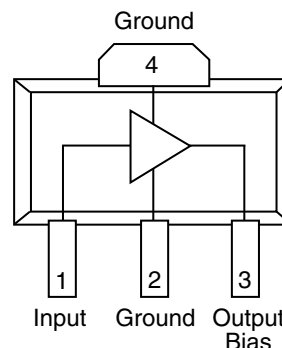


**Advanced Product Information**  
**May 2003** (1 of 5)

# 50 MHz to 870 MHz High Dynamic Range Amplifier

**Features**

- ❑ 50 MHz to 870 MHz Frequency Range
- ❑ +41 dBm Output IP3
- ❑ 1.6 dB Noise Figure (@450 MHz)
- ❑ 17 dB Gain
- ❑ 22 dBm P1dB
- ❑ SOT-89 SMT Package
- ❑ Single Power Supply
- ❑ +3V to +5V Voltage Rail

**Functional Block Diagram**

**Description**

The CMM6003-SC is a high dynamic range amplifier designed for applications operating within the 50 MHz to 870 MHz frequency range. It is an ideal solution for transmit and receive functions where high linearity is required.

The amplifier has the flexibility of being optimized for a number of wireless applications. The combination of

gain flatness, bandwidth, low NF and high IP3 at the same bias point make it an ideal transmit or receive solution when used in intermediate frequency applications.

The CMM6003-SC is packaged in a low-cost, space efficient, surface mount SOT-89 package which provides excellent electrical stability and low thermal resistance. All devices are 100% RF (at 800 MHz) and DC tested.

**Electrical Characteristics**

Unless otherwise specified, the following specifications are guaranteed at room temperature in a Celeritek test fixture.

Parameter	Condition	Min	Typ	Max	Units
Frequency Range		50	800	870	MHz
Gain	Externally matched	15	17	18	dB
Input Return Loss	Externally matched		-11		dB
Output IP3			+41		dBm
Noise Figure	@ 50 MHz		1.9		dB
Noise Figure	@ 800 MHz		3.3		dB
Output P1dB			22		dBm
Operating Current Range		120	150	180	mA
Supply Voltage			5.0		V

Notes:

1. T = 25°C, Vdd = 5.0, Frequency = 800 MHz, 50 Ohm system
2. OIP3 measured with two tones at output power of 10 dBm/tone separated by 10 MHz.

**Typical Parameters**

Parameter	Typical			Units
Frequency Range	450	800	870	MHz
Gain	17.2	16.5	16.25	dB
Input Return Loss	-12.0	-11.5	-10.5	dB
Output Return Loss	-16	-14	-13	dB
Output IP3	+39	+41	+41	dBm
Output P1dB	23.6	23.7	23.8	dBm
Noise Figure	1.6	1.9	2.0	dB

Notes:

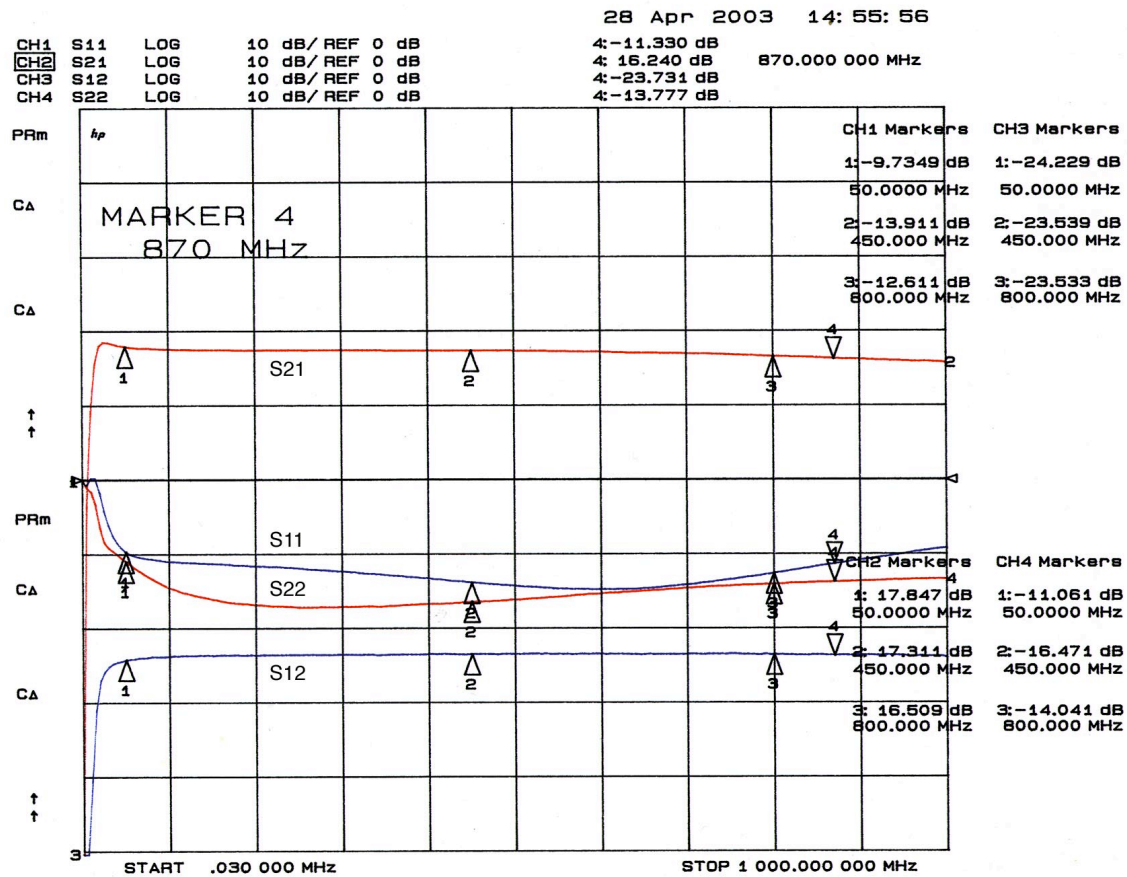
1. Typical values reflect performance in recommended application circuit.

