RF SWITCH

CG2430X1

0.1 to 6.0GHz SP3T Switch

DESCRIPTION

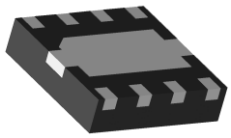
- The CG2430X1 is a pHEMT GaAs SP3T (Single Pole Three Throw) switch. This device can operate from 0.1GHz to 6.0GHz, having low insertion loss and high isolation.

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_{ins} = 0.50 dB TYP. @ f = 2.0 to 2.5 GHz
  L_{ins} = 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 :
  $P_{in(1dB)}$ = +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)



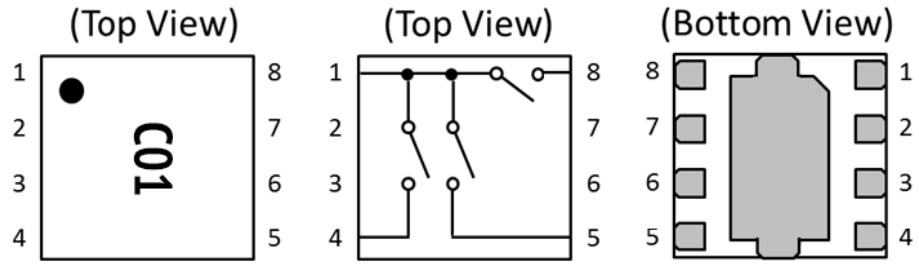
APPLICATIONS

- 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	• Embossed tape 8 mm wide • Pin 1, 8 face the perforation side of the tape • MOQ 10 kpcs/reel
CG2430X1-EVAL	CG2430X1-EVAL			• Evaluation Board with DC block capacitors, power supply bypass capacitors, and RF and DC connectors • MOQ 1

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

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

Parameter	Symbol	Rating	Unit
Control Voltage	VC	6.0 Note 1	V
Input Power	P_{in}	+32.0 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

RECOMMENDED OPERATING RANGE

(T_A = +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

(T_A=+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_{INS}	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz Note 1	-	0.40	0.55	dB
			f=1.0GHz to 2.0GHz Note 1	-	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 Note 1	30	33		dB
			f=1.0GHz to 2.0GHz Note 1	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 Note 1	15	20	-	dB
			f=1.0GHz to 2.0GHz Note 1	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 **Note 2**	$P_{in(-0.1dB)}$	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 **Note 3**	$P_{in(-1dB)}$	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_3		f=2.5GHz, 2-tone 5MHz Spacing	-	+55	-	dBm
2nd Harmonics	2f0		f=2.5GHz, P_{in}=+22dBm	-	75	-	dBc
3rd Harmonics	3f0		f=2.5GHz, P_{in}=+22dBm	-	70	-	dBc
Error Vector Magnitude	EVM		802.11a, 64QAM, 54Mbps, Pin≦+24dBm	-	2.5	-	%
			802.11g, 64QAM, 54Mbps, Pin≦+25dBm	-	2.5	-	%
Switching Speed	t_{SW}		f=1.0GHz	-	80	-	ns
Switch Control Current	I_{CONT}		RF none	-	2	10	uA

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

2. $P_{in(0.1dB)}$ is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

3. $P_{in(1dB)}$ is the measured input power level when the insertion loss increases 1dB more than that of the linear range.

ELECTRICAL CHARACTERISTICS 2

(T_A=+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_{INS}	RFC to RF1, 2, 3 (ON)	f=0.1GHz to 1.0GHz Note 1	---	0.40	0.55	dB
			f=1.0GHz to 2.0GHz Note 1	---	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 Note 1	30	33	---	dB
			f=1.0GHz to 2.0GHz Note 1	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 Note 1	15	20	---	dB
			f=1.0GHz to 2.0GHz Note 1	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 **Note 2**	$P_{in(-0.1dB)}$	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 **Note 3**	$P_{in(-1dB)}$	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_3		f=2.5GHz, 2-tone 5MHz Spacing	---	+47	---	dBm
2nd Harmonics	2f0		f=2.5GHz, P_{in}=+22dBm	---	75	---	dBc
3rd Harmonics	3f0		f=2.5GHz, P_{in}=+22dBm	---	60	---	dBc
Switching Speed	t_{SW}		f=1.0GHz	---	150	---	ns
Switch Control Current	I_{CONT}		RF none	---	2	10	uA

