

Dual SPST Bus Switch

General Description

The ET7WB66M are low ON-resistance, high-speed CMOS 2-bit bus switches.

These bus switches allow connections or disconnections to be made with minimal propagation delay while maintaining Low power dissipation which is the feature of CMOS.

ET7WB66M requires the output enable (OE) input to be set low to place the output into the high impedance state.

These Bus switches consist of P-MOS and N-MOS structure, meaning these devices are suitable for analog signal transmission.

All inputs are equipped with protector circuits to protect the device from static discharge.

Features

- Wide Input Voltage Range: 1.65V to 5.5V
- ON capacitance: $C_{I/O} = 10\text{pF}$ Switch On (typ) @ $V_{CC} = 5.0\text{V}$
- ON resistance: $R_{ON} = 4\Omega$ (typ) @ $V_{CC} = 4.5\text{V}$, $V_{IS} = 0\text{V}$
- ESD performance:
 - ESD HBM $\pm 4\text{KV}$ PASS
 - ESD CDM $\pm 2\text{KV}$ PASS
- Package information:

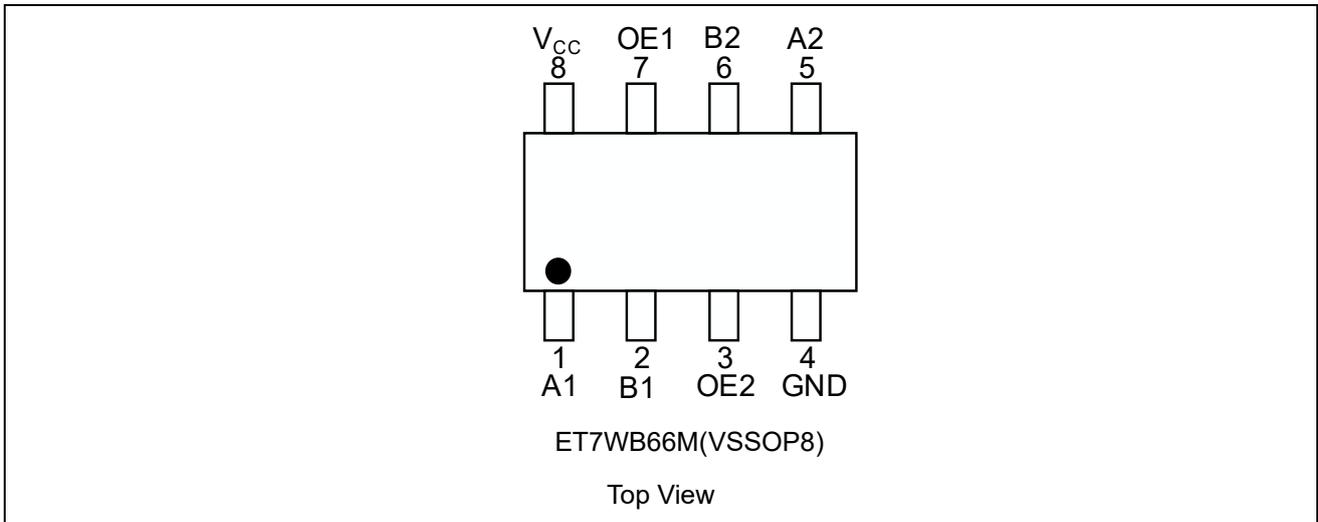
Part No.	Package	Packing Option	MSL
ET7WB66M	VSSOP8	Tape and Reel ,3K	Level 3

