7.0. TECHNICAL SPECIFICATIONS

The specifications are measured under the following channel conditions unless otherwise indicated:

- RF Input Frequency = 900/1800 MHz sinewave

- RF Input Level = -10 dBm nominal (Input Reference Level set 3.0 dB less then input overload)

- Output Attenuator = 0 dB

- LO Input Level = +13 dBm

- LO Input Frequency = RF Input Frequency - 140 MHz

- One Path On, Path Modulation = none, Path Loss = 0 dB, Path Delay = 0 µs

7.1. RF Channel Specifications

RF Input Signal Frequency Range*:	25 to 3000 MHz
RF Bandwidth:	6 MHz, 15 MHz or 26 MHz
Number of Independent RF Channels	1 or 2

RF Input Signal Level

Minimum	-30 dBm
Nominal	-10 dBm
Maximum	+5 dBm
Damage Level	+20 dBm
Automatic Reference Level Range	0 to -25 dBm

Path Insertion Delay

RF In to RF Out	4.0 µs maximum
Variation path to path within a channel at band center	10 ns maximum

Group Delay Distortion

6 MHz Bandwidth System	±50 ns typical ±100 ns maximum
15 or 26 MHz Bandwidth System	±30 ns typical ±70 ns maximum

Technical Specifications are subject to change without notice.
*Consult factory for other available ranges

RF Bandwidth Peak to Peak Amplitude Variation

6 MHz Bandwidth System
(6 MHz Bandwidth)   1 dB typical

15 MHz Bandwidth System
(8 MHz Bandwidth)   1 dB typical
(12 MHz Bandwidth)   2 dB typical
(15 MHz Bandwidth)   3 dB typical

26 MHz Bandwidth System
(26 MHz Bandwidth)   3 dB typical

Path Insertion Loss

Band Center 900 MHz   9 dB typical
13 dB maximum

Band Center 1800 MHz   12 dB typical
16 dB maximum

Insertion Loss Variation (Path to path within a channel)

6 MHz Bandwidth System   <0.2 dB

15 or 26 MHz Bandwidth System   <0.5 dB

Path On/Off Ratio   55 dB minimum

Spurious Emission Levels on RF Out

Nonharmonic within RF Bandwidth
6 or 15 MHz Bandwidth System   -50 dBc maximum
26 MHz Bandwidth System   -40 dBc maximum

Harmonic within RF Bandwidth
6 or 15 MHz Bandwidth System   -45 dBc maximum
26 MHz Bandwidth System   -40 dBc maximum
(except $127 \leq f_c \leq 143$ MHz)   -30 dBc typical

Image Feedthrough   = RF OUT level

LO Feedthrough   0 dBm maximum

Physical Interface Characteristics

Impedance   50 ohms

SWR   < 1.5

Connector Type   Type N Female

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7.2. RF Channel Options

RF Output Attenuator

ATT1:

Attenuation Range	0 to 80 dB
Resolution	0.1 dB steps
Frequency Range	800 to 2500 MHz
Accuracy	
0 to 10 dB attenuation	±0.5 dB
>10 to 20 dB attenuation	±1.25 dB
>20 to 30 dB attenuation	±1.75 dB
>30 to 45 dB attenuation	±2.5 dB
>45 to 60 dB attenuation	±2.75 dB
>60 to 80 dB attenuation	±4.0 dB
Additional Insertion Loss	
900 MHz	2.5 dB maximum
1800 MHz	2.5 dB maximum

ATT2:

Attenuation Range	0 to 95.5 dB
Resolution	0.5 dB steps
Frequency Range	25 to 3000 MHz
Accuracy (25 to 2700 MHz)	
0 to 19.5 dB attenuation	±1.0 dB
20 to 39.5 dB attenuation	±2.0 dB
40 to 59.5 dB attenuation	±3.0 dB
60 to 79.5 dB attenuation	±4.0 dB
80 to 95.5 dB attenuation	±6.0 dB
Additional Insertion Loss	
900 MHz	2.5 dB maximum
1800 MHz	3.5 dB maximum

