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FEATURES

- Large, triple 16 × 5 high speed, nonblocking switch array
 - Pin compatible with the AD8175 and AD8176 (16 × 9 switch arrays) and the AD8177 (16 × 5 switch array)
 - Differential or single-ended operation
 - Supports sync-on common-mode and sync-on color operating modes
 - RGB and HV outputs available for driving monitor directly
 - G = +4 operation (differential input to differential output)
 - Flexible power supplies: +5 V or ±2.5 V
 - Logic ground for convenient control interface
 - Serial or parallel programming of switch array
 - High impedance output disable allows connection of multiple devices with minimal loading on output bus
 - Adjustable output CM and black level through external pins
 - Excellent ac performance
 - Bandwidth: 450 MHz
 - Slew rate: 1650 V/μs
 - Settling time: 4 ns to 1% to support 1600 × 1200 at 85 Hz
 - Low power of 2.3 W
 - Low all hostile crosstalk
 - −82 dB at 5 MHz
 - −47 dB at 500 MHz
 - Wide input common-mode range of 4 V
 - Reset pin allows disabling of all outputs
 - Fully populated 26 × 26 ball PBGA package (27 mm × 27 mm, 1 mm ball pitch)
 - Convenient grouping of RGB signals for easy routing
- ### APPLICATIONS
- RGB video switching
 - KVM
 - Professional video

GENERAL DESCRIPTION

The AD8178 is a high speed, triple 16 × 5 video crosspoint switch matrix. It supports 1600 × 1200 RGB displays at 85 Hz refresh rate, by offering a 450 MHz bandwidth and a slew rate of 1650 V/μs. With −82 dB of crosstalk and −84 dB isolation (at 5 MHz), the AD8178 is useful in many high speed video applications.

The AD8178 supports two modes of operation: differential-in to differential-out mode with sync-on CM signaling passed through the switch and differential-in to differential-out mode with CM signaling removed through the switch. The output CM and black level can be conveniently set via external pins.

Rev. A

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FUNCTIONAL BLOCK DIAGRAM

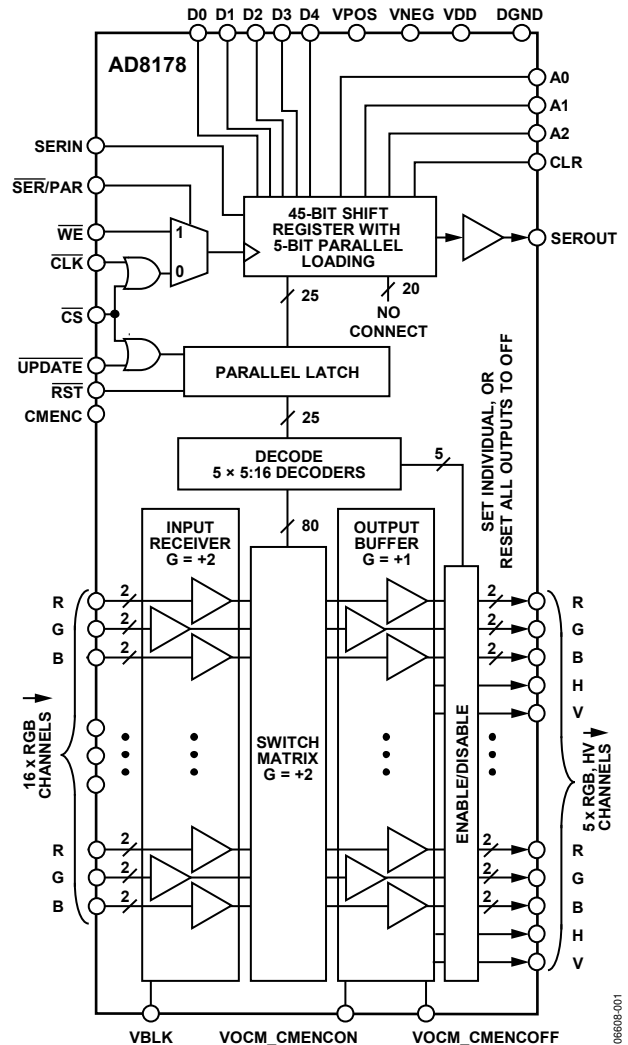


Figure 1.

The outputs can be used single-ended in conjunction with decoded H and V outputs to drive a monitor directly.

The independent output buffers of the AD8178 can be placed into a high impedance state to create larger arrays by paralleling crosspoint outputs. Inputs can be paralleled as well. The AD8178 offers both serial and a parallel programming modes.

The AD8178 is packaged in a fully populated 26 × 26 ball PBGA package and is available over the extended industrial temperature range of −40°C to +85°C.

AD8178* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

EVALUATION KITS

- Evaluation Board for the AD8175/AD8176/AD8177/AD8178

DOCUMENTATION

Data Sheet

- AD8178: 450 MHz, Triple 16 x 5 Video Crosspoint Switch Data Sheet

User Guides

- UG-890: Evaluation Board for the AD8175/AD8176/AD8177/AD8178 Triple Video Crosspoint Switches

DESIGN RESOURCES

- AD8178 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all AD8178 EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

DOCUMENT FEEDBACK

Submit feedback for this data sheet.

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REVISION HISTORY

5/16—Rev. 0 to Rev. A

Changes to General Description Section	1
Changes to Off Isolation, Input-Output Parameter, Table 1.....	3
Changes to Areas of Crosstalk Section	34
Deleted Figure 53; Renumbered Sequentially.....	37
Changes to Ordering Guide	37

7/07—Revision 0: Initial Version

SPECIFICATIONS

$V_S = \pm 2.5$ V at $T_A = 25^\circ\text{C}$, $G = +4$, $R_L = 100\ \Omega$ (each output), $V_{BLK} = 0$ V, output CM voltage = 0 V, differential I/O mode, unless otherwise noted.

Table 1.

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE					
-3 dB Bandwidth	200 mV p-p		450		MHz
	2 V p-p		420		MHz
Gain Flatness	0.1 dB, 200 mV p-p		17		MHz
Propagation Delay	2 V p-p		1.3		ns
Settling Time	1%, 2 V step		4		ns
Slew Rate, Differential Output	2 V step		1650		V/ μs
	2 V step, 10% to 90%		1450		V/ μs
Slew Rate, RGB Common Mode	1 V step, 10% to 90%		300		V/ μs
Slew Rate, HV Outputs	Rail-to-rail, TTL load		400		V/ μs
NOISE/DISTORTION PERFORMANCE					
Crosstalk, All Hostile	$f = 5$ MHz		-82		dB
	$f = 10$ MHz		-74		dB
	$f = 100$ MHz		-56		dB
	$f = 500$ MHz		-47		dB
Off Isolation, Input-Output	$f = 5$ MHz, $R_L = 100\ \Omega$, one channel		-84		dB
Input Voltage Noise	0.01 MHz to 50 MHz		50		nV/ $\sqrt{\text{Hz}}$
DC PERFORMANCE					
Gain Error			1		%
Gain Matching	R, G, B same channel		0.5		%
Gain Temperature Coefficient			32		ppm/ $^\circ\text{C}$
OUTPUT CHARACTERISTICS					
Output Offset Voltage	CMENC on or off		20		mV
	Temperature coefficient		58		$\mu\text{V}/^\circ\text{C}$
Output Offset Voltage, RGB Common Mode	CMENC on or off		10		mV
	Temperature coefficient		-16		$\mu\text{V}/^\circ\text{C}$
Output Impedance	Enabled, differential		1.5		Ω
	Disabled, differential		2.7		k Ω
Output Disable Capacitance	Disabled		2		pF
Output Leakage Current	Disabled		1		μA
Output Voltage Range	No load, differential	4			V p-p
Output Current	Short circuit		45		mA
INPUT CHARACTERISTICS					
Input Voltage Range, Differential Mode		1			V p-p
Input Voltage Range, Common Mode	$V_{IN} = 1$ V p-p		± 2.25		V p-p
CMR, RGB Input	$\Delta V_{OUT,DM}/\Delta V_{IN,CM}$, $\Delta V_{IN,CM} = \pm 0.5$ V, CMENC off		-62		dB
	$\Delta V_{OUT,DM}/\Delta V_{IN,CM}$, $\Delta V_{IN,CM} = \pm 0.5$ V, CMENC on		-45		dB
CM Gain, RGB Input	$\Delta V_{OUT,CM}/\Delta V_{IN,CM}$, $\Delta V_{IN,CM} = \pm 0.5$ V CMENC off		-70		dB
	$\Delta V_{OUT,CM}/\Delta V_{IN,CM}$, $\Delta V_{IN,CM} = \pm 0.5$ V, CMENC on		0		dB
Input Capacitance	Any switch configuration		2		pF
Input Resistance	Differential		3.33		k Ω
Input Offset Current			1		μA

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS					
Enable On Time	50% $\overline{\text{UPDATE}}$ to 50% output		80		ns
Switching Time, 2 V Step	50% $\overline{\text{UPDATE}}$ to 50% output		70		ns
POWER SUPPLIES					
Supply Current	V_{POS} , outputs enabled, no load		460		mA
	Outputs disabled		290		mA
	V_{NEG} , outputs enabled, no load		460		mA
	Outputs disabled		290		mA
	D_{VDD} , outputs enabled, no load		4		mA
Supply Voltage Range			4.5 to 5.5		V
PSR	$\Delta V_{\text{OUT, DM}}/\Delta V_{\text{POS}}$, $\Delta V_{\text{POS}} = \pm 0.5 \text{ V}$		-55		dB
	$\Delta V_{\text{OUT, DM}}/\Delta V_{\text{NEG}}$, $\Delta V_{\text{NEG}} = \pm 0.5 \text{ V}$		-55		dB
OPERATING TEMPERATURE RANGE					
Temperature Range	Operating (still air)		-40 to +85		°C
θ_{JA}	Operating (still air)		15		°C/W

TIMING CHARACTERISTICS (SERIAL MODE)

Table 2.

Parameter	Symbol	Limit			Unit
		Min	Typ	Max	
Serial Data Setup Time	t_1	40			ns
$\overline{\text{CLK}}$ Pulse Width	t_2	60			ns
Serial Data Hold Time	t_3	50			ns
$\overline{\text{CLK}}$ Pulse Separation	t_4	140			ns
$\overline{\text{CLK}}$ to $\overline{\text{UPDATE}}$ Delay	t_5	10			ns
$\overline{\text{UPDATE}}$ Pulse Width	t_6	90			ns
$\overline{\text{CLK}}$ to SEROUT Valid	t_7	120			ns
Propagation Delay, $\overline{\text{UPDATE}}$ to Switch On Data Load Time, $\overline{\text{CLK}}$ = 5 MHz, Serial Mode			80		ns
RST Time			140	200	ns

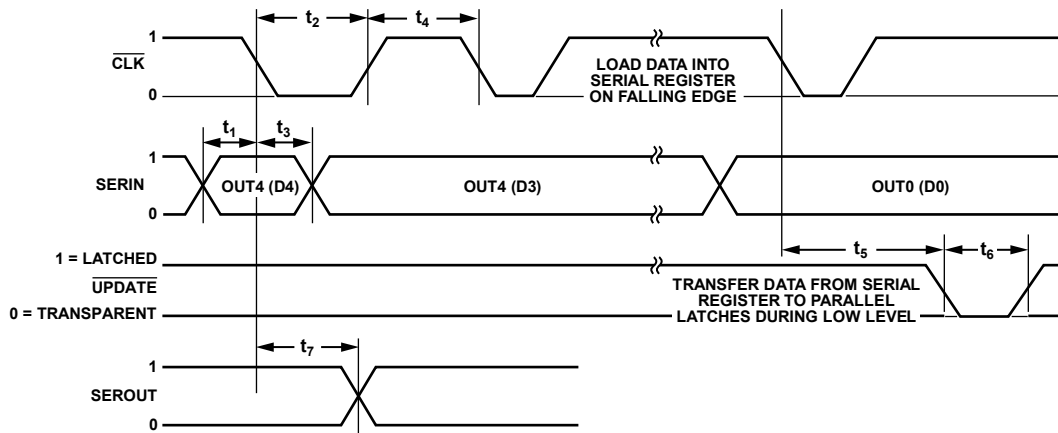


Figure 2. Timing Diagram, Serial Mode

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Table 3. Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{IH}	V_{IL}	V_{OH}	V_{OL}	I_{IH}	I_{IL}	I_{OH}	I_{OL}
$\overline{\text{SER/PAR}}, \overline{\text{CLK}}, \overline{\text{SERIN}}, \overline{\text{UPDATE}}$	$\overline{\text{SER/PAR}}, \overline{\text{CLK}}, \overline{\text{SERIN}}, \overline{\text{UPDATE}}$	SEROUT	SEROUT	$\overline{\text{SER/PAR}}, \overline{\text{CLK}}, \overline{\text{SERIN}}, \overline{\text{UPDATE}}$	$\overline{\text{SER/PAR}}, \overline{\text{CLK}}, \overline{\text{SERIN}}, \overline{\text{UPDATE}}$	SEROUT	SEROUT
2.0 V min	0.6 V max	2.8 V min	0.4 V max	20 μA max	-20 μA max	-1 mA min	1 mA min

Table 4. H and V Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{OH}	V_{OL}	I_{OH}	I_{OL}
2.7 V min	0.5 V max	-3 mA max	3 mA max

Table 5. $\overline{\text{RST}}$ Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{IH}	V_{IL}	I_{IH}	I_{IL}
2.0 V min	0.6 V max	-60 μA max	-120 μA max

Table 6. $\overline{\text{CS}}$ Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{OH}	V_{OL}	I_{IH}	I_{OL}
2.0 V min	0.6 V max	100 μA max	40 μA max

TIMING CHARACTERISTICS (PARALLEL MODE)

Table 7.

