


## Power Rectifier Diodes (T-Modules), 40 A to 110 A



D-55

### FEATURES

- Electrically isolated base plate
- Types up to 1200 V<sub>RRM</sub>
- 3500 V<sub>RMS</sub> isolating voltage
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL E78996 approved 
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level



RoHS  
COMPLIANT

### PRODUCT SUMMARY

I <sub>F(AV)</sub>	40 A to 110 A
Type	Modules - Diode, High Voltage

### DESCRIPTION

These series of T-modules use standard recovery power rectifier diodes. The semiconductors are electrically isolated from the metal base, allowing common heatsink and compact assembly to be built.

Applications include power supplies, battery charges, welders, motor controls and general industrial current rectification.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	T40HF	T70HF	T85HF	T110HF	UNITS
I <sub>F(AV)</sub>		40	70	85	110	A
	T <sub>C</sub>	85	85	85	85	°C
I <sub>F(RMS)</sub>		63	110	134	173	A
I <sub>FSM</sub>	50 Hz	570	1200	1700	2000	A
	60 Hz	600	1250	1800	2100	
I <sup>2</sup> t	50 Hz	1630	7100	14 500	20 500	A <sup>2</sup> s
	60 Hz	1500	6450	13 500	18 600	
I <sup>2</sup> √t		16 300	70 700	148 700	204 300	A <sup>2</sup> √s
V <sub>RRM</sub>		100 to 1200				V
T <sub>J</sub>		- 40 to 150				°C

# T40HF..., T70HF..., T85HF..., T110HF... Series



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## ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 25 °C μA
T40HF... T70HF... T85HF... T110HF...	10	100	150	100
	20	200	300	
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	

FORWARD CONDUCTION									
PARAMETER	SYMBOL	TEST CONDITIONS			T40HF	T70HF	T85HF	T110HF	UNITS
Maximum average forward current at case temperature	I <sub>F(AV)</sub>	180° conduction, half sine wave			40	70	85	110	A
					85	85	85	85	°C
Maximum RMS forward current	I <sub>F(RMS)</sub>				63	110	134	173	A
Maximum peak, one-cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum	570	1200	1700	2000	A
		t = 8.3 ms			600	1250	1800	2100	
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		480	1000	1450	1700	
		t = 8.3 ms			500	1050	1500	1780	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reappplied		1630	7100	14 500	20 500	A <sup>2</sup> s
		t = 8.3 ms			1500	6450	13 500	18 600	
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		1150	5000	10 500	14 500	
		t = 8.3 ms			1050	4570	9600	13 200	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reappplied			16 300	70 700	148 700	204 300	A <sup>2</sup> √s
Low level value of threshold voltage	V <sub>F(TO)1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum			0.66	0.76	0.68	0.68	V
High level value of threshold voltage	V <sub>F(TO)2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum			0.84	0.95	0.90	0.86	
Low level value of forward slope resistance	r <sub>f1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum			4.3	2.4	1.76	1.56	mΩ
High level value of forward slope resistance	r <sub>f2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum			3.1	1.7	1.08	1.12	
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>FM</sub> = π × I <sub>F(AV)</sub> , T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs square pulse Average power = V <sub>F(TO)</sub> × I <sub>F(AV)</sub> + r <sub>f</sub> × (I <sub>F(RMS)</sub> ) <sup>2</sup>			1.30	1.35	1.27	1.35	V



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BLOCKING							
PARAMETER	SYMBOL	TEST CONDITIONS	T40HF	T70HF	T85HF	T110HF	UNITS
Maximum peak reverse leakage current	$I_{RRM}$	$T_J = 150\text{ }^\circ\text{C}$	15	15	20	20	mA
RMS isolation voltage	$V_{ISOL}$	50 Hz, circuit to base, all terminals shorted $T_J = 25\text{ }^\circ\text{C}$ , $t = 1\text{ s}$	3500	3500	3500	3500	V

