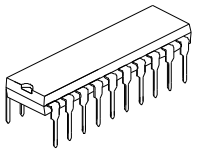
VOLTAGE MODE PWM POWER SUPPLY WITH BUILT-IN SUPERVISOR, PROTECTION AND REGULATION

DESCRIPTION

The SC6105 is a switching mode power supply controller for computers. It can regulator the output voltages by providing PWM signals to drive a transformer. It monitors and protects the 3.3V/±5V/±12V outputs. Two internal TL431 shunt regulators provide stable reference voltage for 3.3V and 5V-standby regulator. Remote ON/OFF control, power good circuitry, over voltage and under voltage protection circuitry and over power protection circuitry is implemented.



DIP-20-300-2.54

FEATURES

* Over voltage protection for 3.3V/5V/12V
* Under voltage protection for 3.3V/±5V/±12V
* Over power protection
* Short circuit protection
* AC-input under voltage protection
* Power good circuitry
* PSON for remote controller
* Delay time for PSON or PG signals
* Two shunt regulators for 3.3V and 5V-standby
* soft start and maximum 93% duty cycle

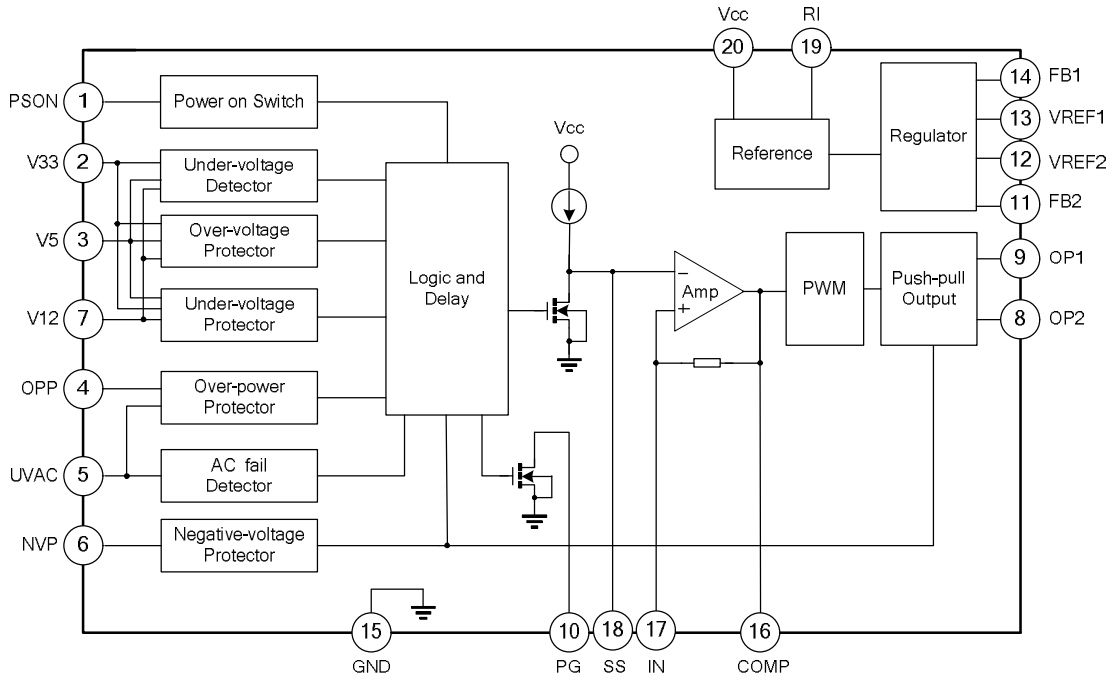
APPLICATIONS

* Switching mode power supply for computers.

ORDERING INFORMATION

Part	Package
SC6105B	DIP-20-300-2.54

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

Characteristics	Symbol	Rating	Unit
Supply Voltage(pin20)	V_{CC}	12	V
Regulator Output At FB1, FB2 Pins	V_{FB}	16	V
Output Current At PG, FB1, FB2 Pins	I_{OUT}	30	mA
Power Dissipation(Tamb=25°C)	P_D	1.5	W
Power Dissipation(Tamb=90°C)	P_D	0.5	W
Thermal Resistance, Junction-To-Air	$R_{\theta JA}$	82.5	°C/W
Operating Temperature Range	T_{amb}	-30 ~ +125	°C
Storage Temperature Range	T_{stg}	-55~+155	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise stated, V_{CC}=5V, T_{amb}=25°C)

