

# FA7630CP(E)

Bipolar IC  
For Switching Power Supply Control

## ■ Description

The FA7630CP(E) is dual channel PWM-type switching power supply control IC.

This IC can drive Pch-MOSFET directly and is optimum for large power DC-DC converter.

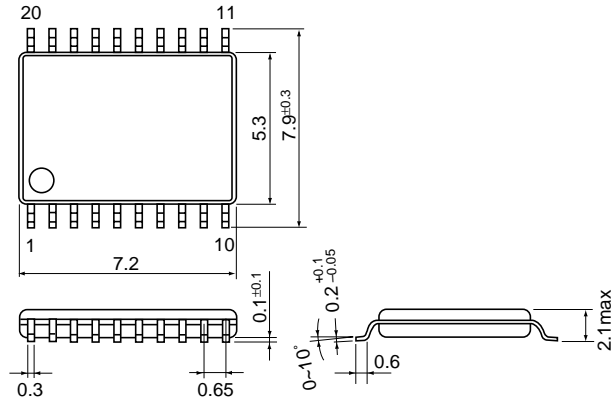
This IC has all the necessary protection functions for a power MOSFET. It is optimum for a portable equipment power supply which uses low-voltage input to output comparably large power.

## ■ Features

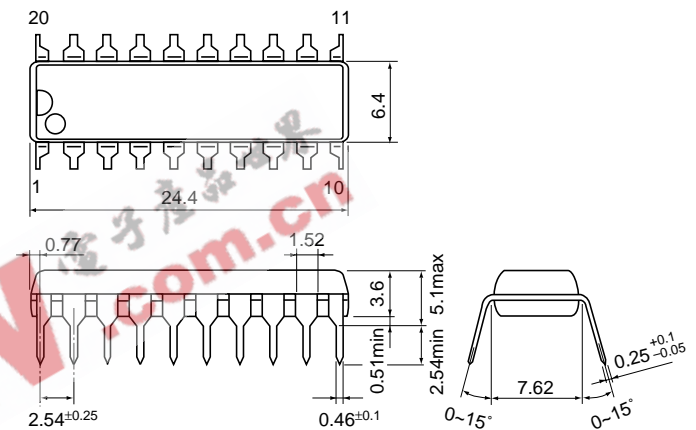
- Dual channel PWM-type switching power supply control
- $\pm 2.6\%$  ( $V_{REF}$ ) and  $\pm 3\%$  ( $V_B$ ) reference voltage
- Low voltage operation ( $V_{CC}$ : 5 to 20V)
- Drive circuit for connecting a Pch-MOSFET
- Overload cutoff circuit with timer latch circuit
- Soft start circuit
- Undervoltage lockout function (UVLO)
- Pulse-by-pulse overcurrent limiting function
- Output ON/OFF control function for each channel
- Master-slave synchronized operation without external components
- Maximum operating frequency is 500kHz

