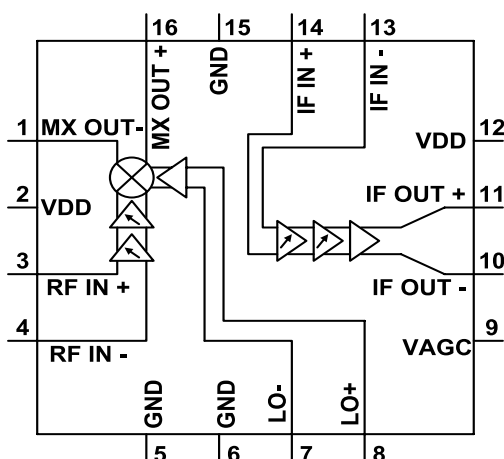




## Product Description

The S510075-33Z is a downconverter designed to be used as an Out-of-Band Tuner for use in CATV set-top box and Digital Cable Ready TV applications. The S510075-33Z consists of an input AGC amplifier, mixer, and a video/AGC amplifier. This device offers optimum performance with low power consumption and low distortion. This product is RoHS Compliant.

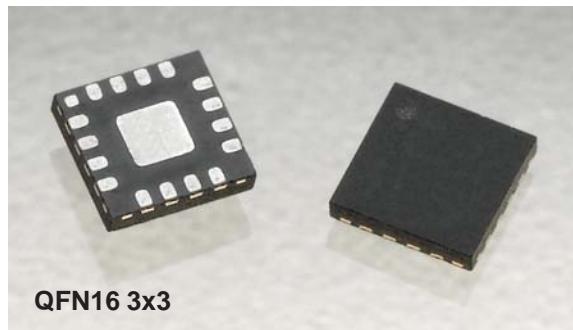
### Functional Block Diagram



## Preliminary Datasheet

# S510075-33Z

## Out-of-Band Tuner



## Product Features

- 3.3 V Single Supply Operation
- Low Power Consumption (300 mW)
- Low Distortion: -50dBc@ 1VPP
- 70 dB Total Conversion Gain
- 55 dB Total Gain Control Range
- Low LO-RF leakage

## Applications

- Cable Set-Top Boxes
- Digital Cable Ready Televisions

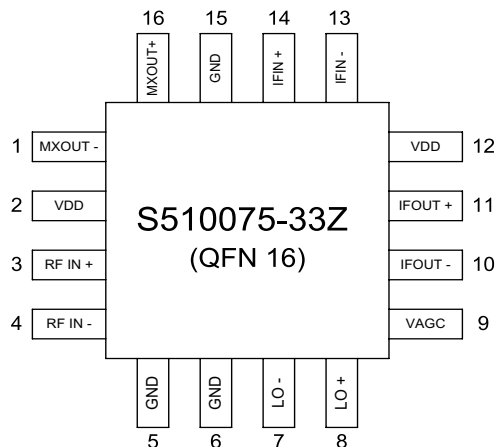
### Electrical Specifications ( $T_A=25^\circ\text{C}$ , $V_{DD}=3.3\text{V}$ , unless otherwise specified)

SYMBOL	PARAMETERS	UNITS	Application Circuit #1			Application Circuit #2		
			MIN	TYP	MAX	MIN	TYP	MAX
$RF_{IN}$	RF Input Frequency Range, High Side L.O.	MHz	50		150	50		150
$LO_{IN}$	LO Input Frequency Range, High Side L.O.	MHz	80		220	80		220
$CG_{MAX}$	Maximum Conversion Gain*	dB		70			80	
$V_{AGC}$	AGC Voltage	V	0		3	0		3
AGC	AGC Dynamic Range $V_{AGC} = 0$ to $3.0\text{V}$	dB	50	55		50	55	
$IM_3$	Third Order Intermodulation, 1Vpp Differential Output, 1K ohm load	dBc	50	55		50	55	
$IF_{OUT}$	IF Output Level, Differential Output, 1K ohm load	$V_{PP}$		1	2		1	2
NF	Noise Figure, $V_{AGC} = 3.0\text{V}$	dB		13	15		13	15
LO-RF LEAKAGE	L.O. Leakage at the RF Port	dBm			-85			-85
$V_{DD}$	Supply Voltage	V	3.0	3.3	3.6	3.0	3.3	3.6
$I_{DD}$	Supply Current	mA		95	110		95	110

\*Includes saw filter loss.

