

SCR / SCR and DIODE / SCR

Power Modules in B- package

## Features

- Glass passivated junctions for greater reliability
- Electrically isolated base plate (3500V RMS)
- Available up to 1200 V<sub>RRM</sub>, V<sub>DRM</sub>
- High surge capability
- Large creepage distances
- Simplified mechanical designs, rapid assembly
- B-package case style
- UL E 78996 approved

25A

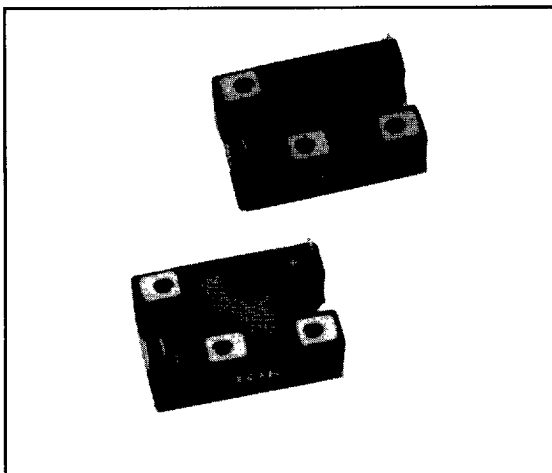
## Description

The B25DC../DA../DS../CS../JS.. series of B-modules consist of power SCR/SCR and DIODE/SCR configured in a single package. With their isolating base plate, mechanical designs are greatly simplified giving advantages of cost reduction and reduced size.

Applications include power supplies, control circuits, light dimmers and battery chargers.

## Major Ratings and Characteristics

Parameters	Value	Units
I <sub>T(AV)</sub>	25	A
	@ T <sub>C</sub>	70 °C
I <sub>TSM</sub>	50Hz	390 A
	60Hz	410 A
i <sup>2</sup> <sub>t</sub>	50Hz	770 A <sup>2</sup> s
	60Hz	700 A <sup>2</sup> s
i <sup>2</sup> <sub>t</sub> /t	7700	A <sup>2</sup> /s
V <sub>RRM</sub> range	100 to 1200	V
T <sub>J</sub>	-40 to 125	°C



**ELECTRICAL SPECIFICATIONS**

**Voltage Ratings**

Part number	Voltage Code	$I_{RRM}, I_{DRM}$ max peak reverse and off-state leakage current at $V_{RRM}, V_{DRM}, T_J = 125^\circ\text{C}$ , gate open circuit mA	$V_{RRM}, V_{DRM}$ maximum repetitive peak reverse and off-state voltage gate open circuit V	$V_{RSM}$ maximum non-repetitive peak reverse voltage V
B25 DC	10	10	100	150
B25 DA	20	10	200	300
B25 DS	40	10	400	500
B25 CS	60	10	600	700
B25 JS	80	10	800	900
	100	10	1000	1100
	120	10	1200	1300

