

# DATA SHEET



## GaAs INTEGRATED CIRCUIT $\mu$ PG2157T5F

### NON-REFLECTIVE HIGH POWER SPDT SWITCH FOR WiMAX

#### DESCRIPTION

The UPG2157T5F is a non-reflective (50 $\Omega$  termination) GaAs MMIC high power SPDT (Single Pole Double Throw) switch for WiMAX. This device can operate from frequency 2.3 to 5.85 GHz, with low insertion loss and high isolation.

This device is housed in a 12-pin plastic QFN (Quad Flat Non-leaded) package, and is suitable for high-density surface mounting.

#### FEATURES

- Control voltage :  $V_{cont(H)} = 2.5$  to  $3.3$  V (3.0 V TYP.)  
:  $V_{cont(L)} = 0$  to  $0.4$  V (0 V TYP.)
- Low insertion loss :  $L_{ins1} = 0.60$  dB TYP. @  $f = 2.3$  to  $2.7$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V  
:  $L_{ins2} = 0.60$  dB TYP. @  $f = 3.3$  to  $3.8$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V  
:  $L_{ins3} = 0.80$  dB TYP. @  $f = 5.15$  to  $5.85$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V
- High isolation :  $ISL1 = 28$  dB TYP. @  $f = 2.3$  to  $2.7$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V  
:  $ISL2 = 25$  dB TYP. @  $f = 3.3$  to  $3.8$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V  
:  $ISL3 = 22$  dB TYP. @  $f = 5.15$  to  $5.85$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V
- Power Handling :  $P_{in(1dB)} \geq +37.0$  dBm TYP. @  $f = 2.5$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V  
:  $P_{in(1dB)} \geq +37.0$  dBm TYP. @  $f = 5.85$  GHz,  $V_{cont(H)} = 3.0$  V,  $V_{cont(L)} = 0$  V
- High-density surface mounting : 12-pin plastic QFN package (3.0 × 3.0 × 0.75 mm)

#### APPLICATIONS

- Antenna switch for WiMAX, 802.11a/b/g access point

#### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PG2157T5F-E2	$\mu$ PG2157T5F-E2-A	12-pin plastic QFN (Pb-Free)	2157	<ul style="list-style-type: none"><li>Embossed tape 8 mm wide</li><li>Pin 1 indicates roll-in direction of tape</li><li>Qty 3 kpcs/reel</li></ul>

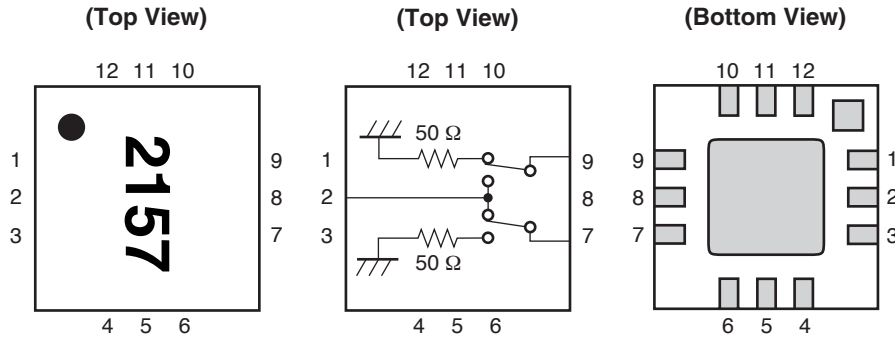
**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PG2157T5F-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	GND
2	INPUT
3	GND
4	GND
5	V <sub>cont2</sub>
6	GND
7	OUTPUT2
8	GND
9	OUTPUT1
10	GND
11	V <sub>cont1</sub>
12	GND

**Remark** Exposed pad : GND

**TRUTH TABLE**

V <sub>cont1</sub>	V <sub>cont2</sub>	INPUT-OUTPUT1	INPUT-OUTPUT2
High	Low	ON	OFF
Low	High	OFF	ON

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C, unless otherwise specified)**

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V <sub>cont</sub>	+6.0	V
<R> Input Power (ON Port, peak)	P <sub>in</sub>	+38	dBm
<R> Input Power (ON Port, average)	P <sub>in</sub>	+28	dBm
<R> Input Power (OFF Port)	P <sub>in (OFF)</sub>	+20	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, unless otherwise specified)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f <sub>opt1</sub>	2.3	-	2.7	GHz
	f <sub>opt2</sub>	3.3	-	3.8	GHz
	f <sub>opt3</sub>	5.15	-	5.85	GHz
Switch Control Voltage (H)	V <sub>cont (H)</sub>	2.5	3.0	3.3	V
Switch Control Voltage (L)	V <sub>cont (L)</sub>	0	0	0.4	V

