

# CT2512 / CT2513 / CT2510 / CT2511

## Dual Redundant Remote Terminal for MIL-STD-1553B

www.aeroflex.com/Avionics

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### FEATURES

- CT2512 Replaces DDC BUS-65112 and BUS-65117
- CT2513 Replaces DDC BUS-65113 and BUS-65118
- CT2510 Replaces DDC BUS-65110 and BUS-65120
- CT2511 Replaces DDC BUS-65111 and BUS-65121
- Functions as a Complete Remote Terminal Unit
- Supports 13 Mode Codes, Illegalization of Codes Allowed
- Transfers Data with DMA Type Handshaking
- Latched Outputs for Command Word and Word Count
- 14 Bit Built-In-Test Word Register
- 4 Error Flag Outputs
- Advanced Low Power VLSI Technology
- Designed for commercial, industrial and aerospace applications
- MIL-PRF-38534 compliant devices available
- Aeroflex-Plainview is a Class H & K MIL-PRF-38534 manufacturer
- Packaging – Hermetic Metal
  - 68 Pin, 2.1" x 1.87" x .25" Plug-In Type Package
  - 82 Leads, 2.195" x 1.60" x .19" Flat Type Package
- DESC SMD# 5962-87535

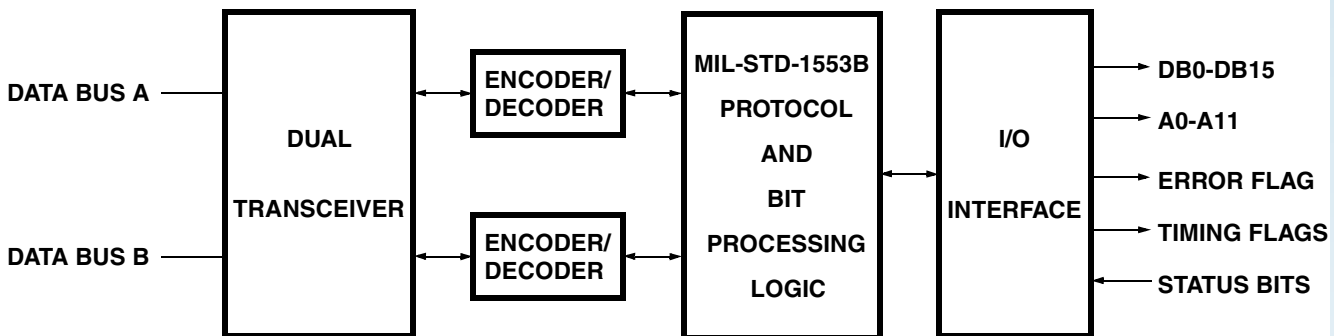


FIGURE 1 – FUNCTIONAL BLOCK DIAGRAM

### DESCRIPTION

The Aeroflex-Plainview CT2512 contains 2 Transceivers, 2 Encoder/Decoders, Bit Processors and complete Remote Terminal (RT) logic. The device is constructed using Aeroflex advanced VLSI custom chip and hybrid technology. It functions as a complete dual redundant MIL-STD-1553B RT Unit supporting all 13 mode codes for dual redundant operation. The CT2512 is a pin-for-pin functional equivalent of the DDC BUS-65112/117 and performs parallel data transfers with a DMA type handshake. Multiple error flag outputs and host access to many of the RT Status Word bits are just some of the features that make this part ideal for many RT applications. The unit has an operating range of -55°C to +125°C. See "Ordering Information" (last sheet) for CT2513 / CT2510 / CT2511.

## ABSOLUTE MAXIMUM RATINGS

| Parameter  | Limits        | Units |
|--|---------------|-------|
| Power Supply Voltage (VCC)<br>(Pins 18, 76 DDIP)           | -0.3 to +18.0 | Volts |
| Power Supply Voltage (VEE)<br>(Pins 38, 57 DDIP)           | +0.3 to -18.0 | Volts |
| Power Supply Voltage (VCCL)<br>(Pins 37, 58 / 51 DDIP)     | -0.3 to +7.0  | Volts |
| Receiver Differential Input<br>(Pins 20, 59 / 74, 36 DDIP) | ±20 (40Vp-p)  | Volts |
| Receiver Input Voltage<br>(Pins 20, 59 / 74, 36 DDIP)      | ±15           | Volts |
| Driver Output Current<br>(Pins 56, 17 / 39, 77 DDIP)       | +200          | mA    |
| Transmission Duty Cycle at Tc = 125°C                      | 100           | %     |
| Operating Case Temperature Range (Tc)                      | -55 to +125   | °C    |

## POWER AND THERMAL DATA (SINGLE TRANSCEIVER AND LOGIC SECTION)

| Parameter/Conditions   | Symbol              | Min    | Typ | Max    | Units |
|--|---------------------|--------|-----|--------|-------|
| Power Supply Voltage   | V <sub>CC</sub>     | 14.25  | 15  | 15.75  | V     |
|  | V <sub>EE</sub>     | -14.25 | -15 | -15.75 | V     |
|  | V <sub>CCL</sub>    | 4.5    | 5   | 5.5    | V     |
| Thermal Resistance, most critical device   | θ <sub>JC</sub>     | -      | 10  | -      | °C/W  |
| Power dissipation of most critical (hottest) device during continuous transmission (100% duty cycle) 1/                                | P <sub>C</sub>      | -      | 700 | -      | mW    |
| Total supply current standby mode, or transmitting at less than 1% duty cycle (e.g. 20us of transmission every 2ms or longer interval) | I <sub>CC</sub>     | -      | 0   | 5      | mA    |
|  | I <sub>EE</sub> 2/  | -      | 12  | 20     | mA    |
|  | I <sub>CCL</sub> 2/ | -      | 20  | 50     | mA    |
| Total supply current transmitting at 1Mhz into a 35-ohm load at Point A in Figure 2 3/   | ICC @ 25%           | -      | 90  | 100    | mA    |
|  | ICC @ 100%          | -      | 180 | 200    | mA    |

Notes

1/ Decreases linearly to zero at zero duty cycle.

2/ Limit does not change with mode of operation or duty cycle.

3/ Decreases linearly to applicable "standby" values at zero duty cycle.

## ELECTRICAL CHARACTERISTICS (RECEIVER SECTION)

| Parameter/Conditions  | Symbol           | Min  | Typ | Max | Units  |
|---|------------------|------|-----|-----|--------|
| Differential input impedance<br>DC to 1MHz  | Z <sub>IN</sub>  | 9K   | -   | -   | Ω      |
| Differential voltage range  | V <sub>DIR</sub> | ±20V | -   | -   | VPK    |
| Input common mode voltage range   | V <sub>ICR</sub> | ±10V | -   | -   | VPK    |
| Common mode rejection ratio<br>(from Point A, Figure 1)   | CMMR             | 40   | -   | -   | dB     |
| Threshold characteristics<br>(Sine wave at 1MHz) Note: Threshold voltages refer to Point A, Figure 2. | V <sub>TH</sub>  | 0.8  | -   | 1.1 | VPK-PK |

## ELECTRICAL CHARACTERISTICS (TRANSMITTER SECTION)

| Parameter/Conditions  | Symbol    | Min | Typ | Max | Units               |
|---|-----------|-----|-----|-----|---------------------|
| Differential output level at Point B, Figure 2 (145-ohm load)   | $V_O$     | 26  | 28  | 35  | V <sub>PK-PK</sub>  |
| Rise and Fall times (10% to 90% of p-p output)  | $T_r$     | 100 | 160 | 300 | nS                  |
| Output offset at Point A in Figure 2 (35-ohm load) 2.5us after mid-bit crossing of parity bit of last word of a 660us message | $V_{OS}$  | -   | ±20 | ±90 | mV <sub>PK</sub>    |
| Differential output noise   | $V_{NOI}$ | -   | -   | 10  | mV <sub>PK-PK</sub> |

