TPS62852x-Q1 2.7V to 6V, 1A, 2A, 3A, Automotive, Step-Down Converters in a WSON Package

1 Features

- AEC-Q100 qualified for automotive applications
  - Device temperature grade 1: –40°C to +125°C T_A
- Wettable flanks
- Designed for low EMI requirements
  - Optional pseudo-random spread spectrum reduces peak emissions
- T_J = –40°C to +150°C
- Family of 1A, 2A, and 3A (continuous) converters
- Input voltage range: 2.7V to 6V
- Quiescent current: 21µA typical
- Shutdown current: 1.5µA typical
- Output voltage from 0.6V to 5.5V
- Output voltage accuracy ±1% (PWM operation)
- Options of forced PWM or PWM, PFM operation
- Switching frequency in PWM: 2.25MHz
- Adjustable soft start-up to 10ms
- Precise ENABLE input allows:
  - User-defined undervoltage lockout
  - Exact sequencing
- Active output discharge
- Foldback overcurrent protection – optional
- Power-good output with window comparator

2 Applications

- Advanced driver assistance systems (ADAS) camera
- ADAS sensor fusion and surround view ECU
- Hybrid and reconfigurable instrument cluster
- Head unit and telematics control unit
- External audio amplifier

3 Description

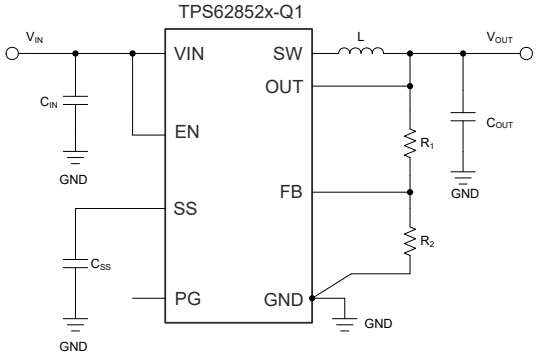
The TPS62852x-Q1 are a family of pin-to-pin, 1A, 2A, and 3A, high efficiency, easy-to-use, synchronous step-down DC/DC converters. These devices are based on a peak current mode control topology and support tight switching frequency variation. These devices are designed for automotive applications such as infotainment and advanced driver assistance systems. Low resistive switches allow up to 3A continuous output current. In the TPS62852x-Q1, the switching frequency is internally fixed at 2.25MHz. The TPS62852x-Q1 automatically selects pulse width modulation (PWM) for higher power demand and pulse frequency mode (PFM) for power saving operation. This selection maintains high efficiency across the whole load range. The device exists also in options with forced PWM in cases where frequency stability requirements dominate. The family provides a 1% output voltage accuracy over the full temperature range in PWM mode, which helps designing power supplies for devices with very tight supply voltage accuracy requirements.

The TPS62852x-Q1 is available in an 8-pin, 2.0mm × 1.5mm, WSON package.

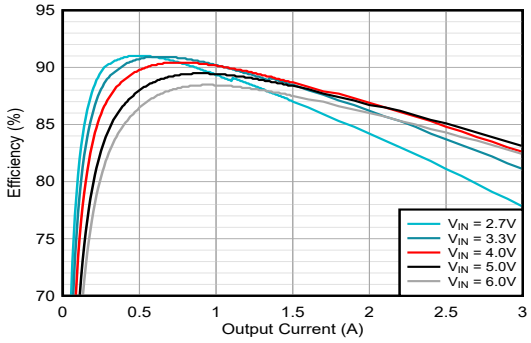
Device Information

PART NUMBER(3)	OUTPUT CURRENT	PACKAGE(1)	PACKAGE SIZE(2)
TPS628521-Q1(4)	1A	DLS (WSON-HR, 8)	2.00mm × 1.50mm
TPS628522-Q1	2A		
TPS628523-Q1	3A		

(1) For more information, see Section 8.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.
(3) See the *Device Comparison Table*.
(4) Preview information (not Production Data).



