MRF5174

The RF Line

2 W – 400 MHz

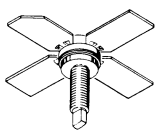
RF POWER TRANSISTOR

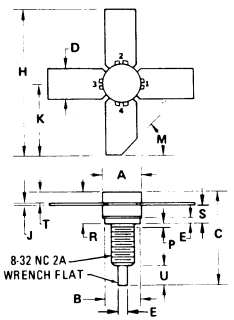
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for wideband large-signal driver and pre-driver amplifier stages in the 260-600 MHz frequency range.

- Specified 28-Volt, 400-MHz Characteristics –
  Output Power = 2.0 Watts
  Minimum Gain = 12 dB
  Efficiency = 50%
- Characterized from 200 to 600 MHz
- Includes Series Equivalent Impedances





STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
B	6.25	6.45	0.246	0.254
C	15.49	16.51	0.610	0.650
D	5.59	5.84	0.220	0.230
E	1.52 NOM		0.060 NOM	
H	26.80	27.05	1.055	1.065
J	0.127 NOM		0.005 NOM	
K	13.41	13.51	0.528	0.532
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	4.52	5.03	0.178	0.198
S	3.00	3.25	0.118	0.128
T	1.40	1.65	0.055	0.065
U	2.92	3.68	0.115	0.145

CASE 244

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	33	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	0.5	Adc
Total Device Dissipation @ $T_A = 25^oC$ (1) Derate above 25^oC	P_D	5.0 28	Watts mW/°C
Storage Temperature Range	T_{stg}	–65 to+150	°C

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

THERMAL CHARACTERISTICS

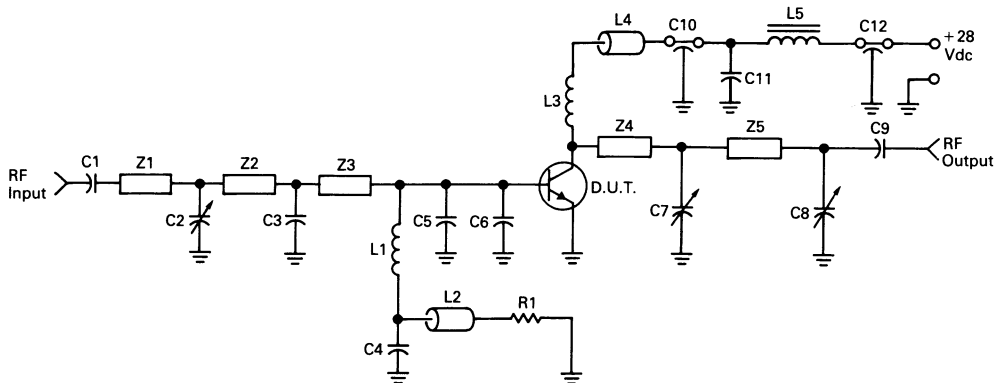
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	25	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 20 mAdc, I_B = 0)	$V_{(BR)CEO}$	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 20 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 1.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	0.1	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	100	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	8.0	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 2.0 W, f = 400 MHz)	G_{PE}	12	–	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 2.0 W, f = 400 MHz)	η	50	–	–	%

3

FIGURE 1 – 400 MHz TEST CIRCUIT SCHEMATIC



C1, 9 — 0.02 μF Chip
C2 — 0.0–10 pF Johanson 2951
C3 — 15 pF Unelco
C4 — 100 pF Unelco
C5, 6 — 5.1 pF ATC 100 mil Chip
C7, 8 — 0.8–20 pF Johanson 3906
C10, 12 — 680 pF Feedthru
C11 — 1.0 μF Tantalum 35 V

R1 — 2.7 Ohm 1/2 Watt

L1 — 3.9 μH Molded Choke
L2, 4 — Ferrite Bead Ferroxcube 56-590-65-38
L3 — 0.15 μH Molded Choke
L5 — Ferrite Choke VK200-20-4B

Z1–Z5 — Microstrip, See Photomaster

Board Material — 0.062" Glass Teflon

FIGURE 2 – OUTPUT POWER versus FREQUENCY

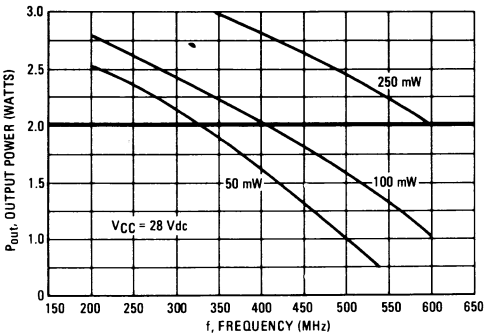


FIGURE 3 – OUTPUT POWER versus INPUT POWER

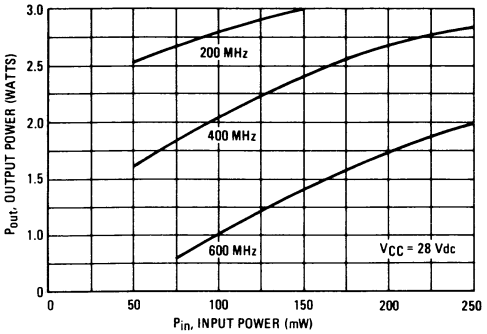


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

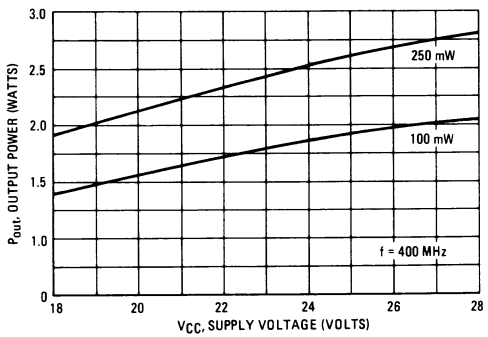
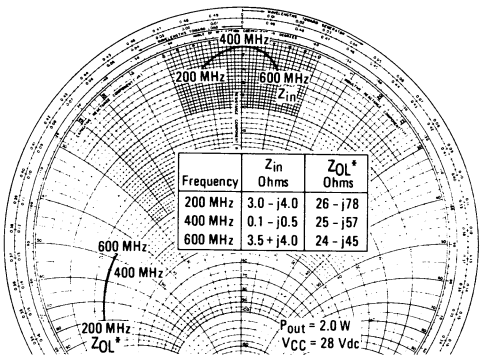


