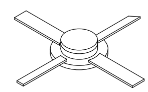
The RF Line
Microwave Linear Power Transistors

. . . designed primarily for large–signal output and driver amplifier stages in the 1.0 to 4.0 GHz frequency range.

- Designed for Class A or AB, Common–Emitter Linear Power Amplifiers
- Specified 20 Volt, 2.0 GHz Characteristics:
  Output Power — 0.5 Watt
  Power Gain — 10 to 11 dB
- 100% Tested for Load Mismatch at All Phase Angles with ∞:1 VSWR
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

MRW54001

10 – 11 dB
1.0 – 4.0 GHz
0.5 WATT
MICROWAVE LINEAR
POWER TRANSISTORS



CASE 400–01, STYLE 1
(TW200)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	22	Vdc
Collector–Base Voltage	V_{CES}	50	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	– 65 to + 200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	40	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 10 mA, I_B = 0)	$V_{(BR)CEO}$	22	—	—	Vdc
Collector–Emitter Breakdown Voltage (I_C = 10 mA, V_{BE} = 0)	$V_{(BR)CES}$	50	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 1.0 mA, I_E = 0)	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 0.25 mA, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 28 V, I_E = 0)	I_{CBO}	—	—	0.25	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 mA, V_{CE} = 5.0 V)	h_{FE}	20	—	120	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 V, I_E = 0, f = 1.0 MHz)	C_{ob}	—	—	3.5	pF

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common–Emitter Amplifier Power Gain (V_{CE} = 20 V, P_{out} = 0.5 W, f = 2.0 GHz, I_E = 120 mA)	G_{PE}	10	—	—	dB
Load Mismatch (V_{CE} = 20 V, I_E = 120 mA, P_{out} = 0.5 W, f = 2.0 GHz, Load VSWR = ∞:1, All Phase Angles)	ψ	No Degradation in Output Power			
Cutoff Frequency (V_{CE} = 20 V, I_E = 120 mA)	f_τ	4.0	4.5	—	GHz
Gain Linearity (V_{CE} = 20 V, I_E = 120 mA, f = 2.0 GHz, P_{o1} = 0.5 W, P_{o2} = 0.5 mW)	L_G	— —	— —	–0.2 +1.0	dB
Intermodulation Distortion, 3rd Order (V_{CE} = 20 V, I_E = 120 mA, P_o (PEP) = 0.5 W, Tones at 2.0 GHz and 2.005 GHz)	IMD	—	–30	—	dB

