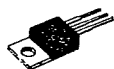
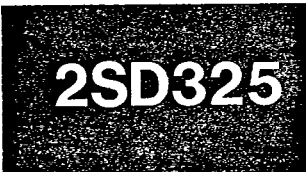


T-33-07



2010A

NPN/PNP Triple Diffused Planar Silicon Transistors

2SB511

Low Frequency Power Amp Applications

©398F

. 5 Watts AF Power amplifier output use. There are complementary pair.

(): 2SB511

Absolute Maximum Ratings at Ta=25°C

Collector to Base Voltage	V _{CB0}	(-) 35	V
Collector to Emitter Voltage	V _{CE0}	(-) 35	V
Emitter to Base Voltage	V _{EB0}	(-) 5	V
Collector Current	I _C	(-) 1.5	V
Peak Collector Current	i _{cp}	(-) 3	A
Collector Dissipation	P _C	1.75	W
		10	W
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

T_c=25°C

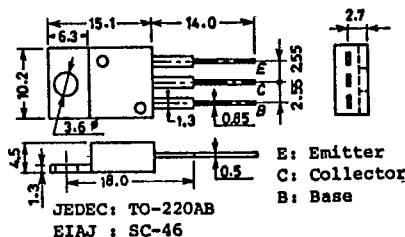
Electrical Characteristics at Ta=25°C

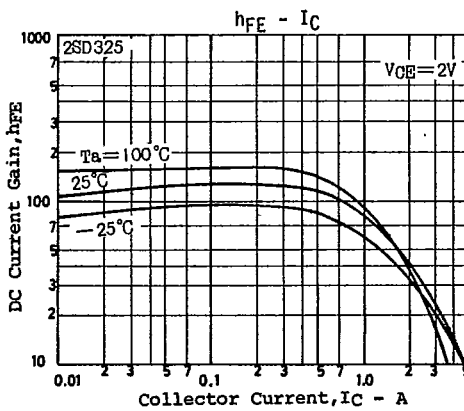
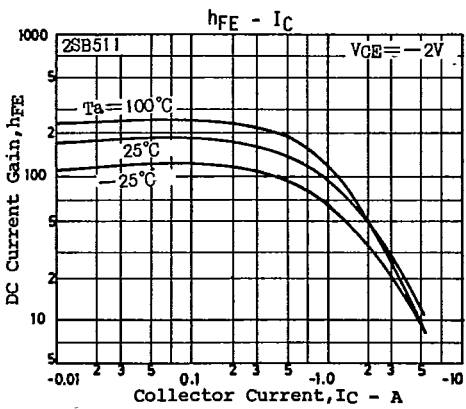
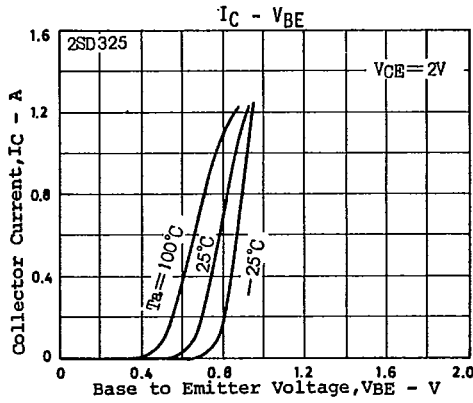
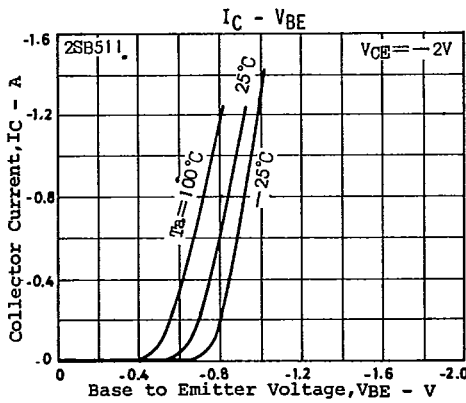
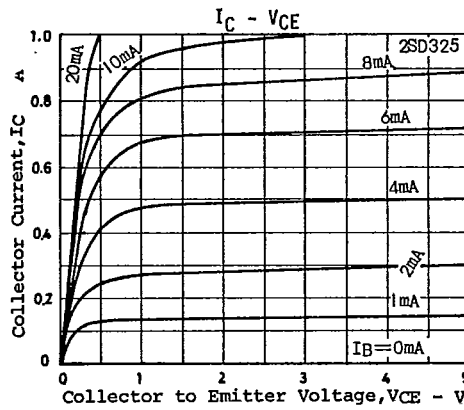
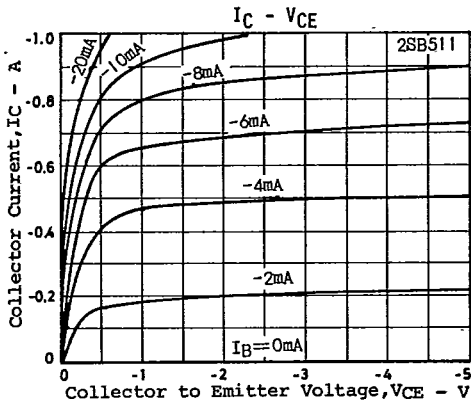
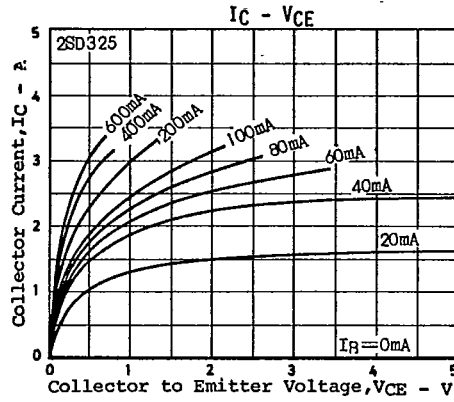
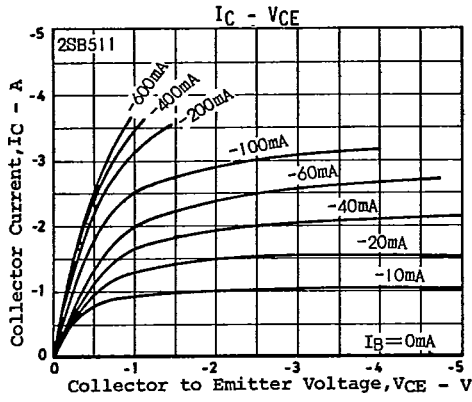
		min	typ	max	unit
Collector Cutoff Current	I _{CB0} V _{CB} =(-) 20V, I _E =0			(-) 0.1	mA
Emitter Cutoff Current	I _{EB0} V _{EB} =(-) 4V, I _C =0			(-) 1.0	mA
DC Current Gain	h _{FE} (1) V _{CE} =(-) 2V, I _C =(-) 1A	40*		320*	
	h _{FE} (2) V _{CE} =(-) 2V, I _C =(-) 0.1A	35			
Gain Bandwidth Product	f _T V _{CE} =(-) 5V, I _C =(-) 0.5A		8		MHz
C-E Saturation Voltage	V _{CE(sat)} I _C =(-) 1.5A, I _B =(-) 0.15A			(-) 1.0	V
Base to Emitter Voltage	V _{BE} I _C =(-) 1A, V _{CE} =(-) 5V			(-) 1.5	V

