



Agamem Microelectronics Inc.

AA51861**PRELIMINARY****SINGLE-PHASE FULL-WAVE FAN MOTOR DRIVER**

■ DESCRIPTION

The AA51861 is a single-phase bipolar drive motor driver that easily implements direct PWM motor drive systems with excellent efficiency. The AA51861 is optimal for fan motor drive in personal computer power supply systems and CPU cooling fan systems.

■ FEATURES

- Built-in Hall Bias Circuit
- Built-in PWM Speed Control Circuit
- Built-in Minimal Speed Setup Circuit
- Rotation Speed Indication (FG)
- Rotation or Lock State Indication (RD)
- Built-in Thermal Shutdown Circuit
- Lock Protection
- Maximum 1.0A (Vcc = 16V) Output Current

■ APPLICATION

- CPU Cooler Fan in PC
- Brushless DC Motor Driver



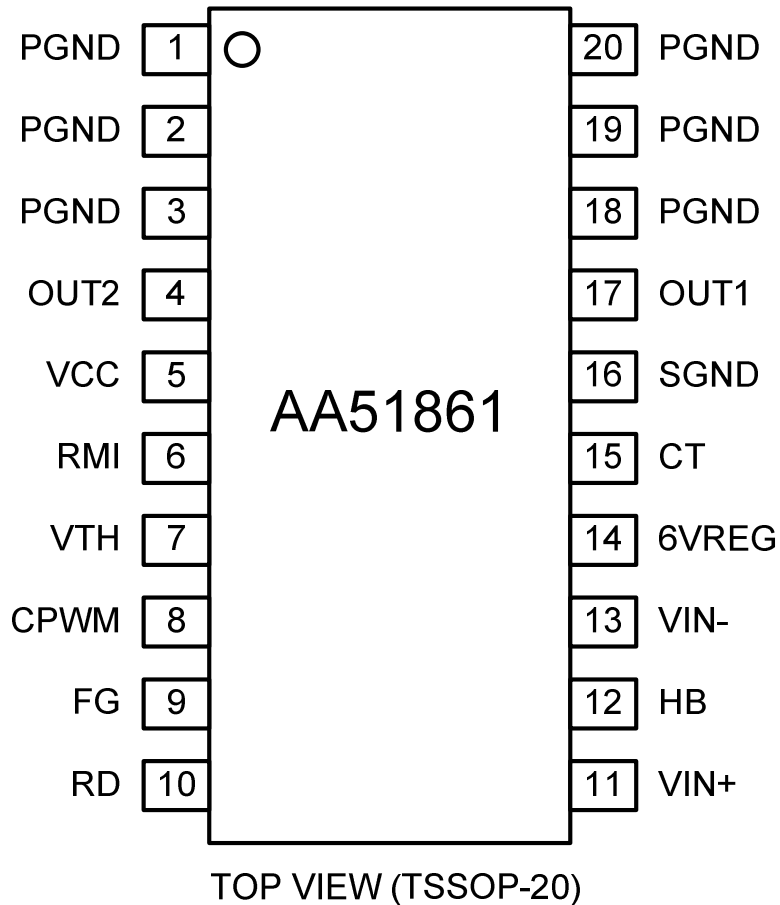
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■ PIN DESCRIPTION