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## Pin Configuration (Top View)



## Pin Descriptions

QFN 16	FUNCTION	DESCRIPTION
1	MX OUT (-)	MIXER Negative Output. Open Drain. See APPLICATION on Page 5.
2, 12	VDD	Supply Voltage, +3.3V.
3	RF IN (+)	RF AMP Positive Input. Input impedance, 1K ohms single ended. SEE APPLICATION on Page 5.
4	RF IN (-)	RF AMP Negative Input. See APPLICATION on Page 5.
5, 6, 15	GND RF	Ground pins. Connect to the ground plane with shortest possible length to minimize inductance.
7	LO IN (-)	LO Buffer Negative Input.
8	LO IN (+)	LO Buffer Positive Input.
9	AGC	Automatic Gain Control, Min Gain @ AGC = 0V, Max Gain @ AGC = 3.0V
10	IF OUT (-)	VIDEO AMP Negative Output. This pin and IFOUT2 form a 1K ohm output impedance. Open Drain. See APPLICATION on Page 5.
11	IF OUT (+)	VIDEO AMP Positive Output. See IFOUT (+).
13	IF IN (-)	VIDEO AMP Negative Input.
14	IF IN (+)	VIDEO AMP Positive Input.
16	MX OUT (+)	MIXER Positive Output. Open Drain. See APPLICATION on Page 5.

## Absolute Maximum Ratings

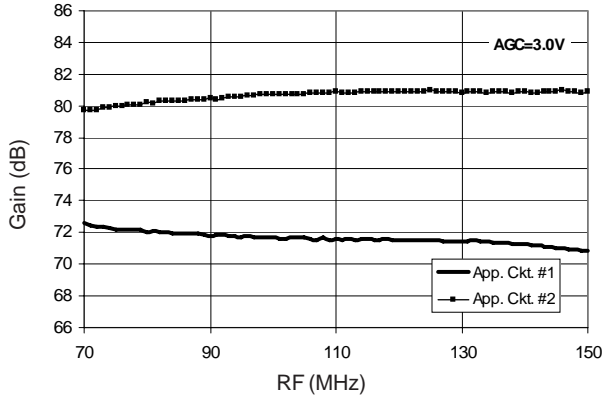
PARAMETER	UNITS	RATING
Supply Voltage ( $V_{DD}$ )	V	-0.3 to +3.6
Operating Temperature ( $T_{OP}$ )	°C	-40 to +85
Storage Temperature ( $T_{STG}$ )	°C	-65 to +150
Junction Temperature ( $T_J$ )	°C	TBD
Thermal Resistance	°C/W	TBD
ESD Rating-Human Body Model (Class 2)	V	TBD

Operation in excess of any one of these parameters may result in permanent damage.

