2048 BIT ELECTRICALLY PROGRAMMABLE READ ONLY MEMORY

1602A-S714-ELECTRICALLY PROGRAMMABLE

1702A-S714-ERASABLE & ELECTRICALLY REPROGRAMMABLE

- **Fast Programming -- 2 minutes for all 2048 bits**
- **All 2048 bits guaranteed* programmable -- 100% factory tested**
- **Fully Decoded, 256x8 organization**
- **Static MOS -- No Clocks Required**
- **Inputs and Outputs DTL and TTL compatible**
- **Three-state Output -- OR-tie Capability**
- **Simple Memory Expansion -- Chip select input lead**
- **Compatible with Intel's MCS™-8 Micro Computer Set**

The 1602A-S714 and 1702A-S714 are 256 word by 8 bit electrically programmable ROMs ideally suited for uses where fast turn-around and pattern experimentation are important. The 1602A-S714 and 1702A-S714 undergo complete programming and functional testing on each bit position prior to shipment thus insuring 100% programmability.

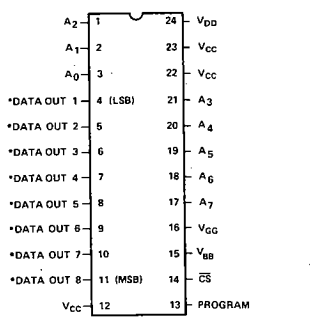
The 1602A-S714 and 1702A-S714 use identical chips. The 1702A-S714 is packaged in a 24 pin dual in-line package with a transparent quartz lid. The transparent quartz lid allows the user to expose the chip to ultra-violet light to erase the bit pattern. A new pattern can then be written into the device. This procedure can be repeated as many times as required. The 1602A-S714 is packaged in a 24 pin dual in-line package with a metal lid and is not erasable.

The circuitry of the 1602A-S714 and 1702A-S714 is entirely static; no clocks are required.

A pin-for-pin metal mask programmed ROM, the Intel 1302, is ideal for large volume production runs of systems initially using the S714.

The 1602A-S714 and 1702A-S714 are fabricated with silicon gate technology. This low threshold technology allows the design and production of higher performance MOS circuits and provides a higher functional density on a monolithic chip than conventional MOS technologies.

PIN CONFIGURATION



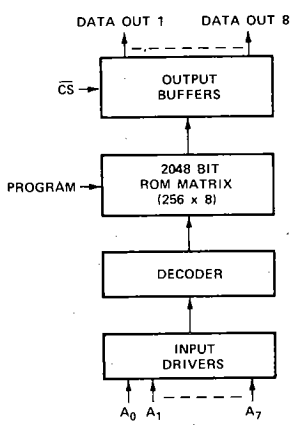
*THIS PIN IS THE DATA INPUT LEAD DURING PROGRAMMING

See page 6-50 for operational connection.

PIN NAMES

A_0–A_7	Address Inputs
$\overline{CS}$	Chip Select Input
D_{OUT1}–D_{OUT8}	Data Outputs

BLOCK DIAGRAM



NOTE: In the read mode a logic 1 at the address inputs and data outputs is a high and logic 0 is a low.

U.S. Patent No. 3660819

*Intel's liability shall be limited to replacing any unit which fails to program as desired.

CAUTION: The 1702A-S714 is a quartz-lid device. The device environment should not exceed that to which a plastic package would be subjected.

PIN CONNECTIONS

The external lead connections to the 1602A/1702A-S714 differ, depending on whether the device is being programmed[1] or used in the read mode. (See following table.)

MODE \ PIN	12 (V_{CC})	13 (Program)	14 ($\overline{CS}$)	15 (V_{BB})	16 (V_{GG})	22 (V_{CC})	23 (V_{CC})
Read	V_{CC}	V_{CC}	GND	V_{CC}	V_{GG}	V_{CC}	V_{CC}
Programming	GND	Program Pulse	GND	V_{BB}	Pulsed V_{GG} (V_{IL4P})	GND	GND

The programming specifications are identical to the standard 1602A/1702A. They are presented in the ROM section of this catalog.

