

## L, S-band Medium Power SPDT Switch

### DESCRIPTION

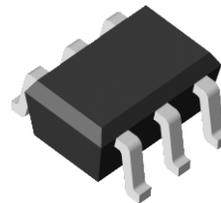
- The CG2179M2 is a pHEMT GaAs SPDT (Single Pole Double Throw) switch. This device can operate from 0.05 GHz to 3.0GHz, having low insertion loss and high isolation.

### FEATURES

- Control voltage :  
VC(H) = 1.8 to 5.3 V (3.0 V TYP.)  
VC(L) = -0.2 to 0.2 V (0 V TYP.)
- Low insertion loss :  
L<sub>ins1</sub> = 0.30 dB TYP. @ f = 0.05 to 0.5 GHz  
L<sub>ins2</sub> = 0.30 dB TYP. @ f = 0.5 to 1.0 GHz  
L<sub>ins3</sub> = 0.40 dB TYP. @ f = 1.0 to 2.0 GHz  
L<sub>ins4</sub> = 0.45 dB TYP. @ f = 2.0 to 2.5 GHz  
L<sub>ins5</sub> = 0.45 dB TYP. @ f = 2.5 to 3.0 GHz
- High isolation :  
ISL1 = 39 dB TYP. @ f = 0.05 to 0.5 GHz  
ISL2 = 33 dB TYP. @ f = 0.5 to 1.0 GHz  
ISL3 = 27 dB TYP. @ f = 1.0 to 2.0 GHz  
ISL4 = 26 dB TYP. @ f = 2.0 to 2.5 GHz  
ISL5 = 23 dB TYP. @ f = 2.5 to 3.0 GHz
- Power handling :  
P<sub>in(0.5dB)</sub> = +32 dBm TYP. @ f = 3.0 GHz,  
VC(H) = 3.0 V, VC(L) = 0 V

### PACKAGE

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



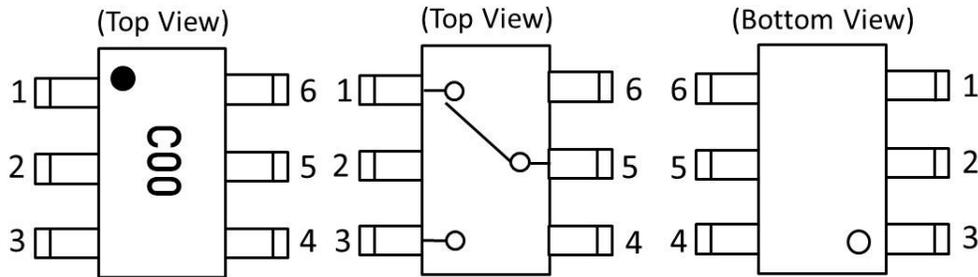
### APPLICATIONS

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

### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Description
CG2179M2	CG2179M2-C4	6-pin mini mold package (Pb-Free)	C00	<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>
CG2179M2-EVAL	CG2179M2-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
Low	High	ON	OFF
High	Low	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>in1</sub>	+33 <sup>Note 2</sup>	dBm
	P <sub>in2</sub>	+29 <sup>Note 3</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.  $3.0V \leq |VC1 - VC2| \leq 5.0V, 0.4GHz \leq f$
  3.  $3.0V \leq |VC1 - VC2| \leq 5.0V, 0.05GHz \leq f \leq 0.4GHz$

