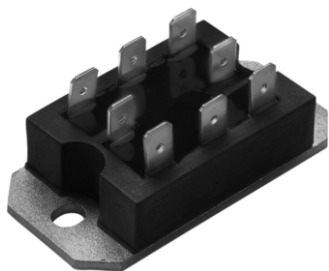



### Passivated Assembled Circuit Elements, 25 A



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 
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT

#### PRODUCT SUMMARY

$I_o$	25 A
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#### DESCRIPTION

The 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.

#### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_o$	85 °C	25	A
$I_{TSM}$ , $I_{FSM}$	50 Hz	357	A
	60 Hz	375	
$I^2t$	50 Hz	637	A <sup>2</sup> s
	60 Hz	580	
$I^2\sqrt{t}$		6365	A <sup>2</sup> √s
$V_{RRM}$	Range	400 to 1200	V
$V_{ISOL}$		2500	V
$T_J$		- 40 to 125	°C
$T_{Stg}$			

#### 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
P101, P121, P131	400	500	10
P102, P122, P132	600	700	
P103, P123, P133	800	900	
P104, P124, P134	1000	1100	
P105, P125, P135	1200	1300	

ON-STATE CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum DC output current at case temperature	I <sub>O</sub>	Full bridge			25	A
					85	°C
Maximum peak, one-cycle non-repetitive on-state or forward current	I <sub>TSM</sub> , I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum	357	A
		t = 8.3 ms			375	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		300	
		t = 8.3 ms			315	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied		637	A <sup>2</sup> s
		t = 8.3 ms			580	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		450	
		t = 8.3 ms			410	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reapplied I <sup>2</sup> t for time t <sub>x</sub> = I <sup>2</sup> √t · √t <sub>x</sub>			6365	A <sup>2</sup> √s
Maximum value of threshold voltage	V <sub>T(TO)</sub>	T <sub>J</sub> = 125 °C			0.82	V
Maximum level value of on-state slope resistance	r <sub>t1</sub>	T <sub>J</sub> = 125 °C, average power = V <sub>T(TO)</sub> × I <sub>T(AV)</sub> + r <sub>t</sub> + (I <sub>T(RMS)</sub> ) <sup>2</sup>			12	mΩ
Maximum on-state voltage drop	V <sub>TM</sub>	I <sub>TM</sub> = π × I <sub>T(AV)</sub>		T <sub>J</sub> = 25 °C	1.35	V
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>FM</sub> = π × I <sub>F(AV)</sub>				
Maximum non-repetitive rate of rise of turned-on current	di/dt	T <sub>J</sub> = 125 °C from 0.67 V <sub>DRM</sub> I <sub>TM</sub> = π × I <sub>T(AV)</sub> , I <sub>g</sub> = 500 mA, t <sub>r</sub> < 0.5 μs, t <sub>p</sub> > 6 μs			200	A/μs
Maximum holding current	I <sub>H</sub>	T <sub>J</sub> = 25 °C anode supply = 6 V, resistive load, gate open			130	mA
Maximum latching current	I <sub>L</sub>	T <sub>J</sub> = 25 °C anode supply = 6 V, resistive load			250	


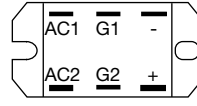
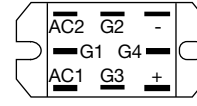
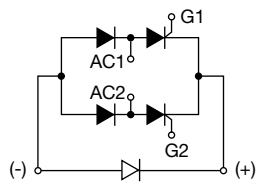
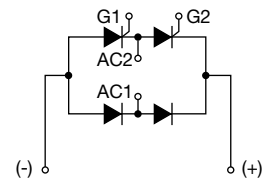
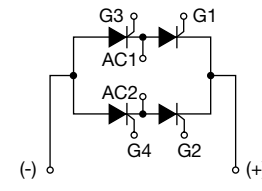
BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum critical rate of rise of off-state voltage	$dV/dt$	$T_J = 125 \text{ °C}$ , exponential to $0.67 V_{DRM}$ gate open	200	V/μs
Maximum peak reverse and off-state leakage current at $V_{RRM}$ , $V_{DRM}$	$I_{RRM}, I_{DRM}$	$T_J = 125 \text{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

TRIGGERING						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum peak gate power	P <sub>GM</sub>			8	W	
Maximum average gate power	P <sub>G(AV)</sub>			2		
Maximum peak gate current	I <sub>GM</sub>			2	A	
Maximum peak negative gate voltage	-V <sub>GM</sub>			10	V	
Maximum gate voltage required to trigger	V <sub>GT</sub>	T <sub>J</sub> = - 40 °C	Anode supply = 6 V resistive load	3	V	
		T <sub>J</sub> = 25 °C		2		
		T <sub>J</sub> = 125 °C		1		
Maximum gate current required to trigger	I <sub>GT</sub>	T <sub>J</sub> = - 40 °C		90	mA	
		T <sub>J</sub> = 25 °C		60		
		T <sub>J</sub> = 125 °C		35		
Maximum gate voltage that will not trigger	V <sub>GD</sub>	T <sub>J</sub> = 125 °C, rated V <sub>DRM</sub> applied		0.2	V	
Maximum gate current that will not trigger	I <sub>GD</sub>			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	$^{\circ}\text{C}$
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 <sup>(1)</sup>			4	Nm
Approximate weight			58	g
			2.0	oz.

