**Fast Link**

**TX System Requirements**

**For**

**Coral**

**Product Catalog No:**

**Document ID:**

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| Prepared by: | **Tadiran Electronic Systems** |
| Prepared for: | Coral |

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|  |  |  |
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# Introduction

## General

The Fast Link communication system is an FM modulated, unidirectional, wireless communication system composed of two subsystems as follows:

1. The transmitting subsystem composed of an integrated transmitter and transmitting antenna, hereafter called the fast link transmitter.
2. The receiving subsystem composed of an integrated receiver and receiving antenna, hereafter called the fast link receiver.

This document covers the requirements for the fast link transmitter. It includes the following chapters:

1. Introduction - this introductory chapter
2. Transmitter Requirements- covers the electrical, mechanical and environmental requirements
3. Quality Assurance – covers the QA requirements and describes the transmitter's tests.

## Fast Link System Deployment

The fast link system may be operated either as a point to point link, where the transmitter transmits to a single receiver, or as a point to multipoint link where the transmitter transmits to a few receivers,

On the transmit side, interface to the transmitter is implemented as described in the following figure:



Figure 1: Transmitter Side Interface

Usually the system will be deployed as described in the following figure, when one Fast Link Transmitter transmits to four Fast Link receivers and one Transmitter or Receiver is

Deployed near by.



Figure 3: Typical System Deployment

## Applicable documents

### Military Standards

* + MIL-STD-810F Environmental Test Methods and Engineering Guidelines
  + MIL-STD-461E Requirements for the Control of Electromagnetic Interference Emission and Susceptibility.
  + MIL-STD-454 Guidelines for Electronic Equipment.
  + MIL-STD-1472 Human Engineering Design Criteria
  + MIL-STD-108 Definition and basic requirements for enclosures for electronic equipment
  + MIL-STD-1686C Electrostatic discharge control program for protection of electrical & electronic parts assemblies and equipment
  + MIL-STD-2175 Castings, Classification and Inspection of
  + MIL-P-11268 Parts, Materials and Processes Used in Electronic Equipment
  + MIL-HDBK-217 Reliability Prediction of Electronic Equipment
  + IDF Communication Corps Basic Standard No. 7
  + IDF Medicine Corps Recommendation 120.016 and Related Products & Performance Test Methods
  + MIL-STD-1275B Characteristics of 28 VDC Electrical Systems in Military Vehicles.

### International standards

ISO 9001:2000

### TES Documents

* + Fast Link RX System Requirements, Doc ID: 10000xxxxxx (TBC)
  + Fast Link System SOW, Doc ID: 10000xxxxxx (TBC)

# Transmitter System Electrical Requirements

This chapter details the transmitter system requirements

## Interface Requirements

The transmitter will have 3 interfaces as follows:

1. Power interface
2. Control interface
3. Data interface



Figure 4: TX Interfaces

Power Interface - the transmitter will be operated on 28VDC.

Control Interface – the control interface to the host computer will be asynchronous, serial, full duplex, RS-422 lines (two pairs, one for transmit and the second for receive).   
The control interface will allow the host computer to send control commands the unit and receive its status reports.

Data Interface – the data interface to the host computer will be implemented by unidirectional RS-422 lines (one pair for TX (in).

Input connector should comply with MIL-C-38999.

## Transmitter Unit Electrical Requirements

The following table details the electrical requirements of the transmitter unit.

| No. | Parameter | Requirement |
| --- | --- | --- |
| 1 | Frequency Range | C-Band.  100 MHz Band at 5.15-5.25GHz & 200MHz at 5.675-5.875GHz (factory selected) |
| 2 | Frequency steps | 1MHz (User Selectable - Controlled via RS422) |
| 3 | Frequency stability | ±2.5ppm max (-20 ÷ +70°C) |
| 4 | Power Output | <1W or 5W (User Selectable - Controlled via RS422) |
| 5 | Harmonic level (output) | 70 dBc min |
| 6 | Output impedance | 50 Ohm, VSWR 1.5:1 max |
| 7 | Deviation | 1.4MHz ÷9MHz PTP (tunable via manual trimmer) |
| 8 | Input Data Rate | Up to 10Mbps |
|  | Input impedance | 50 Ohm, |
| 9 | Supply Voltage | 12÷35Vdc (Reverse voltage protection, no damage: 35V), complies with MIL-STD 1275 |
|  | Current consumption | 14W max (during transmission)  XXW max (during standby) |
| 10 | Signal input level – no damage | 50 dBm |
| 11 | BIT | Constant digital string transmission |
| 12 | Serial port | 38.4KB,1,8,1 |

