NEC

GaAs INTEGRATED CIRCUIT

μPG152TA

L-BAND SPDT SWITCH

DESCRIPTION

The μPG152TA is an L-band SPDT (Single Pole Double Throw) GaAs FET switch which was developed for digital cellular or cordless telephone application. The device can operate from 100 MHz to 2.5 GHz, having the low insertion loss.

It housed in as original 6 pin mini-mold that is smaller than usual 8 pin SSOP and easy to install and contributes to miniaturizing the system. It can be used in wide-band switching applications.

FEATURES

- Low insertion loss : L_{INS} = 0.6 dB typ. @ f = 2 GHz
- High power switching : $P_{in\ (1\ dB)}$ = +30 dBm typ. @ V_{CONT} = +3.0 V/0 V, f = 2 GHz
- Small 6 pin mini-mold

APPLICATION

- Digital cordless telephone : PHS, DECT, PCS etc.
- Digital hand-held cellular phone: PDC Antenna diversity etc.

ORDERING INFORMATION

PART NUMBER	PACKAGE	PACKING FORM
μPG152TA-E3	6 pins Mini-mold	Carrier tape width 8 mm, 1 pin faces toward the open end of the tape, 3000 pcs/Reel

Remark For evaluation sample order, please contact your local NEC sales office.
(Part number for sample order: μPG152TA)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETERS	SYMBOL	RATING	UNIT
Control Voltage 1, 2	$V_{CONT1, 2}$	–6.0 to +6.0[Note]	V
Input Power	P_{in}	+31	dBm
Total Power Dissipation	P_{tot}	0.4	W
Operating Temperature	T_A	–50 to +80	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note Condition $2.7 \leq | V_{CONT1} - V_{CONT2} | \leq 6.0$ V

Caution The IC must be handled with care to prevent static discharge because its circuit is composed of GaAs MES FET.

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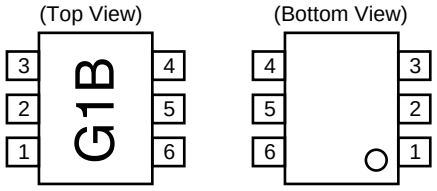
PIN CONNECTION DIAGRAM

PIN No.	CONNECTION	PIN No.	CONNECTION
1	OUT1	4	$V_{CONT\ 2}$
2	GND	5	IN
3	OUT2	6	$V_{CONT\ 1}$



RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Control Voltage (OFF)	V_{CONT}	+2.7	+3.0	+5.3	V
Control Voltage (ON)	V_{CONT}	−0.2	0	+0.2	V
Input Power (V_{CONT} = 3 V/0 V)	P_{in}		+27	+29	dBm

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, T_A = 25 °C, V_{CONT1} = 3 V, V_{CONT2} = 0 V or V_{CONT1} = 0 V, V_{CONT2} = 3 V, Off chip DC blocking capacitors value; 51 pF)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Insertion Loss	L_{INS}	f = 100 M to 2 GHz		0.6	1.0	dB
		f = 2.5 GHz		0.8 Note 1		
Isolation	ISL	f = 100 M to 2 GHz	20	22		dB
		f = 2.5 GHz	20 Note 1			
Input Return Loss	RI_{in}	f = 100 M to 2 GHz	11			dB
Output Return Loss	RI_{out}	f = 100 M to 2 GHz	11			dB
Input Power at 1 dB Compression Point Note 2	$P_{in(1\ dB)}$	f = 1 GHz to 2 GHz	27	30		dBm
Switching Speed	t_{sw}			30		ns
Control Current	I_{CONT}	V_{CONT} = 3 V/0 V RF None			5	μA

Notes 1 Characteristic for reference at 2.0 to 2.5 GHz

2 Pin(1 dB) is measured the input power level when the insertion loss increase more 1 dB than that of linear range. All other characteristics are measured in linear range.

