PRELIMINARY DATA SHEET

SKY77643-81 SkyLiTE™ Multimode Multiband Power Amplifier Module

Applications

- Multiband 3G / LTE handsets
- CDMA
  - Band Classes BC0, BC1, BC4, BC6, BC10, BC15
- WCDMA
  - Bands I, II, III, IV, V, VIII, IX
- TD-SCDMA
  - Bands 34, 39
- FDD LTE
  - Bands 1, 2, 3, 4, 5, 7, 8, 9, 12, 13, 17, 20, 25, 26, 28, 30, 66, 71
- TDD LTE
  - Bands 34, 38, 39, 40, 41

Features

- LTE Power Class 2 High Power User Equipment (HPUE) operation
- Two T/R (RX) ports and 14 outputs
- Industry-leading PAE for 3G/4G
- Optimized for APT DCDC operation
- Fully programmable Mobile Industry Processor Interface (MIPI) control
- MIPI programmable bias modes optimize best efficiency / linearity trade-off for 3G and 4G; minimizes DG09 for 3G.
- Small, low profile package:
  - 4.0 x 6.8 x 0.75 mm
  - 42-pad configuration

Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to Skyworks *Definition of Green*™, document number SQ04-0074.

Description

Skyworks SKY77643-81 SkyLiTE™ is a multimode multiband (MMMB) Power Amplifier Module (PAM) that supports 3G / 4G handsets and operates efficiently in CDMA, WCDMA, TD-SCDMA, and LTE modes. The module is fully programmable through a Mobile Industry Processor Interface (MIPI®).

The PAM consists of a WCDMA / LTE block for low, high, and mid-bands, a Multi-Function Control (MFC) block, and RF input/output ports internally matched to 50 Ω (reduces the number of external components). A CMOS integrated circuit provides the internal MFC interface and operation using standard MIPI controls. Extremely low leakage current maximizes handset standby time.

The InGaP die and the silicon die and passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated in a 4.0 mm x 6.8 mm x 0.75 mm, 42-pad MCM, SMT package which allows for a highly manufacturable, low cost solution.

3G: The SKY77643-81 supports CDMA, WCDMA, High-Speed Downlink Packet Access (HSDPA), High Speed Uplink Packet Access (HSUPA), High Speed Packet Access (HSPA+), and TD-SCDMA modulations. Varying the input power level provides output power control. V_{CC} is adjusted using a DCDC converter to maximize efficiency for each power level and modulation type.

4G: The SKY77643-81 supports 1.4, 3, 5, 10, 15, 20 MHz channel bandwidths. Similar to 3G operation, output power is controlled by varying the input power and V_{CC} is adjusted using a DCDC converter to maximize efficiency for each power level. Supports LTE Power Class 2 HPUE operation.

- 3G / 4G Modulation scheme includes:
- WCDMA Voice Release 99
- HSDPA categories
- HSUPA
- HSPA+
- TD-SCDMA
- CDMA2000 1xRC1, 1xRC3
- CDMA2000 EVDO
- LTE 1.4, 3, 5, 10, 15, 20 MHz Channel BW
- TDD LTE
- Uplink Carrier Aggregation (CA) support for Band 39 (35 up to MHz), Bands 1, 2/25, 3, 4, 7, 38, 40, 41 (up to 40 MHz)

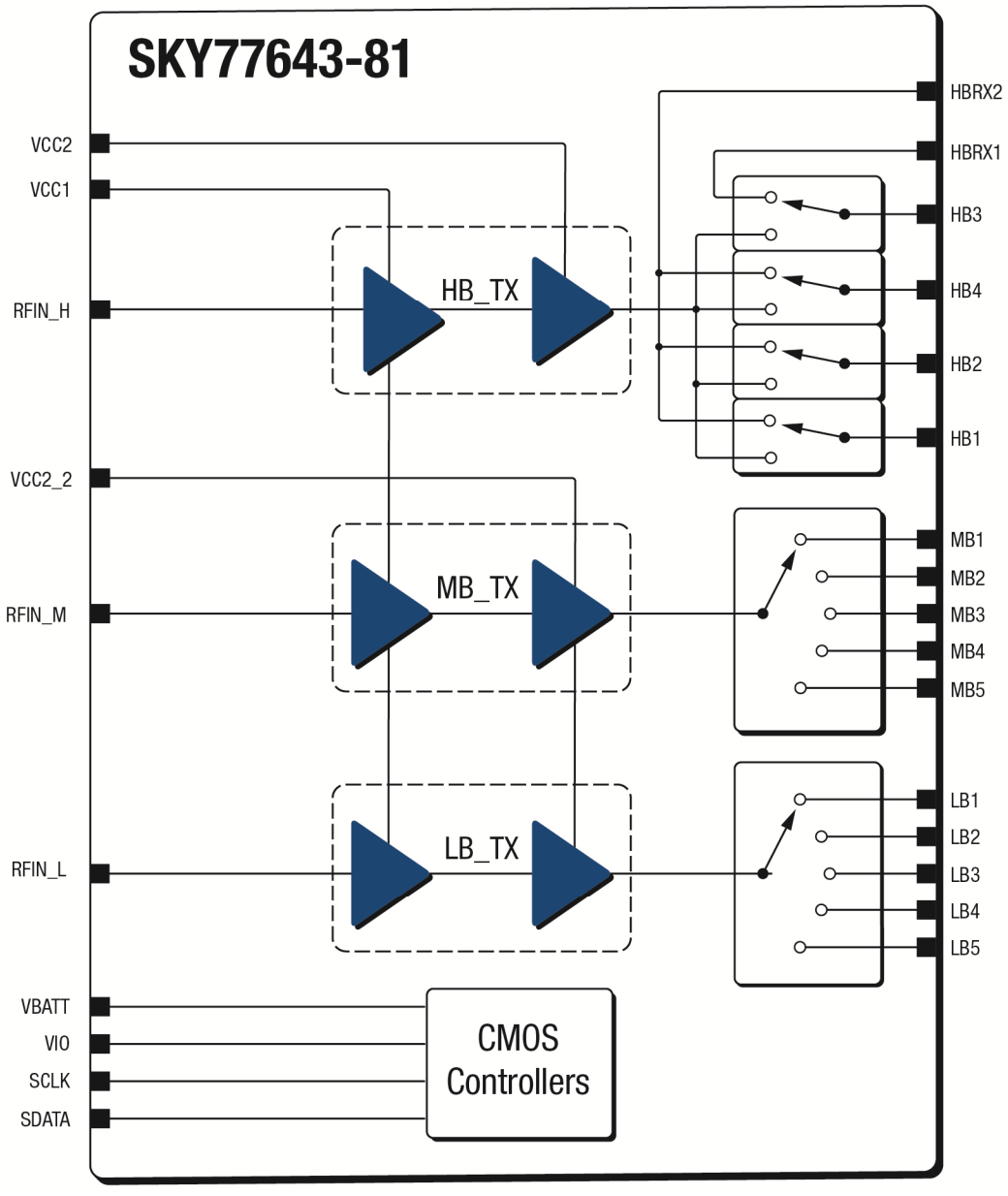


Figure 1. SKY77643-81 Functional Block Diagram

Electrical Specifications

The following tables list the electrical characteristics of the SKY77643-81 Power Amplifier Module. The absolute maximum conditions are provided in Table1; recommended operating conditions are specified in Table 2. Tables 3 through 18 contain the performance characteristics of the SKY77643-81.

The SKY77643-81 is a static-sensitive electronic device and should not be stored nor operated near strong electrostatic fields. Detailed information on device dimensions, pad descriptions, packaging and handling can be found in later sections of this data sheet.

Table 1. SKY77643-81 Absolute Maximum Conditions[1]

Parameter		Symbol	Min	Nom	Max	Unit
RF Input Power		P_{IN}		0	10	dBm
Supply Voltage	No RF	V_{BATT}	–1.2[3]	3.4	6.0	Volts
		V_{CC1}, V_{CC2}, V_{CC2_2}	0	3.4	6.0	
	With RF	V_{BATT}	0	3.4	6.0	
		V_{CC1}, V_{CC2}, V_{CC2_2}	0	3.4	5.5	
Digital Control Lines		VIO, SCLK, SDATA			2	Volts
Case Temperature[2]	Operating	T_{CASE}	–30	25	+100	°C
	Storage	T_{STG}	–40		+150	
ESD – Human Body Mode (HBM)		ESD_{HBM}	–1		1	kV

[1] *Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value.*

[2] *Case Operating Temperature (T_{CASE}) refers to the temperature of the GROUND PAD at the underside of the package.*

[3] *Pulsed for up to 100 µs*

Table 2. SKY77643-81 Recommended Operating Conditions

Parameter		Symbol	Min	Nom	Max	Unit
Supply Voltage		V_{CC1}	0.55	3.4	4.6[1]	Volts
		V_{CC2}, V_{CC2_2}	0.55	3.4	4.6[1]	
		V_{BATT}	3.0	3.4	4.8	
MIPI RFFE Supply		VIO	1.65	1.8	1.95	Volts
MIPI RFFE Signal Levels for SCLK, SDATA	Low	V_{MIPI_LOW}	0.0	0.0	0.2 x VIO	Volts
	High	V_{MIPI_HIGH}	0.8 x VIO	1.8	VIO	
Leakage Current	V_{BATT} = 3.4 V	I_{BATT_LK}			10	µA
	V_{CC1}, V_{CC2}, V_{CC2} = 3.4 V	I_{CC_LK}			10	
Case Operating Temperature Range		T_{RANGE}	–20	+25	+85	°C

[1] *Derate Band 7 and 30 FDD output power by 400 mW/V for V_{CC1}, V_{CC2} above 3.8 V.*

