NEC

BIPOLAR NALOG NTEGRATED IRCUIT

μPC2726T

1.6 GHz DIFFERENTIAL WIDE BAND AMPLIFIER
SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

DESCRIPTION

The μPC2726T is a silicon microwave monolithic integrated circuit designed for miniature differenctial amplifier. This IC operates up to 1.6 GHz and therefore is suitable for BS tuner, mobile communication and measurement equipment applications. This IC can also use as differential oscillator application.

The μPC27XX series is manufactured using NEC's 20 GHz f_T NESAT™ III silicon bipolar process. This process uses silicon nitride passivation film and gold metallization wirings. These materials can protect the chips from external pollution and prevent corrosion and migration. Thus, this process can produce the ICs with excellent performance, uniformity and reliability.

FEATURES

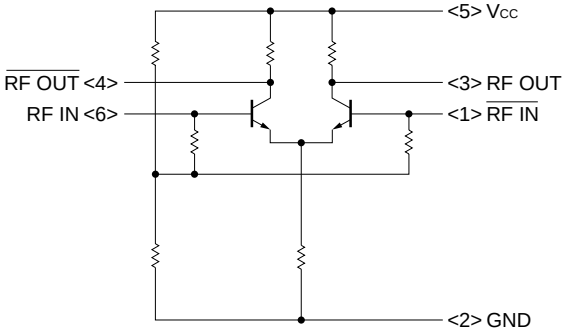
- Wide frequency respone – f_U= 1.6 GHz @ –3 dB G_P, V_{CC} = 5 V
- Power gain – G_P = 15 dB @ 5 V
- Low power consumption: 5 V, 15 mA TYP./2 V, 2.5 mA
- 6 pin mini mold for high-density surface mounting.

ORDERING INFORMATION

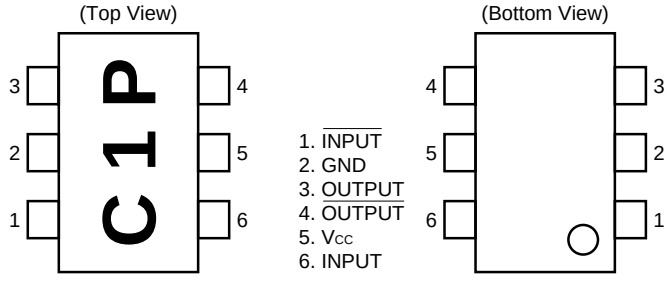
PART NUMBER	PACKAGE	SUPPLYING FORM
μPC2726T-E3	6 pin mini mold	Embossed tape 8 mm wide. 3 kp/reel. Pin 1, 2, 3 face to perforation side of the tape.

***** For evaluation sample order, please contact your local NEC sales office. (Part number: μPC2726T)

EQUIVALENT CIRCUIT



PIN CONNECTIONS



Caution: Electro-static sensitive device

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ABSOLUTE MAXIMUM RATINGS

Supply Voltage	V_{CC}	6	V	T_A = +25 °C
Power Dissipation of Package Allowance	P_D	280	mW	Mounted on 50 × 50 × 1.6 mm epoxy glass PWB at T_A = +85 °C
Input Power	P_{in}	0	dBm	T_A = +25 °C
Operating Temperature	T_{opt}	−40 to +85	°C	
Storage Temperature	T_{stg}	−55 to +150	°C	

RECOMMENDED OPERATING CONDITIONS

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Operating Temperature	T_A	−40	+25	+85	°C

ELECTRICAL CHARACTERISTICS (T_A = +25 °C, V_{CC} = 5. V, Z_L = Z_S = 50 Ω)

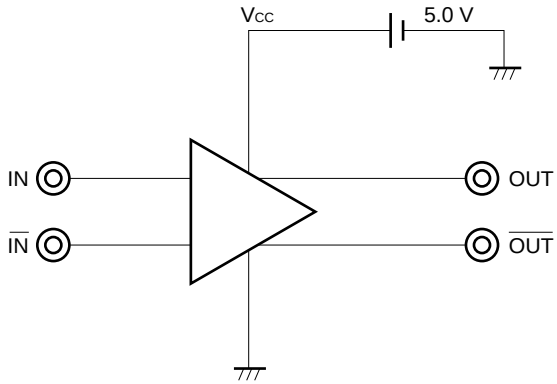
PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Circuit Current	I_{CC}	8.0	11.5	15.0	mA	No input signal
Power Gain	G_P	11.0	15	17.0	dB	f = 400 MHz
Noise Figure	NF		4.5	6.0	dB	f = 400 MHz
Upper Limit Operating Frequency	f_U	1.0	1.6		GHz	3 dB down below flat gain at 0.4 GHz
Isolation	ISL		60		dB	f = 400 MHz
Input Return Loss	RL_{in}		2.0		dB	f = 400 MHz
Output Return Loss	RL_{out}		4.0		dB	f = 400 MHz
Maximum Output Level	$P_{O(sat)}$	−5	−2		dBm	f = 400 MHz, P_{in} = −10 dBm

