HIGHLAND TECHNOLOGY

T124 1 to 4 Logic Buffer

Technical Manual

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1 *Introduction*

This is the technical manual for the Highland Model T124 1 to 4 Logic Buffer.

The T124 logic buffer provides a fast 1 to 4 fanout buffer for digital logic signals.

Features of the T124 include:

- Four short-circuit protected outputs with selectable non-inverting, inverting, or differential drive
- Switchable 50 Ω or high-impedance termination for the input
- Switchable 50 Ω or low-impedance source for the 4 outputs
- Output voltage switchable between +3.3V or +5V
- 10 MHz input bandpass filter for use as a clock distribution amplifier
- Standard +12-volt DC power supply
- Compact, rugged extruded anodized aluminum enclosure with removable mounting flange
- Distribution of fast logic signals from DC to 100 MHz

2 *Specifications*

2.1 *Logic Mode Specifications*

FUNCTION	1 to 4 fanout buffer for digital logic signals
INPUT	V_{LIM} : -0.3 V to +6 V V_H: > +1.3 V V_L: < +1.1 V Termination: 50 Ω or High Impedance
OUTPUTS	Four outputs +5V Operation: V_{H1} Lo-Z: +5.14 V R_L = 10 KΩ V_{H2} Lo-Z: +5.12 V R_L = 1 KΩ V_{H3} Lo-Z: +4.90 V R_L = 50 Ω V_{H4} 50 Ω: +5.14 V R_L = 10 KΩ V_{H5} 50 Ω: +4.80 V R_L = 1 KΩ V_{H6} 50 Ω: +2.60 V R_L = 50 Ω +3.3V Operation: V_{H1} Lo-Z: +3.39 V R_L = 10 KΩ V_{H2} Lo-Z: +3.38 V R_L = 1 KΩ V_{H3} Lo-Z: +3.07 V R_L = 50 Ω V_{H4} 50 Ω: +3.38 V R_L = 10 KΩ V_{H5} 50 Ω: +3.23 V R_L = 1 KΩ V_{H6} 50 Ω: +1.70 V R_L = 50 Ω V_L: 0 V
OUTPUT RISE TIME	700 ps, typical
OUTPUT FALL TIME	700 ps, typical

TRANSITION FREQUENCY	100 MHz, maximum
JITTER	< 12 ps, typical
PROPAGATION DELAY	10 ns, typical

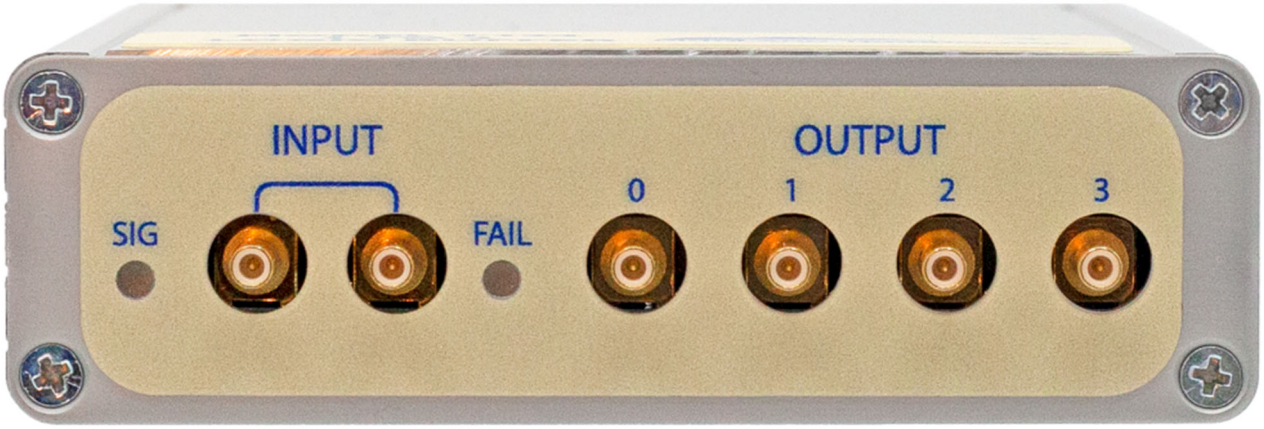
2.2 *10 MHz Clock Distribution Amplifier Mode Specifications*

FUNCTION	10 MHz clock distribution amplifier
INPUT	10 MHz sine or square wave
INPUT TERMINATION	50 Ω or High Impedance
INPUT AC SIGNAL	+0.250 mV_{p-p} to +5 V_{p-p}
INPUT DC LIMITS	V_{max}: +5 VDC V_{min}: 0 VDC
OUTPUTS	Four outputs 10 MHz square wave Voltage: +5V or +3.3V Impedance: Low impedance or 50 Ω
OUTPUT RISE TIME	700 ps, typical
OUTPUT FALL TIME	700 ps, typical
JITTER	<12 ps, typical

