

■ Description

FA3630V is a DC-DC converter controller. This IC can directly drive a Nch/Pch-MOSFET. This IC is suitable to reduce converter size because it has many functions in a small package TSSOP.

■ Features

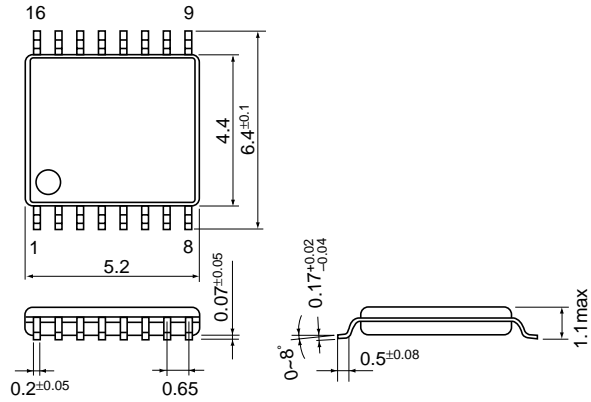
- Low input voltage: 2.5V to 6.5V
- 2-channels PWM control: Rail-to-rail output
Output impedance of output stage = 3.5Ω (typ.)
Nch-MOSFET driving (Ch1)
Nch/Pch-MOSFET driving (Ch2)(selected by SEL pin)
- Low power consumption: 0.7mA (typ.)
- ON/OFF control: Standby current = $0.1\mu\text{A}$ (typ.)
- $\pm 2\%$ high accuracy reference voltage
- Adjustable soft start time and maximum duty cycle
- Adjustable built-in timer latch for short circuit protection
- Wide range of operation frequency: 100kHz to 1MHz
- Package: TSSOP-16 (Thin and small)

■ Applications

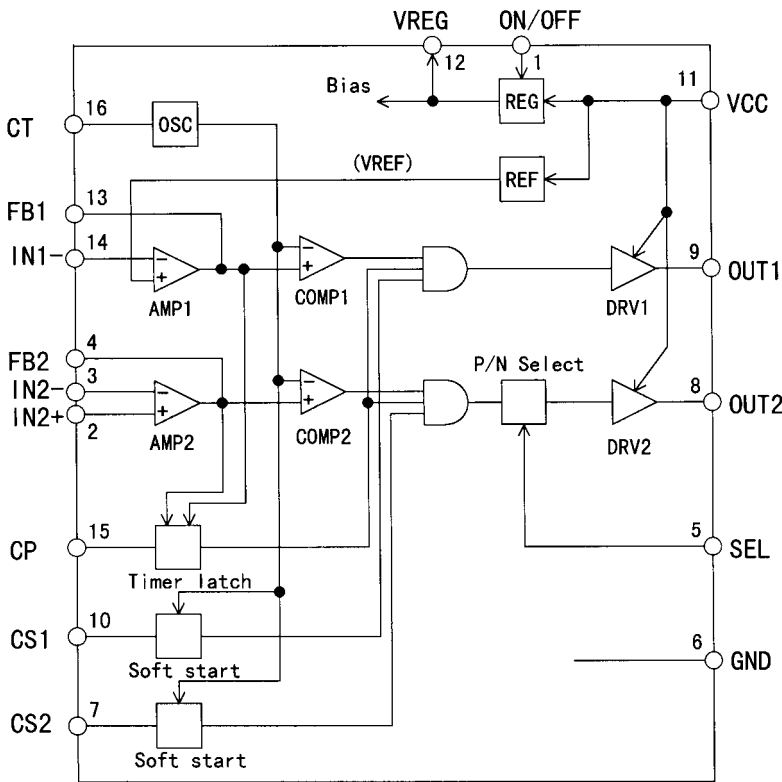
- Power supply for general equipment

■ Dimensions, mm

● TSSOP-16



■ Block diagram



Pin No.	Pin symbol	Description
1	ON/OFF	ON/OFF function
2	IN2+	Ch. 2 non-inverting input to error amplifier
3	IN2-	Ch.2 inverting input to error amplifier
4	FB2	Ch. 2 output of error amplifier
5	SEL	Selection of type of MOSFET driven
6	GND	Ground
7	CS2	Soft start for Ch. 2
8	OUT2	Ch. 2 output (for Nch or Pch-MOSFET)
9	OUT1	Ch.1 output (for Nch-MOSFET)
10	CS1	Soft start for Ch.1
11	VCC	Power supply
12	VREG	Regulated voltage output
13	FB1	Ch.1 output of error amplifier
14	IN1-	Ch.1 inverting input to error amplifier
15	CP	Timing capacitor for timer latch delay
16	CT	Oscillator timing capacitor

