

TELEDYNE
SOLID STATE PRODUCTS
MILITARY SOLID STATE
POWER SWITCHING MODULE
20, 25, 35 AMP MODELS
DARLINGTON TRANSISTOR (-1) OR
POWER FET OUTPUTS (-4, -5) AVAILABLE

SERIES
653

SPST/NO

FEATURES

- Optical Isolation between control and load circuits
- TTL Logic compatible input current level
- Snap action switching (653-1)
- Designed to meet MIL-R-28750
- Power MOSFET output (653-4 and 653-5)
- Available to MIL-STD-883B

DESCRIPTION

The 653 is a military style DC power SSR packaged in a thermally efficient hermetically sealed aluminum case. Circuit components are exclusively military grade (hermetically sealed) with the circuit board assembly encapsulated to assure resistance to military shock and vibration levels.

653-1:

Output switching is accomplished by means of a Darlington Power Transistor which, together with advanced drive circuit techniques, provide reliable operation over the full output range. Input drive circuitry is logic compatible, thereby eliminating the need for additional relay driver stages. Snap action switching precludes damage from slowly ramped inputs. Unit is OPTO coupled.

653-4 and 653-5:

Output switching is accomplished by means of a power MOSFET which provides a reduced output voltage drop. This allows the switching of high currents at higher temperatures than those allowable with bipolar devices. Unit is transformer coupled.

PART NUMBERING

| INPUT CONTROL VOLTAGE RANGE | OUTPUT VOLTAGE RATING (VDC) | OUTPUT CURRENT RATING | PART NUMBER |
|-----------------------------|-----------------------------|-----------------------|-------------|
| 3-16 VDC | 50 | 25 | 653-1 |
| 24-32 VDC | 100 | 20 | 653-4 |
| 16-32 VDC | 50 | 35 | 653-5 |

ENVIRONMENTAL SPECIFICATIONS

| Ambient Temperature | 653-1 | | Operating Storage | -55 to 110°C |
|---------------------|--------------------------|---------|-------------------|--------------|
| | Operating | Storage | | |
| Shock | 653-4 | | Operating | -55 to 125°C |
| | 653-5 | | Storage | -55 to 125°C |
| Vibration | 200g for 6mSEC | | | |
| Acceleration | 50g Level 10 to 3000 Hz | | | |
| Altitude | 5000g | | | |
| | Sea Level to 100,000 ft. | | | |

ELECTRICAL SPECIFICATIONS
 (25°C UNLESS OTHERWISE SPECIFIED)

