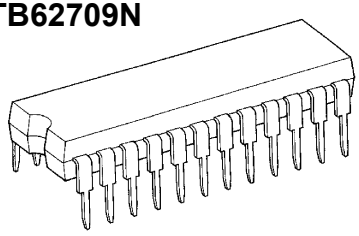
TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

TB62709N/F

Intelligent, *Constant Current*, 7 segment LED numeric display decoder/driver. For use with common anode configuration numeric displays.

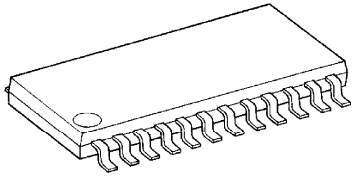
The TB62709N/F is an intelligent *Constant Current* LED display driver designed specifically for seven segment LED display applications. The stand alone device includes all of the decode, multiplex and driver circuitry necessary to control up to four seven segment LED digits. All of the information required to program up to four LED digits is input serially including a 16 step brightness control. Expansion beyond four digits is possible with a cascade connection to a second device. The device automatically refreshes and maintains the displayed information.

TB62709N



SDIP24-P-300-1.78 Weight: 1.62g (Typ.)

TB62709F



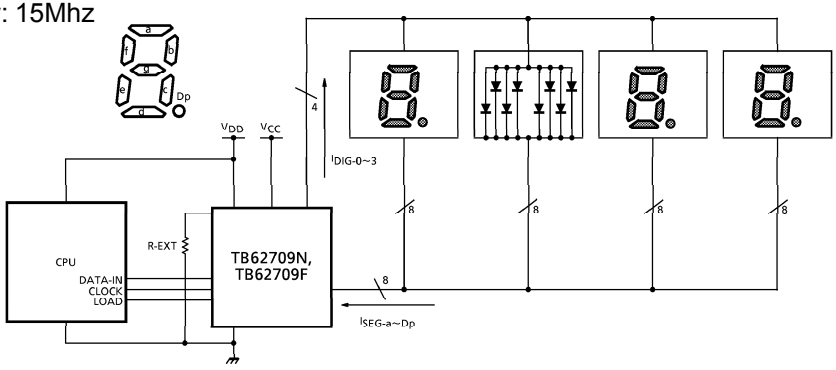
SSOP24-P-300-1.00 Weight: 0.32g (Typ.)

Features

- *Constant Current* segment drivers for consistent display brightness.
- Single device saves labor and board space.
- Internal character set simplifies design efforts.
- Automatically handles multiplex and display refresh tasks.
- 16 step programmable brightness control.
- Single device controls up to four digits.
- Available in thru hole and surface mount packages.
- Data out cascade port for expansion beyond four digits.

Performance Characteristics

V_{DD} = 4.5V~5.5V
Digit enable: 17V / 400mA
Segment select: 17V / 0-40mA
Max transition frequency: 15Mhz

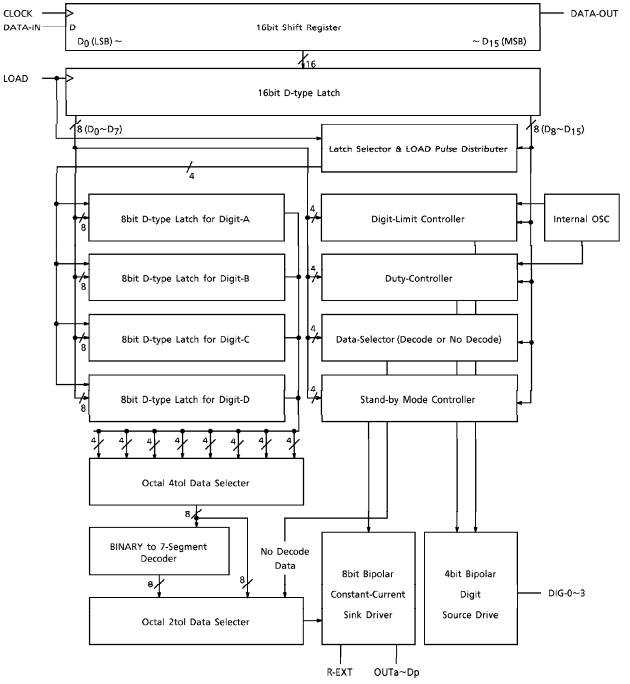


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Block Diagram:



Maximum Ratings:

CHARACTERISTICS	SYMBOL	RATING	UNIT
Supply Voltage	VDD	7.0	volts
LED Supply Voltage	VCC	17	volts
Source Output Current Digit 0~3	IDIG	-400	mA
Segment Drive Current Segment a~DP	IOUT	50	mA
Output Current	IOH/IOL	+/- 5	mA
Input Voltage	VIN	-0.3 ~ VDD ~+0.3	volts
Clock Frequency	FCLK	15	MHz
Total Output Current	IVDD	400	mA
Power Dissipation	PD	TB62709N: 1.78	W
		TB62709F: 0.62	
Operation Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-55 ~+150	°C

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Recommended Operating Conditions:

CHARACTERISTICS	SYMBOL	TEST CIRCUIT	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Stage							
Supply Current	ICC1	1	Set normal operation mode, Rext=760Ω, Out a~DP, all ON VCC = 5V, Ta=25°C	—	300	—	mA
	ICC2	1	Set normal operation mode, Rext=760Ω, Out a~DP, all ON VCC = 5V, Ta=25°C	—	320	—	mA
Digit 0~3 Scanning Freq.	fOSC	2	Normal operation mode, VDD=4.5 - 5.5V	240	480	960	Hz
Out a~DP Output Current	ISEG	3	Normal operation mode, VDD=4.5 - 5.5V	29	34	40	mA
Digit 0~3 Leakage Current	ILEAK1	4	All off mode, VCC=17V	—	—	-20	µA
Out a~DP Leakage Current	ILEAK2	4	All off mode, VCC=17V	—	—	20	µA
Digit 0~3 Output Voltage	VOUT	5	Normal operation mode IDIG = 320mA	3.0	—	—	V
Logic							
Supply Current	IDD1	6	Standby Mode, Ta=25°C	—	—	200	µA
	IDD2	6	Blank Mode, Ta=25°C	—	—	12.5	mA
Operating Supply Current	IDD3	6	Normal operating mode fCLK=10MHz, Ta=25°C Data-in:output a~DP on	—	—	20.5	mA
High Level Input Current	IIH	—	Data-in, Load&Clock VIN=5V	—	—	1	µA
Low Level Output Current	IIL	—	Data-in, Load&Clock VIN=0V	—	—	-1	µA
High Level Output Voltage	VOH1	6	Data out, IOH=-1mA	4.6	—	—	V
	VOH2	6	Data-out, IOH=-1µA	—	VDD	—	V
Low Level Output Voltage	VOL1	6	Data out, IOH=-1mA	—	—	0.4	V
	VOL2	6	Data-out, IOH=-1µA	—	0.1	—	V
Clock Frequency	FCLK	6	CASCADE connected, TA = -40 ~ 85ºC	10	—	—	MHz

