![Texas Instruments]

WL18x1 WiLink™ 8 Single-Band Combo Device Supporting Wi-Fi®, Bluetooth®, and Bluetooth® Low Energy

1 Features

- General
  - Packaged in wafer scale package (WSP) for small PCB footprint
  - Provides efficient direct connection to battery by employing several integrated switched mode power supplies (DC2DC)
  - Seamless integration with TI Sitara and other application processors
  - Operating temperature: -40°C to +85°C
  - 105°C Extended temperature range is supported only in defined use-case profile
- Wi-Fi®
  - Baseband processor and RF Transceiver with support for IEEE 802.11b/g/n
  - Integrated 2.4G-Hz PA for complete WLAN solution
  - Medium access controller
    - Hardware-based encryption and decryption using 64-, 128-, and 256-bit WEP, TKIP, or AES keys
    - Support Wi-Fi Protected Access (WPA, WPA2, WPA3)and IEEE 802.11i
  - IEEE Std 802.11d,e,h,i,k,r PICS Compliant
  - 802.11v support for high-precision timing and location approximation
  - Supports 4 bit SDIO host interface, including High Speed (H3) and V3 modes
- *Bluetooth*® and Bluetooth Low Energy (WL1831 only)
  - Bluetooth 5.1 secure connection compliant and CSA2 support (Declaration ID: D032799)
  - Host controller interface (HCI) transport for Bluetooth over UART
  - Dedicated audio processor support for SBC encoding and A2DP
  - Dual-mode Bluetooth and Bluetooth Low Energy
  - TI's Bluetooth and Bluetooth Low Energy certified stack
- Key Benefits
  - Differentiated use cases by configuring WiLink 8 simultaneously in two roles (STA and AP) to connect directly with other Wi-Fi devices on different RF channels (Wi-Fi networks)
  - Different provisioning methods for in-home devices - connect to Wi-Fi in one step
  - Low Wi-Fi power consumption in connected idle (<800 µA)
  - Configurable wake-on-WLAN filters to only wake up the system
  - Wi-Fi and Bluetooth single antenna coexistence

2 Applications

- Grid Infrastructure
  - Electricity Meter
  - String Inverter
  - Micro Inverter
  - Energy Storage Power Conversion System (PCS)
- Building and Home Automation
  - HVAC Gateway
  - Thermostat
  - Building Security Gateway
- Factory Automation
- Motor Drives
- Appliances
- Retail Automation and Payment

3 Description

The WiLink™ 8 WL18x1 is a highly integrated single-chip WLAN, Bluetooth, and Bluetooth Low Energy device that forms a complete stand-alone communication system.

The device is the 8th-generation connectivity combo chip from Texas Instruments. As such, the WL18x1 is based upon proven technology and complements the TI integrated devices for connectivity portfolio. This device is ideal for use in mobile devices, mobile computer and catalog embedded device applications due to its low current, small area and coexistence-friendly features. TI offers drivers for high-level operating systems such as Linux® and Android™. Additional drivers, such as WinCE and RTOS, which includes QNX, Nucleus, ThreadX, and FreeRTOS are supported through third parties.

