

**L-BAND 4 W SINGLE CONTROL HIGH POWER SPDT SWITCH****DESCRIPTION**

The  $\mu$ PG2156TB is an L-band single control SPDT GaAs FET switch which was developed for digital cellular or cordless telephone application. The device can operate from 800 MHz to 2.5 GHz, having the low insertion loss and high linearity.

**FEATURES**

- Low insertion loss : L<sub>INS</sub> = 0.45 dB TYP. @ V<sub>cont</sub> = +2.6 V/0 V, f = 1.0 GHz, IN-OUT1  
: L<sub>INS</sub> = 0.35 dB TYP. @ V<sub>cont</sub> = +2.6 V/0 V, f = 1.0 GHz, IN-OUT2  
: L<sub>INS</sub> = 0.45 dB TYP. @ V<sub>cont</sub> = +2.6 V/0 V, f = 2.0 GHz, IN-OUT1/2
- High power switching : P<sub>in (0.1 dB)</sub> = 37 dBm TYP. @ V<sub>cont</sub> = +2.6 V/0 V, f = 1.0 GHz, IN-OUT1/2
- 6-pin super minimold package (2.1 × 2.0 × 0.9 mm)

**APPLICATION**

- GSM Triple/Quad band digital cellular

**ORDERING INFORMATION**

| Part Number       | Order Number        | Package                        | Marking | Supplying Form                                                                                                                                                      |
|-------------------|---------------------|--------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\mu$ PG2156TB-E4 | $\mu$ PG2156TB-E4-A | 6-pin super minimold (Pb-Free) | G4V     | <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>• Qty 3 kpcs/reel</li> </ul> |

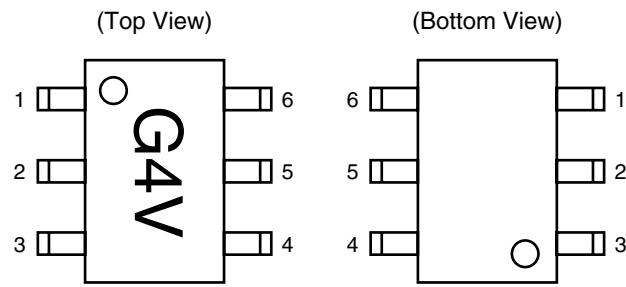
**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PG2156TB

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

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

PIN CONNECTIONS



| Pin No. | Pin Name          |
|---------|-------------------|
| 1       | OUT2              |
| 2       | GND               |
| 3       | OUT1              |
| 4       | V <sub>DD</sub>   |
| 5       | IN                |
| 6       | V <sub>cont</sub> |

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)

| Parameter                     | Symbol            | Ratings     | Unit |
|-------------------------------|-------------------|-------------|------|
| Supply Voltage                | V <sub>DD</sub>   | +8.0        | V    |
| Control Voltage               | V <sub>cont</sub> | +8.0        | V    |
| Input Power                   | P <sub>in</sub>   | +38         | dBm  |
| Operating Ambient Temperature | T <sub>A</sub>    | −45 to +85  | °C   |
| Storage Temperature           | T <sub>stg</sub>  | −55 to +150 | °C   |

RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C)

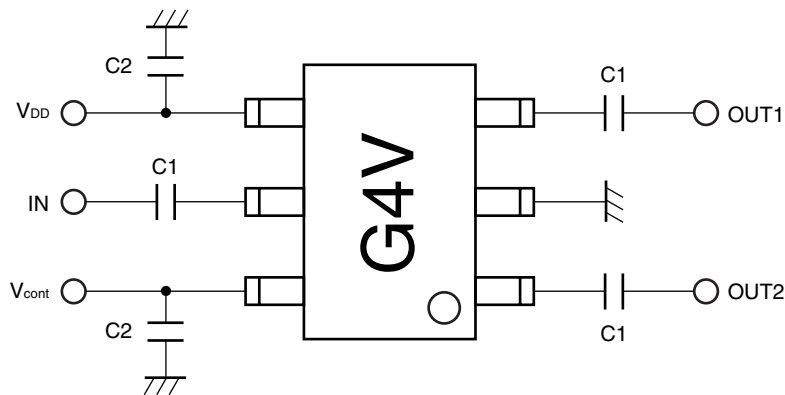
| Parameter              | Symbol                | MIN. | TYP. | MAX. | Unit |
|------------------------|-----------------------|------|------|------|------|
| Supply Voltage         | V <sub>DD</sub>       | +2.4 | +2.6 | +5.0 | V    |
| Control Voltage (High) | V <sub>cont</sub> (H) | +2.4 | +2.6 | +5.0 | V    |
| Control Voltage (Low)  | V <sub>cont</sub> (L) | 0    | 0    | +0.2 | V    |

**ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ ,  $V_{DD} = +2.6\text{ V}$ ,  $V_{\text{cont}} = +2.6\text{ V/0 V}$ ,  $Z_o = 50\ \Omega$ , off chip DC blocking capacitors value: 56 pF, unless otherwise specified)**

| Parameter                              | Symbol                   | Test Conditions                                            | Pass      | MIN. | TYP. | MAX. | Unit          |
|----------------------------------------|--------------------------|------------------------------------------------------------|-----------|------|------|------|---------------|
| Insertion Loss                         | $L_{\text{INS}}$         | $f = 0.8\text{ to }1.0\text{ GHz}$                         | IN-OUT1   | –    | 0.45 | 0.65 | dB            |
|                                        |                          |                                                            | IN-OUT2   | –    | 0.35 | 0.55 | dB            |
|                                        |                          | $f = 1.0\text{ to }2.0\text{ GHz}$                         | IN-OUT1/2 | –    | 0.45 | 0.65 | dB            |
|                                        |                          | $f = 2.0\text{ to }2.5\text{ GHz}$                         | IN-OUT1/2 | –    | 0.50 | –    | dB            |
| Isolation                              | $ISL$                    | $f = 0.8\text{ to }1.0\text{ GHz}$                         | IN-OUT1/2 | 21.0 | 23.0 | –    | dB            |
|                                        |                          | $f = 1.0\text{ to }2.0\text{ GHz}$                         | IN-OUT1/2 | 15.5 | 17.5 | –    | dB            |
|                                        |                          | $f = 2.0\text{ to }2.5\text{ GHz}$                         | IN-OUT1/2 | –    | 16.0 | –    | dB            |
| Input Return Loss                      | $RL_{\text{in}}$         | $f = 0.8\text{ to }1.0\text{ GHz}$                         | IN-OUT1   | 10   | 15   | –    | dB            |
|                                        |                          |                                                            | IN-OUT2   | 15   | 20   | –    | dB            |
|                                        |                          | $f = 1.0\text{ to }2.0\text{ GHz}$                         | IN-OUT1/2 | 15   | 20   | –    | dB            |
|                                        |                          | $f = 2.0\text{ to }2.5\text{ GHz}$                         | IN-OUT1/2 | –    | 20   | –    | dB            |
| Output Return Loss                     | $RL_{\text{out}}$        | $f = 0.8\text{ to }1.0\text{ GHz}$                         | IN-OUT1   | 10   | 15   | –    | dB            |
|                                        |                          |                                                            | IN-OUT2   | 15   | 20   | –    | dB            |
|                                        |                          | $f = 1.0\text{ to }2.0\text{ GHz}$                         | IN-OUT1/2 | 15   | 20   | –    | dB            |
|                                        |                          | $f = 2.0\text{ to }2.5\text{ GHz}$                         | IN-OUT1/2 | –    | 20   | –    | dB            |
| 0.1 dB Loss Compression<br>Input Power | $P_{\text{in (0.1 dB)}}$ | $f = 1.0\text{ GHz}$                                       | IN-OUT1/2 | 35   | 37   | –    | dBm           |
|                                        |                          | $f = 2.0\text{ GHz}$                                       | IN-OUT1/2 | 35   | 37   | –    | dBm           |
| 2nd Harmonics                          | $2f_0$                   | $f = 1.0\text{ GHz}$ ,<br>$P_{\text{in}} = +35\text{ dBm}$ | IN-OUT1/2 | 65   | 75   | –    | dBc           |
|                                        |                          | $f = 2.0\text{ GHz}$ ,<br>$P_{\text{in}} = +33\text{ dBm}$ | IN-OUT1/2 | 65   | 70   | –    | dBc           |
| 3rd Harmonics                          | $3f_0$                   | $f = 1.0\text{ GHz}$ ,<br>$P_{\text{in}} = +35\text{ dBm}$ | IN-OUT1/2 | 65   | 75   | –    | dBc           |
|                                        |                          | $f = 2.0\text{ GHz}$ ,<br>$P_{\text{in}} = +33\text{ dBm}$ | IN-OUT1/2 | 65   | 75   | –    | dBc           |
| Switching Speed                        | $t_{\text{sw}}$          |                                                            |           | –    | 1    | 5    | $\mu\text{s}$ |
| Control Current                        | $I_{\text{cont}}$        | RF Non                                                     |           | –    | 5    | 50   | $\mu\text{A}$ |
| Supply Current                         | $I_{\text{DD}}$          | RF Non                                                     |           | –    | 40   | 200  | $\mu\text{A}$ |

