CEL

NEC's L, S-BAND 4W SPDT SWITCH

UPG2009TB

FEATURES

- **LOW INSERTION LOSS:**
  L_{INS} = 0.25 dB TYP. @ $V_{cont1/2}$ = 2.8 V/0 V, f = 1.0 GHz
  L_{INS} = 0.30 dB TYP. @ $V_{cont1/2}$ = 2.8 V/0 V, f = 2.0 GHz
- **HIGH ISOLATION:**
  ISL = 28 dB TYP. @ $V_{cont1/2}$ = 2.8 V/0 V, f = 2.0 GHz
- **POWER HANDLING:**
  $P_{in\ (0.1dB)}$ = 34 dBm TYP. @ $V_{cont1/2}$ = 2.8 V/0 V, f = 1.0 GHz
  $P_{in\ (1.0dB)}$ = 36 dBm TYP. @ $V_{cont1/2}$ = 2.8 V/0 V, f = 1.0 GHz
- **6-PIN SUPER MINIMOLD PACKAGE (2.0 × 1.25 × 0.9 mm)**

DESCRIPTION

The UPG2009TB is a L, S-band SPDT (Single Pole Double Throw) GaAs FET switch for digital cellular or cordless telephone application. The device can operate from 500 MHz to 2.5 GHz, with low insertion loss and high isolation.

APPLICATIONS

- **L-band digital cellular or cordless telephone**
- **Bluetooth™ , W-LAN and WLL applications**
- **Short Range Wireless**

ORDERING INFORMATION

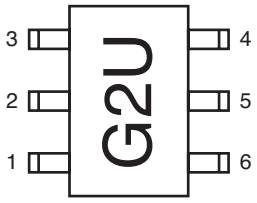
Part Number	Package	Marking	Supplying Form
UPG2009TB-E3	6-pin super minimold	G2U	• Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: UPG2009TB

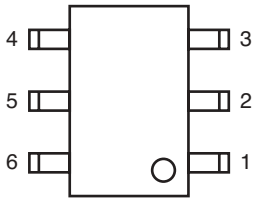
Caution **Observe precautions when handling because these devices are sensitive to electrostatic discharge.**

PIN CONNECTIONS

(Top View)



(Bottom View)



Pin No.	Pin Name
1	OUT1
2	GND
3	OUT2
4	V_{Cont2}
5	IN
6	V_{Cont1}

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

Parameter	Symbol	Ratings	Unit
Control Voltage 1, 2	$V_{cont1, 2}$	–6.0 to +6.0 **Note1**	V
Input Power	P_{in}	+36	dBm
Total Power Dissipation	P_{tot}	0.15	mW
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note $|V_{cont1} - V_{cont2}| \leq 6.0$ V

RECOMMENDED OPERATING RANGE (T_A = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Control Voltage (High)	$V_{cont (H)}$	+2.7	+2.8	+3.0	V
Control Voltage (Low)	$V_{cont (L)}$	–0.2	0	+0.2	V

