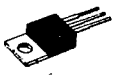
T-33-09

2SD330, 331


2010A


2012

NPN/PNP Triple Diffused Planar Silicon Transistors

2SB514, 515

Low Frequency Power Amp Applications

©397D

Especially suited for use in output stage of 10W AF Power amp. The only difference between B514 and D515 lies in package design; and the same is true of D330 and D331. The B514 and D330 can be connected to form a complementary pair; and the same is true of B515 and D331.

( ):2SB514,514.

Absolute Maximum Ratings at T_a=25°C

				unit
Collector to Base Voltage	V_{CBO}		(-)50	V
Collector to Emitter Voltage	V_{CEO}		(-)50	V
Emitter to Base Voltage	V_{EBO}		(-)5	V
Collector Current	I_C		(-)2	A
Peak Collector Current	i_{cp}		(-)5	A
Collector Dissipation	P_C		1.75	W
		T_C=25°C	20	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		-55 to +150	°C

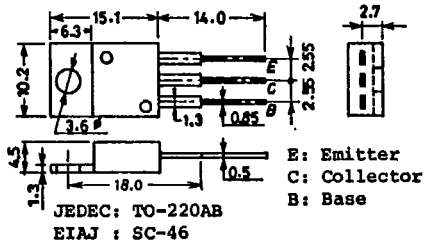
Electrical Characteristics at T_a=25°C

			min	typ	max	unit
Collector Cutoff Current	I_{CBO}	V_{CB}=(-)20V,I_E=0			(-)0.1	mA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(-)4V,I_C=0			(-)1.0	mA
DC Current Gain	$h_{FE(1)}$	V_{CE}=(-)2V,I_C=(-)1A	40*		320*	
	$h_{FE(2)}$	V_{CE}=(-)2V,I_C=(-)0.1A	35			
Gain Bandwidth Product	f_T	V_{CE}=(-)5V,I_C=(-)0.5A		8		MHz
C-E Saturation Voltage	$V_{CE(sat)}$	I_C=(-)2A,I_B=(-)0.2A			(-)1.0	V
Base to Emitter Voltage	V_{BE}	I_C=(-)1A,V_{CE}=(-)5V			(-)1.5	V

* The 2SB514,515/2SD330,331 are classified by 1A h_{FE} as follows

40 C 80	60 D 120	100 E 200	160 F 320

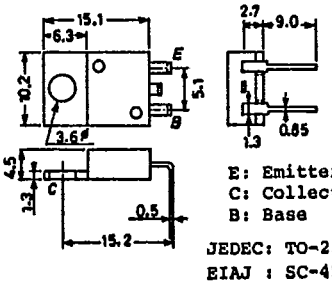
Case Outline 2010A
(unit:mm) [2SB514/2SD330]



E: Emitter
C: Collector
B: Base

JEDEC: TO-220AB
EIAJ : SC-46

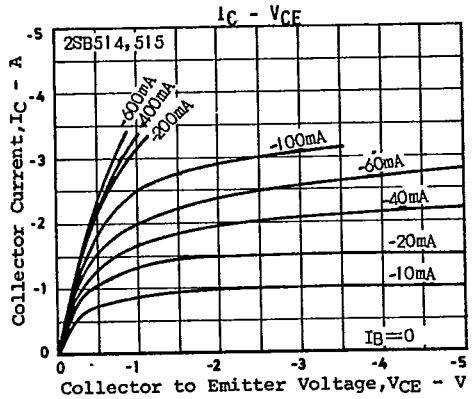
Case Outline 2012
(unit:mm) [2SB515/2SD331]

