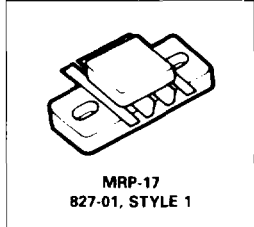


**The RF Line**  
**UHF Linear Power Transistor**

**TPV657**

**6 W — 470 to 860 MHz**  
**UHF LINEAR**  
**POWER TRANSISTOR**



... designed for high power stages in Band V TV transposer amplifiers. Gold metallized dice and diffused emitter ballast resistors are used to enhance reliability, ruggedness and linearity.

- Band IV and V (470–860 MHz)
- 6 W —  $P_{ref}$  (r = 58 dB IMD)
- 25 V —  $V_{CC}$
- High Gain — 9 dB Typ, Class A (r f = 860 MHz)
- Push-Pull Package

**MAXIMUM RATINGS**

Characteristic	Rating	Symbol	Value	Unit
Collector-Emitter Voltage		$V_{CEO}$	27	Vdc
Collector-Base Voltage		$V_{CBO}$	45	Vdc
Emitter-Base Voltage		$V_{EBO}$	4	Vdc
Collector Current — Continuous		$I_C$	2.5	Adc
Total Device Dissipation (r $T_C = 70^\circ\text{C}$ Derate above $70^\circ\text{C}$ )		$P_D$	50	Watts
Operating Junction Temperature		$T_J$	200	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	25 to +200	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case ( $T_C = 70^\circ\text{C}$ )	$R_{\theta JC}$	2.5	$^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS**

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Breakdown Voltage ( $I_C = 20\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	27	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 50\text{ mA}$ , $I_E = 0$ )	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 5\text{ mA}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 20\text{ mA}$ , $R_{BE} = 51\ \Omega$ )	$V_{(BR)ICER}$	40	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 20\text{ V}$ , $I_E = 0$ )	$I_{CBO}$	—	—	5	mAdc

**ON CHARACTERISTICS**

DC Current Gain ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ )	$h_{FE}$	20	—	100	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 25\text{ V}$ , $I_E = 0$ , f = 1 MHz)	$C_{ob}$	—	18	—	pF
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(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Small-Signal Gain ( $V_{CE} = 25\text{ V}$ , $P_{out} = 6\text{ W}$ , $f = 860\text{ MHz}$ , $I_C = 1.7\text{ A}$ )	$G_{SS}$	8	9	—	dB
Intermodulation Distortion, 3 Tone ( $f = 860\text{ MHz}$ , $V_{CE} = 25\text{ V}$ , $I_E = 1.7\text{ A}$ , $P_{ref} = 6\text{ W}$ , Vision Carrier = -8 dB, Sound Carrier = -7 dB, Sideband Signal = -16 dB, Specification TV05001)	$IMD_1$	—	60	-58	dB

