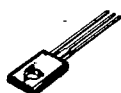


2SD439

2009A

NPN/PNP Epitaxial Planar
Silicon Transistors

T-33-05

2SB559

Low Frequency Power Amp, Medium Speed Switching Applications

©372E

Features

- Large allowable collector dissipation and wide ASO.
- Low saturation voltage and good linearity of h_{FE} .
- Suited for use in output stage of low-voltage high-output ($P_o=2W/V_{CC}=4.5V$) AF amp.

(): 2SB559

Absolute Maximum Ratings at $T_a=25^\circ C$

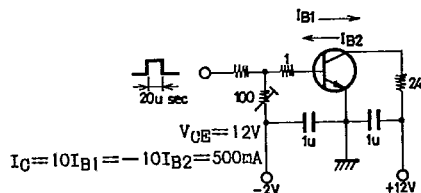
			unit
Collector to Base Voltage	V_{CB0}	(-)20	V
Collector to Emitter Voltage	V_{CE0}	(-)18	V
Emitter to Base Voltage	V_{EB0}	(-)5	V
Collector Current	I_C	(-)1.2	A
Peak Collector Current	i_{cp}	(-)2.0	A
Collector Dissipation	P_C	1	W
		8	W
	$T_c=25^\circ C$		
Junction Temperature	T_j	150	$^\circ C$
Storage Temperature	T_{stg}	-55 to +150	$^\circ C$

Electrical Characteristics at $T_a=25^\circ C$

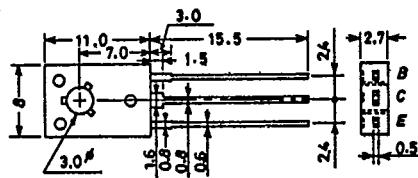
			min	typ	max	unit
C-B Breakdown Voltage	$V_{(BR)CB0}$	$I_C=(-)10\mu A, I_E=0$	(-)20			V
C-E Breakdown Voltage	$V_{(BR)CE0}$	$I_C=(-)1mA, R_{BE}=\infty$	(-)18			V
E-B Breakdown Voltage	$V_{(BR)EB0}$	$I_E=(-)10\mu A, I_C=0$	(-)5			V
Collector Cutoff Current	I_{CBO}	$V_{CB}=(-)15V, I_E=0$			(-)1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=(-)4V, I_C=0$			(-)1	μA
DC Current Gain	$h_{FE}(1)$	$V_{CE}=(-)2V, I_C=(-)500mA$	60*		320*	
	$h_{FE}(2)$	$V_{CE}=(-)2V, I_C=(-)1.5A_{(pulse)}$	(40)50			
Gain Bandwidth Product	f_T	$V_{CE}=(-)10V, I_C=(-)50mA$		150		MHz
Collector Capacitance	c_{ob}	$V_{CB}=(-)10V, f=1MHz$		(30)20		pF
C-E Saturation Voltage	$V_{CE(sat)}$	$I_C=(-)1A, I_B=(-)50mA$	(-)0.35	(-)0.7		V
			0.25	0.5		V
B-E Saturation Voltage	$V_{BE(sat)}$	$I_C=(-)500mA, I_B=(-)50mA$	(-)0.85	(-)1.2		V
Turn-ON Time	t_{on}	See specified Test Circuit.		50		ns
Storage Time	t_{stg}	"		(60)70		ns
Fall Time	t_f	"		200		ns

* The 2SB559/2SD439 are classified by h_{FE} at 500mA.

60 D 120 100 E 200 160 F 320

Case Outline 2009A
(unit:mm)**Switching Time Test Circuit**

(For PNP, the polarity is reversed.)

