CEL

NEC's POWER AMPLIFIER FOR BLUETOOTH™ CLASS 1

UPG2301TQ

FEATURES

- **OPERATION FREQUENCY**
  f_{opt} = 2,400 to 2,500 MHz (2 450 MHz TYP.)
- **SUPPLY VOLTAGE**
  $V_{CC1, 2} = V_{bias}$ = 2.7 to 3.6 V (3.3 V TYP.)
- **CONTROL VOLTAGE**
  V_{cont} = 0 to 3.6 V (2.5 V TYP.)
  V_{enable} = 0 to 3.1 V (2.9 V TYP.)
- **CIRCUIT CURRENT**
  I_{CC} = 120 mA TYP.@ $V_{CC1, 2} = V_{bias}$ = 3.3 V, V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- **MAXIMUM POWER**
  $P_{out(MAX.)}$ = +23 dBm TYP.@ $V_{CC1, 2} = V_{bias}$ = 3.3 V, V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- **GAIN CONTROL RANGE**
  GCR = 23 dB TYP.@ $V_{CC1, 2} = V_{bias}$ = 3.3 V, V_{cont} = 0 to 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- **POWER GAIN**
  G_P = 23 dB TYP.(Reference value)
- **HIGH EFFICIENCY**
  PAE = 50% TYP.(Reference value)
- **SHUT DOWN FUNCTION**
- **HIGH-DENSITY SURFACE MOUNTING**
  10 pin plastic TSON package (2.4 × 2.55 × 0.6 mm)

DESCRIPTION

NEC's μPG2301TQ is a GaAs HBT MMIC for power amplifier for Bluetooth Class 1.

This device realizes high efficiency, high gain and high output power by using InGaP HBT. This device is housed in a low profile 10-pin plastic TSON package.

APPLICATION

- **POWER AMPLIFIER FOR BLUETOOTH CLASS 1**
- **WIRELESS LAN**

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, T_A = +25°C, $V_{CC1, 2} = V_{bias}$ = 3.3 V, f = 2,450 MHz, External input and output matching)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Circuit Current	I_{CC}	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	110	120	130	mA
Shut Down Current	$I_{shut\ down}$	V_{cont} = 2.5 V, V_{enable} = 0 V, P_{in} = +4 dBm	–	0.1	1.0	μA
Output Power 1	P_{out1}	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	+21	+23	+24.5	dBm
Output Power 2	P_{out2}	V_{cont} = 0 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	–	0	+1	dBm
Gain Control Range	GCR	V_{cont} = 0 to 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	20	23	–	dB

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, T_A = +25°C, $V_{CC1, 2} = V_{bias}$ = 3.3 V, f = 2,450 MHz, External input and output matching)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Efficiency	PAE	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	–	50	–	%
Power Gain	G_P	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = –5 dBm	–	23	–	dB

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC1,2}$ / V_{bias}	5.0	V
Control Voltage	V_{cont} / V_{enable}	3.6	V
Circuit Current	I_{CC}	400	mA
Control Current	I_{cont} / I_{enable}	0.5	mA
Power Dissipation	P_D	700 Note	mW
Operating Ambient Temperature	T_A	–40 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Input Power	P_{in}	+10	dBm

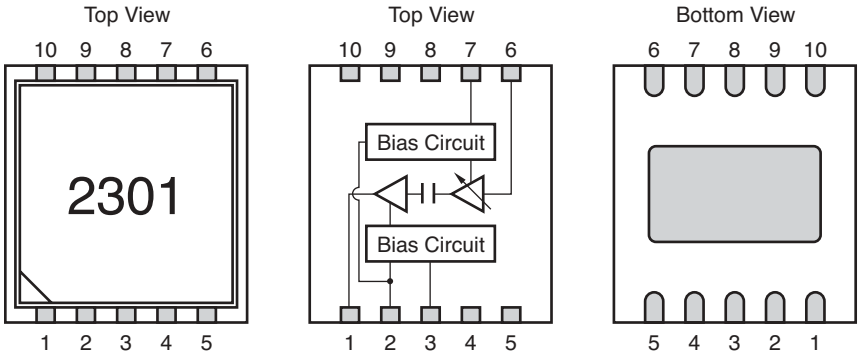
Note Mounted on double copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE

