ZL70323 MICS-Band RF
Miniaturized Standard Implant Module (MiniSIM)

Features

- Complete ZL70103-based MICS-Band[1] RF Telemetry Radio Solution
- Implantable Radio Module Designed to Enable Rapid Development of Implantable Medical Devices
- Implant-Grade Quality Assurance
- Ultracompact Design and Small Size (4.5×5.5×1.6mm)
- RX Sensitivity of −102dBm at 200kbit/s (with packet error rate of 10%)
- Additional Lower Data Rates Available (40/18.18kbit/s)
- Designed to Meet Regulatory Requirements (FDA, FCC, ETSI, and IEC)

Applications

- Implantable Medical Devices
    - Cardiac Rhythm Management
    - Neurostimulators
    - Drug Delivery, Sensors, and Diagnostics

Description

The ZL70323 implantable radio module implements all RF-related functions needed to deploy the implantable node in a MICS-band RF telemetry system. The integrated antenna tuning circuit allows the module to be used with a wide range of implantable antennas (nominal antenna impedance is $100+j150\Omega$). Figure 1 shows the module's major subsystems:

- ZL70103-based MICS-band RF transceiver with an integrated matching network, SAW filters for suppression of unwanted blockers, and antenna tuning.
- 2.45-GHz wake-up receiver matching network.
- Integrated 24-MHz reference frequency crystal.
- Decoupling capacitors.

Ordering Information

ZL70323MNJ   15-pad LGA

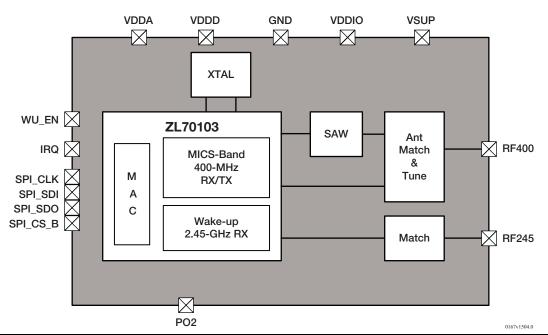Please refer to "Package Overview" on page 4-3 for details.

Figure 1 •   **ZL70323 Block Diagram**

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1 *The MICS band is a subset of the designated MedRadio frequency band.*

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1 – Product Description

The ZL70323 implantable radio module is a second-generation, high-performance, easy-to-use RF module based on the ZL70103 MICS-band transceiver IC. The module is extremely small and is designed to provide good performance while consuming very little power.

The ZL70323 RF module integrates all the circuitry and functionality required to deploy a complete radio solution for implantable applications. This allows the circuit complexity to be reduced to placing one single package on your implantable application board.

Please refer to Table 1-1 below for all documents related to the ZL70103 family of products. These documents can be found on Microsemi's website or by contacting Microsemi's CMPG sales for more information.

Table 1-1 • **Related Documentation**

Product	Document(s)	Description
ZL70103 MICS-Band RF Transceiver	ZL70103 Datasheet	The ZL70103 MICS-Band RF Transceiver is designed specifically for use in implantable medical devices (such as pace makers and neurostimulators). It also supports external applications (such as programmers and patient controllers).
	ZL70103 Design Manual	
ZL70123 MICS-Band RF Base Station Module (BSM) (in development)	ZL70123 Datasheet (in development)	The ZL70123 BSM is a ZL70103-based RF module that integrates additional circuitry and functionality required for external applications.
ZL70120 MICS-Band RF Base Station Module (BSM)	ZL70120 Datasheet	The ZL70120 BSM is a ZL70102-based RF module that integrates additional circuitry and functionality required for external applications. The RF link of the ZL70120 BSM is compatible with the ZL70323 Miniaturized Standard Implant Module.
ZLE70103 Application Development Kit (ADK)	ZLE70103 ADK Users Guide	The ADK combines hardware and software to provide an end-to-end MICS-band communication system based on the ZL70120 Base Station Module and the ZL70323 Miniaturized Standard Implant Module (MiniSIM). Additionally, source code with programming examples is available with a source code license agreement (SCLA).

2 – Functional Description

General

The ZL70323 module provides all the circuitry needed to deploy a complete, implanted, MICS-band, RF telemetry radio solution (PHY- and MAC-layers). The ZL70323 is designed to be versatile so it can serve a broad range of applications with different antenna, feed-through, and case implementations. Please refer to the ZL70103 Data Sheet and the ZL70103 Design Manual for further details on using the ZL70103.

