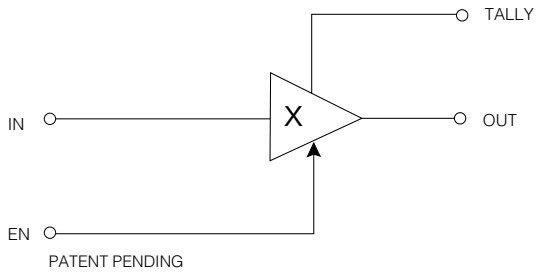
GX4201 Wideband, Monolithic 1x1 Video Crosspoint Switch

DATA SHEET

FEATURES

- **-3 dB bandwidth, 300 MHz with C_L = 0 pF**
- **off isolation at 100 MHz, 80 dB**
- **differential phase and gain at 4.43 MHz, 0.01° & 0.02%**
- **800 μW disabled power consumption**
- **input signal levels from -2 V to +3 V**
- **logic input compatible with TTL and 5 V CMOS**
- **open collector TALLY output**

FUNCTIONAL BLOCK DIAGRAM



PATENT PENDING

TRUTH TABLE

EN	OUT	TALLY
0	HIGH Z	OFF
1	IN	ON

ABSOLUTE MAXIMUM RATINGS

Parameter	Value
Supply Voltage	±7.5 V
Operating Temperature Range	0° C ≤ T_A ≤ 70° C
Storage Temperature Range	-65° C ≤ T_S ≤ 150° C
Lead Temperature (Soldering, 10 Sec)	260° C
Analog Input Voltage	-5.5 V ≤ V_{IN} ≤ 5.5 V
Logic Input Voltage	-0.5 V ≤ V_L ≤ 5.5 V
Output Load Current	12mA
High Level TALLY Output Current	2 mA

CIRCUIT DESCRIPTION

The GX4201 is a wideband 1x1 video crosspoint implemented in bipolar monolithic technology. The device is characterized by excellent differential gain and phase in the enabled state, and very high off-isolation in the disabled state. The fully buffered unilateral signal path ensures negligible output to input feedback while delivering minimal output switching transients through make-before-break switching.

For use in NxM routing matrices, the device features a very high, nearly constant input impedance, coupled with very high output impedance in the disabled state. This allows multiple GX4201's to be paralleled at the input and output without additional circuitry. An open collector PNP to V_{CC} TALLY output provides indication of crosspoint selection.

To maximize system bandwidth, an external current source is used to bias the output device of the crosspoint. One external current source is required per output bus. For less demanding applications, a load resistor can be used in place of the output current source, causing a slight increase in differential phase. Non-additive mixing will occur on the output bus if more than one paralleled GX4201 is enabled at a time.

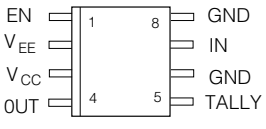
The GX4201 is one of a series of wideband video crosspoints utilizing Gennum's proprietary LSI process.

APPLICATIONS

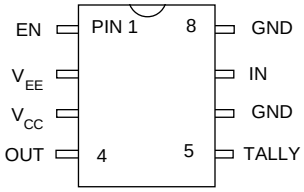
- very high quality video switching
- HDTV
- computer graphics
- RF switching/routing
- PCM/data routing

PIN CONNECTIONS

TOP VIEW



8 PIN SOIC



8 PIN DIP

GENNUM CORPORATION P.O. Box 489, Stn A, Burlington, Ontario, Canada L7R 3Y3 tel. (905) 632-2996 fax: (905) 632-2055
Japan Branch: B-201 Miyamae Village, 2-10-42, Miyamae, Suginami-ku, Tokyo 168, Japan tel. (03) 3247-8838 fax (03) 3247-8839

ELECTRICAL CHARACTERISTICS (V_S = ±5V DC, 0°C < T_A < 70°C, I_L = 6 mA)

	PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC SUPPLY	Supply Voltage	$\pm V_S$		±4.5	±5	±5.5	V
	Supply Current (not including external current load)	I+	EN=1	-	13.5	17	mA
			EN=0	-	80	140	µA
		I-	EN=1	-	12.5	16	mA
			EN=0	-	80	140	µA
STATIC	Analog Output Voltage Swing	V_{OUT}	Extremes before clipping occurs	-2	-	3	V
	Analog Input Bias Current	I_{BIAS}		-	12	-	µA
	Output Offset Voltage	V_{OS}	T_A = 25°C	-10	-	10	mV
LOGIC	Output Offset Voltage Drift-	$\Delta V_{OS} / \Delta T$		-	-25	-80	µV/°C
	Crosspoint Turn-On Time	t_{ON}	Control input to appearance of signal at output.	-	200	400	ns
	Crosspoint Turn-Off Time	t_{OFF}	Control input to disappearance of signal at output.	0.5	1.0	-	µs
	Logic Input Thresholds	V_{IH}	1	2.0	-	-	V
		V_{IL}	0	-	-	0.8	V
	Enable Bias Current	$I_{BIAS(EN)}$	EN = 0	-	0.3	2	µA
	TALLY Output	V_{OH}	EN = 1, I_O = 1mA	4.80	4.89	4.93	V
DYNAMIC	Insertion Loss	I.L.	1V p-p sine or sq.wave, T_A=25°C at 100 kHz R_L=100K, C_L=30pF	0.015	0.025	0.040	dB
	Bandwidth (-3dB) See Fig. 1	B.W.	small signal C_L = 0 pF	-	300	-	MHz
	Input Resistance	R_{IN}	EN = 1	1.0	3.0	-	MΩ
	Input Capacitance	C_{IN}	EN = 0	-	1.1	-	pF
	Output Resistance	R_{OUT}	EN = 1	-	7	-	Ω
	Output Capacitance See Fig. 5	C_{OUT}	EN = 0	-	1.1	-	pF
	Differential Gain	dg	at 3.58 MHz	-	-	0.04	%
	Differential Phase See Fig. 6	dp	V_{IN} = 40 IRE	-	-	0.04	degrees
	Off Isolation See Fig. 4		Enabled GX4201 on output f = 100 MHz V_{IN} = 1V p-p	-	80	-	dB
	Slew Rate	+SR	V_{IN} = 3V p-p (C_L = 0 pF)	250	400	-	V/µs
		-SR		250	350	-	

ORDERING INFORMATION

PART NUMBER	PACKAGE TYPE	TEMPERATURE RANGE
GX4201-CKA	8 PIN SOIC	0° to 70°C
GX4201-CDA	8 PIN DIP	0° to 70°C
GX4201-CTA	8 PIN SOIC TAPE	0° to 70°C

TYPICAL PERFORMANCE CURVES OF THE GX4201

For all graphs, V_S = ±5 V DC and T_A = 25°C. The curves shown below represent typical batch sampled results.

