Ordering number:ENN341G

PNP/NPN Epitaxial Planar Silicon Transistor

2SB632, 632K/2SD612, 612K

25V/35V, 2A Low-Frequency Power Amplifier Applications

Features

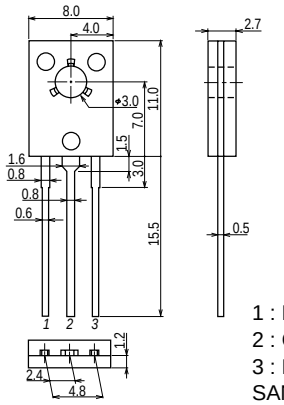
· High collector dissipation and wide ASO.

Package Dimensions

unit:mm

2009B

[2SB632, 632K/2SD612, 612K]



1 : Emitter
2 : Collector
3 : Base
SANYO : TO-126

( ) : 2SB632, 632K

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}	B632, D612	(–)25	V
		B632K, D612K	(–)35	
Collector-to-Emitter Voltage	V_{CEO}	B632, D612	(–)25	V
		B632K, D612K	(–)35	
Emitter-to-Base Voltage	V_{EBO}		(–)5	V
Collector Current	I_C		(–)2	A
Collector Current (Pulse)	I_{CP}		(–)3	A
Collector Dissipation	P_C		1	W
		Tc=25˚C	10	W
Junction Temperature	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

Electrical Characteristics at Ta = 25˚C

Parameter	Symbol	Conditions		Ratings min	Ratings typ	Ratings max	Unit
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	B632, D612	(–)25			V
			B632K, D612K	(–)35			V
Collector-to-Emitter Brakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	B632, D612	(–)25			V
			B632K, D612K	(–)35			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(–)10μA, I_C=0		(–)5			V
Collector Cutoff Current	I_{CBO}	V_{CB}=(–)20V, I_E=0				(–)1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)4V, I_C=0				(–)1	μA

Continued on next page.

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

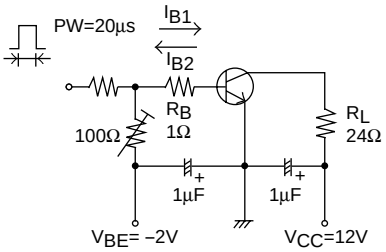
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
DC Current Gain	$h_{FE}1$	V_{CE}=(–)2V, I_C=(–)500mA	60*		320*	
	$h_{FE}2$	V_{CE}=(–)2V, I_C=(–)1.5A	30			
Gain-Bandwidth Product	f_T	V_{CE}=(–)10V, I_C=(–)50mA		100		MHz
Output Capacitance	C_{ob}	V_{CB}=(–)10V, f=1MHz		(45)30		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)1.5A, I_B=(–)0.15A		(–0.4)	(–0.9)	V
				0.3	0.8	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)1.5A, I_B=(–)0.15A		(–)1.1	(–)1.5	V
Turn-ON Time	t_{on}	See specified Test Circuit		(60)50		ns
Fall Time	t_f	See specified Test Circuit		(80)		ns
				100		ns
Storage Time	t_{stg}	See specified Test Circuit		400		ns

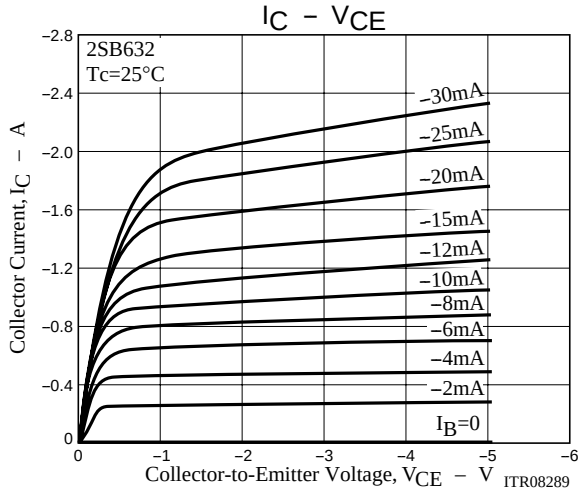
* : The 2SB632/2SD612 are classified by 500mA h_{FE} as follows :

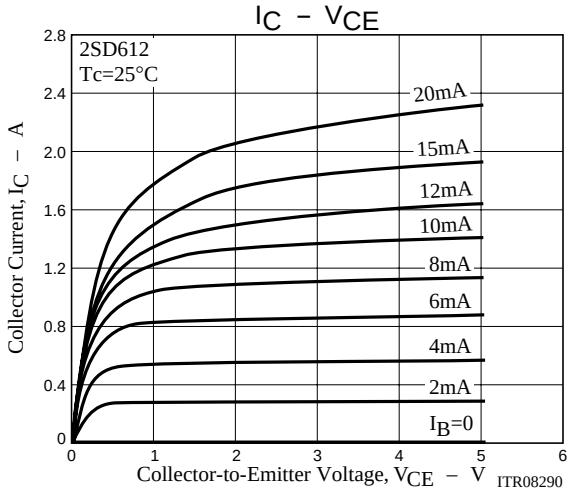
Rank	D	E	F
h_{FE}	60 to 120	100 to 200	160 to 320

