

CFK2062-P1

800 to 900 MHz
+30 dBm Power GaAs FET

Product Specifications

December 1997 (1 of 4)

800 to 900 MHz +30 dBm Power GaAs FET

Features

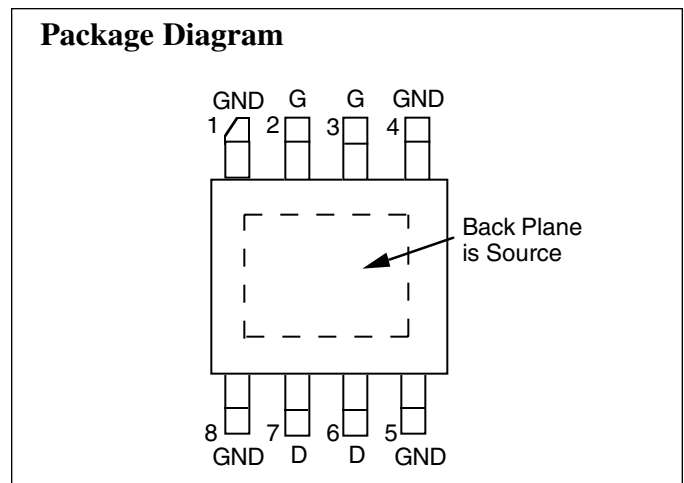
- ❑ High Gain
- ❑ +30 dBm Power Output
- ❑ Proprietary Power FET Process
- ❑ >40% Linear Power Added Efficiency
- ❑ Surface Mount SO-8 Power Package

Applications

- ❑ ISM Band Base Stations and Terminals
- ❑ Cellular Base Stations and Terminals
- ❑ Wireless Local Loop

Description

The CFK2062-P1 is a high-gain FET intended for driver amplifier applications in high-power systems, and output stage usage in medium power applications at power levels up to +30 dBm. The device is easily matched and provides excellent



linearity at 1 Watt. Manufactured in Celeritek's proprietary power FET process, this device is assembled in an industry standard surface mount SO-8 power package that is compatible with high volume, automated board assembly techniques.

Specifications (TA = 25°C) The following specifications are guaranteed at room temperature in Celeritek test fixture at 850 MHz.

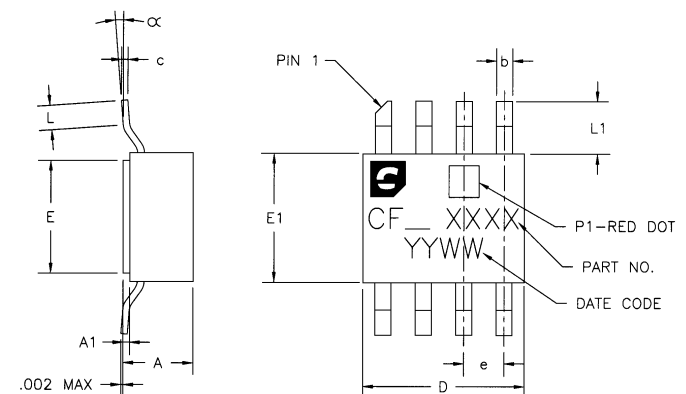
| Parameters | Conditions | Min | Typ | Max | Units |
|---|------------|------|------|-----|-------|
| V_d = 8V, I_d = 400 mA (Quiescent) | | | | | |
| P-1 dB | | 29.0 | 30.0 | — | dBm |
| SSG | | 18.0 | 20.0 | — | dB |
| 3rd Order Products (1) | | — | 30 | — | dBc |
| Efficiency | @ P1dB | — | 40 | — | % |
| V_d = 5V, I_d = 600 mA (Quiescent) | | | | | |
| P-1 dB | | — | 29.5 | — | dBm |
| SSG | | — | 19.0 | — | dB |

| Parameters | Conditions | Min | Typ | Max | Units |
|---------------------|---|-----|------|-----|-------|
| g _m | V _{ds} = 2.0V, V _{gs} = 0V | — | 650 | — | mS |
| I _{dss} | V _{ds} = 2.0V, V _{gs} = 0V | — | 1.4 | — | A |
| V _p | V _{ds} = 3.0V, I _{ds} = 25 mA | — | -1.8 | — | Volts |
| BV _{GD} | I _{gd} = 2.5 mA | 15 | 17 | — | Volts |
| Θ _{JL} (2) | @ 150°C TCH | — | 12 | — | °C/W |

