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AND9525/D

AM Radio Amplifier with Filter using the NSVJ2394SA3

Overview

This application note explains about ON Semiconductor's NSVJ2394SA3 which is used as a Low Noise Amplifier (LNA) for AM Radio.

The NSVJ2394SA3 is a silicon junction field effect transistor best suited for high-frequency applications which is assembled in the 3-pin surface mount package.

For information about the performance, please refer to the datasheet of this product.

The evaluation board is adjusted to provide +9.5dB gain in AM band (520 to 1720 kHz) and reduce gain to -70dB in FM band (76 to 108 MHz).

A standard material FR4 is used for the printed circuit board (PCB).



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APPLICATION NOTE

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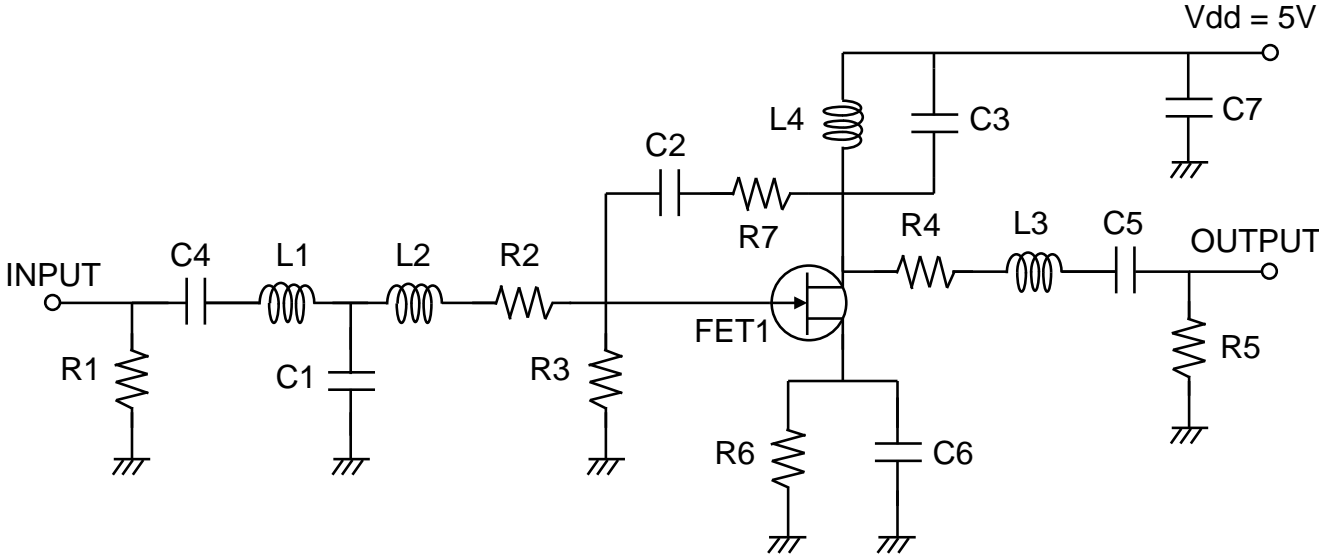
■ Summary of Performance

Ta = 25°C, Input Power = -30 dBm, Zo = 50 Ω

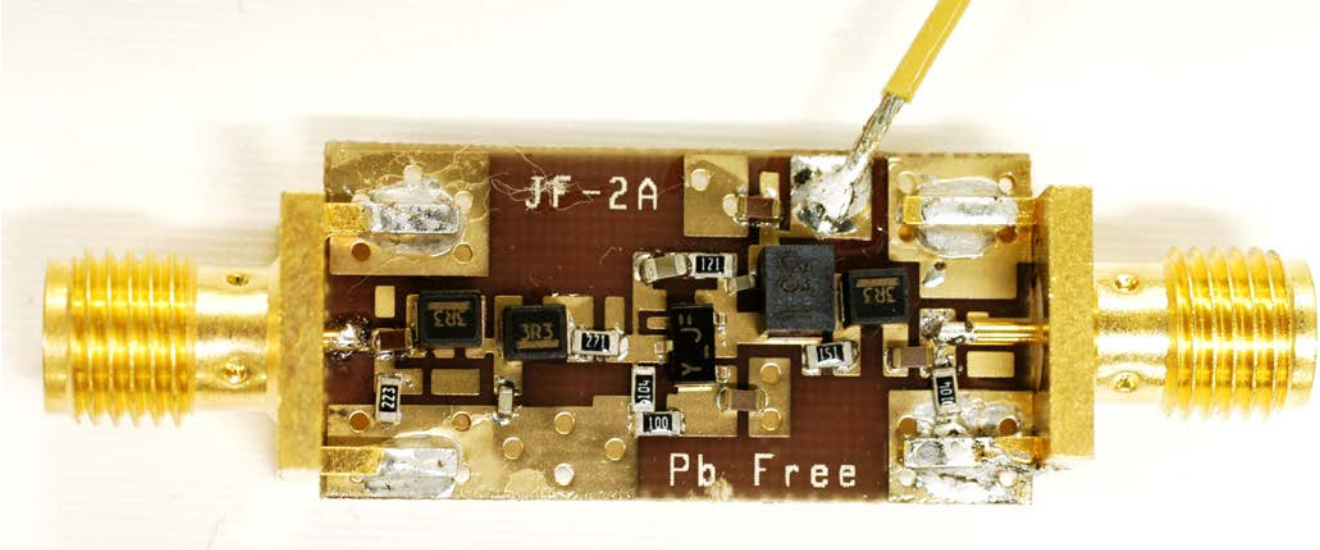
Parameter	Symbol	Condition	Result	Unit
DC Voltage	Vdd		5	V
DC Current	Idd		16.0	mA
Power Gain	Gp1	f = 520 kHz	9.55	dB
		f = 1120 kHz	9.90	
		f = 1720 kHz	9.86	
	Gp2	f = 76 MHz	-77.0	
		f = 90 MHz	-84.7	
		f = 108 MHz	-71.4	
Input Return Loss	RLin	f = 520 kHz	-0.03	dB
		f = 1120 kHz	-0.18	
		f = 1720 kHz	-0.46	
Output Return Loss	RLout	f = 520 kHz	-0.26	dB
		f = 1120 kHz	-0.50	
		f = 1720 kHz	-1.10	
Isolation	ISL	f = 520 kHz	-48.7	dB
		f = 1120 kHz	-40.5	
		f = 1720 kHz	-36.9	

