

Monolithic CMOS Analog Multiplexers

ABSOLUTE MAXIMUM RATINGS

Voltage Referenced to V-

V+	+44V
GND	+25V
Digital Inputs, V _S and V _D (Note 1)	-2V to (V+ + 2V) or 20mA, whichever occurs first

Current (any terminal, except S or D)	30mA
Continuous Current, S or D	20mA
Peak Current, S or D (pulsed at 1ms, 10% duty cycle max)	40mA
Continuous Power Dissipation (T _A = +70°C)	
Plastic DIP (derate 10.53mW/°C above +70°C)	842mW
Narrow SO (derate 8.70mW/°C above +70°C)	696mW
Wide SO (derate 9.52mW/°C above +70°C)	762mW
CERDIP (derate 10.00mW/°C above +70°C)	800mW

Operating Temperature Ranges:

DG50_ACJ/CWE	0°C to +70°C
DG50_ABK	-20°C to +85°C
DG50_ADJ/DY/EWE	-40°C to +85°C
DG50_AAK/MY	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Soldering Temperature (reflow)	
PDIP, Wide SO, Narrow SO, CERDIP containing lead(Pb)	+240°C
PDIP, Wide SO, Narrow SO lead(Pb)-free	+260°C

Note 1: Signals on S₋ or D₋ exceeding V+ or V- are clamped by internal diodes. Limit forward-diode current to maximum current ratings

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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(V+ = 15V, V- = -15V, V_{GND} = 0V, T_A = +25°C, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS		DG508AA/M DG509AA/M			DG508AD/E/B/C DG509AD/E/B/C			UNITS
					MIN	TYP	MAX	MIN	TYP	MAX	
SWITCH											
Analog Signal		V _{ANALOG}			-15	+15		-15	+15		V
Drain-Source On-Resistance		R _{DS(ON)}	Sequence each switch on, V _{A_L} = 0.8V, V _{A_H} = 2.4V (Note 4)	V _D = 10V, I _S = -200μA	170	400		170	450		Ω
				V _D = -10V, I _S = 200μA	130	400		130	450		
Greatest Change in Drain-Source On-Resistance Between Channels		ΔR _{DS(ON)}	$\Delta R_{DS(ON)} = \left(\frac{R_{DS(ON) \text{ max}} - R_{DS(ON) \text{ min}}}{R_{DS(ON)}} \right)$ -10V ≥ V _S ≥ 10V		6			6			%
Source Off-Leakage Current		I _{S(OFF)}	V _{EN} = 0V	V _S = 10V, V _D = -10V	0.002	0.5		0.002	1		nA
				V _S = -10V, V _D = 10V	-0.5	-0.005		-1	-0.005		
Drain Off-Leakage Current	DG508A	I _{D(OFF)}	V _{EN} = 0V	V _D = 10V, V _S = -10V	0.01	2		0.01	5		nA
	V _D = -10V, V _S = 10V			-2	-0.015		-5	-0.015			
	V _D = 10V, V _S = -10V			0.005	2		0.005	5			
	V _D = -10V, V _S = 10V			-2	-0.008		-5	-0.008			
Drain On-Leakage Current	DG508A	I _{D(ON)}	Sequence each switch on, V _{A_L} = 0.8V V _{A_H} = 2.4V (Note 2)	V _{S(all)} = V _D = 10V	0.015	2		0.015	5		nA
	V _{S(all)} = V _D = -10V			-2	-0.03		-5	-0.03			
	V _{S(all)} = V _D = 10V			0.007	2		0.007	5			
	V _{S(all)} = V _D = -10V			-2	-0.015		-5	-0.015			

Monolithic CMOS Analog Multiplexers

DG508A/DG509A

ELECTRICAL CHARACTERISTICS (continued)