Absolute Maximum Ratings

| Parameter | Symbol | Rating |
|------------------------|------------------|------------------|
| Drain-Source Voltage | V _{DS} | 10V (3) |
| Gate-Source Voltage | V _{GS} | -5V |
| Drain Current | I _{DS} | I _{dss} |
| Continuous Dissipation | P _T | 6W |
| Channel Temperature | T _{CH} | 175°C |
| Storage Temperature | T _{STG} | -65°C to +175°C |

SO-8 Power Package Physical Dimensions



| DIMENSION | MINIMUM | NOMINAL | MAXIMUM |
|-----------|-------------|-------------|-------------|
| A | | .086[2.184] | .100[2.540] |
| A1 | .005[.1270] | .008[.2032] | .011[.2794] |
| b | .017[.4318] | .020[.5080] | .023[.5842] |
| c | .007[.1778] | .008[.2032] | .009[.2286] |
| D | .195[4.953] | .200[5.080] | .205[5.207] |
| E | .135[3.429] | .140[3.556] | .145[3.683] |
| E1 | .155[3.937] | .160[4.064] | .165[4.191] |
| e | | .050[1.270] | |
| L | .020[.5080] | | .040[1.016] |
| L1 | .055[1.397] | .065[1.651] | .075[1.905] |
| α | 0° | | 8° |

DIMENSIONS IN INCHES [MILLIMETERS]

Notes:

1. Sum to two tones with 1 MHz spacing = 25 dBm.
2. See thermal considerations information on page 4.
3. Maximum potential difference across the device (V_d + V_g) cannot exceed 12V.

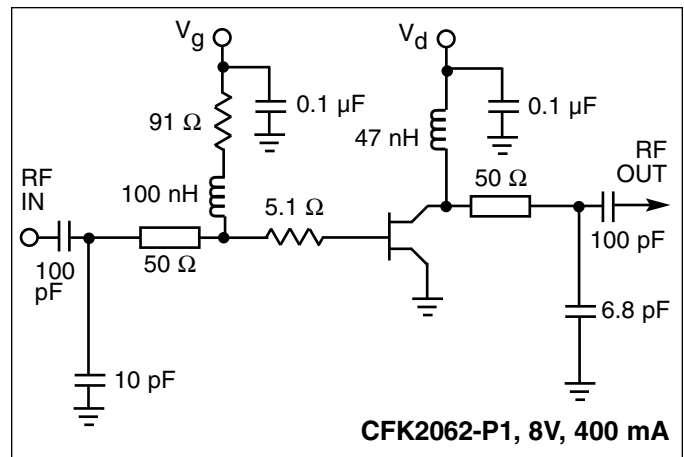
Typical Scattering Parameters (TA = 25°C, Vds = 5 V, Ids = 600 mA)

| Frequency (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|-----------------|-----------------|---------|-----------------|-------|-----------------|--------|-----------------|---------|
| | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang |
| 0.6 | 0.927 | -129.75 | 8.7 | 102.7 | 0.024 | 21.95 | 0.576 | -178.45 |
| 0.7 | 0.921 | -138.64 | 7.587 | 97.2 | 0.025 | 16.98 | 0.588 | 179.24 |
| 0.8 | 0.919 | -145.3 | 6.726 | 92.32 | 0.025 | 12.77 | 0.597 | 177.37 |
| 0.9 | 0.919 | -150.58 | 6.02 | 88.2 | 0.025 | 12.07 | 0.6 | 176.07 |
| 1.0 | 0.914 | -154.69 | 5.449 | 84.82 | 0.025 | 8.72 | 0.6 | 175.04 |
| 1.1 | 0.911 | -157.8 | 5.018 | 82.03 | 0.026 | 7.57 | 0.597 | 174.42 |
| 1.2 | 0.91 | -160.09 | 4.678 | 79.43 | 0.027 | 6.24 | 0.594 | 173.69 |
| 1.3 | 0.908 | -162.37 | 4.423 | 76.85 | 0.027 | 4.79 | 0.588 | 172.66 |
| 1.4 | 0.904 | -164.19 | 4.225 | 74.15 | 0.028 | 2.63 | 0.578 | 171.66 |
| 1.5 | 0.9 | -166.3 | 4.066 | 71.35 | 0.029 | 2.62 | 0.567 | 170.4 |
| 2.0 | 0.883 | 177.09 | 3.605 | 52.62 | 0.05 | -10.6 | 0.512 | 154.61 |
| 2.5 | 0.887 | 150.54 | 2.944 | 28.96 | 0.035 | -30.13 | 0.539 | 128.94 |
| 3.0 | 0.917 | 135.01 | 2.081 | 13.19 | 0.03 | -41.27 | 0.623 | 118.42 |
| 3.5 | 0.932 | 137.14 | 1.635 | 8.18 | 0.028 | -41.69 | 0.643 | 124.18 |
| 4.0 | 0.913 | 143.42 | 1.641 | 3.36 | 0.032 | -41.15 | 0.557 | 131.38 |

