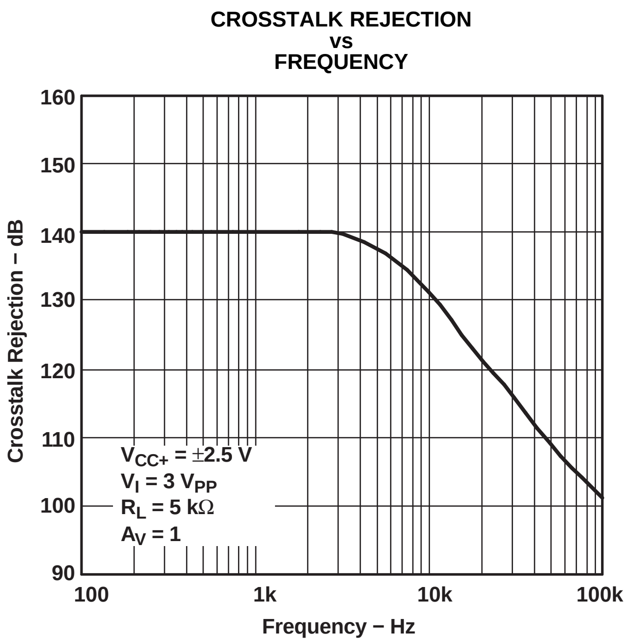


Figure 11.

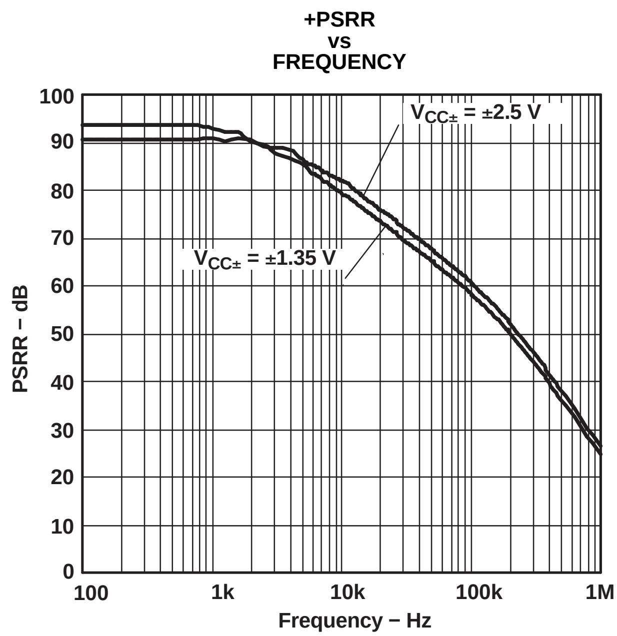


Figure 12.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

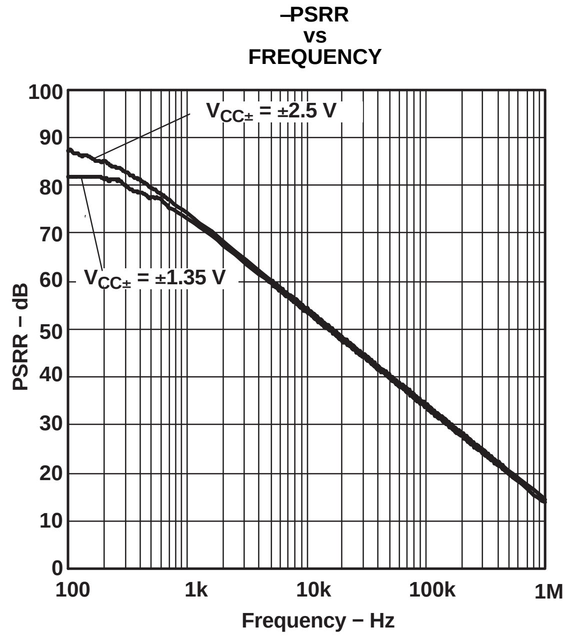


Figure 13.

