

Flexible Micro-LED panels, a laser-cut frame, and a 12-foot by 14-foot layout:

**MICRO-LED
"CEILING CINEMA"**
LIVE STAR GAZING
SYSTEM OVERVIEW

ROOF CORNER CAMERAS

Ultra-wide field of view low-light cameras mounted at each corner of the roof, aimed up to capture the night sky.

SEAMLESS BLENDING

1 2
3 2
3 4
3 4

Advanced stitching algorithms merge all four feeds into one continuous, ultra-high resolution panoramic view.

PROCESSOR ROOM

High-performance processors handle real-time blending, color calibration, and streaming to ceiling display.

CEILING DISPLAY

Micro-LED display covers the entire ceiling for an immersive, true-to-life stargazing experience.

BEDROOM CEILING DISPLAY SPECS

- Size: 12ft x 14ft
- Resolution: 16K+ (Seamless)
- Display Type: Micro-LED
- Color Depth: 16-bit
- Refresh Rate: 120Hz
- HDR: True Black / High Brightness
- Viewing Angle: 180°
- Live Feed: Real-time Star Field

STAR GAZING
LIVE FIELD
BRIGHTNESS 95
COLOR TEMP 50
STAR ENHANCE
SCENE MODE
NATURAL

ROOF CAMERA

PROCESSOR ROOM

BEDROOM
12ft x 14ft
CEILING DISPLAY

ROOF CAMERA

ROOF CAMERA

ROOF CAMERA

Ceiling Cinema Engineering Report

Project Profile: [Immersive Living Night-Sky Display](#)

Dimensions: 12 ft. x 14 ft. (168 Square Feet)

Core Technology: Flexible Micro-LED Panels on Modular Frame



Hardware & Structural Integration

1. The Display: Flexible Micro-LED Panels

- **Backing Base:** High-performance polyimide Flexible Printed Circuits (FPCs). This keeps the installation lightweight over your bed.
- **The Pixel Grid:** Micro-LED COB (Chip-on-Board) tech using an ultra-fine pixel pitch (P0.97mm to P1.25mm). This makes stars look like perfect pinpoint lights with no blocky lines.
- **True Black Levels:** Micro-LEDs turn completely off for black pixels. This gives you a true, ink-black night sky right on your ceiling.

2. The Skeleton: Laser-Cut Modular Frame

- **Material:** Laser-cut aircraft-grade aluminum alloy grid.
- **Retention System:** Neodymium high-temperature magnets built into the back of each flexible display shell.

- **Service Access:** The magnetic system lets you pull-down individual panels from the front for quick maintenance. You don't have to tear down the whole ceiling if a module needs service.

3. Thermal Management & Safety

- **Air Gap:** A built-in 1/2-inch structural air gap sits between the display panels and the main ceiling drywall.
- **Cooling Flow:** Passive ventilation channels route hot air away from the bed area to keep the bedroom perfectly cool.

Camera & Processing Specifications

1. Roof Capture System

- **The Hardware:** Multiple ultra-high-sensitivity astrophotography cameras installed on your roof.
- **The View:** Custom weather-proof enclosures featuring clear optical glass lenses and built-in heating elements. The heaters melt away morning dew, frost, and condensation automatically.

2. Image Stitching & Output

- **The Processing Brain:** A dedicated image-stitching computer system.
- **Seamless Sky:** The software takes individual camera feeds and seamlessly weaves them into one massive, 16K panoramic canvas.
- **Zero Distortion:** Active geometry mapping fixes lens curvature. The stars align precisely with how they actually look in the night sky.

Here are the complete, detailed engineering documents for a **12 ft x 14 ft (168 sq ft / 15.6 m²)** flexible Micro-LED ceiling cinema system.

Complete Bill of Materials (BOM)

This document breaks down every piece of hardware needed to assemble the ceiling display, processing suite, and roof capture system.

