



DIAMOND RGB COLOR CHANGEABLE LEDBOARD - TECHNICAL DATASHEET

Part Number: TEK-DIAMOND-RGB-v1.0

Manufacturer: Teknikio

Description: Diamond-shaped sewable RGB LED board with color changeable capability

LED Component: 5050 RGB SMD LED (Keterine Technology)

Package: Available in 2-pack

RoHS Compliant: Yes

Lead-Free: Yes (HASL Lead-Free finish)

PRODUCT DESCRIPTION

Illuminate your upcoming craft project with the Diamond Color Changeable LED Board from Teknikio! It's effortless to switch up the colors on this sewable LED board. Pick from red, green, blue, and color combinations. Connect now and watch this little diamond sparkle! Features analog RGB control for smooth color mixing and brightness control.

KEY FEATURES

- Diamond-shaped PCB design
- 5050 RGB SMD LED (5.0×5.0mm)
- Analog RGB control (separate R, G, B channels)
- Common cathode configuration
- Full color spectrum through RGB mixing
- Individual channel brightness control
- Sewable connection pads
- Perfect for e-textiles and paper circuits
- Educational electronics projects
- Wearable technology applications

ELECTRICAL SPECIFICATIONS

LED Type: 5050 RGB SMD LED

Control Method: Analog RGB (6-pin configuration)

LED Configuration: Common cathode

Forward Voltage (at IF=20mA):

- Red Channel: 1.9V (min) - 2.1V (max)
- Green Channel: 3.0V (min) - 3.4V (max)
- Blue Channel: 3.0V (min) - 3.4V (max)

Forward Current (per channel): 20mA (continuous)
Pulse Forward Current: 75mA (peak, 1/10 duty cycle, 0.1ms pulse width)
Reverse Voltage: 15V (max)
Power Dissipation: 80mW (per LED)
Supply Voltage: 3.3V - 5V (with appropriate current limiting)

Viewing Angle: 120°
Luminous Intensity (at IF=20mA):
- Red Channel: 400-500 mcd
- Green Channel: 1000-1300 mcd
- Blue Channel: 300-400 mcd

Wavelength Specifications:
- Red: 620-630nm (peak wavelength)
- Green: 519-527nm (peak wavelength)
- Blue: 466-475nm (peak wavelength)

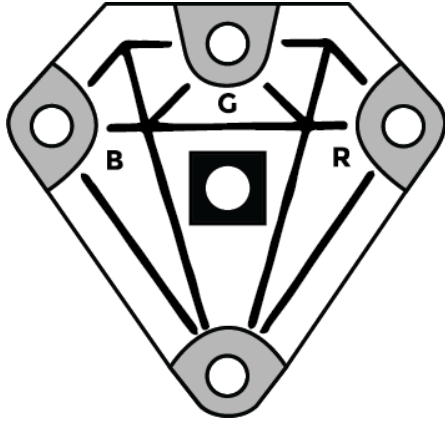
PHYSICAL SPECIFICATIONS

Shape: Diamond
PCB Color: [Check product images for exact color]
LED Type: 5050 RGB SMD (5.0×5.0mm package)
LED Position: Center of diamond shape
Connection Type: Sewable pads (6 connections)
PCB Finish: HASL Lead-Free (Hot Air Solder Leveling)
Thickness: Standard PCB thickness suitable for textile applications
Operating Temperature: -40°C to +85°C
Storage Temperature: -40°C to +85°C

COMPLIANCE & REGULATORY

RoHS Compliance: Yes (Restriction of Hazardous Substances Directive)
Lead-Free: Yes - HASL Lead-Free finish and lead-free solder
WEEE Compliant: Yes (Waste Electrical and Electronic Equipment Directive)
CE Marking: Yes (European Conformity)
Safe for Educational Use: Yes - meets safety standards for classroom use
Environmental Rating: RoHS 2 compliant (2011/65/EU)

PINOUT & CONNECTIONS



Pin Configuration:

Pin 1: Blue Anode (+)

Pin 2: Green Anode (+)

Pin 3: Red Anode (-)

Pin 4: Common Cathode (-)

Connection Method:

- Connect anodes (pins 4,5,6) to positive supply through current limiting resistors
- Control each color by switching anodes (pins 1,2,3) to ground
- Use PWM on anode pins for brightness control and color mixing

POWER SUPPLY REQUIREMENTS

Recommended Supply Voltage: 5V (provides headroom for all channels)

Minimum Supply Voltage: 3.7V (for blue/green channels)

Current Requirements:

- Single Color (20mA): 20mA per active channel
- Full White (all colors): 60mA total (20mA × 3 channels)
- Power Consumption: ~300mW at full white (5V × 60mA)