Parameter	Symbol	Limit			Unit
		Min	Typ	Max	
Parallel Data Setup Time	t_1	80			ns
$\overline{\text{WE}}$ Pulse Width	t_2	110			ns
Parallel Hold Time	t_3	150			ns
$\overline{\text{WE}}$ Pulse Separation	t_4	90			ns
$\overline{\text{WE}}$ to $\overline{\text{UPDATE}}$ Delay	t_5	10			ns
$\overline{\text{UPDATE}}$ Pulse Width	t_6	90			ns
Propagation Delay, $\overline{\text{UPDATE}}$ to Switch On			80		ns
$\overline{\text{RST}}$ Time			140	200	ns

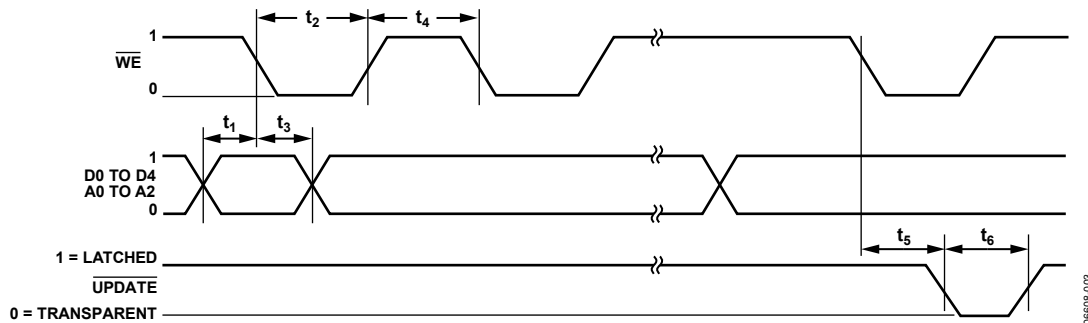


Figure 3. Timing Diagram, Parallel Mode

Table 8. Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{IH}	V_{IL}	V_{OH}	V_{OL}	I_{IH}	I_{IL}	I_{OH}	I_{OL}
SER/PAR, $\overline{\text{WE}}$, D0, D1, D2, D3, D4, A0, A1, A2, A3, $\overline{\text{UPDATE}}$	SER/PAR, $\overline{\text{WE}}$, D0, D1, D2, D3, D4, A0, A1, A2, A3, $\overline{\text{UPDATE}}$	SEROUT	SEROUT	SER/PAR, $\overline{\text{WE}}$, D0, D1, D2, D3, D4, A0, A1, A2, A3, $\overline{\text{UPDATE}}$	SER/PAR, $\overline{\text{WE}}$, D0, D1, D2, D3, D4, A0, A1, A2, A3, $\overline{\text{UPDATE}}$	SEROUT	SEROUT
2.0 V min	0.6 V max	Disabled	Disabled	20 μA max	-20 μA max	Disabled	Disabled

Table 9. H and V Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{OH}	V_{OL}	I_{OH}	I_{OL}
2.7 V min	0.5 V max	-3 mA max	3 mA max

Table 10. $\overline{\text{RST}}$ Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{IH}	V_{IL}	I_{IH}	I_{IL}
2.0 V min	0.6 V max	-60 μA max	-120 μA max

Table 11. $\overline{\text{CS}}$ Logic Levels, $V_{DD} = 3.3\text{ V}$

V_{OH}	V_{OL}	I_{IH}	I_{OL}
2.0 V min	0.6 V max	100 μA max	40 μA max

ABSOLUTE MAXIMUM RATINGS

Table 12.

Parameter	Rating
Analog Supply Voltage ($V_{POS} - V_{NEG}$)	6 V
Digital Supply Voltage ($V_{DD} - D_{GND}$)	6 V
Ground Potential Difference Range ($V_{NEG} - D_{GND}$)	+0.5 V to -2.5 V
Maximum Potential Difference ($V_{DD} - V_{NEG}$)	8 V
Common-Mode Analog Input Voltage Range	($V_{NEG} - 0.5 V$) to ($V_{POS} + 0.5 V$)
Differential Analog Input Voltage	$\pm 2 V$
Digital Input Voltage	V_{DD}
Output Voltage Range (Disabled Analog Output)	($V_{POS} - 1 V$) to ($V_{NEG} + 1 V$)
Output Short-Circuit Duration	Momentary
Storage Temperature Range	-65°C to +125°C
Operating Temperature Range	-40°C to +85°C
Lead Temperature (Soldering, 10 sec)	300°C
Junction Temperature	150°C

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

THERMAL RESISTANCE

θ_{JA} is specified for the worst-case conditions, that is, a device soldered in a circuit board for surface-mount packages.

Table 13. Thermal Resistance

Package Type	θ_{JA}	Unit
PBGA	15	°C/W

POWER DISSIPATION

The AD8178 is operated with $\pm 2.5 V$ or +5 V supplies and can drive loads down to 100 Ω , resulting in a large range of possible power dissipations. For this reason, extra care must be taken when derating the operating conditions based on ambient temperature.

Packaged in a 676-lead PBGA, the AD8178 junction-to-ambient thermal impedance (θ_{JA}) is 15°C/W. For long-term reliability, the maximum allowed junction temperature of the die must not exceed 150°C. Temporarily exceeding this limit may cause a shift in parametric performance due to a change in stresses exerted on the die by the package. Exceeding a junction temperature of 175°C for an extended period can result in device failure. The curve in Figure 4 shows the range of allowed internal die power dissipations that meet these conditions over the -40°C to +85°C ambient temperature range. When using Table 13, do not include external load power in the maximum power calculation, but do include load current dropped on the die output transistors.

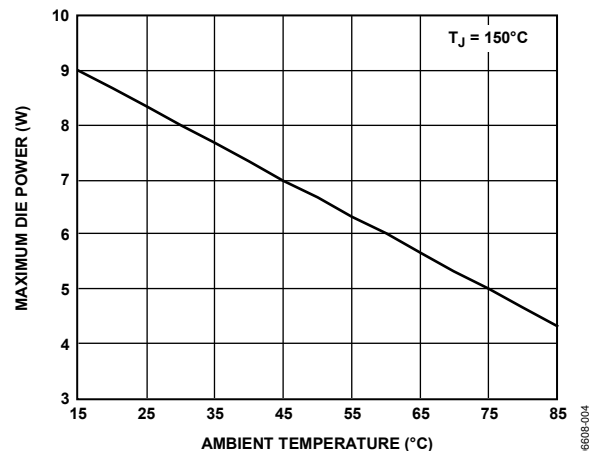


Figure 4. Maximum Die Power Dissipation vs. Ambient Temperature

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
A	VNEG	VNEG	VNEG	NC	NC	VNEG	OPR4	ONB4	VPOS	IPR8	INB8	VNEG	IPR9	INB9	VPOS	IPR10	INB10	VNEG	IPR11	INB11	VPOS	IPR12	INB12	VNEG	VNEG	VNEG	A	
B	VNEG	VNEG	VNEG	NC	NC	VNEG	ONR4	OPB4	VPOS	INR8	IPB8	VNEG	INR9	IPB9	VPOS	INR10	IPB10	VNEG	INR11	IPB11	VPOS	INR12	IPB12	VNEG	VNEG	VNEG	B	
C	VNEG	VNEG	VNEG	NC	NC	VNEG	OPG4	ONG4	VPOS	IPG8	ING8	VNEG	IPG9	ING9	VPOS	IPG10	ING10	VNEG	IPG11	ING11	VPOS	IPG12	ING12	VNEG	VNEG	VNEG	C	
D	VNEG	VNEG	VNEG	NC	NC	VPOS	H4	V4	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	IPG13	INR13	IPR13	D	
E	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	DGND	VDD	SEROUT	CS	CLK	SERIN	SERPAR	A2	A1	A0	CLR	VDD	DGND	VPOS	VPOS	ING13	IPB13	INB13	E	
F	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	F
G	ONB3	OPB3	ONG3	V3	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	G	
H	OPR3	ONR3	OPG3	H3	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	IPG14	INR14	IPR14	H	
J	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	ING14	IPB14	INB14	J	
K	NC	NC	NC	NC	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	K	
L	NC	NC	NC	NC	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	IPG15	INR15	IPR15	L	
M	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	ING15	IPB15	INB15	M	
N	ONB2	OPB2	ONG2	V2	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	N	
P	OPR2	ONR2	OPG2	H2	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VBLK	VPOS	VPOS	VPOS	VPOS	P	
R	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	IPG7	INR7	IPR7	R	
T	NC	NC	NC	NC	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	ING7	IPB7	INB7	T	
U	NC	NC	NC	NC	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	U	
V	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	IPG6	INR6	IPR6	V	
W	ONB1	OPB1	ONG1	V1	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	ING6	IPB6	INB6	W	
Y	OPR1	ONR1	OPG1	H1	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	Y	
AA	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	AA	
AB	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	DGND	VDD	RST	UPDATE	WE	CMENC	D4	D3	D2	D1	D0	VDD	DGND	VPOS	VPOS	IPG5	INR5	IPR5	AB	
AC	VNEG	VNEG	VNEG	NC	NC	VPOS	V0	H0	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	ING5	IPB5	INB5	AC	
AD	VNEG	VNEG	VNEG	NC	NC	VPOS	ONG0	OPG0	VNEG	ING0	IPG0	VPOS	ING1	IPG1	VNEG	ING2	IPG2	VPOS	ING3	IPG3	VNEG	ING4	IPG4	VNEG	VNEG	VNEG	AD	
AE	VNEG	VNEG	VNEG	NC	NC	VPOS	OPB0	ONR0	VNEG	IPB0	INR0	VPOS	IPB1	INR1	VNEG	IPB2	INR2	VPOS	IPB3	INR3	VNEG	IPB4	INR4	VNEG	VNEG	VNEG	AE	
AF	VNEG	VNEG	VNEG	NC	NC	VPOS	ONB0	OPR0	VNEG	INB0	IPR0	VPOS	INB1	IPR1	VNEG	INB2	IPR2	VPOS	INB3	IPR3	VNEG	INB4	IPR4	VNEG	VNEG	VNEG	AF	

