CMOS Digital Integrated Circuits Silicon Monolithic

74LVC1G157FU

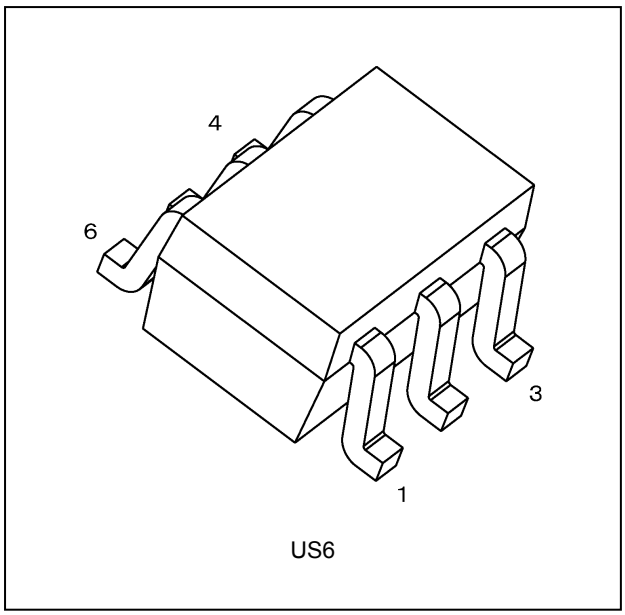
1. Functional Description

- 2-Input Multiplexer

2. Features

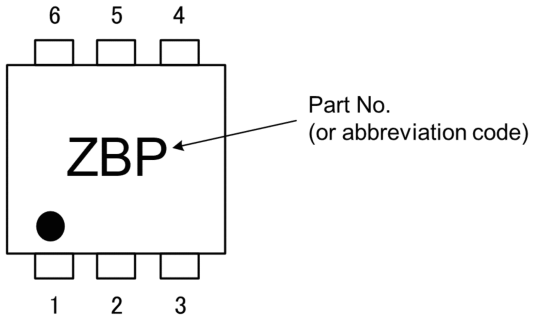
(1) Wide operating temperature range: T_{opr} = -40 to 125 °C
(2) High output current: ±24 mA (min) at V_{CC} = 3.0 V
(3) Super high speed operation: t_{pd} = 2.8 ns (typ.) at V_{CC} = 5.0 V, C_L = 50 pF
(4) Operation voltage range: V_{CC} = 1.65 to 5.5 V
(5) 5.5 V tolerant inputs
(6) 5.5 V power down protection output

3. Packaging

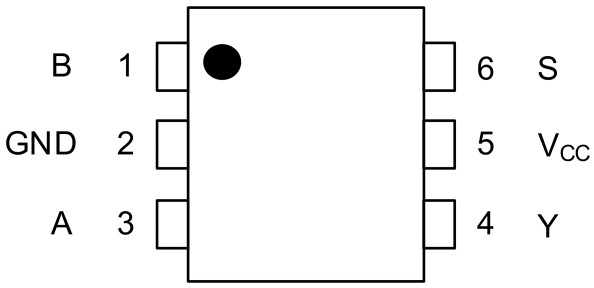


US6

4. Marking and Pin Assignment



Marking



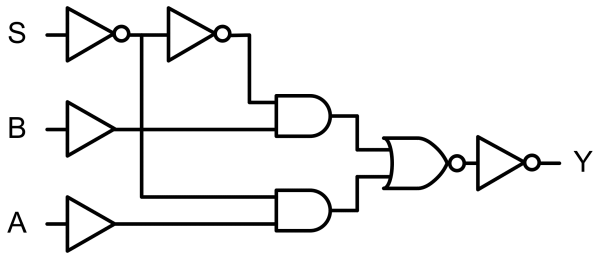
Pin Assignment (Top view)