## Fast Link Transmitter Antenna Requirements

The TX antenna will be based on BA3100 antenna. Antenna requirements are as follows:



## Susceptibility to High Power Signals

The fast link transmitter will be deployed nearby other emitters with the following electromagnetic emissions characteristics:

1. WiMax 5W in the 4.4-4.6 GHz and wireless 1W in the 5.160-5.340 Ghz frequency band.
2. 480-810 MHz up to 20W into 2-5dBi antenna gain

The Fast Link Transmitter transmissions should not be distorted by these emitters.

## Software Requirements

The software interface should enable the host computer to command the transmitter and receive its status and reports.

The following commands/reports should be supported by the transmitter:

1. **Init Transmitter**

The init command should include the carrier frequency and the output power

1. **Start Transmit**

The command will start a continuous transmission

1. **Stop Transmit**

The command will stop the continuous transmission

1. **Get status:**

The following information should be returned in response to a status request and each parameter (value) should be separated at the end with (,) in each field.

1. Synt. Lock indication (PLL Lock)
2. Input power status
3. FREQ=XXXX, (Value in MHz)
4. REV POWER=±XX, (Value in dB)
5. FWD POWER=XX, (Value in dBm)
6. TEMP=XX.X, (Value in Celcius degrees)
7. TRANSMIT= ON/OFF,
8. LIGHT=ON/OFF,
9. UNIT ID=XXX,
10. UNIT DC=YYXX,
11. SW VERSION=<string>,$OK
12. Input power status
13. UNIT TYPE=X, (T or R).
14. BIT = ON/OFF,
15. **Frequency:**
16. The command will set the Freq in 1MHz steps.
17. **Start BIT**
18. The command will start the BIT
19. **Stop BIT**
20. The command will stop the BIT
21. **Power:**
22. The command will select between High power and Low power.

## Power Supply Requirements

1. The unit shall operate from an external electrical source of 27 V DC nominal (18-36V per MIL 1275B).
2. Power may vary by ±10%.  (The power supply has to operate from input voltage 18-36V).
3. Spikes & surges, as described in MIL-STD-1275B shall not cause any performance degradation, functional interference or damage to the unit.
4. Under voltage of 12V for 2sec.
5. Over voltage of 100V / 50msec.
6. Spikes of ±250V /50µsec (limited to 15mJoules).
7. Input ripple of ±2V 50 Hz ÷ 200 KHz.
8. The power supply output will be protected against: short circuit, over current, overload conditions, over voltage and with auto-recover while faulty conditions are removed.

## Wiring interface

1. Supply voltage

2. Supply voltage

3. Supply returned/ GND

4. Supply returned/GND

5. Mod in RS422 (+)

6. Mod in RS422 ( -)

7. Control TX RS422 (+)

8. Control TX RS422 (-)

9. Control RX RS422 (+)

10. Control RX RS422 (-)

11. GND

12. NC

13. NC

# Mechanical Requirements

## Enclosure

The transmitter enclosure should be made of metal and should be IP66 compliant.

## Dimensions and weight

Transmitter dimensions: TBD (to be finalized by supplier before CDR)

Transmitter weight: TBD (to be finalized by supplier before CDR)

Antenna dimensions: 114 X76 X 25.4 mm

Antenna weight: 0.1 Kg

## Mounting:

As the previous order.

