

FEATURES

- Wide safe operating area
- 10µs short circuit withstand
- Outstanding thermal cycling capability
- All-IGBT configuration
- High tolerance of non-uniform clamping pressure

APPLICATIONS

- High voltage DC transmission
- Flexible AC transmission systems
- High reliability inverters
- Motor controllers

ORDERING INFORMATION

Order As:

DPI2100P45A5200

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}		4500V
$V_{CE(sat)}$	(typ)	2.4V
I_C	(max)	2100A
$I_{C(PK)}$	(max)	4200A

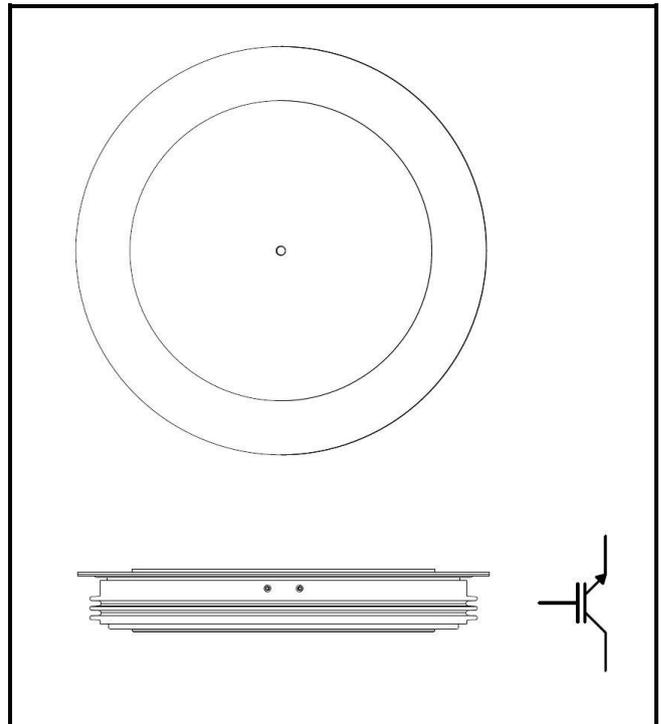
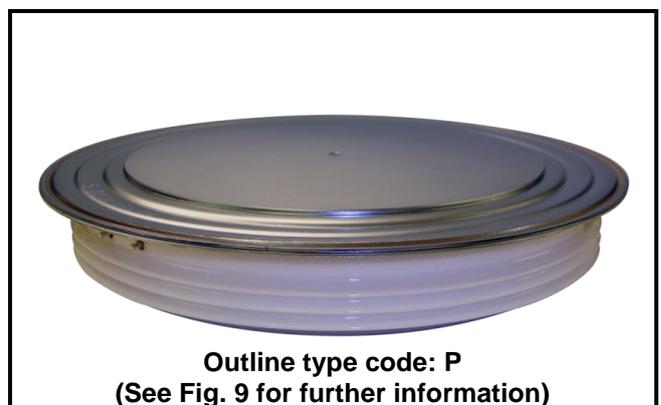


Fig.1 Circuit configuration



Outline type code: P
(See Fig. 9 for further information)

Fig. 2 Package

ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.

$T_{\text{case}} = 25^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
V_{CES}	Collector-emitter voltage	$V_{\text{GE}} = 0\text{V}$	4500	V
V_{GES}	Gate-emitter voltage	-	± 20	V
I_{C}	Continuous collector current	$T_{\text{case}} = 95^{\circ}\text{C}$	2100	A
$I_{\text{C(PK)}}$	Peak collector current	1ms, $T_{\text{j}} = 125^{\circ}\text{C}$	4200	A
P_{max}	Max. transistor power dissipation	$T_{\text{case}} = 25^{\circ}\text{C}$, $T_{\text{j}} = 125^{\circ}\text{C}$	22.7	kW

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$R_{\text{th(j-c)}}^*$	Thermal resistance – junction to case (collector side)	DC	-	0.0044	$^{\circ}\text{C/W}$
$R_{\text{th(c-h)}}^*$	Thermal resistance – case to heatsink (collector side)	Clamping force 70kN (with mounting compound)	-	0.0018	$^{\circ}\text{C/W}$
T_{vj}	Virtual junction temperature	-	-	125	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-	-40	125	$^{\circ}\text{C}$
F_{m}	Clamping force	-	65	75	kN

Note:

* Heat transfer occurs primarily through the collector side of the device.

