

Specifications

Frequency	
Frequency range	10 kHz to 30 MHz (10 kHz to 1.5 MHz with reduced specs) 300 Hz to 60 kHz via separate input (optional)
Frequency spacing	1 Hz
Frequency stability (internal reference)	$\leq 1 \times 10^{-7}$ in operating temperature range
Phase noise	≤ -110 dBc (1 Hz) (1 kHz offset)
External frequency locking	10 MHz
Tuning	
Tuning time	≤ 10 ms (bandwidth 20 kHz) ¹⁾ ≤ 25 ms (delay of AF at 3 kHz IF bandwidth)
Synthesizer setting time	≤ 5 ms
Antenna input	
Nominal impedance	50 Ω
VSWR	≤ 2 , peaks up to 2.5 max.
Maximum input level	+7 dBm
Overvoltage protection	≤ 50 V EMF ($Z_{in} = 50 \Omega$)
Preselection	8 switchable suboctave filters
Noise figure ²⁾	≤ 10 dB, 8 dB typ. (with preamplifier, 0.1 MHz to 20 MHz) ≤ 11 dB, 9 dB typ. (with preamplifier, 20 MHz to 30 MHz) ≤ 20 dB, 17 dB typ. (without preamplifier 0.1 MHz to 20 MHz) ≤ 21 dB, 18 dB typ. (without preamplifier, 20 MHz to 30 MHz)
Linearity	
2nd order intercept point	≥ 85 dBm, 90 dBm typ. (preamplifier off) ≥ 75 dBm, 90 dBm typ. (preamplifier on)
3rd order intercept point ³⁾	≥ 35 dBm, 40 dBm typ. (preamplifier off, 1 MHz to 30 MHz) 24 dBm typ. (preamplifier off, 0.1 MHz/0.13 MHz) ≥ 22 dBm, 26 dBm typ. (preamplifier on, 1 MHz to 20 MHz) ≥ 19 dBm, 23 dBm typ. (preamplifier on, 20 MHz to 30 MHz) 16 dBm typ. (preamplifier on, 0.1 MHz/0.13 MHz)
Crossmodulation	a 30% AM-modulated signal of 6 dBm produces less than 10% crossmodulation for an unmodulated signal of -60 dBm (frequency offset 100 kHz)

Blocking	a useful signal of -60 dBm is attenuated by less than 3 dB by an unmodulated signal of 6 dBm (frequency offset 100 kHz)
Dynamic range of A/D converter	16 bit resolution
Interference rejection	
Image frequency rejection	≥ 90 dB, 120 dB typ.
IF rejection	≥ 100 dB, 110 dB typ. (with suboctave filter)
Oscillator reradiation at antenna input	≤ -90 dBm, -115 dBm typ.
Spurious responses	≤ -110 dBm (max. 3 exceptions with ≤ -100 dBm)
Gain control	AGC or MGC
RF control	
AGC range	≥ 30 dB, 40 dB typ.
AGC time constants	
Attack time	≤ 2 ms (20 dB step)
MGC range	≥ 30 dB, nominal 40 dB in 1 dB steps
Overall control (analog narrowband IF)	
AGC range	110 dB
AGC time constants	
Attack time	≤ 2 ms (60 dB step)
Hold time (incl. decay)	10/20/50/100/200/500 ms/1/5/9 s for 60 dB rolloff
MGC range	110 dB in 1 dB steps
Squelch	syllabic, level squelch selectable above 120 dB in 1 dB steps
Filters	
Analog IF filter	
3 dB bandwidth	≥ 20 kHz
Inband ripple	≤ 2 dB (BW = 8 kHz)
Digital IF filter	
3 dB bandwidths	52 Hz to 20 kHz in 70 steps
Stopband attenuation	≥ 90 dB
Shape factor (60 dB/6 dB)	≤ 1.5 (with bandwidths above 300 Hz)
Inband ripple	0.5 dB typ. (without ripple of analog IF filter)
Notch filter	2 max., selectable in baseband, separately adjustable in 1 Hz steps
Stopband	28 steps in range 50 Hz to 500 Hz, automatic selection at any frequency in 1 Hz steps
Stopband attenuation	≥ 40 dB at BW = 80 Hz
Shape factor (40 dB/1 dB)	1.53 typ.
Demodulation	
Demodulation modes	AM, FM, USB, LSB, CW ISB (bandwidth 2.8 kHz)
AF spectrum	0.3 kHz to 6 kHz

