# EXHIBIT # 7&8

## FCC Requirements CFR 47 Part 2.1033,c(7)&(8)

## Power Rating and DC Power Input

## JXB24X4P-08T

| | | | |
|---|---|---|---|
| SAL | 11-8-99 | TITLE: | |
| MAN.: | | | |
| ENG.: | | TRANSCEIVER, 24GHz, HIGH AND LOW | |
| QA: | | SIZE | DWG NO. |
| PURCH.: | | A | 396-024001-001 & 396-024002-001 |
| ISSUED: | | SCALE 1:1 | CAD FILE: 39624001.SCD |
| DO NOT SCALE DRAWING • | X SPECIFICATION CONTROL DRAWING // SOURCE CONTROL DRAWING | | |

| MANUFACTURER | CATALOG # or DATE | MANUFACTURERS PART NUMBER | DASH NUMBERS |
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| Section | Parameter | Specification Limits |
|---|---|---|
| **1.0** | **Rx Input / Output Parameters:** | |
| 1.1 | RF Input Frequency Range: | -1) 24.250 - 24.450 GHz<br>-2) 25.050 - 25.250 GHz |
| 1.2 | IF Output Frequency Range: | 1575 MHz ± 25 MHz<br>(see 2.2.9) |
| 1.3 | Small-Signal Conversion Gain: | 25 dB Min to 35 dB Max<br>4 dB max variation, (all conditions see 5.1) |
| 1.4 | Gain Flatness: | ± 1.0 dB over any 300 MHz Bandwidth at constant temperature |
| 1.5 | Noise Figure: | 4.5 dB Max all conditions |
| 1.6 | Input 1dB Compression ($P_{1dB}$): | -20 dBm Min |
| 1.7 | Input Third-Order Intercept (IP3) | -10 dBm Min |
| 1.8 | Maximum RF Input (No Damage): | +10 dBm |
| 1.9 | Image Rejection: | Sufficient image rejection to achieve NF of section 1.5 |

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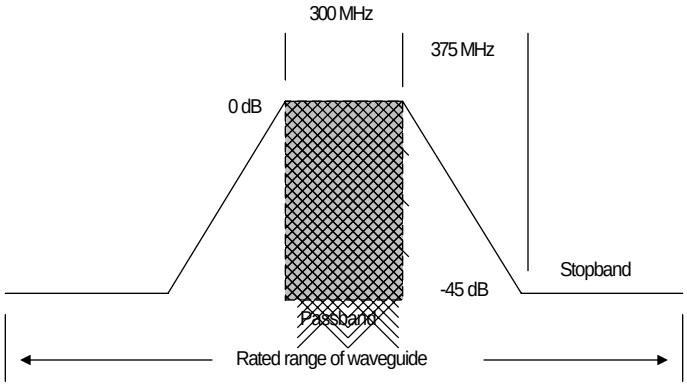
| | | (all conditions see 5.1). |
| 1.10 | Isolation: | |
| 1.10.1 | LO/IF: | -15 dBm Max |
| 1.10.2 | LO/RF: | -5 dBm Max |
| 1.11 | Port VSWR: | |
| 1.11.1 | RF Port | 2.3:1 Max<br>(Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.) |
| 1.11.2 | Rx IF Port | 2.0:1 Max |
| 1.12 | Spurious Output | |
| 1.12.1 | With -20 dBm RxRF input level | -30 dBc Min (non harmonic) 1575 ± 25 MHz<br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz<br>-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2) |
| 1.12.2 | With -70 dBm RF input level and a -40 dBm interference signal (CW) swept through 30 MHz to 110 GHz except at those frequencies where: the swept frequency is two channels or less away from the RxRF.<br><br>(minimum channel is 2.5 MHz) | -30 dBc Min at 1575 ± 25 MHz<br><br>Note: when the CW interference is inside RxRF ± 25 MHz , The specification at 1575 MHz collapses to the actual frequency deviation, down to a minimum of ± 5 MHz.<br><br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz<br>(Excludes the fundamental mixing products of CW interference and LO<br><br>-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2) |
| 1.12.2 | With no RXRF input signal<br>TxIF at +5 dBm & Mute Off | -83 dBm Max 1575 ± 25 MHz<br>-50 dBm Max at {800& 1505 MHz} ± 25 MHz |
| 1.13 | Phase Noise: | -82 dBc/Hz @ 100 kHz offset<br>Measured with Mute OFF (see 2.2.2) |
| 1.14 | Group Delay Variation over any 20 MHz span | 20 ns MAX |
| **2.0** | **Tx Input / Output Parameters:** | |
| 2.1 | RF Tuning Range | -1) 25.050 - 25.250 GHz<br>-2) 24.250 - 24.450 GHz |
| 2.2 | RF Output | |
| 2.2.1 | Output Power | +20.0 dBm minimum all conditions (5 dBm ± 1 dB TX IF input) |
| 2.2.2 | Output "Mute" level | -30 dBm Max<br>Mute "ON" is defined as the PA bias at 0 VDC<br>Mute "OFF" is defined as the PA bias at +5 VDC<br>(See 4.2) |
| 2.2.3 | Output Power Compensation | To maintain a constant RF output power, all conditions (see 5.1), the Tx IF input power must not be varied by more than 8 dB Max.<br><br>Additionally the output power shall be monotonically adjustable over + dBm to -30 dBm, by varying the TXIF power level from max TXIF (+6 dBm) to min TXIF (-52 dBm) . |
| 2.2.4 | Phase Noise | -82 dbc/Hz @ 100KHz<br>Measured with Mute OFF (see 2.2.2) |
| 2.2.5 | Output Flatness | ± 1.0 db over 300 MHz Tune at constant temperature |
| 2.2.6 | Spurious Output Offset from Transmit Carrier Frequency "fc" (see 2.1) | -60 dBc Min in the range, fc ± 150 MHz , Pout = +20dBm<br><br>Given the following Absolute Maximums:<br><br>-50 dBm Max. from 30 MHz to 21.2 GHz |

