PBA 313 07 Singlestone

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1 Introduction

The module is built around the BlueMoon Single Cellular chip (PMB 8761) which contains the radio, baseband, link manager and HCI functionality. For additional information regarding the PMB8761 such as firmware features, complete description of Infineon specific HCI commands and events, please refer to the latest version of the Data sheet for PMB8761, T8761-XV01Dx-7600.

2 General Device Overview

Infineon's Singlestone - PBA 313 07 is a ready-to-use Class2 Bluetooth module solution targeted for data and audio applications in the 10 meters personal area range.

BLUETOOTH wireless technology is an open industry standard for short range wireless communication with both data and voice transmission capability (up to 723 kbit/s data asymmetrically or up to 3 voice channels simultaneously). Singlestone is a Bluetooth 1.1 pre-qualified component, so any further development and qualification efforts for the user are minimized. It is already hardware prepared for the upcoming Bluetooth 1.2 Standard, which will improve the quality of voice connections, support the co-existence with WLAN solutions using the same frequency band and accelerate the connection setup.

Integrating the baseband, link manager and RF-transceiver, Singlestone closes the gap between the Bluetooth air interface (external antenna, 2.4 GHz ISM band) and the standardized host-controller-interface (HCI), which is physically realized as a full-duplex UART port (HW-handshake optional). In parallel, the PCM interface is suitable for audio connections.

Around Infineon's BlueMoon Single Cellular – PMB 8761 Bluetooth chip, all essential components for a complete Bluetooth solution are integrated in the Singlestone module. A 26 MHz temperature compensated crystal oscillator (TCXO) provides the highly accurate Bluetooth clock, an E²PROM holds the application specific configuration data which is loaded after power-up reset, and an integrated balun-filter component ensures optimized RF matching between the chip and the external antenna. Only a 32.768 kHz real-time clock, which is available in most target applications, must be provided to the Singlestone module.

Bluetooth stack software supporting the extended feature set of Infineon's BlueMoon family and a comprehensive portfolio of Bluetooth profiles are available from our SW partners ported to a variety of host architectures.

The device is designed for a broad range of wireless applications in the consumer, automotive and industrial segments, as well as for interconnection of cellular phones, desktop PCs, laptops, and PDAs.

The device is available in a shielded LGA package (11.85 x 10.6 mm²) with 8x9 pads.

2.1 General Features

General
- Low power consumption, programmable Power down mode
- Chip in advanced low power CMOS technology
- External supply-voltage 3.0V..4.75 V, recommended 3.3 V +/- 5 %
- Extended temperature range – 40°C .. +85°C

Interfaces
- UART for UART-HCI with HW-handshake (Baudrate up to 3 Mbaud)
- PCM interface (slave- and master-mode; programmable PCM slot allocation)
- JTAG
- GPIO for control of external devices

Digital-Section
- Digital demodulation gives best performance in sensitivity, co- and adjacent channel performance
- Digital offset compensation and symbol synchronization / frame synchronization
- GFSK-modulator (over-sampling at typ. 9-bit-resolution) with amplitude adjustment and high-performance A/D-converter for RX-data
- Digital part (Noise-shaper, Gaussian impulse filter) of ΣΔ-Fractional-N-PLL
- CVSD transcoder for voice conformant to BLUETOOTH wireless technology
- A-law, u-Law and linear PCM also possible
- Baseband and Linkmanager Firmware up to HCI in internal ROM
- 4 kbit E^2PROM for storing Bluetooth device data

RF and Analog Section
- Analog part of ΣΔ-Fractional-N-PLL for receive and transmit path (multi-modulus-divider, phase detector and charge pump) on chip
- Fully integrated and balanced VCO with integrated varactors and inductors.
- On chip 2.5 GHz RF driver amplifier up to + 5 dBm output power (Fine tuning in the range of -16 - + 5 dBm in 1.5 dB steps)
- Integrated LNA
- Fully integrated Balun, switch and antenna filter giving one single-ended RF interface, no additional external RF components
- Chip-integrated supply voltage regulator for VCO
- On module 26 MHz reference clock
- On module voltage regulator for single supply voltage.
- Typical sensitivity -83 dBm
- Typical output power +2.5 dBm

Software
- Baseband, Link Manager and HCI functionality is incorporated by ProBlue Firmware in chip-integrated ROM.
- Infineon specific HCI+ commands to support enhanced features
- Configuration data (e.g. Bluetooth device address) are loaded from internal E^2PROM after reset. Optionally, configuration data may be provided by the host via HCI+ command.