Start of commercial production
2026-07

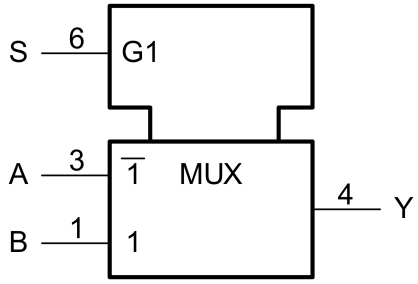
5. Pin functions

Pin name	Pin No.	Pin type	Description
B	1	In	Data input from source B
GND	2	Ground	—
A	3	In	Data input from source A
Y	4	Out	Multiplexer output
V_{CC}	5	Power supply	Power supply terminal
S	6	In	Data select input

6. Block Diagram



7. IEC Logic Symbol



8. Truth Table

Input S	Input B	Input A	Output Y
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

X: Don't care

9. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Rating	Unit
Supply voltage	V_{CC}		-0.5 to 7.0	V
Input voltage	V_{IN}		-0.5 to 7.0	V
DC output voltage	V_{OUT}	(Note 1)	-0.5 to 7.0	V
		(Note 2)	-0.5 to V_{CC} + 0.5	
Input diode current	I_{IK}		-20	mA
Output diode current	I_{OK}	(Note 3)	-20	mA
DC output current	I_{OUT}		±50	mA
V_{CC}/ground current	I_{CC}		±100	mA
Power dissipation	P_D		200	mW
Storage temperature	T_{stg}		-65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: V_{CC} = 0 V

Note 2: High (H) or Low (L) state. I_{OUT} absolute maximum rating must be observed.

Note 3: V_{OUT} < GND

10. Operating Ranges (Note)

Characteristics	Symbol	Note	Test Condition	Rating	Unit
Supply voltage	V_{CC}		—	1.65 to 5.5	V
		(Note 1)	—	1.5 to 5.5	
Input voltage	V_{IN}		—	0 to 5.5	V
Output voltage	V_{OUT}	(Note 2)	—	0 to 5.5	V
		(Note 3)	—	0 to V_{CC}	
Operating temperature	T_{opr}		—	-40 to 125	°C
Input rise and fall time	dt/dv		V_{CC} = 1.8 ± 0.15 V, 2.5 ± 0.2 V	0 to 20	ns/V
			V_{CC} = 3.3 ± 0.3 V	0 to 10	
			V_{CC} = 5.0 ± 0.5 V	0 to 5	

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either V_{CC} or GND.

Note 1: Data retention only

Note 2: V_{CC} = 0 V

Note 3: High (H) or Low (L) state.

11. Electrical Characteristics

11.1. DC Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Typ.	Max	Unit
High-level input voltage	V_{IH}	—		1.65 to 1.95	V_{CC} × 0.80	—	—	V
				2.3 to 2.7	1.7	—	—	
				3.0 to 3.6	2.0	—	—	
				4.5 to 5.5	V_{CC} × 0.70	—	—	
Low-level input voltage	V_{IL}	—		1.65 to 1.95	—	—	V_{CC} × 0.25	V
				2.3 to 2.7	—	—	0.7	
				3.0 to 3.6	—	—	0.8	
				4.5 to 5.5	—	—	V_{CC} × 0.30	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -100 μA	1.65 to 5.5	V_{CC} - 0.1	—	—	V
			I_{OH} = -4 mA	1.65	1.29	1.52	—	
			I_{OH} = -8 mA	2.3	1.9	2.15	—	
			I_{OH} = -16 mA	3.0	2.4	2.8	—	
			I_{OH} = -24 mA	3.0	2.3	2.68	—	
			I_{OH} = -32 mA	4.5	3.8	4.2	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA	1.65 to 5.5	—	—	0.1	V
			I_{OL} = 4 mA	1.65	—	0.08	0.24	
			I_{OL} = 8 mA	2.3	—	0.1	0.3	
			I_{OL} = 16 mA	3.0	—	0.15	0.4	
			I_{OL} = 24 mA	3.0	—	0.22	0.55	
			I_{OL} = 32 mA	4.5	—	0.22	0.55	
Input leakage current	I_{IN}	V_{IN} = 5.5 V or GND		0 to 5.5	—	—	±1	μA
Power-OFF leakage current	I_{OFF}	V_{IN} or V_{OUT} = 5.5 V		0	—	—	1	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	1	μA

