ADVANCE INFORMATION

2912A
PCM TRANSMIT/RECEIVE FILTER

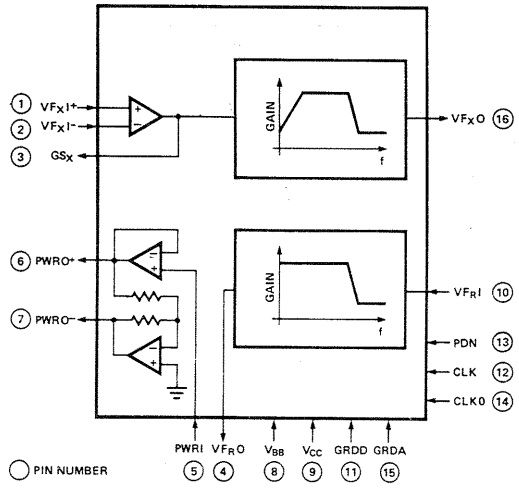
- **Low Power Consumption:**
  50mW Typical without Power Amplifiers
  80mW Typical with Power Amplifiers
  0.4mW Typical Standby
- **Low Idle Channel Noise:**
  3 dBrnc0 Typical, Receive
  6 dBrnc0 Typical, Transmit
- **Excellent Power Supply Rejection:**
  45dB Typical on V_{BB} @ 1kHz
  40dB Typical on V_{BB} @ 20kHz
- **High Pass Filter Rejects Low Frequency Noise:**
  23dB @ 60Hz
  28dB @ 50Hz
  58dB @ 16Hz, Typical
- **Adjustable Gain in Both Directions**
- **Fully Compatible with the Industry Standard Intel 2912**
- **D3/D4 and CCITT G712 Compatible**
- **Common Mode Op Amp Input Rejection 75dB Typical**
- **Direct Interface to the Intel 2910A/2911A PCM Codecs Including Stand-By, Power Down Mode**
- **Direct Interface with Transformer or Electronics Hybrids**
- **Fabricated with Reliable N-Channel MOS Process**

The Intel 2912A 2nd generation PCM line filter is a fully integrated monolithic device containing the two filters of a PCM line or trunk termination. It has improved key parameters of power consumption, idle channel noise, and power supply rejection. A single part exceeds both AT&T D3/D4 and CCITT transmission specs, exceeds digital Class 5 central office switching system stringent specifications, and is fully compatible with the 2912. The primary application for the 2912A is in telephone systems for transmission, switching, or remote concentration.

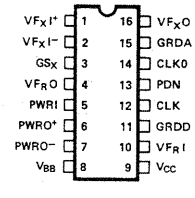
An advanced version of the switched capacitor technique used for the 2912 is used to implement the transmit and receive passband filter sections of the 2912A. The device is fabricated using Intel's reliable two layer polysilicon gate NMOS technology. (See Intel Reliability Report RR-24 on the 2910A, 2911A, and 2912.) The combination of advances in the switched capacitor techniques first used on the 2912 and the NMOS technology results in a monolithic 2912A filter which is packaged in a standard 16 pin DIP.

For additional specs, operating characteristics, and applications information please see the 2912 data sheet.

BLOCK DIAGRAM



PIN CONFIGURATION



PIN NAMES

VF_XI^+, VF_XI^-	ANALOG INPUTS	CLK	CLOCK INPUT
GS_X	GAIN CONTROL	CLK0	CLOCK SELECTION
VF_XO	ANALOG OUTPUT	PDN	POWER DOWN
VF_RI	ANALOG INPUT	V_{CC}	POWER (+5V)
VF_RO	ANALOG OUTPUT	V_{BB}	POWER (-5V)
PWRI	DRIVER INPUT	GRDD	DIGITAL GROUND
PWRO+, PWRO−	DRIVER OUTPUT	GRDA	ANALOG GROUND

