

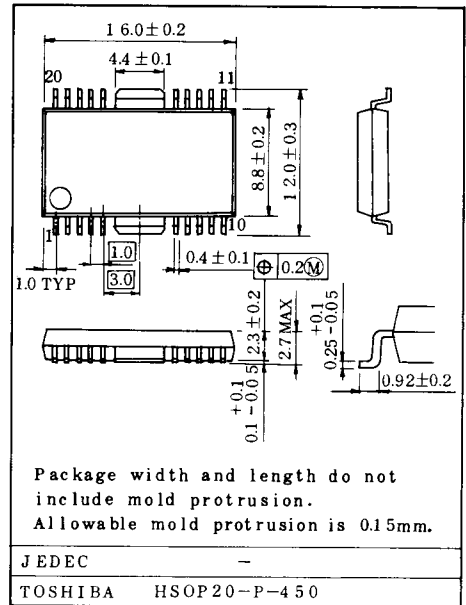
TA8402F

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
: $V_{CC\text{ opr}}=4.0\sim 15V$, $V_S\text{ opr}=0\sim 15V$
- . Build in Thermal Shut Down Circuit.

Unit in mm



MAXIMUM RATINGS ($T_a=25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage (Control)		V_{CC}	18	V
Supply Voltage (Motor)		V_S	18	V
Output Current	I_a, I_b, I_c	I_O	1.0	A
	I_{a}, I_{b}, I_{c}	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		T_{opr}	-30~75	$^\circ\text{C}$
Storage Temperature		T_{stg}	-55~150	$^\circ\text{C}$

Note 1. This rating is obtained by $50 \times 50 \times 1\text{mm}$ Fe board mounting.

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ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_a=25^\circ\text{C}$, $V_{CC}=5\text{V}$)

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}		$I_O=0.1\text{A}$	-	0.1	0.2	V
		V_{SAT2}		$I_O=1.0\text{A}$	-	0.8	1.4	
		V_{SAT3}		$I_O=0.5\text{A}$	-	0.4	-	
Saturation Voltage Differential		ΔV_{SAT}		$I_O=0.1\text{A}$	-	10	50	mV
Regulator ($\textcircled{10}$ PIN)	Output Voltage	V_{OH}		$I_H=3\text{mA}$	2.90	3.05	3.20	V
	Load Regulation	$\text{Reg}(V_{OH})$		$I_H=3\sim 15\text{mA}$	-	2	10	mV/mA
	Temperature Coefficient	T_{CVH}		$T_a=0\sim 75^\circ\text{C}$	-	6	-	mV/ $^\circ\text{C}$
Position Sensing Input	Hysteresis	V_{HYS}			-	2	-	mV
	Offset	$V_{H(OFF)}$			-5	0	5	mV
	Operating Voltage Range	$\text{CMR}(V_H)$			0.2	-	3	V
Rotation Control Input ($\textcircled{17}$ PIN)	FWD	Operating Voltage	V_{FWD}		3.9	-	V_{CC}	V
		Input Current	I_{FWD}	$V_{FWD}=5\text{V}$, 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 ($\textcircled{8}$ PIN)	Operating Voltage Range	$\text{CMR}(ET)$			1.5	2.5	3.5	V
	Gain	G_{ET}		$\textcircled{7}$ $\textcircled{8}$ PIN \rightarrow $\textcircled{6}$ PIN, $V_7=1.5\text{V}$, $V_8=2.5\text{V}$	-	0	-	dB
CS Input ($\textcircled{5}$ PIN)	Gain	G_{CS}		$\textcircled{5}$ PIN \rightarrow $\textcircled{6}$ PIN, $V_{CS}=0\sim 1.5\text{mV}$	30	33	36	dB
	Limiting Voltage	$V_{CS(lim)}$			0.40	0.55	0.70	V
	Limiting Voltage Temperature Coefficient	$T_C(V_{lim})$			-	0.6	-	mV/ $^\circ\text{C}$
Diode Forward Drop		V_F		$I_F=0.7\text{A}$	-	1.3	-	V
Thermal Shut Down Operating Temperature		T_{TSD}			150	160	-	$^\circ\text{C}$

