HPWM3 Isolated Square Wave Amplifier

1 Features

- Input voltage：±20V±0.2V
- Continuous output current 5A
- Signal supply：±15V±0.15V
- Input DC level：-10V～+10V
- Include two separate power amplifier circuits
- Unique ternary output characteristics
- With current negative feedback, the output has constant current source characteristics

45×40×6.5mm3

Weight：65g

2 Applications

DC motor drive control

Drive the reactive load

3 Description

HPWM3 Isolated Square Wave Amplifier is composed by two completely indep endent of the pulse amplifier power amplifiers. According to the size of the input c ontrol voltage change, the single-way amplifier will output three consecutive amplitu des of the square wave to the motor load, and the circuit has a current negative f eedback characteristic, can reduce the motor load loss and improve the anti-jammin g capability.

This series of products are made of thick film hybrid integrated process, metal sealed package. Product design and manufacturing meet the requirements of MIL-S TD and detailed specifications, the quality level is H-class.

4 Technical Specifications

Form 1: Rated conditions and Operating conditions

Absolute maximum rating	Recommended operating conditions
Positive +Vcc：+16.5V Negative -Vcc：-16.5V Positive +Vs：25V Negative -Vs：-25V Input voltage Vin：±12V Storage temperature Tstg：-55℃～125℃ Lead welding temperature（10s）Th：300℃ Junction Temperature Tj：150℃	Positive +Vcc：15V±0.15V Negative -Vcc：-15V±0.15V Positive +Vs：20V±0.2V Negative -Vs：-20V±0.2V Input voltage Vin：±（0V～10V） Operating Temperature（Case）Tc：-55℃～125℃

Form 2 Electrical characteristics

Load	Character	+Vcc=15V±0.15V -Vcc=-15V±0.15V +Vs=20V±0.2V -Vs=-20V±0.2V -55℃≤Tc≤125℃		HPWM3		Unit
				Min	Max	
1	Continuous output current	Full load，VI=1.5		1	-	A
	Output voltage	Full load	V_I=-10V	19	21	V
			V_I=+10V	-19	-21	
	Output frequency	-		11	13	kHZ
	Linearity	-		95		
	Symmetry	-		95		
2	Continuous output current	Full load ，V_I=1.5		1	-	A
	Output voltage	V_I=-10V		19	21	V
		V_I=+10V		-19	-21	
	Output frequency			11	13	KHZ
	Linearity			95		
	Symmetry			95		

5 Lead function descriptions

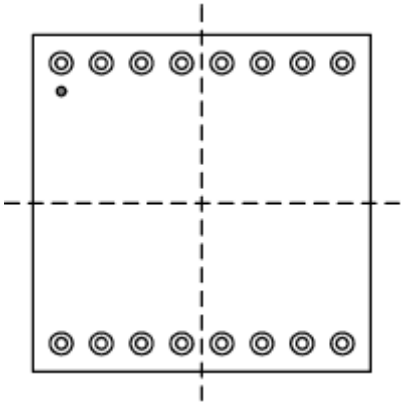


Fig 2 upward view

Form 3 Pin Designation

No	symbol	Designation	No	symbol	Designation
1	F1	1st output square wave	9	GNDS	Signal ground
2	V_{I1}	1st input	10	NC	NC
3	FF1	1st negative feedback	11	OUT_2	2nd output
4	-Vcc	Power supply -15V	12	GNDP	Power ground
5	+Vcc	Power supply +15V	13	-Vs	Power supply -20V
6	F2	2nd output square wave	14	NC	NC
7	V_{I2}	2nd input	15	OUT_1	1st output
8	FF2	2nd negative feedback	16	+Vs	Power supply +20V

6 Circuit principle frame diagram

The ternary pulse-width power amplifier includes a signal processing circuit, a half-bridge drive circuit and a power amplifier.