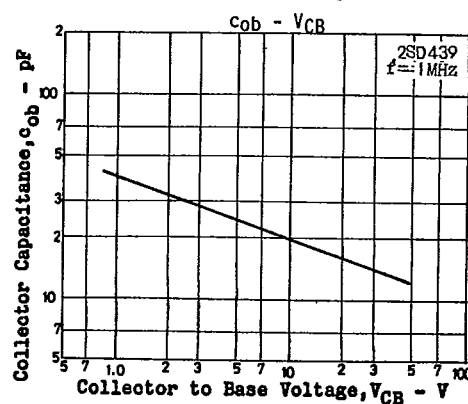
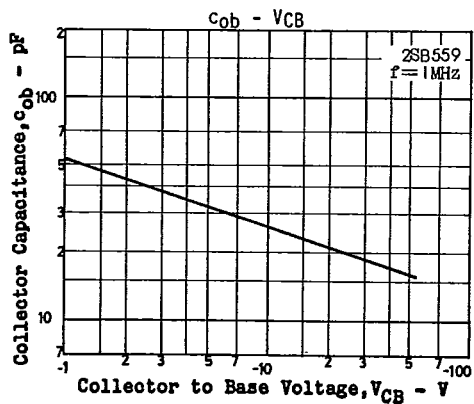
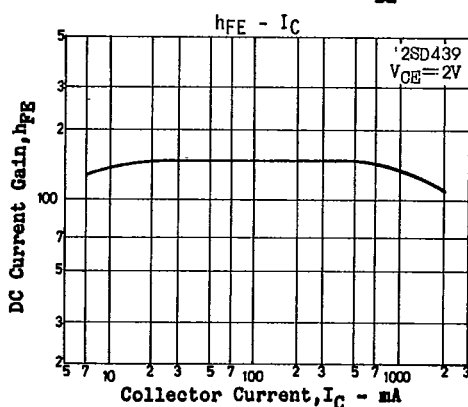
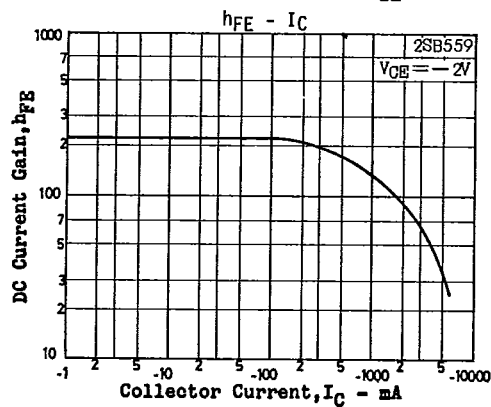
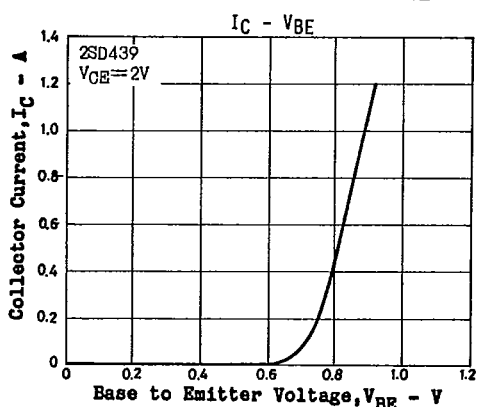
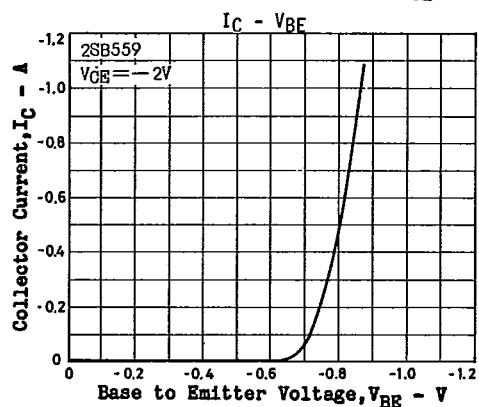
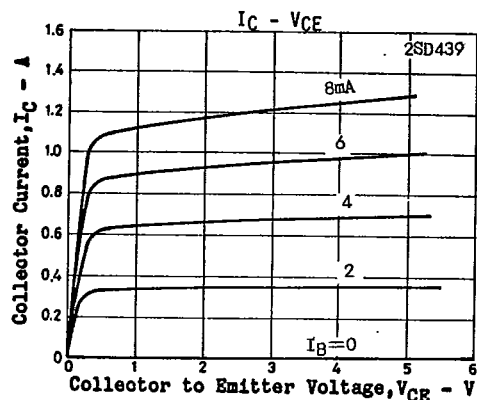
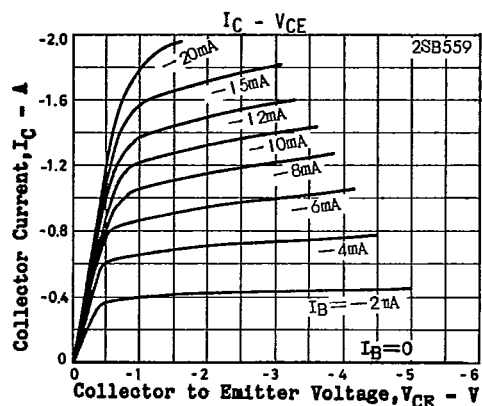


