TOSHIBA TA8198F

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8198F

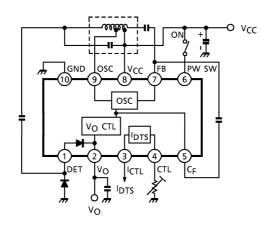
DC/DC CONVERTER FOR ELECTRIC TUNING (3V USE)

The TA8198F is a DC/DC converter IC which is developed for biasing varactor diodes of tuner system. It is especially suitable for supplying high voltage (about 15.5V) for digital tuning (FM/TV/AM) system of headphone stereos, radio cassette recorders, or other equipments.

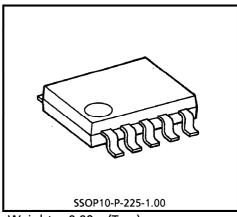
FEATURES

- Few external parts.
- Excellent spurious radiation by oscillation of sine wave.
- Built-in constant current source, it is suitable for digital tuning system. (I_{CTL} can be controlled by R_{CTL})
- Output voltage V_O = 15.5V (Typ.)
- Excellent regulatory capability of output voltage against fluctuation of supply voltage, and of ambient temperature.
- Built-in power switch
- Low supply current (at non-load, V_{CC} = 3V, Ta = 25°C) I_{CCO} = 2.4mA (Typ.)
- Operating supply voltage range (Ta = 25°C) V_{CC (opr)} = 1.8~10V

BLOCK DIAGRAM



* Handle with care to prevent devices from deterioration by static electricity.



Weight: 0.09g (Typ.)

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TERMINAL EXPLANATION

Terminal voltage: Typical terminal voltage with test circuit ($V_{CC} = 3V$, $T_{a} = 25^{\circ}C$)

	TERMINAL NAME	FUNCTION	INTERNAL CIRCUIT	TERMINAL VOLTAGE (V)
1	DET		Coil 1 2 5	_
2	v _O	Boosted output (Voltage double rectifier)	***	15.5
5	C _F		DC FEED BACK	1.4
3	ICTL	Constant current source output (for digital tuning) Vo supplies this circuit with power source.	2 vo	_
4	CTL	In case that this circuit isn't used, the I _{CTL} terminal is connected with GND line.		_
6	PW SW	Power on/off switch (VCC : Power on GND/OPEN : Power off	33kΩ 33kΩ 500	_
7	FB	Hartley type oscillator	$C_{F} \xrightarrow{L_{1} L_{2} L_{3}} C_{3}$ $C_{4} C_{1} \xrightarrow{C_{2}} C_{2}$ $C_{2} \longrightarrow DET$	1.4
8	VCC	$f_{OSC} = \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$	7 8 9	3.0
9	OSC	Controlling oscillation current at the terminal of FB.		_
10	GND	_	-	0

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APPLICATION NOTE

1. PW SW

It is necessary to connect an external pull-down resistor with the terminal PW SW (pin 6), in case that this IC is turned on due to external noise etc.

2. Designing of coil

This IC has the output voltage by means of boosting the oscillation voltage, derived from Hartley type oscillator circuit and of voltage-double rectifier with C_3 , D_1 and D_2 .

(1) Designing of oscillation frequency

$$f_{OSC} = \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$$

(2) Coil turns can be designed as following

$$V_{OSC(p-p)} = 2 \left(V_{CC(min)} - V_{CE1(sat)}\right)$$

$$n = \frac{n3}{n2} = \frac{V_O}{V_{OSC (p-p)}}$$

Note: V_{CC} (min): Minimum of supply voltage

designed by a equipment

 $V_{CE1 (sat)}$: Saturation voltage of Q_1 n : Coil turns ratio (L_2, L_3)

 V_O : Output voltage $V_O = 15.5V$ (Typ.)

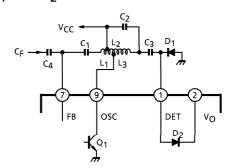


Fig.1 Oscillator and Voltage-Double

The turn of L_1 is designed, so as to make the terminal of FB be about $200\sim300 \text{mV}_{\text{p-p}}$ through C_1 . The turn of L_1 should be small, and the capacitance of C_1 and Q_0 of coil should be large, for the oscillation start at turning power on.