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■ Circuit Diagram



■ Evaluation Board



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■ Bill of Materials

Item	Symbol	Value	Manufacture	Size
J-FET	FET1	NSVJ2394SA3	ON Semiconductor	SC-59
Capacitor	C1	10 pF	Murata GRM155	1005
	C2	12 pF	Murata GQM188	1608
	C3	120 pF	Murata GRM155	1005
	C4, C5, C6, C7	0.1 μ F	ROHM MCH182CN	1608
Resistor	R1	22 k Ω	Various	1608
	R2	270 Ω	Various	1608
	R3	100 k Ω	Various	1608
	R4	150 Ω	Various	1608
	R5	100 k Ω	Various	1608
	R6	10 Ω	Various	1608
	R7	120 Ω	Various	1608
Inductor	L1, L2, L3	3.3 μ H	TDK NLV25T	2520
	L4	330 μ H	TDK NLCV32T	3225
Material		FR-4		25 x 13 mm

■ Measurement Results

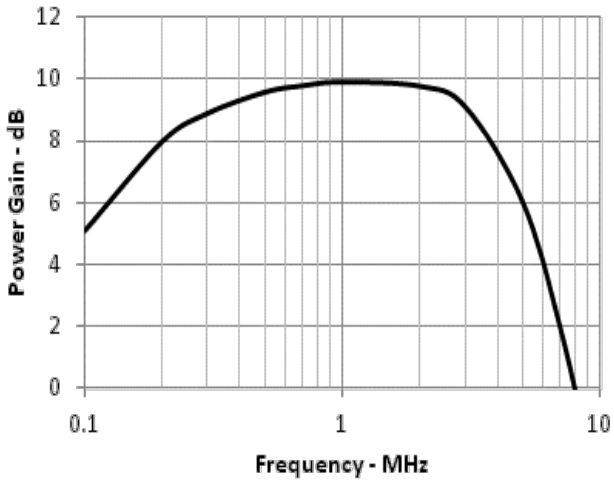


Figure 1 Power Gain vs. Frequency

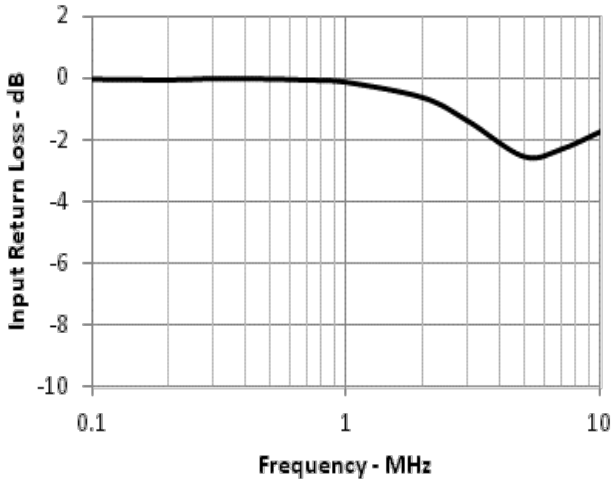
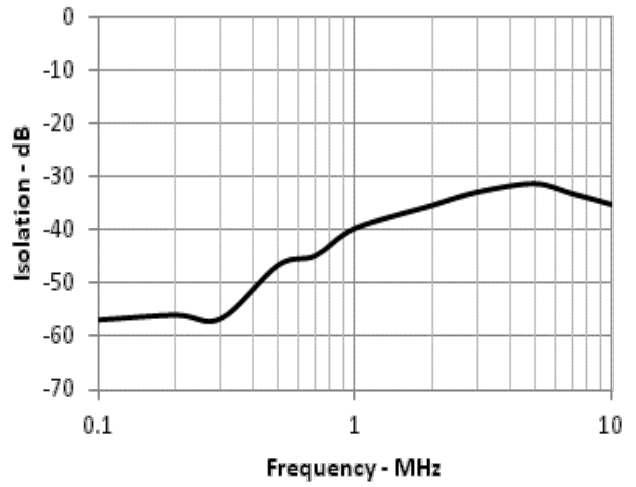


