

KA7577

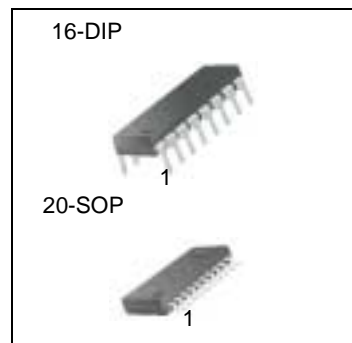
SMPS Controller

Features

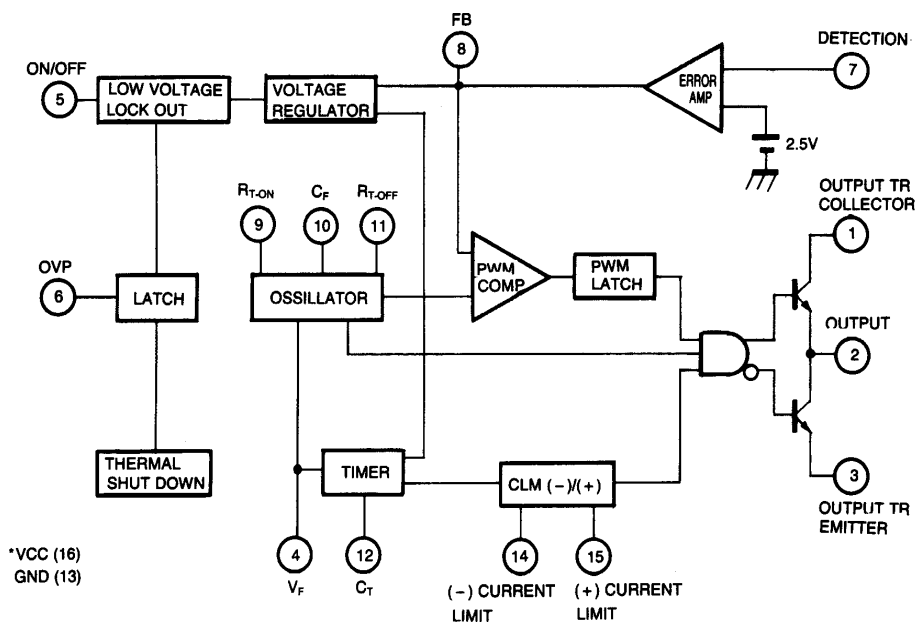
- Low Stand-By Current
- Pulse by Pulse Current Limiting
- Over Voltage Protection
- Over Current Protection
- Integrated Thermal Shutdown Circuit
- Output Driver Current of $\pm 2A$
- Totem pole Output

Description

KA7577 is fixed frequency PWM controller and specially designed for SMPS to get regulated DC voltage from AC power supply. This integrated circuit has so fast rise and fall output pulse that it can directly drive power transistor as well as power MOSFET. This device features high speed and high sensitive current limiting. Protection circuitry include current limiting function against short and over current at secondary side, owing to the integrated timertype-protection circuit.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	31	V
Collector Supply Voltage	V _C	31	V
Output DC Current	I _{O(DC)}	± 0.5	A
Output Peak Voltage	I _{OPK}	± 2	A
V _F Terminal Voltage	V(V _F)	31	V
V _{ON/OFF} Terminal Voltage	V(ON/OFF)	31	V
Current Limiting (-) Terminal Voltage	V(CLM -)	- 4 ~+4	V
Current Limiting (+) Terminal Voltage	V(CLM +)	- 0.3 ~+4	V
Over Voltage Protection Terminal Voltage	V(OVP)	31	V
Detection Terminal Voltage (Note 1)	V(DET)	6	V
Detection Terminal Sink Current (Note 1)	I _{SINK(DET)}	5	mA
Feedback Terminal Voltage	V(FB)	0 - 10	V
Timer ON Terminal Source Current	I _{SOURCE(T-ON)}	-1	mA
Timer OFF Terminal Source Current	I _{SOURCE(T-OFF)}	-1	mA
Power Dissipation	P _D	1.5	W
Thermal Derating Factor	K _{TD}	12	mW/°C
Operating Temperature Range	T _{OPR}	- 25 ~ +85	°C
Storage Temperature Range	T _{STG}	- 40 ~ +125	°C
Junction Temperature	T _J	150	°C

