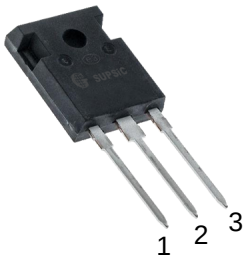
GC3M0120090D
Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

Features

1) Low on-resistance
2) Fast switching speed
3) Fast reverse recovery
4) Easy to parallel
5) Simple to drive
6) Pb-free lead plating ; RoHS compliant



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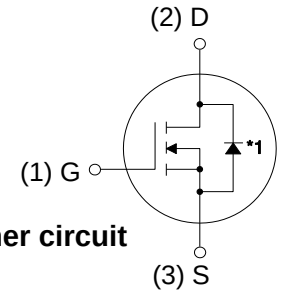
Package

Applications

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating



Inner circuit

(1) Gate
(2) Drain
(3) Source

*1 Body Diode

Part Number	Marking	Package	V_{DS}	$I_{D\ @\ 25^{\circ}C}$	$R_{DS(on)}$
GC3M0120090D	GC3M0120090	TO-247-3	900 V	23 A	120 mΩ

Maximum Ratings (T_C = 25 ˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	900	V	V_{GS} = 0 V, I_D = 100 µA
V_{GSmax}	Gate - Source Voltage (dynamic)	-8/+19	V	AC (f >1 Hz)
V_{GSop}	Gate - Source Voltage (static)	-4/+15	V	Static
I_D	Continuous Drain Current	23	A	V_{GS} = 15 V, T_C = 25˚C
		15		V_{GS} = 15 V, T_C = 100˚C
$I_{D(pulse)}$	Pulsed Drain Current	50	A	Pulse width t_P limited by T_{jmax}
P_D	Power Dissipation	97	W	T_C=25˚C, T_J = 150 ˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +150	˚C	
T_L	Solder Temperature	260	˚C	1.6mm (0.063") from case for 10s
M_d	Mounting Torque	1 8.8	Nm lbf-in	M3 or 6-32 screw

Note (1): When using MOSFET Body Diode V_{GSmax} = -4V/+19V
Note (2): MOSFET can also safely operate at 0/+15 V

Electrical Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	900			V	V_{GS} = 0 V, I_D = 100 µA
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.1	3.5	V	V_{DS} = V_{GS}, I_D = 3 mA
			1.6		V	V_{DS} = V_{GS}, I_D = 3 mA, T_J = 150ºC
I_{DSS}	Zero Gate Voltage Drain Current		1	100	µA	V_{DS} = 900 V, V_{GS} = 0 V
I_{GSS}	Gate-Source Leakage Current		10	250	nA	V_{GS} = 15 V, V_{DS} = 0 V
$R_{DS(on)}$	Drain-Source On-State Resistance		120	155	mΩ	V_{GS} = 15 V, I_D = 15 A
			170			V_{GS} = 15 V, I_D = 15 A, T_J = 150ºC
g_{fs}	Transconductance		8.9		S	V_{DS}= 20 V, I_{DS}= 15 A
			7.1			V_{DS}= 20 V, I_{DS}= 15 A, T_J = 150ºC
C_{iss}	Input Capacitance		414		pF	V_{GS} = 0 V, V_{DS} = 600 V f = 1 MHz V_{AC} = 25 mV
C_{oss}	Output Capacitance		48			
C_{rss}	Reverse Transfer Capacitance		3			
E_{oss}	C_{oss} Stored Energy		10.6		µJ	
E_{ON}	Turn-On Switching Energy (Body Diode FWD)		176		µJ	V_{DS} = 400 V, V_{GS} = -4 V/15 V, I_D = 15 A, $R_{G(ext)}$ = 2.5Ω, L= 99 µH, T_J = 150ºC
E_{OFF}	Turn Off Switching Energy (Body Diode FWD)		36			
$t_{d(on)}$	Turn-On Delay Time		6		ns	V_{DD} = 400 V, V_{GS} = -4 V/15 V I_D = 15 A, $R_{G(ext)}$ = 2.5 Ω, Timing relative to V_{DS} Inductive load
t_r	Rise Time		32			
$t_{d(off)}$	Turn-Off Delay Time		14			
t_f	Fall Time		7			
$R_{G(int)}$	Internal Gate Resistance		13		Ω	f = 1 MHz, V_{AC} = 25 mV
Q_{gs}	Gate to Source Charge		5		nC	V_{DS} = 400 V, V_{GS} = -4 V/15 V I_D = 15 A Per IEC60747-8-4 pg 21
Q_{gd}	Gate to Drain Charge		8			
Q_g	Total Gate Charge		21			

