

UHF-Band RF Modulator for VCR

Description

The CXA3219M is a UHF-band RF modulator which converts the frequency of audio and video signals. Some circuits which comprise this IC are a UHF oscillator video clamp, white clip, video modulator, audio FM modulator and an intercarrier SW.

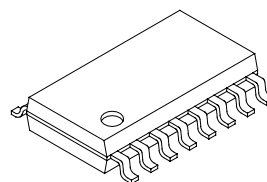
Features

- Low voltage of 5V
- Wide bandwidth 470 to 750MHz
- UHF oscillator greatly reduces external parts
- Sharp white clip circuit
- Built-in voltage regulator can accept large fluctuation of supply voltage
- Video input of 0.5Vp-p for general-purpose use
- Mixer simplifies RF unit design
- Picture/sound ratio is adjustable with external parts
- Intercarrier switch

Structure

Bipolar silicon monolithic IC

16 pin SOP (Plastic)



Applications

PAL system VCR

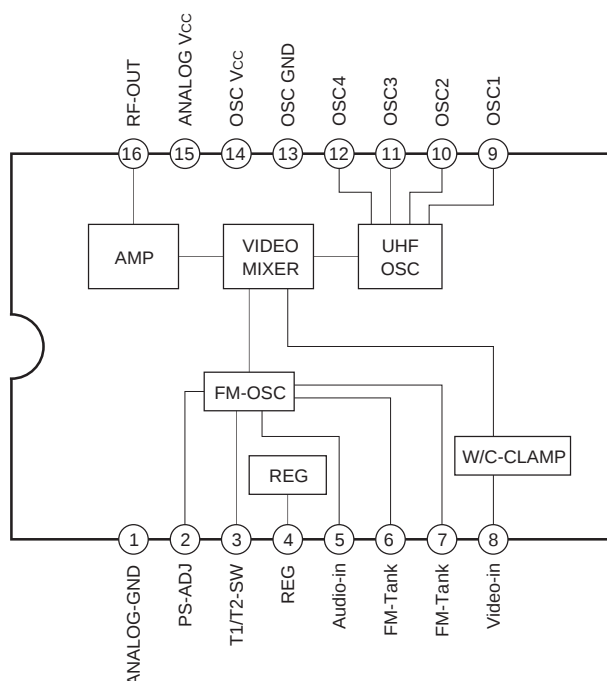
Absolute Maximum Ratings

• Supply voltage	V _{CC}	7	V
• Operating temperature	T _{opr}	−20 to +75	°C
• Storage temperature	T _{stg}	−55 to +150	°C
• Allowable power dissipation	P _D	350	mW

Recommended Supply Voltage Range

Supply voltage	V _{CC}	5.0 ± 0.5	V
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Block Diagram and Pin Configuration



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Pin Description and Equivalent Circuit

Pin No.	Symbol	Typical pin voltage [V]	Equivalent circuit	Description
1	GND1			GND for RF/audio.
2	P/S ADJ	1.8		P/S adjustment (Adding a capacitor between Pin 2 and GND increases P/S ratio.) Video modulation depth adjustment (Adding a resistor between Pin 2 and GND increases the modulation depth; adding a resistor between Pins 2 and 4 decreases the modulation depth.)
3	T1/T2 SW	2.4		T1/T2 SW. T1 for GND. T2 for OPEN.
4	REG OUT	4.1		Regulator output.
5	AUDIO IN	0		Audio input.
6	TANK1	3.1		5.5MHz audio tank coil connection.

Pin No.	Symbol	Typical pin voltage [V]	Equivalent circuit	Description
7	TANK2	2.9		6.0MHz audio tank coil connection.
8	VIDEO IN	2.6		Video input.
9 10 11 12	OSC1 OSC2 OSC3 OSC4	2.5 1.7 1.7 2.5		Oscillator pin.
13	GND2			GND for oscillator.
14	Vcc1			Power supply for oscillator.
15	Vcc2			Power supply for RF/audio.
16	RF OUT	4.1		RF output.

Electrical Characteristics 1

Refer to Electrical Characteristics Test Circuit. (Ta = 25°C, Vcc = 5V, fP = 591.25MHz)

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit
Supply current	I _{cc}	V ₁ (VIDEO IN) and V ₂ (AUDIO IN) at no signal		22	28	35	mA
Video output level	V _o	*1		78.7	81.2	83.7	dBμV
Video modulation depth	mp	V ₁ = 0.5Vp-p, FLAT FIELD signal input		72	78.5	86	%
Max. video modulation depth (During limiter operation)	mp (Max.)	V ₁ = 1.0Vp-p, FLAT FIELD signal input		92	95.5	99	%
Chroma beat	V _{cb}	V ₁ = 4.43MHz, 0.5Vp-p sine wave input*5		68	78	—	dB
Sync crush level	ΔSync	V ₁ = 0.5Vp-p, FLAT FIELD signal input ΔSync = (1 – S/W · 10/4) × 100		—	2	5	%
Differential gain	DG	STAIR STEP signal input V ₁ = 0.5Vp-p*2		0	1.6	5	%
Differential phase	DP	STAIR STEP signal input V ₁ = 0.5Vp-p*2		–5	0	5	deg
Video 2nd-harmonic wave ratio	V _{VH}	V ₁ = 0.5Vp-p, 1MHz sine wave input*3		48	52.5	—	dB
PS ratio	V _{ps}	V ₁ = no input, fs = 5.5MHz		11.5	14	16.5	dB
Audio FM modulation sensitivity	βS1 (T1)	V ₂ = 100mVp-p, 1kHz sine wave input	fs = 5.5MHz	0.400	0.420	0.455	kHz/mV
	βS2 (T2)	fs frequency change/0.1V*6	fs = 6.0MHz	0.380	0.400	0.440	
Audio distortion	THD	V ₂ = 1kHz sine wave input*4		0	0.4	1	%
Audio S/N ratio	ASN	V ₂ = 1kHz sine wave input 0dB at fs = 5.5MHz with 60kHz deviation V ₁ = STAIR STEP signal input (rms measurement)		45	54	—	dB
Max. audio FM modulation depth	ms (Max.)	V ₂ = 1Vp-p, 1kHz sine wave input (T1) fs frequency change (kHz)/100kHz × 100		380	415	—	%
Audio 2nd-harmonic wave ratio	V _{s2}	Difference between video carrier (V ₁ = no input) and 2nd-harmonic wave, at PS ratio of 14dB conversion		52	57	—	dB

