

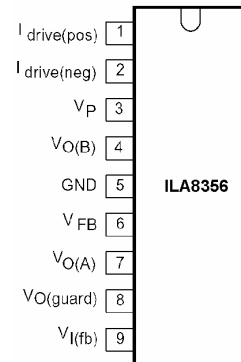
DC-coupled vertical deflection circuit

The KKA8356 is a power circuit for use in 90° and 110° colour deflection systems for field frequencies of 50 to 120 Hz. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system.

FEATURES

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Vertical flyback switch
- Guard circuit
- Protection against:
 - short-circuit of the output pins (7 and 4)
 - short-circuit of the output pins to V_P
- Temperature (thermal) protection
- High EMC immunity because of common mode inputs

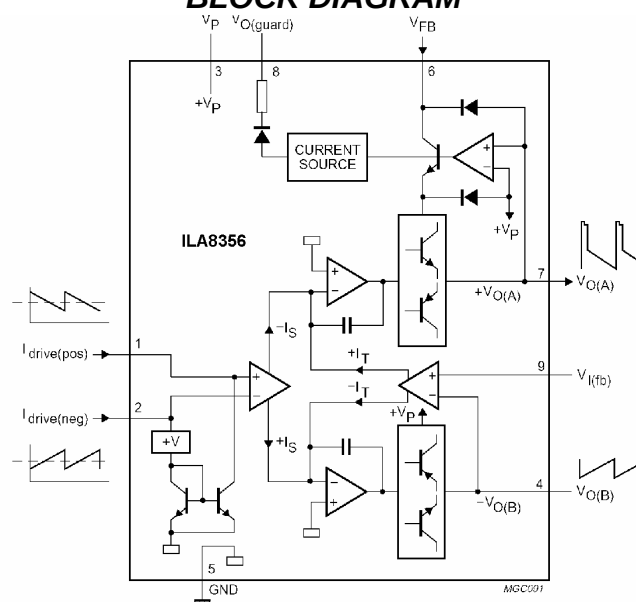
A guard signal in zoom mode



PINNING

SYMBOL	PIN	DESCRIPTION
$I_{drive(pos)}$	1	input power-stage (positive); includes $I_{I(sB)}$ signal bias
$I_{drive(neg)}$	2	input power-stage (negative); includes $I_{I(sB)}$ signal bias
V_P	3	operating supply voltage
$V_{O(B)}$	4	output voltage B
GND	5	ground
V_{FB}	6	input flyback supply voltage
$V_{O(A)}$	7	output voltage A
$V_{O(guard)}$	8	guard output voltage
$V_{I(fb)}$	9	input feedback voltage

BLOCK DIAGRAM



QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
DC supply					
V_P	supply voltage	9	4.5	25	V
I_q	quiescent supply current		30		mA
Vertical circuit					
$I_O(p-p)$	output current (peak-to-peak value)			2	A
$I_{diff(p-p)}$	differential input current (peak-to-peak value)		600		μA
$V_{diff(p-p)}$	differential input voltage (peak-to-peak value)		1.5	1.8	V
Flyback switch					
I_M	peak output current			+1	A
V_{FB}	flyback supply voltage			50	V
Thermal data					
T_{stg}	storage temperature	55		+150	$^{\circ}C$
T_{amb}	operating ambient temperature	25		+75	$^{\circ}C$
T_{vj}	virtual junction temperature			150	$^{\circ}C$

FUNCTIONAL DESCRIPTION

The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. An external resistor (R_M) connected in series with the deflection coil provides internal feedback information. The differential input circuit is voltage driven. An external resistor (R_{CON}) connected between the differential input determines the output current through the deflection coil. The relationship between the differential input current and

the output current is defined by: $I_{diff} \times R_{CON} = I_{coil} \times R_M$. The output current is adjustable from 0.5 A (p-p) to 2 A (p-p) by varying R_M . The maximum input differential voltage is 1.8 V. In the application it is recommended that $V_{diff} = 1.5$ V (typ). This is recommended because of the spread of input current and the spread in the value of R_{CON} . The flyback voltage is determined by an additional supply voltage V_{FB} . The principle of operating with two supply voltages (class G) makes it possible to fix the supply voltage V_P optimum for the scan voltage and the second supply voltage V_{FB} optimum for the flyback voltage. Using this method, very high efficiency is achieved.

The supply voltage V_{FB} is almost totally available as flyback voltage across the coil, this being possible due to the absence of a decoupling capacitor (not necessary, due to the bridge configuration). The output circuit is fully protected against the following:

- thermal protection
- short-circuit protection of the output pins (pins 4 and 7)
- short-circuit of the output pins to V_P .

A guard circuit $V_O(\text{guard})$ is provided. The guard circuit is activated at the following conditions:

- during flyback
- during short-circuit of the coil and during short-circuit of the output pins (pins 4 and 7) to V_P or ground
- during open loop
- when the thermal protection is activated.

This signal can be used for blanking the picture tube screen.

LIMITING VALUES

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
DC supply					
V_P	supply voltage	non-operating	—	40	V
			—	25	V
V_{FB}	flyback supply voltage		—	50	V
Vertical circuit					
$I_{O(p-p)}$	output current (peak-to-peak value)	note 1	—	2	A
$V_{O(A)}$	output voltage (pin 7)		—	52	V
Flyback switch					
I_M	peak output current		—	+1.5	A
Thermal data					
T_{stg}	storage temperature		55	+150	°C
T_{amb}	operating ambient temperature		25	+75	°C
T_{vj}	virtual junction temperature			150	°C
$R_{th\ vj-c}$	resistance v_j -case			4	K/W
$R_{th\ vj-a}$	resistance v_j -ambient in free air			40	K/W
t_{sc}	short-circuiting time	note 2		1	hr

Notes

- I_O maximum determined by current protection.
- Up to $V_P = 18$ V.

