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		/ER, 24GHz, HIGH AND LOW
QA:			SIZE DWG NO.		NO.
PURCH.:			A	396-	024001-001 & 396-024002-001
ISSUED:			SCALE 1:1 CAD FILE: 39624001.SCD		
DO NOT SCALE DRAWING •	X SP	ECIFICATION	CONTR	OL D	RAWING // SOURCE CONTROL DRAWING

000-000079-FRM Rev. A

MANUFACTURER	CATALOG # or DATE	MANUFACTURERS PART NUMBER	DASH NUMBERS

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 ± 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:	± 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

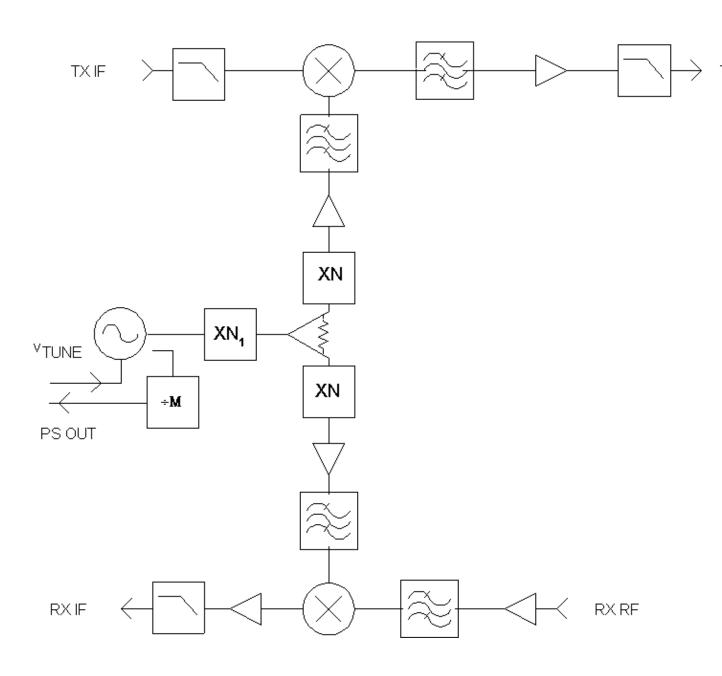
			(all conditions see 5.1).
	1.10	Isolation:	
	1.10.1	LO/IF:	-15 dBm Max
			-5 dBm Max
	1.11	Port VSWR:	
	1.11.1	RF Port	2.3:1 Max
			(Transceiver shall be unconditionally stable, no in-band or out-of-band
			spurious signals or oscillations regardless of port termination.)
	1.11.2	Rx IF Port	2.0:1 Max
	1.12	Spurious Output	
	1.12.1	With -20 dBm RxRF input level	-30 dBc Min (non harmonic) 1575 ± 25 MHz
			-50 dBm Max at {800 & 1505 MHz} ± 25 MHz
			-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2)
	1.12.2	With -70 dBm RF input level and a	$-30 \text{ dBc Min at } 1575 \pm 25 \text{ MHz}$
		-40 dBm interference signal (CW)	
		swept through 30 MHz to 110 GHz	Note: when the CW interference is inside RxRF \pm 25 MHz, The
		except at those frequencies where: the	specification at 1575 MHz collapses to the actual frequency deviation,
		swept frequency is two channels or less	down to a minimum of ± 5 MHz.
		away from the RxRF.	
1		1 1 25 5 5 5 5	-50 dBm Max at $\{800 \& 1505 \text{ MHz}\} \pm 25 \text{ MHz}$
		(minimum channel is 2.5 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	$-83 \text{ dBm Max } 1575 \pm 25 \text{ MHz}$
		TxIF at +5 dBm & Mute Off	-50 dBm Max at {800& 1505 MHz} ± 25 MHz
1	1.13	Phase Noise:	-82 dBc/Hz @ 100 kHz offset
<u> </u>			Measured with Mute OFF (see 2.2.2)
	1.14	Group Delay Variation over any 20	20 ns MAX
		MHz span	
2.0		Tx Input / Output Parameters:	
	2.1	RF Tuning Range	-1) 25.050 - 25.250 GHz
			-2) 24.250 - 24.450 GHz
<u> </u>	2.2	RF Output	
<u> </u>	2.2.1	Output Power	+20.0 dBm minimum all conditions (5 dBm ± 1 dB TX IF input)
1	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
	2.5.5		(See 4.2)
	2.2.3	Output Power Compensation	To maintain a constant RF output power, all conditions (see 5.1), the Ty
			IF input power must not be varied by more than 8 dB Max.
1			Additionally the costant nerven shall be asserted in the discontinuous
			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
	2.2.4	Fliase Noise	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)	(0 JD - Min in the name for ± 150 MH - Do () (20 JD)
		Carrier rrequency ic (see 2.1)	-60 dBc Min in the range, fc \pm 150 MHz, Pout = \pm 20dBm
			Given the following Absolute Maximums
			Given the following Absolute Maximums:
1			-50 dBm Max. from 30 MHz to 21.2 GHz
			- JU UDIII MAX. IIUIII JU MITIZ IU 21.2 UTIZ

