



B5S16862

20-BIT TWO PORT BUS SWITCH WITH FOUR ENABLE CONTROL

PRELIMINARY DATA

- HIGH SPEED: $t_{PD} = 0.25\text{ns}$ (MAX.)
at $V_{CC} = 4.5\text{V}$ $T_A = 85^\circ\text{C}$
- ON RESISTANCE BETWEEN TWO PORT:
 5Ω (TYP) at $V_{CC} = 5.0\text{V}$ $T_A = 25^\circ\text{C}$
- LOW POWER DISSIPATION:
 $I_{CC} = 1\mu\text{A}$ (MAX.) at $T_A = 25^\circ\text{C}$
- COMPATIBLE WITH TTL OUTPUTS:
 $V_{IH} = 2\text{V}$ (MIN), $V_{IL} = 0.8\text{V}$ (MAX)
- POWER DOWN PROTECTION ON INPUTS
AND OUTPUTS
- OPERATING VOLTAGE RANGE:
 $V_{CC}(\text{OPR}) = 4\text{V}$ to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH
74 SERIES 16862
- IMPROVED LATCH-UP IMMUNITY
- ESD PERFORMANCE:
 $\text{HBM} > 2000\text{V}$ (MIL STD 883 method 3015);
 $\text{MM} > 200\text{V}$

DESCRIPTION

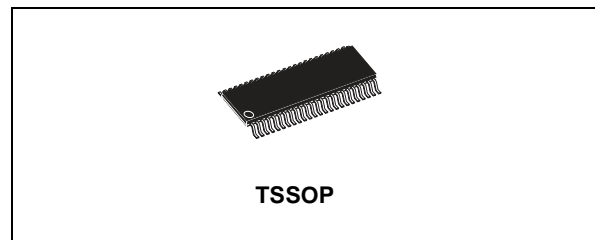
The B5S16862 is an advanced high-speed CMOS 20-BIT TWO PORT BUS SWITCH fabricated with sub-micron silicon gate and double-layer metal wiring C²MOS technology.

It is ideal for 4V to 5.5V V_{CC} operations and ultra-low power and low noise applications, typically notebook and docking station.

Any \overline{nG} output control governs four 5-bit BUS SWITCHES. Output Enable inputs (\overline{nG}) tied together gives full 20-bit operations. When \overline{nG} is LOW, the switches are on. When \overline{nG} is HIGH, the switches are in high impedance state.

It has ultra high-speed performance at 5V near zero delay with low ON resistance.

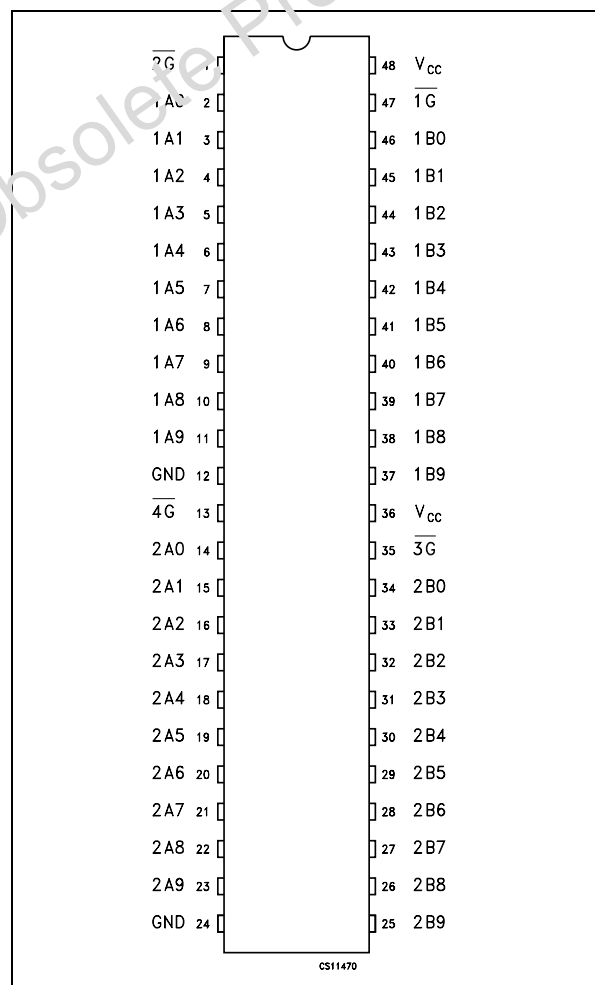
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.