ELECTRICAL CHARACTERISTICS
T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I _{CES}	Collector cut-off current	V _{GE} = 0V, V _{CE} = V _{CES}			5	mA
		V _{GE} = 0V, V _{CE} = V _{CES} , T _{case} = 125°C		20	60	mA
I _{GES}	Gate leakage current	V _{GE} = ±20V, V _{CE} = 0V			10	μA
V _{GE(TH)}	Gate threshold voltage	I _C = 260mA, V _{GE} = V _{CE}		6.1		V
V _{CE(sat)}	Collector-emitter saturation voltage	V _{GE} = 15V, I _C = 2100A, T _j = 25°C		2.4		V
		V _{GE} = 15V, I _C = 2100A, T _j = 125°C		2.8		V
Q _g	Gate charge	V _{GE} = ±15V		38		μC
SC _{Data}	Short circuit current, I _{SC}	T _j = 125°C, V _{CC} = 3400V t _p ≤ 10μs, V _{GE} ≤ 15V V _{CE(max)} = V _{CES} - L* x di/dt IEC 60747-9		10000		A

Note:

* L is the circuit inductance

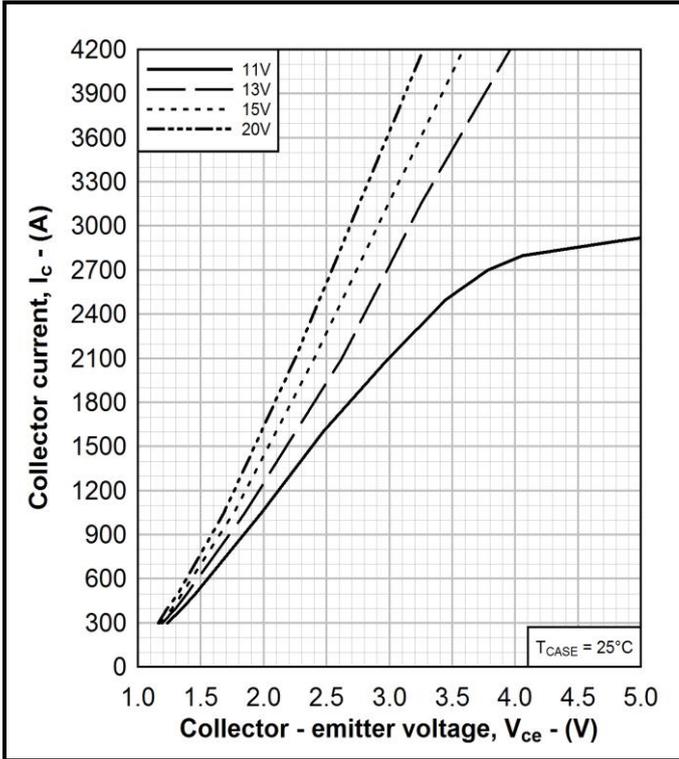
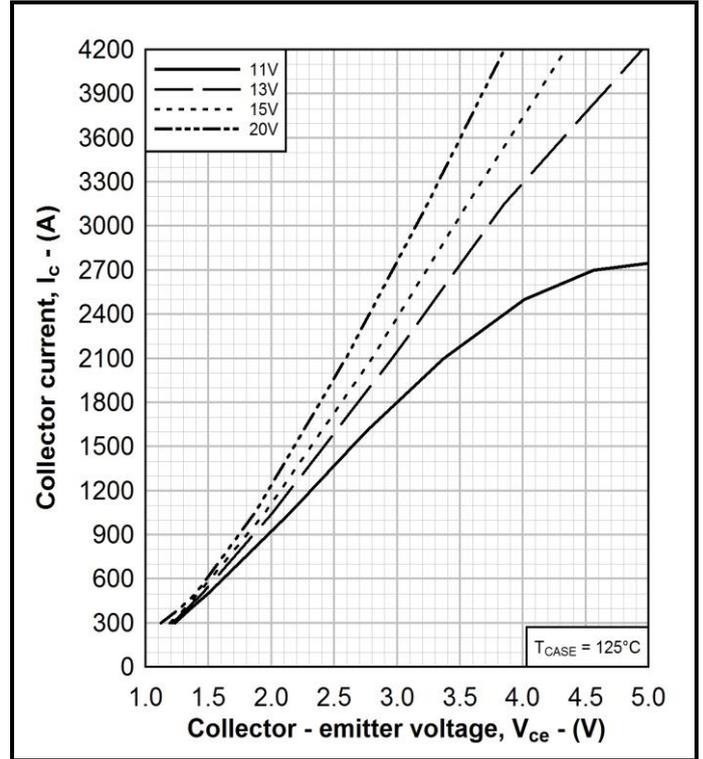
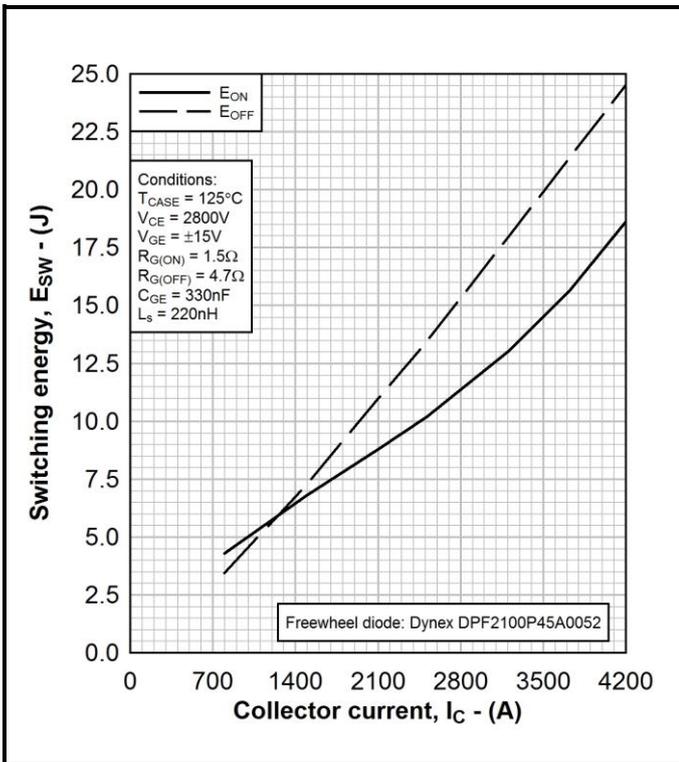
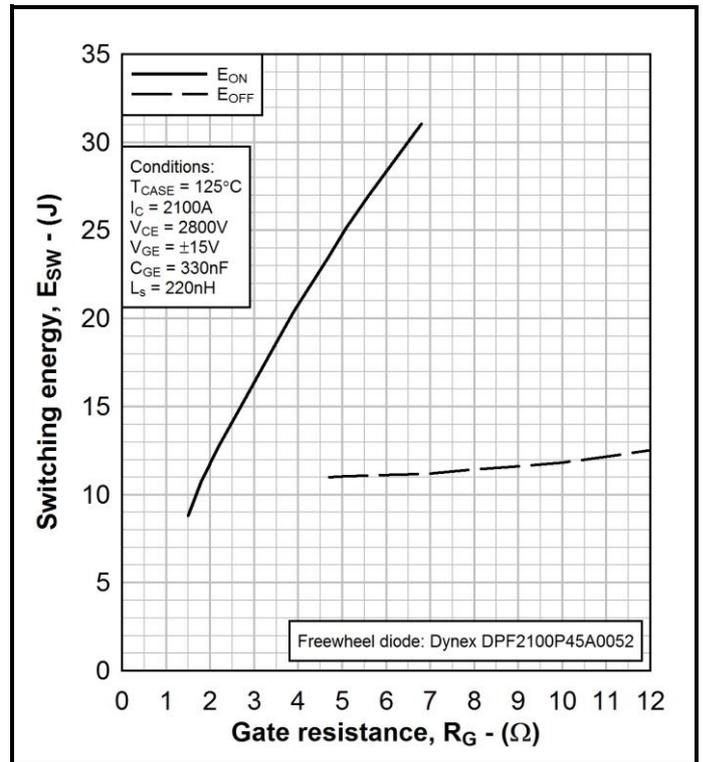
ELECTRICAL CHARACTERISTICS

$T_{case} = 25^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(off)}$	Turn-off delay time	$I_C = 2100\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 2800\text{V}$ $R_{G(ON)} = 1.5\Omega$ $R_{G(OFF)} = 4.7\Omega$ $C_{GE} = 330\text{nF}$ $L_S \sim 220\text{nH}$ Freewheel diode type Dynex DPF2100P45A0052		4700		ns
t_f	Fall time			1900		ns
E_{OFF}	Turn-off energy loss			9900		mJ
$t_{d(on)}$	Turn-on delay time			760		ns
t_r	Rise time			420		ns
E_{ON}	Turn-on energy loss			6400		mJ