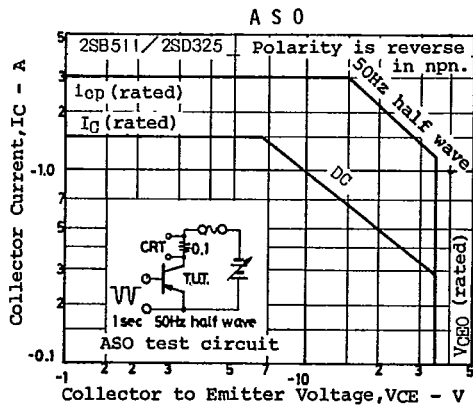
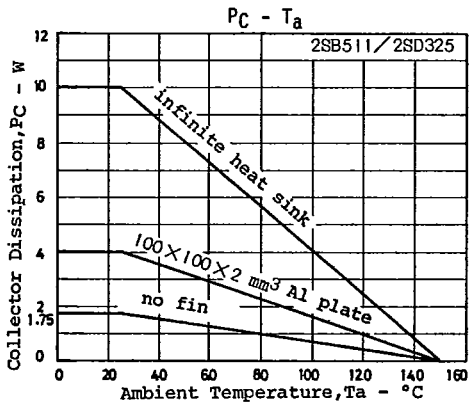
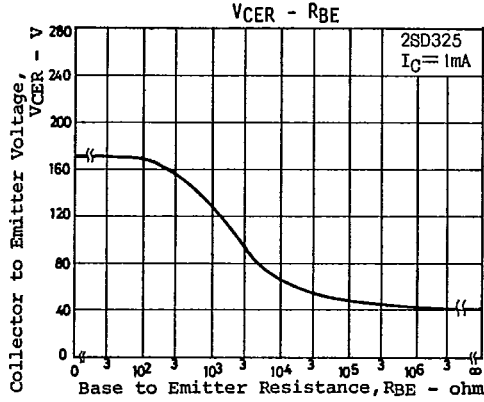
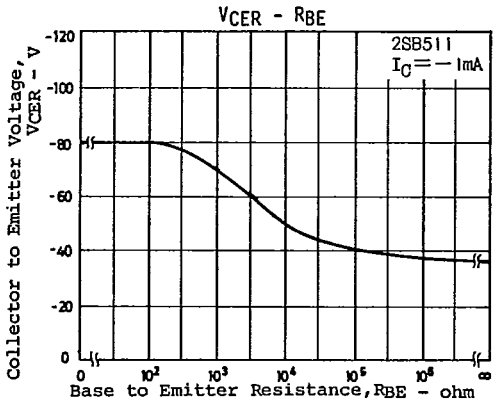
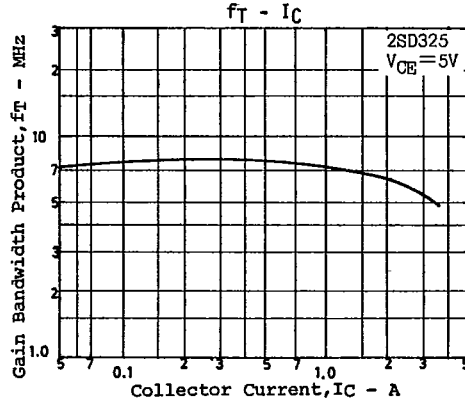
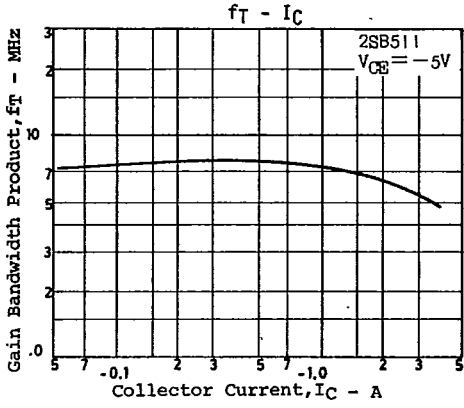
*: The 2SB511/2SD325 are classified by 1A h_{FE} as follows:

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

Case Outline 2010A
(unit:mm)