Figure 5. 676-Ball PBGA Pin Configuration, Bottom View

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		
A	VNEG	VNEG	VNEG	INB12	IPR12	VPOS	INB11	IPR11	VNEG	INB10	IPR10	VPOS	INB9	IPR9	VNEG	INB8	IPR8	VPOS	ONB4	OPR4	VNEG	NC	NC	VNEG	VNEG	VNEG	A	
B	VNEG	VNEG	VNEG	IPB12	INR12	VPOS	IPB11	INR11	VNEG	IPB10	INR10	VPOS	IPB9	INR9	VNEG	IPB8	INR8	VPOS	OPB4	ONR4	VNEG	NC	NC	VNEG	VNEG	VNEG	B	
C	VNEG	VNEG	VNEG	ING12	IPG12	VPOS	ING11	IPG11	VNEG	ING10	IPG10	VPOS	ING9	IPG9	VNEG	ING8	IPG8	VPOS	ONG4	OPG4	VNEG	NC	NC	VNEG	VNEG	VNEG	C	
D	IPR13	INR13	IPG13	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	V4	H4	VPOS	NC	NC	VNEG	VNEG	VNEG	D	
E	INB13	IPB13	ING13	VPOS	VPOS	DGND	VDD	CLR	A0	A1	A2	SER-PAR	SER-IN	CLK	CS	SER-OUT	VDD	DGND	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	E	
F	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	F	
G	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	V3	ONG3	OPB3	ONB3	G	
H	IPR14	INR14	IPG14	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	H3	OPG3	ONR3	OPR3	H
J	INB14	IPB14	ING14	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	J
K	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	NC	NC	NC	NC	K
L	IPR15	INR15	IPG15	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	NC	NC	NC	NC	L
M	INB15	IPB15	ING15	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	M
N	VPOS	VPOS	VPOS	VPOS	VOCM_CMENCON	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	V2	ONG2	OPB2	ONB2	N	
P	VPOS	VPOS	VPOS	VPOS	VBLK	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	H2	OPG2	ONR2	OPR2	P
R	IPR7	INR7	IPG7	VPOS	VOCM_CMENCOFF	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	R
T	INB7	IPB7	ING7	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	NC	NC	NC	NC	T
U	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	NC	NC	NC	NC	U
V	IPR6	INR6	IPG6	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	V
W	INB6	IPB6	ING6	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VNEG	VPOS	V1	ONG1	OPB1	ONB1	W	
Y	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	H1	OPG1	ONR1	OPR1	Y	
AA	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	AA	
AB	IPR5	INR5	IPG5	VPOS	VPOS	DGND	VDD	D0	D1	D2	D3	D4	CMENC	WE	UPDATE	RST	VDD	DGND	VPOS	VPOS	VPOS	VPOS	VPOS	VNEG	VNEG	VNEG	AB	
AC	INB5	IPB5	ING5	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	VPOS	H0	V0	VPOS	NC	NC	VNEG	VNEG	VNEG	AC	
AD	VNEG	VNEG	VNEG	IPG4	ING4	VNEG	IPG3	ING3	VPOS	IPG2	ING2	VNEG	IPG1	ING1	VPOS	IPG0	ING0	VNEG	OPG0	ONG0	VPOS	NC	NC	VNEG	VNEG	VNEG	AD	
AE	VNEG	VNEG	VNEG	INR4	IPB4	VNEG	INR3	IPB3	VPOS	INR2	IPB2	VNEG	INR1	IPB1	VPOS	INR0	IPB0	VNEG	ONR0	OPB0	VPOS	NC	NC	VNEG	VNEG	VNEG	AE	
AF	VNEG	VNEG	VNEG	IPR4	INB4	VNEG	IPR3	INB3	VPOS	IPR2	INB2	VNEG	IPR1	INB1	VPOS	IPR0	INB0	VNEG	OPR0	ONB0	VPOS	NC	NC	VNEG	VNEG	VNEG	AF	

Figure 6. 676-Ball PBGA Pin Configuration, Top View

06608-056

Table 14. Pin Function Description

Pin No.	Mnemonic	Description	Pin No.	Mnemonic	Description
A1	VNEG	Negative Analog Power Supply.	B26	VNEG	Negative Analog Power Supply.
A2	VNEG	Negative Analog Power Supply.	C1	VNEG	Negative Analog Power Supply.
A3	VNEG	Negative Analog Power Supply.	C2	VNEG	Negative Analog Power Supply.
A4	INB12	Input Number 12, Negative Phase.	C3	VNEG	Negative Analog Power Supply.
A5	IPR12	Input Number 12, Positive Phase.	C4	ING12	Input Number 12, Negative Phase.
A6	VPOS	Positive Analog Power Supply.	C5	IPG12	Input Number 12, Positive Phase.
A7	INB11	Input Number 11, Negative Phase.	C6	VPOS	Positive Analog Power Supply.
A8	IPR11	Input Number 11, Positive Phase.	C7	ING11	Input Number 11, Negative Phase.
A9	VNEG	Negative Analog Power Supply.	C8	IPG11	Input Number 11, Positive Phase.
A10	INB10	Input Number 10, Negative Phase.	C9	VNEG	Negative Analog Power Supply.
A11	IPR10	Input Number 10, Positive Phase.	C10	ING10	Input Number 10, Negative Phase.
A12	VPOS	Positive Analog Power Supply.	C11	IPG10	Input Number 10, Positive Phase.
A13	INB9	Input Number 9, Negative Phase.	C12	VPOS	Positive Analog Power Supply.
A14	IPR9	Input Number 9, Positive Phase.	C13	ING9	Input Number 9, Negative Phase.
A15	VNEG	Negative Analog Power Supply.	C14	IPG9	Input Number 9, Positive Phase.
A16	INB8	Input Number 8, Negative Phase.	C15	VNEG	Negative Analog Power Supply.
A17	IPR8	Input Number 8, Positive Phase.	C16	ING8	Input Number 8, Negative Phase.
A18	VPOS	Positive Analog Power Supply.	C17	IPG8	Input Number 8, Positive Phase.
A19	ONB4	Output Number 4, Negative Phase.	C18	VPOS	Positive Analog Power Supply.
A20	OPR4	Output Number 4, Positive Phase.	C19	ONG4	Output Number 4, Negative Phase.
A21	VNEG	Negative Analog Power Supply.	C20	OPG4	Output Number 4, Positive Phase.
A22	NC	No Connect.	C21	VNEG	Negative Analog Power Supply.
A23	NC	No Connect.	C22	NC	No Connect.
A24	VNEG	Negative Analog Power Supply.	C23	NC	No Connect.
A25	VNEG	Negative Analog Power Supply.	C24	VNEG	Negative Analog Power Supply.
A26	VNEG	Negative Analog Power Supply.	C25	VNEG	Negative Analog Power Supply.
B1	VNEG	Negative Analog Power Supply.	C26	VNEG	Negative Analog Power Supply.
B2	VNEG	Negative Analog Power Supply.	D1	IPR13	Input Number 13, Positive Phase.
B3	VNEG	Negative Analog Power Supply.	D2	INR13	Input Number 13, Negative Phase.
B4	IPB12	Input Number 12, Positive Phase.	D3	IPG13	Input Number 13, Positive Phase.
B5	INR12	Input Number 12, Negative Phase.	D4	VPOS	Positive Analog Power Supply.
B6	VPOS	Positive Analog Power Supply.	D5	VPOS	Positive Analog Power Supply.
B7	IPB11	Input Number 11, Positive Phase.	D6	VPOS	Positive Analog Power Supply.
B8	INR11	Input Number 11, Negative Phase.	D7	VPOS	Positive Analog Power Supply.
B9	VNEG	Negative Analog Power Supply.	D8	VPOS	Positive Analog Power Supply.
B10	IPB10	Input Number 10, Positive Phase.	D9	VPOS	Positive Analog Power Supply.
B11	INR10	Input Number 10, Negative Phase.	D10	VPOS	Positive Analog Power Supply.
B12	VPOS	Positive Analog Power Supply.	D11	VPOS	Positive Analog Power Supply.
B13	IPB9	Input Number 9, Positive Phase.	D12	VPOS	Positive Analog Power Supply.
B14	INR9	Input Number 9, Negative Phase.	D13	VPOS	Positive Analog Power Supply.
B15	VNEG	Negative Analog Power Supply.	D14	VPOS	Positive Analog Power Supply.
B16	IPB8	Input Number 8, Positive Phase.	D15	VPOS	Positive Analog Power Supply.
B17	INR8	Input Number 8, Negative Phase.	D16	VPOS	Positive Analog Power Supply.
B18	VPOS	Positive Analog Power Supply.	D17	VPOS	Positive Analog Power Supply.
B19	OPB4	Output Number 4, Positive Phase.	D18	VPOS	Positive Analog Power Supply.
B20	ONR4	Output Number 4, Negative Phase.	D19	V4	Output Number 4, V Sync.
B21	VNEG	Negative Analog Power Supply.	D20	H4	Output Number 4, H Sync.
B22	NC	No Connect.	D21	VPOS	Positive Analog Power Supply.
B23	NC	No Connect.	D22	NC	No Connect.
B24	VNEG	Negative Analog Power Supply.	D23	NC	No Connect.
B25	VNEG	Negative Analog Power Supply.	D24	VNEG	Negative Analog Power Supply.

Pin No.	Mnemonic	Description	Pin No.	Mnemonic	Description
D25	VNEG	Negative Analog Power Supply.	F25	VPOS	Positive Analog Power Supply.
D26	VNEG	Negative Analog Power Supply.	F26	VPOS	Positive Analog Power Supply.
E1	INB13	Input Number 13, Negative Phase.	G1	VPOS	Positive Analog Power Supply.
E2	IPB13	Input Number 13, Positive Phase.	G2	VPOS	Positive Analog Power Supply.
E3	ING13	Input Number 13, Negative Phase.	G3	VPOS	Positive Analog Power Supply.
E4	VPOS	Positive Analog Power Supply.	G4	VPOS	Positive Analog Power Supply.
E5	VPOS	Positive Analog Power Supply.	G5	VPOS	Positive Analog Power Supply.
E6	DGND	Digital Power Supply.	G6	VPOS	Positive Analog Power Supply.
E7	VDD	Digital Power Supply.	G7	VPOS	Positive Analog Power Supply.
E8	CLR	Internal Register Clearing	G8	VPOS	Positive Analog Power Supply.
E9	A0	Control Pin 0, Output Address Bit 0.	G9	VPOS	Positive Analog Power Supply.
E10	A1	Control Pin 1, Output Address Bit 1.	G10	VPOS	Positive Analog Power Supply.
E11	A2	Control Pin 2, Output Address Bit 2.	G11	VPOS	Positive Analog Power Supply.
E12	$\overline{\text{SER/PAR}}$	Control Pin: Serial Parallel Select Mode.	G12	VPOS	Positive Analog Power Supply.
E13	$\overline{\text{SERIN}}$	Control Pin: Serial Data In.	G13	VPOS	Positive Analog Power Supply.
E14	$\overline{\text{CLK}}$	Control Pin: Serial Data Clock.	G14	VPOS	Positive Analog Power Supply.
E15	$\overline{\text{CS}}$	Control Pin: Chip Select.	G15	VPOS	Positive Analog Power Supply.
E16	SEROUT	Control Pin: Serial Data Out.	G16	VPOS	Positive Analog Power Supply.
E17	VDD	Digital Power Supply.	G17	VPOS	Positive Analog Power Supply.
E18	DGND	Digital Power Supply.	G18	VPOS	Positive Analog Power Supply.
E19	VPOS	Positive Analog Power Supply.	G19	VPOS	Positive Analog Power Supply.
E20	VPOS	Positive Analog Power Supply.	G20	VPOS	Positive Analog Power Supply.
E21	VPOS	Positive Analog Power Supply.	G21	VPOS	Positive Analog Power Supply.
E22	VPOS	Positive Analog Power Supply.	G22	VPOS	Positive Analog Power Supply.
E23	VPOS	Positive Analog Power Supply.	G23	V3	Output Number 3, V Sync.
E24	VNEG	Negative Analog Power Supply.	G24	ONG3	Output Number 3, Negative Phase.
E25	VNEG	Negative Analog Power Supply.	G25	OPB3	Output Number 3, Positive Phase.
E26	VNEG	Negative Analog Power Supply.	G26	ONB3	Output Number 3, Negative Phase.
F1	VPOS	Positive Analog Power Supply.	H1	IPR14	Input Number 14, Positive Phase.
F2	VPOS	Positive Analog Power Supply.	H2	INR14	Input Number 14, Negative Phase.
F3	VPOS	Positive Analog Power Supply.	H3	IPG14	Input Number 14, Positive Phase.
F4	VPOS	Positive Analog Power Supply.	H4	VPOS	Positive Analog Power Supply.
F5	VPOS	Positive Analog Power Supply.	H5	VPOS	Positive Analog Power Supply.
F6	VPOS	Positive Analog Power Supply.	H6	VPOS	Positive Analog Power Supply.
F7	VPOS	Positive Analog Power Supply.	H7	VPOS	Positive Analog Power Supply.
F8	VPOS	Positive Analog Power Supply.	H8	VNEG	Negative Analog Power Supply.
F9	VPOS	Positive Analog Power Supply.	H9	VNEG	Negative Analog Power Supply.
F10	VPOS	Positive Analog Power Supply.	H10	VNEG	Negative Analog Power Supply.
F11	VPOS	Positive Analog Power Supply.	H11	VNEG	Negative Analog Power Supply.
F12	VPOS	Positive Analog Power Supply.	H12	VNEG	Negative Analog Power Supply.
F13	VPOS	Positive Analog Power Supply.	H13	VNEG	Negative Analog Power Supply.
F14	VPOS	Positive Analog Power Supply.	H14	VNEG	Negative Analog Power Supply.
F15	VPOS	Positive Analog Power Supply.	H15	VNEG	Negative Analog Power Supply.
F16	VPOS	Positive Analog Power Supply.	H16	VNEG	Negative Analog Power Supply.
F17	VPOS	Positive Analog Power Supply.	H17	VNEG	Negative Analog Power Supply.
F18	VPOS	Positive Analog Power Supply.	H18	VNEG	Negative Analog Power Supply.
F19	VPOS	Positive Analog Power Supply.	H19	VNEG	Negative Analog Power Supply.
F20	VPOS	Positive Analog Power Supply.	H20	VNEG	Negative Analog Power Supply.
F21	VPOS	Positive Analog Power Supply.	H21	VPOS	Positive Analog Power Supply.
F22	VPOS	Positive Analog Power Supply.	H22	VPOS	Positive Analog Power Supply.
F23	VPOS	Positive Analog Power Supply.	H23	H3	Output Number 3, H Sync.
F24	VPOS	Positive Analog Power Supply.	H24	OPG3	Output Number 3, Positive Phase.

