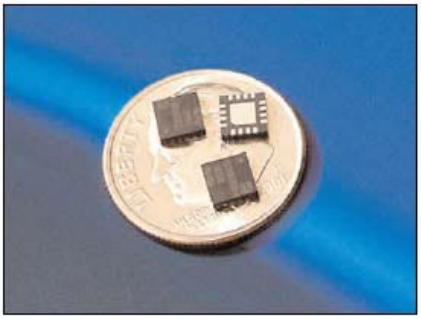
0.05-4.0 GHz
Dual High Dynamic Range Amplifier

April 2006 - Rev 11-Apr-06

CDQ6004-QS
RoHS

Features

- Matched Pair of Amplifiers for Optimum Balanced Design
- 0.25 to 3GHz Frequency Range
- 44 dBm Output IP3 (Balanced configuration)
- 41 dBm Output IP3 (Single-ended configuration)
- 15 dB Gain
- 23 dBm P1dBm
- 2.1dB Noise Figure
- RoHS Compliant 4X4 QFN Package
- Singale Positive Supply
- +3V to +5V Voltage Rail



General Description

The CDQ6004-QS is a dual high dynamic range amplifier designed for applications operation within the 0.25 to 3GHz frequency range. Co-located matched amplifiers are assembled in the 4mm X 4mm QFN package. The low-cost, surface-mount, 16 terminal, plastic package is RoHS compliant. The CDQ6004-QS is an ideal solution for implementing balanced or push-pull designs. The amplifier can also be used for dual-band operation where single-ended design is used for each band. The amplifier has the flexibility of being optimized for a number of wireless applications. The combination of low NF and high IP3 at the same bias point make it an ideal transmit or receive solution when used in applications including CATV operating from 50 to 850 MHz, cellular and PCS (personal communications service) operating from 0.8 to 2.2 GHz; MMDS (multichannel multipoint distribution systems) operating from 2.2 to 2.7 GHz; and WLAN (wireless LAN) operation at 2.4 GHz. All devices are 100% RF and DC tested.

Absolute Maximum Ratings

Supply Voltage	+6.0 V
RF Input Power	+20 dBm
Storage Temperature (Tstg)	-55 °C to +125 °C
Junction Temperature	150 °C
Operating Temperature	-40 °C to +85°C
Thermal Resistance	52 °C/W

Operation of this device above any of these parameters may cause damage.

Typical Parameters

Parameter	Typical			Units
Frequency Range	0.9	2	2.4	GHz
Gain	16.5	15	14.9	dB
Input Return Loss	-13	-11	-20	dB
Output Return Loss	-16	-12	-11	dB
Output IP3	42	41	40.5	dBm
Noise Figure	2.1	2.1	2.6	dB
Output P1dB	+23	+23	+24	dBm

Typical values reflect performance in recommended application circuit @ +5V.

Electrical Characteristics (T = 25°C)

Unless otherwise specified, the following specifications are guaranteed at room temerpature in a Mimix fixture.

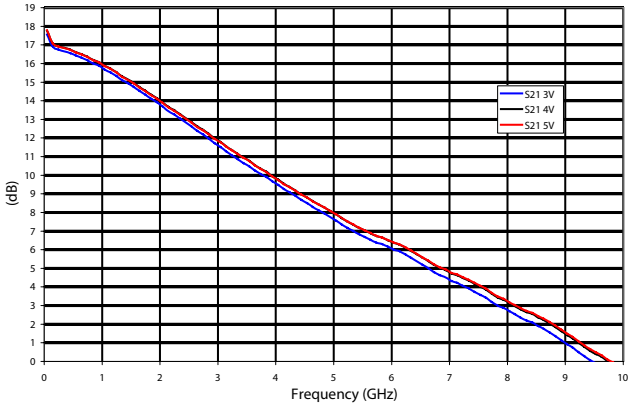
Parameter	Condition	Units	Min.	Typ.	Max.
Frequency Range		GHz	0.25		3.0
Gain	Externally Matched	dB	13.5	15	
Input Return Loss	Externally Matched	dB		-10	
Output Return Loss	Externally Matched	dB		-10	
Output IP3		dBm	38	41	
Noise Figure		dB		2.1	
Output P1dB		dBm		23	
Operating Current Range		mA	120	150	180
Supply Voltage		V		5.0	

Notes:
1. T = 25°C, Frequency = 2 GHz, 50 Ohm system.
2. Each single ended amplifier is tested separately.
3. OIP3 is measured with two tones at output power of 5 dBm/tone separated by 10 MHz.
4. Slight performance degredation is expected over temperature.