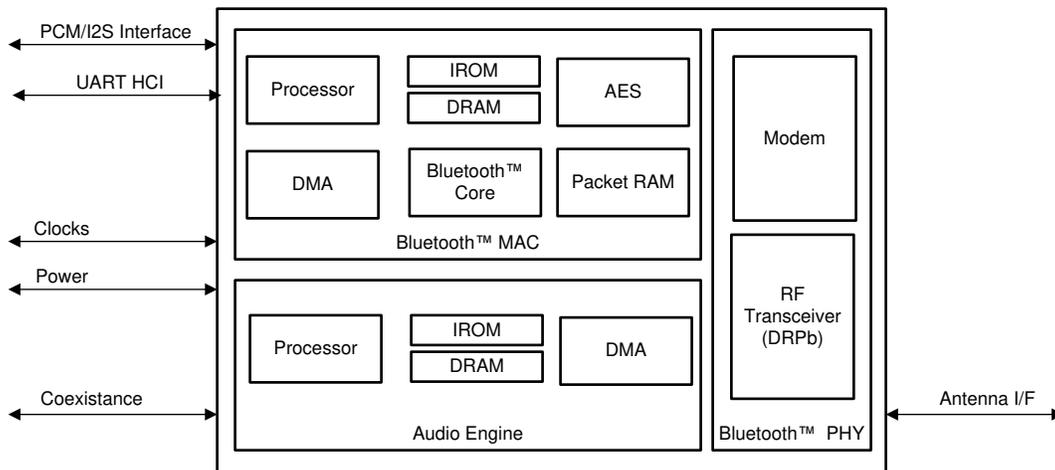**Table 3-1. Device Information**

Device	WLAN 2.4-GHz SISO	Bluetooth, Bluetooth Low Energy
WL1801	✓	
WL1831	✓	✓

4 System Block Diagram

Figure 4-1 shows a system diagrams for the WL18x1.
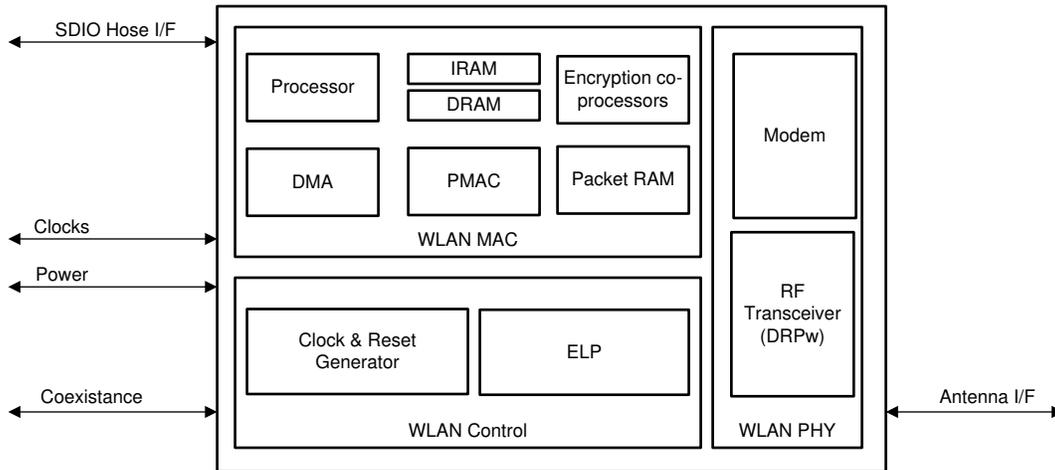
Figure 4-1. WL18x1 High-Level Wi-Fi System Diagram

Figure 4-2. WL1831 High-Level Bluetooth System Diagram

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
May 2021	*	Initial Release

5 Chip Packaging and Ordering

5.1 Ordering Information

WSP/CSP (Wafer/Chip Scale Package) 12x11 matrixes with lead-free balls RoHS compliant.

T&R P/N	ROM/SR	Pitch (mm)	Parts Per Reel	Package
WL1801GYFVR	ROM	0.4	2500	WSP 130 pin
WL1831GYFVR	ROM	0.4	2500	WSP 130 pin

5.1.1 Device Support Nomenclature

To designate the stages in the product development cycle, TI assigns prefixes to the part numbers. These prefixes represent evolutionary stages of product development from engineering prototypes through fully qualified production devices.

Device development indicator:

X   Experimental, preproduction, sample or prototype device. Device may not meet all product qualification conditions and may not fully comply with TI Specifications. Experimental/Prototype devices are shipped against the following disclaimer:"This product is still in development and is intended for internal evaluation purposes." Notwithstanding any provision to the contrary, TI makes no warranty expressed, implied, or statutory, including any implied warranty of merchantability of fitness for a specific purpose, of this device.

Null   Device is qualified and released to production. TI's standard warranty applies to production devices.

