

## High Power 2 × 4 Antenna Switch MMIC with Integrated Control Logic

**Description**

The CXG1064ATN is a high power antenna switch MMIC. The CXG1064ATN is suited to connect Tx/Rx to one of 4 antennas in cellular handset such as PDC.

The CXG1064ATN has the integrated control logic and can be operated with CMOS input.

This IC is designed using the Sony's GaAs J-FET process which enable the CXG1064ATN to be operated with low voltage.

**Features**

- Low insertion loss :  
0.35 dB (Typ.) @900 MHz, 0.45 dB (Typ.) @1.5 GHz
- Small package : TSSOP-16 pin
- High power handling : P1dB : 37 dBm
- CMOS compatible input control
- Low bias voltage :  $V_{DD}=3.0\text{ V}$

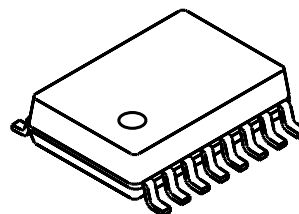
**Applications**

2 × 4 antenna switch for digital cellular telephones such as PDC handsets.

**Structure**

GaAs J-FET MMIC

16 pin TSSOP (Plastic)

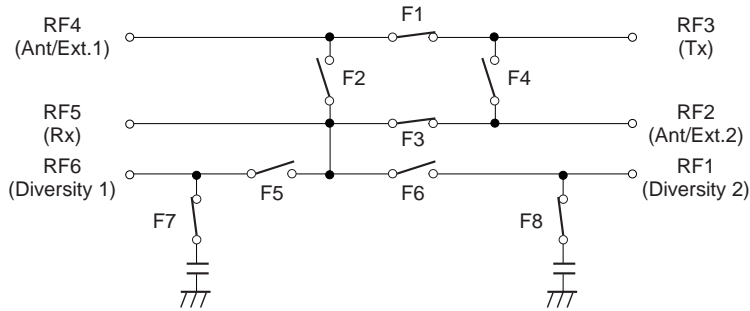
**Absolute Maximum Ratings** ( $T_a=25\text{ }^\circ\text{C}$ )

• Bias voltage	$V_{DD}$	7	V
• Control voltage	$V_{ctl}$	5	V
• Operating temperature	$T_{opr}$	-35 to +85	$^\circ\text{C}$
• Storage temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

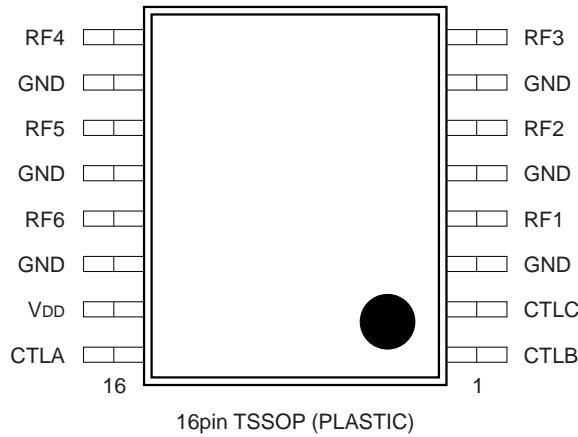
GaAs MMICs are ESD sensitive devices. Special handling precautions are required.

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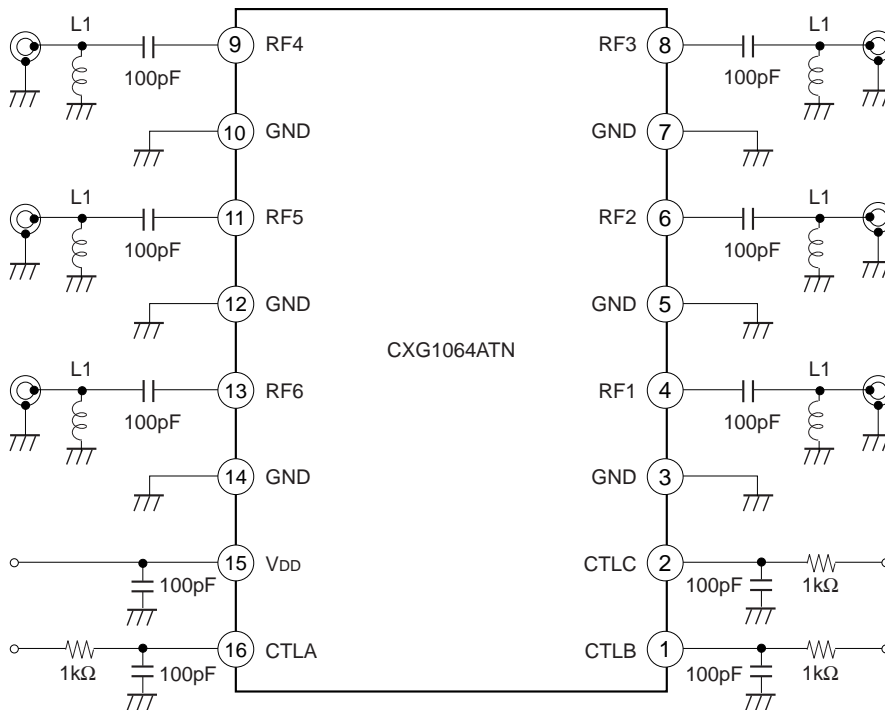
**Block Diagram**