Electrical Characteristics 2

1. Video S/N	50dB (min.), 58dB (typ.)
2. Video amplitude frequency characteristics (at 1MHz reference)	Within ± 1 dB at 0.5 to 5MHz
3. APL variation (Normalized to APL 50%)	Within $\pm 2\%$ at 10 to 90%
4. Pin 5 input impedance	1M Ω and above
5. Pin 8 input impedance	1M Ω and above

*1 Spectrum analyzer with 50 Ω input impedance should be used to test video output level. Measured value V_o (dBm) is used to calculate output according to the following relationship:

$$\text{Output (dB}\mu\text{)} = V_o \text{ (dBm)} + 107 \quad 50\Omega \text{ terminal direct reading value}$$

*2 Measured after demodulating by standard demodulator.

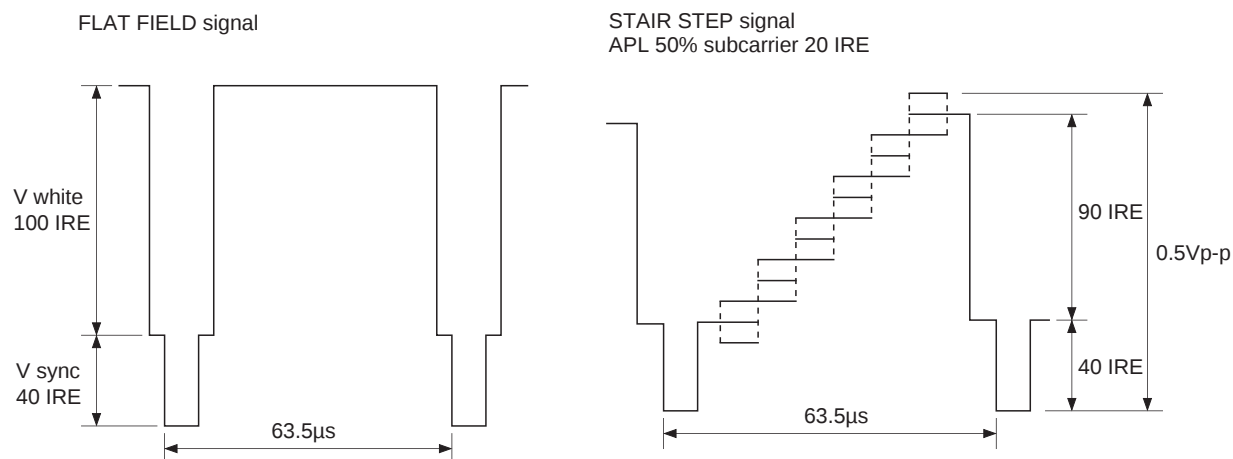
*3 $f_c + 2\text{MHz}$ component of V_1 carrier (f_c) level.

*4 Adjust the V_2 level to obtain an FM deviation of $\pm 30\text{kHz}$ and measure the harmonic distortion after demodulating V_o with a standard demodulator.

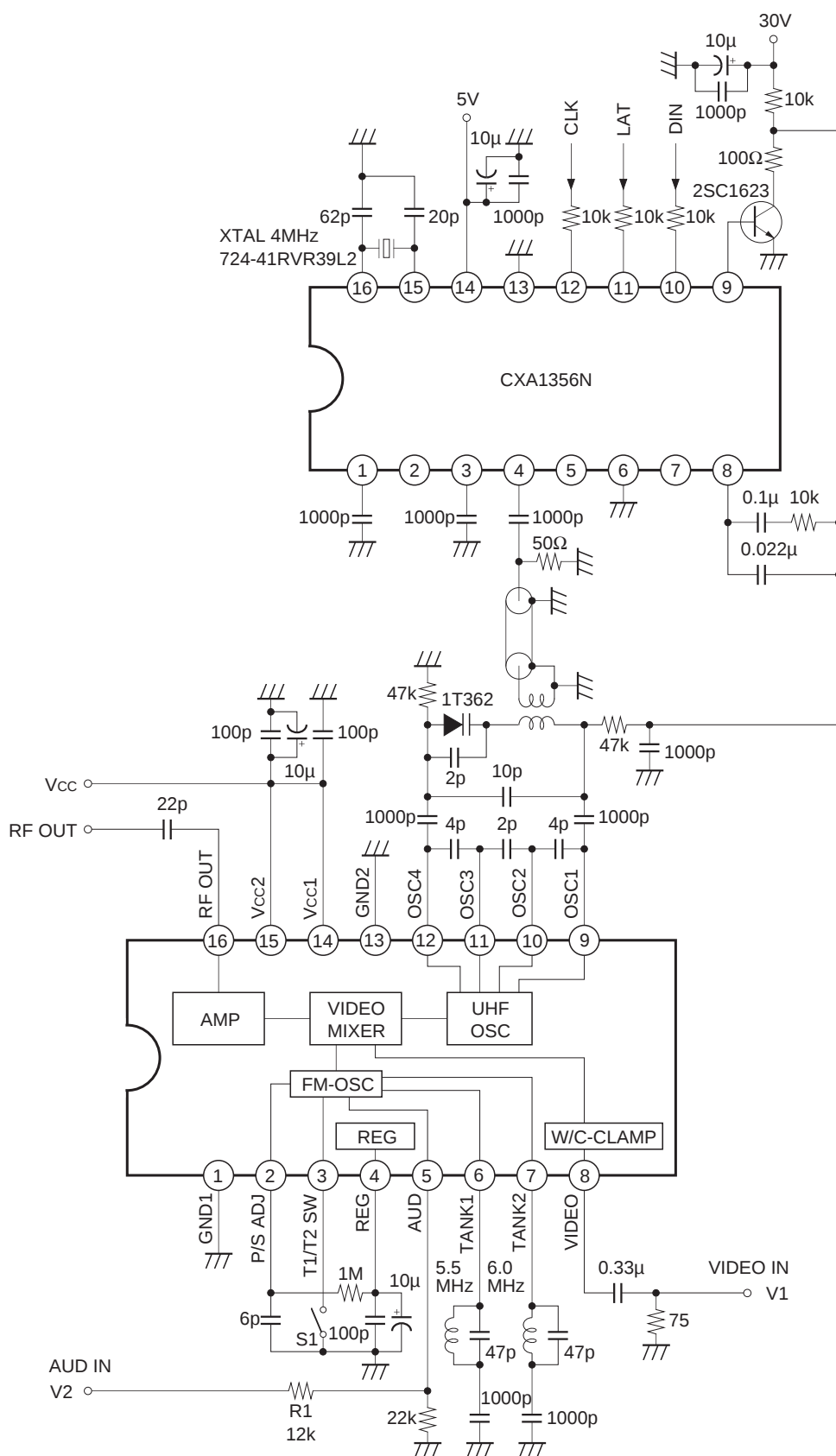
*5 Video determined by measuring ratio (dB) of chroma beat to video carrier level when $V_1 = \text{no signal}$ by spectrum analyzer.

