

FILTER IC FOR Σ - Δ MODULATION SYSTEM DA CONVERTER

KIA2028F an analog filter IC for Σ - Δ modulation system DA converter.

Using the KIA2028F in combination the KIC9237BF, KIC9237BN (the Σ - Δ modulation system DA converter with a built-in digital filter), it is possible to construct a DA conversion system with less external parts.

FEATURES

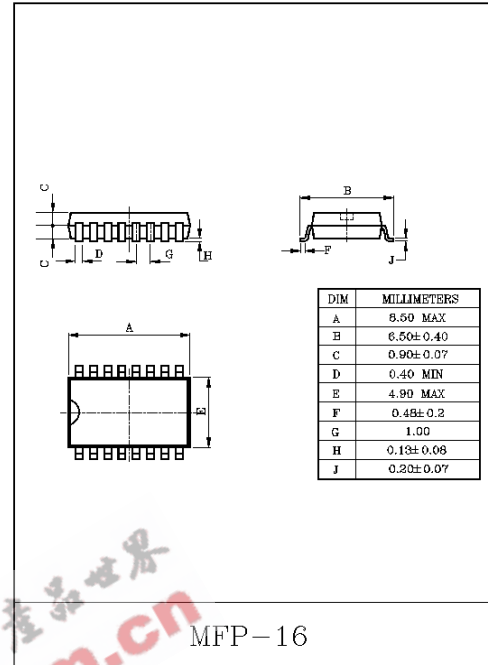
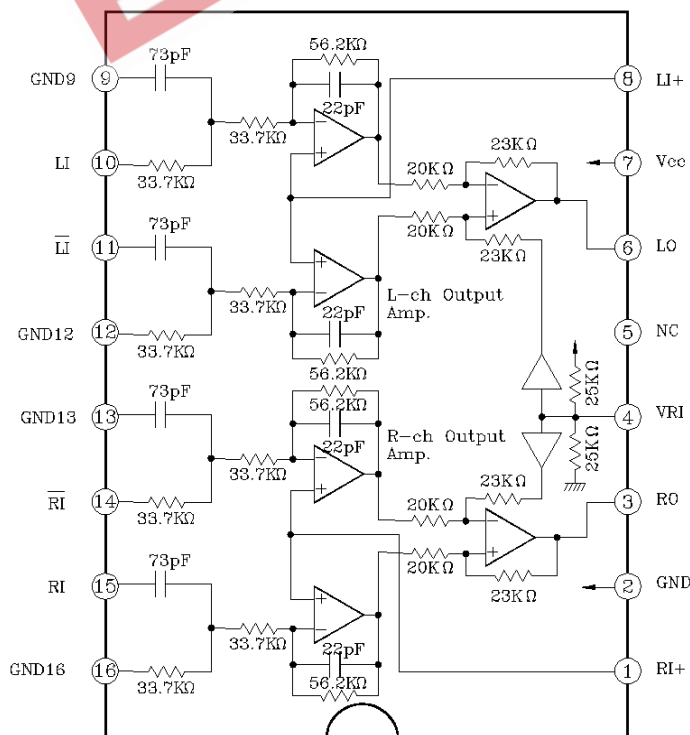
- Built-in CR for LPFs and output (differential) amplifiers for the left and right channel.
- Single power supply operation.
(+9V operation : BS tuner system)
- Noise distortion factor and S/N ratio are as follows
(When operating at +5V single power supply) :
Noise distortion factor : -86dB (Typ.)
S/N : 100dB (Typ.)

MAXIMUM RATINGS (Ta=25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------|-----------------------|---------|------|
| Supply Voltage | V _{CC} | 11 | V |
| Power Dissipation | P _D (Note) | 350 | mW |
| Operating Temperature | T _{opr} | -25~75 | °C |
| Storage Temperature | T _{stg} | -55~150 | °C |

(Note) Derated above Ta=25°C in the proportion of 200mW/°C for KIA2028F.

BLOCK DIAGRAM



KIA2028F

DESCRIPTION OF PIN FUNCTIONS

| PIN No. | SYMBOL | I/O | FUNCTION & OPERATION | REMARK |
|---------|-----------------|-----|---|--|
| 1 | RI+ | I | R channel operational amplifier forward input terminal. Connect to VRI. | - |
| 2 | GND | - | Ground terminal. | - |
| 3 | RO | O | R channel analog output terminal. | - |
| 4 | VRI | - | Reference voltage terminal. ($V_{CC}/2$) | See the block diagram |
| 5 | NC | - | Non-connecting terminal | - |
| 6 | LO | O | L channel analog output terminal. | - |
| 7 | V _{CC} | - | Supply voltage terminal. | - |
| 8 | LI+ | I | L channel operational amplifier forward input terminal. Connect to VRI. | - |
| 9 | GND9 | - | Ground terminal for L channel reverse input side filter. | - |
| 10 | LI | I | L channel forward input terminal. | Connect to LO of KIC9237BF, KIC9237BN |
| 11 | \overline{LI} | I | L channel reverse input terminal. | Connect to \overline{LO} of KIC9237BF, KIC9237BN |
| 12 | GND12 | - | Ground terminal for L channel forward input side filter. | - |
| 13 | GND13 | - | Ground terminal for R channel forward input side filter. | - |
| 14 | \overline{RI} | I | R channel reverse input terminal. | Connect to \overline{RO} of KIC9237BF, KIC9237BN |
| 15 | RI | I | R channel forward input terminal. | Connect to RO of KIC9237BF, KIC9237BN |
| 16 | GND16 | - | Ground terminal for R channel reverse input side filter. | - |

