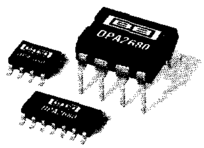
BURR - BROWN®



OPA2680

www.burr-brown.com/databook/OPA2680.html

SpeedPlus™ Dual Wideband, Voltage Feedback OPERATIONAL AMPLIFIER With Disable

FEATURES

- WIDEBAND +5V OPERATION: 220MHz (G = 2)
- HIGH OUTPUT CURRENT: 150mA
- OUTPUT VOLTAGE SWING: ±4.0V
- HIGH SLEW RATE: 1800V/µs
- LOW SUPPLY CURRENT: 6.4mA/Ch.
- LOW DISABLED CURRENT: 200µA/Ch.
- ENABLE/DISABLE TIME: 25ns/100ns

APPLICATIONS

- VIDEO LINE DRIVING
- xDSL LINE DRIVER/RECEIVER
- HIGH SPEED IMAGING CHANNELS
- ADC BUFFERS
- PORTABLE INSTRUMENTS
- TRANSIMPEDANCE AMPLIFIERS
- ACTIVE FILTERS

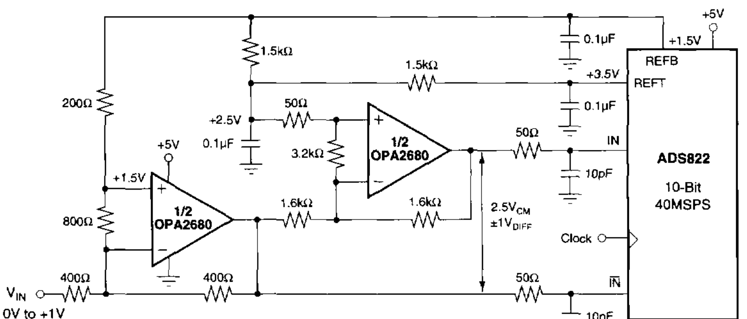
DESCRIPTION

The OPA2680 represents a major step forward in unity gain stable, voltage feedback op amps. A new internal architecture provides slew rate and full power bandwidth previously found only in wideband current feedback op amps. A new output stage architecture delivers high currents with a minimal headroom requirement. These combine to give exceptional single supply operation. Using a single +5V supply, the OPA2680 can deliver a 1V to 4V output swing with over 100mA drive current and 150MHz bandwidth. This combination of features makes the OPA2680 an ideal RGB line driver or single supply ADC input driver.

The OPA2680's low 6.4mA/ch. supply current is precisely trimmed at 25°C. This trim, along with low temperature drift, guarantees lower maximum supply current than competing products. System power may be reduced further using the optional disable control pin (SO-14 package only). Leaving this disable pin open, or holding it high, will operate the OPA2680N normally. If pulled low, the OPA2680N supply current drops to less than 400µA while the output goes into a high impedance state. This feature may be used for either power savings or to implement video MUX applications.

OPA2680 PRODUCT FAMILY

	SINGLES	DUALS
Voltage Feedback	OPA680	OPA2680
Current Feedback	OPA681	OPA2681



Single-Supply, DC-Coupled, Single-to-Differential ADC Driver

International Airport Industrial Park • Mailing Address: PO Box 11400, Tucson, AZ 85734 • Street Address: 6730 S. Tucson Blvd., Tucson, AZ 85706 • Tel: (520) 746-1111 • Twx: 910-952-1111
Internet: http://www.burr-brown.com/ • FAXLine: (800) 548-6133 (US/Canada Only) • Cable: BBRCORP • Telex: 066-6491 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132

SPECIFICATIONS: V_S = ±5V

R_F = 402Ω, R_L = 100Ω, and G = +2, (Figure 1 for AC performance only), unless otherwise noted.

