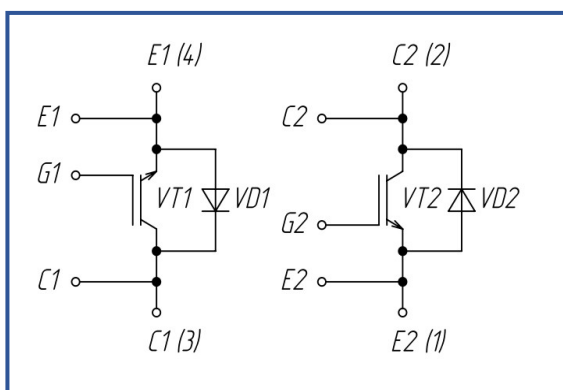
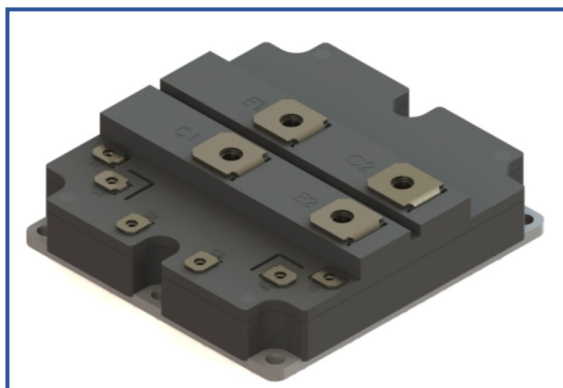


IGBT high-power module
1200 V 1200 A

Chip features

- IGBT chip
 - low $V_{CE(sat)}$ value
 - 10 μs 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

- AlSiC baseplate
- AlN DBC substrate
- ultrasonically welded power terminals

Typical application

- AC and DC motor drives
- high-power converters
- wind-powered generator inverters
- industrial equipment

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	$V_{GE} = 0$.	1200	V
Maximum allowable collector current (continuous)* ²	$I_{C\ 25}$	$T_{vj\ (max)} = 175^\circ C; T_c = 25^\circ C$.	1774	A
	$I_{C\ 80}$	$T_{vj\ (max)} = 175^\circ C; T_c = 80^\circ C$.	1370	A
Repetitive peak collector current* ¹	I_{CRM}	$I_{CRM} = 2 \times I_{C\ nom}; t_p = 1\ ms$.	2400	A
Short-circuit duration	t_{psc}	$T_{vj} = 25^\circ C; V_{GE} = \pm 15\ V; V_{CE} = 720\ V;$ $R_{G\ on} = R_{G\ off} = 0.5\ \Omega$.	10	μs
		$T_{vj} = 150^\circ C; V_{GE} = \pm 15\ V; V_{CE} = 720\ V;$ $R_{G\ on} = R_{G\ off} = 0.5\ \Omega$;	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}	$V_{GE} = 0\ V$.	1200	V
Maximum allowable forward current (continuous)* ²	$I_{F\ 25}$	$T_{vj\ (max)} = 175^\circ C; T_c = 25^\circ C$.	-	A
	$I_{F\ 80}$	$T_{vj\ (max)} = 175^\circ C; T_c = 80^\circ C$.	-	A
Repetitive peak forward current* ¹	I_{FRM}	$I_{FRM} = 2 \times I_{F\ nom}; t_p = 1\ ms$.	2400	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.

*² $I_{C\ 25}$ and $I_{C\ 80}$ ($I_{F\ 25}$ and $I_{F\ 80}$) values were calculated in accordance with typical U_{CE0} , r_{CE0} and $R_{th(j-c)}$ ($U_{(T0)}$, r_T and $R_{th(jc-D)}$).



