FA7630CP(E)

Bipolar IC
For Switching Power Supply Control

■ Description

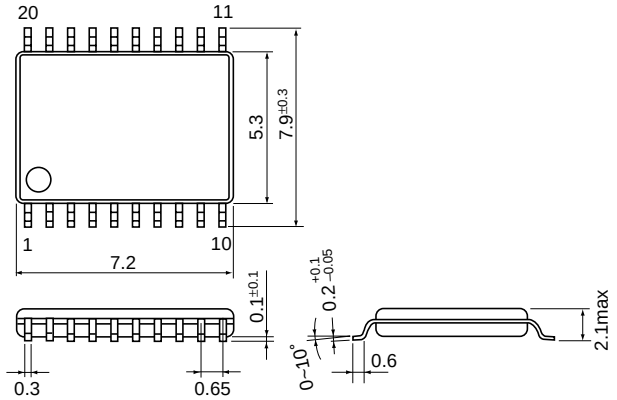
The FA7630CP(E) is dual channel PWM-type switching power supply control IC.
This IC can drive Pch-MOSFET directly and is optimum for large power DC-DC converter.
This IC has all the necessary protection functions for a power MOSFET. It is optimum for a portable equipment power supply which uses low-voltage input to output comparably large power.

■ Features

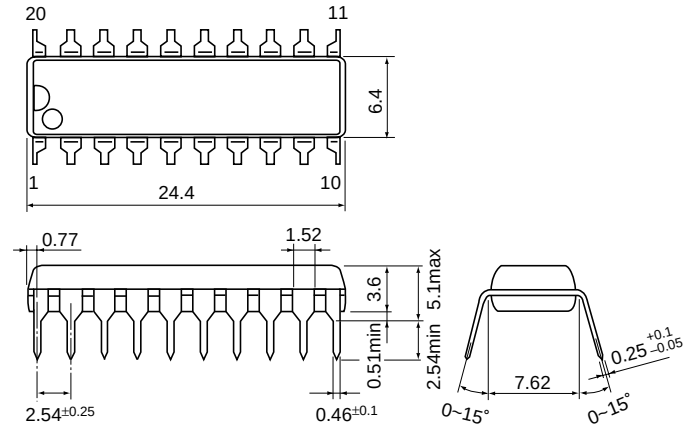
- Dual channel PWM-type switching power supply control
- ±2.6% (V_{REF}) and ±3% (V_B) reference voltage
- Low voltage operation (Vcc: 5 to 20V)
- Drive circuit for connecting a Pch-MOSFET
- Overload cutoff circuit with timer latch circuit
- Soft start circuit
- Undervoltage lockout function (UVLO)
- 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