THERMAL AND MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES				UNITS
			T40HF	T70HF	T85HF	T110HF	
Maximum junction operating and storage temperature range	$T_J, T_{Stg}$		- 40 to 150				$^\circ\text{C}$
Maximum thermal resistance, junction to case per junction	$R_{thJC}$	DC operation	1.36	0.69	0.62	0.47	K/W
Maximum thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface smooth, flat and greased	0.2				
Mounting torque, $\pm 10\%$ to heatsink terminals		Non-lubricated threads	M3.5 mounting screws <sup>(1)</sup>		1.3 $\pm$ 10 %		Nm
			M5 screw terminals		3 $\pm$ 10 %		
Approximate weight		See dimensions - link at the end of datasheet	54				g
Case style			T-module (D-55)				

**Note**

<sup>(1)</sup> A mounting compound is recommended and the torque should be rechecked after a period of about 3 hours to allow for the spread of the compound

$\Delta R$ CONDUCTION PER JUNCTION											
DEVICES	SINUSOIDAL CONDUCTION AT $T_J$ MAXIMUM					RECTANGULAR CONDUCTION AT $T_J$ MAXIMUM					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
T40HF...	0.12	0.14	0.18	0.27	0.46	0.09	0.15	0.20	0.28	0.46	K/W
T70HF...	0.09	0.11	0.14	0.20	0.35	0.07	0.11	0.15	0.21	0.35	
T85HF...	0.08	0.09	0.12	0.18	0.31	0.06	0.10	0.13	0.19	0.31	
T110HF...	0.05	0.07	0.09	0.14	0.23	0.05	0.08	0.10	0.15	0.24	

**Note**

• Table shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC

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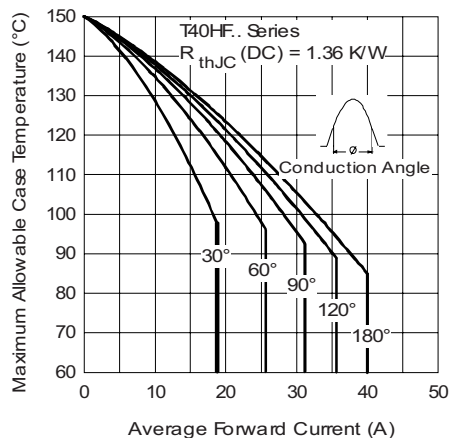


