

VIDEO-CHROMA DEFLECTION SYSTEM FOR A COLOR TELEVISION (PAL/NTSC)

The KA2154 combines a PAL/NTSC video-chroma subsystem and a deflection combination on a single monolithic integrated circuit to provide a PAL or PAL/NTSC color television.

This device includes a video amplifier, PAL and NTSC color demodulator. These are designed to provide color differential signal outputs, and an improved sync separator, horizontal oscillator with saw tooth wave type AFC, horizontal pre-driver with X-ray protection circuit vertical oscillator and vertical pre-driver in a 42-lead, dual in-line type plastic package.

FUNCTIONS

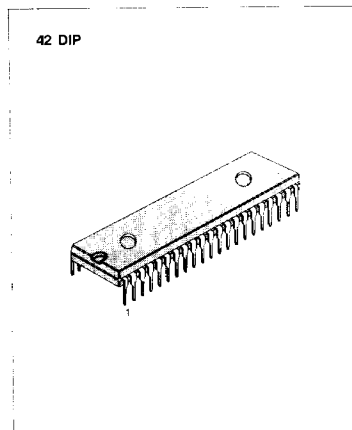
- Inverter-amplifiers
- Contrast control
- Pedestal clamps
- Brightness control
- ACC-amplifiers (peak Acc)
- Tint controls
- Uni-color controls
- fsc VCO
- APC
- Color-killers
- Color demodulators
- Matrix circuits
- Sync-separator (H.V. sync in)
- $2f_H$ horizontal oscillators
- Flip-flops
- Stabilized horizontal V_{CC} by zener diodes
- Horizontal pre drivers
- Gate pulse generators
- Vertical sync input
- Vertical oscillators
- Ramp generators

FEATURES

- **Video-Chroma Section**
- **Simple PAL/NTSC System Switch (Demodulator, Flip-flop, Tint control for NTSC).**
- **Suitable to a Multi-CTV System: KA2154 PAL/NTSC Dual System Suitable to a Multi-CTV System: KA2154 SECAM Combination 3 or more System.**
- **A minimum Number of External Parts are Required.**
- **Stabilized with Respect to Variation of Temperature and Supply Voltage.**
- **A Few Initial Adjustment Required.**

DEFLECTION SECTION

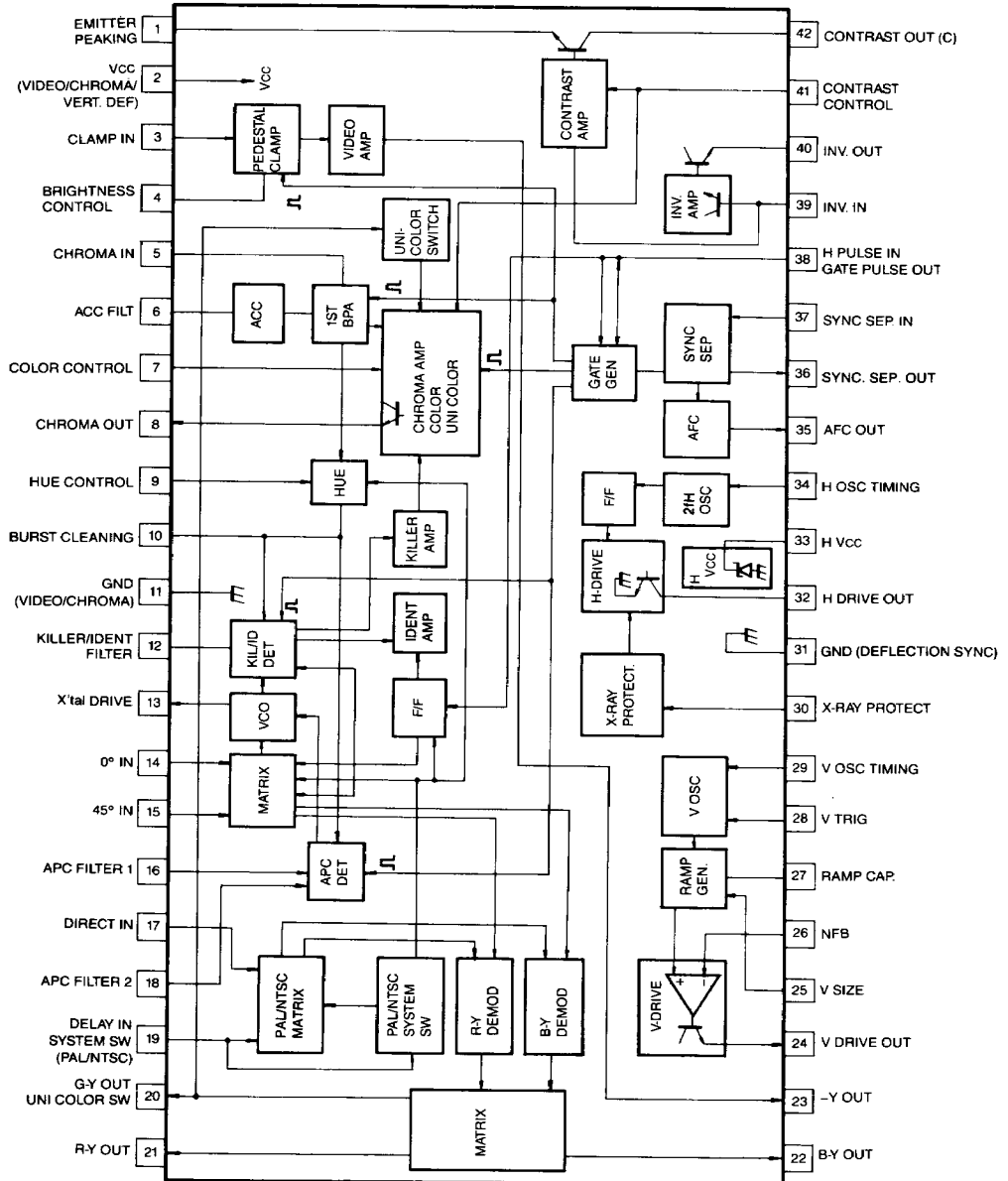
- Excellent Temperature Stability of Horizontal Oscillator.
- Exact 50% Duty Cycle Output Due to the $2f_H$ Oscillator and Flip-Flop Circuit.
- Excellent Interface.