Pin No.	Mnemonic	Description
H25	ONR3	Output Number 3, Negative Phase.
H26	OPR3	Output Number 3, Positive Phase.
J1	INB14	Input Number 14, Negative Phase.
J2	IPB14	Input Number 14, Positive Phase.
J3	ING14	Input Number 14, Negative Phase.
J4	VPOS	Positive Analog Power Supply.
J5	VPOS	Positive Analog Power Supply.
J6	VPOS	Positive Analog Power Supply.
J7	VPOS	Positive Analog Power Supply.
J8	VNEG	Negative Analog Power Supply.
J9	VNEG	Negative Analog Power Supply.
J10	VNEG	Negative Analog Power Supply.
J11	VNEG	Negative Analog Power Supply.
J12	VNEG	Negative Analog Power Supply.
J13	VNEG	Negative Analog Power Supply.
J14	VNEG	Negative Analog Power Supply.
J15	VNEG	Negative Analog Power Supply.
J16	VNEG	Negative Analog Power Supply.
J17	VNEG	Negative Analog Power Supply.
J18	VNEG	Negative Analog Power Supply.
J19	VNEG	Negative Analog Power Supply.
J20	VNEG	Negative Analog Power Supply.
J21	VPOS	Positive Analog Power Supply.
J22	VPOS	Positive Analog Power Supply.
J23	VPOS	Positive Analog Power Supply.
J24	VNEG	Negative Analog Power Supply.
J25	VNEG	Negative Analog Power Supply.
J26	VNEG	Negative Analog Power Supply.
K1	VNEG	Negative Analog Power Supply.
K2	VNEG	Negative Analog Power Supply.
K3	VNEG	Negative Analog Power Supply.
K4	VPOS	Positive Analog Power Supply.
K5	VPOS	Positive Analog Power Supply.
K6	VPOS	Positive Analog Power Supply.
K7	VPOS	Positive Analog Power Supply.
K8	VNEG	Negative Analog Power Supply.
K9	VNEG	Negative Analog Power Supply.
K10	VNEG	Negative Analog Power Supply.
K11	VNEG	Negative Analog Power Supply.
K12	VNEG	Negative Analog Power Supply.
K13	VNEG	Negative Analog Power Supply.
K14	VNEG	Negative Analog Power Supply.
K15	VNEG	Negative Analog Power Supply.
K16	VNEG	Negative Analog Power Supply.
K17	VNEG	Negative Analog Power Supply.
K18	VNEG	Negative Analog Power Supply.
K19	VNEG	Negative Analog Power Supply.
K20	VNEG	Negative Analog Power Supply.
K21	VPOS	Positive Analog Power Supply.
K22	VPOS	Positive Analog Power Supply.
K23	NC	No Connect.
K24	NC	No Connect.

Pin No.	Mnemonic	Description
K25	NC	No Connect.
K26	NC	No Connect.
L1	IPR15	Input Number 15, Positive Phase.
L2	INR15	Input Number 15, Negative Phase.
L3	IPG15	Input Number 15, Positive Phase.
L4	VPOS	Positive Analog Power Supply.
L5	VPOS	Positive Analog Power Supply.
L6	VPOS	Positive Analog Power Supply.
L7	VPOS	Positive Analog Power Supply.
L8	VNEG	Negative Analog Power Supply.
L9	VNEG	Negative Analog Power Supply.
L10	VNEG	Negative Analog Power Supply.
L11	VNEG	Negative Analog Power Supply.
L12	VNEG	Negative Analog Power Supply.
L13	VNEG	Negative Analog Power Supply.
L14	VNEG	Negative Analog Power Supply.
L15	VNEG	Negative Analog Power Supply.
L16	VNEG	Negative Analog Power Supply.
L17	VNEG	Negative Analog Power Supply.
L18	VNEG	Negative Analog Power Supply.
L19	VNEG	Negative Analog Power Supply.
L20	VNEG	Negative Analog Power Supply.
L21	VPOS	Positive Analog Power Supply.
L22	VPOS	Positive Analog Power Supply.
L23	NC	No Connect.
L24	NC	No Connect.
L25	NC	No Connect.
L26	NC	No Connect.
M1	INB15	Input Number 15, Negative Phase.
M2	IPB15	Input Number 15, Positive Phase.
M3	ING15	Input Number 15, Negative Phase.
M4	VPOS	Positive Analog Power Supply.
M5	VPOS	Positive Analog Power Supply.
M6	VPOS	Positive Analog Power Supply.
M7	VPOS	Positive Analog Power Supply.
M8	VNEG	Negative Analog Power Supply.
M9	VNEG	Negative Analog Power Supply.
M10	VNEG	Negative Analog Power Supply.
M11	VNEG	Negative Analog Power Supply.
M12	VNEG	Negative Analog Power Supply.
M13	VNEG	Negative Analog Power Supply.
M14	VNEG	Negative Analog Power Supply.
M15	VNEG	Negative Analog Power Supply.
M16	VNEG	Negative Analog Power Supply.
M17	VNEG	Negative Analog Power Supply.
M18	VNEG	Negative Analog Power Supply.
M19	VNEG	Negative Analog Power Supply.
M20	VNEG	Negative Analog Power Supply.
M21	VPOS	Positive Analog Power Supply.
M22	VPOS	Positive Analog Power Supply.
M23	VPOS	Positive Analog Power Supply.
M24	VPOS	Positive Analog Power Supply.

Pin No.	Mnemonic	Description	Pin No.	Mnemonic	Description
M25	VPOS	Positive Analog Power Supply.	P25	ONR2	Output Number 2, Negative Phase.
M26	VPOS	Positive Analog Power Supply.	P26	OPR2	Output Number 2, Positive Phase.
N1	VPOS	Positive Analog Power Supply.	R1	IPR7	Input Number 7, Positive Phase.
N2	VPOS	Positive Analog Power Supply.	R2	INR7	Input Number 7, Negative Phase.
N3	VPOS	Positive Analog Power Supply.	R3	IPG7	Input Number 7, Positive Phase.
N4	VPOS	Positive Analog Power Supply.	R4	VPOS	Positive Analog Power Supply.
N5	VOCM_ CMENCON	Output CM Reference with CM Encoding On.	R5	VOCM_ CMENCOFF	Output Reference with CM Encoding Off.
N6	VPOS	Positive Analog Power Supply.	R6	VPOS	Positive Analog Power Supply.
N7	VPOS	Positive Analog Power Supply.	R7	VPOS	Positive Analog Power Supply.
N8	VNEG	Negative Analog Power Supply.	R8	VNEG	Negative Analog Power Supply.
N9	VNEG	Negative Analog Power Supply.	R9	VNEG	Negative Analog Power Supply.
N10	VNEG	Negative Analog Power Supply.	R10	VNEG	Negative Analog Power Supply.
N11	VNEG	Negative Analog Power Supply.	R11	VNEG	Negative Analog Power Supply.
N12	VNEG	Negative Analog Power Supply.	R12	VNEG	Negative Analog Power Supply.
N13	VNEG	Negative Analog Power Supply.	R13	VNEG	Negative Analog Power Supply.
N14	VNEG	Negative Analog Power Supply.	R14	VNEG	Negative Analog Power Supply.
N15	VNEG	Negative Analog Power Supply.	R15	VNEG	Negative Analog Power Supply.
N16	VNEG	Negative Analog Power Supply.	R16	VNEG	Negative Analog Power Supply.
N17	VNEG	Negative Analog Power Supply.	R17	VNEG	Negative Analog Power Supply.
N18	VNEG	Negative Analog Power Supply.	R18	VNEG	Negative Analog Power Supply.
N19	VNEG	Negative Analog Power Supply.	R19	VNEG	Negative Analog Power Supply.
N20	VNEG	Negative Analog Power Supply.	R20	VNEG	Negative Analog Power Supply.
N21	VPOS	Positive Analog Power Supply.	R21	VPOS	Positive Analog Power Supply.
N22	VPOS	Positive Analog Power Supply.	R22	VPOS	Positive Analog Power Supply.
N23	V2	Output Number 2, V Sync.	R23	VPOS	Positive Analog Power Supply.
N24	ONG2	Output Number 2, Negative Phase.	R24	VNEG	Negative Analog Power Supply.
N25	OPB2	Output Number 2, Positive Phase.	R25	VNEG	Negative Analog Power Supply.
N26	ONB2	Output Number 2, Negative Phase.	R26	VNEG	Negative Analog Power Supply.
P1	VPOS	Positive Analog Power Supply.	T1	INB7	Input Number 7, Negative Phase.
P2	VPOS	Positive Analog Power Supply.	T2	IPB7	Input Number 7, Positive Phase.
P3	VPOS	Positive Analog Power Supply.	T3	ING7	Input Number 7, Negative Phase.
P4	VPOS	Positive Analog Power Supply.	T4	VPOS	Positive Analog Power Supply.
P5	VBLK	Output Blank Level.	T5	VPOS	Positive Analog Power Supply.
P6	VPOS	Positive Analog Power Supply.	T6	VPOS	Positive Analog Power Supply.
P7	VPOS	Positive Analog Power Supply.	T7	VPOS	Positive Analog Power Supply.
P8	VNEG	Negative Analog Power Supply.	T8	VNEG	Negative Analog Power Supply.
P9	VNEG	Negative Analog Power Supply.	T9	VNEG	Negative Analog Power Supply.
P10	VNEG	Negative Analog Power Supply.	T10	VNEG	Negative Analog Power Supply.
P11	VNEG	Negative Analog Power Supply.	T11	VNEG	Negative Analog Power Supply.
P12	VNEG	Negative Analog Power Supply.	T12	VNEG	Negative Analog Power Supply.
P13	VNEG	Negative Analog Power Supply.	T13	VNEG	Negative Analog Power Supply.
P14	VNEG	Negative Analog Power Supply.	T14	VNEG	Negative Analog Power Supply.
P15	VNEG	Negative Analog Power Supply.	T15	VNEG	Negative Analog Power Supply.
P16	VNEG	Negative Analog Power Supply.	T16	VNEG	Negative Analog Power Supply.
P17	VNEG	Negative Analog Power Supply.	T17	VNEG	Negative Analog Power Supply.
P18	VNEG	Negative Analog Power Supply.	T18	VNEG	Negative Analog Power Supply.
P19	VNEG	Negative Analog Power Supply.	T19	VNEG	Negative Analog Power Supply.
P20	VNEG	Negative Analog Power Supply.	T20	VNEG	Negative Analog Power Supply.
P21	VPOS	Positive Analog Power Supply.	T21	VPOS	Positive Analog Power Supply.
P22	VPOS	Positive Analog Power Supply.	T22	VPOS	Positive Analog Power Supply.
P23	H2	Output Number 2, H Sync.	T23	NC	No Connect.
P24	OPG2	Output Number 2, Positive Phase.	T24	NC	No Connect.