TYPICAL CHARACTERISTICS

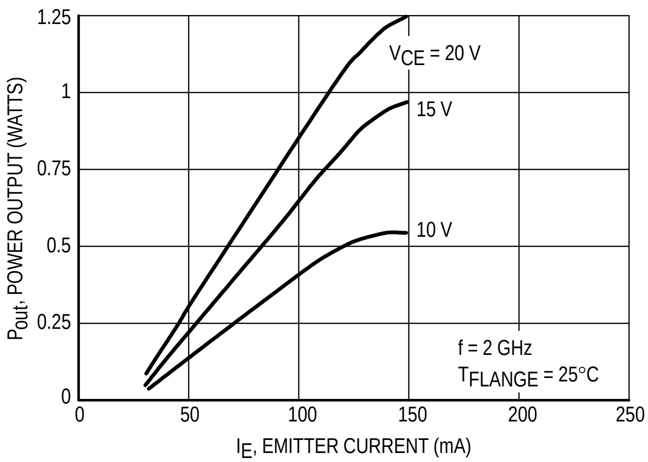


Figure 1. 1.0 dB Compression Point versus Emitter Current

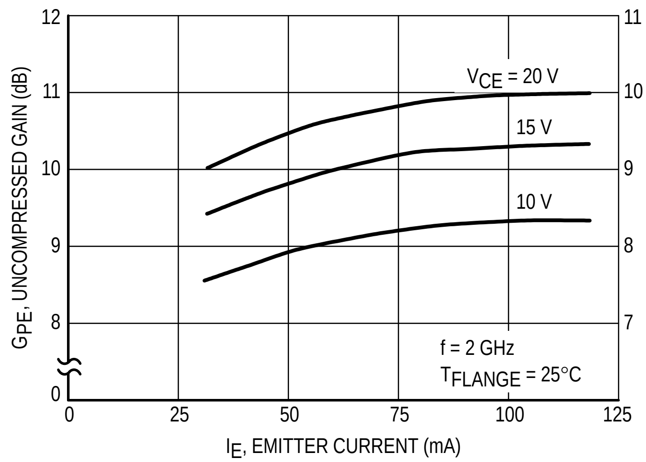


Figure 2. Gain versus Emitter Current

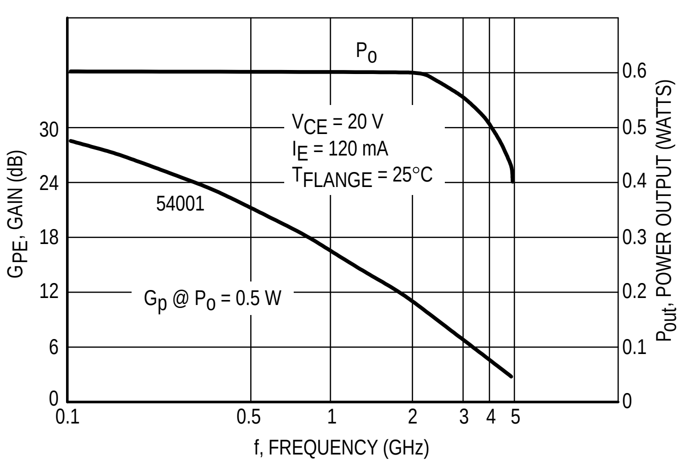


Figure 3. Gain and 1.0 dB Compressed Power versus Frequency

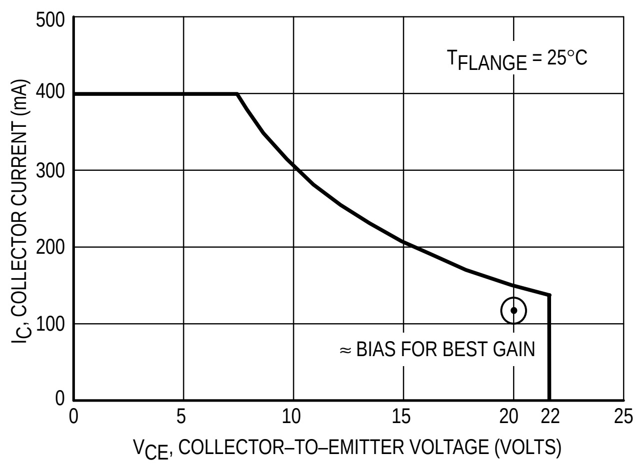


Figure 4. DC Safe Operating Area

V_{CE} (Volts)	I_C (mA)	f (GHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			Mag	∠ φ	**Mag**	∠ φ	**Mag**	∠ φ	**Mag**	∠ φ
20	100	0.5	0.76	–177	6.65	74	0.03	20	0.43	–73
		1.0	0.76	159	3.24	39	0.03	24	0.50	–104
		1.3	0.76	148	2.46	21	0.04	25	0.56	–120
		1.5	0.75	141	2.07	9.0	0.04	24	0.60	–130
		1.7	0.76	134	1.80	–1.0	0.05	24	0.64	–140
		2.0	0.76	124	1.51	–14	0.06	22	0.68	–152
		2.3	0.74	113	1.27	–33	0.06	13	0.74	–167
		2.5	0.73	106	1.15	–43	0.07	9.0	0.76	–173
		2.7	0.72	98	1.06	–52	0.07	5.0	0.77	179
		32	0.69	85	0.95	–67	0.08	–4.0	0.82	170
		3.3	0.64	71	0.86	–81	0.09	–14	0.85	161
		3.5	0.61	60	0.81	–94	0.10	–22	0.87	155
		3.7	0.57	47	0.77	–103	0.10	–30	0.80	149
		4.0	0.51	24	0.70	–119	0.11	–44	0.92	141

Table 1. MRW54001 Common Emitter S–Parameters

The graph shown below displays MTTF in hours x ampere^2 emitter current for each of the devices. Life tests at elevated temperatures have correlated to better than ±10% to the theoretical prediction for metal failure. Divide MTTF by I_C^2 for MTTF in a particular application.

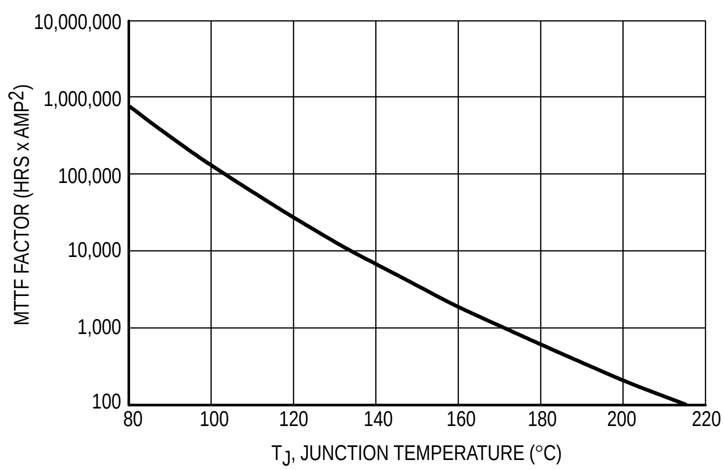
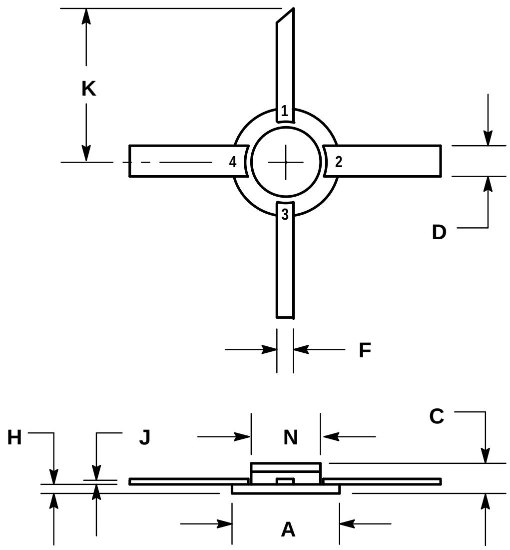


Figure 5. MTTF Factor versus Junction Temperature

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.203	0.207	5.16	5.25
C	0.049	0.065	1.25	1.65
D	0.055	0.065	1.40	1.65
F	0.025	0.035	0.64	0.88
H	0.017	0.023	0.44	0.58
J	0.002	0.004	0.06	0.10
K	0.280	0.320	7.12	8.12
N	0.123	0.133	3.13	3.37

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

CASE 400–01
ISSUE B

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