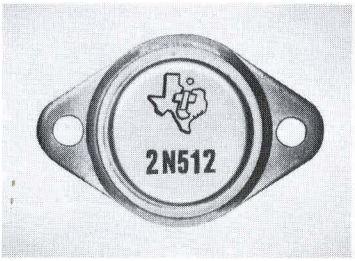
TYPES 2N512, 2N512A, 2N512B

P-N-P ALLOY - JUNCTION GERMANIUM POWER TRANSISTORS

BULLETIN NO. DL-S 1051 MARCH, 1959
TYPES 2N512, 2N512A, 2N512B

40, 60, 80 VOLTS
15-AMP COLLECTOR CURRENT
80-WATT DISSIPATION — 0.05 OHM MAX R_{CS}
LOW I_{CO} LOW V_{BE}
for
AUDIO AMPLIFIERS — SWITCHING CIRCUITS



ACTUAL SIZE

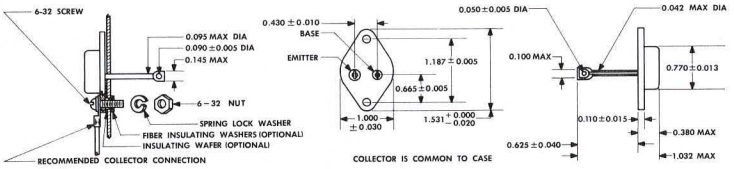
qualification testing

All units are subjected to a high-pressure leak test and are heat cycled from −55°C and room humidity to +95°C and 95% relative humidity, for four complete cycles over an eight-hour period. In addition, all units are stored at +95°C for 100 hours and then thoroughly tested for rigid adherence to electrical design characteristics.

mechanical data

The use of high-temperature silver solder to assemble the mounting base and the use of projection welds to seal the can, provide a hermetically-sealed enclosure which can withstand up to 300 psi. During the assembly process, the absence of flux, soft solder, and wet processing combined with extra cleanliness, prevents sealed-in contamination.

The mounting base is a high conductivity copper which provides an excellent heat path from the collector junction to a heat sink which must be tightly attached to permit operation at maximum rated dissipation. The approximate weight of the unit is 23 grams.



maximum ratings at 25°C*

		2N512	2N512A	2N512B	unit
V_{CBO}	Collector-to-Base Voltage (I_C = −5ma, I_E = 0)	−40	−60	−80	v
V_{CEX}	Collector-to-Emitter Voltage (V_{BE} = +0.2 v, I_C = −5ma)	−40	−60	−80	v
V_{EBO}	Emitter-to-Base Voltage (I_E = −5ma, I_C = 0)	−30	−30	−30	v
I_C	DC Collector Current	−15	−15	−15	a
I_E	DC Emitter Current	−15	−15	−15	a
I_B	Base Current	−5	−5	−5	a
	Total Dissipation†	80	80	80	w
T_J	Junction Temperature	95	95	95	°C

typical characteristics at 25°C*

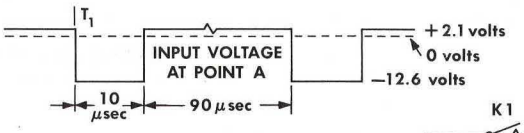
h_{FE}	Forward Current Transfer Ratio (V_{CE} = −1.5 v, I_C = −3.7a)	30	30	30	
	(V_{CE} = −1.5 v, I_C = −15a)	12	12	12	
R_{CS}	Common Emitter Saturation Resistance (I_C = −15a, I_B = −2.25a)	0.025	0.025	0.025	ohm
K	Thermal Resistance from Collector Junction to Mounting Base	0.7	0.7	0.7	°C/w
BV_{CES}	Collector to Emitter Breakdown Voltage with Base Shorted to Emitter (I_C = −300ma, V_{BE} = 0)	−55	−65	−75	v
BV_{CEO}	Collector to Emitter Breakdown Voltage (I_C = −300ma, I_B = 0)	−40	−50	−60	v
I_{CBO}	Collector Reverse Current (V_{CB} = ½ V_{CBO} max, T_J = 85°C)	−8.0	−8.0	−8.0	ma

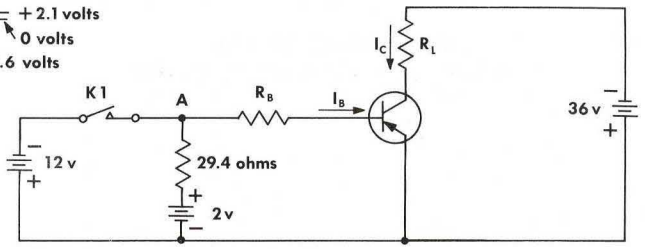
* Temperature is measured on mounting base.
† For operation at higher temperatures refer to derating curve.