### Note

<sup>(1)</sup> 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

CIRCUIT TYPE AND CODING <sup>(1)</sup>			
	CIRCUIT "0"	CIRCUIT "2"	CIRCUIT "3"
Terminal positions			
Schematic diagram			
	Single phase hybrid bridge common cathode	Single phase hybrid bridge doubler	Single phase all SCR bridge
Basic series	P10.	P12.	P13.
With voltage suppression	P10.K	P12.K	P13.K
With freewheeling diode	P10.W	-	-
With both voltage suppression and freewheeling diode	P10.KW	-	-

### Note

<sup>(1)</sup> To complete code refer to Voltage Ratings table, i.e.: For 600 V P10.W complete code is P102W

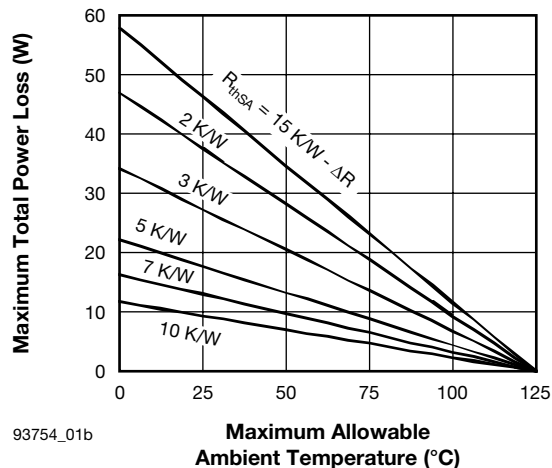
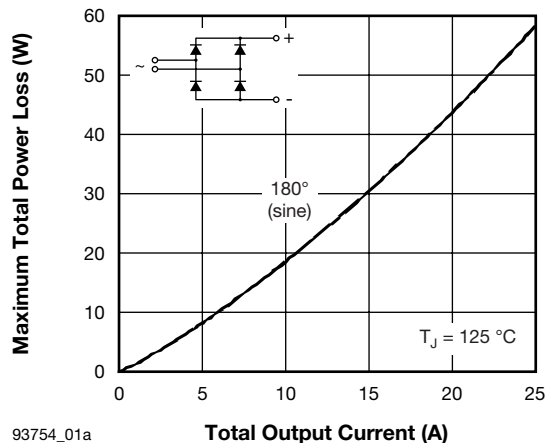


Fig. 1 - Current Ratings Nomogram (1 Module Per Heatsink)

