

THOMSON-CSF
DIVISION SEMICONDUCTEURS DISCRETS

SUPERSWITCH

ESM 243-50, (R)
ESM 243-400, (R)
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 RECOUVREE
- * TRES FAIBLE TEMPS D'ETABLISSEMENT

APPLICATIONS

- Hacheurs à fréquence élevée
- Commandes de moteurs continus et alternatifs
- Alimentation à découpage

VRRM 50 → 400 V

I_{F(AV)} (T_{case} 90°C) 60 At_{rr} (max) 100 nsCase DO 5 (CB 34)
Boîtier

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

ABSOLUTE RATINGS (LIMITING VALUES) VALEURS LIMITEES 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 <i>Tension inverse continue</i>	V _R	50	100	200	300	400	V
Peak reverse voltage <i>Tension inverse de crête</i>	V _{RWM}	50	100	200	300	400	V
Repetitive peak reverse voltage <i>Tension inverse de pointe répétitive</i>	V _{RRM}	50	100	200	300	400	V
Average forward current (1) <i>Courant direct moyen (1)</i>	I _{F(AV)}	60	60	60	60	60	A
Peak one cycle surge current (sinusoidal t _p 10 ms) <i>Courant direct non répétitif de surcharge accidentelle</i>	I _{FSM} I _{2t}	800 3200	800 3200	800 3200	800 3200	800 3200	A A ² s
Junction temperature <i>Température de jonction</i>	T _(vj)	- 65 + 165	- 65 + 165	- 65 + 165	- 65 + 165	- 65 + 165	°C

Junction-case thermal resistance <i>Résistance thermique jonction boîtier</i> max	R _{th(j-c)}	0,7	0,7	0,7	0,7	0,7	°C/W
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(1) See figure 3,
(1) Voir figure 3,

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July 1983 1/7

THOMSON
COMPOSANTS

ESM 243 - 50
ESM 243 - 400

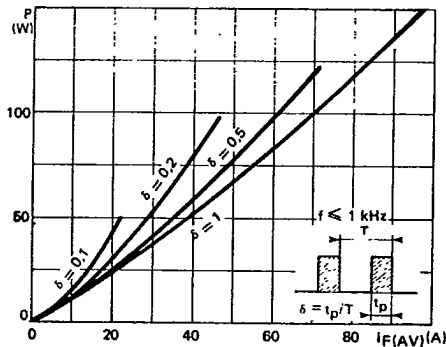
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ELECTRICAL CHARACTERISTICS CARACTERISTIQUES ELECTRIQUES	Test conditions Conditions de mesure		typ max
Maximum reverse current Courant inverse de fuite	$V = V_{RWM}$ $T_{(vj)} = 100\text{ }^\circ\text{C}$	I_R	10 mA
Forward voltage drop Chute de tension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

RECOVERY CHARACTERISTICS See figures from 11 to 17.
CARACTERISTIQUES DE RECOUVREMENT Voir figures 11 à 17. $T_{(vj)} 25\text{ }^\circ\text{C}$

Reverse recovery time Temps de recouvrement inverse	JEDEC method Méthode JEDEC $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt \# 15\text{ A}/\mu\text{s}$	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 $I_F = 60\text{ A}$ $di_F/dt = 50\text{ A}/\mu\text{s}$	Q_R	0,25 μC

FIGURE 1



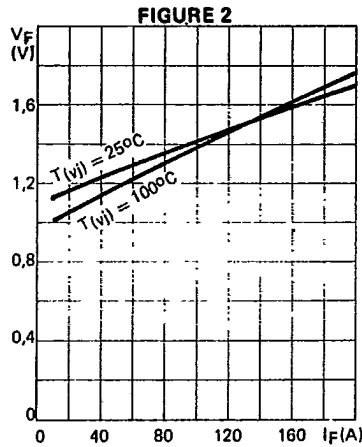
Low frequency power losses versus average current

ESM 243 - 50

ESM 243 - 400

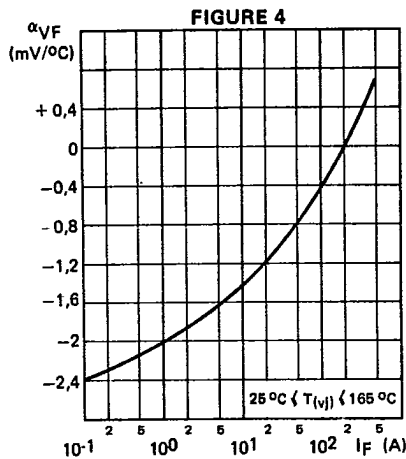
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FORWARD CHARACTERISTICS
CARACTÉRISTIQUES DIRECTES

