

## Bipolar IC For Switching Power Supply Control

### ■ Absolute maximum ratings

Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	31	V
Output current	I <sub>O</sub>	±1.5	A
Error amplifier input voltage	V <sub>I</sub>	4	V
Feedback terminal input voltage	V <sub>FB</sub>	4	V
Overcurrent detection terminal input voltage	V <sub>IS</sub>	-0.3 to +4	V
CS terminal input current	I <sub>CS</sub>	2	mA
Total power dissipation (Ta=25°C)	P <sub>d</sub>	800 (DIP-8) *1 550 (SOP-8) *2	mW
Operating temperature	T <sub>opr</sub>	-30 to +85	°C
Storage temperature	T <sub>stg</sub>	-40 to +150	°C

### ■ Recommended operating conditions

Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Min.	Max.	Unit
Supply voltage	V <sub>CC</sub>	10	30	V
Oscillator timing resistance	R <sub>T</sub>	3.3	10	kΩ
Soft-start capacitor	C <sub>s</sub>	0.1	1	μF
Oscillation frequency	f <sub>osc</sub>	5	600	kHz

Notes:

\*1 Derating factor Ta &gt; 25°C : 8.0mW/°C (on PC board)

\*2 Derating factor Ta &gt; 25°C : 5.5mW/°C (on PC board)

### ■ Electrical characteristics (Ta = 25°C, V<sub>CC</sub> = 18V, f<sub>osc</sub> = 135kHz)

Oscillator section Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f <sub>osc</sub>	C <sub>T</sub> = 330pF	125	135	145	kHz
Frequency variation 1 (due to supply voltage change)	f <sub>dv</sub>	V <sub>CC</sub> = 10 to 30V		±1		%
Frequency variation 2 (due to temperature change)	f <sub>dr</sub>	T <sub>a</sub> = -30 to +85°C		±1.5		%

### Pulse width modulation circuit section

Item	Symbol	Test condition	FA5310P(S)			FA5311P(S)			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Feedback terminal source current	I <sub>FB</sub>	V <sub>FB</sub> = 0	-660	-800	-960	-660	-800	-900	μA
Input threshold voltage (Pin 2)	V <sub>TH FBO</sub>	Duty cycle = 0%		0.75			0.75		V
	V <sub>TH FBM</sub>	Duty cycle = D <sub>MAX</sub>		1.80			2.30		V
Maximum duty cycle	D <sub>MAX</sub>		43	46	49	66	70	74	%

### Soft-start circuit section

Item	Symbol	Test condition	FA5310P(S)			FA5311P(S)			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Charge current (Pin 8)	I <sub>CHG</sub>	Pin 8 = 0V	-15	-10	-5	-15	-10	-5	μA
Input threshold voltage (Pin 8)	V <sub>TH CSO</sub>	Duty cycle = 0%		0.90			0.90		V
	V <sub>TH CSM</sub>	Duty cycle = D <sub>MAX</sub>		1.90			2.40		V

### Overcurrent limiting circuit section Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Input threshold voltage (Pin 3)	V <sub>TH IS</sub>		0.21	0.24	0.27	V
Overcurrent detection terminal source current	I <sub>IS</sub>	Pin 3 = 0V	-300	-200	-100	μA
Delay time	T <sub>PD IS</sub>			150		ns

**FA5310P(S)/FA5311P(S)****Latch-mode cutoff circuit section** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
CS terminal sink current	ISINK CS	Pin 8 = 6V, Pin 2 = 1V	25	45	65	$\mu$ A
Cutoff threshold voltage (Pin 8)	VTH CS		6.5	7.0	7.5	V

**Overload cutoff circuit section** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Cutoff-state supply voltage (Pin 2)	VTH FB		2.6	2.8	3.1	V

**Undervoltage lockout circuit** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF-to-ON threshold voltage	VTH ON		15.5	16.0	16.5	V
ON-to-OFF threshold voltage	VTH OFF		8.20	8.70	9.20	V
Voltage hysteresis	VHYS			7.30		V

**Output section** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
L-level output voltage	VOL	Io = 100mA		1.30	1.80	V
H-level output voltage	VOH	Io = -100mA, VCC = 18V	16.0	16.5		V
Rise time	tr	No load		50		ns
Fall time	tf	No load		50		ns

**Output ON/OFF circuit section** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
CS terminal source current	ISOURCE CS	Pin 8 = 0V	-15	-10	-5	$\mu$ A
OFF-to-ON threshold voltage (Pin 8)	VTH ON	CS terminal voltage OFF→ON		0.56		V
ON-to-OFF threshold voltage (Pin 8)	VTH OFF	CS terminal voltage ON→OFF		0.42		V