JEDEC: TO-126

B: Base
C: Collector
E: Emitter

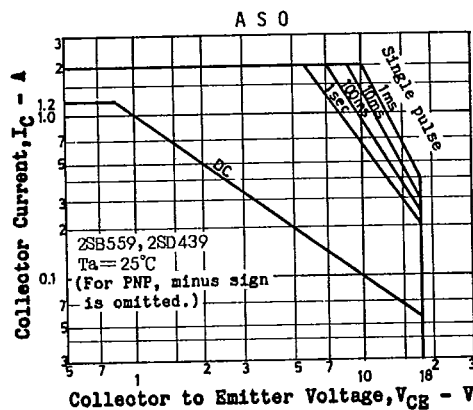
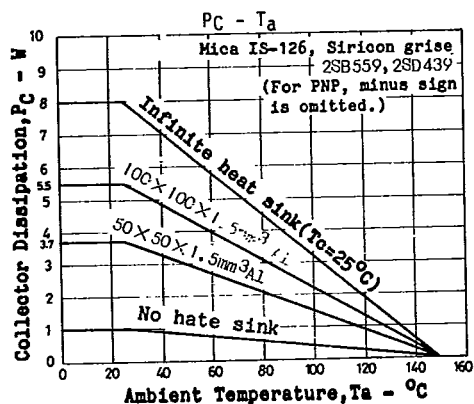
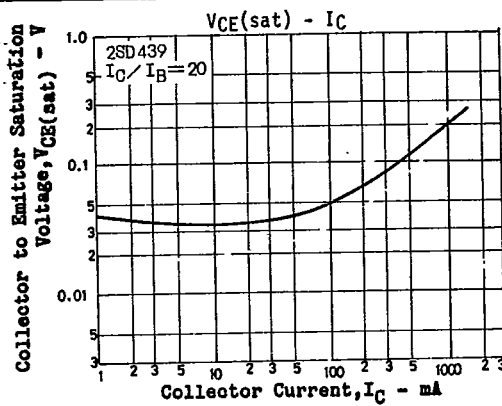
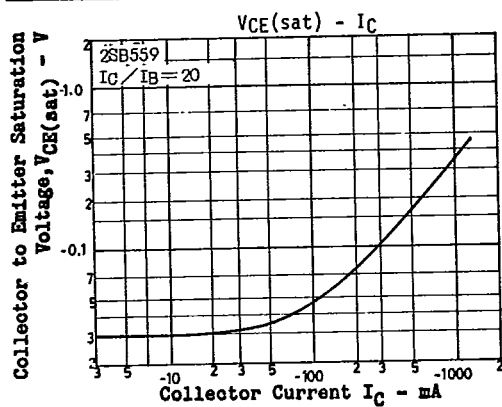
2SD439/2SB559

T-33-05

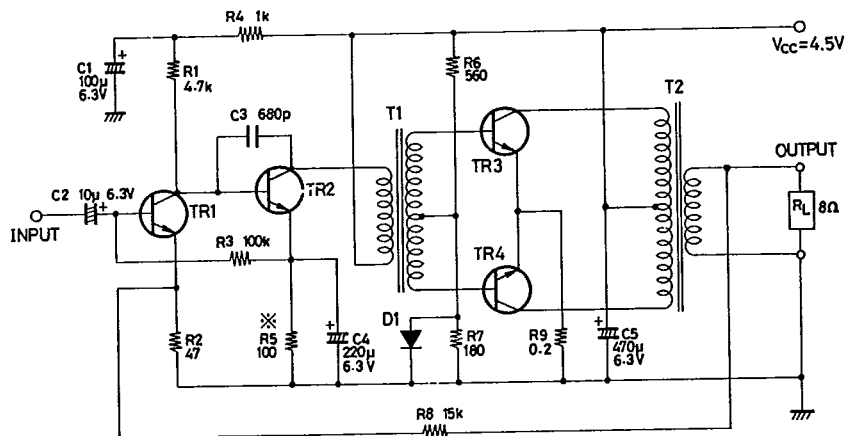


2SD439/2SB559

T-33-05



Sample Application Circuit: 2SD439-used 2.2W input/output transformer coupling amp



TR1: 2SC536 E,F TR2: 2SC536 E,F D1: DS442 TR3: 2SD439 E1, E2, F1, F2
TR4: 2SD439 E1, E2, F1, F2

Note: TR3, TR4 must be on the same rank. * R5 --- TR1 of rank E: 100ohm
TR1 of rank F: 82ohm