(3) Allowance is advisable for coil design of n, Q₀. However, spurious radiation can be reduced, in case that the output current and n of coil don't make large.

3. Pattern Diagram

The Fig.2 shows the oscillation loop. This pattern diagram should be small, because spurious radiation due to the oscillation is reduced.

The Fig.3 shows the rectifier loop. This pattern diagram should be of the small, because spurious radiation due to the switching rectifier is reduced. The two loops should be isolated from other DC lines.

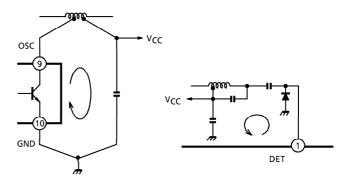


Fig.2 Oscillation Loop

Fig.3 Rectifier Loop

4. ICTL

I_{CTL} can be controlled by R_{CTL} resistor between pin 4 and GND (see Fig.4).

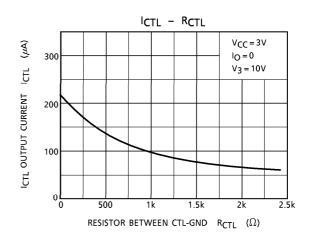


Fig.4 I_{CTL}-R_{CTL}

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT	
Supply Voltage	Vcc	12	V	
Output Voltage	Vo	18		
Constant Current Source	leti	2	mA	
Circuit Output Current	ICTL	2	IIIA	
Power Dissipation	P _D (Note)	400	mW	
Operating Temperature	T _{opr}	- 25∼75	°C	
Storage Temperature	T _{stg}	- 55∼150	C	

(Note) Derated above $Ta = 25^{\circ}C$ in the proportion of 3.2mW.

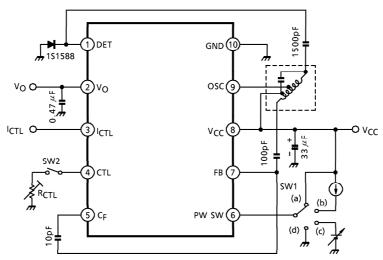
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ELECTRICAL CHARACTERISTICS

(Unless otherwise specified : V_{CC} = 3V, f_{OSC} = 3MHz, I_{O} = 100 μ A, Ta = 25°C, SW1 : a, SW2 : OPEN)

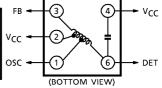
CHARACTERISTIC	SYMBOL	TEST CIR- CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current	lccQ1	_	I _O = 0	PW OFF, SW1 : d	_		5	μ A
Quiescent supply current	lccQ2	_	ָם		_	2.4	4.0	mA
Boosted Output Voltage	V _O	_			14.5	15.5	16.5	\
VO Supply Voltage Fluctuation	oply Voltage Fluctuation ΔV_{O} — $V_{CC} = 1.8 \sim 10V$		8~10V	- 20	0	+ 20	mV	
VO Maximum Output Current	^I O (MAX)	_	$\Delta V_O = 30 \text{mV}$ (With respect to standard $I_O = 100 \mu A$)		300	_	_	μΑ
VO Ambient Temperature Coefficient	V _O /T	_			_	± 0.3	_	mV / °C
Constant Current Source Output Current	ICTL	_	$I_{O} = 0$, $V_{3} = 10V$ SW2 : ON $(R_{CTL} = 820\Omega)$		85	110	140	
I _{CTL} Maximum Current	ICTL (MAX)	_	$I_O = 0$, $V_3 = 10V$ $SW2 : ON (R_{CTL} = 0)$ $\Delta V_O = 30mV$ (With respect to standard $I_{CTL} = 100\mu A$)		ı	200	ı	μΑ
Power Switch On Current	ION	_	V1	SW1 : b V _O ≥ 13V	5	_	_	μΑ
Power Switch Off Voltage	V _{OFF}	_	$V_{CC} = 1.8V$ $SW1 : c$ $V_{O} \le 3.5V$		0	_	0.7	V

TEST CIRCUIT



COIL DATA (TEST CIRCUIT)