## Connector interface:

**The connector should be protected by the mechanic case (Nut lock).**

## Color

Final paint color Lusterless Brown Synthetic “Tambur” No 441-001

Dry Film Thickness 1-1.5 Mils Applicable Paint Specification

# Operational Requirements

The system is to be deployed on an APC (Armored Personnel Carrier).

The system will be operated only when the APC stands still (no on-the-move operation).

During APC movement the system will be stored in transport case for protection.

The fast link communication will be operated for distances of up to 12 km with line of site (LOS) conditions.

# Environmental Conditions Requirements

The Fast Link shall maintain its specified performance when exposed to Environmental conditions specified herein and it shall also be tested to demonstrate its ability to meet the specified performance under various Environmental conditions.

## Natural (Climatic) Environment

### Low and High Temperature

1. The Fast Link shall operate without degradation in performance and safety when subjected to the following temperature range:

|  |  |
| --- | --- |
| Operating (Celsius centigrade) | Non Operating (Celsius centigrade) |
| -10 to 55 | -20 to 71 |

1. The system shall be qualified to meet the low and high temperature extremes.  
   The system shall be able to be stored and operated under high and low temperature without safety implications, experiencing physical damage or deterioration in performance.
2. The low and high temperature tests shall meet the requirements specified in MIL-STD-810F (notice 2) Method 501.4 & 502.4 according to procedures I and II.
3. In addition, the manufacturer shall explore the maximum temperature (Storage & Operation) that the equipment still operates without degradation in performance and safety.

### Solar Radiation

1. Exposed equipment shall withstand the effects of solar radiation in its operating and non-operating states and maintain its specified performance when exposed to such environment for continuous periods, with peak condition of 1120 W/m^2
2. The solar radiation test shall meet the requirements specified in   
   MILSTD-810F Method 505.4, Proc I, Category A2. 3-7 cycles shall be performed, 24 Hours each cycle, until the maximum temperature achieves as per Fig 505.4-1

### Humidity

1. The system shall maintain the specified performance when exposed to a relative humidity of up to 95% at both continuous and intermittent periods, including conditions where water condensation takes place in and on the equipment for continuous periods, without the effects of corrosion or damage to the paint.
2. Tests per MIL-STD-810F Method 507.4 after being subjected to 95%, 10 cycles 24 hours each.

### Rain (Degree of enclosure)

1. Fast Link shall, (with no covers on its plugs) withstand the erosive effects of rain in its operating and non-operating states and shall maintain its specified performance when exposed to rain and wind environment for continuous periods, without any penetration of water.
2. Designed to meet the requirements of MIL-STD-810F, Method 506.4, Procedure I, for 30 minutes on each side.

### Sand and Dust

1. The System set shall withstand the effects of blowing sand and dust in its operating and non-operating states without any mechanical damage and shall maintain its specified performance when exposed to such environment for continuous periods.
2. The sand and dust test shall meet the requirements specified in MIL STD-810F Method 510.4. Procedure II – Blowing Sand, Test duration shall be 90 minutes in room temperature per each vulnerable face. The equipment should be "ON" for the last 10 minutes

### Salt Fog (Spray)

1. The system shall withstand the effects of salt fog environment (5% salt solution) in its operating and non-operating states, without the effects of corrosion or damage to the paint, and shall maintain its specified performance when exposed to such environment for continuous periods
2. The salt fog test shall meet the requirements specified in MIL-STD-810F Method 509.4, 24 hours periods of salt fog exposure and drying conditions for a minimum of four 24 Hours periods (two wet and two dry) making a total of 96 Hours
3. The test shall be performed on mechanical parts and on surface samples.

### Corrosion

The Fast Link is designed against Corrosion for operation in tropical environment. All exposed surfaces will be treated against the effects of corrosion and galvanic corrosion. The Fast Link design shall provide adequate protection against all forms of corrosion commonly associated with operations in a tropical marine environment. In particular, the Fast Link shall be protected against:

1. Uniform Attack. All exposed surfaces shall be treated (e.g. painting) to protect it against the effects of corrosion.
2. Galvanic Corrosion. The Fast Link design shall ensure that metals with large potential differences do not come into direct contact. Where dissimilar metals are to be used in close proximity, adequate insulation shall be provided to preclude galvanic corrosion.
3. Crevice Corrosion. The exposed equipment shall be designed to minimize areas at which water can accumulate and become stagnant. Such places include holes, gasket surfaces, lap joints and crevices under bolt and rivet heads. Where stagnant areas are unavoidable, corrosion resistant material shall be used.