## LOGIC CHARACTERISTICS

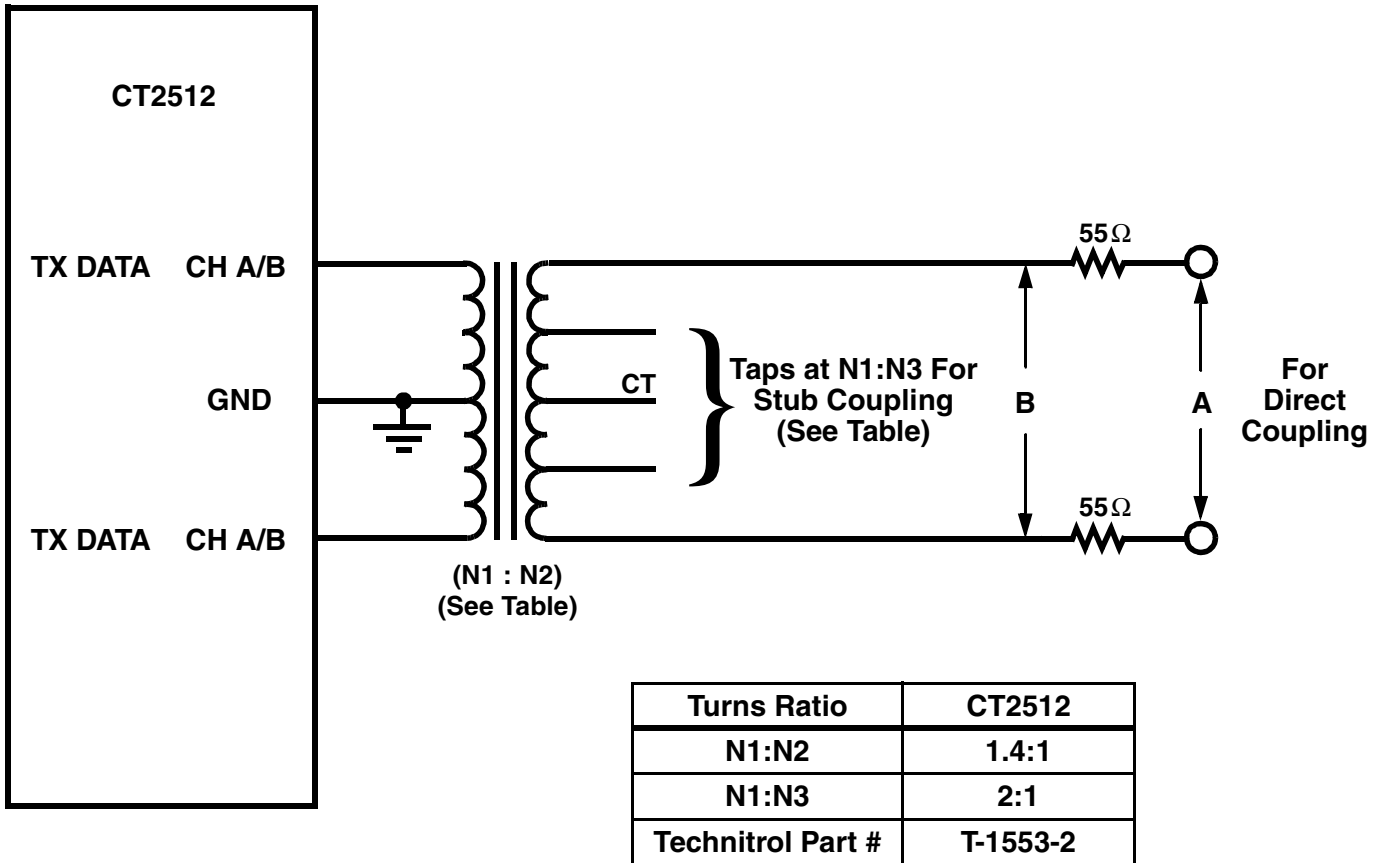
| Symbol   | Parameter  | Min  | Typ | Max  | Units           | Conditions |
|----------|------------|------|-----|------|-----------------|------------|
| $V_{IH}$ | Input "1"  | 2.4  | -   | -    | V <sub>DC</sub> |            |
| $V_{IL}$ | Input "0"  | -    | -   | 0.7  | V <sub>DC</sub> |            |
| $I_{IL}$ | Input 1    | -100 | -   | -650 | μA              | Note 1A    |
| $I_{IH}$ | Input 1    | -    | -   | -650 | μA              | Note 1B    |
| $I_{IL}$ | Input 1    | -20  | -   | +20  | μA              | Note 2A    |
| $I_{IH}$ | Input 1    | -20  | -   | +20  | μA              | Note 1B    |
| $V_{OH}$ | Output "1" | 2.7  | -   | -    | V <sub>DC</sub> | Note 3A/4A |
| $V_{OL}$ | Output "0" | -    | -   | 0.4  | V <sub>DC</sub> | Note 3B/4B |

Note 1: For INPUT pins 12,13,14,15, 53, 54, 55.  
 $V_{CC} = 5.5V$   
 A. @  $V_{IL} = 0.4V$   
 B. @  $V_{IH} = 2.4V$

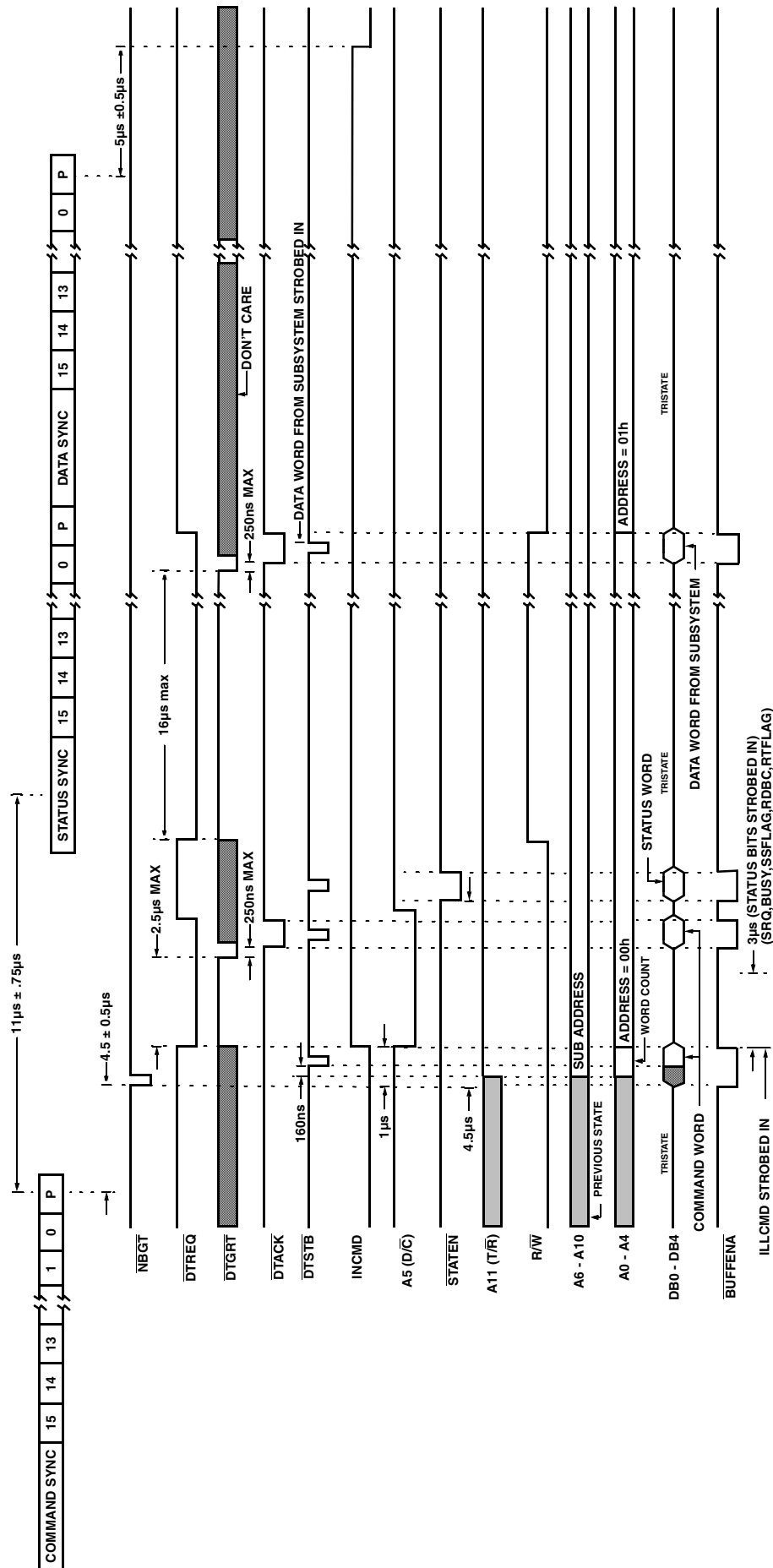
Note 2: All remaining INPUTS other than in Note 1.  
 $V_{CC} = 5.5V$   
 A. @  $V_{IL} = 0.4V$   
 B. @  $V_{IH} = 2.4V$