Characteristics

Definition	Symbol	Conditions	Value			Unit.		
			min.	typ.	max.			
IGBT								
Collector-Emitter saturation voltage	V _{CEsat}	V _{GE} = +15 V; I _C = 1200 A; t _u = 10 μs.	T _{vj} = 25°C	-	2.08	-	V	
			T _{vj} = 150°C	-	2.86	-	V	
Gate-Emitter threshold voltage	V _{GE(th)}	I _C = 8 mA; U _{CE} = U _{GE} ; T _{vj} = 25°C; t _u = 2 ms.	-	5.46	-	-	V	
Collector-Emitter cut-off current	I _{CES}	V _{CE} = 1200 V; t _u = 10 ms; V _{GE} = 0.	T _{vj} = 25°C	-	100	-	μA	
			T _{vj} = 150°C	-	-	-	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0; V _{GE} = ±20 V; T _{vj} = 25°C; t _u = const.	-	125.00	500	-	nA	
Input capacitance	C _{ies}	V _{CE} = 25 V; V _{GE} = 0 V; f = 1 MHz; T _{vj} = 25°C.	-	352	-	-	nF	
Output capacitance	C _{oes}		-	-	-	-	nF	
Reverse transfer capacitance	C _{res}		-	4	-	-	nF	
Total gate charge	Q _G	I _C = 1200 A; V _{CE} = 600 V; V _{GE} = -8...+15 V.	-	-	-	-	μC	
Internal gate resistance	R _{Gint}	T _{vj} = 25°C.	-	0.64	-	-	Ω	
Turn-on delay time	t _{d(on)}	V _{CE} = 600 V; V _{GE} = ±15 V; I _{C max} = 1200 A.	T _{vj} = 25°C	-	367	-	ns	
			T _{vj} = 150°C	-	405	-		
Rise time	t _{ri}		T _{vj} = 25°C	-	69	-	ns	
			T _{vj} = 150°C	-	91	-		
Turn-on energy	E _{on}		T _{vj} = 25°C	-	140	-	mJ	
			T _{vj} = 150°C	-	235	-		
Turn-off delay time	t _{d(off)}		T _{vj} = 25°C	-	290	-	ns	
			T _{vj} = 150°C	-	320	-		
Fall time	t _{fi}		T _{vj} = 25°C	-	250	-	ns	
			T _{vj} = 150°C	-	303	-		
Turn-off energy	E _{off}		T _{vj} = 25°C	-	82	-	mJ	
			T _{vj} = 150°C	-	115	-		
Collector-emitter threshold voltage	V _{CE0}	V _{GE} = +15 V; T _{vj} = 150°C;	-	0.82	-	-	V	
On-State slope resistance (IGBT)	r _{CE0}	I _{CE1} = 300 A; I _{CE2} = 1200 A; t _u = 10 μs.	-	1.70	-	-	mΩ	
Thermal resistance junction to case	R _{th(j-c)}	DC; V _{GE} = +15 V.	-	0.022	-	-	K/W	
Inverse diode \ Freewheeling diode								
Forward voltage drop	V _F	I _F = 1200 A; V _{GE} = 0; t _u = 10 μs.	T _{vj} = 25°C	-	2.17	-	V	
			T _{vj} = 150°C	-	-	-	V	
Reverse recovery time	t _{rr}	V _{GE} = ±15 V; V _{CE} = 600 V; I _{C max} = 1200 A.	T _{vj} = 25°C	-	-	-	ns	
			T _{vj} = 150°C	-	-	-	ns	
Peak reverse current	I _{RM}		T _{vj} = 25°C	-	-	-	A	
			T _{vj} = 150°C	-	-	-	A	
Recovered charge	Q _r		T _{vj} = 25°C	-	-	-	μC	
			T _{vj} = 150°C	-	-	-	μC	
Reverse recovery energy	E _{rec}		T _{vj} = 25°C	-	-	-	mJ	
			T _{vj} = 150°C	-	-	-	mJ	
Threshold voltage	V _(T0)	T _{vj} = 150°C; V _{GE} = 0; I _{CE1} = 300 A;	-	-	-	-	V	
Forward slope resistance	r _T	I _{CE2} = 1200 A; t _u = 10 μs	-	-	-	-	mΩ	
Thermal resistance junction to case	R _{th(JC-D)}	DC; U _{GE} = +15 V.	-	0.047	-	-	K/W	

