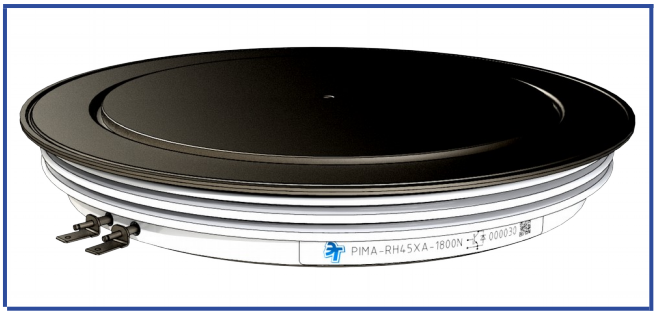
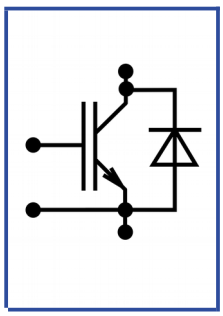
Capsule type (PressPack) IGBT module

4500 V 1800 A





Design features

- Hermetical sealed housing enables operation in explosive hazardous and aggressive environments
- Stable short-circuit state in malfunction mode
- Can be used in serial connection
- Wide range of operation temperatures from -60 to +125 ºC

Typical application

Energy grids

- Flexible AC transmission systems (FACTS):
  - static synchronized compensators (STATCOM)
  - static VAR compensators (SVC)
- High-voltage direct current lines (HVDC)
- Renewable energy (wind and solar power generation)

Electric drives

- Transportation (railroad transport, ship electric drives, electric drives for mining and transport machines)
- Industrial equipment

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	V_{GE} = 0	4500	V
Collector current (nominal)	$I_{C\ nom}$		1800	A
Repetitive peak collector current*1	I_{CRM}	t_p = 1 ms	3600	A
Short-circuit duration	t_{psc}	T_{vj} = 125°C; V_{GE} = ±15 V; V_{CE} = 2800 V; $V_{CE\ max} \leq V_{CE}$	10	µs
Gate-Emitter voltage	V_{GES}		±20	V
Junction operating temperature	$T_{vj\ (op)}$		-60…+125	ºC
Inverse diode				
Repetitive peak reverse voltage	V_{RRM}	V_{GE} = 0 V	4500	V
Forward current (nominal)	$I_{F\ nom}$		1800	A
Repetitive peak forward current*1	I_{FRM}	t_p = 1 ms	3600	A
Junction operating temperature	$T_{vj\ (op)}$		-60…+125	°C
Module				
Storage temperature	T_{stg}		-60…+125	°C
Maximum power dissipation	P_{max}	T_a=25°C, double side cooled	12	kW
Mounting force	F		50 … 70	kN

*1 Pulse width and repetition rate should be such that device junction temperature does not exceed maximum T_{vj} rating

