

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

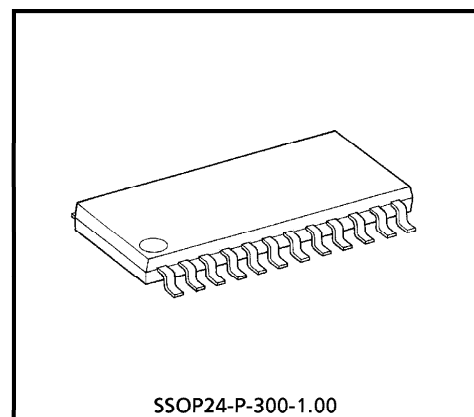
TD62C853F, TD62C854F

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)

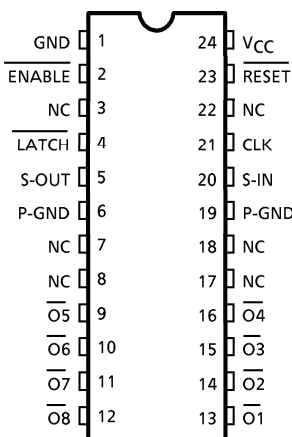


Weight : 0.32 g (Typ.)

- CMOS compatible inputs
- Package ; SSOP24-P-300-1.00

(Note) S-OUT pin is sensitive against Latch-up. (Latch-up performance is under 30mA)

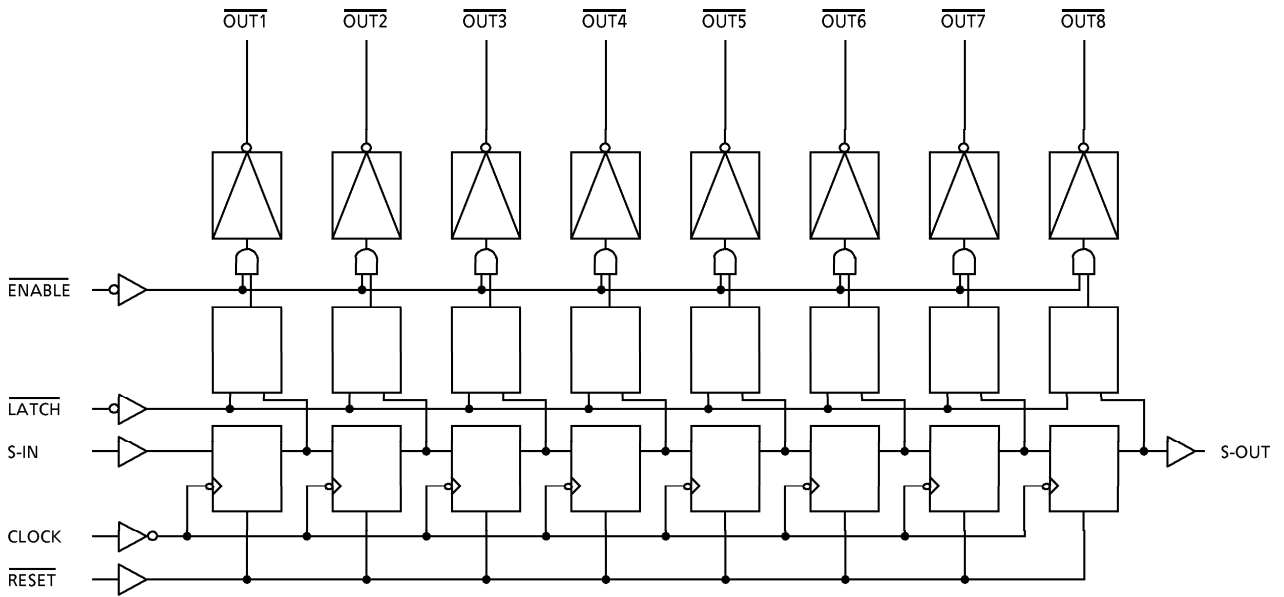
PIN CONNECTION (TOP VIEW)



