Marconi
Electronic Devices

CT2505

+5 VOLT ONLY
MIL-STD-1397 TYPE E
10 MHz LOW LEVEL SERIAL INTERFACE

GENERAL DESCRIPTION

The CT2505 is a single hybrid micro-circuit which incorporates a serial encoder, transceiver, and Manchester decoder in one package. The encoder accepts serial NRZ data in conjunction with two synchronous clocks. This data stream is then Manchester encoded and sent out.

The CT2505 receiver section accepts bipolar Manchester encoded signals and passes level detected signals to the serial decoder. The serial decoder reconstructs an NRZ data stream with derived clock. This allows the data to be processed by our CT2500 monolithic protocol chip for MIL-STD-1397 serial interfaces. All the input and output signals of the CT2505 are completely compatible with the CT2500.

The CT2505 has a power management function. The transmitter standby mode is available to reduce the overall power consumption of the CT2505.

Marconi Circuit Technology, the USA Headquarters and plant of Marconi Electronic Devices is a MIL-STD-1772 Certified Manufacturer.

FEATURES

- **Optional transformer isolation**
- **Internally set threshold**
- **Matched to 50 ohm system impedance power on and off**
- **Operates with +5 volt only supplies**
- **Power management**
- **Accepts synchronous input data**
- **Unique Manchester decoder requires no clock**
- **Generates one clock per received bit**
- **May be used for serial decoding of indefinite word lengths**
- **Bipolar Construction**
- **Other Wire and Fiber Optic types available**

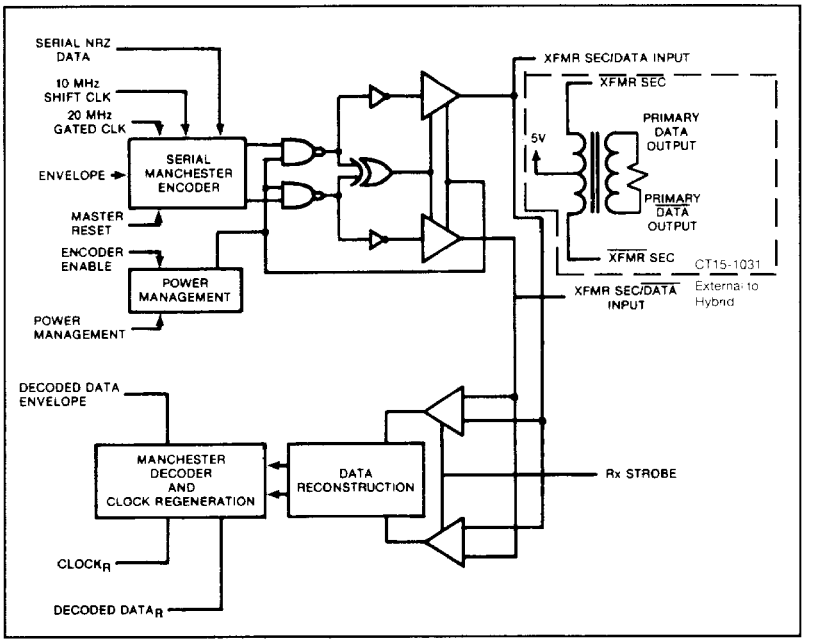


FIGURE 1. CT2505 BLOCK DIAGRAM

TRANSMISSION

The CT 2505 accepts synchronous NRZ Data in conjunction with two clocks signals. The NRZ data stream is then converted to Manchester code which is transformer coupled to a 50 ohm Tri-axial cable for transmission up to 1000 ft. The synchronous transfer of data allows the separation of the CT2505 from the parallel to serial data buffer circuitry.

The transmitter may be placed into a standby condition. This reduces power consumption by approximately 600mW. Power management is made available via two standard TTL input pins. The Receiver is always active and is not affected by the power management circuitry.

The transceiver is matched for 50 ohm operation over a wide band of frequencies. This condition is maintained with power on and off.

RECEPTION

The CT2505 receiver section accepts a bipolar signal which is level detected and passed to the serial decoder. The decoder section reconstructs the data and strips the clock from the serial stream. An NRZ decoded data stream is then produced synchronously with a recovered clock. The receiver is designed to meet the MIL-STD-1397 Type E requirements.

ELECTRICAL REQUIREMENTS

The specification detailed herein encompasses a hybrid Transceiver/Encoder-Decoder designed to meet the requirements of the MIL-STD-1397 Type E. The transceiver is transformer coupled to the specified triaxial cable and is screened to MIL-STD-883 Method 5008.

