Am55/75325
Memory Drivers

Distinctive Characteristics

600mA output source/sink capability
Output short circuit protection
Two source outputs and two sink outputs

- Source strobe input and sink strobe input
- 24 volt output range
- 100% reliability assurance testing in compliance with MIL-STD-883

FUNCTIONAL DESCRIPTION

The Am55/75325 is a high-speed driver for use in magnetic memory systems The device contains two 600mA NPN source transistor switch pairs and two 600mA NPN sink transistor switch pairs

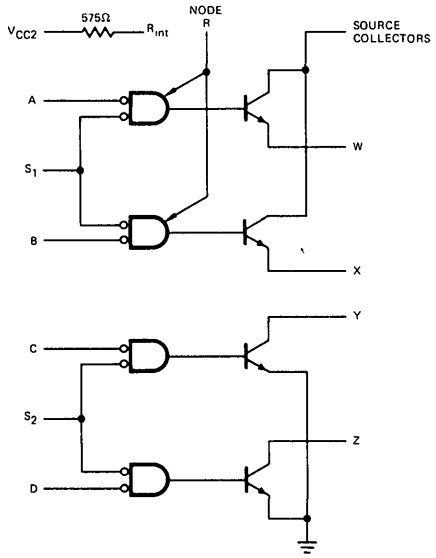
The W source output is enabled when the A input is LOW The X source output is enabled when the B input is LOW When the S1 source strobe input goes LOW, the selected source output will turn on The Y sink output is enabled when the C input is LOW. The Z sink output is enabled when the D input is LOW. When the S2 sink strobe input is LOW, the selected sink output will turn on. Thus, an output can be enabled and turned on with minimum skew time

When R_{int} and node R are connected together, the base drive for the source output transistors is set by a 575Ω internal resistor. This method provides the required base drive for source currents up to 375mA with V_{CC2} at 15V or 600mA with V_{CC2} at 24V.

When source currents greater than 375mA are used, an external resistor should be connected from V_{CC2} to node R and R_{int} should be left unconnected This allows the base drive of the source transistors to be regulated within ±5%

Each output sink transistor has an internal pull-up resistor in parallel with a clamp diode connected to V_{CC2} This provides protection from voltage surges associated with switching inductive loads.

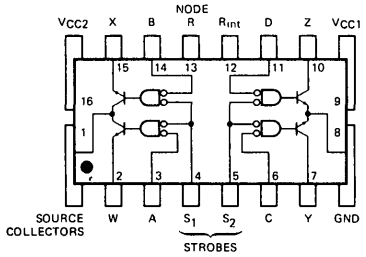
LOGIC DIAGRAM



ORDERING INFORMATION

Package Type	Temperature Range	Order Number
Molded DIP	0°C to +70°C	SN75325N
Hermetic DIP	0°C to +70°C	SN75325J
Dice	0°C to +70°C	AM75325X
Hermetic DIP	−55°C to +125°C	SN55325J
Hermetic Flat Pak	−55°C to +125°C	SN55325W
Dice	−55°C to +125°C	AM55325X

CONNECTION DIAGRAM
Top View



Note Pin 1 is marked for orientation

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MAXIMUM RATINGS (Above which the useful life may be impaired)

Storage Temperature	−65°C to +150°C
Temperature (Ambient) Under Bias	−55°C to +125°C
Supply Voltage to Ground Potential V_{CC1}	0 V to +7 0 V
Supply Voltage to Ground Potential V_{CC2}	0 V to +25 V
DC Input Voltage	−0 5 V to +5 5 V
Continuous Total Dissipation at (or Below) 100°C Case Temperature (Note 1)	1 W

Note 1 For operation above 100°C case temperature see derating curves

ELECTRICAL CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (Unless Otherwise Noted)

