FEATURES

- ±12V to ±15V/±5V DC power supply operation
- 1.5Watt total hybrid dissipation at 25% transmitting duty cycle
- Monolithic construction
- TTL compatible
- Full military (-55°C to +125°C) temperature range
- Driver/Receiver in a single Package for Space & Weight Savings
- Filtering on Receiver to improve S/N ratio of system
- 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 plug-in or flat package
  - 24 Lead, 1.27” sq. max x .200”H Flat package
  - 24 Pin, 1.27” sq. max x .175”H Plug-In package

DRIVER DESCRIPTION

The CT3231 Driver section accepts complementary TTL Data at the input, and produces a 30 Volt nominal peak-to-peak differential signal across a 140Ω load at the output. When coupled to the Data Bus with a 1:1 transformer, isolated on the Data Bus side with two 55.0Ω fault isolation resistors, and loaded by two 70Ω terminations plus additional receivers, the Data Bus signal produced is 7.2 Volts nominal peak-to-peak.

When both “DATA” and “DATA” inputs are held low or both are held high, the driver output becomes a high impedance and is “removed” from the line. In addition, an overriding “INHIBIT” input provides for removal of the Driver output from the line. A logic “1” applied to the “INHIBIT” takes priority over the condition of the data inputs and disables the Driver. See Driver Logic Waveforms, Figure 3.

DATA and DATA inputs must be complementary waveforms, of 50% duty cycle average, with no gate delays between them. It is recommended that those inputs be driven from a “D” type flip-flop.

RECEIVER DESCRIPTION

The CT3231 Receiver section accepts Bi-Phase Differential data at the input and produces two TTL signals at the output. The outputs are “DATA” and “DATA”, and represent positive and negative excursions (respectively) of the input beyond a predetermined threshold. See Receiver Logic Waveforms, Figure 2.

The positive and negative thresholds may be internally set by grounding the appropriate pins, or externally set with resistors. The pre-set internal thresholds will detect Data Bus signals exceeding 1Volt p-p and ignore signals less than 0.5Volt p-p when used with 1:1 transformer (See Figure 4 for a suitable transformer and typical connection).

A low level at the STROBE input inhibits the DATA and DATA outputs. If unused, a 2KΩ pull-up to +5V is recommended.
FIGURE 1 – CT3231 Functional Block Diagram and Pinouts

NOTE: GROUNDS A, B, & C MUST ALL BE EXTERNALLY GROUNDED
### ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>RANGE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Supply Voltage, Pin 4 or 13</td>
<td>-0.3 to +18.0</td>
<td>Volts</td>
</tr>
<tr>
<td>Negative Supply Voltage, Pin 24 or 19</td>
<td>0.3 to -18.0</td>
<td>Volts</td>
</tr>
<tr>
<td>Logic Voltage, Pin 20</td>
<td>-0.3 to + 7.0</td>
<td>Volts</td>
</tr>
<tr>
<td>Logic Input Voltage, Pin 8, 21, 22, or 23</td>
<td>-0.3 to +5.5</td>
<td>Volts</td>
</tr>
<tr>
<td>Receiver Differential Input, Pin 15 to Pin 16</td>
<td>±20 (40Vp-p)</td>
<td>Volts</td>
</tr>
<tr>
<td>Receiver Input Voltage, Pin 15 or Pin 16</td>
<td>±15</td>
<td>Volts</td>
</tr>
<tr>
<td>Driver Peak Output Current, Pin 1 or Pin 2</td>
<td>±300</td>
<td>mA</td>
</tr>
<tr>
<td>Total Package Power Dissipation at (Ambient) TA = +25°C</td>
<td>4.0 (Note 1)</td>
<td>Watts</td>
</tr>
<tr>
<td>Power Dissipation at Specified Case Temperatures</td>
<td>See Figure 5</td>
<td></td>
</tr>
<tr>
<td>Operating Case Temperature Range (Tc)</td>
<td>-55 to +125</td>
<td>°C</td>
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### ELECTRICAL CHARACTERISTICS