CHARACTERISTICS

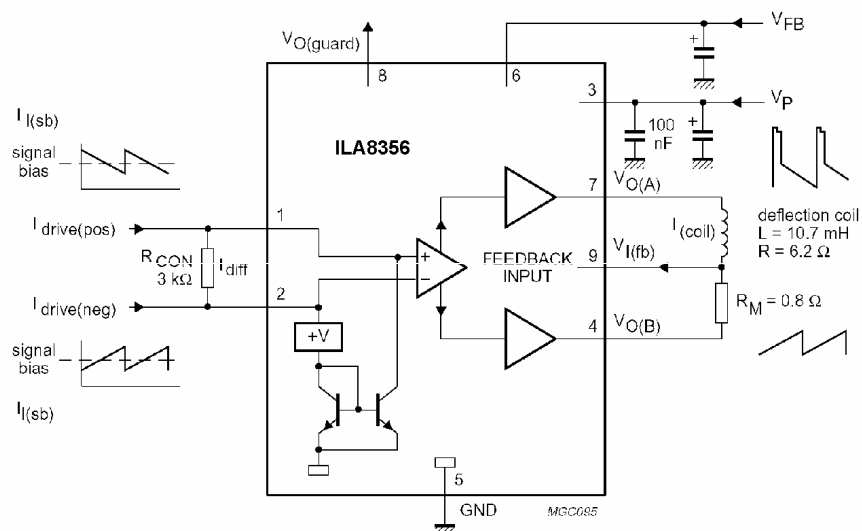
$V_P = 14.5$ V; $T_{amb} = 25$ °C; $V_{FB} = 45$ V; $f_i = 50$ Hz; $I_{I(sb)} = 400$ A; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC supply						
V_P	operating supply voltage		9.0	4.5	25	V
V_{FB}	flyback supply voltage		V_P		50	V
I_P	supply current	no signal; no load		30	55	mA
Vertical circuit						
V_O	output voltage swing (scan)	$I_{diff} = 0.6$ mA (p-p); $V_{diff} = 1.8$ V (p-p); $I_O = 2$ A (p-p)	13.2			V
LE	linearity error	$I_O = 2$ A (p-p); $I_O = 50$ mA (p-p);		1	4	%
				1	4	%
V_O	output voltage swing (flyback) $V_{O(A)} - V_{O(B)}$	$I_{diff} = 0.3$ mA; $I_O = 1$ A (M)		40		V
V_{DF}	forward voltage of the internal efficiency diode ($V_{O(A)} - V_{FB}$)	$I_O = 1$ A (M); $I_{diff} = 0.3$ mA			1.5	V
$ I_{os} $	output offset current	$I_{diff} = 0$; $I_{I(sb)} = 50$ to 500 μ A			40	mA
$ V_{os} $	offset voltage at the input of the feedback amplifier ($V_{I(fb)} - V_{O(B)}$)	$I_{diff} = 0$; $I_{I(sb)} = 50$ to 500 μ A			24	mV
ΔV_{osT}	output offset voltage as a function of temperature	$I_{diff} = 0$			72	μ V/K
$V_{O(A)}$	DC output voltage	$I_{diff} = 0$;		6.5		V
G_{vo}	open-loop voltage gain ($V_{7.4}/V_{1.2}$)			80		dB

	open loop voltage gain (V_{7-4}/V_{9-4} ; $V_{1-2} = 0$)			80		dB
V_R	voltage ratio V_{1-2}/V_{9-4}			0		dB
f_{res}	frequency response (3 dB)	open loop;		40		Hz
G_I	current gain (I_O/I_{diff})			5000		
$\Delta G_c T$	current gain drift as a function of temperature				10^{-4}	K
$I_{I(sB)}$	signal bias current		50	400	500	μA
I_{FB}	flyback supply current	during scan			100	μA
PSRR	power supply ripple rejection			80		dB
$V_{I(DC)}$	DC input voltage			2.7		V
$V_{I(CM)}$	common mode input voltage	$I_{I(sB)} = 0$	0		1.6	V
I_{bias}	input bias current	$I_{I(sB)} = 0$		0.1	0.5	μA
$I_{O(CM)}$	common mode output current	$\Delta I_{I(sB)} = 300 \mu A$ (p-p); $f_i = 50$ Hz; $I_{diff} = 0$		0.2		mA
Guard circuit						
I_O	output current	not active; $V_{O(guard)} = 0$ V			50	μA
		active; $V_{O(guard)} = 4.5$ V	1		2.5	mA
$V_{O(guard)}$	output voltage on pin 8	$I_O = 100 \mu A$			5.5	V
	allowable voltage on pin 8	maximum leakage current = $10 \mu A$;			40	V

$V_P = 13.5$ V; $I_{O(p-p)} = 1.87$ A; $I_{I(sB)} = 400 \mu A$; $I_{diff(p-p)} = 500 \mu A$; $V_{FB} = 42$ V; $t_{FB} = 0.6$ ms.

APPLICATION DIAGRAM.



● 9-Pin Plastic Power Single-in-Line (SIL-9MPF, SOT 131-2)

