

PS257

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4-Channel Secondary Monitoring IC with Fan Control



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新竹市科學園區展業一路9號7樓之1

SILICON TOUCH TECHNOLOGY INC.

9-7F-1, Prosperity Road I, Science Based Industrial Park,
Hsin-Chu, Taiwan 300, R.O.C.

Tel : 886-3-5645656 Fax : 886-3-5645626

General Description

PS257 is designed for monitoring a switching power supply (S.P.S.), especially for desktop ATX system. It protects the S.P.S. and PC from over voltage, under voltage, over current, short circuit and over temperature status. It monitors dual +12V, 5V, 3.3V and -12V DC supply channels.

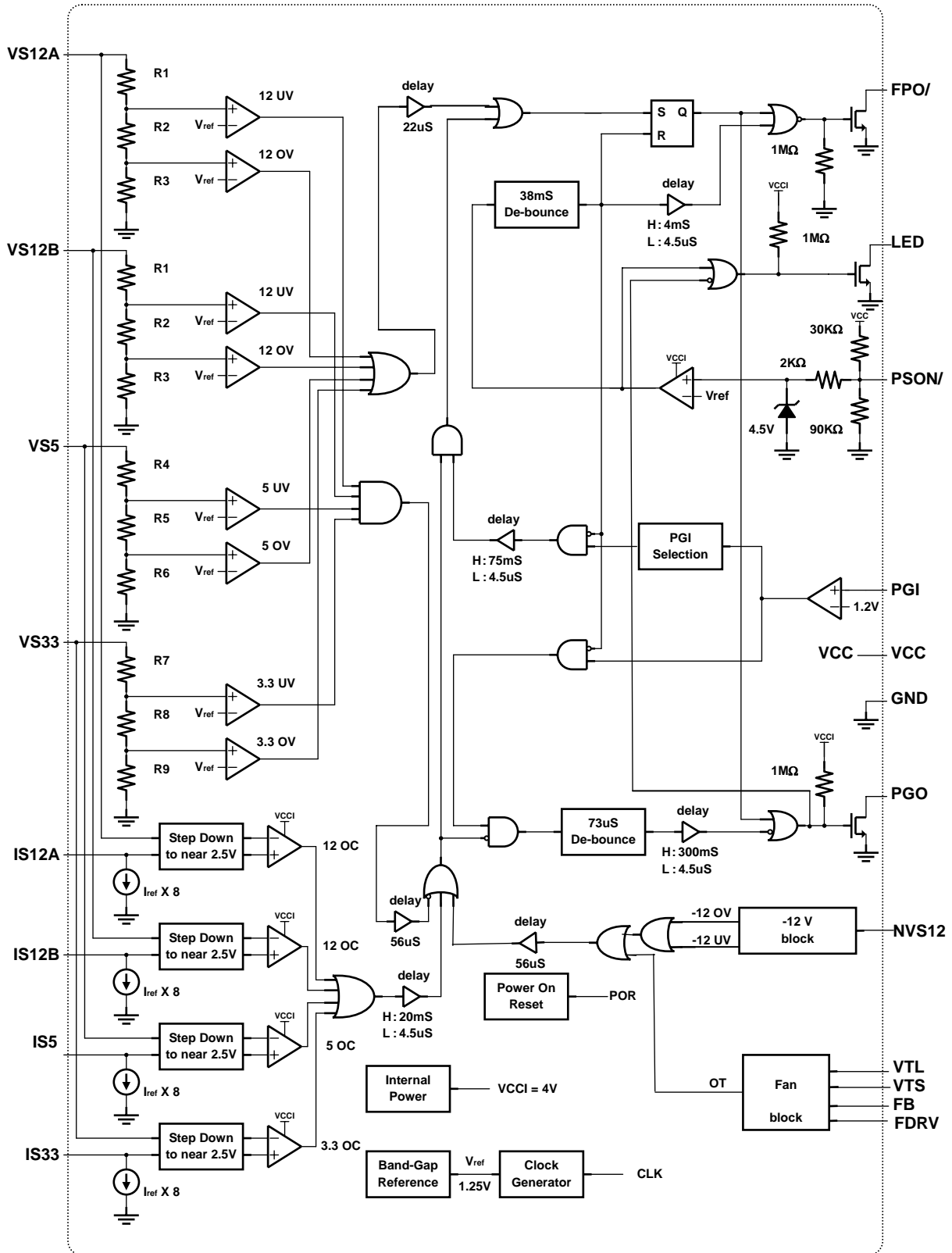
PS257 also provides a FAN drive module with two control modes - "step control mode" and "OP-amp control mode". It adjusts the FAN speed according to the sensed temperature and generates "over-temperature protection" when the temperature is too high.