11.2. DC Characteristics (Unless otherwise specified, T_a = -40 to 85 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
High-level input voltage	V_{IH}	—		1.65 to 1.95	V_{CC} × 0.80	—	V
				2.3 to 2.7	1.7	—	
				3.0 to 3.6	2.0	—	
				4.5 to 5.5	V_{CC} × 0.70	—	
Low-level input voltage	V_{IL}	—		1.65 to 1.95	—	V_{CC} × 0.25	V
				2.3 to 2.7	—	0.7	
				3.0 to 3.6	—	0.8	
				4.5 to 5.5	—	V_{CC} × 0.30	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -100 μA	1.65 to 5.5	V_{CC} - 0.1	—	V
			I_{OH} = -4 mA	1.65	1.29	—	
			I_{OH} = -8 mA	2.3	1.9	—	
			I_{OH} = -16 mA	3.0	2.4	—	
			I_{OH} = -24 mA	3.0	2.3	—	
			I_{OH} = -32 mA	4.5	3.8	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA	1.65 to 5.5	—	0.1	V
			I_{OL} = 4 mA	1.65	—	0.24	
			I_{OL} = 8 mA	2.3	—	0.3	
			I_{OL} = 16 mA	3.0	—	0.4	
			I_{OL} = 24 mA	3.0	—	0.55	
			I_{OL} = 32 mA	4.5	—	0.55	
Input leakage current	I_{IN}	V_{IN} = 5.5 V or GND		0 to 5.5	—	±10	μA
Power-OFF leakage current	I_{OFF}	V_{IN} or V_{OUT} = 5.5 V		0	—	10	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	10	μA

11.3. DC Characteristics (Unless otherwise specified, T_a = -40 to 125 °C)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
High-level input voltage	V_{IH}	—		1.65 to 1.95	V_{CC} × 0.80	—	V
				2.3 to 2.7	1.7	—	
				3.0 to 3.6	2.0	—	
				4.5 to 5.5	V_{CC} × 0.70	—	
Low-level input voltage	V_{IL}	—		1.65 to 1.95	—	V_{CC} × 0.25	V
				2.3 to 2.7	—	0.7	
				3.0 to 3.6	—	0.8	
				4.5 to 5.5	—	V_{CC} × 0.30	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -100 μA	1.65 to 5.5	V_{CC} - 0.1	—	V
			I_{OH} = -4 mA	1.65	0.95	—	
			I_{OH} = -8 mA	2.3	1.7	—	
			I_{OH} = -16 mA	3.0	2.2	—	
			I_{OH} = -24 mA	3.0	2.0	—	
			I_{OH} = -32 mA	4.5	3.4	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA	1.65 to 5.5	—	0.1	V
			I_{OL} = 4 mA	1.65	—	0.7	
			I_{OL} = 8 mA	2.3	—	0.45	
			I_{OL} = 16 mA	3.0	—	0.6	
			I_{OL} = 24 mA	3.0	—	0.8	
			I_{OL} = 32 mA	4.5	—	0.8	
Input leakage current	I_{IN}	V_{IN} = 5.5 V or GND		0 to 5.5	—	±20	μA
Power-OFF leakage current	I_{OFF}	V_{IN} or V_{OUT} = 5.5 V		0	—	100	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	100	μA

11.4. AC Characteristics (Note)(Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	V_{CC} (V)	C_L (pF)	Min	Typ.	Max	Unit
Propagation delay time(A,B-Y)	t_{PLH},t_{PHL}		R_L = 1 MΩ	1.8 ± 0.15	15	2.0	5.1	17.8	ns
				2.5 ± 0.2		1.0	3.1	7.5	
				3.3 ± 0.3		1.0	2.4	5.2	
				5.0 ± 0.5		0.5	1.9	3.5	
			R_L = 500 Ω	3.3 ± 0.3	50	1.5	3.5	6.5	ns
				5.0 ± 0.5		0.5	2.8	4.3	
Propagation delay time(S-Y)	t_{PLH},t_{PHL}		R_L = 1 MΩ	1.8 ± 0.15	15	2.0	5.1	18.0	ns
				2.5 ± 0.2		1.0	3.1	7.9	
				3.3 ± 0.3		1.0	2.4	5.6	
				5.0 ± 0.5		0.5	1.9	3.8	
			R_L = 500 Ω	3.3 ± 0.3	50	1.5	3.2	6.6	ns
				5.0 ± 0.5		0.5	2.7	4.6	
Input capacitance	C_{IN}		—	0 to 5.5	—	—	4	—	pF
Power dissipation capacitance	C_{PD}	(Note 1)	—	3.3	—	—	24	—	pF
	C_{PD}			5.5		—	30	—	pF