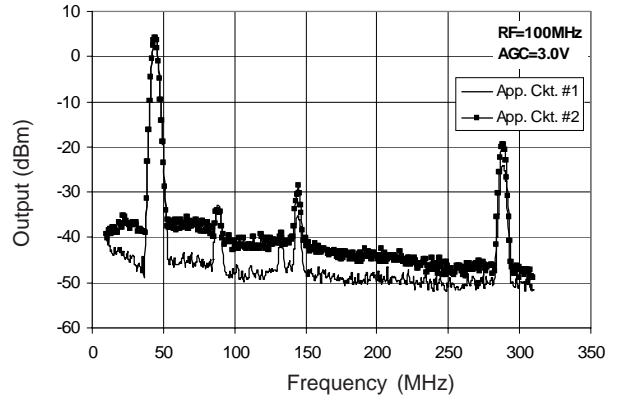


### Typical Performance Curves

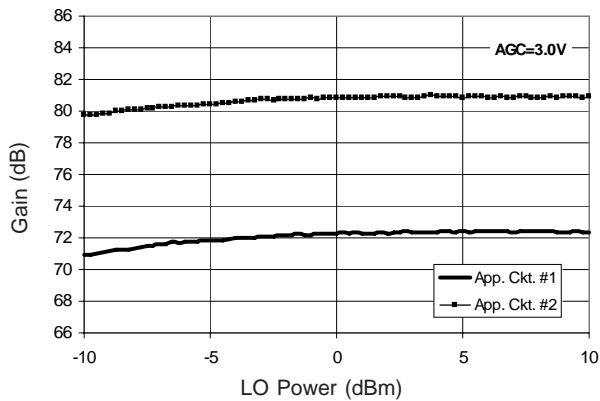
**CONVERSION GAIN vs. RF**



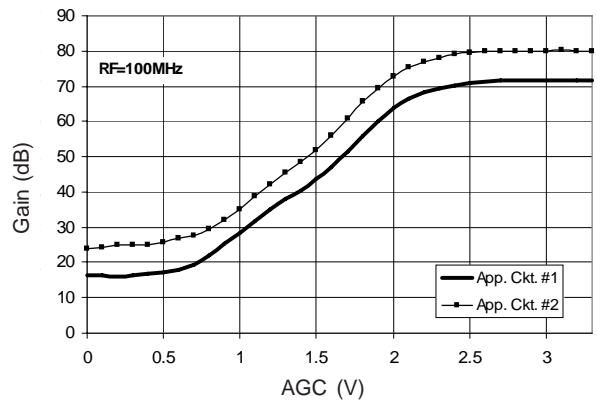
**IF OUTPUT vs. FREQUENCY**



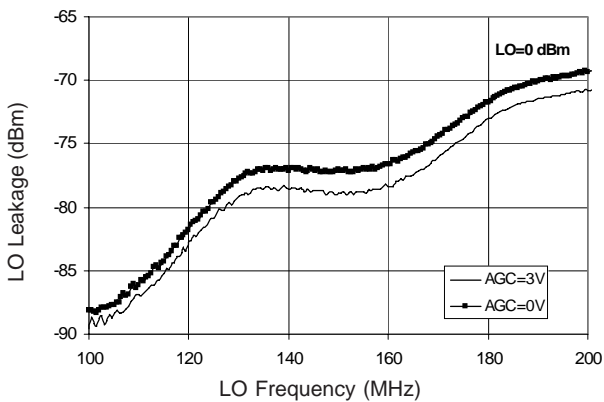
**CONVERSION GAIN vs. LO POWER**



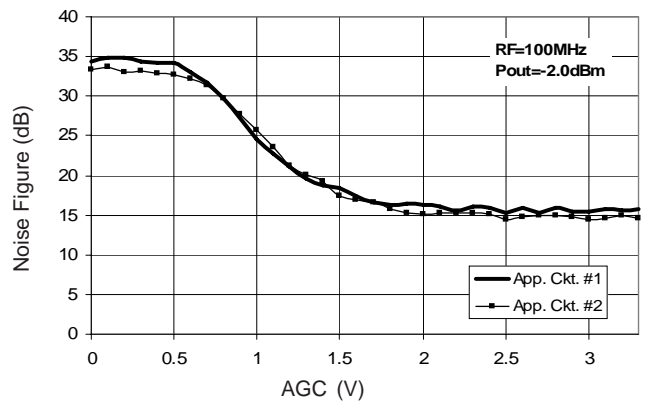