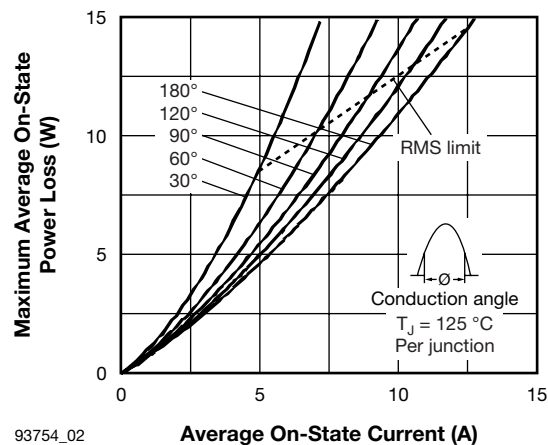


Fig. 2 - On-State Power Loss Characteristics

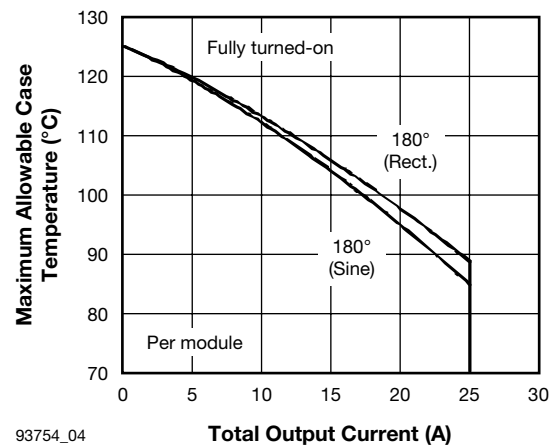


Fig. 4 - Current Ratings Characteristics

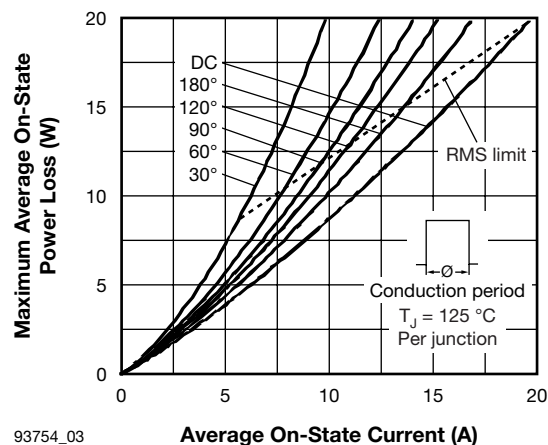


Fig. 3 - On-State Power Loss Characteristics

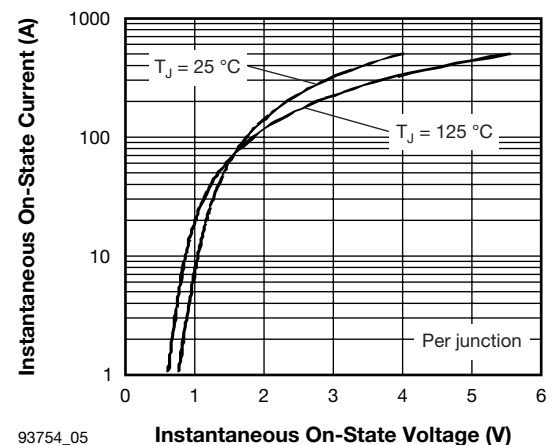
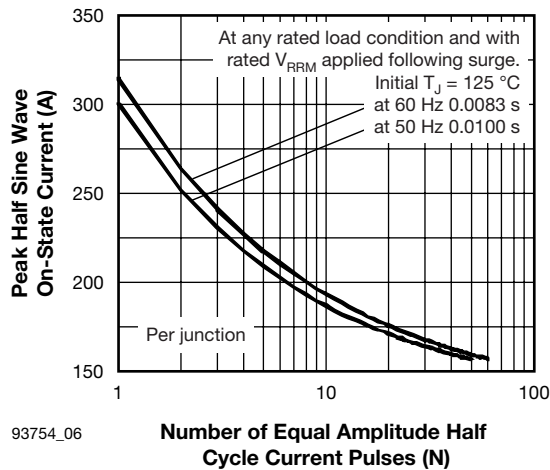
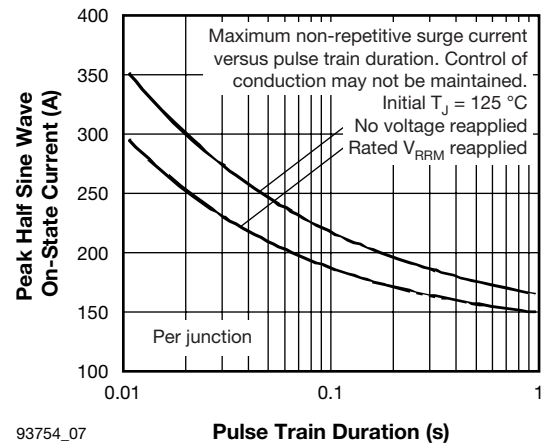


Fig. 5 - On-State Voltage Drop Characteristics



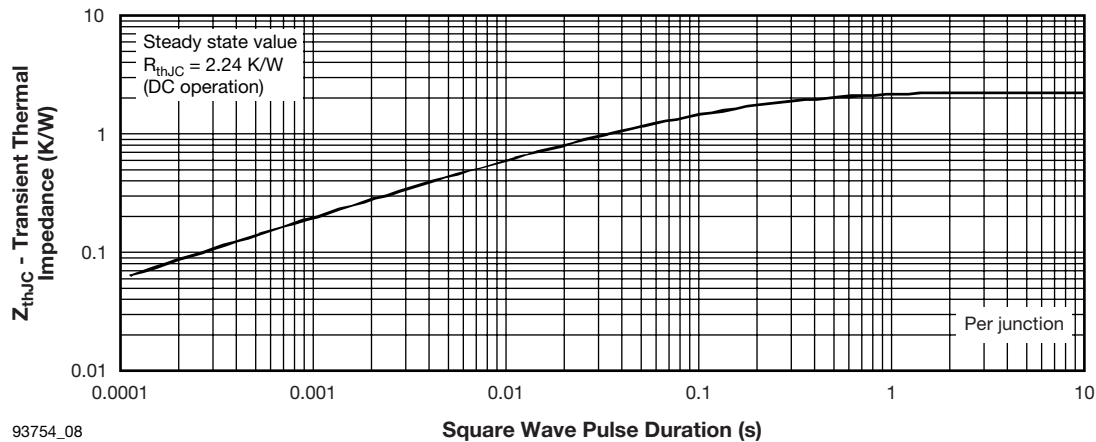
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Fig. 6 - Maximum Non-Repetitive Surge Current



