

1. General description

The CBTL05024 is a custom multiplexer/demultiplexer switch chip optimized to interface the Thunderbolt/MiniDP connector for Thunderbolt systems. It supports 10.3125 Gbit/s Thunderbolt or DisplayPort v1.2 channels.

The TB MUX is a 3 : 1 switch that selects between Thunderbolt data path and DisplayPort v1.2 control signals — either DDC or AUX.

The DP MUX is a 2 : 1 switch that selects between DP ML (DisplayPort Main Link) and LS TX/RX signals. Both LSTX and LSRX are the control signals for Thunderbolt channel.

This chip also includes HPDOUT and CA_DETOUT buffers for HPD_IN and CA_DET control signals.

CBTL05024 is powered by a 3.3 V supply and it is available in a 3 mm × 3 mm HVQFN24 package with 0.4 mm pitch.

2. Features and benefits

- The input of the HPDOUT (Hug Plug Detect) buffer must be 5 V tolerant
- HPDOUT and CA_DETOUT buffers
 - ◆ CA_DET input leakage current < 0.1 μ A to prevent driving the 1 M Ω pull-down to a HIGH level
- Integrated LSRX buffer with 1 M Ω pull-down resistor (R1) on the LSRX buffer input to improve signal integrity
- Integrated 8.75 k Ω pull-up resistor (R4) on the LSTX pin
- When AUXIO_EN = 1, TB_ENA = 0 and DP_PD = 1, the CBTL05024 is in Detect mode
 - ◆ AUXIO+ and AUXIO– of the TB MUX are disabled
 - ◆ LS path is selected in DP MUX
 - ◆ CA_DETOUT and HPDOUT buffers are on
 - ◆ When the CBTL05024 is in Detect mode, this chip will consume < 1 mW
- Patent-pending high bandwidth analog pass-gate technology
- Very low intra-pair differential skew (5 ps typical)
- Back current protection on connector pins (AUXIO+/-, DPMLO+/-, CA_DET and HPD pins)
- All channels support rail-to-rail input voltage
- All CMOS input buffer with hysteresis
- Single 3.3 V $\pm$ 10 % power supply

- HVQFN24 3 mm × 3 mm package, 0.4 mm pitch, exposed center pad for thermal relief and electrical ground
- ESD: 1500 V HBM, 500 V CDM
- Operating temperature range –20 °C to 85 °C

3. Ordering information

Table 1. Ordering information

Type number	Package		Version
	Name	Description	
CBTL05024BS	HVQFN24	plastic thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3 × 3 × 0.85 mm ^[1]	SOT905-1

[1] Maximum package height is 1 mm.