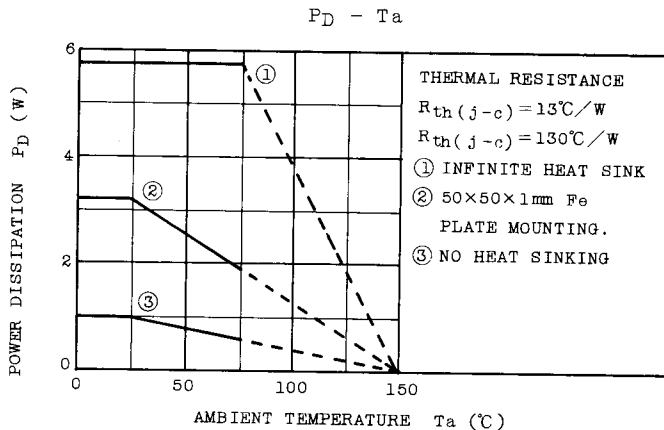
TRUTH TABLE

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)
REV V ₁₇ =0 (Note 2)	H	L	H	OFF	ON	OFF	OFF	OFF	ON
	H	L	L	OFF	ON	OFF	ON	OFF	OFF
	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
FWD V ₁₇ =5V (Note 3)	L	L	H	ON	OFF	OFF	OFF	OFF	ON
	H	L	H	OFF	OFF	ON	OFF	ON	OFF
	H	L	L	ON	OFF	OFF	OFF	ON	OFF
	H	H	L	ON	OFF	OFF	OFF	OFF	ON
	L	H	L	OFF	ON	OFF	OFF	OFF	ON
STOP V ₁₇ =2.5V (Note 4)	L	H	H	OFF	ON	OFF	ON	OFF	OFF
	L	L	H	OFF	OFF	ON	ON	OFF	OFF
	H	L	H	OFF					
	H	L	L						
	H	H	L						
L	H	L							
L	H	H							
(Note 4)	L	L	H						

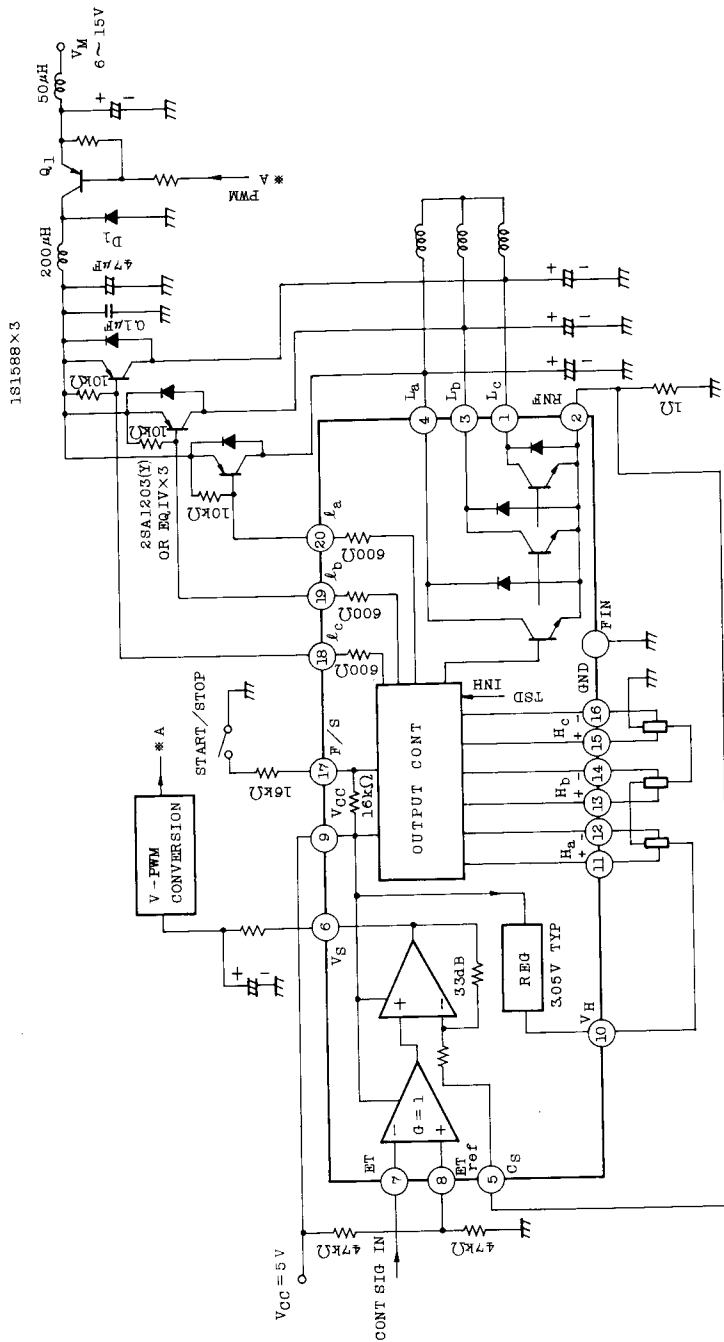
Note 2. This condition is obtained with 17 PIN grounded.

