

DATA SHEET

74ALVCH16841

20-bit bus interface D-type latch (3-State)

Product specification

1998 Jul 27

IC24 Data Handbook

74ALVCH16841

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PIN DESCRIPTION

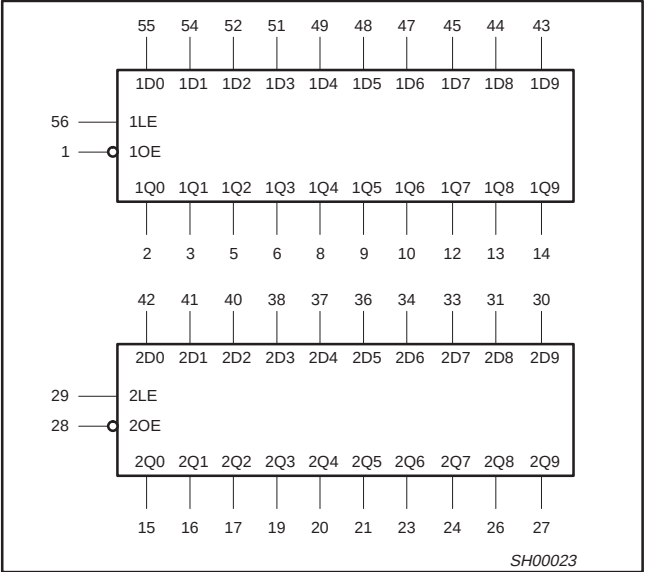
PIN NUMBER	SYMBOL	FUNCTION
1	1OE	Output enable inputs (active-LOW)
56	1LE	Latch enable inputs (active HIGH)
55, 54, 52, 51, 49, 48, 47, 45, 44, 43	1D0 – 1D9	Data inputs
2, 3, 5, 6, 8, 9, 10, 12, 13, 14	1Q0 – 1Q9	Data outputs
4, 11, 18, 25, 32, 39, 46, 53	GND	Ground (0V)
7, 22, 35, 50	VCC	Positive supply voltage
28	2OE	Output enable inputs (active-LOW)
29	2LE	Latch enable inputs (active HIGH)
42, 41, 40, 38, 37, 36, 34, 33, 31, 30	2D0 – 2D9	Data inputs
15, 16, 17, 19, 20, 21, 23, 24, 26, 27	2Q0 – 2Q9	Data outputs

FUNCTION TABLE

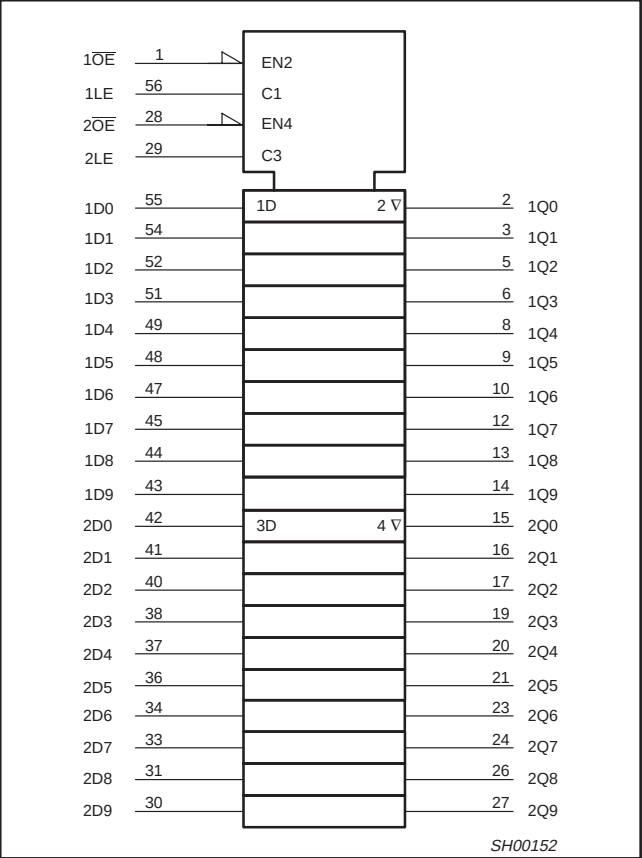
INPUTS			OUTPUT
nOE	LE	Dx	Q
L	H	L	L
L	H	H	H
L	L	X	Q ₀
H	X	X	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