SEMICONDUCTOR—COMPONENTS DIVISION

TEXAS INSTRUMENTS
INCORPORATED
SEMICONDUCTOR-COMPONENTS DIVISION
POST OFFICE BOX 312 • 13500 N. CENTRAL EXPRESSWAY
DALLAS, TEXAS

TYPICAL SWITCHING CHARACTERISTICS AT 25°C–TURN ON CIRCUIT



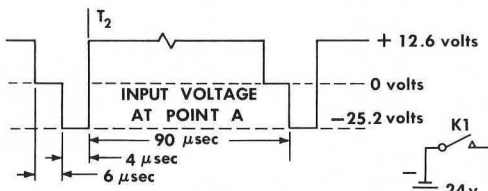


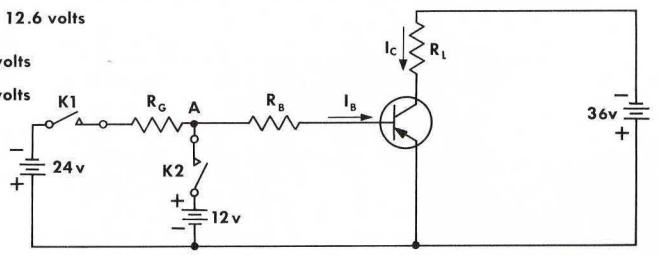
T_{on} is time from T_1 until 0.9 I_C
t_d is time from T_1 until 0.1 I_C
t_r is time from 0.1 I_C until 0.9 I_C
$t_d \approx 0.1\ T_{on}$

I_C	I_{B1}	R_B	R_L	T_{on}
–15a	–1.8a	6.33 ohms	2.42 ohms	12.5 μsec

K1 is a mercury contact relay
All power sources are batteries

TYPICAL SWITCHING CHARACTERISTICS AT 25°C–TURN OFF CIRCUIT





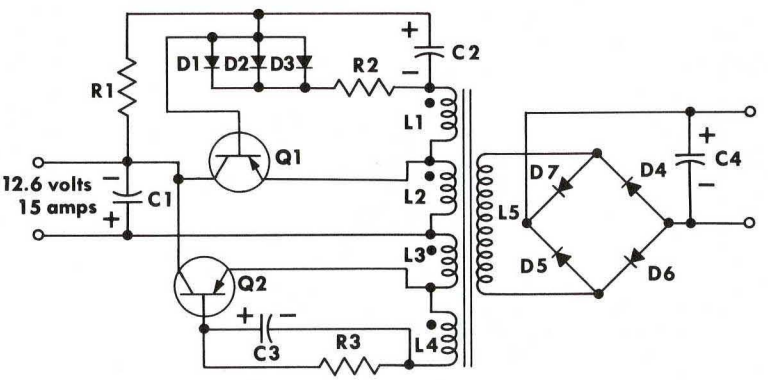
t_s is time from T_2 until 0.9 I_C
t_f is time from 0.9 I_C until 0.1 I_C

I_C	$I_{B2} = -I_{B1}$	R_G	R_B	R_L	t_s	t_f
–15a	1.8a	6.98 ohms	6.33 ohms	2.42 ohms	25 μsec	5.5 μsec

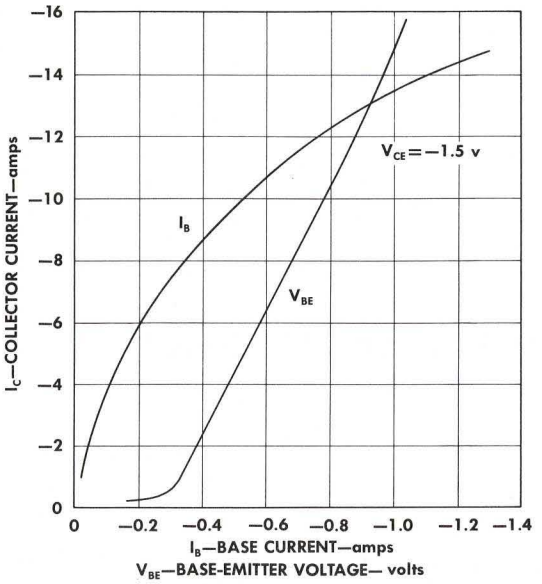
K1 and K2 are mercury contact relays
All power sources are batteries