Note 3: For OUTPUT pins 4 through 11 and 43 through 50.  
 A. @  $V_{CC} = 4.5V$  and  $I_{OH} = 3mA$   
 B. @  $V_{CC} = 2.4V$  and  $I_{OL} = 6mA$

Note 4: All remaining OUTPUTS other than in Note 3.  
 A. @  $V_{CC} = 4.5V$  and  $I_{OH} = 2mA$   
 B. @  $V_{CC} = 5.5V$  and  $I_{OL} = 4mA$



**FIGURE 2 – TYPICAL DIRECT COUPLED CONFIGURATION**



**FIGURE 3 – TIMING DIAGRAM, TRANSMIT ONE WORD**



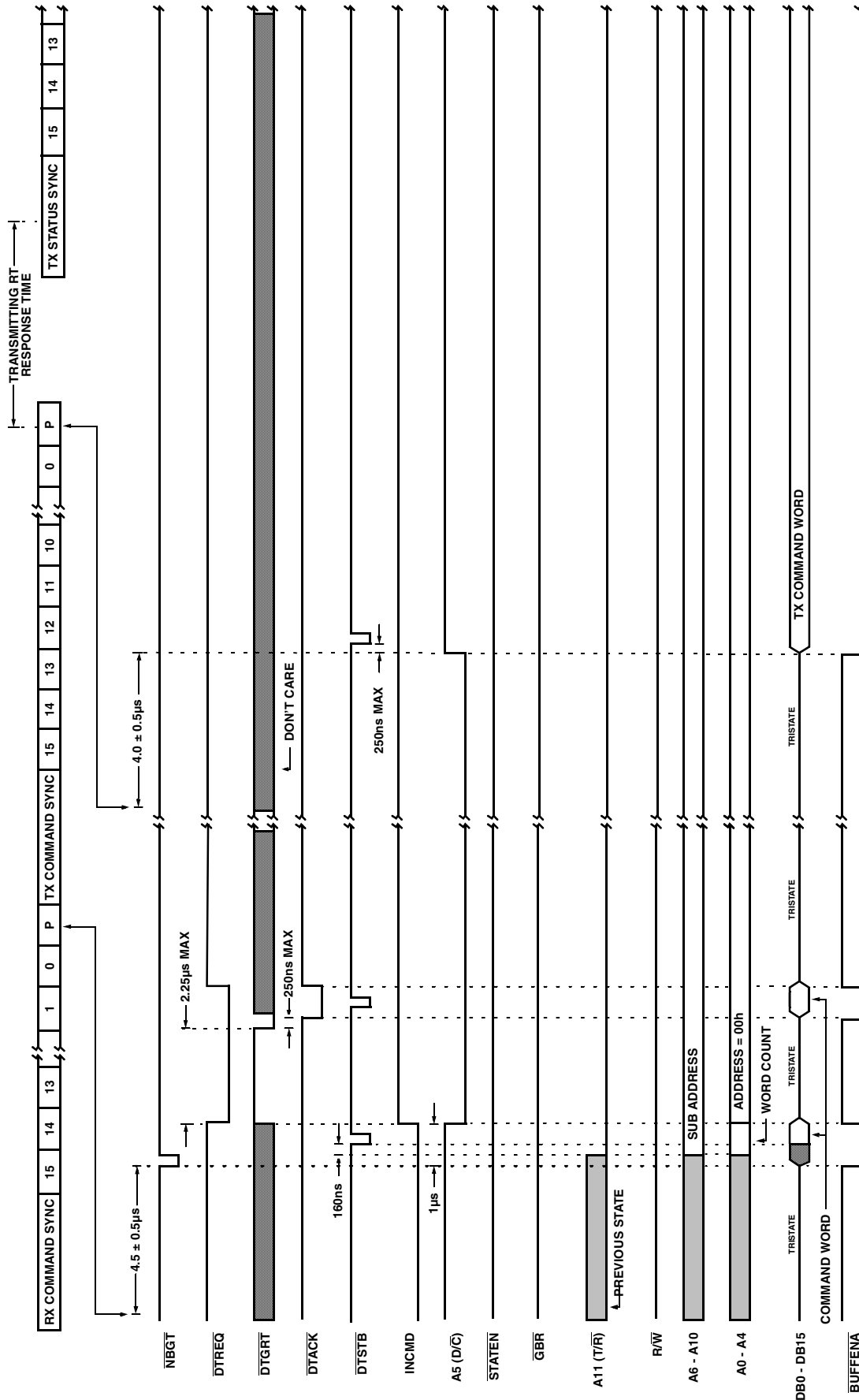


FIGURE 5A – TIMING DIAGRAM, RT TO RT RECEIVE ONE WORD (PART A)

