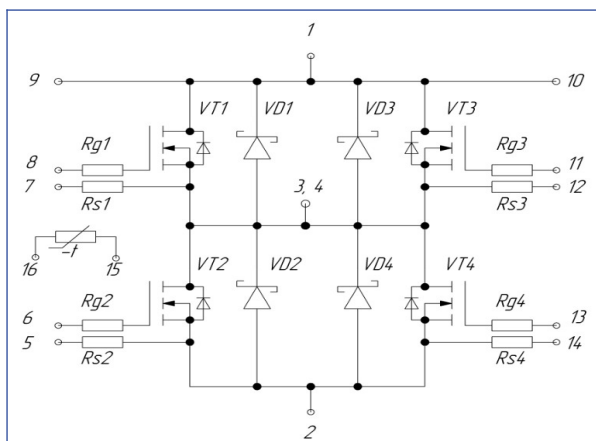
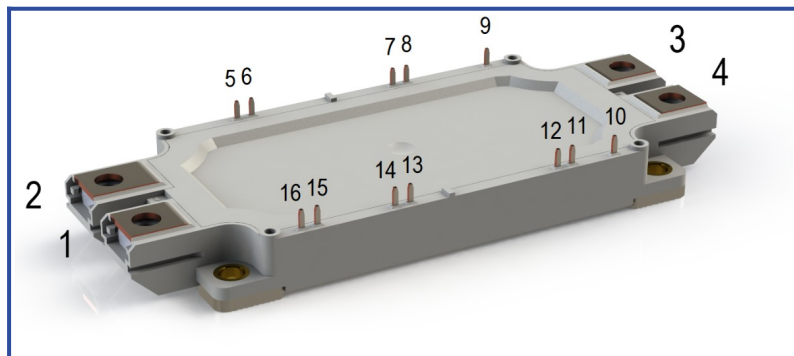


SiC MOSFET module in industry standard package

1200V 600A Half-Bridge



Features

- SiC MOSFET and SiC SBD
- Low inductance (<10 nH)
- Scheme — Half-Bridge
- Switching cell topology
- Low $R_{DS(on)}$ value
- Optimized control circuits
- AlN Substrates
- AISiC Baseplate

Advantages

- Industry standard package
- Low static and dynamic losses
- Fast and clean switching
- Low $R_{th(j-c)}$ value
- High thermal cycling performance

Typical application

- Inverters for RES
- DC/DC converters, inverters
- Motor drives
- Electric transport