Am75325 T_A = 0°C to +70°C
Am55325 T_A = −55°C to +125°C

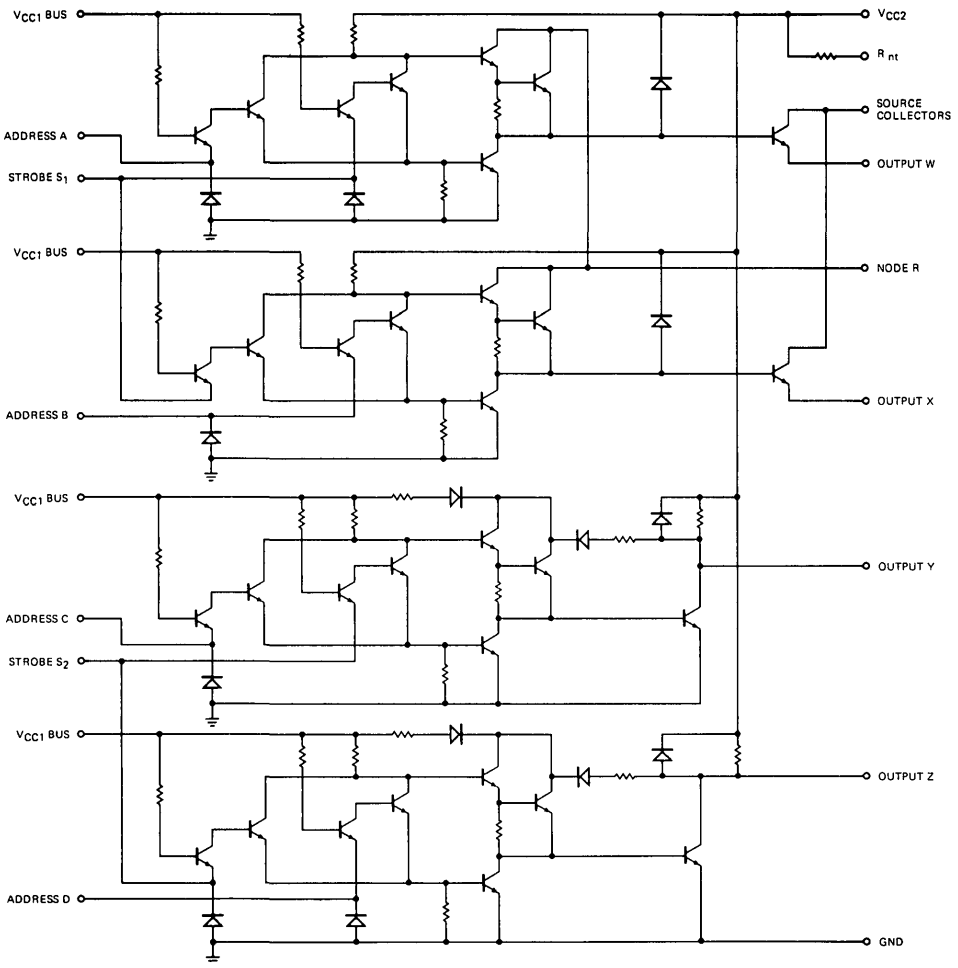
Parameters	Description		Test Figure	Test Conditions			Min	Typ (Note 1)	Max	Units
V_{IH}	High Level Input Voltage		1 & 2				2 0			Volts
V_{IL}	Low Level Input Voltage		3 & 4						0 8	Volts
V_I	Input Clamp Voltage		5	V_{CC1} = 4 5V V_{CC2} = 24V I_I = −10mA T_A = 25°C				−1 3	−1 7	Volts
$I_{(off)}$	Source Collector Terminal Off State Current		1	V_{CC1} = 4 5V V_{CC2} = 24V	Am55 −55°C to +125°C				500	µA
					Am55 T_A = 25°C			3 0	150	
					Am75 0°C to +70°C				200	
					Am75 T_A 25°C			3 0	200	
V_{OH}	High Level Sink Output Voltage		2	V_{CC1} = 4 5V V_{CC2} = 24V I_O = 0			19	23		Volts
$V_{(sat)}$	Saturation Voltage (Note 2)	Source Outputs	3	V_{CC1} = 4 5V V_{CC2} 15V R_L = 24Ω $I_{(source)}$ ≈ −600mA (Note 4)	Full Range (Note 3)				0 9	Volts
					T_A 25°C	Am55		0 43	0 7	
						Am75		0 43	0 75	
		Sink Outputs	4	V_{CC1} = 4 5V V_{CC2} = 15V R_L 24Ω $I_{(sink)}$ ≈ 600mA (Note 4)	Full Range (Note 3)				0 9	Volts
					T_A = 25°C	Am55		0 43	0 7	
						Am75		0 43	0 75	
I_I	Input Current at Maximum Input Voltage	Address Inputs	5	V_{CC1} = 5 5V V_{CC2} = 24V V_{IN} = 5 5V					1 0	mA
		Strobe Inputs							2 0	
I_{IH}	High Level Input Current	Address Inputs	5	V_{CC1} = 5 5V V_{CC2} = 24V V_{IN} = 2 4V				3 0	40	µA
		Strobe Inputs						6 0	80	
I_{IL}	Low Level Input Current	Address Inputs	5	V_{CC1} = 5 5V V_{CC2} = 24V V_{IN} = 0 4V				−1 0	−1 6	mA
		Strobe Inputs						−2 0	−3 2	
$I_{CC(off)}$	Supply Current All Sources and Sinks Off	From V_{CC1}	6	V_{CC1} = 5 5V V_{CC2} = 24V T_A 25°C				14	22	mA
		From V_{CC2}						7 5	20	
I_{CC1}	Supply Current from V_{CC1} Either Sink On		7	V_{CC1} 5 5V V_{CC2} = 24V $I_{(sink)}$ = 50mA T_A = 25°C				55	70	mA
I_{CC2}	Supply Current from V_{CC2} Either Source On		8	V_{CC1} = 5 5V V_{CC2} = 24V $I_{(source)}$ = −50mA T_A = 25°C (Note 4)				32	50	mA

