

### High Power SPDT RF Switch

#### DESCRIPTION

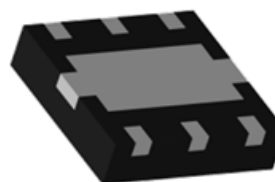
- The CG2409X3 is a GaAs MMIC high power SPDT (Single Pole Double Throw) switch which was designed for WiMAX and Wireless LAN applications

#### FEATURES

- Control Voltage:  
VC(H) = 1.8 to 5.0 V (3.0V TYP.)  
VC(L) = -0.2 to 0.2 V (0V TYP.)
- Low Insertion Loss:  
 $L_{ins} = 0.40$  dB TYP. @  $f = 2.5$  GHz  
 $L_{ins} = 0.45$  dB TYP. @  $f = 3.8$  GHz  
 $L_{ins} = 0.55$  dB TYP. @  $f = 6.0$  GHz
- High Isolation:  
ISL = 31 dB TYP. @  $f = 2.5$  GHz  
ISL = 34 dB TYP. @  $f = 3.8$  GHz  
ISL = 34 dB TYP. @  $f = 6.0$  GHz
- Power Handling:  
 $P_{in}(0.1dB) = +37.5$  dBm TYP. @  $f = 0.4$  to 6.0 GHz,  
VC(H) = 3.0 V, VC(L) = 0 V

#### PACKAGE

- 6-pin Thin SON Package (X3)  
(1.5mm x 1.5mm x 0.37mm)



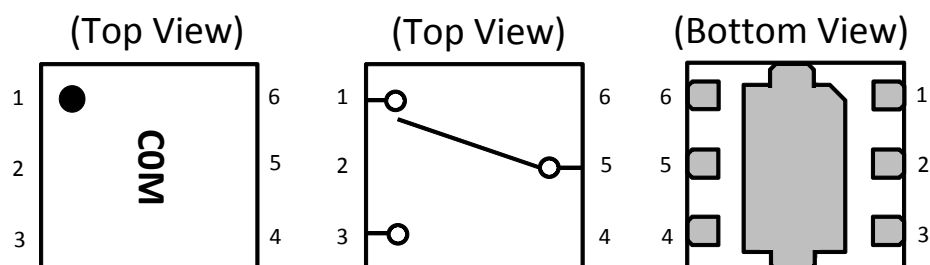
#### APPLICATIONS

- WiMAX and wireless LAN  
(IEEE802.11a/b/g/n/ac)

#### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Description
CG2409X3	CG2409X3-C2	6-pin plastic TSON (Pb-Free)	C0M	<ul style="list-style-type: none"> <li>Embossed tape 8 mm wide</li> <li>Pin 1, 6 face the perforation side of the tape</li> <li>MOQ 10 kpcs/reel</li> </ul>
CG2409X3-EVAL	CG2409X3-EVAL			<ul style="list-style-type: none"> <li>Evaluation Board with DC block capacitors, power supply bypass capacitors, and RF and DC connectors</li> <li>MOQ 1</li> </ul>

## PIN CONFIGURATION AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	RF1
2	GND
3	RF2
4	VC2
5	RFC
6	VC1

**Remark** Exposed pad : GND

## TRUTH TABLE

VC1	VC2	RFC-RF1	RFC-RF2
High	Low	ON	OFF
Low	High	OFF	ON

## ABSOLUTE MAXIMUM RATINGS

(TA = +25°C, unless otherwise specified)

Parameter	Symbol	Rating	Unit
Control Voltage	VC	6.0 <sup>Note 1</sup>	V
Input Power	Pin	+38.0 <sup>Note 2</sup>	dBm
Operating Ambient Temperature	T <sub>A</sub>	-45~+85	°C
Storage Temperature	T <sub>stg</sub>	-55~+150	°C

**Note** 1.  $|VC1 - VC2| \leq 6.0V$   
 2.  $3.0V \leq |VC1 - VC2| \leq 5.0V$ ,  $0.4GHz \leq f \leq 6.0GHz$

## RECOMMENDED OPERATING RANGE

(TA = +25°C, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f	0.05	-	6.0	GHz
Switch Control Voltage (H)	VC(H)	+1.8	+3.0	+5.0	V
Switch Control Voltage (L)	VC(L)	-0.2	0	+0.2	V

