

**MOTOROLA**  
**SEMICONDUCTOR**  
**TECHNICAL DATA**

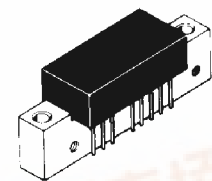
**The RF Line**  
**Wideband Linear Amplifiers**

... designed for amplifier applications in 50 to 100 ohm systems requiring wide bandwidth, low noise and low distortion. This hybrid provides excellent gain stability with temperature and linear amplification as a result of the push-pull circuit design.

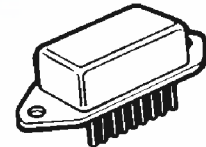
- Specified Characteristics at  $V_{CC} = 24\text{ V}$ ,  $T_C = 25^\circ\text{C}$ :
  - Frequency Range — 1 to 520 MHz
  - Output Power — 440 mW Typ @ 1 dB Compression,  $f = 1\text{--}520\text{ MHz}$
  - Power Gain — 30 dB Typ @  $f = 100\text{ MHz}$
  - Noise Figure — 8.3 dB Typ @  $f = 50\text{ MHz}$
- All Gold Metallization for Improved Reliability
- Unconditional Stability Under All Mismatch Conditions

**CA2820**  
**CA2820H**

**30 dB**  
**1–520 MHz**  
**440 mWATT**  
**WIDEBAND**  
**LINEAR AMPLIFIERS**



**CASE 714M-01, STYLE 2**  
**(CA)**  
**CA2820**



**CASE 826-01, STYLE 4**  
**(SIP)**  
**CA2820H**

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
DC Supply Voltage	$V_{CC}$	28	Vdc
RF Power Input	$P_{in}$	+10	dBm
Operating Case Temperature Range	$T_C$	-40 to +100	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +125	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$ ,  $V_{CC} = 24\text{ V}$ , 50  $\Omega$  system unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Frequency Range	BW	1	—	520	MHz
Gain Flatness ( $f = 1\text{--}520\text{ MHz}$ )	—	—	$\pm 0.8$	$\pm 1.5$	dB
Power Gain ( $f = 100\text{ MHz}$ )	$P_G$	29	30	31	dB
Noise Figure, Broadband $f = 30\text{ MHz}$ $f = 500\text{ MHz}$	NF	—	6 8.3	8 10	dB
Power Output — 1 dB Compression ( $f = 1\text{--}520\text{ MHz}$ )	$P_o$ 1dB	400	440	—	mW
Third Order Intercept (See Figure 10, $f_1 = 520\text{ MHz}$ )	ITO	35	37	—	dBm
Input/Output VSWR	VSWR	—	1.5:1 1.8:1	2:1 2:1	—
Second Harmonic Distortion (Tone at 10 mW, $f_{2H} = 1\text{--}520\text{ MHz}$ )	$d_{so}$	—	-55	-45	dB
Reverse Isolation ( $f = 1\text{--}520\text{ MHz}$ )	—	49	52	—	dB
Peak Envelope Power (Two Tone Distortion Test — See Figure 10) ( $f = 1\text{--}520\text{ MHz}$ @ -32 dB IMD)	PEP	300	400	—	mW
Supply Current	$I_{CC}$	300	330	360	mA



