

## 6GHz Medium Power SPDT Switch

### DESCRIPTION

- The CG2185X2 is a pHEMT GaAs FET SPDT (Single Pole Double Throw) Switch. This device can operate from 2.0GHz to 6.0GHz, with 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>ins1</sub> = 0.35 dB TYP. @ f = 2.0 to 2.5 GHz  
L<sub>ins2</sub> = 0.40 dB TYP. @ f = 4.9 to 6.0 GHz
- High isolation :  
ISL1 = 28 dB TYP. @ f = 2.0 to 2.5 GHz  
ISL2 = 26 dB TYP. @ f = 4.9 to 6.0 GHz
- Power handling :  
P<sub>in(1dB)</sub> = +32 dBm TYP.  
@ VC(H) = 3.0 V, VC(L) = 0 V

### PACKAGE

- 6-pin plastic Thin Small SON (X2) Package (1.0mm x 1.0mm x 0.37mm)



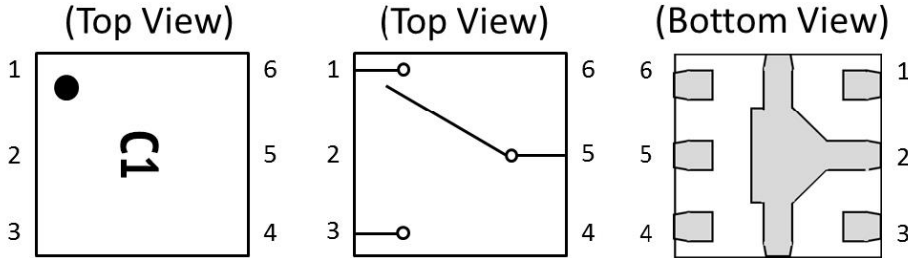
### APPLICATIONS

- Wireless LAN (IEEE802.11 a/b/g/n/ac)
- ISM band radios

### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Description
CG2185X2	CG2185X2-C2	6-pin plastic TSSON (XS02) (Pb-Free)	C1	<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>
CG2185X2-EVAL	CG2185X2-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	OFF	ON
Low	High	ON	OFF

## 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>	+33 <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	2.0	-	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

(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 = 2.0 to 2.5 GHz	-	0.35	0.55	dB
	Lins2	f = 4.9 to 6.0 GHz	-	0.40	0.60	dB
Isolation	ISL1	f = 2.0 to 2.5 GHz	25	28	-	dB
	ISL2	f = 4.9 to 6.0 GHz	23	26	-	dB
Input Return Loss	RL <sub>in1</sub>	f = 2.0 to 2.5 GHz	23	26	-	dB
	RL <sub>in2</sub>	f = 4.9 to 6.0 GHz	15	18	-	dB
Output Return Loss	RL <sub>out1</sub>	f = 2.0 to 2.5 GHz	21	24	-	dB
	RL <sub>out2</sub>	f = 4.9 to 6.0 GHz	15	18	-	dB
0.1 dB Loss Compression Input Power <b>Note 1</b>	P <sub>in(0.1 dB)</sub>	f = 2.5 GHz, VC(H)=1.8V, VC(L)=0V	+20	+23	-	dBm
		f = 2.5 GHz, VC(H)=3.0V, VC(L)=0V	+26	+29	-	dBm
		f = 6.0 GHz, VC(H)=1.8V, VC(L)=0V	+19	+22	-	dBm
		f = 6.0 GHz VC(H)=3.0V, VC(L)=0V	+26	+29	-	dBm
1 dB Loss Compression Input Power <b>Note 2</b>	P <sub>in(1 dB)</sub>	f = 2.5 GHz, VC(H)=1.8V, VC(L)=0V	+24	+27	-	dBm
		f = 2.5 GHz, VC(H)=3.0V, VC(L)=0V	+29	+32	-	dBm
		f = 6.0 GHz, VC(H)=1.8V, VC(L)=0V	+22	+25	-	dBm
		f = 6.0 GHz VC(H)=3.0V, VC(L)=0V	+29	+32	-	dBm
3rd Order Input Intercept Point	IIP3	f = 2.5GHz 2-tone 5MHz Spacing	-	+55	-	dBm
Error Vector Magnitude	EVM	802.11a, 64QAM, 54Mbps, Pin≤+24.5dBm	-	2.5	-	%
		802.11g, 64QAM, 54Mbps, Pin≤+25.5dBm	-	2.5	-	%
Switching Speed	t <sub>sw</sub>	50% CTL to 90/10%	-	50	150	ns
Switch Control Current	I <sub>cont</sub>	RF None	-	2	10	μA

