

CFK2062-P5

2.3 to 2.5 GHz
+30 dBm Power GaAs FET

Product Specifications
July 1997 (1 of 4)

2.3 to 2.5 GHz +30 dBm Power GaAs FET

Features

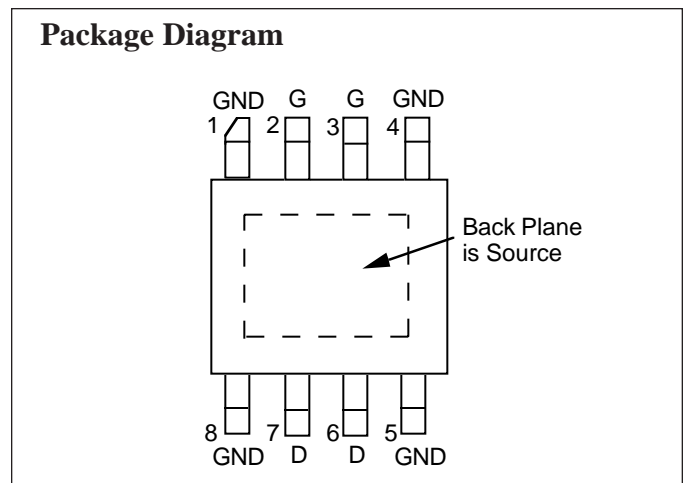
- ❑ High Gain
- ❑ +30 dBm Power Output
- ❑ Proprietary Power FET Process
- ❑ >40% Linear Power Added Efficiency
- ❑ Surface Mount SO-8 Power Package

Applications

- ❑ ISM Band Base Stations and Terminals
- ❑ RF ID/POS Base Stations
- ❑ Wireless Local Loop

Description

The CFK2062-P5 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 2.45 GHz.

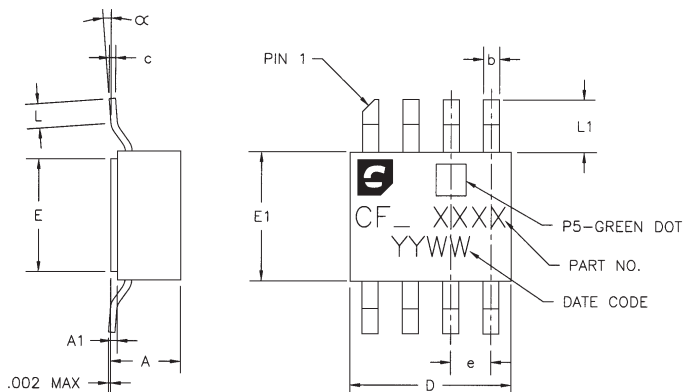
| Parameters | Conditions | Min | Typ | Max | Units |
|---|------------|------|------|-----|-------|
| V_d = 8V, I_d = 400 mA (Quiescent) | | | | | |
| P-1dB | | 30.0 | 31.0 | — | dBm |
| SSG | | 12.0 | 13.0 | — | dB |
| 3rd Order Products (1) | | — | 30 | — | dBc |
| Efficiency | @ P1dB | — | 40 | — | % |
| V_d = 5V, I_d = 600 mA (Quiescent) | | | | | |
| P-1dB | | — | 30.5 | — | dBm |
| SSG | | — | 12.0 | — | 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.

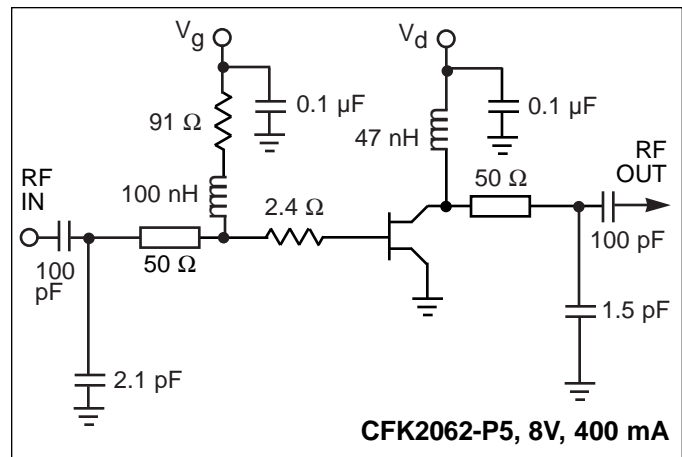
Typical Scattering Parameters (TA = 25°C, Vds = 5 V, Ids = 600 mA)