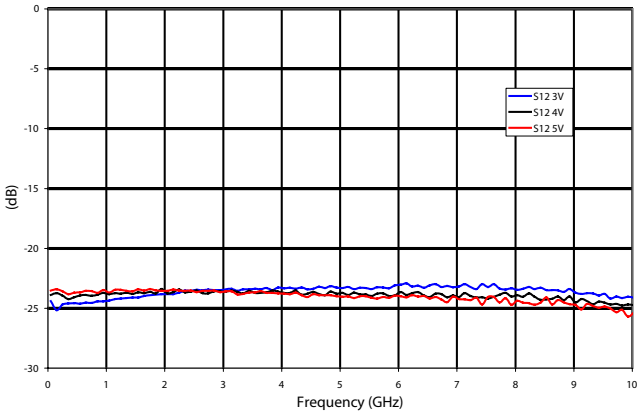
Mimix Broadband, Inc., 10795 Rockley Rd., Houston, Texas 77099
Tel: 281.988.4600 Fax: 281.988.4615 mimixbroadband.com

Typical Device S-Parameters

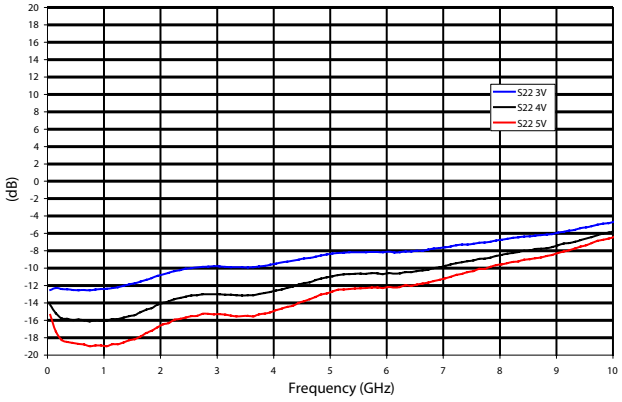
CDQ6004-QS
S21 Vs Voltage



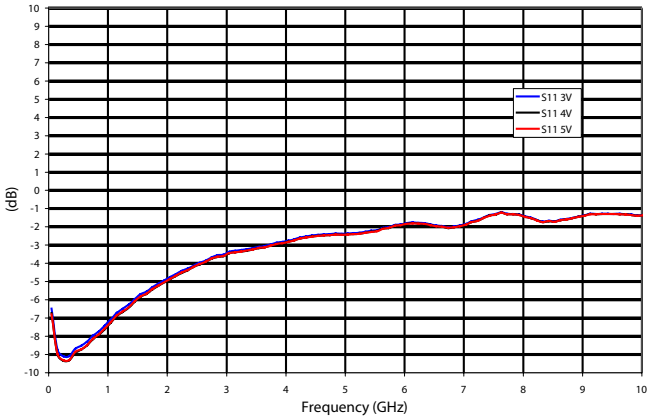
CDQ6004-QS
S12 Vs Voltage



CDQ6004-QS
S22 Vs Voltage



CDQ6004-QS
S11 Vs Voltage



0.05-4.0 GHz
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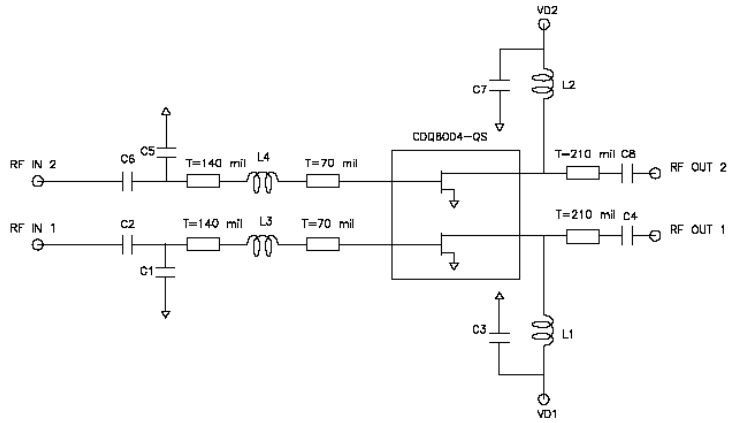
April 2006 - Rev 11-Apr-06

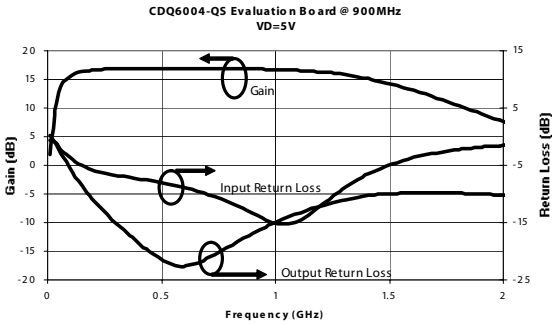
CDQ6004-QS
RoHS

Application Circuit @ 900 MHz

Schematic:

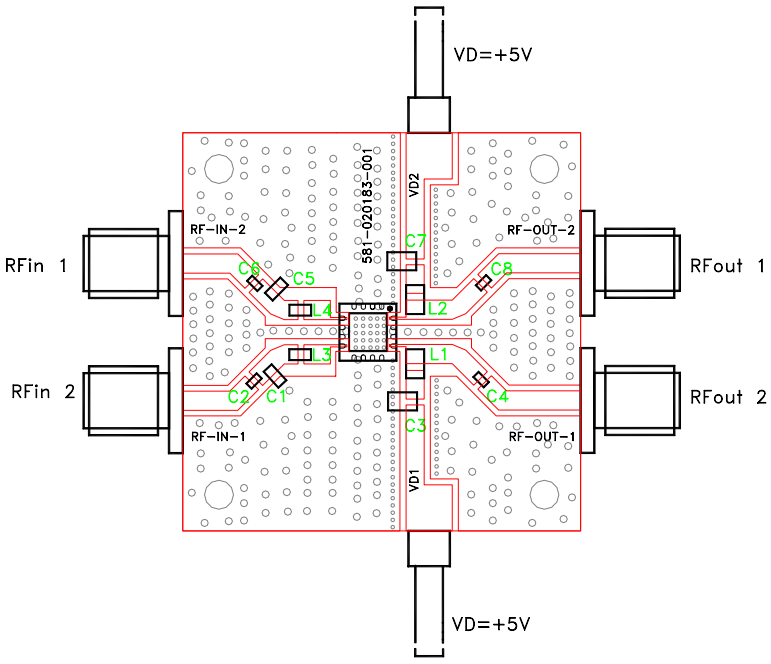


Typical Performance:



Parameter	Typical	Units
Frequency Range	0.9	GHz
Gain	16.5	dB
Input Return Loss	-13	dB
Output Return Loss	-16	dB
Output IP3	42	dBm
Noise Figure	2.1	dB
Output P1dB	23	dBm

Board Layout:



* Material: FR4, 28 mil
* Plating: 1.5 oz. Copper both sides

Components

Ref Designator	Value	Size
C2, C4, C6, C8	2.7 pf	0402
C1, C5	1.5 pf	0603
C3, C7	1000 pf	0805
L1, L2	47 nH	0805
L3, L4	6.8 nH	0603

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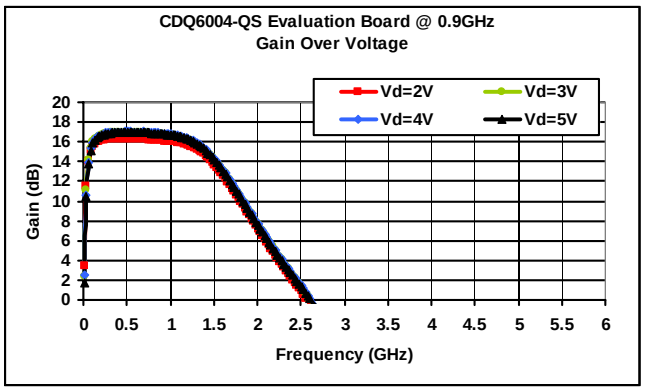
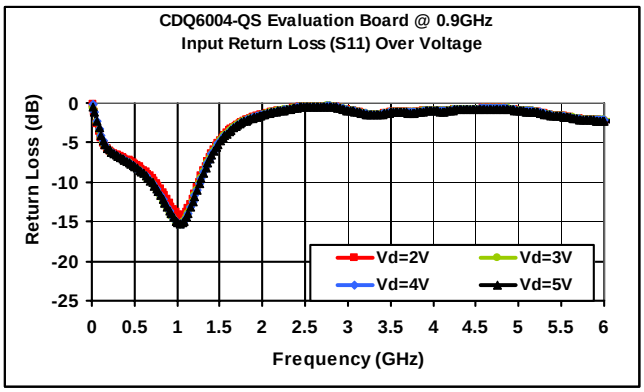
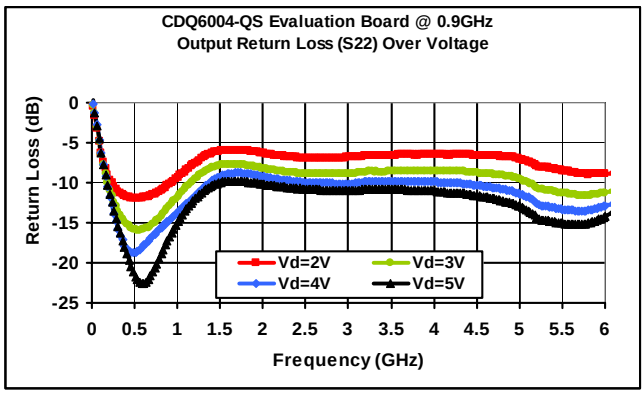
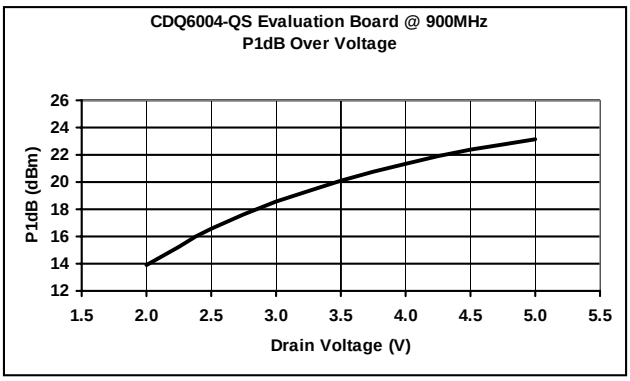
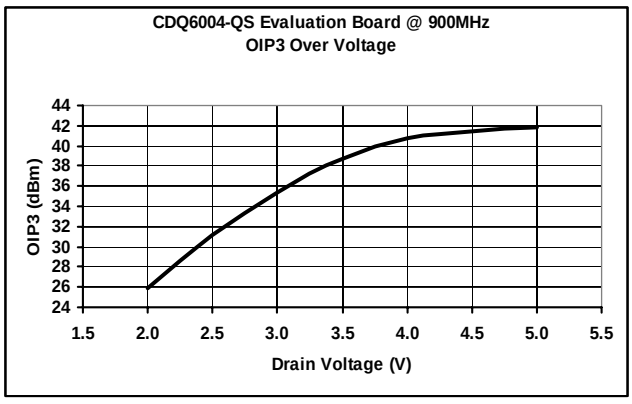
Typical Performance @ 900 MHz (50 Ohm system over voltage)