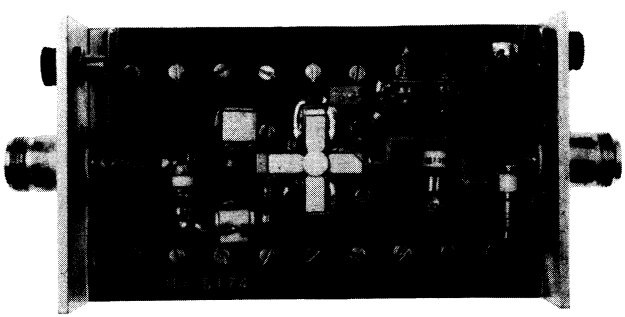
FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



Frequency	Z_{in} Ohms	Z_{OL}^* Ohms
200 MHz	3.0 - j4.0	26 - j78
400 MHz	0.1 - j0.5	25 - j57
600 MHz	3.5 + j4.0	24 - j45

*Z_{OL} = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage, and frequency.

FIGURE 6 – 400 MHz TEST CIRCUIT



MRF5175

The RF Line

5 W – 400 MHz

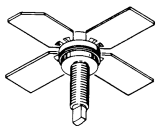
RF POWER TRANSISTOR

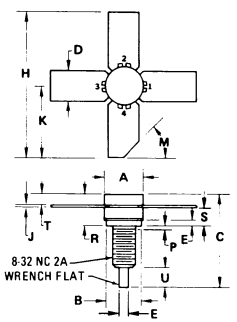
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for wideband large-signal driver and predriver amplifier stages in the 200-600 MHz frequency range.

- Specified 28-Volt, 400-MHz Characteristics –
  Output Power = 5.0 Watts
  Minimum Gain = 11 dB
  Efficiency = 50%
- Characterized from 200 to 600 MHz
- Includes Series Equivalent Impedances





STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.25	6.45	0.246	0.254
C	15.49	16.51	0.610	0.650
D	5.59	5.84	0.220	0.230
E	1.52 NOM		0.060 NOM	
H	26.80	27.05	1.055	1.065
J	0.127 NOM		0.005 NOM	
K	13.41	13.51	0.528	0.532
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	4.52	5.03	0.178	0.198
S	3.00	3.25	0.118	0.128
T	1.40	1.65	0.055	0.065
U	2.92	3.68	0.115	0.145

CASE 244

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	33	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	1.0	Adc
Total Device Dissipation @ $T_A = 25^oC$ (1) Derate above 25^oC	P_D	12 69	Watts mW/^oC
Storage Temperature Range	T_{stg}	-65 to +200	^oC

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

THERMAL CHARACTERISTICS

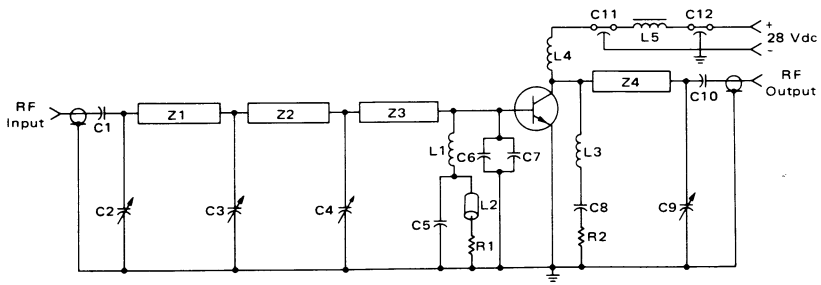
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12	$^oC/W$

3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, I_B = 0)	$V_{(BR)CEO}$	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 1.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	0.5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 250 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	100	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	15	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 5.0 W, f = 400 MHz)	G_{PE}	11	–	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 5.0 W, f = 400 MHz)	η	50	–	–	%

FIGURE 1 – 400 MHz TEST CIRCUIT SCHEMATIC



C1,C10 0.018 μF VITRAMON Chip
C2,C3,C9 1.0-10 pF JOHANSON Type 2951
C4 1.0-20 pF JOHANSON Type 3906
C5 100 pF UNDERWOOD (UNELCO)
C6,C7 5.0 pF ATC Chip
C8 0.1 μF ERIE Disc Ceramic
C11,C12 680 pF ALLEN BRADLEY Feedthru

L1 3.9 μH Molded Choke
L2 Ferrite Bead, FERROXCUBE 56-590-65-3B
L3 4 Turns, #22 AWG, 0.1" ID
L4 6 Turns, #20 AWG, 1/8" ID
L5 Ferrite Choke, FERROXCUBE VK200-20-4B

R1 2.7 Ohm, 1/8 Watt, 10%
R2 5.1 Ohm, 1/8 Watt, 10%

Z1,Z3 Microstrip Line, 0.1" W x 0.5" L
Z2 Microstrip Line, 0.1" W x 0.4" L
Z4 Microstrip Line, 0.075" W x 2.5" L

