

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

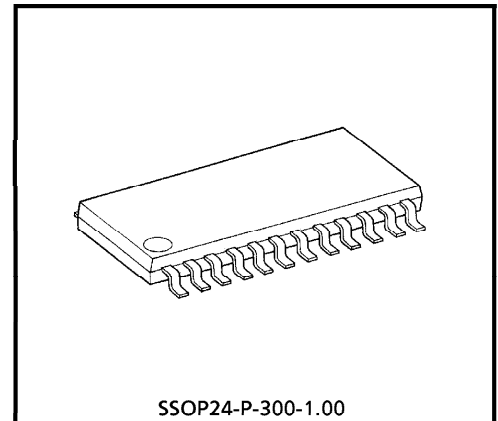
TD62C853F, TD62C854F

8BIT SERIAL-IN PARALLEL-OUT SHIFT REGISTER / LATCH DRIVERS

The TD62C853F and TD62C854F are monolithic circuits designed to be used together with Bi-CMOS integrated circuits. The devices consist of a 8 bit shift register, 8 bit latches, and 8 output circuits.

FEATURES

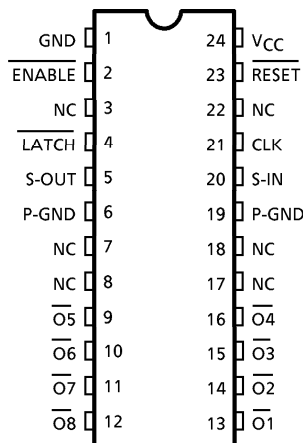
- 8 bit serial-in parallel-out shift register / latch driver (Bi-CMOS process)
- Maximum output sustaining voltage ; 50 V
- Maximum output current ;
 TD62C853F 200 mA / ch (Low saturation type)
 TD62C854F 500 mA / ch (darlington type)
- CMOS compatible inputs
- Package ; SSOP24-P-300-1.00



Weight : 0.32 g (Typ.)

Note: S-OUT pin is sensitive against Latch-up. (Latch-up performance is under 30mA)
 Please connect an external resistor to S-OUT pin in series due to protect this device from Latch-up. (Recommended resistance: R = 100 [Ω])

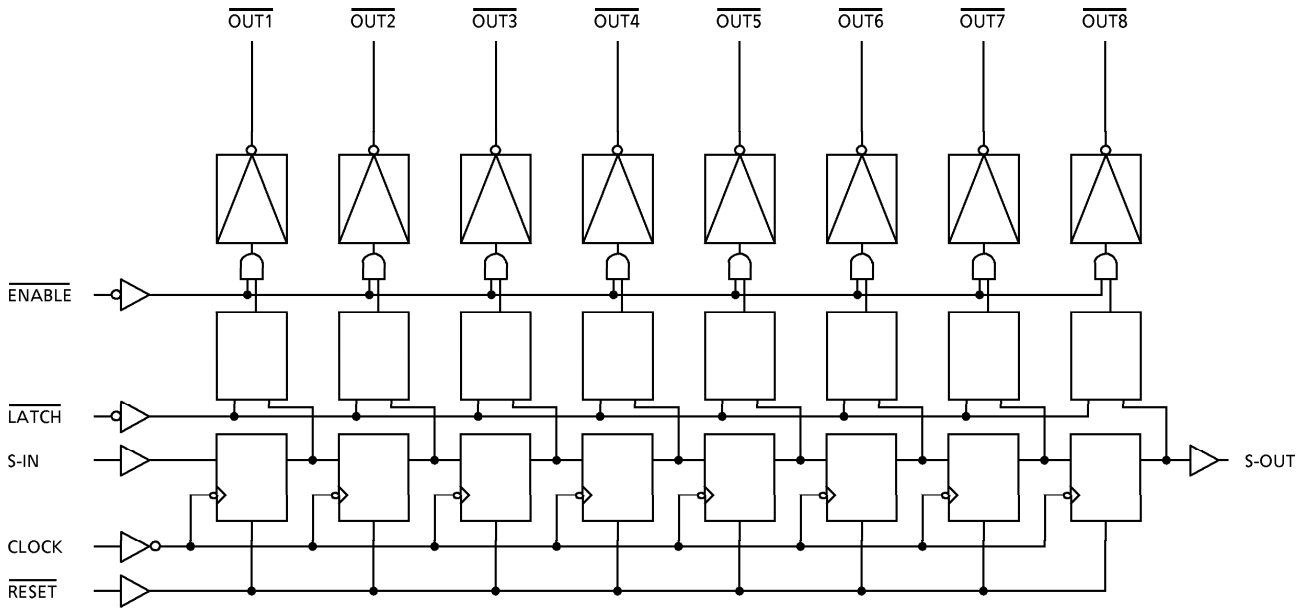
PIN CONNECTION (TOP VIEW)