**Absolute Maximum Ratings**

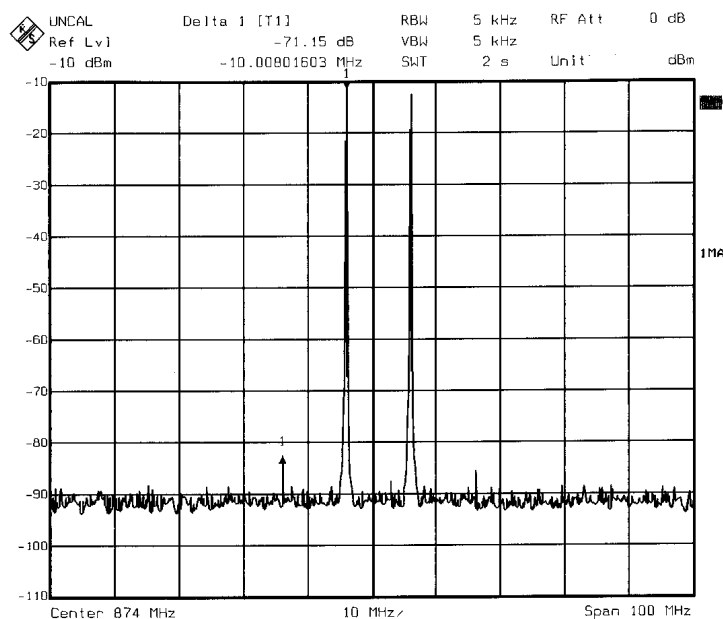
Parameter	Rating	Parameter	Rating	Parameter	Rating
Supply Voltage	+6.0 V	Storage Temperature	-55°C to +125°C	Operating Temperature	-40°C to +85°C
RF Input Power	+10 dBm	Junction Temperature	150°C	Thermal Resistance	59°C/W

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

### S-Parameters vs Frequency



IP3 measured with 2 tones at an output power of 10 dBm/tone separated by 10 MHz



**Typical Scattering Parameters** ( $V_{ds} = +5V$ ,  $I_{ds} = 150\text{ mA}$ ,  $T = 22^\circ\text{C}$ , unmatched device in a 50 ohm system)