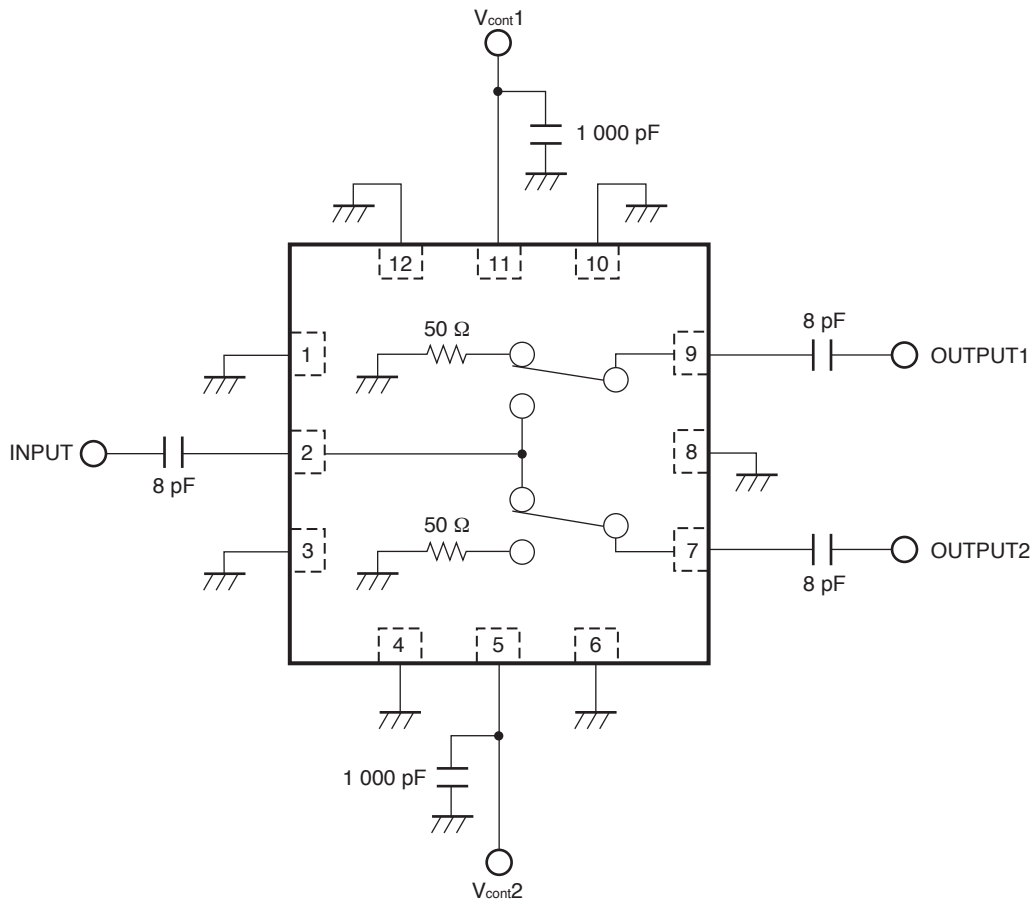
**ELECTRICAL CHARACTERISTICS**

( $T_A = +25^\circ\text{C}$ ,  $V_{\text{cont}}(\text{H}) = 3.0\text{ V}$ ,  $V_{\text{cont}}(\text{L}) = 0\text{ V}$ , DC blocking capacitors = 8 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	$L_{\text{ins1}}$	f = 2.3 to 2.7 GHz	-	0.60	0.85	dB
Insertion Loss 2	$L_{\text{ins2}}$	f = 3.3 to 3.8 GHz	-	0.60	0.85	dB
Insertion Loss 3	$L_{\text{ins3}}$	f = 5.15 to 5.85 GHz	-	0.80	1.05	dB
Isolation 1 (INPUT-OFF Port)	ISL1	f = 2.3 to 2.7 GHz	25	28	-	dB
Isolation 2 (INPUT-OFF Port)	ISL2	f = 3.3 to 3.8 GHz	22	25	-	dB
Isolation 3 (INPUT-OFF Port)	ISL3	f = 5.15 to 5.85 GHz	19	22	-	dB
Isolation 4 (OUTPUT1-OUTPUT2)	ISL4	f = 2.3 to 2.7 GHz	23	26	-	dB
Isolation 5 (OUTPUT1-OUTPUT2)	ISL5	f = 3.3 to 3.8 GHz	20	23	-	dB
Isolation 6 (OUTPUT1-OUTPUT2)	ISL6	f = 5.15 to 5.85 GHz	18	21	-	dB
Input Return Loss 1	$RL_{\text{in1}}$	f = 2.3 to 2.7 GHz	-	20	-	dB
Input Return Loss 2	$RL_{\text{in2}}$	f = 3.3 to 3.8 GHz	-	20	-	dB
Input Return Loss 3	$RL_{\text{in3}}$	f = 5.15 to 5.85 GHz	-	20	-	dB
Output Return Loss 1	$RL_{\text{out1}}$	f = 2.3 to 2.7 GHz	-	20	-	dB
Output Return Loss 2	$RL_{\text{out2}}$	f = 3.3 to 3.8 GHz	-	20	-	dB
Output Return Loss 3	$RL_{\text{out3}}$	f = 5.15 to 5.85 GHz	-	20	-	dB
Return Loss (OFF Port)	RL	f = 2.3 to 2.7 GHz	-	15	-	dB
		f = 3.3 to 3.8 GHz	-	15	-	dB
		f = 5.15 to 5.85 GHz	-	15	-	dB
1 dB Loss Compression Input Power <sup>Note</sup>	$P_{\text{in}}(1\text{ dB})$	f = 2.5 GHz	-	$\geq +37.0$	-	dBm
		f = 5.85 GHz	-	$\geq +37.0$	-	dBm
Switch Control Current	$I_{\text{cont}}$		-	20	30	$\mu\text{A}$
Switch Control Speed	$t_{\text{sw}}$	50% CTL to 90/10% RF	-	100	-	ns