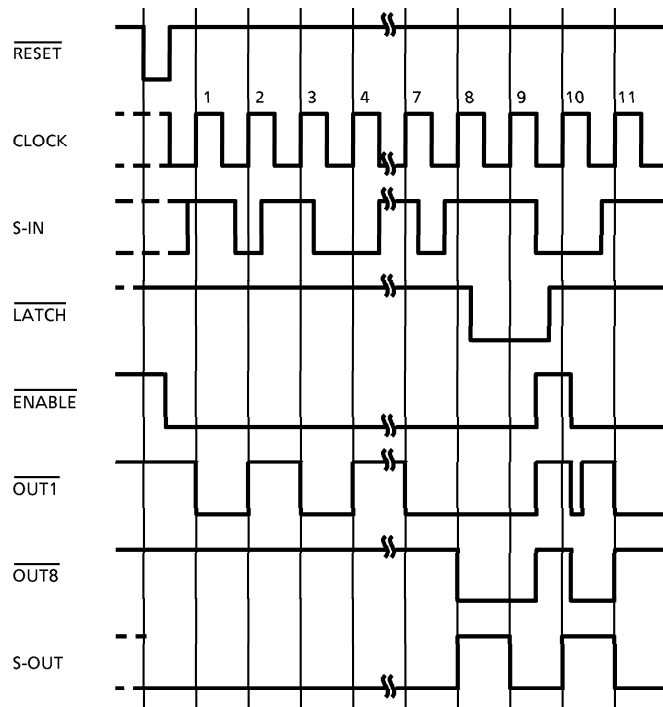
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BLOCK DIAGRAM