Absolute Maximum Ratings*

Ambient Temperature Under Bias . . . . . 0°C to +70°C
Storage Temperature . . . . . −65°C to +125°C
Soldering Temperature of Leads (10 sec) . . . . . +300°C
Power Dissipation . . . . . 2 Watts
Read Operation: Input Voltages and Supply Voltages with respect to V_{CC} . . . . . +0.5V to −20V
Program Operation: Input Voltages and Supply Voltages with respect to V_{CC} . . . . . −48V

*COMMENT

Stresses above those listed under "Absolute Maximum Ratings" 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.

READ OPERATION

D.C. and Operating Characteristics

T_A = 0°C to 70°C, V_{CC} = +5V±5%, V_{DD} = −9V±5%, $V_{GG}^{(2)}$ = −9V±5%, unless otherwise noted.

SYMBOL	TEST	MIN.	TYP.[3]	MAX.	UNIT	CONDITIONS
I_{LI}	Address and Chip Select Input Load Current			10	µA	V_{IN} = 0.0V
I_{LO}	Output Leakage Current			10	µA	V_{OUT} = 0.0V, $\overline{CS}$ = V_{CC} −2
I_{DDO}	Power Supply Current		5	10	mA	V_{GG}=V_{CC}, $\overline{CS}$=V_{CC}−2 I_{OL} = 0.0mA, T_A = 25°C
I_{DD1}	Power Supply Current		35	50	mA	$\overline{CS}$=V_{CC} −2 I_{OL} =0.0mA, T_A = 25°C
I_{DD2}	Power Supply Current		32	46	mA	$\overline{CS}$=0.0 I_{OL} =0.0mA, T_A = 25°C
I_{DD3}	Power Supply Current		38.5	60	mA	$\overline{CS}$=V_{CC} −2 I_{OL} =0.0mA, T_A = 0°C
I_{CF1}	Output Clamp Current		8	14	mA	V_{OUT} = −1.0V, T_A = 0°C
I_{CF2}	Output Clamp Current			13	mA	V_{OUT} = −1.0V, T_A = 25°C
I_{GG}	Gate Supply Current			10	µA	
V_{IL1}	Input Low Voltage for TTL Interface	−1.0		0.65	V	
V_{IL2}	Input Low Voltage for MOS Interface	V_{DD}		V_{CC} −6	V	
V_{IH}	Address and Chip Select Input High Voltage	V_{CC} −2		V_{CC} +0.3	V	
I_{OL}	Output Sink Current	1.6	4		mA	V_{OUT} = 0.45V
V_{OL}	Output Low Voltage		−.7	0.45	V	I_{OL} = 1.6mA
V_{OH}	Output High Voltage	3.5	4.5		V	I_{OH} = −100 µA

Continuous Operation

Note 1: In the programming mode, the data inputs 1–8 are pins 4–11 respectively. $\overline{CS}$ = GND.
Note 2: V_{GG} may be clocked to reduce power dissipation. In this mode average I_{DD} increases in proportion to V_{GG} duty cycle.
Note 3: Typical values are at nominal voltages and T_A = 25°C.

A.C. Characteristics

T_A = 0°C to +70°C, V_{CC} = +5V ±5%, V_{DD} = −9V ±5%, V_{GG} = −9V ±5% unless otherwise noted

SYMBOL	TEST	MINIMUM		MAXIMUM	UNIT
Freq.	Repetition Rate			0.4	MHz
t_{OH}	Previous read data valid			100	ns
t_{ACC}	Address to output delay			2.5	μs
t_{DVGG}	Clocked V_{GG} set up	0.2			μs
t_{CS}	Chip select delay			1600	ns
t_{CO}	Output delay from $\overline{CS}$			900	ns
t_{OD}	Output deselect			300	ns
t_{OHC}	Data out hold in clocked V_{GG} mode (Note 1)			5	μs

Note 1. The output will remain valid for t_{OHC} as long as clocked V_{GG} is at V_{CC}. An address change may occur as soon as the output is sensed (clocked V_{GG} may still be at V_{CC}). Data becomes invalid for the old address when clocked V_{GG} is returned to V_{GG}.

