DATA SHEET

SKY77340 PA Module for Quad-Band GSM / EDGE

Applications

- Quad-band cellular handsets:

  GMSK Modulation
  - Class 4 GSM850/900
  - Class 1 DCS1800/PCS1900
  - Class 12 GPRS multi-slot operation

  EDGE modulation
  - Class E2 GSM850/900
  - Class E2 DCS1800/ PCS1900

Features

- High efficiency:
  - GSM850 54%
  - GSM900 53%
  - DCS 52%
  - PCS 52%
- Input/Output matching 50 Ω internal (with DC blocking)
- 16-pin MCM
- Small outline
  - 6 x 8 mm
- Low profile
  - 1.2 mm
- Gold-plated, lead-free contacts
- Low APC current
  - 10 uA

NEW Skyworks offers lead (Pb)-free "environmentally friendly" packaging that is RoHS compliant (European Parliament for the Restriction of Hazardous Substances).

Description

The SKY77340 Power Amplifier Module (PAM) is designed in a compact form factor for quad-band cellular handsets comprising GSM850/900, DCS1800, PCS1900, supporting GMSK and linear EDGE modulation. Class 12 General Packet Radio Service (GPRS) multi-slot operation is also supported.

The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, impedance-matching circuitry for 50 Ω input and output impedances, and a Multi-function Power Amplifier Control (MFC) block. A custom CMOS integrated circuit provides the internal MFC function and interface circuitry.

Two separate Heterojunction Bipolar Transistor (HBT) PA blocks are fabricated onto InGaP die; one supports the GSM850/900 bands, the other supports the DCS1800 and PCS1900 bands. Both PA blocks share common power supply pins to distribute current. The InGaP die, the silicon die, and the passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.

RF input and output ports are internally matched to 50 Ω to reduce the number of external components. Extremely low leakage current (2.5 μA, typical) maximizes handset standby time. Band select (BS) circuitry selects GSM transmit frequency band (logic 0) and DCS/PCS transmit frequency band (logic 1). MODE circuitry selects GMSK modulation (logic 0) or EDGE modulation (logic 1). VRAMP controls the output power for GMSK modulation and provides bias optimization for EDGE modulation depending on the state of MODE control.

The integrated multi-function control (MFC) provides envelope amplitude control in GMSK mode, reducing sensitivity to input drive, temperature, power supply, and process variation. In EDGE mode, the MFC configures the PA for fixed gain, and provides the ability to optimize the PA bias operation at different power levels. This circuitry regulates PA bias conditions, reducing sensitivity to temperature, power supply, and process variation. The Enable input signal (pin 8) provides a standby state to minimize battery drain.

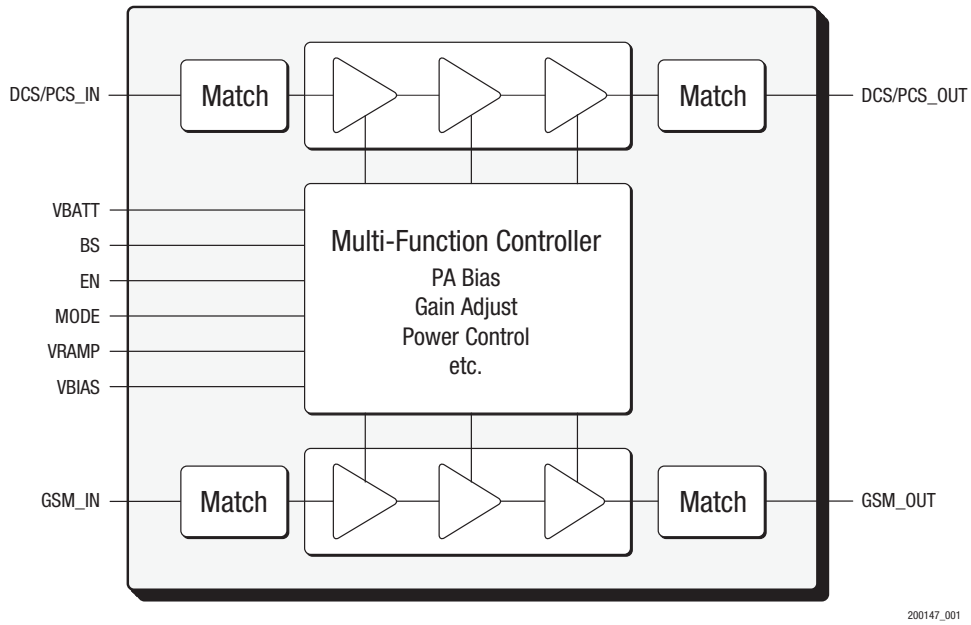


Figure 1. SKY77340 Functional Block Diagram

Electrical Specifications

The absolute maximum ratings of the SKY77340 are provided in Table 1 and the recommended operating conditions are specified in Table 2. Table 3 provides the control logic and Table 4 provides the electrical specifications.

Table 1. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Unit
RF Input Power	P_{IN}	—	—	12	dBm
Case Storage Temperature	T_{STG}	–55	—	150	°C
Supply Voltage	V_{BATT}	–0.3	—	7.0	V
Power Control Voltage	V_{RAMP}	–0.3	—	V_{BATT}	V
PA Bias Voltage	V_{BIAS}	–0.3	—	V_{BATT}	V
Transmit enable	EN	–0.3	—	V_{BATT}	V
Band select	BS	–0.3	—	V_{BATT}	V
Mode select	MODE	–0.3	—	V_{BATT}	V

Table 2. SKY77340 Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Transmit Duty Cycle[1]	D_{TX}	1/8	—	1/2	—
Case Operating Temperatures [1]					
1-Slot (12.5% duty cycle)		–25		100	
2-Slot (25% duty cycle)	(T_{RANGE})	–25		100	°C
3-Slot (37.5% duty cycle)		–25		85	
4-Slot (50% duty cycle)		–25		85	
Voltage Operating Range	V_{RANGE}	3.0	3.5	4.8	V

[1] T_{FRAME} = 4.615 mS

Table 3. SKY77340 Control Logic

Operational State	EN	BS	MODE	NOTES
Standby	0	X	X	X = don't care
Low band GMSK	1	0	0	V_{RAMP} controls output power
Low band EDGE	1	0	1	V_{BIAS} sets PA bias condition, fixed gain PA
High band GMSK	1	1	0	V_{RAMP} controls output power
High band EDGE	1	1	1	V_{BIAS} sets PA bias condition, fixed gain PA

Table 4. SKY77340 Electrical Specifications (1 of 17)