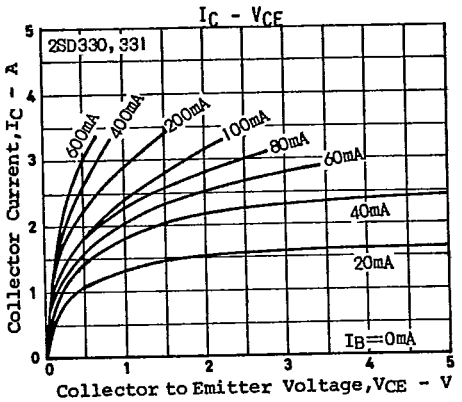


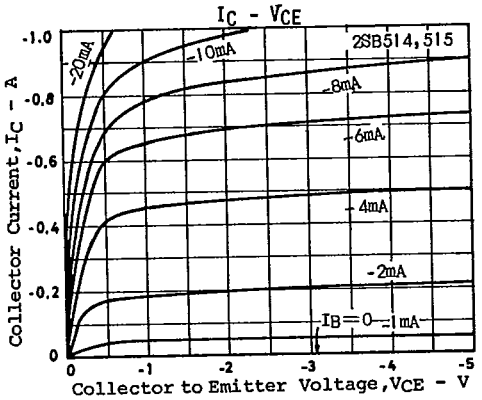
E: Emitter
C: Collector
B: Base

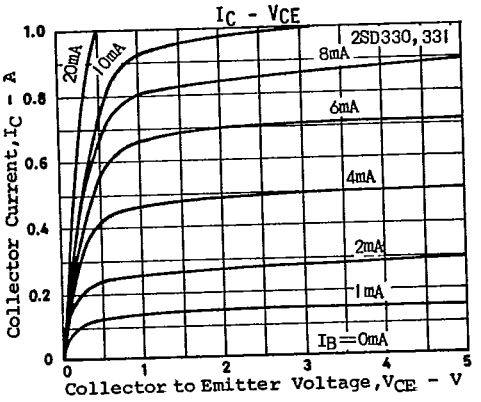
JEDEC: TO-220AA
EIAJ : SC-45

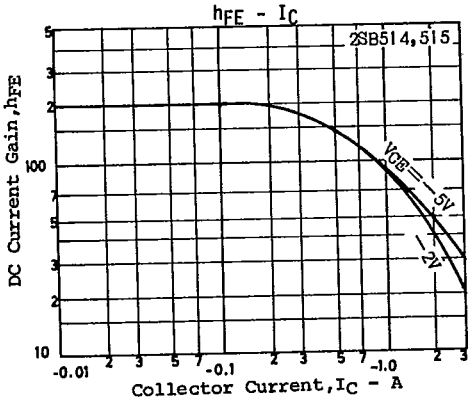
The 2SB515/D331 are scheduled to be discontinued soon. Use the 2SB514/D330, instead of the 2SB515/D331, in new applications where you are planning to use the 2SB515/D331.

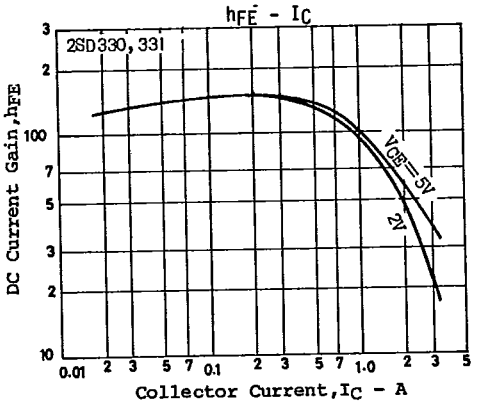

I_C - V_{CE}
2SB514,515
-600mA
-400mA
-200mA
-100mA
-60mA
-40mA
-20mA
-10mA
I_B=0
Collector Current,I_C - A
Collector to Emitter Voltage,V_{CE} - V

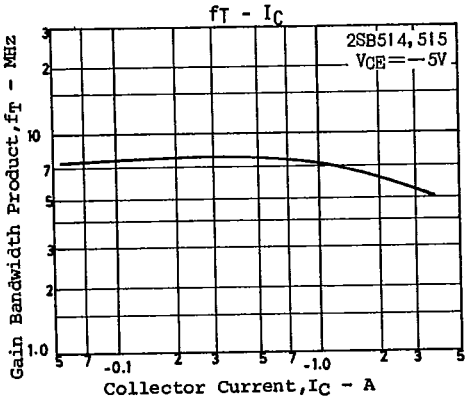

I_C - V_{CE}
2SD330, 331
600mA
400mA
200mA
100mA
80mA
60mA
40mA
20mA
I_B=0mA
Collector Current,I_C - A
Collector to Emitter Voltage,V_{CE} - V