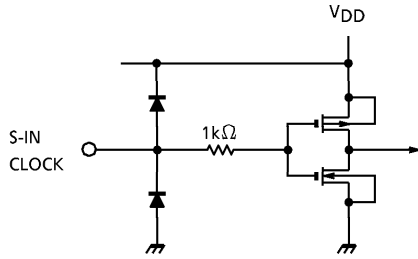


TIMING DIAGRAM

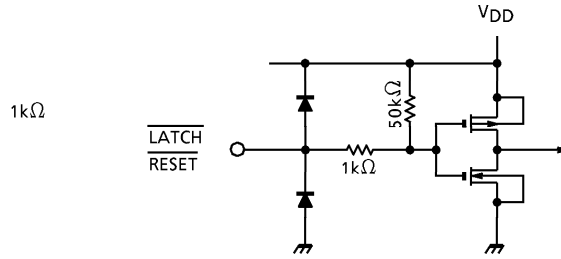


EQUIVALENT CIRCUITS OF INPUTS AND OUTPUTS

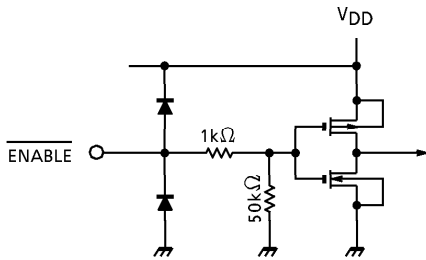
S-IN, CLOCK terminal equivalent circuit



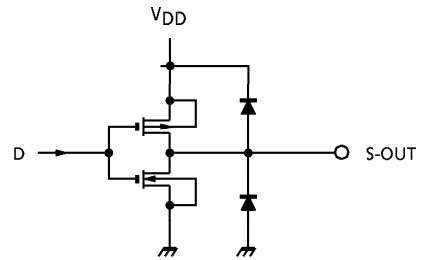
$\overline{\text{LATCH}}$, $\overline{\text{RESET}}$ terminal equivalent circuit



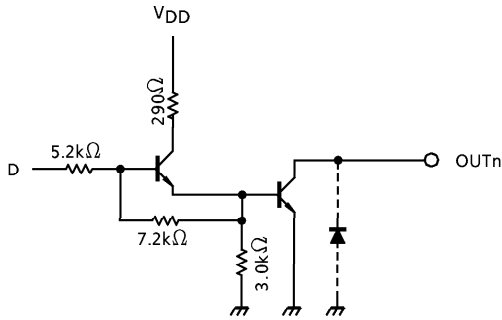
$\overline{\text{ENABLE}}$ terminal equivalent circuit



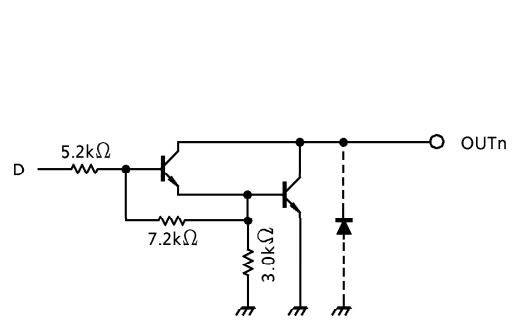
S-OUT terminal equivalent circuit



Output terminal equivalent circuit (TD62C853F)



Output terminal equivalent circuit (TD62C854F)



(Note) The output parasitic diode cannot be used as clamp diode.

TRUTH TABLE

CK	\bar{E}	\bar{R}	$\overline{\text{LATCH}}$	S-IN	OUT		S-OUT
					$\overline{O1}$	$\overline{O_n-1}$	
	L	H	H	L	OFF	$\overline{O_n-1}$	Q7
	L	H	H	H	ON	$\overline{O_n-1}$	Q7
	L	H	L	(*)	NC	NC	Q7
	H	H	(*)	(*)	OFF	NC	Q7
	(*)	(*)	(*)	(*)	NC	NC	Q7
(*)	(*)	L	H	(*)	OFF	OFF	L
(*)	H		L	(*)	NC	NC	L

CK = CLOCK
 \bar{E} = ENABLE
 \bar{R} = RESET
 $\overline{\text{LATCH}}$ = LATCH
 S-IN = SERIAL IN
 OUT = PARALLEL OUT
 S-OUT = SERIAL OUT

(*) = DON'T CARE
 NC = NO CHANGE
 L = LOW LEVEL
 H = HIGH LEVEL

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	- 0.3~7.0	V
Output Sustaining Voltage	V _{CE (SUS)}	- 0.5~50	V
Output Current	TD62C853F	200	mA / ch
	TD62C854F	500	
Input Voltage	V _{IN}	~0.4~V _{DD} + 0.3	V
Power Dissipation	P _D	830 (*)	mW
Operating Temperature	T _{opr}	- 40~85	°C
Storage Temperature	T _{stg}	- 55~150	°C

(*) On PCB (50 × 50 × 1.6 mm Cu 30% Glass Epoxy PCB)
 The derating factor above Ta = 25°C: 6.6 mW / °C

PRECAUTIONS for USING

Utmost care is necessary in the design of the output line, V_{DD} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

RECOMMENDED OPERATING CONDITIONS (Ta = -40~85°C)