**Package Outline/Pin Configuration**



**Recommended Circuit**



- \* DC blocking capacitors (CRF) are needed.
- \* Recommended to use bypass capacitors (Cbypass).
- \* Recommended to use control resistors (RCTL), when it is necessary to improve the electrostatic discharge strength (ESD).

## Truth Table

Control			ON	F1	F2	F3	F4	F5	F6	F7	F8
CTLA	CTLB	CTLC									
H	L	L	RF3 → RF2	OFF	ON	OFF	ON	OFF	OFF	ON	ON
H	L	H	RF3 → RF4	ON	OFF	ON	OFF	OFF	OFF	ON	ON
L	L	L	RF5 → RF2	ON	OFF	ON	OFF	OFF	OFF	ON	ON
L	L	H	RF5 → RF4	OFF	ON	OFF	ON	OFF	OFF	ON	ON
L	H	L	RF5 → RF6	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
L	H	H	RF5 → RF1	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF

## DC Bias Condition

(Ta=25 °C)

Parameter	Min.	Typ.	Max.	Unit.
Vctl (H) A to C	2.4		3.6	V
Vctl (L) A to C	0		0.8	V
V <sub>DD</sub>	2.6		4.5	V

## Electrical Characteristics 1

(Vctl (L)=0 V, Vctl (H)=3 V, Ta=25 °C)

Parameter		Frequency	Condition	Min.	Typ.	Max.	Unit.
Insertion loss	RF3-RF2	889 MHz	*2, *3		0.35	0.60	dB
	RF3-RF4	to 960 MHz	*2, *3		0.35	0.60	dB
	RF5-RF2	810 MHz	*4, *5		0.55	0.80	dB
	RF5-RF4	to 885 MHz	*4, *5		0.55	0.80	dB
	RF5-RF1	810 MHz	*4, *5		0.5	0.75	dB
	RF5-RF6	to 885 MHz	*4, *5		0.5	0.75	dB
Isolation	RF3-RF2	889 MHz	*2, *3	18	20		dB
	RF3-RF4	to 960 MHz	*2, *3	18	22		dB
	RF5-RF2	810 MHz	*4, *5	18	22		dB
	RF5-RF4	to 885 MHz	*4, *5	18	20		dB
	RF5-RF1	810 MHz	*4, *5	25	34		dB
	RF5-RF6	to 885 MHz	*4, *5	22	26		dB
VSWR	Each ON Port	810 MHz to 960 MHz				1.4	
ACP ( $\pm 50$ kHz)	RF3-RF2	889 MHz	*1, *2		-70	-60	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-55	dBc
ACP ( $\pm 100$ kHz)	RF3-RF2	889 MHz	*1, *2		-75	-70	dBc
	RF3-RF4	to 960 MHz	*1, *3		-75	-65	dBc
2nd Harmonics	RF3-RF2	889 MHz	*1, *2		-70	-60	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-60	dBc
3rd Harmonics	RF3-RF2	889 MHz	*1, *2		-70	-60	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-55	dBc
Control current					60	120	$\mu$ A
Bias current			V <sub>DD</sub> =3.0 V		0.6	1.1	mA
			V <sub>DD</sub> =2.8 V		0.6	1.0	mA
Switching speed					1	5	$\mu$ s

\*1 Input signal : ACP ( $\pm 50$  kHz) < -65 dBc, ACP ( $\pm 100$  kHz) < -75 dBc  
 2nd Harmonics < -65 dBc, 3rd Harmonics < -65 dBc

\*2 Pin=29.5 dBm, V<sub>DD</sub>=3.0 V

\*3 Pin=29.5 dBm, V<sub>DD</sub>=2.8 V

\*4 Pin=7 dBm, V<sub>DD</sub>=3.0

\*5 Pin=7 dBm, V<sub>DD</sub>=2.8

## Electrical Characteristics 2

(Vctl (L)=0 V, Vctl (H)=3 V, Ta=25 °C)

