TVCC, SWIM, GND and SWIM-RST can be connected to a low-cost 2.54 mm pitch connector or to pin headers available on the target board.

4.2 Connection with STM32 applications

For STM32 developments, the ST-LINK/V2 needs to be connected to the application using the standard 20-pin JTAG flat ribbon provided.

Table 4 summarizes the signals names, functions, and target connection signals of the standard 20-pin JTAG flat ribbon.

Pin no. ST-LINK/V2 connector (CN3) ST-LINK/V2 function Target connection (JTAG) Target connection (SWD) 1 2 VAPP Target VCC MCU VDD(¹) MCU VDD(¹) 3 4 4 TRST JTAG TRST JNTRST GND(²) 4 5 6 GND GND GND(³) GND(³) 5 6 6 TDI JTAG TDO JTDI GND(²) 6 7 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 8 9 10 GND GND GND(³) GND(³) 9 10 11 12 13 14 14 14 15 15 15 15 16 16 17 17 17 16 17 17 17 17 17 17 17 17 17 18 18 19	Table 4. CTAGOVE Cable Confidences					
VAPP Target VCC MCU VDD(1) MCU VDD(1) 3 TRST JTAG TRST JNTRST GND(2) 4 GND GND GND(3) GND(3) 5 TDI JTAG TDO JTDI GND(2) 6 GND GND GND(3) GND(3) 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND(3) GND(3) 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND(3) GND(3) 11 NC Not connected Not connected Not connected 12 GND GND GND(3) GND(3) 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO(4) 14 GND GND GND(3) GND(3) 15 NRST NRST NRST NRST 16 GND GND GND(3) GND(3) 17	Pin no.	connector	ST-LINK/V2 function			
2 3 TRST JTAG TRST JNTRST GND ⁽²⁾ 4 GND GND GND ⁽³⁾ GND ⁽³⁾ 5 TDI JTAG TDO JTDI GND ⁽²⁾ 6 GND GND GND ⁽³⁾ GND ⁽³⁾ 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND ⁽³⁾ GND ⁽³⁾ 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND ⁽³⁾ GND ⁽³⁾ 11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected	1	\/ADD	Target VCC	MCLLVDD(1)		
4 GND GND GND ⁽³⁾ GND ⁽³⁾ 5 TDI JTAG TDO JTDI GND ⁽²⁾ 6 GND GND GND ⁽³⁾ GND ⁽³⁾ 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND ⁽³⁾ GND ⁽³⁾ 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND ⁽³⁾ GND ⁽³⁾ 11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾	2	VALI:	Target VCC	INICO ADD	INICO VDD.	
5 TDI JTAG TDO JTDI GND ⁽²⁾ 6 GND GND GND ⁽³⁾ GND ⁽³⁾ 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND ⁽³⁾ GND ⁽³⁾ 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND ⁽³⁾ GND ⁽³⁾ 11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected	3	TRST	JTAG TRST	JNTRST	GND ⁽²⁾	
6 GND GND GND ⁽³⁾ GND ⁽³⁾ 7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND ⁽³⁾ GND ⁽³⁾ 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND ⁽³⁾ GND ⁽³⁾ 11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	4	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
7 TMS_SWDIO JTAG TMS, SW IO JTMS SWDIO 8 GND GND GND(3) GND(3) 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND(3) GND(3) 11 NC Not connected Not connected Not connected 12 GND GND GND(3) GND(3) 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO(4) 14 GND GND GND(3) GND(3) 15 NRST NRST NRST NRST 16 GND GND GND(3) GND(3) 17 NC Not connected Not connected Not connected 18 GND GND GND(3) GND(3) 19 VDD VDD (3.3V)(5) Not connected Not connected	5	TDI	JTAG TDO	JTDI	GND ⁽²⁾	
8 GND GND GND(3) GND(3) 9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND(3) GND(3) 11 NC Not connected Not connected Not connected 12 GND GND GND(3) GND(3) 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO(4) 14 GND GND GND(3) GND(3) 15 NRST NRST NRST NRST 16 GND GND GND(3) GND(3) 17 NC Not connected Not connected Not connected 18 GND GND GND(3) GND(3) 19 VDD VDD (3.3V)(5) Not connected Not connected	6	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
9 TCK_SWCLK JTAG TCK, SW CLK JTCK SWCLK 10 GND GND GND ⁽³⁾ GND ⁽³⁾ 11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	7	TMS_SWDIO	JTAG TMS, SW IO	JTMS	SWDIO	
10 GND GND GND(3) GND(3) 11 NC Not connected Not connected Not connected 12 GND GND GND(3) GND(3) 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO(4) 14 GND GND GND(3) GND(3) 15 NRST NRST NRST NRST 16 GND GND GND(3) GND(3) 17 NC Not connected Not connected Not connected 18 GND GND GND(3) GND(3) 19 VDD VDD (3.3V)(5) Not connected Not connected	8	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
11 NC Not connected Not connected Not connected 12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	9	TCK_SWCLK	JTAG TCK, SW CLK	JTCK	SWCLK	
12 GND GND GND ⁽³⁾ GND ⁽³⁾ 13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	10	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
13 TDO_SWO JTAG TDI, SWO JTDO TRACESWO ⁽⁴⁾ 14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	11	NC	Not connected	Not connected	Not connected	
14 GND GND GND ⁽³⁾ GND ⁽³⁾ 15 NRST NRST NRST NRST 16 GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	12	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
15 NRST NRST NRST 16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	13	TDO_SWO	JTAG TDI, SWO	JTDO	TRACESWO ⁽⁴⁾	
16 GND GND GND ⁽³⁾ GND ⁽³⁾ 17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	14	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
17 NC Not connected Not connected Not connected 18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	15	NRST	NRST	NRST	NRST	
18 GND GND GND ⁽³⁾ GND ⁽³⁾ 19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	16	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
19 VDD VDD (3.3V) ⁽⁵⁾ Not connected Not connected	17	NC	Not connected	Not connected	Not connected	
	18	GND	GND	GND ⁽³⁾	GND ⁽³⁾	
20 GND GND GND ⁽³⁾ GND ⁽³⁾	19	VDD	VDD (3.3V) ⁽⁵⁾	Not connected	Not connected	
	20	GND	GND	GND ⁽³⁾	GND ⁽³⁾	