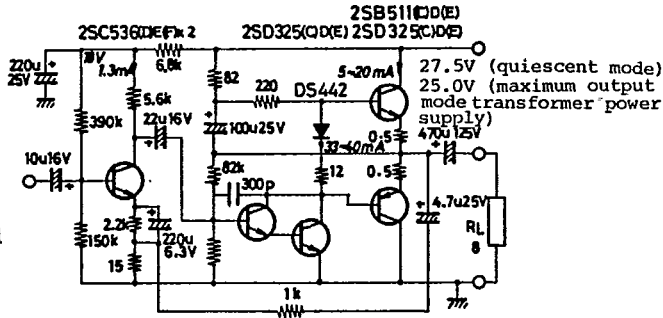






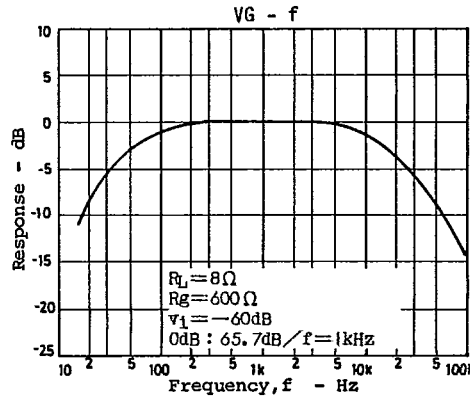
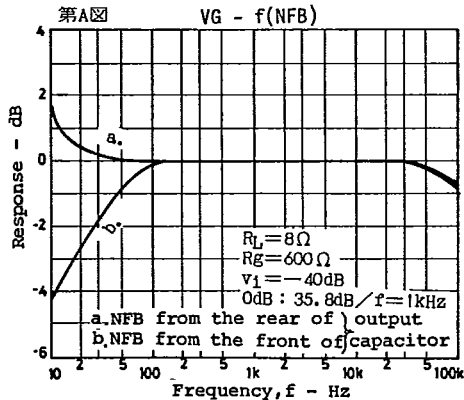
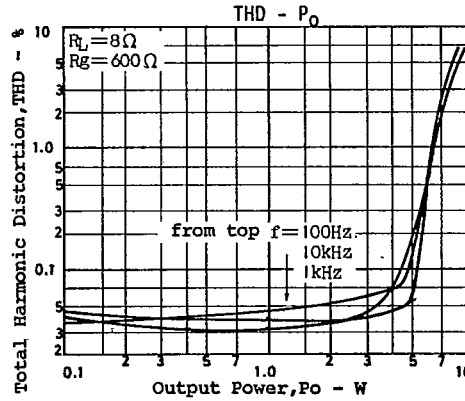
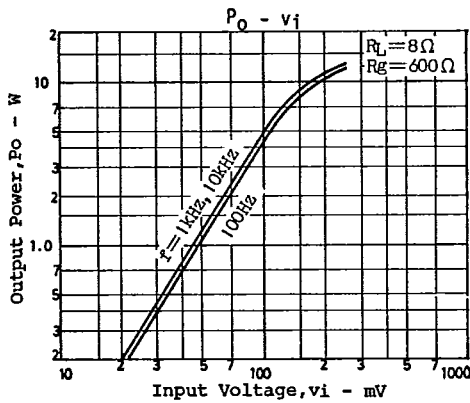
Application Circuit 1: 8W Pure Complementary Push-pull Power Amp. Using 2SB511/2SD325.

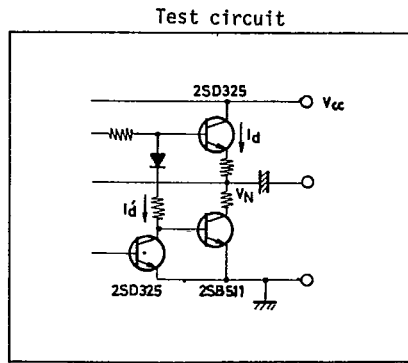
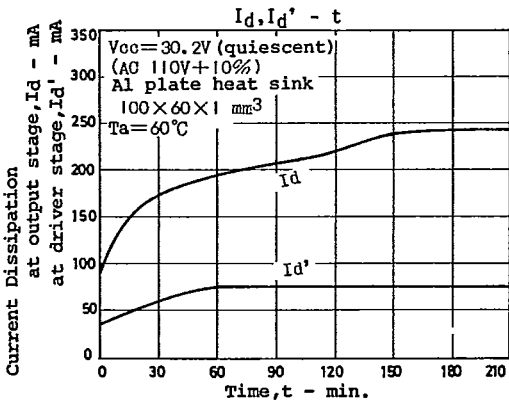
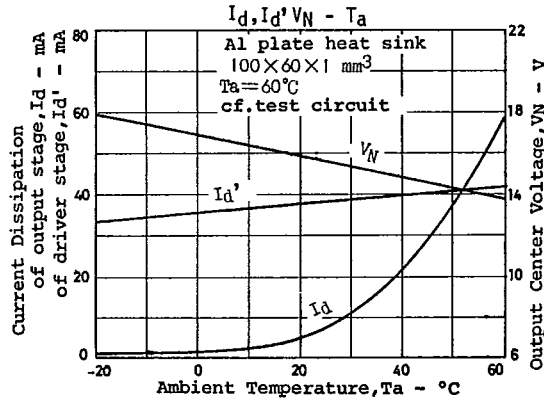
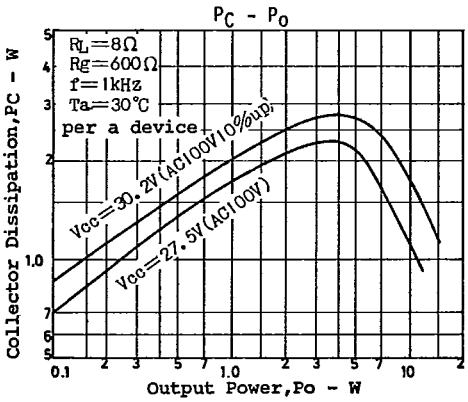
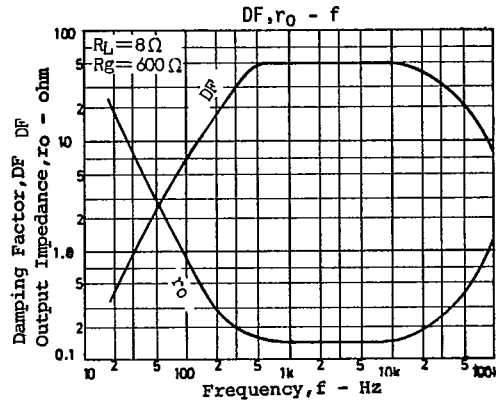
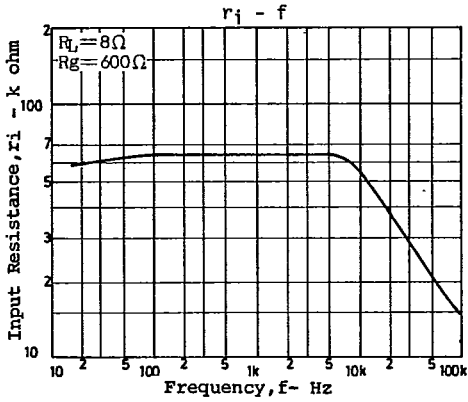
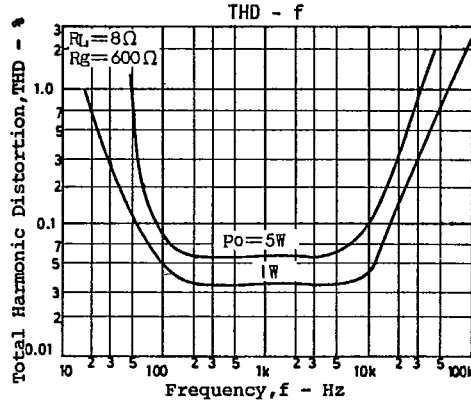
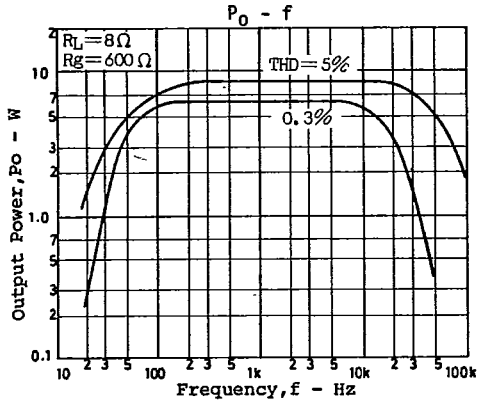
If NFB is applied from after the coupling capacitor, phase shift occurs at low frequencies, increasing the gain at low frequencies as indicated by curve a in Fig. A. NFB is applied from before the output capacitor as shown right to avoid this phenomenon. However, since the voltage actually developed across the load is the voltage divided by the capacitor and load resistor, the gain starts lowering at a rather lower frequency. Therefore, the value of capacitor C_{NF} connected in series with the feedback resistor is made to be 4.7 μ F.

