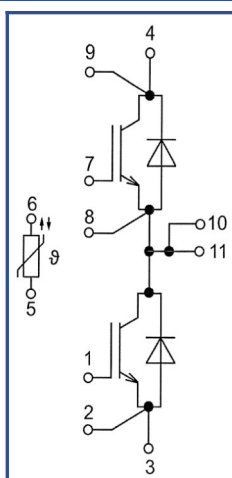
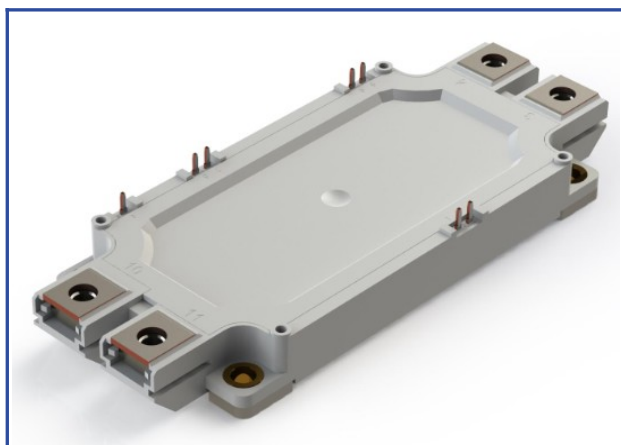


Low Inductance IGBT Module with 17 mm Height Housing
1700 V 450 A

Chip features

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

Design features

- copper baseplate
- Al₂O₃ DBC substrate
- ultrasonic welded power terminals
- improved thermal cycling
- RoHS compliant
- low inductance value

Typical application

- AC motor drives
- solar inverters
- air conditioning
- high power converters and UPS
- Inverters for wind energy converters

