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## ETS-800 Threshold Test Methods All-In-One

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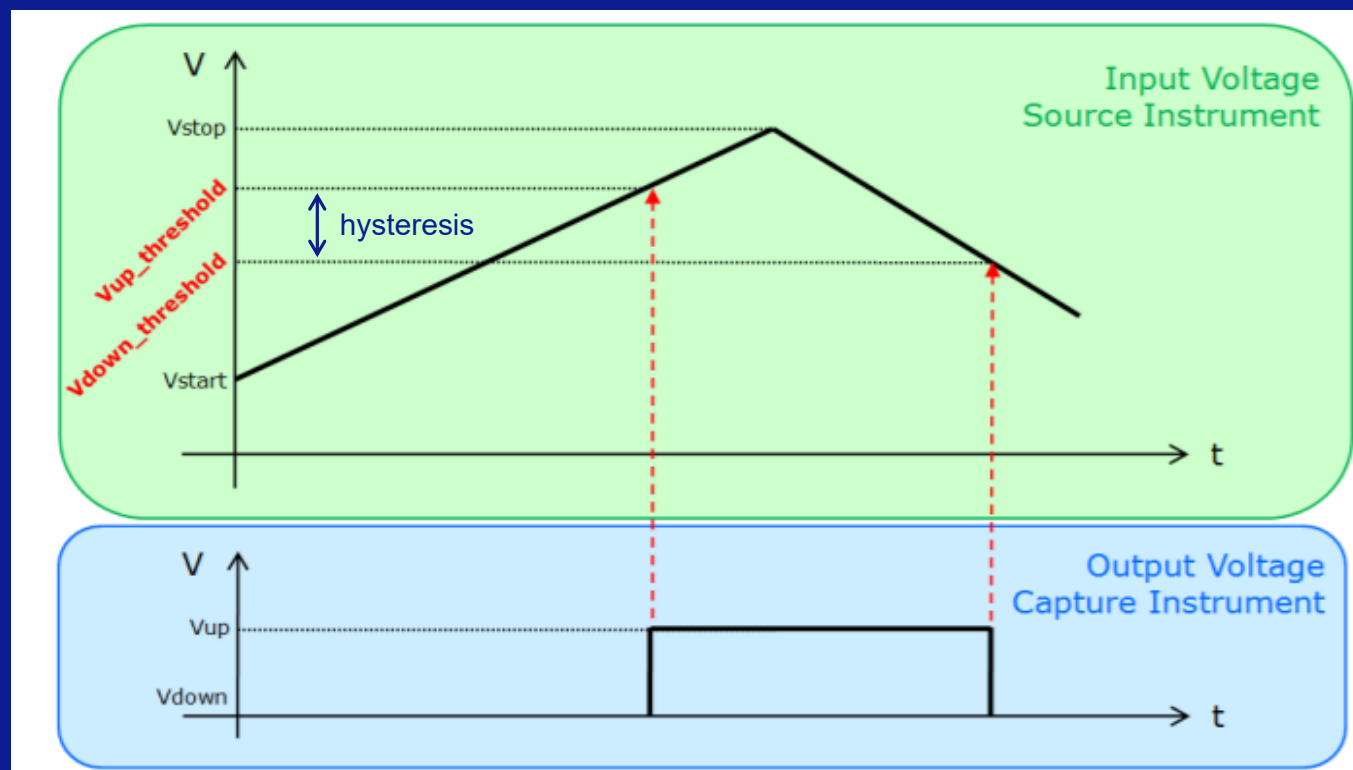


