

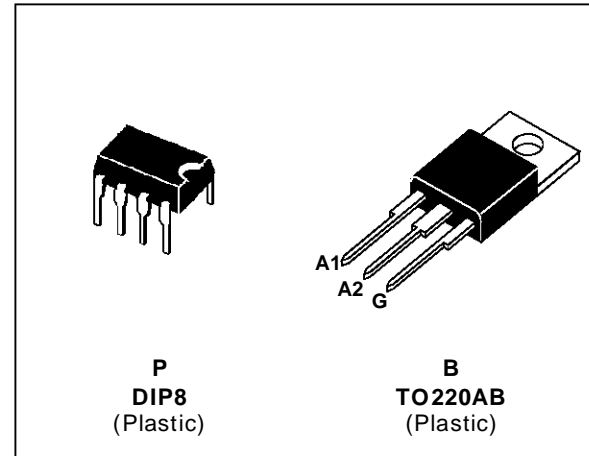
## AUTOMATIC VOLTAGE SWITCH (SMPS < 500W)

### CONTROLLER

- 50/60Hz FULL COMPATIBILITY
- INTEGRATED VOLTAGE REGULATOR
- TRIGGERING PULSE TRAIN OF THE TRIAC
- PARASITIC FILTER
- LOW POWER CONSUMPTION

### TRIAC

- HIGH EFFICIENCY AND SAFETY SWITCHING
- UNINSULATED PACKAGE : AVS12CB
- $V_{DRM} = \pm 600V$
- $I_T(RMS): 12A$

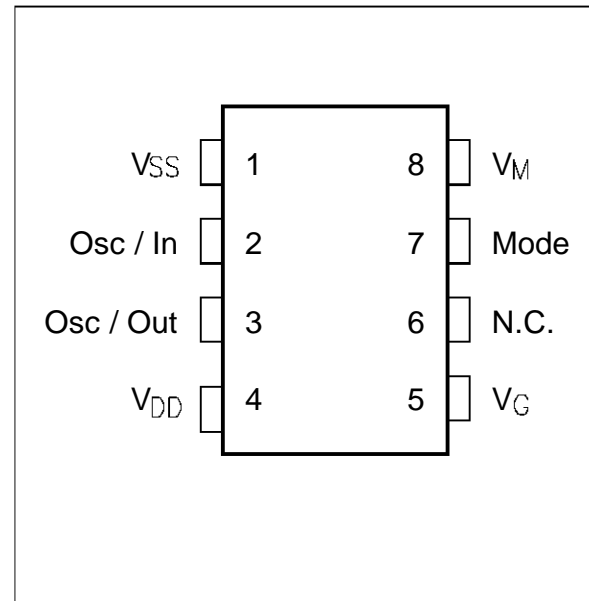


### DESCRIPTION

The AVS12 kit is an automatic mains selector (110/220V AC) to be used in SMPS < 500 W. It is composed of 2 devices :

