

M62502FP

PWM IC for the synchronized deflection system control

GENERAL DESCRIPTION

The M62502 is a controller for a deflection system of CRT display monitors. It performs a stable PWM control over a wide fluctuation of external signals, thanks to the built-in trigger mode oscillator. The IC is suitable for an application to a high voltage drive and a horizontal output correction of CRT monitors because of its following circuits and functions;

- Under Voltage Lock Out circuit (UVLO)
- Soft-start function

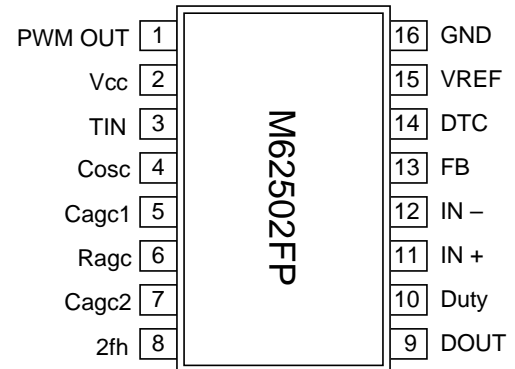
FEATURES

- PWM output synchronized with external signals
- Wide PWM control frequency
15kHz to 150kHz
- Soft start function
- Low voltage malfunction protection circuit
start $V_{cc} > 9V$
stop $V_{cc} < 6V$

APPLICATION

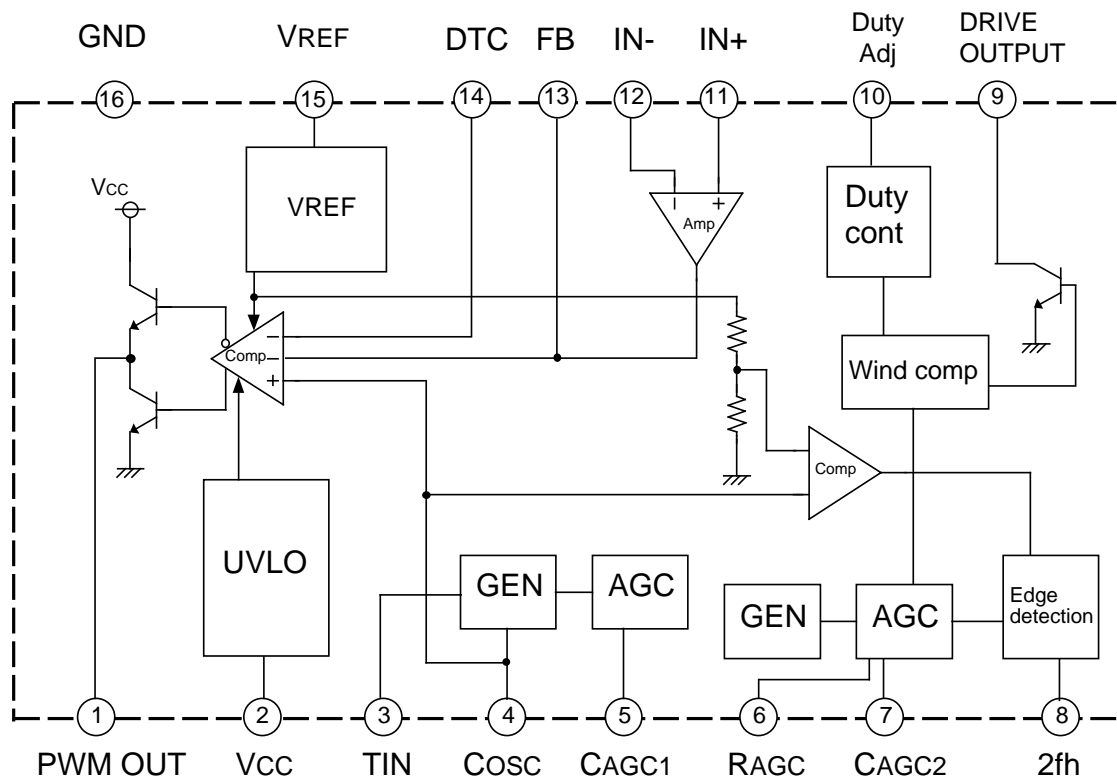
- C R T display monitor

PIN CONFIGURATION(TOP VIEW)



Outline 16P2N-A

BLOCK DIAGRAM



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Terminal Number and The facility

