

EXHIBIT # 7&8

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

Power Rating and DC Power Input

JXB24X4P-08T

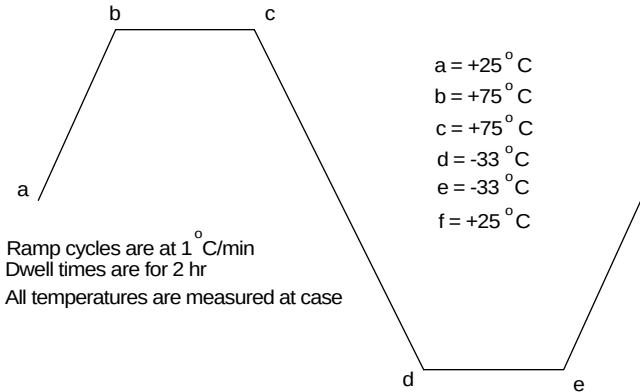
SAL		11-8-99		TITLE: TRANSCIEVER, 24GHz, HIGH AND LOW	
MAN.:					
ENG.:					
QA:				SIZE	DWG NO.
PURCH.:				A	396-024001-001 & 396-024002-001
ISSUED:				SCALE 1:1	CAD FILE: 39624001.SCD
DO NOT SCALE DRAWING •			X SPECIFICATION CONTROL DRAWING // SOURCE CONTROL DRAWING		
000-000079-FRM Rev. A					

[illegible]

Section	Parameter	Specification Limits
1.0	Rx Input / Output Parameters:	
1.1	RF Input Frequency Range:	-1) 24.250 - 24.450 GHz -2) 25.050 - 25.250 GHz
1.2	IF Output Frequency Range:	1575 MHz $\pm$ 25 MHz (see 2.2.9)
1.3	Small-Signal Conversion Gain:	25 dB Min to 35 dB Max 4 dB max variation, (all conditions see 5.1)
1.4	Gain Flatness:	$\pm$ 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

