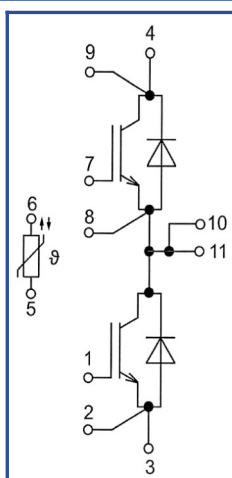
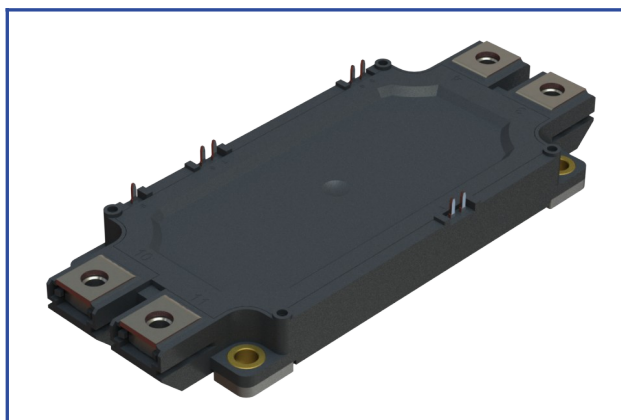


Low Inductance IGBT Module with 17 mm Height Housing
1700 V 450 A

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)	$I_{C 25}$	$T_{vj (max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$.	587	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; $R_{G on} = R_{G off} = 1.5 \Omega$.	10	μs
		$T_{vj} = 150^{\circ}C$; $V_{GE} = \pm 15$ V; $V_{CE} = 1000$ V; $R_{G on} = R_{G off} = 1.5 \Omega$.	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)	$I_{F 25}$	$T_{vj (max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$.	530	A
	$I_{F 80}$	$T_{vj (max)} = 175^{\circ}C$; $T_c = 80^{\circ}C$.	403	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}		-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			Unit.	
				min.	typ.	max.		
IGBT								
Collector-Emitter saturation voltage	V _{CEsat}	V _{GE} = +15 V; I _C = 450 A; t _u = 1000 μs.	T _{vj} = 25°C	-	-	2.45	V	
			T _{vj} = 150°C	-	-	3.20	V	
Gate-Emitter threshold voltage	V _{GE(th)}	I _C = 18 mA; V _{CE} = V _{GE} ; T _{vj} = 25°C; t _u = 2 ms.		4.15	5.90	8.10	V	
Collector-Emitter cut-off current	I _{CES}	V _{CE} = 1700 V; t _u = 50 ms; V _{GE} = 0.	T _{vj} = 25°C	-	11.00	300	μA	
			T _{vj} = 150°C	-	0.60	5.00	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0; V _{GE} = ±20 V; T _{vj} = 25°C; t _u = 30 ms.		-	12.00	200	nA	
Input capacitance	C _{ies}	V _{CE} = 25 V; V _{GE} = 0 V;		-	174.60	-	nF	
Reverse transfer capacitance	C _{res}	f = 1 MHz; T _{vj} = 25°C.		-	1.08	-	nF	
Total gate charge	Q _G	I _C = 450 A; V _{CE} = 920 V; V _{GE} = -8...+15 V.		-	-	2800	nC	
Internal gate resistance	R _{Gint}	T _{vj} = 25°C.		-	2.08	-	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 _s = 56 nH.	T _{vj} = 25°C	-	-	318	ns	
	T _{vj} = 150°C		-	-	368			
Rise time	t _{ri}		T _{vj} = 25°C	-	-	77	ns	
			T _{vj} = 150°C	-	-	93		
Turn-on energy	E _{on}		T _{vj} = 25°C	-	-	110	mJ	
			T _{vj} = 150°C	-	-	191		
Turn-off delay time	t _{d(off)}		T _{vj} = 25°C	-	-	625	ns	
			T _{vj} = 150°C	-	-	710		
Fall time	t _{fi}		T _{vj} = 25°C	-	-	650	ns	
			T _{vj} = 150°C	-	-	975		
Turn-off energy	E _{off}	T _{vj} = 25°C	-	-	141	mJ		
		T _{vj} = 150°C	-	-	197			
Collector-emitter threshold voltage	V _{CE0}	V _{GE} = +15 V; T _{vj} = 150°C;		-	-	0.85	V	
On-State slope resistance (IGBT)	r _{CE0}	I _{CE1} = 112 A; I _{CE2} = 450 A; t _u = 1000 μs.		-	-	4.76	mΩ	
Thermal resistance junction to case	R _{th(j-c)}	DC; I _{test} = 1.5 A; V _{GE} = +15 V.		-	-	0.070	K/W	
Inverse diode								
Forward voltage drop	V _F	I _F = 450 A; V _{GE} = 0; t _u = 1000 μs.	T _{vj} = 25°C	-	-	2.45	V	
			T _{vj} = 150°C	-	-	2.80	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 _s = 56 nH.	T _{vj} = 25°C	-	-	362	ns	
			T _{vj} = 150°C	-	-	715	ns	
Peak reverse current	I _{RM}		T _{vj} = 25°C	-	-	630	A	
			T _{vj} = 150°C	-	-	575	A	
Recovered charge	Q _r		T _{vj} = 25°C	-	-	107	μC	
			T _{vj} = 150°C	-	-	180	μC	
Reverse recovery energy	E _{rec}		T _{vj} = 25°C	-	-	74.5	mJ	
			T _{vj} = 150°C	-	-	133	mJ	
Threshold voltage	V _(T0)		T _{vj} = 150°C; V _{GE} = 0; I _{F1} = 112 A;		-	-	0.87	V
Forward slope resistance	r _T		I _{F2} = 450 A; t _u = 1000 μs		-	-	3.69	mΩ
Thermal resistance junction to case	R _{th(JC-D)}	DC; I _{test} = 1.5 A; V _{GE} = 0 V.		-	-	0.100	K/W	

