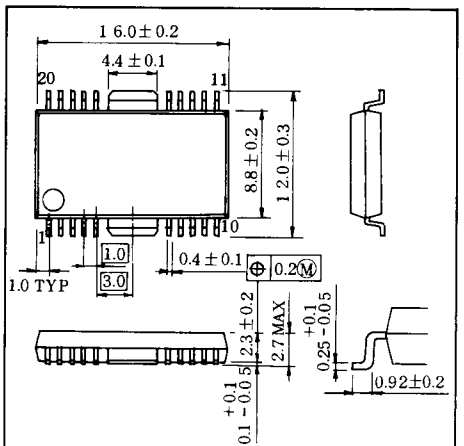
TA8402F

3 PHASE HALL MOTOR DRIVER.

TA8402F is output current detect voltage drive type 3 phase unipolar hall motor driver.
Bipolar drive also available with additional transistors.

- 3 Phase Unipolar Hall Motor Driver and Also Available Bipolar Drivers with Additional Transistors.
- Build in Control Amplifier.
- Build in Regulator for Hall Sensors.
- Output Current Up to 1.0A Max.(AVE).
- Wide Range of Operating Voltage
  : V_{CC} opr=4.0~15V, V_S opr=0~15V
- Build in Thermal Shut Down Circuit.

Unit in mm



Package width and length do not include mold protrusion.
Allowable mold protrusion is 0.15mm.

JEDEC	—
TOSHIBA	HSOP20-P-450

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage (Control)		V_{CC}	18	V
Supply Voltage (Motor)		V_S	18	V
Output Current	La, Lb, Lc	I_O	1.0	A
	ℓa, ℓb, ℓc	I_ℓ	30	mA
	Regulator (for Hall Sensor)	I_H	15	mA
Power Dissipation		P_D	1.0 3.2 Note 1	W
Operating Temperature		Topr	-30~75	°C
Storage Temperature		Tstg	-55~150	°C

Note 1. This rating is obtained by 50 × 50 × 1mm Fe board mounting.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=25°C, V_{CC}=5V)

CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current			I_{CC1}		Stop Mode, Output Open, No Hall Bias	-	1	3	mA
			I_{CC2}		FWD/REV Mode, Output Open, Hall Bias 1.5V	-	12.5	20	mA
Output Saturation Voltage			V_{SAT1}		I_O=0.1A	-	0.1	0.2	V
			V_{SAT2}		I_O=1.0A	-	0.8	1.4	
			V_{SAT3}		I_O=0.5A	-	0.4	-	
Saturation Voltage Differencial			ΔV_{SAT}		I_O=0.1A	-	10	50	mV
Regulator (⑩ PIN)	Output Voltage		V_{OH}		I_H=3mA	2.90	3.05	3.20	V
	Load Regulation		$Reg(V_{OH})$		I_H=3~15mA	-	2	10	mV/mA
	Temperature Coefficient		T_{CVH}		Ta=0~75°C	-	6	-	mV/°C
Position Sensing Input	Hysteresis		V_{HYS}			-	2	-	mV
	Offset		$V_{H(OFF)}$			-5	0	5	mV
	Operating Voltage Range		CMR(VH)			0.2	-	3	V
Rotation Control Input (⑰ PIN)	FWD	Operating Voltage	V_{FWD}			3.9	-	V_{CC}	V
		Input Current	I_{FWD}		V_{FWD}=5V, Sink Mode	-	1.5	2.0	mA
	STOP	Operating Voltage	V_{STP}			2.1	2.5	2.8	V
	REV	Operating Voltage	V_{REV}			0	-	0.9	V
		Input Current	I_{REV}		V_{REV}=0, Source Mode	-	0.4	0.6	mA
ET Amp (⑧ PIN)	Operating Voltage Range		CMR(ET)			1.5	2.5	3.5	V
	Gain		G_{ET}		⑦⑧ PIN→⑥ PIN, V_7=1.5V, V_8=2.5V	-	0	-	dB
CS Input (⑤ PIN)	Gain		G_{CS}		⑤ PIN→⑥ PIN V_{CS}=0~15mV	30	33	36	dB
	Limitting Voltage		$V_{CS(lim)}$			0.40	0.55	0.70	V
	Limitting Voltage Temperature Coefficient		$T_{C(Vlim)}$			-	0.6	-	mV/°C
Diode Forward Drop			V_F		I_F=0.7A	-	1.3	-	V
Thermal Shut Down Operating Temperature			T_{TSD}			150	160	-	°C

