National Semiconductor

PRELIMINARY
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LMX2119 1.9 GHz Power Amplifier

General Description

The LMX2119 1.9 GHz Power Amplifier is a monolithic, integrated power amplifier suitable for use in the Digital European Cordless Telecommunications (DECT) system as well as other mobile telephony and wireless communications applications. It is fabricated using an advanced Gallium Arsenide technology that allows single supply (+3V) operation.

The LMX2119 consists of two MESFETs cascaded to provide 24.5 dB of power gain. The output power at 3.6V is +26.5 dBm with an input power level of +2 dBm. The input VSWR of the power amplifier remains constant in the ON and OFF state.

The LMX2119 is available in a 16-pin SOIC surface mount plastic package.

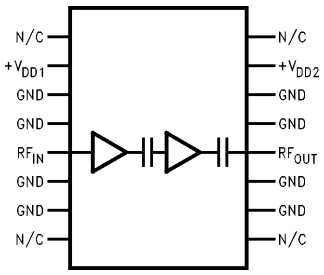
Features

- Single +3V supply operation
- Class A bias; >30% power added efficiency
- 24.5 dB power gain; +26.5 dBm output power
- 50Ω input/output impedance
- 350 mA current consumption at +3.6V

Applications

- Digital European Cordless Telecommunications (DECT)
- Portable wireless communications (PCS/PCN, cordless)
- Wireless local area networks (WLANs)
- Other wireless communications systems

Functional Block Diagram



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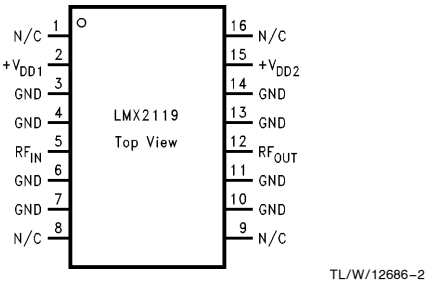
This data sheet contains the design specifications for product development.
Specifications may change in any manner without notice.

LMX2119 Connection Diagram

Small Outline Package (SOP)



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Top View
Order Number LMX2119M
See NS Package Number M16A

Pin Description

Pin No.	Pin Name	I/O	Description
1	N/C		No Connect.
2	$+V_{DD1}$		Positive supply voltage. V_{DD1} must equal V_{DD2}. Decoupling capacitors should be placed as close to the pin as possible.
3	GND		Ground.
4	GND		Ground.
5	RF In	I	RF input to the power amplifier.
6	GND		Ground.
7	GND		Ground.
8	N/C		No Connect.
9	N/C		No Connect.
10	GND		Ground.
11	GND		Ground.
12	RF Out	O	Power amplifier's RF output.
13	GND		Ground.
14	GND		Ground.
15	$+V_{DD2}$		Positive supply voltage. V_{DD2} must equal V_{DD1}. Decoupling capacitors should be placed as close to the pin as possible.
16	N/C		No Connect.

Absolute Maximum Ratings

Supply Voltage (V_{DD})	5.5V
RF Input Power (P_{IN})	6 mW
Storage Temperature (T_{STG})	−40°C to +150°C
ESD Rating (Note)	< 2 keV

Note: This device is a high performance RF integrated circuit with an ESD Rating < 2 keV, and is ESD sensitive. Handling and assembly of this device should only be done at ESD workstations.

Recommended Operating Conditions

	Min	Typ	Max	Units
Supply Voltage, $V_{DD1} = V_{DD2}$	3.0	3.6	4.6	V
Operating Temperature (T_A)	−25		+65	°C
RF Input Power, P_{IN}	0	+2	+4	dBm

Electrical Characteristics

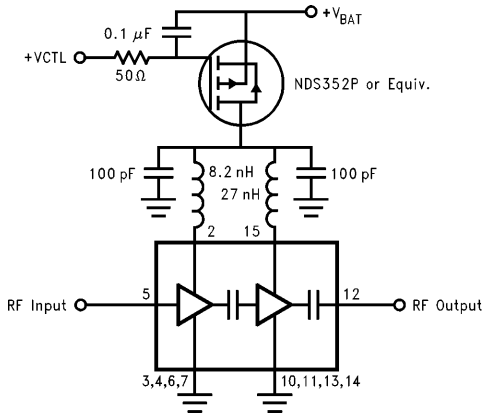
(The following specifications are guaranteed for $V_{DD1} = V_{DD2} = 3.6V$, $T_A = 25°C$, 50Ω system unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Value Typ	Max	Unit
	Frequency Range		1880		1900	MHz
P_{OUT}	Output Power	$P_{IN} = 1.0$ mW–2.5 mW	25.5	26.5	27.5	dBm
	Isolation	PA off ($V_{DD1} = V_{DD2} = 0V$)	40			dB
	Frequency Dependency	$P_{IN} = 1.0$ mW–2.5 mW		0.2	0.5	dB
I_{DD}	Current Consumption	$P_{OUT} = 450$ mW, $P_{IN} = 1.6$ mW		350	420	mA
	Input VSWR, PA On	$P_{OUT} = 450$ mW, $P_{IN} = 1.6$ mW		1.6:1	2.0:1	
	Input VSWR, PA Off	$V_{DD1} = V_{DD2} = 0V$, $P_{IN} = 1.6$ mW		1.4:1	2.0:1	
	Load Mismatch (Note 1)	$V_{DD1} = V_{DD2} = 4.6V$, VSWR = 10:1, $P_{IN} = 6$ mW	No Degradation in Output Power			
	Stability (Note 2)	$P_{IN} = 0$–3 mW, $V_{DD1,2} = 0$–4.6V, 0 mW < P_{OUT} < 450 mW, Load VSWR = 10:1	All Non-Harmonically Related Outputs More Than 60 dB Below Desired Signal			

