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NTE7130

Integrated Circuit

IF Signal Processing (Super-Split PLL-II VIF + SIF)

Circuit for TVs & VCRs

Description:

The NTE7130 is a high tone quality and high picture quality, video IF and sound IF integrated circuit in a 24-Lead DIP type package. This device employs split processing of the video IF signal and sound IF signal using SAW filters and a PLL (Phase-Lock Loop) detector. Further, the PLL detector incorporates a buzz canceler for Nyquist buzz interference suppression to achieve high tone quality.

Features:

- Employs Split Processing for Wide Bandwidth Video Characteristics
- PLL Detector with Buzz Canceler for Excellent Buzz and Buzz Beat Characteristics
- Built-In APC Time Constant Switch
- Hih-Speed AGC Supports Double Time Constant Method
- SIF Carrier Level AGC in the 1st SIF Stage for Good SIF Weak Electric Field Characteristics
- Good Differential Gain and Phase Characteristics
- RF AGC Easily Adjusted using a Variable Resistor

Functions:

VIF Stage

- VIF Amplifier
- PLL Detector
- B/W Noise Canceler
- RF AGC
- VCO
- Equalizer Amplifier
- AFT
- APC Detector
- APC Filter
- Lock Detector
- IF AGC
- Buzz Canceller

1st SIF Stage

- Preamplifier with AGC
- 1st SIF Detector

SIF Stage

- SIF Limiter Amplifier
- FM Quadrature Detector

Mute Stage

- Sound Mute (Pin2)
- IS-15 Switch (Pin13)
- AV Mute (Pin4)

Absolute Maximum Ratings: ($T_A = +25^{\circ}\text{C}$ unless otherwise specified)

Maximum Supply Voltage, $V_{CC\text{max}}$	13.8V
Allowable Power Dissipation ($T_A \leq +50^{\circ}\text{C}$), $P_{d\text{max}}$	1200mW
Circuit Voltage, V_3, V_{13}	V_{CC}
Circuit Voltage, V_{11}	V_{CC}
Circuit Voltage, V_{23}	V_{CC}
Circuit Current (Note 1), I_1	-1mA
Circuit Current (Note 1), I_{17}	-10mA
Circuit Current (Note 1), I_{21}	-3mA
Circuit Current (Note 1), I_{22}	-2mA
Circuit Current (Note 1), I_{10}	3mA
Operating Temperature Range (Note 2), T_{opr}	-20° to $+70^{\circ}\text{C}$
Storage Temperature Range, T_{stg}	-55° to $+150^{\circ}\text{C}$

Note 1. The current that flows into the IC is positive (no signal); the current that flows out of the IC is negative.

Note 2. $T_{opr} = -20^{\circ}$ to $+75^{\circ}\text{C}$ at $V_{CC} = 9\text{V}$.

Recommended Operating Conditions: ($T_A = +25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Recommended Supply Voltage	V_{CC}			9 or 12		V
Operating Supply Voltage Range	V_{CCop}		8.2	–	13.2	V

Electrical Characteristics: ($T_A = +25^{\circ}\text{C}$, $V_{CC} = 12\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
VIF Block						
Circuit Current	I_9	$V_{13} = 5\text{V}$		44	55	68 mA
			$V_{CC} = 9\text{V}$	36	48	59 mA
Quiescent Video Output Voltage	V_{21}	$V_{13} = 5\text{V}$		6.6	7.0	7.4 V
			$V_{CC} = 9\text{V}$	5.0	5.4	5.8 V
Maximum RF AGC Voltage	V_{10H}	$V_{13} = 7\text{V}$		10.6	11.0	11.4 V
			$V_{CC} = 9\text{V}$	7.6	8.0	8.4 V
Minimum RF AGC Voltage	V_{10L}	$V_{13} = 7\text{V}$		–	0	0.5 V
			$V_{CC} = 9\text{V}$	–	0	0.5 V
Quiescent AFT Voltage	V_{14}	$V_{13} = 5\text{V}$		3.0	5.9	8.0 V
			$V_{CC} = 9\text{V}$	2.6	4.5	6.0 V
Input Sensitivity	V_i			33	39	45 dB/ μV
			$V_{CC} = 9\text{V}$	37	43	49 dB/ μV
AGC Dynamic Range	GR		59	65	–	dB
Maximum Allowable Input	$V_{i\text{max}}$		100	105	–	dB/ μV
Video Output Amplitude	$V_{O(\text{video})}$			1.95	2.25	V_{P-P}
			$V_{CC} = 9\text{V}$	1.5	1.75	V_{P-P}
Output Signal-to-Noise Ratio	S/N		49	55	–	dB
Sync Signal Tip Voltage	$V_{21(\text{tip})}$	$V_i = 10\text{mV}$		4.15	4.45	V
			$V_{CC} = 9\text{V}$	3.25	3.55	V