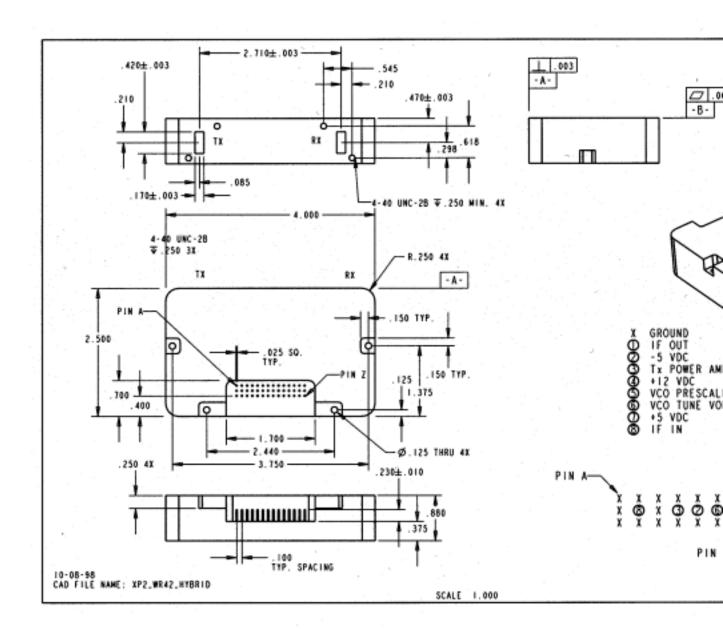
			-30 dBm Max. from 21.2 to 110 GHz
			300 MHz
			375 MHz 0 dB Stopband Als dB Stopband Typical diplexer filter performance
	2.2.7	Tx-IF Port VSWR With 50 Ohm Drive	2.0:1
	2.2.1	Source Source	2.0 . 1
	2.2.8	RF Gain	35 dB Max
	2.2.9	Tx to RX Spacing	800 MHz
	2.2.10	TxIF Input Frequency	2375 MHz ± 25 MHz (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
			(Transceiver shall be unconditionally stable, no in-band or out-of-band
<u> </u>			spurious signals or oscillations regardless of port termination.)
			0 455
3.0		Tuning and Control Port	
3.0	3.1	Specifications:	Oscillator and internal prescallers must operate from the "second of DC supply. See 4.1 I O divided by 24 (See 3.7)
3.0	3.1		DC supply. See 4.1 LO divided by 24 (See 3.7)
3.0		Specifications: LO Sample Output Frequency:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4).
3.0	3.1 3.2 3.3	Specifications:	DC supply. See 4.1 LO divided by 24 (See 3.7)
3.0	3.2	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms.
3.0	3.2	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms.
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal
3.0	3.2 3.3 3.4	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 – 16.0 MHz/V
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 – 16.0 MHz/V Example:
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 – 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 – 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6
3.0	3.2 3.3 3.4 3.5	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 – 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4
3.0	3.2 3.3 3.4 3.5 3.6	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)):	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band)
	3.2 3.3 3.4 3.5 3.6	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)):	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band)
4.0	3.2 3.3 3.4 3.5 3.6	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)): LO Frequency Range DC Power Requirements:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band) (See 2.1)
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	3.2 3.3 3.4 3.5 3.6	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)): LO Frequency Range DC Power Requirements:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms. -50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band) (See 2.1) +12.0 ±0.2 VDC @ IDC MAX < 250 mA "second on" +5.0 ± 0.1 VDC @ IDC MAX < 1000 mA "on after VCO lock"
