

000701 iCu600MB1202

FHB Series

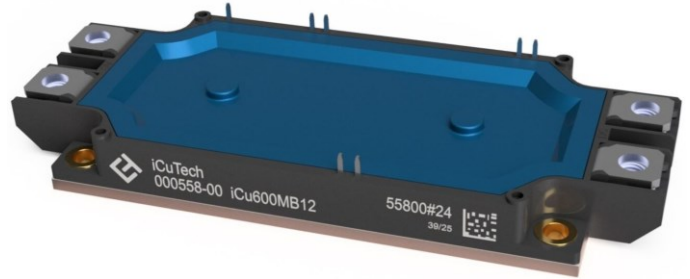
Silicon Carbide Mosfet Half Bridge

TARGET DATASHEET

1. General Description

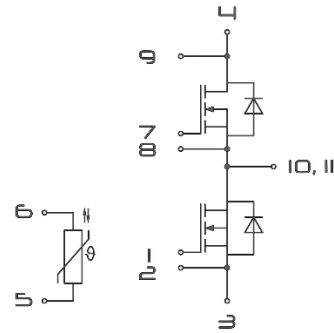
Silicon Carbide Mosfet Half Bridge based on AEC-Q101 qualified discrete components:

- ✓ Typ. $R_{DS(on)} = 3.7 \text{ m}\Omega$ @ $V_{GS} = 18 \text{ V}$
- ✓ Ultra Low Gate Charge
- ✓ High Speed Switching with Low Capacitance
- ✓ 100% Avalanche tested



2. Features and Benefits

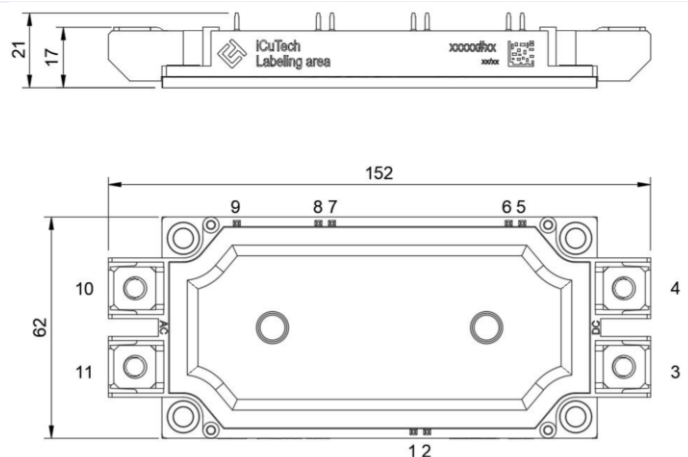
- ✓ $V_{DSS} = 1200 \text{ V}$
- ✓ $I_{D \text{ Nominal}} = 600 \text{ A}$
- ✓ Integrated temperature sensor
- ✓ Insulation: 2,5 kV AC, 1 min
- ✓ Industry standard design
- ✓ High performance IMS/IMB copper baseplate



3. Applications

Suitable for:

- ✓ Motor drives
- ✓ High frequency power supplies
- ✓ AC inverters
- ✓ EV chargers
- ✓ Photovoltaic, wind power
- ✓ Induction heating





4. Electrical Ratings

Table 1: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	1200	V
V_{GS}	Gate-source voltage	-10 / 22	V
	Gate-source voltage (recommended operating values)	-3 / 18	
I_D	Drain current (continuous) at $T_C = 25\text{ °C}$	600	A
	Drain current (continuous) at $T_C = 100\text{ °C}$	426	
I_{DM}^*	Drain current (pulsed)	1782	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ °C}$	2646	W
T_{stg}	Storage temperature range	-40 to 125	°C
T_J	Operating junction temperature range	-40 to 175	

* Pulse width is limited by safe operating area.