2.3 *General Specifications*

OPERATING TEMPERATURE	0 to 60°C
STORAGE TEMPERATURE	-40 to 70°C
POWER	+12 VDC typical (11.5 to 13.5 V) Nominal 200 mA J12 12 volt power supply adapter furnished

CONNECTORS	6 SMB connectors 1 securable 2.1 x 5.5 mm power barrel connector with center pin positive
PACKAGING	4.75" (L) x 4.05" (W) x 1.25" (H) Extruded Anodized Aluminum enclosure
INDICATORS	LEDs indicate power, input signal and output short failure



3 *Overview*

The T124 is a compact 1 to 4 fan-out logic driver/buffer. The T124 is capable of distributing fast logic signals and clock signals up to 100 MHz to multiple loads via long lines. It has the capability to receive any TTL or CMOS signal, with switchable 50Ω input termination. Input threshold is +1.2 Volts.

Outputs can drive 50Ω loads to +3.3 V or +5V; they also can be source terminated to 50 Ω to minimize cable reflections. All 4 outputs can be inverted, this is done in pairs: outputs 0 and 2 form a pair and outputs 1 and 3 form another pair. All outputs can be inverted or none, or they may be treated as two differential pairs.

Outputs of the T124 are short-circuit protected. If one of the outputs is short-circuited the red FAIL LED will light up and the short circuited output will be shut off until the issue is resolved.

The T124 has the capability to work as a clock distribution amplifier by using the 10MHz bandpass filter provided on the T124. This mode helps with the distribution of any 10 MHz clock reference signal to devices located far away from the source.

The 6 position dipswitch allows you to switch between the different operational modes. For the options see section 4.3

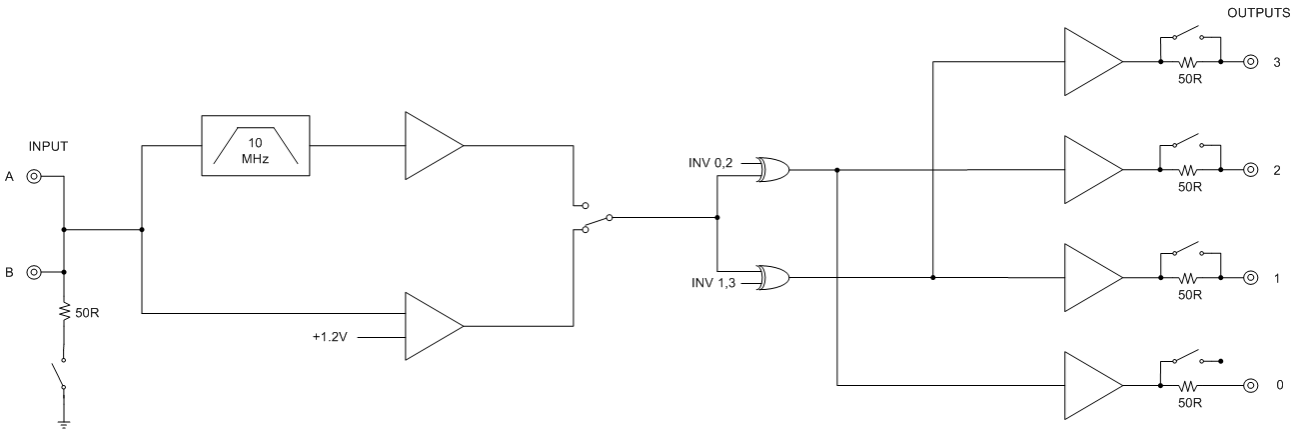


Figure 1: T124 Block Diagram

4 *Connectors, DIP switch and LEDs*

4.1 *INPUT and OUTPUTS SMB connectors*

There are two male SMB connectors provided as the input of the T124, in allowing one to be used as a loop thru connector to connect the input to an Oscilloscope or any other device the user needs. Do not connect multiple input signals.

There are four front panel male SMB connectors for outputs 0-3.

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4.2 *Barrel Power Connector*

The T124 requires +12-volt DC power. A Highland model J12 supply is furnished with purchase. The J12 includes a standard 2.1x5.5 mm DC barrel connector.

If users furnish their own 12-volt power, the model J27 cable is available, with a screw-thread barrel connector for a durable, vibration-proof connection. The other end of the J27 is bare leads.