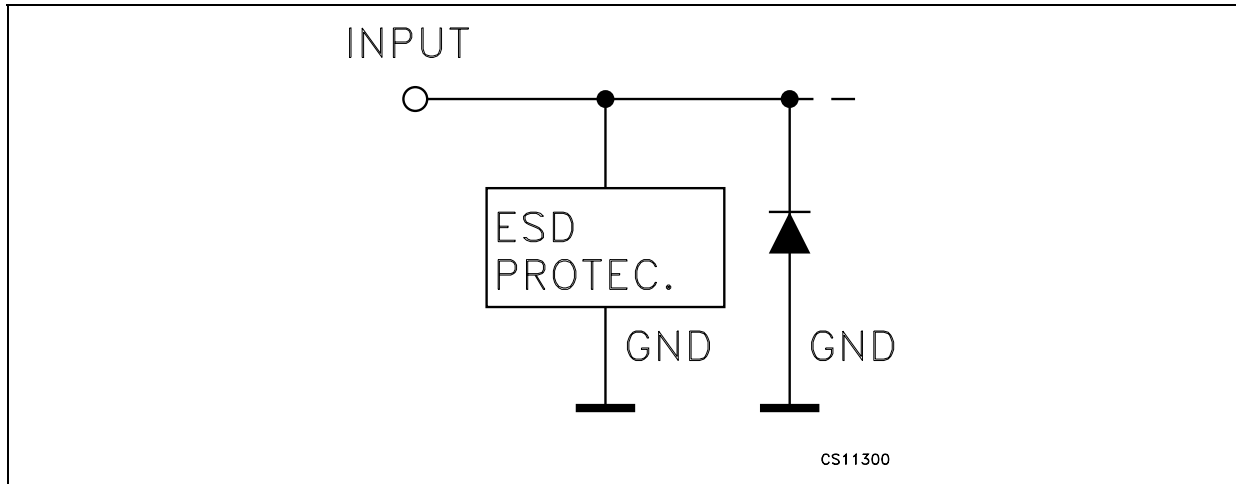
ORDER CODES

| PACKAGE | T & R |
|---------|-------------|
| TSSOP48 | B5S168621TR |

PIN CONNECTION



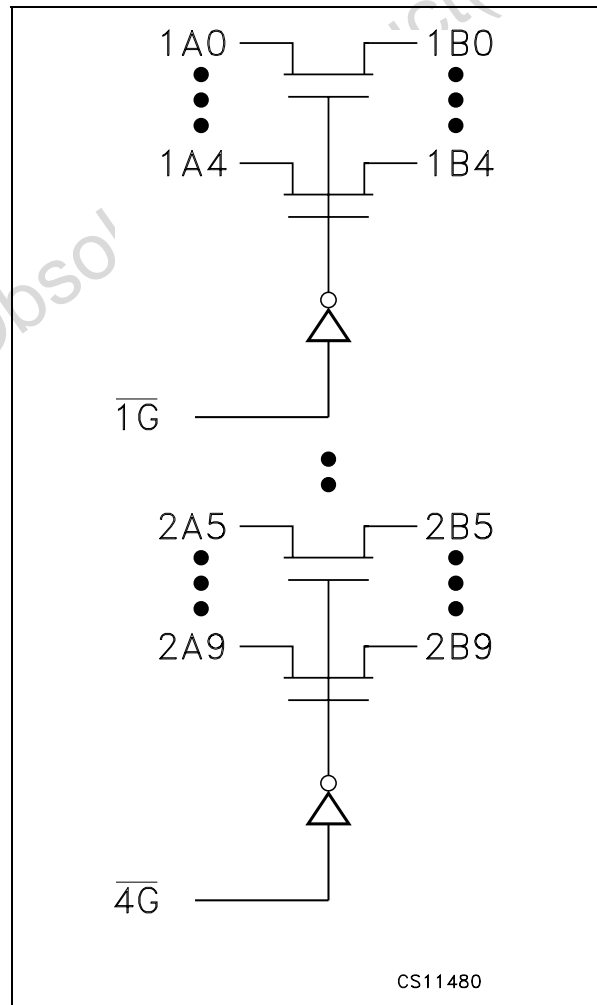
INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