Pin No.	Mnemonic	Description	Pin No.	Mnemonic	Description
T25	NC	No Connect.	V25	VPOS	Positive Analog Power Supply.
T26	NC	No Connect.	V26	VPOS	Positive Analog Power Supply.
U1	VNEG	Negative Analog Power Supply.	W1	INB6	Input Number 6, Negative Phase.
U2	VNEG	Negative Analog Power Supply.	W2	IPB6	Input Number 6, Positive Phase.
U3	VNEG	Negative Analog Power Supply.	W3	ING6	Input Number 6, Negative Phase.
U4	VPOS	Positive Analog Power Supply.	W4	VPOS	Positive Analog Power Supply.
U5	VPOS	Positive Analog Power Supply.	W5	VPOS	Positive Analog Power Supply.
U6	VPOS	Positive Analog Power Supply.	W6	VPOS	Positive Analog Power Supply.
U7	VPOS	Positive Analog Power Supply.	W7	VPOS	Positive Analog Power Supply.
U8	VNEG	Negative Analog Power Supply.	W8	VNEG	Negative Analog Power Supply.
U9	VNEG	Negative Analog Power Supply.	W9	VNEG	Negative Analog Power Supply.
U10	VNEG	Negative Analog Power Supply.	W10	VNEG	Negative Analog Power Supply.
U11	VNEG	Negative Analog Power Supply.	W11	VNEG	Negative Analog Power Supply.
U12	VNEG	Negative Analog Power Supply.	W12	VNEG	Negative Analog Power Supply.
U13	VNEG	Negative Analog Power Supply.	W13	VNEG	Negative Analog Power Supply.
U14	VNEG	Negative Analog Power Supply.	W14	VNEG	Negative Analog Power Supply.
U15	VNEG	Negative Analog Power Supply.	W15	VNEG	Negative Analog Power Supply.
U16	VNEG	Negative Analog Power Supply.	W16	VNEG	Negative Analog Power Supply.
U17	VNEG	Negative Analog Power Supply.	W17	VNEG	Negative Analog Power Supply.
U18	VNEG	Negative Analog Power Supply.	W18	VNEG	Negative Analog Power Supply.
U19	VNEG	Negative Analog Power Supply.	W19	VNEG	Negative Analog Power Supply.
U20	VNEG	Negative Analog Power Supply.	W20	VNEG	Negative Analog Power Supply.
U21	VPOS	Positive Analog Power Supply.	W21	VPOS	Positive Analog Power Supply.
U22	VPOS	Positive Analog Power Supply.	W22	VPOS	Positive Analog Power Supply.
U23	NC	No Connect.	W23	V1	Output Number 1, V Sync.
U24	NC	No Connect.	W24	ONG1	Output Number 1, Negative Phase.
U25	NC	No Connect.	W25	OPB1	Output Number 1, Positive Phase.
U26	NC	No Connect.	W26	ONB1	Output Number 1, Negative Phase.
V1	IPR6	Input Number 6, Positive Phase.	Y1	VPOS	Positive Analog Power Supply.
V2	INR6	Input Number 6, Negative Phase.	Y2	VPOS	Positive Analog Power Supply.
V3	IPG6	Input Number 6, Positive Phase.	Y3	VPOS	Positive Analog Power Supply.
V4	VPOS	Positive Analog Power Supply.	Y4	VPOS	Positive Analog Power Supply.
V5	VPOS	Positive Analog Power Supply.	Y5	VPOS	Positive Analog Power Supply.
V6	VPOS	Positive Analog Power Supply.	Y6	VPOS	Positive Analog Power Supply.
V7	VPOS	Positive Analog Power Supply.	Y7	VPOS	Positive Analog Power Supply.
V8	VNEG	Negative Analog Power Supply.	Y8	VPOS	Positive Analog Power Supply.
V9	VNEG	Negative Analog Power Supply.	Y9	VPOS	Positive Analog Power Supply.
V10	VNEG	Negative Analog Power Supply.	Y10	VPOS	Positive Analog Power Supply.
V11	VNEG	Negative Analog Power Supply.	Y11	VPOS	Positive Analog Power Supply.
V12	VNEG	Negative Analog Power Supply.	Y12	VPOS	Positive Analog Power Supply.
V13	VNEG	Negative Analog Power Supply.	Y13	VPOS	Positive Analog Power Supply.
V14	VNEG	Negative Analog Power Supply.	Y14	VPOS	Positive Analog Power Supply.
V15	VNEG	Negative Analog Power Supply.	Y15	VPOS	Positive Analog Power Supply.
V16	VNEG	Negative Analog Power Supply.	Y16	VPOS	Positive Analog Power Supply.
V17	VNEG	Negative Analog Power Supply.	Y17	VPOS	Positive Analog Power Supply.
V18	VNEG	Negative Analog Power Supply.	Y18	VPOS	Positive Analog Power Supply.
V19	VNEG	Negative Analog Power Supply.	Y19	VPOS	Positive Analog Power Supply.
V20	VNEG	Negative Analog Power Supply.	Y20	VPOS	Positive Analog Power Supply.
V21	VPOS	Positive Analog Power Supply.	Y21	VPOS	Positive Analog Power Supply.
V22	VPOS	Positive Analog Power Supply.	Y22	VPOS	Positive Analog Power Supply.
V23	VPOS	Positive Analog Power Supply.	Y23	H1	Output Number 1, H Sync.
V24	VPOS	Positive Analog Power Supply.	Y24	OPG1	Output Number 1, Positive Phase.

Pin No.	Mnemonic	Description	Pin No.	Mnemonic	Description
Y25	ONR1	Output Number 1, Negative Phase.	AB25	VNEG	Negative Analog Power Supply.
Y26	OPR1	Output Number 1, Positive Phase.	AB26	VNEG	Negative Analog Power Supply.
AA1	VPOS	Positive Analog Power Supply.	AC1	INB5	Input Number 5, Negative Phase.
AA2	VPOS	Positive Analog Power Supply.	AC2	IPB5	Input Number 5, Positive Phase.
AA3	VPOS	Positive Analog Power Supply.	AC3	ING5	Input Number 5, Negative Phase.
AA4	VPOS	Positive Analog Power Supply.	AC4	VPOS	Positive Analog Power Supply.
AA5	VPOS	Positive Analog Power Supply.	AC5	VPOS	Positive Analog Power Supply.
AA6	VPOS	Positive Analog Power Supply.	AC6	VPOS	Positive Analog Power Supply.
AA7	VPOS	Positive Analog Power Supply.	AC7	VPOS	Positive Analog Power Supply.
AA8	VPOS	Positive Analog Power Supply.	AC8	VPOS	Positive Analog Power Supply.
AA9	VPOS	Positive Analog Power Supply.	AC9	VPOS	Positive Analog Power Supply.
AA10	VPOS	Positive Analog Power Supply.	AC10	VPOS	Positive Analog Power Supply.
AA11	VPOS	Positive Analog Power Supply.	AC11	VPOS	Positive Analog Power Supply.
AA12	VPOS	Positive Analog Power Supply.	AC12	VPOS	Positive Analog Power Supply.
AA13	VPOS	Positive Analog Power Supply.	AC13	VPOS	Positive Analog Power Supply.
AA14	VPOS	Positive Analog Power Supply.	AC14	VPOS	Positive Analog Power Supply.
AA15	VPOS	Positive Analog Power Supply.	AC15	VPOS	Positive Analog Power Supply.
AA16	VPOS	Positive Analog Power Supply.	AC16	VPOS	Positive Analog Power Supply.
AA17	VPOS	Positive Analog Power Supply.	AC17	VPOS	Positive Analog Power Supply.
AA18	VPOS	Positive Analog Power Supply.	AC18	VPOS	Positive Analog Power Supply.
AA19	VPOS	Positive Analog Power Supply.	AC19	H0	Output Number 0, H Sync.
AA20	VPOS	Positive Analog Power Supply.	AC20	V0	Output Number 0, V Sync.
AA21	VPOS	Positive Analog Power Supply.	AC21	VPOS	Positive Analog Power Supply.
AA22	VPOS	Positive Analog Power Supply.	AC22	NC	No Connect.
AA23	VPOS	Positive Analog Power Supply.	AC23	NC	No Connect.
AA24	VNEG	Negative Analog Power Supply.	AC24	VNEG	Negative Analog Power Supply.
AA25	VNEG	Negative Analog Power Supply.	AC25	VNEG	Negative Analog Power Supply.
AA26	VNEG	Negative Analog Power Supply.	AC26	VNEG	Negative Analog Power Supply.
AB1	IPR5	Input Number 5, Positive Phase.	AD1	VNEG	Negative Analog Power Supply.
AB2	INR5	Input Number 5, Negative Phase.	AD2	VNEG	Negative Analog Power Supply.
AB3	IPG5	Input Number 5, Positive Phase.	AD3	VNEG	Negative Analog Power Supply.
AB4	VPOS	Positive Analog Power Supply.	AD4	IPG4	Input Number 4, Positive Phase.
AB5	VPOS	Positive Analog Power Supply.	AD5	ING4	Input Number 4, Negative Phase.
AB6	DGND	Digital Power Supply.	AD6	VNEG	Negative Analog Power Supply.
AB7	VDD	Digital Power Supply.	AD7	IPG3	Input Number 3, Positive Phase.
AB8	D0	Control Pin, Input Address Bit 0.	AD8	ING3	Input Number 3, Negative Phase.
AB9	D1	Control Pin, Input Address Bit 1.	AD9	VPOS	Positive Analog Power Supply.
AB10	D2	Control Pin, Input Address Bit 2.	AD10	IPG2	Input Number 2, Positive Phase.
AB11	D3	Control Pin, Input Address Bit 3.	AD11	ING2	Input Number 2, Negative Phase.
AB12	D4	Control Pin, Input Address Bit 4.	AD12	VNEG	Negative Analog Power Supply.
AB13	CMENC	Control Pin, Pass/Stop CM Encoding.	AD13	IPG1	Input Number 1, Positive Phase.
AB14	\overline{WE}	Control Pin, 1st Rank Write Strobe.	AD14	ING1	Input Number 1, Negative Phase.
AB15	\overline{UPDATE}	Control Pin, 2nd Rank Write Strobe.	AD15	VPOS	Positive Analog Power Supply.
AB16	\overline{RST}	Control Pin, 2nd Rank Data Reset.	AD16	IPG0	Input Number 0, Positive Phase.
AB17	VDD	Digital Power Supply.	AD17	ING0	Input Number 0, Negative Phase.
AB18	DGND	Digital Power Supply.	AD18	VNEG	Negative Analog Power Supply.
AB19	VPOS	Positive Analog Power Supply.	AD19	OPG0	Output Number 0, Positive Phase.
AB20	VPOS	Positive Analog Power Supply.	AD20	ONG0	Output Number 0, Negative Phase.
AB21	VPOS	Positive Analog Power Supply.	AD21	VPOS	Positive Analog Power Supply.
AB22	VPOS	Positive Analog Power Supply.	AD22	NC	No Connect.
AB23	VPOS	Positive Analog Power Supply.	AD23	NC	No Connect.
AB24	VNEG	Negative Analog Power Supply.	AD24	VNEG	Negative Analog Power Supply.

