



**THE DATASHEET OF  
TPS658640ZQZT**



# Advanced Power Management Unit

Check for Samples: [TPS658640](#)

## 1 INTRODUCTION

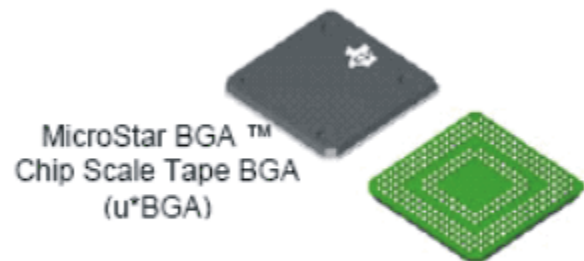
### 1.1 MAIN FEATURES

- **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.A 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 programmable)
    - 1 “Always On” With Output Voltages of 1.25V to 3.3V
    - 1 With Output Voltage of 1.7V–2.475V
- **DISPLAY SUPPORT FUNCTIONS**
  - 3 PWM Outputs With Programmable Frequency and Duty Cycle
  - Dual RGB LED Drivers
- **HOST INTERFACE**
  - I2C Bus
  - Interrupt Controller With Maskable Interrupts
  - GPIO Control (4)
- **SYSTEM MANAGEMENT**
  - Power Good Monitoring on all Supply Outputs
  - Software Reset Function
  - Hardware On/Off and Reboot Control

- Real Time Counter
- 11 Channel ADC With 3 Operating Modes
  - Single Conversion
  - Peak Detection
  - Averaging

### 1.2 APPLICATIONS

- Tablet PCs
- Netbooks
- SmartPhones
- Portable Navigation Devices
- Portable Media Players



### 1.3 DESCRIPTION

The TPS658640 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 I<sup>2</sup>C 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.



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**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TPS658640ZGUR	ACTIVE	BGA MICROSTAR	ZGU	169	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658640	<a href="#">Samples</a>
TPS658640ZGUT	ACTIVE	BGA MICROSTAR	ZGU	169	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658640	<a href="#">Samples</a>
TPS658640ZQZR	ACTIVE	BGA MICROSTAR JUNIOR	ZQZ	120	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658640	<a href="#">Samples</a>
TPS658640ZQZT	ACTIVE	BGA MICROSTAR JUNIOR	ZQZ	120	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658640	<a href="#">Samples</a>

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side 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 Top-Side Marking for that device.

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## 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
TPS658640ZQZR	BGA MICROSTAR JUNIOR	ZQZ	120	2500	330.0	16.4	6.3	6.3	1.5	12.0	16.0	Q1
TPS658640ZQZT	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**

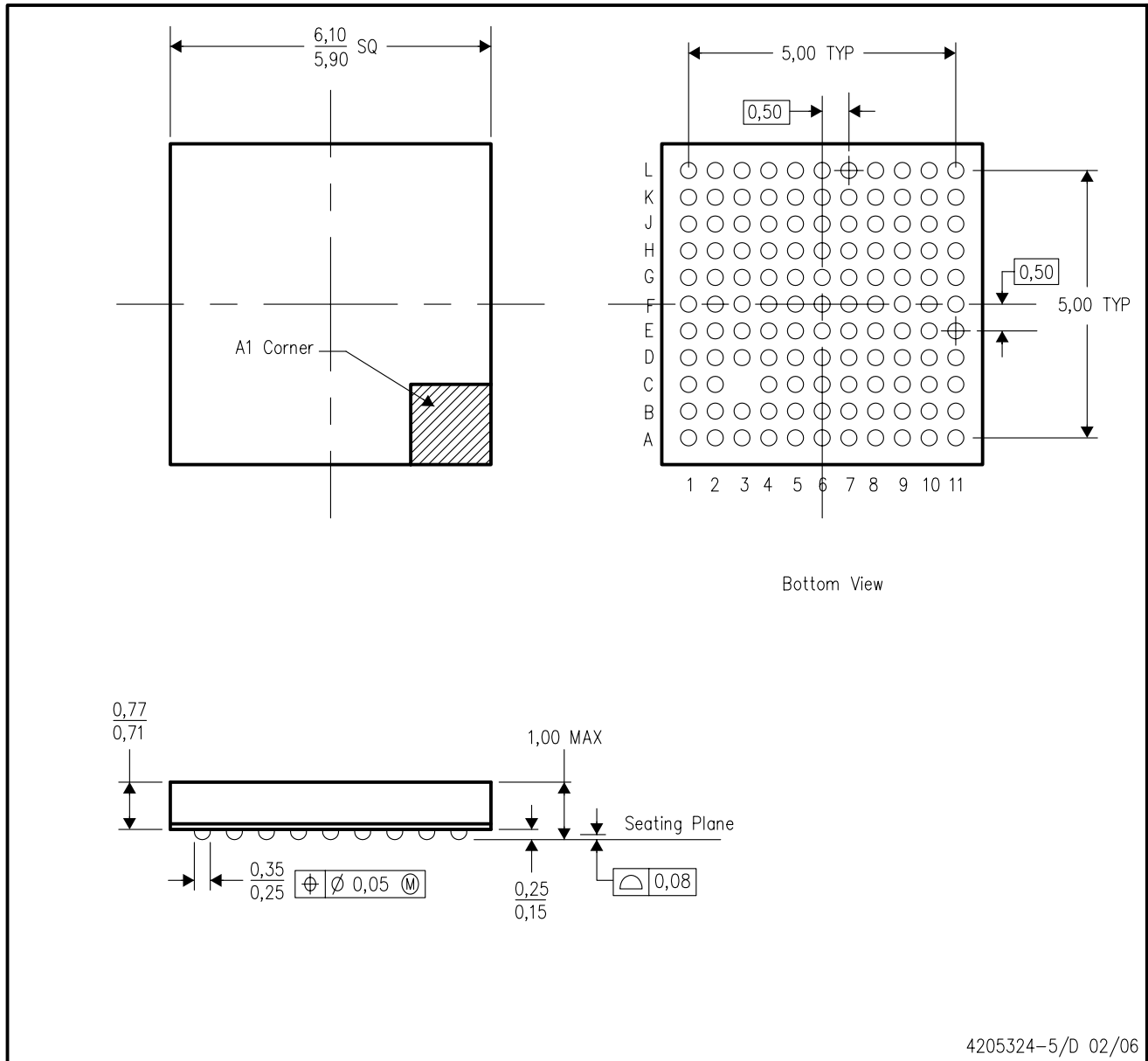

\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS658640ZQZR	BGA MICROSTAR JUNIOR	ZQZ	120	2500	336.6	336.6	31.8
TPS658640ZQZT	BGA MICROSTAR JUNIOR	ZQZ	120	250	336.6	336.6	31.8



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.

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