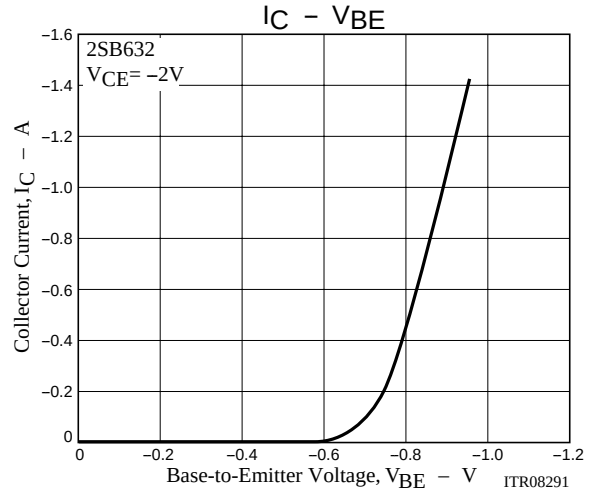
Switching Time Test Circuit

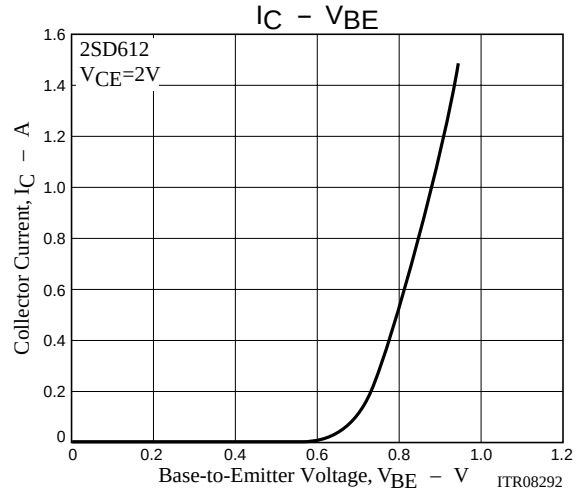


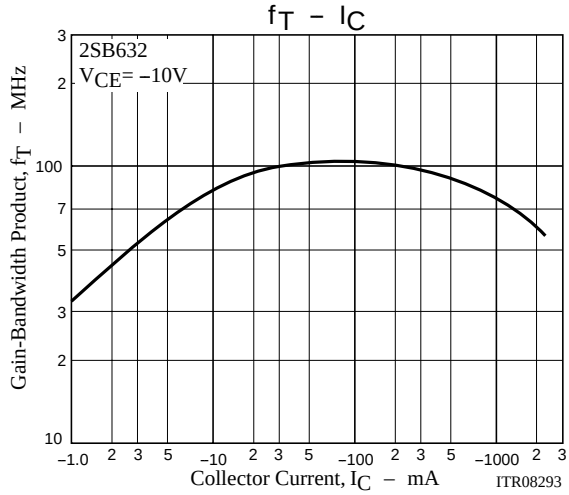
V_{CE}=12V
I_C=10I_{B1}= –10I_{B2}=500mA
For PNP, the polarity is reversed.

