Ordering number : EN5675

Monolithic linear IC

LA7170M

RF Modulator for UHF Band (Supports SECAM)

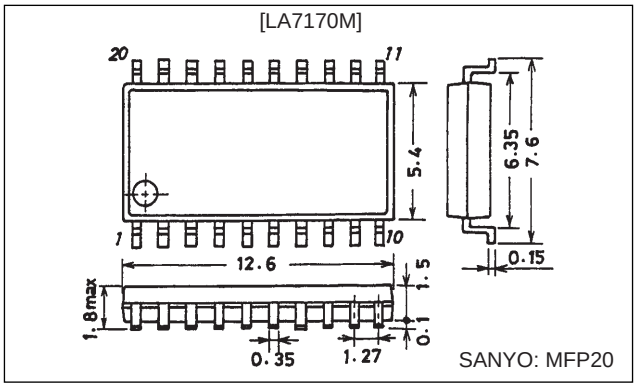
Overview

The LA7170M is a UHF band RF modulator whose built-in RF oscillator and mixer make it a single-chip RF modulator solution. It also supports image positivity modulation and AM sound modulation for SECAM systems.

Package Dimensions

unit: mm

3036B-MFP20



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7	V
Allowable power dissipation	Pd max	Ta ≤ 75°C	250	mW
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–55 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V_{CC}		5.0	V
Operating supply voltage range	V_{CC} op		4.5 to 5.5	V

Operating Characteristics at Ta = 25°C, V_{CC} = 5 V, Unless otherwise specified, fp = 591.25 MHz, fs = 5.5 MHz, S9: ON, S10: B, S19A: B, S19B: B

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain 1	$I_{CC}1$	With no input	24	30	36	mA
Regulator voltage	Vreq	With no input	3.7	3.9	4.1	V
[RF Output Level] (S19A: A, S19B: A)						
Picture carrier output	P	With no input, with 50 Ω terminator	77	79.5	82	dBμ
Sound carrier output ratio	P/S	Ratio of levels at fp and fp+fs	12.5	15	17.5	dB
Sound second harmonic distortion	P/S2	Ratio of levels at fp and fp+2fs	52	62		dB
Sound third harmonic distortion	P/S3	Ratio of levels at fp and fp+3fs	58	68		dB
Chrominance beat	P/CB	Ratio of P above to chrominance beat for V_{IN} = 0.4 Vp-p with 4.43-MHz sine wave input	65	75		dB
Picture harmonic distortion	P/V2	Ratio of P above to level at fp+2 MHz for V_{IN} = 1 Vp-p with 1-MHz sine wave input	50	62		dB

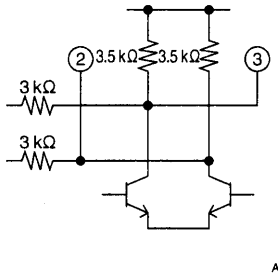
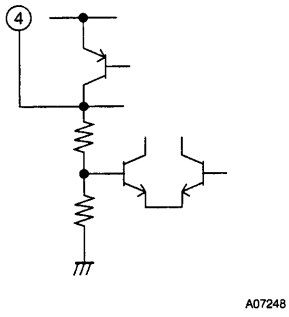
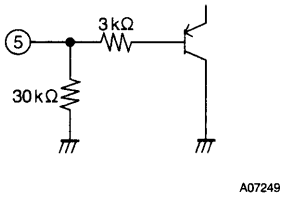
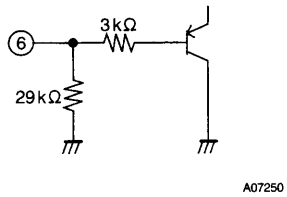
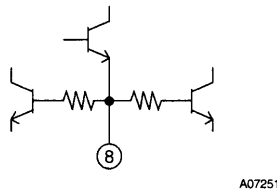
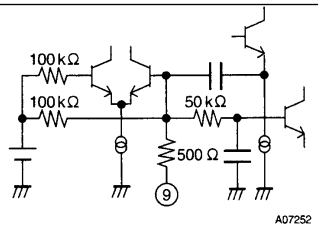
Continued on next page.

Continued from preceding page.