General							
Parameter		**Symbol**	**Test Condition**	**Minimum**	**Typical**	Maximum	Units
Supply voltage		V_{BATT}	—	3.0	3.5	4.8	V
Analog power control impedance		Z_{RAMP}	—		200	—	kΩ
Analog PA bias control impedance		Z_{BIAS}	—	—	200	—	kΩ
ENable	Control voltage LOW Control voltage HIGH	V_{EN}	—	0.0 1.5	— —	0.5 V_{BATT}	V
ENable current		I_{EN}	—	---	—	30	µA
Band select	Control voltage LOW Control voltage HIGH	V_{BS}	—	0.0 1.5	— —	0.5 V_{BATT}	V
Band select current		I_{BS}	—		—	30	µA
MODE		V_{MODE}	GMSK EDGE	0.0 1.5	— —	0.5 V_{BATT}	V
		I_{MODE}	$V_{MODE} \leq 2.7$ V	—	—	30	µA
“Off“ Current		I_{OFF}	Sum Current on all pins $V_{BATT} = 3.5$ V EN ≤ 0.1 V $V_{RAMP} \leq 0.1$ V MODE ≤ 0.1 V Temp = 25 °C	—	—	30	µA
“On” Current		$I_{BATT\ MAX}$		—	—	2.2	A

Table 4. SKY77340 Electrical Specifications (2 of 17)

Mode: Transmit GMSK and EDGE [1] Band: CEL						
General Test Conditions						
Frequency = 824-849 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Output Power	P_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C –1 dBm ≤ P_{IN} ≤ 6 dBm	34.5	35.1	—	dBm
	P_{GSM_EX-L}	V_{CC} = 3.0 V T_{CASE} = T_{RANGE} –1 dBm ≤ P_{IN} ≤ 6 dBm	32.0	33.7	—	
	P_{GSM_EX-H}	V_{CC} = 4.8 V T_{CASE} = T_{RANGE} –1 dBm ≤ P_{IN} ≤ 6 dBm	34.5	35.9	—	
	P_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = P_{IN} + G_{EDGE}	28.5	—	—	
	P_{EDGE_EX}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	26.0	—	—	
Linear Gain	G_{EDGE}	V_{CC} = 3.5 V V_{BIAS} = 1.4 V P_{OUT} = P_{EDGE} T_{CASE} = 25 °C MODE = HIGH Load = 50 ohms	31.5	33.0	34.5	dB
		V_{CC} = 3.0 V < V_{BATT} < 4.8 V V_{BIAS} = 1.4 V P_{OUT} = P_{EDGE} T_{CASE} = T_{RANGE} MODE = HIGH Load VSWR ≤ 3:1 all phase angles	27.0	33.0	36.0	
	G_{VAR}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} MODE = HIGH	—	–0.034	—	dB/C
Power Added Efficiency	PAE_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C V_{RAMP} = 1.6 V P_{IN} = 3 dBm	49	54	—	%
	PAE_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 28.5 dBm	20	23	—	
Low Power Current Consumption	$I_{GSM\_LOW\_POWER}$	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 6.5 dBm	—	116	130	mA
	$I_{EDGE\_LOW\_POWER}$	V_{CC} = 3.5 V V_{BIAS} = 0.3 V T_{CASE} = 25 °C P_{OUT} = 6.5 dBm	—	120	—	

Table 4. SKY77340 Electrical Specifications (3 of 17)

Mode: Transmit GMSK and EDGE [1] Band: CEL [continued}							
General Test Conditions							
Frequency = 824-849 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Noise Power	20 MHz Offset	N_XS_{AT}	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–85.0	–83.5	dBm
		N_XL_{IN}	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–84.0	–83.5	
	1930 to 1990 MHz	N_XS_{AT} _PCS	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–100.0	–84.0	
		N_XL_{IN} _PCS	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–100.0	–84.0	
Forward Isolation		I_{SO}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{IN} \leq$ 6 dBm EN = 0	—	–40	–30	dBm
Crossover Isolation	Fundamental	I_{SO}_CEL	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	–10	0	dBm
	2nd Harmonic	I_{SO}_DCS	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	–30	–20	
Input VSWR		VSWR_SAT	6.5 dBm $\leq P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	1.8	2.25	Ratio
		VSWR_LIN	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{OUT} \leq P_{EDGE}$	—	1.2	2.0	
Harmonics		$2f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–25	–10	dBm
		$3f_0$ to $15f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–25	–17	

Table 4. SKY77340 Electrical Specifications (4 of 17)

Mode: Transmit GMSK and EDGE [1] Band: CEL [continued]							
General Test Conditions							
Frequency = 824-849 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Adjacent Channel Leakage	ACPR1		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ V_{CC} = 3.5 V T_{CASE} = 25 °C MODE = HIGH Offset = ±200 kHz Load = 50 Ohms	—	–37	–33	dBc
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ MODE = HIGH Offset = ±200 kHz Load VSWR ≤ 3:1, all phase angles	—	–35	—	
	ACPR2		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ V_{CC} = 3.5 V T_{CASE} = 25 °C MODE = HIGH Offset = ±400 kHz Load = 50 Ohms	—	–60	–58	
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ MODE = HIGH Offset = ±400 kHz Load VSWR ≤ 3:1, all phase angles	—	–57	—	
	ACPR3		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ V_{CC} = 3.5 V T_{CASE} = 25 °C MODE = HIGH Offset = ±600 kHz Load = 50 Ohms	—	–77	–63	
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ MODE = HIGH Offset = ±600 kHz Load VSWR ≤ 3:1, all phase angles	—	–65	—	
	ACPR4		RBW = 100 kHz $P_{OUT} \leq P_{EDGE}$ V_{CC} = 3.5 V T_{CASE} = 25 °C MODE = HIGH Offset = ±1.8 MHz Load = 50 Ohms	—	–81	–66	
			RBW = 100 kHz $P_{OUT} \leq P_{EDGE\_EX}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ MODE = HIGH Offset = ±1.8 MHz Load VSWR ≤ 3:1, all phase angles	—	–75	—	

Table 4. SKY77340 Electrical Specifications (5 of 17)

Mode: Transmit GMSK and EDGE [1] ***Band: CEL*** {continued}						
General Test Conditions						
Frequency = 824-849 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Error Vector Magnitude	EVM1	V_{CC} = 3.5 V T_{CASE} = 25 °C RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ Load = 50 Ω	—	1.5	5.0	%
	EVM2	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ Load VSWR ≤ 3:1 , all phase angles	—	3.0	9.0	
Stability (all spurious)		$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ 6.5 dBm ≤ $P_{OUT} \leq P_{GSM}$ Load VSWR = 8:1, all phase angles	—	—	–36	dBm
Ruggedness		V_{CC} = 4.8 V $T_{CASE} = T_{RANGE}$ P_{OUT} = PGSM P_{IN} = 6 dBm Load VSWR = 10:1, all phase angles	No degradation No damage			
Mode Switching Time (Time does not include loop lock time [pedestal] for GMSK PAC operation.)	τ_{MODE}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$		2	4	µS

[1] All specifications related to modulated waveforms are for the EDGE waveform (i.e., EVM/ ACPR).

