

DATA SHEET

74HC3G06; 74HCT3G06 Inverter with open-drain outputs

Product specification
Supersedes data of 2003 May 15

2003 Dec 02

Inverter with open-drain outputs

74HC3G06; 74HCT3G06

FEATURES

- Wide supply voltage range from 2.0 to 6.0 V
- High noise immunity
- Low power dissipation
- SOT505-2 and SOT765-1 package
- ESD protection:
HBM EIA/JESD22-A114-A exceeds 2000 V
MM EIA/JESD22-A115-A exceeds 200 V.
- Specified from -40 to $+85$ °C and -40 to $+125$ °C.

DESCRIPTION

The 74HC3G06/74HCT3G06 is a high-speed Si-gate CMOS device. Specified in compliance with JEDEC standard no. 7A.

The 74HC3G06/74HCT3G06 provides three inverting buffers.

The outputs of the 74HC3G06; 74HCT3G06 devices are open drains and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions. For digital operation this device must have a pull-up resistor to establish a logic HIGH-level.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25$ °C; $t_r = t_f \leq 6.0$ ns.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC3G	HCT3G	
t_{pZL}	propagation delay nA to nY	$C_L = 50$ pF; $V_{CC} = 4.5$ V	9	9	ns
t_{PLZ}	propagation delay nA to nY	$C_L = 50$ pF; $V_{CC} = 4.5$ V	11	12	ns
C_I	input capacitance		1.5	1.5	pF
C_{PD}	power dissipation capacitance per buffer	notes 1 and 2	4	4	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μ W).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts;

N = total load switching outputs;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

2. For 74HC3G06 the condition is $V_I = \text{GND}$ to V_{CC} .

For 74HCT3G06 the condition is $V_I = \text{GND}$ to $V_{CC} - 1.5$ V.

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FUNCTION TABLE

See note 1.

INPUT	OUTPUT
nA	nY
L	Z
H	L

Note

1. H = HIGH voltage level;
L = LOW voltage level;
Z = high-impedance OFF-state.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE					
	TEMPERATURE RANGE	PINS	PACKAGE	MATERIAL	CODE	MARKING
74HC3G06DP	-40 to +125 °C	8	TSSOP8	plastic	SOT505-2	H06
74HCT3G06DP	-40 to +125 °C	8	TSSOP8	plastic	SOT505-2	T06
74HC3G06DC	-40 to +125 °C	8	VSSOP8	plastic	SOT765-1	H06
74HCT3G06DC	-40 to +125 °C	8	VSSOP8	plastic	SOT765-1	T06

PINNING

PIN	SYMBOL	DESCRIPTION
1	1A	data input
2	3Y	data output
3	2A	data input
4	GND	ground (0 V)
5	2Y	data output
6	3A	data input
7	1Y	data output
8	V _{CC}	supply voltage

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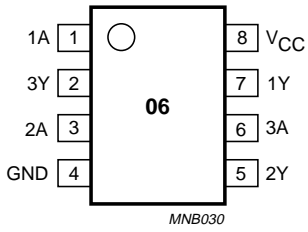


Fig.1 Pin configuration.

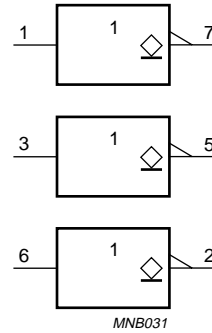


Fig.2 Logic symbol.

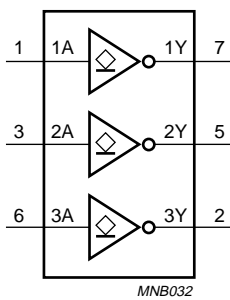


Fig.3 IEC logic symbol.

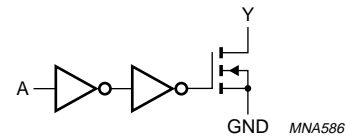


Fig.4 Logic diagram (one driver).

