Ethernet Coaxial Impedance Monitor

FEATURES

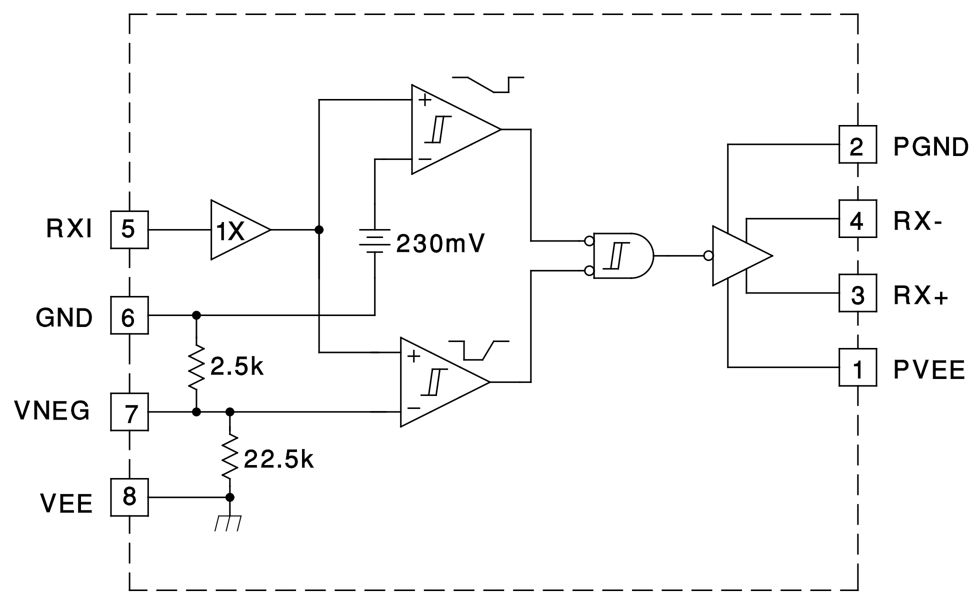
- Compatible with IEEE 802.3 10Base5, 10Base2, and 10BaseT
- Preset and Adjustable Data Thresholds
- Protects DTE from Spurious Data
- Prevents Erroneous Transmission Through Repeaters
- Detects Cable Termination Errors
- Detects Cable Impedance Errors

DESCRIPTION

The UC5661 is a monolithic integrated circuit which functions as an Ethernet Coaxial Impedance Monitor (CIM). This IC is intended to augment the receive (RX) function of IEEE 802.3 Coaxial Transceiver Interface (CTI) circuits. The UC5661 implements a hardware algorithm to detect reflections on the Ethernet coaxial cable or twisted pair which are caused by improper network termination or physical medium damage. If a physical problem is detected, the UC5661, whose receiver outputs operate in parallel with the CTI, immediately squelches the receive data, preventing the propagation of invalid network packets. During ordinary operation, the CIM RX outputs enable at the beginning of the data packet preamble, making it transparent to normal CTI functions. The valid data threshold, although preset for thick and thin-wire Ethernets, may be adjusted with the addition of one or two external resistors to meet 10BaseT requirements.

A secondary system design feature is provided by the UC5661. At the completion of a normal data transmission, the CIM Squelch activates much faster than typical transceiver ICs. The receiver outputs of the UC5661 have been designed to properly terminate the data packet, even with RX data transformers as small as 16µH, possibly allowing for smaller and less expensive system implementations. In these cases, end-of-packet squelch overshoot will be held to less than 100mV.

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

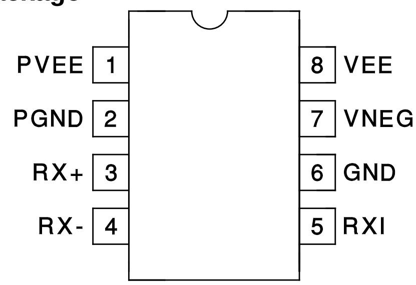
Supply Voltage (PVEE,VEE) . . . . –15V
Input Voltage (RXI) . . . .+2V to –10V
Operating Temperature Range . . . . .0°C to +70°C
Junction Temperature (Note 1) . . . .+125°C
Storage Temperature Range . . . .–55°C to +150°C
Lead Temperature (Soldering, 10 sec.) . . . .+300°C

All currents are positive into, negative out of the specified terminal. Consult Packaging Section of Databook for thermal limitations and considerations of packages.

Note 1: The devices are guaranteed by design to be functional up to the absolute maximum junction temperature.