It monitors the power-good-input signal (PGI) from SPS and generates power-good-output signal (PGO) to motherboard. Therefore it enables/disables protection according to the SPS status and provides a reliable power supply environment.

Features

- Over-Voltage/Under-Voltage Protection (OVP & UVP) and lock out
It monitors 3.3V, 5V, -12V and dual +12V. FPO/ goes to high and latch-up when one of these supply voltages exceeds their normal operation voltage range.
- Over Current Protection (OCP) and lock out
It monitors 3.3V, 5V and dual +12V. FPO/ goes to high and latch-up when one of these supply currents exceeds their normal operation current range.
- PGO (Power Good Output) signal generation-
It generates PGO to motherboard according to the power status.
- Over Temperature Protection (OTP) and lock out.
- FAN drive control with two modes: "step control mode" and "OPamp control mode"
- Wide power supply range (3.8V~16V)
- Fault-protection output with open drain output stage
- LED lighting-up when error occurs or remote-off
- Built-in delay/debounce for the following important timing features:
 - 300mS power good output delay when remote-on
 - 75ms delay for UV/OC protection when AC-on
 - 38mS PSON/ control de-bounce

Block Diagram



Pin Descriptions

Pin No (20 Pin)	Pin No (24 Pin)	PIN NAME	Descriptions
1	3	PGI	Power good input signal pin
2	4	GND	Ground
3	5	FPO/	Inverted fault protection output ,open drain output stage
4	6	PSON/	Remote ON/OFF control input pin
5	7	NVS12	-12V over/under voltage protection input pin
6	8	LED	LED drive output
7	9	FDRV	FAN drive output
8	10	FB	FAN feedback voltage input
9	11	VTS	Temperature sense voltage
10	12	VTL	Low temperature threshold voltage
11	13	IS12B	12V(1) over current protection input pin
12	14	VS12B	12V(2) over/under voltage protection input pin
13	15	IS12A	12V(2) over current protection input pin
14	16	VS12A	12V(1) over/under voltage protection input pin
15	17	IS5	5.0V over current protection input pin
16	18	VS5	5.0V over/under voltage protection input pin
17	19	IS33	3.3V over current protection input pin
18	20	VS33	3.3V over/under voltage protection input pin
19	21	VCC	Power supply
20	22	PGO	Power good output signal pin , open drain output stage

Absolute Maximum Ratings

Parameter		Rating	Unit
Storage Temperature	(T _{stg})	-40 to +125	°C
Operating Temperature	(T _{opr})	-10 to +90	°C
Supply Voltage	(V _{cc})	VCC	-0.3 to +16.0 V
Input Voltage Range	(V _i)	VS12A, IS12A, VS12B, IS12B	-0.3 to +16.0 V
		VS5, IS5	-0.3 to +9.0 V
		VS33, IS33	-0.3 to +7.0 V
		PGI	-0.3 to V _{cc} +0.3 V
		VTS, VTL	-0.3 to VS12B+0.3 V
		PSON/	-0.3 to V _{cc} +0.3 V
		FB	-0.3 to VS12B+0.3 V
Output Voltage Range	(V _o)	NVS12	0.3 to -16 V
		FPO, LED, PGO	-0.3 to V _{cc} +0.3 V
ESD Susceptibility	(V _{ESD})	FDRV	-0.3 to VS12B+0.3 V
		HBM	> 2000 V
		MM	> 200 V

Electrical Characteristics, V_{cc}=12V, T_a=25°C. (unless otherwise specified)

Power Supply Section

Parameter	Conditions	MIN	TYP	MAX	Unit
Supply Voltage		3.8	5.0	16.0	V
Supply Current	V _{PSON/} = 5V		4.5	5	mA
Power On Reset Threshold Voltage (V _{POR})		3.2	3.4	3.6	V
Under Voltage Lockout (UVLO)		2.8	3.0	3.2	V

Over-Voltage Section

Parameter	Conditions	MIN	TYP	MAX	Unit
Over-Voltage Threshold	VS33	3.9	4.0	4.1	V
	VS5	5.6	5.8	6.0	V
	VS12A/B	13.75	14.1	14.45	V
	NVS12	-9.5	-9	-8.5	V

Electrical Characteristics (Continued)