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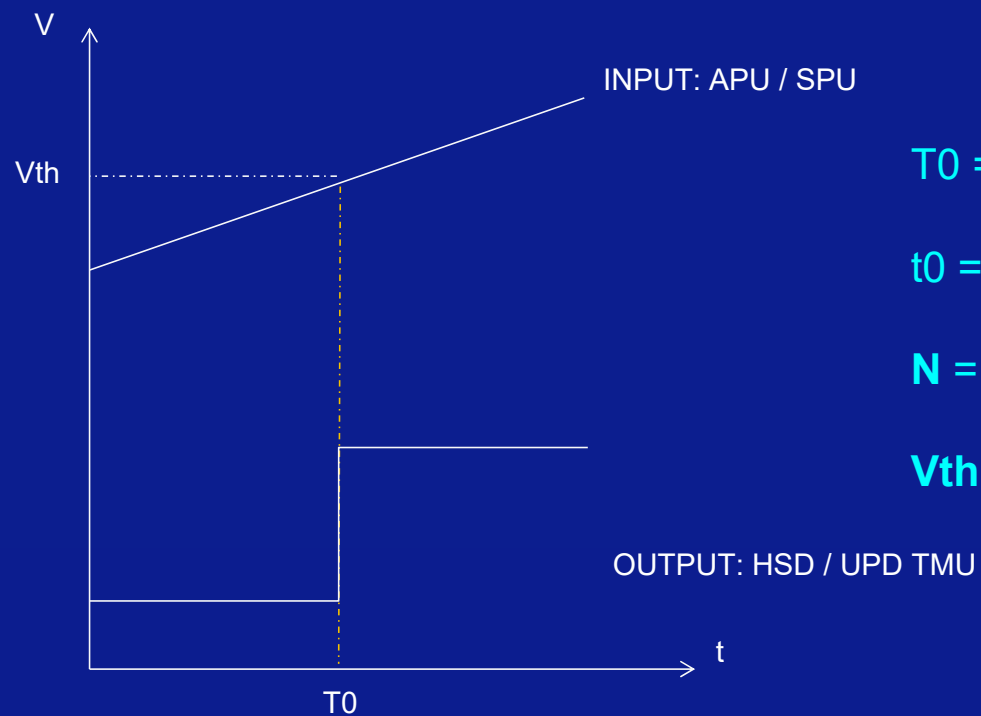
## Threshold Test Concept



↔ APU-32, SPU-2112

↔ APU-32, SPU-2112,  
QMS, HSD-32, UPD-64

## TMU – Time Measurement Unit



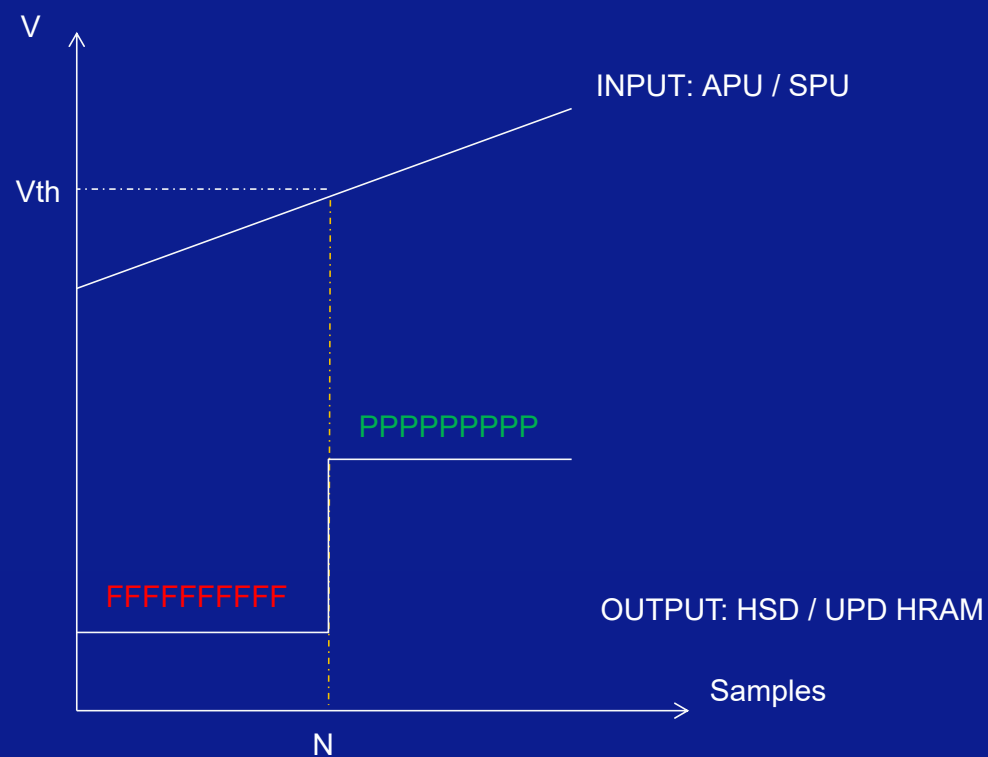
$$T0 = \text{hsd32tsmeasure} / \text{upd64tsmeasure}$$

