

Advanced Power Management Unit

Check for Samples: [TPS658629-Q1](#)

1 INTRODUCTION

1.1 MAIN FEATURES

- Qualified for Automotive Applications
- AEC-Q100 Test Guidance With the Following Results:
 - Device Temperature Grade 3: –40°C to 85°C Ambient Operating Temperature Range
 - Device HBM ESD Classification Level H1C
 - Device CDM ESD Classification Level C2
- INTEGRATED POWER SUPPLIES
 - 3 Programmable Step-Down Converters
 - Software Controlled Enable/Forced PWM Mode
 - Automatic Power Saving Mode
 - Maximum 1.5 A Outputs (SM0 and SM2)
 - Maximum 1.3 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 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
 - AUTOBOOT Support
 - 11 Channel ADC With 3 Operating Modes
 - Single Conversion
 - Peak Detection
 - Averaging

1.2 APPLICATIONS

- Portable Navigation Devices
- Portable Media Players

1.3 DESCRIPTION

The TPS658629-Q1 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.

To request a full datasheet, please send an e-mail to msapmu_contact@list.ti.com



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.

1.4 ORDERING INFORMATION⁽¹⁾

T _A	PART NUMBER ^{(2) (3)}	PACKAGE ⁽⁴⁾	PACKAGE DESIGNATOR	ORDERING ⁽²⁾	PACKAGE MARKING
–40°C to 85°C	TPS658629	169 Pin nFBGA	ZWS	TPS658629IZWSRQ1	TPS658629I

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.
- (2) The TPS658629 is only available taped and reeled. Quantities are 1,000 devices per reel.
- (3) Devices with distinct part numbers have unique factory configurations for supply defaults, sequencing and other functions. Consult the factor for configuration information for each part number.
- (4) This product is RoHS compatible, including a lead concentration that does not exceed 0.1% of total product weight, and is suitable for use in specified lead-free soldering processes. In addition, this product uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

PACKAGING INFORMATION

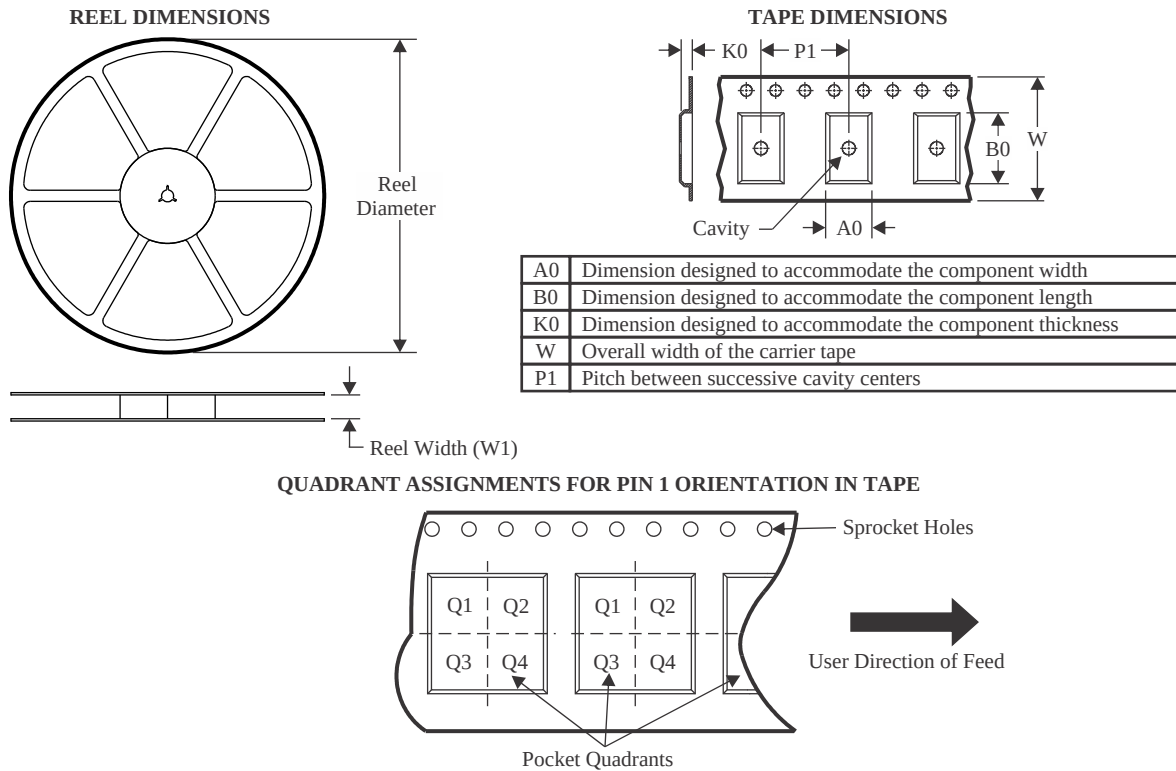
Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TPS658629IZWSRQ1	Active	Production	NFBGA (ZWS) 169	1000 LARGE T&R	Yes	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658629I
TPS658629IZWSRQ1.B	Active	Production	NFBGA (ZWS) 169	1000 LARGE T&R	Yes	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS658629I

- ⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).
- ⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.
- ⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.
- ⁽⁴⁾ **Lead finish/Ball material:** Parts 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.
- ⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.
- ⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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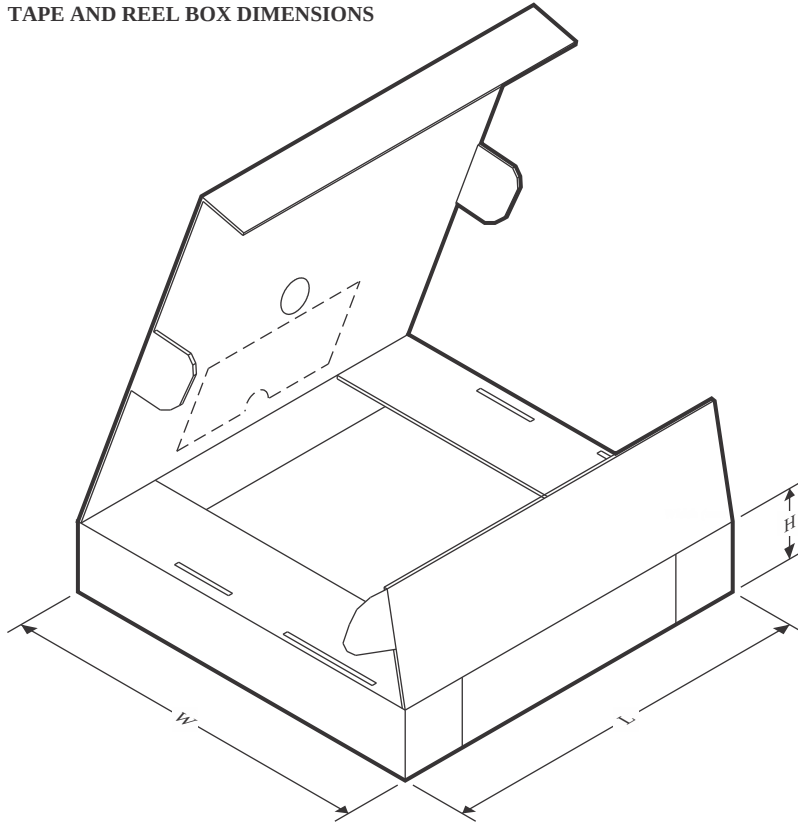
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TAPE AND REEL INFORMATION


*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
TPS658629IZWSRQ1	NFBGA	ZWS	169	1000	330.0	24.4	12.35	12.35	2.3	16.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

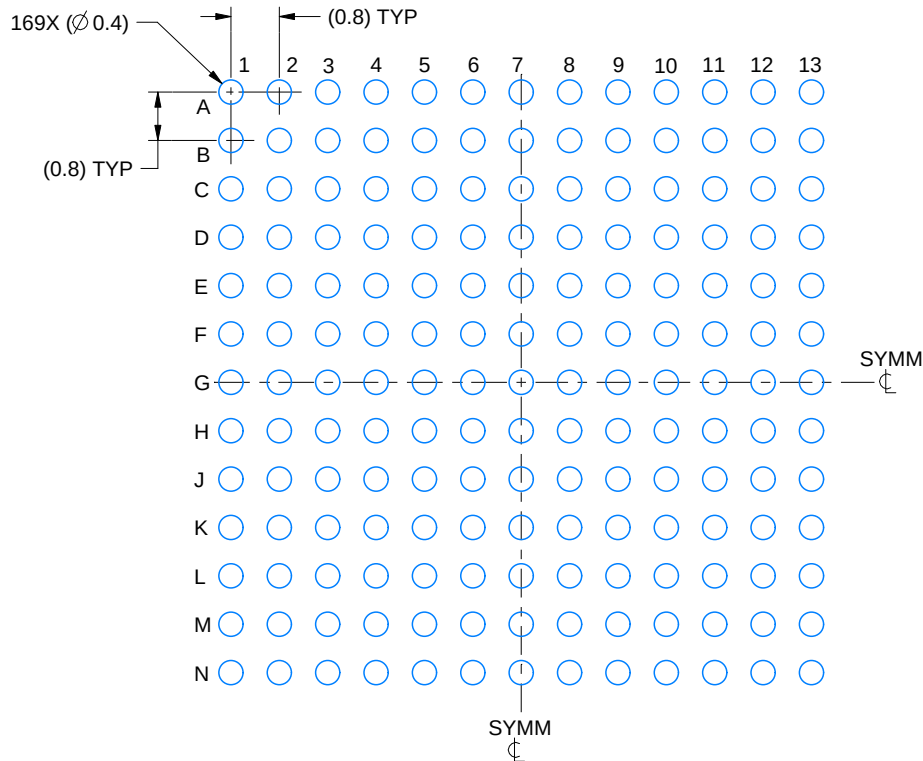
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS658629IZWSRQ1	NFBGA	ZWS	169	1000	336.6	336.6	41.3