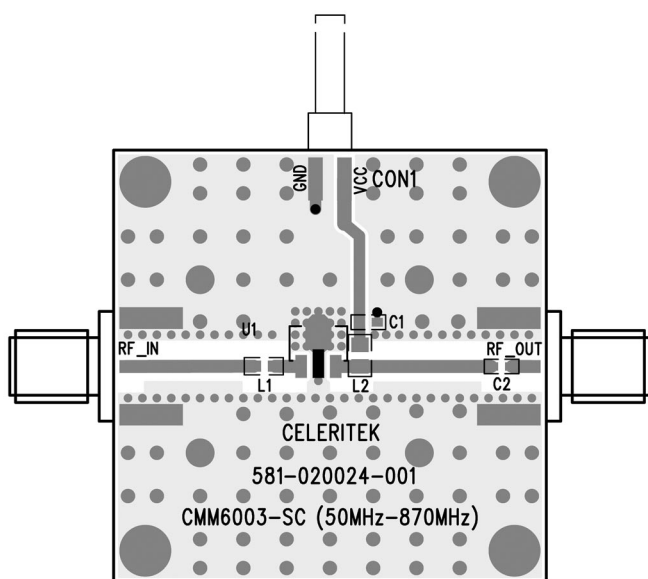
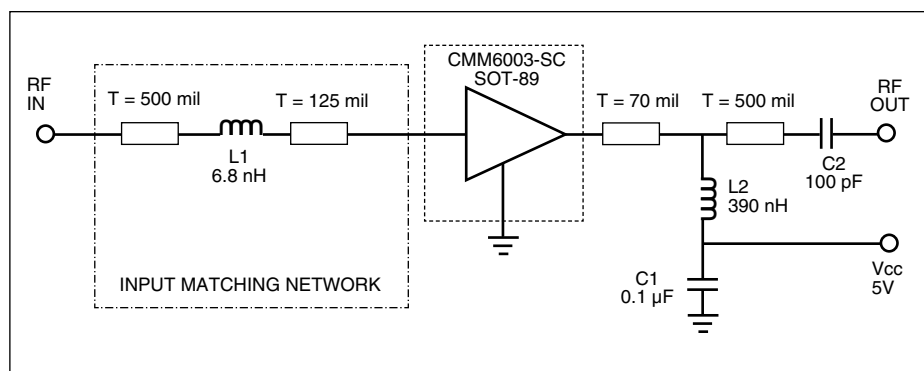
Frequency (MHz)	$S_{11}$		$S_{21}$		$S_{12}$		$S_{22}$	
	(Mag)	(Ang)	(Mag)	(Ang)	(Mag)	(Ang)	(Mag)	(Ang)
50	0.418	-33.88	8.155	166.00	0.064	16.93	0.152	-97.060
75	0.366	-31.32	7.826	167.10	0.065	9.83	0.115	-113.000
100	0.347	-31.04	7.683	167.20	0.066	6.57	0.096	-123.500
125	0.338	-31.54	7.614	166.50	0.066	4.30	0.087	-132.000
150	0.344	-32.97	7.566	165.50	0.066	2.50	0.080	-139.400
175	0.322	-34.79	7.520	164.40	0.066	1.25	0.076	-145.400
200	0.331	-36.93	7.487	163.10	0.066	-0.01	0.074	-150.200
225	0.332	-39.38	7.462	161.80	0.066	-1.00	0.071	-154.000
250	0.334	-41.89	7.432	160.40	0.066	-1.79	0.069	-157.900
275	0.335	-44.55	7.402	159.00	0.066	-2.69	0.068	-161.400
300	0.377	-47.27	7.379	157.50	0.066	-3.40	0.067	-164.100
325	0.340	-50	7.350	156.00	0.066	-4.19	0.066	-166.200
350	0.343	-52.74	7.318	154.50	0.066	-4.66	0.065	-168.900
375	0.346	-55.52	7.294	153.00	0.066	-5.44	0.065	-171.200
400	0.349	-58.24	7.259	151.40	0.066	-6.12	0.064	-173.500
425	0.352	-60.96	7.233	149.90	0.066	-6.73	0.064	-174.900
450	0.356	-63.68	7.197	148.40	0.066	-7.42	0.062	-176.900
475	0.360	-66.33	7.160	146.90	0.066	-7.95	0.062	-178.800
500	0.363	-68.99	7.127	145.30	0.066	-8.43	0.062	179.700
525	0.368	-71.67	7.095	143.80	0.066	-8.99	0.061	178.900
550	0.371	-74.19	7.059	142.30	0.066	-9.64	0.060	177.000
575	0.375	-76.77	7.023	140.80	0.066	-10.12	0.060	175.200
600	0.379	-79.29	6.986	139.30	0.066	-10.74	0.060	173.900
625	0.384	-81.76	6.948	137.80	0.065	-11.32	0.059	173.300
650	0.388	-84.27	6.907	136.20	0.065	-11.81	0.059	171.900
675	0.392	-86.65	6.870	134.80	0.066	-12.39	0.059	170.300
700	0.396	-89.00	6.829	133.30	0.065	-12.90	0.059	169.100
725	0.400	-91.40	6.791	131.70	0.065	-13.49	0.058	168.200
750	0.405	-93.68	6.749	130.30	0.065	-13.96	0.057	167.300
775	0.409	-95.90	6.705	128.80	0.065	-14.40	0.057	165.900
800	0.413	-98.12	6.666	127.40	0.065	-14.99	0.057	165.000
825	0.417	-100.30	6.624	125.90	0.065	-15.51	0.056	164.700
850	0.422	-102.40	6.583	124.40	0.065	-15.97	0.055	163.800
875	0.426	-104.60	6.537	123.00	0.065	-16.41	0.055	162.400
900	0.430	-106.70	6.502	121.60	0.065	-16.99	0.055	161.600
925	0.434	-108.80	6.460	120.10	0.065	-17.53	0.054	161.300
950	0.438	-110.80	6.417	118.70	0.065	-17.91	0.054	160.400
975	0.433	-112.80	6.375	117.30	0.065	-18.51	0.053	159.200
1000	0.447	-114.70	6.330	115.90	0.065	-18.97	0.053	158.600