Table 3. SKY77643-81 Electrical Specifications – General

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn On Time	T_{ON}	Gain settled to within 0.5 dB of $G_P(P_{OUT} = P_{OUT\_MAX})$			5	µs
Turn Off Time	T_{OFF}	Gain ≤ $G_P(P_{OUT} = P_{OUT\_MAX})$ – 30 dB			5	µs
Mode Switching Time	T_{MODE}	Time to transition from HPM to LPM, or LPM to HPM by changing state of Reg 0 [1]			2.5	µs
Switching Time	T_{SW}	Time to transition from Iso to RX, Iso to TX, TX to RX, RX to TX, RX to Iso, and TX to Iso			2.5	µs

Table 4. SKY77643-81 Electrical Specifications for Nominal Operating Conditions – FDD LTE Band 7

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Operating Frequency		f_0		2500	2535	2570	MHz
Max Output Power		P_{OUT_MAX}	MPR = 0[1]	29.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}	28.25			
Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = +25 °C	29.0	31.5	33.0	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	27.0		34.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V	13.0	15.5	17.5	
Power Added Efficiency[2]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		32		%
Total Supply Current[3]		$I_{\_TOT\_MAX}$	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		770		mA
Adjacent Channel Leakage power Ratio	EUTRA	E-UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–33	
		E-UTRA$_{ACLR1_CA}$	P_{OUT} = P_{OUT_MAX}, Modulation = QPSK/40 MHz/200 RB		–37		
	UTRA1	UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–38	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	UTRA$_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–39	
Harmonic Suppression	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$			–14	dBm
	Third	$3f_0$				–20	
	Fourth	$4f_0$				–20	
	Fifth	$5f_0$				–36	
Tx Noise in Rx Bands	Rx Band	PNRX$_{LTE}$	2620 MHz–2690 MHz[4]			–126	dBm/Hz
	GPS Rx	PNRX$_{GPS}$	1574 MHz–1577 MHz[4]			–140	
	BT, WLAN	PNRX$_{BT}$	2400 MHz–2452 MHz[4]			–101	
	WLAN	PNRX$_{5GHz}$	4900 MHz–5800 MHz[4]			–140	
EVM		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		3	5	%
Input Voltage Standing Wave Ratio		VSWR			1.5:1		
Stability (Spurious output)		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] MPR is the maximum power reduction as defined in 3GPP TS36.101

[2] V_{CC} optimized for ACLR1$_{EUTRA}$ = –38 dBc, QPSK 10 MHz / 12RB.

[3] $I_{\_TOT}$ = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.

[4] Measured with 20 MHz/100RB LTE Waveform.

Table 5. SKY77643-81 Electrical Specifications for Nominal Operating Conditions – FDD LTE Band 30 (WCS)

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/10 MHz/50RB for MPR = 1.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Operating Frequency		f_0		2305	2310	2315	MHz
Maximum Output Power		P_{OUT_MAX}	MPR = 0[1]	29.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}	28.25			
Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = +25 °C	29.0	30.5	32.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	27.0		34.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V	13.0	15.3	17.5	
Power Added Efficiency[2]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		33		%
Total Supply Current[3]		$I_{\_TOT\_MAX}$	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		740		mA
Adjacent Channel Leakage power Ratio	EUTRA	E-UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–33	
	UTRA1	UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–38	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	UTRA$_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–39	
Harmonic Suppression	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$			–8	dBm
	Third	$3f_0$				–15	
	Fourth	$4f_0$				–10	
	Fifth	$5f_0$				–36	
Tx Noise in Rx Bands	Rx Band	$PNRX_{\_LTE}$	2350 MHz–2360 MHz				dBm/Hz
	GPS Rx	$PNRX_{\_GPS}$	1574 MHz–1577 MHz[4]			–140	
	BT, WLAN	$PNRX_{\_BT}$	2400 MHz–2483.5 MHz[4]			–113	
	WLAN	$PNRX_{\_5GHz}$	4900 MHz–5800 MHz[4]			–140	
EVM		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		3	5	%
Input Voltage Standing Wave Ratio		VSWR			1.8:1		
Stability (Spurious output)		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] MPR is the maximum power reduction as defined in 3GPP TS36.101

[2] V_{CC} optimized for $ACLR1_{EUTRA}$ = –38 dBc, QPSK 10 MHz / 12RB.

[3] $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.

[4] Measured with 10 MHz/50RB LTE Waveform.

Table 6. SKY77643-81 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 38

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100 RB for MPR = 1.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Operating Frequency		f_0		2570	2595	2620	MHz
Maximum Output Power		P_{OUT_MAX}	MPR = 0[1]	29.25			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}	28.0			
Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = +25 °C	30.0	31.5	33.0	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	28.0		34.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V	13.0	15.0	17.5	
Power Added Efficiency[2]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		30		%
Total Supply Current[3]		$I_{\_TOT\_MAX}$	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		770		mA
Adjacent Channel Leakage power Ratio	EUTRA	E-UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–33	
		E-UTRA$_{ACLR1_CA}$	P_{OUT} = P_{OUT_MAX}, Modulation = QPSK/40 MHz/200 RB		–37		
	UTRA1	UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–38	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	UTRA$_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–39	
Harmonic Suppression	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$			–8	dBm
	Third	$3f_0$				–15	
	Fourth	$4f_0$				–15	
	Fifth	$5f_0$				–36	
Tx Noise in Rx Bands	GPS Rx	PNRX$_{GPS}$	1574 MHz–1577 MHz[4]			–140	dBm/Hz
	BT, WLAN	PNRX$_{BT}$	2400 MHz–2483.5 MHz[4]			–113	
	WLAN	PNRX$_{5GHz}$	4900 MHz–5800 MHz[4]			–140	
EVM		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		3	5	%
Input Voltage Standing Wave Ratio		VSWR			1.5:1		
Stability (Spurious output)		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] MPR is the maximum power reduction as defined in 3GPP TS36.101

[2] V_{CC} optimized for $ACLR1_{EUTRA}$ = –38 dBc, QPSK 10 MHz / 12RB.

[3] $I_{\_TOT}$ = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.

[4] Measured with 20 MHz/100RB LTE Waveform.

Table 7. SKY77643-81 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 40

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100 RB for MPR = 1.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Operating Frequency		f_0		2300	2350	2400	MHz
Maximum Output Power		P_{OUT_MAX}	MPR = 0[1]	29.0			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}	27.5			
Maximum Output Power – HPUE Operation		$P_{OUT\_MAX\_HPUE}$	MPR = 0, V_{CC} = 3.4 V	30.0			dBm
		$P_{OUT\_MAX\_HPUE\_BOOST}$	MPR = 0, V_{CC} = 4.3 V	31.5			
Gain		$G_{P\_NTC\_non\text{-}HPUE}$	P_{OUT} = P_{OUT_MAX}, T_{CASE} = +25 °C	29.5	31.5	33.0	dB
		$G_{P\_NTC\_HPUE}$		31.0		35.0	
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	27.5		35.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V	13.0	15.0	17.5	
Power Added Efficiency[2]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		34		%
Power Added Efficiency – HPUE Operation[2]		PAE_{APT_HPUE}	P_{OUT} = $P_{OUT\_MAX\_HPUE}$		33		%
Total Supply Current[3]		I_{TOT_MAX}	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		640		mA
Adjacent Channel Leakage power Ratio	E-UTRA	E-UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–33	
		E-UTRA$_{ACLR1_CA}$	P_{OUT} = P_{OUT_MAX} Modulation = QPSK/40 MHz/200RB		–37		
		E-UTRA$_{ACLR1_HPUE}$	P_{OUT} = $P_{OUT\_MAX\_HPUE}$		–38		
	UTRA1	UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–37	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	UTRA$_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–39	
Harmonic Suppression	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$			–8	dBm
	Third	$3f_0$				–15	
	Fourth	$4f_{0\_non\text{-}HPUE}$				–10	
		$4f_{0\_HPUE}$				–8	
	Fifth	$5f_0$				–36	
Tx Noise in Rx Bands	GPS Rx	$PNRX_{GPS}$	1574 MHz–1577 MHz[4]			–140	dBm/Hz
	BT, WLAN	$PNRX_{BT}$	2447 MHz–2483.5 MHz[4]			–97	
	WLAN	$PNRX_{5GHz}$	4900 MHz–5800 MHz[4]			–140	
EVM		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		3	5	%
Input Voltage Standing Wave Ratio		VSWR			1.8:1		
Stability (Spurious output)		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] MPR is the maximum power reduction as defined in 3GPP TS36.101

[2] V_{CC} optimized for $ACLR1_{EUTRA}$ = –38 dBc, QPSK 10 MHz / 12RB.

[3] I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.

[4] Measured with 20 MHz/100RB LTE Wave form.