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RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	74HC3G06			74HCT3G06			UNIT
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
V_{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V_I	input voltage		0	–	6.0	0	–	5.5	V
V_O	output voltage		0	–	V_{CC}	0	–	V_{CC}	V
T_{amb}	operating ambient temperature	see DC and AC characteristics per device	–40	+25	+125	–40	+25	+125	°C
t_r, t_f	input rise and fall times	$V_{CC} = 2.0$ V	–	–	1000	–	–	–	ns
		$V_{CC} = 4.5$ V	–	6.0	500	–	6.0	500	ns
		$V_{CC} = 6.0$ V	–	–	400	–	–	–	ns

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134); voltages are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	supply voltage		–0.5	+7.0	V
I_{IK}	input diode current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V; note 1	–	±20	mA
I_{OK}	output diode current	$V_O < -0.5$ V; note 1	–	–20	mA
V_O	output voltage	active mode; note 1	–0.5	$V_{CC} + 0.5$	V
		high-impedance mode; note 1	–0.5	7.0	V
I_O	output sink current	-0.5 V < V_O < 7.0 V; note 1	–	25	mA
I_{CC}, I_{GND}	V_{CC} or GND current	note 1	–	50	mA
T_{stg}	storage temperature		–65	+150	°C
P_D	power dissipation	$T_{amb} = -40$ to +125 °C; note 2	–	300	mW

Notes

1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. Above 110 °C the value of P_D derates linearly with 8 mW/K.

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DC CHARACTERISTICS

Type 74HC3G06

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T_{amb} = -40 to +85 °C; note 1							
V _{IH}	HIGH-level input voltage		2.0	1.5	1.2	–	V
			4.5	3.15	2.4	–	V
			6.0	4.2	3.2	–	V
V _{IL}	LOW-level input voltage		2.0	–	0.8	0.5	V
			4.5	–	2.1	1.35	V
			6.0	–	2.8	1.8	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 20 µA	2.0	–	0	0.1	V
		I _O = 20 µA	4.5	–	0	0.1	V
		I _O = 4.0 mA	4.5	–	0.15	0.33	V
		I _O = 20 µA	6.0	–	0	0.1	V
		I _O = 5.2 mA	6.0	–	0.16	0.33	V
I _{LI}	input leakage current	V _I = V _{CC} or GND	6.0	–	–	±1.0	µA
I _{LO}	output leakage current	V _I = V _{IH} ; V _O = V _{CC} or GND	6.0	–	–	±5.0	µA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0	6.0	–	–	10	µA
T_{amb} = -40 to +125 °C							
V _{IH}	HIGH-level input voltage		2.0	1.5	–	–	V
			4.5	3.15	–	–	V
			6.0	4.2	–	–	V
V _{IL}	LOW-level input voltage		2.0	–	–	0.5	V
			4.5	–	–	1.35	V
			6.0	–	–	1.8	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 20 µA	2.0	–	–	0.1	V
		I _O = 20 µA	4.5	–	–	0.1	V
		I _O = 4.0 mA	4.5	–	–	0.4	V
		I _O = 20 µA	6.0	–	–	0.1	V
		I _O = 5.2 mA	6.0	–	–	0.4	V
I _{LI}	input leakage current	V _I = V _{CC} or GND	6.0	–	–	±1.0	µA
I _{LO}	output leakage current	V _I = V _{IH} ; V _O = V _{CC} or GND	6.0	–	–	±10	µA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0	6.0	–	–	20	µA

