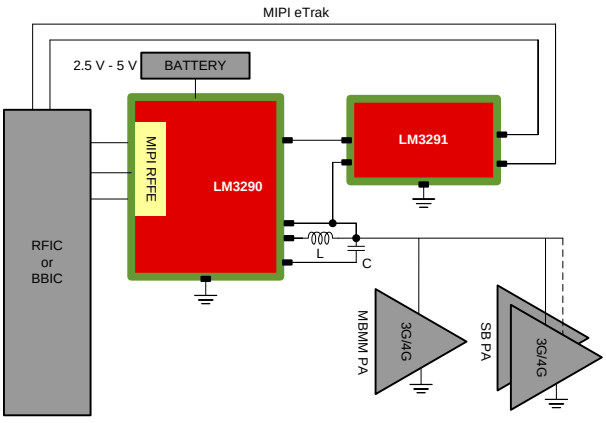
LM3290 Product Brief

1 Features

- **V_{OUT_RANGE}**
  - V_{OUT_ET} = 0.6 V to 4.5 V
  - V_{OUT_APT} = 0.4 V to 3.81 V (or V_{IN} – 200 mV)
- **DC Boost For ET Operation:**
  - Boost Input Voltage Range: 2.5 V to 5 V
  - High-Efficiency (90% typical) with Internal Synchronous Rectification
  - Boost Bypass Function with Low Resistance (150 mΩ typ.)
  - 2.7-MHz PWM Switching Frequency
- **Buck DC-DC for APT and ET Operation:**
  - High Operating Frequency for Small External Inductor and Capacitors
  - V_{OUT_RANGE} = 0.4 V to 3.81 V (or V_{IN} – 200 mV)
  - High-Efficiency (95% typical) with Internal Synchronous Rectification
  - Low-Power PFM Mode
- **LM3291 Control:**
  - Automatic Control of LM3291 in ET Mode
- **RFFE Control Interface:**
  - 1.8-V MIPI® RFFE 1.1-Compatible Digital Control Interface
  - 26-MHz Write Capability
  - 13-MHz Read Capability



2 Description

The LM3290, with its companion IC LM3291, is an RF envelope supply modulator (EM) with integrated DC-DC boost converter optimized for Envelope Tracking (ET) RF power amplifiers (PAs). The device enables maximum transmit output power independent of the input battery voltage (battery as low as 2.5 V) and is controlled by the MIPI® RFFE 1.1.

The LM3290 operates in two active modes:

Active Mode 1: For low TX output power, LM3290 may operate in Average Power Tracking (APT) mode, providing a static, but programmable, output voltage to supply the PA. At light load and in APT mode, the LM3290 enters into Pulse Frequency Mode (PFM) operation automatically and operates with reduced switching frequency. In PFM mode, the quiescent current is reduced, which extends the battery life.

Active Mode 2: In ET mode, the LM3290 with LM3291 efficiently provides a dynamic, high-bandwidth supply voltage for the PA to maximize total EM + PA efficiency. The envelope modulator follows the envelope reference input signal delivered by the RFIC to the LM3291 via a differential analog input. The output is a single-ended power supply signal to the PA.

The LM3290 and LM3291 support 3G, as well as LTE operation up to 20-MHz signal bandwidth.

The LM3290 controls the LM3291 companion-IC through direct control signals, and no additional controls are needed from the system. Shutdown, standby, and idle modes turn the EM off and reduce battery current consumption.

For the full datasheet, samples, or the EVM hardware and software please contact a TI representative at ET@list.ti.com.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
LM3290	DSBGA (30)	2.432 mm x 2.808 mm

(1) For all available packages, see the orderable addendum at the end of the datasheet.

3 Revision History

Changes from Original (August 2013) to Revision A	Page
• Changed First page layout; added Device Information table; Device and Documentation Support page	1

4 Device and Documentation Support

4.1 Trademarks

MIPI is a registered trademark of Mobile Industry Processor Interface Alliance.
All other trademarks are the property of their respective owners.

4.2 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.

4.3 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms and definitions.

5 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.

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)
LM3290TME/NOPB	NRND	Production	DSBGA (YFQ) | 30	250 | SMALL T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-30 to 85	3290
LM3290TME/NOPB.A	NRND	Production	DSBGA (YFQ) | 30	250 | SMALL T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-30 to 85	3290

(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.

