

## High Power SPDT RF Switch

### DESCRIPTION

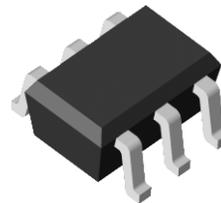
- The CG2409M2 is a GaAs MMIC high power SPDT (Single Pole Double Throw) switch which was designed for WiMAX and Wireless LAN applications

### 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<sub>ins1</sub> = 0.35 dB TYP. @ f = 1.0 GHz  
L<sub>ins2</sub> = 0.42 dB TYP. @ f = 2.5 GHz  
L<sub>ins3</sub> = 0.45 dB TYP. @ f = 3.0 GHz
- High isolation:  
ISL1 = 34 dB TYP. @ f = 1.0 GHz  
ISL2 = 30 dB TYP. @ f = 2.5 GHz  
ISL3 = 26 dB TYP. @ f = 3.0 GHz
- Power Handling  
P<sub>in(0.1dB)</sub> = +36.5 dBm TYP. @ f = 0.4 to 3.8 GHz,  
VC(H) = 3.0 V, VC(L) = 0 V

### PACKAGE

- 6-pin mini mold Package  
(2.0mm x 1.25mm x 0.9mm)



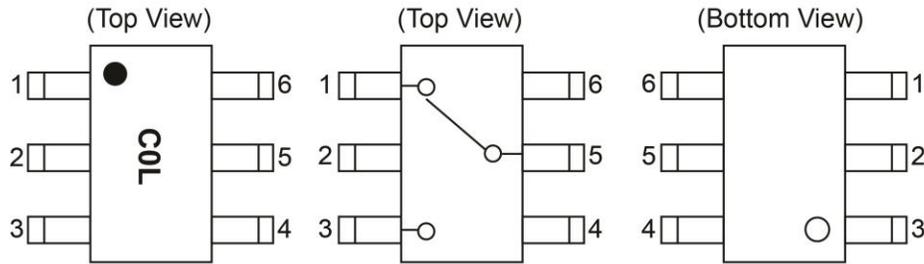
### APPLICATIONS

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

### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Description
CG2409M2	CG2409M2-C4	6-pin mini mold (Pb-Free)	C0L	<ul style="list-style-type: none"> <li>Embossed Tape 8 mm wide</li> <li>Pin 4, 5, 6 face the perforation side of the tape</li> <li>MOQ 10 kpcs/reel</li> </ul>
CG2409M2-EVAL	CG2409M2-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

## 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**
- $|VC1 - VC2| \leq 6.0V$
  - $3.0V \leq |VC1 - VC2| \leq 5.0V, 0.4GHz \leq f \leq 3.8GHz$

## RECOMMENDED OPERATING RANGE

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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f	0.05	-	3.8	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

(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 <sup>Note 1</sup>	-	0.35	0.55	dB
	Lins2	f = 0.5 to 1.0 GHz <sup>Note 2</sup>	-	0.35	0.55	dB
	Lins3	f = 1.0 to 2.0 GHz <sup>Note 2</sup>	-	0.40	0.60	dB
	Lins4	f = 2.0 to 2.5 GHz	-	0.42	0.62	dB
	Lins5	f = 2.5 to 3.0 GHz	-	0.45	0.70	dB
	Lins6	f = 3.0 to 3.8 GHz	-	0.50	0.80	dB
Isolation	ISL1	f = 0.05 to 0.5 GHz <sup>Note 1</sup>	32	35	-	dB
	ISL2	f = 0.5 to 1.0 GHz <sup>Note 2</sup>	31	34	-	dB
	ISL3	f = 1.0 to 2.0 GHz <sup>Note 2</sup>	29	32	-	dB
	ISL4	f = 2.0 to 2.5 GHz	27	30	-	dB
	ISL5	f = 2.5 to 3.0 GHz	23	26	-	dB
	ISL6	f = 3.0 to 3.8 GHz	18	21	-	dB
Return Loss	RL1	f = 0.05 to 0.5 GHz <sup>Note 1</sup>	15	20	-	dB
	RL2	f = 0.5 to 2.0 GHz <sup>Note 2</sup>	15	20	-	dB
	RL3	f = 2.0 to 3.8 GHz	15	20	-	dB
0.1 dB Loss Compression Input Power <sup>Note 3</sup>	P <sub>in(0.1dB)</sub>	f = 0.4 to 3.8 GHz	-	+36.5	-	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 = 2.5GHz 2-tone 1MHz Spacing	-	+62	-	dBm
Error Vector Magnitude	EVM	802.11g, 64QAM, 54Mbps, P <sub>in</sub> ≤+25dBm	-	0.5	-	%
Switch Control Speed	tsw	50% CTL to 90/10% RF	-	100	-	ns
Switch Control Current	I <sub>cont</sub>	Non RF	-	7	-	μA