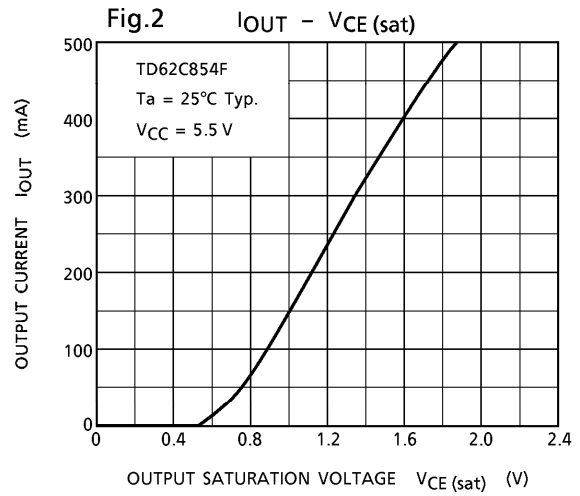
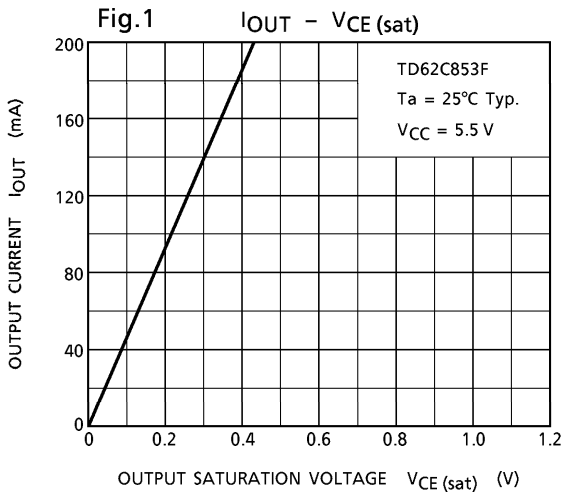
CHARACTERISTIC		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT	
Supply Voltage		V _{DD}	—	4.5	5.0	5.5	V	
Input Voltage		V _{IN}	—	0	—	V _{DD}	V	
Output Current ("H" Level)	S-OUT	I _{OH}	Ta = 25°C	—	—	-0.4	mA	
Output Voltage ("H" Level)	$\overline{\text{On}}$	V _{OH}	—	0	—	50	V	
Output Current ("L" Level)	S-OUT	I _{OL}	—	—	—	0.4	mA / ch	
			DC 1 circuit, Ta = 25°C	0	—	160		
	8 circuits on T _{pw} = 25 ms Ta = 85°C V _{DD} = 5.5 V		Duty = 10%	0	—	160		
			Duty = 40%	0	—	55		
	TD62C853F		$\overline{\text{On}}$	DC 1 circuit, Ta = 25°C	0	—		360
				8 circuits on T _{pw} = 25 ms Ta = 85°C V _{DD} = 5.5 V	Duty = 10%	0		—
Duty = 50%	0	—	170					
Clock Frequency		f _{CLOCK}	—	1.5	—	—	MHz	
Clock Pulse Width		f _w CLOCK	—	0.33	—	—	μs	
Data Set Up Time		t _{setup}	—	100	—	—	ns	
Data Hold Time		t _{hold}	—	100	—	—	ns	

ELECTRICAL CHARACTERISTICS (Ta = -40~85°C)

