AC Line Monitor Logic-Out Device

MID400M

Description

The MID400M is an optically isolated AC line to logic interface device. It is packaged in an 8 lead plastic DIP. The AC line voltage is monitored by two back to back GaAs LED diodes in series with an external resistor. A high gain detector circuit senses the LED current and drives the output gate to a logic low condition.

The MID400M has been designed solely for the use as an AC line monitor. It is recommended for use in any AC/DC control application where excellent optical isolation, solid state reliability, TTL compatibility, small size, low power, and low frequency operations are required.

Features

€ Direct Operation from any Line Voltage with the Use of an External Resistor

€ Externally Adjustable Time Delay

€ Externally Adjustable AC Voltage Sensing Level

€ Logic Level Compatibility

€ Safety and Regulatory Approvals:

UL1577, 5,000 VAC$_{RMS}$ for 1 Minute

DIN EN/IEC60747-5-5, 890 V Peak Working Insulation Voltage

Applications

€ Monitoring of the AC/DC "Line-down" Condition

€ "Closed-loop" Interface between Electromechanical Elements such as Solenoids, Relay Contacts, Small Motors, and Microprocessors

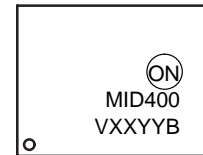€ Time Delay Isolation Switch
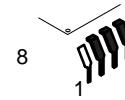
PDIP8 6.6x3.81, 2.54P
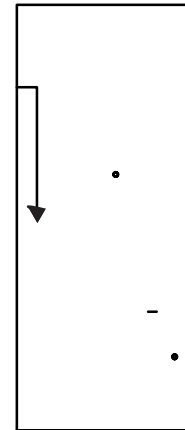CASE 646BW
8
1
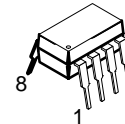
PDIP8 9.655x6.6, 2.54P
CASE 646CQ
8
1

PDIP8 GW
CASE 709AC
8
1

MARKING DIAGRAM

(ON)
MID400
VXXYYB
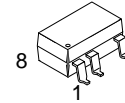
MID400	= Specific Device Code
V	= DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option)
XX	= Two-Digit Year Code, e.g., "06"
YY	= Digit Work Week, Ranging from "01" to "53"
B	= Assembly Package Code

FUNCTIONAL SCHEMATIC

ORDERING INFORMATION

See detailed ordering and shipping information on page 10 of this data sheet.

SAFETY AND INSULATION RATINGS (As per DIN EN/IEC 60747 ï5 ï5, this optocoupler is suitable for "safe electrical insulation" only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.)

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	<150 V_{RMS}	I–IV
	<300 V_{RMS}	I–IV
	<450 V_{RMS}	I–III
	<600 V_{RMS}	I–III
Climatic Classification		40/100/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V_{PR}	Input ïto ïOutput Test Voltage, Method A, V_{IORM} x 1.6 = V_{PR}, Type and Sample Test with t_m = 10 s, Partial Discharge < 5 pC	1,335	V_{peak}
	Input ïto ïOutput Test Voltage, Method B, V_{IORM} x 1.875 = V_{PR}, 100% Production Test	1,335	

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
T_{STG}	Storage Temperature	ï55 to +125	°C
T_{OPR}	Operating Temperature	ï40 to +85	°C
T_J	Junction Temperature	ï55 to +100	°C
T_{SOL}	Lead Solder Temperature	260 for 10 seconds	°C
P_D	Total Device Power Dissipation @ T_A = 25°C	115	mW
	Derate Above 70°C	4	mW/°C

EMITTER

	RMS Current	25	mA

MID400M

ELECTRICAL CHARACTERISTICS (0°C to 70°C Free Air Temperature unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit

INDIVIDUAL COMPONENT CHARACTERISTICS

EMITTER

V_F

APPLICATION INFORMATION

The input of the MID400M consists of two back to back LED diodes which will accept and convert alternating currents into light energy. An integrated photo diode−detector amplifier forms the output network. Optical coupling between input and output provides 2500 V$_{AC_{RMS}}$ voltage isolation. A very high current transfer ratio (defined as the ratio of the DC output current and the DC input current) is achieved through the use of high gain amplifier. The detector amplifier circuitry operates from a 5 V DC supply and drives an open collector transistor output. The switching times are intentionally designed to be slow in order to enable the MID400M, when used as an AC line monitor, to respond only to changes in input voltage exceeding many milliseconds. The short period of time during zero−crossing which occurs once every half cycle of the power line is completely ignored. To operate the MID400M, always add a resistor, R$_{IN}$ in series with the input (as shown in figure 2) to limit the current to the required value. The value of the resistor can be determined by the following equation:

$$R_{IN} = \frac{V_{IN} - V_F}{I_{IN}}$$

(eq. 1)

Where,

V$_{IN}$ (RMS) is the input voltage.

V$_F$ is the forward voltage drop across the LED.

I$_{IN}$ (RMS) is the desired input current required to sustain a logic "O" on the output.

PIN DESCRIPTION

Pin Number	Pin Name	Description
1, 3	V$_{IN1}$, V$_{IN2}$	Input terminals
2, 4	N/C	No Connect
8	V$_{CC}$	Supply voltage, output circuit.
7	AUX	Auxiliary terminal. Programmable capacitor input to adjust AC voltage sensing level and time delay.
6	V$_O$	Output terminal; open collector.
5	GND	Circuit ground potential.

SCHEMATIC DIAGRAM
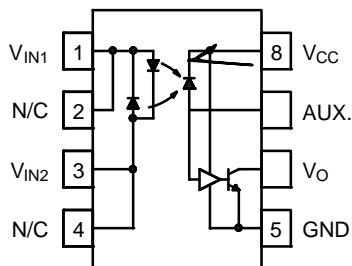
I_{OL}

Low−Level Output Current

The current flowing into an output with input conditions appliedaccording to the product specification will establish low ïlevel atthe output.

I_{CCL}

Supply Current, Output LOW

The current flowing into the V_{CC} supply terminal of a circuit when the output is at a low ïlevel voltage.

I_{CCH}

Supply Current, Output HIGH

The current flowing into the V_{CC} supply terminal of a circuit when the output is at a high ïlevel voltage.

Dynamic Characteristics

t_{ON}

Turn−On Time

The time between the specified reference points on the input and the output voltage waveforms with the output changing from the defined high ïOLu

REFLOW PROFILE

MID400M

ORDERING INFORMATION

Part Number	Package	Shipping [†]
MID400M	DIP 8 ïPin (Pb ïFree)	50 / Tube
MID400SM	SMT 8 ïPin (Lead Bend) (Pb ïFree)	50 / Tube
MID400SDM	SMT 8 ïPin (Lead Bend) (Pb ïFree)	1,000 / Tape and Reel
MID400VM	DIP 8 ïPin, DIN EN/IEC 60747 ï5 ï5 Option (Pb ïFree)	50 / Tube
MID400SVM	SMT 8 ïPin (Lead Bend), DIN EN/IEC 60747 ï5 ï5 Option (Pb ïFree)	50 / Tube
MID400SDVM	SMT 8 ïPin (Lead Bend), DIN EN/IEC 60747 ï5 ï5 Option (Pb ïFree)	1,000 / Tape and Reel

MID400TVM

MID400M

PACKAGE DIMENSIONS

PDIP8 GW
CASE 709AC
ISSUE O

LAN