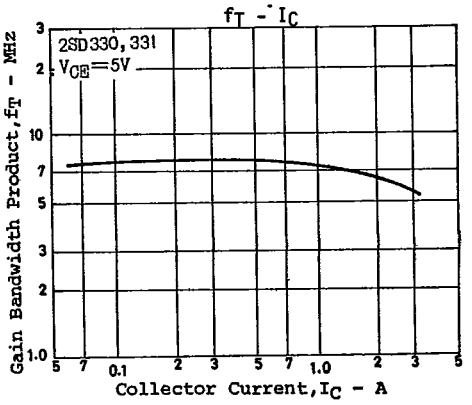

I_C - V_{CE}
2SB514,515
-20mA
-10mA
-8mA
-6mA
-4mA
-2mA
I_B=0--1mA
Collector Current,I_C - A
Collector to Emitter Voltage,V_{CE} - V

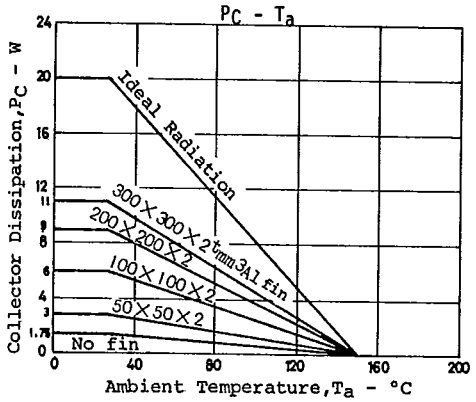

I_C - V_{CE}
2SD330, 331
20mA
10mA
8mA
6mA
4mA
2mA
1mA
I_B=0mA
Collector Current,I_C - A
Collector to Emitter Voltage,V_{CE} - V

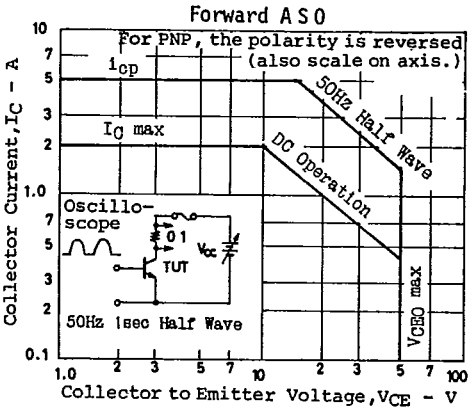

h_{FE} - I_C
2SB514,515
V_{CE}=-5V
-2V
DC Current Gain,h_{FE}
Collector Current,I_C - A


h_{FE} - I_C
2SD330, 331
V_{CE}=5V
2V
DC Current Gain,h_{FE}
Collector Current,I_C - A


f_T - I_C
2SB514,515
V_{CE}=-5V
Gain Bandwidth Product,f_T - MHz
Collector Current,I_C - A


f_T - I_C
2SD330, 331
V_{CE}=5V
Gain Bandwidth Product,f_T - MHz
Collector Current,I_C - A

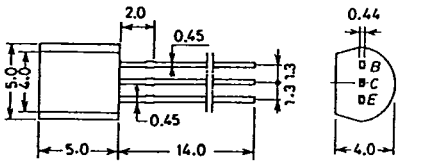

P_C - T_a
Collector Dissipation, P_C - W
Ambient Temperature, T_a - °C
Ideal Radiation
300×300×2t mm Al fin
200×200×2
100×100×2
50×50×2
No fin
24
20
16
12
11
9
8
6
4
3
1.75
0
0
40
80
120
160
200


Forward A S O
For PNP, the polarity is reversed
(also scale on axis.)
i_{CP}
I_C max
50Hz Half Wave
DC Operation
V_{CBO} max
Oscillo-
scope
TUT
V_{CC}
50Hz 1sec Half Wave
Collector Current, I_C - A
Collector to Emitter Voltage, V_{CE} - V
10
7
5
3
2
1.0
0.1
1.0
2
3
5
7
10
100

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.