Note:

1. This terminal has the constant voltage characteristics of 6-8V, when current is supplied from outside. The maximum allowable voltage is 6V when the constant voltage is applied to this terminal. And maximum allowable current is 5mA, it is recommended to use current limiting resistor.

Electrical Characteristics

(V_{CC} = 18V, T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
POWER SUPPLY VOLTAGE AND CURRENT SECTION						
Power Supply Voltage	V _{CC}	-	-	-	30	V
Operation Start-Up Voltage	V _{CC} (START)	-	15.2	16.2	17.2	V
Operation Stop Voltage	V _{CC} (STOP)	-	9.0	9.9	10.9	V
Difference Voltage Between Operation Start and Stop	ΔV _{CC}	-	5.0	6.3	7.6	V
Stand-By Current	I _{SB}	T _A = 25°C, V _{CC} = 14.5V	50	80	140	μA
		T _A = -30 to +85°C, V _{CC} = 14.5V	40	80	160	μA
Operating Supply Current	I _{CC} (OPR)	V _{CC} = 30V	13	15	21	mA
Supply Current at Non-Operating	I _{CC} (OFF)	V _{CC} = 25V	0.95	1.31	1.9	mA
		V _{CC} = 14V	50	80	120	μA
Supply Current at Timer Non-Operating	I _{CC} (CT)	V _{CC} = 25V	0.95	1.35	2.0	mA
		V _{CC} = 14V	-	140	220	μA
Supply Current at OVP Operating	I _{CC} (OVP)	V _{CC} = 25V	1.0	2.0	3.0	mA
		V _{CC} = 9.5V	125	190	290	μA
ON/OFF SECTION						
ON/OFF Terminal High Threshold Voltage	V _{THH} (ON/OFF)	-	2.1	2.6	3.1	V
ON/OFF Terminal Low Threshold Voltage	V _{THL} (ON/OFF)	-	1.9	2.4	2.9	V
ON/OFF Terminal Hysteresis Voltage	V _{HYS} (ON/OFF)	-	0.1	0.2	0.3	V
DETECTION SECTION						
Detection Voltage	V _(DET)	-	2.4	2.5	2.6	V
Input Current of Detection Voltage	I _I (DET)	V _(DET) = 2.5V	-	1.0	3.0	μA
Voltage Gain of Detection Amp	G _V (DET)	-	40	55	-	dB
FEEDBACK SECTION						
Current at Min Duty Cycle	I _{FB} (MIND)	-	- 2.1	-1.54	-1.0	mA
Current at Max Duty Cycle	I _{FB} (MAXD)	-	- 0.9	- 0.55	- 0.4	mA
Current Difference Between Max and Zero Duty Cycle	ΔI (FB)	-	-1.35	- 0.99	- 0.7	mA
FB Terminal Voltage	V _(FB)	I _{SINK} = - 0.95mA	4.9	5.9	7.1	V
FB Terminal Resistance	R _(FB)	V _(DET) = 2.5V	-	500	-	W