Parameter		Frequency	Condition	Min.	Typ.	Max.	Unit.
Insertion loss	RF3-RF2	1429 MHz	*2, *3		0.45	0.70	dB
	RF3-RF4	to 1453 MHz	*2, *3		0.45	0.70	dB
	RF5-RF2	1477 MHz	*4, *5		0.65	0.95	dB
	RF5-RF4	to 1501 MHz	*4, *5		0.65	0.95	dB
	RF5-RF1	1477 MHz	*4, *5		0.60	0.90	dB
	RF5-RF6	to 1501 MHz	*4, *5		0.60	0.90	dB
Isolation	RF3-RF2	1429 MHz	*2, *3	14	16		dB
	RF3-RF4	to 1453 MHz	*2, *3	16	18		dB
	RF5-RF2	1477 MHz	*4, *5	16	18		dB
	RF5-RF4	to 1501 MHz	*4, *5	14	16		dB
	RF5-RF1	1477 MHz	*4, *5	25	30		dB
	RF5-RF6	to 1501 MHz	*4, *5	18	21		dB
VSWR	Each ON Port	1429 MHz to 1501 MHz				1.4	
ACP ( $\pm 50$ kHz)	RF3-RF2	1429 MHz	*1, *2		-70	-60	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-55	dBc
ACP ( $\pm 100$ kHz)	RF3-RF2	1429 MHz	*1, *2		-75	-70	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-75	-65	dBc
2nd Harmonics	RF3-RF2	1429 MHz	*1, *2		-75	-60	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-55	dBc
3rd Harmonics	RF3-RF2	1429 MHz	*1, *2		-70	-60	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-55	dBc
Control current					60	120	$\mu$ A
Bias current			V <sub>DD</sub> =3.0 V		0.6	1.1	mA
			V <sub>DD</sub> =2.8 V		0.6	1.0	mA
Switching speed					1	5	$\mu$ s

\*1 Input signal : ACP ( $\pm 50$  kHz) < -65 dBc, ACP ( $\pm 100$  kHz) < -75 dBc  
 2nd Harmonics < -65 dBc, 3rd Harmonics < -65 dBc

\*2 Pin=29.5 dBm, V<sub>DD</sub>=3.0 V

\*3 Pin=29.5 dBm, V<sub>DD</sub>=2.8 V

\*4 Pin=7 dBm, V<sub>DD</sub>=3.0

\*5 Pin=7 dBm, V<sub>DD</sub>=2.8

## Electrical Characteristics 3

(Vctl (L)=0 V, Vctl (H)=3 V, Ta=-35 °C to +85 °C)

Parameter		Frequency	Condition	Min.	Typ.	Max.	Unit.
Insertion loss	RF3-RF2	889 MHz	*2, *3		0.35	0.90	dB
	RF3-RF4	to 960 MHz	*2, *3		0.35	0.90	dB
	RF5-RF2	810 MHz	*4, *5		0.55	1.10	dB
	RF5-RF4	to 885 MHz	*4, *5		0.55	1.10	dB
	RF5-RF1	810 MHz	*4, *5		0.5	1.05	dB
	RF5-RF6	to 885 MHz	*4, *5		0.5	1.05	dB
Isolation	RF3-RF2	889 MHz	*2, *3	18	20		dB
	RF3-RF4	to 960 MHz	*2, *3	18	22		dB
	RF5-RF2	810 MHz	*4, *5	18	22		dB
	RF5-RF4	to 885 MHz	*4, *5	18	20		dB
	RF5-RF1	810 MHz	*4, *5	25	34		dB
	RF5-RF6	to 885 MHz	*4, *5	22	26		dB
VSWR	Each ON Port	810 MHz to 960 MHz				1.4	
ACP ( $\pm 50$ kHz)	RF3-RF2	889 MHz	*1, *2		-70	-55	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-50	dBc
ACP ( $\pm 100$ kHz)	RF3-RF2	889 MHz	*1, *2		-75	-65	dBc
	RF3-RF4	to 960 MHz	*1, *3		-75	-60	dBc
2nd Harmonics	RF3-RF2	889 MHz	*1, *2		-70	-55	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-55	dBc
3rd Harmonics	RF3-RF2	889 MHz	*1, *2		-70	-55	dBc
	RF3-RF4	to 960 MHz	*1, *3		-70	-50	dBc
Control current					60	150	$\mu$ A
Bias current			V <sub>DD</sub> =3.0 V		0.6	1.3	mA
			V <sub>DD</sub> =2.8 V		0.6	1.2	mA
Switching speed					1	5	$\mu$ s

\*1 Input signal : ACP ( $\pm 50$  kHz) < -65 dBc, ACP ( $\pm 100$  kHz) < -75 dBc  
2nd Harmonics < -65 dBc, 3rd Harmonics < -65 dBc

\*2 Pin=29.5 dBm, V<sub>DD</sub>=3.0 V

\*3 Pin=29.5 dBm, V<sub>DD</sub>=2.8 V

\*4 Pin=7 dBm, V<sub>DD</sub>=3.0

\*5 Pin=7 dBm, V<sub>DD</sub>=2.8

## Electrical Characteristics 4

(Vctl (L)=0 V, Vctl (H)=3 V, Ta=-35 °C to +85 °C)

