

Advanced Power Management Unit

Check for Samples: [TPS658623](#)

1 INTRODUCTION

1.1 MAIN FEATURES

- **INTEGRATED POWER SUPPLIES**
 - 3 Programmable Step-Down converters
 - Software Controlled Enable/Forced PWM Mode
 - Automatic Power Saving Mode
 - Maximum 1.5A Outputs (SM0 and SM2)
 - Maximum 2.0A Output (SM1)
 - 11 Programmable General Purpose LDOs
 - 7 With Output Voltages of 1.25V to 3.3V
 - 2 With Output Voltages of 0.725V to 1.5V or 1.25V to 2.586V (Factory Configurable)
 - 1 “Always On” With Output Voltages of 1.25V to 3.3V
 - 1 With Output Voltage of 1.7V–2.475V
- **DISPLAY SUPPORT FUNCTIONS**
 - 4 PWM Outputs With Programmable Frequency and Duty Cycle
 - Dual RGB LED Drivers
 - Constant Current WLED Driver
 - 26.5V (max) at 25mA
 - Over-Voltage Protection
 - Programmable Current Level and Brightness Control
- **HOST INTERFACE**
 - Interrupt Controller With Maskable Interrupts
 - External ADC Triggering and Step-Down Converter Mode Control
- **SYSTEM MANAGEMENT**
 - Dual Input Power Path
 - USB Current Limiting
 - Max 18V Over-Voltage Protection

- Power Good Monitoring on all Supply Outputs
- Software Reset Function
- Hardware On/Off and Reboot Control
- Momentary Power Loss (MPL) Support
- AUTOBOOT Support
- 11 Channel ADC With 3 Operating Modes
 - Single Conversion
 - Peak Detection
 - Averaging

1.2 APPLICATIONS

- Netbooks
- Portable Navigation Devices
- Portable Media Players



1.3 DESCRIPTION

The TPS658623 provides an easy to use, fully integrated solution for handheld devices, integrating multiple regulated power supplies, system management and display functions in a small package. The I²C interface enables control of a wide range of subsystem parameters. Internal registers have a complete set of status information, enabling easy diagnostics and host-controlled handling of fault conditions.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

To request a full data sheet, please send an email to:
nvidia_contact@list.ti.com.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS658623ZGUR	LIFEBUY	BGA MICROSTAR	ZGU	169	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658623	
TPS658623ZGUT	LIFEBUY	BGA MICROSTAR	ZGU	169	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658623	
TPS658623ZQZR	LIFEBUY	BGA MICROSTAR JUNIOR	ZQZ	120	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658623	
TPS658623ZQZT	LIFEBUY	BGA MICROSTAR JUNIOR	ZQZ	120	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658623	

(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.

OBSELETE: 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/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish 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.

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS658623ZQZR	BGA MICROSTAR JUNIOR	ZQZ	120	2500	330.0	16.4	6.3	6.3	1.5	12.0	16.0	Q1
TPS658623ZQZT	BGA MICROSTAR JUNIOR	ZQZ	120	250	330.0	16.4	6.3	6.3	1.5	12.0	16.0	Q1

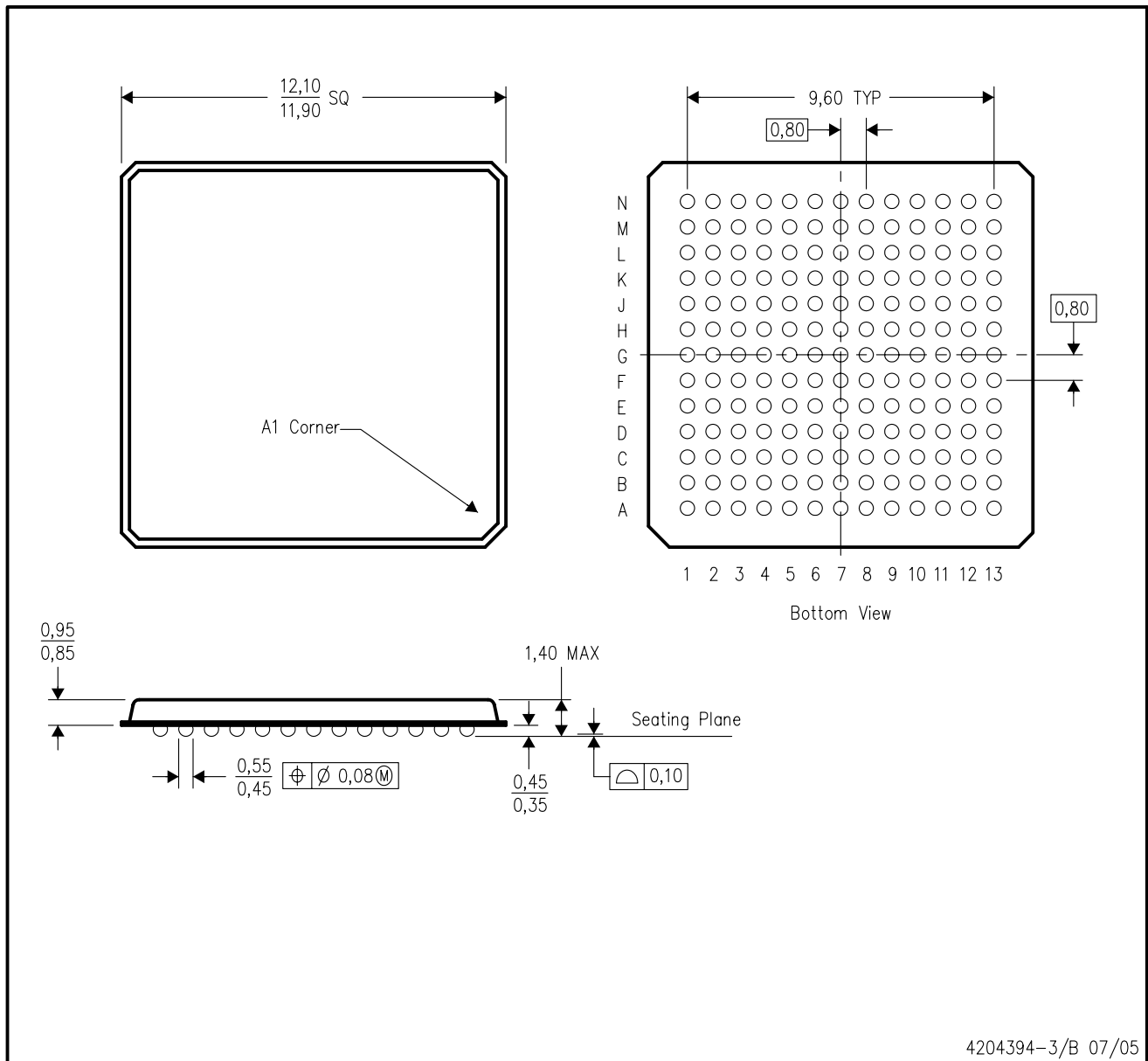
TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS658623ZQZR	BGA MICROSTAR JUNIOR	ZQZ	120	2500	336.6	336.6	31.8
TPS658623ZQZT	BGA MICROSTAR JUNIOR	ZQZ	120	250	336.6	336.6	31.8

