THOMSON-CSF
DIVISION SEMICONDUCTEURS DISCRETS

TH 416 - TH 417

NPN POWER TRANSISTOR FOR SSB AND VHF APPLICATIONS

FEATURES

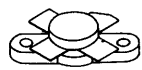
— Diffused ballast resistors
— Hermetical ceramic packages

APPLICATIONS

Transistor used in SSB telecommunications

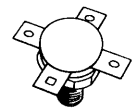
f = 30 MHz
P_{OUT} = 130 W PEP
Gp ⩾ 12 dB
ηc ⩾ 37 %
V_{CC} = 28 V
IMD* ⩽ − 30 dB

TH 416



CB-290
(.500 4L FL)

TH 417



CB-291
(.550 4L STUD)

ABSOLUTE RATINGS (LIMITING VALUES)		Symbols	Values	Units
Emitter-base (d.c.) voltage		V_{EBO}	4	V
Collector-base (d.c.) voltage		V_{CBO}	70	V
Collector-emitter (d.c.) voltage		V_{CEO}	35	V
Collector current	— d.c. — peak	I_C I_{CM}	12 30	A
Total power dissipation		P_{tot}	175	W
Storage and junction temperatures		T_{stg} T_j	− 65 ⟶ + 200 + 200	°C °C

Thermal resistance (junction-case)	$R_{th\ (j-c)}$	1	°C/W

* 2 tones

September 1981 1/3

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THOMSON-CSF
COMPOSANTS

STATIC CHARACTERISTICS at T_{amb} = 25°C

Symbols	Values			Units	Test conditions	
	min.	typ.	max.			
$V_{(BR)EBO}$	4			V	I_B = 20 mA	I_C = 0
$V_{(BR)CES}$	70			V	I_C = 50 mA	V_{BE} = 0
$V_{(BR)CEO}$	35			V	I_C = 100 mA	I_B = 0
H_{FE}	15		80		I_C = 7 A	V_{CE} = 5 V
C_{cb}		220		pF	V_{CB} = 28V	f = 1 MHz

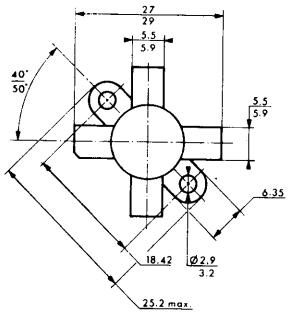
DYNAMIC CHARACTERISTICS at T_{amb} = 25°C

Symbols	Values			Units	Test conditions	
	min.	typ.	max.			
G_P	12			dB	AB class	
η_c	37			%	f_1 = 30 MHz	f_2 = 30,001 MHz
IMD*			− 30	dB	V_{CC} = 28 V P_{OUT} = 130 W PEP	I_{CQ} = 150 mA
f_T		300		MHz	V_{CE} = 28 V	I_C = 7 A

*2 tones

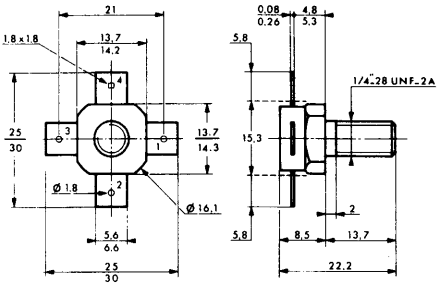
CASE DESCRIPTION

TH 416



CB-290
(.500 4L FL)

TH 417



CB-291
(.550 4L STUD)

Dimensions in millimeters

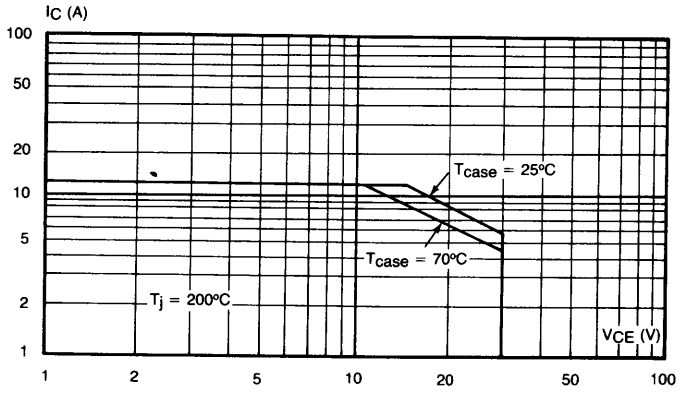


Fig. 1 — Safe operating area.

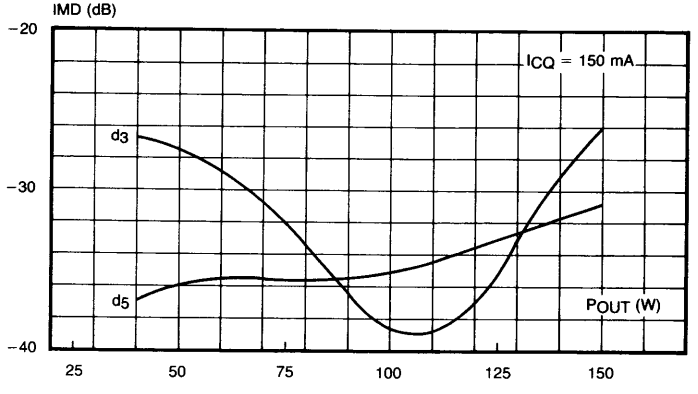


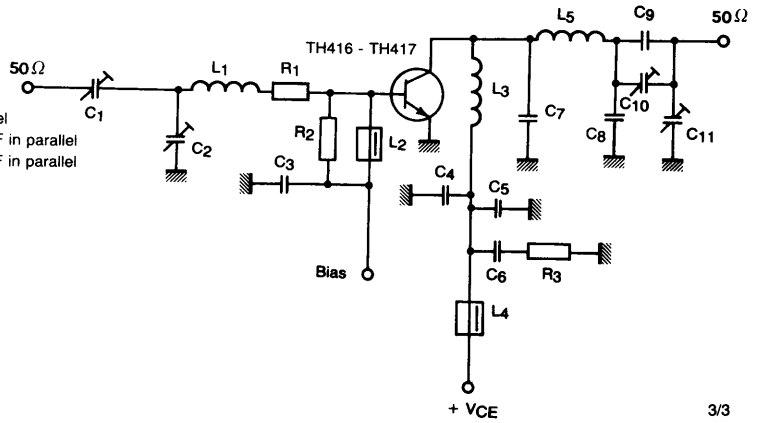
Fig. 2 — Intermodulation distortion versus output power.