Pin No.	Mnemonic	Description
AD25	VNEG	Negative Analog Power Supply.
AD26	VNEG	Negative Analog Power Supply.
AE1	VNEG	Negative Analog Power Supply.
AE2	VNEG	Negative Analog Power Supply.
AE3	VNEG	Negative Analog Power Supply.
AE4	INR4	Input Number 4, Negative Phase.
AE5	IPB4	Input Number 4, Positive Phase.
AE6	VNEG	Negative Analog Power Supply.
AE7	INR3	Input Number 3, Negative Phase.
AE8	IPB3	Input Number 3, Positive Phase.
AE9	VPOS	Positive Analog Power Supply.
AE10	INR2	Input Number 2, Negative Phase.
AE11	IPB2	Input Number 2, Positive Phase.
AE12	VNEG	Negative Analog Power Supply.
AE13	INR1	Input Number 1, Negative Phase.
AE14	IPB1	Input Number 1, Positive Phase.
AE15	VPOS	Positive Analog Power Supply.
AE16	INR0	Input Number 0, Negative Phase.
AE17	IPB0	Input Number 0, Positive Phase.
AE18	VNEG	Negative Analog Power Supply.
AE19	ONR0	Output Number 0, Negative Phase.
AE20	OPB0	Output Number 0, Positive Phase.
AE21	VPOS	Positive Analog Power Supply.
AE22	NC	No Connect.
AE23	NC	No Connect.
AE24	VNEG	Negative Analog Power Supply.
AE25	VNEG	Negative Analog Power Supply.

Pin No.	Mnemonic	Description
AE26	VNEG	Negative Analog Power Supply.
AF1	VNEG	Negative Analog Power Supply.
AF2	VNEG	Negative Analog Power Supply.
AF3	VNEG	Negative Analog Power Supply.
AF4	IPR4	Input Number 4, Positive Phase.
AF5	INB4	Input Number 4, Negative Phase.
AF6	VNEG	Negative Analog Power Supply.
AF7	IPR3	Input Number 3, Positive Phase.
AF8	INB3	Input Number 3, Negative Phase.
AF9	VPOS	Positive Analog Power Supply.
AF10	IPR2	Input Number 2, Positive Phase.
AF11	INB2	Input Number 2, Negative Phase.
AF12	VNEG	Negative Analog Power Supply.
AF13	IPR1	Input Number 1, Positive Phase.
AF14	INB1	Input Number 1, Negative Phase.
AF15	VPOS	Positive Analog Power Supply.
AF16	IPR0	Input Number 0, Positive Phase.
AF17	INB0	Input Number 0, Negative Phase.
AF18	VNEG	Negative Analog Power Supply.
AF19	OPR0	Output Number 0, Positive Phase.
AF20	ONB0	Output Number 0, Negative Phase.
AF21	VPOS	Positive Analog Power Supply.
AF22	NC	No Connect.
AF23	NC	No Connect.
AF24	VNEG	Negative Analog Power Supply.
AF25	VNEG	Negative Analog Power Supply.
AF26	VNEG	Negative Analog Power Supply.

TRUTH TABLE AND LOGIC DIAGRAM

Table 15. Operation Truth Table

WE	UPDATE	CLK	SERIN	SEROUT	RST	SER/PAR	CS	CMENC	Operation/Comment
X ¹	X	X	X	X	0	X	X	X	Asynchronous reset. All outputs are disabled. Contents of the 45-bit shift register are unchanged.
1	1	$\bar{1}$	SERIN _i	SERIN _{i-45}	1	0	0	X	Serial mode. The data on the SERIN line is loaded into the 45-bit shift register. The first bit clocked into the shift register appears at SEROUT 45 clock cycles later. Data is not applied to the switch array.
0	1	1	X	X	1	1	0	X	Parallel mode. The data on parallel lines D0 through D4 is loaded into the shift register location addressed by A0 through A2. Data is not applied to the switch array.
1	0	1	X	X	1	X	0	X	Switch array update. Data in the 45-bit shift register is transferred to the parallel latches and applied to the switch array.
1	X	X	X	X	1	1	0	X	No change in logic.

¹X = don't care.

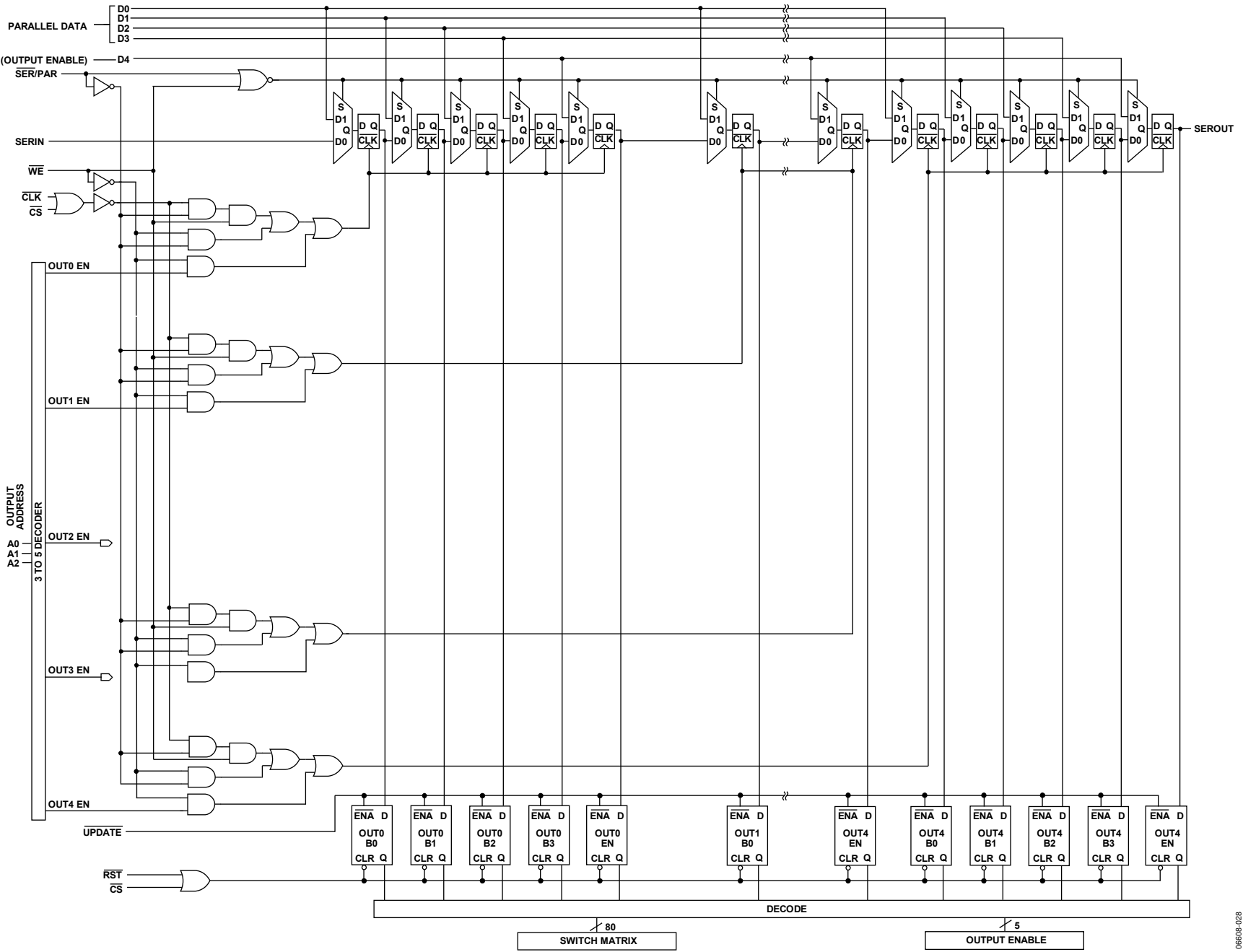


Figure 7. Logic Diagram

EQUIVALENT CIRCUITS

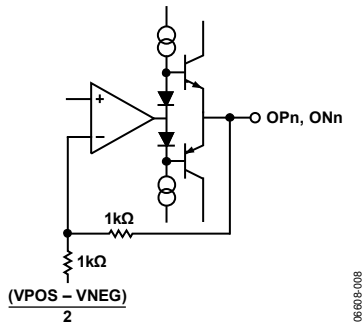


Figure 8. Enabled Output (Also See ESD Protection Map, Figure 19)

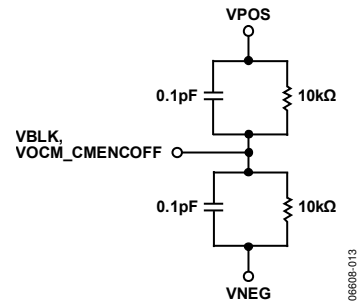


Figure 13. VBLK and VOVM_CMENCOFF Inputs (Also See ESD Protection Map, Figure 19)

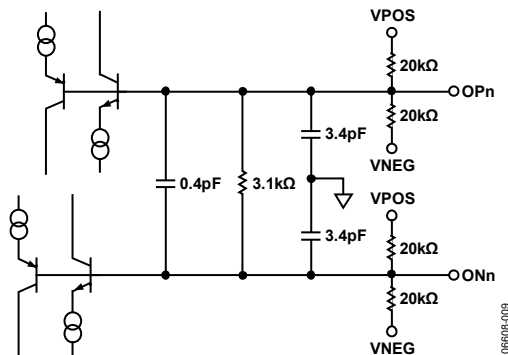


Figure 9. Disabled Output (Also See ESD Protection Map, Figure 19)

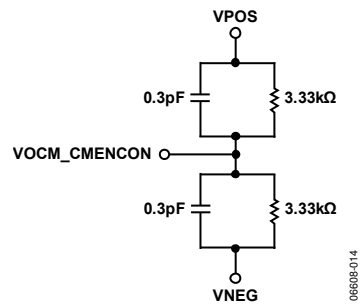


Figure 14. VOVM_CMENCON Input (Also See ESD Protection Map, Figure 19)

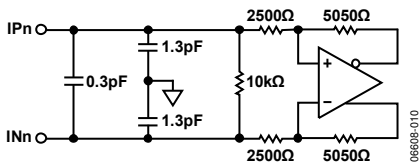


Figure 10. Receiver Differential (Also See ESD Protection Map, Figure 19)

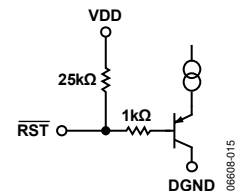


Figure 15. \overline{RST} Input (Also See ESD Protection Map, Figure 19)

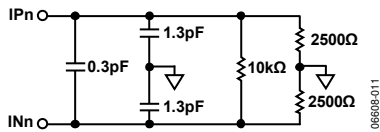


Figure 11. Receiver Simplified Equivalent Circuit When Driving Differentially

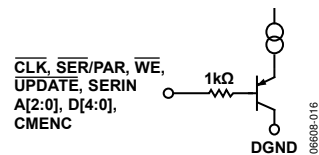


Figure 16. Logic Input (Also See ESD Protection Map, Figure 19)

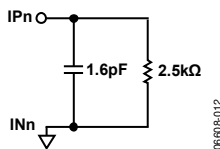


Figure 12. Receiver Simplified Equivalent Circuit When Driving Single-Ended

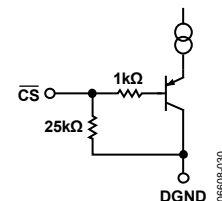
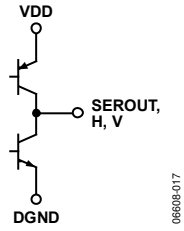
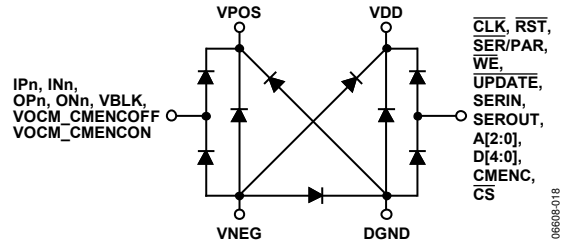


Figure 17. \overline{CS} Input (Also See ESD Protection Map, Figure 19)



06608-017

Figure 18. SEROUT, H, V Logic Outputs
(Also See ESD Protection Map, Figure 19)



06608-018

Figure 19. ESD Protection Map

TYPICAL PERFORMANCE CHARACTERISTICS

$V_S = \pm 2.5\text{ V}$ at $T_A = 25^\circ\text{C}$, $G = +2$, $R_L = 100\ \Omega$ (each output), $V_{BLK} = 0\text{ V}$, output CM voltage = 0 V , differential I/O mode, unless otherwise noted.