STANDARD CHARACTERISTICS FOR REFERENCE (T_A = +25 °C, Z_L = Z_S = 50 Ω)

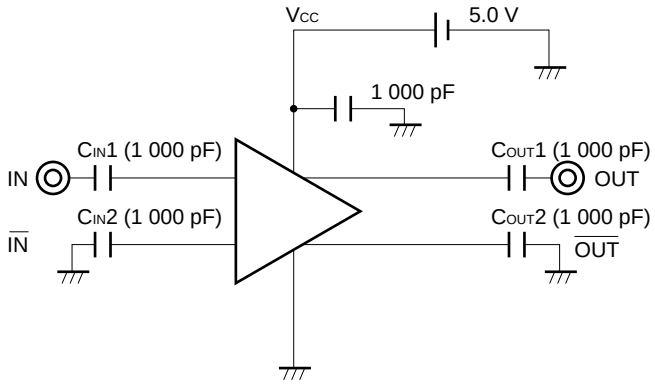
PARAMETERS	SYMBOL	REFERENCE VALUE	UNIT	TEST CONDITIONS
Circuit Current	I_{CC}	2.5	mA	V_{CC} = 2 V, No input signal
Power Gain	G_P	4.5	dB	V_{CC} = 2 V, f = 400 MHz
Noise Figure	NF	5.1	dB	V_{CC} = 2 V, f = 400 MHz
Upper Limit Operating Frequency	f_u	2.4	GHz	3 dB down below flat gain at 0.4 GHz
Isolation	ISL	58	dB	V_{CC} = 2 V, f = 400 MHz
Input Return Loss	RL_{in}	1.0	dB	V_{CC} = 2 V, f = 400 MHz
Output Return Loss	RL_{out}	4.0	dB	V_{CC} = 2 V, f = 400 MHz
Maximum Output Power	$P_{O(sat)}$	−14	dBm	V_{CC} = 2 V, f = 400 MHz, P_{in} = −10 dBm
3rd Order Intermodulation Distortion	IM_3	−29	dBc	V_{CC} = 2 V, $P_{O(each)}$ = −25 dBm, f_1 = 400 MHz, f_2 = 402 MHz
3rd Order Intermodulation Distortion	IM_3	−45	dBc	V_{CC} = 5 V, $P_{O(each)}$ = −25 dBm, f_1 = 400 MHz, f_2 = 402 MHz

TEST CIRCUITS

DC Parameters

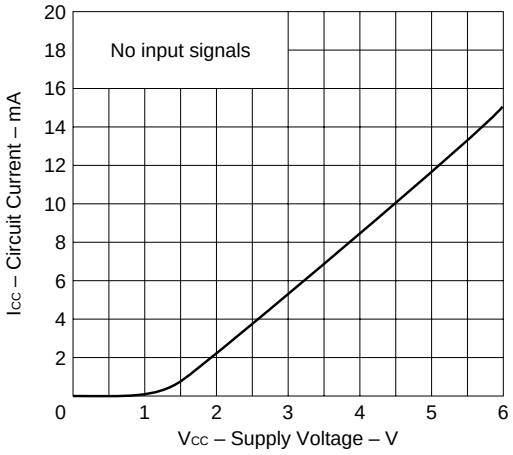


AC Parameters

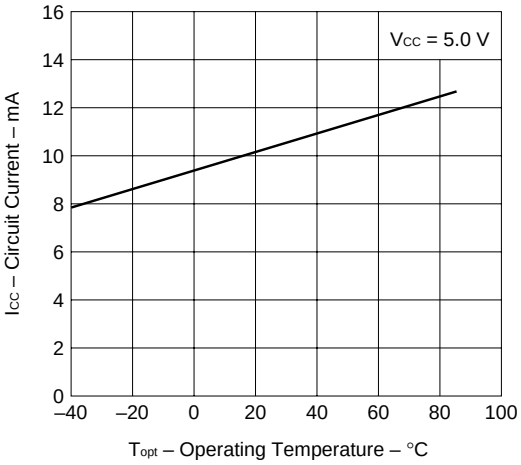


TYPICAL CHARACTERISTICS (Unless otherwise specified T_A = +25 °C)