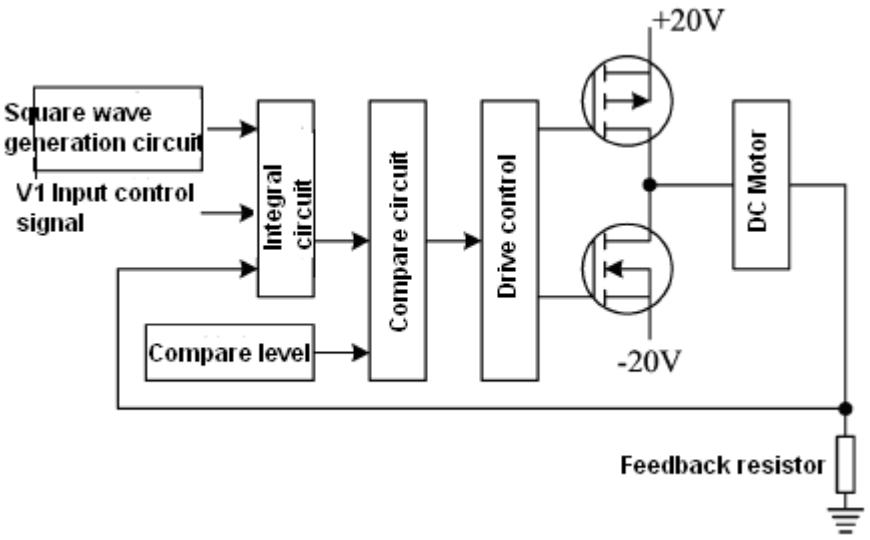
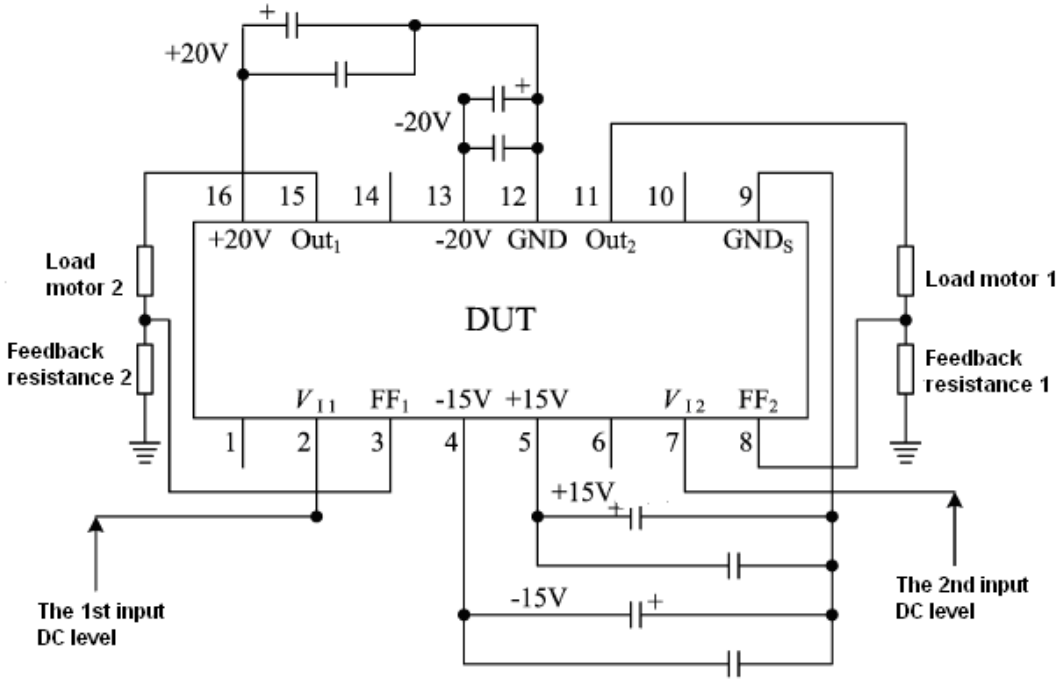


Fig 3 signal processing circuit

A triangle wave signal is generated by input control signal and square wave generator circuit , the effect of triangle wave signal and fixed level can generate width modulated square wave signal. Drive circuit can make isolation and distribution for the front width modulated square wave signal, then drive the power tubes, to make power amplifier and drive load for DC motor..

