

Am29803A

16-Way Branch Control Unit

DISTINCTIVE CHARACTERISTICS

- 16 separate instructions – 2, 4, 8 or 16-way branch in one microprogram execution cycle
- Four individual test inputs
- Advanced Low-Power Schottky processing
- Four individual outputs for driving the four OR inputs on the Am2909A Microprogram Sequencer
- Provides maximum branch capability in a microprogram control unit using the Am2909

GENERAL DESCRIPTION

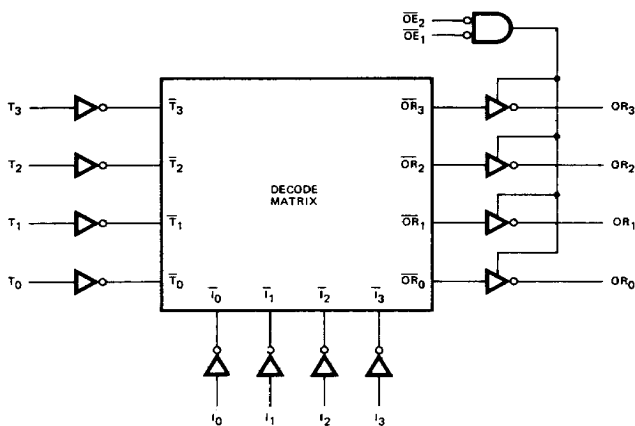
The Am29803A is a Low-Power Schottky processed device that provides 16-way branch control when used in conjunction with the Am2909A Microprogram Sequencer.

The device features 16 instructions that provide all combinations of simultaneous testing of four different inputs. The device has four outputs that are used to drive the four OR inputs of the Am2909A Microprogram Sequencer.

The "zero" instruction inhibits the testing of any of the four test (T) inputs. The remaining 15 instructions are used to

test combinations of 1, 2, 3 or 4 of the T inputs simultaneously. If one T input is being tested, the Am29803A will select one of two possible addresses. If two T inputs are being tested, the device will select one of four possible addresses. If three T inputs are being tested, the device will select one of eight possible addresses. If all four T inputs are being tested, the device will select one of sixteen addresses as the field used to drive the OR inputs of the Am2909A.

BLOCK DIAGRAM

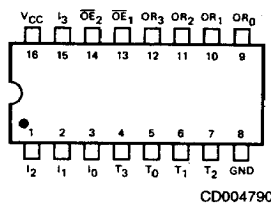


BD002570

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CONNECTION DIAGRAM Top View

D16
P16
F-16*

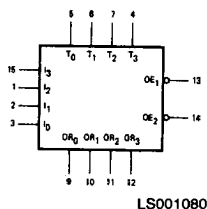


CD004790

*F-16 pin configuration identical to D-16, P16.

Note: Pin 1 is marked for orientation

LOGIC SYMBOL



LS001080

ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).

Am29803A

D

C

B

Screening Option
Blank – Standard processing
B – Burn-in

Temperature (See Operating Range)
C – Commercial (0°C to +70°C)
M – Military (–55°C to +125°C)

Package

D – 16-pin CERDIP
F – 16-pin flatpak
P – 16-pin plastic DIP

Device type

16-Way Branch Control Unit

Valid Combinations

Valid Combinations	
Am29803A	PC DC, DCB, DMB FMB

Valid Combinations

Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

PIN DESCRIPTION

Pin No.	Name	I/O	Description
3, 2 1, 15	I ₀ , I ₁ , I ₂ , I ₃	I	The four instruction inputs to the device.
5, 6 7, 4	T ₀ , T ₁ , T ₂ , T ₃	I	The four test inputs for the device.
9, 10, 11, 12	OR ₀ , OR ₁ , OR ₂ , OR ₃	O	The four outputs of the device that are connected to the four OR inputs of the Am2909.
13, 14	OE ₁ , OE ₂	I	Output Enable. When either OE input is HIGH, the OR _i outputs are in the high impedance state. When both the OE ₁ and OE ₂ inputs are LOW, the OR outputs are enabled and the selected data will be present.