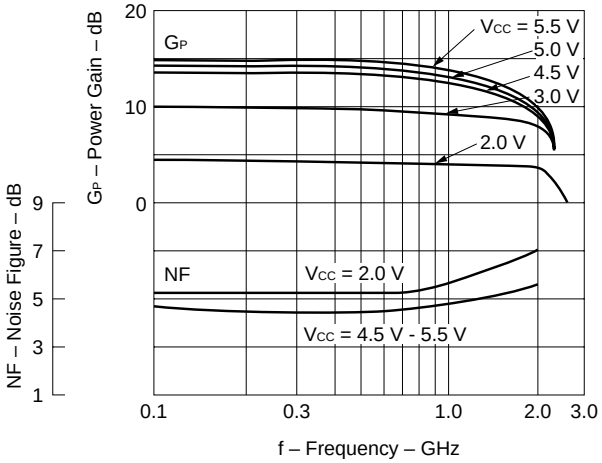
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



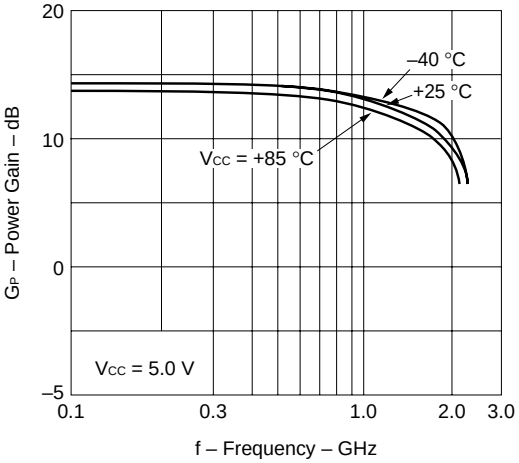
CIRCUIT CURRENT vs. OPERATING TEMPERATURE