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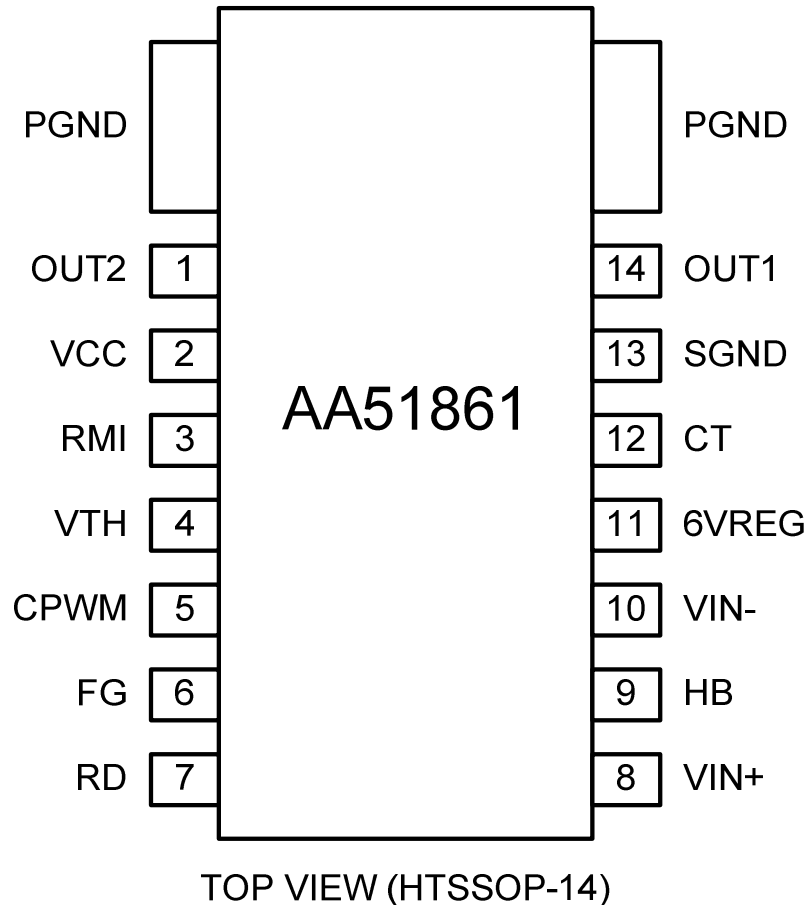
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SINGLE-PHASE FULL-WAVE FAN MOTOR DRIVER

(For TSSOP-20)

PIN NO.	PIN NAME	FUNCTION
1	PGND	Power ground
2	PGND	Power ground
3	PGND	Power ground
4	OUT2	Driver output 2
5	VCC	Power supply
6	RMI	Minimum duty setting
7	VTH	Adjustable Input
8	CPWM	Oscillator capacitor
9	FG	Rotation speed indicator
10	RD	Rotation/lock state indicator
11	VIN+	Hall sensor input +
12	HB	Hall sensor bias regulator
13	VIN-	Hall sensor input -
14	6VREG	Reference voltage regulator
15	CT	Lock and rotation setting capacitor terminal
16	SGND	Ground for control circuit
17	OUT1	Driver output 1
18	PGND	Power ground
19	PGND	Power ground
20	PGND	Power ground



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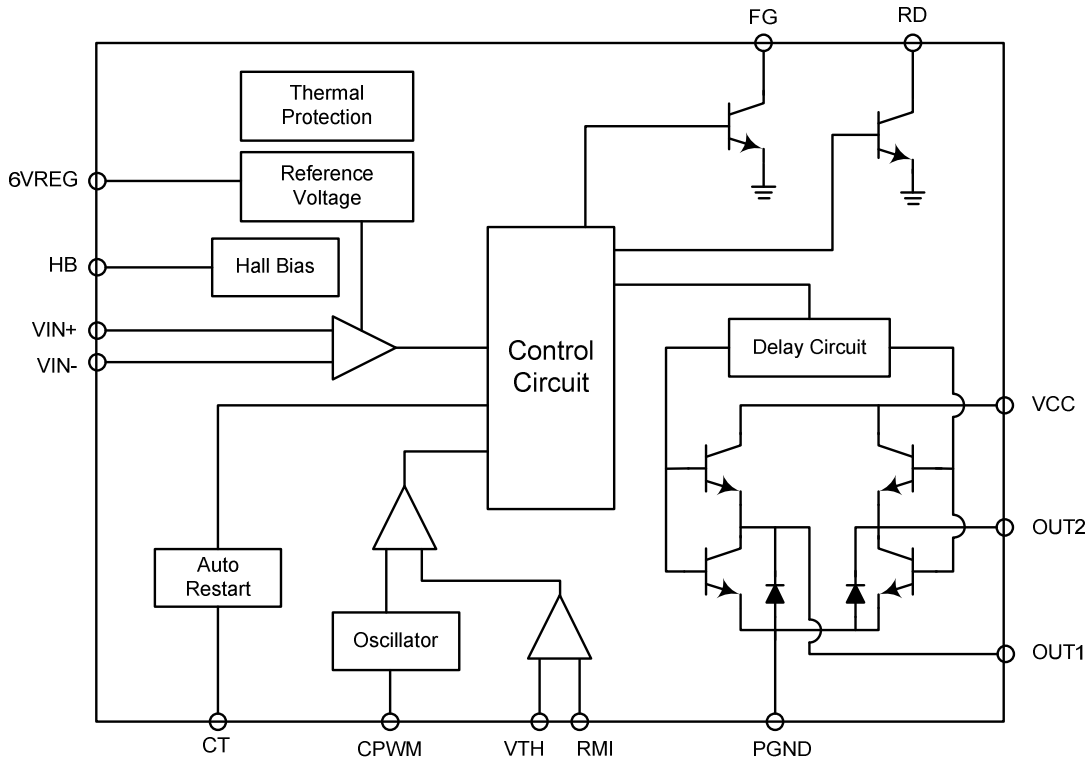
AA51861**PRELIMINARY****SINGLE-PHASE FULL-WAVE FAN MOTOR DRIVER**