## ELECTRICAL CHARACTERISTICS 1

(TA=+25°C, VC(H)=3.0V, VC(L)=0V, Zo=50Ω, DC Block Capacitance=8pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	Lins1	f = 0.05 to 0.5 GHz <b>Note 1</b>	-	0.35	0.55	dB
	Lins2	f = 0.5 to 1.0 GHz <b>Note 2</b>	-	0.35	0.55	dB
	Lins3	f = 1.0 to 2.0 GHz <b>Note 2</b>	-	0.40	0.60	dB
	Lins4	f = 2.0 to 2.5 GHz	-	0.40	0.60	dB
	Lins5	f = 2.5 to 3.0 GHz	-	0.40	0.60	dB
	Lins6	f = 3.0 to 3.8 GHz	-	0.45	0.70	dB
	Lins7	f = 3.8 to 6.0 GHz	-	0.55	0.85	dB
Isolation	ISL1	f = 0.05 to 0.5 GHz <b>Note 1</b>	32	35	-	dB
	ISL2	f = 0.5 to 1.0 GHz <b>Note 2</b>	29	32	-	dB
	ISL3	f = 1.0 to 2.0 GHz <b>Note 2</b>	27	30	-	dB
	ISL4	f = 2.0 to 2.5 GHz	28	31	-	dB
	ISL5	f = 2.5 to 3.0 GHz	29	32	-	dB
	ISL6	f = 3.0 to 3.8 GHz	29	32	-	dB
	ISL7	f = 3.8 to 6.0 GHz	31	34	-	dB
Return Loss	RL1	f = 0.05 to 0.5 GHz <b>Note 1</b>	15	20	-	dB
	RL2	f = 0.5 to 2.0 GHz <b>Note 2</b>	15	20	-	dB
	RL3	f = 2.0 to 3.8 GHz	15	20	-	dB
	RL4	f = 3.8 to 6.0 GHz	15	20	-	dB
0.1 dB Loss Compression Input Power <b>Note 3</b>	P <sub>in(0.1dB)</sub>	f = 0.4 to 6.0 GHz	-	+37.5	-	dBm
2nd Harmonics	2f <sub>0</sub>	f = 2.5 GHz, P <sub>in</sub> =+26dBm	-	80	-	dBc
3rd Harmonics	3f <sub>0</sub>	f = 2.5 GHz, P <sub>in</sub> =+26dBm	-	85	-	dBc
Input 3rd Order Intercept Point	IIP3	f = 2.5 GHz 2-tone 1MHz Spacing	-	+62	-	dBm

**Note 1** DC block capacitance = 1,000pF at f=0.05 to 0.5 GHz

**Note 2** DC block capacitance = 56pF at f=0.4 to 2.0 GHz

**Note 3** P<sub>in(0.1dB)</sub> is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

## ELECTRICAL CHARACTERISTICS 2

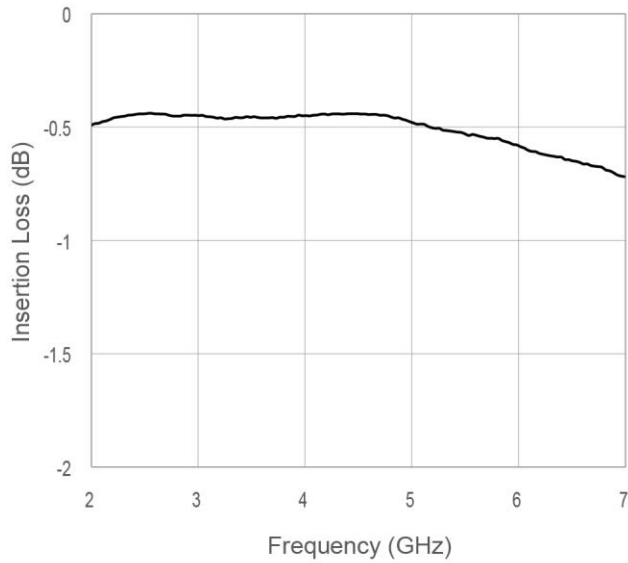
(TA=+25°C, VC(H)=3.0V, VC(L)=0V, Zo=50Ω, DC Block Capacitance=8pF, unless otherwise specified)

Error Vector Magnitude	EVM	802.11a, 64QAM, 54Mbps, Pin≤+25dBm	-	0.5	-	%
		802.11g, 64QAM, 54Mbps, Pin≤+25dBm	-	0.5	-	%
		802.11ac, 256QAM, MCS9, 80MHz, Pin≤+25dBm	-	0.5	-	%
Switch Control Speed	tsw	50% CTL to 90/10% RF	-	100	-	ns
Switch Control Current	Icont	Non RF	-	7	-	μA

