

The RF Line
UHF Linear Power Transistors

The TP3401/S are NPN transistors, gold metallized for reliability. They use diffused emitter ballast resistors for linearity and ruggedness. The transition frequency of 5 GHz makes these transistors ideal for UHF broadband linear amplification such as in high level 1.2 Volts MATV amplifiers up to 860 MHz, low power TV transposer stages or instrumentation.

- High Output — 1.2 V (DIN 45004/B)
- 5 GHz f_T
- High Gain — 16 dB Typ @ 500 MHz

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE0}	13	Vdc
Collector-Base Voltage	V_{CB0}	24	Vdc
Emitter-Base Voltage	V_{EB0}	3.5	Vdc
Total Device Dissipation (in $T_C = 25^\circ\text{C}$ Derate above 25 C)	P_D	5 25	Watts mW C
Collector Current — Continuous		200	mA
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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 5\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	13	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 1\text{ mA}$, $I_E = 0$)	$V_{(BR)CBO}$	24	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1\text{ mA}$, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 9\text{ V}$, $I_B = 0$)	I_{CEO}	—	—	0.6	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 50\text{ mA}$, $V_{CE} = 5\text{ V}$)	h_{FE}	70	—	190	—
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DYNAMIC CHARACTERISTICS

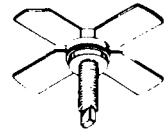
Output Capacitance ($V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$)	C_{ob}	—	3.5	4.5	pF
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FUNCTIONAL TESTS

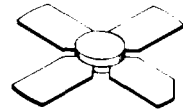
Cutoff Frequency ($V_{CE} = 12.5\text{ V}$, $I_C = 150\text{ mA}$, $f = 500\text{ MHz}$)	f_T	4.5	5	—	GHz
Maximum Unilateral Gain ($V_{CE} = 12.5\text{ V}$, $I_C = 150\text{ mA}$, $f = 500\text{ MHz}$)	G_{UMAX}	15	16.3	—	dB
Insertion Gain ($V_{CE} = 12.5\text{ V}$, $I_C = 150\text{ mA}$, $f = 500\text{ MHz}$)	$ S_{21} ^2$	12.5	14	—	dB
Intermodulation Distortion 3 Tone — DIN 45004/B ($f_{\text{vision}} = 800\text{ MHz}$, $R_{\text{Load}} = 75\text{ Ohms}$, $V_{CE} = 12.5\text{ V}$, $I_C = 150\text{ mA}$, $V_{\text{out}} = 1.2\text{ V}$)	IMD	—	60	58	dB

TP3401
TP3401S

$I_C = 200\text{ mA}$
UHF LINEAR
TRANSISTORS
NPN SILICON



CASE 244C-01, STYLE 1
(.280 SOE)
TP3401



CASE 249A-01, STYLE 1
(.280 SOE S)
TP3401S

TP3401, TP3401S

TYPICAL CHARACTERISTICS

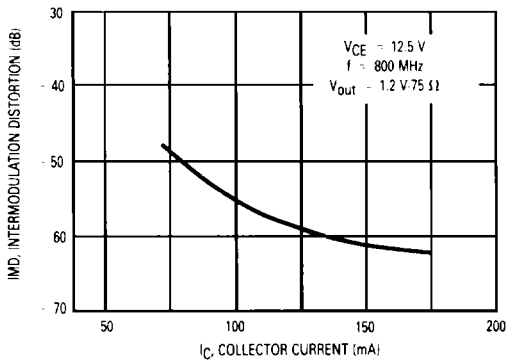


Figure 1. 3rd Order Intermodulation (DIN 45004 B)

