

# Rise Time Extender RTE-24A

Advanced TLP/HMM/HBM Solutions

## 1 Features

- Rise time extender with pulse shaping for transmission line pulse (TLP) and common-mode- transfer-immunity (CMTI) pulse generators
- Up to 24 software programmable rise times in the range of 100 ps to 200 ns (customizable)
- $\pm 3$  kV pulse voltage at  $50 \Omega$
- Software driver for remote control and Graphical User Interface (GUI)
- Industrial isolated and EMI/ESD protected USB control interface

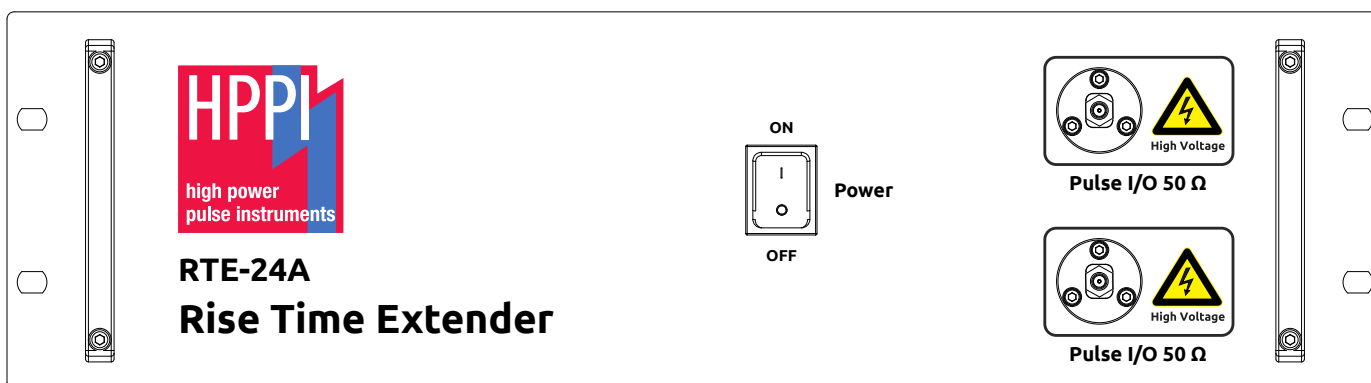


Figure 1: RTE-24A front side view

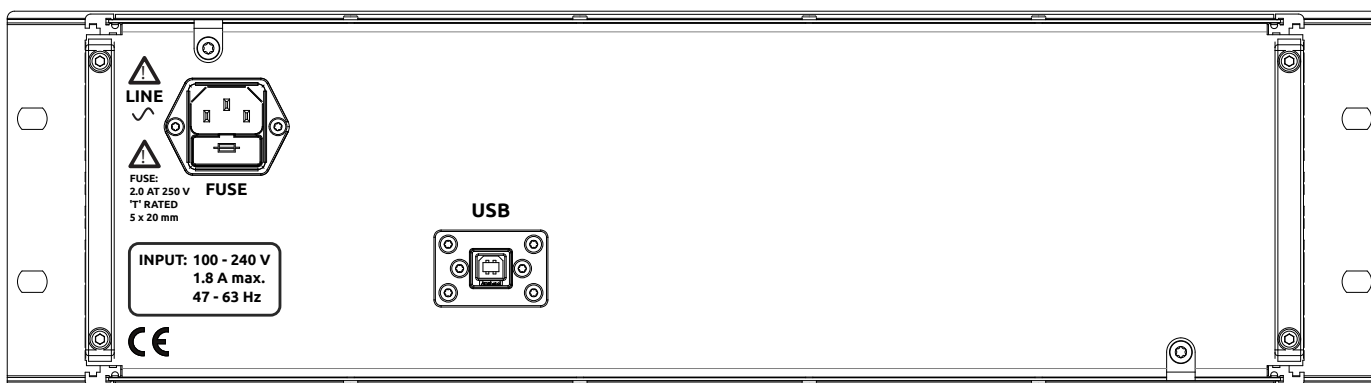


Figure 2: RTE-24A rear side view

## 2 Introduction

The rise time extender RTE-24A is compatible with all TLP and CMTI pulse generators. It is used to set the rise time of the pulse by automated software control.

State of the art isolated data transmission couplers and isolated gated drivers require CMTI performance tests at pulse slew rates in the range of  $50 \text{ V ns}^{-1}$  up to  $250 \text{ V ns}^{-1}$  or even beyond. While IGBTs are at the lower end of the CMTI necessities, SiC and GaN require CMTI performances above  $150 \text{ V ns}^{-1}$ . High performance capacitive couplers can reach  $250 \text{ V ns}^{-1}$ , while magnetic couplers can surpass this performance easily. The weakest CMTI performance is offered by opto-couplers.

