

Standard Products

CT3231M Low Power Driver / Receiver for MIL-STD-1553B & SAE-AS15531

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FEATURES

- $\pm 12\text{V}$ to $\pm 15\text{V}/+5\text{V}$ DC power supply operation
- 1.5Watt total hybrid dissipation at 25% transmitting duty cycle
- Monolithic construction
- TTL compatible
- Full military (-55°C to $+125^{\circ}\text{C}$) 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 " $\overline{\text{DATA}}$ " 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 $\overline{\text{DATA}}$ 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 " $\overline{\text{DATA}}$ ", 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 1 Volt p-p and ignore signals less than 0.5 Volt 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 $\overline{\text{DATA}}$ outputs. If unused, a $2\text{K}\Omega$ pull-up to +5V is recommended.

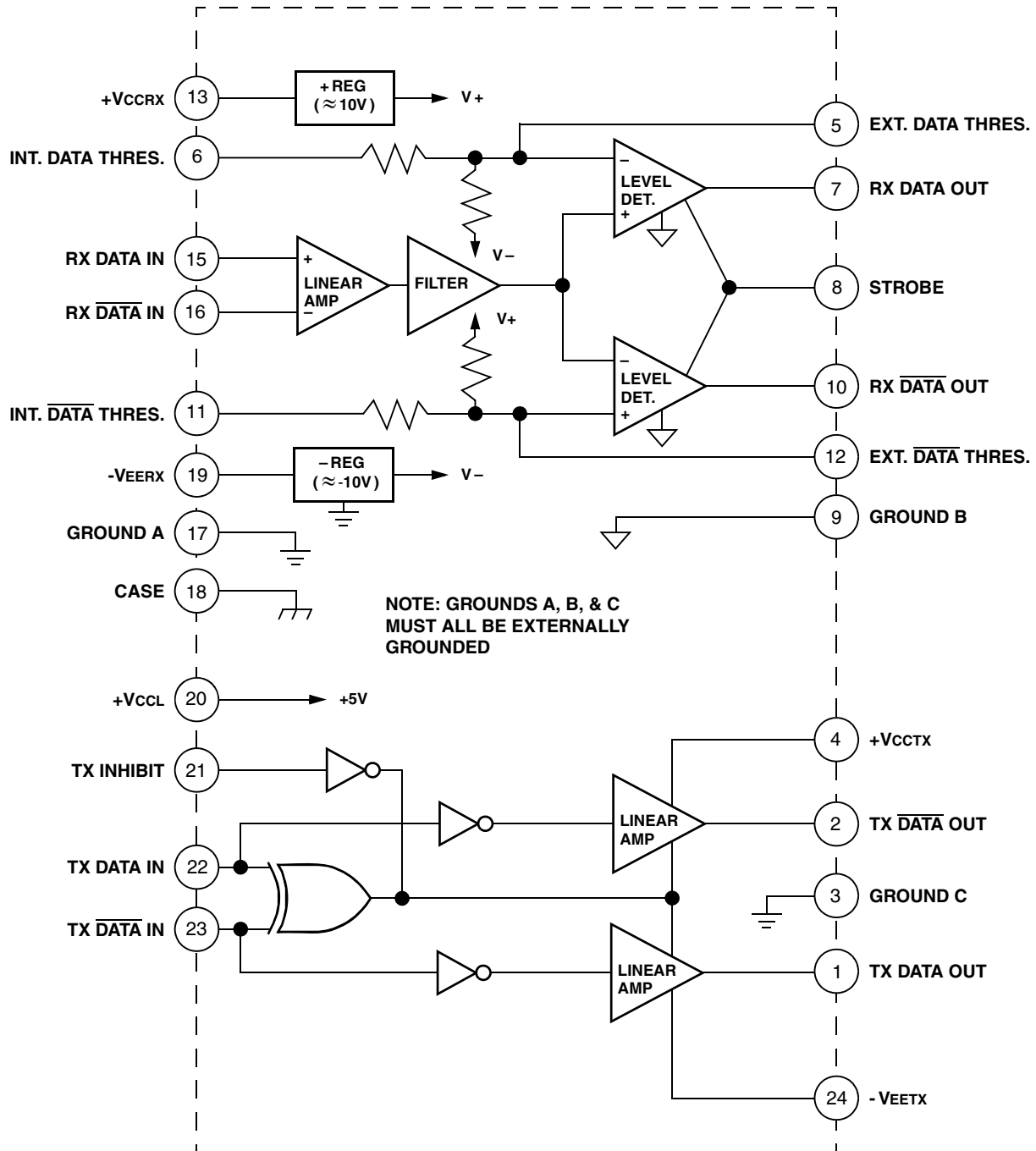


FIGURE 1 – CT3231 Functional Block Diagram and Pinouts

ABSOLUTE MAXIMUM RATINGS

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

ELECTRICAL CHARACTERISTICS

RECEIVER SECTION

Parameter / Condition		Sym	Min	Typ	Max	Unit
Power Supply Voltage Ranges		VCCR _X	+11.75	-	+15.75	V
		VEER _X	-11.75	-	-15.75	V
		VCCL	+4.75	-	+5.25	V
Supply Current		ICCR _X	-	25	-	mA
		IEER _X	-	30	-	mA
		ICCL	-	35	-	mA
Differential Input Impedance	DC	R _{IN}	6K	-	-	Ω
	f = 1MHz	Z _{IN}	4K	-	-	Ω
Differential Voltage Range		VIDR	±20	-	-	V _{peak}
Input Common Mode Voltage Range		VICR	±10	-	-	V _{peak}
Common Mode Rejection Ratio (From Point A, Figure 4)		CMRR	40	-	-	dB
Strobe Characteristics (Logic "0" inhibits Output)						
"0" Input Current (V _{STROBE} = 0.5 V)		I _{IL}	-	-	-4	mA
"1" Input Current (V _{STROBE} = 2.7 V)		I _{IH}	-	-	400	μA
"0" Input Voltage		V _{IL}	-	-	0.7	V
"1" Input Voltage		V _{IH}	2.0	-	-	V
Strobe Delay (turn-on or turn-off)		t _{SD}	-	6	-	ns
Threshold Characteristics (Sinewave input, 100KHz to 1MHz) <i>Note: Threshold voltages are referred to the Input</i> Internal (Pin 6 & 11 grounded) External (Pin 6 & 11 open; threshold setting resistors from Pin 5 to ground & from Pin 12 to ground; R _{TH} Max = 10KΩ)		V _{TH1} R _{TH} /V _{TH1}	0.6 -	- 4000	0.9 -	V _{p-p} Ω/V _{p-p}
Filter Characteristics (Pin 6 & 11 Grounded) (Sinewave input)	f = 2MHz	V _{TH2}	0.8	-	1.5	V _{p-p}
	f = 4MHz	V _{TH3}	4.2	-	8.5	V _{p-p}

