

Three Phase AC Switch (Power Modules), 50 A to 100 A



MT-K

FEATURES

- Package fully compatible with the industry standard INT-A-PAK power modules series
- High thermal conductivity package, electrically insulated case
- Outstanding number of power encapsulated components
- Excellent power volume ratio
- 4000 V_{RMS} isolating voltage
- UL E78996 approved 
- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see www.vishay.com/doc299912


RoHS
COMPLIANT

PRODUCT SUMMARY

I _O	50 A to 100 A
V _{RRM}	800 V to 1600 V
Package	MT-K
Circuit	Three phase AC switch

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 54MT..K	VALUES 94MT..K	VALUES 104MT..K	UNITS
I _O		50	90	100	A
	T _C	80	80	80	°C
I _{FSM}	50 Hz	390	950	1130	A
	60 Hz	410	1000	1180	
I ² _t	50 Hz	770	4525	6380	A ² s
	60 Hz	700	4130	5830	
I ² √t		7700	45250	63800	A ² √s
V _{RRM}	Range	800 to 1600			V
T _{Stg}	Range	-40 to 125			°C
T _J	Range	-40 to 125			°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V _{RRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V _{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	V _{DRM} , MAXIMUM REPETITIVE PEAK OFF-STATE VOLTAGE, GATE OPEN CIRCUIT V	I _{RRM} /I _{DRM} , MAXIMUM AT T _J = 125 °C mA
VS-54MT..K	80	800	900	800	20 (1)
	100	1000	1100	1000	
	120	1200	1300	1200	
	140	1400	1500	1400	
	160	1600	1700	1600	
VS-94/104MT..K	80	800	900	800	40 (1)
	100	1000	1100	1000	
	120	1200	1300	1200	
	140	1400	1500	1400	
	160	1600	1700	1600	

Note

(1) For single AC switch

**FORWARD CONDUCTION**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES 54MT.K	VALUES 94MT.K	VALUES 104MT.K	UNITS	
Maximum I_{RMS} output current at case temperature	I_O	For all conduction angle	50	90	100	A	
			80	80	80	°C	
Maximum peak, one-cycle forward, non-repetitive on state surge current	I_{TSM}	$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ $t = 10\text{ ms}$ $t = 8.3\text{ ms}$	No voltage reapplied 100 % V_{RRM} reapplied	390 410 330 345	950 1000 800 840	1130 1180 950 1000	A
Maximum I^2t for fusing	I^2t	$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ $t = 10\text{ ms}$ $t = 8.3\text{ ms}$	No voltage reapplied 100 % V_{RRM} reapplied	770 700 540 500	4525 4130 3200 2920	6380 5830 4510 4120	A ² s
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to } 10\text{ ms}$, no voltage reapplied	7700	45 250	63 800	A ² √s	
Low level value of threshold voltage	$V_{T(TO)1}$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, T_J maximum	1.16	0.99	0.99	V	
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, T_J maximum	1.44	1.19	1.15	V	
Low level value on-state slope resistance	r_{t1}	$16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$, T_J maximum	12.54	4.16	3.90	mΩ	
High level value on-state slope resistance	r_{t2}	$(I > \pi \times I_{T(AV)})$, T_J maximum	11.00	3.56	3.48	mΩ	
Maximum on-state voltage drop	V_{TM}	$I_{pk} = 150\text{ A}$, $T_J = 25\text{ °C}$ $t_p = 400\text{ μs}$ single junction	2.68	1.55	1.53	V	
Maximum non-repetitive rate of rise of turned on current	di/dt	$T_J = 25\text{ °C}$, from $0.67 V_{DRM}$, $I_{TM} = \pi \times I_{T(AV)}$, $I_g = 500\text{ mA}$, $t_r < 0.5\text{ μs}$, $t_p > 6\text{ μs}$	150			A/μs	
Maximum holding current	I_H	$T_J = 25\text{ °C}$, anode supply = 6 V, resistive load, grate open circuit	200			mA	
Maximum latching current	I_L	$T_J = 25\text{ °C}$, anode supply = 6 V, resistive load	400			mA	