5.2 Chip Marking

Chip Topside
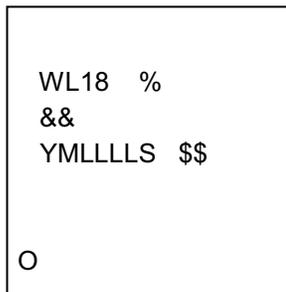
```
WL18    %
&&
YMLLLLS   $$



O
```

WL18	= WL18xx family
%	= Features (Blank = standard power)
&&	= Device Mark 1 & 2
YM	= 2 digit Date Code
LLLL	= Lot Trace code
S	= Assembly Site Code per QSS 005-120
$$	= Fab Code
O	= Pin one indicator (filled solid)

5.2.1 Marking System

In order to minimize delivery time to customer for small quantities, TI may ship the device ordered or an equivalent device currently available that contains at least the functions of the part ordered. From all aspects, this device will behave exactly the same as the part ordered. For example:

Customer orders device WL1831.

Part shipped may be either WL1831, WL1833, WL1835, or WL1837

Mark 1 indication (first digit):

Mark	WLAN	Bluetooth	WL180x	WL183x
0&	Tested		Valid	
3&	Tested	Tested	Valid	Valid

Mark 2 indication (second digit):

Mark	WLAN 2.4G	WLAN 5G	MIMO 2.4G	WL18x1	WL18x3	WL18x5	WL18x7
&1	Tested			Valid			

Mark	WLAN 2.4G	WLAN 5G	MIMO 2.4G	WL18x1	WL18x3	WL18x5	WL18x7
&3	Tested	Tested		Valid	Valid		
&5	Tested		Tested	Valid		Valid	
&7	Tested	Tested	Tested	Valid	Valid	Valid	Valid