7. Typical Connection Diagram

HPWM3 Isolated Square Wave Amplifier is composed by two completely independent of the pulse amplifier power amplifiers



7.1 Ternary output

The difference between Ternary PWMA and the general PWMA is that the amplifier output of the three states, namely, ternary characteristics, as shown below . Figure 4 shows the input control voltage is 0, the output is positive and negative symmetrical narrow pulse, the average DC is 0, and two output signals are reverse ; When the input voltage reaches half of the input voltage, the negative pulse disappears and becomes a positive unipolar type wide square wave, and the negative pulse duty is reduced. When the input voltage reaches -0.1V, As shown in Figure 5; Input control voltage is increased in positive direction, the output negative pulse duty cycle increases, positive pulse duty cycle decreases, when the input voltage reaches +0.1V or so, the positive pulse disappears and becomes negative type wide square wave, as shown in Figure 6.

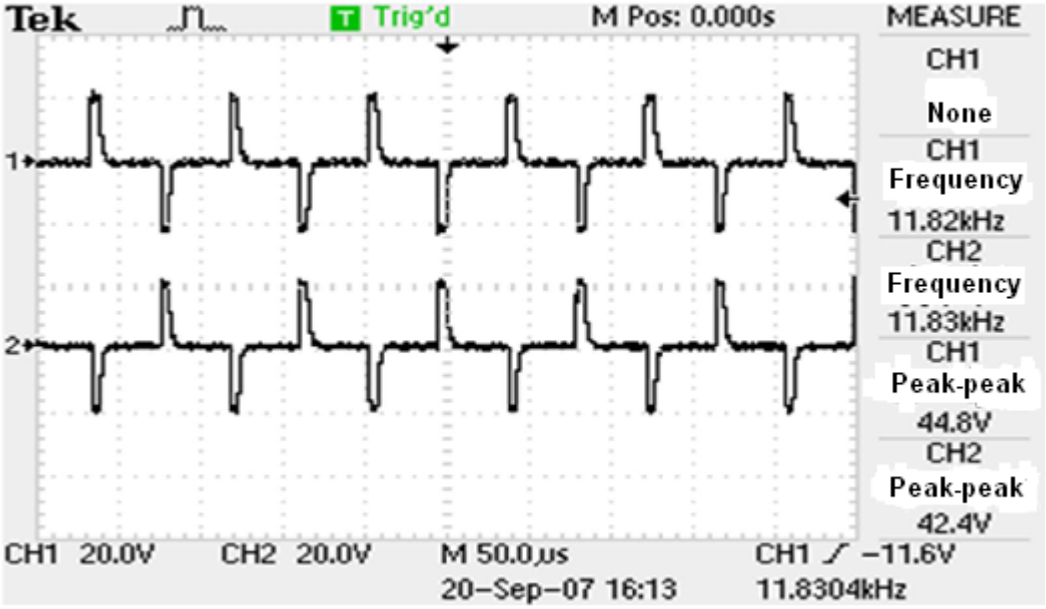


Fig 4 The amplifier output two waveforms when the input control voltage is 0.