Package
- LGA 9 x 8 pads

2.2 Block diagram

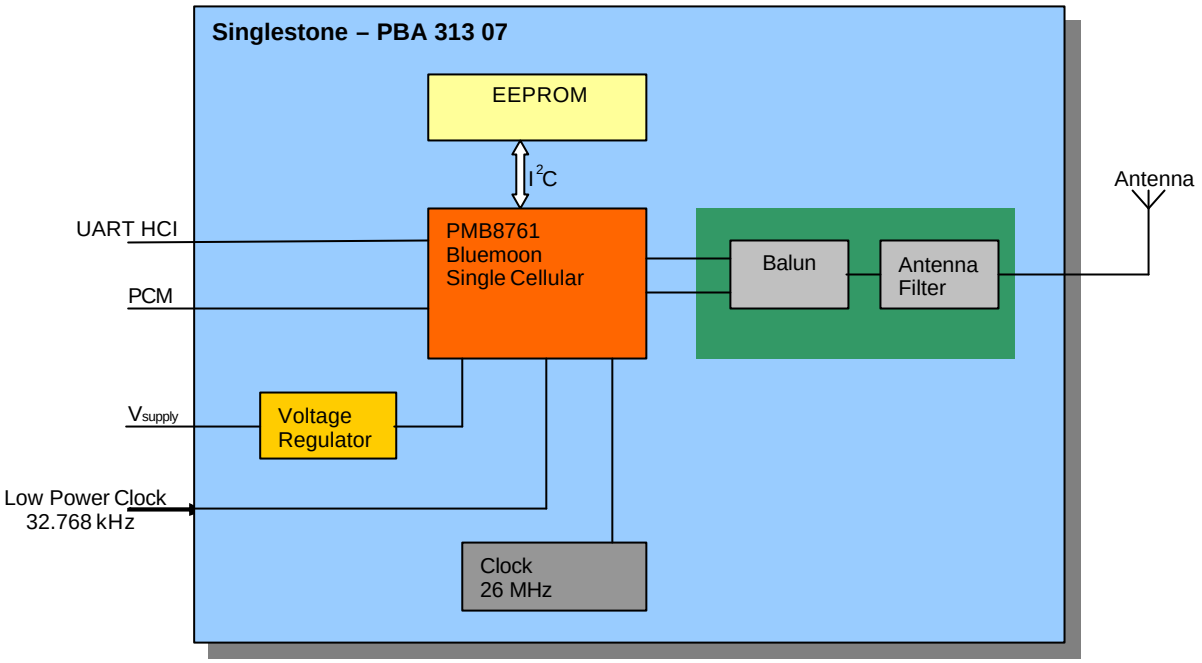


Figure 2-1: Block diagram of the PBA 313 07 Singlestone module

2.3 Typical application

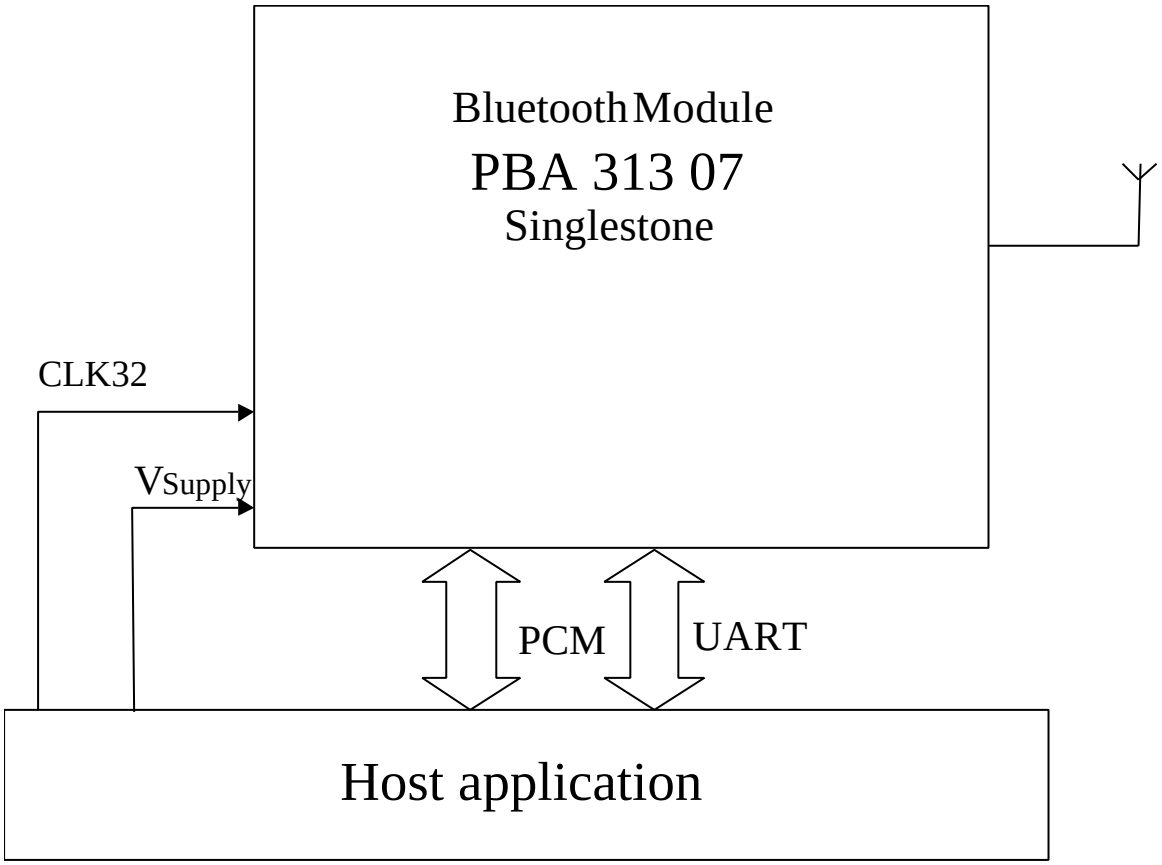


Figure 2-2: Typical application diagram

2.4 Mechanical dimension and pad arrangement

Below shows the module's pad layout. All dimensions are in mm.