Note: See figure 12.1, 13.1, table 12.1.1, 13.1.1 for the measurement circuit

Note 1: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation.

$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

11.5. AC Characteristics (Note) (Unless otherwise specified, T_a = -40 to 85 °C)

Characteristics	Symbol	Test Condition	V_{CC} (V)	C_L (pF)	Min	Max	Unit
Propagation delay time(A,B-Y)	t_{PLH},t_{PHL}	R_L = 1 MΩ	1.8 ± 0.15	15	2.0	19.0	ns
			2.5 ± 0.2		1.0	8.2	
			3.3 ± 0.3		1.0	5.8	
			5.0 ± 0.5		0.5	3.9	
		R_L = 500 Ω	3.3 ± 0.3	50	1.5	6.6	ns
			5.0 ± 0.5		0.5	4.6	
Propagation delay time(S-Y)	t_{PLH},t_{PHL}	R_L = 1 MΩ	1.8 ± 0.15	15	2.0	19.4	ns
			2.5 ± 0.2		1.0	8.4	
			3.3 ± 0.3		1.0	6.2	
			5.0 ± 0.5		0.5	4.2	
		R_L = 500 Ω	3.3 ± 0.3	50	1.5	7.2	ns
			5.0 ± 0.5		0.5	5.0	

Note: See figure 12.1, 13.1, table 12.1.1, 13.1.1 for the measurement circuit

11.6. AC Characteristics (Note)
(Unless otherwise specified, T_a = -40 to 125 °C)

Characteristics	Symbol	Test Condition	V_{CC} (V)	C_L (pF)	Min	Max	Unit
Propagation delay time(A,B-Y)	t_{PLH},t_{PHL}	R_L = 1 MΩ	1.8 ± 0.15	15	2.0	19.1	ns
			2.5 ± 0.2		1.0	8.6	
			3.3 ± 0.3		1.0	6.3	
			5.0 ± 0.5		0.5	4.3	
		R_L = 500 Ω	3.3 ± 0.3	50	1.5	7.0	ns
			5.0 ± 0.5		0.5	4.9	
Propagation delay time(S-Y)	t_{PLH},t_{PHL}	R_L = 1 MΩ	1.8 ± 0.15	15	2.0	19.6	ns
			2.5 ± 0.2		1.0	8.7	
			3.3 ± 0.3		1.0	6.5	
			5.0 ± 0.5		0.5	4.5	
		R_L = 500 Ω	3.3 ± 0.3	50	1.5	7.6	ns
			5.0 ± 0.5		0.5	5.3	

Note: See figure 12.1, 13.1, table 12.1.1, 13.1.1 for the measurement circuit

12. AC Tast Circuit

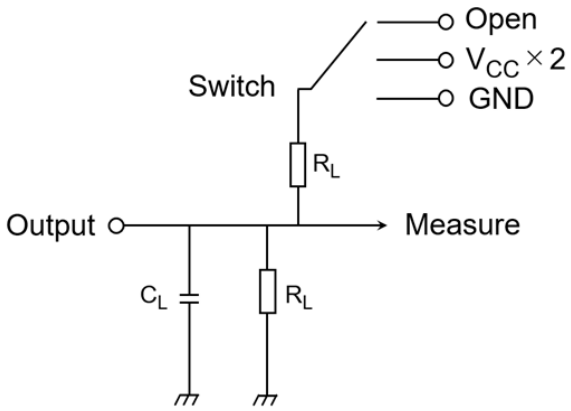


Fig. 12.1 AC Teat Circuit

Table 12.1.1 Parameter for AC Test Circuit

Symbol	V_{CC} = 3.3 ± 0.3 V V_{CC} = 5.0 ± 0.5 V	V_{CC} = 1.8 ± 0.15 V V_{CC} = 2.5 ± 0.2 V V_{CC} = 3.3 ± 0.3 V V_{CC} = 5.0 ± 0.5 V
Switch	Open	Open
R_L	500 Ω	1 MΩ
C_L	50 pF	15 pF