(T_A = +25°C)

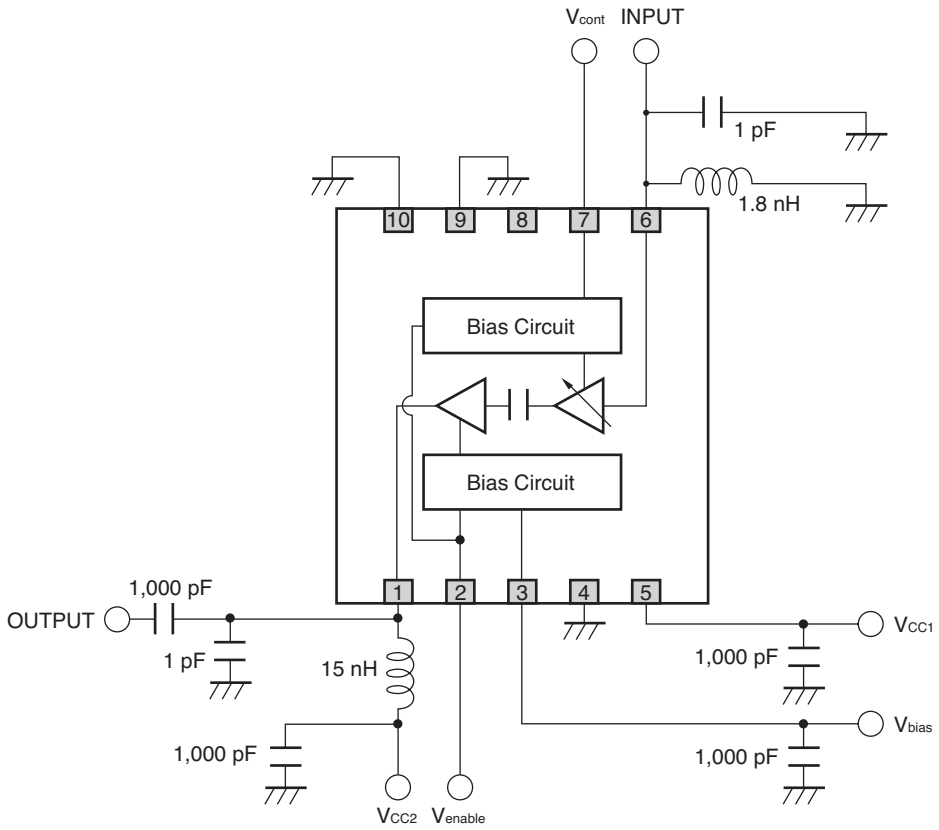
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Frequency	f_{opt}	2,400	2,450	2,500	MHz
Supply Voltage	$V_{CC1,2}$ / V_{bias}	2.7	3.3	3.6	V
Control Voltage	V_{cont}	0	2.5	3.6	V
	V_{enable}	0	2.9	3.1	