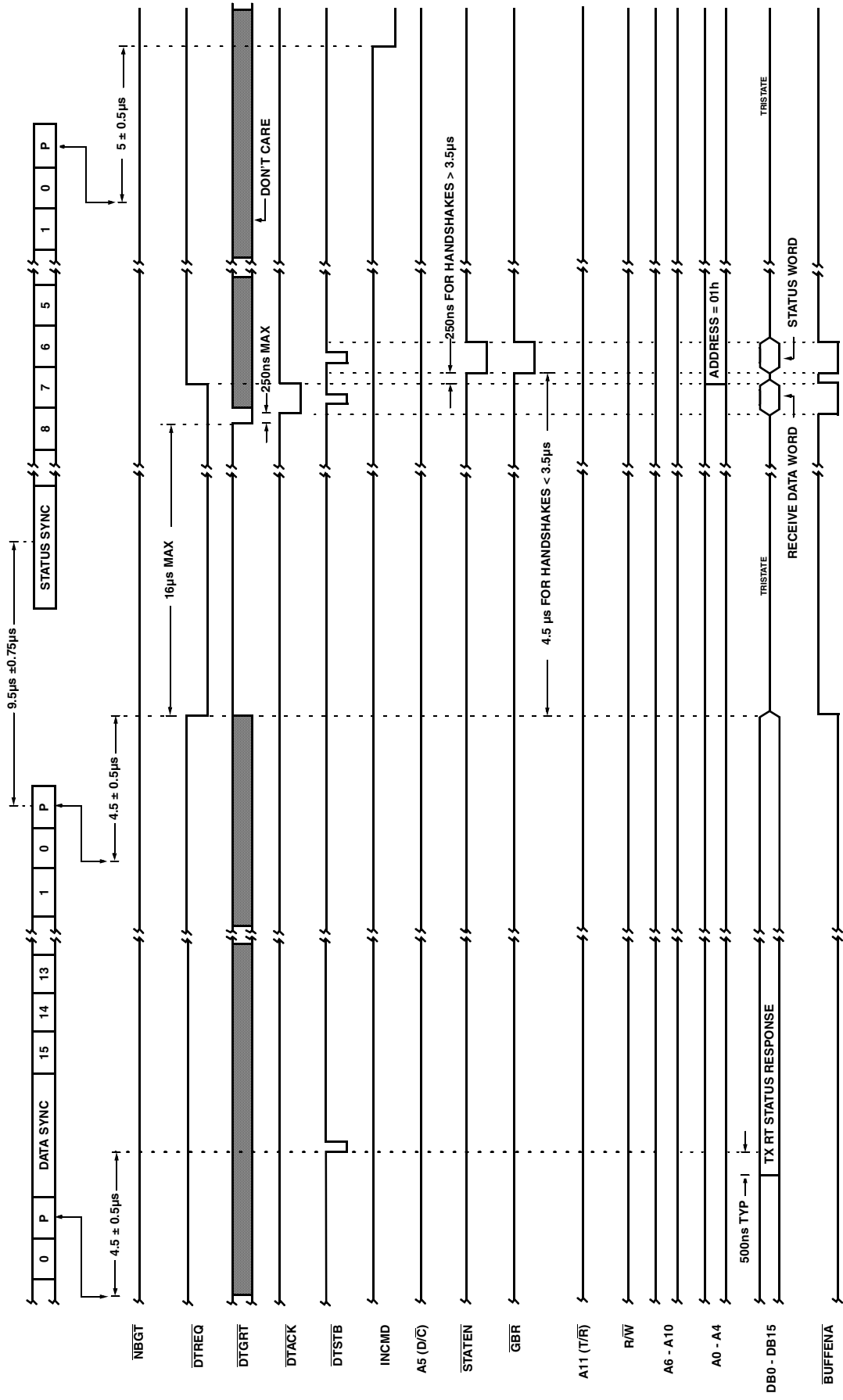


FIGURE 5B – TIMING DIAGRAM, RT TO RT RECEIVE ONE WORD (PART B)

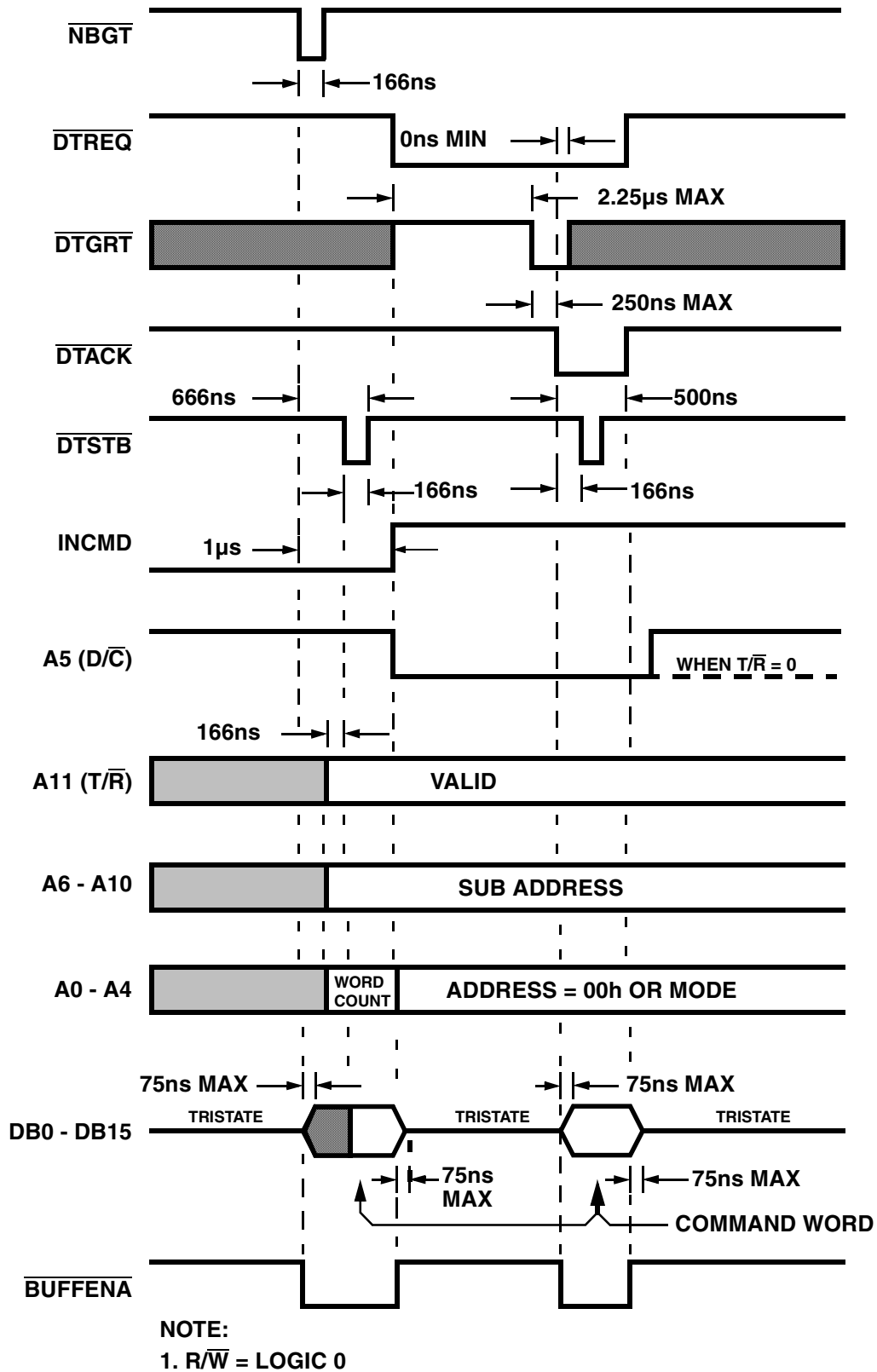
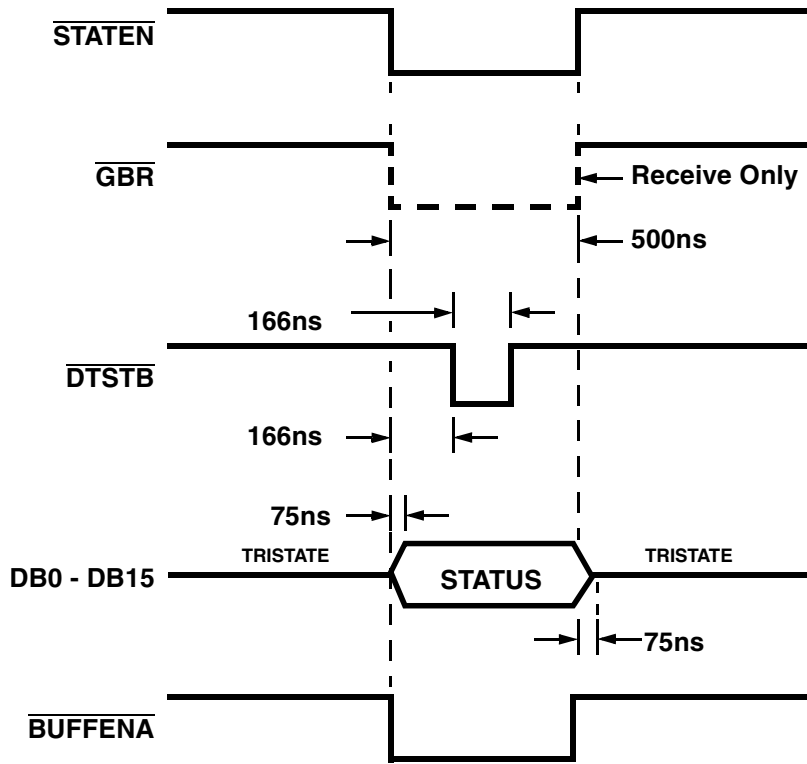
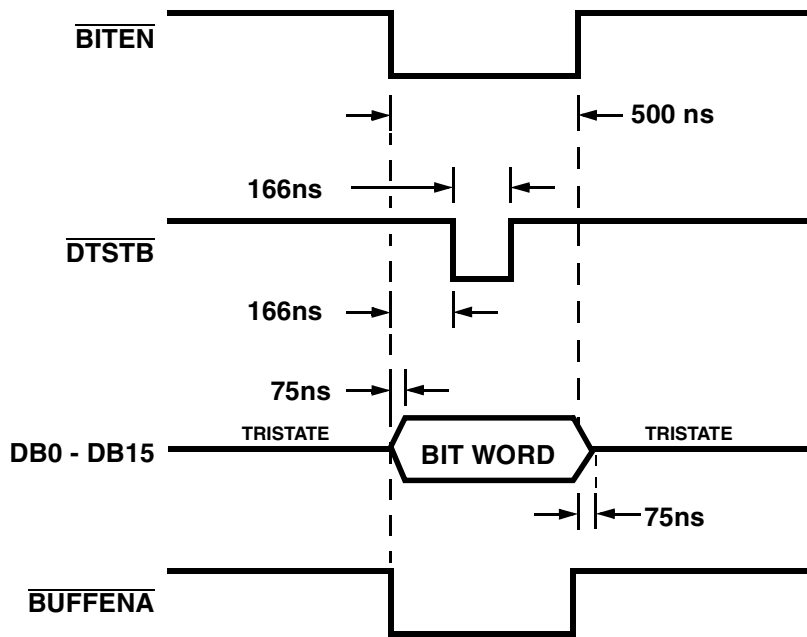