Table 4. SKY77340 Electrical Specifications (6 of 17)

Mode: Transmit GMSK and EDGE [1] Band: EGSM						
General Test Conditions						
Frequency = 880-915 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Output Power	P_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C –1 dBm ≤ P_{IN} ≤ 6 dBm	34.5	34.9	—	dBm
	P_{GSM_EX-L}	V_{CC} = 3.0 V T_{CASE} = T_{RANGE} –1 dBm ≤ P_{IN} ≤ 6 dBm	32.0	33.4	—	
	P_{GSM_EX-H}	V_{CC} = 4.8 V T_{CASE} = T_{RANGE} –1 dBm ≤ P_{IN} ≤ 6 dBm	34.5	35.5	—	
	P_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = P_{IN} + G_{EDGE}	28.5	—	—	
	P_{EDGE_EX}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	26.0	—	—	
Linear Gain	G_{EDGE}	V_{CC} = 3.5 V V_{BIAS} = 1.4 V P_{OUT} = P_{EDGE} T_{CASE} = 25 °C MODE = HIGH Load = 50 ohms	31.5	33.0	34.5	dB
		V_{CC} = 3.0 V < V_{BATT} < 4.8 V V_{BIAS} = 1.4 V P_{OUT} = P_{EDGE} T_{CASE} = T_{RANGE} MODE = HIGH Load VSWR ≤ 3:1 all phase angles	27.0	33.0	36.0	
	G_{VAR}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} MODE = HIGH	—	–0.034	—	dB/C
Power Added Efficiency	PAE_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C V_{RAMP} = 1.6 V P_{IN} = 3 dBm	49	53	—	%
	PAE_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 28.5 dBm	20	23	—	
Low Power Current Consumption	$I_{GSM\_LOW\_POWER}$	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 6.5 dBm	—	110	130	mA
	$I_{EDGE\_LOW\_POWER}$	V_{CC} = 3.5 V V_{BIAS} = 0.3 V T_{CASE} = 25 °C P_{OUT} = 6.5 dBm	—	120	—	

Table 4. SKY77340 Electrical Specifications (7 of 17)

Mode: Transmit GMSK and EDGE [1] Band: EGSM [continued}							
General Test Conditions							
Frequency = 880-915 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Noise Power	20 MHz Offset	N_xS_{AT}	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–86.0	–83.5	dBm
		N_xL_{IN}	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–84.0	–83.5	
	10 MHz Offset	N_xS_{AT}_10 MHz	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–86.0	–76.0	
		N_xL_{IN} _10 MHz	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–84.0	–78.0	
	1805 to 1880 MHz	N_xS_{AT} _DCS	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–100.0	–84.0	
		N_xL_{IN} _DCS	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–100.0	–84.0	
Forward Isolation		I_{SO}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{IN} \leq 6$ dBm EN = 0	—	–40	–30	dBm
Crossover Isolation	Fundamental	I_{SO}_EGSM-DCS	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	—	0	dBm
	2nd Harmonic		$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	—	–20	
Input VSWR		VSWR_SAT	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ 6.5 dBm $\leq P_{OUT} \leq P_{GSM}$	—	1.7	2.25	Ratio
		VSWR_LIN	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{OUT} \leq P_{EDGE}$	—	1.5	2.0	

Table 4. SKY77340 Electrical Specifications (8 of 17)

Mode: Transmit GMSK and EDGE [1] Band: EGSM [continued}							
General Test Conditions							
Frequency = 880-915 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Harmonics		$2f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–20	–10	dBm
		$3f_0$ to $15f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–25	–17	
Adjacent Channel Leakage	ACPR1		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Offset = ±200 kHz Load = 50 Ohms	—	–36	–33	dBc
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Offset = ±200 kHz Load VSWR ≤ 3:1, all phase angles	—	–35	—	
	ACPR2		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Offset = ±400 kHz Load = 50 Ohms	—	–60	–58	
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Offset = ±400 kHz Load VSWR ≤ 3:1, all phase angles	—	–57	—	

Table 4. SKY77340 Electrical Specifications (9 of 17)

Mode: Transmit GMSK and EDGE [1] ***Band: EGSM*** [continued}							
General Test Conditions							
Frequency = 880-915 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 0		RF Ports = GSM_IN, GSM_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Adjacent Channel Leakage [continued]	ACPR3		RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Offset = ±600 kHz Load = 50 Ohms	—	–77	–63	
			RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Offset = ±600 kHz Load VSWR ≤ 3:1, all phase angles	—	–65	—	
	ACPR4		RBW = 100 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Offset = ±1.8 MHz Load = 50 Ohms	—	–81	–66	
			RBW = 100 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Offset = ±1.8 MHz Load VSWR ≤ 3:1, all phase angles	—	–75	—	
Error Vector Magnitude		EVM1	RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Load = 50 Ω	—	1.5	5.0	%
		EVM2	RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR ≤ 3:1 , all phase angles	—	3.0	9.0	
Stability (all spurious)			6.5 dBm ≤ $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR = 8:1, all phase angles	—	—	–36	dBm
Ruggedness			P_{OUT} = PGSM P_{IN} = 6 dBm V_{CC} = 4.8 V $T_{CASE} = T_{RANGE}$ Load VSWR = 10:1, all phase angles	No degradation No damage			
Mode Switching Time (Time does not include loop lock time [pedestal] for GMSK PAC operation.)		τ_{MODE}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$		2	4	µS

[1] All specifications related to modulated waveforms are for the EDGE waveform (i.e., EVM/ ACPR).

Table 4. SKY77340 Electrical Specifications (10 of 17)

Mode: Transmit GMSK and EDGE [1] Band: DCS						
General Test Conditions						
Frequency = 1710-1785 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Output Power	P_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C 0 dBm ≤ P_{IN} ≤ 6 dBm	32.5	33.5	—	dBm
	P_{GSM_EX-L}	V_{CC} = 3.0 V T_{CASE} = T_{RANGE} 0 dBm ≤ P_{IN} ≤ 6 dBm	29.0	32.0	—	
	P_{GSM_EX-H}	V_{CC} = 4.8 V T_{CASE} = T_{RANGE} 0 dBm ≤ P_{IN} ≤ 6 dBm	29.0	34.2	—	
	P_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C Pout = P_{IN} + GEDGE	27.3	—	—	
	P_{EDGE_EX}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	25.0	—	—	
Linear Gain	G_{EDGE}	V_{CC} = 3.5 V V_{BIAS} = 1.3 V P_{OUT} = P_{EDGE} T_{CASE} = 25 °C MODE = HIGH Load = 50 ohms	33.0	34.8	36.0	dB
		V_{CC} = 3.0 V < V_{BATT} < 4.8 V V_{BIAS} = 1.3 V P_{OUT} = P_{EDGE} T_{CASE} = T_{RANGE} MODE = HIGH Load VSWR ≤ 3:1 all phase angles	28.0	34.8	38.0	
	G_{VAR}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} MODE = HIGH	—	–0.025	—	dB/C
Power Added Efficiency	PAE_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C V_{RAMP} = 1.6 V P_{IN} = 3 dBm	48	52	—	%
	PAE_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 27.3 dBm	20	25	—	
Low Power Current Consumption	$I_{GSM\_LOW\_POWER}$	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 1.5 dBm	—	80	100	mA
	$I_{EDGE\_LOW\_POWER}$	V_{CC} = 3.5 V V_{BIAS} = 0.4 V T_{CASE} = 25 °C P_{OUT} = 1.5 dBm	—	110	—	

