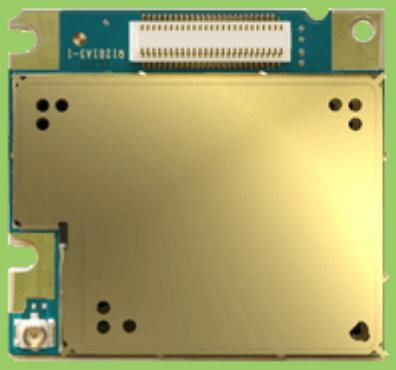
CINTERION
a Gemalto company

Product Comparison

Differences between MC55i-W and MC55i



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Contents

0 Document History

Preceding document: "Differences between MC55i-W and MC55i", v01
New document: "Differences between MC55i-W and MC55i", v02

Chapter	What is new
2	Updated Feature/Property Overview.
3.4	Added Section: SIM Interface (CCIN Pin).
3.5	Revised Figure 1 and Figure 2 showing ASC0/ASC1 signal states.
3.6	Revised section to include audio mode 6 as mode for DTMF end-to-end transmission.
3.8	Revised entries in Table 5 for the following functions: Ignition, SIM card interface, ASC0 and ASC1 interface, analog and digital audio interface.
3.9	Added Section: Power Supply Ratings.
4.4	Added Section: Tunneling Mode.
4.5	Added Section: Escape Character Handling.
4.6	Added Section DTMF End-to-End Transmission.
4.7	Added AT^SRPN, AT^SCFG=”GPRS/AutoAttach”, Explicit Call Transfer (ECT).

1 Introduction

This document[1] compares the Cinterion wireless modules MC55i-W and MC55i. It lists hardware as well as software related differences between these products.

The aim of the document is to provide information and to offer support in order to facilitate a possible migration from MC55i to MC55i-W.

Note: Product differences between MC55i-W and MC55i may prevent a migration through simple module replacement. Instead, the external application itself will have to be adapted. This may for example become necessary because MC55i-W supports only one analog audio interface or because it does not support a charging interface.

For a quick overview of feature/property differences see Chapter 2. Where appropriate these differences are described in more detail in Chapter 3 and Chapter 4. For a complete description please refer to the respective “Hardware Interface Description” and “AT Command Set”.

1.1 Related Documents

[1] MC55i-W Hardware Interface Description
[2] MC55i Hardware Interface Description
[3] MC55i-W AT Command Set
[4] MC55i AT Command Set

1.2 Type Approval

For regulatory and type approval information and differences see [1] and [2].

[1] The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Cinterion wireless product.

2 Feature/Property Overview

The following table compares general properties and features of MC55i-W and MC55i. It lists differences between the modules. Where appropriate, differences are described in more detail in the next sections.

Feature/Property	MC55i-W	MC55i
General Properties		
Operating temperature (board temperature)	Normal operation: **-30°C to +85°C** Restricted operation: **-40°C to +90°C**	Normal operation: -20°C to +70°C Restricted operation: -40°C to +80°C
Pin assignment and characteristics	MC55i-W: **V_{IH}nom = 2.90V** for ASC0, ASC1 and DAI interface For further details and comments see Section 3.8.	
Power supply ratings	For details see Section 3.9.	
Interface Features		
Startup timing	Startup **timing** has been improved (see Sections 3.2, 3.5 and 3.7)	
Analog interface(s)	**1** balanced audio interface with MIC power feeding	2 balanced audio interfaces including MIC power feeding bridge
Digital audio	**RFSDAI has no functionality**	
SIM interface	3V and 1.8V cards supported Signal lines < **100mm** CCIN pin level derived from **VDD**	3V and 1.8V cards supported Signal lines < 200mm CCIN pin level derived from CCVCC
Emergency switch off	**No. Emergency restart functionality instead**	Yes
SYNC/Status LED	**Status signalization only**	Possible synchronization and status signalization
Charging	**No charging interface**	Yes
Antenna interface	50Ω connected via antenna connector or **circular** pad	50Ω connected via antenna connector or rectangular pad
Other Features		
Power saving (AT+CFUN=<fun>)	Functionality level: <fun> = **0, 1, 7 or 9**	Functionality level: <fun> = 0, 1, 5, 6, 7, 8 or 9
Protocol stack	**Release 99 and GERAN FP 1**	Release 98
SIM Application Toolkit	**SAT class 3, SAT Release 99, 3GPP TS 31.111, letter class "c"**	SAT class 3, SAT Release 98, GSM 11.14, letter class "c"
Number of alarms	**5** configurable alarms (AT+CALA)	1 configurable alarm (AT+CALA)
Multiplexer channels	Three Mux channels plus **dedicated fourth channel for direct serial interface tunnel**	Three Mux channels
Escape characters	**Escape sequences for non-USC2 output**	No escape sequences for non-USC2 output
Audio modes	**Dedicated audio mode 6 for DTMF end-to-end transmission**	Identical audio modes 5 and 6
Evaluation kit	**DSB75 evaluation board with 50to80 adapter to mount the module** Used as reference equipment	DSB45 evaluation board Used as reference equipment

3 Hardware Related Differences

The focus of this chapter is on differences in hardware related properties between MC55i-W and MC55i.

3.1 Operating Temperature

The operating board temperatures for the modules are listed in the following table.

Table 1: Board temperature

Parameter	Unit	MC55i-W		MC55i	
		Min	Max	Min	Max
Operating temperature range	°C	-30	+85	-20	+70
Restricted temperature range	°C	-30 to -40	+85 to +90	-20 to -40	+70 to +80
Automatic shutdown Temp. measured on board	°C	 -40	 >+90	 <-40	 >+80

Reference:
- “Hardware Interface Description”: Section “Operating Temperatures”, see [1] and [2]

3.2 Power-up Behavior

With MC55i-W the IGT (Ignition) signal needs to be driven to ground level for at least 3ms after the operating voltage BATT+ was applied. If the operating voltage BATT+ is applied while the IGT signal is present, MC55i-W will be switched on automatically. Please note that if the rise time for the operating voltage BATT+ is longer than 12ms, the module startup will be delayed by about 1 second. Please also note that if there is no IGT signal present right after applying BATT+, MC55i-W will, instead of switching on, perform a very short switch on/off sequence (approx. 120ms) that cannot be avoided.