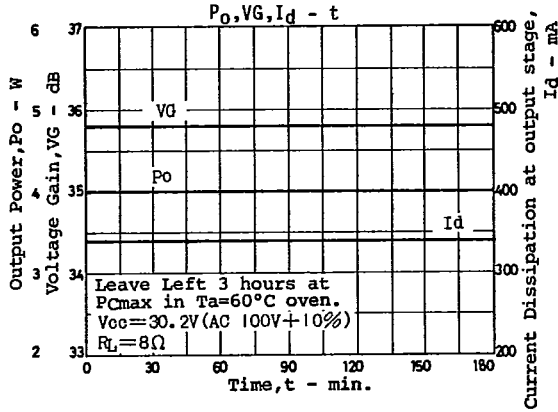


Main Characteristics

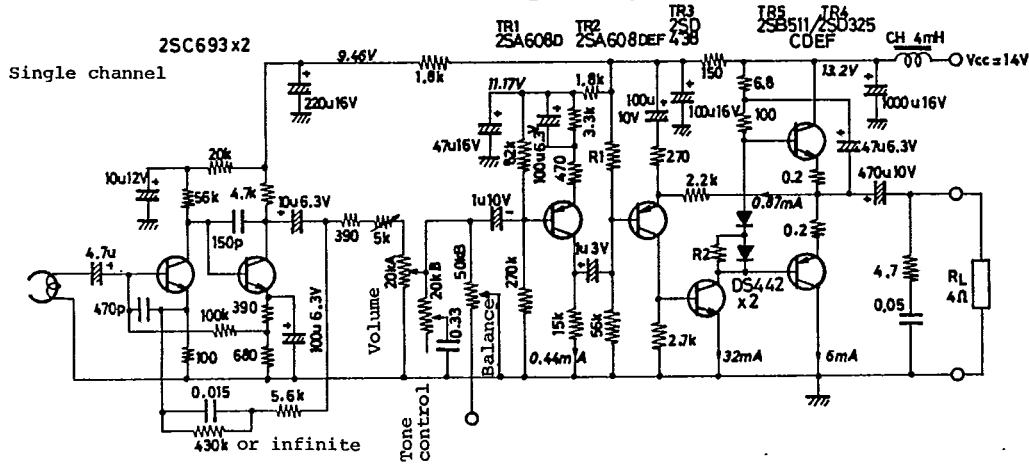
Voltage Gain	VG	Without NFB	65 to 67 dB
		With NFB	35.8 dB
Output Power	Po	THD=5%	7.2 to 8.6 W
Total Harmonic Distortion	THD	Po+3W	0.03 to 0.09 %
Input Impedance	ri		65 to 80 kohm
Output Impedance	ro		0.16 ohm
Damping factor	DF		50







