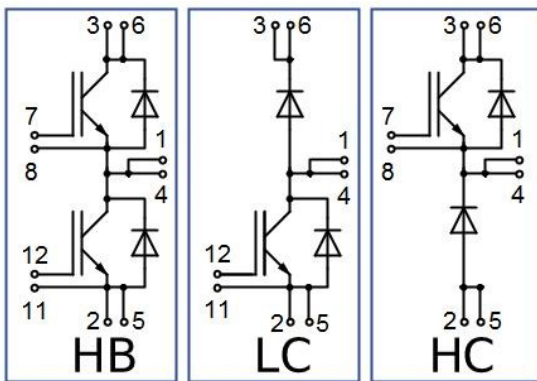
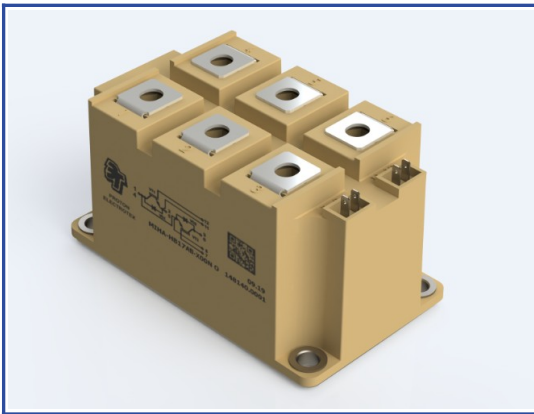


IGBT module with base width 62 mm &amp; increased rated insulation voltage 9800 V

1700 V 300 A



### Chip features

- IGBT chip
  - low  $V_{CE(sat)}$  value
  - 10  $\mu$ s short circuit of 150°C
  - square RBSOA of 2xlc
  - 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)