Notes 1 All typical values are at T_A = 25°C
2 Not more than one output is to be on at any one time
3 Full range for Am55325 is −55°C to 125°C and for Am75325 is 0°C to 70°C
4 These parameters must be measured using pulse techniques t_W = 200µs duty cycle ≤ 2%

Switching Characteristics (V_{CC1} = 5V, T_A = 25°C)

Parameters	To (Output)	Test Figure	Test Conditions	Min	Typ	Max	Units
t_{PLH}	Source Collectors	9	V_{CC2} = 15V, R_L = 24Ω C_L = 25pF		25	50	ns
t_{PHL}					25	50	
t_{TLH}	Source Outputs	10	V_{CC2} = 20V R_L = 1kΩ C_L = 25pF		7 0		ns
t_{THL}					55		
t_{PLH}	Sink Outputs	9	V_{CC2} = 15V, R_L = 24Ω C_L = 25pF		20	45	ns
t_{PHL}					20	45	
t_{TLH}	Sink Outputs	9	V_{CC2} = 15V, R_L = 24Ω C_L = 25pF		7 0	15	ns
t_{THL}					9 0	20	
t_S	Sink Outputs	9	V_{CC2} = 15V, R_L = 24Ω C_L = 25pF		15	30	ns

SCHEMATIC DIAGRAM



FUNCTION TABLE

ADDRESS INPUTS				STROBE INPUTS		OUTPUTS			
Source		Sink		Source	Sink	Source		Sink	
A	B	C	D	S1	S2	W	X	Y	Z
L	H	X	X	L	H	ON	OFF	OFF	OFF
H	L	X	X	L	H	OFF	ON	OFF	OFF
X	X	L	H	H	L	OFF	OFF	ON	OFF
X	X	H	L	H	L	OFF	OFF	OFF	ON
X	X	X	X	H	H	OFF	OFF	OFF	OFF
H	H	H	H	X	X	OFF	OFF	OFF	OFF