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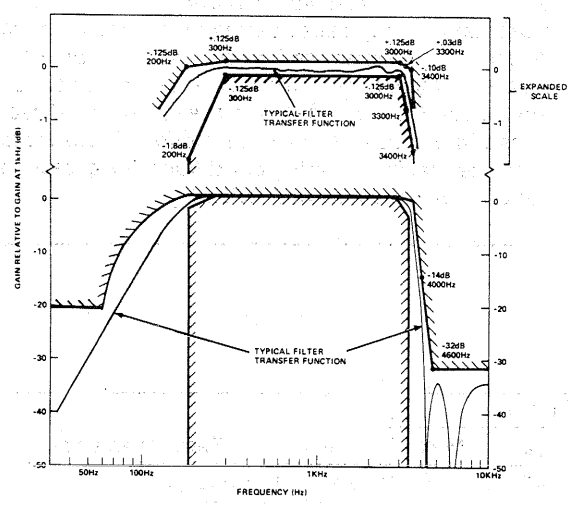
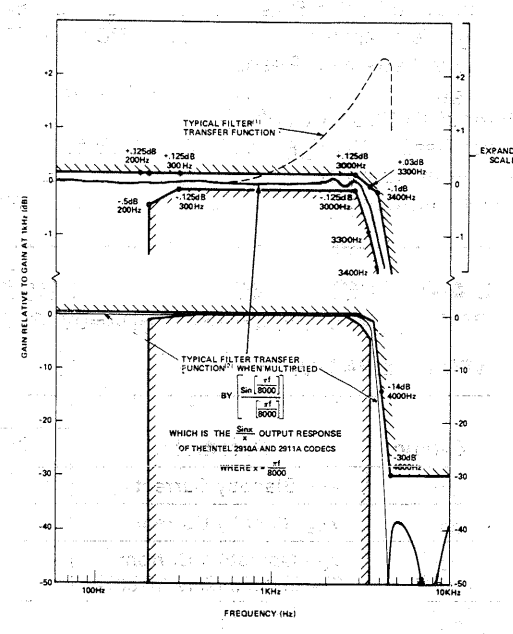
TRANSFER CHARACTERISTICS

TRANSMIT FILTER



RECEIVE FILTER

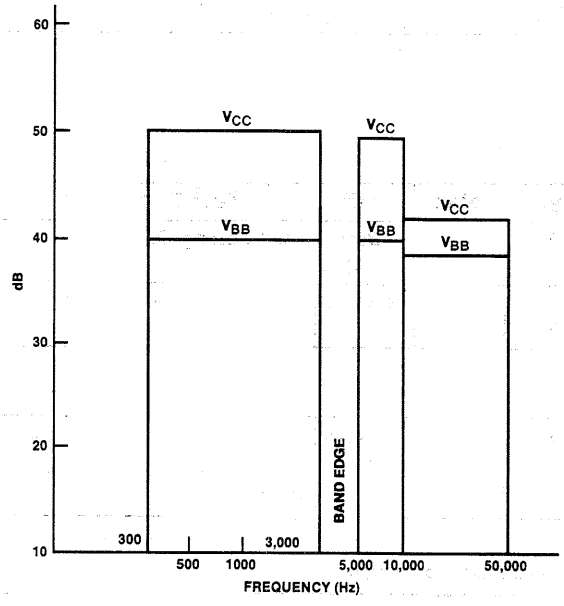


NOTES:
1. TYPICAL TRANSFER FUNCTION OF THE RECEIVE FILTER AS A SEPARATE COMPONENT.
2. TYPICAL TRANSFER FUNCTION OF THE RECEIVE FILTER DRIVEN BY THE SAMPLE AND HOLD OUTPUT OF THE INTEL 2910A AND 2911A CODECS. THE COMBINED FILTER/CODEC RESPONSE MEETS THE STATED SPECIFICATIONS.