*6 R1 (12k Ω) of the Electrical Characteristics Test Circuit is added for obtaining a better match between the audio modulation sensitivity classifications and the actual pre-emphasis.

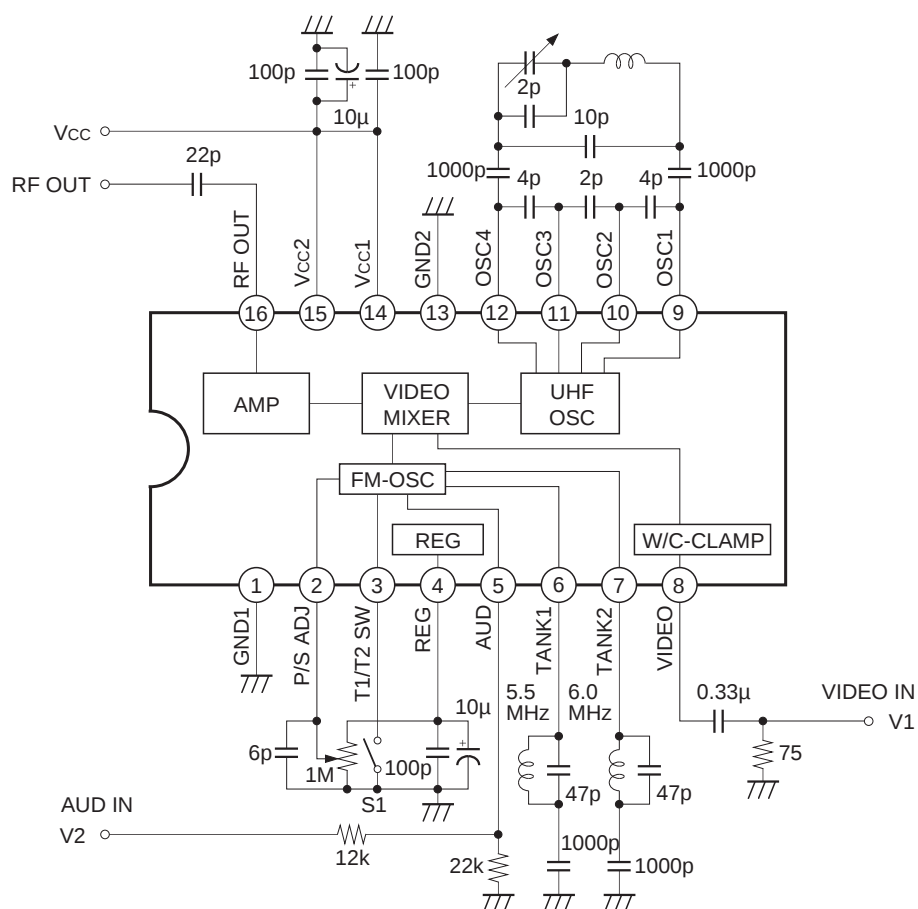
Input Waveform



Electrical Characteristics Test Circuit

