

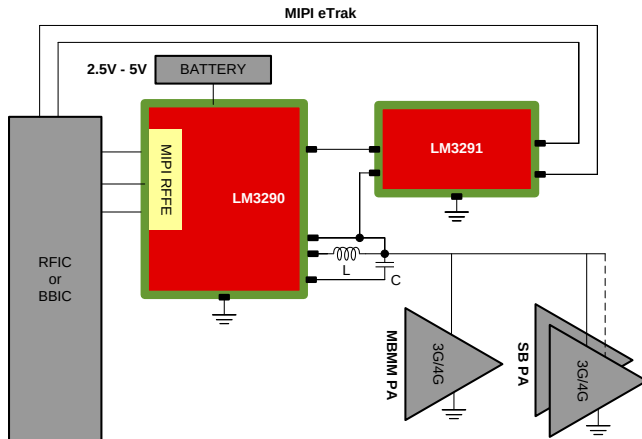
LM3291 Product Brief

FEATURES

- **Highly Programmable High-Current Linear Amplifier**
- **> 75 MHz Typical Small Signal Bandwidth**
- **Extremely Low Output Impedance**
- **High Linearity**
- **Differential Analog Input Compatible with eTrak 1.0 Standard**
- **Low Output Noise**
- **When paired with the LM3290 provides a complete Envelope Modulator solution for 3G/4G Envelope Tracking Power Amplifiers.**
- **Automatically controlled through LM3290 in an envelope modulation solution using MIPI® RFFE 1.1-compatible interface.**

APPLICATIONS

- **3G/LTE Handsets**
- **3G/LTE Tablets**
- **3G/LTE Data Cards and Wireless Modems**



DESCRIPTION

The LM3291 is a high-speed linear amplifier that, with its companion IC LM3290, constitutes an RF Envelope Modulator (EM) for supplying 3G/4G Power Amplifiers (PA) in envelope tracking systems. The amplifier provides extremely low output impedance and low output noise over a wide bandwidth.

In conjunction with an Envelope Tracking (ET) capable RFIC and PA, the LM3291 and LM3290 greatly improve PA efficiency for 3G and LTE operation.

In ET mode, the LM3291 and LM3290 provide envelope tracking supply voltage for the PA maximizing total EM + PA efficiency. The envelope modulator follows the differential envelope reference input signal delivered by the RFIC to the LM3291. The output is a single-ended dynamic power supply voltage to the PA.

The LM3291 supports 3G and LTE operation up to 20 MHz signal bandwidth.

The LM3291's programmable parameters are controlled by LM3290 via a direct serial interface between the two devices. No additional controls are needed in the system. This interface provides flexible control and adjustment options to optimize LM3291 efficiency and noise performance for various frequency bands and power levels.

At high TX output power, the EM can be operated in ET mode where LM3290 and LM3291 together modulate the supply of the PA with the envelope signal to improve overall system efficiency. At low TX output power, the EM can be transitioned to Average Power Tracking (APT) mode where LM3291 is placed into shutdown mode to improve system efficiency.

The LM3291 is available in a 12-pin lead-free DSBGA package.

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

MIPI is a registered trademark of Mobile Industry Processor Interface Alliance.

All other trademarks are the property of their respective owners.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2013, Texas Instruments Incorporated

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM3291TME/NOPB	ACTIVE	DSBGA	YFQ	12	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-30 to 85	AE	Samples
LM3291TMX/NOPB	ACTIVE	DSBGA	YFQ	12	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-30 to 85	AE	Samples

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2020, Texas Instruments Incorporated