| INPUT (CONTROL) SPECIFICATIONS | MIN. | TYP. | MAX. | UNITS | NOTES | |
|---|---------|--------|------|-----------------|------------|------------|
| Control Voltage Range (-55°C to +110°C) | -1 | 3 | 16 | VDC | See Note 5 | |
| | -4 | 24 | 32 | VDC | | |
| | -5 | 16 | 32 | VDC | | |
| Input Current at: (-55°C to +110°C) | -1 | 5 VDC | 10 | 15 | mA | See Fig. 1 |
| | | 16 VDC | 15 | 20 | mA | |
| | -4 | 24 VDC | | 15 | mA | See Note 6 |
| | | 16 VDC | | 10 | mA | |
| Turn-On Voltage (-55°C to +110°C) | -1 | 3 | | VDC | | |
| | -4 | 24 | | | | |
| | -5 | 16 | | | | |
| Turn-Off Voltage (-55°C to +110°C) | -1 | | 1.0 | VDC | | |
| | -4 | | 4.0 | | | |
| | -5 | | 3.0 | | | |
| Isolation (Input to Output, Input & Output to Case) | 10' | | | Ohms | | |
| Capacitance (Input to Output) | | | 15 | pf | | |
| Dielectric Strength (Input to Output, Input & Output to Case) | 500 | | | VAC (RMS) 60 Hz | | |
| OUTPUT (LOAD) SPECIFICATIONS | MIN. | TYP. | MAX. | UNITS | NOTES | |
| Output Current Rating Resistive (See Figures 3 and 4) | -1 | 01 | 25 | Amps | | |
| | -4 | 0 | 20 | | | |
| | -5 | 0 | 35 | | | |
| Load Voltage Rating (-55°C to +110°C) | -1 | 5 | 50 | VDC | | |
| | -4 | | 100 | VDC | | |
| | -5 | 0 | 50 | | | |
| Surge Current Rating @ 25°C for .1 sec. (See Figure 5) | -1 | | 40 | Amps | | |
| | -4 | | 50 | Amps | | |
| | -5 | | 60 | | | |
| Output Voltage Drop @ (See Figure 2) | 25 Amps | -1 | 2.7 | VDC | | |
| | 20 Amps | -4 | 1.2 | VDC | | |
| | 30 Amps | -5 | 0.9 | | | |
| Turn-On Time (-55°C to +110°C) | -1 | | 20 | μSEC | | |
| | -4,-5 | | 60 | | | |
| Turn-Off Time (-55°C to +110°C) | -1 | | 175 | μSEC | See Note 3 | |
| | -4,-5 | | 100 | | | |
| Off-State Leakage @ 50 VDC | -1 | 25°C | 3 | mA | | |
| | | 110°C | 10 | | | |
| | -4 | 25°C | 10 | μA | | |
| Power Switch Junction Temperature (T _J Max.) | -1 | | 200 | °C | | |
| | -4 | | 150 | °C | | |
| | -5 | | | | | |
| On State Resistance @ 25°C | -4 | | .06 | Ohms | | |
| -5 | | .03 | | | | |
| Thermal Resistance Junction to HS (Θ _{JH}) (Includes Θ _{CS}) (See Note 2) | | | 1.3 | °C/Watt | | |
| Thermal Resistance Junction to Ambient (Θ _{JA}) (No Heat Sink) | | | 10.3 | °C/Watt | | |