### Fungus

1. The Fast Link shall be resistant to fungus growth and maintain its specified performance in both operating and non-operating conditions.
2. The fungus test shall meet the requirements specified in MIL-STD-810F Method 508.5 or other equivalent standards.

### Lightning Protection

1. The equipment set shall incorporate lightning protection to prevent failure or destruction of equipment during thunderstorms

### Wind Velocity

1. Exposed equipment shall withstand and maintain its specified Performance when exposed to relative wind velocity of up to steady speed 100 km/h (operation) and gust speed of up to 120 km/h (operation). It shall also withstand, without damage, winds having a relative velocity up to steady speed and gust wind of up to 140 km/h (survival).
2. The contractor shall prove this requirement using stress analysis

## Induced (Mechanical) Environment Requirements

### Vibration

1. Fast Link packed in its transportable case shall withstand with following transportation vibration conditions:
2. Vibration tests shall meet the requirements specified in MIL STD-810E. Notice 2, Method. 514.4 per table 514.4-AXVII for Fast Link installed on top of the M113 armored personnel carrier, 3h per axis.

### Vibration (during transportation)

1. The Equipment (in its transportable case) set shall not suffer damage or fail to meet the specified performance and safety when subjected to vibration environment expected during movement and transportation, as loose cargo, by wheeled vehicles/trailers, tracked vehicles, air and onboard ships.
2. The vibration tests shall meet the requirements specified in MIL STD-810F, Method 514.5, Category 5 where package tester 300 rpm circular mode, for duration 20 minutes (represents 240 km).

### Shock

1. The Equipment set shall not suffer damage or subsequently fail to meet the specified performance when subjected to the mechanical shock during transportation in a track wheeled vehicle.
2. Fast Link packed in its transportable case shall withstand with following transportation shock conditions: MIL-STD-810F notice 2 Shock 40g 11msec.

### Withstanding exposure to various liquids

Equipment installed in the track wheeled vehicle environment should withstand the exposal to the following oils/liquids as per MIL-STD- 810F, Method 504.

Table: List of oils

|  |  |
| --- | --- |
| Oil 2740 | LUBRICANT OIL PER MIL-PRF-2104 |
| Hydraulic Oil H 5500 | HYDRAULIC FLUID PER MIL-PRF-46170 |
| Brakes oil 9040 | BRAKE FLUID PER SAE-J-1703 |
| Lubricating ointment40 | GREASE PER MIL-PRF-10924 |
| Kerosene | KEROSENE |
| Diesel | DIESEL PER A-A-52557 |
| Riffle oil 9439 |  |
| Side Transmission oil 2820 |  |
| Lubricating oil 9439 |  |
| Lubricating oil 2820 |  |

Certificate of Compliance shall be submitted to prove that the Fast Link shall withstand the above requirements

### ESD

The Fast Link set shall be designed in accordance with good engineering practice and protected against ESD generated by personnel, transportation, and other sources. MIL‑STD‑1686C shall be used as a guide for design approach.

# EMC Requirements

The Equipment set will comply with MIL-STD-461E requirements and special adaptations to some frequency bands as impacted from IDF Communication Corps Basic Standard No.7.