Characteristics

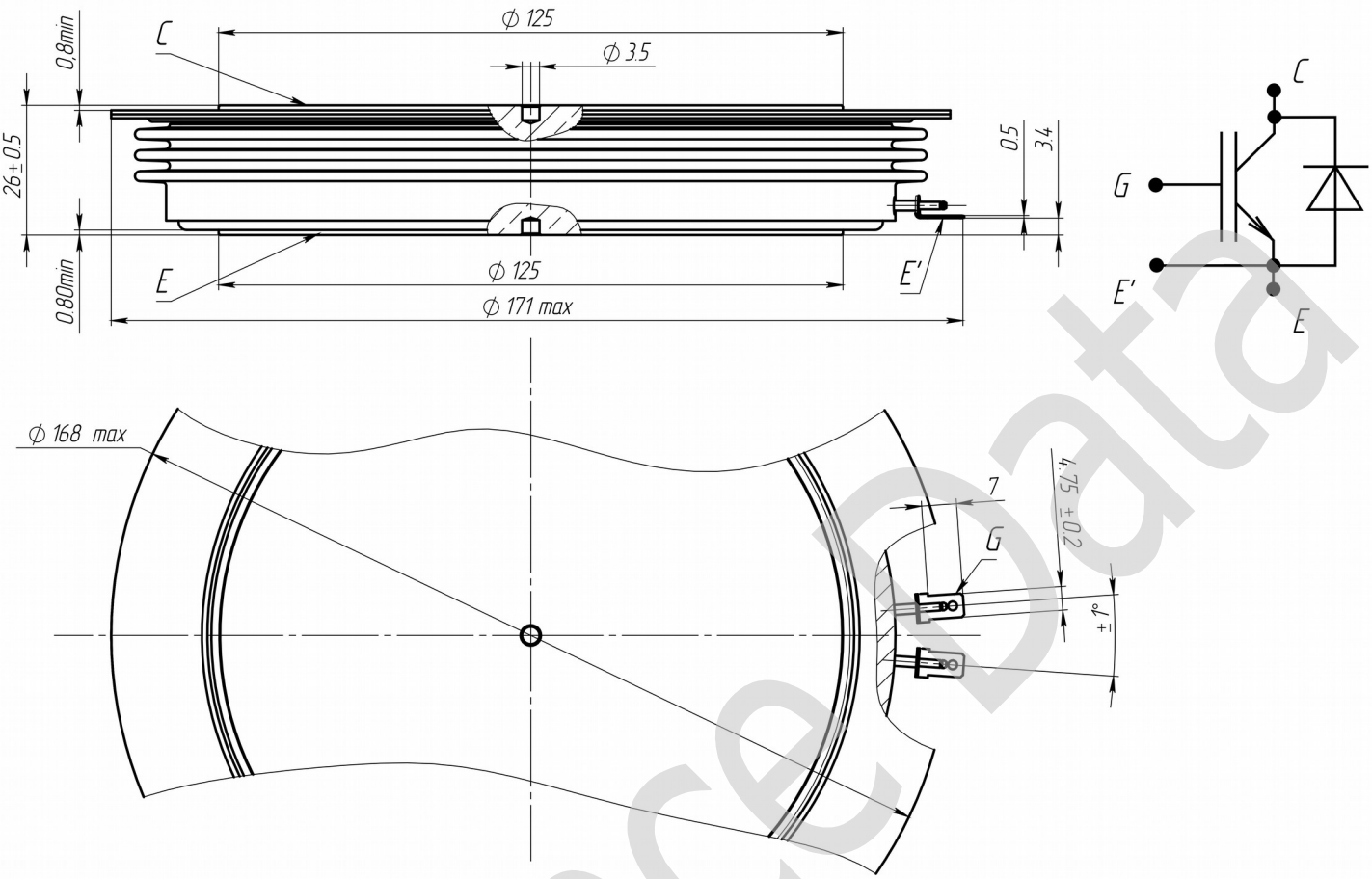
Definition	Symbol	Conditions		Value min.	Value typ.	Value max.	Unit.
IGBT							
Collector-Emitter saturation voltage	V_{CEsat}	V_{GE} = +15 В; I_C = 800A; t_u = 1000 µs	T_{vj} = 25°C		2.80		V
			T_{vj} = 125°C		3.50		V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C = 180 mA; V_{CE} = V_{GE}; T_{vj} = 125°C; t_u = 2 ms			5.0		V
Collector-Emitter cut-off current	I_{CES}	V_{CE} =4500 V; t_u = 50 ms; V_{GE} = 0; T_{vj} = 125°C			70.0		mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0; V_{GE} = ±20 В; T_{vj} = 125°C; t_u = 30 ms				±20	µA
Input capacitance	C_{ies}	V_{CE} = 25 V; U_{GE} = 0 V; f = 1 MHz; T_{vj} = 25°C			280.0		nF
Total gate charge	Q_G	$I_{C\,max}$ = 1800 A; V_{CE} = 2800 V; V_{GE} = - 8÷15 V; $R_{G\,on}$ = 3 Ω; $R_{G\,off}$ = 11 Ω				22.5	µC
Turn-on delay time	$t_{d(on)}$	V_{CE} = 2800 V; V_{GE} = ±15 V; $I_{C\,max}$ = 1800 A; $R_{G\,on}$ = 3 Ω; $R_{G\,off}$ = 11 Ω; T_{vj} = 125°C; L = 200 nH			1.5		µs
Rise time	t_{ri}				3.3		µs
Turn-on energy	E_{on}				11		J
Turn-off delay time	$t_{d(off)}$				4.7		µs
Fall time	t_{fi}				2.5		µs
Turn-off energy	E_{off}				10.5		J
Collector-emitter threshold voltage	V_{CE0}	V_{GE} = +15 V; T_{vj} = 125°C; I_{CE1} = 600 A; I_{CE2} = 1800 A; t_u = 1000 µs				1.82	V
On-State slope resistance	r_{CE0}					1.21	mΩ
Thermal resistance junction to case	$R_{th(j-c)}$	DC; I_{CE} = 1750±50 A; I_{test} = 10 A; V_{GE} = +15 V.	Double side cooled		5.0	7.0	K/kW
			Collector side cooled			11.0	K/kW
			Emitter side cooled			18.0	K/kW
Short-circuit duration	t_{psc}	T_{vj} = 125°C; V_{GE} = ±15 V; V_{CE} = 2800 V; $V_{CE\,max}$ ≤U_{CE}			10		µs
Inverse diode							
Forward voltage drop	V_F	I_F = 1800 A; V_{GE} = 0; t_u = 1000 µs	T_{vj} = 25°C		3.70	4.00	V
			T_{vj} = 125°C		3.90	4.20	V
Reverse recovery time	t_{rr}	V_{CE} = 2800 V; V_{GE} = ±15 V; $I_{C\,max}$ = 1800 A; di/dt = 3000 A/µs; T_{vj} = 125°C			1.6		µs
Repetitive peak reverse current	I_{rrM}				1600		A
Reverse recovered charge	Q_{rr}				2000		µC
Reverse recovery energy	E_{rec}				2.8		J
Threshold voltage	$V_{(T0)}$	T_{vj} = 125°C; U_{GE} = 0; I_{CE1} = 600 A; I_{CE2} = 1800 A; t_u = 1000 мкс				2.27	V
Forward slope resistance	r_T					1.07	mΩ
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; I_{CE} = 1750±50 A; I_{test} = 5 A; U_{GE} = +15 V			10	14	K/kW
						22	K/kW
						41	K/kW

Module						
Mounting force	F		60	-	70	kN
Weight	W			2000		g

Notes:

- Insulating material operating temperature 125°C max;
- Case temperature 125°C max;
- The recommended operating junction temperature $T_{vj\ op}$ = - 50 ÷ +125°C.

Overall dimensions: Package type – PIMA



Part numbering guide

PIMA	-	RH	45	XA	-	1800	N	
PIMA								IGBT module package type: PressPack IGBT, electrode diameter 125 mm
		AS						Asymmetric scheme
		RC						Reverse conducting
		RH						Reverse conducting (ratio IGBT : FRD = 2:1)
			45					Voltage rating (V_{CES}/100)
				XA				IGBT chipset modification
						1800		Current Rating
							N	Climatic version: normal climate