THOMSON-CSF
DIVISION SEMICONDUCTEURS DISCRETS

ESM 243-50, (R)
ESM 243-400, (R)

SUPERSWITCH

FAST RECOVERY RECTIFIER DIODES
DIODES DE REDRESSEMENT RAPIDES

59C 02309 D T-03-21

FAST RECOVERY SUPERSWITCH RECTIFIERS

* VERY FAST RECOVERY TIME
* VERY LOW RECOVERED CHARGE
* VERY LOW FORWARD RECOVERY TIME

APPLICATIONS
- High frequency choppers
- DC and AC motor control
- Switchmode power supply

** TRES FAIBLE TEMPS DE RECOUVREMENT*
** TRES FAIBLE CHARGE RECOUVRÉE*
** TRES FAIBLE TEMPS D'ÉTABLISSEMENT*

APPLICATIONS
- *Hâcheurs à fréquence élevée*
- *Commandes de moteurs continus et alternatifs*
- *Alimentation à découpage*

V_{RRM}	50 → 400 V
$I_{F(AV)}$ (T_{case} 90°C)	60 A
t_{rr} (max)	100 ns

Case / Boîtier : DO 5 (CB 34)

Type number : Cathode is connected to case
Type number + suffix R : anode is connected to case

ABSOLUTE RATINGS (LIMITING VALUES) / VALEURS LIMITES ABSOLUES D'UTILISATION		ESM 243 50, (R)	ESM 243 100, (R)	ESM 243 200, (R)	ESM 243 300, (R)	ESM 243 400, (R)	
DC reverse voltage *Tension inverse continue*	V_R	50	100	200	300	400	V
Peak reverse voltage *Tension inverse de crête*	V_{RWM}	50	100	200	300	400	V
Repetitive peak reverse voltage *Tension inverse de pointe répétitive*	V_{RRM}	50	100	200	300	400	V
Average forward current (1) (T_{case} 90°C, $\delta = 0,5$) *Courant direct moyen (1)*	$I_{F(AV)}$	60	60	60	60	60	A
Peak one cycle surge current (sinusoidal t_p 10 ms) *Courant direct non répétitif de surcharge accidentelle*	I_{FSM} I^2t	800 3200	800 3200	800 3200	800 3200	800 3200	A A^2s
Junction temperature *Température de jonction*	$T_{(vj)}$	−65 +165	−65 +165	−65 +165	−65 +165	−65 +165	°C

Junction-case thermal resistance *Résistance thermique jonction boîtier*	max	$R_{th(j-c)}$	0,7	0,7	0,7	0,7	0,7	°C/W

(1) See figure 3.
(1) Voir figure 3.

50, rue Jean-Pierre Timbaud - B.P. 5
F - 92403 Courbevoie Cedex FRANCE
Tél. : (1) 788-50-01 Telex : 610560 F

THOMSON COMPOSANTS

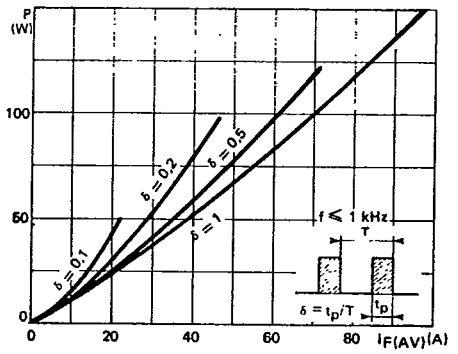
ESM 243 - 50
ESM 243 - 400

59C 02310 D T-03-21

ELECTRICAL CHARACTERISTICS *CARACTERISTIQUES ELECTRIQUES*	Test conditions *Conditions de mesure*		typ	max	
Maximum reverse current *Courant inverse de fuite*	$V = V_{RWM}$ $T_{(vj)} = 100\ ^oC$	I_R		10	mA
Forward voltage drop *Chute de tension directe*	$I_F = 60\ A$ $T_{(vj)} = 25\ ^oC$ $I_F = 60\ A$ $T_{(vj)} = 100^oC$	V_F	1,2	1,5	V
Forward recovery time *Temps d'établissement*	$I_F = 60\ A$ $dI_F/dt = 60\ A/\mu s$	t_{fr}	50		ns

