2–18 GHz Four-Channel Downconverter with SPI Control

LCMIXD-2000-18000-4C accepts four RF inputs from 2–18 GHz and provides four fixed 1.8 GHz IF outputs with 1 GHz bandwidth. Output P1dB is ≥12 dBm and OIP3 is ≥25 dBm. RF attenuation spans 0–31.5 dB and calibration attenuation 0–15.5 dB, both with 0.5 dB steps. The ±0.5 dB gain-variation value applies after user calibration.



SPI includes a channel address byte and a two-byte Data[15:0] word to select filters, BITE and attenuator weights. Typical supply is +12 V, 2 A; dimensions are 132 × 166 × 27 mm and typical weight is 600 g. The source LO1 range differs between table and block and is held.

XS4 factory-debug contacts CD and CK must remain floating during normal operation.

Electrical specifications

Parameter	Value	Unit
RF input frequency	2–18	GHz
Channel count	4	-
IF output frequency	1.8	GHz
IF output bandwidth	1	GHz
Downconversion gain	≥28	dB
Noise figure	≤12	dB
Output P1dB	≥12	dBm
Output OIP3	≥25	dBm
RF attenuation range [1]	0–31.5	dB
RF attenuation step	0.5	dB
RF attenuator bit count	6	-
Calibration attenuation range [1]	0–15.5	dB
Calibration attenuation step	0.5	dB
Calibration attenuator bit count	5	-
RF-input-equivalent spurious level [2]	≤−90	dBm
Single-tone SFDR [3]	≥55	dB
Harmonic rejection [4]	≥45	dB
Image rejection	≥70	dB
Gain flatness [5]	≤5	dB
IF filter rejection [6]	≥50	dBc
Supply voltage [7]	+12	VDC

Electrical specifications

Parameter	Value	Unit
Supply current	2 (Typical)	A

[1] Range follows the explicit binary weights and each bit’s enable/disable behavior.
[2] Equivalent RF input, bandwidth: 1000 MHz.
[3] RF input power: −25 dBm.
[4] RF input power: −29 dBm.
[5] Bandwidth: 1 GHz.
[6] IF frequency: 1.8 GHz; Offset: ±700 MHz.
[7] Typical: 12 VDC.

Environmental limits

Parameter	Value	Unit
Operating temperature	−40–+80	°C
Storage temperature	−55–+125	°C

Interfaces and contacts

Interface	Specification	Unit
RF input ports	RF1–RF4: 2–18 GHz	-
BITE calibration input	BITE1–BITE4: 2–18 GHz	-
IF output ports	IF1–IF4: 1.8 GHz	-
Reference input	REF: 100	MHz
Typical reference input drive range	0–6 (Typical range stated by the source; not an absolute drive limit.)	dBm
Reference phase noise at 100 Hz	≤-130 (Offset: 100 Hz. Maximum: -130 dBc/Hz.)	dBc/Hz
Reference phase noise at 1 kHz	≤-150 (Offset: 1 kHz. Maximum: -150 dBc/Hz.)	dBc/Hz
Reference phase noise at 10 kHz	≤-165 (Offset: 10 kHz. Maximum: -165 dBc/Hz.)	dBc/Hz
Reference phase noise at 100 kHz	≤-165 (Offset: 100 kHz. Maximum: -165 dBc/Hz.)	dBc/Hz
XS1: Supply contacts	XS1: 1, 2 → +12 V	-
XS1: Ground contacts	XS1: 3, 4 → GND	-
XS3: Supply contacts	XS3: 1, 2 → +12 V	-
XS3: Ground contacts	XS3: 3, 4 → GND	-
XS2: SPI data contact	XS2: 1 → SPI_MOSI	-
XS2: SPI clock contact	XS2: 2 → SPI_SCK	-
XS2: SPI select contact	XS2: 3 → SPI_NSS (LE)	-

Interfaces and contacts

Interface	Specification	Unit
XS2: SPI ground contact	XS2: 4 → GND	-
XS4: SPI data contact	XS4: 1 → SPI_MOSI	-
XS4: SPI clock contact	XS4: 2 → SPI_SCK	-
XS4: SPI select contact	XS4: 3 → SPI_NSS (LE)	-
XS4: SPI ground contact	XS4: 4 → GND	-
XS2: SPI NC contact	XS2: 5 → NC	-
XS4 lock-detect contact	XS4: 5 → LD	-

