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L-BAND SPDT SWITCH

DESCRIPTION

The μPG2012TK is a GaAs MMIC for L-band SPDT (Single Pole Double Throw) switch which were developed for mobile phone and another L-band application.

This device can operate frequency from 0.5 GHz to 2.5 GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin lead-less minimold package (1511). And this package is able to high-density surface mounting.

FEATURES

- Supply voltage : $V_{DD} = 2.7$ to 3.0 V (2.8 V TYP.)
- Switch control voltage : $V_{cont(H)} = 2.7$ to 3.0 V (2.8 V TYP.)
: $V_{cont(L)} = -0.2$ to $+0.2$ V (0 V TYP.)
- Low insertion loss : $L_{INS1} = 0.27$ dB TYP. @ $f = 0.5$ to 1.0 GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $L_{INS2} = 0.30$ dB TYP. @ $f = 2.0$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $L_{INS3} = 0.30$ dB TYP. @ $f = 2.5$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V (Reference value)
- High isolation : $ISL1 = 30$ dB TYP. @ $f = 0.5$ to 2.0 GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V
: $ISL2 = 30$ dB TYP. @ $f = 2.5$ GHz, $V_{DD} = 2.8$ V, $V_{cont} = 2.8$ V/0 V (Reference value)
- High-density surface mounting : 6-pin lead-less minimold package ($1.5 \times 1.1 \times 0.55$ mm)

APPLICATIONS

- L-band digital cellular or cordless telephone
- PCS, W-LAN, WLL and Bluetooth™ etc.

ORDERING INFORMATION

| Part Number | Package | Marking | Supplying Form |
|--------------|---------------------------------|---------|--|
| μPG2012TK-E2 | 6-pin lead-less minimold (1511) | G3H | <ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel |

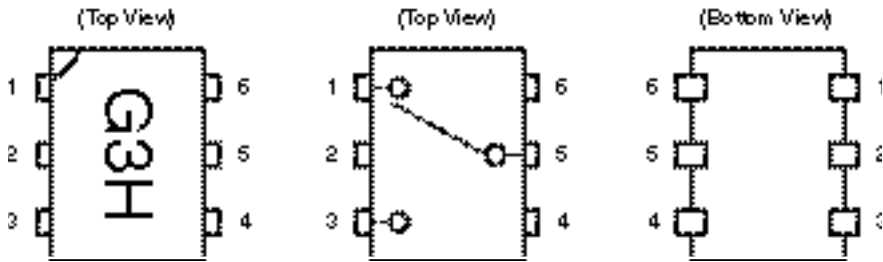
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μPG2012TK-A

Caution: Observe precautions when handling because these devices are sensitive to electrostatic discharge

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



| Pin No. | Pin Name |
|---------|-------------------|
| 1 | OUTPUT1 |
| 2 | GND |
| 3 | OUTPUT2 |
| 4 | V _{cont} |
| 5 | INPUT |
| 6 | V _{DD} |

TRUTH TABLE

| V _{cont} | INPUT-OUTPUT1 | INPUT-OUTPUT2 |
|-------------------|---------------|---------------|
| Low | OFF | ON |
| High | ON | OFF |

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|-------------------|---------------------|------|
| Supply Voltage | V _{DD} | +6.0 | V |
| Switch Control Voltage | V _{cont} | +6.0 | V |
| Input Power | P _{in} | +26 | dBm |
| Power Dissipation | P _D | 150 ^{Note} | mW |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|----------------------------|----------------------|------|------|------|------|
| Supply Voltage | V _{DD} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (H) | V _{cont(H)} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (L) | V _{cont(L)} | -0.2 | 0 | 0.2 | V |