ZGU (S-PBGA-N169)

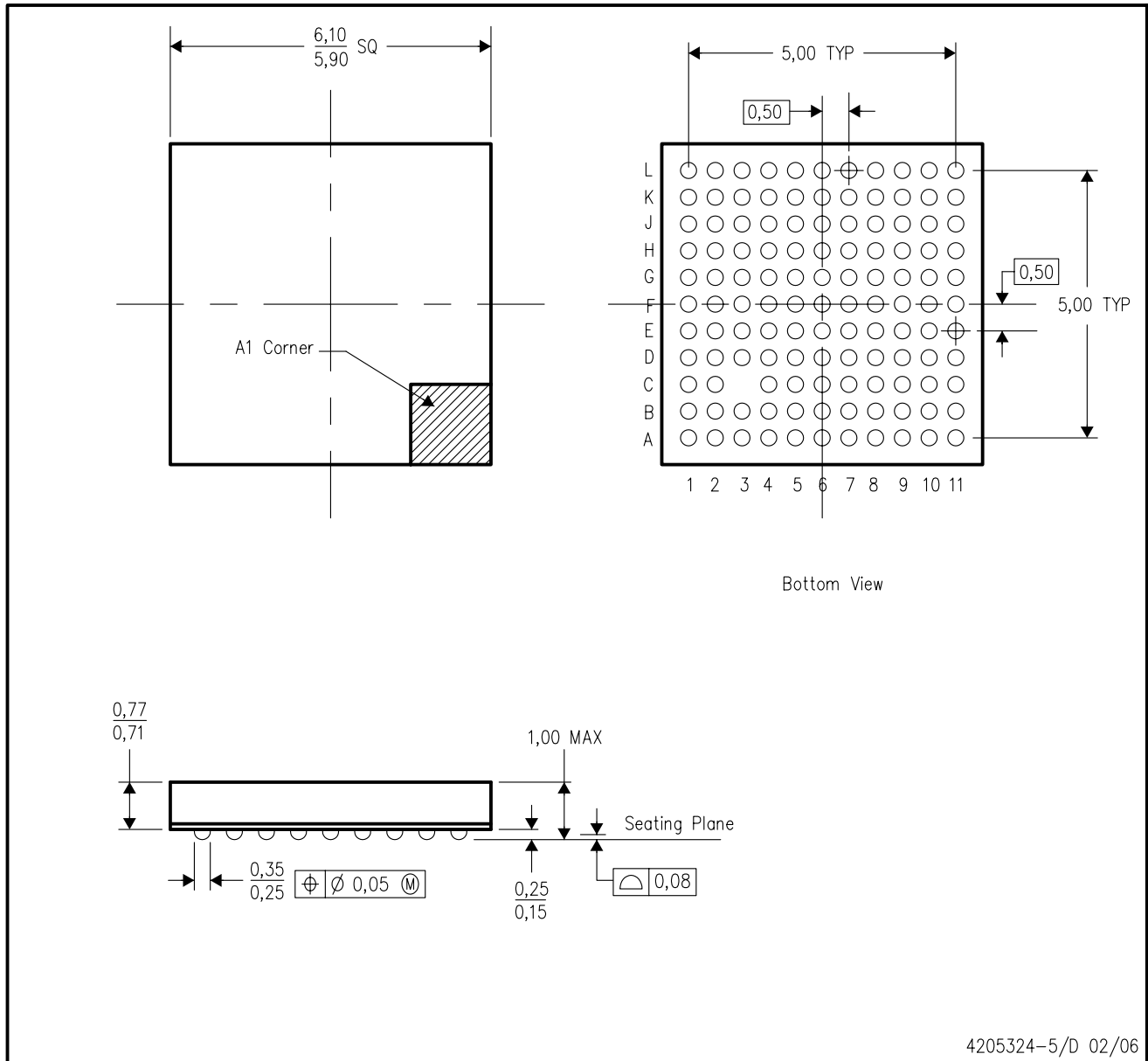
PLASTIC BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Micro Star BGA configuration
 - D. This is a lead-free solder ball design.

ZQZ (S-PBGA-N120)

PLASTIC BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MO-225
 - D. This package is lead-free.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2020, Texas Instruments Incorporated