Application Circuit 2: 4.3W Car Stereo Amp. Using 2SB511/2SD325

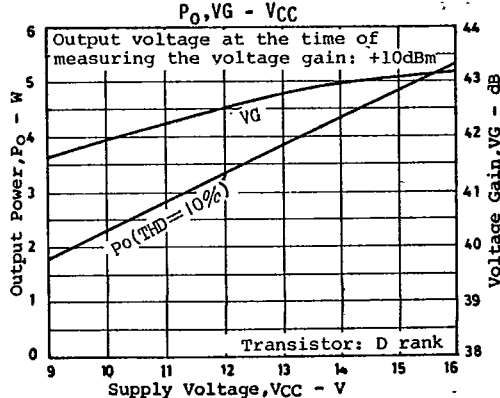
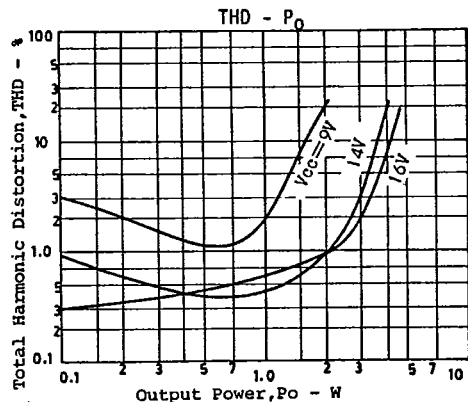
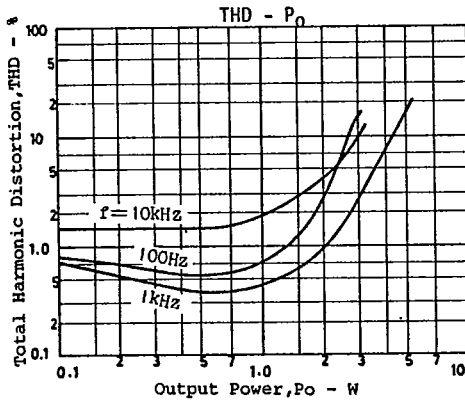
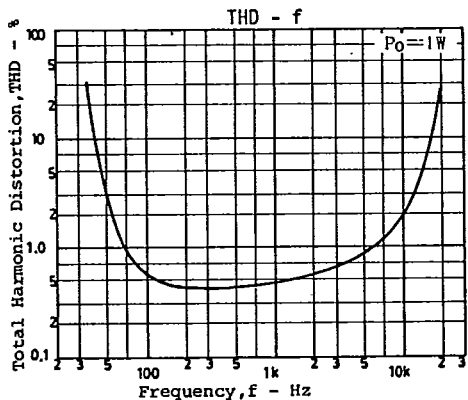
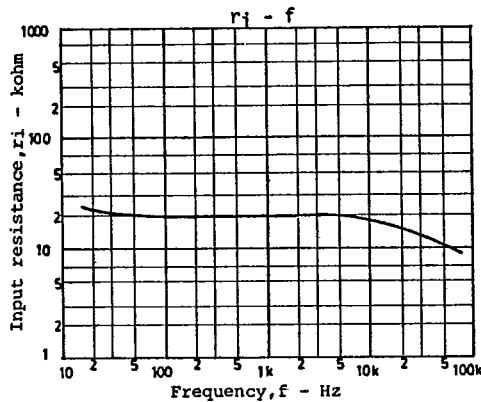
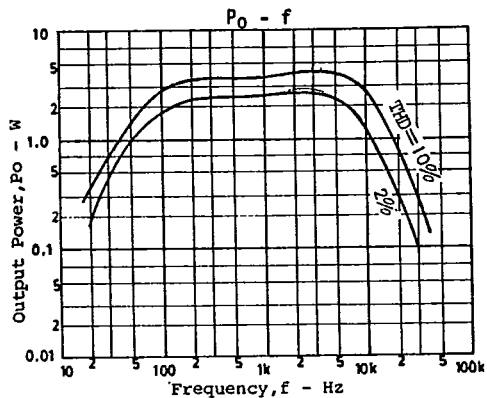
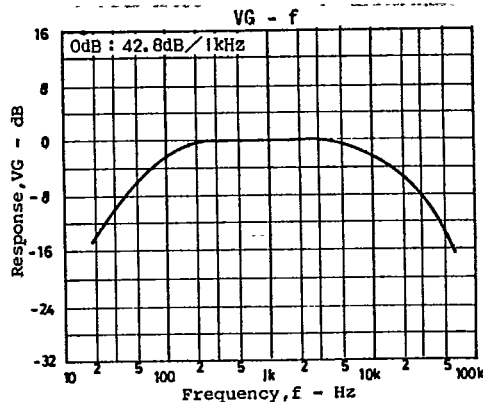
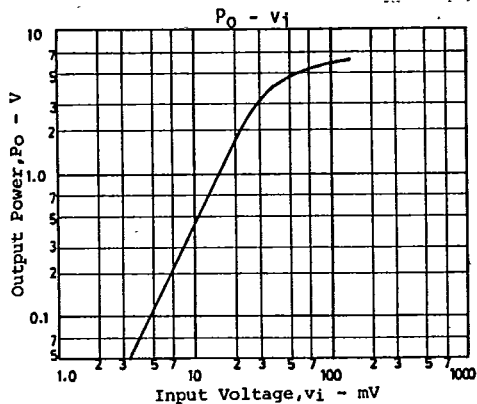


Main Characteristics at VCC=14V, RL=4ohm, Rg+600ohm, f=1kHz

Voltage Gain	VG	42.8	dB
Output Power	Po THD=10%	3.85	W
Total Harmonic Distortion	THD Po=1W	0.45	%
Frequency	-3dB	80 to 15k	Hz
Input Impedance	ri	20	kohm
Output Impedance	ro	0.99	ohm