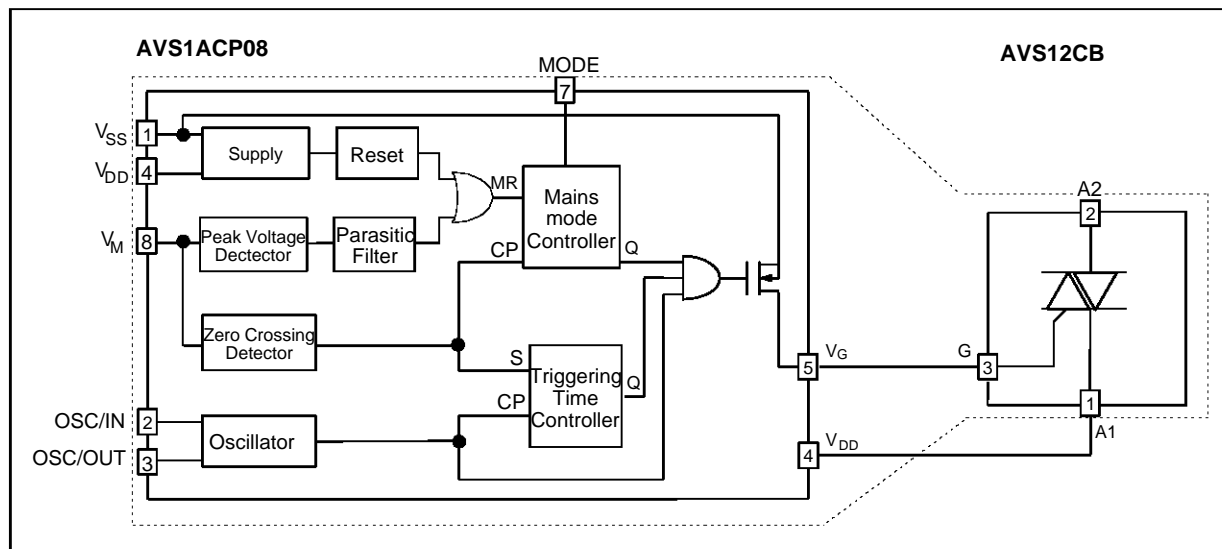
- The **Controller** is optimized for low consumption and high security triggering of the triac. When connected to  $V_{SS}$ , the **mode** input activates an additional **option**. If the main power drops from 220V to 110V, the triac control remains locked to the 220V mode and avoids any high voltage spike when the voltage comes back to 220V. When connected to  $V_{DD}$ , the **mode** input deactivates this **option**.
- The TRIAC is specially designed for this application. An optimization between sensitivity and dynamic parameters of the triac gate highly reduces the losses of supply resistor and allows excellent immunity against disturbances.

### PIN CONNECTION



# AVS12

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

### CONTROLLER AVS1ACP08

| Symbol                          | Parameter                        | Value                 |       | Unit |
|---------------------------------|----------------------------------|-----------------------|-------|------|
|                                 |                                  | Min.                  | Max.  |      |
| V <sub>SS</sub>                 | Supply voltage                   | - 12                  | 0.5   | V    |
| V <sub>I</sub> / V <sub>O</sub> | I / O voltage                    | V <sub>SS</sub> - 0.5 | 0.5   | V    |
| I <sub>I</sub> / I <sub>O</sub> | I / O current                    | - 40                  | + 40  | mA   |
| T <sub>stg</sub>                | Storage Temperature              | - 60                  | + 150 | °C   |
| T <sub>oper</sub>               | Operating Temperature code " C " | 0                     | + 70  | °C   |

### TRIAC AVS12CB T<sub>j</sub> = 25°C (unless otherwise specified)

| Symbol                             | Parameter  |                       | Value                  | Unit |                  |
|------------------------------------|--|-----------------------|------------------------|------|------------------|
| V <sub>DRM</sub>                   | Repetitive peak off-state voltage (2)                                      |                       | ± 600                  | V    |                  |
| I <sub>T(RMS)</sub>                | RMS on-state current (360° conduction angle)                               | T <sub>C</sub> = 70°C | 12                     | A    |                  |
| I <sub>TSM</sub>                   | Non repetitive surge peak on-state current (T <sub>j</sub> initial = 25°C) | t = 8.3ms<br>t = 10ms | 105<br>100             | A    |                  |
| i <sup>2</sup> t                   | i <sup>2</sup> t value   |                       | t = 10ms               | 50   | A <sup>2</sup> s |
| di/dt                              | Critical rate of rise of on-state current (1)                              |                       | Repetitive<br>F = 50Hz | 20   | A/μs             |
|                                    |  |                       | Non Repetitive         | 100  |                  |
| dv/dt *                            | Linear slope up to 0.67 V <sub>DRM</sub>                                   | Gate open             | T <sub>j</sub> = 110°C | 50   | V/μs             |
| T <sub>stg</sub><br>T <sub>j</sub> | Storage Temperature<br>Operating Junction Temperature                      |                       | - 40 + 150<br>0 + 110  |      | °C               |

(1) Gate supply : I<sub>G</sub> = 100mA - di/dt = 1A/μs  
 (2) T<sub>j</sub> = 110°C

\* For either polarity of electrode A2 voltage with reference to electrode A1

**THERMAL RESISTANCES**

## TRIAC AVS12CB

| Symbol       | Parameter   | Value | Unit |
|--------------|---|-------|------|
| Rth (j-a)    | Junction-to-ambient                                   | 60    | °C/W |
| Rth (j-c) DC | Junction-to-case for DC                               | 3     | °C/W |
| Rth (j-c) AC | Junction-to-case for 360° conduction angle ( f= 50Hz) | 2.3   | °C/W |