Board – Glass Teflon, ϵ_R = 2.56, t = 0.062"
Input/Output Connectors – Type N

FIGURE 2 – OUTPUT POWER versus FREQUENCY

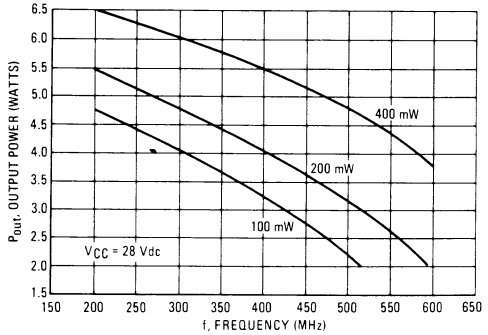


FIGURE 3 – OUTPUT POWER versus INPUT POWER

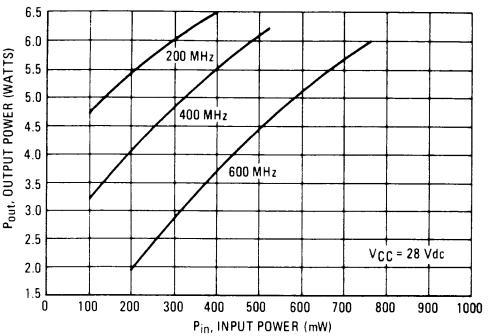


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

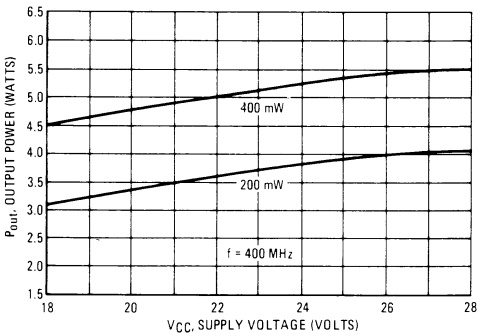
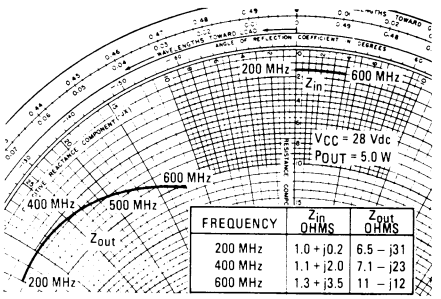
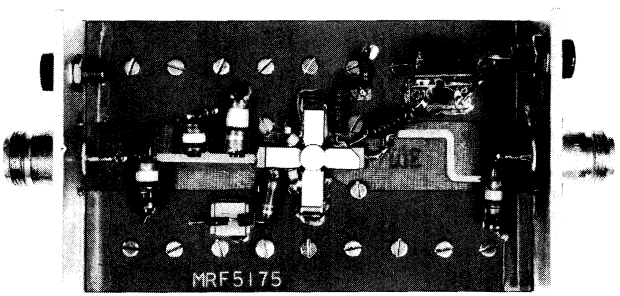


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



FREQUENCY	Z_{in} OHMS	Z_{out} OHMS
200 MHz	1.0 + j0.2	6.5 – j31
400 MHz	1.1 + j2.0	7.1 – j23
600 MHz	1.3 + j3.5	11 – j12

FIGURE 6 – 400 MHz TEST CIRCUIT



MRF5176

The RF Line

15 W – 400 MHz

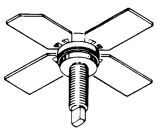
RF POWER TRANSISTOR

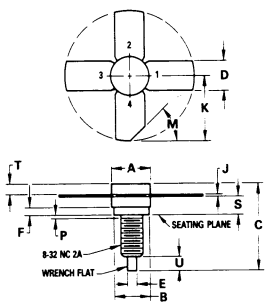
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for wideband large-signal driver and predriver amplifier stages in the 200-600 MHz frequency range.

- Specified 28 Volt, 400 MHz Characteristics –
  Output Power = 15 Watts
  Minimum Gain = 10 dB
  Efficiency = 50%
- Characterized from 200 to 600 MHz
- Includes Series Equivalent Impedances





STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.96	0.215	0.235
E	1.40	1.65	0.055	0.065
F	1.52	—	0.060	—
J	0.08	0.17	0.003	0.007
K	11.05	—	0.435	—
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.77	0.055	0.070
U	2.92	3.68	0.115	0.145

CASE 244-04

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	33	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	2.0	Adc
Total Device Dissipation @ $T_A = 25^oC$ (1) Derate above 25^oC	P_D	30 170	Watts mW/^{o}C
Storage Temperature Range	T_{stg}	-65 to +200	^{o}C

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

THERMAL CHARACTERISTICS

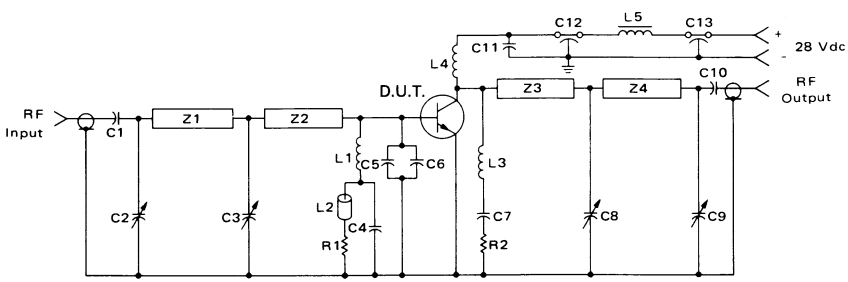
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	6.0	^{o}C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 2.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	1.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 500 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	100	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	25	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 15 W, f = 400 MHz)	G_{PE}	10	–	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 15 W, f = 400 MHz)	η	50	–	–	%