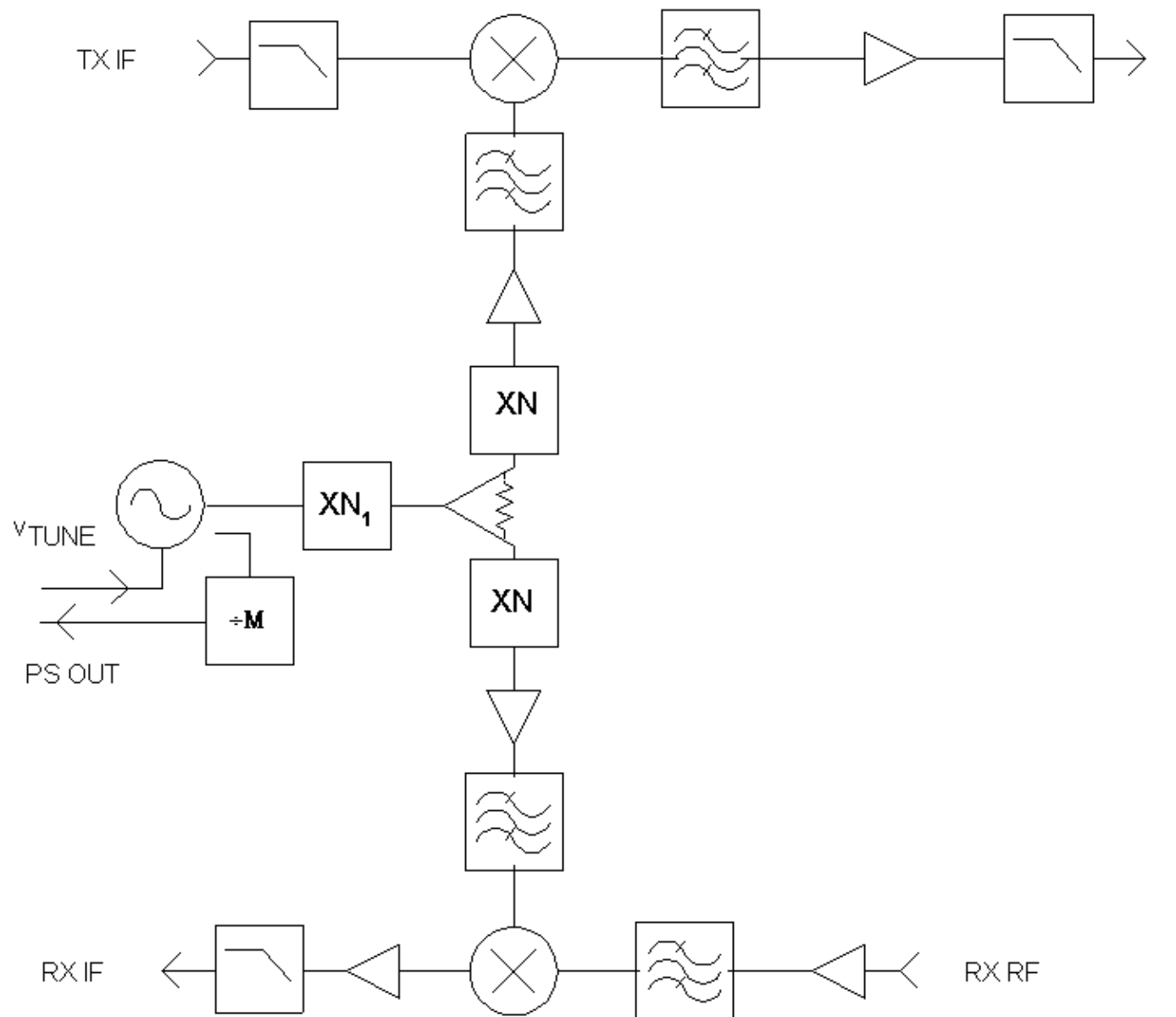
		(all conditions see 5.1).
1.10	Isolation:	
1.10.1	LO/IF:	-15 dBm Max
1.10.2	LO/RF:	-5 dBm Max
1.11	Port VSWR:	
1.11.1	RF Port	2.3:1 Max (Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.)
1.11.2	Rx IF Port	2.0:1 Max
1.12	Spurious Output	
1.12.1	With -20 dBm RxRF input level	-30 dBc Min (non harmonic) 1575 $\pm$ 25 MHz -50 dBm Max at {800 & 1505 MHz} $\pm$ 25 MHz -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. (minimum channel is 2.5 MHz)	-30 dBc Min at 1575 $\pm$ 25 MHz Note: when the CW interference is inside RxRF $\pm$ 25 MHz , The specification at 1575 MHz collapses to the actual frequency deviation, down to a minimum of $\pm$ 5 MHz. -50 dBm Max at {800 & 1505 MHz} $\pm$ 25 MHz (Excludes the fundamental mixing products of CW interference and LO -25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2)
1.12.2	With no RXRF input signal TxIF at +5 dBm & Mute Off	-83 dBm Max 1575 $\pm$ 25 MHz -50 dBm Max at {800& 1505 MHz} $\pm$ 25 MHz
1.13	Phase Noise:	-82 dBc/Hz @ 100 kHz offset 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 -2) 24.250 - 24.450 GHz
2.2	RF Output	
2.2.1	Output Power	+20.0 dBm minimum all conditions (5 dBm $\pm$ 1 dB TX IF input)
2.2.2	Output "Mute" level	-30 dBm Max Mute "ON" is defined as the PA bias at 0 VDC Mute "OFF" is defined as the PA bias at +5 VDC (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. 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 Measured with Mute OFF (see 2.2.2)
2.2.5	Output Flatness	$\pm$ 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 $\pm$ 150 MHz , Pout = +20dBm Given the following Absolute Maximums: -50 dBm Max. from 30 MHz to 21.2 GHz