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

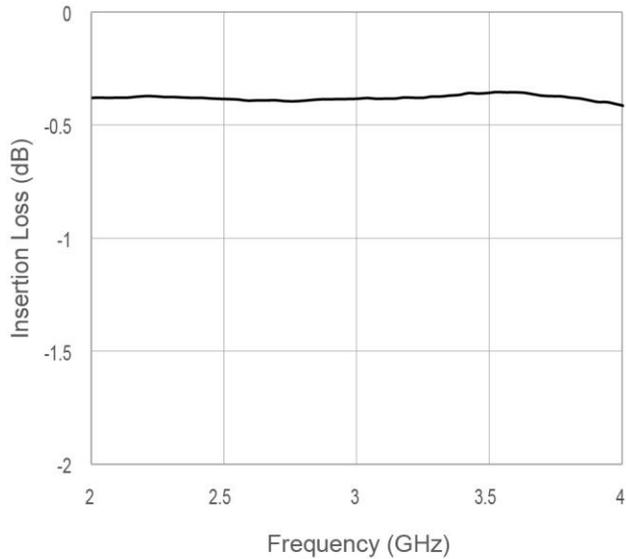
**Note 2** DC block capacitance = 56pF at f=0.4 to 2.0 GHz

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

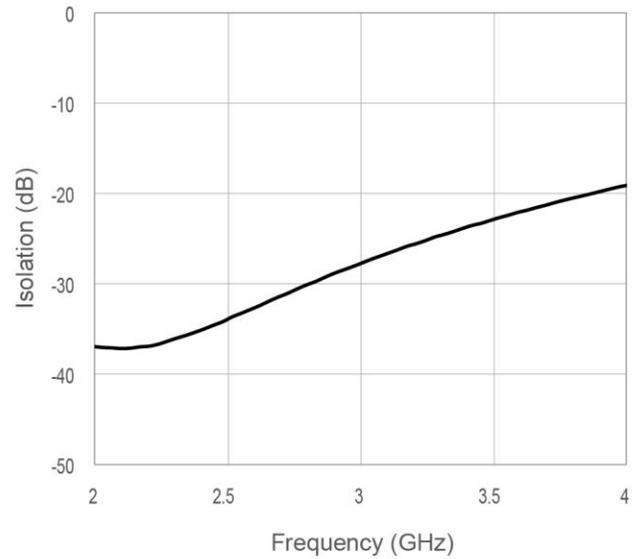
## TYPICAL CHARACTERISTICS

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

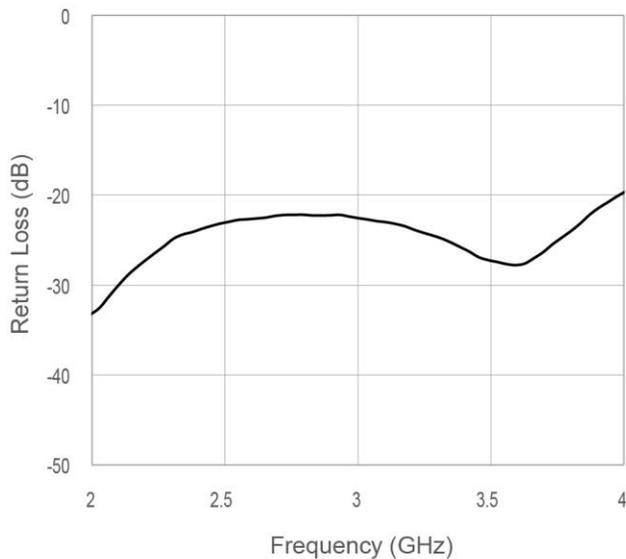
### Typical Insertion Loss vs. Frequency