Capacitance* T_A = 25°C

SYMBOL	TEST	MINIMUM	TYPICAL	MAXIMUM	UNIT	CONDITIONS
C_{IN}	Input Capacitance		8	15	pF	$V_{IN} = V_{CC}$, $\overline{CS} = V_{CC}$, $V_{OUT} = V_{CC}$, $V_{GG} = V_{CC}$; All unused pins are at A.C. ground
C_{OUT}	Output Capacitance		10	15	pF	
$C_{V_{GG}}$	V_{GG} Capacitance (Clocked V_{GG} Mode)			30	pF	

*This parameter is periodically sampled and is not 100% tested.

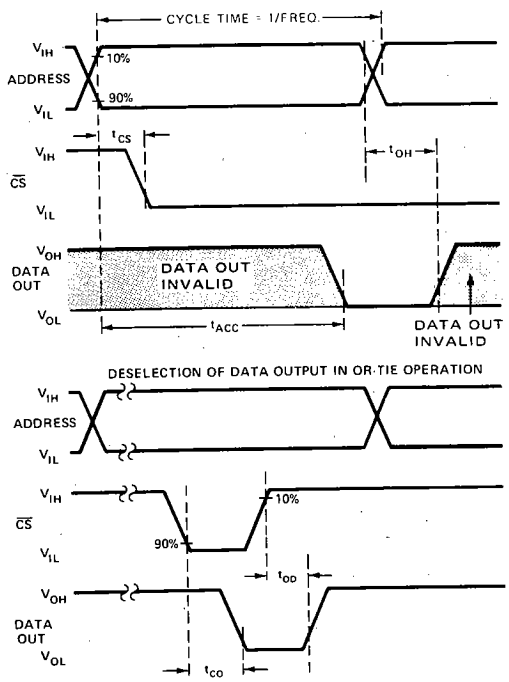
Switching Characteristics

Conditions of Test:

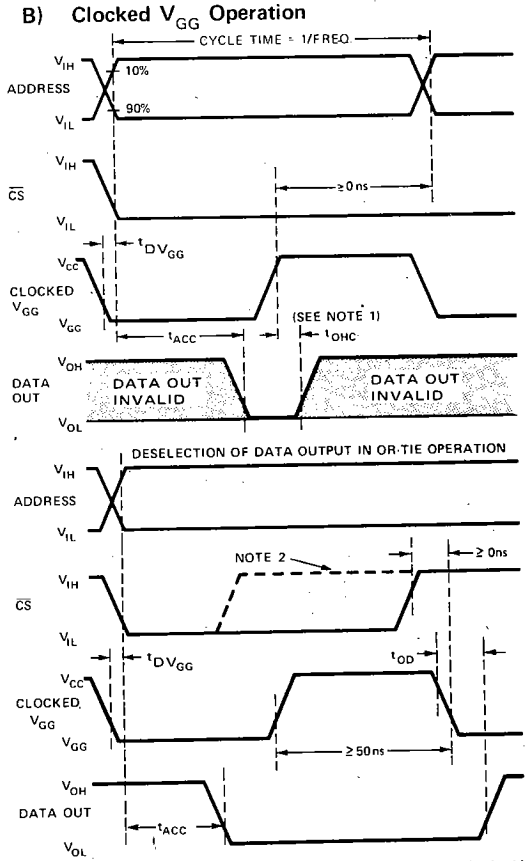
Input pulse amplitudes: 0 to 4V; t_R, t_F ≤50 ns

Output load is 1 TTL gate; measurements made at output of TTL gate (t_{PD} ≤15 ns)

A) Constant V_{GG} Operation



B) Clocked V_{GG} Operation



NOTE 1: The output will remain valid for t_{OHC} as long as clocked V_{GG} is at V_{CC}. An address change may occur as soon as the output is sensed (clocked V_{GG} may still be at V_{CC}). Data becomes invalid for the old address when clocked V_{GG} is returned to V_{GG}.

NOTE 2: If $\overline{CS}$ makes a transition from V_{IL} to V_{IH} while clocked V_{GG} is at V_{GG}, then deselection of output occurs at t_{OD} as shown in static operation with constant V_{GG}.

Programming Operation

All programming operation characteristics as described on pages 3-11 through 3-14 apply for the 1602A/1702A-S714.