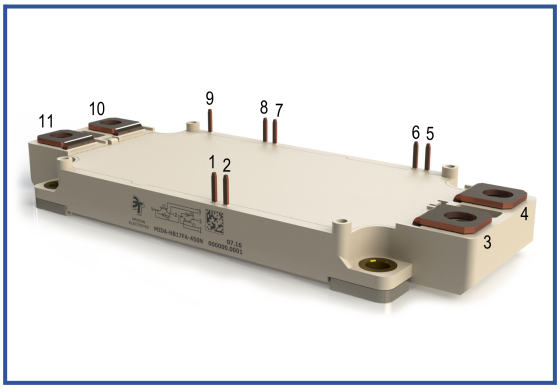
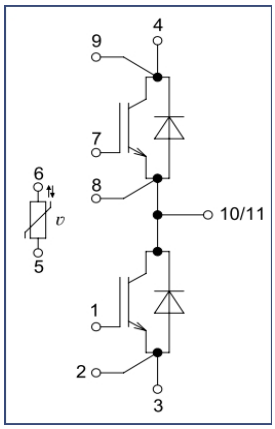
Low Inductance IGBT Module with 17 mm Height Housing

1700 V 450 A





Chip features

- IGBT chip
  - Trench FS — V-Series IGBT (6 th gen)
  - low $V_{CE(sat)}$ value
  - 10 µs short circuit of 150°C
- FRD chip
  - fast and soft reverse recovery
  - low voltage drop

Design features

- copper baseplate
- Al_2O_3 DBC substrate
- copper wire bonding of power terminals
- Improved thermal cycling
- RoHS compliant
- low inductance value

Typical application

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

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	V_{GE} = 0.	1700	V
Collector current (nominal)	$I_{C\ nom}$		450	A
Repetitive peak collector current*1	I_{CRM}	I_{CRM} = 3 x $I_{C\ nom}$; t_p = 1 ms.	1350	A
Short-circuit duration	t_{psc}	T_{vj} = 25°C; V_{GE} = ±15 V; V_{CE} = 1700 V; $R_{G\ on}$ = $R_{G\ off}$ = 1.5 Ω.	10	µs
		T_{vj} = 150°C; V_{GE}= ±15 V; V_{CE}= 1700 V; $R_{G\ on}$ = $R_{G\ off}$ = 1.5 Ω.	10	
Gate-Emitter voltage	V_{GES}		±20	V
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	°C
Inverse diode \ Freewheeling diode				
Repetitive peak reverse voltage	V_{RRM}	V_{GE} = 0 V.	1700	V
Forward current (nominal)	$I_{F\ nom}$		450	A
Repetitive peak forward current*1	I_{FRM}	I_{FRM} = 3 x $I_{F\ nom}$; t_p = 1 ms.	1350	A
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	°C
Module				
Storage temperature	T_{stg}		-55…+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

