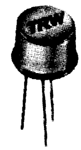
RF Transistor

- **High fT - 3.0 GHz**
- **Low Distortion**
- **Low Noise Figure, 2,5 dB @ 300 MHz**



TO 39

The LT1001 is a high-output NPN silicon TO-39-mounted transistor designed for ultra-linear communications or instrumentation applications. Low noise figure combined with high-output capability gives this device an exceptional dynamic range. Gold metallization and diffused emitter ballasting are combined to achieve the high reliability demanded by the most severe communications requirements. High gain makes this transistor ideal for broadband applications.

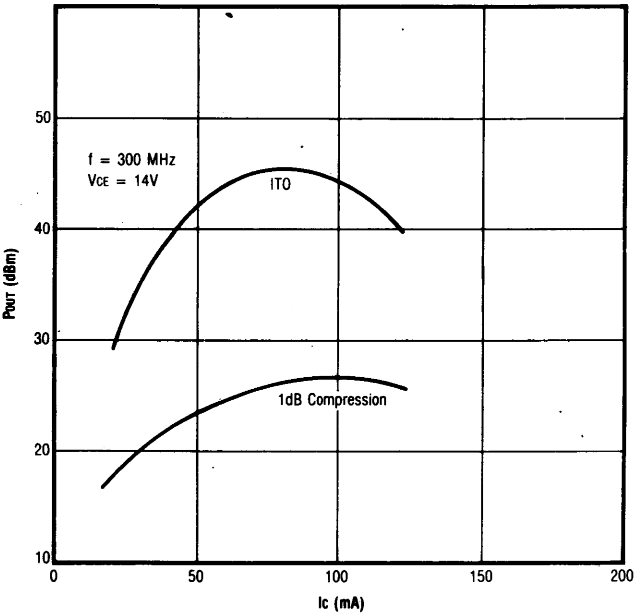
Electrical Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
BV_{EBO}	Emitter-Base Breakdown-Voltage	I_E = 0.1mA	3.5			V
BV_{CEO}	Collector-Emitter Breakdown-Voltage	I_C = 5.0mA	20			V
BV_{CBO}	Collector-Base Breakdown-Voltage	I_C = 1.0mA	40			V
I_{CBO}	Collector-Base Leakage	V_{CB} = 10V		50		μA
$V_{CE\,(SAT)}$	Collector-Emitter Saturation Voltage	I_C = 50mA I_C/I_B = 10		500		mV
h_{FE}	DC Current Gain	V_{CE} = 5V I_C = 50mA	70	100	300	
C_{CB}	Collector-Base Capacitance	V_{CB} = 8V f = 1 MHz		1.6		pF
NF_{min}	Minimum Noise Figure	V_{CE} = 8V I_C = 50mA f = 300 MHz		2.5		dB
G_{Umax}	Maximum Unilateral Gain	V_{CE} = 14V I_C = 90mA f = 300 MHz		15		dB
$[S_{21}]^2_E$	Common Emitter Insertion Gain	V_{CE} = 14V I_C = 90mA f = 300 MHz		13.5		dB
F_T	Gain Bandwidth Product	V_{CE} = 14V I_C = 90mA		3.0		GHz
P_{OUT}	Power out @ 1dB Compression	V_{CE} = 14V I_C = 90mA f = 300 MHz		26		dBm
ITO	Third Order Intercept	V_{CE} = 14V I_C = 90mA f = 300 MHz		45		dBm

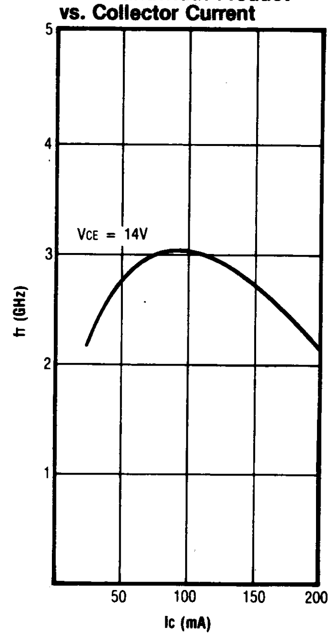
Absolute Maximum Ratings @ 25 °C Case

Collector Current (I_C)	Collector Base Voltage (V_{CBO})	Junction Temperature (T_j)	Storage Temperature (T_{STG})
200mA	40V	200 °C	−65 °C to 200 °C

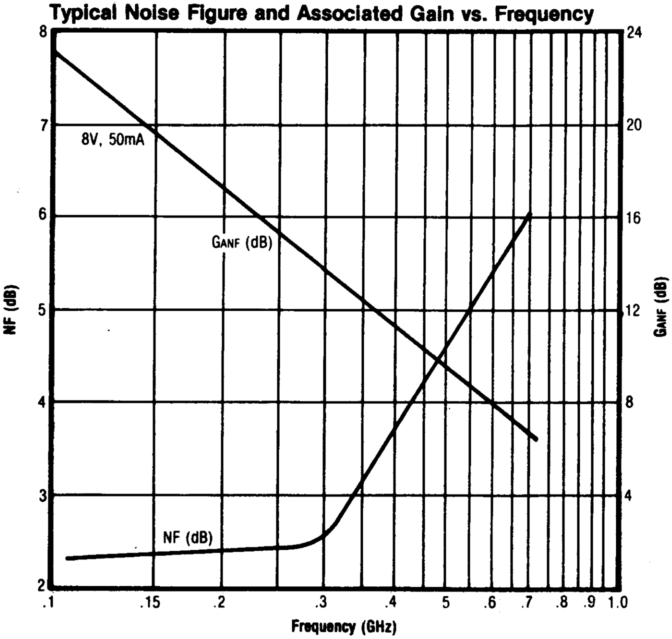
Third Order Intercept and 1dB Compression