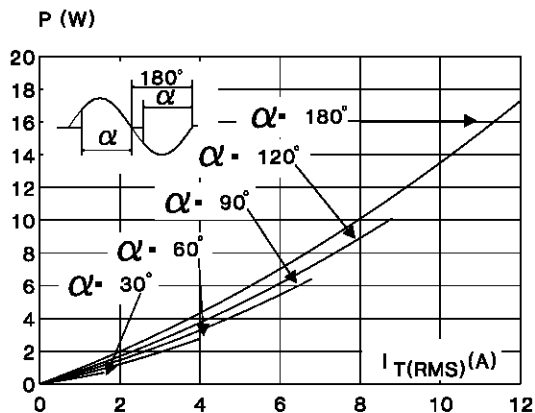
**DC GENERAL ELECTRICAL CHARACTERISTICS**

## TRIAC AVS12CB

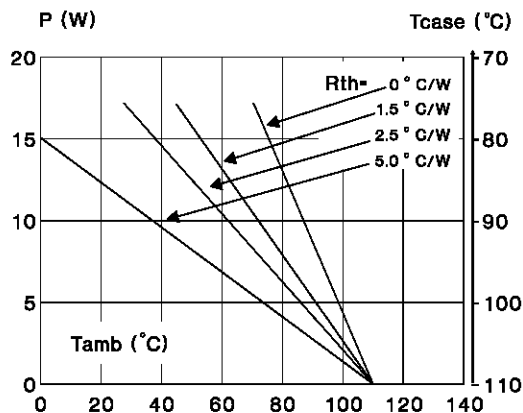
| Symbol             | Parameter  | Value                  |      | Unit |
|--------------------|--|------------------------|------|------|
|                    |  | Min.                   | Max. |      |
| V <sub>GD</sub>    | V <sub>D</sub> = V <sub>DRM</sub> R <sub>L</sub> = 3.3kΩ Pulse duration > 20μs | T <sub>j</sub> = 110°C | 0.2  | V    |
| V <sub>TM</sub> *  | I <sub>TM</sub> = 17A tp = 10ms  | T <sub>j</sub> = 25°C  | 1.75 | V    |
| I <sub>DRM</sub> * | V <sub>DRM</sub> rated Gate open   | T <sub>j</sub> = 25°C  | 10   | μA   |
|                    |  | T <sub>j</sub> = 110°C | 500  |      |

\* For either polarity of electrode A2 voltage with reference to electrode A1.

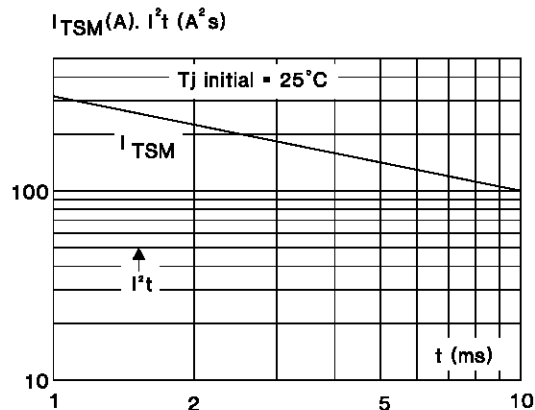
**Fig. 1 :**Maximum RMS power dissipation versus RMS on-state current (F = 60Hz).  
(Curves are cut off by (di/dt)c limitation)



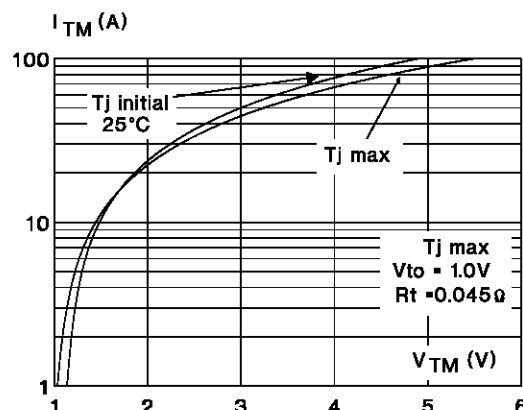
**Fig. 2 :**Correlation between maximum mean power dissipation and maximum allowable temperatures ( $T_{amb}$  and  $T_{case}$ ) for different thermal resistances heatsink + contact.