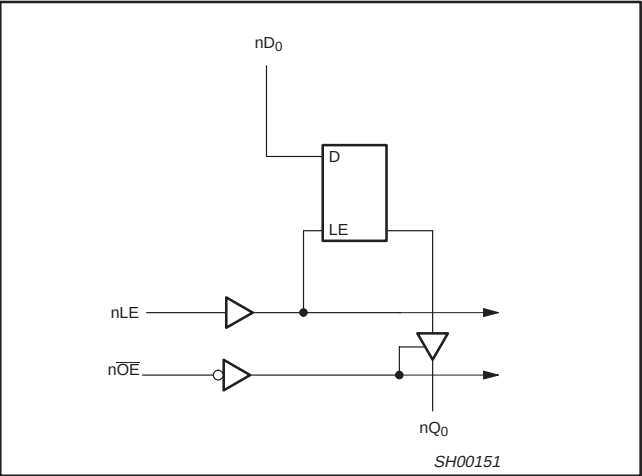
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



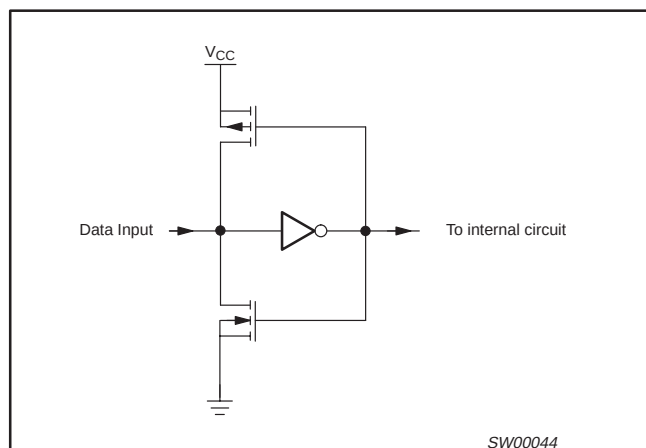
LOGIC DIAGRAM



20-bit bus interface D-type latch (3-State)

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BUS HOLD CIRCUIT



RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V_{CC}	DC supply voltage 2.5V range (for max. speed performance @ 30 pF output load)		2.3	2.7	V
	DC supply voltage 3.3V range (for max. speed performance @ 50 pF output load)		3.0	3.6	
V_I	DC Input voltage range		0	V_{CC}	V
V_O	DC output voltage range		0	V_{CC}	V
T_{amb}	Operating free-air temperature range		-40	+85	°C
t_r, t_f	Input rise and fall times	$V_{CC} = 2.3$ to 3.0 V $V_{CC} = 3.0$ to 3.6 V	0	20 10	ns/V

ABSOLUTE MAXIMUM RATINGS

In accordance with the Absolute Maximum Rating System (IEC 134)
 Voltages are referenced to GND (ground = 0V)

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 to +4.6	V
I_{IK}	DC input diode current	$V_I < 0$	-50	mA
V_I	DC input voltage	For control pins ¹	-0.5 to +4.6	V
		For data inputs ¹	-0.5 to $V_{CC} + 0.5$	
I_{OK}	DC output diode current	$V_O > V_{CC}$ or $V_O < 0$	± 50	mA
V_O	DC output voltage	Note 1	-0.5 to $V_{CC} + 0.5$	V
I_O	DC output source or sink current	$V_O = 0$ to V_{CC}	± 50	mA
I_{GND}, I_{CC}	DC V_{CC} or GND current		± 100	mA
T_{stg}	Storage temperature range		-65 to +150	°C
P_{TOT}	Power dissipation per package -plastic medium-shrink (SSOP) -plastic thin-medium-shrink (TSSOP)	For temperature range: -40 to +125 °C above +55°C derate linearly with 11.3 mW/K above +55°C derate linearly with 8 mW/K	850 600	mW

NOTE:

1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions. Voltage are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Temp = -40°C to +85°C			
			MIN	TYP ¹	MAX	
V _{IH}	HIGH level Input voltage	V _{CC} = 2.3 to 2.7V	1.7	1.2		V
		V _{CC} = 2.7 to 3.6V	2.0	1.5		
V _{IL}	LOW level Input voltage	V _{CC} = 2.3 to 2.7V		1.2	0.7	V
		V _{CC} = 2.7 to 3.6V		1.5	0.8	
V _{OH}	HIGH level output voltage	V _{CC} = 2.3 to 3.6V; V _I = V _{IH} or V _{IL} ; I _O = -100μA	V _{CC} - 0.2	V _{CC}		V
		V _{CC} = 2.3V; V _I = V _{IH} or V _{IL} ; I _O = -6mA	V _{CC} - 0.3	V _{CC} - 0.08		
		V _{CC} = 2.3V; V _I = V _{IH} or V _{IL} ; I _O = -12mA	V _{CC} - 0.6	V _{CC} - 0.26		
		V _{CC} = 2.7V; V _I = V _{IH} or V _{IL} ; I _O = -12mA	V _{CC} - 0.5	V _{CC} - 0.14		
		V _{CC} = 3.0V; V _I = V _{IH} or V _{IL} ; I _O = -12mA	V _{CC} - 0.6	V _{CC} - 0.09		
		V _{CC} = 3.0V; V _I = V _{IH} or V _{IL} ; I _O = -24mA	V _{CC} - 1.0	V _{CC} - 0.28		
V _{OL}	LOW level output voltage	V _{CC} = 2.3 to 3.6V; V _I = V _{IH} or V _{IL} ; I _O = 100μA		GND	0.20	V
		V _{CC} = 2.3V; V _I = V _{IH} or V _{IL} ; I _O = 6mA		0.07	0.40	V
		V _{CC} = 2.3V; V _I = V _{IH} or V _{IL} ; I _O = 12mA		0.15	0.70	V
		V _{CC} = 2.7V; V _I = V _{IH} or V _{IL} ; I _O = 12mA		0.14	0.40	
		V _{CC} = 3.0V; V _I = V _{IH} or V _{IL} ; I _O = 24mA		0.27	0.55	
I _I	Input leakage current	V _{CC} = 2.3 to 3.6V; V _I = V _{CC} or GND		0.1	5	μA
I _{OZ}	3-State output OFF-state current	V _{CC} = 2.3 to 3.6V; V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND		0.1	10	μA
I _{CC}	Quiescent supply current	V _{CC} = 2.3 to 3.6V; V _I = V _{CC} or GND; I _O = 0		0.2	40	μA
ΔI _{CC}	Additional quiescent supply current	V _{CC} = 2.3V to 3.6V; V _I = V _{CC} - 0.6V; I _O = 0		150	750	μA
I _{BHL} ²	Bus hold LOW sustaining current	V _{CC} = 2.3V; V _I = 0.7V	45	—		μA
		V _{CC} = 3.0V; V _I = 0.8V	75	150		
I _{BHH} ²	Bus hold HIGH sustaining current	V _{CC} = 2.3V; V _I = 1.7V	-45			μA
		V _{CC} = 3.0V; V _I = 2.0V	-75	-175		
I _{BHLO} ²	Bus hold LOW overdrive current	V _{CC} = 3.6V	500			μA
I _{BHHO} ²	Bus hold HIGH overdrive current	V _{CC} = 3.6V	-500			μA

NOTES:

1. All typical values are at T_{amb} = 25°C.
2. Valid for data inputs of bus hold parts.

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AC CHARACTERISTICS FOR $V_{CC} = 2.3V$ TO $2.7V$ RANGEGND = 0V; $t_r = t_f \leq 2.0ns$; $C_L = 30pF$

SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			V _{CC} = 2.3 to 2.7V			
			MIN	TYP ¹	MAX	
t _{PLH} /t _{PHL}	Propagation delay nD _n to nQ _n	1, 5	1.0	2.5	5.0	ns
t _{PLH} /t _{PHL}	Propagation delay nLE to nQ _n	2, 5	1.0	2.5	5.6	ns
t _{PZH} /t _{PZL}	3-State output enable time nOE _n to nQ _n	4, 5	1.0	2.7	6.2	ns
t _{PHZ} /t _{PLZ}	3-State output disable time nOE _n to nQ _n	4, 5	1.1	2.2	5.3	ns
t _W	nLE pulse width HIGH	2, 5	3.3	1.5	—	ns
t _{SU}	Set up time nD _n to nLE	3, 5	1.3	0.1	—	ns
T _h	Hold time nD _n to nLE	3, 5	1.4	0.3	—	ns