Fig. 1 - Current Ratings Characteristics

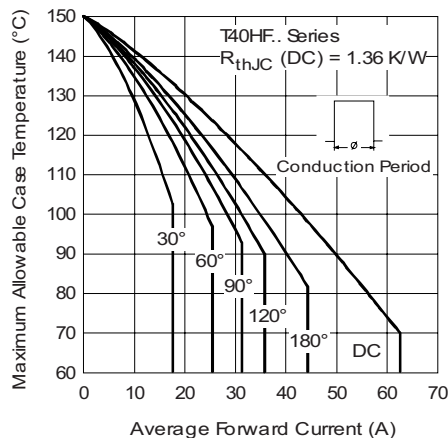


Fig. 2 - Current Ratings Characteristics

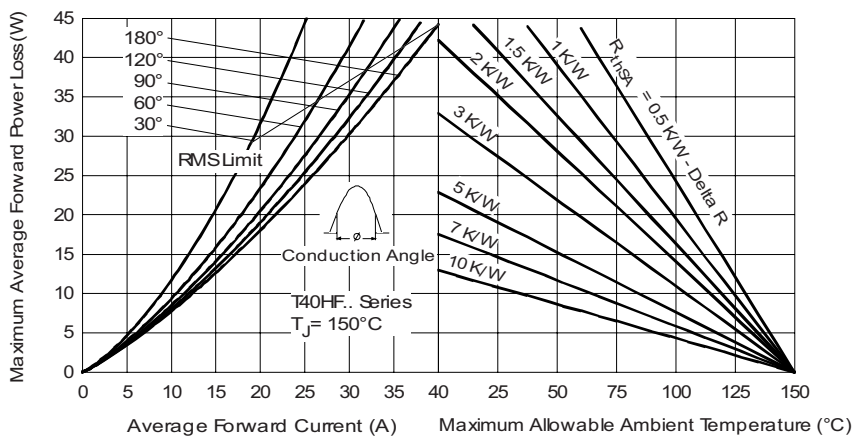


Fig. 3 - Forward Power Loss Characteristics

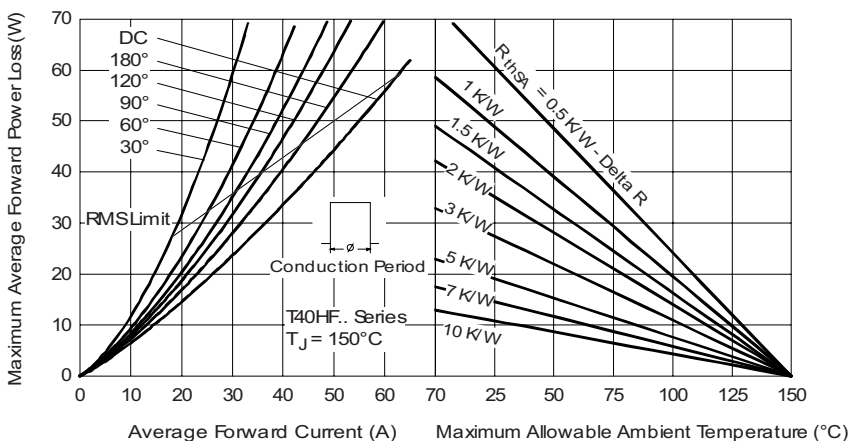


Fig. 4 - Forward Power Loss Characteristics



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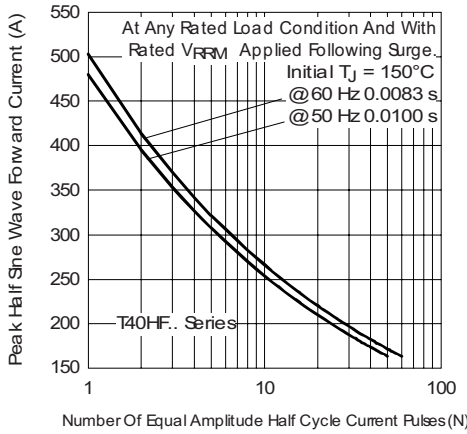