| | | |
|---|---|---|
| | | -30 dBm Max. from 21.2 to 110 GHz<br>  <br><br>Typical diplexer filter performance |
| 2.2.7 | Tx-IF Port VSWR With 50 Ohm Drive Source | 2.0 : 1 |
| 2.2.8 | RF Gain | 35 dB Max |
| 2.2.9 | Tx to RX Spacing | 800 MHz |
| 2.2.10 | TxIF Input Frequency | 2375 MHz ± 25 MHz (Tx to Rx spacing of 800 MHz) |
| 2.2.11 | Tx IF Power Input Maximum | 6 dBm |
| 2.2.12 | Tx to Rx Isolation | 50 dB Min |
| 2.2.13 | TXRF Port VSWR | 2.3:1 Max<br>(Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.) |
| **3.0** | **Tuning and Control Port Specifications:** | **Oscillator and internal prescallers must operate from the "second o DC supply. See 4.1** |
| 3.1 | LO Sample Output Frequency: | LO divided by 24 (See 3.7)<br>Monotonic over the entire tuning voltage range (see 3.4). |
| 3.2 | LO Sample Prescaler Output Level | -10 to 0 dBm into 50 ohms. |
| 3.3 | LO Sample Prescaler Output Harmonics | Each integer harmonic shall be at -20 dBc or less into 50 ohms.<br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz |
| 3.4 | Tuning Voltage Range: | +1.0 to +11.5 VDC over all operating conditions. |
| 3.5 | Tuning Port Input Capacitance: | 1000 pf nominal |
| 3.6 | RF Tuning Sensitivity Ratio<br>Knm = (Kv/(NxM)): | 8.0 – 16.0 MHz/V<br><br>Example:<br>RF tuning sensitivity = 360 MHz/V<br>RF multiplier factor = 6<br>Prescaler divide ratio = 4<br><br>Knm = 360/(6x4) = 15 MHz/V |
| 3.7 | LO Frequency Range | LO = 22.675 – 22.875 GHz (Tx High Band)<br>LO = 26.625 – 26.825 GHz (Tx Low Band)<br>(See 2.1) |
| **4.0** | **DC Power Requirements:** | |
| 4.1 | Operating Voltage: | + 12.0 ±0.2 VDC @ IDC MAX < 250 mA **"second on"**<br>+5.0 ± 0.1 VDC @ IDC MAX < 1000 mA **"on after VCO lock"**<br>-5.0 ± 0.1 VDC @ IDC MAX < 250 mA **"first on"** |
| 4.2 | Tx PA Bias | +5.0 VDC ± 0.1 VDC @ IDC MAX < 1000 mA **"last on"** |

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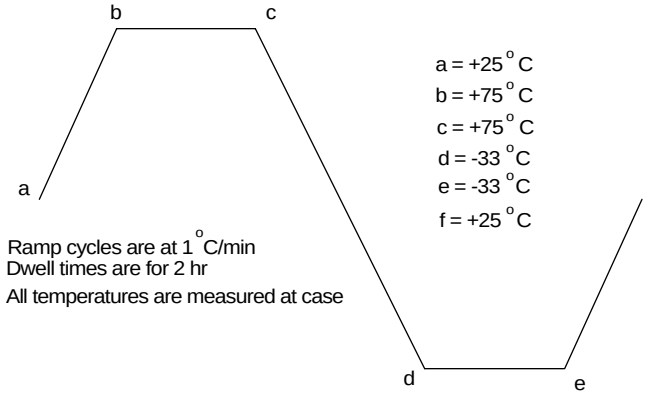
|---|---|---|
| 4.3 | Power consumption | 8.0 watt Max (all conditions) |
| **5.0** | **Environmental Conditions:** | |
| 5.1 | Operating Temperature Range: | -33°C to +75°C case temperature (see note 4)<br><br>Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output when subject to two consecutive temperature ramping cycles.<br><br>  <br>Temperature ramping cycle |
| 5.2 | Storage Temperature Range: | -40°C to +85°C |
| 5.3 | Humidity: | |
| 5.3.1 | Operating | 85% Maximum, non condensing |
| 5.3.2 | Storage | 95% Maximum, condensing. |
| 5.4 | Shock and Vibration Operation Frequency Jumping | Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output when subject to:<br><br>30G, ½ sine 11ms shocks in each direction of 3 mutually perpendicular axis for a total of 18 shocks.<br><br>3G rms., 20 to 2000 Hz , 10 minutes/axis in each of 3 mutually perpendicular axis |
| 5.5 | Phase Locked Operation Frequency Jumping | Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output, under Phase Locked Loop (PLL) control, with a PLL loop bandwidth not greater than 1K Hz (see 5.1) |
| 5.6 | Mean Time To Failure: | 100 years when operated at a heat sink temperature of +50°C |
| 5.7 | Warranty Period | 24 months repair or replace |
| | | |
| **6.0** | **Functional Block Diagram** | Per drawing |
| | | |
| **7.0** | **Mechanical Specifications** | |
| 7.1 | Mechanical outline: | Per Drawing |
| 7.2 | Electrical connections | Per Drawing |
| 7.2.1 | RF I/O | WR-42 |
| 7.2.2 | Hybrid Interface Connector | Interface connector per drawing.<br>Interface connector and transceiver to be fully functional after 50 matin cycles of interface connector. |

