



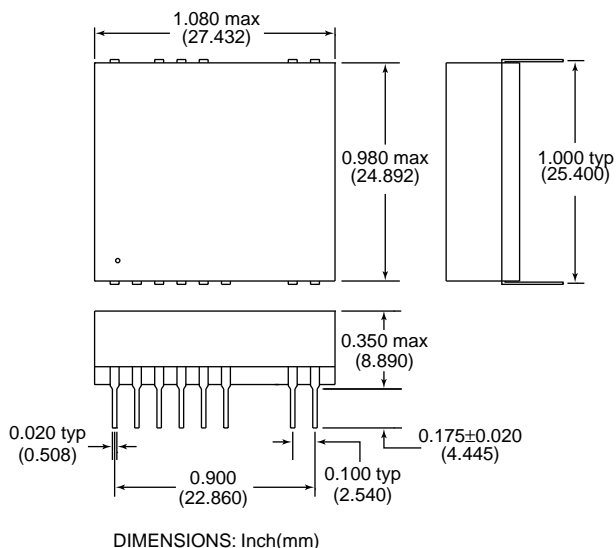
## “TNT” – Thin Net Transceiver Modules



The HALO Electronics "TNT" (Thin Net Transceiver) Module is a complete "On-Board" Thin Net solution that allows the Network Engineer to significantly reduce the total real estate and components required to provide 10BASE2 in a network design.

### Features

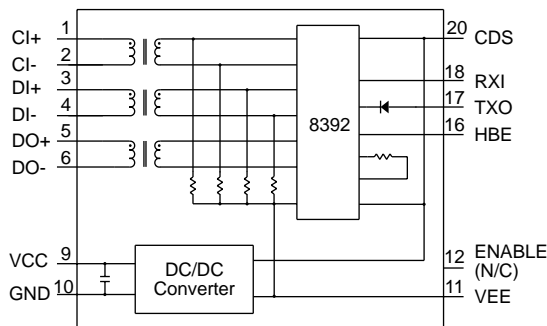
- Compliant with ANSI / IEEE 802.3 and ISO 8802-3 Standards for Thin Net.
- Contains all Thin Net Transceiver functions in one single 20 pin package.
- Low power Transceiver Chip and high efficiency DC/DC Converter for power sensitive applications.
- Squelch circuits on all signal Inputs to eliminate noise.
- Loopback test detects network cable opens and shorts.
- 2kV Isolation Transformers.
- Heart Beat Enable.
- Wide Variety of Input Voltages.
- Optional Enable Feature.
- Ultra Quiet versions available.
- Variety of 83C92 transceiver chips available.



### Description of Pin Functions

- Pins 1 - 2 CD± Collision. A balanced 10MHz differential output from the module to the station equipment when a collision is detected, when excessive data occurs (jabber) or during the SQE Test (Heartbeat Test).
- Pins 3 - 4 RX± Receive Data. A balanced line driver output from the module to the station equipment, providing receive data detected on the network.
- Pins 5 - 6 TX± Transmit Data. A balanced line receiver input to the module from the station equipment, to drive transmit data onto the network.
- Pin 9 VCC ±5% input supply. (Please refer to Module Descriptions)
- Pin 10 GND Ground. Ground is referenced to VCC. (Do not connect this ground to CABLE SHIELD since the COAX SHIELD must be isolated from the station equipment)
- Pin 11 VEE Negative Supply. Nominally -9 volts referenced to coax shield ground.
- Pin 12 No Connection (Optional Enable feature - Module is off when a "0" signal is supplied. Unit is on when floating or a "1" signal is supplied.)
- Pin 16 HBE Heartbeat Enable. This input enables the SQE (also called Heartbeat) Test when connected to (Isolated) ground and disables the test when connected to VEE. This pin must be connected to VEE for repeater applications.

- Pin 17 TXO Network Signal Transmitter. Connects to the network COAX center conductor through an internal 1N916 diode, and transmits all signals from the MCC to the network.
- Pin 18 RXI Network Signal Receiver. Connects to the network COAX center conductor, and receives packet data and detects the collision voltage level.
- Pin 20 CDS Collision Detect Sense. Connects directly to the network shield and references the collision detection voltage level.



