TYPE TIS126
N-P-N SILICON TRANSISTOR

BULLETIN NO. DL-S 7311992, MARCH 1973

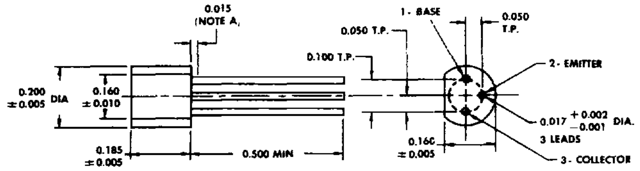
HIGH-FREQUENCY SILECT[†] TRANSISTOR[‡] FOR USE IN VHF MIXERS AND NON-AGC IF AMPLIFIERS

- **High f_T . . . 600 MHz Min**
- **Specified f_T vs I_C Characteristic**
- **Low C_{cb} . . . 0.36 pF Max**
- **Rugged, One-Piece Construction with Standard TO-18 100-Mil Pin Circle**

mechanical data

This transistor is encapsulated in a plastic compound specifically designed for this purpose, using a highly mechanized process developed by Texas Instruments. The case will withstand soldering temperatures without deformation. This device exhibits stable characteristics under high-humidity conditions and is capable of meeting MIL-STD-202C, Method 106B. The transistor is insensitive to light.

Feedback capacitance is minimized by placing the emitter terminal between the base and collector terminals, thus optimizing compatibility with advanced high-frequency design.



NOTES: A. Lead diameter is not controlled in this area.
B. Leads having maximum diameter (0.019) shall be within 0.007 of their true positions measured in the gaging plane 0.054 below the seating plane of the device relative to a maximum-diameter package.
C. All dimensions are in inches.

absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

Collector-Base Voltage	45 V
Collector-Emitter Voltage (See Note 1)	40 V
Emitter-Base Voltage	4 V
Continuous Collector Current	50 mA
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 2)	400 mW
Continuous Device Dissipation at (or below) 25°C Lead Temperature (See Note 3)	700 mW
Storage Temperature Range	−65°C to 150°C
Lead Temperature 1/16 Inch from Case for 10 Seconds	260°C

NOTES: 1. This value applies when the base-emitter diode is open-circuited.
2. Derate linearly to 150°C free-air temperature at the rate of 3.2 mW/°C.
3. Derate linearly to 150°C lead temperature at the rate of 5.6 mW/°C. Lead temperature is measured on the collector lead 1/16 inch from the case.

[†] Trademark of Texas Instruments

[‡] U.S. Patent No. 3,439,238

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electrical characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 µA, I_E = 0	45		V
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = 1 mA, I_B = 0, See Note 4	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 µA, I_C = 0	4		V
I_{CBO}	Collector Cutoff Current	V_{CB} = 30 V, I_E = 0		50	nA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = 15 V, I_C = 10 mA, See Note 4	25		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = 3 mA, I_C = 30 mA, See Note 4		0.5	V
$\|h_{fe}\|$	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = 15 V, I_C = 10 mA, f = 100 MHz	6		
$\frac{f_{T(2)}}{f_{T(1)}}$	Ratio of Transition Frequencies	V_{CE} = 15 V, $I_{C(1)}$ = 15 mA, $I_{C(2)}$ = 20 mA, See Note 5	0.65		
C_{cb}	Collector-Base Capacitance	V_{CB} = 10 V, I_E = 0, f = 1 MHz, See Note 6		0.36	pF
$r_b'C_c$	Collector-Base Time Constant	V_{CB} = 15 V, I_E = −4 mA, f = 79.8 MHz		10	ps

NOTES: 4. These parameters must be measured using pulse techniques. t_w = 300 µs, duty cycle ≤ 2%.

5. To obtain f_T, the $|h_{fe}|$ response is extrapolated at the rate of −6 dB per octave from f = 100 MHz to the frequency at which $|h_{fe}|$ = 1.

6. C_{cb} measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter is connected to the guard terminal of the bridge.

operating characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
F	Spot Noise Figure	V_{CE} = 15 V, I_C = 4 mA, R_G = 50 Ω, f = 200 MHz		5	dB
$G_{pe(conv)}$	Small-Signal Conversion Power Gain	V_{CC} = 15 V, I_C = 10 mA, f_{LO} = 245 MHz, f_{RF} = 200 MHz, See Figure 3	24		dB
B	Bandwidth		6		MHz
G_{pe}	Small-Signal Common-Emitter Insertion Power Gain	V_{CC} = 15 V, I_C = 10 mA, f = 45 MHz, See Figure 4	30		dB
B	Bandwidth		6		MHz