Notes:

1. -1) option (DMC part # 396-024002-001) is High Band Tx, Low Band Rx
   -2) option (DMC part # 396-024001-001) is Low Band Tx, High Band Rx

2. All specifications, unless otherwise noted, must be met when module is subjected to environmental and bias conditions specified herein.

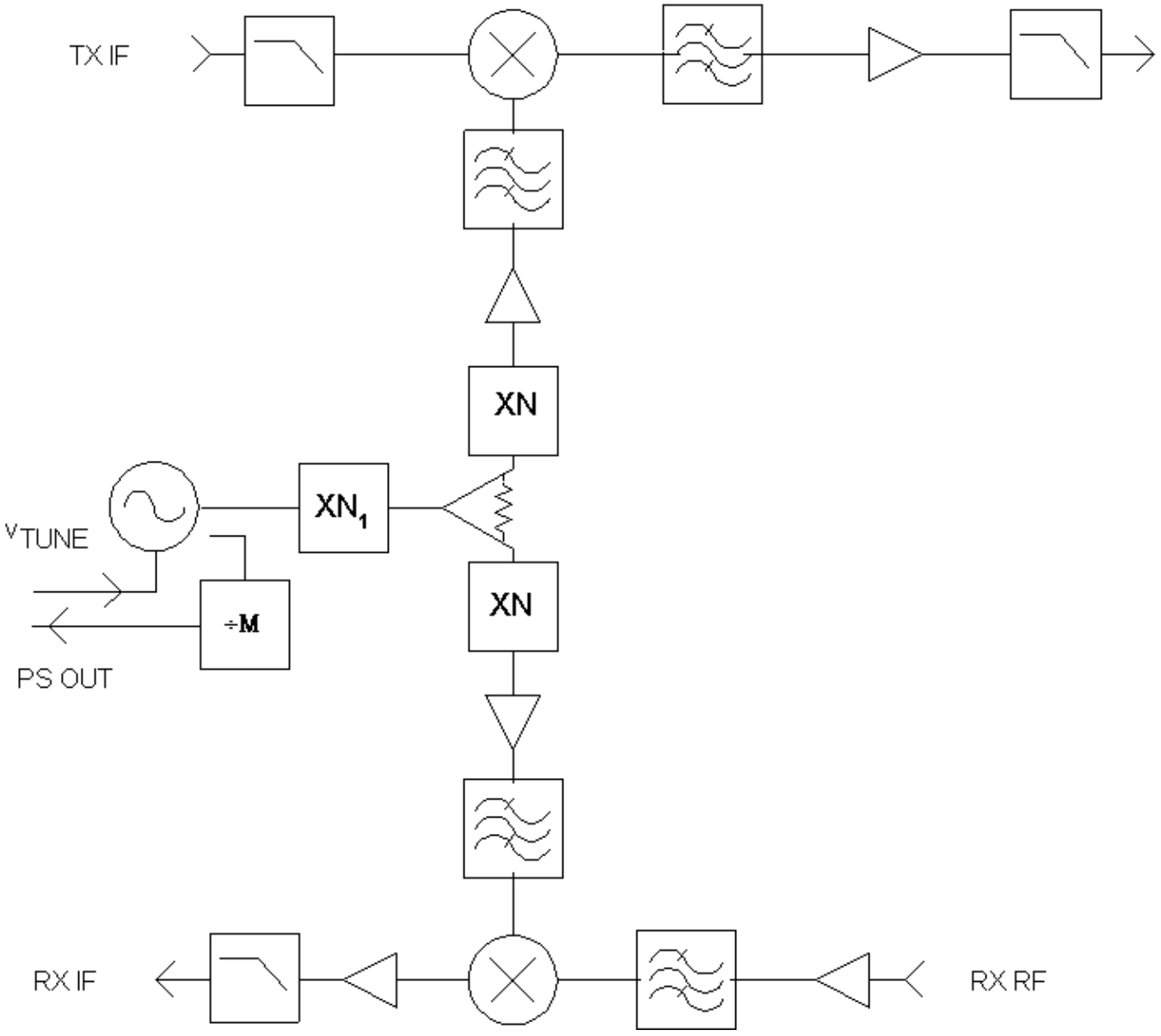
3. DMC must be notified of any product changes affecting form, fit or function.