Power Supply Requirements

The module contains a decoupling capacitor on the VSUP power supply input as well as integrated decoupling capacitors required by the analog and digital regulators of the ZL70103.

The VDDA and VDDD pads are test pads and should be neither loaded nor used in the user application. They are connected to the internal analog and digital regulators of the ZL70103 and are intended only for production testing by Microsemi.

MICS-Band Transceiver

The MICS-band transceiver is based on the ZL70103 IC. The transceiver signal chain is equipped with a matching network, a SAW filter, and antenna tuning to allow a wide range of antennas to be used with the module. Please refer to "Antenna Requirements" for more details.

Reference Frequency Crystal

The ZL70323 module is equipped with a 24-MHz reference frequency crystal supporting the integrated XO of the ZL70103. Please refer to Chapter 10 in the ZL70103 Design Manual for information on tuning the XO.

General Purpose I/O

The ZL70323 module provides access to the PO2 pad of the ZL70103.

2.45-GHz Wake-Up Receiver

The 2.45-GHz wake-up receiver is integrated on the ZL70103 radio IC and provides a very power-efficient wake-up subsystem. All necessary RF matching is integrated on the ZL70323 module, and the RF245 and RF400 ports can be shorted together and connected directly to the antenna.

If the ZL70323 module is operated without using the 2.45-GHz wake-up, the RF245 connection should be grounded.

Antenna Requirements

Antenna Tuning

The ZL70323 takes advantage of the integrated antenna tuning capacitors (MATCH1 and MATCH2). This allows the RF port to be tuned to the actual antenna impedance (within the supported tuning range). Please refer to Section 3.6 of the ZL70103 Design Manual for details.

3 – Electrical Specifications

Tables 3-1 through 3-9 provide the absolute maximum ratings and other electrical characteristics for the ZL70323. Voltages are with respect to ground (GND) unless otherwise stated.

Absolute Maximum Ratings

Table 3-1 • **Absolute Maximum Ratings**

ID	Parameter	Symbol	Condition	Limits			Unit	Note
				Min.	Typ.	Max.[1]		
1.0	Supply voltage	V_{SUP}		−0.3		3.6	V	Note 1
1.1	Digital I/O supply voltage	V_{DDIO}		−0.3		V_{SUP}	V	Note 2
1.2	Digital I/O voltage	V_{IOD}		VSS−0.3		V_{DDIO} +0.3	V	Note 3
1.3	RF I/O voltage	V_{IORF}		VSS−0.3		V_{SUP}+0.3	V	Note 4
1.4	Storage temperature	T_{stg}	Unpowered	−40		+125	°C	Note 5
1.5	Burn-in temperature	T_{bi}	3.3V on VSUP and VDDIO			+125	°C	Note 5
1.6	Electrostatic discharge (human body model)	V_{ESD}	Any			500	V	Note 6

Notes:

1. *Application of voltage beyond the stated absolute maximum rating may cause permanent damage to the device or cause reduced reliability.*
2. *V_{DDIO} must never be higher than V_{SUP} even during system startup.*
3. *Applies to digital interface pins, including WU_EN, SPI_CS_B, SPI_CLK, SPI_SDI, SPI_SDO, PO2, and IRQ,*
4. *Applies to RF interface pins, including RF400 and RF245.*
5. *Device may be powered during burn-in but operation is not guaranteed.*
6. *Applied one at a time. Exceeding these values may cause permanent damage. Functional operation under these conditions is not implied.*

Recommended Operating Conditions

The recommended operating conditions in Table 3-2 define the nominal conditions for the device.

Table 3-2 •   **Recommended Operating Conditions**

ID	Parameter	Symbol	Limits			Unit	Note
			Min.	Typ.	Max.[1]		
2.0	Supply voltage	V_{SUP}	2.05		3.5	V	Note 2
2.1	Input voltage (digital I/O)	V_{DDIO}	1.5		V_{SUP}	V	Note 1
2.2	Operating temperature	T_{op}	0	+37	+55	°C	

Notes:

1. *Application of voltage beyond the stated absolute maximum rating may cause permanent damage to the device or cause reduced reliability.*
2. *For voltages less than 2.1V, a production trim procedure must be followed.*

Electrical Characteristics

Default register and mode settings are assumed unless noted. The RF ports are assumed to have a nominal load equal to an antenna impedance of 100+j150Ω at 403.5MHz and 50Ω at 2442MHz when the two RF ports are combined.