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	$V_{GE} = 0$.	1700	V
Maximum allowable collector current (continuous)	$I_{C\ 25}$	$T_{vj\ (max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$.	679	A
	$I_{C\ 80}$	$T_{vj\ (max)} = 175^{\circ}C$; $T_c = 80^{\circ}C$.	450	A
Repetitive peak collector current ^{*1}	I_{CRM}	$I_{CRM} = 3 \times I_{C\ nom}$; $t_p = 1\ ms$.	1350	A
Short-circuit duration	t_{psc}	$T_{vj} = 25^{\circ}C$; $V_{GE} = \pm 15\ V$; $V_{CE} = 1000\ V$; $R_{G\ on} = R_{G\ off} = 3\ \Omega$.	10	μs
		$T_{vj} = 150^{\circ}C$; $V_{GE} = \pm 15\ V$; $V_{CE} = 1000\ V$; $R_{G\ on} = R_{G\ off} = 3\ \Omega$.	10	
Gate-Emitter voltage	V_{GES}		± 20	V
Junction operating temperature	$T_{vj\ (op)}$		-40...+150	°C
Inverse diode				
Repetitive peak reverse voltage	V_{RRM}	$V_{GE} = 0\ V$.	1700	V
Maximum allowable forward current (continuous)	$I_{F\ 25}$	$T_{vj\ (max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$.	471	A
	$I_{F\ 80}$	$T_{vj\ (max)} = 175^{\circ}C$; $T_c = 80^{\circ}C$.	353	A
Repetitive peak forward current ^{*1}	I_{FRM}	$I_{FRM} = 3 \times I_{F\ nom}$; $t_p = 1\ ms$.	1350	A
Junction operating temperature	$T_{vj\ (op)}$		-40...+150	°C
Module				
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.			
IGBT								
Collector-Emitter saturation voltage	V_{CEsat}	$V_{GE} = +15\text{ V}; I_C = 450\text{ A};$ $t_u = 1000\text{ }\mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	1.74 2.24	1.84 2.39	1.94 2.53	V V	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$I_C = 3\text{ mA}; V_{CE} = V_{GE}; T_{vj} = 25^\circ\text{C};$ $t_u = 2\text{ ms}.$		5.00	5.60	6.20	V	
Collector-Emitter cut-off current	I_{CES}	$V_{CE} = 1700\text{ V};$ $t_u = 50\text{ ms}; V_{GE} = 0.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	10.00 1.40	300 5.00	μA mA	
Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0; V_{GE} = \pm 20\text{ V}; T_{vj} = 25^\circ\text{C};$ $t_u = 30\text{ ms}.$		-	5.00	400	nA	
Input capacitance	C_{ies}	$V_{CE} = 10\text{ V}; V_{GE} = 0\text{ V};$ $f = 1\text{ MHz}; T_{vj} = 25^\circ\text{C}.$		-	-	-	nF	
Output capacitance	C_{oes}			-	-	-	nF	
Reverse transfer capacitance	C_{res}			-	-	-	nF	
Total gate charge	Q_G	$I_C = 450\text{ A}; V_{CE} = 920\text{ V};$ $V_{GE} = -8\div 15\text{ V}.$		-	3000	-	nC	
Internal gate resistance	R_{Gint}	$T_{vj} = 25^\circ\text{C}.$		-	1.60	-	Ω	
Turn-on delay time	$t_{d(on)}$	$V_{CE} = 920\text{ V};$ $V_{GE} = \pm 15\text{ V};$ $I_{C\text{ max}} = 450\text{ A};$ $R_G = 3.0\text{ }\Omega;$ $L_s = 53\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	ns ns	
Rise time	t_{ri}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	ns ns	
Turn-on energy	E_{on}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	108 147	- -	mJ mJ	
Turn-off delay time	$t_{d(off)}$		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	ns ns	
Fall time	t_{fi}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	ns ns	
Turn-off energy	E_{off}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	99 138	- -	mJ mJ	
Collector-emitter threshold voltage	V_{CE0}		$V_{GE} = +15\text{ V}; T_{vj} = 150^\circ\text{C};$ $I_{CE1} = 112\text{ A}; I_{CE2} = 450\text{ A};$ $t_u = 1000\text{ }\mu\text{s}.$		-	0.79	-	V
On-State slope resistance (IGBT)	r_{CE0}				-	3.15	-	m Ω
Thermal resistance junction to case	$R_{th(j-c)}$		DC; $I_{CE} = 300\pm 50\text{ A}; I_{test} = 1.5\text{ A};$ $V_{GE} = +15\text{ V}.$		-	0.051	-	K/W
Inverse diode								
Forward voltage drop	V_F	$I_F = 450\text{ A};$ $V_{GE} = 0; t_u = 1000\text{ }\mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	1.62 1.87	1.70 1.98	1.80 2.09	V V	
Reverse recovery time	t_{rr}	$V_{CE} = 920\text{ V};$ $V_{GE} = \pm 15\text{ V};$ $I_{C\text{ max}} = 450\text{ A};$ $R_G = 3.0\text{ }\Omega;$ $L_s = 53\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	ns ns	
Peak reverse current	I_{RM}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	- -	- -	A A	
Recovered charge	Q_r		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	135 159	- -	μC μC	
Reverse recovery energy	E_{rec}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	- -	87 108	- -	mJ mJ	
Threshold voltage	$V_{(T0)}$		$T_{vj} = 150^\circ\text{C}; V_{GE} = 0; I_{CE1} = 112\text{ A};$ $I_{CE2} = 450\text{ A}; t_u = 1000\text{ }\mu\text{s}$		-	0.89	-	V
Forward slope resistance	r_T				-	2.42	-	m Ω
Thermal resistance junction to case	$R_{th(JC-D)}$		DC; $I_{CE} = 300\pm 50\text{ A}; I_{test} = 1.5\text{ A};$ $V_{GE} = 0\text{ V}.$		-	0.110	-	K/W