Data on transformer

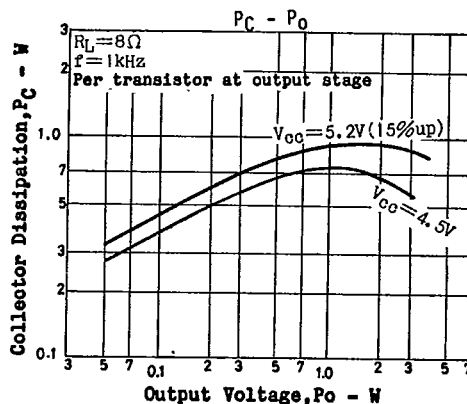
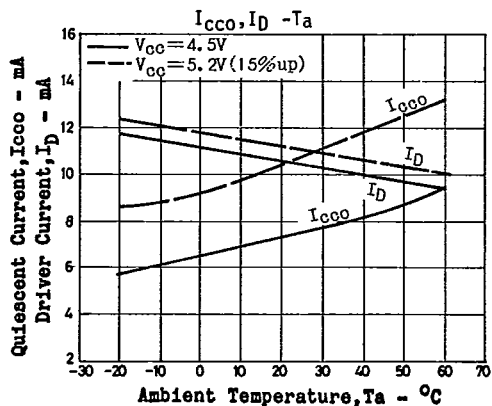
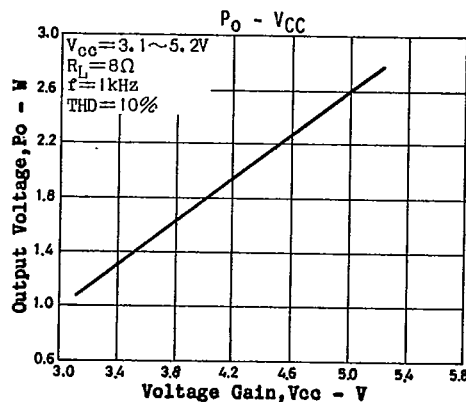
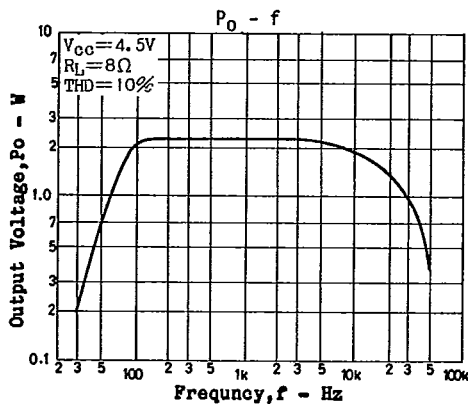
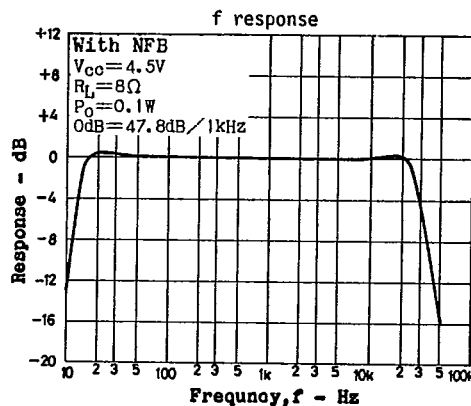
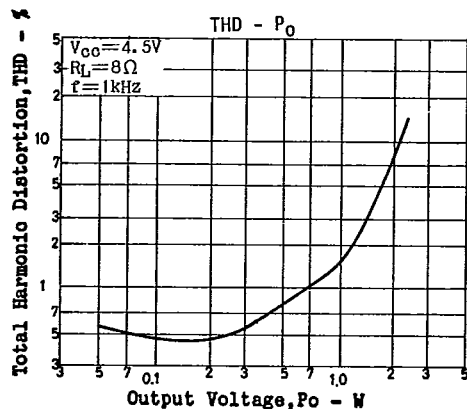
Transformer name		Impedance		DC resistor	
		Primary	Secondary	Primary	Secondary
Driver transformer	T1 ST-52	600ohm	2Kohm	37ohm	165ohm
Output transformer	T2 GS-1684	14ohm	8ohm	0.24ohm	0.17ohm

2SD439/2SB559

T-33-05

[Specification] At $V_{CC}=4.5V$, $R_L=8\Omega$, $R_g=600\Omega$, $f=1kHz$

Quiescent Current	I_{CCO}	Output stage	typ	
	I_D	Driver stage	7.6	mA
Voltage Gain	VG	Without NFB	10.5	dB
	VG	With NFB	48.0	dB
Output Voltage	P_o	THD=10%	2.2	W
	P_o	Output stage: Rank D2	1.7	W
Total Harmonic Distortion	THD	$P_o=0.5W$	0.8	%
Input Resistance	r_i	$P_o=0.5W$	55	kohm



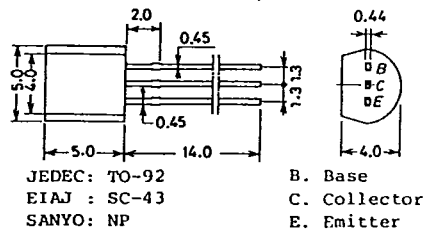
T-91-20

CASE OUTLINES AND ATTACHMENTS

- All of Sanyo Transistor case outlines are illustrated below.
- All dimensions are in mm, and dimensions which are not followed by min. or max. are represented by typical values.
- No marking is indicated.