RECOVERY CHARACTERISTICS See figures from 11 to 17. *CARACTERISTIQUES DE RECOUVREMENT Voir figures 11 à 17.* $T_{(vj)}$ 25 °C					
Reverse recovery time *Temps de recouvrement inverse*	JEDEC method *Méthode JEDEC* $I_F = 1\ A$ $V_R = 30\ V$ $dI_F/dt \# 15\ A/\mu s$	t_{rr}		100	ns
Maximum reverse recovery current *Courant inverse maximal de recouvrement*		I_{RM}		1,5	A
Rate of decrease of recovery current *Vitesse d'extinction du courant de recouvrement*		di_{rr}/dt	70		A/µs
		Q_R		0,075	µC
Recovered charge *Charge recouvrée*	Pulse method See figures from 11 to 17 *Méthode impulsionnelle* *Voir figures 11 à 17* $I_F = 60\ A$ $dI_F/dt = 50\ A/\mu s$	Q_R	0,25		µC

FIGURE 1



Low frequency power losses versus average current

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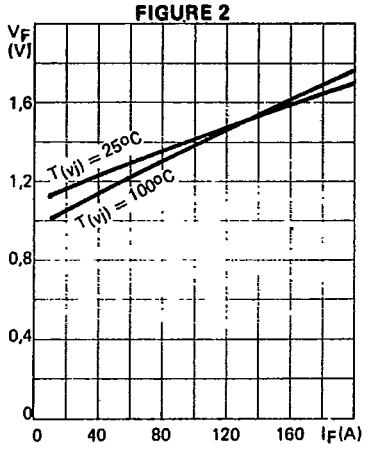
FORWARD CHARACTERISTICS
CARACTÉRISTIQUES DIRECTES

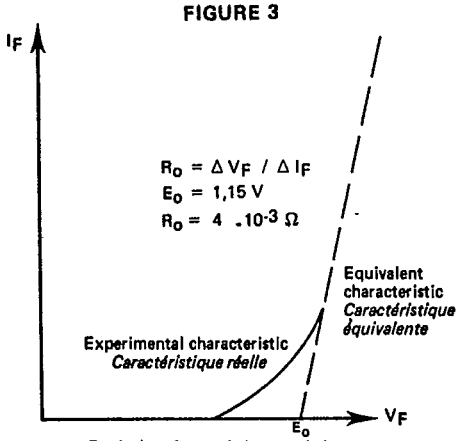
FIGURE 2



Typical values
Forward voltage drop vs forward current

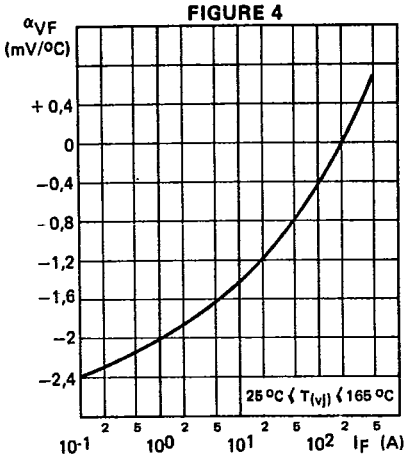
Valeurs typiques
Chute de tension directe en fonction du courant direct

FIGURE 3



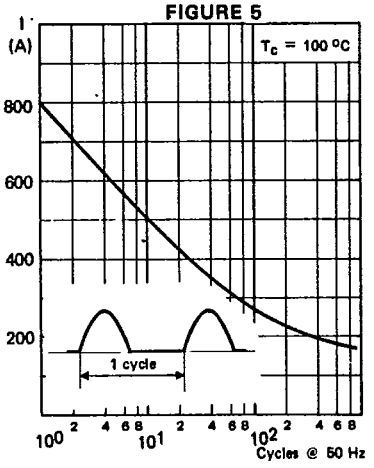
Equivalent forward characteristic
For the purpose of calculating power losses, the forward characteristic can be approximated by the linear curve
Caractéristique directe équivalente
Pour le calcul des pertes de puissance, la caractéristique directe de la diode est assimilable à la droite :
$V_F = E_o + R_o I$ at $T_{(vj)} = 100\ °C$

