Octal Transparent Latch with 3-State Outputs

The MC74AC373/74ACT373 consists of eight latches with 3–state outputs for bus organized system applications. The flip–flops appear transparent to the data when Latch Enable (LE) is HIGH. When LE is LOW, the data that meets the setup time is latched. Data appears on the bus when the Output Enable (\overline{OE}) is LOW. When \overline{OE} is HIGH, the bus output is in the high impedance state.

Features

- Eight Latches in a Single Package
- 3-State Outputs for Bus Interfacing
- Outputs Source/Sink 24 mA
- 'ACT373 Has TTL Compatible Inputs
- These are Pb-Free Devices

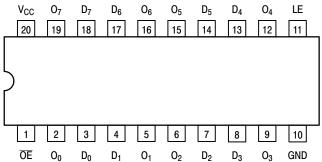


Figure 1. Pinout: 20-Lead Packages Conductors
(Top View)

PIN ASSIGNMENT

PIN	FUNCTION
D ₀ –D ₇	Data Inputs
LE	Latch Enable Input
ŌĒ	Output Enable Input
O ₀ -O ₇	3-State Latch Outputs

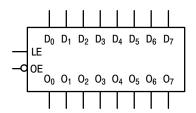


Figure 2. Logic Symbol



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SOIC-20W DW SUFFIX CASE 751D



TSSOP-20 DT SUFFIX CASE 948E

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 9 of this data sheet.

TRUTH TABLE

	Outputs		
ŌĒ	LE	D _n	On
Н	Х	Χ	Z
L	Н	L	L
L	Н	Н	Н
L	L	X	O_0

H = HIGH Voltage Level

L = LOW Voltage Level

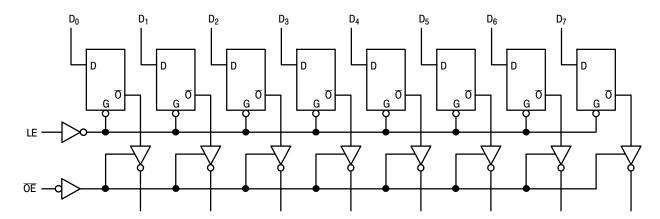
Z = High Impedance

X = Immaterial

 O_0 = Previous O_0 before LOW-to-HIGH Transition of Clock

FUNCTIONAL DESCRIPTION

The MC74AC373/74ACT373 contains eight D-type latches with 3-state standard outputs. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW, the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state standard outputs are controlled by the Output Enable (\overline{OE}) input. When \overline{OE} is LOW, the standard outputs are in the 2-state mode. When \overline{OE} is HIGH, the standard outputs are in the high impedance mode but this does not interfere with entering new data into the latches.



NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

MAXIMUM RATINGS

Symbol		Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to 0	GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GN	ND)	-0.5 to V_{CC} +0.5	V
V _{OUT}	DC Output Voltage (Referenced to 0	GND) (Note 1)	-0.5 to V _{CC} +0.5	V
I _{IK}	DC Input Diode Current		±20	mA
I _{OK}	DC Output Diode Current		±50	mA
I _{OUT}	DC Output Sink/Source Current		±50	mA
I _{CC}	DC Supply Current, per Output Pin		±50	mA
I _{GND}	DC Ground Current, per Output Pin		±100	mA
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead temperature, 1 mm from Case	for 10 Seconds	260	°C
TJ	Junction Temperature Under Bias		140	°C
$\theta_{\sf JA}$	Thermal Resistance (Note 2)	SOIC TSSOP	65.8 110.7	°C/W
MSL	Moisture Sensitivity	SOIC TSSOP	Level 3 Level 1	
F _R	Flammability Rating	Oxygen Index: 30% – 35%	UL 94 V-0 @ 0.125 in	
V _{ESD}	ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	> 2000 > 200 > 1000	V
I _{Latchup}	Latchup Performance	Above V _{CC} and Below GND at 85°C (Note 6)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 1. I_{OUT} absolute maximum rating must be observed.
- The package thermal impedance is calculated in accordance with JESD 51–7.
 Tested to EIA/JESD22–A114–A.
- Tested to EIA/JESD22-A115-A.
- 5. Tested to JESD22-C101-A.
- 6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Тур	Max	Unit
\/	Cumply Valtage	′AC	2.0	5.0	6.0	V
V _{CC}	Supply Voltage	'ACT	4.5	5.0	5.5	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)		0	-	V _{CC}	V
		V _{CC} @ 3.0 V	_	150	-	
t _r , t _f	Input Rise and Fall Time (Note 7) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	_	40	-	ns/V
	The Borlood Oxeopt Collinia III pale	V _{CC} @ 5.5 V	_	25	-	
	Input Rise and Fall Time (Note 8)	V _{CC} @ 4.5 V	_	10	-	20/1
t _r , t _f	'ACT Devices except Schmitt Inputs	V _{CC} @ 5.5 V	_	8.0	-	ns/V
T _A	Operating Ambient Temperature Range	-40	25	85	°C	
I _{OH}	Output Current – High	_	_	-24	mA	
I _{OL}	Output Current – Low		_	_	24	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