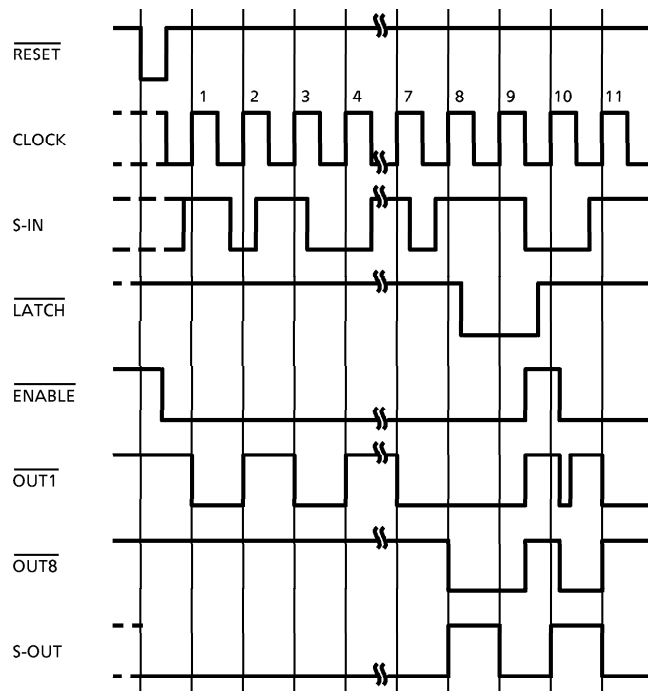
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BLOCK DIAGRAM

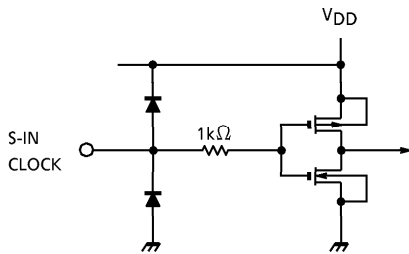


TIMING DIAGRAM

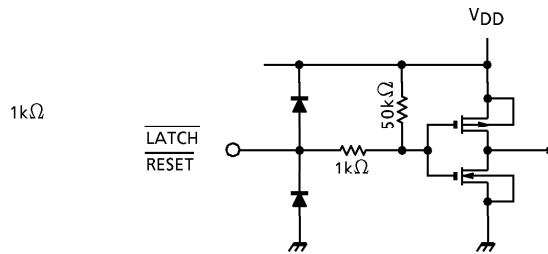


EQUIVALENT CIRCUITS OF INPUTS AND OUTPUTS

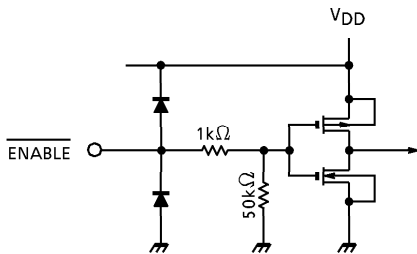
S-IN, CLOCK terminal equivalent circuit



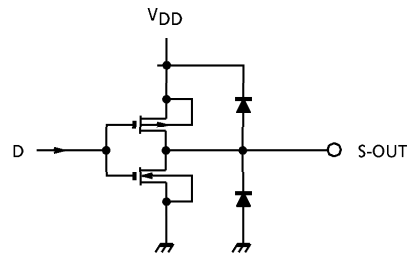
LATCH, RESET terminal equivalent circuit



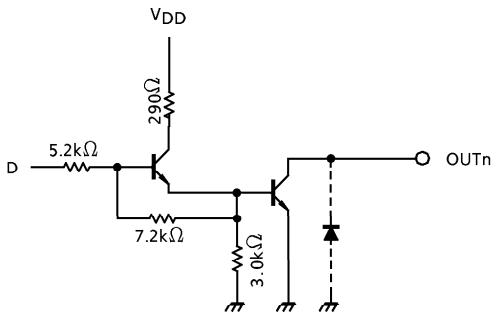
ENABLE terminal equivalent circuit



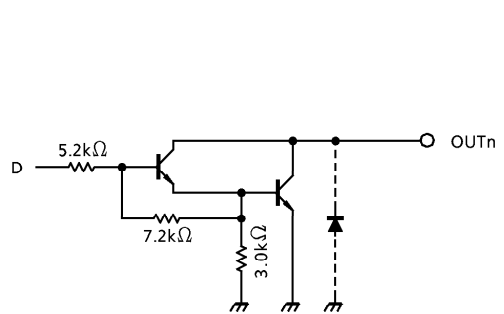
S-OUT terminal equivalent circuit



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 |
|-----|-----------|-----------|---------------------------|------|-----|--------------------|-------|
| | | | | | O1 | $\overline{O_n}$ | |
| | 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 | 780 (*) | 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)
 Ambient temperature delated above 25°C in the proportion of 6.6 mW/°C