# CA2820, CA2820H

## TYPICAL CHARACTERISTICS

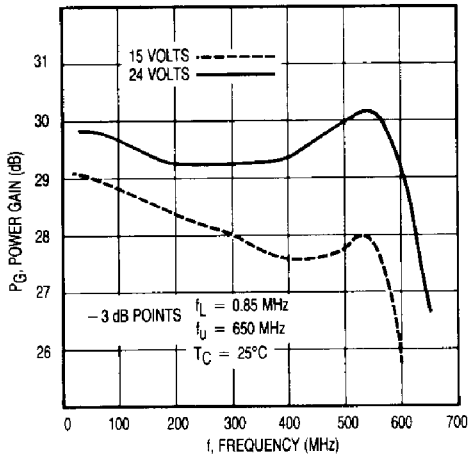


Figure 1. Power Gain versus Frequency

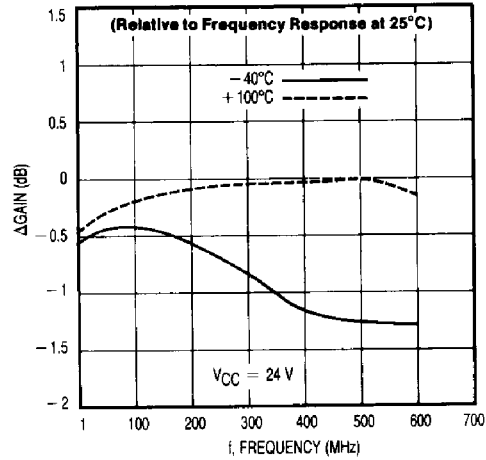


Figure 2. Relative Power Gain versus Temperature

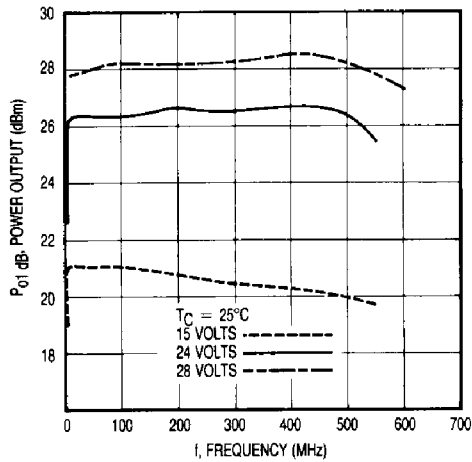


Figure 3. 1 dB Gain Compression versus Voltage

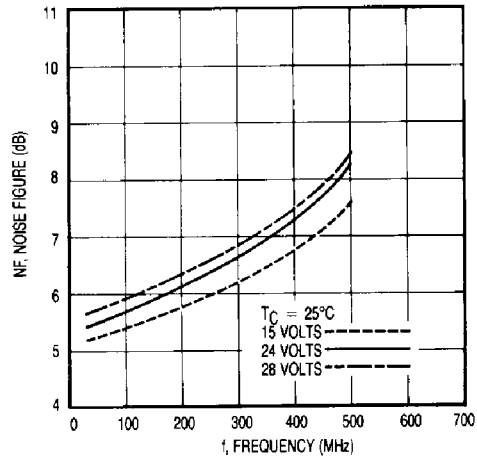


Figure 4. Noise Figure versus Voltage

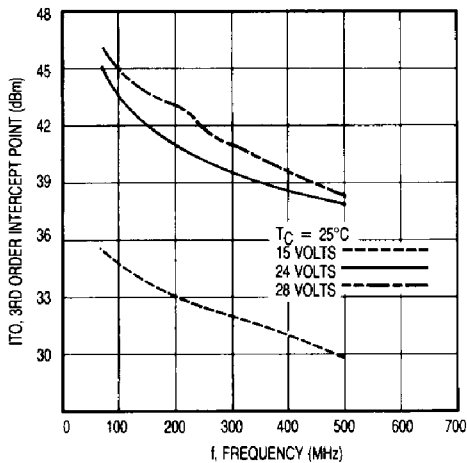


Figure 5. Third Order Intercept versus Voltage

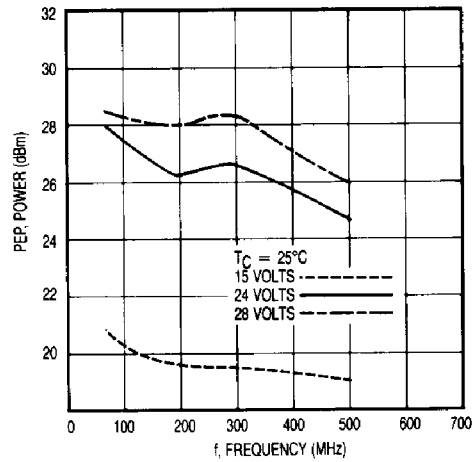


Figure 6. Peak Envelope Power versus Voltage

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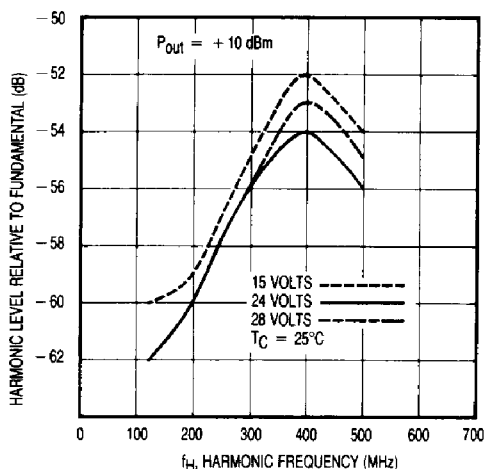


Figure 7. Second Harmonic Distortion versus Voltage

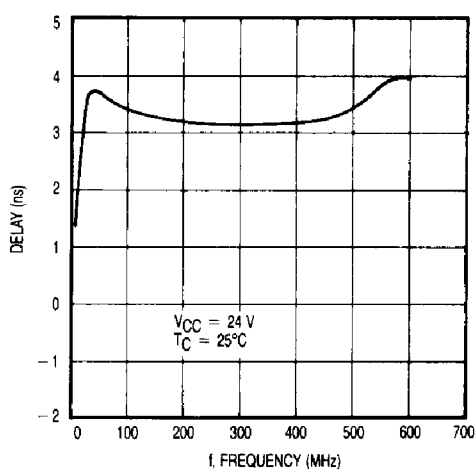


Figure 8. Group Delay versus Frequency

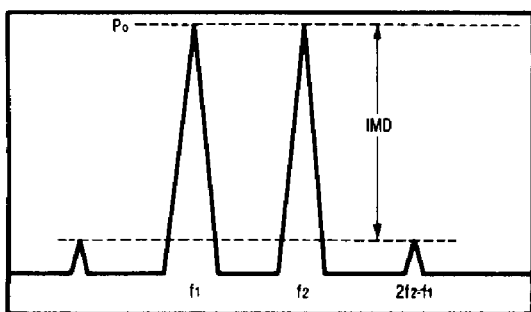