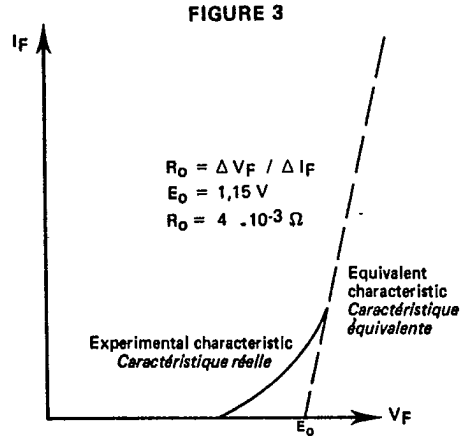


Typical values
Forward voltage drop vs forward current

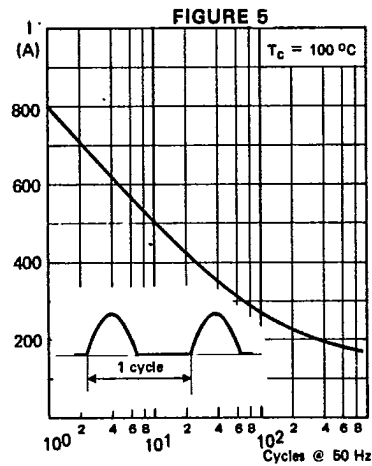
Valeurs typiques
Chute de tension directe en fonction du courant direct



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



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 :
 $V_F = E_0 + R_o I_F$ at $T(v_j) = 100^\circ\text{C}$



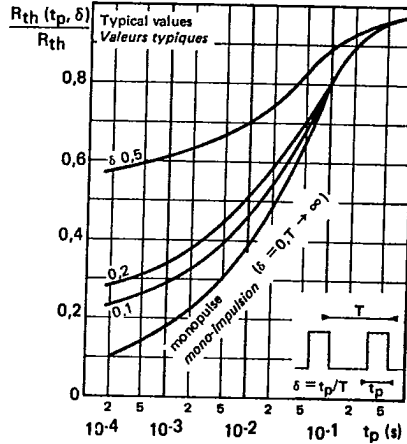
Limiting values - Accidental peak surge current vs. cycles applied at 50 Hz
Valeurs limites - Courant crête de surcharge accidentelle en fonction du nombre de cycles appliqués à 50 Hz.

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TRANSIENT THERMAL CHARACTERISTICS
CARACTERISTIQUES THERMIQUES TRANSITOIRES

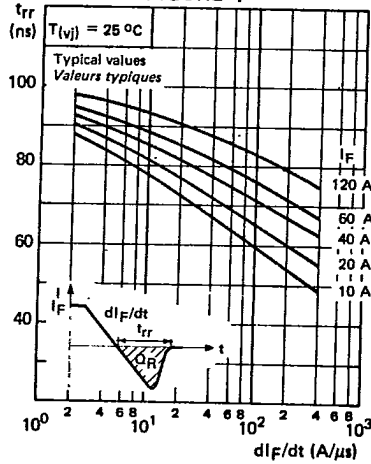
FIGURE 6



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-boîtier $R_{th}(t_p, \delta)$ en fonction de la durée d'impulsion t_p et du rapport cyclique δ

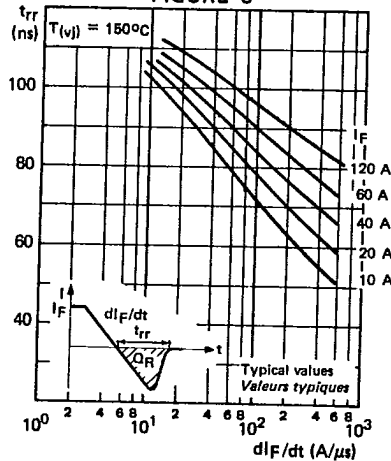
REVERSE RECOVERY TIME (TYPICAL VALUES)
TEMPS DE RECOUVREMENT INVERSE (VALEURS TYPIQUES)

FIGURE 7



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)

