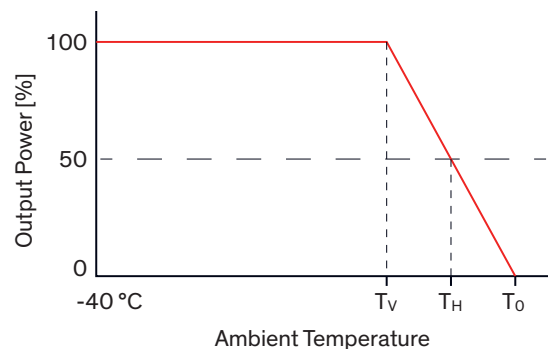
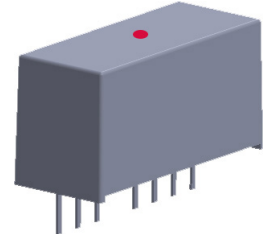


### Thermal Consideration

#### Environment temperature

It is a physical condition that power conversion over a galvanic isolation comes along with some power loss. This power loss is transformed to heat which might reduce the lifetime of electronic components. It is our design guideline to use best resistant components and to optimize the dissipation of internal heat. But please take in consideration that the environment has an impact on the heat exchange process and the heat emission of the DC/DC converter can have an impact on other components nearby. Avoid heat accumulation! Operating temperature range is typically specified for an ambient with free air convection. If free air convection is not given it is recommended to simulate the worst case condition (concerning environment temperature and power) and measure the temperature at the point as per below.

The temperature at this point should not exceed 105°C in the application.



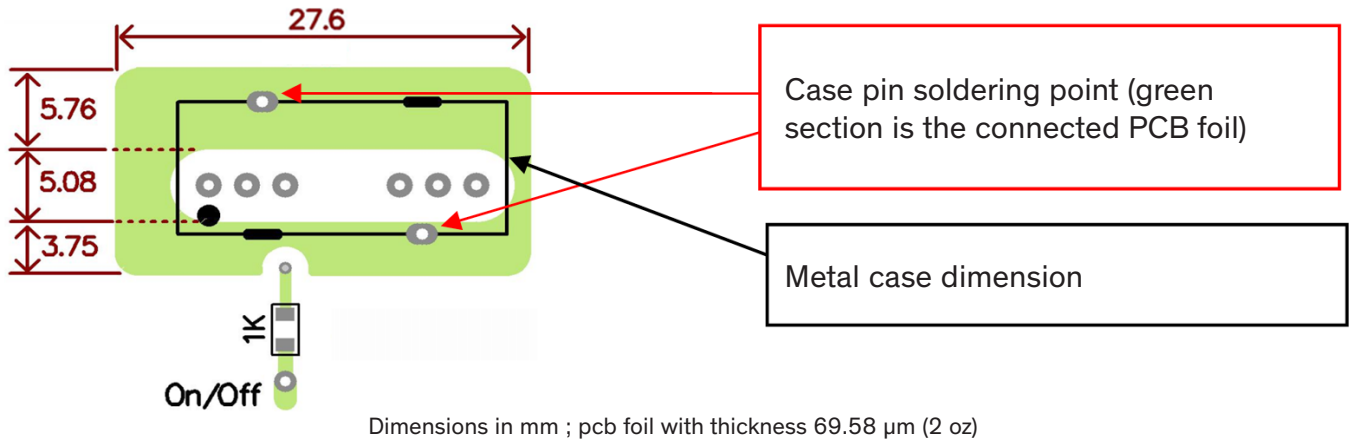
#### Operating temperature ranges and power derating with natural convection

Models	Models with Metal Casing									Models with Plastic Casing (Suffix -P)								
	20 LFM (natural convection)			100 LFM			300 LFM			20 LFM (natural convection)			100 LFM			300 LFM		
Single output	TV	TH	T0	TV	TH	T0	TV	TH	T0	TV	TH	T0	TV	TH	T0	TV	TH	T0
TMR 9-1210	57	78	100	72	86	100	83	91	100	50	75	100	63	82	100	74	87	100
TMR 9-1211	57	79	100	72	86	100	83	91	100	50	75	100	64	82	100	74	87	100
TMR 9-1219	62	82	100	75	88	100	85	92	100	54	77	100	67	84	100	77	88	100
TMR 9-1212	65	83	100	77	88	100	86	92	100	57	78	100	69	84	100	77	89	100
TMR 9-1213	67	84	100	78	89	100	87	93	100	59	79	100	71	85	100	79	90	100
TMR 9-1215	70	85	100	81	90	100	88	94	100	63	81	100	73	87	100	80	91	100
TMR 9-2410	58	79	100	73	86	100	83	92	100	50	75	100	63	82	100	74	87	100
TMR 9-2411	62	82	100	75	88	100	85	92	100	54	77	100	67	83	100	77	88	100
TMR 9-2419	65	83	100	77	88	100	86	93	100	58	79	100	69	84	100	78	89	100
TMR 9-2412	68	84	100	79	89	100	88	94	100	61	80	100	72	86	100	79	90	100
TMR 9-2413	74	87	100	83	92	100	89	95	100	67	84	100	76	88	100	83	92	100
TMR 9-2415	72	86	100	82	92	100	89	94	100	65	83	100	75	88	100	81	91	100
TMR 9-4810	60	80	100	74	87	100	83	91	100	53	76	100	65	83	100	75	88	100
TMR 9-4811	58	79	100	72	86	100	83	91	100	50	75	100	64	82	100	74	87	100
TMR 9-4819	67	84	100	78	89	100	87	93	100	60	80	100	71	85	100	79	90	100
TMR 9-4812	68	84	100	79	90	100	87	93	100	62	81	100	72	86	100	79	90	100
TMR 9-4813	67	84	100	78	89	100	87	93	100	61	80	100	72	86	100	79	90	100
TMR 9-4815	70	85	100	81	90	100	88	94	100	63	82	100	73	87	100	81	91	100
Dual output																		
TMR 9-1221	60	80	100	74	87	100	83	91	100	52	76	100	65	83	100	75	88	100
TMR 9-1222	63	82	100	71	85	100	85	93	100	56	78	100	68	84	100	77	88	100
TMR 9-1223	69	84	100	80	90	100	88	94	100	62	81	100	73	86	100	80	90	100
TMR 9-2421	63	82	100	76	88	100	85	92	100	55	78	100	67	84	100	77	88	100
TMR 9-2422	71	86	100	81	91	100	88	94	100	64	82	100	74	87	100	81	91	100
TMR 9-2423	62	81	100	75	87	100	84	92	100	54	77	100	67	83	100	77	88	100
TMR 9-4821	63	81	100	75	88	100	84	92	100	55	77	100	67	83	100	77	88	100
TMR 9-4822	60	80	100	74	87	100	83	92	100	53	77	100	66	83	100	76	88	100
TMR 9-4823	63	82	100	76	88	100	85	92	100	57	78	100	68	84	100	78	89	100

### Thermal Consideration

#### PCB layout suggestion

For reducing the case temperature and thus increasing the modul life time, the following PCB layout is suggested.



#### BOTTOM VIEW

The following table shows the effect of the suggested PCB layout.

Model: TMR 9-4815WI (Vin=48V; Full Load)				
Conduction	Ambient temperature	Metal case temperature	Temperature difference	Images of thermal camera
Case pin is not connected to PCB foil circuit.	28.3°C	59.1°C	30.8°C	
Case pin is connected to PCB foil circuit.	28.2°C	54.8°C	26.6°C	