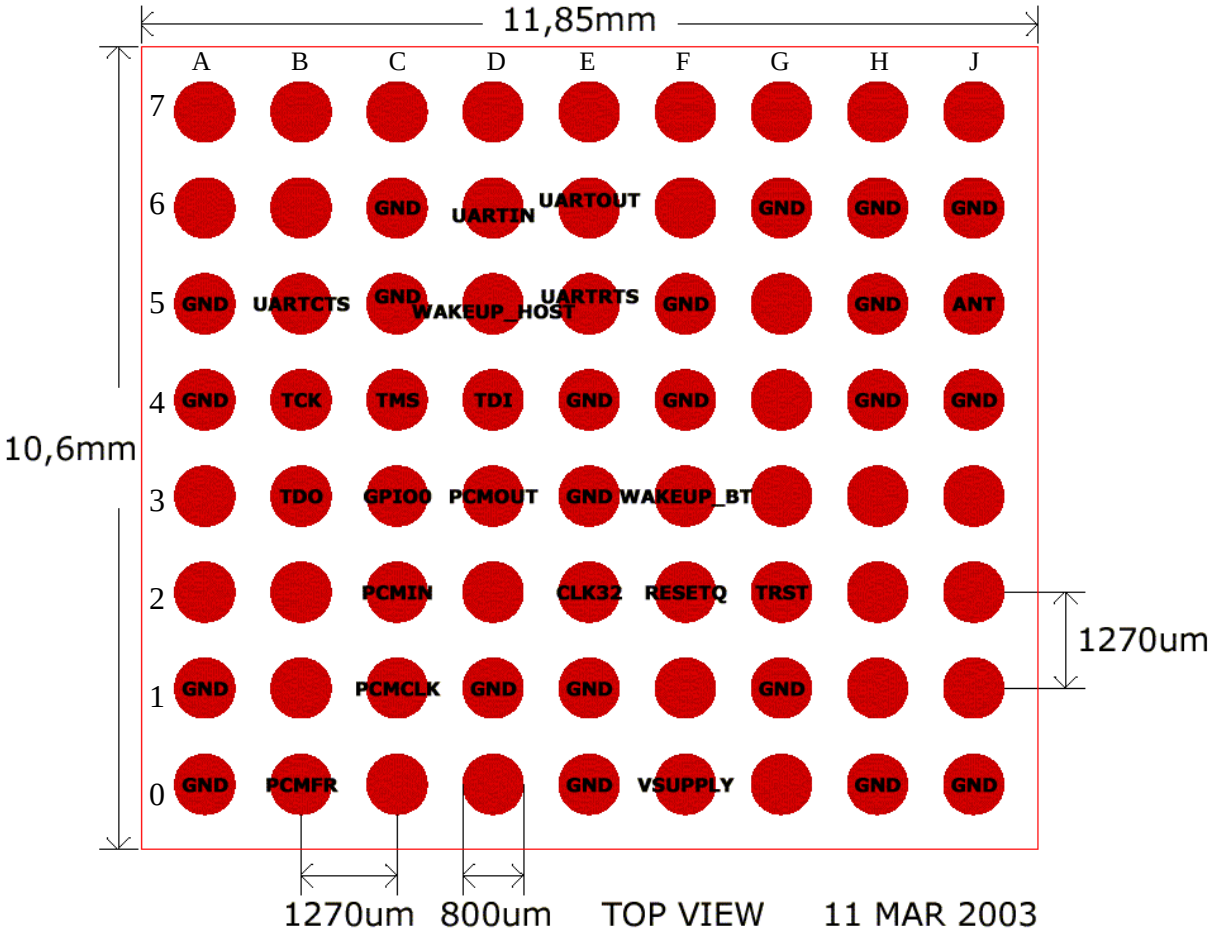


Figure 2-3 Mechanical dimensions, pad arrangement.

Dimension	min.	typ.	max.	Unit
Length	11.65	11.85	12.05	mm
Width	10.40	10.6	10.80	mm
Height	1.6	1.8	2.0	mm

Table 2-1 Mechanical dimensions with tolerances

2.5 Module pin-out

Table 2-2 represents the functional description of Singlestone's connecting pads. Functionally non-used pads (NC) are used as sacrifice pads or test pads, and must not be connected in an application.

Pin Location	Symbol	Input/ Output	During Reset	After Reset	Function	Comments
D6	UARTIN	I	Tristate	Tristate	UART-Input	
E6	UARTOUT	O	Pull-Up	Pull-Up	UART-Output (Pull-Up controlled by FW)	
E5	UARTRTS	O	Pull-Down	Pull-Down	UART-Request to Send (Pull-Down/-Up controlled by FW)	
B5	UARTCTS	I	Tristate	Tristate	UART-Clear to Send	
D5	WAKEUP_HOST	O	Pull-Down	Pull-Down	Wake-up signal for host) (Pull-Down controlled by FW)	
C2	PCMIN	I	Tristate	Tristate	PCM input	
D3	PCMOUT	O	Pull-Down	Pull-Down	PCM output (Pull-Down/-Up controlled by FW)	
B0	PCMFR	I/O	Pull-Down	Pull-Down	PCM frame (8kHz)(Pull-Down/-Up controlled by FW)	
C1	PCMCLK	I/O	Pull-Down	Pull-Down	PCM clock (>64kHz) (Pull-Down/-Up controlled by FW)	
C3	GPIO (=GPIO0)	I/O	Pull-Down	Pull-Down	General purpose Input/Output (Pull-Down/Up controlled by FW)	
G2	TRST	I	Pull-Down	Pull-Down	Test Reset (JTAG)	
B4	TCK	I	Input	Input	Test Clock (JTAG)	
C4	TMS	I	Pull-Up	Pull-Up	Test Mode Set (JTAG)	
D4	TDI	I	Pull-Up	Pull-Up	Test Data Input (JTAG)	
B3	TDO	O	Tristate	Tristate	Test Data Output (JTAG)	
F2	RESETQ	I	Pull-Up	Pull-Up	Reset line (0:reset, 1:active)	
F3	WAKEUP_BT	I	Input	Input	Wake-up signal from low power mode	
E2	CLK32	I	Input	Input	32.768 kHz clock input	
J5	ANT	A			RF input /output 50 ohms.	
F0	VSUPPLY	S			Power Supply	
G7	NC (VDD)				Regulated supply voltage for test purposes. Important that is leaved NC.	
A0, A1, A4, A5	GND					
C5, C6	GND					
D1	GND					
E0, E1	GND					
E3, E4	GND					
F4, F5	GND					
G1, G6	GND					
H0, H4, H5, H6	GND					
J0, J4, J6	GND					
A2, A3 , A6, A7	NC					
B1, B2, B6, B7	NC					
C0, C7	NC					
D0, D2, D7	NC					
E7	NC					
F1, F6, F7	NC					
G0, G3, G4, G5, G7	NC					
H1, H2, H3, H7	NC					
J1, J2, J3, J7	NC					