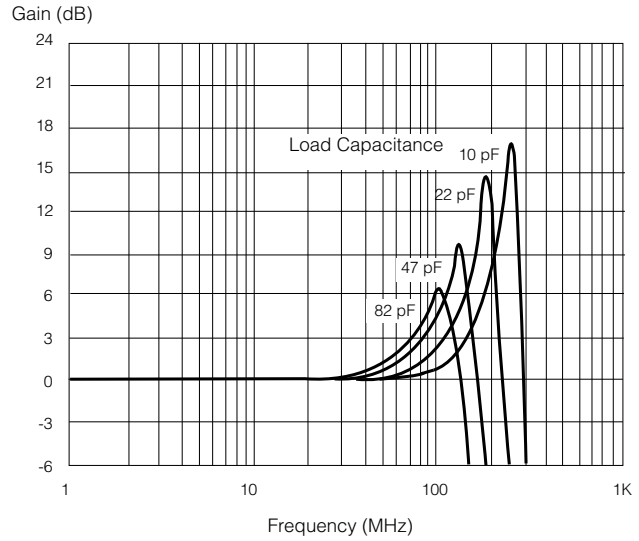


Fig. 1 Gain vs Frequency

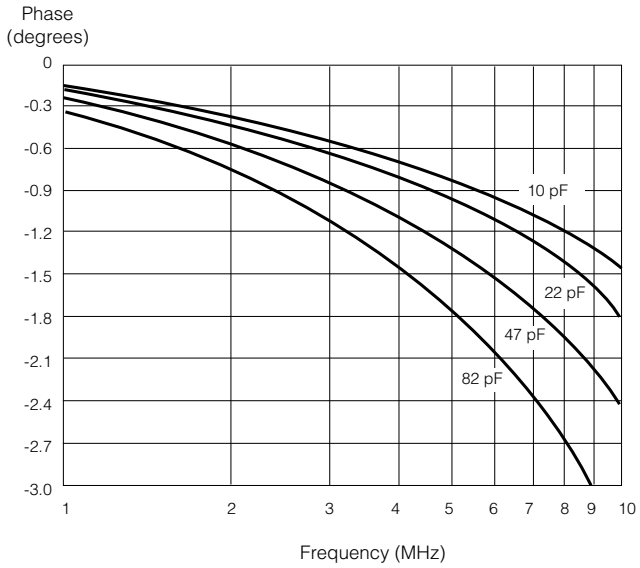


Fig. 2 Phase vs Frequency

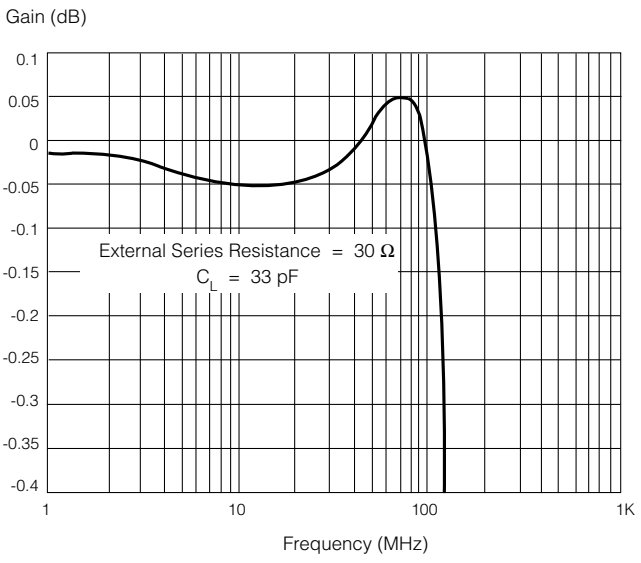


Fig. 3 Gain vs Frequency

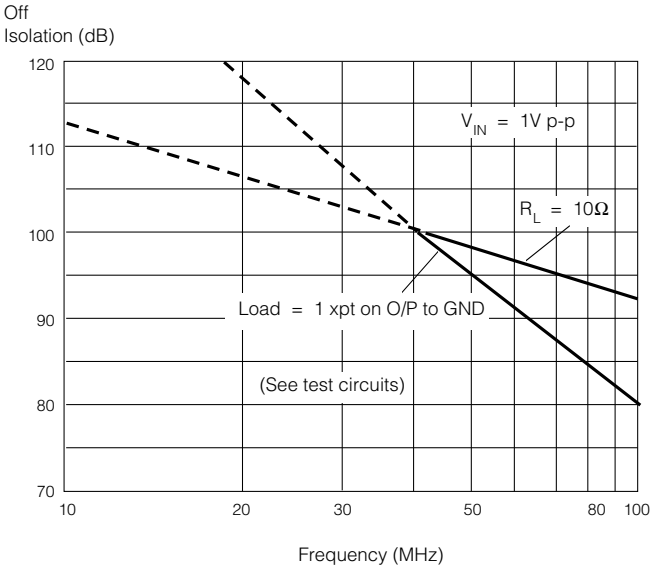


Fig. 4 Off Isolation vs Frequency

continued over

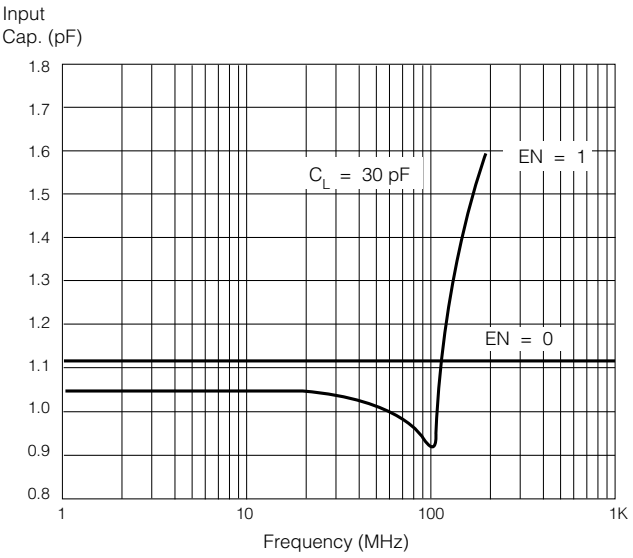


Fig. 5 C_{IN} vs Frequency