ELECTRICAL CHARACTERISTICS

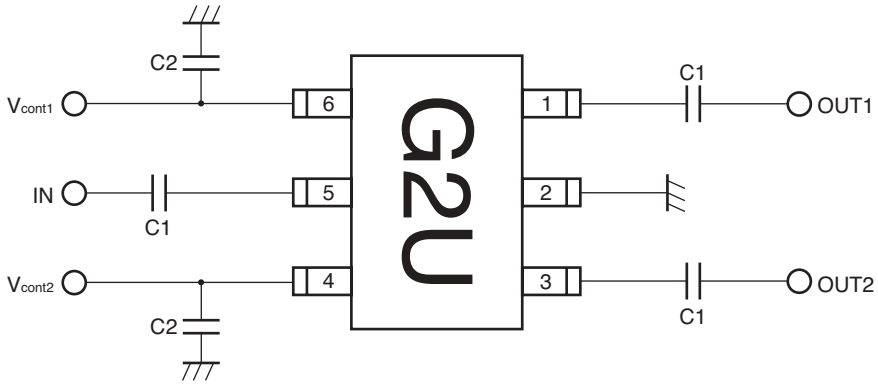
(T_A = +25°C, V_{cont1} = 2.8 V, V_{cont2} = 0 V or V_{cont1} = 0 V, V_{cont2} = 2.8, Z_o = 50 Ω, off chip DC blocking capacitors value; 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L_{INS}	f = 0.5 to 1.0 GHz	–	0.25	0.45	dB
		f = 2.0 GHz	–	0.30	0.50	dB
		f = 2.5 GHz	–	0.40	–	dB
Isolation	ISL	f = 0.5 to 2.0 GHz	24	28	–	dB
		f = 2.5 GHz	–	25	–	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
Input Power at 0.1 dB Compression Point **Note**	$P_{in(0.1\ dB)}$	f = 1.0 GHz, V_{cont} = 2.8 V/0 V	32.5	34	–	dBm
2nd Harmonics	2f0	f = 1.0 GHz, V_{cont} = 2.8 V/0 V, P_{in} = 30.5 dBm	65	75	–	dBc
3rd Harmonics	3f0	f = 1.0 GHz, V_{cont} = 2.8 V/0 V, P_{in} = 30.5 dBm	65	75	–	dBc
Switching Speed	t_{SW}		–	150	–	ns
Control Current	I_{cont}	V_{cont} = 2.8 V/0 V, RF Non	–	1	50	μA

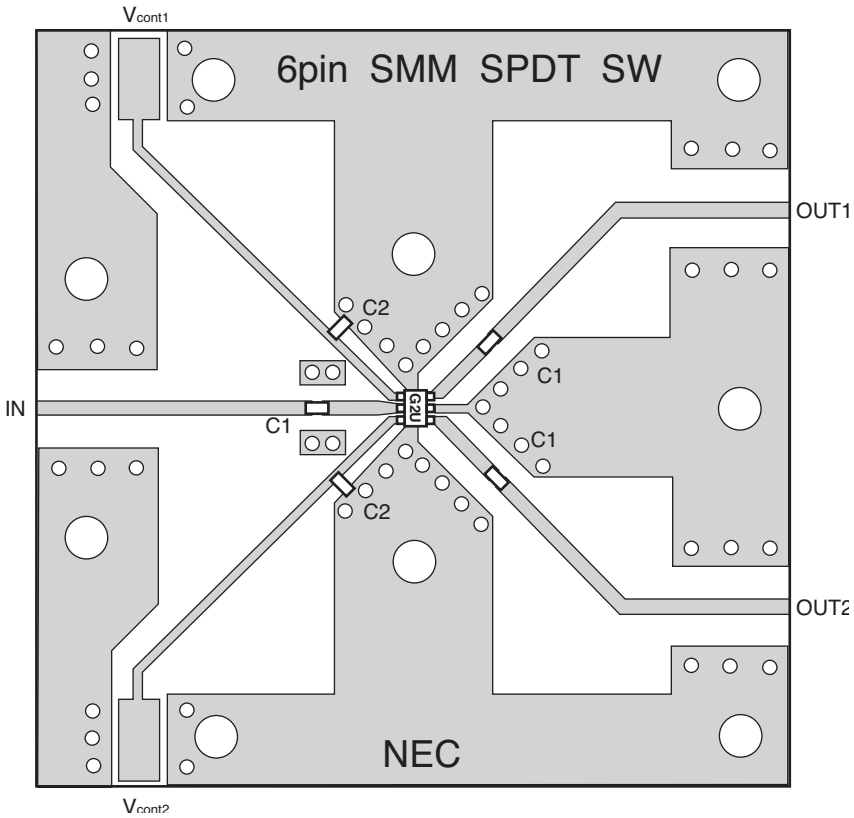
Note $P_{in\ (0.1\ dB)}$ is the measured input power level when the insertion loss increases 0.1 dB more than that of linear range. All other characteristics are measured in linear range.

Caution It is necessary to use DC blocking capacitors with the device.
The value of DC blocking 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 blocking capacitor value is less than 100 pF.