TEST CIRCUIT SSB CLASS AB

C 1 = 20 — 120 pF
C 2 = 50 — 300 pF
C 3 = C4 = 3,9 nF
C 5 = 100 nF
C 6 = 2,2 µF
C 7 = 2 × 180 pF in parallel
C 8 = 3 × 56 pF and 33 pF in parallel
C 9 = 4 × 56 pF and 68 pF in parallel
C10 = 360 pF
C11 = 360 pF

L1 = 88 nH
L2 = 22 µH choke coil
L3 = L5 = 80 nH
L4 = Ferrox cube choke coil

R1 = 0,55 Ω
R2 = 27 Ω
R3 = 4,7 Ω



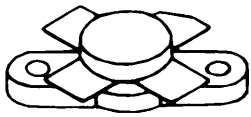
3/3

SGS-THOMSON
MICROELECTRONICS

TH430

RF & MICROWAVE TRANSISTORS SSB APPLICATIONS

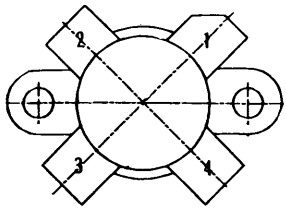
- OPTIMIZED FOR SSB
- FREQUENCY 30 MHz
- VOLTAGE 50 V
- POWER OUT 250 W PEP
- POWER GAIN 15.5 dB
- I_{MD} –30 dB
- GOLD METALLIZATION
- COMMON EMITTER



.550 4LFL (M177)
epoxy sealed

ORDER CODE	BRANDING
SD1728	TH430

PIN CONNECTION



S88TH430-01

1 collector
2 emitter
3 base
4 emitter

DESCRIPTION

The TH430 is a 50 v epitaxial silicon NPN planar transistor designed primarily for SSB and VHF communications. This device utilizes emitter ballasting for improved ruggedness and reliability.

ABSOLUTE MAXIMUM RATINGS (T_{case} = 25 °C)

Symbol	Parameter	Value	Unit
V_{CBO}	Collector – Base Voltage	110	V
V_{CEO}	Collector – Emitter Voltage	55	V
V_{EBO}	Emitter – Base Voltage	4	V
I_C	Collector Current	40	A
P_{tot}	Total Power Dissipation	330	W
T_{stg}	Storage Temperature	– 65 to 150	°C
T_j	Junction Temperature	200	°C

THERMAL DATA

$R_{th\ (j-c)}$	Junction-case Thermal Resistance	0.4	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C)

STATIC

Symbol	Test Conditions		Value			Unit
			Min.	Typ.	Max.	
BV_{CES}	I_C = 200 mA	V_{BE} = 0	110			V
BV_{CEO}	I_C = 200 mA	I_B = 0	55			V
BV_{EBO}	I_B = 20 mA	I_C = 0	4			V
I_{CEO}	V_{CE} = 30 V	I_C = 0			10	mA
h_{FE}	V_{CE} = 6 V	I_C = 10 A	15		80	

DYNAMIC

Symbol	Test Conditions			Value			Unit
				Min.	Typ.	Max.	
P_O	f = 30 MHz	V_{CE} = 50 V	I_{cq} = 150 mA	250			W PEP
G_P	f = 30 MHz	V_{CE} = 50 V	I_{cq} = 150 mA	14.5			dB
IMD*	f = 30 MHz	V_{CE} = 50 V	I_{cq} = 150 mA			– 30	dB
C_{ob}	f = 1 MHz	V_{CB} = 50 V			320	360	pF

* two tone method.
in class C ; Gp min 13.5 dB, eff 65 %
at 30 MHz.
; Gp min 10 dB, eff 57 %
at 70 MHz.

APPLICATION INFORMATION

TYPICAL CURVES

CLASS AB

Figure 1 : Output Peak Envelope Power versus Input Power.

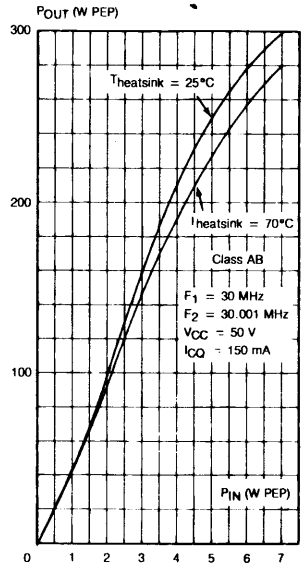


Figure 2 : Collector Efficiency versus Output Peak Envelope Power.

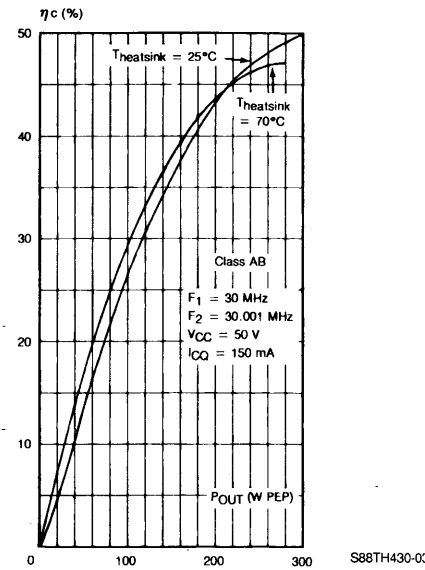
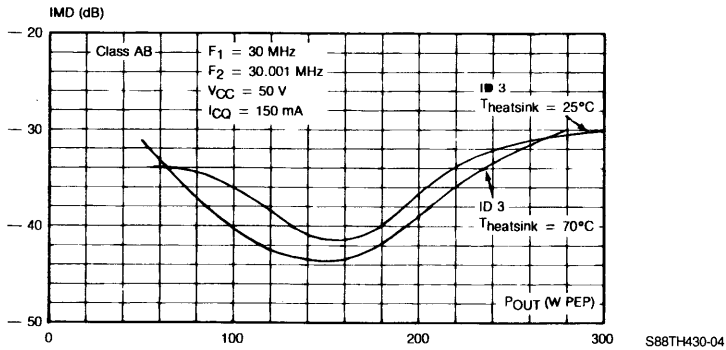