Fig. 5 - Maximum Non-Repetitive Surge Current

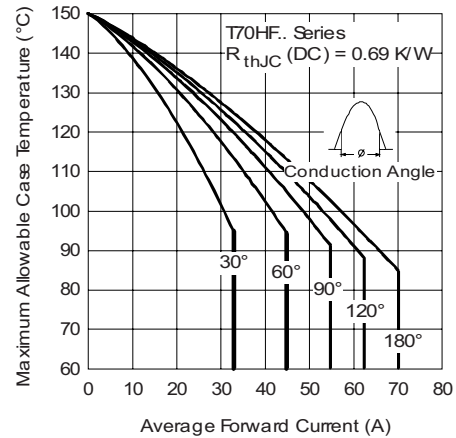


Fig. 7 - Current Ratings Characteristics

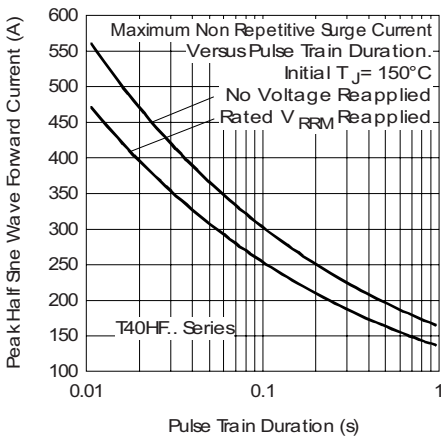


Fig. 6 - Maximum Non-Repetitive Surge Current

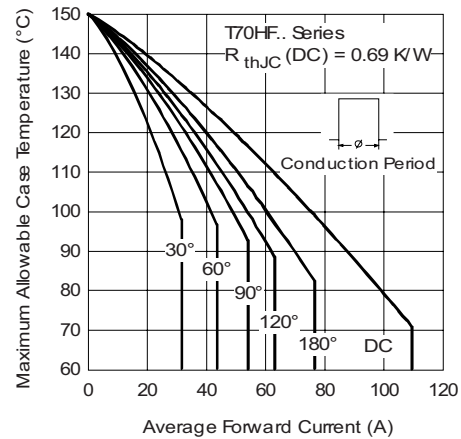


Fig. 8 - Current Ratings Characteristics

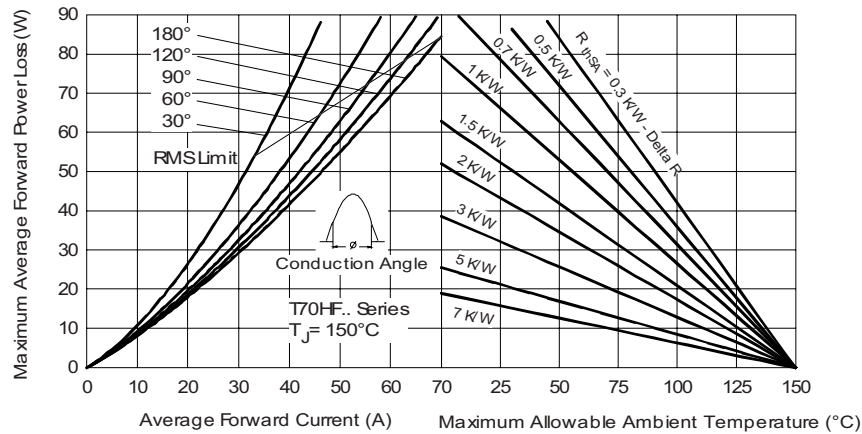


Fig. 9 - Forward Power Loss Characteristics

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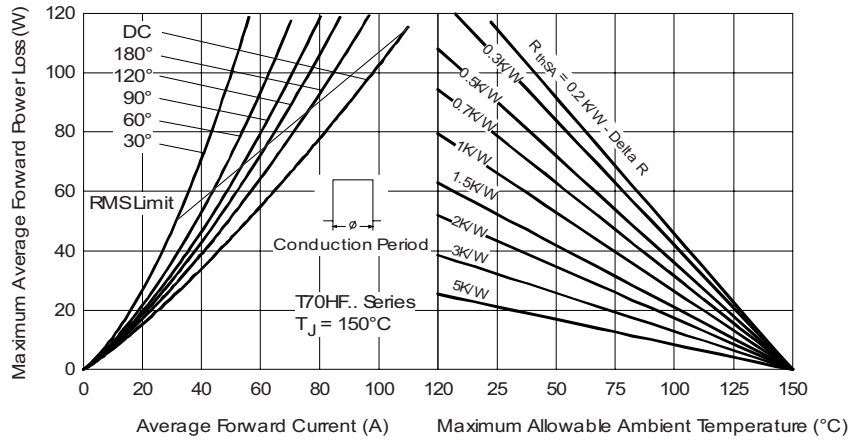


