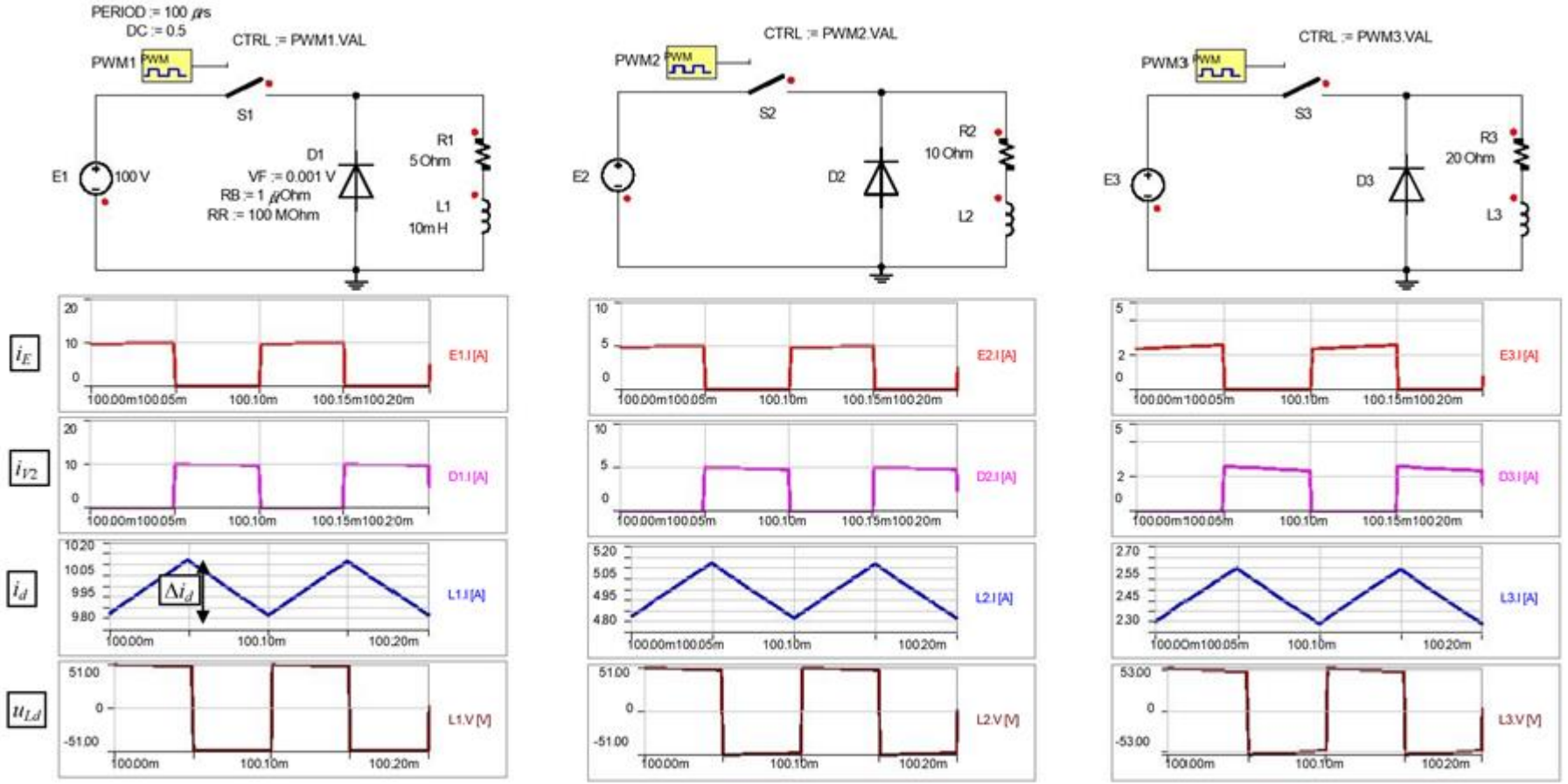
Dependance of the buck converter waveforms on the load resistance R_d