Table 4. SKY77340 Electrical Specifications (11 of 17)

Mode: Transmit GMSK and EDGE [1] Band: DCS [continued]							
General Test Conditions							
Frequency = 1710-1785 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Noise Power	20 MHz Offset	NxSAT	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–82	–80	dBm
		NxLIN	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–82	–80	
	925 to 960 MHz	NxSAT_EGSM	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–88	–84	
		NxLIN_EGSM	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–86	–84	
Forward Isolation		ISO	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{IN} \leq 6$ dBm EN = 0	—	–33	–30	dBm
Crossover Isolation	Fundamental	ISO_DCS-EGSM	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	–17	–10	dBm
Input VSWR		VSWR_SAT	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ 1.5 dBm $\leq P_{OUT} \leq P_{GSM}$	—	1.5	2.25	Ratio
		VSWR_LIN	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{OUT} \leq P_{EDGE}$	—	1.2	2.0	
Harmonics		$2f_0$ to $4f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–25	–10	dBm
		$5f_0$ to $7f_0$	Measured at GSM_OUT $P_{OUT} \leq P_{GSM}V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	—	–17	

Table 4. SKY77340 Electrical Specifications (12 of 17)

Mode: Transmit GMSK and EDGE [1] Band: DCS [continued]							
General Test Conditions							
Frequency = 1710-1785 MHz Pulse Rate = 12.5% Duty Cycle		TFRAME = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS _OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Adjacent Channel Leakage	ACPR1		RBW = 30 kHz POUT ≤ PEDGE VCC = 3.5 V TCASE = 25 °C Offset = ±200 kHz Load = 50 Ohms	—	–36	–33	dBc
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±200 kHz Load VSWR ≤ 3:1, all phase angles	—	–30	—	
	ACPR2		RBW = 30 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±400 kHz Load = 50 Ohms	—	–60	–57	
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±400 kHz Load VSWR ≤ 3:1, all phase angles	—	–55	—	
	ACPR3		RBW = 30 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±600 kHz Load = 50 Ohms	—	–75	–63	
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±600 kHz Load VSWR ≤ 3:1, all phase angles	—	–65	—	
	ACPR4		RBW = 100 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±1.8 MHz Load = 50 Ohms	—	–77	–66	
			RBW = 100 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±1.8 MHz Load VSWR ≤ 3:1, all phase angles	—	–77	—	

Table 4. SKY77340 Electrical Specifications (13 of 17)

Mode: Transmit GMSK and EDGE [1] ***Band: DCS*** {continued}						
General Test Conditions						
Frequency = 1710-1785 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS _OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Error Vector Magnitude	EVM1	RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 °C Load = 50 Ω	—	1.9	5.0	%
	EVM2	RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR ≤ 2.5:1 , all phase angles	—	6.0	9.0	
Stability (all spurious)		1.5 dBm ≤ $P_{OUT} \leq P_{GSM}$ $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR = 8:1, all phase angles	—	—	–36	dBm
Ruggedness		P_{OUT} = PGSM P_{IN} = 6 dBm V_{CC} = 4.8 V $T_{CASE} = T_{RANGE}$ Load VSWR = 10:1, all phase angles	No degradation No damage			
Mode Switching Time (Time does not include loop lock time [pedestal] for GMSK PAC operation.)	τ_{MODE}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$		2	4	µS

[1] All specifications related to modulated waveforms are for the EDGE waveform (i.e., EVM/ACPR).

Table 4. SKY77340 Electric3al Specifications (14 of 17)

Mode: Transmit GMSK and EDGE [1] Band: PCS						
General Test Conditions						
Frequency = 1850-1910 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Output Power	P_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C 0 dBm≤ P_{IN} ≤ 6 dBm	32.5	33.2	—	dBm
	P_{GSM_EX-L}	V_{CC} = 3.0 V T_{CASE} = T_{RANGE} 0 dBm≤ P_{IN} ≤ 6 dBm	29.0	32.0	—	
	P_{GSM_EX-H}	V_{CC} = 4.8 V T_{CASE} = T_{RANGE} 0 dBm≤ P_{IN} ≤ 6 dBm	29.0	34.0	—	
	P_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C Pout = P_{IN} + G_{EDGE}	27.3	—	—	
	P_{EDGE_EX}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	25.0	—	—	
Linear Gain	G_{EDGE}	V_{CC} = 3.5 V V_{BIAS} = 1.3 V P_{OUT} = P_{EDGE} T_{CASE} = 25 °C MODE = HIGH Load = 50 ohms	33.0	35.0	36.0	dB
		V_{CC} = 3.0 V < V_{BATT} < 4.8 V V_{BIAS} = 1.3 V P_{OUT} = P_{EDGE} T_{CASE} = T_{RANGE} MODE = HIGH Load VSWR ≤ 3:1 all phase angles	28.0	35.0	38.0	
	G_{VAR}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} MODE = HIGH	—	–0.025	—	dB/C
Power Added Efficiency	PAE_{GSM}	V_{CC} = 3.5 V T_{CASE} = 25 °C V_{RAMP} = 1.6 V P_{IN} = 3 dBm	48	52	—	%
	PAE_{EDGE}	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 27.3 dBm	20	25	—	
Low Power Current Consumption	$I_{GSM\_LOW\_POWER}$	V_{CC} = 3.5 V T_{CASE} = 25 °C P_{OUT} = 1.5 dBm	—	80	100	mA
	$I_{EDGE\_LOW\_POWER}$	V_{CC} = 3.5 V V_{BIAS} = 0.4 V T_{CASE} = 25 °C P_{OUT} = 1.5 dBm	—	110	—	

Table 4. SKY77340 Electrical Specifications (15 of 17)