Figure 2: J27 Power Connector

The return (negative) side of the +12 power is grounded to the T124 enclosure, and the high side is protected by a polyfuse and a transzorb power zener.

4.3 *DIP Switch*

The T124 comes with at 6 position DIP switch which allows you to change between different operation options.

The DIP switch setting options are as follows:

OFF	DIP SWITCH	ON
High Impedance Input	1	50 Ω
Low Impedance Output	2	50 Ω Output

OFF	DIP SWITCH	ON
Outputs 0 and 2 normal	3	Outputs 0 and 2 inverted
Outputs 1 and 3 normal	4	Outputs 1 and 3 inverted
Logic (DC-Coupled)	5	10 MHz BPF, clock distribution
+3.3V Output	6	+5.0V Output

4.4 *LEDs*

There 3 LED indicators: POWER, SIG and FAIL.

The green POWER will be on to indicate that the T124 is powered on and should be functional.

The blue SIG LED will turn on whenever an input signal above the threshold is present on either input A or B.

The red FAIL LED will turn on if a short circuit is detected on any of the outputs of the T124.

5 *Dimensions and Mounting*

The T124 mechanical dimensions are shown below. The optional T566 mounting flange may be bolted to the bottom of the extruded enclosure to make it easier to install on mounting surfaces which do not have rear access. Captive 4-40 machine inserts on the underside of the enclosure enable bottom mounted configurations.

CAUTION: Mounting screws may not penetrate more than 0.160 inches (4 mm) into the T124 enclosure.