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	All function is normal.	4.5	5.0	7.0	V
Supply Current	I_{CC}	PG High	--	5	10	mA
Over-Voltage Protection 3.3V	V_{OVP1}	-	3.9	4.1	4.3	V
Over-Voltage Protection 5V	V_{OVP2}	-	5.8	6.1	6.5	V
Over-Voltage Protection 12V	V_{OVP3}	-	13.9	14.5	14.9	V
Under-Voltage Protection 3.3V	V_{UVP1}	-	2.0	2.6	2.8	V

(To be continued)

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Characteristics		Symbol	Test condition	Min.	Typ.	Max.	Unit
Under-Voltage Protection 5V		V_{UVP2}	-	3.0	3.6	3.9	V
Under-Voltage Protection 12V		V_{UVP3}	-	6.0	7.2	8.0	V
Under-Voltage Sense 3.3V For PG Low		V_{UVS1}	-	2.5	2.8	3.0	V
Under-Voltage Sense 5V For PG Low		V_{UVS2}	-	4.0	4.3	4.5	V
Under-Voltage Sense 12V For PG Low		V_{UVS3}	-	9.4	10.1	10.4	V
Over-Power Protection.		V_{OPPS}	V_{UVAC} = 1.5V	2.02	2.4	2.66	V
Negative Voltage Protection: Voltage Level		V_{NVP}	-	2.0	2.1	2.2	V
Negative Voltage Protection: Source Current		I_{NVP}	R_I = 75KΩ	57	64	72	μA
Timing For Over-Voltage Protection		t_{OVP}	R_I = 75KΩ	0.5	0.7	1.3	ms
Timing For Under-Voltage Protection		t_{UVP}	R_I = 75KΩ	0.9	2.4	3.8	ms
Timing For Under-Voltage Sense for PG Low		t_{UVS}	R_I = 75KΩ	0.5	1.2	1.9	ms
Timing for Over-Power-Protection		t_{OPP}	R_I = 75KΩ	4.0	7.0	10.0	ms
Timing for Negative Voltage Protection		t_{NVP}	RI = 75KΩ	4.0	7.0	10.0	ms
Shunt Regulator (FB1,V_{REF1}, FB2,V_{REF2})	Reference Voltage	V_{REF}	I_{FB} = 0.5mA, T_{amb} = 25°C	2.475	2.5	2.525	V
	Line Regulation	$R_{EGLI-FB}$	4 < V_{FB} < 16V	-	1	-	MV/V
	Output Sinking Current Capability	I_{OUT-FB}	V_{FB} > 2V	10	-	-	mA
Power Good	Timing for PG Delay	t_{PG}	RI = 75KΩ	200	300	400	ms
	UVAC Voltage Sense for PG	V_{UVAC}	-	0.65	0.7	0.75	V
	PG Good Output Rising Time	t_R	C_L = 100pF	-	1	-	us
	PG Good Falling Time	t_F	C_L = 100pF	-	300	-	ns
	Power Good Output Saturation Level	V_{OL2}	I_{PG} = 5mA	-	-	0.5	V
	Power Good Leakage Current Collector	I_{ON2}	V_{PG} = 5V	-	-	1	μA
Remote On/Off	PSON Input Threshold Level	V_{PSON}	-	1	1.4	2.0	V
	Remote Input Driving Current	I_{PSON}	-	-	-	0.5	mA
	Timing PSON to On/Off On Off (PS-off)	 $t_{PSON(ON)}$ $t_{PSON(OFF)}$	R_I = 75kΩ	 20 10	 40 20	 50 30	ms
	Timing PG low to Power Off	t_{PSOFF}	R_I = 75kΩ	2	4.8	6.5	ms

(To be continued)