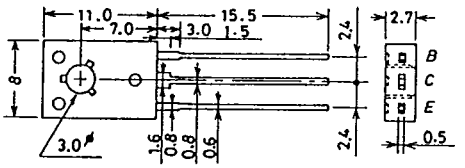
Case Outline—[2003A]
unit:mm



JEDEC: TO-92
EIAJ : SC-43
SANYO: NP

B. Base
C. Collector
E. Emitter

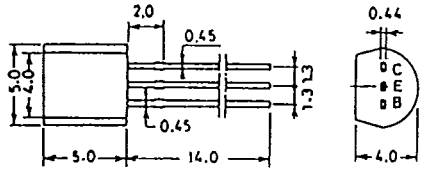
Case Outline—[2009A]
unit:mm



JEDEC: TO-126

B: Base
C: Collector
E: Emitter

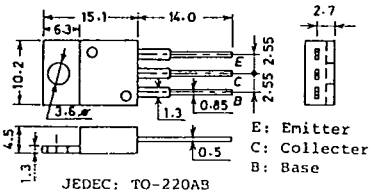
Case Outline—[2004A]
unit:mm



JEDEC: TO-92
EIAJ : SC-43
SANYO: NP

C. Collector
E. Emitter
B. Base

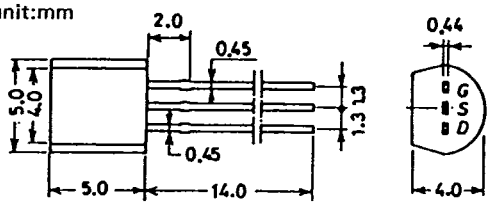
Case Outline—[2010A]
unit:mm



JEDEC: TO-220AB
EIAJ: SC-46

E: Emitter
C: Collecter
B: Base

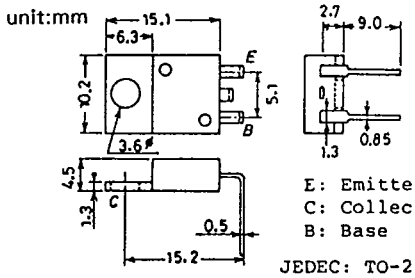
Case Outline—[2005A]
unit:mm



JEDEC: TO-92
EIAJ : SC-43
SANYO: NP

G: Gate
S: Source
D: Drain

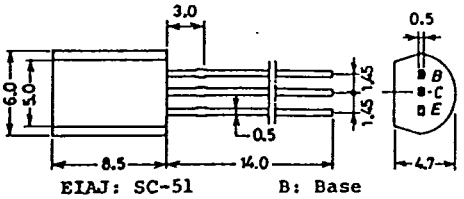
Case Outline—[2012]
unit:mm



E: Emitter
C: Collector
B: Base

JEDEC: TO-220AA
EIAJ : SC-45

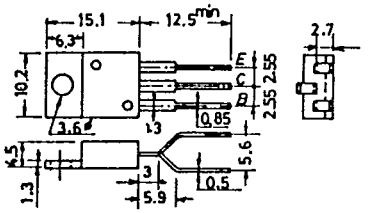
Case Outline—[2006A]
unit:mm



EIAJ: SC-51
SANYO:MP

B: Base
C: Collector
E: Emitter

Case Outline—[2013]
unit:mm