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	54MT.K	94MT.K	104MT.K	UNITS
RMS isolation voltage	V_{INS}	$T_J = 25\text{ °C}$ all terminal shorted $f = 50\text{ Hz}$, $t = 1\text{ s}$	4000			V
Maximum critical rate of rise of off-state voltage	dV/dt (1)	$T_J = T_J$ maximum, linear to $0.67 V_{DRM}$, grate open circuit	500			V/μs

Note

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

TRIGGERING

PARAMETER	SYMBOL	TEST CONDITIONS	54MT.K	94MT.K	104MT.K	UNITS		
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum	10			W		
Maximum average gate power	$P_{G(AV)}$		2.5			W		
Maximum peak gate current	I_{GM}		2.5			A		
Maximum peak negative gate voltage	$-V_{GT}$		10			V		
Maximum required DC gate voltage to trigger	V_{GT}	$T_J = 40\text{ °C}$ $T_J = 25\text{ °C}$ $T_J = 125\text{ °C}$	4.0 2.5 1.7			V		
Maximum required DC gate current to trigger	I_{GT}	$T_J = -40\text{ °C}$ $T_J = 25\text{ °C}$ $T_J = 125\text{ °C}$	270 150 80			mA		
Maximum gate voltage that will not trigger	V_{GD}	$T_J = T_J$ maximum, rated V_{DRM} applied	0.25			V		
Maximum gate current that will not trigger	I_{GD}		6			mA		

Note

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

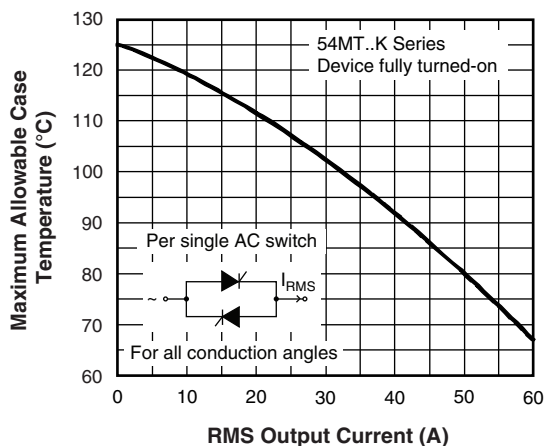


Fig. 1 - Current Ratings Characteristic

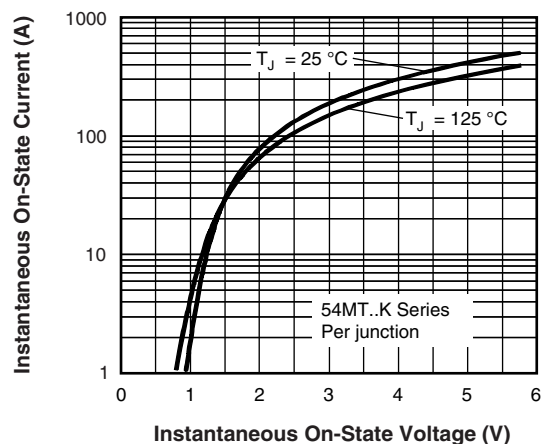


Fig. 2 - Forward Voltage Drop Characteristics

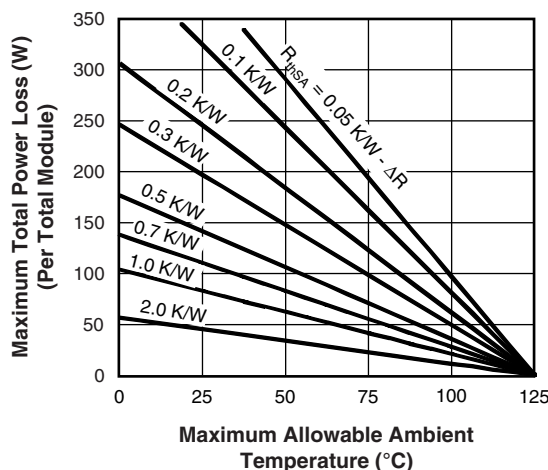
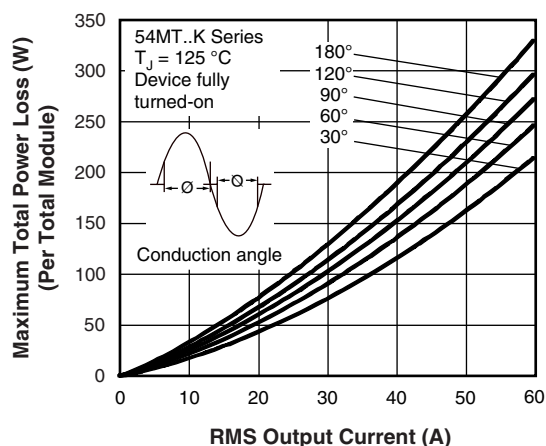