Fig. 10 - Forward Power Loss Characteristics

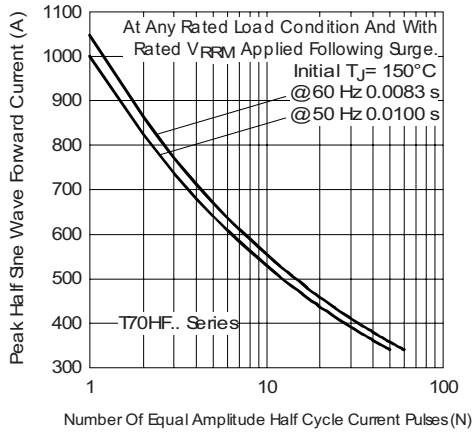


Fig. 11 - Maximum Non-Repetitive Surge Current

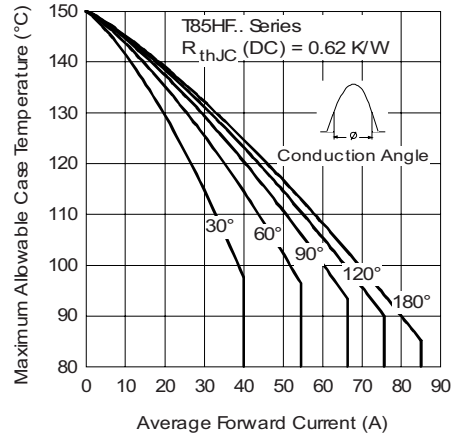


Fig. 13 - Current Ratings Characteristics

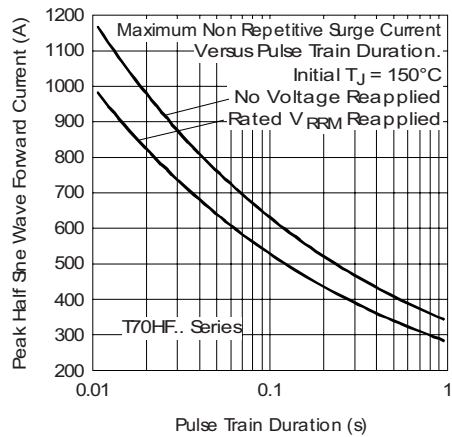


Fig. 12 - Maximum Non-Repetitive Surge Current

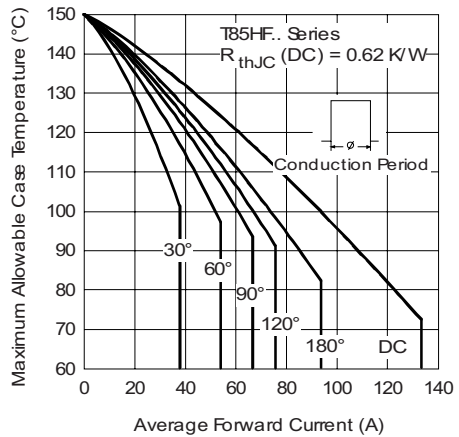


Fig. 14 - Current Ratings Characteristics



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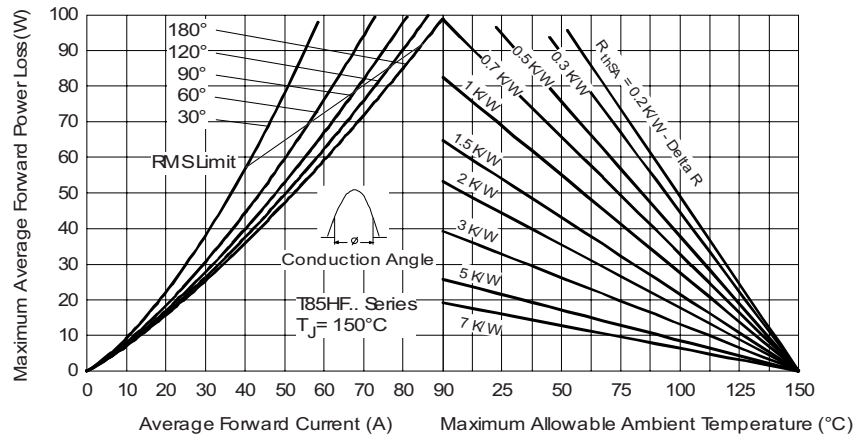