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

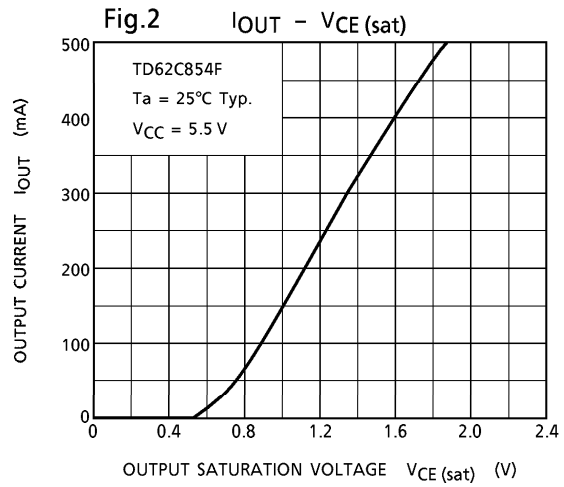
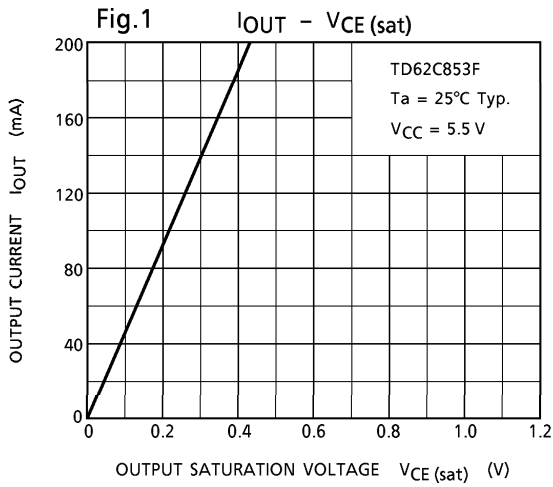
| CHARACTERISTIC | | SYMBOL | CONDITION | MIN | TYP. | MAX | UNIT | | |
|----------------------------|------------------|----------------------|--|--|-------------------------|-----------------|---------|-----|-----|
| Supply Voltage | | V _{DD} | — | 4.5 | 5.0 | 5.5 | V | | |
| Input Voltage | | V _{IN} | — | 0 | — | V _{DD} | V | | |
| Output Current ("H" Level) | S-OUT | I _{OH} | Ta = 25°C | — | — | -0.4 | mA | | |
| Output Voltage ("H" Level) | $\overline{O_n}$ | V _{OH} | — | 0 | — | 50 | V | | |
| Output Current ("L" Level) | S-OUT | I _{OL} | — | — | — | 0.4 | mA / ch | | |
| | TD62C853F | | 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 | |
| | TD62C854F | | $\overline{O_n}$ | 8 circuits on T _{pw} = 25 ms Ta = 85°C V _{DD} = 5.5 V | Duty = 40% | 0 | | — | 55 |
| | | | | | DC 1 circuit, Ta = 25°C | 0 | | — | 360 |
| | TD62C854F | | $\overline{O_n}$ | 8 circuits on T _{pw} = 25 ms Ta = 85°C V _{DD} = 5.5 V | Duty = 10% | 0 | | — | 400 |
| 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 On | 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 | On | 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 | mA | |
| | | | 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} | — | $V_{DD} = 5.0\text{ V}, V_{IH} = 5.0\text{ V}$ $V_{IL} = 0\text{ V}, \text{Duty} = 50\%$ $R_L = \begin{cases} 300\ \Omega \text{ (TD62C853F)} \\ 120\ \Omega \text{ (TD62C854F)} \end{cases}$ | — | 0.40 | 0.65 | μs |
| | | $\overline{\text{CK}}\text{-}\overline{\text{On}}$ | | | | — | 1.80 | 3.00 | |
| | | $\overline{\text{L}}\text{-}\overline{\text{On}}$ | | | | — | 2.10 | 3.50 | |
| | | $\overline{\text{R}}\text{-}\overline{\text{On}}$ | | | | — | 1.50 | 2.50 | |
| | | $\overline{\text{E}}\text{-}\overline{\text{On}}$ | | | | — | 1.50 | 2.50 | |
| | High-to-Low | CK-S-OUT | t_{pHL} | | | — | 0.33 | 0.55 | |
| | | $\overline{\text{CK}}\text{-}\overline{\text{On}}$ | | | | — | 0.41 | 0.70 | |
| | | $\overline{\text{L}}\text{-}\overline{\text{On}}$ | | | | — | 0.30 | 0.50 | |
| | | R-S-OUT | | | | — | 0.25 | 0.42 | |
| | | $\overline{\text{E}}\text{-}\overline{\text{On}}$ | | | | — | 0.21 | 0.35 | |
| Maximum Clock Frequency | | | f_{MAX} | — | | 1.5 | 2.0 | — | MHz |
| Minimum Pulse Width | CLOCK | t_{wCK} | — | | — | 250 | 330 | ns | |
| | $\overline{\text{LATCH}}$ | t_{wL} | | — | 116 | 160 | | | |
| | $\overline{\text{RESET}}$ | 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} ($T_{opr} = 85^\circ\text{C}$)