With MC55i the IGT (Ignition) signal needs to be driven to ground level for at least 100ms after the operating voltage BATT+ was applied. This can be accomplished using an open drain/collector driver in order to avoid current flowing into this pin.

Reference:
“Hardware Interface Description”: Section “Power up / Power Down Scenarios”, see [1] and [2]

3.3 Power-down Behavior

By default both, MC55i-W and MC55i can be switched off using the AT command AT^SMSO. At module turn off the power supply pin VDD provided to supply external application circuits are switched low almost immediately (100µs resp. 25ms).

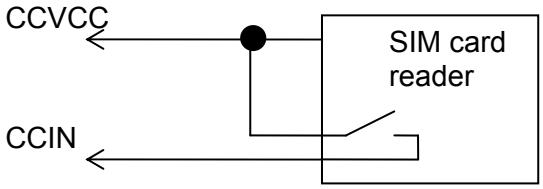
In an emergency MC55i-W can be restarted using the EMERG_RST pin. MC55i can be switched off by driving the EMERGOFF pin to ground for at least 10ms.

Reference:
"Hardware Interface Description": Section "Power up / Power Down Scenarios", see [1] and [2]

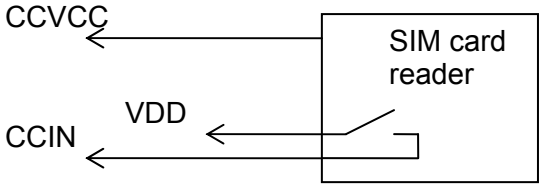
3.4 SIM Interface (CCIN Pin)

The SIM interface's CCIN pin serves to detect whether a tray, i.e., with SIM card, is present in the card holder.

With MC55i the CCIN level can be derived by means of CCVCC as shown in the following figure – SIM card removal and insertion is recognized:



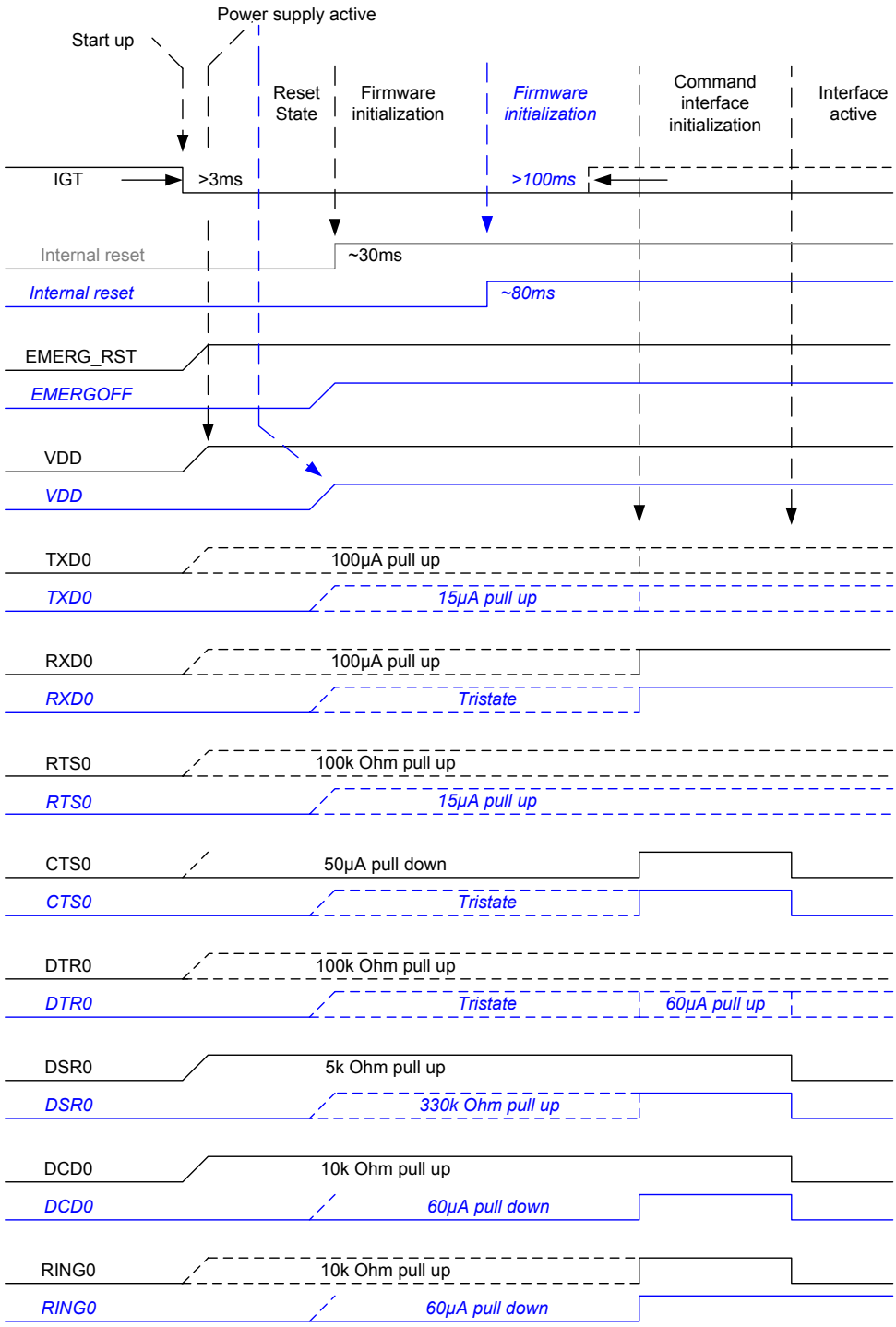
With MC55i-W the CCIN level may also be derived by means of CCVCC. However, only SIM card removal will then be recognized during operation, detection of SIM card insertion requires a module restart. To detect SIM card insertion during module operation, the CCIN pin will have to be supplied by means of a separate 2.9V source (e.g., VDD) as shown in the following figure:



Reference:
"Hardware Interface Description": Section "SIM Interface", see [1] and [2]