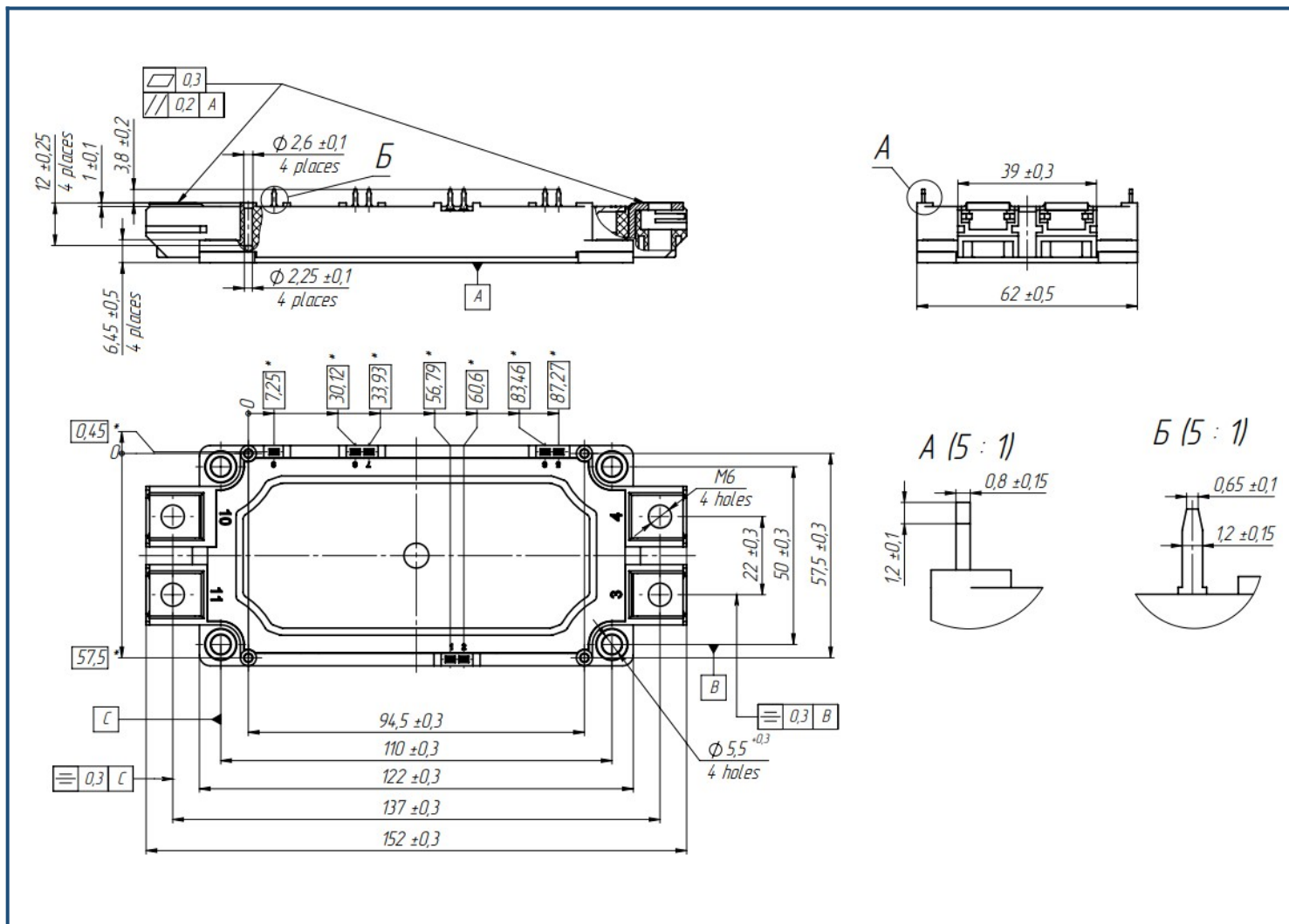


Module						
Pin resistance	R_{Pxy}	$T_{vj} = 25^{\circ}\text{C}$	$R_{P10/11-3}$	-	0.95	1.00
			$R_{P10/11-4}$	-	0.68	1.00
Parasitic inductance between terminals	L_{Pce}		-	22.00	-	nH
Thermistor resistance	R_t	$T_{vj} = 25^{\circ}\text{C}$	4850	-	6225	Ω
		$T_{vj} = 150^{\circ}\text{C}$	160	-	195	
Coefficient of temperature sensitivity	$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50} (1/T_2 - 1/T_1)],$ $T_1 = 298,15 \text{ K}$	-	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 – D2

Part numbering guide

MID2	-	HB	17	LA	-	450	N	
MID2								IGBT module package type: D2
		HB						2 switches as Half-Bridge
			17					Voltage rating ($V_{CES}/100$)
				LA				IGBT+FRD chipset modification
						450		Current Rating
							N	Climatic version: normal climate

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