Parameter		Symbol	Conditions	Ratings			Unit
				min	typ	max	
[Picture]							
Picture modulation		mp	V_{IN} = 1 Vp-p, 100% white	73	80	87	%
Maximum picture modulation		mp max	V_{IN} = 1.5 Vp-p, 100% white	88	93	98	%
SYNC compression		Δ(S/V)	V_{IN} = 1 Vp-p, 100% white {1–(S/V)(3/7)} × 100		1.5	5	%
Differential gain		DG	V_{IN} : 5-stair step, mp = 80%, at fourth step		2	5	%
Differential phase		DP	V_{IN} : 5-stair step, mp = 80%, at fourth step	–6	0	+6	deg
SECAM picture modulation		mp SCM	V_{IN} = 1 Vp-p, 100% white S10 : a	88	93	98	%
TSG picture modulation		mp TSG	S9 : off	70	80	90	%
TSG SV ratio		V/S	S9 : off	6.3/3.7	6.8/3.2	7.3/2.7	
TSG horizontal period		TS	S9 : off	63.7	64.0	64.3	µs
TSG synchronization pulse width		HS	S9 : off	3.6	4.0	4.4	µs
TSG white signal width		HV	S9 : off	3.6	4.0	4.4	µs
TSG first white rising edge		TV1	S9 : off	22	24	26	µs
TSG second white rising edge		TV2	S9 : off	38	40	42	µs
[Sound]							
FM sound modulation	Rank A	ms FM	A_{IN} = 1.66 Vp-p with 1-kHz sine wave input; 100% modulation: ±50 kHz; S10: b Note: A_{IN} = 1 Vp-p normally produces 60% modulation.	73	81	89	%
	Rank B			81	90	99	%
	Rank C			90	100	110	%
	Rank D			99	110	121	%
	Rank E			109	121	133	%
Interchannel FM sound modulation ratio		Δms FM	ms FM ratio with S10: off	0.93	0.98	1.03	
FM sound distortion		THD FM	S10: b/off; A_{IN} = 1 V_{p-p} with 1-kHz sine wave input		0.3	1.0	%
FM sound signal-to-noise ratio		S/NFM	S10: b/off; V_{IN} = 1 Vp-p color bar; A_{IN} with 1-kHz sine wave input; ratio of level at A_{IN} = 1 Vp-p to that at A_{IN} = 0 Vp-p	43	55		dB
Maximum FM modulation		ms max	Maximum modulation possible with S10: b/off and sound distortion ratio within 3%	400			%
AM sound modulation		ms AM	S10: a; A_{IN} = 1 Vp-p with 1-kHz sine wave input	43	50	57	%
AM sound distortion ratio		THD AM	S10: a; A_{IN} = 1 Vp-p with 1-kHz sine wave input		0.5	2	%
AM sound signal-to-noise ratio		S/N AM	S10: a; V_{IN} = 1 Vp-p color bar; A_{IN} with 1-kHz sine wave input; ratio of level at A_{IN} = 1 Vp-p to that at A_{IN} = 0 Vp-p	42	47		dB

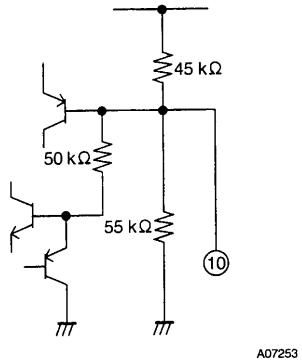
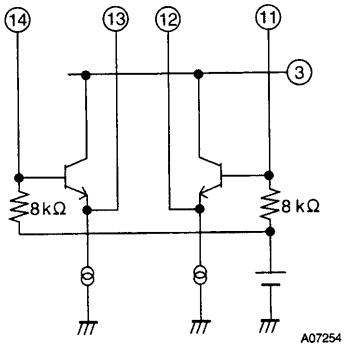
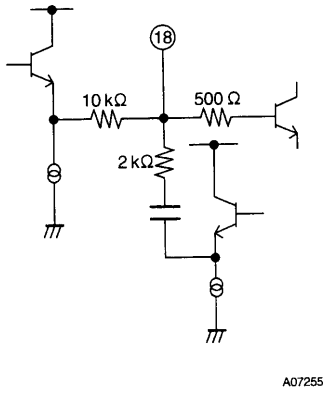
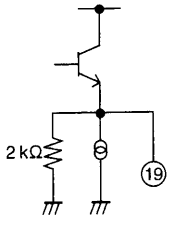
Note: The AM sound items refer to direct AM detection from the sound carrier (fp + sound intercarrier). This device requires the special care associated with all high-frequency devices.