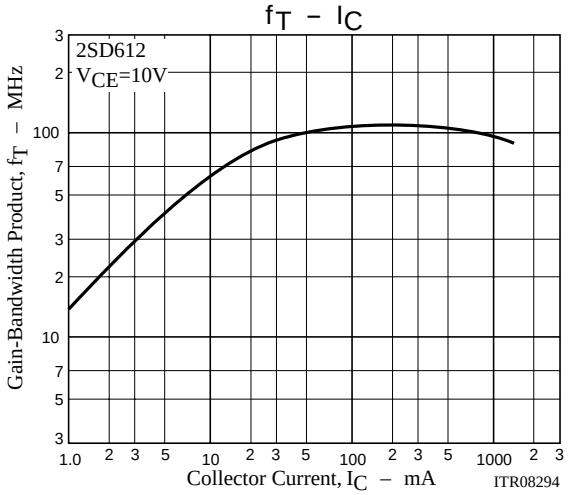


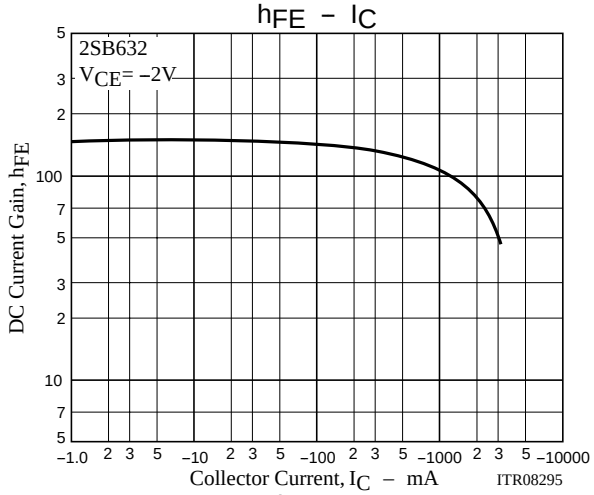


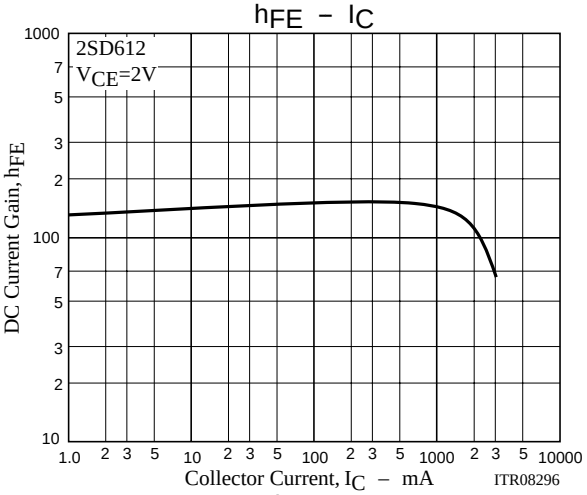


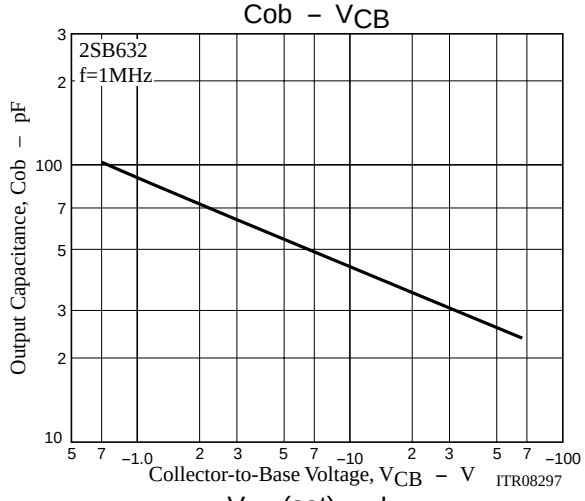


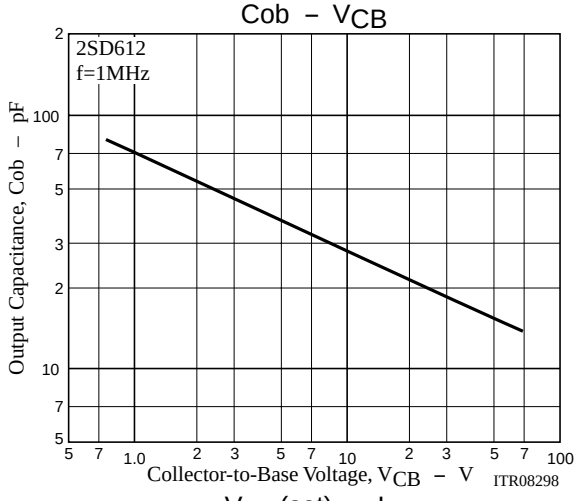

fT – IC
2SB632
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
ITR08293

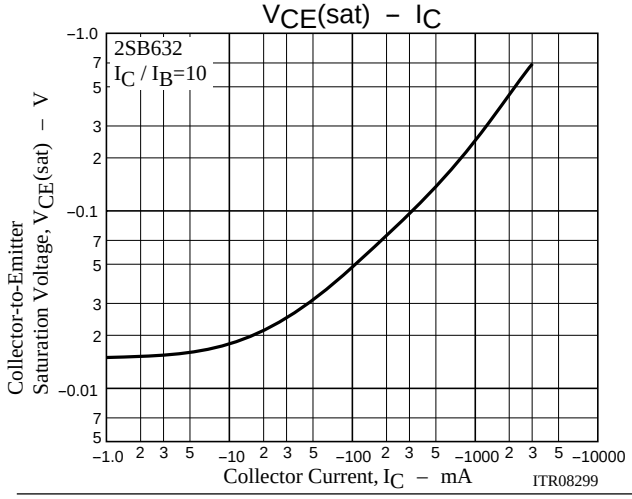

fT – IC
2SD612
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
ITR08294

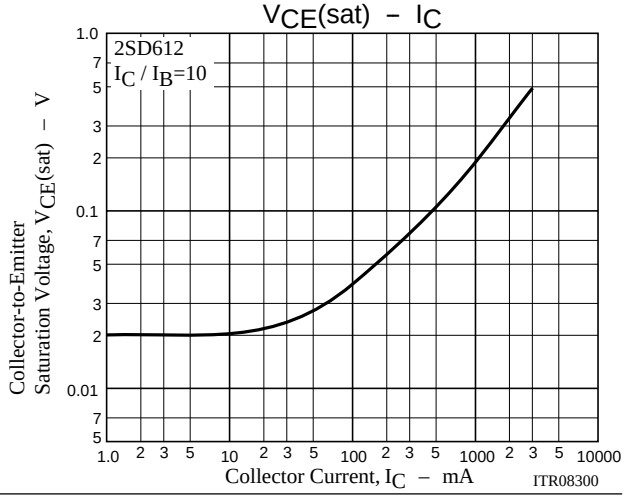

hFE – IC
2SB632
VCE= –2V
DC Current Gain, hFE
Collector Current, IC – mA
ITR08295