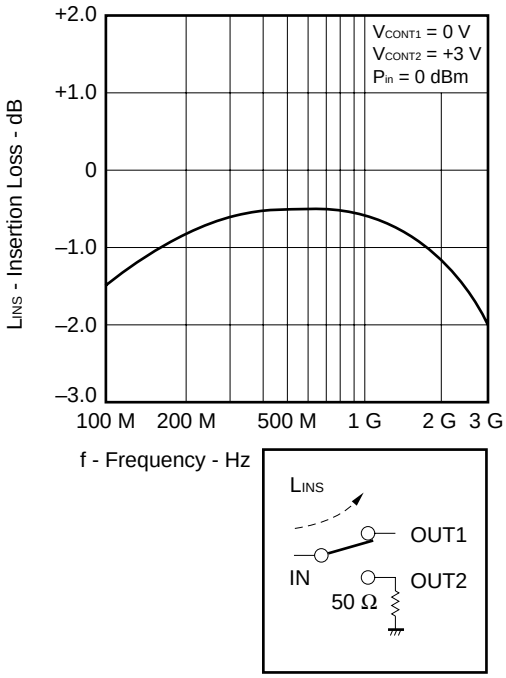
3 When the μPG152TA is used it is necessary to use DC blocking capacitors for No.1 (OUT1), No.3 (OUT2) and No.5 (IN). The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, band width, switching speed and the condition with actual board of your system. The range of recommended DC blocking capacitor value is less than 100 pF.

4 The distance between IC's GND pin and ground pattern of substrate should be as shorter as possible to avoid parasitic parameters.

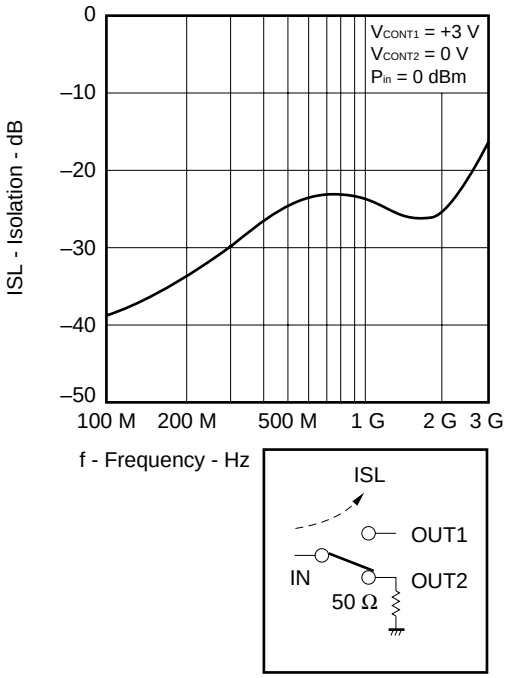
TYPICAL CHARACTERISTICS (T_A = 25 °C)