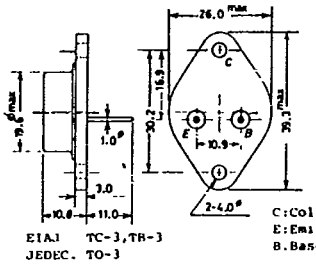


JEDEC TO-220

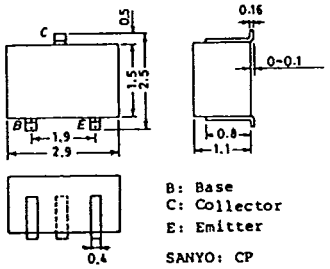
B: Base
C: Collector
E: Emitter

T-91-20

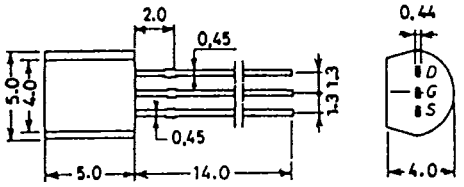
Case Outline—[2017]
unit:mm



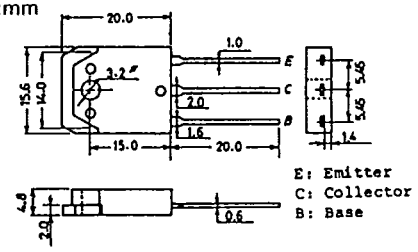
Case Outline—[2018A]
unit:mm



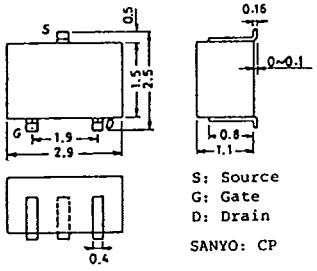
Case Outline—[2019A]
unit:mm



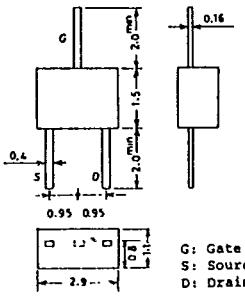
Case Outline—[2022]
unit:mm



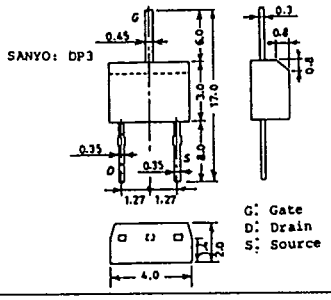
Case Outline—[2024A]
unit:mm



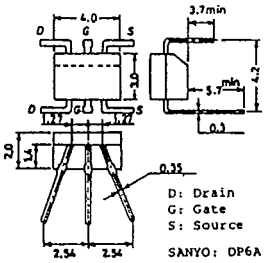
Case Outline—[2025]
unit:mm



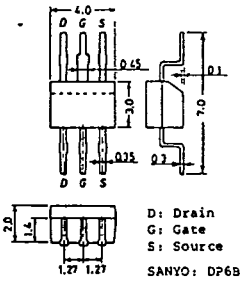
Case Outline—[2026]
unit:mm



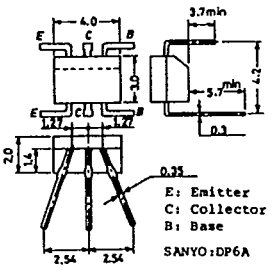
Case Outline—[2027A]
unit:mm



Case Outline—[2028A]
unit:mm



Case Outline—[2029A]
unit:mm



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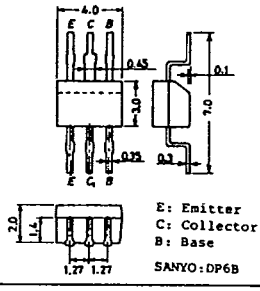
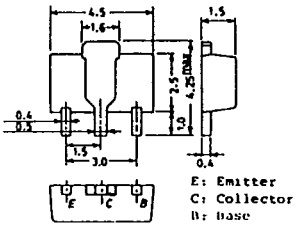
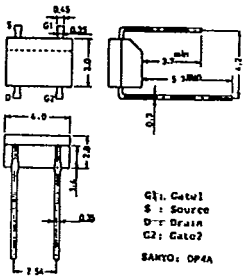
Case Outline—[2030A]
unit:mm