FIGURE 4



Typical values
Forward voltage drop variation with temperature vs. forward current
Variation de la chute de tension directe avec la température en fonction du courant direct

FIGURE 5



Limiting values - Accidental peak surge current vs. cycles applied at 50 Hz
Valeurs limites - Courant crête de surcharge accidentelle en fonction du nombre de cycles appliqués à 50 Hz.

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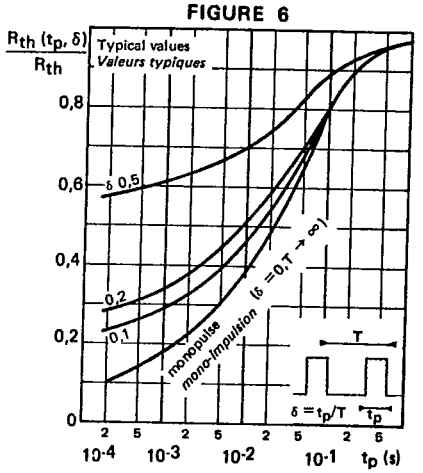
TRANSIENT THERMAL CHARACTERISTICS
CARACTÉRISTIQUES THERMIQUES TRANSITOIRES

FIGURE 6



Change in apparent junction to case thermal impedance $R_{th}(t_p, \delta)$ vs. pulse width (t_p) and duty cycle (δ)

Variation relative de l'impédance thermique apparente jonction-boitier $R_{th}(t_p, \delta)$ en fonction de la durée d'impulsion t_p et du rapport cyclique δ

REVERSE RECOVERY TIME (TYPICAL VALUES)
TEMPS DE RECOUVREMENT INVERSE (VALEURS TYPIQUES)

FIGURE 7

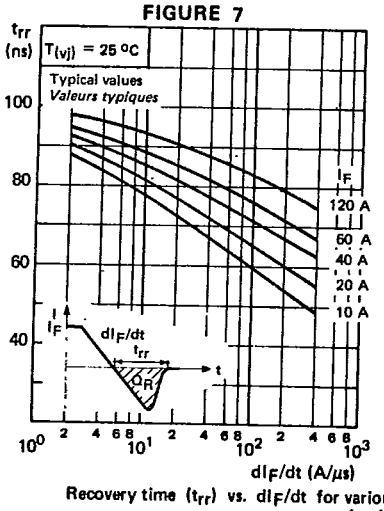
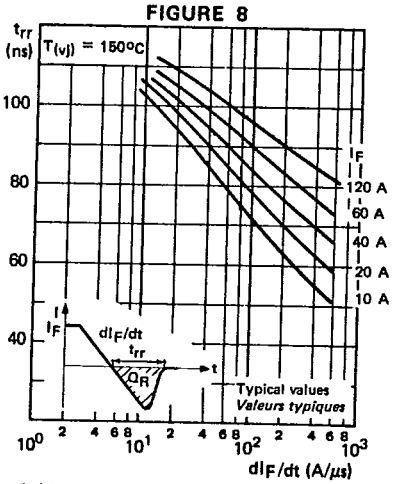


FIGURE 8



Recovery time (t_{rr}) vs. dI_F/dt for various current levels (the reverse current is not circuit limited)

Temps de recouvrement (t_{rr}) en fonction de dI_F/dt à différents niveaux de courant I_F (le courant inverse n'est pas limité par le circuit)

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RECOVERED CHARGE (MAXIMUM VALUES)
CHARGE RECOUVRÉE (VALEURS MAXIMALES)