## RECOMMENDED OPERATING RANGE

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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f	0.05	-	3.0	GHz
Switch Control Voltage (H)	VC(H)	+1.8	+3.0	+5.3	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 = 56pF, unless otherwise specified)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Insertion Loss	L <sub>INS1</sub>	f=0.05 to 0.5GHz <sup>Note 1</sup>	-	0.30	0.50	dB
	L <sub>INS2</sub>	f=0.5 to 1.0GHz	-	0.30	0.50	dB
	L <sub>INS3</sub>	f=1.0 to 2.0GHz	-	0.40	0.60	dB
	L <sub>INS4</sub>	f=2.0 to 2.5GHz	-	0.45	0.65	dB
	L <sub>INS5</sub>	f=2.5 to 3.0GHz	-	0.45	0.65	dB
Isolation	ISL1	f=0.05 to 0.5GHz <sup>Note 1</sup>	36	39	-	dB
	ISL2	f=0.5 to 1.0GHz	30	33	-	dB
	ISL3	f=1.0 to 2.0GHz	23	27	-	dB
	ISL4	f=2.0 to 2.5GHz	22	26	-	dB
	ISL5	f=2.5 to 3.0GHz	21	24	-	dB
Return Loss	RL	f=0.05 to 3.0GHz <sup>Note 1</sup>	15	20	-	dB
0.1dB Loss Compression Input Power <b>Note 2</b>	P <sub>in(0.1dB)</sub>	f=0.05~0.5GHz <sup>Note 1</sup>	-	+26	-	dBm
		f=0.5~3.0GHz	-	+30	-	dBm
0.5dB Loss Compression Input Power <b>Note 3</b>	P <sub>in(0.5dB)</sub>	f=0.05~0.5GHz <sup>Note 1</sup>	-	+28.5	-	dBm
		f=0.5~3.0GHz	-	+32	-	dBm
2nd Harmonics	2f <sub>0</sub>	f=3.0GHz, P <sub>in</sub> =+20dBm	-	-85	-	dBc
3rd Harmonics	3f <sub>0</sub>	f=3.0GHz, P <sub>in</sub> =+20dBm	-	-85	-	dBc
3rd Order Input Intercept Point	IIP <sub>3</sub>	f=2.5GHz, 2-tone 1MHz Spacing	-	+58	-	dBm
Error Vector Magnitude	EVM	802.11g, 64QAM, 54Mbps P <sub>in</sub> ≤ +25dBm	-	2.5	-	%
Switch Control Current	I <sub>CONT</sub>	RF none	-	1	10	uA
Switching Speed	t <sub>SW</sub>	50% CTL to 90/10% RF	-	50	-	ns

**Note 1.** DC block capacitance = 1000pF at f=0.05 to 0.5GHz

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(0.5dB)</sub> is the measured input power level when the insertion loss increases 0.5dB 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 = 56pF, unless otherwise specified)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Insertion Loss	L <sub>INS1</sub>	f=0.05 to 0.5GHz <sup>Note 1</sup>	-	0.30	0.50	dB
	L <sub>INS2</sub>	f=0.5 to 1.0GHz	-	0.30	0.50	dB
	L <sub>INS3</sub>	f=1.0 to 2.0GHz	-	0.40	0.60	dB
	L <sub>INS4</sub>	f=2.0 to 2.5GHz	-	0.45	0.65	dB
	L <sub>INS5</sub>	f=2.5 to 3.0GHz	-	0.45	0.65	dB
Isolation	ISL1	f=0.05 to 0.5GHz <sup>Note 1</sup>	36	39	-	dB
	ISL2	f=0.5 to 1.0GHz	30	33	-	dB
	ISL3	f=1.0 to 2.0GHz	23	27	-	dB
	ISL4	f=2.0 to 2.5GHz	22	26	-	dB
	ISL5	f=2.5 to 3.0GHz	21	24	-	dB
Return Loss	RL	f=0.05 to 3.0GHz <sup>Note 1</sup>	15	20	-	dB
0.1dB Loss Compression Input Power <b>Note 2</b>	P <sub>in(0.1dB)</sub>	f=0.05~0.5GHz <sup>Note 1</sup>	-	+19	-	dBm
		f=0.5~3.0GHz	-	+23	-	dBm
0.5dB Loss Compression Input Power <b>Note 3</b>	P <sub>in(0.5dB)</sub>	f=0.05~0.5GHz <sup>Note 1</sup>	-	+22	-	dBm
		f=0.5~3.0GHz	-	+26	-	dBm
Switch Control Current	I <sub>CONT</sub>	RF none	-	1	10	uA
Switching Speed	t <sub>SW</sub>	50% CTL to 90/10% RF	-	50	-	ns