3

FIGURE 1 – 400 MHz TEST CIRCUIT SCHEMATIC



C1,C10 0.018 μF VITRAMON Chip
C2,C3,C8 1.0-20 pF JOHANSON Type 3906
C4 100 pF UNDERWOOD (UNELCO)
C5,C6 56 pF ATC Chip
C7 0.1 μF ERIE Disc Ceramic
C9 1.0-20 pF JOHANSON Type 3906
C11 1.0 μF, 35 V TANTALUM
C12,C13 680 pF ALLEN BRADLEY Feedthru

L1 3.9 μH Molded Choke
L2 Ferrite Bead, FERROXCUBE, 56-590-65-3B
L3 3 Turns, #20 AWG, 0.1" ID
L4 6 Turns, #20 AWG, 1/4" ID
L5 Ferrite Choke, FERROXCUBE, VK200-20-4B

R1 207 Ω, 1/8 W, 10%
R2 5.1 Ω, 1/8 W, 10%

Z1 Microstrip Line, 0.1" W x 1.2" L
Z2 Microstrip Line, 0.25" W x 0.7" L
Z3,Z4 Microstrip Line, 0.075" W x 1.25" L

Board – Glass Teflon, ϵ_R = 2.56, t = 0.062"
Input/Output Connectors – Type N

FIGURE 2 – OUTPUT POWER versus FREQUENCY

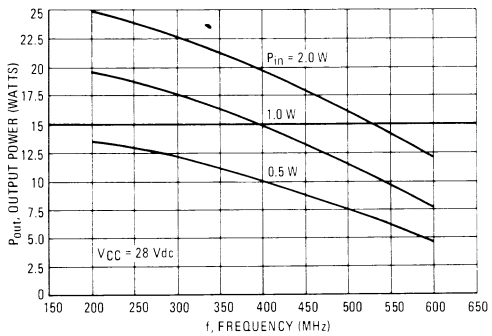


FIGURE 3 – OUTPUT POWER versus INPUT POWER

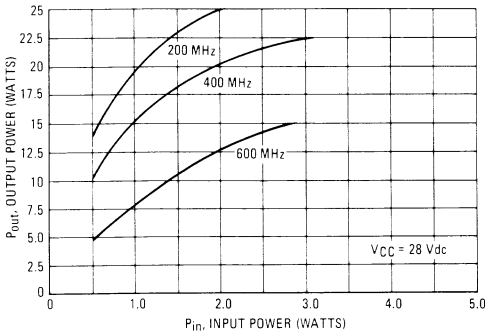


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

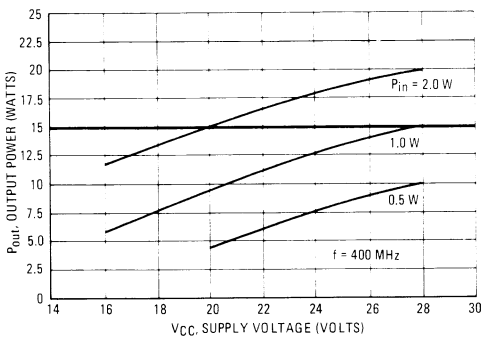
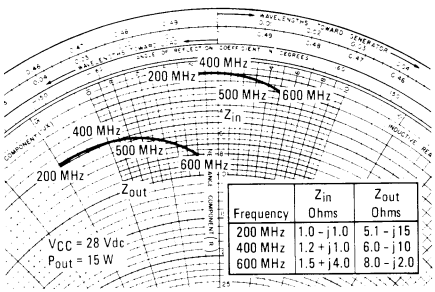
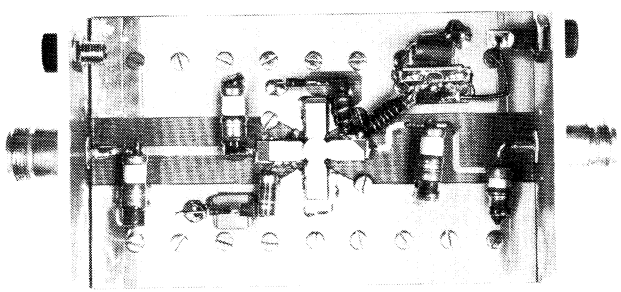


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



Frequency	Z_{in} Ohms	Z_{out} Ohms
200 MHz	1.0 – j1.0	5.1 – j15
400 MHz	1.2 + j1.0	6.0 – j10
600 MHz	1.5 + j4.0	8.0 – j2.0

FIGURE 6 – 400 MHz TEST CIRCUIT



MRF5177
MRF5177A

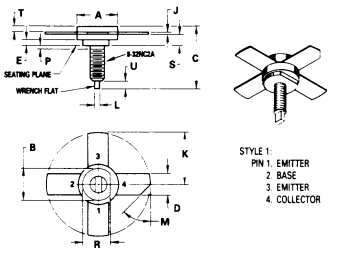
The RF Line

30 W, 400 MHz
RF POWER TRANSISTOR
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed for VHF/UHF power amplifier applications. This device is optimized for rugged performance in 225-400 MHz communications equipment.