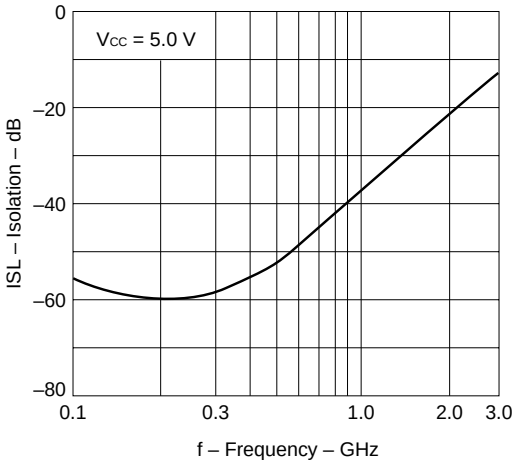
NOISE FIGURE, POWER GAIN vs. FREQUENCY



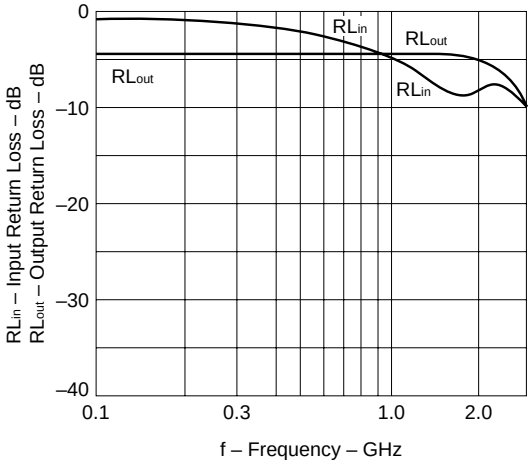
POWER GAIN vs. FREQUENCY



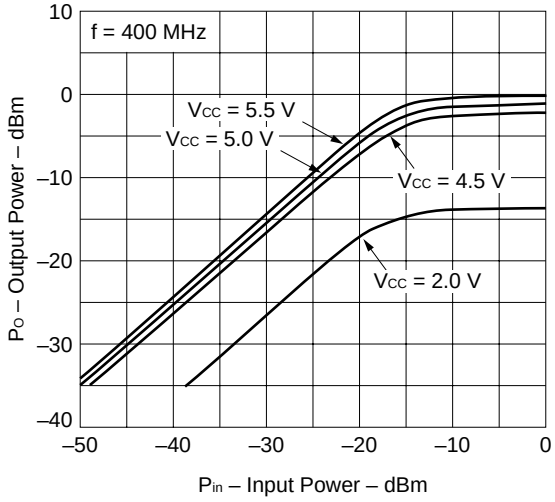
ISOLATION vs. FREQUENCY



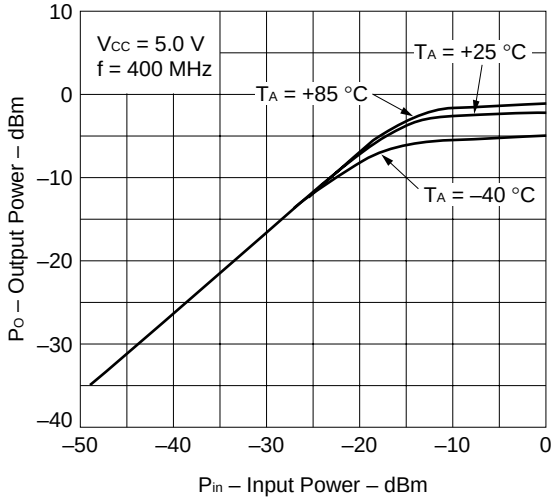
RETURN LOSS vs. FREQUENCY



