



ON Semiconductor®

Application Note

AM Radio Amplifier Module with Filter Using the 2SK3557

January 2014

Feature of AM-band Amplifier Module

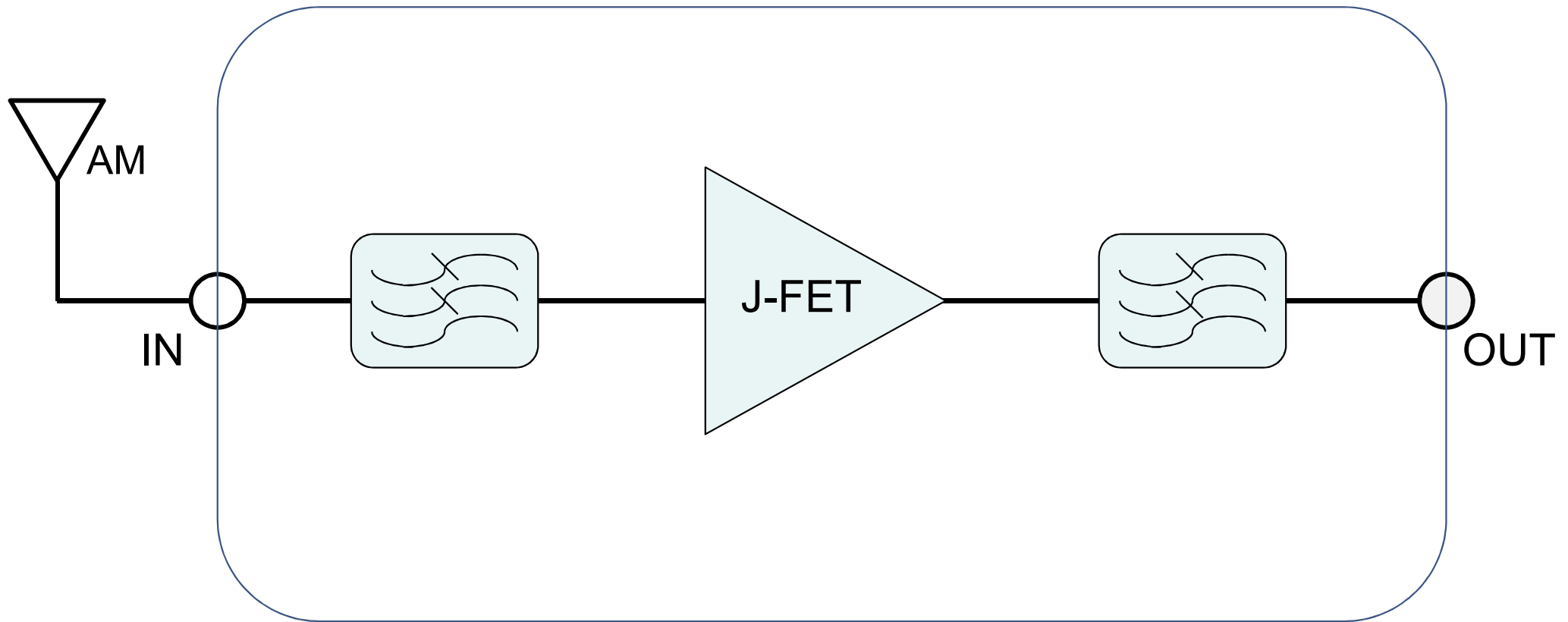
- J-FET : 2SK3557
- High Gain : $G_a=9.6\text{dB}$ @1MHz ($Z_o=50\Omega$)
- Excellent Gain Flatness : $\Delta G_{a1}<0.3\text{dB}$
- Low Gain Variation : $\Delta G_{a2}<1.1\text{dB}$ for $V_{DD}=3\sim 8\text{V}$
- High FM Suppression : $<-80\text{dB}$
- High Impedance at INPUT/OUTPUT Port