Simplified Schematic



Efficiency vs I_{OUT}, V_{OUT} = 1.1V

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4 Device Comparison Table

DEVICE NUMBER	OUTPUT CURRENT	OPERATION MODE	V_{OUT} DISCHARGE	FOLDBACK CURRENT LIMIT	TYPICAL OUTPUT CAPACITOR	INDUCTOR	OUTPUT VOLTAGE	PACKAGE TYPE
TPS628523PAWDLSRQ1(1)	3A	FPWM	ON	OFF	2 × 22uF	470nH	Adjustable	WDLS(2)
TPS628523HAWDLSRQ1(1)	3A	FPWM	ON	OFF	2 × 22uF	200nH	Adjustable	WDLS(2)
TPS628523SADLSRQ1	3A	FPWM	ON	OFF	1 × 22uF	470nH	Adjustable	DLS
TPS628522SADLSRQ1	2A	FPWM	ON	OFF	1 × 22uF	470nH	Adjustable	DLS
TPS628523PADLSRQ1	3A	FPWM	ON	OFF	2 × 22uF	470nH	Adjustable	DLS
TPS628523PDLSRQ1	3A	PFM/PWM	ON	OFF	2 × 22uF	470nH	Adjustable	DLS
TPS628522PADLSRQ1	2A	FPWM	ON	OFF	2 × 22uF	470nH	Adjustable	DLS
TPS628523HADLSRQ1	3A	FPWM	ON	OFF	2 × 22uF	200nH	Adjustable	DLS
TPS628522HADLSRQ1	2A	FPWM	ON	OFF	2 × 22uF	200nH	Adjustable	DLS

(1) Advance Information (not Production Data)
(2) WDLS - wettable flanks

The TPS628523S and P versions use a 470nH inductor and can be used interchangeably with industry standard devices. The TPS628523H is an enhanced version for 200nH inductors with 2 × 22uF output capacitors. 200nH inductors have lower DC resistance and can have a smaller form factor compared to a 470nH inductor with the same current carrying capability. The TPS628523H also offers best transient behavior and can additionally support higher output capacitance for transient suppression down to very few mV.

5 Pin Configuration and Functions

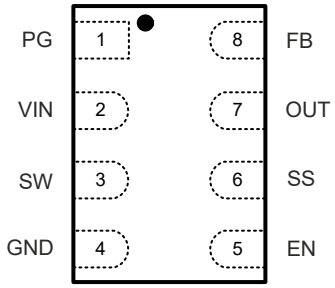

Figure 5-1. 8-Pin WSON-HR DLS (Top View)

Table 5-1. Pin Functions

PIN		TYPE[1]	DESCRIPTION
NAME	NO.		
PG	1	O	Open-drain power-good output
VIN	2	—	Power supply input. Make sure the input capacitor is connected as close as possible between the VIN and GND pins.
SW	3	—	This pin is the switch pin of the converter and is connected to the internal power MOSFETs.
GND	4	—	Ground pin
EN	5	I	This pin is the enable pin of the device. Connect to logic low to disable the device. Pull high to enable the device. Do not leave this pin unconnected.
SS	6	I	Soft-Start pin. An external capacitor connected from this pin to GND defines the rise time for the internal reference voltage.
OUT	7	I	Output voltage sense pin. Connect the load to this pin
FB	8	I	Voltage feedback input. Connect the resistive output voltage divider to this pin.

(1) I = input, O = output

6 Device and Documentation Support

6.1 Device Support

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6.5 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

6.6 Glossary

TI Glossary	This glossary lists and explains terms, acronyms, and definitions.