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Switching Characteristics:

CHARACTERISTICS	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Data Hold Time (D-IN Clock)	tDHO		—	10	—	ns
Data Set-up Time (D-IN Clock)	tDST		—	20	—	ns
Propagation Delay (Clock D-OUT)	tPHL-SO	CL=10pf	—	25	—	ns
	tPLH-SO	CL=10pf	—	25	—	ns
High Level Pulse Width Of Clock	tCLKH		—	30	—	ns
Low Level Pulse Width Of Clock	tCLKL		—	30	—	ns
Pulse Width Of Load	tw LD		—	100	—	ns
Setup Time (Clock-Load)	tCLK-LD		—	50	—	ns
Setup Time (Load-Clock)	tLD-CLK		—	50	—	ns
Out a ~ DP Propagation Delay (Load-Outn)	tpHL-SEG	CL=10pf	—	—	5.0	ns
	tpLH-SEG	CL=10pf	—	—	5.0	ns
Out a ~ DP Rise Time (OUTn)	trSEG	CL=10pf	0.2	1.0	—	µs
Out a ~ DP Fall Time (OUTn)	tfSEG	CL=10pf	0.2	1.0	—	µs
Digit 0 ~ 3 Propagation Delay (Load-DIGn)	tpHL-DIG	CL=10pf	—	—	10.0	µs
	tpLH-DIG	CL=10pf	—	—	10.0	µs
Digit 0 ~ 3 Rise Time (DIGn)	trDIG	CL=10pf	0.4	2.0	—	µs
Digit 0 ~ 3 Fall Time (DIGn)	tfDIG	CL=10pf	0.4	2.0	—	µs

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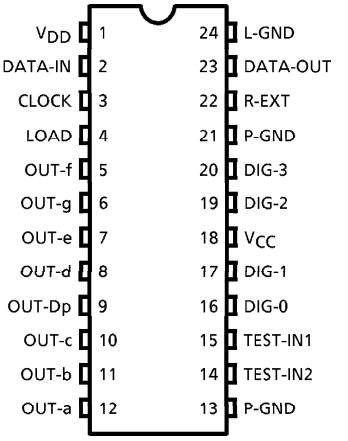
Recommended Operating Conditions:

CHARACTERISTICS	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Stage						
Supply Voltage	VCC		4.0	—	6.0	V
Digit 0~3 Output Current	IDIG	VOUT=3.0V	—	—	-320	mA
Out a~DP Output Current	ISEG	VCE=0.7V	—	—	40	mA
Logic						
Supply Voltage	VDD		4.5	—	5.5	V
High Level Input Current	IIH	Data-In, Load&Clock,VIN=VDD	—	—	1	μA
Low Level Input Current	IIL	Data-In, Load&Clock,VIN=0V	—	—	-1	μA
High Level Input Voltage	VIH		0.7 VDD	—	—	V
Low Level Input Voltage	VIL		—	—	0.3 VDD	V
Switching Condition						
Data Hold Time (D-IN Clock)	tDHO		30	—	—	ns
Data Setup Time (D-IN Clock)	tDST		50	—	—	ns
Propagation Delay (Clock D-Out)	tPDSO	CL=10pf	50	—	—	ns
High Level Pulse Width Of Clock	tCLKH		30	—	—	ns
Low Level Pulse Width Of Clock	tCLKL		30	—	—	ns
Pulse Width Of Load	twLD		150	—	—	ns
Setup Time (Clock-Load)	tCKLD		100	—	—	ns
Setup Time (Load-Clock)	tLDCLK		100	—	—	ns

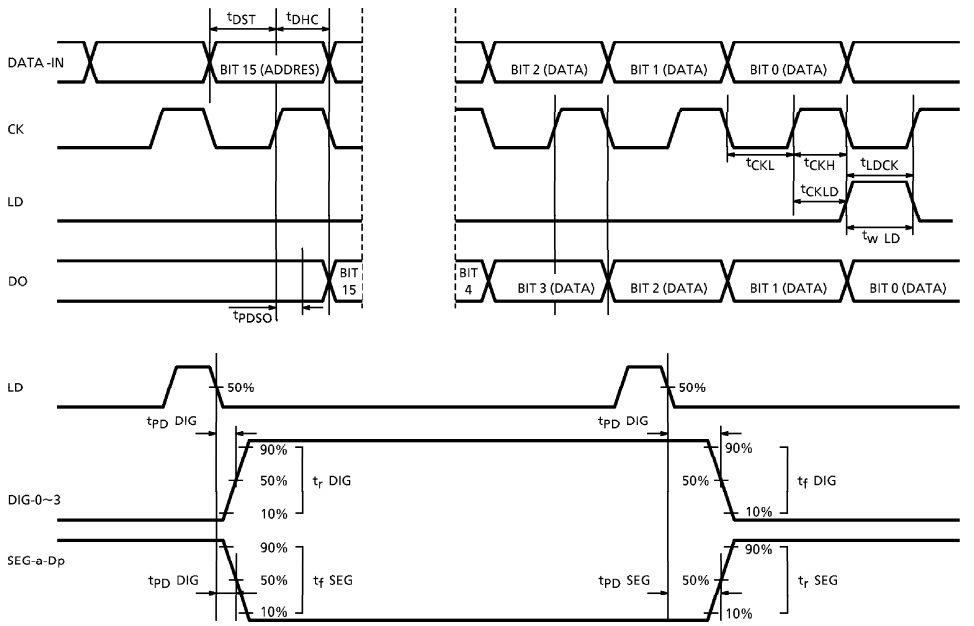
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Terminal Description:

PIN No.	NAME	FUNCTION
1	V_{DD}	Logic Supply Voltage
2	Serial Data IN (SI)	Serial Data Input To Shift Register
3	Clock (CK)	Clock Input Terminal
4	Load (LD)	Load Input Terminal
5-12	OUT a~DP	Output Terminal to Cathodes of Seven Segment Display
13	P-GND	Power Ground Terminal
14	Test In 2	Test Terminal - Grounded During Normal Operation
15	Test In 1	Test Terminal - Grounded During Normal Operation
6,17,19,2	Digit 0~3	Output Terminal to Anodes of Seven Segment Display
18	V_{CC}	Supply Voltage For LEDs
21	P-GND	Power Ground Terminal
22	Rext	Constant Current Programming Terminal
23	Data Out (DO)	Cascade Connection To Next Display Stage
24	L-GND	Logic Ground Terminal



Timing Diagram:



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Data Input

Data is input on the SERIAL-IN terminal. Each 16 bit serial word includes an address (D15 ~ D8) and data (D7 ~ D0). A low to high transition load command on the LOAD terminal loads the data into the appropriate registers following the 16th clock pulse.

Operation

Serial data is input on the DATA-IN terminal beginning with the most significant bit (MSB). Data is clocked through the 16 bit shift register on the rising edge of the clock. A Low to High transition on the LOAD input following the 16th (LSB) bit latches the 16 bit word into the 16 bit D-type latch.

Expansion beyond four digits is possible through the use of a cascade connection from the DATA-OUT terminal. The data-out lags data-in by one bit through the data-out terminal.

Each 16 bit word typically includes 8 address bits and 8 data bits. The first four data bits, beginning with D15 (MSB) ~ D12 select the Action mode (see figure 1). These global commands determine the overall function the device is to perform and includes Blank, Normal Operation, Load Register, All On and Stand-by. Data bits D11~D8 select the particular register to be loaded (see figure 2) should the load register function be selected. Data bits D7~D0 (LSB) define the specific commands required to program the display and define the brightness setting (duty cycle).

Figure 1. Action Mode

	REGISTER DATA								INITIAL STATE
FUNCTION	D15	D14	D13	D12	D11~D8	D7~D4	D3~D0	Hex Code	
Blank (OUTn & Digit 0~3 All Off)	0	0	0	0	—	—	—	0 --- H	⇐
Normal Operation	0	0	0	1	—	—	—	1 --- H	
Load Register (Duty, Decode, Digit & Data)	0	0	1	0	X	X	X	2 xxx H	
All On (OUTn ALL On)	0	0	1	1	—	—	—	3 --- H	
Stand-By	0	1	0	0	—	—	—	4 --- H	

"x" indicates that data is required in this field to execute the function. "-" indicates that data in this field is not required and not recognized.

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Action Mode

1. Blank - Constant current segment drivers are off resulting in an all segments off condition. Data D15 ~ D12 are 0. D11~D0 are not relevent in blank mode.

2. Normal (Operation) - Instructs device to display data loaded during previous steps. D11~ D0 are not relevent in the Normal Operation mode.

3. Load Register - Directs the device to recognize and load D11~ D0. In this mode D11 ~ D8 determines the specific register to be loaded (see figure 2) and D7 ~ D0 serves as the actual data to be loaded for programming the brightness (duty cycle) or the particular digit.

4. All On - All constant current segment drivers are on resulting in an all segments illuminated condition. D11 ~ D0 are not relevent in this mode.

5. Stand By - All display segments off condition. The Stand-By command turns off all internal bias currents and serves as a low power consumption mode (<.2mA). Used with Stand-By set up commands “All Data Clear” or “Data Not Cleared” (table 7).

The initial state, upon power up, is the BLANK state.

Application Note:
Stand-By and Blank perform similar functions in that the display is totally blank when either command is input. Stand-By provides a low power consumption (<.2ma current draw on V_{DD}) mode by turning off all internal bias currents in the internal driver circuits. The Stand-By command also cuts off the Rext bias current used to regulate the programmed constant current within the device.

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LOAD REGISTER Mode

Figure 2. LOAD REGISTER Mode

	REGISTER DATA							
FUNCTION	D15~D12	D11	D10	D9	D8	D7~D4	D3~D0	Hex Code
Load Duty Register	2H	0	0	0	0	X	X	20XXH
Load Decode & Digit Register	2H	0	0	0	1	X	X	21XXH
Load Data Register 0	2H	0	0	1	0	X	X	22XXH
Load Data Register 1	2H	0	0	1	1	X	X	23XXH
Load Data Register 2	2H	0	1	0	0	X	X	24XXH
Load Data Register 3	2H	0	1	0	1	X	X	25XXH

“x” indicates that data is required in this field to execute the function. “-” indicates that data in this field is not required and not recognized.

Selects the specific register to be loaded. The LOAD REGISTER mode is enabled by the Load Register Action mode command (see Figure 1 - Action mode).

1. Duty Register - Enables the device to accept duty cycle (brightness) setting. Sixteen brightness steps (0/16 to 15/16) are available.

2. Decode and Digit Register - Enables the device to accept data defining digit or digits to be programmed.

3. Data Register 0~3 - Commands the device to enable a specific digit register to accept the data to be displayed on the selected digit. Actual display data is set up by D7~D0.

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Data Decode

The TB62709F utilizes two basic modes of operation. In the DECODE MODE, data encoded in data bits D7~D0 is decoded to display preset characters per table 8. This mode is activated as illustrated in table 5. With D15~D8 programmed as 21 Hex and D7~D4 as 1 Hex the DECODE MODE is selected.

In the DIRECT DRIVE MODE the ability to decode data to preset characters for display is bypassed giving the programmer direct control of the 8 constant current sink outputs. This mode may be used to drive discrete LEDs or to display characters not included in the character set.