PARAMETER	CONDITIONS	OPA2680P, U, N TYP +25°C	GUARANTEED +25°C(2)	0°C to 70°C(3)	–40°C to +85°C(3)	UNITS	MIN/ MAX	TEST LEVEL(1)
AC PERFORMANCE (Figure 1)								
Small Signal Bandwidth	G = +1, V_O = 0.5Vp-p, R_F = 25Ω	400				MHz	Typ	C
	G = +2, V_O = 0.5Vp-p	220	210	200	190	MHz	Min	B
	G = +10, V_O = 0.5Vp-p	30	20	—	—	MHz	Min	B
Gain-Bandwidth Product	G ≥ 10	300	200	—	—	MHz	Min	B
Bandwidth for 0.1dB Gain Flatness	G = +2, V_O < 0.5Vp-p	30				MHz	Typ	C
Peaking at a Gain of +1	V_O < 0.5Vp-p	4				dB	Typ	C
Large Signal Bandwidth	G = +2, V_O = 5Vp-p	175				MHz	Typ	C
Slew Rate	G = +2, 4V Step	1800	1400	1200	900	V/μs	Min	B
Rise/Fall Time	G = +2, V_O = 0.5V Step	1.4	—	—	—	ns	Max	B
	G = +2, V_O = 5V Step	2.8	—	—	—	ns	Max	B
Settling Time to 0.02%	G = +2, V_O = 2V Step	—				ns	Typ	C
0.1%	G = +2, V_O = 2V Step	—				ns	Typ	C
Harmonic Distortion	G = +2, f = 5MHz, V_O = 2Vp-p							
2nd Harmonic	R_L = 100Ω	–68	–63	—	—	dBc	Max	B
	R_L ≥ 500Ω	–80	–70	—	—	dBc	Max	B
3rd Harmonic	R_L = 100Ω	–80	–75	—	—	dBc	Max	B
	R_L ≥ 500Ω	–88	–85	—	—	dBc	Max	B
Channel-to-Channel Crosstalk	f = 5MHz	–70				dBc	Typ	C
Input Voltage Noise	f > 1MHz	4.8	—	—	—	nV/√Hz	Max	B
Input Current Noise	f > 1MHz	2.5	—	—	—	pA/√Hz	Max	B
Differential Gain	G = +2, NTSC, V_O = 1.4Vp, R_L = 150	0.05				%	Typ	C
Differential Phase	G = +2, NTSC, V_O = 1.4Vp, R_L = 150	0.03				deg	Typ	C
DC PERFORMANCE(4)								
Open-Loop Voltage Gain (A_{OL})	V_O ±2V, R_L = 100Ω	62	**56**	54	52	dB	Min	A
Input Offset Voltage	V_{CM} = 0V	±1.0	**±4.5**	—	—	mV	Max	A
Average Offset Voltage Drift	V_{CM} = 0V			—	—	μV/°C	Max	B
Input Bias Current	V_{CM} = 0V	+8	**+14**	—	—	μA	Max	A
Average Bias Current Drift	V_{CM} = 0V			—	—	nA/°C	Max	B
Input Offset Current	V_{CM} = 0V	±0.1	**±0.7**	—	—	μA	Max	A
Average Offset Current Drift	V_{CM} = 0V			—	—	nA/°C	Max	B
INPUT								
Common-Mode Input Range (CMIR)(5)		±3.5	**±3.4**	—	—	V	Min	A
Common-Mode Rejection (CMR)	V_{CM} = ±1V	59	**56**	—	—	dB	Min	A
Input Impedance								
Differential-Mode	V_{CM} = 0	—				kΩ ‖ pF	Typ	C
Common-Mode	V_{CM} = 0	—				MΩ ‖ pF	Typ	C
OUTPUT								
Voltage Output Swing	No Load	±4.0	**±3.8**	±3.7	±3.6	V	Min	A
	100Ω Load	±3.9	**±3.7**	±3.6	±3.3	V	Min	A
Current Output, Sourcing	V_O = 0	+190	**+160**	+140	+80	mA	Min	A
Current Output, Sinking	V_O = 0	–150	**–135**	–130	–80	mA	Min	A
Closed-Loop Output Impedance	G = +2, f = 100kHz	0.03				Ω	Typ	C
DISABLE (SO-14 Only)	Disabled Low							
Power Down Supply Current (+V_S)	$V_{\overline{DIS}}$ = 0, Both Channels	–400				μA	Typ	C
Disable Time		100				ns	Typ	C
Enable Time		25				ns	Typ	C
Off Isolation	G = +2, 5MHz	70				dB	Typ	C
Output Capacitance in Disable		4				pF	Typ	C
Turn On Glitch	G = +2, R_L = 150Ω, V_{IN} = 0	±50				mV	Typ	C
Turn Off Glitch	G = +2, R_L = 150Ω, V_{IN} = 0	±20				mV	Typ	C
Enable Voltage		2.0	**2.4**	—	—	V	Min	A
Disable Voltage		1.1	**.8**	—	—	V	Max	A
Control Pin Input Bias Current ($V_{\overline{DIS}}$)	$V_{\overline{DIS}}$ = 0, Each Channel	100	**160**	—	—	μA	Max	A
POWER SUPPLY								
Specified Operating Voltage		±5				V	Typ	C
Maximum Operating Voltage Range			**±6**	±6	±6	V	Max	A
Max Quiescent Current	V_S = ±5V	12.8	**13.6**	14.0	14.4	mA	Max	A
Min Quiescent Current	V_S = ±5V	12.8	**12.0**	12.0	10.6	mA	Min	A
Power Supply Rejection (+PSR)	Input Referred	70	**60**	—	—	dB	Min	A
THERMAL CHARACTERISTICS								
Specified Operating Range P, U, N Package		–40 to +85				°C	Typ	C
Thermal Resistance, θ_{JA}	Junction-to-Ambient							
P 8-Pin DIP		100				°C/W	Typ	C
U SO-8		125				°C/W	Typ	C
N SO-14		100				°C/W	Typ	C