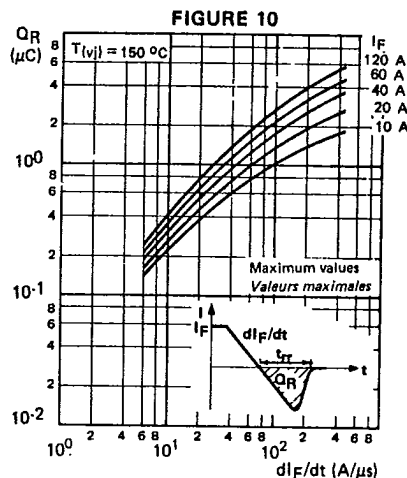
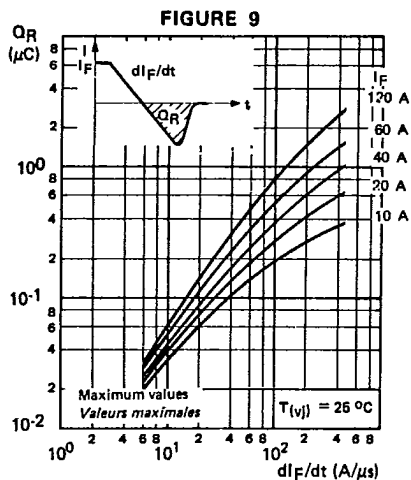
FIGURE 8



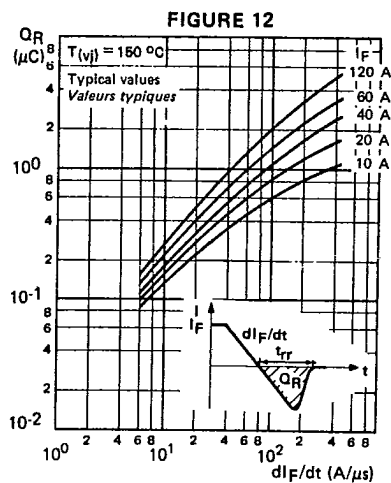
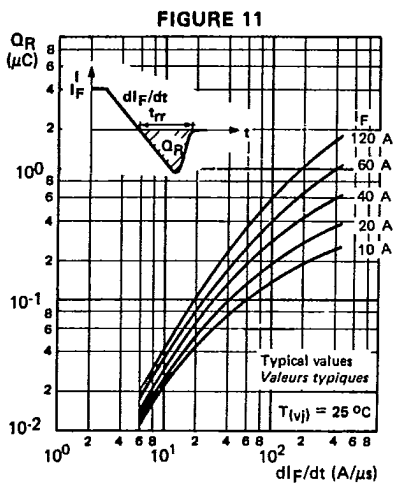
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RECOVERED CHARGE (MAXIMUM VALUES)
CHARGE RECOUVRÉE (VALEURS MAXIMALES)



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



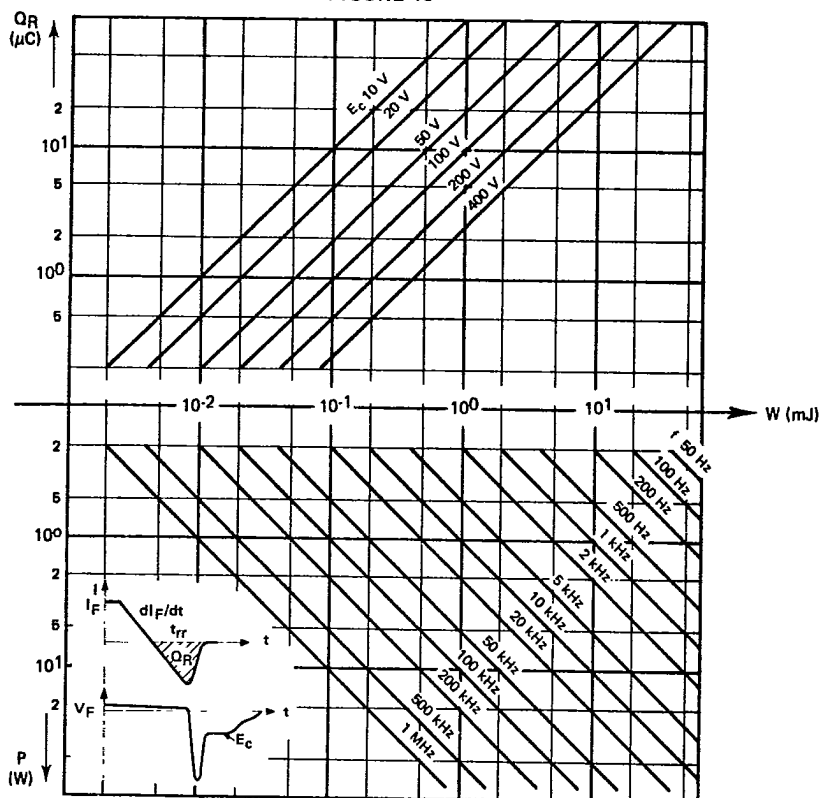
Recovered charge Q_R versus dI_F/dt for various current levels I_F at $T(v_j)$ 25 and 150 °C. Recovered charge is a linear function of temperature. An interpolation allows the Q_R calculation within the limits 25 - 150 °C.
Charge recouvrée Q_R en fonction de dI_F/dt à différents niveaux de courant I_F et $T(v_j)$ 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.