$T_s = 1/f_s$, $U_d(0) = \alpha E$, $I_d(0) = U_d(0)/R_d$, $P_d(0) = U_d(0)\, I_d(0)$, $I_E(0) = P_d(0)/E$, $I_{V2}(0) = I_d(0) - I_E(0)$, $\tau = L_d/R_d$, $\Delta i_{d\uparrow} = [E - U_d(0)]\alpha\, T_s/L_d$, $\Delta i_{d\downarrow} = -U_d(0)(1-\alpha)T_s/L_d$

				R_d, Ω	$U_d(0)$, V	$I_d(0)$, A	$P_d(0)$, W	$I_E(0)$, A	$I_{V2}(0)$, A	τ, s	$\Delta i_{d\uparrow}$, A	$\Delta i_{d\downarrow}$, A
E	100	V		5	50	10,00	500,00	5,00	5,00	0,00200	0,25	-0,25
α	0,5			10	50	5,00	250,00	2,50	2,50	0,00100	0,25	-0,25
f_s	10	kHz		20	50	2,50	125,00	1,25	1,25	0,00050	0,25	-0,25
T_s	100	µs										
L_d	10	mH										

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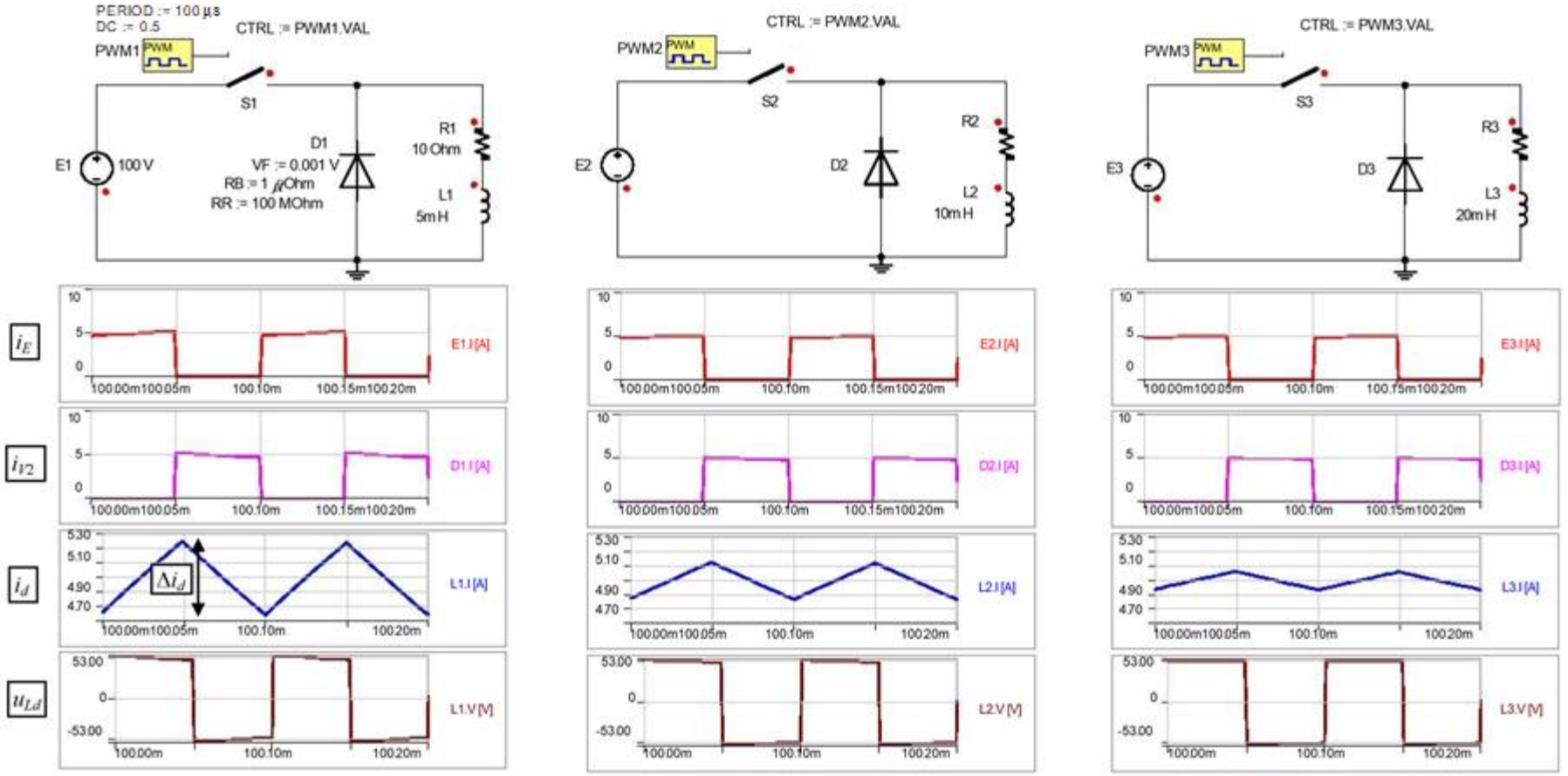
Dependance of the buck converter waveforms on the load iductance L_d