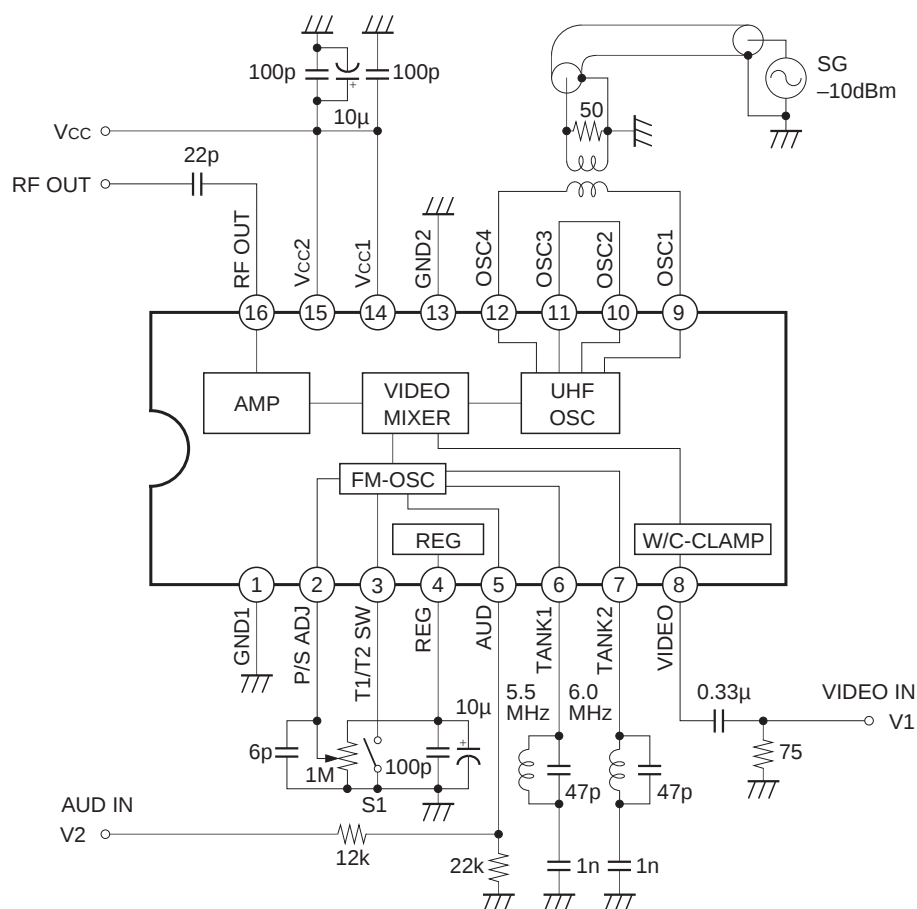


Application Circuit 1



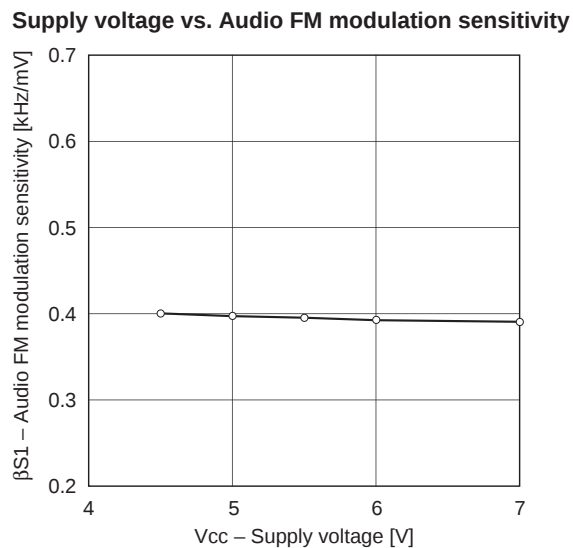
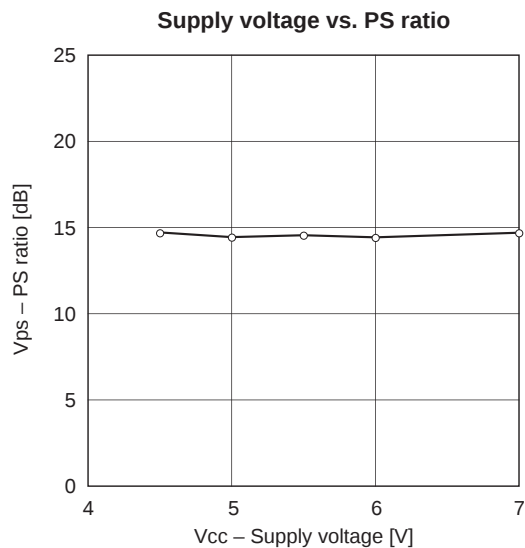
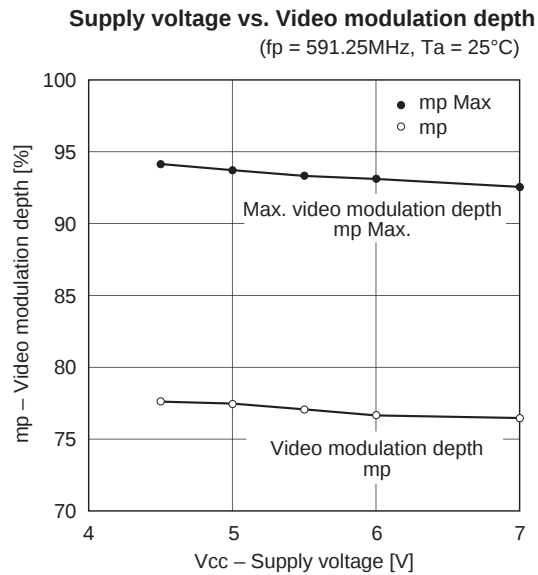
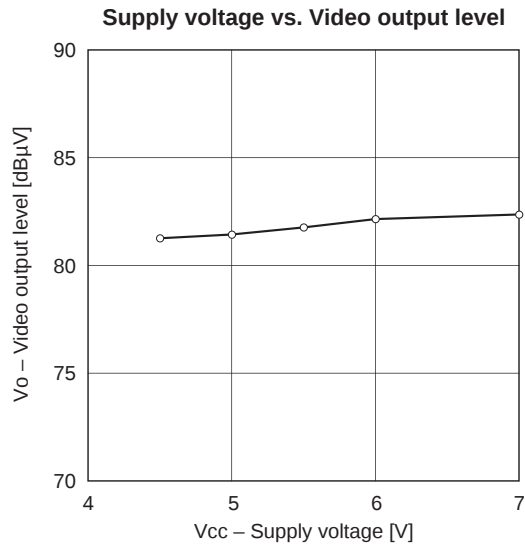
Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Application Circuit 2