ORDERING INFORMATION

Device	Package	Operating Temperature
KA2154	42 DIP	-20 ~ +65°C

BLOCK DIAGRAM



3

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC} Max	15	V
Horiz. Supply Current	I_{CC} Max	40	mA
Max. Input Signal Level	V_{IN} 5, 14, 15, 17, 19, 28, 37, 39	5	$V_{P.P}$
Max. Control Terminal Voltage	$V_{4 \text{ MAX}}, V_{5 \text{ MAX}}, V_{7 \text{ MAX}}, V_{9 \text{ MAX}}$	V_{CC}	V
Term. 1 Max. Output Current	$I_{1 \text{ MAX}}$	4	mA
Term. 8 Max. Output Current	$I_{3 \text{ MAX}}$	10	mA
Term. 10 Max. Output Current	$I_{10 \text{ MAX}}$	4	mA
Term. 13 Max. Output Current	$I_{13 \text{ MAX}}$	4	mA
Min. Load Resistance	R_{LD}	1.8	$K\Omega$
Term. 23 Max. Output Current	$I_{23 \text{ MAX}}$	4	mA
Vertical Stage Output Current	$I_{24 \text{ MAX}}$	20	mA
Term. 25 Max. Output Current	$I_{25 \text{ MAX}}$	4	mA
Term. 26 Max. Input Voltage	$V_{26 \text{ MAX}}$	V_{CC}	V
Term. 27 Max. Output Current	$I_{27 \text{ MAX}}$	50	mA
Term. 30 Max. Input Current	$-I_{30 \text{ MAX}}$	1	mA
Horiz. Max. Sink Current	$-I_{32 \text{ MAX}}$	30	mA
Horiz. Ave. Sink Current	$-I_{32}$	15	mA
Term. 35 Max. Input Voltage	$V_{35 \text{ MAX}}$	V_{CCH}	V
Term. 36 Max. Voltage	$V_{36 \text{ MAX}}$	V_{CC}	V
Term. 38 Max. Input Voltage	$V_{38 \text{ MAX}}$	5	V
Term. 40 Max. Output Current	$I_{40 \text{ MAX}}$	5	mA
Term. 42 Max. Sink Current	$-I_{42 \text{ MAX}}$	4	mA
Max. Power Dissipation (Note)	P_D Max	2.2 (Note)	W
Operating Temperature	T_{OP}	-20 ~ 65	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ 150	$^\circ\text{C}$

Note: Derated above $T_a = 25^\circ\text{C}$ in the proportion of $17.6\text{mW}/^\circ\text{C}$.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{CC} = 12V$, $T_a = 25^\circ C$)

Video Section (f)