Table 2: Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	0.060	K/W
R_{thCH}	Thermal resistance, case-to-heatsink	t.b.d.	K/W



5. Package

Table 3: Insulation coordination

Symbol	Parameter	Test conditions	Value	Unit
V_{ISOL}	Isolation test voltage	AC RMS, $f = 50$ Hz, $t = 1$ min	2.5	kV
	Baseplate	Copper	3	mm
	Internal isolation	IMS Insulation sheet	110	μ m
d_{Creep}	Creepage distance	Terminal to heatsink	14.5	mm
d_{Creep}	Creepage distance	Terminal to terminal	13.0	mm
d_{Clear}	Clearance	Terminal to heatsink	12.5	mm
d_{Clear}	Clearance	Terminal to terminal	10	mm
CTI	Comparative Tracking Index	IEC 60112	>600	V
	Case		PBT (UL-V0)	

Table 4: Characteristic values

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
L_{sDS}	Module stray inductance			14		nH
$R_{DD'+SS'}$	Internal lead resistance	$T_c = 25$ °C		t.b.d.		m Ω
R_{25}	NTC Temperature sensor resistance	$T_c = 25$ °C		4.7		k Ω
$B_{25/50}$	NTC Temperature sensor B value			3590		K
$B_{25/85}$	NTC Temperature sensor B value			3635		K
$B_{25/100}$	NTC Temperature sensor B value			3650		K
M	Mounting torque	M6 screw Main Terminals	3		6	Nm
M	Mounting torque	M5 screw mounting to heatsink	3		5	Nm
G	Weight			375		g



6. Electrical Characteristics

Table 5: On/off states (chip level)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0 V, I_D = 1 mA$	1200			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0 V, V_{DS} = 1200 V$			100	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0 V, V_{GS} = +22/-10 V$			± 1	μA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 120 mA$	2.04	2.72	4.4	V
$R_{DS(on)}$	Static drain-source on-resistance					m Ω
		$V_{GS} = 18 V, I_D = 240 A$		3.7	5.0	
		$V_{GS} = 18 V, I_D = 240 A, T_J = 175 ^\circ C$		7.3		

Table 6: Dynamic (chip level)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 800 V, f = 1 MHz, V_{GS} = 0 V$		19		nF
C_{oss}	Output capacitance			876		pF
C_{rss}	Reverse transfer capacitance			84		pF
Q_g	Total gate charge	$V_{DS} = 800 V, V_{GS} = -5 to 18 V, I_D = 240 A$		852		nC
Q_{gs}	Gate-source charge			96		nC
Q_{gd}	Gate-drain charge			228		nC
R_g	Internal Gate input resistance	$f = 1 MHz, I_D = 0 A, included internal gate PCB$		1		Ω

Table 7: Switching energy (inductive load) (chip level)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
E_{on}	Turn-on switching energy	$V_{DD} = 800 V, I_D = 240 A,$		2910		μJ
E_{off}	Turn-off switching energy	$R_G = 4.5 \Omega, V_{GS} = -3 V to 18 V$		1320		μJ



Table 8: Switching times (chip level)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 800\text{ V}, I_D = 240\text{ A},$ $R_G = 4.5\ \Omega, V_{GS} = -3 / 18\text{ V}$		18		ns
t_r	Rise time			24		ns
$t_{d(off)}$	Turn-off delay time			47		ns
t_f	Fall time			14		ns

Table 9: Reverse SiC diode characteristics (chip level)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD*}	Continuous diode forward current	$V_{GS} = -3\text{ V}, T_C = 25\text{ }^\circ\text{C}$			534	A
I_{SDM}	Pulsed Source-Drain Diode Forward Current	$V_{GS} = -3\text{ V}, T_C = 25\text{ }^\circ\text{C}$			1782	A
V_{SD}	Diode forward voltage	$I_{SD} = 240\text{ A}, V_{GS} = -3\text{ V}$		4.5		V
t_{rr}	Reverse recovery time	$I_{SD} = 240\text{ A},$ $di/dt = 1000\text{ A}/\mu\text{s},$ $V_{DD} = 800\text{ V}, V_{GS} = -3\text{ V}$		23		ns
E_{REC}	Reverse recovery charge			30		μJ
I_{RRM}	Reverse recovery current			78		A

* I_{SD} is limited by package.



7. Package Outlines