Table 8. SKY77643-81 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 41, TDD AXGP Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100 RB for MPR = 1.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Operating Frequency		f_0		2496	2595	2690	MHz
Maximum Output Power		P_{OUT_MAX}	MPR = 0[1]	29.3			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}	28.0			
Maximum Output Power – HPUE operation		$P_{OUT\_MAX\_HPUE}$	MPR = 0, V_{CC} = 3.4 V	30.0			dBm
		$P_{OUT\_MAX\_HPUE\_BOOST}$	MPR = 0, V_{CC} = 4.3 V	32.0			
Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = +25 °C	30.0	31.5	33.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	28.0		35.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V	13.0	15.0	17.5	
Power Added Efficiency[2]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		33		%
Power Added Efficiency – HPUE Operation[2]		$PAE_{\_APT\_HPUE}$	P_{OUT} = $P_{OUT\_MAX\_HPUE}$		32		%
Total Supply Current[3]		$I_{\_TOT\_MAX}$	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		710		mA
Adjacent Channel Leakage power Ratio	E-UTRA	$E\text{-}UTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–33	
		$E\text{-}UTRA_{\_ACLR1\_CA}$	P_{OUT} = P_{OUT_MAX} Modulation = QPSK/40 MHz/200RB		–37		
		$E\text{-}UTRA_{\_ACLR1\_HPUE}$	P_{OUT} = $P_{OUT\_MAX\_HPUE}$		–38		dBc
	UTRA1	$UTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–38	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	$UTRA_{\_ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.1 V, T_{CASE} = T_{RANGE}			–39	
Harmonic Suppression	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$			–8	dBm
	Third	$3f_0$				–15	
	Fourth	$4f_0$				–15	
	Fifth	$5f_0$				–36	
Tx Noise in Rx Bands	GPS Rx	$PNRX_{\_GPS}$	1574 MHz–1577 MHz[4]			–140	dBm/Hz
	BT, WLAN	$PNRX_{\_BT}$	2400 MHz–2452 MHz[4]			–100	
	WLAN	$PNRX_{\_5GHz}$	4900 MHz–5800 MHz[4]			–140	
EVM		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		3	5	%
Input Voltage Standing Wave Ratio		VSWR			1.5:1		
Stability (Spurious output)		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] MPR is the maximum power reduction as defined in 3GPP TS36.101

[2] V_{CC} optimized for $ACLR1_{\_EUTRA}$ = –38 dBc, QPSK 10 MHz / 12RB.

[3] $I_{\_TOT}$ = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.

[4] Measured with 20 MHz/100RB LTE Wave form.

Table 9. SKY77643-81 Electrical Specifications – Transmit WCDMA Mid-Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; Voice RMC 12.2 kbps

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Operating Frequency	Band 1	f_0		1920		1980	MHz
	Band 2			1850		1910	
	Band 3			1710		1785	
	Band 4			1710		1755	
Maximum Output Power		P_{OUT_MAX}		29.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	28.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0		31.0	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		32.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	
Power Added Efficiency[1]			P_{OUT} = P_{OUT_MAX}		42		%
Total Supply Current[2]		I_TOT_MAX	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		580		mA
Adjacent Channel Leakage power Ratio	5 MHz offset	ACLR1	P_{OUT} = P_{OUT_MAX}		–40	–38	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	10 MHz offset	ACLR2	P_{OUT} = P_{OUT_MAX}		–52	–48	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–46	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$		–16	–12	dBm
	Third	$3f_0$			–23	–15	
	Fourth and higher	$4f_0$				–20	
Noise Power in Rx Band at Duplex Frequency with WCDMA Modulated Tx							dBm/Hz
	B1 f_{TX} = 1920–1980 MHz	P_{NOISE_DPX}	f_{RX} = f_{TX} +190 MHz		–133.5		
	B2 f_{TX} = 1850–1910 MHz		f_{RX} = f_{TX} +80 MHz		–133.0		
	B3 f_{TX} = 1710–1785 MHz		f_{RX} = f_{TX} +95 MHz		–132.5		
	B4 f_{TX} = 1710–1755 MHz		f_{RX} = f_{TX} +400 MHz		–137.0		
Input VSWR		$VSWR\_IN$	$P_{OUT} \le P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for ACLR1 = –40 dBc.*

[2] *$I\_TOT = IBATT + (ICC1 + ICC2)(VCC/VBATT)(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.*

Table 10. SKY77643-81 Electrical Specifications – Transmit WCDMA Low Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; Voice RMC 12.2 kbps

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Operating Frequency	Band 5	f_O		824		849	MHz
	Band 8			880		915	
Maximum Output Power	Bands 5, 8	P_{OUT_MAX}		29.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	28.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0		31.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		33.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		14.5	20.0	dB
Power Added Efficiency[1]	Band 5	PAE_{APT}	P_{OUT} = P_{OUT_MAX}		45		%
	Band 8				43		
Total Supply Current[2]	Band 5	I_{TOT_MAX}	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		545		mA
	Band 8				570		
Adjacent Channel Leakage power Ratio	5 MHz offset	ACLR1	P_{OUT} = P_{OUT_MAX}		–40	–38	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	10 MHz offset	ACLR2	P_{OUT} = P_{OUT_MAX}		–52	–48	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–46	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_O$	$P_{OUT} \le P_{OUT\_MAX}$		–16	–13	dBm
	Third	$3f_O$			–23	–15	
	Fourth and higher	$4f_O$				–20	
Noise Power in Rx Band at Duplex Frequency with WCDMA Modulated Tx							dBm/Hz
	B5 f_{TX} = 824–849 MHz	P_{NOISE_DPX}	f_{RX} = f_{TX} +45 MHz		–131.5		
	B8 f_{TX} = 880–915 MHz		f_{RX} = f_{TX} +45 MHz		–131.5		
Input VSWR		$VSWR_{IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.6:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for ACLR1 = –40 dBc.*

[2] *$I_{\_TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.*

Table 11. SKY77643-81 Electrical Specifications – Transmit LTE Mid-Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE}= +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Operating Frequency	Band 1	f_0		1920		1980	MHz
	Band 2			1850		1910	
	Band 3			1710		1785	
	Band 4			1710		1755	
	Band 25			1850		1915	
	Band 66			1710		1780	
Maximum Output Power		P_{OUT_MAX}		28.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0	29.5	32.0	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		33.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	
Power Added Efficiency[1]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		35		%
Total Supply Current[2]		I_{TOT_MAX}	P_{OUT_MAX}		560		mA
Adjacent Channel Leakage power Ratio	EUTRA	$EUTRA_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–36	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–33	
		$E\text{-}UTRA_{ACLR1\_CA}$	P_{OUT} = P_{OUT_MAX}, Modulation = QPSK/40 MHz/200 RB		–37		
	UTRA1	$UTRA_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–37	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	$UTRA_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–39	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$		–15	–7	dBm
	Third	$3f_0$			–25	–20	
	Fourth and higher	$4f_0$				–20	
Noise Power in Rx Band at Duplex Frequency with LTE[3]							dBm/Hz
	B1 f_{TX} = 1920–1980 MHz	P_{NOISE_DPX}	f_{RX} = f_{TX} +190 MHz		–133.0		
	B2 f_{TX} = 1850–1910 MHz		f_{RX} = f_{TX} +80 MHz		–131.5		
	B25 f_{TX} = 1850–1915 MHz		f_{RX} = f_{TX} +80 MHz		–131.5		
	B3 f_{TX} = 1710–1785 MHz		f_{RX} = f_{TX} +95 MHz		–132.6		
	B4 f_{TX} = 1710–1755 MHz		f_{RX} = f_{TX} +400 MHz		–136.0		
	B66 f_{TX} = 1710–1780MHz		f_{RX} = f_{TX} +400 MHz		–136.0		
Input VSWR		$VSWR_{IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] V_{CC} optimized for $ACLR1_{UTRA}$ = –40 dBc.

[2] I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.

[3] Measured with 10 MHz/1RB LTE Waveform.

Table 12-1. SKY77643-81 Electrical Specifications – Transmit LTE Low Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Frequency	Band 5	f_O		824		849	MHz
	Band 8			880		915	
	Band 12			699		716	
	Band 13			777		787	
	Band 17			704		716	
	Band 20			832		862	
	Band 26			814		849	
	Band 28			703		748	
	Band 71			663		698	
Maximum Output Power	Bands 5, 8, 12, 13, 17, 20, 26, 28	P_{OUT_MAX}		28.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.0			
	Band 71	P_{OUT_MAX}		28.25			
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	26.75			
Power Gain	Bands 5, 12, 13, 17, 20, 26, 28	G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.5	30.0	32.0	dB
		G_{P_ETC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.5		34.0	
	Bands 8, 71	G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0	29.5	31.5	
		G_{P_ETC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		33.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	
Power Added Efficiency[1]	Band 12, 71	PAE_{APT}	P_{OUT_MAX}		36		%
	Bands 5, 8, 20, 28				38		
	Band 13				39		
Total Supply Current[2]		$I_{\_TOT\_MAX\_B12,17}$	P_{OUT} = 28.5 dBm, V_{BATT} = 3.8 V		540		mA
		$I_{\_TOT\_MAX\_B13}$			500		
		$I_{\_TOT\_MAX\_B5,8,20,26,28,71}$	P_{OUT} = 28.5 dBm, V_{BATT} = 3.8 V		510		
Adjacent Channel Leakage power Ratio	EUTRA	$EUTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–36	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–33	
	UTRA1	$UTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–37	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	$UTRA_{\_ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–39	

Table 12-2. SKY77643-81 Electrical Specifications – Transmit LTE Low Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, $T_{CASE} = T_{RANGE}$		2.5	5.0	%
Harmonics	Second Bands 12, 17, 28, 71	$2f_0$	$P_{OUT} \le P_{OUT\_MAX}$		–13	–7	dBm
	Second Bands 5, 8, 13, 20, 26				–20	–15	
	Third	$3f_0$			–40	–35	
	Fourth and higher	$4f_0$				–20	
Noise Power in Rx Band at Duplex Frequency with LTE[3]							dBm/Hz
	B26 f_{TX} = 814–849 MHz	P_{NOISE_DPX}	$f_{RX} = f_{TX}$ + 45 MHz		–133.5		
	B5 f_{TX} = 824–849 MHz		$f_{RX} = f_{TX}$ + 45 MHz		–133.5		
	B8 f_{TX} = 880–915 MHz		$f_{RX} = f_{TX}$ + 45 MHz		–133.3		
	B13 f_{TX} = 777–787 MHz		$f_{RX} = f_{TX}$ – 31 MHz		–129.0		
	B17 f_{TX} = 704–716 MHz		$f_{RX} = f_{TX}$ + 30 MHz		–131.0		
	B20 f_{TX} = 832–862 MHz		$f_{RX} = f_{TX}$ – 41 MHz		–131.0		
	B28 f_{TX} = 703–748 MHz		f_{RX} = 758–803 MHz		–132.0		
Input VSWR		$VSWR_{IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.6:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, $T_{CASE} = T_{RANGE}$	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] V_{CC} optimized for $ACLR1_{UTRA}$ = –40 dBc.