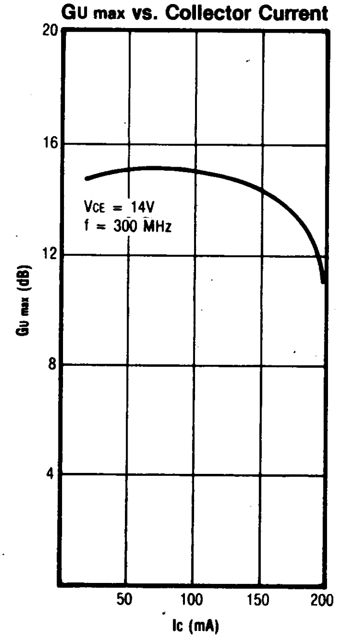
Gain-Bandwidth Product vs. Collector Current



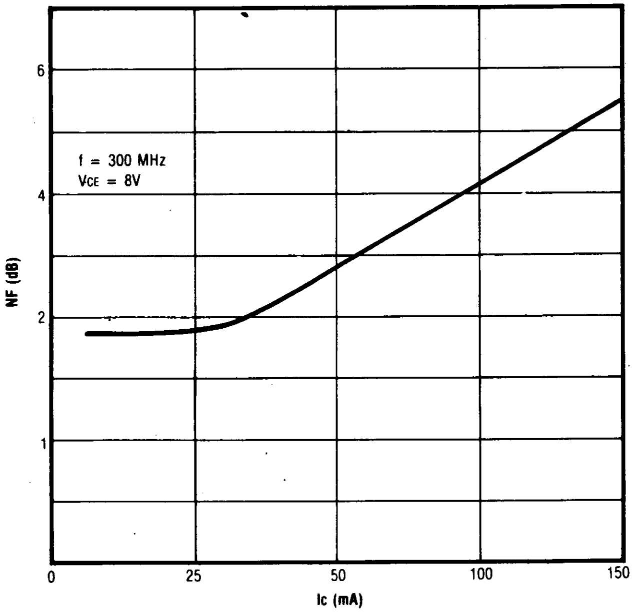
Typical Noise Figure and Associated Gain vs. Frequency