| 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 |
| 1.0 | 0.914 | -154.69 | 5.449 | 84.82 | 0.025 | 8.72 | 0.6 | 175.04 |
| 1.8 | 0.889 | -174.42 | 3.768 | 61.32 | 0.033 | -5.24 | 0.53 | 163.11 |
| 1.9 | 0.866 | -178.39 | 3.693 | 57.12 | 0.035 | -8.52 | 0.52 | 159.17 |
| 2.0 | 0.883 | 177.09 | 3.605 | 52.62 | 0.05 | -10.6 | 0.512 | 154.61 |
| 2.1 | 0.78 | 171.92 | 3.504 | 48.01 | 0.035 | -14.75 | 0.508 | 149.35 |
| 2.2 | 0.879 | 166.48 | 3.386 | 42.82 | 0.036 | -18.18 | 0.509 | 143.77 |
| 2.3 | 0.88 | 160.6 | 3.243 | 37.96 | 0.036 | -22.89 | 0.515 | 137.96 |
| 2.4 | 0.884 | 154.86 | 3.09 | 32.93 | 0.035 | -26.59 | 0.528 | 132.84 |
| 2.5 | 0.887 | 150.54 | 2.944 | 28.96 | 0.035 | -30.13 | 0.539 | 128.94 |
| 2.6 | 0.891 | 145.9 | 2.757 | 24.85 | 0.035 | -32.91 | 0.555 | 124.99 |
| 2.7 | 0.899 | 141.82 | 2.57 | 20.93 | 0.035 | -37.19 | 0.574 | 122.00 |
| 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 |
| 1.0 | 0.904 | -155.33 | 5.68 | 82.61 | 0.027 | 6.34 | 0.548 | 178.8 |
| 1.8 | 0.883 | -174.77 | 3.86 | 58.87 | 0.034 | -7.72 | 0.483 | 168.5 |
| 1.9 | 0.88 | -178.6 | 3.783 | 54.83 | 0.034 | -9.68 | 0.472 | 164.9 |
| 2.0 | 0.877 | 176.74 | 3.696 | 50.36 | 0.035 | -13.77 | 0.463 | 160.21 |
| 2.1 | 0.873 | 171.86 | 3.589 | 45.5 | 0.036 | -16.17 | 0.458 | 154.9 |
| 2.2 | 0.874 | 166.29 | 3.46 | 40.56 | 0.037 | -21.9 | 0.458 | 149.35 |
| 2.3 | 0.876 | 160.6 | 3.324 | 35.55 | 0.036 | -26.41 | 0.463 | 143.16 |
| 2.4 | 0.878 | 154.94 | 3.159 | 30.56 | 0.036 | -29.59 | 0.475 | 137.57 |
| 2.5 | 0.882 | 150.43 | 3.014 | 26.66 | 0.036 | -31.65 | 0.486 | 133.49 |
| 2.6 | 0.888 | 145.65 | 2.872 | 22.43 | 0.035 | -33.01 | 0.504 | 129.21 |
| 2.7 | 0.893 | 141.74 | 2.643 | 18.41 | 0.035 | -39.11 | 0.524 | 125.87 |
| 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 |