4. Block diagram

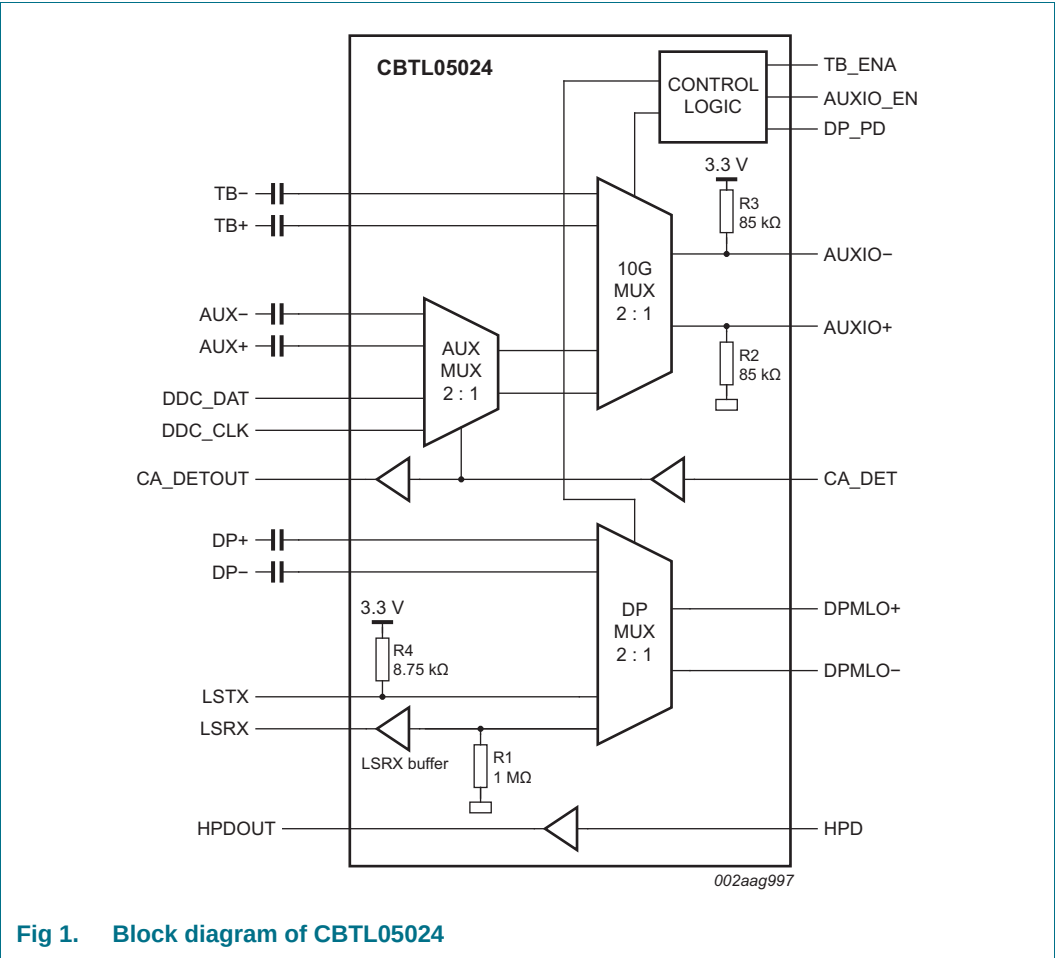


Fig 1. Block diagram of CBTL05024

5. Package outline

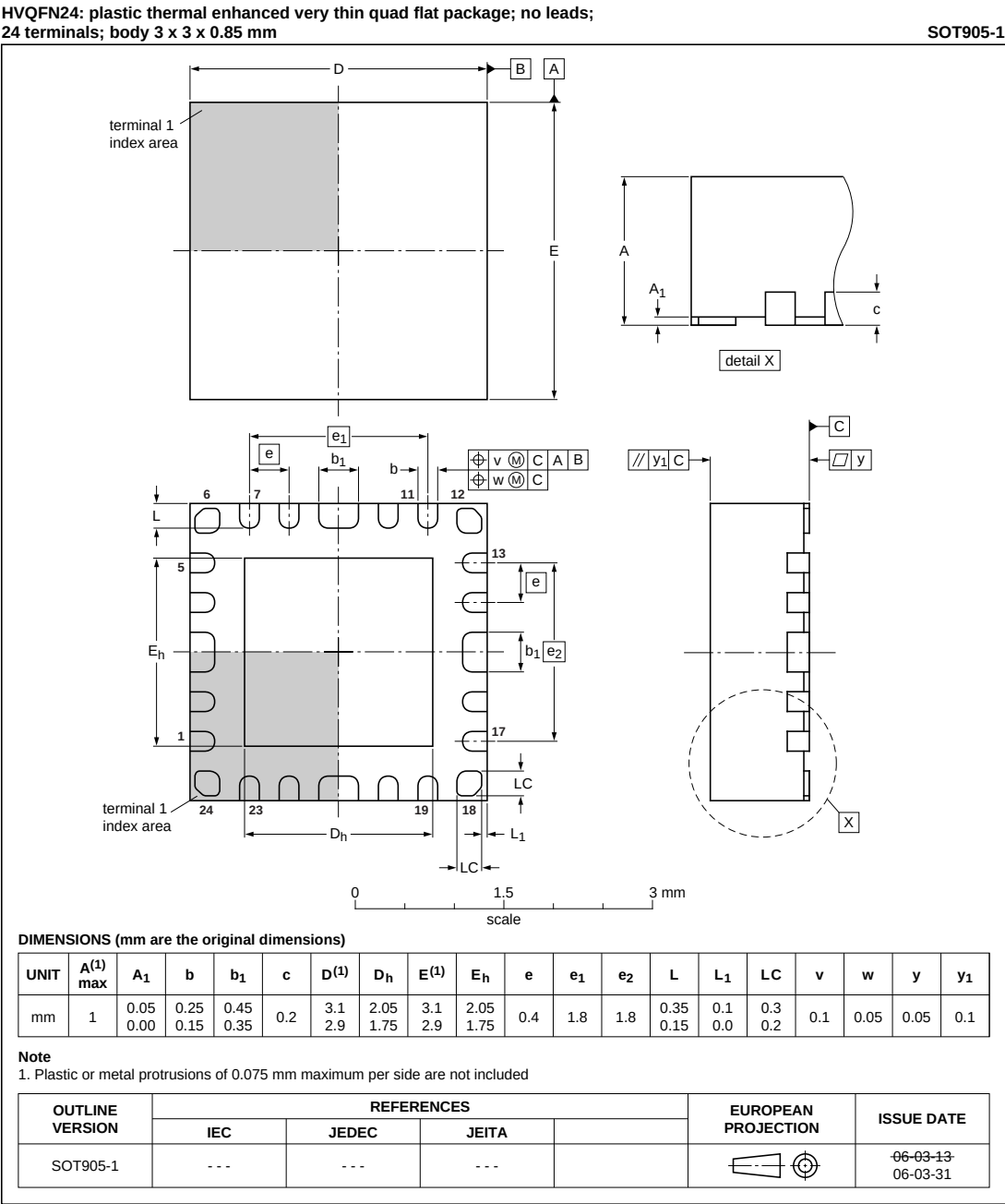


Fig 2. Package outline SOT905-1 (HVQFN24)