Electrical testing during production is used to ensure that delivered parts fulfill the limits defined herein. In some cases it is not possible to perform electrical testing or the testing has been carried out in a different way. These exceptions are marked in the "Exceptn" column of Tables 3-4 to 3-8; refer to legend below.

① These parameters are guaranteed by production tests but with different limits to what is specified in the data sheet. This is due to limitations in the capabilities of the automated test equipment. The production tests that are carried out have been correlated to tests carried out in the lab environment.

② These parameters are guaranteed by production tests; however, these may be carried out in a different manner to that defined in the data sheet.

③ These parameters are tested during production test but the limits are for design guide only.

④ These parameters are for design aid only: not guaranteed and not subject to production testing.

⑤ Typical values according to the specified condition. If no conditions are specified, then the typical figures assume 37°C and V_{SUP} at 3.0V. Typical values are for design aid only: not guaranteed and not subject to production testing.

Digital Interface

The characteristics in Table 3-3 are valid for the following interconnects:

- Digital inputs: WU_EN, SPI_CS_B, SPI_CLK, SPI_SDI
- Digital outputs: IRQ, SPI_SDO, PO2

Table 3-3 • **Digital Interface**

ID	Parameter	Symbol	Limits			Note
			Min.	**Max.**	**Unit**	
3.0	Digital input low	V_{IL}	0	$0.2 \times V_{DDIO}$	mV	Note 1
3.1	Digital input high	V_{IH}	$0.8 \times V_{DDIO}$	V_{DDIO}	mV	Note 2
3.2	Digital output low	V_{OL}	0	$0.2 \times V_{DDIO}$	mV	
3.3	Digital output high	V_{OH}	$0.8 \times V_{DDIO}$	V_{DDIO}	mV	
3.4	Maximum SPI clock rate	f_{clk}		4	MHz	Note 3

Notes:

1. *V_{IL} is the required input voltage to ensure internal signal switching from high to low.*
2. *V_{IH} is the required input voltage to ensure internal signal switching from low to high.*
3. *Default value. The maximum SPI clock rate can be programmed to 1, 2, or 4MHz.*

Performance Characteristics

Current Consumption

Table 3-4 • **Current Consumption**

ID	Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Exceptn	Note
						Limits			
4.0	SLEEP state current	I_{sleep}	$T_{op} \leq 37°C$		10	50	nA	⑤	Note 1
			$T_{op} \leq 55°C$		10	150	nA	⑤	Note 1
			$-20°C \leq T_{op} \leq 60°C$		10	200	nA	⑤	Note 1, 2
4.1	IDLE state current	I_{idle}			0.95	1.1	mA	⑤	
4.2	400-MHz receive state current	I_{RX400}			4.3	5.0	mA	⑤	
4.3	400-MHz transmit state current	I_{TX400}	$V_{SUP} = 2.05V$		5.2	5.7	mA	⑤	Note 3
			$V_{SUP} = 3.0V$		5.6	6.1	mA	⑤	
4.4	400-MHz RSSI sniff current	$I_{sniff400}$			4.0	4.7	mA	⑤	
4.5	400-MHz average wake-up current	I_{wu400}				<5	µA		Note 4
4.6	Wake-up strosc (strobe oscillator) current	I_{strosc}	$V_{SUP} = 2.05V$		270	320	nA	⑤	Note 5
			$V_{SUP} = 3.0V$		320	365	nA	⑤	
4.7	Wake-up 2.45-GHz RX sniff current	$I_{sniff245}$			1.4	1.8	mA	⑤	Note 6
			$-20°C \leq T_{op} \leq 60°C$		1.4	2.1	mA	⑤	Note 2, 6
4.8	Average wake-up current (external pulse on WU_EN)	I_{wu245_ext}	$T_{op} \leq 37°C$		290	410	nA	⑤	Note 6, 7
4.9	Average wake-up current (internal strobe oscillator)	I_{wu245_int}	$T_{op} \leq 37°C$		600	810	nA	③⑤	Note 6, 7

Notes:

1. *WU_EN low between external strobe pulses.*
2. *The extended temperature operating conditions specify a temperature range where the chip is operating but has limited performance. The purpose of this temperature range is to provide a wider temperature range for devices that are powered on but are in stand-by and stored before use. Under these conditions, the device always powers up and communicates as expected.*
3. *Register setting for power code reg_rf_txrfpwrdefaultset is 48.*
4. *Average sleep/sniff current consumption for a 400-MHz sniff based on a sniff interval of 5 seconds and a sniff duration of 9.375ms.*
5. *WU_EN low between internal strobe pulses.*
6. *Register setting for bias code reg_wakeup_lnabias is 10; reg_wakeup_wk_rx_lna_negrtrim1 based on trimming.*
7. *Wake-up strobe period is 1s; register setting for reg_wakeup_stroscpwidth1 is 7.*

400-MHz Transmitter

Table 3-5 •   400-MHz Transmitter

ID	Parameter	Symbol	Condition	Limits					Note
				Min.	Typ.	Max.	Unit	Exceptn	
5.0	Transmit power	$P_{TX400max}$	$T_{op} = 37°C$ and $V_{SUP} = 2.1V$	−7.4	−5.6		dBm	⑤	Note 1
			$T_{op} = 37°C$ and $V_{SUP} = 3.0V$	−4.5	−3.5		dBm	⑤	
5.1	Minimum transmit power	$P_{TX400min}$				−31	dBm	①	Note 2
5.2	Unwanted emissions outside the 401.75 – 405.25-MHz band	$E_{outband}$				−30	dBc		Note 3
5.3	Unwanted emissions within the 401.75 – 405.25-MHz band	E_{inband}				−20	dBc		Note 4

Notes:

1. *Register setting for power code reg_rf_txrfpwrdefaultset is 48.*
2. *Register setting for power code reg_rf_txrfpwrdefaultset is 0.*
3. *Fulfills FCC CFR47.95. Requires trimming; please refer to the ZL70103 Design Manual for details.*
4. *Fulfills FCC CFR47.95.*

400-MHz Receiver

Table 3-6 •   400-MHz Receiver

ID	Parameter	Symbol	Condition	Limits					Note
				Min.	Typ.	Max.	Unit	Exceptn	
6.0	Minimum RF amplifier and mixer gain	G_{RX}			11	16	dB	①⑤	
6.1	Maximum RF amplifier and mixer gain	G_{RX}		24	33		dB	①⑤	
6.2	1-dB compression point referred to input	ICP1			−41		dBm	③⑤	Note 1
6.3	Third-order input intercept point	IIP3			−32		dBm	④⑤	Note 1
6.4	RX sensitivity (2FSK-fallback with Barker11 spreading)	$P_{RX\_2F\_FB\_B11}$			−108		dBm	④	Note 2
6.5	RX sensitivity (2FSK-fallback with Barker5 spreading)	$P_{RX\_2F\_FB\_B5}$			−104		dBm	④	Note 2
6.6	RX sensitivity (2FSK-fallback)	$P_{RX\_2F\_FB}$			−98		dBm	①⑤	Note 2
6.7	RX sensitivity (2FSK)	P_{RX_2F}			−85		dBm	①⑤	Note 2

Note:

1. *Register reg_rf_rxrflnagaintrim set to 127 (second highest gain).*
2. *The sensitivity is based on the application circuit in Figure 5-1 on page 5-1, at the reference point of the dual-band antenna including the optional prematch for 50-ohm testing. This value represents a packet error rate of 10%.*

2.45-GHz Receiver

Table 3-7 •   **2.45-GHz Receiver**

ID	Parameter	Symbol	Condition	Limits					Note
				Min.	Typ.	Max.	Unit	Exceptn	
7.0	Sensitivity at RF245 pad (normal mode)	P_{RX245}	$T_{op} \leq 37°C$		−73		dBm	②⑤	Note 1
7.1	Sensitivity at RF245 pad (sensitive mode)	P_{RX245}	$T_{op} \leq 37°C$		−75		dBm	②⑤	Note 2

Notes:

1. *3-µs RF-on time. No frequency hopping. 2.45-GHz receiver trimmed for the conditions. Register reg_wakeup_lnabias is 10; reg_wakeup_wk_rx_lna_negrtrim1 is based on trimming.*

