

## AUTOMATIC VOLTAGE SWITCH (SMPS < 300W)

### CONTROLLER

- 50/60Hz FULL COMPATIBILITY
- INTEGRATED VOLTAGE REGULATOR
- TRIAC TRIGGERING BY PULSE TRAIN
- HIGH IMMUNITY TO AC DISTURBANCES (SPIKES, MISSING CYCLE)
- HIGH RELIABILITY ON LINE VOLTAGE DETECTION (PARASITIC FILTER ON SIGNAL INPUT)
- FAST DIGITAL START-UP TIME (< 2 LINE CYCLES)
- LOW POWER CONSUMPTION

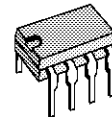
### TRIAC

- HIGH EFFICIENCY AND SAFETY SWITCHING
- UNINSULATED PACKAGE : AVS10CB/AVS100CB
- INSULATED PACKAGE (2500V<sub>RMS</sub>) : AVS10CBI
- V<sub>DRM</sub> = ±600V (AVS10CB), ±800V (AVS100CB)
- I<sub>T(RMS)</sub> : 8A

### DESCRIPTION

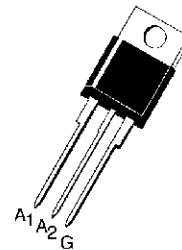
The AVS20 (AVS200) kit is an automatic mains selector (120/230V AC) to be used in SMPS with input power < 300 W. It is composed of 2 devices :

- The **Controller** is optimized for low consumption and high security triggering of the triac. When connected to V<sub>SS</sub>, the **mode** input activates an additional **option** "the **latched** option". If the main power drops from 230V to 120V, the triac control remains locked to the 230V mode and avoids any high voltage spike when the voltage is restored to 230V.  
When connected to V<sub>DD</sub>, the **mode** input desactivates this **option** "this is the **follower** 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 line disturbances.



**P**  
**DIP8**  
(Plastic Package)

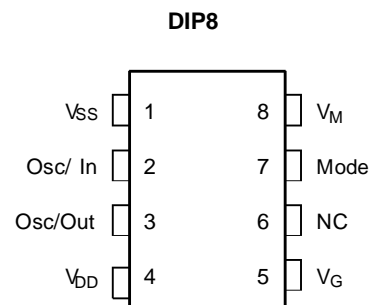
**ORDER CODE : AVS2ACP08**



**B**  
**TO220AB**  
(Plastic Package)

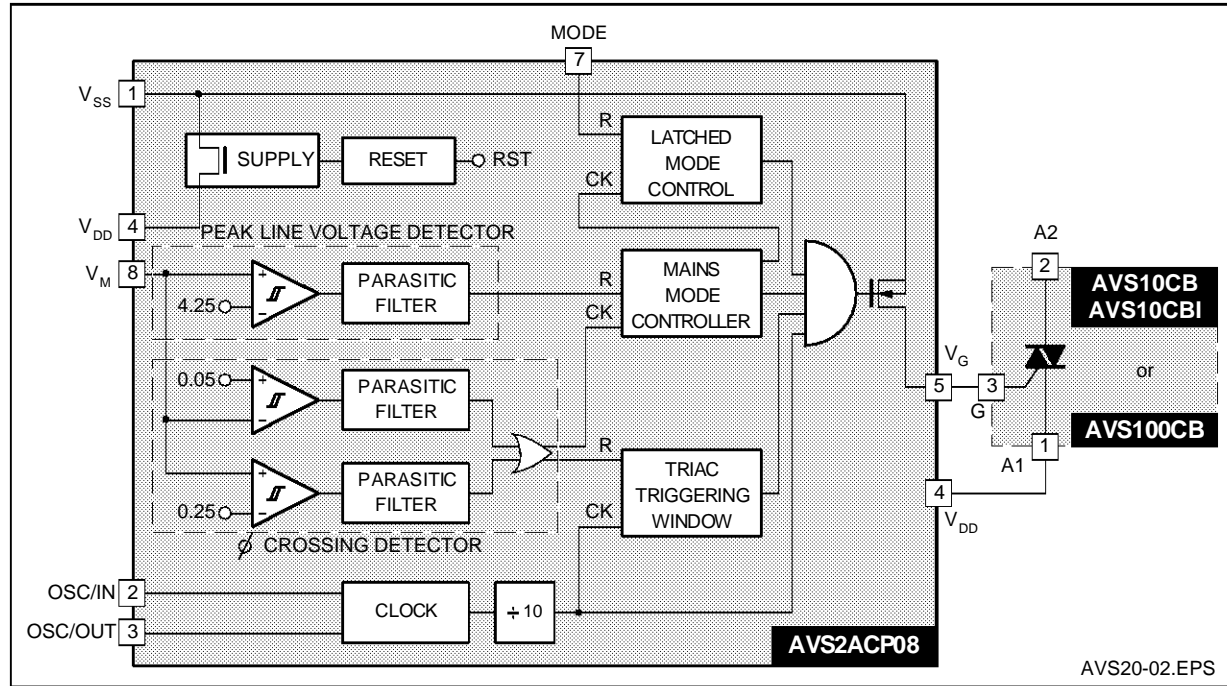
**ORDER CODES : AVS10CB-AVS10CBI-AVS100CB**