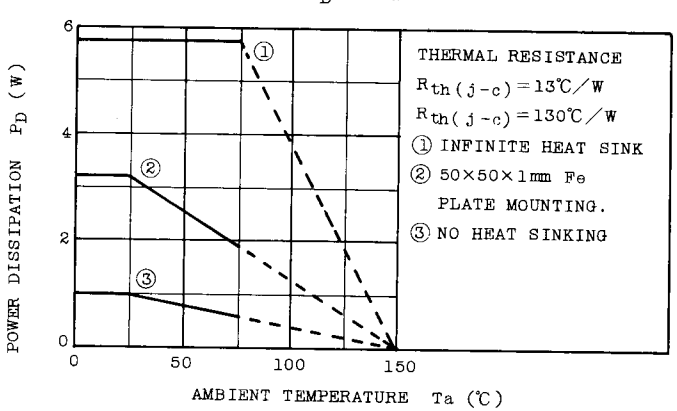
TRUTH TABLE

FWD/REV INPUT (17 PIN)	POSITION SENSING INPUT			OUTPUT					
	Ha	Hb	Hc	La (4 PIN)	Lb (3 PIN)	Lc (1 PIN)	ℓa (20 PIN)	ℓb (19 PIN)	ℓc (18 PIN)
	H	L	H	OFF	ON	OFF	OFF	OFF	ON
REV	H	L	L	OFF	ON	OFF	ON	OFF	OFF
V_{17}=0	H	H	L	OFF	OFF	ON	ON	OFF	OFF
	L	H	L	OFF	OFF	ON	OFF	ON	OFF
	L	H	H	ON	OFF	OFF	OFF	ON	OFF
(Note 2)	L	L	H	ON	OFF	OFF	OFF	OFF	ON
	H	L	H	OFF	OFF	ON	OFF	ON	OFF
FWD	H	L	L	ON	OFF	OFF	OFF	ON	OFF
V_{17}=5V	H	H	L	ON	OFF	OFF	OFF	OFF	ON
	L	H	L	OFF	ON	OFF	OFF	OFF	ON
	L	H	H	OFF	ON	OFF	ON	OFF	OFF
(Note 3)	L	L	H	OFF	OFF	ON	ON	OFF	OFF
	H	L	H						
STOP	H	L	L						
V_{17}=2.5V	H	H	L						
	L	H	L						
	L	H	H						
(Note 4)	L	L	H						

