DATA SHEET

NEC

GaAs HBT INTEGRATED CIRCUIT

μPG2315T5T

2.4 GHz SINGLE BAND POWER AMPLIFIER FOR W-LAN

DESCRIPTION

The μPG2315T5T is GaAs HBT MMIC power amplifier which were developed for W-LAN.

This device realizes high efficiency, high gain and high output power by using InGaP HBT. This device is housed in a 16-pin plastic QFN (Quad Flat Non-leaded) package. And this package is able to high-density surface mounting.

FEATURES

- Operation frequency : f_{opt} = 2 400 to 2 500 MHz (2 450 MHz TYP.)
- Supply voltage : $V_{CC}1, 2$ = 3.0 to 3.6 V (3.3 V TYP.)
- Control voltage : V_{enable} = 0 to 2.95 V (2.85 V TYP.)
- Circuit current : I_{CC} = 130 mA TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, P_{out} = +18 dBm (at OFDM modulation)
- Power gain : G_P = 26 dB TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, P_{out} = +18 dBm (at OFDM modulation)
- Gain flatness : ΔG_P = 1.0 dB TYP. @ f = 2.4 to 2.5 GHz, $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, P_{out} = +18 dBm (at OFDM modulation)
- Error vector magnitude : EVM = 3% TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, P_{out} = +18 dBm (at OFDM modulation)
- Harmonics : $2f_0, 3f_0, 4f_0$ = 30 dBc TYP. @ $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, P_{out} = +18 dBm (at OFDM modulation)
- High-density surface mounting : 16-pin plastic QFN package (3.0 × 3.0 × 0.75 mm)

APPLICATIONS

- Power Amplifier for W-LAN (802.11 b/g) and DECT

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2315T5T-E2	μPG2315T5T-E2-A	16-pin plastic QFN (Pb-Free)	2315	• Embossed tape 8 mm wide • Pin 1, 12 face the perforation side of the tape • Qty 3 kpcs/reel

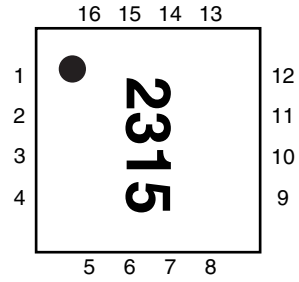
Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPG2315T5T

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

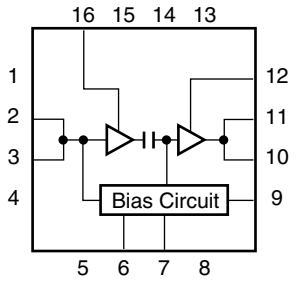
Document No. PG10625EJ01V0DS (1st edition)
Date Published July 2006 NS CP(K)
Printed in Japan

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

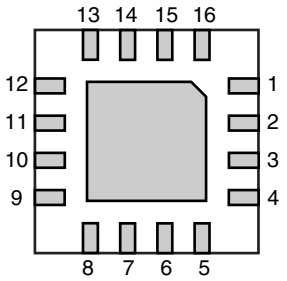
(Top View)



(Top View)



(Bottom View)



Pin No.	Pin Name
1	N.C.
2	INPUT
3	INPUT
4	N.C.
5	N.C.
6	$V_{enable}1$
7	$V_{enable}2$
8	N.C.
9	V_{det}
10	OUTPUT
11	OUTPUT
12	$V_{CC}2$
13	N.C.
14	N.C.
15	N.C.
16	$V_{CC}1$

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	$V_{CC}1, 2$	5.0	V
Control Voltage	V_{enable}	4.0	V
Input Power	P_{in}	+10	dBm
Power Dissipation	P_D	500 Note	mW
Operating Ambient Temperature	T_A	−45 to +85	°C
Storage Temperature	T_{stg}	−55 to +150	°C