- Performance @ 400 MHz, 28 Vdc —
  Power Output = 30 W (Min)
  Gain = 6.0 dB (Min)
- Isothermal Design for Rugged Performance —
  Tested at 30:1 VSWR through all phase angles



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	—	0.070	—
J	0.08	0.18	0.003	0.007
K	12.45	—	0.490	—
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-09
MRF5177A

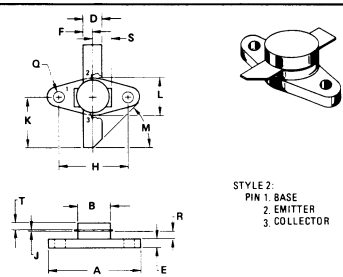
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	4.0	Adc
Base Current	I_B	1.0	Adc
Total Device Dissipation @ $T_C = 25^oC$) (1) Derate Above 25^oC	P_D —	58 0.33	Watts $W/^oC$
Storage Temperature Range	T_{stg}	-65 to +200	^oC

(1) This device is designed for RF Power operation. The total device dissipation rating applies only when the device is operated as a Class C RF Amplifier.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.0	$^oC/W$



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	21.08	21.59	0.830	0.850
B	9.27	9.78	0.365	0.385
D	5.59	5.84	0.220	0.230
E	2.03	2.41	0.080	0.095
F	2.79	2.92	0.110	0.115
H	15.11	15.37	0.595	0.605
J	0.10	0.15	0.004	0.006
K	13.08	13.59	0.515	0.535
L	9.91	10.41	0.390	0.410
M	45°	NOM	45°	NOM
Q	2.92	3.18	0.115	0.125
R	1.52	2.03	0.060	0.080
S	-	5.38	-	0.212
T	2.03	2.54	0.080	0.100

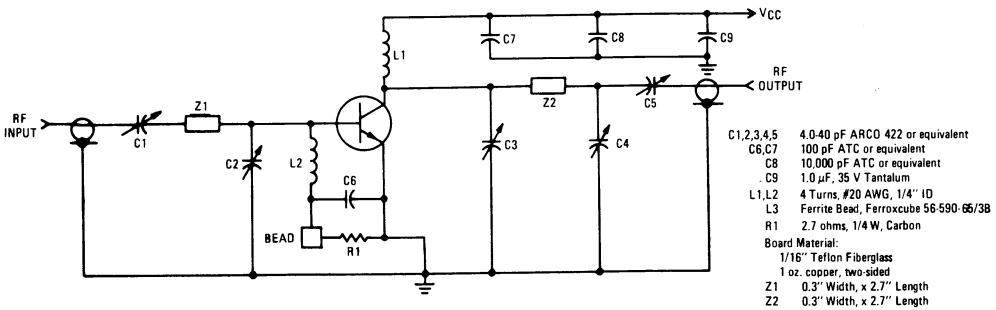
CASE 215
MRF5177

3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

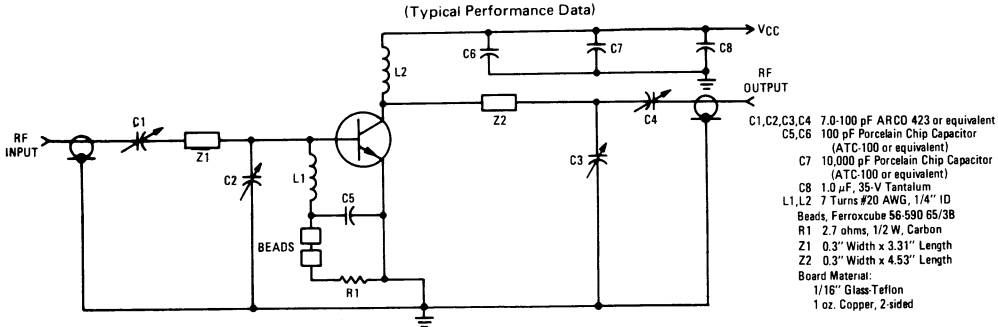
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 2.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	2.0	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 100 mAdc, V_{CE} = 5.0 Vdc) (I_C = 4.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10 10	100 –	–
DYNAMIC CHARACTERISTICS				
Output Capactiance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	50	pF
FUNCTIONAL TESTS (Figures 1 and 9)				
Common-Emitter Amplifier Power Gain (P_{out} = 30 W, V_{CC} = 28 Vdc, f = 400 MHz)	G_{PE}	6.0	–	dB
Collector Efficiency (P_{out} = 30 W, V_{CC} = 28 Vdc, f = 400 MHz)	η	60	–	%
Saturated Power (P_{in} = 11 W, V_{CC} = 28 Vdc, f = 400 MHz)	P_{sat}	36	–	Watts
Electrical Ruggedness (P_{out} = 30 W, V_{CC} = 28 Vdc, f = 400 MHz, $T_C \leq 50°C$)	VSWR > 30:1 through all phase angles in a 3 second time interval, After which, devices will meet G_{PE} test limits.			

FIGURE 1 – 400 MHz TEST CIRCUIT
(Typical Performance Data for 300-500 MHz Operation)



C1,2,3,4,5 4.0-40 pF ARCO 422 or equivalent
C6,C7 100 pF ATC or equivalent
C8 10,000 pF ATC or equivalent
C9 1.0 μF, 35 V Tantalum
L1,L2 4 Turns, #20 AWG, 1/4" ID
L3 Ferrite Bead, Ferroxcube 56-590-65/3B
R1 2.7 ohms, 1/4 W, Carbon
Board Material:
1/16" Teflon Fiberglass
1 oz. copper, two-sided
Z1 0.3" Width, x 2.7" Length
Z2 0.3" Width, x 2.7" Length

FIGURE 2 – 200-300 MHz TEST CIRCUIT
(Typical Performance Data)



C1,C2,C3,C4 7.0-100 pF ARCO 423 or equivalent
C5,C6 100 pF Porcelain Chip Capacitor (ATC-100 or equivalent)
C7 10,000 pF Porcelain Chip Capacitor (ATC-100 or equivalent)
C8 1.0 μF, 35-V Tantalum
L1,L2 7 Turns #20 AWG, 1/4" ID
Beads, Ferroxcube 56-590 65/3B
R1 2.7 ohms, 1/2 W, Carbon
Z1 0.3" Width x 3.31" Length
Z2 0.3" Width x 4.53" Length
Board Material:
1/16" Glass-Teflon
1 oz. Copper, 2-sided

