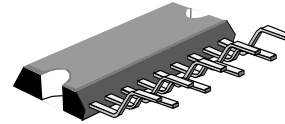


## VERTICAL DEFLECTION AND GUARD CIRCUIT (110°)

The KKA3654 is a full performance vertical deflection output circuit for direct drive of the deflection coils and can be used for a wide range of 90° and 110° deflection systems. A guard circuit is provided which blanks the picture tube screen in the absence of deflection current.

### FEATURES

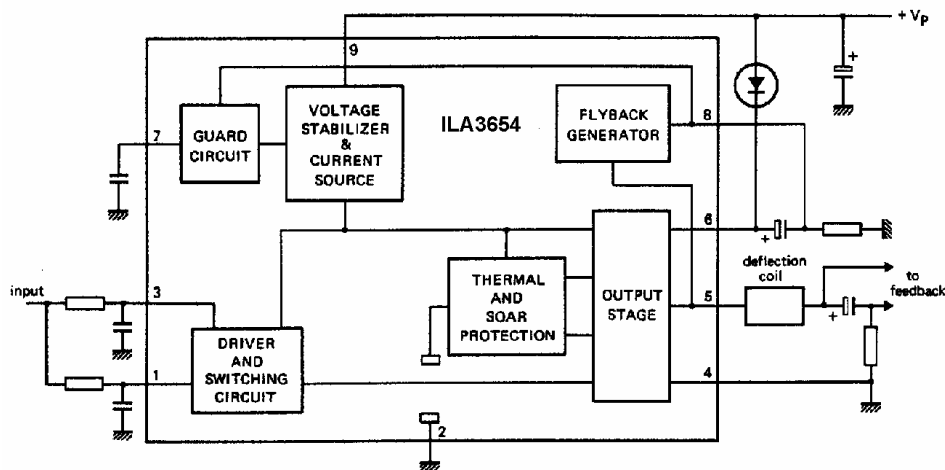
- Direct drive to the deflection coils
- 90° and 110° deflection system
- Internal blanking guard circuit
- Internal voltage stabilizer



### QUICK REFERENCE DATA

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Output voltage	$V_{5-2}$		60	V
Output current (peak-to-peak)	$I_{5(p-p)}$		3	A
Supply voltage	$V_{9-2}$		40	V
Guard circuit output voltage	$V_{7-2}$		5,6	V
Operating ambient temperature range	$T_{amb}$	25	60	°C
Storage temperature	$T_{stg}$	55	150	°C
<b>THERMAL RESISTANCE</b>				
From junction to mounting base	$R_{th j-mb}$	3,5	4	K/W

### BLOCK DIAGRAM.



### FUNCTIONAL DESCRIPTION

#### Output stage and protection circuits

The output stage consists of two Darlington configurations in class B arrangement. Each output transistor can deliver 1,5 A maximum and the  $V_{CEO}$  is 60 V.

Protection of the output stage is such that the operation of the transistors remains well within the SOAR area in all circumstances at the output pin, (pin 5). This is obtained by the cooperation of the thermal protection circuit, the current-voltage detector and the short circuit protection.

Special measures in the internal circuit layout give the output transistors extra solidity. The same curves also apply for the upper output device. The supply for the output stage is fed to pin 6 and the output stage ground is connected to pin 4.

### Driver and switching circuit

Pin 1 is the input for the driver of the output stage. The signal at pin 1 is also applied to pin 3 which is the input of a switching circuit (pin 1 and 3 are connected via external resistors).

This switching circuit rapidly turns off the lower output stage when the flyback starts and it, therefore, allows a quick start of the flyback generator. The maximum required input signal for the maximum output current peak-to-peak value of 3 A is only 3 V, the sum of the currents in pins 1 and 3 is then maximum 1 mA.

### Flyback generator

During scan, the capacitor between pins 6 and 8 is charged to a level which is dependent on the value of the resistor at pin 8 (see Block diagram ).

When the flyback starts and the voltage at the output pin (pin 5) exceeds the supply voltage, the flyback generator is activated.

The supply voltage is then connected in series, via pin 8, with the voltage across the capacitor during the flyback period. This implies that during scan the supply voltage can be reduced to the required scan voltage plus saturation voltage of the output transistors. The amplitude of the flyback voltage can be chosen by changing the value of the external resistor at pin 8. It should be noted that the application is chosen such that the lowest voltage at pin 8 is > 1,5 V, during normal operation.

### Guard circuit

When there is no deflection current, for any reason, the voltage at pin 8 becomes less than 1 V, the guard circuit will produce a d.c. voltage at pin 7. This voltage can be used to blank the picture tube, so that the screen will not burn in.

### Voltage stabilizer

The internal voltage stabilizer provides a stabilized supply of 6 V to drive the output stage, so the drive current is not affected by supply voltage variations.