### PIN CONNECTIONS



AVS20-01.EPS

**BLOCK DIAGRAM**



AVS20-02.EPS

**ABSOLUTE MAXIMUM RATINGS**

CONTROLLER AVS2ACP08

Symbol	Parameter	Min.	Max.	Unit
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

AVS20-01.TBL

TRIAC AVS10CB / AVS10CBI / AVS100CB T<sub>j</sub> = +25°C (unless otherwise specified)

Symbol	Parameter	Value	Unit
V <sub>DRM</sub>	Repetitive peak off-state voltage (2) AVS10 AVS100	±600 ±800	V V
I <sub>T(RMS)</sub>	RMS on-state current (360° conduction angle) T <sub>C</sub> = 80°C, AVS10CB/AVS100CB T <sub>C</sub> = 70°C, AVS10CBI	8 8	A A
I <sub>TSM</sub>	Non repetitive surge peak on-state current ( T <sub>j</sub> initial = 25°C ) t = 8.3ms t = 10ms	85 80	A A
I <sup>2</sup> t	I <sup>2</sup> t value (t = 10ms)	32	A <sup>2</sup> s
di/dt	Critical rate of rise of on-state current (1) Repetitive f = 50Hz Non Repetitive	20 100	A/μs A/μs
dv/dt (3)	Linear slope up to 400V (Gate open) (T <sub>j</sub> = 70°C) AVS10 AVS100	75 150	V/μs V/μs
T <sub>stg</sub>	Storage Temperature	-40, +150	°C
T <sub>j</sub>	Operating Junction Temperature	0, +110	°C

AVS20-02.TBL

(1) Gate supply : I<sub>G</sub> = 100mA - di/dt = 1A/μs

(2) T<sub>j</sub> = 110°C

(3) For either polarity of electrode A<sub>2</sub> voltage with reference to electrode A<sub>1</sub>

**THERMAL RESISTANCES**

TRIAC AVS10CB / AVS10CBI / AVS100CB

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction-to-ambient	60	°C/W
$R_{th(j-c)}$ DC	Junction-to-case for DC	AVS10CB / AVS100CB 3.5 AVS10CBI 4.4	°C/W °C/W
$R_{th(j-c)}$ AC	Junction-to-case for 360° conduction angle ( f = 50Hz)	AVS10CB / AVS100CB 2.6 AVS10CBI 3.3	°C/W °C/W

AVS20-03.TBL

**DC GENERAL ELECTRICAL CHARACTERISTICS**

TRIAC AVS10CB / AVS10CBI / AVS100CB

Symbol	Parameter	Min.	Max.	Unit
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3k\Omega$ Pulse duration > 20µs ( $T_j = 110^\circ C$ )	0.2		V
$V_{TM}$ (1)	$I_{TM} = 11A$ ( $t_p = 10ms$ , $T_j = 25^\circ C$ )		1.75	V
$I_{DRM}$ (1)	$V_{DRM}$ rated Gate open			
	$T_j = 25^\circ C$ AVS10/AVS100 $T_j = 110^\circ C$ AVS10 $T_j = 700^\circ C$ AVS100		10 500 500	µA µA µA