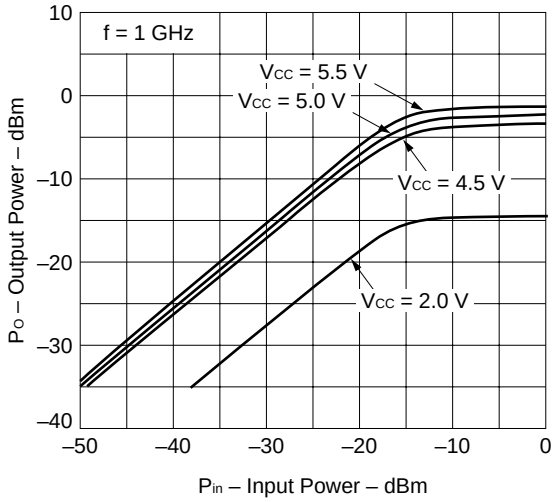
OUTPUT POWER vs. INPUT POWER



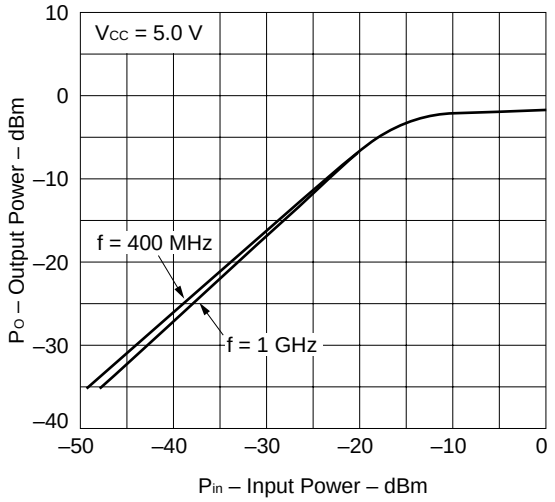
OUTPUT POWER vs. INPUT POWER



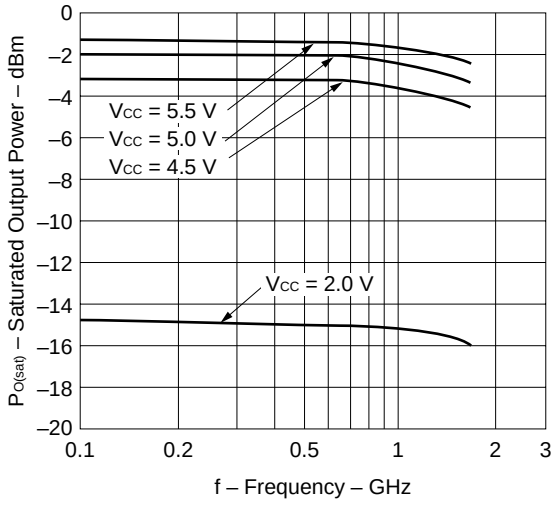
OUTPUT POWER vs. INPUT POWER



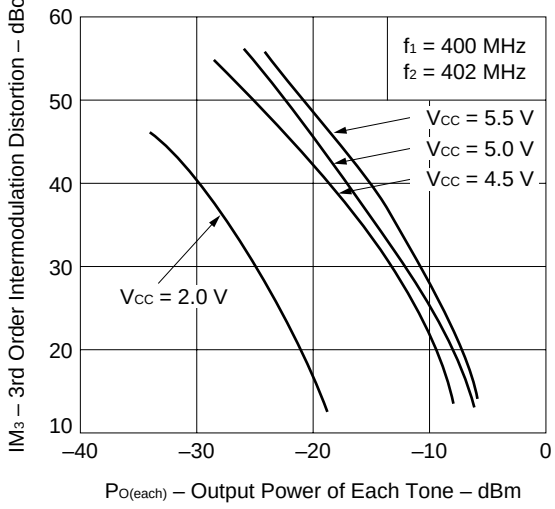
OUTPUT POWER vs. INPUT POWER



