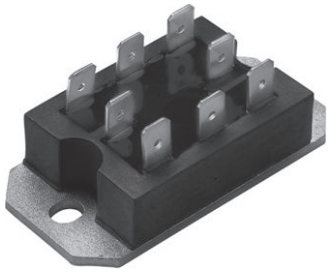
Power Modules, Passivated Assembled Circuit Elements, 25 A



PACE-PAK (D-19)

FEATURES

- Glass passivated junctions for greater reliability
- Electrically isolated base plate
- Available up to 1200 V_{RRM}/V_{DRM}
- High dynamic characteristics
- Wide choice of circuit configurations
- Simplified mechanical design and assembly
- UL E78996 approved
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

DESCRIPTION

The VS-P100 series of integrated power circuits consists of power thyristors and power diodes configured in a single package. With its isolating base plate, mechanical designs are greatly simplified giving advantages of cost reduction and reduced size.

Applications include power supplies, control circuits and battery chargers.

PRIMARY CHARACTERISTICS	
I_O	25 A
Type	Modules - thyristor, standard
Package	PACE-PAK (D-19)

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I_O	85 °C	25	A
I_{TSM}	50 Hz	357	A
	60 Hz	375	
I^2t	50 Hz	637	A^2s
	60 Hz	580	
$I^2\sqrt{t}$		6365	$A^2\sqrt{s}$
V_{DRM}, V_{RRM}		400 to 1200	V
V_{ISOL}		2500	V
T_J	Range	-40 to +125	°C
T_{Stg}		-40 to +125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS			
TYPE NUMBER	V_{RRM}/V_{DRM}, MAXIMUM REPETITIVE PEAK REVERSE AND PEAK OFF-STATE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM} MAXIMUM AT T_J MAXIMUM mA
VS-P101, VS-P121, VS-P131	400	500	10
VS-P102, VS-P122, VS-P132	600	700	
VS-P103, VS-P123, VS-P133	800	900	
VS-P103, VS-P124, VS-P134	1000	1100	
VS-P105, VS-P125, VS-P135	1200	1300	

ON-STATE CONDUCTION						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**			**VALUES**	**UNITS**
Maximum DC output current at case temperature	I_O	Full bridge			25	A
					85	°C
Maximum peak, one-cycle non-repetitive on-state or forward current	I_{TSM}, I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	357	A
		t = 8.3 ms			375	
		t = 10 ms	100 % V_{RRM} reapplied		300	
		t = 8.3 ms			315	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		637	A^2s
		t = 8.3 ms			580	
		t = 10 ms	100 % V_{RRM} reapplied		450	
		t = 8.3 ms			410	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied I^2t for time tx = $I^2\sqrt{t} \cdot \sqrt{tx}$			6365	$A^2\sqrt{s}$
Maximum value of threshold voltage	$V_{T(TO)}$	T_J = 125 °C			0.82	V
Maximum level value of on-state slope resistance	r_{t1}	T_J = 125 °C, average power = $V_{T(TO)} \times I_{T(AV)} + r_t + (I_{T(RMS)})^2$			12	mΩ
Maximum on-state voltage drop	V_{TM}	$I_{TM} = \pi \times I_{T(AV)}$		T_J = 25 °C	1.35	V
Maximum forward voltage drop	V_{FM}	$I_{FM} = \pi \times I_{F(AV)}$		T_J = 25 °C	1.35	V
Maximum non-repetitive rate of rise of turned-on current	dI/dt	T_J = 125 °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			200	A/µs
Maximum holding current	I_H	T_J = 25 °C anode supply = 6 V, resistive load, gate open			130	mA
Maximum latching current	I_L	T_J = 25 °C anode supply = 6 V, resistive load			250	

BLOCKING				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum critical rate of rise of off-state voltage	dV/dt	T_J = 125 °C, exponential to 0.67 V_{DRM} gate open	200	V/µs
Maximum peak reverse and off-state leakage current at V_{RRM}, V_{DRM}	I_{RRM}, I_{DRM}	T_J = 125 °C, gate open circuit	10	mA
Maximum peak reverse leakage current	I_{RRM}	T_J = 25 °C	100	µA
RMS isolation voltage	V_{ISOL}	50 Hz, circuit to base, all terminals shorted, T_J = 25 °C, t = 1 s	2500	V

