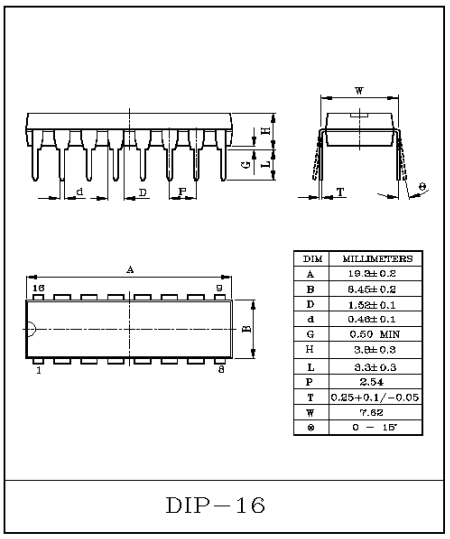
GENERAL PURPOSE SWITCHING REGULATOR.

The KIA494APV/AFV is an IC for switching regulator, with 5V reference voltage, built-in error amplifier, saw tooth wave generating circuit, dead time adjusting comparator, flip-flop, and output buffer.

FEATURES

- Wide Same Phase Range of the Error Amplifier.
- Built-in 250mA/100mA Output Buffer.
- Dead Time is Adjustable.
- Built-in Low Supply Voltage Protective Circuit.



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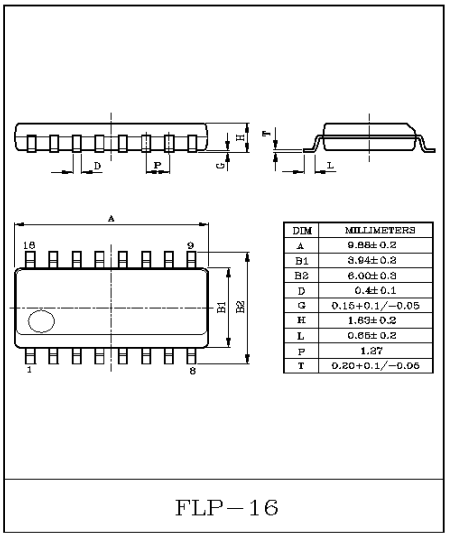

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MAXIMUM RATINGS (Ta=25℃)

ITEM		SYMBOL	RATING	UNIT
Supply Voltage	KIA494APV	V_{CC}	41	V
	KIA494AFV		25	
Error Amplifier Input Voltage		V_{ICM}	V_{CC}+0.3	V
Output Voltage	KIA494APV	V_{CER}	41	V
	KIA494AFV			
Output Current	KIA494APV	I_C	250	mA
	KIA494AFV		100	
Power Consumption	KIA494APV	P_D	750	mW
	KIA494AFV		400	
Operating Temperature		T_{opr}	-40~85	℃
Storage Temperature		T_{stg}	-55~150	℃

RECOMMENDED OPERATING CONDITIONS

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	KIA494APV	V_{CC}	7	-	40	V
	KIA494AFV				25	
Output Voltage	KIA494APV	V_{CER}	-0.3	-	40	V
	KIA494AFV					
Output Current (per one stage of output unit)	KIA494APV	I_C	-	-	200	mA
	KIA494AFV				100	
Error Amplifier Sink Current		I_{OAMP}	-	-	-0.3	mA
Timing Capacitor		C_T	0.47	-	10,000	nF
Timing Resister		R_T	1.8	-	500	kΩ
Oscillation Frequency		f_{osc}	1	-	300	kHz
Operating Temperature		T_{opr}	-20	-	70	℃

ELECTRICAL CHARACTERISTICS REFERENCE VOLTAGE UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{ref}	I_{ref}=1mA, Ta=25℃	4.75	5.00	5.25	V
Input Stability	R_{eg} IN	7V≦V_{CC}≦25V, I_{ref}=1mA, Ta=25℃	-	8	25	mV
Load Stability	R_{eg} L	1mA≦I_{ref}≦10mA, Ta=25℃	-	1	15	
Output Voltage Temp. Change	T_C V_{ref}	-40℃≦Ta≦85℃, I_{ref}=1mA	-	0.01	0.03	%/℃
Output Short-Circuit Current	I_S	V_{ref}=0	-	50	-	mA

