



## Three Phase Bridge (Power Modules), 90 A/110 A



MT-K

### FEATURES

- Package fully compatible with the industry standard INT-A-PAK power modules series
- High thermal conductivity package, electrically insulated case
- Excellent power volume ratio, outline for easy connections to power transistor and IGBT modules
- 4000 V<sub>RMS</sub> isolating voltage
- 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

PRODUCT SUMMARY	
I <sub>O</sub>	90 A to 110 A
V <sub>RRM</sub>	800 V to 1600 V
Package	MT-K
Circuit	Three phase bridge

### DESCRIPTION

A range of extremely compact, encapsulated three phase bridge rectifiers offering efficient and reliable operation. They are intended for use in general purpose and heavy duty applications.

MAJOR RATINGS AND CHARACTERISTICS				
SYMBOL	CHARACTERISTICS	90MT.K	110MT.K	UNITS
I <sub>O</sub>		90 (120)	110 (150)	A
	T <sub>C</sub>	90 (61)	90 (57)	°C
I <sub>FSM</sub>	50 Hz	770	950	A
	60 Hz	810	1000	
I <sup>2</sup> t	50 Hz	3000	4500	A <sup>2</sup> s
	60 Hz	2700	4100	
I <sup>2</sup> √t		30 000	45 000	A <sup>2</sup> √s
V <sub>RRM</sub>	Range	800 to 1600		V
T <sub>Stg</sub>	Range	-40 to 150		°C
T <sub>J</sub>				

### 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> = MAXIMUM mA
VS-90-110MT..K	80	800	900	10
	100	1000	1100	
	120	1200	1300	
	140	1400	1500	
	160	1600	1700	



FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS		90MT.K	110MT.K	UNITS	
Maximum DC output current at case temperature	I <sub>O</sub>	120° rect. conduction angle		90 (120)	110 (150)	A	
				90 (61)	90 (57)	°C	
Maximum peak, one-cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Initial T <sub>J</sub> = T <sub>J</sub> maximum	770	950	A
		t = 8.3 ms			810	1000	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		650	800	
		t = 8.3 ms			680	840	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied	Initial T <sub>J</sub> = T <sub>J</sub> maximum	3000	4500	A <sup>2</sup> s
		t = 8.3 ms			2700	4100	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		2100	3200	
		t = 8.3 ms			1900	2900	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reapplied		30 000	45 000	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		0.89	0.81	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		1.05	0.99		
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		5.11	4.37	mΩ	
High level value of forward slope resistance	r <sub>f2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum		4.64			
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>pk</sub> = 150 A, T <sub>J</sub> = 25 °C t <sub>p</sub> = 400 μs single junction		1.6	1.4	V	
RMS isolation voltage	V <sub>ISOL</sub>	T <sub>J</sub> = 25 °C, all terminal shorted f = 50 Hz, t = 1 s		4000			

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		90MT.K	110MT.K	UNITS
Maximum junction operating and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>			-40 to 150		°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation per module		0.21	0.18	°C/W
		DC operation per junction		1.26	1.07	
		120° rect. conduction angle per module		0.25	0.21	
		120° rect. conduction angle per junction		1.47	1.25	
Maximum thermal resistance, case to heatsink per module	R <sub>thCS</sub>	Mounting surface smooth, flat and greased		0.03		
Mounting torque ± 10 %	to heatsink to terminal	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.		4 to 6		Nm
				3 to 4		
Approximate weight				176		g



