

MITSUBISHI ICs (VCR)  
**M52944FP**

**AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR**

**DESCRIPTION**

The M52944FP is a semiconductor integrated circuit with a built-in color sensor developed for automatic white balance control of a video camera. R control voltage and B control voltage are switched to output by a logic input signal.

**FEATURES**

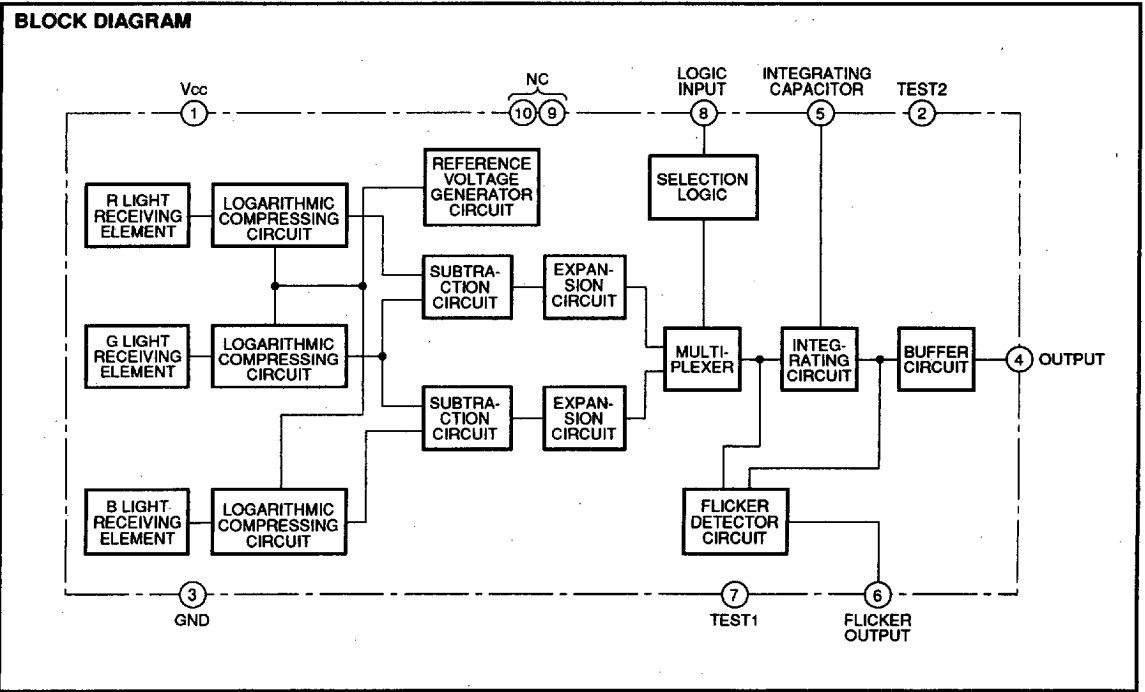
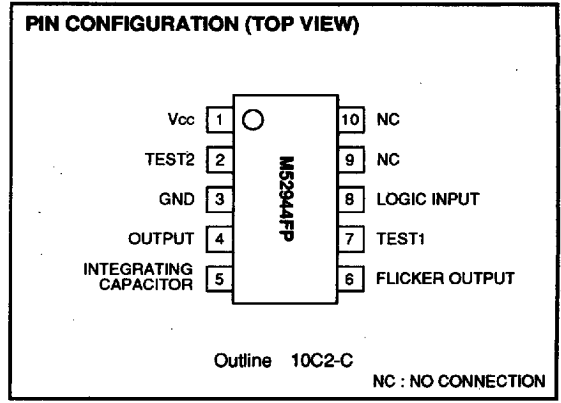
- On-chip RGB color sensor
- Wide operating illumination range (1 x to 100,000 x)
- Temperature compensating output voltage
- 10-pin transparent mold SOP package

**APPLICATION**

Video camera

**RECOMMENDED OPERATING CONDITION**

Supply voltage range.....2.5 to 5.5V  
 Rated supply voltage.....3.0V



6249826 0023042 75T



**AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR**

**ABSOLUTE MAXIMUM RATINGS** (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>cc</sub>	Supply voltage		7.0	V
P <sub>d</sub>	Power dissipation		180	mW
K <sub>θ</sub>	Thermal derating	Ta ≥ 25°C	3.0	mW/°C
T <sub>opr</sub>	Operating temperature		-20 to +60	°C
T <sub>stg</sub>	Storage temperature		-30 to +85	°C
V <sub>i</sub>	Pin applied voltage	Except V <sub>cc</sub> and GND pins	-0.3 to V <sub>cc</sub> +0.3	V