FIGURE 9

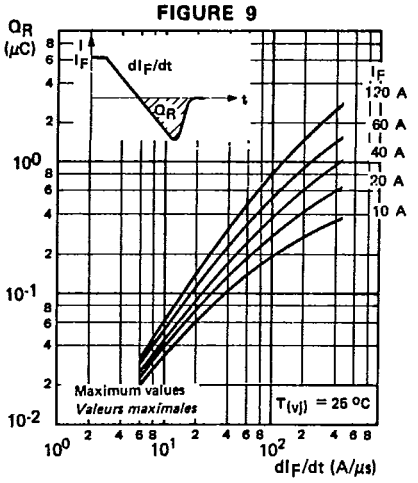
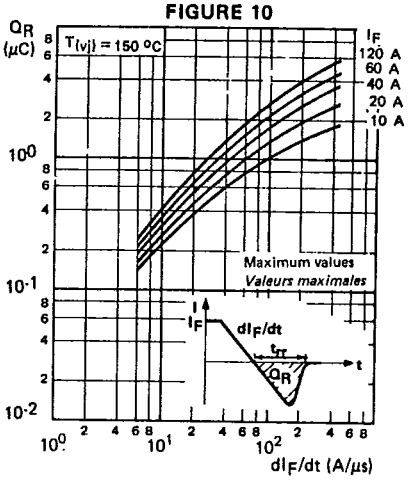


FIGURE 10



RECOVERED CHARGE (TYPICAL VALUES)
CHARGE RECOUVRÉE (VALEURS TYPIQUES)

FIGURE 11

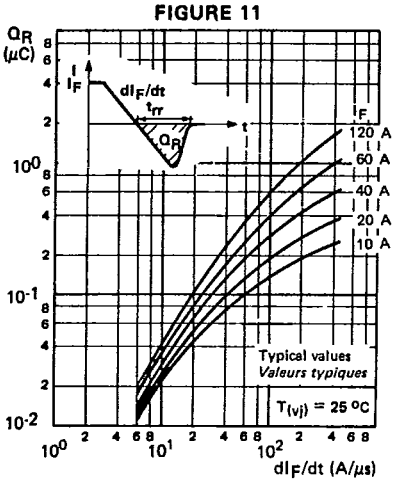
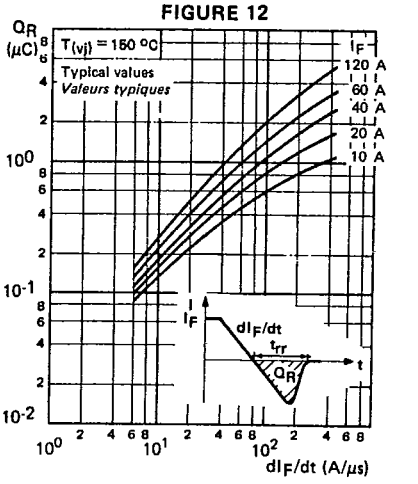


FIGURE 12



Recovered charge Q_R versus dI_F/dt for various current levels I_F at $T_{(vj)}$ 25 and 150 °C. Recovered charge is a linear function of temperature. An interpolation allows the Q_R calculation within the limits 25 - 150 °C.
Charge recouvrée Q_R en fonction de dI_F/dt à différents niveaux de courant I_F et $T_{(vj)}$ 25 et 150 °C. Q_R varie linéairement avec la température. Une interpolation permet le calcul de Q_R entre 25 et 150 °C.