FIGURE 6 – TIMING DIAGRAM, COMMAND WORD TRANSFER



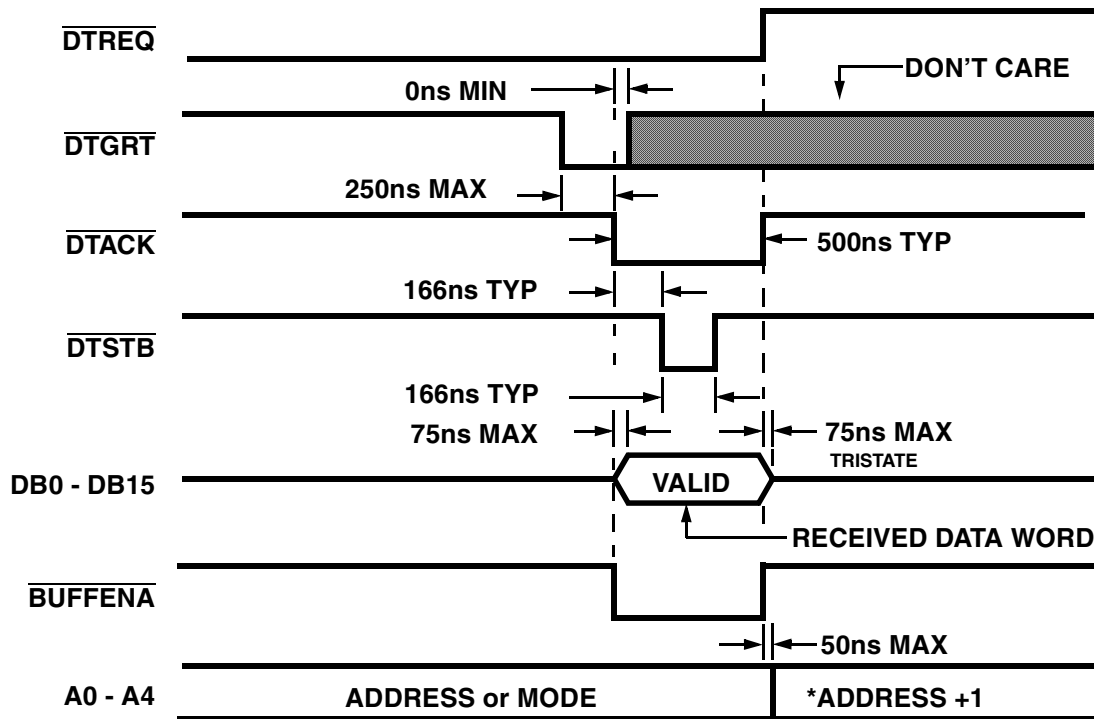
NOTE:  
1.  $R/\overline{W} = 0$

FIGURE 7 – TIMING DIAGRAM, STATUS WORD TRANSFER



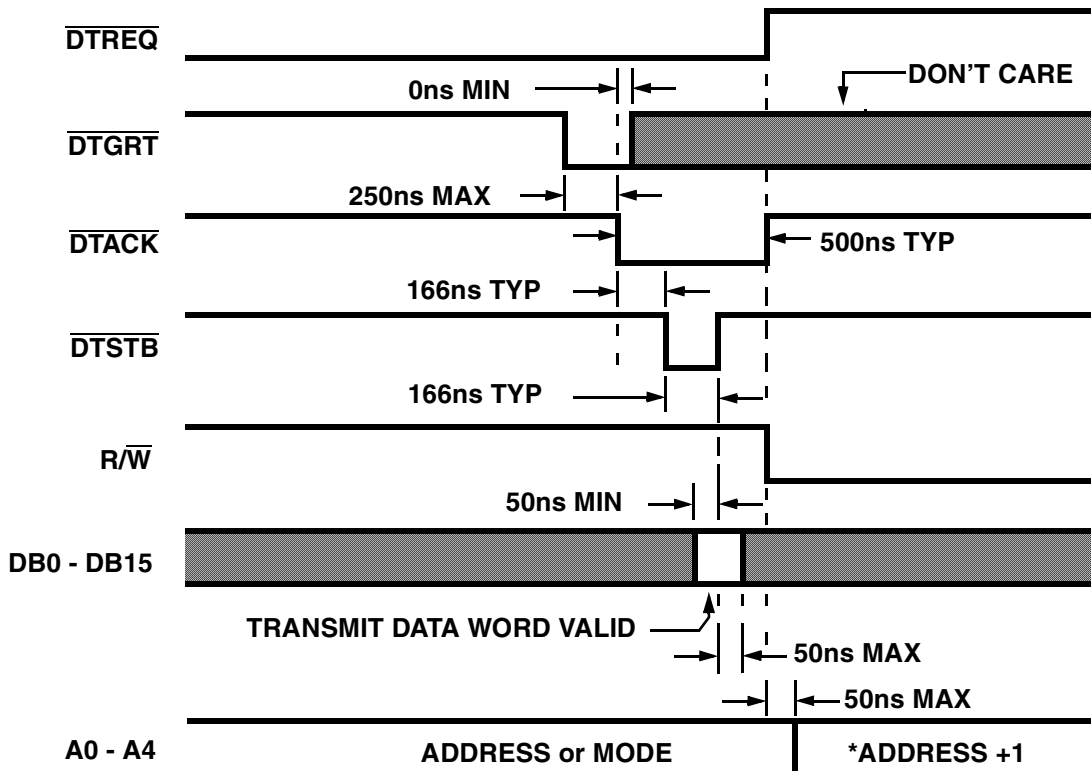
NOTE:  
1.  $R/\overline{W} = 0$

FIGURE 8 – TIMING DIAGRAM, BIT WORD TRANSFER



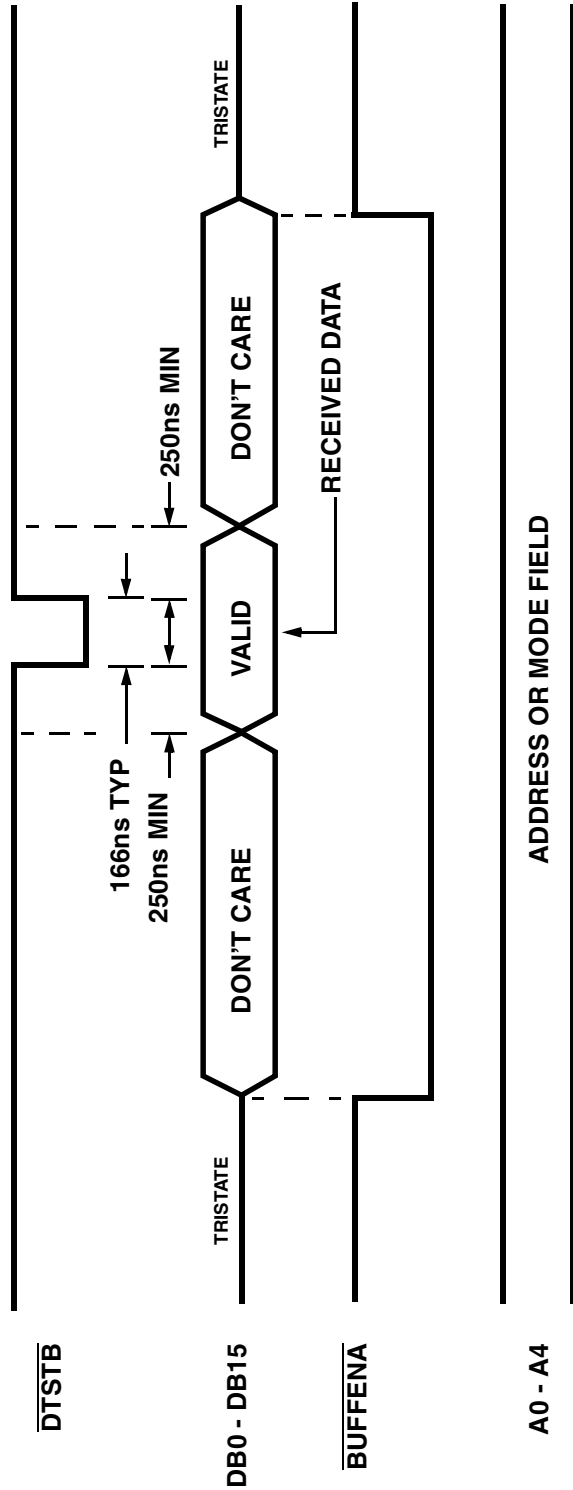
- 1.  $R/\overline{W}$  = Logic 0
- 2. (\*) = Non-Mode Only
- 3.  $\overline{BUFFENA}$  =  $\overline{DTACK}$