(For SSOP-16)

PIN NO.	PIN NAME	FUNCTION
	PGND	Power ground
1	OUT2	Driver output 2
2	VCC	Power supply
3	RMI	Minimum duty setting
4	VTH	Adjustable Input
5	CPWM	Oscillator capacitor
6	FG	Rotation speed indicator
7	RD	Rotation/lock state indicator
8	VIN+	Hall sensor input +
9	HB	Hall sensor bias regulator
10	VIN-	Hall sensor input -
11	6VREG	Reference voltage regulator
12	CT	Lock and rotation setting capacitor terminal
13	SGND	Ground for control circuit
14	OUT1	Driver output 1



■ BLOCK DIAGRAM



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■ TRUTH TABLE

VTH	IN-	IN+	CPWM	CT	OUT1	OUT2	FG	RD	Mode
LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	LOW	ON	Rotation
	LOW	HIGH			LOW	HIGH	OFF		
HIGH	HIGH	LOW	LOW		OFF	LOW	LOW		PWM
	LOW	HIGH			LOW	OFF	OFF		
-	HIGH	LOW	-	HIGH	HIGH	OFF	LOW	OFF	Lock
	LOW	HIGH			OFF	HIGH	OFF		



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AA51861**PRELIMINARY****SINGLE-PHASE FULL-WAVE FAN MOTOR DRIVER****■ ABSOLUTE MAXIMUM RATINGS** $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	RATINGS	UNIT
$V_{CC,MAX}$	Maximum Supply voltage	18	V
$I_{OUT,MAX}$	Maximum Output Current	1	A
$V_{OUT,MAX}$	Maximum Output Voltage	18	V
$I_{HB,MAX}$	HB Maximum Output Current	10	mA
$V_{TH,MAX}$	VTH Maximum Input Voltage	6	V
$V_{FG}/V_{RD,MAX}$	FG/RD Maximum Output Voltage	18	V
$I_{FG}/I_{RD,MAX}$	FG/RD Maximum Output Current	10	mA
$P_{D,MAX}$	Power Dissipation	1.5	W
T_{STG}	Storage Temperature Range	-55 ~ 150	$^\circ\text{C}$
T_{OPR}	Operating Temperature Range	-30 ~ 90	$^\circ\text{C}$

■ RECOMMENDED RATINGS $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	RATINGS	UNIT
VCC	VCC supply voltage	4.5 ~ 16	V
VTH	VTH input level voltage range	0 ~ 9	V
VICM	Hall sensor input common-mode input voltage range	0.2 ~ 3	V



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AA51861**PRELIMINARY****SINGLE-PHASE FULL-WAVE FAN MOTOR DRIVER****ELECTRICAL CHARACTERISTICS** $T_A = 25^\circ\text{C}$, $V_{CC}=12\text{V}$