## Maximum rated values

Definition	Symbol	Conditions	Value	Unit
<b>IGBT</b>				
Collector-Emitter voltage	$V_{CES}$	$V_{GE} = 0$ .	1700	V
Maximum allowable collector current (continuous)	$I_{C 25}$	$T_{vj(max)} = 175^{\circ}C; T_c = 25^{\circ}C$ .	410	A
	$I_{C 80}$	$T_{vj(max)} = 175^{\circ}C; T_c = 80^{\circ}C$ .	300	A
Repetitive peak collector current <sup>*1</sup>	$I_{CRM}$	$I_{CRM} = 3 \times I_{C nom}; t_p = 1 ms$ .	900	A
Short-circuit duration	$t_{psc}$	$T_{vj} = 25^{\circ}C; V_{GE} = \pm 15 V; V_{CE} = 700V;$ $R_{G on} = R_{G off} = 2.2 \Omega; I_{Cmax} < 1300 A$ .	10	$\mu$ s
		$T_{vj} = 150^{\circ}C; V_{GE} = \pm 15 V; V_{CE} = 700V;$ $R_{G on} = R_{G off} = 2.2 \Omega; I_{Cmax} < 1200 A$ .	10	
Gate-Emitter voltage	$U_{GES}$		$\pm 20$	V
Junction operating temperature	$T_{vj (op)}$		-40...+175	°C
<b>Inverse diode \ Freewheeling diode</b>				
Repetitive peak reverse voltage	$V_{RRM}$	$V_{GE} = 0 V$ .	1700	V
Maximum allowable forward current (continuous)	$I_{F 25}$	$T_{vj(max)} = 175^{\circ}C; T_c = 25^{\circ}C$ .	389	A
	$I_{F 80}$	$T_{vj(max)} = 175^{\circ}C; T_c = 80^{\circ}C$ .	295	A
Repetitive peak forward current <sup>*1</sup>	$I_{FRM}$	$I_{FRM} = 3 \times I_{F nom}; t_p = 1 ms$ .	900	A
Junction operating temperature	$T_{vj (op)}$		-40...+175	°C
<b>Module</b>				
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			Unit.		
			min.	typ.	max.			
<b>IGBT</b>								
Collector-Emitter saturation voltage	$V_{CEsat}$	$V_{GE} = +15\text{ V}; I_C = 300\text{ A}; t_u = 1000\text{ }\mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$	-	3.00	-	V	
			$T_{vj} = 175^\circ\text{C}$	-	3.75	-	V	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$I_C = 8\text{ mA}; V_{CE} = V_{GE}; T_{vj} = 25^\circ\text{C}; t_u = 2\text{ ms}.$		4.50	-	6.50	V	
Collector-Emitter cut-off current	$I_{CES}$	$V_{CE} = 1700\text{ V}; t_u = 50\text{ ms}; V_{GE} = 0.$	$T_{vj} = 25^\circ\text{C}$	-	-	300	$\mu\text{A}$	
			$T_{vj} = 175^\circ\text{C}$	-	20	-	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0; V_{GE} = \pm 20\text{ V}; T_{vj} = 25^\circ\text{C}; t_u = 30\text{ ms}.$		-	-	500	nA	
Input capacitance	$C_{ies}$	$V_{CE} = 10\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}; T_{vj} = 25^\circ\text{C}.$		-	12.2	-	nF	
Output capacitance	$C_{oes}$			-	0.70	-	nF	
Reverse transfer capacitance	$C_{res}$			-	0.48	-	nF	
Total gate charge	$Q_G$	$I_C = 300\text{ A}; V_{CE} = 920\text{ V}; V_{GE} = -8\div 15\text{ V}.$		-	1400	-	nC	
Internal gate resistance	$R_{Gint}$	$T_{vj} = 25^\circ\text{C}.$		-	2.95	-	$\Omega$	
Turn-on delay time	$t_{d(on)}$	$V_{CE} = 920\text{ V}; V_{GE} = \pm 15\text{ V}; I_{Cmax} = 300\text{ A}; R_G = 2.2\text{ }\Omega; L_s = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$	-	150	-	ns	
			$T_{vj} = 175^\circ\text{C}$	-	200	-		
Rise time	$t_{ri}$		$T_{vj} = 25^\circ\text{C}$	-	100	-	ns	
			$T_{vj} = 175^\circ\text{C}$	-	120	-		
Turn-on energy	$E_{on}$		$T_{vj} = 25^\circ\text{C}$	-	150.0	-	mJ	
			$T_{vj} = 175^\circ\text{C}$	-	200.0	-		
Turn-off delay time	$t_{d(off)}$		$T_{vj} = 25^\circ\text{C}$	-	350	-	ns	
			$T_{vj} = 175^\circ\text{C}$	-	400	-		
Fall time	$t_{fi}$		$T_{vj} = 25^\circ\text{C}$	-	150	-	ns	
			$T_{vj} = 175^\circ\text{C}$	-	200	-		
Turn-off energy	$E_{off}$	$T_{vj} = 25^\circ\text{C}$	-	50.0	-	mJ		
		$T_{vj} = 175^\circ\text{C}$	-	65.0	-			
Collector-emitter threshold voltage	$V_{CE0}$	$V_{GE} = +15\text{ V}; T_{vj} = 175^\circ\text{C};$		-	-	1.10	V	
On-State slope resistance (IGBT)	$r_{CE0}$	$I_{CE1} = 75\text{ A}; I_{CE2} = 300\text{ A}; t_u = 1000\text{ }\mu\text{s}.$		-	-	8.60	m $\Omega$	
Thermal resistance junction to case	$R_{th(j-c)}$	DC; $I_{CE} = 145\pm 10\text{ A}; I_{test} = 1\text{ A}; V_{GE} = +15\text{ V}.$		-	-	0.079	K/W	
<b>Inverse diode \ Freewheeling diode</b>								
Forward voltage drop	$V_F$	$I_F = 300\text{ A}; V_{GE} = 0; t_u = 500\text{ }\mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$	-	2.05	-	V	
			$T_{vj} = 175^\circ\text{C}$	-	2.20	-	V	
Reverse recovery time	$t_{rr}$	$V_{GE} = \pm 15\text{ V}; V_{CE} = 920\text{ V}; I_{Cmax} = 300\text{ A}; R_{Gon} = 2.2\text{ }\Omega; L_s = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$	-	500	-	ns	
			$T_{vj} = 175^\circ\text{C}$	-	800	-	ns	
Импульсный обратный ток	$I_{RM}$		$T_{vj} = 25^\circ\text{C}$	-	300	-	A	
			$T_{vj} = 175^\circ\text{C}$	-	300	-	A	
Заряд восстановления	$Q_r$		$T_{vj} = 25^\circ\text{C}$	-	90.0	-	$\mu\text{C}$	
			$T_{vj} = 175^\circ\text{C}$	-	180.0	-	$\mu\text{C}$	
Reverse recovery energy	$E_{rec}$		$T_{vj} = 25^\circ\text{C}$	-	60.0	-	mJ	
			$T_{vj} = 175^\circ\text{C}$	-	80.0	-	mJ	
Threshold voltage	$V_{(TO)}$		$T_{vj} = 175^\circ\text{C}; V_{GE} = 0; I_{CE1} = 75\text{ A};$		-	-	0.90	V
Forward slope resistance	$r_T$		$I_{CE2} = 300\text{ A}; t_u = 1000\text{ }\mu\text{s}$		-	-	4.70	m $\Omega$
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; $I_{CE} = 185\pm 10\text{ A}; I_{test} = 1\text{ A}; V_{GE} = +15\text{ V}.$		-	-	0.141	K/W	

