TELEDYNE
RELAYS
A Unit of Teledyne Electronics and Communications

Series LS

**30A to 600 Vac SIP Package
DC control**

Part Number	Description
LS24D16C	16A, 240 Vac
LS24D21C	21A, 240 Vac
LS60D22C	22A, 600 Vac
LS24D27C	27A, 240 Vac
LS60D27C	27A, 600 Vac
LS60D30C	30A, 600 Vac

Part Number Explanation

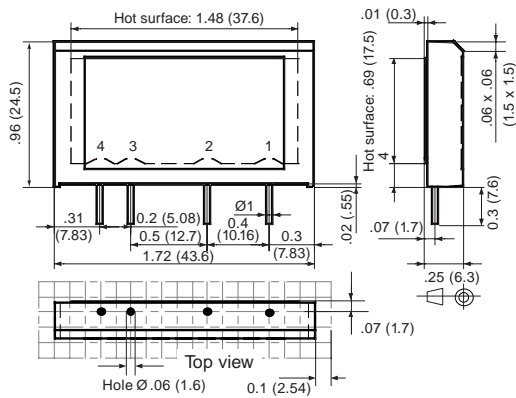| LS	24	D	16	C
Series		*Switch Type*[2]		*Control Range*[3]
	Line Voltage[1]	*Output Current - Amps*		
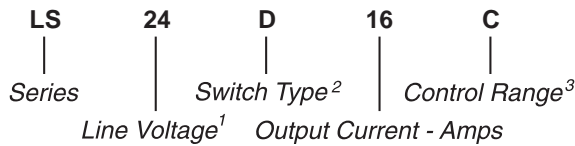
NOTES
1) Line Voltage (nominal): 24 = 240 Vac; 60 = 600 Vac
2) Switch Type: D = Zero-cross turn-on
3) Control Range: C = 4-14 Vdc (N = 8-32 Vdc also available)

MECHANICAL SPECIFICATION

Hot surface: 1.48 (37.6)
.01 (0.3)
Hot surface: .69 (17.5)
.96 (24.5)
.06 x .06 (1.5 x 1.5)
4 3 2 1
.02 (.55)
.4
0.3 (7.6)
.31 (7.83)
0.2 (5.08)
0.4 (10.16)
Ø1
0.5 (12.7)
0.3 (7.83)
.07 (1.7)
1.72 (43.6)
.25 (6.3)
Top view
.07 (1.7)
Hole Ø .06 (1.6)
0.1 (2.54)

WEIGHT: 0.53 oz. (15g)   TOLERANCES: ±0.01

Figure 1 — LS relays; dimensions in inches (mm)
(See Figure 12 for LS with HS1)

TYPICAL APPLICATION

L₁   L₁
MOV on the PCB
SSR   Load
Or
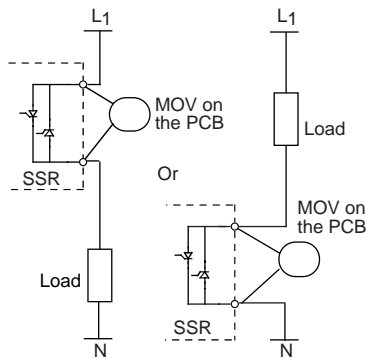MOV on the PCB
Load   SSR
N   N

Figure 2 — LS relays

FEATURES/BENEFITS
- Industry standard package
- Designed for external heat-sink attachment
- Over-sized thyristor ratings
- Direct-copper bonding technology

DESCRIPTION
These solid-state single inline package (SIP) relays are designed for mounting on printed circuit boards. The Series LS relays facilitate heat sinking by providing an interface surface. The relays are designed with 16A, 25A and 50A thyristors. They can switch loads with high starting currents. The nominal switched currents depend on the size of the heat sink and are limited by the cross section of the tracks of the printed circuit (mainly 25A/30A). The relays use a direct-bonded copper substrate for thermal efficiency, thermal stress performance and long-life expectancy.