FIGURE 3 – OUTPUT POWER versus FREQUENCY

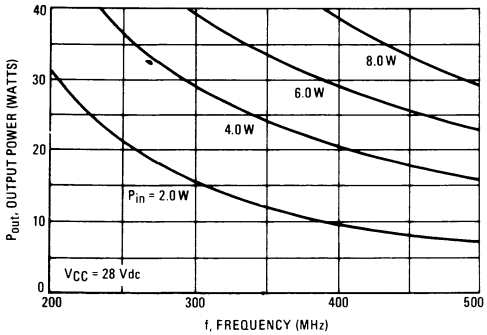


FIGURE 4 – OUTPUT POWER versus INPUT POWER

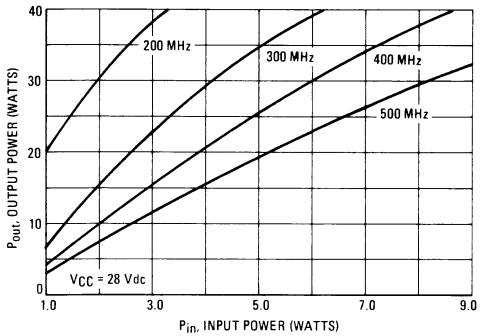


FIGURE 5 – OUTPUT POWER versus SUPPLY VOLTAGE

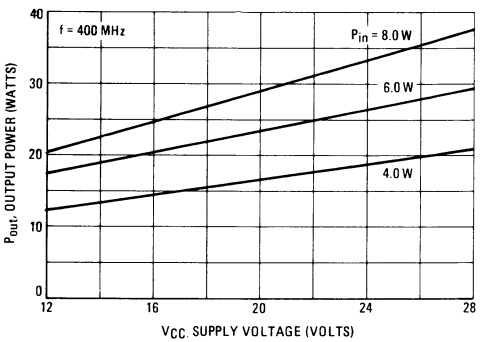


FIGURE 6 – OUTPUT POWER versus SUPPLY VOLTAGE

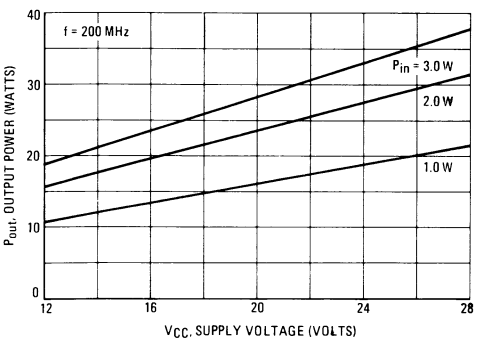


FIGURE 7 – RF POWER DERATING

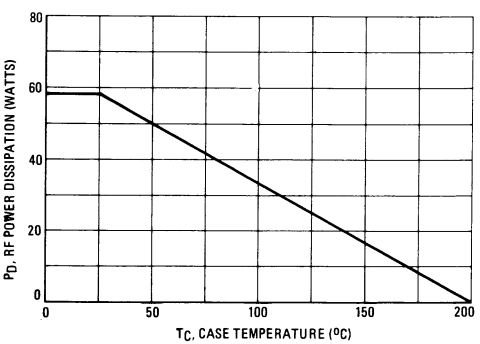
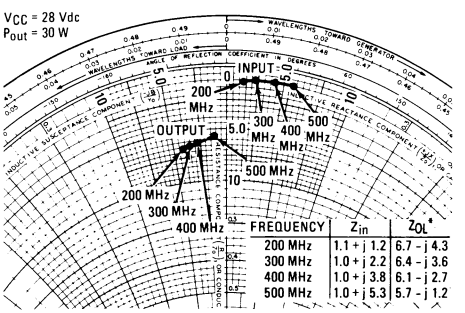


FIGURE 8 – SERIES EQUIVALENT IMPEDANCE



*ZOL = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage, and frequency.

MRF5711
BF430*
MRF5711L
BF430L*

*European Part Numbers

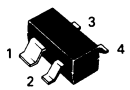
SURFACE MOUNTED HIGH FREQUENCY TRANSISTOR NPN SILICON

The RF Line

NPN Silicon High-Frequency Transistor

. . . designed primarily for use in the high-gain, low-noise small-signal amplifiers for operation up to 3.5 GHz. Also usable in applications requiring fast switching times.

- High Current-Gain-Bandwidth Product — f_T = 7.5 GHz (Typ) @ I_C = 50 mAdc
- Low Noise Figure @ f = 1 GHz — $NF_{(matched)}$ = 1.6 dB (Typ)
- High Power Gain — $G_{pe\ (matched)}$ = 13.5 dB (Typ)
- Guaranteed RF Parameters
- Surface Mounted SOT-143 Offers Improved RF Performance
  - Lower Package Parasitics
  - Higher Gain
- Available In Both Standard Profile (MRF5711) and Low Profile (MRF5711L)
- Tape and Reel Packaging Options



CASE 318B-01
SOT-143

3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	10	Vdc
Collector-Base Voltage	V_{CBO}	20	Vdc
Emitter-Base Voltage	V_{EBO}	2.5	Vdc
Collector-Current — Continuous	I_C	70	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.58 4.64	Watts mW/°C
Total Device Dissipation(1) @ T_C = 75°C Derate above 75°C	P_D	0.58 7.73	Watts mW/°C
Maximum Junction Temperature	T_{Jmax}	150	°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	216	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	130	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1 mAdc, I_B = 0)	$V_{(BR)CEO}$	10	12	—	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 50 μAdc, I_C = 0)	$V_{(BR)EBO}$	2.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 8 Vdc, I_E = 0)	I_{CBO}	—	—	10	μAdc

Note 1. Case Temperature is measured on the collector lead where it first contacts the printed circuit board closest to the package.