$$t0 = 1 / \text{SampleRate}$$

$$N = T0 / t0 = \text{Number of samples sourced when } V_{th} \text{ reach}$$

$$V_{th} = \text{InputRamp\_Data}[N-1].\text{pattern}$$

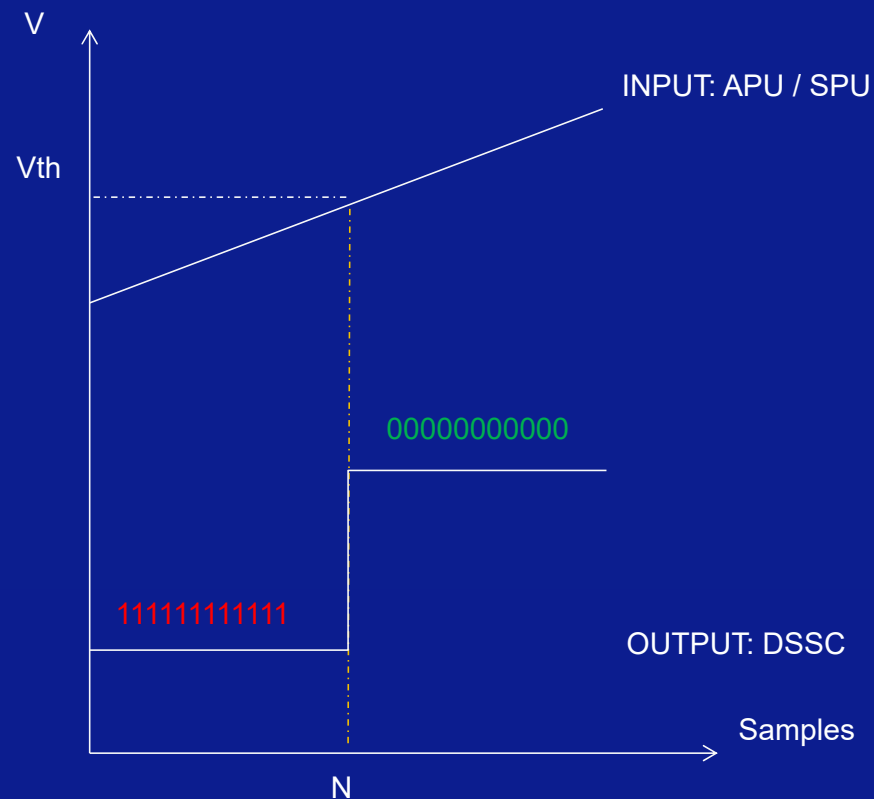
## FailCount



$N = \text{digitalgetfailpins}$

$V_{th} = \text{InputRamp\_Data}[N-1].\text{pattern};$

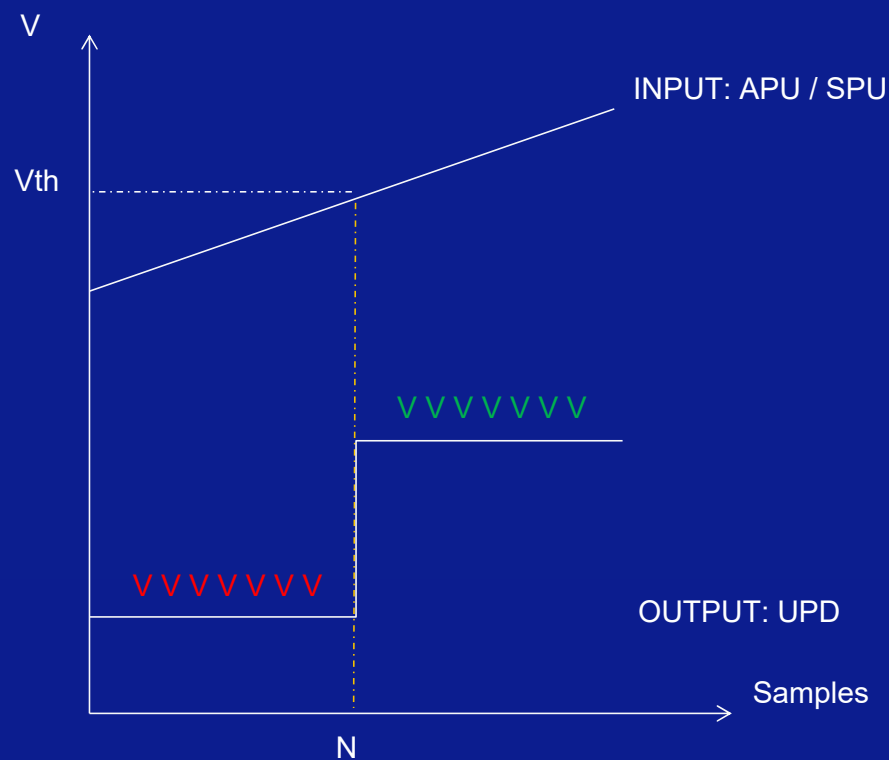
## DSSC – Digital Signal Source Capture



$N = \text{workareacreate}(\text{hsd32\_dssc}) + \text{whereat}$