Fig. 15 - Forward Power Loss Characteristics

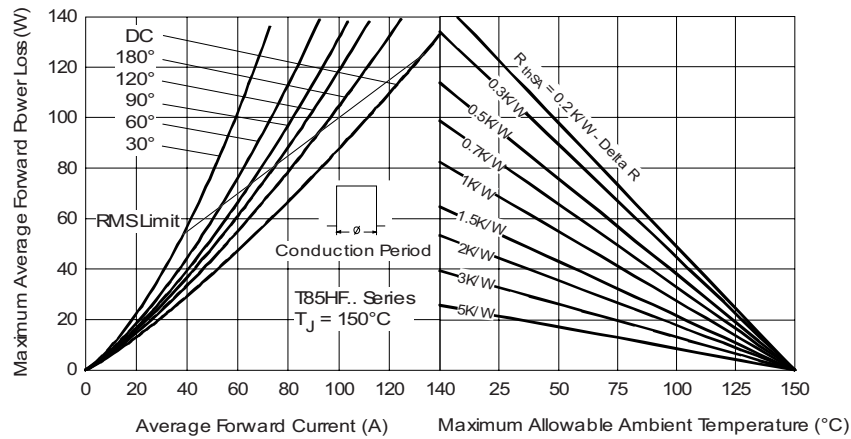


Fig. 16 - Forward Power Loss Characteristics

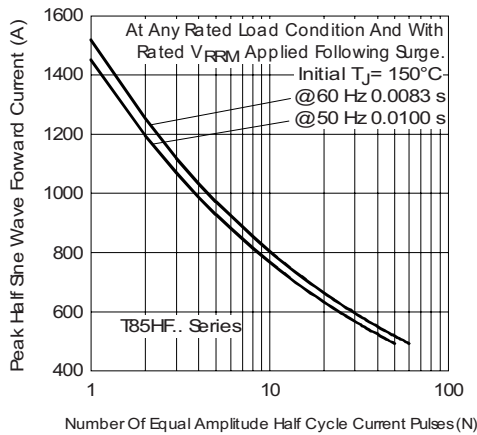


Fig. 17 - Maximum Non-Repetitive Surge Current

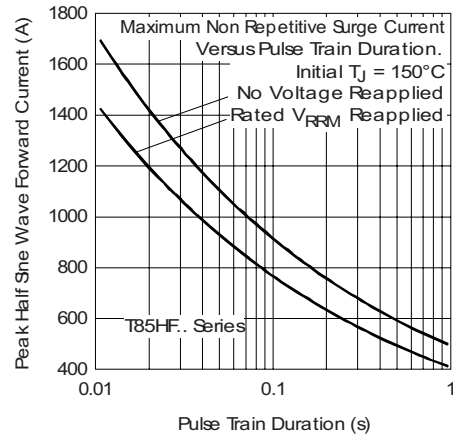


Fig. 18 - Maximum Non-Repetitive Surge Current

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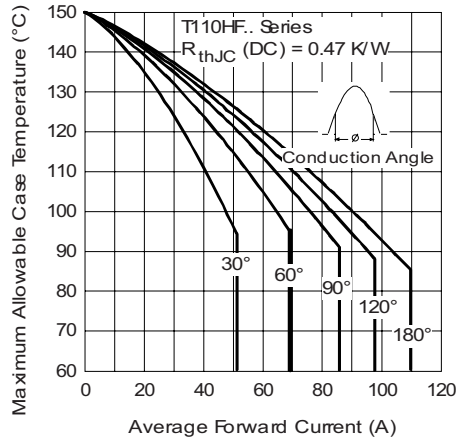