NOTE:1. All typical values are at $V_{CC} = 3.3V$ and $T_{amb} = 25^\circ C$.**AC CHARACTERISTICS FOR $V_{CC} = 3.0V$ TO $3.6V$ RANGE AND $V_{CC} = 2.7V$** GND = 0V; $t_r = t_f \leq 2.5ns$; $C_L = 50pF$

SYMBOL	PARAMETER	WAVEFORM	LIMITS			LIMITS			UNIT
			V _{CC} = 3.3 ± 0.3V			V _{CC} = 2.7V			
			MIN	TYP ^{1, 2}	MAX	MIN	TYP ¹	MAX	
t _{PLH} /t _{PHL}	Propagation delay nD _n to nQ _n	1, 5	1.0	2.4	3.9	1.0	2.6	4.7	ns
t _{PLH} /t _{PHL}	Propagation delay nLE to nQ _n	2, 5	1.0	2.4	4.3	1.0	2.6	5.1	ns
t _{PZH} /t _{PZL}	3-State output enable time nOE _n to nQ _n	4, 5	1.0	2.3	4.9	1.0	3.1	6.0	ns
t _{PHZ} /t _{PLZ}	3-State output disable time nOE _n to nQ _n	4, 5	1.3	2.9	4.1	1.3	3.1	4.3	ns
t _W	nLE pulse width HIGH	2, 5	3.3	1.5	—	3.3	1.5	—	ns
t _{SU}	Set up time nD _n to nLE	3, 5	1.0	0.6	—	1.1	0.1	—	ns
t _h	Hold time nD _n to nLE	3, 5	1.4	0.2	—	1.7	0.2	—	ns

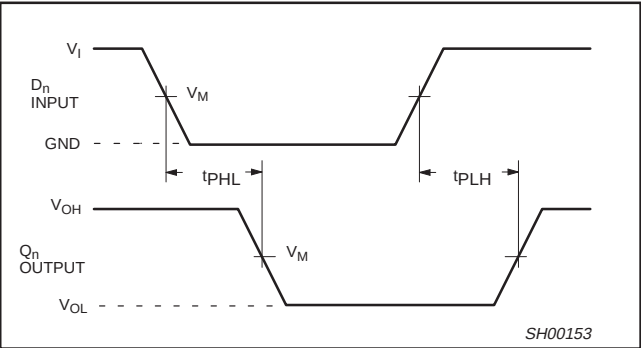
NOTES:1. All typical values are measured $T_{amb} = 25^\circ C$.2. Typical value is measured at $V_{CC} = 3.3V$

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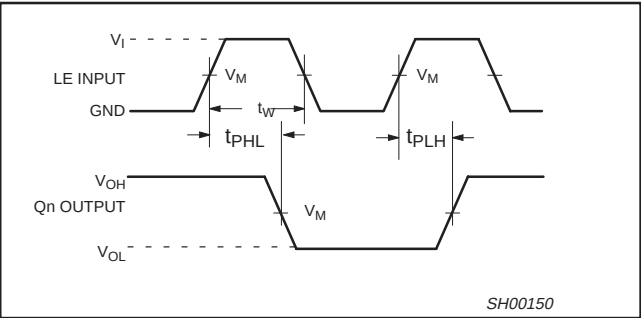
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AC WAVEFORMS FOR $V_{CC} = 2.3V$ TO $2.7V$ AND $V_{CC} < 2.3V$ RANGE
 $V_M = 0.5 V_{CC}$
 $V_X = V_{OL} + 0.15V$
 $V_Y = V_{OH} - 0.15V$
 V_{OL} and V_{OH} are the typical output voltage drop that occur with the output load.