| PIN No | SYMBOL | NAME QND FUNCTION |
|--|--------------------------------|-------------------------------|
| 1, 13 | $\overline{2G}, \overline{4G}$ | Bus Enable Input (Active Low) |
| 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 | 1A0 to 1A9 | Data Inputs |
| 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 | 2A0 to 2A9 | Data Inputs |
| 34, 33, 32, 31, 30, 29, 28, 27, 26, 25 | 2B0 to 2B9 | Data Outputs |
| 46, 45, 44, 43, 42, 41, 40, 39, 38, 37 | 1B0 to 1B9 | Data Outputs |
| 47, 35 | $\overline{1G}, \overline{3G}$ | Bus Enable Input (Active Low) |
| 12, 24 | GND | Ground (0V) |
| 36, 48 | V _{CC} | Positive Supply Voltage |

SCHEMATIC DIAGRAM



TRUTH TABLE

| INPUT | | OUTPUT |
|-----------------|----------|----------|
| \overline{yG} | 1An, 2An | 1Bn, 2Bn |
| L | X | Bus ON |
| H | X | Z |

y: 1 to 4

y: 1, active on 1An, 1Bn port only with n:0 to 4

y: 2, active on 1An, 1Bn port only with n:5 to 9

y: 3, active on 2An, 2Bn port only with n:0 to 4

y: 4, active on 2An, 2Bn port only with n:5 to 9

X: "H" or "L"

Z: High Impedance

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter ² | Value | Unit |
|-------------------------------------|---|--------------|------|
| V _{CC} | Supply Voltage | -0.5 to +7.0 | V |
| V _I | DC Switch and Control Pin Voltage | -0.5 to +7.0 | V |
| V _O | DC Output Voltage (V _{CC} = 0V) (note 1) | -0.5 to +7.0 | V |
| V _O | DC Output Voltage (V _{I/O} =Gnd) | -0.5 to +7.0 | V |
| I _{IK} | DC Input Diode Current (V _{I/O} < 0V) | - 50 | mA |
| I _{OK} | DC Output Diode Current (note 2) | - 50 | mA |
| I _O | DC Output Current (note 3) | 128 | mA |
| I _{CC} or I _{GND} | DC V _{CC} or Ground Current per Supply Pin | ± 100 | mA |
| T _{stg} | Storage Temperature | -65 to +150 | °C |
| T _L | Lead Temperature (10 sec) | 300 | °C |

Absolute Maximum Rating are those value beyond which damage to the device may occur. Functional operation under these condition is not implied

1) I_O absolute maximum rating must be observed

2) V_O < GND, V_O > V_{CC}

3) Not more than one output should be tested at one time. Duration of the test should not exceed one second.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Value | Unit |
|-----------------|---|------------|------|
| V _{CC} | Supply Voltage | 4 to 5.5 | V |
| V _I | Input Voltage | 0 to 5.5 | V |
| V _O | Output Voltage (V _{CC} = 0V) | 0 to 5.5 | V |
| V _O | Output Voltage | 0 to 5.5 | V |
| T _{op} | Operating Temperature | -55 to 125 | °C |
| dt/dv | Switch Input Rise and Fall Time | 0 to DC | ns/V |
| dt/dv | Control Input Rise and Fall Time (note 1) | 0 to 10 | ns/V |