**Fig. 3 :**Non repetitive surge peak on state current for a sinusoidal pulse with width :  $t \leq 10\text{ms}$ , and corresponding value of  $I^2t$ .



**Fig. 4 :**On-state characteristics (maximum values).



**DC GENERAL ELECTRICAL CHARACTERISTICS** (continued)

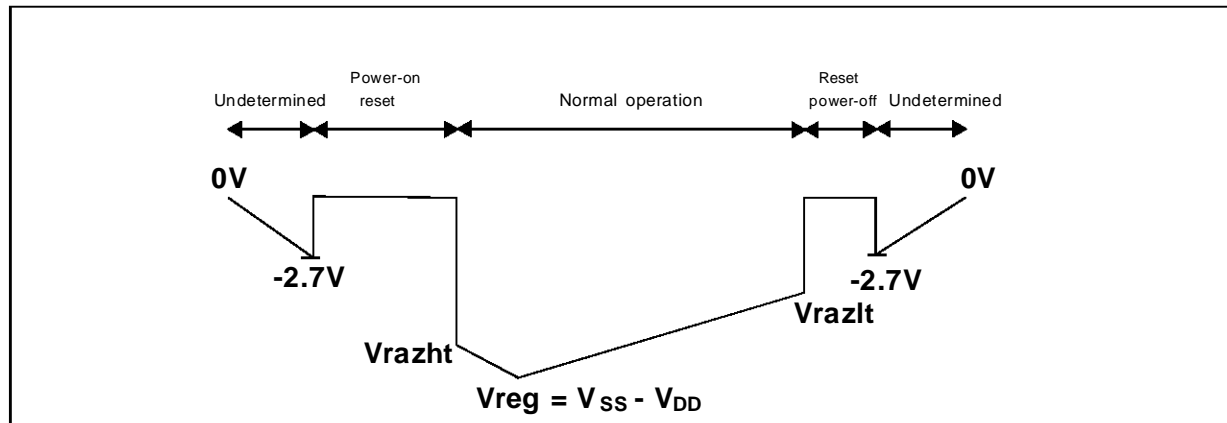
CONTROLLER AVS1ACP08  $T_{oper} = 25^{\circ}C$  (unless otherwise specified)

| Symbol   | Parameter  | Value    |                       |             | Unit          |
|--|--|----------|-----------------------|-------------|---------------|
|  |  | Min      | Typ                   | Max         |               |
| $V_{SS}$ (pin 1) (Vreg)                              | Shunt regulator  | - 10     | - 9                   | - 8         | V             |
| $I_{SS}$ (pin 1) (Vreg)<br>(@ $V_{SS} = 9V$ )        | Supply current   | 0.4      |                       | 30          | mA            |
| $I_{SS}$ (pin 1)<br>(@ triac gate non connected)     | Quiescent current  |          |                       | 0.7         | mA            |
| f (pin 3)<br>(@ $R = 91k\Omega$ )<br>( $C = 100pF$ ) | Oscillator frequency   | 42       | 44                    | 46          | kHz           |
| $V_M$ (pin 8) $V_{th}$ (3)                           | Peak voltage of detection high-threshold                           | 4.08     | 4.25                  | 4.42        | V             |
| $V_M$ (pin 8) $V_h$ (3)                              | Peak voltage of detection hysteresis                               | 0.370    | 0.4                   | 0.420       | V             |
| (1) $V_M$ (pin 8) $V_{th}$ (3)                       | Zero-crossing detection high-threshold                             | 95       | 110                   | 125         | mV            |
| $V_M$ (pin 8) $V_h$ (3)                              | Zero-crossing detection hysteresis                                 | 27       | 50                    | 80          | mV            |
| (2) $V_{razht}$ (4)                                  | Power-on-reset activation threshold                                |          | $V_{reg} \times 0.89$ |             | V             |
| (2) $V_{razlt}$ (4)                                  | Power-down-reset activation threshold                              | 3        |                       | 6.5         | V             |
| Mode (pin 7)   | $V_{IL}$ (4)<br>$V_{IH}$ (4)                                       | 0.7 Vreg |                       | 0.3 Vreg    | v             |
| $V_G$ (pin 5)  | $V_{OL}$ ( $I_{VG} = 25mA$ )<br>Leakage current ( $V_G = V_{DD}$ ) |          |                       | 650<br>+ 10 | mV<br>$\mu A$ |