Applications

- Main application fields

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Pin Configuration



Pin Function

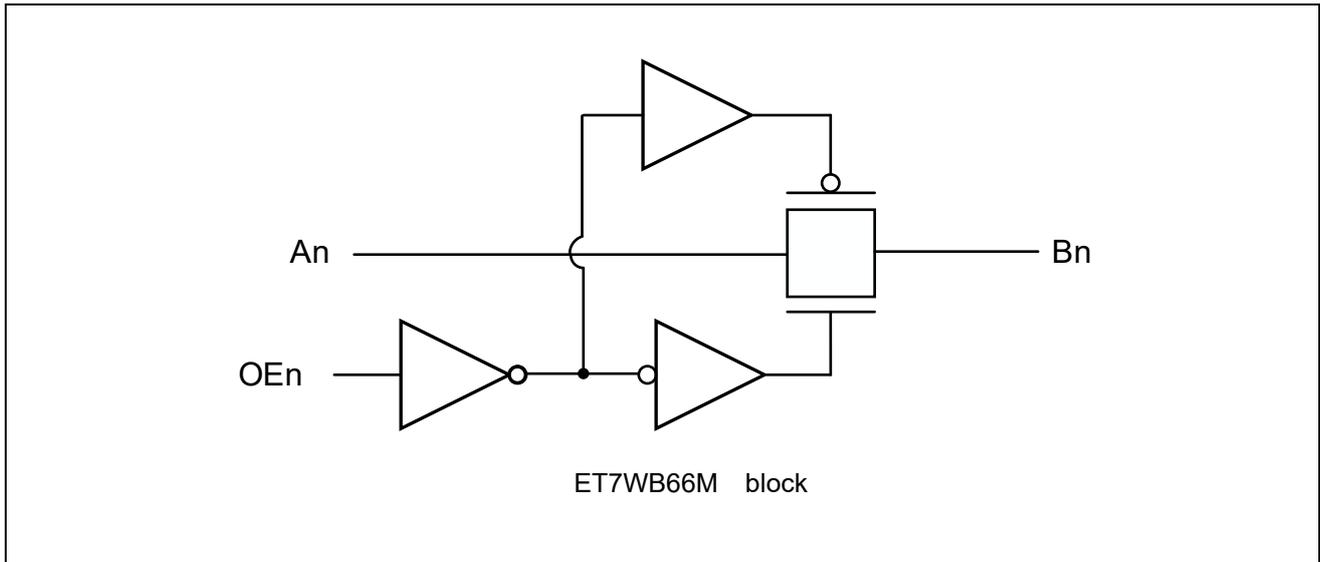
Pin NO.	Pin Name	Description
1	A1	Analog input/output 1
2	B1	Analog input/output 1
3	OE2	Control
4	GND	Ground
5	A2	Analog input/output 2
6	B2	Analog input/output 2
7	OE1	control
8	VCC	Supply

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Truth Table

ET7WB66M OE	Function
H	A port = B port
L	Disconnect

Analog Symbol



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Absolute Maximum Ratings

Symbol	Characteristic	Value	Unit
V _{CC}	Supply Voltage	-0.5~+7.0	V
V _{IN}	Digital Select Input Voltage	-0.5~+7.0	V
V _S	Analog Input Voltage	-0.5~V _{CC} +0.5	V
I _{IK}	Clamp diode current	-50	mA
I _S	Switch I/O current	50	mA
P _D	Power dissipation	200	mW
I _{CC} /I _{GNND}	V _{CC} /ground current	±100	mA
T _{stg}	Storage Temperature	-65 to 150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Recommended Operating Conditions

Symbol	Characteristic	Min	Max	Unit
V _{CC}	DC Supply Voltage	1.65	5.5	V
V _{IN}	Input Voltage (OE)	0	5.5	V
V _S	Analog Input Voltage	0	V _{CC}	V
T _{opr}	Operating Temperature Range	-40	+85	°C
dt/dv	Input Rise or Fall Time	0	10	ns/V

