Am25LS2536

Eight-Bit Decoder with Control Storage

DISTINCTIVE CHARACTERISTICS

- 8-bit decoder/demultiplexer with control storage
- 3-state outputs
- Common clock enable
- Common clear
- Polarity control
- Advanced Low-Power Schottky Process

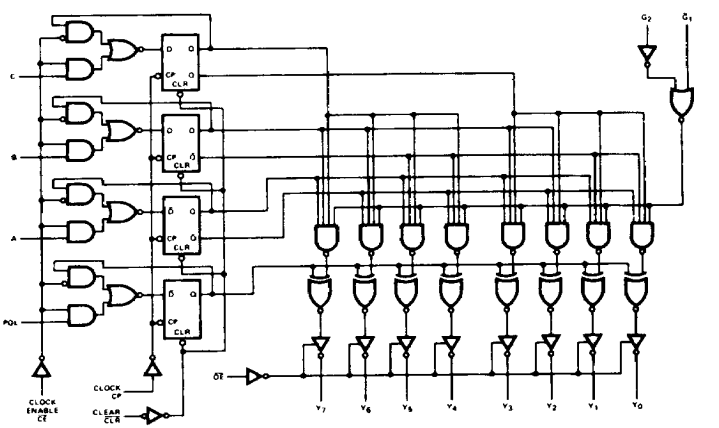
GENERAL DESCRIPTION

The Am25LS2536 is an eight-bit decoder with control storage. It provides a conventional 8-bit decoder function with two enable inputs which may also be used for data input. This can be used to implement a demultiplexer function. In addition, the exclusive "OR" gate allows for polarity control of the selected output. The 3-state outputs are enabled by a LOW on the ($\overline{OE}$) output enable.

The three control bits representing the output selection and the single bit polarity control are stored in "D" type flip-flops. These flip-flops have both Clear, Clock, and Clock Enable functions provided. The $\overline{G}_1$ and G_2 input provide either polarity for input control or data.

BLOCK DIAGRAM

8-Bit Decoder/Demultiplexer with Control Storage



BD001630

RELATED PRODUCTS

Part No.	Description
Am25LS2537	1 of 10 Decoder
Am25LS2538	1 of 8 Decoder
Am25LS2539	Dual 1 of 4 Decoder
Am25LS2548	Chip Select Address Decoder
Am2921	1 of 8 Decoder
Am2924	3 to 8 Line Decoder/Demultiplexer

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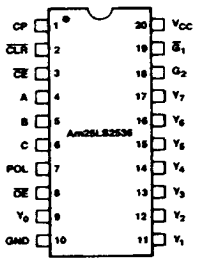
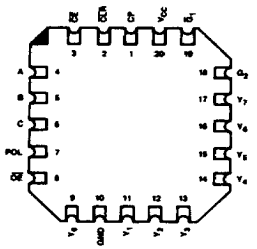
CONNECTION DIAGRAM
Top View

D-20-1



CD001930

L-20-1



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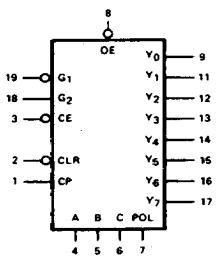
Note: Pin 1 is marked for orientation

LOGIC SYMBOL



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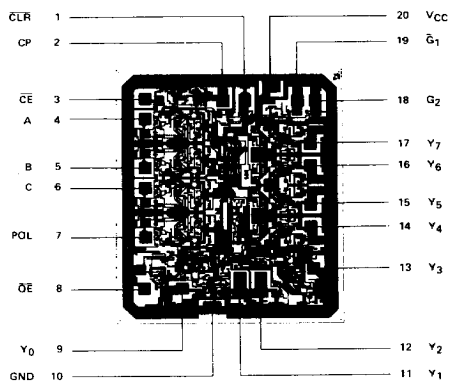
METALLIZATION AND PAD LAYOUT



DIE SIZE 0.084" x 0.099"

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).

Am25LS2536 **D** **C** **B**

- **B** — Screening Option
  - Blank – Standard processing
  - B – Burn-in
- **C** — Temperature (See Operating Range)
  - C – Commercial (0°C to +70°C)
  - M – Military (–55°C to +125°C)
- **D** — Package
  - D – 20-pin CERDIP
  - F – 20-pin flatpak
  - L – 20-pin leadless chip carrier
  - P – 20-pin plastic DIP
  - X – Dice
- **Am25LS2536** — Device type 8-Bit Decoder

