

Am25LS2537

One-of-Ten Decoder with Three-State Outputs and Polarity Control

DISTINCTIVE CHARACTERISTICS

- Three-state outputs
- Separate output polarity control
- Inverting and non-inverting enable inputs
- Does not respond to codes above nine
- A.C. parameters specified over operating temperature and power supply ranges

GENERAL DESCRIPTION

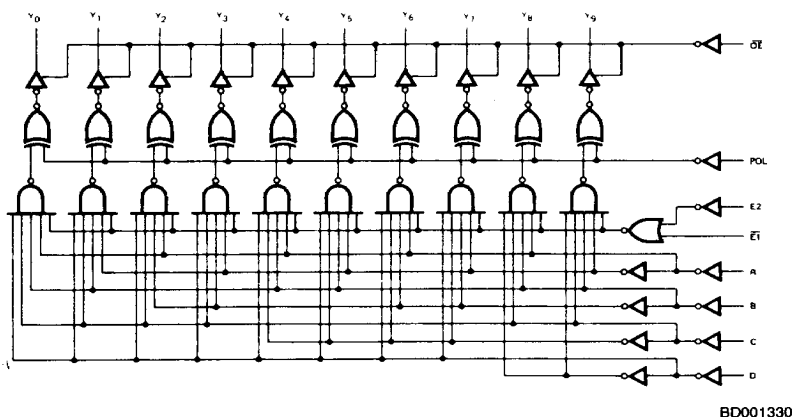
The Am25LS2537 is a demultiplexer/one-of-ten decoder that accepts four active high BCD inputs and selects one-of-ten mutually exclusive outputs. The device features three-state outputs as well as a buffered common polarity control such that the outputs are mutually exclusive active-low or mutually exclusive active-high. The logic design of the Am25LS2537 ensures that all outputs are unselected when the binary codes greater than nine are applied to the inputs. The inputs A, B, C, and D of the Am25LS2537 correspond to the respective binary weight of 1, 2, 4, and 8.

The output enable ($\overline{OE}$) input controls the three-state outputs. When the $\overline{OE}$ input is HIGH, the outputs are in the high-impedance state. When the $\overline{OE}$ input is LOW, the

outputs are enabled. The polarity (POL) input is used to drive the Y outputs to either the active-HIGH state or the active-LOW state. When the POL input is LOW, the outputs are active-HIGH. When the POL input is HIGH, the Y outputs are active-LOW. The device features one active-HIGH and one active-LOW enable input which can be used for gating the decoder or can be used with incoming data for demultiplexing applications.

The Am25LS2537 is packaged in a space saving (0.3-inch row spacing) 20-pin package. The device also features Am25LS family faster switching specifications, higher noise margin, and twice the fan-out over the military temperature range when compared with Am54LS/74LS devices.

BLOCK DIAGRAM



RELATED PRODUCTS

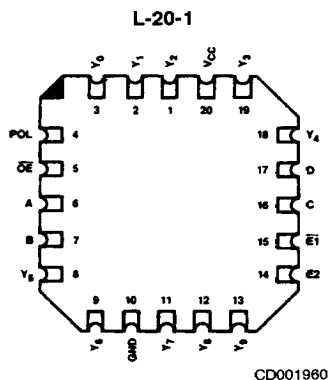
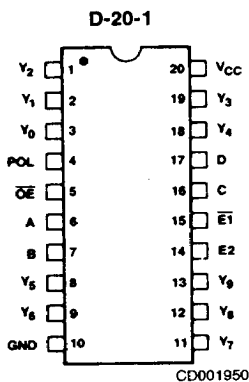
Part No.	Description
Am25LS2536	8-Bit Decoder
Am25LS2538	1-of-8 Decoder
Am25LS2539	Dual 1-of-4 Decoder
Am25LS2548	Chip Select Address Decoder
Am2921	1-of-8 Decoder
Am2924	3-to-8 Line Decoder/Demultiplexer

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

CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation

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).