DC-TO-DC POWER CONVERTER
180-WATT OUTPUT AT 95% EFFICIENCY

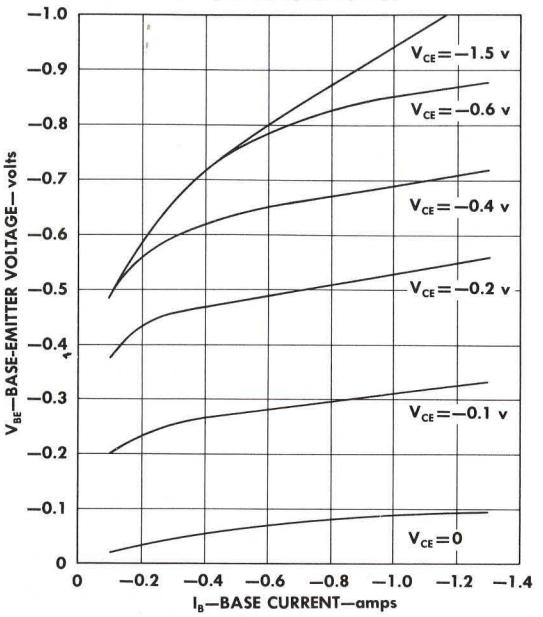
L5 may be wound according to the output voltage desired, allowing about turns per volt. The wire size should be large enough to allow one circular mil per millampere. The output current and load will then determine D4, D5, D6, D_7 and C4.
L2, L3—29 turns each bifilar wound #12
L1, L4—10 turns each 318 #18
Q1, Q2—2N512 15 amp 40 volt each mounted on a total of 150 sq. in. exposed surface of ⅛" aluminum sheet. Operation to 60°C.
D1, D2, D3—1N2069
R1 = 1 K ¼ volt
R2 = 1.4 ohms 10 watt
R3 = 1.8 ohms 10 watt
C1 = 500 μf 20 volt (must not be omitted)
C2, C3 = 20 μf 6 volt
Frequency about 1 kc.
Core-type 50017-2a Magnetics, Inc.



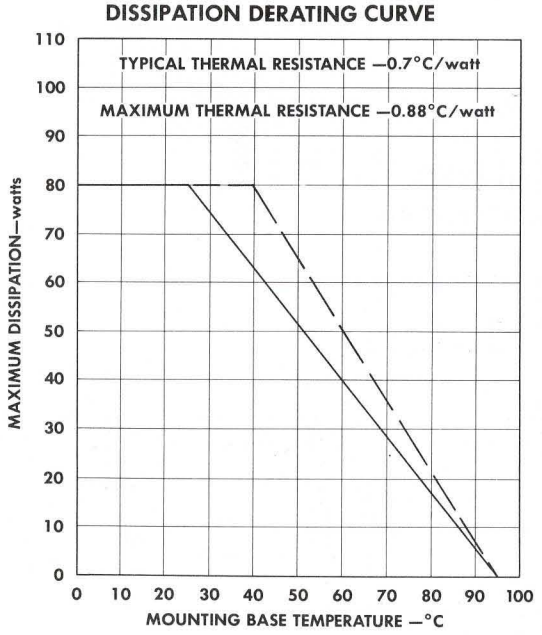
CURRENT TRANSFER AND TRANSCONDUCTANCE CHARACTERISTICS



