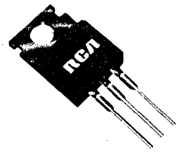
Solid State
Division

Power Transistors

RCA1C05
RCA1C06



JEDEC TO-220AB H-1535R1

Silicon Transistors for 25-Watt Full-Complementary-Symmetry Audio Amplifiers

RCA1C05 and RCA1C06 are n-p-n and p-n-p epitaxial-base silicon power transistors, respectively. These complementary output devices for audio applications are provided in the JEDEC TO-220AB plastic package.

The 25-watt audio-amplifier circuit shown in Figs. 1 and 2 uses RCA1C05 and RCA1C06 as output devices in conjunction with seven TO-39 discrete transistors, ten diodes, and a 52-volt split power supply. The amplifier output is directly coupled to an 8-ohm speaker. The full-complementary-symmetry output stage provides excellent high-frequency performance at moderate cost.

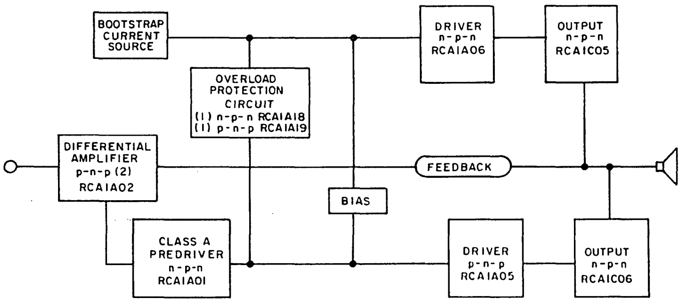


Fig.1— Block diagram and transistor complement for 25-watt full-complementary-symmetry audio amplifier.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		RCA1C05	RCA1C06	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	60	−60	V
COLLECTOR-TO-EMITTER VOLTAGE:				
With base open	V_{CEO}	50	−50	V
With external base-to-emitter resistance (R_{BE}) = 100Ω	V_{CER}	60	−60	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	5	−5	V
COLLECTOR CURRENT	I_C	7	−7	A
BASE CURRENT	I_B	3	−3	A
TRANSISTOR DISSIPATION:	P_T			
At case temperatures up to 25°C		40	40	W
At case temperatures above 25°C		← See Fig. 5 →		
TEMPERATURE RANGE:				
Storage & Operating (Junction)		← −65 to +150 →		°C
PIN TEMPERATURE (During Soldering):				
At distances ≥1/32 in. (0.8 mm) from case of 10 s max.		← 230 →		°C

Type RCA1C05
Package: JEDEC TO-220AB
Construction: Silicon n-p-n, epitaxial base

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C Unless Otherwise Specified*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS MIN.	LIMITS MAX.	UNITS
Collector Cutoff Current: With external base-to-emitter resistance (R_{BE})	I_{CER}	V_{CE} = 50 V, R_{BE} = 100Ω	–	1	mA
Emitter Cutoff Current: With collector open	I_{EBO}	V_{BE} = 5 V, I_C = 0	–	1	mA
Collector-to-Emitter Voltage: With external base-to-emitter resistance (R_{BE})	V_{CER}	I_C = 0.1 A, R_{BE} = 100Ω	60	–	V
Gain Bandwidth Product	f_T	I_C = 0.1 A, V_{CE} = 4 V	4	–	MHz
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 3 A, V_{CE} = 4 V	20	120	
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$	I_C = 3 A, I_B = 0.3 A	–	1	V
Base-to-Emitter Voltage	V_{BE}	I_C = 3 A, V_{CE} = 4 V	–	1.5	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$	V_{CE} = 20 V, t = 0.5 s	2	–	A