**ELECTRICAL CHARACTERISTICS** (Ta=25°C, V<sub>cc</sub>=3.0V, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>cc</sub>	Circuit current		—	4.0	6.7	mA
V <sub>R/G</sub>	R/G output voltage	When setting gain at input of 3000K light	0.7	1.0	1.4	V
V <sub>B/G</sub>	B/G output voltage	When setting gain at input of 3000K light	0.6	0.9	1.3	V
V <sub>R/GG1</sub>	R/G output voltage color temperature gain (1)	V4 (light 1) - V4 (light 2)	0.24	0.35	0.5	V
V <sub>B/GG1</sub>	B/G output voltage color temperature gain (1)	V4 (light 2) - V4 (light 1)	0.28	0.4	0.6	V
V <sub>R/GG2</sub>	R/G output voltage color temperature gain (2)	V (light 2) - V (light 3) V <sub>R/GG1</sub>	0.15	0.3	0.45	—
V <sub>R/GG2</sub>	B/G output voltage color temperature gain (2)	V (light 3) - V (light 2) V <sub>B/GG1</sub>	0.3	0.6	0.9	—
ΔV <sub>R/G(1)</sub>	R/G output voltage illumination variance (1)	V4 (light 5) - V4 (light 4) V4 (light 1) - V4 (light 3)	-0.1	—	0.1	—
ΔV <sub>B/G(1)</sub>	B/G output voltage illumination variance (1)	V4 (light 5) - V4 (light 4) V4 (light 3) - V4 (light 1)	-0.1	—	0.1	—
ΔV <sub>R/G(2)</sub>	R/G output voltage illumination variance (2)	V4 (light 6) - V4 (light 1) V4 (light 1) - V4 (light 3)	-0.1	—	0.1	—
ΔV <sub>B/G(2)</sub>	B/G output voltage illumination variance (2)	V4 (light 6) - V4 (light 1) V4 (light 3) - V4 (light 1)	-0.1	—	0.1	—
V <sub>ⓄL</sub>	"L" voltage at Pin ⑥		—	—	0.3	V
V <sub>ⓄH</sub>	"H" voltage at Pin ⑥		2.7	—	—	V
R <sub>Ⓞ</sub>	Output resistance at Pin ⑤		11	16	21	kΩ
R <sub>P</sub>	Input resistance at Pin ④		30	100	300	kΩ
ΔV <sub>ⓄL</sub>	Load characteristic at Pin ④	I <sub>L</sub> ④ = ±50 μA	-20	—	20	mV

**PIN SETTING CONDITION**

Pin No.	Pin Name	Pin Setting Condition	Setting mode	Remarks
⑧	Logic input	H (≥0.9V <sub>cc</sub> )	R/G output selection	Output selection pin
		L (≤0.1V <sub>cc</sub> )	B/G output selection	

**OPERATION OF FLICKER DETECTOR**

Rectangular waves synchronous with flickers in photometry are produced at the output terminal of the flicker detector.