#### RECEIVER SECTION

<table>
<thead>
<tr>
<th>Parameter / Condition</th>
<th>Sym</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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<tr>
<td>Power Supply Voltage Ranges</td>
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<td></td>
</tr>
<tr>
<td>VCXR</td>
<td>+11.75</td>
<td>-</td>
<td>+15.75</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>VEEX</td>
<td>-11.75</td>
<td>-</td>
<td>-15.75</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>VCL</td>
<td>+4.75</td>
<td>-</td>
<td>+5.25</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICCX</td>
<td>-</td>
<td>25</td>
<td>-</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>IEEX</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>mA</td>
<td></td>
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<tr>
<td>ICCL</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td>mA</td>
<td></td>
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<tr>
<td>Differential Input Impedance</td>
<td>DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f = 1MHz</td>
<td>RIN</td>
<td>6K</td>
<td>-</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td>ZIN</td>
<td>4K</td>
<td>-</td>
<td>-</td>
<td>Ω</td>
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<td>Differential Voltage Range</td>
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<td></td>
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<tr>
<td>VIDR</td>
<td>±20</td>
<td>-</td>
<td>-</td>
<td>Vpeak</td>
<td></td>
</tr>
<tr>
<td>Input Common Mode Voltage Range</td>
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<tr>
<td>VICR</td>
<td>±10</td>
<td>-</td>
<td>-</td>
<td>Vpeak</td>
<td></td>
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<tr>
<td>Common Mode Rejection Ratio (From Point A, Figure 4)</td>
<td>CMRR</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>dB</td>
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<td>Strobe Characteristics (Logic “0” inhibits Output)</td>
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<td>“0” Input Current (VSTROBE = 0.5 V)</td>
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<tr>
<td>“1” Input Current (VSTROBE = 2.7 V)</td>
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<td></td>
<td></td>
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<tr>
<td>“0” Input Voltage</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>“1” Input Voltage</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Strobe Delay (turn-on or turn-off)</td>
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</tr>
<tr>
<td>IIL</td>
<td>-</td>
<td>-</td>
<td>-4</td>
<td>mA</td>
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<tr>
<td>IIH</td>
<td>-</td>
<td>-</td>
<td>400</td>
<td>μA</td>
<td></td>
</tr>
<tr>
<td>VIIL</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>VIH</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>tSD</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>ns</td>
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<td>Threshold Characteristics (Sinewave input, 100KHz to 1MHz)</td>
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<td></td>
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<tr>
<td>Note: Threshold voltages are referred to the Input</td>
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<tr>
<td>Internal (Pin 6 &amp; 11 grounded)</td>
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<tr>
<td>External (Pin 6 &amp; 11 open; threshold setting resistors from Pin 5 to ground &amp; from Pin 12 to ground; RTH Max = 10KΩ)</td>
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<tr>
<td>VTH1</td>
<td>0.6</td>
<td>-</td>
<td>0.9</td>
<td>Vp-p</td>
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<tr>
<td>RTH/VTH1</td>
<td>-</td>
<td>4000</td>
<td>-</td>
<td>Ω/Vp-p</td>
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</tr>
<tr>
<td>Filter Characteristics (Pin 6 &amp; 11 Grounded) (Sinewave input)</td>
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<tr>
<td>f = 2MHz</td>
<td>VTH2</td>
<td>0.8</td>
<td>-</td>
<td>1.5</td>
<td>Vp-p</td>
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<tr>
<td>f = 4MHz</td>
<td>VTH3</td>
<td>4.2</td>
<td>-</td>
<td>8.5</td>
<td>Vp-p</td>
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</table>
**ELECTRICAL CHARACTERISTICS con’t**

### RECEIVER SECTION

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<thead>
<tr>
<th>Parameter / Condition</th>
<th>Sym</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Output Characteristics, RX Data &amp; RX Data</td>
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<tr>
<td>“1” State (ISOURCE = -0.4 mA) Note 2</td>
<td>VOH</td>
<td>2.5</td>
<td>3.3</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>“0” State (ISINK = 4 mA) Note 2</td>
<td>VOL</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>V</td>
</tr>
<tr>
<td>Note: With Receiver input below threshold, both RX Data &amp; RX Data outputs remain in “1” state.</td>
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<tr>
<td>Delay (average) from differential input zero crossings to RX Data &amp; RX Data output 50% points.</td>
<td>IDRX</td>
<td>-</td>
<td>190</td>
<td>450</td>
<td>ns</td>
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</table>

Note 1: Assumes unit in free air (natural convection cooling).