NOTES: (1) Test Levels: (A) 100% tested at 25°C. Over temperature limits by characterization and simulation. (B) Limits set by characterization and simulation. (C) Typical value only for information. (2) Junction Temperature = Ambient for 25°C guaranteed specifications. (3) Junction Temperature = Ambient at low temperature limit: Junction Temperature = Ambient +23°C at high temperature limit for over temperature guaranteed specifications. (4) Current is considered positive out of node. V_{CM} is the input common-mode voltage. (5) Tested < 3dB below minimum CMR specification at ±CMIR limits.

SPECIFICATIONS: V_S = +5V

R_F = 402Ω, R_L = 100Ω to V_S/2, G = +2, (Figure 2 for AC performance only), unless otherwise noted.

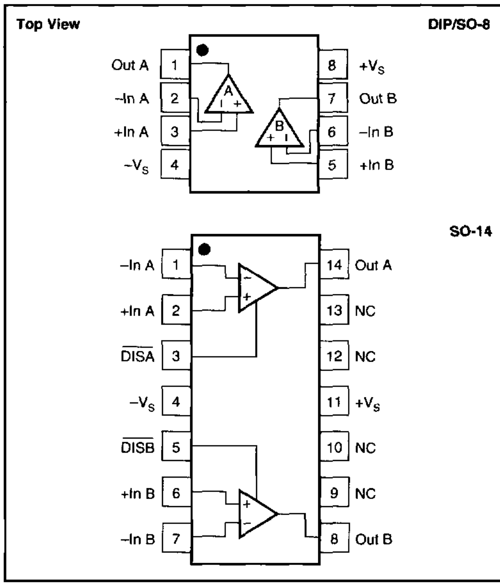
		OPA2680P, U, N						
		TYP	GUARANTEED					
PARAMETER	CONDITIONS	+25°C	+25°C(2)	0°C to 70°C(3)	–40°C to +85°C(3)	UNITS	MIN/ MAX	TEST LEVEL(1)
AC PERFORMANCE (Figure 2)								
Small Signal Bandwidth	G = +1, V_O < 0.5Vp-p, R_F = ±25Ω	300				MHz	Typ	C
	G = +2, V_O < 0.5Vp-p	220	120	—	—	MHz	Min	B
	G = +10, V_O < 0.5Vp-p	25	—	—	—	MHz	Min	B
Gain-Bandwidth Product	*G ≥ 10*	*250*	—	—	—	MHz	*Min*	B
Bandwidth for 0.1dB Gain Flatness	G = +2, V_O < 0.5Vp-p	20				MHz	Typ	C
Peaking at a Gain of +1	V_O < 0.5Vp-p	5				dB	Typ	C
Large Signal Bandwidth	G = +2, V_O = 2Vp-p	200				MHz	Typ	C
Slew Rate	G = +2, 2V Step	1000	700	—	—	V/µs	Min	B
Rise/Fall Time	G = +2, V_O = 0.5V Step	1.6				ns	Typ	C
	G = +2, V_O = 2V Step	2.0				ns	Typ	C
Settling Time to 0.02%	G = +2, V_O = 2V Step	—				ns	Typ	C
0.1%	G = +2, V_O = 2V Step	—				ns	Typ	C
Harmonic Distortion	G = +2, f = 5MHz, V_O = 2Vp-p							
2nd Harmonic	*R_L = 100Ω to V_S/2*	–60	—	—	—	dBc	Max	B
	R_L ≥ 500Ω to V_S/2	–70	—	—	—	dBc	Max	B
3rd Harmonic	R_L = 100Ω to V_S/2	–72	—	—	—	dBc	Max	B
	R_L ≥ 500Ω to V_S/2	–80	—	—	—	dBc	Max	B
Channel-to-Channel Crosstalk	f = 5MHz	–70				dBc	Typ	C
Input Voltage Noise	f > 1MHz	5	—	—	—	nV/√Hz	Max	B
Input Current Noise	f > 1MHz	2.5	—	—	—	pA/√Hz	Max	B
Differential Gain	G = +2, NTSC, V_O = 1.4Vp, R_L = 150 to V_S/2	0.06				%	Typ	C
Differential Phase	G = +2, NTSC, V_O = 1.4Vp, R_L = 150 to V_S/2	0.03				deg	Typ	C
DC PERFORMANCE(4)								
Open-Loop Voltage Gain	V_O = 2.5V, R_L = 100Ω to 2.5V	62	**56**	—	—	dB	Min	A