13. AC Waveform

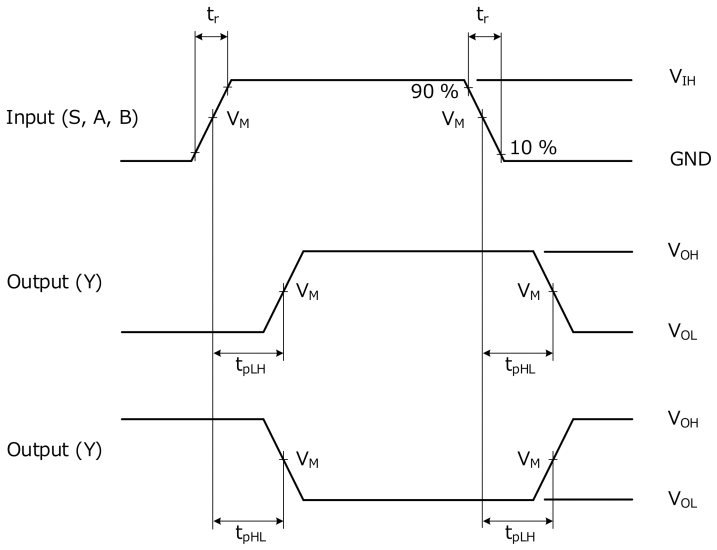
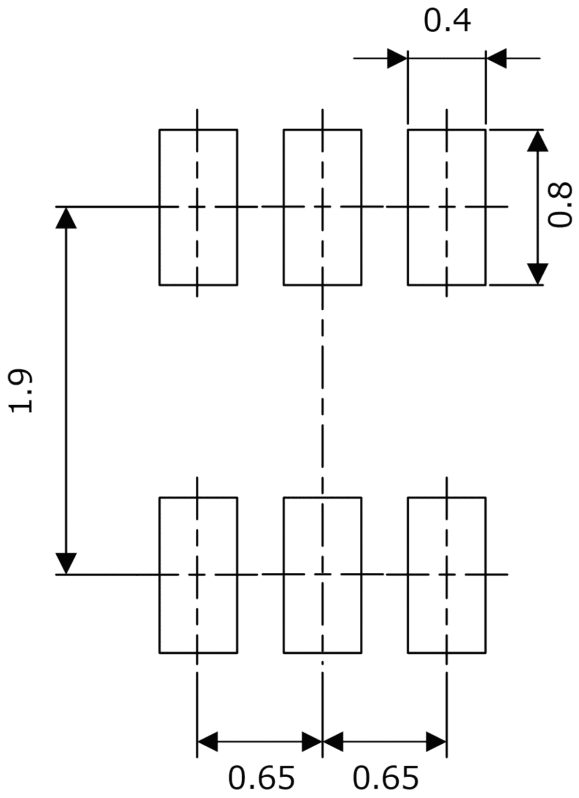