[2] $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.

[3] Measured with 10 MHz/1RB LTE Waveform.

Table 13. SKY77643-81 Electrical Specifications – TD-SCDMA Bands 34, 39

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; Voice Modulation

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Operating Frequency	Band 34	f_O		2010		2025	MHz
	Band 39			1880		1920	
Maximum Output Power	Band 34	P_{OUT_MAX}		29.25			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.75			
	Band 39	P_{OUT_MAX}		29.5			
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	28.0			
Power Gain	Band 34	G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	27.0	29.5	31.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	25.0		31.5	
	Band 39	G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0	29.5	31.0	
		G_{P_ETC}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		32.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	dB
Power Added Efficiency[1]		$PAE_{\_APT}$	P_{OUT} = P_{OUT_MAX}		42		%
Total Supply Current[2]		$I_{\_TOT\_MAX\_B39}$			580		mA
		$I_{\_TOT\_MAX\_B34}$			550		
Adjacent Channel Leakage Power Ratio	1.6 MHz offset	ACLR1	P_{OUT} = P_{OUT_MAX}		–40	–38	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	3.2 MHz offset	ACLR2	P_{OUT} = P_{OUT_MAX}		–52	–48	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–46	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_O$	$P_{OUT} \le P_{OUT\_MAX}$		–16	–10	dBm
	Third	$3f_O$			–23	–15	
	Fourth and higher	$4f_O$				–20	
Input VSWR		$VSWR_{\_IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for ACLR1 = –40 dBc.*

[2] *$I_{\_TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.*

Table 14. SKY77643-81 Electrical Specifications – Transmit TDD LTE Band 39

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Frequency		f		1880		1920	MHz
Maximum Output Power		P_{OUT_MAX}		28.5			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0	30.0	31.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.0		32.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	dB
Power Added Efficiency[1]		PAE_{APT}	P_{OUT} = P_{OUT_MAX}		34		%
Total Supply Current[2]		I_{TOT_MAX}	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		570		mA
Adjacent Channel Leakage power Ratio	EUTRA	E-UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–33	
		E-UTRA$_{ACLR1_CA}$	P_{OUT} = P_{OUT_MAX} Modulation = QPSK/35 MHz/175RB		–37		
	UTRA1	UTRA$_{ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–37	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–36	
	UTRA2	UTRA$_{ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–39	
Modulation Accuracy		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_0$	P_{OUT} = P_{OUT_MAX}		–16	–12	dBm
	Third	$3f_0$			–23	–20	
	Fourth and higher	$4f_0$				–20	
Input VSWR		$VSWR_{IN}$	$P_{OUT} \leq P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for $ACLR1_{UTRA}$ = –40 dBc.*

[2] *$I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.*

Table 15. SKY77643-81 Electrical Specifications – Transmit TDD LTE Band 34

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/15 MHz/75RB for MPR = 1.

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Frequency		f		2010		2025	MHz
Maximum Output Power		P_{OUT_MAX}		28.0			dBm
		$P_{OUT\_MAX\_ETC}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	26.5			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	27.0	29.5	31.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	25.0	28.5	31.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	dB
Power Added Efficiency[1]		$PAE_{\_APT}$	P_{OUT} = P_{OUT_MAX}		33		%
Total Supply Current[2]		$I_{\_TOT\_MAX}$	P_{OUT} = P_{OUT_MAX}, V_{BATT} = 3.8 V		520		mA
Adjacent Channel Leakage power Ratio	EUTRA	E-$UTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–38	–35	dBc
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–33	
	UTRA1	$UTRA_{\_ACLR1}$	P_{OUT} = P_{OUT_MAX}		–40	–37	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–35	
	UTRA2	$UTRA_{\_ACLR2}$	P_{OUT} = P_{OUT_MAX}		–43	–41	
			P_{OUT} = $P_{OUT\_MAX\_RANGE}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–39	
Modulation Accuracy		EVM	V_{BATT} = 3.0 to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5	%
Harmonics	Second	$2f_0$	P_{OUT} = P_{OUT_MAX}		–15	–13	dBm
	Third	$3f_0$			–20	–17	
	Fourth and higher	$4f_0$				–17	
Input VSWR		$VSWR_{\_IN}$	$P_{OUT} \leq P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for $ACLR1_{\_UTRA}$ = –40 dBc.*

[2] *$I_{\_TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.*

Table 16. SKY77643-81 Electrical Specifications – Transmit CDMA2000 Low Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; 1x RC1

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Frequency	Band BC0	f		815		849	MHz
	Band BC10			814		849	
Maximum Output Power		P_{OUT_MAX}	CDMA RC1	28.8			dBm
			CDMA EVDO	28.5			
		$P_{OUT\_MAX\_ETC}$	CDMA RC1, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.3			
			CDMA EVDO, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.5	30.0	31.5	dB
		G_{P_EXT}	P_{OUT} = P_{OUT_MAX}, T_{CASE} = T_{RANGE}	26.5		33.0	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		14.5	20.0	dB
Power Added Efficiency[1]	CDMA RC1	PAE_{APT}	P_{OUT} = $P_{OUT\_MAX\_RC1}$		37		%
	CDMA EVDO		P_{OUT} = $P_{OUT\_MAX\_EVDO}$		36		
Total Supply Current[2]	CDMA RC1	I_{TOT_MAX}	P_{OUT} = $P_{OUT\_MAX\_RC1}$, V_{BATT} = 3.8 V		560		mA
	CDMA EVDO		P_{OUT} = $P_{OUT\_MAX\_EVDO}$, V_{BATT} = 3.8 V		540		
Adjacent Channel Leakage power Ratio	885 kHz offset	ACLR1	P_{OUT} = P_{OUT_MAX}		–50	–46	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–44	
	1.98 MHz offset	ACLR2	P_{OUT} = P_{OUT_MAX}		–60	–57	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0, T_{CASE} = T_{RANGE}			–55	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_o$	$P_{OUT} \le P_{OUT\_MAX}$, MBW = 1 MHz		–16	–12	dBm
	Third	$3f_o$			–15	–12	
	Fourth and higher	$4f_o$				–20	
Noise Power in Rx Band at Duplex Frequency							dBm/Hz
BC0 f_{TX} = 815 MHz –849 MHz		P_{NOISE_DPX}	f_{RX} = f_{TX} +45 MHz		–133		
BC10 f_{TX} = 806 MHz –901 MHz			f_{RX} = f_{TX} +45 MHz		–133		
Input VSWR		$VSWR_{IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.6:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] V_{CC} optimized for ACLR1 = –50 dBc.

[2] $I\_TOT = IBATT + (ICC1 + ICC2)(VCC/VBATT)(1/DC\_DC\_EFF)$. DC_DC_EFF ~ 96%.

Table 17. SKY77643-81 Electrical Specifications – Transmit CDMA2000 Mid-Band

Unless otherwise specified: V_{BATT} = 3.4 V; T_{CASE} = +25 °C; 1x RC1

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Frequency	Band BC15	f_O		1710		1755	MHz
	Band BC4			1750		1780	
	Band BC1			1850		1910	
	Band BC6			1920		1980	
Maximum Output Power	CDMA RC1	$P_{OUT\_MAX\_RC1}$		29.0			dBm
		$P_{OUT\_MAX\_ETC\_RC1}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.5			
	CDMA EVDO	$P_{OUT\_MAX\_EVDO}$		28.5			
		$P_{OUT\_MAX\_ETC\_EVDO}$	V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}	27.0			
Power Gain		G_{P_NTC}	P_{OUT} = P_{OUT_MAX}	28.0	30.0	31.5	dB
		G_{P_EXT}	P_{OUT} = $P_{OUT\_MAX\_ETC}$, T_{CASE} = T_{RANGE}	26.0		32.5	
		G_{P_LOW}	P_{OUT} = 3 dBm, V_{CC} = 0.55 V		15.0	20.0	
Power Added Efficiency[1]	CDMA RC1	$PAE_{\_APT\_RC1}$	P_{OUT} = $P_{OUT\_MAX\_RC1}$		37		%
	CDMA EVDO	$PAE_{\_APT\_EVDO}$	P_{OUT} = $P_{OUT\_MAX\_EVDO}$		36		
Total Supply Current[2]	CDMA RC1	$I_{\_TOT\_MAX\_RC1}$	P_{OUT} = $P_{OUT\_MAX\_RC1}$, V_{BATT} = 3.8 V		590		mA
	CDMA EVDO	$I_{\_TOT\_MAX\_EVDO}$	P_{OUT} = $P_{OUT\_MAX\_EVDO}$, V_{BATT} = 3.8 V		540		
Adjacent Channel Leakage power Ratio	1.25 MHz offset	ACLR1	P_{OUT} = P_{OUT_MAX}		–50	–47	dBc
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–45	
	1.98 MHz offset	ACLR2	P_{OUT} = P_{OUT_MAX}		–60	–56	
			P_{OUT} = $P_{OUT\_MAX\_ETC}$, V_{BATT} = V_{CC} = 3.0 V, T_{CASE} = T_{RANGE}			–55	
Modulation Accuracy		EVM	V_{BATT} = 3.0 V to 4.8 V, Load = 50 ohms, T_{CASE} = T_{RANGE}		2.5	5.0	%
Harmonics	Second	$2f_O$	$P_{OUT} \le P_{OUT\_MAX}$, MBW = 1 MHz		–16	–10	dBm
	Third	$3f_O$			–23	–14	
	Fourth and higher	$4f_O$				–19	
Noise Power in Rx Band at Duplex Frequency							dBm/Hz
BC15 f_{TX} = 1710 MHz–1755 MHz		P_{NOISE_DPX}	f_{RX} = f_{TX} +400 MHz		–137.0		
BC4 f_{TX} = 1750 MHz–1780 MHz			f_{RX} = f_{TX} +90 MHz		–133.0		
BC1 f_{TX} = 1850 MHz–1910 MHz			f_{RX} = f_{TX} +80 MHz		–133.0		
BC6 f_{TX} = 1920 MHz–1980 MHz			f_{RX} = f_{TX} +190 MHz		–133.5		
Input VSWR		$VSWR_{\_IN}$	$P_{OUT} \le P_{OUT\_MAX}$		1.3:1	2:1	
Stability		S	Load VSWR = 6:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 3.0 V to 4.8 V, T_{CASE} = T_{RANGE}	All spurious below –36 dBm			
Ruggedness		Ru	Load VSWR = 10:1, all phase angles, $P_{OUT} \le P_{OUT\_MAX}$, V_{BATT} = 4.8 V, V_{CC} = 4.6 V, T_{CASE} = +25 °C	No module damage or permanent degradation			