SERIES 653

CHARACTERISTIC CURVES

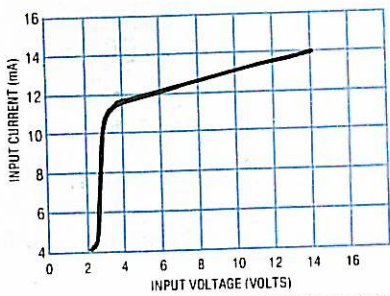


FIGURE 1 - INPUT CURRENT VS. INPUT VOLTAGE (TYPICAL)
653-1

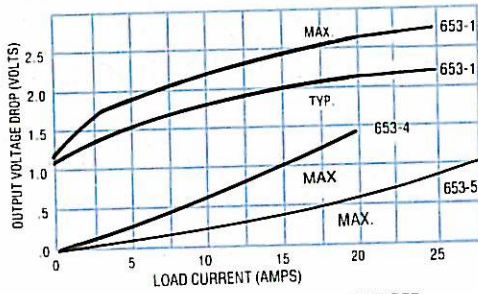


FIGURE 2 - LOAD CURRENT VS. OUTPUT VOLTAGE DROP

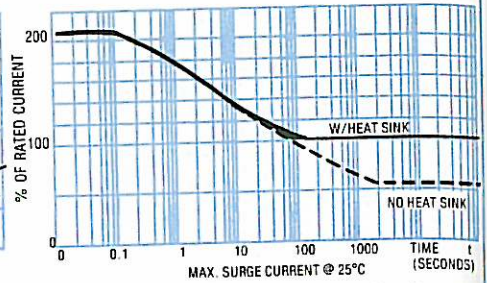


FIGURE 3 - MAX. SURGE CURRENT @ 25°C
653-1, 653-4

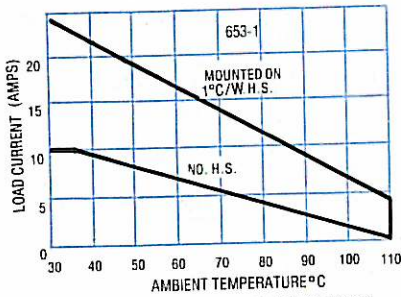


FIGURE 4 - MAX. LOAD CURRENT VS. AMBIENT TEMPERATURE
653-1

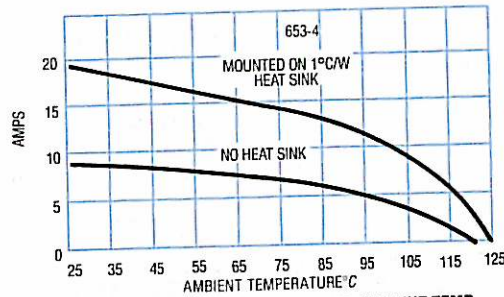


FIGURE 5 - MAX. LOAD CURRENT VS. AMBIENT TEMP.
653-4

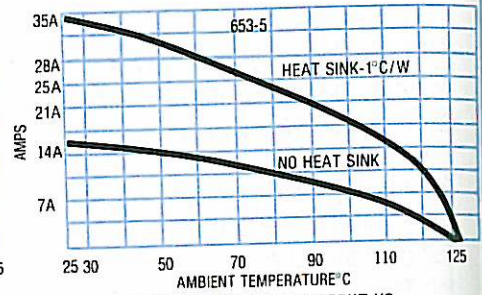
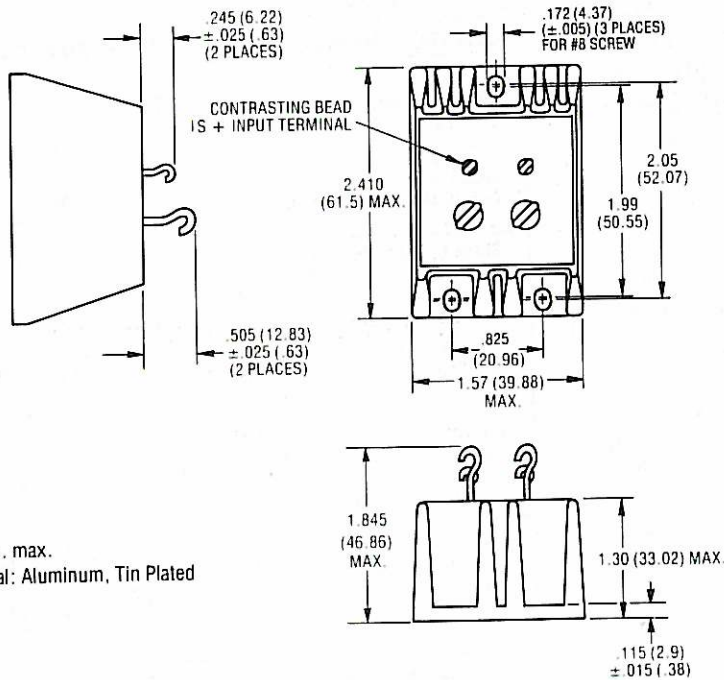


FIGURE 6 - MAX. LOAD CURRENT VS. AMBIENT TEMPERATURE
653-5

(PRELIMINARY)

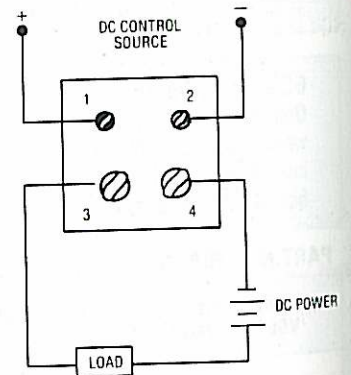
MECHANICAL SPECIFICATIONS



- Weight: 6 oz. max.
- Case Material: Aluminum, Tin Plated

DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

WIRING DIAGRAM



NOTES:

1. Reversing polarity of input or output may cause permanent damage.
2. Case temperature measurement is center of mounting surface.
3. Measured at $V_L = 50 \text{ VDC}$, $R_L = 10 \Omega$.
4. Rise and fall times of input signal must be $\leq 10 \mu\text{sec}$, or damage to output stage may result.

5. 3.8-32 volt input will be available.
6. 653-4 is transformer coupled.

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