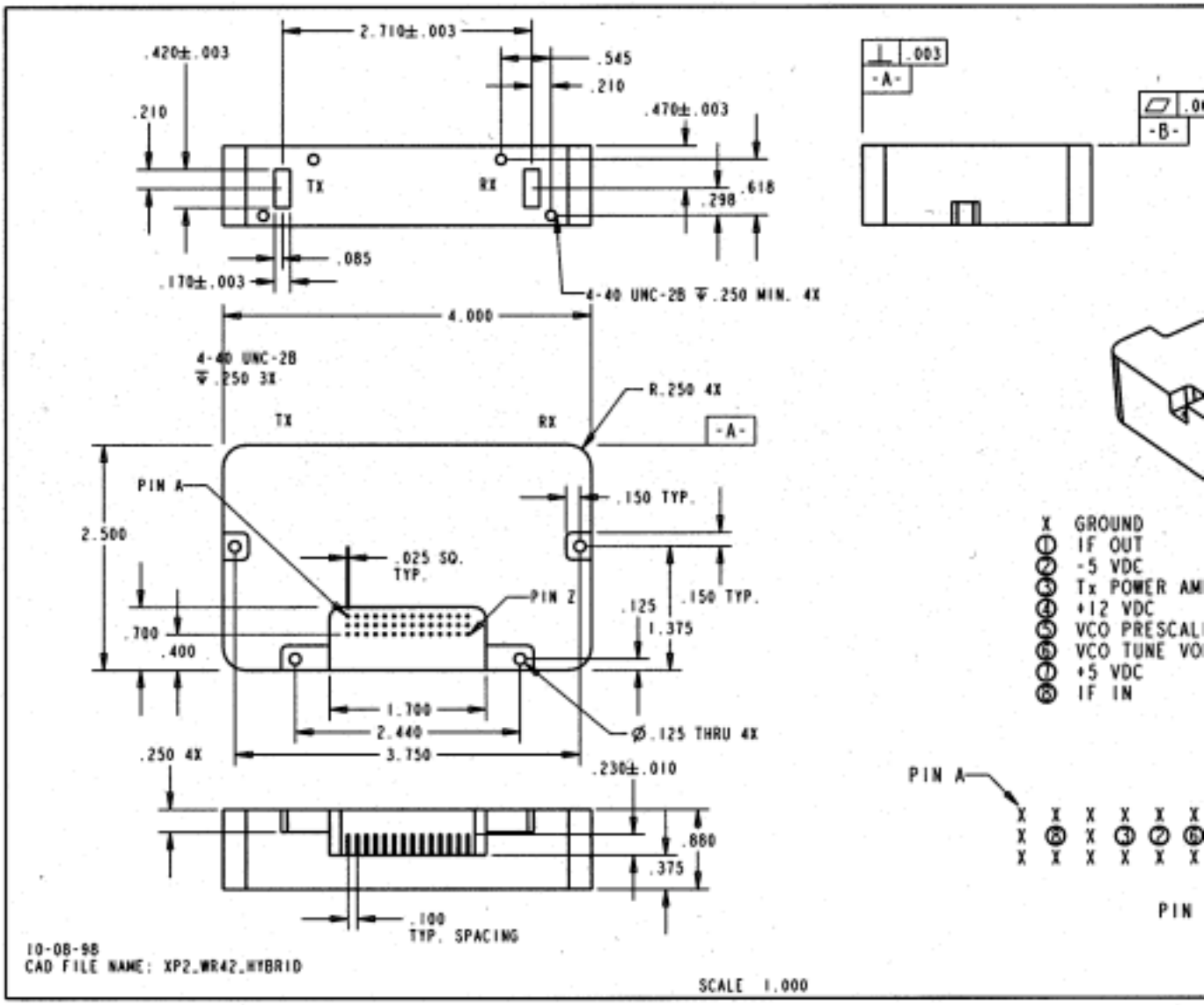
4. Module must be functional but not fully spec compliant at power-up @ -40°C and must recover to full spec compliance when -33°C is achieved without cycling input power.

5. LO is defined as the final microwave frequency input to the upconverter/downconverter mixers.

6. RF is defined as the frequency at the transceiver's, Tx & Rx, waveguide ports.

7. IF is defined as the input/output frequencies passed through the multi-pin connector.

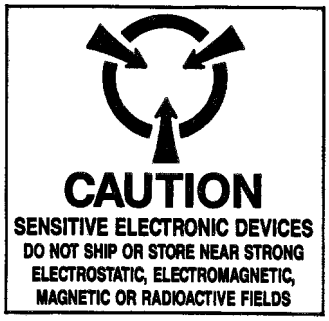

TX IF
XN
XN1
VTUNE
÷M
XN
PS OUT
RX IF
RX RF






REVISIONS

| ZONE | REV | DESCRIPTION | DATE |
|---|---|---|---|
| | 01 | Initial Release | |
| | 02 | Per PCN 9616 | |
| | 03 | Per PCN 10005 | |




