



## Power Rectifiers Diodes (T-modules), 40 A to 110 A



D-55 (T-module)

### 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 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
I <sub>F(AV)</sub>	40 A to 110 A
Type	Modules - diode, high voltage
V <sub>RRM</sub>	100 V to 1200 V
Package	D-55 (T-module)
Circuit configuration	Single diode

### DESCRIPTION / APPLICATIONS

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> <sub>t</sub>	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

### 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
VS-T40HF... VS-T70HF... VS-T85HF... VS-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		VALUES				UNITS	
				T40HF	T70HF	T85HF	T110HF		
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		40	70	85	110	A	
				85	85	85	85	°C	
Maximum RMS forward current	$I_{F(RMS)}$			63	110	134	173	A	
Maximum peak, one-cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms t = 8.3 ms	No voltage reappplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	570	1200	1700	2000	A
					600	1250	1800	2100	
					480	1000	1450	1700	
					500	1050	1500	1780	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms t = 8.3 ms	No voltage reappplied		1630	7100	14 500	20 500	A <sup>2</sup> s
					1500	6450	13 500	18 600	
					1150	5000	10 500	14 500	
					1050	4570	9600	13 200	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	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	$V_{F(TO)1}$	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J$ maximum		0.66	0.76	0.68	0.68	V	
High level value of threshold voltage	$V_{F(TO)2}$	$(I > \pi \times I_{F(AV)})$ , $T_J$ maximum		0.84	0.95	0.90	0.86		
Low level value of forward slope resistance	$r_{f1}$	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J$ maximum		4.3	2.4	1.76	1.56	mΩ	
High level value of forward slope resistance	$r_{f2}$	$(I > \pi \times I_{F(AV)})$ , $T_J$ maximum		3.1	1.7	1.08	1.12		
Maximum forward voltage drop	$V_{FM}$	$I_{FM} = \pi \times I_{F(AV)}$ , $T_J = 25\text{ °C}$ , $t_p = 400\ \mu\text{s}$ square pulse Average power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		1.30	1.35	1.27	1.35	V	

BLOCKING								
PARAMETER	SYMBOL	TEST CONDITIONS		T40HF	T70HF	T85HF	T110HF	UNITS
Maximum peak reverse leakage current	$I_{RRM}$	$T_J = 150\text{ °C}$		15	15	20	20	mA
RMS isolation voltage	$V_{ISOL}$	50 Hz, circuit to base, all terminals shorted $T_J = 25\text{ °C}$ , t = 1 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				°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, ± 10 % to heatsink terminals		Non-lubricated threads	M3.5 mounting screws <sup>(1)</sup>	1.3 ± 10 %				Nm
			M5 screw terminals	3 ± 10 %				
Approximate weight		See dimensions - link at the end of datasheet		54				g
Case style				D-55 (T-module)				

**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



<b>ΔR CONDUCTION PER JUNCTION</b>											
DEVICES	SINUSOIDAL CONDUCTION AT T <sub>J</sub> MAXIMUM					RECTANGULAR CONDUCTION AT T <sub>J</sub> 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<sub>thJC</sub> when devices operate at different conduction angles than DC



Fig. 1 - Current Ratings Characteristics



Fig. 2 - Current Ratings Characteristics



Fig. 3 - Forward Power Loss Characteristics



Fig. 4 - Forward Power Loss Characteristics



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



Fig. 10 - Forward Power Loss Characteristics



Fig. 11 - Maximum Non-Repetitive Surge Current



Fig. 12 - Maximum Non-Repetitive Surge Current



Fig. 13 - Current Ratings Characteristics



Fig. 14 - Current Ratings Characteristics



Fig. 15 - Forward Power Loss Characteristics



Fig. 16 - Forward Power Loss Characteristics



Fig. 17 - Maximum Non-Repetitive Surge Current



Fig. 19 - Current Ratings Characteristics

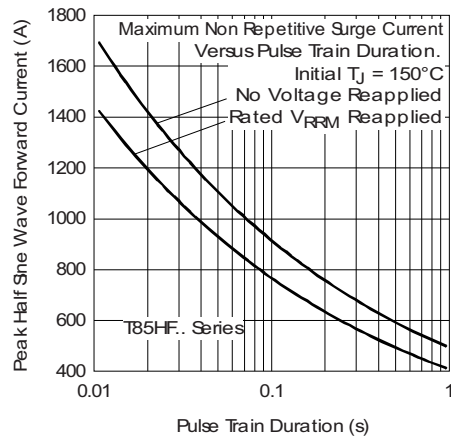


Fig. 18 - Maximum Non-Repetitive Surge Current

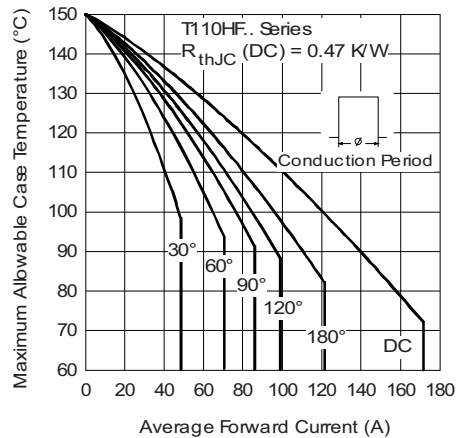


Fig. 20 - Current Ratings Characteristics



Fig. 21 - Forward Power Loss Characteristics



Fig. 22 - Forward Power Loss Characteristics



Fig. 23 - Maximum Non-Repetitive Surge Current



Fig. 25 - Forward Voltage Drop Characteristics



Fig. 24 - Maximum Non-Repetitive Surge Current



Fig. 26 - Forward Voltage Drop Characteristics





Fig. 27 - Forward Voltage Drop Characteristics



Fig. 28 - Forward Voltage Drop Characteristics



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

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>T</b>	<b>110</b>	<b>HF</b>	<b>120</b>
	①	②	③	④	⑤
<b>1</b>	- Vishay Semiconductors product				
<b>2</b>	- Module type				
<b>3</b>	- Current rating				
<b>4</b>	- Circuit configuration (see Circuit Configuration table)				
<b>5</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>



## D-55 T-Module Diode Standard and Fast Recovery

**DIMENSIONS** in millimeters (inches)



**Note**

- 1 = Anode
- 2 = Cathode



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