**On-state Conduction**

Parameter	Value	Units	Conditions
$I_{T(AV)}$ Max. average on-state current	25	A	180° conduction half sine wave @ $T_C = 70^\circ\text{C}$
$I_{T(RMS)}$ Max. RMS on-state current	55.5	A	
$I_{TSM}$ Maximum peak one half cycle non repetitive surge current	390	A	10ms No voltage
	410	A	8.3ms reappplied Sinusoidal half Wave Initial $T_J = 125^\circ\text{C}$
	330	A	10ms 100% $V_{RRM}$
	345	A	8.3ms reappplied Sinusoidal half Wave Initial $T_J = 125^\circ\text{C}$
$I^2t$ Maximum $I^2t$ for fusing	770	$\text{A}^2\text{s}$	10ms No voltage
	700	$\text{A}^2\text{s}$	8.3ms reappplied Initial $T_J = 125^\circ\text{C}$
	545	$\text{A}^2\text{s}$	10ms 100% $V_{RRM}$
	490	$\text{A}^2\text{s}$	8.3ms reappplied Initial $T_J = 125^\circ\text{C}$
$I^2t$ Maximum $I^2t$ for fusing (1)	7700	$\text{A}^2/\text{s}$	t=0 to 10ms, no voltage reappplied, Initial $T_J = 125^\circ\text{C}$
$V_{TM}$ Maximum peak on-state voltage	1.6	V	$T_J = 25^\circ\text{C}, I_{TM} = I_{T(AV)} \times \pi, t_p = 400 \mu\text{s}, 180^\circ$ conduction
$V_{T(TO)}$ Max. value of threshold voltage	0.90	V	Low level (3)
	1.15	V	High level (4)
$r_t$ Max. value of on-state slope resistance	12.5	m $\Omega$	Low level (3)
	9.7	m $\Omega$	High level (4)
$I_H$ Maximum holding current	100	mA	$T_J = 25^\circ\text{C}$ anode supply=6V, resistive load, gate open, Initial $I_T = 1\text{A}$
$I_L$ Maximum latching current	200	mA	$T_J = 25^\circ\text{C}$ anode supply=6V, resistive load
$di/dt$ Maximum rate of rise of off-state voltage	$V_{DRM} \leq 600\text{V}$	200	$\text{A}/\mu\text{s}$ $T_J = 125^\circ\text{C}$ , from $0.67 V_{DRM}$
	$V_{DRM} = 800\text{V}$	180	$\text{A}/\mu\text{s}$ $I_{TM} = \pi \times I_{T(AV)}, I_g = 500\text{mA}$
	$V_{DRM} = 1000\text{V}$	160	$\text{A}/\mu\text{s}$ $t_r < 0.5 \mu\text{s}, t_p > 6 \mu\text{s}$
	$V_{DRM} \geq 1100\text{V}$	150	$\text{A}/\mu\text{s}$

(1)  $I^2t$  for time  $t_x = I^2t \times \sqrt{t_x}$

(3)  $16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$

(2) Average power =  $V_{T(TO)} \times I_{T(AV)} + r_t \times (I_{T(RMS)})^2$

(4)  $\pi \times I_{T(AV)} < I < 20 \times \pi \times I_{T(AV)}$

## ELECTRICAL SPECIFICATIONS

## Triggering

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Parameter	Value	Units	Conditions
$P_{GM}$ Maximum peak gate power	8.0	W	
$P_{G(AV)}$ Maximum average gate power	2.0	W	
$+I_{GM}$ Maximum peak gate current	1.5	A	
$-V_{GM}$ Maximum peak negative gate voltage	10	V	
$V_{GT}$ Maximum required DC gate current to trigger	3.0	V	$T_J = -65^\circ\text{C}$
	2.0	V	$T_J = 25^\circ\text{C}$
	1.0	V	$T_J = 125^\circ\text{C}$
$I_{GT}$ Maximum required DC gate current to trigger	90	mA	$T_J = -65^\circ\text{C}$
	60	mA	$T_J = 25^\circ\text{C}$
	35	mA	$T_J = 125^\circ\text{C}$
$V_{GD}$ Maximum gate voltage that will not trigger	0.2	V	@ $T_J = 125^\circ\text{C}$ , rated $V_{DRM}$ applied
$I_{GD}$ Maximum gate current that will not trigger	2.0	mA	@ $T_J = 125^\circ\text{C}$ , rated $V_{DRM}$ applied

## Switching

$t_{gd}$ Typical turn-on time	0.9	$\mu\text{s}$	$T_J = 25^\circ\text{C}$
$t_{rr}$ Typical reverse recovery time	4	$\mu\text{s}$	$T_J = 125^\circ\text{C}$ (5)
$t_q$ Typical turn-off time	110	$\mu\text{s}$	$T_J = 125^\circ\text{C}$ (6)