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



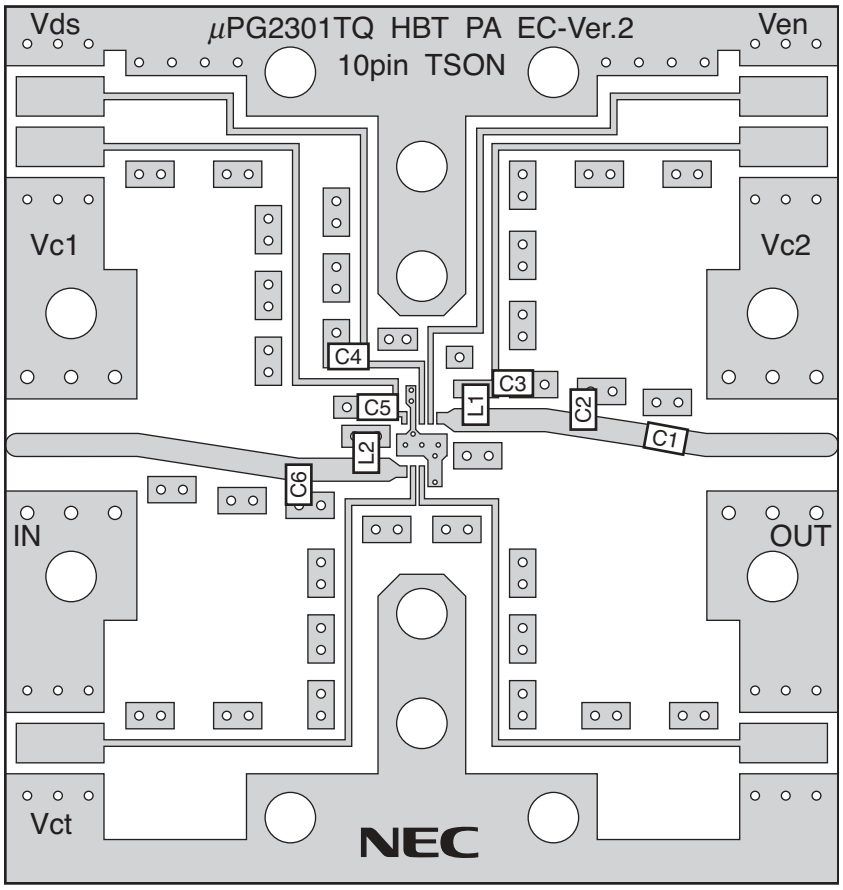
PIN NO.	PIN NAME
1	OUTPUT/ V_{CC2}
2	V_{enable}
3	V_{bias}
4	GND
5	V_{CC1}
6	INPUT
7	V_{cont}
8	N.C.
9	GND
10	GND

ELEVALUATION CIRCUIT ($V_{CC1, 2}$ = V_{bias} = 3.3 V, f = 2,450 MHz)



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

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

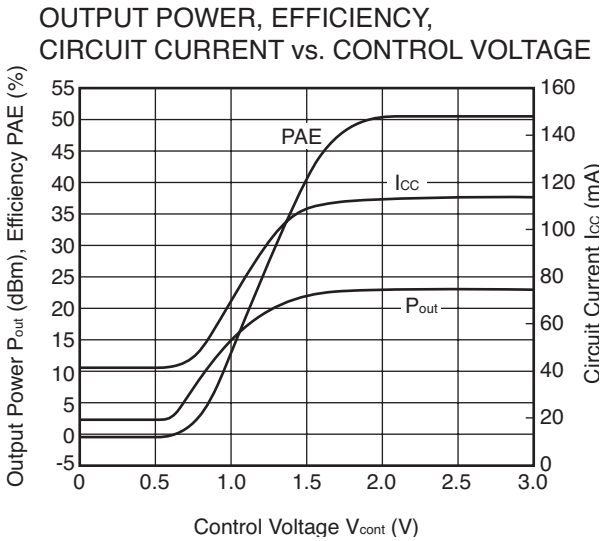


COMPONENT LIST

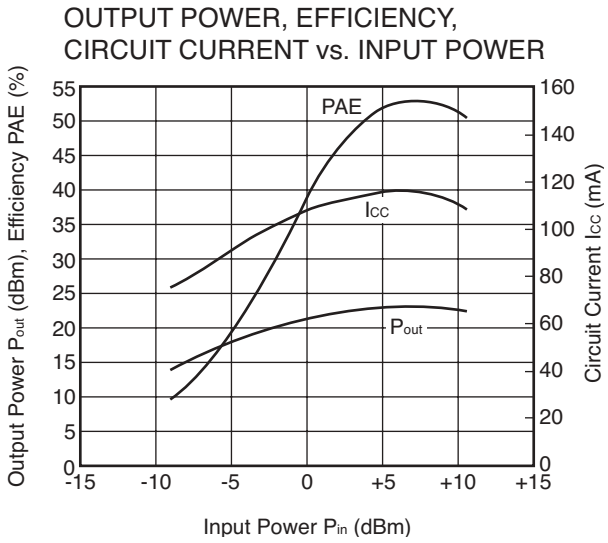
SYMBOL	RATING	PART NUMBER	MANUFACTURER
C1, C3, C4, C5	1,000 pF	GRM39CH102J50	muRata
C2, C6	1 pF	GRM39CH010C50	muRata
L1	15 nH	TFL0816-15N	Susumu
L2	1.8 nH	TFL0816-1N8	Susumu