2. *6-µs RF-on time. No frequency hopping. 2.45-GHz receiver trimmed for the conditions. Register reg_wakeup_lnabias is 10; reg_wakeup_wk_rx_lna_negrtrim1 is based on trimming.*

RF Ports

Table 3-8 •   **RF Ports**

ID	Parameter	Symbol	Condition	Limits					Note
				Min.	Typ.	Max.	Unit	Exceptn	
8.0	400-MHz nominal port impedance, resistive part	R_{400}			100		Ω	⑤	Note 1
8.1	400-MHz nominal port impedance, reactive part	X_{400}			−j150		Ω	⑤	Note 1
8.2	2.45-GHz nominal port impedance, resistive part	R_{245}			50		Ω	⑤	Note 2
8.3	2.45-GHz nominal port impedance, reactive part	X_{245}			0		Ω	⑤	Note 2

Note:

1. *This impedance is measured at the RF_400 pad.*

2. *This impedance is measured at the RF_245 pad.*

ESD

Table 3-9 •   **ESD**

ID	Parameter	Symbol	Limits				Note
			Min.	Typ.	Max.	Unit	
9.0	ESD	V_{ESD}	500			V	Note 1

Note:

1. *Human Body Model (HBM).*

4 – Mechanical Specifications

Pad List

Table 4-1 describes each pad on the ZL70323 module, and Table 4-2 provides definitions of the pad types listed in Table 4-1. Proper ground is essential for good and stable performance. Please ensure all ground pads are connected.

Table 4-1 • **ZL70323 Pad List**

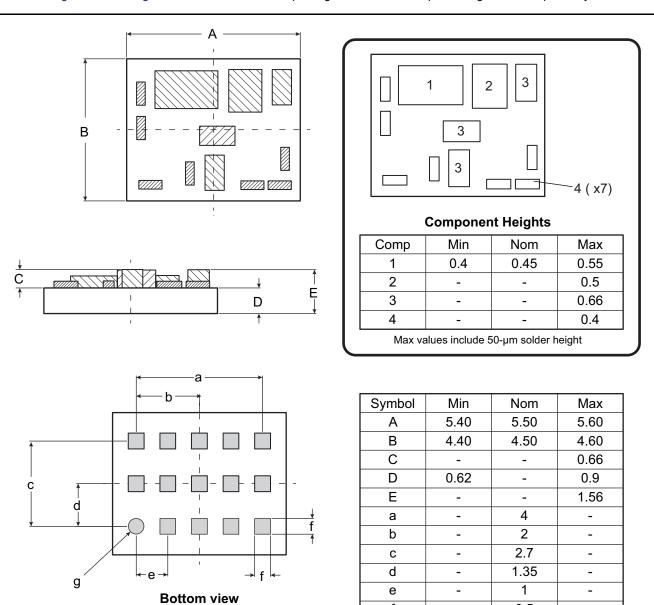| Pad	Symbol	Description	Type	Notes
A1	IRQ	Interrupt request output	DO	
A2	SPI_SDI	Data input for SPI bus interface	DI	
A3	VDDD	Internal signal, not for customer use (digital on-chip regulated power; sensitive to noise)	INT	
B1	WU_EN	Wake-up enable signal	DI	
B2	VDDIO	Digital I/O supply	SUP	
B3	GND	Ground supply connection	GND	
C1	SPI_SDO	Data output for SPI bus interface	DO	
C2	SPI_CLK	Clock for SPI bus interface	DI	
C3	RF400	Antenna RF input and output for the MICS band	RF	
D1	SPI_CS_B	SPI chip select (active low)	DI	
D2	PO2	Programmable output 2	DO	
D3	RF245	Wake-up receiver RF input	RF	
E1	GND	Ground supply connection	GND	
E2	VDDA	Internal signal, not for customer use (analog on-chip regulated power; sensitive to noise)	INT	
E3	VSUP	Positive supply connection (3.3 V typical)	SUP	

Pad Type Definitions

Table 4-2 • **Pad Type Definitions**

Type	Description
SUP	Supply pad.
GND	Ground pad.
RF	RF pad. Ensure proper isolation and track impedance.
RFGND	RF ground pad.
DI	Digital input pad.
DO	Digital output pad.
INT	Internal signal. These signals are used inside the module and are made available only for Microsemi production testing.