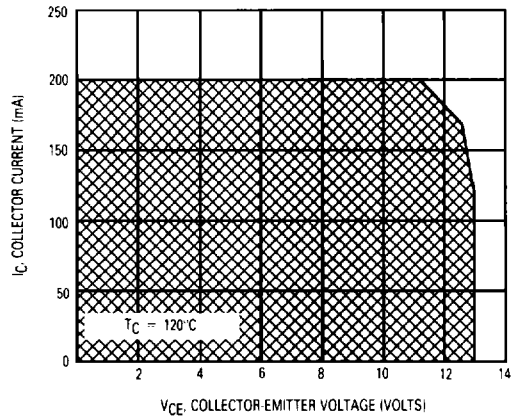


Figure 3. DC Safe Operating Area

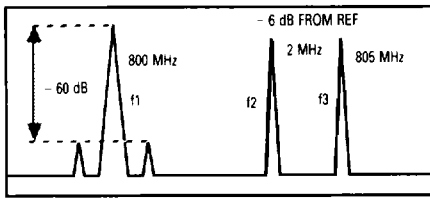


Figure 2. Intermodulation Distortion Test

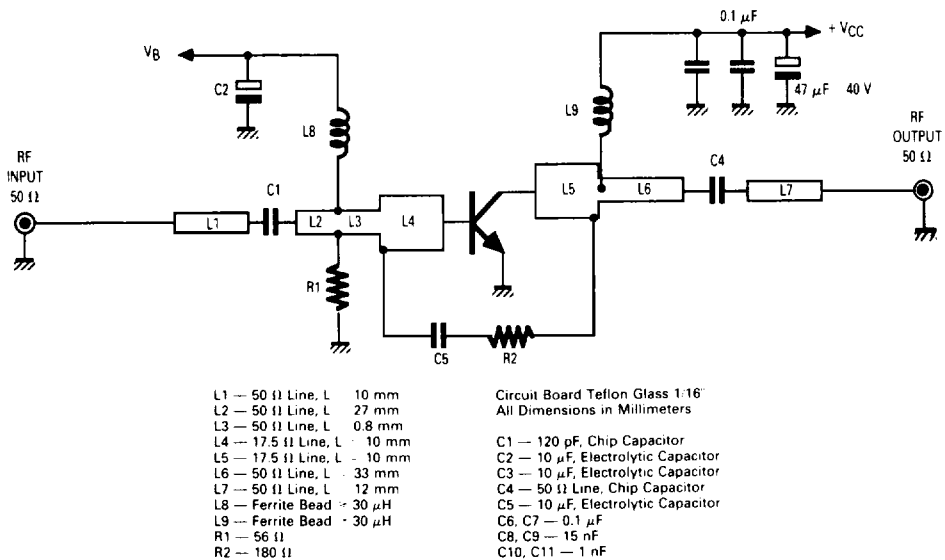


Figure 4. 800 MHz Test Circuit

TP3401, TP3401S

S-PARAMETERS (TYPICAL)

V_{CE} = 7.5 V, I_C = 100 mA, Z₀ = 50 Ω, T_C = 25°C

F (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.605	-156.9	10.19	+92.1	0.046	42.8	0.437	-137.7
300	0.636	-167.6	7.52	80.9	0.059	46.1	0.438	-149.2
400	0.600	-174.9	5.56	72.6	0.070	47.9	0.415	-155.1
500	0.585	-179.0	4.68	66.1	0.083	49.1	0.426	-157.5
600	0.562	+177.2	4.02	60.0	0.095	49.4	0.396	-158.7
700	0.536	+174.5	3.45	53.9	0.107	48.7	0.402	-159.3
800	0.535	+171.6	3.02	47.1	0.118	45.9	0.399	-159.5
900	0.517	+169.5	2.78	39.8	0.131	43.8	0.392	-159.6
1000	0.504	+167.7	2.43	33.4	0.149	40.1	0.397	-159.6

V_{CE} = 12.5 V, I_C = 150 mA, Z₀ = 50 Ω, T_C = 25°C

F (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.559	-156.8	10.8	93.8	0.044	43.5	0.38	-136.3
300	0.594	-166.9	7.807	84.5	0.058	47.2	0.395	-147.5
400	0.584	-173.8	6.138	74.1	0.069	48.5	0.385	-152.9
500	0.561	-177.9	5.046	67.3	0.08	49.6	0.375	-155.1
600	0.546	+178.3	4.345	61.0	0.094	49.6	0.369	-156.5
700	0.515	+175.8	3.648	54.7	0.103	48.9	0.372	-156.0
800	0.514	+173.0	3.217	48	0.113	46.2	0.369	-155.8
900	0.502	+170.0	3.000	40.9	0.129	44.0	0.364	-155.5
1000	0.484	+169.1	2.812	34.2	0.145	40.4	0.368	-154.9