CHARACTERISTIC		SYM-BOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT			
Input Voltage	"H" Level	V _{IH}	—	—	0.7 V _{DD}	—	—	V			
	"L" Level	V _{IL}	—	—	—	—	0.3 V _{DD}				
Input Current	"H" Level	I _{IH}	—	ENABLE, V _{DD} = 5.5 V V _{IH} = V _{DD}	28	55	110	μA			
	"L" Level	I _{IL}	—	LATCH, RESET V _{DD} = 5.5 V, V _{IL} = GND	-55	-110	-275				
		I _{IN}	—	CLOCK, S-IN V _{IN} = V _{CC} or GND	—	—	±1.0				
Output Voltage	"H" Level	S-OUT	V _{OH}	—	V _{DD} = 4.5 V I _{OH} = -10 μA	3.9	4.1	—	V		
	"L" Level	S-OUT	V _{OL}	—	V _{DD} = 4.5 V	I _{OL} = 0.8 mA	—	0.2	0.4	V	
						I _{OL} = 100 mA	—	0.29	0.50		
						I _{OL} = 160 mA	—	0.39	0.65		
						I _{OL} = 250 mA	—	1.24	1.90		
						I _{OL} = 400 mA	—	1.54	2.30		
Output Current	"H" Level	$\overline{O_n}$	I _{OH}	—	V _{DD} = 5.5 V, V _{OH} = 50.0 V	—	—	100	μA		
Operating Supply Current			I _{DD1}	—	V _{DD} = 5.5 V Ta = 25°C	ENABLE = "H"	—	130	200	μA	
			I _{DD2}			f _{CLK} = 1 MHz Output open DATA = 1/2 f _{CLK}	—	2.0	5.0		
			TD62C853F TD62C854F			I _{DD3}	1 circuit on f _{CLK} = 1 MHz	—	35		40
							ENABLE = "L"	—	1.0		1.4

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Propagation Delay Time	Low-to-High	CK-S-OUT	t _{pLH}	V _{DD} = 5.0 V, V _{IH} = 5.0 V V _{IL} = 0 V, Duty = 50% R _L = { 300 Ω (TD62C853F) 120 Ω (TD62C854F) }	—	0.40	0.65	μs
		CK- $\overline{O}n$			—	1.80	3.00	
		L- $\overline{O}n$			—	2.10	3.50	
		R- $\overline{O}n$			—	1.50	2.50	
		E- $\overline{O}n$			—	1.50	2.50	
	High-to-Low	CK-S-OUT	t _{pHL}		—	0.33	0.55	
		CK- $\overline{O}n$			—	0.41	0.70	
		L- $\overline{O}n$			—	0.30	0.50	
		R-S-OUT			—	0.25	0.42	
		E- $\overline{O}n$			—	0.21	0.35	
Maximum Clock Frequency		f _{MAX}	—	1.5	2.0	—	MHz	
Minimum Pulse Width	CLOCK	t _{wCK}	—	—	250	330	ns	
	LATCH	t _{wL}	—	—	116	160		
	RESET	t _{wR}	—	—	107	140		
Data Set Up Time		t _{setup}	—	—	30	60	ns	
Data Hold Time		t _{hold}	—	—	14	40		
Maximum Clock Rise Time		t _r	—	—	70	—	ns	
Maximum Clock Fall Time		t _f	—	—	70	—		



TD62C853F each characteristic data and reference graph

Output current I_{OUT} vs lighting rate DUTY,
 Condition: 1~8 circuit operation, $V_{DD} = 5.5\text{ V}$

Fig.3 DUTY - I_{OUT} ($T_{opr} = 85^\circ\text{C}$)

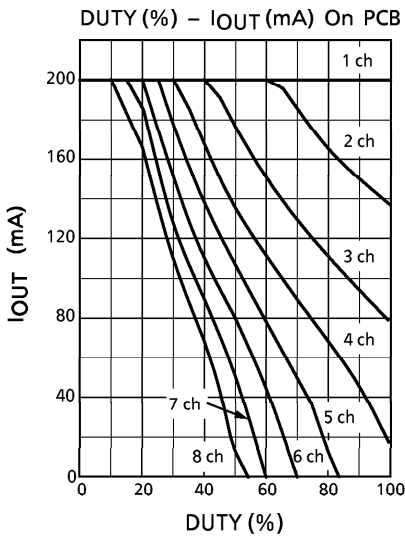


Fig.4 DUTY - I_{OUT} ($T_{opr} = 55^\circ\text{C}$)