(TA = 25°C, Vds = 8 V, Ids = 400 mA)

| | | | | | | | | |
|-----|-------|---------|-------|-------|-------|--------|-------|---------|
| 0.6 | 0.91 | -131.25 | 9.129 | 100.5 | 0.026 | 17.07 | 0.521 | -174.04 |
| 0.7 | 0.905 | -139.87 | 7.943 | 95.18 | 0.026 | 13.22 | 0.534 | -176.65 |
| 0.8 | 0.906 | -146.47 | 7.028 | 90.26 | 0.026 | 11.05 | 0.543 | -178.82 |
| 0.9 | 0.906 | -151.44 | 6.281 | 86.16 | 0.027 | 8.59 | 0.547 | 179.94 |
| 1.0 | 0.904 | -155.33 | 5.68 | 82.61 | 0.027 | 6.34 | 0.548 | 178.8 |
| 1.1 | 0.903 | -158.37 | 5.226 | 79.83 | 0.027 | 3.72 | 0.547 | 178.18 |
| 1.2 | 0.903 | -160.69 | 4.866 | 77.15 | 0.027 | 3.34 | 0.544 | 177.57 |
| 1.3 | 0.899 | -167.2 | 4.574 | 74.6 | 0.028 | 0.5 | 0.538 | 176.86 |
| 1.4 | 0.897 | -164.68 | 4.366 | 71.76 | 0.029 | 1.6 | 0.53 | 176.13 |
| 1.5 | 0.892 | -166.63 | 4.203 | 68.96 | 0.03 | -0.36 | 0.519 | 174.97 |
| 2.0 | 0.877 | 176.74 | 3.696 | 50.36 | 0.035 | -13.77 | 0.463 | 160.21 |
| 2.5 | 0.882 | 150.43 | 3.014 | 26.66 | 0.036 | -31.65 | 0.486 | 133.49 |
| 3.0 | 0.915 | 135.06 | 2.136 | 10.26 | 0.031 | -46.6 | 0.579 | 121.99 |
| 3.5 | 0.93 | 137.37 | 1.662 | 4.59 | 0.027 | -43.86 | 0.611 | 128.44 |
| 4.0 | 0.912 | 143.75 | 1.642 | -0.35 | 0.031 | -43.95 | 0.541 | 137.64 |

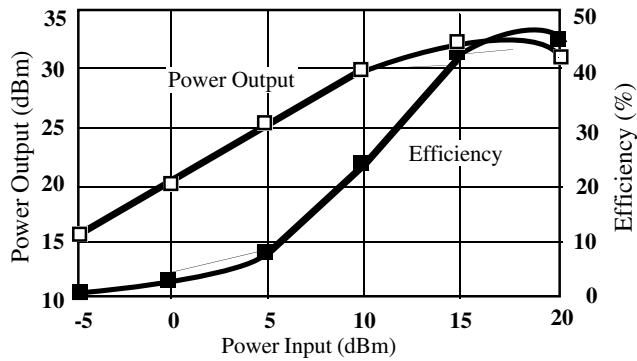
RF Match Data shown in the performance graphs was taken in the test circuit shown at right. Layout is important for proper operation. Phase length of input and output 50Ω line varies as a function of exact desired frequency of operation. Output shunt inductor effects output performance. Celeritek recommends the use of a high impedance printed inductor Lambda/4 in length. Please contact the factory for an evaluation board and/or more detailed application support.