CONNECTION DIAGRAMS

DIL-8 (Top View)
J or N Package



DC ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for T_A = 0°C to 70°C, VEE = PVEE = –9.0V, and R_L = 500 ohms, T_A = T_J.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current	Outputs Locked or Unlocked, Unloaded		10	20	mA
Input Bias Current	RXI = 0V		2	5	µA
Input Shunt Resistance	RXI = - 2V to 0V	0.200	45		MΩ
Input Shunt Capacitance	(Note 1)		3	4	pF
VNEG (Valid Data Reference)	VNEG = open	–980	–900	–830	mV
RX Output Voltage High (Squelch)		–1.2	–0.9	0	V
RX Output Voltage Low (Enable)		–6	–3.7	–3.2	V
Output Short Circuit	RX+ = RX– = 9V	–150			mA
Valid Data Threshold		–980	–900	–830	mV
Data Reflection Threshold		200	230	300	mV

Note 1: Guaranteed by design. Not 100% tested in production.

AC ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for T_A = 0°C to 70°C, VEE = PVEE = –9.0V, and R_L = 500 ohms, T_A = T_J.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
T_{EN} RX Enable Delay	See Figures 1, 2		100	400	ns
T_{DIS} RX Disable Delay	See Figures 1, 2	250	340	475	ns
T_{FS} RX+ to RX– Falling Edge Skew	See Figures 1, 2		5	20	ns
T_{FR} RX+ to RX– Rising Edge Skew	See Figures 1, 2		5	20	ns
T_{SQL} RX Squelch Delay	See Figures 1, 3		230	2000	ns
T_{REL} RX Release Delay	See Figures 1, 3	500	1150	1500	ns

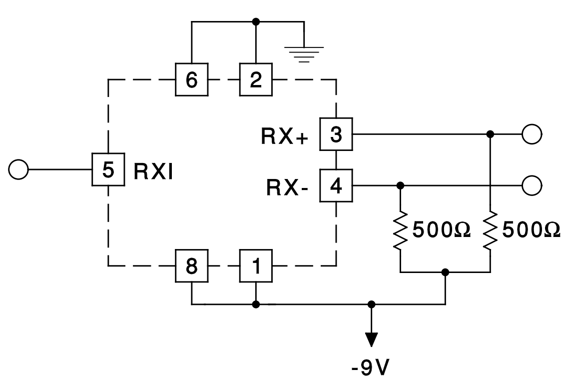


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Figure 1. Switching Test Circuit