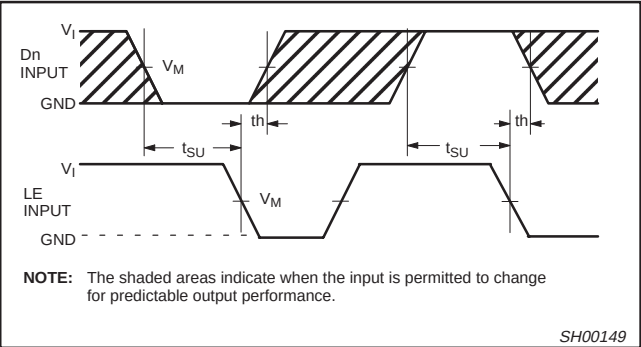
AC WAVEFORMS FOR $V_{CC} = 3.0V$ TO $3.6V$ AND $V_{CC} = 2.7V$ RANGE
 $V_M = 1.5 V$
 $V_X = V_{OL} + 0.3V$
 $V_Y = V_{OH} - 0.3V$
 V_{OL} and V_{OH} are the typical output voltage drop that occur with the output load.
 $V_I = 2.7V$
 $V_I = V_{CC}$



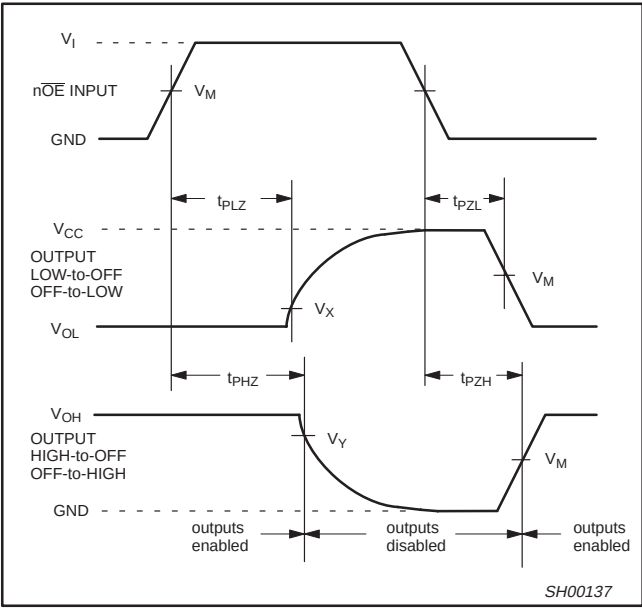
Waveform 1. The input (D_n) to output (Q_n) propagation delay



Waveform 2. The latch enable (LE) pulse width, the latch enable input to output (Q_n) propagation delay

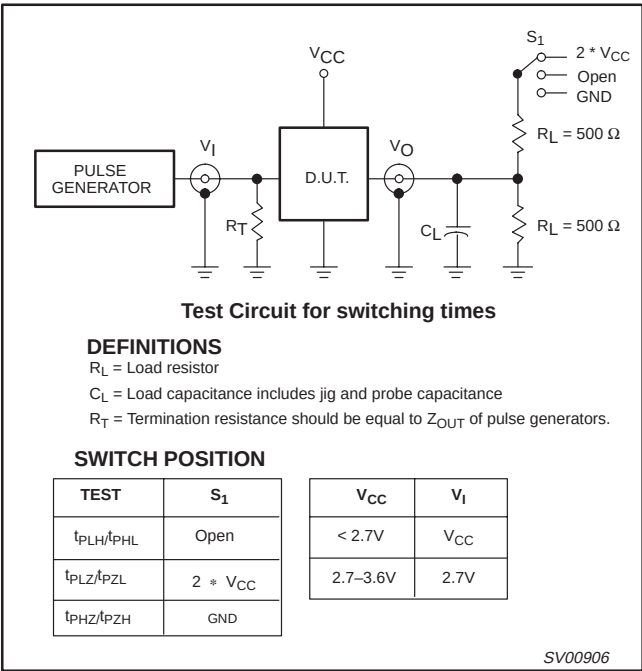


Waveform 3. The data set up and hold times for the D_n input to the LE input



Waveform 4. 3-State enable and disable times

TEST CIRCUIT



Test Circuit for switching times

DEFINITIONS
 R_L = Load resistor
 C_L = Load capacitance includes jig and probe capacitance
 R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