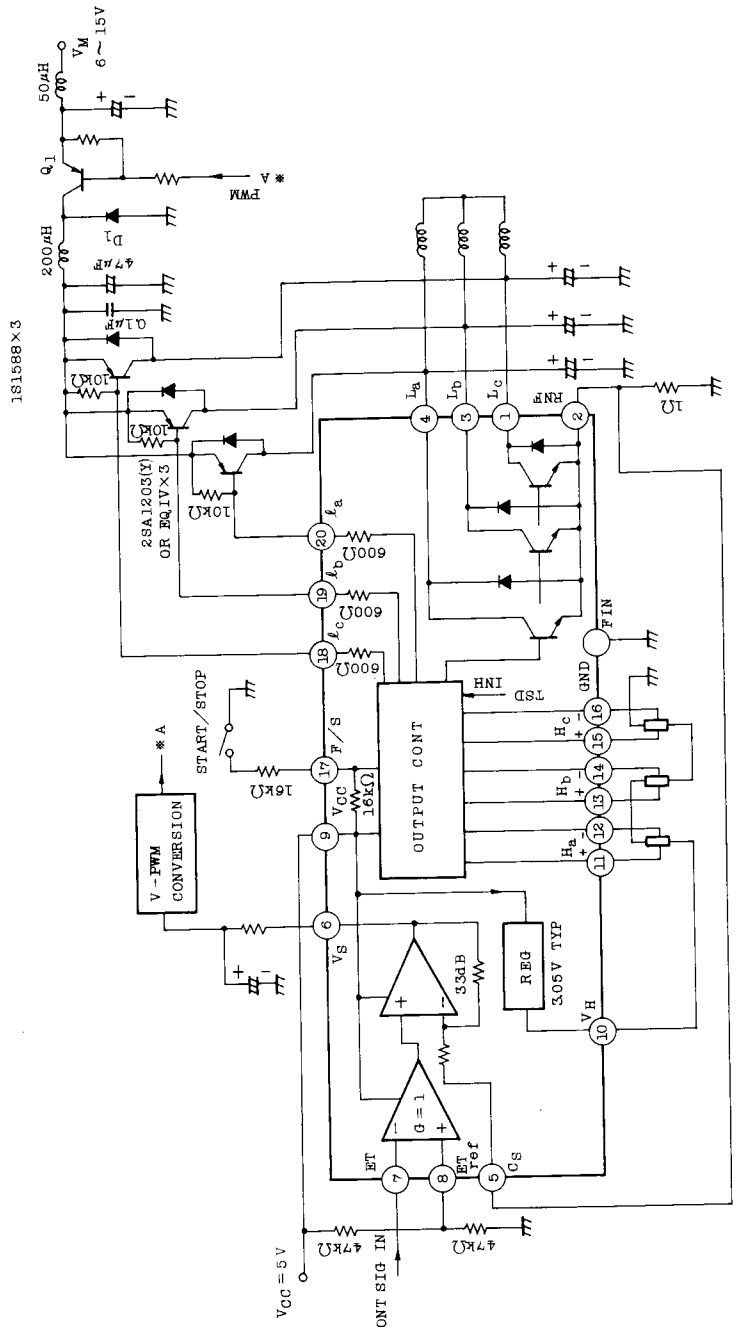
OFF

Note 2. This condition is obtained with 17 PIN grounded.
Note 3. This condition is obtained with 17 PIN open.
Note 4. This condition is obtained with 17 PIN ground through 16kΩ resistor.

