Monolithic Linear IC



## Overview

The Sanyo LA8515N Telephonic Speech Network provides amplification, switching and line drive functions for telephone equipment. It can perform 2 to 4 line conversion and impedance matching, and supports both DTMF and keytone signals.

The LA8515N's low operating current reduces line load. Switching between the DTMF/keytone and voice circuits is controlled directly from a single MUTE input. The LA8515N is available in plastic 20-pin DIPs.

Features

- · Direct connection to low-impedance receiver
- · DTMF/keytone and voice circuit switching controlled by a single MUTE input
- · Receive and transmit gain are adjusted automatically in response to the line current.
- · Applicable to a wide variety of transmitters and receivers by selecting external components.

Maximum Ratings at Ta=25°C			unit
Line Voltage	V <sub>L</sub> max	15	v
Line Current	I <sub>L</sub> max	150	mA
Allowable Power Dissipation	Pd max	1200	$\mathbf{m}\mathbf{W}$
Operating Temperature	Topr	-30 to $+75$	°C
Storage Temperature	Tstg	-55  to  +150	°C

<b>Operating Characteristics</b>	s at Ta $= 25^{\circ}$ C	f = 1  kHz, See specified Test Circuit.	min	typ	max	unit
Line Voltage	$v_{L}$	$I_L = 20 m A$		3.6		v
		$I_L = 50 m A$		6.1		v
		$I_L = 120 \text{mA}$		12.3		V
Supply Voltage	$v_{cc}$	$I_L = 20 m A$		2.1		V
		$I_L = 50 \text{mA}$		3.6		v
		$I_L = 120 mA$		7.1		v
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## **Package Dimensions** 3021B-D20SIC (unit: mm)



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			min	typ	max	unit
Transmit Gain	GT	$I_L = 20 \text{mA}, V_{IN} = -55 \text{dBV}$	38	40	42	dB
		$I_{L} = 120 \text{mA}, V_{IN} = -55 \text{dBV}$	35	37		dB
Receive Gain	$G_R$	$I_{L} = 20 m A, V_{IN} = -20 d B V$	-4	-2	0	dB
		$I_{L} = 120 \text{mA}, V_{IN} = -20 \text{dBV}$	-9.5	-7	- 5	dB
DTMF Gain	$G_{MF}$	$I_{L} = 20 \text{mA}, V_{IN} = -30 \text{dBV}$	23	25	27	$\mathbf{dB}$
		$I_{L} = 120 \text{mA}, V_{IN} = -30 \text{dBV}$	20	22		dB
Transmit Dynamic Range	DRT	$I_L = 20 \text{mA}, \text{THD} = 4\%$	2.5			Vpp
		$I_{L} = 120 \text{mA}, \text{THD} = 4\%$	4.6			Vpp
Receive Dynamic Range	DR <sub>R</sub>	$I_{L} = 20 \text{mA}, \text{THD} = 10\%$	0.3			Vpp
		$I_{L} = 120 \text{mA}, \text{THD} = 10\%$	0.5			Vpp
DTMF Input Impedance	$Z_{IMF}$	I <sub>L</sub> =50mA	24			kΩ
KTI Input Impedance	$Z_{KTI}$	I <sub>L</sub> =50mA	17			kΩ
MUTE "H"-Level Input Voltage	e V <sub>IH</sub>	$I_L = 20 \text{mA}$ to $120 \text{mA}$	1.5		$v_{cc}$	v
MUTE "L"-Level Input Voltage	$V_{IL}$	IL=20mA to 120mA	0		0.2	V
Transmit Attenuation	$\Delta G_{T}$	$I_L$ =30mA,PADC grounded via 24k $\Omega$		3		dB
Receive Attenuation	$\Delta G_R$	$I_L$ = 30mA,PADC grounded via 24k $\Omega$		6		dB
Reference Voltage	$V_{REF}$	$I_L = 20 m A$		0.65		v
		$I_L = 50 \text{mA}$		1.13		v
		$I_L = 120 \text{mA}$		2.1		v
	37 4 3 1					

Note) Be careful of dielectric breakdown.

## Equivalent Circuit Block Diagram







No.3301-3/6

## **Pin Descriptions**

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Pin Number	Pin Name	Description
1	V <sub>L</sub>	Line voltage Connected to the positive side of the line diode bridge. See the application circuit.
2	TOI	Transmit output current source, input side Connected to $V_L$ through a 27 $\Omega$ resistor. Select the value of this resistor after considering the maximum expected line current.
3	TO <sub>O</sub>	Transmit output current source, output side As above, but to ground through a $15\Omega$ resistor
4		Not used. This pin has a DC bias and should not be connected.
5	AC BIAS	AC signal reference voltage An internally-generated reference voltage.
6	DTMF	DTMF input The signal on this pin is output on $V_L$ (pin 1) when MUTE (pin 7) is LOW. It should be decoupled using a capacitor since it is biased with the REF voltage.
7	MUTE	Mute control input Switches between the transmit side DTMF or receive side keytone, and voice circuits. LOW : DTMF output, keytone receive output HIGH : Voice circuits
8	REF	Reference voltage Internal amplifier bias voltage. Requires an external capacitor. This voltage should not bused by external circuitry.
9	GND	Ground Connected to the negative side of the line diode bridge.
10	КТІ	Key tone input Switched through to the receive circuit output when MUTE (pin 7) is LOW. It should be decoupled using a capacitor since it is biased with REF voltage.
11	TPI2	Transmit input amp non-inverting input Transmit voice circuit input. Requires a DC bias from REF (pin 8) through a resistor.
12	TPI1	Transmit input amp inverting input Negative feedback input. Amplifier gain and frequency response are controlled by th feedback network.
13	TPO	Transmit input amp output
14	PADC	Pad control input The value of the resistor between this pin and either V <sub>CC</sub> or ground determines the shape of the line-current vs. gain characteristics. See Electrical Characteristics.
15	RPI2	Receive input amp inverting input Negative feedback is applied from the amplifier output to control amplifier gain an frequency response.
16	RPI1	Receive input amp non-inverting input This pin is internally biased through a resistor using REF.
17	RPo	Receive input amp output
18	R <sub>O</sub>	Receive circuit output Connect to a low-impedance (approximately $15k\Omega$ ) receiver through a decouplin capacitor.
19	NC	No connection
20	v <sub>cc</sub>	Supply voltage Supply voltage for internal circuitry. This supply should not be used as an external circui supply except as the high-level voltage for the MUTE and PADC inputs.





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