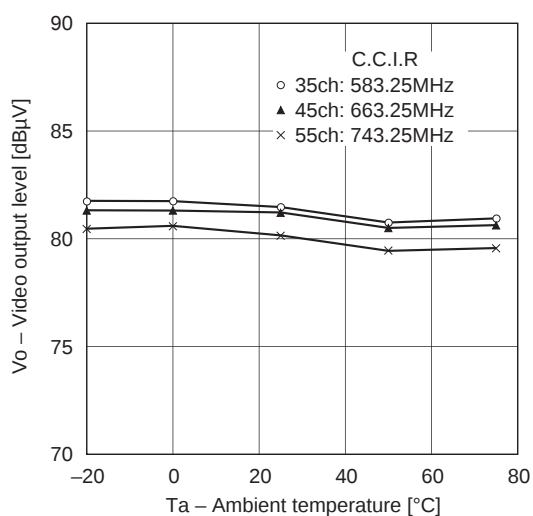


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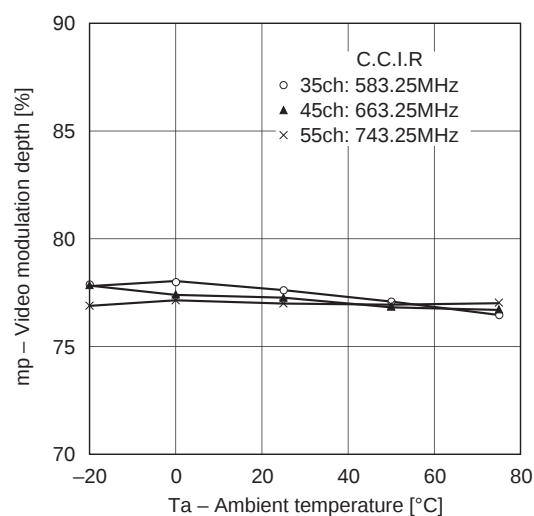
Example of Representative Characteristics



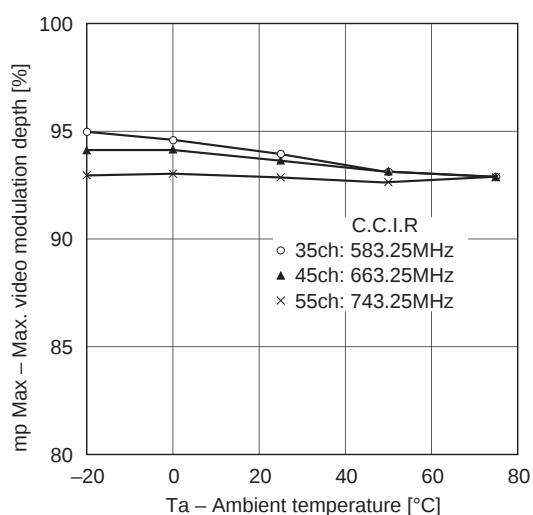
Ambient temperature vs. Video output level



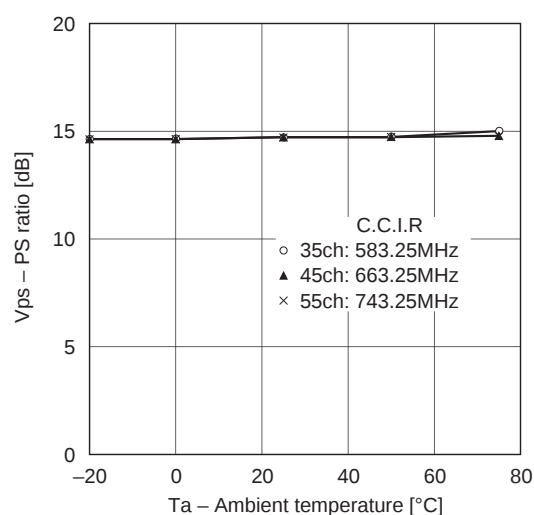
Ambient temperature vs. Video modulation depth



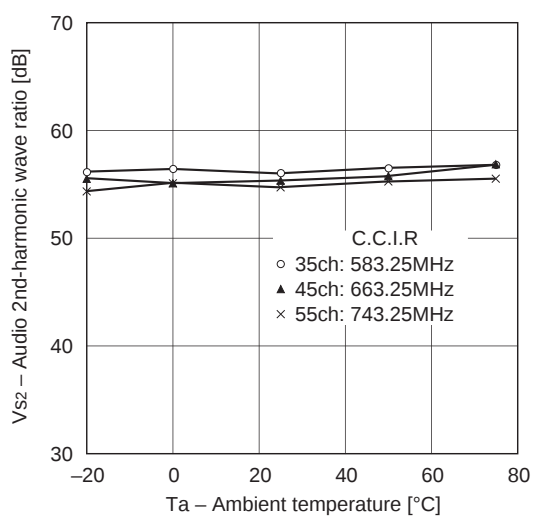
Ambient temperature vs. Max. video modulation dep



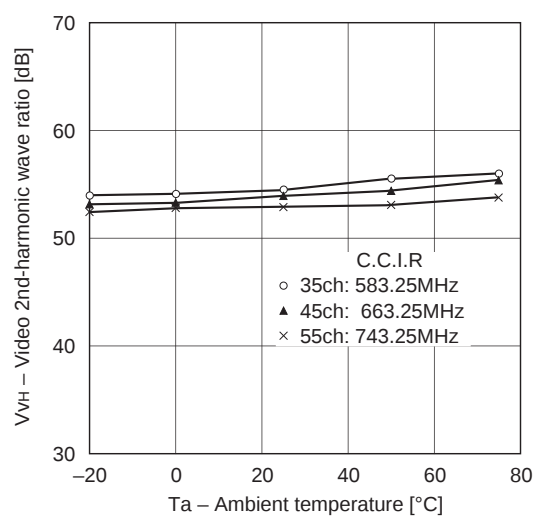
Ambient temperature vs. PS ratio



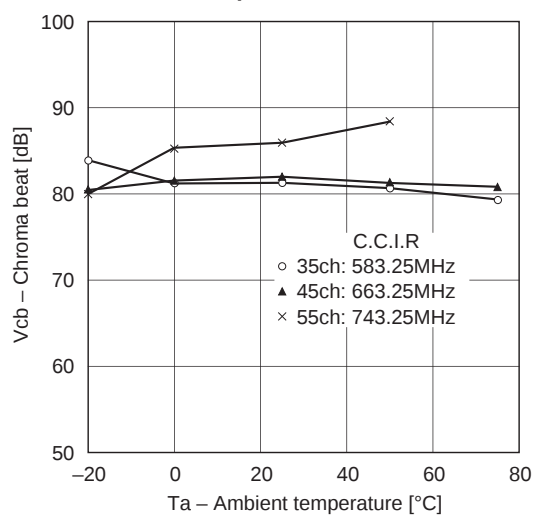
Ambient temperature vs. Audio 2nd-harmonic wave ratio