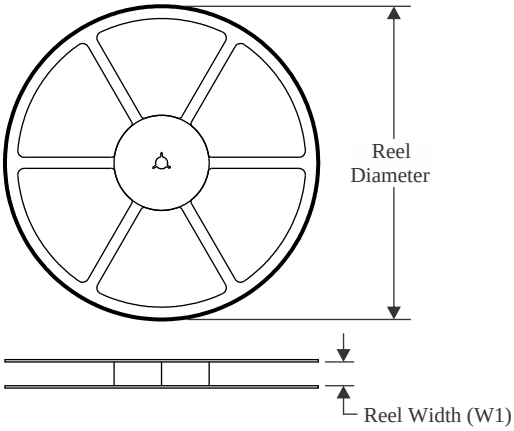
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

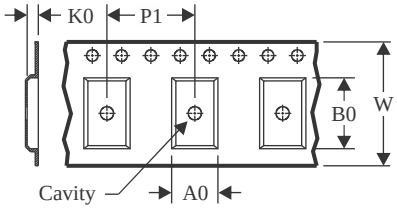
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

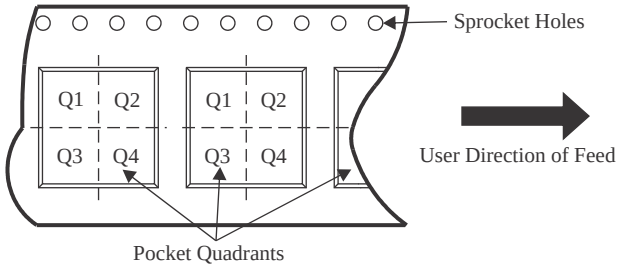


TAPE DIMENSIONS



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

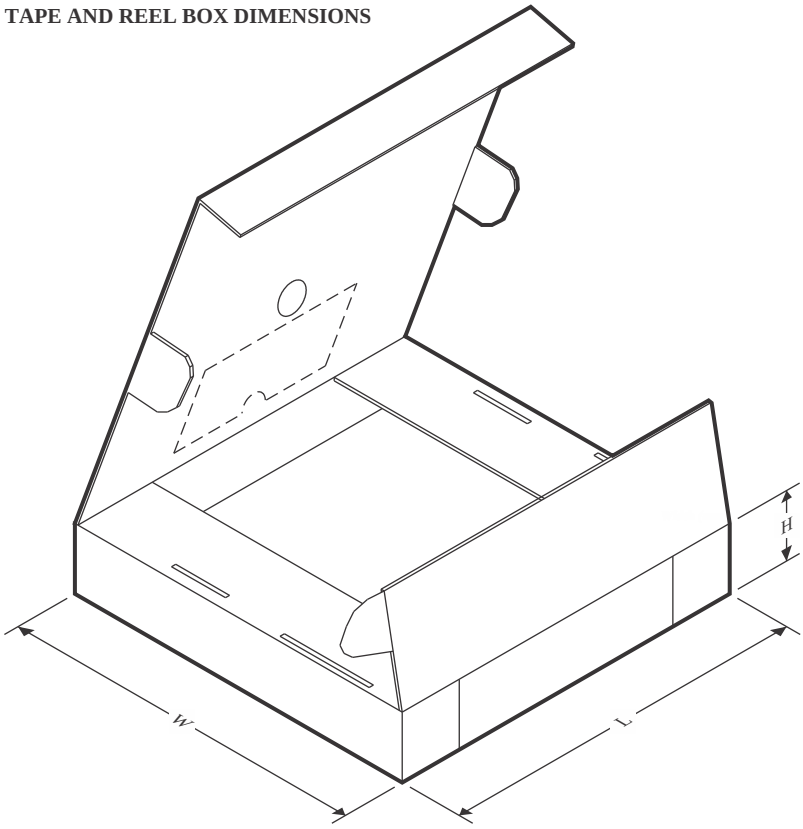
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
LM3290TME/NOPB	DSBGA	YFQ	30	250	178.0	8.4	2.67	2.95	0.76	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)
LM3290TME/NOPB	DSBGA	YFQ	30	250	208.0	191.0	35.0

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