

## Part Numbers

| Package & Chip Type | Line Voltage <sup>1</sup> | Switch Type <sup>2</sup> | Output Current | Options <sup>3</sup> |
|---------------------|---------------------------|--------------------------|----------------|----------------------|
| S                   | 24                        | R                        | 12             | -22                  |
|                     |                           | D                        | 25             |                      |
|                     |                           | A                        | 40             |                      |
| S                   | 48                        | R                        | 25             | -22                  |
|                     |                           | D                        | 50             |                      |
|                     |                           | A                        | 75             |                      |
|                     |                           |                          | 95             |                      |
|                     |                           |                          | 125            |                      |
| S                   | 60                        | D                        | 50             |                      |
|                     |                           |                          | 75             |                      |
|                     |                           |                          | 95             |                      |
|                     |                           |                          | 125            |                      |

Part Number Example: **S48A25-22**

### NOTES

- 1) Line Voltage (nominal): 24 = 240 Vac; 48 = 480 Vac; 60 = 600 Vac
- 2) Switch Type: R = Random turn-on; D = Zero cross turn-on;  
A = AC control, Zero cross turn-on
- 3) Options: -22 = 24Vac control. Available on D type 240Vac, 25 and 40A models and D type 480Vac, 25, 50, 125A models

## MECHANICAL SPECIFICATION

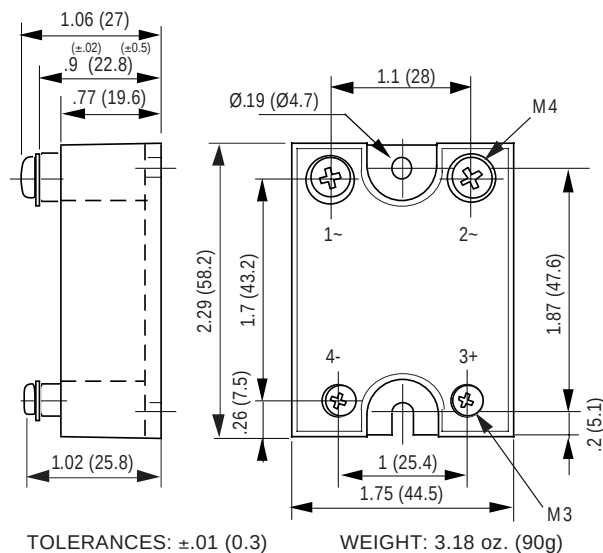


Figure 1 — S relays, 12–95 A;  
dimensions in inches (mm)  
125A model uses larger M5 output screw terminals



## FEATURES/BENEFITS

- Industry standard package
- Internal snubber (except S60 models)
- Designed for all types of loads
- AC or DC control available
- Excellent thermal performance
- Tight zero-cross window for low EMI
- High immunity to surges

## DESCRIPTION

The Series S single-phase relays are designed for all types of loads. The design incorporates an SCR or triac output. The relays utilize optical isolation to protect the control from load transients. All contain an internal snubber for output protection. High current models are excellent for motor and phase angle control.

## APPLICATIONS

- Heating control
- Motor control
- Uninterruptible power supplies
- Light dimmers
- Industrial and process control
- On/Off controls of AC equipment

## APPROVALS

S60 models are pending UL recognition. All other models are UL recognized. UL File Number: E128555.

## TYPICAL APPLICATION

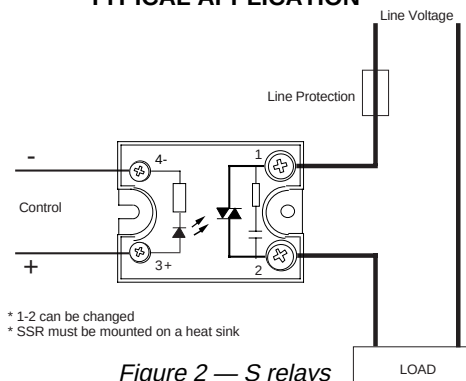


Figure 2 — S relays

### INPUT (CONTROL) SPECIFICATION

|                      | Input Type | Min | Max | Units   |
|----------------------|------------|-----|-----|---------|
| <b>Control Range</b> |            |     |     |         |
| S24                  | R          | 3   | 30  | Vdc     |
|                      | D          | 4   | 30  | Vdc     |
| S48                  | R          | 4   | 30  | Vdc     |
|                      | D          | 5   | 30  | Vdc     |
| S60                  | D          | 7   | 30  | Vdc     |
| SxxA                 | A          | 90  | 240 | Vac/Vdc |
| Sxxxx-22             | A          | 17  | 80  | Vac/Vdc |