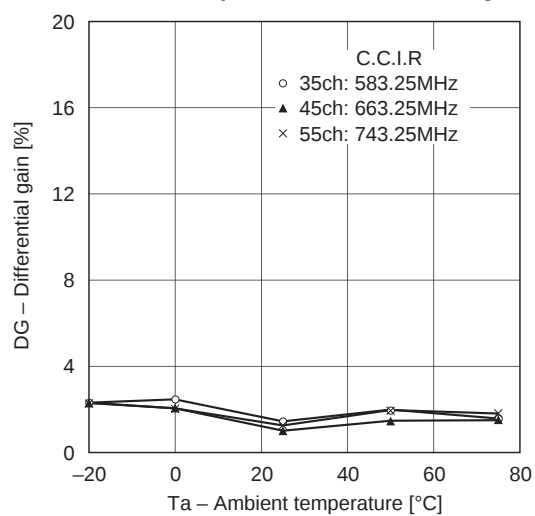
Ambient temperature vs. Video 2nd-harmonic wave ratio



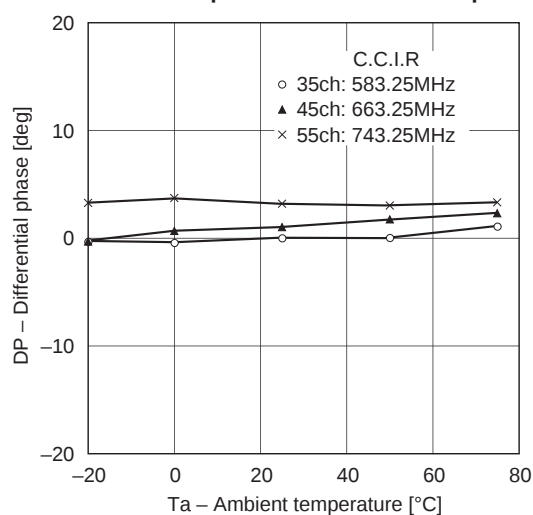
Ambient temperature vs. Chroma beat



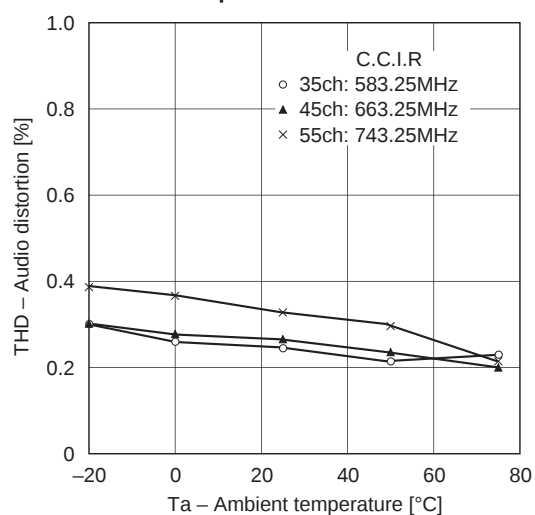
Ambient temperature vs. Differential gain



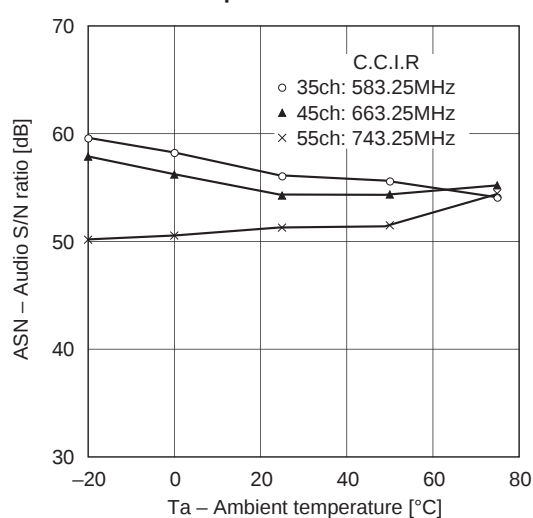
Ambient temperature vs. Differential phase



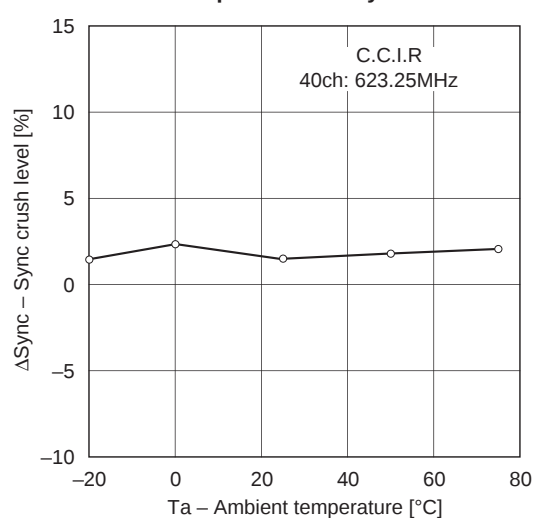
Ambient temperature vs. Audio distortion