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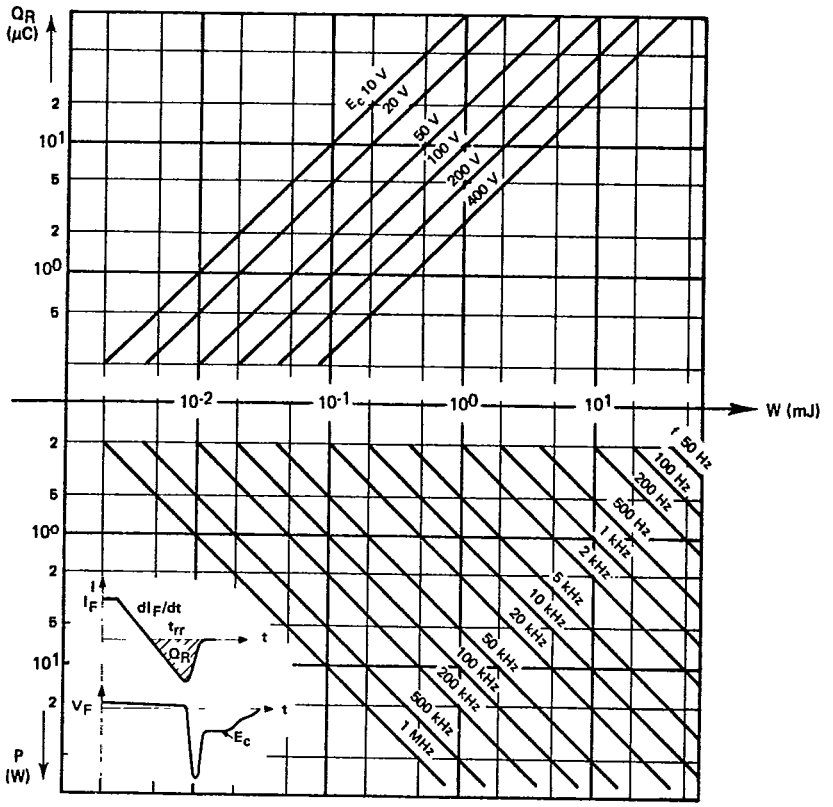
RECOVERY CHARACTERISTICS
CARACTÉRISTIQUES DE RECOUVREMENT

FIGURE 13



Recovery switching losses vs. recovered charge (Q_R) for various reverse voltages (E_c) applied to various frequencies

Pertes de commutation de recouvrement en fonction de la charge recouvrée Q_R pour différentes tensions inverses appliquées E_c et à différentes fréquences de fonctionnement.

$$P = Q_R \times E_c \times f$$

Recovered charge	Q_R	*Charge recouvrée*
Reverse voltage applied to the diode just after transient state	E_c	*Tension inverse appliquée à la diode juste après le régime transitoire*
Recovery phenomenon frequency	f	*Fréquence du phénomène de recouvrement*
Dissipated energy during each switching	W	*Energie dissipée à chaque commutation*

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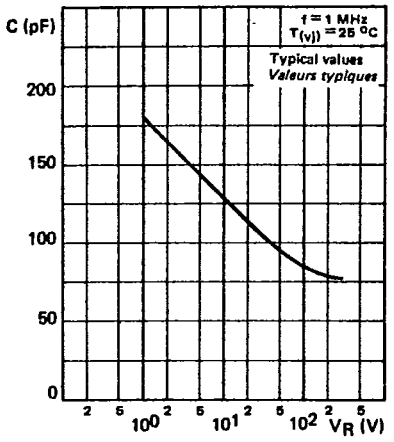
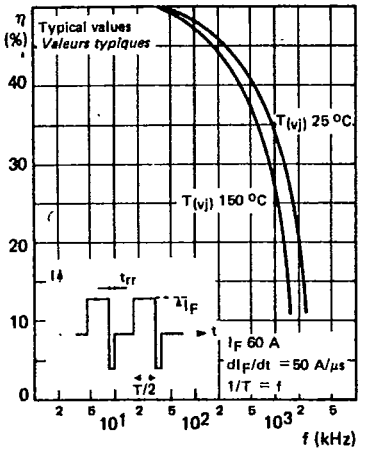
FIGURE 14