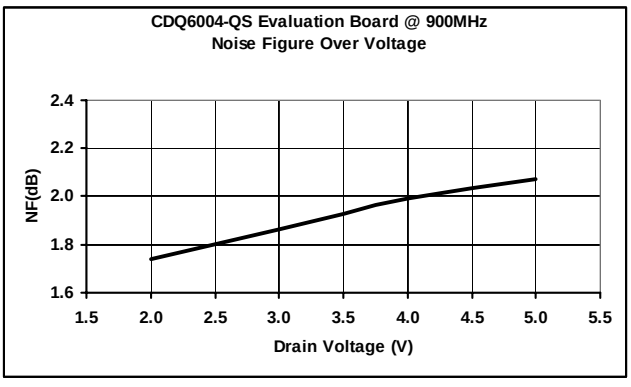






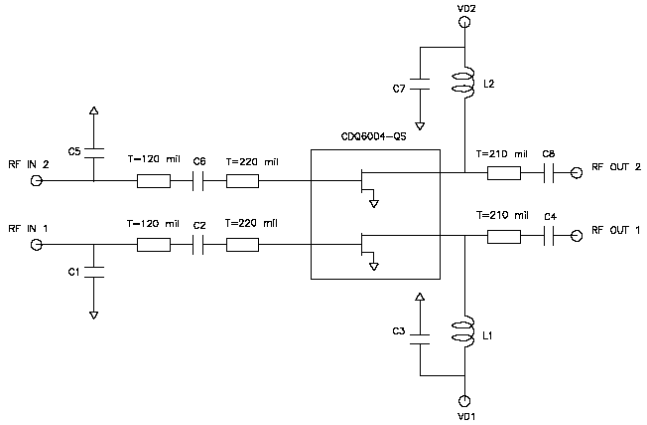




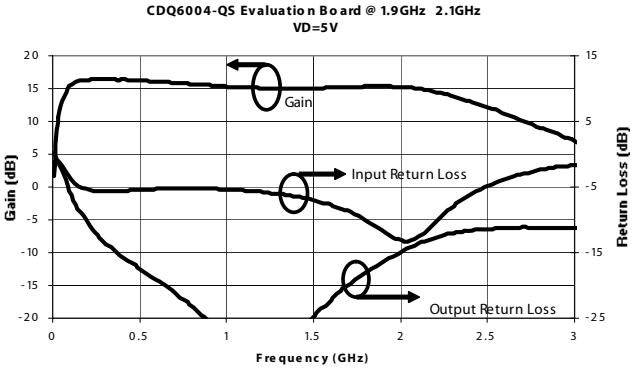


Application Circuit @ 1.9 GHz ~ 2.1 GHz:

Schematic:

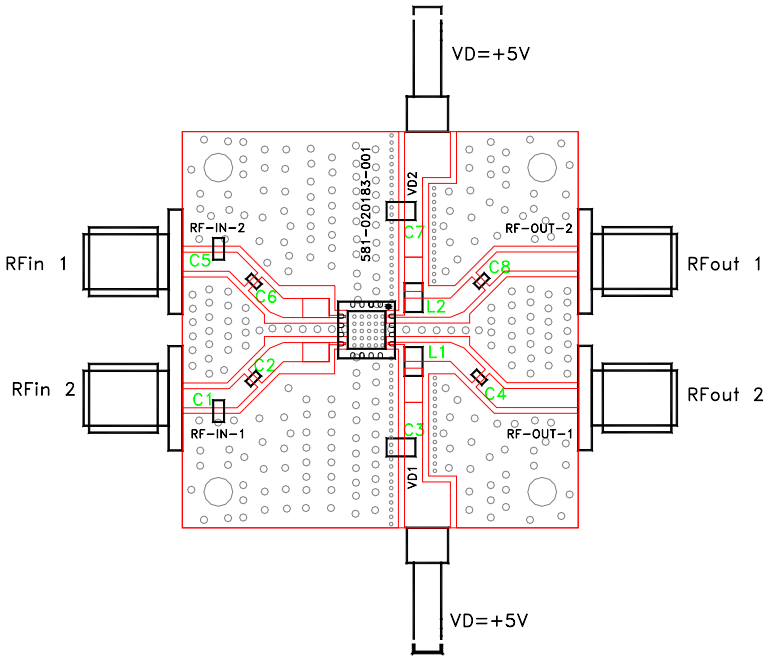


Typical Performance:



Parameter	Typical		Units
Frequency Range	1.9	2.1	GHz
Gain	15.3	15.0	dB
Input Return Loss	-11.9	-12.5	dB
Output Return Loss	-16.3	-13.6	dB
Output IP3	41	41.3	dBm
Noise Figure	2.1	2.1	dB
Output P1dB	23	23	dBm

