RF SWITCH

CG2409X3

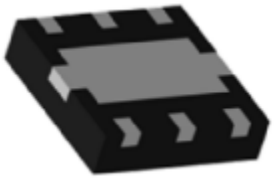
High Power SPDT RF Switch

DESCRIPTION

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

PACKAGE

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



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

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	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • MOQ 10 kpcs/reel
CG2409X3-EVAL	CG2409X3-EVAL			• Evaluation Board with DC block capacitors, power supply bypass capacitors, and RF and DC connectors • MOQ 1

This document is subject to change without notice.
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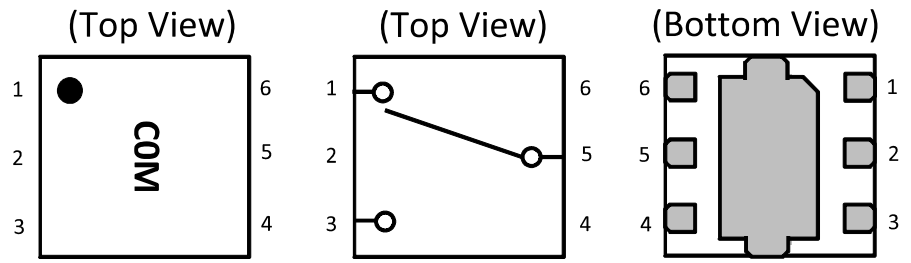
PIN CONFIGURATION AND INTERNAL BLOCK DIAGRAM



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

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

Parameter	Symbol	Rating	Unit
Control Voltage	VC	6.0[Note 1]	V
Input Power	Pin	+38.0[Note 2]	dBm
Operating Ambient Temperature	T_A	-45~+85	°C
Storage Temperature	T_{stg}	-55~+150	°C

Note 1. |VC1 - VC2|≦6.0V

2. 3.0V≦|VC1 – VC2|≦5.0V, 0.4GHz≦f≦6.0GHz

RECOMMENDED OPERATING RANGE

(T_A = +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

(T_A=+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 Note 1	-	0.35	0.55	dB
	Lins2	f = 0.5 to 1.0 GHz Note 2	-	0.35	0.55	dB
	Lins3	f = 1.0 to 2.0 GHz Note 2	-	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 Note 1	32	35	-	dB
	ISL2	f = 0.5 to 1.0 GHz Note 2	29	32	-	dB
	ISL3	f = 1.0 to 2.0 GHz Note 2	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 Note 1	15	20	-	dB
	RL2	f = 0.5 to 2.0 GHz Note 2	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 Note 3	$P_{in(0.1dB)}$	f = 0.4 to 6.0 GHz	-	+37.5	-	dBm
2nd Harmonics	2f0	f = 2.5 GHz, P_{in}=+26dBm	-	80	-	dBc
3rd Harmonics	3f0	f = 2.5 GHz, P_{in}=+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_{in}(0.1dB) is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

ELECTRICAL CHARACTERISTICS 2

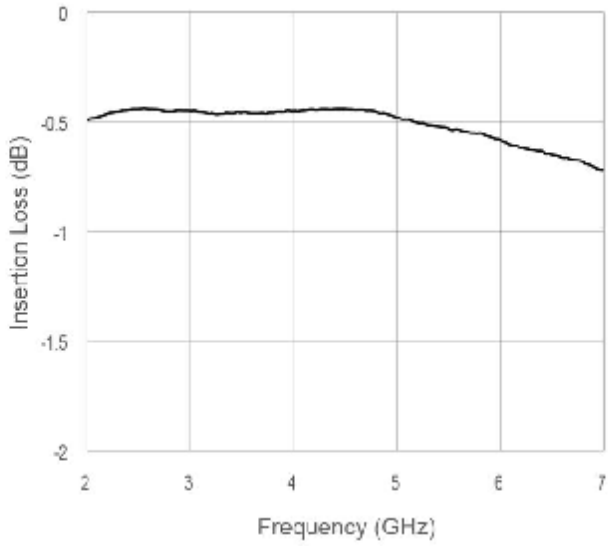
(T_A=+25°C, VC(H)=3.0V, VC(L)=0V, Zo=50Ω, DC Block Capacitance=8pF, unless otherwise specified