Mode: Transmit GMSK and EDGE [1] Band: PCS [continued]							
General Test Conditions							
Frequency = 1850-1910 MHz Pulse Rate = 12.5% Duty Cycle		T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Noise Power	20 MHz Offset	$N_{x}S_{AT}$	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–82	–80	dBm
		$N_{x}L_{IN}$	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–82	–80	
	869 to 894 MHz	$N_{x}S_{AT}$_CEL	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{GSM}$ RBW = 100 kHz	—	–88	–84	
		$N_{x}L_{IN}$_CEL	V_{CC} = 3.5 V T_{CASE} = 25 °C $P_{OUT} \leq P_{EDGE}$ RBW = 100 kHz	—	–86	–84	
Forward Isolation		I_{SO}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{IN} \leq$ 6 dBm EN = 0	—	–33	–30	dBm
Crossover Isolation	Fundamental	I_{SO}_PCS–EGSM	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$	—	—	–10	dBm
Input VSWR		VSWR_S_{AT}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ 1.5 dBm $\leq P_{OUT} \leq P_{GSM}$	—	2.1	2.25	Ratio
		VSWR_L_{IN}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ $P_{OUT} \leq P_{EDGE}$	—	1.5	2.0	
Harmonics		$2f_0$ to $3f_0$	Measured at DCS/PCS_OUT P_{OUT_RANGE} $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–10	–7	dBm
		$4f_0$	Measured at DCS/PCS_OUT P_{OUT_RANGE} $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–11	–5	
		$5f_0$ to $7f_0$	Measured at DCS/PCS _OUT P_{OUT_RANGE} $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load = 50 ohms	—	–30	–17	

Table 4. SKY77340 Electrical Specifications (16 of 17)

Mode: Transmit GMSK and EDGE [1] Band: PCS [continued}							
General Test Conditions							
Frequency = 1850-1910 MHz Pulse Rate = 12.5% Duty Cycle		TFRAME = 4.615 mS Control States: EN = 1, BS =1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter		**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Adjacent Channel Leakage	ACPR1		RBW = 30 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±200 kHz Load = 50 Ohms	—	–36	–33	dBc
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±200 kHz Load VSWR ≤ 3:1, all phase angles	—	–30	—	
	ACPR2		RBW = 30 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±400 kHz Load = 50 Ohms	—	–60	–57	
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±400 kHz Load VSWR ≤ 3:1, all phase angles	—	–55	—	
	ACPR3		RBW = 30 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 °C Offset = ±600 kHz Load = 50 Ohms	—	–75	–63	
			RBW = 30 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±600 kHz Load VSWR ≤ 3:1, all phase angles	—	–65	—	
	ACPR4		RBW = 100 kHz POUT ≤ PEDGE MODE = HIGH VCC = 3.5 V TCASE = 25 ° C Offset = ±1.8 MHz Load = 50 Ohms	—	–77	–66	
			RBW = 100 kHz POUT ≤ PEDGE_EX MODE = HIGH VCC = VRANGE TCASE = TRANGE Offset = ±1.8 MHz Load VSWR ≤ 3:1, all phase angles	—	–77	—	

Table 4. SKY77340 Electrical Specifications (17 of 17)

Mode: Transmit GMSK and EDGE [1] ***Band: PCS*** [continued}						
General Test Conditions						
Frequency = 1850-1910 MHz Pulse Rate = 12.5% Duty Cycle	T_{FRAME} = 4.615 mS Control States: EN = 1, BS = 1		RF Ports = DCS/PCS_IN, DCS/PCS_OUT			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
Error Vector Magnitude	EVM1	RBW = 30 kHz $P_{OUT} \leq P_{EDGE}$ MODE = HIGH V_{CC} = 3.5 V T_{CASE} = 25 C Load = 50 Ω	—	1.9	5.0	%
	EVM2	RBW = 30 kHz $P_{OUT} \leq P_{EDGE\_EX}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR ≤ 2.5:1 , all phase angles	—	6.0	9.0	
Stability (all spurious)		1.5 dBm ≤ $P_{OUT} \leq P_{GSM}$ MODE = HIGH $V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$ Load VSWR = 8:1, all phase angles	—	—	–36	dBm
Ruggedness		P_{OUT} = PGSM P_{IN} = 6 dBm V_{CC} = 4.8 V $T_{CASE} = T_{RANGE}$ Load VSWR = 10:1, all phase angles	No degradation No damage			
Mode Switching Time (Time does not include loop lock time [pedestal] for GMSK PAC operation.)	τ_{MODE}	$V_{CC} = V_{RANGE}$ $T_{CASE} = T_{RANGE}$		2	4	µS

[1] All specifications related to modulated waveforms are for the EDGE waveform (i.e., EVM/ACPR).

Table 5. SKY77340 Functional Specifications – GMSK PA Control Operation (1 of 4)

Mode: Closed Loop PA Control (GMSK Mode) Band: CEL & EGSM						
General Test Conditions						
Frequency = 824-849 MHz & 880-915 MHz	Pulse Rate = 12.5% Duty Cycle, T_{FRAME} = 4.615 mS		Control States: EN = 1,MODE = 0, BS = 0, V_{BIAS} = don't care V_{RAMP} = active			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
V_{RAMP} Input Voltage	V_{RAMP}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} 6.5 dBm ≤ P_{OUT} ≤ 34.5 dBm	0.2	—	1.6	V
Dynamic Range		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	37.0	40.0	—	dB
Tolerance		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} P_{OUT} = 6.5 dBm	–4.0	—	3.0	dB
		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} P_{OUT} = 34.5 dBm	–3.0	—	2.0	
Power Control Slope	P_{CS}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} 6.5 dBm ≤ P_{OUT} ≤ 34.5 dBm	—	—	250.0	dB/V
PAC Loop Enable Time	τ_{EN}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} After EN transitions LOW ≥ HIGH	—	1	2	µS
Minimum Pedestal Duration	τ_{PED}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} 6.5 dBm ≤ P_{OUT} ≤ 34.5 dBm	—	2	—	µS

Note:
Response is monotonic over frequency, temperature, and P_{OUT}

Table 5. SKY77340 Functional Specifications – EDGE PA Control Operation (2 of 4)

Mode: Open Loop, Fixed PA Gain (EDGE Mode) Band: CEL & EGSM						
General Test Conditions						
Frequency = 824-849 MHz & 880-915 MHz	Pulse Rate = 12.5% Duty Cycle, T_{FRAME} = 4.615 mS		Control States: EN = 1, MODE = 1, BS = 0, V_{RAMP} = don't care, V_{BIAS} = active			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
V_{BIAS} Input Voltage	V_{BIAS}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} POUT = 28.5 dBm EVM1 ≤ 5% ACPR2 ≤ 58 dBc Gain = G_{EDGE}	—	1.4	1.6	V

Table 5. SKY77340 Functional Specifications – GMSK PA Control Operation (3 of 4)