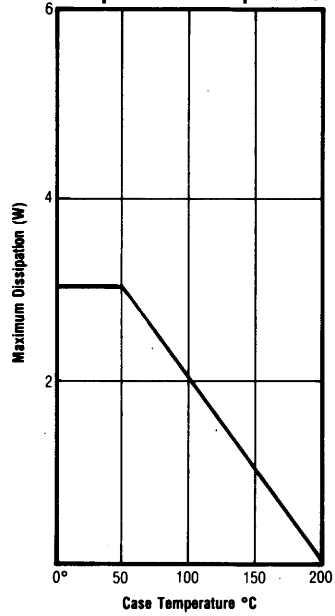
GU max vs. Collector Current



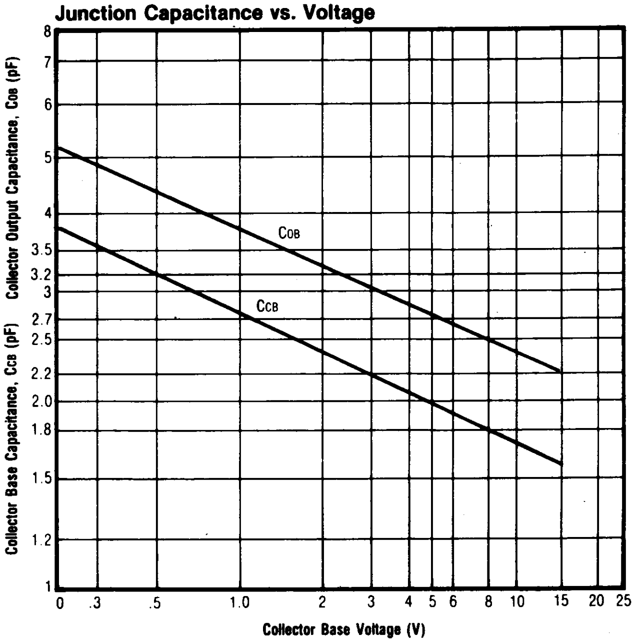
NF vs. Collector Current



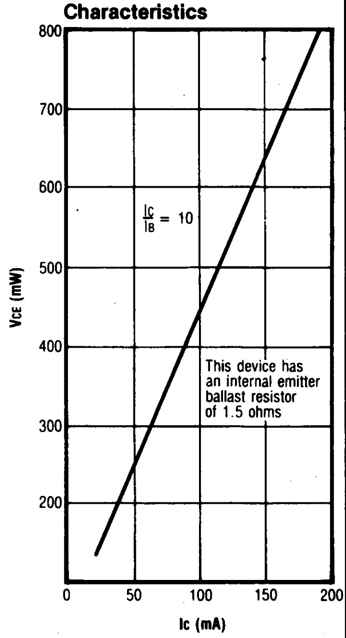
Dissipation vs. Temperature



Junction Capacitance vs. Voltage



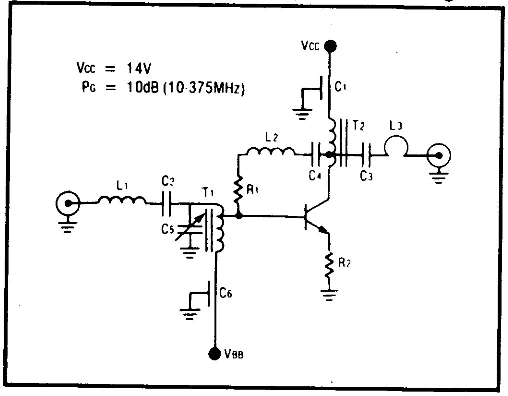
Collector Saturation Characteristics



F

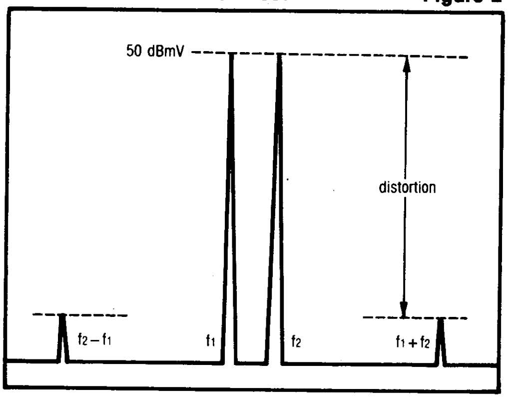
CATV/MATV Characterization

Broadband Test Circuit **Figure 1**

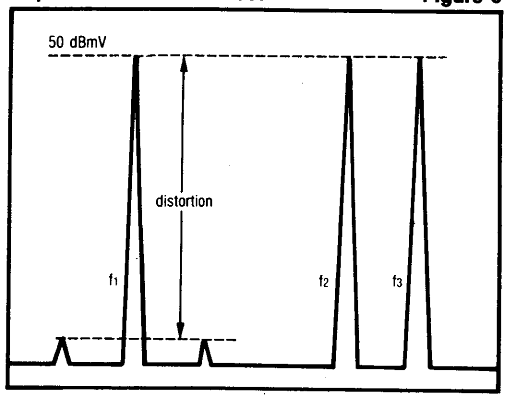


$C_{1,2,3,4}$	0.001μF
C_5	5-10pF
C_6	0.01μF
L_1	2 turns 1/8'' I.D. #20AWG
L_2	3 turns 3/16'' I.D. #20AWG
L_3	1 turn 1/8'' I.D. #20AWG
T_{12}	2x8 #30AWG, Q_1 Core
R_1	24Ω, 1/8W
R_2	13Ω, 1/2W

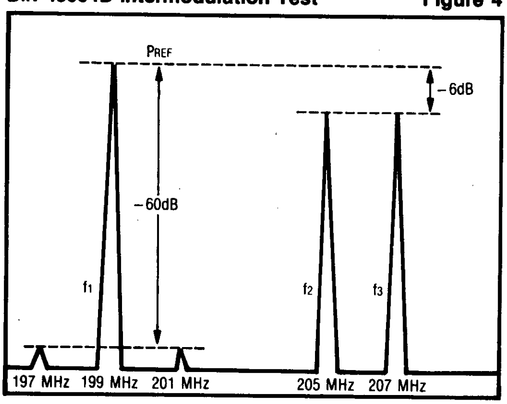
Second Order Distortion Test **Figure 2**



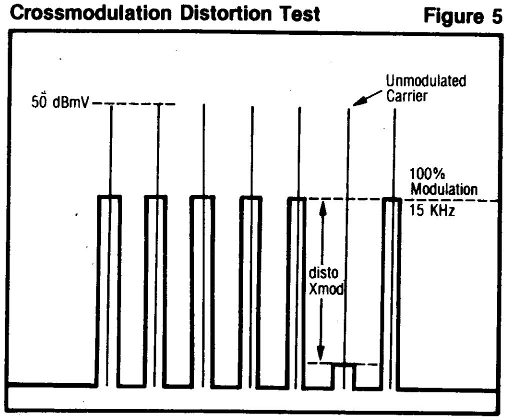
Triple Beat Distortion Test **Figure 3**