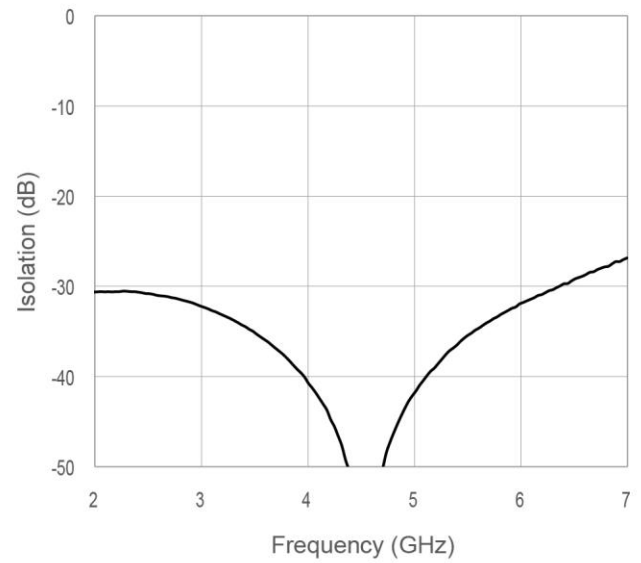
## TYPICAL CHARACTERISTICS

(VC(H)=3V, VC(L)=0V,  $T_A = +25^{\circ}\text{C}$ , DC Block Capacitance=8pF, through board loss is subtracted in insertion loss data)

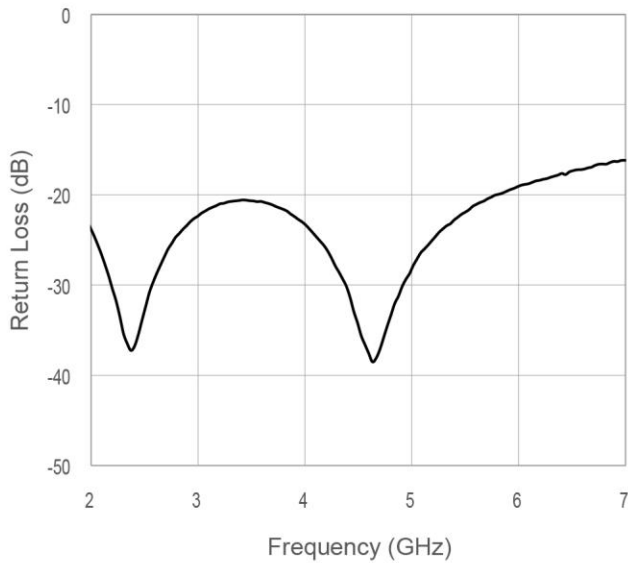
**Typical Insertion Loss vs. Frequency**