■ 6249826 0023043 696 ■

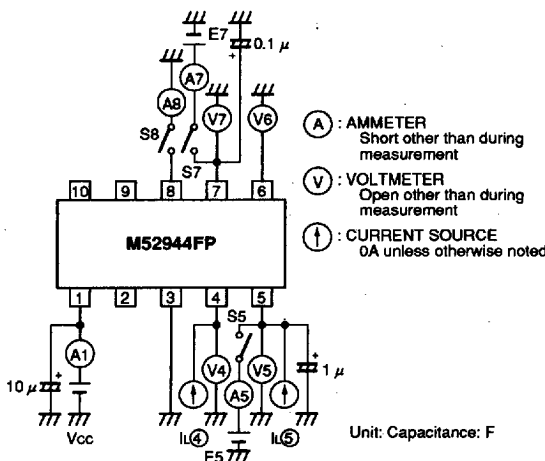


AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR

TEST CONDITIONS

Symbol	Test point	Input light condition	Supply conditions			SW conditions			Test description
			Vcc (V)	E5 (V)	E7 (V)	S8	S5	S7	
Icc	A1	Light 0	3.0	—	—	OFF	OFF	OFF	Measure pin ① current.
V <sub>R/G</sub>	V4	Light 1	3.0	—	—	OFF	OFF	OFF	Measure pin ④ voltage.
V <sub>B/G</sub>	V4	Light 1	3.0	—	—	ON	OFF	OFF	Measure pin ④ voltage.
V <sub>R/G</sub> G1	V4	Light 1, 2	3.0	—	—	OFF	OFF	OFF	Calculate from a measured value of pin ④ voltage. $V_{④}(\text{light 1}) - V_{④}(\text{light 2})$
V <sub>B/G</sub> G1	V4	Light 1, 2	3.0	—	—	ON	OFF	OFF	Calculate from a measured value of pin ④ voltage. $V_{④}(\text{light 1}) - V_{④}(\text{light 2})$
V <sub>R/G</sub> G2	V4	Light 1, 2, 3	3.0	—	—	OFF	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 2}) - V_{④}(\text{light 3})) / (V_{④}(\text{light 1}) - V_{④}(\text{light 2}))$
V <sub>B/G</sub> G2	V4	Light 1, 2, 3	3.0	—	—	ON	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 3}) - V_{④}(\text{light 2})) / (V_{④}(\text{light 2}) - V_{④}(\text{light 1}))$
V <sub>R/G</sub> (1)	V4	Light 1, 3, 4, 5	3.0	—	—	OFF	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 5}) - V_{④}(\text{light 4})) / (V_{④}(\text{light 1}) - V_{④}(\text{light 3}))$
V <sub>B/G</sub> (1)	V4	Light 1, 3, 4, 5	3.0	—	—	ON	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 5}) - V_{④}(\text{light 4})) / (V_{④}(\text{light 3}) - V_{④}(\text{light 1}))$
V <sub>R/G</sub> (2)	V4	Light 1, 3, 6	3.0	—	—	OFF	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 6}) - V_{④}(\text{light 1})) / (V_{④}(\text{light 1}) - V_{④}(\text{light 3}))$
V <sub>B/G</sub> (2)	V4	Light 1, 3, 6	3.0	—	—	ON	OFF	OFF	Calculate from a measured value of pin ④ voltage. $(V_{④}(\text{light 6}) - V_{④}(\text{light 1})) / (V_{④}(\text{light 3}) - V_{④}(\text{light 1}))$
V <sub>⑥</sub> L	V6	Light 1	3.0	—	—	OFF	OFF	OFF	Measure pin ⑥ voltage.
V <sub>⑥</sub> H	V6	Light 1	3.0	V <sub>⑥</sub>	V <sub>⑦</sub> - 0.1	OFF	ON	ON	Measure pin ⑥ voltage. Apply pin ⑥ output voltage to pin ⑥. Apply pin ⑦ output voltage -0.1V to pin ⑦.
R <sub>o</sub> ③	A5	Light 0	3.0	—	—	OFF	ON	OFF	
R <sub>p</sub> ③	A8	Light 0	3.0	—	—	ON	OFF	OFF	Measure pin ③ current. 3V/ I <sub>③</sub>
ΔV <sub>④</sub> L	V4	Light 5	3.0	—	—	OFF	OFF	OFF	Measure pin ④ voltage. $V_{④}(I_{④} \pm 50 \mu A) - V_{④}(I_{④} \pm 0 \mu A)$

TEST CIRCUIT



6249826 0023044 522



**AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR**

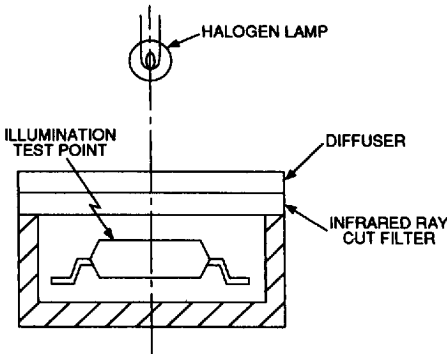
**INCIDENT LIGHT SETTING CONDITIONS**

(The surface of package should be defined as an illumination test point).