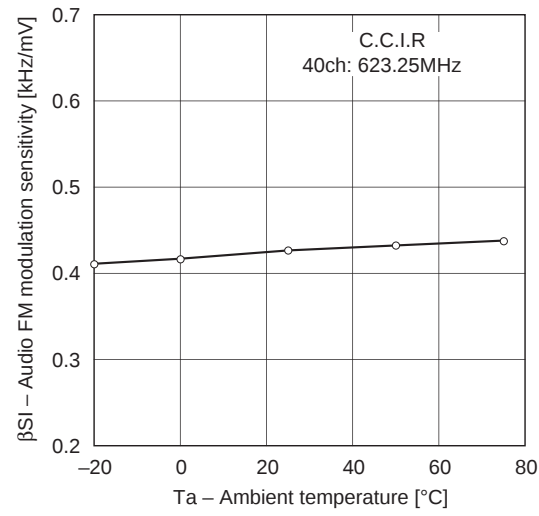
Ambient temperature vs. Audio S/N ratio



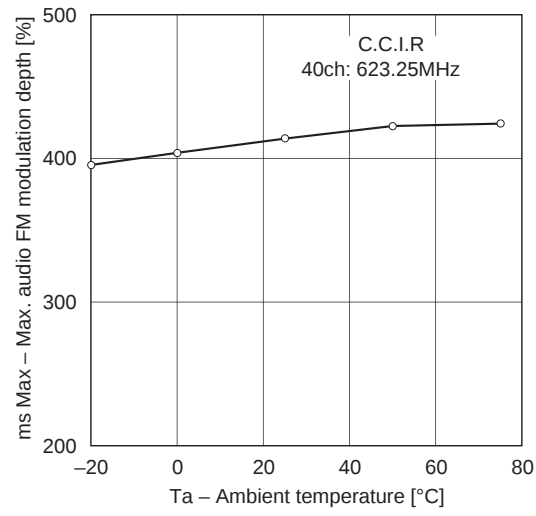
Ambient temperature vs. Sync crush level



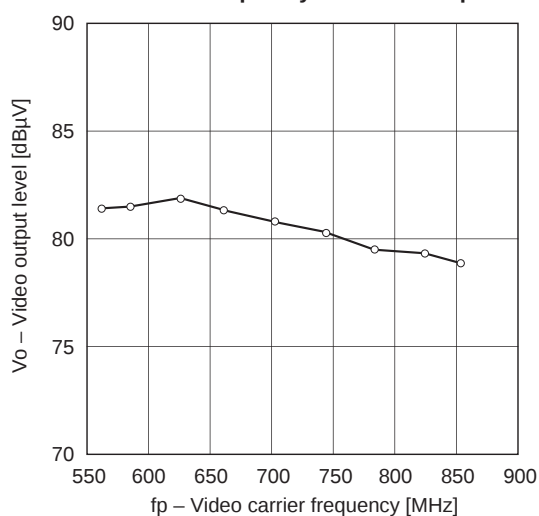
Ambient temperature vs. Audio FM modulation sensitivity



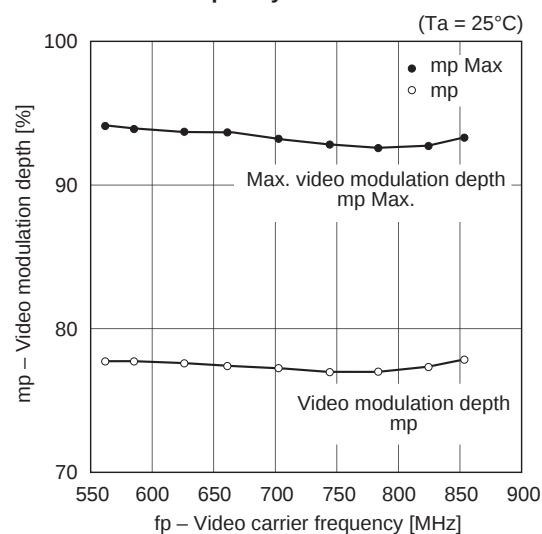
Ambient temperature vs. Max. audio FM modulation depth



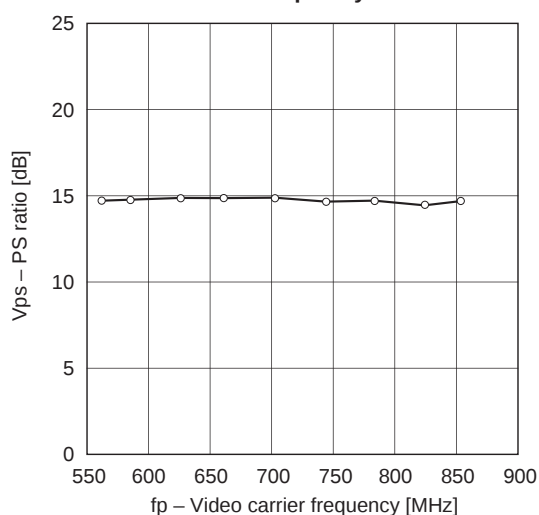
Video carrier frequency vs. Video output level



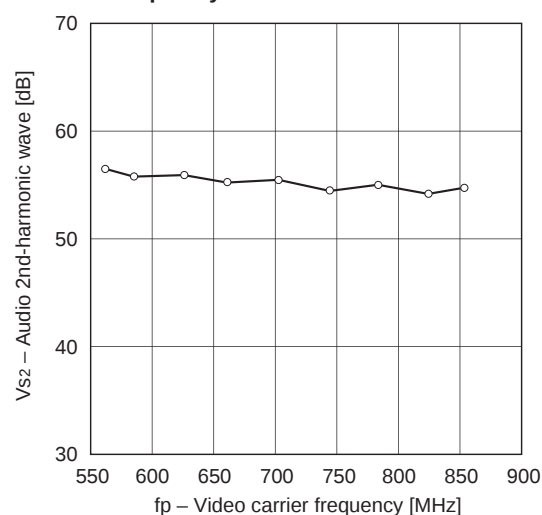
Video carrier frequency vs. Video modulation depth



