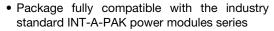


# Three Phase AC Switch (Power Modules), 100 A



PRIMARY CHARACTERISTICS						
I <sub>O</sub>	100 A					
V <sub>RRM</sub>	800 V to 1600 V					
Package	MTK					
Circuit configuration	Three phase AC switch					

#### **FEATURES**





- High thermal conductivity package, electrically insulated case
- Outstanding number of power encapsulated components
- Excellent power volume ratio
- 4000 V<sub>RMS</sub> isolating voltage
- UL E78996 approved
- · Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>

#### **DESCRIPTION**

A range of extremely compact, encapsulated three phase AC switches offering efficient and reliable operation. They are intended for use in general purpose and heavy duty applications as control motor starter.

MAJOR RATINGS AND CHARACTERISTICS						
SYMBOL	CHARACTERISTICS	VALUES	UNITS			
1		100	A			
I <sub>O</sub>	T <sub>C</sub>	80	°C			
I <sub>FSM</sub>	50 Hz	1130	А			
	60 Hz	1180	^			
l²t	50 Hz	6380	A <sup>2</sup> s			
	60 Hz	5830	— A <sup>2</sup> S			
l <sup>2</sup> √t		63 800	A²√s			
$V_{RRM}$	Range	800 to 1600	V			
T <sub>Stg</sub>	Range	-40 to +125	***			
TJ	Range	-40 to +125	°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	V <sub>DRM</sub> , MAXIMUM REPETITIVE PEAK OFF-STATE VOLTAGE, GATE OPEN CIRCUIT V	I <sub>RRM</sub> /I <sub>DRM</sub> , MAXIMUM AT T <sub>J</sub> = 125 °C mA				
	80	800	900	800					
	100	1000	1100	1000					
VS-104MTK	120	1200	1300	1200	40 (1)				
	140	1400	1500	1400					
	160	1600	1700	1600					

#### Note

<sup>(1)</sup> For single AC switch



FORWARD CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum I authorit august at agas temperatura		Far all aandus	ation anala		100	Α
Maximum I <sub>RMS</sub> output current at case temperature	I <sub>O</sub>	For all conduction angle			80	°C
		t = 10 ms	No voltage		1130	
Maximum peak, one-cycle forward, non-repetitive		t = 8.3 ms	reapplied		1180	^
on state surge current	I <sub>TSM</sub>	t = 10 ms	100 % V <sub>RRM</sub>		950	A
		t = 8.3 ms	reapplied	Initial	1000	
		t = 10 ms	No voltage	$T_J = T_J$ maximum	6380	
Maximum I <sup>2</sup> t for fusing	l <sup>2</sup> t	t = 8.3 ms	reapplied		5830	A <sup>2</sup> s
	1-1	t = 10 ms	100 % V <sub>RRM</sub>		4510	
		t = 8.3 ms	reapplied		4120	
Maximum I <sup>2</sup> √t for fusing	I²√t	t = 0.1 ms to 10 ms, no voltage reapplied			63 800	A²√s
Low level value of threshold voltage	V <sub>T(TO)1</sub>	(16.7 % x $\pi$ x I <sub>T(AV)</sub> < I < $\pi$ x I <sub>T(AV)</sub> ), T <sub>J</sub> maximum		0.99	V	
High level value of threshold voltage	V <sub>T(TO)2</sub>	$(I > \pi \times I_{T(AV)})$ , $T_J$ maximum		1.15	V	
Low level value on-state slope resistance	r <sub>t1</sub>	16.7 % x π x $I_{T(AV)}$ < $I$ < π x $I_{T(AV)}$ ), $T_J$ maximum		3.90	mΩ	
High level value on-state slope resistance	r <sub>t2</sub>	$(I > \pi \times I_{T(AV)}), T_J$ maximum			3.48	1115.2
Maximum on-state voltage drop	$V_{TM}$	$I_{pk} = 150 \text{ A}, T_J = 25 ^{\circ}\text{C}, t_p = 400 \mu\text{s} \text{ single junction}$		1.53	V	
Maximum non-repetitive rate of rise of turned on current	dl/dt	$T_J = 25$ °C, from 0.67 $V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500$ mA, $t_r < 0.5$ µs, $t_p > 6$ µs			150	A/μs
Maximum holding current	I <sub>H</sub>	T <sub>J</sub> = 25 °C, anode supply = 6 V, resistive load, grate open circuit		200	mA	
Maximum latching current	ΙL	T <sub>J</sub> = 25 °C, anode supply = 6 V, resistive load			400	