1) V_{IN} from 0.8V to 2V at V_{CC} = 3.0V

DC SPECIFICATION

| Symbol | Parameter | Test Condition | | Value | | | | | | Unit | |
|------------------|--|------------------------|--|------------------------|------|------|--------------|------|---------------|------|------------|
| | | V _{CC} (V) | | T _A = 25 °C | | | -40 to 85 °C | | -55 to 125 °C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | Min. | | Max. |
| V _{IH} | High Level Input Voltage | 4 to 5.5 | | 2 | | | 2 | | 2 | | V |
| V _{IL} | Low Level Input Voltage | 4 to 5.5 | | | | 0.8 | | 0.8 | | 0.8 | V |
| V _H | Input Hysteresis at Control pin | 4.5 to 5.5 | | | 150 | | | | | | mV |
| R _{ON} | Switch ON Resistance | 4.5 | I _{ON} =64 mA V _I =0V | | | | | 7 | | | Ω |
| | | 4.5 | I _{ON} =48 mA V _I =0V | | | 5 | | 7 | | | |
| | | 4.5 | I _{ON} =15 mA V _I =2.4V | | | 10 | | 15 | | | |
| | | 4.0 | I _{ON} =15 mA V _I =2.4V | | | 14 | | 22 | | | |
| I _I | Input Leakage Current | 0 to 5.5 | V _I = 5.5V or GND | | | ±0.1 | | ±1.0 | | ±2.0 | μA |
| I _{OZ} | High Impedance Leakage Current | 4.5 to 5.5 | V _{I/O} = 5.5V to GND | | | | | ±1.0 | | ±2.0 | μA |
| V _{IK} | Clamp Diode Voltage | 4.0 to 5.5 | I _I = -18mA | | -0.7 | | | -1.2 | | -1.2 | V |
| I _{CC} | Quiescent Supply Current | 5.5 | V _I = V _{CC} or GND | | 0.1 | 1.0 | | 3.0 | | 10.0 | μA |
| I _{CCD} | Supply Current per Control Input per MHz (1) | 5.5 | V _{I/O} = Open nG=GND; Control Input Toggling 50% Duty Cycle | | | | | 0.25 | | | mA/ MHz |
| ΔI _{CC} | I _{CC} incr. per Input | 5.5 | V _{IC} =V _{CC} -2.1 V | | | | | 2.5 | | | mA |

1) This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The 1An and 2An inputs generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

AC ELECTRICAL CHARACTERISTICS

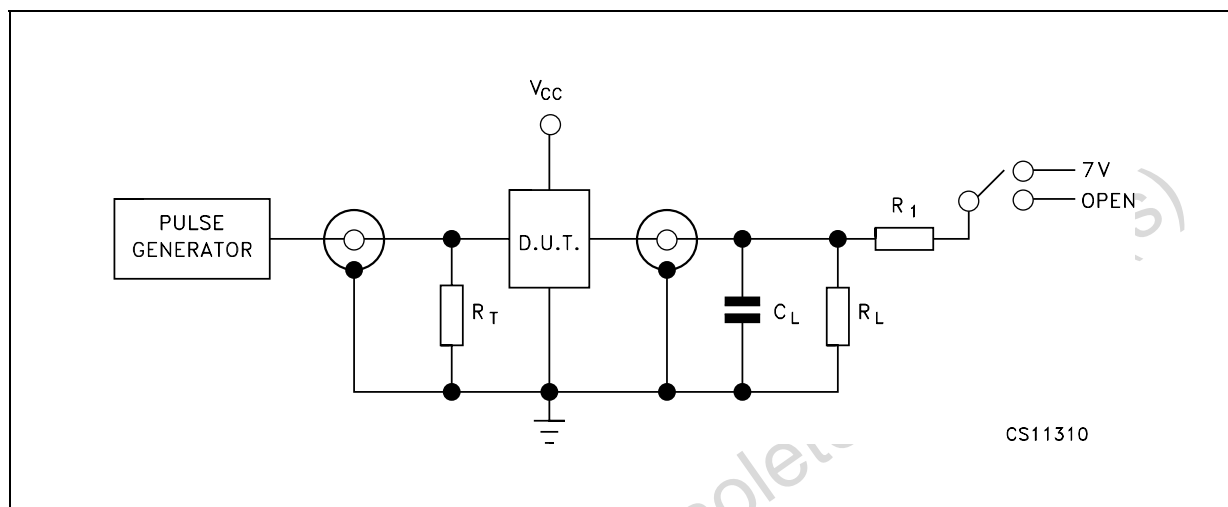
| Symbol | Parameter | Test Condition | | | | Value | | | | Unit |
|-----------------------------------|---|------------------------|------------------------|-----------------------|---|--------------|------|---------------|------|------|
| | | V _{CC} (V) | C _L (pF) | R _L (Ω) | t _s = t _r (ns) | -40 to 85 °C | | -55 to 125 °C | | |
| | | | | | | Min. | Max. | Min. | Max. | |
| t _{PLH} t _{PHL} | Propagation Delay Time (1) xAn to xBn, xBn to xAn(2) | 4.5 to 5.5 | 50 | 500 | 2.5 | | 0.25 | | | ns |
| t _{PZL} t _{PZH} | Output Enable Time | | 50 | 500 | 2.5 | 1.5 | 5.5 | | | ns |
| t _{PLZ} t _{PHZ} | Output Disable Time | | 50 | 500 | 2.5 | 1.5 | 5.5 | | | ns |