**Note 1.** DC block capacitance = 1000pF at f=0.05 to 0.5GHz

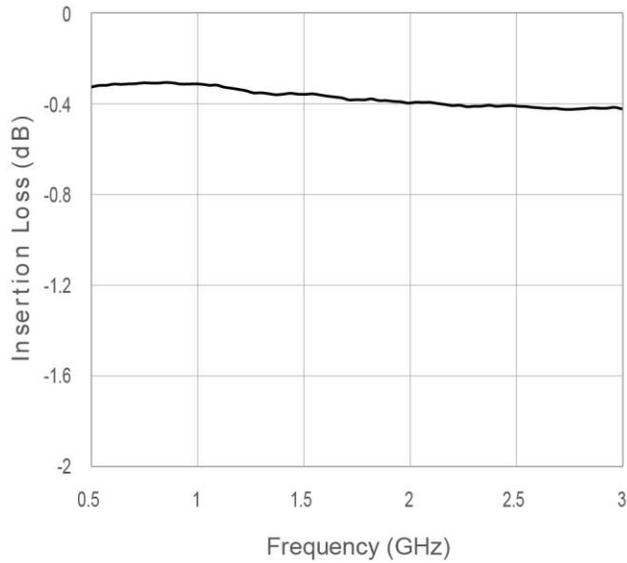
2. P<sub>in(0.1dB)</sub> is the measured input power level when the insertion loss increases 0.1dB more than that of the linear range.

3. P<sub>in(0.5dB)</sub> is the measured input power level when the insertion loss increases 0.5dB more than that of the linear range

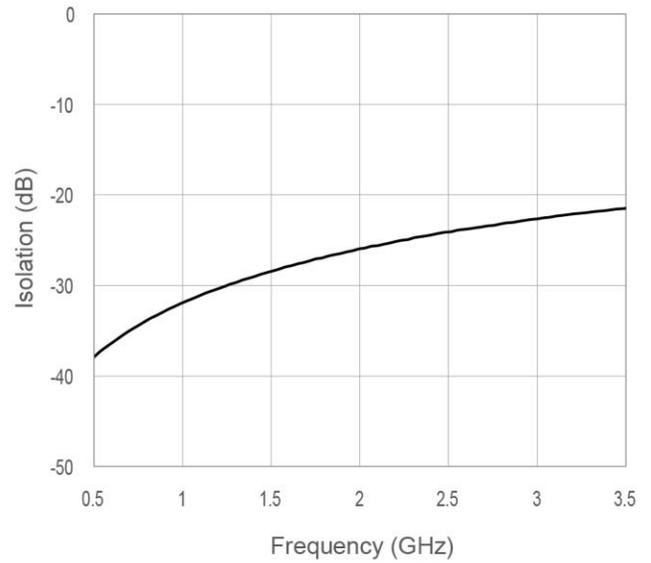
## TYPICAL CHARACTERISTICS

(Vc(H)=3V, Vc(L)=0V, TA= +25°C, DC Block Capacitance=56pF, through board loss is subtracted in insertion loss data)

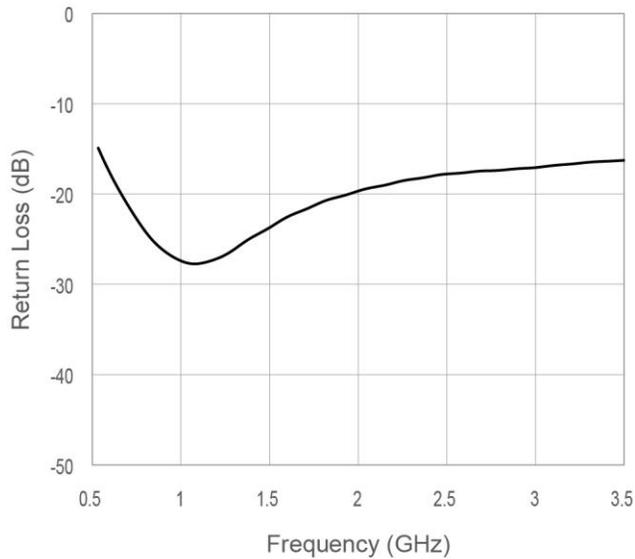
**Typical Insertion Loss vs. Frequency**