## ■ Dimensions, mm

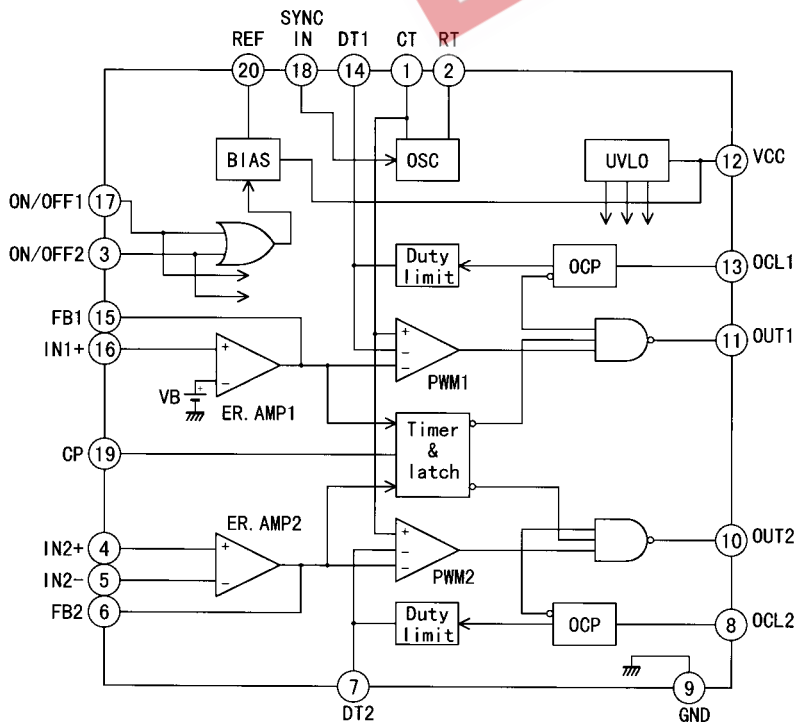
### ● SSOP-20



### ● DIP-20



## ■ Block diagram



Pin No.	Pin symbol	Description
1	CT	Oscillator timing capacitor
2	RT	Oscillator timing resistor
3	ON/OFF2	Output ON/OFF control 2
4	IN2+	Non-inverting input to error amplifier
5	IN2-	Inverting input to error amplifier
6	FB2	Error amplifier output
7	DT2	Dead time adjustment
8	OCL2	Overcurrent limiting circuit 2
9	GND	Ground
10	OUT2	CH.2 output
11	OUT1	CH.1 output
12	VCC	Power supply
13	OCL1	Overcurrent limiting circuit
14	DT1	Dead time adjustment
15	FB1	Error amplifier output
16	IN1+	Non-inverting input to error amplifier
17	ON/OFF1	Output ON/OFF control 1
18	SYNC IN	Synchronizing signal input
19	CP	Timer and latch circuit
20	REF	Reference voltage output

### ■ Absolute maximum ratings

Item	Symbol	Rating	Unit
Maximum supply voltage	V <sub>CC</sub>	22	V
Maximum output current	I <sub>OUT</sub>	±500	mA
Maximum power dissipation	P <sub>d</sub>	650	mW
Junction temperature	T <sub>J</sub>	125	°C
Operating temperature	T <sub>opr</sub>	-20 to +85	°C
Storage temperature	T <sub>stg</sub>	-40 to +150	°C

### ■ Recommended operating conditions

Item	Symbol	Min.	Max.	Unit
Supply voltage	V <sub>CC</sub>	5	20	V
Feedback resistance	R <sub>NF</sub>	100		kΩ
Oscillator timing capacitance	C <sub>T</sub>	50	2200	pF
Oscillator timing resistance	R <sub>T</sub>	24	100	kΩ
Oscillation frequency	f <sub>osc</sub>	50	500	kHz

### ■ Electrical characteristics (T<sub>a</sub>=25°C, V<sub>CC</sub>=6V, C<sub>T</sub>=180pF, R<sub>T</sub>=47kΩ)

#### Reference voltage section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Output voltage	V <sub>REF</sub>	I <sub>OR</sub> = 1mA	2.450	2.520	2.580	V
Line regulation	LINE	V <sub>CC</sub> = 5.0 to 20V I <sub>OR</sub> =1mA		5	20	mV
Load regulation	LOAD	I <sub>OR</sub> = 0.1 to 1mA		30	50	mV
Output voltage variation due to temperature change	V <sub>TC1</sub>	T <sub>a</sub> = -20 to +25°C	-1		1	%
	V <sub>TC2</sub>	T <sub>a</sub> = +25 to +85°C	-1		1	%

#### Oscillation and synchronizing circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f <sub>osc</sub>	C <sub>T</sub> =180pF, R <sub>T</sub> =47kΩ	74	83	92	kHz
Frequency variation(due to supply voltage change)	f <sub>ΔV</sub>	V <sub>CC</sub> = 3.6 to 20V		1		%
Frequency variation(due to temperature change)	f <sub>ΔT</sub>	T <sub>a</sub> = -20 to +85°C		5		%
H level of synchronizing signal	V <sub>SYH</sub>		1.5		1.8	V
L level of synchronizing signal	V <sub>SYL</sub>		0.8		1.1	V
Cutoff level of synchronizing signal	V <sub>SD</sub>				0.4	V
Bias current of synchronizing signal	I <sub>SYNC</sub>	V <sub>SYNC</sub> =1.6V			5	μA