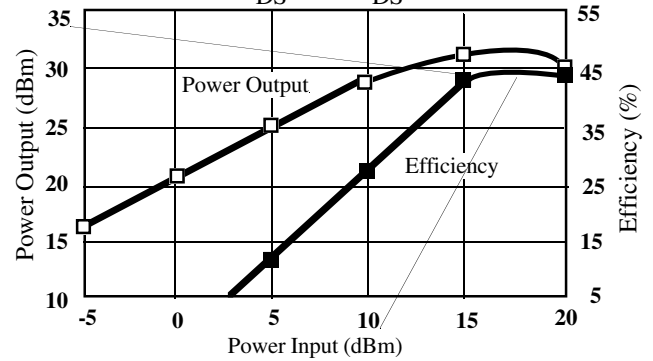


Typical Performance

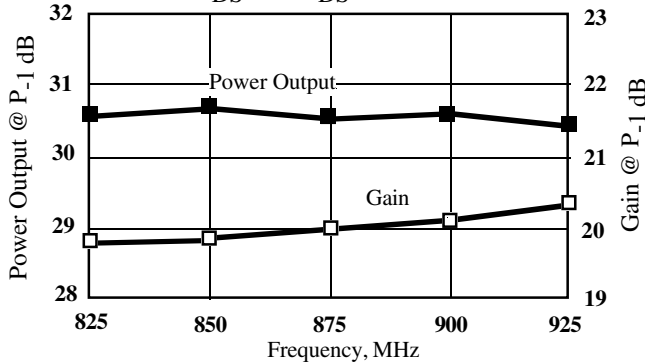
Power Output & Power Added Efficiency vs Power Input
850 MHz, $V_{DS} = 8\text{ V}$, $I_{DS} = 400\text{ mA}$



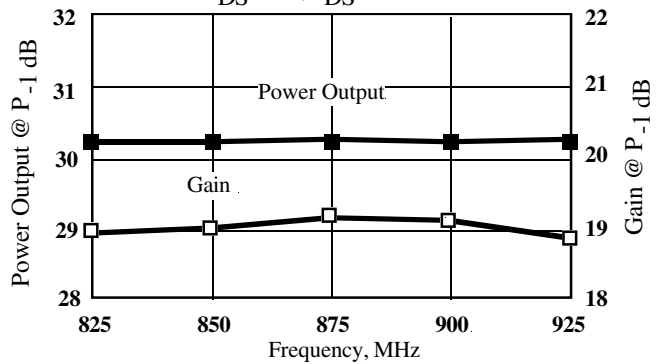
Power Output & Power Added Efficiency vs Power Input
850 MHz, $V_{DS} = 5\text{ V}$, $I_{DS} = 600\text{ mA}$



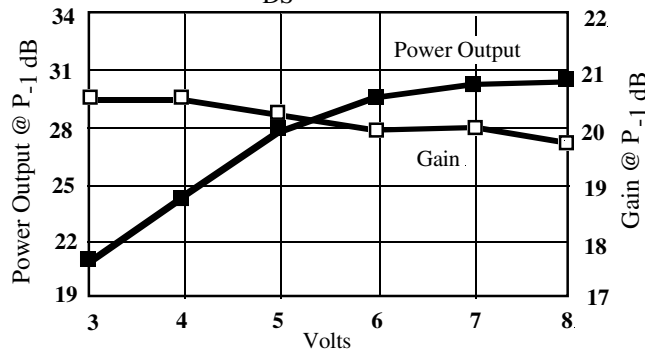
Power Output and Gain vs Frequency
 $V_{DS} = 8\text{ V}$, $I_{DS} = 400\text{ mA}$



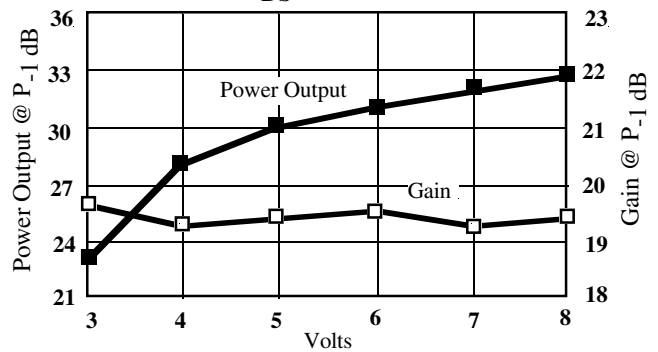
Power Output and Gain vs Frequency
 $V_{DS} = 5\text{ V}$, $I_{DS} = 600\text{ mA}$