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
Circuit Current	I_{CC1}	Drive Mode	12	18	24	mA
	I_{CC2}	Lock Mode	5.3	6.7	8	mA
6VREG Voltage	V_{6VREG}	$I_{6VREG} = 5\text{mA}$	5.9	6.1	6.3	V
HB Voltage	V_{HB}		1.25	1.4	1.55	V
CPWM High-Level Voltage	V_{CRH}		3.45	3.6	3.75	V
CPWM Low-Level Voltage	V_{CRL}		1.95	2.05	2.15	V
CPWM Oscillator Frequency	F_{PWM}	$C = 100\text{pF}$	18	25	32	kHz
CT High-Level Voltage	V_{CTH}		3.58	3.73	3.88	V
CT Low-Level Voltage	V_{CTL}		1.53	1.68	1.83	V
CT Charge Current	I_{CT1}		0.84	1.14	1.44	μA
CT Discharge Current	I_{CT2}		0.15	0.2	0.25	μA
CT Charge/Discharge Current Ratio	R_{CT}		3.4	5.7	9.6	
OUT output low saturation voltage	V_{OL}	$I_O = 200\text{mA}$		0.2	0.3	V
OUT output high saturation voltage	V_{OH}	$I_O = 200\text{mA}$		0.9	1.1	V
Hall Sensor Input Sensitivity	V_{HN}			10	20	mV
RD/FG Low-Level Voltage	$V_{RDL/FGL}$			0.2	0.3	V
RD/FG Pin Leakage Current	$I_{RDL/FGL}$				30	μA



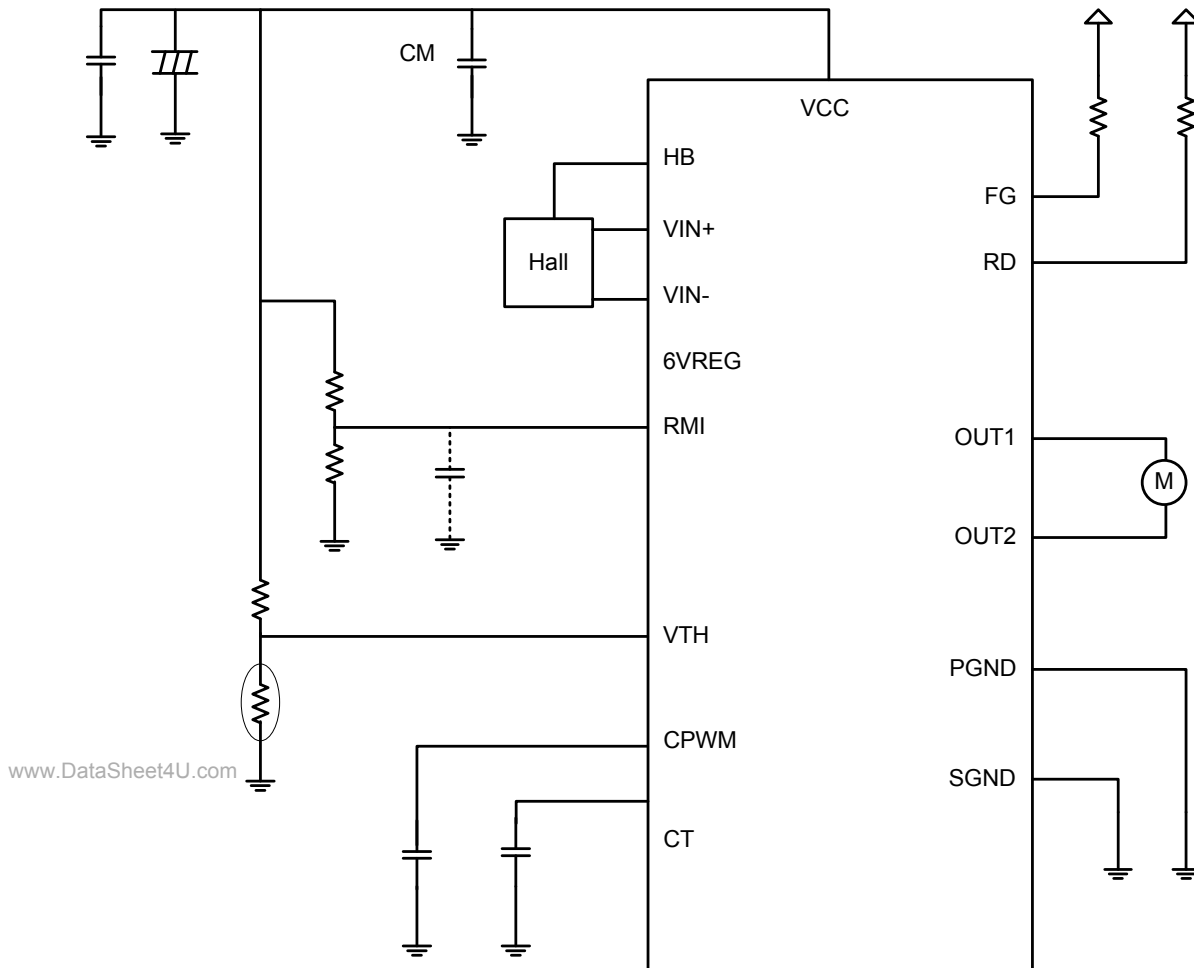
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APPLICATION CIRCUIT