AVS20-04.TBL

CONTROLLER AVS2ACP08  $T_{oper} = 25^\circ C$  (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
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**MAIN CHARACTERISTICS**

$V_{SS}$ (pin 1) (Vreg)	Shunt Regulator Voltage	- 10	- 9	- 8	V
$I_{SS}$ (pin 1) (Vreg) (@ $V_{SS} = -9V$ )	Supply Current	0.4		30	mA
$I_{SS}$ (pin 1) (@ triac gate non connected)	Quiescent Current		0.6	0.7	mA
F (pin 3) (@ $R = 91k\Omega$ ) (C = 100pF)	Oscillator Frequency	42	44	46	kHz
$V_{PWRON}$ (2)	Power-on-reset Threshold		0.89 Vreg		
$V_{PWROFF}$ (2)	Power-off-reset Threshold		4.6		V
Mode (pin 7)	$V_{IL}$ (2) $V_{IH}$ (2)	0.7 Vreg		0.3 Vreg	
$V_G$ (pin 5)	$V_{OL}$ ( $I_{VG} = 25mA$ ) Leakage Current ( $V_G = V_{DD}$ )			650 + 10	mV µA

**PEAK LINE VOLTAGE DETECTOR**

$V_{SWON}$ (pin 8)	Low Threshold of Trip Point (switching-on of triac triggering) (3)	3.89	4.05	4.22	V
$V_{SWOFF}$ (pin 8)	High Threshold of Trip Point (switching-off of triac triggering) (3)	4.08	4.25	4.42	V
$t_{ON}$ (pin 5)	Triac Turn-on Delay Time ( $V_{AC} = 120V$ )	1		2	Line cycles

**ZERO VOLTAGE CROSSING DETECTOR**

$V_{0CRPH}$ (pin8)	High Threshold on Positive AC Side (3)		250		mV
$V_{0CRPL}$ (pin8)	Low Threshold on Positive AC Side (3) (4)		200		mV
$V_{0CRNH}$ (pin8)	High Threshold on Negative AC Side (3)		100		mV
$V_{0CRNL}$ (pin8)	Low Threshold on Negative AC Side (3) (4)		60		mV

AVS20-05.TBL

**NOTES :**

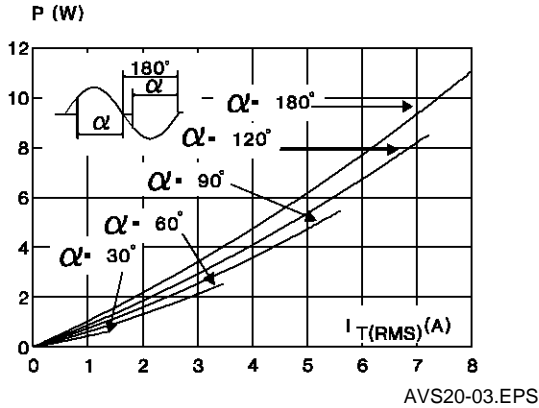
(1) : For either polarity of electrode  $A_2$  voltage with reference to electrode  $A_1$ .

(2) : Voltage referred to  $V_{DD}$ .

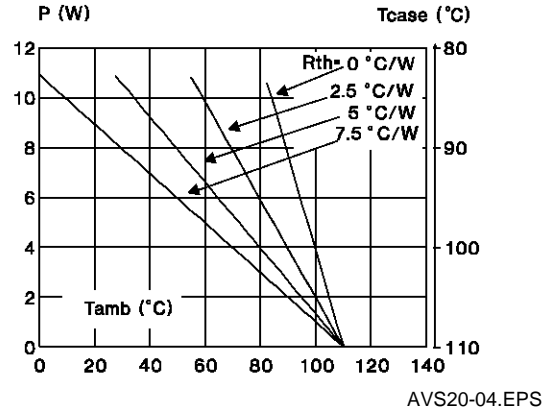
(3) : Voltage referred to  $V_{SS}$ .