APPLICATIONS
- Motor control — Pumps, reversing, integration of relays in terminal boxes
- Lamp control — Infrared drying, traffic lights, theater lighting

APPROVALS
All models are UL recognized.
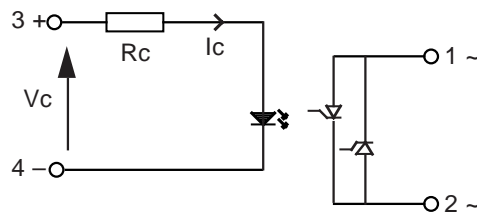UL File Number: E128555.

BLOCK DIAGRAM

3 +
Rc
Ic
Vc
4 −
1 ~
2 ~

Figure 3 — LS relays

INPUT (CONTROL) SPECIFICATION

	Min	Max	Units
Control Range	4	14	Vdc
Input Current Range	6.5	30	mAdc
Must Turn-off Voltage		1	Vdc
Input Resistance (Typical)		440	Ohms

OUTPUT (LOAD) SPECIFICATION

	Min	Max	Unit
Operating Range			
LS24	12	280	Vrms
LS60	24	600	Vrms
Peak Voltage			
LS24D16C		600	Vpeak
LS60D22C		1200	Vpeak
Load Current Range			
LS24D16C	.005	16*	Arms
LS24D21C	.005	25*	Arms
LS60D22C	.005	25*	Arms
LS24D27C	.005	30*	Arms
LS60D27C	.005	30*	Arms
LS60D30C	.005	30*	Arms

*Limited by the heat sink

Maximum Surge Current Rating (Non-Repetitive)
(See Figure 6)

LS24D16C		160	Apeak
LS24D21C		250	Apeak
LS60D22C		300	Apeak
LS24D27C		600	Apeak
LS60D27C		600	Apeak
LS60D30C		1000	Apeak

On-State Voltage Drop			
All relays		1.6	V

Zero-Cross Window (Typical)			
All relays		±12	V

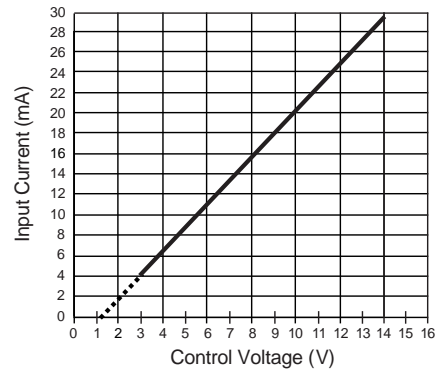| Off-State Leakage Current (60Hz)			
All relays		1	mA

CONTROL CHARACTERISTIC
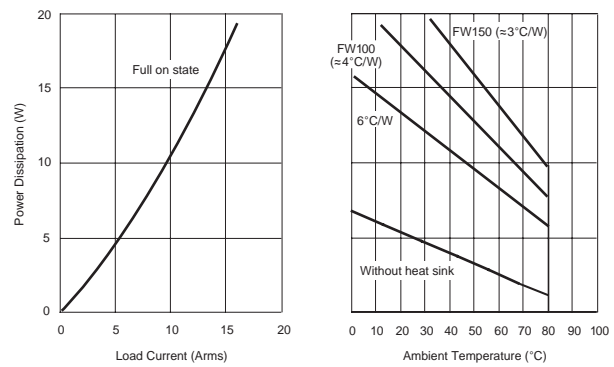

Figure 4 — LS relays

THERMAL CHARACTERISTICS

Figure 5a — LS24D16C relay
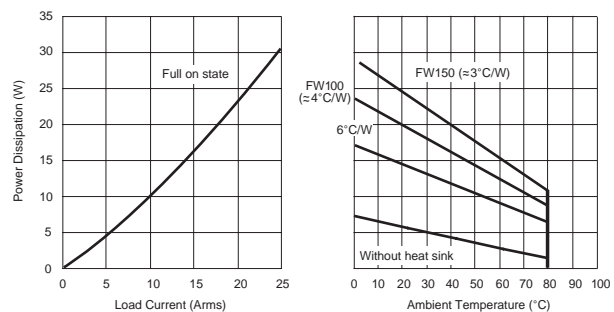
Figure 5b — LS24D21C, LS60D22C relays
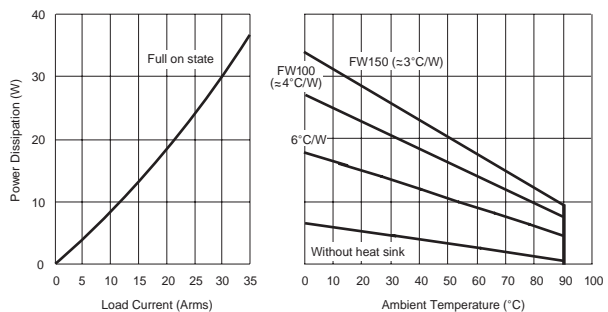
Figure 5c — LS24D27C, LS60D27C, LS60D30C relays

