

DOCSIS®3.1 Full Duplex Amplifier IC



Key Features

- Provides push-pull amplifier performance as a 75 Ohm Single-Ended I/O amplifier IC (no baluns required)
- DOCSIS® 3.1 Full Duplex (FDX) operation from 108 to 684 MHz
- Extended Spectrum DOCSIS® Downstream PHY Compliance from 750 to 1794 MHz
- Typical Gain = 14.0 dB \pm 1.0 dB (108 to 684 MHz) and 14.0 dB \pm 1.5 dB (750 to 1794 MHz)
- OIP3 $>$ +40 dBm (108 MHz); OIP2 $>$ +70 dBm (108 MHz)
- \geq 45 dB MER (DOCSIS® 3.1 OFDM), 108 to 684-MHz, FLAT, uncorrected
- RF Output to +30 dBmV/channel (108 to 684 MHz)
- Single Power Supply Input (+8.5 to +12 Vdc)
- Operating Current = 180 mA Typical ($P_{diss} \approx 1.5$ Wdc)
- Advanced GaAs Amplifier Technology
- QFN-16 3 x 3 x 0.80 mm SMT Package

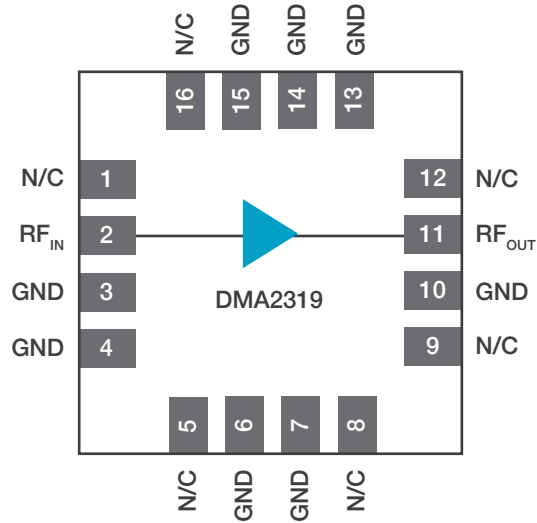
Applications

- DOCSIS® 3.1 Full Duplex (FDX) Consumer Premises Equipment (CPE) from 108 to 684 MHz
- DOCSIS® 3.1 FDX Capable Gateways, Routers, Servers, Computing Devices, Displays
- DOCSIS® 4.0 HFC/FTTx/RFoG Network Downstream 750 to 1794 MHz
- DOCSIS® Set-Top-Gateway (DSG), Home/SOHO Wireless Gateway Router
- Extended Spectrum DOCSIS® Downstream from 750 to 1794 MHz

Product Description

The DMA2319 is a high-linearity RF amplifier IC designed for exceptionally wide bandwidth (BW), flat gain over BW, and artifact-free amplification of multi-carrier modulated signals. Employing an amplifier die manufactured on an advanced GaAs process, this linear CATV amplifier is a single-ended, ultra-linear amplifier ideal for high data rate broadband systems. Designed for use as an easily cascadable 75 Ω gain block, its gain flatness of \pm 1dB from 108 MHz to 684 MHz combined with an OIP2 at 100 MHz of $>$ +70 dBm, make this part ideal for D3.1 full-duplex FDX applications. No baluns are required and the part is available in a small outline, low profile SMT package.

Functional Block Diagram



Package Pin Out

Pin Number	Description	Notes
1	No Connect (N/C)	
2	RF Input	75 Ω Single-Ended 50 Ω Single-Ended (OPTIONAL)
3	Ground	
4	Ground	
5	No Connect (N/C)	
6	Ground	
7	Ground	
8	No Connect (N/C)	
9	No Connect (N/C)	
10	Ground	
11	RF Output	75 Ω Single-Ended 50 Ω Single-Ended (OPTIONAL)
12	No Connect (N/C)	
13	Ground	
14	Ground	
15	Ground	
16	No Connect (N/C)	

Absolute Minimum and Maximum Ratings

Parameter	Min	Max	Units
Supply	0	+15	Vdc
RF Power at the Input	-	+7	dBm
Case Operating Temperature Range, T _c	-40	+110	°C
Storage Temperature	-65	+150	°C
Soldering Temperature	-	+260	°C
Soldering Time	-	5	seconds

Stresses more than the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Operating Ranges

Parameter	Min	Typ	Max	Units
RF Input/Output Frequency	108		1794	MHz
Supply Voltage	+8	+8.5	+12	V _{DC}
Case Temperature, T _c	-40	-	+100	°C

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical Specification.

Electrical Specifications

(Ta = +25 °C, Vdd = +8.5 VDC, f = as stated below, 75 Ω Input/Output)

Parameter	Min	Typ	Max	Units	Comments
Gain	13	14	14.5	dB	See Note 1; 108 to 684 MHz
Gain Slope	12	14	14.5	dB	See Note 1; 750 to 1794 MHz
Gain Flatness	-	-	± 1	dB	F = 108 to 684 MHz
Gain Flatness	-	-	± 2	dB	F = 750 to 1794 MHz
Noise Figure (NF)	-	2.8	-	dB	F = 108 to 1794 MHz
Input Return Loss (IRL)	-	-20	-	dB	F = 108 to 684 MHz
	-	-18	-	dB	F = 750 to 1794 MHz
Output Return Loss (ORL)	-	-18	-	dB	F = 108 to 684 MHz
	-	-15	-	dB	F = 750 to 1794 MHz
Tx Modulation Error Ratio (MER)	-45	-	-	dB	See Note 2, 108 to 684 MHz, FLAT, uncorrected
IIP3	-	+29.5	-	dBm	See Note 1; F = 108 MHz
	-	+26	-	dBm	F = 500 MHz
	-	+25	-	dBm	F = 1000 MHz
OIP3	-	+44	-	dBm	See Note 1; F = 108 MHz
	-	+40	-	dBm	F = 500 MHz
	-	+38	-	dBm	F = 1000 MHz
OIP2	-	+70	-	dBm	See Note 1; F = 108 MHz
	-	+65	-	dBm	See Note 1; F = 500 MHz
OP1dB	-	+25	-	dBm	See Note 1; ±0.5 dBm; F = 100 to 500 MHz
	-	+24	-	dBm	; ±0.5 dBm; F = 1218 MHz
Supply Current	-	180	-	mA	@ +8 Vdc

Notes: All specifications as measured using Duet evaluation assembly.

