

Features

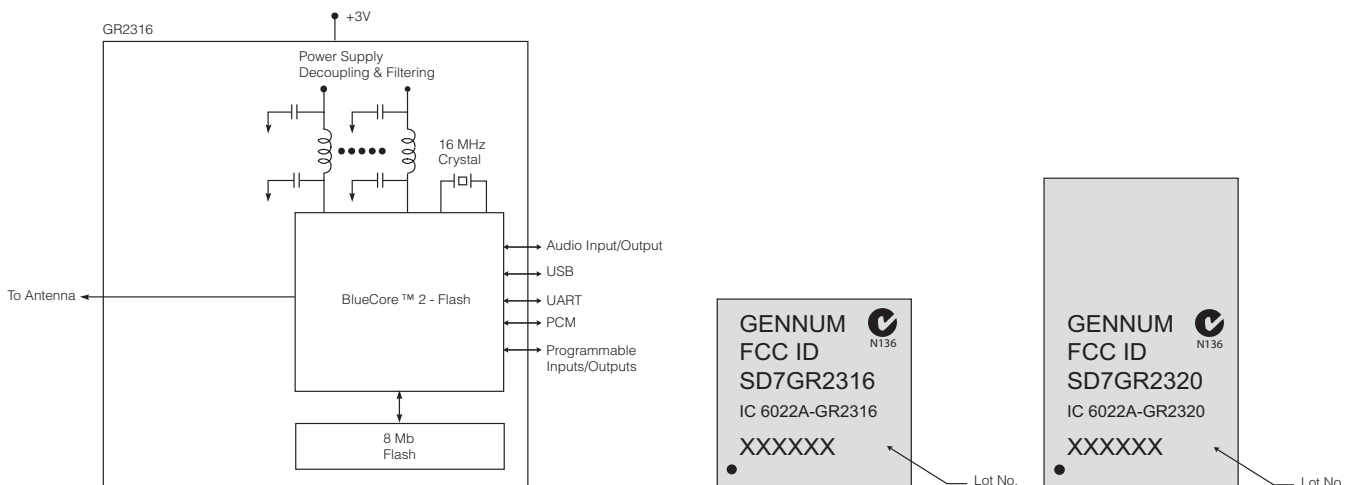
- Compliant to the Bluetooth® specifications v1.2 and v1.1
- RoHS compliant (see [Ordering Information on page 12](#))
- FCC, CE, Industry Canada, Australia certified
- Class 2 operation
- Integrated voice codec
- BlueCore™ HCI firmware stack
- Internal 8Mb flash, 16MHz crystal
- Power control function supported
- Surface mount compatible with standard 1.0mm BGA package interface
- GR2316 size: 14.5mm x 14.5mm x 3mm
- GR2320 size: 23mm x 14.5mm x 3mm
- Temperature range: -20°C to +85°C
- Voltage range: +2.2V to +3.6V

Description

The GR2316 (without on-board antenna) / GR2320 (with on-board antenna) is one of the smallest modules available providing the most flexibility for a wide range of applications. Powered by Cambridge Silicon Radio's world leading single-chip technology, and combined with Gennum's packaging technology, the result is a fully integrated module providing a complete system for data and voice communications.

Applications

- Headsets
- Keyboards
- Mobile Phones
- Personal Digital Assistants (PDAs)