Figure 3 Input Return Loss vs. Frequency

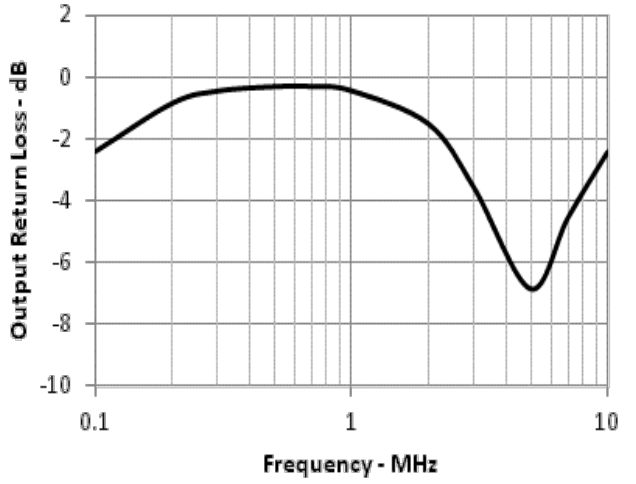
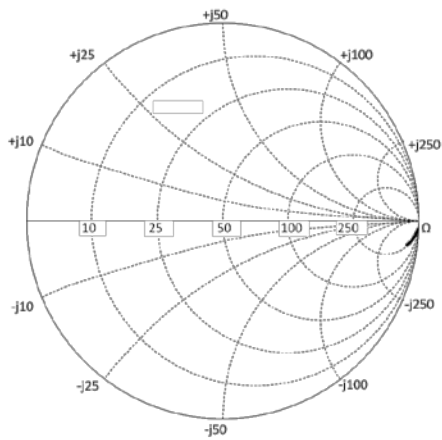
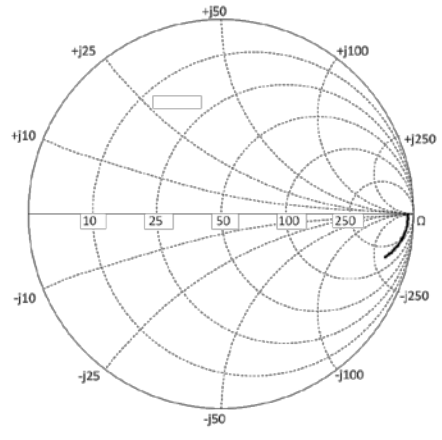


Figure 4 Output Return Loss vs. Frequency



520 kHz to 1720 KHz

Figure 5 Smith Chart S11



520 kHz to 1720 kHz

Figure 6 Smith Chart S22

■ Measurement Results

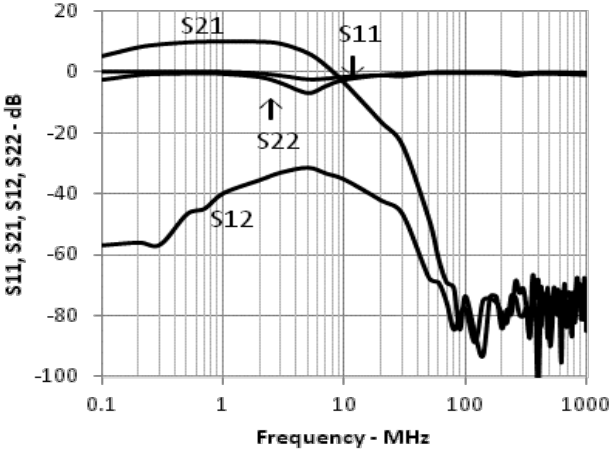


Figure 7 S11, S21, S12, S22 Wide Span

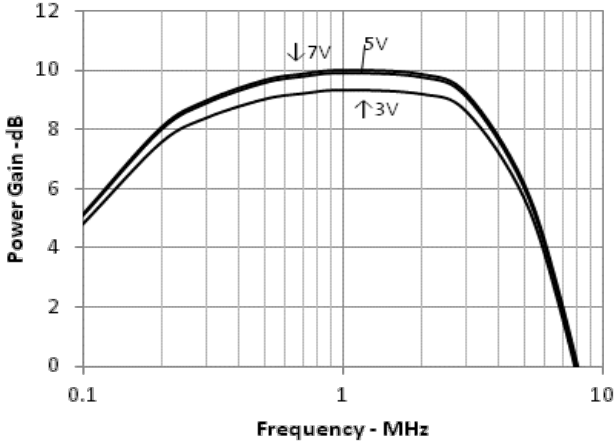


Figure 8 Voltage Dependency

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