OSCILLATION UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency Set Value	f_{OSC}	C_T=0.001μF, R_T=30kΩ	-	40	-	kHz
Oscillation Frequency Setting Accuracy	f_{DIV}	C_T=0.001μF, R_T=30kΩ	-	3.0	-	%
Frequency Input Stability	f_{VIN}	7V≦V_{CC}≦25V, Ta=25℃	-	0.1	-	
Frequency Temp. Change	f_{Ta}	0℃≦Ta≦70℃	-	1	2	

PAUSE PERIOD ADJUSTING UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Bias Current	I_{IND}	0≦V_{IN}≦5.25V PIN 4	-	-2	-10	A
Max. Duty (Each Output Stage)	Dy MAX.	V_{IN}=0, C_T=0.1μF, R_T=12kΩ	45	48	-	%
Input Threshold Voltage 1	V_{TH-1}	Output pulse 0% duty	-	2.8	3.3	V
Input Threshold Voltage 2	V_{TH-2}	Output pulse max. duty	0	-	-	

ERROR AMPLIFIER Ⅰ, Ⅱ

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	V_O PIN 3=2.5V	-	2	10	mV
Input Offset Current	I_{IO}	V_O PIN 3=2.5V	-	5.0	250	nA
Input Bias Current	I_{IB}	V_O PIN 3=2.5V	-	0.1	1	A
In-phase Input Voltage Range	CMR_{IN}	7V≦V_{CC}≦25V	0.3	-	V_{CC}-2	V
Open Load Gain	G_V	V_O PIN 3=0.5~3.5V, R_L=2kΩ	70	95	-	dB
Unity Gain Frequency	f_O	V_O PIN 3=0.5~3.5V, R_L=2kΩ	-	350	-	kHz
In-phase Signal Removing Ratio	CMRR	V_{CC}=25V	65	90	-	dB
Output Sink Current	I_O+	V_O PIN 3=0.7V	0.3	0.7	-	mA
Output Source Current	I_O+	V_O PIN 3=3.5V	-2	-10	-	

PWM COMPARATOR

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Threshold Voltage	V_{TH}	Zero duty cycle	-	4	4.5	V
Input Sink Current	I_I	V_O PIN 3=0.7V	0.3	0.7	-	mA

