TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT   SILICON MONOLITHIC
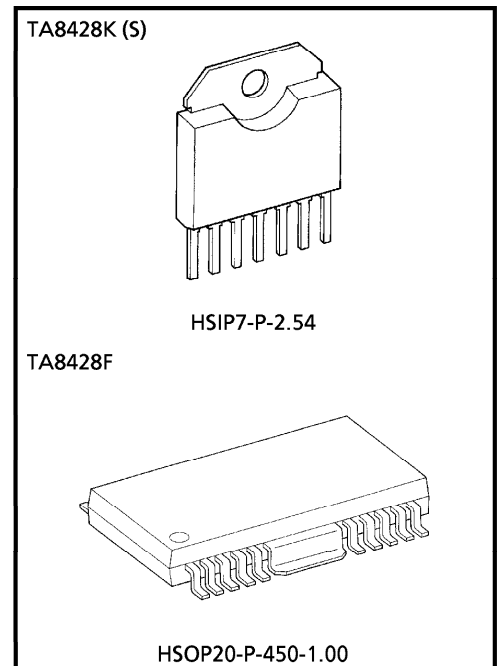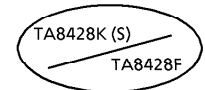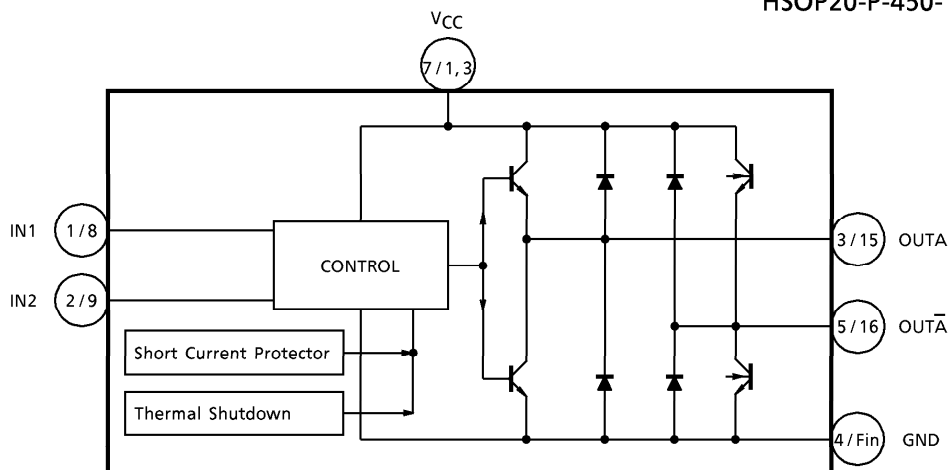
TA8428K (S), TA8428F

FULL BRIDGE DRIVER

The TA8428K (S), TA8428F is Full Bridge Driver IC for Brush Motor Rotation Control.
Forward Rotation, Reverse Rotation, Stop and Braking operations are available.
Thermal Shutdown and Short Current Protector are provided.

TA8428K (S)

HSIP7-P-2.54

TA8428F

HSOP20-P-450-1.00

Weight
HSIP7-P-2.54   : 1.88 g (Typ.)
HSOP20-P-450-1.00 : 0.79 g (Typ.)

FEATURES

● Output Current : TA8428K (S)   1.5 A (AVE.), 3.0 A (PEAK)
                          TA8428F   0.8 A (AVE.), 2.4 A (PEAK)

● 4 modes (forward / reverse / short brake and stop) are available with 2 TTL compatible inputs control.

● Free wheeling diodes are equipped.

● Multi protection system driver
  (Thermal shutdown and short current protector)

BLOCK DIAGRAM

980910EBA2

PIN FUNCTION

PIN No. K (S)	PIN No. F	SYMBOL	FUNCTIONAL DESCRIPTION
1	8	IN1	TTL compatible control inputs.
2	9	IN2	(PNP type low active comparator inputs)
3	15	OUTA	Output terminals and free wheeling diodes are connected between each output to GND and V_{CC}.
4	Fin	GND	GND terminal
5	16	OUT$\overline{A}$	Output terminals and free wheeling diodes are connected between each output to GND and V_{CC}.
6	Other pin	N.C	Non connection
7	1, 3	V_{CC}	Supply voltage terminal for control and motor drive.