- V_{IN} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
 V_{IN} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

			74AC		74AC		
Symbol	Parameter	V _{CC} (V)	T _A = +	+25°C	T _A = -40°C to +85°C	Unit	Conditions
			Тур	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OH}	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V	I _{OUT} = -50 μA
		3.0 4.5 5.5	- - -	2.56 3.86 4.86	2.46 3.76 4.76	V	* V _{IN} = V _{IL} or V _{IH} -12 mA I_{OH} -24 mA -24 mA
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	Ι _{ΟUT} = 50 μΑ
		3.0 4.5 5.5	- - -	0.36 0.36 0.36	0.44 0.44 0.44	V	* V _{IN} = V _{IL} or V _{IH} 12 mA $_{IOL}$ 24 mA $_{24}$ mA
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μА	V _I = V _{CC} , GND
I _{OZ}	Maximum 3-State Current	5.5	-	±0.5	±5.0	μΑ	$\begin{aligned} &V_{I}\left(OE\right) = V_{IL}, V_{IH} \\ &V_{I} = V_{CC}, GND \\ &V_{O} = V_{CC}, GND \end{aligned}$
I _{OLD}	†Minimum Dynamic Output Current	5.5	_		75	mA	V _{OLD} = 1.65 V Max
I _{OHD}		5.5	_	-	-75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	$V_{IN} = V_{CC}$ or GND

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

*All outputs loaded; thresholds on input associated with output under test.

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC} .

[†]Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms – See AND8277/D at www.onsemi.com)

				74AC		74.	AC		
Symbol	Parameter	V _{CC} * (V)		* T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Fig. No.
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to O _n	3.3 5.0	1.5 1.5	10 7.0	13.5 9.5	1.5 1.5	15 10.5	ns	3–5
t _{PHL}	Propagation Delay D _n to O _n	3.3 5.0	1.5 1.5	9.5 7.0	13 9.5	1.5 1.5	14.5 10.5	ns	3–5
t _{PLH}	Propagation Delay LE to O _n	3.3 5.0	1.5 1.5	10 7.5	13.5 9.5	1.5 1.5	15 10.5	ns	3–6
t _{PHL}	Propagation Delay LE to O _n	3.3 5.0	1.5 1.5	9.5 7.0	12.5 9.5	1.5 1.5	14 10.5	ns	3–6
t _{PZH}	Output Enable Time	3.3 5.0	1.5 1.5	9.0 7.0	11.5 8.5	1.0 1.0	13 9.5	ns	3–7
t_{PZL}	Output Enable Time	3.3 5.0	1.5 1.5	8.5 6.5	11.5 8.5	1.0 1.0	13 9.5	ns	3–8
t _{PHZ}	Output Disable Time	3.3 5.0	1.5 1.5	10 8.0	12.5 11	1.0 1.0	14.5 12.5	ns	3–7
t _{PLZ}	Output Disable Time	3.3 5.0	1.5 1.5	8.0 6.5	11.5 8.5	1.0 1.0	12.5 10	ns	3–8

^{*}Voltage Range 3.3 V is 3.3 V ± 0.3 V. Voltage Range 5.0 V is 5.0 V ± 0.5 V.