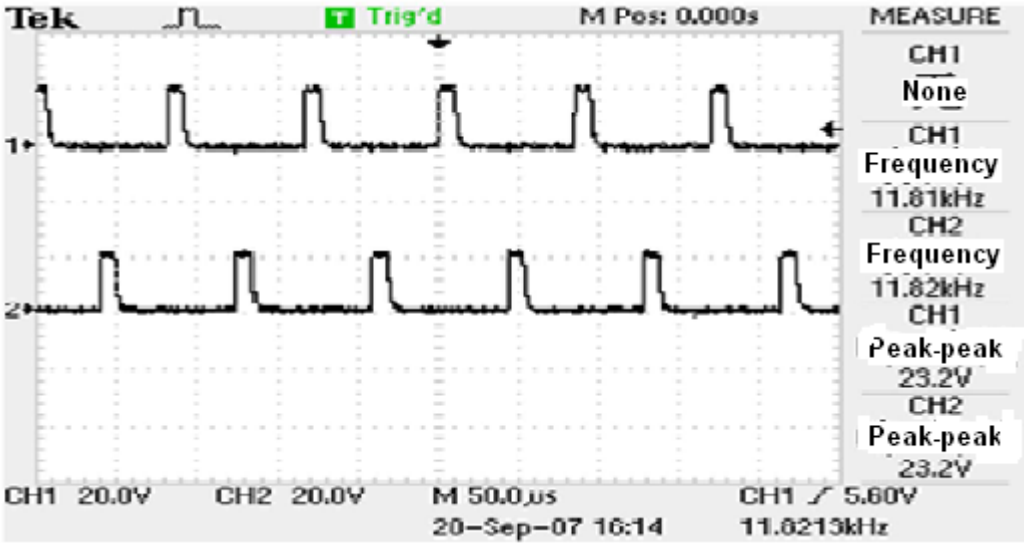


Fig 5 The amplifier output two waveforms a point waveforms when input control voltage is negative.(V<-0.1V)

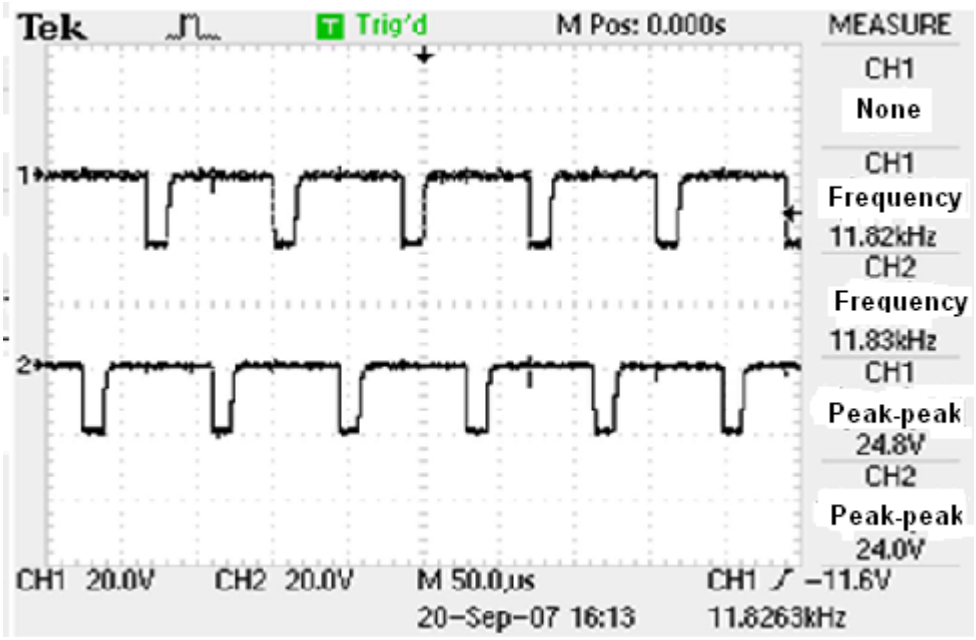


Fig 6 The amplifier output two waveforms a point waveforms when input control voltage is positive.(V>0.1V)

7.2 Power supply bypass

Power supply should have sufficient bypass capacitors to ensure proper operation, otherwise it may be unstable and reduce efficiency, and the output may be oscillated. ±20V power supply should connect an at least 1uF ceramic capacitor paralleled with a low value ESR capacitor, the capacitance should be at least 10uF/A ; for ±15V power supply also requires a 0.1uF～0.47uF ceramic capacitor paralleled with a low ESR value of 6.8uF～10uF bypass capacitor, All bypass capacitors should be connected as close as possible to the corresponding power supply root.