Note

1. All typical values are measured at T_{amb} = 25 °C.

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Type 74HCT3G06

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T_{amb} = -40 to +85 °C; note 1							
V _{IH}	HIGH-level input voltage		4.5 to 5.5	2.0	1.6	–	V
V _{IL}	LOW-level input voltage		4.5 to 5.5	–	1.2	0.8	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 20 μA	4.5	–	0	0.1	V
		I _O = 4.0 mA	4.5	–	0.15	0.33	V
I _{LI}	input leakage current	V _I = V _{CC} or GND	5.5	–	–	±1.0	μA
I _{LO}	output leakage current	V _I = V _{IH} ; V _O = V _{CC} or GND	5.5	–	–	±5.0	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0	5.5	–	–	10	μA
ΔI _{CC}	additional supply current per input	V _I = V _{CC} – 2.1 V; I _O = 0	4.5 to 5.5	–	–	375	μA
T_{amb} = -40 to +125 °C							
V _{IH}	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
V _{IL}	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 20 μA	4.5	–	–	0.1	V
		I _O = 4.0 mA	4.5	–	–	0.4	V
I _{LI}	input leakage current	V _I = V _{CC} or GND	5.5	–	–	±1.0	μA
I _{LO}	output leakage current	V _I = V _{IH} ; V _O = V _{CC} or GND	5.5	–	–	±10	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0	5.5	–	–	20	μA
ΔI _{CC}	additional supply current per input	V _I = V _{CC} – 2.1 V; I _O = 0	4.5 to 5.5	–	–	410	μA

Note1. All typical values are measured at T_{amb} = 25 °C.

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AC CHARACTERISTICS

Type 74HC3G06

GND = 0 V; $t_r = t_f \leq 6.0$ ns; $C_L = 50$ pF.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V_{CC} (V)				
$T_{amb} = -40$ to $+85$ °C; note 1							
t_{PZL}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	22	95	ns
			4.5	–	9	18	ns
			6.0	–	8	16	ns
t_{PLZ}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	24	95	ns
			4.5	–	11	20	ns
			6.0	–	10	19	ns
t_{THL}	output transition time	see Figs 5 and 6	2.0	–	18	95	ns
			4.5	–	6	19	ns
			6.0	–	5	16	ns
$T_{amb} = -40$ to $+125$ °C							
t_{PZL}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	–	125	ns
			4.5	–	–	25	ns
			6.0	–	–	20	ns
t_{PLZ}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	–	125	ns
			4.5	–	–	27	ns
			6.0	–	–	23	ns
t_{THL}	output transition time	see Figs 5 and 6	2.0	–	–	125	ns
			4.5	–	–	25	ns
			6.0	–	–	20	ns