GUARANTEED LOADING RULES
OVER OPERATING RANGE (In Unit Loads)

A Low-Power Schottky TTL Unit Load is defined
as 20 μ A measured at 2.7V HIGH and -0.36mA
measured at 0.4V LOW.

Pin No.'s	Input/ Output	Input Load	Output HIGH	Output LOW	
				MIL	COM'L
1	I ₂	0.5	-	-	-
2	I ₁	0.5	-	-	-
3	I ₀	0.5	-	-	-
4	T ₃	0.5	-	-	-
5	T ₀	0.5	-	-	-
6	T ₁	0.5	-	-	-
7	T ₂	0.5	-	-	-
8	GND	-	-	-	-
9	OR ₀	-	100	44	44
10	OR ₁	-	100	44	44
11	OR ₂	-	100	44	44
12	OR ₃	-	100	44	44
13	OE ₁	0.5	-	-	-
14	OE ₂	0.5	-	-	-
15	I ₃	0.5	-	-	-
16	V _{CC}	-	-	-	-

FUNCTION TABLE

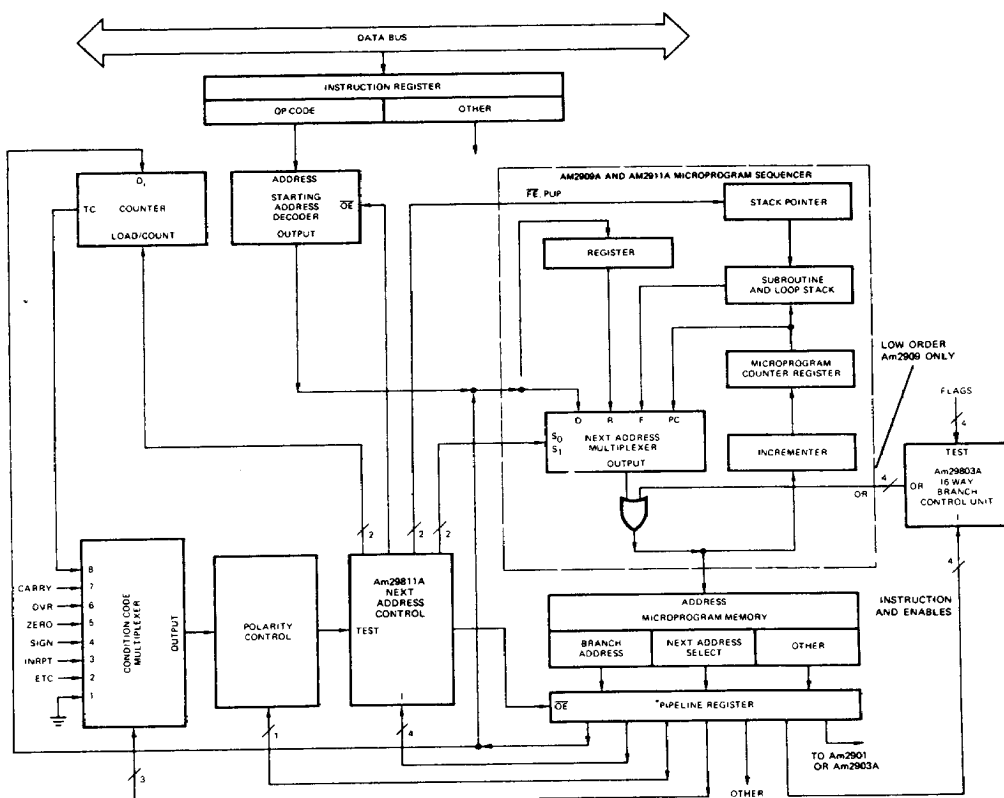
Function	I ₃	I ₂	I ₁	I ₀	T ₃	T ₂	T ₁	T ₀	OR ₃	OR ₂	OR ₁	OR ₀
No Test	L	L	L	L	X	X	X	X	L	L	L	L
Test T ₀	L	L	L	H	X	X	X	H	L	L	L	H
Test T ₁	L	L	H	L	X	X	L	X	L	L	L	H
Test T ₀ & T ₁	L	L	H	H	X	X	L	L	L	L	L	H
					X	X	H	L	L	L	H	L
					X	X	H	H	L	L	H	H
Test T ₂	L	H	L	L	X	L	X	X	L	L	L	L
					X	H	X	X	L	L	L	H
Test T ₀ & T ₂	L	H	L	H	X	L	X	H	L	L	L	H
					X	H	X	L	L	L	H	L
					X	H	X	H	L	L	H	H
Test T ₁ & T ₂	L	H	H	L	X	L	H	X	L	L	L	H
					X	H	L	X	L	L	H	L
					X	H	L	X	L	L	H	H
					X	H	H	X	L	L	H	H
Test T ₀ , T ₁ & T ₂	L	H	H	H	X	L	L	L	L	L	L	H
					X	L	H	L	L	L	H	L
					X	L	H	H	L	L	H	L
					X	L	H	L	L	L	H	L
					X	H	L	L	L	H	L	L
					X	H	L	H	L	H	L	L
					X	H	H	H	L	H	H	L
Test T ₃	H	L	L	L	L	X	X	X	L	L	L	L
					H	X	X	X	L	L	L	H
Test T ₀ & T ₃	H	L	L	H	L	X	X	H	L	L	L	L
					H	X	X	L	L	L	H	L
					H	X	X	H	L	L	H	H
Test T ₁ & T ₃	H	L	H	L	L	X	L	X	L	L	L	L
					H	X	H	X	L	L	H	L
					H	X	L	X	L	L	H	L
					H	X	H	X	L	L	H	H
Test T ₀ , T ₁ & T ₃	H	L	H	H	L	X	L	H	L	L	L	L
					L	X	H	L	L	L	H	L
					L	X	H	H	L	L	H	L
					L	X	H	L	L	L	H	L
					L	X	L	L	L	L	H	L
					H	X	L	H	L	H	L	L
					H	X	H	L	L	H	L	L
					H	X	H	H	L	H	H	L
Test T ₂ & T ₃	H	H	L	L	L	L	X	X	L	L	L	L
					L	H	X	X	L	L	L	L
					H	L	X	X	L	L	H	L
					H	H	X	X	L	L	H	L
Test T ₀ , T ₂ & T ₃	H	H	L	H	L	L	X	L	L	L	L	L
					L	H	X	H	L	L	H	L
					L	H	X	L	L	L	H	L
					L	H	X	L	L	L	H	L
					H	L	X	H	L	H	L	L
					H	L	X	L	L	H	L	L
					H	H	X	L	L	H	L	L
					H	H	X	H	L	H	L	L
Test T ₁ , T ₂ & T ₃	H	H	H	L	L	L	L	X	L	L	L	L
					L	H	L	X	L	L	H	L
					L	H	L	X	L	L	H	L
					L	H	L	X	L	L	H	L
					H	L	L	X	L	H	L	L
					H	L	L	X	L	H	L	L
					H	H	L	X	L	H	L	L
					H	H	H	X	L	H	H	L