TA8428K (S), TA8428F has 2 build-in protective functions which work independently.
These circuit operations are as follows.
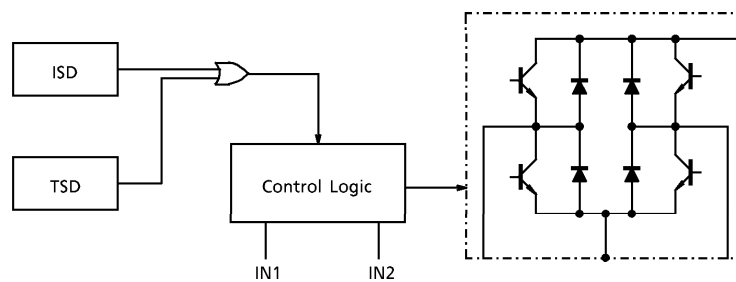
● Thermal shutdown (TSD)

If junction temperature of TA8428K (S), TA8428F is over the specified temperature (150°C Typ.) by excess power dissipation or abnormal ambient temperature change, thermal Shutdown circuit turn "ON" and output 4 transistors become High impedance. (All transistors turn "OFF")

● Short current protector (ISD)

Short current protector circuit senses all output transistor current. If output transistor current is over the specified limiting current value (2.0~3.0 A Typ.), short current protector operates and all output transistors periodically turn "OFF" (High Impedance Mode) in a period of approximately 80 μs.
This state is continued until the release of over current mode.
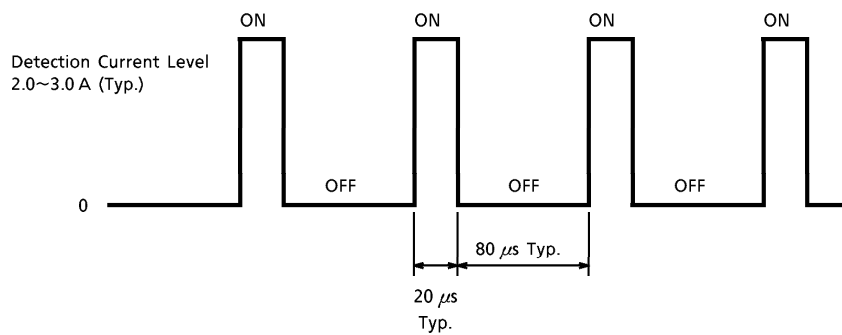
INTERNAL CIRCUIT
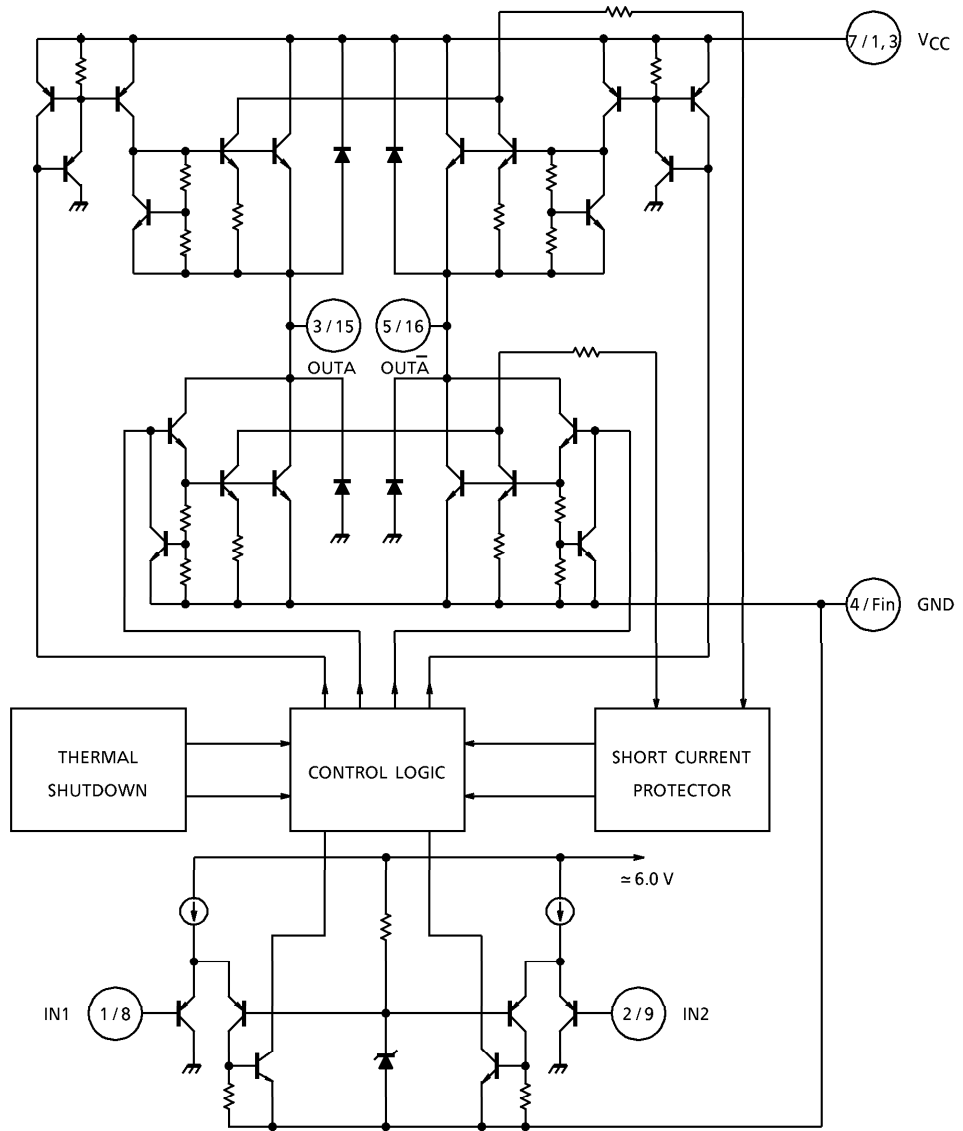
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC				SYMBOL	RATING	UNIT
Supply Voltage				V_{CC}	30	V
Input Voltage				V_{IN}	$-0.3 \sim V_{CC}$	V
Output Current	K (S) type		PEAK	I_O (PEAK)	3.0 (Note 1)	A
			AVE.	I_O (AVE.)	1.5	
	F type		PEAK	I_O (PEAK)	2.4 (Note 1)	
			AVE.	I_O (AVE.)	0.8	
Power Dissipation	K (S) type		P_D	1.25 (Note 2)	W	
				10.0 (Note 3)		
	F type		P_D	1.9 (Note 4)		
				2.5 (Note 5)		
Operating Temperature				T_{opr}	$-30 \sim 85$	°C
Storage Temperature				T_{stg}	$-55 \sim 150$	°C