Pin Functions

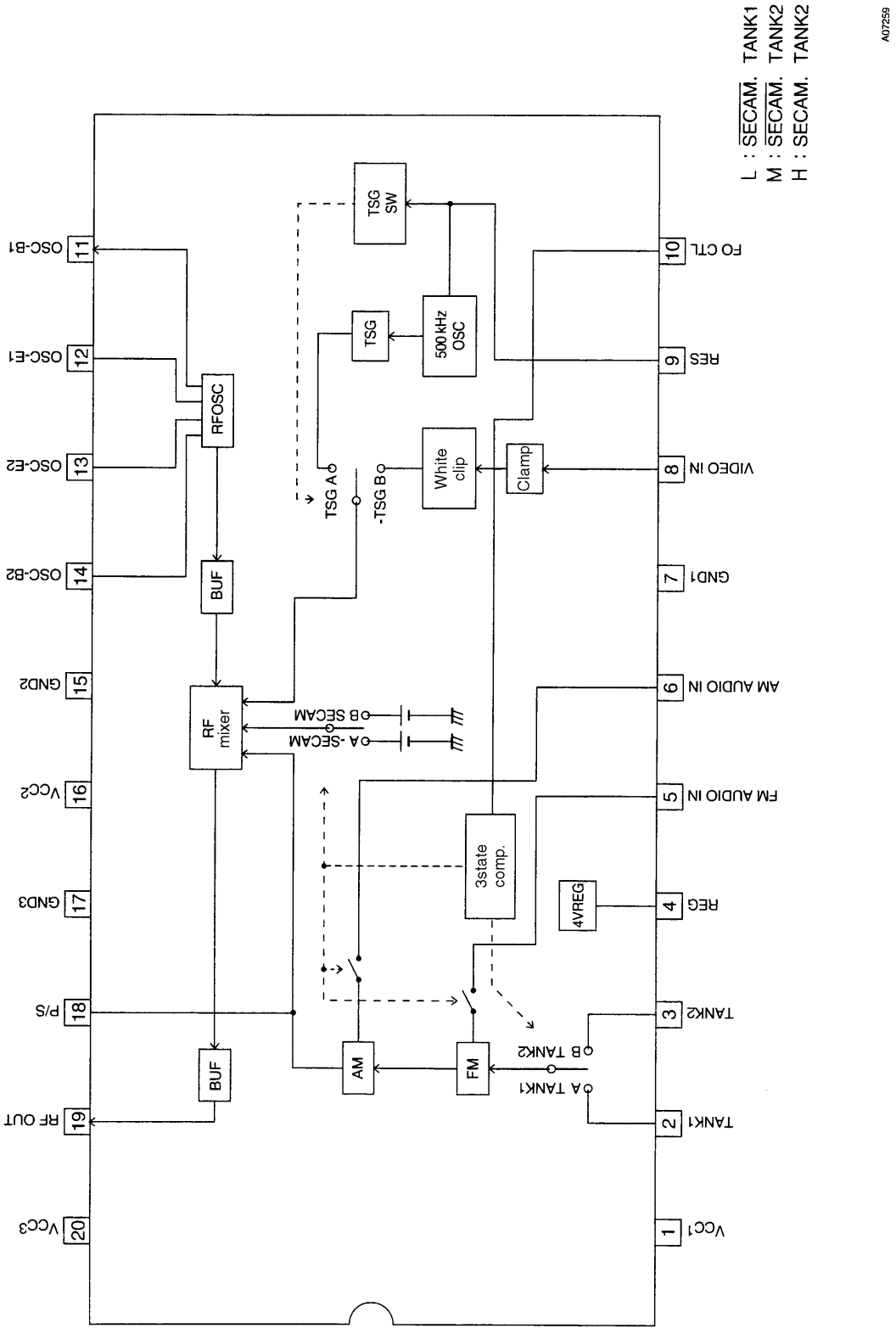
Pin No.	Symbol	Pin Voltage	Pin Description	Equivalent Circuit
1	$V_{CC}1$	5.0	V_{CC} for baseband circuits	
2 3	TANK1 TANK2	3.9	Connect tank circuits between these pins and the REG pin.	
4	REG	3.9	Regulator output	
5	FM AUDIO IN	0	FM sound input	
6	AM AUDIO IN	0	AM sound input	
7	GND1	0	Ground for baseband circuits	
8	VIDEO IN	3.0	Picture input. Clamp at SYNC tip.	
9	RES	2.6 (open)	Ground this pin through a 500-kHz oscillator. Open : TSG ON GND : TSG OFF	

Continued on next page.