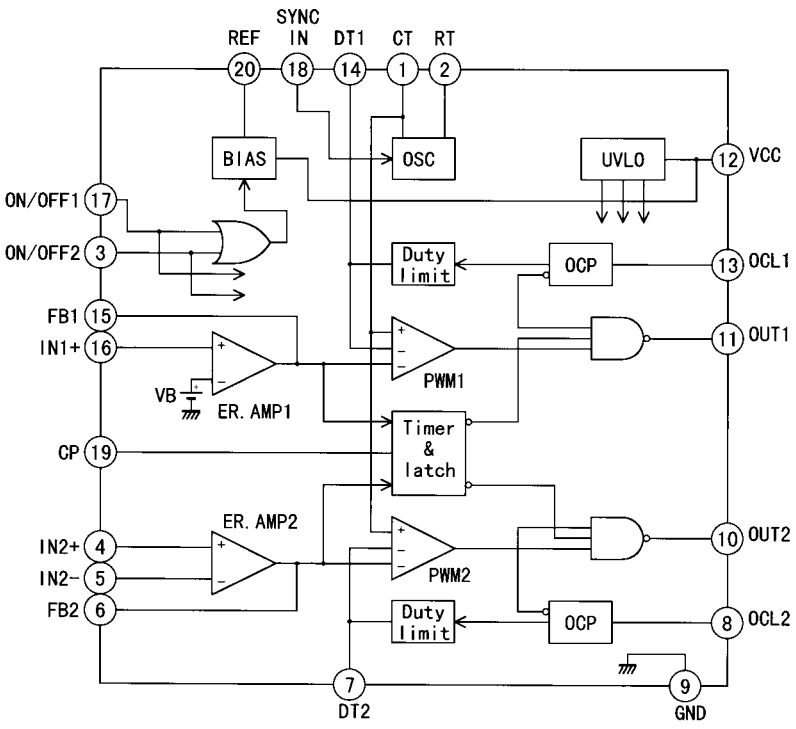
● SSOP-20



● 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_{CC}	22	V
Maximum output current	I_{OUT}	±500	mA
Maximum power dissipation	P_d	650	mW
Junction temperature	T_J	125	°C
Operating temperature	Topr	–20 to +85	°C
Storage temperature	Tstg	–40 to +150	°C

■ Recommended operating conditions

Item	Symbol	Min.	Max.	Unit
Supply voltage	V_{CC}	5	20	V
Feedback resistance	R_{NF}	100		kΩ
Oscillator timing capacitance	C_T	50	2200	pF
Oscillator timing resistance	R_T	24	100	kΩ
Oscillation frequency	f_{OSC}	50	500	kHz

■ Electrical characteristics (Ta=25°C, V_{CC}=6V, C_T=180pF, R_T=47kΩ)

Reference voltage section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Output voltage	V_{REF}	I_{OR} = 1mA	2.450	2.520	2.580	V
Line regulation	L_{INE}	V_{CC} = 5.0 to 20V I_{OR}=1mA		5	20	mV
Load regulation	L_{OAD}	I_{OR} = 0.1 to 1mA		30	50	mV
Output voltage variation due to temperature change	V_{TC1}	Ta = –20 to +25°C	–1		1	%
	V_{TC2}	Ta = +25 to +85°C	–1		1	%

Oscillation and synchronizing circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f_{OSC}	C_T=180pF, R_T=47kΩ	74	83	92	kHz
Frequency variation(due to supply voltage change)	f_{dV}	V_{CC} = 3.6 to 20V		1		%
Frequency variation(due to temperature change)	f_{dT}	Ta = –20 to +85°C		5		%
H level of synchronizing signal	V_{SYH}		1.5		1.8	V
L level of synchronizing signal	V_{SYL}		0.8		1.1	V
Cutoff level of synchronizing signal	V_{SD}				0.4	V
Bias current of synchronizing signal	I_{SYNC}	V_{SYNC}=1.6V			5	μA

Error amplifier section (Ch.1)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Reference voltage	V_B		0.769	0.793	0.817	V
Input bias current	I_B			5	100	nA
Open-loop voltage gain	A_{VO}			60		dB
Unity-gain bandwidth	f_T			1		MHz
H state output voltage	V_{OH}	No load	2.10			V
L state output voltage	V_{OL}	No load			300	mV
Output source current	I_{OH}	V_{OH}=1V	40	55	100	μA

Error amplifier section (Ch.2)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input offset voltage	V_{IO}			2	10	mV
Input bias current	I_B			5	100	nA
Common-mode input voltage	V_{COM}		0		1.0	V
Open-loop voltage gain	A_{VO}		70			dB
Unity-gain bandwidth	f_T			1.0		MHz
H state output voltage	V_{OH}	No load	2.10			V
L state output voltage	V_{OL}	No load			300	mV
Output source current	I_{OH}	V_{OH}=1V	50	65	200	μA

Pulse width modulation circuit section (FB pin)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage	V_{THO}	Duty cycle = 0%		1.65		V
Input threshold voltage	V_{TH1}	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_{THO}	Duty cycle = 0%		1.65		V
Input threshold voltage	V_{TH1}	Duty cycle = 100%		0.95		V
Standby voltage	V_{STB}	DT pin open	1.80			V

Overcurrent limiting circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage	V_{THOC}		175	200	225	mV
Hysteresis voltage	V_{HYOC}			40		mV
Input bias current	I_{OC}			45	80	µA
Delay in OCL	tdoc	Overdriving : 50mV		120		ns

Timer and latch circuit section

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

Output ON/OFF control section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF-to-ON threshold voltage	V_{THON}				3.0	V
ON-to-OFF threshold voltage	V_{THOF}		0.60			V
Input bias current	I_{IN}	V_{IN}=3V		230	350	µA