Capacitance (C) vs. reverse voltage (V_R) applied

Capacité C en fonction de la tension inverse V_R appliquée

FIGURE 15

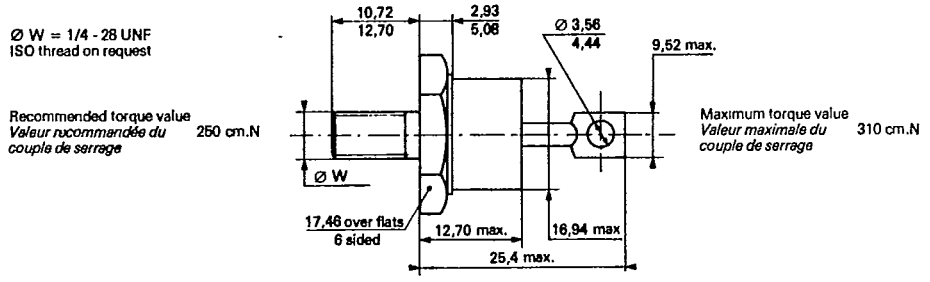


Rectifying efficiency (η) vs. frequency

$$\eta = \frac{I^2 \text{ mov}}{I^2 \text{ eff}} \times 100$$

Efficacité de redressement η en fonction de la fréquence

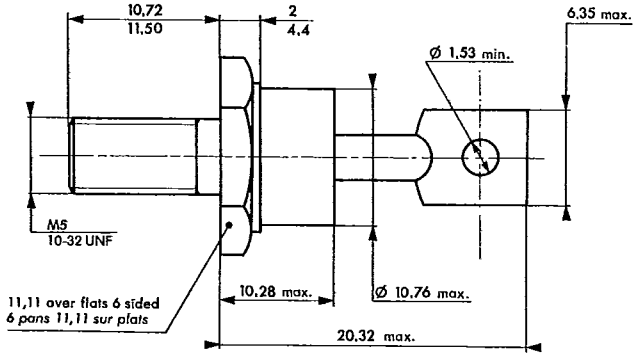
CASE OUTLINE



DO-5 (CB-34)

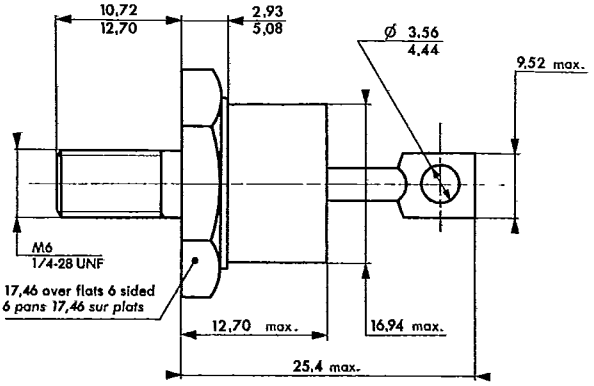
DO 4 (CB-33)

CB-33 M → Ø W = M 5
U → Ø W = 10-32 UNF

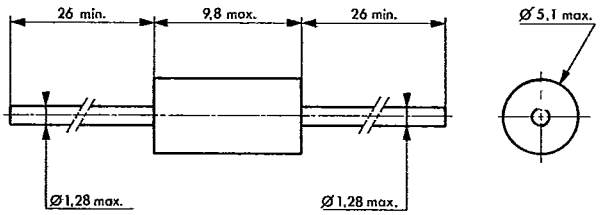


DO 5 (CB-34)

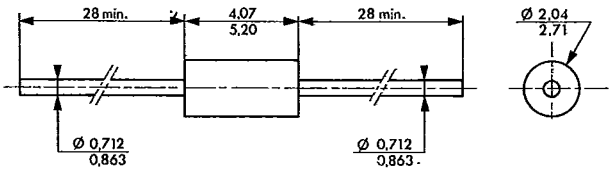
CB-34 M → Ø W = M 6
U → Ø W = 1/4-28 UNF



DO 27 A (CB-197)