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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OUTPUT (LOAD) SPECIFICATION (continued)

	Min	Max	Unit
Turn-On Time (60Hz)			
All relays		8.3	ms
Turn-Off Time (60Hz)			
All relays		8.3	ms
Off-State dv/dt			
All relays		500	V/µs
Operating Frequency			
All relays	10	440	Hz
I^2t for match fusing (<8.3ms)			
LS24D16C		128	A^2S
LS24D21C		312	A^2S
LS60D22C		450	A^2S
LS24D27C		1800	A^2S
LS60D27C		1800	A^2S
LS60D30C		5000	A^2S

ENVIRONMENTAL SPECIFICATION

	Min	Max	Unit
Operating Temperature	–40	80	°C
Storage Temperature	–40	120	°C
Input-Output Isolation	4000		Vrms
Output-Case Isolation	3300		Vrms

NOTES:
1. MOV across the output recommended for non-resistive loads — minimum size: 14mm
2. Maximum current based on size of the heat sink and the ambient temperature.
3. For 800Hz applications, contact factory.
4. For additional/custom options, contact factory.

SURGE CURRENTS

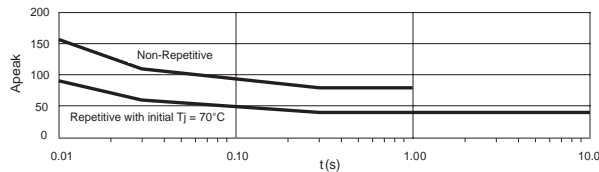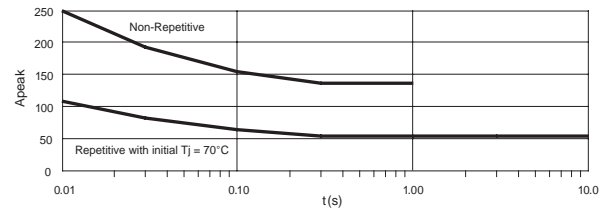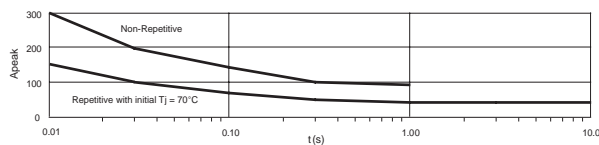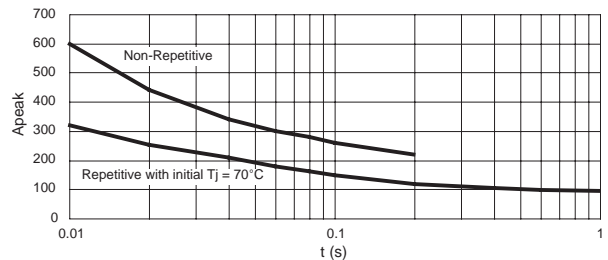
Figure 6a — L24D16C relay

Figure 6b — LS24D21C relay

Figure 6c — LS60D22C relay

Long time overload @ Tj init = 45°C	Temps	60 s	100 s
	I (A)	20	15

Figure 6d — LS60D27C, LS24D27C relays

Figure 6e — LS60D30C relay

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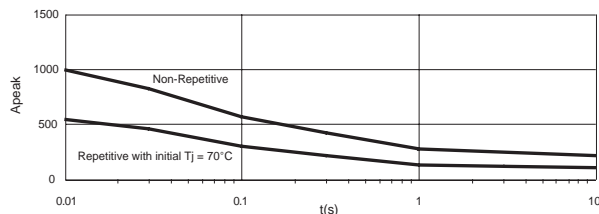
MOUNTING EXAMPLES