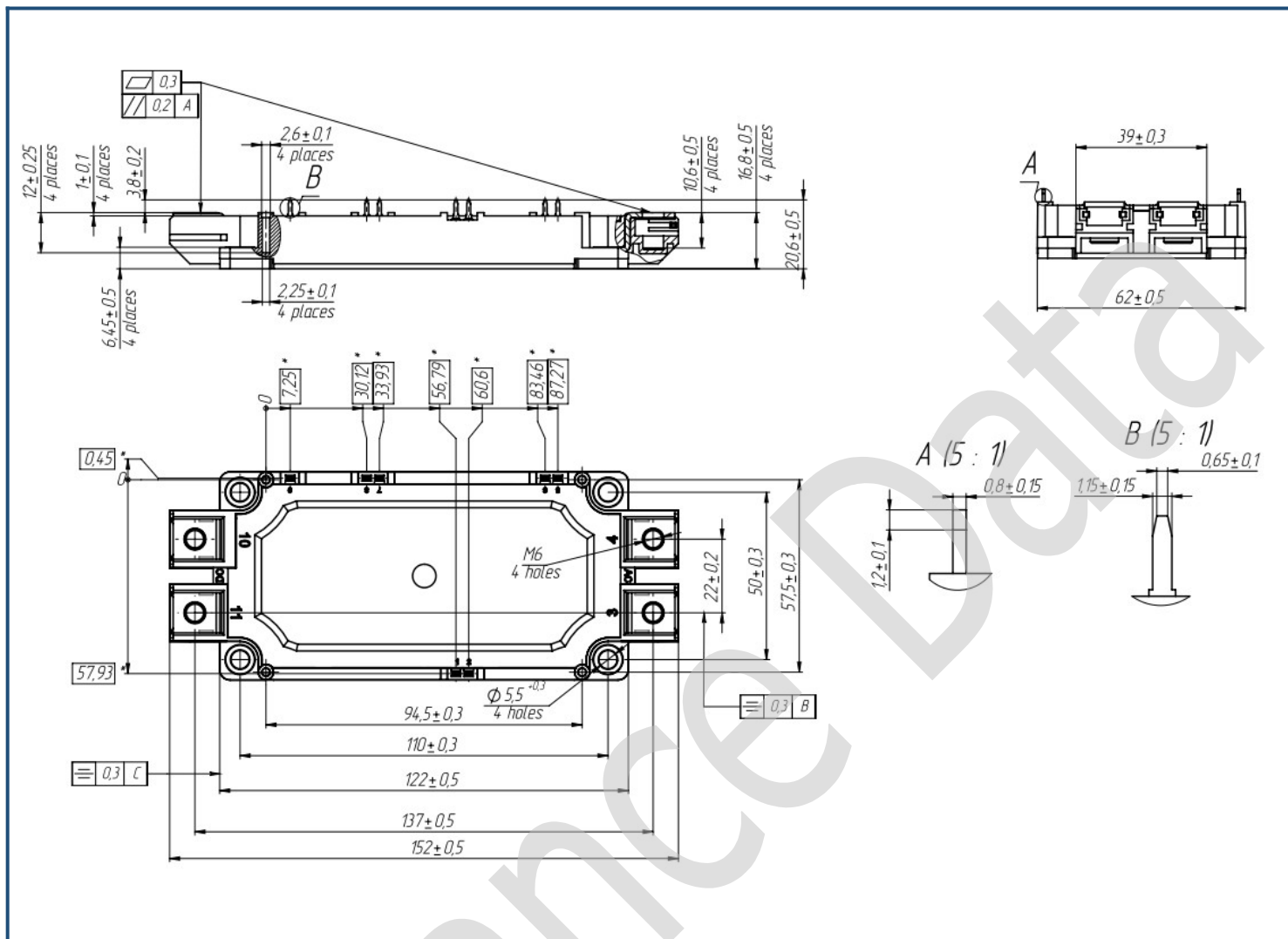
Module							
Pin resistance	R _{Pxy}	T _{vj} = 25°C.	R _{P10/11-3}	-	0.92	1.00	mΩ
			R _{P10/11-4}	-	0.59	1.00	
Parasitic inductance between terminals	L _{Pce}			-	26.00	-	nH
Thermistor resistance	R _t	T _{vj} = 25°C		4850	-	6225	Ω
		T _{vj} = 100°C		475	-	554	
Coefficient of temperature sensitivity	B _{25/50}	R ₂ = R ₂₅ exp [B _{25/50} (1/T ₂ - 1/T ₁)], T ₁ = 298,15 K		-	3375	-	κ
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 M5		3	-	6	N*m
Mounting torque for terminal screws	M _t	to terminals M6		3	-	6	N*m
Weight	W			-	360	-	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 $T_{vj \text{ op}} = -40...+150^{\circ}\text{C}$.

Overall dimensions: Package type – DA



Part numbering guide

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

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