Input Offset Voltage	V_{CM} = 2.5V	±2.0	**±6.0**	—	—	mV	Max	A
Average Offset Voltage Drift	V_{CM} = 2.5V			—	—	µV/°C	Max	B
Input Bias Current	V_{CM} = 2.5V	+8	**+15**	—	—	µA	Max	A
Average Bias Current Drift	V_{CM} = 2.5V			—	—	*nA/°C*	*Max*	B
Input Offset Current	V_{CM} = 2.5V	±0.1	**±0.6**	—	—	µA	Max	A
Average Offset Current Drift	V_{CM} = 2.5V			—	—	nA/°C	Max	B
INPUT								
Least Positive Input Voltage(5)		1.5	**1.6**	—	—	V	Max	A
Most Positive Input Voltage(5)		3.5	**3.4**	—	—	V	Min	A
Common-Mode Rejection (CMR)	V_{CM} = 2.5V ±0.5V	59	**56**			dB	Min	A
Input Impedance								
Differential-Mode	V_{CM} = 2.5V	—				kΩ ∥ pF	Typ	C
Common-Mode	V_{CM} = 2.5V	—				MΩ ∥ pF	Typ	C
OUTPUT								
Most Positive Output Voltage	No Load	4	**3.8**	3.6	3.5	V	Min	A
	R_L = 100Ω to 2.5V	3.9	**3.7**	3.5	3.4	V	Min	A
Least Positive Output Voltage	No Load	1	**1.2**	1.4	1.5	V	Max	A
	R_L = 100Ω to 2.5V	*1.1*	**1.3**	*1.5*	*1.7*	V	*Max*	A
Current Output, Sourcing		+150	**+110**	+110	+60	mA	Min	A
Current Output, Sinking		–110	**–80**	–70	–50	mA	Min	A
Closed-Loop Output Impedance	G =+2, f = 100kHz	0.03				Ω	Typ	C
DISABLE (SO-14 Only)	Disabled Low							
Power Down Supply Current (+V_S)	$V_{\overline{DIS}}$ = 0, Both Channels	–260				µA	Typ	C
Disable Time		100				ns	Typ	C
Enable Time		25				ns	Typ	C
Off Isolation	G = +2, 5MHz	65				dB	Typ	C
Output Capacitance in Disable		4				pF	Typ	C
Turn On Glitch	G = +2, R_L = 150Ω, V_{IN} = V_S/2	±50				mV	Typ	C
Turn Off Glitch	G = +2, R_L = 150Ω, V_{IN} = V_S/2	±20				mV	Typ	C
Enable Voltage		2.0	**2.4**	—	—	V	Min	A
Disable Voltage		1.1	**.8**	—	—	V	Max	A
Control Pin Input Bias Current ($V_{\overline{DIS}}$)	$V_{\overline{DIS}}$ = 0, Each Channel	100				µA	Typ	C
POWER SUPPLY								
Specified Single Supply Operating Voltage		5				V	Typ	C
Maximum Single Supply Operating Voltage			12	12	12	V	Max	B
Max Quiescent Current	V_S = +5V	10.2	**12.0**	12.0	12.0	mA	Max	A
Min Quiescent Current	V_S = +5V	10.2	**8.0**	8.0	7.6	mA	Min	A
Power Supply Rejection (+PSR)	Input Referred	59				dB	Typ	C
TEMPERATURE RANGE								
Specification: P, U, N		–40 to +85				°C	Typ	C
Thermal Resistance, θ_{JA}	Junction-to-Ambient							
P 8-Pin DIP		100				°C/W	Typ	C
U SO-8		125				°C/W	Typ	C
N SO-14		100				°C/W	Typ	C