TYPICAL CHARACTERISTICS

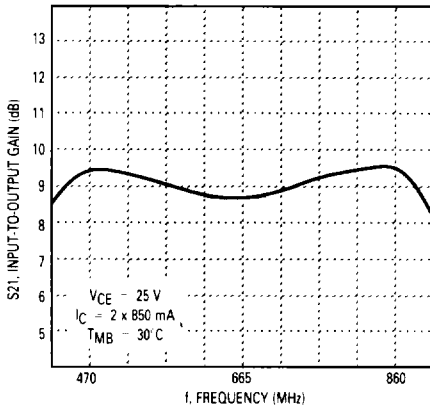


Figure 1. S21 Parameter versus Frequency

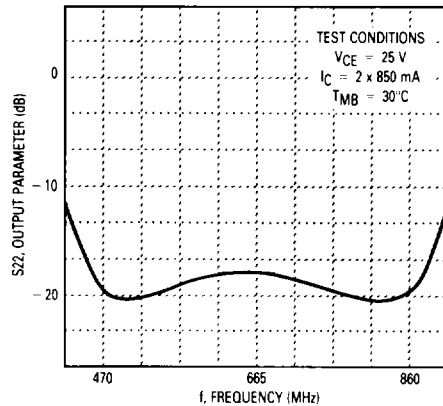


Figure 2. S22 Parameter versus Frequency

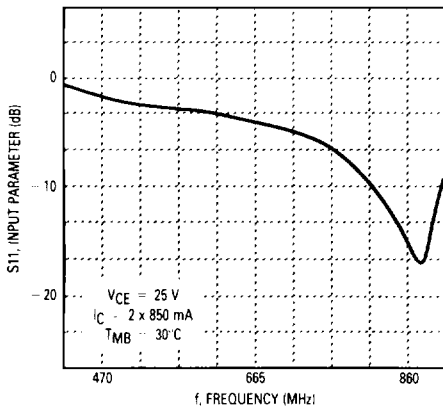


Figure 3. S11 Parameter versus Frequency

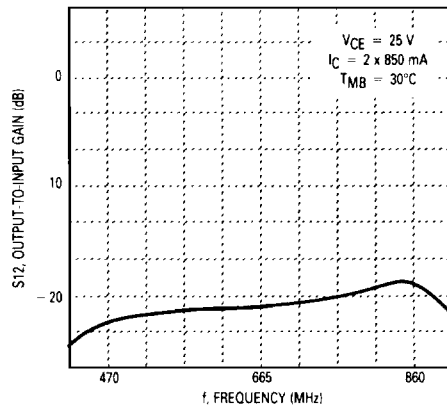
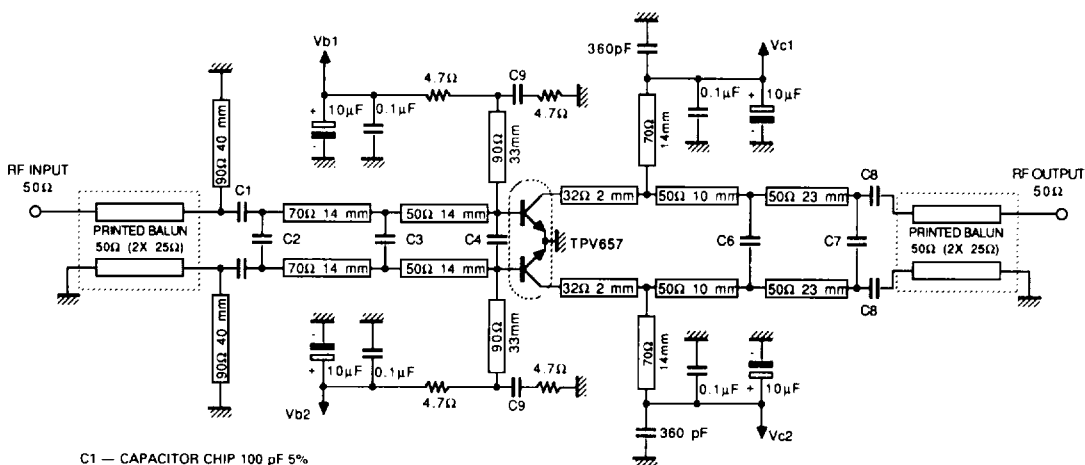


Figure 4. S12 Parameter versus Frequency

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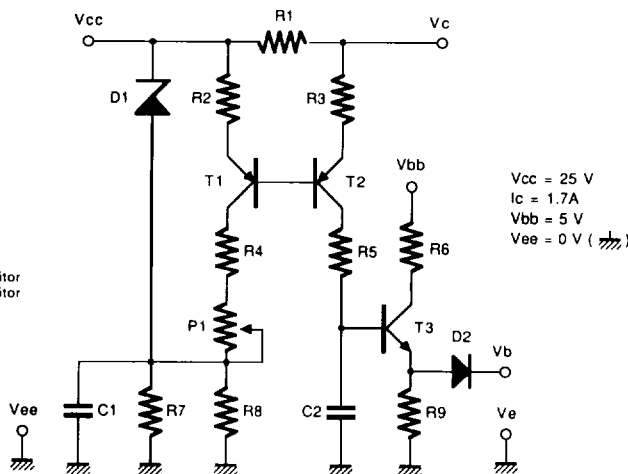


