0.38–18 GHz RF Up/Downconverter Module with Internal LO

LCMIXUD-380-18000-2G integrates separate upconversion and downconversion paths, RF switching, low-noise amplification, switched filters and internal LO sources. The converted IF band is 3.6 ±1 GHz, with up to 2 GHz instantaneous bandwidth. Both channels also support direct operation over 0.38–4.6 GHz without frequency conversion.



The downconversion LNA path specifies 60 dB typical gain and 4.5 dB typical noise figure. Through Path specifies at least 25 dB gain and noise figure no greater than 12 dB; this low-gain condition is distinct from direct RF operation.

Upconversion specifies 20 dB typical gain and output P1dB of at least 10 dBm, under a recommended input-power setting of −15 dBm.

The drawing identifies a 145 × 130 × 40 mm body and a 145 × 142 × 40 mm envelope including mounting lugs, both excluding connector protrusions. Six SMA ports distinguish RFU/IFU, RFD/IFD, BITE and REF OUT. Major functions are configured through SPI.

Downconversion performance

Parameter	Specification	Unit
RF input frequency [1]	0.38–18	GHz
Converted IF output band [2]	3.6 ±1	GHz
Direct RF output band [3]	0.38–4.6	GHz
Instantaneous bandwidth [4]	Up to 2	GHz
Conversion gain — LNA path [5]	60 typical	dB
Conversion gain — Through Path [6]	25 minimum	dB
Noise figure — LNA path [5]	4.5 typical	dB
Noise figure — Through Path [7]	≤12	dB
Output 1 dB compression point [8]	≥+12	dBm
Output third-order intercept [9]	≥+25	dBm

[1] Broadband RF input
[2] Nominal centre 3.6 GHz
[3] Separate output path without frequency conversion
[4] Source description; converted IF operation
[5] LNA path
[6] Source-defined low-gain condition; not the direct RF output
[7] Through Path; not the direct RF output
[8] OP1dB
[9] OIP3

Programmable attenuation

Parameter	Specification	Unit
RF attenuation range	31.5 (6-bit)	dB
RF attenuation step	0.5	dB
IF attenuation range	31.5 (6-bit)	dB
IF attenuation step	0.5	dB
IF calibration attenuation range	15.5 (5-bit)	dB
IF calibration attenuation step	0.5	dB

Spurious and rejection performance

Parameter	Specification	Unit
Absolute spurious level [1]	≤−87	dBm
Spurious-free dynamic range [2]	≥55	dB
Harmonic suppression [3]	≥45	dB
Image rejection	≥70	dB
Gain flatness [4]	≤5	dB
IF rejection [5]	≥50	dBc

[1] Equivalent RF input power; 2000 MHz bandwidth
[2] Pin = −25 dBm; low-gain path test
[3] Pin = −29 dBm; low-gain path test
[4] Across the specified operating range
[5] At 3.75 GHz ±1250 MHz

Upconversion performance

Recommended input power −15 dBm

Parameter	Specification	Unit
RF output frequency	0.38–18	GHz
Converted IF input band	3.6 ±1	GHz
Direct RF input band	0.38–4.6	GHz
Upconversion gain	20 typical	dB
Output 1 dB compression point	≥+10	dBm
RF attenuation range	31.5 (6-bit)	dB
RF attenuation step	0.5	dB
Spurious-free dynamic range	≥40 (Pout = 0 dBm)	dB
Harmonic suppression	≥20 (Pout = 0 dBm)	dB

Upconversion performance

Recommended input power −15 dBm

Parameter	Specification	Unit
IF rejection	≥50 (3.6 GHz ±1400 MHz)	dBc

Internal LO tuning

Source design guarantees apply only where identified.

Parameter	Specification	Unit
LO1 operating frequency [1]	26–40	GHz
LO1 frequency step	10	MHz
LO1 switching response time [1]	≤100	µs
LO2 output frequencies [2]	18.4 / 25.6	GHz

[1] Design guaranteed

[2] Design guaranteed; discrete alternatives

LO1 phase-noise design targets

Designed to meet; not measured results.
Design target; not a measured result

Parameter	Specification	Unit
LO1 phase noise at 100 Hz	≤−65	dBc/Hz
LO1 phase noise at 1 kHz	≤−80	dBc/Hz
LO1 phase noise at 10 kHz	≤−88	dBc/Hz
LO1 phase noise at 100 kHz	≤−90	dBc/Hz
LO1 phase noise at 1 MHz	≤−100	dBc/Hz

LO2 phase-noise design targets

Designed to meet; not measured results.
Design target; not a measured result

Parameter	Specification	Unit
LO2 phase noise at 100 Hz	≤−75	dBc/Hz
LO2 phase noise at 1 kHz	≤−85	dBc/Hz
LO2 phase noise at 10 kHz	≤−90	dBc/Hz
LO2 phase noise at 100 kHz	≤−93	dBc/Hz
LO2 phase noise at 1 MHz	≤−103	dBc/Hz

RF interfaces

Interface	Specification
IFU [1]	SMA
RFU [2]	SMA
BITE [3]	SMA
IFD [4]	SMA
RFD [5]	SMA
REF OUT [6]	SMA

[1] Upconversion IF input
[2] Upconversion RF output
[3] Built-in test and calibration
[4] Downconversion IF output
[5] Downconversion RF input
[6] 100 MHz reference signal output

Power and SPI pin assignments

J30J-9ZKP; source pin numbering.