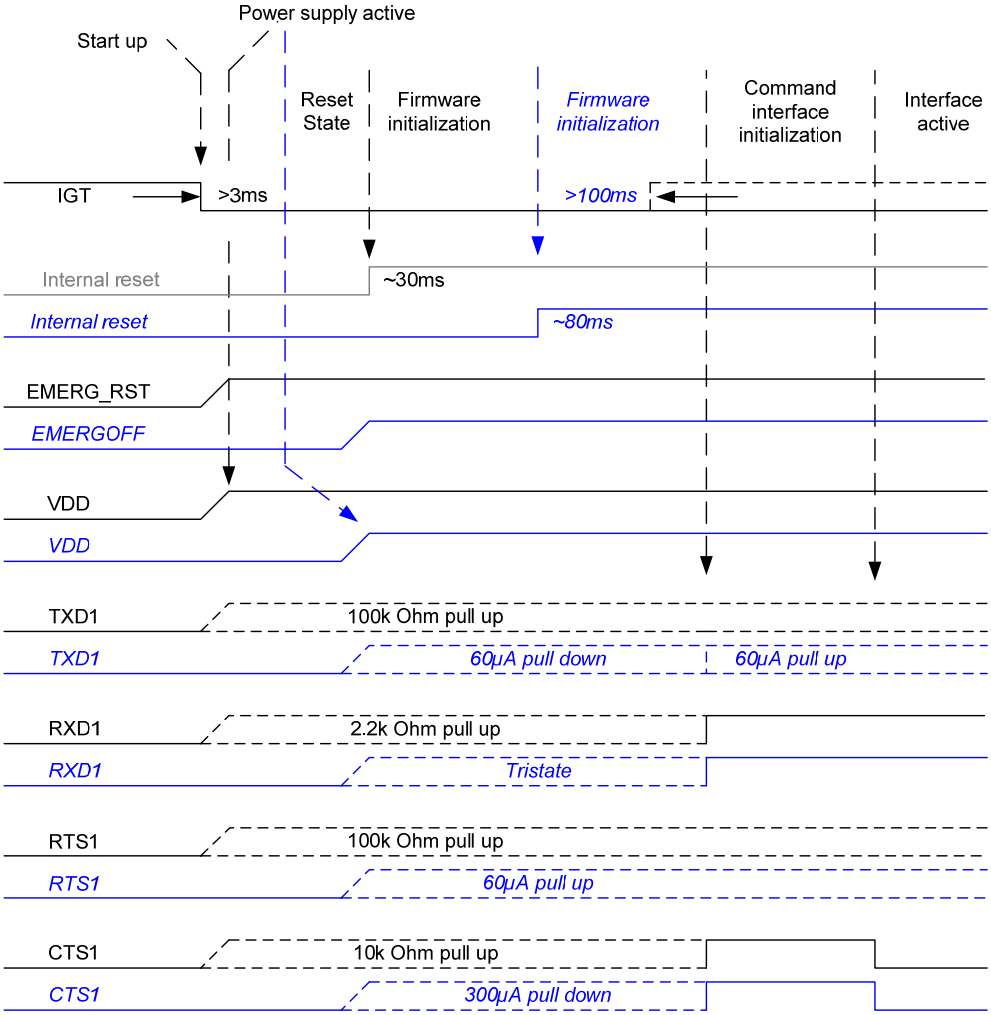
3.5 Serial Interface

The startup timing and the signal levels of MC55i-W and MC55i (*blue italics*) are different as illustrated in the following figures:



* Reset is an internal signal that is set to high once the module's processor is powered up..

Figure 1: ASC0 signal state differences



* Reset is an internal signal that is set to high once the module's processor is powered up.

Figure 2: ASC1 signal state differences

Reference:
"Hardware Interface Description": sections "Power up / Power Down Scenarios", "Serial Interface ASC0" as well as "Serial Interface ASC1", see [1] and [2]

3.6 Audio Interface

MC55i-W modules provide one analog audio interface plus a digital audio interface using pulse code modulation (PCM), whereas MC55i modules provide two analog audio interfaces as well as a digital audio interface (DAI). With MC55i-W modules the MICP2 and MICN2 pins of the second audio interface have become VMICP and VMICN respectively.

The following two figures show the differing audio programming models.