	REGISTER DATA							INITIAL STATE
FUNCTION	D15~D8	D7	D6	D5	D4	D3~D0	Hex Code	
Direct Drive	21H	0	0	0	0	X	210XH	
Decode	21H	0	0	0	1	X	211XH	⇐

“x” indicates that data is required in this field to execute the function. “-” indicates that data in this field is not required and not recognized.

This programming step is performed simultaneously with the DIGIT SELECTION decision (table 4) which utilizes D3~D0.The initial state, upon power up, is the DECODE mode.

Table below illustrates the input / output relationship in the DIRECT DRIVE mode. A Logic 1 data state turns the respective output on and a Logic 0 data state turns the respective output off.

REGISTER DATA	OUTPUT	INITIAL STATE	NOTE
D0	Out-a	L	H Data is output ON (1) and L Data is output OFF (0)
D1	Out-b	L	
D2	Out-c	L	
D3	Out-d	L	
D4	Out-e	L	
D5	Out-f	L	
D6	Out-g	L	
D7	Out-DP	L	

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Brightness Control

Brightness is controlled by controlling the “on time” duty cycle. The device allows for 16 brightness steps as illustrated in list 3 with 0/16 as the dimmest setting (not illuminated) to 15/16 as the brightest setting. The duty cycle control register is addressed with a 20 Hex command at D15~D8 and the appropriate data per list 3 at D3~D0. D7~D4 are not recognized by the duty cycle register. The initial state, upon power up is 15/16, or full brightness.

	REGISTER DATA							INITIAL STATE
Duty Cycle	D15~D8	D7~D4	D3	D2	D1	D0	Hex Code	
0/16	20H	—	0	0	0	0	20X0H	
1/16	20H	—	0	0	0	1	20X1H	
2/16	20H	—	0	0	1	0	20X2H	
3/16	20H	—	0	0	1	1	20X3H	
4/16	20H	—	0	1	0	0	20X4H	
5/16	20H	—	0	1	0	1	20X5H	
6/16	20H	—	0	1	1	0	20X6H	
7/16	20H	—	0	1	1	1	20X7H	
8/16	20H	—	1	0	0	0	20X8H	
9/16	20H	—	1	0	0	1	20X9H	
10/16	20H	—	1	0	1	0	20XAH	
11/16	20H	—	1	0	1	1	20XBH	
12/16	20H	—	1	1	0	0	20XCH	
13/16	20H	—	1	1	0	1	20XDH	
14/16	20H	—	1	1	1	0	20XEH	
15/16	20H	—	1	1	1	1	20XFH	⇐

“x” indicates that data is required in this field to execute the function. “-” indicates that data in this field is not required and not recognized.

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Digit Selection

The digit(s) to be programmed are selected as illustrated table below. This function is enabled with a 21 Hex command at D15~D8 and the appropriate data sequence to select Digit 0 only, Digit 0 and 1, Digit 0 -2 or digit 0-3 as illustrated in table 4. This programming step is performed simultaneously with the DECODE / DIRECT DRIVE decision (table 5) which utilizes D7~D4. The initial state, upon power up, is Digits 0-3 activated.

	REGISTER DATA							INITIAL STATE
	D15~D8	D7~D4	D3	D2	D1	D0	Hex Code	
Activate Digit 0 Only	21H	X	0	0	0	0	21X0H	
Activate Digit 0~1	21H	X	0	0	0	1	21X1H	
Activate Digit 0~2	21H	X	0	0	1	0	21X2H	
Activate Digit 0~3	21H	X	0	0	1	1	21X3H	⇐

STAND-BY Commands

Two STAND-BY commands are available as illustrated in table below. STAND-BY / NO DATA CLEAR places the device in a power save mode while leaving data intact in the various registers. This mode is enabled by a 4 Hex command at D15~D12 and 0 Hex at D3~D0. D11~D4 are not relevent in the STAND-BY / NO DATA CLEAR Mode.

STAND-BY / DATA CLEAR also places the device in a power save mode and clears data in the various registers leaving registers in their initial state. This mode is enabled by a 4 Hex command at D15~D12 and 1 Hex at D3~D0. D11~D4 are not relevent in the STAND-BY / DATA CLEAR Mode.

	REGISTER DATA						
	D15~D8	D7~D4	D3	D2	D1	D0	Hex Code
Stand-By (No Data Clear)	4-H	—	0	0	0	0	4XX0H
Stand-By (Data Clear)	4-H	—	0	0	0	1	4XX1H

“x” indicates that data is required in this field to execute the function. “-” indicates that data in this field is not required and not recognized.

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CHARACTER DECODE Mode

Table 8 illustrates the data versus character displayed relationship. This mode is enabled along with the LOAD REGISTER Mode (See LOAD REGISTER Mode section - Figure 2). A 2 Hex command at D15~D12 selects the LOAD REGISTER Mode. The specific register to be addressed is selected by D11~D8. The digits are designated D0, D1, D2 and D3 and are addressed per their respective registers as illustrated in Figure 2. D3~D0 provides the code for the seven segment display. D5 and D4 select one of two character sets and D6 controls the decimal point for each digit.

Table 8 List of character generator decoding data

		D_0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
		D_1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
		D_2	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
		D_3	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
D_5	D_4	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F
0	1	1		H	J	L	P	q	r	S	U	y	-	°	o	]	-	]

D_7	D_6	
X	0	Dp OFF
X	1	Dp ON

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Operation examples.

Example 1

Example 1 sets up the character **a** at Digit 0, **b** at Digit 1, **c** at Digit 2 and **d** at Digit 3. The characters are initially set at full brightness (15/16 duty cycle) and displayed. The duty cycle is then changed to half brightness (8/16 duty cycle) as the display is first blanked and then activated with the same **a**,**b**,**c** and **d** characters. The display is then flashed on and off by alternating the BLANK and NORMAL commands before going to the STAND-BY Mode.