TRIGGERING					
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**VALUES**	**UNITS**
Maximum peak gate power	P_{GM}			8	W
Maximum average gate power	$P_{G(AV)}$			2	
Maximum peak gate current	I_{GM}			2	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum gate voltage required to trigger	V_{GT}	T_J = -40 °C	Anode supply = 6 V resistive load	3	V
		T_J = 25 °C		2	
		T_J = 125 °C		1	
Maximum gate current required to trigger	I_{GT}	T_J = -40 °C		90	mA
		T_J = 25 °C		60	
		T_J = 125 °C		35	
Maximum gate voltage that will not trigger	V_{GD}	T_J = 125 °C, rated V_{DRM} applied		0.2	V
Maximum gate current that will not trigger	I_{GD}			2	mA

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum junction operating and storage temperature range	T_J, T_{Stg}		-40 to +125	°C
Maximum thermal resistance, junction to case per junction	R_{thJC}	DC operation	2.24	K/W
Maximum thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth and greased	0.10	
Mounting torque, base to heatsink (1)			4	Nm
Approximate weight			58	g
			2.0	oz.
Case style			PACE-PAK (D-19)	

Note

(1) A mounting compound is recommended and the torque should be checked after a period of 3 hours to allow for the spread of the compound

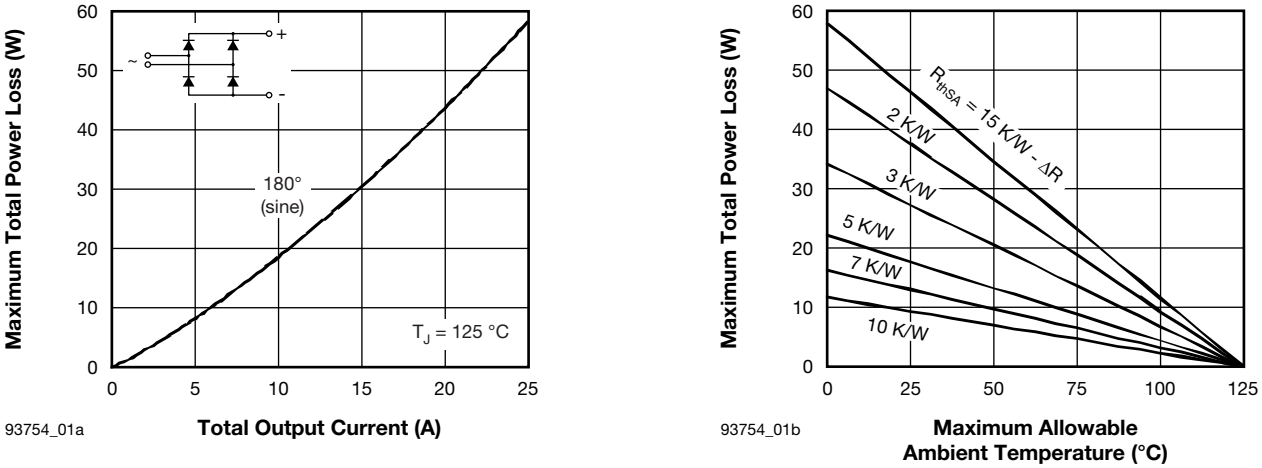


Fig. 1 - Current Ratings Nomogram (1 Module Per Heatsink)