FIGURE 9 – TIMING DIAGRAM, DATA TO SUBSYSTEM



- 1. (\*) = Non-Mode Only
- 2. Word Count for Mode Code
- 3.  $\overline{BUFFENA}$  = Don't Care

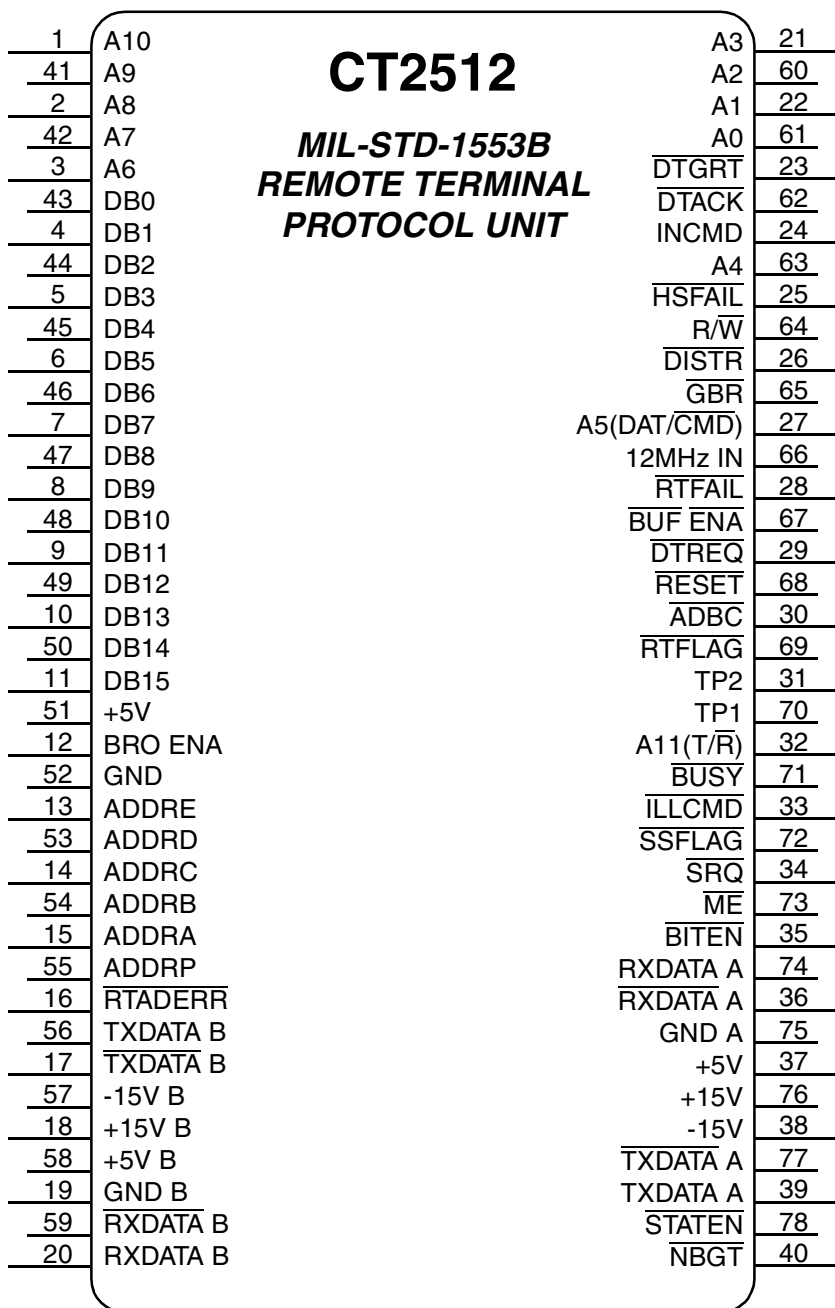
FIGURE 10 – TIMING DIAGRAM, DATA FROM SUBSYSTEM



- NOTES:
1.  $R/\overline{W}$  = LOGIC 0
  2.  $\overline{DTGRT}$  =  $\overline{DTREQ}$  = LOGIC 1
  3.  $\overline{INCMD}$  =  $\overline{DAT/CMD}$  ARE LOGIC 1

FIGURE 11 – TIMING DIAGRAM, DATA TRANSFERS TO SUBSYSTEM (NO HANDSHAKE)