Characteristic	Symbol	Test Pin	SW		Test Conditions	Specification			Unit	Test CCT
			36	41		Min.	Typ.	Max.		
Recommendable Supply Voltage	V_{CC1}					10.8	12	13.2	V	
12V Supply Current	I_{CC1}	2				60	82	106	mA	1
Video Gain	G_V	23 39	Off	On	$V_C = 10V$, $V_X = 4.25V$, $V_Z = 4.0V$ $v_{39} = 500KHz$, $1V_{P-P}$ (Multi Burst) $G_V = 20 \log (v_{23}/v_{39})$	3	6	7	dB	2
Contrast Gain Control Range	ΔG_V	23	Off	On	$V_O = 10V \sim 2V$, $V_X = 4.25V$, $V_Z = 4.0V$ v_{39} ; 500KHz $1V_{P-P}$ (Multi Burst) $\Delta G_V = 20 \log (v_{23 \text{ MAX}}/v_{23 \text{ MIN}})$	40	—	—	dB	2
Video Frequency Characteristics	ΔG_{VF}	23	Off	On	$V_C = 10V$, $V_X = 4.25V$, $V_Z = 4.0V$, v_{39} ; 500KHz, 4.0MHz $1V_{P-P}$ (Multi Burst) $\Delta G_{VF} = 20 \log (V_{23 \text{ 4MHz}}/V_{23 \text{ 5MHz}})$	-3.5	-1.5	0.5	dB	2
DC Restoration Ratio	K	23	Off	On	$V_C = 10V$, $V_Z = 4.0V$ V_X ; Pedestal #39=3.25V v_{39} ; $2.5V_{P-P}$ 10_{STEP} APL 10% ~ 90% $K = (1 - \frac{\Delta V_{23 \text{ pedestal}}}{V_{23 \text{ 100\% APL}}} \times 100)$	63	70	77	%	2
Max. Video Output	$v_{23 \text{ MAX}}$	23	Off	Off	$V_X = 4.25V$, v_{39} ; No Signal $V_Z = 2V \sim 7V$ 10% to 90% of Variation	5.0	7.5	—	V_{P-P}	2
Video DC Output Therm Co-effici.	$\partial V_{23}/\partial T$	23	Off	Off	$V_X = 4.25V$, $V_Z = 4.0V$ v_{39} ; No Signal $T_a = -20^\circ C \sim 65^\circ C$	-2.5	0	2.5	mV/°C	2
Inverter Amp. Gain	G_R	40	Off	Off	$V_X = 4.25V$ v_{39} ; 500KHz, $1V_{P-P}$ $G_R = 20 \log (v_{40}/v_{39})$	2.2	3.5	4.6	dB	2
Inverter Amp. Differential	DG_R	40	Off	Off	V_X ; 3.3 ~ 5.3V v_{39} ; 3.58 MHz $100mV_{P-P}$ $DG_R = (v_{40 \text{ MAX}}/v_{40 \text{ MIN}} - 1) \times 100$	—	2.5	5	%	2
Inverter Amp. Differential Phase	DP_R	40	Off	Off	V_X ; 3.3 ~ 5.3V v_{39} ; 3.58MHz, $100mV_{P-P}$ $DP_R = \phi_{40 \text{ MAX}} - \phi_{40 \text{ MIN}}$	—	3	5	deg	2

ELECTRICAL CHARACTERISTICS(Unless otherwise specified; $V_{CC} = 12V$, $T_a = 25^\circ C$)**Video Section (2)**

Characteristic	Symbol	Test Pin	SW		Test Conditions	Specification			Unit	Test CCT
			36	41		Min	Typ	Max		
Inverter Amp. Frequency Characteristic	ΔG_{RF}	40	Off	Off	$V_X = 4.25V$ $v_{39} = 500KHz, 4MHz 1V_{pp}$ $\Delta G_{RF} = 20 \log$ $(v_{40} 4MHz / v_{40} 500KHz)$	-3.5	-0.1	0.5	dB	2
Inverter Amp. 3.58MHz Linearity	v_{39}	39 40	Off	Off	$V_X = 4.25V$ Measure #39 input level at #40 maximum output.	1.6	—	—	V_{pp}	2
Contrast Control Open Voltage	V_{41}	41	—	—		6.7	7.2	7.7	V	1
Color Control Open Voltage	V_7	7	—	—		5.5	6.0	6.5	V	1
Tint Control Open Voltage	V_9	9	—	—		5.5	6.0	6.5	V	1
Pedestal AMP. Gain	G_P	3 23			$V_X = 4.25V, V_Z = 4V$ $v_{39} = 500KHz 1V_{pp}$ (Multi Burst) $G_P = 20 \log (v_{23}/v_3)$	9.5	12.0	13.5	dB	

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_C = 10V$, $V_S = 10V$, SW_{36} : On, SW_{10} : Off, SW_{4A} : On, SW_{4B} : On)