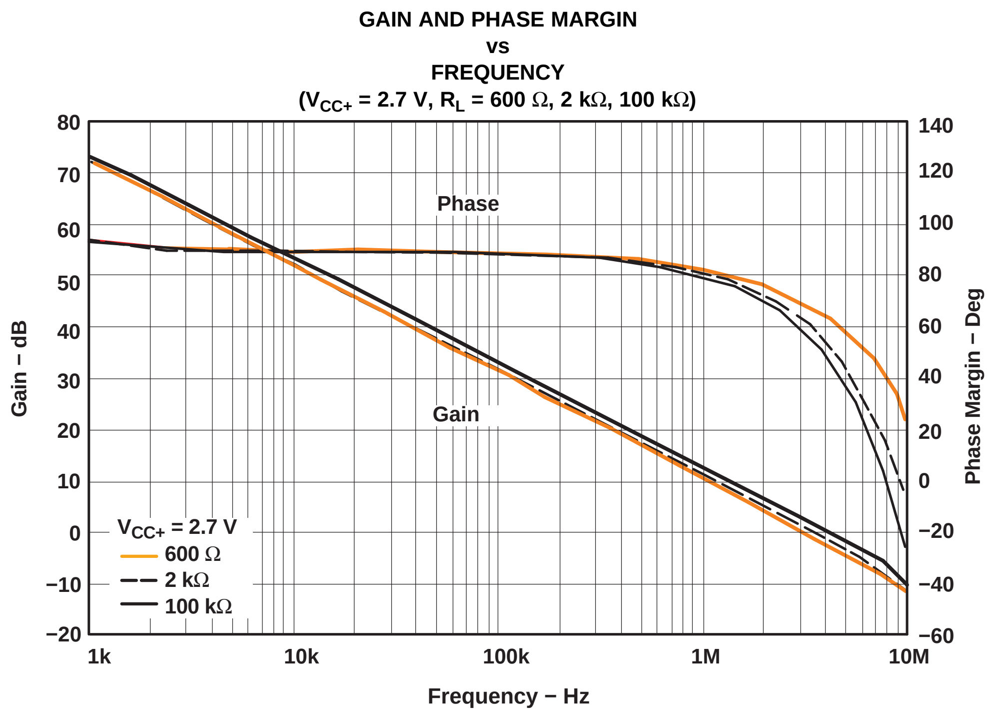


Figure 14.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

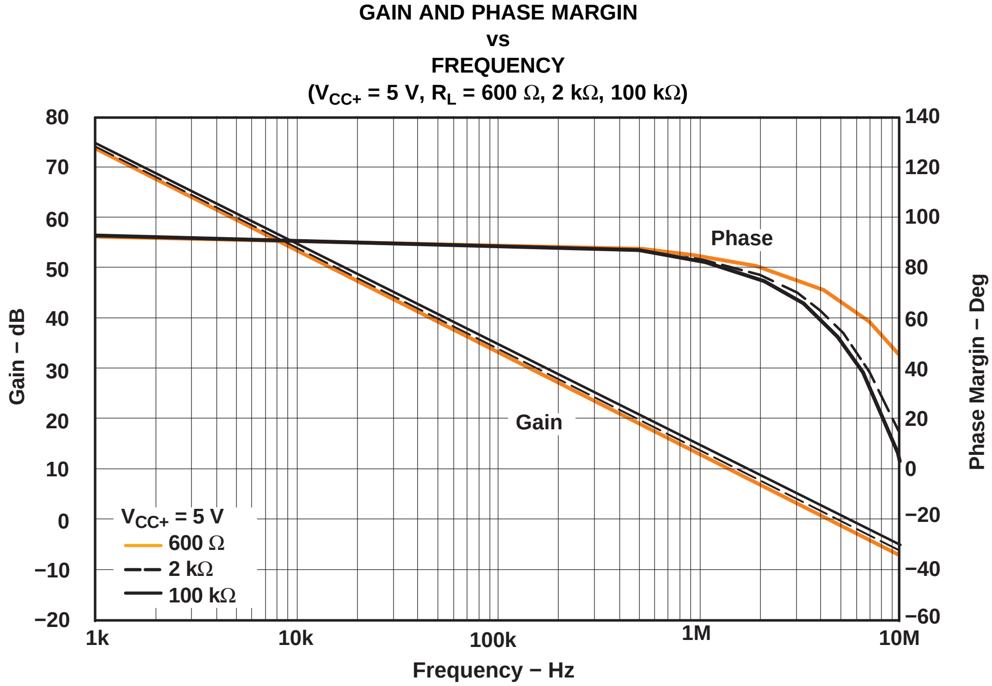


Figure 15.