STEP	D15~D12	D11~D8	D7~D4	D3~D0	DIGIT 0~3	SEGMENT a,b,c,d,e,f,g	SEG DP	MODE	DISPLAY INDICATION
0	—	—	—	—	Off	Off	Off	Initial State (Clear Mode)	All Blank
1	0010	0000	XXXX	1111	Off	Off	Off	Duty=15/16	All Blank
2	0010	0001	0001	0011	Off	Off	Off	Decode 4 Dig.	All Blank
3	0010	0010	X000	1010	Off	Off	Off	Dig 0=a	All Blank
4	0010	0011	X000	1011	Off	Off	Off	Dig 1=b	All Blank
5	0010	0100	X000	1100	Off	Off	Off	Dig 2=c	All Blank
6	0010	0101	X000	1101	Off	Off	Off	Dig 3=d	All Blank
7	0001	XXXX	XXXX	XXXX	On	On	Off	Normal	a-b-c-d
8	0010	0000	XXXX	1000	On	On	Off	Duty=8/16	a-b-c-d
9	0000	XXXX	XXXX	XXXX	Off	Off	Off	Blank	All Blank
10	0001	XXXX	XXXX	XXXX	On	On	Off	Normal	a-b-c-d
11	0000	XXXX	XXXX	XXXX	Off	Off	Off	Blank	All Blank
12	0001	XXXX	XXXX	XXXX	On	On	Off	Normal	a-b-c-d
13	0000	XXXX	XXXX	XXXX	Off	Off	Off	Blank	All Blank
14	0001	XXXX	XXXX	XXXX	On	On	Off	Normal	a-b-c-d
15	0100	XXXX	XXXX	0000	Off	Off	Off	Stand-By (Shut Down)	All Blank

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Operation examples.

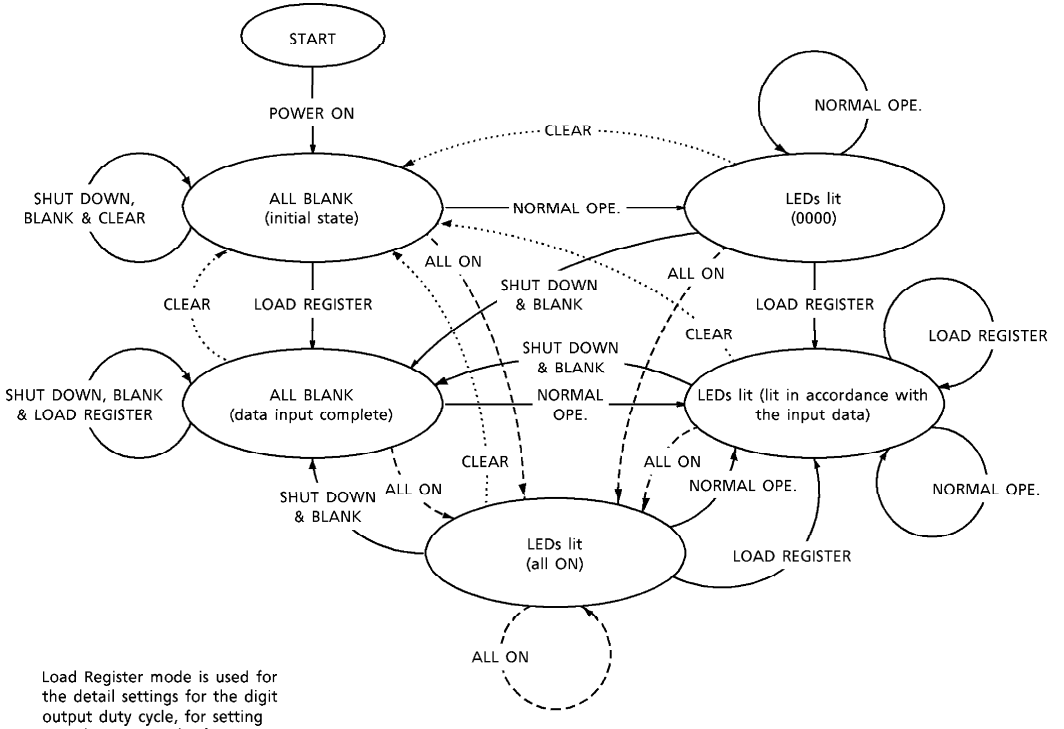
Example 2

Example 2 sets up the character **a** with the decimal point on at Digit 0 at full brightness (15/16 duty cycle) with the remaining digits (1~3) left blank. The display then changes to a character **b** with the decimal point on displayed at Digit 1 with Digits 0, 2 and 3 blank. Character **c** (decimal point on) is then displayed at Digit 2 with Digits 0, 1 and 3 left blank and the sequence ends with the character **d** (decimal point on) displayed on Digit 3 with Digits 0~2 left blank followed by the STAND-BY Mode.

STEP	D15~D12	D11~D8	D7~D4	D3~D0	DIGIT 0~3	SEGMENT a,b,c,d,e,f,g	SEG DP	MODE	DISPLAY INDICATION
0	—	—	—	—	Off	Off	Off	Initial State (Clear Mode)	All Blank
1	0010	0000	XXXX	1111	Off	Off	Off	Duty=15/16	All Blank
2	0010	0001	0001	0011	Off	Off	Off	Decode 4 Dig.	All Blank
3	0010	0010	X100	1010	Off	Off	Off	Dig 0=a	All Blank
4	0010	0011	X001	0000	Off	Off	Off	Dig 1=Blank	All Blank
5	0010	0100	X001	0000	Off	Off	Off	Dig 2=Blank	All Blank
6	0010	0101	X001	0000	Off	Off	Off	Dig 3=Blank	All Blank
7	0001	XXXX	XXXX	XXXX	On	On	Off	Normal	a - - -
8	0010	0010	X001	0000	Off	On	Off	Dig 0=Blank	All Blank
9	0010	0011	X100	1011	On	On	Off	Dig 1=b	- b - -
10	0010	0011	X001	0000	Off	On	Off	Dig 1=Blank	All Blank
11	0010	0100	X100	1100	On	On	Off	Dig 2=c	- - c -
12	0010	0100	X001	0000	Off	On	Off	Dig 2=Blank	All Blank
13	0010	0101	X100	1101	On	On	Off	Dig 3=d	- - - d
14	0100	XXXX	XXXX	0000	Off	Off	Off	Stand-By (Shut Down)	All Blank