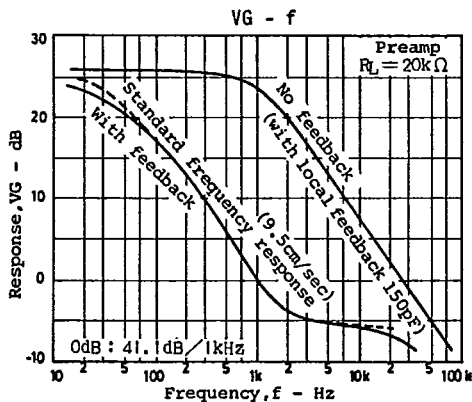
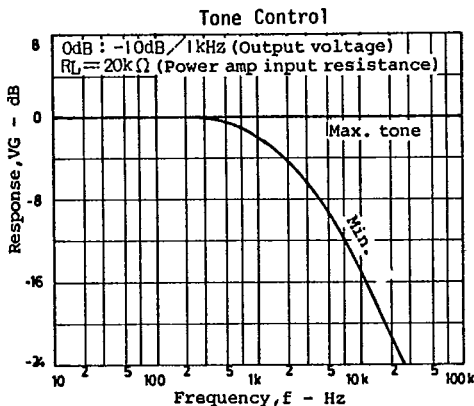
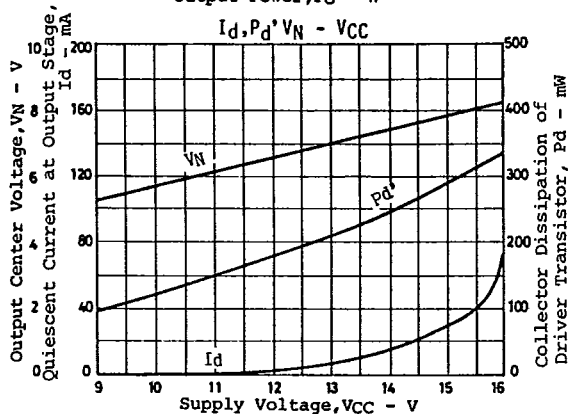
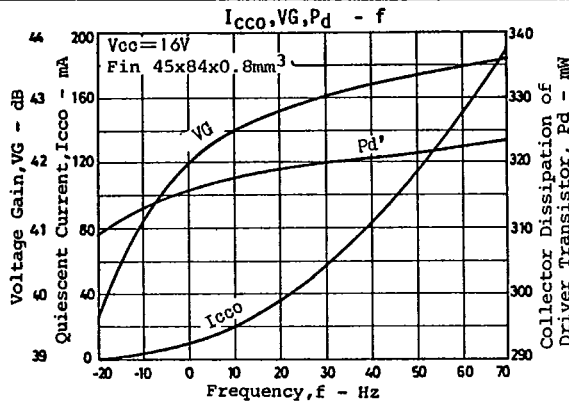
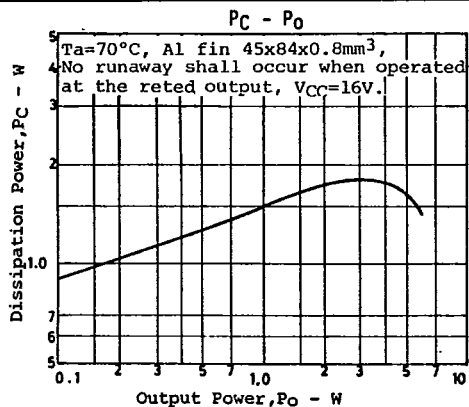
hFE rank of each transistor and circuit constants corresponding to such hFE rank

hFE rank					Circuit constants	Idling current (in collector of TR5)	THD 10% output	Gain
TR1 A608	TR2 A608	TR3 C875	TR4 D325	TR5 B511				
					R1 R2	mA	W	dB
D	D	D	C	C	120k 13	3.5	3.3	41.8
D	F	E	C	C	100k 13	7.3	3.4	42.9
D	D	D	D	D	120k 13	6.0	3.85	42.6
D	F	E	D	D	100k 13	11.5	3.95	43.5
D	D	D	E	E	100k 13	7.2	4.1	43.0
D	F	E	E	E	82k 13	11.3	4.2	43.7
D	D	D	F	F	100k 12	7.0	4.1	43.5
D	F	E	F	F	82k 12	9.7	4.2	43.9



2SD325/2SB511

T-33-07

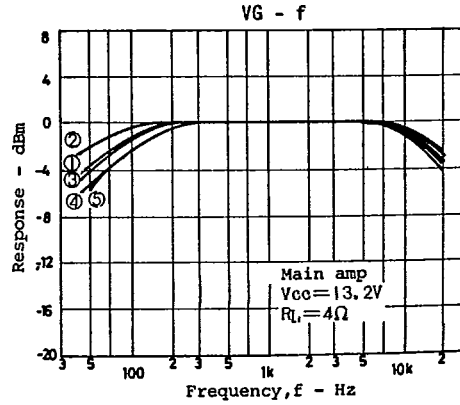
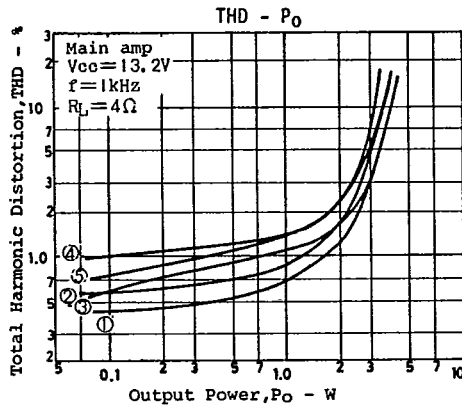
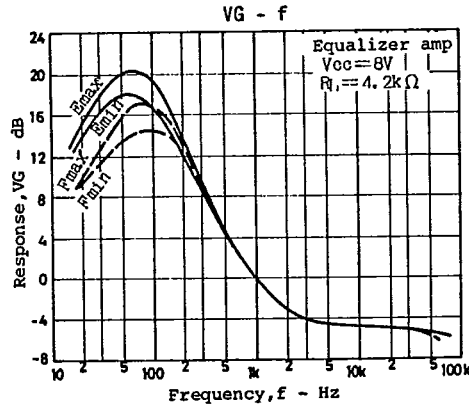
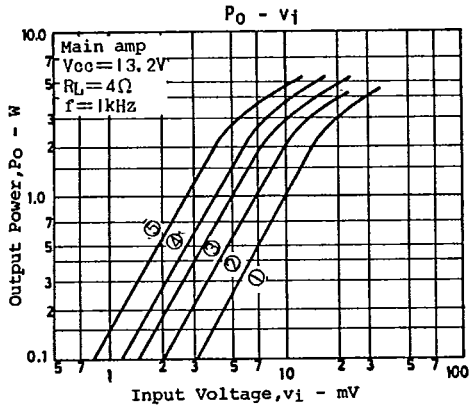
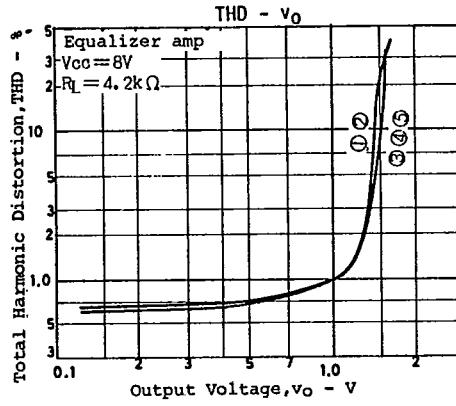
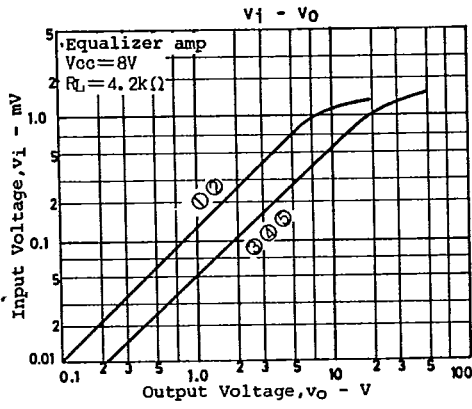
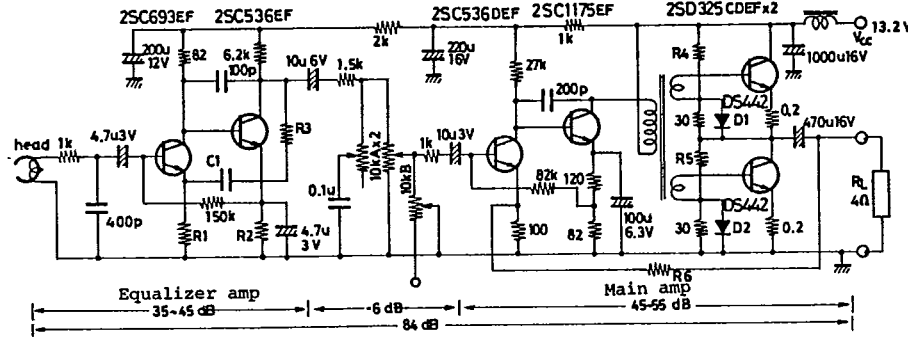