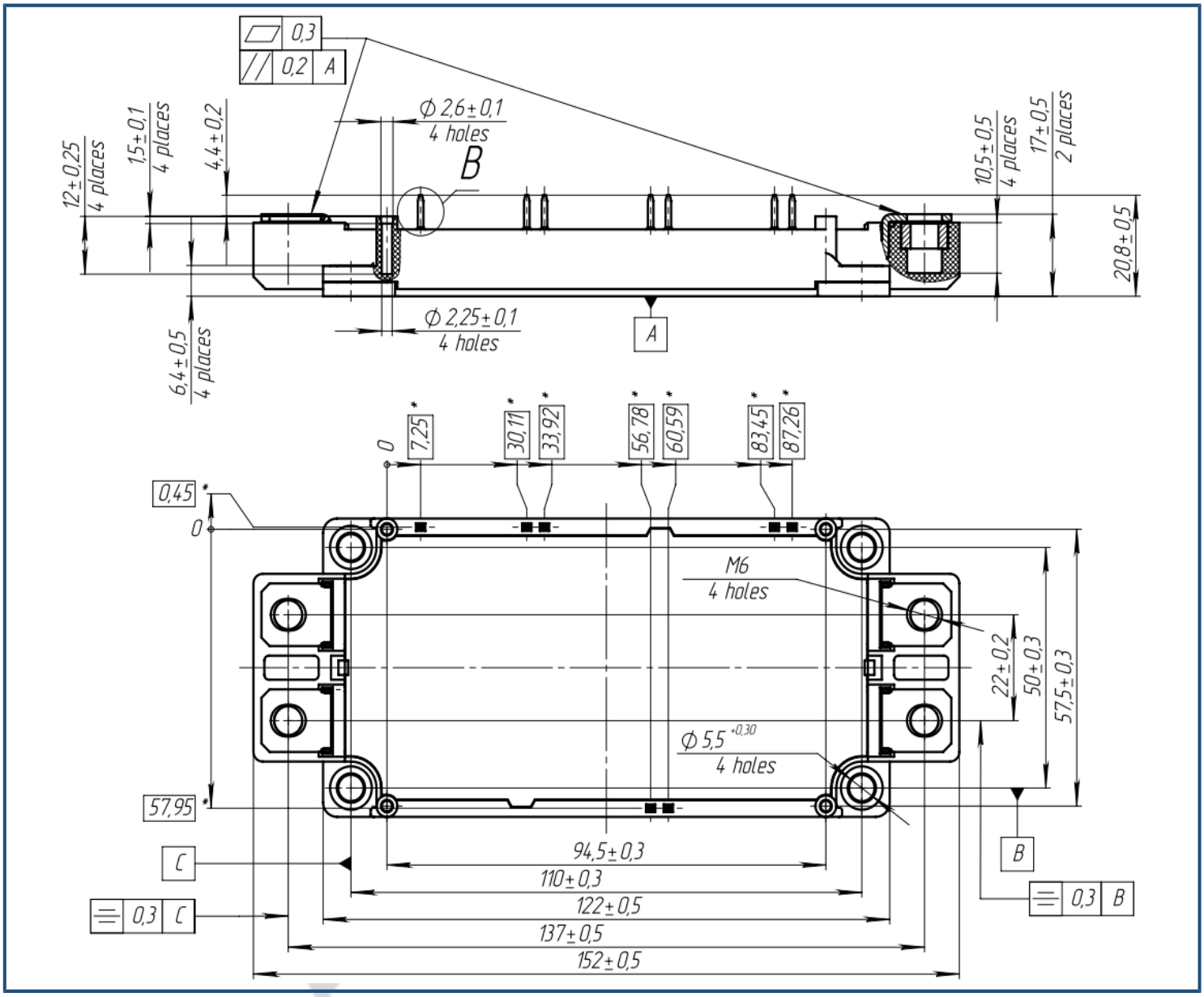
Definition	Symbol	Conditions		Value min.	Value typ.	Value max.	Unit.
IGBT							
Collector-Emitter saturation voltage	V_{CEsat}	V_{GE} = +15 V; I_C = 450 A; t_u = 1000 µs.	T_{vj} = 25°C		2.41		V
			T_{vj} = 150°C		3.11		V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C = 18 mA; V_{CE} = V_{GE}; T_{vj} = 25°C; t_u = 2 ms.			5.70		V
Collector-Emitter cut-off current	I_{CES}	V_{CE} = 920 V; t_u = 50 ms; V_{GE} = 0.	T_{vj} = 25°C		3.00	400	µA
			T_{vj} = 150°C		2.00	3.00	mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0; V_{GE} = ±20 V; T_{vj} = 25°C; t_u = 30 ms.			2.00	600	nA
Input capacitance	C_{ies}	V_{CE} = 10 V; V_{GE} = 0 V; f = 1 MHz; T_{vj} = 25°C.			41.0		nF
Output capacitance	C_{oes}				2.10		nF
Reverse transfer capacitance	C_{res}				4.20		nF
Total gate charge	Q_G	I_C = 450 A; V_{CE} = 920 V; V_{GE} = - 8÷15 V.					nC
Internal gate resistance	R_{Gint}	T_{vj} = 25°C.			1.70		Ω
Turn-on delay time	$t_{d(on)}$	V_{CE} = 920 V; V_{GE} = ±15 V; $I_{C\,max}$ = 450 A; R_G = 1.5 Ω; L = 100 µH.	T_{vj} = 25°C		503		ns
			T_{vj} = 150°C		582		ns
Rise time	t_{ri}		T_{vj} = 25°C		65.5		ns
			T_{vj} = 150°C		71.0		ns
Turn-on energy	E_{on}		T_{vj} = 25°C		41.6		mJ
			T_{vj} = 150°C		81.5		mJ
Turn-off delay time	$t_{d(off)}$		T_{vj} = 25°C		752		ns
			T_{vj} = 150°C		899		ns
Fall time	t_{fi}		T_{vj} = 25°C		426		ns
			T_{vj} = 150°C		638		ns
Turn-off energy	E_{off}		T_{vj} = 25°C		101		mJ
			T_{vj} = 150°C		146		mJ
Collector-emitter threshold voltage	V_{CE0}	V_{GE} = +15 V; T_{vj} = 150°C; I_{CE1} = 125 A; I_{CE2} = 450 A; t_u = 1000 µs.			1.04		V
On-State slope resistance (IGBT)	r_{CE0}				4.56		mΩ