Electrical Characteristics

(V_{CC}=18V, T_A=25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OVER VOLTAGE PROTECTION SECTION						
OVP Terminal Threshold Voltage	V _{TH(OVP)}	-	1.0	1.4	1.8	V
OVP Terminal Input Current	I _{I(OVP)}	-	-	1.2	3.6	μA
OVP Cancellation Voltage	V _{CC(OVPC)}	-	7.6	8.6	-	V
Difference Voltage Between Operating Stop and OVP Cancellation	ΔV _{CC(OVP)}	-	0.65	1.3	-	V
TIMER SECTION						
Timer Frequency	f(TIMER)	-	0.27	0.4	0.6	Hz
Timer Charge Current	I _{CHG(TIMER)}	T _A = -5°C T _A = 25°C T _A = 85°C	-193 -178 -147	-138 -127 -105	-102 -94 -78	μA
Off Time/On Time Ratio	K	-	7.0	8.7	11.0	-
CURRENT LIMITING SECTION						
CLM(-) Terminal Threshold Voltage	V _{TH(CL M -)}	T _A = -5 to +85°C	-220	-200	-180	mV
CLM(-) Terminal Source Current	I _{SOURCE(CL M -)}	V(CL M -)	-170	-125	-90	μA
CLM(-) Terminal Duty Time	t _{D(CL M -)}			170		nS
CLM(+) Terminal Threshold Voltage	V _{TH(CL M +)}	T _A = -5 to +85°C	180	200	220	mV
CLM(+) Terminal Source Current	I _{SOURCE(CL M +)}	V(CL M +) = 0V	-270	-205	-140	μA
CLM(+) Terminal Duty Time	t _{D(CL M +)}	-	-	-	130	nS
OSCILLATOR SECTION						
Operation Frequency	f	R _{T-ON} = 17K R _{T-OFF} = 20K C _F = 220pF T _A = -5 to +85°C	170	188	208	KHz
Maximum On Duty	D _{ON(MAX)}	T _A = -5 to +85°C	47	50	53	%
Upper Limit Voltage of Oscillation Waveform	V _{L(OSC)}	-	3.97	4.37	4.77	V
Lower Limit Voltage of Oscillation Waveform	V _{L(OSC)}	-	1.76	1.96	2.16	V
Voltage Difference Between Upper Limit and Lower Limit	ΔV(OSC)	-	2.11	2.41	2.71	V
V_F SECTION						
OSC. Frequency at CLM Operating	f _{V_F}	V _{V_F} = 5V, R _{T-ON} = 17K R _{T-OFF} = 20K C _F = 220pF	170	188	207	KHz
		V _{V_F} = 2V, R _{T-ON} = 17V R _{T-OFF} = 20K C _F = 220pF	108	124	143	KHz

Electrical Characteristics

(VCC=18V, TA = 25°C , unless otherwise specified)