SATURATED OUTPUT POWER vs. FREQUENCY

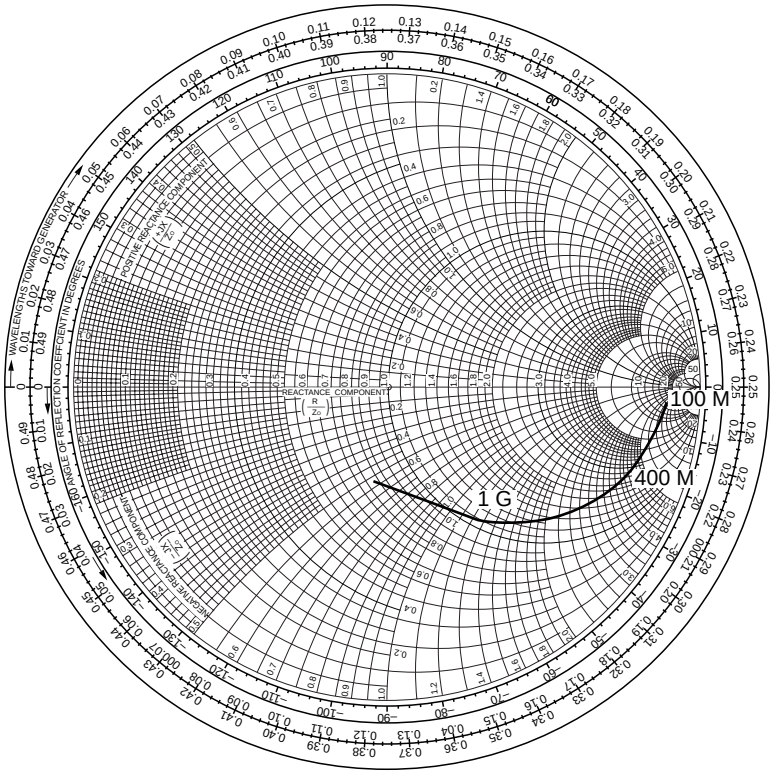


3rd ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE



S PARAMETER

S_{11}-FREQUENCY



S_{22}-FREQUENCY

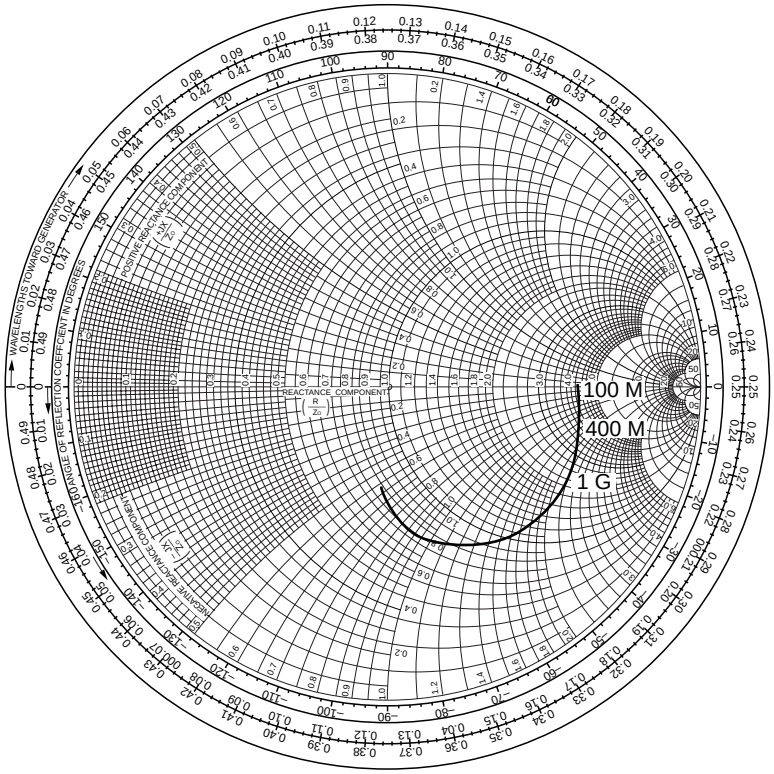
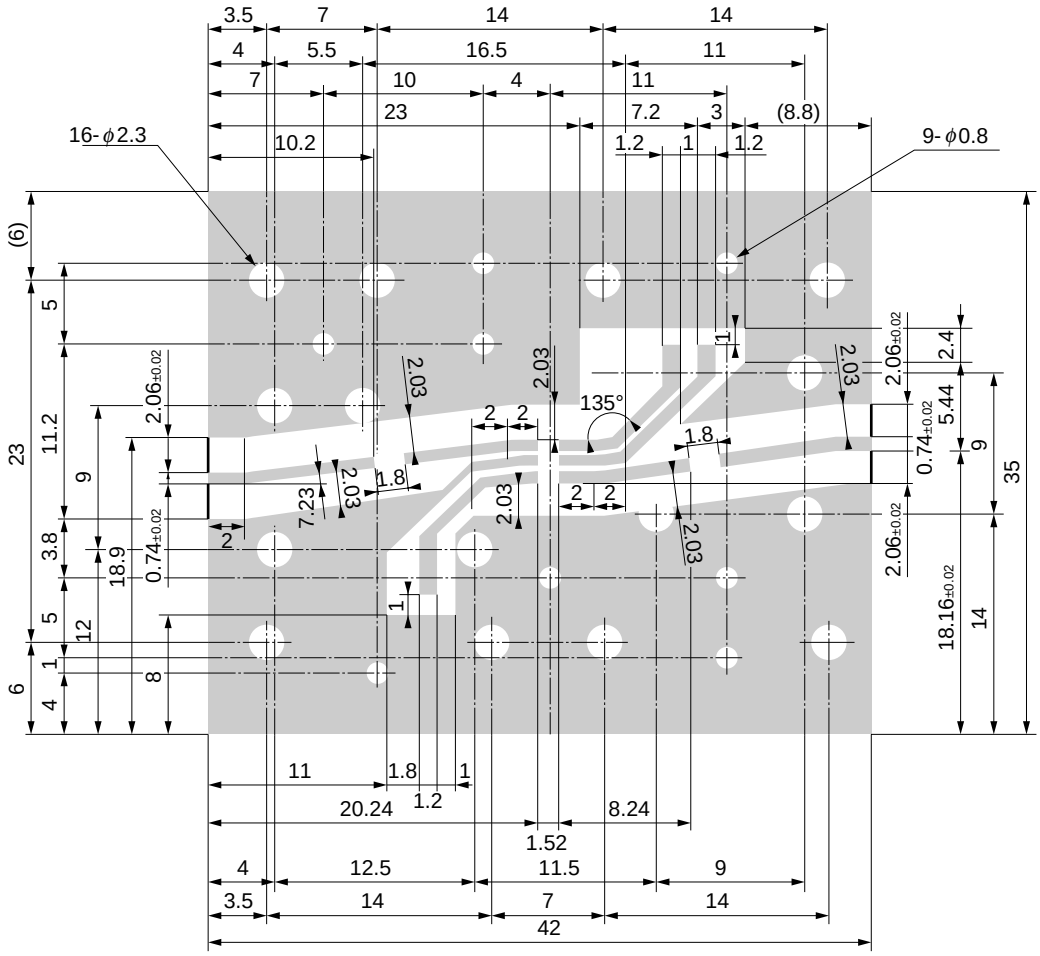
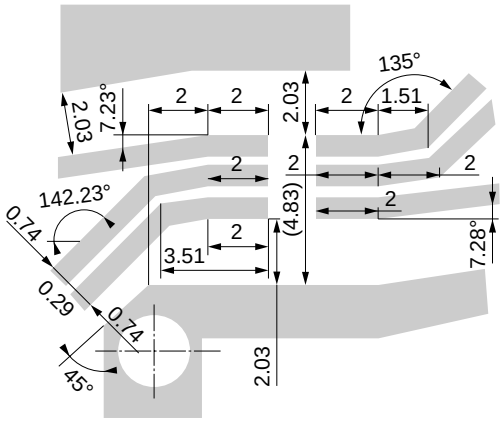