AM-band Amplifier Module ($Z_o=50\Omega$)			
Parameter	Unit	AM-band	FM-band
Frequency	[MHz]	0.52~1.71	76~108
VDD	[V]	5	
IDD	[mA]	16.8	
G_a	[dB]	9.6	<-80
ΔG_{a1} *1	[dB]	0.28	—
ΔG_{a2} *2	[dB]	1.05	—
Input Impedance	[Ω]	High	—
Output Impedance	[Ω]	High	—

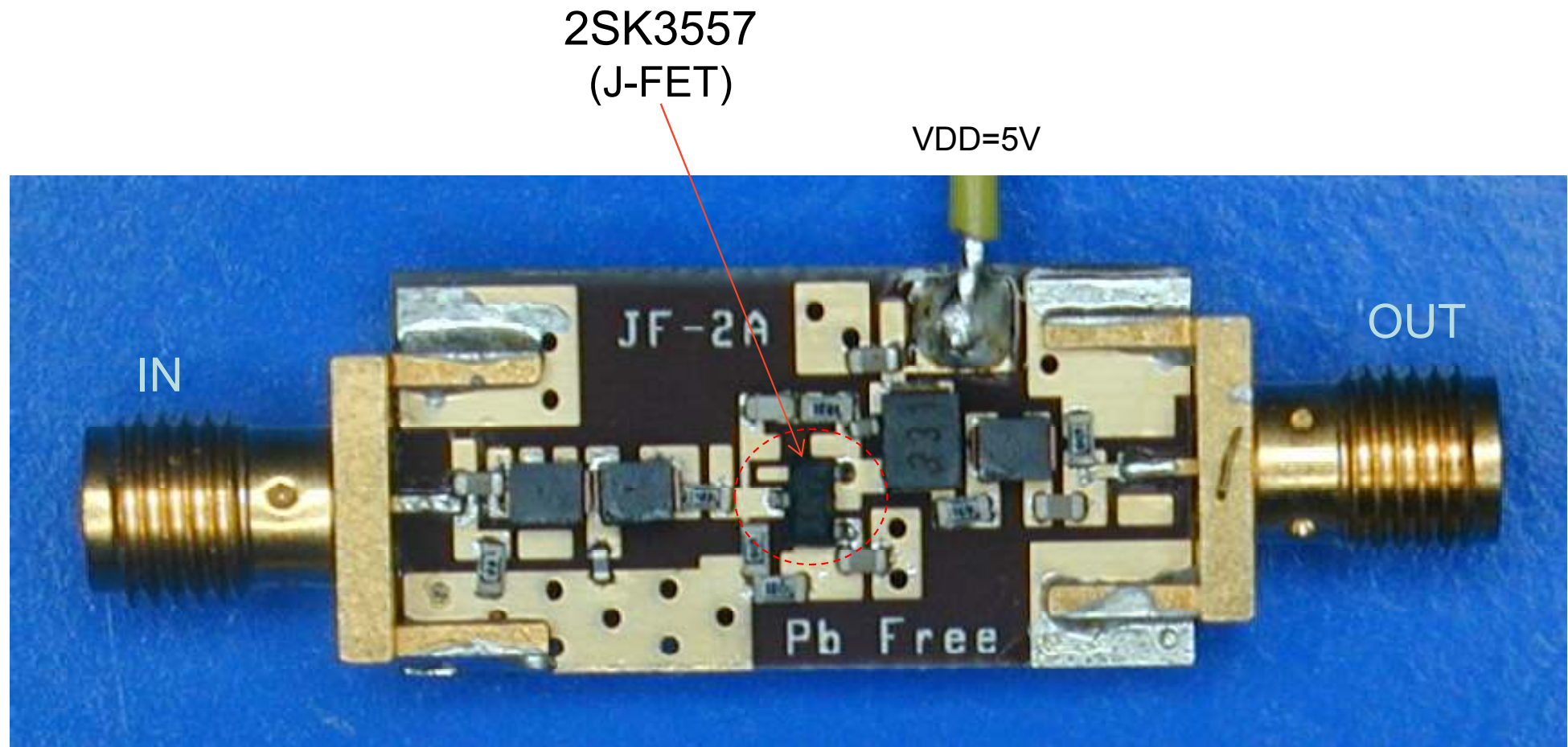
*1 : G_a Variation within AM-band

*2 : G_a Variation for $V_{DD}=3\sim 8\text{V}$