[1] *V_{CC} optimized for ACLR1 = –50 dBc.*

[2] *$I_{\_TOT}$ = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC_DC_EFF). DC_DC_EFF ~ 96%.*

Table 18. SKY77643-81 Electrical Specification – Band Select Switch

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Frequency Range		f_LB		663		915	MHz
		f_MB		1710		2025	
		f_HB		2300		2690	
Insertion Loss		IL	HB1 to HBRx2		0.70		dB
			HB2 to HBRx2		0.75		
			HB3 to HBRx1		0.75		
			HB4 to HBRx2		0.95		
VSWR		SWR	HB4 to HBRx2			2.2:1	
			HB1/HB2 to HBRx2, HB3 to HBRx1			1.9:1	
Isolation	Tx Mode	ISO_Tx	Tx output at HB1, Isolation to HB3, HB4, HBRx1, HB2, HBRx2	35			
			Tx output at HB2, Isolation to HB1, HB3, HB4, HBRx1, HBRx2	35			
			Tx output at HB3, Isolation to HB1, HB2, HBRx1, HBRx2	35			
			Tx output at HB3, Isolation to HB4	30			
			Tx output at HB4, Isolation to HB2, HB3, HB1, HBRx1, HBRx2	35			
			Tx output at any LB output, Isolation to LB1, LB2, LB5	30			
			Tx output at any LB output, Isolation to LB3, LB4	25			
			Tx output at any MB output, Isolation to MB1, MB2, MB3, MB4	30			
			Tx output at any MB output, Isolation to MB5	25			
	Rx Mode	ISO_Rx	Rx Path: HB1 to HBRx2 Isolation to HB2, HB3, HB4, HBRx1	25			
			Rx Path: HB2 to HBRx2 Isolation to HB1, HB3, HB4, HBRx1	25			
			Rx Path: HB3 to HBRx1 Isolation to HB1, HB2, HB4, HBRx2	25			
			Rx Path: HB4 to HBRx2 Isolation to HB1, HB2, HB3, HBRx1	25			

Table 19. SKY77643-81 LTE Maximum Power Reduction (MPR)

Modulation	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	5 MHz + 10 MHz	10 MHz + 10 MHz	5 MHz + 20 MHz	10 MHz + 20 MHz	15 MHz + 15 MHz	15 MHz + 20 MHz	20 MHz + 20 MHz	MPR (dB)
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	8 < RB ≤ 25	12 < RB ≤ 50	8 < RB ≤ 25	12 < RB ≤ 50	16 < RB ≤ 75	16 < RB ≤ 75	18 < RB ≤ 100	≤ 1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 8	≤ 12	≤ 8	≤ 12	≤ 16	≤ 16	≤ 18	≤ 1
QPSK	N/A	N/A	N/A	N/A	N/A	N/A	> 25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 2
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	8 < RB ≤ 25	12 < RB ≤ 50	8 < RB ≤ 25	12 < RB ≤ 50	16 < RB ≤ 75	16 < RB ≤ 75	18 < RB ≤ 100	≤ 2
64QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 8 and one CC	≤ 12 and one CC	≤ 8 and one CC	≤ 12 and one CC	≤ 16 and one CC	≤16 and one CC	≤ 18 and one CC	≤ 2
16QAM	N/A	N/A	N/A	N/A	N/A	N/A	>25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 3
64QAM	> 5	> 4	> 8	> 12	> 16	> 18	> 8 or two CC's	> 12 or two CC's	> 8 or two CC's	> 12 or two CC's	> 16 or two CC's	> 16 or two CC's	> 18 or two CC's	≤ 3

Table 20. SKY77643-81 Power vs. Modulation

	WDCMA					LTE							
		3GPP HS Test Cases				3GPP Test Cases: QPSK			3GPP Test Cases: 16QAM			3GPP Test Cases: 64QAM	
Band	R99	HSDPA ST 1, 2 HSUPA ST 1, 5	HSDPA ST 3, 4	HSUPA ST 3	HSUPA ST 2, 4	5 MHz 8RB 10 MHz 12RB 20 MHz 18RB	5 MHz 25RB 10 MHz 50RB 15 MHz 75RB 20 MHz 100RB	35 MHz 175RB 40 MHz 200RB	5 MHz 8RB 10 MHz 12RB 20 MHz 18RB	5 MHz 25RB 10 MHz 50RB 15 MHz 75RB 20 MHz 100RB	35 MHz 175RB 40 MHz 200RB	5 MHz 8RB 10 MHz 12RB 20 MHz 18RB	5 MHz 25RB 10 MHz 50RB 15 MHz 75RB 20 MHz 100RB 35 MHz 175RB 40 MHz 200RB
1	29.5	28.5	28.0	27.5	26.5	28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5
2, 25	29.5	28.5	28.0	27.5	26.5	28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5
3	29.5	28.5	28.0	27.5	26.5	28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5
4	29.5	28.5	28.0	27.5	26.5	28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5
5, 26	29.5	28.5	28.0	27.5	26.5	28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
8	29.5	28.5	28.0	27.5	26.5	28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
12						28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
13						28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
17						28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
20						28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
28						28.5	27.5	N/A	27.5	26.5	N/A	26.5	25.5
71						28.25	27.25	N/A	27.25	26.25	N/A	26.25	25.25
34						28.0	27.0	N/A	27.0	26.0	N/A	26.0	25.0
39						28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5
38						29.25	28.25	27.25	28.25	27.25	26.25	27.25	26.25
40						29.0	28.0	27.0	28.0	27.0	26.0	27.0	26.0
41						29.25	28.25	27.25	28.25	27.25	26.25	27.25	26.25
7						29.5	28.5	27.5	28.5	27.5	26.5	27.5	26.5
30						29.5	28.5	N/A	28.5	27.5	N/A	27.5	26.5
AXGP						29.25	28.25	N/A	28.25	27.25	N/A	27.25	26.25
66						28.5	27.5	26.5	27.5	26.5	25.5	26.5	25.5

MIPI RFFE Information

Table 21-1. MIPI RFFE Standard Register Map

Register 0, Address 0x00 (PA_CTRL0)					
Register 0	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**
[7]	Spare	Trigger0	R/W	0	
[6:3]	PA Band Select Control Mode		R/W	0000	Control Mode
					0000 = PA's Disabled
					0001 = LB1_TX
					0010 = LB2_TX
					0011 = LB3_TX
					0100 = LB4_TX
					0101 = LB5_TX
					0110 = MB1_TX
					0111 = MB2_TX
					1000 = MB3_TX
					1001 = MB4_TX
					1010 = MB5_TX
					1011 = HB1_TX
					1100 = HB2_TX
					1101 = HB3_TX
					1110 = HB4_TX
					1111 = PA's Disabled (High switch isolation)
[2:1]	PA Mode		R/W	0	00 = PA Off
					01 = HPUE
					10 = HPM
					11 = LPM
[0]	RESERVED		R/W	0	
Register 1, Address 0x01 (BIAS_CTRL1)					
Register 1	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**
[7:0]	Primary PA Bias	Trigger0	R/W	00000000	See Lookup Table for appropriate bias words for each band and mode
Register 2, Address 0x02 (HB_Switch_RX_CTRL)					
Register 2	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**
[7:4]	Spare	Trigger0	R/W	0000	Spare
[3:0]	HB_Switch_RX_CTRL		R/W	0000	Control Mode
					0000 = Switch Off (Standby)
					0001 = HB1 → HBRX2
					0010 = HB2 → HBRX2
					0011 = HB3 → HBRX1
					0100 = HB4 → HBRX2
					Other States = High Isolation
Register 3, Address 0x03 (BIAS_CTRL3)					
Register 3	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**
[7]	Bias Mode	Trigger0	R/W	0	0 = Limited Bias
					1 = Standard Bias
[6:4]	Temperature Compensation		R/W	000	Bias Temperature Compensation
[3:0]	Secondary PA Bias		R/W	0000	Secondary PA Bias Adjustment

