IL3101

(Preliminary) **WCDMA Band1 Front End Module**

Feature

- Excellent Linearity
- Operating Frequency
  - Tx: 1920 ~ 1980MHz
  - Rx: 2110 ~ 2170Mhz
- 24.5dBm Linear Output Power (HSDPA)
- Very Low quiescenc current in low frequency mode
- High isolation (Low Tx leakag at Rx port)
- HSDPA capable
- 50Ω input and output matching
- 5.0 x 4.0 x 0.98 mm 18-pin SMT package

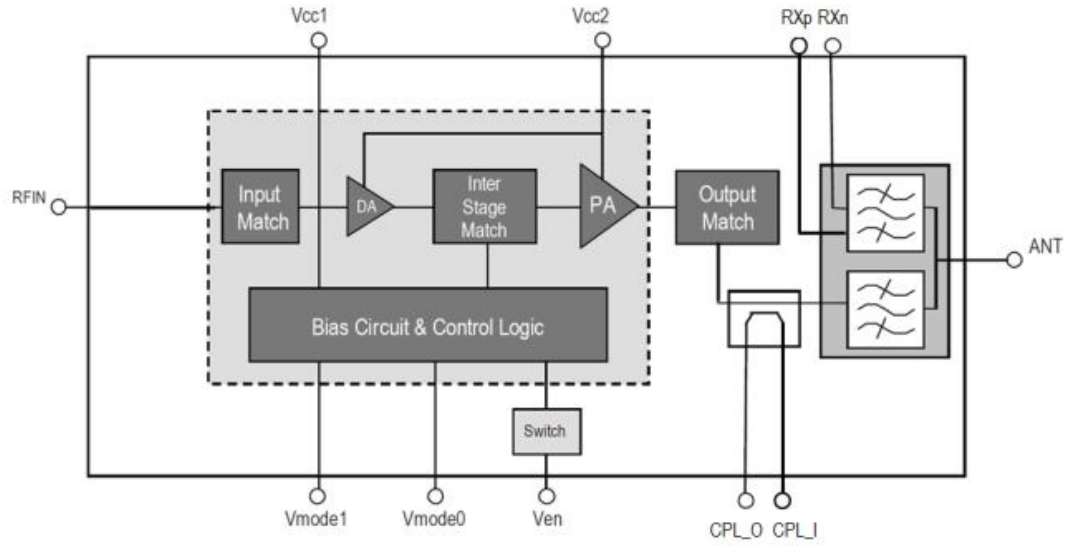
Application

- WCDMA handset (HSDPA)

Product Description

The IL3101, a fully matched WCDMA Band 1 Front-End Module (FEM) integraing a duplexer, shows best performance with smaller footprint. The IL3101 offers extended talk and excellent linearity which enhances efficienies in low and medium power mode. Idle current is as low as 11mA.
The duplexer provides low insertion loss and outstanding isolation, which improves efficiency and Rx sensitivity.

Block Diagram



Absolute Maximum Rating (TBD)

No damage assuming only one parameter is set at limit at a time with all other parameters set at or below typical value					
Descripiton	**Min**	**Typ**	**Max**	**Unit**	**Associated Pins**
TX Input Power			10	dBm	RFIN
DC Supply Voltage			5	V	Vcc
Enable Voltage			5	V	V_{EN}
Control Voltage			5	V	V_{mode0}, V_{mode1}
Storage Temperature	-65	25	125	°C	

Recommended Operating Conditioins (TBD)

Descripiton	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Tx Frequency		1920		1980	MHz
Rx Frequency		2110		2170	MHz
DC Supply Voltage (Vcc1m Vcc2)		3.0	3.4	4.2	V
Enable Voltage (V_{EN})	Low	0	0	0.5	V
	High	2.0	2.8	4.2	V
Mode Control Voltage (V_{mode0}, V_{mode1})	Low	0	0	0.5	V
	High	2.0	2.8	4.2	V
Case Operating Temperature		-40	25	85	°C

Operating Logic Table (TBD)

Power Mode	**Recommended Pout Range**	**V_{EN}**	**V_{mode0}**	**V_{mode1}**
High Power Mode	-25dBm	High	Low	Low
Mid Power Mode	-15.5dBm	High	High	Low
Low Power Mode	-95dBm	High	High	High
Standby Mode		Low	x	x
Shunt Down Mode		Low	-	-