**CONVERSION GAIN vs. AGC**



**LO LEAKAGE AT RF vs. LO FREQUENCY**



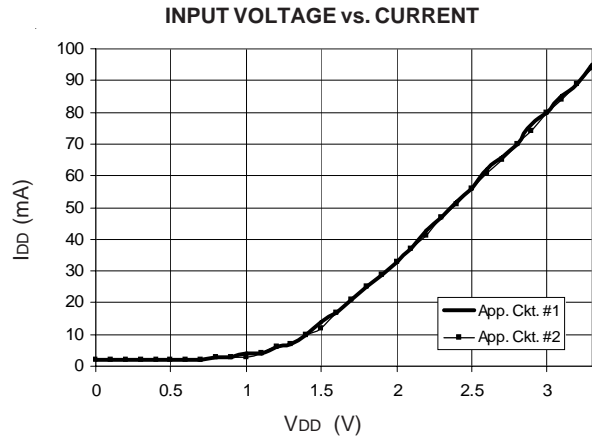
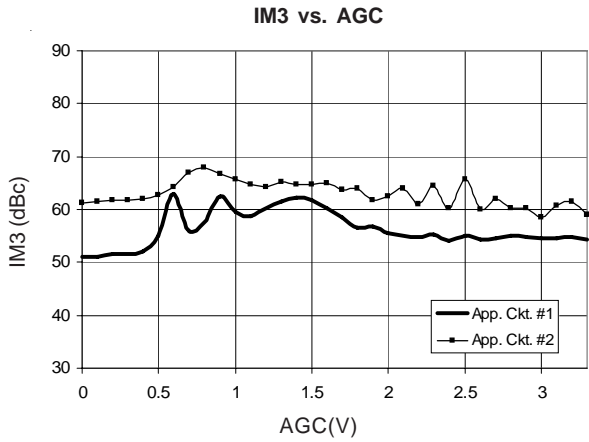
**NOISE FIGURE vs. AGC**



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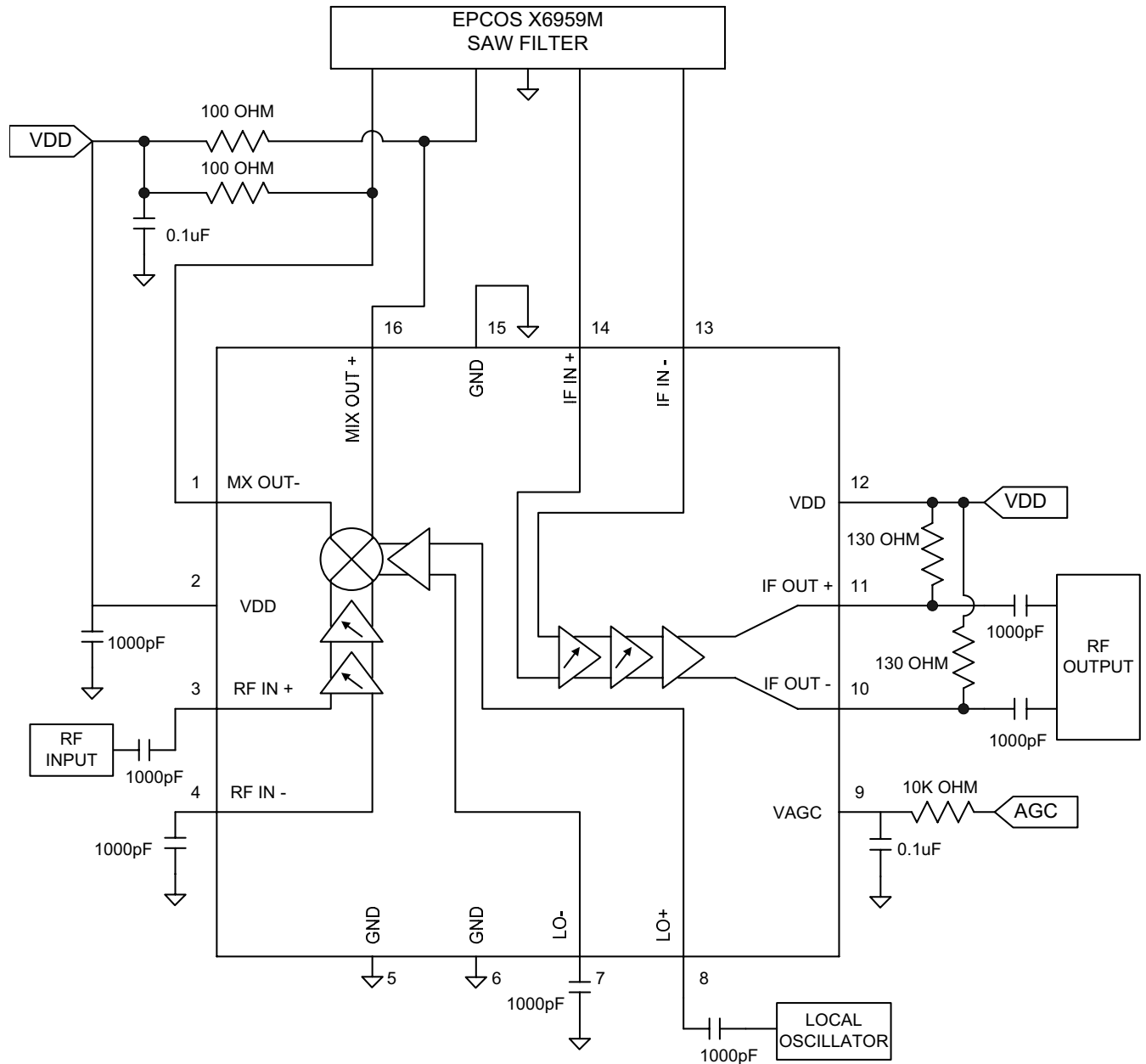