### Input Current Range

|          |     |     |    |    |
|----------|-----|-----|----|----|
| S        | R/D | 3   | 30 | mA |
| S        | A   | 3   | 8  | mA |
| Sxxxx-22 | A   | 5.6 | 26 | mA |

### Must Turn-Off Voltage

|          |     |    |     |
|----------|-----|----|-----|
| S        | R/D | 1  | Vdc |
| S24      | A   | 15 | Vac |
| S48      | A   | 1  | Vac |
| Sxxxx-22 |     | 3  | Vac |

### Input Resistance (Typical)

|          |     |        |      |
|----------|-----|--------|------|
| S        | R/D | 1000   | Ohms |
| S        | A   | 30,000 | Ohms |
| Sxxxx-22 |     | 3000   | Ohms |

### Reverse Voltage Protection

|   |     |    |   |
|---|-----|----|---|
| S | R/D | 30 | V |
| S | A   | NA |   |

### CONTROL CHARACTERISTICS

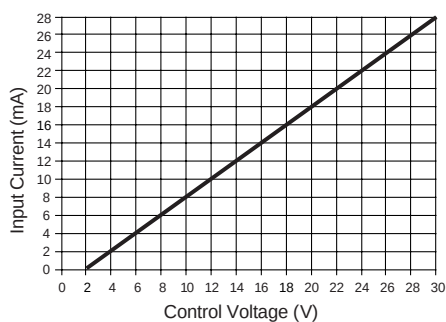


Figure 3a — S48R, S48D and S60D relays

### CONTROL CHARACTERISTICS

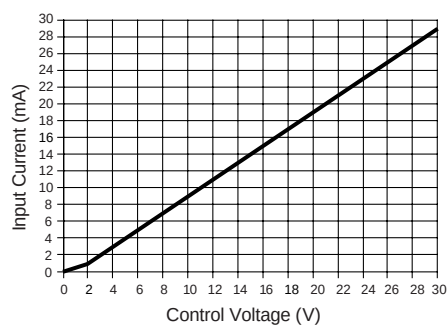


Figure 3b — S24D/R relays

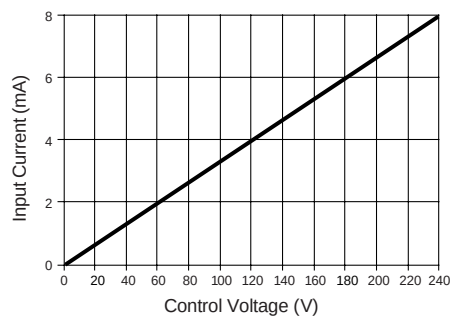


Figure 3c — S24A and S48A relays

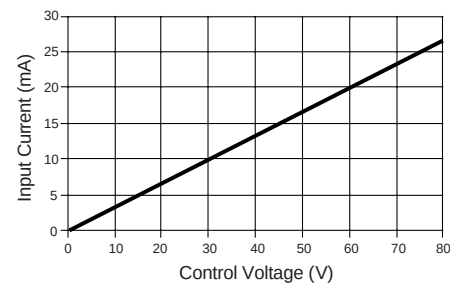


Figure 3d — Sxxxx-22 relays

**OUTPUT (LOAD) SPECIFICATION**

| Input Type                                           | Min  | Max  | Units |
|------------------------------------------------------|------|------|-------|
| <b>Operating Range</b>                               |      |      |       |
| S24                                                  | 12   | 280  | Vrms  |
| S48                                                  | 24   | 520  | Vrms  |
| S60                                                  | 24   | 660  | Vrms  |
| <b>Peak Voltage</b>                                  |      |      |       |
| S24                                                  |      | 600  | Vpeak |
| S48                                                  |      | 1200 | Vpeak |
| S60                                                  |      | 1600 | Vpeak |
| <b>Load Current Range (Resistive)</b>                |      |      |       |
| 12A output current                                   | .005 | 12   | Arms  |
| 25A output current                                   | .005 | 25   | Arms  |
| 40A output current                                   | .005 | 40   | Arms  |
| 50A output current                                   | .005 | 50   | Arms  |
| 75A output current                                   | .005 | 75   | Arms  |
| 95A output current                                   | .005 | 95   | Arms  |
| 125A output current                                  | .005 | 125  | Arms  |
| <b>Inductive Load Current</b>                        |      |      |       |
| 12A output current                                   |      | 2.5  | Arms  |
| 25A output current                                   |      | 5    | Arms  |
| 40A output current                                   |      | 9    | Arms  |
| 50A output current                                   |      | 12   | Arms  |
| 75A output current                                   |      | 16   | Arms  |
| 95A output current                                   |      | 20   | Arms  |
| 125A output current                                  |      | 30   | Arms  |
| <b>Capacitive Load Current</b>                       |      |      |       |
| S60D50                                               |      | 13   | Arms  |
| S60D75                                               |      | 24   | Arms  |
| S60D90                                               |      | 36   | Arms  |
| S60D125                                              |      | 48   | Arms  |
| <b>Maximum Surge Current Rating (Non-Repetitive)</b> |      |      |       |
| 12A output current                                   |      | 120  | A     |
| S24, 25A output current                              |      | 240  | A     |
| S24R25                                               |      | 250  | A     |
| S48, 25A output current                              |      | 230  | A     |
| 40A output current                                   |      | 350  | A     |
| 50A output current                                   |      | 550  | A     |
| 75A output current                                   |      | 1000 | A     |
| 95A output current                                   |      | 1500 | A     |