Table 2-2 Module pin-out

2.6 Functional Block Diagram

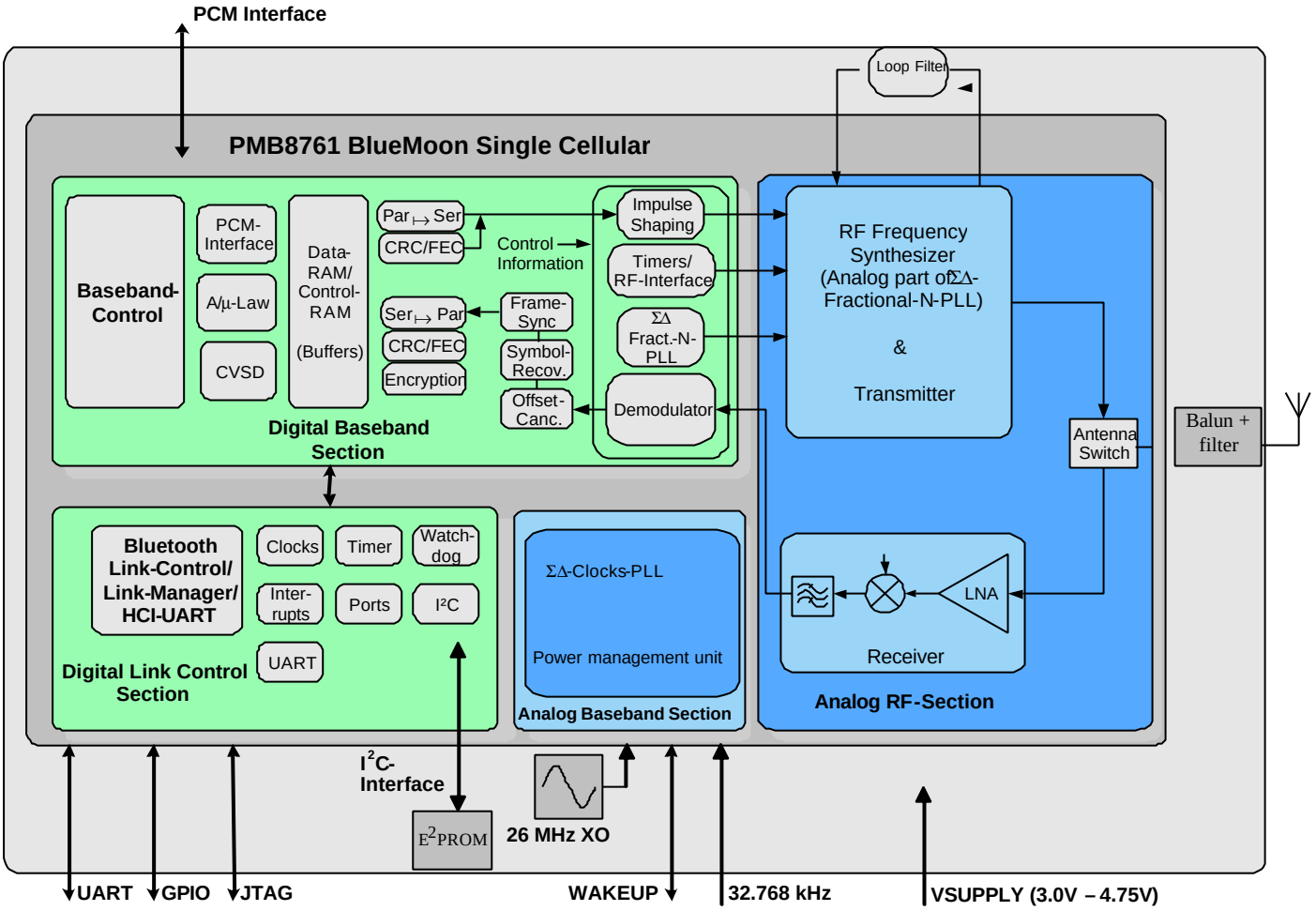


Figure 2-4: Singlestone PBA 313 07 Block diagram

2.7 System Integration and Applications

2.7.1 General description

On the RF-side, Singlestone provides a 50 Ohm single-ended input/output to be directly connected to an external antenna. The design of the antenna is open to a broad spectrum (e.g. PCB antenna, ceramic antenna, external antenna) and can be optimized to the target application requirements.

The HCI-interface is implemented as a full-duplex UART port which can be configured to be used in 2-line or 4-line mode (with or without hardware handshake). If hardware handshake is not used then the UARTCTS pin must be grounded.

The PCM interface is able to serve one Bluetooth SCO channel for voice data. Optionally, SCO channels may be linked to the host via the HCI-UART interface.

Both the UART- and PCM-interfaces are assigned to the regulated voltage (2.7V) powered by VSUPPLY. VSUPPLY must be in the range of 3.0 to 4.75 V.

General purpose input/output lines (GPIOs) can be controlled via HCI+ commands.

Configuration data (e.g. Bluetooth device address) are loaded from internal E^2PROM after reset. Optionally, configuration data may be provided by the host via HCI+ commands.

3 Electrical Specifications

3.1 Absolute Maximum Ratings

The maximum ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the module will result.

Parameter		*Limit values*		*Unit*
		min.	*max.*	
V_{SUPPLY}	*Supply voltage range*	*-0.3*	*6.0*	*V*
V_I	*Input Voltage Range*	*-0.3*	*3.75*	*V*
V_O	*Output Voltage Range*	*0.3*	*3.0*	*V*
I_{IN}	*Input Current*	*- 10*	*10*	*mA*
	ESD integrity according to MIL-STD883D Method 3015.7		*1*	*kV*
$T_{Storage}$	*Maximum storage temperature range*	*-40*	*125*	*°C*

Table 3-1: Absolute maximum ratings

Note: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to conditions beyond those indicated in the recommended operational conditions of this specification may affect device reliability. This is a stress rating only and functional operation of the device under these conditions or at any other condition beyond those indicated in the operational conditions of this specification is not implied.

3.2 Operating conditions

Unless otherwise stated, the following characteristics apply operating conditions.

Parameter	min.	typ.	max.	Remarks
Temperature	-40°C	+25°C	+85°C	
VSUPPLY	3.0V	3.3V	4.75V	

Table 3-2 Operating Conditions

3.3 Latch-up immunity

Latch-up immunity is guaranteed in accordance with JEDEC-standard No. 17, EIA Jedec JC-40.2.

3.4 Quality

For quality and reliability conditions se 105 63-PBA31301+ Uen.

3.5 Capacitance

T = 25°C

Symbol	Parameter	Limit Values		
		min.	max.	Unit
CIN	input capacitance	-	10	pF
COUT	output capacitance	-	15	pF
CIO	I/O	-	20	pF

Table 3-3: Capacitance

3.6 Current consumption

Regulator input voltage: V_{SUPPLY} = 3.0..4.75V

#	Bluetooth mode	Average Consumption			Unit	Test Conditions
		min.	typ.	max.		
1	HV3		32	40	mA	ACL link in sniff mode with max. interval
2	WSE 0x02		2.2	3.5	mA	1.28 s scan interval, 11.25 ms scan, no interlaced scan
3	WSE 0x03		3.0	4	mA	1.28 s scan interval, 2*11.25 ms scan, no interlaced scan
4	Sniff mode		2	3	mA	2.00 s sniff interval, sniff attempt = 1, sniff timeout = 0

Table 3-4: Average current for some Bluetooth modes. WSE means after HCI_Write_Scan_Enable.

3.7 DC Characteristics of Digital Part

VSUPPLY = 3.0V..4.75V.

Maximum allowed input levels are from -0.3V to 3.0V.
Higher voltages up to 3.6V can be applied at UARTIN, UARTCTS, PCMIN, PCMFR, PCMCLK, TRST, TCK, TMS, TDI, RESETQ, CLK32, WAKEUP_BT.