DIN 45004B Intermodulation Test **Figure 4**

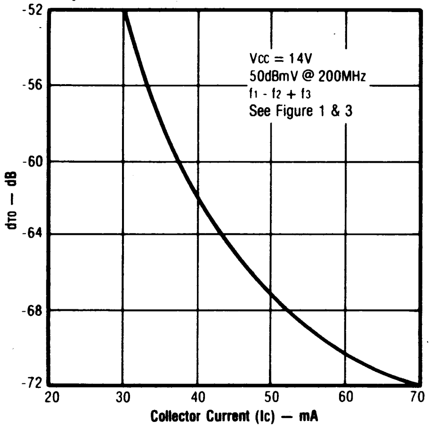


Crossmodulation Distortion Test **Figure 5**

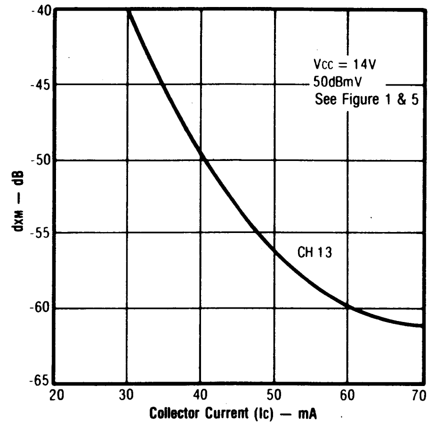


CATV/MATV Characterization

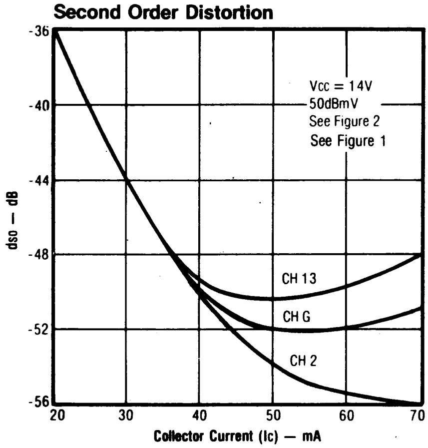
Triple Beat Distortion Test



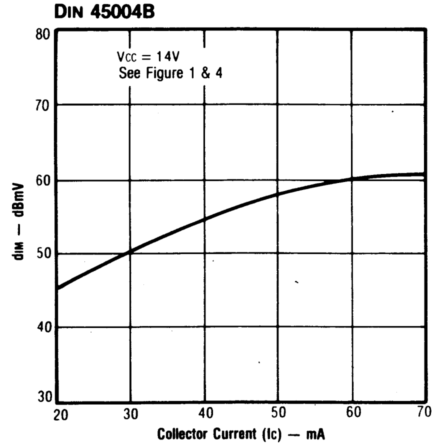
7 Channel X-Modulation Distortion



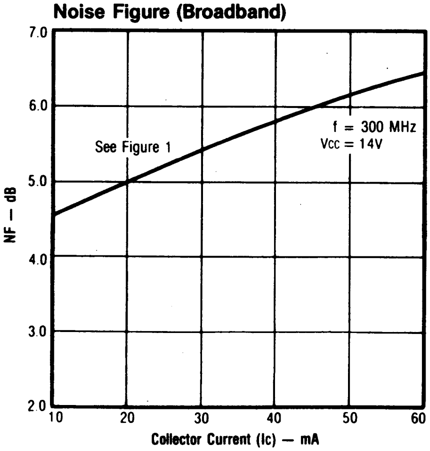
Second Order Distortion



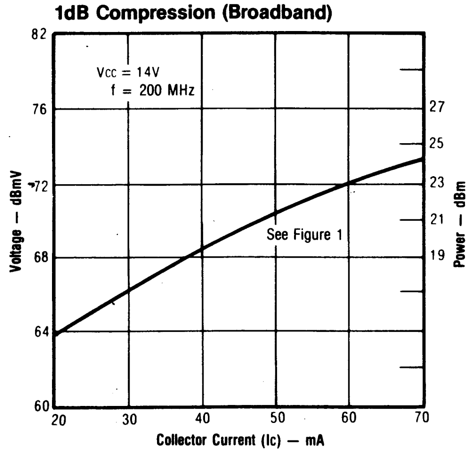
DIN 45004B



Noise Figure (Broadband)



1dB Compression (Broadband)



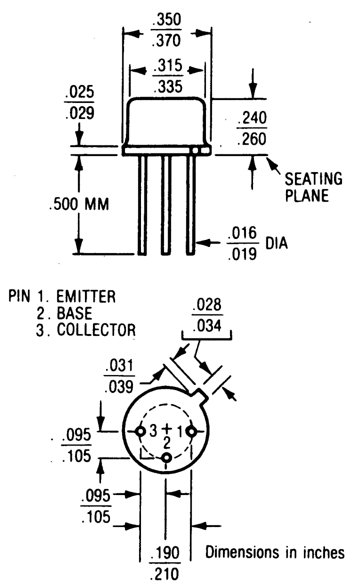
LT 1001A S PARAMETERS

S-dB and Angles:
V_{CE} = 8V, I_C = 50mA

Frequency (MHz)	S11		S21		S12		S22		k
100	−7.23	−131.8	21.95	101.3	−25.33	58.8	−7.08	−78.4	0.631
200	−9.06	−167.6	16.02	85.4	−21.46	65.6	−11.85	−86.2	0.969
300	−9.06	175.3	12.69	75.7	−18.49	68.9	−12.58	−93.5	1.025
400	−8.90	160.9	10.33	67.5	−16.21	69.7	−12.74	−102.7	1.049
500	−8.87	145.8	8.53	60.8	−14.42	69.7	−12.55	−110.4	1.071
600	−8.67	136.0	7.14	54.8	−12.90	69.3	−11.66	−119.7	1.068
700	−8.70	124.0	6.12	49.6	−11.50	68.3	−10.72	−126.6	1.059
800	−8.94	114.2	5.13	43.7	−10.37	66.4	−9.85	−136.3	1.065
900	−8.91	105.3	4.28	39.1	−9.34	65.0	−9.39	−143.9	1.066
1000	−9.16	93.6	3.63	34.6	−8.42	62.8	−3.70	−152.1	1.064

V_{CE} = 14V, I_C = 90mA

Frequency (MHz)	S11		S21		S12		S22		k
100	−7.74	−126.6	22.66	103.0	−28.85	57.6	−6.82	−47.5	0.748
200	−8.33	−157.8	17.08	86.3	−25.01	62.6	−8.40	−56.7	0.965
300	−8.28	−172.6	13.71	75.6	−22.37	65.8	−8.25	−66.4	1.026
400	−8.31	−177.5	11.25	66.7	−20.31	66.9	−7.58	−75.0	1.037
500	−8.18	173.9	9.61	61.2	−17.69	70.4	−7.33	−78.9	0.938
600	−8.12	167.5	8.08	55.5	−16.35	71.2	−6.81	−85.1	0.932
700	−8.19	161.2	6.83	48.9	−15.21	70.2	−6.22	−91.6	0.913
800	−8.16	−155.6	5.60	43.6	−14.22	70.9	−5.44	−96.4	0.883
900	−8.07	149.9	4.58	38.0	−13.28	70.0	−4.84	−102.4	0.844
1000	−7.86	143.8	3.70	34.4	−12.40	70.2	−4.54	−105.1	0.824

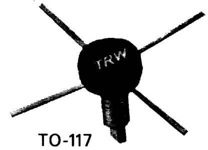


TO-39

TRW

High Frequency, High Voltage Transistor for CRT Driver Applications

- High Voltage
- High Frequency
- Low Capacitance
- Rugged
- All Gold Metallization



TO-117

F

These rugged NPN silicon transistors are specifically designed for CRT driver applications requiring high voltage and high frequency, such as high resolution color graphics video monitors. A new process in wafer fabrication enables high breakdown voltage without sacrificing high frequency capability. Utilizing ion implantation techniques coupled with microwave processing, the LT1817 sets new standards for bipolar transistors in these applications. Gold metallization insures high reliability for these rugged devices.

