2G/3G Operation Description

Model: NUGGET D5

Band：GSM850、GSM900、DCS1800、PCS1900、 WCDMA850、WCDMA1900、WCDMA2100

1. Scope

This document shows and provides the basic information about the platform we used.The more detail information about RF section are also included.

The product is new Pad designed by NTD. The baseband circuit is based on MTK MT6577 and RF section included Transceiver named MTK MT6162, SKY77590 go PA and PA.

at seven band GSM850、GSM900、DCS1800、PCS1900、WCDMA850、WCDMA1900、WCDMA2100

2. Platform MT6577

MT6577 is based on RF band support WCDMA+GSM. The package supports
dual-channel LPDDR2 using the PoP package and NAND flash device through EBI2 interface.

- Baseband functions, including multiple hardware cores
- Single platform that provides dedicated support for all market leading codecs and other multimedia formats to support carrier deployments around the word.
- High-quality digital still image camera performance with up to 5 -megapixel resolution
- HS-USB core with built-in PHY eliminates additional USB components
- DC power reduction using innovative technique
- Integrates multiple processors
- Supported memory busses (EBI0 and EBI1)

3. Transceiver MT6162

- radio One RF transceiver functions(Rx and Tx,both eliminating their inte
- WCDMA(Rel'99,HSDPA) and GSM(Rel'99,GPRS and EDGE)
- Wireless connectivity and analog functions-Bluetooth 3.0,FM radio, audio codec
- RF transmitters: a single analog baseband Tx input from the MSM device is shared by all the QTR transmit paths, Two quadrature upconverters, one translate the WCDMA850 Tx waveform directly to the desired RF band, the other GSM850/1900 transmitters implement the small signal polar configuration.
- RF receivers: supports GSM850/1900,WCDMA850 operation with primary receiver path, using a differential configuration to maximize common-mode rejection, Tx isolation, out-of-band suppression,and second-order intermodulation performance. There are three quadrature downconverters and three separate baseband interfaces to the MSM device.

4. PA SKY77590

SKY Linear EDGE PAM designed for use with the MTK MT6162 WEDGE solutions and compact form factor for quad-band cellular handsets con

Operating Parameters

Parameter		Symbol	Minimum	Nominal	Maximum	Unit
Input Power		P_{IN}	—	—	15	dBm
Supply Voltage ≤ 1 µs (measured to GND)		V_{BATT}	—	—	6	V
DC Continuous During Burst[1]		I_{BATT}	—	—	2.5	A
Burst Duty Cycle		D_B	—	—	50	%
Voltage Standing Wave Ratio		VSWR	—	—	20:1	V
Power Control Voltage		V_{RAMP}	−0.3	—	V_{BATT}	V
Transmit Enable Voltage		V_{TxEN}	−0.3	—	See Footnote[2]	V
Mode Control Voltage		V_{MODE}	−0.3	—	See Footnote[2]	V
Band Select Control Voltage		V_{BS1}, V_{BS2}	−0.3	—	See Footnote[2]	V
Temperatures	Operating	T_{CASE}	−30	—	+100	°C
	Storage	T_{STG}	−40	—	+150	
Moisture Sensitivity Level		MSL	—	—	3	
Reflow Solder Temperature (J-STD-020B)		T_{SOLDER}	260	—	—	°C

Modes of Operation

Mode	Input Control Bits			
	TxEN	MODE	BS1	BS2
Standby	0	0	0	0
LB_GMSK_Tx	1	0	0	1
HB_GMSK_Tx	1	0	1	1
LB_EDGE_Tx	1	1	0	1
HB_EDGE_Tx	1	1	1	1
TRx1	0	1	0	0
TRx2	0	1	1	0
TRx3	0	1	0	1
TRx4	0	1	1	1
TRx5	0	0	1	0
TRx6	0	0	0	1
TD-SCDMA	1	1	1	1

WCDMA

The SKY77758 Power Amplifier Module (PAM) is a fully matched, 14-pad, surface mount module developed for Wideband Code Division Multiple Access (WCDMA) applications. This small and efficient module packs full coverage for WCDMA Bands I, II, V, VIII into a single compact package. The SKY77758 meets the stringent spectral linearity requirements of WCDMA, HSDPA, HSUPA, HSPA+ transmission, with high power added efficiency to maximum power output. A directional coupler integrated into the module eliminates the need for any external coupler.

