TA - Current Sense

Purpose

They are used to detect high frequency currents, in order to protect an electronic switch against overcurrents in switching converters. They are typically connected at the primary side of medium-high power high frequency transformers, but they are furthermore suitable for currents measurement, in applications which don't require high accuracy, but prompt response of the measurement equipment instead.

Features

They are developed to detect alternate currents in the frequency range of some kHz. By connecting a burden resistance to the secondary side, you can read a proportional voltage signal, isolated from the mains. Depending on the application, other different signal processing are possible, either by using digital or analogue techniques. Anyway, the result is an information that defines for example the protection threshold for the electronic switch or can be used to perform current controls.

These current transformers can be built with any possible turns ratio, depending on what the application requires, but the typical ratios are the following ones: 1:50, 1:100, 1:200, 1:500, 1:1000. As the number of turns increases, the optimum working frequency range moves towards low frequencies, while the minimum working frequency is related to the capability of the core to transfer the current pulse, that is the transfer area of the transformer. The burden resistance sets the output voltage range, and after the designer has chosen the signal level, the minimum working frequency is fixed and for higher frequencies the detection circuit will not show any signal distortion. The maximum working frequency is influenced mainly by two factors: the core material behaviour versus frequency and the number of turns, in fact each pair of turns composes a parasitic capacitor and the total amount of this effect is a big capacity that limits the current transformer's bandwidth.

From a building point of view, high frequency current transformers can be wound either on toroidal cores or on E cores. Toroidal models are available with passing-through hole, but some of them are feasible with the inserted primary turn too. Linear models, based on E cores, are available exclusively with the primary turn inside, so they are especially recommended for control functions in equipments where the low cost is achieved by simply, strong and easy-mounting components. All standard current sense transformers are made according the safety standard IEC 742 for working voltage up to 600 Vrms, with patended bobbins that were developed by Sirio.
Typical working temperature is from -25 to +85°C.
The plastic material of the case is UL94-HB or UL94-V0 on request.

Main features of current sense transformers are the following ones.

- **n** secondary to primary turns ratio, that is the number of secondary turns
- R_S secondary winding's resistance
- I_p rated primary current (rms value)
- L_S rated secondary inductance
- f_n optimum working frequency (or optimum working frequency range)
- **Vt** minimum secondary transfer area at 25°C
- U_{is} maximum working voltage primary/secondary
- U_p isolation voltage primary/secondary
- **D** central hole diameter/primary turn diameter

Code	Ip [Arms]	n	Ls [mH]	fmax [kHz]	Vt [µVs]	Drawing	D [mm]	Uis [Vrms]	Up [Vrms]
Rated primary current Ip = 20 Arms									
TA 150511	20	(1) : 50	1,9	1000	180	1508FA	5	1000	4500
TA 150512	20	(1) : 100	7,5	400	400	1508FA	5	1000	4500
TA 150513	20	(1) : 200	30,0	100	850	1508FA	5	1000	4500
TA 150521	20	(1) : 50	4,5	500	160	1508FA	5	1000	4500
TA 150522	20	(1) : 100	19,0	200	360	1508FA	5	1000	4500
TA 150523	20	(1) : 200	76,0	50	750	1508FA	5	1000	4500
TA 150524	20	(1) : 500	475,0	10	1800	1508FA	5	1000	4500
Rated primary current Ip = 25 Arms									
TA 150320	25	(1) : 200	100	80	500	150320	6	750	3500
TA 150563	25	(1) : 1000	5000	10	2500	1508FB	6	750	4000
Rated primary current Ip = 70 Arms									
TA 153201	70	(1) : 50	11,5	500	650	153A	9	1000	4500
TA 153202	70	(1) : 100	45	200	1300	153A	9	1000	4500
TA 153203	70	(1) : 200	180	50	2700	153A	9	1000	4500
TA 153204	70	(1) : 500	1130	20	7500	153A	9	1000	4500
TA 153205	70	(1) : 1000		10	15000	153A	9	1000	4500
TA 153206	70	(1) : 50	11,5	500	650	153B	9	1000	4500
TA 153207	70	(1) : 100	45	200	1300	153B	9	1000	4500
TA 153208	70	(1) : 200	180	50	2700	153B	9	1000	4500
TA 153209	70	(1) : 500	1130	20	7500	153B	9	1000	4500
TA 153210	70	(1) : 1000		10	15000	153B	9	1000	4500
Various rated primary current on the 152 size									
TA 152009	100	(1) : 100	31	60	2250	152A	13	1000	4000
TA 152043	200	(1) : 100	31	60	2250	152B	13	1000	4000
TA 152056	60	(1) : 200	124	25	4500	152A	13	1000	4000
TA 152059	100	(1) : 200	124	25	4500	152B	13	1000	4000

Code	Ip [Arms]	n	Ls [mH]	fn [kHz]	Vt [µVs]	Drawing	D [mm]	Uis [Vrms]	Up [Vrms]
Rated primary current Ip = 20 Arms									
TA 150621	20	1 : 100	10	5 + 100	550	15062X	1,2	440	4000
TA 150622	20	1 : 200	40	1 + 50	1100	15062X	1,2	440	4000
TA 150624	20	1 : 500	250	0,1 + 20	2700	15062X	1,2	440	4000
TA 150625	20	1 : 1000	1000	0,05 + 10	6000	15062X	1,2	440	4000
Rated primary current Ip = 40 Arms									
TA 150651	40	1 : 100	18	5 + 100	600	15065X	2,0	440	4200
TA 150652	40	1 : 200	72	1 + 50	1200	15065X	2,0	440	4200
TA 150654	40	1 : 500	450	0,1 + 20	3000	15065X	2,0	440	4200
TA 150655	40	1 : 1000	1800	0,05 + 10	6000	15065X	2,0	440	4200
Rated primary current Ip = 50 Arms									
TA 150641	50	1 : 100	21	5 + 100	850	15064X	2,3	480	4680
TA 150642	50	1 : 200	86	1 + 50	1900	15064X	2,3	480	4680
TA 150644	50	1 : 500	537	0,1 + 20	4600	15064X	2,3	480	4680
TA 150645	50	1 : 1000	2150	0,05 + 10	9000	15064X	2,3	480	4680
Rated primary current Ip = 70 Arms									
TA 150671	70	1 : 100	31	5 + 100	1400	15067X	3,5	600	5000
TA 150672	70	1 : 200	124	1 + 50	2800	15067X	3,5	600	5000
TA 150674	70	1 : 500	775	0,1 + 20	7000	15067X	3,5	600	5000
TA 150675	70	1 : 1000	3100	0,05 + 10	14000	15067X	3,5	600	5000