Fig. 3 - Total Power Loss Characteristics

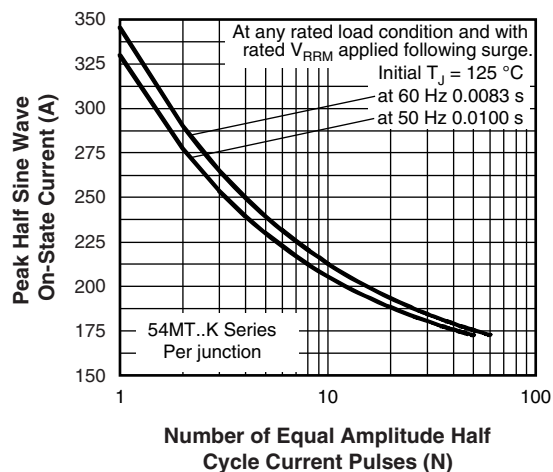


Fig. 4 - Maximum Non-Repetitive Surge Current

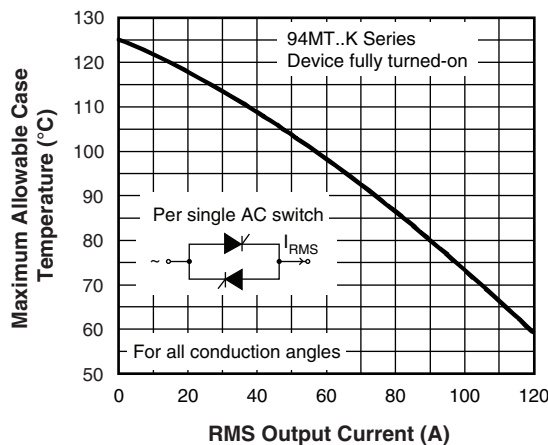


Fig. 6 - Current Ratings Characteristic

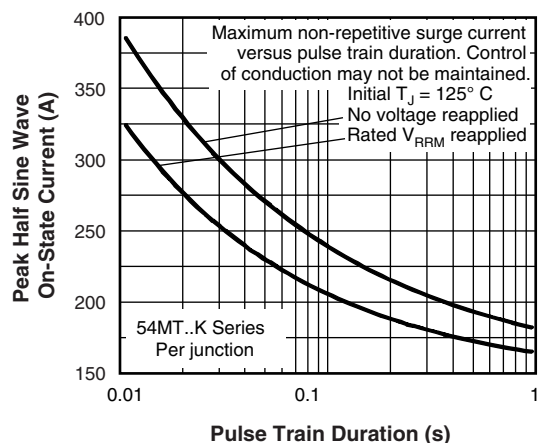


Fig. 5 - Maximum Non-Repetitive Surge Current

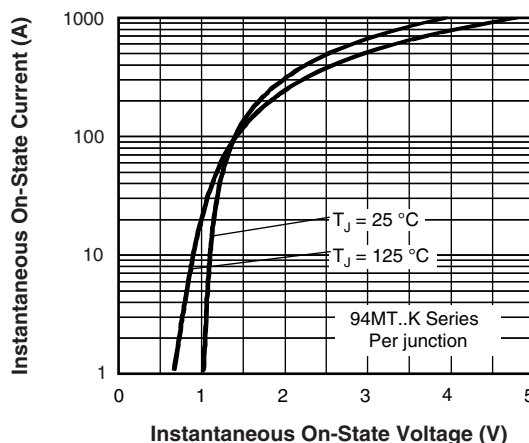


Fig. 7 - Forward Voltage Drop Characteristics

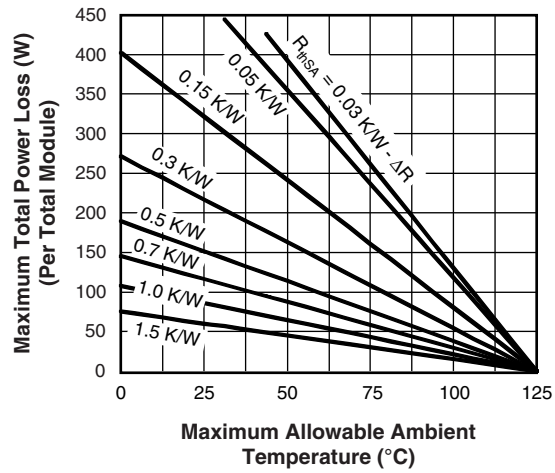
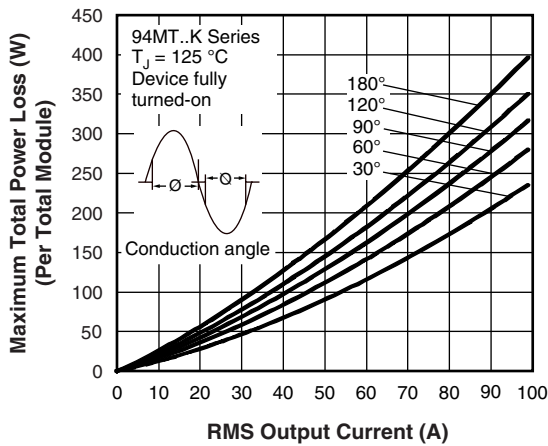