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

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

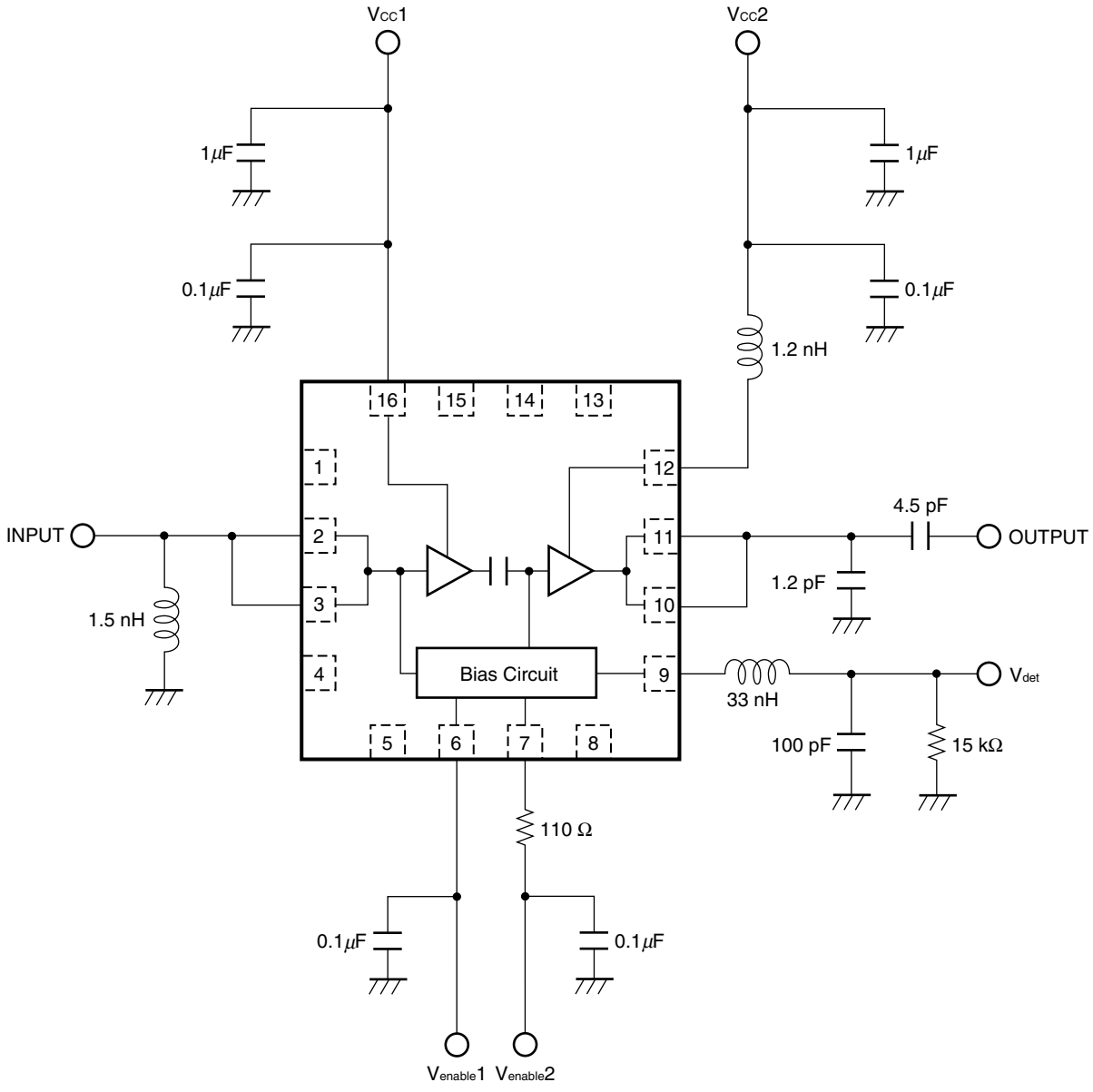
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f_{opt}	2 400	2 450	2 500	MHz
Supply Voltage	$V_{CC}1, 2$	3.0	3.3	3.6	V
Control Voltage	V_{enable}	0	2.85	2.95	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, $V_{CC}1, 2$ = 3.3 V, V_{enable} = 2.85 V, f = 2 400 to 2 500 MHz, External input and output matching, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	P_{out} = +18 dBm (at OFDM modulation)	–	130	150	mA
Power Gain	G_P	P_{out} = +18 dBm (at OFDM modulation)	23	26	–	dB
Gain Flatness	ΔG_P	P_{out} = +18 dBm (at OFDM modulation)	–	1.0	1.5	dB
Error Vector Magnitude	EVM	P_{out} = +18 dBm (at OFDM modulation)	–	3.0	–	%
Input Return Loss	RL_{in}	P_{in} = –30 dBm	–	15	–	dB
Output Return Loss	RL_{out}	P_{in} = –30 dBm	–	10	–	dB
2nd Harmonics	$2f_0$	P_{out} = +18 dBm (at OFDM modulation)	–	30	–	dBc
3rd Harmonics	$3f_0$	P_{out} = +18 dBm (at OFDM modulation)	–	30	–	dBc
4th Harmonics	$4f_0$	P_{out} = +18 dBm (at OFDM modulation)	–	30	–	dBc
Power Detector Voltage	V_{det}		0.5	–	2.0	V