Under-Voltage Section

Parameter	Conditions	MIN	TYP	MAX	Unit
Under-Voltage Threshold	VS33	2.65	2.8	2.95	V
	VS5	4.1	4.3	4.5	V
	VS12A/B	9.6	10.0	10.4	V
	NVS12	-15.75	-15	-14.25	V

PGI, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
Threshold Voltage for start T_{d1}		1.176	1.2	1.224	V
Threshold Voltage for start T_{d2}		0.60	0.63	0.75	V
Threshold Voltage for mask OC,UV,PGO		1.156	1.18	1.204	V

PGO, Open Drain Digital Output

Parameter	Conditions	MIN	TYP	MAX	Unit
Leakage Current (I_{LKG})	$V_{PGO}=5V$			5	μA
Low Level Output Voltage (V_{OL})	$I_{SINK}=10mA$			0.3	V

Over-Current Section

Parameter	Conditions	MIN	TYP	MAX	Unit
Offset Voltage (V_{OV})		-1	2	5	mV
Constant I_{SINK} Current (I_{SINK})		150.	160.	170	μA

FPO/, Open Drain Digital Output

Parameter	Conditions	MIN	TYP	MAX	Unit
Leakage Current (I_{LKG})	$V_{FPO/}=5V$			5	μA
Low Level Output Voltage (V_{OL})	$I_{SINK}=20mA$			0.45	V

Electrical Characteristics (Continued)

LED, Open Drain Digital Output

Parameter	Conditions	MIN	TYP	MAX	Unit
Leakage Current (I_{LKG})	$V_{Led}=5V$			5	μA
Low Level Output Voltage (V_{OL})	$I_{SINK}=10mA$			0.3	V

PSON/, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
Threshold Voltage (High)		1.60			V
Threshold Voltage (Low)				0.9	V

VTS, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
Input Current (I_{VTS})				1	μA
Full Speed Voltage ($V_{FULL-VTS}$), ($V_{TH}=1/2V_{S12B}$)	OP Mode		6		V

*1 Fan driver application

FB, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
FAN Output Mode Threshold Voltage			3		V

FDRV, Analog output

Parameter	Conditions	MIN	TYP	MAX	Unit
FAN driver sink current	$I_{F-SINK}=1mA$		5.5		V

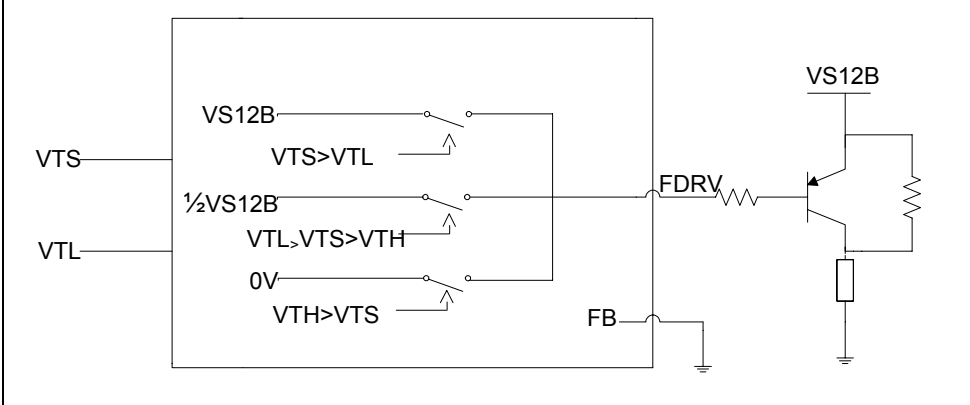
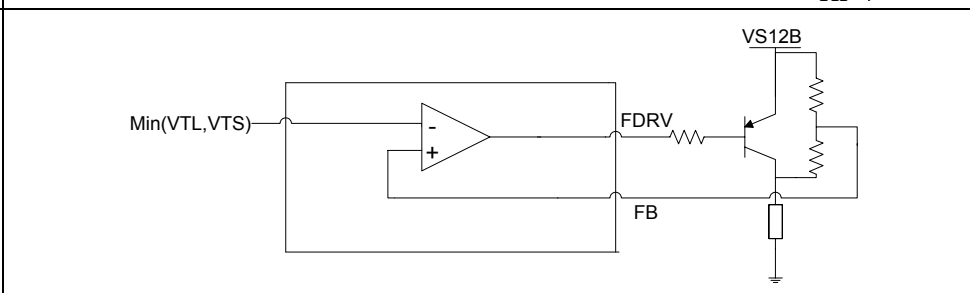
Electrical Characteristics (Continued)

Switching Characteristics, $V_{CC}=12V$, $T_a = 25^{\circ}C$.