Undervoltage lock-out circuit section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF-to-ON threshold voltage	V_{CCON}		3.92	4.20	4.48	V
ON-to-OFF threshold voltage	V_{CCOF}			3.50		V
Voltage hysteresis	V_{HYS}			0.70		V

Output section

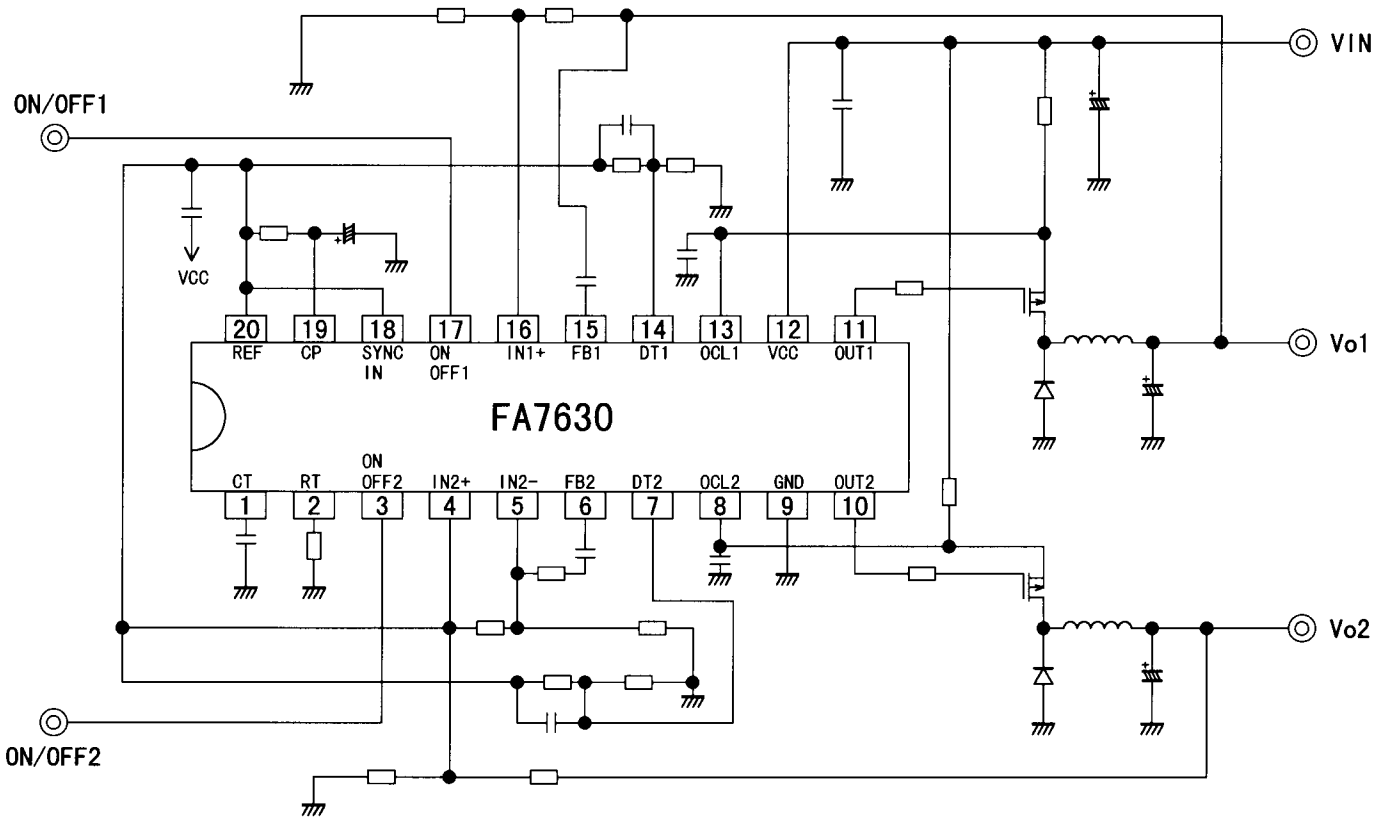
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Saturation voltage(H level)	V_{SAT+}	I_O= –50mA		1.60	2.00	V
Saturation voltage(L level)	$V_{SAT–}$	I_O= 50mA		1.40	1.80	V