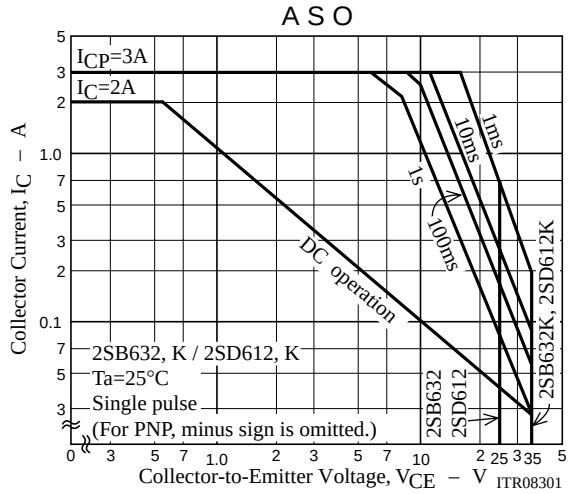

hFE – IC
2SD612
VCE=2V
DC Current Gain, hFE
Collector Current, IC – mA
ITR08296

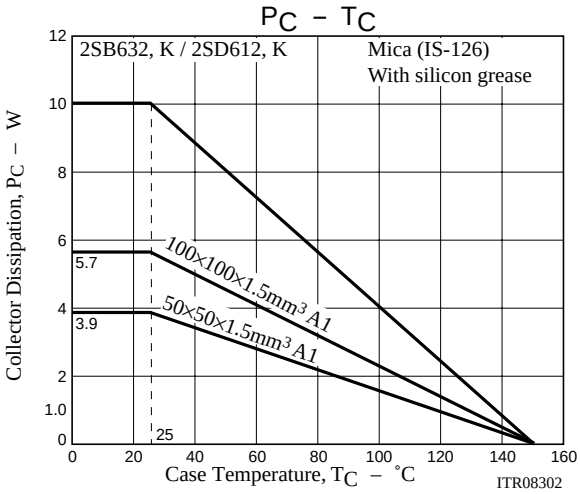

Cob – VCB
2SB632
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR08297

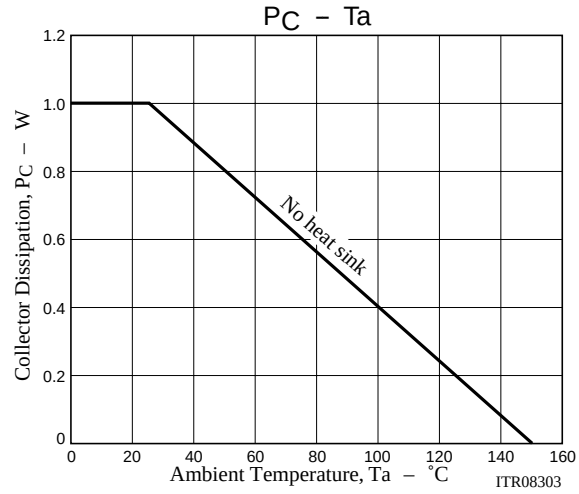

Cob – VCB
2SD612
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
ITR08298


VCE(sat) – IC
2SB632
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
ITR08299


VCE(sat) – IC
2SD612
IC / IB=10
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – mA
ITR08300





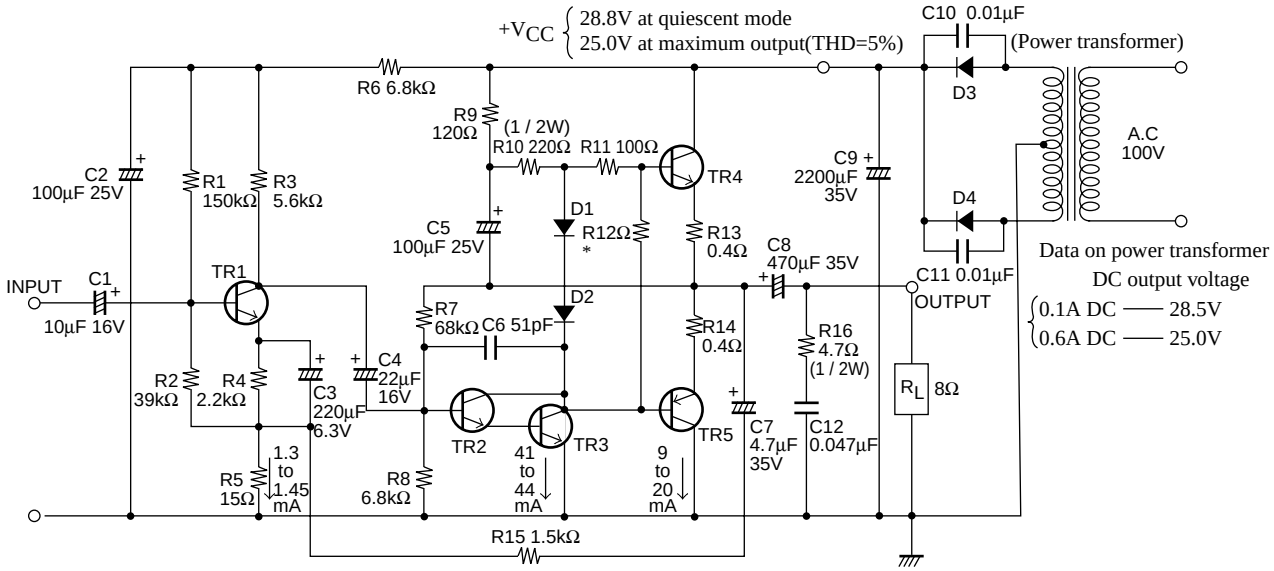


Sample Application Circuit 1 : 8W pure complementary amplifier using the 2SB632K/2SD612K

[Specifications] Power supply : 100V AC supply transformer with no signal=28.8V,

Maximum output=(THD=5%)=25V, f=1kHz, R_L=8Ω, R_g=600Ω

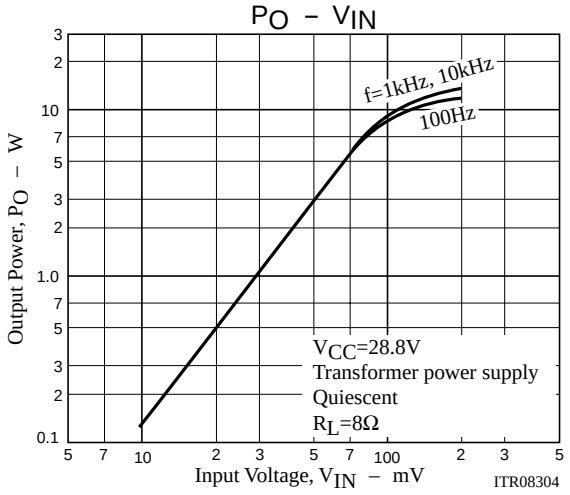
Parameter	Symbol	Conditions	typ	Unit
Quiescent Current (Collector Current)	I_{CCO}	Output stage	14.0	mA
	I_D	Drive stage	42.0	mA
	I_C	First stage	1.4	mA
Voltage Gain	V_G	Without NFB	75	dB
	V_G	With NFB	40	dB
Output Power	P_O	THD=5%	8.7	W
Total Harmonic Distortion	THD	P_O=1W	0.05	%
Input Resistance	r_i	P_O=1W	60	kΩ
Output Resistance	r_o	P_O=1W	0.2	Ω