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State Movement Diagram

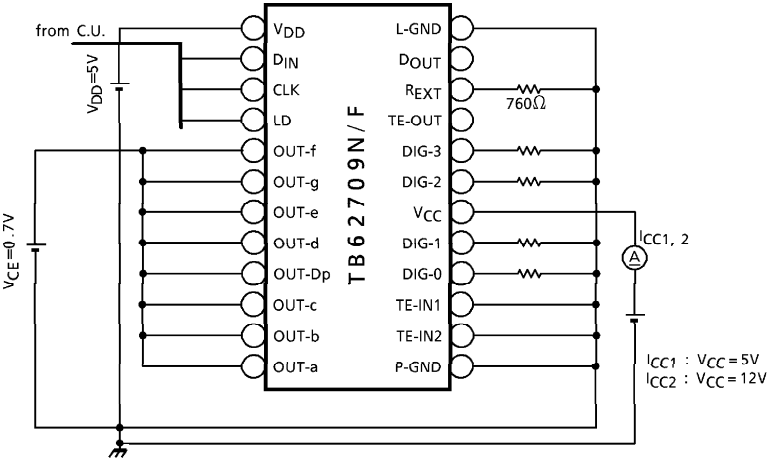


Load Register mode is used for the detail settings for the digit output duty cycle, for setting Decode / No Decode, for inputting display data, and for setting the number of digits to use.

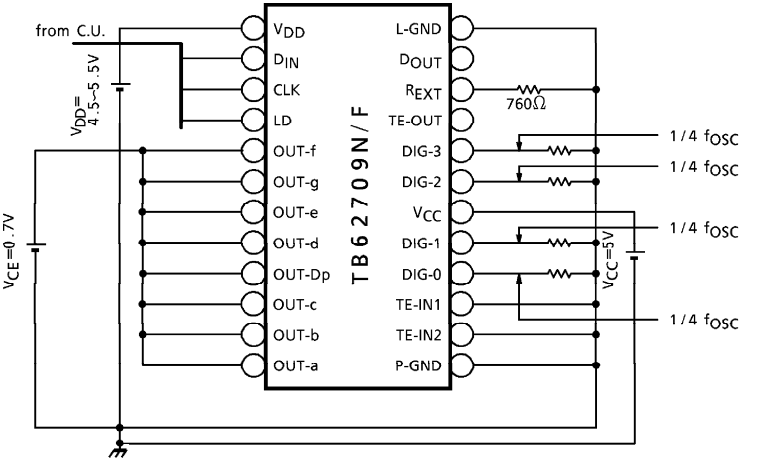
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Test Circuit

(1) I_{CC1}, I_{CC2}



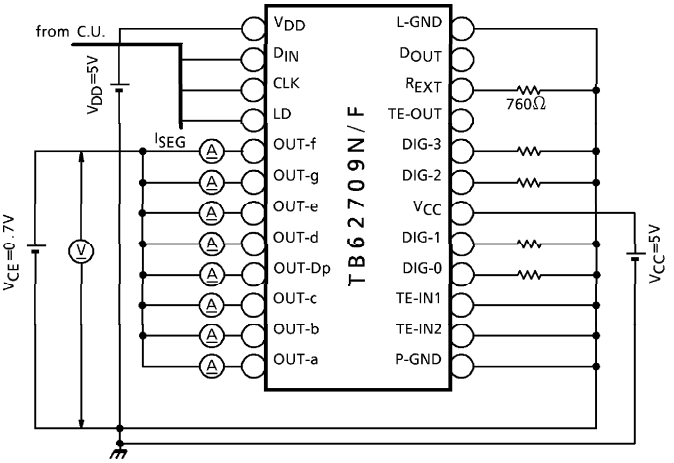
(2) f_{OSC}



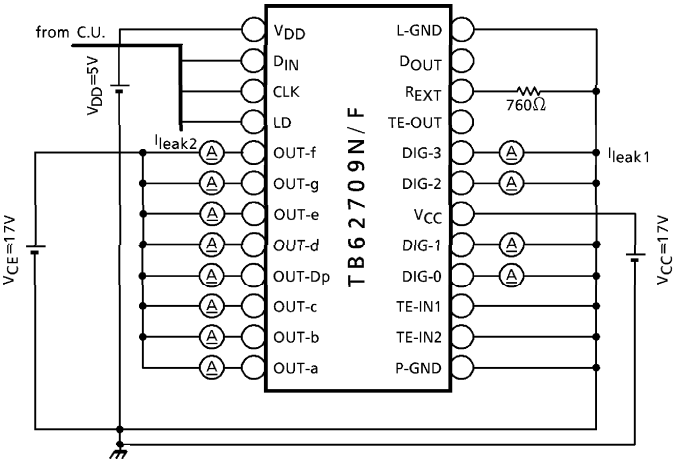
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Test Circuit