(V₊ = 15V, V₋ = -15V, V_{GND} = 0V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		DG508AA/M DG509AA/M			DG508AD/E/B/C DG509AD/E/B/C			UNITS
				MIN	TYP	MAX	MIN	TYP	MAX	
LOGIC INPUT										
Logic Input Current, Input Voltage High	I _{AH}	V _{A_} = 2.4V		-10	-		10	-0.002		μA
		V _{A_} = 15V			0.006	10		0.006	10	
Logic Input Current, Input Voltage Low	I _{AL}	All V _{A_} = 0V	V _{EN} = 2.4V	-10	-		10	-0.002		μA
			V _{EN} = 0V	-10	-		-10	-0.002		
DYNAMIC										
Multiplexer Switching	t _{transition}	Figure 1			0.6	1.0		0.6	1.0	μs
Break-Before-Make Interval	t _{OPEN}	Figure 3			0.2			0.2		μs
Enable Turn-On Time	t _{ON(EN)}	Figure 2			0.4	1.0		0.4	1.5	μs
Enable Turn-Off Time	t _{OFF(EN)}	Figure 2			0.2	0.7		0.2	1.0	μs
Off-Isolation	OIRR	V _{EN} = 0V, R _L = 1kΩ, C _L = 15pF, V _S = 7V _{RMS} f = 500kHz (Note 3)			68			68		dB
Source Off-Capacitance	C _{S(OFF)}	V _S = 0V, V _{EN} = 0V, f = 140kHz			5			5		pF
Drain Off- Capacitanc	IDG508A	C _{D(OFF)}	V _S = 0V, V _{EN} = 0V, f = 140kHz		25			25		pF
	DGS09A				12			12		
SUPPLY										
Positive Supply Current	I ₊	V _{EN} = 2.4V, all V _{A_} = 0V or 2.4V			0.02	0.2		0.02	0.2	mA
Negative Supply Current	I ₋	V _{EN} = 2.4V, all V _{A_} = 0V or 2.4V		-0.1	-0.01		-0.1	-0.01		mA
Positive Supply Current in Standby	I ₊	V _{EN} = 0V, all V _{A_} = 0V or 2.4V			0.02	0.2		0.02	0.2	mA
Negative Supply Current in Standby	I ₋	V _{EN} = 0V, all V _{A_} = 0V or 2.4V		-0.1	-0.01		-0.1	-0.01		mA
Power-Supply Range for Continuous Operation	V ₋ , V ₊	(Notes 4, 5)		±4.5		±18.0	±4.5		±18.0	V

Monolithic CMOS Analog Multiplexers

ELECTRICAL CHARACTERISTICS

(V₊ = 15V, V_{GND} = 0V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS		DG508AA/M DG509AA/M			DG508AD/E/B/C DG509AD/E/B/C			UNITS
					MIN	TYP	MAX	MIN	TYP	MAX	
SWITCH											
Analog Signal Range		V _{ANALOG}			-15		+15	-15		+15	V
Drain-Source On-Resistance		R _{DS(ON)}	Sequence each switch on, V _{A_L} = 0.8V, V _{A_H} = 2.4V	V _D = 10V, I _S = -200μA		500		550	Ω		
				V _D = -10V, I _S = 200μA		500		550			
Source Off-Leakage Current		I _{S(OFF)}	V _{EN} = 0V	V _S = 10V, V _D = -10V V _S = -10V, V _D = -10V		+50		+50	nA		
					-50		-50				
Drain Off-Leakage Current	DG508A	I _{D(OFF)}	V _{EN} = 0V	V _D = 10V, V _S = -10V		+200		+100	nA		
	V _D = -10V, V _S = -10V			-200		-200					
	DG509A			V _D = 10V, V _S = -10V		+200		+100			
	V _D = -10V, V _S = -10V			-100		-100					
Drain On-Leakage Current	DG508A	I _{D(ON)}	Sequence each switch on, V _{A_L} = 0.8V, V _{A_H} = 2.4V (Note 2)	V _{S(all)} = V _D = 10V		+200		+100	nA		
	V _{S(all)} = V _D = -10V			-200		-100					
	DG509A			V _{S(all)} = V _D = 10V		+100		+100			
	V _{S(all)} = V _D = -10V			-100		-100					
LOGIC INPUT											
Logic Input Current, Input Voltage High		I _{AH}	V _{A_} = 2.4V		-30		-30		μA		
			V _{A_} = 15V			+30		+30			
Logic Input Current, Input Voltage Low		I _{AL}	All V _{A_} = 0V	V _{EN} = 2.4V	-30		-30		μA		
				V _{EN} = 0V	-30		-30				

Note 2: I_{D(ON)} is leakage from driver into on switch.