■ Absolute maximum ratings

Item	Symbol	Rating	Unit
Power supply voltage	V _{CC}	6.5	V
Source peak current of OUT1/2	I _{OUT+}	-500	mA
Sink peak current of OUT1/2	I _{OUT-}	500	mA
Input voltage for logic input	V _{LOG}	-0.3 to +6.5	V
Output current of VREG	I _{REGMAX}	-10	mA
Total power dissipation*	P _d	300	mW
Junction temperature	T _J	125	°C
Ambient temperature	T _{OP}	-20 to +85	°C
Storage temperature	T _{stg}	-40 to +125	°C

* Ta ≤ 25°C

■ Recommended operating conditions

Item	Symbol	Min.	Max.	Unit
Power supply voltage	V _{CC}	2.5	5.5	V
Input voltage for logic input	V _{LOG}	0	5.5	V
Oscillation frequency	f _{osc}	100	1000	kHz

■ Electrical characteristics (V_{CC}=3.3V, Ta=25°C, C_T=100pF)

Regulated voltage section for internal control blocks

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Regulated voltage	V _{REG}	I _{REG} =no load	2.156	2.200	2.244	V
Variation with output current	V _{RGOUT}	V _{REG} =0 to 5mV			5	mV
Variation with supply voltage	V _{RGLIN}	V _{CC} =2.5 to 5.5V			8	mV
Variation with temperature	V _{RGTa}	Ta=-20 to +25°C		±0.5		%
		Ta=+25 to +85°C		±0.5		%

Reference voltage section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Reference voltage	V _{REF}		0.98	1.00	1.02	V
Variation with supply voltage	V _{RGLIN}	V _{CC} =2.5 to 5.5V		1	5	mV
Variation with temperature	V _{RGTa}	Ta=-20 to +25°C		±0.5		%
		Ta=+25 to +85°C		±0.5		%

Oscillator section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f _{osc}	C _T =100pF	437	485	533	kHz
High level voltage	V _{OSCH}	C _T =100pF		1.39		V
Low level voltage	V _{OSCL}	C _T =100pF		0.77		V
Variation with supply voltage	f _{dV}	V _{CC} =2.5 to 5.5V		±1	±5	%
Variation with temperature	f _{dT}	Ta=-20 to +25°C		±5		%
		Ta=+25 to +85°C		±5		%

Error amplifier section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input offset voltage	V _{IOF}			3	10	mV
Common mode input voltage	V _{ICOM}		0.2		1.5	V
DC open loop gain	A _{VOL}		70	75		dB
Unity gain band width	f _T			1.6		MHz
Output sink current	I _{FBL}	V _{FB} =0.5V	2.0	2.5	3.0	mA
Output source current	I _{FBH}	V _{FB} =V _{REG} -0.5V	-160	-125	-90	μA

ON/OFF logic input signal section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input range for ON mode	VONH	V _{CC} =2.5V to 5.5V	2.0			V
Input range for OFF mode	VONL	V _{CC} =2.5V to 5.5V			0.5	V

SEL logic input signal section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input range for driving Nch-MOSFET	VSELH		V _{CC} -0.5			V
Input range for driving Pch-MOSFET	VSELL				0.5	V

Timer latch protection section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Threshold voltage of CP	VCPTH		1.55	1.70	1.85	V
Charge current of CP	ICP	V _{CP} =V _{REG} -0.5V	-2.5	-2.1	-1.7	μA
Threshold voltage of FB1/FB2	VFBL		1.56	1.73	1.90	V