1. Display Surface & Structural System

- **Flexible Micro-LED Modules (P1.25 pitch, 320mm x 160mm): 306 Modules**
(Includes 272 active modules to cover the full area + 34 spare modules for front-service maintenance).
- **Modular Sub-Frame: 1 Unit** custom laser-cut aircraft-grade aluminum mounting skeleton.
- **Magnetic Retention System: 1,224 Neodymium Magnets** (4 per module) pre-fixed to the structural framing points.
- **Border Trim: 52 Linear Feet** of custom aluminum edge casing with integrated low-voltage LED accent channel loops.

2. Signal Distribution & Control System

- **Main LED Controller / Sending Box: 1 Unit** (e.g., [NovaStar MCTRL4K](#) or Colorlight equivalent 16K master screen driver).
- **LED Receiving Cards: 34 Units** (HUB75 interface cards, each daisy-chaining a sub-grid of 8 display modules).
- **Data Cable Architecture: 1,000 Feet** of Cat6A Shielded Twisted Pair (STP) data lines (internal frame runs).
- **Main Data Trunk: 2 Units** 50ft High-Bandwidth Armor-Jacketed Fiber Optic lines (routing data from the bedroom frame to the AV processing closet).

3. Roof-Mounted Astrophotography Capture Suite

- **Sensors: 4 Units** Sony IMX-based Ultra-Low-Light back-illuminated specialized astrophotography cameras.
- **Optics: 4 Units** 12mm f/1.4 wide-field of view low-distortion cinema lenses.
- **Enclosures: 4 Units** IP67-rated weather-proof optical domes featuring internal automated 12V PTC glass heating rings (dew/frost melting system).
- **Mounting: 1 Unit** Rigid heavy-duty roof tripod rack with micro-adjustment pan/tilt leveling plates.

4. Media Processing Suite

- **Central Processor: 1 Unit** Custom Rackmount Media Server (AMD Threadripper, Dual NVIDIA RTX 4090 GPUs, 128GB RAM) running real-time multi-camera frame-blending, edge-stitching, and geometrical lens correction software.
- **Capture Hardware: 1 Unit** PCIe Quad-Channel 4K HDMI/SDI synchronous video ingestion card.

Detailed Electrical Power Estimate

This section calculates maximum power needs based on running the Micro-LED screen under peak conditions (such as handling high-brightness star points over true ink-black fields).

1. Power Consumption Calculations

- **Screen Physical Area: 12 ft × 14 ft = 168 sq ft** (equivalent to **15.6 square meters**).

- **Maximum Screen Draw:** Standard fine-pitch P1.25 Micro-LEDs consume a peak of **600 Watts per square meter** ((W/m^2)) under full white loads.
 $(\text{Peak Screen Load}) = 15.6 \, m^2 \times 600 \, W/m^2 = \mathbf{9,360 \, Watts}$
- **Average Viewing Draw:** Typical dark night-sky content draws roughly **350 Watts per square meter** ((W/m^2)) due to turning dark pixels entirely off.
 $(\text{Typical Viewing Load}) = 15.6 \, m^2 \times 350 \, W/m^2 = \mathbf{5,460 \, Watts}$
- **Ancillary Component Draw:** Media processing server, cameras, dome lens heaters, and control boxes add a combined **2,100 Watts**.

2. Power Supply Units (PSU) & Breaker Infrastructure

To safely distribute this load across standard residential infrastructure, a split-load strategy is required. All electrical layouts must obey the **National Electrical Code (NEC) 80% continuous-load safety rule** ($(20 \, \text{A breaker}) \times 120 \, \text{V} \times 0.8 = \mathbf{1,920 \, W \, \text{max continuous load}}$)).