1) Parameter guaranteed by design
2) X=1,2; n=0..9.

CAPACITANCE CHARACTERISTICS

| Symbol | Parameter | Test Condition | | Value | | | Unit |
|------------------|----------------------------------|------------------------|--------------------|------------------------|------|------|------|
| | | V _{CC} (V) | | T _A = 25 °C | | | |
| | | | | Min. | Typ. | Max. | |
| C _{IN} | Input Capacitance at Control Pin | | | | 4 | | pF |
| C _{I/O} | Input Capacitance at I/O Pin | 5.0 | nG=V _{CC} | | 5.5 | | pF |

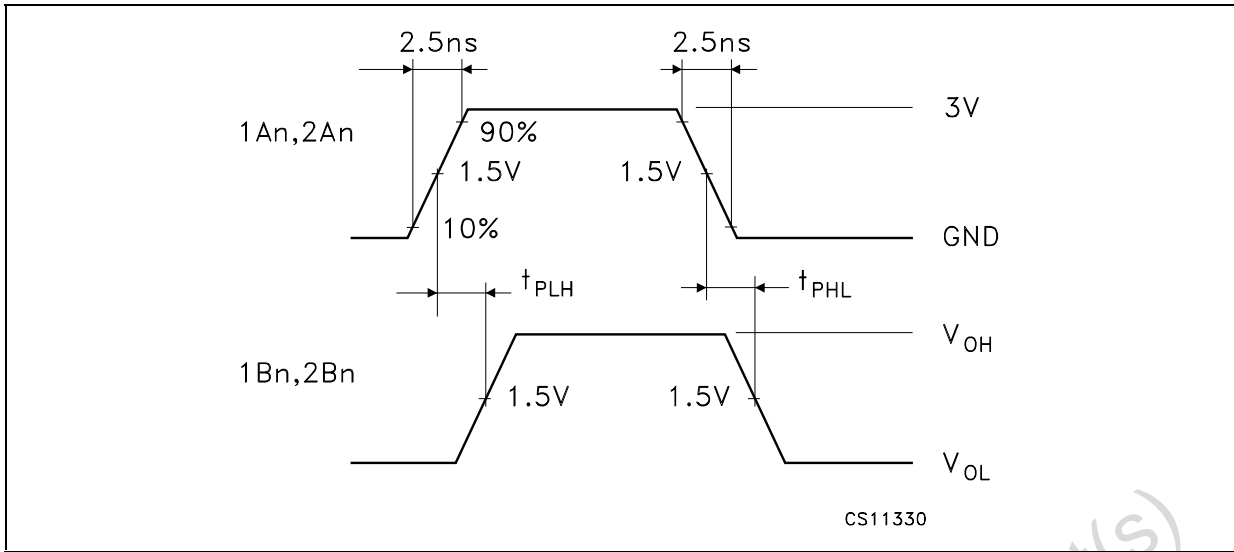
TEST CIRCUIT



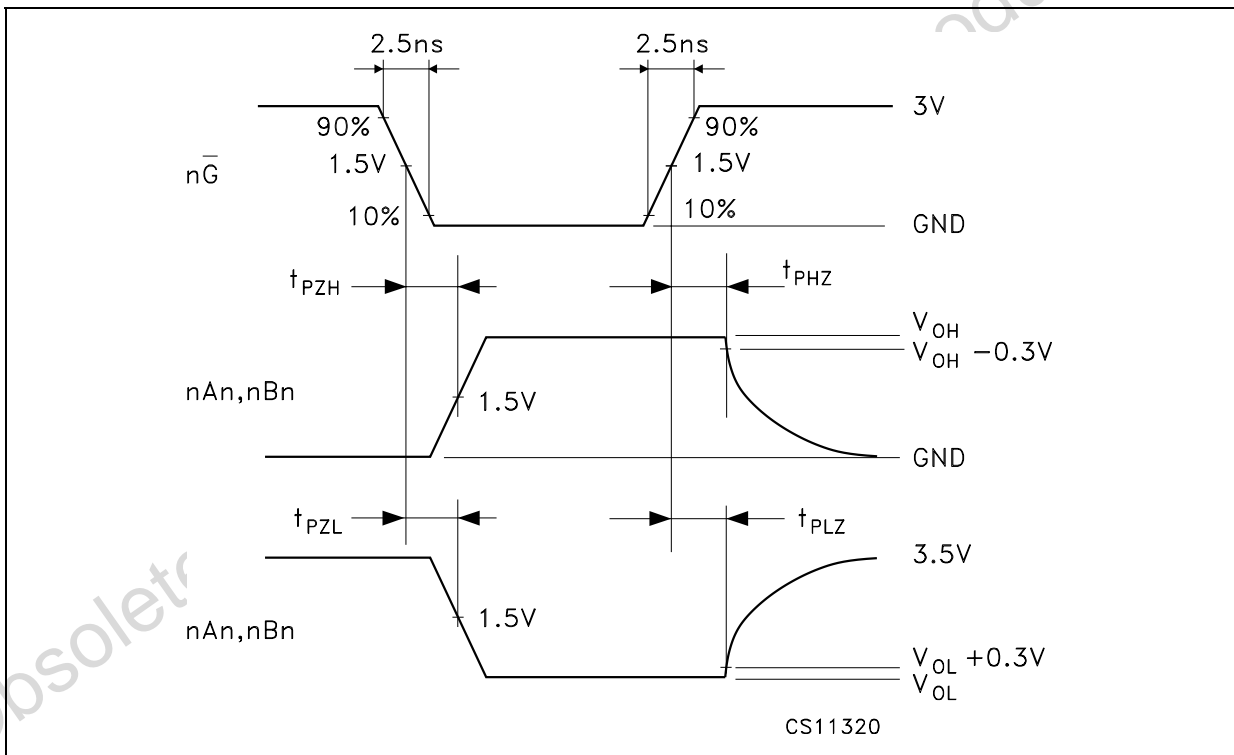
| TEST | SWITCH |
|-------------------------------------|--------|
| t _{PLH} , t _{PHL} | Open |
| t _{PZL} , t _{PLZ} | 7V |
| t _{PZH} , t _{PHZ} | Open |

C_L = 50pF or equivalent (includes jig and probe capacitance)
 R_L = R₁ = 500Ω or equivalent
 R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM 1: PROPAGATION DELAY (f=1MHz; 50% duty cycle)

