COMMUNICATION

4800 bps MODEM CHIP SET

YM3405 Modem Signal Processing LSI

YM3022 Analog-digital interface LSI

■ OUTLINE

The YM3405 chip is a modem signal processing LSI for conducting data transfers at 4800bps (2400bps during fallbacks) over voice grade channels by means of differential phase modulation in conformity with the CCITT V.27ter recommendations.

In addition to the PSK modulator-demodulator circuit, scrambler/descrambler, automatic equalizer, training sequencer, AGC control circuit, and other similar functions called for in the CCITT V.27ter recommendations, the YM3405 chip also offers the 75bps FSK modulator function necessary for the CAPTAIN adapter modem, the 300bps FSK modulator-demodulator function required for G3 facsimiles, and functions for producing and transmitting tones of various frequencies. These features make it ideal for application in such equipment as standard modems used in G3 facsimiles, CAPTAIN adapter modems, and personal computer communications modems which use the system recommended by the Japanese Ministry of Posts and Telecommunications.

The YM3022 chip, developed at the same time as the YM3405, is an analog-digital interface LSI for the YM3405. It houses AGC, S & H, AD conversion, and DA conversion circuits and is designed to function as the interface between the YM3405, which conducts digital signal processing, and an analog filter, for which most hybrid ICs on the market may be used. Use of the YM3022 permits a major reduction in the number of components required for the YM3405's peripheral circuits.

■ FEATURES

Here are the major features of the YM3405 - YM3022 4800bps modem chip set.

- The YM3405 provides the following modulator-demodulator functions conforming to CCITT recommendations:
  4800/2400bps modulator-demodulator function, automatic equalizer, scrambler/ descrambler, and training sequencer called for in CCITT recommendation V.27ter (half-duplex);
  Channel 2 (higher frequency range at 300bps) modulator- demodulator function (half duplex) called for in CCITT recommendation V.21;
  Backward channel (75bps) modulator function called for in CCITT recommendation V.23.
- Full duplex communications are also possible through the combined use of V.27ter reception and V.23 backward channel transmission (CAPTAIN mode).
- The YM3405 contains tone transmission functions for producing and sending tones of various frequencies.
- The YM3022 contains AGC, S&H, AD conversion, and DA conversion circuits.
- The YM3405 has terminals for a 4.9152MHz crystal oscillator.
- Both operate with a 5V power supply and are CMOS process.
- The YM3405 comes in a 40-pin DIL package and the YM3022 comes in a 16-pin DIL package.

■ ELECTRICAL

YM3405 Electrical Characteristics

(1) Maximum ratings (V_{SS} = 0V)

Item	Symbol	Rated value	Unit
Power supply voltage	V_{DD}	−0.5 ~ +7.0	V
Input voltage	V_{IN}	−0.5 ~ V_{DD} +0.5	V
Output voltage	V_{OUT}	−0.5 ~ V_{DD} +0.5	V
Input current	I_{IN}	−20 ~ +20	mA
Storage temperature	T_{STG}	−50 ~ +125	°C

(2) Recommended operating conditions (V_{SS} = 0V)

Item	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}	4.75	5.0	5.25	V
Clock frequencies	FCL^K	4.9148	4.9152	4.9156	MHz
Operational temperature	T_{OPR}	0	25	70	°C

(3) Electrical characteristics under the recommended operating conditions

Item	Symbol	Condition	Min.	Max.	Unit
Power consumption	I_{DD}	—	—	40	mA
High level input voltage	V_{IH}		2.0	—	V
Low level input voltage	V_{IL}	—	—	0.8	V
Input leakage	I_L	(NOTE 1)	−10	+10	μA
High level output voltage	V_{OH}	I_{OH} = −1.0 mA	V_{DD}−1.0	—	V
Low level output voltage	V_{OL}	I_{OL} = 1.0 mA	—	0.4	V
Output delay time	td	C_L = 100pF; delay from rise edge of CLKOUT	−20	+150	nsec
External clock duty	—	When external clock used.	40	60	%

Note 1: does not apply to $\overline{TESTOE}$, $\overline{TESTSB}$, $\overline{TESTLD}$, and XTAL1.