(4) : These values give a typical noise immunity on the zero-crossing detection of  $100mV \times \frac{1018}{18} = 5.65V$  on the mains supply.

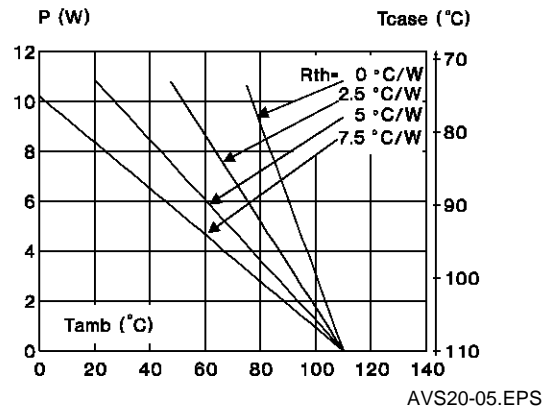
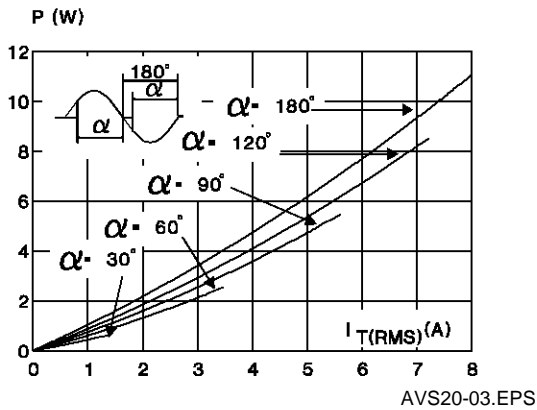
**Figure 1 :** Maximum RMS power dissipation versus RMS on-state current (f=60Hz) (Curves are cut-off (di/dt)<sub>c</sub> limitation)



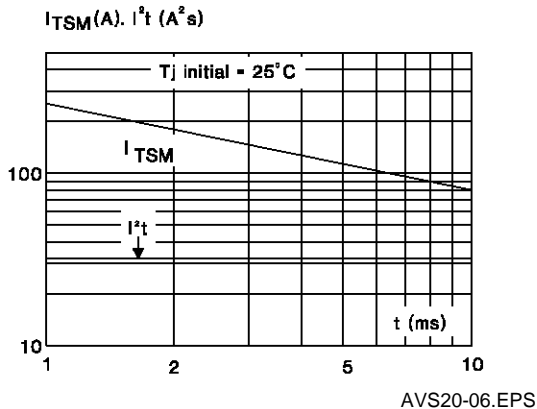
**Figure 2a :** Correlation between maximum mean power dissipation and maximum allowable temperatures (T<sub>A</sub> and T<sub>C</sub>) for different thermal resistances heatsink + contact (AVS10CB/AVS100CB)



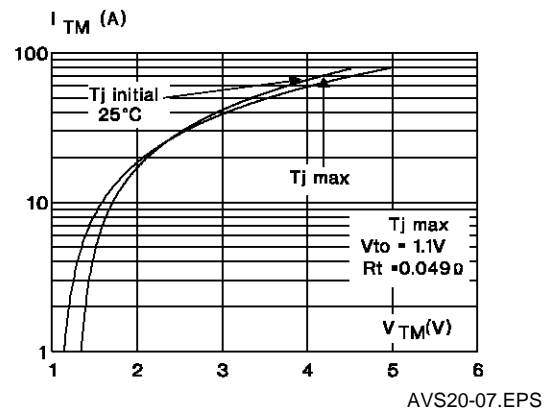
**Figure 2b :** Correlation between maximum mean power dissipation and maximum allowable temperatures (T<sub>A</sub> and T<sub>C</sub>) for different thermal resistances heatsink + contact (AVS10CBI)



