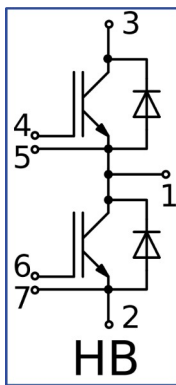
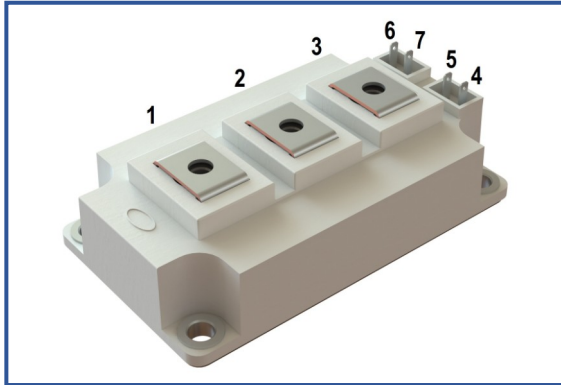


Industry standard 62mm IGBT module

1700 V 150 A



### Chip features

- IGBT chip
  - Trench FS
  - low  $V_{CE(sat)}$  value
  - 10  $\mu$ s short circuit of 150°C
  - square RBSOA of  $2 \times I_C$
  - low EMI
- FRD chip
  - fast and soft reverse recovery
  - low voltage drop

### Design features

- copper baseplate
- $Al_2O_3$  DBC substrate
- ultrasonically welded power terminals
- Improved thermal cycling
- RoHS compliant

### Typical application

- AC motor drives
- solar inverter
- air conditioning
- high power converters and UPS

## 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)	$I_{C25}$	$T_{vj(max)} = 175^\circ C; T_c = 25^\circ C$ .	-	A
	$I_{C80}$	$T_{vj(max)} = 175^\circ C; T_c = 80^\circ C$ .	150	A
Repetitive peak collector current <sup>*1</sup>	$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}; t_p = 1 ms$ .	300	A
Short-circuit duration	$t_{psc}$	$T_{vj} = 25^\circ C; V_{GE} = \pm 15 V; V_{CE} = 700 V;$ $R_{Gon} = R_{Goff} = 2.2 \Omega; I_{Cmax} < 930 A$ .	10	$\mu$ s
		$T_{vj} = 150^\circ C; V_{GE} = \pm 15 V; V_{CE} = 700 V;$ $R_{Gon} = R_{Goff} = 2.2 \Omega; I_{Cmax} < 800 A$ .	10	
Gate-Emitter voltage	$V_{GES}$		$\pm 20$	V
Junction operating temperature	$T_{vj(op)}$		-40...+150	°C
<b>Inverse diode \ Freewheeling diode</b>				
Repetitive peak reverse voltage	$V_{RRM}$	$V_{GE} = 0 V$ .	1700	V
Maximum allowable forward current (continuous)	$I_{F25}$	$T_{vj(max)} = 175^\circ C; T_c = 25^\circ C$ .	-	A
	$I_{F80}$	$T_{vj(max)} = 175^\circ C; T_c = 80^\circ C$ .	150	A
Repetitive peak forward current <sup>*1</sup>	$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}; t_p = 1 ms$ .	300	A
Junction operating temperature	$T_{vj(op)}$		-40...+150	°C
<b>Module</b>				
Storage temperature	$T_{stg}$		-40...+50	°C
Isolation voltage	$V_{isol}$	AC sin 50 Hz; t = 1 min.	4000	V