Electrical Characteristics (TBD)

- Conditions: Vcc1=Vcc2=3.4V, V_{EN}/V_{mode0}/V_{mode1} = 0V or 2.8V, Temp=25°C, Zin/Zout = 50Ω
- Signal Configuration: HSDPA modulated uplink (DPCCH/DPDCH=12/15 HS-DPCCH/DPDCH=15/15

Parameter	**Condition**	**Min**	**Typ**	**Max**	**Unit**
TX to Antenna Port					
Tx Operating Frequency Range	Tx	1920		1980	MHz
Maximum Output Power	High Power Mode	25			dBm
Gain	High Power Mode, Po=25dBm		25		dB
	Mid Power Mode, Po=15.5dBm		12		dB
	Low Power Mode, Po=9.5dBm		10		dB
Power Added Effieiency	High Power Mode, Po=25dBm	35			%
	Mid Power Mode, Po=15.5dBm	15			%
	Low Power Mode, Po=9.5dBm	8			%
Total Supply Current	High Power Mode, Po=25dBm			480	mA
	Mid Power Mode, Po=15.5dBm			130	mA
	Low Power Mode, Po=9.5dBm			60	mA
Quiescent Current	High Power Mode		88		mA
	Mid Power Mode		20		mA
	Low Power Mode		12		mA
Adjacent Channel Power	±5MHz Offset, High Power Mode, Po=25dBm			-34	dBc
	±10MHz Offset, High Power Mode, Po=25dBm			-50	dBc
	±5MHz Offset, High Power Mode, Po=15.5dBm			-36	dBc
	±10MHz Offset, High Power Mode, Po=15.5dBm			-60	dBc
	±5MHz Offset, High Power Mode, Po=9.5dBm			-49	dBc
	±10MHz Offset, High Power Mode, Po=9.5dBm			-67	dBc
Harmonics	2nd Harmonics (Pout=27.5dBm)		-39		dBc
	3rd Harmonics (Pout-27.5dBm)		-45		dBc

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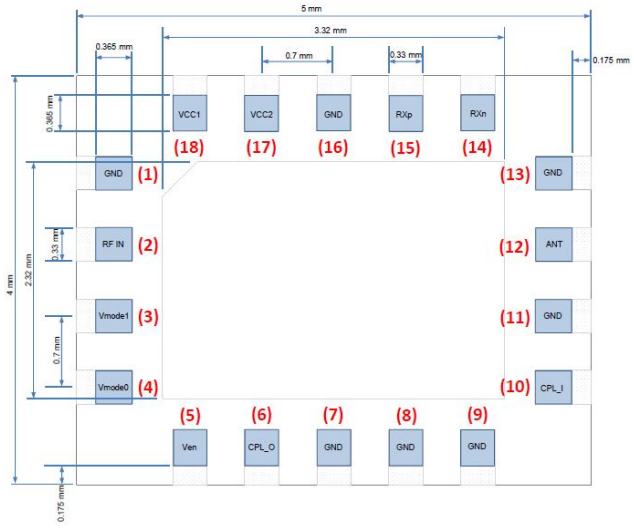
Electrical Characteristics (continued)

Parameter	Condition	Min	Typ	Max	Unit
Input VSWR at TxPort			5:1		
Stability Spurious Level	HPM, Power = 25dBm			-60	dBc
Leakage Current	Ven=0V, without RF			5	μA
Phase Discontinuity	MPM<->HPM at Pout=12dBm			10	degree
	LMP <->MPMat Pout=5dBm			30	degree
Intermodulation	CW Interface -40dBc				
	@ 5MHz Intermod products				dBc
	@ 10MHz Intermod products				dBc
Noise Power from Tx	GPS Band (1570~1580MHz)		-145		dBm/Hz
	DCS Band (1805~1880MHz)				dBm/Hz
	ISM Band (2400~2480MHz)		-147		dBm/Hz
	Noise folding at DCS Band Tx Port noise input power=-134dBm/Hz				dBm/100KHz
Attenuation	0~1000MHz		27	32	dB
	1500~1600MHz		24	28	dB
	1805~1880MHz		6	9	dB
	2110~2170MH		38	41	dB
	2400~2500MHz		24	28	dB
	3840~3960MHz		15	18	dB
Antenna to Rx Port					
Rx Operating Frequency Range	RX				MHz
Rx Insertion Loss			1.7	2.3	dB
Input VSWR at Rx port					
Attenuation	0~1900MHz	43	52		dB
	1920~1980MHz	48	54		dB
	2015~2070MHz	7	15		dB
	2400~2500MHz	35	42		dB
	4220~4340MHz	43	50		dB
Noise Poer from Tx to Rx port					
Noise Power	2110~2170MHz		-185	-181	dBm/Hz
	1920~1980MHz		-27	-24	dBm/3.84MHz
Coupling Port					
Coupled power	Measured after 6dB attenuator			0	dBm