### DRIVER SECTION

<table>
<thead>
<tr>
<th>Parameter / Condition</th>
<th>Sym</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Voltage Ranges</td>
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<td></td>
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</tr>
<tr>
<td>(See Receiver Section for VCCL)</td>
<td>VCCTX</td>
<td>+11.75</td>
<td>-</td>
<td>+15.75</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>VEETXL</td>
<td>-11.75</td>
<td>-</td>
<td>-15.75</td>
<td>V</td>
</tr>
<tr>
<td>Supply Current, “Standby” mode (See Receiver Section for ICCL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(TX Inhibit high; or TX Data &amp; TX Data both high or both low)</td>
<td>ICCTXS</td>
<td>-</td>
<td>12</td>
<td>Note 2</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>IEETXS</td>
<td>-</td>
<td>0</td>
<td>1.0</td>
<td>mA</td>
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<tr>
<td>Supply Current transmitting at 1MHz into a 35Ω load at point A in Figure 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Duty Cycle</td>
<td>ICCX25</td>
<td>Note 4</td>
<td>45</td>
<td>Note 2</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>IEEX25</td>
<td>Note 3</td>
<td>35</td>
<td>Note 2</td>
<td>mA</td>
</tr>
<tr>
<td>Note: ICCL limits do not change with mode of operation or duty cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Characteristics, TX Data In or TX Data In</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“0” Input Current (VIN = 0.4 V)</td>
<td>IILD</td>
<td>-</td>
<td>-</td>
<td>-1.2</td>
<td>mA</td>
</tr>
<tr>
<td>“1” Input Current (VIN = 2.7 V)</td>
<td>IIHD</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>µA</td>
</tr>
<tr>
<td>“0” Input Voltage</td>
<td>VILD</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>V</td>
</tr>
<tr>
<td>“1” Input Voltage</td>
<td>VIHD</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Inhibit Characterian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“0” Input Current (VIN = 0.4 V)</td>
<td>IILI</td>
<td>-</td>
<td>-</td>
<td>-0.8</td>
<td>mA</td>
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<tr>
<td>“1” Input Current (VIN = 2.7 V)</td>
<td>IHHI</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>µA</td>
</tr>
<tr>
<td>“0” Input Voltage</td>
<td>VILI</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
<td>V</td>
</tr>
<tr>
<td>“1” Input Voltage</td>
<td>VIHI</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Delay from TX Inhibit (0→1) to inhibited output impedance</td>
<td>IDXOFF</td>
<td>-</td>
<td>300</td>
<td>400</td>
<td>ns</td>
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<tr>
<td>Delay from TX Inhibit (1→0) to active output impedance</td>
<td>IDXON</td>
<td>-</td>
<td>100</td>
<td>250</td>
<td>ns</td>
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<tr>
<td>Differential Output Noise, inhibit mode</td>
<td>VNOI</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>mVpeak</td>
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<tr>
<td>Differential output impedance (inhibited) at 1MHz</td>
<td>ZOI</td>
<td>10K</td>
<td>-</td>
<td>-</td>
<td>Ω</td>
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### Output Characteristics (Figure 3)

<table>
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<tr>
<th>Parameter / Condition</th>
<th>Sym</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Differential output level (140 ohm load)</td>
<td>V0</td>
<td>26</td>
<td>30</td>
<td>35</td>
<td>Vp-p</td>
</tr>
<tr>
<td>Differential Active output impedance at 1MHz</td>
<td>ZOA</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>Rise and Fall times (10% to 90% of p-p output)</td>
<td>tUI</td>
<td>IR / tF</td>
<td>100</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>Output offset at point A in Fig. 4 (35Ω load) 2.5µS after mid-bit crossing of the parity bit of the last word of a 660µS message</td>
<td>VOS</td>
<td>-</td>
<td>±20</td>
<td>±75</td>
<td>mVpeak</td>
</tr>
<tr>
<td>Delay from 50% point of TX Data or TX Data input to zero crossing of differential output</td>
<td>tDTX</td>
<td>-</td>
<td>100</td>
<td>250</td>
<td>ns</td>
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</tbody>
</table>

Note 2: Maximum supply currents for driver and receiver combined are included in power and thermal data table.

SCDCT3231 Rev B
### ELECTRICAL CHARACTERISTICS con’t
### POWER AND THERMAL DATA, TOTAL HYBRID (DRIVER AND RECEIVER) SECTION