#### Error amplifier section (Ch.1)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Reference voltage	V <sub>B</sub>		0.769	0.793	0.817	V
Input bias current	I <sub>B</sub>			5	100	nA
Open-loop voltage gain	A <sub>VO</sub>			60		dB
Unity-gain bandwidth	f <sub>T</sub>			1		MHz
H state output voltage	V <sub>OH</sub>	No load	2.10			V
L state output voltage	V <sub>OL</sub>	No load			300	mV
Output source current	I <sub>OH</sub>	V <sub>OH</sub> =1V	40	55	100	μA

#### Error amplifier section (Ch.2)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input offset voltage	V <sub>IO</sub>			2	10	mV
Input bias current	I <sub>B</sub>			5	100	nA
Common-mode input voltage	V <sub>COM</sub>		0		1.0	V
Open-loop voltage gain	A <sub>VO</sub>		70			dB
Unity-gain bandwidth	f <sub>T</sub>			1.0		MHz
H state output voltage	V <sub>OH</sub>	No load	2.10			V
L state output voltage	V <sub>OL</sub>	No load			300	mV
Output source current	I <sub>OH</sub>	V <sub>OH</sub> =1V	50	65	200	μA

## FA7630CP(E)

### Pulse width modulation circuit section (FB pin)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage	V <sub>TH0</sub>	Duty cycle = 0%		1.65		V
Input threshold voltage	V <sub>TH1</sub>	Duty cycle = 100%		0.95		V

### Dead time adjustment circuit section (DT pin)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage	V <sub>TH0</sub>	Duty cycle = 0%		1.65		V
Input threshold voltage	V <sub>TH1</sub>	Duty cycle = 100%		0.95		V
Standby voltage	V <sub>STB</sub>	DT pin open	1.80			V

### Overcurrent limiting circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage	V <sub>THOC</sub>		175	200	225	mV
Hysteresis voltage	V <sub>HIOC</sub>			40		mV
Input bias current	I <sub>OC</sub>			45	80	μA
Delay in OCL	t <sub>DOC</sub>	Overdriving : 50mV		120		ns

### Timer and latch circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Latch-mode threshold voltage	V <sub>THCP</sub>		1.00	1.25	1.50	V
Input bias current	I <sub>INCP</sub>	V <sub>CP</sub> =1.5V, V <sub>FB</sub> =0.3V			1	μA
CP pin voltage / LOW	V <sub>SATC</sub>	I <sub>CP</sub> =20μA, V <sub>FB</sub> =1.0V			300	mV

### Output ON/OFF control section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF-to-ON threshold voltage	V <sub>THON</sub>				3.0	V
ON-to-OFF threshold voltage	V <sub>THOF</sub>		0.60			V
Input bias current	I <sub>IN</sub>	V <sub>IN</sub> =3V		230	350	μA

### Undervoltage lock-out circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF-to-ON threshold voltage	V <sub>CCON</sub>		3.92	4.20	4.48	V
ON-to-OFF threshold voltage	V <sub>CCOF</sub>			3.50		V
Voltage hysteresis	V <sub>HYS</sub>			0.70		V