Note

1. All typical values are measured at $T_{amb} = 25$ °C.

Inverter with open-drain outputs

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Type 74HCT3G06

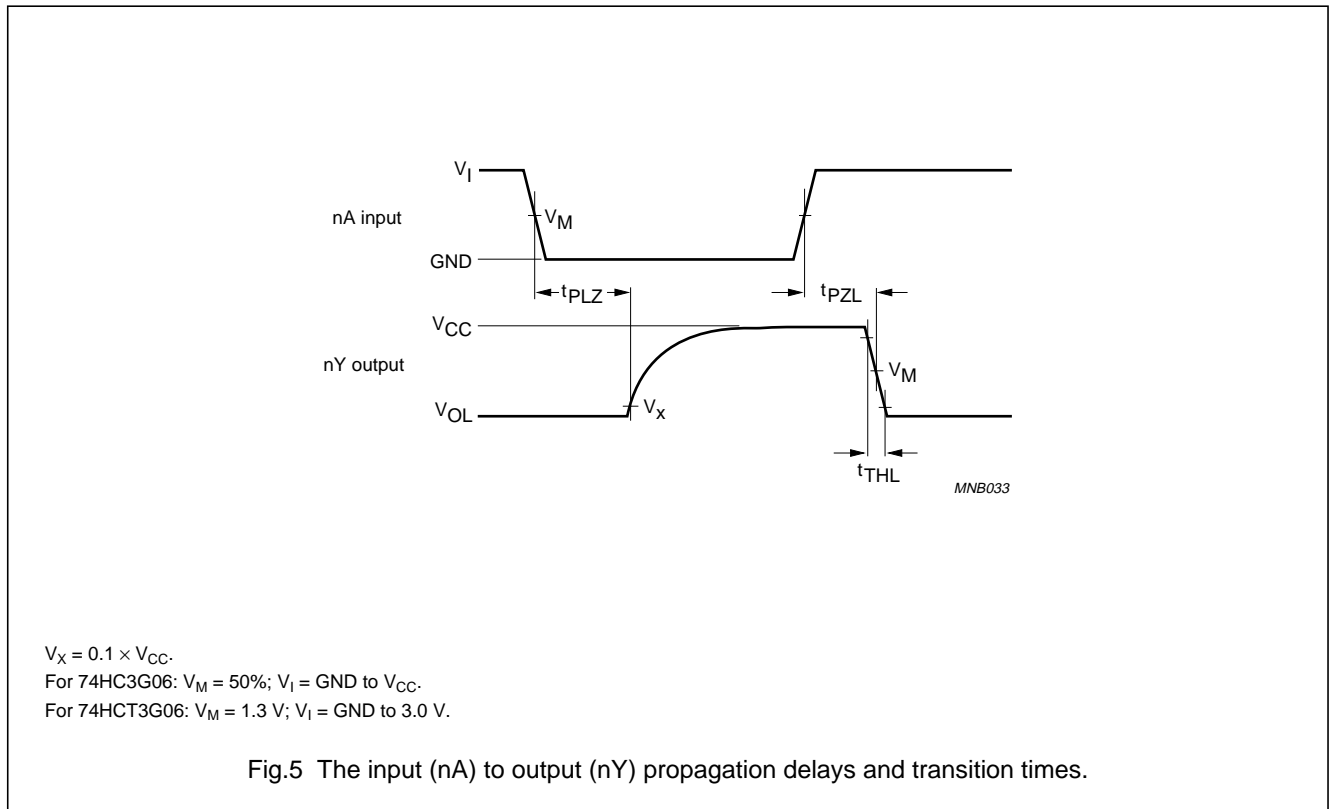
GND = 0 V; $t_r = t_f \leq 6.0$ ns; $C_L = 50$ pF.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V _{CC} (V)				
T_{amb} = -40 to +85 °C; note 1							
t _{PZL}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	9	24	ns
t _{PLZ}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	12	27	ns
t _{THL}	output transition time	see Figs 5 and 6	2.0	–	6	19	ns
T_{amb} = -40 to +125 °C							
t _{PZL}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	–	29	ns
t _{PLZ}	propagation delay nA to nY	see Figs 5 and 6	2.0	–	–	32	ns
t _{THL}	output transition time	see Figs 5 and 6	2.0	–	–	22	ns

Note

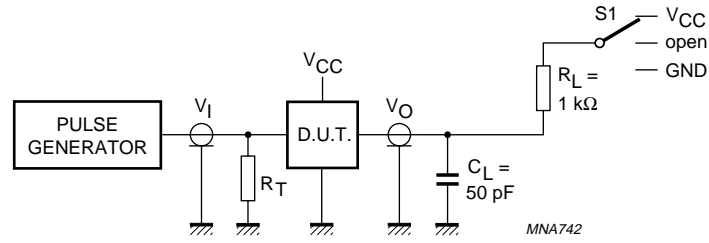
1. All typical values are measured at T_{amb} = 25 °C.

AC WAVEFORMS



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TEST	S1
t_{PLH}/t_{PHL}	V_{CC}
t_{PLZ}/t_{PZL}	V_{CC}

Definitions for test circuit:

R_L = Load resistor.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator.