<table>
<thead>
<tr>
<th>Parameter / Condition</th>
<th>Sym</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Supply Current, “Standby” mode or transmitting at less than 1% duty cycle</td>
<td>ICCS</td>
<td>40</td>
<td>50</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>(e.g. 20µS of transmission every 2mS or longer interval)</td>
<td>IEES</td>
<td>30</td>
<td>40</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>ICCL</td>
<td>35</td>
<td>45</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Total Supply Current transmitting at 1MHz into a 35Ω load at point A in Figure 4</td>
<td>Duty Cycle</td>
<td>ICC25</td>
<td>Note 4</td>
<td>70</td>
<td>80</td>
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<tr>
<td></td>
<td></td>
<td>IEE25</td>
<td>Note 4</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>25%</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>100%</td>
<td>ICC100</td>
<td>Note 4</td>
<td>175</td>
<td>190</td>
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<tr>
<td></td>
<td></td>
<td>IEE100</td>
<td>Note 3</td>
<td>165</td>
<td>180</td>
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<tr>
<td>Note: Iccl limits do not change with mode of operation or duty cycle</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Power Dissipation of most critical (hottest) device in hybrid during continuous</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
</tr>
<tr>
<td>transmission (100% duty cycle)</td>
<td>±12V</td>
<td>300</td>
<td>400</td>
<td></td>
<td>mW</td>
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<td></td>
<td>±15V</td>
<td>450</td>
<td>600</td>
<td></td>
<td>mW</td>
</tr>
<tr>
<td>Thermal Resistance, junction-to-case, of most critical device</td>
<td>ØJC</td>
<td>-</td>
<td>80</td>
<td>100</td>
<td>°C/W</td>
</tr>
<tr>
<td>Allowable transmitting duty cycle when case is held to +100°C maximum</td>
<td>Note 5</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>%</td>
</tr>
<tr>
<td>Allowable transmitting duty cycle when case is held to +125°C maximum</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
<td>Supply Voltage</td>
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<tr>
<td></td>
<td>±12V</td>
<td>Note 5</td>
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<td>80</td>
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<td>±15V</td>
<td>Note 5</td>
<td>-</td>
<td>-</td>
<td>55</td>
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</tbody>
</table>

Note 3: Decreases linearly to zero at zero duty cycle.
Note 4: Decreases linearly to applicable “Standby” value at zero duty cycle.
Note 5: Based upon operating junction temperature of 160°C for hottest device. For lower operating junction temperatures, reduce maximum duty cycle accordingly.

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**FIGURE 2** – Receiver Logic Waveforms
FIGURE 3 – Driver Logic Waveforms

FIGURE 4 – Typical Input / Output Connections

FIGURE 5 – Typical Power Dissipation (Total Hybrid)

Note: Case Temperature must be held to +100°C Maximum for 100% Duty Cycle. For Operation at Case Temperature of +125°C, See "Power and Thermal Data".
TABLE I – CT3231 Pin Out Description (Plug-In & Flat Package)

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Function</th>
<th>Pin #</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tx Data Out</td>
<td>13</td>
<td>+VCCRX</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data Out</td>
<td>14</td>
<td>NC</td>
</tr>
<tr>
<td>3</td>
<td>Ground C</td>
<td>15</td>
<td>Rx Data In</td>
</tr>
<tr>
<td>4</td>
<td>+VCCTX</td>
<td>16</td>
<td>Rx Data In</td>
</tr>
<tr>
<td>5</td>
<td>Ext. Data Threshold</td>
<td>17</td>
<td>Ground A</td>
</tr>
<tr>
<td>6</td>
<td>Int. Data Threshold</td>
<td>18</td>
<td>Case</td>
</tr>
<tr>
<td>7</td>
<td>Rx Data Out</td>
<td>19</td>
<td>-VEERX</td>
</tr>
<tr>
<td>8</td>
<td>Strobe</td>
<td>20</td>
<td>+VCCL (+5V)</td>
</tr>
<tr>
<td>9</td>
<td>Ground B</td>
<td>21</td>
<td>Tx Inhibit</td>
</tr>
<tr>
<td>10</td>
<td>Rx Data Out</td>
<td>22</td>
<td>Tx Data In</td>
</tr>
<tr>
<td>11</td>
<td>Int. Data Threshold</td>
<td>23</td>
<td>Tx Data In</td>
</tr>
<tr>
<td>12</td>
<td>Ext. Data Threshold</td>
<td>24</td>
<td>-VEETX</td>
</tr>
</tbody>
</table>

Notes: 1. Dimensions shown are in inches.
2. Pins are equally spaced at .100 ± .002 tolerance non-cumulative each row.

FIGURE 6 – Package Outline Drawings
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Screening</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT3231M</td>
<td>Military Temperature, -55°C to +125°C, Screened to the Individual Test Methods of MIL-STD-883</td>
<td>Plug-In</td>
</tr>
<tr>
<td>CT3231MFP</td>
<td></td>
<td>Flat Package</td>
</tr>
</tbody>
</table>

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.