PIN No.	Symbol	Functional Description
1	PWM OUT	PWM output
2	VCC	Power supply
3	TIN	Trigger input
4	COSC	Setting oscillating frequency
5	Cagc1	AGC setting
6	RAGC	AGC Current setting resistor connected to this terminal
7	Cagc2	AGC setting
8	2fh	Double velocity reshuffle
9	DOUT	Drive output
10	Duty	Duty regulation
11	IN+	Positive input of Op-Amp.
12	IN-	Negative input of Op-Amp.
13	FB	Output of Op-Amp.
14	DTC	Dead time control (Soft start function)
15	VREF	Output of reference voltage (5V)
16	GND	Ground

Absolute Maximum Rating (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
VCC	Supply voltage		15	V
VOUT	Output voltage		15	V
IOUT	Output current		±100	mA
Vd	Drive output voltage		15	V
Id	Drive output current		20	mA
VICM	Error amplifier input common mode voltage range		-0.3 to VCC	V
VID	Error amplifier input common mode voltage		VCC	V
Pd	Power dissipation		650	mW
Kθ	Thermal derating ratio	Ta≥25°C	5.2	mW/°C
Topr	Operating ambient temperature		-20 to +75	°C
Tstg	Storage temperature		-40 to +150	°C

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ELECTRICAL CHARACTERISTICS (Vcc=12V, T_{IN}=40kHz, Ta=25°C, unless otherwise noted)

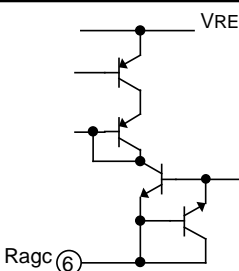
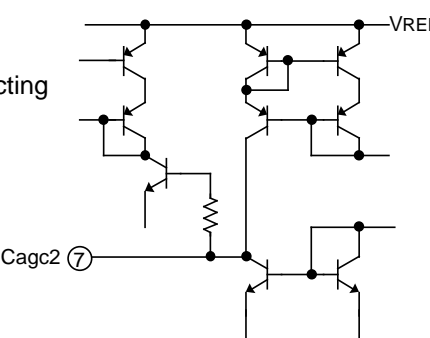
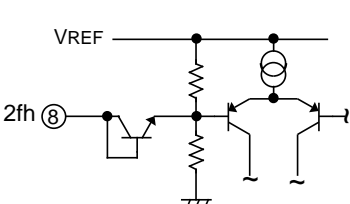
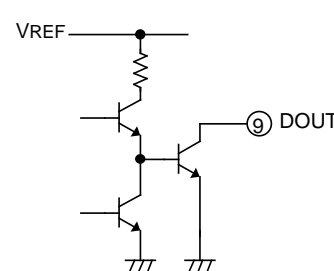
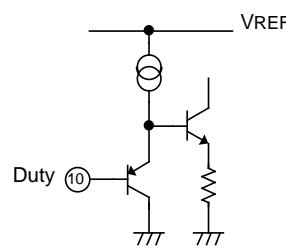
Block	Symbol	Parameter	Test conditions	Limits			Unit
				Min	Typ	Max	
	V _{CC}	Range of power supply		V _{CC} OFF		14	V
	I _{CC}	Circuit current	Output off mode		25		mA
Reference voltage section	V _{REF}	Reference voltage		4.80	5.00	5.20	V
	Reg-in	Input regulation			1.0	10	mV
	Reg-L	Load regulation			2.0	20	mV
	TCV _{REF}	Reference voltage thermal coefficient			0.01		%/°C
	I _{REF} MAX	Maximum reference current			-30		mA
	I _S	Short-circuit current			-30		mA
Error Amp.	V _{IO}	Input offset voltage				7	mV
	I _{IB}	Input bias current		-100			nA
	I _{IO}	Input offset current		-100		100	nA
	V _{ICM}	Common mode input voltage range		-0.3		V _{CC} -2	V
	A _V	Open loop transmission gain		70	110		dB
	S _R	Slew rate			4		V/μs
	V _{OR}	Output voltage range		0.3		V _{REF} -1.5	V
	I _{sink}	Output sink current		10			mA
	I _{source}	Output source current				-10	mA
Oscillator	f _{OSC}	Oscillation frequency		15		150	kHz
	V _{OSC} H	The oscillator waveform bound voltage			3.5		V
	V _{OSC} L	The oscillator waveform lower limit voltage			1.5		V
	V _{TIN} H	High level of T _{IN}		2.5		V _{CC}	V
	V _{TIN} L	Low level of T _{IN}				1.0	V
PWM output section	V _{sat} L	Output saturation voltage L	I _O =100mA		0.7	1.4	V
	V _{sat} H	Output saturation voltage H	I _O =-100mA	9.5	10.5		V
UVLO section	V _{TH} ON	ON threshold voltage		8.0	9.0	10.0	V
	V _{TH} OFF	OFF threshold voltage		5.4	6.0	6.6	V
Duty adj section	I _{Duty}	Input current	V _{Duty} =2.5V	-6.5	-1.3	-	μA
	Duty max	Maximum ON duty	V _{Duty} =3V		5.0		μsec
UVP section	V _{UVPO}	Input offset voltage	I _d =10mA			0.4	V
	I _{IN} UVP	UVP terminal input current	V _{DO} =12V			1.0	μA
fh reshuffle section	I _{fh}	fh terminal current	V _{hf} =5V	-	330	430	μA
	V _{fh}	fh reshuffle voltage		0.4V _{REF}	0.5V _{REF}	0.6V _{REF}	V

