The following should be considered to determine the applicable maximum output conditions for setting up WCDMA devices (handsets etc.) for SAR testing in head & body configurations, including applicable justification and documentation:

- 3GPP defines 7 SF and data rates for WCDMA (DPDCH), which can have impact on output power
  - higher data rates (lower SF) implies higher output power (in normal operating conditions; the impact of these operating configurations at Maximum Output conditions requires consideration

Sierra Wireless : As indicated in the Theory of operation file submitted, MC8765 complies with #GPP TS25.101 and TS34.121 Release 5.

TS25.011 Specification :

Table 6.1 UE power class :

Table 6.1: UE Power Classes

Operating Band	Power Class 1		Power Class 2		Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
Band I	+33	+1/-3	+27	+1/-3	+24	+1/-3	+21	+2/-2
Band II	-	-	-	-	+24	+1/-3	+21	+2/-2
Band III	-	-	-	-	+24	+1/-3	+21	+2/-2

TS34.121 Specification:

Tablet 5.2.1 Nominal Max. Output power

Table 5.2.1: Nominal Maximum Output Power

Operating Band	Power Class 1		Power Class 2		Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
Band I	+33	+1/-3	+27	+1/-3	+24	+1/-3	+21	+2/-2
Band II	-	-	-	-	+24	+1/-3	+21	+2/-2
Band III	-	-	-	-	+24	+1/-3	+21	+2/-2
Band V	-	-	-	-	+24	+1/-3	+21	+2/-2
Band VI					+24	+1/-3	+21	+2/-2

Test result: As documented in the original application of Part 22/24 RF conducted report, the output power was measured with Spectrum analyzer, the measured output power are within the power class 3 as declared in the theory of operation.

- 3GPP defines 4 downlink and 5 uplink Reference Measurement Channels (RMC, TS 25.101, TS 34.121) to enable stable measurement conditions using defined loopback test modes (TS 34.109)

Sierra Wireless:

SAR test was performed with Test mode (Script file below) for GSM/GPRS/EDGE operation during radiated ERP/EIRP to ensure stable continuous transmission through the test period. The test mode is designed to simulate various modulations and frequency bands.

Below is a table that briefly describes what mode the script will put the modem in.

Script File Name	Description
MC8765_RESET	Resets the modem
MC8765_Tx_OFF_Rx_ON	Turns off the modem's Tx and turns the Rx on.
MC8765_TX_EDGE1900_512CH_2SLOT_MAX	EDGE1900 band, channel 512, 2 slots TX at max power
MC8765_TX_EDGE1900_661CH_2SLOT_MAX	EDGE1900 band, channel 661, 2 slots TX at max power
MC8765_TX_EDGE1900_810CH_2SLOT_MAX	EDGE1900 band, channel 810, 2 slots TX at max power
MC8765_TX_EDGE850_128CH_2SLOT_MAX	EDGE850 band, channel 128, 2 slots TX at max power
MC8765_TX_EDGE850_192CH_2SLOT_MAX	EDGE850 band, channel 192, 2 slots TX at max power
MC8765_TX_EDGE850_251CH_2SLOT_MAX	EDGE850 band, channel 251, 2 slots TX at max power
MC8765_TX_GSM1900_512CH_2SLOT_MAX	GSM1900 band, channel 512, 2 slots TX at max power
MC8765_TX_GSM1900_661CH_2SLOT_MAX	GSM1900 band, channel 661, 2 slots TX at max power
MC8765_TX_GSM1900_810CH_2SLOT_MAX	GSM1900 band, channel 810, 2 slots TX at max power
MC8765_TX_GSM850_128CH_2SLOT_MAX	GSM850 band, channel 128, 2 slots TX at max power
MC8765_TX_GSM850_192CH_2SLOT_MAX	GSM850 band, channel 192, 2 slots TX at max power
MC8765_TX_GSM850_251CH_2SLOT_MAX	GSM850 band, channel 251, 2 slots TX at max power

When WCDMA mode is selected, the transmitting is transmitting continuously with 100 % modulation by establishing air communication with Agilent / E5515. Agilent base station simulator setting is included in the test report

- uplink can contain 1 DPCCH channel and up to 6 DPDCH channels (code channels)
  - info on device capability is needed

Sierra Wireless: MC8765 is capable of uplink with 1 DPCCH channel and 1 DPDCH channel.

- the number of code channels in a physical channel affects output power & processing gain
  - maximum output conditions need investigation because DPDCH gain is relative to DPCCH - more DPDCH means larger crest factor and higher output (up to the maximum output)
  - gain of physical channel is relative to total CDMA channel power
  - code domain and other power measurements may be necessary to identify and verify relative channel gain and output conditions (specific impairments) with respect to 3GPP standards

Sierra Wireless :

With Sierra Wireless Test Mode Software, MC8765 can achieve max. output power with 100 % duty factor.

- need to determine if data connection is applicable during a voice call (e.g. simultaneous voice and data during a call, which means more DPDCH and possibly different or adverse output conditions)
  - basic voice channel may be simulated by 12.2 kbps RMC

Sierra Wireless :
MC8765 is a wireless data modem to be embedded in notebook computer.

- need to determine how many DPDCH channels are supported by the device in body-worn configurations (voice + data and data only etc.)

Sierra Wireless : 1 DPDCH channel

- develop test plan to identify device configurations (SF, data rate, RMC, loopback mode, code channels etc.) for head & body SAR tests in maximum output conditions (determined by above investigations)
  - device configurations with equivalent or similar (close to maximum) conditions may be verify at the highest SAR conditions and/or configurations (when applicable) tested for the maximum output conditions (above)
  - lower output conditions should be explained and justified in the test report

Sierra Wireless :

SAR tests with air link communication to Agilent base station simulator were performed in the U.S. operation for WCDMA operation. Head SAR is not applicable for MC8765 since it does not provide held-to-head operation. All the output power has been verified per TS34.121 / TS25.101 Class 3 specification for WCDMA modulation.

- information reported by the test device to the test equipment (basestation simulator) such as device & output class, operating capabilities etc should be included in the test report

- according to 3GPP standards, device should be tested with established communication link; therefore, built-in device test codes is likely inapplicable for testing the code channel conditions

- band II (PCS) has 12 additional out of sequence channels
  - check with grantee on applicability

Sierra Wireless : Yes, it applies.

- device support of Packet Data convergence Protocol (TS 25.323)
  - check with grantee on applicability

Sierra Wireless : Yes, it applies.
- the applicable crest factors, determined through peak and RMS maximum power measurements in various operating configurations, must be applied to SAR measurements to obtain correct results, and fully explained in the test report

Sierra Wireless : Max. output power was measured with spectrum analyzer with RBW higher than WCDMA 26BW. The output power was measured with 100 % duty cycle.

Information on 3GPP WCDMA test protocols and standards can be downloaded

- at the following link: http://www.3gpp.org/specs/specs.htm
    - applicable 3GPP standards include, but not limited to, TS 25.XXX & TS 34.XXX etc.
- Agilent application note AN-1356 can provide *very* quick tutorial on 3GPP user equipment (UE) testing info
    - reference section has list of applicable 3GPP standards