# Garrett's Workshop

# GW4301A

RAM Expansion Card for Commodore 64

# User's Guide

## Overview

The GW4301A RAM expansion card provides the Commodore 64 with 2 MB of geoRAM-compatible expansion memory. GW4301A is sold with a transparent, TFW8b-brand cartridge casing. The TWF8b cartridge is well-manufactured and feels nice, especially compared to 3d-printed cases.

### Compact Size, Low Power Consumption

The GW4301A RAM expansion card is small enough to fit into a "stumpy" sized C64 cartridge, but provides 2 MB of geoRAM-compatible memory. Power consumption is minimized through the use of a single 16 megabit DRAM chip.

### Open-Source Design

GW4301A's design is fully open-source. The schematics, board layouts, and CPLD firmware are all freely available for commercial and noncommercial use. To download the design files, visit the Garrett's Workshop GitHub page, https://github.com/garrettsworkshop.

## Technical Specifications

### Physical Dimensions

| Parameter | Value |
|---|---|
| Height | 49.53 mm |
| Width | 5.7658 mm |
| Thickness | < 8 mm |
| Weight | < 28 g |

### Electrical Specifications

Specifications are valid over temperature range of $0\,°C - 85\,°C$ and $V_{CC} = 4.5\,V - 5.5\,V$.

| Parameter | Value | Conditions |
|---|---|---|
| $V_{IH\,min}$ | 2.0 V | |
| $V_{IL\,max}$ | 0.8 V | |
| $V_{OH\,min}$ | 2.4 V | $I_{OH} = -2\,mA$ |
| $V_{OL\,max}$ | 0.5 V | $I_{OL} = 4\,mA$ |
| Output Slew Rate | < 1.5 V/ns | |
| $I_{I\,max}$ | ± 20 µA | $V_{in} = 0\,V - 5.5\,V$ |
| $C_{IO\,max}$ | 20 pF | |
| $I_{CC\,max}$ | 120 mA | |