EVALUATION CIRCUIT



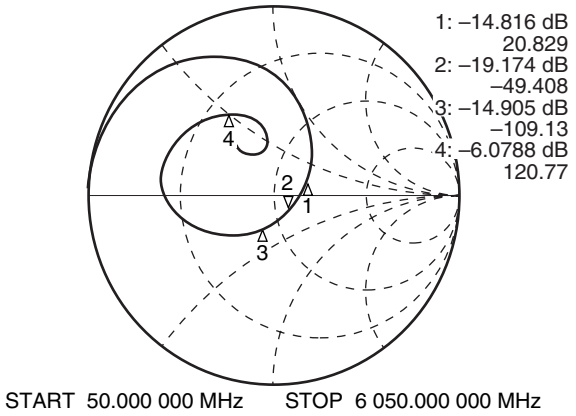
The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

TYPICAL CHARACTERISTICS

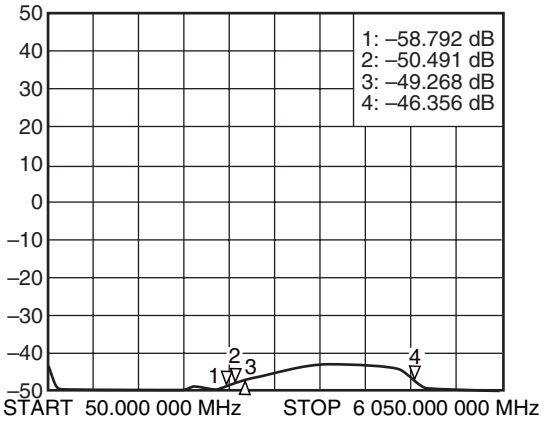
S-parameter (Reference Data) –This data is included external matching components–

Condition : $V_{CC}1 = V_{CC}2 = 3.3$ V, $V_{enable}1 = V_{enable}2 = 2.85$ V, $I_q = 58$ mA