Fig. 8 - Total Power Loss Characteristics

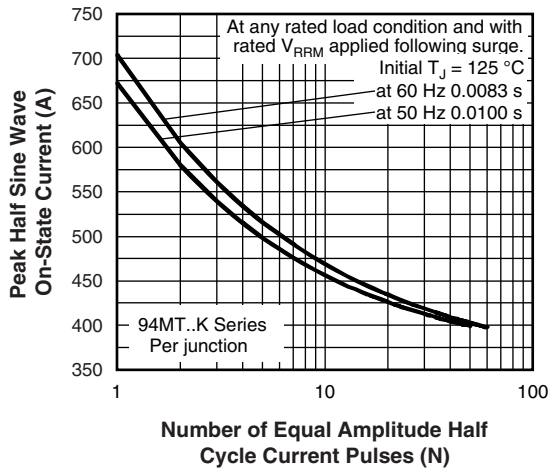


Fig. 9 - Maximum Non-Repetitive Surge Current

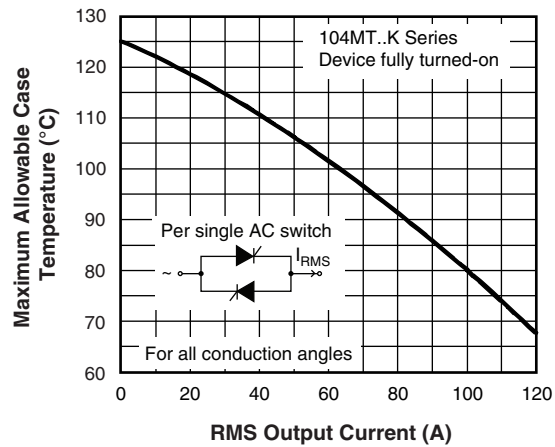


Fig. 11 - Current Ratings Characteristic

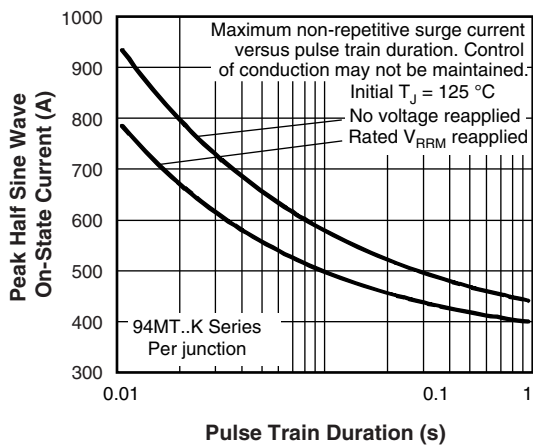


Fig. 10 - Maximum Non-Repetitive Surge Current

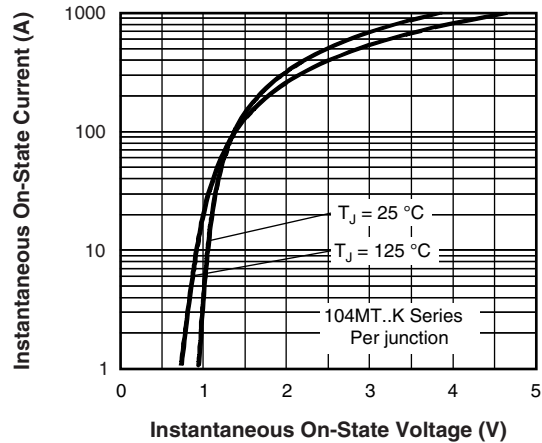


Fig. 12 - Forward Voltage Drop Characteristics

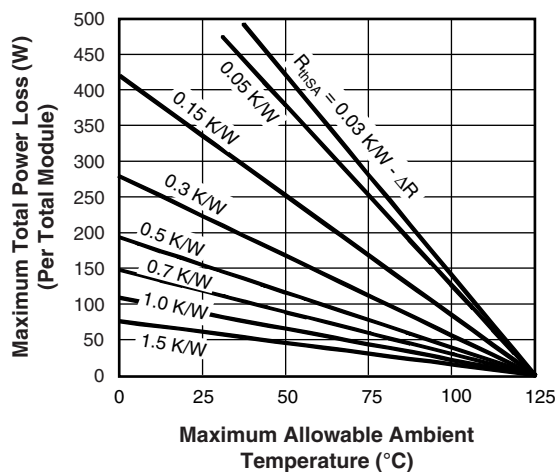
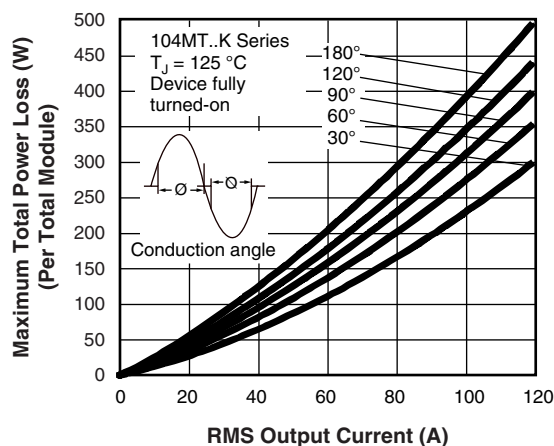