BLOCKING								
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS				
RMS isolation voltage	V <sub>INS</sub>	$T_J$ = 25 °C all terminal shorted f = 50 Hz, t = 1 s	4000	V				
Maximum critical rate of rise of off-state voltage	dV/dt (1)	$T_J = T_J$ maximum, linear to 0.67 $V_{DRM}$ , gate open circuit	500	V/µs				

#### Note

 $<sup>^{(1)}</sup>$  Available with dV/dt = 1000 V/µs, to complete code add S90 i. e. 104MT160KBS90

TRIGGERING							
PARAMETER	SYMBOL	Т	EST CONDITIONS	VALUES	UNITS		
Maximum peak gate power	P <sub>GM</sub>			10	W		
Maximum average gate power	P <sub>G(AV)</sub>	T - T movimu	m	2.5	VV		
Maximum peak gate current	I <sub>GM</sub>	ij = ijillaxilliu	$T_J = T_J$ maximum				
Maximum peak negative gate voltage	- V <sub>GT</sub>		10				
		T <sub>J</sub> = 40 °C	Anode supply = 6 V, resistive load	4.0	V		
Maximum required DC gate voltage to trigger	$V_{GT}$	T <sub>J</sub> = 25 °C		2.5	mA		
		T <sub>J</sub> = 125 °C		1.7			
		T <sub>J</sub> = -40 °C	Ariode supply = 6 v, resistive load	270			
Maximum required DC gate current to trigger	I <sub>GT</sub>	T <sub>J</sub> = 25 °C		150			
		T <sub>J</sub> = 125 °C		80			
Maximum gate voltage that will not trigger	$V_{GD}$	T T manyimay	0.25	V			
Maximum gate current that will not trigger	$I_{GD}$	$T_J = T_J$ maximum, rated $V_{DRM}$ applied			mA		



THERMAL AND MECHANICAL SPECIFICATIONS								
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS				
Maximum junction operating and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-40 to +125	°C				
		DC operation per single AC switch	0.34					
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation per junction	0.69					
		180 °C sine conduction angle per single AC switch	0.36	K/W				
		180 °C sine conduction angle per junction	0.72					
Maximum thermal resistance, case to heat sink	R <sub>thCS</sub>	Per module Mounting surface smooth, flat and greased	0.03					
Mounting to heat sink		A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for	4 to 6	Nm				
torque ± 100 % to terminal			3 to 4					
Approximate weight		the spread of the compound. Lubricated threads.	225	g				

△R CONDUCTION PER JUNCTION											
DEVICES	SINUSOIDAL CONDUCTION AT T <sub>J</sub> MAXIMUM				RECTANGULAR CONDUCTION AT TJ MAXIMUM				UNITS		
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
104MT.K	0.027	0.033	0.042	0.057	0.081	0.023	0.037	0.046	0.059	0.082	K/W

#### Note

Table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC

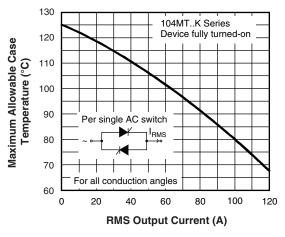


Fig. 1 - Current Ratings Characteristic

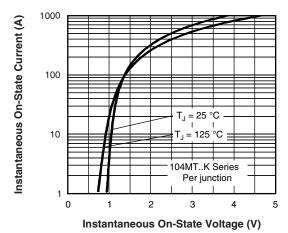
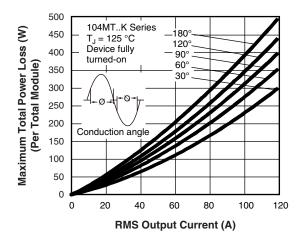