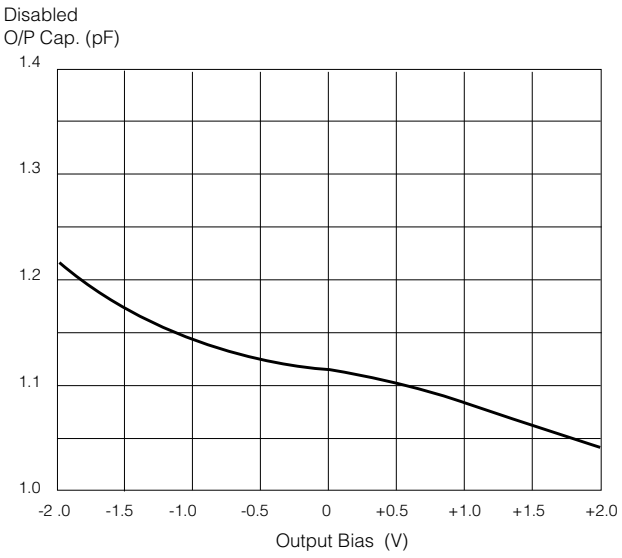


Fig. 6 C_{OUT} vs Bias

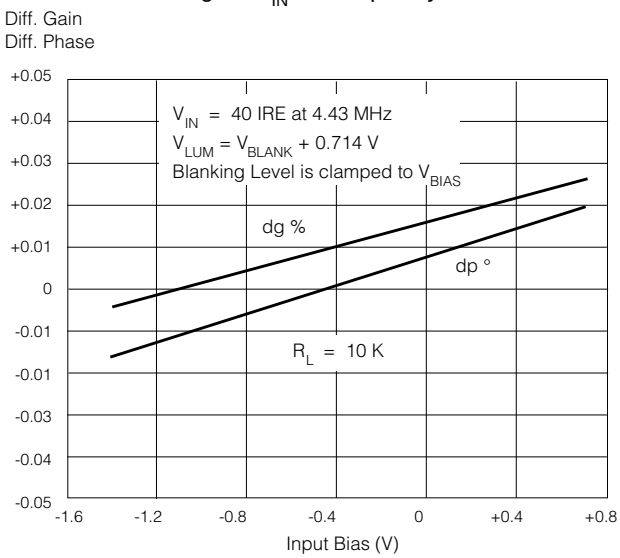


Fig. 7 dg/dp vs Input Bias

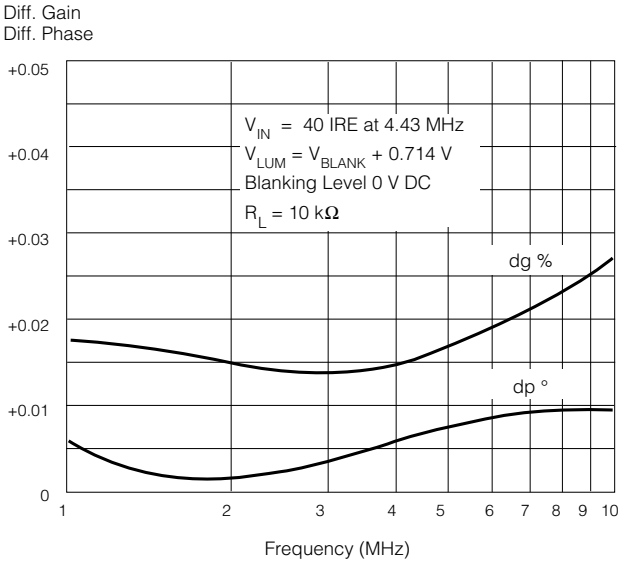


Fig. 8 dg/dp vs Frequency

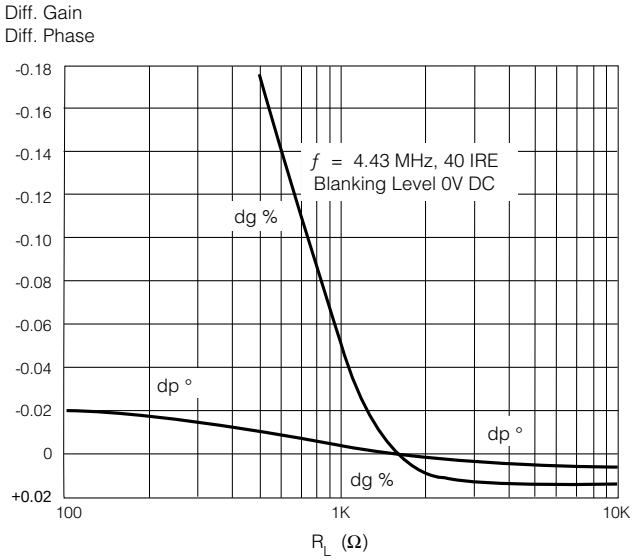


Fig. 9 dg/dp vs R_L

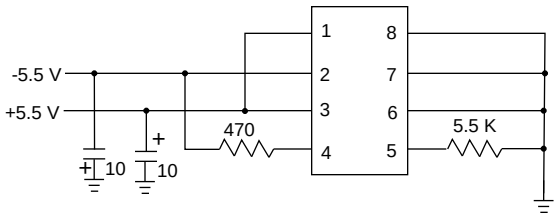


Fig. 10 Burn-in Test Circuit

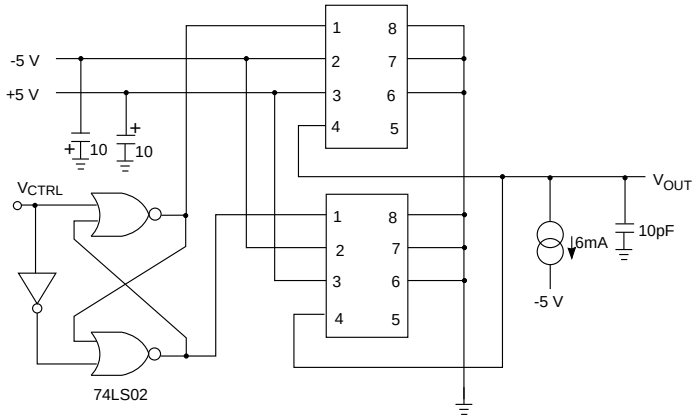


Fig. 11a Switching Transient Test Circuit