Parameter		Frequency	Condition	Min.	Typ.	Max.	Unit.
Insertion loss	RF3-RF2	1429 MHz	*2, *3		0.45	1.00	dB
	RF3-RF4	to 1453 MHz	*2, *3		0.45	1.00	dB
	RF5-RF2	1477 MHz	*4, *5		0.65	1.25	dB
	RF5-RF4	to 1501 MHz	*4, *5		0.65	1.25	dB
	RF5-RF1	1477 MHz	*4, *5		0.60	1.2	dB
	RF5-RF6	to 1501 MHz	*4, *5		0.60	1.2	dB
Isolation	RF3-RF2	1429 MHz	*2, *3	14	16		dB
	RF3-RF4	to 1453 MHz	*2, *3	16	18		dB
	RF5-RF2	1477 MHz	*4, *5	16	18		dB
	RF5-RF4	to 1501 MHz	*4, *5	14	16		dB
	RF5-RF1	1477 MHz	*4, *5	25	30		dB
	RF5-RF6	to 1501 MHz	*4, *5	18	21		dB
VSWR	Each ON Port	1429 MHz to 1501 MHz				1.4	
ACP ( $\pm 50$ kHz)	RF3-RF2	1429 MHz	*1, *2		-70	-55	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-50	dBc
ACP ( $\pm 100$ kHz)	RF3-RF2	1429 MHz	*1, *2		-75	-65	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-75	-60	dBc
2nd Harmonics	RF3-RF2	1429 MHz	*1, *2		-75	-55	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-50	dBc
3rd Harmonics	RF3-RF2	1429 MHz	*1, *2		-70	-55	dBc
	RF3-RF4	to 1453 MHz	*1, *3		-70	-50	dBc
Control current					60	150	$\mu$ A
Bias current			V <sub>DD</sub> =3.0 V		0.6	1.3	mA
			V <sub>DD</sub> =2.8 V		0.6	1.2	mA
Switching speed					1	5	$\mu$ s

\*1 Input signal : ACP ( $\pm 50$  kHz) < -65 dBc, ACP ( $\pm 100$  kHz) < -75 dBc  
 2nd Harmonics < -65 dBc, 3rd Harmonics < -65 dBc

\*2 Pin=29.5 dBm, V<sub>DD</sub>=3.0 V

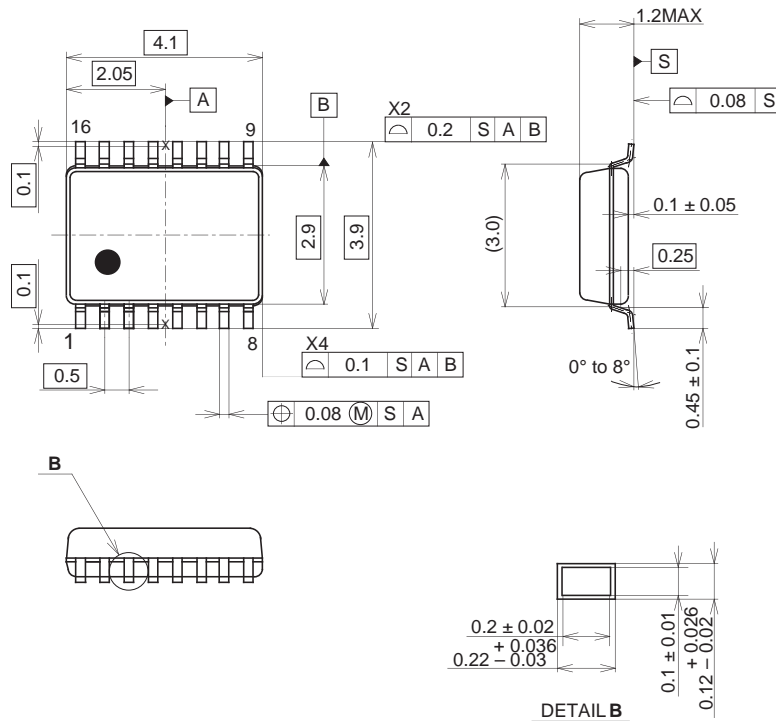
\*3 Pin=29.5 dBm, V<sub>DD</sub>=2.8 V

\*4 Pin=7 dBm, V<sub>DD</sub>=3.0

\*5 Pin=7 dBm, V<sub>DD</sub>=2.8

Package Outline Unit : mm

16PIN TSSOP(PLASTIC)



SONY CODE	TSSOP-16P-L01
EIAJ CODE	_____
JEDEC CODE	_____

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.03g