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|-------------------------|--------------------|-------|-------|------|------|
| Insertion Loss1 | L _{INS1} | f = 0.5 to 1.0 GHz | – | 0.27 | 0.50 | dB |
| Insertion Loss2 | L _{INS2} | f = 2.0 GHz | – | 0.30 | 0.50 | dB |
| Isolation1 | ISL1 | f = 0.5 to 2.0 GHz | 24 | 30 | – | dB |
| Input Return Loss | RL _{in} | f = 0.5 to 2.5 GHz | 15 | 20 | – | dB |
| Output Return Loss | RL _{out} | f = 0.5 to 2.5 GHz | 15 | 20 | – | dB |
| 0.1 dB Gain Compression Input Power ^{Note} | P _{in(0.1 dB)} | f = 2.0 GHz | +17.5 | +20.5 | – | dBm |
| Supply Current | I _{DD} | | – | 50 | 100 | μA |
| Switching Control Current | I _{cont} | | – | 4 | 20 | μA |

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

STANDARD CHARACTERISTICS FOR REFERENCE

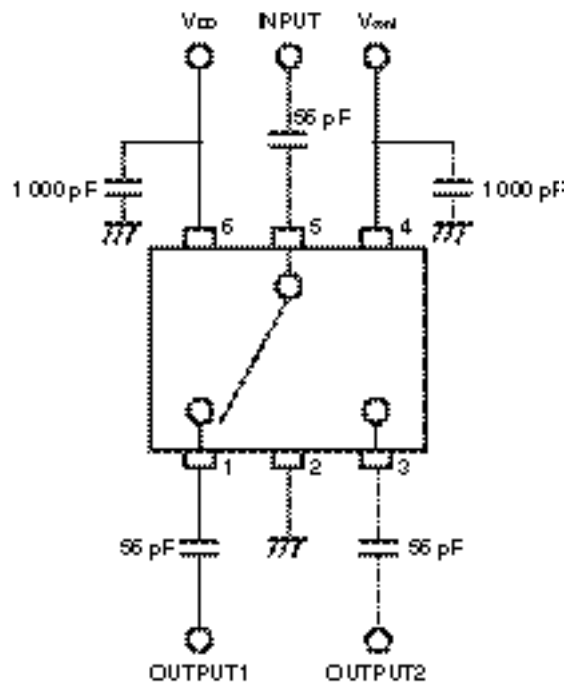
(T_A = +25°C, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|-----------------------|-----------------|------|-------|------|------|
| Insertion Loss3 | L _{INS3} | f = 2.5 GHz | – | 0.30 | – | dB |
| Isolation2 | ISL2 | f = 2.5 GHz | – | 30 | – | dB |
| 1 dB Gain Compression Input Power ^{Note} | P _{in(1 dB)} | f = 2.0 GHz | – | +24.0 | – | dBm |
| Switching Control Speed | t _{sw} | | – | 300 | – | ns |

