TELEDYNE RELAYS
A Unit of Teledyne Electronic Technologies

SMART **Series M33-2N**

Transformer Isolated, High Surge Current
DC Solid-State Relay

Part Number*	Relay Description
M33-2N	Solid State Relay With High Surge Current Capability

* The Y suffix denotes parameters tested to MIL-PRF-28750 specifications.
The W suffix denotes parameters tested to Teledyne specifications.



ELECTRICAL SPECIFICATIONS

(-55°C TO +125°C CASE UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATION

	Min	Typ	Max	Units
Control Current @ 5 Vdc (Note 5)			80	µA
Control Voltage Range			6.5	Vdc
Bias Supply Range V_{DD} (Note 7)	4.5		5.5	Vdc
Bias Current			16	mA
Turn-Off (Guaranteed Off)			0.4	Vdc
Turn-On (Guaranteed On)	2.0			Vdc

OUTPUT (LOAD) SPECIFICATIONS

		Min	Typ	Max	Units
Continuous Output	@25 °C (case)			7.0	A
Current (See Figure 1)	@120 °C (case)			3.0	A
Pulse/Surge Current	@100 µs			100	A
(See Notes 1, 2, 3, Fig. 4)	@100 ms			23.5	A
Operating Output Voltage				60	Vdc
Continuous Blocking Voltage				80	Vdc
On-State Resistance R_{ds} (on) (Note 4)				0.09	Ohm
Turn-On Time (Figure 2)				60	µs
Turn-Off Time (Figure 2)				3.0	ms
Off-State Leakage at 60 Vdc	@25°C			10	µA
	@125°C			100	µA
Off-State Leakage at 80 Vdc	@25°C			1.0	mA
Capacitance Across Output @ V_{DS} = 25 Vdc F = 1.0 MHz				1700	pF
Insulation Resistance @ 500 Vdc		10^9			Ohm
Capacitance (Input to Output at 1 KHz)				15	pF
Dielectric Strength, Input to Case, Input to Output, Output to Case				1000	Vrms
Thermal Resistance Junction To Ambient (θ_{JA})				35	°C/W
Thermal Resistance Junction To Case (θ_{JC})				7	°C/W

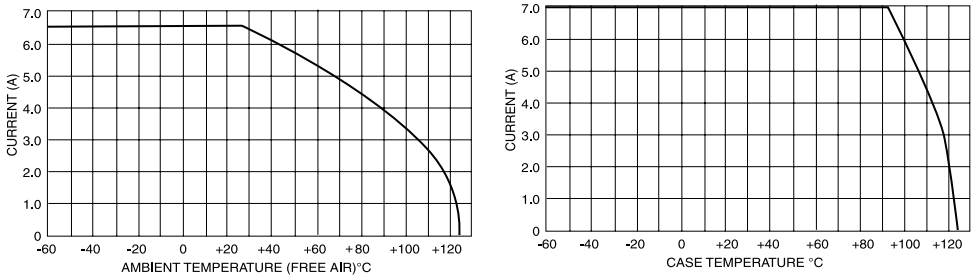
FEATURES

- Up to 100 Amp pulse load capability
- Fast switching speed
- Low ON resistance
- Power FET output
- Transformer Isolated
- TTL or CMOS logic compatible input control
- Low-profile metal DIP, hermetically sealed
- Meets 80V surge and ±600V spike requirements
- Built and tested to requirements of MIL-PRF-28750