H = HIGH
L = LOW
X = Don t Care

Note Not more than one output is to be on at any one time

DEFINITION OF FUNCTIONAL TERMS

A The enable input for the W source output When the A input is LOW, the W output is enabled

B The enable input for the X source output When the B input is LOW, the X output is enabled

C The enable input for the Y sink output When the C input is LOW, the Y output is enabled

D The enable input for the Z sink output When the D input is LOW, the Z output is enabled

S1 The strobe input for the source drivers When the S1 input is LOW, the enabled source driver is on

S2 The strobe input for the sink drivers When the S2 input is LOW, the enabled sink driver is on

W, X The two source driver outputs

Y, Z The two sink driver outputs

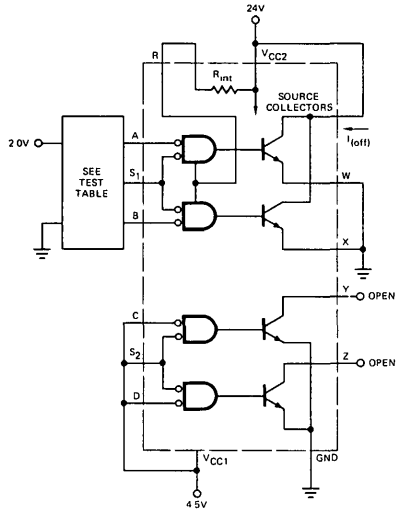
Source Collectors The common node of the driver transistors of the source outputs

R_{int} The node for a 575Ω internal resistor The other terminal of the resistor is connected internally to V_{CC2}