Fig. 1 - Current Ratings Characteristics



Fig. 2 - Forward Voltage Drop Characteristics



Fig. 3 - Total Power Loss Characteristics



Fig. 4 - Maximum Non-Repetitive Surge Current



Fig. 5 - Maximum Non-Repetitive Surge Current

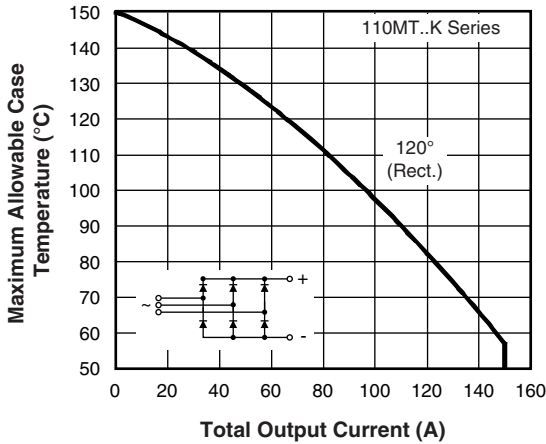


Fig. 6 - Current Ratings Characteristics

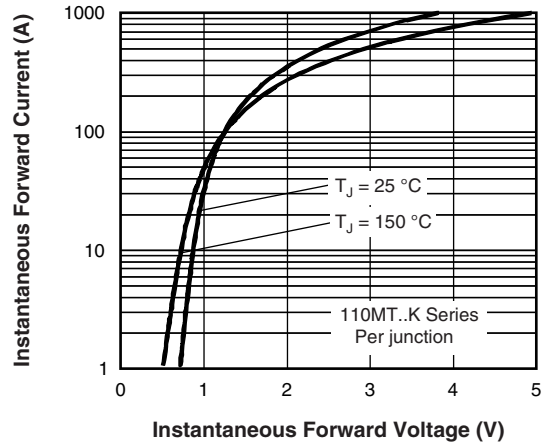


Fig. 7 - Forward Voltage Drop Characteristics



Fig. 8 - Total Power Loss Characteristics

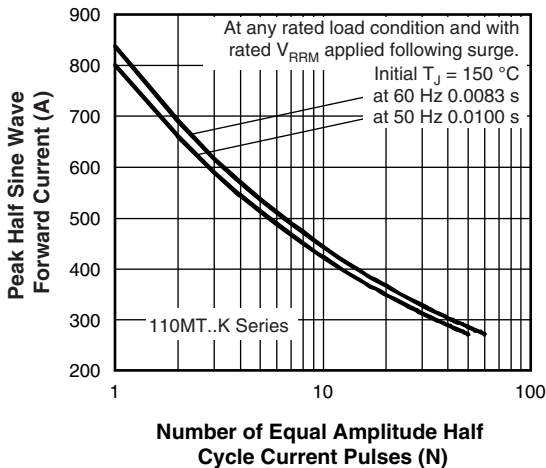


Fig. 9 - Maximum Non-Repetitive Surge Current



Fig. 10 - Maximum Non-Repetitive Surge Current



Fig. 11 - Thermal Impedance  $Z_{thJC}$  Characteristic

## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>11</b>	<b>0</b>	<b>MT</b>	<b>160</b>	<b>K</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	

- 1** - Vishay Semiconductors product
- 2** - Current rating code: 9 = 90 A (average)  
11 = 110 A (average)
- 3** - Three phase diodes bridge
- 4** - Essential part number
- 5** - Voltage code x 10 =  $V_{RRM}$  (see Voltage Ratings table)
- 6** - PbF = Lead (Pb)-free

### Note

- To order the optional hardware go to [www.vishay.com/doc?95172](http://www.vishay.com/doc?95172)

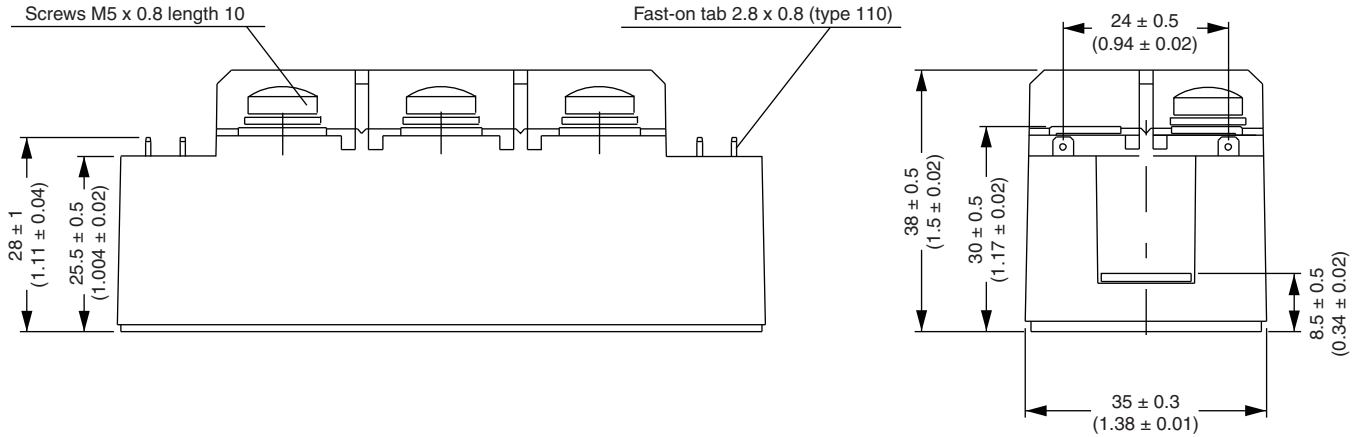
## CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95004">www.vishay.com/doc?95004</a>

## MTK (with and without optional barrier)

### DIMENSIONS WITH OPTIONAL BARRIERS in millimeters (inches)



# Outline Dimensions

Vishay Semiconductors MTK (with and without optional barrier)



## DIMENSIONS WITHOUT OPTIONAL BARRIERS in millimeters (inches)





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