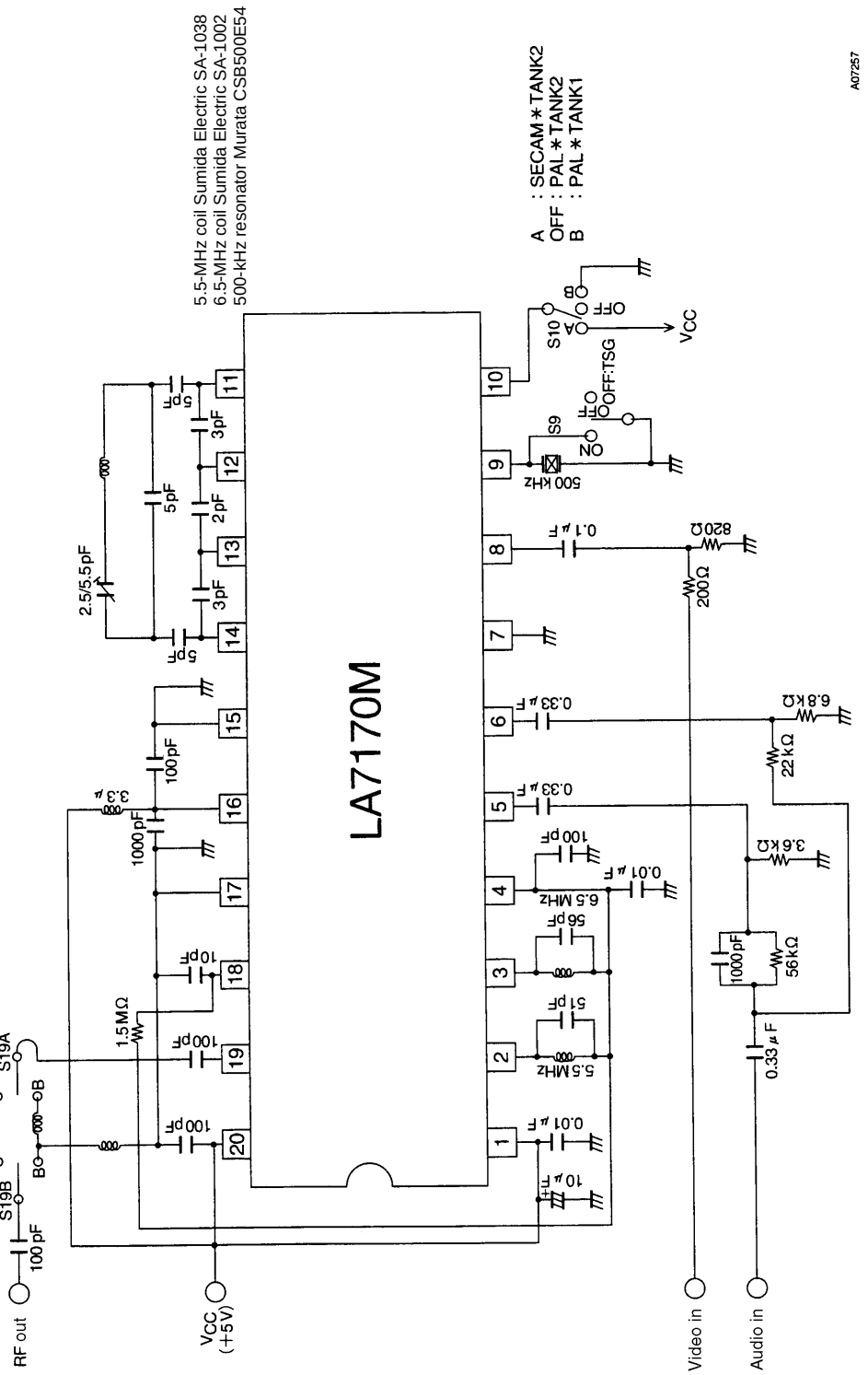
Continued from preceding page.