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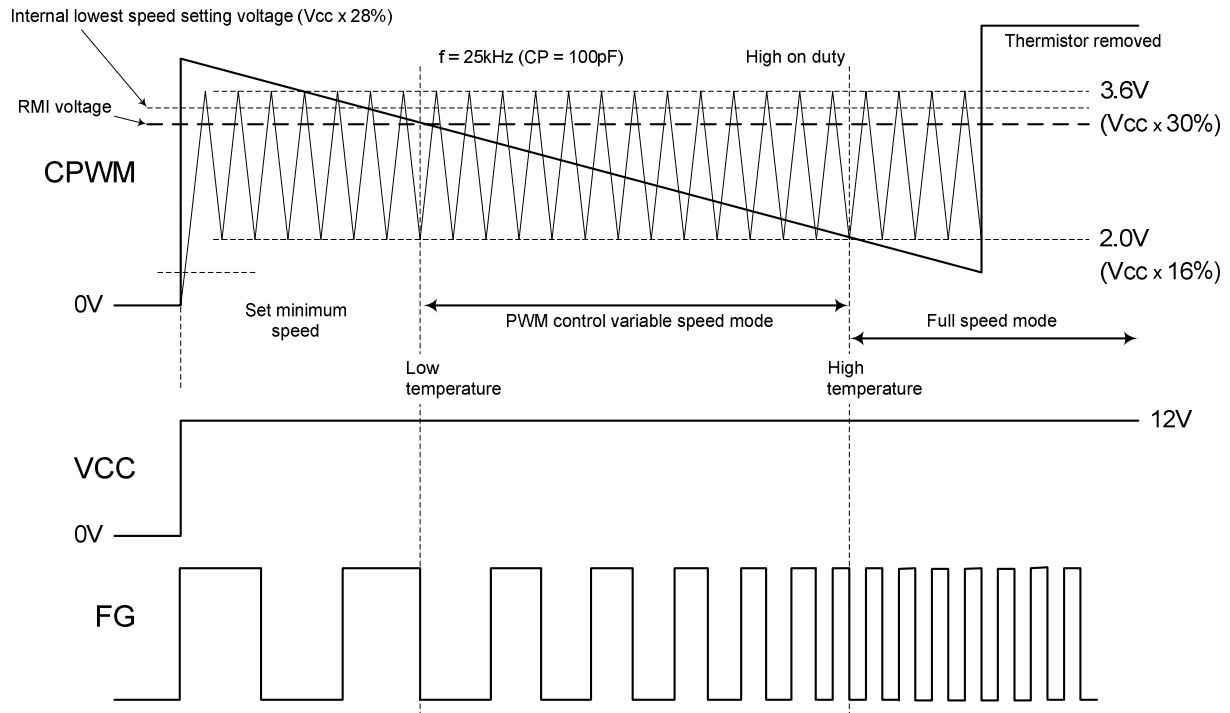
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CONTROL TIMING CHART



1. Low Speed Setting Mode

When V_{TH} voltage is higher than RMI pin voltage, motor speed is settable by RMI pin voltage. The minimum drive duty cycle is settable by comparing CPWM oscillating voltage and RMI pin voltage. V_{TH} voltage is decided by variation of PWM duty.