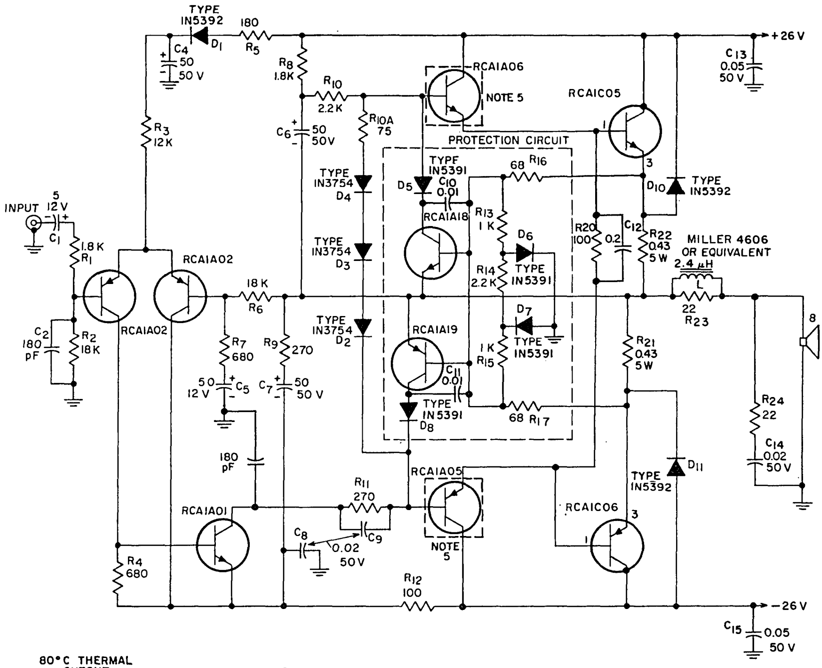
For characteristics curves and test conditions, refer to published data for prototype 2N6292 (File 542).

Type RCA1C06
Package: JEDEC TO-220AB
Construction: Silicon p-n-p, epitaxial base

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C Unless Otherwise Specified*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS MIN.	LIMITS MAX.	UNITS
Collector Cutoff Current: With external base-to-emitter resistance (R_{BE})	I_{CER}	V_{CE} = −50 V, R_{BE} = 100Ω	–	−1	mA
Emitter Cutoff Current: With collector open	I_{EBO}	V_{EB} = −5 V, I_C = 0	–	−1	mA
Collector-to-Emitter Voltage: With external base-to-emitter resistance (R_{BE})	V_{CER}	I_C = −0.1 A, R_{BE} = 100Ω	−60	–	V
Gain Bandwidth Product	f_T	I_C = −0.1 A, V_{CE} = −4 V	10	–	MHz
DC Forward-Current Transfer Ratio	h_{FE}	I_C = −3 A, V_{CE} = −4 V	20	120	
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$	I_C = −3 A, I_B = −0.3 A	–	−1	V
Base-to-Emitter Voltage	V_{BE}	I_C = −3 A, V_{CE} = −4 V	–	−1.5	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$	V_{CE} = −20 V, t = 0.5 s	−2	–	A

For characteristics curves and test conditions, refer to published data for prototype 2N6107 (File 488).



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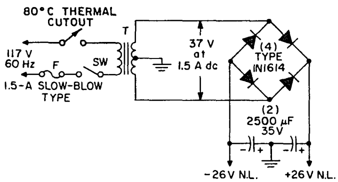

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NOTES:

1. T: Signal 36-2 (Signal Transformer Co., 1 Junius St., Brooklyn, N.Y. 11212), or equivalent.
2. Resistors are 1/2-watt unless otherwise specified; values are in ohms.
3. Capacitances are in µF unless otherwise specified.
4. Non-inductive resistors.
5. Mount driver transistors on heat sink, Wakefield No. 209-AB, or equivalent. (Alternatively, this type may be obtained with a factory-attached integral heat sink.)
6. Provide approximately 2°C/W heat sinking per output device.

Fig. 2—25-watt amplifier circuit featuring true-complementary-symmetry output with load line limiting.

TYPICAL PERFORMANCE DATA
For 25-Watt Audio Amplifier

Measured at a line voltage of 120 V, $T_A = 25^oC$, and a frequency of 1 kHz, unless otherwise specified.