$V_{th} = \text{InputRamp\_Data}[N-1].\text{pattern}$

## UPD64WhereAt

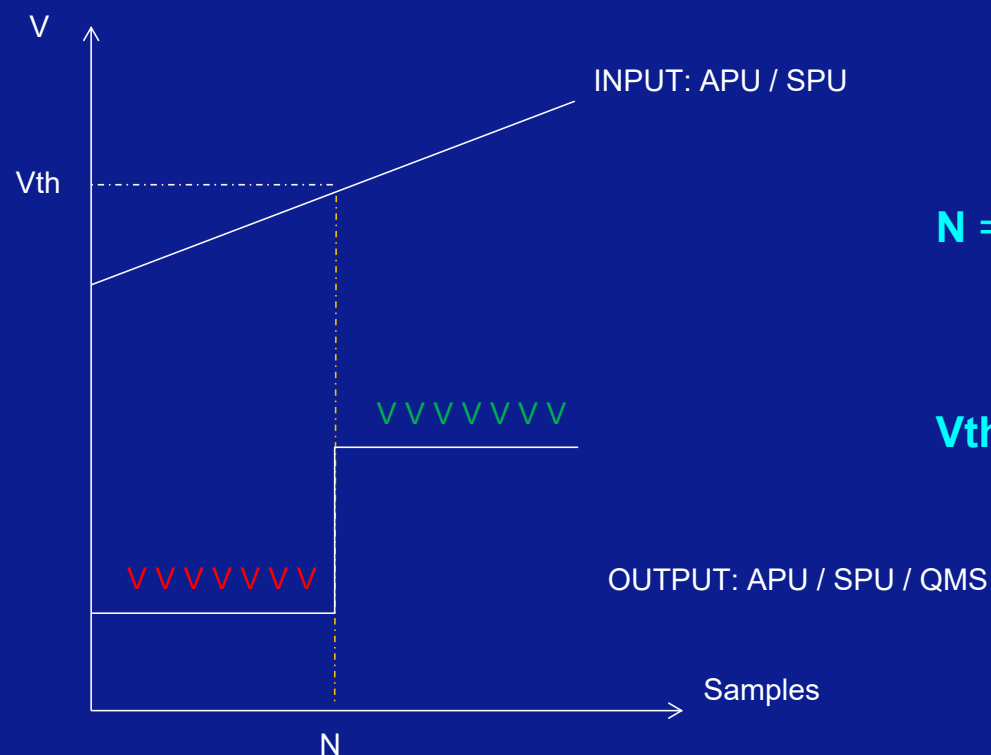


**N = upd64setwhereat + upd64getwhereat**

**Vth = InputRamp\_Data[N-1].pattern**



## A2A – Analog to Analog



**N** = workareacreate + whereat (APU32 or SPU2112) /  
namearray + dspwhereat (QMS) /  
apu32setwhereat + apu32getwhereat (APU32)

