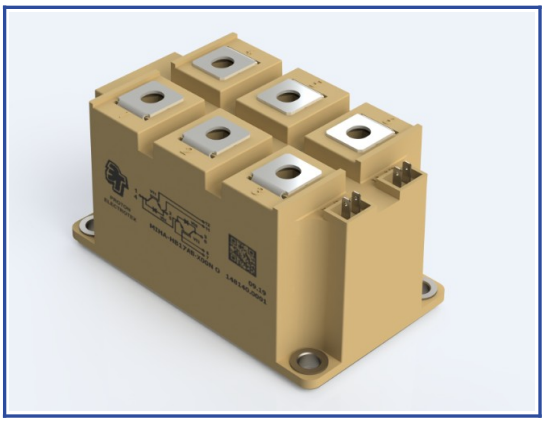
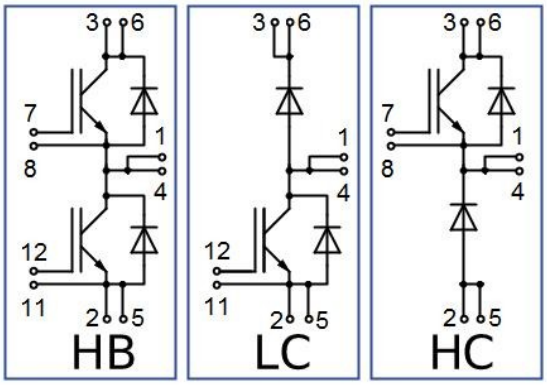
IGBT module with base width 62 mm & increased rated insulation voltage 9800 V 1700 V 200 A





Chip features

- IGBT chip
  - low $V_{CE(sat)}$ value
  - 10 µs short circuit of 150°C
  - square RBSOA of 2xI_C
  - low EMI
- FRD chip
  - fast and soft reverse recovery
  - low voltage drop

Design features

- copper baseplate
- AlN DBC substrate
- ultrasonically welded power terminals
- high rated insulation voltage - 9800 V
- RoHS compliant

Typical application

- transport (auxiliary power systems for rail and public transport)
- industrial equipment
- alternative energy (wind power plants, solar generation)

Advance Data

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	V_{GE} = 0.	1700	V
Maximum allowable collector current (continuous)	$I_{C\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	355	A
	$I_{C\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	200	A
Repetitive peak collector current*1	I_{CRM}	I_{CRM} = 3 x $I_{C\ nom}$; t_p = 1 ms.	600	A
Short-circuit duration	t_{psc}	T_{vj} = 25°C; V_{GE} = ±15 V; V_{CE} = 700 V; $R_{G\ on}$ = $R_{G\ off}$ = 2.2 Ω; I_{Cmax} < 900 A.	10	µs
		T_{vj} = 150°C; V_{GE}= ±15 V; V_{CE}= 700V; $R_{G\ on}$ = $R_{G\ off}$ = 2.2 Ω; I_{Cmax} < 770 A.	10	
Gate-Emitter voltage	V_{GES}		±20	V
Junction operating temperature	$T_{vj\ (op)}$		-40…+175	°C
Inverse diode \ Freewheeling diode				
Repetitive peak reverse voltage	V_{RRM}	V_{GE} = 0 V.	1700	V
Maximum allowable forward current (continuous)	$I_{F\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	291	A
	$I_{F\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	200	A
Repetitive peak forward current*1	I_{FRM}	I_{FRM} = 3 x $I_{F\ nom}$; t_p = 1 ms.	600	A
Junction operating temperature	$T_{vj\ (op)}$		-40…+175	°C
Module				
Storage temperature	T_{stg}		-40…+50	°C
Isolation voltage	V_{isol}	AC sin 50 Hz; t = 1 min.	9800	V