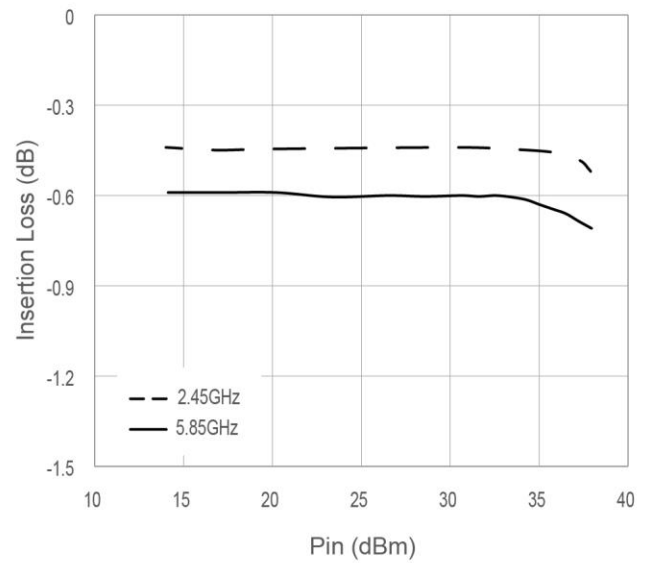
**Typical Isolation vs. Frequency**



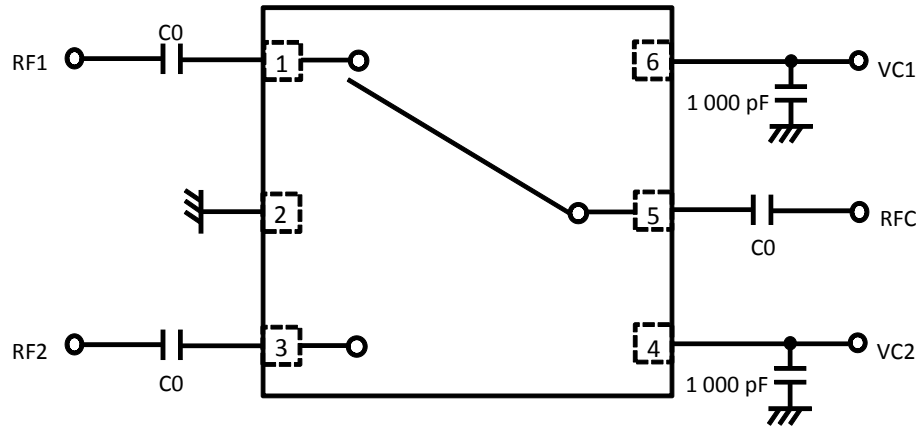
**Typical Return Loss vs. Frequency**



**Typical Insertion Loss vs. Input Power**



## EVALUATION CIRCUIT

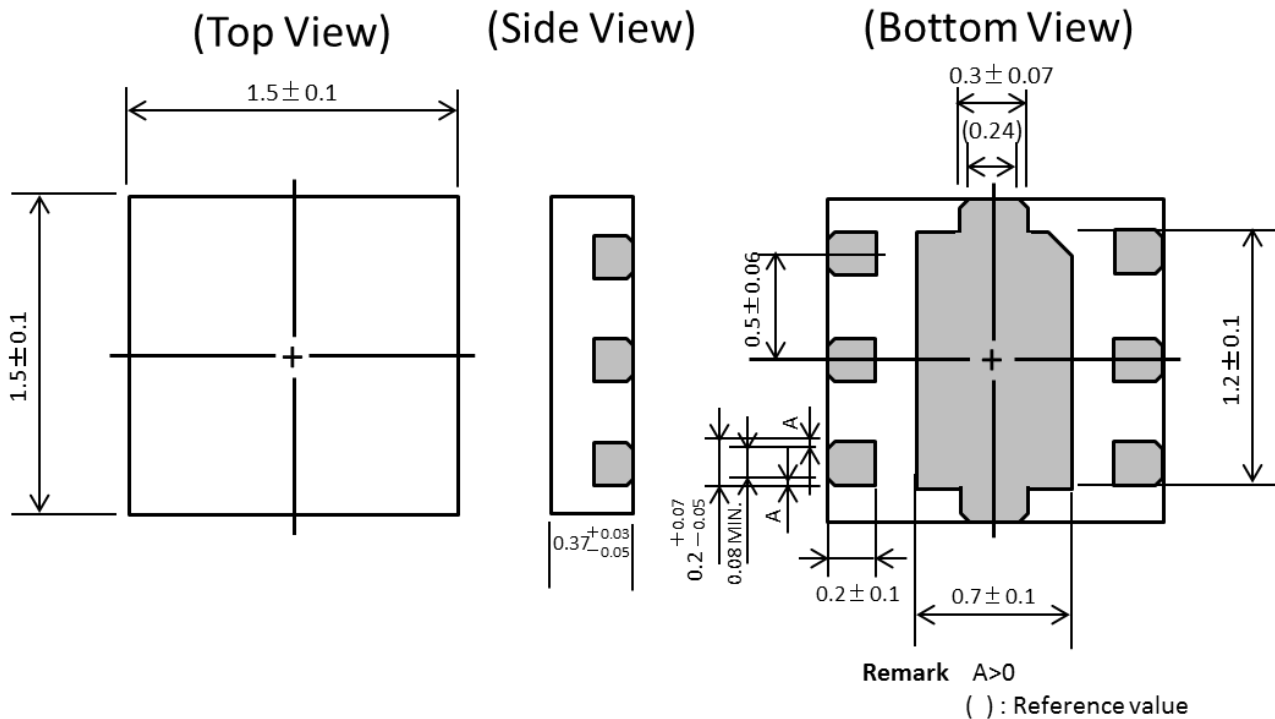


**Note** C0: 0.05 to 0.5 GHz 1,000pF  
: 0.4 to 2.0 GHz 56pF  
: 2.0 to 6.0 GHz 8pF

The application circuits and their parameters are for reference only and are not intended for use in actual designs. DC Blocking Capacitors are required at all RF ports.

## PACKAGE DIMENSIONS

6-pin Plastic TSON (Unit: mm)



## **RECOMMENDED SOLDERING CONDITIONS**

Recommended Soldering Conditions are available on CEL's [Part Summary page](#) under Associated Documents

## REVISION HISTORY

Version	Change to current version	Page(s)
CDS-0031-01 (Issue A) September 14, 2016	Preliminary datasheet	N/A
CDS-0031-02 (Issue B) December 27, 2016	Revised Electrical Characteristics table Added "Recommended Soldering Conditions" section	3, 5
CDS-0031-03 (Issue C) March 13, 2016	Initial Datasheet Revised Electrical Characteristics table	3
CDS-0031-04 (Issue D) September 12, 2017	Updated Characteristics tables and added Error Vector Magnitude Added "Typical Characteristics" graphs section	3, 4, 5



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