**Only the item described on this drawing when procured from supplier(s) listed hereon is approved by Engineering and Manufacturing Engineering for use in the application(s) specified hereon. A substitu testing and approval by Digital Microwave Corporation Engineering or Manufacturing Engineering a PCN / ECO process to add the additional vendor(s).**

**Identification of the approved source(s) hereon is not to be construed as a guarantee of present or cont for the item described on this drawing.**

| SIGNATURES | DATE | D | 3325 S. 116TH ST BLDG 2 SEATTLE, WA 98168<br>(206) 439-9121 (206) 439-2700 FAX |
|---|---|---|---|
| SAL | 11-8-99 | TITLE: | |
| MAN.: | | | |
| ENG.: | | HYBRID, 24.250 – 24.450 GHz (LOW) & 25.050 – 25.250 GHz (HI | |
| QA: | | SIZE | DWG NO. |
| PURCH.: | | A | 396-024001-001 & 396-024002-001 |
| ISSUED: | | SCALE 1:1 | CAD FILE: 396-2401.SCD |

DO NOT SCALE DRAWING • X SPECIFICATION CONTROL DRAWING // SOURCE CONTROL DRAWING

| MANUFACTURER | CATALOG # or DATE | MANUFACTURERS PART NUMBER | DASH NUMBERS |
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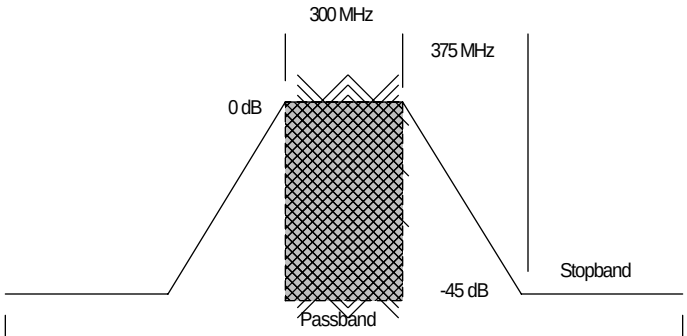
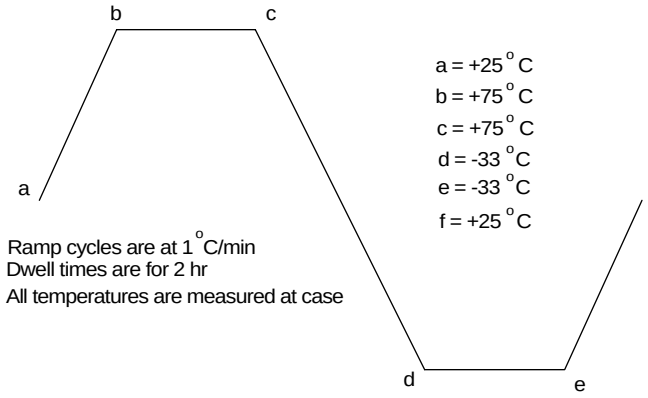
| Section | Parameter | Specification Limits |
|---|---|---|
| **1.0** | **Rx Input / Output Parameters:** | |
| 1.1 | RF Input Frequency Range: | -1) 24.250 - 24.450 GHz<br>-2) 25.050 - 25.250 GHz |
| 1.2 | IF Output Frequency Range: | 1575 MHz ± 25 MHz<br>(see 2.2.9) |
| 1.3 | Small-Signal Conversion Gain: | 25 dB Min to 35 dB Max<br>4 dB max variation, (all conditions see 5.1) |
| 1.4 | Gain Flatness: | ± 1.0 dB over any 300 MHz Bandwidth at constant temperature |
| 1.5 | Noise Figure: | 4.5 dB Max all conditions |
| 1.6 | Input 1dB Compression ($P_{1dB}$): | -20 dBm Min |
| 1.7 | Input Third-Order Intercept (IP3) | -10 dBm Min |
| 1.8 | Maximum RF Input (No Damage): | +10 dBm |
| 1.9 | Image Rejection: | Sufficient image rejection to achieve NF of section 1.5 |