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Electrical Characteristics

Full = -40°C to +85°C, typical values are at $T_a = +25^\circ\text{C}$, unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IH}	High-Level Input Voltage (OE)	$V_{CC}=1.65$ to 1.95V	$0.8 \times V_{CC}$			V
		$V_{CC}=2.3$ to 5.5V	$0.7 \times V_{CC}$			
V_{IL}	Low-Level Input Voltage (OE)	$V_{CC}=1.65$ to 1.95V			$0.2 \times V_{CC}$	V
		$V_{CC}=2.3$ to 5.5V			$0.3 \times V_{CC}$	
I_{IN}	Input Leakage Current (OE)	$V_{IN}=0$ to 5.5V $V_{CC}=1.65$ to 5.5V			± 1.0	μA
I_{SZ}	Switch OFF-state leakage current	$A, B=0$ to V_{CC} , $OE=GND$ $V_{CC}=1.65$ to 5.5V			± 10	μA
R_{ON}	On-Resistance ⁽¹⁾	$V_{IS}=0\text{V}$, $I_{IS}=30\text{mA}$ $V_{CC}=4.5\text{V}$		4	7	Ω
		$V_{IS}=2.4\text{V}$, $I_{IS}=30\text{mA}$ $V_{CC}=4.5\text{V}$		5	12	
		$V_{IS}=4.5\text{V}$, $I_{IS}=30\text{mA}$ $V_{CC}=4.5\text{V}$		6	10	
		$V_{IS}=0\text{V}$, $I_{IS}=24\text{mA}$ $V_{CC}=3.0\text{V}$		5	9	
		$V_{IS}=3.0\text{V}$, $I_{IS}=24\text{mA}$ $V_{CC}=3.0\text{V}$		7	14	
		$V_{IS}=0\text{V}$, $I_{IS}=8\text{mA}$ $V_{CC}=2.3\text{V}$		6	12	
		$V_{IS}=2.3\text{V}$, $I_{IS}=8\text{mA}$ $V_{CC}=2.3\text{V}$		9	18	
		$V_{IS}=0\text{V}$, $I_{IS}=4\text{mA}$ $V_{CC}=1.65\text{V}$		8	20	
		$V_{IS}=1.65\text{V}$, $I_{IS}=4\text{mA}$ $V_{CC}=1.65\text{V}$		15	30	
I_{CC}	Quiescent supply current	$V_{IN}=V_{CC}$ or GND $I_{OUT}=0\text{A}$, $V_{CC}=5.5\text{V}$			10	μA
ΔI_{CC}	Quiescent supply current	$V_{IN}=V_{CC}-0.6\text{V}$, $V_{CC}=5.5\text{V}$			50	μA

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Electrical Characteristics (Continued)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t _{PZL} /t _{PZH}	3-state output enable time	V _{CC} =5.0 ± 0.5V See Figure 1,2, Table 1			5.5	ns
		V _{CC} =3.3 ± 0.3V See Figure 1,2, Table 1			6	
		V _{CC} =2.5 ± 0.2V See Figure 1,2, Table 1			9	
		V _{CC} =1.8 ± 0.15V See Figure 1,2, Table 1			18	
t _{PLZ} /t _{PHZ}	3-state output disable time	V _{CC} =5.0 ± 0.5V See Figure 1,2, Table 1			6	ns
		V _{CC} =3.3 ± 0.3V See Figure 1,2, Table 1			7	
		V _{CC} =2.5 ± 0.2V See Figure 1,2, Table 1			9	
		V _{CC} =1.8 ± 0.15V See Figure 1,2, Table 1			18	
C _{IN}	Input capacitance ⁽²⁾ (OE)	V _{IN} =0V, V _{CC} =5V		4		pF
C _{I/O}	Switch terminal OFF-capacitance ⁽²⁾	OE=GND, V _{I/O} =0V V _{CC} =5V		5		pF
C _{I/O}	Switch terminal ON-capacitance ⁽²⁾	OE=V _{CC} , V _{I/O} =0V V _{CC} =5V		10		pF

Note1: Measured by the voltage drop between A and B pins at the indicated current through the switch. On-resistance is determined by the lower of the voltages on the two (A or B) pins.

Note2: Parameter guaranteed by design.