Control and filter selection

Parameter	Value	Unit
SPI data rate [1]	2 / 10	Mbps
SPI frame [2]	0xAA 0x55 | Address[7:0] | Data[15:0] | 0x44 0xBB	-
SPI channel addresses	00 → 1; 01 → 2; 02 → 3; 03 → 4	-
SPI filter-selection bits	14:C2; 13:C1; 12:C0	-
SPI BITE selection bit	11: 1 → BITE; 0 → RF	-
SPI RF attenuation bits [3]	10:16; 9:8; 8:4; 7:2; 6:1; 5:0.5	dB
SPI calibration attenuation bits [3]	4:8; 3:4; 2:2; 1:1; 0:0.5	dB
SPI NC data bit	15: NC	-
SPI power-down data state [4]	0	-
Filter code 000 passband [5]	000 → 1.9–3.2	GHz
Filter code 001 passband [5]	001 → 2.2–3.7	GHz
Filter code 010 passband [5]	010 → 2.7–4.6	GHz
Filter code 011 passband [5]	011 → 3.6–6.1	GHz
Filter code 100 passband [5]	100 → 5.1–8.9	GHz
Filter code 101 passband [5]	101 → 7.9–13.8	GHz
Filter code 110 passband [5]	110 → 12.8–18	GHz

[1] Typical: 2 Mbps. Maximum: 10 Mbps.

[2] One address byte plus two Data[15:0] bytes; further payload byte order is not specified.

[3] Each bit: 1 enables its attenuation step; 0 disables it.

[4] Set all data bits to 0 when powered off.

[5] Selected filter passband; overall RF operating range remains 2–18 GHz.

Oscillator specifications

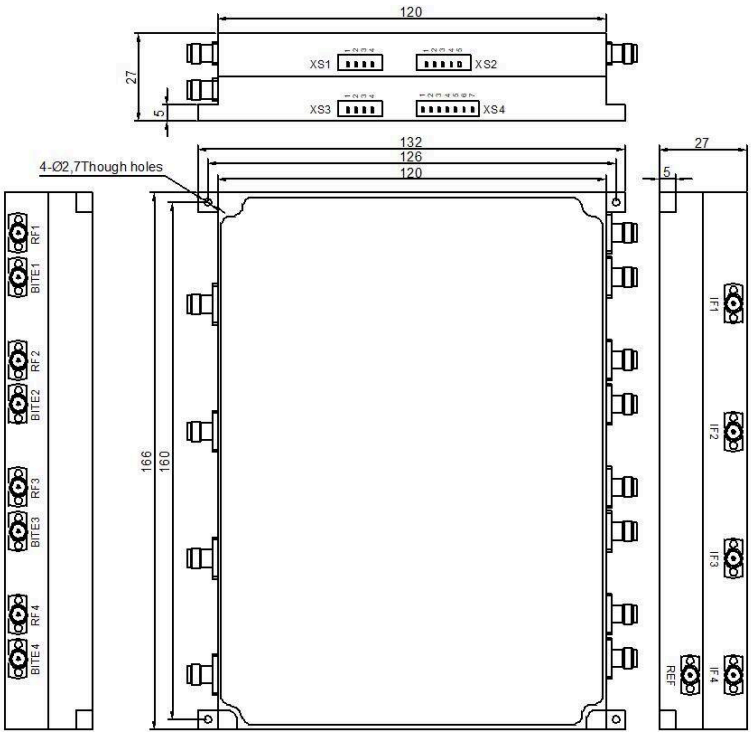
Parameter	Value	Unit
LO1 frequency step	20	MHz
LO1 switching response	≤200	µs
LO1 spurious	≤−60	dBc
LO2 frequency	20.2	GHz
LO2 spurious	≤−65	dBc
LO1 phase noise at 100 Hz	≤-70	dBc/Hz
LO1 phase noise at 1 kHz	≤-81	dBc/Hz
LO1 phase noise at 10 kHz	≤-88	dBc/Hz
LO1 phase noise at 100 kHz	≤-92	dBc/Hz
LO1 phase noise at 1 MHz	≤-100	dBc/Hz
LO2 phase noise at 100 Hz	≤-75	dBc/Hz
LO2 phase noise at 1 kHz	≤-87	dBc/Hz
LO2 phase noise at 10 kHz	≤-94	dBc/Hz
LO2 phase noise at 100 kHz	≤-96	dBc/Hz
LO2 phase noise at 1 MHz	≤-106	dBc/Hz

Integration guidance

Parameter	Value	Unit
User-calibrated gain variation	±0.5 (After user calibration.)	dB
XS4 factory-debug contacts	XS4: 6 → CD; 7 → CK (Factory debug only; leave both contacts floating during normal operation.)	-

Mechanical specifications

Parameter	Value	Unit
Body dimensions	132 × 166 × 27	mm
Weight	600 (Typical: 600 g.)	g
Mounting-hole center spacing	126 × 160	mm
Mounting holes	4 × Φ2.7 (Through holes.)	mm



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.