| | | |
|---|---|---|
| | | (all conditions see 5.1). |
| 1.10 | Isolation: | |
| 1.10.1 | LO/IF: | -15 dBm Max |
| 1.10.2 | LO/RF: | -5 dBm Max |
| 1.11 | Port VSWR: | |
| 1.11.1 | RF Port | 2.3:1 Max<br>(Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.) |
| 1.11.2 | Rx IF Port | 2.0:1 Max |
| 1.12 | Spurious Output | |
| 1.12.1 | With -20 dBm RxRF input level | -30 dBc Min (non harmonic) 1575 ± 25 MHz<br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz<br>-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2) |
| 1.12.2 | With -70 dBm RF input level and a -40 dBm interference signal (CW) swept through 30 MHz to 110 GHz except at those frequencies where: the swept frequency is two channels or less away from the RxRF.<br><br>(minimum channel is 2.5 MHz) | -30 dBc Min at 1575 ± 25 MHz<br><br>Note: when the CW interference is inside RxRF ± 25 MHz , The specification at 1575 MHz collapses to the actual frequency deviation, down to a minimum of ± 5 MHz.<br><br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz<br>(Excludes the fundamental mixing products of CW interference and LO<br><br>-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2) |
| 1.12.3 | With no RXRF input signal<br>TxIF at +5 dBm & Mute Off<br>Measured with a Tx to Rx Isolation no greater than 45dB. | -83 dBm Max 1575 ± 25 MHz<br>-50 dBm Max at {800& 1505 MHz} ± 25 MHz |
| 1.13 | Phase Noise: | -82 dBc/Hz @ 100 kHz offset<br>Measured with Mute OFF (see 2.2.2) |
| 1.14 | Group Delay Variation over any 20 MHz span | 20 ns MAX |
| **2.0** | **Tx Input / Output Parameters:** | |
| 2.1 | RF Tuning Range | -1) 25.050 - 25.250 GHz<br>-2) 24.250 - 24.450 GHz |
| 2.2 | RF Output | |
| 2.2.1 | Output Power | +20.0 dBm minimum all conditions (5 dBm ± 1 dB TX IF input) |
| 2.2.2 | Output "Mute" level | -30 dBm Max<br>Mute "ON" is defined as the PA bias at 0 VDC<br>Mute "OFF" is defined as the PA bias at +5 VDC<br>(See 4.2) |
| 2.2.3 | Output Power Compensation | To maintain a constant RF output power, all conditions (see 5.1), the Tx IF input power must not be varied by more than 8 dB Max.<br><br>Additionally the output power shall be monotonically adjustable over + dBm to -30 dBm, by varying the TXIF power level from max TXIF (+6 dBm) to min TXIF (-52 dBm) . |
| 2.2.4 | Phase Noise | -82 dbc/Hz @ 100KHz<br>Measured with Mute OFF (see 2.2.2) |
| 2.2.5 | Output Flatness | ± 1.0 db over 300 MHz Tune at constant temperature |
| 2.2.6 | Spurious Output Offset from Transmit Carrier Frequency "fc" (see 2.1) | -60 dBc Min in the range, fc ± 150 MHz , Pout = +20dBm<br><br>Given the following Absolute Maximums: |

| | | |
|---|---|---|
| | | -50 dBm Max. from 30 MHz to 21.2 GHz<br>-30 dBm Max. from 21.2 to 110 GHz<br>  <br><br>Typical diplexer filter performance |
| 2.2.7 | Tx-IF Port VSWR With 50 Ohm Drive Source | 2.0 : 1 |
| 2.2.8 | Tx Noise Power Density | -130 dBm/Hz Max |
| 2.2.9 | Tx to RX Spacing | 800 MHz |
| 2.2.10 | TxIF Input Frequency | 2375 MHz ± 25 MHz (Tx to Rx spacing of 800 MHz) |
| 2.2.11 | Tx IF Power Input Maximum | 6 dBm |
| 2.2.12 | Tx to Rx Isolation | 50 dB Min |
| 2.2.13 | TXRF Port VSWR | 2.3:1 Max<br>(Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.) |
| **3.0** | **Tuning and Control Port Specifications:** | **Oscillator and internal prescallers must operate from the "second o DC supply. See 4.1** |
| 3.1 | LO Sample Output Frequency: | LO divided by 24 (See 3.7)<br>Monotonic over the entire tuning voltage range (see 3.4). |
| 3.2 | LO Sample Prescaler Output Level | -10 to 0 dBm into 50 ohms. |
| 3.3 | LO Sample Prescaler Output Harmonics | Each integer harmonic shall be at -20 dBc or less into 50 ohms.<br>-50 dBm Max at {800 & 1505 MHz} ± 25 MHz |
| 3.4 | Tuning Voltage Range: | +1.0 to +11.5 VDC over all operating conditions. |
| 3.5 | Tuning Port Input Capacitance: | 1000 pf nominal |
| 3.6 | RF Tuning Sensitivity Ratio<br>Knm = (Kv/(NxM)): | 8.0 – 16.0 MHz/V<br><br>Example:<br>RF tuning sensitivity = 360 MHz/V<br>RF multiplier factor = 6<br>Prescaler divide ratio = 4<br><br>Knm = 360/(6x4) = 15 MHz/V |
| 3.7 | LO Frequency Range | LO = 22.675 – 22.875 GHz (Tx High Band)<br>LO = 26.625 – 26.825 GHz (Tx Low Band)<br>(See 2.1) |
| **4.0** | **DC Power Requirements:** | |
| 4.1 | Operating Voltage: | + 12.0 ±0.2 VDC @ IDC MAX < 250 mA **"second on"**<br>+5.0 ± 0.1 VDC @ IDC MAX < 1000 mA **"on after VCO lock"**<br>-5.0 ± 0.1 VDC @ IDC MAX < 250 mA **"first on"** |
| 4.2 | Tx PA Bias | +5.0 VDC ± 0.1 VDC @ IDC MAX < 1000 mA **"last on"** |