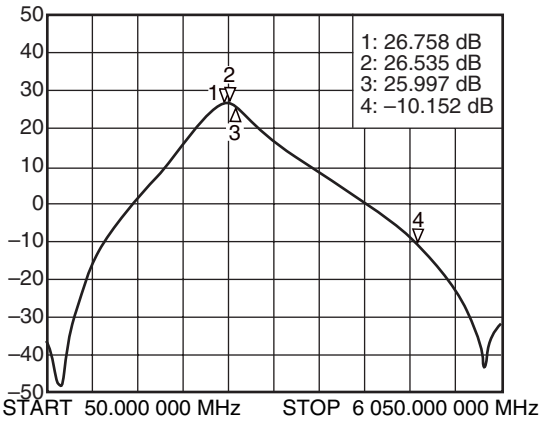
S_{11}-FREQUENCY



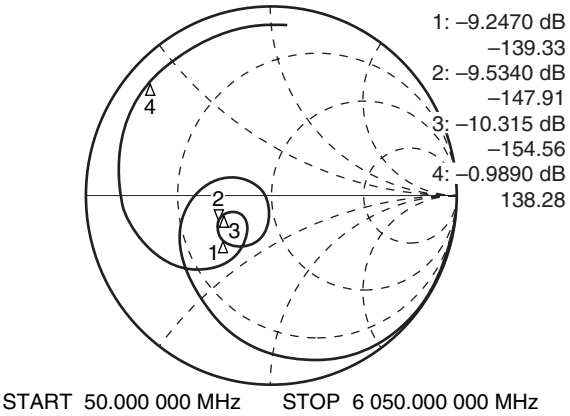
S_{12}-FREQUENCY



S_{21}-FREQUENCY



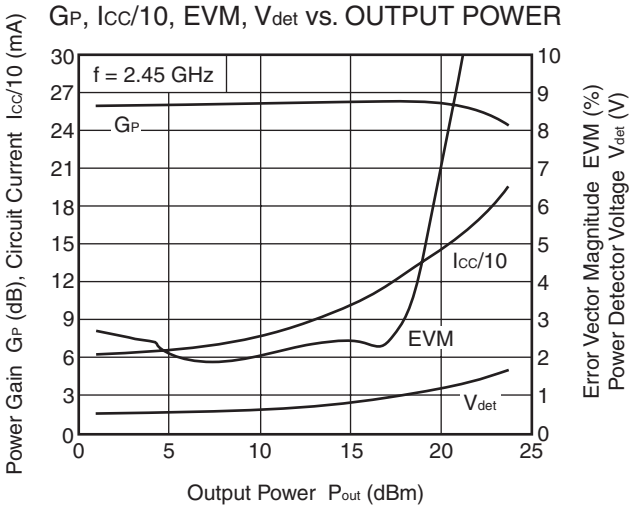
S_{22}-FREQUENCY

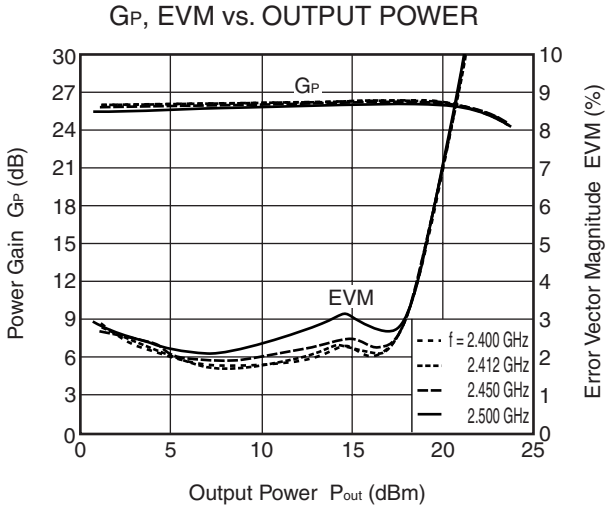


Remarks 1. The graphs indicate nominal characteristics.