Note 3: Off-isolation = $20 \log \frac{|V_S|}{|V_D|}$

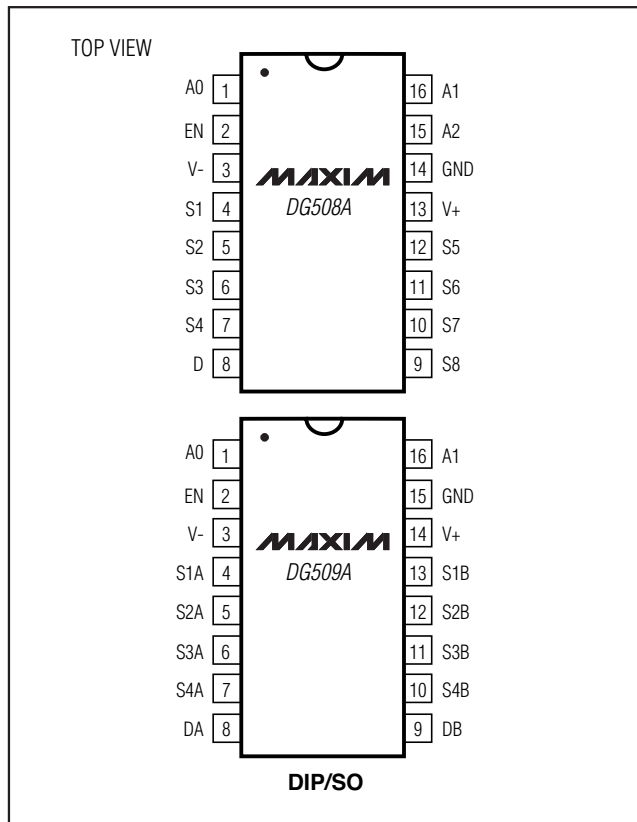
V_S = input to off switch,
V_D = output due to V_S.

Note 4: Electrical characteristics (such as on-resistance) change when power supplies other than ±15V are used.

Note 5: For designs requiring single 5V or dual ±5V operation, refer to Maxim's improved MAX338 and MAX339. Minimum operating voltage for DG508ADY/MY and DG509ADY/MY is ±9V.