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

**Characteristics**

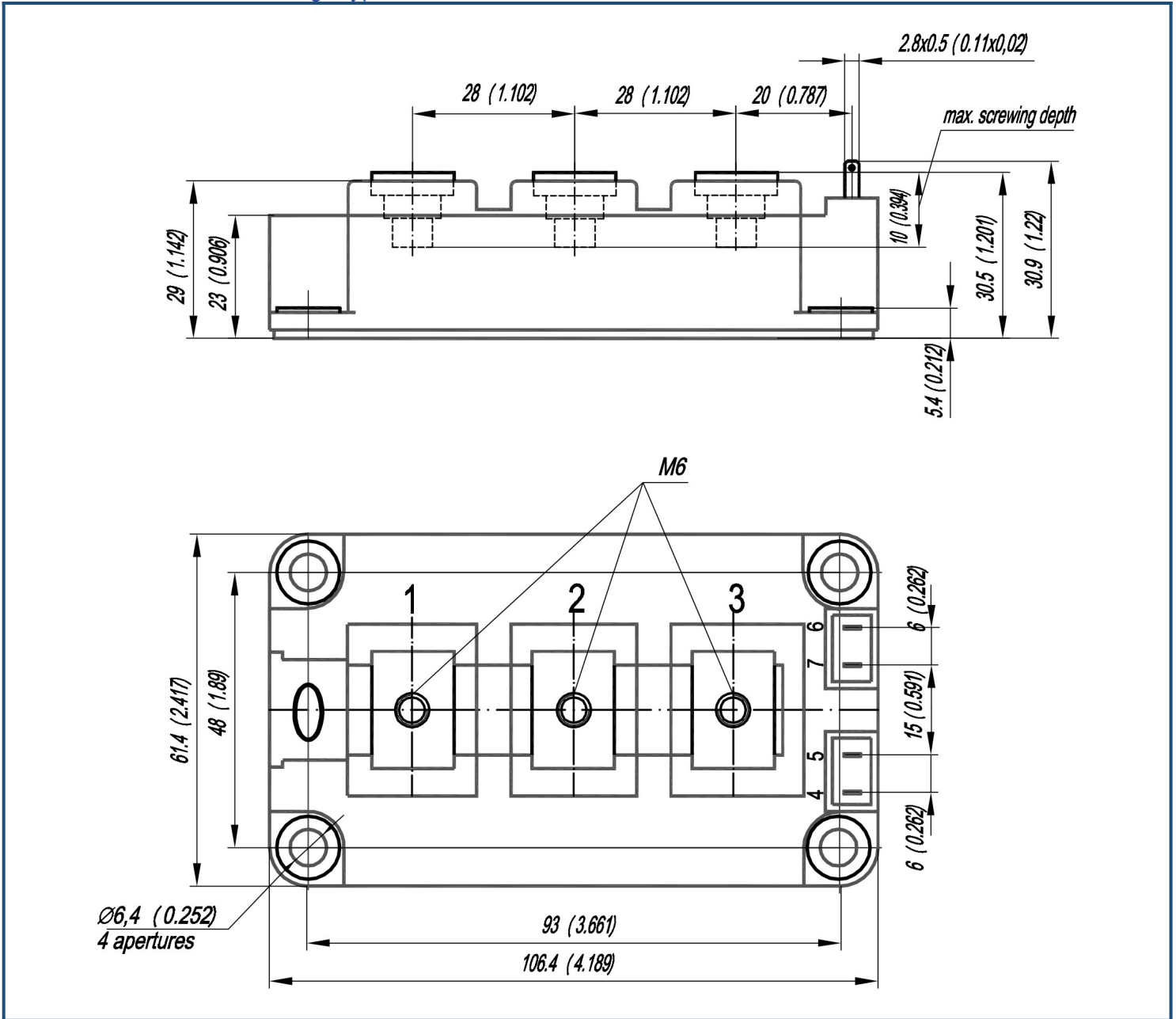
Definition	Symbol	Conditions	Value			Unit.		
			min.	typ.	max.			
<b>IGBT</b>								
Collector-Emitter saturation voltage	$V_{CEsat}$	$V_{GE} = +15\text{ V}; I_C = 150\text{ A}; t_u = 1000\ \mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$	-	1.93	2.35	V	
			$T_{vj} = 150^\circ\text{C}$	-	2.34	2.80	V	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$I_C = 6\text{ mA}; V_{CE} = V_{GE}; T_{vj} = 25^\circ\text{C}; t_u = 2\text{ ms}.$		4.90	5.50	6.10	V	
Collector-Emitter cut-off current	$I_{CES}$	$V_{CE} = 1700\text{ V}; t_u = 50\text{ ms}; V_{GE} = 0.$	$T_{vj} = 25^\circ\text{C}$	-	-	100	$\mu\text{A}$	
			$T_{vj} = 150^\circ\text{C}$	-	-	20	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0; V_{GE} = \pm 20\text{ V}; T_{vj} = 25^\circ\text{C}; t_u = 30\text{ ms}.$		-	-	100	nA	
Input capacitance	$C_{ies}$	$V_{CE} = 10\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}; T_{vj} = 25^\circ\text{C}.$		-	17.20	-	nF	
Reverse transfer capacitance	$C_{res}$			-	0.50	-	nF	
Total gate charge	$Q_G$	$I_C = 150\text{ A}; V_{CE} = 920\text{ V}; V_{GE} = -15\dots+15\text{ V}.$		-	-	1650	nC	
Internal gate resistance	$R_{Gint}$	$T_{vj} = 25^\circ\text{C}.$		-	4.30	-	$\Omega$	
Turn-on delay time	$t_{d(on)}$	$V_{CE} = 920\text{ V}; V_{GE} = \pm 15\text{ V}; I_{Cmax} = 150\text{ A}; R_G = 2.2\ \Omega; L_s = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$	-	-	205	ns	
			$T_{vj} = 150^\circ\text{C}$	-	-	254		
Rise time	$t_{ri}$		$T_{vj} = 25^\circ\text{C}$	-	-	66	ns	
			$T_{vj} = 150^\circ\text{C}$	-	-	72		
Turn-on energy	$E_{on}$		$T_{vj} = 25^\circ\text{C}$	-	-	34.0	mJ	
			$T_{vj} = 150^\circ\text{C}$	-	-	53.0		
Turn-off delay time	$t_{d(off)}$		$T_{vj} = 25^\circ\text{C}$	-	-	435	ns	
			$T_{vj} = 150^\circ\text{C}$	-	-	533		
Fall time	$t_{fi}$		$T_{vj} = 25^\circ\text{C}$	-	-	448	ns	
			$T_{vj} = 150^\circ\text{C}$	-	-	498		
Turn-off energy	$E_{off}$		$T_{vj} = 25^\circ\text{C}$	-	-	32.0	mJ	
			$T_{vj} = 150^\circ\text{C}$	-	-	47.0		
Collector-emitter threshold voltage	$V_{CE0}$	$V_{GE} = +15\text{ V}; T_{vj} = 150^\circ\text{C}; I_{CE1} = 38\text{ A}; I_{CE2} = 150\text{ A}; t_u = 1000\ \mu\text{s}.$		-	-	1.05	V	
On-State slope resistance (IGBT)	$r_{CE0}$			-	-	8.99	m $\Omega$	