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Test Circuit

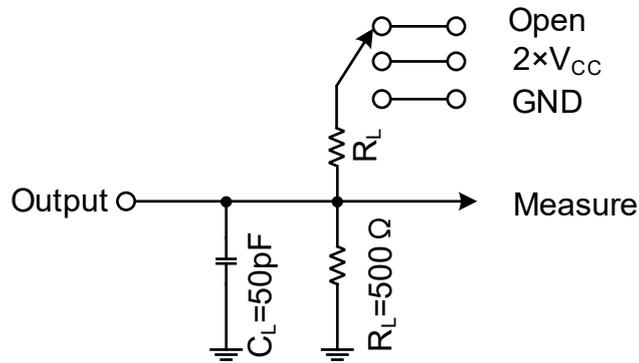


Figure1. AC Test Circuit

Table1. Parameter for AC Test Circuit

Parameter	Switch
t_{PLZ} , t_{PZL}	$2 \times V_{CC}$
t_{PHZ} , t_{PZH}	GND

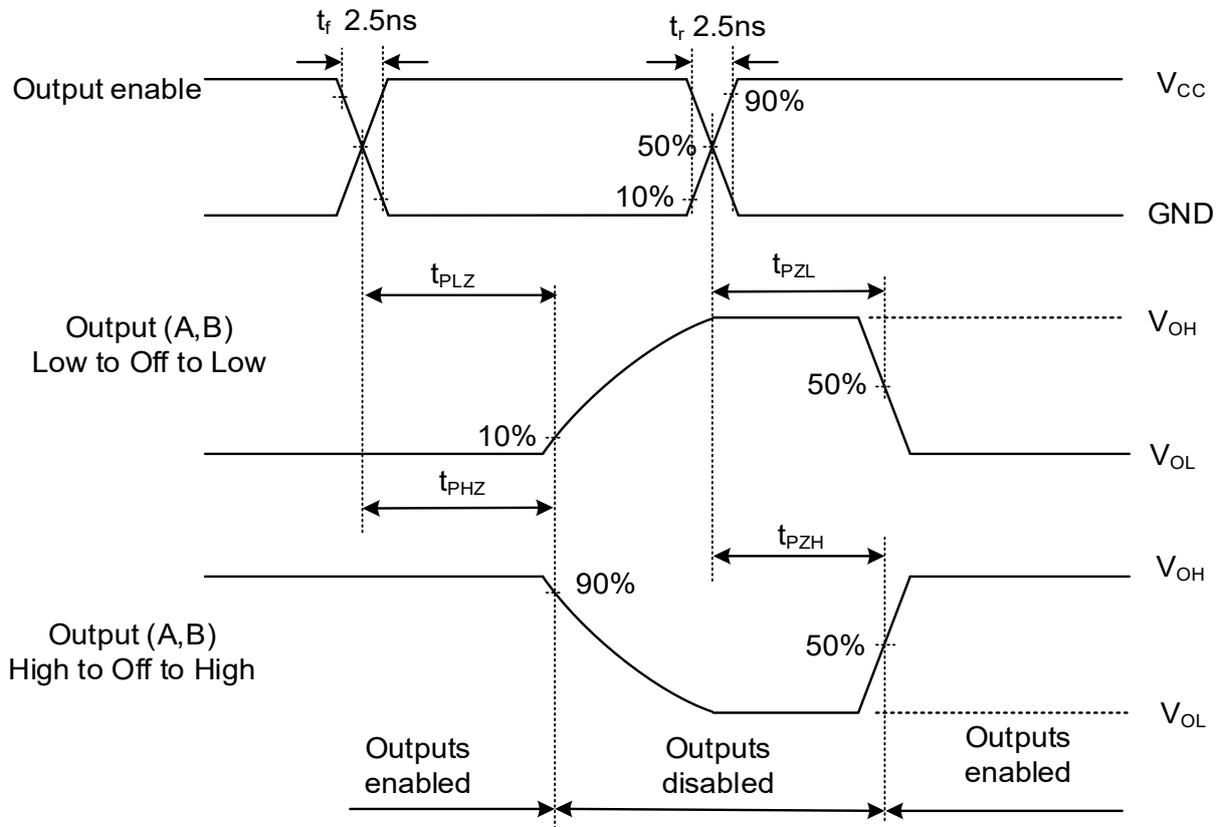


Figure2. AC Waveform

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Typical Characteristics

$T_a=25^\circ\text{C}$, unless otherwise stated

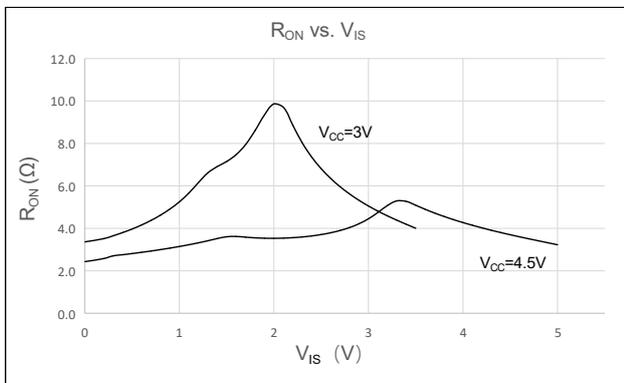


Figure 3. On-Resistance vs. V_{IS}

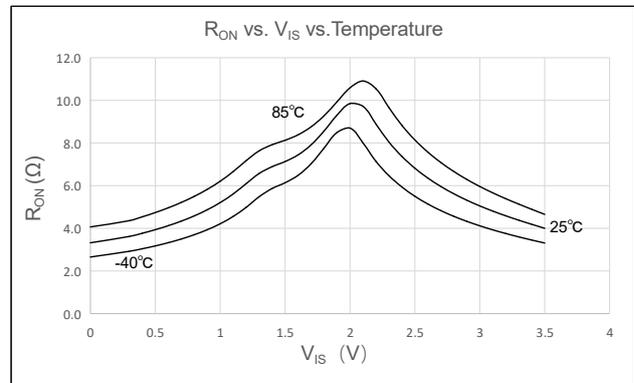


Figure 4. R_{ON} vs. V_{IS} vs. Temperature @ $V_{CC}=3V$