Chroma (1) PAL

Characteristic	Symbol	Test Pin							Test Conditions	Specification			Unit	Test CCT
			SW 41	SW 7	SW 9	SW 12	SW 15	SW 20		Min.	Typ.	Max.		
Max. Chroma Output Voltage	Q_{CMP}	8	On	On	Off	a	b	On	$v_s: 120mV_{P-P} (B:C=1:1)$	0.5	0.75	1.05	V_{P-P}	3
Burst Output Voltage	Q_{BP}	10	On	On	Off	a	b	On	$v_s: 120mV_{P-P} (B:C=1:1)$	0.45	0.70	0.95	V_{P-P}	3
ACC Characteristic (1)	Q_{AP}	8	On	On	Off	a	b	On	$v_s: 15mV_{P-P} (B:C=1:1)$	0.2	0.43	—	V_{P-P}	3
ACC Characteristic (2)	A_P	8	On	On	Off	a	b	On	$v_s: 100mV_{P-P}, 300mV_{P-P} (B:C=1:1)$ $A_P = \frac{V_B (v_s=300mV_{P-P})}{V_B (v_s=100mV_{P-P})}$	—	1.0	1.3	Times	3
Chroma Input Dynamic Range	Q_{CIP}	8	On	On	Off	a	b	On	$v_s = 100mV_{P-P} \rightarrow 800mV_{P-P}$	500	600	—	mV_{P-P}	3
Uni Color Control Range (1) Uni Color Switch On	ΔQ_{CU1P}	8	On	On	Off	a	b	On	$V_C = 4 \sim 10V, V_S = 10V$ $v_s = 120mV_{P-P} (B:C=1:1)$ $\Delta Q_{CU1P} = 20 \log \frac{v_B (V_C=10V)}{v_B (V_C=4V)}$	40	—	—	dB	3
Uni Color Control Range (2) (Switch Off)	ΔQ_{CU2P}	8	On	On	Off	a	b	Off	Same as above	—	0	—	dB	3
Uni Color Control Phase Shift	$\Delta \theta_{UP}$	8	On	On	Off	a	b	On	$V_C = 4V \sim 10V, V_S = 10V$ $v_s = 120mV_{P-P} (B:C=1:1)$	—	—	5	deg	3
Residual Color	Q_{CKP}	8	On	On	Off	a	b	On	$V_C = 10V, V_S = 0V$ $v_s = 120mV_{P-P} (B:C=1:1)$	—	—	3	mV_{P-P}	3

ELECTRICAL CHARACTERISTICS(Unless otherwise specified; $V_C = 10V$, $V_S = 10V$, SW₃₆: On, SW₁₀: Off, SW_{4A}: On, SW_{4B}: On)**Chroma (2) PAL**

Characteristic	Symbol	Test Pin	Test Conditions						Specification			Unit	Test CCT	
			SW 41	SW 7	SW 9	SW 12	SW 15	SW 20	Min	Typ	Max			
Color Control Phase Shift	$\Delta\theta_{CCP}$	8	On	On	Off	a	b	On	$V_C = 10V$, $V_S = 2 - 10V$ $v_5 = 120mV_{p-p}$ (B:C=1:1) From maximum output of pin 8 to 20dB attenuation	—	3	7	deg	3
Burst-Chroma Phase Difference	$\Delta\theta_{BCP}$	8 10	On	On	Off	a	b	On		45	60	—	deg	3
Tint Control Range	$\Delta\theta_{bH1p}$	10	On	On	On	a	b	On		—	0	—	deg	3
Tint Control Phase Distribution	$\Delta\theta_{bH2p}$	10	On	On	On	a	b	On		—	0	—	deg	3
Killer Det. Sensitivity	eK_P	8 10	Off	On	Off	a	a	On		30	60	110	mV _{p-p}	3
Ident Dept. Sensitivity	eI_P	21 10	Off	On	Off	a	a	On		—	60	—	mV _{p-p}	3
APC Pul-in Range	f_{PP}	13	Off	Off	Off	a	a	On	$v_5 = 120mV_{p-p}$	± 300	± 500	—	Hz	3
Phase Det. Sensitivity	μ_P	16 18	Off	Off	Off	a	c	On	$v_5 = 120mV_{p-p}$	—	25	—	mV/deg	3
Control Sensitivity	β_P	13 16 18	Off	Off	Off	a	a	On	$v_5 = 120mV_{p-p}$	—	2.2	—	Hz/mV	3

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_C = 10V$, $V_S = 10V$, SW_{36} : On, SW_{10} : Off, SW_{4A} : On, SW_{4B} : On)