See Figure 1 for Block Diagram. Inputs and Outputs are all Synchronous NRZ DATA STREAMS. The transformer is external to the package with its use being mandatory under MIL-STD-1397 Type E specs.

TRANSFORMER ISOLATION

The CT2505 is then connected with pin 1 and pin 30 to the CT 15-1031 transformer secondary winding. The center tap of the secondary winding is connected to +5 Volts. For matching 50Ω load operation, a 54Ω resistor must be placed across the primary winding of the transformer.

ENCODER TIMING/TRANSMITTER SPECIFICATIONS

Symbol	Parameter/Condition	Min	Typ	Max	Unit
Encode Timing					
t_1	Input Data Set-up Time	15		45	ns
t_2	Encode Clock Set-up Time	15		45	ns
t_3	Encode Envelope Set-up Time	15		45	ns
t_4	Encode Envelope Turn-off Time	10		35	ns
t_5	Transmitter Activation Set-up Time	200			ns
t_6	Transmitter Deactivation Hold-time	100			ns
t_{w1}	20MHz Gated CK Pulse Width High	20		30	ns
t_{w2}	Encoder Shift CK Pulse Width High	45		55	ns
Output Signals					
Va	Output Amplitude (See Figure 2)	0.45	0.7	0.8	Volts
T	Pulse Period	97	100	103	ns
Ts	Width of 1st Positive Half Bit	45		65	ns
Te	Width of Last Half Bit	47		65	ns
T/2	Half Pulse Period	47	50	53	ns
Tr	Pulse Rise Time	0.05		0.3	V/ns
Tf	Pulse Fall Time	0.05		0.3	V/ns
Vs	Voltage Overshoot			100	mV
Tos	Offset Voltage 2T After Last Zero Crossing			30	mV
Tdtx	Delay From 20 MHz Clock Input to Data Output On Transformer Secondary		20	55	ns
Zo	Output Impedance	45	50	55	ohms