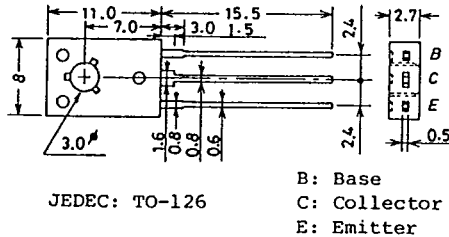
Case Outline—[2003A]

unit:mm



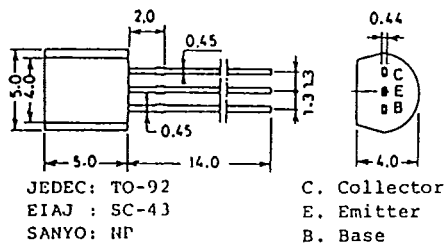
Case Outline—[2009A]

unit:mm



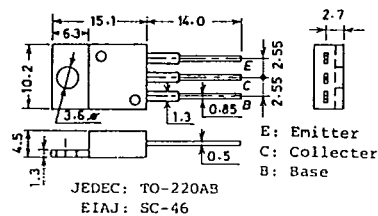
Case Outline—[2004A]

unit:mm



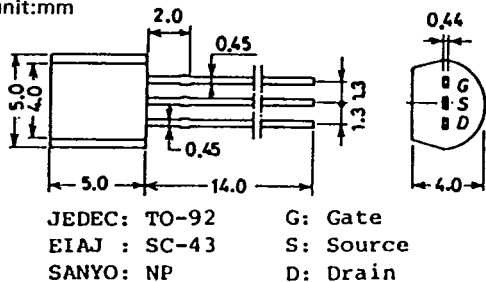
Case Outline—[2010A]

unit:mm



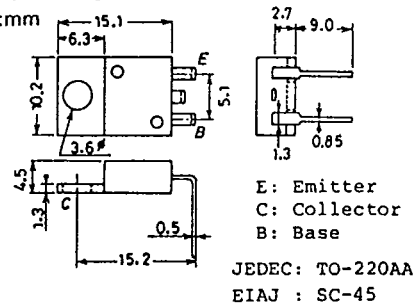
Case Outline—[2005A]

unit:mm



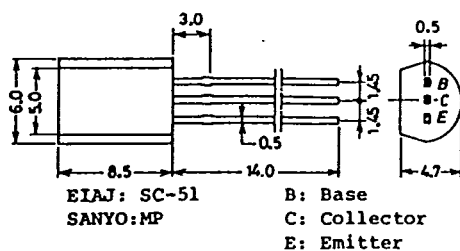
Case Outline—[2012]

unit:mm



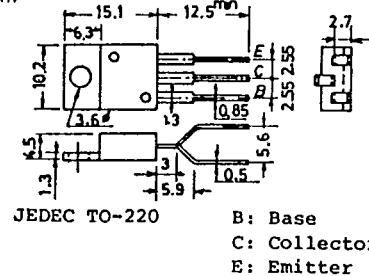
Case Outline—[2006A]

unit:mm

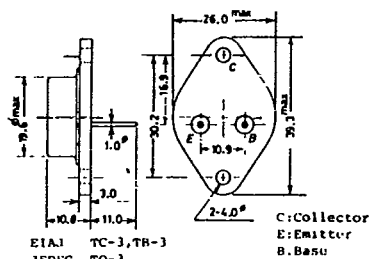


Case Outline—[2013]