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RECEIVER SECTION

Parameter / Condition	Sym	Min	Typ	Max	Unit
Output Characteristics, RX Data & $\overline{\text{RX Data}}$					
“1” State (ISOURCE = -0.4 mA) Note 2	VOH	2.5	3.3	-	V
“0” State (ISINK = 4 mA) Note 2	VOL	-	-	0.5	V
<i>Note: With Receiver input below threshold, both RX Data & $\overline{\text{RX Data}}$ outputs remain in “1” state.</i>					
Delay (average) from differential input zero crossings to RX Data & $\overline{\text{RX Data}}$ output 50% points.	tDRX	-	190	450	ns

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

DRIVER SECTION

Parameter / Condition	Sym	Min	Typ	Max	Unit	
Power Supply Voltage Ranges (See Receiver Section for VCCL)	VCCTX VEETXL	+11.75 -11.75	- -	+15.75 -15.75	V V	
Supply Current, “Standby” mode (See Receiver Section for ICCL) (TX Inhibit high; or TX Data & $\overline{\text{TX Data}}$ both high or both low)	ICCTXS IEETXS	- -	12 0	Note 2 1.0	mA mA	
Supply Current transmitting at 1MHz into a 35Ω load at point A in Figure 4 <i>Note: ICCL limits do not change with mode of operation or duty cycle</i>	Duty Cycle					
	25%	ICC25 IEEX25	Note 4 Note 3	45 35	Note 2 Note 2	mA mA
	100%	VCCTX IEETX	Note 4 Note 3	150 135	Note 2 Note 2	mA mA
Input Characteristics, TX Data In or $\overline{\text{TX Data}}$ In						
“0” Input Current (VIN = 0.4 V)	IILD	-	-	-1.2	mA	
“1” Input Current (VIN = 2.7 V)	IIRD	-	-	100	μA	
“0” Input Voltage	VILD	-	-	0.7	V	
“1” Input Voltage	VIRD	2.0	-	-	V	
Inhibit Characteristic						
“0” Input Current (VIN = 0.4 V)	IILI	-	-	-0.8	mA	
“1” Input Current (VIN = 2.7 V)	IIRI	-	-	50	μA	
“0” Input Voltage	VILI	-	-	0.7	V	
“1” Input Voltage	VIRI	2.0	-	-	V	
Delay from TX Inhibit (0→1) to inhibited output impedance	tDXOFF	-	300	400	ns	
Delay from TX Inhibit (1→0) to active output impedance	tDXON	-	100	250	ns	
Differential Output Noise, inhibit mode	VNOI	-	-	10	mVPEAK	
Differential output impedance (inhibited) at 1MHz	ZOI	10K	-	-	Ω	
Output Characteristics (Figure 3)						
Differential output level (140 ohm load)	VO	26	30	35	Vp-p	
Differential Active output impedance at 1MHz	ZOA	-	4	-	Ω	
Rise and Fall times (10% to 90% of p-p output)	tR / tF	100	150	300	ns	
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	VOS	-	±20	±75	mVpeak	
Delay from 50% point of TX Data or $\overline{\text{TX Data}}$ input to zero crossing of differential output	tDTX	-	100	250	ns	