## Blocking

$dv/dt$ Minimum critical rate-of-rise of off-state voltage	100	V/ $\mu\text{s}$	$T_J = 125^\circ\text{C}$ , Linear to 100% rated $V_{DRM}$
	300	V/ $\mu\text{s}$	$T_J = 125^\circ\text{C}$ , Linear to 67% rated $V_{DRM}$
$I_{RRM}$ Max peak reverse and off-state leakage current at $V_{RRM}$ , $V_{DRM}$	10	mA	$T_J = 125^\circ\text{C}$ , gate open circuit
$I_{RM}$ Max peak rev. leakage current	100	$\mu\text{A}$	$T_J = 25^\circ\text{C}$
$V_{INS}$ RMS isolation voltage	3500	V	50Hz, circuit to base, all terminals shorted $T_J = 25^\circ\text{C}$ , $t = 1\text{ s}$

## Thermal and Mechanical Specifications

$T_J$ Junction temperature range	-40 to 125	$^\circ\text{C}$	
$T_{stg}$ Storage temperature range	-40 to 125	$^\circ\text{C}$	
$R_{thJC}$ Maximum thermal resistance, junction to case	1.05	K/W	Per junction - DC operation
	0.525	K/W	Per module - DC operation
$R_{thCS}$ Max. thermal resistance case to heatsink	0.10	K/W	Mounting surface smooth flat and greased Per module/Per junction
T Mounting torque $\pm 10\%$	Module to heatsink	2	Nm
	Module Terminals	0.8	Nm
wt Approximate weight	40	g	
Case style "B" Type			See outline table

(5)  $I_{TM} = \text{rated } I_{T(AV)}$  for at least 200  $\mu\text{s}$ ,  $di_{R}/dt = 10\text{ A}/\mu\text{s}$ (6)  $I_{TM} = \text{rated } I_{T(AV)}$  for at least 200  $\mu\text{s}$ . Min.  $V_R$  during turn-off = 100V, reapplied  $dv_{jdt} = 20\text{ V}/\mu\text{s}$  linear to 0.80  $V_{DRM}$  - Gate bias 0V, 100  $\Omega$ 

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

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**ΔR Conduction (per Junction)**

(The following table shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal	Rectangular	Units
180°	0.25	0.18	K/W
120°	0.30	0.30	K/W
90°	0.38	0.41	K/W
60°	0.55	0.58	K/W
30°	0.95	0.96	K/W

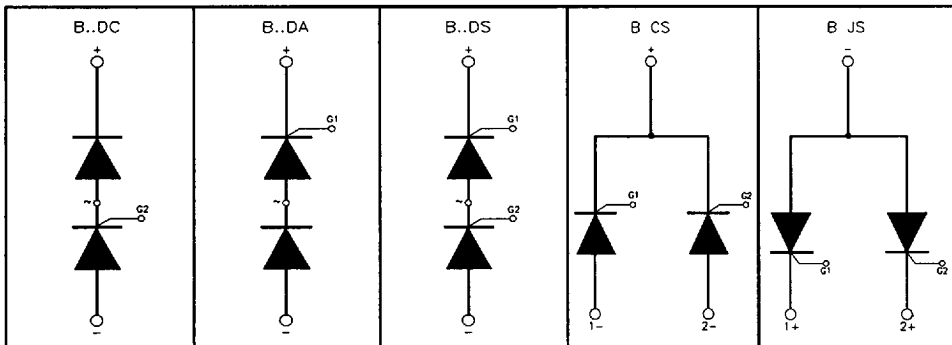
**Ordering Information Table**

**Device Code**



- 1** - Module type
- 2** - Average current
- 3** - Circuit configuration \*\*
- 4** - Voltage code (See Voltage Ratings Table)
- 5** - dv/dt code:  
 No letter = 300V/μs  
 D = 500V/μs  
 K = 1000V/μs
- 6** - Terminal type:  
 No letter = Screw terminal  
 L = Fast on