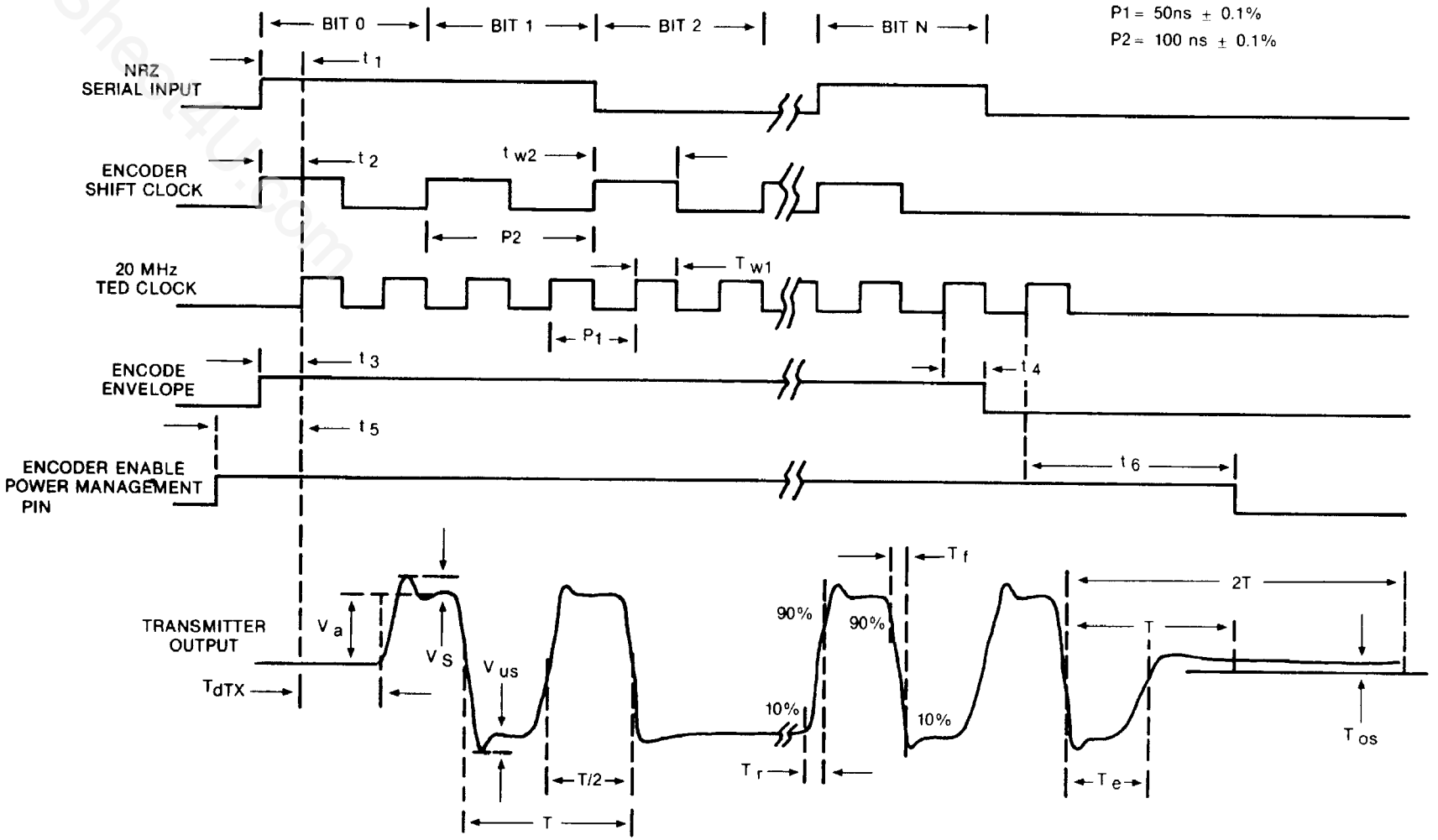


FIGURE 2. ENCODER - TRANSMITTER TIMING

FUNCTIONAL DESCRIPTION AND PINOUTS

Pin#	Pin Name	Function	Load or Drive
1	XFMR Secondary/ RX Data Input	Transmitter-Receiver I/O Pin	
2	No Connection		
3	No Connection		
4	No Connection		
5	+5 Volts		
6	R_x Strobe	Low Level Disables Receiver	3 S Loads
7	Power Management Input	Controls Transmitter Power Consumption In Conjunction With Pin 10	1 S Load
8	Encoder Enable	Controls Transmitter Power Consumption In Conjunction With Pin 9	1 S Load
9	Case/Signal GND		
10	Case/Signal GND		
11	Decoded Data Envelope	High After Reception of First Half Bit; Goes Low After Reception of Last Half Bit (Normally Low in Inactive State)	4 S Drive
12	TP3 Test Point	Alignment Point: No Electrical Connection Permitted	
13	TP1 Test Point	Alignment Point: No Electrical Connection Permitted	
14	TP2 Test Point	Alignment Point: No Electrical Connection Permitted	
15	GND		
16	TP4 Test Point	Alignment Point: No Electrical Connection Permitted	
17	$Clock_R$	Reconstructed Clock; One Clock Pulse Per Input Bit Received	3 S Drive
18	No Connection		
19	$Decoded\ Data_R$	NRZ Reconstructed Data. Sampled on $Clock_R$ Rising Edge.	3 S Drive
20	No Connection		
21	+5 Volts		
22	+5 Volts		
23	10 MHz Encoder Shift Clock	On Cycle Required Per Data Bit. Must Be High In First Half Of Bit Cell	1 S Load
24	NRZ Serial Input Data	Serial Input To Be Manchester Encoded With The 20 MHz Gated Ck.	1 S Load
25	Encode Envelope	Must Be High To Enable Transmission. Must Go Low Before Reception Of Last 20 MHz Positive Edge To Complete Transmission	1 S Load
26	20 MHz Gated Clock (Encoder)	Each Bit To Be Encoded Requires Two Positive Edges Of The 20 MHz Ck. These Edges Must Occur At 25 nS And 75 nS Into The Bit Cell. The End Of Transmission Requires An Additional Edge In Conjunction With A Logic Low On The Encode Envelope. t_R, $t_F \leq 5$ ns.	1 S Load
27	$\overline{\text{Master Reset}}$	Logic Low Resets Encoder Reset Pulse ≥ 15 ns.	2 S Load
28	No Connection		
29	No Connection		
30	XFMR Secondary/ RX $\overline{\text{Data}}$ Input	Transmitter-Receiver I/O Pin	