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

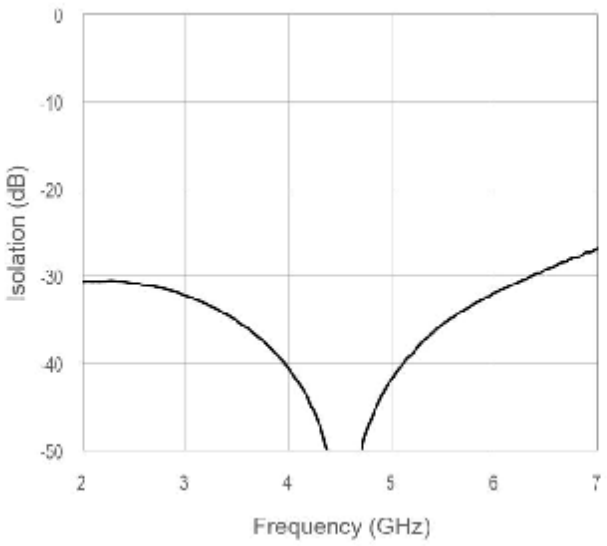
TYPICAL CHARACTERISTICS

(VC(H)=3V, VC(L)=0V, T_A = +25˚C, DC Block Capacitance=8pF, through board loss is subtracted in insertion loss data)