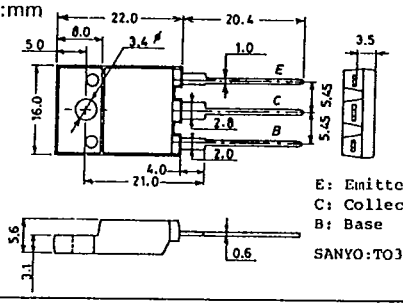
Case Outline—[2038]
unit:mm



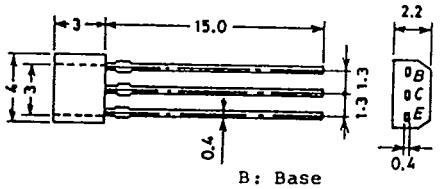
Case Outline—[2031A]
unit:mm



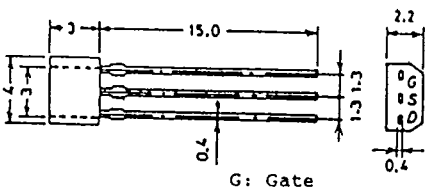
Case Outline—[2039]
unit:mm



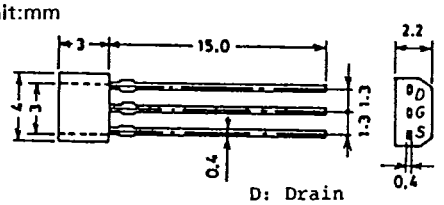
Case Outline—[2033]
unit:mm



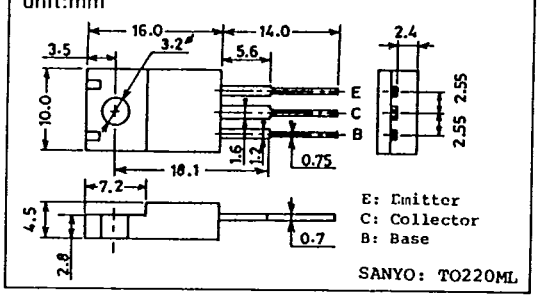
Case Outline—[2040]
unit:mm



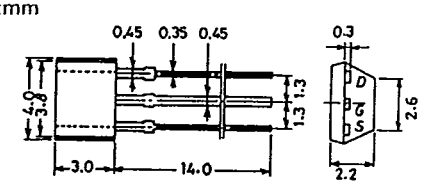
Case Outline—[2034]
unit:mm



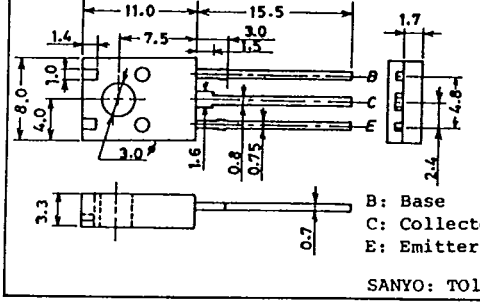
Case Outline—[2041]
unit:mm



Case Outline—[2037]
unit:mm



Case Outline—[2042A] unit:mm



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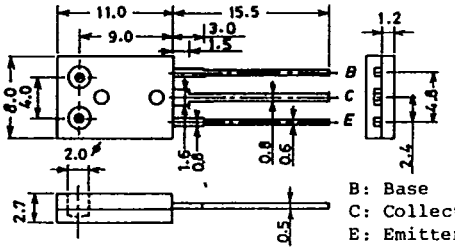
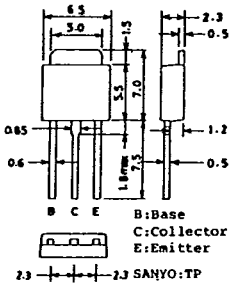
Case Outline—[2043A] unit:mm