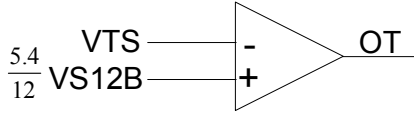
Parameter	Conditions	MIN	TYP	MAX	Unit
PGI to PGO Delay Time (T_{d1})		200	300	400	mS
Short Circuit Delay Time (T_{d2})	PGI < 0.63V	Disable UV/OC Protection			
	PGI > 0.63V	49	75	100	mS
PGO to FPO/ Delay Time (T_{d3})		2	4	6	mS
Under Voltage Delay Time (T_{d4})		30	56	81	uS
Over Current Delay Time (T_{d5})		13	20	27	mS
Over Voltage Delay Time (T_{d6})		15	22	30	uS
Over Temperature Delay Time (T_{d7})		30	56	81	uS
NVS12 Over/Under Voltage Delay Time (T_{d8})		30	56	81	uS
PERSON/ De-bounce Time (T_{b1})		24	38	52	mS
PGO Noise De-glitch Time (T_{b2})		47	73	100	uS

Electrical Characteristics (Continued)

Fan driver application

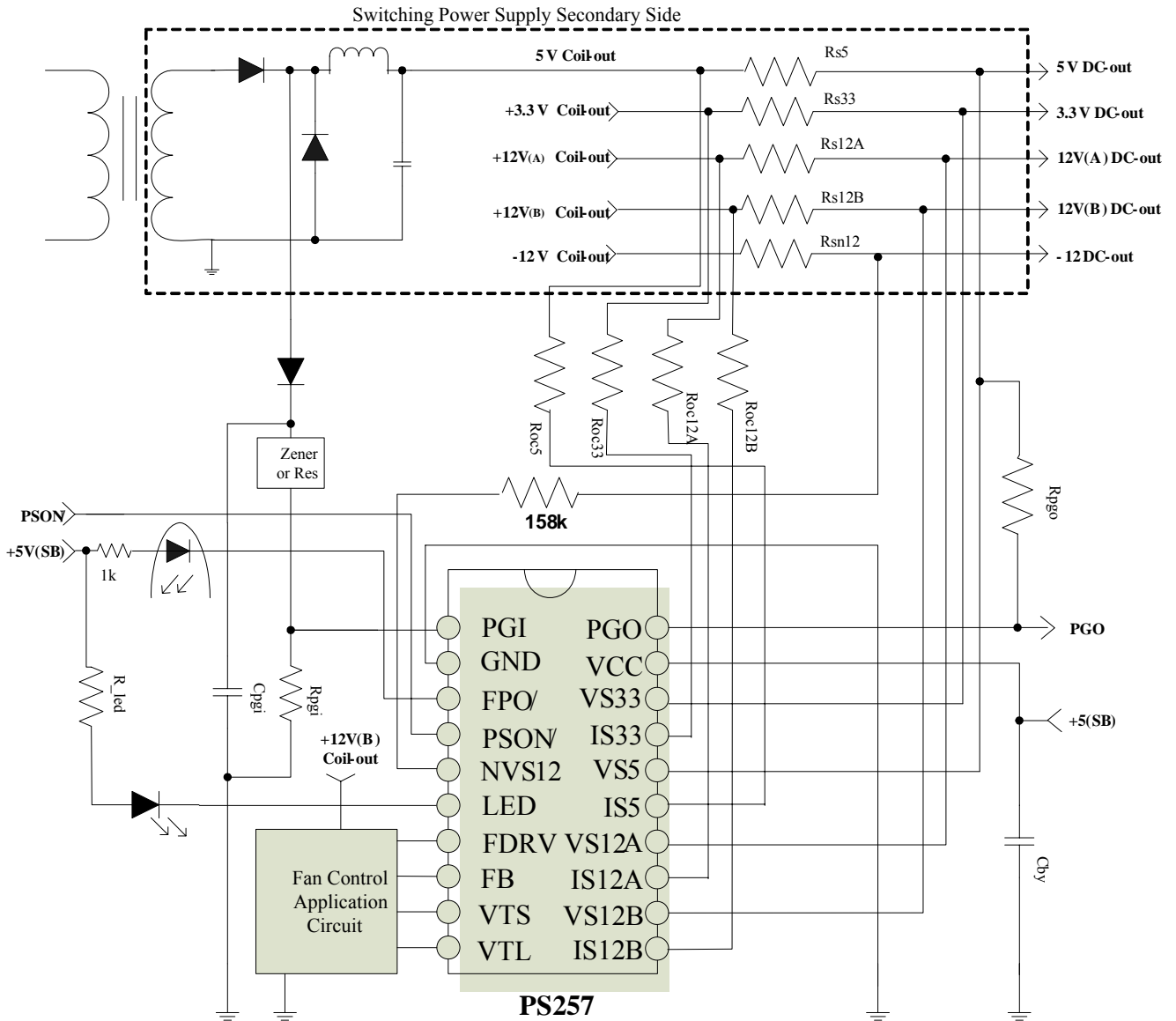
Step Mode ($V_{FB} < 3V$)	
	<p>$VTS > VTL \Rightarrow FDRV = VS12B$</p> <p>$VTL > VTS > V_{TH} \Rightarrow FDRV = \frac{1}{2} VS12B$</p> <p>$V_{TH} > VTS \Rightarrow FDRV = 0V$ $\#V_{TH} = \frac{1}{2} VS12B$</p>
OP Mode ($V_{FB} > 3V$)	
	<p>$V_{FB} = \text{Min}(VS12B, VS12B - [\text{Min}(V_{TL}, V_{TS}) - V_{TH}])$</p> <p>$\#V_{TH} = \frac{1}{2} VS12B$</p>