R The base drive node of the output source transistor drivers

DC PARAMETER MEASUREMENT INFORMATION

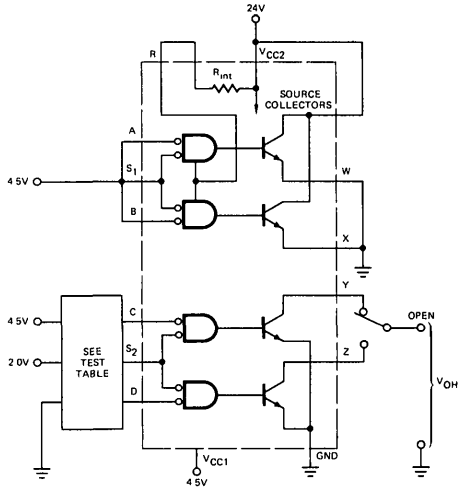
DC TEST CIRCUITS



TEST TABLE

A	B	S1
GND	GND	2V
2V	2V	GND

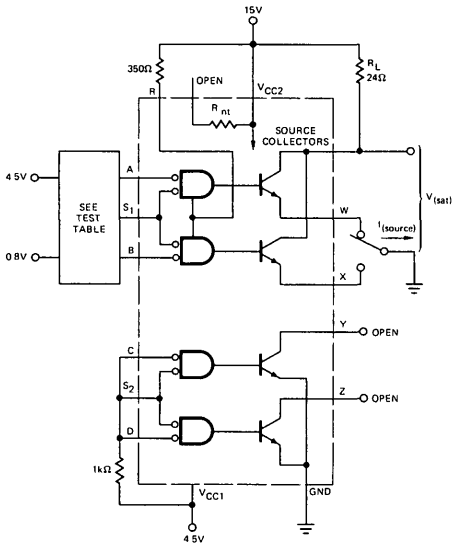
Figure 1. V_{IH} and $I_{(Off)}$



TEST TABLE

C	D	S2	Y	Z
2V	4 5V	GND	V_{OH}	OPEN
GND	4 5V	2V	V_{OH}	OPEN
4 5V	2V	GND	OPEN	V_{OH}
4 5V	GND	2V	OPEN	V_{OH}

Figure 2. V_{IH} and V_{OH}

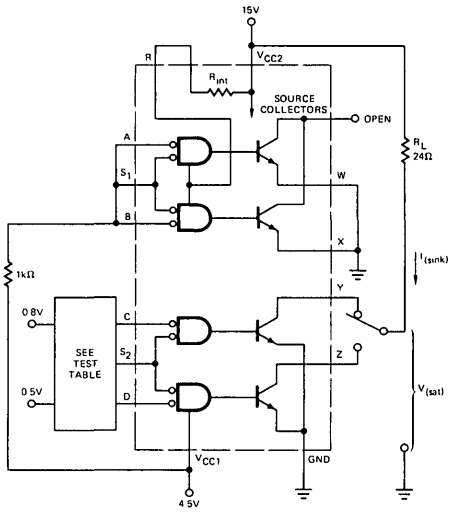


Note
These parameters must be measured using pulse techniques
t_W = 200μs duty cycle ≤ 2%

TEST TABLE

A	B	S1	W	X
0 8V	4 5V	0 8V	GND	OPEN
4 5V	0 8V	0 8V	OPEN	GND

Figure 3. V_{IL} and Source $V_{(sat)}$



Note
These parameters must be measured using pulse techniques