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
MOSFET (VT1;VT2;VT3;VT4)				
Drain-source voltage	V_{DSmax}	$V_{GE} = 0$	1200	V
Maximum allowable drain current (continuous)	I_{D25}	$T_{vj(max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$	511	A
	I_{D80}	$V_{GS} = +20 V$; $T_c = 80^{\circ}C$	406	
Repetitive peak drain current ^{*1}	$I_{D(pulse)}$	$t_p > 10 \mu s$; $D = 1\%$	-	A
Gate-source voltage (maximum)	V_{GSmax}		-5/+22	V
Gate-source voltage (operating)	V_{GSop}		-3.5/+20	V
Junction operating temperature	$T_{vj(op)}$		-40...+150	$^{\circ}C$
Diode (VD1;VD2;VD3;VD4)				
Repetitive peak reverse voltage	V_{RRM}	$V_{GS} = 0 V$	1200	V
Maximum allowable forward current (continuous)	I_{F25}	$T_{vj(max)} = 175^{\circ}C$; $T_c = 25^{\circ}C$	370	A
	I_{F80}	$T_{vj(max)} = 175^{\circ}C$; $T_c = 80^{\circ}C$	281	
Repetitive peak forward current ^{*1}	I_{FRM}	$t_p > 10 \mu s$; $D = 1\%$; $T_{vj} = 25^{\circ}C$	-	A
Junction operating temperature	$T_{vj(op)}$		-40...+150	$^{\circ}C$
Module				
Storage temperature	T_{stg}		-55...+50	$^{\circ}C$
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.			
MOSFET (VT1;VT2;VT3;VT4)								
On-state drain-source resistance (at chip)	R _{DS(on)}	V _{GS} = +20 V; I _D = 360 A	T _{vj} = 25°C T _{vj} = 150°C	- -	2.83 5.23	- -	mΩ mΩ	
Drain-source voltage (at terminals)	V _{DS(on)}	V _{GS} = +20 V; I _D = 600 A; t _u = 1000 μs	T _{vj} = 25°C T _{vj} = 150°C	- -	2800 3850	- -	mV mV	
Gate-source threshold voltage	V _{GS(th)}	V _{GS} =V _{DS} ; I _D = 108 mA; t _u = 2 ms		1800	3200	5000	mV	
Drain-Source cut-off current	I _{DSS}	V _{DS} = 1200 V; t _u = 50 ms; V _{GS} = 0	T _{vj} = 25°C T _{vj} = 150°C	- -	30 -	600 -	μA μA	
Gate-Source leakage current	I _{GSS}	V _{DS} = 0; V _{GS} = -5...+20 V; t _u = 30 ms	T _{vj} = 25°C T _{vj} = 150°C	- -	- -	600 -	nA nA	
Transconductance	g _{fs}	V _{DS} = 20 V; I _D = 100 A		-	-	-	S	
Short-circuit duration	t _{psc}	-		-	-	-	μs	
Input capacitance	C _{iss}	V _{DS} = 800 V; V _{GS} = 0 V; f = 100 kHz		-	36780	-	pF	
Output capacitance	C _{oss}			-	1512	-		
Reverse transfer capacitance	C _{rss}			-	93.6	-		
Effective output capacitance	C _{o(er)}			-	-	-		
Gate-source charge	Q _{gs}	I _D = 360 A; V _{DD} = 800 V; V _{GS} = -5...+20 V		-	576	-	nC	
Gate-drain charge	Q _{gd}			-	456	-		
Total gate charge	Q _g			-	1680	-		
Internal gate resistance	R _{Gint}	T _{vj} = 25°C.; R _{Gint} =R _{G1} =R _{G2} =R _{G3} =R _{G4}		-	0.222	-	Ω	
Internal source resistance	R _{Sint}	T _{vj} = 25°C.; R _{Sint} =R _{s1} =R _{s2} =R _{s3} =R _{s4}		-	0.10	-	Ω	
Turn-on delay time	t _{d(on)}	V _{DS} = 800 V; V _{GS} = -2...+20 V; I _D = 360 A; R _{Gon/off} = 2.7 Ω	T _{vj} = 25°C T _{vj} = 150°C	- -	36 -	- -	ns ns	
Rise time	t _{ri}		T _{vj} = 25°C T _{vj} = 150°C	- -	31 -	- -	ns ns	
Turn-off delay time	t _{d(off)}		T _{vj} = 25°C T _{vj} = 150°C	- -	64 -	- -	ns ns	
Fall time	t _{fi}		T _{vj} = 25°C T _{vj} = 150°C	- -	24 -	- -	ns ns	
Turn-off energy	E _{off}		T _{vj} = 25°C T _{vj} = 150°C	- -	3.9 -	- -	mJ	
Turn-on energy	E _{on}		T _{vj} = 25°C T _{vj} = 150°C	- -	7.9 -	- -		
Thermal resistance junction to case	R _{th(j-c)}		DC; I _D = 170 A; I _{test} = 1.5 A; V _{GS} = +20 V		-	-	0.11	K/W
Diode (VD1;VD2;VD3;VD4)								
Forward voltage drop (at terminals)	V _F	I _{DS} = 600 A; V _{GS} = -4 V; t _u = 1000 μs	T _{vj} = 25°C T _{vj} = 150°C	- -	- -	- 4900	mV mV	
Reverse recovery time	t _{rr}	V _{DS} = 600 V; V _{GS} = -4...+15 V; I _D = 600 A; R _{Gon/off} = 1 Ω	T _{vj} = 25°C T _{vj} = 150°C	- -	- -	- -	ns ns	
Peak reverse current	I _{RM}		T _{vj} = 25°C T _{vj} = 150°C	- -	- -	- -	A A	
Recovered charge	Q _r		T _{vj} = 25°C T _{vj} = 150°C	- -	- -	- 12.0	μC μC	
Reverse recovery energy	E _{rec}		T _{vj} = 25°C T _{vj} = 150°C	- -	- -	- 2	mJ mJ	
Threshold voltage	U _(T0)		T _{vj} = 150°C; V _{GE} = -4 V; I _{DS1} = 150 A;		-	-	754	mV
Forward slope resistance	r _T	I _{DS2} = 600 A; t _u = 1000 μs		-	-	4.82	mΩ	
Thermal resistance junction to case	R _{th(JC-D)}	DC; I _D = 170 A; I _{test} = 1.5 A; V _{GS} = +20 V		-	-	0.16	K/W	