Application Circuit 3: 4W Car Stereo Pre & Main Amp Using 2SD325 x 2

hfg rank-Circuit constants-Circuit characteristics (The fraction in each column represents characteristic variations depending on the upper/lower limits of each hfg rank.)

Circuit	hfg rank					Equalizer amp							Main amp							
	C858	C537	C537	C1175	D325	R1	R2	R3	C1	V _G (NFB)	V _G (open loop)	V ₀ *	V ₀	r ₁	R4	R6	V _G (NFB)	V _G (open loop)	I _d	r ₁
						Ω	Ω	Ω	μF	dB	dB	dB	V	Ω	Ω	Ω	dB	dB	mA	Ω
①	F	F	E	E	C	110	750	9.1k	0.01	42.1 42.6	58.5 62.5	64.5 67.4	1.05 1.34	100k 135k	270	30k	44.1 48.2	50.5 64.5	20 58	25k 57k
②	F	F	F	F	C										270	36k	47.4 50.4	56.0 67.8	25 50	40k 65k
③	E	E	D	F	D										300	56k	51.4 53.7	60.9 67.2	15 20	24k 47k
④	E	E	D	F	E	220	910	6.2k	0.015	33.9 34.2	53.5 57.2	60.4 63.5	0.95 1.15	100k 150k	300	68k	52.7 55.3	61.0 72.0	15 25	22k 50k
⑤	E	E	E	F	F										300	100k	56.7 57.9	66.9 72.3	30 32	35k 58k

* Open loop, without R_L



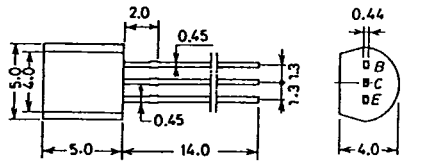
T-91-20

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

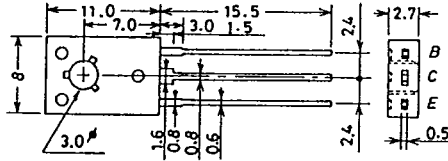


JEDEC: TO-92
EIAJ: SC-43
SANYO: NP

B. Base
C. Collector
E. Emitter

Case Outline-[2009A]

unit:mm

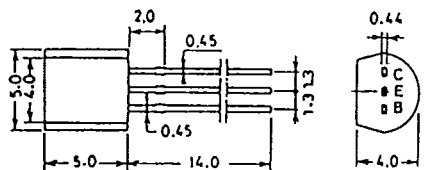


JEDEC: TO-126

B: Base
C: Collector
E: Emitter

Case Outline-[2004A]

unit:mm

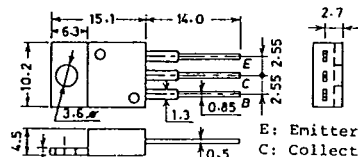


JEDEC: TO-92
EIAJ: SC-43
SANYO: NP

C. Collector
E. Emitter
B. Base

Case Outline-[2010A]

unit:mm

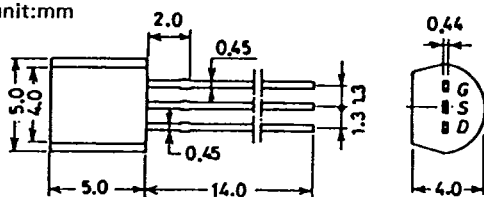


JEDEC: TO-220AB
EIAJ: SC-46

E: Emitter
C: Collector
B: Base

Case Outline-[2005A]

unit:mm

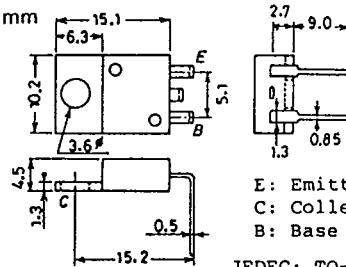


JEDEC: TO-92
EIAJ: SC-43
SANYO: NP

G: Gate
S: Source
D: Drain

Case Outline-[2012]

unit:mm

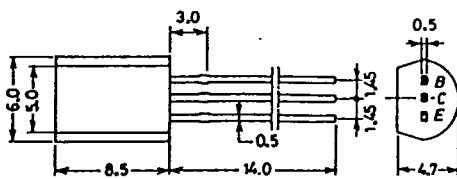


JEDEC: TO-220AA
EIAJ: SC-45

E: Emitter
C: Collector
B: Base

Case Outline-[2006A]

unit:mm

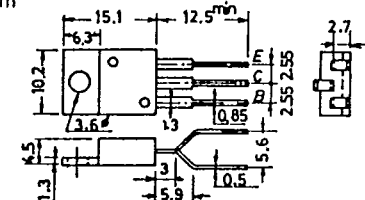


EIAJ: SC-51
SANYO: MP

B: Base
C: Collector
E: Emitter

Case Outline-[2013]