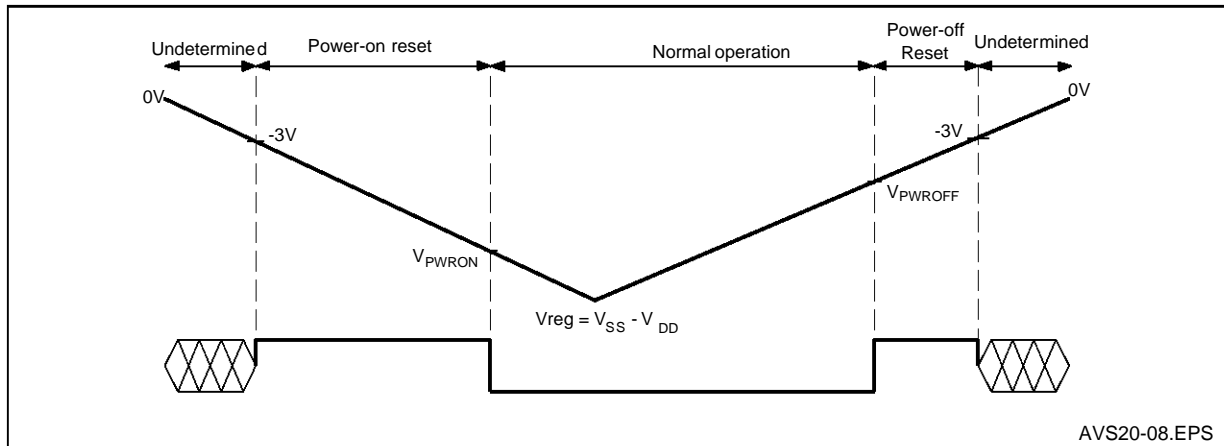
**Figure 3 :** Non-repetitive surge peak on-state current for a sinusoidal pulse with width : t ≤ 10ms, and corresponding value of I<sup>2</sup>t.



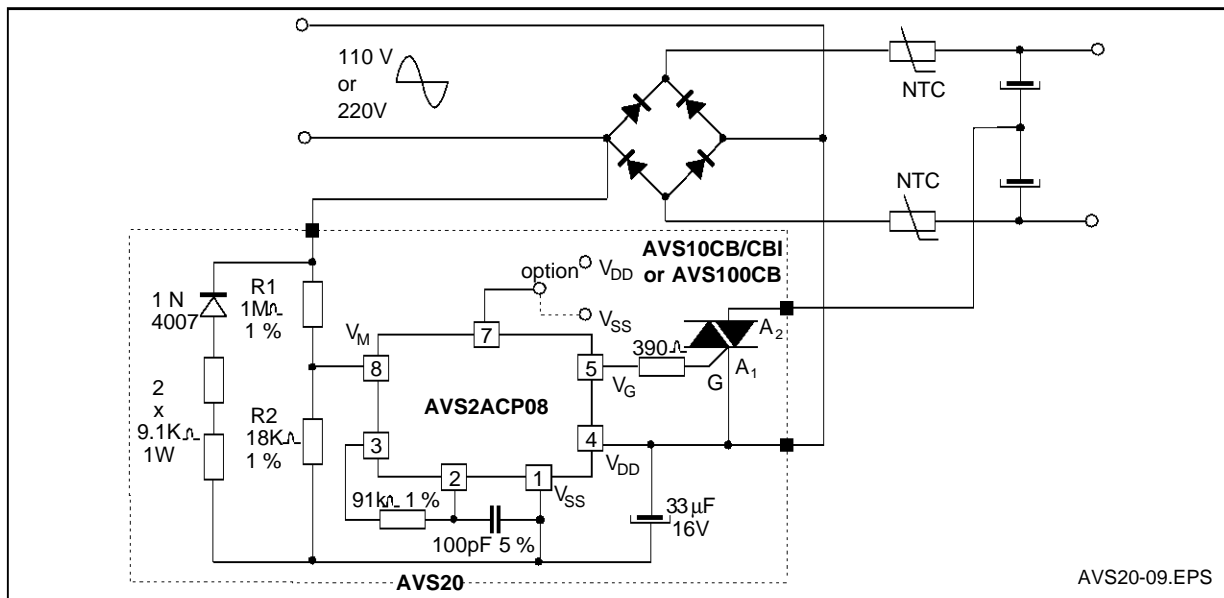
**Figure 4 :** On-state characteristics (maximum values).