**Typical Performance Curves (Cont.)**

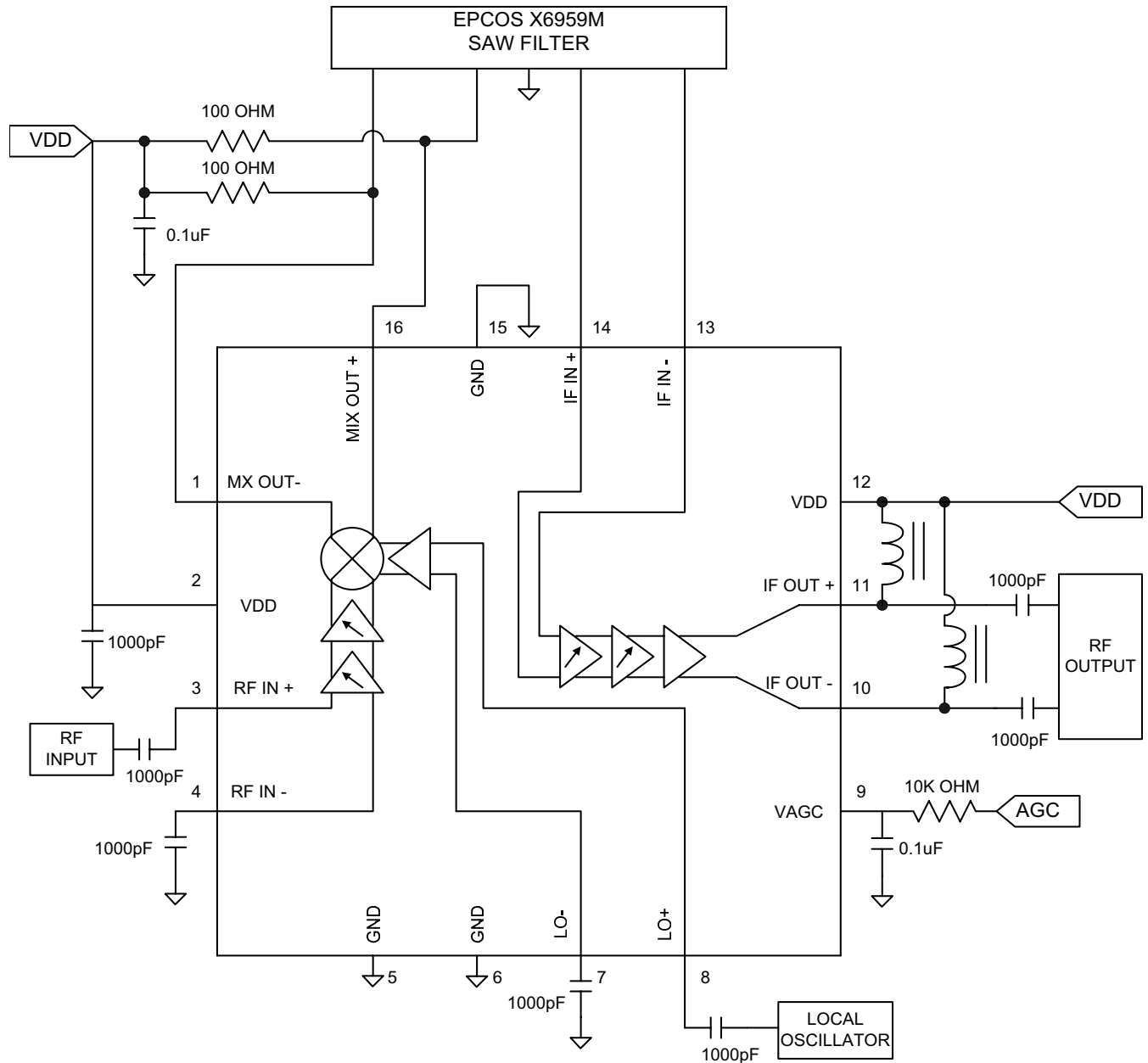


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