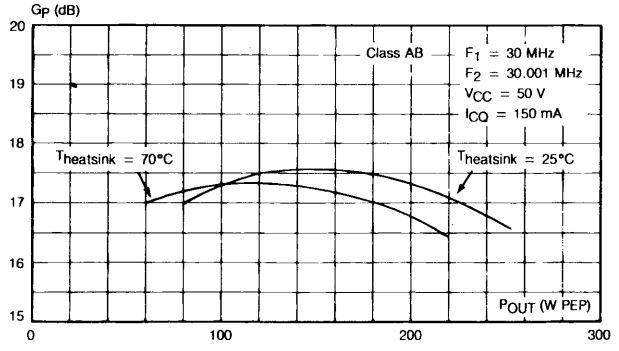
Figure 3 : Intermodulation Distortion versus Output Peak Envelope Power.



APPLICATION INFORMATION

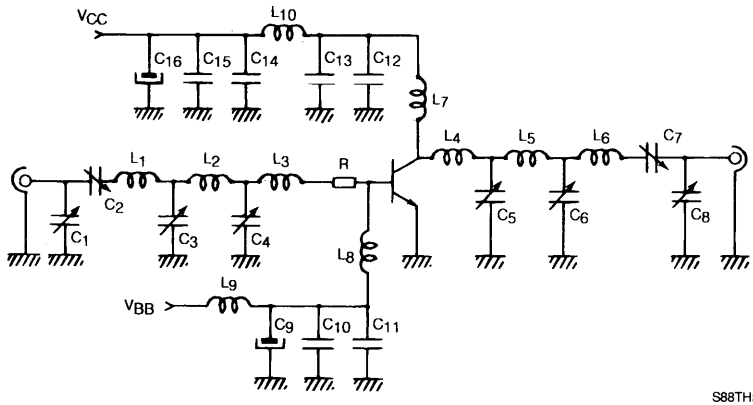
TYPICAL CURVES

Figure 4 : Power Gain versus Output Power Envelope Power.



S88TH430-05

TEST CIRCUIT SSB - CLASS AB - 30 MHz



S88TH5430-06

L_1	=	5 turns Ø 10 mm - 1.3 mm wire - Length 15 mm	C_1	=	ARCO 429
L_2	=	2 turns Ø 12 mm - 2 mm wire Lenght 8 mm	C_2	=	ARCO 4615
L_3	=	1 turn Ø 12 mm - 2 mm wire - Length 5 mm	C_3	=	ARCO 4213
L_4	=	Hair pin copper foil 20 x 5 mm	C_4	=	ARCO 4611
L_5	=	1 turn Ø 12 mm - 2 mm wire - Length 8 mm	C_5	=	ARCO 4611
L_6	=	5 turns Ø 8 mm - 1.3 mm wire - Length 18 mm	C_6	=	ARCO 4213
L_7	=	3 turns Ø 8 mm - 1.3 mm wire - Length 15 mm	C_7	=	ARCO 4611
L_8	=	CHOKE COIL	C_8	=	ARCO 427
L_9	=	CHOKE COIL	C_9	=	470 µF - 40 V
L_{10}	=	CHOKE COIL	C_{10}	=	100 nF - 63 V
R	=	0.25 Ω*	C_{11}	=	1 nF
			C_{12}	=	10 nF
			C_{13}	=	1 nF
			C_{14}	=	100 nF - 63 V
			C_{15}	=	1 nF
			C_{16}	=	220 µF - 63 V.

* 4 Resistors 1 Ω 0.5 W in parallel.

APPLICATION INFORMATION

TYPICAL CURVES

CLASS C . F = 30 MHz

Figure 5 : Output Power versus Input Power.

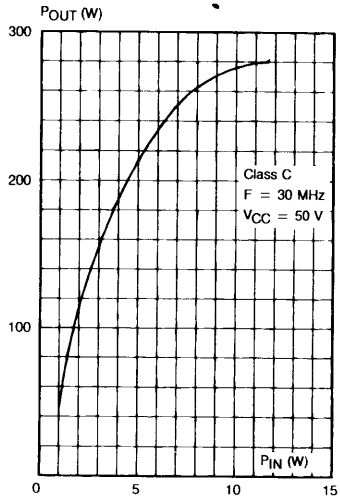
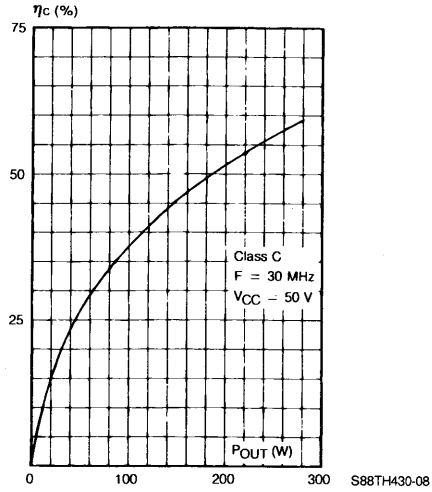


Figure 6 : Collector Efficiency versus Output Power.



CLASS C . F = 70 MHz

Figure 7 : Output Power versus Input Power.