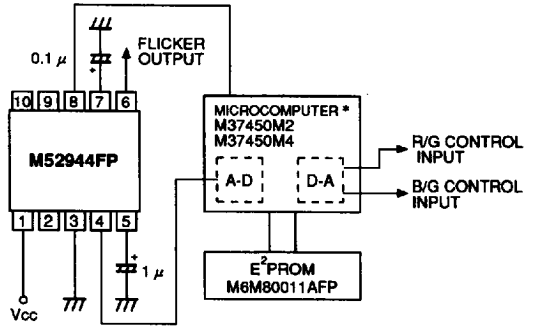
Light condition No.	Light condition on sample surface	
	Illuminator (lx)	Color temperature (K)
0	0.1 or less	—
1	Equivalent to about 1000	Equivalent to about 3000
2		Equivalent to about 5000
3		Equivalent to about 7000
4	Equivalent to about 10	Equivalent to about 3000
5	Equivalent to about 100	
6	Equivalent to about 10000	

Satisfy the following three parameters and make light incident as follows:

- (1) Use a halogen lamp as a source of light so that light can get into the IC directly.
- (2) Put an infrared ray cut filter on the light path. Provide a shading screen around the IC so as to avoid the light which does not pass the infrared ray cut filter.
- (3) Put a diffuser on the light path to limit the uniformity of light incident on the receiving side to  $\pm 2\%$  or less.



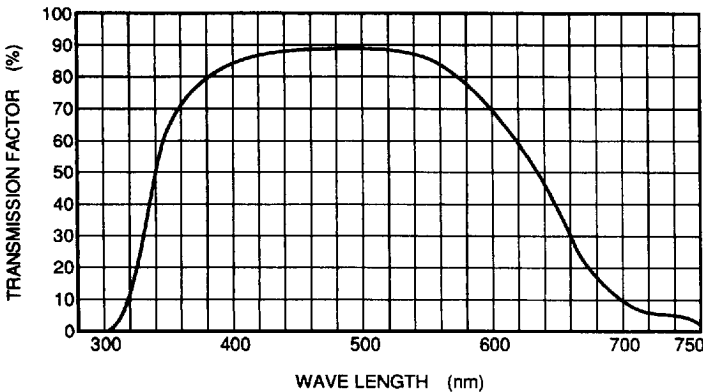
**APPLICATION EXAMPLE**



\* Part of system control microcomputer is used.

Unit: Capacitance: F

**EXAMPLE OF INFRARED RAY CUT FILTER TRANSMISSION CHARACTERISTIC (FILTER USED WHEN MEASURING TYPICAL CHARACTERISTICS)**

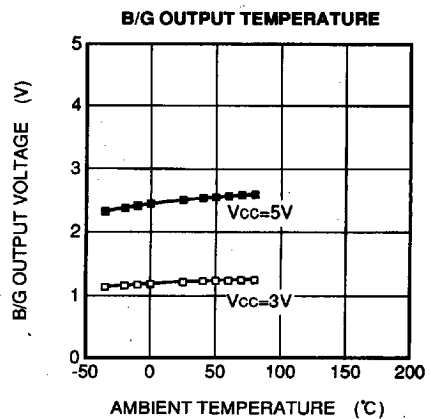
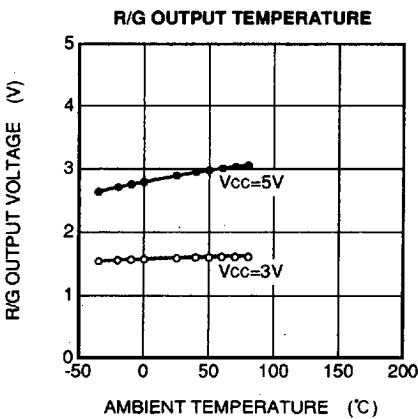
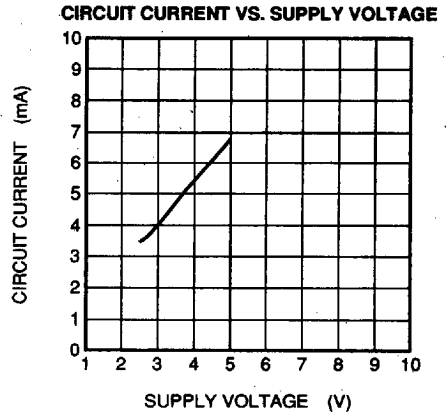
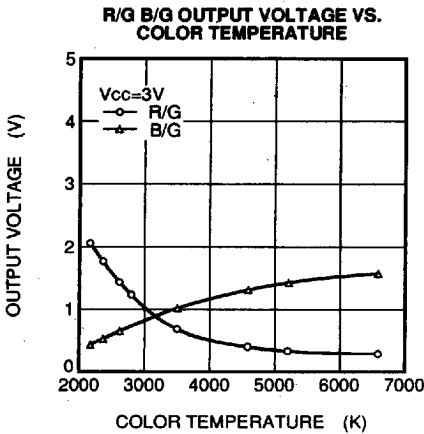
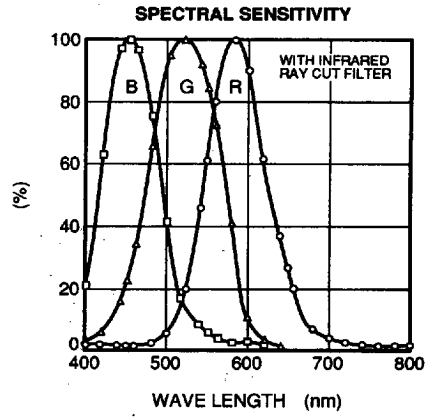
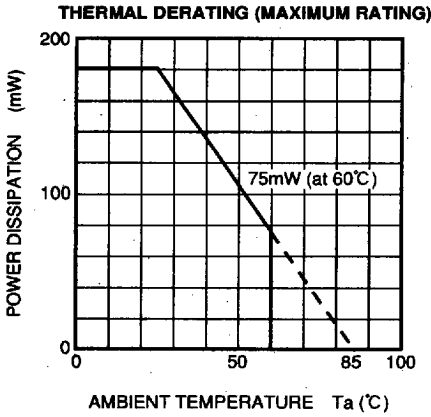