## RATINGS

Pins 2 and 4 are externally connected to ground.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
<b>Voltages</b>				
Output voltage	$V_{5-4}$	0	60	V
Supply voltage	$V_{9-4}$	0	40	V
Supply voltage output stage	$V_{6-4}$	0	60	V
Input voltage	$V_{1-2}$	0	$V_{9-4}$	V
Input voltage switching circuit	$V_{3-2}$	0	$V_{9-4}$	V
External voltage at pin 7	$V_{7-2}$	0	5,6	V
<b>Currents</b>				
Repetitive peak output current	$\pm I_{5RM}$		1,5	A
Non-repetitive peak output current (note 1)	$\pm I_{5SM}$		3	A
Repetitive peak output current of flyback generator	$I_{8RM}$		1,5	A
			1,6	A
Non-repetitive peak output current of flyback generator (note 1)	$\pm I_{8SM}$		3	A
<b>Temperatures</b>				
Storage temperature range	$T_{stg}$	-65	150	°C
Operating ambient temperature range	$T_{amb}$	25	60	°C
Operating junction temperature range (the output current at pin 5 should not exceed 2.5A)	$T_j$	25	150	°C

**CHARACTERISTICS**

$T_{amb} = 25\text{ °C}$ , supply voltage ( $V_{9-4}$ ) = 26 V; unless otherwise stated; pin 1 externally connected to pin 3. Pins 2 and 4 externally connected to ground.

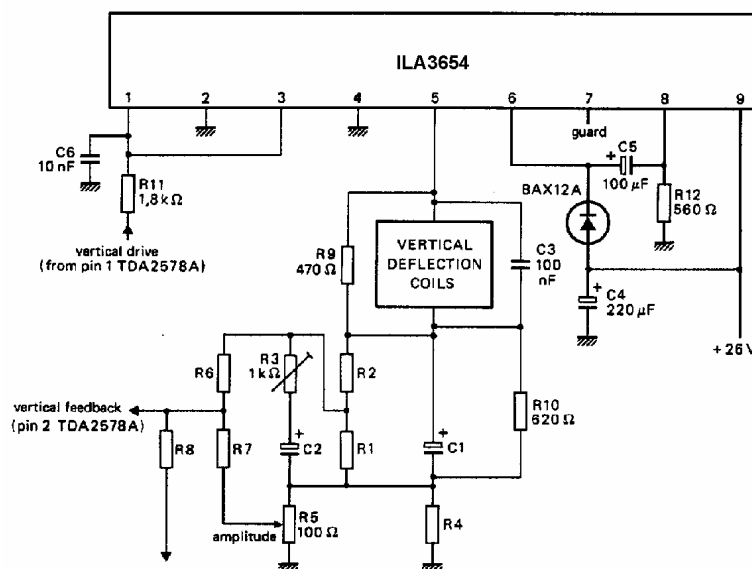
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>Supply</b>					
Supply voltage, pin 9 (note 2)	$V_{9-4}$	10		40	V
Supply voltage output stage	$V_{6-4}$			60	V
Supply current, pins 6 and 9 (note 3)	$I_6+I_9$	35	55	85	mA
Quiescent current	$I_4$	25	40	65	mA
Variation of quiescent current with temperature	TC		0,04		mA/K
<b>Output current</b>					
Output current, pin 5 (peak-to-peak)	$I_{5(p-p)}$		2,5	3	A
Output current flyback generator, pin 8	$I_{8(p-p)}$		1,25	1,5	A
	$I_{8(p-p)}$		1,35	1,6	A
<b>Output voltage</b>					
Peak voltage during flyback	$V_{5-4}$			60	V
Saturation voltage to supply at $I_5 = 1,5\text{ A}$	$V_{6-5(sat)}$		2,5	3,2	V
at $I_5 = 1,5\text{ A}$ (note 4)	$V_{5-6(sat)}$		2,5	3,2	V
at $I_5 = 1,2\text{ A}$	$V_{6-5(sat)}$		2,2	2,7	V
at $I_5 = 1,2\text{ A}$ (note 4)	$V_{5-6(sat)}$		2,3	2,8	V
<b>Saturation voltage to ground</b>					
at $I_5 = 1,2\text{ A}$	$V_{5-4(sat)}$		2,2	2,7	V
at $I_5 = 1,5\text{ A}$	$V_{5-4(sat)}$		2,5	3,2	V
<b>Flyback generator</b>					
<b>Saturation voltage</b>					
at $I_8 = 1,6\text{ A}$	$V_{9-8(sat)}$		1,6	2,1	V
at $I_8 = 1,5\text{ A}$ (note 4)	$V_{8-9(sat)}$		2,3	3	V
at $I_8 = 1,3\text{ A}$	$V_{9-8(sat)}$		1,4	1,9	V
at $I_8 = 1,2\text{ A}$ (note 4)	$V_{8-9(sat)}$		2,2	2,7	V
Leakage current at pin 8	$I_8$		5	100	$\mu\text{A}$
Flyback generator active if:	$V_{5-9}$	4			V
<b>Input</b>					
Input current, pin 1, for $I_5 = 1,5\text{ A}$	$I_1$		0,33	0,55	mA
Input voltage during scan, pin 1	$V_{1-2}$		2,35	3	V
Input current, pin 3, during scan (note 5)	$I_3$	0,03			mA
Input voltage, pin 3, during scan (note 5)	$V_{3-2}$	0,8		$V_{9-4}$	V
Input voltage, pin 1, during flyback	$V_{1-2}$			250	mV
Input voltage, pin 3, during flyback	$V_{3-2}$			250	mV
<b>Guard circuit</b>					
Output voltage, pin 7 $R_L = 100\text{ k}\Omega$ (note 8)	$V_{7-2}$	4,1	4,5	5,8	V
Output voltage, pin 7 at $I_L = 0,5\text{ mA}$ (note 8)	$V_{7-2}$	3,4	3,9	5,3	V
Internal series resistance of pin 7	$R_{I7}$	0,95	1,35	1,7	$\text{k}\Omega$
Guard circuit activates (note 6)	$V_{8-2}$			1,0	V
<b>General data</b>					
Thermal protection activation range	$T_j$	158	175	192	$^{\circ}\text{C}$