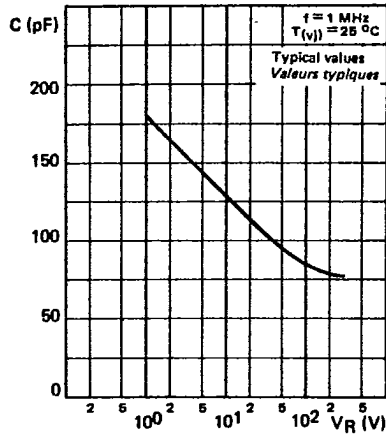
$$P = Q_R \times E_C \times f$$

- 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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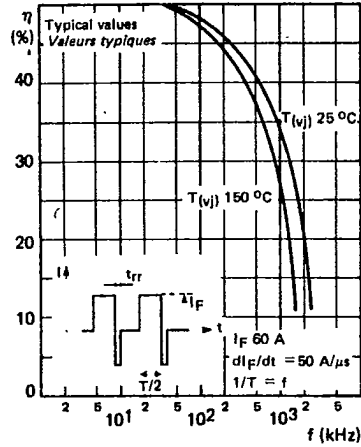
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FIGURE 14



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

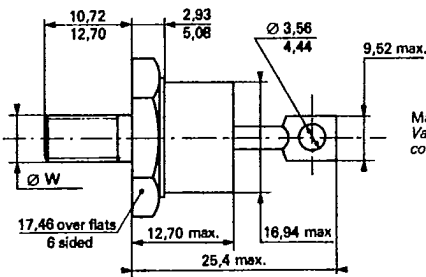
$$\eta = \frac{I_{2\text{ mov}}}{I_{2\text{ off}}} \times 100$$