Fig. 13.1 t_{PLH}, t_{PHL}

Table 13.1.1 AC Waveform Symbols

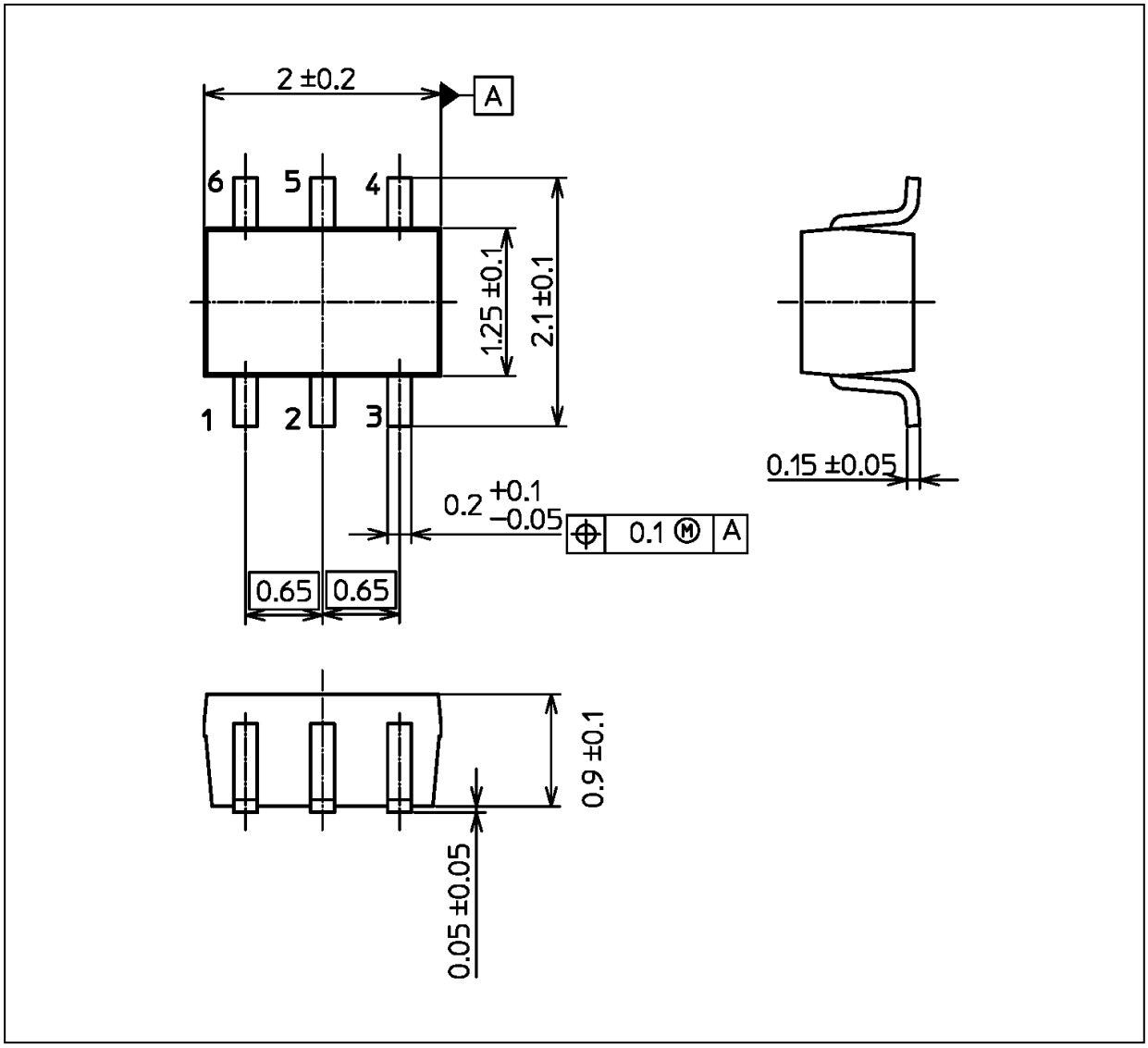
Symbol	V_{CC} = 1.8 ± 0.15 V	V_{CC} = 2.5 ± 0.2 V	V_{CC} = 3.3 ± 0.3 V	V_{CC} = 5.0 ± 0.5 V
V_{IH}	V_{CC}	V_{CC}	2.7 V	V_{CC}
V_M	V_{CC} / 2	V_{CC} / 2	1.5 V	V_{CC} / 2
t_r, t_f	2.0 ns	2.0 ns	2.5 ns	2.5 ns

14. Land Pattern Dimensions (for reference only)



Package Dimensions

Unit: mm



Weight: 0.007 g (typ.)

Package Name(s)
JEDEC: SOT-363
Nickname: US6

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