Symbol	Parameter	Test Condition		Limit Values			Unit
				Min	typ	max	
Pins: PCMCLK, PCMFR, PCMIN, UARTIN, UARTCTS, GPIO0							
$V_{IN\,LOW}$	Input low voltage	-			-	0.81	V
$V_{IN\,HIGH}$	Input high voltage	-		1.89	-		V
Pins: PCMCLK, PCMFR, PCMOUT, UARTOUT, UARTRTS, GPIO0							
$V_{OUT\,LOW}$	Output low voltage	I_{OL}=2.4mA		-	-	0.68	V
$V_{OUT\,LOW}$	Output low voltage	I_{OL}=100µA		-	-	0.27	V
$V_{OUT\,HIGH}$	Output high voltage	I_{OH}=-2.4mA		2.02	-	-	V
$V_{OUT\,HIGH}$	Output high voltage	I_{OH}=-100µA		2.43	-	-	V
Pins: WAKEUP_HOST							
$V_{OUT\,LOW}$	Output low voltage	I_{OL}=100µA		-	-	0.27	V
$V_{OUT\,HIGH}$	Output high voltage	I_{OH}=-100µA		2.43	-	-	V
Pins: TRST, TCK, TMS, TDI							
$V_{IN\,LOW}$	Input low voltage	-			-	0.81	V
$V_{IN\,HIGH}$	Input high voltage	-		1.89	-		V
Pin: TDO							
$V_{OUT\,LOW}$	Output low voltage	I_{OL}=2.4mA			-	0.35	V
$V_{OUT\,LOW}$	Output low voltage	I_{OL}=100µA			-	0.15	V
$V_{OUT\,HIGH}$	Output high voltage	I_{OH}=-2.4mA		2.2	-		V
$V_{OUT\,HIGH}$	Output high voltage	I_{OH}=-100µA		2.6	-		V
Pin: WAKEUP_BT, CLK32							
V_{ILOSC}	Input low voltage	-			-	0.4	V
V_{IHOSC}	Input high voltage	-		2.0	-		V
Pin: RESETQ							
$V_{IN\,LOW}$	Input low voltage	-			-	0.35	V
$V_{IN\,HIGH}$	Input high voltage	-		2.5	-		V

Table 3-5: DC characteristics of digital part

	max. Load Capacitance (during test)	Rise/Fall Time (for measurement of DC characteristics)
PCMOUT	30 pF	30 ns
PCMCLK	30 pF	30 ns
PCMFRM	30 pF	30 ns

Table 3-6: Pin characteristics

Symbol	Parameter	Limit Values			Unit	Test Condition
		min	typ	max		
I_{LI}	Input leakage current	-	-	1	µA	0V<V_{IN}<2.7V
I_{LO}	Output leakage current	-	-	1	µA	0V<V_{OUT}<2.7V
$I_{LI,\,H}$	Input leakage current for 3.6V tolerant pins*	-	-	1	µA	0V<V_{IN}<3.6V
$I_{LO,\,H}$	Output leakage current for UART and PCM domain pins	-	-	1	µA	0V<V_{OUT}<2.7V

Table 3-7: Leakage currents

* The following pins are 3.6 V tolerant: UARTIN, UARTCTS, PCMIN, PCMFR, PCMCLK, TRST, TCK, TMS, TDI, RESETQ, CLK32, WAKEUP_BT

Pull-Up and Pull-Down Values

Symbol	Pull-Up			Pull-Down			Unit	Test Condition
	min	typ	max	min	typ	max		
UARTRTS	100	160	230	100	150	200	µA	
UARTOUT	100	160	230	100	150	200	µA	
WAKEUP_HOST	100	160	230	100	140	200	µA	
PCMOUT	100	160	230	100	140	200	µA	
PCMFR	100	160	230	100	140	200	µA	
PCMCLK	100	160	230	100	140	200	µA	
GPIO0	40	100	200	30	90	170	µA	

Table 3-8: Pull-Up / Pull-Down characteristics

3.7.1 Pull Up characteristics on ResetQ

The ResetQ signal is pulled up to Vdd. In order for the chip to start up properly at power up the pull up is delayed. Below is a table stating the delay from applying a stable Vsupply to the module until the ResetQ goes high.

Parameter	Limit Values			Unit	Test Condition
	min	typ	max		
Delay pull up of ResetQ		26	50	µs	
Pull-up current ResetQ		270	500	µA	

3.8 Operational Range for RF part

Within the operational range the module operates as described in the circuit description. The AC/DC characteristic limits are not guaranteed.

Note: Power levels refer to 50Ω impedance

#	Parameter	Symbol	Limit values		Unit	Remarks
			min.	max.		
1	RF input level	P_{RFIN}		10	dBm	
2	RF input frequency	f_{RFIN}		2500	MHz	
3	Ambient temperature	T_A	-40	+85	°C	

Table 3-9: Operational range for the RF part

3.9 AC/DC Characteristics of RF part

AC/DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical values are the median of the production.

3.9.1 Transmitter Characteristics

#	Parameter	Symbol	Limit values			Unit	Test Conditions
			min.	typ.	max.		
1	Output power		-3.0	1.0	4.5	dBm	
2	Output power		-1.0	1.0	4	dBm	T=25°C
3	Frequency deviation (00001111 sequence)	f_{dev}	140	158	175	kHz	
4	Frequency deviation (0101 sequence)	f_{dev}	115	140	175	kHz	
5	Relative frequency deviation (0101 sequence)	$f_{dev,0101}/f_{dev,00001111}$	0.8	0.95			
6	In-band spurious emissions				-20	dBc	@ 500kHz offset*
					-20	dBm	@ 2MHz offset*
					-40	dBm	@ 3MHz offset*
7	Out of band spurious emission				-36	dBm	30MHz -1GHz
					-30	dBm	1 - 12.75 GHz
					-47	dBm	1.8 - 1.9 GHz
					-47	dBm	5.15 -5.3 GHz
*measurement method corresponding to Bluetooth test specification							

Table 3-10: Transmitter characteristics

3.9.2 RSSI

#	Parameter	Symbol	Limit values			Unit	Test Conditions
			min.	typ.	max.		
1	Linear response lower limit			-90	-80	dBm	
2	Linear response upper limit		-40			dBm	