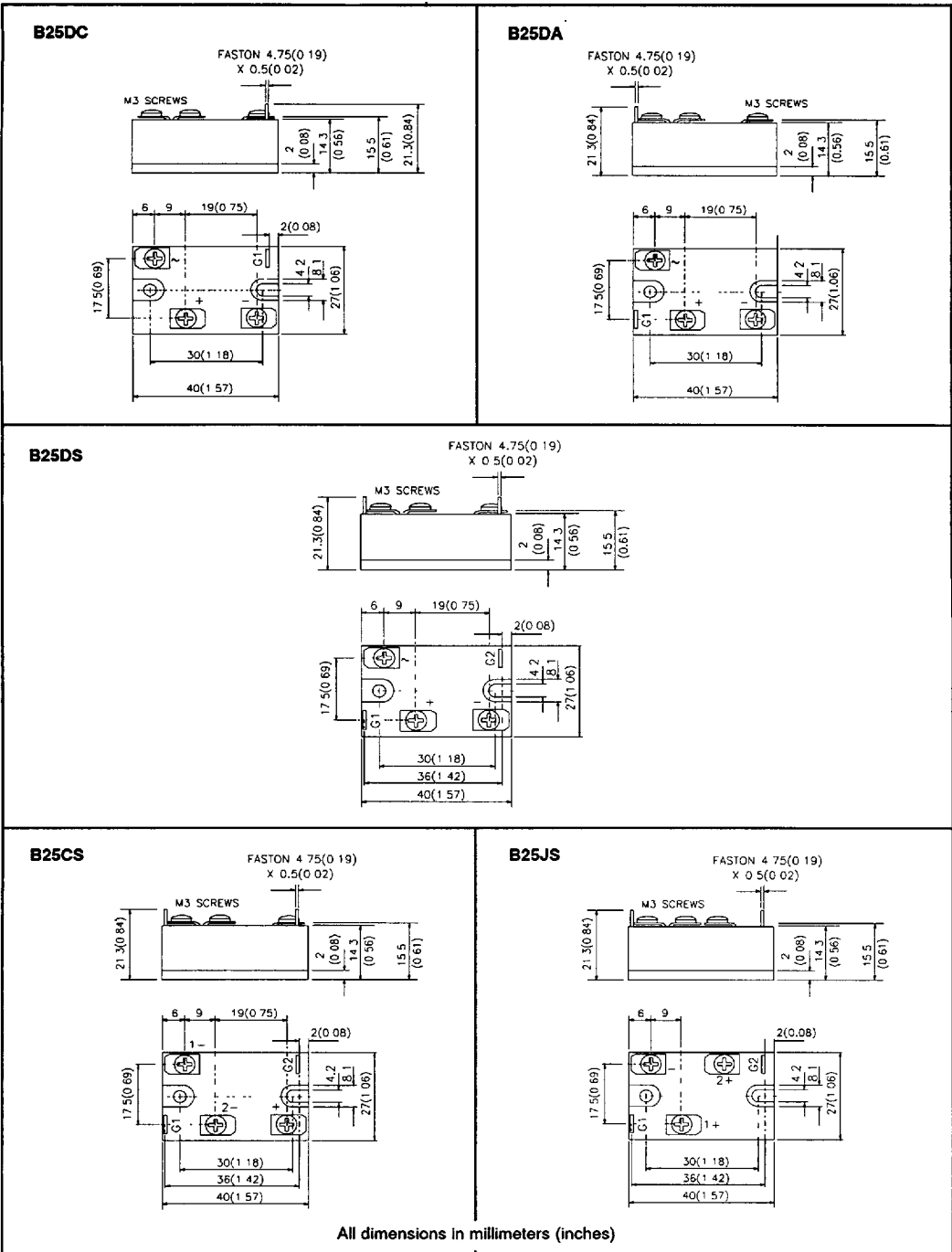
**Circuit configuration \*\***



Outlines Table

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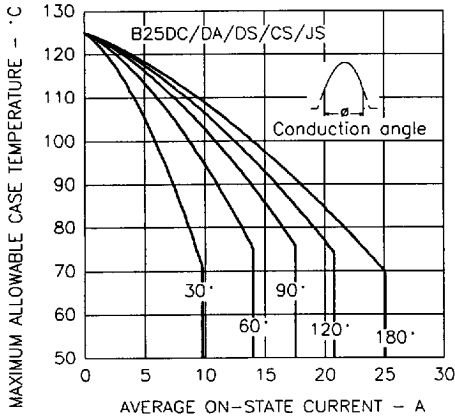