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BlueCore™ is a trademark owned by Cambridge Silicon Radio.
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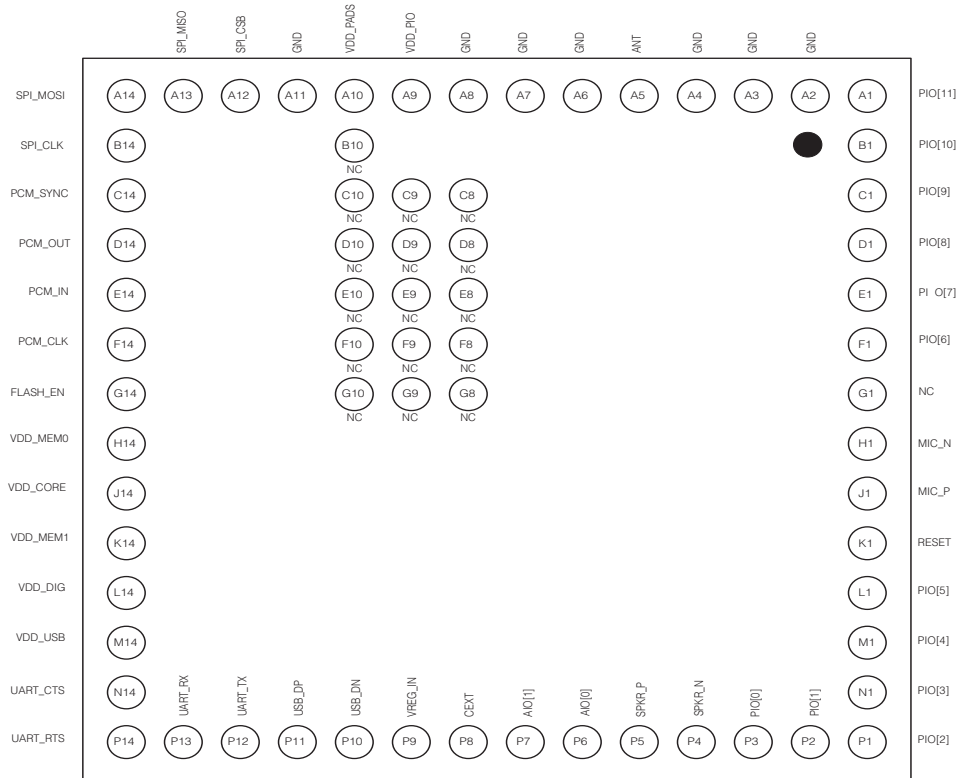


Block diagram

Contents

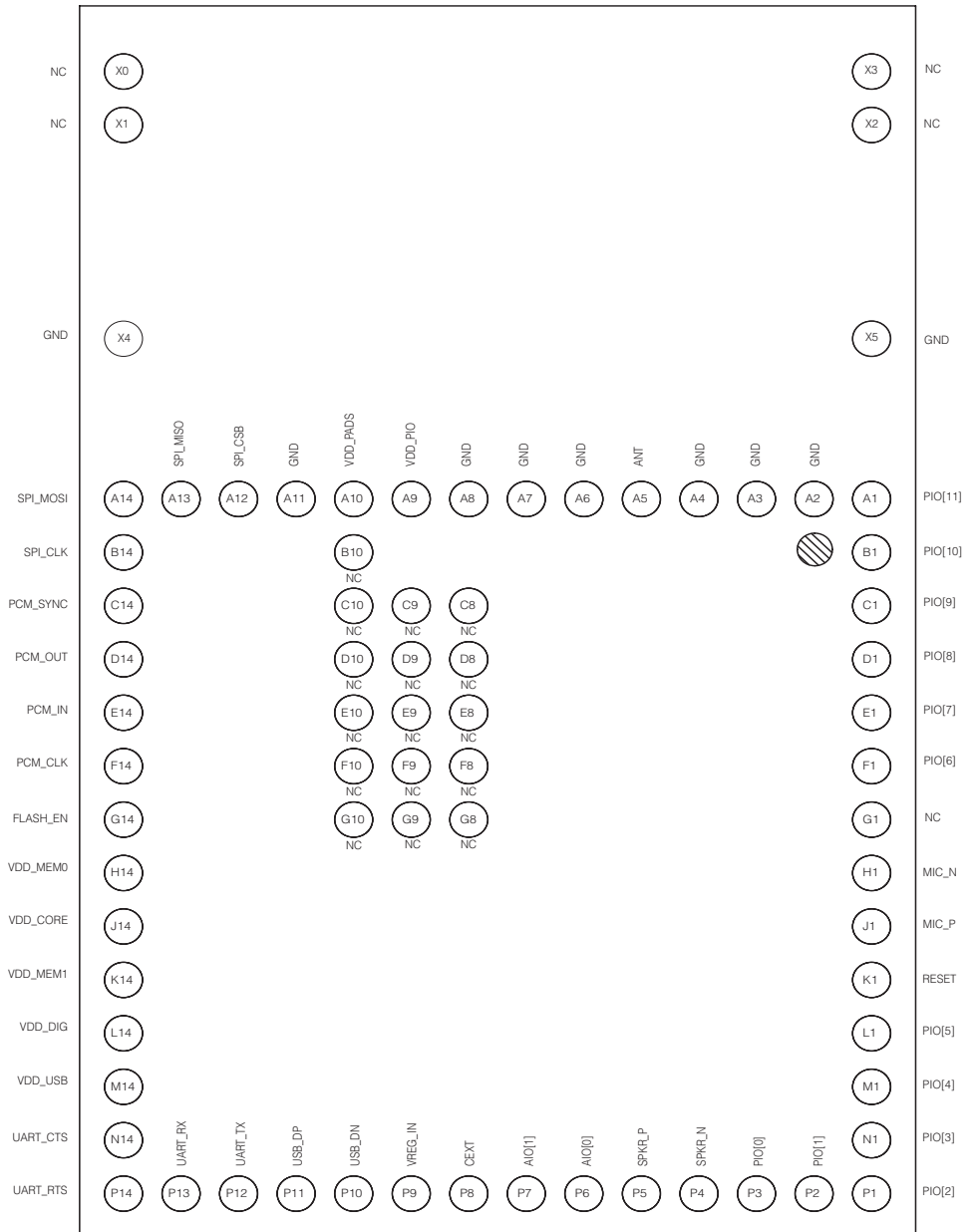
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1. Pinout