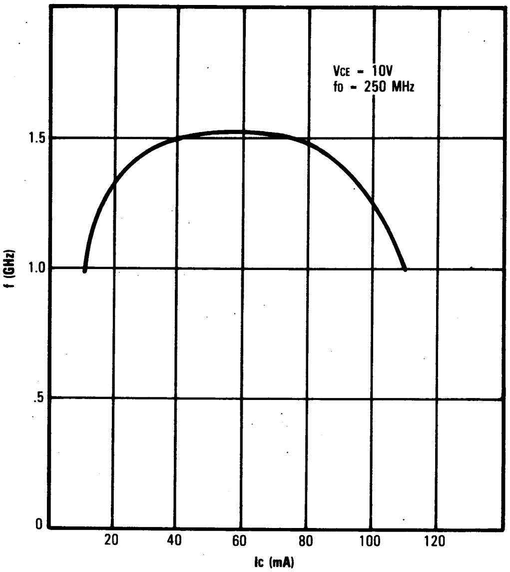
Electrical Characteristics (25°C Unless otherwise noted.)

Symbol	Description	Conditions	Min.	Max.	Units
BV_{EBO}	Emitter-Base Breakdown-Voltage	I_E = .1mA	3.0		V
BV_{CBO}	Collector-Base Breakdown-Voltage	I_C = .1mA	120		V
BV_{CEO}	Collector-Emitter Breakdown-Voltage	I_C = 1mA	70		V
I_{CES}	Collector-Emitter Leakage	V_{CE} = 80V		100	µA
I_{CBO}	Collector-Base Leakage	V_{CB} = 80V		20	µA
h_{FE}	DC Current Gain	V_{CE} = 5V I_C = 50mA	15	45	
C_{CB}	Collector-Base Capacitance	V_{CB} = 10V		2.0	pF
$V_{CE\ (SAT)}$	Collector-Emitter Saturation Voltage	I_C = 50mA I_B = 5mA		800	mV
F_T	Gain Bandwidth Product	V_{CE} = 10V I_C = 80mA fo = 250MHz	1.0		GHz
F_{max}	Maximum Oscillation Frequency	V_{CE} = 10V I_C = 80mA fo = 250MHz	2.0		GHz
S_{21}	Common Emitter Insertion Gain	V_{CE} = 10V I_C = 50mA f = 200MHz	15		dB

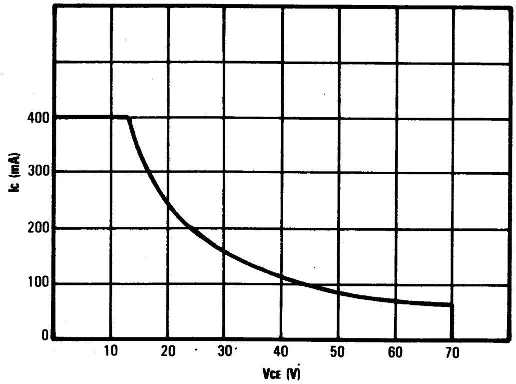
Absolute Maximum Ratings @ 25°C Case

Collector Current (I_C)	Collector Base Voltage (V_{CBO})	Junction Temperature (T_J)	Storage Temperature (T_{STG})
400mA	120V	+200°C	−65°C to +200°C

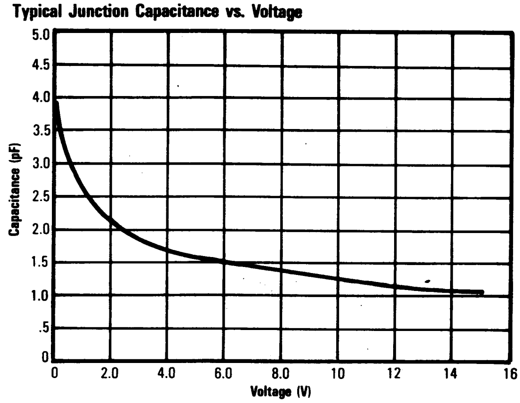
Typical Gain Bandwidth Product vs. Collector Current