- C1 — CAPACITOR CHIP 100 pF 5%
- C2 — CAPACITOR CHIP 3.3 pF 5%
- C3 — CAPACITOR AJUST 0.1-4 pF  
+ CAPACITOR CHIP 1 pF
- C4 — CAPACITOR CHIP 10 pF  
+ CAPACITOR AJUST 0.1-4 pF
- C5 — CAPACITOR CHIP 180 pF
- C6 — CAPACITOR CHIP 4.7 pF  
+ CAPACITOR AJUST 0.1-4 pF
- C7 — CAPACITOR CHIP 1 pF
- C8 — CAPACITOR CHIP 47 pF

**Figure 5. Wideband Amplifier**

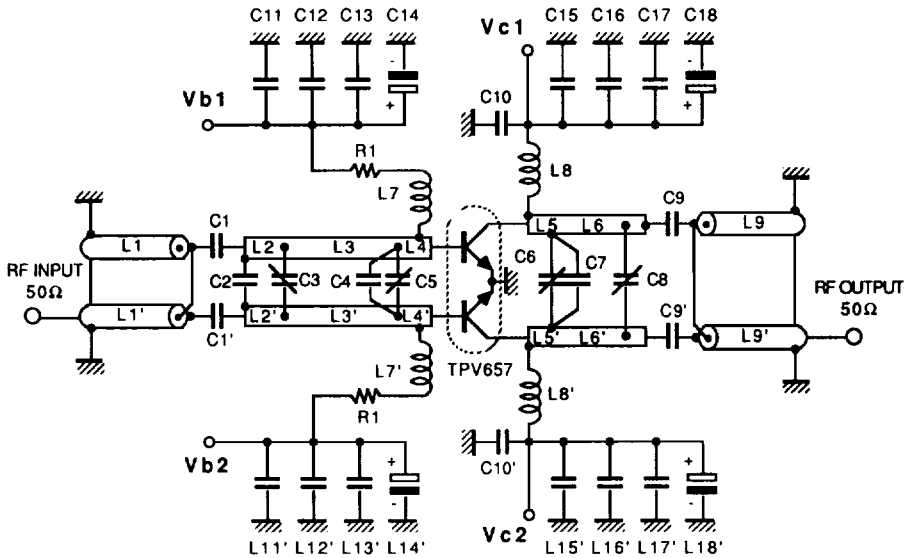
CLASS A CONDITIONS (25 V — 2 x 850 mA)  
470 - 860 MHz  
9 dB GAIN  
60 dB IMD @ 6 W ref ( 8 dB: 16 dB: 7 dB)

- R1b — 0.1  $\Omega$  1 W
- R2 — 270  $\Omega$  1/4 W
- R3 — 4.7  $\Omega$  1/4 W
- R4 — 6.8  $\Omega$  1/4 W
- R5 — 330  $\Omega$  1/4 W
- R6 — 15  $\Omega$  1/4 W
- R7 — 2.2 k $\Omega$  1/4 W
- R8 — 2.2 k $\Omega$  1/4 W
- R9 — 1 k $\Omega$  1/4 W
- P1 — 5 k $\Omega$  10 turns
- C1 — 1 nF ceramic capacitor
- C2 — 1 nF ceramic capacitor
- D1 — Zener Diode 4.7 V
- T1, T2 — BC557
- T3 — 2N2219



Vcc = 25 V  
Ic = 1.7A  
Vbb = 5 V  
Vee = 0 V (  $\text{ground}$  )