## Application Circuit #1

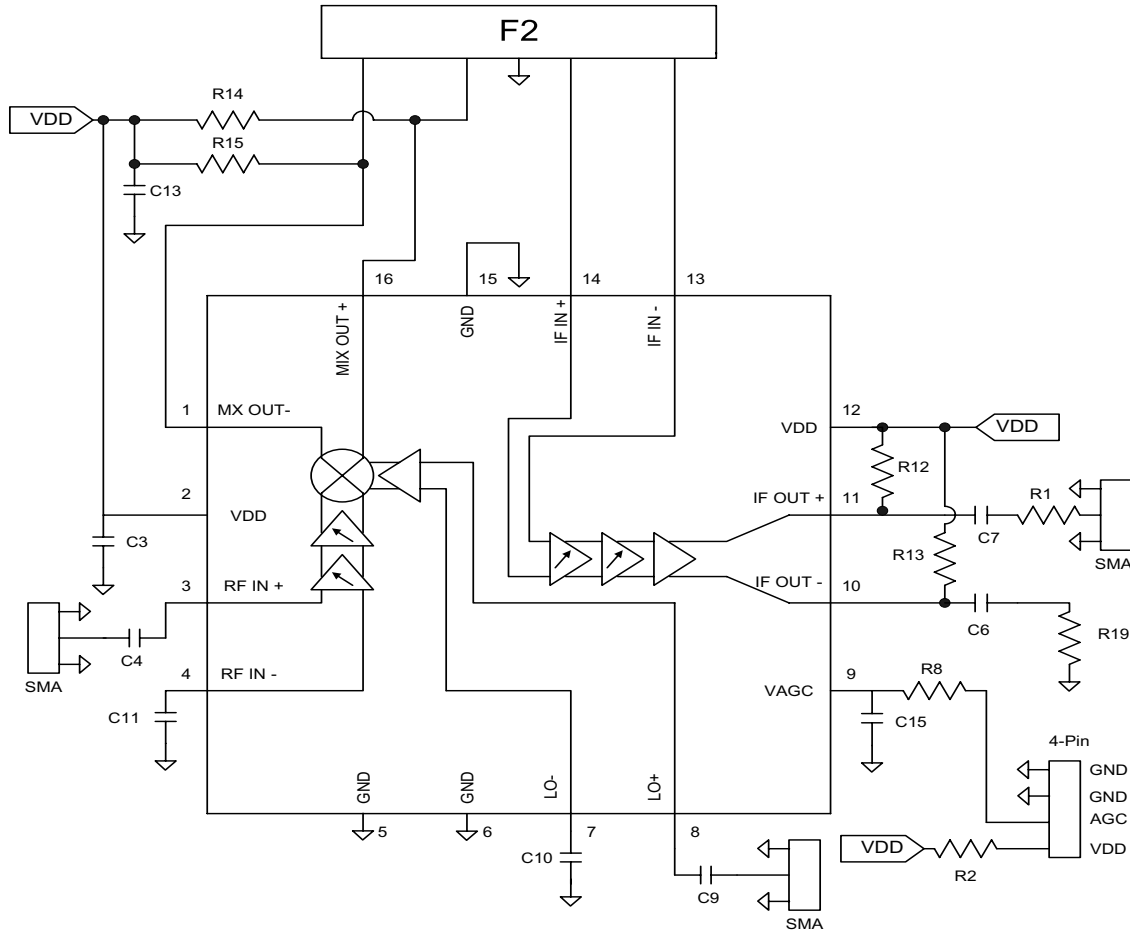


## Application Circuit #2