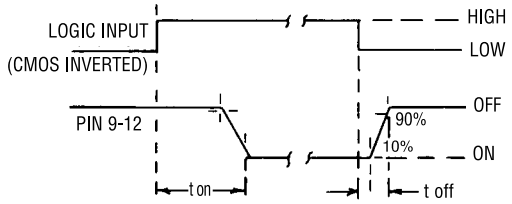
DESCRIPTION

The M33-2N is a military-style DC solid-state relay designed specifically for high-current pulse load applications. This device is constructed utilizing state-of-the-art solid-state techniques and features the latest power FET output technology to minimize ON resistance. This feature provides minimum output voltage drop and allows the M33-2N to switch high pulse currents up to 100 amps at higher temperatures than those allowable with bipolar devices. The input and output are magnetically isolated to protect delicate input logic circuits from output voltage transients. The M33-2N is designed to switch loads on MIL-STD-704 28 Vdc power systems, and meets 80V surge and ±600V spike requirements. The M33-2N is packaged in a low-profile hermetically sealed 22-pin DIP.

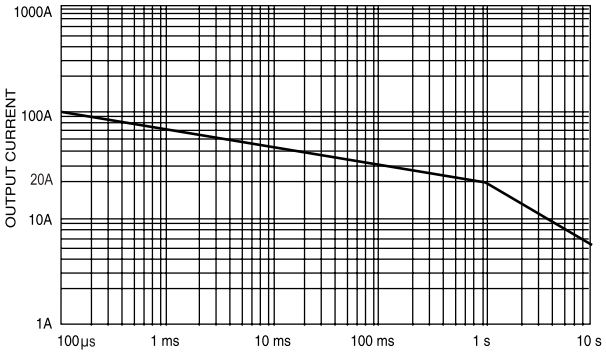
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LOAD CURRENT DERATING CURVE
FIGURE1



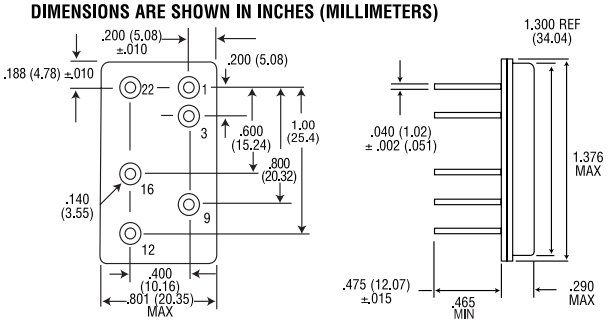
TIMING DIAGRAM
FIGURE 2



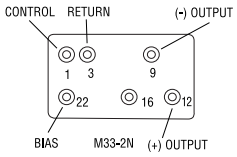
MAX OUTPUT CURRENT VS TIME
-55°C TO +100°C CASE
FIGURE 3

MECHANICAL SPECIFICATIONS

DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)



- Enclosure: 22 Pin DIP, Hermetically Sealed
- Leak Rate: 1 x 10^{-8} CC/Sec Maximum
- Material: Header: Cold Rolled Steel Nickel Plated
  Pins: Copper Core, Alloy #52 Clad Gold Plated
- Weight: 20 grams maximum



HEADER PINOUTS
(BOTTOM VIEW)

ENVIRONMENTAL SPECIFICATIONS

	Min	Max	Units
Temperature Range			
Operating (case)	-55	+125	°C
Storage	-55	+125	°C
Vibration, 100 g	10	3000	Hz
Constant Acceleration		5000	g
Shock, 0.5 ms pulse		1500	g

NOTES:
1. 100 Amp max for 100 µsec pulse, non-repetitive.
2. 23.5 Amps, 100 msec pulse, 47 Vdc, 2 Ω load, 30 times at 2% duty cycle, 5 seconds between pulses.
3. 17.5 Amp, 100 msec pulse, 35 Vdc, 2 Ω load, 120 times at 1 second intervals, 10% duty cycle.
4. On-state resistance measured at 22A, 300 µsec pulse, 10 Hz repetition rate; for test purposes only, not a continuous operating condition.
5. Input transitions are to be less than 1.0 msec duration.
6. Inductive loads should be diode suppressed.
7. For test purposes, input bias voltage shall be 5.0 Vdc.
8. The maximum recommended solder temperature is 220°C for 4 seconds.

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