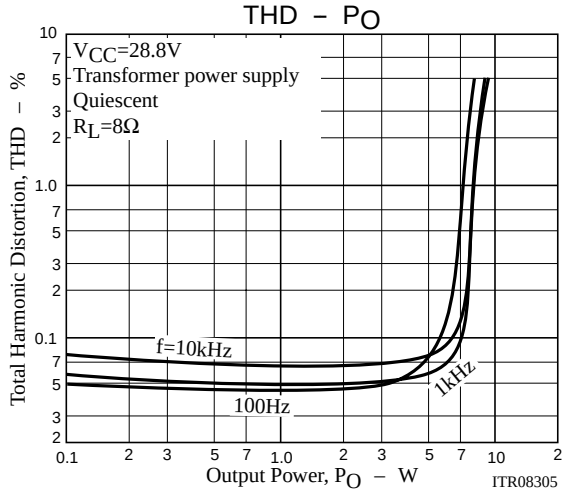
TR1 : 2SC536(D, E, F) TR2 : 2SC536(D, E, F) TR4 : 2SD612K(D, E, F)
TR3 : 2SD438(D, E, F) P1 fin, P2 fin
TR5 : 2SB632K(D, E, F)
D1, D2 : DS448 D3, D4 : DS135

Note : TR3 : With P1 fin or P2 fin
* TR4, TR5 : D, E rank version R12=560Ω
F rank version R12=470Ω
Must be paired in the same rank.