**OUTPUT (LOAD) SPECIFICATION (Continued)**

| Input Type                                                           | Min | Max  | Units |
|----------------------------------------------------------------------|-----|------|-------|
| <b>Maximum Surge Current Rating (Non-Repetitive)<br/>(Continued)</b> |     |      |       |
| 125A output current                                                  |     | 2000 | A     |
| <b>On-State Voltage Drop</b>                                         |     |      |       |
| 12A output current                                                   |     | 1.3  | V     |
| 25A output current                                                   |     | 1.2  | V     |
| 40A output current                                                   |     | 1.4  | V     |
| 50A output current                                                   |     | 1.4  | V     |
| 75A output current                                                   |     | 1.35 | V     |
| S60D75                                                               |     | 1.3  | V     |
| 95A output current                                                   |     | 1.3  | V     |
| S60D90                                                               |     | 1.15 | V     |
| 125A output current                                                  |     | 1.3  | V     |
| S60D125                                                              |     | 1.1  | V     |
| <b>Zero Cross Window (Typical)</b>                                   |     |      |       |
| S                                                                    | R   | NA   |       |
| S                                                                    | D/A | ±12  | Vac   |
| <b>Off-State Leakage Current (60Hz)</b>                              |     |      |       |
| S24                                                                  |     | 3    | mA    |
| S48                                                                  | D/A | 3    | mA    |
| S48                                                                  | R   | 2.5  | mA    |
| S60                                                                  | A   | 1    | mA    |
| <b>Turn-On Time (60 Hz)</b>                                          |     |      |       |
| S                                                                    | R   | 0.1  | ms    |
| S                                                                    | D   | 8.3  | ms    |
| S                                                                    | A   | 24.9 | ms    |
| <b>Turn-Off Time (60 Hz)</b>                                         |     |      |       |
| S                                                                    | R/D | 8.3  | ms    |
| S                                                                    | A   | 24.9 | ms    |
| <b>Off-State dv/dt</b>                                               |     |      |       |
| All relays                                                           |     | 500  | V/μs  |
| <b>Maximum di/dt (Non-Repetitive)</b>                                |     |      |       |
| All relays                                                           |     | 50   | A/μs  |

**OUTPUT (LOAD) SPECIFICATION (Continued)**

| Input Type          | Min | Max | Units |
|---------------------|-----|-----|-------|
| Operating Frequency |     |     |       |
| All relays          | 0.1 | 440 | Hz    |

I<sup>2</sup>t for match fusing (<8.3ms)

|                              |       |                  |
|------------------------------|-------|------------------|
| 12A output current           | 72    | A <sup>2</sup> S |
| S24R25                       | 312   | A <sup>2</sup> S |
| S24D/S24A 25A output current | 288   | A <sup>2</sup> S |
| S48 25A output current       | 265   | A <sup>2</sup> S |
| 40A output current           | 612   | A <sup>2</sup> S |
| 50A output current           | 1500  | A <sup>2</sup> S |
| 75A output current           | 5000  | A <sup>2</sup> S |
| 95A output current           | 11000 | A <sup>2</sup> S |
| 125A output current          | 20000 | A <sup>2</sup> S |

**ENVIRONMENTAL SPECIFICATION**

|                        | Min | Max  | Units |
|------------------------|-----|------|-------|
| Operating Temperature  | -40 | 100  | °C    |
| Storage Temperature    | -40 | 100  | °C    |
| Input-Output Isolation |     | 4000 | Vrms  |

**Output-Case Isolation**

|                       |      |      |
|-----------------------|------|------|
| 12A output current    | 2500 | Vrms |
| 25A output current    | 2500 | Vrms |
| 40A output current, R | 2500 | Vrms |
| 40A output current, D | 3300 | Vrms |
| 40A output current, A | 3300 | Vrms |
| 50A output current    | 3300 | Vrms |
| 75A output current    | 3300 | Vrms |
| 95A output current    | 3300 | Vrms |
| 125A output current   | 3300 | Vrms |