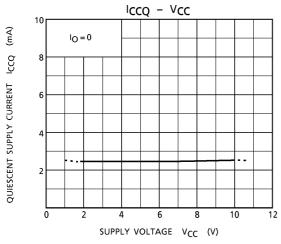
COL DATA (1231 CIRCOTT)									
TEST	L (μ H)	Q ₀	C ₀ (pF)	TURN			WIRE	REFERENCE	
FREQUENCY	2-6		4-6	1-2	2-3	1-6	$(mm\phi)$	REFERENCE	
3MHz	103	40	22	7	2	57 <u>1</u>	0.1UEW	\$4143-3099-356	

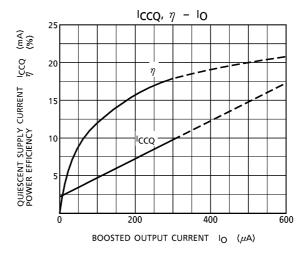


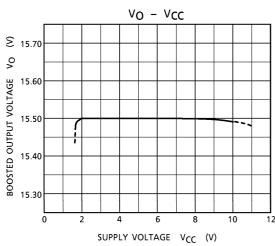
S: SUMIDA ELECTRIC & Co.,Ltd.

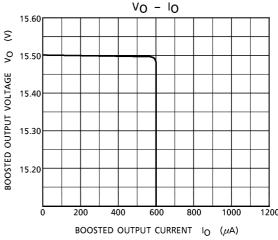
CHARACTERISTIC CURVES

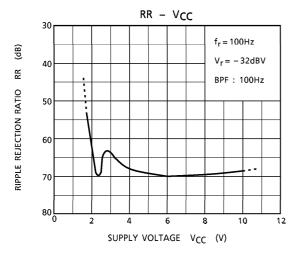
(Unles otherwise specified : $V_{CC} = 3V$, $f_{OSC} = 3MHz$, $I_{O} = 100 \mu A$, $I_{CTL} = 0$, $Ta = 25 ^{\circ}C$)

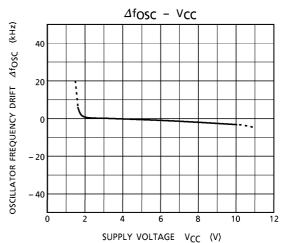


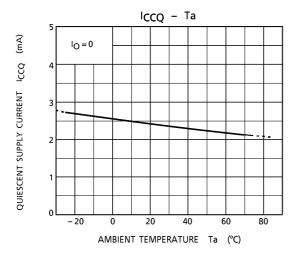


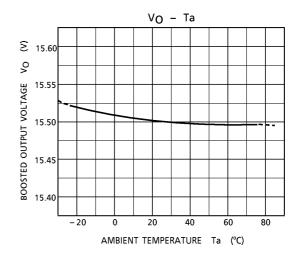


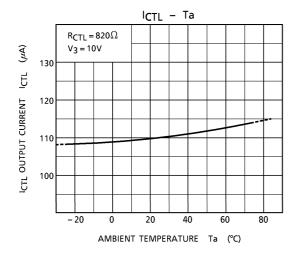


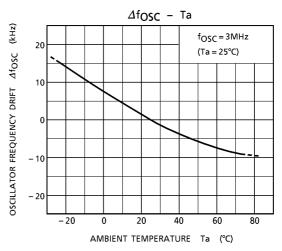


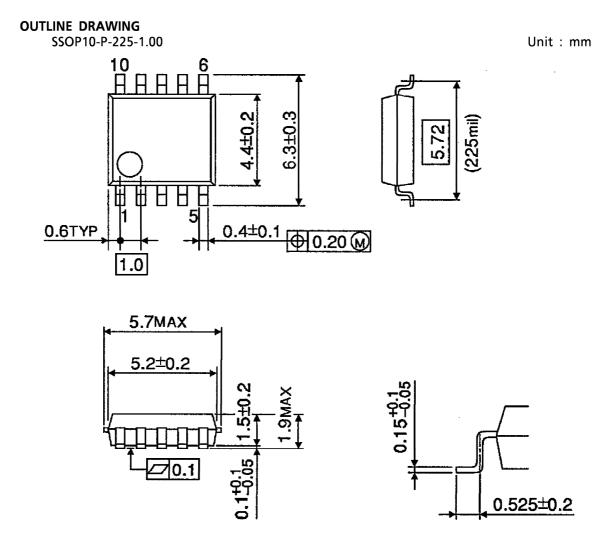












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