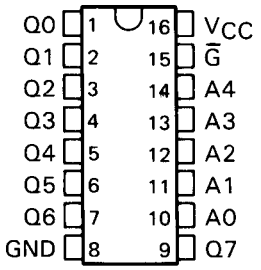
TBP18S030, TBP18SA030
256 BITS (32 WORDS BY 8 BITS)
PROGRAMMABLE READ-ONLY MEMORIES

SDMS024 – SEPTEMBER 1979 – REVISED AUGUST 1984

- **Titanium-Tungsten (Ti-W) Fuse Link for Reliable Low-Voltage Full Family Compatible Programming**
- **Full Decoding and Fast Chip Select Simplify System Design**
- **P-N-P Inputs for Reduced Loading on System Buffers/Drivers**
- **Applications Include:**
  Microprogramming/Firmware Loaders
  Code Converters/Character Generators
  Translators/Emulators
  Address Mapping/Look-Up Tables
- **Choice of 3-State or Open-Collector Outputs**

TBP18SA030, TBP18S030 . . . J OR N PACKAGE
(TOP VIEW)



description

These monolithic TTL programmable read-only memories (PROMs) feature titanium-tungsten (Ti-W) fuse links with each link designed to program in 20 microseconds. The Schottky-clamped versions of these PROMs offer considerable flexibility for upgrading existing designs or improving new designs as they feature full Schottky clamping for improved performance, low-current MOS-compatible p-n-p inputs, choice of bus-driving three-state or open-collector outputs, and improved chip-select access times.

Data can be electronically programmed, as desired, at any bit location in accordance with the programming procedure specified. All PROMs are supplied with a low-logic level output condition stored at each bit location. The programming procedure open-circuits Ti-W metal links, which reverses the stored logic level at selected locations. The procedure is irreversible; once altered, the output for that bit location is permanently programmed. Outputs that have never been altered may later be programmed to supply the opposite output level. Operation of the unit within the recommended operating conditions will not alter the memory content.

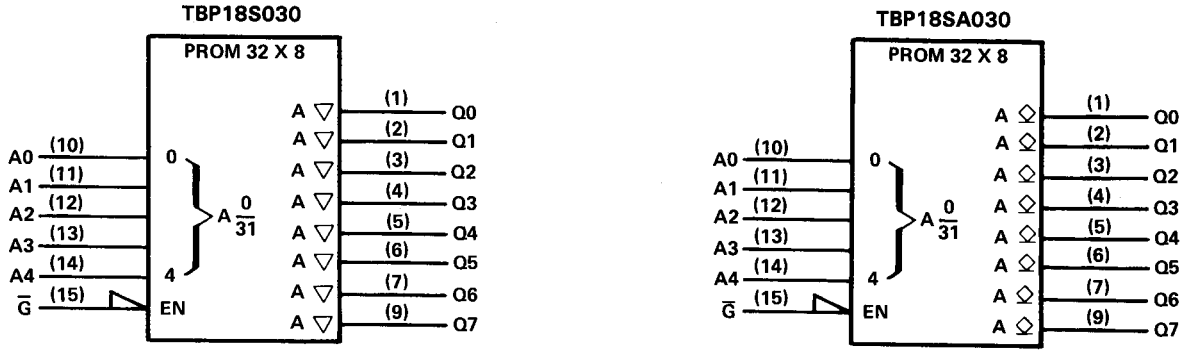
A low level at the chip-select input(s) enables each PROM. The opposite level at any chip-select input causes the outputs to be off.

The three-state output offers the convenience of an open-collector with the speed of a totem-pole output; it can be bus-connected to other similar outputs yet it retains the fast rise time characteristic of the TTL totem-pole output. The open-collector output offers the capability of direct interface with a data line having a passive pull up.