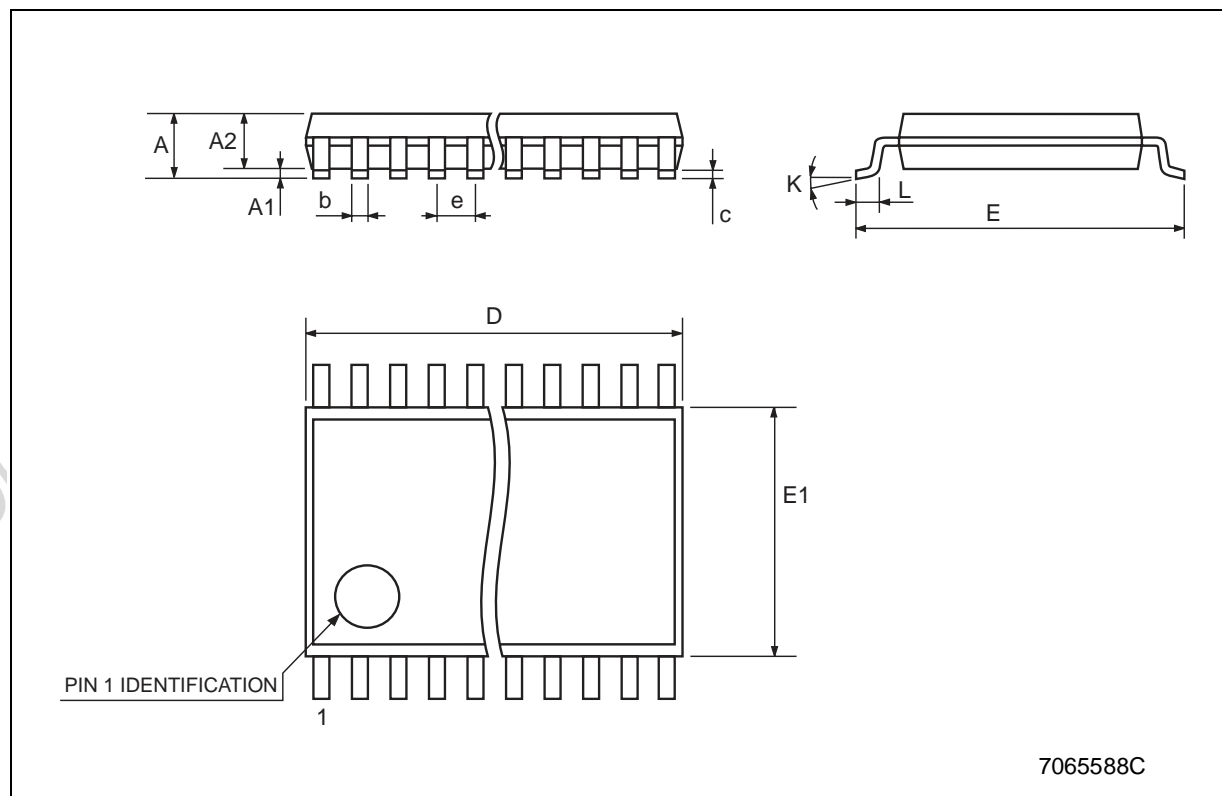


WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle)