Block Diagram of AM-band Amplifier

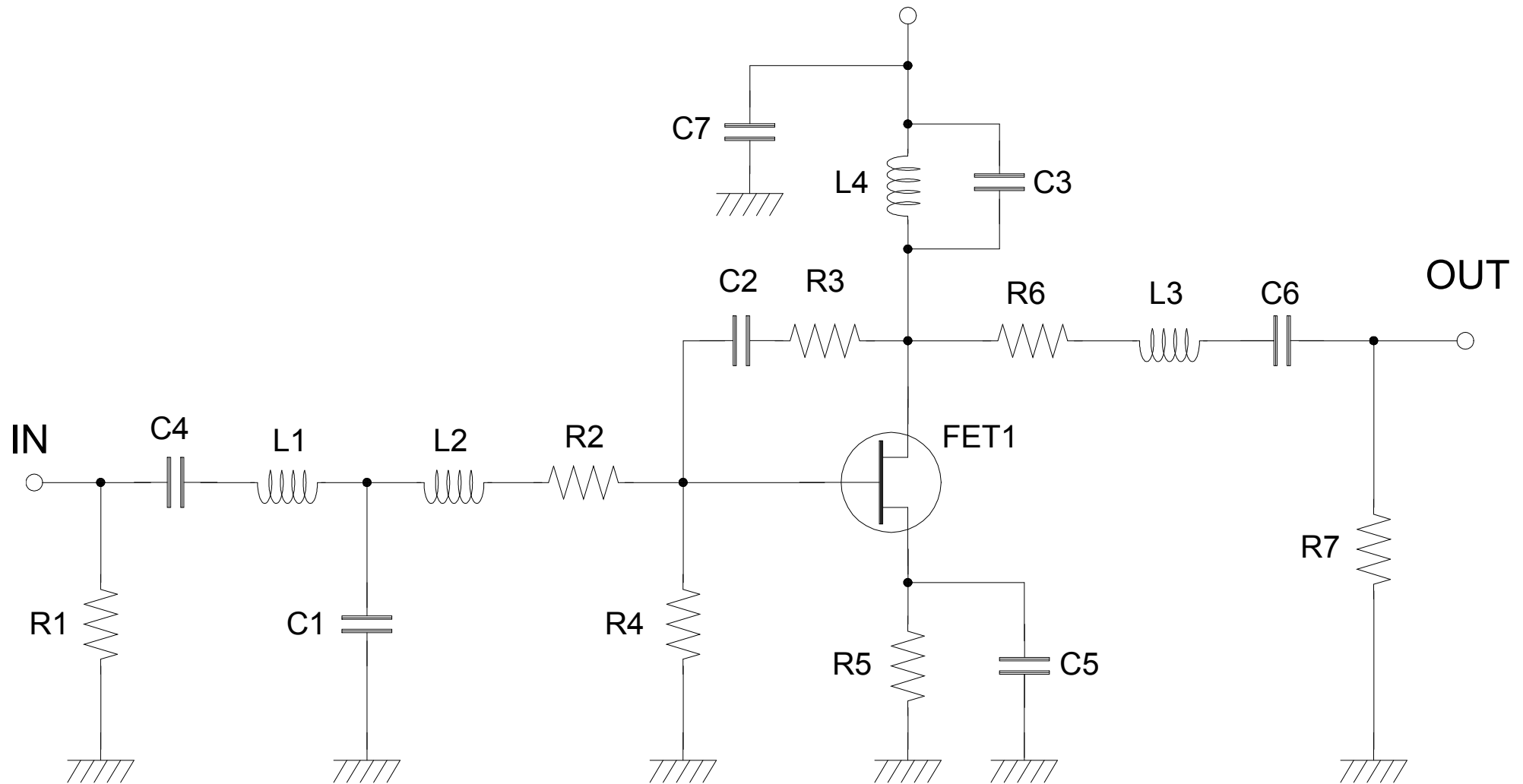


Board of AM-band Amplifier Module



Circuits of AM-band Amplifier Module

VDD=5V-16.8mA

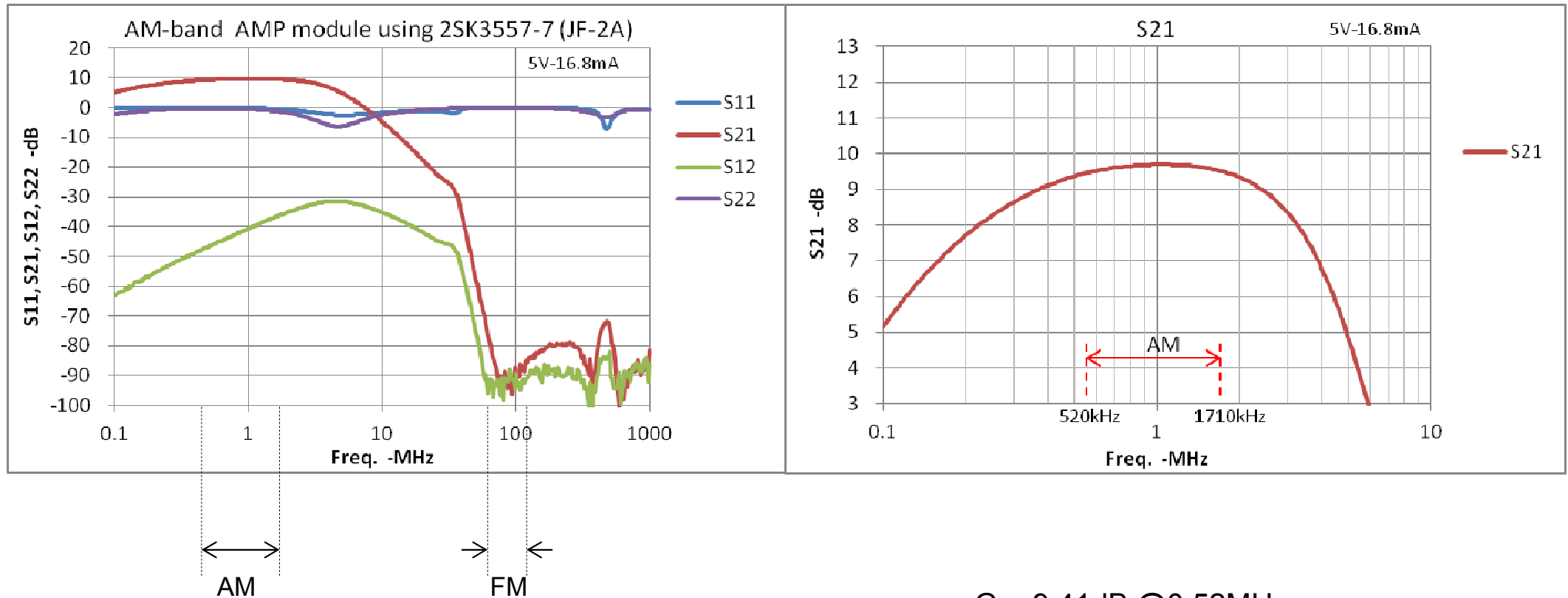


Bill of Materials

Item	Symbol	Value	Manufacturer	Size
JFET	FET1	2SK3557	ON Semiconductor	SC59
Capacitor	C1	10 pF	TAIYOYUDEN	1005
	C2	12 pF	Murata GQM1882C1H120	1608