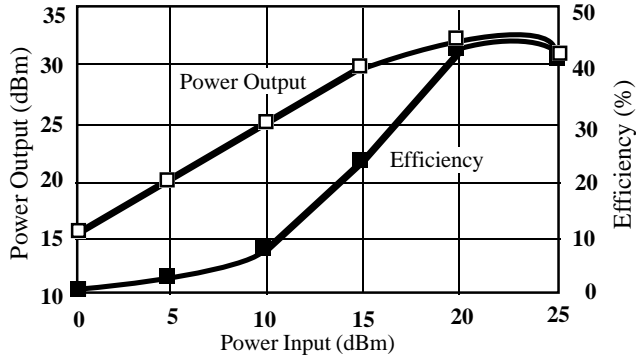
RF Match Data shown in the performance graphs was taken in the test circuit shown at right. Layout is important for proper operation. Phase length of input and output 50Ω line varies as a function of exact desired frequency of operation. Output shunt inductor effects output performance. Celeritek recommends 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.



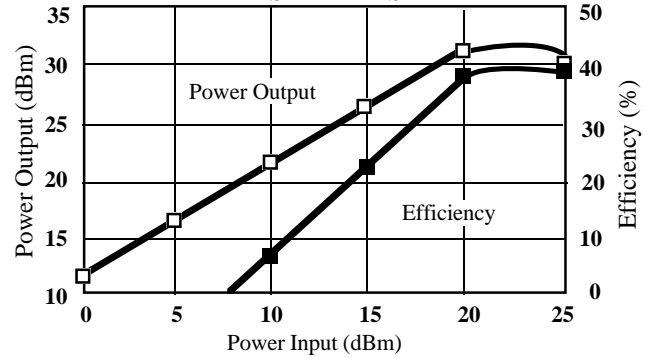


Typical Performance

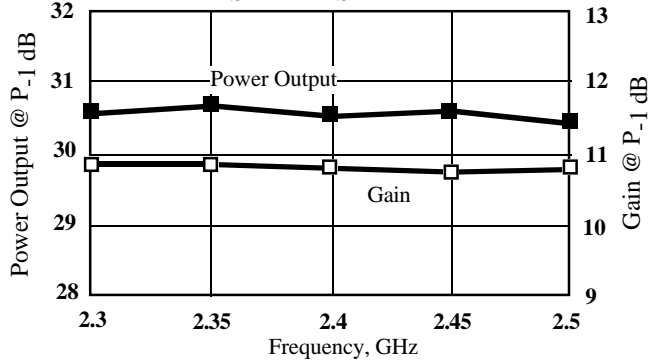
Power Output & Power Added Efficiency vs Power Input
2.45 GHz, $V_{DS} = 8V$, $I_{DS} = 400mA$



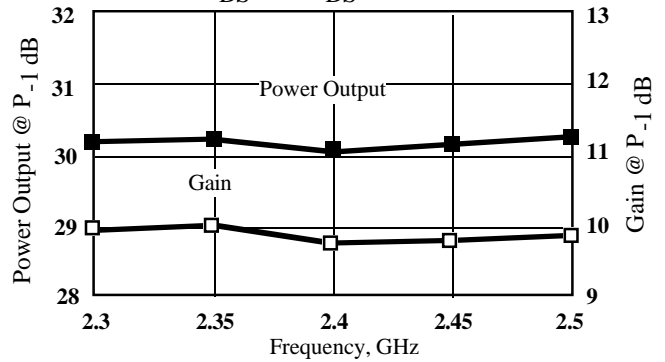
Power Output & Power Added Efficiency vs Power Input
2.45 GHz, $V_{DS} = 5V$, $I_{DS} = 600mA$



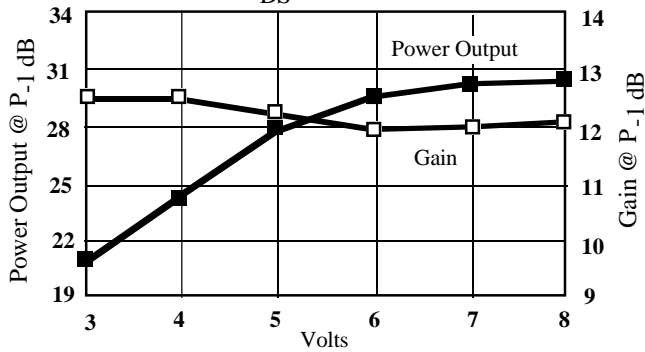
Power Output and Gain vs Frequency
 $V_{DS} = 8V$, $I_{DS} = 400mA$