2. Variable Speed Setting Mode

When V_{TH} voltage is lower than RMI pin voltage, PWM control system works by comparing V_{TH} voltage with CPWM voltage. If V_{TH} voltage is higher, the ON duty cycle of the upper side transistors will be minimized and motor speed becomes lower.

3. Full Speed Rotation Mode

At a certain PWM duty, when V_{TH} voltage is lower than the low side of CPWM output voltage, the motor will run at full speed.



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■ ORDERING INFORMATION

ORDER NO.	PACKAGE	PACKING	ONE REEL Q'TY	MARK CHART
AA51861F	TSSOP20FD	Tape & Reel	2,500ea	
AA51861H	HTSSOP14L	Tape & Reel	2,500ea	

■ THERMAL COEFFICIENT

PACKAGE TYPE	LEAD COUNT	PAD SIZE	THERMAL RESISTANCE	
		mm ²	Theta ja	Theta jc
TSSOP20FD	20 Pin	3.0 × 4.2	48.57	22.83



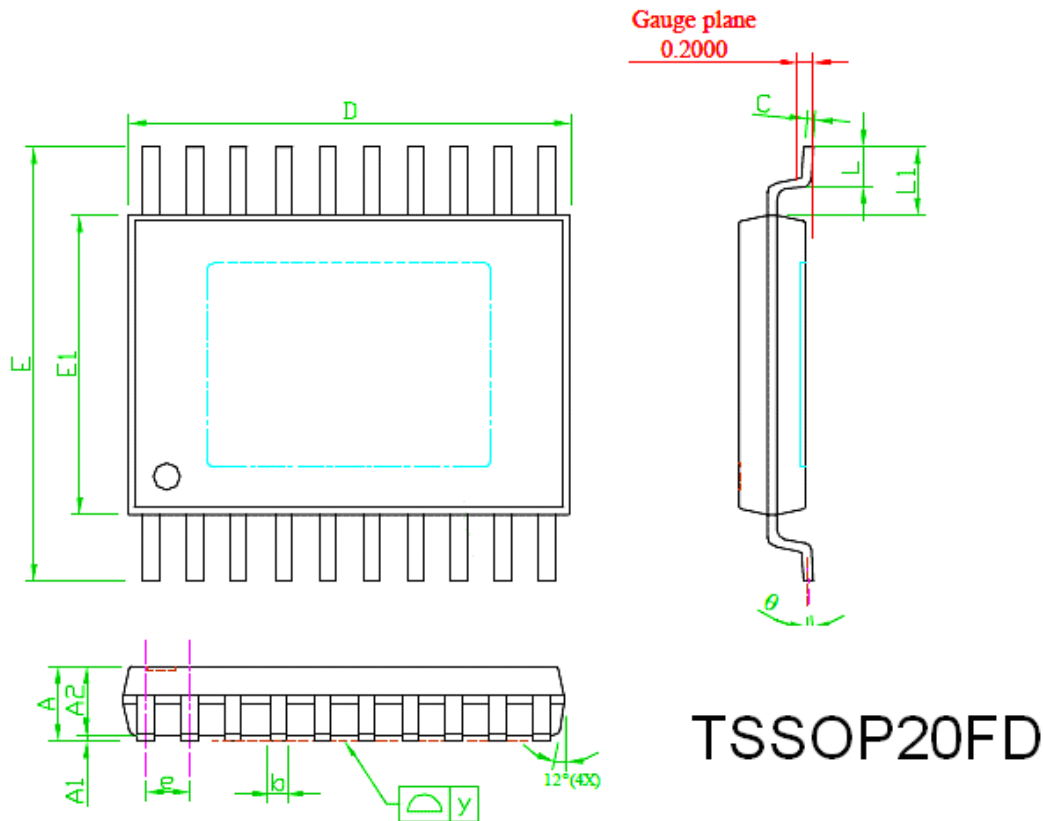
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■ PACKAGE DIMENSIONS