Overall device

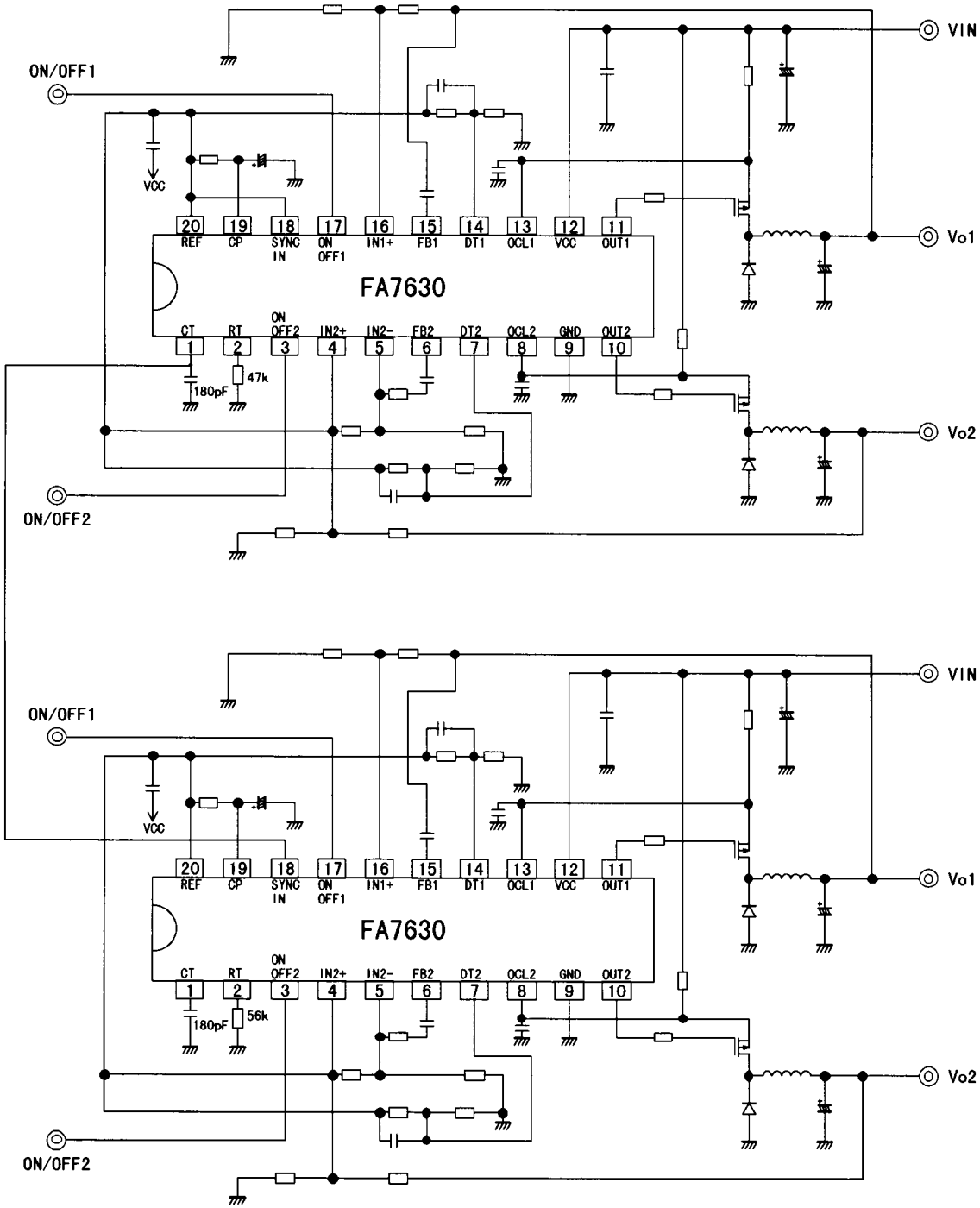
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Standby supply current	I_{CCST}	Out pin open		0.1	10	µA
Operating-state supply current	I_{CC1}	Single channel operation Duty cycle =50%		2.20	3.20	mA
	I_{CC2}	Dual channel operation Duty cycle =50%		3.00	4.20	mA

■ 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.