**Vth** = InputRamp\_Data[N-1].pattern

## Solutions Comparison

| Test Method        | Trigger Instrument | Test Time | PTE* | Repeatability | Development | Debug |
|--------------------|--------------------|-----------|------|---------------|-------------|-------|
| TMU                | HSD-32, UPD-64     | +++       | ++   | +++           | +++         | ++    |
| FailCount          | HSD-32, UPD-64     | ++        | +++  | +++           | +           | +     |
| DSSC               | HSD-32             | +         | +    | +++           | +           | ++    |
| UPD64WhereAt       | UPD64              | ++        | +++  | +++           | +           | ++    |
| A2A(workareacreat) | SPU-2112           | -         | -    | +++           | +++         | +++   |
| A2A(apu32whereat)  | APU-32             | ++        | +++  | +++           | +++         | +++   |
| A2A(dspwhereat)    | QMS                | ++        | +    | +++           | +++         | +++   |

\* PTE: Parallel Test Efficiency



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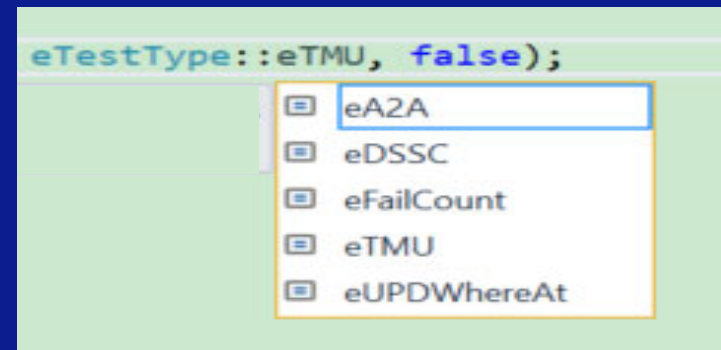
## RampSearch Code Library Functionality

### 1. Support Methods

- Analog to Digital
  - eTMU
  - eFailCount
  - eDSSC
  - eUPDWhereAt
- Analog to Analog
  - eA2A
    - i. workareacreate + whereat
    - ii. namearray + dspwhereat
    - iii. apu32setwhereat + apu32getwhereat

## Functionality

2. Two mail functions call
- LoadRampPat()
  - TestRun()



`crLVPORon = RampSearch.TestRun(ap3V3IN, upADCTEMP, rsLVPORon, eTestType::eTMU, false)`

## Functionality

### 3. Three calculation mode

- Linear calculation
  - $V_{th} = \text{StartValue} + V_{I\_Step} * \text{TransitionSize}$ , ramp be linear and dual ramps are symmetrical
- AWG\_Data
  - pass in awg data,  $V_{th} = \text{Ramp\_Data}[\text{TransitionSize}]. \text{pattern}$ , arbitrary ramp
- Measured data
  - measure input,  $V_{th} = \text{Measured\_Ramp\_Data}[\text{TransitionSize}]$ , arbitrary ramp

### 4. Support both voltage and current force / measure

## Functionality

5. Support dual ramps mode

6. Debug display



```
RampSearch() Debug Info Print START: all meet your test condition?  
Sector= A  
AWG Name= UVLO_VH_OFFon_001  
awg pinname= spU  
awg ramp resource= SPU2112  
awg ramp force type= V  
spu2112 force mode= SPU2112_FV_PATTERN  
spu2112 connect mode= SPU2112_OUTA  
Vrange= SPU2112_30V  
Irange= SPU2112_100MA  
  
TestMethod= eTMU  
ramp count= TwoRamp  
ramp start value= 10.800000 V  
ramp sample size= 520  
second ramp start sample position= 260  
ramp sample rate= 100.000000 Khz  
  
out pinname= hsASC  
First threshold TSC select = TSC_A-A0,TSC_C-A1,  
Second threshold TSC select = TSC_B-A0,TSC_D-A1,  
outpin transition slope = eSrchAUTO, actual: L2H2L  
outpin high level= 3.300000 V (strobe level= 1.650000 V, half)  
  
Calculation Mode: Vth = AWG_Data[iTransPoint].pattern  
Debug Info Print END
```

## Functionality

### 7. Warning, Fatal Error Report



e.g. ThrRampSearch->Trigger pin resource is analog. eTestType is forced to use eA2A( **awg name= awgHVPORon** )

## Conclusion

- ETS-800 can support so many efficient test methods for testing threshold tests providing its flexible instrument functionality.
- Each method has its specific feature, pros and cons. We need to choose an appropriate method based on test conditions, requirements and available resource.
- RampSearch Code Library help greatly to ease the code development and debug procedure.



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