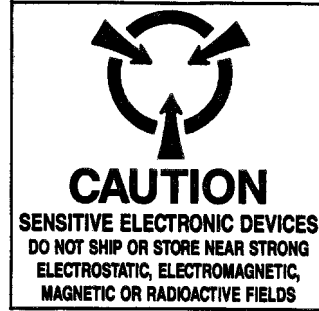
		-30 dBm Max. from 21.2 to 110 GHz 300 MHz 375 MHz 0 dB -45 dB Stopband Passband Rated range of waveguide Typical diplexer filter performance
2.2.7	Tx-IF Port VSWR With 50 Ohm Drive Source	2.0 : 1
2.2.8	RF Gain	35 dB Max
2.2.9	Tx to RX Spacing	800 MHz
2.2.10	TxIF Input Frequency	2375 MHz $\pm$ 25 MHz (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 (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 prescalers must operate from the “second on” DC supply. See 4.1
3.1	LO Sample Output Frequency:	LO divided by 24 (See 3.7) 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. -50 dBm Max at {800 & 1505 MHz} $\pm$ 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 $K_{nm} = (K_v/(N \times M))$:	8.0 – 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 $K_{nm} = 360/(6 \times 4) = 15 \text{ MHz/V}$
3.7	LO Frequency Range	LO = 22.675 – 22.875 GHz (Tx High Band) LO = 26.625 – 26.825 GHz (Tx Low Band) (See 2.1)
4.0	DC Power Requirements:	
4.1	Operating Voltage:	+ 12.0 $\pm$ 0.2 VDC @ IDC MAX < 250 mA “second on” +5.0 $\pm$ 0.1 VDC @ IDC MAX < 1000 mA “on after VCO lock” -5.0 $\pm$ 0.1 VDC @ IDC MAX < 250 mA “first on”
4.2	Tx PA Bias	+5.0 VDC $\pm$ 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) Instantaneous frequency stability of 100 KHz from center frequency (f₀) and no additional spurious output when subject to two consecutive temperature ramping cycles.  a = +25 °C b = +75 °C c = +75 °C d = -33 °C e = -33 °C f = +25 °C Ramp cycles are at 1 °C/min Dwell times are for 2 hr All temperatures are measured at case 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 (f₀) and no additional spurious output when subject to: 30G, ½ sine 11ms shocks in each direction of 3 mutually perpendicular axis for a total of 18 shocks. 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 (f ₀) 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. Interface connector and transceiver to be fully functional after 50 mating 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.





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 substitution requires testing and approval by Digital Microwave Corporation Engineering or Manufacturing Engineering and 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 continued availability for the item described on this drawing.

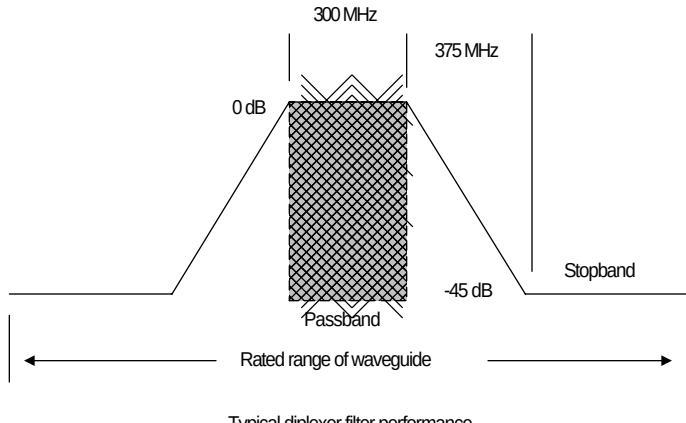
SIGNATURES		DATE		D 3325 S. 116TH ST BLDG 2 SEATTLE, WA 98168 (206) 439-9121 (206) 439-2700 FAX	
SAL		11-8-99		TITLE:	
MAN.:					
ENG.:					
QA:				SIZE	DWG NO.
PURCH.:				A	396-024001-001 & 396-024002-001
ISSUED:				SCALE 1:1	CAD FILE: 396-2401.SCD
DO NOT SCALE DRAWING •			☒ SPECIFICATION CONTROL DRAWING // SOURCE CONTROL DRAWING		