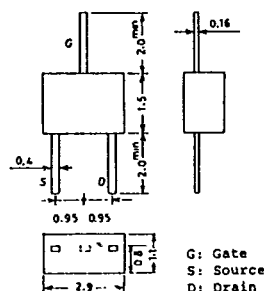
unit:mm



unit:mm

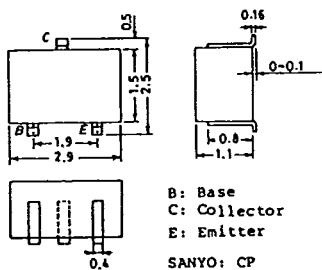


unit:mm

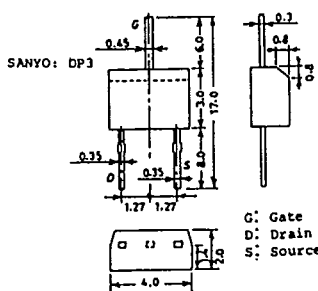


T-91-20

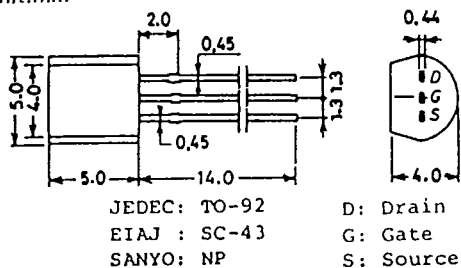
unit:mm



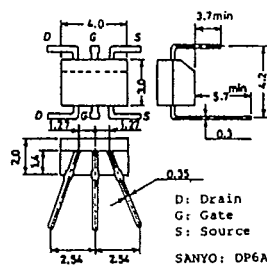
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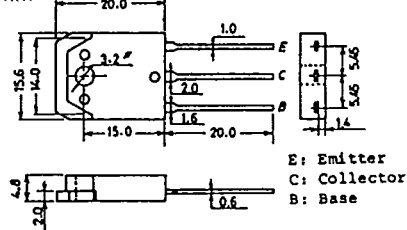
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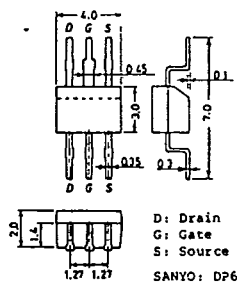
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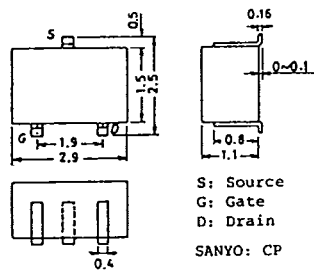
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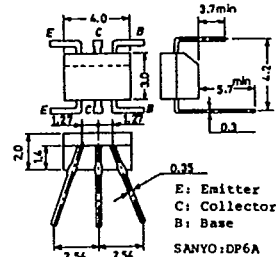
unit:mm



unit:mm



unit:mm



E: Emitter
C: Collector
B: Base
SANYO: DP6B

E: Emitter
C: Collector
B: Base

G1: Catw1
\$: Source
D-r Drain
G2: Gate2
SANYO: OP4A

E: Emitter
C: Collector
B: Base

SANYO:TO3PML

B: Base
C: Collector
E: Emitter
SANYO: SPA

G: Gate
S: Source
D: Drain
SANYO: SPA

D: Drain
G: Gate
S: Source
SANYO: SPA

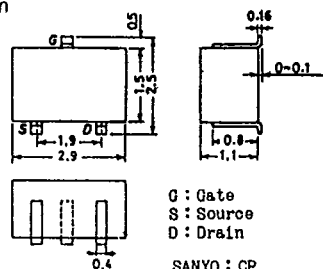
SANYO: TO220ML

D: Drain
G: Gate
S: Source
SANYO: SP'