The single Gallium Arsenide (GaAs) Microwave Monolithic Integrated Circuit (MMIC) contains all active circuitry in the module. The MMIC contains on-board bias circuitry, as well as input and interstage matching circuits. Output match into a 50-ohm load is realized off-chip within the module package to optimize efficiency and power performance.

The SKY77758 PAM is manufactured with Skyworks' InGaP GaAs Heterojunction Bipolar Transistor (HBT) process that provides for all positive voltage DC supply operation while maintaining high efficiency and good linearity. No VREF voltage is required. Power down is accomplished by setting the voltage on VEN_HB and VEN_LB to zero volts. No external supply side switch is needed as typical "off" leakage is a few microamperes with full primary voltage supplied from the battery.

Electrical Target Specifications

The following tables list the electrical specifications of the SKY77758 Power Amplifier Module. Absolute maximum ratings are listed in Table 1. WCDMA recommended operating conditions for Bands I, II, V, VIII are listed in Table 3. Performance Parameters for the WCDMA bands are shown in Tables 4 through 7.

Table 1. SKY77758 Absolute Maximum Rating

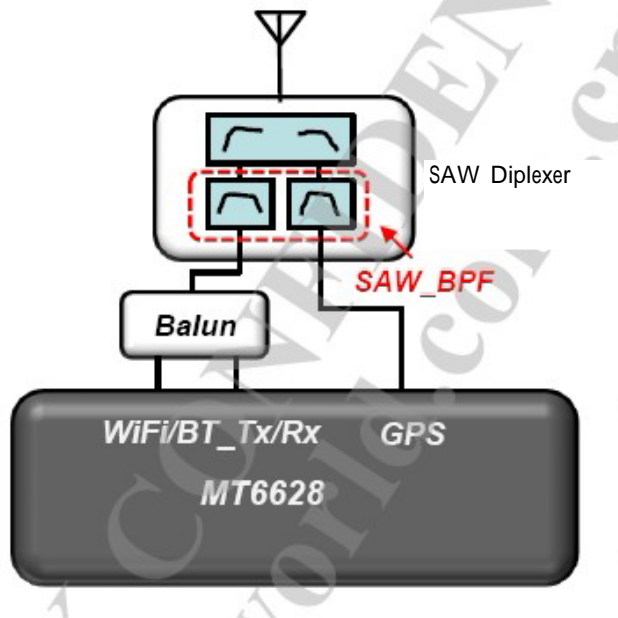*No damage assuming only one parameter set at limit at a time with all other parameters set at nominal value.*

Parameter		Symbol	Minimum	Nominal	Maximum	Unit
RF Input Power		P_{IN}			10.0	dBm
Supply Voltage	No RF	V_{BATT}, V_{CC}			6.0	Volts
	RF				4.6	
Mode Control Voltage		V_{MODE}			4.2	Volts
Enable Control Voltage		V_{EN_LB}, V_{EN_HB}			4.2	Volts
Case Temperature [1]	Operating	T_{CASE}	−30	+25	+100	°C
	Storage	T_{STG}	−40	—	+150	