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

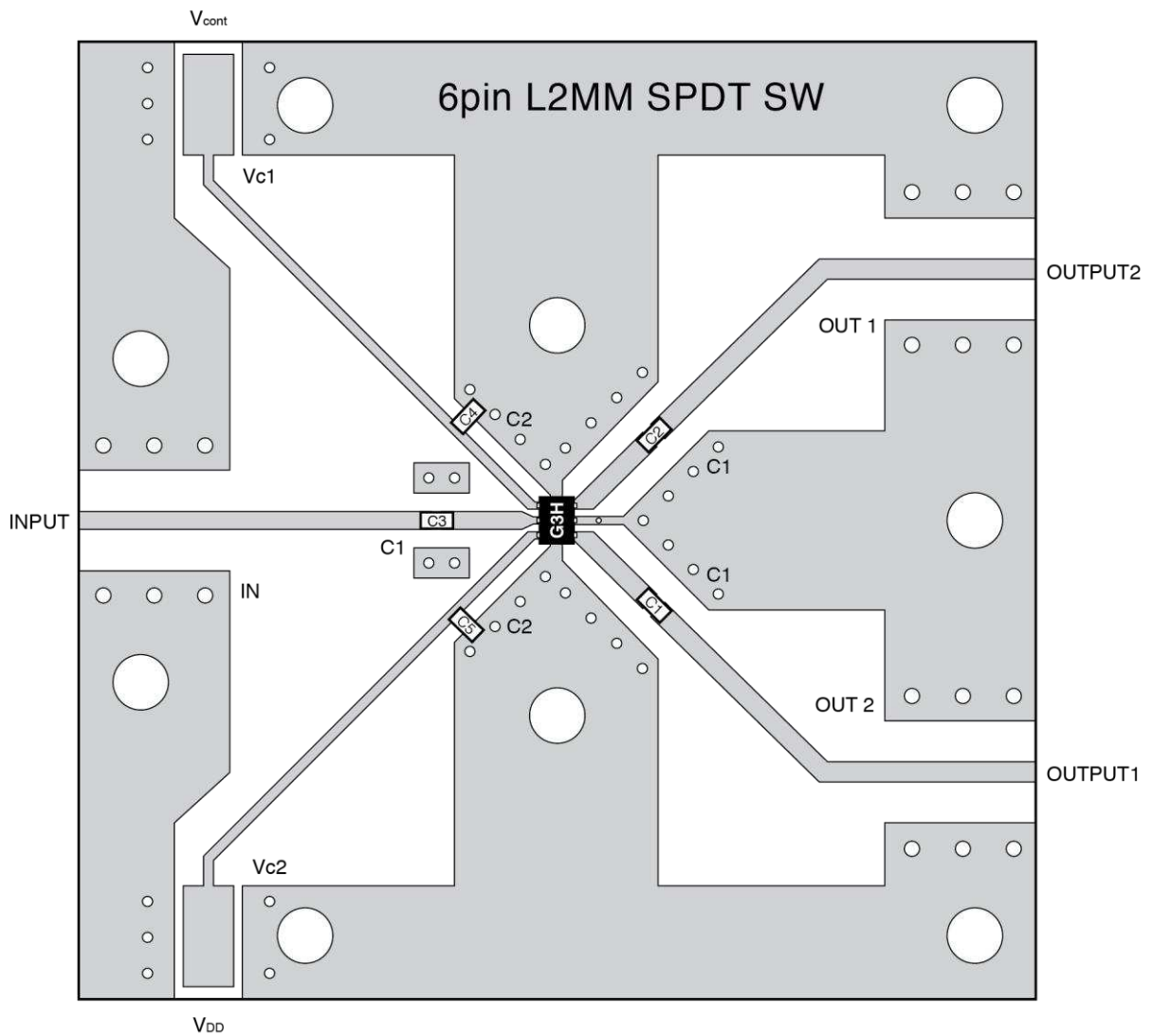
Caution This device is used it is necessary to use DC cut capacitors. The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than 100 pF.

EVALUATION CIRCUIT ($V_{DD} = 2.8\text{ V}$, $V_{cont} = 2.8\text{ V/0 V}$, DC cut capacitors = 56 pF)



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

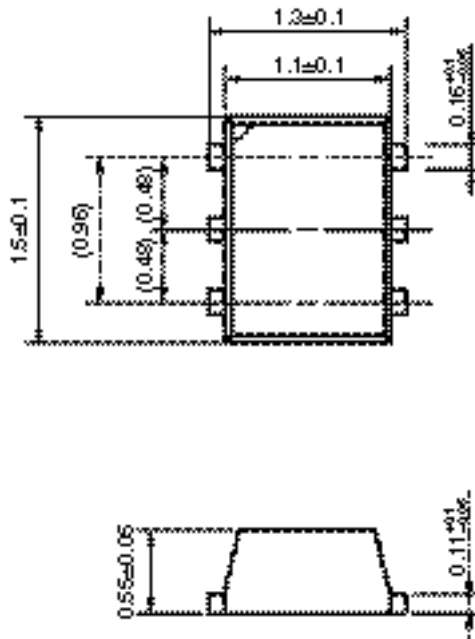


USING THE EVALUATION BOARD

| Symbol | Values |
|------------|----------|
| C1, C2, C3 | 56 pF |
| C4, C5 | 1 000 pF |

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (1511) (UNIT: mm)



Remark (): Reference value

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| VPS | Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | VP215 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350 |

Caution Do not use different soldering methods together (except for partial heating).

SAFETY INFORMATION ON THIS PRODUCT

| | | |
|-----------------------|----------------------|--|
| <p>Caution</p> | <p>GaAs Products</p> | <p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p> |
|-----------------------|----------------------|--|