(3) I_{SEG}



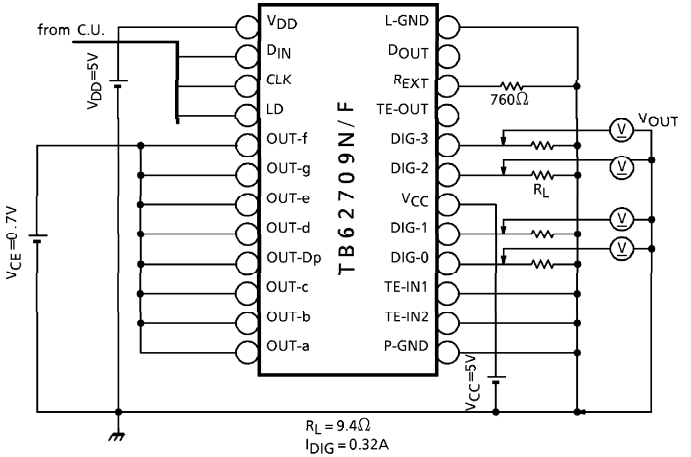
(4) I_{leak1}, I_{leak2}



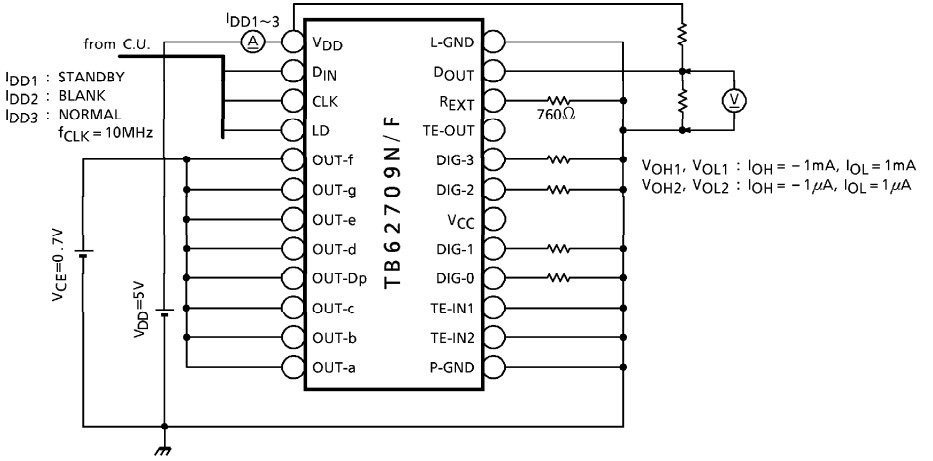
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Test Circuit

(5) V_{OUT}

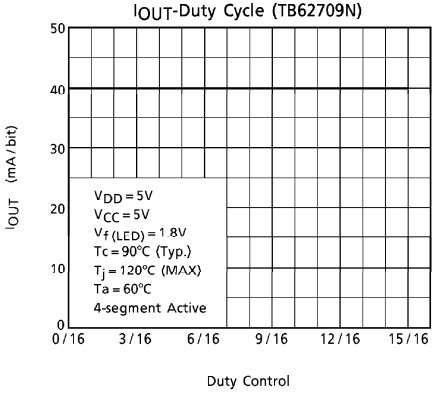


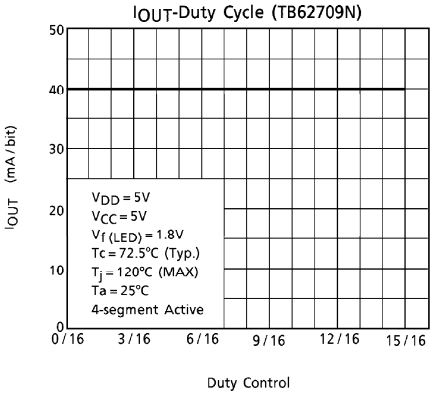
(6) I_{DD1}, I_{DD2}, I_{DD3}, V_{OH1}, V_{OH2}, V_{OL1}, V_{OL2}, f_{CLK}

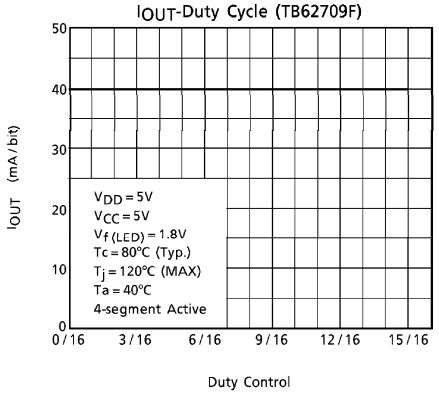


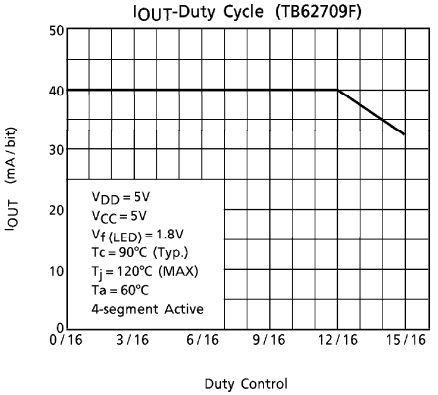
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Duty Cycle Control vs. Output Current Value:



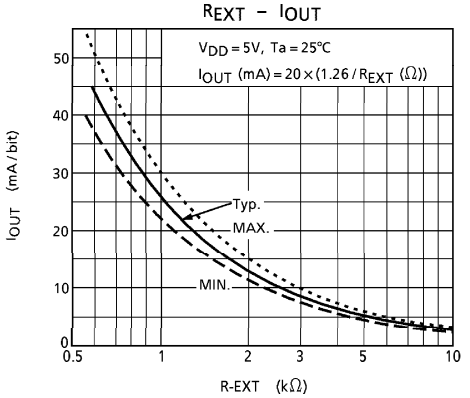






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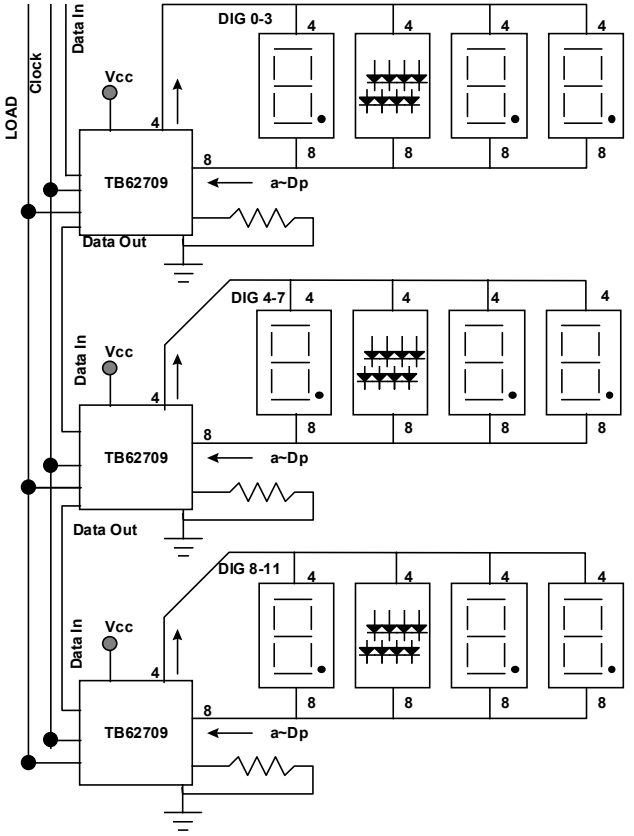
External Resister vs. Output Current Value:



The following diagram shows application circuits.
Because operation may be unstable due to influences such as the electromagnetic induction of the wiring, the IC should be located as close as possible to the LED.
The L-GND and P-GND of this IC are connected to the substrate in the IC.
Take care to avoid a potential difference exceeding 0.4V at two pins.
When executing the pattern layout, Toshiba recommends not including inductance components in the GND or output pin lines, and not inserting capacitance components exceeding 50pF between the R_{EXT} pin and GND.