Tab. 1 reflects the recommended range of slew rates in the green fields. These slew rates map to a number of 25 rise times for the pulse shaping. As a result a HPPI CMTI tester can cover maximum  $24 + 6$  (optional 8) = 30 (optional 32) rise times.

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			GaN, Super-Junction MOSFET			Automotive, Solar IGBT, SiC	Solar, Fork Lift, Welding SiC, IGBT		
	CMTI [V/ns]		VIORM [V]						
			600	800	1000	1420	1800	2000	2200
1	Rise-Time [ns]	0,6	1000	1333	1667	2367	3000	3333	3667
2		1	600	800	1000	1420	1800	2000	2200
3		1,5	400	533	667	947	1200	1333	1467
4		2	300	400	500	710	900	1000	1100
5		2,25	267	356	444	631	800	889	978
6		2,5	240	320	400	568	720	800	880
7		3	200	267	333	473	600	667	733
8		3,25	185	246	308	437	554	615	677
9		3,5	171	229	286	406	514	571	629
10		4	150	200	250	355	450	500	550
11		4,5	133	178	222	316	400	444	489
12		5	120	160	200	284	360	400	440
13		5,5	109	145	182	258	327	364	400
14		6	100	133	167	237	300	333	367
15		7	86	114	143	203	257	286	314
16		8	75	100	125	178	225	250	275
17		9	67	89	111	158	200	222	244
18		10	60	80	100	142	180	200	220
19		11	55	73	91	129	164	182	200
20		12	50	67	83	118	150	167	183
21		14	43	57	71	101	129	143	157
22		15	40	53	67	95	120	133	147
23		17,5	34	46	57	81	103	114	126
24		20	30	40	50	71	90	100	110
25		30	20	27	33	47	60	67	73
26		35	17	23	29	41	51	57	63
27		40	15	20	25	36	45	50	55
28		55	11	15	18	26	33	36	40

Table 1: Preferred CMTI slew rate to pulse rise time mapping for typical isolated data transmission coupler product applications

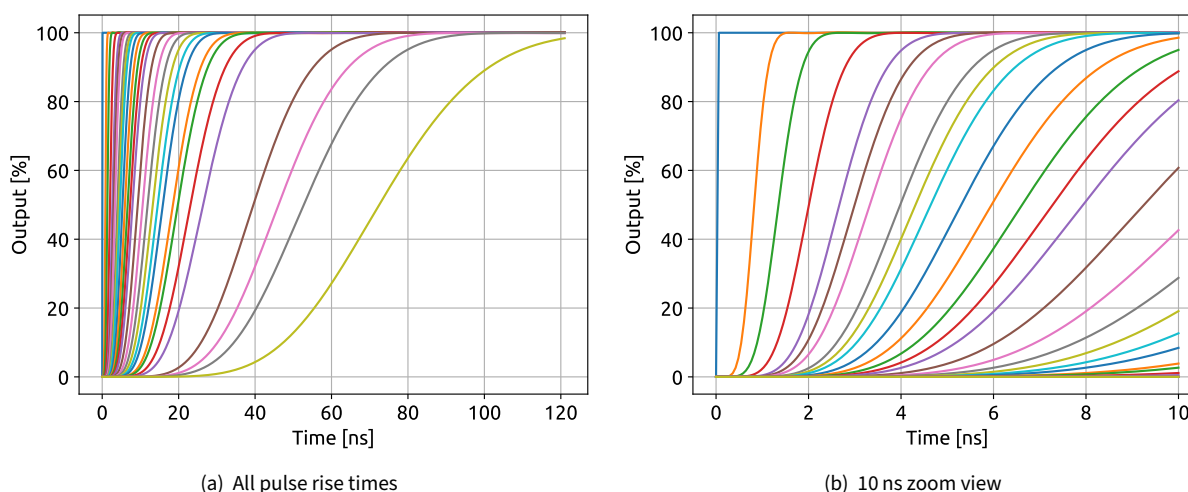


Figure 3: Software programmable rise times

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### 2.1 Measurement Setup

The RTE-24A is always connected in series with the pulse generator at its pulse output. Fig. 4 to Fig. 6 show typical static and dynamic CMTI measurement setups.