Over Temperature Protection (OTP)

<p>OTP function ($VTS < \frac{5.4}{12} VS12B$)</p>	
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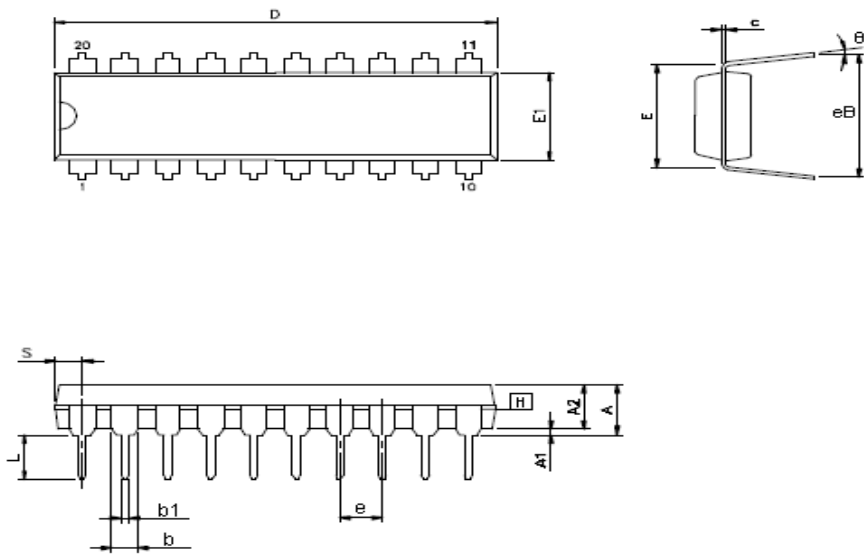
Electrical Characteristics (Continued)

<Typical switching power supply application >



Package Specification

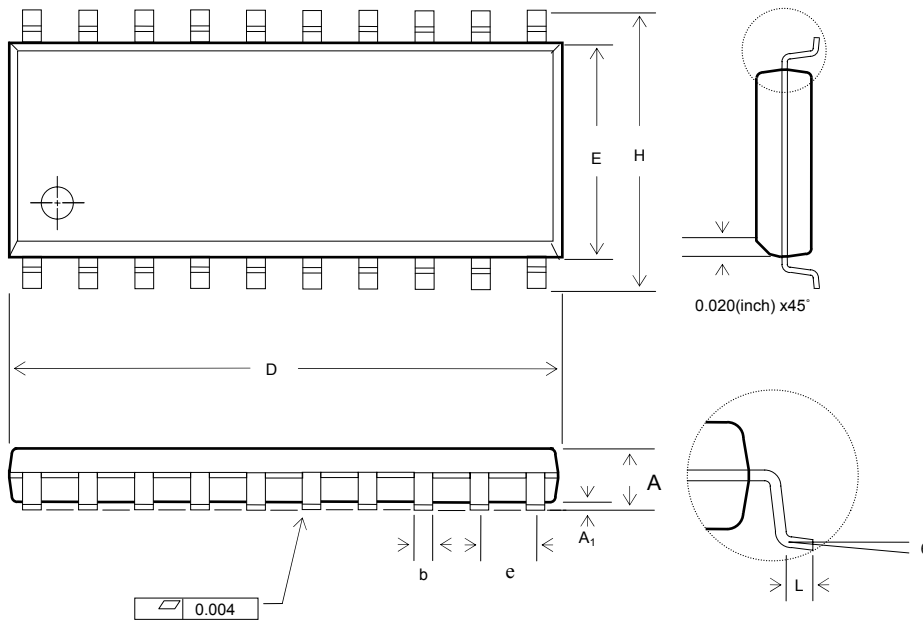
(20-pin DIP)