Electrical Characteristics (Cont'd): ($T_A = +25^{\circ}\text{C}$, $V_{CC} = 12\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
VIF Block (Cont'd)							
920kHz Beat Level	I ₉₂₀	P = 0, C = -4dB, S = -14dB		37	43	-	dB
Frequency Characteristics	f _c	P = 0, S = -14dB		6	8	-	MHz
Differential Gain	DG	V _i = 10mV, 87.5% MOD, f _p = 58.75MHz		-	3	6	%
Differential Phase	DP			-	2	5	deg
Maximum AFT Voltage	V _{14H}			11.0	11.5	12.0	V
			V _{CC} = 9V	8.0	8.5	9.0	V
Minimum AFT Voltage	V _{14L}			0	0.4	1.0	V
			V _{CC} = 9V	-	0.3	1.0	V
White Noise Threshold Voltage	V _{WTH}			8.9	9.3	9.7	V
			V _{CC} = 9V	6.8	7.2	7.6	V
White Noise Clamp Voltage	V _{WCL}			5.3	5.7	6.1	V
			V _{CC} = 9V	4.0	4.4	4.8	V
Black Noise Threshold Voltage	V _{BTH}	S1 = ON		3.4	3.7	4.0	V
			V _{CC} = 9V	2.5	2.8	3.1	V
Black Noise Clamp Voltage	V _{BCL}	S1 = ON		5.3	5.7	6.1	V
			V _{CC} = 9V	2.5	4.1	4.5	V
AFT Detector Sensitivity	S _f			44	60	84	mV/kHz
			V _{CC} = 9V	28	39	55	mV/kHz
VIF-Stage Input Resistance	R _i (VIF)	f = 58.75MHz		0.8	1.3	1.75	kΩ
VIF-Stage Input Capacitance	C _i (VIF)	f = 58.75MHz		-	3.0	6.0	pF
APC Pull-In Range	f _{PU-2}	S1 = ON		0.6	1.6	-	MHz
	f _{PL-2}			-	-1.6	-0.8	MHz
VCO Maximum Variable Range	Δf _U	V ₁₈ = 3V		0.6	1.6	-	MHz
	Δf _L	V ₁₈ = 7V		-	-1.6	-0.8	MHz
VCO Control Sensitivity	β	V ₁₈ = 4.6V to 5V		1.5	3.1	6.2	kHz/mV
1st SIF Block							
4.5MHz Conversion Gain	VG			21	26	31	dB
4.5MHz Output Level	V _{SIF1}	V _i = 10mV _{rms}		50	75	110	mV _{rms}
1st SIF Stage Maximum Input	V _{SIFmax}	+2.2dB, -1dB		60	70	-	mV _{rms}
1st SIF Stage Input Resistance	R _i (SIF1)	f = 54.25MHz		1.2	2.0	2.7	kΩ
1st SIF Stage Input Capacitance	C _i (SIF1)	f = 54.25MHz		-	3	6	pF
SIF Block (V ₁₃ = 5V)							
SIF Limiting Sensitivity	V _I (lim)			-	33	39	dB/μV
FM Detection Output Voltage	V _O			400	600	790	mV _{rms}
			V _{CC} = 9V	400	600	790	mV _{rms}
AM Rejection	AMR			40	49	-	dB
Total Harmonic Distortion	THD			-	0.5	1.0	%
SIF Signal-to-Noise Ratio	S/N (SIF)			60	78	-	dB

Electrical Characteristics (Cont'd): ($T_A = +25^{\circ}\text{C}$, $V_{CC} = 12\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Mute, Defeat						
AFT Defeat Start Voltage	VD_{11}			0.5	2.3	V
			$V_{CC} = 9\text{V}$	0.5	1.6	V
AV Mute Threshold	V_{4TH}			0.5	1.9	V
			$V_{CC} = 9\text{V}$	0.5	1.1	V
FM Mute Threshold	V_{2TH}			0.5	2.0	V
			$V_{CC} = 9\text{V}$	0.5	1.9	V
AFT Defeat Voltage	VD_{14}			5.4	6.0	V
			$V_{CC} = 9\text{V}$	3.9	4.5	V

Pin Connection Diagram

FM Detector Output	1	24	SIF Input
FM Discriminator	2	23	1st SIF AGC Filter
IF AGC 2	3	22	1st SIF Output
RF AGC VR	4	21	Video Output
VIF Input	5	20	EQ Amp GND
VIF Input	6	19	EQ Amp In
GND	7	18	APC Filter
1st IF Input	8	17	Composite Video Output
V_{CC}	9	16	VCO Tank
RF AGC Output	10	15	VCO Tank
AFT Tank	11	14	AFT Output
AFT Tank	12	13	IF AGC 1

