

# 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

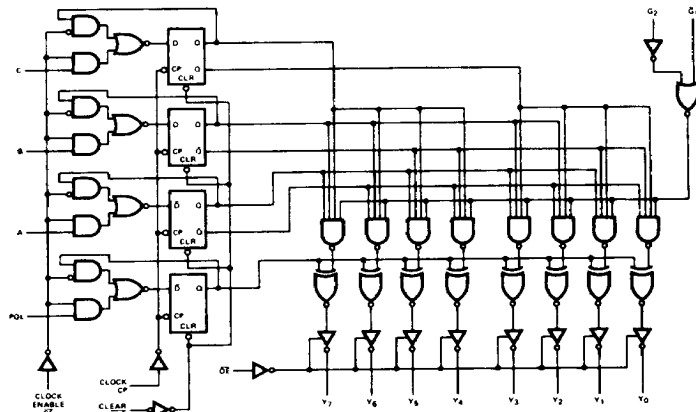
## GENERAL DESCRIPTION

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  $\overline{G}_2$  input provide either polarity for input control or data.

## BLOCK DIAGRAM

8-Bit Decoder/Demultiplexer with Control Storage



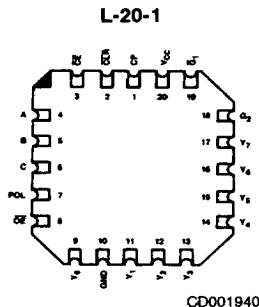
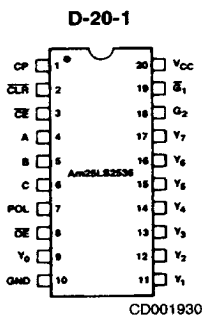
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## RELATED PRODUCTS

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

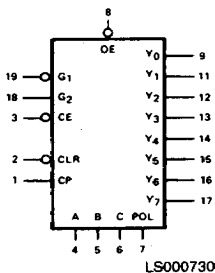
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### CONNECTION DIAGRAM Top View

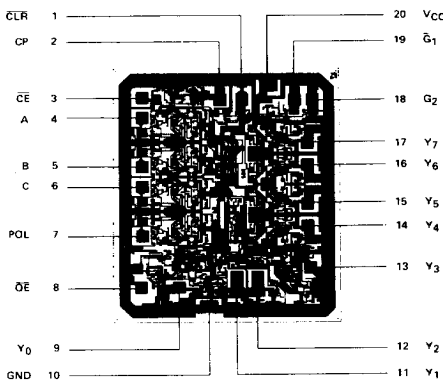


Note: Pin 1 is marked for orientation

### LOGIC SYMBOL



### METALLIZATION AND PAD LAYOUT



### 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

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 - 20-pin Cerdip  
F - 20-pin flatpak  
L - 20-pin leadless chip carrier  
P - 20-pin plastic DIP  
X - Dice

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.

## PIN DESCRIPTION

Pin No.	Name	I/O	Description
2	CLR	I	Clear. When the CLEAR input is LOW, the control register outputs (Q <sub>A</sub> , Q <sub>B</sub> , Q <sub>C</sub> , Q <sub>POL</sub> ) 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	CE	I	Clock Enable. Allows data to enter the control register when CE is LOW. When CE is HIGH, the Q <sub>i</sub> 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 CE is LOW.
7	POL	I	Input to the control register bit used for determining the polarity of the selected output.
19	G <sub>1</sub>	I	Active LOW part of the expression $G = \bar{G}_1 \oplus G_2$ where G is either data input for the selected Y <sub>n</sub> or is used as an input enable.
18	G <sub>2</sub>	I	Active HIGH part of the expression $G = \bar{G}_1 \oplus G_2$ .
	Y <sub>n</sub>	O	The three-state outputs. When active (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 $Y_{SELECTED} = G \oplus Q_{POL}$ .
8	OE		Output Enable. When OE is HIGH the Y <sub>n</sub> outputs are in the high impedance state; when OE is LOW the Y <sub>n</sub> 's are in their active state as determined by the other control logic. The OE input affects the Y <sub>n</sub> output buffers only and has no effect on the control register or any other logic.