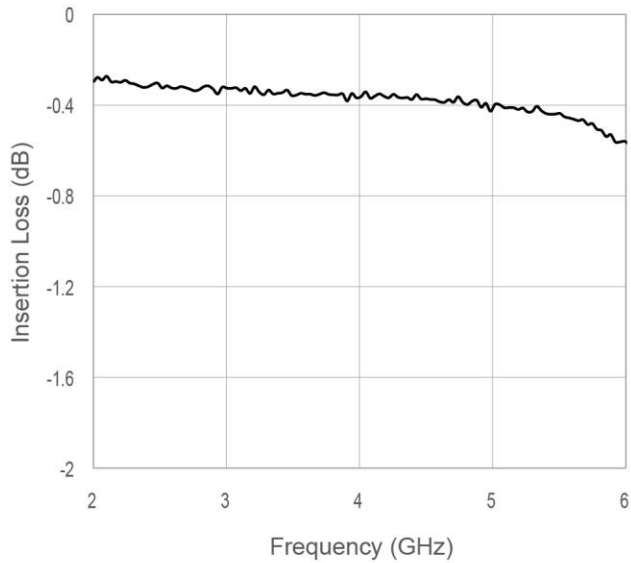
**Note 1.** P<sub>in(0.1dB)</sub> is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

**Note 2.** P<sub>in(1dB)</sub> is the measured input power level when the insertion loss increases 1dB more than that of the linear range.

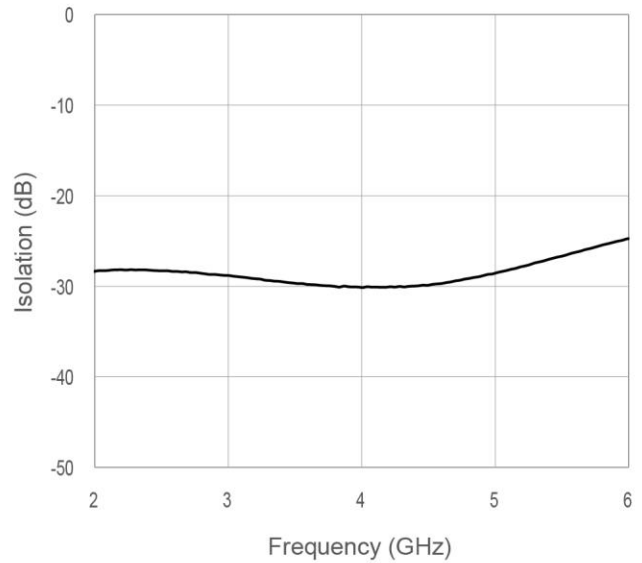
## TYPICAL CHARACTERISTICS

(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)

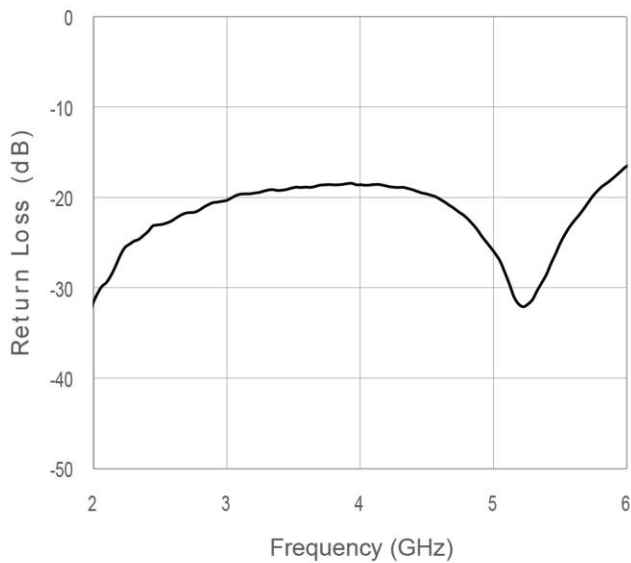
**Typical Insertion Loss vs. Frequency**