## Application Circuit

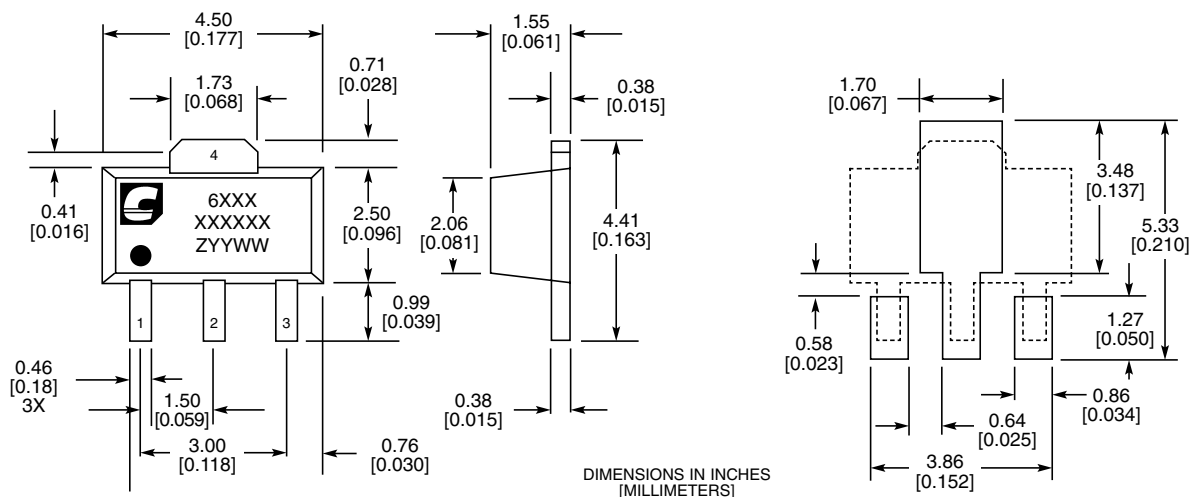
Parameter	Typical			Units
Frequency Range	450	800	870	MHz
Gain	17.2	16.5	16.25	dB
Input Return Loss	-12.0	-11.5	-10.5	dB
Output Return Loss	-16	-14	-13	dB
Output IP3	+396	+41	+41	dBm
Output P1dB	23.6	23.7	23.8	dBm
Noise Figure	1.6	1.9	2.0	dB

Notes:

1. Typical values reflect performance in recommended application circuit.



Ref Designator	Value	Description	Size
C2	0.1 $\mu$ F	VITR 0.1 $\mu$ F 25V CER CAP 0603 X7R 10%	0603
C2	100 pF	0603CG101J9B20 T/R	0603
L1	6.8 nH	TOKO LL1608-F6N8J	0603
L2	390 nH	Coilcraft 0805CS-391XJBC	0603

**Physical Dimensions**

MARKINGS:  
6XXX = CELERITEK MODEL NO.  
XXXXXX = WAFER LOT NO.  
ZYYWW = DATE CODE (YR/WEEK)  
FIRST LETTER COUNTRY OF ORIGIN IF OTHER THAN USA

**Ordering Information**

The CMM6003-SC is available in a surface-mount SOT-89 package and devices are available in tape and reel.

Part Number for Ordering

**CMM6003-SC**

**PB-CMM6003-SC**

Package

**SOT-89 surface-mount power package in tape and reel**

**Evaluation Board with SMA connectors for CMM6003-SC**

Celeritek reserves the right to make changes without further notice to any products herein. Celeritek makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Celeritek assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Celeritek does not convey any license under its patent rights nor the rights of others. Celeritek products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Celeritek product could create a situation where personal injury or death may occur. Should Buyer purchase or use Celeritek products for any such unintended or unauthorized application, Buyer shall indemnify and hold Celeritek and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Celeritek was negligent regarding the design or manufacture of the part. Celeritek is a registered trademark of Celeritek, Inc. Celeritek, Inc. is an Equal Opportunity/Affirmative Action Employer.