Fig. 1 - Current Ratings Characteristics

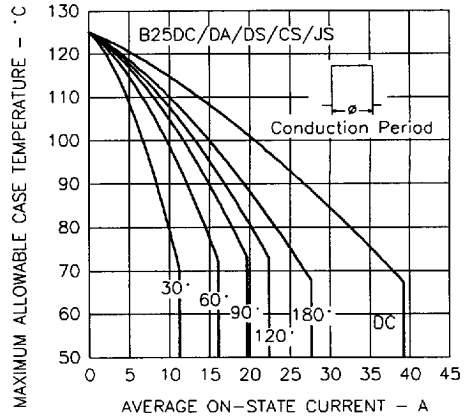


Fig. 2 - Current Ratings Characteristics

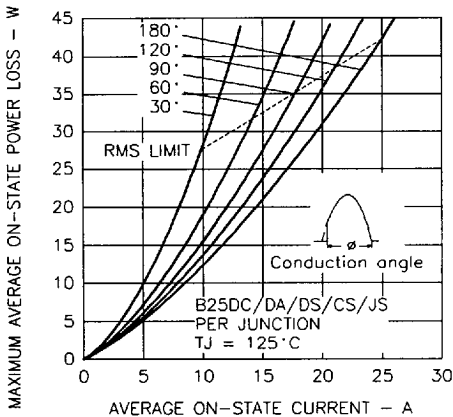


Fig. 3 - On-state Power Loss Characteristics

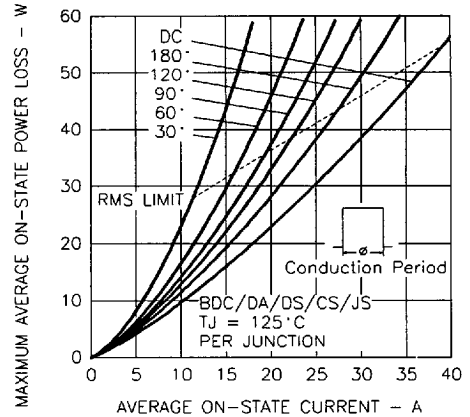


Fig. 4 - On-state Power Loss Characteristics

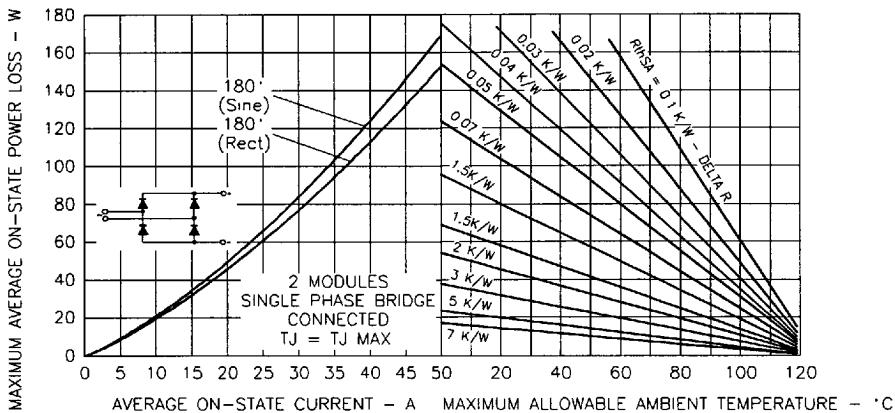


Fig. 5 - On-state Power Loss Characteristics

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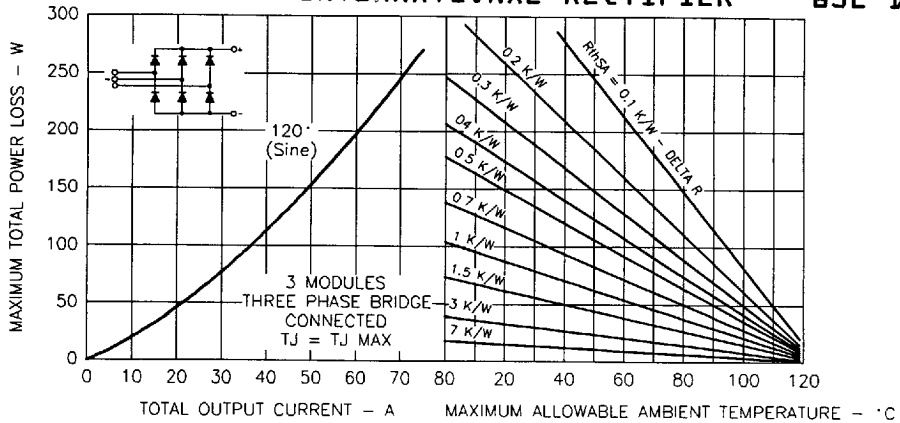