YM3022 Electrical Characteristics

(1) Maximum ratings (V_{SS} = 0V)

Item	Symbol	Rated value	Unit
Power supply voltage	V_{DD}	−0.5 ~ +15.0	V
Input voltage	V_{IN}	−0.5 ~ V_{DD} +0.5	V
Output voltage	V_{OUT}	−0.5 ~ V_{DD} +0.5	V
Input current	I_{IN}	−20 ~ +20	mA
Storage temperature	T_{STG}	−50 ~ +125	°C

(2) Recommended operating conditions (V_{SS} = 0V)

Item	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}	4.75	5.0	5.25	V
Clock frequencies	FCL^K	1.0	2.46	5.0	MHz
Operational temperature	T_{OPR}	0	25	70	°C

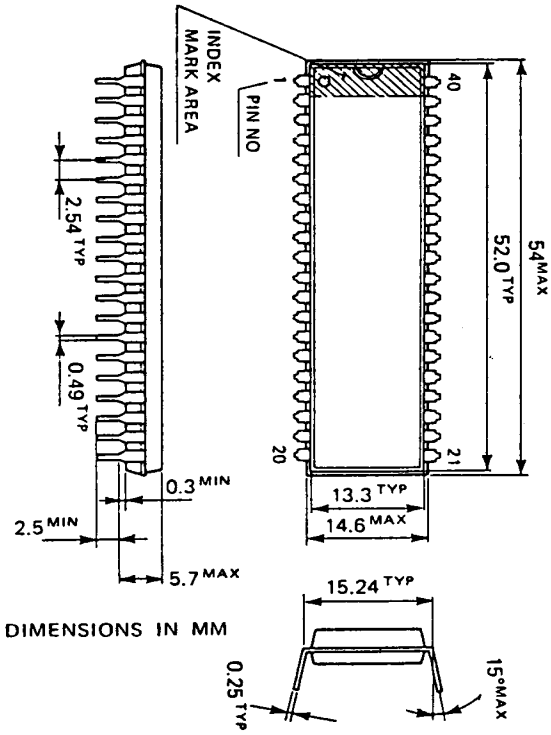
(3) Electrical characteristics under the recommended operating conditions

Item	Symbol	Condition	Min.	Max.	Unit
Power consumption	I_{DD}	—	—	6.0	mA
High level input voltage	V_{IH}	CLK terminal ADST terminal DAI terminal	3.3	—	V
Low level input voltage	V_{IL}		—	1.5	V
Input leakage	I_L		−10	+10	μA
High level output voltage	V_{OH}	ADD terminal	V_{DD}−1.0		V
Low level output voltage	V_{OL}		—	0.4	V
Output delay time	td	C_L = 50pF; delay from rise edge of CLKOUT	0	+150	nsec

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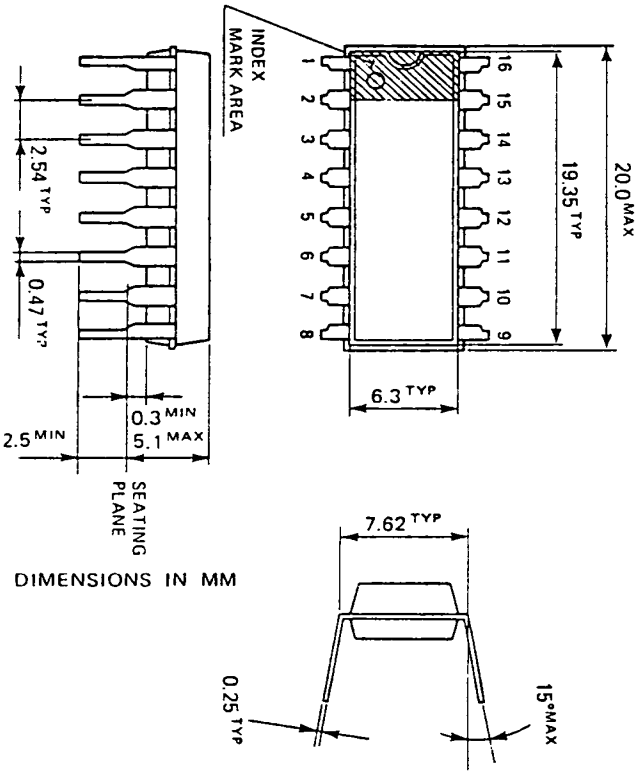
■ OUTLINE DIMENSIONS