Table 3-11: RSSI

3.9.3 Receiver Characteristics

#	Parameter	Range/Location	Limit values			Unit	Test Conditions
			min.	typ.	max.		
1	Sensitivity (BER=10^{-3})			-85	-75	dBm	According to Bluetooth spec.
2	Sensitivity (BER=10^{-3})			-85	-81	dBm	T=25°C, nominal transmitter
3	Interference performance (BER=10^{-3})	Y=M	-71	-68		dBm	frequency deviation 160kHz for wanted (M) and interferer (Y), level wanted –60dBm measured at antenna input
		Y=M±1	-60	-58		dBm	
		Y=M-2	-30	-23		dBm	
		Y=M+2 (image)	-51	-43		dBm	
		Y=M-3	-27	-25		dBm	frequency deviation 160kHz for wanted (M) and interferer (Y), level wanted –67dBm measured at antenna input
		Y=M+3 (adj. Image)	-47	-36		dBm	
		Y= any other Bluetooth channel	-27	-22		dBm	
4	a) Out of band blocking (BER=10^{-3})	30MHz≤f≤2GHz	5	8		dBm	frequency deviation 160kHz for wanted, unmodulated interferer, level wanted –67dBm, not at VCO frequency and mixing products of :3/2, measured at antenna input
		2GHz≤f≤2.4GHz	-27			dBm	
		2.5GHz≤f≤3GHz	-27			dBm	
		3GHz≤f≤5GHz	5	8		dBm	
		5GHz≤f≤12.75GHz	-10			dBm	
	c) Exceptions for LO spurious (based on measurements on golden board)	1/3 f_{out}	0	5		dBm	
		1/2 f_{out}	-10	0		dBm	
		1785MHz<f<1850MHz	-10	0		dBm	
		2 fout	-10	0		dBm	
5	Intermodulation performance (BER=10^{-3})		-39	-34		dBm	frequency deviation 160kHz for wanted (N), level –64dBm; interferer (N+5) unmodulated, frequency deviation 160kHz for interferer (N+10), measured at antenna input
6	Spurious Emission	30 MHz - 1 GHz			-57	dBm	
		1 - 12.75 GHz			-47	dBm	

Table 3-12: Receiver characteristics (including Digital Demodulator and PAM-Receiver)

3.10 Characteristics of externally supplied 32.768kHz clock signal

The 32.768kHz clock signal applied to CLK32 has to be a rectangular waveform with a duty cycle of 10% up to 90%. The frequency accuracy has to be better than 250ppm. The rise time and fall time of the 32.768kHz signal must be below 10µs. The amplitude must satisfy the requirements in Table 3-5.

4 Assembly and design guidelines

4.1 General description of the module

Singlestone is a Land Grid Array (LGA 8x9) module made for surface mounting. The pad diameter is 0.8 mm and the pitch 1.27 mm.

All solder joints on the module will reflow during soldering on the mother board. All components and shield will stay in place due to wetting force.

Surface treatment on the module pads is Nickel /Gold.

Figure 1 shows the pad layout on the module, Seen from component side.

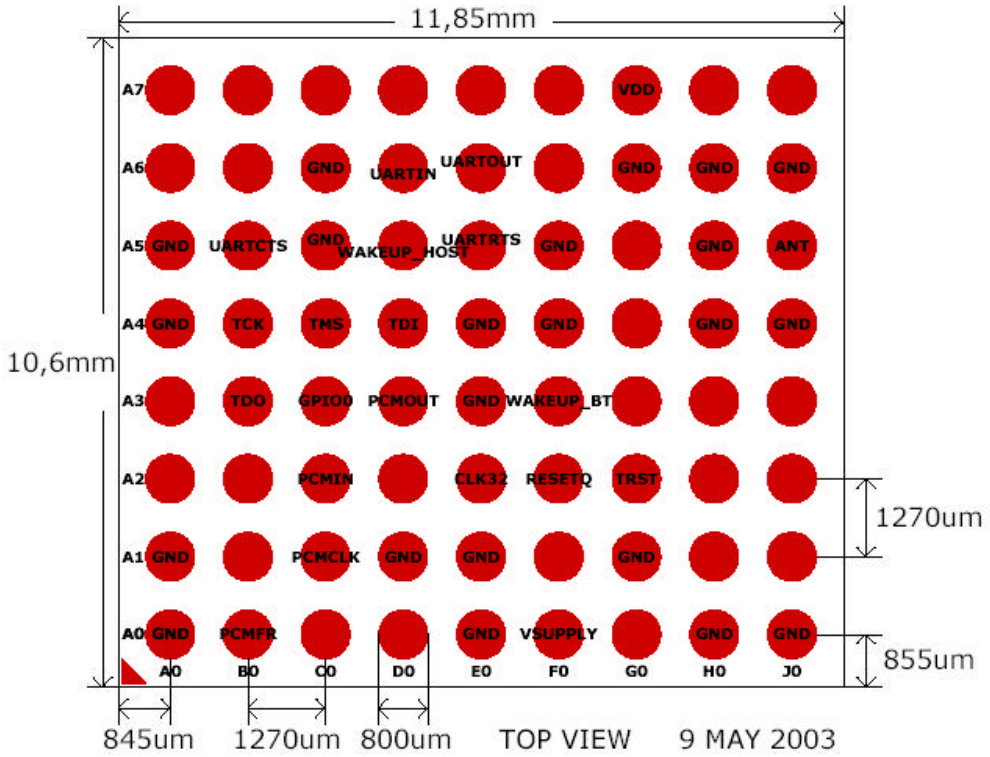


Figure 4-1 Pad layout on the module (top view)

4.2 Printed Circuit Board design

The land pattern on the PCB shall be according to the land pattern on the module, which means that the diameter of the LGA pads on the PCB shall be 0.8 mm. It is recommended that each pad on the PCB shall be surrounded by a solder mask clearance of about 75 µm to avoid overlapping solder mask and pad.

The solder pads must have wetability to eutectic solder. Electroless Ni/Au plating or OSP (Organic Surface Protection) is a common surface finish and is suitable for assembly.

4.3 Solder paste printing

The solder paste deposited on the PCB by stencil printing has to be of eutectic or near eutectic tin lead composition (e.g. 63Sn37Pb or 62Sn36Pb2Ag). A no-clean solder paste is preferred, because cleaning of the solder joints which are under the module is difficult.

Preferred thickness of the solder paste stencil is 100 - 127 µm (4 - 5 mils). The apertures on the solder paste stencil shall be of the same size as the pads, 0.8 mm.

4.4 Assembly

4.4.1 Component placement

In order to assure a high yield soldering process good placement on the PCB is necessary. As a rule of thumb the tolerable misplacement is 150 µm. This means that the Singlestone module can be assembled with a variety of placement systems.