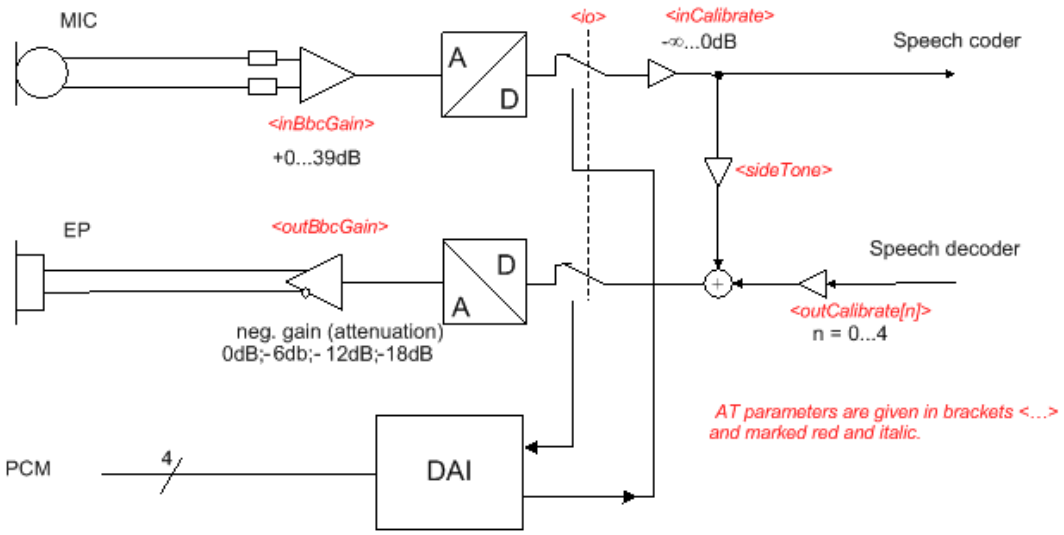


Figure 3: MC55i-W audio interface and programming interface

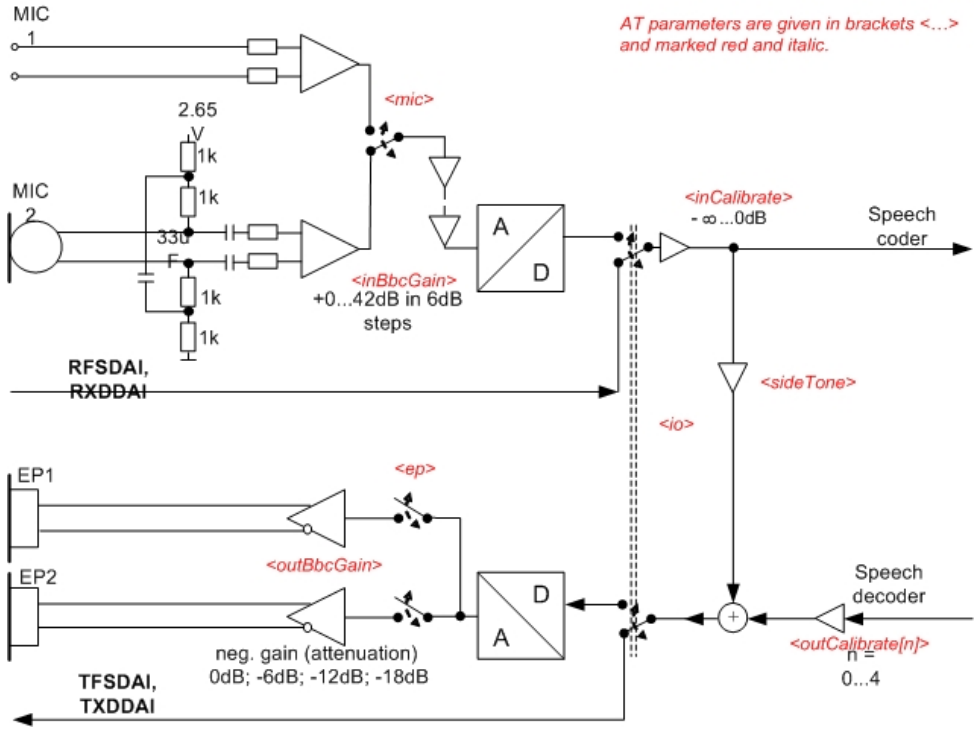


Figure 4: MC55i audio interface and programming model

Further audio interface differences between MC55i-W and MC55i (*blue italics*) are listed in the tables below. For more details please refer to the respective Hardware Interface Descriptions ([1] and [2]).

Table 2: Voiceband characteristics

Audio mode no. AT^SNFS=	**1** (Default settings, not adjustable)	**2**	**3**	**4**	**5**	**6**
Name	Default Handset	Basic Handsfree	Headset	User Handset	Plain Codec 1	DTMF *Plain Codec 2*
Purpose	DSB with Votronic hand-set	Car Kit	Headset	DSB with individual hand-set	Direct access to speech coder	Tip and Ring i/f for DTMF end-to-end transmission *Direct access to speech coder*
Gain setting via AT command. Defaults: inBbcGain outBbcGain	Fix 4 (24dB) 0 (0dB)	Adjustable 1 (6dB) *2 (12dB)* 2 (-12dB)	Adjustable 6 (36dB) 2 (-12dB)	Adjustable 4 (24dB) 0 (0dB)	Adjustable 0 (0dB) 0 (0dB)	Adjustable 0 (0dB) 1 (-6dB) *0 (0dB)*
Default audio interface	*1*	*2*	*2*	*1*	*1*	*2*
Power supply	ON (2.2V) *ON (2.65V)*	ON (2.2V) *ON (2.65V)*	ON (2.2V) *ON (2.65V)*	ON (2.2V) *ON (2.65V)*	ON (2.2V) *ON (2.65V)*	ON (2.2V) *ON (2.65V)*
Sidetone	ON	--	Adjustable	Adjustable	Adjustable	Adjustable
Volume control	OFF	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
Echo control (send)	Cancellation	Cancellation	Cancellation	Cancellation	-----	Line echo cancellation -----
Noise suppression[2]	12dB -----	12dB *15dB*	12dB *15dB*	12dB -----	-----	-----
MIC input signal for 0dBm0 @ 1024 Hz (default gain)	16mV *18mV*	130mV *65mV*	7.5mV[3]	16mV *18mV*	275mV *315mV*	275mV *315mV*
EP output signal in mV rms. @ 0dBm0, 1024 Hz, no load (default gain); @ 3.14 dBm0	500mV *620mV*	160mV *210mV*	230mV *320mV*	500mV *620mV*	1160mV *880mV* 4.5Vpp *3.7Vpp*	520mV *880mV* *3.7Vpp*
Sidetone gain at default settings	20dB *21.5dB*	-∞	17dB *20.5dB*	20dB *21.5dB*	-∞ *-3dB @ sidetone = 8192*	-∞ *-3dB @ sidetone = 8192*

[2] In audio modes with noise reduction, the microphone input signal for 0dBm0 shall be measured with a sine burst signal for a tone duration of 5 seconds and a pause of 2 sec. The sine signal appears as noise and, after approx. 12 sec, is attenuated by the noise reduction by up to 12dB.

[3] Signal for -2dBm0 (due to attenuation of uplink filter at 1kHz)

Table 3: Voiceband receive path

Parameter	Min	Typ	Max	Unit	Test condition/remark
Differential output voltage (peak to peak)		3.4 4.5/*3.7*		Vpp	16Ohm, no load, from EPPx to EPNx *gs* = 0dB @ 3.14dBm0
Differential output gain settings (*gs*) at 6dB stages (outBbcGain)	-18		0	dB	Set with AT^SNFO
Fine scaling by DSP (outCalibrate)	-∞		+6 *0*	dB	Set with AT^SNFO
Output differential DC offset	-50		+50	mV	*gs* = 0dB, outBbcGain = 0 and -6dB
Differential output resistance		*4*		*Ω*	*from EPP to EPN*
Differential output load resistance	14			Ω	from EPP to EPN
Allowed single ended load capacitance			150	pF	from EPP or EPN to AGND
Absolute gain drift	-5 *-2*		+5 *+2*	%	Variation due to change in temperature and life time
Passband ripple			0.5	dB	for f < 3600 Hz
Stopband attenuation	50			dB	for f > 4600 Hz