Mode: Closed Loop PA Control (GMSK Mode) Band: DCS & PCS						
General Test Conditions						
Frequency = 1710-1785 MHz & 1850-1910 MHz	Pulse Rate = 25% Duty Cycle, T_{FRAME} = 4.615 mS		Control States: EN = 1,MODE = 0, BS = 1, V_{BIAS} = don't care, V_{RAMP} = active			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
V_{RAMP} Input Voltage	V_{RAMP}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} 1.5 dBm ≤ P_{OUT} ≤ 32.5 dBm	0.2	—	1.6	V
Dynamic Range		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE}	32.0	35.0	—	dB
Tolerance		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} P_{OUT} = 1.5 dBm	–5.0	—	4.0	dB
		V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} P_{OUT} = 32.5 dBm	–3.0	—	2.0	
Power Control Slope	P_{CS}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} 1.5 dBm ≤ P_{OUT} ≤ 32.5 dBm	—	—	250	dB/V
PAC Loop Enable Time	τ_{EN}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} After EN transitions LOW ≥ HIGH	—	1	2	µS
Minimum Pedestal Duration	τ_{PED}	V_{CC} = V_{RANGE} T_{CASE} = T_{RANGE} 1.5 dBm ≤ P_{OUT} ≤ 32.5 dBm	—	2.0	—	µS

Note:
Response is monotonic over frequency, temperature, and P_{OUT}

Table 5. SKY77340 Functional Specifications – EDGE PA Control Operation (4 of 4)

Mode: Open Loop, Fixed PA Gain (EDGE Mode) Band: DCS & PCS						
General Test Conditions						
Frequency = 1710-1785 MHz & 1850-1910 MHz	Pulse Rate = 25% Duty Cycle, T_{FRAME} = 4.615 mS		Control States: EN = 1, MODE = 1, BS = 1, V_{RAMP} = don't care, V_{BIAS} = active			
Parameter	**Symbol**	**Condition**	**Minimum**	**Typical**	**Maximum**	**Unit**
V_{BIAS} Input Voltage	V_{BIAS}	V_{CC} = 3.5 V T_{CASE} = T_{RANGE} POUT = 27.3 dBm EVM1 ≤ 5% ACPR2 ≤ 58 dBc Gain = G_{EDGE}	—	1.3	1.6	V

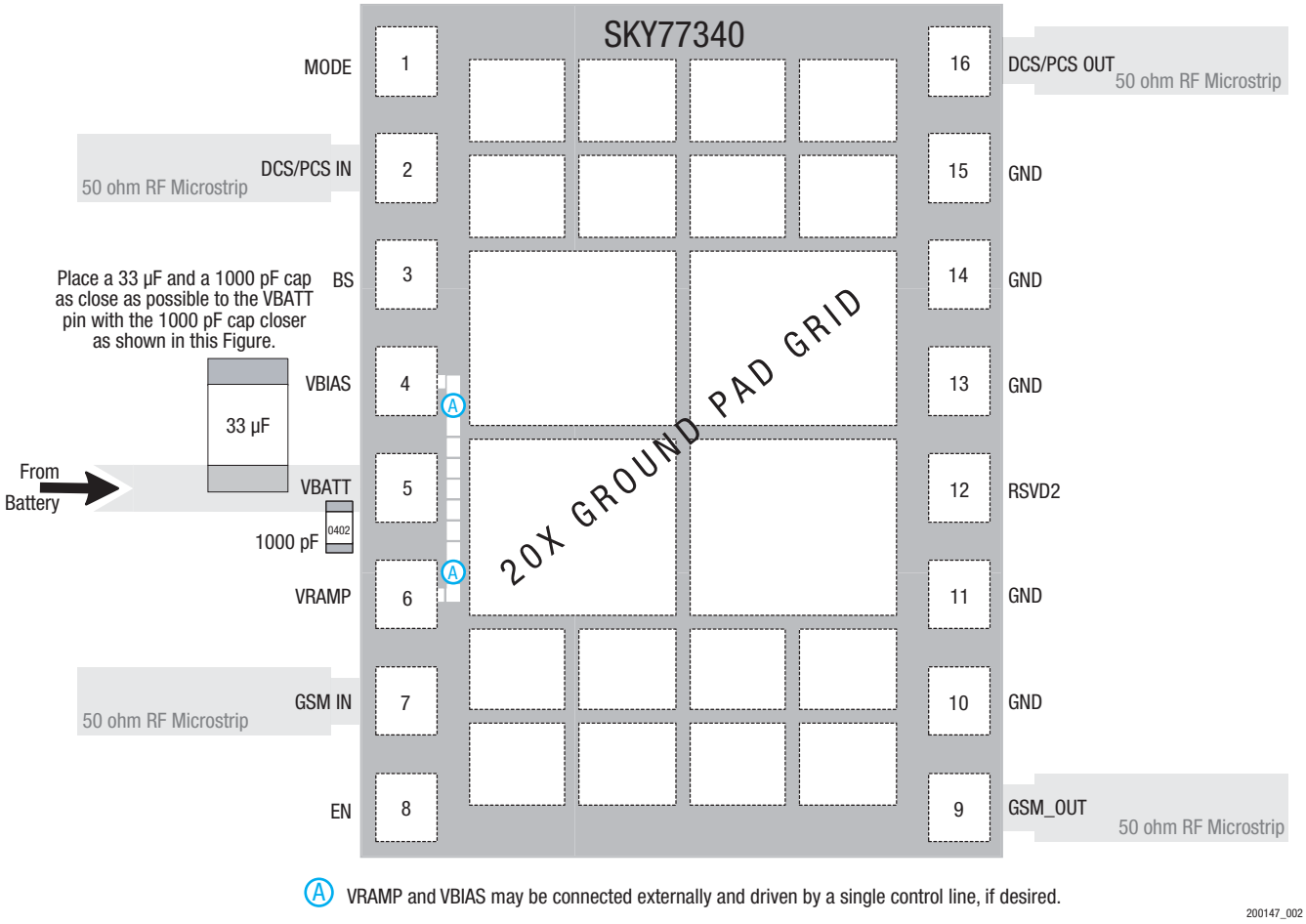
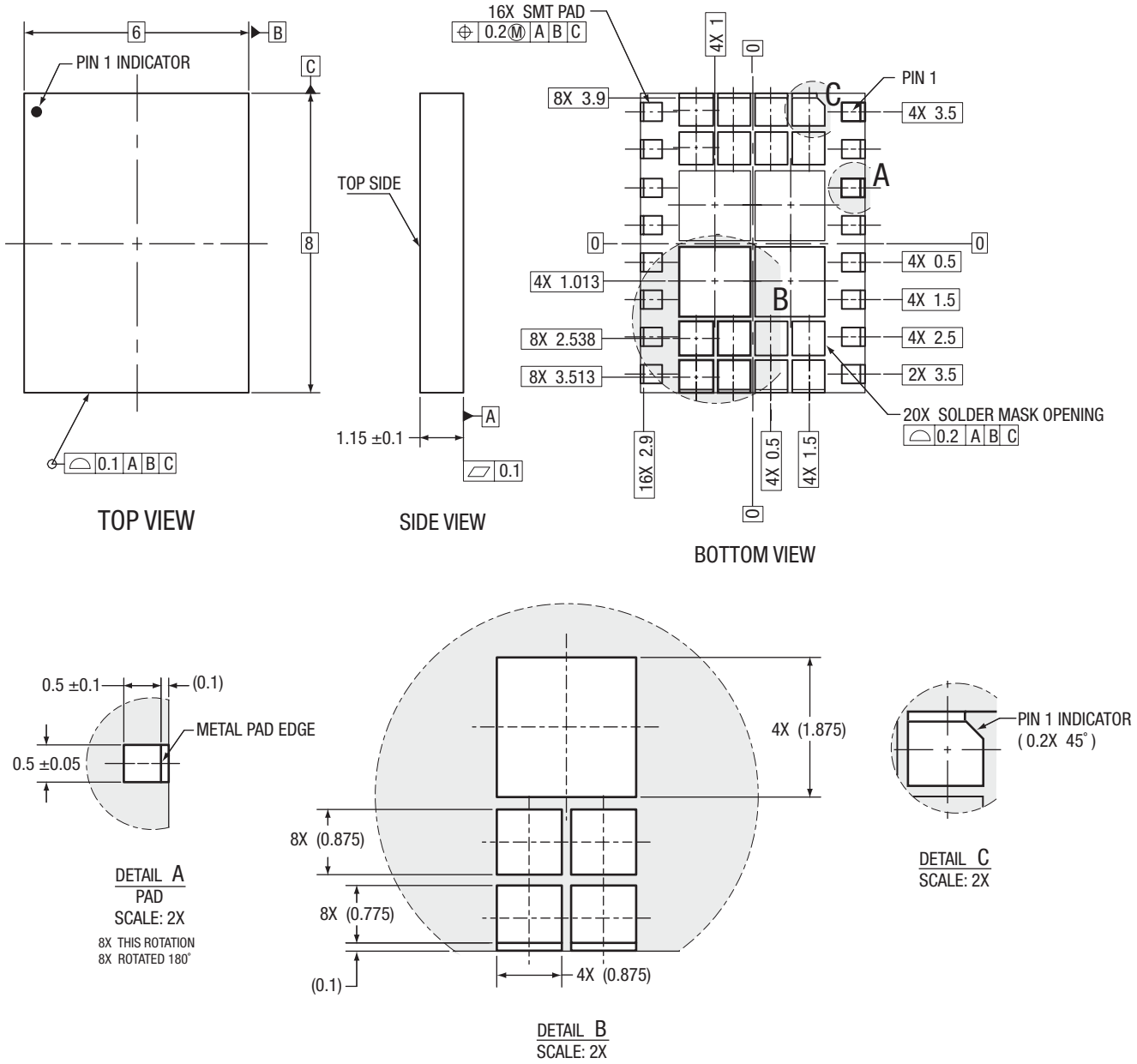