The recommendation is to pick and place the module with a nozzle in the centre of the shield. The nozzle diameter shall not be bigger than 4 mm.

4.4.2 Pin mark

Pin 1 (A0) is marked on bottom footprint and on the top of the shield on the module according to fig 2a-b. Diameter of pin 1 mark on the shield is 0.40 mm.

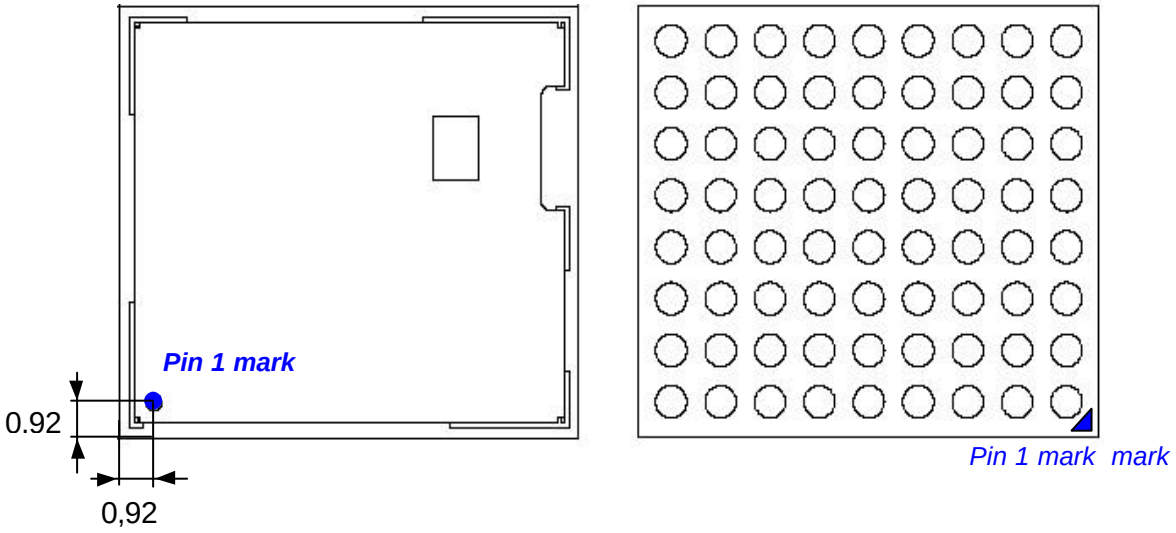


Figure 4-2 Pin mark

4.5 Soldering profile

Generally all standard reflow soldering processes (vapour phase, convection, infra red) and typical temperature profiles used for surface mount devices are suitable for the Singlestone module. Wave soldering is not possible.

Figure 4-3 shows an example of a suitable solder reflow profile.

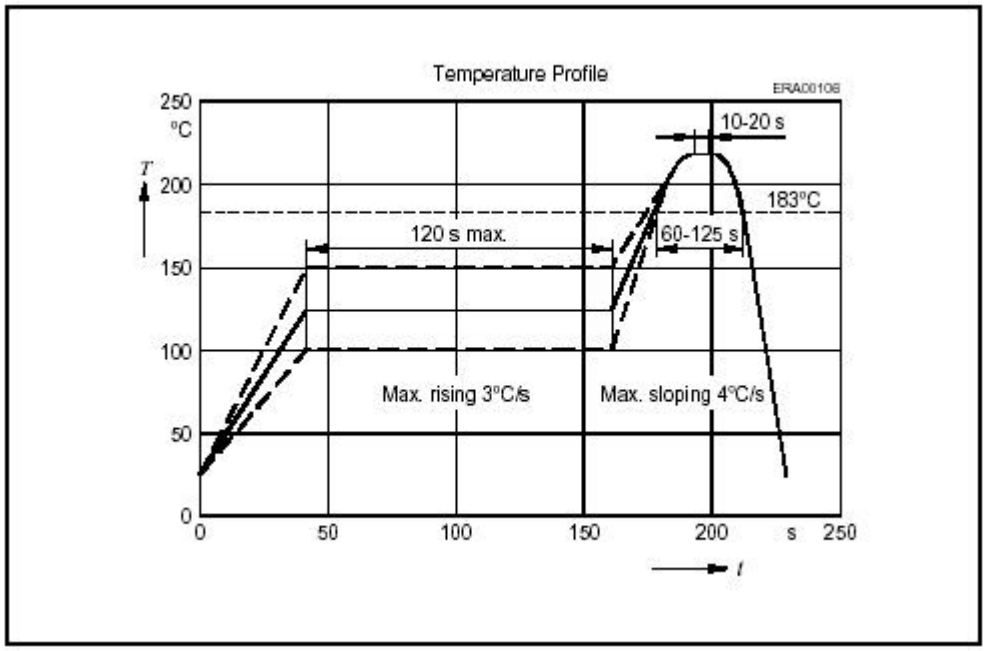


Figure 4-3 : Eutectic Sn/Pb-Solder Profile

Singlestone shall be handled according to MSL3, which means a floor life of 168 h in 30°C/60% r.h.

4.6 Antenna

The antenna output routing should be 50 W (VSWR $\leq$ 2:1) all the way to the antenna in order to maintain the radio performance listed in this data sheet. For the routing underneath the module, the modules ground plane should be considered. The type approval for FCC and R&TTE have been done with an antenna gain of 1.6dBi.

4.7 Shielding / EMC requirements

The module has its own RF shielding and is approved according to the standards by FCC and R&TTE. If the approval number is not visible on the outside when the module is utilised in the final product, an exterior label must state that there is a transmitter module inside the product (see Section 5.2).

4.8 Safety

In the R&TTE directives there are safety requirements for high voltage applications. For complying with the R&TTE security requirements regarding usage in high voltage equipment, using 230V supply, the device shall be mounted un-resolvable or it needs to be ensured that it cannot cause a short circuit.

5 Type approvals and Qualification

5.1 Bluetooth Qualification

The PBA 31307 is Bluetooth Qualified according to specification v1.1 with the ID: PBA31307. The covered functionality of this listing covers RF, Baseband and Link Manager.
Since the PBA 31307 constitute a complete Bluetooth system, the pre-testing, listings and qualifications can be reused by reference by the end-customer.
Please refer to the application note “PBA 31307 Bluetooth Qualification & Type Approval” for the details on the procedure to re-using the BT-qualification.