Note 1: The device is adjusted to provide maximum load power into a 50Ω load under stress conditions specified by adjusting V_{DD1}. The device is switched off and a 10:1 load replaces the 50Ω load. The device is switched on and the phase of the 10:1 load is varied through 360 electrical degrees during a 60 second test period. The device is switched off and the load is restored to 50Ω. When the device is switched on, no change in load power is permitted. The pre and post load power measurements are recorded after a 5 minute stabilization period. This parameter is not tested in production but is guaranteed by design and characterization.

Note 2: The device is adjusted to provide 400 mW of load power into a 50Ω load by changing and recording the value of the supply voltage. The device is switched off and a 10:1 load replaces the 50Ω load. The device is switched on and the phase of the 10:1 load is varied through 360 electrical degrees during a 60 second test period. The value of $V_{DD1} = V_{DD2}$ is adjusted from the initial value to a lower value greater than 0V. The phase of the 10:1 load is varied through 360 electrical degrees during a 60 second test period. For any value of the supply voltage between 0V and the initial setting, the non-harmonically related output signals shall be as specified herein for any electrical phase. This parameter is not tested in production but is guaranteed by design and characterization.

Typical Application Block Diagram



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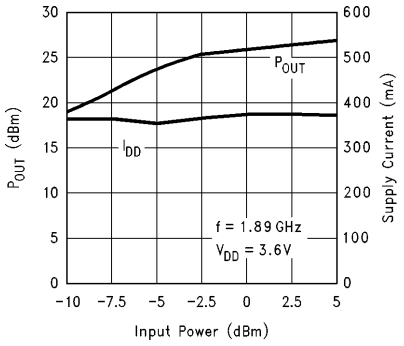
Typical Performance Characteristics

Output Power and Supply Current vs Input Power



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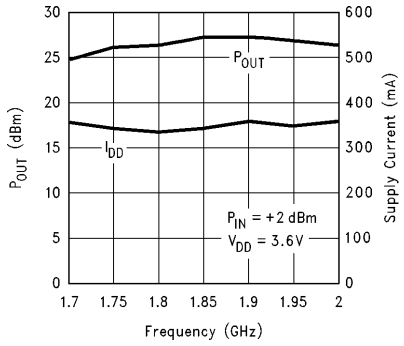
Output Power and Supply Current vs Frequency



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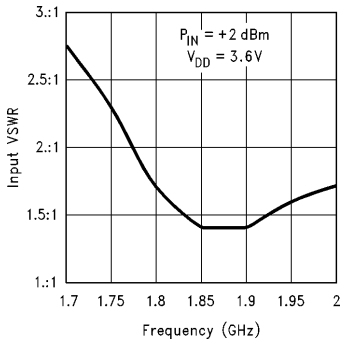
Input VSWR vs Frequency



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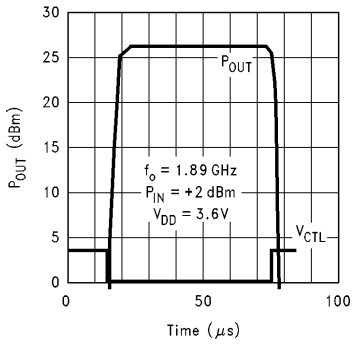
Power Ramping Characteristic (See Application Circuit)



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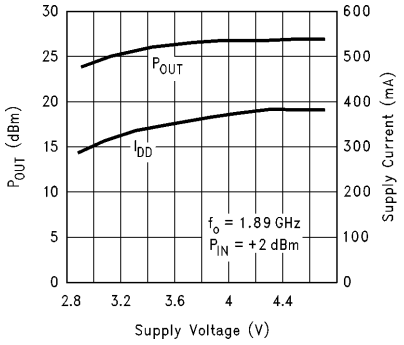
Typical Performance Characteristics (Continued)