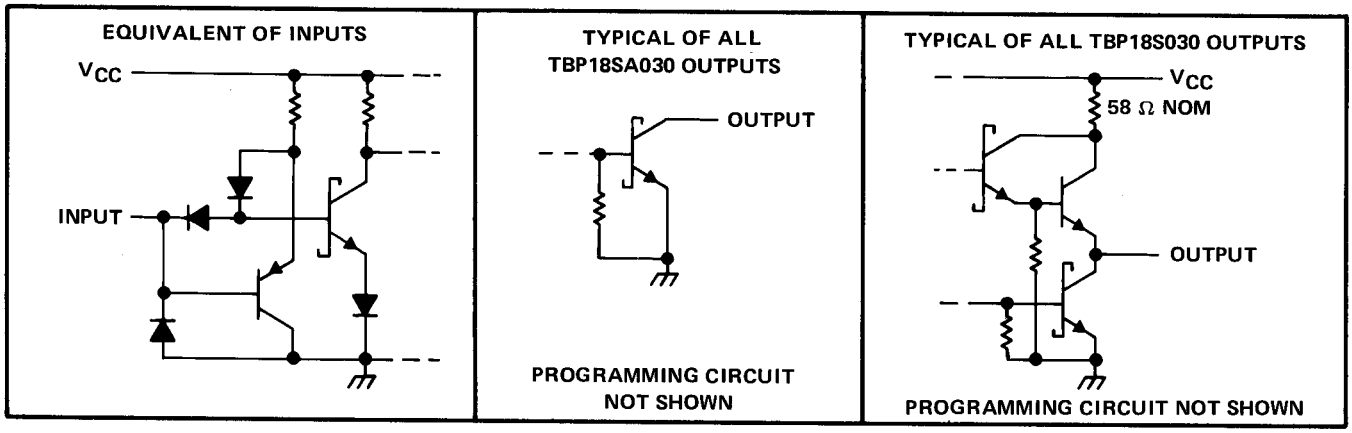
A MJ suffix designates full-temperature circuits (formerly 54 Family) and are characterized for operation over the full military temperature range of −55°C to 125°C. A J or N suffix designates commercial-temperature circuits (formerly 74 Family) and are characterized for operation from 0°C to 70°C.

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logic symbol



schematics of inputs and outputs



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage (see Note 1) 7V
Input voltage 5.5V
Off-state output voltage 5.5V
Operating free-air temperature range: Full-temperature-range circuits ..... −55°C to 125°C
Commercial-temperature-range circuits ..... 0°C to 70°C
Storage temperature range ..... −65°C to 150°C

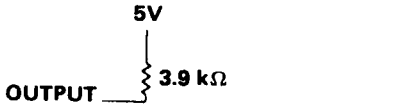
recommended conditions for programming TBP18S', TBP18SA PROMs

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC} (see Note 1)	Steady state	4.75	5	5.25	V
	Program pulse	9	9.25	9.5	
Input voltage	High level, V_{IH}	2.4		5	V
	Low level, V_{IL}	0		0.5	
Termination of all outputs except the one to be programmed		See load circuit (Figure 1)			
Voltage applied to output to be programmed, $V_{O(pr)}$ (see Note 2)		0	0.25	0.3	V
Duration of V_{CC} programming pulse X (see Figure 2 and Note 3)		15	25	100	μs
Programming duty cycle for Y pulse			25	35	%
Free-air temperature		20	25	30	°C

NOTES: 1. Voltage values are with respect to network ground terminal. The supply voltage rating does not apply during programming.
2. The TBP18S030, TBP18SA030 are supplied with all bit locations containing a low logic level, and programming a bit changes the output of the bit to high logic level.

programming procedure

1. Apply steady-state supply voltage (V_{CC} = 5 V) and address the word to be programmed.
2. Verify that the bit location needs to be programmed. If not, proceed to the next bit.
3. If the bit requires programming, disable the outputs by applying a high-logic level voltage to the chip-select input(s).
4. Only one bit location is programmed at a time. Connect each output not being programmed to 5 V through 3.9 kΩ and apply the voltage specified in the table to the output to be programmed. Maximum current into the programmer output is 150 mA.
5. Step V_{CC} to 9.25 nominal. Maximum supply current required during programming is 750 mA.
6. Apply a low-logic-level voltage to the chip-select input(s). This should occur between 1 μs and 1 ms after V_{CC} has reached its 9.25 level. See programming sequence of Figure 2.
7. After the X pulse time is reached, a high logic level is applied to the chip-select inputs to disable the outputs.
8. Within the range of 1 μs to 1 ms after the chip-select input(s) reach a high logic level, V_{CC} should be stepped down to 5 V at which level verification can be accomplished.
9. The chip-select input(s) may be taken to a low logic level (to permit program verification) 1 μs or more after V_{CC} reaches its steady-state value of 5 V.
10. At a Y pulse duty cycle of 35% or less, repeat steps 1 through 8 for each output where it is desired to program a bit.
11. Verify accurate programming of every word after all words have been programmed using V_{CC} values of 4.5 and 5.5 volts.