Thermal resistance junction to case	$R_{th(j-c)}$	$\text{DC}; I_{CE} = 150 \pm 10\text{ A}; I_{test} = 1.0\text{ A}; V_{GE} = +15\text{ V}.$		-	-	0.140	K/W	
<b>Inverse diode \ Freewheeling diode</b>								
Forward voltage drop	$V_F$	$I_F = 150\text{ A}; V_{GE} = 0; t_u = 1000\ \mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$	-	2.18	2.70	V	
			$T_{vj} = 150^\circ\text{C}$	-	2.35	2.80	V	
Reverse recovery time	$t_{rr}$	$V_{GE} = \pm 15\text{ V}; V_{CE} = 920\text{ V}; I_{Cmax} = 150\text{ A}; R_{Gon} = 2.2\ \Omega; L_s = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$	-	-	300	ns	
			$T_{vj} = 150^\circ\text{C}$	-	-	600	ns	
Peak reverse current	$I_{RM}$		$T_{vj} = 25^\circ\text{C}$	-	-	121	A	
			$T_{vj} = 150^\circ\text{C}$	-	-	134	A	
Recovered charge	$Q_r$		$T_{vj} = 25^\circ\text{C}$	-	-	27.0	$\mu\text{C}$	
			$T_{vj} = 150^\circ\text{C}$	-	-	49.0	$\mu\text{C}$	
Reverse recovery energy	$E_{rec}$		$T_{vj} = 25^\circ\text{C}$	-	-	16.0	mJ	
			$T_{vj} = 150^\circ\text{C}$	-	-	31.0	mJ	
Threshold voltage	$V_{(T0)}$		$T_{vj} = 150^\circ\text{C}; V_{GE} = 0; I_{CE1} = 38\text{ A}; I_{CE2} = 150\text{ A}; t_u = 1000\ \mu\text{s}.$		-	-	1.05	V
Forward slope resistance	$r_T$				-	-	9.20	m $\Omega$
Thermal resistance junction to case	$R_{th(jc-D)}$		$\text{DC}; I_{CE} = 120 \pm 10\text{ A}; I_{test} = 1.0\text{ A}; V_{GE} = +15\text{ V}.$		-	-	0.160	K/W

Module							
Pin resistance	$R_{Pxy}$	$T_{vj} = 25^{\circ}\text{C}.$	$R_{P12}$	-	0.28	0.50	mΩ
			$R_{P13}$	-	0.38	0.50	
Parasitic inductance between terminals	$L_{Pce}$			-	22	-	nH
Thermal resistance case to heatsink	$R_{thCH}$	per module		-	0.02	0.04	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	$W$			-	318	340	g

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

### Notes:

- Insulating material operating temperature 125°C max;
- Case temperature 125°C max;
- The recommended operating junction temperature  $T_{vj\ op} = -40\dots+150^{\circ}\text{C}.$

**Overall dimensions: Package type – AA**

**Part numbering guide**

MIAA	-	HB	17	SA	-	150	N	
MIAA								IGBT module package type: AA
		HB						2 switches as Half-Bridge
			17					Voltage rating ( $V_{CE}/100$ )
				SA				IGBT+FRD chipset modification
						150		Current Rating
							N	Climatic version: normal climate

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