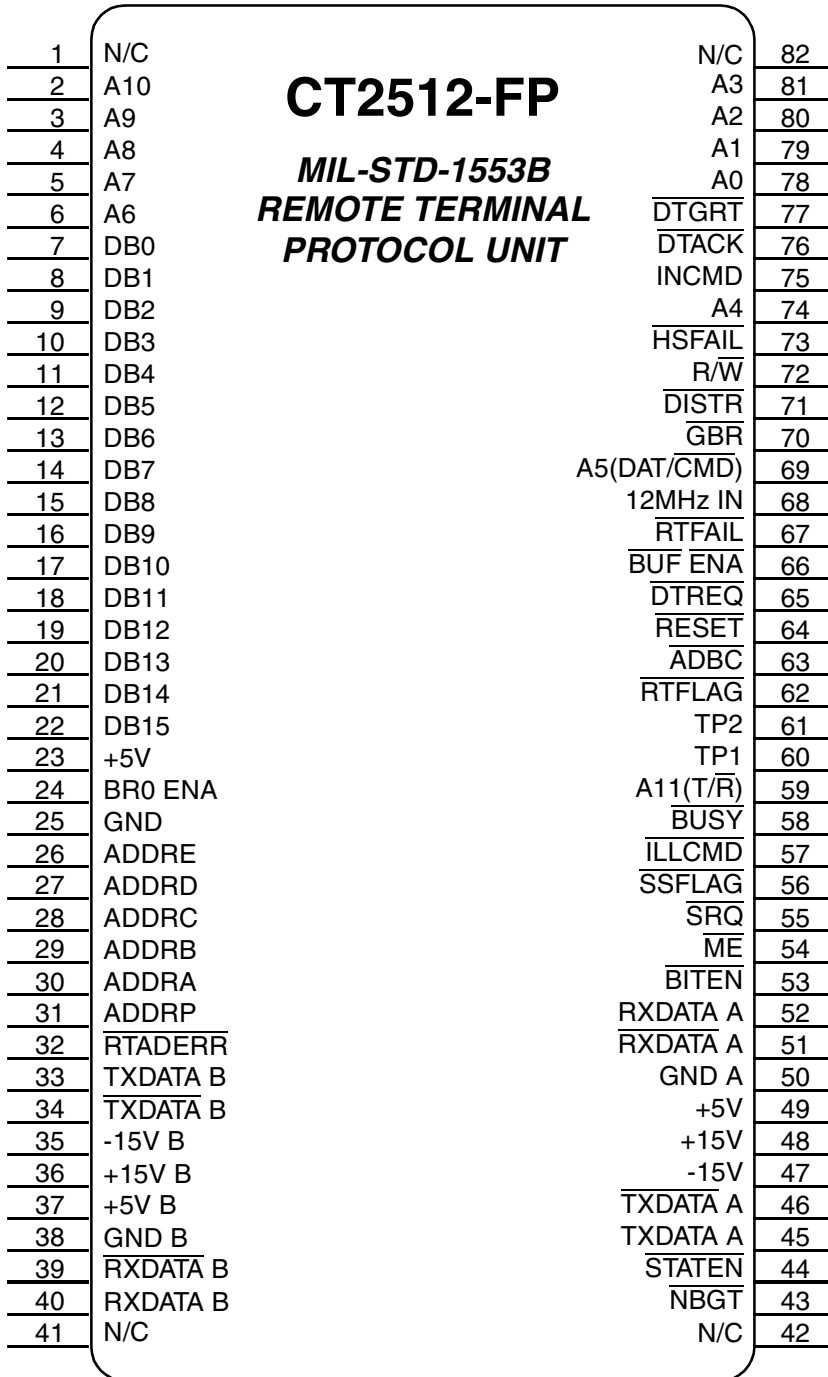
**CT2512 PIN OUT DESCRIPTION (DDIP)**



| Pin # | Function     | Pin # | Function |
|-------|--------------|-------|----------|
| 1     | A10          | 40    | NBGT     |
| 2     | A8           | 41    | A9       |
| 3     | A6           | 42    | A7       |
| 4     | DB1          | 43    | DB0      |
| 5     | DB3          | 44    | DB2      |
| 6     | DB5          | 45    | DB4      |
| 7     | DB7          | 46    | DB6      |
| 8     | DB9          | 47    | DB8      |
| 9     | DB11         | 48    | DB10     |
| 10    | DB13         | 49    | DB12     |
| 11    | DB15         | 50    | DB14     |
| 12    | BRO ENA      | 51    | +5V      |
| 13    | ADDRE        | 52    | GND      |
| 14    | ADDRC        | 53    | ADDRD    |
| 15    | ADDRA        | 54    | ADDRB    |
| 16    | RTADERR      | 55    | ADDRP    |
| 17    | TXDATA B     | 56    | TXDATA B |
| 18    | +15V B       | 57    | -15V B   |
| 19    | GND B        | 58    | +5V B    |
| 20    | RXDATA B     | 59    | RXDATA B |
| 21    | A3           | 60    | A2       |
| 22    | A1           | 61    | A0       |
| 23    | DTGRT        | 62    | DTACK    |
| 24    | INCMD        | 63    | A4       |
| 25    | HSFAIL       | 64    | R/W      |
| 26    | DTSTR        | 65    | GBR      |
| 27    | A5 (DAT/CMD) | 66    | 12MHz IN |
| 28    | RTFAIL       | 67    | BUF ENA  |
| 29    | DTREQ        | 68    | RESET    |
| 30    | ADBC         | 69    | RTFLAG   |
| 31    | TP2 (NC)     | 70    | TP1 (NC) |
| 32    | A11 (T/R)    | 71    | BUSY     |
| 33    | ILLCMD       | 72    | SSFLAG   |
| 34    | SRQ          | 73    | ME       |
| 35    | BITEN        | 74    | RXDATA A |
| 36    | RXDATA A     | 75    | GND A    |
| 37    | +5V A        | 76    | +15V A   |
| 38    | -15V A       | 77    | TXDATA A |
| 39    | TXDATA A     | 78    | STATEN   |