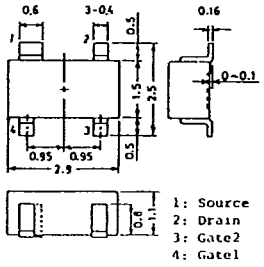


SANYO: TO126LP

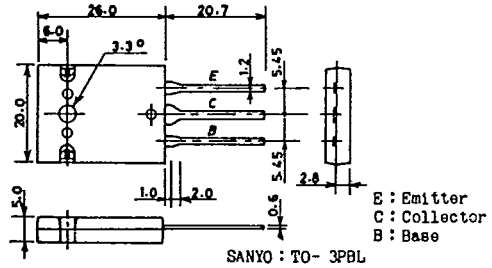
Case Outline—[2045] unit:mm



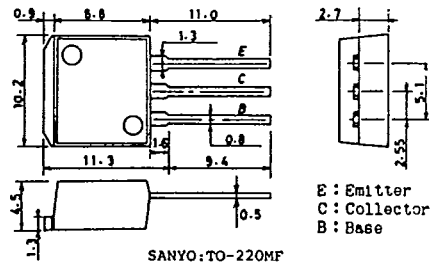
Case Outline—[2046] unit:mm



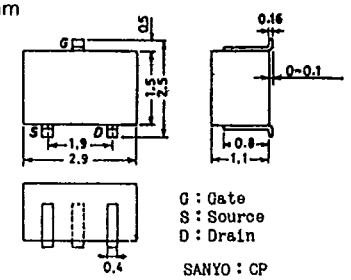
Case Outline—[2048] unit:mm



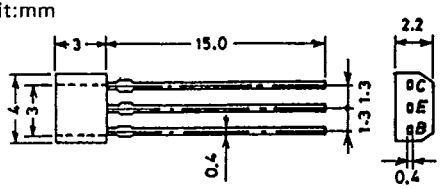
Case Outline—[2049] unit:mm



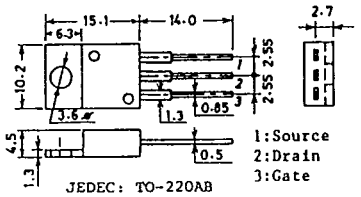
Case Outline—[2050] unit:mm



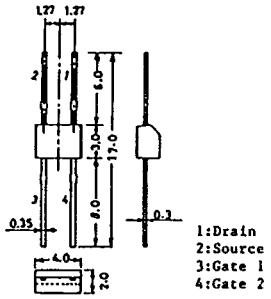
Case Outline—[2051] unit:mm



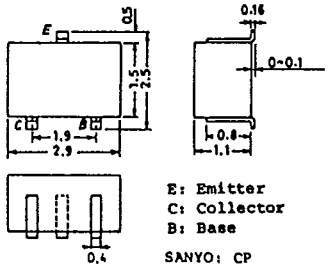
Case Outline—[2052A] unit:mm



Case Outline—[2053] unit:mm



Case Outline—[2054] unit:mm



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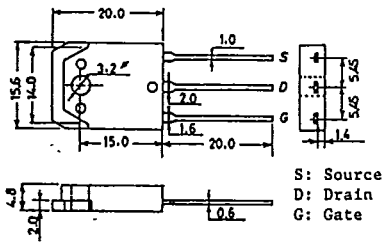
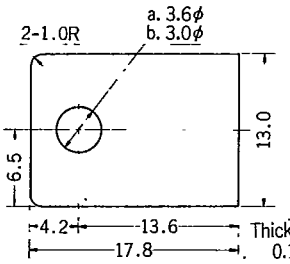
Case Outline—[2056] unit:mm