**Typical Applications**

- Network Interface Cards
- Mother board PC implementation
- Adapter Boards for “off motherboard” PC applications
- 10BASE-T Hub with 10BASE2 Interface
- 10BASE2 Repeaters
- Thin Net Transceivers
- Print Servers
- Applications requiring “optional” 10BASE-2 ports

Operating Temperature: 0° to 70° C  
 Storage Temperature: -40° to 125° C  
 Input Voltage: ±5% of Nominal  
 Isolation Voltage  
     CD,RX &TX           2,000 VDC  
     Vcc,GND             500 VDC

Part Number	Input Voltage	Vee Ripple (Max. @ 20MHz)	Input Current (mA)		Enable Feature
			Typ	Max	
MD-001_	5V±5%	100 mVp-p	200	225	NO
MD-002_	5V±5%	100 mVp-p	210	235	YES
MD-003_	3.3V±5%	100 mVp-p	305	340	NO
MD-004_	3.3V±5%	100 mVp-p	315	350	YES
MD-012_	12V±5%	100 mVp-p	85	105	NO
MD-013_	12V±5%	100 mVp-p	95	115	YES
MDQ-001_	5V±5%	40 mVp-p	200	225	NO

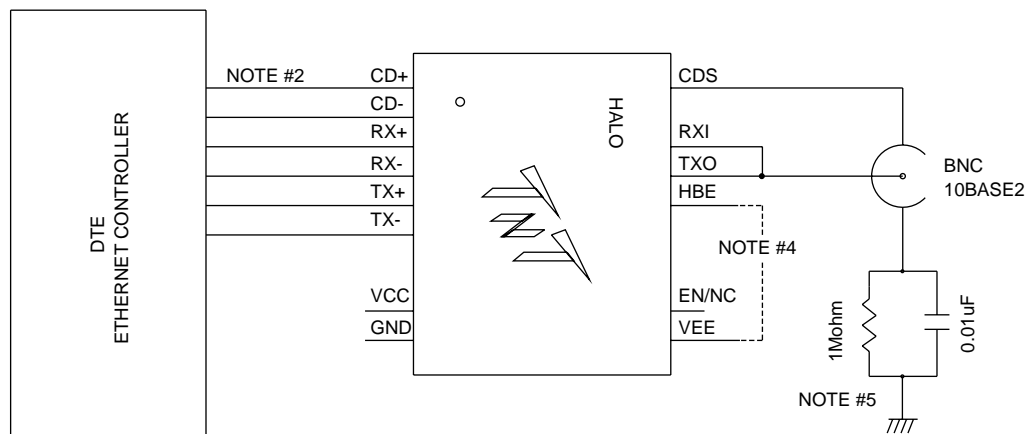
The TNT family is available with two different 83C92 manufacturers' transceiver chips. Customers should specify the desired transceiver chip by adding the appropriate suffix designator to the HALO part number. Please see the following suffix descriptions;

- M = Myson MTD492
- SS = Silicon Systems 83C92

For complete application information please contact your local Halo representative.

## "TNT" Application Notes

1. The HALO Electronics "TNT" family of modules is available with 3.3V, 5V, 8V or 12V input voltages. Care should be taken to connect the module to the correct supply voltage.
2. The standard MD series incorporates 1.5k $\Omega$  pull-down resistors internally, designed specifically for "on board" applications, not driving a 78 $\Omega$  load. For applications requiring a 78 $\Omega$  load the MDQ series is recommended. This series incorporates 1K $\Omega$  pull down resistors capable of driving terminated RX and CD lines.
3. RXI and TXO (Pins 17 and 18) must be tied together externally at the BNC connector. The 1N916 diode is contained within the TNT module.
4. For repeater applications, the SQE Test (Heartbeat Test) must be disabled. This is accomplished by connecting Pin 16 (HBE) to Pin 11 (VEE). For non-repeater applications Pin 16 (HBE) should be connected to isolated ground (CDS). It is not recommended to leave HBE floating.



5. A 1M $\Omega$ , 750 volt minimum resistor to provide a static discharge path from the trunk of the coaxial cable and each DTE is required. Please see paragraph 10.7.2.4 of the IEEE 802.3 standard for more information. A .01 $\mu$ F, 500 VAC rms minimum capacitor is also recommended for safety considerations.
6. The TNT module should be located as close to the BNC connector as possible. This will assure the lowest shunt capacitance. IEEE 802.3 requires a maximum of 8pF shunt capacitance. Please see paragraph 10.6.3 and Appendix C3.
7. A de-coupling capacitor between VCC and GND is helpful to minimize noise on the supply line. A low ESR 0.1 $\mu$ F, 50 volt capacitor is recommended. For repeater applications or noise sensitive applications a simple Pi filter is suggested. For additional Pi filter information please consult the factory.
8. Additional surge protection components are recommended for applications where higher voltage static surge is a concern. Please contact the factory for additional information.