### Output section

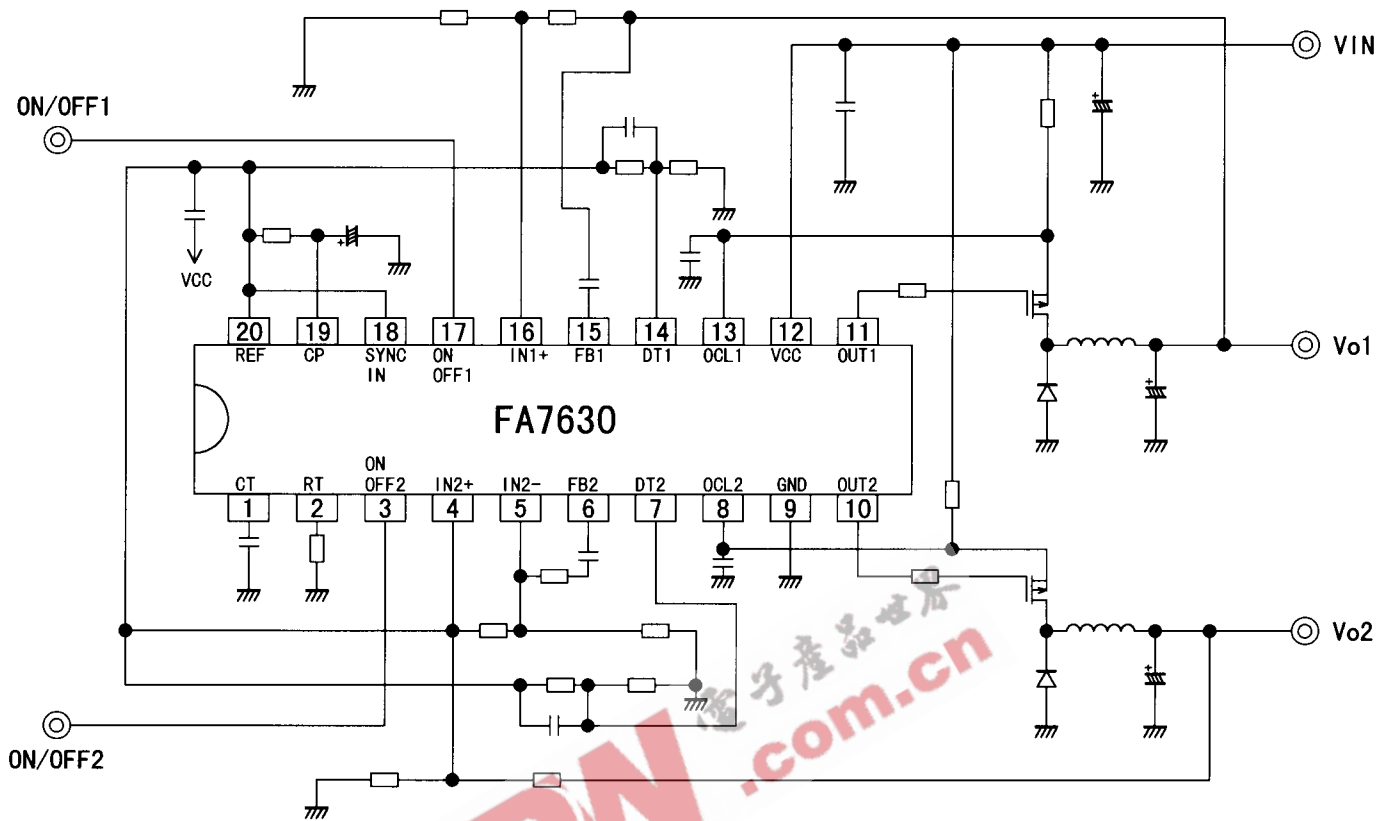
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Saturation voltage(H level)	V <sub>SAT+</sub>	I <sub>O</sub> = -50mA		1.60	2.00	V
Saturation voltage(L level)	V <sub>SAT-</sub>	I <sub>O</sub> = 50mA		1.40	1.80	V