NOTE:
NC = No connection

Figure 1-1: GR2316 bottom view



NOTE:
NC = No connection

Figure 1-2: GR2320 bottom view

2. Package Information

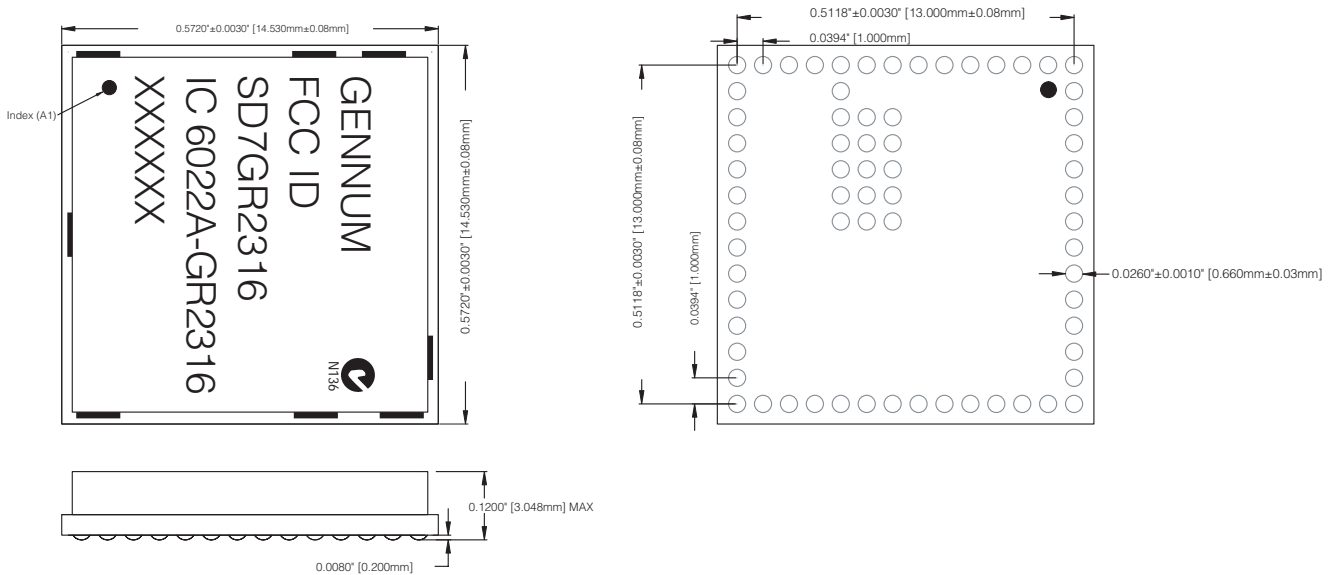


Figure 2-1: GR2316 package dimensions

NOTE: The following GigaAnt (www.gigaant.com) antennas have been approved for use with the GR2316 module:

- Rufa
- Picea
- Titanis
- Flavus
- Mica

For other types of antennas, please contact Gennum (bluetooth@gennum.com).