t_W = 200μs duty cycle ≤ 2%

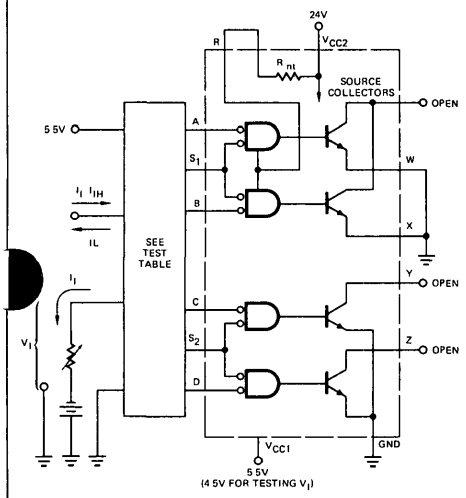
TEST TABLE

C	D	S2	Y	Z
0 8V	4 5V	0 8V	R_L	OPEN
4 5V	0 8V	0 8V	OPEN	R_L

Figure 4. V_{IL} and Sink $V_{(sat)}$

DC PARAMETER MEASUREMENT INFORMATION (Cont.)

DC TEST CIRCUITS



I_I, I_{IH}

Apply V_I = 5.5V, Measure I_I / Apply V_I = 2.4V, Measure I_{IH}	Ground	Apply 5.5V
A	S1	B C S2 D
S1	A B	C S2 D
B	S1	A C S2 D
C	S2	A S1 B D
S2	C D	A S1 B
D	S2	A S1 B C

V_I, I_{IL}

Apply V_I = 0.4V Measure I_{IL} / Apply I_I = −10mA Measure V_I	Apply 5.5V
A	S1 B C S2 D
S1	A B C S2 D
B	A S1 C S2 D
C	A S1 B S2 D
S2	A S1 B C D
D	A S1 B C S2

Figure 5 V_I, I_I, I_{IH}, and I_{IL}

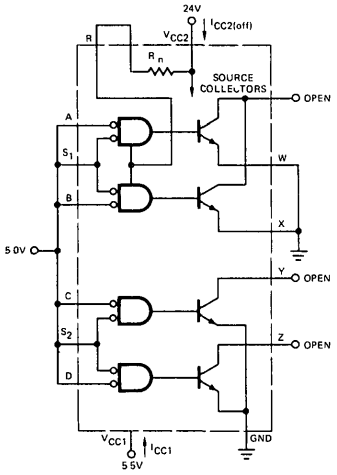
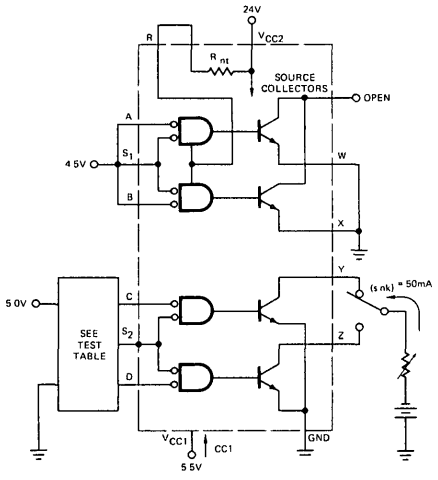