LOAD CIRCUIT FOR EACH OUTPUT NOT BEING PROGRAMMED OR FOR PROGRAM VERIFICATION

FIGURE 1 – LOAD CIRCUIT

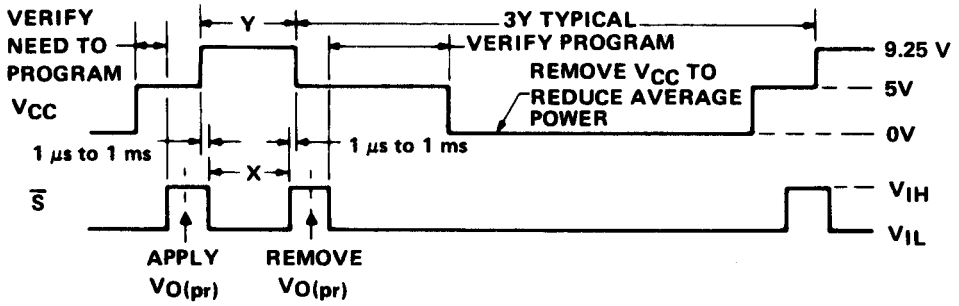


FIGURE 2 – VOLTAGE WAVEFORMS FOR PROGRAMMING

recommended operating conditions (see Note 4)

PARAMETER		TBP18S030			UNIT
		MIN	NOM	MAX	
Supply voltage, V_{CC}	MJ	4.5	5	5.5	V
	J, N	4.75	5	5.25	
High-level output current, I_{OH}	MJ			−2	mA
	J,N			−6.5	
Low-level output current, I_{OL}				20	mA
Operating free-air temperature, T_A	MJ	−55		125	°C
	J ,N	0		70	

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Note 4)

PARAMETER		TEST CONDITIONS†	FULL TEMP (MJ)			COMM. TEMP (J,N)			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.8			0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = −18 mA			−1.2			−1.2	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2V, V_{IL} = 0.8V, I_{OH} = MAX	2.4	3.4		2.4	3.2		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2V, V_{IL} = 0.8V, I_{OL} = MAX			0.5			0.5	V
I_{OZH}	Off-state output current, high-level voltage applied	V_{CC} = MAX, V_{IH} = 2 V, V_O = 2.4 V			50			50	μA
I_{OZL}	Off-state output current, low-level voltage applied	V_{CC} = MAX, V_{IH} = 2 V, V_O = 0.5 V			−50			−50	μA
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V,			1			1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V			25			25	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.5 V			−0.25			−0.25	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX,	−30		−100	−30		−100	mA
I_{CC}	Supply current	V_{CC} = MAX, Chip select(s) at 0 V, Outputs open, See Note 5		80	110		80	110	mA

switching characteristics over recommended ranges of T_A and V_{CC} (unless otherwise noted)

TYPE	TEST CONDITIONS	$t_{a(A)}$ ACCESS TIME FROM ADDRESS			$t_{a(S)}$ ACCESS TIME FROM CHIP SELECT (ENABLE TIME)			t_{dis} DISABLE TIME FROM HIGH OR LOW LEVEL			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	MIN	TYP‡	MAX	
TBP18S030MJ	C_L = 30 pF for $t_{a(A)}$ and $t_{a(S)}$, 5 pF for t_{dis}, See Note 6		25	50		12	30		8	30	ns
TBP18S030			25	40		12	25		8	20	ns

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡All typical values are at V_{CC} = 5 V, T_A = 25°C.
§Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
NOTES: 4. MJ designates full-temperature circuits (formerly 54 Family), J and N designate commercial-temperature circuits (formerly 74 Family).
5. The typical values of I_{CC} are with all outputs low.

recommended operating conditions (see Note 4)

PARAMETER		TBP18SA030			UNIT
		MIN	NOM	MAX	
Supply voltage, V_{CC}	MJ	4.5	5	5.5	V
	J, N	4.75	5	5.25	
High-level output voltage, V_{OH}				5.5	V
Low-level output current, I_{OL}				20	mA
Operating free-air temperature, T_A	MJ	−55		125	°C
	J, N	0		70	