| Electromagnetic compatibility requirements for the jamming system and FAST LINK communication channels | |
| --- | --- |
| TEST | DESCRIPTION |
| CE101 | Conducted Emission in the Power & Interconnecting Leads (30Hz to 15KHz) |
| CE102 | Conducted Emissions, Power & Interconnecting Leads (15KHz to 10 MHz);  Note: The required level for 50 to 100 MHz is constant and equals to the 50 MHz level |
| CE106 | Conduct Emission from the Antenna Terminals (10KHz to 40GHz) |
| CS101 | Conducted Susceptibility in Power Leads (30Hz to 150KHz) |
| CS103 | (for the FAST LINK): Mutual modulation in the range of 15 KHz to 10 MHz. |
| CS104 | (for the FAST LINK): Rejection of foreign signals in the range of 30 Hz to 20 GHz |
| CS105 | (for the FAST LINK): Mixed modulation in the range of 30 Hz to 20 GHz |
| CS114 | Conducted Susceptibility (not including optic fiber) in the power Cables (10KHz to 200MHz)  Note: Injection of 1 Watt from a 50 ohm source into the power and control inputs over the whole frequency band. |
| CS115 | Conducted Susceptibility (not including optic fiber) in the power Cables in the form of Impulse excitation.  Note: voltage level of   +200V while the system is operating or + 300V calibrated upon a 0.5 ohm resistor, connected in parallel to the un operated system (the lower between the above requirements). |
| CS116 | Conducted Susceptibility (not including optic fiber) in the form of Damping Sinusoidal waves (10KHz to 100MHz) injected in power and control conductors. |
| RE101 | Radiated Emissions, Magnetic Field, (30Hz to 100 KHz) |
| RE102 | Radiated Emissions, Electric Field, (14KHz to 18GHz);  Note: The PA should comply with MIL-STD-461E requirements except for the frequency band from 2 MHz-1590 MHz where the requirements are as follows – when transmitted on dummy load:   1. 2-20 MHz : radiations < 10 dBV/m when measured at 3 KHz bandwidth; 2. 20-30 MHz : radiations < 15 dBV/m when measured at 3 KHz bandwidth; 3. 30-80 MHz : radiations < +5 dBV/m when measured at 30 KHz bandwidth; 4. 80-90 MHz : radiations < +5 dBV/m when measured at 10 KHz bandwidth; 5. 486-807 MHz : radiations to be 10 dB below MIL-STD-461E requirements  when measured at 10 MHz bandwidth; 6. 955-980 MHz: radiations < 0 dBV/m when measured at 200 KHz bandwidth; |
| RS101 | Radiated Susceptibility, Magnetic Field, (30Hz to 100KHz) |
| RS103 | Radiated Susceptibility, Electric Field, (2MHz to 40GHz) |

# Human Engineering Requirements

The design of the Fast Link shall comply with MIL-STD-1472.

In addition, any typical operator should be able to read clearly in the following conditions the on panel indication of the unit as follows:

1. Under any illumination day or night.
2. From 10cm to 100cm away from the Fast Link at +45 degrees or -45 degrees relatively to an operator sitting straight on front the center of the Fast Link.

# Reliability, Maintainability and Testability Requirements

## Reliability Requirements

### MTBF Specification

MTBF will be calculated for GF environment at 40º C

MTBF will be at least 200,000hrs.

### Reliability Critical Items

The manufacturer shall define the Reliability Critical Items

### Thermal Management

The manufacturer shall perform thermal mapping

### De-rating Criteria/Guidelines

The manufacturer shall provide the De-rating Criteria for electronic and thermal design.

## Maintainability Requirements

MTTR at Organization level will be 30min.

MCT max will be 45min.

## Testability Requirements

1. The manufacturer shall specify the testability specification of the Fast Link units.
2. Test points to LRU/CARD/MODULE level shall be defined by the supplier and provided to TES
3. The manufacturer shall provide a list of LRU that require standard/special support & test equipment (STE) for fault detection and fault isolation.

# Quality Assurance Provisions

## General

Supplier shall establish and maintain an effective and timely quality assurance program based on their existing standards and procedures and any additional requirements that the supplier considers cost effective or essential to assure that reliable hardware and software are provided, this plan shall cover all necessary procedures, processes and controls and shall include, as a minimum, the following:

Parts, Materials and Processes  
Supplier shall maintain and control by revision, all documents pertaining to procurement, inspection and control of parts, materials, equipment and/or formulation of software furnished in accordance with this procurement.