Note 3. This condition is obtained with 17 PIN open.

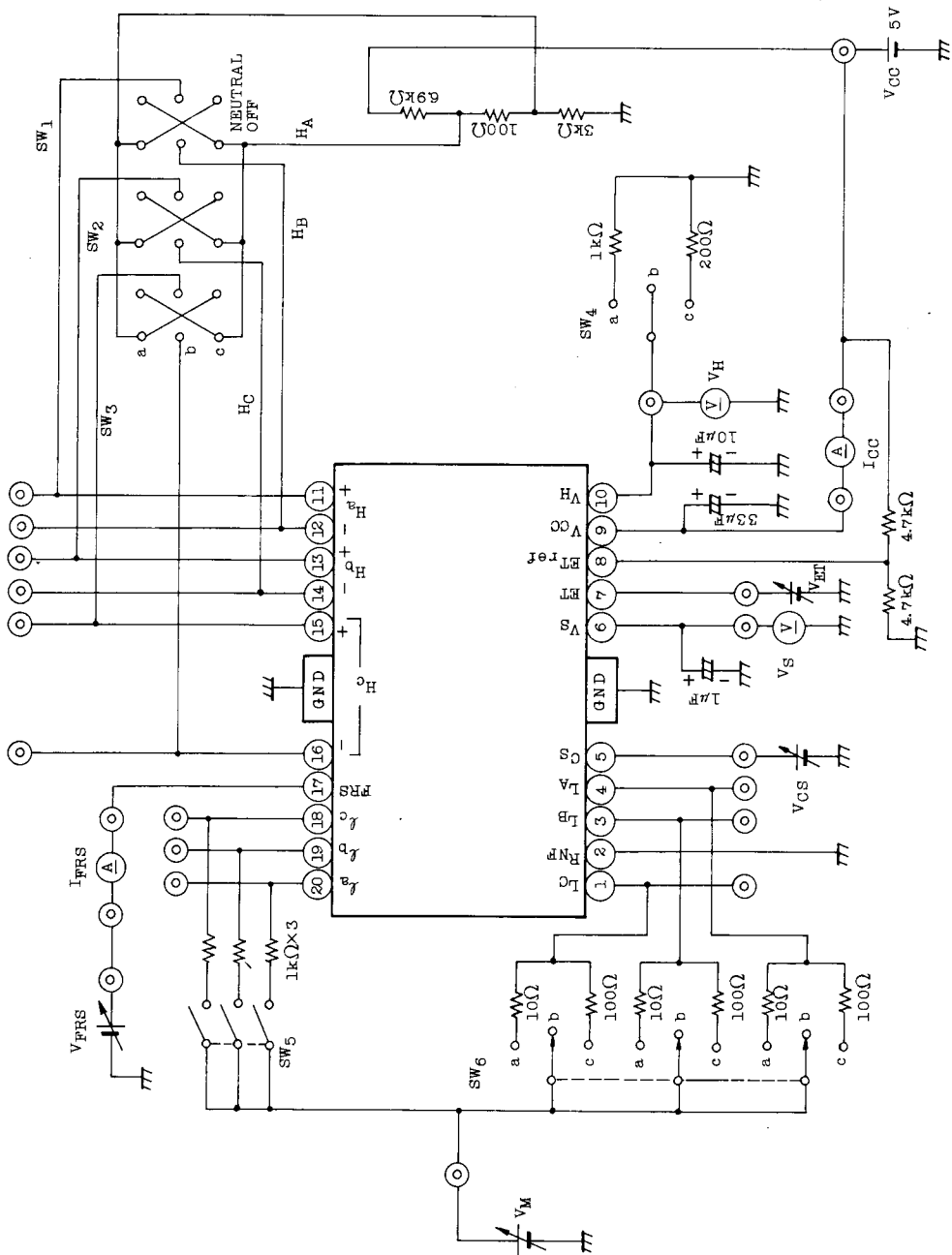
Note 4. This condition is obtained with 17 PIN ground through 16kΩ resistor.