TYPICAL CHARACTERLISTICS

Condition : f = 2,450 MHz, $V_{CC1} = V_{CC2} = V_{bias}$ = 3.3 V, V_{enable} = 2.9 V, P_{in} = +4 dBm, External input and output matching



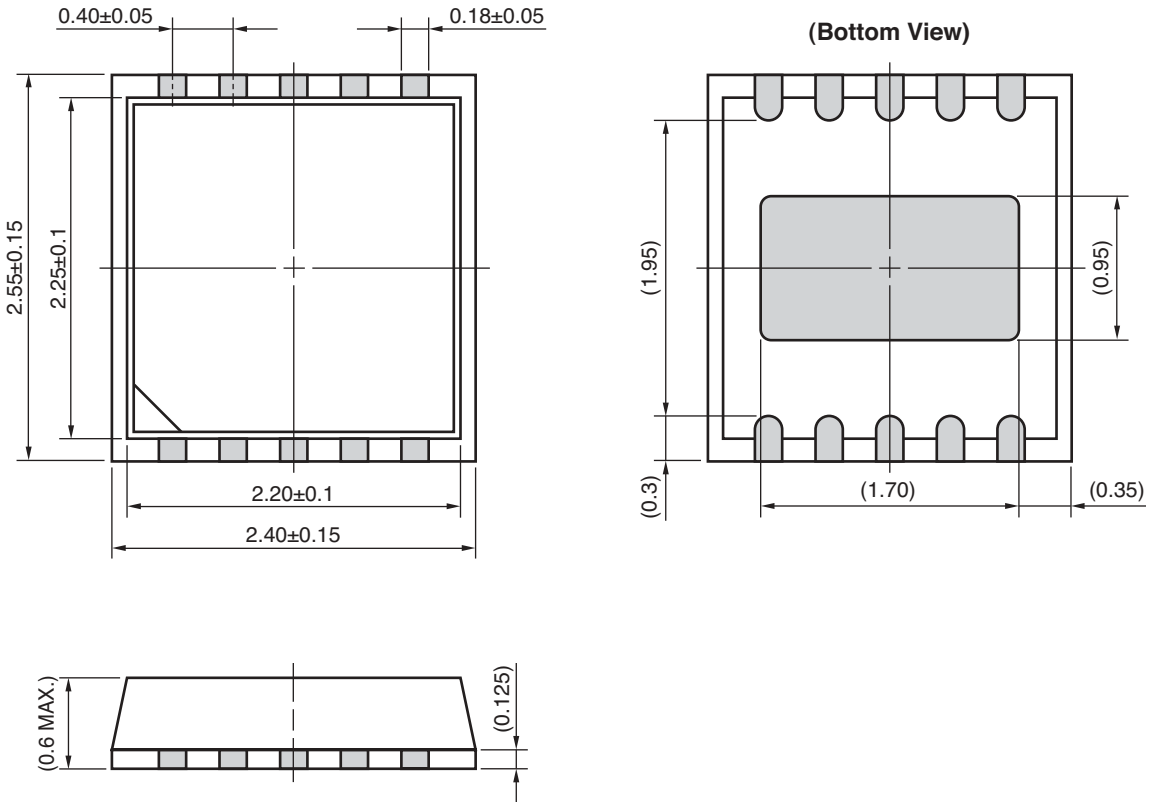
Condition : f = 2,450 MHz, $V_{CC1} = V_{CC2} = V_{bias}$ = 3.3 V, V_{enable} = 2.9 V, V_{cont} = 2.5 V, External input and output matching



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

10-PIN PLASTIC TSON (UNIT: mm)



Note () : Reference value

ORDERING INFORMATION

PART NUMBER	PACKAGE	MARKING	SUPPLYING FORM
μPG2301TQ-E1	10-pin plastic TSON	2301	• Embossed tape 8 mm wide • Pin 5, 6 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: μPG2301TQ