Fig. 6 - On-state Power Loss Characteristics

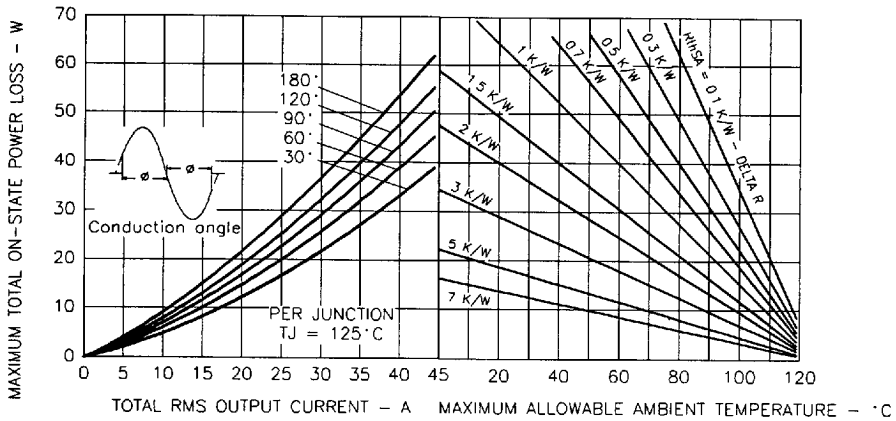


Fig. 7 - On-state Power Loss Characteristics

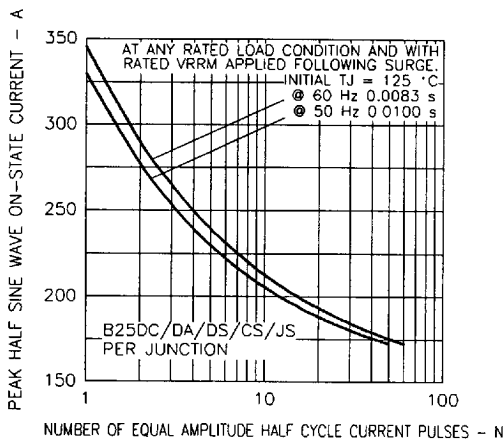


Fig. 8 - Maximum Non-Repetitive Surge Current

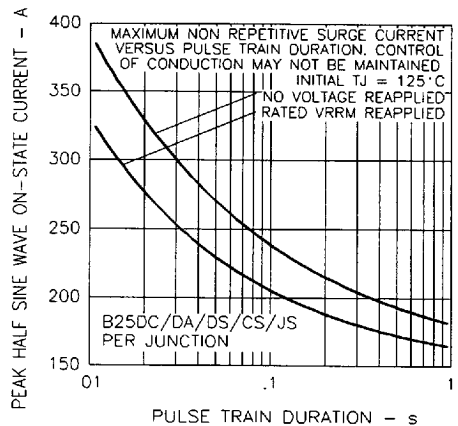


Fig. 9 - Maximum Non-Repetitive Surge Current