	C3	120 pF	TAIYOYUDEN	1005
	C4,C5,C6,C7	0.1 uF	ROHM MCH182CN104KK	1608
Resistor	R1	22 kΩ	Various	1608
	R2	270 Ω	Various	1608
	R3	120 Ω	Various	1608
	R4	100 kΩ	Various	1608
	R5	10 Ω	Various	1608
	R6	150 Ω	Various	1608
	R7	100 kΩ	Various	1608
Inductor	L1,L2,L3	3.3 uH	TDK NLV25T-3R3J-PF	2520
	L4	330 uH	TDK NLCV32T-331K-PF	3225
Material	-	FR4	JF-2A	25.4 X 12.7 mm

Characteristics of Gain

$Z_0=50\Omega$



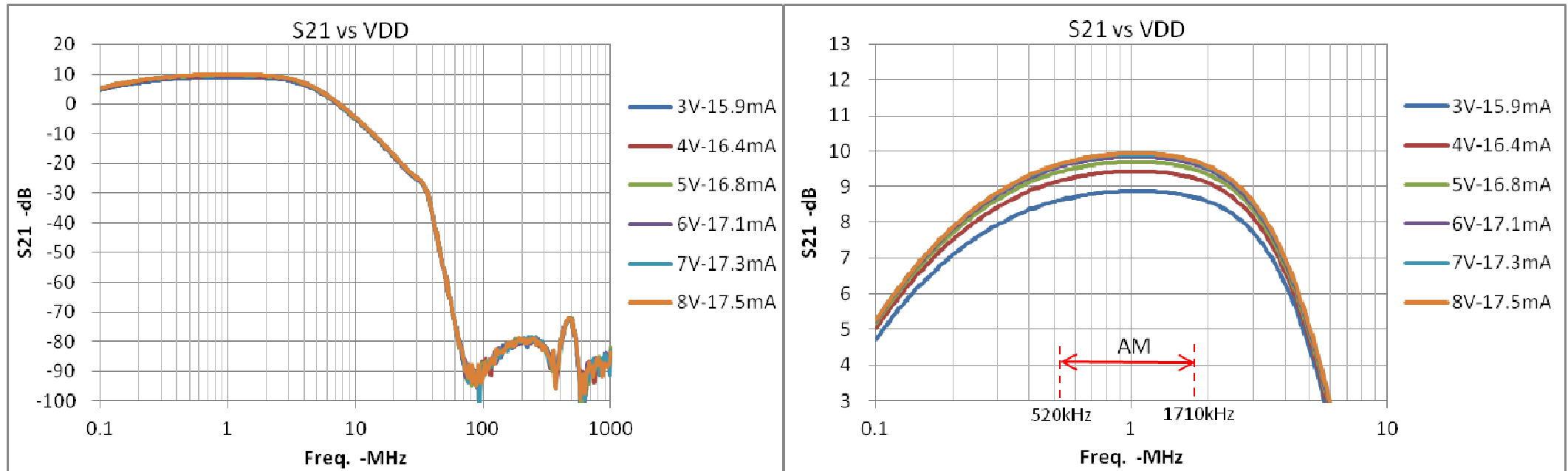
Ga = 9.6dB in AM-band (0.52~1.71MHz)
Ga < -80dB in FM-band (76~108MHz)

Ga=9.41dB @0.52MHz
 Ga=9.69dB @1.00MHz
 Ga=9.51dB @1.71MHz

$\Delta Ga_1=0.28\text{dB}$ within AM-band

Gain vs VDD

$Z_o=50\Omega$



$\Delta G_{a2} = 1.05\text{dB}$ for $V_{DD}=3 \sim 8\text{V}$

Characteristics of Impedance