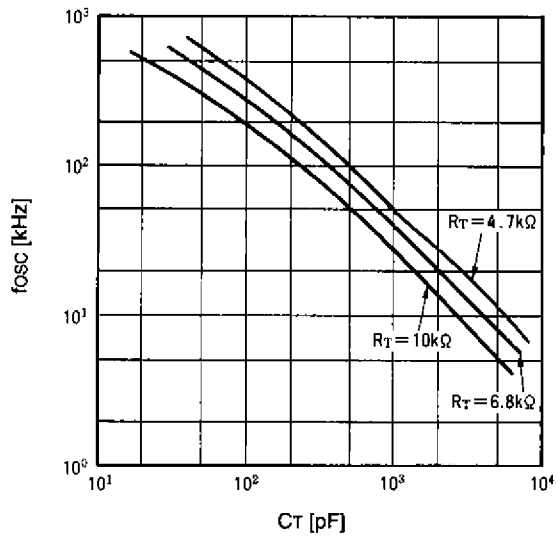
**Overall device** Common to FA5310P(S) and FA5311P(S)

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Standby current	ICC ST	VCC = 14V		90	150	$\mu$ A
Operating-state supply current	ICC OP			9	15	mA
OFF-state supply current	ICC OFF			1.1	1.8	mA
Cutoff-state supply current	ICC L			1.1	1.8	mA

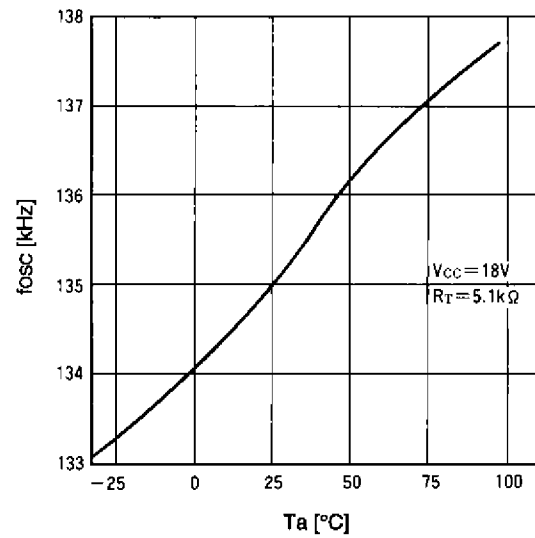
The ratings and pin numbers given in the tables are applicable for DIP-8 and SOP-8 packages.

### ■ Characteristic curves ( $T_a = 25^\circ\text{C}$ )

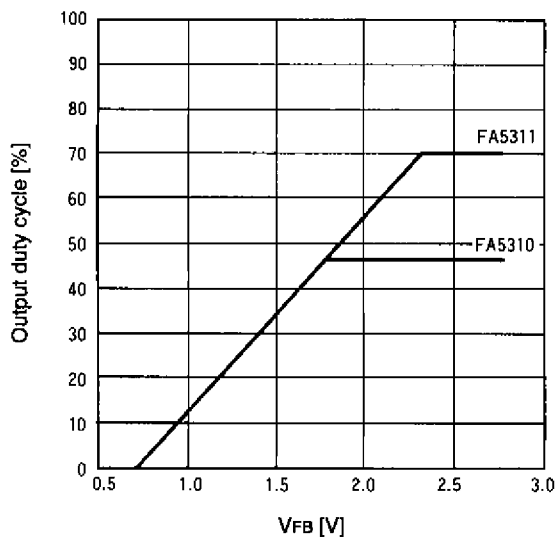
Oscillation frequency ( $f_{osc}$ ) vs.  
timing capacitor capacitance ( $C_T$ )



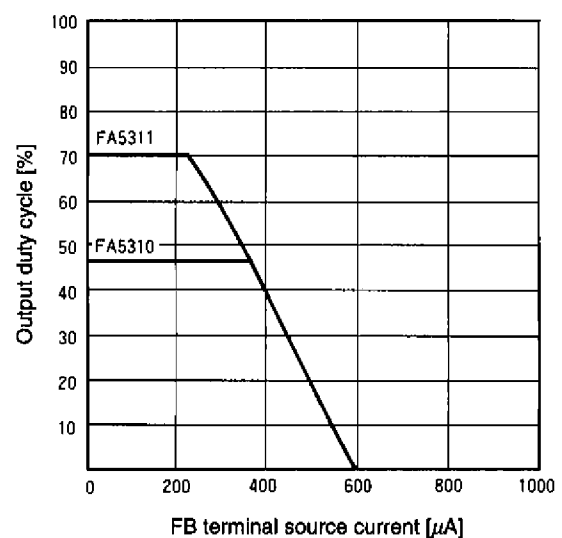
Oscillation frequency ( $f_{osc}$ ) vs. ambient temperature ( $T_a$ )