Fig. 19 - Current Ratings Characteristics

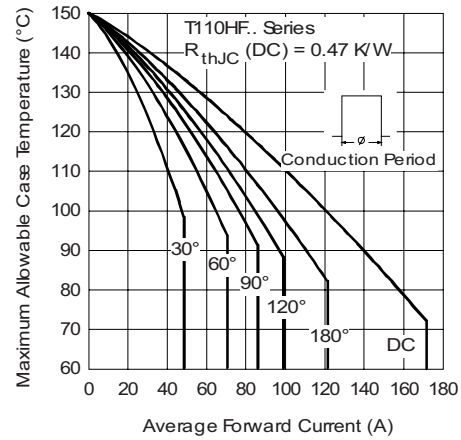


Fig. 20 - Current Ratings Characteristics

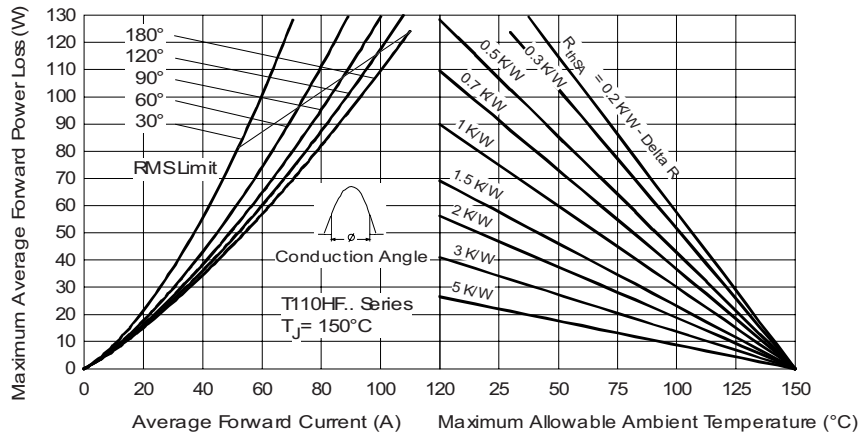


Fig. 21 - Forward Power Loss Characteristics

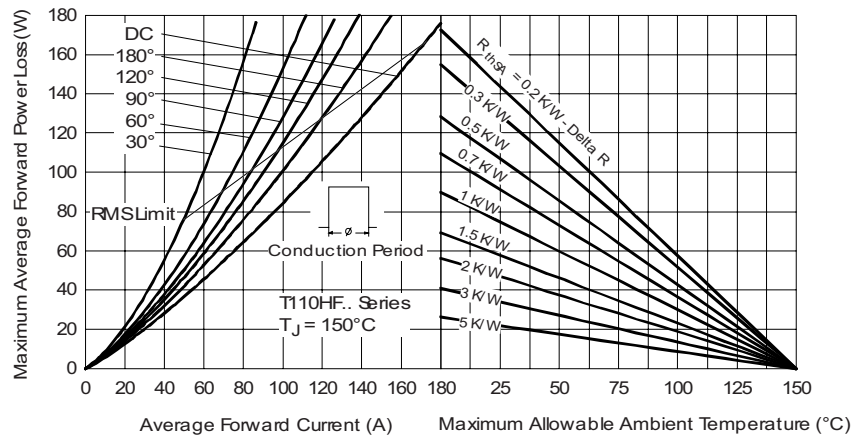


Fig. 22 - Forward Power Loss Characteristics





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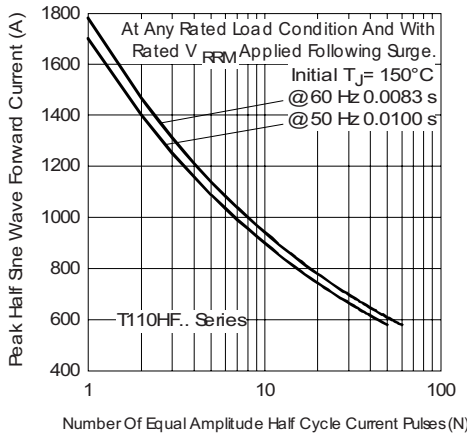