*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 V; I_C = 200 A; t_u = 1000 µs.	T_{vj} = 25°C	-	2.65	-	V
			T_{vj} = 175°C	-	3.00	-	V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C = 6 mA; V_{CE} = V_{GE}; T_{vj} = 25°C; t_u = 2 ms.		4.5	-	6.5	V
Collector-Emitter cut-off current	I_{CES}	V_{CE} = 1700 V; t_u = 50 ms; V_{GE} = 0.	T_{vj} = 25°C	-	-	300	µA
			T_{vj} = 175°C	-	15	-	mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0; V_{GE} = ±20 V; T_{vj} = 25°C; t_u = 30 ms.		-	-	500	nA
Input capacitance	C_{ies}	V_{CE} = 10 V; V_{GE} = 0 V; f = 1 MHz; T_{vj} = 25°C.		-	9.2	-	nF
Output capacipance	C_{oes}			-	0.52	-	nF
Reverse transfer capacitance	C_{res}			-	0.36	-	nF
Total gate charge	Q_G	I_C = 200 A; V_{CE} = 920 V; V_{GE} = - 8÷15 V.		-	1060	-	nC
Internal gate resistance	R_{Gint}	T_{vj} = 25°C.		-	3.9	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{CE} = 920 V; V_{GE} = ±15 V; $I_{C\,max}$ = 200 A; R_G = 2.2 Ω; L_s = 56 nH.	T_{vj} = 25°C	-	180	-	ns
			T_{vj} = 175°C	-	200	-	
Rise time	t_{ri}		T_{vj} = 25°C	-	60	-	ns
			T_{vj} = 175°C	-	70	-	
Turn-on energy	E_{on}		T_{vj} = 25°C	-	100	-	mJ
			T_{vj} = 175°C	-	150	-	
Turn-off delay time	$t_{d(off)}$		T_{vj} = 25°C	-	350	-	ns
			T_{vj} = 175°C	-	400	-	
Fall time	t_{fi}		T_{vj} = 25°C	-	200	-	ns
			T_{vj} = 175°C	-	250	-	
Turn-off energy	E_{off}		T_{vj} = 25°C	-	33	-	mJ
			T_{vj} = 175°C	-	48	-	
Collector-emitter threshold voltage	V_{CE0}	V_{GE} = +15 V; T_{vj} = 175°C; I_{CE1} = 50 A; I_{CE2} = 200 A; t_u = 1000 µs.		-	-	1.10	V
On-State slope resistance (IGBT)	r_{CE0}			-	-	12.00	mΩ
Thermal resistance junction to case	$R_{th(j-c)}$	DC; I_{CE} = 125±10 A; I_{test} = 1.0 A; V_{GE} = +15 V.		-	-	0.079	K/W
Inverse diode \ Freewheeling diode							
Forward voltage drop	V_F	I_F = 200 A; V_{GE} = 0; t_u = 300 µs.	T_{vj} = 25°C	-	2.00	-	V
			T_{vj} = 175°C	-	2.10	-	V
Reverse recovery time	t_{rr}	V_{GE} = ±15 V; V_{CE} = 920 V; $I_{C\,max}$ = 200 A; $R_{G\,on}$ = 2.2 Ω; L_s = 56 nH.	T_{vj} = 25°C	-	520	-	ns
			T_{vj} = 175°C	-	1000	-	ns
Peak reverse current	I_{RM}		T_{vj} = 25°C	-	215	-	A
			T_{vj} = 175°C	-	200	-	A
Recovered charge	Q_r		T_{vj} = 25°C	-	50	-	µC
			T_{vj} = 175°C	-	80	-	µC
Reverse recovery energy	E_{rec}		T_{vj} = 25°C	-	60	-	mJ
			T_{vj} = 175°C	-	80	-	mJ
Threshold voltage	$V_{(T0)}$	T_{vj} = 175°C; V_{GE} = 0; I_{CE1} = 50 A; I_{CE2} = 200 A; t_u = 1000 µs		-	-	0.95	V
Forward slope resistance	r_T			-	-	6.20	mΩ
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; I_{CE} = 165±10 A; I_{test} = 1.0 A; V_{GE} = +15 V.		-	-	0.187	K/W

Advance Data

Module							
Pin resistance	R_{Pxy}	T_{vj} = 25°C.	R_{P12}	-	0.38*2	-	mΩ
			R_{P13}	-	0.48*2	-	
Parasitic inductance between terminals	L_{Pxy}		L_{P12}	-	35.0*2	-	nH
			L_{P13}	-	60.0*2	-	
Thermal resistance case to heatsink	R_{thCH}	per module		-	0.02	-	K/W
Mounting torque for screws to heatsink	M_s	to heatsink M6		3	-	5	N*m
Mounting torque for terminal screws	M_t	to terminals M6		2.25	2.50	2.75	N*m
Weight	W			-	450	-	g