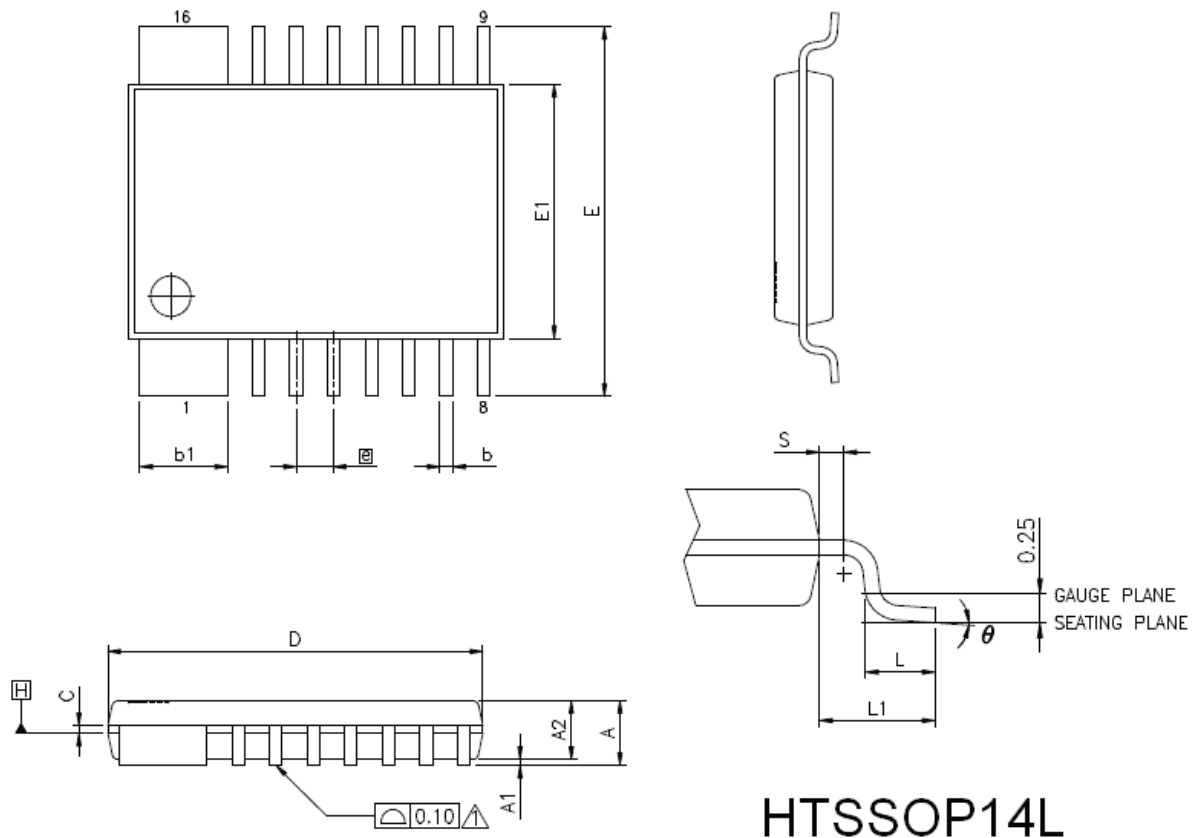


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SYBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	-	1.15	0.031	-	0.045
A1	0.00	-	0.10	0.000	-	0.004
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19	-	0.30	0.007	-	0.012
C	0.09	-	0.20	0.004	-	0.008
D	6.40	6.50	6.60	0.252	0.256	0.260
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	-	0.65	-	-	0.026	-
L	0.45	0.60	0.75	0.018	0.024	0.030
Y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°
L1	0.90	1.00	1.10	0.035	0.039	0.043



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SYBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	-	-	1.20
A1	0.05	-	0.15
A2	0.80	0.90	1.05
b	0.19	-	0.30
b1	1.49	-	1.60
C	0.09	-	0.20
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.40 BSC		
e	0.65 BSC		
L1	1.00 REF		
L	0.50	0.60	0.75
S	0.20	-	-
θ	0°	-	8°