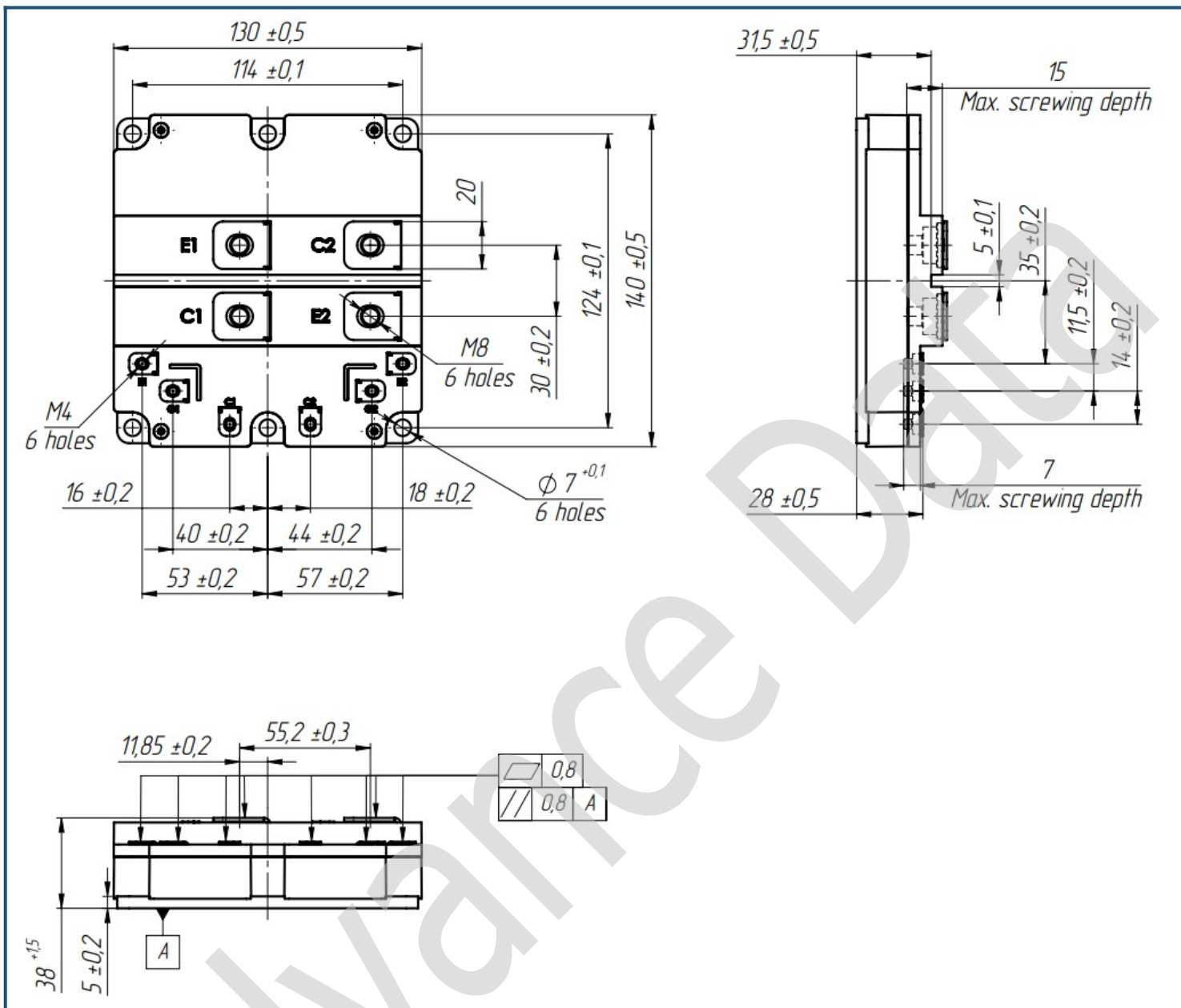


Module							
Pin resistance	R_{Pxy}	$T_{vj} = 25^{\circ}\text{C}$	$R_{P4-3/1-2}$	-	0.31	-	mΩ
Parasitic inductance between terminals	L_{Pxy}		$L_{P4-3/1-2}$	-	28.60	-	nH
Thermal resistance case to heatsink	R_{thCH}	per module		-	6.00	-	K/kW
Mounting torque for screws to heatsink	M_s	to heatsink M6		-	-	5.75	N*m
Mounting torque for screws to control terminal	M_{ct}	to terminals M4		-	-	2.00	N*m
Mounting torque for screws to power terminal	M_{pt}	to terminals M8		-	-	9.00	N*m
Creepage distance	d_s			-	-	15.00	mm
Clearance	d_a			-	-	10.00	mm
Comparative Tracking Index	CTI			-	-	600	
Weight	W			-	-	900	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 $T_{vj\text{ op}} = -40 \div +150^{\circ}\text{C}$.

Overall dimensions: Package type – SM

Part numbering guide

MISM	-	DS	12	SG	-	1200	N	
MISM								IGBT module package type: SM
		DS						Double switch
			12					Voltage rating ($V_{CES}/100$)
				SG				IGBT+FRD chipset modification
						1200		Current Rating
							N	Climatic version: normal climate

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