Board Layout:

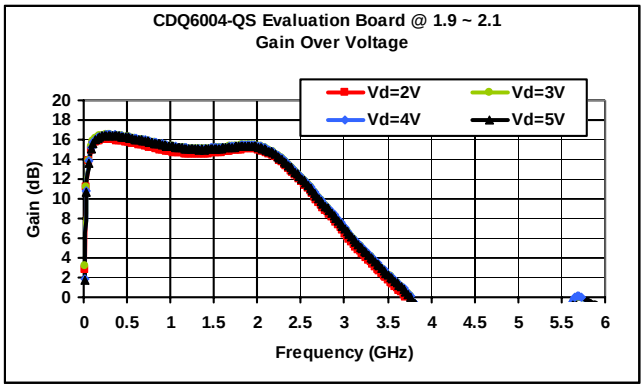


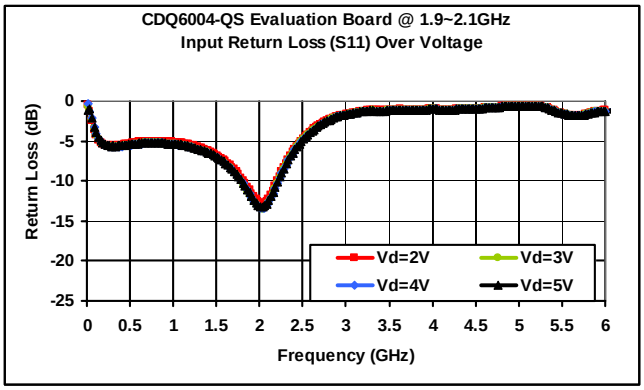
* Material: FR4, 28 mil
* Plating: 1.5 oz. Copper both sides

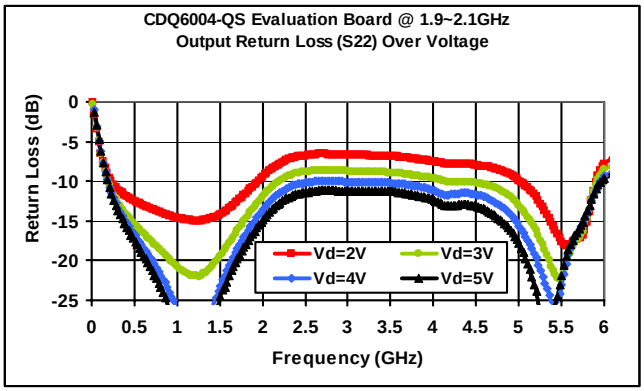
Components

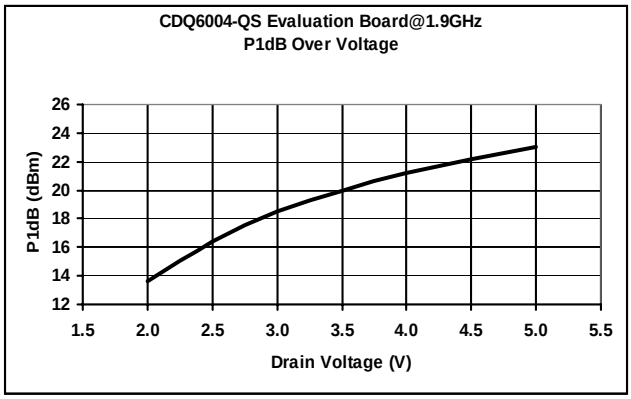
Ref Designator	Value	Size
C2, C4, C6, C8	100 pf	0402
C1, C5	1.5 pf	0603
C3, C7	1000 pf	0805
L1, L2	47 nH	0805

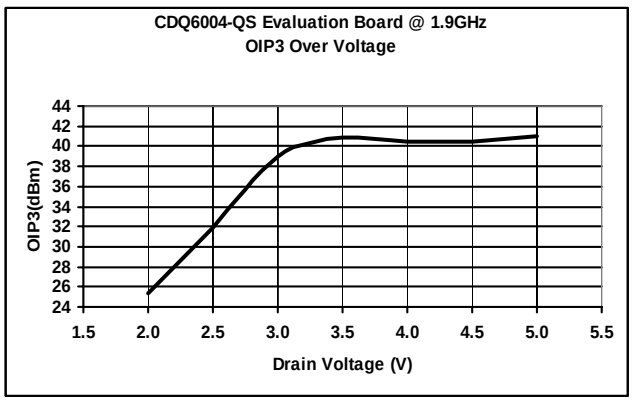
Typical Performance @ 1.9 GHz (50 Ohm system over voltage)