**SURGE CURRENT**

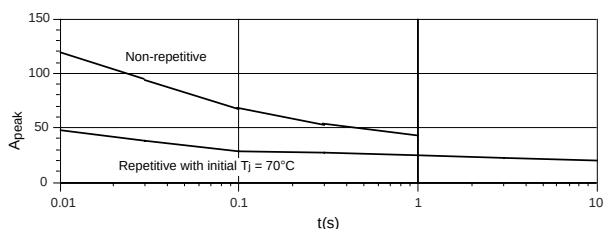


Figure 4a — 12A output current

**SURGE CURRENT (continued)**

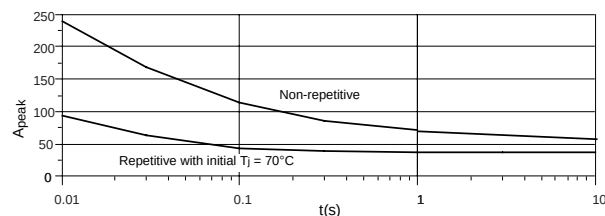


Figure 4b — 25A output current

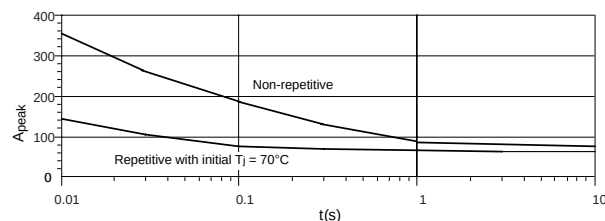


Figure 4c — 40A output current

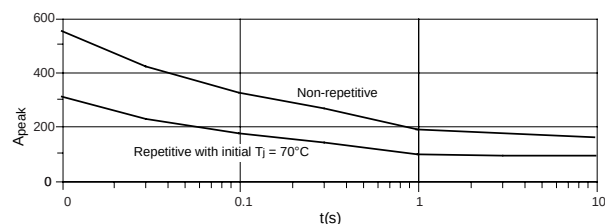


Figure 4d — 50A output current

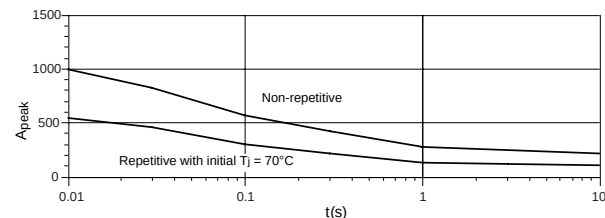


Figure 4e — 75A output current

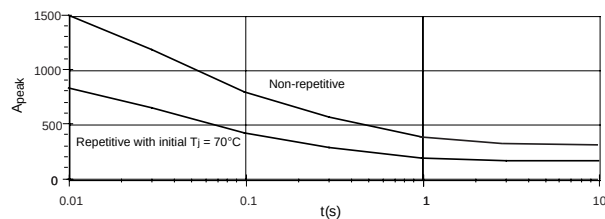


Figure 4f — 95A output current

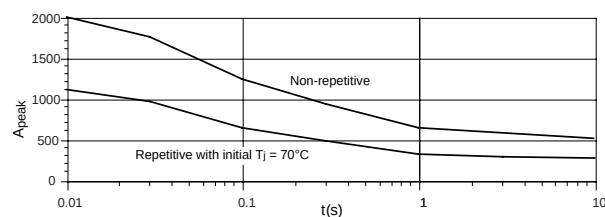


Figure 4g — 125A output current

# THERMAL CHARACTERISTICS

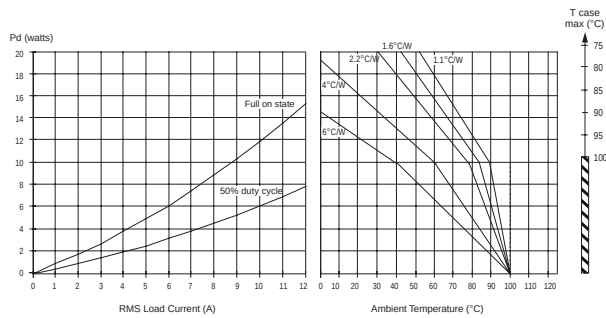