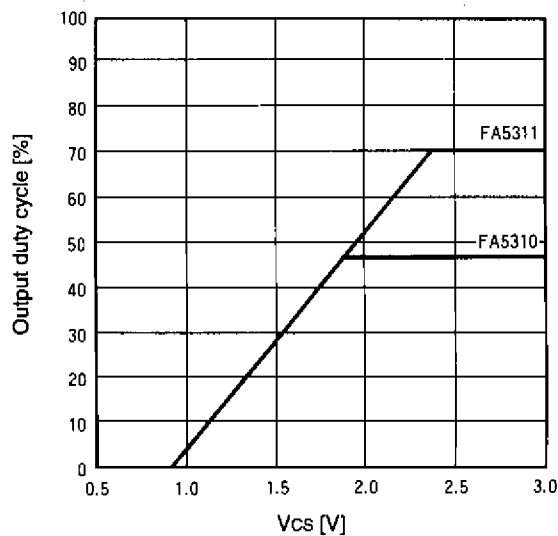
Output duty cycle vs. FB terminal voltage ( $V_{FB}$ )



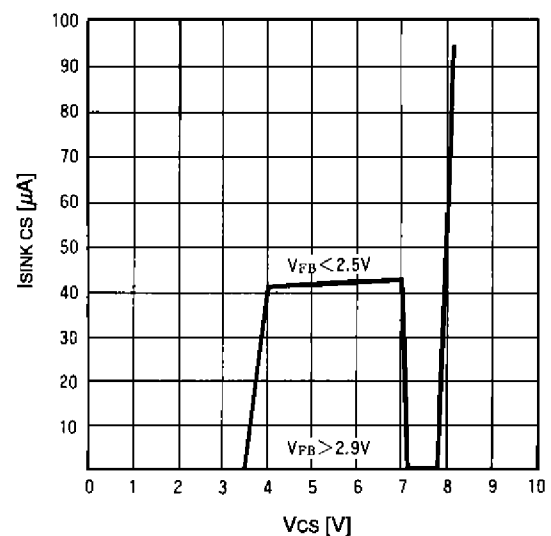
Output duty cycle vs. FB terminal source current ( $I_{SOURCE}$ )



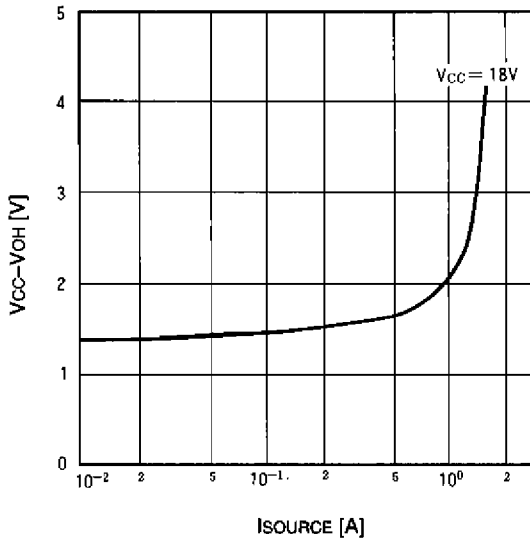
Output duty cycle vs. CS terminal voltage ( $V_{CS}$ )



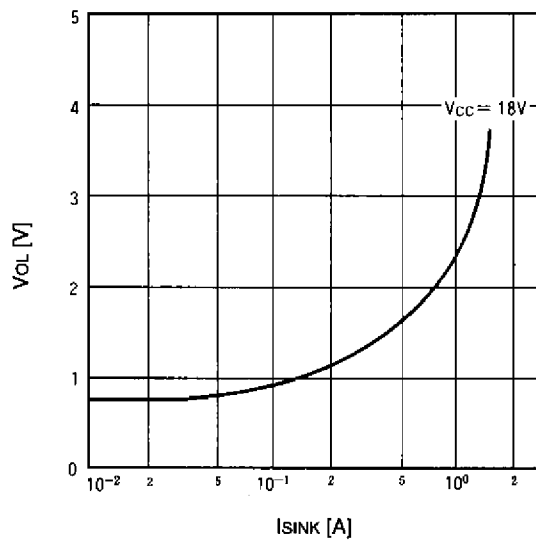
CS terminal sink current ( $I_{SINK\ CS}$ ) vs.  
CS terminal voltage ( $V_{CS}$ )