(Note 1) : t = 100 ms
(Note 2) : No heat sink
(Note 3) : Tc = 85°C
(Note 4) : This value is obtained by 30 × 30 × 1.6mm PCB mounting occupied copper area in excess of 60%
(Note 5) : This value is obtained by 50 × 50 × 1.6mm PCB mounting occupied copper area in excess of 60%

ELECTRICAL CHARACTERISTICS (V_{CC} = 24 V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current		I_{CC1}	1	Stop mode	—	8	15	mA
		I_{CC2}		Forward / reverse mode	—	35	85	
		I_{CC3}		Brake mode	—	16	30	
Input Voltage		V_{IL}	2	—	—	—	0.8	V
		V_{IH}		—	2.0	—	—	
Input Current		I_{IL}	2	V_{IN} = GND	—	—	50	μA
		I_{IH}		V_{IN} = V_{CC}	—	—	10	
Output Saturation Voltage	K (S) type	V_{sat} (total)	3	I_O = 1.5 A, Tc = 25°C	—	2.2	2.9	V
	F type			I_O = 0.8 A, Tc = 25°C	—	1.8	2.5	
Output Leakage Current		I_{LU}	4	V_L = 25 V	—	—	50	μA
		I_{LL}			—	—	50	
Diode Forward Voltage	K (S) type	I_{LU}	4	I_F = 1.5 A	—	2.6	—	V
		I_{LL}			—	1.5	—	
	F type	I_{LU}		I_F = 0.8 A	—	2.2	—	
		I_{LL}			—	1.2	—	
Thermal Shutdown Operating Temperature		T_{SD}	—	—	—	150	—	°C
Propagation Delay Time		t_{pLH}	2	—	—	1	—	μs
		t_{pHL}	2	—	—	1	—	