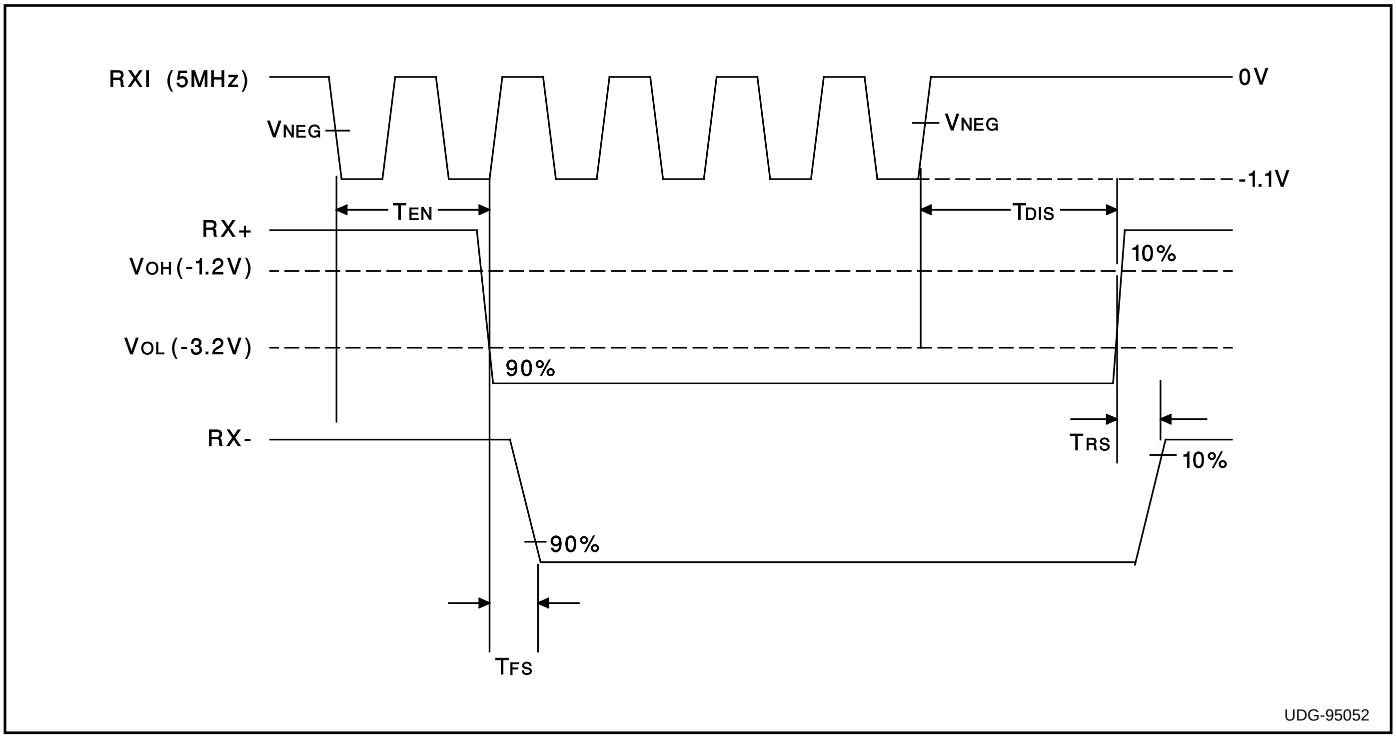

Figure 2. Input/Output Timing Diagram

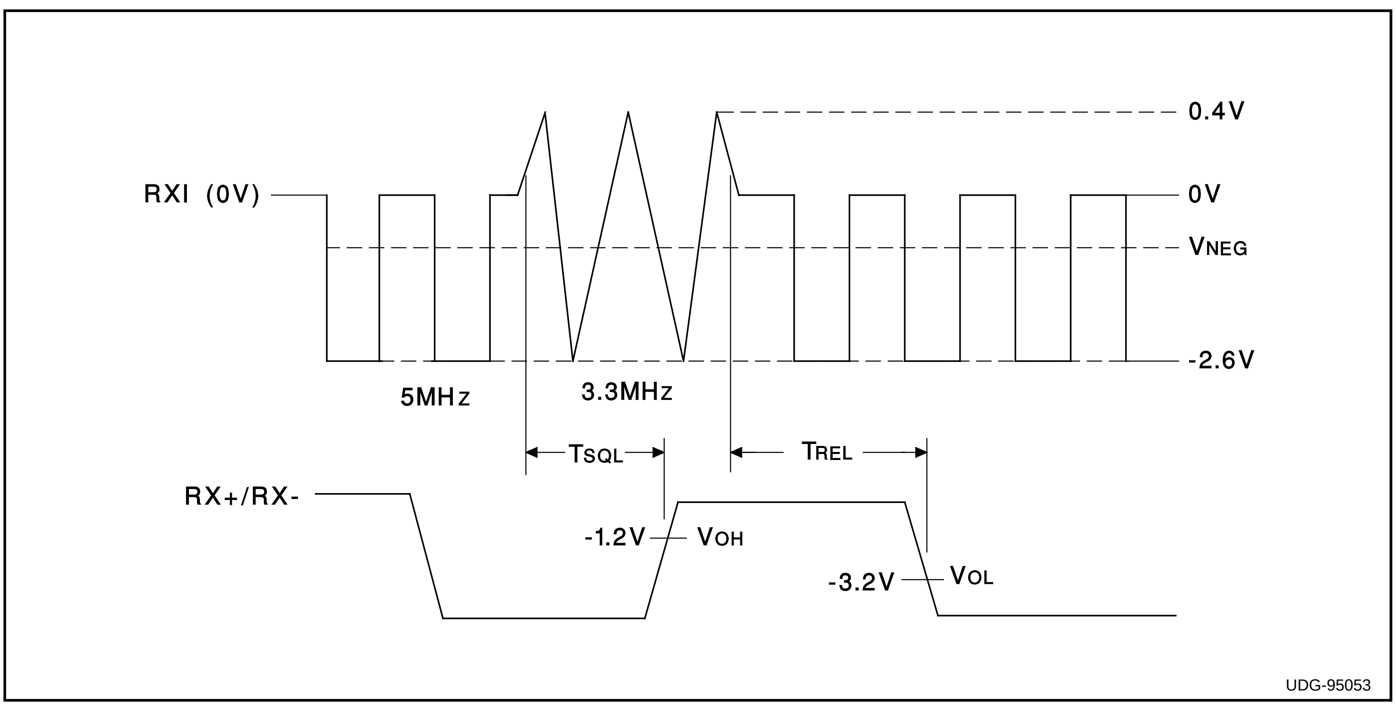

Figure 3. Short Detect Timing Diagram

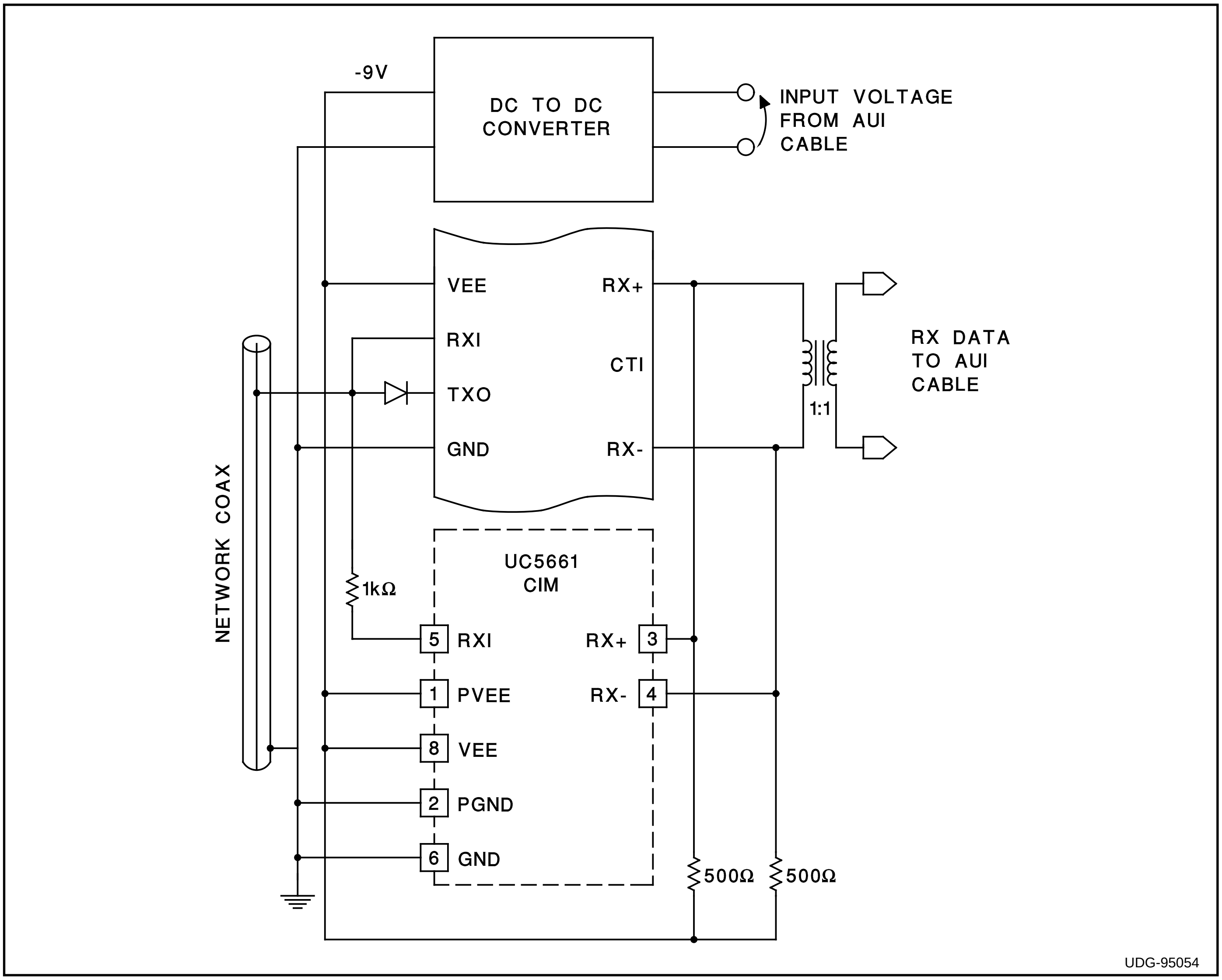

Figure 4. Typical Application

Figure 4 shows the UC5661 (SDI) being used with a Coaxial Transceiver Interface (CTI) device. The primary function of the SDI is to detect LAN cable shorts (or other impedance matching problems) and appropriately squelch the RX outputs of the CTI device to prevent the transmission of corrupted network data. The secondary function of the SDI is to provide improved RX squelching at the completion of a normal data transmission.

To perform the two functions, SDI uses two threshold voltages, Data Reflection Threshold (DRT), and the Valid Data Threshold (VDT). During transmission SDI looks for signal activity above ground and below ground. In the event that the magnitude of the input voltage exceeds DRT the outputs will be locked within 2µs and will remain locked for 0.5 to 1.5µs after the last edge below DRT (see Figure 3). During signal activity below ground when the signal goes below VDT the outputs will unlock within 400ns. While unlocked, if the input exceeds VDT the outputs will lock within 250 to 475ns relative to the last positive going edge (Figure 2).

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