SiC MOSFET Module

FCA150AC120

FCA150AC120
- 2in1 SiC MOSFET module
- Isolated module
- Integrated FWD function

《Features》
- Small size package
- High reliability
- Safe gate driving
- Short circuit tolerance
- Low power loss
- Low temperature dependency of RDS(on)
- Unnecessity of additional FWD

《Applications》
- Industrial inverters / DC-DC converters / EV chargers / Resonant power supply

CIRCUIT DIAGRAM

Unit：mm

■ Maximum Ratings (Tj=25℃ unless otherwise specified)

Item		Symbol	Unit	Ratings	Conditions
Drain−Source Voltage		V_{DSS}	V	1200	
Gate−Source Voltage(+)		V_{GSS}	V	22	
Gate−Source Voltage(−)			V	−7	
Continuous Drain Current		I_D	A	150	V_{GS}=20V, Tc=90℃
Continuous Source Current		I_S	A	150	V_{GS}=−5V, Tc=90℃
Total Power Dissipation		P_{tot}	W	1135	T_C=25℃
Operating Junction Temperature		T_j	℃	−40 to +150	
Storage Temperature		T_{stg}	℃	−40 to +125	
Isolation Voltage (RMS)		V_{iso}	V	2500	AC 60Hz 1minute
Mounting torque	Mounting M5		N·m	2.7	Recommended Value 1.5 to 2.5
	Terminal M5			2.7	Recommended Value 1.5 to 2.5
Mass		−	g	130	Typical value

■ Electrical Characteristics (Tj=25℃ unless otherwise specified)

Item	Symbol	Unit	Ratings Min.	Ratings Typ.	Ratings Max.	Conditions
Drain−Source Breakdown Voltage	$V_{(BR)DSS}$	V	1200			V_{GS}=0V, I_D=300μA
Static Drain−Source On−State Voltage	$V_{DS(on)}$	V		0.61	1.40	V_{GS}=20V, I_D=150A
				0.67	1.50	V_{GS}=20V, I_D=150A, T_j=150℃
On−State Resistance	$R_{DS(on)}$	mΩ		4.1	9.3	V_{GS}=20V, I_D=150A
				4.5	10.0	V_{GS}=20V, I_D=150A, T_j=150℃
Drain Cutoff Current	I_{DSS}	μA			300	V_{DS}=1200V, V_{GS}=0V
Gate−Source Threshold Voltage	$V_{GS(th)}$	V	3	4	5	V_{DS}=10V, I_D=4.5mA
Gate−Source Leakage Current	I_{GSS}	nA			300	V_{GS}=20V, V_{DS}=0V
Switching Characteristics	$t_{d(on)}$	ns		66		I_D=150A, V_{DS}=600V, V_{GS}=+20V/−5V, R_G=2.2Ω, L=126μH
	t_r	ns		36		
	$t_{d(off)}$	ns		114		
	t_f	ns		50		
Input Capacitance	C_{iss}	nF		25.3		V_{DS}=20V, V_{GS}=0V, f=100kHz
Output Capacitance	C_{oss}	nF		7.4		
Reverse Transfer Capacitance	C_{rss}	nF		1.1		
Source−Drain Voltage	V_{SD}	V		2.68	2.90	V_{GS}=−5V, I_S=150A
				2.63	2.95	V_{GS}=−5V, I_S=150A, T_j=150℃
Diode Total Capacitive Charge	Q_c	nC			4000	I_{SD}=150A, V_{DS}=600V, di_{SD}/dt=3200A/μs, V_{GS}=−5V

■ Thermal Characteristics（Tj=25℃ unless otherwise specified）

Item	Symbol	Unit	Ratings			Conditions
			Min.	Typ.	Max.	
Thermal Resistance	$R_{th(j-c)}$	℃/W			0.11	Junction to case (Per Leg)
Interface Thermal Resistance	$R_{th(c-f)}$	℃/W		0.06		Case to Heat sink (Per Module) Thermal conductivity (Silicone grease) $= 9 \times 10^{-3}$ [W/cm・℃]

Output Characteristics (Typical)

Tj=25℃ Pulse Test

V_{GS}= 22V, V_{GS}= 20V, V_{GS}= 18V, V_{GS}= 13V, V_{GS}= 10V

Drain Current I_D [A] vs Drain-Source Voltage V_{DS} [V]

Output Characteristics (Typical)

Tj=150℃ Pulse Test

V_{GS}= 22V, V_{GS}= 20V, V_{GS}= 18V, V_{GS}= 15V, V_{GS}= 13V, V_{GS}= 10V

Drain Current I_D [A] vs Drain-Source Voltage V_{DS} [V]

Forward Transfer Characteristics (Typical)

V_{DS}=10V Pulse Test

—— Tj=25℃
- - - Tj=150℃

Drain Current I_D [A] vs Gate-Source Voltage V_{GS} [V]

Integrated Diode Forward Characteristics (Typical)

—— Tj=25℃
- - - Tj=150℃

V_{GS}=−5V, V_{GS}=0V, V_{GS}=−7V, V_{GS}=−2.5V

Pulse Test

Drain Current I_D [A] vs Drain Voltage V_{DS} [V]

Capacitance (Typical)

Ciss, Coss, Crss

V_{GS}=0V
f=100kHz
Tj=25℃

Capacitance C [nF] vs Drain-Source Voltage V_{DS} [V]

Gate Charge Characteristics (Typical)

I_D=150A
V_{DS}=600V
Tj=25℃

Gate-Source Voltage V_{GS} [V] vs Gate Charge Q_g [nC]

Switching Time vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=25°C$

td(off)
td(on)
tr
tf

Switching Time vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=125°C$

td(off)
td(on)
tr
tf

Switching Loss vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=25°C$

Eon
Eoff
Err

Switching Loss vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=125°C$

Eon
Eoff
Err

Recovery Characteristics vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=25°C$

irr
trr

Recovery Characteristics vs. Drain Current (Typical)

$V_{GS}/-V_{GS}=20V/-5V$
$R_G=2.2\Omega$
$V_{DS}=600V$
$Tj=125°C$

irr
trr

Transient Thermal Impedance

Per Leg
Junction to Case