Am25LS2537

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
1-of-10 Decoder

Valid Combinations

Valid Combinations	
Am25LS2537	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
6, 7, 16, 17	A, B, C, D	I	To select inputs to the decoder.
15	$\overline{E1}$	I	The active-LOW enable input. A HIGH on the $\overline{E1}$ input inhibits the decoder function regardless of any other inputs.
14	E2	I	The active-HIGH enable input. A LOW on the E2 input forces all the decoder functions to the inactive state regardless of any other inputs.
4	POL	I	The polarity control for the output function. When the polarity control is HIGH, the outputs are active-LOW. When the POL input is LOW, the outputs are active-HIGH.
5	$\overline{OE}$	O	Output Enable. An active-LOW three-state control used to enable the outputs. A HIGH level input forces the output to the high-impedance (off) state.
	Y_i	O	Decoder outputs. The ten outputs of the decoder.

FUNCTION TABLE

FUNCTION	INPUTS								OUTPUTS									
	$\overline{OE}$	E1	E2	POL	D	C	B	A	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
3-State	H	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
Disable	L	H	X	L	X	X	X	X	L	L	L	L	L	L	L	L	L	L
	L	H	X	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H
	L	X	L	L	X	X	X	X	L	L	L	L	L	L	L	L	L	L
Active-HIGH Output	L	X	L	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H
	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
	L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
Active-LOW Output	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
	L	L	H	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H

H = HIGH
L = LOW

X = Don't Care
Z = High-Impedance



The diagram shows the Am25LS2537 decoder with the following connections:

- Inputs:**
 - D, C, B, A: Connected to the four lines of the THUMB WHEEL SWITCH.
 - E2: Connected to H.
 - E1: Connected to ground.
 - POL: Connected to the POLARITY CONTROL input, which is also connected to ground.
- Outputs:**
 - Y0 through Y9: Ten output lines.
 - Y0: Connected to ground.

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BCD to Decimal (One-of-Ten) Decoder.

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}	MIL, I _{OH} = -1.0mA COM'L, I _{OH} = -2.6mA	2.4 3.4		Volts
V _{OL}	Output LOW Voltage (Note 5)	V _{CC} = MIN V _{IN} = V _{IH} or V _{IL}	I _{OL} = 4.0 mA I _{OL} = 8.0mA I _{OL} = 12mA		0.4 0.45 0.5	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.	MIL COM'L		0.7 0.8	Volts
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			-0.36	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 _{OZ}	Off-State (High-Impedance) Output Current	V _{CC} = MAX V _O = 0.4V V _O = 2.4V			-20 20	μA
I _{SC}	Output Short Circuit Current (Note 3)	V _{CC} = MAX	-15		-85	mA
I _{CC}	Power Supply Current (Note 4)	V _{CC} = MAX		25	40	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 = D = E1 = GND; E2 = POL = OE = 4.5V.
 5. V_{OL} is specified with total device I_{OL} = 60mA (max).

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

Parameters	Description	Test Conditions	Min	Typ	Max	Units
tPLH	A, B, C, D to Y _i	C _L = 15pF R _L = 2.0kΩ		22	33	ns
tPHL				17	25	
tPLH	E1 to Y _i			19	28	ns
tPHL				21	31	
tPLH	E2 to Y _i			21	31	ns
tPHL				23	34	
tPLH	POL to Y _i			18	27	ns
tPHL				21	31	
tZH	OE Control to Y _i	C _L = 5.0pF R _L = 2.0kΩ		22	33	ns
tZL				14	21	
tHZ	OE Control to Y _i			19	28	ns
tLZ				23	34	

SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

Parameters	Description	Test Conditions	COMMERCIAL		MILITARY		Units
			Am25LS2537		Am25LS2537		
			Min	Max	Min	Max	
tPLH	A, B, C, D to Y _i	C _L = 50pF R _L = 2.0kΩ		41		48	ns
tPHL				32		39	
tPLH	E1 to Y _i			34		40	ns
tPHL				38		45	
tPLH	E2 to Y _i			38		45	ns
tPHL				42		49	
tPLH	POL to Y _i			32		37	ns
tPHL				42		52	
tZH	OE Control to Y _i	C _L = 5.0pF R _L = 2.0kΩ		44		55	ns
tZL				23		25	
tHZ	OE Control to Y _i			33		37	ns
tLZ				38		42	

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