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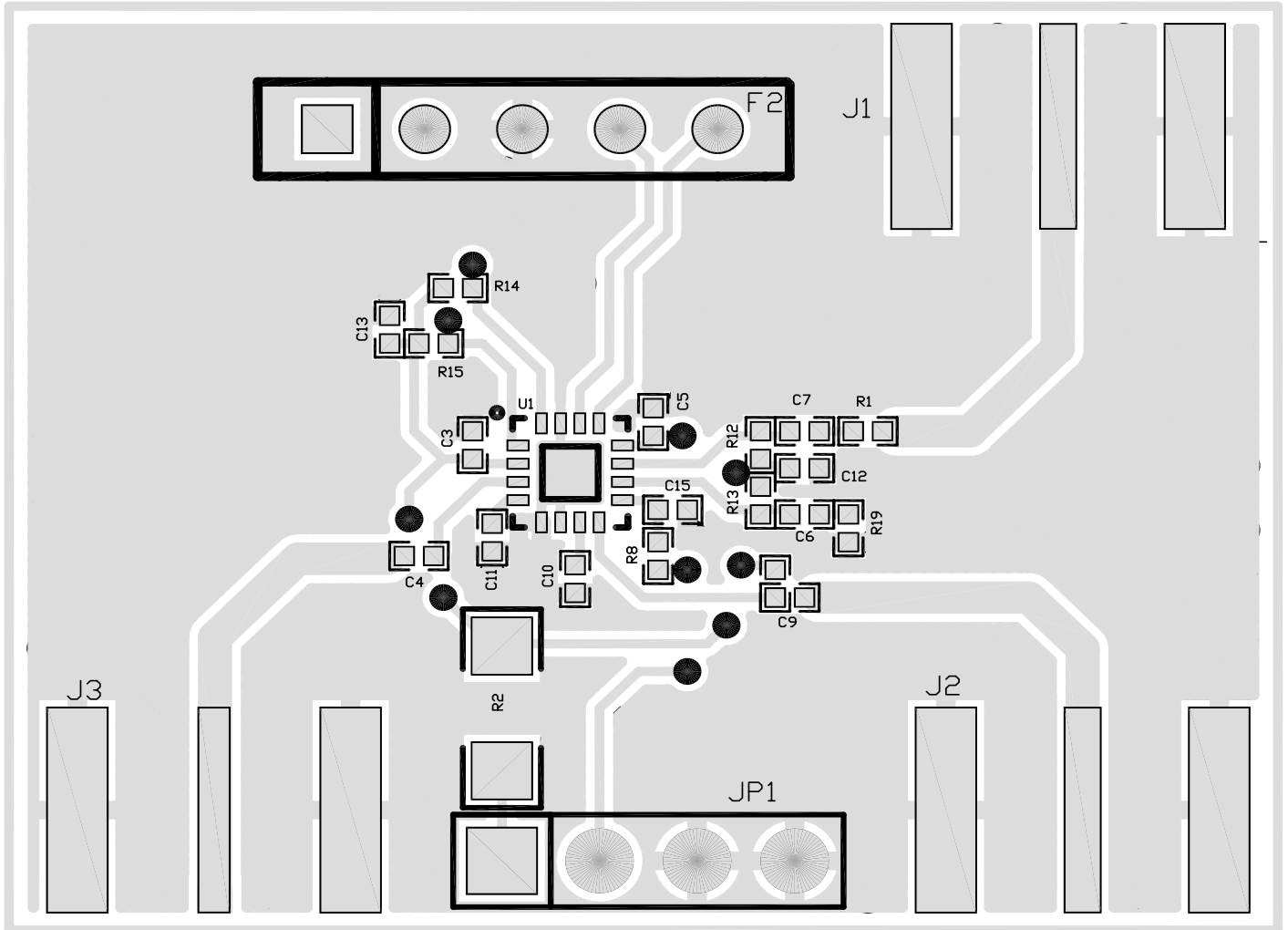
### Evaluation Board Schematic