## FUNCTION TABLE

Mode	Inputs									Internal Registers				Three-State Outputs								
	C	B	A	POL	CE	CLR	G*	OE	CP	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>	Q <sub>POL</sub>	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	
Clear	X	X	X	X	X	L	L	L	X	L	L	L	L	H	H	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	H	L	L	L	L	L	L	L	L
	L	L	L	H	L	H	H	L	↑	L	L	L	H	H	L	L	L	L	L	L	L	L
	L	H	L	H	L	H	H	L	↑	L	H	L	H	H	L	L	L	L	L	L	L	L
	L	H	H	L	L	H	H	L	↑	L	H	H	H	H	L	L	L	L	L	L	L	L
	H	L	L	H	L	H	H	L	↑	H	L	L	H	H	L	L	L	L	L	L	L	L
	H	L	L	H	L	H	H	L	↑	H	H	L	H	H	L	L	L	L	L	L	L	L
	H	H	L	H	L	H	H	L	↑	L	L	L	L	L	L	L	L	L	L	L	L	L
	H	H	H	L	L	H	H	L	↑	L	L	L	L	L	L	L	L	L	L	L	L	L
	X	X	X	H	L	H	L	L	↑	X	X	X	H	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	H
Output Disable	X	X	X	X	X	X	X	H	X	NC	NC	NC	NC	Z	Z	Z	Z	Z	Z	Z	Z	Z

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

\*

G <sub>1</sub>	G <sub>2</sub>	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<sub>CC</sub> 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 <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = MIN V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -2.6mA, COM'L	2.4	3.2	Volts	
			I <sub>OH</sub> = -1.0mA, MIL	2.4	3.4		
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = MIN V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 24mA, COM'L		0.4	0.5	Volts
			I <sub>OL</sub> = 12mA, MIL		0.35	0.4	
V <sub>IH</sub>	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2.0			Volts	
V <sub>IL</sub>	Input LOW Level	Guaranteed input logical LOW voltage for all inputs.	MIL		0.7	Volts	
			COM'L		0.8		
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18mA			-1.5	Volts	
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4V			-0.4	mA	
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7V			20	μA	
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0V			0.1	mA	
I <sub>O</sub>	Off-State (High-Impedance) Output Current	V <sub>CC</sub> = MAX	V <sub>O</sub> = 0.4V		-20	μA	
			V <sub>O</sub> = 2.4V		20		
I <sub>SC</sub>	Output Short Circuit Current (Note 3)	V <sub>CC</sub> = MAX	-15		-85	mA	
I <sub>CC</sub>	Power Supply Current (Note 4)	V <sub>CC</sub> = MAX		37	56	mA	

- Notes: 1. Typical limits are at V<sub>CC</sub> = 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 = G<sub>1</sub> = OE = CE = GND; CLK = CLR = POL = G<sub>2</sub> = 4.5V.

**SWITCHING CHARACTERISTICS** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}$ )

Parameters	Description	Test Conditions	Min	Typ	Max	Units
$t_{PLH}$	$\bar{G}_1$ to $Y_0 - Y_7$	$C_L = 45\text{pF}$ $R_L = 667\Omega$		17	25	ns
$t_{PHL}$				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	
$t_{PLH}$	$\bar{C}LR$ 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			
$t_{HZ}$	$\bar{O}E$ to $Y_0 - Y_7$	$C_L = 5\text{pF}$ $R_L = 667\Omega$		9	14	ns
$t_{LZ}$				11	17	
$t_{ZH}$	$\bar{O}E$ to $Y_0 - Y_7$	$C_L = 45\text{pF}$ $R_L = 667\Omega$		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		MILITARY		Units
			Am25LS2536		Am25LS2536		
			Min	Max	Min	Max	
$t_{PLH}$	$\bar{G}_1$ to $Y_0 - Y_7$	$C_L = 45\text{pF}$ $R_L = 667\Omega$		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		
$t_{PLH}$	$\bar{C}LR$ to $Y_0 - Y_7$					47	54 ns
$t_{PHL}$					58		
$t_s$	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		
$t_{HZ}$	$\bar{O}E$ to $Y_0 - Y_7$	$C_L = 5.0\text{pF}$ $R_L = 667\Omega$		17		18	ns
$t_{LZ}$				27		34	
$t_{ZH}$	$\bar{O}E$ to $Y_0 - Y_7$	$C_L = 5.0\text{pF}$ $R_L = 667\Omega$		25		27	ns
$t_{ZL}$					28		
$t_s$	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.