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

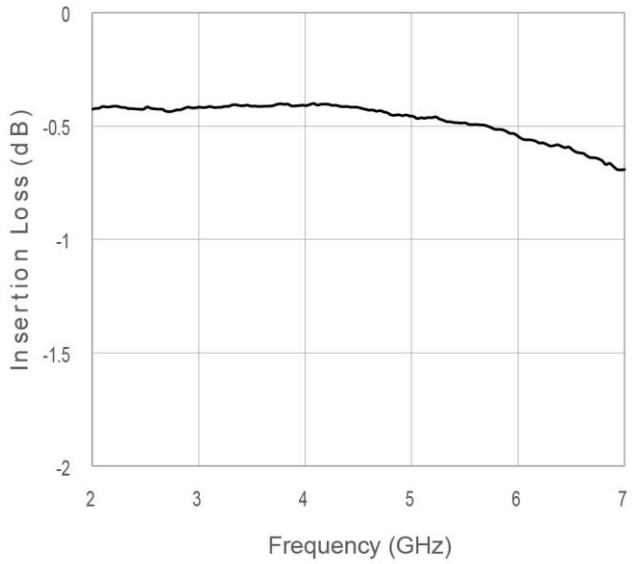
2. $P_{in(0.1dB)}$ is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

3. $P_{in(1dB)}$ is the measured input power level when the insertion loss increases 1dB more than that of the linear range.