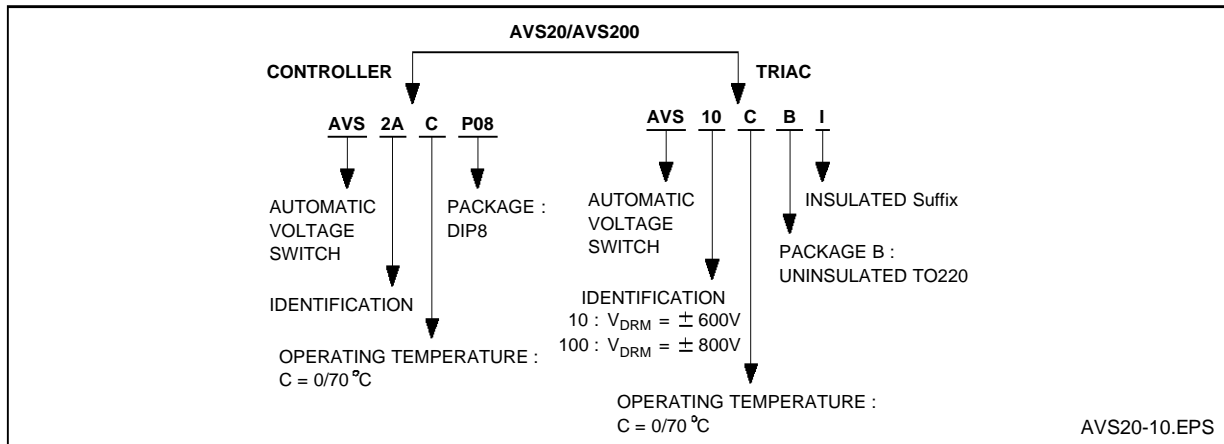
POWER-ON AND POWER-OFF RESET BEHAVIOUR



TYPICAL APPLICATION DIAGRAM

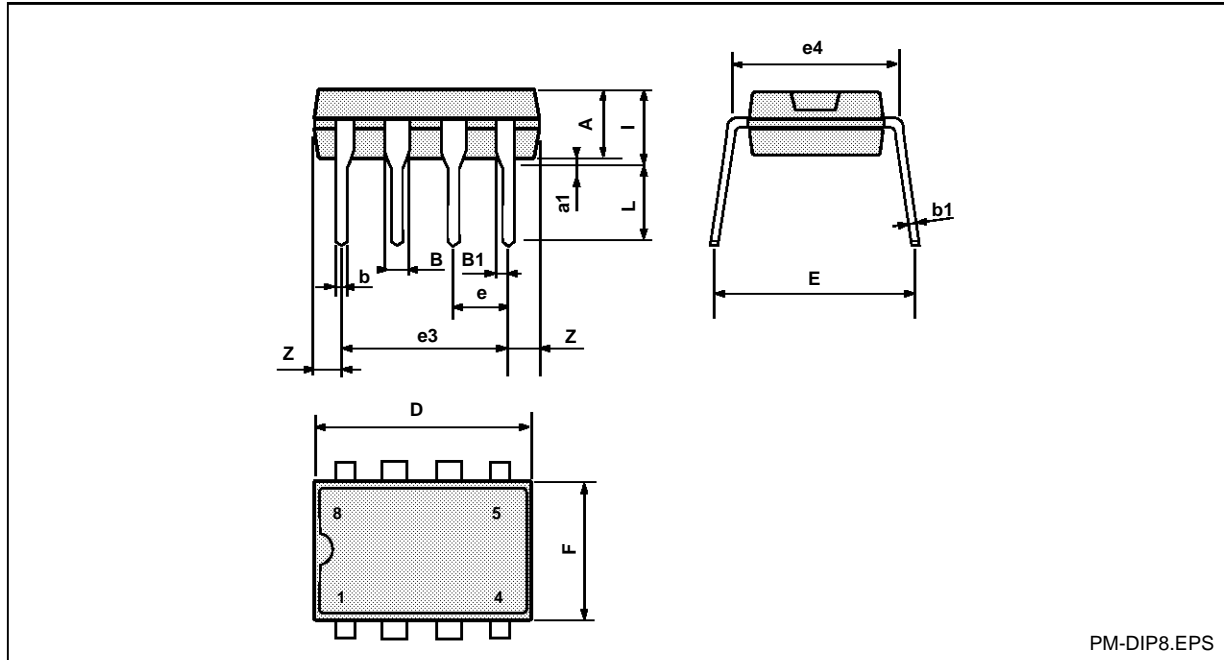


ORDERING INFORMATION



PACKAGE MECHANICAL DATA

CONTROLLER  
8 PINS - PLASTIC DIP



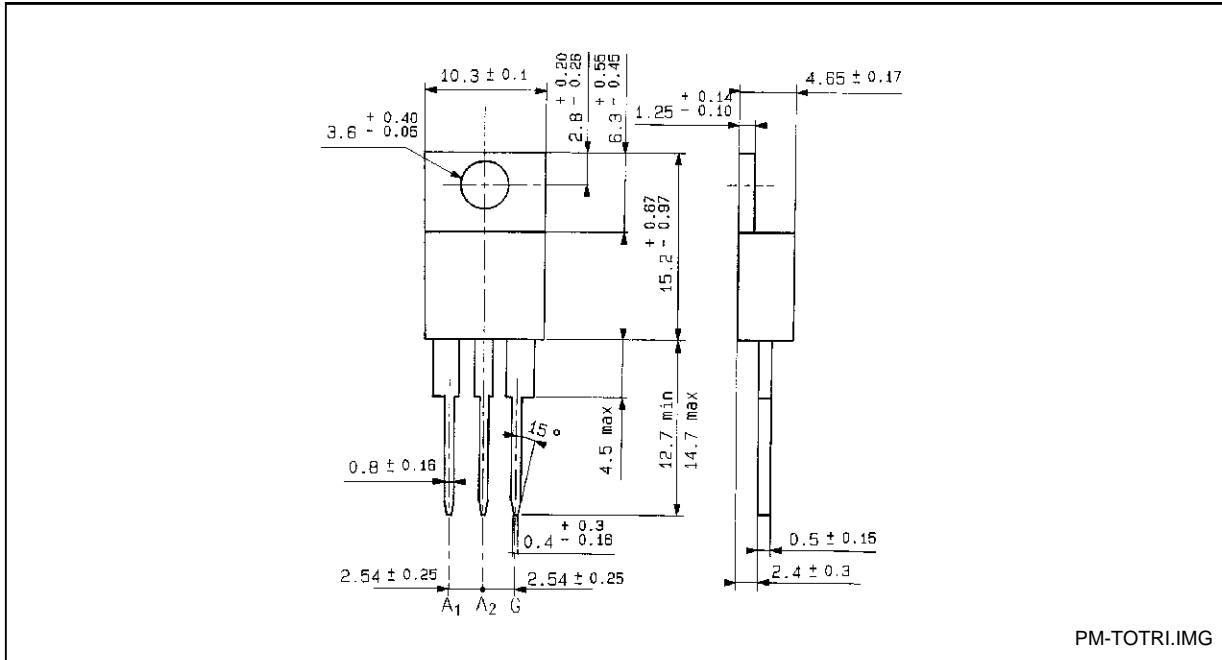
Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

PACKAGE MECHANICAL DATA

TRIAC

3 PINS - PLASTIC TO220AB



Cooling method : by conduction (method C)

Weight : 2 g

## AVS20 - AVS200

### NOTES:

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