| | | |
|---|---|---|
| 4.3 | Power consumption | 8.0 watt Max (all conditions) |
| **5.0** | **Environmental Conditions:** | |
| 5.1 | Operating Temperature Range: | -33°C to +75°C case temperature (see note 4)<br><br>Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output when subject to two consecutive temperature ramping cycles.<br><br>  <br>Temperature ramping cycle |
| 5.2 | Storage Temperature Range: | -40°C to +85°C |
| 5.3 | Humidity: | |
| 5.3.1 | Operating | 85% Maximum, non condensing |
| 5.3.2 | Storage | 95% Maximum, condensing. |
| 5.4 | Shock and Vibration Operation Frequency Jumping | Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output when subject to:<br><br>30G, ½ sine 11ms shocks in each direction of 3 mutually perpendicular axis for a total of 18 shocks.<br><br>3G rms., 20 to 2000 Hz , 10 minutes/axis in each of 3 mutually perpendicular axis |
| 5.5 | Phase Locked Operation Frequency Jumping | Instantaneous frequency stability of 100 KHz from center frequency (fc and no additional spurious output, under Phase Locked Loop (PLL) control, with a PLL loop bandwidth not greater than 1K Hz (see 5.1) |
| 5.6 | Mean Time To Failure: | 100 years when operated at a heat sink temperature of +50°C |
| 5.7 | Warranty Period | 24 months repair or replace |
| | | |
| **6.0** | **Functional Block Diagram** | Per drawing |
| | | |
| **7.0** | **Mechanical Specifications** | |
| 7.1 | Mechanical outline: | Per Drawing |
| 7.2 | Electrical connections | Per Drawing |
| 7.2.1 | RF I/O | WR-42 |
| 7.2.2 | Hybrid Interface Connector | Interface connector per drawing.<br>Interface connector and transceiver to be fully functional after 50 matin cycles of interface connector. |

Notes:

1. -1) option (DMC part # 396-024002-001) is High Band Tx, Low Band Rx
   -2) option (DMC part # 396-024001-001) is Low Band Tx, High Band Rx

2. All specifications, unless otherwise noted, must be met when module is subjected to environmental and bias conditions specified herein.

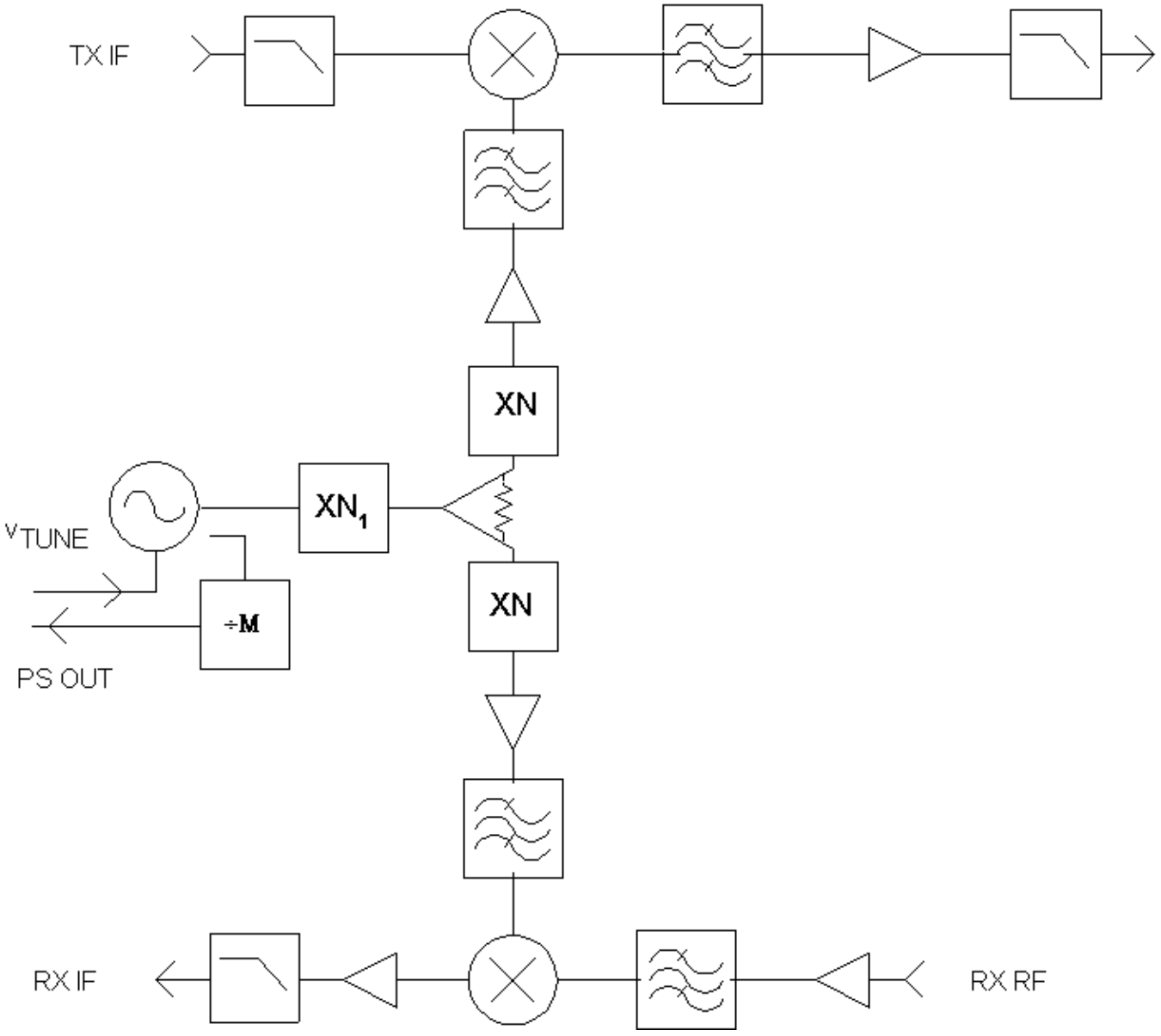
3. DMC must be notified of any product changes affecting form, fit or function.