Soft-start section

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Threshold voltage of CS1/2	V _{CS0}	Duty cycle=0%	0.74	0.79	0.84	V
Threshold voltage of CS1/2	V _{CS100}	Duty cycle=100%	1.29	1.34	1.39	V

Output section

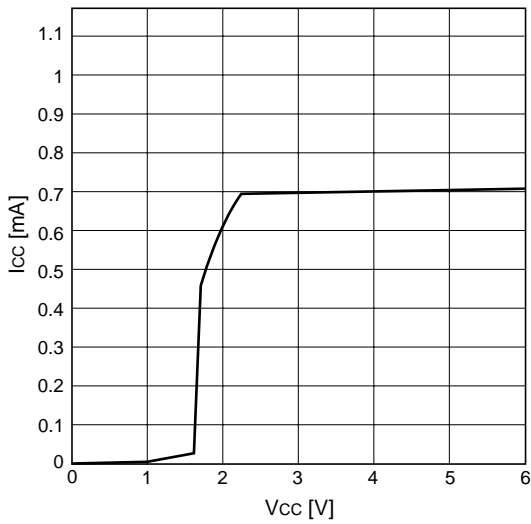
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
ON resistance	R _{ON}	I _{OUT} =±100mA		3.5	7	Ω
		V _{CC} =3.3V		3.5	7	Ω
Rise time	t _r	C _{LOAD} =1000pF		25	35	ns
		V _{CC} =3.3V		25	35	ns
Fall time	t _f	C _{LOAD} =1000pF		25	35	ns
		V _{CC} =3.3V		25	35	ns

Overall device

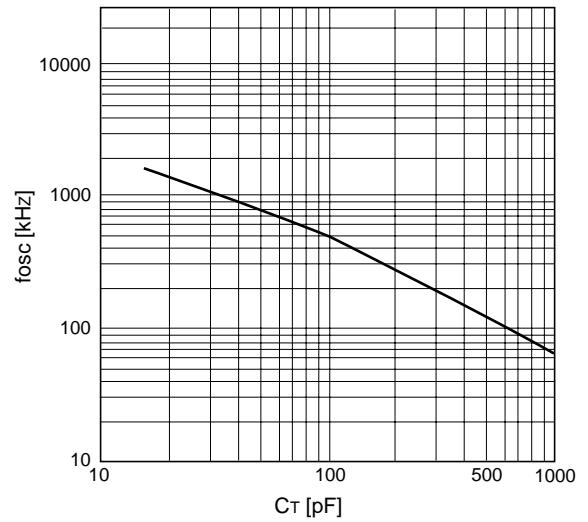
Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Standby current	I _{CC0}	ON/OFF=GND		0.1	5	μA
Operating average current	I _{CC}	OUT1, OUT2: Open Output duty=100%		0.7	1	mA
		(Reference value) OUT1, OUT2: Open IN- and FB: Shorted		1.5		mA

■ Characteristic curves (Ta=25°C)

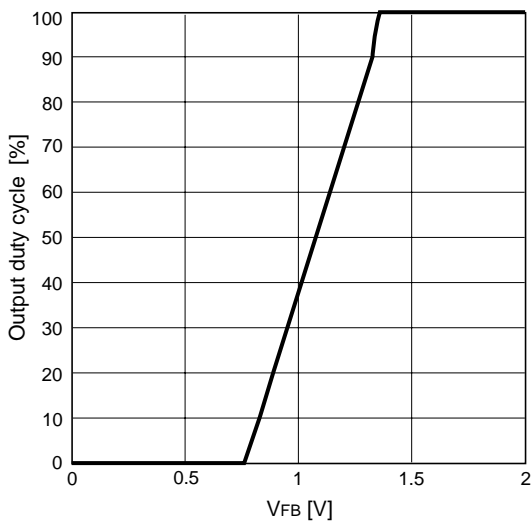
Supply current (I_{CC}) vs. supply voltage (V_{CC})