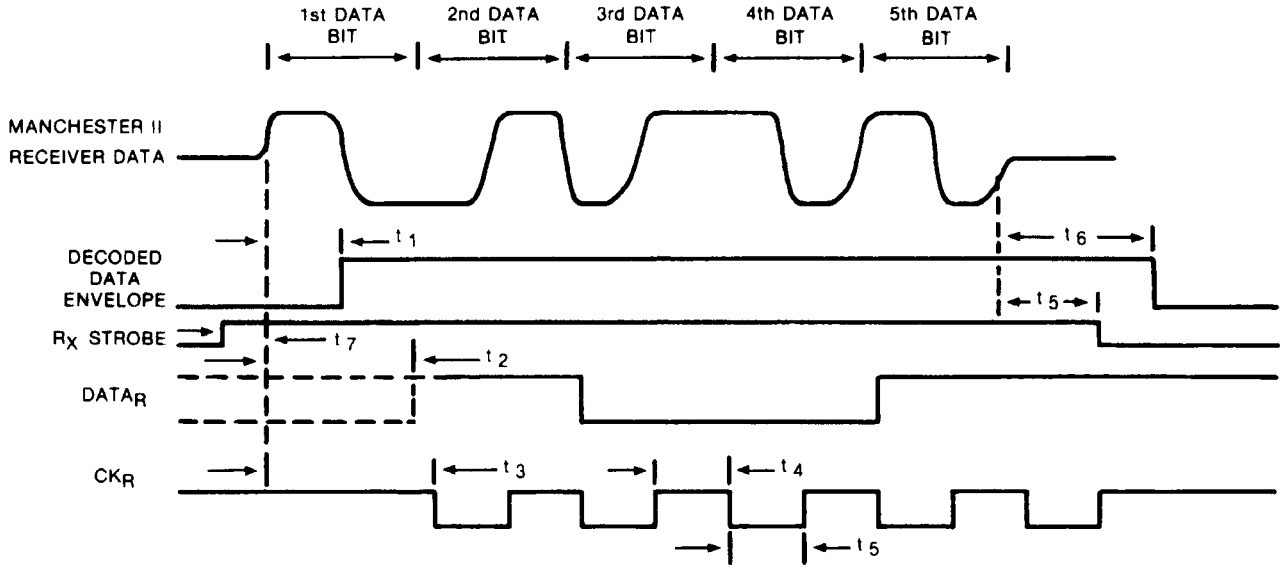


FIGURE 3. CT2505 RECEIVER/DECODE TIMING

Symbol	Parameter/Condition	Min	Nom	Max	Units
t_1	Envelope Delay Time	—		300	ns
t_2	Data Decode Delay	—		350	ns
t_3	Clock Low Transition Delay	—		350	ns
t_4	$Clock_R$ High Time	35	50	65	ns
t_5	$Clock_R$ Low Time	35	50	65	ns
t_6	Transmission Envelope Off Delay	175	—	350	ns
t_7	Receiver Strobe Enable to Input Data Set-Up Time	5			ns
t_8	Receiver Strobe Disable to Input Data Hold-Time	20			

POWER MANAGEMENT FUNCTIONAL TABLE

Encoder Enable (PIN 8)	Power Management Input (PIN 7)	Receiver Status	Transmitter Status
0	0	Active	Standby
X	1	Active	Active
1	X	Active	Active

Power Management Timing See Figure 2.

LOAD AND DRIVE DEFINITIONS

1 S Load: Requires I_{IL}= -2 mA Max., V_{IL}= 0.8V Max
I_{IH}= 50 uA Max., V_{IH}= 2.5V Min C_{IN}<15 pf
1 S Drive: I_{OH}= 50 uA Min., V_{OH}= 2.5V Min
I_{OL}= -2 mA Min., V_{OL}= 0.5V Max

CT2505 POWER CONSUMPTION

	Current (mA)	
	TYP	MAX
I_{CC} Standby Mode	400	550
I_{CC} 100% Transmission	500	600