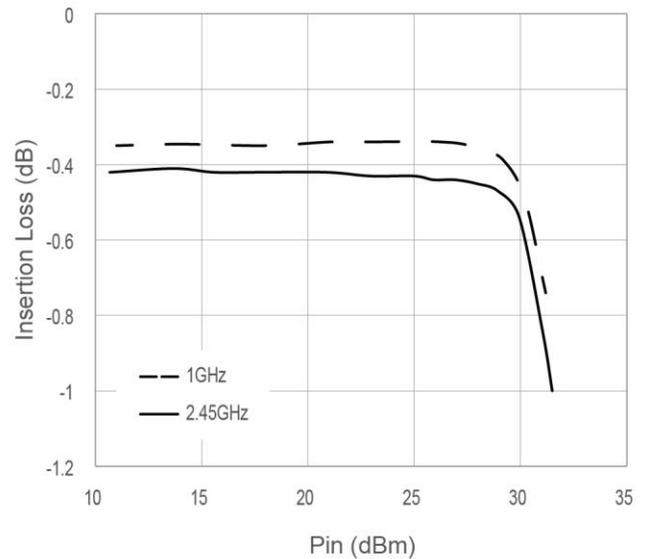
**Typical Isolation vs. Frequency**



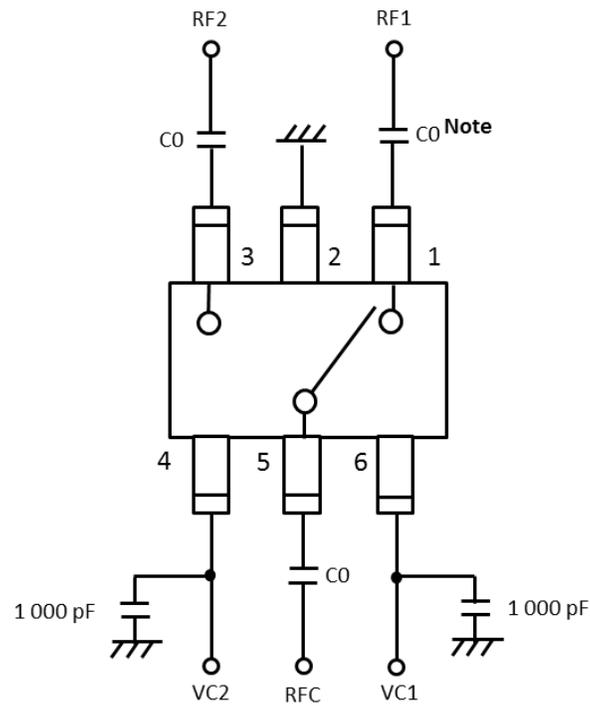
**Typical Return Loss vs. Frequency**



**Typical Insertion Loss vs. Input Power**



## EVALUATION CIRCUIT

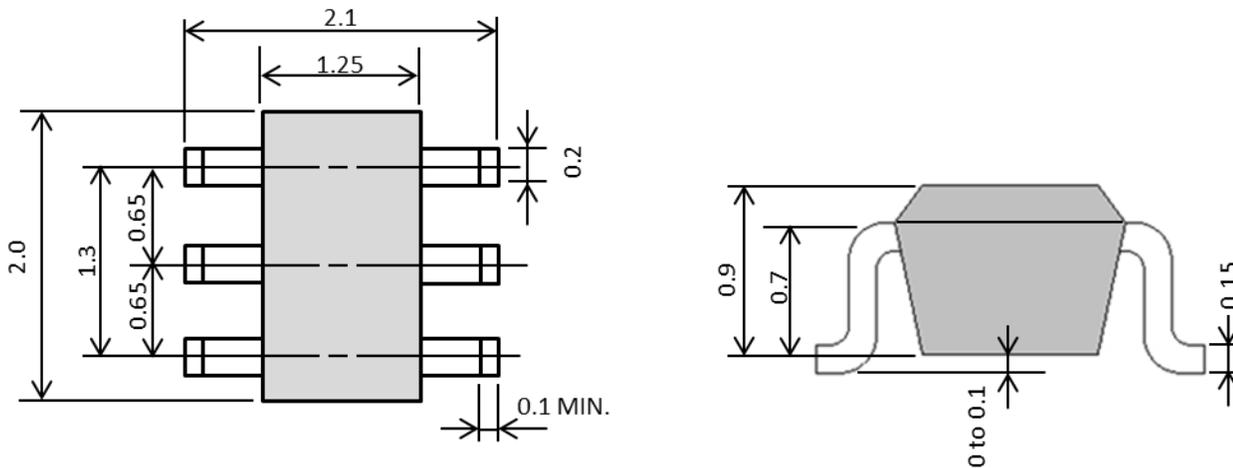


**Note** C0 : 0.05 to 0.5 GHz 1000pF  
: 0.4 to 3.0 GHz 56pF

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.

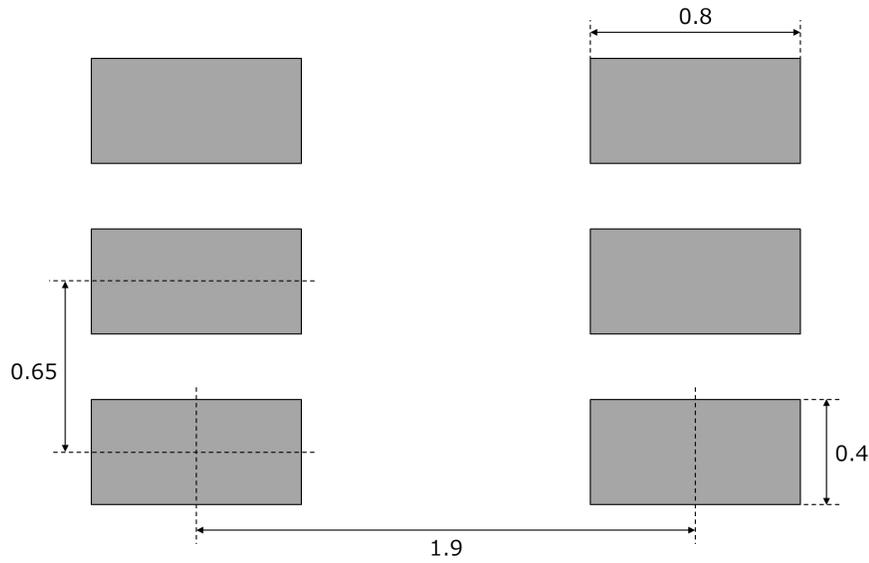
## PACKAGE DIMENSIONS

6-pin mini mold package (Unit: mm)



## PCB LAYOUT FOOTPRINT

6-pin mini mold (unit: mm)



The PCB Layout Footprint in this document is for reference only

## 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-0008-03 (Issue A) February 17, 2016	Initial datasheet	N/A
CDS-0008-03 (Issue B) March 24, 2016	Added Eval Board ordering information Updated Marking information	1, 2
CDS-0008-03 (Issue C) August 11, 2016	Removed "Preliminary"	All
CDS-0008-03 (Issue D) January 11, 2017	Revised Electrical Characteristics table Added "Recommended Soldering Conditions" section	3, 5
CDS-0008-03 (Issue E) May 24, 2017	Updated Evaluation Circuit output pinouts - switched RF1 and RF2	4
CDS-0008-04 (Issue F) June 13, 2017	Added power handling @0.05GHz to 0.5GHz Added absolute maximum rating @ $0.05\text{GHz} \leq f \leq 0.4\text{GHz}$ Revised recommended operating switch control voltage Updated Electrical Characteristics table and added a second Electrical characteristics table on page 4	1,2,3,4
CDS-0008-05 (Issue G) June 20, 2017	Added Error Vector Magnitude parameter to Electrical Characteristics table 1	3
CDS-0008-06 (Issue H) August 29, 2017	Updated Applications section Added "Typical Characteristics" graphs section	1, 5
CDS-0008-07 (Issue I) April 12, 2019	Added PCB Layout Footprint section	7

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- Do not lick the product or in any way allow it to enter the mouth.

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