Fig. 23 - Maximum Non-Repetitive Surge Current

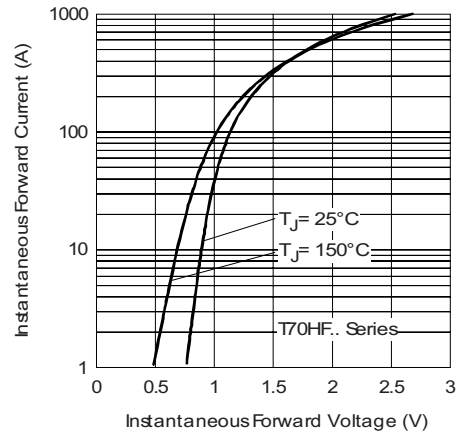


Fig. 26 - Forward Voltage Drop Characteristics

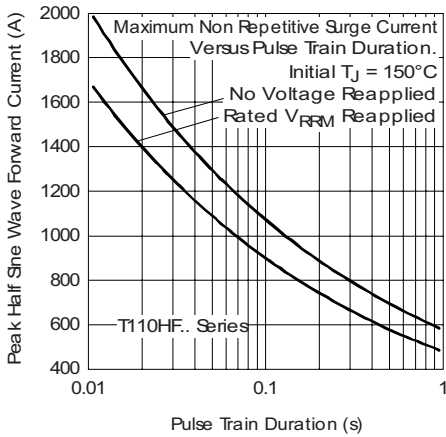


Fig. 24 - Maximum Non-Repetitive Surge Current

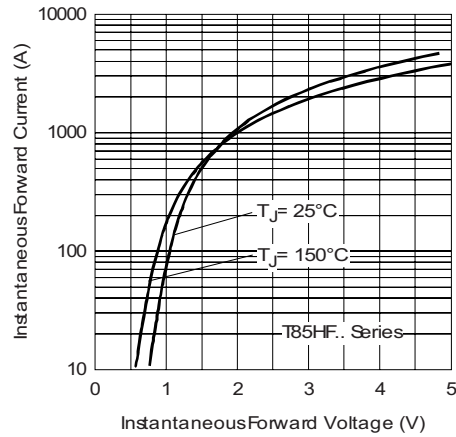


Fig. 27 - Forward Voltage Drop Characteristics

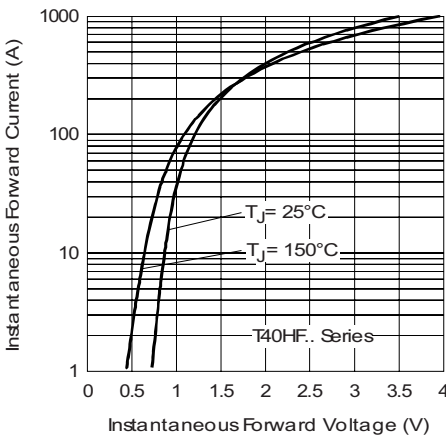


Fig. 25 - Forward Voltage Drop Characteristics

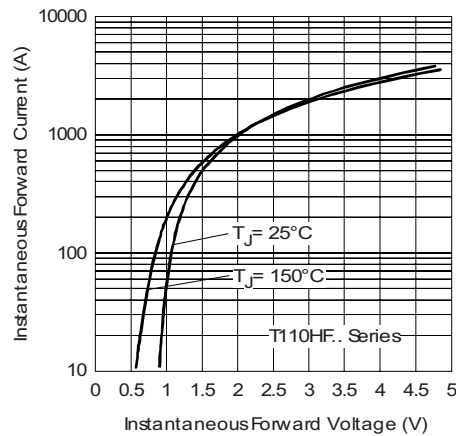


Fig. 28 - Forward Voltage Drop Characteristics

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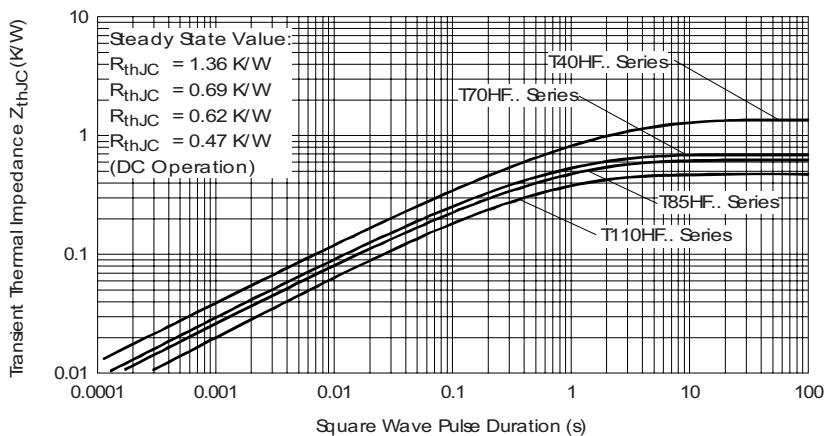


Fig. 29 - Thermal Impedance  $Z_{thJC}$  Characteristics

## ORDERING INFORMATION TABLE

Device code	<b>T</b>	<b>110</b>	<b>HF</b>	<b>120</b>
	①	②	③	④
	<b>1</b>	-	Module type	
	<b>2</b>	-	Current rating	
	<b>3</b>	-	Circuit configuration (see Circuit Configuration table)	
	<b>4</b>	-	Voltage code x 10 = $V_{RRM}$	

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single diode	HF	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95313">www.vishay.com/doc?95313</a>



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