Tuning aid	32-point FFT, output via data interface, matched to selected bandwidth
Sensitivity (0.1 MHz to 30 MHz)	
AM (m = 50%, $f_{mod} = 1000$ Hz, bandwidth 6 kHz)	–100 dBm for (S+N)/N = 16 dB with preamplifier –100 dBm for (S+N)/N = 8 dB without preamplifier
FM (5 kHz deviation, $f_{mod} = 400$ Hz, bandwidth 14.4 kHz)	–95 dBm for (S+N)/N = 26 dB with preamplifier –95 dBm for (S+N)/N = 20 dB without preamplifier
CW (bandwidth 313 Hz)	–118 dBm for (S+N)/N = 15 dB with preamplifier –118 dBm for (S+N)/N = 10 dB without preamplifier
SSB (bandwidth 2.75 kHz)	–108 dBm for (S+N)/N = 18 dB with preamplifier –108 dBm for (S+N)/N = 10 dB without preamplifier
Sensitivity of LF input (option) f = 10 kHz, CW (bandwidth 313 Hz)	3 dB μ V (corresponds to –114 dBm into 600 Ω) for (S+N)/N = 10 dB and LF gain = 30 dB
BFO	settable in the range ± 10 kHz in 1 Hz steps, can be switched off
Scan functions	
Memory scan	1000 programmable channels
Frequency scan (sweep)	start frequency – stop frequency, step size according to IF filter
Power supply	
Supply voltages	+24 V DC, 20 mA max. +12 V DC, 1500 mA max. –12 V DC, 240 mA max. +5 V DC, 2500 mA max.
Total power consumption	34 W typ.
Inputs/outputs	
Inputs	
HF	10 kHz to 30 MHz, impedance 50 Ω (SMA)
LF	300 Hz to 60 kHz, impedance 600 Ω (SMA)
1st LO	40.058 MHz to 70.048 MHz (SMA)
2nd LO	40 MHz (SMA)
10 MHz reference	SMA

Outputs	baseband digital I and Q (VXI) optional: baseband digital I and Q via C40-Link bandwidth 20 kHz AF digital (VXI, C40-Link (optional)) 16 ksample/s
IF0 (software-configurable)	broadband 40.048 MHz, bandwidth 4 MHz (when this output is used, the narrowband function/demodulation of the receiver is deactivated)
IF1 (SMA)	IF analog, 455 kHz regulated (15 kHz bandwidth) or IF analog, frequency 0 Hz to 40 kHz, selectable
IF2 (software-configurable, SMA)	40.058 MHz to 70.048 MHz (SMA) 40 MHz (SMA) SMA 32 ksample/s
1st LO	600 Ω balanced (26-pin AMPLIMITE .050 series)
2nd LO	0 dBm \pm 3dB (modulation depth at AM: 50%)
10 MHz reference	0 dBm \pm 3 dB (frequency deviation 2.5 kHz) at bandwidths >6 kHz
AES/EBU	8 Ω load resistor, 0 V to 3 V V_{pp}
AF line	
AM, CW, SSB	
FM	
AF phone (3.5 mm jack)	
Control data interfaces	VXI (meets VXI standard IEEE 1155-1992) 26-pin AMPLIMITE .050 series 26-pin AMPLIMITE .050 series 26-pin AMPLIMITE .050 series 26-pin AMPLIMITE .050 series
AUDIO	
COMM	
LINK	
JTAG	
Displays	status LED "FAILED" LED "VXI bus active" LED "POWER"

General data

Operating temperature range	–10°C to +55°C
Storage temperature range	–40°C to +75°C
Shock	30 g, 11 ms DIN IEC 68-2-27, 40 g shock spectrum
Vibration	
Sine	5 Hz to 55 Hz, 0.15 mm amplitude
Random	DIN IEC 68-2-36, 10 Hz to 300 Hz, 1.2 g (rms)
Relative humidity	50% to 95% at +25°C to +40°C, non-condensing
EMC	EN 50081-1/82-2
Weight	1.75 kg
MTBF	$\geq 10\,000$ h to MIL-HDBK, $\geq 70\,000$ h to ISO 1709

¹⁾ Level deviation ± 1 dB.

²⁾ Values apply in the range +10°C to +30°C. A limit value higher by 1 dB applies in the full range from –10°C to +55°C.

³⁾ Frequency spacing between intermodulated signals ≥ 30 kHz.

Ordering information

Designation	Type	Order No.
VXI HF Receiver	EM010	4055.0008.03
VXI Mainframe	GX400VM	4056.9509.02
VXI Controller	GX400VC	4056.9896.02
VXI Platform Software	GX400PS	4057.0305.02
Tuner Software to control VXI HF Receivers EM010	GX400RX	4056.9209.02
LF Receiver (option) 300 Hz to 60 kHz	EM010LF	4055.0014.02

