

## To JTC1/SC17/WG8 for consideration

### Request to correct insufficiencies in ISO/IEC 10373-6/AM5

Austria asks WG8 to reconsider the further processing of the approved FCD txt of ISO/IEC 10373-6/AM5 as FDIS due to the following reasons:

#### General Reasoning:

The test conditions for higher data rates, which are specified in amendment 5, have been developed very recently. These tests have been evaluated and implemented by testhouses end of 2005 and most test conditions could be successfully verified. However some inconsistencies have been detected and we propose to correct them as described below.

Historically ISO/IEC 10373-6 was developed for default data rate 106 KBps. PCD test signals are generated with a reference antenna that shall be as similar as possible to a real terminal antenna as it is used in the field. The test signal shapes are influenced by various physical PCD antenna parameters most importantly size, shape, material of the printed coil which determine electrical parameters like inductance, parasitic capacitance and quality factor.

After development of high data rate base specifications the test specifications have also been amended to cover the new requirements. A range of allowed PCD signal shapes have been introduced to achieve interoperability.

Type A uses the principle of 100% ASK modulation. This applies for the default data rate as well as for high data rates, however due to real world antenna loading effects the residual modulation factor detected by the PICC, becomes smaller for lower data rates. The current specification allows residual modulation factors (see parameter a in ISO/IEC 14443-2/AM1) of 0 to 0.6 for data rates  $fc/64$ ,  $fc/32$  and  $fc/16$ .

Real world PCDs use one specific antenna for all data rates. Consequently the antenna parameters of real world PCDs need to be designed to cover all data rates. The worst-case condition is the highest specified data rate =  $fc/16$ . In order to comply with the specified maximum residual modulation factor  $a=0.6$  for the data rate  $fc/16$ , typical ePassport PCD antennas will use an electrical quality factor 15 to 30. Consequently the factor a for all other (lower) data rates will become significantly smaller.

#### Theoretical background:

The mathematical formula for the factor a, as detected by the reference PICC is

$$a = \exp -(t*fc*PI/Q)$$

t . pause time [s]

fc . carrier frequency 13.56 MHz

Q . antenna quality factor

Data rate	Pause time [us]	Pause time [fc]
$fc/128$	2.94985	40
$fc/64$	1.47493	20
$fc/32$	0.73746	10
$fc/16$	0.36873	5

Figure 1 shows dependencies of calculated values which have been verified with measurements with the ISO reference antenna and compared with a  $Q=20$  antenna as illustrated in Figure 2.

The measured residual modulation factor is consistently below the calculated number due to amplifier loading effects of the antenna circuit. So the calculated values are effectively worst-case figures.