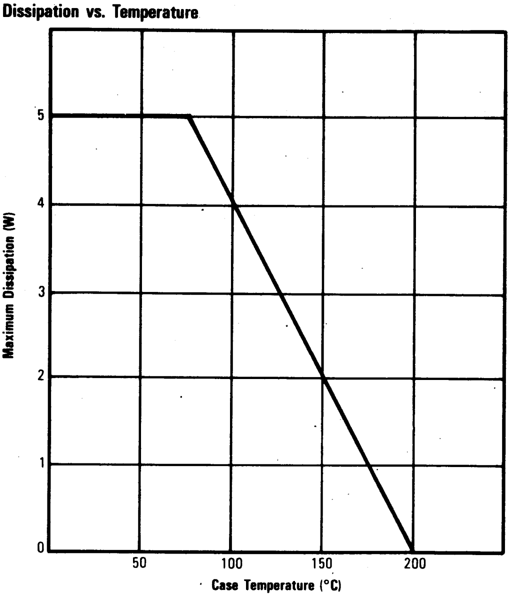
Safe Operating Area

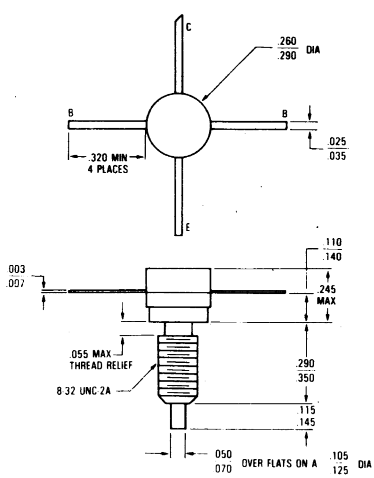


Typical Junction Capacitance vs. Voltage



Dissipation vs. Temperature

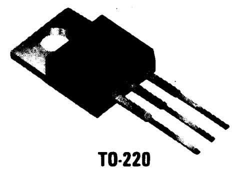




TRW

High Frequency, High Voltage Transistor for CRT Driver Applications

- High Voltage
- High Frequency
- Low Capacitance
- Rugged
- All Gold Metallization



TO-220

F

These rugged NPN silicon transistors are specifically designed for CRT driver applications requiring high frequency and high voltage, such as high resolution color graphics video monitors. A new process in wafer fabrication enables high breakdown voltage without sacrificing high frequency capability. Utilizing ion implantation techniques coupled with microwave processing, the LT1820 sets new standards for bipolar transistors in these applications. Gold metallization insures high reliability for these rugged devices.

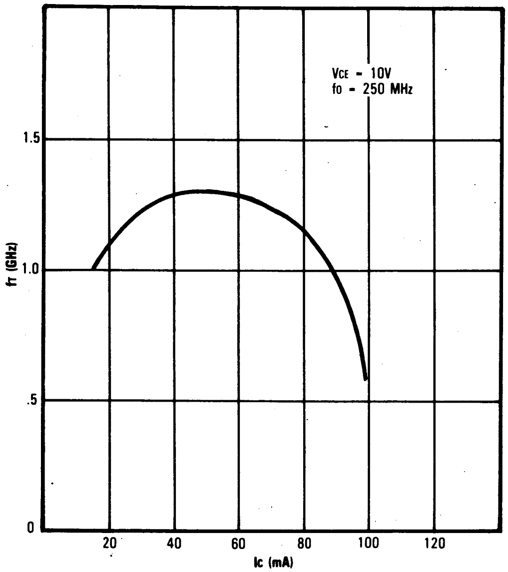
Electrical Characteristics (25°C Unless otherwise noted.)

Symbol	Description	Conditions	Min.	Max.	Units
BV_{EBO}	Emitter-Base Breakdown-Voltage	I_E = .1mA	3.0		V
BV_{CBO}	Collector-Base Breakdown-Voltage	I_C = .1mA	120		V
BV_{CEO}	Collector-Emitter Breakdown-Voltage	I_C = 1mA	70		V
I_{CES}	Collector-Emitter Leakage	V_{CE} = 80V		100	μA
I_{CBO}	Collector-Base Leakage	V_{CB} = 80V		20	μA
h_{FE}	DC Current Gain	V_{CE} = 5V I_C = 50mA	15	45	
C_{CB}	Collector-Base Capacitance	V_{CB} = 10V		2.5	pF
$V_{CE\ (SAT)}$	Collector-Emitter Saturation Voltage	I_C = 50mA I_B = 5mA		800	mV
F_T	Gain Bandwidth Product	V_{CE} = 10V I_C = 80mA fo = 250MHz	1.0		GHz
S_{21}	Common Emitter Insertion Gain	V_{CE} = 10V I_C = 50mA f = 200MHz	13		dB

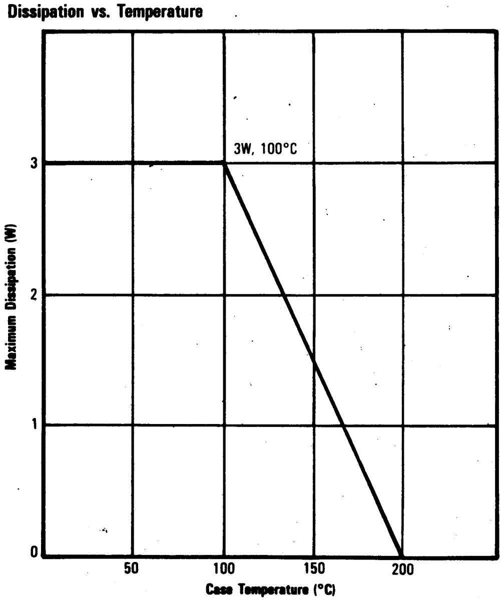
Absolute Maximum Ratings @ 25°C Case

Collector Current (I_C)	Collector Base Voltage (V_{CBO})	Junction Temperature (T_J)	Storage Temperature (T_{STG})
300mA	120V	+200°C	−65°C to +200°C

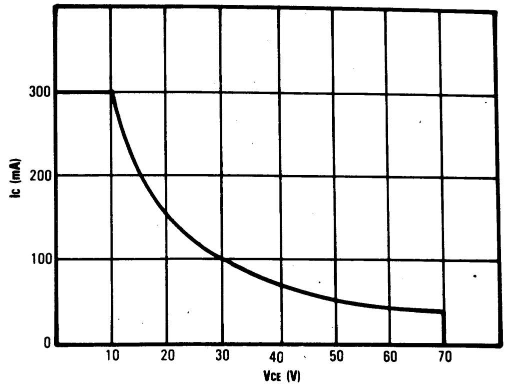
Typical Gain Bandwidth Product vs. Collector Current