**Figure 6. Class A Biasing Circuit**  
(one for each side of the push-pull transistor)

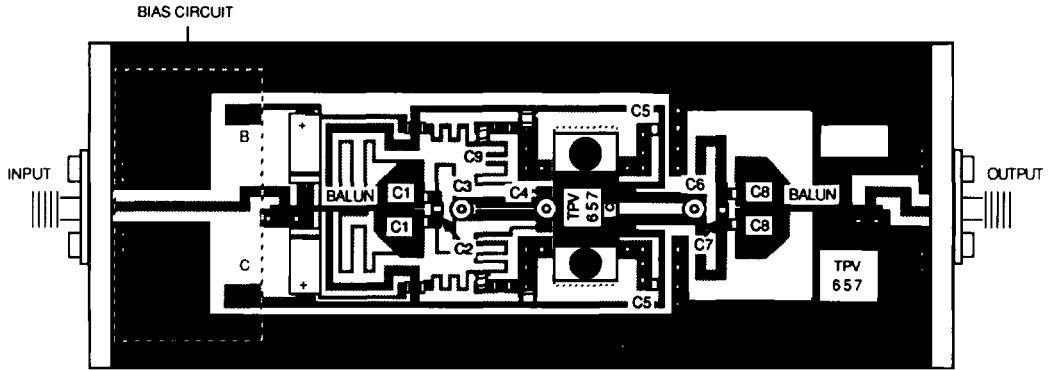


COMPONENTS LIST			
REF. MARK	DESCRIPTION	REFERENCY	SUPPLIER
C1-C9	CAPACITOR CHIP 82 PF 5%	100A820JP50	ATC
C2-C4-C7	CAPACITOR CHIP 4.7 PF 5%	100A4R7DP50	ATC
C3-C5-C6-C8	CAPACITOR AJUST.1-4PF	GKU 4R0	PYRECAP
C11-C15	CAPACITOR CHIP 1nF	0805	SPRAGUE
C12-C16	CAPACITOR CHIP 0.1μF	VJ0907Y104MH	VITRAMON
C10	CAPACITOR CHIP 100PF 5%	100A101JP50	ATC
C13-C17	CAPACITOR CHIP 15nF	0805	SPRAGUE
C14-C18	CAPACITOR 10μF 40V	CO31	SICSAFCO
R1+L7	10Ω 1/4 W	SFR 25	RTC
L1-L9	50Ω COAXIAL CABLE 29MM	AE50070	SEAELECTRO
L2	52Ω STRIPLINE L=3MM	PRINTED LINE	-
L3	52Ω STRIPLINE L=12MM	PRINTED LINE	-
L4	39Ω STRIPLINE L=8MM	PRINTED LINE	-
L5	39Ω STRIPLINE L=14MM	PRINTED LINE	-
L6	39Ω STRIPLINE L=18MM	PRINTED LINE	-
L8	1 TURN WIRE ID : 4 MM	WIRE Ø 1MM	-

Figure 7. 860 MHz Test Circuit

TPV657

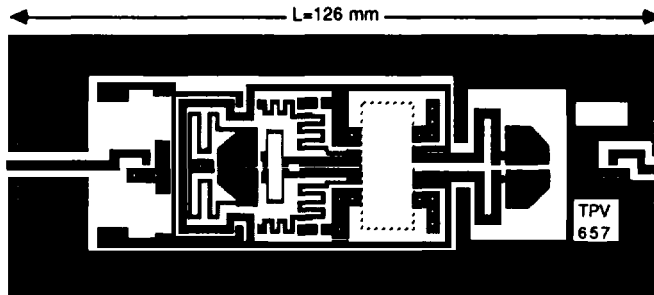
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BIAS Circuit Connection:

- Vee (Ground)
- Vcc ( 25 V )
- Vbb ( 5 V )

Figure 8. Layout for Wideband Amplifier



(Not to Scale)

Figure 9. Test Circuit