Current Limiting Resistors (for 5V supply):

- Red Channel: 145Ω ($(5V - 2.0V) / 0.02A = 150\Omega$, use 150Ω)
- Green Channel: 85Ω ($(5V - 3.3V) / 0.02A = 85\Omega$, use 82Ω or 100Ω)
- Blue Channel: 85Ω ($(5V - 3.3V) / 0.02A = 85\Omega$, use 82Ω or 100Ω)

Battery Life Calculations:

- CR2032 (225mAh): 3.75 hours at full white, 11.25 hours single color
- 4×AA (2500mAh): 41.7 hours at full white, 125 hours single color

INSTALLATION GUIDELINES

Sewable Connection:

1. Use conductive thread for e-textile projects

2. Recommended thread: Stainless steel conductive thread
3. Make secure knots at connection pads
4. Test continuity before final installation
5. Plan for 6 separate connections (more complex than single LEDs)
6. Keep anode and cathode connections separated

Soldering Connection:

1. Use lead-free solder (SAC305 recommended) or standard 60/40 solder
2. Keep soldering time minimal to prevent heat damage
3. Use flux for clean connections
4. Test each color channel immediately after soldering
5. PCB is manufactured with HASL lead-free finish

DESIGN CONSIDERATIONS

Color Control:

- Use PWM (500Hz-2kHz) for smooth brightness control
- RGB values: 0-255 for each channel gives 16.7M colors
- Consider gamma correction for perceptually linear brightness
- Green appears brightest due to higher luminous intensity

Current Requirements:

- Total current: 60mA at full white output
- Plan power supply capacity accordingly
- Use current limiting resistors for each channel
- Consider using constant current drivers for precision

Thermal Management:

- 5050 LED generates ~240mW heat at full power
- Diamond PCB provides some heat spreading
- Ensure adequate ventilation in enclosed projects
- Consider duty cycle reduction for continuous operation

Color Mixing Examples:

- Red: R=255, G=0, B=0
- Green: R=0, G=255, B=0
- Blue: R=0, G=0, B=255
- White: R=255, G=255, B=255
- Yellow: R=255, G=255, B=0
- Magenta: R=255, G=0, B=255
- Cyan: R=0, G=255, B=255

APPLICATIONS

Educational Projects:

- Color theory demonstrations

- Introduction to RGB mixing
- PWM and analog control learning
- Basic electronics and Ohm's law
- STEM education activities

Wearable Technology:

- Color-changing clothing and accessories
- Interactive costumes with mood lighting
- Fashion technology
- Safety gear with variable colors
- Fitness trackers with color feedback

Art & Craft Projects:

- Illuminated artwork with color effects
- Interactive greeting cards
- Holiday decorations
- Light sculptures
- Color-responsive installations

----- **TROUBLESHOOTING**

LED Not Lighting:

1. Check power supply voltage (should be 3.7V-5V)
2. Verify current limiting resistors are correct values
3. Test each channel individually
4. Check for correct common cathode wiring
5. Measure voltage across each LED channel

Wrong Colors Displayed:

1. Verify R, G, B channel connections
2. Check for crossed cathode/anode connections
3. Test each color channel separately
4. Verify resistor values are correct for each channel
5. Check PWM signal polarity (common cathode = inverted)

Dim or Uneven Colors:

1. Check current limiting resistor values
2. Verify power supply current capability (60mA minimum)
3. Test connection resistance
4. Check for voltage drop in supply lines
5. Consider different resistor values for color balance

One Color Not Working:

1. Test individual LED channels with multimeter
2. Check for broken connections to specific channel
3. Verify correct resistor for that channel

4. Test for damaged LED die

SAFETY INFORMATION

Electrical Safety:

- Do not exceed 20mA continuous current per channel
- Use appropriate current limiting resistors
- Avoid short circuits between channels
- Disconnect power when not in use
- Maximum total current: 60mA for all channels

Thermal Safety:

- Monitor LED temperature during continuous operation
- Provide adequate ventilation
- Reduce duty cycle if overheating occurs
- Maximum junction temperature: 85°C

STORAGE & HANDLING

Storage Conditions:

- Temperature: -40°C to +85°C
- Humidity: < 85% RH
- Avoid direct sunlight
- Store in anti-static packaging
- Keep connection pads clean and dry

Handling Guidelines:

- Handle by edges to avoid LED damage
- Use anti-static precautions
- Avoid applying pressure to LED surface
- Keep connection pads clean
- Store in original packaging when possible

LED Degradation:

- Expected lifetime: 50,000+ hours at 20mA
- Brightness degrades to 70% over lifetime
- Blue LEDs typically degrade faster than red
- High temperature accelerates degradation

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