$T_{case} = 125^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(off)}$	Turn-off delay time	$I_C = 2100\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 2800\text{V}$ $R_{G(ON)} = 1.5\Omega$ $R_{G(OFF)} = 4.7\Omega$ $C_{GE} = 330\text{nF}$ $L_S \sim 220\text{nH}$ Freewheel diode type Dynex DPF2100P45A0052		4800		ns
t_f	Fall time			2900		ns
E_{OFF}	Turn-off energy loss			11000		mJ
$t_{d(on)}$	Turn-on delay time			720		ns
t_r	Rise time			440		ns
E_{ON}	Turn-on energy loss			8800		mJ


Fig. 3 Typical output characteristics

Fig. 4 Typical output characteristics

Fig. 5 Typical switching energy vs. collector current

Fig. 6 Typical switching energy vs. gate resistance

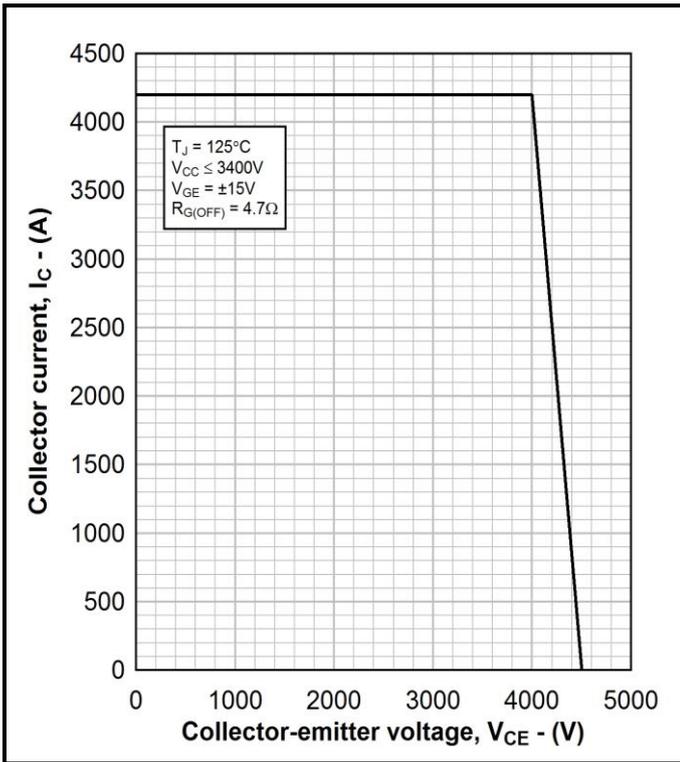


Fig. 7 Reverse bias safe operating area

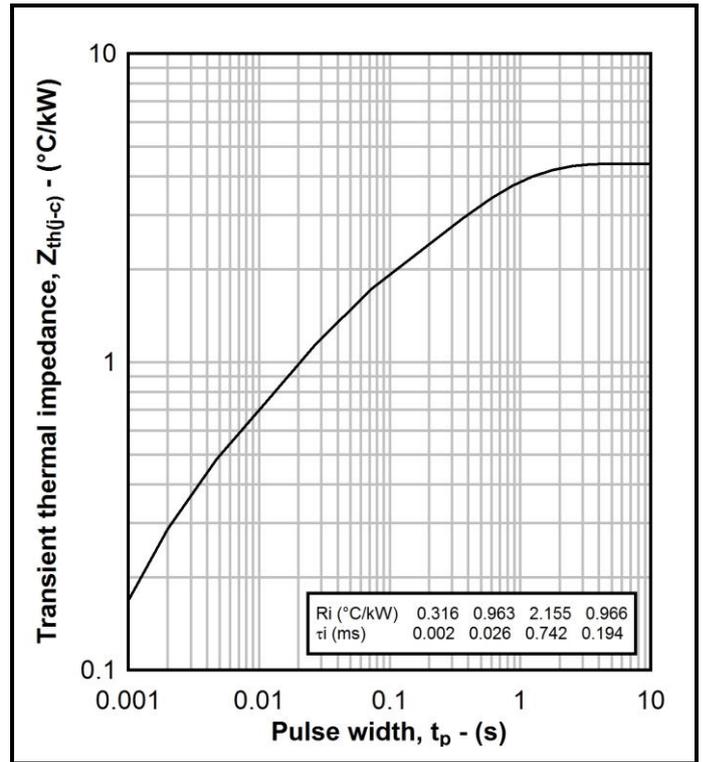


Fig. 8 Thermal impedance

PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services.
 All dimensions in mm, unless stated otherwise.

