

High Power SPDT RF Switch

DESCRIPTION

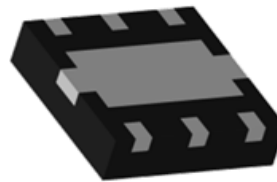
- The CG2409X3 is a GaAs MMIC high power SPDT (Single Pole Double Throw) switch which was designed for WiMAX and Wireless LAN applications

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

PACKAGE

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



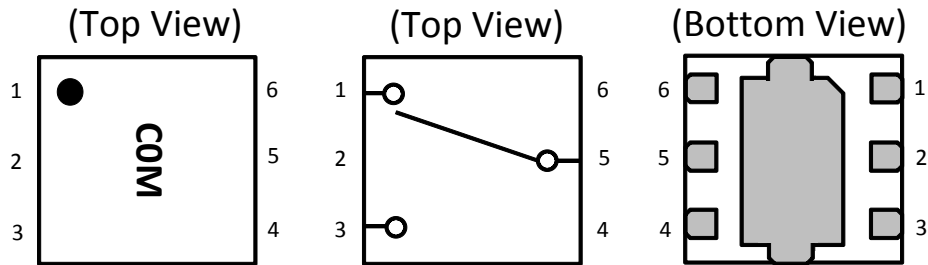
APPLICATIONS

- 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) | COM | <ul style="list-style-type: none"> Embossed tape 8 mm wide Pin 1, 6 face the perforation side of the tape MOQ 10 kpcs/reel |
| CG2409X3-EVAL | CG2409X3-EVAL | | | <ul style="list-style-type: none"> 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 | 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

(TA = +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. $|VC1 - VC2| \leq 6.0V$
 2. $3.0V \leq |VC1 - VC2| \leq 5.0V, 0.4GHz \leq f \leq 6.0GHz$

RECOMMENDED OPERATING RANGE

(TA = +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

(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 = 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 | 2f ₀ | f = 2.5 GHz, P _{in} =+26dBm | - | 80 | - | dBc |
| 3rd Harmonics | 3f ₀ | 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

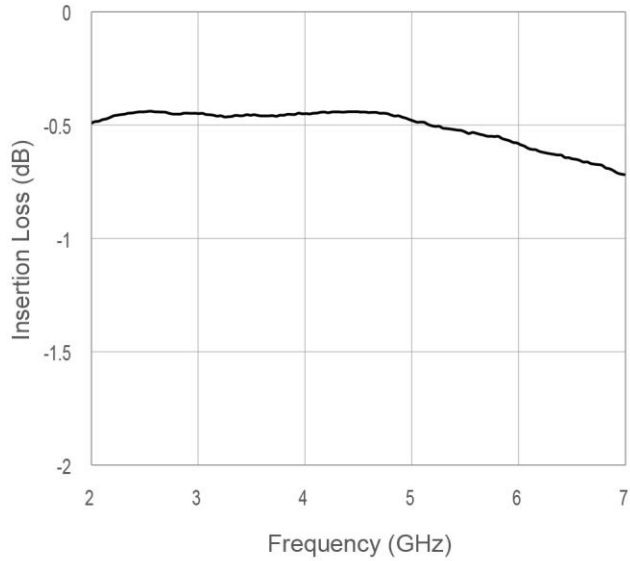
(TA=+25°C, VC(H)=3.0V, VC(L)=0V, Zo=50Ω, DC Block Capacitance=8pF, unless otherwise specified)

| | | | | | | |
|------------------------|-------|--|---|-----|---|----|
| 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 |