	3.2 3.3 3.4 3.5 3.6 3.7	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)): LO Frequency Range DC Power Requirements: Operating Voltage:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band) (See 2.1) +12.0 ±0.2 VDC @ IDC MAX < 250 mA "second on" +5.0 ± 0.1 VDC @ IDC MAX < 1000 mA "on after VCO lock" -5.0 ± 0.1 VDC @ IDC MAX < 250 mA "first on"
	3.2 3.3 3.4 3.5 3.6	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)): LO Frequency Range DC Power Requirements:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band) (See 2.1) + 12.0 ±0.2 VDC @ IDC MAX < 250 mA "second on" +5.0 ± 0.1 VDC @ IDC MAX < 1000 mA "on after VCO lock"
	3.2 3.3 3.4 3.5 3.6 3.7	Specifications: LO Sample Output Frequency: LO Sample Prescaler Output Level LO Sample Prescaler Output Harmonics Tuning Voltage Range: Tuning Port Input Capacitance: RF Tuning Sensitivity Ratio Knm = (Kv/(NxM)): LO Frequency Range DC Power Requirements: Operating Voltage:	DC supply. See 4.1 LO divided by 24 (See 3.7) Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms. Each integer harmonic shall be at -20 dBc or less into 50 ohms50 dBm Max at {800 & 1505 MHz} ± 25 MHz +1.0 to +11.5 VDC over all operating conditions. 1000 pf nominal 8.0 - 16.0 MHz/V Example: RF tuning sensitivity = 360 MHz/V RF multiplier factor = 6 Prescaler divide ratio = 4 Knm = 360/(6x4) = 15 MHz/V LO = 22.675 - 22.875 GHz (Tx High Band) LO = 26.625 - 26.825 GHz (Tx Low Band) (See 2.1) +12.0 ±0.2 VDC @ IDC MAX < 250 mA "second on" +5.0 ± 0.1 VDC @ IDC MAX < 1000 mA "on after VCO lock" -5.0 ± 0.1 VDC @ IDC MAX < 250 mA "first 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 (for and no additional spurious output when subject to two consecutive temperature ramping cycles.
		b c $a = +25 ^{\circ} \text{C}$ $b = +75 ^{\circ} \text{C}$ $c = +75 ^{\circ} \text{C}$ $c = +75 ^{\circ} \text{C}$ $d = -33 ^{\circ} \text{C}$ $e = -33 ^{\circ} \text{C}$ $f = +25 ^{\circ} \text{C}$ 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 (fand no additional spurious output when subject to:
		30G, ½ sine 11ms shocks in each direction of 3 mutually perpendicula 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 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 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.