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

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POWER AND THERMAL DATA, TOTAL HYBRID (DRIVER AND RECEIVER) SECTION

Parameter / Condition	Sym	Min	Typ	Max	Unit	
Total Supply Current, "Standby" mode or transmitting at less than 1% duty cycle (e.g. 20µS of transmission every 2mS or longer interval)	ICCS	-	40	50	mA	
	IEES	-	30	40	mA	
	ICCL	-	35	45	mA	
Total Supply Current transmitting at 1MHz into a 35Ω load at point A in Figure 4 <i>Note: Iccl limits do not change with mode of operation or duty cycle</i>	Duty Cycle	ICC25	Note 4	70	80	mA
	25%	IEE25	Note 4	65	75	mA
	100%	ICC100	Note 4	175	190	mA
Power Dissipation of most critical (hottest) device in hybrid during continuous transmission (100% duty cycle)	<u>Supply Voltage</u> ±12V ±15V	PC12	Note 3	300	400	mW
		PC15	Note 3	450	600	mW
Thermal Resistance, junction-to-case, of most critical device	ØJC	-	80	100	°C/W	
Allowable transmitting duty cycle when case is held to +100°C maximum	Note 5	-	-	100	%	
Allowable transmitting duty cycle when case is held to +125°C maximum	<u>Supply Voltage</u> ±12V ±15V	Note 5	-	-	80	%
		Note 5	-	-	55	%

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.