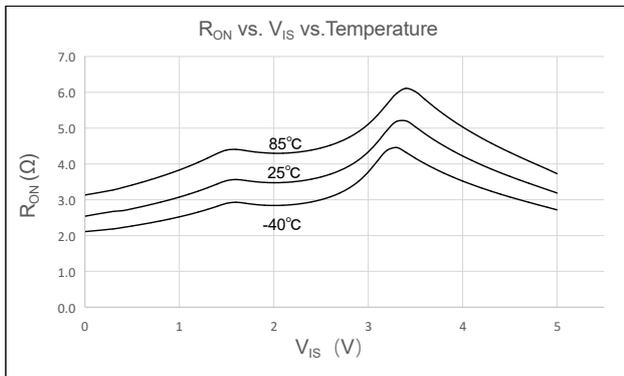


Figure 5. R_{ON} vs. V_{IS} vs. Temperature @ $V_{CC}=4.5V$

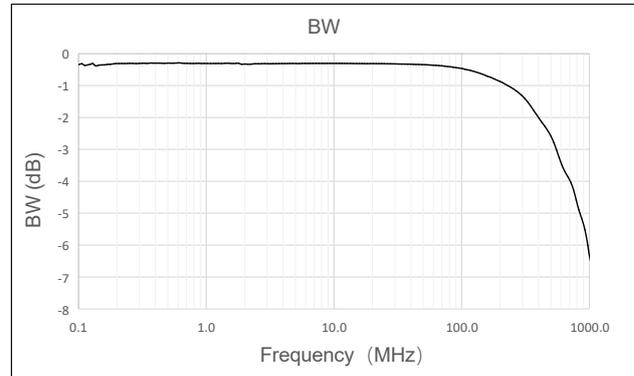


Figure 6. Bandwidth vs. Frequency @ $V_{CC}=3V$

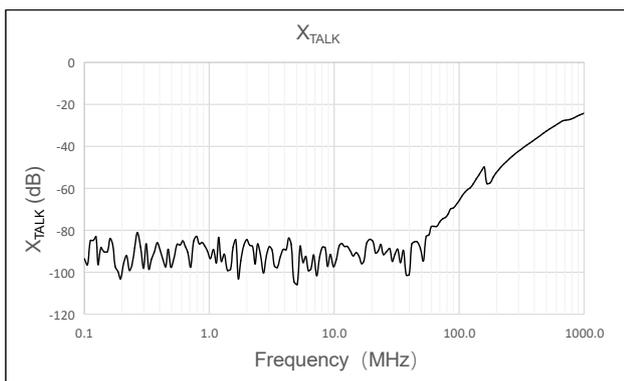


Figure 7. X_{TALK} vs. Frequency @ $V_{CC}=3V$

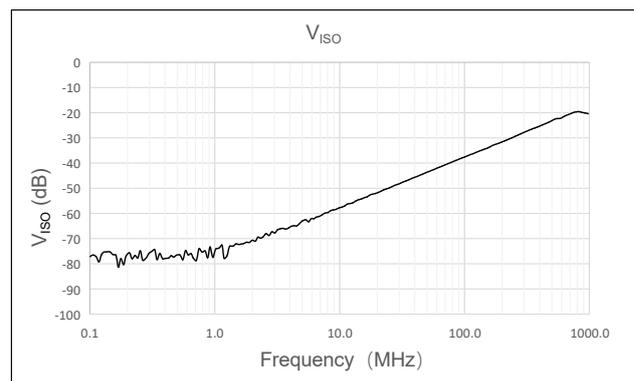


Figure 8. V_{ISO} vs. Frequency @ $V_{CC}=3V$

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Rise and Fall Time (t_r/t_f)

The $t_{r(out)}$ and $t_{f(out)}$ values of the output signals are affected by the CR time constant of the input, which consists of the switch terminal capacitance ($C_{I/O}$) and the on-resistance (R_{ON}) of the input.

