

## LM3290 Product Brief

### FEATURES

- **V<sub>OUT\_RANGE</sub>**
  - V<sub>OUT\_ET</sub> = 0.6 V to 4.5 V
  - V<sub>OUT\_APT</sub> = 0.4 V to 3.81 V (or V<sub>IN</sub> – 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 Frequencies**
- **BUCK DC-DC FOR APT AND ET OPERATION:**
  - **High Operating Frequency for Small External Inductors and Capacitors**
  - V<sub>OUT\_RANGE</sub> = 0.6 V to min of 3.81 V and V<sub>IN</sub> – 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**

### 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 system by MIPI® RFFE 1.1.

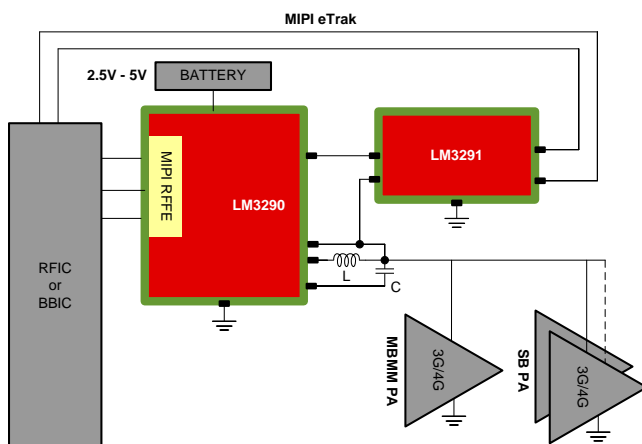
The LM3290 operates in two active modes:

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.
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.**



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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)	Device Marking (4/5)	Samples
LM3290TME/NOPB	ACTIVE	DSBGA	YFQ	30	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-30 to 85	3290	<a href="#">Samples</a>
LM3290TMX/NOPB	ACTIVE	DSBGA	YFQ	30	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-30 to 85	3290	<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.

**OBSOLETE:** 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) 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.

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Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
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