### Overall device

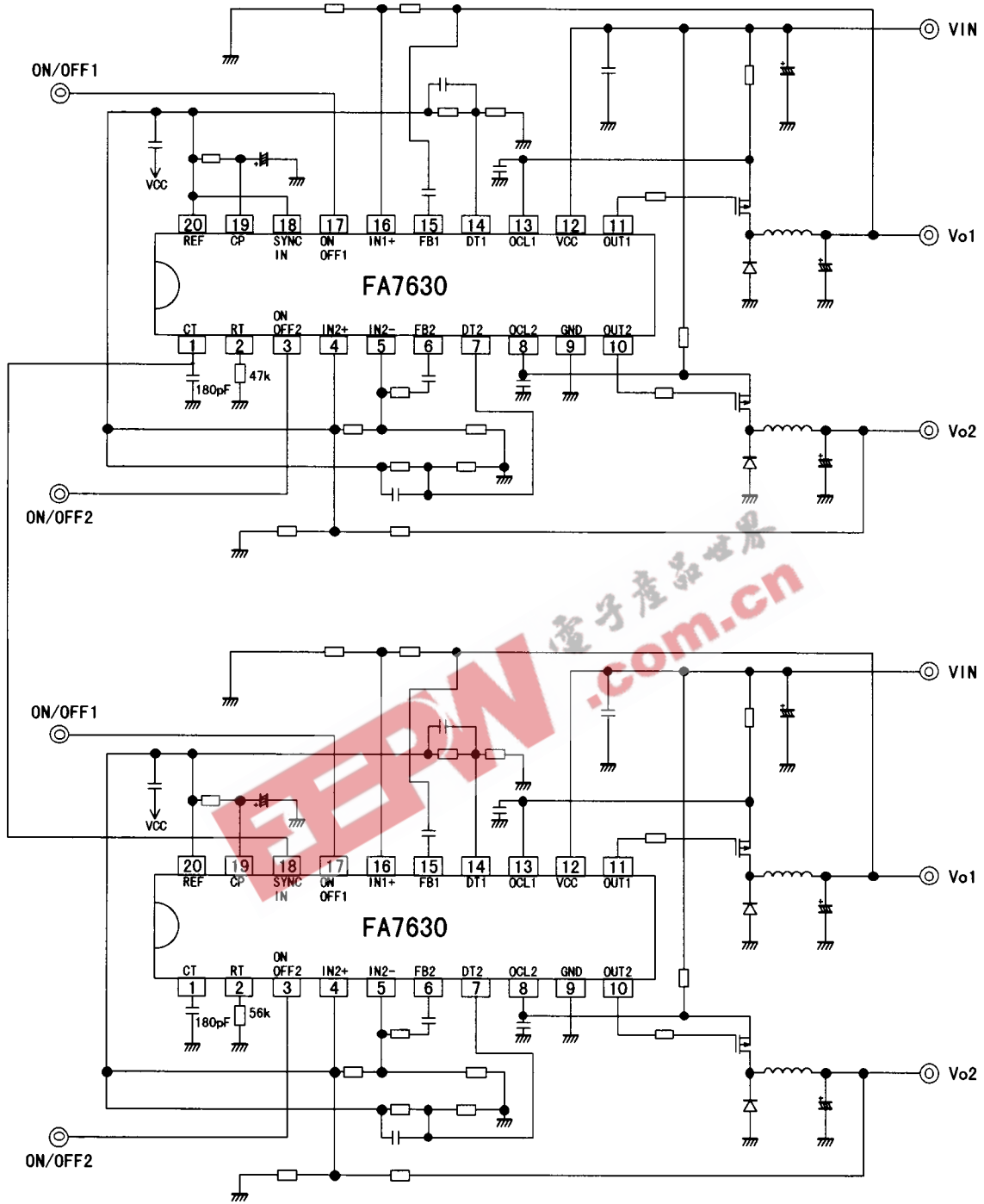
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Standby supply current	I <sub>CCST</sub>	Out pin open		0.1	10	μA
Operating-state supply current	I <sub>CC1</sub>	Single channel operation Duty cycle =50%		2.20	3.20	mA
	I <sub>CC2</sub>	Dual channel operation Duty cycle =50%		3.00	4.20	mA

■ Application circuit

● Individual application circuit



• Master-slave application circuit



Parts tolerances characteristics are not defined in the circuit design sample shown above. When designing an actual circuit for a product, you must determine parts tolerances and characteristics for safe and economical operation.