#### *Digital Control and Telemetry*

[PA-471] The PA shall accept Digital Control/Telemetry over an RS-422 interface.

[PA-878] The PA unit's Control/Telemetry interface shall incorporate a bi-directional UART-based serial interface with a data rate of 230,400 baud, with 1 Start bit, 8 data bits, and 1 Stop bit, and 1 "Even" parity bit.

[PA-870] The PA shall provide Gain, Band, Temperature and Voltage Fault Status to the Lynx Payload as indicated in Figure 6.

[PA-476] The PA unit's control interface shall accept the command message input format shown in Figure 5. All consist of single-byte messages.

[PA-1074] After receipt of command to change PA configuration, the PA shall be able to provide a telemetry message, with current configuration, within 500 msec. This message would be sent in response to a Report Status command.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Commands** | **MSB** |  |  |  |  |  |  | **LSB** |  | **Definition** |
|  |  |  |  |  |  |  |  |  |  |  |
| RF Enable / Disable | CMD 0 000 | | | Reserved | | | | RF On |  | 0=RF Off 1=RF On |
| Report Status | CMD 1 001 | | | Reserved | | | | |  | Reserved |
| Set Band | CMD 2 010 | | | Reserved | | L/M/H | | |  | Disabled=000 L=001 M=010 H=011 Other values Reserved |
| Set Gain | CMD 3 011 | | | Gain Value | | | | |  | 1 dB steps; examples:  00000=12dB 01111=25dB 11110=40dB |
| Spare | CMD 4 100 | | | Reserved | | | | |  | Reserved |
| Spare | CMD 5 101 | | | Reserved | | | | |  | Reserved |
| Spare | CMD 6 110 | | | Reserved | | | | |  | Reserved |
| Spare | CMD 7 111 | | | Reserved | | | | |  | Reserved |

Figure 5: Command Message Input Format

[PA-881] The PA unit's telemetry interface shall provide the telemetry return message format shown in Figure 6. All consist of five bytes sent in response to one Report Status Control message.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Telemetry** | **MSB** |  |  |  |  |  |  | **LSB** |  |  |
| TLM | TLM 0 000 | | | Reserved | | | | RF On |  | 0=RF Off 1=RF On |
|  | TLM 1 001 | | | Fault Telemetry | | | | |  | 00000 = No Fault 00001 = Fault\_+5V Reg \_Band 3\_TLM 00010 = Fault\_+8V Reg \_Band 2\_TLM 00100 = Fault\_+8V Reg \_Band 1\_TLM 01000 = Fault\_-5V Reg 10000 = Fault\_Command Error  TLM1 shall identify up to five simultaneous faults |
|  | TLM 2 010 | | | Reserved | | | L/M/H | |  | Disabled=000 L=001 M=010 H=011 Other values Reserved |
|  | TLM 3 011 | | | Gain Value | | | | |  | 00000=10dB 01111=25dB 11110=40dB |
|  | TLM 4 100 | | | TMP 9 MSB | TMP 8 | TMP 7 | TMP 6 | TMP 5 |  | Temperature Telemetry (10 bit) Bits 9-5 |
|  | TLM 5 101 | | | TMP 4 | TMP 3 | TMP 2 | TMP 1 | TMP 0 LSB |  | Temperature Telemetry (10 bit) Bits 4-0 |
| Spare | TLM 6 110 | | | Reserved | | | | |  | Reserved |
| Spare | TLM 7 111 | | | Reserved | | | | |  | Reserved |
|  |  |  |  |  |  |  |  |  |  |  |
|  | *Note: "Reserved" bits can be either zero or one.* | | | | | |  |  |  |  |

Figure 6: Telemetry Return Message Format

[PA-976] On PA Power on Reset (POR), the PA shall default to the following configuration:

RF Output:          Off

Band Sel:           000 (disable)

Attenuator:        30 dB

[PA-977] The PA shall power off the selected amplifier path upon receipt of an RF Output serial command disabling the RF output, but shall retain other configuration (selected band and attenuator setting).

[PA-978] The PA shall not enable any RF output Path if the band selected is configured for the “Disabled” band, or an invalid band.

[PA-979] The serial UART command messages shall be received with the LSB first.

[PA-980] The serial UART telemetry messages shall be received with the LSB first.

[PA-981] The PA Telemetry bus shall have an inactive default state of “high” when not transmitting data.

[PA-984] The PA shall not be damaged by receiving serial commands on the control interface when the 30V Prime power is not energized.

#### *Analog Telemetry*

[PA-475] The PA shall provide an analog temperature sensor (311P18-01S7R6 or equivalent) for monitoring PA temperature via the J1 connector interface.