Module							
Pin resistance	$R_{Pxy}$	$T_{vj} = 25^{\circ}\text{C}$ .	$R_{P12}$	-	$0.38^{*2}$	-	m $\Omega$
			$R_{P13}$	-	$0.48^{*2}$	-	
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

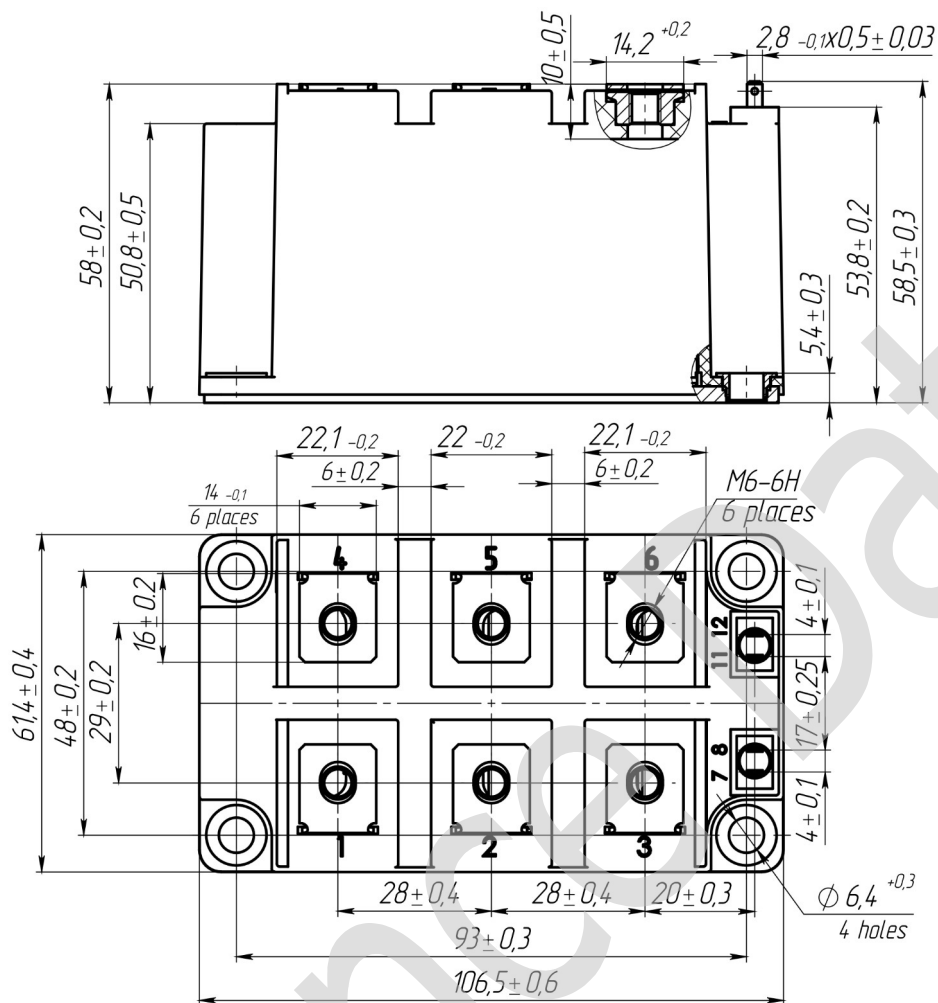
" - " Data will be refined as additional tests are conducted and statistics are collected.

\*2 Based on simulation results

### Notes:

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

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  $\mu$ m, on dimension (48 0,2) mm – 50...130  $\mu$ m.*

**Part numbering guide**

MIHA	-	HB	17	AB	-	300	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
						300		Current Rating
							N	Climatic version: normal climate