Symbol	Dimension in mm	Dimension in inch	NOTE
A	5.334 (MAX)	0.210 (MAX)	
A ₁	0.381 (MIN)	0.015 (MIN)	
A ₂	3.302 ± 0.130	0.130 ± 0.005	
b	1.626 (MAX)	0.064 (MAX)	
b ₁	0.56 (MAX)	0.022 (MAX)	
D	26.416 (MAX)	1.04 (MAX)	
E	7.620 (TYP)	0.300 (TYP)	
E ₁	7.000 (MAX)	0.275 (MAX)	
e	2.794 (MAX)	0.110 (MAX)	
eB	9.017 ± 0.508	0.355 ± 0.020	
L	3.556 (MAX)	0.140 (MAX)	
S	1.905 (MAX)	0.075 (MAX)	
θ°	0° ~ 15°	0° ~ 15°	

Package Specification

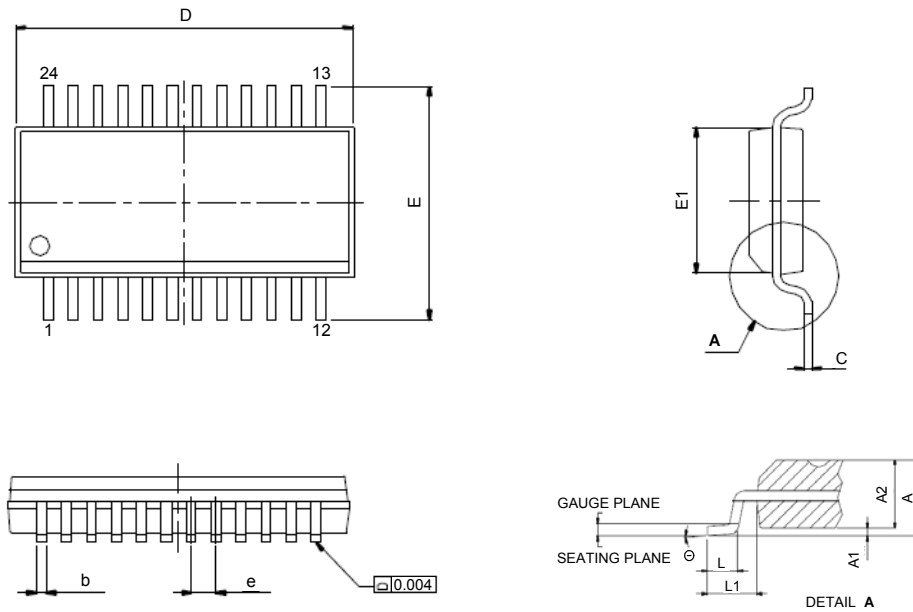
(20-pin SOP)



Symbol	Dimension in mm		Dimension in inch		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	2.36	2.64	0.093	0.104	
A ₁	0.10	0.30	0.004	0.012	
b	0.41BSC		0.016BSC		
e	1.27BSC		0.050BSC		
D	12.60	12.90	0.496	0.508	
H	10.01	10.64	0.394	0.419	
E	7.39	7.59	0.291	0.299	
L	0.41	1.27	0.016	0.050	
θ	0°	8°	0°	8°	

Package Specification

(24-pin SSOP)



SYMBOLS	DIMENSIONS IN INCH		DIMENSIONS IN MM	
	MIN.	MAX.	MIN.	MAX.
A	0.053	0.069	1.346	1.753
A1	0.004	0.010	0.102	0.254
A2	-	0.059	-	1.499
b	0.008	0.012	0.203	0.305
C	0.007	0.010	0.178	0.254
D	0.337	0.344	8.560	8.738
E	0.228	0.244	5.791	6.198
E1	0.150	0.157	3.810	3.988
e	0.025 BSC.		0.635 BSC	
L	0.016	0.050	0.406	1.270
L1	0.041 BSC		1.041 BSC	
Θ	0°	8°	0°	8°



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