

Channel and Permanent Link Category 3, 5e & 6 Verification Specifications

UL's Link/Channel Performance Verification Testing Services (PVTs) provide system designers, consultants, installers, contractors and end-users with extra assurance that manufactured system solutions meet the latest industry specifications.

Category 3 Permanent Link Specifications (TIA/EIA 568B.1)								
<ul style="list-style-type: none"> • Insertion Loss (Attenuation) = insertion loss(3 connectors) + insertion loss(cable,90 meters) • Pair to Pair Near End Crosstalk (NEXT) Loss $\geq -20\log(10^{-\text{NEXT cable}/20} + 10^{-\text{NEXT Conn}/20})$ dB • NEXT Conn. $\geq \text{NEXT}(16) - 20\log(f/16)$ dB 								
MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL dB	DELAY ns	DELAY SKEW ns
1	4.2	40.1	--	--	--	--	--	--
4	7.3	30.7	--	--	--	--	--	--
8	10.2	25.9	--	--	--	--	--	--
10	11.5	24.3	--	--	--	--	498	44
16	14.9	21.0	--	--	--	--	--	--

Category 3 Channel Specifications (TIA/EIA 568B.1)								
<ul style="list-style-type: none"> • Insertion Loss (Attenuation) = insertion loss(4 connectors) + insertion loss(cable,90 meters) + insertion loss (cords, 10 meters) • Pair to Pair Near End Crosstalk (NEXT) Loss $\geq -20\log(10^{-\text{NEXT cable}/20} + 2 \cdot 10^{-\text{NEXT Conn}/20})$ dB • NEXT Conn. $\geq \text{NEXT}(16) - 20\log(f/16)$ dB 								
MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL dB	DELAY ns	DELAY SKEW ns
1	3.5	39.1	--	--	--	--	--	--
4	6.2	29.3	--	--	--	--	--	--
8	8.9	24.3	--	--	--	--	--	--
10	9.9	22.7	--	--	--	--	555	50
16	13.0	19.3	--	--	--	--	--	--

Category 5e Permanent Link Specifications (TIA/EIA 568B.1)

- Insertion Loss (Attenuation) = insertion loss(3 connectors) + insertion loss(cable,90 meters)
- Pair to Pair Near End Crosstalk (NEXT) Loss $\geq -20\log(10^{-\text{NEXT cable}/20} + 10^{-\text{NEXT Conn}/20})$ dB
- NEXT Conn. $\geq \text{NEXT}(100) - 20\log(f/100)$ dB
- Power Sum NEXT (PSNEXT) $\geq -20\log(10^{-\text{PSNEXT cable}/20} + 10^{-\text{PSNEXT Conn}/20})$ dB
- PSNEXT Conn. $\geq 40 - 20\log(f/100)$ dB
- Far End Crosstalk (FEXT) $\geq 35.1 - 20\log(f/100)$ dB
- Equal Level Far End Crosstalk (ELFEXT) $\geq -20\log(10^{-\text{ELFEXT cable}/20} + 3 \cdot 10^{-\text{FEXT Conn}/20})$ dB
- Power Sum Equal Level Far End Crosstalk (PSELFEXT) $\geq -20\log(10^{-\text{PSELFEXT cable}/20} + 3 \cdot 10^{-\text{PSFEXT Conn}/20})$ dB
- PSFEXT Loss Conn. $\geq 32.1 - 20\log(f/100)$ dB
- Return Loss: $1 \leq f < 20 = 19\text{dB}$, $20 \leq f \leq 100 = 19 - 10\log(f/20)$

MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL dB	DELAY ns	DELAY SKEW ns
1	2.1	>60	>57	58.6	55.6	19	--	--
4	3.9	54.8	51.8	46.6	43.6	19	--	--
8	5.5	50.0	47.0	40.6	37.5	19	--	--
10	6.2	48.5	45.5	38.6	35.6	19	498	44
16	7.9	45.2	42.2	34.5	31.5	19	--	--
20	8.9	43.7	40.7	32.6	29.6	19	--	--
25	10.0	42.1	39.1	30.7	27.7	18	--	--
31.25	11.2	40.5	37.5	28.7	25.7	17.1	--	--
62.5	16.2	35.7	32.7	22.7	19.7	14.1	--	--
100	21.0	32.3	29.3	18.6	15.6	12	--	--