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Cascade Operation:



In order to update the display information within a specific driver perform the following actions as appropriate.

Case 1. Digit 0–3:
Input 16 bit data serially, Pulse Load Line High Once

Case 2. Digit 4-7:
Input 32 bits of data that corresponds to the information to be displayed on Digits 0-3 + Digits 4-7 (most significant) then Pulse Load Line High Once

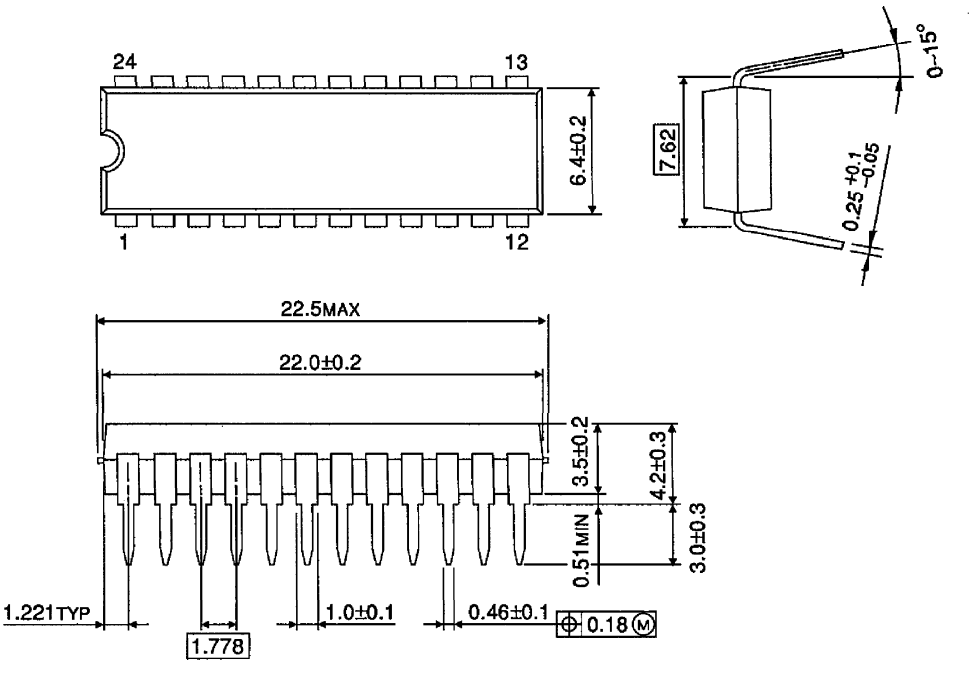
Case 3. Digit 8-11:
Input 48 bits of data that corresponds to the information to be displayed on Digits 0-3 + Digits 4-7 + Digits 8-11 (most significant) then Pulse Load Line High Once

TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

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Outline:

SDIP24-P-300-1.78 Unit : mm



Weight : 1.62g (Typ.)

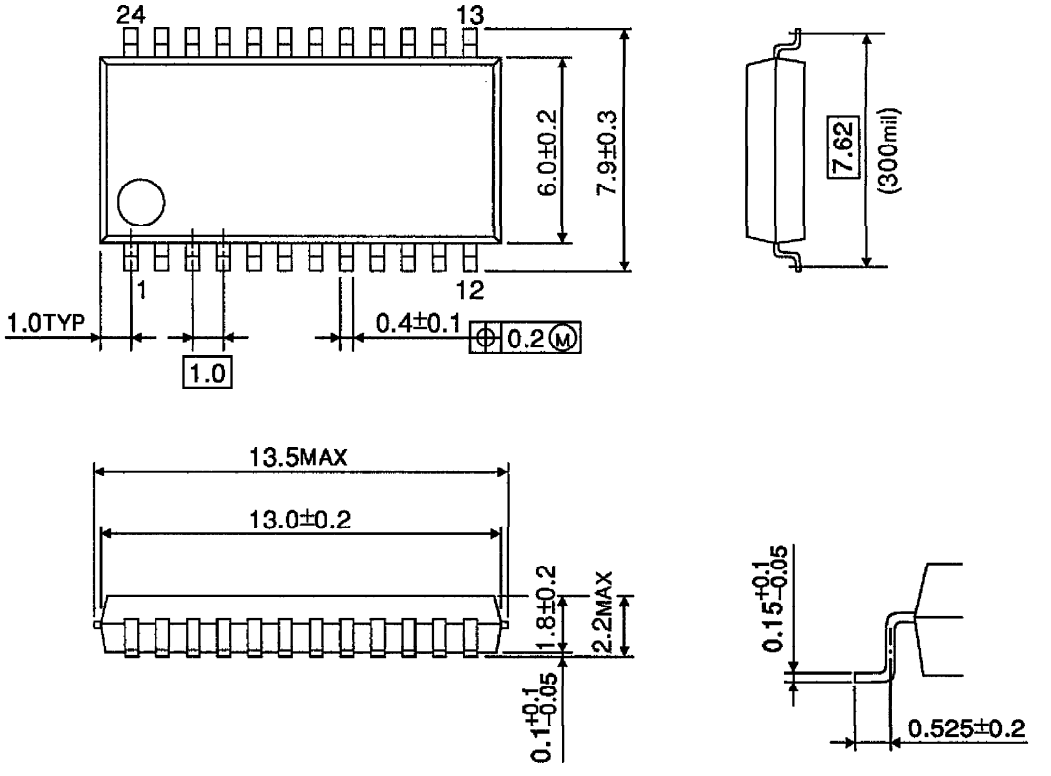
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120 Broadway • Menands, New York 12204
Toll Free: **(800) 98-4LEDS** • Fax: (518) 432-7454

TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

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Outline:

SSOP24-P-300-1.00 Unit : mm



Weight : 0.32g (Typ.)

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For up-to-date product info visit our web site at www.marktechopto.com

All specifications subject to change.