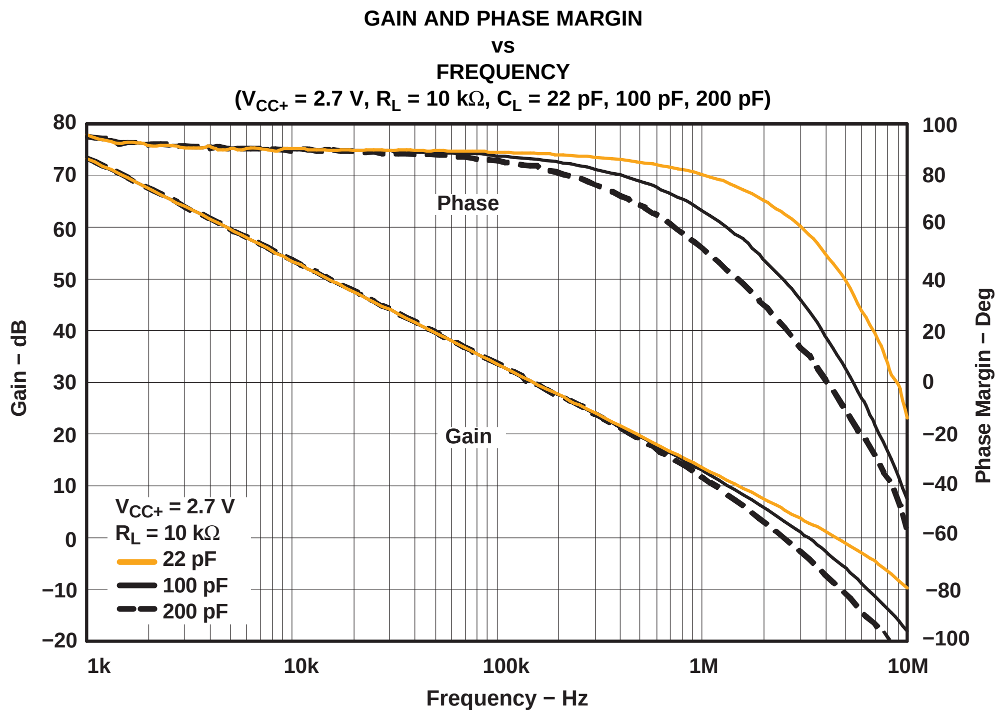


Figure 16.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

GAIN AND PHASE MARGIN vs FREQUENCY (V_{CC+} = 5 V, R_L = 10 kΩ, C_L = 22 pF, 100 pF, 200 pF)

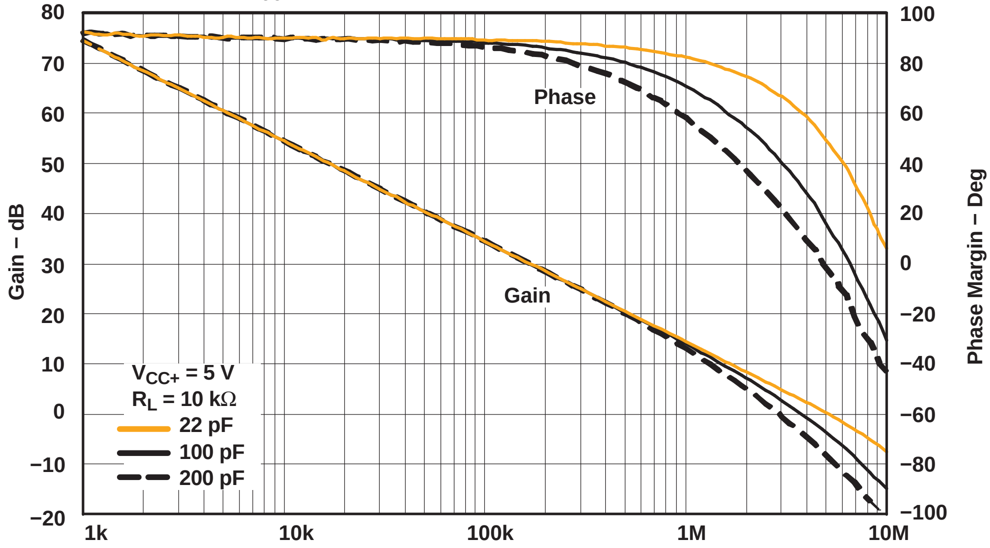


Figure 17.