Chroma (3) PAL

Characteristic	Symbol	Test Pin	Test Conditions						Specification			Unit	Test CCT	
			SW 41	SW 7	SW 9	SW 12	SW 15	SW 20	Min.	Typ.	Max.			
Color Differential Output Voltage	Q_{ORP}	21	On	On	Off	a	a	On	$V_{17}, V_{19}: 100mV_{P-P}$ 4.443618 MHz CW: 4.433618MHz	1.8	2.4	3.0	V_{P-P}	3
	Q_{OGP}	20								—	—	—		
	Q_{OBP}	22								3.2	4.2	5.4		
Max. Color Differential Output Voltage	Q_{ORMP}	21	On	On	Off	a	a	On	$V_{17}, V_{17}, 500mV_{P-P}$ 4.443618MHz CW: 4.433618 MHz	3.8	5.5	—	V_{P-P}	3
	Q_{OGMP}	20								—	—	—		
	Q_{OBMP}	22								3.8	5.5	—		
Relative Amplitude	R-Y/B-Y _P	21/22	On	On	Off	a	a	On	$V_{17}: 200mV_{P-P}$ 4,443618 MHz CW: 4.433618 MHz	0.46	0.56	0.66	—	3
	G-Y/B-Y _P	20/22								0.24	0.34	0.44		
Relative Phase	θ_{R-Y_P}	21/22	On	On	Off	a	a	On	Same as above	77	90	100	deg	3
	θ_{G-Y_P}	20/22								220	230	240		
Residual Carrier	$Q_{RC R_P}$	21	On	On	Off	a	a	On		—	—	300	mV _{P-P}	3
	$Q_{RC G_P}$	20												
	$Q_{RC B_P}$	22												
Demodulator Bandwidth	f_{BRP}	21	On	On	Off	a	a	On	$V_{17}: 200mV_{P-P}$ 10KHz ~ 5MHz	1.1	2.1	3.2	MHz	3
	f_{BG_P}	20												
	f_{BB_P}	22												
Demo. Output DC Voltage	E_{ORP}	21	Off	Off	Off	a	b	On		6.8	7.4	8.0	V	1
	E_{OGP}	20												
	E_{CBP}	22												
Demo. Output DC Voltage Difference	$E_{O(R-G)_P}$	21	Off	Off	Off	a	b	On		-0.2	0	0.2	V	1
	$E_{O(R-B)_P}$	20												
	$E_{O(B-G)_P}$	22												
Demo. Output DC Voltage Therm. Co-eff	ΔE_{ORP}	21	Off	Off	Off	a	b	On	$T_a = -20^\circ C \sim +65^\circ C$	-3	0	2	mV/°C	1
	ΔE_{OGP}	20												
	ΔE_{OBP}	22												
Demo. Output Diffence Voltage Therm. Co-eff.	$\Delta E_{O(R-G)_P}$	21	Off	Off	Off	a	b	On	$T_a = -20^\circ C \sim +65^\circ C$	-2	-0.5	2	mV/°C	1
	$\Delta E_{O(R-B)_P}$	20												
	$\Delta E_{O(B-G)_P}$	22												
System SW Threshold	V_{THS}	19	Off	Off	Off	a	b	On	$V_{17}: 200mV_{P-P}$ 4.443618 MHz CW: 4.433618 MHz	2.4	3	3.6	V	3
DC Change by System SW	ΔE_{OR}	21	Off	Off	Off	a	b	On	$V_{IN}: 220mV_{P-P}$ 4.443618MHz	-100	0	100	mV	3
	ΔE_{OG}	20												
	ΔE_{OB}	22												

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_C = 10V$, $V_S = 10V$, SW_{36} : On, SW_{10} : Off, SW_{4A} : On, SW_{4B} : On)

Chroma (4) NTSC

Characteristic	Symbol	Test Pin							Test Conditions	Specification			Unit	Test CCT
			SW 41	SW 7	SW 9	SW 12	SW 15	SW 20		Min.	Typ.	Max.		
Max. Chroma Output Voltage	Q_{CMN}	8	On	On	Off	a	b	On	$v_S = 120mV_{P,P}$ (B:C=1:1)	0.5	0.75	1.05	$V_{P,P}$	4
Burst Output Voltage	Q_{bN}	10	On	On	Off	a	b	On	$v_S = 120mV_{P,P}$ (B:C=1:1)	0.45	0.70	0.95	$V_{P,P}$	4
ACC Characteristic (1)	Q_{aN}	8	On	On	Off	a	b	On	$v_S = 15mV_{P,P}$ (B:C=1:1)	0.2	0.43	—	$V_{P,P}$	4
ACC Characteristic (2)	A_N	8	On	On	Off	a	b	On	$v_S = 100mV_{P,P}, 300mV_{P,P}$ (B:C=1:1) $A_P = \frac{v_b (v_S = 300mV_{P,P})}{v_b (v_S = 100mV_{P,P})}$	—	1.0	1.3		4
Chroma Input Dynamic Range	Q_{CIN}	8	On	On	Off	a	b	On	$v_S = 100mV_{P,P} \rightarrow 800mV_{P,P}$	500	600	—	$mV_{P,P}$	4
Uni Color Control Range (1) Uni Color SW On	Δ_{ecu1N}	8	On	On	Off	a	b	On	$V_C = 4 \sim 10V, V_S = 10V$ $v_S = 120mV_{P,P}$ (B:C=1:1) $\Delta_{QCU_P} = 20 \log \frac{v_b (V_C = 10V)}{v_b (V_C = 4V)}$	40	—	—	dB	4
Uni Color Control Range (2) (SW. Off)	Δ_{QCU2N}	8	On	On	Off	a	b	Off	Same as above	—	0	—	dB	4
Uni Color Control Phase Shift	$\Delta\theta_{UN}$	8	On	On	Off	a	b	On	$V_C = 4V \sim 10V, V_S = 10V$ $v_S = 120mV_{P,P}$ (B:C=1:1)	—	—	5	deg	4
Residual Color	Q_{CKN}	3	On	On	Off	a	b	On	$V_C = 0V, V_S = 0V$ $v_S = 120mV_{P,P}$ (B:C=1:1)	—	—	3	$mV_{P,P}$	4