SANYO: TO126ML

T-91-20

unit:mm

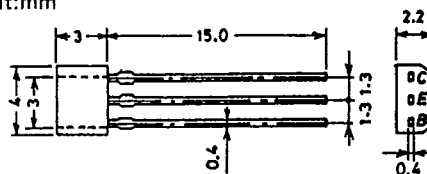


SANYO: TO126LP

G : Gate
S : Source
D : Drain

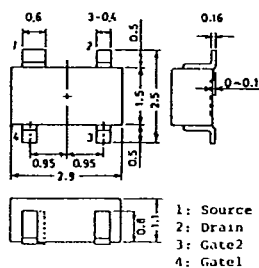
SANYO : CP

unit:mm



C : Collector
E : Emitter
B : Base
SANYO: SPA

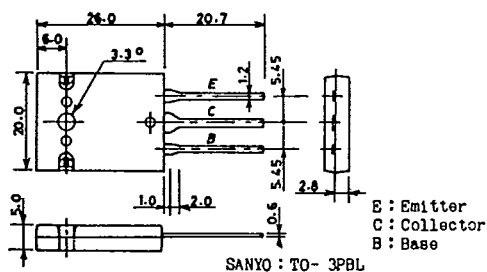
unit:mm



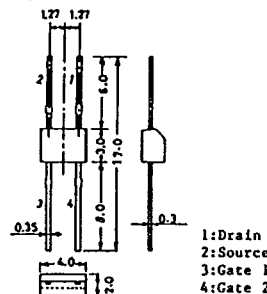
JEDEC: TO-220AB
EIAJ: SC-46

1:Source
2:Drain
3:Gate

unit:mm

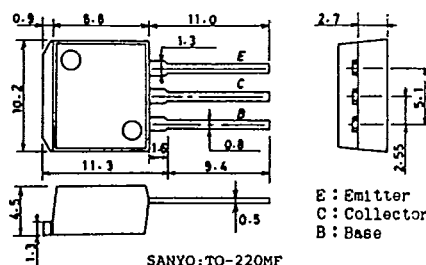


SANYO : TO- 3PBL

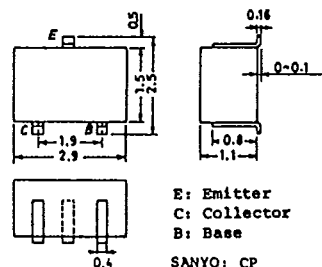


1: Drain
2: Source
3: Gate 1
4: Gate 2

unit:mm



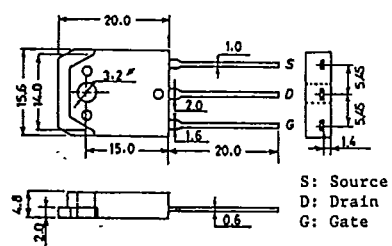
SANYO:TO-220MF



E: Emitter
C: Collector
B: Base

SANYO: CP

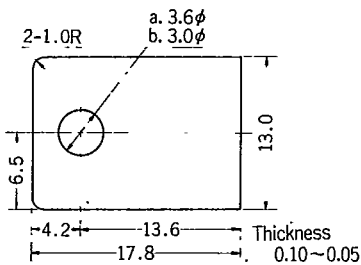
Case Outline—[2056] unit:mm



SANYO: TO3PB

Case Outline—[0008] unit:mm

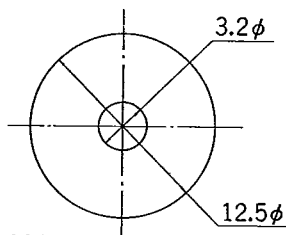
unit:mm

a. IS-313B
b. IS-313D

SANYO

Case Outline—[0004] unit:mm

unit:mm

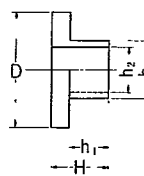


SANYO IS-126

Thickness : 0.075

Case Outline—[0009] unit:mm

unit:mm

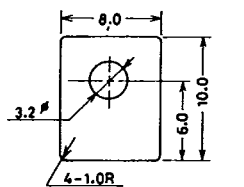


SANYO Bush

Bush	D	H	h ₁	h ₂	h ₃
A	8.0φ	4.0	2.8	3.1φ	3.89φ
B	8.0φ	3.0	1.8	3.1φ	3.89φ
C	8.0φ	5.7	4.5	3.1φ	3.89φ
D	8.0φ	2.7	1.5	3.1φ	3.89φ
E	8.0φ	3.4	2.2	3.1φ	3.89φ
F	8.0φ	4.0	2.8	3.0φ	3.59φ
K	16.0φ	3.4	1.4	3.1φ	6.0φ
L	6.0φ	3.1	1.5	2.6φ	3.5φ
M	6.0φ	3.1	1.5	3.0φ	3.59φ
P	6.0φ	2.3	1.1	3.0φ	3.59φ

Case Outline—[0005] unit:mm

unit:mm

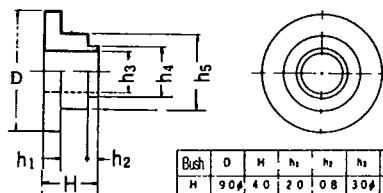


Thickness : 0.075

SANYO IS-126A Mica

Case Outline—[0010] unit:mm

unit:mm

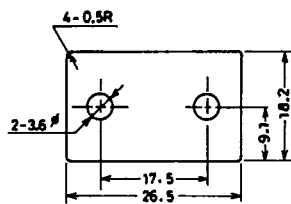


SANYO Bush

Bush	D	H	h ₁	h ₂	h ₃	h ₄	h ₅
H	9.0φ	4.0	2.0	0.8	3.0φ	3.59φ	5.6φ
T	9.0φ	5.8	2.0	2.6	3.0φ	3.59φ	5.6φ
UB	16.0φ	6.8	1.5	3.3	3.0φ	3.89φ	8.0φ