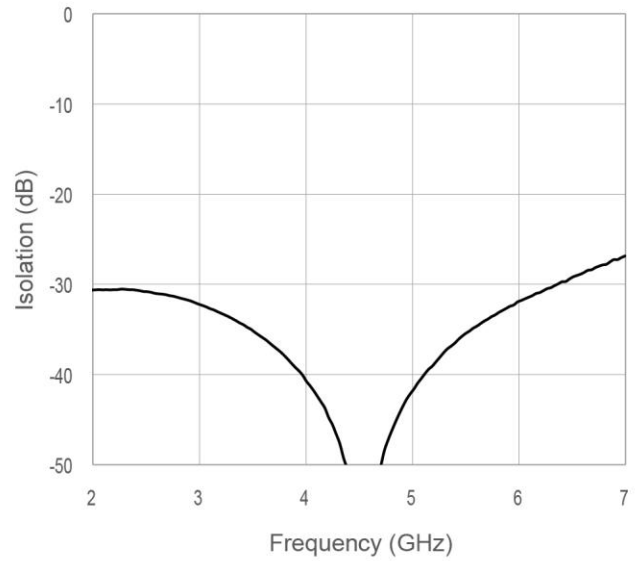
TYPICAL CHARACTERISTICS

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

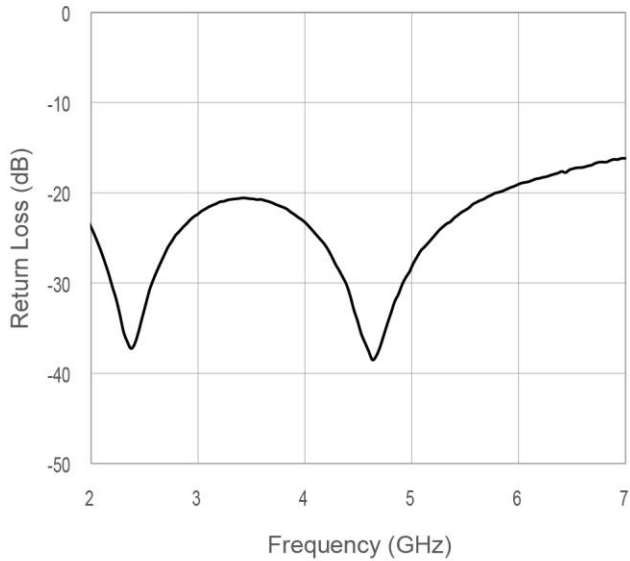
Typical Insertion Loss vs. Frequency



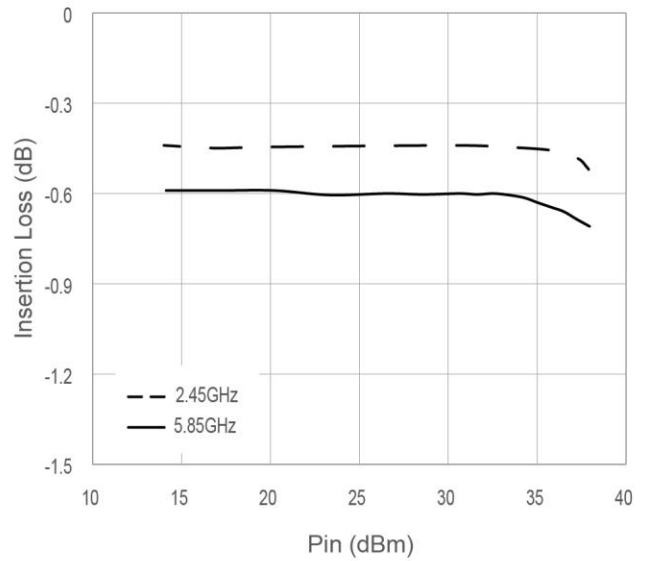
Typical Isolation vs. Frequency



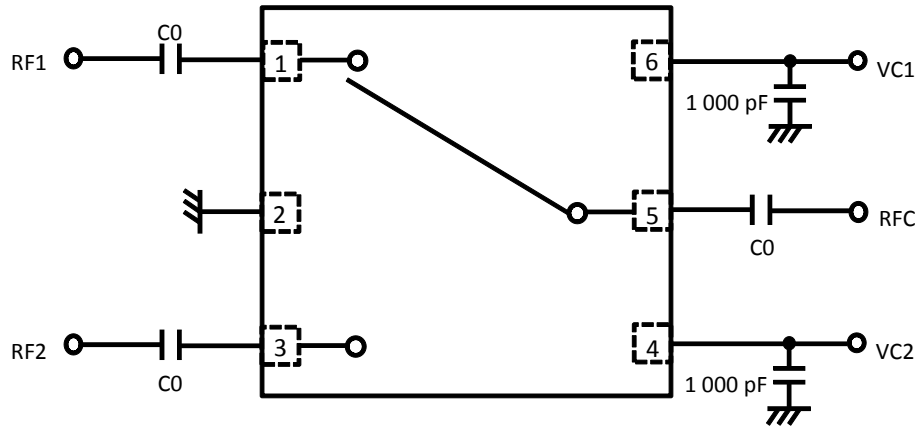