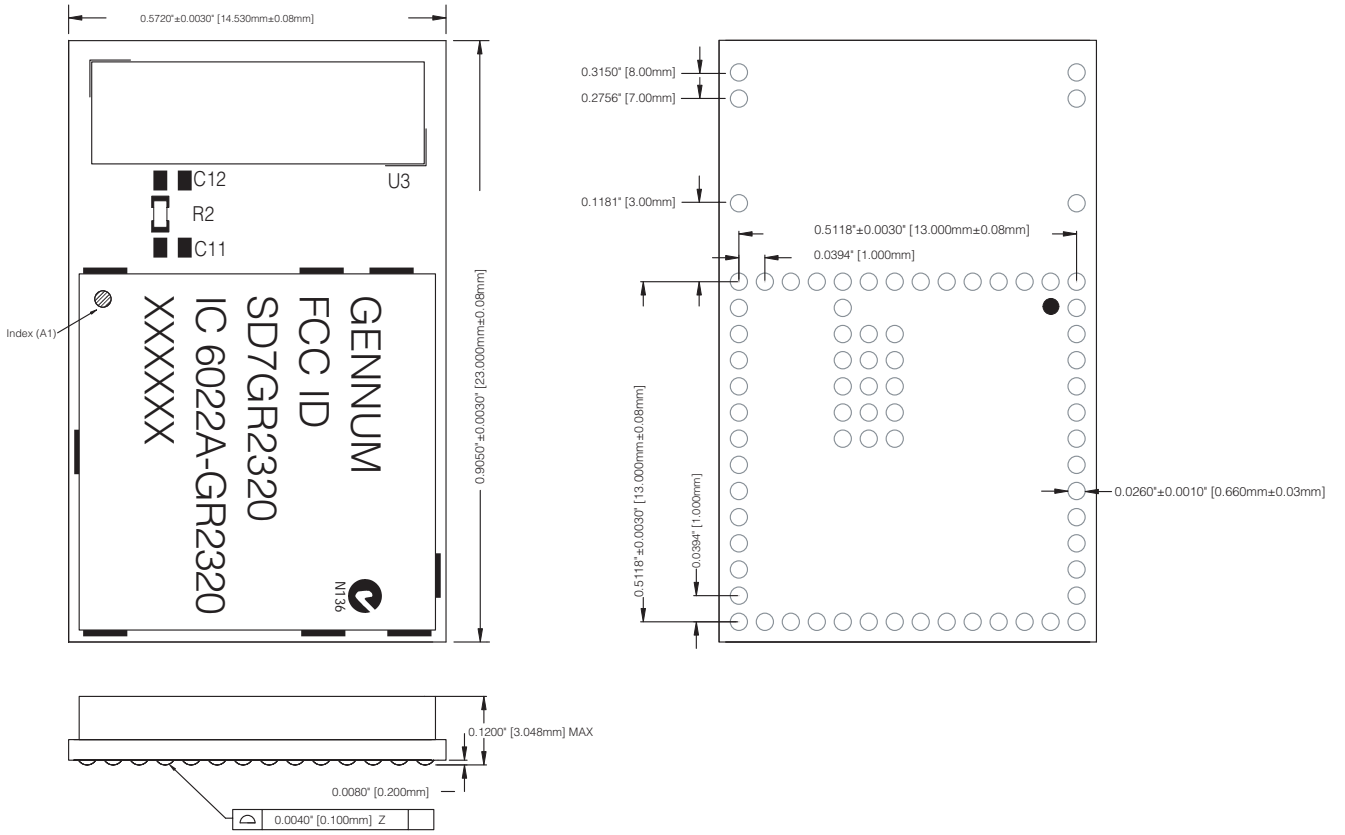


Figure 2-2: GR2320 package dimensions

3. Pin Descriptions

Table 3-1: Pin Descriptions

Pin Number	Pin Name	Description
A2	GND	Ground connection to external low impedance ground plane
A3	GND	Ground connection to external low impedance ground plane
A4	GND	Ground connection to external low impedance ground plane
A6	GND	Ground connection to external low impedance ground plane
A7	GND	Ground connection to external low impedance ground plane
A8	GND	Ground connection to external low impedance ground plane
A11	GND	Ground connection to external low impedance ground plane
A5 (GR2316)	ANT	RF Connection to Antenna
A5 (GR2320)	DNC	Do not connect this pin for the GR2320
A12	SPI_CSB	Chip select for serial peripheral interface, active low
A13	SPI_MISO	Serial peripheral interface data output
A14	SPI_MOSI	Serial peripheral interface data input
B14	SPI_CLK	Serial peripheral interface clock
C14	PCM_SYNC	Synchronous data sync
D14	PCM_OUT	Synchronous data output
E14	PCM_IN	Synchronous data input
F14	PCM_CLK	Synchronous data clock
N14	UART_CTS	UART clear to send, active low
P14	UART_RTS	UART request to send, active low
P13	UART_RX	UART data input, active low (idle status high)
P12	UART_TX	UART data output, active low
P11	USB_P	USB data plus with selectable internal 1.5k pull-up resistor
P10	USB_N	USB data minus
P5	SPKR_P	Speaker output positive
P4	SPKR_N	Speaker output negative
J1	MIC_P	Microphone input positive
H1	MIC_N	Microphone input negative
P7	AIO(1)	Programmable input/output line
P6	AIO(0)	Programmable input/output line