RF Image and LO Feedthrough Suppression (EFX Option)

Frequency Range	800 to 3000 MHz
Image Feedthrough on RF Out	-50 dBc maximum
LO Feedthrough on RF Out	-55 dBc maximum
Additional Insertion Loss	4 dB typical, 6 dB maximum
Additional Amp. vs. Freq. Variation	1 dB typical

RF Channel Bypass (CBP Option)

Insertion Loss with Channel Bypassed	1 dB typical

Technical Specifications are subject to change without notice.

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7.3. Channel Characteristics Emulation

Number of Independent Paths per Channel	3 or 6

Path Modulation
None, Rayleigh, Frequency Shift, Phase Shift, GSM Rician, Rayleigh with Frequency Shift, Nakagami, Programmable Rician

Fading Emulation Method

Programmable in 2 modes: Jakes, Filtered Noise

Fading (Rayleigh) Amplitude Distribution

Deviation from Theoretical CPDF exceeds the following IS-55/56, IS-137/138, and IS-97/98 requirements:

From +10 to -30 dB of mean power level   ± 0.5 dB

Level Crossing Rate (LCR) Accuracy exceeds following IS-55/56, IS-137/138, and IS-97/98 requirements:

From +3 to -30 dB of mean power level   < ± 2.5% deviation theoretical LCR curve of the simulated vehicle velocity

Fading Power Spectrum

Emulation Method = Jakes
Programmable in 2 modes: Classical 6 dB, Flat

Emulation Method = Filtered Noise
Programmable in 4 modes: Classical 6 dB, Flat, Classical 3 dB, Rounded

Fading Repetition Interval

Emulation Method = Jakes
Simulated Doppler frequency ≤ 500 Hz   > 20 minutes
Simulated Doppler frequency > 500 Hz   > 10 minutes

Emulation Method = Filtered Noise
Programmable in three nominal ranges: 20 minutes, 27 seconds, 24 hours

Technical Specifications are subject to change without notice.

Correlation Coefficient
(Between Channel 1 and Channel 2 Paths)

Range	0 to 1
Resolution	0.01

Velocity

Range (f_c = 900 MHz)	± 1.2 to ± 885.0 km/hr (± 0.74 to ± 550 mph)
Resolution	0.1 units
Units	m/sec, km/hr, feet/sec, miles/hr

Doppler Frequency (Frequency Shift or Fading)

Range	± 1 to ± 740 Hz
Resolution	0.1 Hz

Relative Phase Between Paths
(Modulation = Phase)

Range	0 to 360 degrees
Resolution	0.1 degrees

Rician K Factor
(Modulation = Rician)

Range	- 30 to + 30 dB
Resolution	0.1 dB

Nakagami M Value
(Modulation = Nakagami)

Values	1, 3, 5, 10, 15, 25, 100

Rayleigh Fading Shift Frequency (Only available when Emulation Method = Jakes)
(Modulation = Rayleigh with Frequency Shift)

Range	- 240 to + 240 Hz
Resolution	0.1 Hz

Technical Specifications are subject to change without notice.

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Relative Path Delay

Range

6 MHz Bandwidth System	0 to 200 μsec
Extended Delay Option	0 to 1600 μsec
15 MHz Bandwidth System	0 to 100 μsec
Extended Delay Option	0 to 800 μsec
26 MHz Bandwidth System	0 to 66.666 μsec
Extended Delay Option	0 to 533.328μsec

Resolution   1 nsec

Accuracy

6 or 26 MHz Bandwidth System	± 10 nsec maximum
15 MHz Bandwidth System	± 5 nsec maximum

Relative Path Loss
(measurement performed with Modulation=Rayleigh)