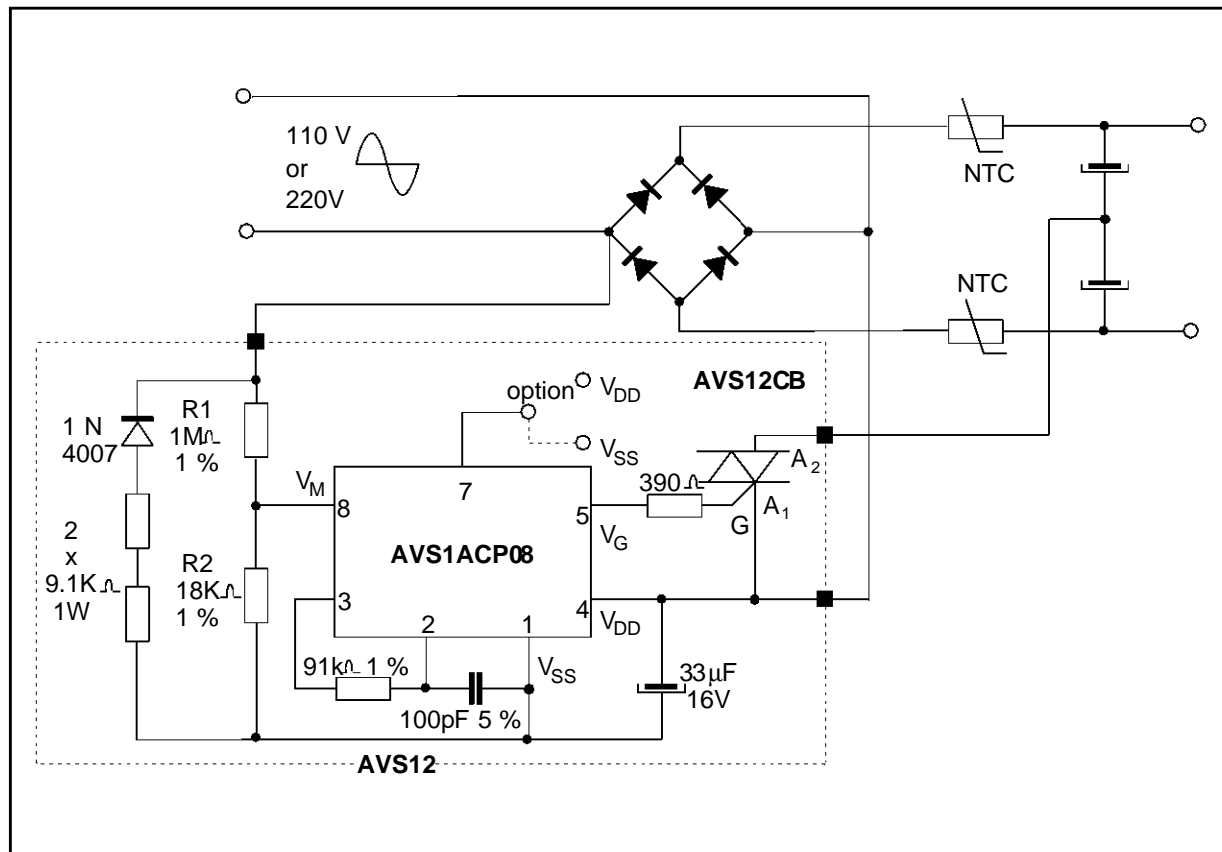
**NOTES :**

- (1) : This value gives a typical noise immunity on the zero-crossing detection of  $110mV \times 1018/18 = 6.20V$  on the main supply
- (2) : See following diagram
- (3) : Voltage referred to  $V_{SS}$
- (4) : Voltage referred to  $V_{DD}$