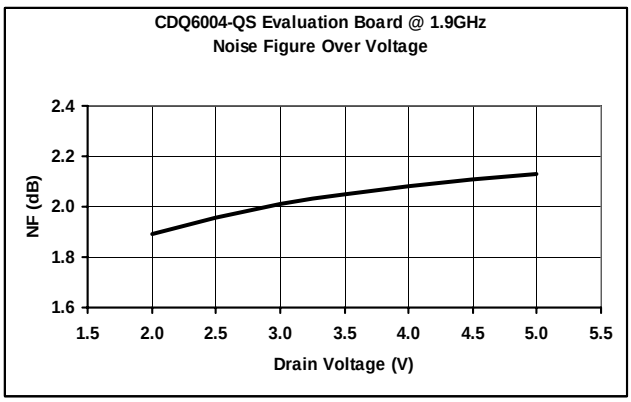












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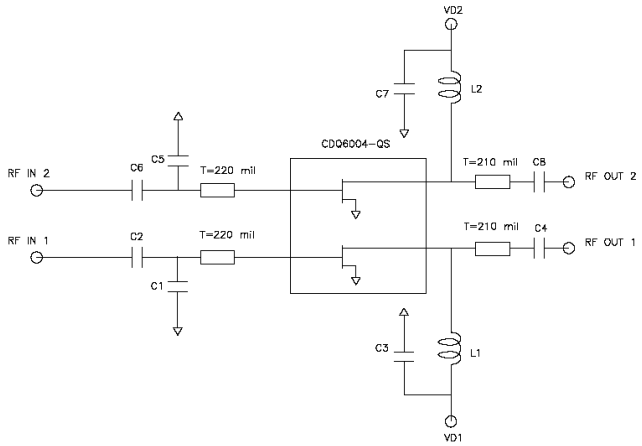
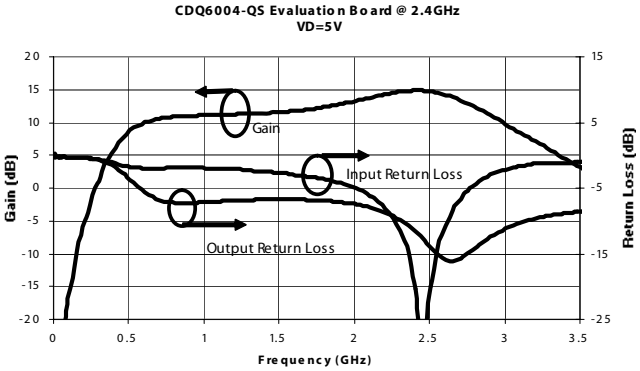
RoHS

Application Circuit @ 2.4 GHz:

Schematic:

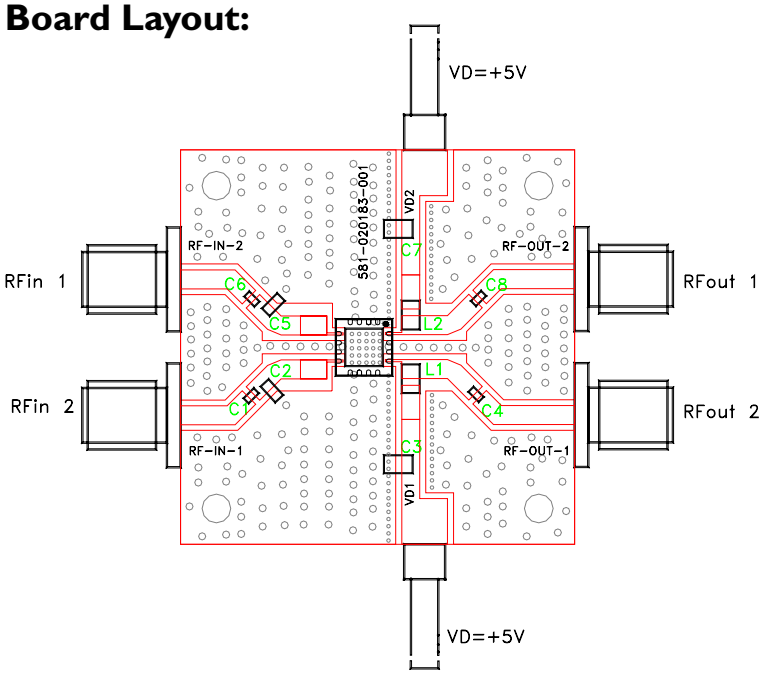


Typical Performance:



Parameter	Typical	Units
Frequency Range	2.4	GHz
Gain	14.9	dB
Input Return Loss	-20	dB
Output Return Loss	-11	dB
Output IP3	40.5	dBm
Noise Figure	2.6	dB
Output P1dB	24	dBm

Board Layout:

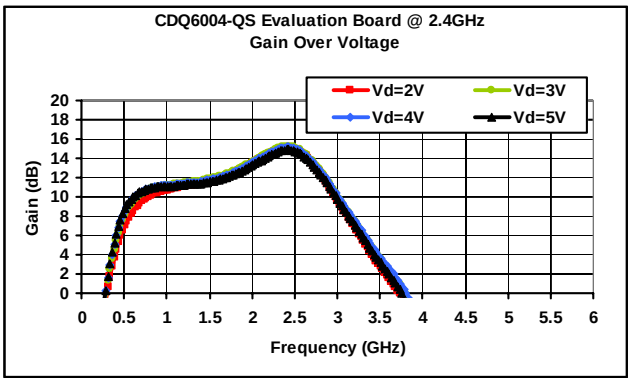


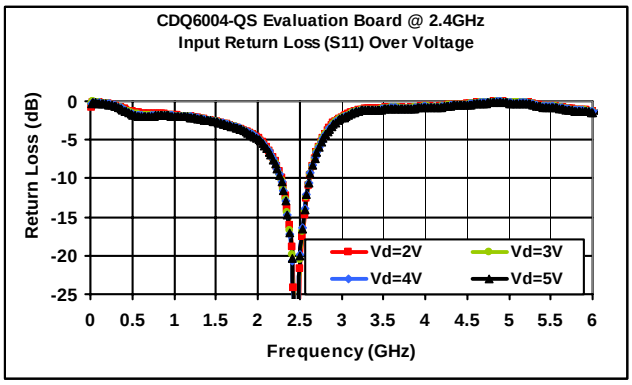
* Material: FR4, 28 mil
* Plating: 1.5 oz. Copper both sides