**FIGURE 12 – DDIP PIN CONNECTION DIAGRAM, CT2512 AND PINOUT TABLE**

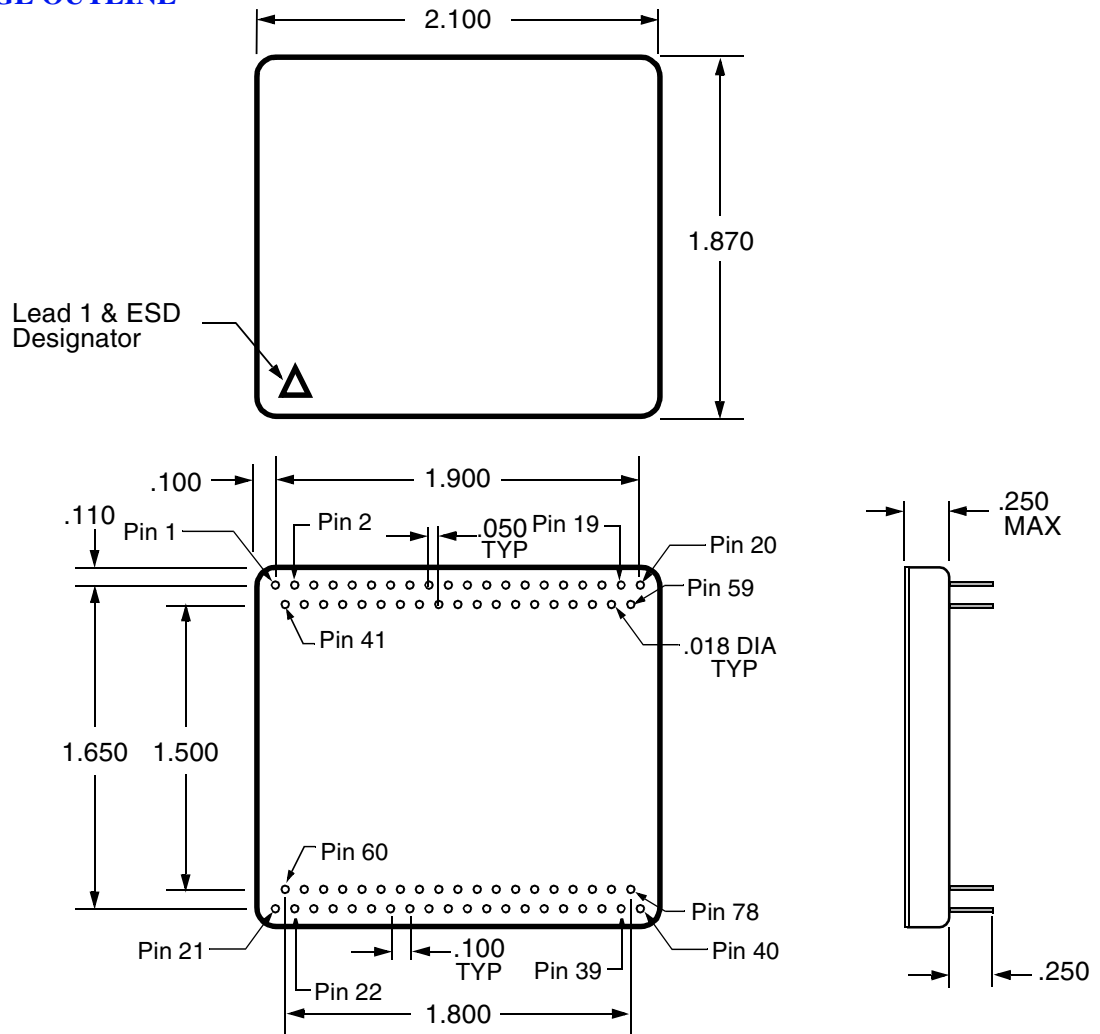
**CT2512 PIN OUT DESCRIPTION (FP)**



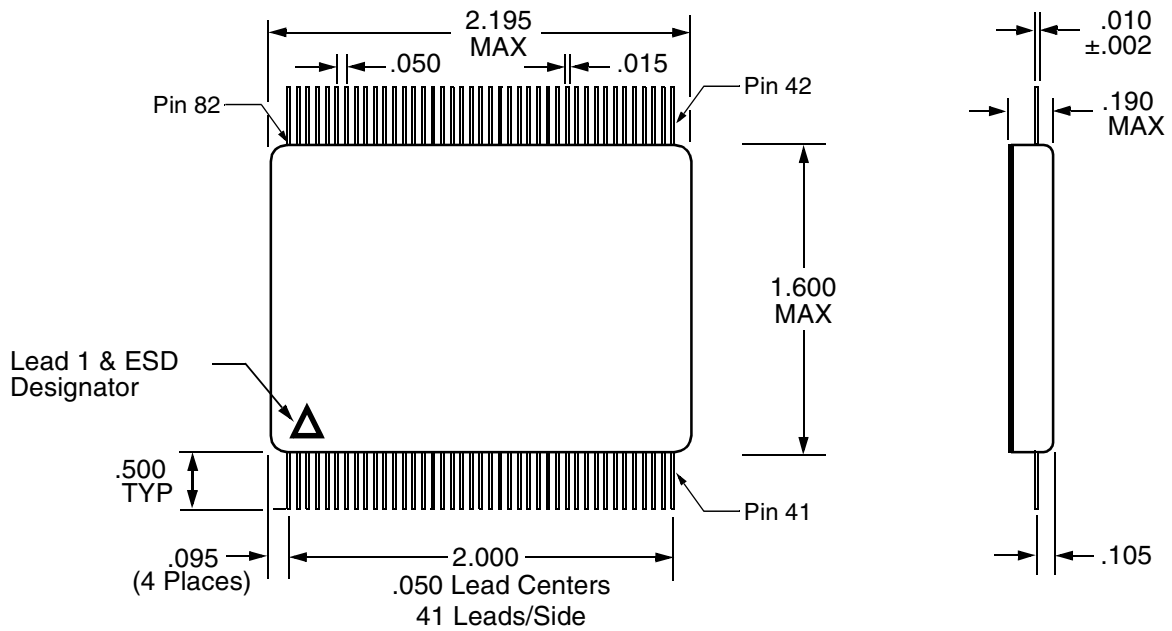
| Pin # | Function | Pin # | Function     |
|-------|----------|-------|--------------|
| 1     | NC       | 42    | NC           |
| 2     | A10      | 43    | NBGT         |
| 3     | A9       | 44    | STATEN       |
| 4     | A8       | 45    | TXDATA A     |
| 5     | A7       | 46    | TXDATA A     |
| 6     | A6       | 47    | -15V A       |
| 7     | DB0      | 48    | +15V A       |
| 8     | DB1      | 49    | +5V A        |
| 9     | DB2      | 50    | GND A        |
| 10    | DB3      | 51    | RXDATA A     |
| 11    | DB4      | 52    | RXDATA A     |
| 12    | DB5      | 53    | BITEN        |
| 13    | DB6      | 54    | ME           |
| 14    | DB7      | 55    | SRQ          |
| 15    | DB8      | 56    | SSFLAG       |
| 16    | DB9      | 57    | ILLCMD       |
| 17    | DB10     | 58    | BUSY         |
| 18    | DB11     | 59    | A11 (T/R)    |
| 19    | DB12     | 60    | TP1          |
| 20    | DB13     | 61    | TP2          |
| 21    | DB14     | 62    | RTFLAG       |
| 22    | DB15     | 63    | ADBC         |
| 23    | +5V      | 64    | RESET        |
| 24    | BRO ENA  | 65    | DTREQ        |
| 25    | GND      | 66    | BUF ENA      |
| 26    | ADDRE    | 67    | RTFAIL       |
| 27    | ADDRD    | 68    | 12MHz IN     |
| 28    | ADDRC    | 69    | A5 (DAT/CMD) |
| 29    | ADDRB    | 70    | GBR          |
| 30    | ADDRA    | 71    | DTSTR        |
| 31    | ADDRP    | 72    | R/W          |
| 32    | RTADERR  | 73    | HSFAIL       |
| 33    | TXDATA B | 74    | A4           |
| 34    | TXDATA B | 75    | INCMD        |
| 35    | -15V B   | 76    | DTACK        |
| 36    | +15V B   | 77    | DTGRT        |
| 37    | +5V B    | 78    | A0           |
| 38    | GND B    | 79    | A1           |
| 39    | RXDATA B | 80    | A2           |
| 40    | RXDATA B | 81    | A3           |
| 41    | NC       | 82    | NC           |

**FIGURE 13 – FLAT PACKAGE PIN CONNECTION DIAGRAM, CT2512 AND PINOUT TABLE**

## PLUG IN PACKAGE OUTLINE



## FLAT PACKAGE OUTLINE



## ORDERING INFORMATION

| Model Number  | Screening   | DESC SMD       | Power Supply | Package      |
|---------------|---|----------------|--------------|--------------|
| CT-2512-001-2 | Military Temperature, -55°C to +125°C,<br>Screened to the individual test methods<br>of MIL-STD-883 | 5962-8753503XA | +5V, ±15V    | Plug in      |
| CT-2512-001-1 |   | 5962-8753503XC |              |              |
| CT-2512-201-2 |   | 5962-8753503ZA |              | Flat Package |
| CT-2512-201-1 |   | 5962-8753503ZC |              |              |
| * CT2513      |   | -              | +5V, ±12V    | Plug in      |
| * CT2513-FP   |   |                |              | Flat Package |
| * CT2510      |   |                | +5V, -15V    | Plug in      |
| * CT2510-FP   |   |                |              | Flat Package |
| * CT2511      |   |                | +5V, -12V    | Plug in      |
| * CT2511-FP   |   |                |              | Flat Package |

\* Contact Factory for availability

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Fax: 516-694-6715

**INTERNATIONAL**  
Tel: 805-778-9229  
Fax: 805-778-1980

**NORTHEAST**  
Tel: 603-888-3975  
Fax: 603-888-4585

**SE AND MID-ATLANTIC**  
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Fax: 321-951-4254

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Fax: 949-362-2266

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