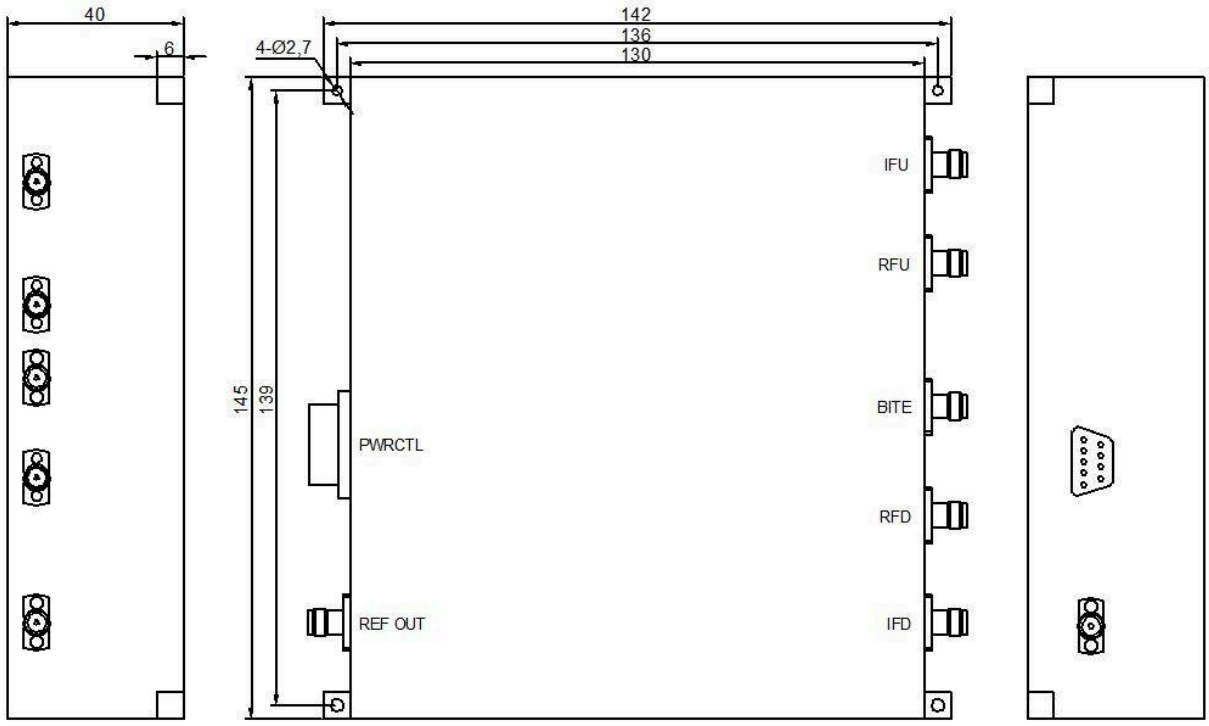
Parameter	Specification
Pin 1 [1]	+12 V
Pin 2 [1]	+12 V
Pin 3 [2]	GND
Pin 4 [2]	GND
Pin 5 [3]	SCK
Pin 6 [4]	CSB
Pin 7 [5]	MOSI
Pin 8 [6]	MISO
Pin 9 [7]	NC

[1] DC power input
[2] Power ground
[3] SPI clock
[4] SPI chip select
[5] SPI data input
[6] SPI data output
[7] Reserved

Mechanical dimensions and interfaces

Preliminary drawing dimensions; includes mounting lugs, excludes connector protrusions.

Parameter	Specification	Unit
Body dimensions	145 × 130 × 40 (Preliminary drawing dimensions; body only, excluding mounting lugs and connector protrusions.)	mm
Envelope including mounting lugs	145 × 142 × 40 (Preliminary drawing dimensions; includes mounting lugs, excludes connector protrusions.)	mm
Mounting-hole pitch	136 × 139	mm
Mounting holes	4 × Ø2.7	mm
RF connectors	Six SMA connectors	-
Power/control connector	Side-mounted J30J series (Preliminary; pin table identifies J30J-9ZKP)	-



Product overview

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Interfaces and system integration

The downconversion IF-rejection specification retains its native 3.75 GHz ±1250 MHz test point; it is not changed to 3.6 GHz. The upconversion rejection row separately uses 3.6 GHz ±1400 MHz. LO1 covers 26–40 GHz; LO2 uses the discrete alternatives 18.4 GHz and 25.6 GHz. Phase-noise entries remain design targets, not measured results. J30J-9ZKP pins retain the source assignments. Supply current, voltage tolerance, operating temperature and SPI command details are not specified.

Document notice

Specifications are subject to revision. Before design release, confirm the current document revision and product-specific requirements with LCRF. The approved quotation and order documentation define the supplied configuration.