Thermal resistance junction to case	$R_{th(j-c)}$	DC; I_{CE} = 400±50 A; I_{test} = 1.5 A; V_{GE} = +15 V.			0.06		K/W
Inverse diode							
Forward voltage drop	V_F	I_F = 450 A; V_{GE} = 0; t_u = 1000 µs.	T_{vj} = 25°C		2.21		V
			T_{vj} = 150°C		2.55		V
Reverse recovery time	t_{rr}	V_{CE} = 920 V; V_{GE} = ±15 V; $I_{C\,max}$ = 450 A; R_G = 1.5 Ω; L = 100 µH.	T_{vj} = 25°C		268		ns
			T_{vj} = 150°C		600		ns
Repetitive peak reverse current	I_{RRM}		T_{vj} = 25°C		500		A
			T_{vj} = 150°C		570		A
Reverse recovered charge	Q_{rr}		T_{vj} = 25°C		65.6		µC
			T_{vj} = 150°C		126		µC
Reverse recovery energy	E_{rec}		T_{vj} = 25°C		50.0		mJ
			T_{vj} = 150°C		87.3		mJ
Threshold voltage	$V_{(T0)}$	T_{vj} = 150°C; V_{GE} = 0; I_{CE1} = 125 A; I_{CE2} = 450 A; t_u = 1000 µs			0.95		V
Forward slope resistance	r_T				3.53		mΩ
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; I_{CE} = 300±50 A; I_{test} = 1.5 A; V_{GE} = +15 V.			0.10		K/W

Module							
Pin resistance	R_{Pxy}	T_{vj} = 25°C.	R_{P12}			1.00	mΩ
			R_{P13}			1.00	
Parasitic inductance between terminals	L_{Pxy}	T_{vj} = 25°C; f = 1 MHz.	L_{P12}			20.0	nH
			L_{P13}			20.0	
Thermal resistance case to heatsink	R_{thCH}	per module			0.009	0.014	K/W
Mounting torque for screws to heatsink	M_s	to heatsink M6		3		6	N*m
Mounting torque for terminal screws	M_t	to terminals M5		3		6	N*m
Weight	W				355		g

Notes:

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

Overall dimensions: Package type – DA



Part numbering guide

MIDA	-	HB	17	FA	-	450	N	
MIDA								IGBT module package type: DA
		HB						2 switches as Half-Bridge
			17					Voltage rating (V_{CES}/100)
				FA				IGBT+FRD chipset modification
						450		Current Rating
							N	Climatic version: normal climate