Power Output and Gain vs Voltage @ 850 MHz
 $I_{DS} = 400\text{ mA}$



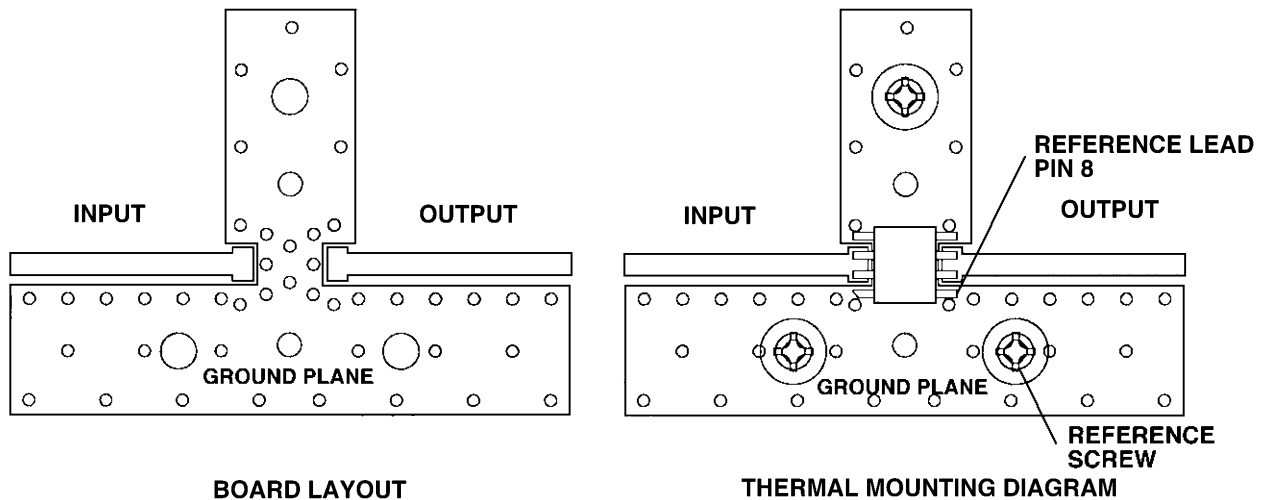
Power Output and Gain vs Voltage @ 850 MHz
 $I_{DS} = 600\text{ mA}$



Thermal Considerations

The data shown was taken on a 31 mil thick FR-4 board with 1 ounce copper on both sides. The board was mounted to a baseplate with 3 screws as shown. The screws bring the top side copper temperature to the same value as the baseplate. The thermal resistance to the indicated reference lead, Θ_{JL} , is 12°C/W. The thermal resistance to the reference screw is 14°C/W.

1. Use 1 or 2 ounce copper if possible.
2. Solder all eight leads of the CFK2062-P1 package to the appropriate electrical connection.
3. Solder the copper pad on the backside of the CFK2062-P1 package to the ground plane.
4. Use a large ground pad area with many plated through-holes as shown.
5. If possible, use at least one screw no more than 0.2 inches from the CFK2062-P1 package to provide a low thermal resistance path to the baseplate of the package.



Ordering Information

The CFK2062-P1 power stage is available in a SO-8 surface mount package. Devices are available in tape and reel. Ordering part numbers are listed.

| <u>Part Number for Ordering</u> | <u>Function</u> | <u>Package</u> |
|---------------------------------|----------------------------------|--|
| CFK2062-P1 | 800 - 900 MHz Power Stage | SO-8 surface mount power package |
| CFK2062-P1-000T | 800 - 900 MHz Power Stage | SO-8 surface mount power package in tape and reel |

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.

800-900 MHz +30 dBm Power GaAs FET



November 2007 - Rev 15-Nov-07

CFK2062-PI

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% matte 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.

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

Characteristic Data and Specifications are subject to change without notice. ©2007 Mimix Broadband, Inc.
Export of this item may require appropriate export licensing from the U.S. Government. In purchasing these parts, U.S. Domestic customers accept their obligation to be compliant with U.S. Export Laws.