Note This data is including loss of the test fixture

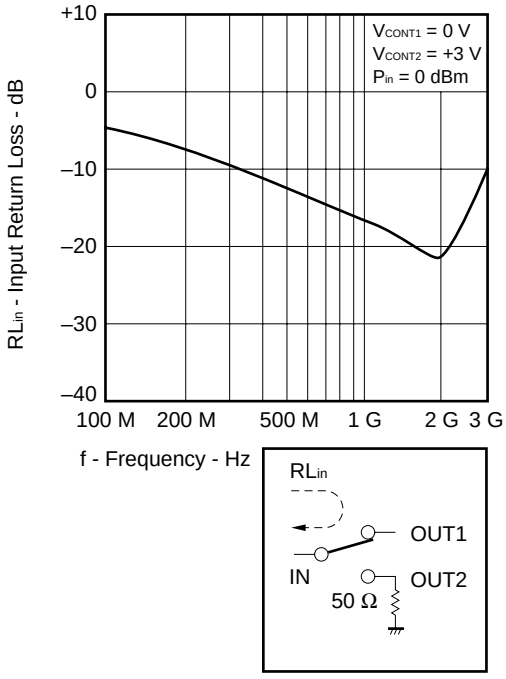
IN-OUT1 INSERTION LOSS vs. FREQUENCY



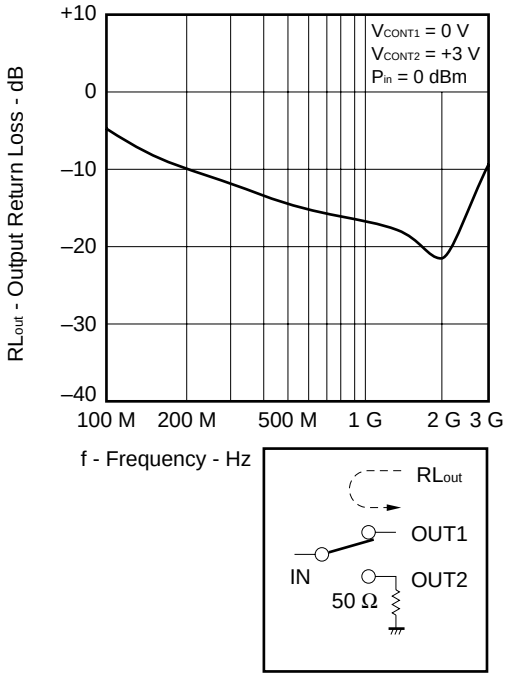
IN-OUT1 ISOLATION vs. FREQUENCY



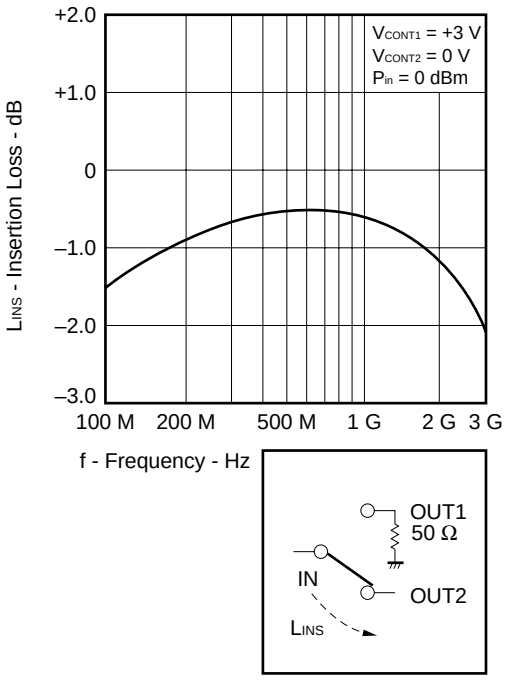
IN-OUT1 INPUT RETURN LOSS vs. FREQUENCY



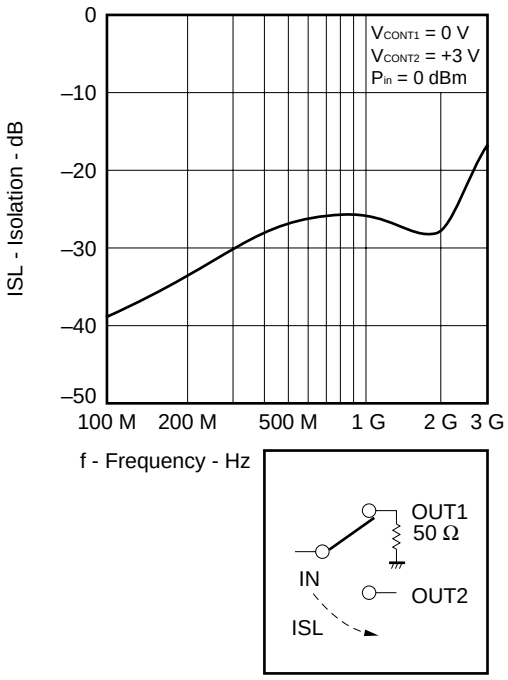
IN-OUT1 OUTPUT RETURN LOSS vs. FREQUENCY