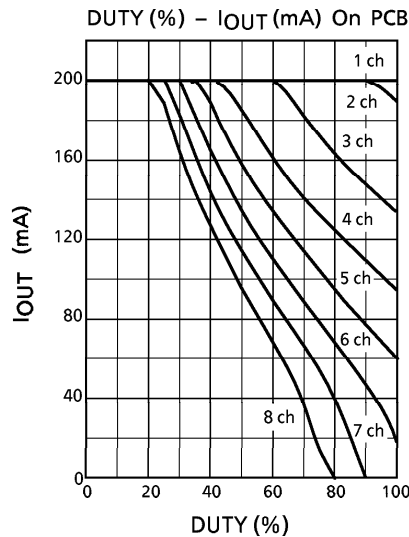
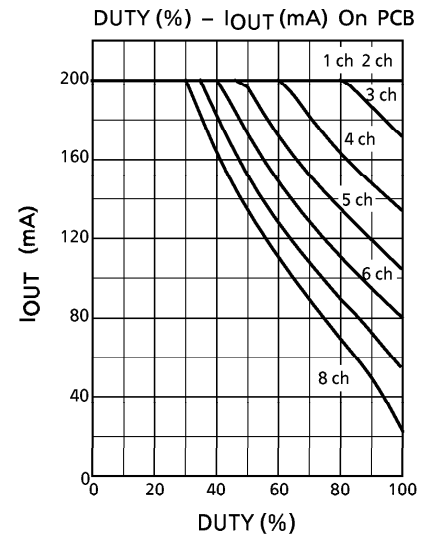


Fig.5 DUTY - I_{OUT} ($T_{opr} = 25^\circ\text{C}$)



TD62C854F each characteristic data and reference graph

Output current I_{OUT} vs lighting rate DUTY,
 Condition: 1~8 circuit operation, $V_{DD} = 5.5\text{ V}$

Fig.6 DUTY - I_{OUT} ($T_{opr} = 85^\circ\text{C}$)

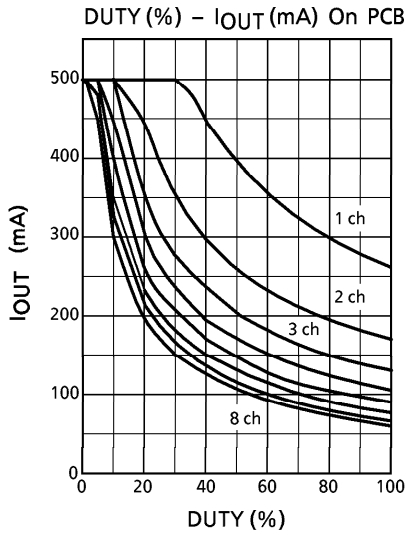


Fig.7 DUTY - I_{OUT} ($T_{opr} = 55^\circ\text{C}$)