Hardware Manufacture Data:  
Critical manufacturing steps shall be so identified along with in-process and final inspection and test points, process specifications, inspection instructions and test procedures shall be appropriately referenced. Any sampling of other use of Quality Control shall be delineated.

Source Inspection  
Buyer shall accomplish in-process workmanship inspection and end item acceptance at supplier's location, Supplier shall notice buyer 1 month ahead on ATP schedule. Buyer reserves his rights to wittiness the tests and inspections at the supplier facilities.

End item Acceptance shall consist of:

1. Workmanship and Mechanical External Interface Inspection.
2. Final equipment Test to be performed according to acceptance test procedures as approved by the buyer

## Requirements for the Equipment

The equipment to be purchased must be new, unused, of recent manufacture and to be in a perfect state of conservation and operation.

Reconditioned materials will not be accepted.

## Unit Acceptance

Each unit will pass the following tests prior to shipment to Tadiran:

1. ESS- Electrical Stress Screening
2. ATP- Acceptance Tests (electrical and mechanical)

### ESS

Each unit shall pass an ESS, and shall be tested afterwards, prior of shipment to Tadiran.

The ESS process is performed to eliminate weak components and poor workmanship problems during manufacturing process.

ESS will be performed in accordance with the manufacturer’s procedure. The procedure will be presented to Tadiran for approval.

### Acceptance Tests

Each unit will pass acceptance test. The signed acceptance test result sheets and the signed COC will be supplied with the equipment.

The supplier will prepare ATP procedures and ATP results sheets and submit them to buyer's approval 1 month ARO. The ATP procedure shall include methods, means and set-ups for testing all the technical requirements outlined in the specification.

The supplier will inform the buyer two-weeks in advance of the exact date of ATP. The buyer will be invited to participate and witness the ATP. In case the buyer chooses not to participate in the ATP and informs the supplier in writing, the supplier will proceed with the tests and the QA manager of the supplier will represent the buyer.

The inspection and acceptance of the equipment by the buyer does not free the supplier from his responsibility for defects, hidden or apparent, not detected during the inspection.

## Requirement/verification Cross-Reference Matrix

The tests should be performed on every unit.

Methods utilized to accomplish verification include:

1. **Analysis**: An element of verification that utilizes established technical or mathematical models or simulations, algorithms, charts, graphs, circuit diagrams, or other scientific principles and procedures to provide evidence that stated requirements were met.
2. **Demonstration:** An element of verification which generally denotes the actual operation, adjustment, or re‑configuration of items to provide evidence that the designed functions were accomplished under specific scenarios. The items may be instrumented and quantitative limits of performance monitored.
3. **Examination:** An element of verification and inspection consisting of investigation, without the use of special laboratory appliances or procedures, of items to determine conformance to those specified requirements which can be determined by such investigations. Examination is generally nondestructive and typically includes the use of sight, hearing, smell and touch; simple physical manipulation; mechanical and electrical gauging and measurement; and other forms of investigation.
4. **Test:** An element of verification and inspection that generally denotes the determination, by technical means, of the properties or elements of items, including functional operation, and involves the application of established scientific principles and procedures.

In the event that environment qualification tests have been performed on similar equipment and the manufacturer intends to use the test results as evidence to compliance, the manufacturer shall provide an equipment commonality matrix to correlate the design of the proposed equipment with that of the similar equipment. For the similar equipment that has been qualified previously, the manufacturer shall provide details on the EQT that has been conducted on the equipment