7 Revision History

Changes from Revision * (February 2025) to Revision A (May 2025)	Page
• Changed the document status from Advance Information to Production Data	1

8 Mechanical, Packaging, and Orderable Information

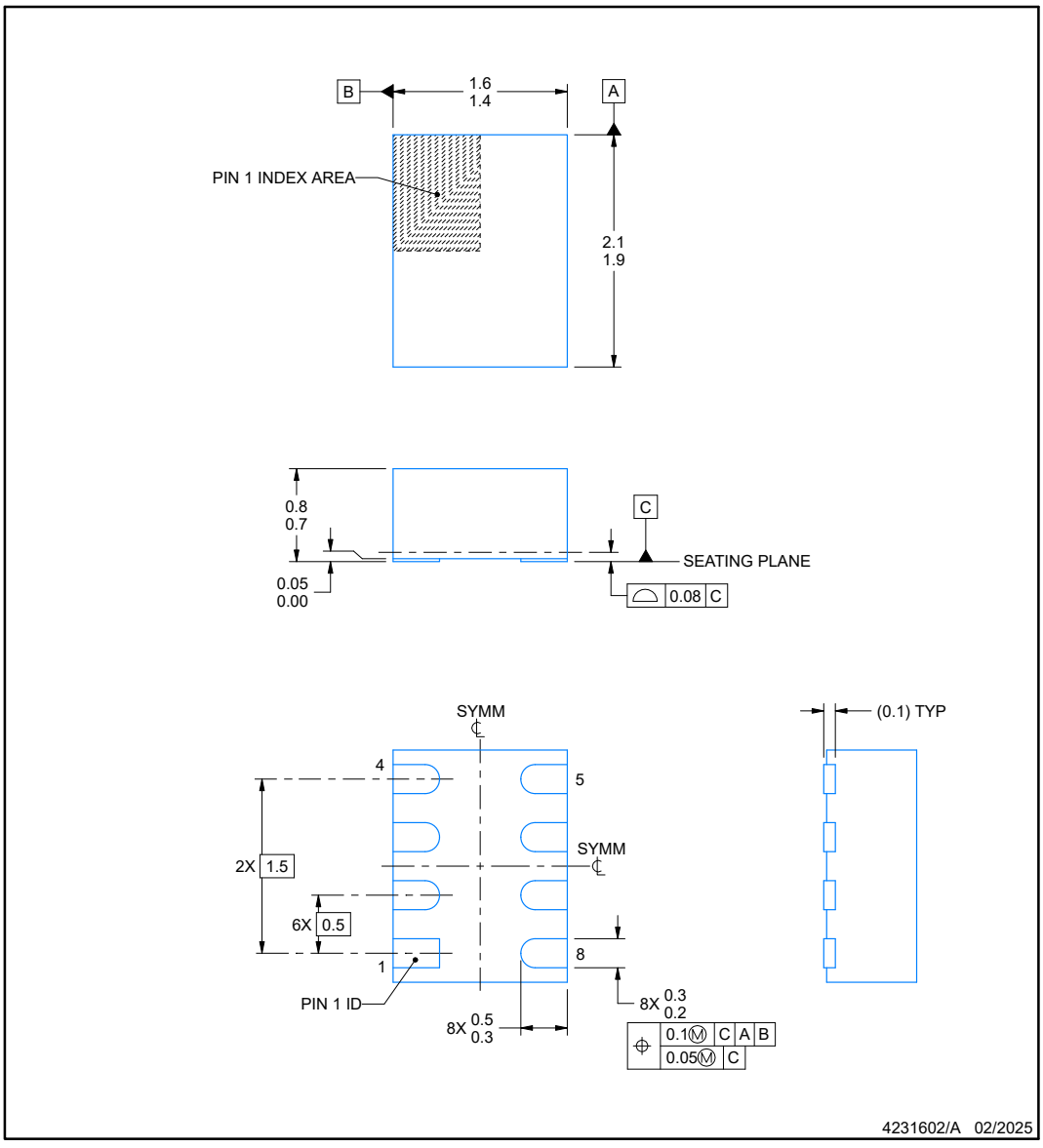
The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGE OUTLINE

DLS0008A-C01

WSON-HR - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



NOTES:

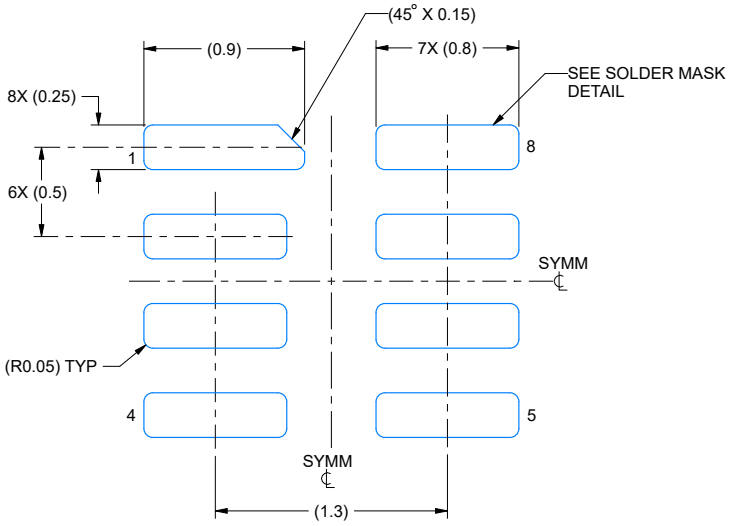
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

EXAMPLE BOARD LAYOUT

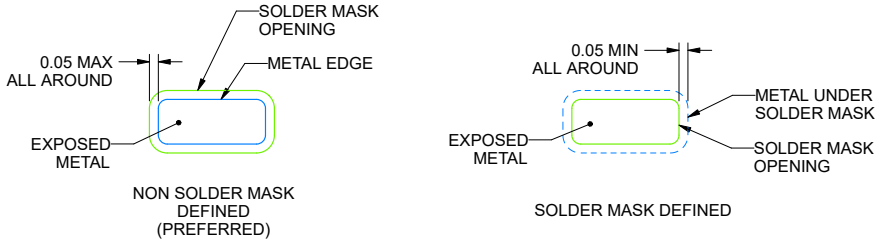
DLS0008A-C01

WSON-HR - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 30X



SOLDER MASK DETAILS

4231602/A 02/2025

NOTES: (continued)

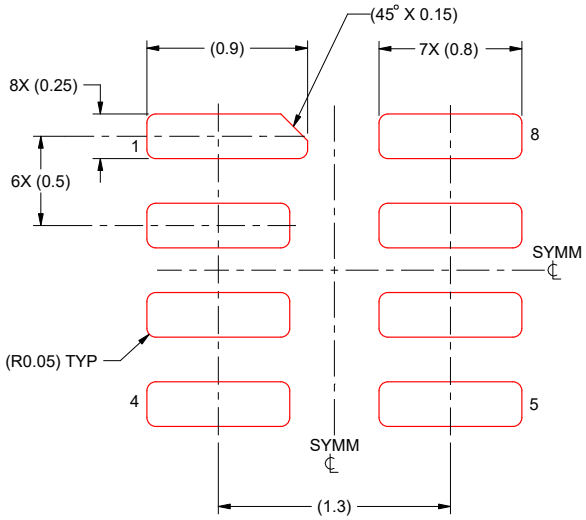
3. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DLS0008A-C01

WSON-HR - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE: 30X

4231602/A 02/2025

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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)
TPS628523PADLSRQ1	Active	Production	WSON-HR (DLS) | 8	3000 | LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 125	1W1
XPS628523HAWDLSRQ1	Active	Preproduction	WSON-HR (DLS) | 8	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	
XPS628523HAWDLSRQ1.A	Active	Preproduction	WSON-HR (DLS) | 8	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	
XPS628523PAWDLSRQ1	Active	Preproduction	WSON-HR (DLS) | 8	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	
XPS628523PAWDLSRQ1.A	Active	Preproduction	WSON-HR (DLS) | 8	3000 | LARGE T&R	-	Call TI	Call TI	-40 to 125	

(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.

