

## Solid State Relays GQ and GRSH Series



**GQ-25-24-D-1-3**



**GRSH-25-60-A-5-0**



**GRSH-120-60-A-5-61**

### Features GQ Series

- Alternating current solid state relay
- Zero crossing switching
- In 15, 25, 50, 75, and 90 Arms contact ratings
- Nominal voltage up to 600VAC
- SCCR 100kA
- Isolation (input-output) 4000 Vrms
- Green LED drive active signal
- Thermal pad included
- IP20 finger-safe protection rating

### Main Applications

- Packaging machinery
- Thermoforming
- Plastic extrusion lines
- Industrial ovens and furnaces
- Control application with high switching speed

### Features GRSH Series

- In 15A to 120A contact ratings
- DIN rail and panel mounting
- Zero crossing switching
- Input command from DC/AC logic signal with push-in connectors; signaling LEDs
- Cage clamps for power cables
- Load voltage 480VAC, 600VAC
- SCCR 100kA
- Thermal alarm option with led and alarm output
- Interrupted load option with led and alarm output
- Internal overvoltage protection
- P20 finger-safe protection rating

### Main Applications

- Extrusion, injection, blow molding, thermoforming of plastics
- Vulcanization of rubber
- Synthetic fiber production and polymerization
- Packing and packaging
- Dryers for ceramics and building elements
- Industrial electric ovens
- Food processing plants
- Chemical and pharmaceutical industry

## Overview

A solid state relay is a relay with an isolated input and output, whose functions are achieved by using electronic components without the use of moving parts (vs. electromechanical relays).

## Operation

Solid state relays (SSR) are similar to electromechanical relays, in that both use a control circuit and a separate circuit for switching the load. When voltage is applied to the input of the SSR, the relay is energized by a light-emitting diode. The light from the diode is beamed into a light sensitive semiconductor which, in the case of zero voltage crossover relays, signals the control circuit to turn on the output of the solid state switch at the next zero voltage crossover.

## Solid State Relays GQ Series 15-90A Models

| Solid State Relays Selection Table GQ Series 15-90A Models |         |                |              |               |                   |             |                     |
|------------------------------------------------------------|---------|----------------|--------------|---------------|-------------------|-------------|---------------------|
| Part Number                                                | Price   | Contact Rating | Load Voltage | Input Voltage | Connector         | Weight (lb) | Drawing Link        |
| <a href="#">GQ-15-24-D-1-3</a>                             | \$21.75 | 15A            | 24-230 VAC   | 3-32 VDC      | Screw terminal(s) | 0.17        | <a href="#">PDF</a> |
| <a href="#">GQ-15-24-A-1-3</a>                             | \$30.00 | 15A            | 24-230 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-24-D-1-4</a>                             | \$21.75 | 15A            | 24-230 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-24-A-1-4</a>                             | \$30.00 | 15A            | 24-230 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-60-D-1-3</a>                             | \$23.00 | 15A            | 48-600 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-60-A-1-3</a>                             | \$31.00 | 15A            | 48-600 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-60-D-1-4</a>                             | \$23.00 | 15A            | 48-600 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-15-60-A-1-4</a>                             | \$31.00 | 15A            | 48-600 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-24-D-1-3</a>                             | \$22.50 | 25A            | 24-230 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-24-A-1-3</a>                             | \$32.00 | 25A            | 24-230 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-24-D-1-4</a>                             | \$22.50 | 25A            | 24-230 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-24-A-1-4</a>                             | \$32.00 | 25A            | 24-230 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-60-D-1-3</a>                             | \$25.00 | 25A            | 48-600 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-60-A-1-3</a>                             | \$33.00 | 25A            | 48-600 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-60-D-1-4</a>                             | \$25.00 | 25A            | 48-600 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-25-60-A-1-4</a>                             | \$33.00 | 25A            | 48-600 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-24-D-1-3</a>                             | \$32.00 | 50A            | 24-230 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-24-A-1-3</a>                             | \$38.00 | 50A            | 24-230 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-24-D-1-4</a>                             | \$32.00 | 50A            | 24-230 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-24-A-1-4</a>                             | \$38.00 | 50A            | 24-230 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-60-D-1-3</a>                             | \$35.00 | 50A            | 48-600 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-60-A-1-3</a>                             | \$39.00 | 50A            | 48-600 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-60-D-1-4</a>                             | \$35.00 | 50A            | 48-600 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-50-60-A-1-4</a>                             | \$39.00 | 50A            | 48-600 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-24-D-1-3</a>                             | \$45.00 | 75A            | 24-230 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-24-A-1-3</a>                             | \$50.00 | 75A            | 24-230 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-24-D-1-4</a>                             | \$45.00 | 75A            | 24-230 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-24-A-1-4</a>                             | \$50.00 | 75A            | 24-230 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-60-D-1-3</a>                             | \$47.00 | 75A            | 48-600 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-60-A-1-3</a>                             | \$51.00 | 75A            | 48-600 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-60-D-1-4</a>                             | \$47.00 | 75A            | 48-600 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-75-60-A-1-4</a>                             | \$51.00 | 75A            | 48-600 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-24-D-1-3</a>                             | \$51.00 | 90A            | 24-230 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-24-A-1-3</a>                             | \$55.00 | 90A            | 24-230 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-24-D-1-4</a>                             | \$51.00 | 90A            | 24-230 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-24-A-1-4</a>                             | \$55.00 | 90A            | 24-230 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-60-D-1-3</a>                             | \$53.00 | 90A            | 48-600 VAC   | 3-32 VDC      | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-60-A-1-3</a>                             | \$56.00 | 90A            | 48-600 VAC   | 20-260 VAC    | Screw terminal(s) |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-60-D-1-4</a>                             | \$53.00 | 90A            | 48-600 VAC   | 3-32 VDC      | Push-in spring    |             | <a href="#">PDF</a> |
| <a href="#">GQ-90-60-A-1-4</a>                             | \$56.00 | 90A            | 48-600 VAC   | 20-260 VAC    | Push-in spring    |             | <a href="#">PDF</a> |