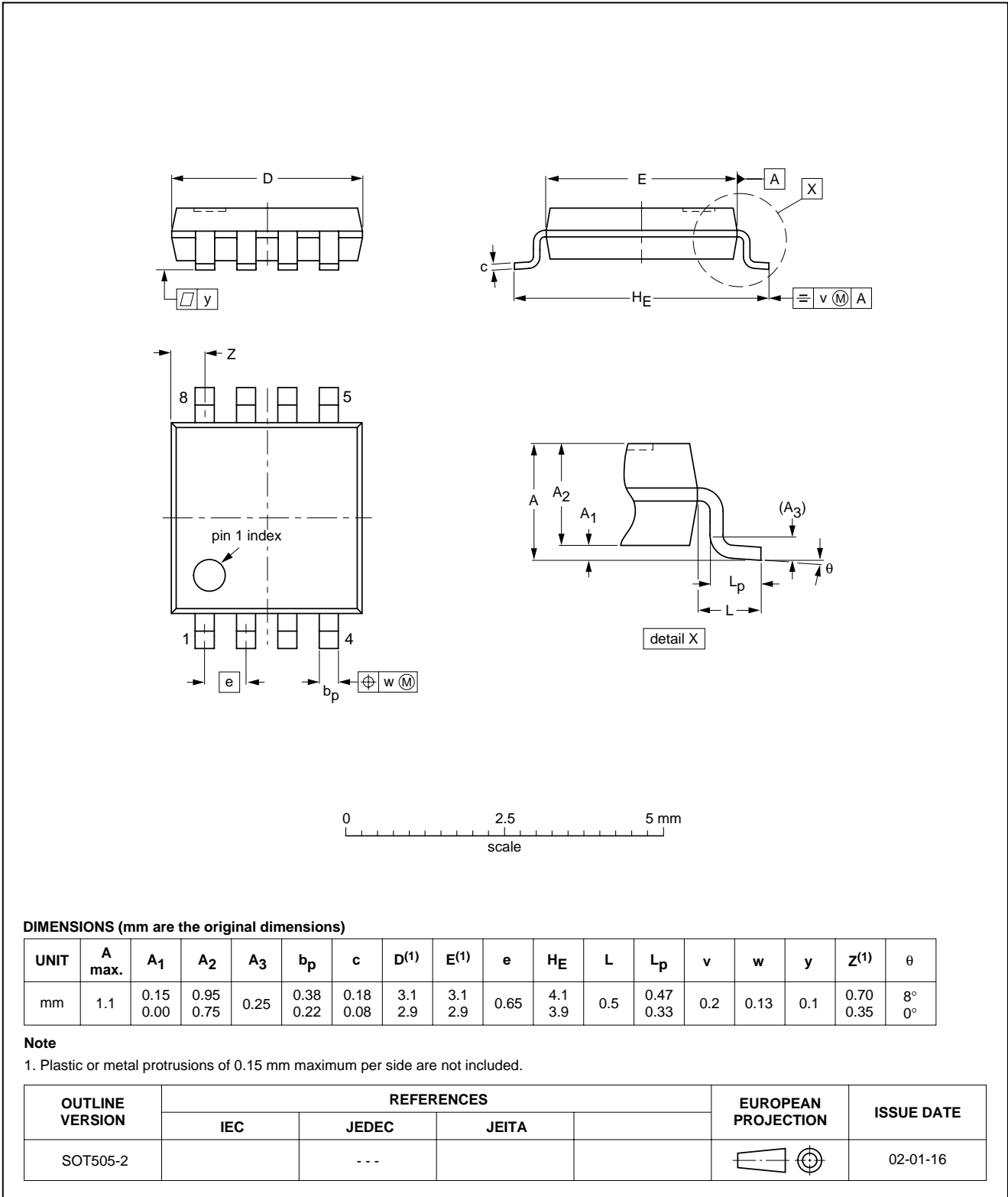
Fig.6 Load circuitry for switching times.