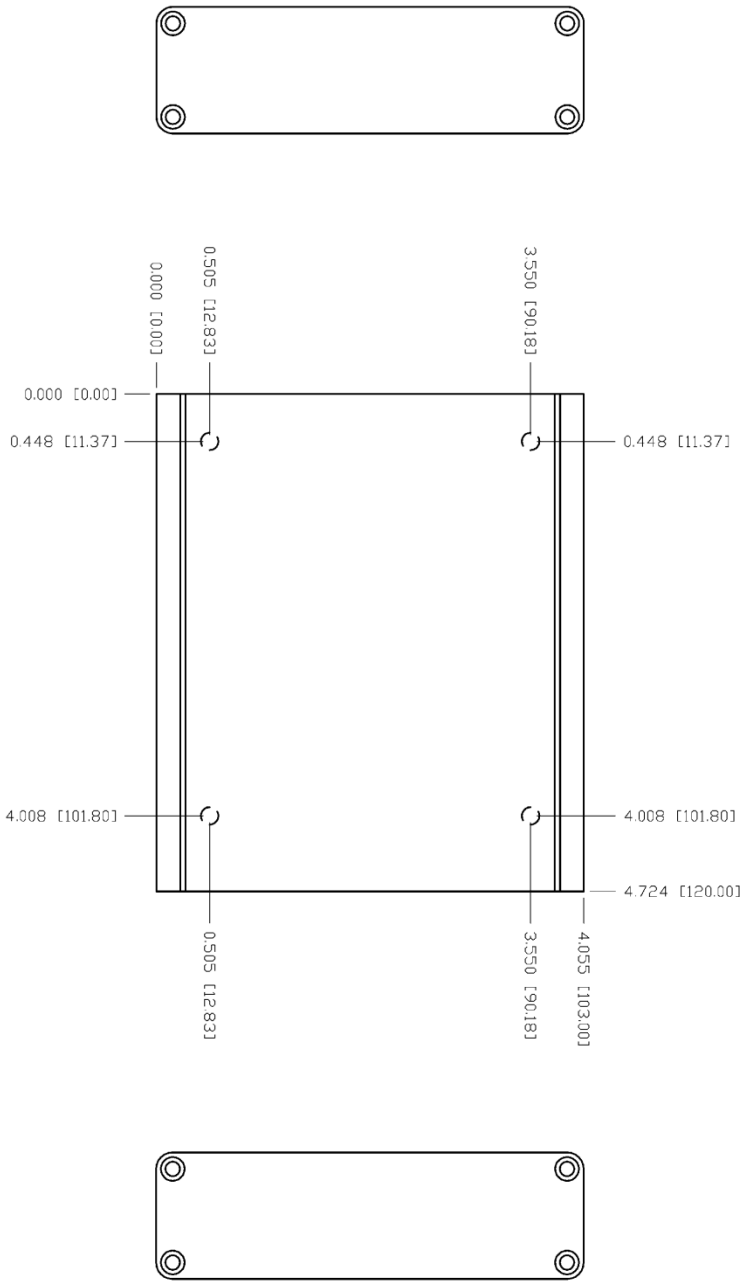

Figure 3: T124 Outline and Mounting

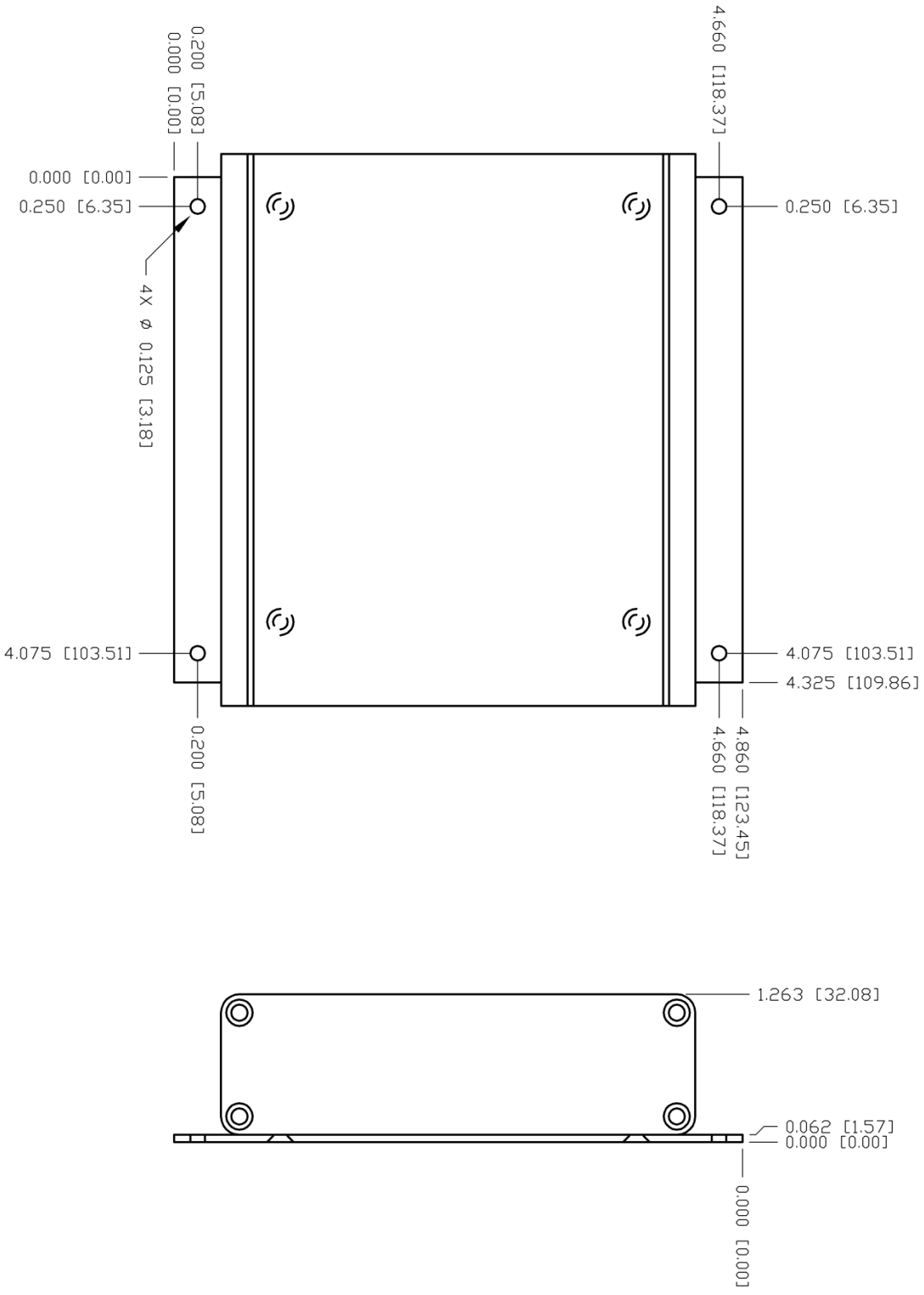

Figure 4: Flange Mounting Dimensions

6 *Versions*

T124-1:	1 to 4 Logic Buffer

7 *Customization*

Consult factory for information about additional custom versions.

8 *Revision History*

8.1 *Hardware Revision History*

Revision A	June 2019 Initial T124 release

9 *Accessories*

J12-1:	12 volt power supply (furnished with purchase)
J27-1:	2.1 x 5.5 mm barrel to pigtail power cable
J41-1:	3′ SMB to SMB cable
J41-2:	6" SMB to SMB cable
J53-1:	3′ SMB to BNC cable
J53-2:	6" SMB to BNC cable
P10-1:	19" rack mount shelf (four t-boxes per rack)
T566-1:	Mounting flange