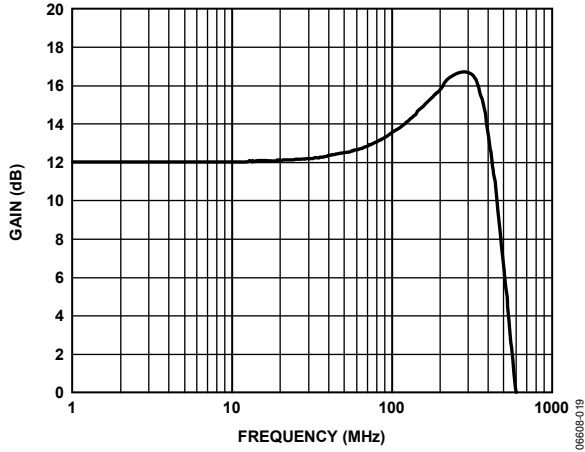


Figure 20. Small Signal Frequency Response, 200 mV p-p

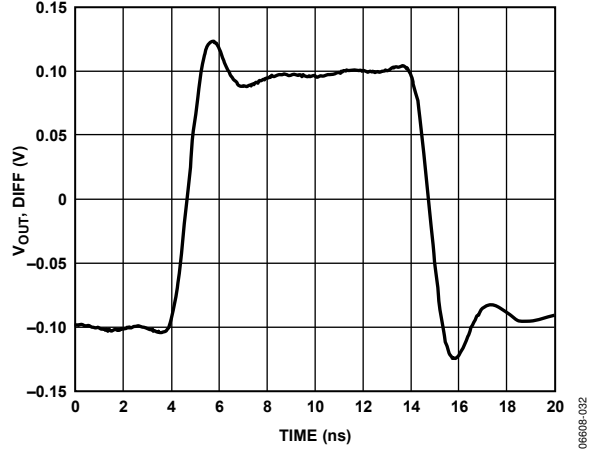


Figure 23. Small Signal Pulse Response, 200 mV p-p

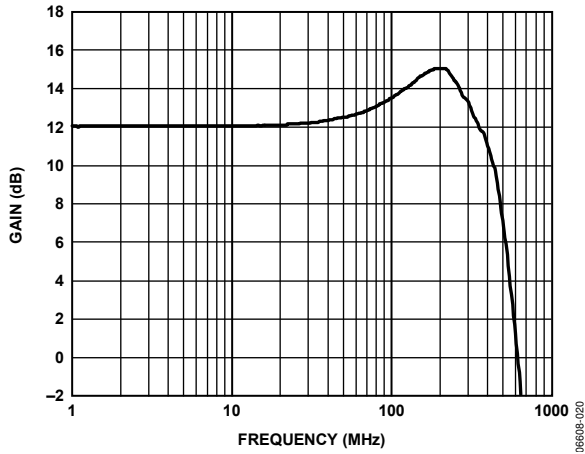


Figure 21. Large Signal Frequency Response, 2 V p-p

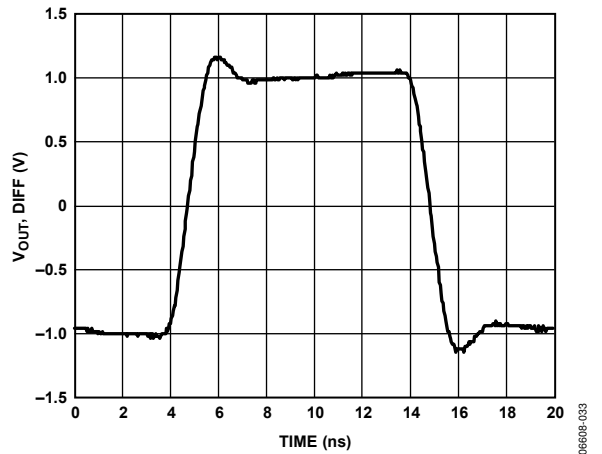


Figure 24. Large Signal Pulse Response, 2 V p-p

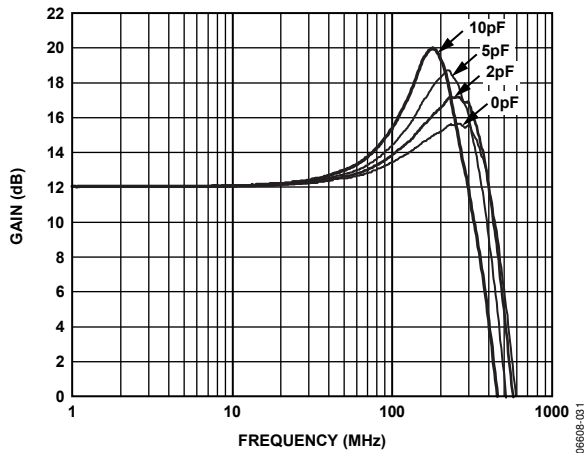


Figure 22. Small Signal Frequency Response with Capacitive Loads

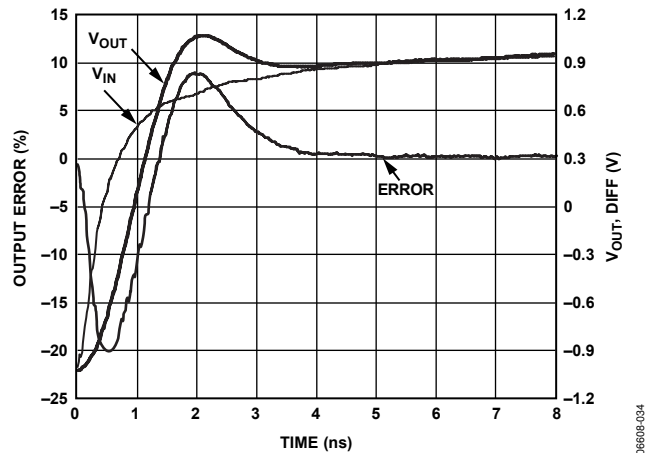


Figure 25. Settling Time

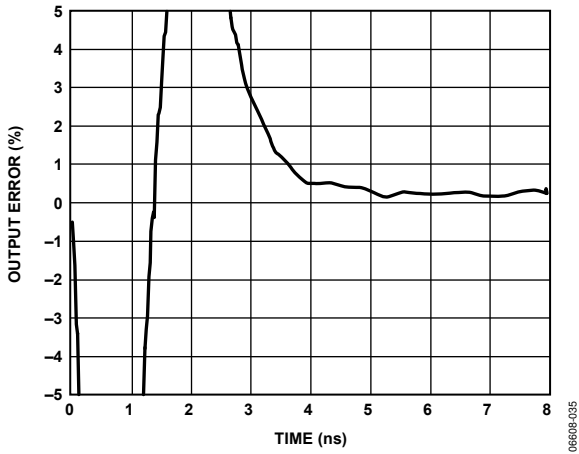


Figure 26. Settling Time, 1% Zoom

06608-035

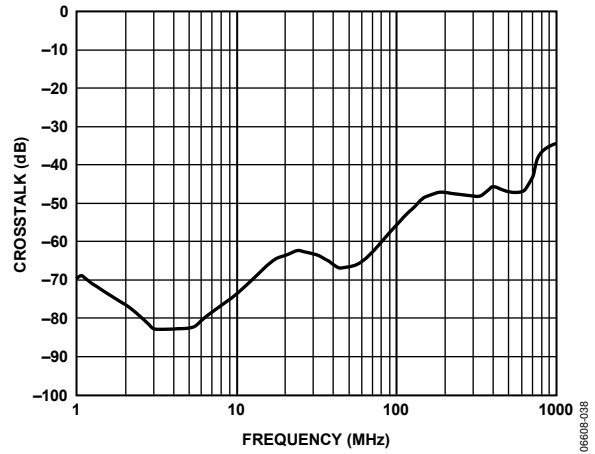


Figure 29. Crosstalk, All Hostile

06608-038

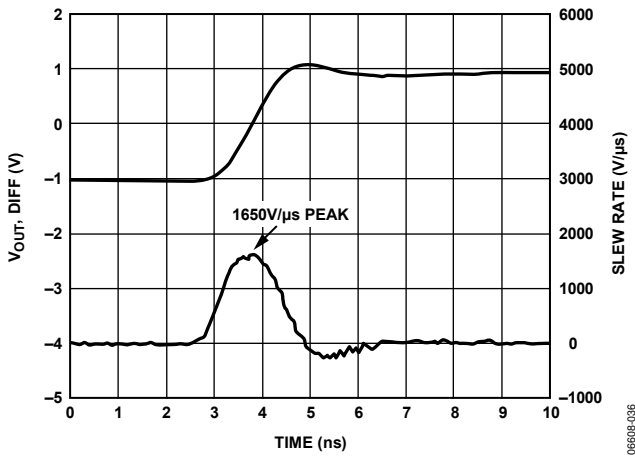


Figure 27. Large Signal Rising Edge Slew Rate

06608-036

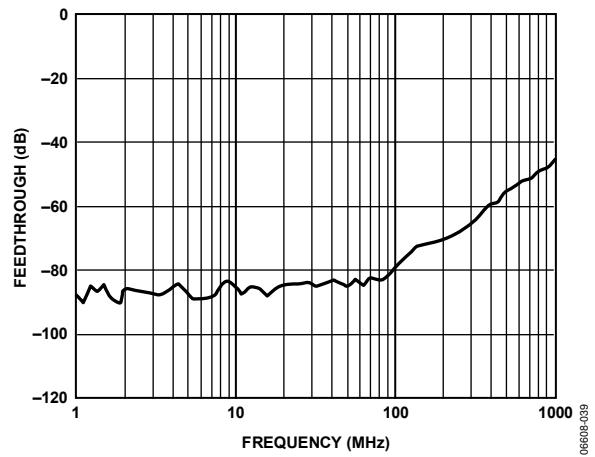


Figure 30. Crosstalk, Off Isolation

06608-039

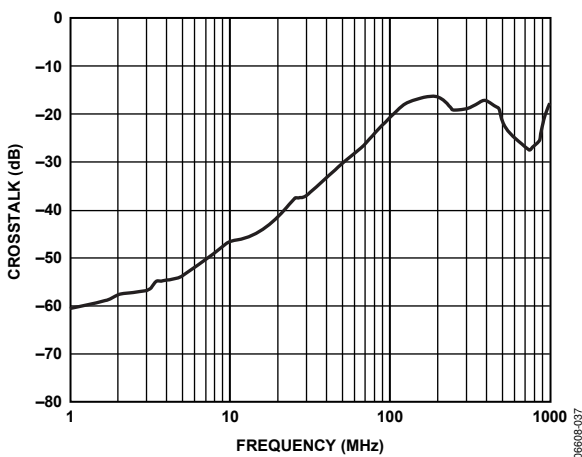


Figure 28. Crosstalk, All Hostile, Single-Ended

06608-037

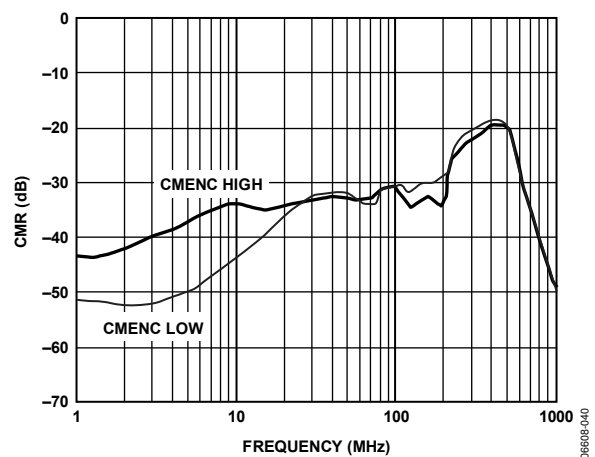