Table 21-2. MIPI RFFE Standard Register Map

Register 28, Address 0x1C (PM_TRIG)						
Register 28	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:6]	PWR_MODE[1:0]	No	R/W	10	00 = Normal Operation (ACTIVE)	10 = Low Power (LOW POWER)
					01 = Default Settings (STARTUP)	11 = Reserved
[5]	TRIGGER_MASK_2			0	0 = Trigger Enable	1 = Trigger Disable
[4]	TRIGGER_MASK_1			0	0 = Trigger Enable	1 = Trigger Disable
[3]	TRIGGER_MASK_0			0	0 = Trigger Enable	1 = Trigger Disable
[2]	TRIGGER_2			0	1 = Load Trigger 2 registers	
[1]	TRIGGER_1			0	1 = Load Trigger 1 registers	
[0]	TRIGGER_0			0	1 = Load Trigger 0 registers	
Register 29, Address 0x1D (PROD_ID)						
Register 29	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:0]	Product ID	No	R	00101101	Product ID = 0x2D	
Register 30, Address 0x1E (MAN_ID)						
Register 30	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:0]	Manufacturer ID	No	R	10100101	Manufacturer ID = 0xA5	
Register 31, Address 0x01F (USID)						
Register 31	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:6]	Reserved	No	R	00		
[5:4]	MANUFACTURER_ID[9:8]		R	01		
[3:0]	USID		R/W	1111	USID = 0xF	
Register 32, Address 0x20 (EXT_PRODUCT_ID)						
Register 32	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:0]	EXT_PRODUCT_ID	No	R	00000000	Extended Product ID = 0X00	
Register 33, Address 0x021 (REVISION_ID)						
Register 33	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:6]	MAJOR REV	No	R	00		
[5:4]	MINOR REV		R	00		
[3:0]	MISC VARIANTS		R	0000		
Register 34, Address 0x22 (GROUP_SID)						
Register 34	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7:4]	Group SID	No	R/W	0000	Group Slave ID	
[3:0]	Reserved		R/W	0000	Reserved	
Register 35, Address 0x23 (SW_RST)						
Register 35	**Description**	**Trigger Support**	**R/W**	**Default**	**Notes**	
[7]	SOFTWARE RESET	No	R/W	0		
[6:0]	Reserved		R	0000000		

Evaluation Board Description

The evaluation board is a platform for testing and interfacing design circuitry. To accommodate the interface testing of the SKY77643-81, the evaluation board schematic and assembly diagrams are included for preliminary analysis and design. The basic EVB schematic is shown in Figure 2 and the assembly diagram in Figure 3. Table 22 is the Bill of Material list.