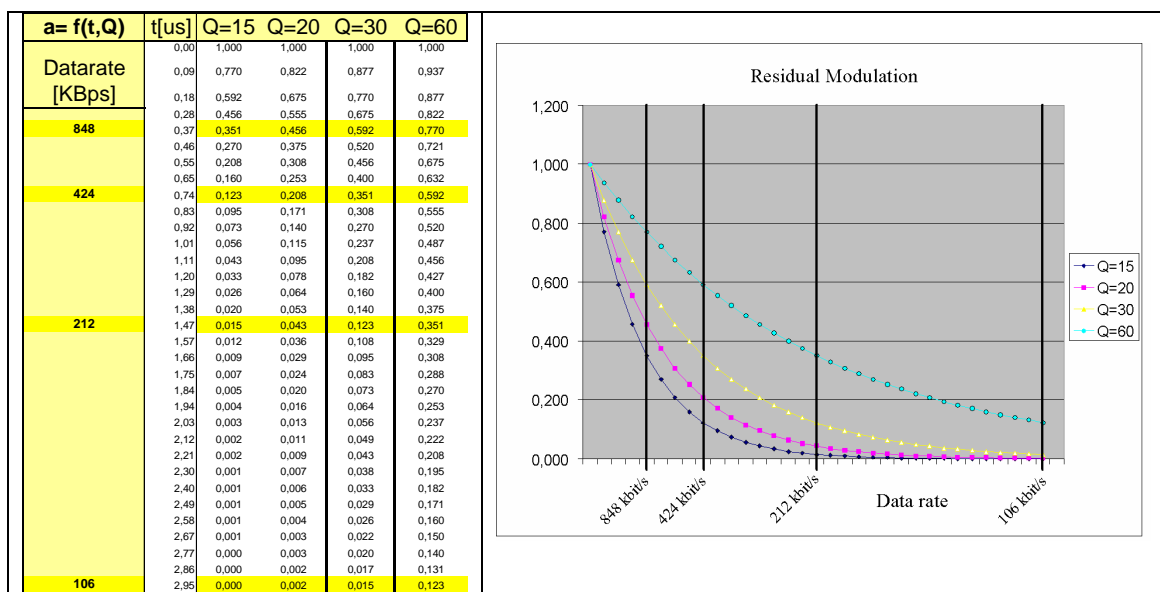


Figure 1

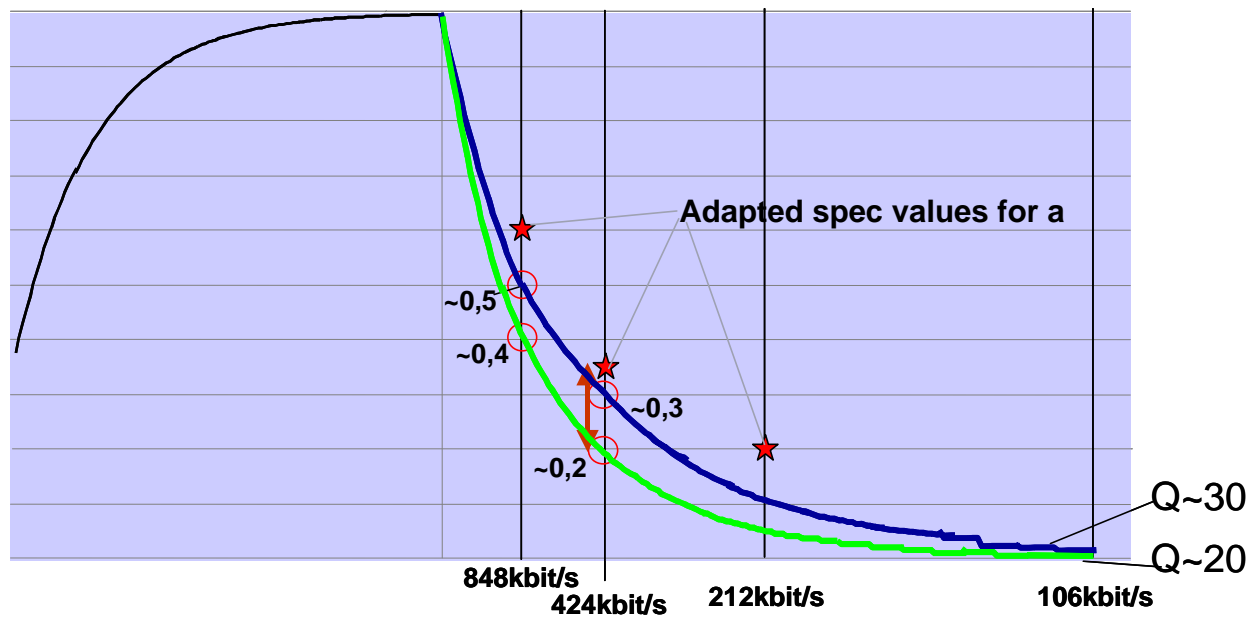


Figure 2

Consequencies:

This intrinsic PCD behaviour shall also be expressed by the test specification instead of a constant maximum a = 0.6, as it is described in the current version.

Therefore Austria believes that under those new circumstances it would be wiser to confirm the few necessary changes to be integrated into the currently proposed FDIS text via the exceptional procedure via a 2nd FCD ballot. This would delay the publication of that Amendment for a few months, but would finally make it earlier available to the market than a future totally revised text of ISO/IEC 10373-6.

The required changes in the AM5 specification are specified in the below change request.

The change of the specification does not affect compliance of PICCs that strictly follow the current specification but it allows design of improved PICCs for higher signal to noise communication stability because PICC's can be configured to only accept those signal amplitudes that are consistent with the chosen data rate.

### Change Request for FPDAM 10373-6/AM5

1. Clause 7.2.2 replace table 2 entitled “Additional test conditions for a bit rate of  $f_c/64$ ” with the following table:

Condition	$H$ (A/m)	t1	t2	t3	a
1	1.5	$20/f_c$	$18/f_c$	$6/f_c$	0.2
2	1.5	$20/f_c$	$18/f_c$	$7/f_c$	= 0.05
3	4.5	$20/f_c$	$18/f_c$	$6/f_c$	0.2
4	4.5	$20/f_c$	$18/f_c$	$7/f_c$	= 0.05
5	7.5	$20/f_c$	$18/f_c$	$6/f_c$	0.2
6	7.5	$20/f_c$	$18/f_c$	$7/f_c$	= 0.05

2. Clause 7.2.2 replace table 3 entitled “Additional test conditions for a bit rate of  $f_c/32$ ” with the following table:

Condition	$H$ (A/m)	t1	t2	t3	a
1	1.5	$10/f_c$	$8/f_c$	$6/f_c$	0.35
2	1.5	$10/f_c$	$8/f_c$	$7/f_c$	= 0.15
3	4.5	$10/f_c$	$8/f_c$	$6/f_c$	0.35
4	4.5	$10/f_c$	$8/f_c$	$7/f_c$	= 0.15
5	7.5	$10/f_c$	$8/f_c$	$6/f_c$	0.35
6	7.5	$10/f_c$	$8/f_c$	$7/f_c$	= 0.15

3. Clause 7.2.2 replace table 4 entitled “Additional test conditions for a bit rate of  $f_c/16$ ” with the following table:

Condition	$H$ (A/m)	t1	t2	t3	a
1	1.5	$5/f_c$	$4/f_c$	$6/f_c$	0.6
2	1.5	$5/f_c$	$4/f_c$	$7/f_c$	= 0.3
3	4.5	$5/f_c$	$4/f_c$	$6/f_c$	0.6
4	4.5	$5/f_c$	$4/f_c$	$7/f_c$	= 0.3
5	7.5	$5/f_c$	$4/f_c$	$6/f_c$	0.6
6	7.5	$5/f_c$	$4/f_c$	$7/f_c$	= 0.3