Efficacité de redressement η en fonction de la fréquence

CASE OUTLINE

$\varnothing W = 1/4 - 28 \text{ UNF}$
ISO thread on request

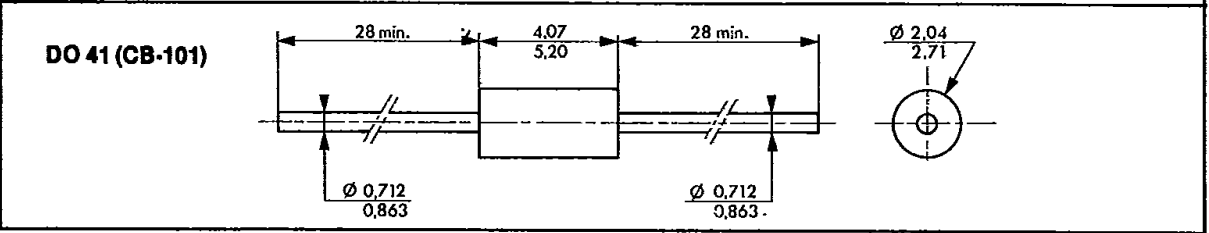
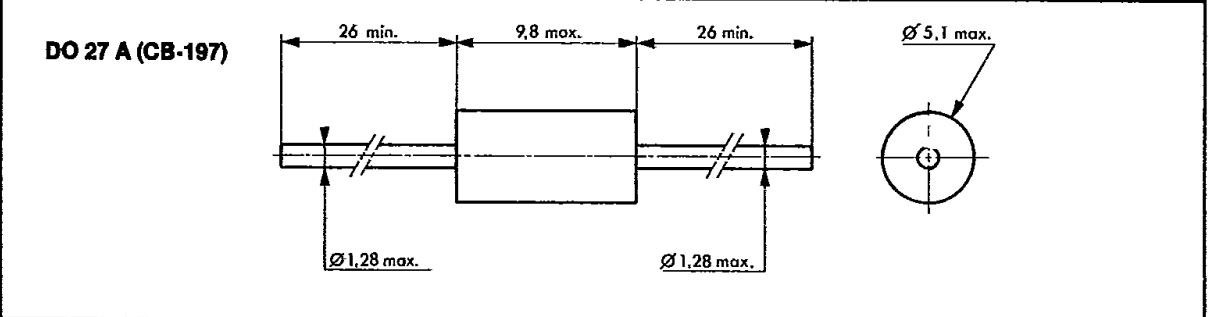
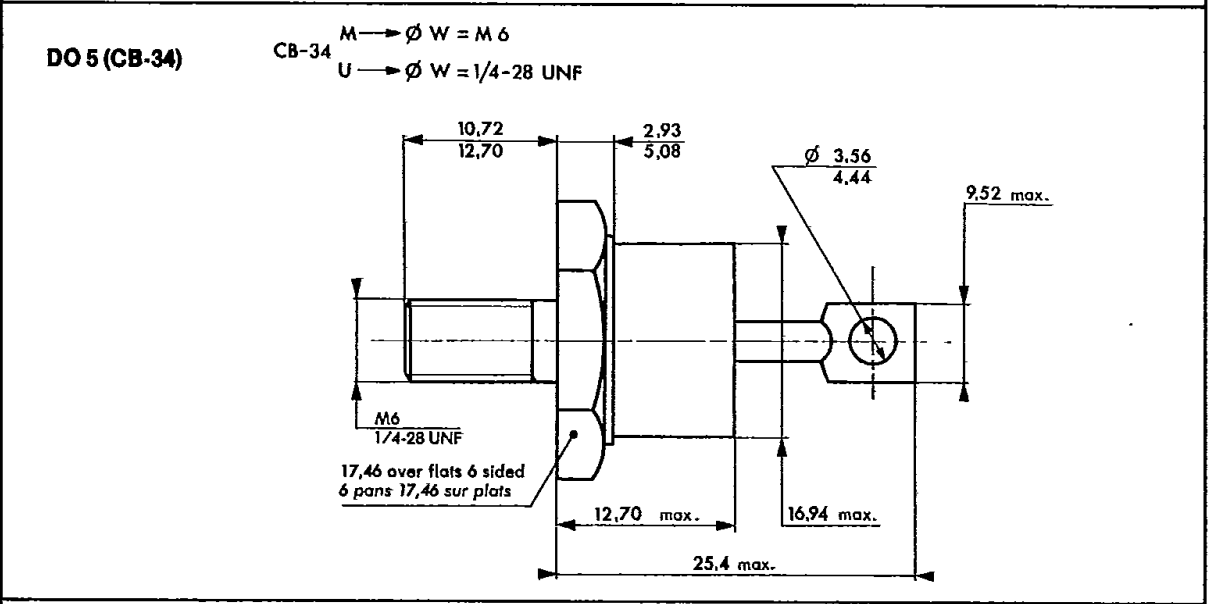
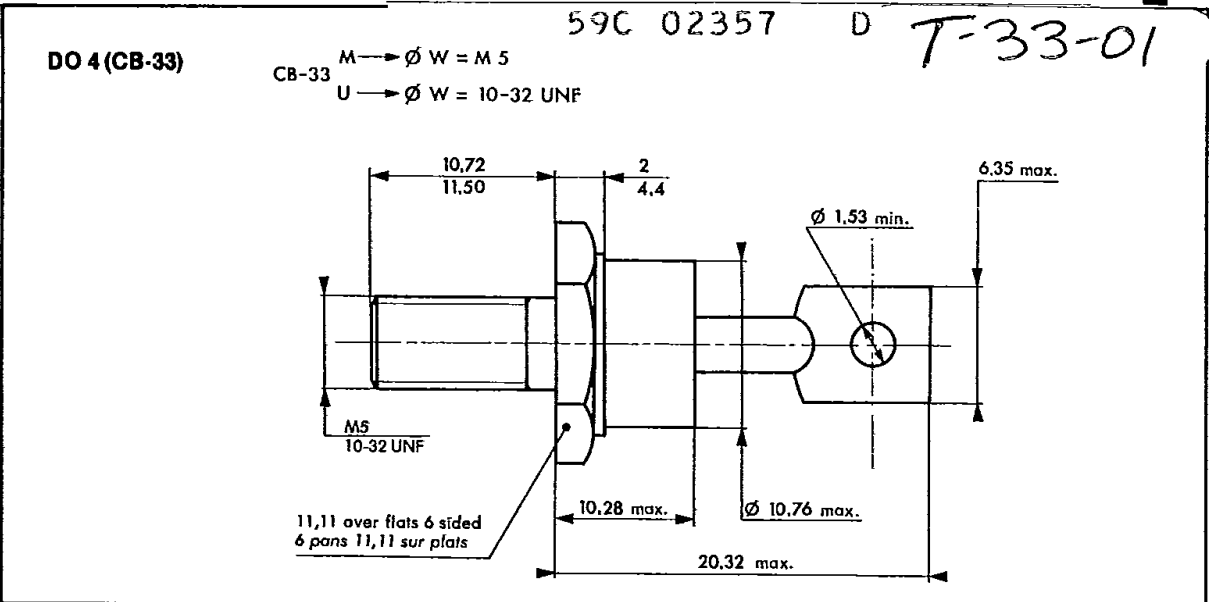
Recommended torque value
Valeur recommandée du couple de serrage 250 cm.N



