

TEA2037A

HORIZONTAL AND VERTICAL DEFLECTION MONITOR

FEATURES SUMMARY

- DIRECT LINE DARLINGTON DRIVE
- DIRECT FRAME-YOKE DRIVE (± 1A)
- COMPOSITE VIDEO SIGNAL INPUT CAPABILITY
- FRAME OUTPUT PROTECTION AGAINST SHORT CIRCUITS
- PLL
- HORIZONTAL OSCILLATOR FREQUENCY RANGE FROM 15kHz TO 100kHz
- VERTICAL OSCILLATOR FREQUENCY RANGE FROM 30Hz TO 120Hz
- VERY FEW EXTERNAL COMPONENTS
- VERY LOW COST POWER PACKAGE

DESCRIPTION

The TEA2037A is an horizontal and vertical deflection circuit. It uses the same concept as TEA2117 but optimised for small screens, for a very low cost solution.

Figure 1. Package



Figure 2. Pin Connections		
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F, 7AME OSCILLATOR	1 16	5 🗍 V _{CC1}
FLTBACK GENERATOR SUPPLY	2 15	
FRAME FLYBACK	3 14	
GROUND	4 13	3 GROUND
GROUND	5 12	2 GROUND
	6 11	
FRAME POWER SUPPLY	7 10	PHASE DETECTOR
FRAME OUTPUT	8 9	D LINE OSCILLATOR

REV. 2

Figure 3. Block Diagram



Table 1. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _{CC1}	Supply Voltage	30	V
V2	Flyback Generator Supply Voltage	35	V
V ₇	Frame Power Supply Voltage	60	V
l _{8nr}	Frame Output Current (non repetitive)	± 1.5	A
l ₈	Frame Output Current (continuous)	± 1	Α
V ₁₄	Line Output Voltage (external)	60	V
I _{p14}	Line Output Peak Current	0.8	A
I _{C14}	Line Output Continuous Current	0.4	Α
T _{stg}	Storage Temperature	-40 to 150	°C
ŢJ	Max Operating Junction Temperature	+ 150	°C

Table 2. Thermal Data

Symbol	Parameter		Value	Unit
R _{th (j-c)}	Junction-case Thermal Resistance	Max	15	°C/W
R _{th (j-a)}	Junction-ambient Thermal Resistance (Soldered on a 35µm thick 45cm ² PC Board	Typ. d copper area)	45	°C/W
Tj	Recommended Junction Temperature	Max	120	°C

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C)

Symbol	Parameter	Min.	Тур.	Max.	Unit
ICC1	Supply Current	10		20	mA
V _{CC1} ∆V _{CC1}	Supply Voltage (I _{CC1} = 15mA) Voltage Variation (I _{CC1} : 10mA to 20mA)	9 –280	9.8 50	10.5 +280	V mV
LPS	Starting Threshold for Line Output Pulses			5	V

Table 3. Supply (shunt regulator) (Pin 16)

Table 4. Video Input (Pin 15)

Symbol	Parameter	Min.	Тур.	Max.	Unit
V ₁₅	Reference Voltage ($I_{15} = -1\mu A$)	1.4	1.75	2	V
MWF	Minimum Width of Frame Pulse (When synchronized with TTL signal)	50			μs
V _{IN}	Sync Bottom to Black Level ($R_{SYNC 15} = 560 k\Omega$)	0.2	0.3		V _{PP}
Table 5. L	ine Oscillator (Pin 9)			Al	5)

Table 5. Line Oscillator (Pin 9)

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Symbol	Parameter	Min.	Тур.	Max.	Unit
LT9	Low Threshold Voltage	2.8	3.2	3.6	V
HT9	High Threshold Voltage	5.4	6.6	7.8	V
BI9	Bias Current		100		nA
DR9	Discharge Impedance	1.0	1.4	1.8	kΩ
FLP1	Free Running Line Period (R = $34.9k\Omega$ Tied to V _{CC1} , C = $2.2nF$ Tied to Ground)	62	64	66	μs
FLP2	Free Running Line Period (R = $13.7K\Omega$, C = $2.2nF$)		27		μs
OT9	Oscillator Threshold for Line Output Pulse Triggering		4.6		V
$\frac{\Delta F}{\Delta 0}$	Horizontal Frequency Drift with Temperature (see application Figure 11)		2		Hz/°C

