

Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

PSDI 33/06

$I_{C25} = 44 \text{ A}$
 $V_{CES} = 600 \text{ V}$
 $I_{FAV25} = 18 \text{ A}$
 $V_{RRM} = 1200 \text{ V}$

Preliminary Data Sheet

IGBT

Symbol	Test Conditions	Maximum Ratings
V_{CES}	$T_{VJ} = 25 \text{ }^\circ\text{C to } 150 \text{ }^\circ\text{C}$	600 V
V_{GES}	continuous	± 20 V
I_{C25}	$T_C = 25 \text{ }^\circ\text{C}$	44 A
I_{C80}	$T_S = 80 \text{ }^\circ\text{C}$	30 A
RBSOA	$V_{CE} = 600 \text{ V}, R_G = 10 \text{ } \Omega, T_{VJ} = 125 \text{ }^\circ\text{C}$ clamped inductive load, $L = 100 \text{ } \mu\text{H}$	$I_{CM} = 100$ A $V_{CEK} \leq V_{CES}$
t_{SC}	$V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_G = 10 \text{ } \Omega,$ $T_{VJ} = 125 \text{ }^\circ\text{C}, \text{ non-repetitive}$	10 μs

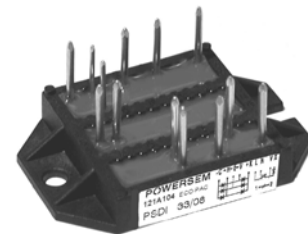
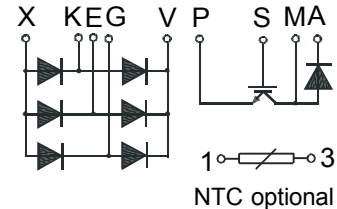
Symbol Test Conditions Characteristic Values

$T_{VJ} = 25 \text{ }^\circ\text{C}, \text{ unless otherwise specified}$

$V_{CE(sat)}$	$V_{GE} = 15 \text{ V}, I_C = 10 \text{ A}, T_{VJ} = 25 \text{ }^\circ\text{C}$	max. 1.8 V
$V_{CE(sat)}$	$V_{GE} = 15 \text{ V}, I_C = 10 \text{ A}, T_{VJ} = 25 \text{ }^\circ\text{C}$	typ. 1.5 V
$V_{CE(sat)}$	$T_{VJ} = 125 \text{ }^\circ\text{C}$	typ. 1.6 V
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1 \text{ mA}$	min. 3 V
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1 \text{ mA}$	max. 5 V
I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0 \text{ V}, T_{VJ} = 25 \text{ }^\circ\text{C}$	max. 0.04 mA
I_{CES}	$T_{VJ} = 125 \text{ }^\circ\text{C}$	typ. 1 mA
I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$	max. 100 nA
$t_{d(on)}$	inductive load, $T_{VJ} = 125 \text{ }^\circ\text{C}$ $V_{CE} = 400 \text{ V}, I_C = 10 \text{ A}$ $V_{GE} = \pm 15 \text{ V}, R_G = 10 \text{ } \Omega$	typ. 31 ns
t_r		typ. 50 ns
$t_{d(off)}$		typ. 291 ns
t_f		typ. 70 ns
E_{on}		typ. 0.60 mJ
E_{off}	typ. 0.31 mJ	
C_{ies}	$V_{CE} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GE} = 0 \text{ V}$	typ. 1600 pF
Q_{Gon}	$V_{CE} = 480 \text{ V}, I_C = 10 \text{ A}, V_{GE} = 15 \text{ V}$	typ. 140 nC
R_{thJC}		max. 0.96 K/W
R_{thJH}		max. tbd K/W

Module

Symbol	Test Conditions	Maximum Ratings
T_{VJ}		-40...+150 $^\circ\text{C}$
T_{JM}		150 $^\circ\text{C}$
T_{stg}		-40...+150 $^\circ\text{C}$
V_{isol}	50/60 Hz $t = 1 \text{ min}$	3000 V~
	lisol $\leq 1 \text{ mA}$ $t = 1 \text{ s}$	3600 V~
M_d	Mounting torque (M 4)	1.5-2.0 Nm
Weight	typ.	24 g



Features

- High level of integration - only one power semiconductor module required for the whole braking system module
- Isolation voltage 3600 V~
- Planar glass passivated chips
- Ultrafast freewheel diode
- Leads suitable for PC board soldering
- Thermistor (optional)

Applications

- Drive inverters with brake system

Advantages

- Easy to mount with two screws
- Space and weight savings
- high temperature and power cycling capability
- Small and light weight
- 2 functions in one package

Caution: These Devices are sensitive to electrostatic discharge. Users should observe proper ESD handling precautions.