Package Dimensions

Figure 4-1 and Figure 4-2 show the ZL70323 package dimensions and pad configuration, respectively.
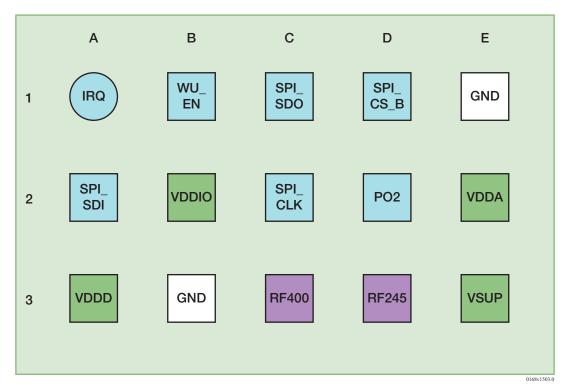

Component Heights

Comp	Min	Nom	Max
1	0.4	0.45	0.55
2	-	-	0.5
3	-	-	0.66
4	-	-	0.4

Max values include 50-µm solder height

Symbol	Min	Nom	Max
A	5.40	5.50	5.60
B	4.40	4.50	4.60
C	-	-	0.66
D	0.62	-	0.9
E	-	-	1.56
a	-	4	-
b	-	2	-
c	-	2.7	-
d	-	1.35	-
e	-	1	-
f	-	0.5	-
g	-	0.5 dia	-

All dimensions in mm

Bottom view

0169v1611.2

Figure 4-1 • **ZL70323 Package Dimensions**

Note: View from top

Figure 4-2 •   ZL70323 Pad Configuration

Module Assembly

It is recommended that the module be attached using an automated pick-and-place machine that has a vacuum head with a rubber tip and that a reflow oven be used. The reflow profile should be based upon JESD-20-C, ensuring that the maximum and minimum parameters of the standard are not exceeded when creating a profile for the customer's chosen assembly process.

Any rework operations undertaken need to be verified to ensure that no damage comes to the product being removed. Microsemi does not guarantee the product reliability once it's been reworked.

The solder alloys to be used are either a lead-free SAC 0305 or 0405 alloy, although the module can be assembled to the customer's board with a leaded alloy. The product is designed to be cleaned, but this is at the customer's discretion depending upon their assembly requirements.

Package Overview

Table 4-3   provides   additional   specifications   for   the   ZL70323   MICS-Band   RF Miniaturized Standard Implant Module (MiniSIM).

Table 4-3 • **ZL70323 Package Overview**

Package	Delivery Form	Temp Range (°C)	Pb Free	Implant Grade	Application Area	
					Implant Devices	**External Devices**
15-pad LGA	30-piece waffle pack	0 to +55	Yes	Yes	Yes	No

5 – Typical Application Example

Figure 5-1 shows a typical application example. For a detailed circuit example, please refer to the AIM300 documentation included with the ZL70103 ADK (refer to related documentation listed in Table 1-1 on page 1-1). The AIM300 is an Application Implant Module (AIM) board that features the ZL70323 implant module. Note that the ADK AIM300 prematch is designed for a 50-Ω antenna suitable for evaluation in air.
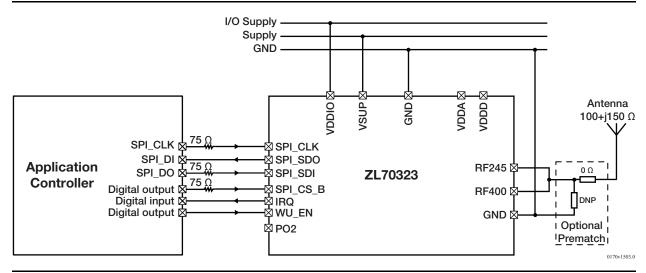

Figure 5-1 •   **Typical Application Example**

Comments:

1. Connect VSUP to supply. VSUP is decoupled inside the module with a 100-nF capacitor.
2. Connect VDDIO to the I/O supply (alternatively VDDIO can be connected to VSUP if the SPI bus operates at the same supply level as VSUP).
3. PO2 can be left unconnected.
4. Add resistors (approximately 75Ω) on the application host controller side to the SPI digital output lines to suppress ringing. This is highly recommended to avoid an increased risk of reduced receiver sensitivity during SPI bus activity.
5. IRQ and SPI_SDO have series 68-Ω resistors to suppress reflections and ringing.
6. RF245 and RF400 are connected together. Positions for additional antenna matching components (*prematch*) are reserved if the impedance of the target antenna has to be adapted to the tunable range (DNP stands for Do Not Populate).
7. VDDA and VDDD are sensitive to noise since they are connected to the regulated side of the on-chip analog and digital voltage regulators. These pads should have no external circuitry or tracks connected.