BLOCK DIAGRAM AND BASIC APPLICATION CIRCUIT



MEASURING CIRCUIT



TA8402F

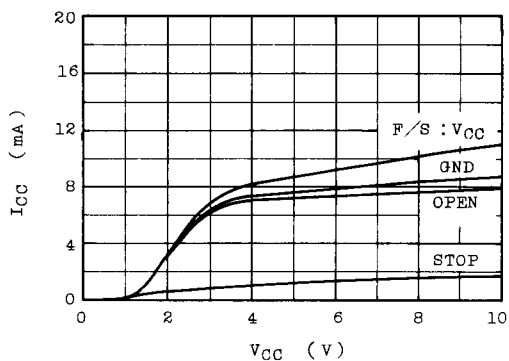
MEASURING METHOD

CHARAC- TERISTIC	SWITCH						MEASURING METHOD	METER
	1	2	3	4	5	6		
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} R _g	b	b	b	a		b	I _H =3mA R _g is load regulation of V _{OH} under the condition of I _H =3~15mA	V _H
V _{FWD} V _{STP} V _{REV} I _{FWD} I _{REV}	Refer to truth table			b	ON	c	V _{FWD} , V _{STP} , V _{REV} are threshold voltages when output change own states. I _{FWD} , I _{REV} are operating input current.	V _{FRS} I _{FRS}
GET	b	b	b	b	OFF	b	GET is a gain of ET Amp. measure V _S differential under the condition of V _{ET} =2.2~2.3V.	V _S
GCS							GCS is a gain of CS Amp. Measure V _S differential under the condition of V _{CS} =0~15mV.	V _S