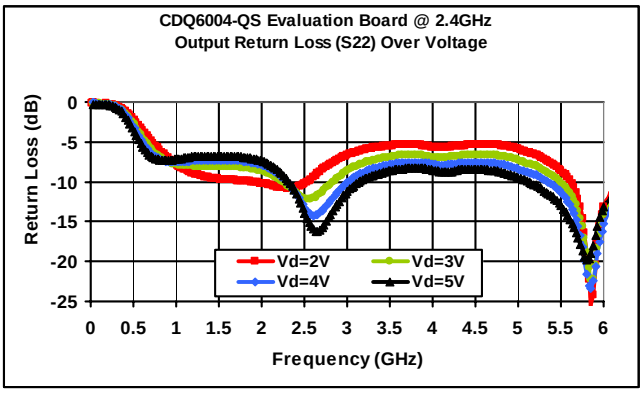
Components

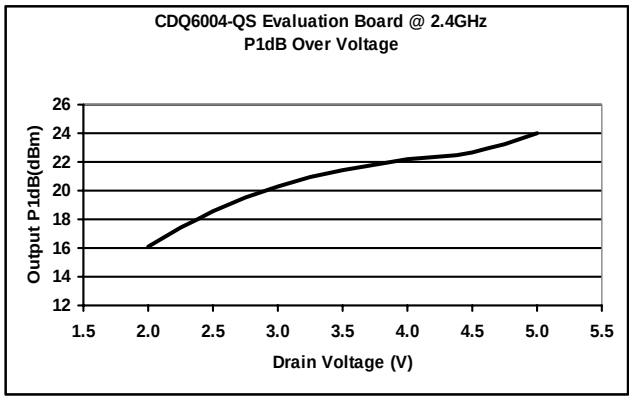
Ref Designator	Value	Size
C2, C4, C6, C8	2.7 pf	0402
C1, C5	1.2 pf	0603
C3, C7	1000 pf	0805
L1, L2	47 nH	0805

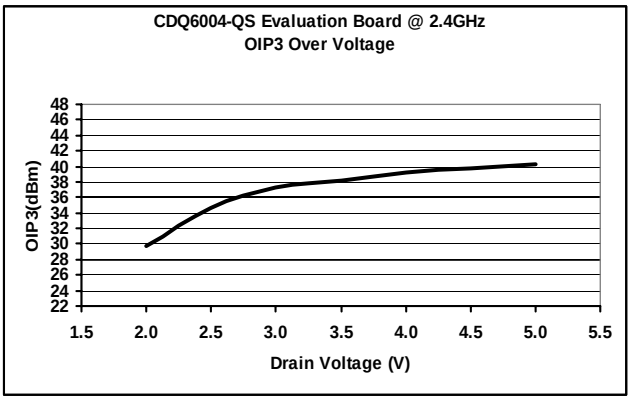
Typical Performance @ 2.4 GHz (50 Ohm system over voltage)