Valid Combinations	
Am25LS2536	PC DC, DM FM LC, LM XC, XM

Valid Combinations

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

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PIN DESCRIPTION

Pin No.	Name	I/O	Description
2	$\overline{CLR}$	I	Clear. When the CLEAR input is LOW, the control register outputs (Q_A, Q_B, Q_C, Q_{POL}) are set LOW regardless of any other inputs.
1	CP	I	Clock. Enters data into the control register on the LOW-to-HIGH transition.
3	$\overline{CE}$	I	Clock Enable. Allows data to enter the control register when $\overline{CE}$ is LOW. When $\overline{CE}$ is HIGH, the Q_i outputs do not change state, regardless of data or clock input transitions.
4, 5, 6	A, B, C	I	Inputs to the control register which are entered on the LOW-to-HIGH clock transition if $\overline{CE}$ is LOW.
7	POL	I	Input to the control register bit used for determining the polarity of the selected output.
19	$\overline{G}_1$	I	Active LOW part of the expression $G = \overline{G}_1 \oplus G_2$ where G is either data input for the selected Y_n or is used as an input enable.
18	G_2	I	Active HIGH part of the expression $G = \overline{G}_1 G_2$.
	Y_n	O	The three-state outputs. When active ($\overline{OE}$ = LOW), one of eight outputs is selected by the code stored in the control register, with the polarity of all eight determined by the bit stored in the POL flip-flop of the control register. The selected output can further be controlled by G according to the expression $Y_{SELECTED} = \overline{G} \oplus Q_{POL}$.
8	$\overline{OE}$		Output Enable. When $\overline{OE}$ is HIGH the Y_n outputs are in the high impedance state; when $\overline{OE}$ is LOW the Y_n's are in their active state as determined by the other control logic. The $\overline{OE}$ input affects the Y_n output buffers only and has no effect on the control register or any other logic.

FUNCTION TABLE

	Inputs									Internal Registers				Three-State Outputs							
Mode	C	B	A	POL	$\overline{CE}$	$\overline{CLR}$	G*	$\overline{OE}$	CP	Q_C	Q_B	Q_A	Q_{POL}	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
Clear	X	X	X	X	X	L	L	L	X	L	L	L	L	H	H	H	H	H	H	H	H
	X	X	X	X	X	L	H	L	X	L	L	L	L	L	H	H	H	H	H	H	H
Hold	X	X	X	X	H	H	NC	L	↑	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Select	L	L	L	H	L	H	H	L	↑	L	L	L	H	L	H	L	L	L	L	L	L
	L	L	H	H	L	H	H	L	↑	L	L	H	H	L	L	H	L	L	L	L	L
	L	H	L	H	L	H	H	L	↑	L	H	L	H	L	L	L	H	L	L	L	L
	L	H	H	H	L	H	H	L	↑	L	H	H	H	L	L	L	L	H	L	L	L
	H	L	L	H	L	H	H	L	↑	H	L	L	H	L	L	L	L	L	H	L	L
	H	L	H	H	L	H	H	L	↑	H	L	H	H	L	L	L	L	L	L	H	L
	H	H	L	H	L	H	H	L	↑	H	H	L	H	L	L	L	L	L	L	L	H
	H	H	H	H	L	H	H	L	↑	H	H	H	H	L	L	L	L	L	L	L	H
	L	L	L	L	L	H	H	L	↑	L	L	L	L	L	H	H	H	H	H	H	H
	L	L	H	L	L	H	H	L	↑	L	L	H	L	H	L	H	H	H	H	H	H
	L	H	L	L	L	H	H	L	↑	L	H	L	L	H	H	L	H	H	H	H	H
	L	H	H	L	L	H	H	L	↑	L	H	H	L	H	H	H	L	H	H	H	H
	H	L	L	L	L	H	H	L	↑	H	L	L	L	H	H	H	H	L	H	H	H
	H	L	H	L	L	H	H	L	↑	H	L	H	L	H	H	H	H	H	L	H	H
	H	H	L	L	L	H	H	L	↑	H	H	L	L	H	H	H	H	H	H	L	H
	H	H	H	L	L	H	H	L	↑	H	H	H	L	H	H	H	H	H	H	H	L
	X	X	X	H	L	H	L	L	↑	X	X	X	H	L	L	L	L	L	L	L	L
	X	X	X	L	L	H	L	L	↑	X	X	X	L	H	H	H	H	H	H	H	H
Output Disable	X	X	X	X	X	X	X	H	X	NC	NC	NC	NC	Z	Z	Z	Z	Z	Z	Z	Z