Table 4: Voiceband transmit path

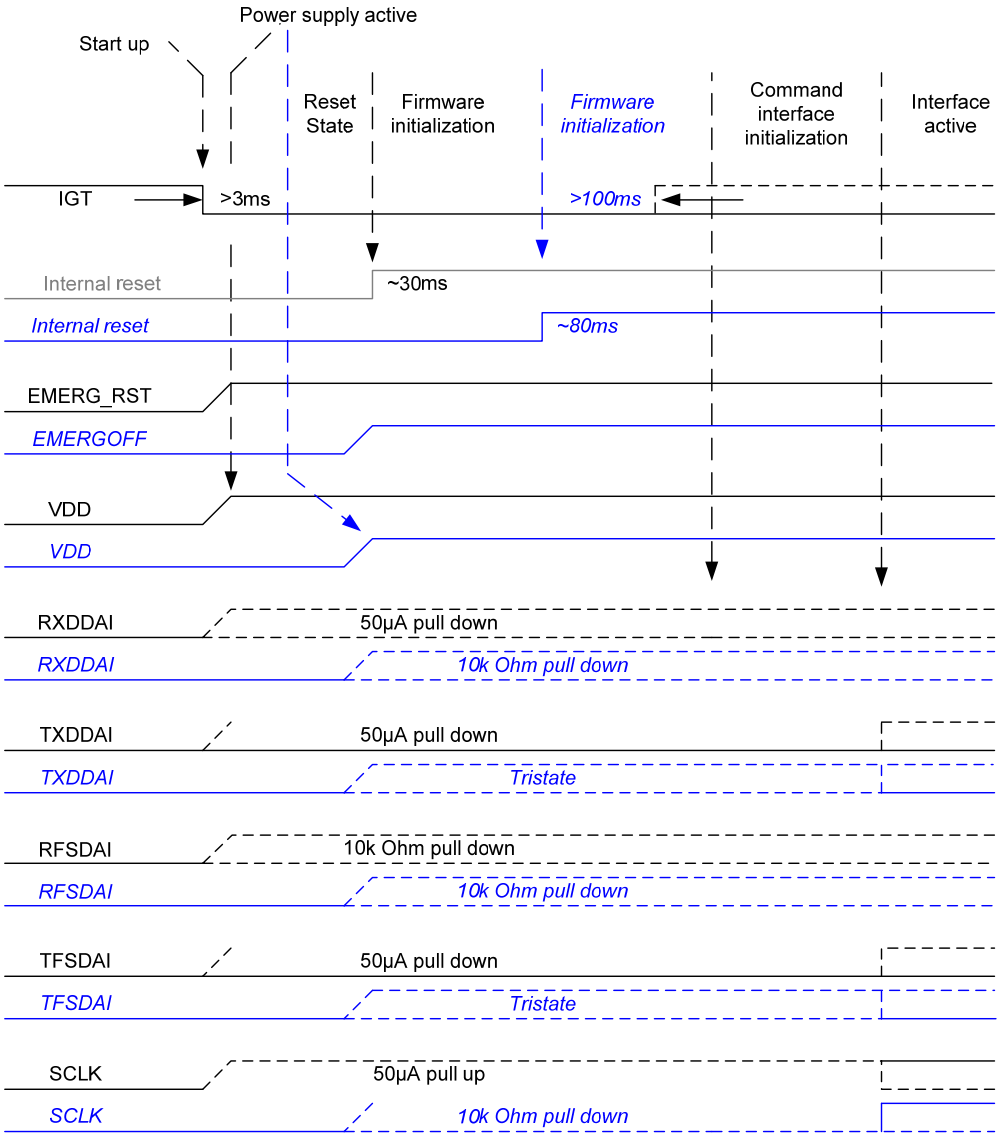
Parameter	Min	Typ	Max	Unit	Test condition/Remark
Input voltage (peak to peak) MICP to MICN			0.8 *1.03*	V	
Input amplifier gain in 6dB steps (inBbcGain)[4]	0		39 *42*	dB	Set with AT^SNFI
Fine scaling by DSP (inCalibrate)	-∞		0	dB	Set with AT^SNFI
Input impedance MIC		50		kΩ	
Microphone supply voltage VMICP to VMICN		2.2		V	No load MC55i-W only
Microphone supply current VMICP to VMICN			1.1	mA	Short circuit MC55i-W only
Microphone supply source resistance (VMICP to VMICN)		2		kΩ	MC55i-W only

For further characteristics of the audio signal lines see Section 3.8.

[4] 3dB step between inBbcGain 6 and 7.

3.7 Digital Audio Interface

Figure 5 shows the differences between MC55i-W and MC55i (*blue italics*) for the startup phase of the DAI interface.



* Reset is an internal signal that is set to high once the module's processor is powered up.

Figure 5: Digital audio interface signal state differences

For further characteristics of the digital audio signal lines see Section 3.8.

Reference:
"Hardware Interface Description": Section "Digital Audio Interface", see [1] and [2]

3.8 Signal Description

Figure 6 compares the pin assignments for MC55i and MC55i-W - *blue italics* indicate where the MC55i assignments differ. The following Table 5 lists electrical characteristics for the signal lines at the board-to-board connector. Characteristics for MC55i are given in *blue italics*.

1	CCCLK	Not connected / *EPN2*	50
2	CCVCC	Not connected / *EPP2*	49
3	CCIO	EPP*1*	48
4	CCRST	EPN*1*	47
5	CCIN	VMICN / *MICN2*	46
6	CCGND	VMICP / *MICP2*	45
7	RXDDAI	MICP*1*	44
8	TFSDAI	MICN*1*	43
9	SCLK	AGND	42
10	TXDDAI	IGT	41
11	RFSDAI	EMERG_RST / *EMERGOFF*	40
12	Do not use / *BATT_TEMP*	DCD0	39
13	STATUS / *SYNC*	CTS1	38
14	RXD1	CTS0	37
15	RXD0	RTS1	36
16	TXD1	DTR0	35
17	TXD0	RTS0	34
18	VDDLP	DSR0	33
19	Not connected / *POWER*	RING0	32
20	Not connected / *CHARGE*	VDD	31
21	GND	BATT+	30
22	GND	BATT+	29
23	GND	BATT+	28
24	GND	BATT+	27
25	GND	BATT+	26