Figure 5a — 12A output current

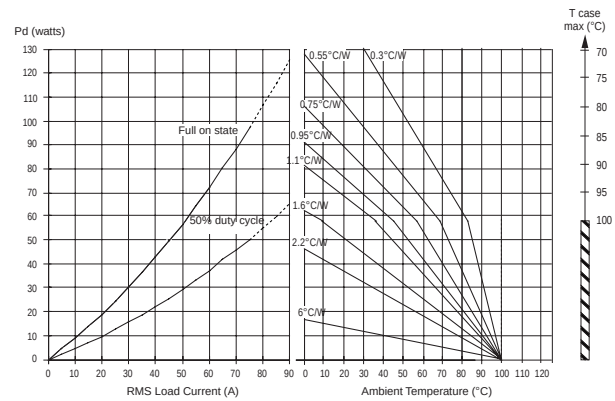


Figure 5e — 75A output current

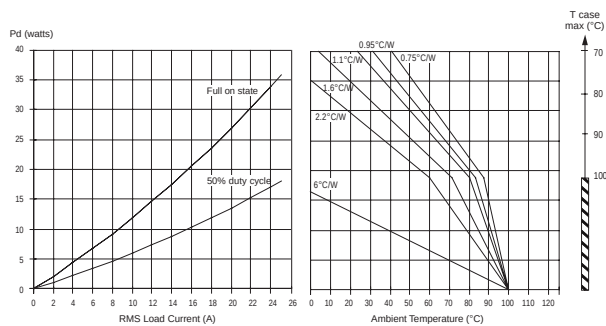


Figure 5b — 25A output current

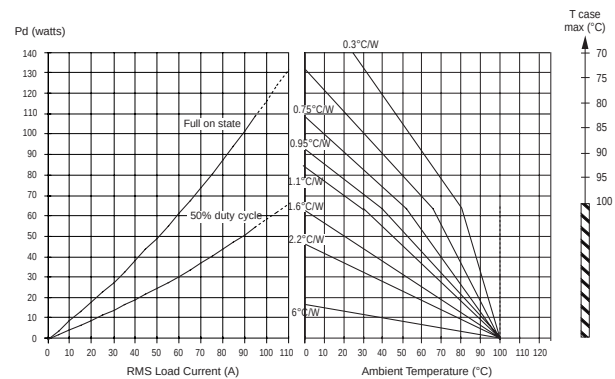


Figure 5f — 95A output current

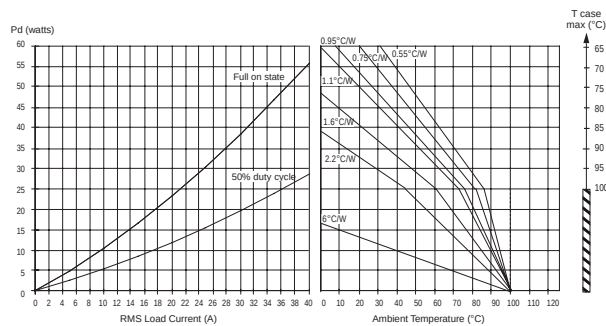


Figure 5c — 40A output current

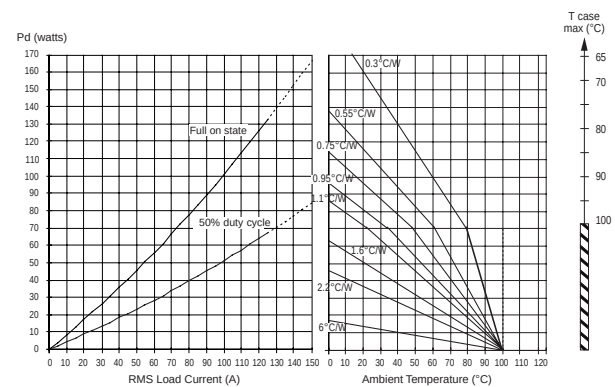


Figure 5g — 125A output current

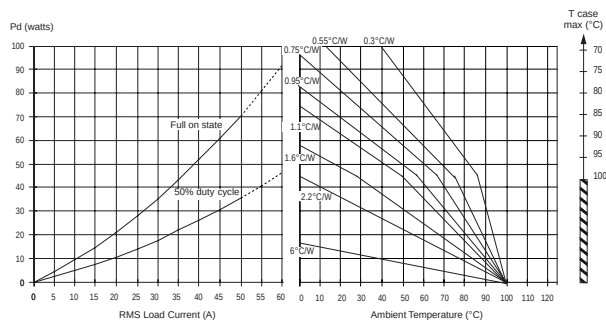


Figure 5d — 50A output current

## NOTES:

1. Electrical specifications measured at 25°C unless otherwise specified.
2. For 800Hz applications, contact factory.
3. For additional/custom options, contact factory.