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ISO/IEC JTC1/SC6 Secretariat Ms. Jooran Lee, KSA (on behalf of KATS)

Korea Technology Center #701-7 Yeoksam-dong, Gangnam-gu, Seoul, 135-513, Republic of Korea ;

Telephone: +82 2 6009 4808 ; Facsimile: +82 2 6009 4819 ; Email : jooran@kisi.or.kr

Discussion on ASK modulation parameters

Contribution to SC6/WG1 Ad Hoc meeting

May 2010

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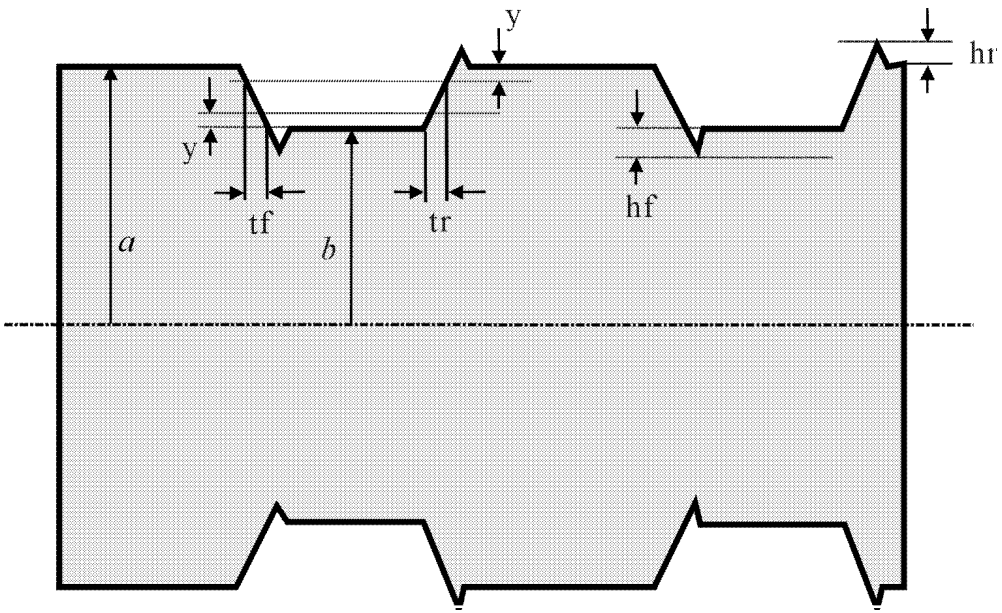
Modulation parameters

- ASK modulation parameters are:
  - ¬ Modulation index
    - Defined as $(a - b)/(a + b)$
  - ¬ Rise/Fall Times
    - tr, tf
  - ¬ Over/Undershoots
    - hr,hf



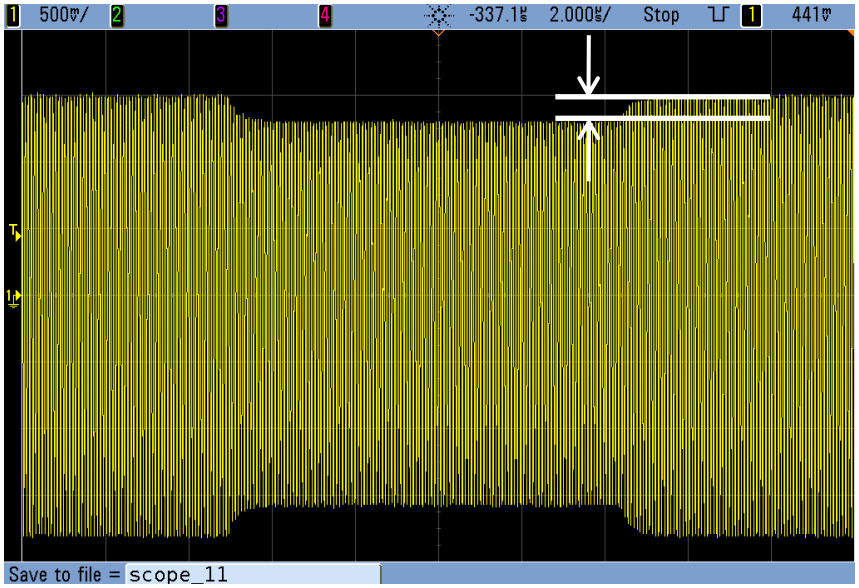
ASK modulation parameters

- Modulation index
  - Several modulation index ranges defined in different standards:
    - ISO/IEC 14443-2:2010
      - Type B: 8 – 14 %
    - EMV 2.0.1
      - Type B: 9.0+0.25 z – 15.0-0.25z, z:=0,1,2,3,4
    - NFC Forum
      - NFC-B: 8 – 15 %
    - ISO/IEC 18092:2003
      - 212k and 424kbit/s: 8 – 30 %
  - Different ranges for the same ASK principle defined.

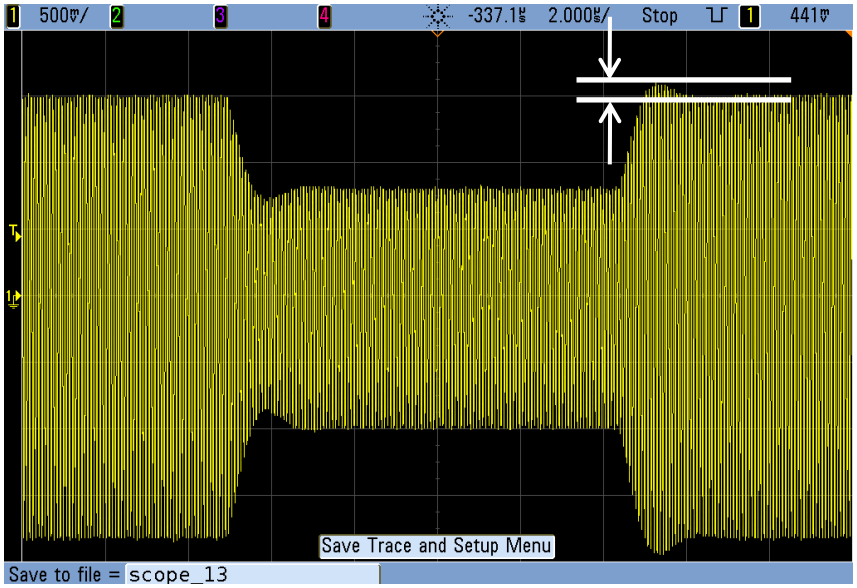
  -> Modulation index range may be harmonized

ASK modulation parameters (2)

- Modulation index(2)
  - ¬ Different ranges may cause:
    - Interoperability problems e.g. Devices and/or Cards only tested up to 15% with Devices and/or Readers generating 30% -> max. modulation index may be reduced to avoid interoperability issues.
    - Sensitivity issues when over/undershoots are present under loaded and close coupled conditions.
    - m=8 %, no overshoot



m = 30 %, 10% overshoot



Rise and Fall Times

- Rise and Fall Times are mainly determined by antenna quality factor.
- One antenna is used for several types and bit rates
- Most demanding specification will define antenna quality factor
- Max rise time of 106 kbit/s is about 1.2 µs to achieve 60 % requirement (t4).
- With same antenna the rise/fall times of other technologies will be the same.
- **-> Max rise/fall time values may be harmonized**.