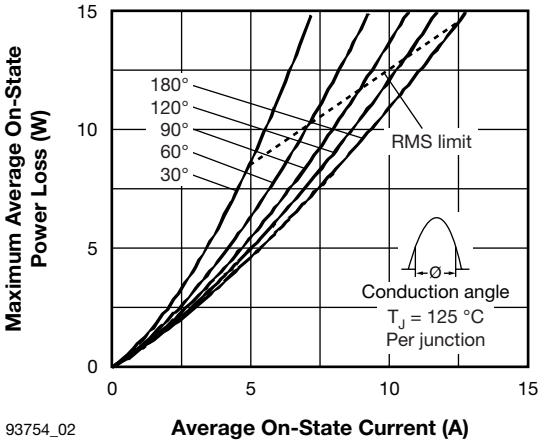


Fig. 2 - On-State Power Loss Characteristics

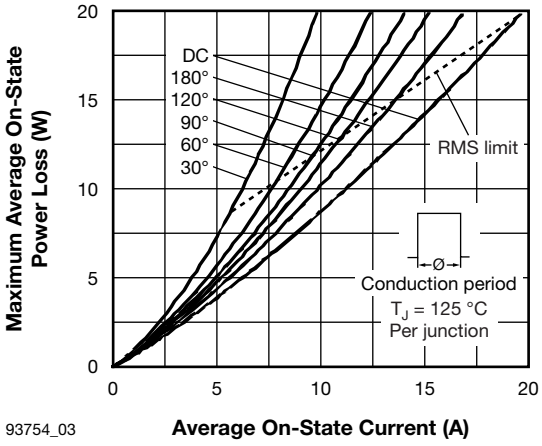


Fig. 3 - On-State Power Loss Characteristics

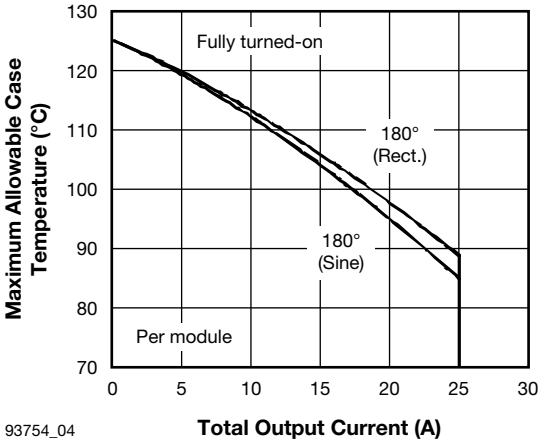


Fig. 4 - Current Ratings Characteristics

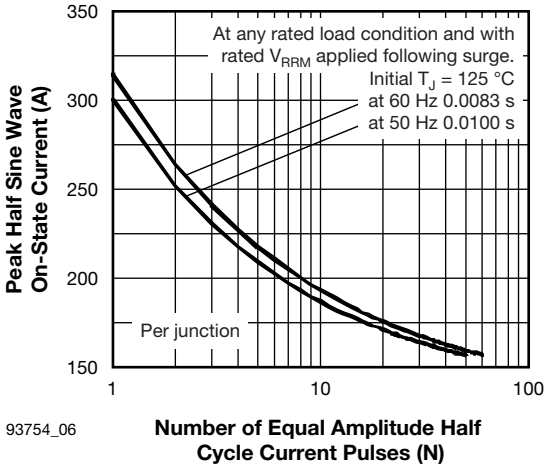


Fig. 6 - Maximum Non-Repetitive Surge Current

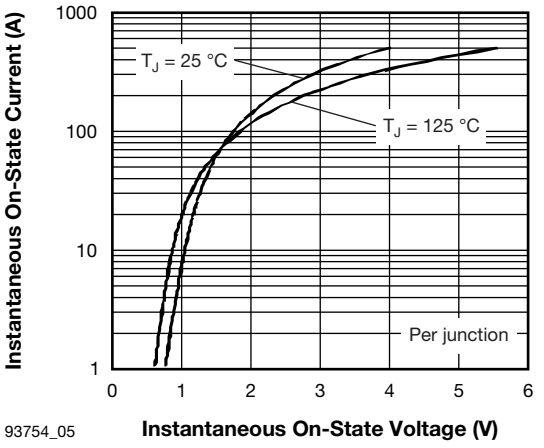


Fig. 5 - On-State Voltage Drop Characteristics

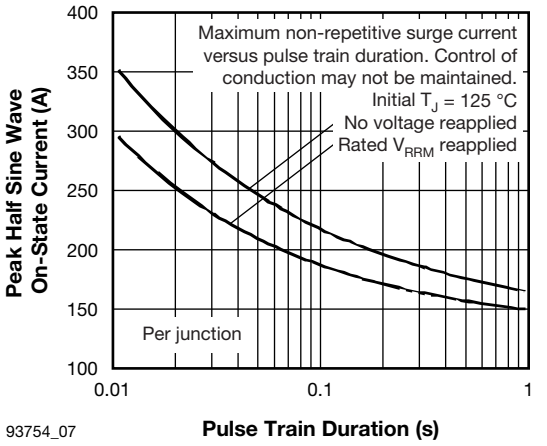