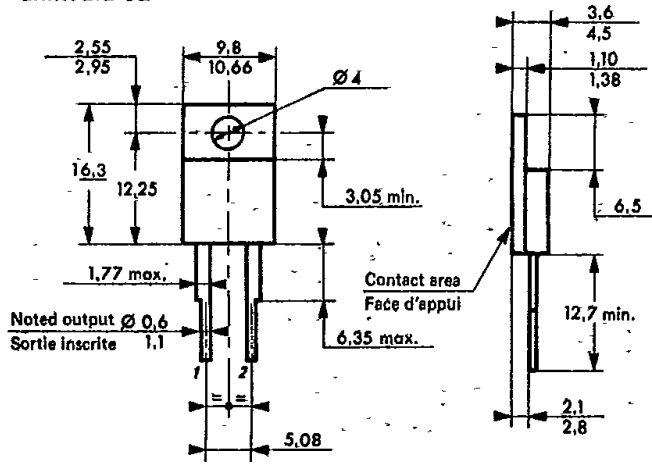
Maximum torque value
Valeur maximale du couple de serrage 310 cm.N

DO-5 (CB-34)

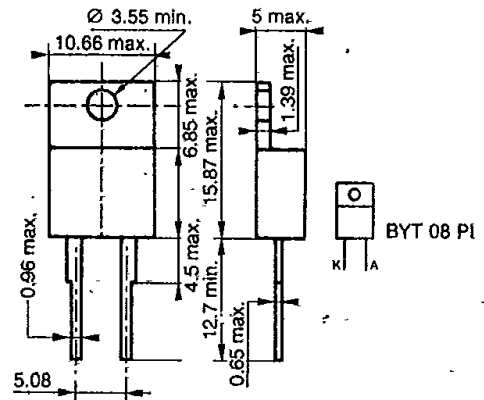
59C 02357 D T-33-01



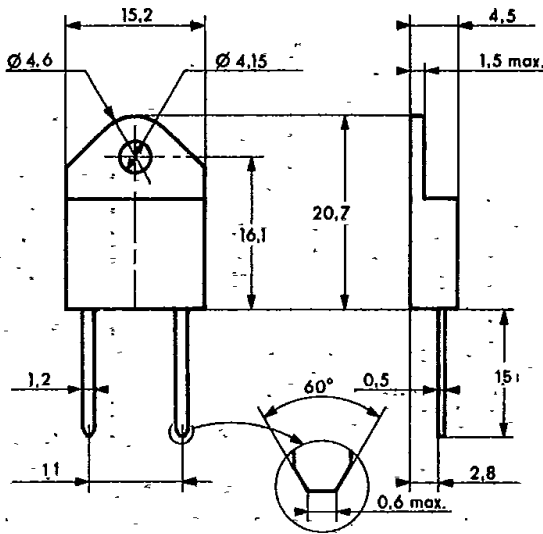
DO 220 AB (CB-227)
uninsulated



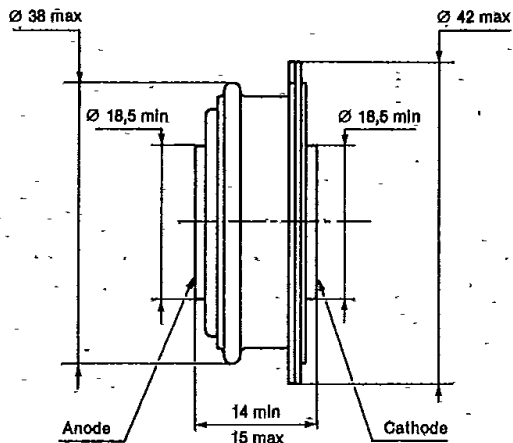
DO 220 AB (CB-426)
insulated



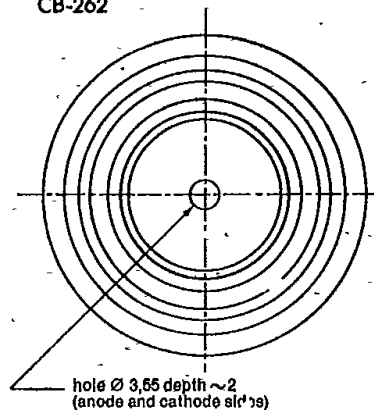
DOP 3 (CB-425)



M 771
(CB-262)

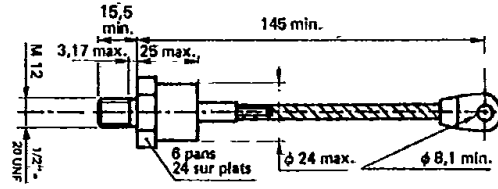


CB-262

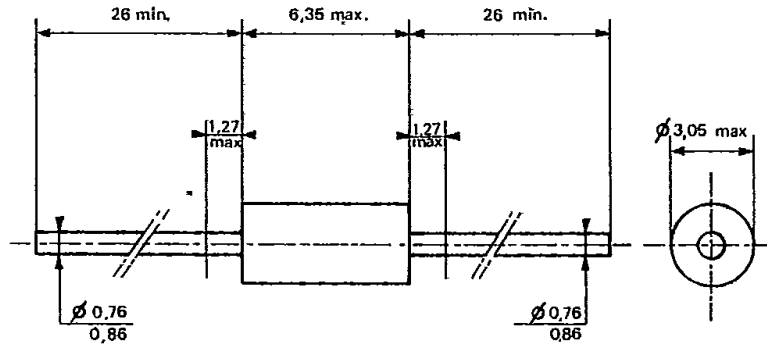


M 771 CASE OUTLINE

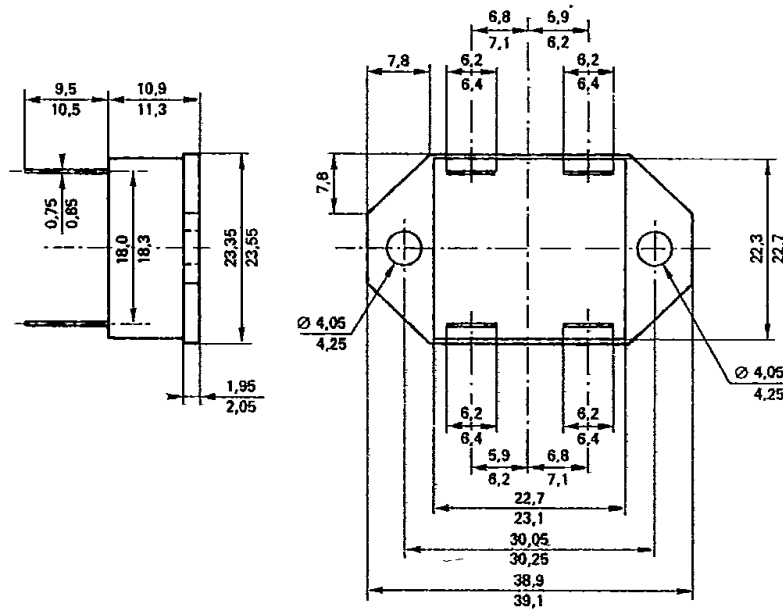
F62 m (CB-252)



F 126 (CB-210)