6 – Quality

The ZL70323 module is intended for implantable applications.

Manufacturing processes are carried out in ISO9001-approved facilities and all products are fully tested and qualified to ensure conformance to this data sheet.

The following additional stages are implemented among others:

- Enhanced change notification.
- Die acceptance testing.
  - Every ZL70103 die used is individually tested at 37°C.
  - Every ZL70103 die used is visually inspected.
- Every module is individually tested at room temperature.

For implantable products, the following additional stages are implemented in addition to the above:

- A comprehensive system of change notification and approval is invoked. No major changes to the product are made without notification to and/or approval from the customer.
- Material traceability: For each module assembly lot, all components and consumables are traceable to the incoming material lot number.
- Process traceability: Traceability is maintained to the assembly lot level. The physical size of the ZL70323 prohibits the part number and assembly batch number from being directly printed on the part. For traceability, a unique five-digit assembly batch number is printed on the packing tray label and shipping documentation.
- Enhanced record retention: Quality records are retained for the expected duration of production and use of end products.

7 – Glossary

Term	Definition
ADK	Application Development Kit
AIM	Application Implant Module
Ant	Antenna
BSM	Base Station Module
CMPG	Microsemi's Communication-Medical Products Group
DNP	Do Not Populate
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
Exceptn	Exception (to testing parameters for Electrical Characteristics)
FCC	Federal Communications Commission (USA)
FDA	Food and Drug Administration (USA)
FSK	Frequency Shift Keying
HBM	Human body model
I/O	Input/output
IC	Integrated Circuit
ID	Identifier
IEC	International Electrotechnical Commission
inf	Infinity
LGA	Land Grid Array
MAC	Media Access Controller
Max	Maximum
MICS	Medical Implantable Communication Service
Min	Minimum
MiniSIM	Miniaturized Standard Implant Module
Nom	Nominal
ref	Reference
RF	Radio Frequency
RoHS	Restriction of Hazardous Substances
RSSI	Received Signal Strength Indicator
RX	Receive
SAC	SnAgCu (tin-silver-copper alloy)
SAW	Surface Acoustic Wave
SCLA	Source Code License Agreement

Term	Definition
SPI	Serial Peripheral Interface
strosc	Strobe oscillator
Temp	Temperature
TX	Transmit
Typ	Typical
XO	Crystal Oscillator
XTAL	Crystal

Note: Table 4-2 on page 4-1 defines the Pad Type abbreviations that are used in that chapter. They are not included in the list above.

8 – Datasheet Information

List of Changes

The following table lists substantive changes that were made in the ZL70323 MICS-Band RF Miniaturized Standard Implant Module (MiniSIM) datasheet (151827).

Revision	Changes	Page
Revision 2 (November 2016)	Modify footnote 1 to match wording of ZL70103 datasheet.	I
	Modify Table 3-1 to match format of ZL70103 datasheet, adding three rows with additional details. Minimum limits now reflect reverse supply voltage.	3-1
	Replace Figure 4-1.	4-2
	Clarify recommendation for pick-and-place machine under "Module Assembly".	4-3
	Under "Quality", clarify material traceability bullet and replace process traceability bullet.	6-1
Revision 1 (July 2015)	Initial release.	All

Datasheet Categories

In order to provide the latest information to designers, some datasheet parameters are published before data has been fully characterized from silicon devices. The data provided for a given device is designated as either "Product Brief," "Advance," "Preliminary," or "Production." The definitions of these categories are as follows:

Product Brief

The product brief is a summarized version of a datasheet (advance or production) and contains general product information. This document gives an overview of specific device and family information.

Advance

This advance version contains initial estimated information based on simulation, other products, devices, or speed grades. This information can be used as estimates, but not for production. This label is used only when the data has not been fully characterized.

Preliminary

The preliminary datasheet contains information based on simulation and/or initial characterization. The information is believed to be correct, but changes are possible.

Production

The production version contains information that is considered to be final.

Safety Critical, Life Support, and High-Reliability Applications Policy

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