Figure 6: Pin assignment

Table 5: Signal description

Function	Signal name	IO	Signal form and level	Comments
Power supply	BATT+	I	MC55i-W: $V_I$max= 4.80V $V_I$nom = 4.20V $V_I$min = 3.30V during Tx burst on board Ipeak ≈ 1.2A (during Tx burst) *MC55i:* *$V_I$max= 4.80V* *$V_I$norm = 4.20V* *$V_I$min = 3.30V during Tx burst on board* *Ipeak ≈ 1.6A (during Tx burst)*	
	GND		Ground	
Charge interface	[---]	[ ]	MC55i-W Pin internally not connected	Charge Interface removed Pin internally not connected.
	POWER	I	*MC55i* *VImin = 3.30V* *$V_I$max = 12V*	
	[---]	[ ]	MC55i-W: Pin internally not connected	Charge Interface removed Pin internally not connected.
	CHARGE	O	*MC55i:* *I_{CHARGE}max = 2mA* *V_{IH}max = 12V* *V_{LO}max = 0.25V at I = 2mA*	
	[---]	[ ]	MC55i-W: Do not use. Pin internally connected.	Charge Interface removed Pin internally connected.
	BATT_TEMP	I	*MC55i:* *Connect NTC with R_{NTC} ≈ 10kΩ @ 25°C to ground.*	
External supply voltage	VDD	O	MC55i-W: $V_O$nom = 2.85V +1.5%, -2% $I_O$max = -10mA CLmax = 100nF	
	VDD	O	*MC55i:* *VDDmin = 2.75V, VDDtyp= 2.85V, VDDmax = 2.95V* *Imax = -10mA* *$C_L$max = 1µF*	

Function	Signal name	IO	Signal form and level	Comments
VDD Low Power	VDDLP		MC55i-W: R_I =1kΩ $V_O$max ≈ 4.30V $V_I$max = 5.50V $V_I$nom = 2.20V $V_I$min = 1.20V (in Power Down mode) $I_I$typ = 6µA at BATT+ = 0V *MC55i:* R_I =1kΩ $V_O$max ≈ 4.30V $V_I$max = 5.50V $V_I$min = 2.20V $V_I$min in Power Down mode = 1.20V $I_I$typ = 6µA in the case BATT+ = 0V	
Status LED/ Synchroni-zation	STATUS *SYNC*	O	MC55i-W: V_{OL}max = 0.40V; I_{OL}max = 1mA at V_{OL}max V_{OH}min = 2.40V; I_{OH}min = -40µA at V_{OH}max V_{OH}max = 2.90V *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V* ___|~~~~~|_____|~~~~~|____ *1 Tx, 877µs impulse each 4.616ms and 2 Tx, 1454µs impulse each 4.616ms, with approximately 280µs forward time.*	This signal shows only the status LED functionality. Transmission burst synchronization signaling has been removed.
Ignition	IGT	I	MC55i-W: R_I ≈ 100kΩ V_{IL}max = (VRTC) -1V; I_{IL} = -5µA at V_{IL}max V_{IL}min = 0V; I_{IL}max = -20µA at V_{IL}min VRTC = 2.30V ±5% IGT ~~~|_|~~~~~~~~~~~~ Active low ≥ 3ms *MC55i:* *R_I ≈ 100kΩ, C_I ≈ 1nF* *V_{IL}max = (BATT+) -0.5V at I = -5µA* *V_{IL}min = 0V at Imax = -50µA* *V_{Open}max = 4.80V* *ON ~~~|_____|~~~ Active low ≥ 100ms*	Starts with a 3ms low impulse.
Emergency Restart	EMERG_RST *EMERGOFF*	I I	MC55i-W: R_I ≈ 1kΩ, C_I ≈ 1nF V_{OH}max = 1.90V V_{IH}min = 1.35V V_{IL}max = 0.30V; I_{IL}max < 200µA at V_{IL}max ~~~~~|___|~~~~~ Low impulse width > 10ms *MC55i* *V_{IL}max = (BATT+) -0.50V at I = -5µA* *V_{IL}min = 0V at Imax = -50µA* *V_{Open}max = 4.80V* ~~~~~|___|~~~~~ *Low impulse width > 10ms*	Restart only after emergency signal.

Function	Signal name	IO	Signal form and level	Comments
3V SIM Interface	CCIN	I	MC55i-W: $R_I \approx 100k\Omega$ $V_{IH}min = 1.45V$; $I_{IH} = 10\mu A$ at $V_{IH}min$ $V_{IH}max = 3.30V$; $I_{IH}max = 30\mu A$ at $V_{IH}max$ $V_{IL}max = 0.30V$ *MC55i:* *$R_I \approx 100k\Omega$* *$V_{IL}max = 0.50V$* *$V_{IH}min = 2.15V$ at $I = 20\mu A$,* *$V_{IH}max = 3.3V$ at $I = 30\mu A$*	Interface differences for CCIN, CCRST, CCIO, CCCLK and CCVCC.
	CCRST	O	MC55i-W: $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 2.40V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 2.90V$ *MC55i:* *$R_O \approx 47\Omega$* *$V_{OL}max = 0.25V$ at $I = 1mA$* *$V_{OH}min = 2.50V$ at $I = -1mA$* *$V_{OH}max = 2.95V$*	
	CCIO	I/O	MC55i-W: $V_{IL}max = 0.60V$ $V_{IH}min = 1.95V$ $V_{IH}max = 2.90V$ $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 2.40V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 2.90V$ *MC55i:* *$R_I \approx 4.7k\Omega$* *$V_{IL}max = 0.50V$* *$V_{IH}min = 2.00V$, $V_{IH}max = 3.3V$* *$R_O \approx 100\Omega$* *$V_{OL}max = 0.3V$ at $I = 1mA$* *$V_{OH}min = 2.65V$ at $I = -20\mu A$* *$V_{OH}max = 2.95V$*	
	CCCLK	O	MC55i-W: $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 2.40V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 2.90V$ *MC55i:* *$R_O \approx 100\Omega$* *$V_{OL}max = 0.30V$ at $I = 1mA$* *$V_{OH}min = 2.45V$ at $I = -1mA$* *$V_{OH}max = 2.95V$*	
	CCVCC	O	MC55i-W: $V_O min = 2.80V$ $V_O typ = 2.85V$ $V_O max = 2.90V$ $I_O max = -30mA$ *MC55i:* *$R_O max \approx 5\Omega$* *$CCVCCmin = 2.75V$,* *$CCVCCmax = 2.95V$* *$Imax = -20mA$*	
	CCGND		Ground	