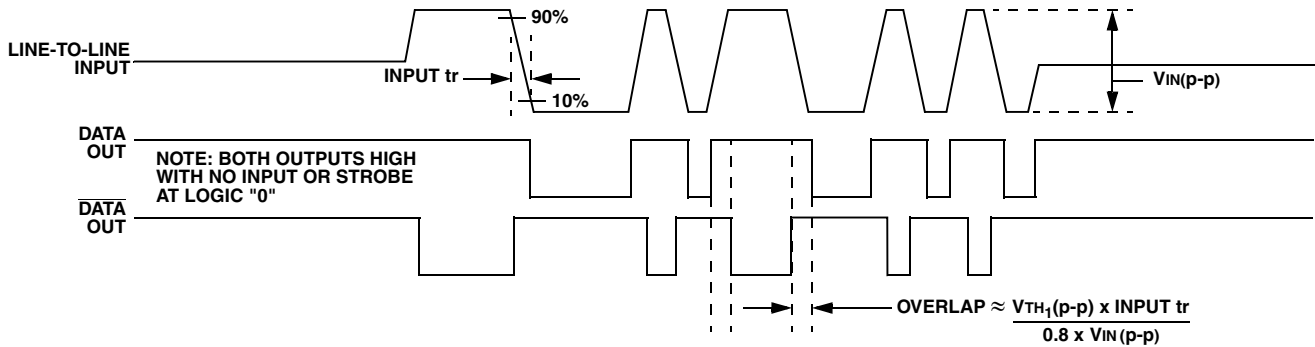


FIGURE 2 – Receiver Logic Waveforms

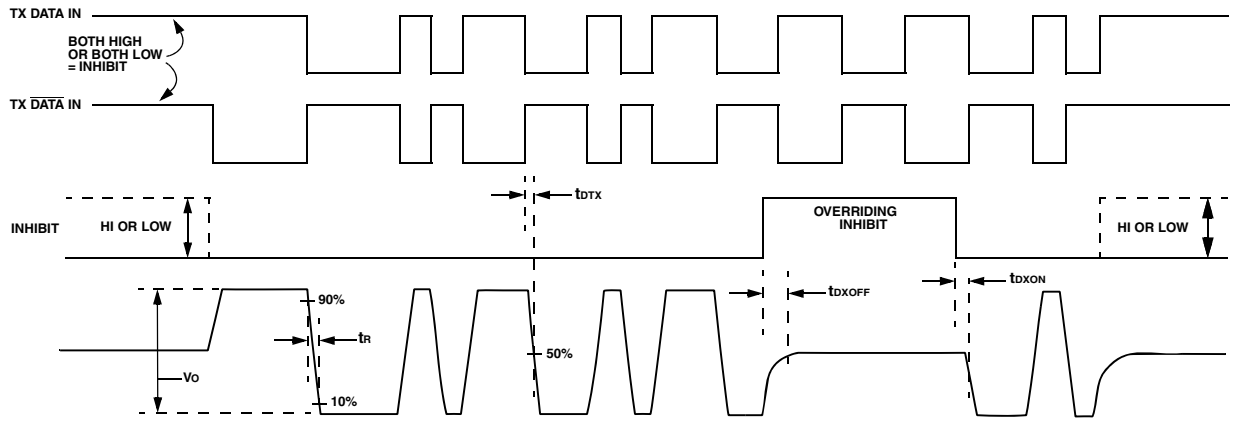


FIGURE 3 – Driver Logic Waveforms

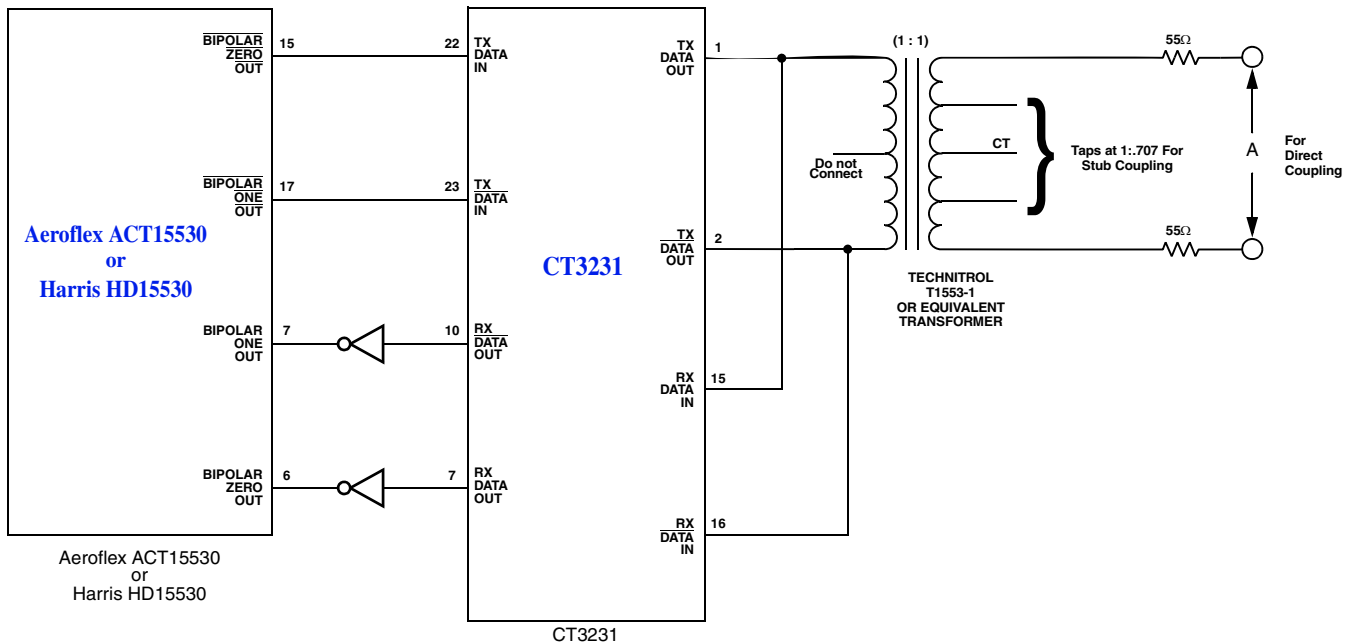
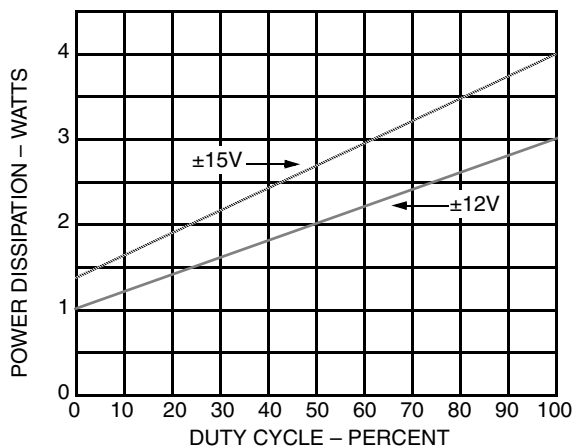