2. Marker1 : 2.40 GHz
Marker2 : 2.45 GHz
Marker3 : 2.50 GHz
Marker4 : 4.90 GHz

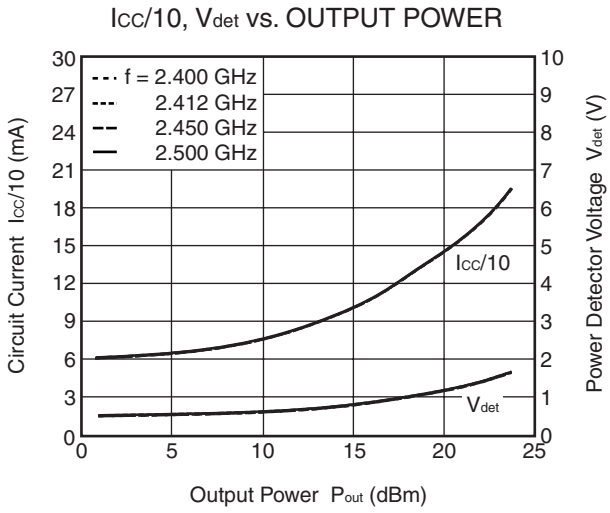
Typical power performance characteristics ($V_{CC}1 = V_{CC}2 = 3.3$ V, $V_{enable}1 = V_{enable}2 = 2.85$ V)





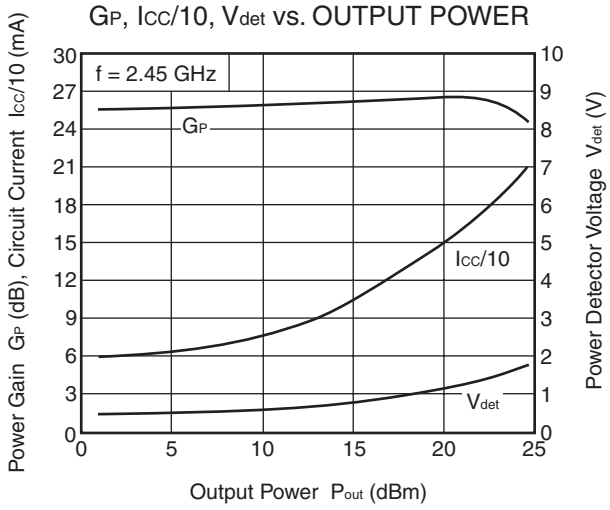
Remark The graphs indicate nominal characteristics.

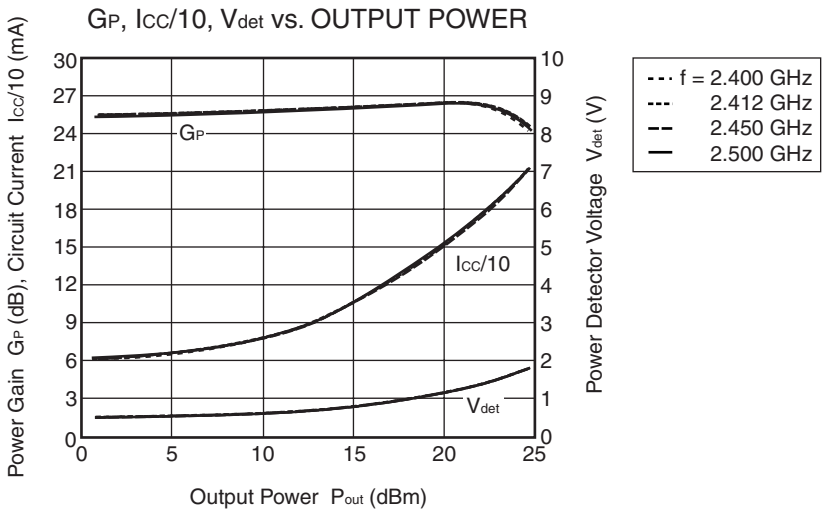
Typical V_{det} performance characteristics ($V_{CC}1 = V_{CC}2 = 3.3$ V, $V_{enable}1 = V_{enable}2 = 2.85$ V)