Table 1: Requirement/Verification Cross Reference Matrix

| METHOD OF VERIFICATION | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
| N/A - NOT APPLICABLE  A – ANALYSIS; D – DEMONSTRATION ; E – EXAMINATION ; T - TEST | | | | | |  |
| Parameter | VERIFICATION METHOD | | | | | COMMENTS |
| N/A | A | D | E | T |  |
| *TX ELECTRICAL REQUIREMENTS* | ---- | ---- | ---- | ---- | ---- | ----------------------------- |
| Frequency Range |  |  |  |  | X |  |
| Frequency Steps |  |  |  |  | X |  |
| Frequency Stability |  |  |  |  | X |  |
| Power output |  |  |  |  | X |  |
| Harmonic level (output) |  |  |  |  | X |  |
| Output impedance |  |  |  |  | X |  |
| Deviation |  |  |  |  | X |  |
| Data Rate |  |  |  |  | X |  |
| Supply Voltage |  |  |  |  | X |  |
| Current consumption |  |  |  |  | X |  |
| Signal input level – no damage |  |  |  |  | X |  |
|  |  |  |  |  |  |  |
| *TX ELECTRICAL REQUIREMENTS* | ---- | ---- | ---- | ---- | ---- | ----------------------------- |
| Frequency range |  |  |  |  | X |  |
| VSWR |  |  |  |  | X |  |
| Gain |  |  |  |  | X |  |
| Beam Width |  |  |  |  | X |  |
| Sensitivity |  |  |  |  | X |  |
| Max power |  |  |  |  | X |  |
| BIT |  |  |  |  | X |  |
| *SUS. TO HIGH POWER SIGNALS* |  |  |  |  | X |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *SOFTWARE INTERFACE* |  |  |  |  | X |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *POWER SUPPLY REQUIREMENTS* |  |  |  |  | X | First unit only |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *MECHANICAL REQUIREMENTS* |  |  |  |  |  | First unit only |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *ENVIRONMENTAL REQUIREMENTS* |  |  |  |  |  |  |
| Low & High Temperature |  | X |  |  | X | COC acceptable |
| Solar Radiation |  | X |  |  | X | COC acceptable |
| Humidity |  | X |  |  | X | COC acceptable |
| Rain |  | X |  |  | X | COC acceptable |
| Sand & Dust |  | X |  |  | X | COC acceptable |
| Salt Fog |  | X |  |  | X | COC acceptable |
| Corrosion |  | X |  |  | X | COC acceptable |
| Fungus |  | X |  |  | X | COC acceptable |
| Lightening Protection |  | X |  |  | X | COC acceptable |
| Wind Velocity |  | X |  |  | X | COC acceptable |
| Vibration |  | X |  |  | X | COC acceptable |
| Vibration during Transportation |  | X |  |  | X | COC acceptable |
| Shock |  | X |  |  | X | COC acceptable |
| Exposure to various liquids |  | X |  |  | X | COC acceptable |
| ESD |  | X |  |  | X | COC acceptable |
|  |  |  |  |  |  |  |
| *EMC REQUIREMENTS* |  |  |  |  |  |  |
| CE101 |  | X |  |  | X | COC acceptable |
| CE102 |  | X |  |  | X | COC acceptable |
| [CE106](#_Toc258919378) |  | X |  |  | X | COC acceptable |
| CS101 |  | X |  |  | X | COC acceptable |
| CS103 |  | X |  |  | X | COC acceptable |
| CS104 |  | X |  |  | X | COC acceptable |
| CS105 |  | X |  |  | X | COC acceptable |
| CS114 |  | X |  |  | X | COC acceptable |
| [CS115](#_Toc258919384) |  | X |  |  | X | COC acceptable |
| [CS116](#_Toc258919385) |  | X |  |  | X | COC acceptable |
| RE101 |  | X |  |  | X | COC acceptable |
| RE102 |  | X |  |  | X | COC acceptable |
| RS101 |  | X |  |  | X | COC acceptable |
| RS103 |  | X |  |  | X | COC acceptable |
|  |  |  |  |  |  |  |
| *HUMAN ENGINEERING REQUIREMENTS* |  | X |  |  | X | COC acceptable |
|  |  |  |  |  |  |  |
| *RELIABILITY , MAINTAINABILITY and TESTABILITY* |  |  |  |  |  |  |
| Reliability |  | X |  |  |  |  |
| Maintainability |  | X |  |  |  |  |
| Testability |  | X |  |  |  |  |
|  |  |  |  |  |  |  |

## Documentation

Following documentation shall be attached to each fast link TX system unit:

1. Acceptance test results
2. ESS test reports
3. Failure report if exist
4. QA control final acceptance approval
5. COC