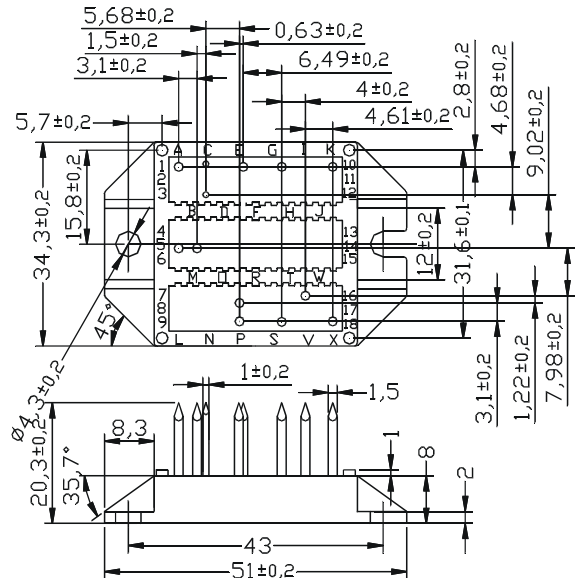
Data according to IEC 60747 refer to a single diode unless otherwise stated

Fast Recovery Diode

Symbol	Test Conditions	Maximum Ratings	
V_{RRM}	$T_{VJ} = 25\text{ °C to }150\text{ °C}$	600	V
I_{F25}	$T_C = 25\text{ °C}$	30	A
I_{F80}	$T_C = 80\text{ °C}$	19	A

Symbol	Test Conditions	Characteristic Values			
$T_{VJ} = 25\text{ °C}$, unless otherwise specified					
V_F	$I_F = 10\text{ A}$, $T_{VJ} = 25\text{ °C}$	$T_{VJ} = 25\text{ °C}$	max.	3.2	V
		$T_{VJ} = 25\text{ °C}$	typ.	2.2	V
		$T_{VJ} = 125\text{ °C}$	max.	2.4	V
I_R	$V_R = V_{RRM}$, $T_{VJ} = 25\text{ °C}$	$T_{VJ} = 25\text{ °C}$	max.	0.1	mA
		$T_{VJ} = 125\text{ °C}$	typ.	0.1	mA
I_{RM}	$I_F = 10\text{ A}$, $di_F/dt = -400\text{ A}/\mu\text{s}$, $T_{VJ} = 125\text{ °C}$		tbd	A	
t_{tr}	$V_R = 400\text{ V}$		tbd	ns	
R_{thJC}		max.	1.15	K/W	
R_{thJH}	with heat transfer paste		tbd	K/W	

Package style and outline
Dimensions in mm (1mm = 0.0394")



Rectifier Diodes

Symbol	Test Conditions	Maximum Ratings	
V_{RRM}		1200	V
I_{FAV25}	$T_C = 25\text{ °C}$, sine 180 °	41	A
I_{FAV80}	$T_C = 80\text{ °C}$, sine 180 °	28	A
I_{FSM}	$T_{VJ} = 25\text{ °C}$, $T = 10\text{ ms}$ (50Hz)	75	A

Symbol	Test Conditions	Characteristic Values			
$T_{VJ} = 25\text{ °C}$, unless otherwise specified					
V_F	$I_F = 10\text{ A}$, $T_{VJ} = 25\text{ °C}$	$T_{VJ} = 25\text{ °C}$	max.	1.8	V
		$T_{VJ} = 25\text{ °C}$	typ.	1.4	V
		$T_{VJ} = 125\text{ °C}$	typ.	1.6	V
I_R	$V_R = V_{RRM}$, $T_{VJ} = 25\text{ °C}$	$T_{VJ} = 25\text{ °C}$	max.	0.05	mA
		$T_{VJ} = 125\text{ °C}$	typ.	0.5	mA
t_{tr}	$V_R = 100\text{ V}$, $I_F = 10\text{ A}$, $-di/dt = 5\text{ A}/\mu\text{s}$	typ.	1	μs	
R_{thJC}	per diode	max.	2.5	K/W	
R_{thJH}	with heat transfer paste		tbd	K/W	

Module

Symbol	Test Conditions	Characteristic Values	
d_s	Creeping distance on surface	11.2	mm
d_A	Creeping distance in air	5	mm
a	Max. allowable acceleration	50	m/s ²
R_{25}^*	NTC @ 25 °C	470.000	Ω

*NTC will be changed in future to 5.000 Ω .