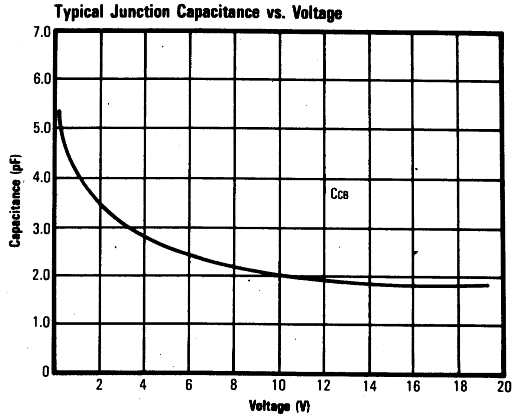
Dissipation vs. Temperature



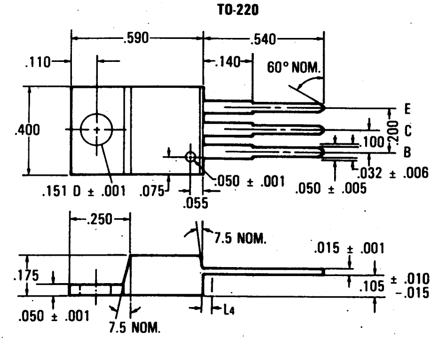
Safe Operating Area



Typical Junction Capacitance vs. Voltage



TO-220

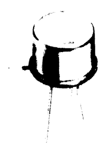


NOTE:
1. DIMENSIONS IN INCHES
2. TOLERANCE OF ±.010 APPLIED UNLESS OTHERWISE SPECIFIED
3. MOLD FLASH ALLOWED WITHIN L4 MAX .020

TRW

High Frequency, High Voltage Transistor for CRT Driver Applications

- High Voltage
- High Frequency
- Low Capacitance
- Rugged
- All Gold Metallization



TO-39

F

These rugged NPN silicon transistors are specifically designed for CRT driver applications requiring high frequency and high voltage, such as high resolution color graphics video monitors. A new process in wafer fabrication enables high breakdown voltage without sacrificing high frequency capability. Utilizing ion implantation techniques coupled with microwave processing, the LT1839 sets new standards for bipolar transistors in these applications. Gold metallization insures high reliability for these rugged devices.

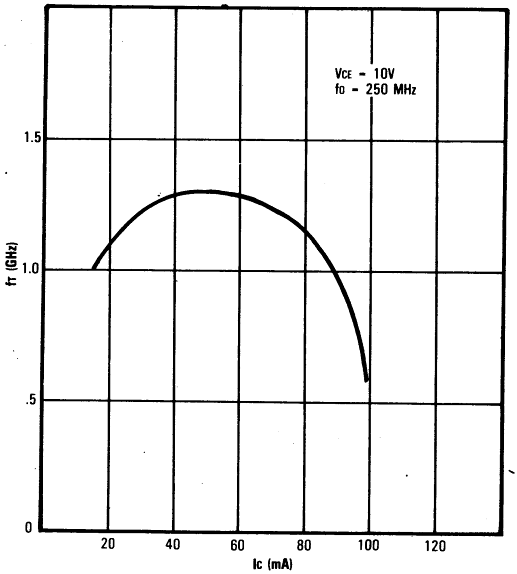
Electrical Characteristics (25°C Unless otherwise noted.)

Symbol	Description	Conditions	Min.	Max.	Units
BV_{EBO}	Emitter-Base Breakdown-Voltage	I_E = .1mA	3.0		V
BV_{CBO}	Collector-Base Breakdown-Voltage	I_C = .1mA	120		V
BV_{CEO}	Collector-Emitter Breakdown-Voltage	I_C = 1mA	70		V
I_{CES}	Collector-Emitter Leakage	V_{CE} = 80V		100	μA
I_{CBO}	Collector-Base Leakage	V_{CB} = 80V		20	μA
h_{FE}	DC Current Gain	V_{CE} = 5V I_C = 50mA	15	45	
C_{CB}	Collector-Base Capacitance	V_{CB} = 10V		2.0	pF
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	I_C = 50mA I_B = 5mA		800	mV
F_T	Gain Bandwidth Product	V_{CE} = 10V I_C = 80mA fo = 250MHz	1.0		GHz
S_{21}	Common Emitter Insertion Gain	V_{CE} = 10V I_C = 50mA f = 200MHz	13		dB

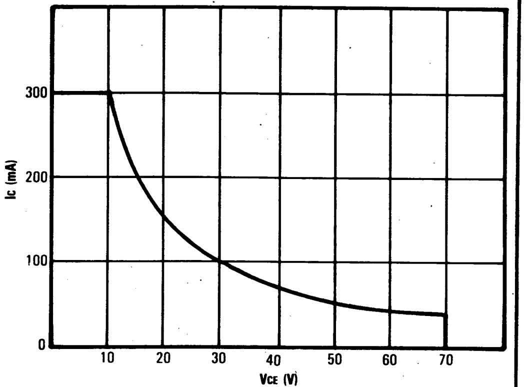
Absolute Maximum Ratings @ 25°C Case

Collector Current (I_C)	Collector Base Voltage (V_{CBO})	Junction Temperature (T_J)	Storage Temperature (T_{STG})
300mA	120V	+200°C	−65°C to +200°C