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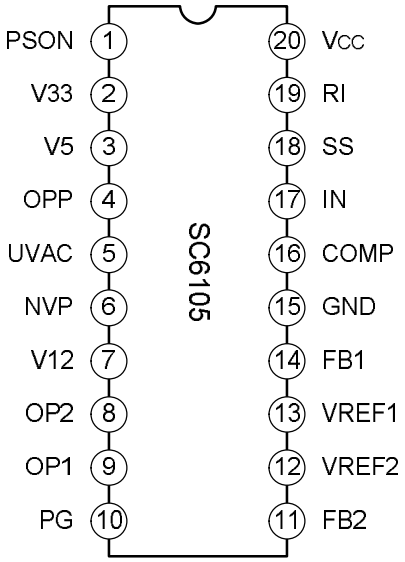
Characteristics		Symbol	Test condition	Min.	Typ.	Max.	Unit
Error Amplifier	Reference Voltage	V2.5	-	2.45	2.5	2.55	V
	Input Bias Current	I_{IB}	-	-	-	0.1	μA
	Open-Loop Voltage Gain	A_{VOL}	-	50	60	-	dB
	Unity Gain Bandwidth	BW	-	0.3	1	-	MHz
	Power Supply Rejection Ratio	PSRR		50	-	-	dB
Oscillator	PWM Frequency	F_{OSC}	R_I = 75kΩ	60	65	70	kHz
Soft-Start	Charge Current	I_{SS}	R_I = 75kΩ	4.0	5.7	7.0	μA
	Duty Cycle	DC	-	85	-	93	%
PWM Output	Output Voltage Low	V_{OL}	Io = 5mA	-	-	0.5	V
	Output Voltage High	V_{OH}	V12 = 12V	4	-	-	V
	Output Impedance of V_{OH}	RO	-	1.5	-	3.3	kΩ

PIN CONFIGURATIONS



PIN DESCRIPTIONS

Pin No.	Pin Name	Description
1	PSON	Remote On/Off logic input for CPU or controller. Turn on/off the PWM Output.
2	V33	3.3V over-voltage/under-voltage control sense input.
3	V5	5V over-voltage/under-voltage control sense input.
4	OPP	Over-power sense input.
5	UVAC	AC fail detection.
6	NVP	The protection input for negative output.
7	V12	12V over-voltage/under-voltage control sense input.

(To be continued)