(continued)

ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain (I_C = 30 mAdc, V_{CE} = 5 Vdc)		h_{FE}	50	—	300	—
DYNAMIC CHARACTERISTICS						
Collector-Base Capacitance (V_{CB} = 6 Vdc, I_E = 0, f = 1 MHz)	Figure 1	C_{cb}	—	0.75	1	pF
Current Gain — Bandwidth Product (V_{CE} = 8 Vdc, I_C = 50 mA, f = 1 GHz)	Figure 7	f_T	—	7.5	—	GHz
FUNCTIONAL TESTS						
Power Gain at Minimum Noise Figure (V_{CE} = 6 Vdc, I_C = 5 mA, f = 1 GHz)	Figure 5	G_{NFmin}	—	13.5	—	dB
Noise Figure (V_{CE} = 6 Vdc, I_C = 5 mA, f = 1 GHz)	Figure 5	NF_{min}	—	1.6	—	dB
Power Gain in 50 Ω System (V_{CE} = 6 Vdc, I_C = 5 mA, f = 1 GHz)	Figure 2	G_{NF}	9	10	—	dB
Noise Figure (V_{CE} = 6 Vdc, I_C = 5 mA, f = 1 GHz)	Figure 2	NF	—	2.2	3	dB

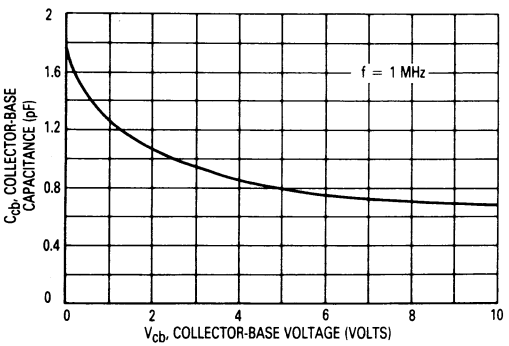


Figure 1. Collector-Base Capacitance versus Collector-Base Voltage

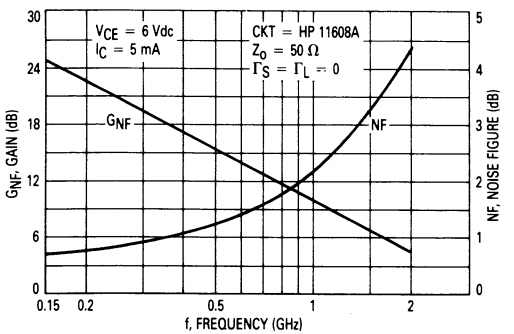


Figure 2. Gain and Noise Figure versus Frequency

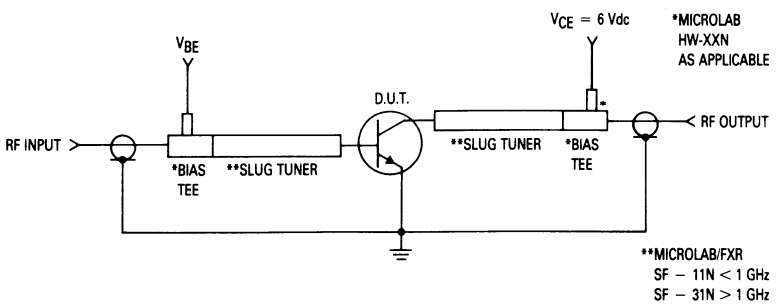


Figure 3. Functional Circuit Schematic

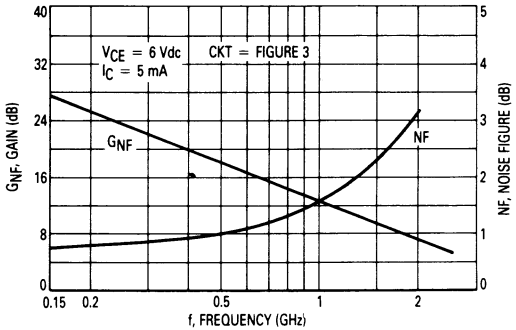


Figure 4. Gain and Noise Figure versus Frequency

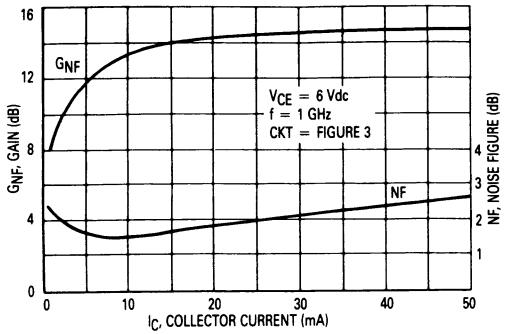


Figure 5. Gain and Noise Figure versus Collector Current

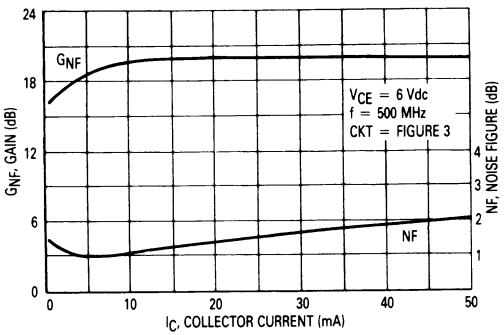


Figure 6. Gain and Noise Figure versus Collector Current

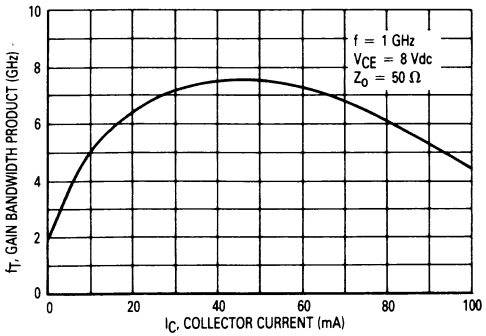


Figure 7. Gain Bandwidth Product versus Collector Current

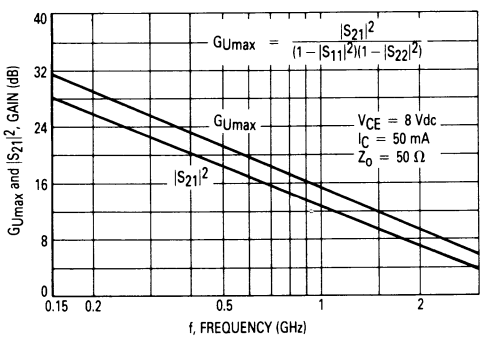


Figure 8. G_{Umax} and $|S_{21}|^2$ versus Frequency

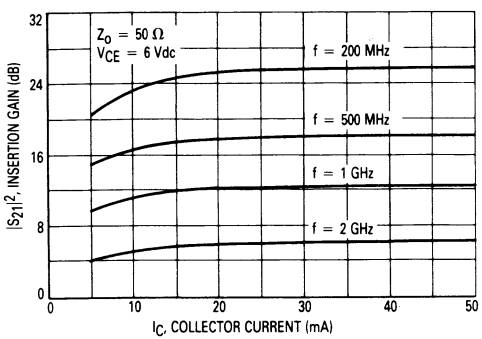


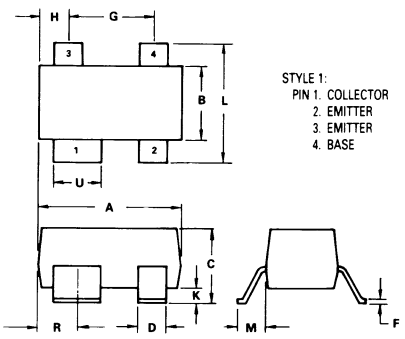
Figure 9. Insertion Gain versus Collector Current

COMMON EMITTER S-PARAMETERS

V_{CE} (Vdc)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$\|S_{11}\|$	$\angle\phi$	$\|S_{21}\|$	$\angle\phi$	$\|S_{12}\|$	$\angle\phi$	$\|S_{22}\|$	$\angle\phi$