FIGURE 4 – Typical Input/Output Connections

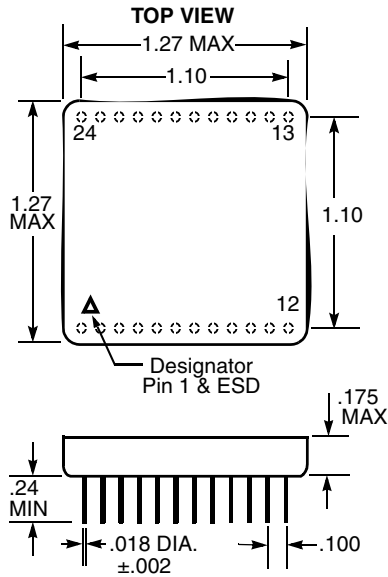


$$\% \text{ Duty Cycle} = \frac{\text{Transmit Time}}{\text{Transmit \& Receive Time}} \times 100$$

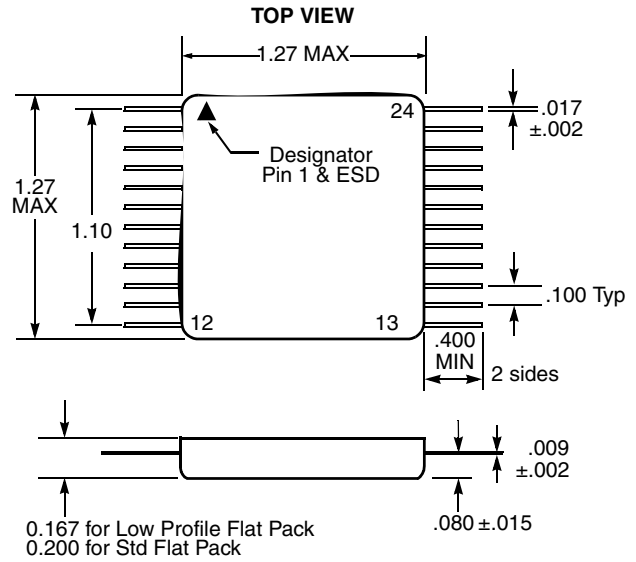
Note: Case Temperature must be held to +100°C Maximum for 100% Duty Cycle. for Operation at Case Temperature of +125°C, See "Power and Thermal Data".

FIGURE 5 – Typical Power Dissipation (Total Hybrid)

PLUG-IN PACKAGE



FLAT PACKAGE



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

FIGURE 6 – Package Outline Drawings

Pin #	Function	Pin #	Function
1	Tx Data Out	13	+VCCR _X
2	Tx $\overline{\text{Data}}$ Out	14	NC
3	Ground C	15	Rx Data In
4	+VCC _{TX}	16	Rx $\overline{\text{Data}}$ In
5	Ext. Data Threshold	17	Ground A
6	Int. Data Threshold	18	Case
7	Rx Data Out	19	-VEER _X
8	Strobe	20	+VCC _L (+5V)
9	Ground B	21	Tx Inhibit
10	Rx $\overline{\text{Data}}$ Out	22	Tx Data In
11	Int. $\overline{\text{Data}}$ Threshold	23	Tx $\overline{\text{Data}}$ In
12	Ext. $\overline{\text{Data}}$ Threshold	24	-VEET _X

TABLE I – CT3231 Pin Out Description (Plug-In & Flat Package)

ORDERING INFORMATION

Model Number	Screening	Package
CT3231M	Military Temperature, -55°C to +125°C, Screened to the Individual Test Methods of MIL-STD-883	Plug-In
CT3231MFP		Flat Package

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