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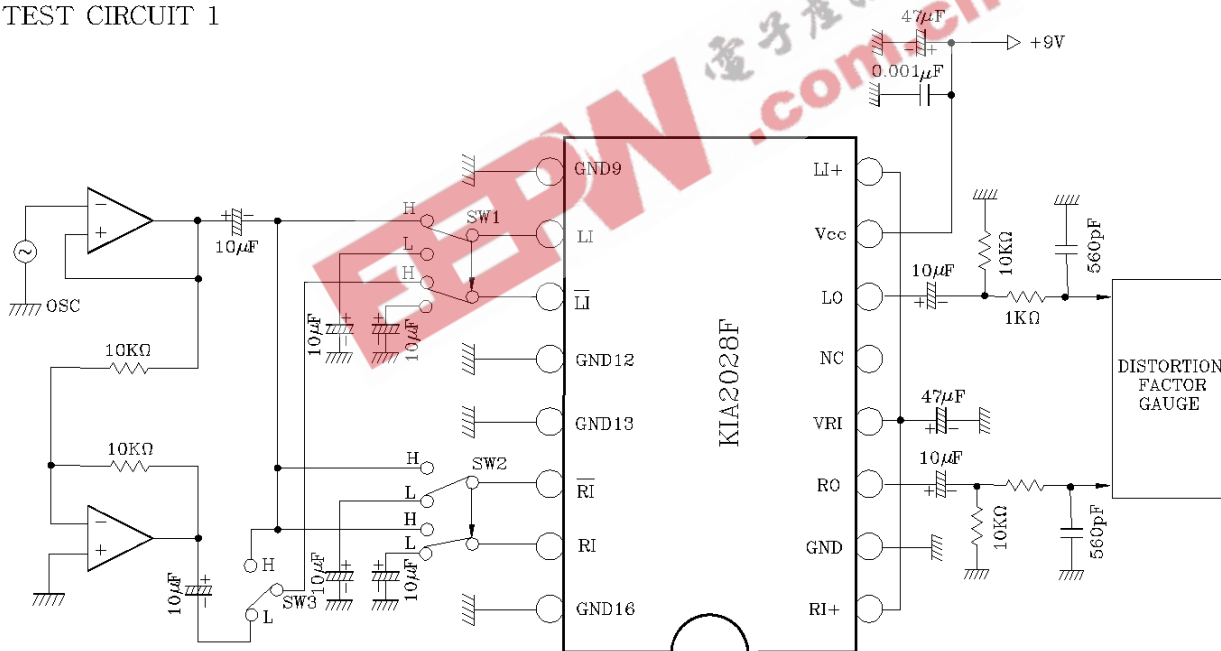
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{CC}=5V$, $T_a=25^{\circ}C$)

| CHARACTERISTIC | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------------|------------|--------------|--|------|------|------|-----------|
| Operating Supply Voltage | V_{CC} | - | $T_a=-35\sim 85^{\circ}C$ | 8.0 | 9.0 | 10 | V |
| Operating Supply Current | I_{CCQ} | - | At no signal | 8.1 | 11.0 | 13.7 | mA |
| Reference Voltage | VRI | - | - | 4.4 | 4.5 | 4.6 | V |
| Noise Distortion Factor | THD(1) | 1 | 1kHz, $V_O=2mV_{rms}$ | - | -86 | -83 | dB |
| | THD(2) | | 10kHz, $V_O=2mV_{rms}$ | - | -86 | -83 | |
| | THD(3) | | 1kHz, $V_O=100mV_{rms}$ | - | -74 | -70 | |
| Cross Talk | C.T. | 1 | 1kHz, $V_O=2mV_{rms}$ | - | -60 | -90 | dB |
| Attenuation | ATT(1) | 1 | 40kHz, $V_O=-10dBV_{rms}$ | 0.51 | 0.71 | 1.41 | dB |
| | ATT(2) | | 80kHz, $V_O=-10dBV_{rms}$ | 1.50 | 2.70 | 4.50 | |
| Max. Output Level | V_{Omax} | 1 | 1kHz, THD=1% | 2.5 | 2.6 | - | V_{rms} |
| Differential Balance | G_{VB} | 1 | 1kHz, 1.1dBV _{rms} , In-phase input | - | - | -40 | dB |
| LR Output Difference | G_{VD} | 1 | 1kHz, 1.1dBV _{rms} , Differential input | - | 0 | 0.5 | dB |

(Note1) When the KIC9237BF, KIC9237BN(+5V) and +9V single power supply are operated : Full scal=2mV_{rms}(Typ.)