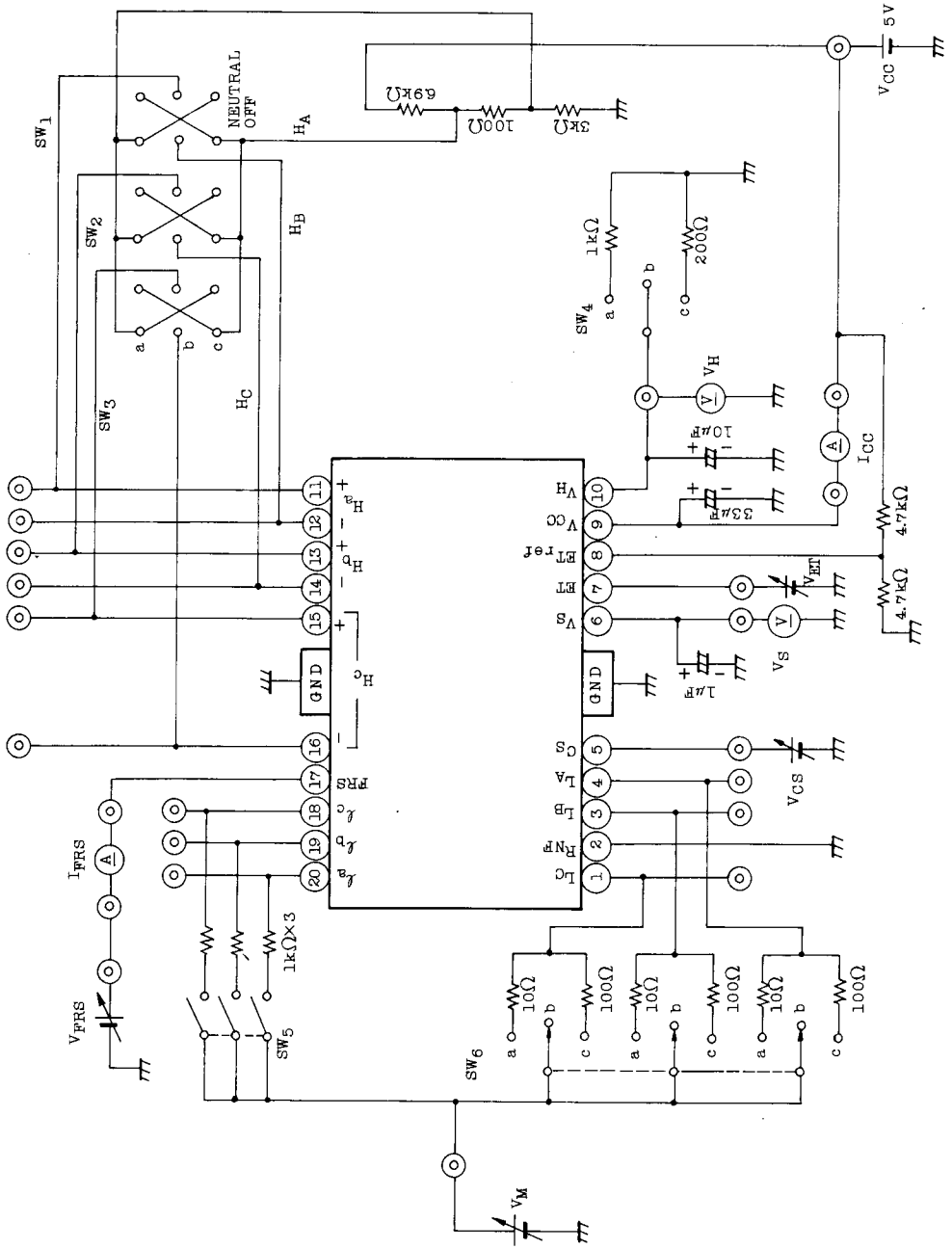
P_D - Ta



BLOCK DIAGRAM AND BASIC APPLICATION CIRCUIT



MEASURING CIRCUIT



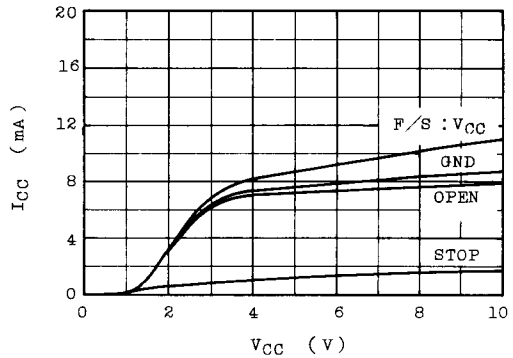
MEASURING METHOD

CHARACTERISTIC	SWITCH 1	2	3	4	5	6	MEASURING METHOD	METER
I_{CC1}	b	b	b	b	OFF	b	V_{FRS}=2.5V	I_{CC}
I_{CC2}	a	a	a			b	All position sensing inputs are all shorted and V_{FRS}=5V	I_{CC}
V_{SAT1} V_{SAT2} ΔV_{SAT}	Refer to truth table					c a c	. I_O calibration is required with V_M. . Measure each output to GND voltage. . ΔV_{SAT} is the maximum differential voltage between the highest V_{SAT} value and lowest one.	Measure each output to ground voltage
V_{OH} Rg	b	b	b	a		b	I_H=3mA Reg is load regulation of V_{OH} under the condition of I_H=3~15mA	V_H
V_{FWD} V_{STP} V_{REV}	Refer to truth table			b	ON	c	V_{FWD}, V_{STP}, V_{REV} are threshold voltages when output change own states.	V_{FRS}
I_{FWD} I_{REV}							I_{FWD}, I_{REV} are operating input current.	I_{FRS}
G_{ET}	b	b	b	b	OFF	b	G_{ET} is a gain of ET Amp. measure V_S differential under the condition of V_{ET}=2.2~2.3V.	V_S
G_{CS}							G_{CS} is a gain of CS Amp. Measure V_S differential under the condition of V_{CS}=0~15mV.	V_S

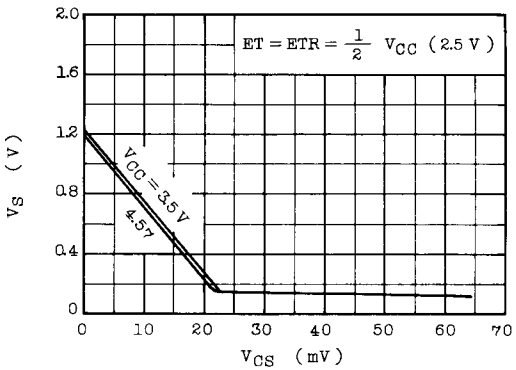
. Diode Forward Drop

Measure voltage drops between GND and each output under specified condition (I_F=0.7A).

