

## 0.1 to 6.0GHz SP3T Switch

### DESCRIPTION

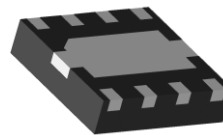
- The CG2430X1 is a pHEMT GaAs SP3T (Single Pole Three Throw) switch. This device can operate from 0.1GHz to 6.0GHz, having low insertion loss and high isolation.

### 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>ins</sub> = 0.50 dB TYP. @ f = 2.0 to 2.5 GHz  
L<sub>ins</sub> = 0.60 dB TYP. @ f = 4.9 to 6.0 GHz
- High Isolation :  
ISL = 28 dB TYP. @ f = 2.0 to 2.5 GHz  
ISL = 25 dB TYP. @ f = 4.9 to 6.0 GHz
- Power handling :  
P<sub>in(1dB)</sub> = +31.0 dBm TYP.  
@ VC(H) = 3.0 V, VC(L) = 0 V

### PACKAGE

- 8-pin Thin SON (X1) Package  
(1.5mm x 1.5mm x 0.37mm)



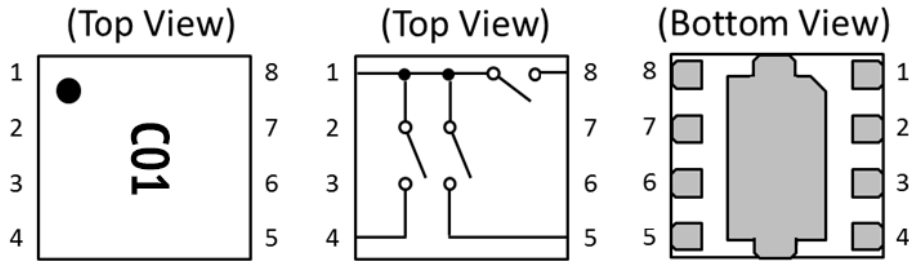
### APPLICATIONS

- Wireless LAN (IEEE 802.11 a/b/g/n/ac)

### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Description
CG2430X1	CG2430X1-C2	8-pin plastic TSON (Pb-Free)	C01	<ul style="list-style-type: none"> <li>Embossed tape 8 mm wide</li> <li>Pin 1, 8 face the perforation side of the tape</li> <li>MOQ 10 kpcs/reel</li> </ul>
CG2430X1-EVAL	CG2430X1-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	RFC
2	GND
3	VC1
4	RF1
5	RF2
6	VC2
7	VC3
8	RF3

Remark Exposed pad : GND

## TRUTH TABLE

VC1	VC2	VC3	RFC-RF1	RFC-RF2	RFC-RF3
High	Low	Low	ON	OFF	OFF
Low	High	Low	OFF	ON	OFF
Low	Low	High	OFF	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	P <sub>in</sub>	+32.0 <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.  $3.0V \leq |VC1 - VC2| \leq 5.0V$

## RECOMMENDED OPERATING RANGE

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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f	0.1	-	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	Path	Condition	MIN.	TYP.	MAX.	Unit
Insertion Loss	L <sub>INS</sub>	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	-	0.40	0.55	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	-	0.40	0.55	dB
			f=2.0GHz to 2.5GHz	-	0.50	0.65	dB
			f=2.5GHz to 4.9GHz	-	0.55	0.70	dB
			f=4.9GHz to 6.0GHz	-	0.60	0.80	dB
Isolation	ISL	RFC to RF1, 2, 3 (OFF)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	30	33	-	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	27	30	-	dB
			f=2.0GHz to 2.5GHz	25	28	-	dB
			f=2.5GHz to 4.9GHz	23	28	-	dB
			f=4.9GHz to 6.0GHz	20	25	-	dB
Return Loss	RL	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	15	20	-	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	15	20	-	dB
			f=2.0GHz to 2.5GHz	15	20	-	dB
			f=2.5GHz to 4.9GHz	15	20	-	dB
			f=4.9GHz to 6.0GHz	15	20	-	dB
0.1dB Loss Compression Input Power <b>Note 2</b>	P <sub>in(-0.1dB)</sub>	RFC to RF1, 2, 3	f=2.5GHz	+25.0	+28.0	-	dBm
			f=6.0GHz	+25.0	+28.0	-	dBm
1dB Loss Compression Input Power <b>Note 3</b>	P <sub>in(-1dB)</sub>	RFC to RF1, 2, 3	f=2.5GHz	+28.0	+31.0	-	dBm
			f=6.0GHz	+28.0	+31.0	-	dBm
3rd Order Input Intercept Point	IIP <sub>3</sub>		f=2.5GHz, 2-tone 5MHz Spacing	-	+55	-	dBm
2nd Harmonics	2f <sub>0</sub>		f=2.5GHz, P <sub>in</sub> =+22dBm	-	75	-	dBc
3rd Harmonics	3f <sub>0</sub>		f=2.5GHz, P <sub>in</sub> =+22dBm	-	70	-	dBc
Error Vector Magnitude	EVM		802.11a, 64QAM, 54Mbps, P <sub>in</sub> ≤+24dBm	-	2.5	-	%
			802.11g, 64QAM, 54Mbps, P <sub>in</sub> ≤+25dBm	-	2.5	-	%
Switching Speed	t <sub>SW</sub>		f=1.0GHz	-	80	-	ns
Switch Control Current	I <sub>CONT</sub>		RF none	-	2	10	uA