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_C = 10V$, $V_S = 10V$, SW_{36} : On, SW_{10} : Off, SW_{4A} : On, SN_{4B} : On)

Chroma (5) NTSC

Characteristic	Symbol	Test Pin	SW						Test Conditions	Specification			Unit	Test CCT	
			41	7	9	12	15	20		Min.	Typ.	Max.			
Color Control Phase Shift	$\Delta\theta_{CCN}$	8	On	On	Off	a	b	On	$V_C = 10V$, $V_S = 2 \sim 10V$ $V_5 = 120mV_{P-P}$ (B:C=1:1)	—	3	7	deg	4	
Burst-Chroma Phase Difference	$\Delta\theta_{bCN}$	8 10	On	On	Off	a	b	On		—	60	—	deg	4	
Tint Control Range	$\Delta\theta_{bH14}$	10	On	On	On	a	b	On	$V_C = 10V$, $V_T = 2 \sim 10V$ $V_5 = 120mV_{P-P}$ (B:C = 1:1)	f=4.43MHz	75	95	110	deg	4
										f=3.58MHz	100	120	140		
Tint Control Phase Distraction	$\Delta\theta_{bH2N}$	10	On	On	On	a	b	On	$V_C = 10V$, $V_5 = 120mV_{P-P}$ (B:C = 1:1) V_7 : Open	f=4.43MHz	34	47	62	deg	4
										f=3.58MHz	45	60	80		
Killer Det Sensitivity	g_{KN}	8	Off	On	Off	a	a	On	$V_5 = 100mV_{P-P}$	15	30	75	mV_{P-P}	4	
APC Pull-in Range	f_{PN}	13	Off	Off	Off	a	a	On	$V_5 = 100mV_{P-P}$	± 300	± 500	—	Hz	4	
Phase Det. Sensitivity	μ_N	16 18	Off	Off	Off	a	c	On	$V_5 = 100mV_{P-P}$	—	25	—	mV/deg	4	
Control Sensitivity	β_N	13 16 18	Off	Off	Off	a	a	On	$V_5 = 100mV_{P-P}$	—	2.2	—	Hz/mV	4	

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified; $V_C = 10V$, $V_S = 10V$, SW_{36} : On, SW_{10} : Off, SW_{4A} : On, SW_{4B} : On)