Table 6. Line Output (Pin 14)

Symbol	Parameter	Min.	Тур.	Max.	Unit
LV14	Saturation Voltage (I ₁₄ = 200mA)		1.1	1.6	V
OPW	Output Pulse Width (line period = 64µs)	20	22	24	μs
60	*				

Table 7. Line Flyback Input (Pin 11)

Symbol	Parameter	Min.	Тур.	Max.	Unit
V11	Bias Voltage	1.8	2.4	3.2	V
Z11	Input Impedance	4.5	5.8	8	kΩ

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Table 8. Phase Detector

Symbol	Parameter	Min.	Тур.	Max.	Unit
I ₁₀	Output Current During Synchro Pulse	250	450	800	μA
RI10	Current Ratio (positive/negative)	0.95	1	1.05	
LI10	Leakage Current	-2		+2	μA
CV10	Control Range Voltage	2.60		7.10	V

Table 9. Frame Oscillator (Pin 1)

Symbol	Parameter	Min.	Тур.	Max.	Unit
LT1	Low Threshold Voltage	1.6	2.0	2.3	V
HT1	High Threshold Voltage	2.6	3.1	3.6	V
BI1	Bias Current		30		nA
DR1	Discharge Impedance	300	470	700	kΩ
FFP1	Free Running Line Period (R = $845k\Omega$ Tied to V _{CC1} , C = $180nF$ Tied to Ground)	20.5	23	25	ms
MFP	Minimum Frame Period ($I_{15} = -100\mu A$) (with the Same RC)		12.8	C/	ms
FFP2	Free Running Line Period (R = $408k\Omega$, C = $220nF$)		14.3		ms
FPR	Frame Period Ratio =	1.7	1.8	1.9	
FG	Frame Saw-tooth Gain Between Pin 1 and non Inverting Input of the Frame Amplifier	X.	-0.4		
$\frac{\Delta F}{\Delta 0}$	Vertical Frequency Drift with Temperature (see application Figure 11)		4.10 ⁻³		Hz/°C
Fable 10.	Frame Power Supply (Pin 7)				

Table 10. Frame Power Supply (Pin 7)

Symbol	Parameter	Min.	Тур.	Max.	Unit
V ₇	Operating Voltage (with flyback generator)	10		58	V
I ₇	Supply Current (V ₇ = 30V)			22	mA

Table 11. Flyback Generator Supply (Pin 2)

Max.	Unit
30	V

Table 12. Frame Output (Pin 8)	Table	12. I	Frame	Output	(Pin 8)
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Symbol	Parameter	Min.	Тур.	Max.	Unit
LV8A LV8B	Saturation Voltage to Ground (V ₇ = 30V) I ₈ = 0.1 I ₈ = 1A		0.06 0.37	0.6 1	V V
HV8A HV8B	Saturation Voltage to V ₇ (V ₇ = 30V) $I_8 = -0.1$ $I_8 = -1A$		1.3 1.7	1.6 2.4	V V
FV8A FV8B	Saturation Voltage to V ₇ in Flyback Mode (V ₈ > V ₇) I ₈ = 0.1 I ₈ = 1A		1.6 2.5	2.1 4.5	V V

Table 13. Flyback Generator (Pin 2 and 3)

Symbol	Parameter	Min.	Тур.	Max.	Unit
F2DA F2DB FSVA FSVB	Flyback Transistor on (output = high state) (V ₂ = 30V) V3/2 with $I_{3 \rightarrow 2} = 0.1A$ $I_{3 \rightarrow 2} = 1A$ V2/3 with $I_{3 \rightarrow 2} = 0.1$ $I_{3 \rightarrow 2} = 1A$		1.5 3.0 0.8 2.2	2.1 4.5 1.1 4.5	~~~~
	Flyback Transistor off (output = $V_7 - 8V$) ($V_7 = V_2 = 30V$)		0		
FCI	Leakage Current Pin 2	3	5	170	μA

The TEA2037A performs all the video and power functions required to provide signals for the direct drive of the line darlington and frame yoke.