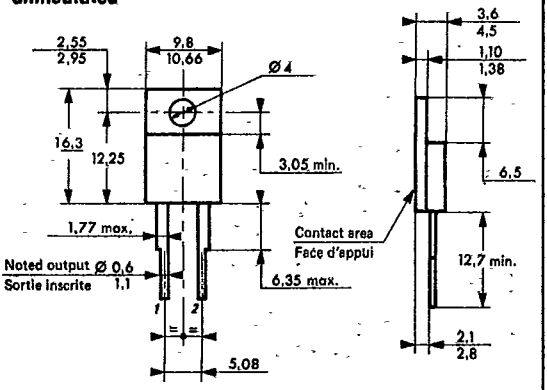


DO 41 (CB-101)

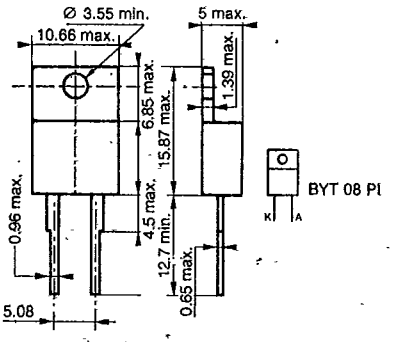


0839 D-08

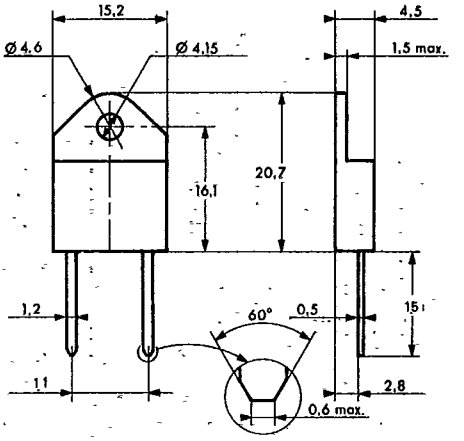
DO 220 AB (CB-227)
uninsulated



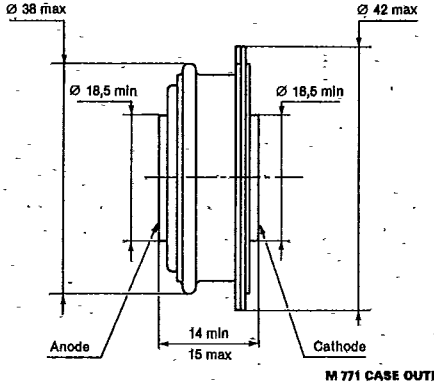
DO 220 AB (CB-426)
insulated



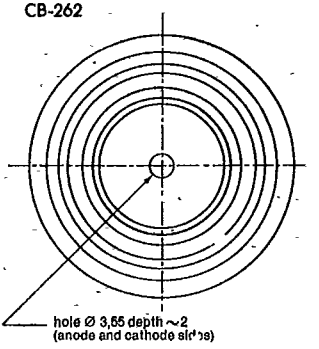
DOP 3 (CB-425)



M 771
(CB-262)