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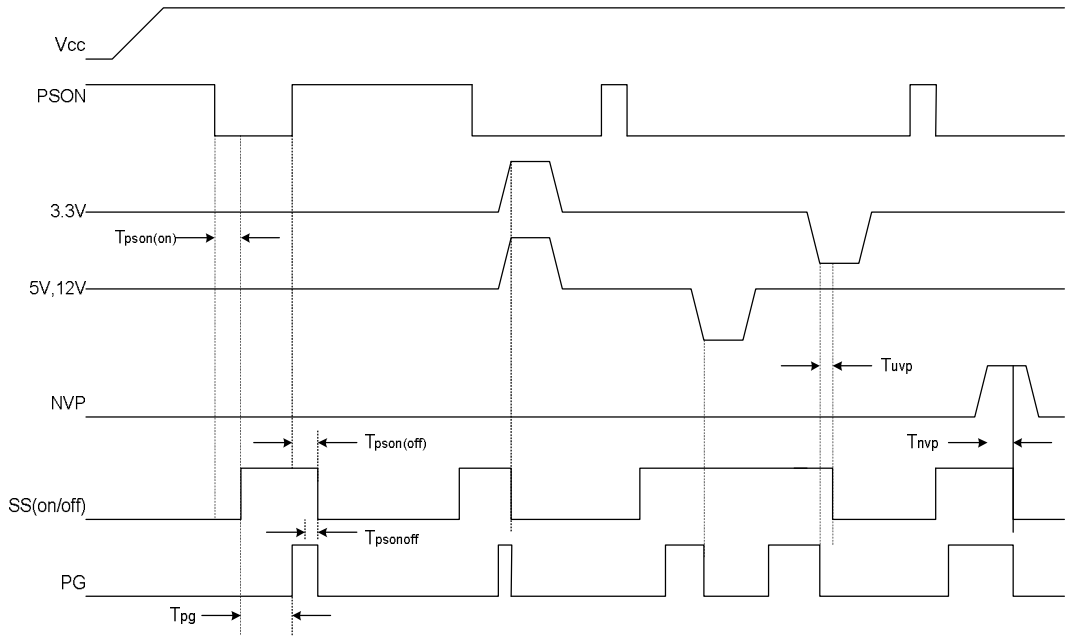
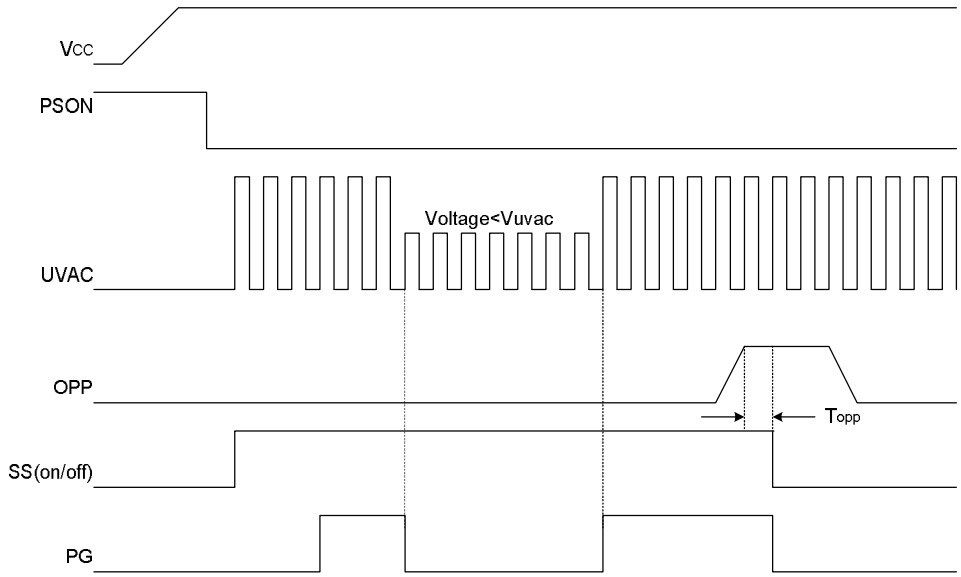
Pin No.	Pin Name	Description
8	OP2	The totem-pole output drivers of push-pull PWM. The maximum duty cycle on an output (OP1 or OP2) is 46%.
9	OP1	The totem-pole output drivers of push-pull PWM.
10	PG	Power Good logic output, 0 or 1 (open-collector). PG=1 means that the power is good for operation.
11	FB2	Output for second converter regulation loop.
12	VREF2	Reference comparison input for second converter regulation loop. 2.5V.
13	VREF1	Reference comparison input for first converter regulation loop. 2.5V.
14	FB1	Output for first converter regulation loop.
15	GND	Ground.
16	COMP	Error amplifier output and the input of the PWM comparator.