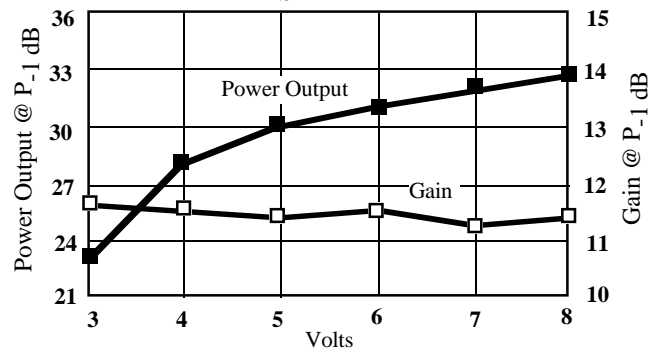
Power Output and Gain vs Frequency
 $V_{DS} = 5V$, $I_{DS} = 600mA$



Power Output and Gain vs Voltage @ 2.45 GHz
 $I_{DS} = 400mA$



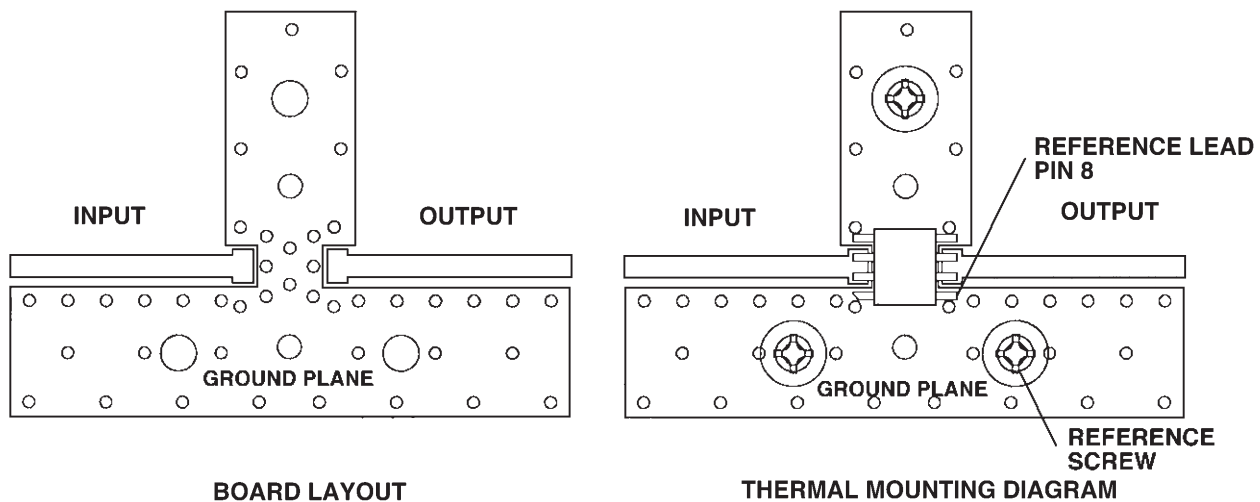
Power Output and Gain vs Voltage @ 2.45 GHz
 $I_{DS} = 600mA$



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-P5 package to the appropriate electrical connection.
3. Solder the copper pad on the backside of the CFK2062-P5 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-P5 package to provide a low thermal resistance path to the baseplate of the package.



Ordering Information

The CFK2062-P5 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-P5 | 2.3 - 2.5 GHz Power Stage | SO-8 surface mount power package |
| CFK2062-P5-000T | 2.3 - 2.5 GHz Power Stage | SO-8 surface mount power package in tape and reel |

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