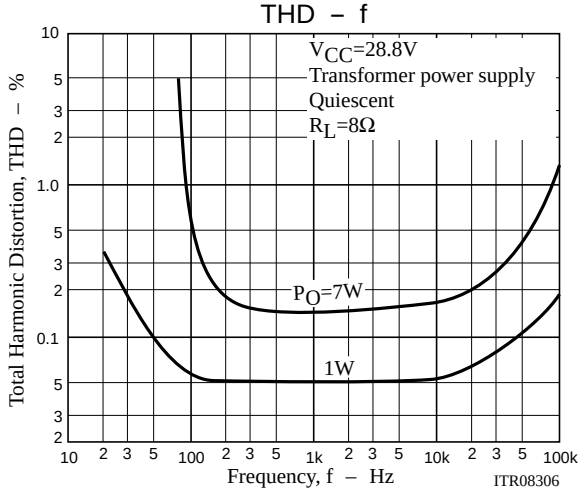
ITR09904



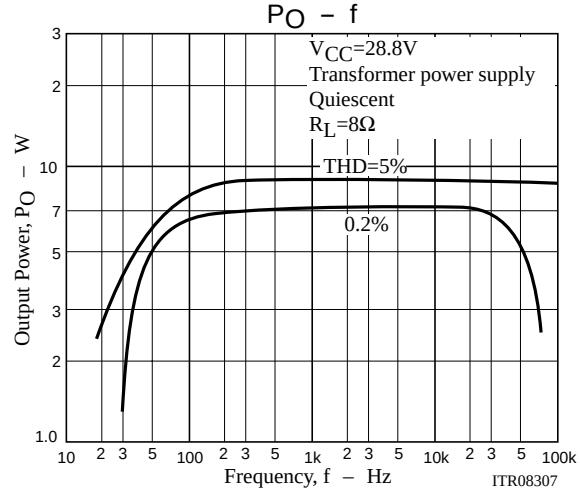
ITR08304



ITR08305

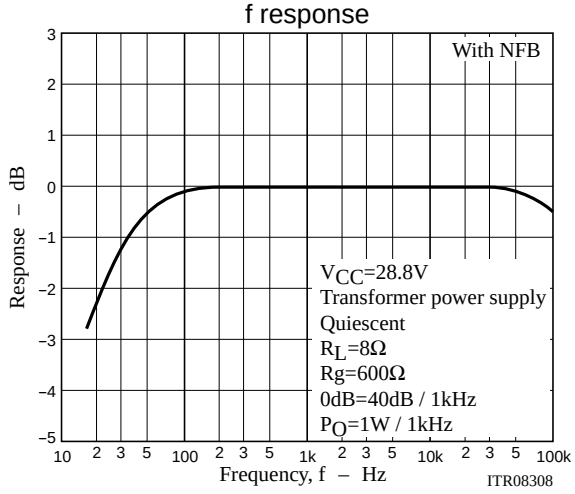


ITR08306

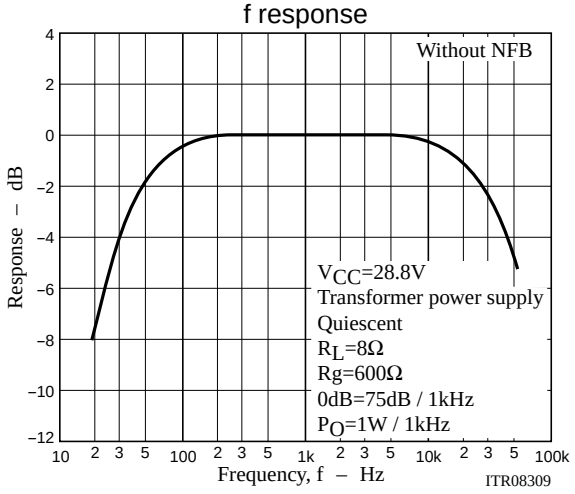


ITR08307

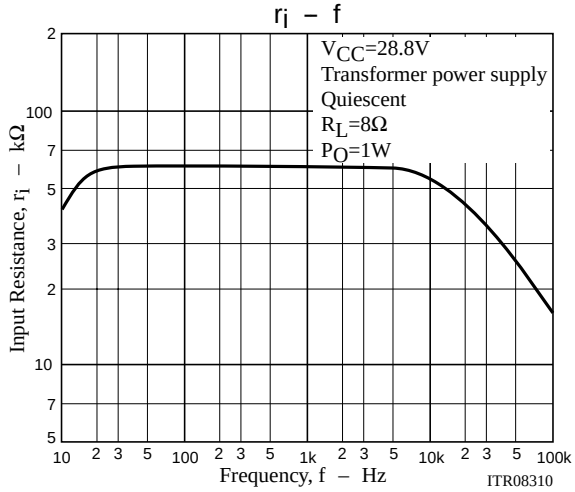
f response



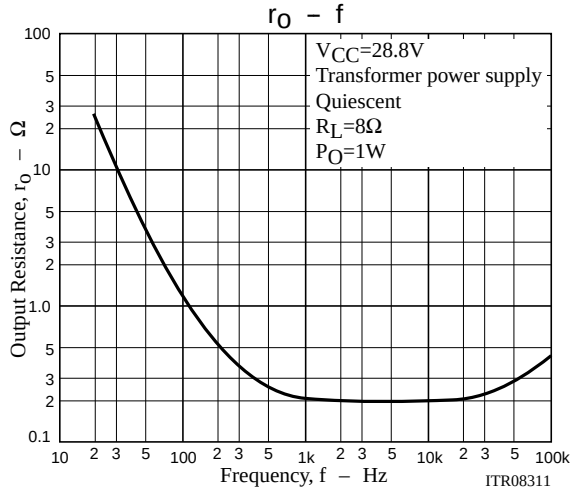
f response



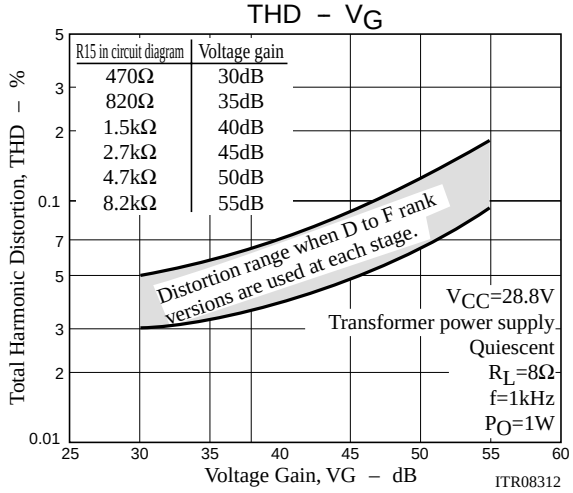
r_i – f



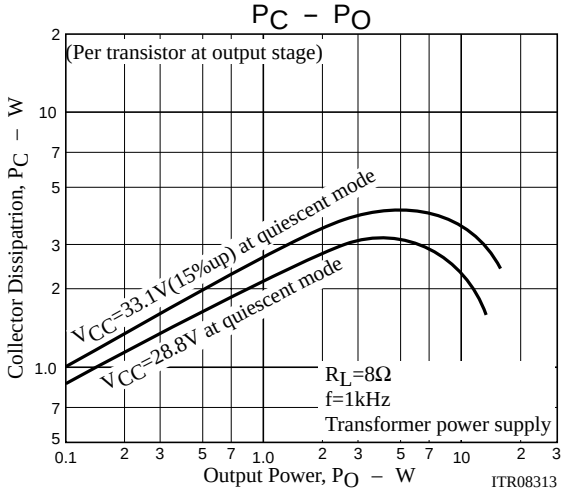
r_o – f



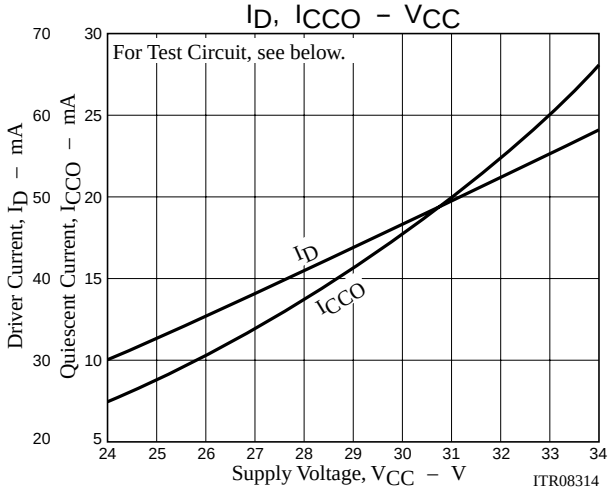
THD – V_G



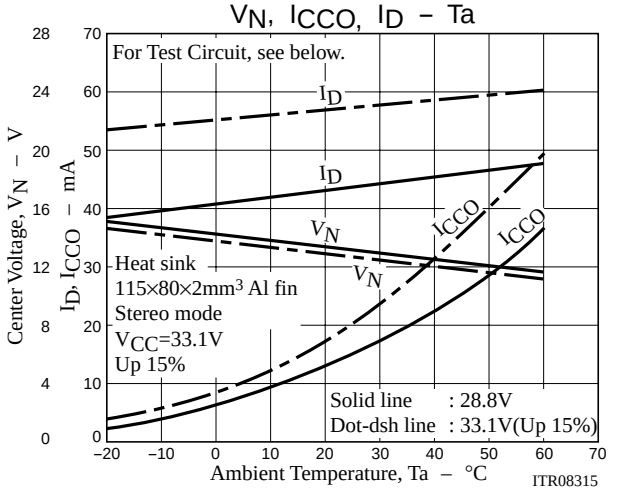
P_C – P_O



I_D, I_{CCO} – V_{CC}