Range

6 MHz Bandwidth System	0 to 50 dB
15 MHz Bandwidth System	0 to 40 dB
26 MHz Bandwidth System	0 to 30 dB

Resolution   0.1 dB

Accuracy

6 MHz Bandwidth System	
0 to 30 dB attenuation	±0.3 dB
>30 to 40 dB attenuation	±1.0 dB
>40 to 50 dB attenuation	±3.0 dB
15 MHz Bandwidth System	
0 to 20 dB attenuation	±0.3 dB
>20 to 30 dB attenuation	±1.0 dB
>30 to 40 dB attenuation	±3.0 dB
26 MHz Bandwidth System	
0 to 20 dB attenuation	±0.3 dB
>20 to 30 dB attenuation	±1.0 dB

Log Normal Fading Standard Deviation
(Relative Path Loss = 25 dB)

Range	0 to 12 dB
Resolution	1 dB

Log Normal Fading Rate

Range	0 to 20 Hz
Resolution	0.001 Hz

Technical Specifications are subject to change without notice.

7.4. Dynamic Parameter Emulation

NOTE: Dynamic Parameter Emulation is available via the remote connection only. The front panel interface is disabled while in Dynamic Parameter Emulation mode. Dynamic Parameter Emulation is not available on 26 MHz bandwidth systems.

Number of States: 1 to 512

State Duration

    Range   0.1 to 3276.7 sec.

    Resolution   0.1 sec.

State Transitions   automatic looping,
automatic single pass,
single step, jump

All other specifications in Section 7.0. are valid with the following exceptions:

    Relative Path Delay Resolution

        6 MHz Bandwidth System   50 nsec

        15 MHz Bandwidth System   25 nsec

    Fading Emulation Method: Filtered Noise Only

    Log Normal Fading: Not Available

7.5. Local Oscillator (LO) Characteristics

Internal Local Oscillators (optional)
(All specs refer to LO OUT unless noted)

LO Frequency Range
    LO 3 option   200-400 MHz
    LO 4 option   940-2860 MHz

Carrier Frequency Range (RF IN)
    LO 3 option   60 - 260, 340-540 MHz
    LO 4 option   800-3000 MHz

Frequency Resolution   100 kHz

Frequency Accuracy   2 kHz

Level   +13 dBm typical

Off Level (wideband)   -40 dBm maximum

Phase Noise (1 kHz offset)
    LO 3 or LO 4 option   -75 dBc/Hz

Harmonics   < -10 dBc

External Local Oscillators
(All specs refer to LO IN unless noted)

LO Frequency Range   165-2860 MHz

LO Offset from Carrier Frequency (F_c)
    $F_c \geq 800$ MHz F_c - 140 MHz
    $F_c < 800$ MHz F_c + 140 MHz

Level
    Nominal   +13 dBm
    Minimum   +10 dBm
    Maximum   +15 dBm
    Damage   +23 dBm

Nominal LO Impedance   50Ω

Technical Specifications are subject to change without notice.

7.6. General

Power Requirements

Voltage	85-265 VAC (auto sensing)
Frequency	47 - 63 Hz
Fuse Type	8.0 Amp, 250 Volt slo-blo
Number of Fuses	2
Fuse Location	Hot conductor, Neutral conductor

Operating Environment

Temperature	0 to 50 degrees C (32 to 122 degrees F)
Humidity	10% to 90%, noncondensing

Dimensions and Weight

Height	6.9 inches
Width	17.7 inches
Depth	19.9 inches
Weight	45 pounds

Control Interfaces

Interfaces Provided	RS-232 (DCE) and IEEE-488 (GPIB)

Serial Control Port Parameters

Bit Rates	300, 1200, 2400, 4800, 9600
Format	asynchronous
Bits/Char.	7 or 8
Parity	none, odd, even
Stop Bits	1, 1.5, 2

External 10 MHz Reference Requirements

Input Frequency	10.000 MHz
Input Power Level	+5.0 dBm

Technical Specifications are subject to change without notice..

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