Fig. 2 - Forward Voltage Drop Characteristics



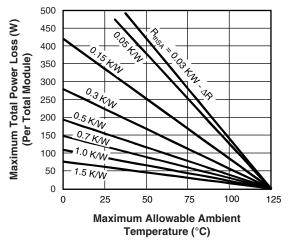


Fig. 3 - Total Power Loss Characteristics

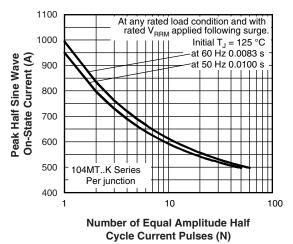


Fig. 4 - Maximum Non-Repetitive Surge Current

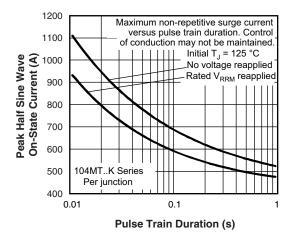


Fig. 5 - Maximum Non-Repetitive Surge Current

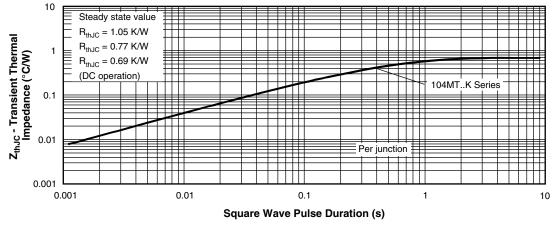


Fig. 6 - Thermal Impedance Z<sub>thJC</sub> Characteristics

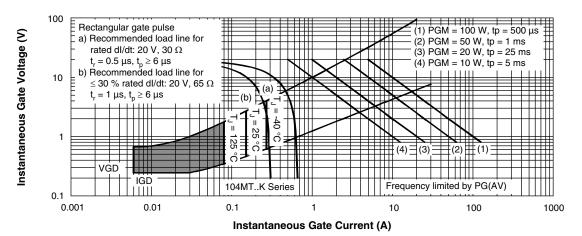
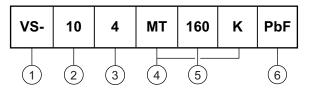


Fig. 7 - Gate Characteristics

#### **ORDERING INFORMATION TABLE**

#### Device code

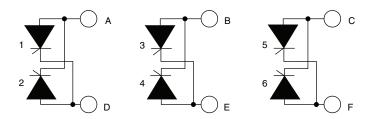


- 1 Vishay Semiconductors product
- Current rating code: 10 = 100 A (average)
- 3 AC switch
- 4 Essential part number
- 5 Voltage code x 10 = V<sub>RRM</sub> (see Voltage Ratings table)
- 6 PbF = lead (Pb)-free

#### Note

• To order the optional hardware go to <a href="https://www.vishay.com/doc?95172">www.vishay.com/doc?95172</a>

## **CIRCUIT CONFIGURATION**

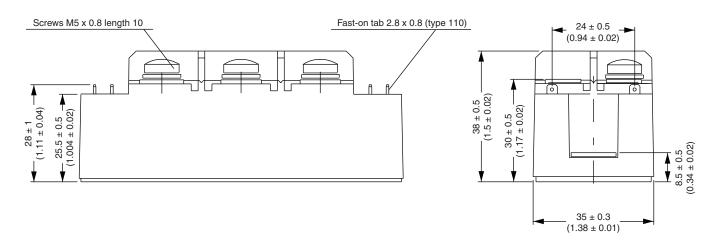


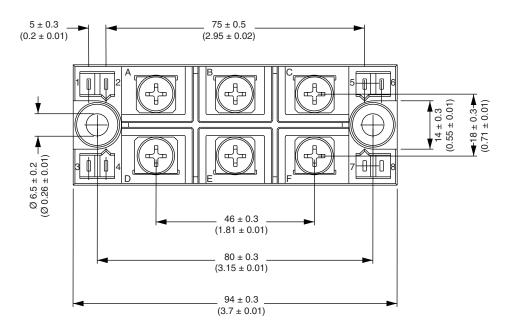
LINKS TO RELATED DOCUMENTS					
Dimensions	www.vishay.com/doc?95004				



# MTK (with and without optional barrier)

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

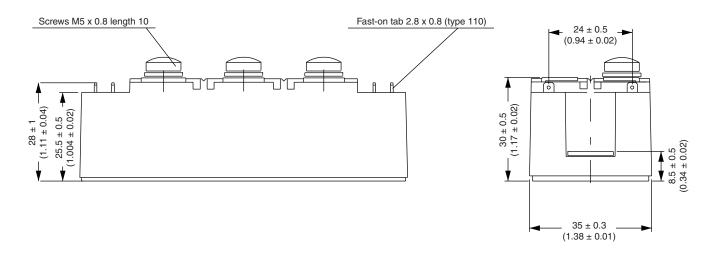


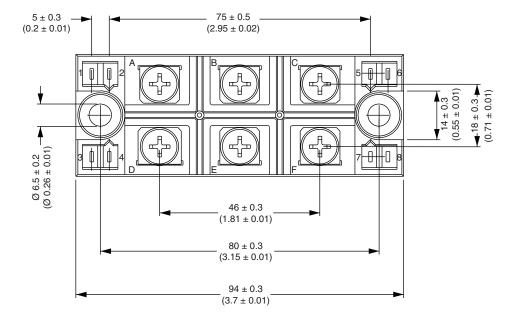


# Vishay Semiconductors MTK (with and without optional barrier)



### **DIMENSIONS WITHOUT OPTIONAL BARRIERS** in millimeters (inches)







## **Legal Disclaimer Notice**

Vishay

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