Fig. 13 - Total Power Loss Characteristics

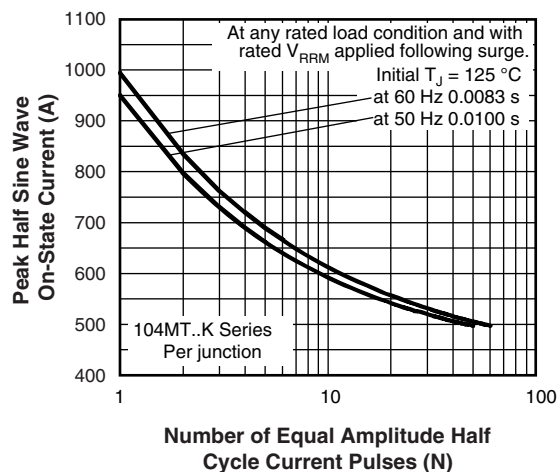


Fig. 14 - Maximum Non-Repetitive Surge Current

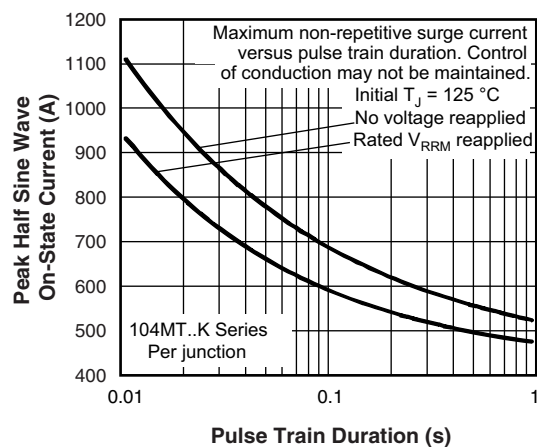
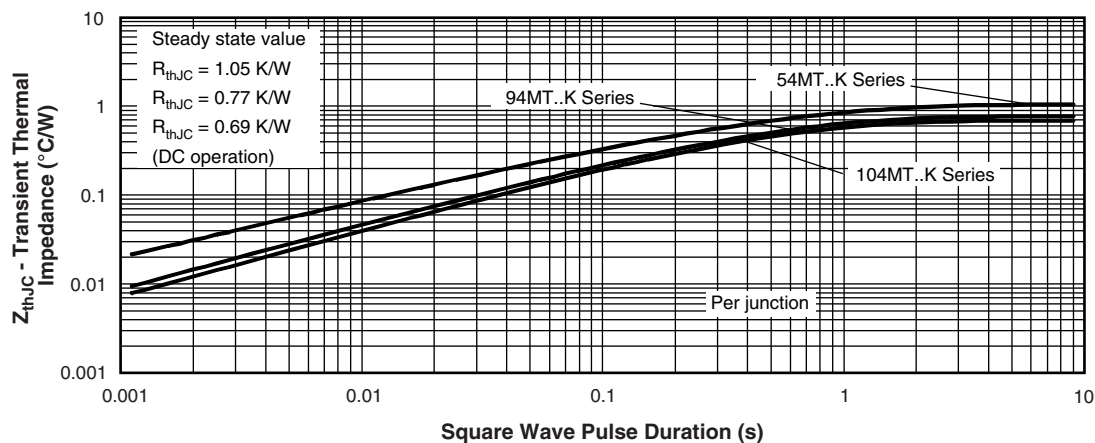


Fig. 15 - Maximum Non-Repetitive Surge Current


Fig. 16 - Thermal Impedance Z_{thJC} Characteristics

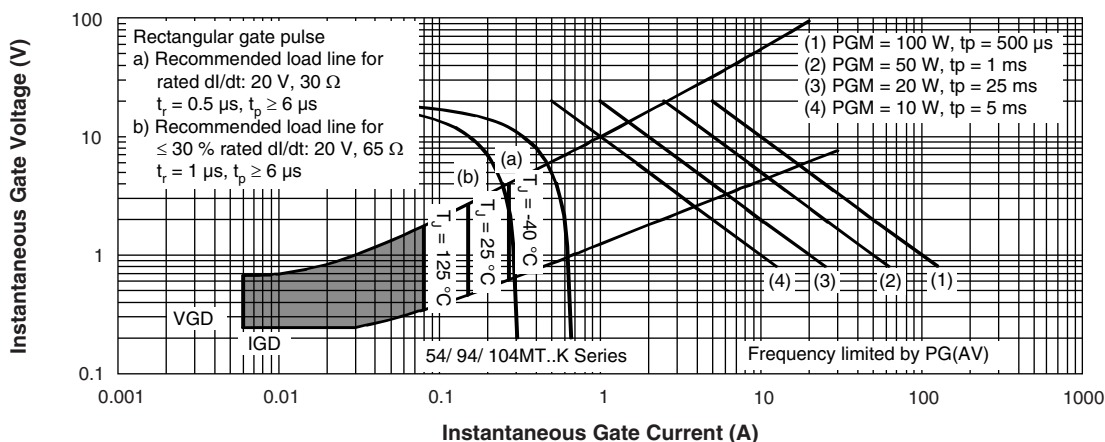


Fig. 17 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code

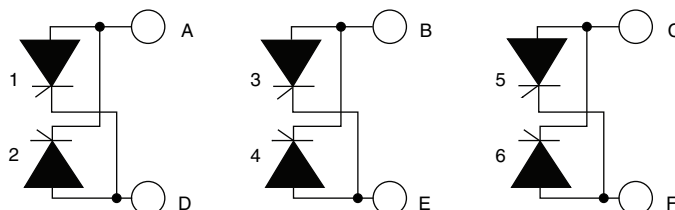
VS-	10	4	MT	160	K	PbF
1	2	3	4	5	6	

- 1** - Vishay Semiconductors product
- 2** - Current rating code: 5 = 50 A (average)
9 = 90 A (average)
10 = 100 A (average)
- 3** - AC switch
- 4** - Essential part number
- 5** - Voltage code $\times 10 = V_{RRM}$ (see Voltage Ratings table)
- 6** - PbF = Lead (Pb)-free

Note

- To order the optional hardware go to www.vishay.com/doc?95172

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

Dimensions

www.vishay.com/doc?95004



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