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

	PARAMETER	TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN,	I_I = −18mA			−1.2	V
I_{OH}	High-level output current	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V	V_{OH} = 2.4 V			50	μA
			V_{OH} = 5.5 V			100	
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IL} = 0.8 V,	V_{IH} = 2 V, I_{OL} = MAX			0.5	V
I_I	Input current at maximum input voltage	V_{CC} = MAX,	V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = MAX,	V_I = 2.7 V			25	μA
I_{IL}	Low-level input current	V_{CC} = MAX,	V_I = 0.5 V			−0.25	mA
I_{CC}	Supply current	V_{CC} = MAX, Chip select(s) at 0 V, Outputs open, See Note 5			80	110	mA

switching characteristics over recommended ranges of T_A and V_{CC} (unless otherwise noted)

TYPE	TEST CONDITIONS	$t_{(A)}$ ACCESS TIME FROM ADDRESS			$t_{a(S)}$ ACCESS TIME FROM CHIP SELECT (ENABLE TIME)			t_{PLH} PROPAGATION DELAY TIME, LOW-TO-HIGH-LEVEL OUTPUT FROM CHIP SELECT (DISABLE TIME)			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	MIN	TYP‡	MAX	
TBP18SA030MJ	C_L = 30pF, R_{L1} = 300 Ω, R_{L2} = 600 Ω, See Note 6		25	50		12	30		12	30	ns
TBP18SA030			25	40		12	25		12	25	ns

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡All typical values are at V_{CC} = 5 V, T_A = 25°C.

NOTES: 4. MJ designates full-temperature circuits (formerly 54 Family), J and N designate commercial-temperature circuits (formerly 74 Family).
5. The typical values of I_{CC} are with all outputs low.
6. Load circuits and voltage waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
JBP18S030MJ	NRND	Production	CDIP (J) | 16	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JBP18S030MJ
JBP18S030MJ.A	NRND	Production	CDIP (J) | 16	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JBP18S030MJ

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

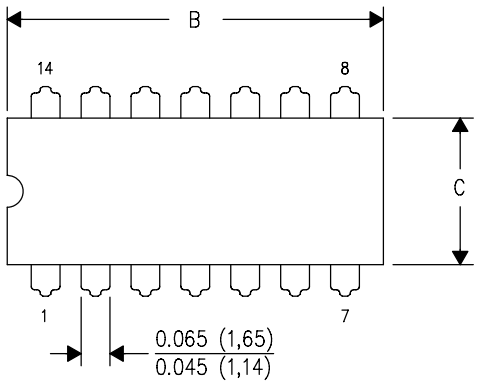
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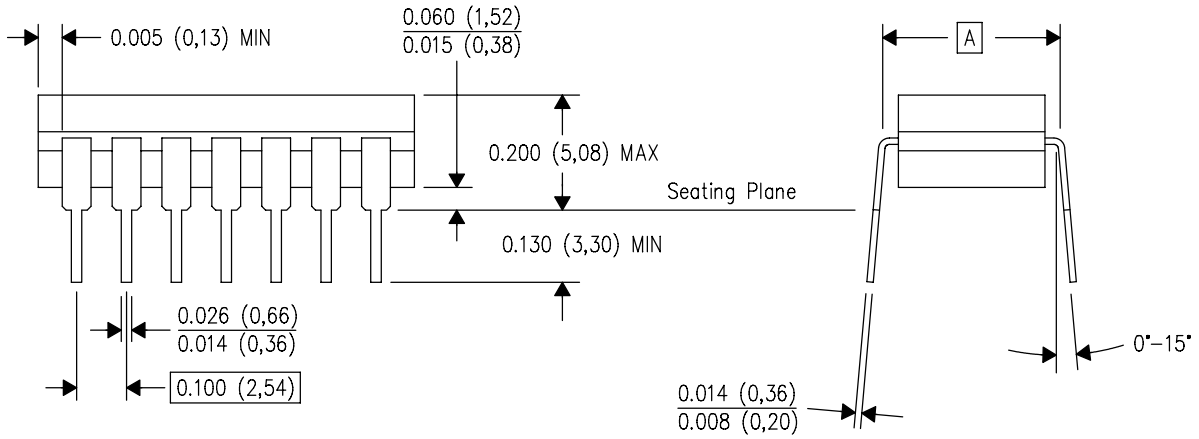
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
E. Falls within MIL STD 1835 GDIP1–T14, GDIP1–T16, GDIP1–T18 and GDIP1–T20.

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