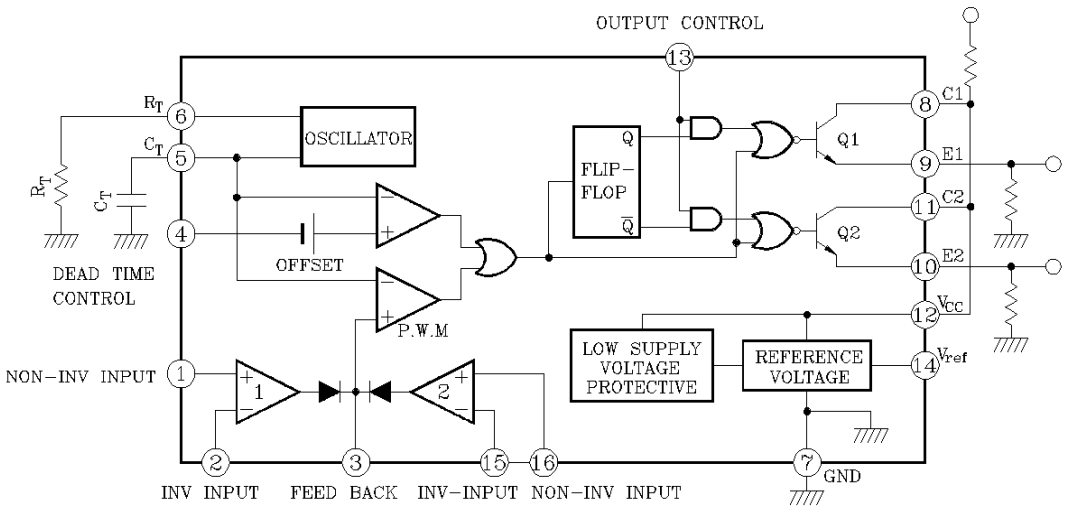
OUTPUT UNIT

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		I_{CER}	V_{CE}=25V, V_{CC}=25V Emitter grounded	-	-	100	μA
Emitter Cut-off Current		$I_{E(OFF)}$	V_{CC}=V_C=25V, V_E=0V Emitter follower	-	-	-100	
Emitter Saturation Voltage (Emitter grounded)		$V_{SAT(C)}$	I_C=50mA, V_E=0V	-	0.95	1.3	V
Collector Saturation Voltage (Emitter follower)		$V_{SAT(E)}$	I_E=-50mA, V_C=15V	-	1.6	2.5	
Output Voltage Rise Time (Emitter grounded)		t_{r1}		-	100	200	nS
Output Voltage Fall Time (Emitter follower)		t_{f1}		-	25	100	
Output Voltage Rise Time (Emitter follower)		t_{r2}		-	100	200	
Output Voltage Fall Time (Emitter grounded)		t_{f2}		-	40	100	
Output Control Input Operating Current	"L" State	I_{OCL}	V_{OC}≦0.4V	-	10	-	μA
	"H" State	I_{OCH}	V_{OC}=V_{ref}	-	0.2	3.5	mA

CURRENT CONSUMPTION (TOTAL)

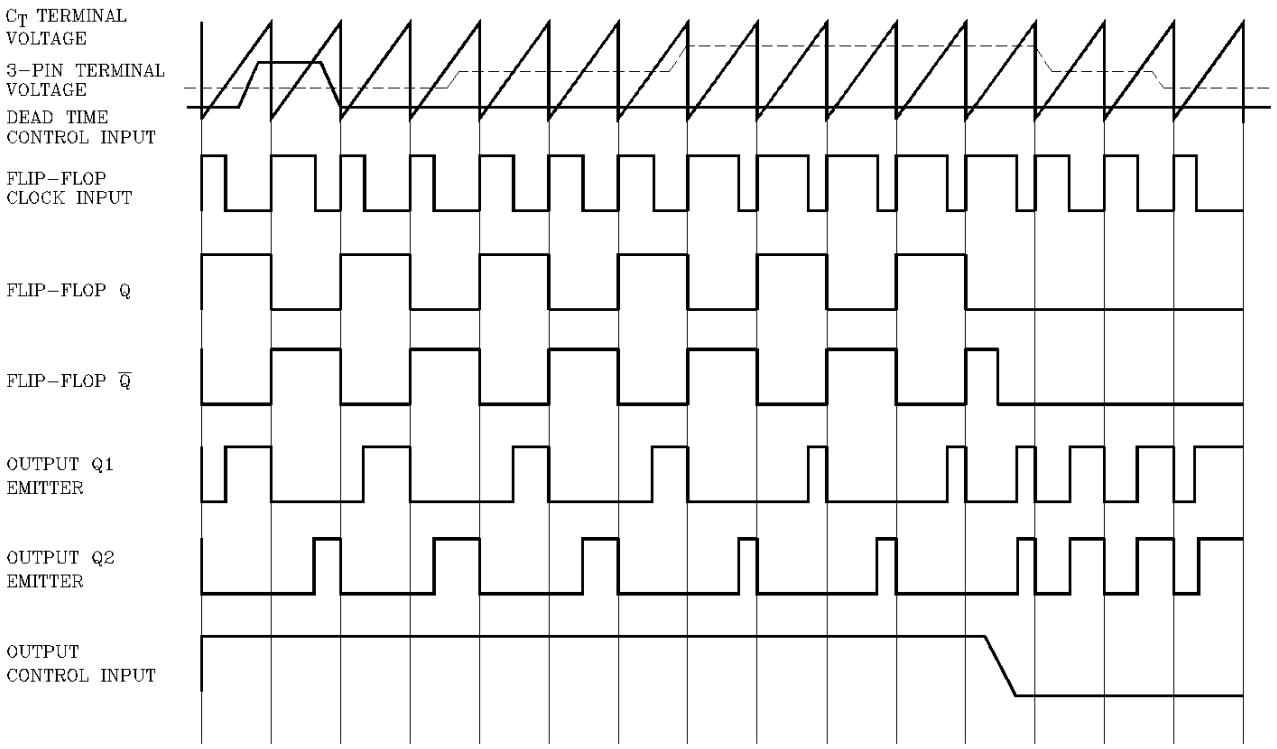
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Standby Current	$I_{CC(S\cdot B)}$	V_{CC}=15V, Other terminal opened	-	8	12.5	mA
Bias Current	I_{CC} total	$V_{(PIN4)}$=2V, C_T=0.01μF R_T=12kΩ, V_{CC}=15V	-	10	-	