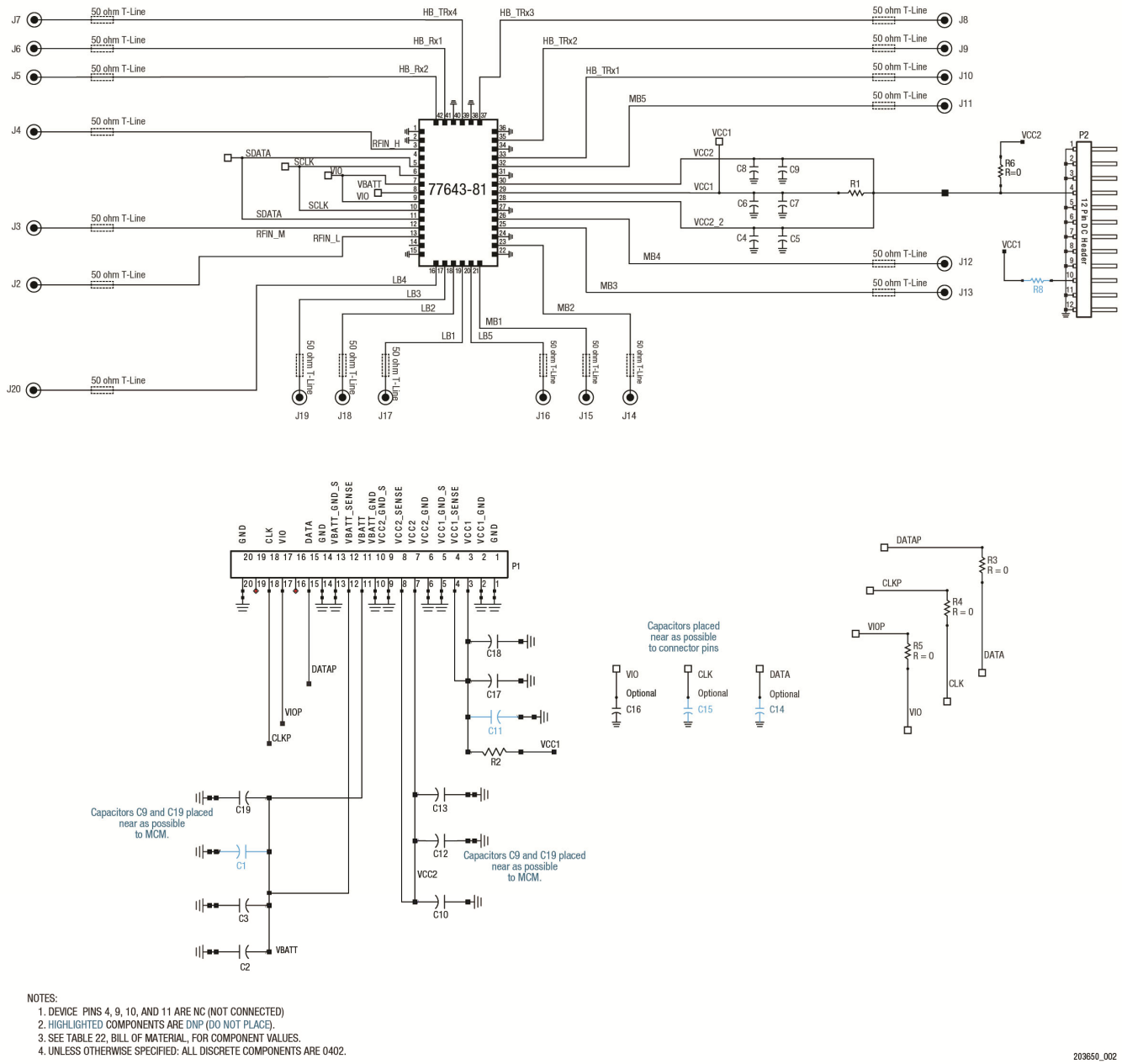


Figure 2. SKY77643-81 Evaluation Board Schematic Diagram

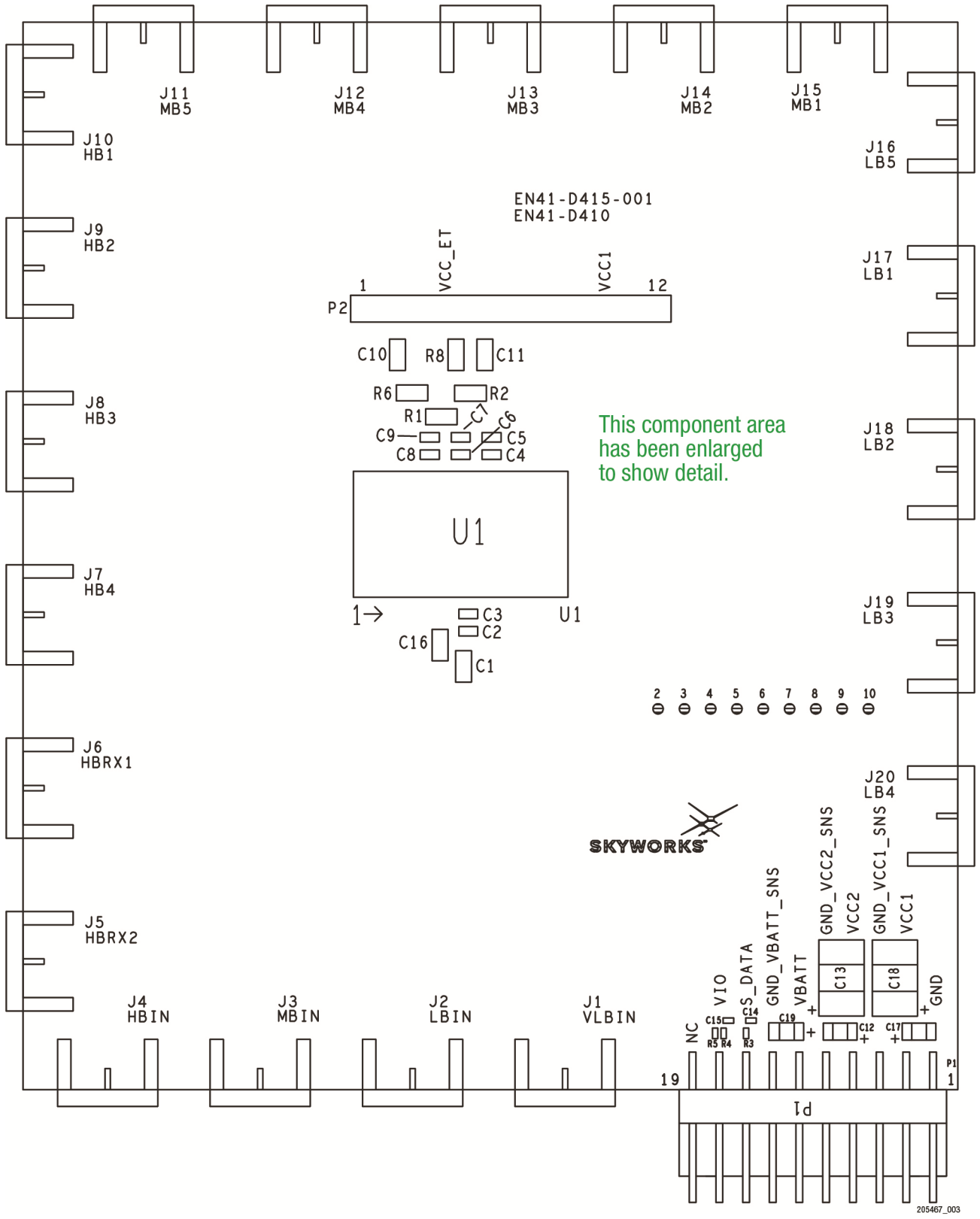


Figure 3. SKY77643-81 Evaluation Board Assembly Diagram

Table 22. SKY77643-81 Evaluation Board Bill of Material

ITEM	QTY	REFERENCE DESIGNATORS	PART DESCRIPTION
1	1	P1	CONNECTOR, 20 PINPOST LENGTH = 0.53 »
2	20	J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20	CONN SMA END LAUNCH JACK TAB CONTACT GOLD .062
3	1	C2	CAPACITOR, CERAMIC, 0.1 µF, 10%, X5R, 10 V, 0201 (RSI)
4	4	C3, C4, C6, C8	CAPACITOR, CERAMIC, 100 pF, 10%, X7R, 16 V, 0201 (RSI)
5	3	C5, C7, C9	CAPACITOR, 1µF, 0201, 10 V
6	3	C12, C17, C19	CAPACITOR TANTALUM MOLDED 10 µF, 16 V, ±10%, 1206
7	2	C13, C18	CAPACITOR 220 µF, TANT, LOW ESR, CASE D, AVX
8	1	C16	CAPACITOR, CERAMIC, 270 pF, 10%, X7R, 50 V, 0402
9	6	R1, R3, R4, R5, R6	RESISTOR, 0 OHM, JUMPER, 0.063 W, 0402
10	7	C1, C10, C11, C14, C15, R2, R8	DNP (Do Not Place)

Package Dimensions

Figure 4 is a mechanical drawing of the pad layout for the SKY77643-81, a 42-pad leadless quad-band power amplifier module. Figure 5 provides a recommended PC board layout footprint of the module to help the designer attain optimum thermal conductivity, good grounding, and minimum RF discontinuity for the 50-ohm terminals.

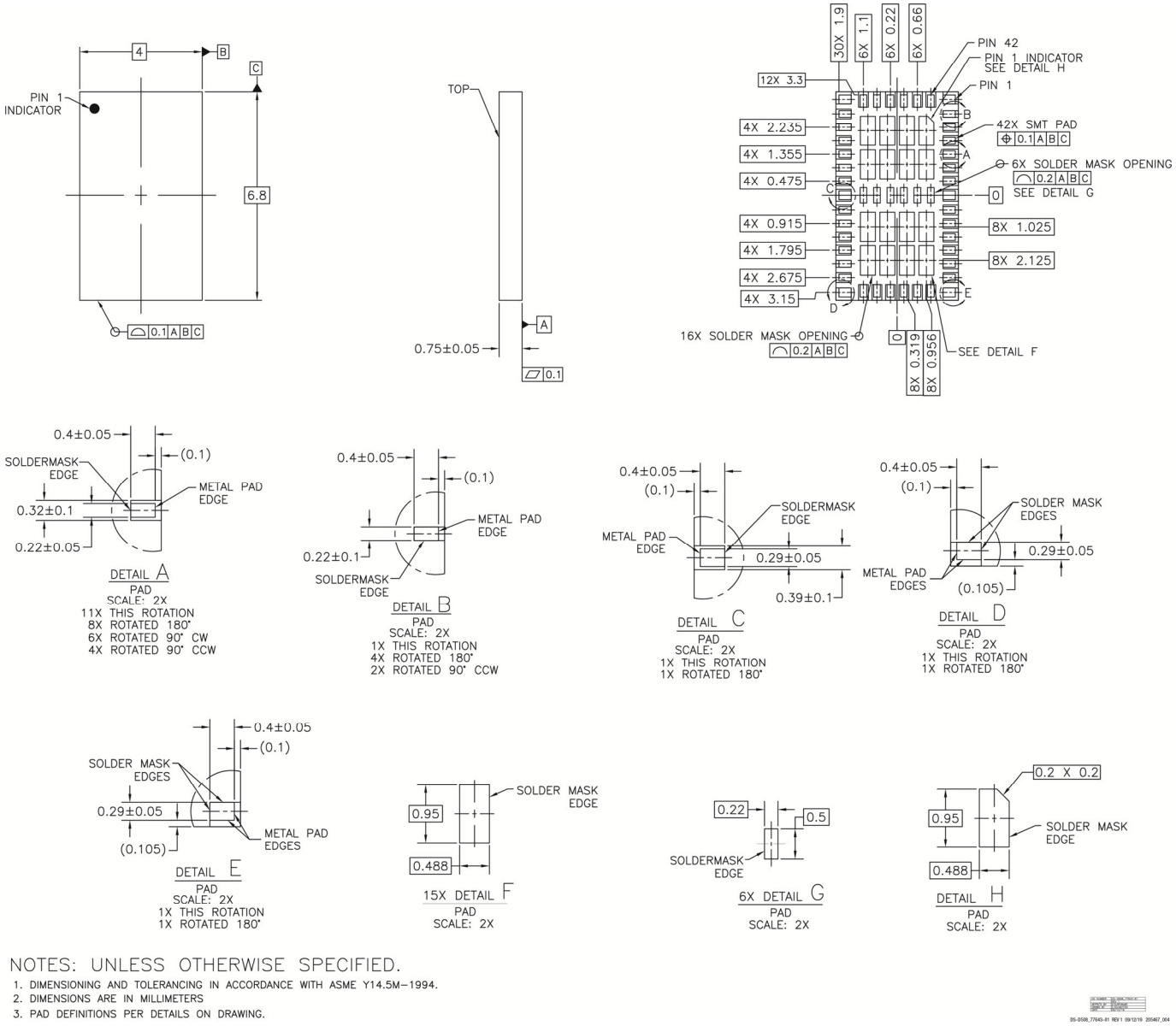


Figure 4. Dimensional Diagram for 4.0 mm x 6.8 mm x 0.75 mm, 42-Pad MCM Package – SKY77643-81

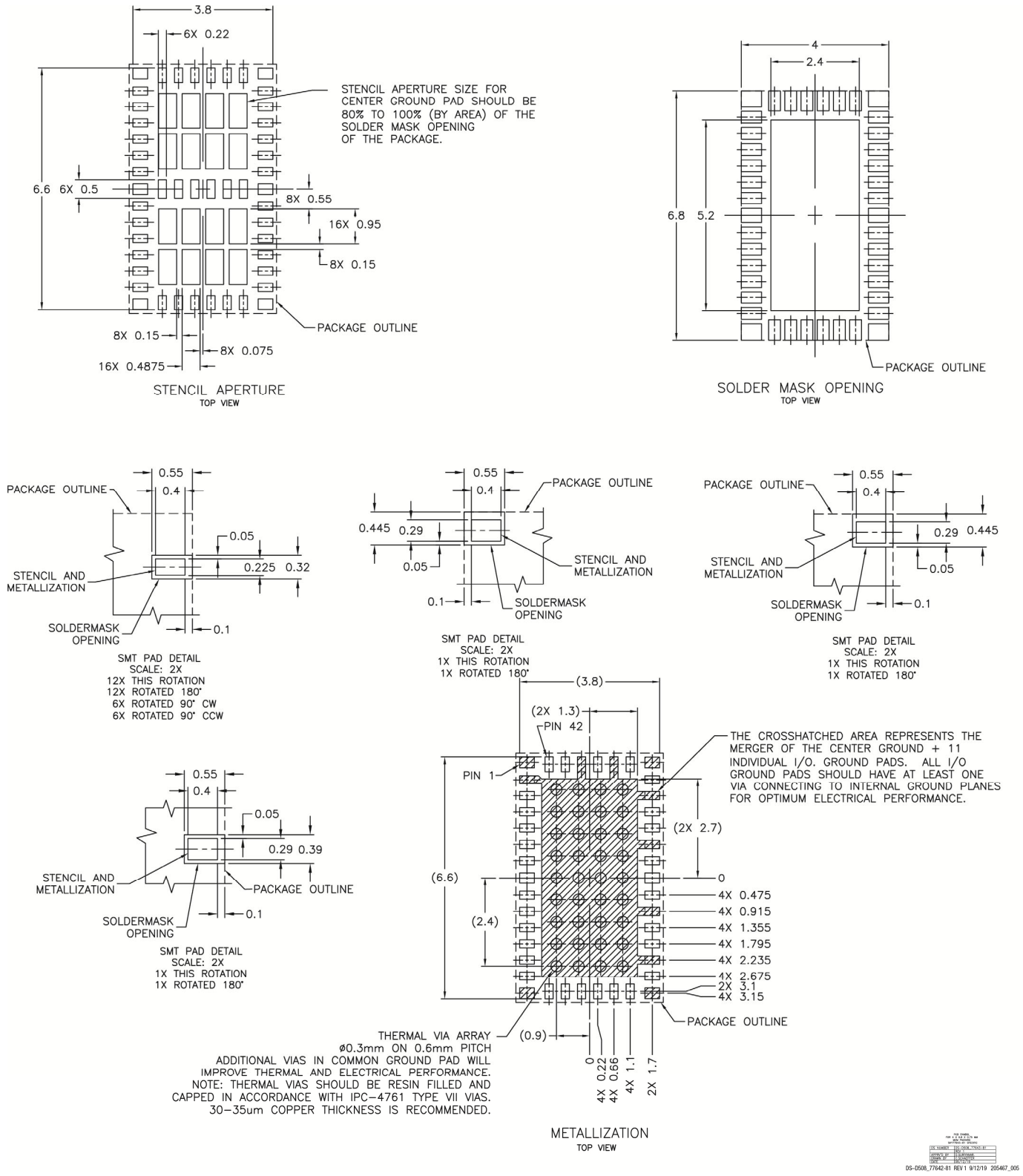
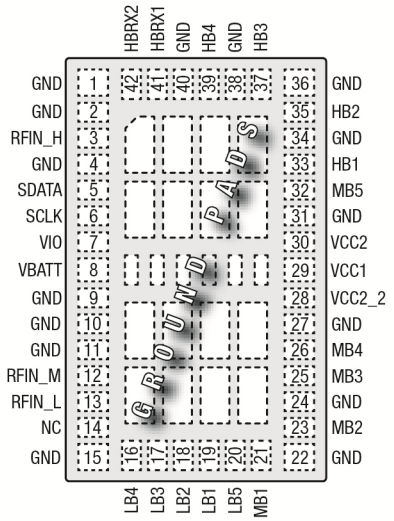


Figure 5. PCB Layout Footprint for 4.0 mm x 6.8 mm, 42-Pad Package – SKY77643-81

Package Description

Figure 6 shows the device pad configuration and the pad numbering convention, which starts with pad 1 in the upper left corner and increments counter-clockwise around the package. Table 23 lists the pad names and signal descriptions. Figure 7 shows typical case markings for the SKY77643-81.