Note: Thermal mounting pad included.

## Solid State Relays GQ Series 15-90A Models

| Solid State Relays Specifications GQ Series 15-90A Models |                                                                              |                           |                        |                           |         |
|-----------------------------------------------------------|------------------------------------------------------------------------------|---------------------------|------------------------|---------------------------|---------|
| Part Number Series                                        | GQ-15                                                                        | GQ-25                     | GQ-50                  | GQ-75                     | GQ-90   |
| Control Voltage Range                                     | GQ-xx-xx-D-x-x models: 3–32 VDC<br>GQ-xx-xx-A-x-x models: 20–260 VAC         |                           |                        |                           |         |
| Turn-On Voltage                                           | GQ-xx-xx-D-x-x models: ≥ 2.7 VCC<br>GQ-xx-xx-A-x-x models: ≥ 15VAC           |                           |                        |                           |         |
| Turn-Off Voltage                                          | GQ-xx-xx-D-x-x models: ≤ 1VAC<br>GQ-xx-xx-A-x-x models: ≤ 6VAC               |                           |                        |                           |         |
| Consumption                                               | GQ-xx-xx-D-x-x models: ≤ 8mA @ 260VAC<br>GQ-xx-xx-A-x-x models: ≤ 13mA @ 32V |                           |                        |                           |         |
| Nominal Current (IEC 60947-4-3)                           | 15 Arms                                                                      | 25 Arms                   | 50 Arms                | 75 Arms                   | 90 Arms |
| Nominal Current (IEC 60947-4-2)                           | 3 Arms                                                                       | 5 Arms                    | 15 Arms                | 18 Arms                   | 20 Arms |
| Min. Load Current                                         | 0.1 Arms                                                                     | 0.3 Arms                  |                        | 0.5 Arms                  |         |
| Repetitive Overcurrent                                    | t = 1s: ≤ 35 Arms                                                            | t = 1s: ≤ 60 Arms         | t = 1s: ≤ 125 Arms     | t = 1s: ≤ 150 Arms        |         |
| Non-Repetitive Overcurrent                                | t = 20ms: 200 Ap                                                             | t = 20ms: 300 Ap          | t = 20ms: 600 Ap       | t = 20ms: 1,600 Ap        |         |
| Current Drop at Nominal Voltage                           | ≤ 8m Arms                                                                    |                           |                        | ≤10m Arms                 |         |
| I²t for Fusing                                            | t = 1-10ms: ≤ 200A²s                                                         | t = 1-10ms: ≤ 450A²s      | t = 1-10ms: ≤ 1,800A²s | t = 1-10ms: ≤ 12,800A²s   |         |
| Critical di/dt                                            | ≥ 100A/μs                                                                    |                           |                        |                           |         |
| Voltage Drop at Nominal Current                           | ≤1.45 Vrms                                                                   |                           | ≤1.35 Vrms             | ≤1.3 Vrms                 |         |
| Critical dV/dt Off-State                                  | ≥ 1000 V/μs                                                                  |                           |                        |                           |         |
| Dielectric Strength (Input-to-Output Isolation)           | 4000 Vrms                                                                    |                           |                        |                           |         |
| Relay Configuration                                       | SPST                                                                         |                           |                        |                           |         |
| Output Type                                               | (1) N.O. SCR                                                                 |                           |                        |                           |         |
| Switching Type                                            | Zero Cross                                                                   |                           |                        |                           |         |
| Heatsink/Thermal Resistance *                             | R <sub>th</sub> ≤ 2.8 kW                                                     | R <sub>th</sub> ≤ 0.83 kW |                        | R <sub>th</sub> ≤ 0.56 kW |         |
| Operating Temperature Range                               | -25 to 80°C [-13 to 176°F]                                                   |                           |                        |                           |         |
| Storage Temperature Range                                 | -55 to 100°C [-67 to 212°F]                                                  |                           |                        |                           |         |
| Max. Relative Humidity                                    | 90% at 40°C                                                                  |                           |                        |                           |         |
| Protection Level                                          | IP20                                                                         |                           |                        |                           |         |
| Pollution Level                                           | 2                                                                            |                           |                        |                           |         |
| Frequency                                                 | 45–65 Hz                                                                     |                           |                        |                           |         |
| Input Indication                                          | Green LED                                                                    |                           |                        |                           |         |
| Tightening Torque Command Terminals                       | 0.5 – 0.6 N·m 7 [4.4 – 5.3 lb·in]                                            |                           |                        |                           |         |
| Tightening Torque Power Terminals                         | 2 – 2.4 N·m [18 – 21.3 lb·in]                                                |                           |                        |                           |         |
| Mount Type                                                | Panel mount                                                                  |                           |                        |                           |         |
| Agency Approvals **                                       | CE, cURus File E243386                                                       |                           |                        |                           |         |