Reverse Diode Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	4.8		V	V_{GS} = -4 V, I_{SD} = 7.5 A
		4.4		V	V_{GS} = -4 V, I_{SD} = 7.5 A, T_J = 150 °C
I_S	Continuous Diode Forward Current		15	A	V_{GS} = -4 V
$I_{S, pulse}$	Diode pulse Current		50	A	V_{GS} = -4 V, pulse width t_P limited by T_{jmax}
t_{rr}	Reverse Recover time	28		ns	V_{GS} = -4 V, I_{SD} = 15 A, V_R = 400 V dif/dt = 600 A/µs, T_J = 150 °C
Q_{rr}	Reverse Recovery Charge	127		nC	
I_{rrm}	Peak Reverse Recovery Current	6		A	

Thermal Characteristics

Symbol	Parameter	Max.	Unit	Test Conditions
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.3	°C/W	
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40		

Note (3): Turn-off and Turn-on switching energy and timing values measured using SiC MOSFET Body Diode

Package Dimensions

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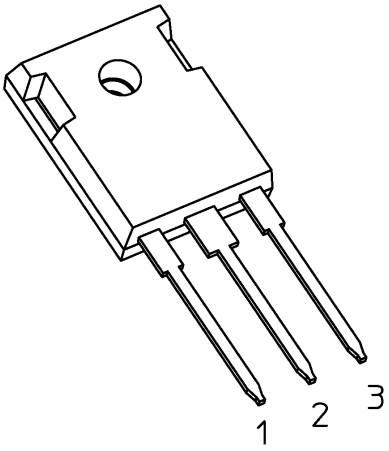
Unit: mm



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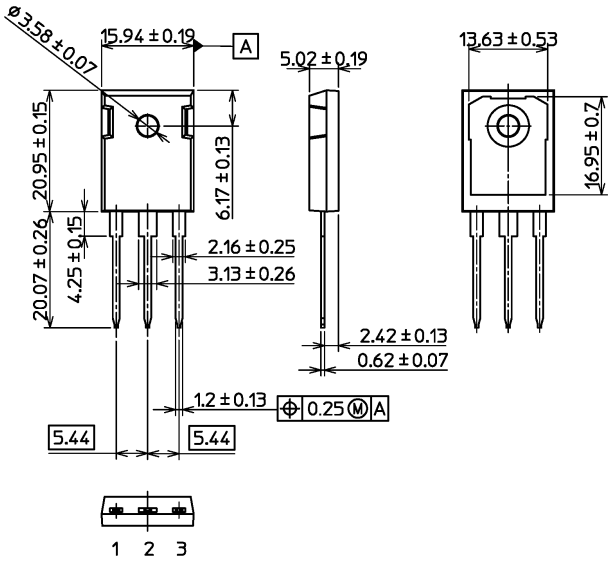
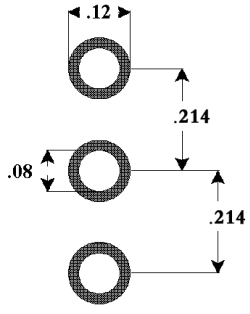


Recommended Solder Pad Layout



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