V_N, I_{CCO}, I_D – Ta

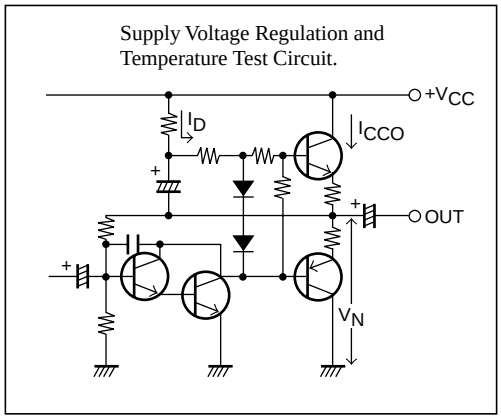


Sample Application Circuit 2 : 2SD612-Used 4W Input Transtformer coupling Amplifier for Car Use.

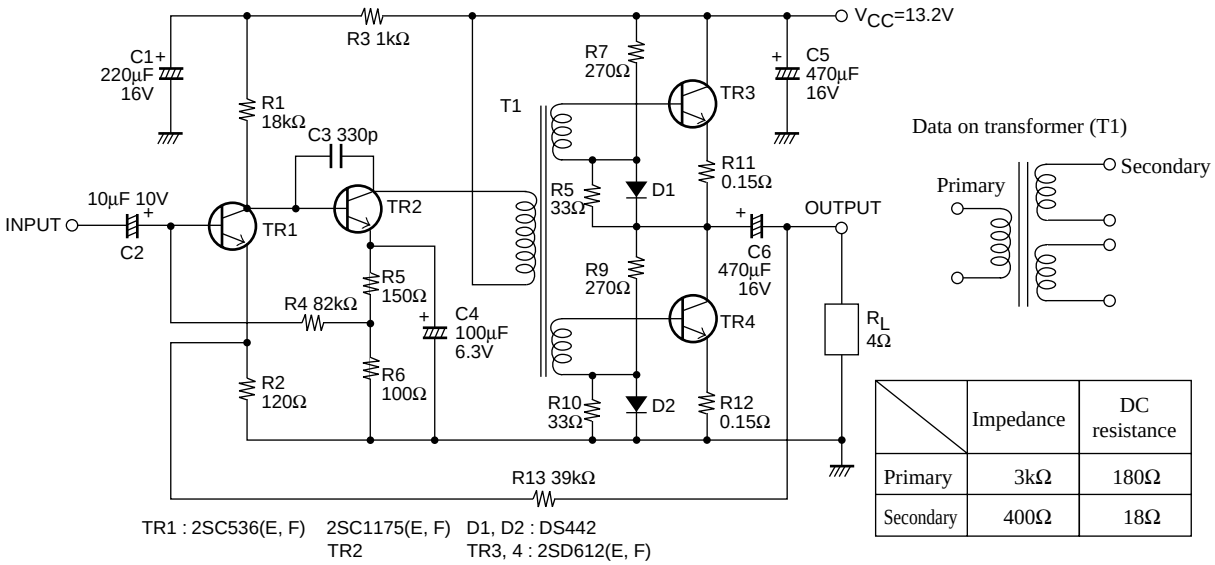
[Specifications] V_{CC}=13.2V, R_L=4Ω, R_g=600Ω, f=1kHz.

Parameter	Symbol	Conditions	typ	Unit
Quiescent Current (Collector Current)	I_{CCO}	Output stage	12.0	mA
	I_D	Drive stage	9.0	mA
Voltage Gain	V_G	Without NFB	66	dB
	V_G	With NFB	49	dB
Output Power	P_O	THD=10%	4.7	W
Total Harmonic Distortion	THD	P_O=0.5W	0.8	%
Input Impedance	r_i	P_O=0.5W	60	kΩ

