

NorDig-Unified_Test_Plan_ver_2.6.0 – SATELLITE PART

1 Introduction

This document summarizes Silicon Labs understanding of current test plan and the needs of further clarification or update from NorDig when comparing latest test plan requirements with related NorDig unified requirements.

2 Satellite

2.1 Table 2.1 Maximum C/N (Es/No) for QEF reception

Per DVB-S2 standard ETSI EN 302 307-1, DVB-S2 QPSK modes with code rates 1/4, 1/3 and 2/5 are optional for Broadcast services. This has been updated since NorDig Unified requirements version 2.6.

Could Table 2.1 be updated with Note 1 and Note 2 related to Table 3.2 of NorDig Unified requirements.



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NorDig Unified ver. 2.6 diff. 2.5.1 with markups

The satellite NorDig IRD IF back/back error performance for a single carrier shall comply with the requirements given in EN 300 421 (section 5) [13] for DVB-S carriers and in ETSI EN 302 307 [22] for DVB-S2 carriers. The NorDig IRD shall **at least** provide QEF reception for the maximum **required** C/N (Es/No) ratios that are specified in Table 3.2.

Modulation	Code Rate	C/N (Es/No) performance (dB)	
		DVB-S	DVB-S2
QPSK	1/4	n/a	-1.4 (2)
QPSK	1/3	n/a	-0.2 (2)
QPSK	2/5	n/a	0.7 (2)
QPSK	1/2	3.8	2.0
QPSK	3/5	n/a	3.2
QPSK	2/3	5.6	4.1
QPSK	3/4	6.7	5.0
QPSK	4/5	n/a	5.7
QPSK	5/6	7.7	6.2
QPSK	7/8	8.4	n/a
QPSK	8/9	n/a	7.2
QPSK	9/10	n/a	7.4
8PSK	3/5	n/a	6.5
8PSK	2/3	n/a	7.6
8PSK	3/4	n/a	8.9
8PSK	5/6	n/a	10.4
8PSK	8/9	n/a	11.7
8PSK	9/10	n/a	12.0

Table 3.2 Maximum C/N (Es/No) for QEF reception (1)

Note 1: C/N measured for a bandwidth that equals the symbol rate.
 Quasi-Error-Free (QEF) means less than one uncorrected error event per hour, corresponding to (MPEG TS Packet Error Rate) PER= 10⁻⁷ or BER = 10⁻¹⁰ to 10⁻¹¹ at the input of the MPEG-2 demultiplexer

Note 2: For DVB-S2 Modes with QPSK and code rates 1/4, 1/3 and 2/5, the C/N (Es/No) values are optional (recommended) for satellite NorDig IRDs to support.

Note that in NorDig Unified 3.0, performance specified in Table 3.2 includes DVB-S2X requirements for 25 additional modes. So Table 2.1 of NorDig Test Plan 3.0 should be updated accordingly.

2.2 Task 1:4 Symbol and FEC-rate (DVB-S2)

This task is related to both DVB-S and DVB-S2 standard. Therefore "(DVB-S2)" should be removed from title of Task 1:4. DVB-S requirement of Test Case does not match

- section 3.2.2 of NorDig Unified
- test results expected for Task 1:4 (page 30)

DVB-S being QPSK-carrier, the following requirement is expected:

The IRD accepts symbol rates between ~~10-30~~ 7.5 – 45 Mbaud for DVB-S carriers.

Similar typo should be corrected in Test procedure:

Purpose of test:

To verify that the IRD accepts a transport stream with a symbol rate in the range ~~10-30~~ 7.5 – 45 Mbaud

Test procedure and Measurement record do not mention if DVB-S2 modes shall use pilots on or off.

Could NorDig clarify Pilots settings applied in measurement record (Enabled, Disabled or both):

DVB-S2 QPSK carrier, Pilots=...

DVB-S2 8PSK carrier, Pilots=...

Note that NorDig Unified 3.0 introduces 25 DVB-S2X additional modes with symbol rate ranging from 5 to 34 Mbaud. Therefore, task 1:4 of NorDig test plan 3.0 should be updated accordingly.

2.3 Task 1:9 Demodulation (DVB-S2)

This task is related to both DVB-S and DVB-S2 standard. Therefore "(DVB-S2)" should be removed from title of Task 1:9

To clarify expected results, could Test procedure be updated as shown in red:

Expected result:

IRD decodes picture and sound without any visible degradation.

IRD Es/No performance meets the requirements of NorDig Unified 3.2.8.

Note that in NorDig Unified 3.0, performance specified in Table 3.2 includes DVB-S2X requirements for 25 additional modes, ie 200 additional measurements considering current test conditions for Pilots/SR/input power level which almost triple test duration for this task (312 measurements instead of 112).

To reduce test duration of Task 1:9 and considering that

- Pilots/SR are tested in NorDig task 1:4
- Input power levels are tested in NorDig task 1:11

Silicon Labs recommends to measure DVB-S, DVB-S2 and DVB-S2X Task 1:9 performance

- only for pilots=Disabled instead of currently for both pilots Disabled and Enabled
- only for 30Mbaud instead of currently for both 10Mbaud and 30Mbaud
- only at -40dBm instead of currently at both -25dBm and -60dBm

2.4 Task 1:11 Input Signal Level

This task complies with NorDig Unified requirements 2.6.

Note that since NorDig Unified 3.0, minimum sensitivity level has been decreased from -60dBm to -65dBm for all DVB-S, DVB-S2 and DVB-S2X modcodes. So NorDig Test Plan 3.0 for task 1:11 should be updated accordingly.

2.5 Task 1:14 Performance: Digital interference

NorDig Unified 3.2.8 specifies 1.25xSR channel spacing for DVB-S carriers and 1.2xSR channel spacing for DVB-S2 carriers.

To prevent any misunderstanding, Silicon Labs recommends to update Test procedure as shown in red:

UACI/LACI:

Symbol rate and power equal to wanted carrier. Frequency separation from wanted carrier: +/- 1.25 SR for DVB-S carriers and +/-1.2 SR for DVB-S2 carriers.

In Measurement record, frequency spacing between DVB-S 30Mbaud wanted and interferer channels is 36MHz and does not comply with NorDig Unified DVB-S requirement. Silicon Labs recommends to update Test result(s) as shown in red:

DVB-S QPSK FEC=7/8, Roll-off=0.35, Channel spacing = 1.25xSR

Symbol Rate [Mbaud]	IF frequency interferer [MHz]	IF frequency wanted [MHz]	Es/No (C/N) level [dB]	
10	1512,5	1500		
10	1487,5	1475		
30	1537,5	1500		
30	1462,5	1425		

Note that since NorDig Unified 3.0:

- performance specified in Table 3.2 shall be met with a C/N allowance of 0.4dB (instead of 0.5dB). So sentence in Expected result for task 1:14 of NorDig Test Plan 3.0 should be updated as shown in red:

Expected result:

IRD decodes picture and sound without any visible degradation. The minimum Es/No meets the requirement in NorDig Unified specification [1] with ~~0.5~~0.4dB allowance.

minimum sensitivity level has been decreased from -60dBm to -65dBm. So wanted signal level for task 1:14 may be updated accordingly.