FUNCTION TABLE (Cont.)

Function	I ₃	I ₂	I ₁	I ₀	T ₃	T ₂	T ₁	T ₀	OR ₃	OR ₂	OR ₁	OR ₀
Test T ₀ , T ₁ , T ₂ & T ₃	H	H	H	H	L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L
					L	L	L	L	L	L	L	L

H = HIGH
L = LOW
X = Don't care

APPLICATION



AF001831

A typical computer control unit using the Am2909, Am2911, Am29803A and Am29811A. Note that the least significant microprogram sequencer is an Am2909 and the more significant sequencers are Am2911's.

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ABSOLUTE MAXIMUM RATINGS

Storage Temperature -65°C to +150°C
 Ambient Temperature Under Bias -55°C to +125°C
 Supply Voltage to Ground Potential
 (Pin 16 to Pin 8) Continuous -0.5V to +7.0V
 DC Voltage Applied to Outputs For
 High Output State -0.5V to +V_{CC} max
 DC Input Voltage -0.5V to +5.5V
 DC Output Current, Into Outputs 30mA
 DC Input Current -30mA to +5.0mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Commercial (C) Devices

Temperature 0°C to +70°C
 Supply Voltage +4.75V to +5.25V

Military (M) Devices

Temperature -55°C to +125°C
 Supply Voltage +4.5V to +5.5V

Operating ranges define those limits over which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range unless otherwise specified