In practice, the $t_{r(out)}$ and $t_{f(out)}$ values are also affected by the circuit's capacitance and resistance components other than the capacitance of ET7WB66M.

The $t_r/t_{f(out)}$ values can be approximated as follows.

(Figure8, Table2 shows the test circuit.)

$$t_r/t_{f(out)} \text{ (approx)} = - (C_{I/O} + C_L) \cdot (R_{DRIVE} + R_{ON}) \cdot \ln \left(\frac{(V_{OH} - V_{OL}) - V_M}{V_{OH} - V_{OL}} \right)$$

Where, R_{DRIVE} is the output impedance of the previous-stage circuit.

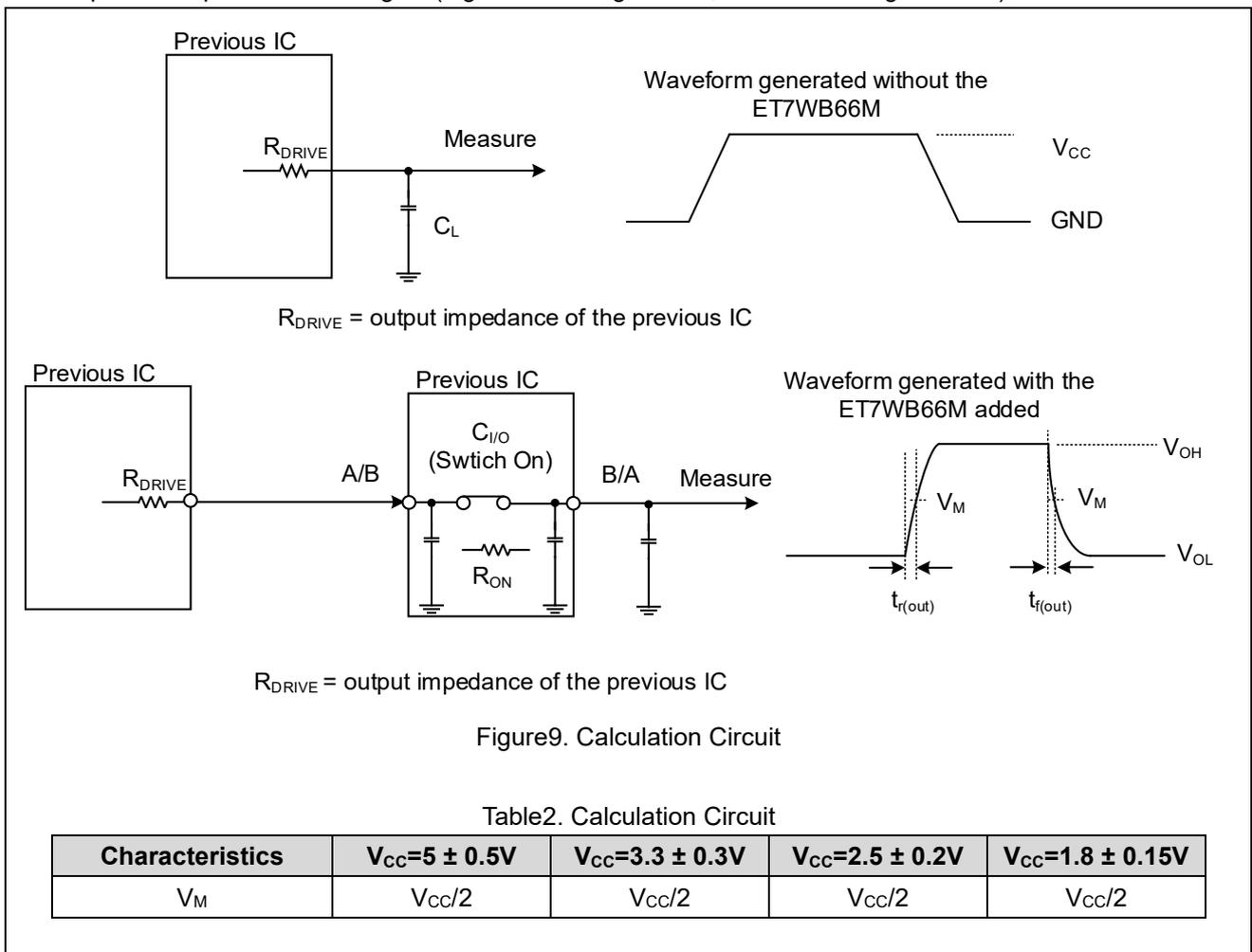
Calculation example:

$$t_{r(out)} \text{ (approx)} = - (10 + 15) \text{ E} - 12 \cdot (120 + 4) \cdot \ln \left(\frac{(4.5 - 0) - 2.25}{4.5 - 0} \right) = \approx 2.1 \text{ ns}$$

Calculation conditions:

$V_{CC} = 4.5 \text{ V}$, $C_L = 15 \text{ pF}$, $R_{DRIVE} = 120 \Omega$ (output impedance of the previous IC), $V_M = 2.25 \text{ V}$ ($V_{CC}/2$)

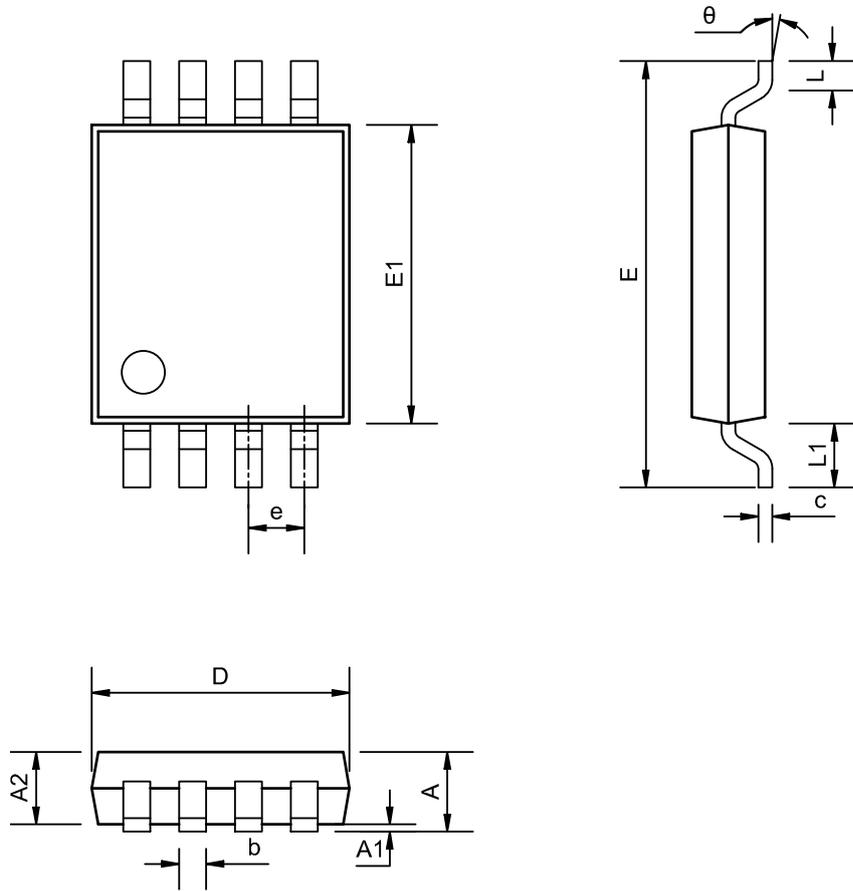
Output of the previous IC = digital (high-level voltage = V_{CC} , low-level voltage = GND)