Heat sinks references:

FW100: L=100mm about 4°C/W (1SSR) without ventilation (3.6°C/W with 4SSRs)

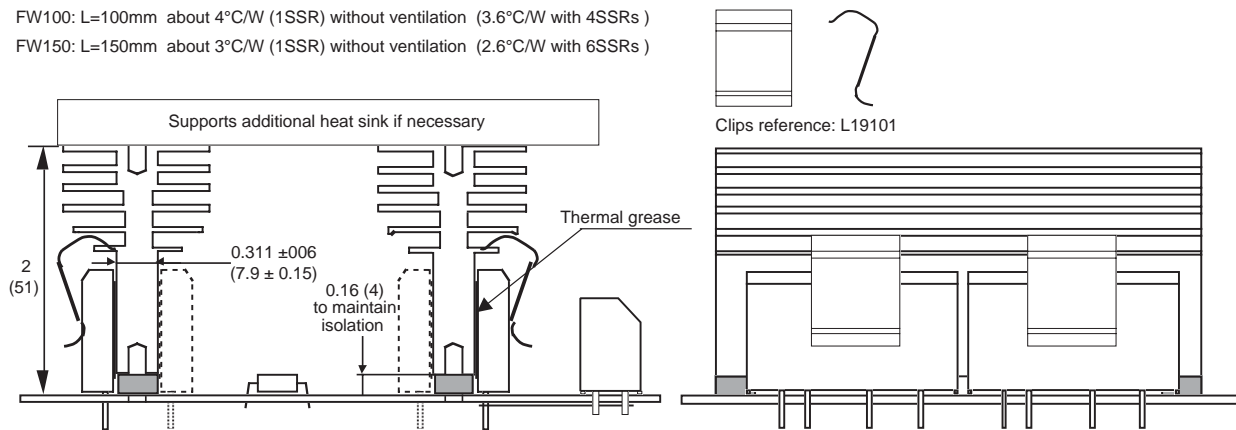FW150: L=150mm about 3°C/W (1SSR) without ventilation (2.6°C/W with 6SSRs)

Clips reference: L19101

Supports additional heat sink if necessary

Thermal grease

2
(51)

0.311 ±006
(7.9 ± 0.15)

0.16 (4)
to maintain
isolation

Figure 7a — Thermal heat sinks with mounting clips; dimensions in inches (mm)

0.16 (4) to
maintain
insulation

M3

1.04
(26.5)

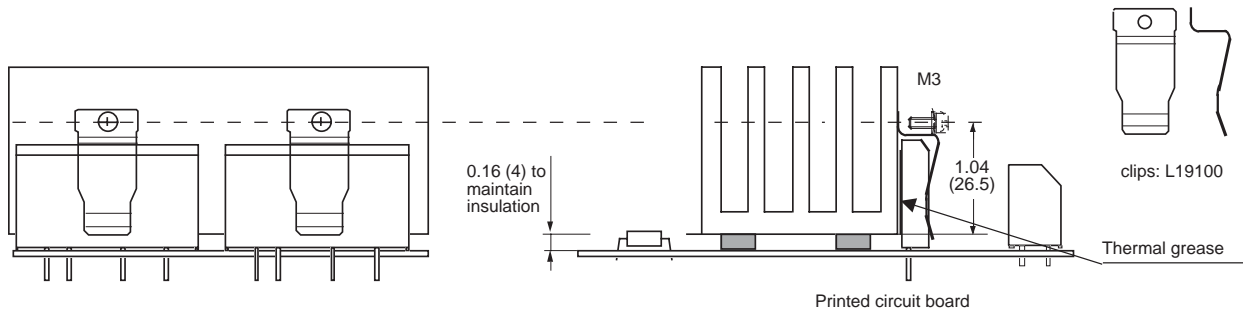clips: L19100

Thermal grease

Printed circuit board

Figure 7b — Clips with screws on standard heat sinks; dimensions in inches (mm)