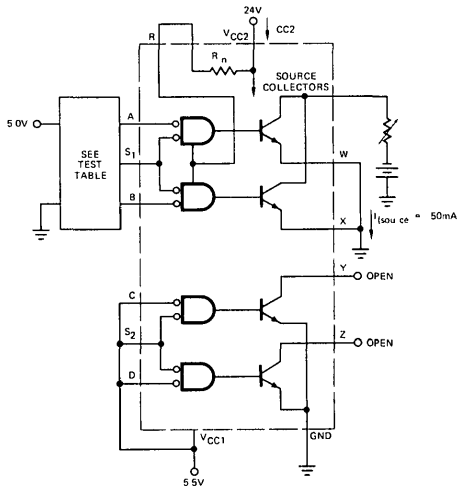
Figure 6 $I_{CC1(off)}$ and $I_{CC2(off)}$



TEST TABLE

C	D	S2	Y	Z
GND	5V	GND	$I_{(sink)}$	OPEN
5V	GND	GND	OPEN	$I_{(sink)}$

Figure 7 I_{CC1}, Either Sink On



TEST TABLE

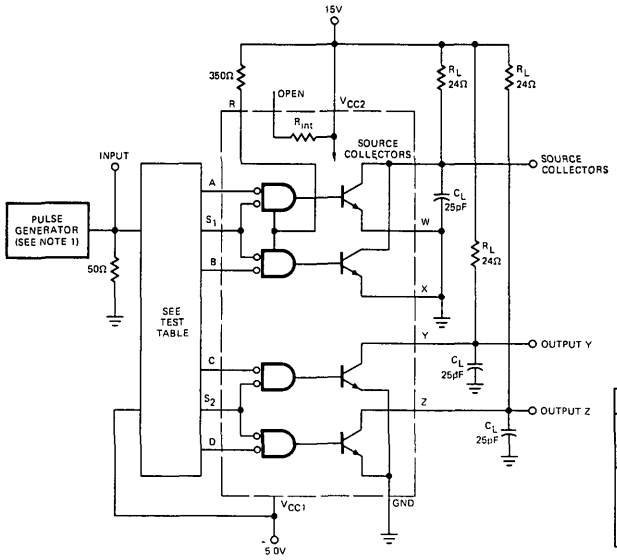
A	B	S1
GND	5V	GND
5V	GND	GND

Figure 8 I_{CC2}, Either Source On

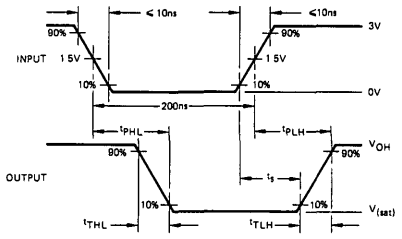
AC PARAMETER MEASUREMENT INFORMATION

SWITCHING CHARACTERISTICS

TEST CIRCUIT



VOLTAGE WAVEFORMS



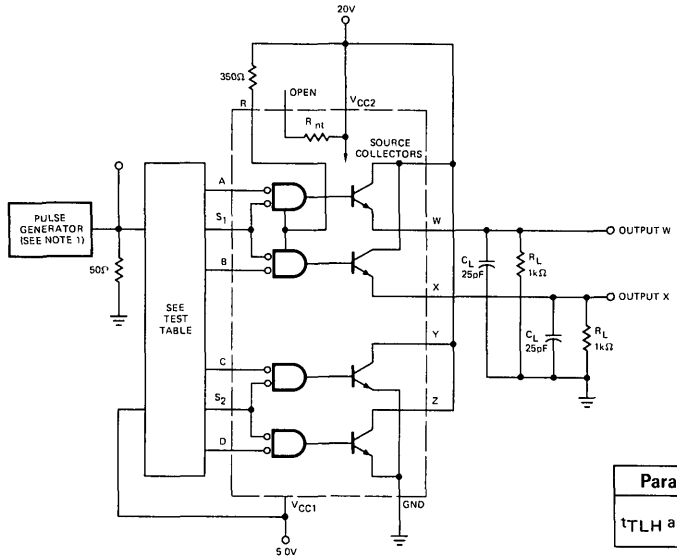
TEST TABLE

Parameter	Output Under Test	Input	Connect to 5V
t_{PLH} and t_{PHL}	Source collectors	A and S1	B, C, D and S2
		B and S1	A, C, D and S2
t_{PLH}, t_{PHL}, t_{TLH}, t_{THL}, and t_S	Sink output Y	C and S2	A, B, D and S1
	Sink output Z	D and S2	A, B, C and S1

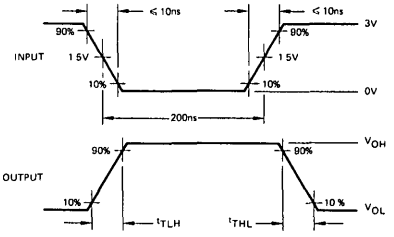
Notes 1 The pulse generator has the following characteristics Z_{out} = 50Ω, duty cycle ≤ 1%
2 C_L includes probe and jig capacitance

Figure 9. Switching Times

TEST CIRCUIT



VOLTAGE WAVEFORMS



TEST TABLE

Parameter	Output Under Test	Input	Connect to 5V
t_{TLH} and t_{THL}	Source output W	A and S1	B, C, D, and S2
	Source output X	B and S1	A, C, D, and S2

Notes 1 The pulse generator has the following characteristics Z_{out} = 50Ω, duty cycle ≤ 1%
2 C_L includes probe and jig capacitance