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

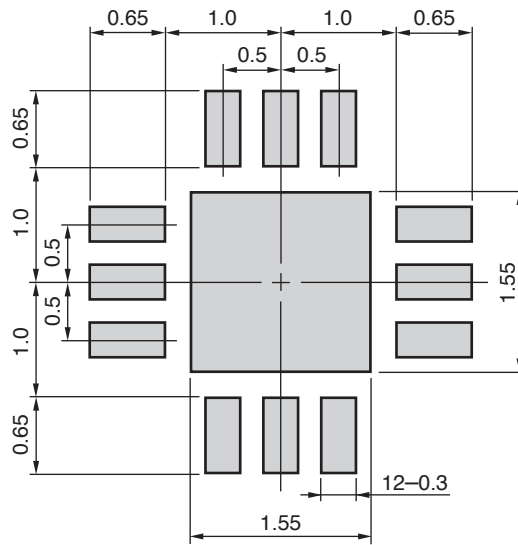
EVALUATION CIRCUIT



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

**MOUNTING PAD LAYOUT DIMENSIONS**

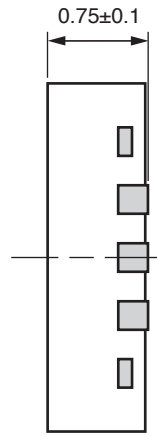
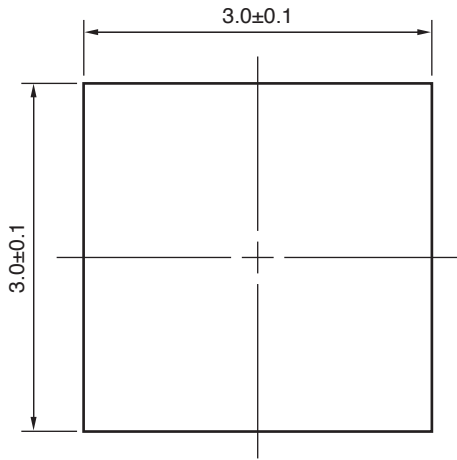
**12-PIN PLASTIC QFN (UNIT: mm)**



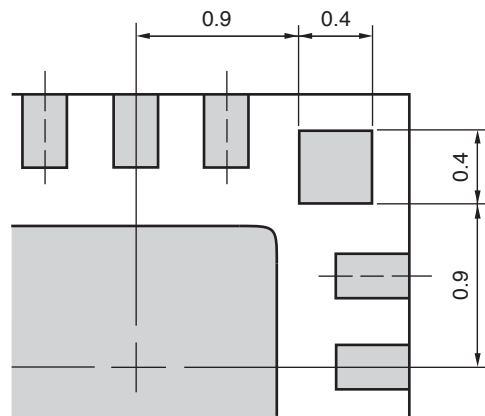
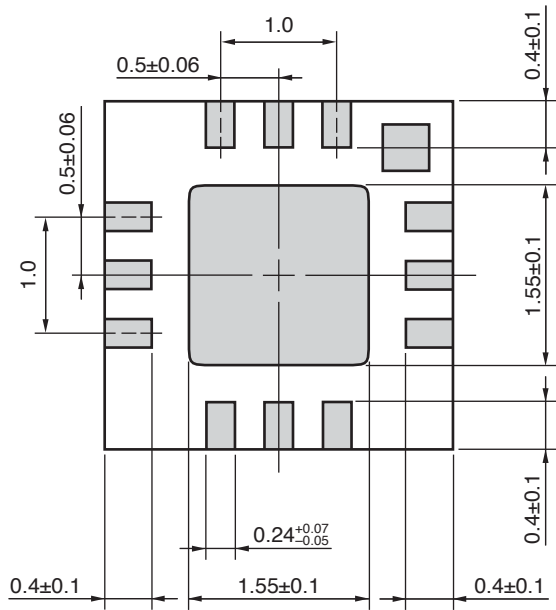
**Remark** The mounting pad layouts in this document are for reference only.

**PACKAGE DIMENSIONS**

**12-PIN PLASTIC QFN (UNIT: mm)**



**(Bottom View)**



Dimensions of pin No.1 indication

**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
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 (terminal 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).**

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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