Typical Return Loss vs. Frequency



Typical Insertion Loss vs. Input Power



EVALUATION CIRCUIT

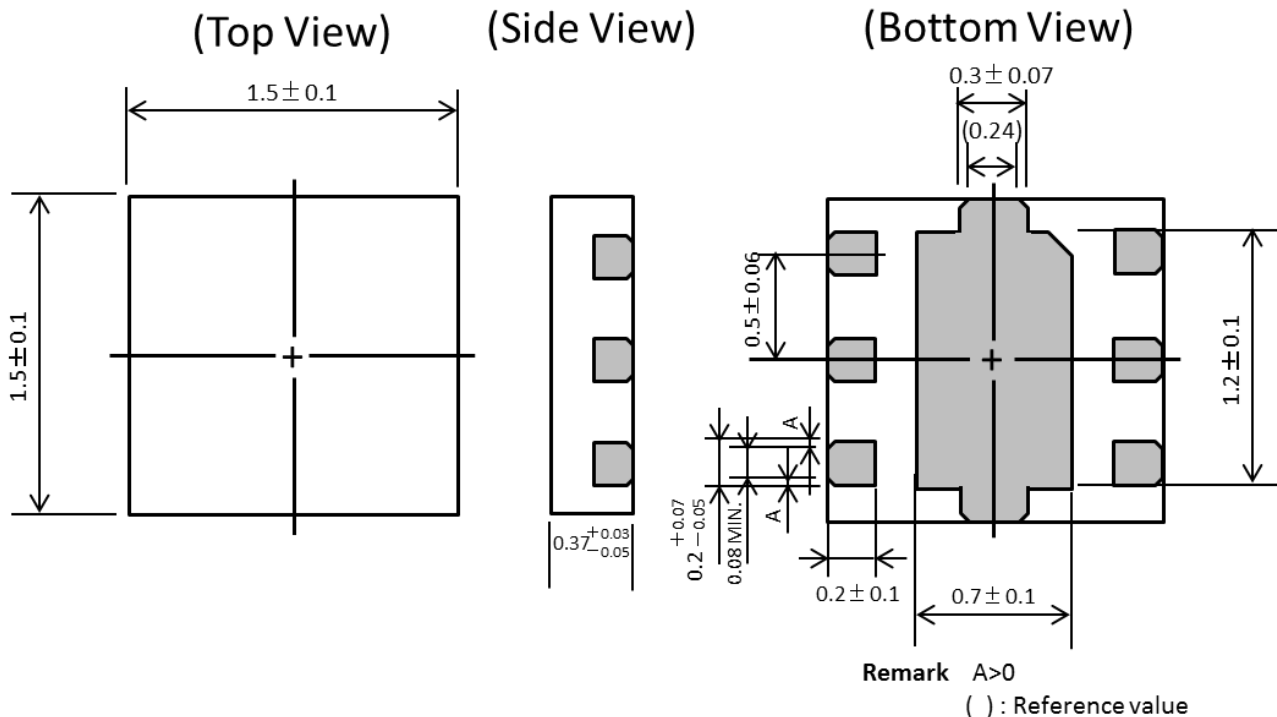


Note C0: 0.05 to 0.5 GHz 1,000pF
 : 0.4 to 2.0 GHz 56pF
 : 2.0 to 6.0 GHz 8pF

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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