Fig. 7 - Maximum Non-Repetitive Surge Current

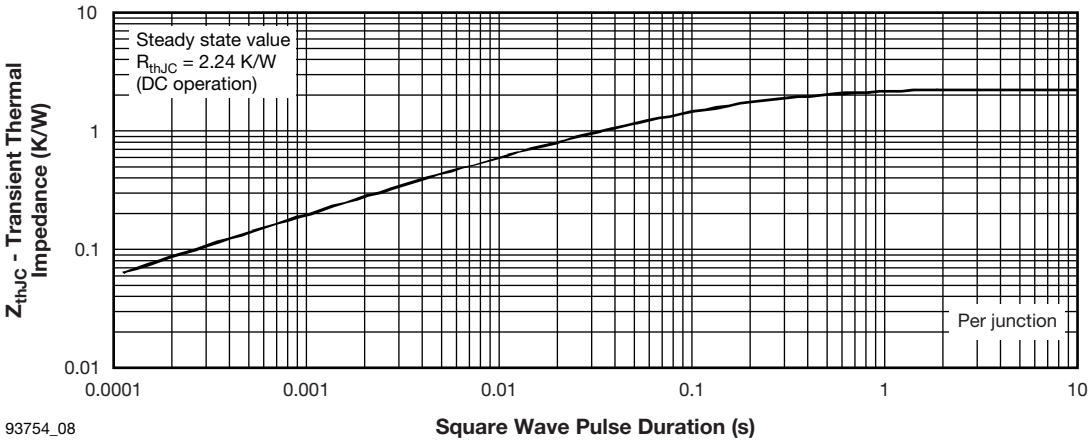


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

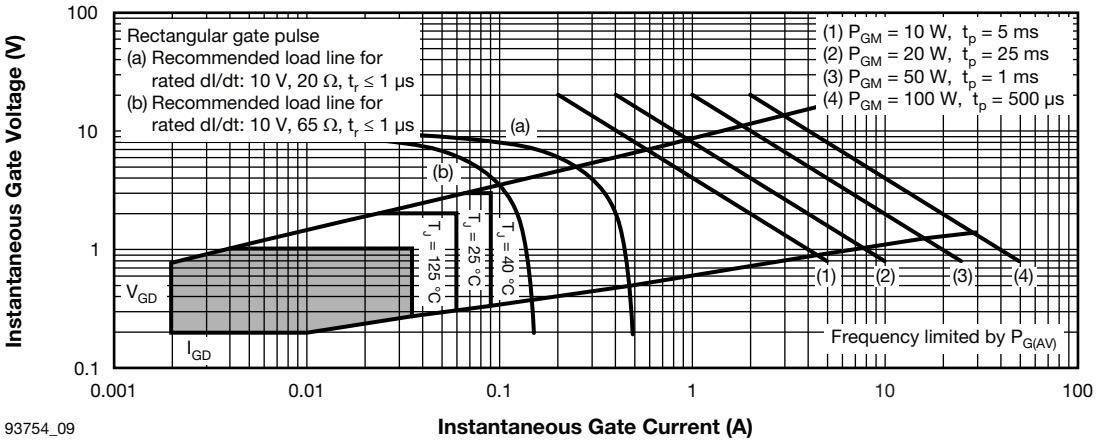


Fig. 9 - Gate Characteristics

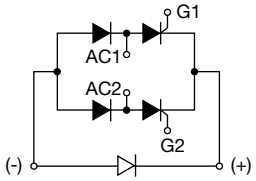
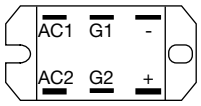
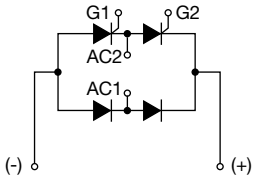
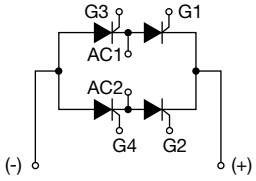
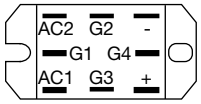
ORDERING INFORMATION TABLE