NOTES: (1) Test Levels: (A) 100% tested at 25°C. Over temperature limits by characterization and simulation. (B) Limits set by characterization and simulation. (C) Typical value only for information. (2) Junction Temperature = Ambient for 25°C guaranteed specifications. (3) Junction Temperature = Ambient at low temperature limit: Junction Temperature = Ambient +23°C at high temperature limit for over temperature guaranteed specifications. (4) Current is considered positive out of node. V_{CM} is the input common-mode voltage. (5) Tested < 3dB below minimum CMR specification at ±CMIR limits.

ABSOLUTE MAXIMUM RATINGS

Power Supply	±6.5VDC
Internal Power Dissipation	See Thermal Analysis
Differential Input Voltage	±1.2V
Input Voltage Range	$\pm V_S$
Storage Temperature Range: P, U, N	–40°C to +125°C
Lead Temperature (soldering, 10s)	+300°C
(soldering, SOIC 3s)	+260°C
Junction Temperature (T_J)	+175°C

PIN CONFIGURATIONS



ELECTROSTATIC DISCHARGE SENSITIVITY

Electrostatic discharge can cause damage ranging from performance degradation to complete device failure. Burr-Brown Corporation recommends that all integrated circuits be handled and stored using appropriate ESD protection methods.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet published specifications.

PACKAGE/ORDERING INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER(1)	TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER
OPA2680P	8-Pin Plastic DIP	006	–40°C to +85°C	OPA2680P	Contact Factory for Availability
OPA2680U	SO-8 Surface Mount	182	–40°C to +85°C	OPA2680U	OPA2680U
OPA2680N	SO-14 Surface Mount	235	–40°C to +85°C	OPA2680N	Contact Factory for Availability

NOTES: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.