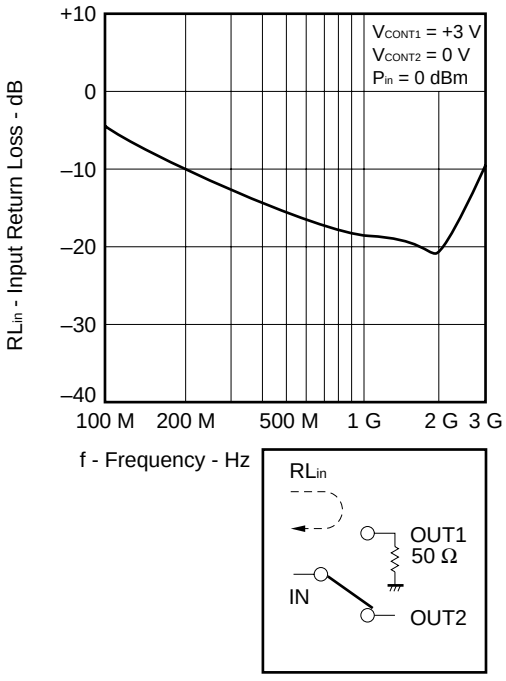
IN-OUT2 INSERTION LOSS vs. FREQUENCY



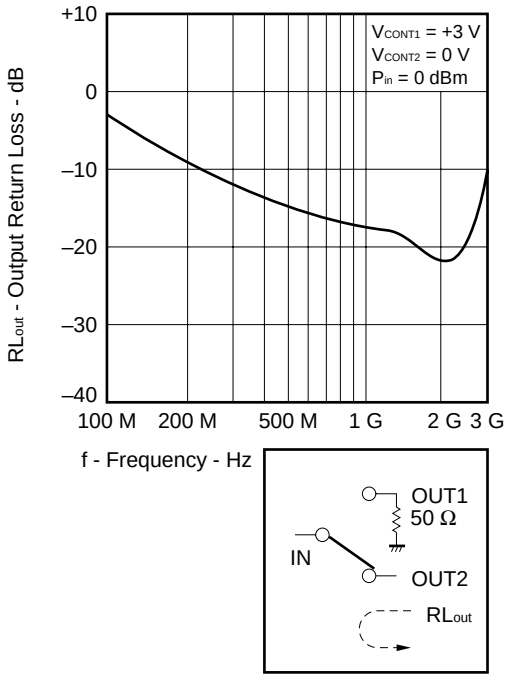
IN-OUT2 ISOLATION vs. FREQUENCY



IN-OUT2 INPUT RETURN LOSS vs. FREQUENCY

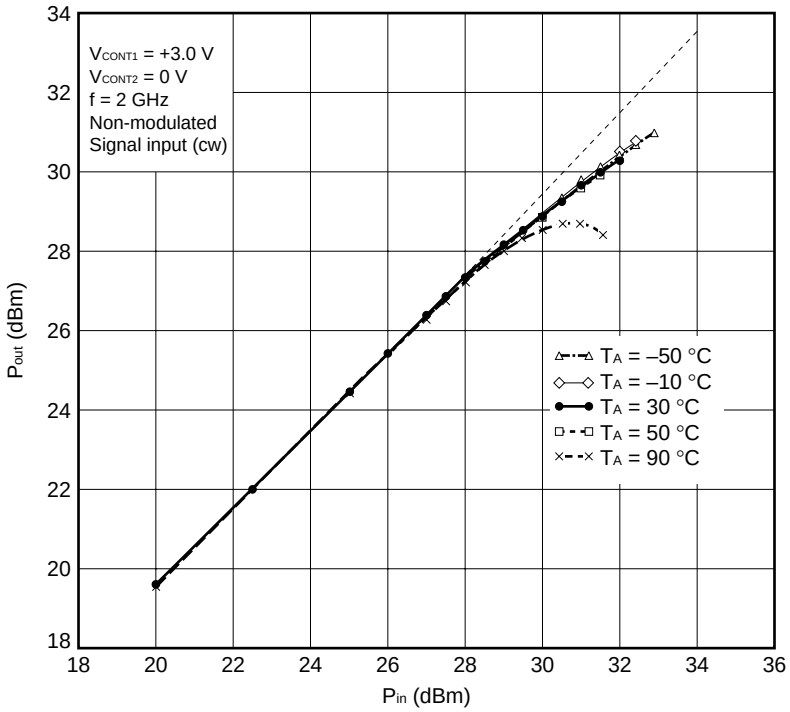


IN-OUT2 OUTPUT RETURN LOSS vs. FREQUENCY



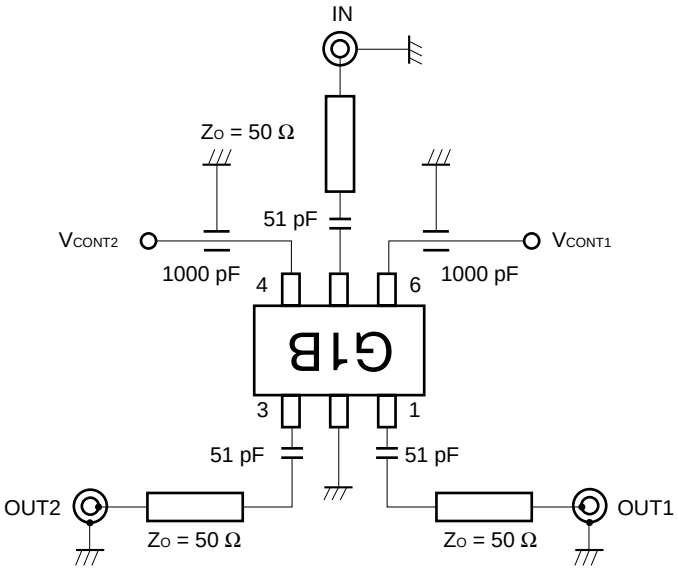
Temperature characteristics

Temperature Characteristics of Input/Output

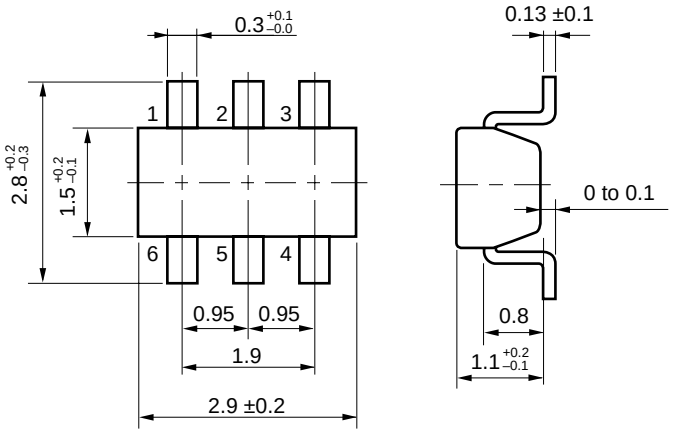


TEST CIRCUIT

T_A = 25 °C, V_{CONT1} = +3 V, V_{CONT2} = 0 V or V_{CONT1} = 0 V, V_{CONT2} = +3 V, f = 2 GHz
Off chip DC blocking capacitors value; 51 pF, Using NEC standard evaluation board



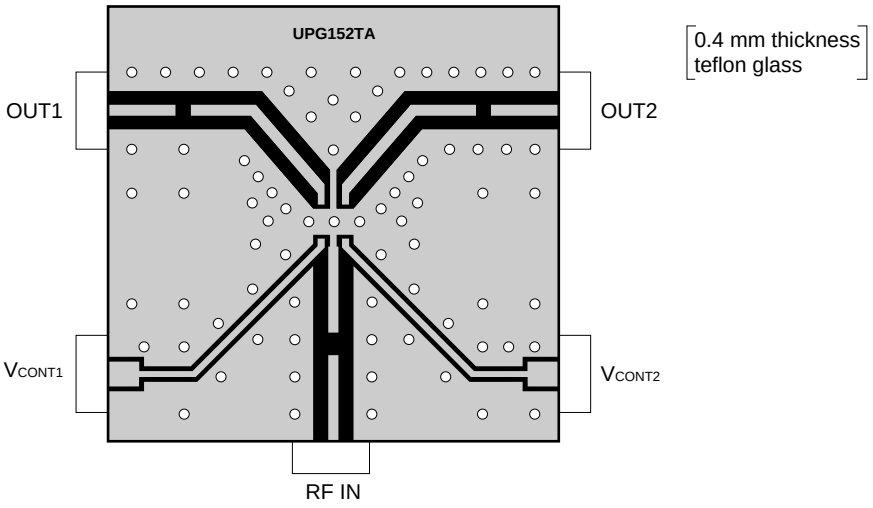
6 PIN MINI-MOLD PACKAGE DIMENSIONS (UNIT: mm)



TRUTH TABLE OF SWITCHING BY CONDITION OF CONTROL VOLTAGE

V_{CONT2} \ V_{CONT1}	+3 V	0 V
+3 V	IN → OUT1, OUT2	IN → OUT1, OUT2
0 V	IN → OUT1, OUT2	IN → OUT1, OUT2

EVALUATION BOARD



RECOMMENDED SOLDERING CONDITIONS

This Product should be soldered in the following recommended conditions. Other soldering methods and conditions than the recommended conditions are to be consulted with our sales representatives.

Soldering process	Soldering conditions	Recommended condition symbol
Infrared ray reflow	Package peak temperature: 235 °C Hour: within 30 s. (more than 210 °C) Time: 3 times, Limited days: no.[Note]	IR35-00-3
VPS	Package peak temperature: 215 °C Hour: within 40 s. (more than 200 °C) Time: 3 times, Limited days: no.[Note]	VP15-00-3
Wave Soldering	Soldering tub temperature: less than 260 °C, Hour: within 10 s. Time: 1 time, Limited days: no.[Note]	WS60-00-1
Pin part heating	Pin area temperature: less than 300 °C, Hour: within 3 s. Limited days: no.[Note]	

Note It is the storage days after opening a dry pack, the storage conditions are 25 °C, less than 65 %, RH.

Caution The combined use of soldering method is to be avoided (However, except the pin area heating method).

For details of recommended soldering conditions for surface mounting, refer to information document **SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E).**

[MEMO]

[MEMO]

[MEMO]

Caution

The Great Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.
Keep the law concerned and so on, especially in case of removal.

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

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