GAIN AND PHASE MARGIN vs FREQUENCY (V_{CC+} = 2.7 V, R_L = 600 Ω, C_L = 22 pF, 100 pF, 200 pF)

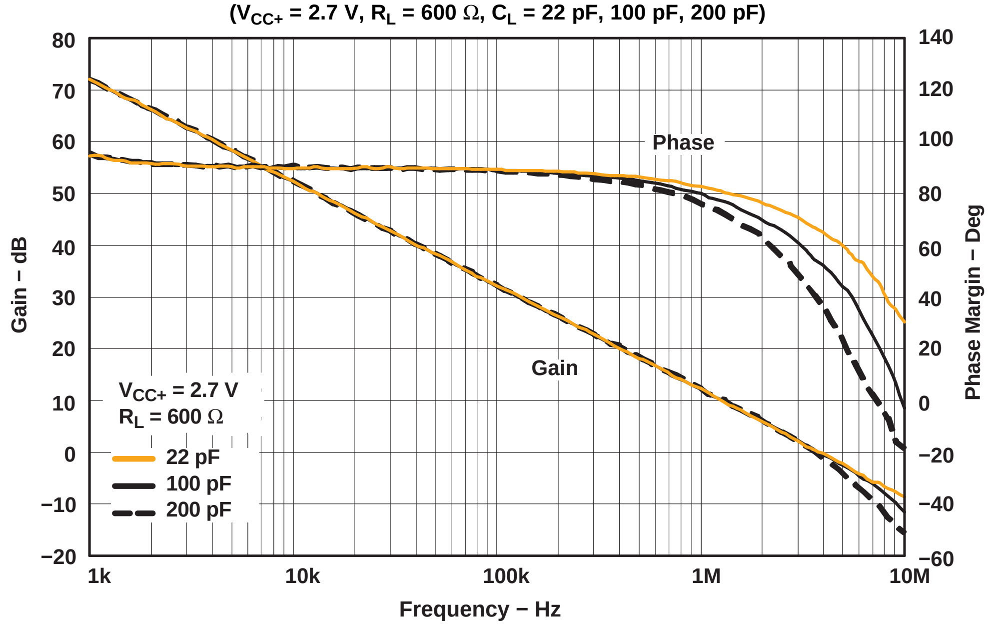


Figure 18.

TYPICAL CHARACTERISTICS (continued)

T_A = 25°C, V_{CC+} = 5-V Single Supply (Unless Otherwise Noted)

GAIN AND PHASE MARGIN vs FREQUENCY (V_{CC+} = 5 V, R_L = 600 Ω, C_L = 22 pF, 100 pF, 200 pF)

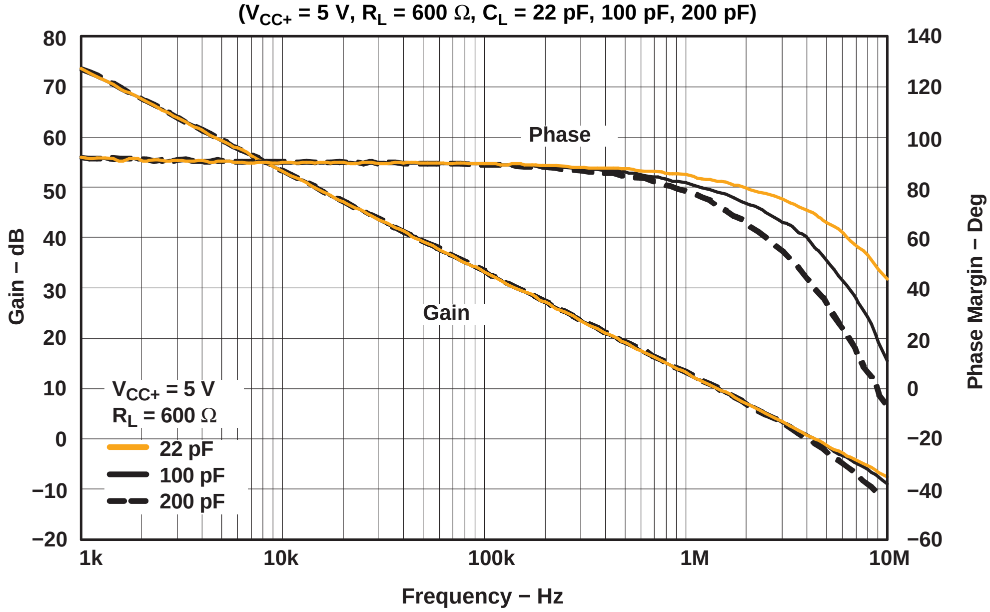


Figure 19.

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