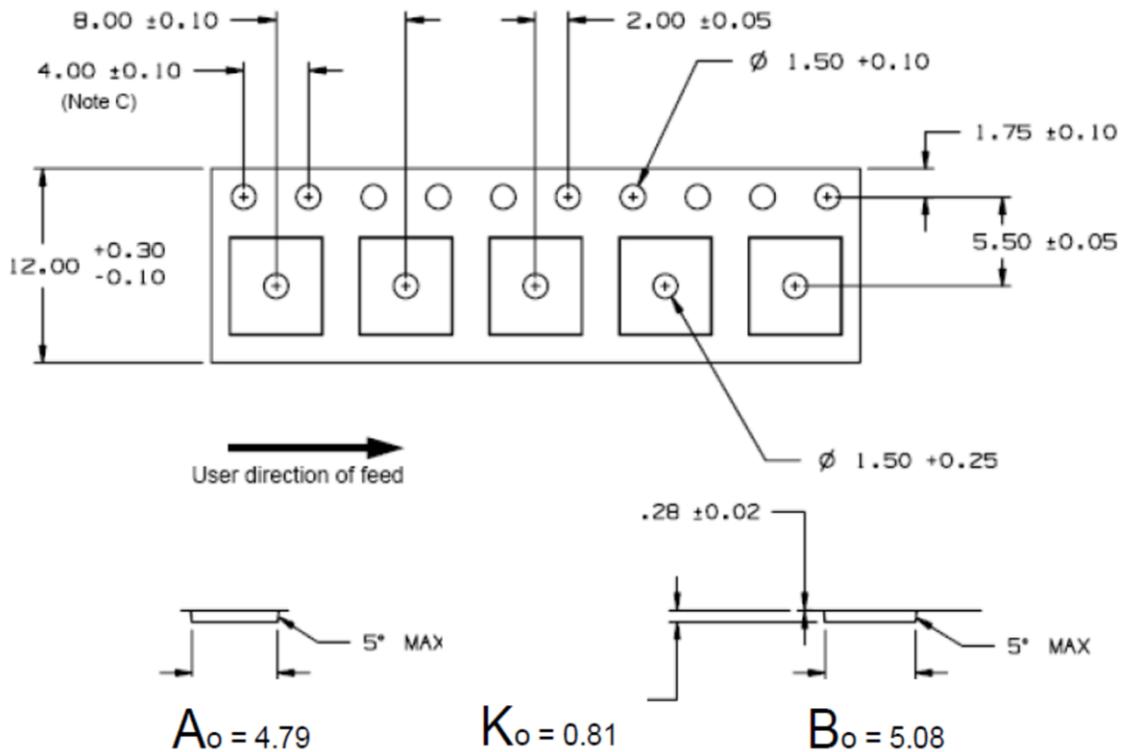## 5.3 Tape and Reel Information

5.3.1 Tape Direction
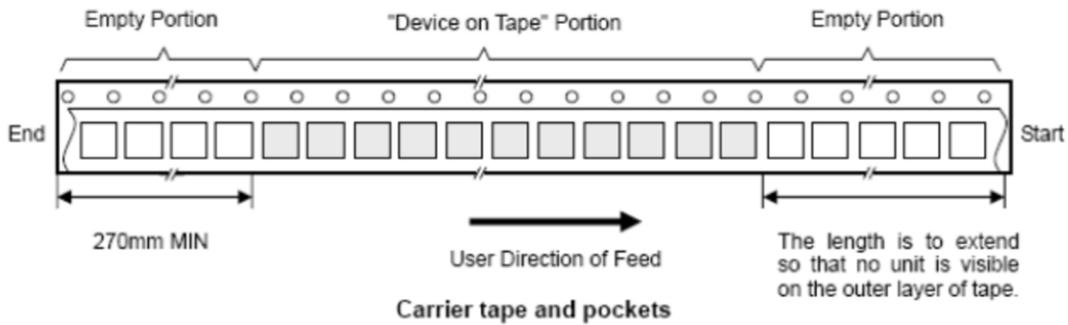
5.3.2 Part Direction
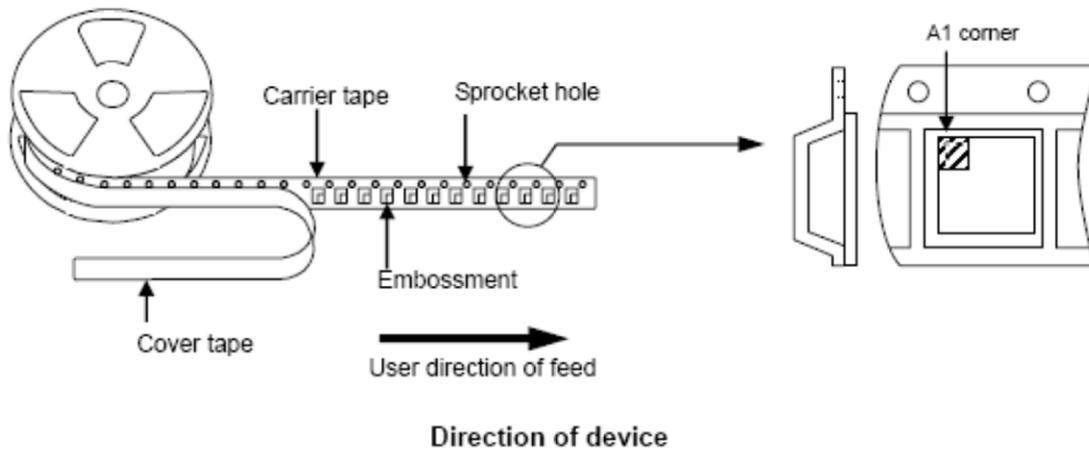
5.3.3 Part Orientation

The device is located such as symbolization in upper side and lead pins in lower side.
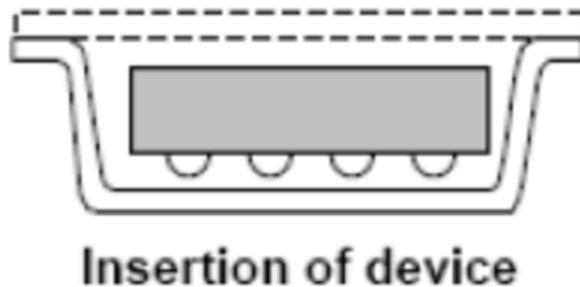
5.3.4 Tape Dimensions

Tape Dimensions (12 mm width Tape) (Notes A, B)

NOTES : A. Tolerance unless otherwise specified : ± 0.10.
B. Unless otherwise noted, R = 0.3 MAX.
C. 10 pitch cumulative tolerance : ± 0.20.

Tape dimension (UNIT : mm)

1. Tape cover = 9.3mm. The cover tape does not cover the index hole and does not shift to outside from carrier tape
2. Tape structure

   - The carrier tape is made of plastic and the structure is shown in above schematic.