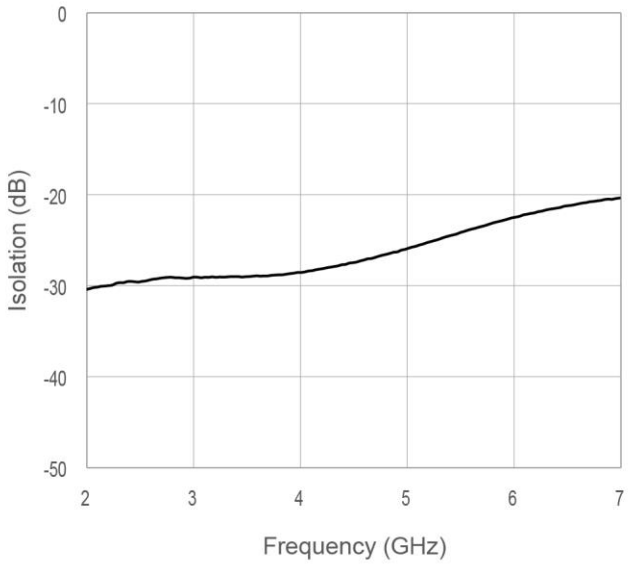
TYPICAL CHARACTERISTICS

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

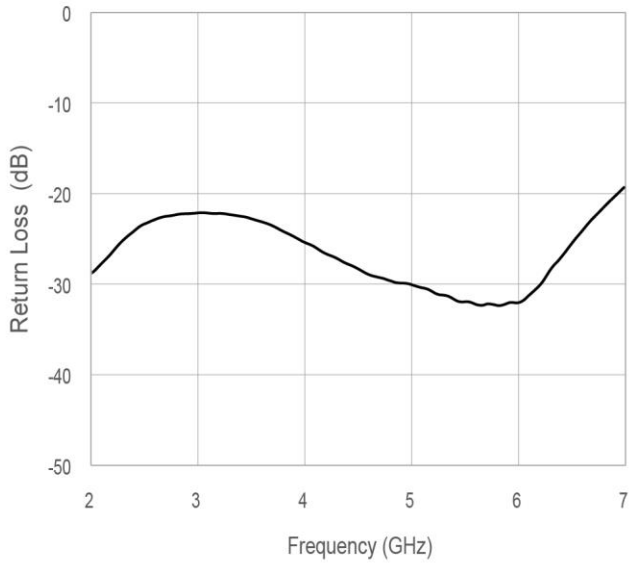
Typical Insertion Loss vs. Frequency



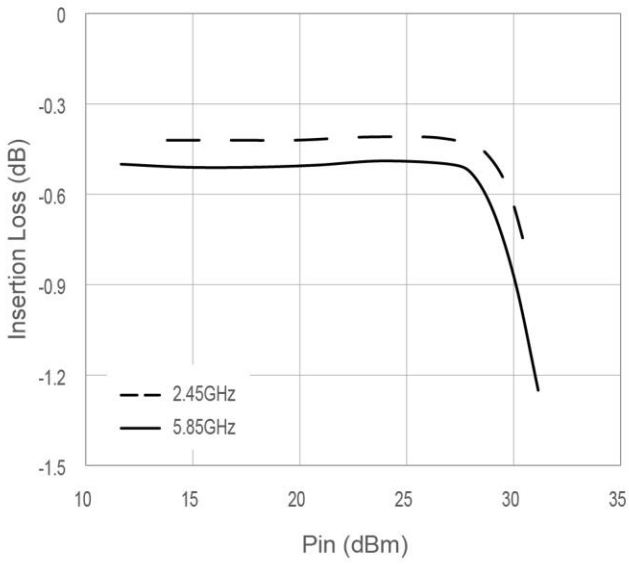
Typical Isolation vs. Frequency



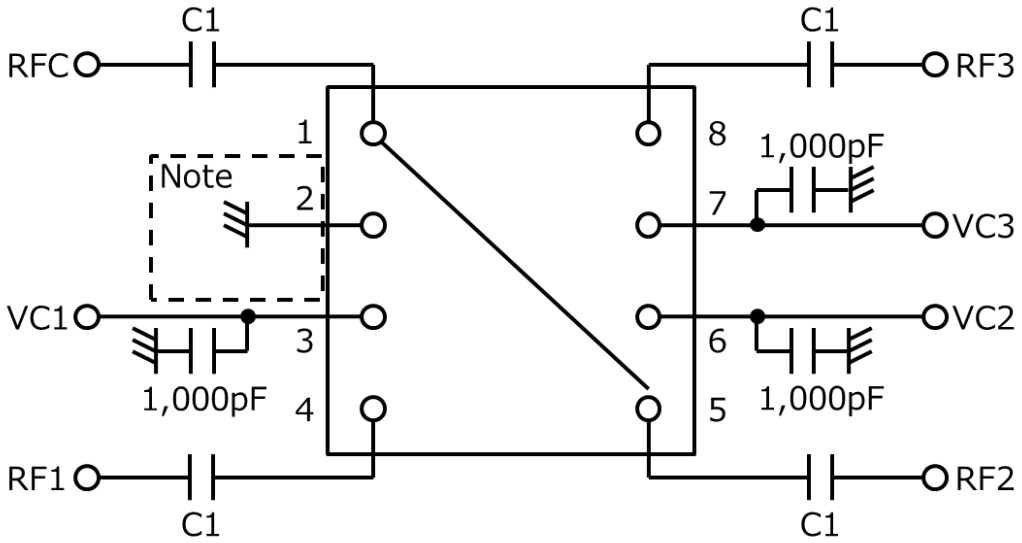
Typical Return Loss vs. Frequency



Typical Insertion Loss vs. Input Power



EVALUATION CIRCUIT



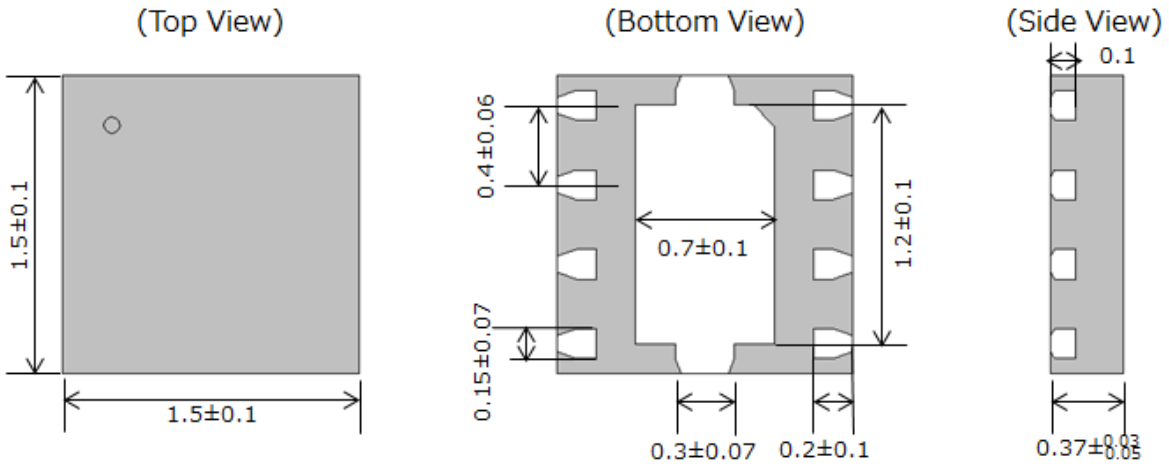
Note: It is recommended to connect the pin directly to ground, or leave unconnected.

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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