Monolithic CMOS Analog Multiplexers

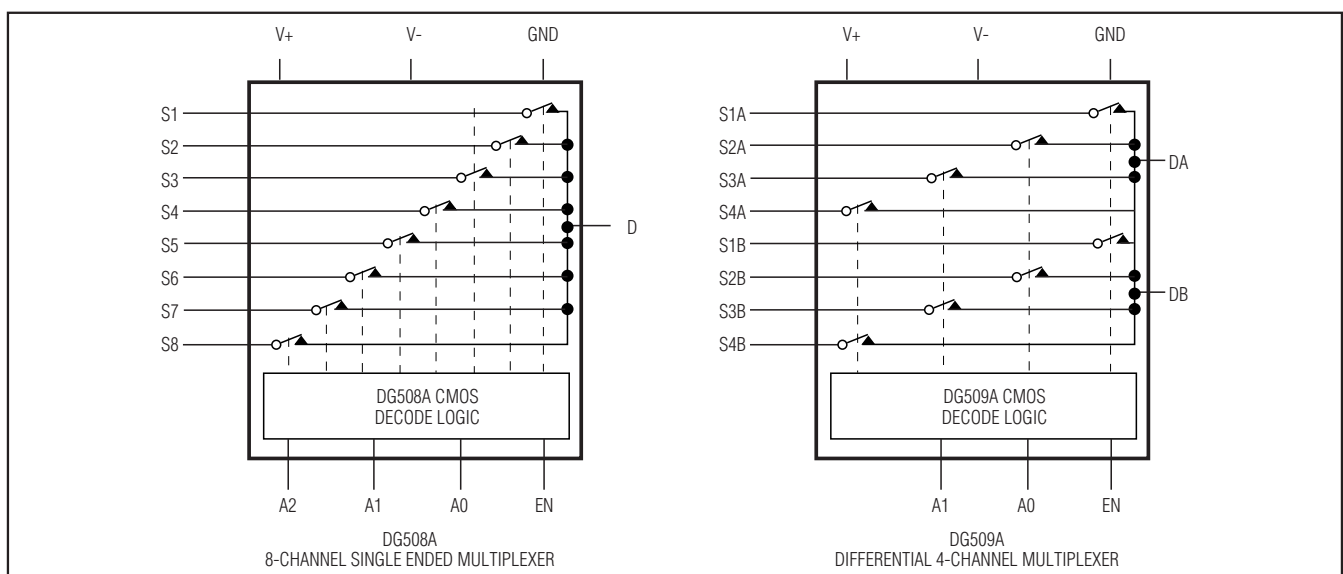
Pin Configurations



Pin Descriptions

PIN		NAME	FUNCTION
DG508A DIP/SO	DG509A DIP/SO		
1, 15, 16	—	A0, A2, A1	Address Input
—	1, 16	A0, A1	Address Input
2	2	EN	Enable
3	3	V-	Negative-Supply Voltage Input
4-7	—	S1-S4	Analog Inputs, Bidirectional
—	4-7	S1A-S4A	Analog Inputs, Bidirectional
8	—	D	Analog Outputs, Bidirectional
—	8, 9	DA, DB	Analog Outputs, Bidirectional
9-12	—	S8-S5	Analog Inputs, Bidirectional
—	10-13	S4B-S1B	Analog Inputs, Bidirectional
13	14	V+	Positive-Supply Voltage Input
14	15	GND	Ground