It contains:

- A shunt regulator
- A synchronization separator
- An integrated frame separator without external components
- A saw-tooth generator for the frame
- A power amplifier for direct drive of frame yoke (short circuit protected)

- An open collector output for the line darlington drive
- A line phase detector and a voltage control oscillator.

The slice level of sync-separation is fixed by value of the external resistors R_1 and R_2 . V_R is an internally fixed voltage.

The sync-pulse allows the discharge of the capacitor by a 2 x 1 current. A line sync-pulse is not able to discharge the capacitor under $V_Z/2$. A frame sync pulse permits the complete discharge of the capacitor, so during the frame sync-pulse Q3 and Q4 provide current for the other parts of the circuit.

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Figure 4. Synchronization Separator Circuit



The oscillator thresholds are internally fixed by resistors. The discharge of the capacitor depends on

Figure 5. Frame Separator



the internal resistor R4. The control voltage is applied on resistor R5.

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Figure 6. Line Oscillator



The sync-pulse drives the current in the comparator. The line flyback integrated by the external network gives on pin 11 a saw tooth, the DC offset of this saw tooth is fixed by VC. The comparator output provides a positive current for the part of the obsolete Product(s) - obsol signal on pin 11 greater than to VC and a negative

the video signal are synchronized, the output of the comparator is an alternatively negative and positive current. The frame sync-pulse inhibits the comparator to prevent frequency drift of the line oscillator on the frame beginning.







Line Output (pin 14)

It is an open collector output which is able to drive pulse current of 800mA for a rapid discharging of the darlington base. The output pulse time is 22μ s for a 64μ s period.

The oscillator thresholds are internally fixed by resistors. The oscillator is synchronized during the last half free run period. The input current during the charge of the capacitor is less than 100nA.

Frame Output Amplifier

This amplifier is able to drive directly the frame yoke. Its output is short circuit and overload protected; it contains also a thermal protection.

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Figure 9. Frame Oscillator

TYPICAL APPLICATION FOR DISPLAY UNITS









TYPICAL APPLICATION FOR HIGH FREQUENCY MONITOR

Table 14. Characteristics

• Screen: 14" Color • Frame deflection yoke: 11mH, 7 Ω , 750mA peak-to-peak • V _{CC} = + 14V with flyback generator • Frame flyback time: 0.6ms • Vertical frequency: 72Hz • Vertical free-running period: 16ms (adjustable) • Horizontal frequency: 35kHz (adjustable) • Line flyback time: 5.5 μ s	 Capture range: ± 5µs (@ sync pulse = 4.7µs) Input signal: negative TTL sync (line + frame) Dissipated power: 1.4W (heatsink required) Adjustments: Vertical amplitude Vertical Linearity Vertical frequency Horizontal frequency
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Figure 12. Characteristics



PART NUMBERING

Table 15. Order Codes

Part Number	Package	Temperature Range
TEA2037A	POWERDIP (8+8)	-25 to 85 °C

obsolete Product(s) - Obsolete Product(s)

PACKAGE MECHANICAL

Table 16. POWERDIP(8+8) - Mechanical Data

Symbol	millimeters			inches			
Symbol	Min	Тур	Max	Min	Тур	Max	
a1	0.51			0.020			
В	0.85		1.4	0.033		0.055	
b		0.5			0.020		
b1	0.38		0.5	0.015		0.020	
D			20			0.787	
E		8.8			0.346		
е		2.54			0.100		
e3		17.78			0.700		
F			7.1			0.280	
i			5.1			0.201	
L		3.3			0.130	<u> </u>	
Z			1.27			0.050	

Figure 13. POWERDIP(8+8) - Package Dimensions



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Note: Drawing is not to scale

REVISION HISTORY

Table 17. Revision History

Date	Revision	Description of Changes
September-1996	1	First Issue
13-May-2004	2	Stylesheet update. No content change.

obsolete Product(s) - Obsolete Product(s)

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