Figure 2. Typical SKY77340 Application Circuit

Package Dimensions and Pin Descriptions

Figure 3 is a mechanical diagram of the pad layout for the SKY77340, a 16-pin leadless quad-band PA module. Figure 4 provides a recommended phone board layout footprint for the PAM to help the designer attain optimum thermal conductivity, good grounding, and minimum RF discontinuity for the 50-ohm terminals.

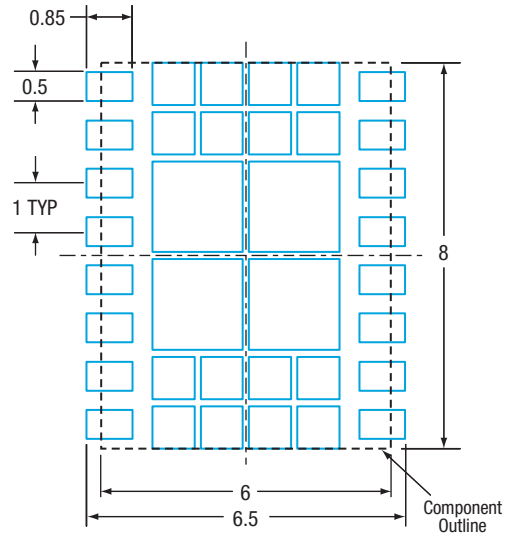
Figure 5 shows the device pin configuration and numbering convention, which starts with pin 1 at the upper left, as indicated, and increments counter-clockwise around the package. Table 6 lists the pin names and signal descriptions. Figure 6 interprets typical Case Markings.



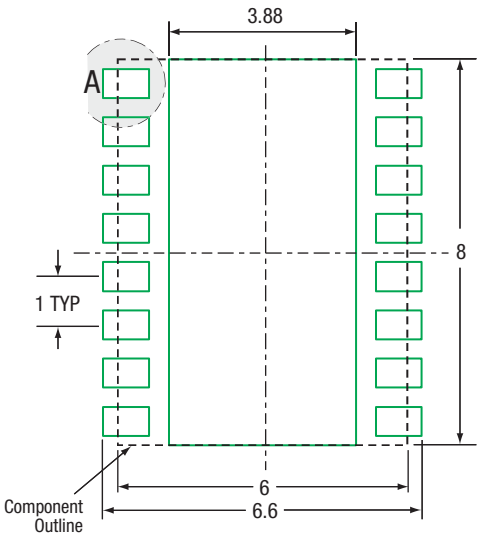
NOTES: Unless otherwise specified.
1. Dimensioning and Tolerancing in accordance with ASME Y14.5M–1994.
2. Pads are solder mask defined on 3 edges.

200147_003

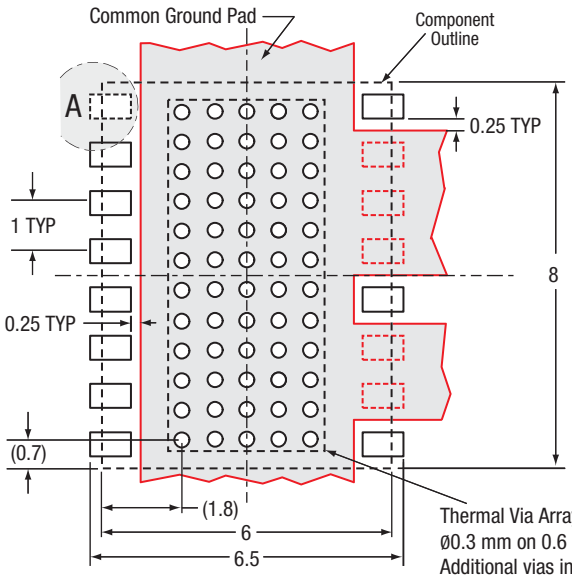
Figure 3. SKY77340 16-Pin MCM Package Dimensional Drawing



STENCIL APERTURE
TOP VIEW
(0–20% reduction of openings
for Center Ground Pads by area.
Shown same as package footprint.)