Function	Signal name	IO	Signal form and level	Comments
1.8V SIM Interface	CCIN	I	MC55i-W: $R_I \approx 100k\Omega$ $V_{IH}min = 1.45V$; $I_{IH} = 10\mu A$ at $V_{IH}min$ $V_{IH}max = 3.30V$; $I_{IH}max = 30\mu A$ at $V_{IH}max$ $V_{IL}max = 0.30V$ *MC55i:* *$R_I \approx 100k\Omega$* *$V_{IL}max = 0.30V$* *$V_{IH}min = 1.40V$ at $I = 15\mu A$,* *$V_{IH}max = 3.30V$ at $I = 30\mu A$*	Interface differences for CCIN, CCRST, CCIO, CCCLK and CCVCC.
	CCRST	O	MC55i-W: $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 1.50V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 1.90V$ *MC55i:* *$R_O \approx 47\Omega$* *$V_{OL}max = 0.25V$ at $I = 1mA$* *$V_{OH}min = 1.40V$ at $I = -1mA$* *$V_{OH}max = 1.95V$*	
	CCIO	IO	MC55i-W: $V_{IL}max = 0.37V$ $V_{IH}min = 1.22V$ $V_{IH}max = 1.90V$ $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 1.50V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 1.90V$ *MC55i:* *$R_I \approx 4.7k\Omega$* *$V_{IL}max = 0.3V$* *$V_{IH}min = 1.20V$, $V_{IH}max = 3.3V$* *$R_O \approx 100\Omega$* *$V_{OL}max = 0.30V$ at $I = 1mA$* *$V_{OH}min = 1.60V$ at $I = -20\mu A$* *$V_{OH}max = 1.95V$*	
	CCCLK	O	MC55i-W: $V_{OL}max = 0.20V$; $I_{OL} = 1mA$ at $V_{OL}max$ $V_{OH}min = 1.50V$; $I_{OH} = -1mA$ at $V_{OH}min$ $V_{OH}max = 1.90V$ *MC55i:* *$R_O \approx 100\Omega$* *$V_{OL}max = 0.30V$ at $I = 1mA$* *$V_{OH}min = 1.40V$ at $I = -1mA$* *$V_{OH}max = 1.95V$*	
	CCVCC	O	MC55i-W: $V_O min = 1.75V$ $V_O typ = 1.80V$ $V_O max = 1.85V$ $I_O max = -30mA$ *MC55i:* *$R_O max \approx 5\Omega$* *$CCVCCmin = 1.71V$,* *$CCVCCmax = 1.95V$* *$Imax = 20mA$*	
	CCGND		Ground	

Function	Signal name	IO	Signal form and level	Comments
ASC0 interface	RXD0	O	MC55i-W: V_{OL}max = 0.20V; I_{OL} = 1mA at V_{OL}max V_{OH}min = 2.40V; I_{OH} = -1mA at V_{OL}min V_{OH}max = 2.90V V_{IL}max = 0.56V V_{IH}min = 2.05V V_{IH}nom = 2.90V V_{IH}max = 3.30 V; I_{IH}max < 300 µA at V_{IH}max *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V* *V_{IL}max = 0.50V at I = -15µA* *V_{IH}min = 2.00V at I= -5µA* *V_{IH}max=3.30V*	**Caution:** Input voltages higher than V_{IH}nom may result in increased current consumption.
	CTS0	O		
	TXD0	I		
	RTS0	I	MC55i-W: V_{IL}max = 0.30V; I_{IL} = -180µA at V_{IL}max V_{IH}min = 2.00V; I_{IH} = -10µA at V_{IL}min V_{IH}nom = 2.90V V_{IH}max = 3.30V; I_{IH}max < 5µA at V_{IH}max *MC55i:* *V_{IL}max = 0.50V at I = -15µA* *V_{IH}min = 2.00V at I= -5µA* *V_{IH}max=3.30V*	
	DTR0	I	MC55i-W: V_{IL}max = 0.30V; I_{IL} = -180µA at V_{IL}max V_{IH}min = 2.00V; I_{IH} = -10µA at V_{IL}min V_{IH}nom = 2.90V V_{IH}max = 3.30V; I_{IH}max < 5µA at V_{IH}max *MC55i:* *V_{IL}max = 0.50V at I = -50µA* *V_{IH}min = 2.00V at I= -20µA* *V_{IH}max=3.30V*	
	DCD0	O	MC55i-W: Open Drain Output R_I ≈ 10kOhm (internal Pull up) V_{OL}min = 0.20V; I_{OL} = 1mA at V_{OL}min V_{OH}min = 2.40V; I_{OH} = -40µA at V_{OH}min V_{OH}max = 2.90V *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V*	

Function	Signal name	IO	Signal form and level	Comments
	DSR0	O	MC55i-W: Open Drain Output R_I ≈ 5kOhm (internal Pull up) V_{OL}min = 0.20V; I_{OL} = -1mA at V_{OL}min V_{OH}min = 2.40V; I_{OH} = -80µA at V_{OH}min V_{OH}max = 2.90V *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V*	
	RING0	O	MC55i-W: V_{OL}max = 0.40V; I_{OL} = 1mA at V_{OL}max V_{OH}min = 2.40V; I_{OH} = -40µA at V_{OH}min V_{OH}max = 2.90V *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V*	
ASC1 interface	RXD1	O	MC55i-W: V_{OL}min = 0.40V; I_{OL} = 1mA at V_{OL}min V_{OH}min = 2.40V; I_{OH} = -180µA at V_{OH}min V_{OH}max = 2.90V V_{OL}max = 0.40V; I_{OL} = 1mA at V_{OL}max V_{OH}min = 2.40V; I_{OH} = -40µA at V_{OH}min V_{OH}max = 2.90V *MC55i:* *V_{OL}max = 0.20V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V*	**Caution:** Input voltages higher than V_{IH}nom may result in increased current consumption.
	CTS1	O		
	TXD1	I	MC55i-W: V_{IL}max = 0.30V; I_{IL} = -180µA at V_{IL}max V_{IH}min = 2.00V; I_{IH} = -10µA at V_{IH}min V_{IH}nom = 2.90V V_{IH}max = 3.30V; I_{IH}max < 5µA at V_{IH}max *MC55i:* *V_{IL}max = 0.50V at I = -50µA* *V_{IH}min = 2.00V at I = -20µA* *V_{IH}max=3.30V*	
	RTS1	I		