7.3 Output constant current characteristics:

Figure 7 circuit, assuming that the input DC control voltage signal is Vi, the output DC current is I_o, then the circuit gain A=Io/Vi, because it is a series of negative feedback, F1 is the symmetrical positive and negative square wave when average DC voltage is 0, then $V_i/R_1 \approx U_f/R_3 \approx R_f/R_3$, launched $Io/Vi=R_3/R_1R_f$, the circuit gain $A=Io/Vi=R_3/R_1R_f$, the formula shows that the circuit gain is basically independent of the carrier gain Aod and the load DC motor R_1 and other parameters, that is, when the input DC level is stable and the DC motor changes, the output square wave duty cycle will change, thus ensuring the output DC Io which improves the ability to adapt to the motor load, so that the output has a constant current source characteristics.

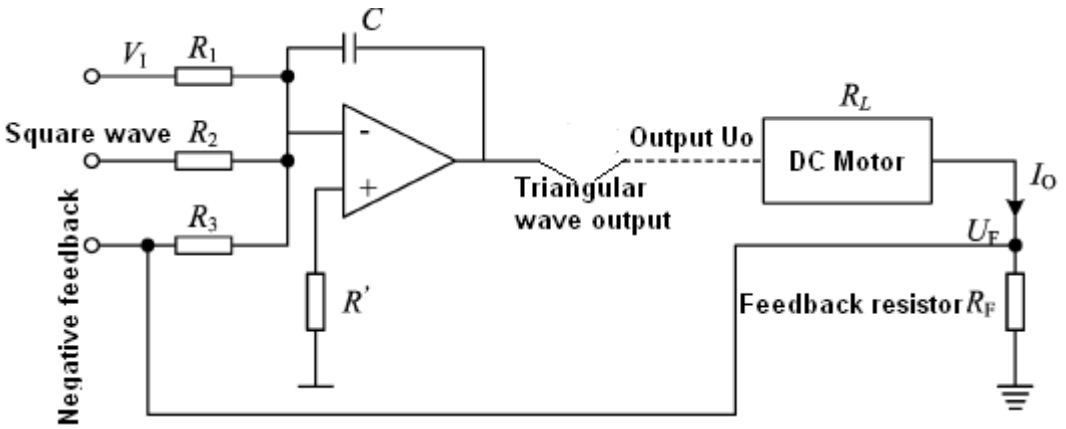


Fig 7 Current series negative feedback circuit

8. Package Specifications

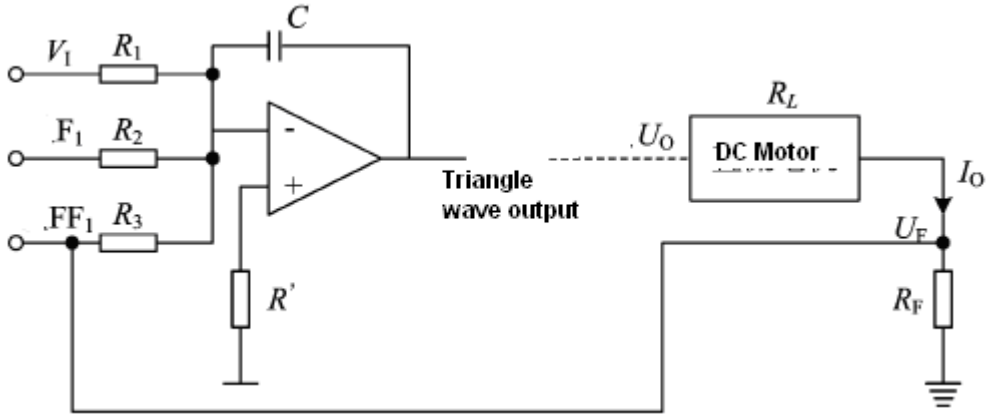


Fig 5

Application notes please refer to the appendix, must read it carefully