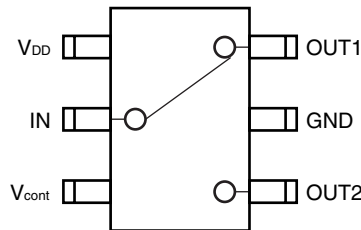
EVALUATION CIRCUIT

Off chip DC blocking capacitors value C1 = 56 pF, C2 = 1 000 pF (Bypass), using NEC standard evaluation board.



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

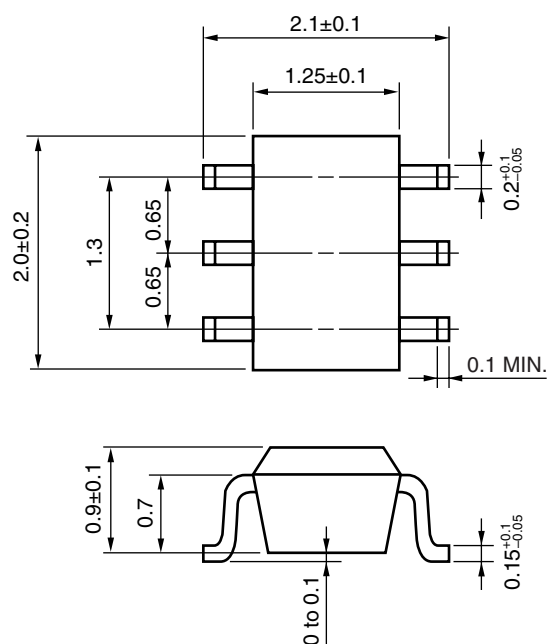
TRUTH TABLE



| V <sub>cont</sub> | IN-OUT1 | IN-OUT2 |
|-------------------|---------|---------|
| High              | OFF     | ON      |
| Low               | ON      | OFF     |

PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



# 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<br>Time at peak temperature : 10 seconds or less<br>Time at temperature of 220°C or higher : 60 seconds or less<br>Preheating time at 120 to 180°C : 120±30 seconds<br>Maximum number of reflow processes : 3 times<br>Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260            |
| Wave Soldering   | Peak temperature (molten solder temperature) : 260°C or below<br>Time at peak temperature : 10 seconds or less<br>Preheating temperature (package surface temperature) : 120°C or below<br>Maximum number of flow processes : 1 time<br>Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below                                                | WS260            |
| Partial Heating  | Peak temperature (terminal temperature) : 350°C or below<br>Soldering time (per side of device) : 3 seconds or less<br>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).

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M8E 00.4-0110

|                |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Caution</b> | GaAs Products | <p>This product uses gallium arsenide (GaAs).<br/>GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> <li>• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.</li> </ul> <ol style="list-style-type: none"> <li>1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.</li> <li>2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.</li> </ol> <ul style="list-style-type: none"> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul> |
|----------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

► For further information, please contact

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