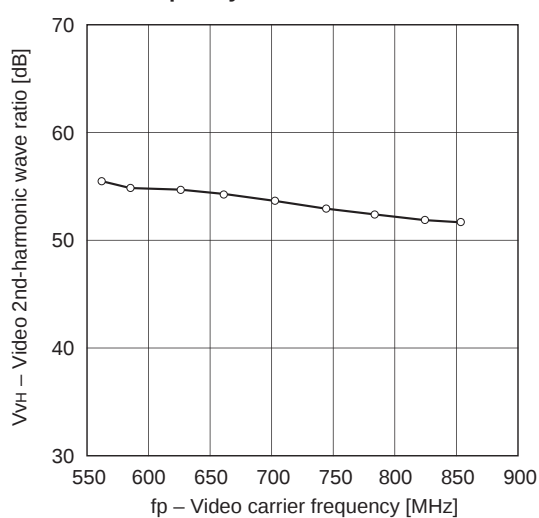
Video carrier frequency vs. PS ratio



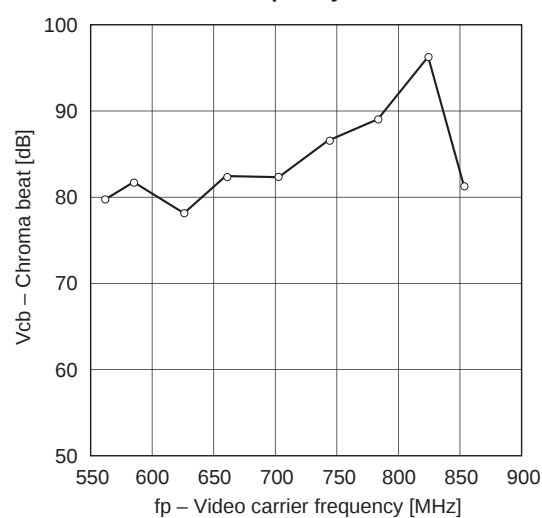
Video carrier frequency vs. Audio 2nd-harmonic wave ratio



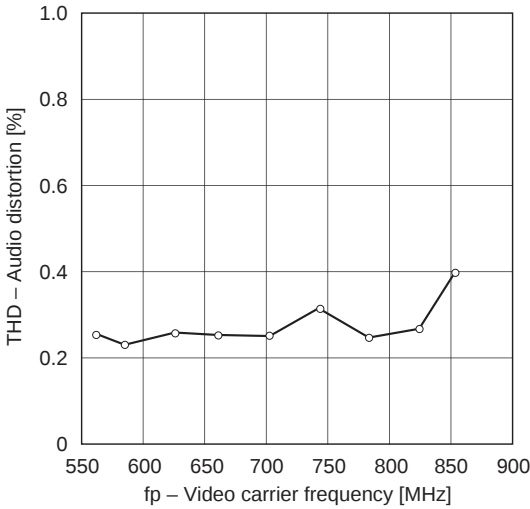
Video carrier frequency vs. Video 2nd-harmonic wave ratio



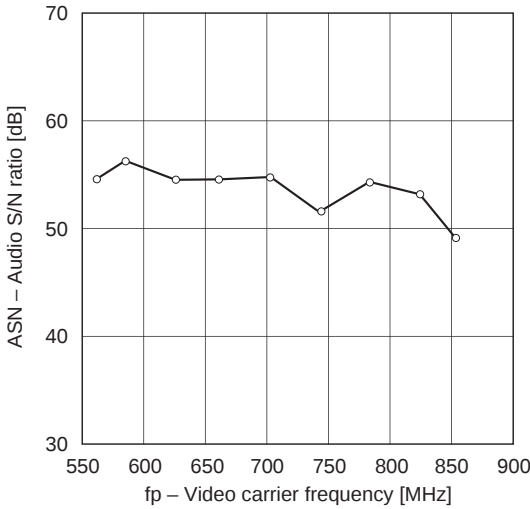
Video carrier frequency vs. Chroma beat



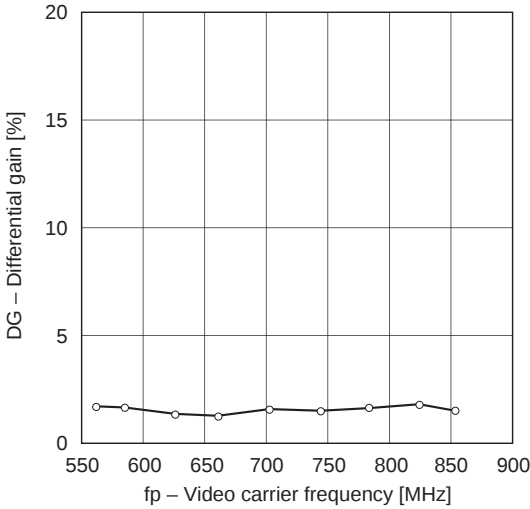
Video carrier frequency vs. Audio distortion



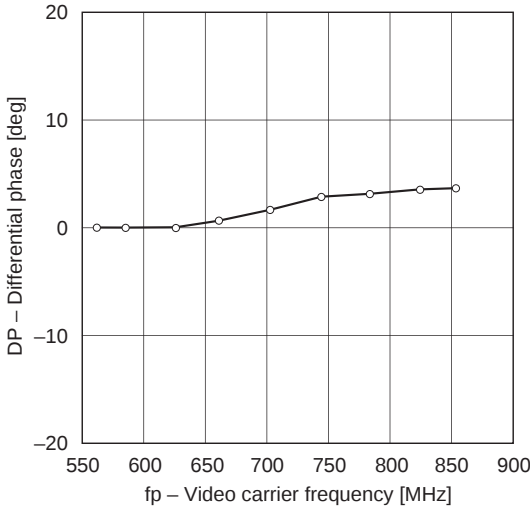
Video carrier frequency vs. Audio S/N ratio



Video carrier frequency vs. Differential gain



Video carrier frequency vs. Differential phase



Unit: mm

16PIN SOP (PLASTIC) 300mil



PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE WEIGHT	0.2g