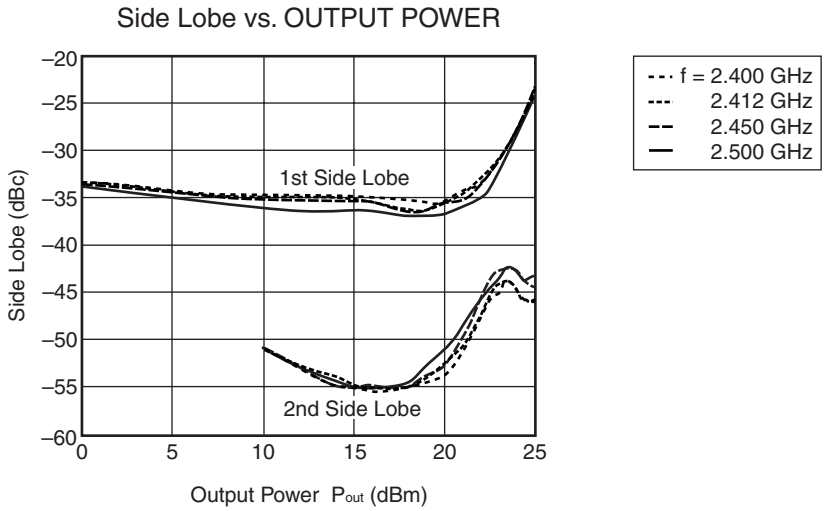


Remark The graph indicates nominal characteristics.

Typical 802.11b power performance characteristics ($V_{CC}1 = V_{CC}2 = 3.3$ V, $V_{enable}1 = V_{enable}2 = 2.85$ V)



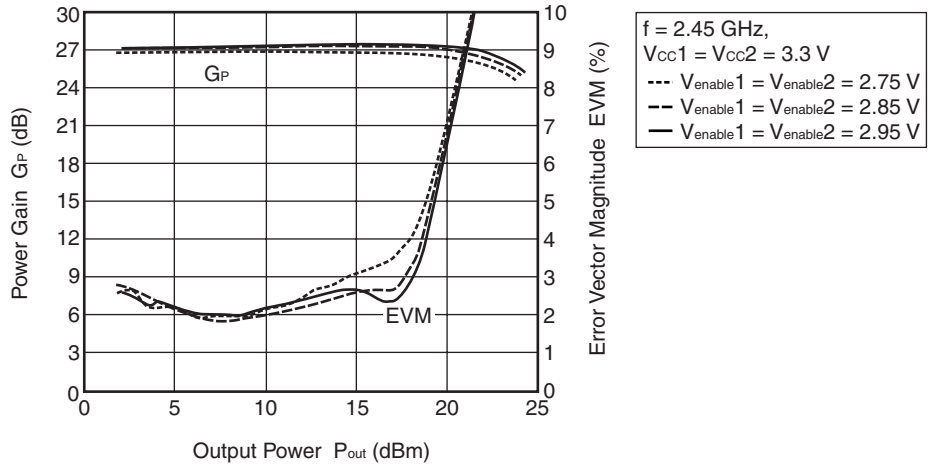




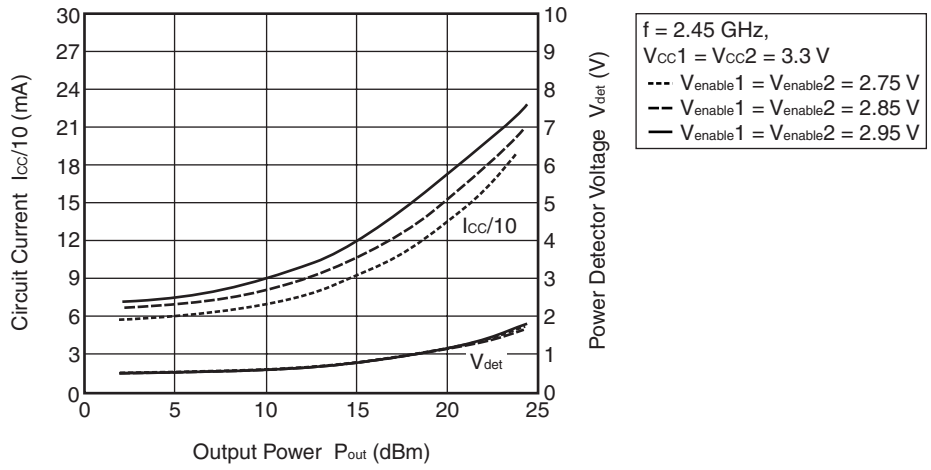
Remark The graphs indicate nominal characteristics.