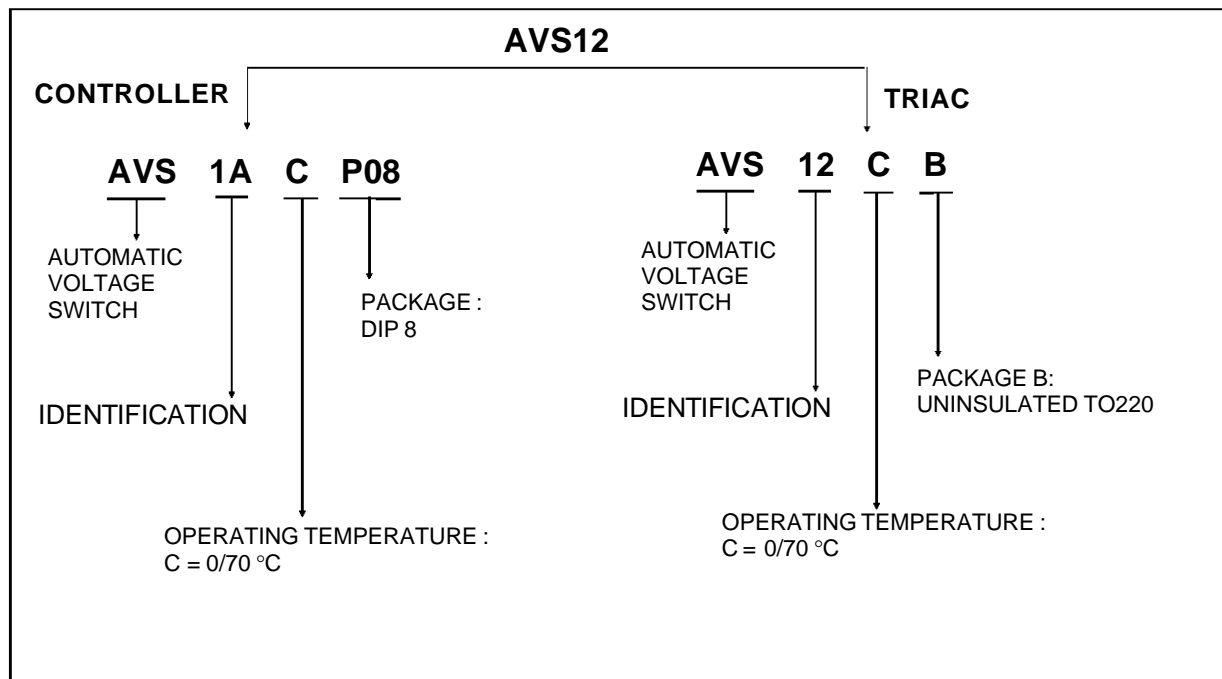
**POWER-ON AND POWER-OFF RESET BEHAVIOUR**