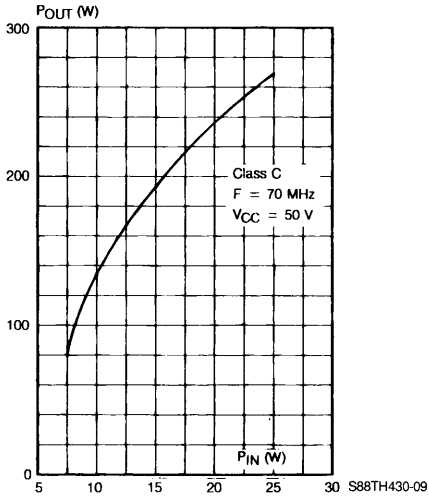
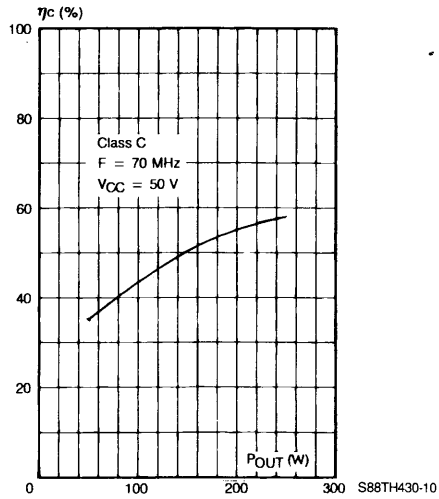


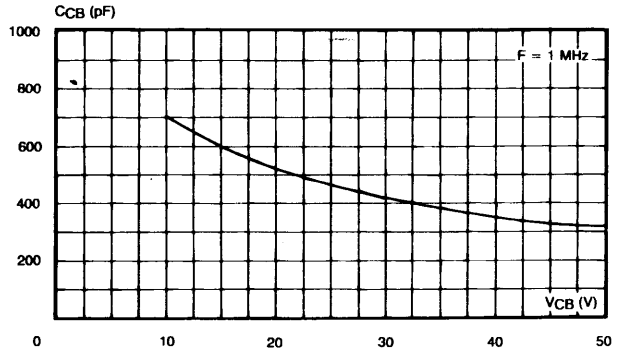
Figure 8 : Collector Efficiency versus Output Power.



APPLICATION INFORMATION

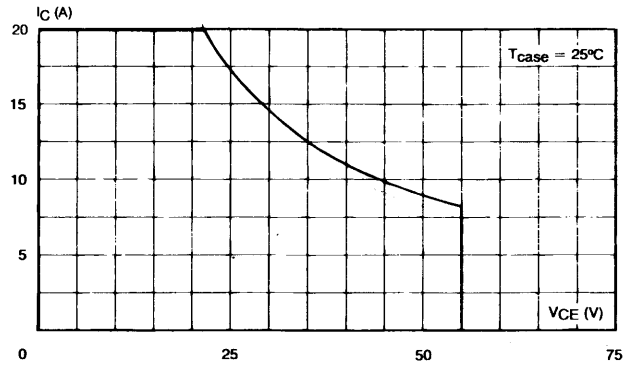
TYPICAL CURVES

Figure 9 : Collector-base Capacitance versus Collector-base Voltage.



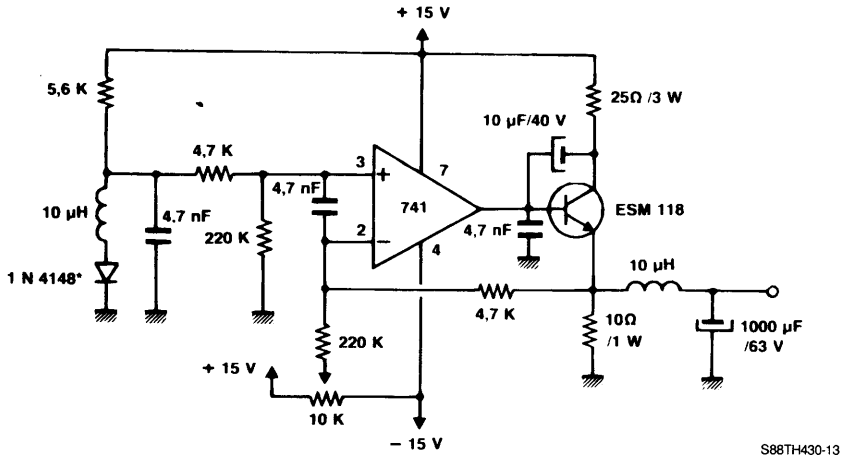
S88TH430-11

Figure 10 : DC Safe Operating Area.