Output Power and Supply Current vs Supply Voltage



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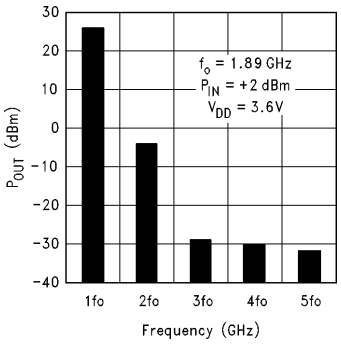
Power Amplifier Harmonics



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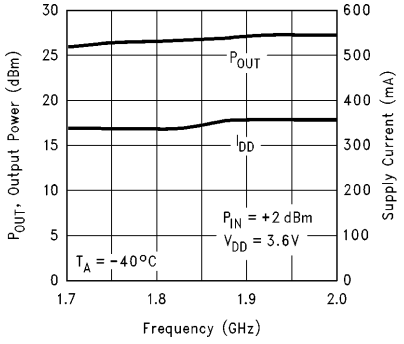
Output Power and Supply Current vs Frequency for $T_A = -40°C$



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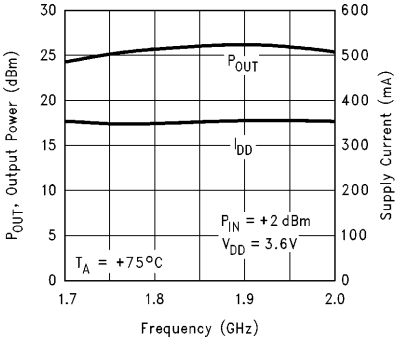
Output Power and Supply Current vs Frequency for $T_A = +75°C$



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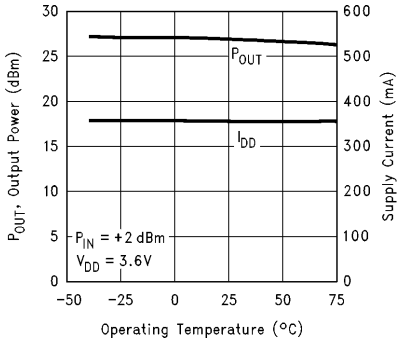
Output Power and Supply Current vs Temperature



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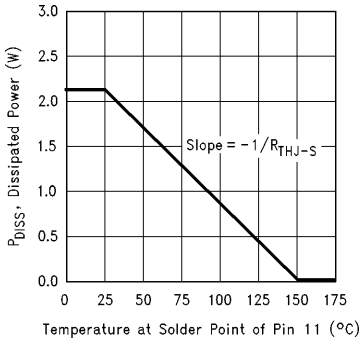
Maximum Operating Temperature Chart (50% Duty Cycle)



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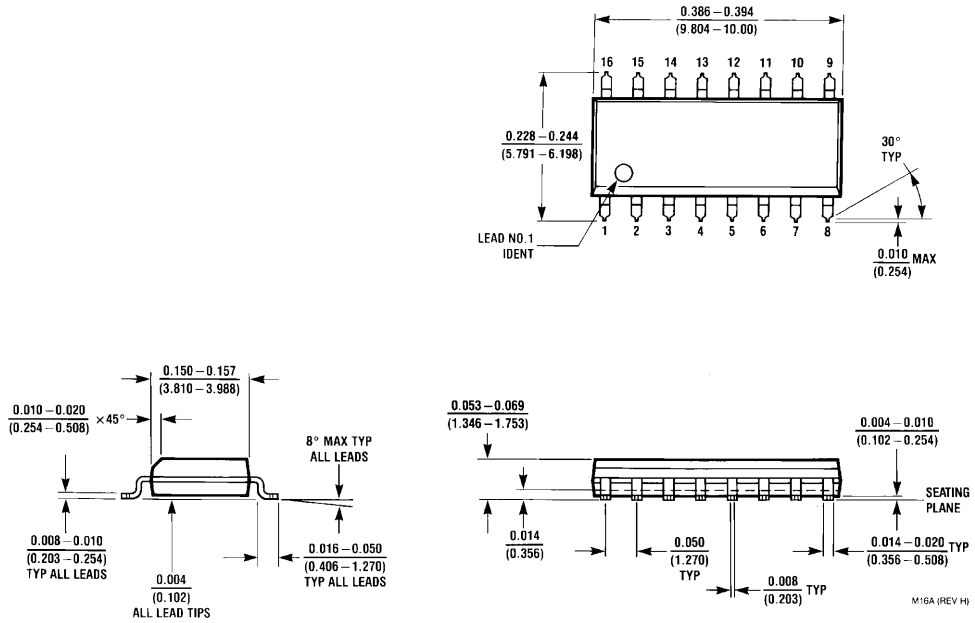
Physical Dimensions inches (millimeters) unless otherwise noted



JEDEC 16-Lead (0.150″ Wide) Small Outline Molded Package (M)
Order Number LMX2119M
For Tape and Reel (2500 Units per Reel)
Order Number LMX2119MX
NS Package Number M16A

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