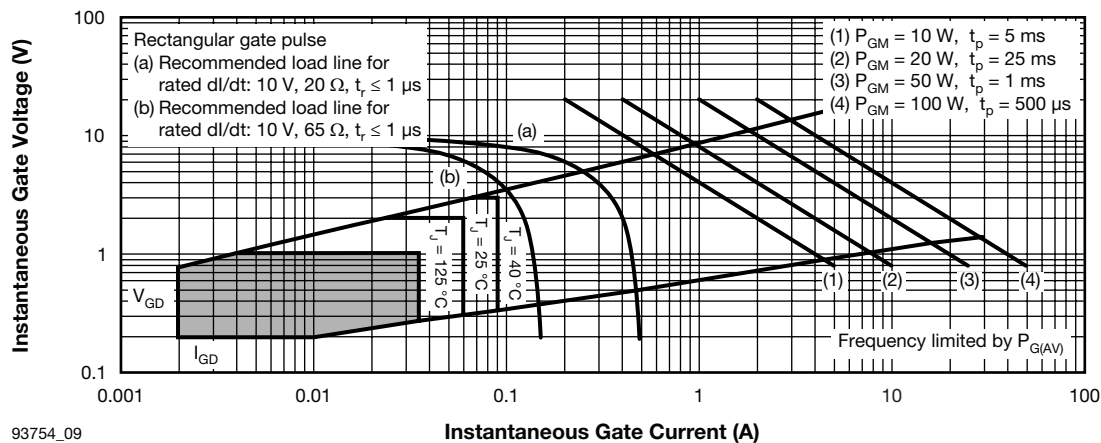
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Fig. 7 - Maximum Non-Repetitive Surge Current



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Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics



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Fig. 9 - Gate Characteristics

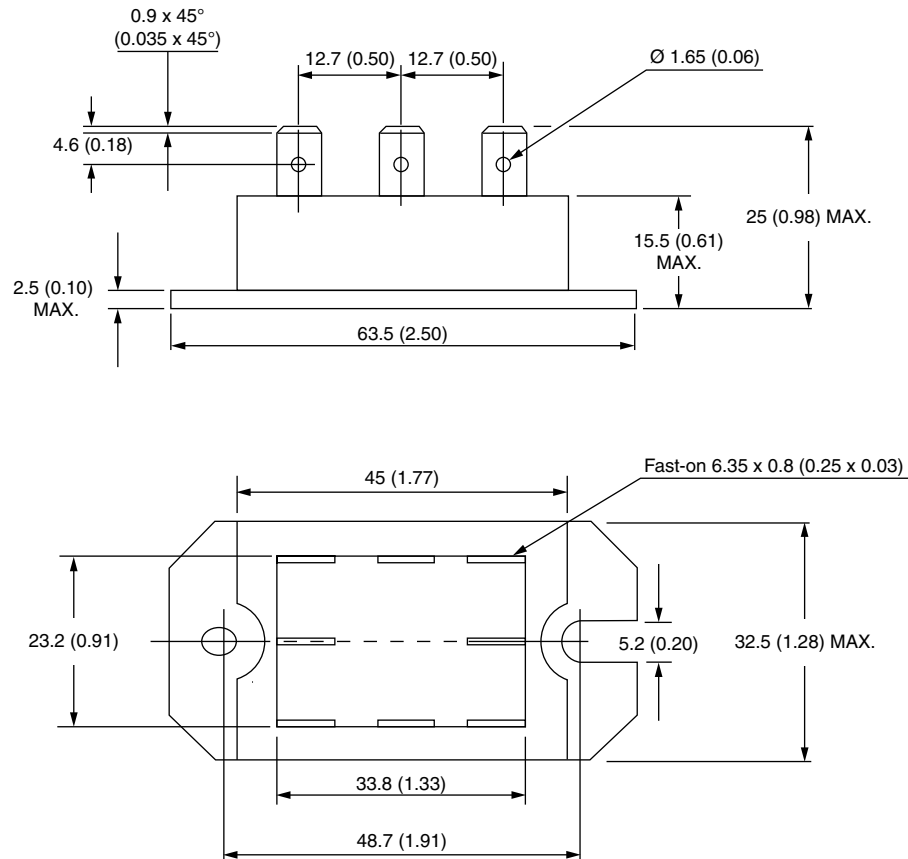
### LINKS TO RELATED DOCUMENTS

Dimensions

[www.vishay.com/doc?95335](http://www.vishay.com/doc?95335)

## D-19 PACE-PAK

**DIMENSIONS** in millimeters (inches)





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