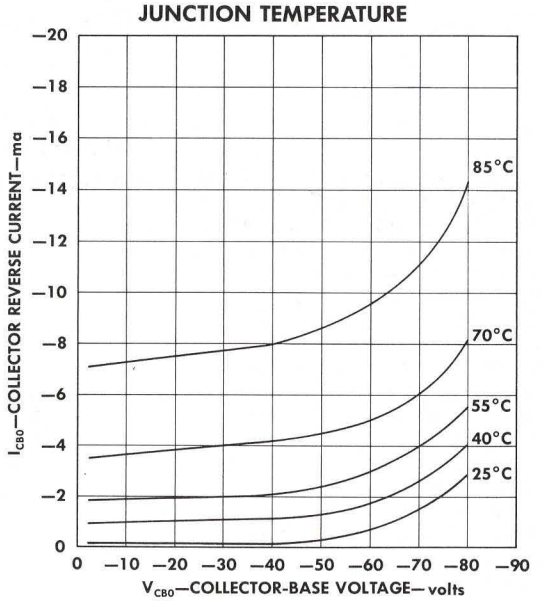
INPUT CHARACTERISTICS



DISSIPATION DERATING CURVE



COLLECTOR REVERSE CURRENT vs JUNCTION TEMPERATURE



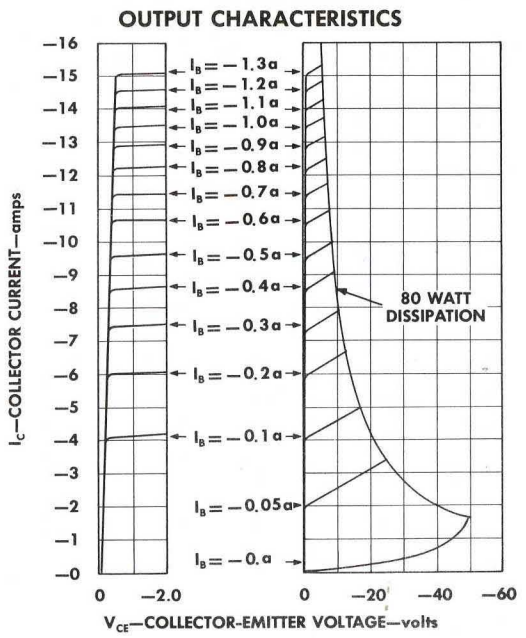
TYPES 2N512, 2N512A, 2N512B

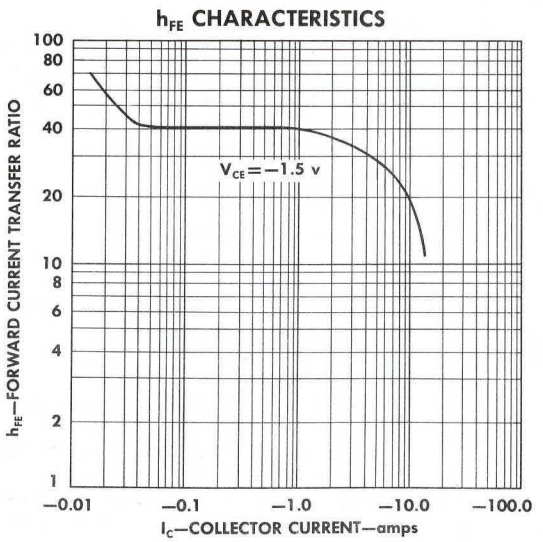
TYPICAL CHARACTERISTICS

design characteristics at 25°C

type	symbol	parameter	test conditions	min	design center	max	unit
2N512	BV_{CBO}	Collector-to-Base Breakdown Voltage	$I_C = -5ma, I_E = 0$	−40	—	—	v
	I_{CBO}	Collector Reverse Current	$V_{CBO} = -20$ v, $I_E = 0$	—	−0.2	−2.0	ma
2N512A	BV_{CBO}	Collector-to-Base Breakdown Voltage	$I_C = -5ma, I_E = 0$	−60	—	—	v
	I_{CBO}	Collector Reverse Current	$V_{CB} = -30$ v, $I_E = 0$	—	−0.2	−2.0	ma
2N512B	BV_{CBO}	Collector-to-Base Breakdown Voltage	$I_C = -5ma, I_E = 0$	−80	—	—	v
	I_{CBO}	Collector Reverse Current	$V_{CB} = -40$ v, $I_E = 0$	—	−0.2	−2.0	ma
All	I_{CBO}	Collector Reverse Current	$V_{CB} = -2$ v, $I_E = 0$	—	−0.14	—	ma
All	BV_{EBO}	Emitter-to-Base Breakdown Voltage	$I_E = -5ma, I_C = 0$	−30	—	—	v
All	I_{EBO}	Emitter Reverse Current	$V_{EB} = -15$ v, $I_C = 0$	—	−0.25	—	ma
All	I_B	Base Current	$V_{CE} = -1.5$ v, $I_C = -3.7a$	—	−120.	200.	ma
			$V_{CE} = -1.5$ v, $I_C = -15a$	—	−1.2	−1.4	a
All	V_{BE}	Base Voltage	$V_{CE} = -1.5$ v, $I_C = -3.7a$	—	−0.4	—	v
			$V_{CE} = -1.5$ v, $I_C = -15a$	—	−1.0	−1.5	v
All	V_{CE} (SAT)	Collector-to-Emitter Saturation Voltage	$I_C = -15a, I_B - 2.25a$	—	−0.38	−0.75	v
All	$f_{\alpha e}$	Common-Emitter Frequency Cutoff	$V_{CE} = -6$ v, $I_C - 1a$	—	7.0	—	kc

TYPICAL CHARACTERISTICS — COMMON EMITTER





TEXAS INSTRUMENTS
INCORPORATED
SEMICONDUCTOR-COMPONENTS DIVISION
POST OFFICE BOX 312 · 13500 N. CENTRAL EXPRESSWAY
DALLAS, TEXAS