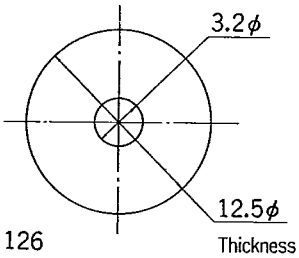
SANYO: TO3PB

Case Outline—[0008]
unit:mm



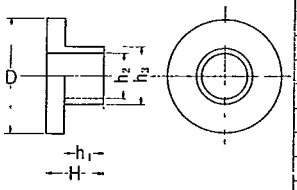
SANYO

Case Outline—[0004]
unit:mm



SANYO IS-126 Thickness : 0.075

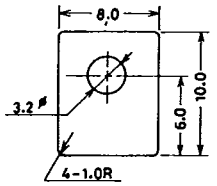
Case Outline—[0009]
unit:mm



Bush	D	H	h1	h2	h3
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

SANYO Bush

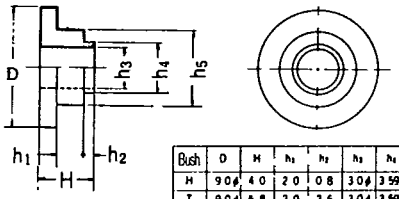
Case Outline—[0005]
unit:mm



Thickness : 0.075

SANYO IS-126A Mica

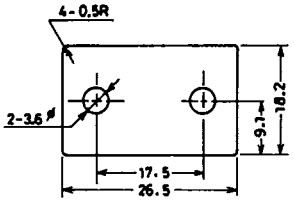
Case Outline—[0010]
unit:mm



Bush	D	H	h1	h2	h3	h4	h5
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

SANYO Bush

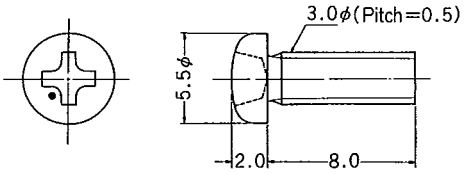
Case Outline—[0006]
unit:mm



Thickness : 0.05~0.1

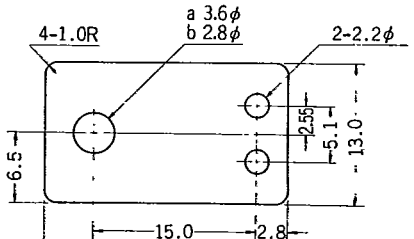
SANYO IS-20MA Mica

Case Outline—[0011]
unit:mm



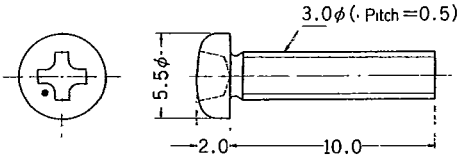
JIS No.B1111 M3×0.5

Case Outline—[0007]
unit:mm



a. IS-313
b. IS-313A
Thickness
0.10~0.05

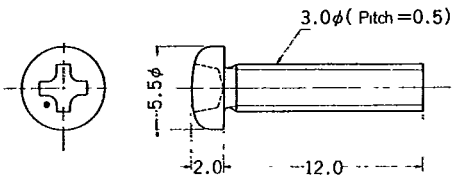
Case Outline—[0012]
unit:mm



JIS No.B1111 M3×0.5

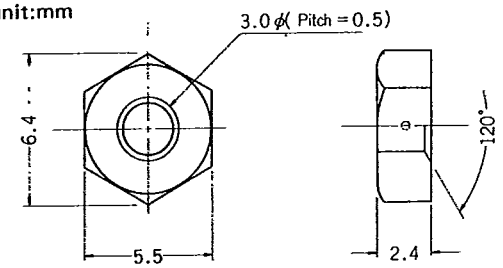
T-91-20

Case Outline—[0013]
unit:mm



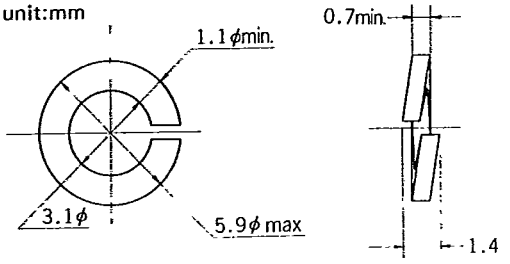
JIS No.B1111 M3×0.5

Case Outline—[0014]
unit:mm



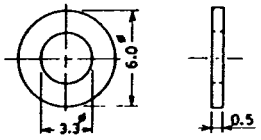
JIS No. B1181 M3×0.5

Case Outline—[0015]
unit:mm



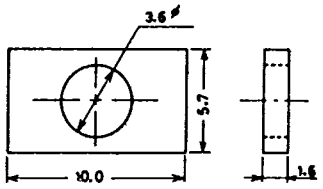
JIS No. B 1251 Spring washer (M3)

Case Outline—[0016]
unit:mm



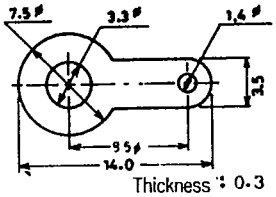
JIS No.B1252 Flat washer

Case Outline—[0017]
unit:mm



JIS No.G3141 Rectangular washer

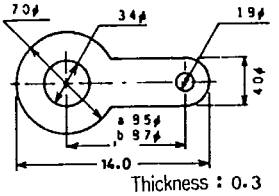
Case Outline—[0018]
unit:mm



Thickness : 0.3

SANYO Lug 1.4

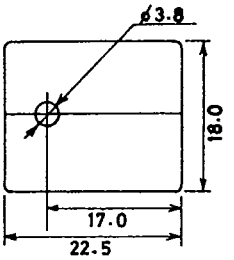
Case Outline—[0019]
unit:mm



Thickness : 0.3

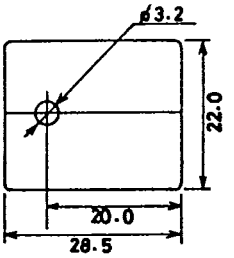
SANYO Lug 1.8φ

Case Outline—[0020]
unit:mm



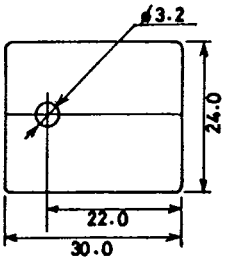
SANYO IS-3MP Mica

Case Outline—[0021]
unit:mm



SANYO IS-MPC Mica

Case Outline—[0022]
unit:mm



SANYO IS-3PBL Mica