In each case, allow 0.16 in. (4mm) between the printed circuit board and the heat sink to keep a correct insulation between input to output (0.16 in./4mm insulated washer). To maintain a good contact between the SSR and the heat sink, use thermal grease.
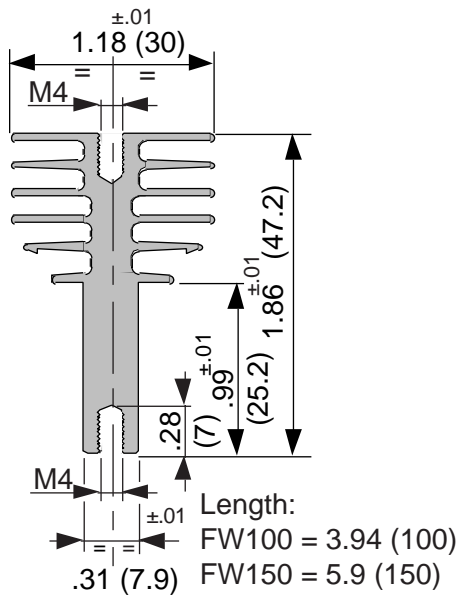
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MECHANICAL SPECIFICATION

Figure 8 – FW100 and FW150 heat sinks; dimensions in inches (mm)

Length:
FW100 = 3.94 (100)
FW150 = 5.9 (150)

FW100 heat sink with Max Clip System*

Rth = 3.6°C/W (4 SSRs)

Rth = 4°C/W (1 SSR)

FW150 heat sink with Max Clip System*

Rth = 2.6°C/W (4 SSRs)

Rth = 3°C/W (1 SSR)

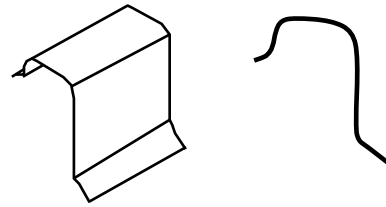*The Max Clip System of Aavid Thermalloy, patented worldwide

L19101 CLIP

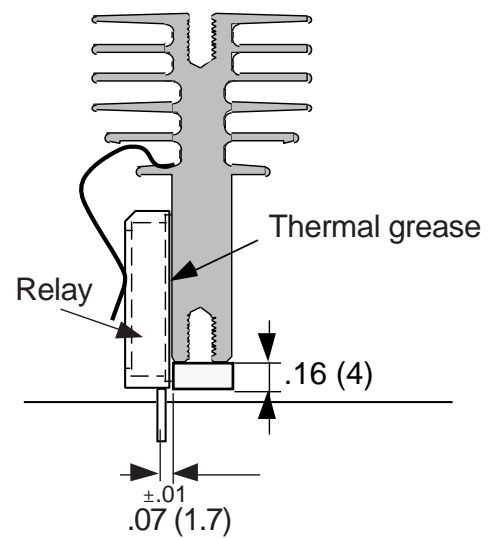*Figure 9a – Clip for FW100 and FW150 heat sinks*

Thermal grease
Relay
.16 (4)
.07 (1.7)

Figure 9b – Mounting with L19101 clip; dimensions in inches (mm)

L19100 CLIP
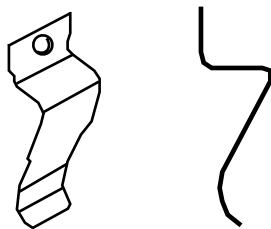
Figure 10a – Clips with screws for other heat sinks

Thermal grease
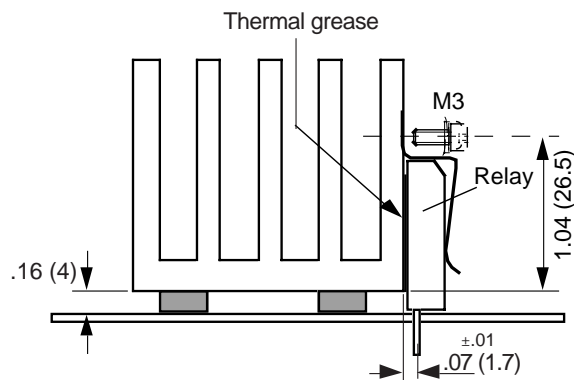M3
Relay
1.04 (26.5)
.16 (4)
.07 (1.7)

Figure 10b – Mounting with L19100 clip; dimensions in inches (mm)

NOTES
1. 0.16-inch (4mm) mounting washer must have correct insulation between input to output.