Parameters	Description	Test Conditions	Min	Typ (Note 1)	Max	Units
V _{OH}	Output HIGH Voltage	V _{CC} = MIN, I _{OH} = -2.0mA V _{IN} = V _{IH} or V _{IL}	2.4			Volts
V _{OL}	Output LOW Voltage	V _{CC} = MIN, I _{OL} = 16mA V _{IN} = V _{IH} or V _{IL}			0.45	Volts
V _{IH}	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2.0			Volts
V _{IL}	Input LOW Level	Guaranteed input logical LOW voltage for all inputs			0.8	Volts
I _{IL}	Input LOW Current	V _{CC} = MAX, V _{IN} = 0.45V		-0.010	-0.250	mA
I _{IH}	Input HIGH Current	V _{CC} = MAX, V _{IN} = 2.7V			25	μA
I _I	Input HIGH Current	V _{CC} = MAX, V _{IN} = 5.5V			1.0	mA
I _{SC}	Output Short Circuit Current	V _{CC} = MAX, V _{OUT} = 0.0V (Note 2)	-20	-40	-90	mA
I _{CC}	Power Supply Current	All inputs = GND V _{CC} = MAX		95	130	mA
V _I	Input Clamp Voltage	V _{CC} = MIN, I _{IN} = -18mA			-1.2	Volts
I _{CEX}	Output Leakage Current	V _{CC} = MAX V _{CEST} = 2.4V			40	μA
		V _O = 4.5V			40	
		V _O = 0.4V			-40	
C _{IN}	Input Capacitance	V _{IN} = 2.0V @ f = 1MHz (Note 3)		4		pF
C _{OUT}	Output Capacitance	V _{OUT} = 2.0V @ f = MHz (Note 3)		8		

Notes: 1. Typical limits are at V_{CC} = 5.0V and T_A = 25°C.

2. Not more than one output should be shorted at a time. Duration of the short circuit should not be more than one second.

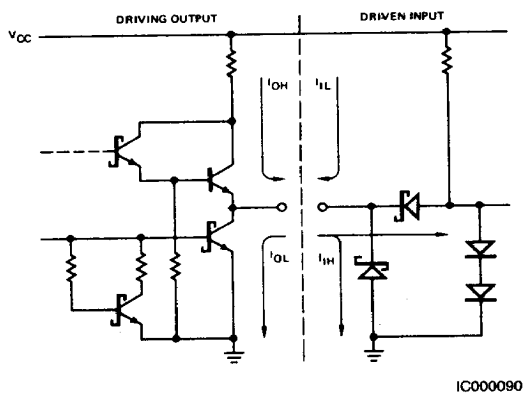
3. These parameters are not 100% tested, but are periodically sampled.

SWITCHING CHARACTERISTICS (T_A = +25°C, V_{CC} = 5.0V)

Parameters	Description	Test Conditions	Min	Typ	Max	Units
t _{PLH}	I _I to OR _i	C _L = 15pF R _L = 2.0kΩ		25	35	ns
t _{PHL}						
t _{PLH}	T _I to OR _i			25	35	ns
t _{PHL}						
t _{ZH}	OE _i to OR _i	C _L = 5.0pF R _L = 2.0kΩ		15	18	ns
t _{ZL}						
t _{HZ}	OE _i to OR _i			15	18	ns
t _{LZ}						

SWITCHING CHARACTERISTICS over operating range unless otherwise specified

Parameters	Description	Test Conditions	COMMERCIAL		MILITARY		Units
			Min	Max	Min	Max	
t_{PLH} t_{PHL}	I_i to OR_i	$C_L = 15\text{pF}$ $R_L = 2.0\text{k}\Omega$		45		60	ns
t_{PLH} t_{PHL}	T_i to OR_i			45		60	ns
t_{ZL} t_{ZH}	$\overline{OE}_i$ to OR_i			30		30	ns
t_{LZ} t_{LZ}	$\overline{OE}_i$ to OR_i			20		20	ns

LOW-POWER SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS

Note: Actual current flow direction shown.