Device code

VS-	P	1	0	2	K	W
1	2	3	4	5	6	7

- **1** - Vishay Semiconductors product
- **2** - Module type
- **3** - Current rating
  - 1 = 25 A DC (P100 series)
  - 4 = 40 A DC (P400 series)
- **4** - Circuit configuration
  - 0 = single phase, hybrid bridge common cathode
  - 2 = single phase, hybrid bridge doubler connection
  - 3 = single phase, all SCR Bridge
- **5** - Voltage code
  - 1 = 400 V
  - 2 = 600 V
  - 3 = 800 V
  - 4 = 1000 V
  - 5 = 1200 V
- **6** - K = optional voltage suppression
- **7** - W = optional freewheeling diode

CIRCUIT CONFIGURATION

CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	SCHEMATIC DIAGRAM	TERMINAL POSITIONS
Single phase, hybrid bridge common cathode	0		
Single phase, hybrid bridge doubler connection	2		
Single phase, all SCR bridge	3		

CODING (1)

CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	BASIC SERIES	WITH VOLTAGE SUPPRESSION	WITH FREEWHEELING DIODE	WITH BOTH VOLTAGE SUPPRESSION AND FREEWHEELING DIODE
Single phase, hybrid bridge common cathode	0	P10.	P10.K	P10.W	P10.KW
Single phase, hybrid bridge doubler connection	2	P12.	P12.K	-	-
Single phase, all SCR bridge	3	P13.	P13.K	-	-

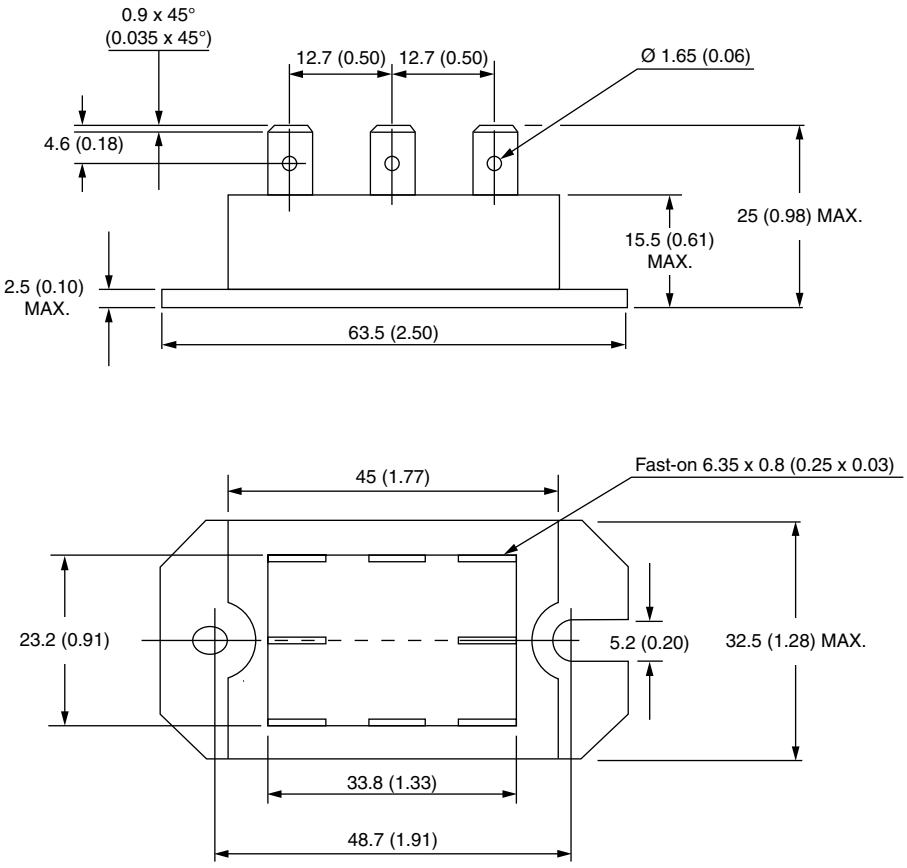
Note

(1) To complete code refer to Voltage Ratings table, i.e.: for 600 V P10.W complete code is P102W

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95335

D-19 PACE-PAK

DIMENSIONS in millimeters (inches)



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