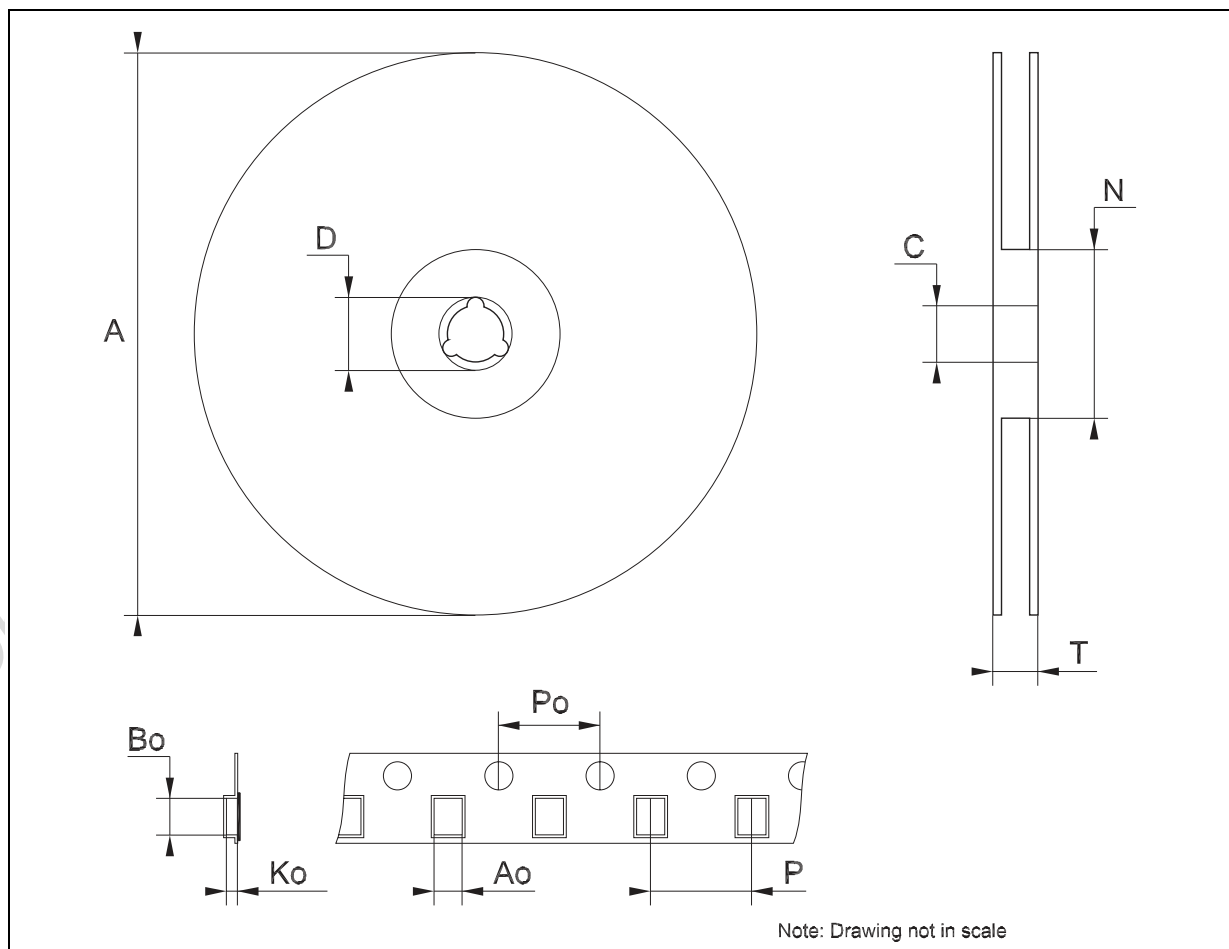
TSSOP48 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|---------|------|--------|------------|--------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.2 | | | 0.047 |
| A1 | 0.05 | | 0.15 | 0.002 | | 0.006 |
| A2 | | 0.9 | | | 0.035 | |
| b | 0.17 | | 0.27 | 0.0067 | | 0.011 |
| c | 0.09 | | 0.20 | 0.0035 | | 0.0079 |
| D | 12.4 | | 12.6 | 0.488 | | 0.496 |
| E | | 8.1 BSC | | | 0.318 BSC | |
| E1 | 6.0 | | 6.2 | 0.236 | | 0.244 |
| e | | 0.5 BSC | | | 0.0197 BSC | |
| K | 0° | | 8° | 0° | | 8° |
| L | 0.50 | | 0.75 | 0.020 | | 0.030 |



Tape & Reel TSSOP48 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-----|------|-------|------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | | 13.2 | 0.504 | | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 30.4 | | | 1.197 |
| Ao | 8.7 | | 8.9 | 0.343 | | 0.350 |
| Bo | 13.1 | | 13.3 | 0.516 | | 0.524 |
| Ko | 1.5 | | 1.7 | 0.059 | | 0.067 |
| Po | 3.9 | | 4.1 | 0.153 | | 0.161 |
| P | 11.9 | | 12.1 | 0.468 | | 0.476 |



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