SWITCH POSITION

TEST	S_1	V_{CC}	V_I
t_{PLH}/t_{PHL}	Open	$< 2.7V$	V_{CC}
t_{PLZ}/t_{PZL}	$2 * V_{CC}$	$2.7-3.6V$	$2.7V$
t_{PHZ}/t_{PZH}	GND		

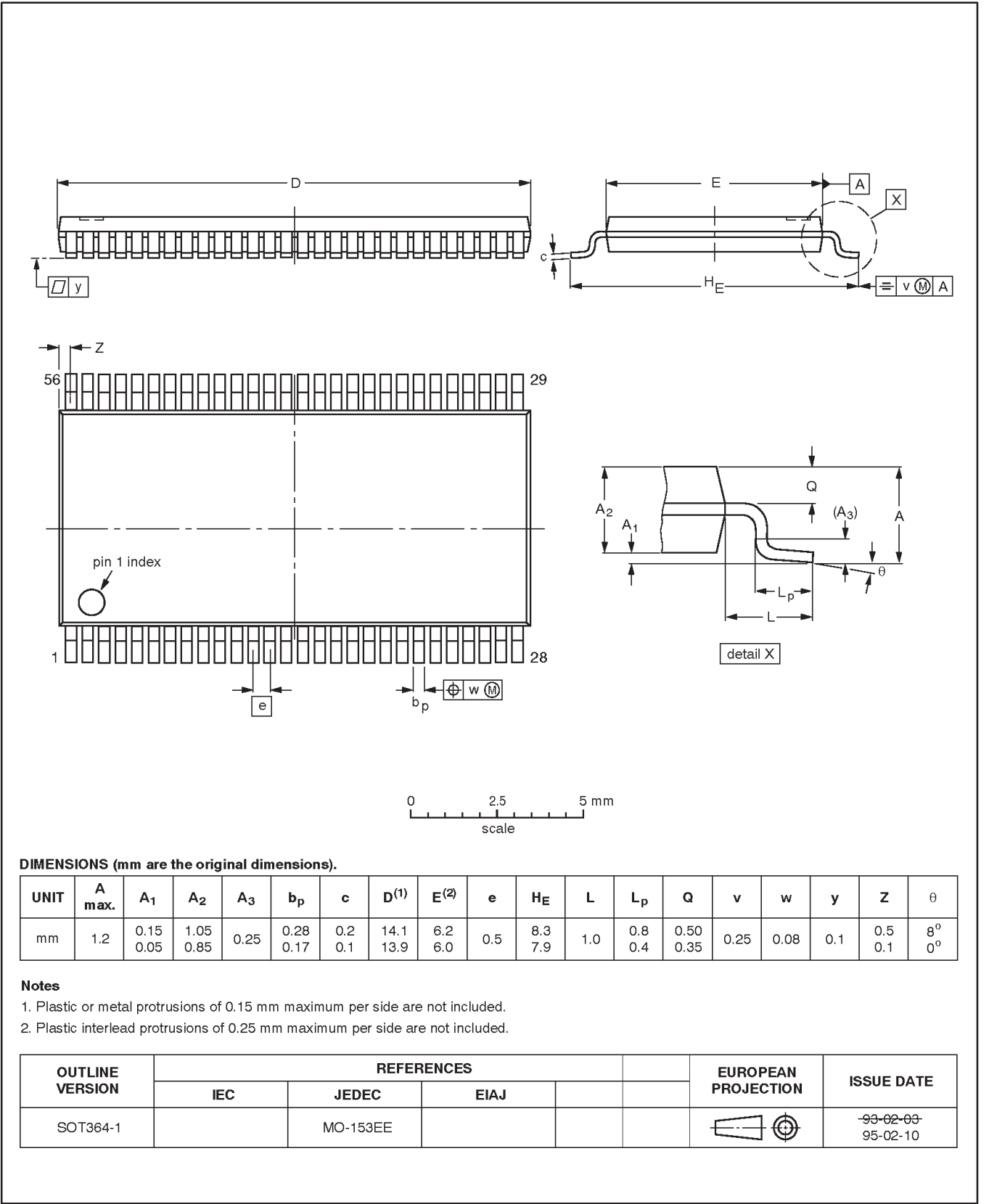
Waveform 5. Load circuitry for switching times

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TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1mm

SOT364-1



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NOTES

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Data sheet status

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