17	IN	The negative input of error amplifier. The positive input of error amplifier is a 2.5V reference voltage.
18	SS	The soft-start. It is settable through external capacitor. The current source output at this pin is 5.7uA and the voltage is clamped at 2.5V.
19	RI	Connected to external resistor for the reference setting.
20	VCC	Supply voltage. It is connected to 5V-standby.

FUNCTION DESCRIPTION

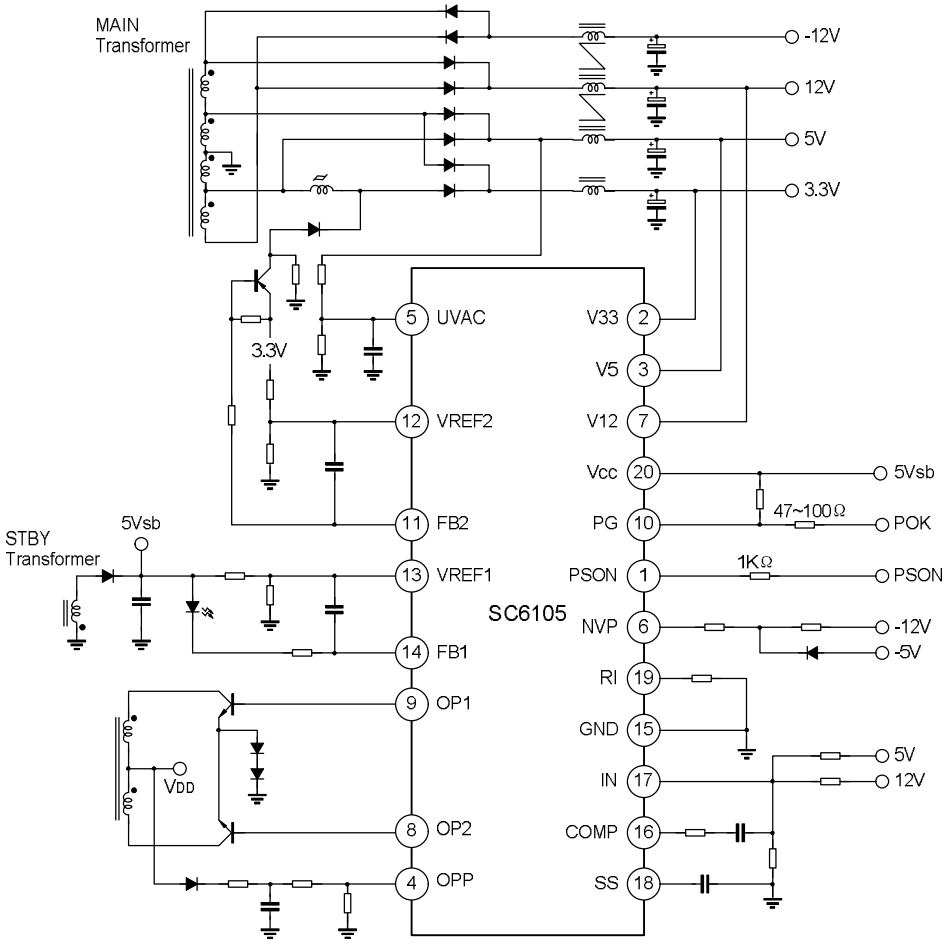
SC6105 have functions below: AC Power-down Detection, Over Power Protection (OPP), Negative Voltage Protection, Over-voltage and under-voltage protection, Power-down warning for power good signal, Power good signal and power-fail lockup, Remote on/off control, Complete pulse width modulation (PWM) control circuitry, On-chip oscillator, Programmable Soft-Start and so on.