Chroma (6) NTSC

Characteristic	Symbol	Test Pin	Test Conditions						Specification			Unit	Test CCT	
			SW 41	SW 7	SW 9	SW 12	SW 15	SW 20	Min	Typ	Max			
Color Difference Output Voltage	qOR_N	21	On	On	Off	a	a	On	v_{17} : 100mV _{p-p} 4.443618MHz CW: 4.433618MHz	3.0	4.1	5.3	V_{p-p}	4
	qOG_N	20								1.0	1.6	2.2		
	qOB_N	22								3.0	4.1	5.3		
Max. Color Differential Output Voltage	$qCRM_N$	21	On	On	Off	a	a	On	v_{17} : 500mV _{p-p} 4.443618MHz CW: 4.433618MHz	4.5	5.5	—	V_{p-p}	4
	$qCGM_N$	20								1.4	1.8	—		
	$qCBM_N$	22								4.5	5.5	—		
Relative Amplitude	R-Y/B-Y _N	21/22	On	On	Off	a	a	On	v_{17} : 100mV _{p-p} 4.443618MHz CW: 4.433618MHz	0.88	1.00	1.11	—	4
	G-Y/B-Y _N	20/22								0.28	0.38	0.48		
Relative Phase	$\theta R-Y_N$	21/22	On	On	Off	a	a	On	Same as above	—	105	—	deg	4
	$\theta G-Y_N$	20/22								—	235	—		
Residual Carrier	$qrcR_N$	21	On	On	Off	a	a	On		—	—	300	mV _{p-p}	4
	$qrcG_N$	20												
	$qrcB_N$	22												
Demodulator Bandwidth	f_{BR_N}	21	On	On	Off	a	a	On	v_{17} : 100mV _{p-p} 10KHz~5MHz	1.1	2.1	3.2	MHz	4
	f_{BG_N}	20												
	f_{BB_N}	22												
Demo. Output DC Voltage	E_{OR_N}	21	Off	Off	Off	a	b	On		6.8	7.4	8.0	V	1
	E_{OG_N}	20												
	E_{OB_N}	22												
Demo. Output DC Voltage Difference	$E_o (R-G)_N$	21	Off	Off	Off	a	b	On		-0.3	0	0.3	V	1
	$E_o (G-B)_N$	20												
	$E_o (B-G)_N$	22												
Demo. Output DC Voltage Therm. Co. Eff.	ΔE_{OR_N}	21	Off	Off	Off	a	b	On	$T_a = -20 \sim +65^\circ C$	-3	0	2	mV/°C	1
	ΔE_{OG_N}	20												
	ΔE_{OB_N}	22												
Demo. Output Diff. Voltage Therm. Co. Eff.	ΔE_{OR-GN}	21	Off	Off	Off	a	b	On	$T_a = -20 \sim +65^\circ C$	-2	0	2	mV/°C	1
	ΔE_{OR-BN}	20												
	ΔE_{OB-GN}	22												

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, SW₂₄, SW₂₇, SW₂₈, Off, SW₂₉; a)

Horizontal Section (1)

Characteristic	Symbol	Test Pin						Test Conditions	Specification			Unit	Test CCT
			SW 34	SW 35	SW 36	SW 37	SW 32		Min.	Typ.	Max.		
Horizontal Regulated Voltage	V ₃₃	33	—	—	—	—			7.4	8.2	9.0	V	1
Recommendable Supply Current	I ₃₃	33							22	26	30	mA	5
Horizontal Free Running Frequency	f _H	34	Off	Off	Off	b	a	V _H = 4V	15.125	15.625	16.125	kHz	5
f _H Thermal Drift	Δf _{HT}	34	Off	Off	Off	b	a	V _H = 4V T _a = -20°C ~ +60°C	-90	70	230	Hz	5
AFC Clamping Voltage	V _{CL}	35	—	—	—	—	a	SW ₁ : a SW ₂ : a	3.9	4.5	5.1	V	1
AFC Sink Current	I _{IN35}	35	—	—	—	—	a	SW ₁ : 1 SW ₂ : b	2.7	3.7	5.0	mA	1
AFC Source Current	I _{O35}	35	—	—	—	—	a	SW ₁ : a SW ₂ : b	2.7	4.0	5.0	mA	1
Horiz. Drive Residual Voltage	V _{OL32}	32	Off	Off	Off	b	a	V _H = 4V Saturation Voltage of #32	—	—	0.3	V	5
Horiz. Output Pulse Duty	T _{O32}	32	Off	Off	Off	b	a	V _H = 4V T _{O32} = Duty cycle of H period.	45	50	55	%	5
Horiz. Osc. Starting Voltage	V _{33START}	33	Off	Off	Off	b	a	V _B : Variable Measure #33 which provides Δ50% duty Output to #32	—	—	4.0	V	5
4V Supply Current	I _{33START}	33	Off	Off	Off	b	a	V _B = 4V Measure I ₃₃	4.6	6.7	8.8	mA	5
AFC Pull-in Range	Δf _H PULL	32 37	On	On	Off	a ↓ b	a	V _H : Variable Observe #32 and #37 wave form. S ₃₇ a → b, Measure the frequency difference.	—	±900	—	Hz	5
AFC Hold Range	Δf _H HOLD	32 37	On	On	Off	a ↓ b	a	Same as above	—	±1800	—	Hz	5

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, SW₂₄, SW₂₇, SW₂₈, Off, SW₂₉; a)**Horizontal Section (2)**