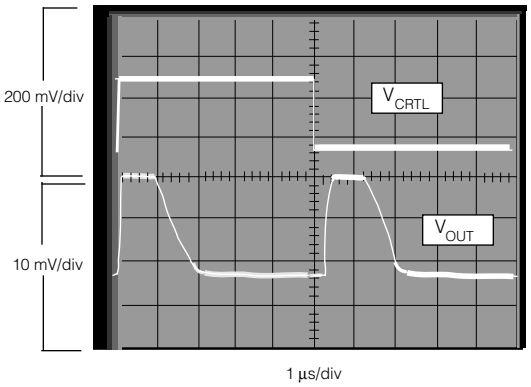
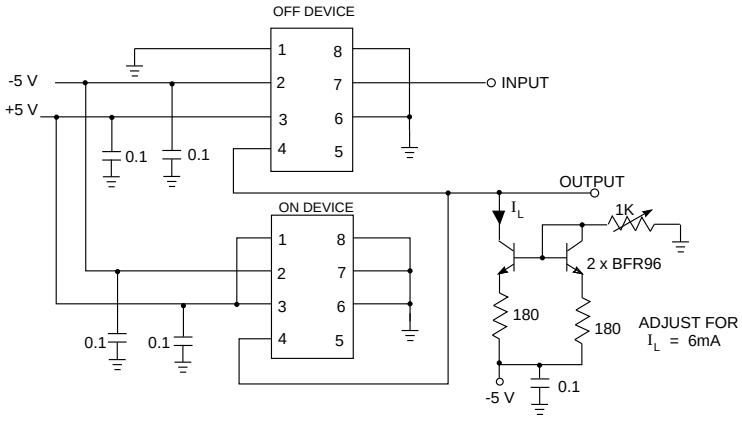
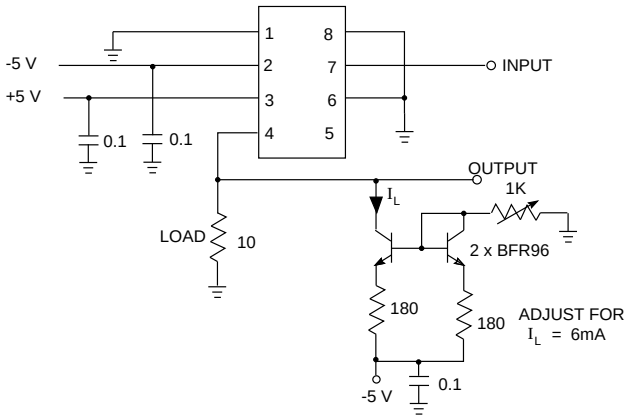


Fig. 11b Switching Transient



NOTE: Off-isolation can be increased by eliminating the signal path through the power supplies. This is demonstrated by replacing the enabled crosspoint with a 10Ω load resistor as shown in the passive load circuit.