   - The device is put on embossed area of carrier tape, and covered by cover tape made of plastic.
3. ESD Countermeasure: Plastic material used in both carrier tape and cover tape are static dissipative

5.3.5 Reel Dimensions

Reel dimension (ø 330 mm Reel, 12 mm width Tape)

Product Folder Links: *WL1801 WL1831*
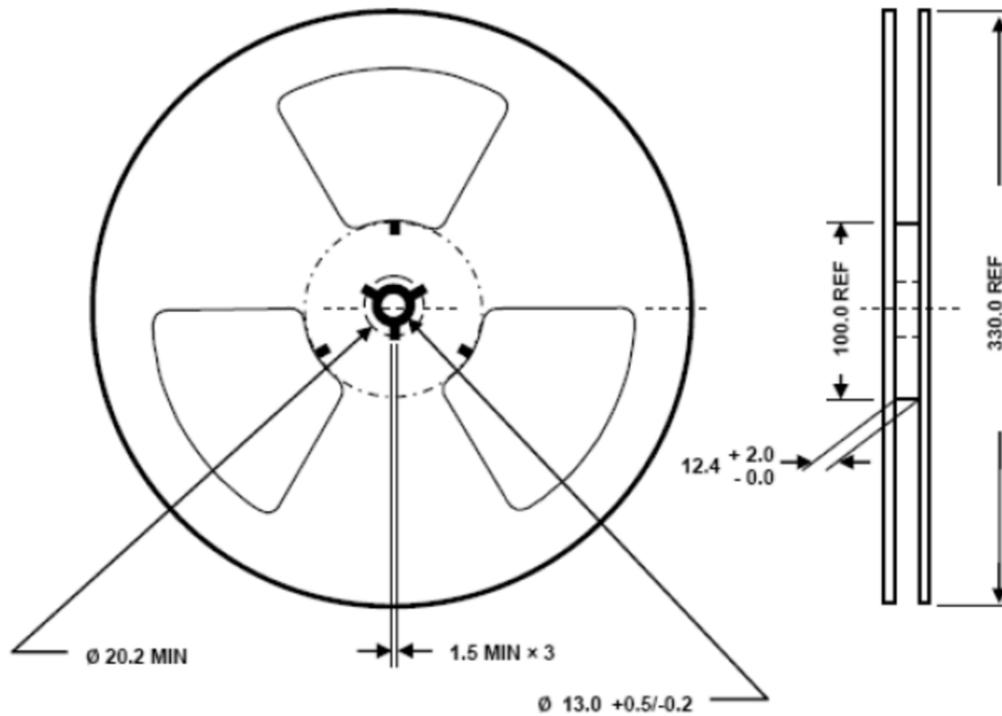
Reel dimension (UNIT : mm)

This reel drawing is just for showing dimensions, so the design may be different.