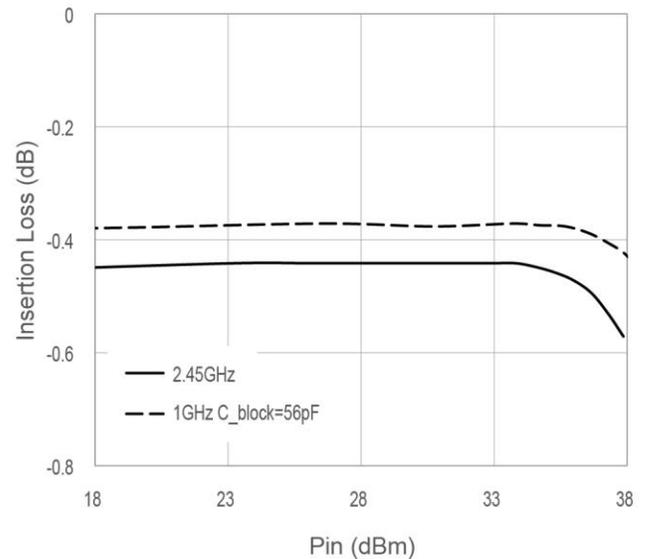
### Typical Isolation vs. Frequency



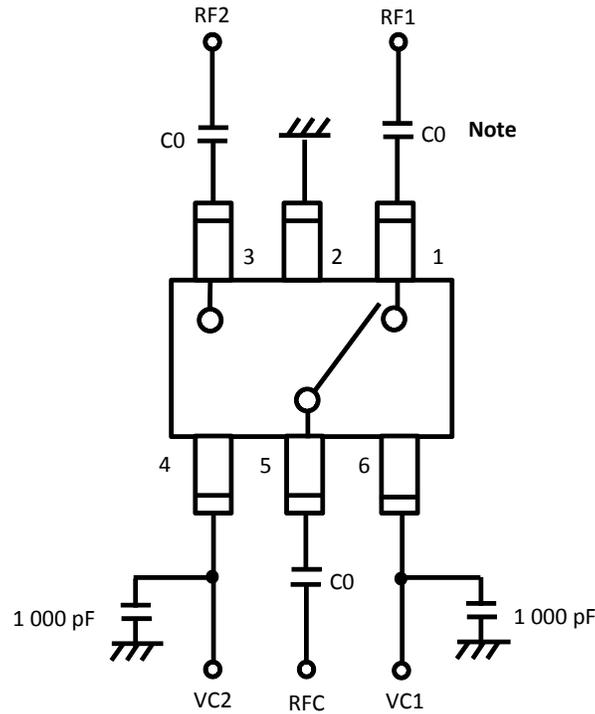
### Typical Return Loss vs. Frequency



### Typical Insertion Loss vs. Input Power



## EVALUATION CIRCUIT

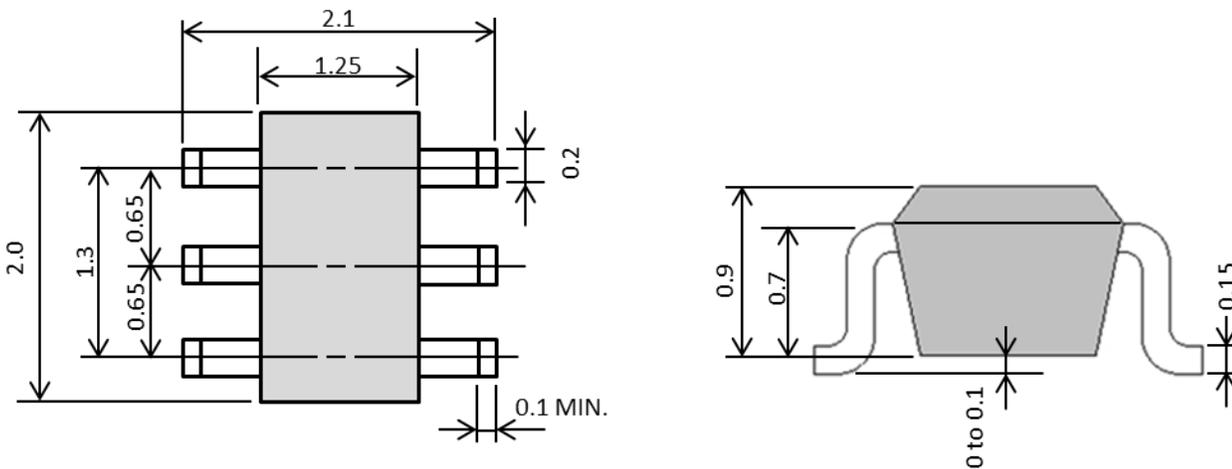


**Note** C0 : 0.05 to 0.5 GHz 1,000pF  
 : 0.4 to 2.0 GHz 56pF  
 : 2.0 to 3.8 GHz 8pF

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

## PACKAGE DIMENSIONS

6-pin mini mold package (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-0032-01 (Issue A) September 14, 2016	Preliminary Datasheet	N/A
CDS-0032-02 (Issue B) December 27, 2016	Revised Electrical Characteristics table Added "Recommended Soldering Conditions" section	3, 5
CDS-0032-03 (Issue C) March 14, 2017	Initial datasheet Revised Electrical Characteristics table	3
CDS-0032-04 (Issue D) September 14, 2017	Updated Applications section Updated Characteristics tables and added Error Vector Magnitude Added "Typical Characteristics" graphs section	1, 3, 4

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