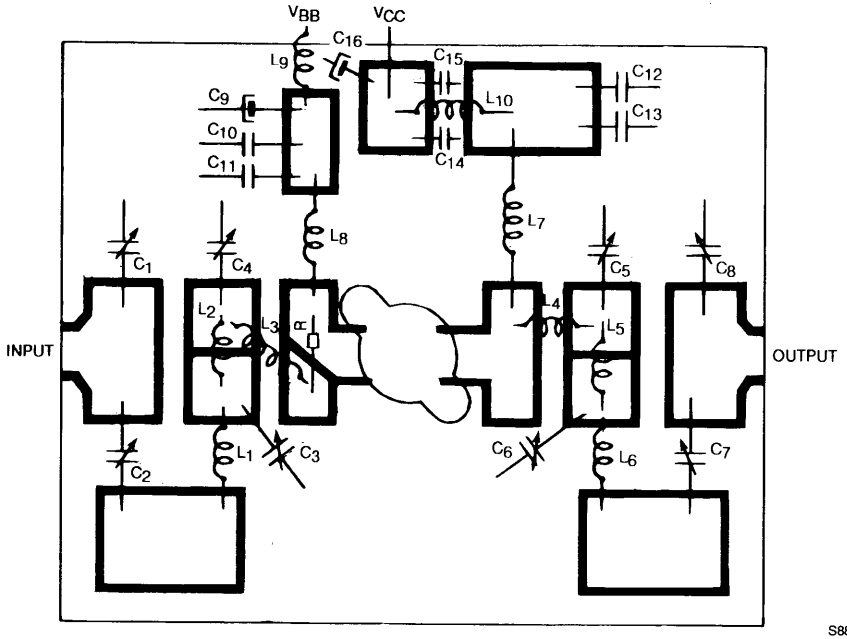
S88TH430-12

BIAS CIRCUIT



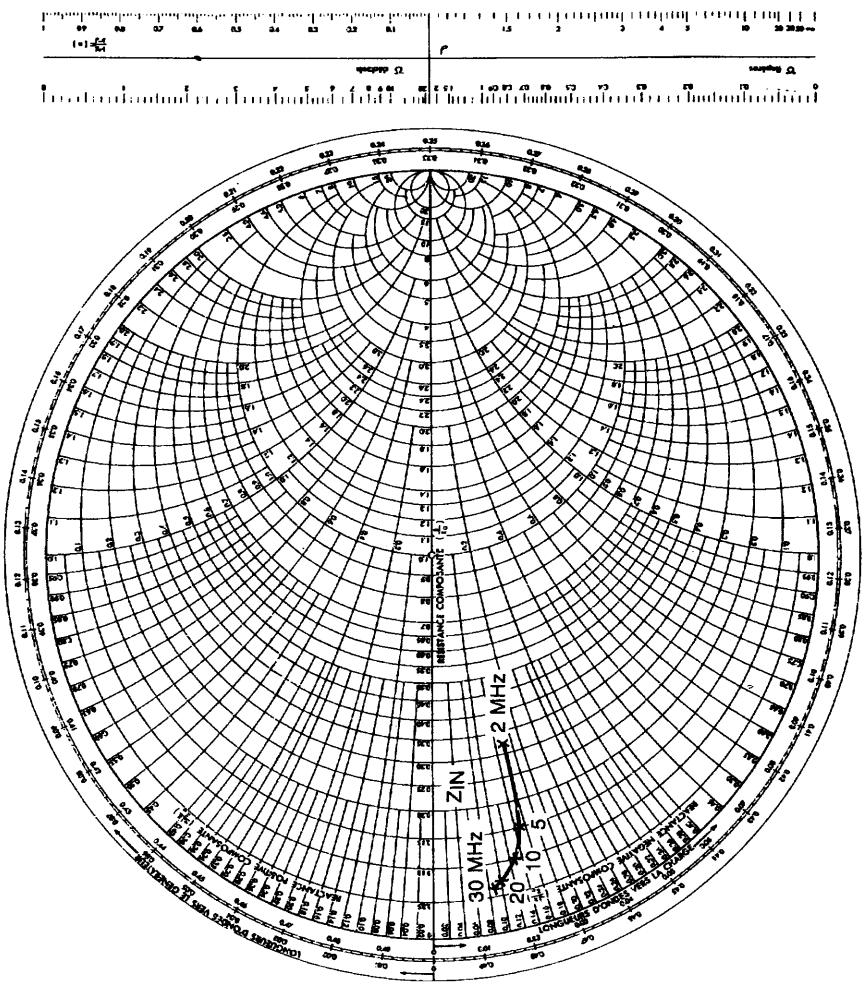
* Diode mechanically tied to the heatsink of the test amplifier.

MOUNTING CIRCUIT



IMPEDANCES DATAS (typical)

Figure 11 : Series Equivalent Impedance.

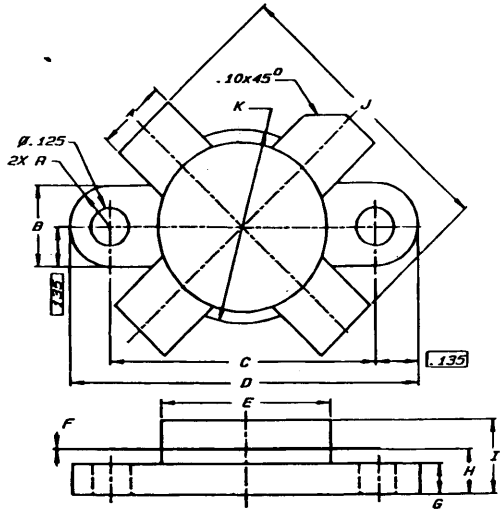


S88TH430-15

V_{CC} = 50 V
I_{CQ} = 150 mA
P_{OUT} = 250 W PEP.

PACKAGE MECHANICAL DATA

.550 4LFL



S88TH430-16

	Minimum Inches/mm	Maximum Inches/mm
A	.225/5.72	.235/5.97
B	.265/6.73	.275/6.96
C	.860/21.84	.870/22.10
D	1.130/28.70	1.140/28.96
E	.545/13.84	.555/14.10
F	.003/0.08	.007/0.18

	Minimum Inches/mm	Maximum Inches/mm
G	.100/2.54	.118/3.00
H	.150/3.81	.170/4.32
I		.280/7.11
J	1.080/27.43	1.120/28.45
K	.625/15.88	.635/16.13

THOMSON-CSF
DIVISION SEMICONDUCTEURS DISCRETS

TH 476

MICROWAVE NPN POWER TRANSISTOR FOR CLASS C OPERATION
TRANSISTOR NPN HYPERFREQUENCE DE PUISSANCE, CLASSE C

FEATURES

- Gold metallizations
- Hermetical package
- Emitter ballast resistors
- Stripline encapsulation

} → high reliability
→ severe impedance mismatch

APPLICATIONS

Telecommunications up to 1000 MHz frequency band.