6249826 0023045 469



AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR

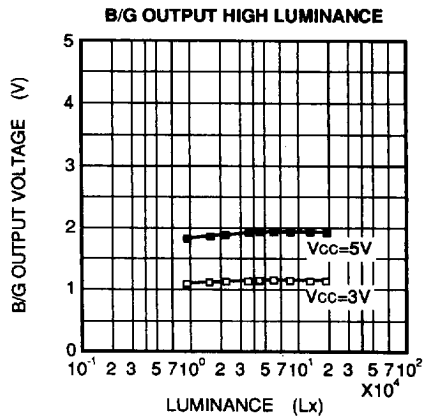
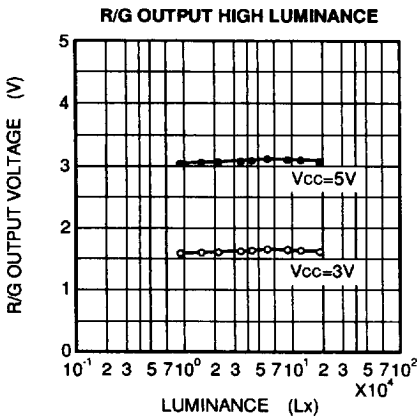
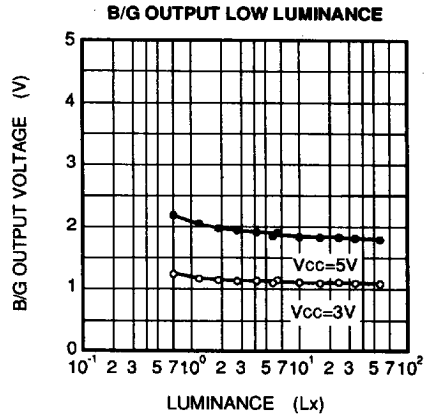
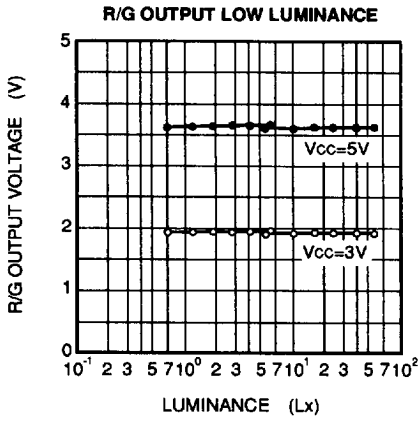
TYPICAL CHARACTERISTICS



6249826 0023046 3T5



AUTO WHITE BALANCE WITH BUILT-IN RGB SENSOR



6249826 0023047 231