BLOCK DIAGRAM

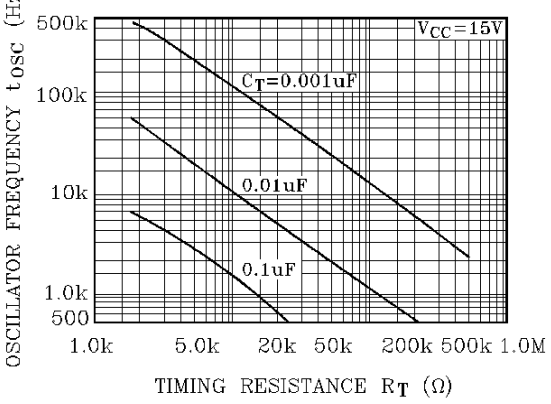


(Note) PIN (13) BECOMES SINGLE MODE AT "L" AND PUSH-PULL MODE AT "H"

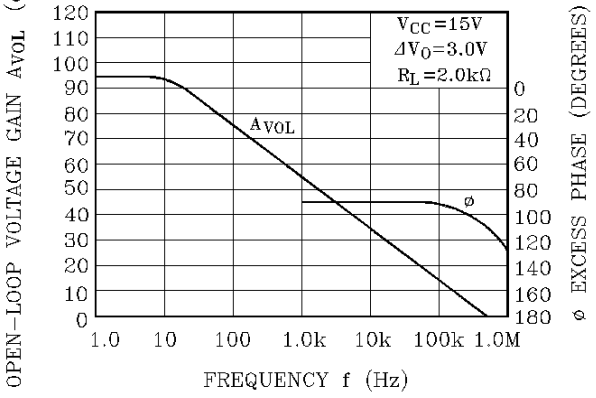
OPERATING WAVEFORM



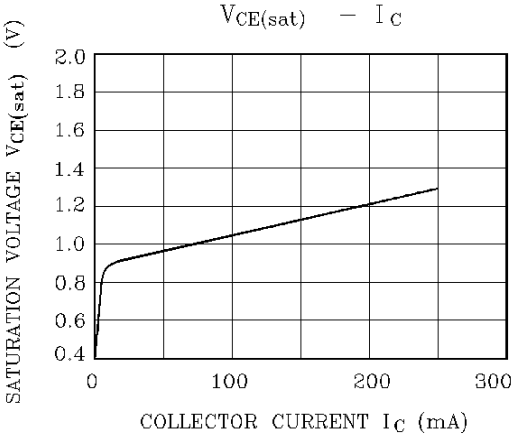
t_{OSC} – R_T



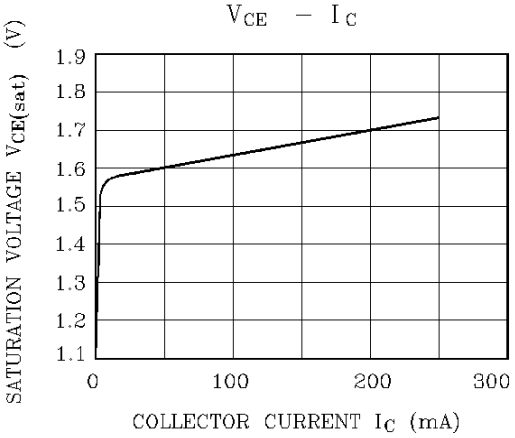
A_{VOL} , PHASE – f



$V_{CE(sat)}$ – I_C



V_{CE} – I_C



I_{CC} – V_{CC}