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>Thermal resistance</b>					
From junction to mounting base	$R_{th\ j-mb}$	~	3,5	4	K/W
Open loop gain at 1 kHz; (note 7)	$G_o$	~	33	~	
Frequency response, 3 dB; (note 9)	f	~	60	~	kHz

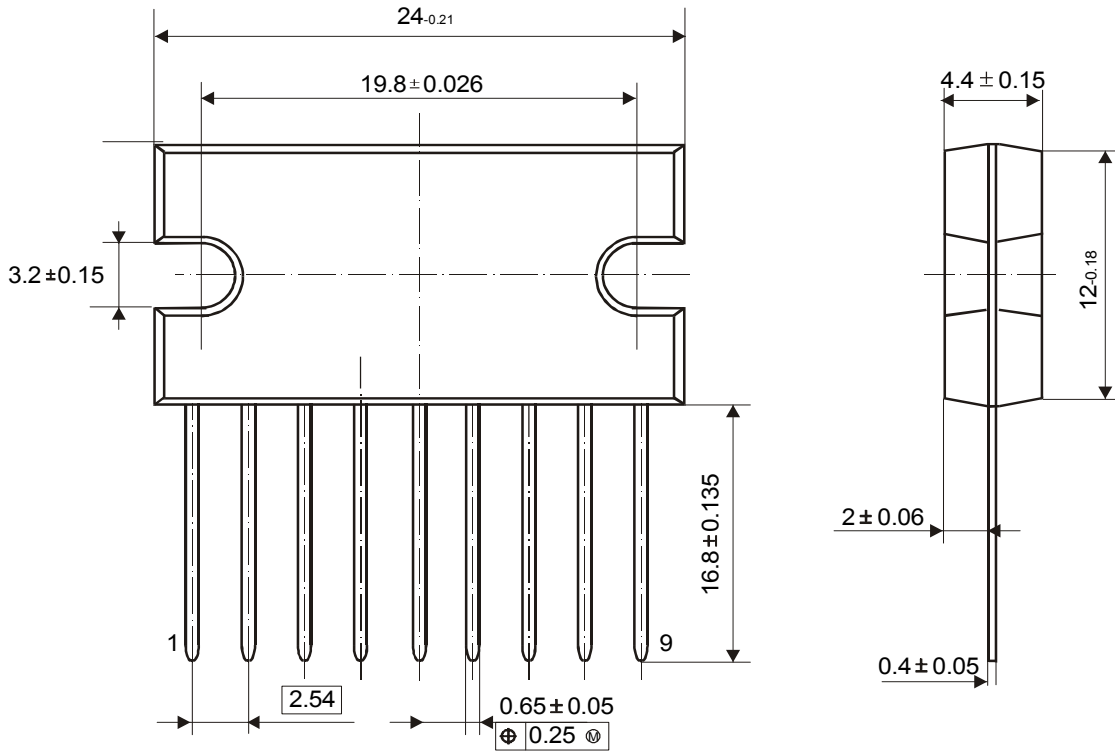
### Notes

1. Non-repetitive duty factor 3,3%.
2. The maximum supply voltage should be chosen so that during flyback the voltage at pin 5 does not exceed 60 V.
3. When  $V_{5-4}$  is 13 V and no load at pin 5.
4. Duty cycle,  $d = 5\%$  or  $d = 0,05$ .
5. When pin 3 is driven separately from pin 1.
6. During normal operation the voltage  $V_{8-2}$  may not be lower than 1,5 V.
7.  $R_L = 8 \Omega$  ;  $I_L = 125\text{ mA}$  (r.m.s.).
8. If guard circuit is active.
9. With a 22 pF capacitor between pins 1 and 5.

### APPLICATION DIAGRAM.



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



● 9-Pin Plas (SIL-9P, SOT 157-2)