Terminal functional description and equivalent circuit

Terminal No	Symbol	Function and internal circuit
1	PWM OUT	<p>PWM output</p> <ul style="list-style-type: none"> • PWM output synchronized with the TIN input is available. • Output "H" level = 10.5V typ (The output current:-100mA, Vcc=12V) • Output "L" level = 0.7V Typ (The output current:+100mA, Vcc=12V)
2	Vcc	Power supply
3	TIN	<p>Trigger input</p> <ul style="list-style-type: none"> • Frequency range 15kHz to 150kHz • It is taken on a leading edge. <p>TIN input waveform</p>
4	Cosc	<p>A saw-wave oscillator timing setting (Cosc)</p> <ul style="list-style-type: none"> • A saw-wave is generated by connecting the capacitor between pin4 and GND. • Recommended capacitor value is 1000pF. <p>Setting AGC sensitivity (Cagc)</p> <ul style="list-style-type: none"> • The sensitivity of AGC circuit is set by connecting the capacitor between pin5 and GND. • Recommended capacitor value is 1μF.
5	Cagc1	

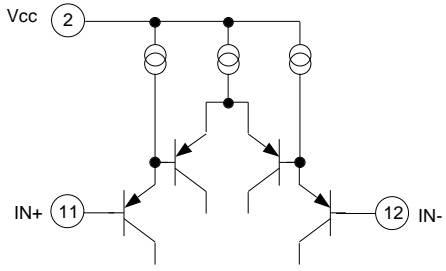
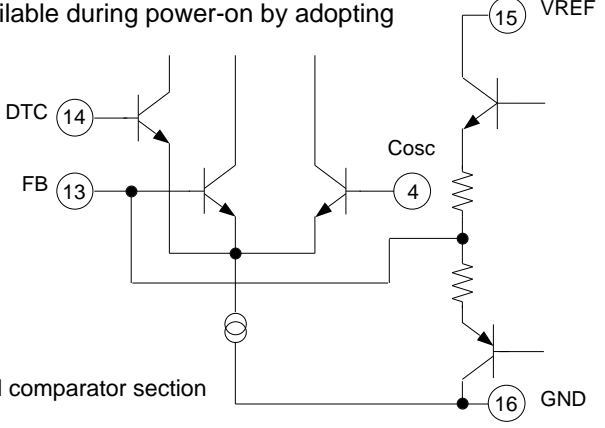
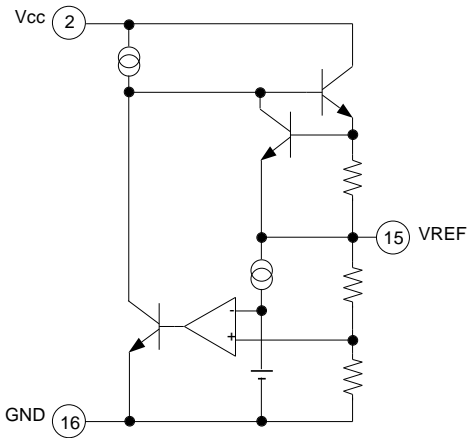
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Terminal No	Symbol	Function and internal circuit
6	Ragc	<p>AGC current setting</p> <ul style="list-style-type: none"> The resistor is connected between pin6 and GND for setting AGC current flowing in DOUT circuit. 
7	Cagc2	<p>Setting AGC sensitivity</p> <ul style="list-style-type: none"> The sensitivity of AGC is set by connecting the capacitor between pin7 and GND. Recommended capacitor value is 1μF. 
8	2fh	<p>Frequency selection</p> <ul style="list-style-type: none"> The frequency of drive output is alternated between just(fh) and doubled(2fh) one. <p>OPEN, GND : fh VREF : 2fh</p> 
9	DOUT	<p>Drive output</p> <ul style="list-style-type: none"> Open collector circuit. 
10	Duty	<p>The duty adjustment of drive output</p> 