TIMING DIAGRAM



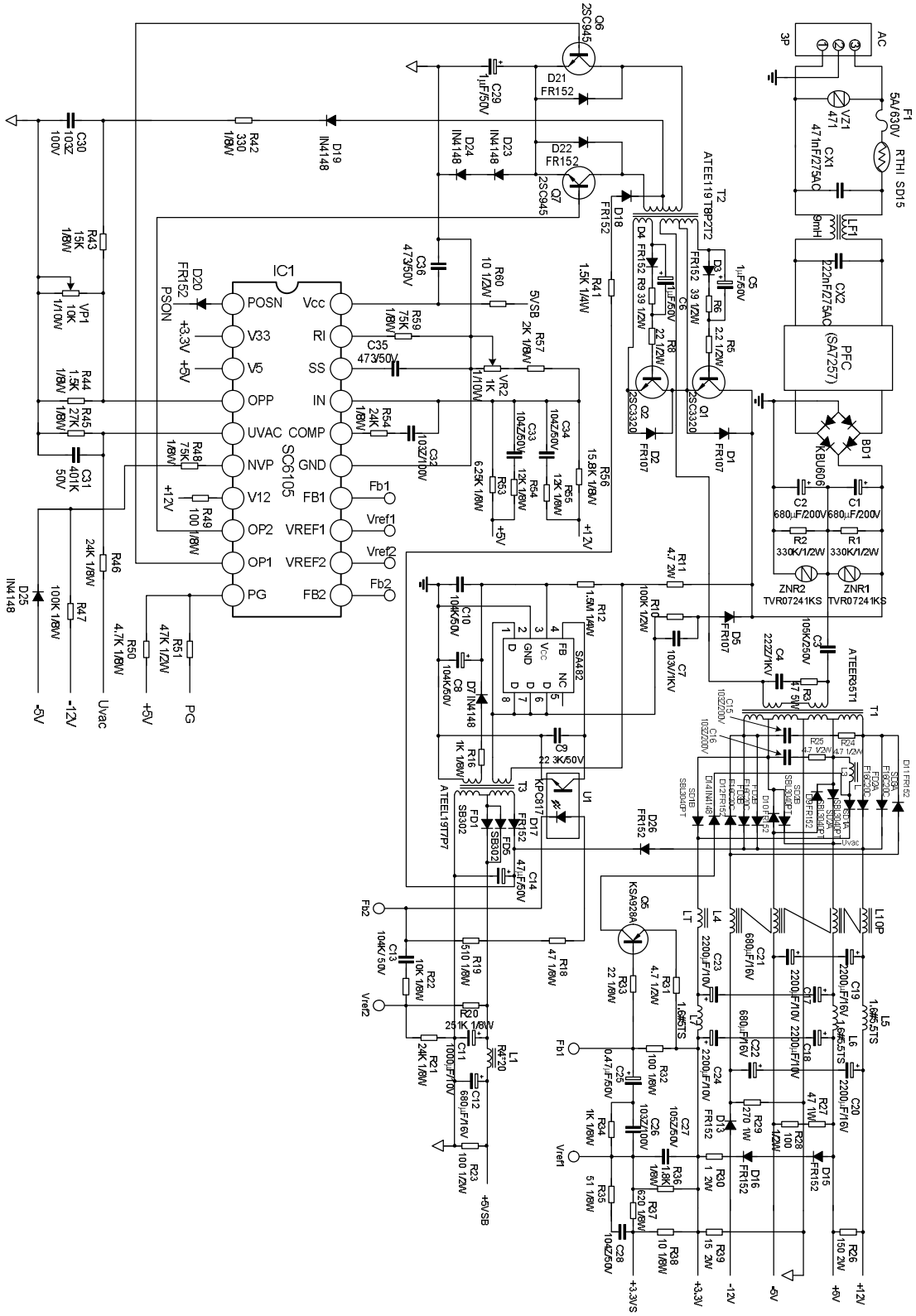


TYPICAL APPLICATION CIRCUIT



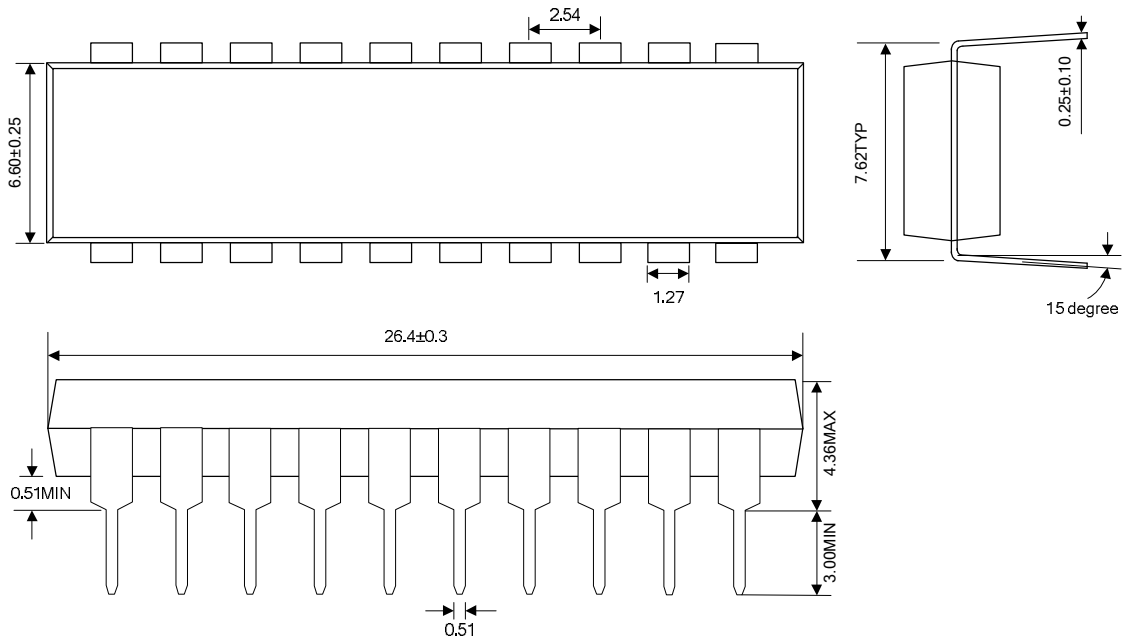
Note:The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test .

DETAIL APPLICATION CIRCUIT



PACKAGE OUTLINE

DIP-20-300-2.54 UNIT: mm



HANDLING MOS DEVICES:

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.

Attachment

Revision History

Data	REV	Description	Page
2006.03.24	1.0	Original	
2006.10.26	1.1	Modify the “TYPICAL APPLICATION CIRCUIT”	
2007.07.20	1.2	Modify the “ELECTRICAL CHARACTERISTICS”	
2008.04.17	1.3	Modify the “ELECTRICAL CHARACTERISTICS” Add the “DETAIL APPLICATION CIRCUIT”	
2008.04.17	1.4	Modify the “ELECTRICAL CHARACTERISTICS”	