Power:	
Rated power (8-Ω load, at rated distortion)	25 W
Typical power (4-Ω load)	45 W
Typical power (16-Ω load)	16 W
Total Harmonic Distortion:	
Rated distortion	1.0%
Typical at 20 W	0.05%
IM Distortion:	
10 dB below continuous power output at 60 Hz and 7 kHz (4:1)	0.1%
IHF Power Bandwidth:	
3 dB below rated continuous power at rated distortion	80 kHz
Sensitivity:	
At continuous power-output rating	600 mV
Hum and Noise:	
Below continuous power output:	
Input shorted	80 dB
Input open	75 dB
Input Resistance	20 kΩ

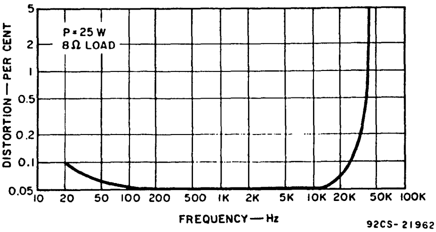

Fig.3— Typical distortion vs. frequency.

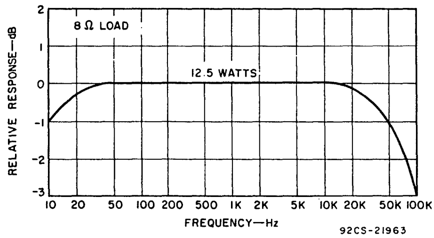

Fig.4— Response curve.

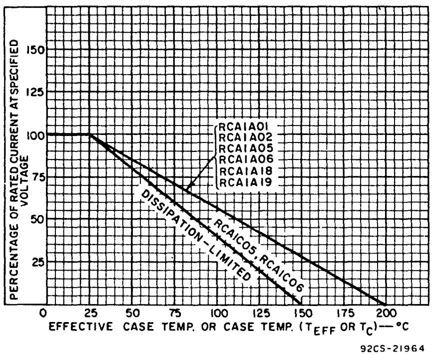

Fig.5 — Derating curve for all types.

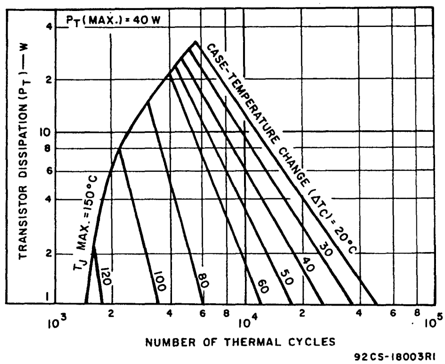

Fig.6 — Thermal-cycling ratings for RCA1C05 and RCA1C06.

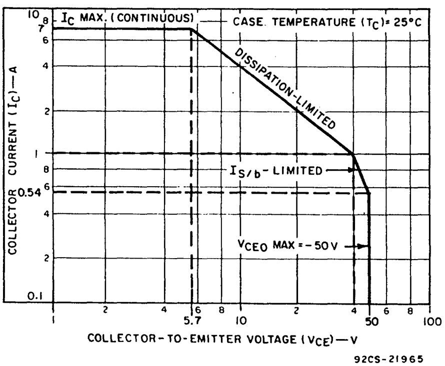

Fig.7 — Maximum operating areas for RCA1C05.

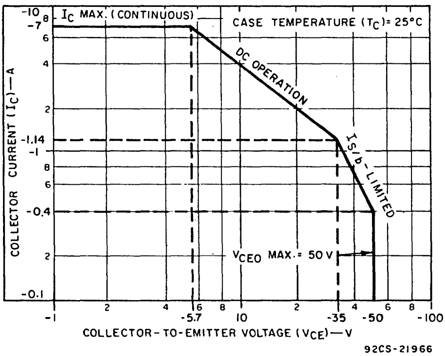

Fig.8 — Maximum operating areas for RCA1C06.

TERMINAL CONNECTIONS FOR TYPES RCA1C05, RCA1C06

Lead 1 — Base
Lead 2 — Collector
Lead 3 — Emitter
Lead 4 — Collector