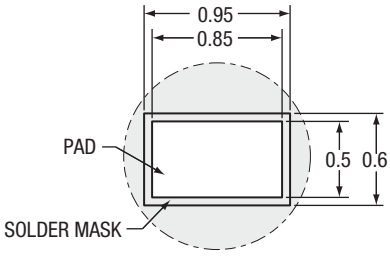


SOLDER MASK OPENING
TOP VIEW



METALLIZATION
TOP VIEW

Thermal Via Array (12 rows x 5 columns)
ø0.3 mm on 0.6 mm Pitch
Additional vias in Common Ground Pad
will improve thermal performance.
NOTE: Thermal vias should be
tented and filled with solder
mask 30-35 µm Cu plating recommended.



DETAIL A
16X

ALL DIMENSIONS IN MILLIMETERS

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Figure 4. Phone Board Layout Footprint for 6 x 8 mm Package – SKY77340 Specific

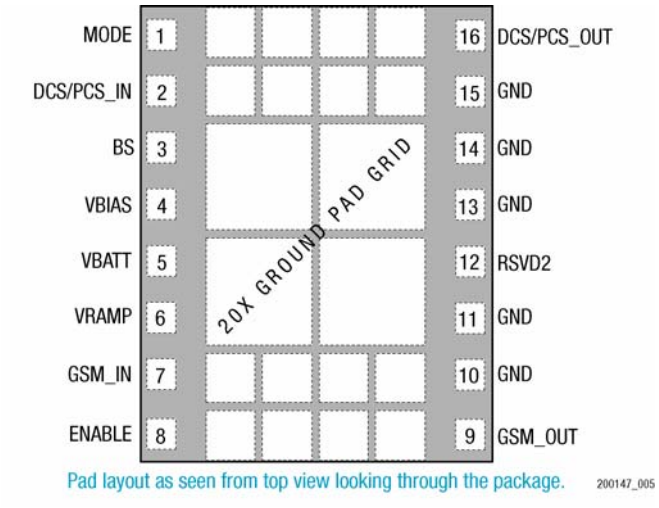

Figure 5. SKY77340 Pin Configuration (Top View)

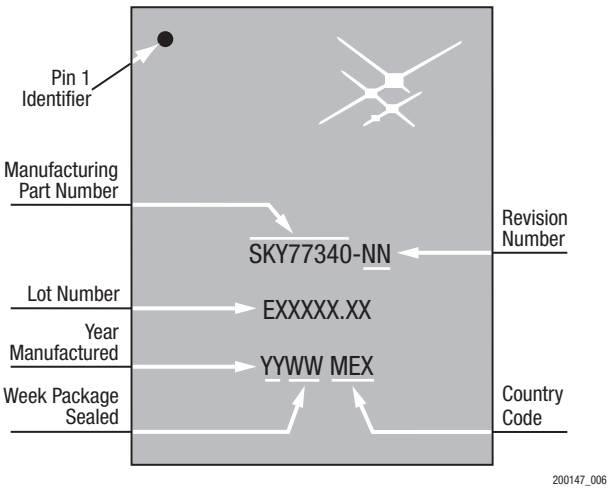

Figure 6. Typical Case Markings

Table 6. SKY77340 Pin Names and Signal Descriptions

Pad	Name	Description
1	MODE	GMSK/EDGE Power Control Mode: Low = GMSK, High = EDGE
2	DCS/PCS_IN	RF Input (DCS / PCS Bands) DC Blocked
3	BS	Band Select
4	VBIAS	Analog PA Bias Control (ALL BANDS, EDGE MODE)
5	VBATT	DC Supply
6	VRAMP	Analog Output Power Control (ALL BANDS, GMSK MODE)
7	GSM_IN	RF Input (CEL / EGSM Bands) DC Blocked
8	EN	Transmit Enable / Disable. Low = Disable
9	GSM_OUT	RF Output (CEL / EGSM Bands) DC Blocked
*12	RSVD2	Reserved
*16	DCS/PCS_OUT	RF Output (DCS / PCS Bands) DC Blocked
*10, 11, 13–15	GND	Ground
Pad	GND PAD GRID	Ground pad grid is device underside.

Package and Handling Information

Because of its sensitivity to moisture absorption, this device package is baked and vacuum-packed prior to shipment in accordance with IPC J-STD 033 guidelines. Instructions on the shipping container label are in accordance with IPC J-STD 020B regarding exposure to moisture after the container seal is broken. These instructions must be followed; otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY77340 is capable of withstanding an MSL3/250 °C solder reflow. Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. If the part is attached in a reflow oven, the temperature ramp rate should not exceed 3 °C per second; maximum temperature should not exceed 250 °C. If the part is manually attached, precaution should be taken to insure that the part is not subjected to temperatures exceeding 250 °C for more than 10 seconds. For details on attachment techniques, precautions, and handling procedures recommended by Skyworks, please refer to Skyworks Application Note: *PCB Design and SMT Assembly/Rework,* Document Number 101752. Additional information on standard SMT reflow profiles can also be found in the *JEDEC Standard J-STD–020*.

Production quantities of this product are shipped in the standard tape-and-reel format. For packaging details, refer to Skyworks Application Note: *Tape and Reel Information – RF Modules,* Document Number 101568.

Electrostatic Discharge Sensitivity

The SKY77340 is a Class 1 device. ESD testing was performed in compliance with JEDEC standards JESD22-A114 (Human Body Model), JESD22-A115 (Machine Model), and JESD22-C101 (Charged Device Model).

Various failure criteria can be utilized when performing ESD testing. Many vendors employ relaxed ESD failure standards, which fail devices only after "the pin fails the electrical specification limits" or "the pin becomes completely non-functional". Skyworks' most stringent criteria fail devices as soon as the pin begins to show any degradation on a curve tracer. To avoid ESD damage, both latent and visible, it is very important that the product assembly and test areas follow the Class-1 ESD handling precautions listed in Table 7.

Table 7. Precautions for Handling GaAs IC-based Products to Avoid ESD-Induced Damage

Personnel Grounding	Wrist Straps Conductive Smocks Gloves and Finger Cots Antistatic ID Badges
Facility	Relative Humidity Control and Air Ionizers Dissipative Floors (less than 10^9 Ω to GND)
Protective Workstation	Dissipative Table Tops Protective Test Equipment (Properly Grounded) Grounded Tip Soldering Irons Conductive Solder Suckers Static Sensors
Protective Packaging and Transportation	Bags and Pouches (Faraday Shield) Protective Tote Boxes (Conductive Static Shielding) Protective Trays Grounded Carts Protective Work Order Holders

Ordering Information

Model Number	Manufacturing Part Number	Product Revision	Package	Operating Temperature
SKY77340	SKY77340		6 x 8 x 1.2 mm	–25 °C to 85 °C

Revision History

Revision	Level	Date	Description
A		October 17, 2006	Initial Release

References

Application Note: Tape and Reel Information – RF Modules, Document Number 101568

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

JEDEC JESD22-A114 (Human Body Model)

JEDEC JESD22-A115 (Machine Model)

JEDEC JESD22-C101 (Charged Device Model)