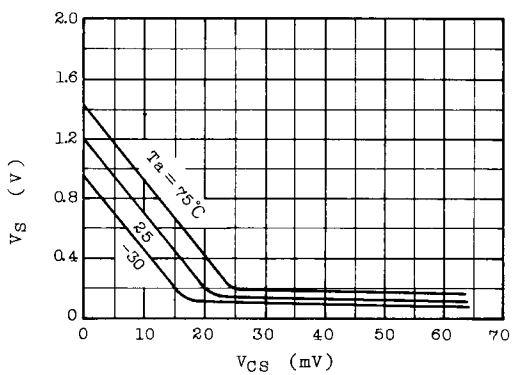
I_{CC} – V_{CC}



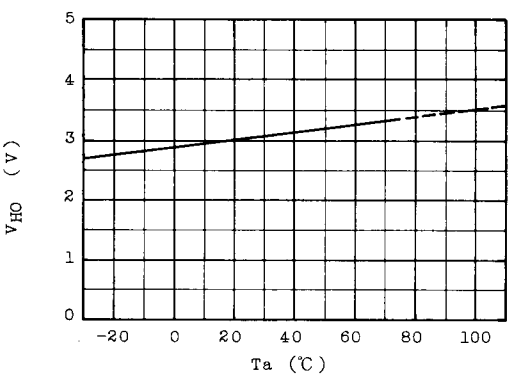
V_S – V_{CS}



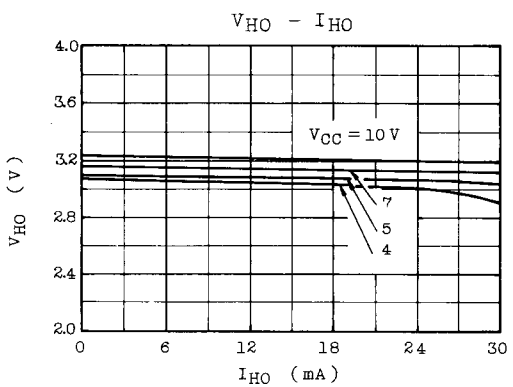
V_S – V_{CS}



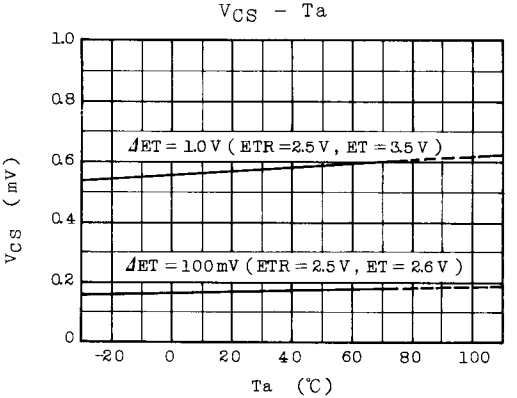
V_{HO} – Ta



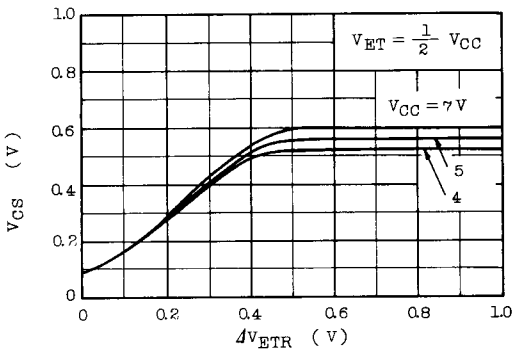
V_{HO} – I_{HO}



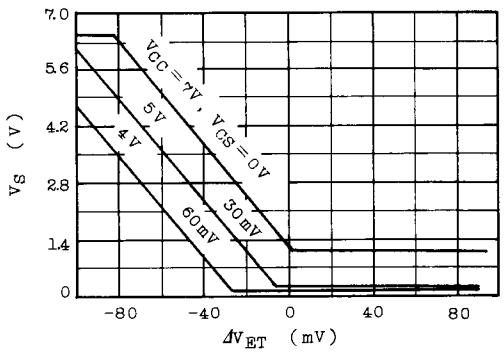
V_{CS} – Ta



V_{CS} – ΔV_{ETR}



V_S – ΔV_{ET}



V_{sat} – I_{out}