FUNCTION

INPUT		OUTPUT		MODE
IN1	IN2	OUTA	OUT$\overline{A}$	
H	H	L	L	Brake
L	H	L	H	CW / CCW
H	L	H	L	CCW / CW
L	L	OFF (high impedance)		Stop

(Note) : PIN ⑥ is non connection.
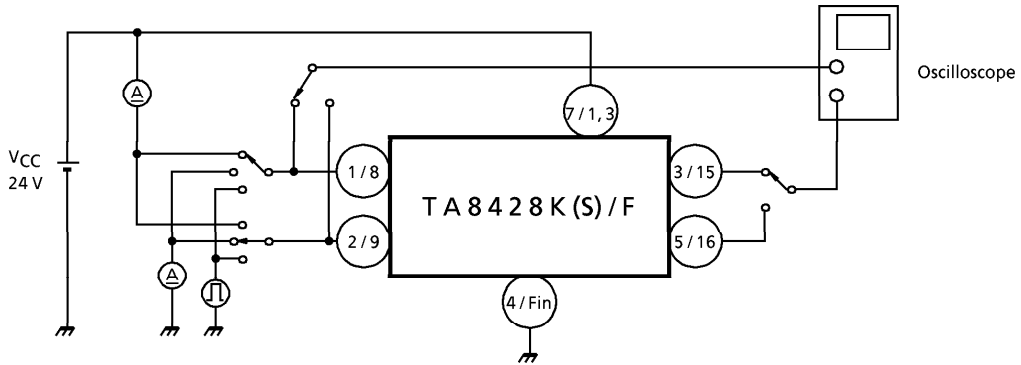(Note) : Heat fin is connected with GND with low impedance.
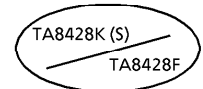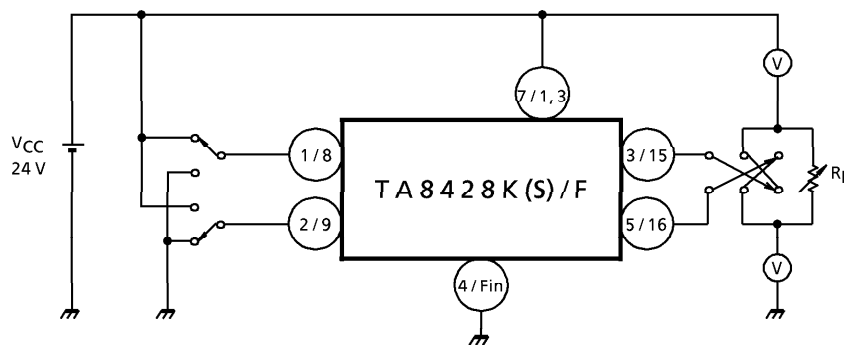
TEST CIRCUIT 1.

I_{CC1}, I_{CC2}, I_{CC3}
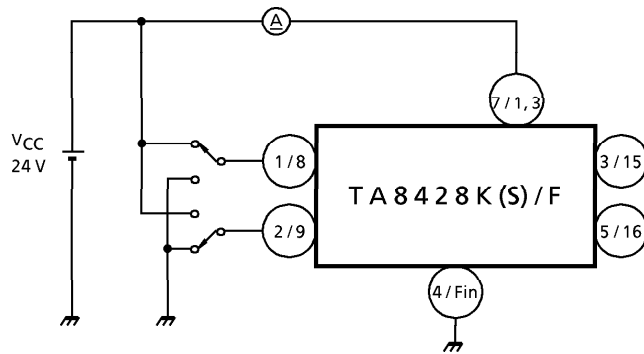
TEST CIRCUIT 2.