Foot Print (top view)



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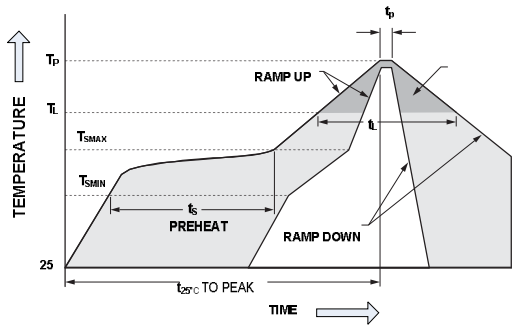
Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	GND	Ground	10	CPL_I	Tx Coupling
2	RFIN	T_X RF Input	11	GND	Ground
3	Vmode0	Mode Control Voltage	12	ANT	Antenna
4	Vmode1	Mode Control Voltage	13	GND	Ground
5	Ven	Module On/Off Control	14	RXn	Duplexer RX Output
6	CPL_O	Tx Coupling	15	RXp	Duplexer RX Output
7	GND	Ground	16	GND	Ground
8	GND	Ground	17	Vcc2	DC Supply Voltage
9	GND	Ground	18	Vcc1	DC Supply Voltage

Evaluation Board Schematic

Reflow Profile Recommendation



Typical SMT Reflow Profile for Maximum Temperature = 260 +/-5°C

Profile	Sn-Pb Solder	Pb-Free Solder
Average ramp-up rate (T_L TO T_P)	3°C/sec max	3°C/sec max
Preheat		
- Temperature Min (T_{SMIN})	100°C	150°C
- Temperature Max (T_{SMAX})	150°C	200°C
- Time (min to max) (ts)	60~120 sec	60~180sec
Tsmax to T_L		
- Ramp-up Rate		3°C/sec max
Time maintained above		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60~150 sec	60~150 sec
Peak temperature (T_P)	240+0/-5°C	260+0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down rate	6°C/sec max	6°C/sec max
Time 25°C to Peak Temperature	6 min max	8 min max

Marking Specification

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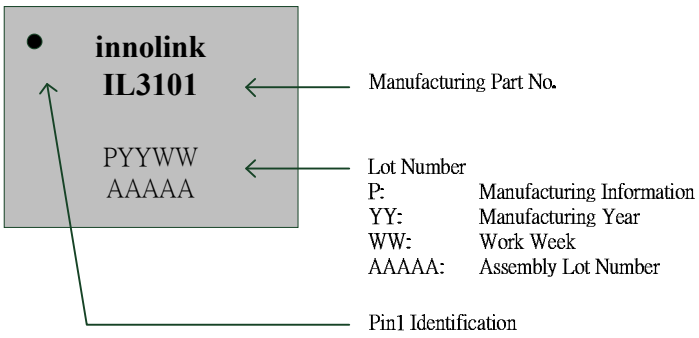

Ordering Information

Handling and Storage

IL3101 is MSL3. Thus, according to the J-STD-033 p.11 the maximum Manufacturers Exposure Time (MET) for this part is 168 hours. After this time period, the part would need to be removed from the reel, de-taped and then re-baked. MSL classification reflow temperature for the AFEM-7780 is targeted at 260°C +0/-5°C. Figure and table on following page shows typical SMT profile for maximum temperature of 260 +0/-5°C.