**Note** 1. DC block capacitance = 330pF at f=0.1 to 2.0GHz

2. 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.

3. P<sub>in(1dB)</sub> is the measured input power level when the insertion loss increases 1dB more than that of the linear range.

## ELECTRICAL CHARACTERISTICS 2

(TA=+25°C, VC(H)=1.8V, VC(L)=0V, Zo=50Ω, DC Block Capacitance=8pF, unless otherwise specified)

Parameter	Symbol	Path	Condition	MIN.	TYP.	MAX.	Unit
Insertion Loss	L <sub>INS</sub>	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	---	0.40	0.55	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	---	0.40	0.55	dB
			f=2.0GHz to 2.5GHz	---	0.50	0.65	dB
			f=2.5GHz to 4.9GHz	---	0.55	0.70	dB
			f=4.9GHz to 6.0GHz	---	0.60	0.80	dB
Isolation	ISL	RFC to RF1, 2, 3 (OFF)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	30	33	---	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	27	30	---	dB
			f=2.0GHz to 2.5GHz	25	28	---	dB
			f=2.5GHz to 4.9GHz	23	28	---	dB
			f=4.9GHz to 6.0GHz	20	25	---	dB
Return Loss	RL	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz <sup>Note 1</sup>	15	20	---	dB
			f=1.0GHz to 2.0GHz <sup>Note 1</sup>	15	20	---	dB
			f=2.0GHz to 2.5GHz	15	20	---	dB
			f=2.5GHz to 4.9GHz	15	20	---	dB
			f=4.9GHz to 6.0GHz	15	20	---	dB
0.1dB Loss Compression Input Power <b>Note 2</b>	P <sub>in(-0.1dB)</sub>	RFC to RF1, 2, 3	f=2.5GHz	+19.0	+22.0	---	dBm
			f=6.0GHz	+18.0	+21.0	---	dBm
1dB Loss Compression Input Power <b>Note 3</b>	P <sub>in(-1dB)</sub>	RFC to RF1, 2, 3	f=2.5GHz	+22.0	+25.0	---	dBm
			f=6.0GHz	+21.0	+24.0	---	dBm
3rd Order Input Intercept Point	IIP <sub>3</sub>		f=2.5GHz, 2-tone 5MHz Spacing	---	+47	---	dBm
2nd Harmonics	2f <sub>0</sub>		f=2.5GHz, P <sub>in</sub> =+22dBm	---	75	---	dBc
3rd Harmonics	3f <sub>0</sub>		f=2.5GHz, P <sub>in</sub> =+22dBm	---	60	---	dBc
Switching Speed	t <sub>SW</sub>		f=1.0GHz	---	150	---	ns
Switch Control Current	I <sub>CONT</sub>		RF none	---	2	10	uA

**Note** 1. DC block capacitance = 330pF at f=0.1 to 2.0GHz

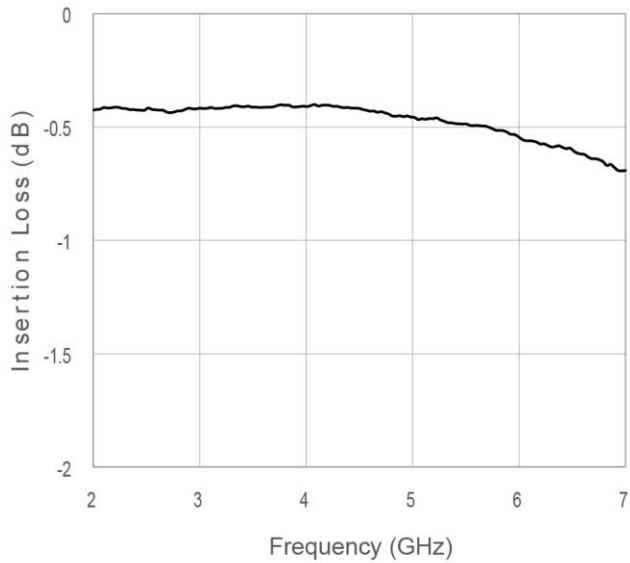
2. P<sub>in(0.1dB)</sub> is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

3. P<sub>in(1dB)</sub> is the measured input power level when the insertion loss increases 1dB more than that of the linear range.