Functional Diagrams



DG508A/DG509A

Monolithic CMOS Analog Multiplexers

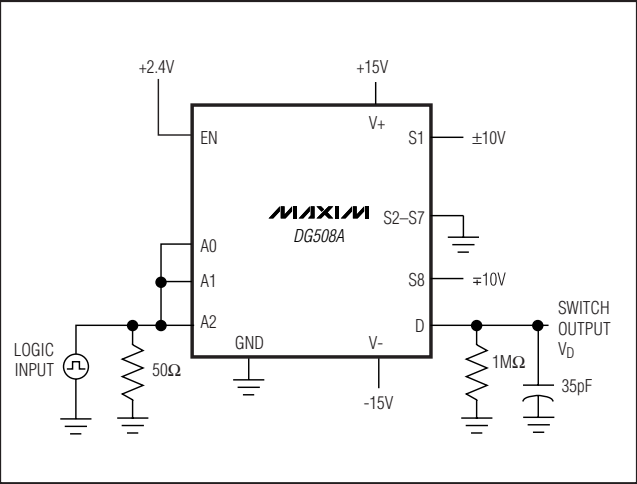


Figure 1a. Switching-Time Test Circuit

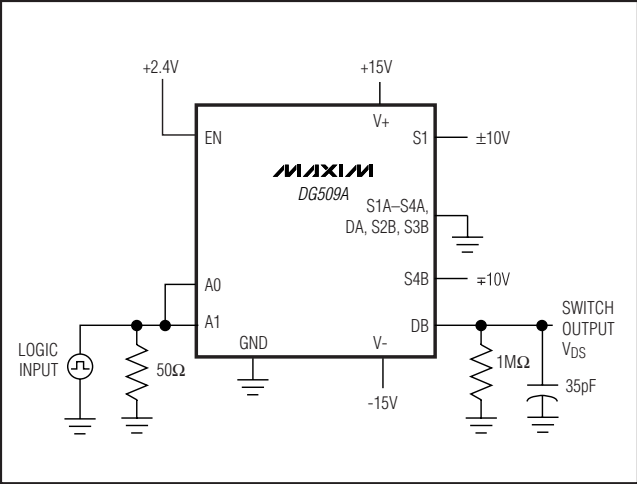


Figure 1b. Switching-Time Test Circuit

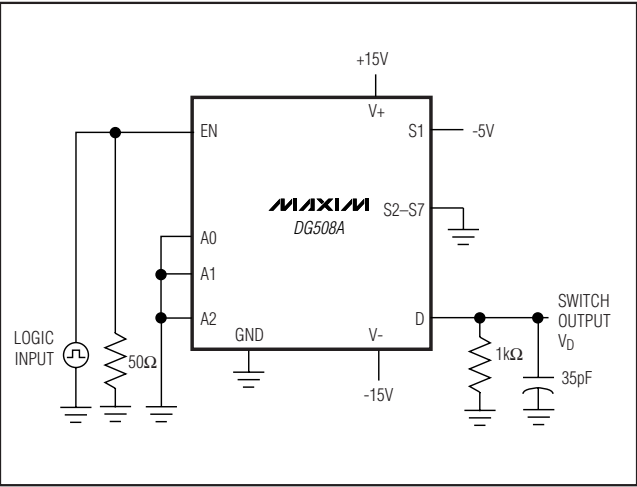


Figure 2a. DG508A Enable-Time Test Circuit

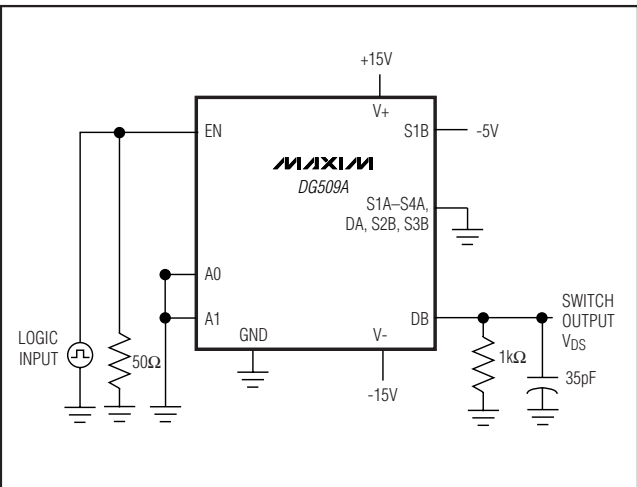


Figure 2b. DG509A Enable-Time Test Circuit

Monolithic CMOS Analog Multiplexers

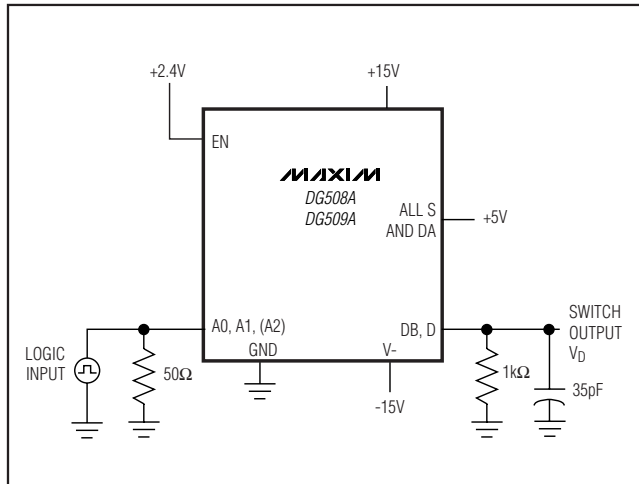


Figure 3. Break-Before-Make Test Circuit

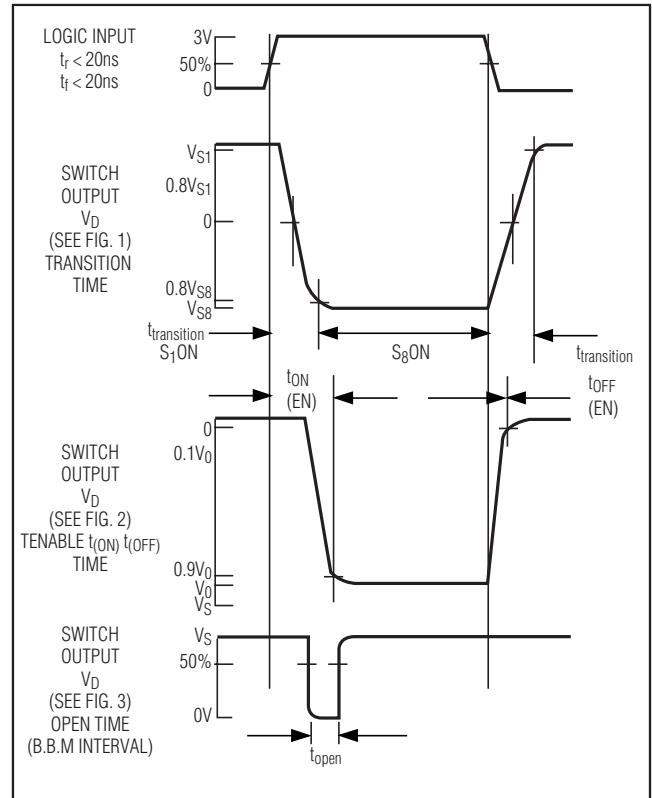


Figure 4. Timing Diagram for Figures 1, 2, and 3

Table 1a. DG508A Truth Table

A2	A1	A0	EN	ON SWITCH
X	X	X	0	NONE
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8

X = Don't care.

Table 1b. DG509A Truth Table

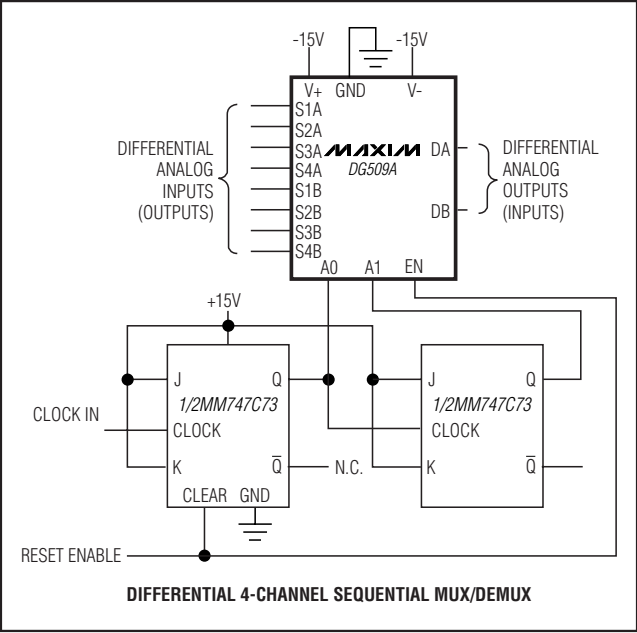
A1	A0	EN	ON SWITCH
X	X	0	NONE
0	0	1	1
0	1	1	2
1	0	1	3
1	1	1	4

X = Don't care.

DG508A/DG509A

Monolithic CMOS Analog Multiplexers

Typical Operating Circuits (continued)



Package Information

For the latest package outline information and land patterns, go to www.maxim-ic.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	DOCUMENT NO.
16 Plastic DIP	P16-1	21-0043
16 Wide SO	W16-2	21-0042
16 Narrow SO	S16-5	21-0041
16 Cerdip	J16-3	21-0045

Monolithic CMOS Analog Multiplexers

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
4	5/10	Updated the "Drain-Source On-Resistance" parameter for both the $T_A = +25^\circ\text{C}$ and $T_A = T_{\text{MIN}}$ to T_{MAX} conditions.	2, 4
		Deleted the QFN package from the <i>Ordering Information</i> , <i>Absolute Maximum Ratings</i> , <i>Pin Configurations</i> , <i>Pin Descriptions</i> , and <i>Package Information</i> sections.	1, 2, 5, 8
		Added the DG508AMY/PR and DG509AMY/PR parts to the <i>Ordering Information</i> table.	1

DG508A/DG509A

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600 _____ **9**

© 2010 Maxim Integrated Products

Maxim is a registered trademark of Maxim Integrated Products, Inc.