AC OPERATING REQUIREMENTS

			74	AC	74AC		
Symbol	Parameter	V _{CC} *	T _A = 4	⊦25°C 50 pF	$T_A = -40$ °C to +85°C $C_L = 50$ pF	Unit	Fig. No.
			Typ Guarant		Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW D _n to LE	3.3 5.0	3.5 2.0	5.5 4.0	6.0 4.5	ns	3–9
t _h	Hold Time, HIGH or LOW D _n to LE	3.3 5.0	-3.0 -1.5	1.0 1.0	1.0 1.0	ns	3–9
t _w	LE Pulse Width, HIGH	3.3 5.0	4.0 2.0	5.5 4.0	6.0 4.5	ns	3–6

^{*}Voltage Range 3.3 V is 3.3 V ±0.3 V. Voltage Range 5.0 V is 5.0 V ±0.5 V.

DC CHARACTERISTICS

			74	CT	74ACT		
Symbol	Parameter	V _{CC} (V)	T _A = +25°C		T _A = -40°C to +85°C	Unit	Conditions
			Typ Guaranteed Limit		aranteed Limits		
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	$V_{OUT} = 0.1 \text{ V}$ or $V_{CC} - 0.1 \text{ V}$
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	$V_{OUT} = 0.1 \text{ V}$ or $V_{CC} - 0.1 \text{ V}$
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = -50 μA
		4.5 5.5	_ _	3.86 4.86	3.76 4.76	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OH} = -24 \text{ mA}$ $= -24 \text{ mA}$
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA
		4.5 5.5	_ _	0.36 0.36	0.44 0.44	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ $^{24} \text{ mA}$ ^{1}OL $^{24} \text{ mA}$
I _{IN}	Maximum Input Leakage Current	5.5	_	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
ΔI_{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	_	1.5	mA	$V_{I} = V_{CC} - 2.1 \text{ V}$
l _{OZ}	Maximum 3-State Current	5.5	_	±0.5	±5.0	μΑ	$\begin{aligned} &V_{I}\left(OE\right) = V_{IL}, V_{IH} \\ &V_{I} = V_{CC}, GND \\ &V_{O} = V_{CC}, GND \end{aligned}$
I _{OLD}	†Minimum Dynamic	5.5	-	-	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}	Output Current	5.5	-	-	-75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	V _{IN} = V _{CC} or GND

^{*}All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms – See AND8277/D at www.onsemi.com)

				74ACT		74	ACT		
Symbol	Parameter	V _{CC} * (V)			to +	-40°C 85°C 50 pF	Unit	Fig. No.	
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to O _n	5.0	2.5	8.5	10	1.5	11.5	ns	3–5
t _{PHL}	Propagation Delay D _n to O _n	5.0	2.0	8.0	10	1.5	11.5	ns	3–5
t _{PLH}	Propagation Delay LE to O _n	5.0	2.5	8.5	11	2.0	11.5	ns	3–6
t _{PHL}	Propagation Delay LE to O _n	5.0	2.0	8.0	10	1.5	11.5	ns	3–6
t _{PZH}	Output Enable Time	5.0	2.0	8.0	9.5	1.5	10.5	ns	3–7
t _{PZL}	Output Enable Time	5.0	2.0	7.5	9.0	1.5	10.5	ns	3–8
t _{PHZ}	Output Disable Time	5.0	2.5	9.0	11	2.5	12.5	ns	3–7
t _{PLZ}	Output Disable Time	5.0	1.5	7.5	8.5	1.0	10	ns	3–8

^{*}Voltage Range 5.0 V is 5.0 V \pm 0.5 V.

AC OPERATING REQUIREMENTS (For Figures and Waveforms – See AND8277/D at www.onsemi.com)

				74ACT	74ACT						
Symbol	Parameter	V _{CC} * (V)	$T_A = +25^{\circ}C$ $C_L = 50 \text{ pF}$ Typ Guaranteed		C* T _A = +25°C C _L = 50 pF		T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF	Unit	Fig. No.
					d Minimum						
t _s	Setup Time, HIGH or LOW D _n to LE	5.0	3.0	7.0	8.0	ns	3–9				
t _h	Hold Time, HIGH or LOW D _n to LE	5.0	0	0	1.0	ns	3–9				
t _w	LE Pulse Width, HIGH	5.0	2.0	7.0	8.0	ns	3–6				