PARTICULARITES

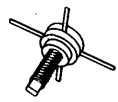
- *Métallisations "Or"*
- *Boîtier hermétique*
- *Résistances ballast d'émetteur*
- *Encapsulation "Stripline"*

} → *haute fiabilité*
→ *bonne tenue au ROS*

APPLICATIONS

Télécommunications dans la bande de fréquences jusqu'à 1000 MHz

f	=	700	MHz
P_{OUT}	≥	1,2	W
G_P	≥	7,8	dB
η_c	≥	50	%
V_{CC}	=	28	V



Case / *Boîtier* : CB-307 (TO-117)

ABSOLUTE RATINGS (LIMITING VALUES) / ***VALEURS LIMITES ABSOLUES D'UTILISATION***	Symbols	Values	Units
Emitter-base (d.c.) voltage / *Tension continue émetteur-base*	V_{EBO}	3,5	V
Collector-base (d.c.) voltage / *Tension continue collecteur-base*	V_{CBO}	55	V
Collector-emitter (d.c.) voltage / *Tension continue collecteur-émetteur*	V_{CEO}	35	V
Collector (d.c.) current / *Courant continu de collecteur*	I_C		A
Storage and junction temperature range / *Températures extrêmes de stockage et de jonction*	T_{stg} T_j	— 65 → + 200 — 55 → + 200	°C °C

Thermal resistance (junction-ambient) / *Résistance thermique (jonction-ambiante)*	$R_{th(j-c)}$	32	°C/W

May 1981 1/3

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THOMSON-CSF COMPOSANTS

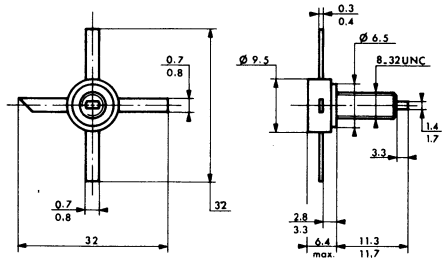
STATIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES STATIQUES à t_{amb} = 25°C

Symbols	Values			Units	Test conditions	
	min.	typ.	max.			
$V_{(BR)EBO}$	3,5			V	I_E = 0,1 mA	
$V_{(BR)CEO}$	35			V	I_C = 20 mA	I_B = 0
$V_{(BR)CER}$	55			V	I_C = 20 mA	R_{BE} = 10 Ω
I_{CES}			1	mA	V_{CE} = 55 V	V_{BE} = 0
H_{FE}	15		90		I_C = 50 mA	V_{CE} = 5 V
C_{22b}			3,5	pF	V_{CB} = 28 V	f = 1 MHz

DYNAMIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES DYNAMIQUES à t_{amb} = 25°C

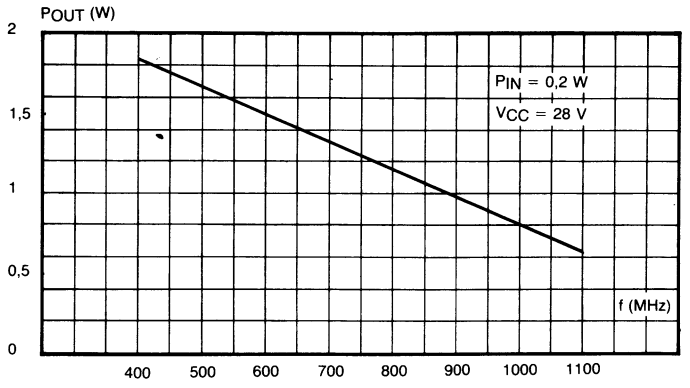
Symbols	Values			Units	Test conditions		
	min.	typ.	max.				
P_{OUT}	1,2			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 0,2 W
G_P	7,8			dB	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 0,2 W
η_c	50			%	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 0,2 W
Impedance mismatch	∞				f = 700 MHz	V_{CC} = 28 V	P_{OUT} = 2 W
P_{sat}	1,8			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 0,35 W

CASE DESCRIPTION
DESCRIPTION DU BOITIER



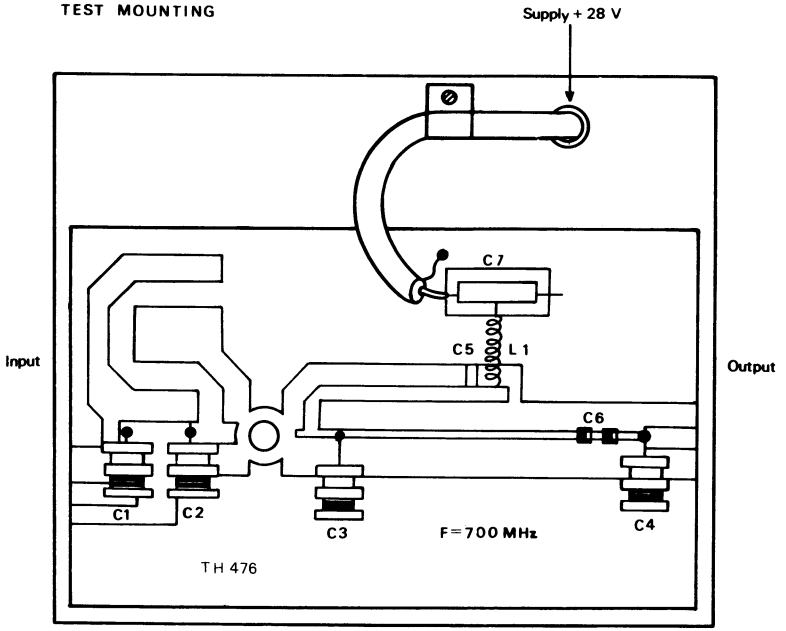
Dimensions in millimeters

CB-307 (TO-117)



Typical output power versus frequency.