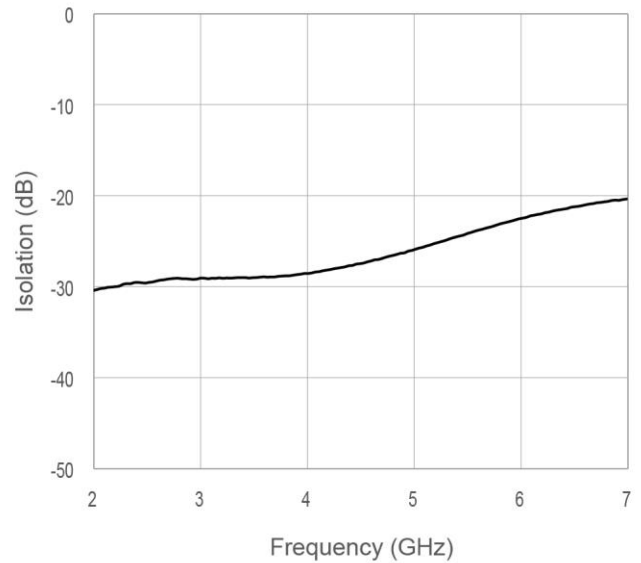
## TYPICAL CHARACTERISTICS

(VC(H)=3V, VC(L)=0V, T<sub>A</sub> = +25°C, DC Block Capacitance=8pF, through board loss is subtracted in insertion loss data)

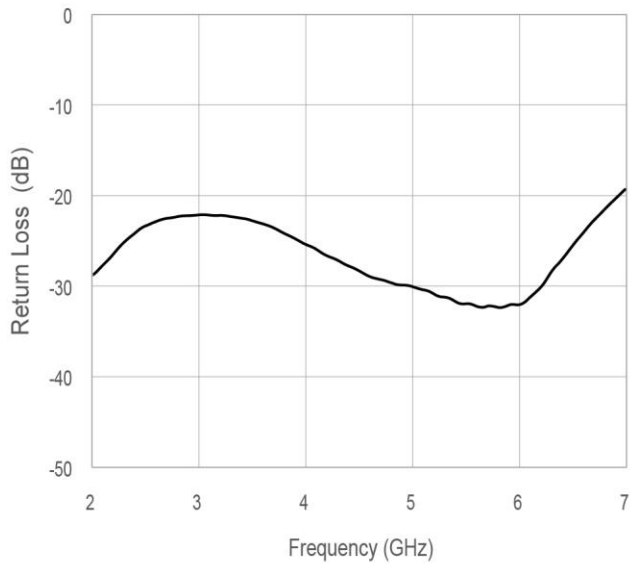
**Typical Insertion Loss vs. Frequency**