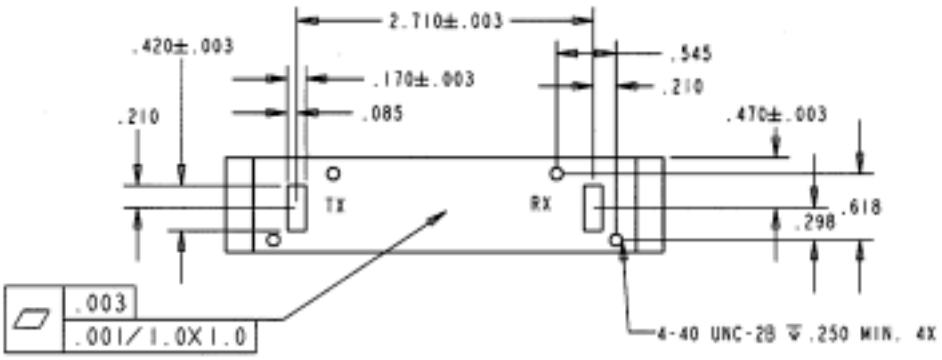
4. Module must be functional but not fully spec compliant at power-up @ -40°C and must recover to full spec compliance when -33°C is achieved without cycling input power.

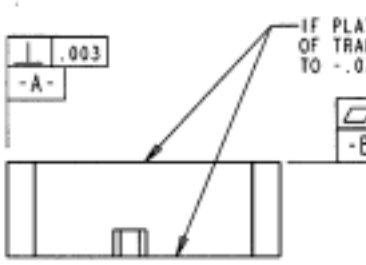
5. LO is defined as the final microwave frequency input to the upconverter/downconverter mixers.

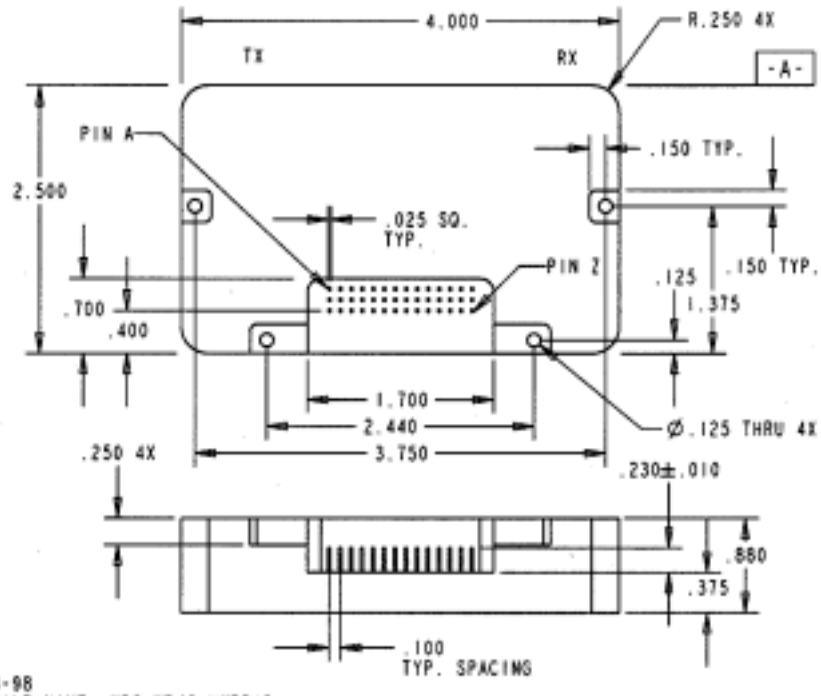
6. RF is defined as the frequency at the transceiver's, Tx & Rx, waveguide ports.

7. IF is defined as the input/output frequencies passed through the multi-pin connector.

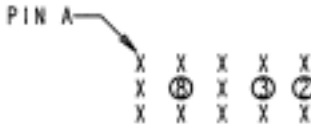

TX IF
XN
XN1
VTUNE
÷M
XN
PS OUT
RX IF
RX RF




X GROUND
① IF OUT
② -5 VDC
③ Tx POWER
④ +12 VDC
⑤ VCO PRES
⑥ VCO TUNE
⑦ +5 VDC
⑧ IF IN




10-08-98
CAD FILE NAME: XP2_WR42_HYBRID

SCALE 1.000