(Note2) Measuring circuit-1 : indicates the measuring circuit.

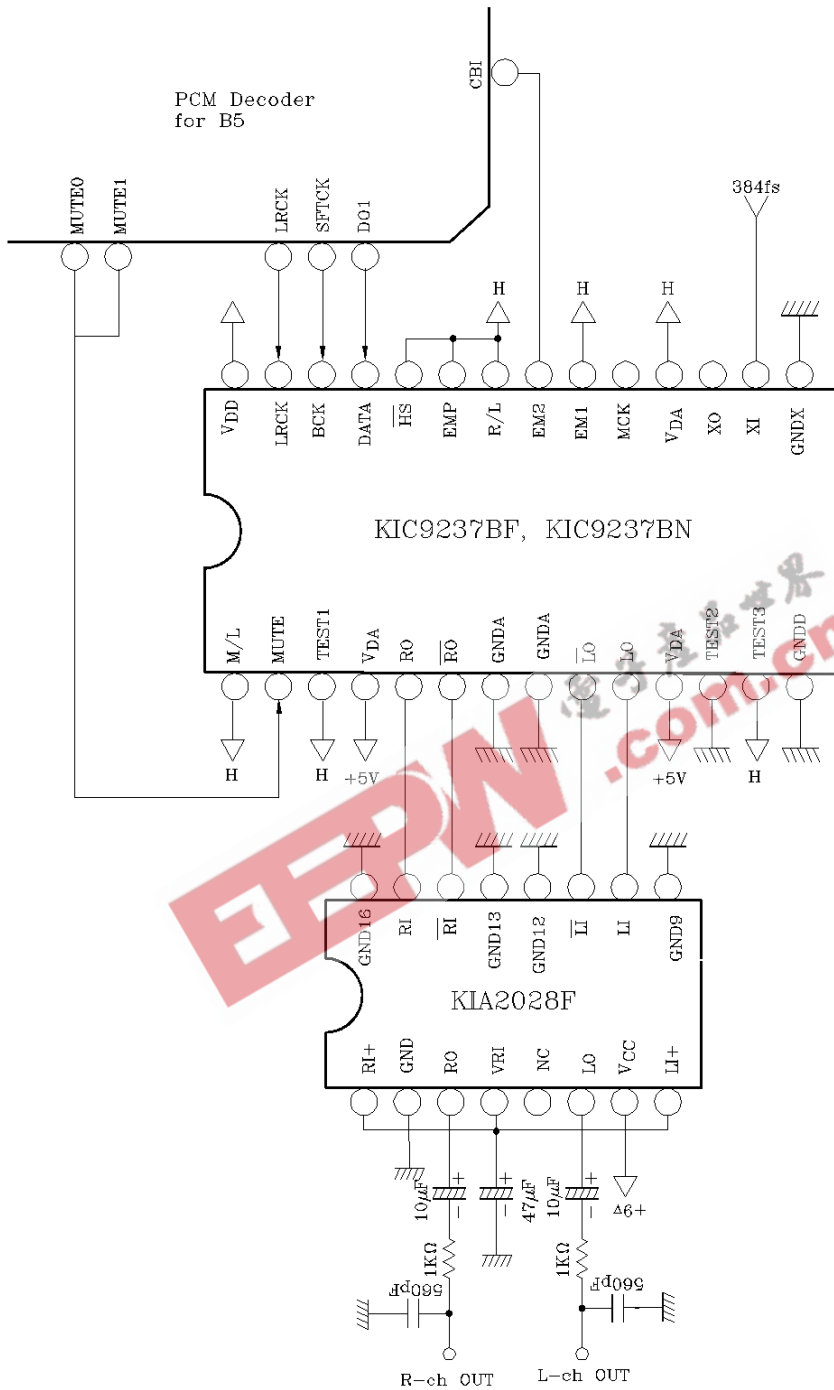
TEST CIRCUIT 1



| SW1 | SW2 | SW3 | MEASURING ITEM |
|-----|-----|-----|--|
| L | L | - | Operating supply voltage, Reference voltage |
| L | H | L | Cross talk (R→L) |
| H | L | L | Cross talk (L→R) |
| H | H | L | Noise distortion factor, Attenuation, Maximum output level, LR output difference |
| H | H | H | Difference balance |

KIA2028F

APPLICATION CIRCUIT EXAMPLE



(CAUTIONS)

- Quality of crystal oscillation waveform largely effects S/N ratio. Further, this is also true when system clock is input externally through the XI terminal of pin⑩.
- Suppress diltch of input signals (LRCK, BCK, DATA) as could as possible.
- The wiring between the KIC9237BF, KIC9237BN output and the analog filter amplifier input must be made the shortest.
- The capacitor between V_{DA} and GND shall be connected as close to the pin as possible.