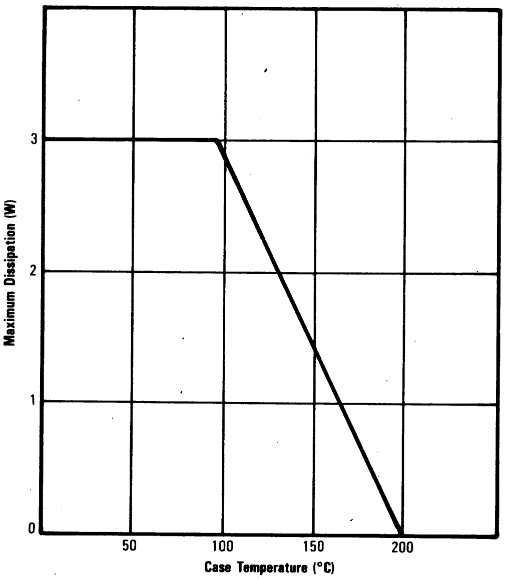
Typical Gain Bandwidth Product vs. Collector Current



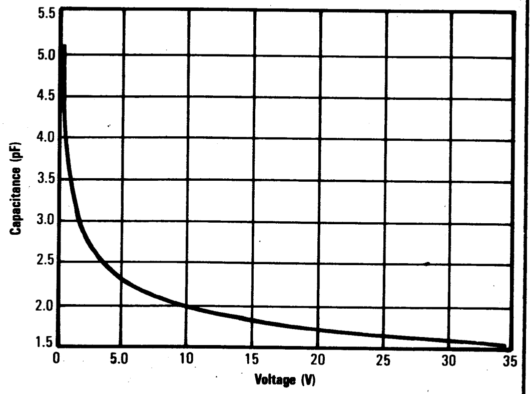
Safe Operating Area

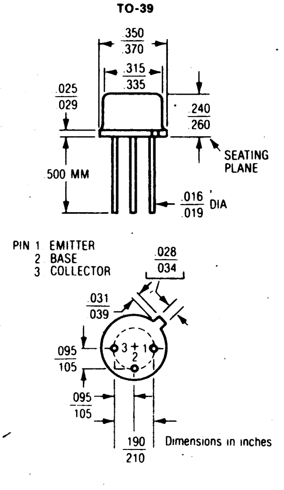


Dissipation vs. Temperature



Typical Junction Capacitance vs. Voltage





Semiconductor Division
TRW Electronic Components Group
14520 Aviation Blvd.
Lawndale, CA 90260

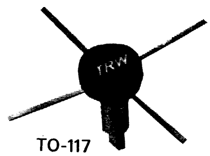
LT 5817

NEW

TRW

PNP Bipolar Transistor High Frequency, High Voltage Transistor for CRT Driver Applications

- High Voltage
- High Frequency
- Low Capacitance
- Rugged
- All Gold Metallization



TO-117

F

These rugged PNP silicon transistors are specifically designed for CRT driver applications requiring high frequency and high voltage, such as high resolution color graphics video monitors. A new process in wafer fabrication enables high breakdown voltage without sacrificing high frequency capability. Utilizing ion implantation techniques coupled with microwave processing, the LT 5817 sets new standards for bipolar transistors in these applications. Gold metallization insures high reliability for these rugged devices.

Electrical Characteristics (25 °C Unless otherwise noted)

TEST	TEST CONDITIONS*	LIMIT Min.	LIMIT Max.	UNITS
BVE_{BO}	I_E = .1 mA,	3.0		V
BV_{CEO}	I_E = 1 mA	65		V
BV_{CBO}	I_C = .1 mA,	75		V
I_{CES}	V_{CE} = 50 V		100	μA
IC_{BO}	V_{CB} = 50 V		20	μA
H_{FE}	V_{CE} = 5 V, I_C = 50 mA	20	60	
C_{CB}	V_{CB} = 10 V, 1 MHz		2.0	pF
V_{CE} (SAT)	I_C = 50 mA, I_B = 5 mA		800	mV
$(S21)^2$	V_{CE} = 10 V, I_C = 50 mA, 200 MHz	13		dB
F_T	V_{CE} = 10 V, I_C = 50 mA	1.5		GHz

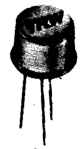
* Puise width 300 μ sec 2 % duty cycle

NEW

TRW

PNP Bipolar Transistor High Frequency, High Voltage Transistor for CRT Driver Applications

- High Voltage
- High Frequency
- Low Capacitance
- Rugged
- All Gold Metallization



TO 39

These rugged PNP silicon transistors are specifically designed for CRT driver applications requiring high frequency and high voltage, such as high resolution color graphics video monitors. A new process in wafer fabrication enables high breakdown voltage without sacrificing high frequency capability. Utilizing ion implantation techniques coupled with microwave processing, the LT 5839 sets new standards for bipolar transistors in these applications. Gold metallization insures high reliability for these rugged devices.

Electrical Characteristics (25 °C Unless otherwise noted)

TEST	TEST CONDITIONS*	LIMIT Min.	LIMIT Max.	UNITS
BVE_{BO}	I_E = .1 mA,	3.0		V
BV_{CEO}	I_E = 1 mA	65		V
BV_{CBO}	I_C = .1 mA,	75		V
I_{CES}	V_{CE} = 50 V		100	μA
IC_{BO}	V_{CB} = 50 V		20	μA
H_{FE}	V_{CE} = 5 V, I_C = 50 mA	20	60	
C_{CB}	V_{CB} = 10 V, 1 MHz		2.0	pF
V_{CE} (SAT)	I_C = 50 mA, I_B = 5 mA		800	mV
$(S21)^2$	V_{CE} = 10 V, I_C = 50 mA, 200 MHz	13		dB
F_T	V_{CE} = 10 V, I_C = 50 mA	1.5		GHz

* Pulse width 300 μ sec 2 % duty cycle