TYPICAL CHARACTERISTICS

SMALL-SIGNAL CONVERSION POWER GAIN
vs
COLLECTOR CURRENT

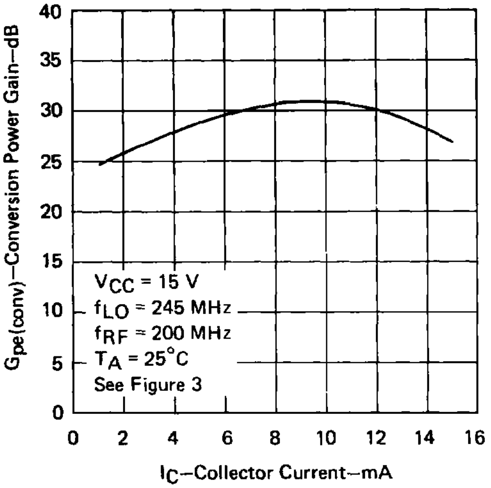

FIGURE 1

SMALL-SIGNAL COMMON-EMITTER
INSERTION POWER GAIN
vs
COLLECTOR CURRENT

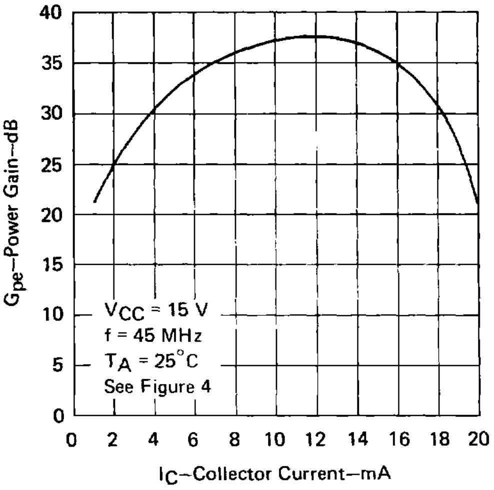

FIGURE 2

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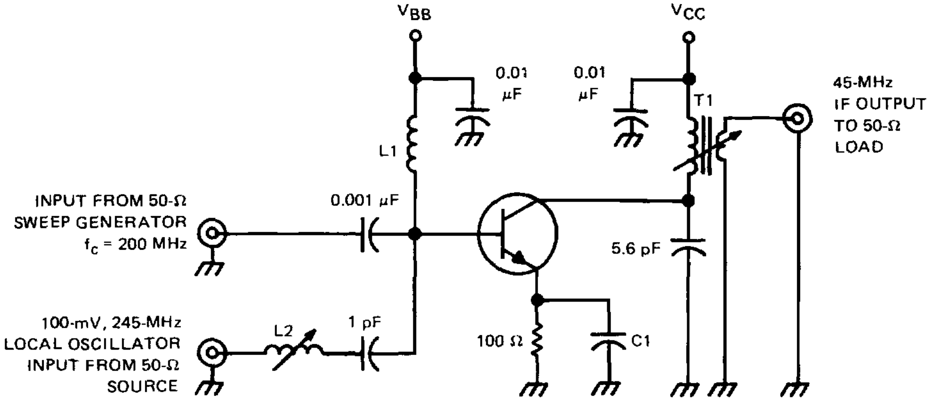
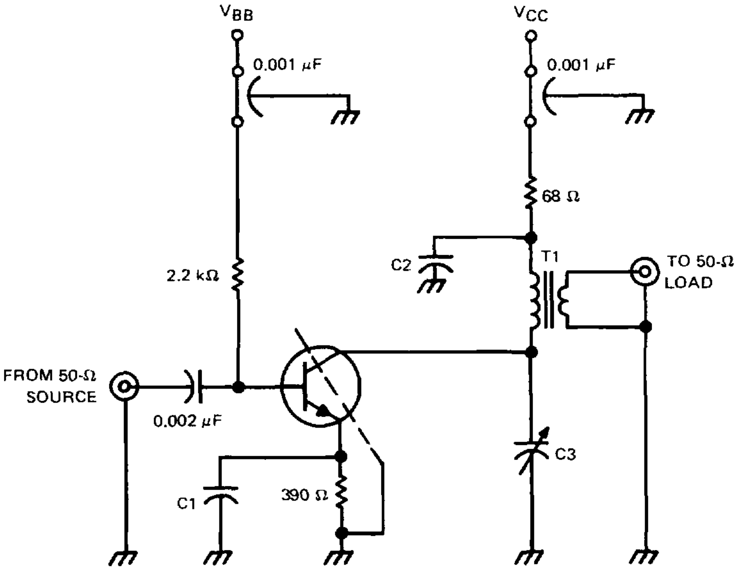
PARAMETER MEASUREMENT INFORMATION



CIRCUIT COMPONENT INFORMATION

C1: Leadless disc ceramic, 0.001 pF
L1: 8T #26 close wound, 3/32-inch ID, air core
L2: 7T #30 wound on coil form 7/32-inch ID, aluminum core 5/16-inch long
T1: Primary: 20T #30 close wound
Secondary: 4T #30 close wound and centered on primary
7/32-inch-ID paper form, ferrite core

FIGURE 3—200-MHz-to-45-MHz CIRCUIT FOR CONVERSION POWER GAIN



CIRCUIT COMPONENT INFORMATION

C1, C2: Leadless disc ceramic, 0.001 µF
C3: Arco 427 (or equivalent), 55-300 pF
T1: Primary: 8T #26 double spaced
Secondary: 2T #26 double spaced
Core: Ferrite torroid, 5/16-inch OD, 5/32-inch ID

FIGURE 4—45-MHz POWER GAIN TEST CIRCUIT

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