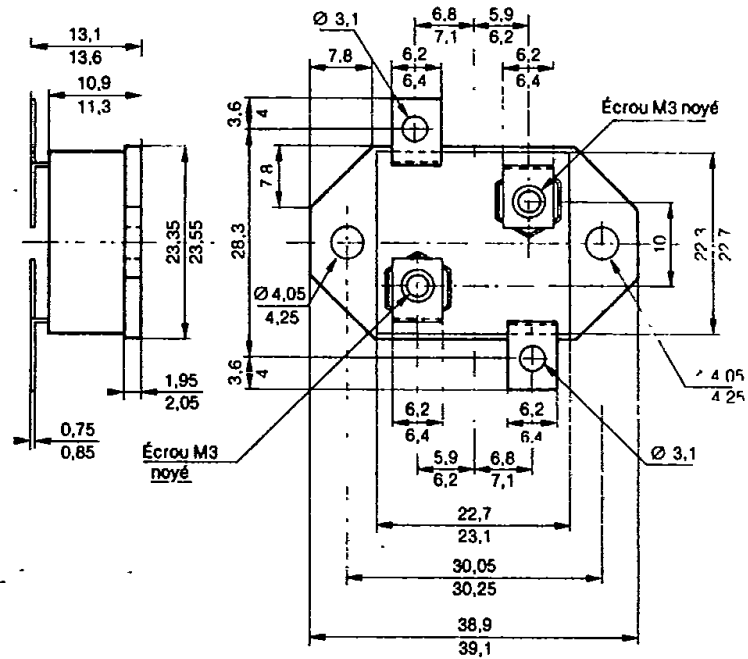
CB-427



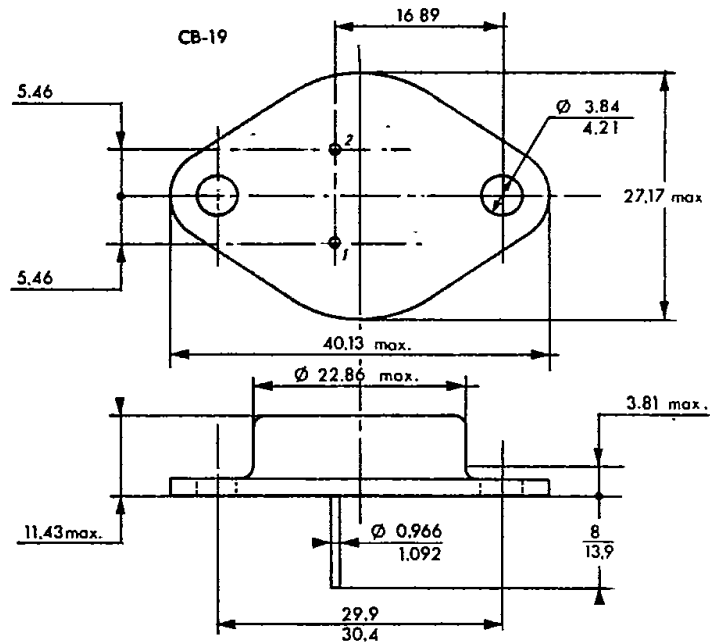
1	2
4	3

Marking : clear
 Marquage : en clair
 Note : Pin 3 may be omitted
 La broche 3 peut être omise

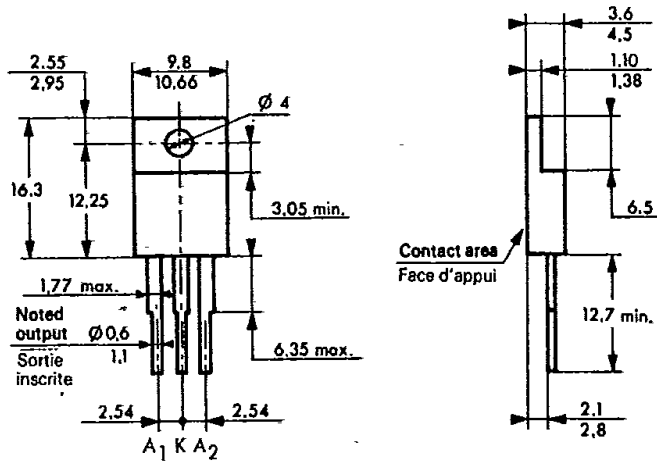
CB-434



TO 3 modified (CB-19)



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



CB-244 (TOP 3 - TO 218)