Typical V_{enable} dependency of power performance characteristics

G_P, EVM vs. OUTPUT POWER



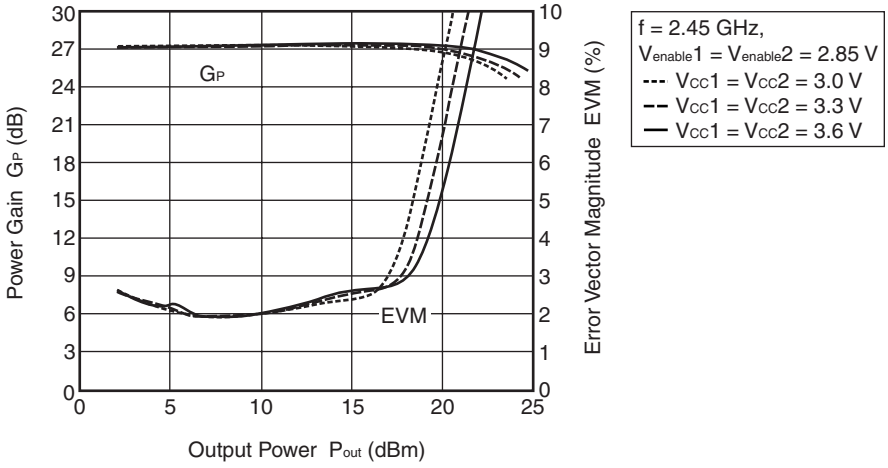
I_{CC}/10, V_{det} vs. OUTPUT POWER



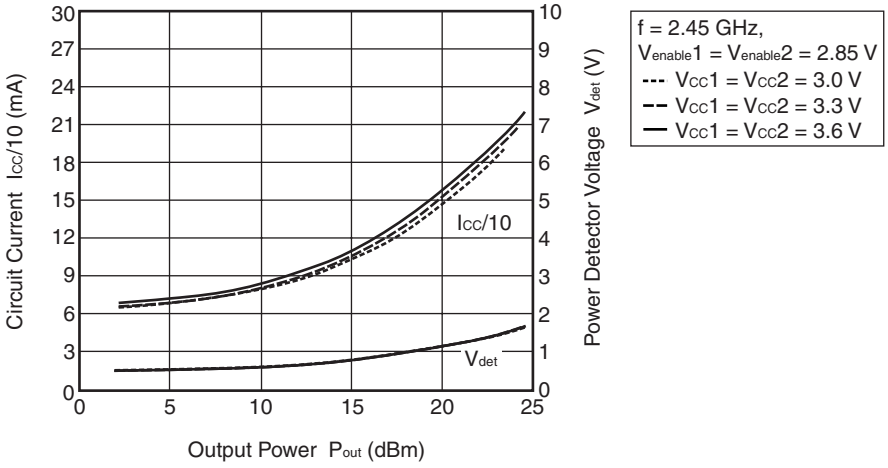
Remark The graphs indicate nominal characteristics.