\* $R_{\theta}$  = (90°C - T. amb. max) (max air temperature inside the electrical cabinet) / Pd (dissipated power)

\*\*To obtain the most current agency approval information, see the Agency Compliance & Certifications Checklist section on the specific part number's web page.

## Solid State Relays GQ Series

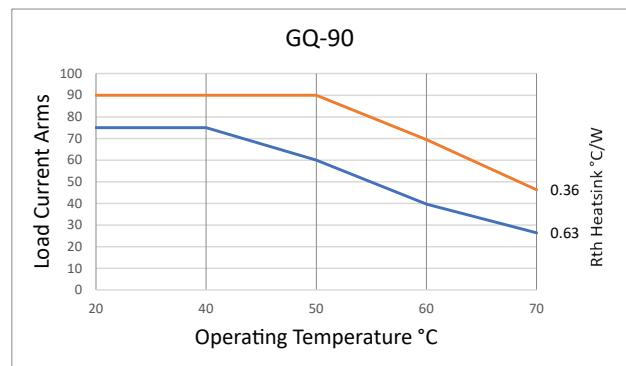
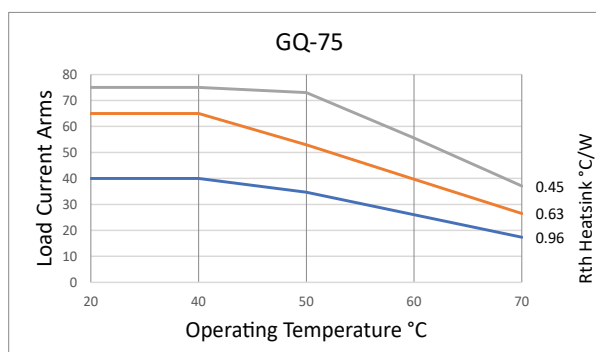
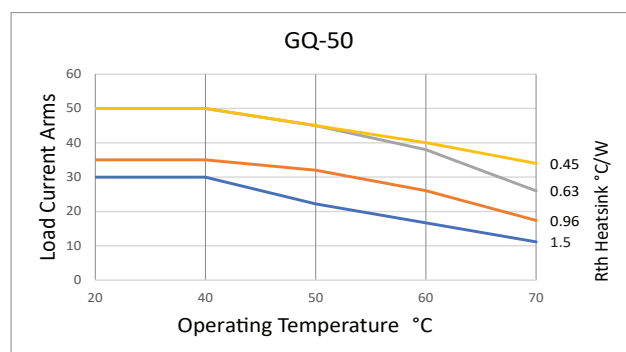
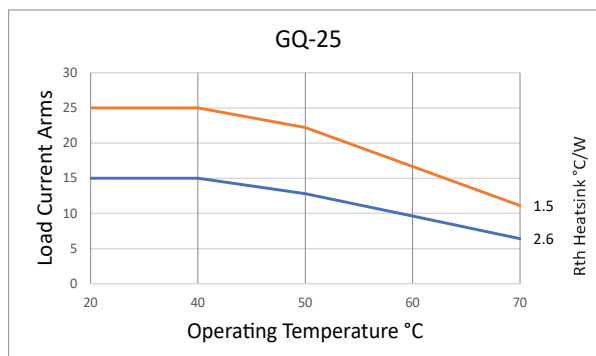
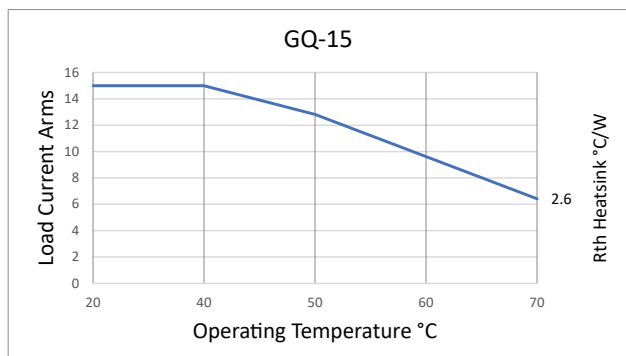
| Power Terminals                                       |                                                                              |                                       |
|-------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------|
| Wiring Type                                           | Rigid / Flexible / Ferrule Conductor                                         | Fork Or Eyelet Cable                  |
| Nominal Current of the Load                           | 15-25-50-75-90                                                               |                                       |
| Contact Area (WxD) Screw Type                         | 13 x 11mm M5                                                                 |                                       |
| Stripping Length                                      | 11mm                                                                         | –                                     |
| Minimum Allowed Section<br>1 Conductor / 2 Conductors | 1 x 1.5 mm <sup>2</sup> / 2 x 1.5 mm <sup>2</sup><br>1 x 15 AWG / 2 x 15 AWG | 1 x 1.5 mm <sup>2</sup><br>1 x 15 AWG |
| Maximum Allowed Section<br>1 Conductor / 2 Conductors | 1 x 6mm <sup>2</sup> / 2 x 6mm <sup>2</sup><br>1 x 10 AWG / 2 x 10 AWG       | 1 x 25 mm <sup>2</sup><br>1 x 3 AWG   |