Case Outline—[0006] unit:mm

unit:mm

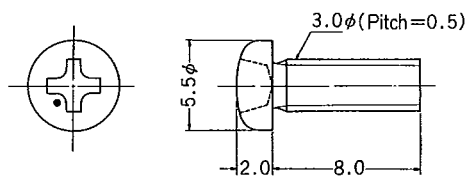


Thickness : 0.05~0.1

SANYO IS-20MA Mica

Case Outline—[0011] unit:mm

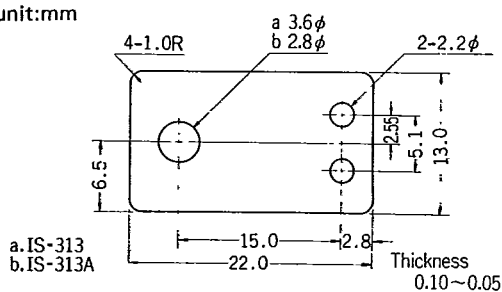
unit:mm



JIS No. B1111 M3×0.5

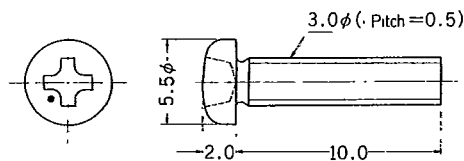
Case Outline—[0007] unit:mm

unit:mm



Case Outline—[0012] unit:mm

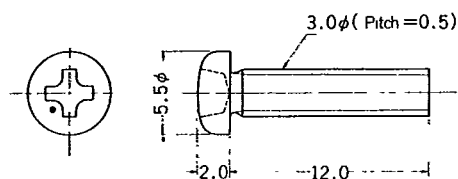
unit:mm



JIS No. B1111 M3×0.5

Case Outline—[0013]

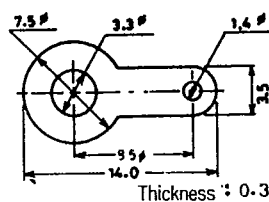
unit:mm



JIS No. B1111 M3×0.5

Case Outline—[0018]

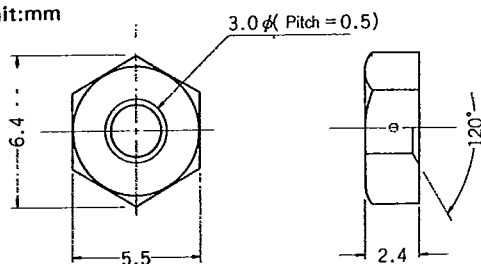
unit:mm



SANYO Lug 1.4

Case Outline—[0014]

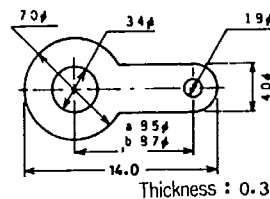
unit:mm



JIS No. B1181 M3×0.5

Case Outline—[0019]

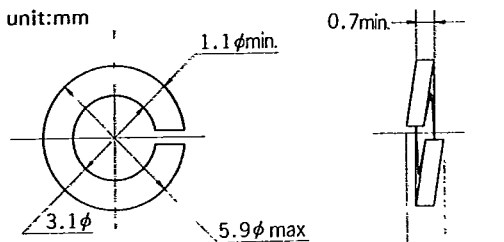
unit:mm



SANYO Lug 1.8φ

Case Outline—[0015]

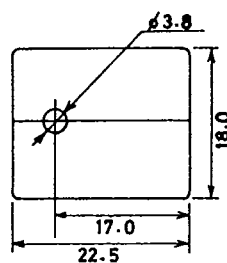
unit:mm



JIS No. B 1251 Spring washer (M3)

Case Outline—[0020]

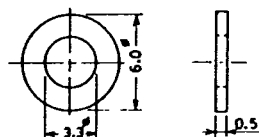
unit:mm



SANYO IS-3MP Mica

Case Outline—[0016]

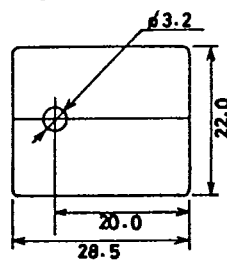
unit:mm



JIS No. B1252 Flat washer

Case Outline—[0021]

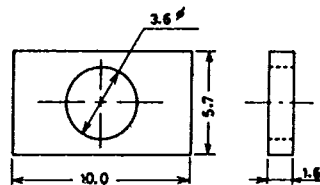
unit:mm



SANYO IS-MPC Mica

Case Outline—[0017]

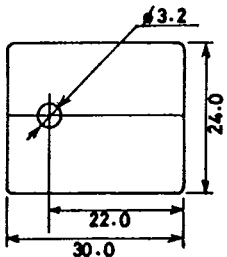
unit:mm



JIS No. G3141 Rectangular washer

Case Outline—[0022]

unit:mm



SANYO IS-3PBL Mica