Test Circuit



ITR09905

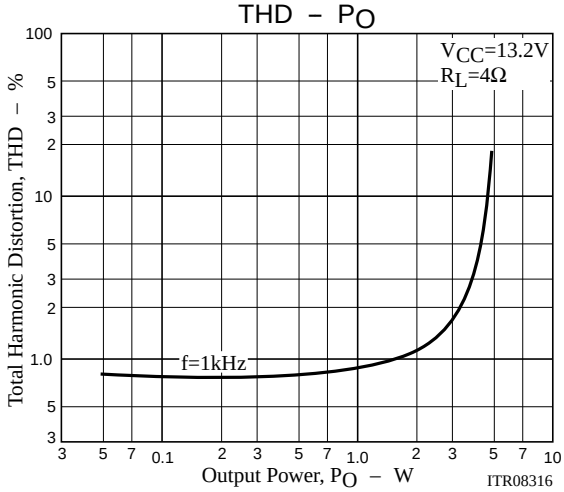


	Impedance	DC resistance
Primary	3kΩ	180Ω
Secondary	400Ω	18Ω

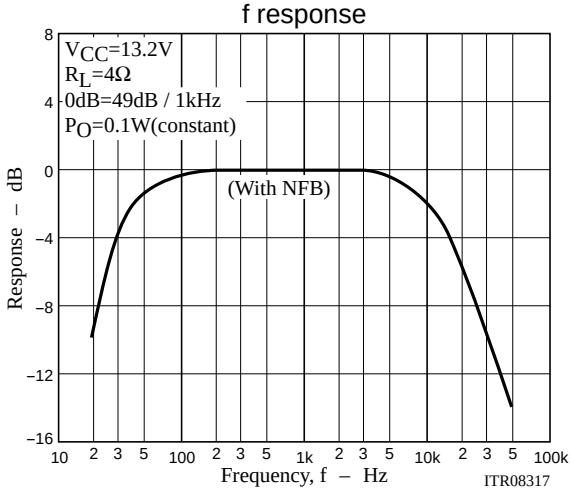
TR1 : 2SC536(E, F) 2SC1175(E, F) D1, D2 : DS442
TR2 TR3, 4 : 2SD612(E, F)
(Must be paired in the same rank).

ITR09906

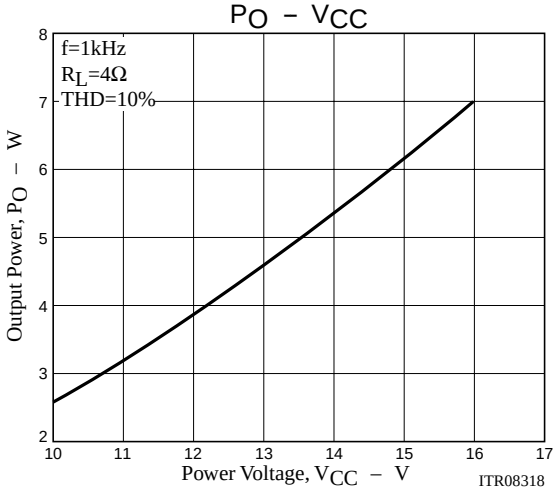
THD – P_O



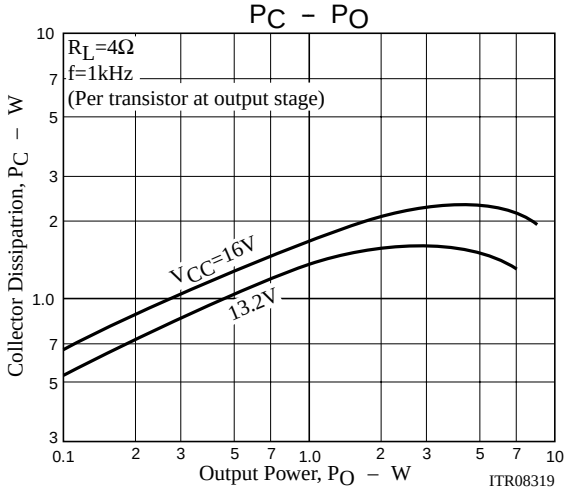
f response



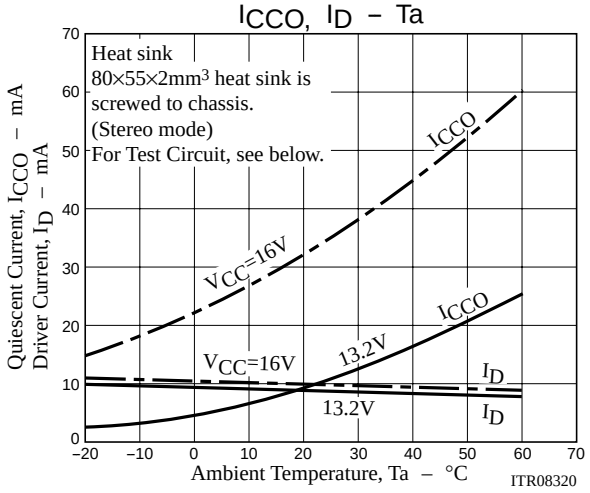
P_O – V_{CC}



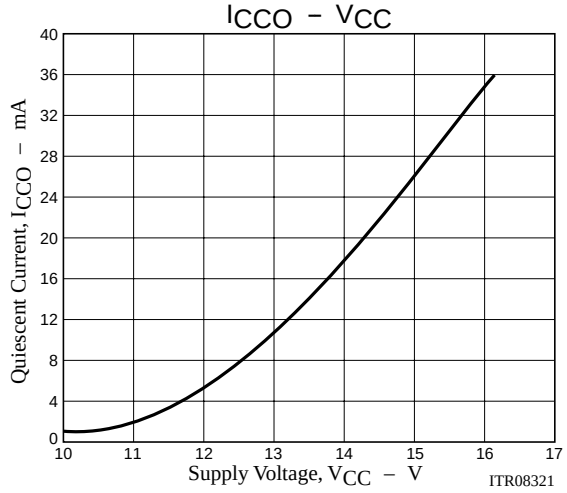
P_C – P_O



I_{CCO}, I_D – Ta



I_{CCO} – V_{CC}



Test Circuit