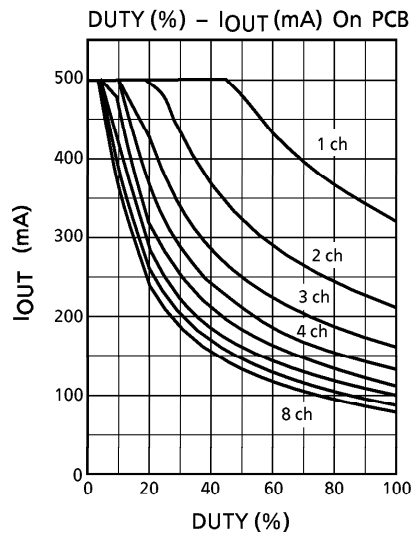
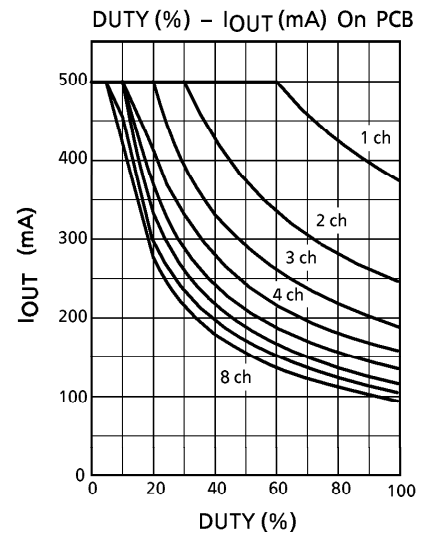
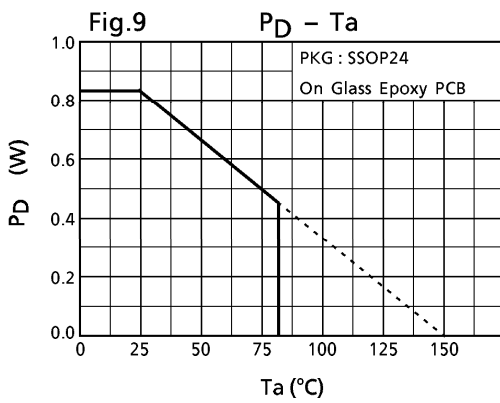


Fig.8 DUTY - I_{OUT} ($T_{opr} = 25^\circ\text{C}$)

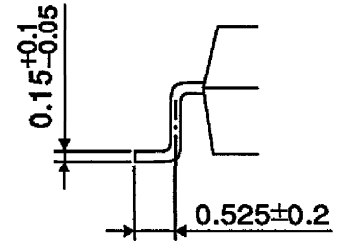
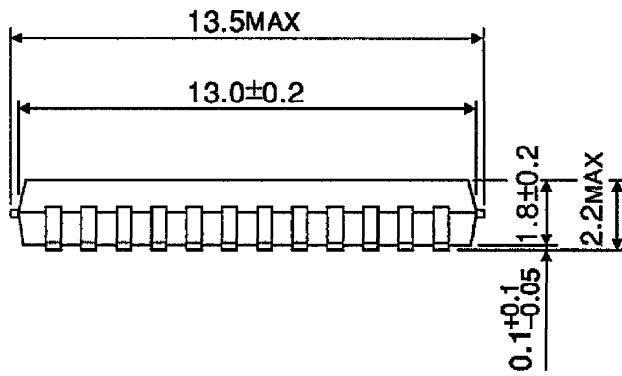
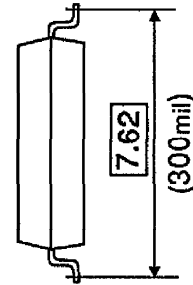
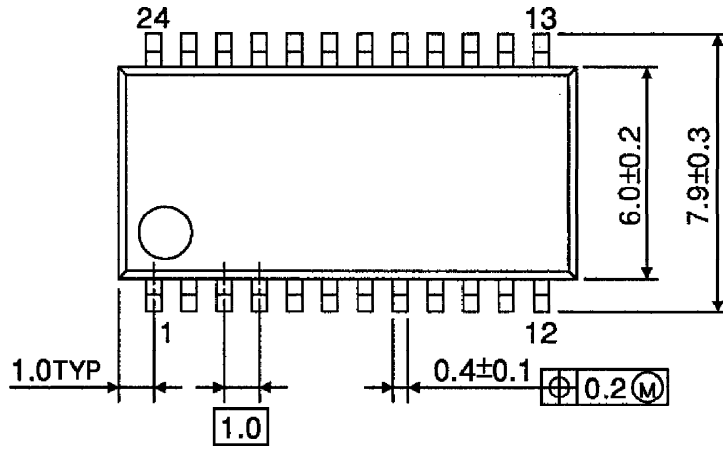


SSOP24 Power dissipation



PACKAGE DIMENSIONS
SSOP24-P-300-1.00

Unit: mm



Weight: 0.32 g (Typ.)