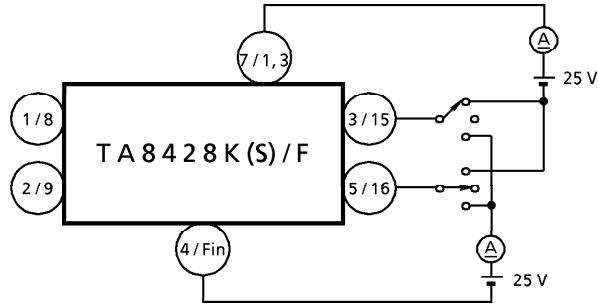V_{IL}, V_{IH}, I_{IL}, I_{IH}, t_{pLH}, t_{pHL}
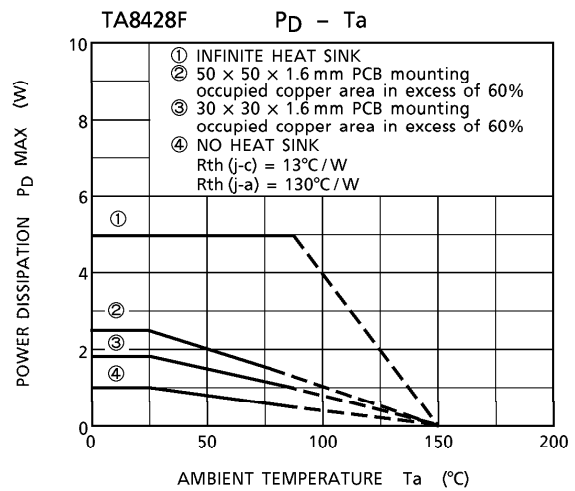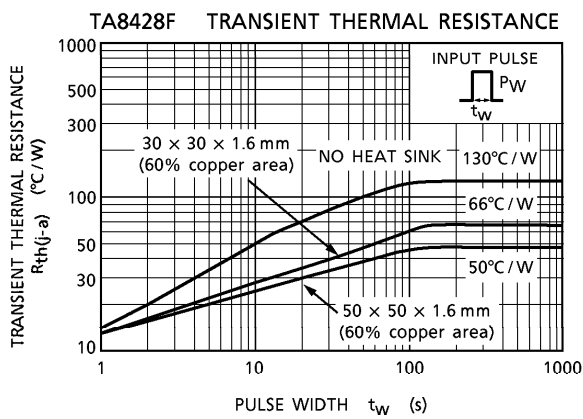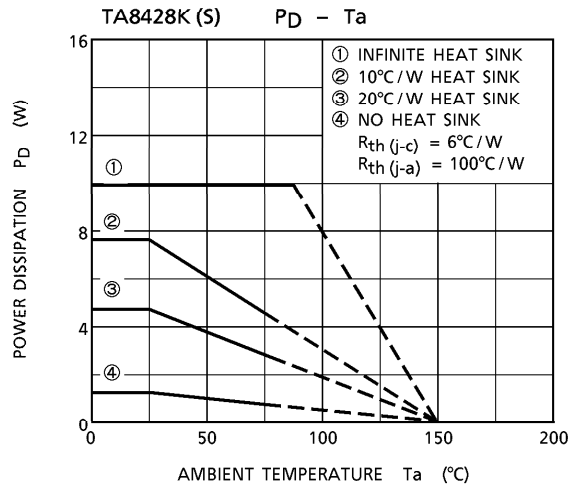

TEST CIRCUIT 3.

V_{sat}

TEST CIRCUIT 4.

I_{LH}, I_{LL}

TEST CIRCUIT 5.

V_{FU}, V_{FL}

OUTPUT SATURATION VOLTAGE

QUIESCENT CURRENT   (CW / CCW)

TA8428K (S)   TRANSIENT THERMAL RESISTANCE

TA8428K (S) P_D – Ta

① INFINITE HEAT SINK
② 10°C / W HEAT SINK
③ 20°C / W HEAT SINK
④ NO HEAT SINK
$R_{th\,(j-c)}$ = 6°C / W
$R_{th\,(j-a)}$ = 100°C / W