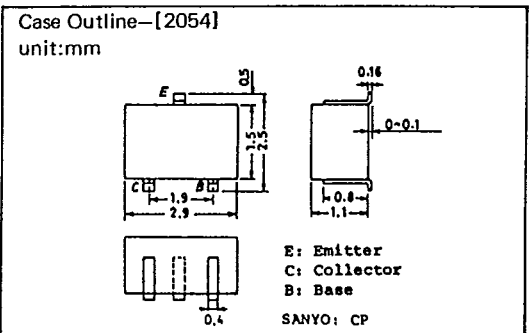
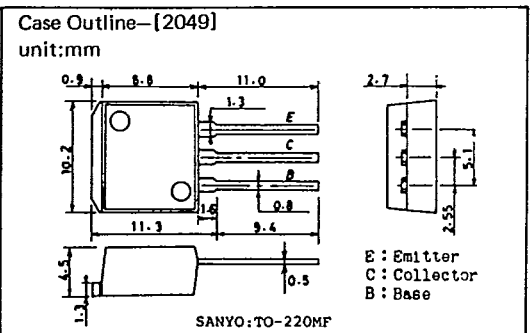
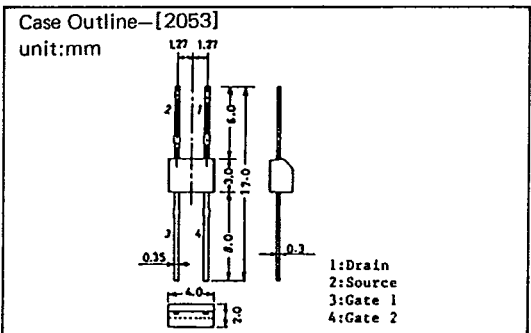
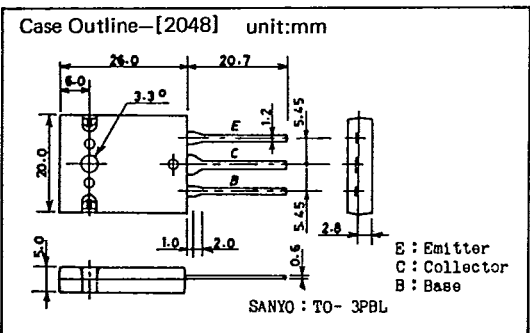
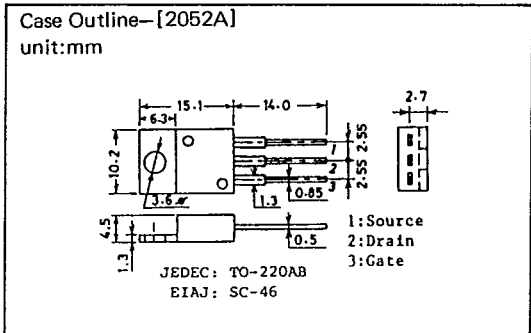
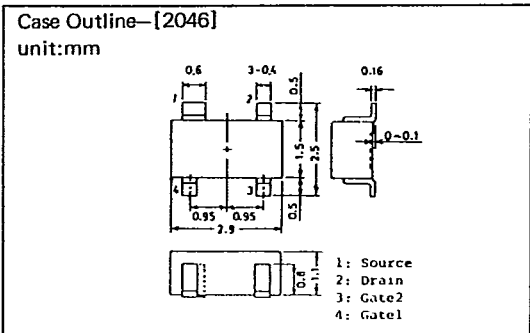
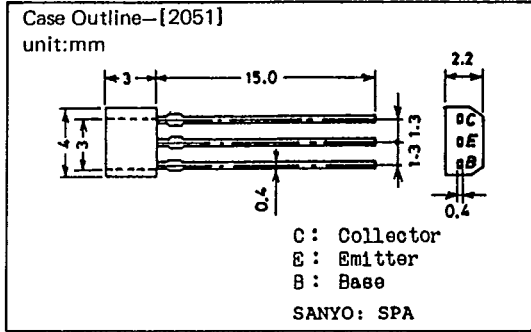
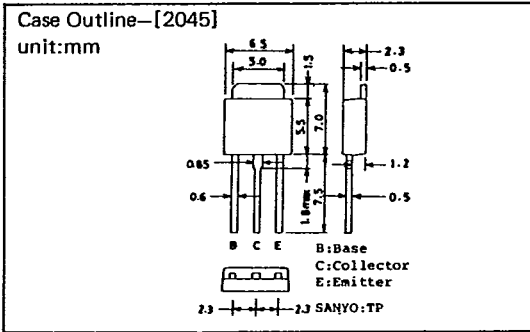
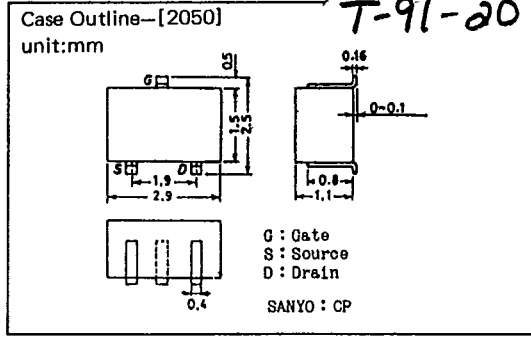
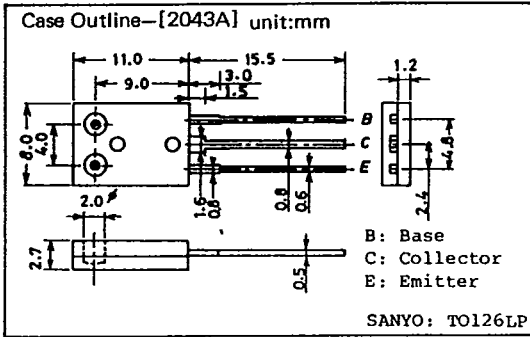
unit:mm



JEDEC TO-220

B: Base
C: Collector
E: Emitter

T-91-20



T-91-20