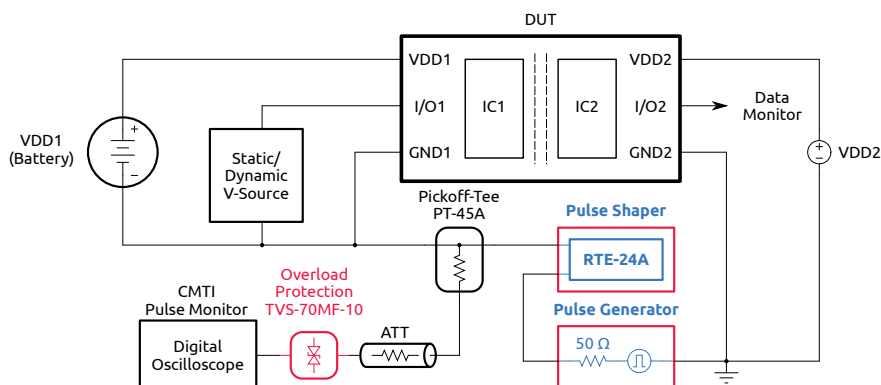


Figure 4: Static open load measurement setup including monitoring

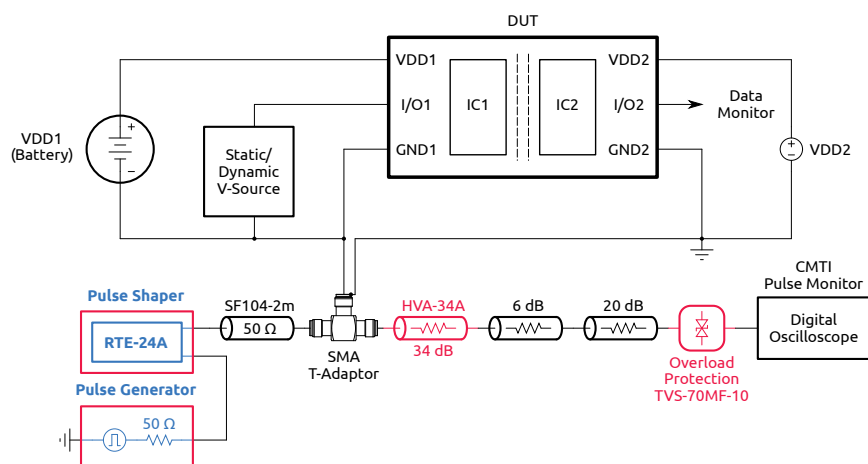


Figure 5: Static terminated load measurement setup including monitoring

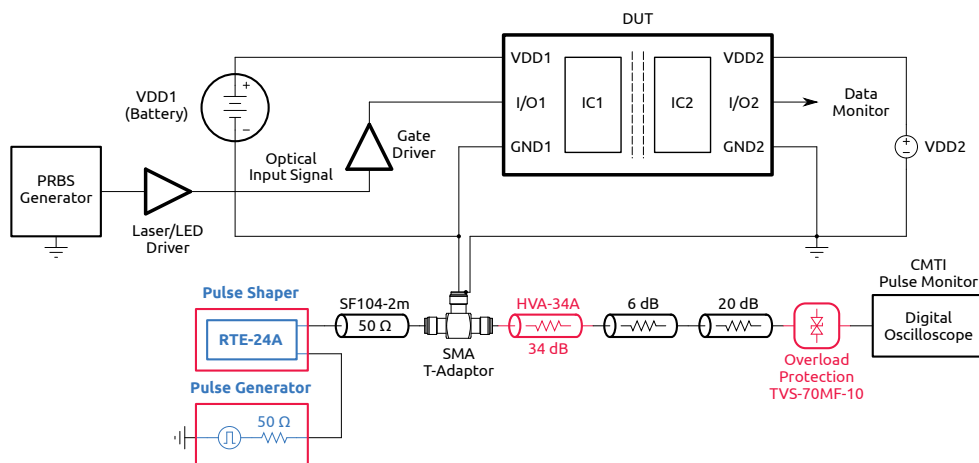


Figure 6: Dynamic terminated load measurement setup including pulse monitoring

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## 3 Specifications

Parameter	Symbol	Limit Values			Unit	Remarks
		Min.	Typ.	Max.		
Pulse voltage	$V_{IO,50\Omega}$	−3		+3	kV	into 50 $\Omega$ <sup>1)</sup>
Output pulse rise time	$t_r$	0.1		200	ns	customized rise times, 24 steps
Digital control interface	-	USB 2.0			-	Industrial isolated and EMI/ESD protected USB 2.0 interface
AC line voltage range	$V_{AC}$	100		240	V	47-63 Hz, max. 1.8 A
Dimensions RTE-24A (W x H x D)	D	428 (482.6) x 132.5 x 485			mm <sup>3</sup>	428 mm body, 482.6 mm rack flange
Weight RTE-24A	W		10		kg	excluding accessories
Pulse I/O connectors	SMA					

<sup>1)</sup> The maximum open load output voltage could reach 6.0 kV according the pulse voltage setting. But in reality the output voltage is limited by the breakdown voltage of the SMA connector and the interconnection devices towards the DUT. The SMA connector interface must be cleaned and fixed tight. The pulse voltage setting must not exceed the interconnection limits. The RTE-24A should not operated with maximum voltage at open load condition.

## 4 Ordering Information

Pos.	Description	Part No.
01	Rise Time Extender	RTE-24A

### General

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