POWER SUPPLY REJECTION
AVERAGE VALUES OVER 3 RANGES

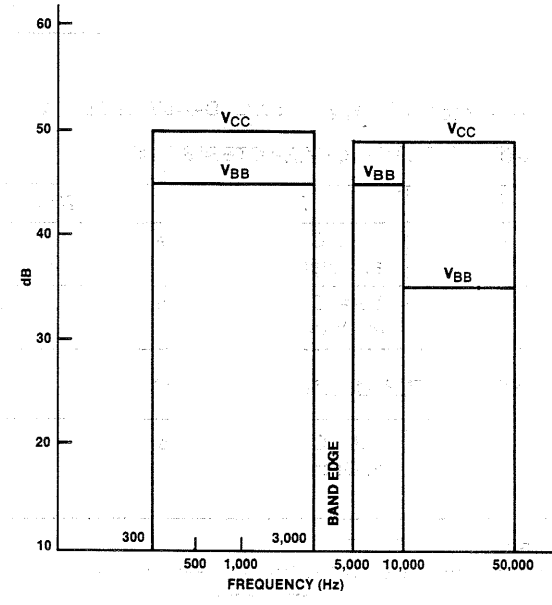
TRANSMIT FILTER

At VF_XO with VF_XI^+ Connected to GRDA; Input Op Amp at Unity Gain



RECEIVE FILTER

At VF_RO with VF_RI Connected to GRDA



ABSOLUTE MAXIMUM RATINGS*

Temperature Under Bias ..... −10°C to +80°C
Storage Temperature ..... −65°C to +150°C
Supply Voltage with Respect to V_{BB} ..... −0.3V to +14.0V
All Input and Output Voltages with Respect to V_{BB} ..... −0.3V to +14.0V
All Output Currents ..... ±50mA
Power Dissipation ..... 1 Watt

COMMENT:

Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

D.C. AND OPERATING CHARACTERISTICS

T_A=25°C, V_{CC}=+5V, V_{BB}=−5V, GRDA=0V, GRDD=0V

POWER DISSIPATION

Symbol	Parameter	Limits Min.	Typ.	Max.	Unit	Test Conditions
I_{CC0}	V_{CC} Standby Current		40		μA	PDN=$V_{IH\ MIN}$
I_{BB0}	V_{BB} Standby Current		40		μA	PDN=$V_{IH\ MIN}$
I_{CC1}	V_{CC} Operating Current, Power Amplifiers Inactive		5		mA	PWRI=V_{BB}
I_{BB1}	V_{BB} Operating Current, Power Amplifiers Inactive		5		mA	PWRI=V_{BB}
I_{CC2}	V_{CC} Operating Current		8		mA	
I_{BB2}	V_{BB} Operating Current		8		mA	

ANALOG INTERFACE, TRANSMIT FILTER INPUT STAGE

CMRR	Common Mode Rejection, VF_XI^+, VF_XI^-		75		dB	−2.2V<V_{IN}<2.2V, 0dBmO
A_{VOL}	DC Open Loop Voltage Gain, GS_X		6000			

A.C. CHARACTERISTICS

T_A=25°C, V_{CC}= +5V, V_{BB}= −5V, GRDA=0V, GRDD=0V

TRANSMIT FILTER CHARACTERISTICS

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
N_{CX1}	Total C Message Noise at Output, VF_XO		6		dBrnc0 [1]	Gain Setting Op Amp at Unity Gain
N_{CX2}	Total C Message Noise at Output, VF_XO		9		dBrnc0 [1]	Gain Setting Op Amp at 20dB Gain

RECEIVE FILTER CHARACTERISTICS

N_{CR}	Total C Message Noise at Output, VF_RO		3		dBrnc0 [1]	VF_RO Output or $PWRO^+$ and $PWRO^-$ Connected with Unity Gain

NOTES:
1. A noise measurement of 15dBrnc into a 600Ω load at the 2912A device is equivalent to 9dBrnc0.