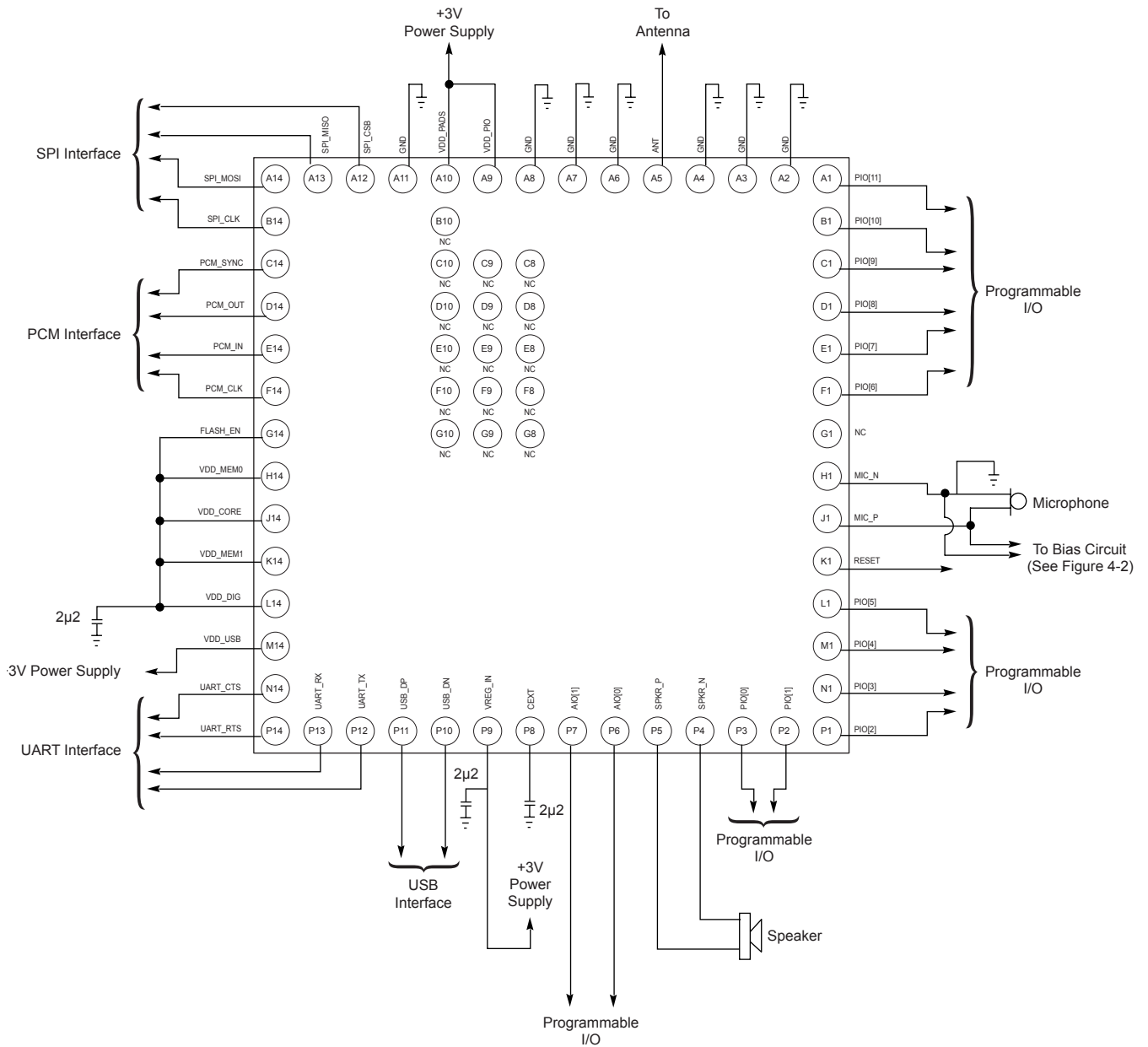
Table 3-1: Pin Descriptions (Continued)

Pin Number	Pin Name	Description
P3	PIO(0)	Programmable input/output line
P2	PIO(1)	Programmable input/output line
P1	PIO(2)	Programmable input/output line
N1	PIO(3)	Programmable input/output line
M1	PIO(4)	Programmable input/output line
L1	PIO(5)	Programmable input/output line
F1	PIO(6)	Programmable input/output line
E1	PIO(7)	Programmable input/output line
D1	PIO(8)	Programmable input/output line
C1	PIO(9)	Programmable input/output line
B1	PIO(10)	Programmable input/output line
A1	PIO(11)	Programmable input/output line
D8, D9, C9, B10, E9, F8, F9, G10, E8, C8, D10, C10, E10, G8, F10, G9	NC	No connection. Do not connect this pin.
K1	RESET	Reset high (input debounced so must be high for >5ms)
P8	CEXT	Connection to external decoupling capacitor
G1	NC	No connection. Do not connect this pin.
P9	VREG_IN	Linear regulator voltage input (3 VOLTS)
A9	VDD_PIO	Positive supply for PIO (connect to +3 volts supply)
A10	VDD_PADS	Positive supply for digital input/output ports (connect to +3 volts supply)
M14	VDD_USB	Positive supply for UART/USB ports (connect to +3 volts supply)
L14	VDD_DIG	Positive 1.8V supply output for VDD_MEM, FLASH_EN and VDD_CORE
G14	FLASH_EN	Connect to VDD_DIG
H14	VDD_MEM0	Connect to VDD_DIG
J14	VDD_CORE	Connect to VDD_DIG
K14	VDD_MEM1	Connect to VDD_DIG

Table 3-1: Pin Descriptions (Continued)

Pin Number	Pin Name	Description
X0 (GR2320)	NC	Mounting pad only
X1 (GR2320)	NC	Mounting pad only
X2 (GR2320)	NC	Mounting pad only
X3 (GR2320)	NC	Mounting pad only
X4 (GR2320)	GND	Ground connection to external low impedance ground plane.
X5 (GR2320)	GND	Ground connection to external low impedance ground plane.

