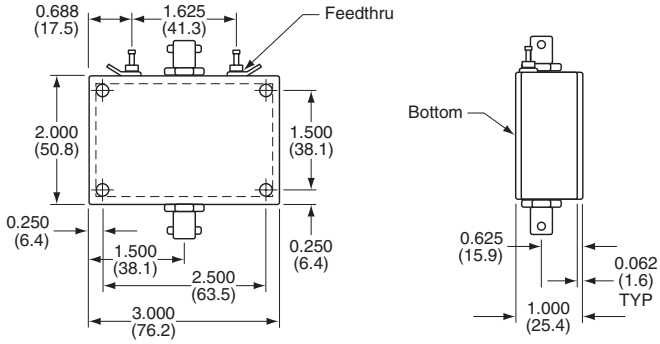
FAIRCHILD
SEMICONDUCTOR TM

KE Series
Encased Amplifiers

Features
- Wide bandwidth, fast settling, high slew rate
- Low distortion and overshoot
- Linear phase
- Easy to use encased form
- Direct replacement for E103, E104, E200, E220, and E231

Applications
- For use on the bench or in a test station as a video amp, pulse amp, line driver, etc.
- "drop in" units for radar and communication systems



General Description
The KE Series amplifiers are designed to take full advantage of Fairchild's high-performance DC-coupled operational amplifiers in an easy-to-use, encased form. This format makes the KE Series amplifiers an excellent choice for use on the bench, in a test station, or in other environments needing both high performance and ease of use.

The op amp-based KE Series amplifiers provide a wide selection of features as well as the ability to customize parameters such as voltage gain and output impedance to the application.

KE231 .... designed for low-gain applications (A_v = ±1 to ±5)
KE220 .... high bandwidth (-3dB BW of 190MHz), lower output current (50mA)
KE200 .... general purpose (-3dB BW of 95MHz)
KE103 .... high output current (200mA)

The KE104 is an encased version of the KH104AI, a DC to 1.1GHz linear amplifier with a fixed gain of 14dB and 50Ω input and output impedances. These features, coupled with excellent distortion and VSWR characteristics, make the KE104 ideal for applications in wideband analog and high-speed digital communications, radar, and fiber optics transmitters and receivers.

KE104 .... DC to 1.1GHz, fixed 14dB gain, low distortion.

Ordering Information
KE104
Since gain and input and output impedances are fixed on the KE104, simply designate the connector type required by: KE104-BNC or KE104-SMA.

KE103, KE200, KE220, and KE231
Due to the flexibility possible with these amplifiers, the user must specify several parameters when ordering:

The full part number is KEnnn-p-con-Z_i-Z_o-A_v,
nnn: specify 103, 200, 220, or 231
p: specify N (non-inverting) or I (inverting)
con: specify BNC or SMA connectors or NDC for no case
Z_i: specify input impedance in ohms
Z_o: specify output impedance in ohms
A_v: specify voltage gain with output unterminated (ie: $Z_{load} = \infty$) (see example)

Select Z_i, Z_o, and A_v within the following constraints:

Parameter	KE103	KE200	KE220	KE231
A_v	±1/±40	±1/±50	±1/±50	±1/±5
max Z_{in} inverting	$\frac{1500}{A_v}$	$\frac{2000}{A_v}$	$\frac{1500}{A_v}$	$\frac{250}{A_v}$
non-inverting	10k	10k	10k	10k
min Z_{out}	0	0	0	0

Example:
KE200-N-BNC-75-50-20 means a KE200 with a non-inverting gain, BNC connectors, 75W input impedance, 50W output impedance, and a voltage gain of 20V/V (unterminated output). (When driving a realistic load, the actual gain is reduced by the factor $Z_{load}/(Z_{load} + Z_o)$ due to the resistive divider action of the output impedance, Z_o, and the load connected to the amplifier, Z_{load}. The unterminated voltage gain, A_v, should be selected with this in mind.)

Typical Specifications (Note1) Absolute Maximum Ratings

Model	-3dB BW (MHz)	Settling Time (ns, %)	Slew Rate (V/µs)	V_{out}, I_{out} (V, mA) (Note 2)	V_{CC} (V)	Power Dissipation (W @ 25°C)	Derate Above 25°C mW/°C	Output Current (mA)	Input Voltage (V)	T_o (°C)	T_S (°C)
General Purpose											
KE200	95	18, 0.1	4000	±12, ±100	5-17	1.8	10	100	Note 3	-25 to +85	-65 to +150
Wide bandwidth											
KE220	190	8, 0.1	7000	±12, ±50	5-17	1.5	5	50	Note 3	-25 to +85	-65 to +150
High Output Current											
KE103	150	10, 0.4	6000	±11, ±200	9-17	2.0	10	200	Note 3/4	-25 to +85	-65 to +150
Low Gain											
KE231	165	12, 0.1	3000	±11, ±100	5-17	1.8	10	100	Note 3	-25 to +85	-65 to +150
Ultra-wide Bandwidth											
KE104	1100	1.2, 0.8	4500	±1.6, ±40	9-17	1.8	N/A	40	±0.5	-25 to +85	-65 to +150

Notes

1. Nominal configuration

   V_{cc}: ±15V KE103, KE104, KE200, KE220, KE231 Load: 100Ω KE103, KE231 A_v: +20 KE103, KE200, KE220
   200Ω KE200, KE220 +2 KE231
   50Ω KE104

2. When the amplifier is configured with an output impedance ($Z_{out} > 0$, the maximum output voltage swing (at the load) is reduced by the factor $Z_{load}/(Z_{load} + Z_{out})$. See the example on page 1.
3. These amplifiers must be kept out of saturation; in other words, the output voltage (determined by V_{in} and A_v.) must be kept away from the supply voltage. $\left(|V_{in}| < \frac{|V_{CC}| - 2.5}{|A_v|}\right)$
4. In the non-inverting configuration, the input voltage to the KE103 must not exceed ±5V.

Discussion

The performance specified above is that typically seen for a nominally-configured KE Series amplifier; performance for different configurations can be determined using the graphs. Other parameters not shown can be approximated by referring to the individual hybrid data sheets.

Relative Bandwidth vs. Gain

At the nominal gain setting of +20 (+2 for the KE231),the amplifiers will typically provide 100% of the specified bandwidth; higher gains will reduce the bandwidth somewhat as shown in the graph.

Relative Bandwidth vs. Load

Listed under the typical specifications table are the nominal loads at which the amplifiers will typically provide 100% of the specified bandwidth. Heavier loads decrease the bandwidth as the plot indicates. (The total load on the amplifier is the sum of the output impedance, Z_o, and the load connected external to the amplifier, Z_{load}).

Relative Bandwidth vs. V_{CC}

All of the KE Series amplifiers are designed to operate on ±15V supplies. The user may elect, however, to use lower supplies but at some sacrifice in performance as shown in the plot.