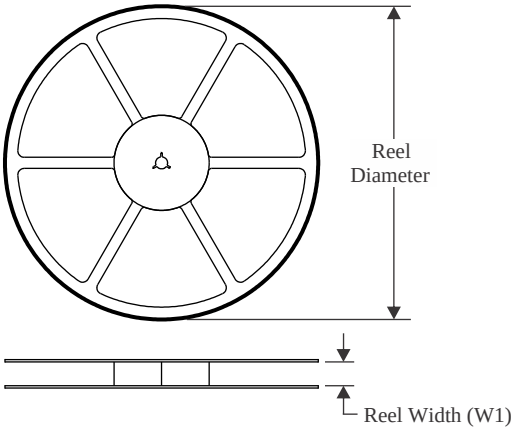
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will 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.

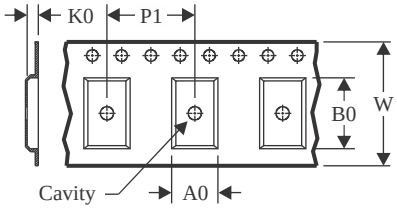
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

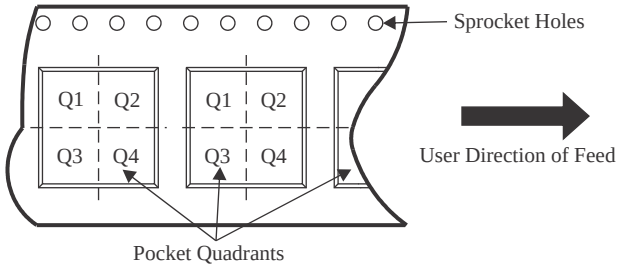


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

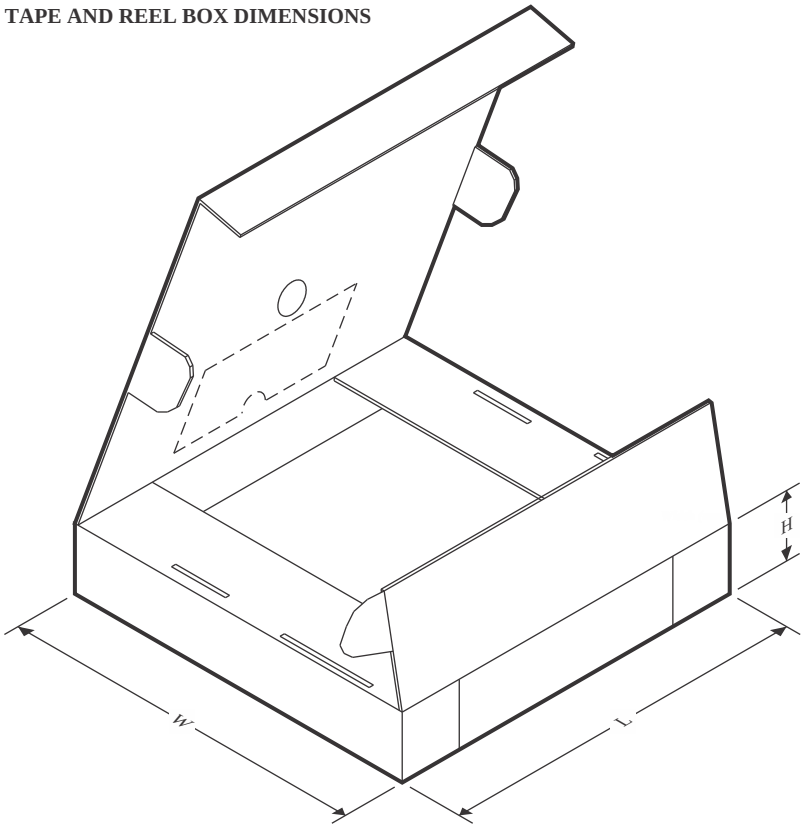
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
TPS628523PADLSRQ1	WSON-HR	DLS	8	3000	180.0	8.4	1.75	2.25	1.0	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS628523PADLSRQ1	WSON-HR	DLS	8	3000	210.0	185.0	35.0

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