Active Load



Passive Load

Fig. 12 Off-isolation Test Circuits

All capacitors in farads, all resistors in ohms unless otherwise stated.

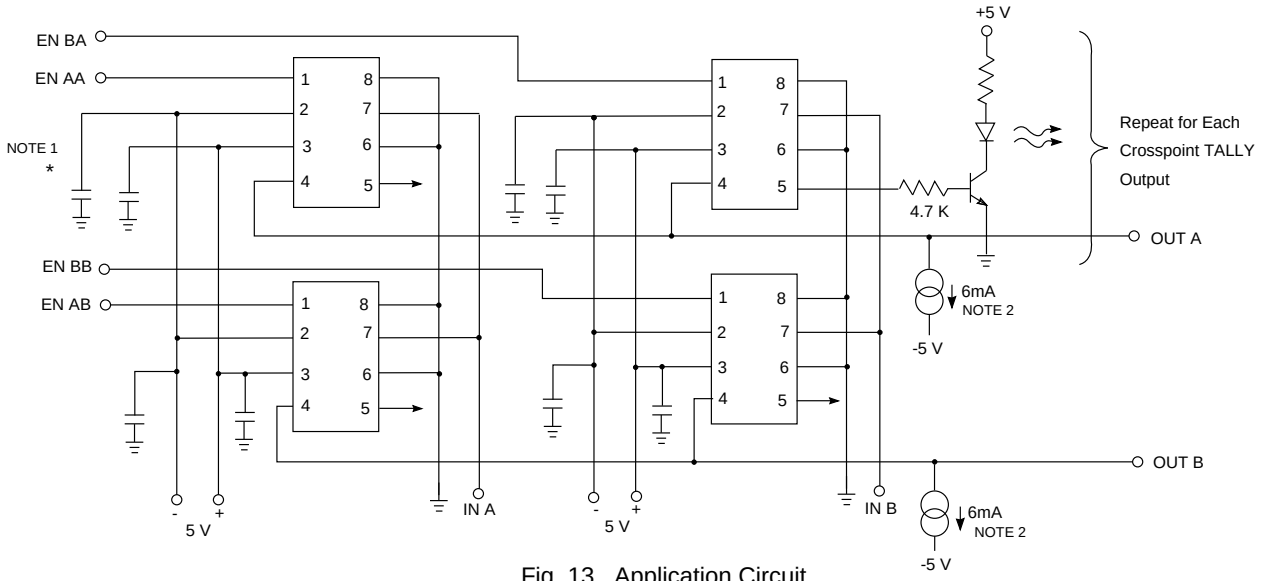
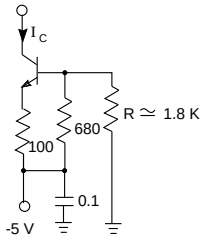


Fig. 13 Application Circuit
2 x 2 Matrix using Four GX4201

All capacitors in μF, all resistors in Ω unless otherwise shown.

NOTES: 1. * All decoupling capacitors are 0.1 μF, 50 V.

2. 6mA can be implemented by the following circuit.
Choose a transistor with ß / f_T at 6 mA
f_T is ≥ 800MHz.



3. Alternatively, an 820Ω resistor may be used.
The insertion loss will be increased to 0.1 dB.

AVAILABLE PACKAGING

8 pin DIP 8 pin SOIC
8 pin SOIC - TAPE

CAUTION
ELECTROSTATIC
SENSITIVE DEVICES
DO NOT OPEN PACKAGES OR HANDLE
EXCEPT AT A STATIC-FREE WORKSTATION

DOCUMENT
IDENTIFICATION

PRODUCT PROPOSAL
This data has been compiled for market investigation purposes only, and does not constitute an offer for sale.

ADVANCE INFORMATION NOTE
This product is in development phase and specifications are subject to change without notice. Gennum reserves the right to remove the product at any time. Listing the product does not constitute an offer for sale.

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