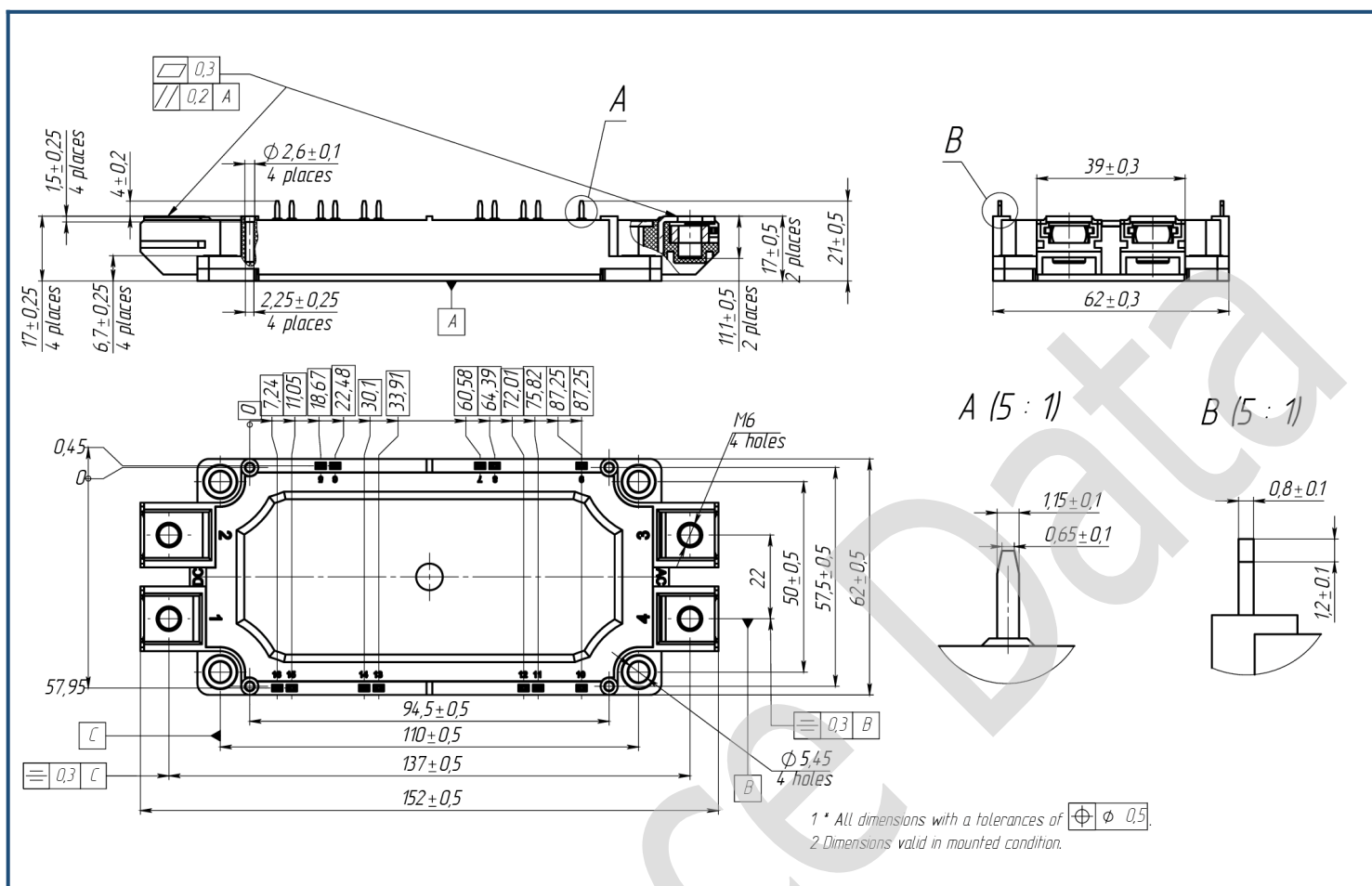
Module							
Pin resistance	R_{Pxy}	$T_{vj} = 25^{\circ}\text{C}.$	$R_{P1-3/4}$	-	1.00	-	mΩ
			$R_{P2-3/4}$	-	1.00	-	
Parasitic inductance between terminals	L_{Pxy}	$T_{vj} = 25^{\circ}\text{C};$ $f = 1 \text{ MHz}.$	$L_{P12} (\text{DC}+\text{DC}-)$	-	10.0	-	nH
Thermal resistance case to heatsink	R_{thCH}	per module		-	0.010	0.015	K/W
Mounting torque for screws to heatsink	M_s	to heatsink M5		3.00	-	6.00	N*m
Mounting torque for terminal screws	M_t	to terminals M6		3.00	-	6.00	N*m
Weight	W			-	240	-	g

“ - ” Data will be refined as additional tests are conducted and statistics are collected.

Notes:

- To configure the module to the "Half-bridge" scheme, please, connect pins 3+4, 5+14, 6+13, 7+12, 8+11 in parallel.
- This document contains data for the "Half-bridge" scheme.
- The operating temperature of the package and insulation materials must not exceed $T_c = 125^{\circ}\text{C}$ max;
- The recommended operating temperature of the chip $T_{vj \text{ op}} = -40 \div +150^{\circ}\text{C}.$

Overall dimensions: Package type – MCDA



Руководство по маркировке

MCDA	-	HBS	12	-	I	600	N	-	A	
MCDA										Module based on SiC MOSFET in the package type MCDA
		FBS								Full bridge (H-bridge) with Schottky barrier diode (SBD)
		HBS								Half-bridge with Schottky barrier diode (SBD)
			12							Nominal voltage ($U_{DS(max)}/100$)
					I					Chip SiC MOSFET: I – Chip manufacturer code
						600				600A nominal current
							N			Climatic version: normal climate
									A	AlSiC baseplate

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