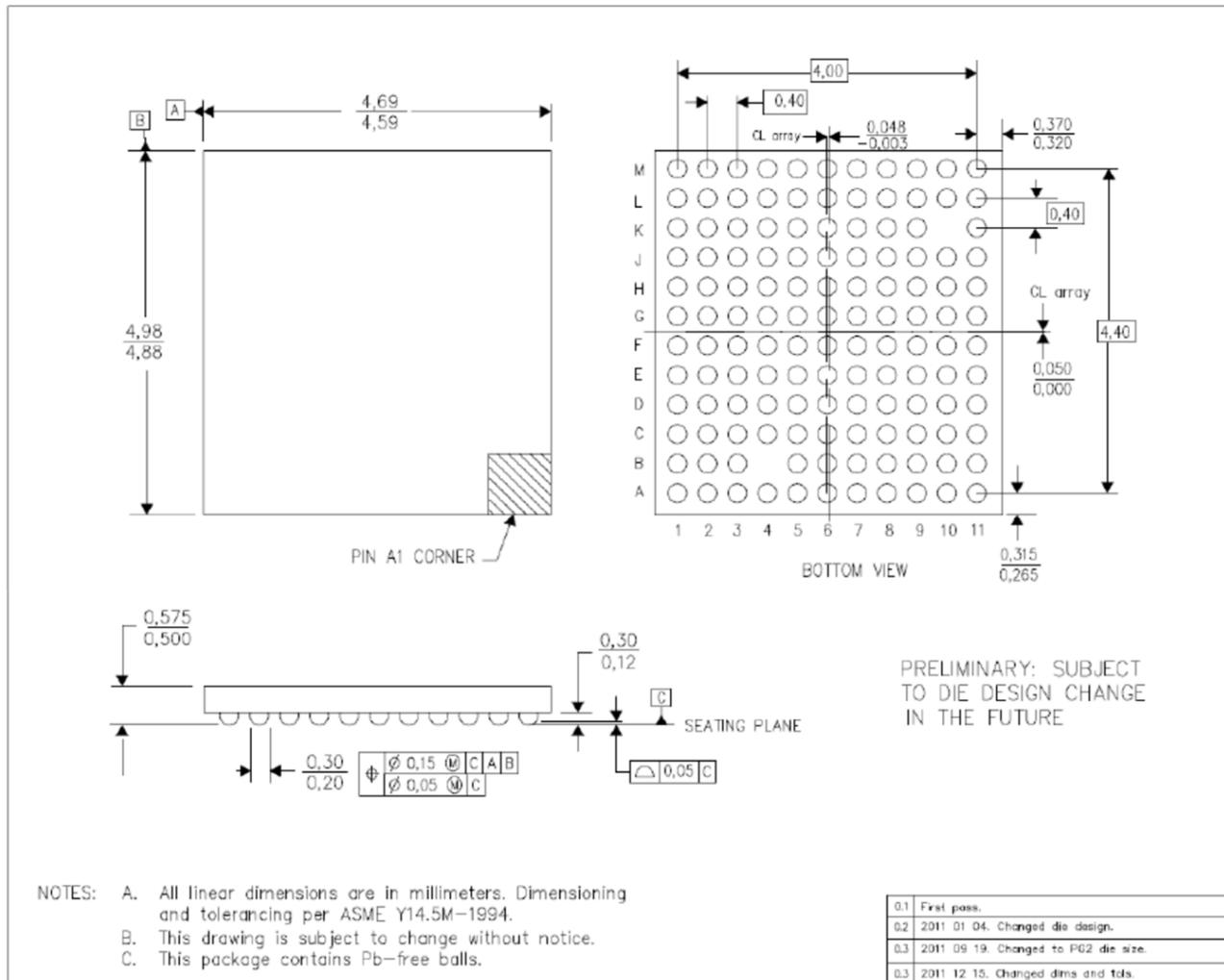1. Material: Polystyrene (Static Dissipative / Antistatic)

5.4 Packaging

- Tape leader fixed by drafting tape.
- Reel is placed in moisture-proof anti-static bag and bag is heat-sealed.
- Reel bag is placed into corrugated fiberboard box. Filler such as cushion is added if space exists inside.
- Reel box is stacked into corrugated fiberboard shipping box.

6 Mechanical Drawing

YFV (WL185x PG2 — N130)   DIE-SIZE BALL GRID ARRAY (WCSP)

NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. This package contains Pb-free balls.

0.1	First pass.
0.2	2011 01 04. Changed die design.
0.3	2011 09 19. Changed to PG2 die size.
0.3	2011 12 15. Changed dims and tols.

PRELIMINARY: SUBJECT TO DIE DESIGN CHANGE IN THE FUTURE

DESCRIPTION	MIN	NOM	MAX
Body size (W, mm) *	4.59	4.64	4.69
Body size (L, mm) *	4.88	4.93	4.98
Overall thickness (t, mm)	0.500	0.538	0.575
Terminal pitch (mm)	-----	0.40	-----
Ball / terminal diameter (mm)	0.20	0.25	0.30
Ball height (mm)	0.12	0.21	0.30
Ball matrix footprint (W x L)	-----	11x12	-----
Coplanarity at terminal / ball side (mm)	-----	-----	0.05

Product Folder Links: *WL1801 WL1831*

PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
WL1801GYFVR	ACTIVE	DSBGA	YFV	130	2500	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 105	WL18G 01	Samples
WL1831GYFVR	ACTIVE	DSBGA	YFV	130	2500	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 105	WL18G 31	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.