Function	Signal name	IO	Signal form and level	Comments
Digital audio interface	RFSDAI		MC55i-W: V_{OL}max = 0.20V; I_{OL} = 1mA at V_{OL}max V_{OH}min = 2.40V; I_{OH} = -1mA at V_{OH}min V_{OH}max = 2.90V V_{IL}max = 0.56V; I_{IL} < 30 µA at V_{IL}max V_{IH}min = 2.20 V; I_{IH}min < 120 µA at V_{IH}min V_{IH}nom = 2.90V; I_{IH}nom < 160 µA at V_{IH}nom V_{IH}max = 3.30 V; I_{IH}max < 500 µA at V_{IH}max *MC55i:* *V_{OL}max = 0.2V at I = 1mA* *V_{OH}min = 2.40V at I = -1mA* *V_{OH}max = 2.82V* *V_{IL}max = 0.50V at I = +50µA* *V_{IH}min = 2.00V at I = + 200µA* *V_{IH}max=3.30V at I = +330µA*	**Caution:** Input voltages higher than V_{IH}nom may result in increased current consumption. The RFSDAI pin exists for compatibility reasons only. It has no functionality. RFSDAI is internally connected to ground via 10kOhm.
	RXDDAI	I		
	SCLK	O		
	TFSDAI	O		
	TXDDAI	O		

Function	Signal name	IO	Signal form and level	Comments
Analog Audio Interface	[---] [---]	[ ] [ ]	MC55i-W: Pins internally not connected	
	EPP2 *EPN2*	*O* *O*	*MC55i:* *$V_O$max = 3.7Vpp*	
	EPP EPN	O O	MC55i-W: Differential, typ. 3.2Vpp at 16Ω load typ. 4.1Vpp at no load PCM level = +3dBm0, 1.02 kHz sine wave CLmax < 150pF to GND at each pin. (Test condition Audio Mode 5)	
	EPP1 EPN1		*MC55i:* *$V_O$max = 3.7Vpp*	
	MICP MICN	I I	MC55i-W: $Z_I$typ = 50kΩ Vinmax = 0.8Vpp (for 3dBm0 @ 0dB gain) (Test condition Audio Mode 5)	
	MICP1 *MICN1*		*MC55i:* *R_I ≈ 50kΩ differential* *$V_I$max = 1.03Vpp*	
	VMICP	O	MC55i-W: R_I ~ 1kOhm $V_O$max = 2.2V (without load) $V_O$nom = 1.6V; I_O = 300µA at $V_O$nom I_{max} = 1.1mA (short circuit) (Tested between VMICP and VMICN)	Positive microphone supply for customer feeding circuits
	MICP2	*I*	*MC55i:* *R_I = 2kΩ differential* *$V_I$max = 1.03Vpp*	
	VMICN		R_I ~1kOhm	Negative microphone supply
	MICN2	*I*	*MC55i:* *R_I = 2kΩ differential* *$_I$max = 1.03Vpp*	
	AGND		Analog ground	AGND for external audio circuits

Reference:
“Hardware Interface Description”: Section “Signal Description”, see [1] and [2]

3.9 Power Supply Ratings

The power supply ratings for MC55i-W are generally lower than for MC55i.
Reference:
“Hardware Interface Description”: Section “Power Supply Ratings”, see [1] and [2]

4 Software Related Differences

The focus of this chapter is on software related differences between MC55i-W and MC55i.

4.1 Alarm Messages

MC55i-W modules allow for five different alarms to be configured non-volatile. With MC55i only one alarm message is supported. For details see [3]: AT+CALA.

4.2 Power Saving

With MC55i-W the available functionality levels configurable with AT+CFUN have been reduced – the levels 5, 6 and 8 are no longer available. For details see [3]: AT+CFUN.

4.3 Event Indicator

With MC55i-W a new “simtray” indicator reports whether a SIM card tray is empty or inserted – as reported by the CCIN line. Also, a new “steerroam” indicator has been introduced to support so-called steering-of-roaming (“SOR”) techniques. For details see [3]: AT^SIND.

4.4 Tunneling Mode

With MC55i-W a new tunneling mode has been introduced. The mode provides a direct tunnel between the external application and a device connected to the ASC1 UART interface. Input data will be transparently transmitted between a dedicated fourth Mux channel and the second asynchronous interface ASC1 without being interpreted by the module. For details see [3]: AT^SCFG "Serial/Ifc".

4.5 Escape Character Handling

MC55i-W uses escape sequences for its non-UCS2 output: Quotation mark (") and the escape character itself (\, respectively Ö in GSM alphabet) are converted, as well as all characters with a value below 32 (hexadecimal 0x20). For details see [3]: Section 1.6.

4.6 DTMF End-to-End Transmission

With MC55i-W a dedicated audio mode has been introduced to optimize DTMF end-to-end transmission. The DTMF audio mode 6 can be selected by AT command. For details see [3]: AT^SNFS.

The DTMF adapted audio mode 6 means that with MC55i-W the TTY/CTM functionality is no longer available for this mode but should be configured using audio mode 5. For details see [3]: AT^SNFTTY.

4.7 AT Command Set Differences

The following table lists AT Command Set differences, i.e., commands that exist only for a MC55i-W module as well as commands that are only available for a MC55i module.

Please note that the below table lists differences in the set of AT commands available for these products. It does not relate any information on differences within individual commands resp. on features configurable by the same AT command.

For a complete AT command overview (including all differences between MC55i-W and MC55i) please refer to the respective AT Command Specifications, i.e., [3] for MC55i-W and [4] for MC55i.

MC55i-W	MC55i
Configuration commands	
AT^SCFG="Call/ECC"	
AT^SCFG=”GPRS/AutoAttach”	
AT^SCFG="MEopMode/CregRoam"	
AT^SCFG="Serial/Ifc"	
	AT^SCFG="Radio/NWSM"
Status Control Commands	
AT+CMER Mobile equipment event reporting (No longer requires PIN)	
Call related Commands	
AT+CHUP Hang up call (No longer requires PIN)	
Network Service Commands	
AT^SPCL Set preferred cell list	
AT^SRPN Replace operator names	
Supplementary Service Commands	
AT+CHLD (supports Explicit Call Transfer AT+CHLD=4)	
GPRS Commands	
AT+CGEQMIN Rel. 99 Quality of Service profile (minimum acceptable)	
AT+CGEQREQ Rel. 99 Quality of Service profile (requested)	
SIM related Commands	
AT+CRSM Restricted SIM access (No longer requires PIN)	
AT+CSIM Generic SIM access	
AT^SSET Indicate SIM data ready	
Audio Commands	
AT^SNFG Generate tone	
Hardware related Commands	
	AT^SBC Battery charge control
AT^SFDL Firmware download	