NC = No Change X = Don't Care Z = High-Impedance ↑ = Low-to-High Transition

*

$\overline{G}_1$	G_2	G
L	L	L
L	H	H
H	L	L
H	H	L

ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... −65°C to +150°C
Ambient Temperature
Under Bias ..... −55°C to +125°C
Supply Voltage to Ground Potential
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 +7.0V
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 (Note 2)			Min	Typ (Note 1)	Max	Units
V_{OH}	Output HIGH Voltage	V_{CC} = MIN, V_{IN} = V_{IH} or V_{IL}	I_{OH} = −2.6mA, COM'L		2.4	3.2		Volts
			I_{OH} = −1.0mA, MIL		2.4	3.4		
V_{OL}	Output LOW Voltage	V_{CC} = MIN, V_{IN} = V_{IH} or V_{IL}	I_{OL} = 24mA, COM'L			0.4	0.5	Volts
			I_{OL} = 12mA, MIL			0.35	0.4	
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.		MIL			0.7	Volts
				COM'L			0.8	
V_I	Input Clamp Voltage	V_{CC} = MIN, I_{IN} = −18mA					−1.5	Volts
I_{IL}	Input LOW Current	V_{CC} = MAX, V_{IN} = 0.4V					−0.4	mA
I_{IH}	Input HIGH Current	V_{CC} = MAX, V_{IN} = 2.7V					20	μA
I_I	Input HIGH Current	V_{CC} = MAX, V_{IN} = 7.0V					0.1	mA
I_O	Off-State (High-Impedance) Output Current	V_{CC} = MAX	V_O = 0.4V				−20	μA
			V_O = 2.4V				20	
I_{SC}	Output Short Circuit Current (Note 3)	V_{CC} = MAX			−15		−85	mA
I_{CC}	Power Supply Current (Note 4)	V_{CC} = MAX				37	56	mA

Notes:
1. Typical limits are at V_{CC} = 5.0V, 25°C ambient and maximum loading.
2. For conditions shown as MIN or MAX, use the appropriate value specified under Operating Ranges for the applicable device type.
3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.
4. Test Conditions A = B = C = $\overline{G_1}$ = $\overline{OE}$ = $\overline{CE}$ = GND; CLK = $\overline{CLR}$ = POL = G_2 = 4.5V.

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Refer to Page 13-1 for Essential Information on Military Devices

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

Parameters	Description		Test Conditions	Min	Typ	Max	Units
t_{PLH}	$\overline{G}_1$ to Y_0 – Y_7		C_L = 45pF R_L = 667Ω		17	25	ns
t_{PLH}					23	34	
t_{PLH}	G_2 to Y_0 – Y_7				20	30	ns
t_{PHL}					26	39	
t_{PLH}	CP to Y_0 – Y_7				24	36	ns
t_{PHL}					30	45	
t_{PLH}	$\overline{CLR}$ to Y_0 – Y_7				24	36	ns
t_{PHL}					31	46	
t_s	Clock Enable to CP			25			ns
t_h				0			
t_s	A, B, C, POL to CP			15			ns
t_h				0			
t_{HZ}	$\overline{OE}$ to Y_0 – Y_7		C_L = 5pF R_L = 667Ω		9	14	ns
t_{LZ}					11	17	
t_{ZH}	$\overline{OE}$ to Y_0 – Y_7		C_L = 45pF R_L = 667Ω		15	22	ns
t_{ZL}					16	24	
t_s	Set-up Time, Clear Recovery to CP			20			ns
t_{pw}	Pulse Width	Clock		15			ns
		Clear		15			

SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

Parameters	Description		Test Conditions	COMMERCIAL Am25LS2536 Min	COMMERCIAL Am25LS2536 Max	MILITARY Am25LS2536 Min	MILITARY Am25LS2536 Max	Units
t_{PLH}	$\overline{G}_1$ to Y_0 – Y_7		C_L = 45pF R_L = 667Ω		29		31	ns
t_{PHL}					39		42	
t_{PLH}	G_2 to Y_0 – Y_7				34		37	ns
t_{PHL}					44		48	
t_{PLH}	CP to Y_0 – Y_7				40		42	ns
t_{PHL}						51		55
t_{PLH}	$\overline{CLR}$ to Y_0 – Y_7					47		54
t_{PHL}					58		66	ns
t_s	Clock Enable to CP			27		30		ns
t_h				0		0		
t_s	A, B, C, POL to CP			17		20		ns
t_h				0		0		
t_{HZ}	$\overline{OE}$ to Y_0 – Y_7		C_L = 5.0pF R_L = 667Ω		17		18	ns
t_{LZ}					27		34	
t_{ZH}	$\overline{OE}$ to Y_0 – Y_7		C_L = 5.0pF R_L = 667Ω		25		27	ns
t_{ZL}					28		30	
t_s	Set-up Time, Clear Recovery to CP			23		25		ns
t_{pw}	Pulse Width	Clock		17		20		ns
		Clear		15		15		

*AC performance over the operating temperature range is guaranteed by testing defined in Group A, Subgroup 9.

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Refer to Page 13-1 for Essential Information on Military Devices