ABSOLUTE MAXIMUM RATINGS

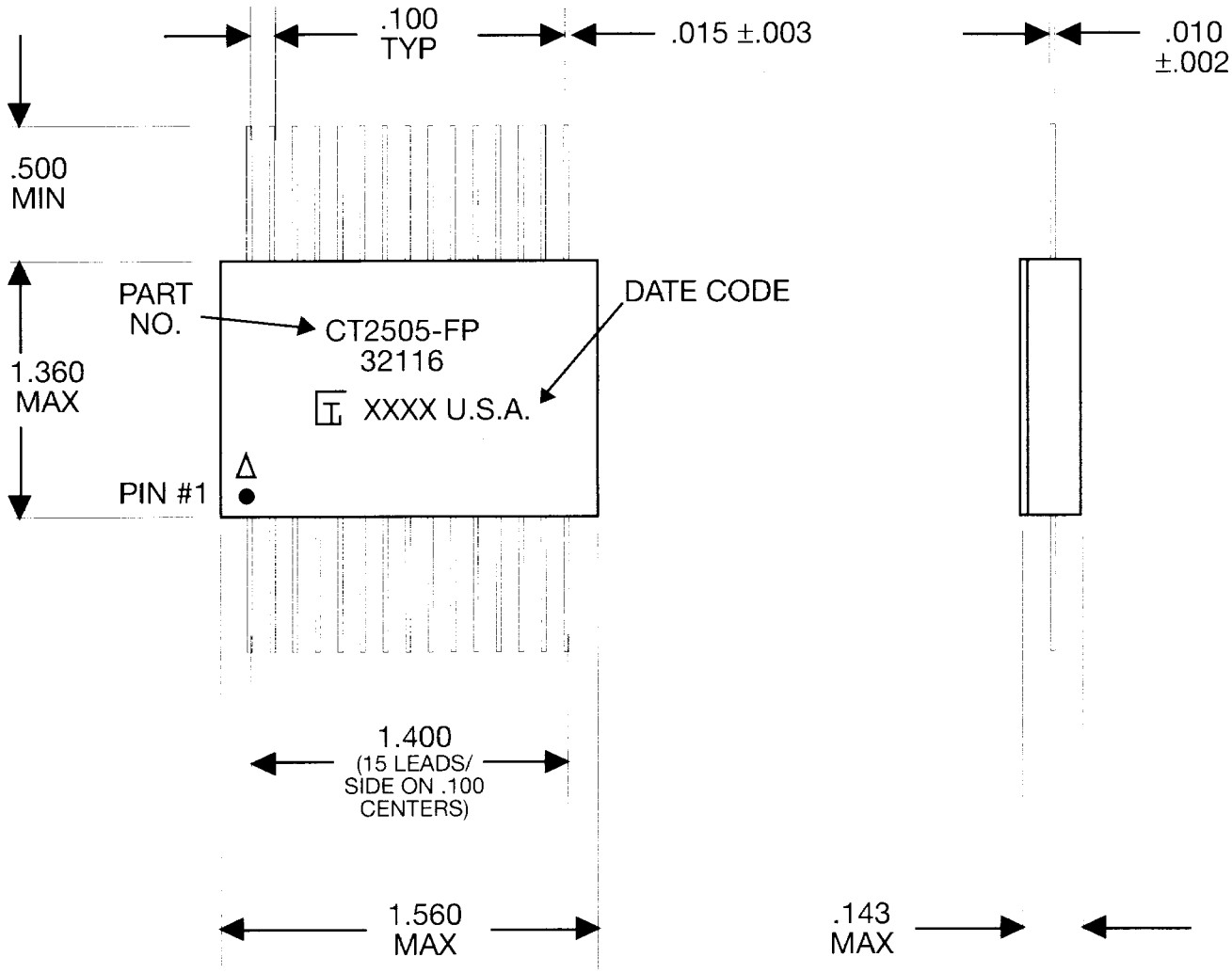
V_{CC} (Pins 5, 21, 22) +7 Volts Max
Logic Input Voltage Applied:
Logic Low -1.2V @ 10mA Max
Logic High +5.5 Volts

Damage will not result from the following faults to the transformer primary:
Short circuit line to line
Short circuit to ground
Short circuit to V_S when $-50 \leq V_S \leq +50$ V
120 VAC 60 HZ Common Mode Signal

ENVIRONMENTAL PARAMETERS

Operating Temperature -55°C to +100°C Case
Storage Temperature -65°C to +150°C
Screened per MIL-STD-883B Method 5008 except as outlined here
Burn-in: 168 hours at +100°C case temperature.

Note: All tolerances ±.005 unless otherwise specified.



CT2505 FLATPACK PACKAGE OUTLINE

Note: All tolerances ±.005 unless otherwise specified.

Marconi
Electronic Devices

European Headquarters
Marconi Electronic Devices Ltd.
Doddington Road,
Lincoln LN6 3LF England.
Tel: 0522 500500 Telex: 56380
Fax: 0522 500550

USA Headquarters & Plant
Marconi Circuit Technology Corp.,
160 Smith Street, Farmingdale,
New York 11735 U.S.A.
Tel: (516) 293-8686
Fax: (516) 293-0061

France
Marconi Electronic Devices, s.a.
2 Rue Henri-Bergson,
92600, Asnieres, France
Tel: (1) 4080 54 00
Telex: 612650
Fax: (1) 4733 11 31

Germany
Marconi Electronic Devices GmbH
Landsberger Strasse 65
D8034, Germering, West Germany
Tel: 089 849 360
Telex: 5212642
Fax: 089 841 91 42

PRINTED IN U.S.A. 8/90 5.0M