TYPICAL APPLICATION



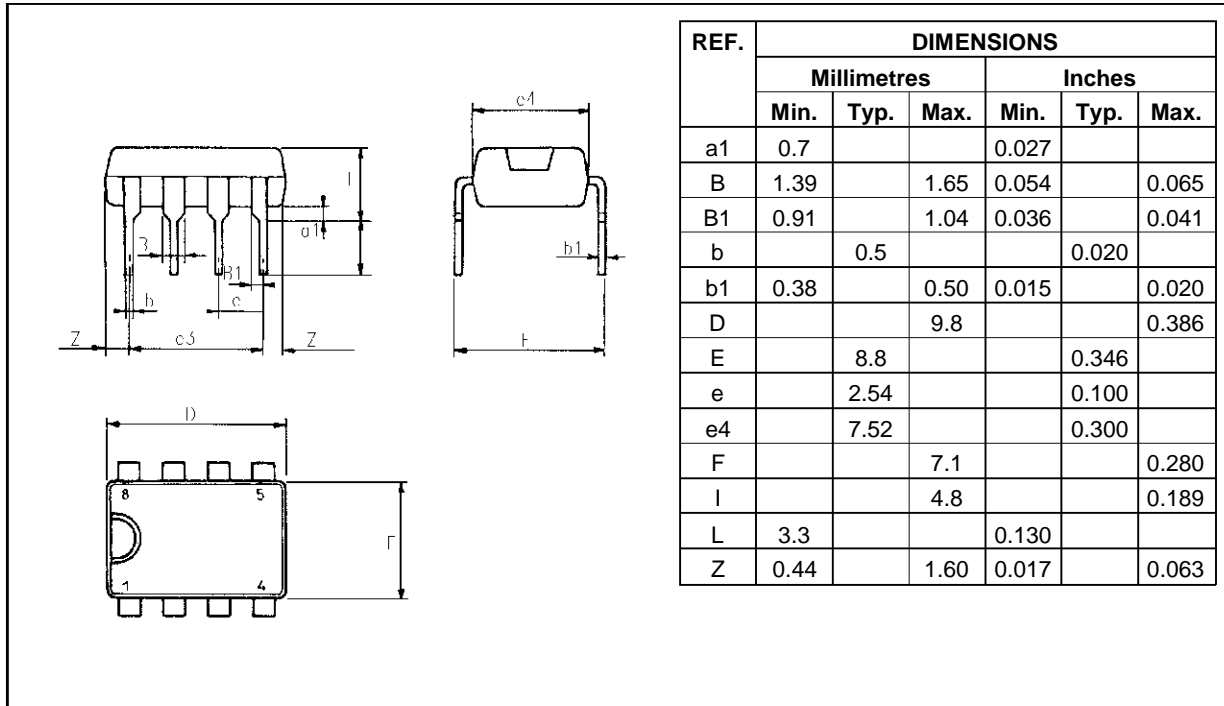
ORDERING INFORMATION



PACKAGE MECHANICAL DATA

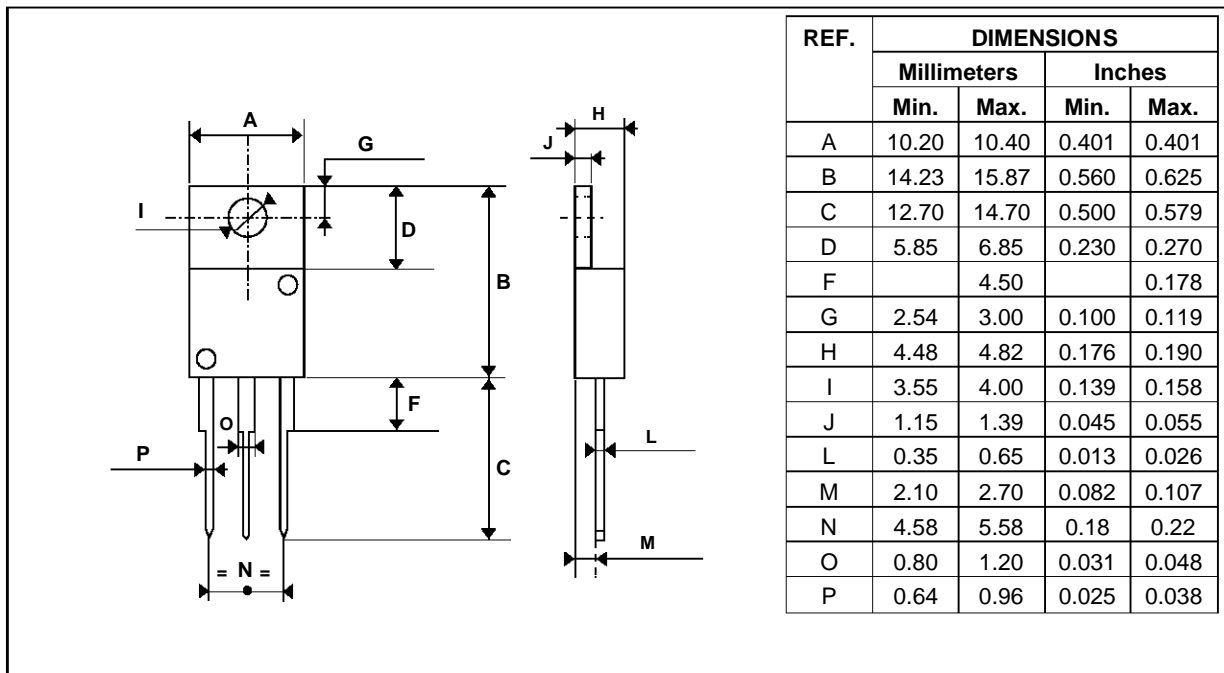
8 PINS - PLASTIC DIP

CONTROLLER



TO220AB (Plastic)

TRIAC



Cooling method : C  
 Marking : Type number  
 Weight : 2.3 g  
 Recommended torque value : 0.8 m.N.  
 Maximum torque value : 1 m.N.

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