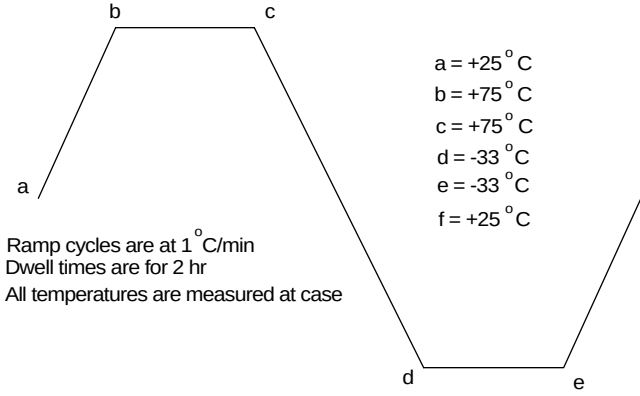
000-000079-FRM Rev. A

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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 -2) 25.050 - 25.250 GHz
1.2	IF Output Frequency Range:	1575 MHz $\pm$ 25 MHz (see 2.2.9)
1.3	Small-Signal Conversion Gain:	25 dB Min to 35 dB Max 4 dB max variation, (all conditions see 5.1)
1.4	Gain Flatness:	$\pm$ 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

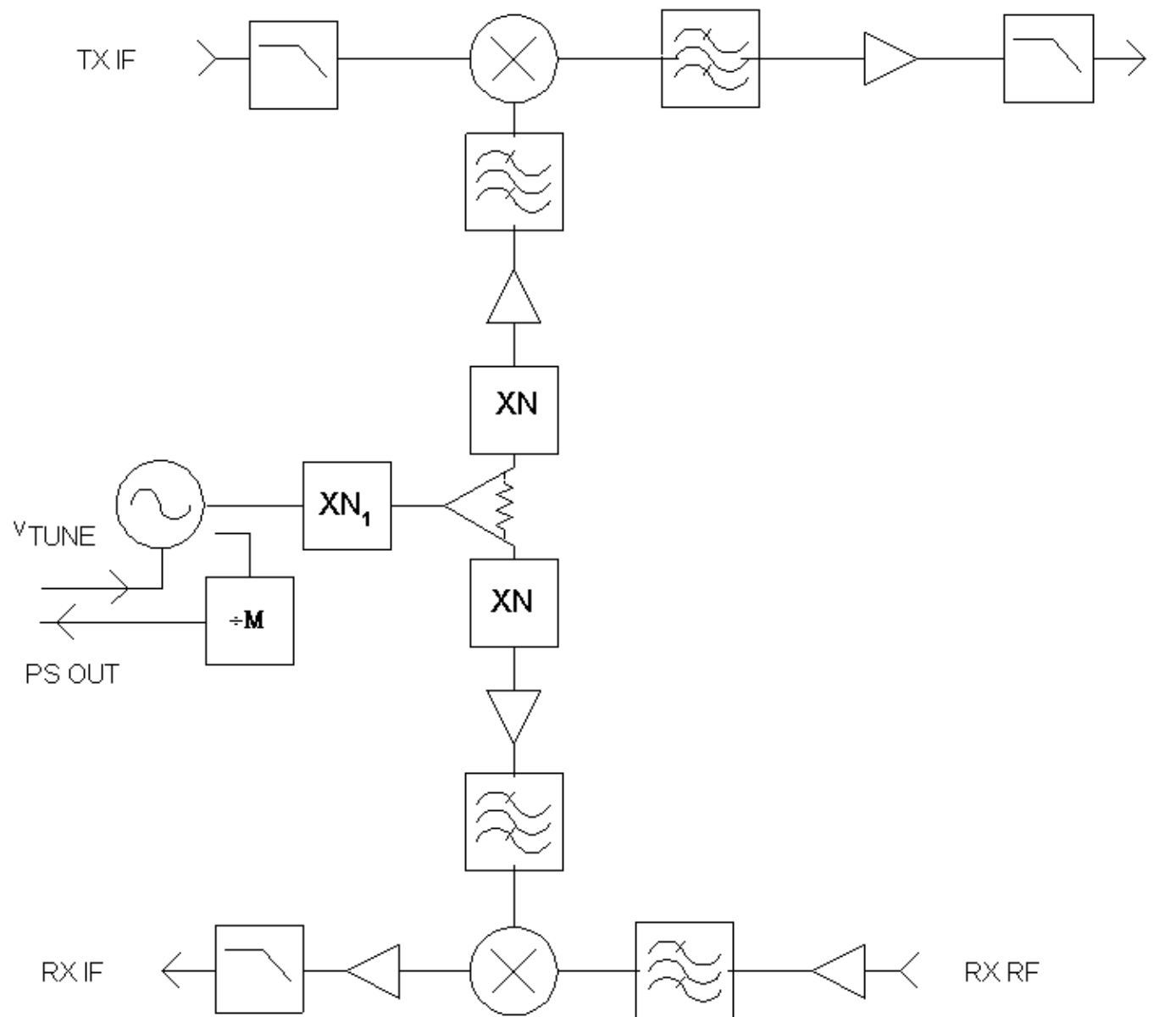
		(all conditions see 5.1).
1.10	Isolation:	
1.10.1	LO/IF:	-15 dBm Max
1.10.2	LO/RF:	-5 dBm Max
1.11	Port VSWR:	
1.11.1	RF Port	2.3:1 Max (Transceiver shall be unconditionally stable, no in-band or out-of-band spurious signals or oscillations regardless of port termination.)
1.11.2	Rx IF Port	2.0:1 Max
1.12	Spurious Output	
1.12.1	With -20 dBm RxRF input level	-30 dBc Min (non harmonic) 1575 $\pm$ 25 MHz -50 dBm Max at {800 & 1505 MHz} $\pm$ 25 MHz -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. (minimum channel is 2.5 MHz)	-30 dBc Min at 1575 $\pm$ 25 MHz Note: when the CW interference is inside RxRF $\pm$ 25 MHz , The specification at 1575 MHz collapses to the actual frequency deviation, down to a minimum of $\pm$ 5 MHz. -50 dBm Max at {800 & 1505 MHz} $\pm$ 25 MHz (Excludes the fundamental mixing products of CW interference and LO -25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2)
1.12.3	With no RXRF input signal TxIF at +5 dBm & Mute Off Measured with a Tx to Rx Isolation no greater than 45dB.	-83 dBm Max 1575 $\pm$ 25 MHz -50 dBm Max at {800& 1505 MHz} $\pm$ 25 MHz
1.13	Phase Noise:	-82 dBc/Hz @ 100 kHz offset 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 -2) 24.250 - 24.450 GHz
2.2	RF Output	
2.2.1	Output Power	+20.0 dBm minimum all conditions (5 dBm $\pm$ 1 dB TX IF input)
2.2.2	Output "Mute" level	-30 dBm Max Mute "ON" is defined as the PA bias at 0 VDC Mute "OFF" is defined as the PA bias at +5 VDC (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. 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 Measured with Mute OFF (see 2.2.2)
2.2.5	Output Flatness	$\pm$ 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 $\pm$ 150 MHz , Pout = +20dBm Given the following Absolute Maximums:

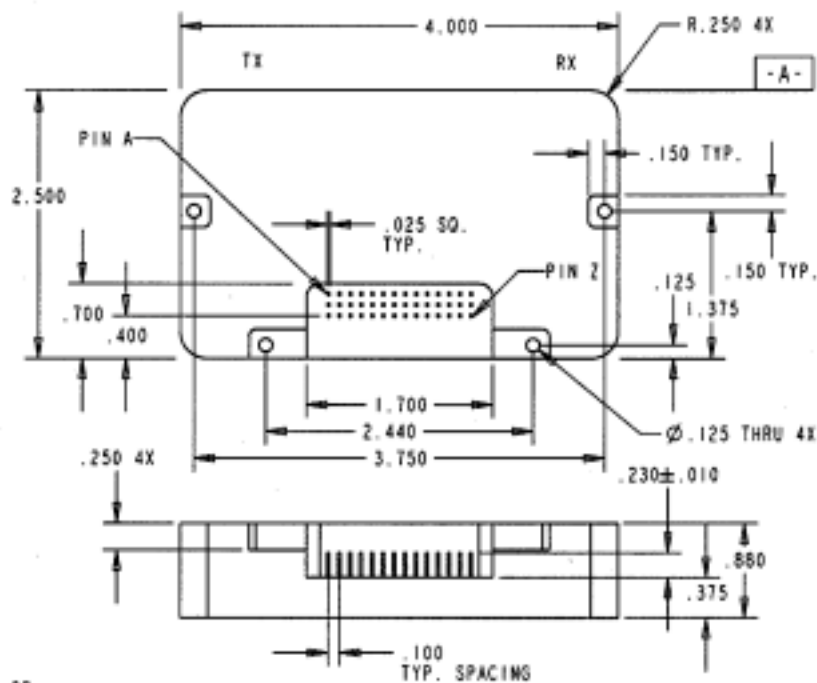
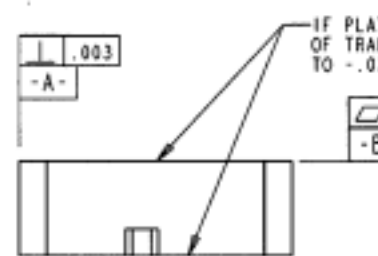
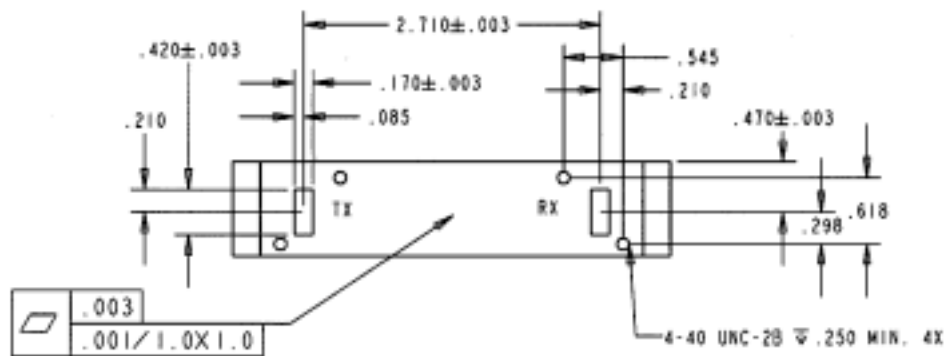
		-50 dBm Max. from 30 MHz to 21.2 GHz -30 dBm Max. from 21.2 to 110 GHz  Typical diplexer filter performance
2.2.7	Tx-IF Port VSWR With 50 Ohm Drive Source	2.0 : 1
2.2.8	Tx Noise Power Density	-130 dBm/Hz Max
2.2.9	Tx to RX Spacing	800 MHz
2.2.10	TxIF Input Frequency	2375 MHz $\pm$ 25 MHz (Tx to Rx spacing 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 (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 prescalers must operate from the “second on” DC supply. See 4.1
3.1	LO Sample Output Frequency:	LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4).
3.2	LO Sample Prescaler Output Level	-10 to 0 dBm into 50 ohms.
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3.5	Tuning Port Input Capacitance:	1000 pf nominal
3.6	RF Tuning Sensitivity Ratio $K_{nm} = (K_v / (N \times M))$:	8.0 – 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 $K_{nm} = 360 / (6 \times 4) = 15 \text{ MHz/V}$
3.7	LO Frequency Range	LO = 22.675 – 22.875 GHz (Tx High Band) LO = 26.625 – 26.825 GHz (Tx Low Band) (See 2.1)
4.0	DC Power Requirements:	
4.1	Operating Voltage:	+ 12.0 $\pm$ 0.2 VDC @ IDC MAX < 250 mA “second on” +5.0 $\pm$ 0.1 VDC @ IDC MAX < 1000 mA “on after VCO lock” -5.0 $\pm$ 0.1 VDC @ IDC MAX < 250 mA “first on”
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4.3	Power consumption	8.0 watt Max (all conditions)
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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 (f₀) and no additional spurious output when subject to: 30G, ½ sine 11ms shocks in each direction of 3 mutually perpendicular axis for a total of 18 shocks. 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 (f ₀) 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	
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7.2.2	Hybrid Interface Connector	Interface connector per drawing. Interface connector and transceiver to be fully functional after 50 mating cycles of interface connector.

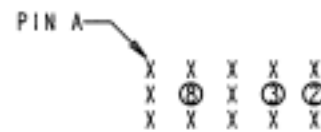
Notes:

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.
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- 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