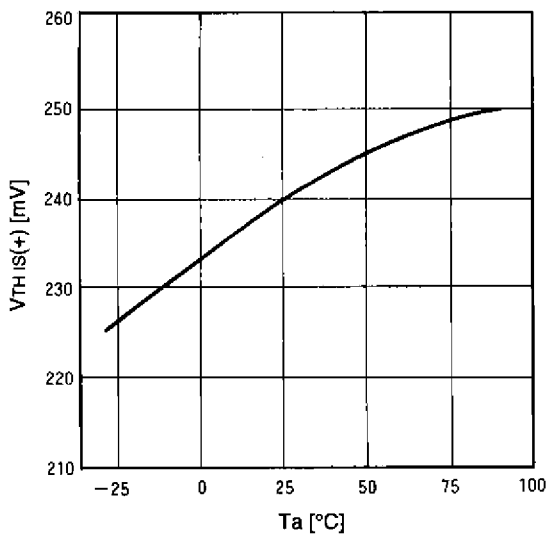
H-level output voltage ( $V_{OH}$ ) vs. output source current ( $I_{SOURCE}$ )



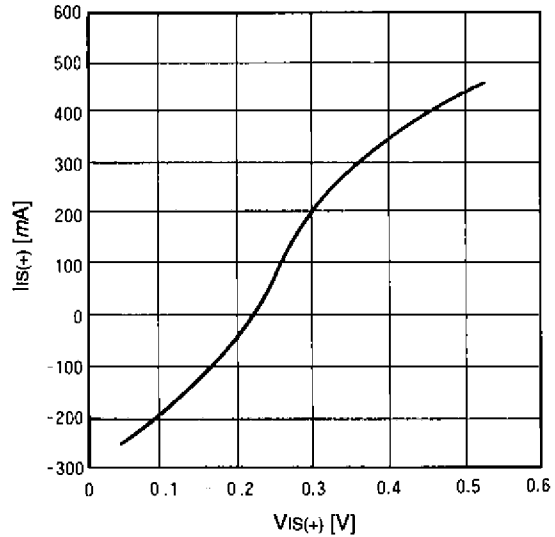
L-level output voltage ( $V_{OL}$ ) vs. output sink current ( $I_{SINK}$ )



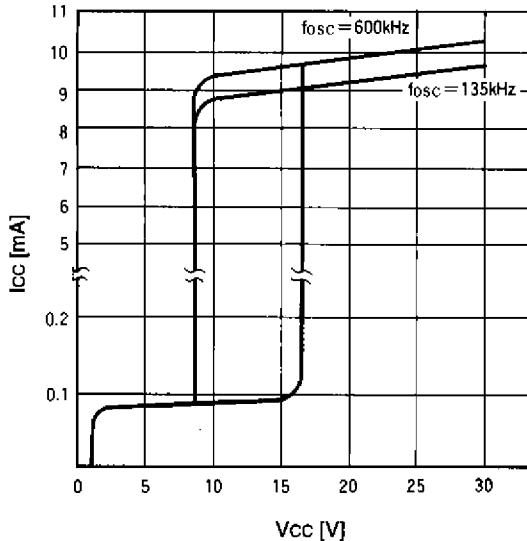
IS (+) terminal threshold voltage ( $V_{TH\ IS(+)}$ ) vs. ambient temperature ( $T_a$ )



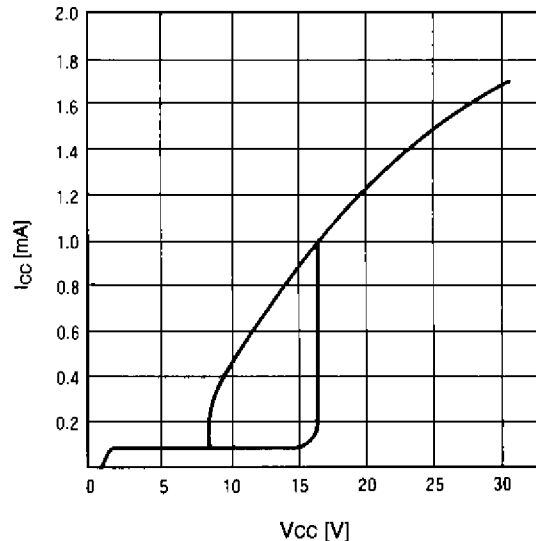
IS (+) terminal current ( $I_{IS(+)}$ ) vs. IS (+) terminal voltage ( $V_{IS(+)}$ )



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



Supply current ( $I_{CC}$ ) vs. supply voltage ( $V_{CC}$ )  
OFF or OFF latch mode







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