Pin No.	Symbol	Pin Voltage	Pin Description	Equivalent Circuit
10	FoCTL	2.6 (open)	L (0 to 1.5 V) : PAL-TANK1 M (2.1 to 3.2 V) : PAL-TANK2 H (3.8 to 5.0 V) : SECAM-TANK2	
11 12 13 14	OSC-B1 OSC-E1 OSC-E2 OSC-B2	2.5 1.8 1.8 2.5	This circuit forms a Colpitts oscillator.	
15	GND2	0	Ground for RF oscillator	
16	$V_{CC}2$	5.0	V_{CC} for RF oscillator	
17	GND3	0	V_{CC} for RF mixer	
18	P/S	1.7	Grounding this pin through a capacitor or resistor attenuates the sound intercarrier level.	
19	RF OUT	3.0	RF mixer signal output	
20	$V_{CC}3$	5.0	V_{CC} for RF mixer	

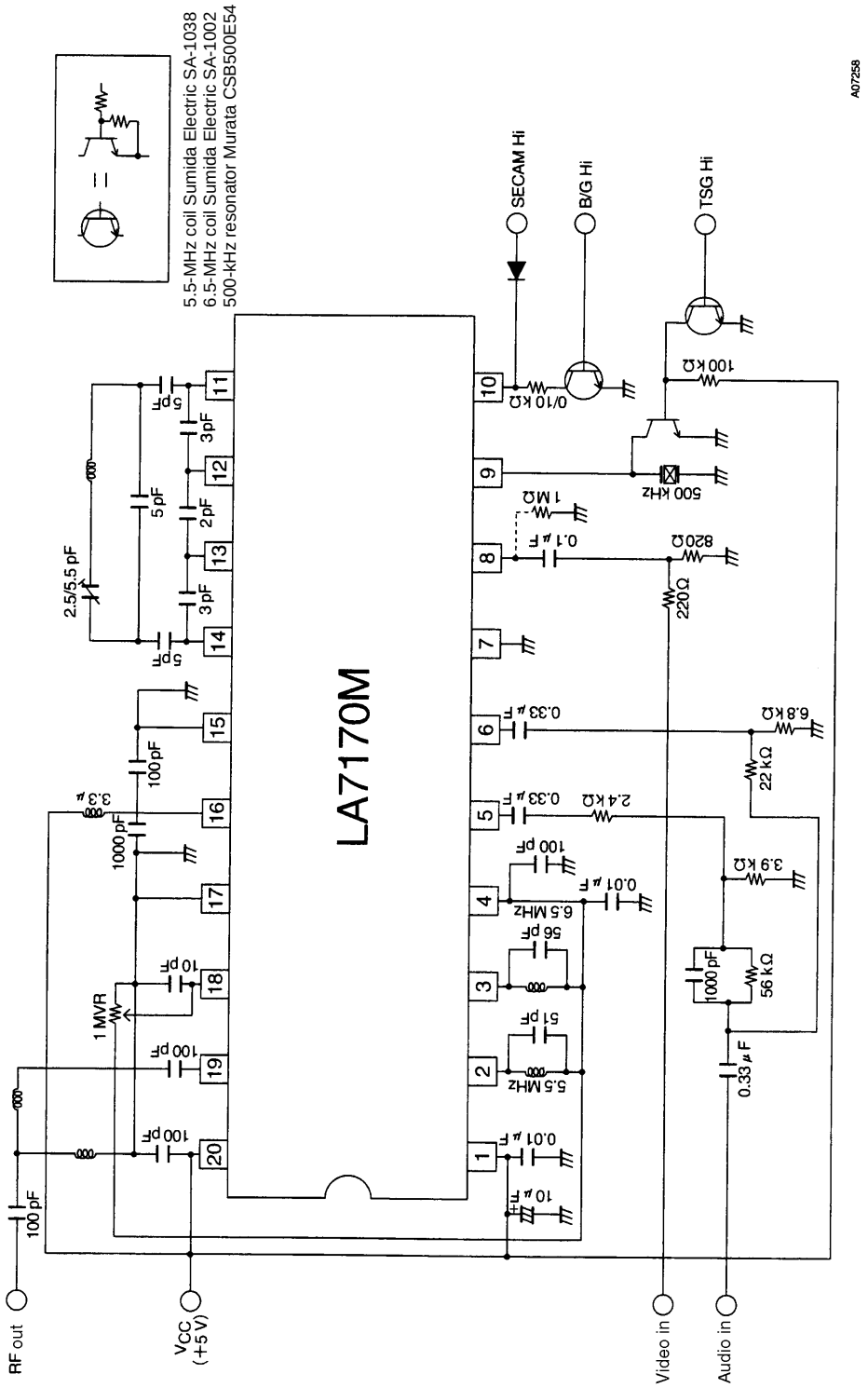
Block Diagram



Test Circuit



Sample Application Circuit



■ No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.

■ Anyone purchasing any products described or contained herein for an above-mentioned use shall:
① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.

■ Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of April, 1998. Specifications and information herein are subject to change without notice.