Figure 31. Common-Mode Rejection

06608-040

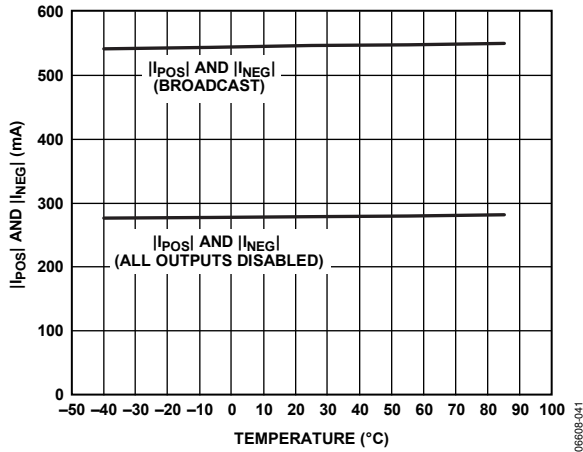


Figure 32. Quiescent Supply Currents vs. Temperature

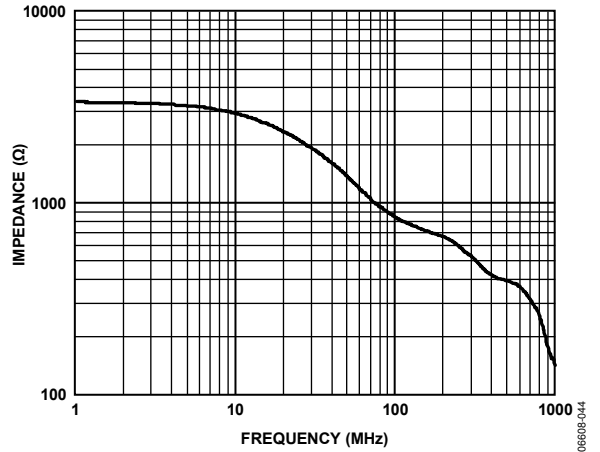


Figure 35. Input Impedance

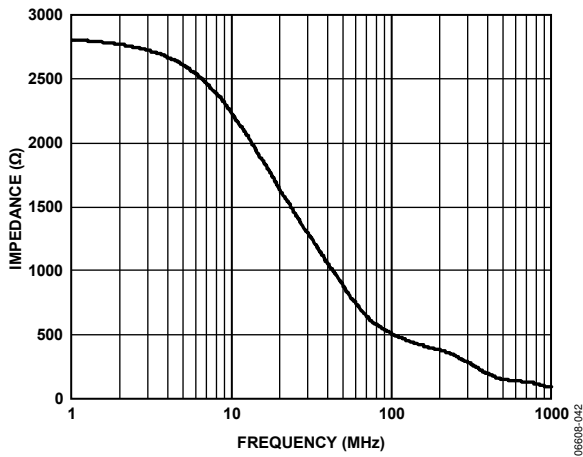


Figure 33. Output Impedance, Disabled

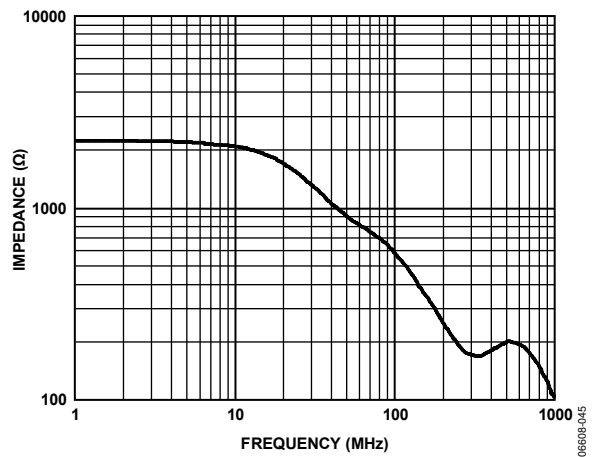


Figure 36. Input Impedance, Single-Ended

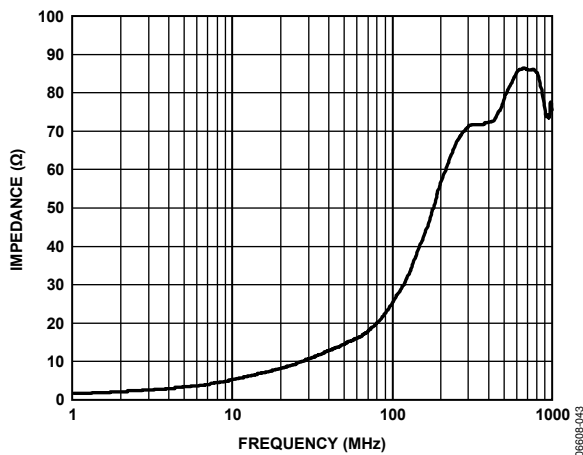


Figure 34. Output Impedance, Enabled

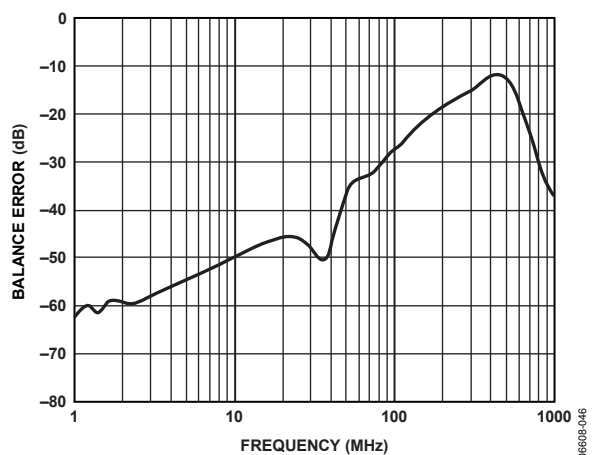


Figure 37. Output Balance Error

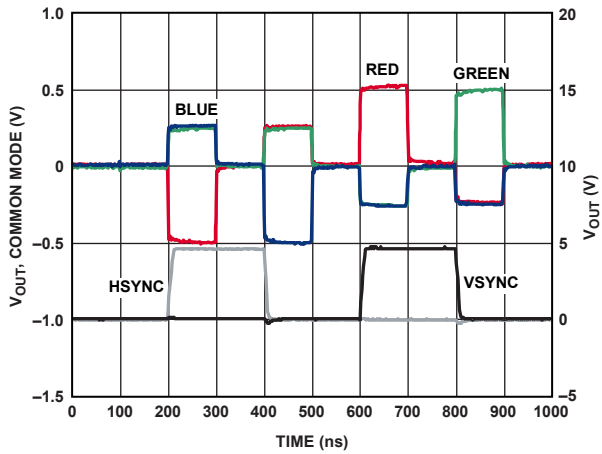


Figure 38. Common-Mode Pulse Response

06608-047

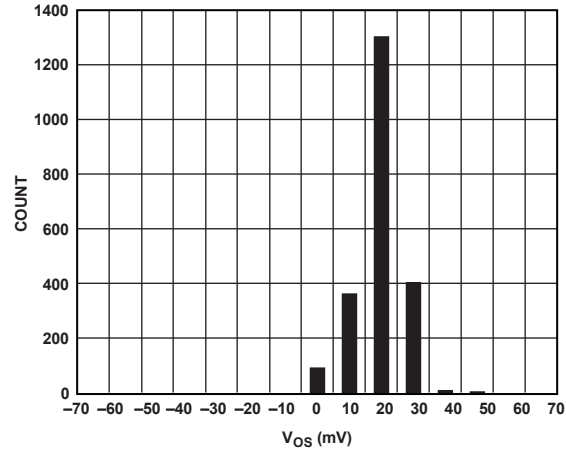


Figure 41. Vos Distribution

06608-050

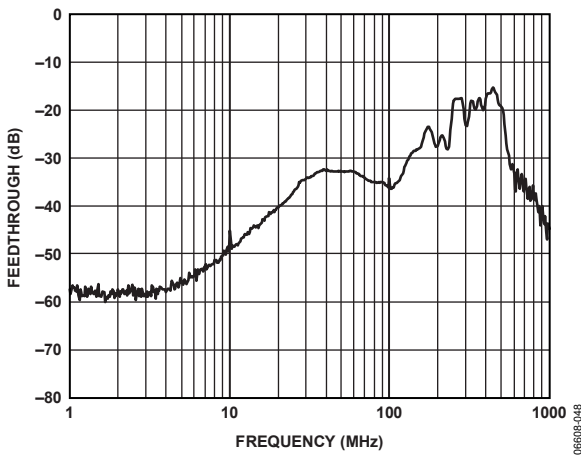


Figure 39. Common-Mode Isolation, CMENC Low

06608-046

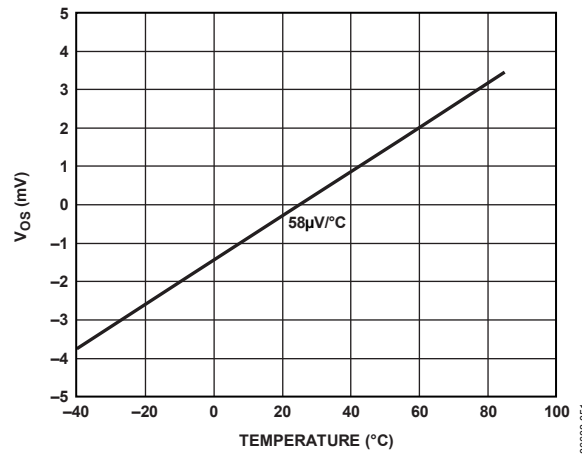


Figure 42. Vos Drift, RTO

06608-051

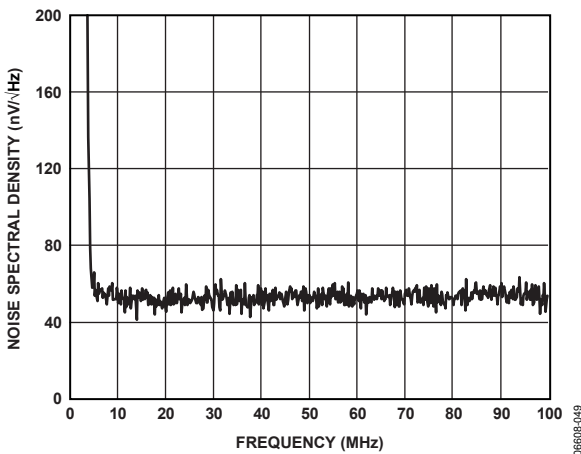


Figure 40. Noise Spectral Density

06608-049

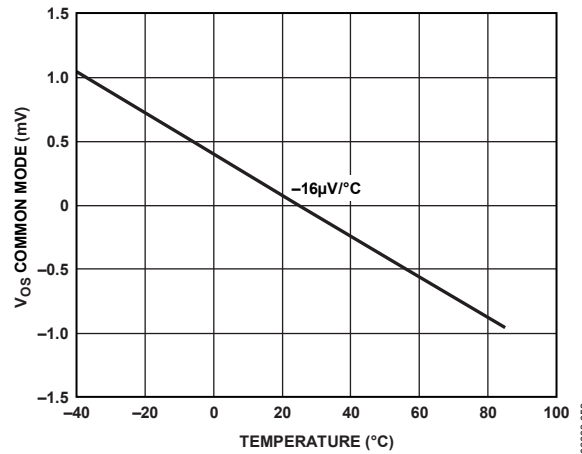


Figure 43. Vos Drift, Common Mode, RTO

06608-052