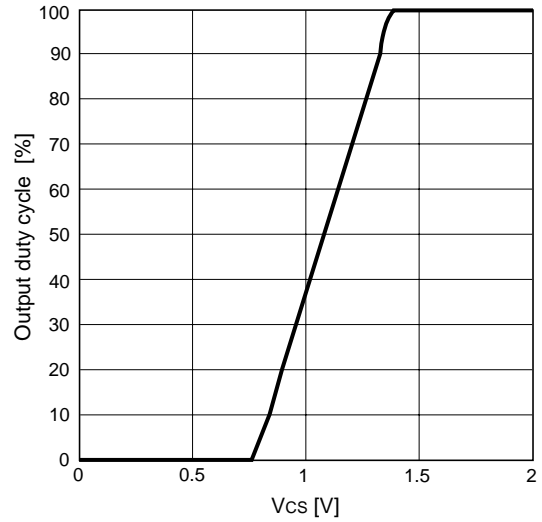
Oscillation frequency (f_{osc}) vs. timing capacitor (C_T)



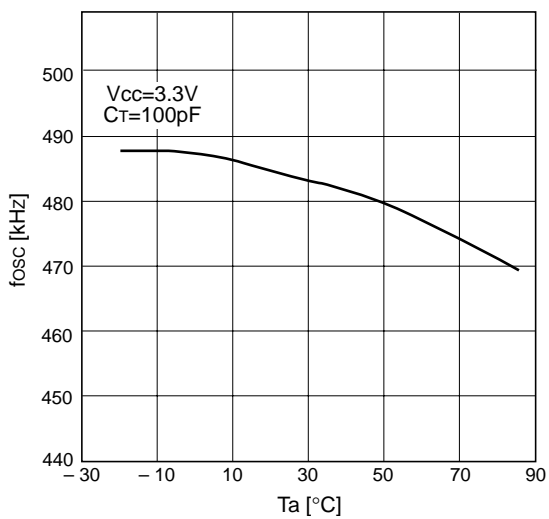
Output duty cycle vs. FB terminal voltage (V_{FB})



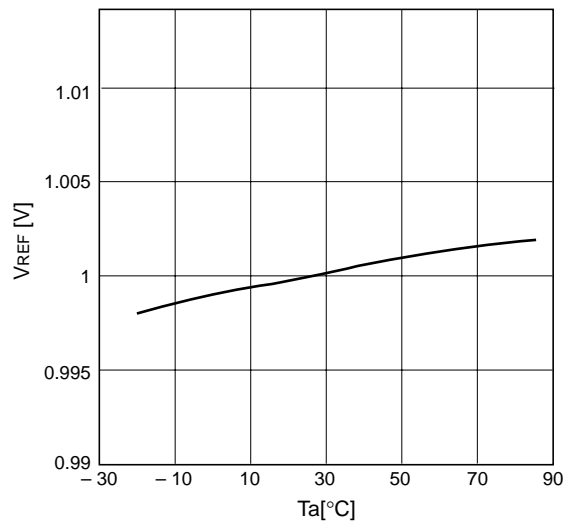
Output duty cycle vs. CS terminal voltage (V_{CS})



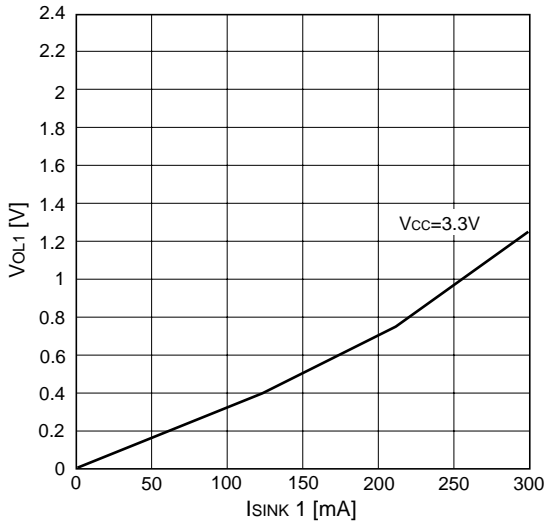
Oscillation frequency (f_{osc}) vs. ambient temperature (T_a)