Equipment Sub-System	Peak Load	Required Dedicated Circuitry (120V)	Power Supplies Required (Within Frame)
LED Ceiling Quadrant A	2,340 W	1x 20-Amp Circuit	3x 5V/160A (800W) Slimline PSUs
LED Ceiling Quadrant B	2,340 W	1x 20-Amp Circuit	3x 5V/160A (800W) Slimline PSUs
LED Ceiling Quadrant C	2,340 W	1x 20-Amp Circuit	3x 5V/160A (800W) Slimline PSUs
LED Ceiling Quadrant D	2,340 W	1x 20-Amp Circuit	3x 5V/160A (800W) Slimline PSUs
AV Rack & Cameras	2,100 W	1x 20-Amp Circuit	Internal server PSUs / 12V injection blocks
TOTAL SYSTEM	11,460W	5x Dedicated 20A Circuits	12x Internal Display PSUs

3. Key Thermal & Electrical Safety Notes

- **Step-Down Heat Displacement:** The 12 internal display power supplies convert 120V AC house power down to 5V DC low-voltage power inside the ceiling grid. This transition creates heat.
- **Ventilation Clearance:** The engineered 1/2-inch structural air gap behind the panels must remain entirely unobstructed to allow passive convective airflow to cool the display backing.

The section documents a complete **Bill of Materials (BOM)** and **Electrical Power Estimate** for your **168-square-foot Micro-LED ceiling cinema**.

Power Estimate Summary

- **Average Load: 2,520 Watts** (15W per sq. ft.)
- **Peak Load: 7,560 Watts** (45W per sq. ft.)
- **Breaker Plan:** Split into **four independent 20-Amp circuits** for the display zones to meet the 80% safety capacity rule, plus **one 15-Amp circuit** for the AV processor rack.

Major BOM Components Included

- **Display:** P1.2 Fine-Pitch Modular Micro-LED Tiles and structural aluminum ceiling matrix grids.
- **Power:** 16 ultra-slim 5V DC switching power supplies and 5 industrial-grade circuit breakers.
- **Processing:** [Flagship 4K/8K Master LED Video Processor](#) supporting HDR10 and 4 high-bandwidth fiber optic receiving cards.
- **Wiring:** 12 AWG heavy-duty AC wires, 14 AWG flexible DC cables, 48Gbps HDMI 2.1 Active Optical cables, and shielded Cat6A data lines.



Adorama HDMI Cables For Projectors (Updated Daily)

BZB GEAR BG-CAB-H21A10 HDMI 2.1 48Gbps 8K Ultra HD Active Optical Cable, 33' A 33' HDMI 2.1 fiber optic cable with 48Gbps bandwidt...

The section documents a **Ventilation and Passive Cooling Layout Plan** along with a comprehensive, step-by-step **Electrical and AV Pull Checklist**.

Ventilation Plan Highlights

- **Airflow Strategy:** Splits the 168 sq. ft. ceiling into **four independent thermal quadrants** to keep travel distances for hot air short.
- **Structural Intakes:** Uses continuous **3/4-inch linear slot diffusers** around the room perimeter to pull in fresh room air.
- **Heat Shielding:** Features **0.020-inch aluminum thermal barrier sheets** lined with ceramic fiber insulation to protect the ceiling framing from the display's peak **25,795 BTU/hr** heat load.
- **Silent Exhaust:** Relies on central plenum drop-boxes connected to **remote inline mixed-flow fans** tucked away in an attic or closet to maintain silent room operation.

Pull Checklist Highlights

- **AC High-Voltage:** Strictly mandates **12 AWG THHN copper wire** inside 3/4-inch EMT or flexible conduit for the four 20-Amp display circuits.
- **DC Power Protection:** Caps low-voltage **14 AWG pure copper DC lines** at a maximum of 6 feet to eliminate voltage drop, requiring all terminals to be torqued to **9 in-lbs**.
- **Polarity Safeguard:** Enforces a multi-point verification check on the 5V DC lines, as reverse polarity will instantly destroy Micro-LED tiles.
- **Signal Shielding:** Establishes a **6-inch isolation air gap** between data lines (Shielded Cat6A / Fiber Optic HDMI 2.1) and AC lines to prevent image distortion.

If you are ready for the next phase, I can help you **draft the specific cable scheduling tags** for your installer to label the wires, or outline a **structural template layout** for mounting the tiles to the ceiling framework. What would you like to explore next?

dasco.com.kw

Linear Slot Diffusers MODEL: DLD-CS & DLD-CR – Dasco

Two types of linear slot diffusers are available: Linear slot diffusers with 3/4" slot width. Linear slot diffusers with 1" slot w...

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