Figure 10. Transition Times of Source Outputs

TYPICAL CHARACTERISTICS

Off-State Current Into Source Collectors Versus Ambient Temperature

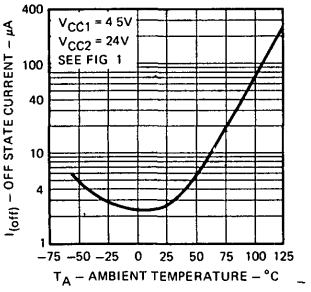


Figure 11

High-Level Sink Output Voltage Versus Ambient Temperature

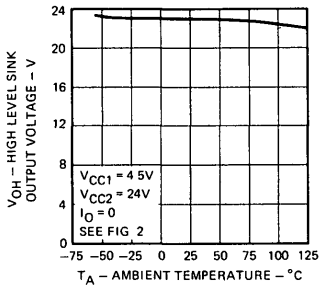


Figure 12

Source or Sink Saturation Voltage Versus Source Current or Sink Current

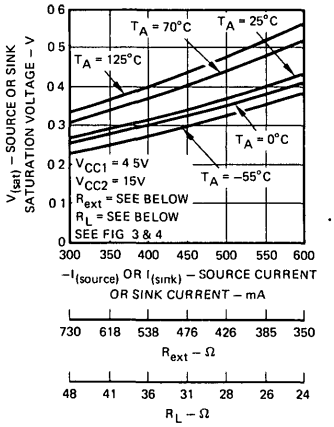


Figure 13

Source or Sink Saturation Voltage Versus Ambient Temperature

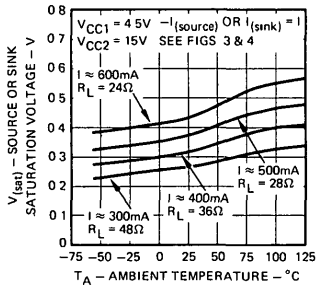


Figure 14

Supply Current, All Sources and Sinks Off Versus Ambient Temperature

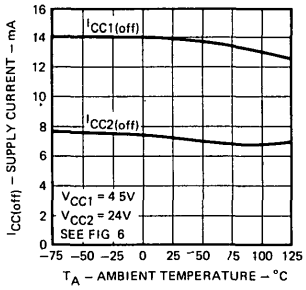
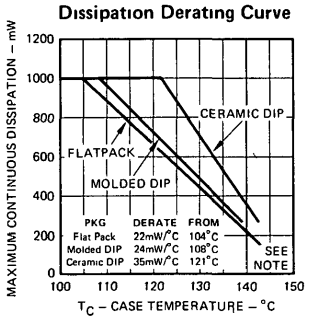


Figure 15

Case Temperature Dissipation Derating Curve



Note Rated operating ambient temperature ranges must be observed regardless of heat sinking

Figure 16

Ambient Temperature Dissipation Derating Curve

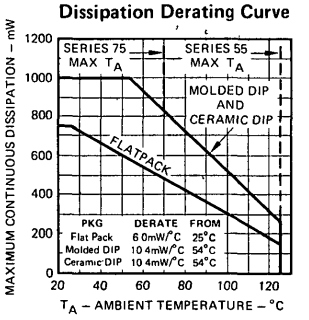


Figure 17

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APPLICATIONS

External Resistor Calculation

The value of the external pull up resistor (R_{ext}) for a particular memory application may be determined as

$$R_{ext} = \frac{16\,[V_{CC2(min)} - V_S - 2\,2]}{I_L - 1\,6\,[V_{CC2(min)} - V_S - 2\,9]}$$

where R_{ext} is in kΩ,

$V_{CC2(min)}$ is the lowest expected value of V_{CC2} in volts,

V_S is the source output voltage in volts with respect to ground, I_L is in mA

The power dissipated in resistor R_{ext} during the load current pulse duration is calculated as

$$P_{Rext} \approx \frac{I_L}{16}\,[V_{CC2(min)} - V_S - 2]$$

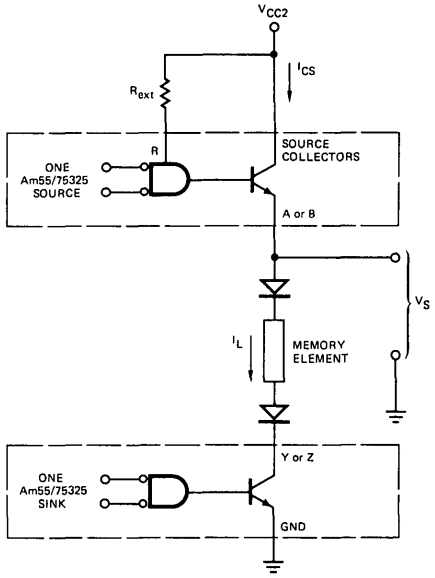
where P_{Rext} is in mW

After solving for R_{ext}, the magnitude of the source collector current (I_{CS}) is determined from

$$I_{CS} \approx 0\,94\,I_L$$

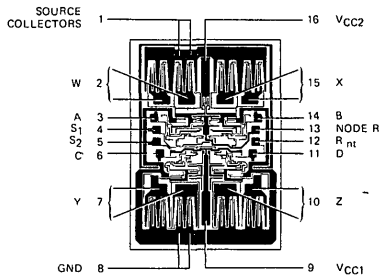
where I_{CS} is in mA

The regulated source output transistor base current through the external pull up resistor (R_{ext}) and the source gate and I_{CS} comprise I_L



Notes 1 For clarity partial logic diagrams of two Am75325 s are shown
2 Source and sink shown are in different packages

Metallization and Pad Layout



DIZE SIZE 0 077 ' X 0 112"