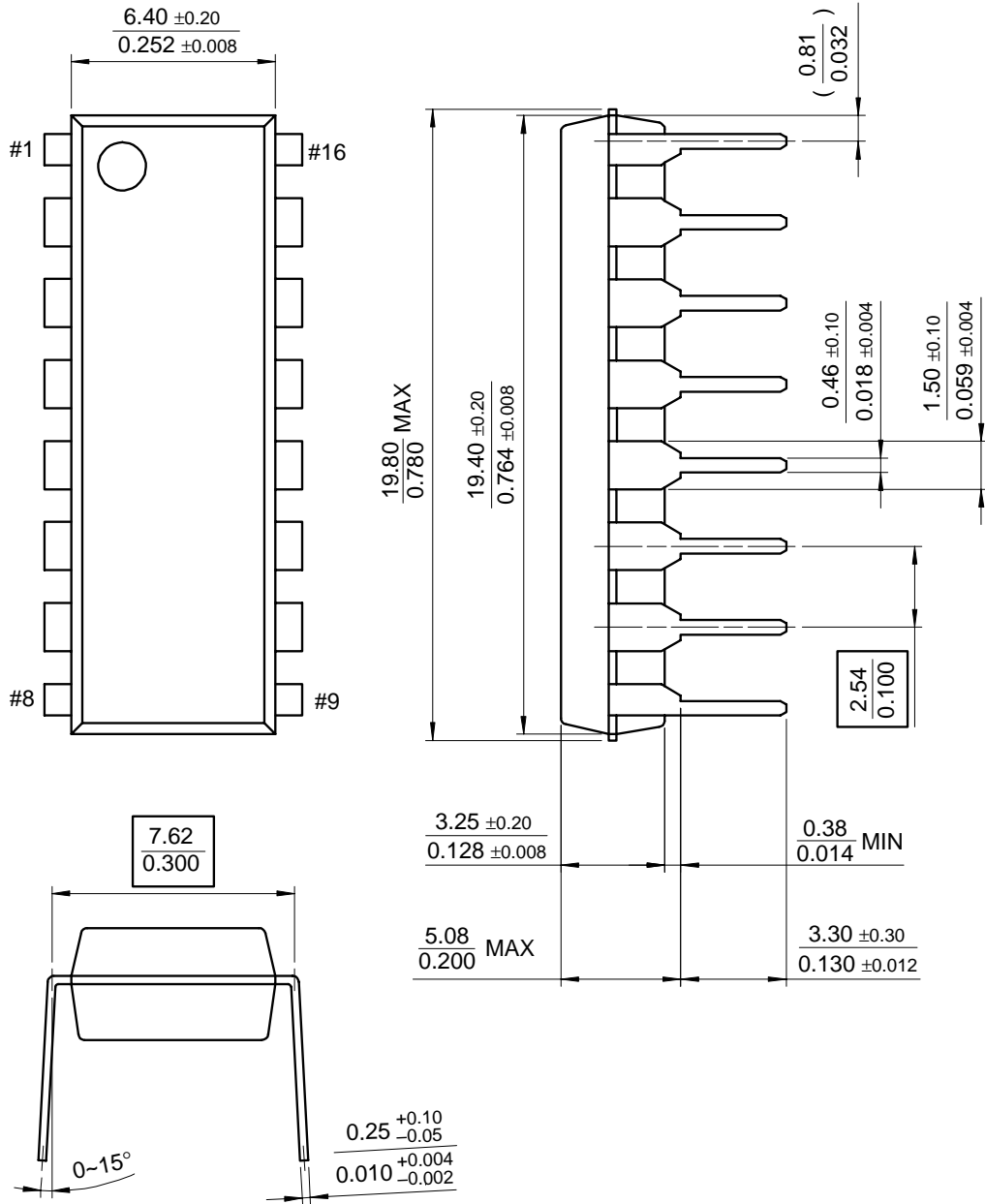
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
V_F SECTION						
Duty Ratio of CLM Operating	K	V _F = 0.2V Max On Duty/ Min Off Duty	11	13.7	22	-
V _F Voltage at Timer Operating Start	V(V _F)	-	2.7	3.0	3.3	V
V _F Terminal Input Current	I(V _F)	-	-	2	6	μA
OUTPUT SECTION						
Low Output Voltage	VOL1	VCC = 18V, I _O = 10mA	-	0.05	0.4	V
	VOL2	VCC = 18V, I _O = 100mA	-	0.7	1.4	V
	VOL3	VCC = 5V, I _O = 1mA	-	0.69	1.0	V
	VOL4	VCC = 5V, I _O = 100mA	-	1.3	2.0	V
High Output Voltage	VOH1	VCC = 18V, I _O = -10mA	16.0	16.5	-	V
	VOH2	VCC = 18V, I _O = -100mA	15.5	16.0	-	V
Rise Time	T _R	No load	-	50	-	ns
Fall Time	T _F	No load	-	35	-	ns
THERMAL PROTECTION SECTION						
Thermal protection Operating Temperature	T(TP)	-	120	140	160	°C