TA8428F   TRANSIENT THERMAL RESISTANCE

TA8428F P_D – Ta

① INFINITE HEAT SINK
② 50 × 50 × 1.6 mm PCB mounting
   occupied copper area in excess of 60%
③ 30 × 30 × 1.6 mm PCB mounting
   occupied copper area in excess of 60%
④ NO HEAT SINK
Rth (j-c) = 13°C / W
Rth (j-a) = 130°C / W

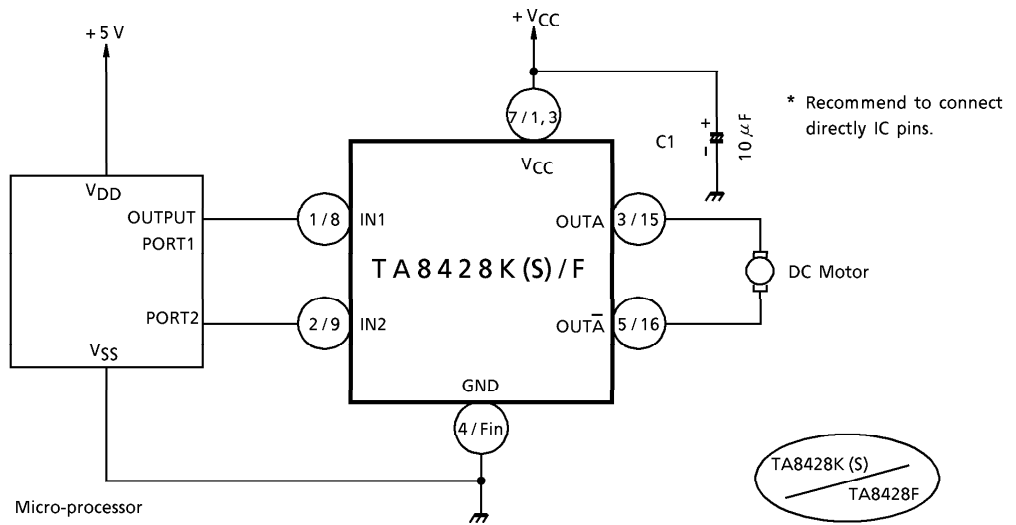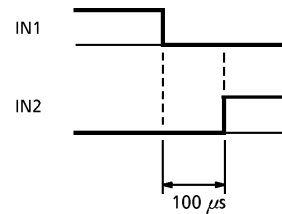## APPLICATION CIRCUIT

(Note) :   Recommend to take approximately 100 μs of input
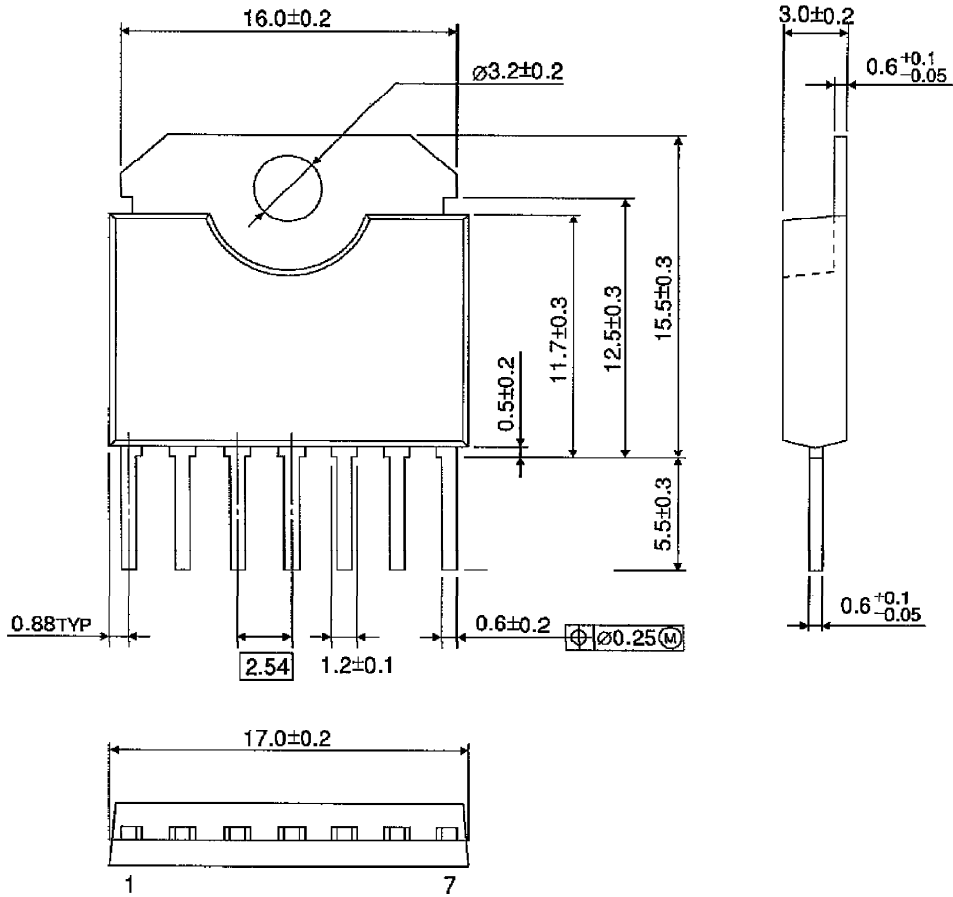dead time for reliable operations.