4. Typical Application



NOTES:

1. NC = No connection. Do not connect this pin.
2. \perp = Connection to low impedance ground plane
3. The speaker outputs are differential, so must be connected directly across the speaker terminals or into a differential amplifier to remove the common mode noise.

Figure 4-1: Typical application circuit (bottom view)

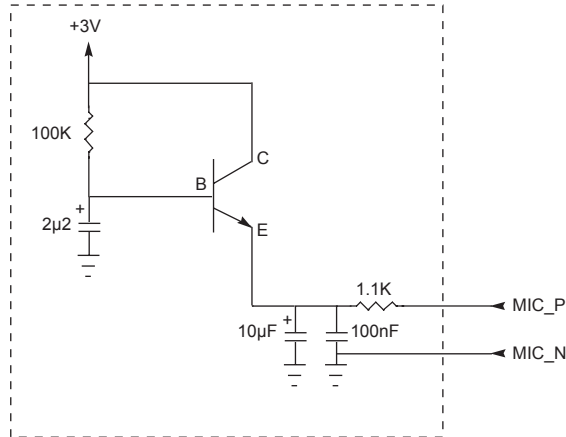


Figure 4-2: Typical Microphone Bias Circuit

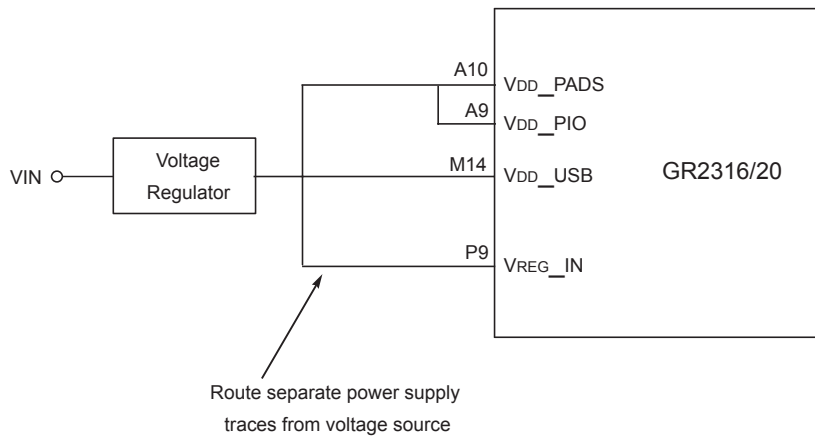


Figure 4-3: Recommended Power Supply Configuration

5. General Design Considerations

The following are general design considerations:

- Decoupling capacitors should be as close as possible to the pin.
- Grounds should go directly to a ground plane.
- All ground pins should be grounded.
- All power feeds should come directly from the regulator, as shown in [Figure 4-3](#).
- Power lines should be kept away from the audio pathway.
- The ground plane should be cut away in the area of the antenna on the GR2320. For the GR2316, this will be dependent on the antenna used.

6. Ordering Information

Part Number	Bluetooth Stack	RoHS Compliant	Antenna
GR2316	HCI	No	External
GR2320	HCI	No	Internal
GR2316 - XXXX	Full	No	External
GR2320 - XXXX	Full	No	Internal
GR2316 - E1	HCI	Yes	External
GR2320 - E1	HCI	Yes	Internal
GR2316 - E1 - XXXX	Full	Yes	External
GR2320 - E1 - XXXX	Full	Yes	Internal

Notes:

1. XXXX = Uniquely assigned per customer application.
2. Reflow document available for RoHS compliant modules.

7. FCC, Industry Canada (IC) and EU Regulatory Compliance

7.1 FCC Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Consult the dealer or an experienced radio/TV technician for help

7.2 Industry Canada (IC) Notice

This device complies with RSS-210 requirements of Industry Canada. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The GR2316 module has been designed to operate with antennas selectable by the user. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (EIRP) is not more than that required for successful communication. The GR2316 module has been designed to operate with an antenna having a maximum gain of +4.4 dBi. Antennas having a higher gain are strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

7.3 OEM Labelling Requirements

The GR2316 / GR2320 module has specific OEM labelling requirements. See [FCC Labelling](#) and [IC Labelling](#).