6	5	200	0.79	−90	10.9	128	0.06	46	0.70	−45
		500	0.72	−144	5.7	96	0.08	28	0.42	−66
		1000	0.69	−177	3	75	0.09	28	0.31	−77
		1500	0.66	164	2	59	0.10	32	0.34	−89
		2000	0.65	147	1.6	47	0.12	38	0.32	−94
	10	200	0.72	−115	15.2	118	0.05	41	0.55	−66
		500	0.69	−160	6.9	92	0.06	34	0.30	−92
		1000	0.67	174	3.6	74	0.08	42	0.21	−108
		1500	0.64	159	2.4	60	0.10	46	0.23	−114
		2000	0.64	143	1.8	49	0.12	50	0.20	−116
	50	200	0.67	−159	20	102	0.02	48	0.33	−111
		500	0.67	179	8.2	85	0.04	58	0.33	−142
		1000	0.66	174	3.8	72	0.07	65	0.21	−158
		1500	0.63	151	2.7	61	0.10	64	0.22	−158
		2000	0.58	138	2.1	51	0.14	62	0.17	−165
8	5	200	0.80	−87	11.1	130	0.06	47	0.71	−42
		500	0.72	−141	5.9	97	0.08	30	0.44	−60
		1000	0.70	−177	3.1	75	0.09	28	0.33	−68
		1500	0.66	166	2.1	60	0.10	32	0.35	−80
		2000	0.61	149	1.6	47	0.12	39	0.35	−85
	10	200	0.72	−113	15.6	119	0.05	42	0.56	−61
		500	0.68	−159	7.2	92	0.06	34	0.31	−82
		1000	0.66	175	3.7	74	0.08	41	0.21	−92
		1500	0.64	160	2.5	61	0.09	47	0.23	−101
		2000	0.60	144	2	49	0.13	50	0.21	−103
	50	200	0.66	−156	20.9	103	0.02	48	0.31	−101
		500	0.65	−179	8.6	85	0.04	58	0.19	−128
		1000	0.64	164	4.3	72	0.07	65	0.16	−144
		1500	0.61	153	2.9	61	0.10	65	0.17	−142
		2000	0.58	137	2.3	51	0.13	64	0.14	145

3

OUTLINE DIMENSIONS



STYLE 1:
PIN 1. COLLECTOR
2. EMITTER
3. EMITTER
4. BASE

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.85	1.14	0.033	0.045
D	0.38	0.45	0.015	0.018
F	0.85	0.15	0.003	0.006
G	1.78	2.03	0.070	0.080
H	0.51	0.60	0.020	0.024
K	0.10	0.25	0.004	0.010
L	2.11	2.48	0.083	0.098
M	0.46	0.60	0.018	0.024
R	0.71	0.83	0.028	0.033
U	0.78	0.88	0.031	0.035
* K	0.013	0.102	0.0005	0.0040

***Low Profile = Case 318A-02**

CASE 318B-01
SOT-143