Biased at 24 Volts

T = 25°C Z<sub>0</sub> = 50Ω

Frequency (MHz)	S11		S21		S12		S22	
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
1	-12.5	-41.4	30.1	169	-52.8	150	-6.3	138
10	-25.4	-24.0	29.6	5.0	-53.8	5.0	-24.1	78
100	-27.5	5.6	29.6	-120	-55.3	-51.0	-39.3	-126
200	-21.4	3.6	29.3	120	-59.0	-118	-21.3	15.7
300	-17.1	-43	29.1	-1.6	-58.2	145	-16.0	-30
400	-15.5	-106	29.1	-123	-53.2	89.8	-10.4	-56.6
500	-16.5	-181	29.5	109	-50.3	36.0	-37.7	150
600	-17.3	129	28.7	-41.2	-55.4	14.8	-2.5	-14.2

Magnitude in dB, Phase Angle in degrees.

Figure 9. S-Parameters



$$I_{T0} = P_o + \frac{IMD}{2} @ IMD > 60dB$$

$$PEP = 4X P_o @ IMD = -32dB$$

Figure 10. Intermodulation Test

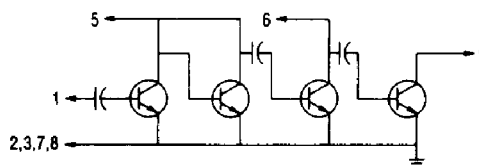


Figure 11. Functional Schematic

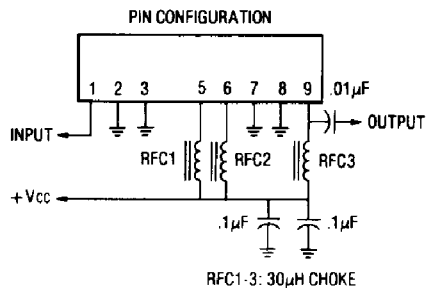


Figure 12. External Connections