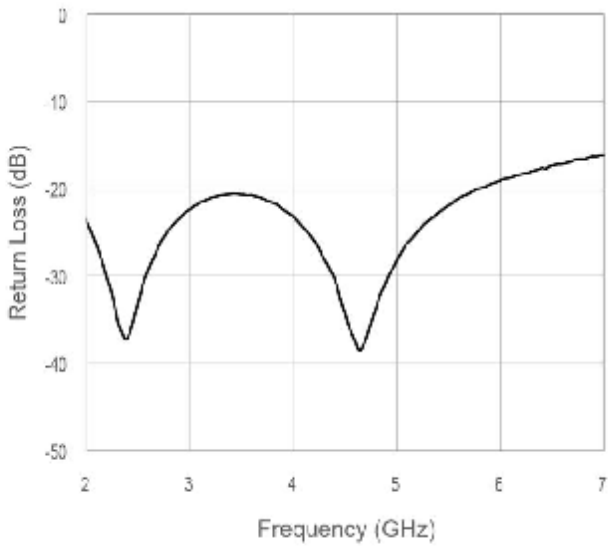
Typical Insertion Loss vs. Frequency



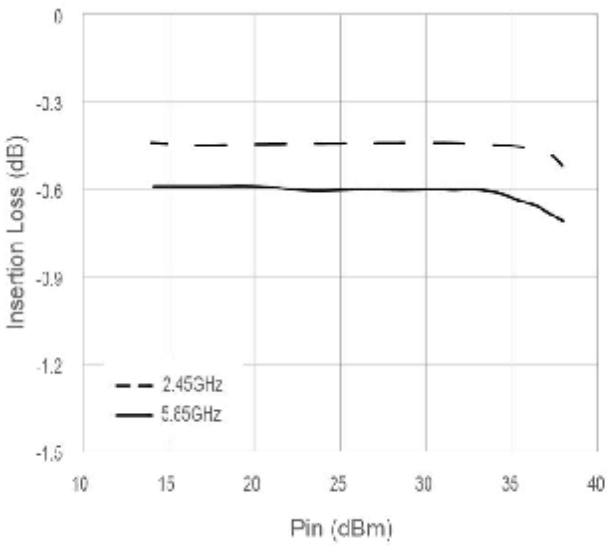
Typical Isolation vs. Frequency



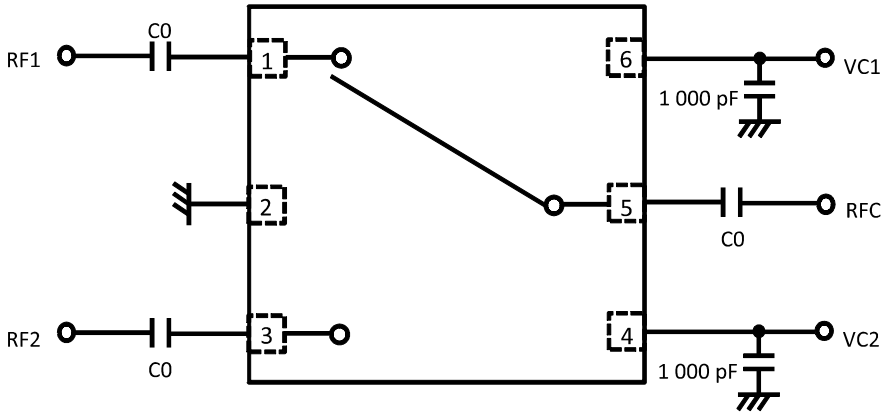
Typical Return Loss vs. Frequency



Typical Insertion Loss vs. Input Power



EVALUATION CIRCUIT

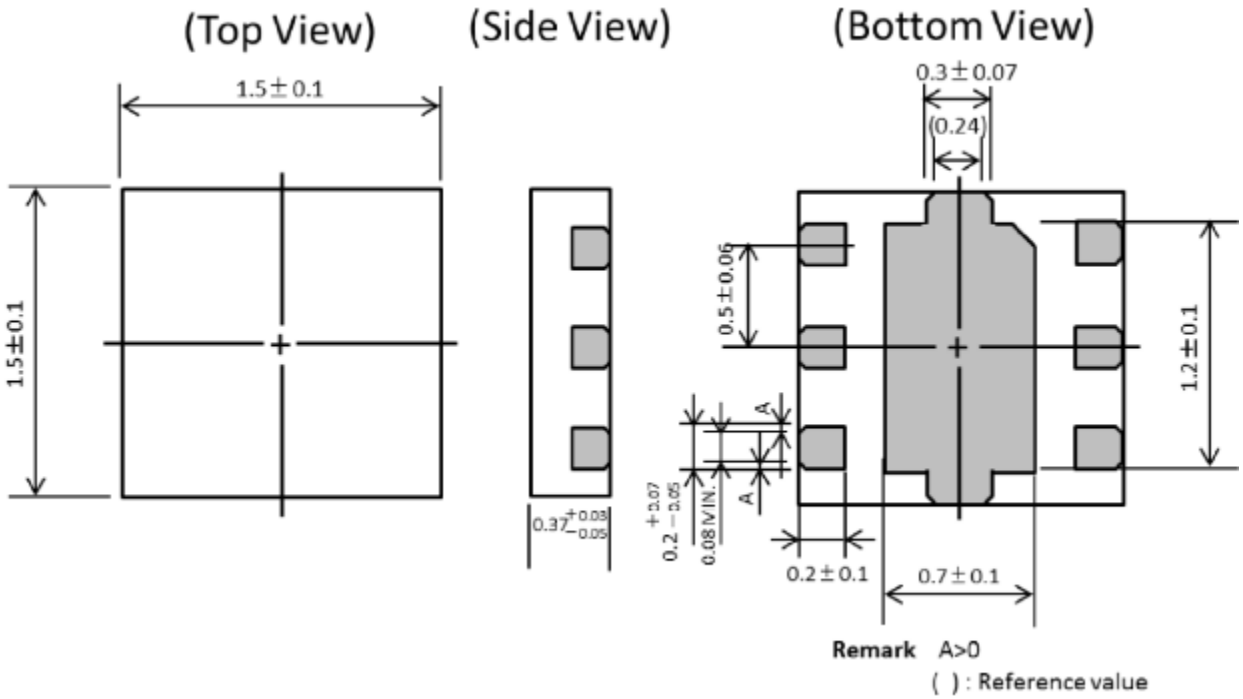


Note C0: 0.05 to 0.5 GHz 1,000pF
: 0.4 to 2.0 GHz 56pF
: 2.0 to 6.0 GHz 8pF

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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- Do not chemically make gas or powder with this product.
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