Category 5e Channel Specifications (TIA/EIA 568B.1)

- Insertion Loss (Attenuation) = insertion loss(4 connectors) + insertion loss(cable,90 meters) + insertion loss (cords, 10 meters)
- Pair to Pair Near End Crosstalk (NEXT) $\geq -20\log(10^{-\text{NEXT cable}/20} + 10^{-\text{NEXT Conn}/20})$ dB
- NEXT Conn. $\geq \text{NEXT}(100) - 20\log(f/100)$ dB
- Power Sum NEXT (PSNEXT) $\geq -20\log(10^{-\text{PSNEXT cable}/20} + 2 \cdot 10^{-\text{PSNEXT Conn}/20})$ dB
- PSNEXT Conn. $\geq 40 - 20\log(f/100)$ dB
- Equal Level Far End Crosstalk (ELFEXT) $\geq -20\log(10^{-\text{ELFEXT cable}/20} + 4 \cdot 10^{-\text{FEXT Conn}/20})$ dB
- Far End Crosstalk (FEXT) $\geq 35.1 - 20\log(f/100)$ dB
- Power Sum Equal Level Far End Crosstalk (PSELFEXT) $\geq -20\log(10^{-\text{PSELFEXT cable}/20} + 4 \cdot 10^{-\text{PSFEXT Conn}/20})$ dB
- PSFEXT Conn. $\geq 32.1 - 20\log(f/100)$ dB
- Return Loss: $1 \leq f < 20 = 17\text{dB}$, $20 \leq f \leq 100 = 17 - 10\log(f/20)$

MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL dB	DELAY ns	DELAY SKEW ns
1	2.2	>60	>57	57.4	54.4	17	--	--
4	4.5	53.5	50.5	45.4	42.4	17	--	--
8	6.3	48.6	45.6	39.3	36.3	17	--	--
10	7.1	47.0	44.0	37.4	34.4	17	555	50
16	9.1	43.6	40.6	33.3	30.3	17	--	--
20	10.2	42.0	39.0	31.4	28.4	17	--	--
25	11.4	40.3	37.3	29.4	26.4	16	--	--
31.25	12.9	38.7	35.7	27.5	24.5	15.1	--	--
62.5	18.6	33.6	30.6	21.5	18.5	12.1	--	--
100	24.0	30.1	27.1	17.4	14.4	10	--	--

Category 6 Permanent Link Specifications (TIA/EIA 568B.2-1)

- Insertion Loss (Attenuation) $\leq 1.687\sqrt{f} + 0.153f + 0.18/\sqrt{f} + 0.00015f^{1.5}$ dB
- Pair to Pair Near End Crosstalk Loss (NEXT) $\geq -20\log(10^{-\text{NEXT cable}/20} + 10^{-\text{NEXT Conn}/20})$ dB
- Pair to Pair Near End Crosstalk Loss (NEXT) Conn. $\geq 54-20\log(f/100)$ dB
- Power Sum NEXT (PSNEXT) $\geq -20\log(10^{-\text{PSNEXT cable}/20} + 10^{-\text{PSNEXT Conn}/20})$ dB
- PSNEXT Conn. $\geq 50-20\log(f/100)$ dB
- Far End Crosstalk (FEXT) Conn. = $43.1 - 20\log(f/100)$ dB
- Power Sum Far End Crosstalk (FEXT) Conn. = $40.1 - 20\log(f/100)$ dB
- Equal Level Far End Crosstalk (ELFEXT) $\geq -20\log(10^{-\text{ELFEXT cable}/20} + 3 \cdot 10^{-\text{FEXT Conn}/20})$ dB
- Power Sum Equal Level Far End Crosstalk (PSELFEXT) $\geq -20\log(10^{-\text{PSELFEXT cable}/20} + 3 \cdot 10^{-\text{PSFEXT Conn}/20})$ dB
- Power Sum Far End Crosstalk (PSFEXT) = $40.1-20\log f/100$ dB
- Return Loss: $1 \leq f < 3 = 21+4\log(f/3)$ dB, $3 \leq f < 10 = 21$ dB, $10 \leq f < 40 = 26-5\log(f)$ dB, $40 \leq f \leq 250 = 34-10\log(f)$ dB

MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL DB	DELAY ns	DELAY SKEW ns
1	1.9	65	62.0	64.2	61.2	19.1	--	--
4	3.5	64.1	61.8	52.1	49.1	21	--	--
8	5.0	59.4	57.0	46.1	43.1	21	--	--
10	5.6	57.8	55.5	44.2	41.2	21	498	44
16	7.0	54.6	52.2	40.1	37.1	20	--	--
20	7.9	53.1	50.7	38.2	35.2	19.5	--	--
25	8.9	51.5	49.1	36.2	33.2	19	--	--
31.25	10.0	50	47.5	34.3	31.3	18.5	--	--
62.5	14.4	45.1	42.7	28.3	25.3	16	--	--
100	18.6	41.8	39.3	24.2	21.2	14	--	--
200	27.4	36.9	34.3	18.2	15.2	11	--	--
250	31.1	35.3	32.7	16.2	31.2	10	--	--

Category 6 Channel Specifications (TIA/EIA 568B.2-1)

- Insertion Loss (Attenuation) $\leq 1.924\sqrt{f} + 0.17f + 0.204/\sqrt{f} + 0.0003f^{1.5}$ dB
- Pair to Pair Near End Crosstalk Loss (NEXT) $\geq -20\log(10^{-\text{NEXT cable}/20} + 2 \cdot 10^{-\text{NEXT Conn}/20})$ dB
- Pair to Pair Near End Crosstalk Loss (NEXT) Conn. $\geq 54 - 20\log(f/100)$ dB
- Power Sum NEXT (PSNEXT) $\geq -20\log(10^{-\text{PSNEXT cable}/20} + 2 \cdot 10^{-\text{PSNEXT Conn}/20})$ dB
- PSNEXT Conn. $\geq 50 - 20\log(f/100)$ dB
- Far End Crosstalk (FEXT) Conn. = $43.1 - 20\log(f/100)$ dB
- Power Sum Far End Crosstalk (FEXT) Conn. = $40.1 - 20\log(f/100)$ dB
- Equal Level Far End Crosstalk (ELFEXT) $\geq -20\log(10^{-\text{ELFEXT cable}/20} + 4 \cdot 10^{-\text{FEXT Conn}/20})$ dB
- Power Sum Equal Level Far End Crosstalk (PSELFEXT) $\geq -20\log(10^{-\text{PSELFEXT cable}/20} + 4 \cdot 10^{-\text{PSFEXT Conn}/20})$ dB
- Power Sum Far End Crosstalk (PSFEXT) = $40.1 - 20\log(f/100)$ dB
- Return Loss: $1 \leq f < 10 = 19$ dB, $10 \leq f < 40 = 24 - 5\log(f)$ dB, $40 \leq f \leq 250 = 32 - 10\log(f)$ dB

MHz	Attenuation dB	NEXT dB	PSNEXT dB	ELFEXT dB	PSELFEXT dB	RL dB	DELAY ns	DELAY SKEW ns
1	2.1	65.0	62.0	63.3	60.3	19	--	--
4	4.0	63.0	60.5	51.2	48.2	19	--	--
8	5.7	58.2	55.6	45.2	42.2	19	--	--
10	6.3	56.6	54.0	43.3	40.3	19	555	50
16	8.0	53.2	50.6	39.2	36.2	18	--	--
20	9.0	51.6	49.0	37.2	34.2	17.5	--	--
25	10.1	50.0	47.3	35.3	32.3	17	--	--
31.25	11.4	48.4	45.7	33.4	30.4	16.5	--	--
62.5	16.5	43.4	40.6	27.3	24.3	14	--	--
100	21.3	39.9	37.1	23.3	20.3	12	--	--
200	31.5	34.8	31.9	17.2	14.2	9	--	--
250	35.9	33.1	30.2	15.3	12.3	8	--	--