$T_s = 1/f_s$, $U_d(0) = \alpha E$, $I_d(0) = U_d(0)/R_d$, $P_d(0) = U_d(0)\, I_d(0)$, $I_E(0) = P_d(0)/E$, $I_{V2}(0) = I_d(0) - I_E(0)$, $\tau = L_d/R_d$, $\Delta i_{d\uparrow} = [E - U_d(0)]\alpha\, T_s/L_d$, $\Delta i_{d\downarrow} = -\,U_d(0)(1-\alpha)T_s/L_d$

				L_d, H	$U_d(0)$, V	$I_d(0)$, A	$P_d(0)$, W	$I_E(0)$, A	$I_{V2}(0)$, A	τ, s	Δ i_d, A	Δ i_d, A
E	100	V		0,005	50	5,00	250,00	2,50	2,50	0,00050	0,5000	-0,5000
α	0,5			0,01	50	5,00	250,00	2,50	2,50	0,00100	0,2500	-0,2500
f_s	10	kHz		0,02	50	5,00	250,00	2,50	2,50	0,00200	0,1250	-0,1250
T_s	100	µs										
R_d	10	Ω										

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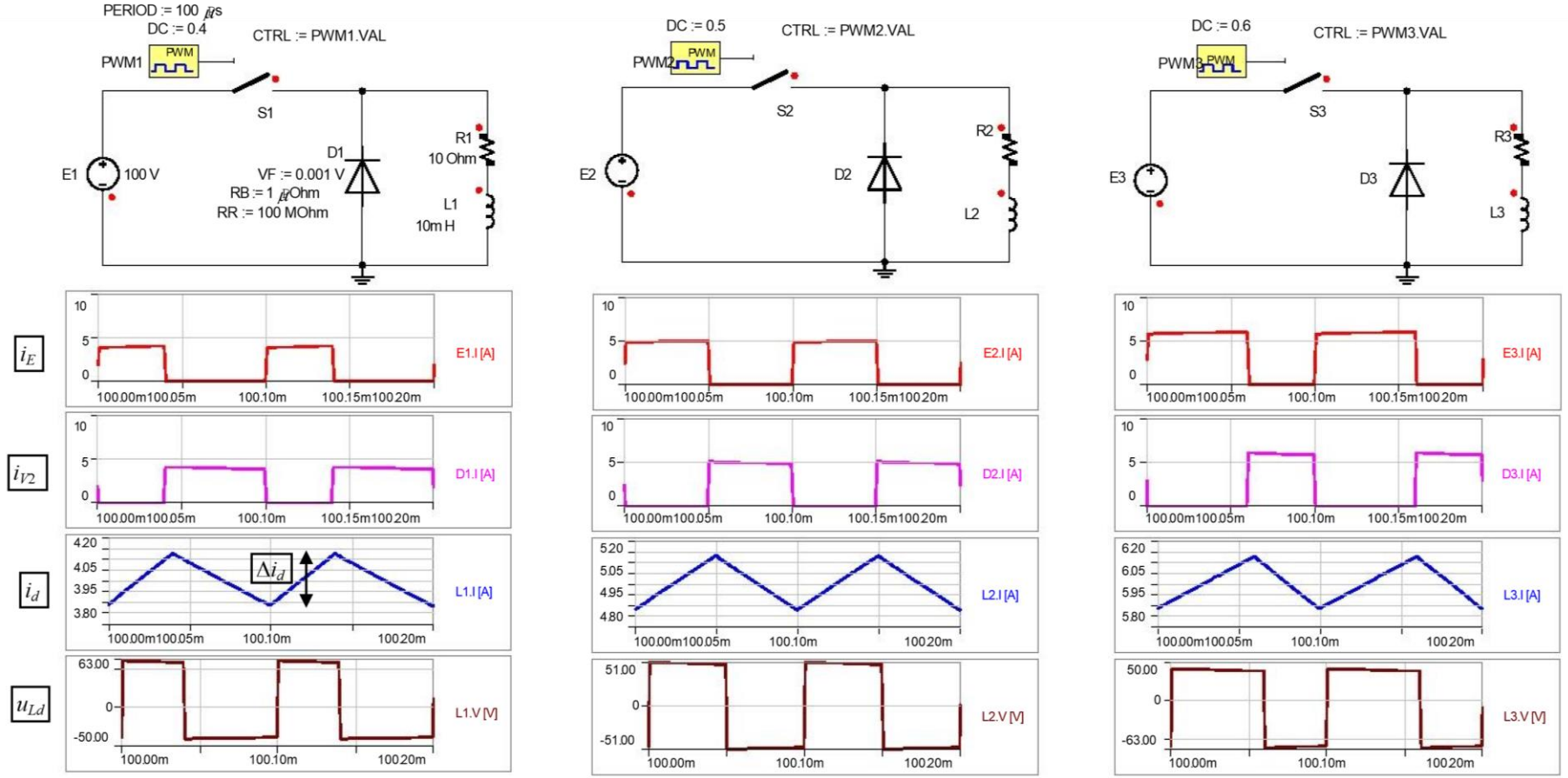
Dependance of the buck converter waveforms on the duty cycle α