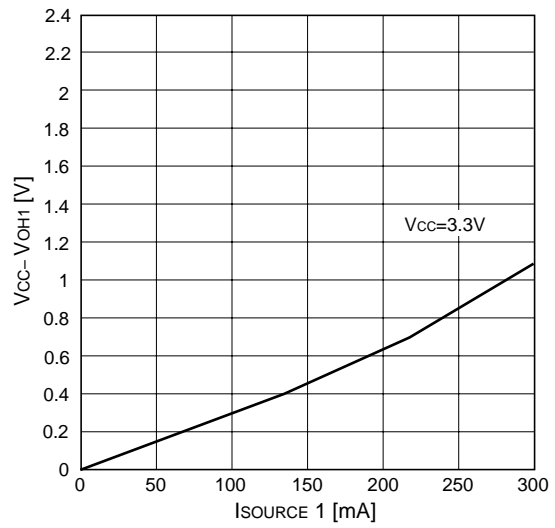
Reference voltage (V_{REF}) vs. ambient temperature (T_a)



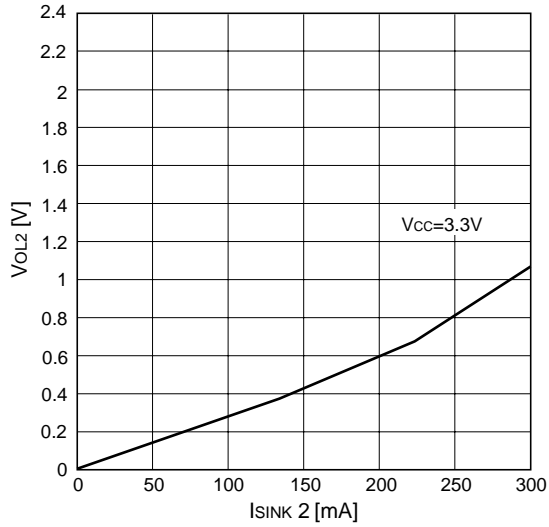
L-level output voltage (V_{OL1}) vs. output sink current (I_{SINK1})



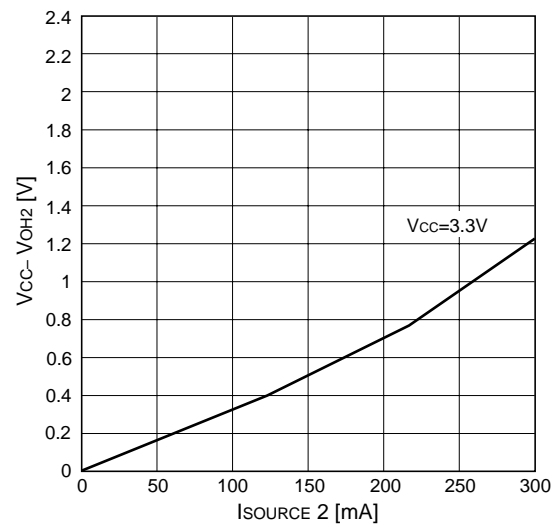
H-level output voltage (V_{OH1}) vs. output source current ($I_{SOURCE1}$)



L-level output voltage (V_{OL2}) vs. output sink current (I_{SINK2})

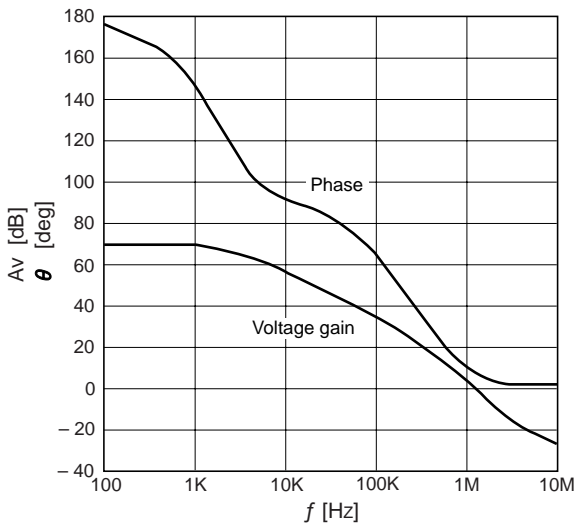


H-level output voltage (V_{OH2}) vs. output source current ($I_{SOURCE2}$)