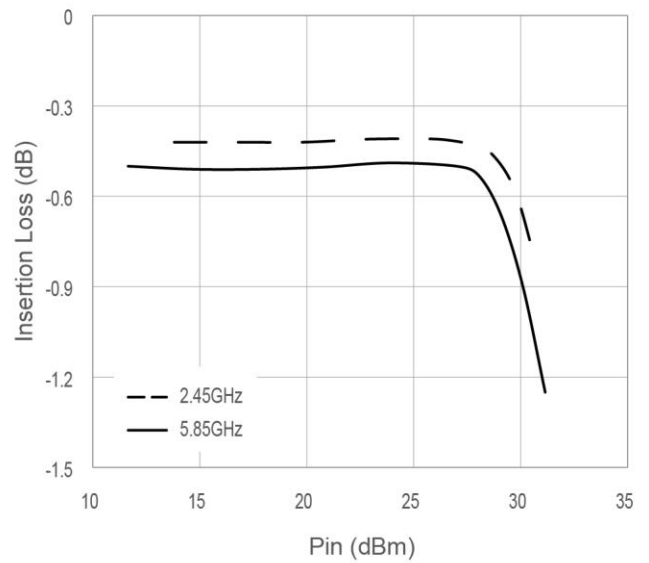
**Typical Isolation vs. Frequency**



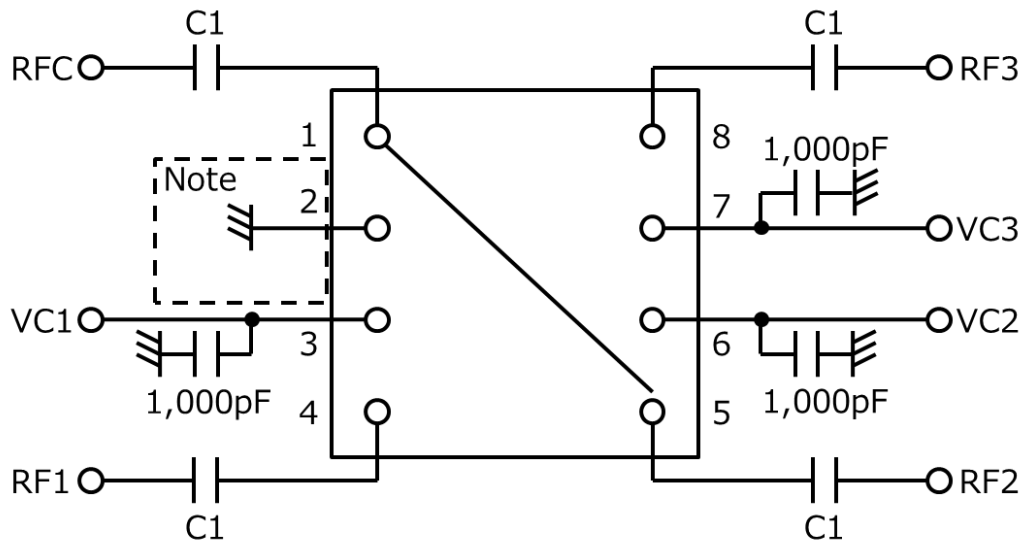
**Typical Return Loss vs. Frequency**



**Typical Insertion Loss vs. Input Power**



## EVALUATION CIRCUIT



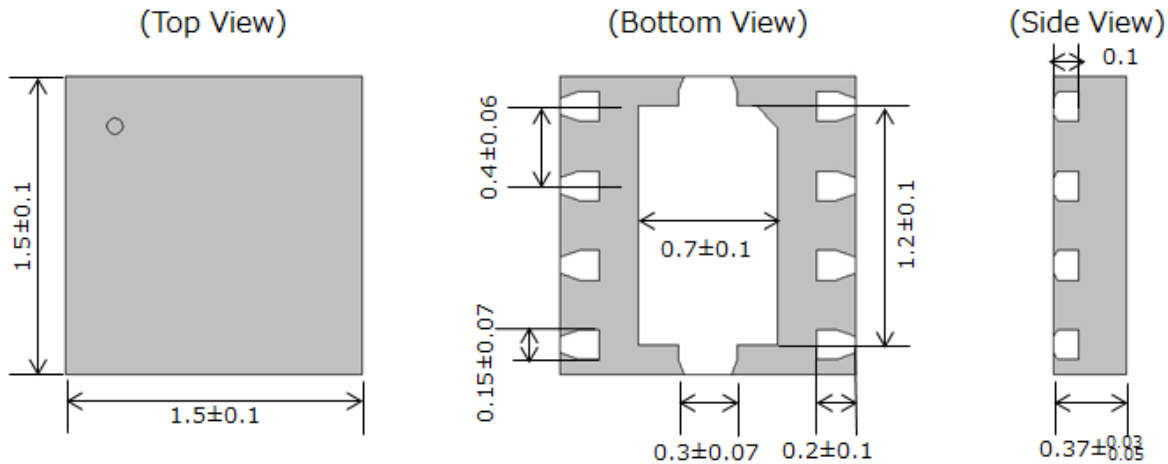
Note: It is recommended to connect the pin directly to ground, or leave unconnected.

**Remarks** C1 : 0.1 to 2.0 GHz 330pF  
 ; 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

8-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-0010-03 (Issue A) February 17, 2016	Initial datasheet	N/A
CDS-0010-03 (Issue B) March 23, 2016	Added Eval Board ordering information. Updated Marking information.	1,2
CDS-0010-04 (Issue C) April 20, 2016	Revised package dimensions (Added tolerance spec and Pin thickness)	5
CDS-0010-04 (Issue D) August 11, 2016	Removed "Preliminary"	All
CDS-0010-04 (Issue E) January 11, 2017	Added "Recommended Soldering Conditions" section	6
CDS-0010-06 (Issue F) September 13, 2017	Updated Applications section Added Error Vector Magnitude to Electrical Characteristics table 1 Added "Typical Characteristics" graphs section	1, 3, 5



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