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PACKAGE OUTLINES

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

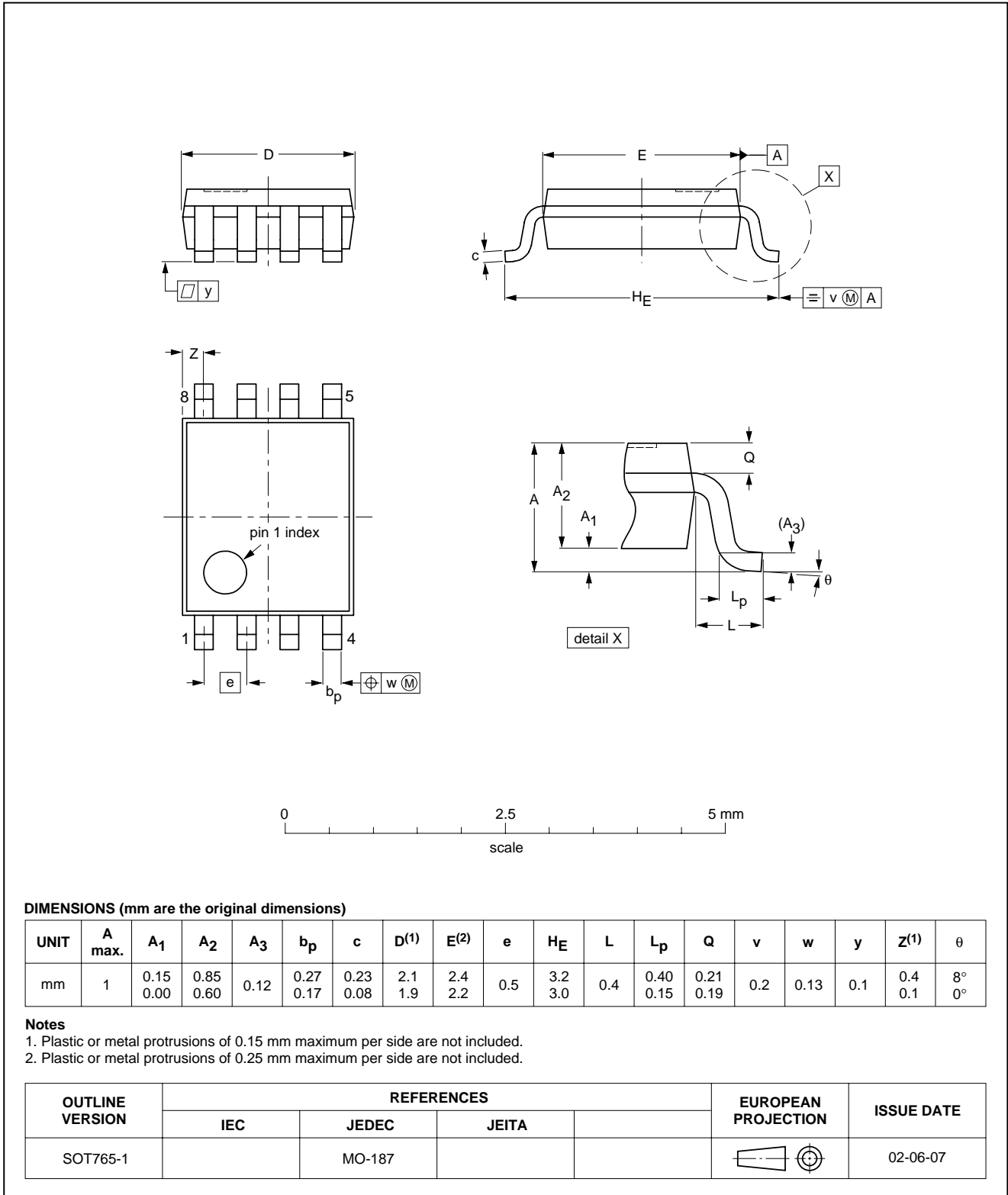


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VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



Inverter with open-drain outputs

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DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
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