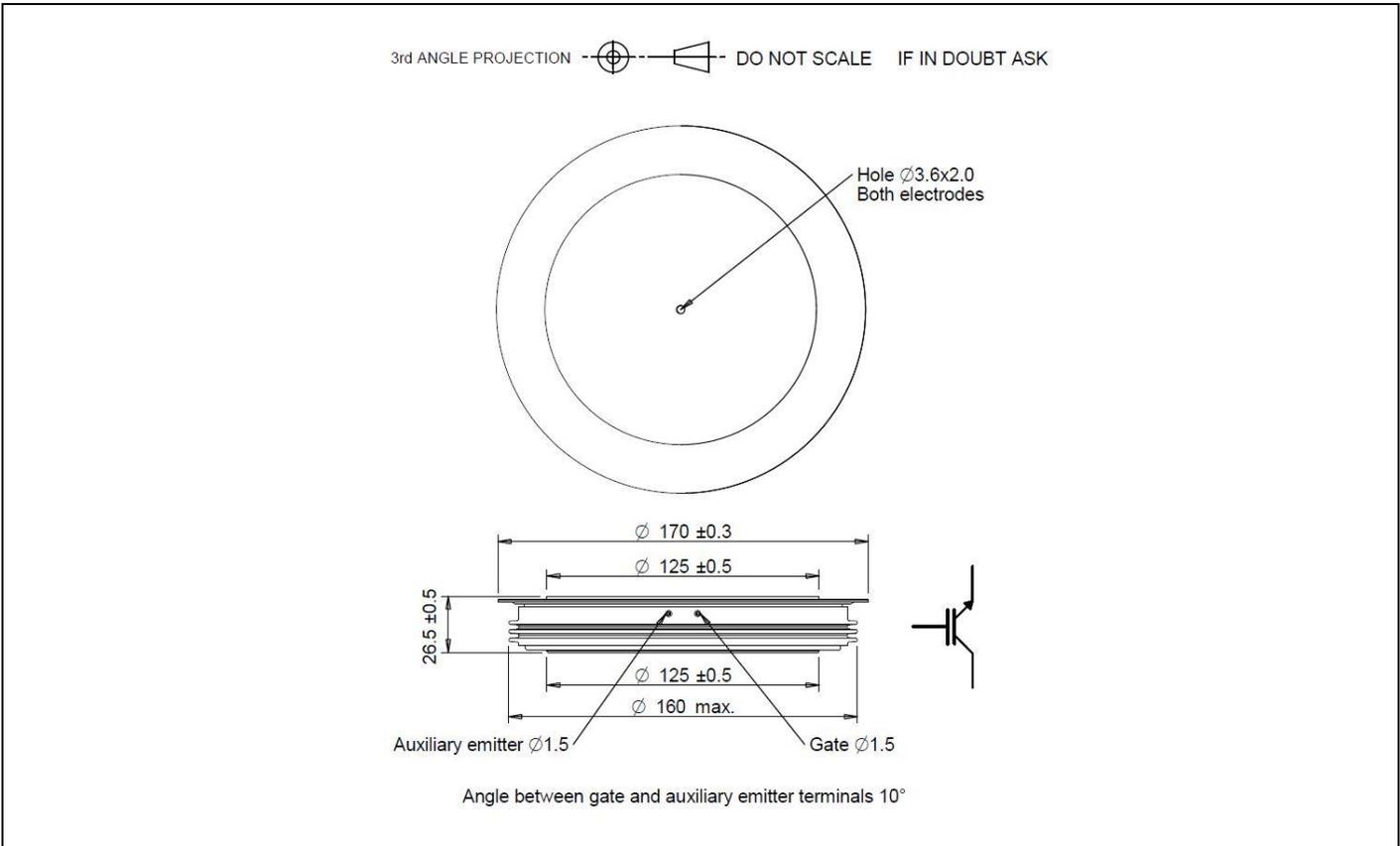


Fig. 9 Package outline

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The products must not be touched when operating because there is a danger of electrocution or severe burning. Always use protective safety equipment such as appropriate shields for the product and wear safety glasses. Even when disconnected any electric charge remaining in the product must be discharged and allowed to cool before safe handling using protective gloves.

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Preliminary Information:	The product design is complete and final characterisation for volume production is in progress. The datasheet represents the product as it is now understood but details may change.
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