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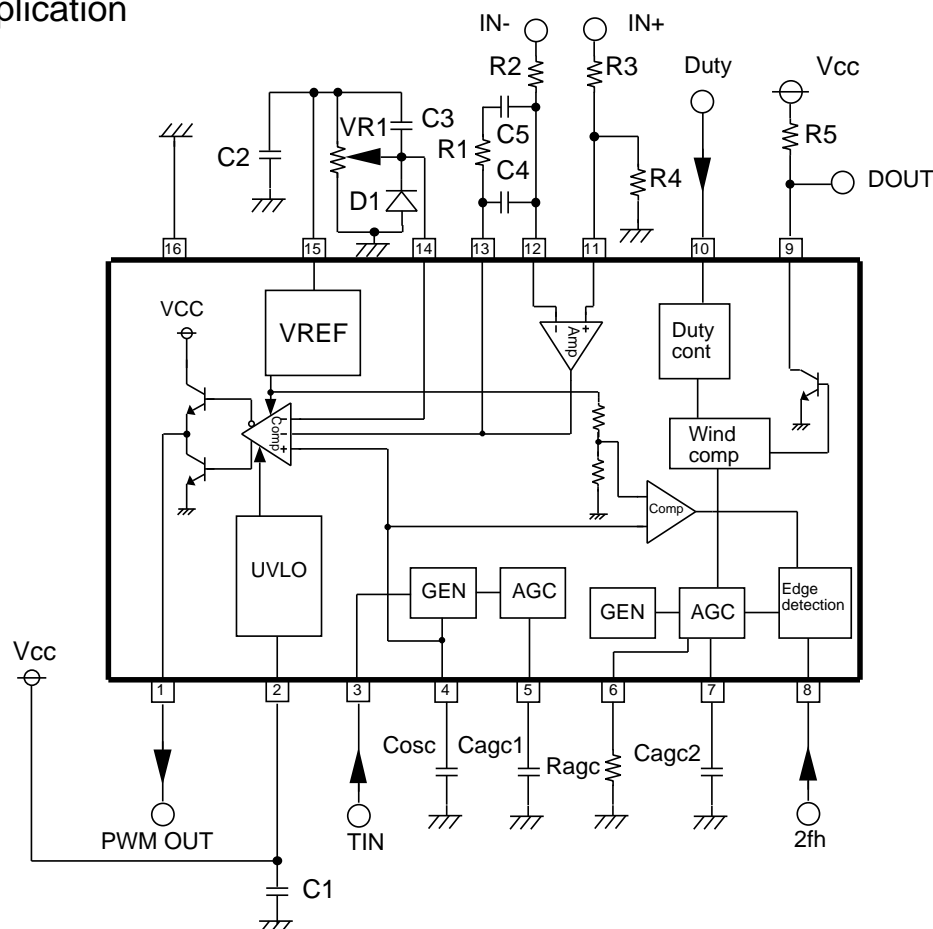
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Terminal No.	Symbol	Function and internal circuit
11	IN+	Positive input of Op-Amp (IN+) Negative input of OP Amp (IN-) 
12	IN-	
13	FB	Output of Op-Amp (FB) Dead time control (DTC) <ul style="list-style-type: none"> A soft start function is available during power-on by adopting a time constant. 
14	DTC	
15	VREF	Reference voltage terminal <ul style="list-style-type: none"> 5V is output via this terminal. A current capability is 5mA. 
16	GND	<ul style="list-style-type: none"> Ground

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M62502 application



- C1,C2 ----- These capacitors are for stabilization of Vcc and VREF.
- VR1 ----- It is decided considering a current capability of VREF. (The capability is about 5mA.) Recommended value is around 10k Ω
- C3,D1 ----- They are for a soft start function. A time constant is decided considering VR1.
- Cagc1,2 ----- These capacitors are for stabilization of AGC circuit. A larger capacitor improves a stability of the system, however a system response is degraded. Recommended capacitor value is around 1 μ F.
- Cosc ----- This capacitor is for the saw-wave generation. Recommended capacitor value is around 1000pF.
- R1,R2,R3,R4 ----- They are for the gain setting of the error Amp. R2 should be several k Ω to dozens of k Ω to set a voltage gain 20dB to 40dB at f = 1kHz, so that the feed back loop is stable. When the voltage gain is too low, it causes jitter. Recommended values of C4, C5 and R1 are ; C4 = dozens of pF to several hundreds pF, C5 = several thousands pF to tens of thousands pF, R1 = dozens of k Ω to several hundreds k Ω .
- Ragc ----- This resistor is for the AGC setting of DOUT. Recommended value is 27k Ω .
- R5 ----- It is a pull-up resister of DOUT output, because DOUT is configured by the open collector circuit. Recommended value is several k Ω .