Mechanical Dimensions

Package

Dimensions in millimeters

16-DIP

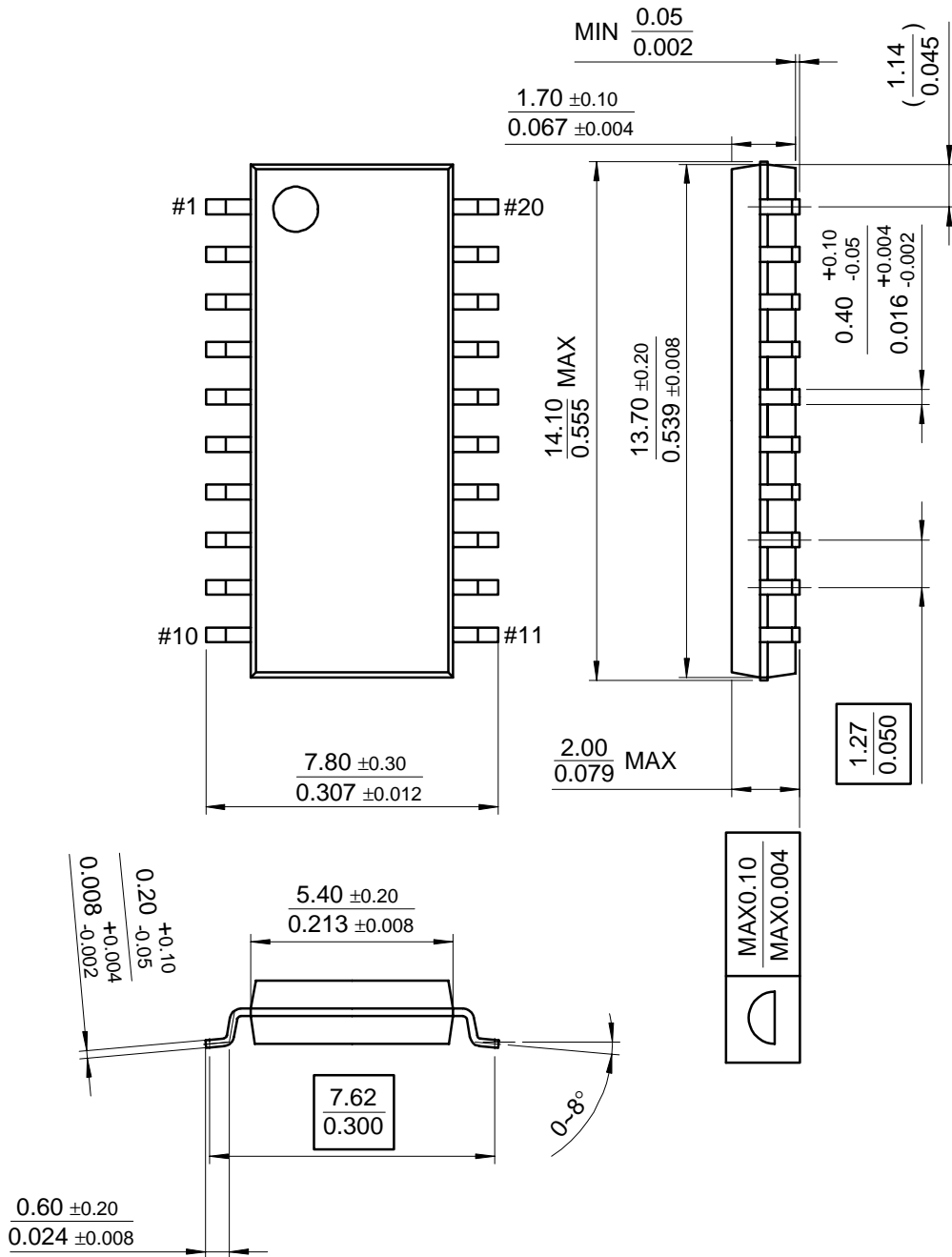


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

20-SOP



Ordering Information

Product Number	Package	Operating Temperature
KA7577	16-DIP	-25 ~ +85°C
KA7577D	20-SOP	-25 ~ +85°C

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