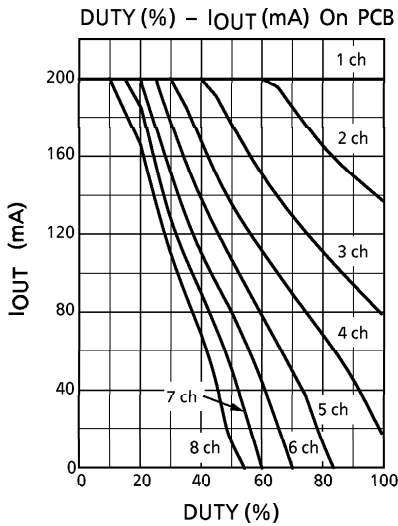


Fig.4 DUTY - I_{OUT} ($T_{opr} = 55^\circ\text{C}$)

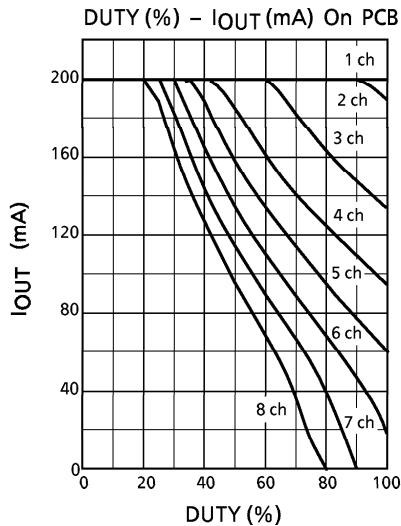
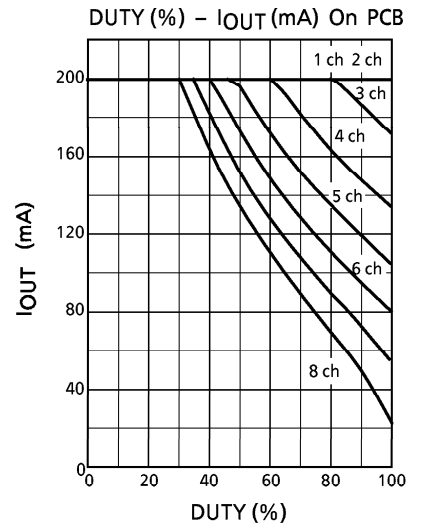


Fig.5 DUTY - I_{OUT} ($T_{opr} = 25^\circ\text{C}$)



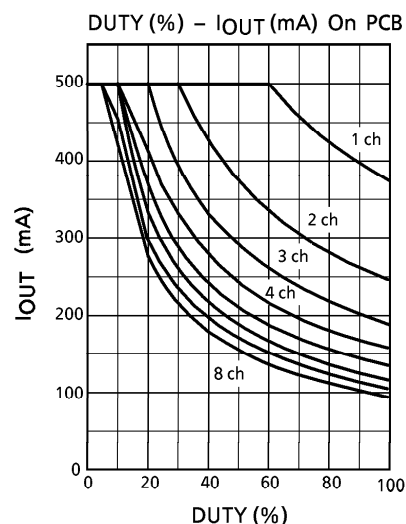
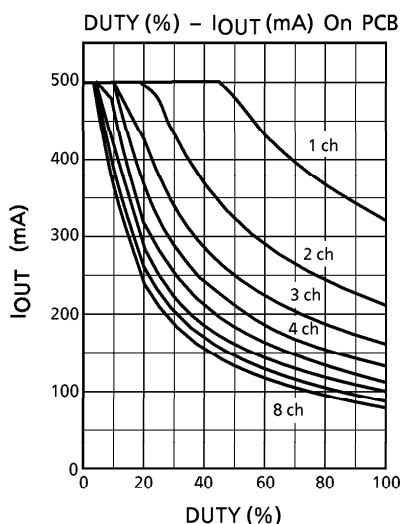
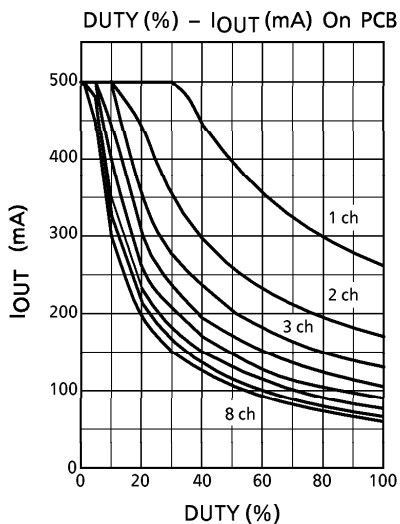
TD62C854F each characteristic data and reference graph