Typical V_{CC} dependency of power performance characteristics

G_P, EVM vs. OUTPUT POWER



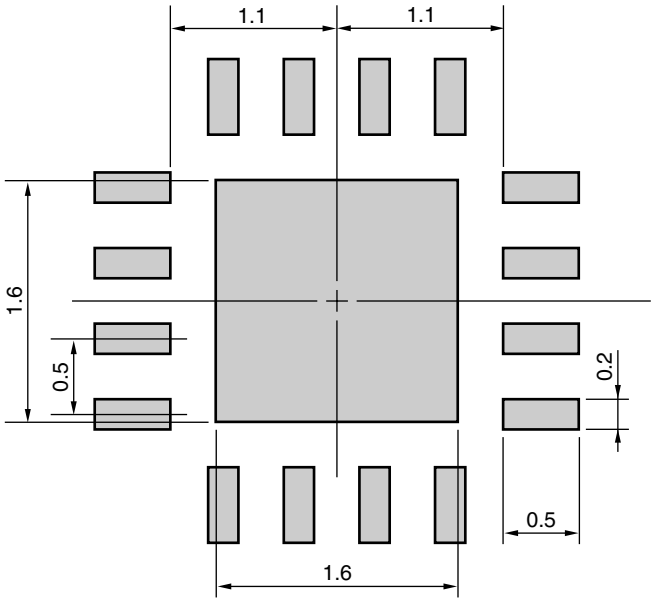
I_{CC}/10, V_{det} vs. OUTPUT POWER



Remark The graphs indicate nominal characteristics.

MOUNTING PAD DIMENSIONS

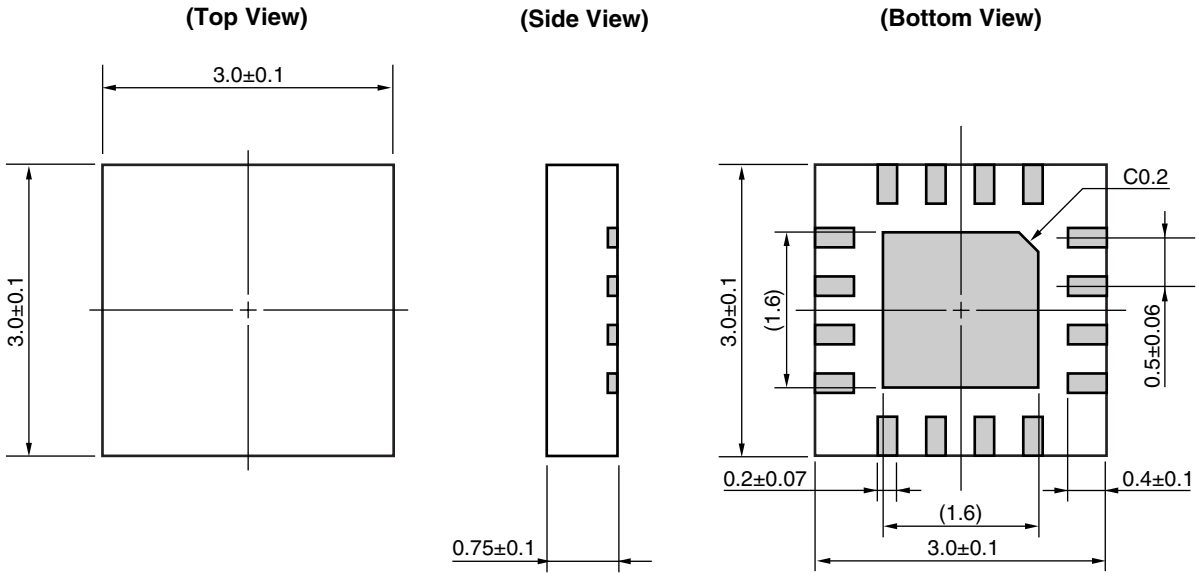
16-PIN PLASTIC QFN (UNIT: mm)



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

PACKAGE DIMENSIONS

16-PIN PLASTIC QFN (UNIT: mm)



Remark ( ) : Reference value

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) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 120°C or below : 1 time : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (terminal temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

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

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▶**For further information, please contact**

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