Pad layout as seen from Top View looking through package.
GROUND PAD is package underside

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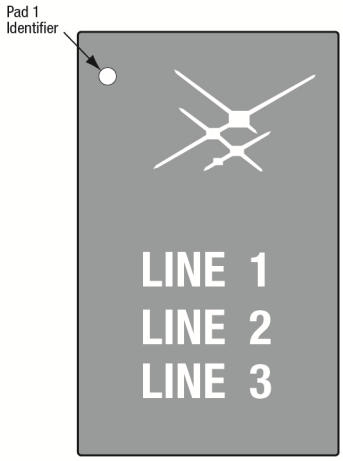
Figure 6. SKY77643-81 Pad Configuration – 42-Pad MCM (Top View)



NOTE: Lines 1, 2, 3 have a maximum of 12 characters
Line 1 = Part Number and Version
Line 2 = Lot Number
Line 3 = Year–Week–Country Code (MX)

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Figure 7. Typical Case Markings (Top View)

Table 23. SKY77643-81 Pad Names and Signal Descriptions

Pad No.	Name	Description
3	RFIN_H	High Band (HB) Input
4	NC	No connect
5	SDATA	MIPI Data Bus
6	SCLK	MIPI Clock Bus
7	VIO	MIPI Supply
8	VBATT	Battery Supply
9	NC	No connect
10	NC	No connect
11	NC	No connect
12	RFIN_M	Mid Band (MB) Input
13	RFIN_L	Low Band (LB) Input
14	NC	No connect (float or connect to GND)
16	LB4	Low Band (LB) 4 RF OUT
17	LB3	Low Band (LB) 3 RF OUT
18	LB2	Low Band (LB) 2 RF OUT
19	LB1	Low Band (LB) 1 RF OUT
20	LB5	Low Band (LB) 5 RF OUT
21	MB1	Mid Band (MB) 1 RF OUT
23	MB2	Mid Band (MB) 2 RF OUT
25	MB3	Mid Band (MB) 3 RF OUT
26	MB4	Mid Band (MB) 4 RF OUT
28	VCC2_2	Mid/Low Band 2nd Stage PA Collector Supply
29	VCC1	High/Mid/Low Band 1st Stage PA Collector Supply
30	VCC2	High Band 2nd Stage PA Collector Supply
32	MB5	Mid Band (MB) 5 RF OUT
33	HB1	High Band 1 RF OUT
35	HB2	High Band 2 RF OUT
37	HB3	High Band 3 RF OUT
39	HB4	High Band 4 RF OUT
41	HBRX1	High Band 3 RX OUT
42	HBRX2	High Bands 1, 2, 4 RX OUT

[1] *Pads 1, 2, 4, 9–11, 15, 22, 24, 27, 31, 34, 36, 38, and 40 are GROUND pads.*

Package Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY77643-81 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to Skyworks Application Note, *PCB Design and SMT Assembly/Rework Guidelines for MCM-L Packages*, Document Number 101752.

Care must be taken when attaching this product, whether done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format (Figure 8).

Electrostatic Discharge (ESD) Sensitivity

Attention: Observe Precautions for Handling Electrostatic Sensitive Devices

Electrostatic Discharge (ESD) can damage this device, which must be protected from ESD at all times. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

The SKY77643-81 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper ESD precautions.

To avoid ESD damage, both latent and visible, it is very important that the product assembly and test areas follow the ESD handling precautions listed below.

- Personnel Grounding
  - Wrist Straps
  - Conductive Smocks, Gloves and Finger Cots
  - Antistatic ID Badges
- Protective Workstation
  - Dissipative Table Top
  - Protective Test Equipment (Properly Grounded)
  - Grounded Tip Soldering Irons
  - Solder Conductive Suckers
  - Static Sensors
- Facility
  - Relative Humidity Control and Air Ionizers
  - Dissipative Floors (less than 1,000 MΩ to GND)
- Protective Packaging and Transportation
  - Bags and Pouches (Faraday Shield)
  - Protective Tote Boxes (Conductive Static Shielding)
  - Protective Trays
  - Grounded Carts
  - Protective Work Order Holders

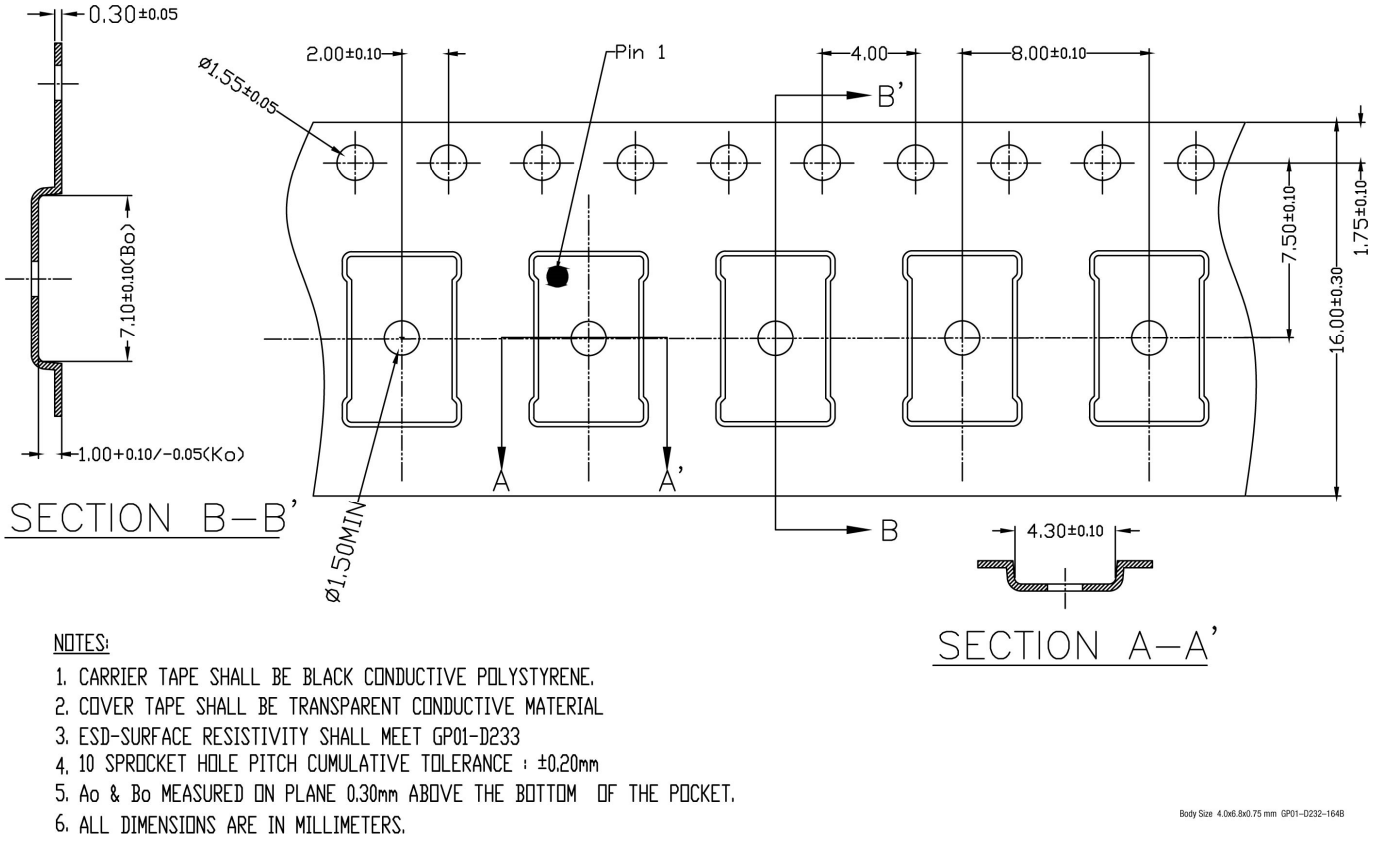

Figure 8. Carrier Tape Dimensional Diagram for Body Size 4.0 mm x 6.8 mm x 0.85–1.05 mm – Overmold MCM

Ordering Information

Product Name	Order Number	Evaluation Board Part Number
SKY77643-81 SkyLiTE™ Multimode Multiband Power Amplifier Module	SKY77643-81	SKY77643-81EK1

Revision History

Revision	Date	Description
A	September 24, 2019	Initial Release – Preliminary Information CN 37519
B	September 24, 2019	Revise: Running footer CN 38831

References

Skyworks Application Note: *PCB Design and SMT Assembly/Rework*, Document Number 101752

Electrostatic Discharge Sensitivity (ESD) Testing: *JEDEC Standard, JESD22-A114 Human Body Model (HBM)*