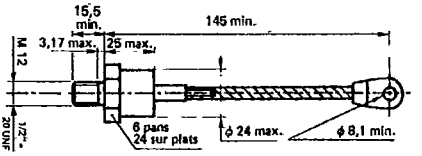


CB-262

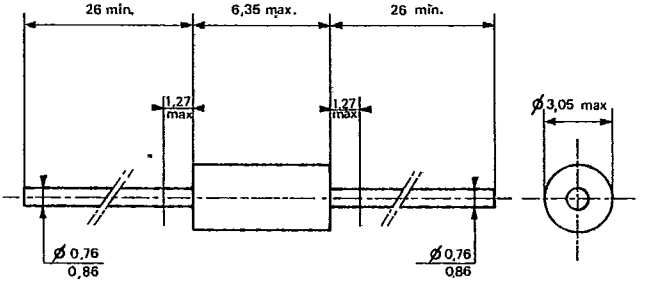


M 771 CASE OUTLINE

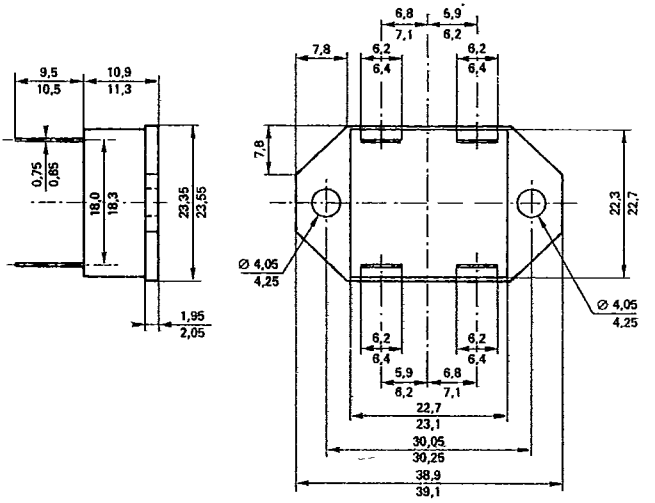
F62 m (CB-252)



F 126 (CB-210)



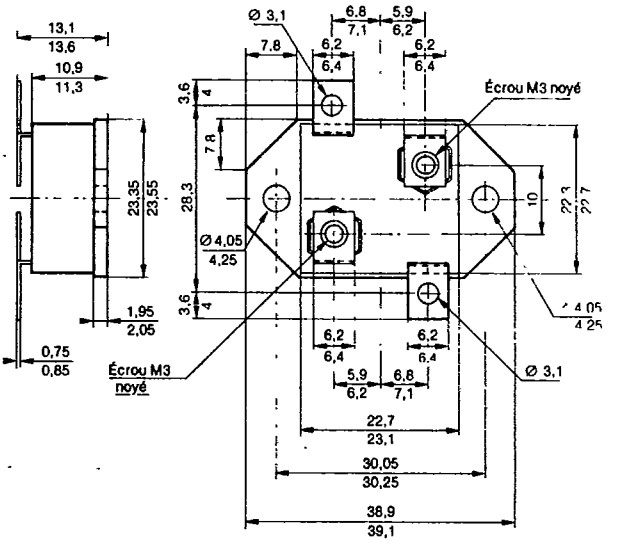
CB-427



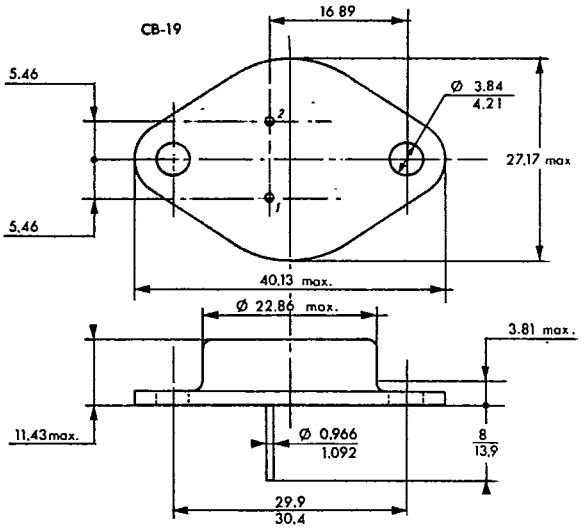
Marking : clear
Marquage : en clair

Note : Pin 3 may be omitted
La broche 3 peut être omise

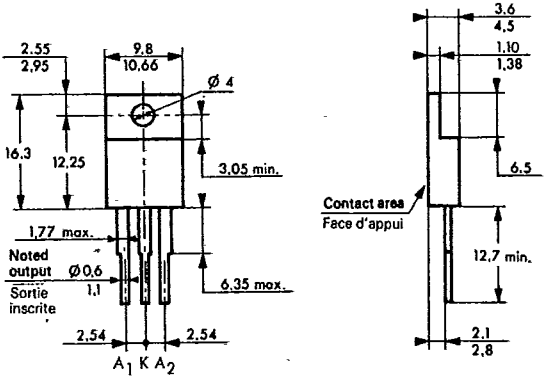
CB-434



TO 3 modified (CB-19)



TO 220 AB (CB-428)
for duo-diodes



CB-244 (TOP 3 - TO 218)