7.3.1 FCC Labelling

If the modules are integrated in a way that they are not visible after installation, the product in which the modules are integrated shall be labelled as follows:

- Contains FCC ID SD7GR2316
or
- Contains FCC ID SD7GR2320

In addition, the following statement shall be incorporated into the OEM user manual for the end product:

- This device contains FCC ID: SD7GR2316 which complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

or

- This device contains FCC ID: SD7GR2320 which complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

7.3.2 IC Labelling

If the modules are integrated in a way that they are not visible after installation, the product in which the modules are integrated shall be labelled as follows:

- Contains IC: 6022A-GR2316
or
- Contains IC: 6022A-GR2320
or
- Approved in accordance to IC rules transmitter module marked by IC: 6022A-GR2316
manufactured by GENNUM Corporation, incorporated into [OEM product].
or
- Approved in accordance to IC rules transmitter module marked by IC: 6022A-GR2320
manufactured by Gennum Corporation, incorporated to [OEM product].

In addition, the following statement shall be incorporated into the OEM user manual for the end product:

- This device contains IC: 6022A-GR2316 which complies with RSS 210 of Industry Canada. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
or
- This device contains IC: 6022A-GR2320 which complies with RSS 210 of Industry Canada. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

7.4 EU Notice

In accordance with Annex IV of the EU directive 1999/5/EC, **Genum Corporation** declares under our responsibility that the product:

Type: **GR2316 and GR2320**
Intended Purpose: **Bluetooth Transceivers**
Equipment Class: **1**

complies with the appropriate essential requirements of the Article 3 of the R&TTE and the other relevant provisions, when used for its intended purpose.

Means of the efficient use of the radio frequency spectrum Art.3 (2)

EN 300 328-2 V1.2.1, Electromagnetic compatibility and Radio Spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation techniques; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive.

8. Revision History

Version	ECR	Date	Changes and / or Modifications
A	134127	July 2004	New document.
B	134483	August 2004	Added features information, updated part marking, updated application schematic and added FCC and EU notice.
C	136634	April 2005	Removed Note on page 1, added list of antennas, added to FCC statement.
D	137006	October 2005	Added design information. Updated certification information.
E	138904	December 2005	Update package dimensions.
F	140383	May 2006	Add RoHS compliance information.

CAUTION

ELECTROSTATIC SENSITIVE DEVICES
DO NOT OPEN PACKAGES OR HANDLE
EXCEPT AT A STATIC-FREE WORKSTATION



DOCUMENT IDENTIFICATION

DATA SHEET

The product is in production. Gennum reserves the right to make changes to the product at any time without notice to improve reliability, function or design, in order to provide the best product possible.

GENNUM CORPORATION

Mailing Address: P.O. Box 489, Stn. A, Burlington, Ontario, Canada L7R 3Y3
Shipping Address: 970 Fraser Drive, Burlington, Ontario, Canada L7L 5P5
Tel. +1 (905) 632-2996 Fax. +1 (905) 632-5946

GENNUM JAPAN CORPORATION

Shinjuku Green Tower Building 27F, 6-14-1, Nishi Shinjuku, Shinjuku-ku, Tokyo, 160-0023 Japan
Tel. +81 (03) 3349-5501, Fax. +81 (03) 3349-5505

GENNUM UK LIMITED

25 Long Garden Walk, Farnham, Surrey, England GU9 7HX
Tel. +44 (0)1252 747 000 Fax +44 (0)1252 726 523

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