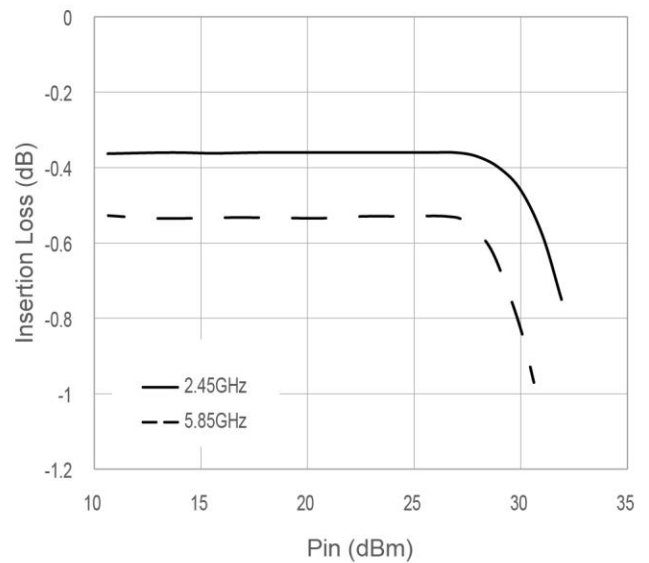
**Typical Isolation vs. Frequency**



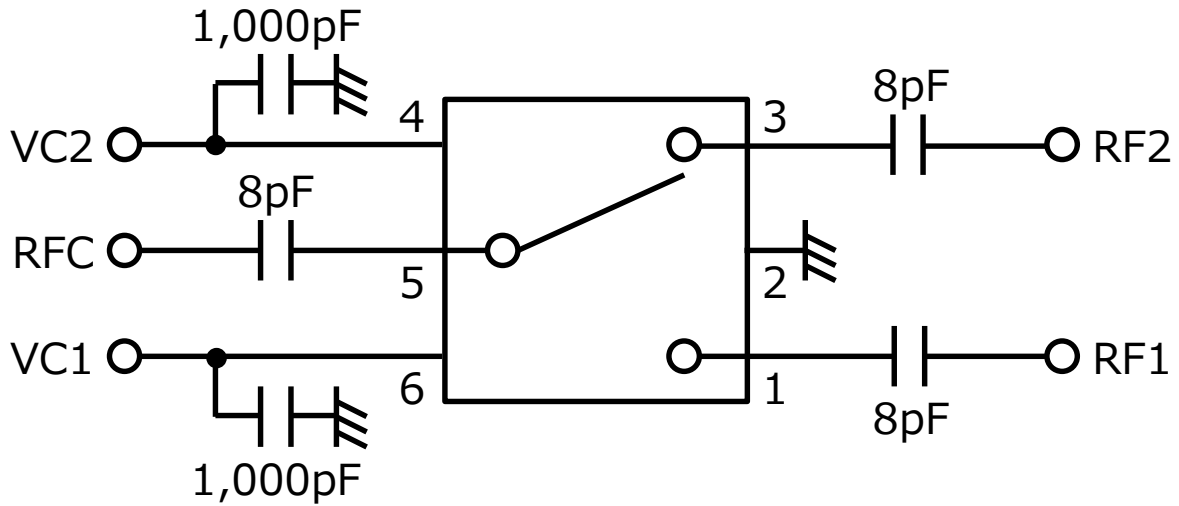
**Typical Return Loss vs. Frequency**



**Typical Insertion Loss vs. Input Power**



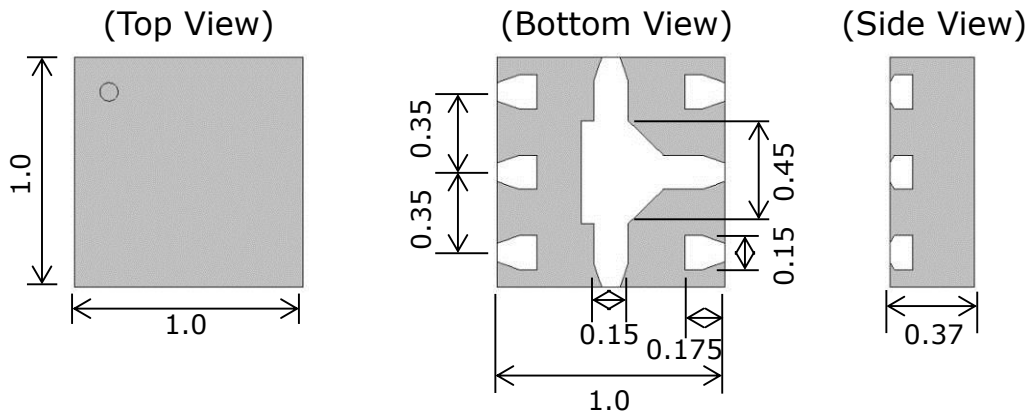
### EVALUATION CIRCUIT



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 TSSON (XS02) (Unit: mm)



## RECOMMENDED SOLDERING CONDITIONS

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

## REVISION HISTORY

Version	Change to current version	Page(s)
CDS-0004-02 (Issue A) February 17, 2016	Initial datasheet	N/A
CDS-0004-02 (Issue B) March 24, 2016	Added Eval Board ordering information. Updated Marking information.	Page 1,2
CDS-0004-02 (Issue C) August 11, 2016	Removed "preliminary"	All
CDS-0004-02 (Issue D) January 11, 2017	Added "Recommended Soldering Conditions" section	5
CDS-0004-03 (Issue E) June 21, 2017	Added Error Vector Magnitude parameter to Electrical Characteristics table	3
CDS-0004-04 (Issue F) August 29, 2017	Updated Applications section Added "Typical Characteristics" graph section	1, 4

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- Do not chemically make gas or powder with this product.
- When discarding this product, please obey the laws of your country.
- Do not lick the product or in any way allow it to enter the mouth.

[CAUTION]

Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

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