EXAMPLE BOARD LAYOUT

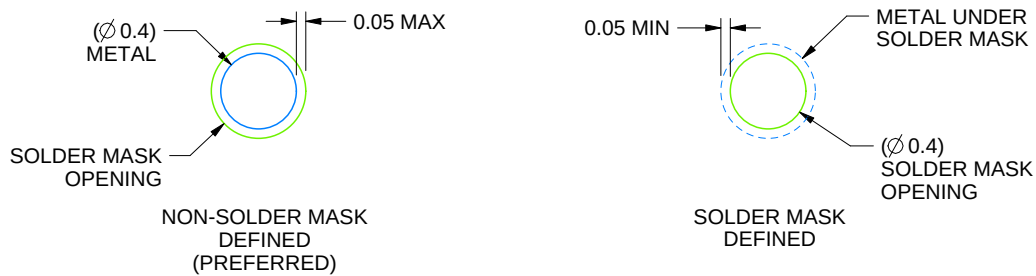
ZWS0169A

NFBGA - 1.4 mm max height

PLASTIC BALL GRID ARRAY



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS
NOT TO SCALE

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NOTES: (continued)

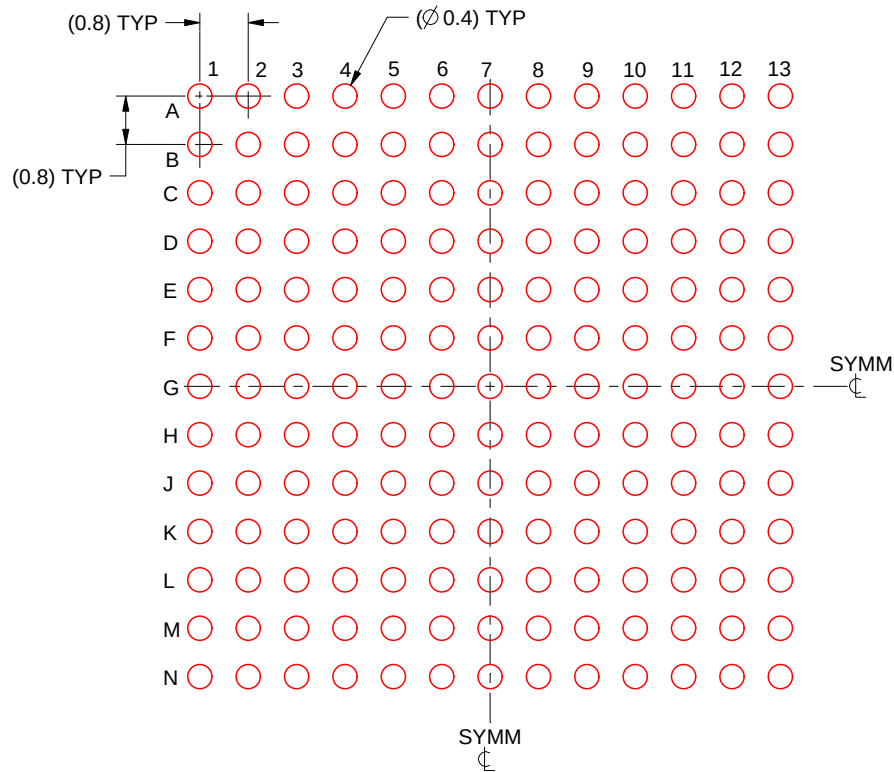
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
For information, see Texas Instruments literature number SSZA002 (www.ti.com/lit/ssza002).

EXAMPLE STENCIL DESIGN

ZWS0169A

NFBGA - 1.4 mm max height

PLASTIC BALL GRID ARRAY



SOLDER PASTE EXAMPLE
BASED ON 0.15 mm THICK STENCIL
SCALE:8X

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NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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