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Package Dimension

VSSOP8

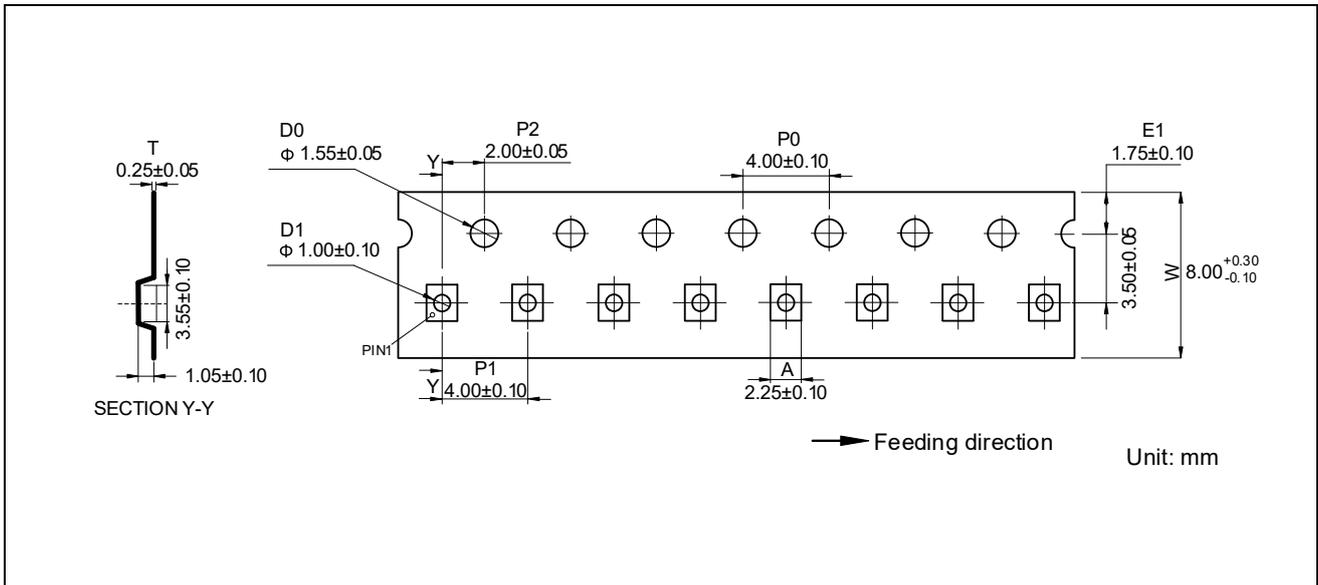


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	-	-	0.90
A1	0	0.05	0.10
A2	0.65	0.75	0.80
b	0.17	-	0.27
c	0.10	-	0.18
D	1.90	2.00	2.10
E	3.00	3.10	3.20
E1	2.20	2.30	2.40
e	0.40	0.50	0.60
L	0.20	0.26	0.35
L1	0.40 REF		
θ	0°	-	6°

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Tape Information



Marking Information

VSOP10



W66M - Part Number

XXXXX - Tracking Number

Note: X (Tracking Number) is variable, according to the wafer lot number.

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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2024-11-06	Preliminary Version	Qinpl	Geh	Liujiy
1.0	2025-03-25	Original Version	Qinpl	Geh	Liujiy