| Tightening Torque                                     | 2 – 2.4 N•m<br>[18 – 21.3 lb•in]                                             |                                       |

Note: Use 75°C (167°F) copper (CU), multi-stranded conductors.

| Control Signal Terminals                              |                                                                                |                                                                              |
|-------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Connector                                             | Extractable (MORS3)                                                            | Integrated (MORS4)                                                           |
| Wire Locking Type                                     | Screw M3                                                                       | Push-in                                                                      |
| Minimum Allowed Section<br>1 Conductor / 2 Conductors | 1 x 0.25 mm <sup>2</sup> / 2 x 0.25 mm <sup>2</sup><br>1 x 23 AWG / 2 x 23 AWG | 1 x 0.5 mm <sup>2</sup> / 2 x 0.5 mm <sup>2</sup><br>1 x 20 AWG / 2 x 20 AWG |
| Maximum Allowed Section<br>1 Conductor / 2 Conductors | 1 x 2.5 mm <sup>2</sup> / 2 x 1mm <sup>2</sup><br>1 x 13 AWG / 2 x 17 AWG      | 1 x 1.5 mm <sup>2</sup> / 2 x 0.5 mm <sup>2</sup><br>1 x 15 AWG / 2 x 20 AWG |
| Stripping Length / Cable Lug                          | 7mm                                                                            | 6mm                                                                          |

Note: Use 75°C (167°F) copper (CU), multi-stranded conductors.