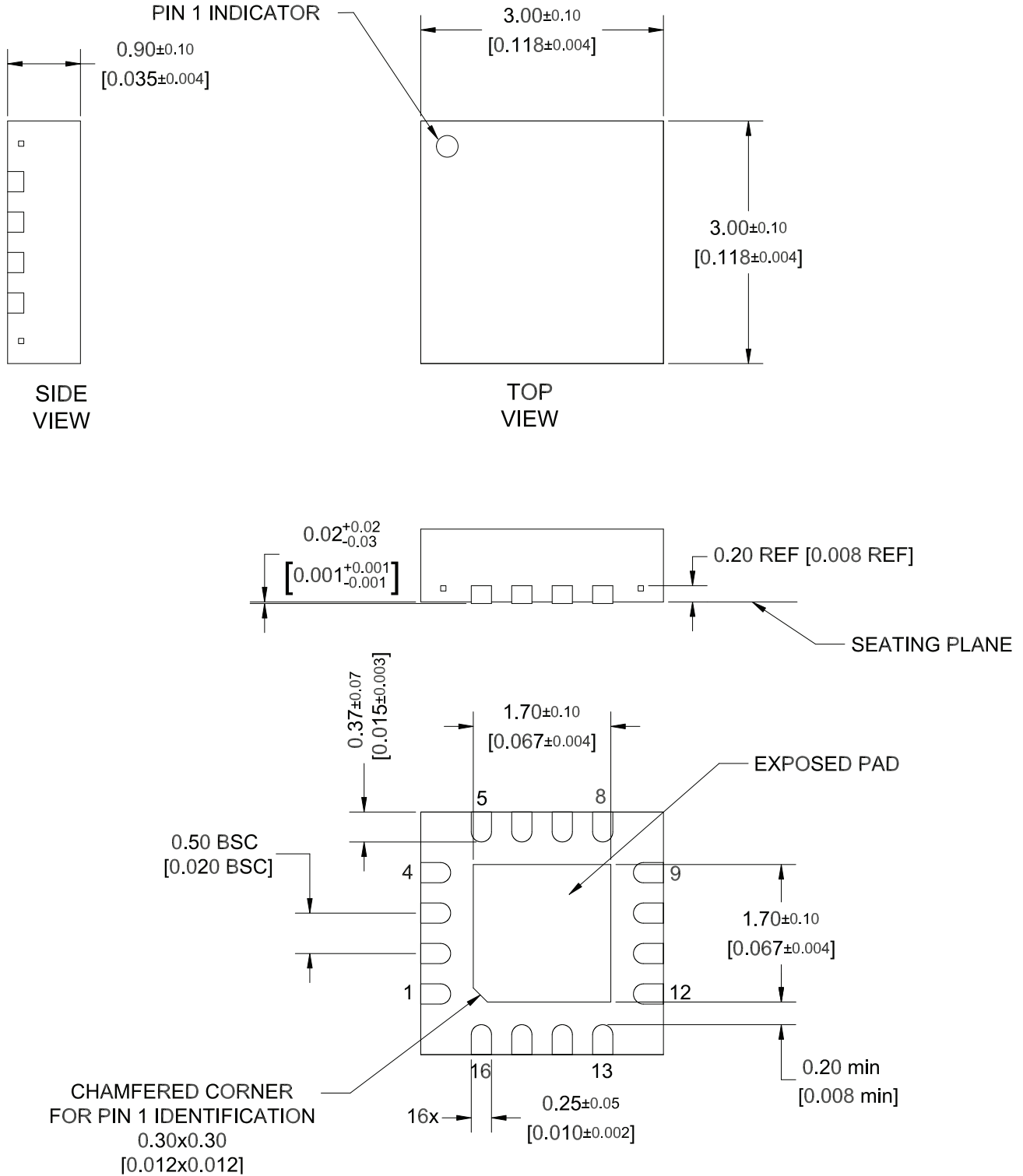
1. Measured in application circuit.
2. Measured IAW Data-Over-Cable Service Interface Specifications (DOCSIS®) Downstream RF Interface Specification, CM-SP-DRFI-116-170111 and CM-SP-PHYv3.1-115-180926.

Multi-Carrier Distortion Data

(Typical at +24 °C Ambient Temperature)

XMOD	CTB	CSO+	CSO-	Unit	Notes
≤ -75	-78	-76	-80	dBc	@288.25 MHz 100 channels PAL-D FLAT; +10 dBmV/ch RFin

Package Dimensions



Ordering Information

Order Number	Temperature Range	Package Description	Component Packaging
DMA2319P0	-40 to +85 °C	3 x 3 x 0.8 mm SMT QFN-16	Gel Pak, 1 to 100 each
DMA2319V0	-40 to +85 °C	3 x 3 x 0.8 mm SMT QFN-16	1500 each, T&R
DMA2319PCBA	-40 to +85 °C	75 Ω I/O Evaluation Board (EVB) with F-Type PCB Edge Connectors	EVB Kit with five (5) piece IC sample ESD bag

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