5.2 FCC Modular Approval

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.
The modular transmitter is labeled with its own FCC ID number, but, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. The exterior label can use wording such as the following: “Contains Transmitter Module FCC ID Q2331307” or “Contains FCC ID Q2331307”. Any similar wording that expresses the same meaning may be used.
When reusing the Modular Approval, antenna related measurements might need to be redone. The antenna used for modular approval was a max 1.6dBi half-wave antenna from gigAnt (PCB Swivel 6076019). When using an other antenna a class II permissive change will be needed.
For further details on the procedure for re-using the FCC type approval, please refer to the application note “PBA 31307 Bluetooth Qualification & Type Approval”.

5.3 R&TTE Approval

This device complies with the requirements in the European Union and EFTA according to the following test specifications:
EN 300 328
EN 301 489 -1/17
The R&TTE approval for the PBA31307 - device is valid in the following countries:
Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.
The notification time for these countries to request additional testing and/or documentation are 4 weeks.

6 Module marking

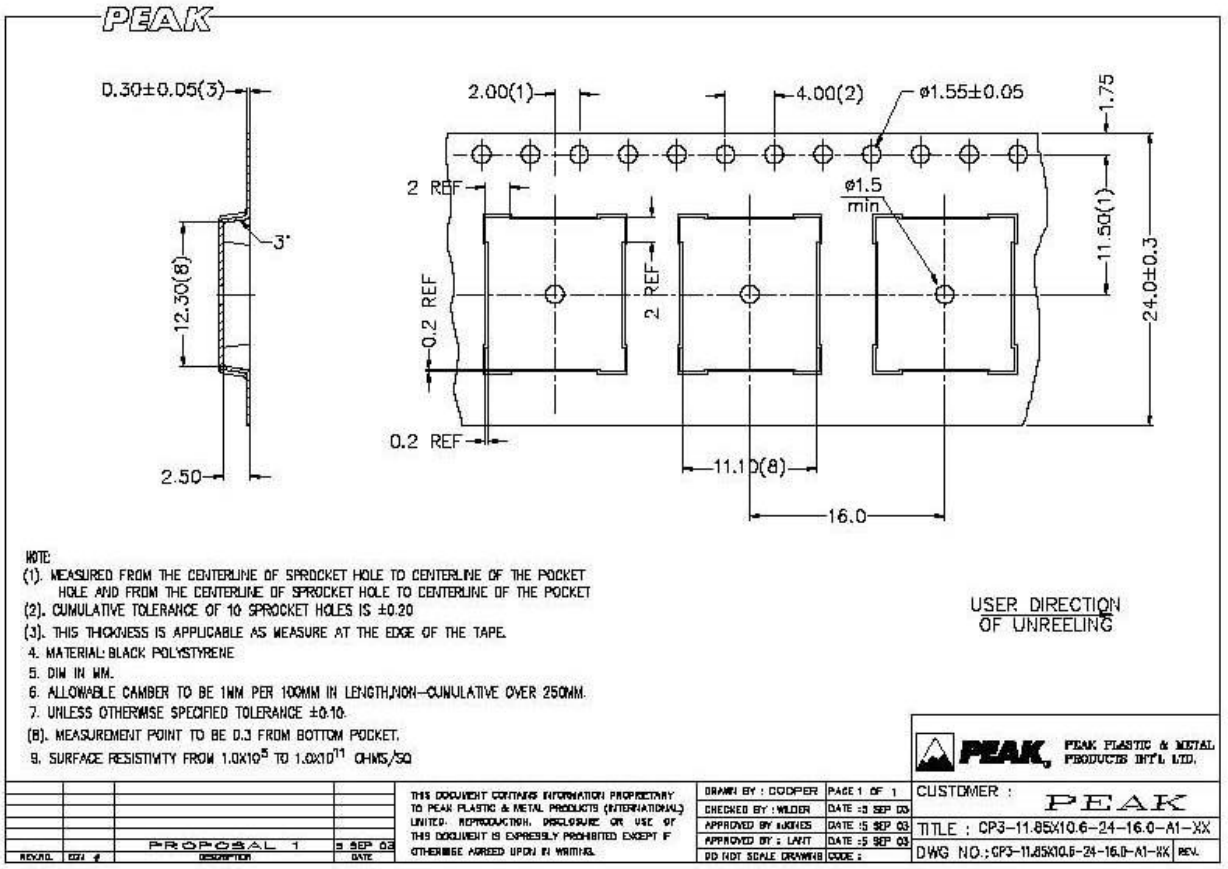
Marking	Description
1, Infineon	Infineon logotype
2. <PBA 313 07 R1A>	Product number with suffix and revision state according to purchase order.
3. <**bbbbbb**>	Batch number
4. <**XX**>	Type of module: Engineering Samples, XX=ES
5. <**yyww2**>	Manufacturing year (yy), week (ww) and factory code (2)
6. <FCC ID Q23 31307>	FCC Identification number
7 Bluetooth	Bluetooth logotype.
8. CE	CE marking

Table 6-1

Figure 6-1 Marking example

7 Package

Singlestone is packed in tape on reel according to Figure 7-1. The tape is also the module dry pack as referred to in chapter 4.5.



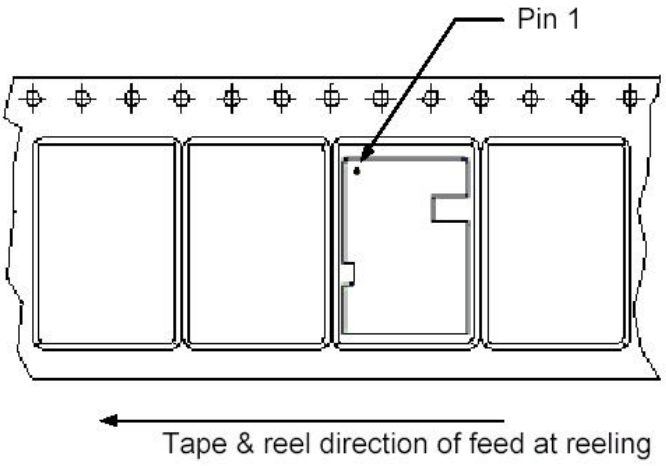


Figure 7-1 Tape on reel for Singlestone

8 References

1. T8761-XV01D12 -7600 Preliminary Data Sheet PMB 8761