## Solid State Relays GQ Series Derating Curves



## Solid State Relays Accessories GQ Series

### Terminal Block Replacement

| Part Number                  | Price  | Description                                                                                    | Weight (lb) | Drawing Link |
|------------------------------|--------|------------------------------------------------------------------------------------------------|-------------|--------------|
| <a href="#"><u>MORS3</u></a> | \$5.00 | Gefran terminal block, replacement. For use with all Gefran GQ-xx-xx-x-x-3 solid state relays. | 0.01        | N/A          |

**MORS3**

### Thermal Mounting Pad Replacement

| Part Number                      | Price   | Description                                                                                                    | Weight (lb) | Drawing Link |
|----------------------------------|---------|----------------------------------------------------------------------------------------------------------------|-------------|--------------|
| <a href="#"><u>10-PAD-GQ</u></a> | \$36.00 | Gefran thermal mounting pad, replacement. Package of 10. For use with all Gefran GQ series solid state relays. | 0.01        | N/A          |

**10-PAD-GQ**

### Heatsink

| Part Number                            | Price   | Description                                                                                                                            | Weight (lb) | Drawing Link               |
|----------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|
| <a href="#"><u>HS-60-10</u></a>        | \$21.00 | Gefran heatsink, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 25A. Mounting hardware included.          | 0.45        | <a href="#"><u>PDF</u></a> |
| <a href="#"><u>HS-52-50</u></a>        | \$32.00 | Gefran heatsink, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 50A. Mounting hardware included.          | 0.80        | <a href="#"><u>PDF</u></a> |
| <a href="#"><u>HS-70-67</u></a>        | \$32.00 | Gefran heatsink, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 75A. Mounting hardware included.          | 1.15        | <a href="#"><u>PDF</u></a> |
| <a href="#"><u>HS-52-50-FAN</u></a> *  | \$40.00 | Gefran heatsink with fan, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 75A. Mounting hardware included. | 0.80        | <a href="#"><u>PDF</u></a> |
| <a href="#"><u>DIS-90G-KIT</u></a>     | \$58.00 | Gefran heatsink, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 90A. Mounting hardware included.          | 2.70        | <a href="#"><u>PDF</u></a> |
| <a href="#"><u>HS-70-67-FAN</u></a> ** | \$41.00 | Gefran heatsink with fan, 35mm DIN rail mount. For use with Gefran GQ series solid state relays up to 90A. Mounting hardware included. | 1.30        | <a href="#"><u>PDF</u></a> |

\* HS-52-50-FAN 24VDC 0.05 A

\*\* HS-70-67-FAN 24VDC 0.11 A

**HS-60-10****HS-70-67-FAN**

### Heatsink Performance Data

| Part Number                         | Recommended Max Relay Load [A] | Rth Heatsink [°C/W] | Dimension WxHxD mm [inch]               |
|-------------------------------------|--------------------------------|---------------------|-----------------------------------------|
| <a href="#"><u>HS-60-10</u></a>     | 15                             | ≤ 2.6               | 60 x 10 x 100<br>[2.36 x 0.39 x 3.93]   |
| <a href="#"><u>HS-52-50</u></a>     | 25                             | ≤ 1.5               | 52.5 x 50 x 90<br>[2.07 x 1.97 x 3.54]  |
| <a href="#"><u>HS-70-67</u></a>     | 35                             | ≤ 0.96              | 70 x 67 x 90<br>[2.76 x 2.64 x 3.54]    |
| <a href="#"><u>DIS-90G-KIT</u></a>  | 65                             | ≤ 0.63              | 127 x 100 x 100<br>[5 x 3.94 x 3.94]    |
| <a href="#"><u>HS-52-50-FAN</u></a> | 75                             | ≤ 0.45              | 52.5 x 50 x 125<br>[2.07 x 1.97 x 4.92] |
| <a href="#"><u>HS-70-67-FAN</u></a> | 90                             | ≤ 0.36              | 70 x 67 x 130<br>[2.76 x 2.64 x 5.12]   |

Note: Data relating to 40°C ambient temperature, heatsink in vertical position, using part number [10-PAD-GQ](#).