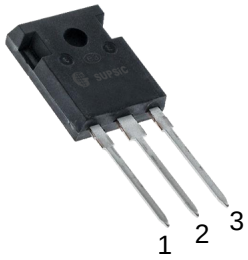
GC2M0045170D
Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

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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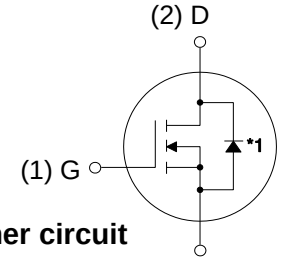
Package

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}	$I_{D\ @\ 25^{\circ}C}$	$R_{DS(on)}$
GC2M0045170D	GC2M0045170	TO247-3	1700 V	72 A	45 mΩ

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

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	1700	V	V_{GS} = 0 V, I_D = 100 µA
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values, AC (f >1 Hz)
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values
I_D	Continuous Drain Current	72	A	V_{GS} =20 V, T_C = 25˚C
		48		V_{GS} =20 V, T_C = 100˚C
$_{D(pulse)}$	Pulsed Drain Current	160	A	Pulse width t_P limited by T_{jmax}
P_D	Power Dissipation	520	W	T_C=25˚C, T_J = 150 ˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-40 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

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1700			V	V_{GS} = 0 V, I_D = 100 µA
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.6	4	V	V_{DS} = V_{GS}, I_D = 18mA
			1.8		V	V_{DS} = V_{GS}, I_D = 18mA, T_J = 150 °C
I_{DSS}	Zero Gate Voltage Drain Current		2	100	µA	V_{DS} = 1700 V, V_{GS} = 0 V
I_{GSS}	Gate-Source Leakage Current			600	nA	V_{GS} = 20 V, V_{DS} = 0 V
$R_{DS(on)}$	Drain-Source On-State Resistance		45	70	mΩ	V_{GS} = 20 V, I_D = 50 A
			90			V_{GS} = 20 V, I_D = 50 A, T_J = 150 °C
g_{fs}	Transconductance		21.7		S	V_{DS}= 20 V, I_{DS}= 50 A
			24.4			V_{DS}= 20 V, I_{DS}= 50 A, T_J = 150 °C
C_{iss}	Input Capacitance		3678		pF	V_{GS} = 0 V V_{DS} = 1000 V f = 1 MHz V_{AC} = 25 mV
C_{oss}	Output Capacitance		176			
C_{rss}	Reverse Transfer Capacitance		6.7			
E_{oss}	C_{oss} Stored Energy		105		µJ	
E_{ON}	Turn-On Switching Energy (SiC Diode FWD)		2.1		mJ	V_{DS} = 1200 V, V_{GS} = -5/20 V, I_D = 50A, $R_{G(ext)}$ = 2.5Ω, L= 105 µH, T_J = 150 °C, using SiC Diode as FWD
E_{OFF}	Turn Off Switching Energy (SiC Diode FWD)		0.86			
E_{ON}	Turn-On Switching Energy (Body Diode FWD)		4.7		mJ	V_{DS} = 1200 V, V_{GS} = -5/20 V, I_D = 50A, $R_{G(ext)}$ = 2.5Ω, L= 105 µH, T_J = 150 °C, using MOSFET as FWD
E_{OFF}	Turn Off Switching Energy (Body Diode FWD)		0.93			
$t_{d(on)}$	Turn-On Delay Time		65		ns	V_{DD} = 1200 V, V_{GS} = -5/20 V I_D = 50 A, $R_{G(ext)}$ = 2.5 Ω, Timing relative to V_{DS} Inductive load
t_r	Rise Time		20			
$t_{d(off)}$	Turn-Off Delay Time		48			
t_f	Fall Time		18			
$R_{G(int)}$	Internal Gate Resistance		1.3		Ω	f = 1 MHz, V_{AC} = 25 mV
Q_{gs}	Gate to Source Charge		44		nC	V_{DS} = 1200 V, V_{GS} = -5/20 V I_D = 50 A Per IEC60747-8-4 pg 21
Q_{gd}	Gate to Drain Charge		57			
Q_g	Total Gate Charge		188			

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	4.1		V	V_{GS} = - 5 V, I_{SD} = 25 A
		3.6		V	V_{GS} = - 5 V, I_{SD} = 25 A, T_J = 150 °C
I_S	Continuous Diode Forward Current		72	A	T_C= 25 °C, V_{GS} = - 5 V
t_{rr}	Reverse Recovery Time	70		ns	V_{GS} = - 5 V, I_{SD} = 50 A , V_R = 1200 V dif/dt = 1400 A/µs
Q_{rr}	Reverse Recovery Charge	530		nC	
I_{rrm}	Peak Reverse Recovery Current	14		A	

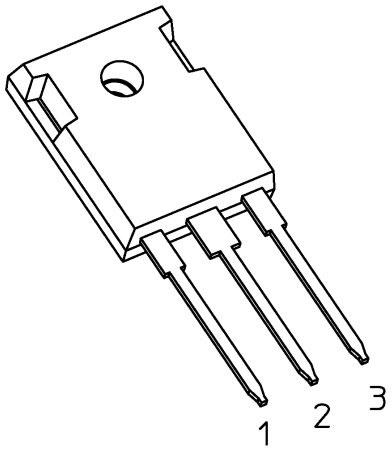
Note (1): When using SiC Body Diode the maximum recommended V_{GS} = -5V

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.22	0.24	°C/W	
$R_{\theta JC}$	Thermal Resistance from Junction to Ambient		40		

Package Dimensions

Unit: mm



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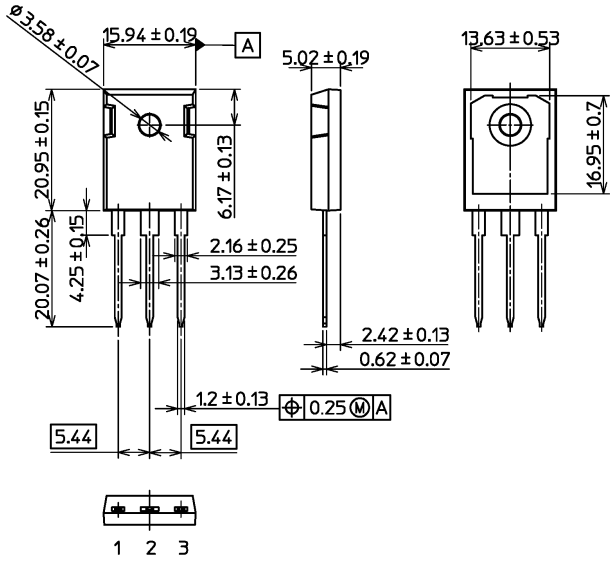
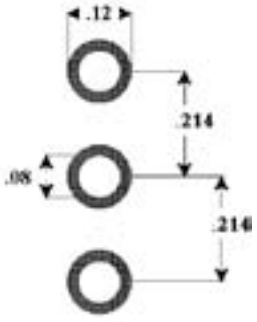


Recommended Solder Pad Layout



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