Characteristic	Symbol	Test Pin						Test Conditions	Specification			Unit	Test CCT
			SW 34	SW 35	SW 36	SW 37	SW 32		Min.	Typ.	Max.		
AFC Voltage Sensitivity	β_H	32	Off	Off	Off	b	a	Set V_H so that f_H will be 15.75 KHz. Then, change V_A 4V ~5V, Measure f_H difference.	—	1900	—	Hz/V	5
X-ray protector Voltage Sensitivity	V_{IN30}	30	Off	Off	Off	b	a	Apply variable DC voltage to #30 (V_{30}). Measure V_{30} and I_{30} when #32 output disappears.	0.75	0.93	1.1	V	5
X-ray protector Current Sensitivity	I_{IN30}	30	Off	Off	Off	b	a		0.05	0.18	1.0	μ A	5
H. Drive Output Excess Voltage Protector Current Sens.	I_{IN32}	32	Off	Off	Off	b	b	Apply variable DC voltage to #32 Measure V_{32} and I_{32} just before V_{32} goes down.	0.05	0.18	1.0	μ A	5
Excess Voltage Protector Voltage Sens.	V_{IN32}	32	Off	Off	Off	b	b		7.1	8.6	9.5	V	5

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, SW₂₄, SW₂₇, SW₂₈, Off, SW₂₉: a)

Vertical Section

Characteristic	Symbol	Test Pin					Test Conditions	Specification			Unit	Test CCT
			SW 24	SW 26	SW 28	SW 29		Min.	Typ.	Max.		
Vertical Frequency	f_v	27	Off	Off	Off	c		47	50	54.1	Hz	5
Retrace Time	T_r	27	Off	Off	Off	c	H period of #27 output pulse	450	690	850	μ sec	5
f_v Pull-in Range	$\Delta f_{v\text{ PULL}}$	27	Off	Off	On Off	b	Set f_v to 50Hz at SW ₂₈ Off; $f_{\text{OSC } 28}$ Measure f_v at SW ₂₈ On; $f_{\text{OSC } 28}$ $\Delta f_{v\text{ PULL}} = f_{\text{OSC } 28} - f_{\text{OSC } 28}$	9.0	10.0	11.0	Hz	5
Term. 27 Max. Output Voltage	V_{O27}	27	—	—	—	—	SW ₂₈ ; On SW ₄ ; Off	7.7	8.5	9.2	V	1
Term. 27 Max. Output Current	I_{O27}	27	—	—	—	—	SW ₂₈ ; On SW ₄ ; On	15	27	50	mA	1
Max. Common Mode Input Voltage	V_{IH26}	26	On	On	Off	a	$V_{27} = 6 \rightarrow 12V$	11.9	—	—	V	5
Min. Common Mode Input Voltage	V_{IL26}	26	On	On	Off	a	$V_{27} = 6 \rightarrow 0V$	—	2.8	3.7	V	5
Term. 27 Input Current	I_{I27}	27	On	On	Off	a	$V_{27} = 6V$	0.25	1.0	4.5	μ A	5
Term. 26 Input Current	I_{I26}	26	On	On	Off	a	$V_{27} = 6V$	0.18	1.0	6.3	μ A	5
Max. Drive Output Voltage	V_{OH24}	24	Off	On	Off	d		7.3	8.0	8.7	V	5
Min. Drive Output Voltage	V_{OL24}	24	Off	Off	Off	d		—	—	0.3	V	5
Term. 25 Bias Voltage	V_{25}	25	—	—	—	—	$I_{25} = -0.2mA$	3.7	3.9	4.1	V	5
f_v Thermal Drift	Δf_{vT}	27	Off	Off	Off	c	$T_a = -20^\circ C \sim +60^\circ C$	-1.0	—	2.0	Hz	5

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, SW₂₄, SW₂₇, SW₂₈, Off, SW₂₉: a)**SYNC. Separator**

Characteristic	Symbol	Test Pin	Test Conditions				Test Conditions	Specification			Unit	Test CCT
			SW 34	SW 35	SW 36	SW 37		Min.	Typ.	Max.		
Sync. Separator Current Sensitivity	I _{IN37}	36 37	Off	Off	Off	c	Measure #37 input current when V ₃₆ goes L level to H.	18	35	113	μA	5
Sync. Output H Level	V _{OH36}	36	Off	Off	Off	c	V _S = 2V Measure V ₃₆	7.0	8.2	9.4	V	5
Sync. Output L Level	V _{OL36}	36	Off	Off	Off	b	Measure V ₃₆	0	0.2	1.0	V	5
Gate Pulse H Level	V _{OH38}	38	Off	Off	Off	b	V _D = 12V, V ₃₆ = 5V Measure V ₃₈	4.5	5.3	6.1	V	5
Gate Pulse L Level	V _{OL38}	38	Off	Off	Off	b	V _O = 12V Measure V ₃₈	—	1.6	—	V	5
H Pulse Threshold	V _{38ON}	38	Off	Off	Off	b	V _D : Variable 0 → 2V Measure V _D when V ₃₈ goes H to L.	0.7	1	1.5	V	5

KA2154 PAL (SECAM)NTSC TYPICAL APPLICATION CIRCUIT