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

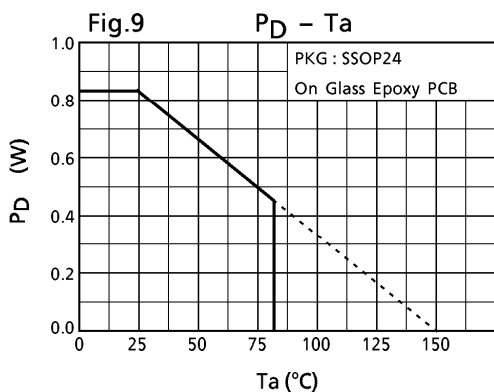
Fig.6 DUTY - I_{OUT} (Topr = 85°C)

Fig.7 DUTY - I_{OUT} (Topr = 55°C)

Fig.8 DUTY - I_{OUT} (Topr = 25°C)

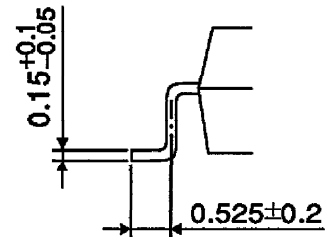
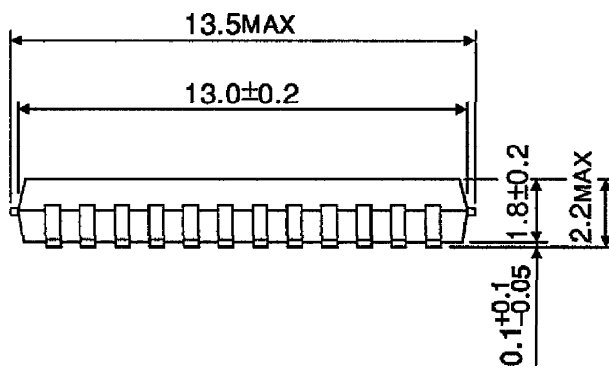
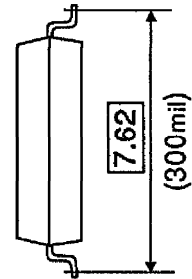
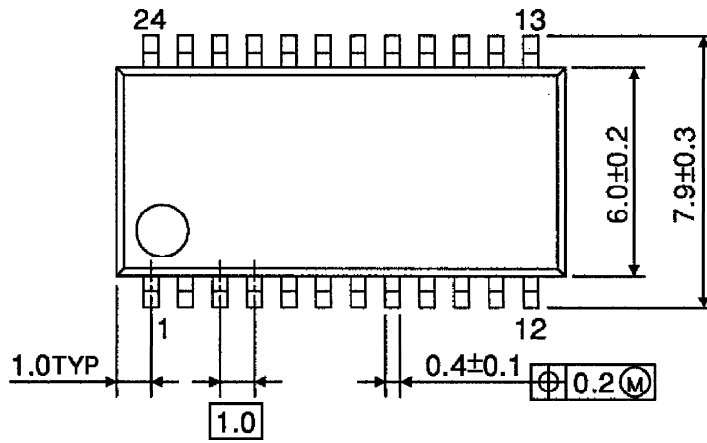


SSOP24 Power dissipation



PACKAGE DIMENSIONS
SSOP24-P-300-1.00

Unit: mm



Weight: 0.32 g (Typ.)