$T_s = 1/f_s$, $\tau = L_d/R_d$, $U_d(0) = \alpha E$, $I_d(0) = U_d(0)/R_d$, $P_d(0) = U_d(0)\, I_d(0)$, $I_E(0) = P_d(0)/E$, $I_{V2}(0) = I_d(0) - I_E(0)$, $\Delta i_{d\uparrow} = [E - U_d(0)]\alpha\, T_s/L_d$, $\Delta i_{d\downarrow} = -\,U_d(0)(1-\alpha)T_s/L_d$

E	100	V		α	$U_d(0)$, V	$I_d(0)$, A	$P_d(0)$, W	$I_E(0)$, A	$I_{V2}(0)$, A	τ, ms	$\Delta\, i_d$, A	$\Delta\, i_d$, A
R_d	10	Ω		0,4	40	4,00	160,00	1,60	2,40	1	0,24	-0,24
f_s	10	kHz		0,5	50	5,00	250,00	2,50	2,50	1	0,25	-0,25
T_s	100	µs		0,6	60	6,00	360,00	3,60	2,40	1	0,24	-0,24
L_d	10	mH										

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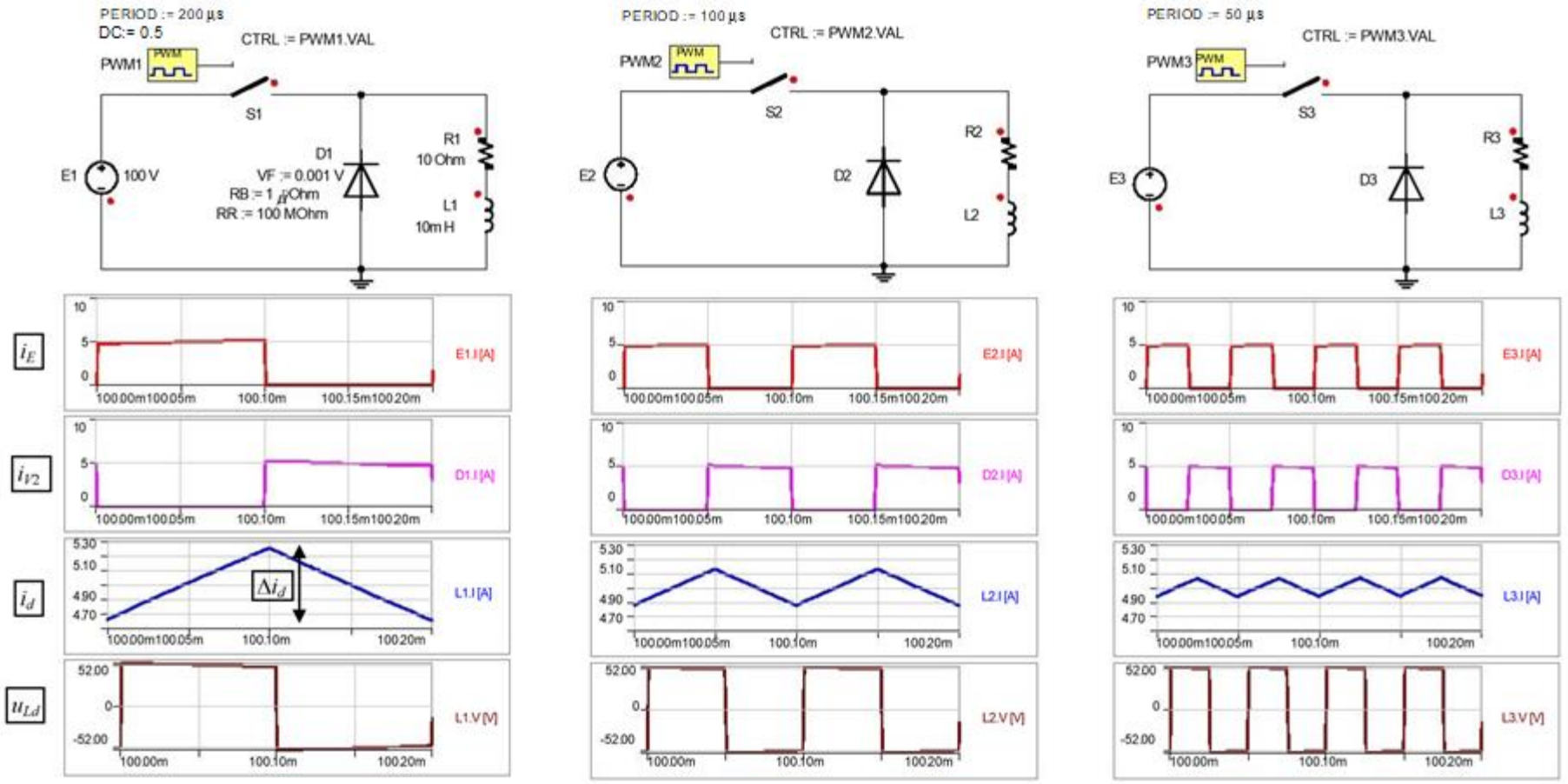
Dependance of the buck converter waveforms on the switching frequency f_s



$\tau = L_d/R_d,\ T_s = 1/f_s,\ U_d(0) = \alpha E,\ I_d(0) = U_d(0)/R_d,\ P_d(0) = U_d(0)\, I_d(0),\ I_E(0) = P_d(0)/E,\ I_{V2}(0) = I_d(0)\ - I_E(0),\ \Delta i_{d\uparrow} = [E - U_d(0)]\alpha\, T_s/L_d,\ \Delta i_{d\downarrow} = -\,U_d(0)(1-\alpha)T_s/L_d$

E	100	V		f_s, kHz	T_S, µs	$U_d(0)$, V	$I_d(0)$, A	$P_d(0)$, W	$I_E(0)$, A	$I_{V2}(0)$, A	$\Delta\, i_d$, A	$\Delta\, i_d$, A
α	0,5			5	200	50	5,00	250,00	2,50	2,50	0,5	-0,5
R_d	10	Ω		10	100	50	5,00	250,00	2,50	2,50	0,25	-0,25
L_d	10	mH		20	50	50	5,00	250,00	2,50	2,50	0,125	-0,125
τ	1	ms										

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