EVALUATION CIRCUIT (V_{cont1} = 2.8 V, V_{cont2} = 0 V or V_{cont2} = 0 V, V_{cont1} = 2.8 V, off chip DC blocking capacitors value C1 = 56 pF, C2 = 1 000 pF (Bypass), using NEC standard evaluation board)



EVALUATION BOARD



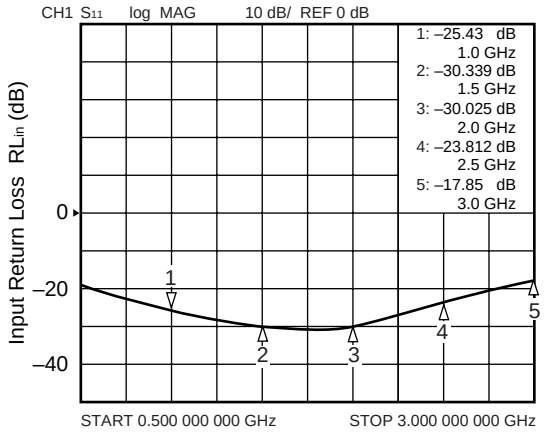
TRUTH TABLE

Vcont1	Vcont2	IN–OUT1	IN–OUT2
Low	High	OFF	ON
High	Low	ON	OFF

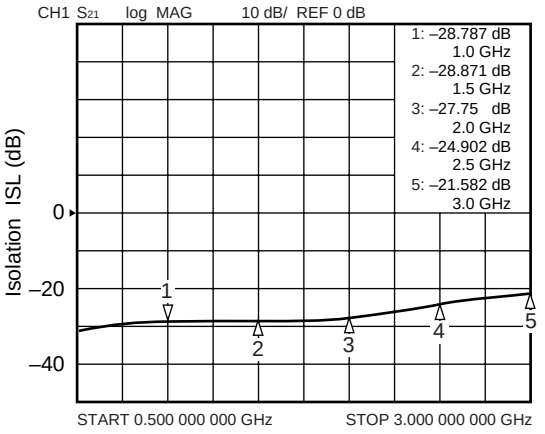
TYPICAL CHARACTERISTICS

(T_A = +25°C $V_{cont1/2}$ = 2.8 V/0 V, P_{in} = 0 dBm, OUT2 side is 50 Ω termination)

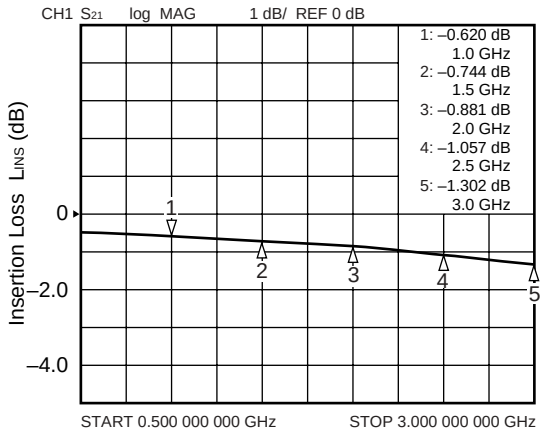
INPUT RETURN LOSS vs. FREQUENCY



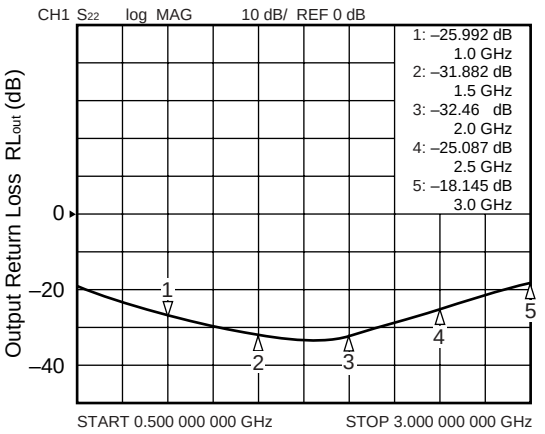
ISOLATION vs. FEQUENCY



INSERTION LOSS vs. FREQUENCY



OUTPUT RETERN LOSS vs. FREQUENCY



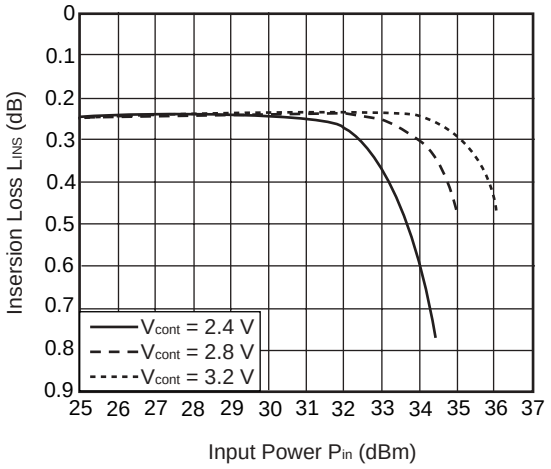
Caution These characteristics values include the losses of the NEC evaluation board.