TEST MOUNTING



C1 - C2 - C3 - C4 : Variable capacitors at 5201 AIRTRONIC 0,8/10 pF
C5 - C6 : Chips 100 pF
C7 : Electrolytic 6,8 μF
L1 : 6 turns ø 1,7 mm 25/100e

3/3

THOMSON-CSF

DIVISION SEMICONDUCTEURS DISCRETS

TH 478

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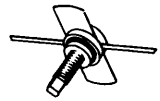
APPLICATIONS

Télécommunications dans la bande de fréquences jusqu'à 1000 MHz

f	=	700	MHz
P_{OUT}	⩾	5	W
G_P	⩾	5,85	dB
η_C	⩾	55	%
V_{CC}	=	28	V



Case / *Boîtier* : CB-295 (TO-129)

ABSOLUTE RATINGS (LIMITING VALUES) / ***VALEURS LIMITES ABSOLUES D'UTILISATION***	Symbols	Values	Units
Emitter-base (d.c.) voltage / *Tension continue émetteur-base*	V_{EBO}	3,5	V
Collector-base (d.c.) voltage / *Tension continue collecteur-base*	V_{CBO}	55	V
Collector-emitter (d.c.) voltage / *Tension continue collecteur-émetteur*	V_{CEO}	35	V
Collector (d.c.) current / *Courant continu de collecteur*	I_C		A
Storage and junction temperature range / *Températures extrêmes de stockage et de jonction*	T_{stg} T_j	— 65 → + 200 — 55 → + 200	°C °C

Thermal resistance (junction-ambient) / *Résistance thermique (jonction-ambiante)*	$R_{th(j-c)}$	18	°C/W

May 1981 1/3

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THOMSON-CSF COMPOSANTS

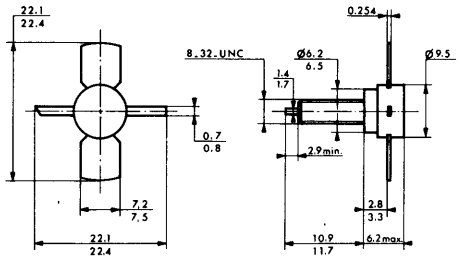
STATIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES STATIQUES à t_{amb} = 25°C

Symbols	Values			Units	Test conditions	
	min.	typ.	max.			
$V_{(BR)EBO}$	3,5			V	I_E = 0,2 mA	
$V_{(BR)CEO}$	35			V	I_C = 50 mA	I_B = 0
$V_{(BR)CER}$	55			V	I_C = 20 mA	R_{BE} = 10 Ω
I_{CES}			2	mA	V_{CE} = 55 V	V_{BE} = 0
H_{FE}	15		90		I_C = 50 mA	V_{CE} = 5 V
C_{22b}			5	pF	V_{CB} = 28 V	f = 1 MHz

DYNAMIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES DYNAMIQUES à t_{amb} = 25°C

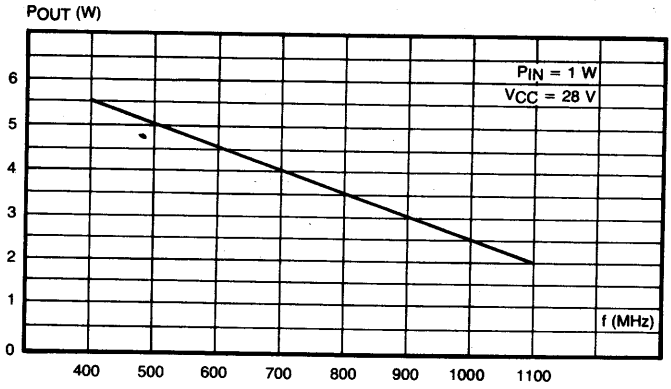
Symbols	Values			Units	Test conditions		
	min.	typ.	max.				
P_{OUT}	5			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 1,3 W
G_P	5,85			dB	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 1,3 W
η_c	55			%	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 1,3 W
Impedance mismatch	∞				f = 700 MHz	V_{CC} = 28 V	P_{OUT} = 4 W
P_{sat}	6			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 1,6 W

CASE DESCRIPTION
DESCRIPTION DU BOITIER



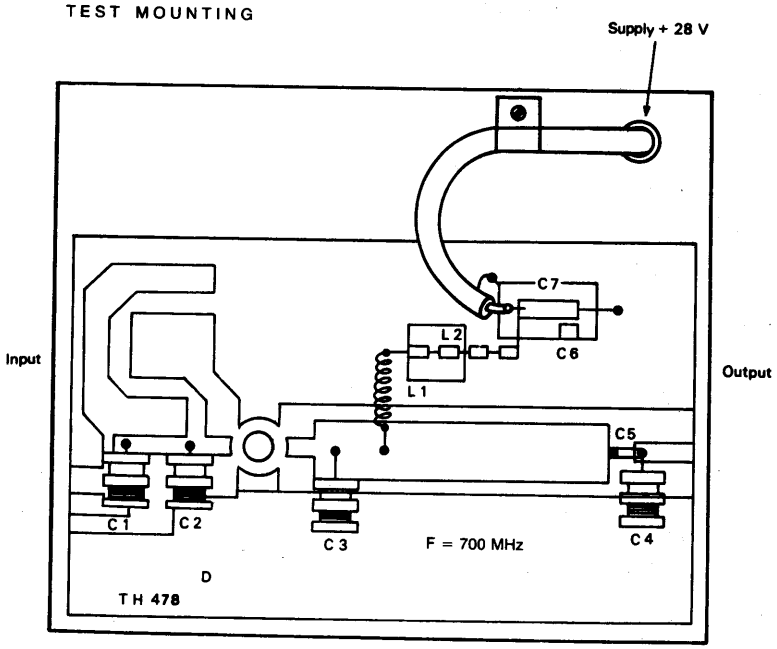
Dimensions in millimeters

CB-295 (TO-129)



Typical output power versus frequency.

TEST MOUNTING



C1 - C2 - C3 - C4	:	Variable capacitor at 5201 AIRTRONIC 0,8/10 pF
C5 - C6	:	Chips 470 pF
C7	:	Electrolytic 6,8 μF
L1	:	6 turns ø 1,7 mm 25/100e
L2	:	4 ferro-cube pearls - Ref. 3,5 × 1,2 × 3,3 B

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THOMSON-CSF
DIVISION SEMICONDUCTEURS DISCRETS

TH 480

MICROWAVE NPN POWER TRANSISTOR FOR CLASS C OPERATION
TRANSISTOR NPN HYPERFREQUENCE DE PUISSANCE, CLASSE C

FEATURES

- Gold metallizations
- Hermetical package
- Emitter ballast resistors
- Stripline encapsulation

→ high reliability
→ severe impedance mismatch

APPLICATIONS

Telecommunications up to 1000 MHz frequency band.