YM3405



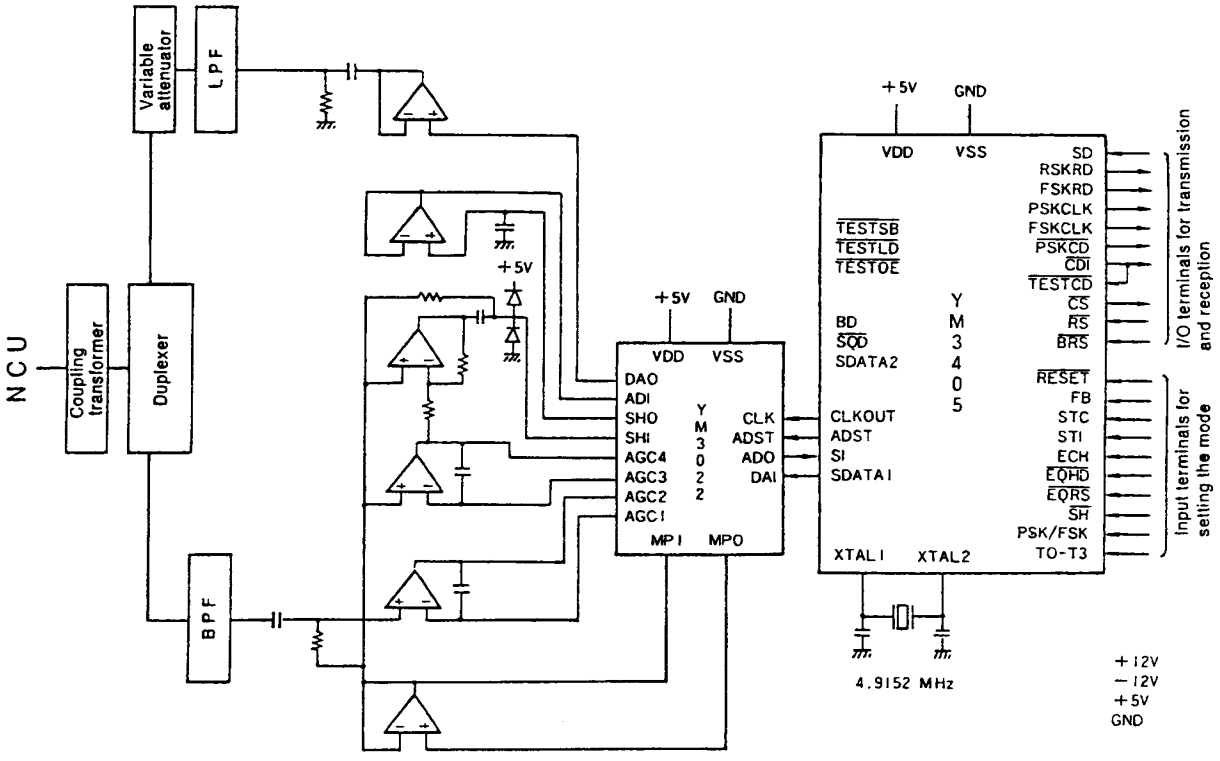
DIMENSIONS IN MM

YM3022



DIMENSIONS IN MM

■ BLOCK DIAGRAM



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