Table 4. JTAG/SWD cable connections

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The power supply from the application board is connected to the ST-LINK/V2 debugging and programming board to ensure signal compatibility between both boards.

^{2.} Connect to GND for noise reduction on the ribbon.

^{3.} At least one of this pin must be connected to the ground for correct behavior (connecting all of them is recommended).

^{4.} Optional: for Serial Wire Viewer (SWV) trace.

^{5.} Available on ST-LINK/V2 only and not connected on ST-LINK/V2/OPTO.

Figure 9 shows how to connect the ST-LINK/V2 to a target using the JTAG cable.

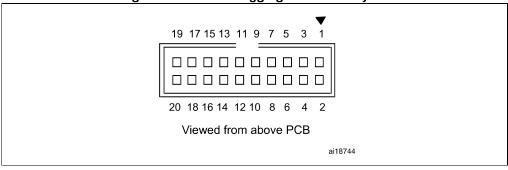
Figure 9. JTAG and SWD connection



- 1. A = Target application board with JTAG connector
- 2. B = JTAG/SWD 20-wire flat cable
- 3. C= STM32 JTAG and SWD target connector

The reference of the connector needed on the target application board is: 2x10C header wrapping 2x40C H3/9.5 (pitch 2.54) - HED20 SCOTT PHSD80.

Figure 10. JTAG debugging flat ribbon layout



Note:

For low cost applications or when the standard 20-pins-2.54mm-pitch-connector footprint is too big, it is possible to implement the Tag-Connect solution to save cost and space on the application board. The Tag-Connect adapter and cable provide a simple reliable means of connecting ST-LINK/V2 or ST-LINK/V2-ISOL to the PCB without requiring a mating