PARTICULARITES

- *Métallisations "Or"*
- *Boîtier hermétique*
- *Résistances ballast d'émetteur*
- *Encapsulation "Stripline"*

→ *haute fiabilité*
→ *bonne tenue au ROS*

APPLICATIONS

Télécommunications dans la bande de fréquences jusqu'à 1000 MHz

f	=	700	MHz
P_{OUT}	⩾	8	W
G_P	⩾	6	dB
η_c	⩾	55	%
V_{CC}	=	28	V

Case / ***Boîtier*** : CB-295 (TO-129)

ABSOLUTE RATINGS (LIMITING VALUES) / ***VALEURS LIMITES ABSOLUES D'UTILISATION***	Symbols	Values	Units
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Collector-emitter (d.c.) voltage *Tension continue collecteur-émetteur*	V_{CEO}	35	V
Collector (d.c.) current *Courant continu de collecteur*	I_C		A
Storage and junction temperature range *Températures extrêmes de stockage et de jonction*	T_{stg} T_j	— 65 → + 200 — 55 → + 200	°C °C

Thermal resistance (junction-ambient) *Résistance thermique (jonction-ambiante)*	$R_{th(j-c)}$	10	°C/W

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THOMSON-CSF COMPOSANTS

STATIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES STATIQUES à t_{amb} = 25°C

Symbols	Values			Units	Test conditions	
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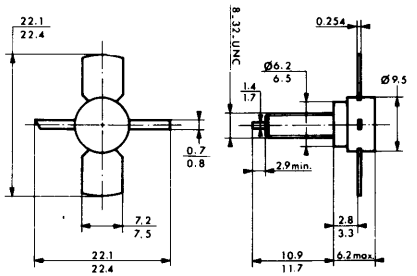
$V_{(BR)CEO}$	35			V	I_C = 50 mA	I_B = 0
$V_{(BR)CER}$	55			V	I_C = 50 mA	R_{BE} = 10 Ω
I_{CES}			5	mA	V_{CE} = 55 V	V_{BE} = 0
H_{FE}	15		90		I_C = 100 mA	V_{CE} = 5 V
C_{22b}			10	pF	V_{CB} = 28 V	f = 1 MHz

DYNAMIC CHARACTERISTICS at t_{amb} = 25°C
CARACTERISTIQUES DYNAMIQUES à t_{amb} = 25°C

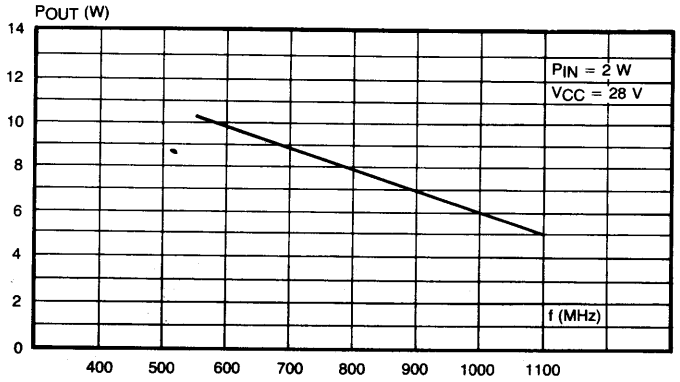
Symbols	Values			Units	Test conditions		
	min.	typ.	max.				
P_{OUT}	8			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 2 W
G_P	6			dB	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 2 W
η_c	55			%	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 2 W
Impedance mismatch			5		f = 700 MHz	V_{CC} = 28 V	P_{OUT} = 8 W
P_{sat}	10			W	f = 700 MHz	V_{CC} = 28 V	P_{IN} = 3 W

CASE DESCRIPTION
DESCRIPTION DU BOITIER



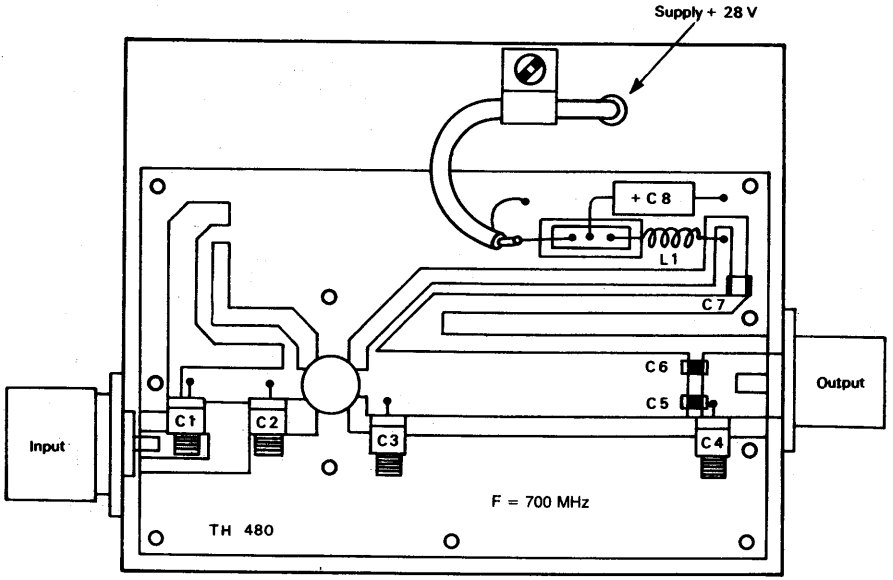
Dimensions in millimeters

CB-295 (TO-129)



Typical output power versus frequency.

TEST MOUNTING



C1 - C2 - C3 - C4	:	Variable capacitors at 5201 AIRTRONIC 0,8/10 pF
C5 - C6 - C7	:	Chips 100 pF
C8	:	Electrolytic 6,8 pF
L1	:	6 turns ø 1,7 mm 25/100e

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