[1] Case Operating Temperature (T_{CASE}) refers to the temperature of the GROUND PAD at the underside of the package.
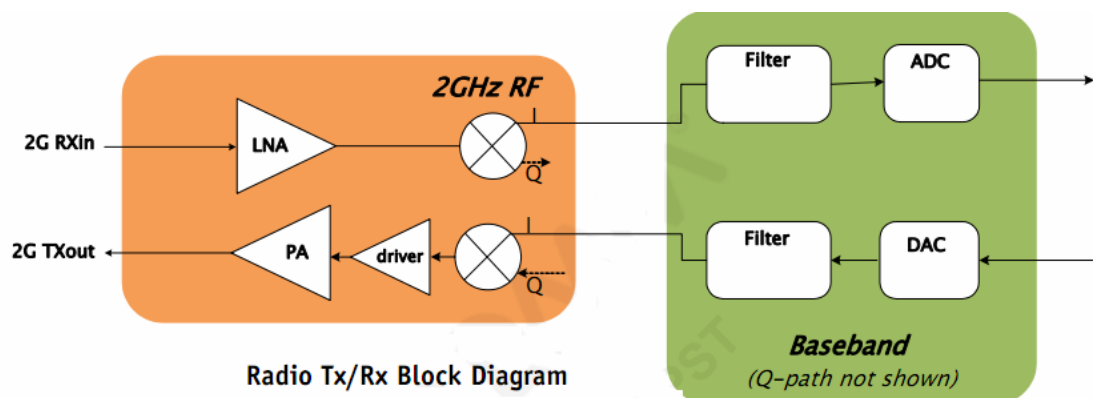
Table 2. SKY77758 Modes of Operation

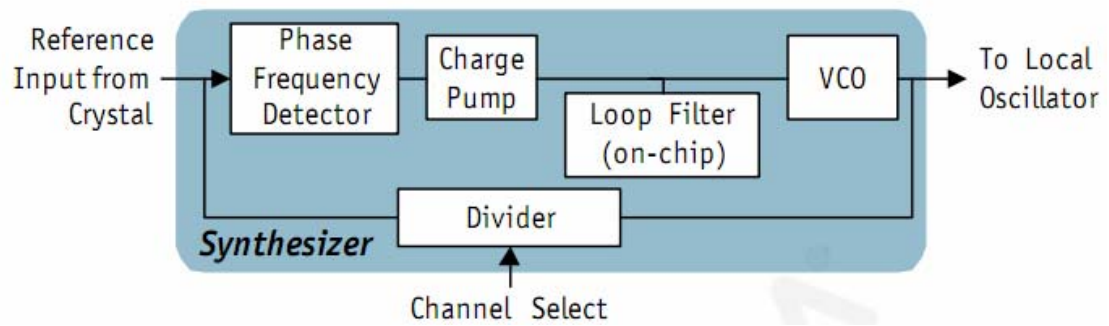| Power Setting		Band	V_{EN_HB}	V_{EN_LB}	V_{MODE}	V_{BATT}
Power Down Mode		—	Low	Low	Low	On
Standby Mode		—	Low	Low	X	On
Low Power Mode	($P_{OUT} \leq 17$ dBm)	I, II	High	Low	High	On
High Power Mode	($P_{OUT} = 17$ dBm to P_{MAX})	I, II	High	Low	Low	On
Low Power Mode	($P_{OUT} \leq 17$ dBm)	V, VIII	Low	High	High	On
High Power Mode	($P_{OUT} = 17$ dBm to P_{MAX})	V, VIII	Low	High	Low	On

The WIFI device receives anolog clock and the Transceiver Bluetooth solution receives digital clock from PMIC.In nomal operation,3.3V,1.8V power supplies are provided from the PMIC for the WIFI device and 1.3V power supply is provided from the PMIC for the Transceive Bluetooth .The WIFI device has a SDIO lines which is intended to connect to host processer and the Transceiver Bluetooth solution is intended to host processer via UART bus on the Transceiver itself.The coexistence between WIFI and Transceiver Bluetooth is linked through the controlled GPIO named the BT active,the BT status and WLAN active.

The WIFI device and the BT module on the transceiver itself have the similar Tx/Rx functional hardware.For example ,the receive is comprised of an LNA,a direct conversion mixer,and a baseband programmable gain filter.This receiver is implemented using the direct conversion topology.The mixer down convert the signal to baseband in-phase and quadrature-phase signals.The I/Q signals are low-pass filtered and amplified by the baseband

programmable gain filter controlled by digital logic.The baseband I/Q signals are sent to the ADC.

The transmitter is comprised of a programmable reconstruction filter,a direct convertion mixer,a preamplifier and a PA .This transmitter is implemented using the direct conversion topology.The transmit output power is adjusted by a digitally programmable control loop at the start of each packet and the Tx signal is amplified by the PA   to the sky.