Component	Description	Value	Manufacturer	Part Number
C3, C5	Capacitor	0.01uF	Murata	GRM155R71C103KA01E
C4, C6, C7, C9, C10, C11	Capacitor	1000pF	Murata	GRM155R71H102KA01E
C12, C13, C15	Capacitor	0.1uF	Murata	GRM155R71C104KA01D
F2	SAW Filter	44MHz	Epcos	X6959M
R1	Resistor	470 ohms	KOA	RK73B1ETTP471J
R2	Resistor	0 ohms	Panasonic	ERJ-8GEY0R00V
R12, R13	Resistor	130 ohms	Panasonic	ERJ-2GEJ131X
R14, R15	Resistor	100 ohms	KOA	RK73B1ETTP101J
R19	Resistor	510 ohms	KOA	RK73B1ETTP511J

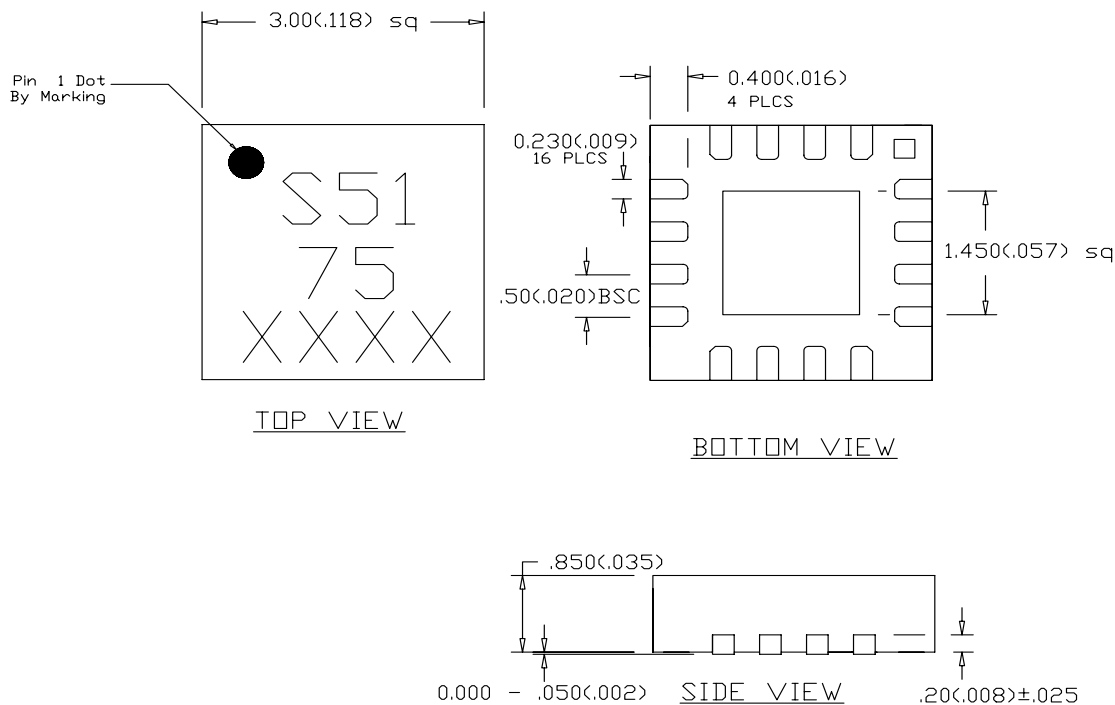
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## Evaluation Board Layout



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1. Dimensions and tolerances conform to ASME Y14.5-1994.
2. All dimensions are in millimeters. All angles are in degrees.
3. The exposed thermal pad is also an electrical ground .

**LAND PATTERN FOR TERMINALS AND THERMAL/GROUND PAD**