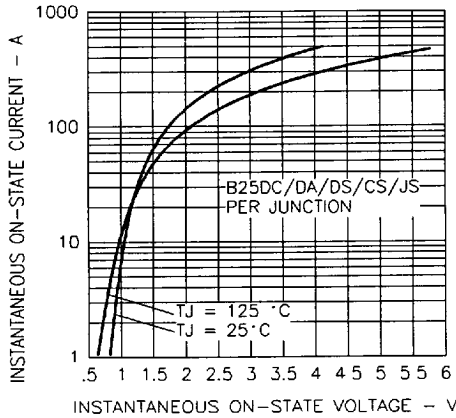


Fig. 10 - On-state Voltage Drop Characteristics

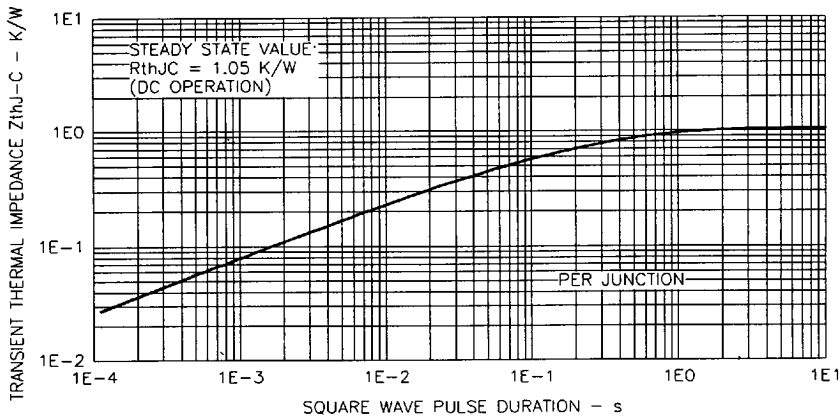


Fig. 11 - Thermal Impedance ZthJC Characteristics

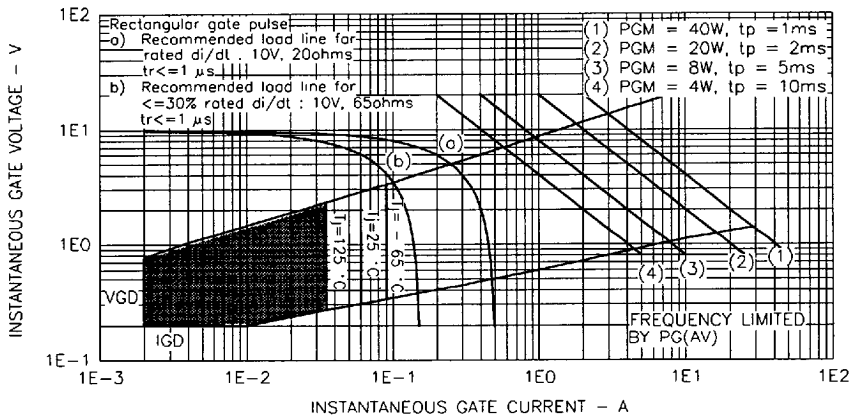


Fig. 12 - Gate Characteristics

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