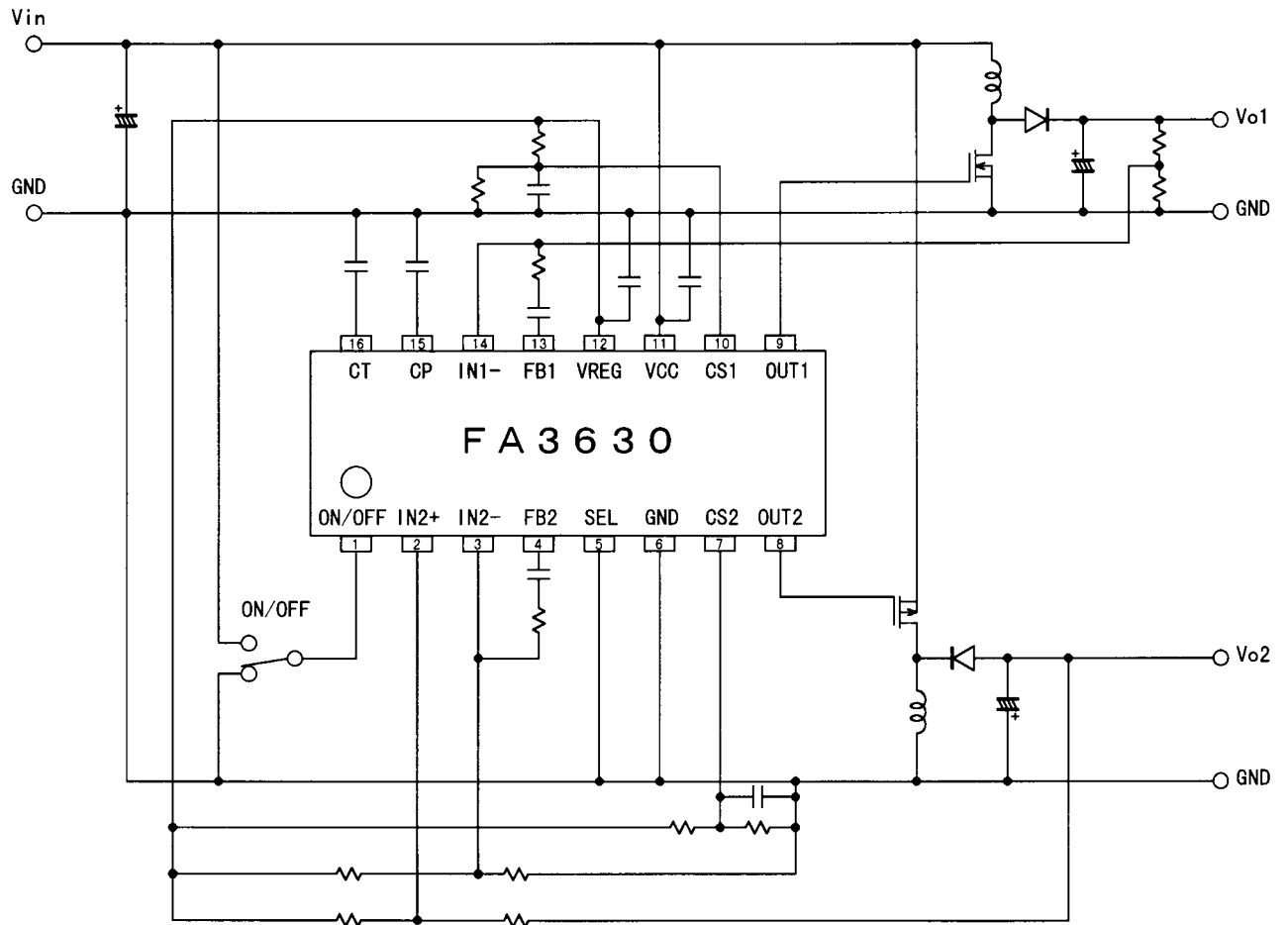


Error amplifier voltage gain (A_v) / phase (θ) vs. frequency (f)

Condition: Open loop



■ 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.