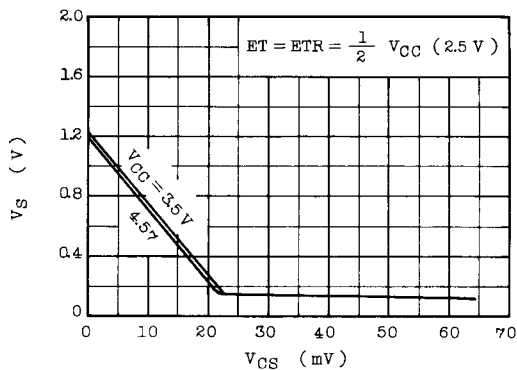
. Diode Forward Drop

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

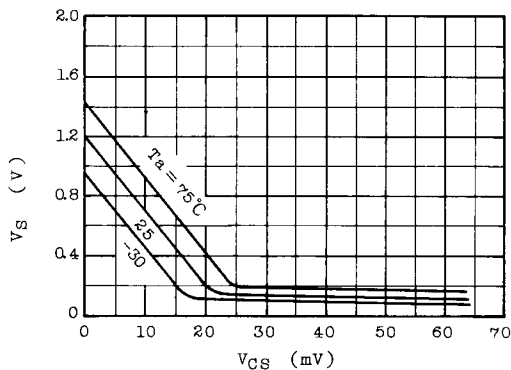
$I_{CC} - V_{CC}$



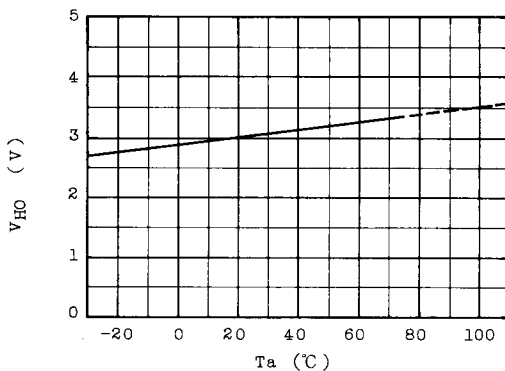
$V_S - V_{CS}$



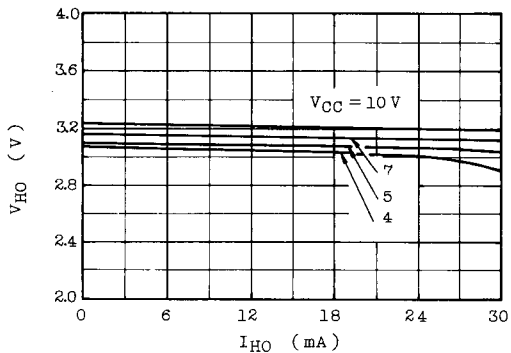
$V_S - V_{CS}$



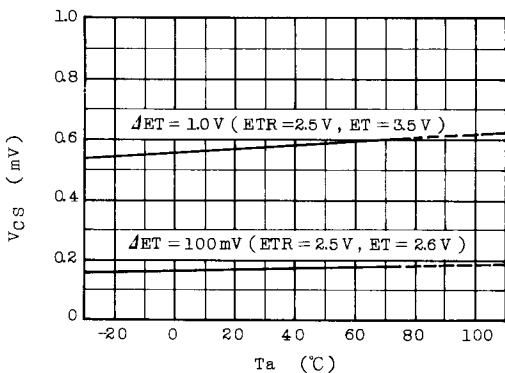
$V_{HO} - T_a$



$V_{HO} - I_{HO}$

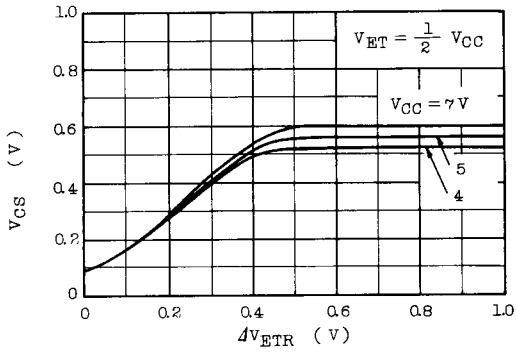


$V_{CS} - T_a$

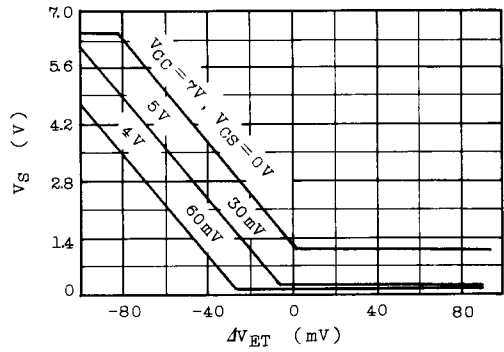


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$V_{CS} - \Delta V_{ETR}$



$V_S - \Delta V_{ET}$



$V_{sat} - I_{out}$