ILLUSTRATION OF THE EVALUATION BOARD FOR TEST CIRCUIT





DETAIL LAYOUT t = 0.4

Note

(1) 50 × 50 × 0.5 mm double copper clad polyimide board.

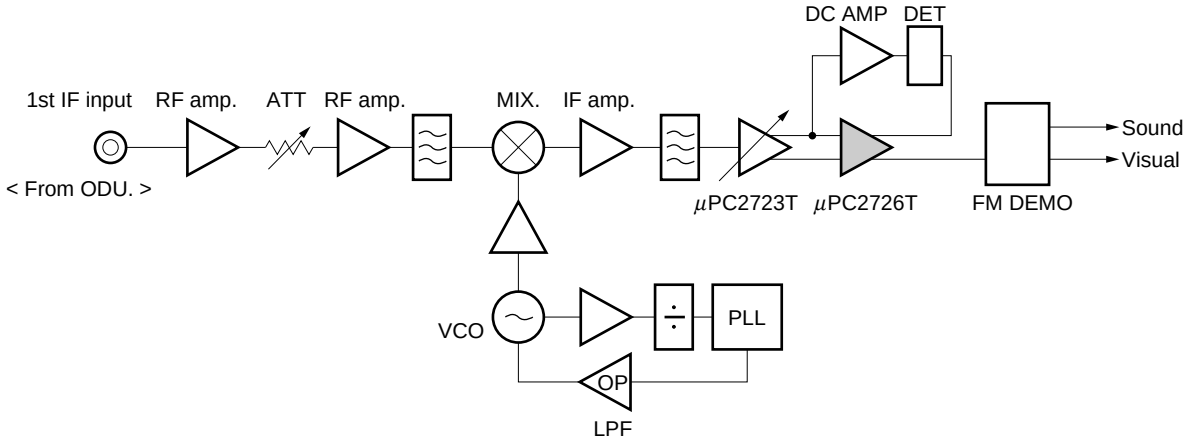
(2) Back side: GND pattern

(3) Solder plated on pattern

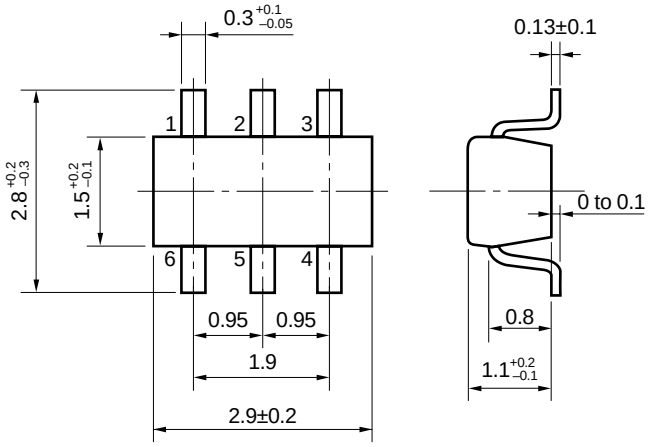
(4) ○: Through holes

EXAMPLE FOR SYSTEM APPLICATION

DBS tuner



6 PINS MINI MOLD PACKAGE DIMENSIONS (Unit: mm)



NOTE ON CORRECT USE

(1) Observe precautions for handling because of electro-static sensitive devices.
(2) Form a ground pattern as wide as possible to prevent an increase in ground impedance (which can cause undesired oscillation).
(3) Keep the wiring length of the ground pins as short as possible.
(4) Connect a bypass capacitor (having, for example, a capacitance of 1 000 pF) to the V_{CC} pin.

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.

μPC2726T

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

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

Note 1. 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]

The applicatoin circuit and circuit constants shown in this document are for reference only and may not be employed for mass production of the application system.

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