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

(Note) :   In case of mounted on radiators, do not use silicon rubber. (TA8428K(S))

(Note) :   Connect and use 1 pin and 3 pin surely. (TA8428F)
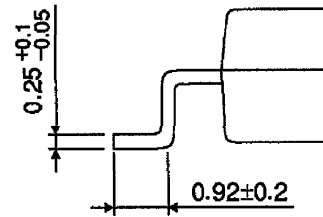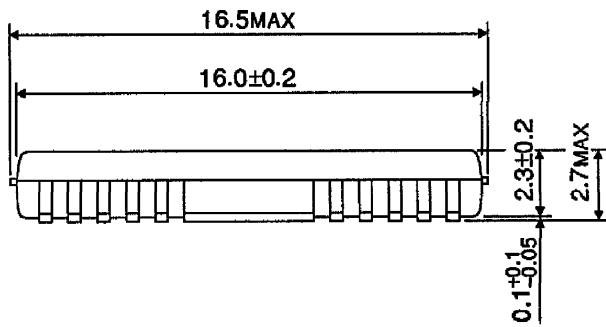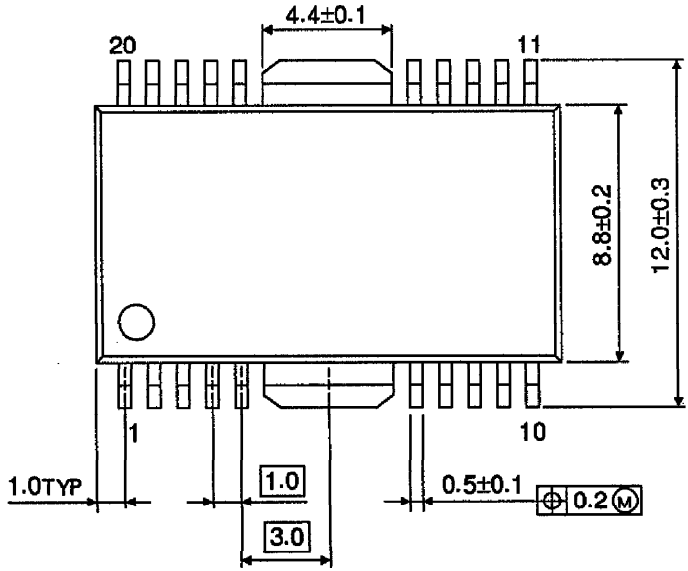
PACKAGE DIMENSIONS
HSIP7-P-2.54   Unit : mm

16.0±0.2

ø3.2±0.2

3.0±0.2

0.6$^{+0.1}_{-0.05}$

11.7±0.3

12.5±0.3

15.5±0.3

0.5±0.2

5.5±0.3

0.88 TYP

2.54   1.2±0.1

0.6±0.2   ⊕ ⌀0.25 Ⓜ

0.6$^{+0.1}_{-0.05}$

17.0±0.2

1   7

Weight : 1.88 g (Typ.)

PACKAGE DIMENSIONS

HSOP20-P-450-1.00

Unit : mm

Weight :