Remark The graphs indicate nominal characteristics.

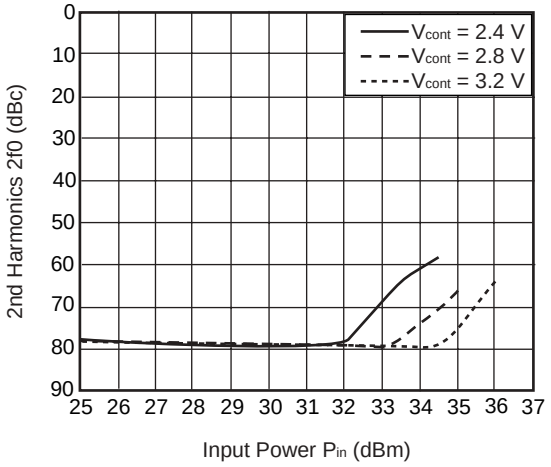
TYPICAL CHARACTERISTICS

(f = 2 GHz, OUT2 side is 50 Ω termination)

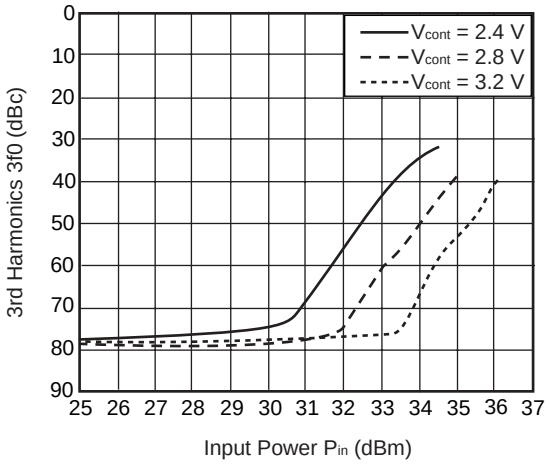
RELATION BETWEEN CONTROL VOLTAGE OF INSERSION LOSS



RELATION BETWEEN CONTROL VOLTAGE OF 2nd HARMONICS



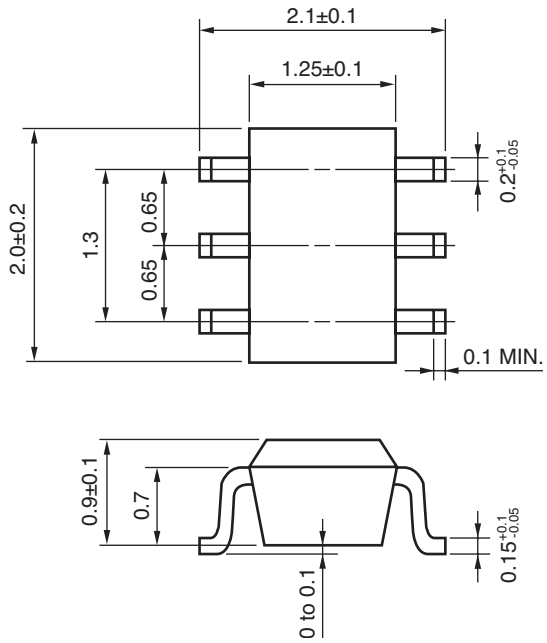
RELATION BETWEEN CONTROL VOLTAGE OF 3rd HARMONICS



Remark The graphs indicate nominal characteristics.

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	IR260
	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	
VPS	Peak temperature (package surface temperature)	: 215°C or below	VP215
	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	
Wave Soldering	Peak temperature (molten solder temperature)	: 260°C or below	WS260
	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	
Partial Heating	Peak temperature (pin temperature)	: 350°C or below	HS350
	Soldering time (per side of device)	: 3 seconds or less	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	

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