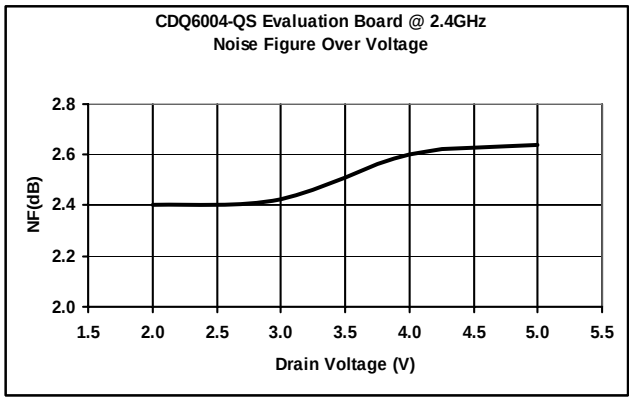




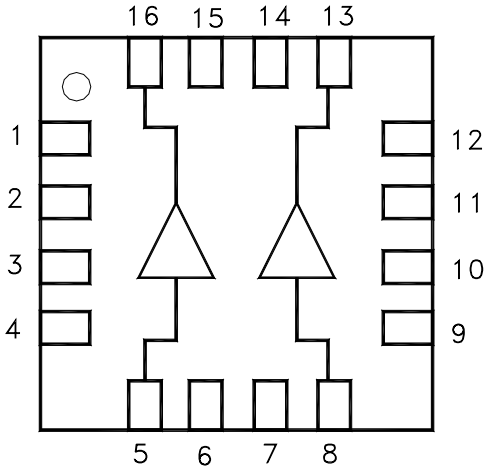








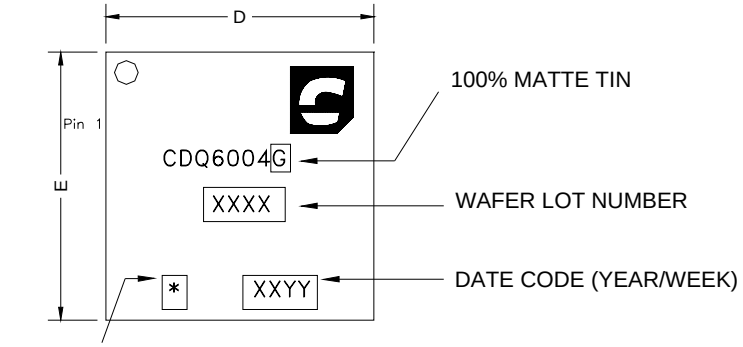
Functional Block Diagram

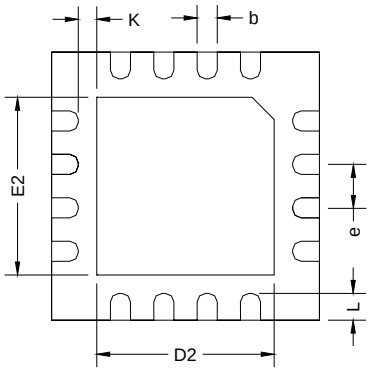


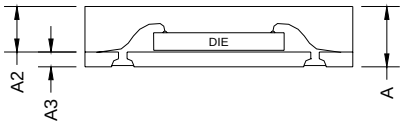
Pin Out Detail

Pin	Function	Description
5	IN 1	Amplifier 1 RF Input
8	IN 2	Amplifier 2 RF Input
16	OUT 1	Amplifier 1 RF Output
13	OUT 2	Amplifier 2 RF Output
1,2,3,4	VS 1	Amplifier 1 Source Connection
9,10,11,12	VS 2	Amplifier 2 Source Connection
6,7,14,15	GND	Main Heat-Sinking Connection

Physical Dimensions







	MIN	NOM	MAX
A	0.80	0.90	1.00
A3		0.20 REF	
A2	0	0.65	1.00
b	0.25	0.30	0.35
K	0.20	-	-
D		4.00 BSC	
E		4.00 BSC	
e		0.65	
D2	2.50	2.65	2.80
E2	2.50	2.65	2.80
L	0.35	0.40	0.45

NOTES:
1. ALL DIMENSIONS ARE IN mm

Ordering Information

Part Number for Ordering	Description
CDQ6004-QS-0G00	Matte Tin plated RoHS compliant QFN4x4 16L surface mount package in bulk quantity
CDQ6004-QS-0G0T	Matte Tin plated RoHS compliant QFN4x4 16L surface mount package in tape and reel
PB-CDQ6004-QS-00A0	CDQ6004-QS Evaluation Board @ 900 MHz
PB-CDQ6004-QS-00B0	CDQ6004-QS Evaluation Board @ 1.9 GHz~2.1 GHz
PB-CDQ6004-QS-00C0	CDQ6004-QS Evaluation Board @ 2.4 GHz

We also offer this product with SnPb (Tin-Lead) or NiPdAu plating. Please contact your regional sales manager for more information regarding different plating types.

Handling and Assembly Information

CAUTION! - Mimix Broadband MMIC Products contain gallium arsenide (GaAs) which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- Do not ingest.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.

Life Support Policy - Mimix Broadband's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President and General Counsel of Mimix Broadband. As used herein: (1) Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user. (2) A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Package Attachment - This packaged product from Mimix Broadband is provided as a rugged surface mount package compatible with high volume solder installation. Care should be taken not to apply heavy pressure to the top or base material to avoid package damage. Vacuum tools or other suitable pick and place equipment may be used to pick and place this part. Care should be taken to ensure that there are no voids or gaps in the solder connection so that good RF, DC and ground connections are maintained. Voids or gaps can eventually lead not only to RF performance degradation, but reduced reliability and life of the product due to thermal stress.

Mimix Lead-Free RoHS Compliant Program - Mimix has an active program in place to meet customer and governmental requirements for eliminating lead (Pb) and other environmentally hazardous materials from our products. All Mimix RoHS compliant components are form, fit and functional replacements for their non-RoHS equivalents. Lead plating of our RoHS compliant parts is 100% matt tin (Sn) over copper alloy and is backwards compatible with current standard SnPb low-temperature reflow processes as well as higher temperature (260°C reflow) "Pb Free" processes.

Part Numbering Designator - For Mimix/Celeritek lead-free products, the letter "G" will be used in the part number for Matte Tin finished RoHSCompliant components and "L" will be used in the part number of NiPdAu finished RoHS Compliant components in the second position of the part number suffix, as shown below:

Example A: CXX1234-XX-0G00 = component bulk quantity Matte Tin finished RoHScompliant parts
Example B: CXX1234-XX-0L0T = component in tape and reel NiPdAu finished RoHS parts

For those customers not making the change at this time, Mimix/Celeritek will maintain production of current configurations. For questions and comments e-mail: ourearth@mimixbroadband.com.