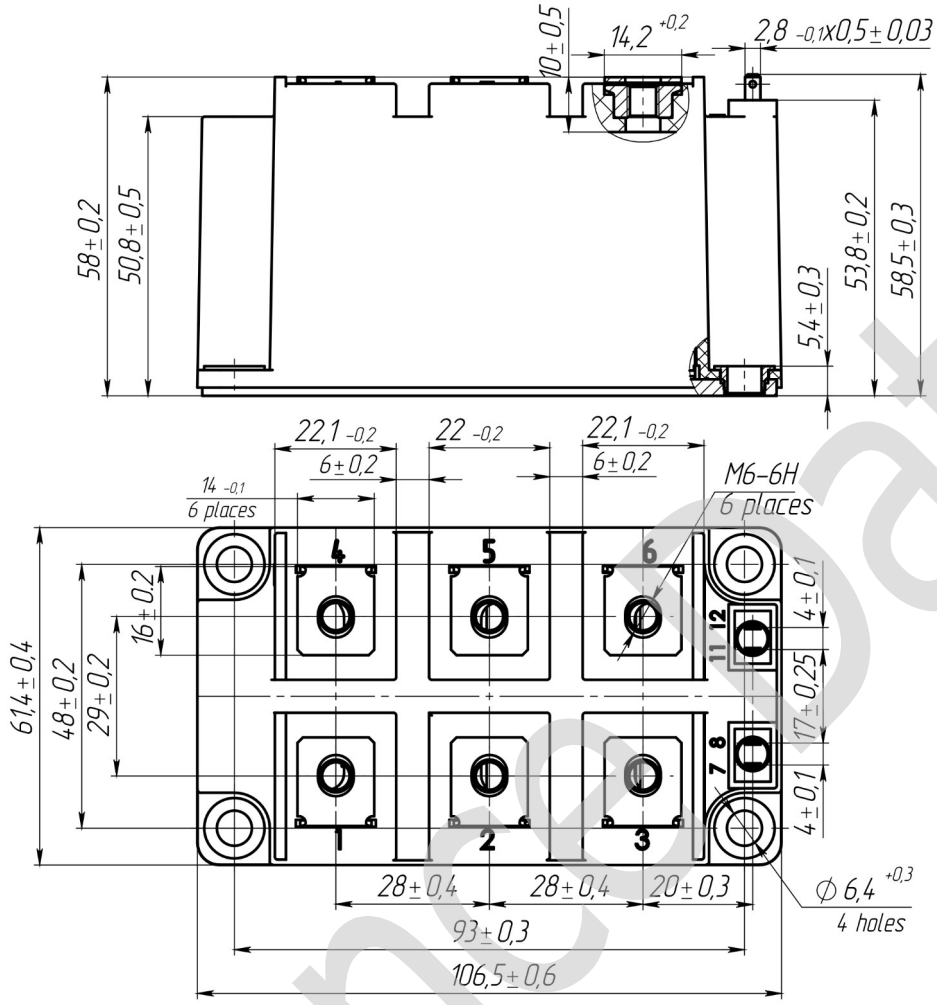
" - " Data will be refined as additional tests are conducted and statistics are collected.
*2 Based on simulation results

Notes:

- Insulating material operating temperature 125°C max;
- Case temperature 125°C max;
- The recommended operating junction temperature $T_{vj\ (op)}$ = -40...+175°C.

Advance Data

Overall dimensions: Package type – HA



Terminals 1 and 4, 2 and 5, 3 and 6 need to be connected externally.
The surface must be convex with deviation on dimension (93 0,3) mm – 110...200 um, on dimension (48 0,2) mm – 50...130 um.

Part numbering guide

MIHA	-	HB	17	AB	-	200	N	
MIHA								IGBT module package type: HA
		HB						2 switches as Half-Bridge
		HC						1 switch as High-Side chopper
		LC						1 switch as Low-Side chopper
			17					Voltage rating (V_{CES}/100)
				AB				IGBT+FRD chipset modification
						200		Current Rating
							N	Climatic version: normal climate

Advance Data

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