^{*}Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

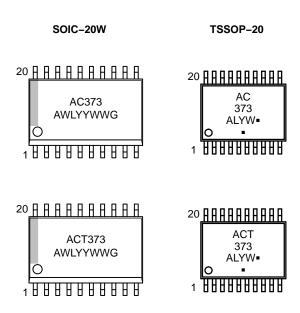
Symbol	Parameter	Value Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	40	pF	V _{CC} = 5.0 V

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74AC373DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74AC373DWR2G	SOIC-20 (Pb-Free)	1000 / Tape & Reel
MC74ACT373DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74ACT373DWR2G	SOIC-20 (Pb-Free)	1000 / Tape & Reel
MC74AC373DTG	TSSOP-20 (Pb-Free)	75 Units / Rail
MC74AC373DTR2G	TSSOP-20 (Pb-Free)	2500 / Tape & Reel
MC74ACT373DTG	TSSOP-20 (Pb-Free)	75 Units / Rail
MC74ACT373DTR2G	TSSOP-20 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MARKING DIAGRAMS



A = Assembly Location

 $\begin{array}{ll} \text{WL, L} &= \text{Wafer Lot} \\ \text{YY, Y} &= \text{Year} \\ \text{WW, W} &= \text{Work Week} \\ \end{array}$

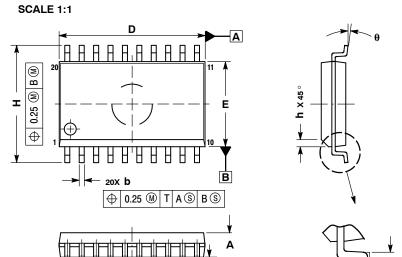
G or ■ = Pb–Free Package (Note: Microdot may be in either location)





SOIC-20 WB CASE 751D-05 **ISSUE H**

DATE 22 APR 2015



- DIMENSIONS ARE IN MILLIMETERS.
 INTERPRET DIMENSIONS AND TOLERANCES.
- PER ASME Y14.5M, 1994.
 3. DIMENSIONS D AND E DO NOT INCLUDE MOLD
- PROTRUSION.
 MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
- DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL

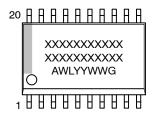
	MILLIMETERS		
DIM	MIN	MAX	
Α	2.35	2.65	
A1	0.10	0.25	
b	0.35	0.49	
С	0.23	0.32	
D	12.65	12.95	
E	7.40	7.60	
е	1.27 BSC		
Н	10.05	10.55	
h	0.25	0.75	
L	0.50	0.90	
A	0 °	7 °	

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code = Assembly Location

WL = Wafer Lot ΥY = Year WW = Work Week = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	SOIC-20 WB		PAGE 1 OF 1

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^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

0.100 (0.004) -T- SEATING

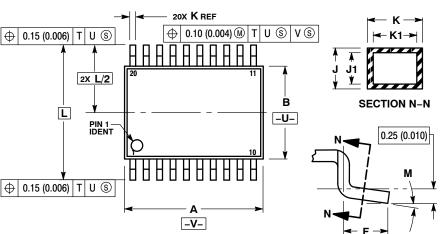
SOLDERING FOOTPRINT

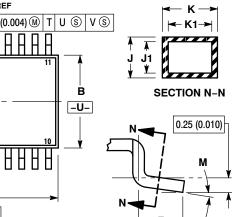
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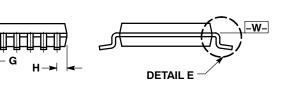


TSSOP-20 WB CASE 948E ISSUE D

DATE 17 FEB 2016







DETAIL E

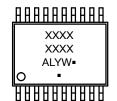
NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
- 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K
- (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

 7. DIMENSION A AND B ARE TO BE
- DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
Α	6.40	6.60	0.252	0.260
В	4.30	4.50	0.169	0.177
С		1.20		0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
Н	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	٥°	80	٥°	80

GENERIC MARKING DIAGRAM*



= Assembly Location

= Wafer Lot

= Year

= Work Week

= Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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DESCRIPTION:	TSSOP-20 WB		PAGE 1 OF 1

DIMENSIONS: MILLIMETERS

0.65

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0.36

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