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CONSENT OF DIGITAL MICROWAVE
CORPORATION.

			DEVICIO	NIC
			REVISIO	NS
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 substitutesting 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 9816 (206) 439-9121 (206) 439-2700 FAX
SAL		11-8-99	TITLE:		
MAN.:					
ENG.:			HYBR	ID, 24	4.250 – 24.450 GHz (LOW) & 25.050 – 25.250 GHz (I
QA:			SIZE	DWC	G NO.
PURCH.:			A	396-	-024001-001 & 396-024002-001
ISSUED:			SCALE	1:1	CAD FILE: 396-2401.SCD
DO NOT SCALE DRAWING •	X SP	PECIFICATION	CONTR	OL D	DRAWING // SOURCE CONTROL DRAWING

000-000079-FRM Rev. A

MANUFACTURER	CATALOG # or DATE	MANUFACTURERS PART NUMBER	DASH NUMBERS

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 ± 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:	± 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 ± 25 MHz
		-50 dBm Max at {800 & 1505 MHz} ± 25 MHz
		-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2)
1.12.2	With -70 dBm RF input level and a	-30 dBc Min at 1575 \pm 25 MHz
	-40 dBm interference signal (CW) swept through 30 MHz to 110 GHz	N
	except at those frequencies where: the	Note: when the CW interference is inside RxRF ± 25 MHz, The
	swept frequency is two channels or less	specification at 1575 MHz collapses to the actual frequency deviation, down to a minimum of \pm 5 MHz.
	away from the RxRF.	down to a minimum of ± 5 MHz.
		-50 dBm Max at {800 & 1505 MHz} ± 25 MHz
	(minimum channel is 2.5 MHz)	(Excludes the fundamental mixing products of CW interference and LC
		(Exercises the fundamental mixing products of 5 % interference and 25
		-25 dBc Min (LO,RF Harmonics & Subharmonics; see note 2)
1.12.3	With no RXRF input signal	-83 dBm Max 1575 ± 25 MHz
	TxIF at +5 dBm & Mute Off	-50 dBm Max at {800& 1505 MHz} ± 25 MHz
	Measured with a Tx to Rx Isolation no	,
	greater than 45dB.	
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	20 ns MAX
2.0	MHz span	
2.0	Tx Input / Output Parameters:	1) 25 050 25 250 CH
2.1	RF Tuning Range	-1) 25.050 - 25.250 GHz
2.2	DE Outrout	-2) 24.250 - 24.450 GHz
	RF Output	20.0 dDini
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 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 Ta
2.2.3	Carpet 1 on of Componention	IF input power must not be varied by more than 8 dB Max.
		1 1
		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	± 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 = $+20$ dBm
		Given the following Absolute Maximums:
I		

		-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
		'
		Typical diplexer filter performance
2.2.7	Tx-IF Port VSWR With 50 Ohm Drive	2.0:1
	Source	100 17 17
2.2.8	Tx Noise Power Density	-130 dBm/Hz Max
2.2.9	Tx to RX Spacing	800 MHz
2.2.10 2.2.11	TxIF Input Frequency Tx IF Power Input Maximum	2375 MHz ± 25 MHz (Tx to Rx spacing of 800 MHz) 6 dBm
2.2.11		50 dB Min
2.2.13	TXRF Port VSWR	2.3:1 Max
2.2.13		(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	Oscillator and internal prescallers must operate from the "second of
	Specifications:	DC supply. See 4.1
3.1	LO Sample Output Frequency:	LO divided by 24 (See 3.7) Monotonia over the entire tuning voltage range (see 3.4)
3.2	LO Sample Prescaler Output Level	Monotonic over the entire tuning voltage range (see 3.4). -10 to 0 dBm into 50 ohms.
3.3	LO Sample Prescaler Output LO Sample Prescaler Output	Each integer harmonic shall be at -20 dBc or less into 50 ohms.
3.3	Harmonics	$-50 \text{ dBm Max at } \{800 \& 1505 \text{ MHz}\} \pm 25 \text{ MHz}$
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	8.0 – 16.0 MHz/V
	Knm = (Kv/(NxM)):	
		Example:
		RF tuning sensitivity = 360 MHz/V
		RF multiplier factor = 6 Prescaler divide ratio = 4
		1 research divide rano – 4
		Knm = 360/(6x4) = 15 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)
4.0	DC Power Power and	(See 2.1)
4.0	DC Power Requirements:	12.0 ±0.2 VDC @ IDC MAY < 250 A "forcoard on"
4.1	Operating Voltage:	+ 12.0 ±0.2 VDC @ IDC MAX < 250 mA "second on" +5.0 ± 0.1 VDC @ IDC MAX < 1000 mA "on after VCO lock"
		-5.0 ± 0.1 VDC @ IDC MAX < 1000 mA
4.2	Tx PA Bias	+5.0 VDC ± 0.1 VDC @ IDC MAX < 230 IIIA
2		15.0 120 - 0.1 120 C 120 Mar 1000 mar and on

4.3	Power consumption	8.0 watt Max (all conditions)
5.0	Environmental Conditions:	
		-33 °C to +75 °C case temperature (see note 4) Instantaneous frequency stability of 100 KHz from center frequency (for and no additional spurious output when subject to two consecutive temperature ramping cycles. b c a = +25 °C b = +75 °C c = +75 °C d = -33 °C e = -33 °C f = +25 °C
5.2	Storage Temperature Range:	Temperature ramping cycle -40 °C to +85 °C
5.3	Humidity:	-40 C to 103 C
5.3.1	Operating	85% Maximum, non condensing
5.3.2	Storage	95% Maximum, non-condensing.
5.4	Shock and Vibration Operation Frequency Jumping	Instantaneous frequency stability of 100 KHz from center frequency (f 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 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	
		Don Drowing
7.1	Mechanical outline:	Per Drawing
7.2	Electrical connections	Per Drawing
7.2.1 7.2.2	RF I/O Hybrid Interface Connector	WR-42 Interface connector per drawing. 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.

