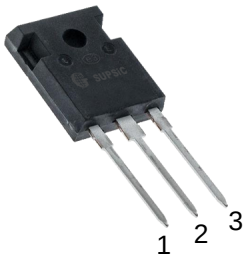
GC3M0015065D
Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

Features

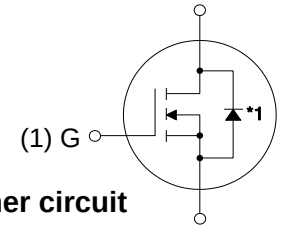
1) Low on-resistance
2) Fast switching speed
3) Fast reverse recovery
4) Easy to parallel
5) Simple to drive
6) Pb-free lead plating ; RoHS compliant



TO-247-3
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}	$I_{D\ @\ 25°C}$	$R_{DS(on)}$
GC3M0015065D	GC3M0015065	TO-247-3	650	120	15

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

Symbol	Parameter	Value	Unit	Note
V_{DSmax}	Drain - Source Voltage	650	V	
V_{GSmax}	Gate - Source voltage	-8/+19	V	Note 1
I_D	Continuous Drain Current, V_{GS} = 15 V, T_C = 25˚C	120	A	Fig. 19 Note 2
	Continuous Drain Current, V_{GS} = 15 V, T_C = 100˚C	96		
$I_{D(pulse)}$	Pulsed Drain Current, Pulse width t_P limited by T_{jmax}	420	A	
P_D	Power Dissipation, T_C=25˚C, T_J = 175 ˚C	417	W	Fig. 20
T_J , T_{stg}	Operating Junction and Storage Temperature	-40 to +175	˚C	
T_L	Solder Temperature, 1.6mm (0.063") from case for 10s	260	˚C	
M_d	Mounting Torque, (M3 or 6-32 screw)	1 8.8	Nm lbf-in	

Note (1): Recommended turn off / turn on gate voltage V_{GS} - 4V...0V / +15V
Note (2): Package limited to 120 A

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	V_{GS} = 0 V, I_D = 100 µA
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.3	3.6	V	V_{DS} = V_{GS}, I_D = 15.5 mA
			1.9		V	V_{DS} = V_{GS}, I_D = 15.5 mA, T_J = 175ºC
I_{DSS}	Zero Gate Voltage Drain Current		1	50	µA	V_{DS} = 650 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	10.5	15	21	mΩ	V_{GS} = 15 V, I_D = 55.8A
			20			V_{GS} = 15 V, I_D = 55.8A, T_J = 175ºC
g_{fs}	Transconductance		42		S	V_{DS}= 20 V, I_{DS}= 55.8 A
			40			V_{DS}= 20 V, I_{DS}= 55.8 A, T_J = 175ºC
C_{iss}	Input Capacitance		5011		pF	V_{GS} = 0 V, V_{DS} = 400 V f = 100 Khz V_{AC} = 25 mV
C_{oss}	Output Capacitance		289			
C_{rss}	Reverse Transfer Capacitance		31			
$C_{o(er)}$	Effective Output Capacitance (Energy Related)		357			
$C_{o(tr)}$	Effective Output Capacitance (Time Related)		516			
E_{oss}	C_{oss} Stored Energy		29		µJ	
E_{ON}	Turn-On Switching Energy (Body Diode)		1500		µJ	V_{DS} = 400 V, V_{GS} = -4 V/15 V, I_D = 55.8 A, $R_{G(ext)}$ = 5 Ω, L= 57.6 µH, T_J = 175ºC FWD = Internal Body Diode of MOSFET
E_{OFF}	Turn Off Switching Energy (Body Diode)		700			
E_{ON}	Turn-On Switching Energy (External Diode)		1200		µJ	V_{DS} = 400 V, V_{GS} = -4 V/15 V, I_D = 55.8 A, $R_{G(ext)}$ = 5 Ω, L= 57.6 µH, T_J = 175ºC FWD = External SiC DIODE
E_{OFF}	Turn Off Switching Energy (External Diode)		1000			
$t_{d(on)}$	Turn-On Delay Time		22		ns	V_{DD} = 400 V, V_{GS} = -4 V/15 V I_D = 55.8 A, $R_{G(ext)}$ = 5 Ω, L= 57.6 µH Timing relative to V_{DS} Inductive load
t_r	Rise Time		125			
$t_{d(off)}$	Turn-Off Delay Time		58			
t_f	Fall Time		25			
$R_{G(int)}$	Internal Gate Resistance		1.5		Ω	f = 1 MHz, V_{AC} = 25 mV
Q_{gs}	Gate to Source Charge		54		nC	V_{DS} = 400 V, V_{GS} = -4 V/15 V I_D = 55.8 A Per IEC60747-8-4 pg 21
Q_{gd}	Gate to Drain Charge		62			
Q_g	Total Gate Charge		188			

Note (3): $C_{o(er)}$, a lumped capacitance that gives same stored energy as Coss while Vds is rising from 0 to 400V
$C_{o(tr)}$, a lumped capacitance that gives same charging time as Coss while Vds is rising from 0 to 400V

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

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	4.7		V	V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 25 °C
		4.2		V	V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 175 °C
I_S	Continuous Diode Forward Current		79	A	V_{GS} = -4 V, T_C = 25˚C
$I_{S, pulse}$	Diode pulse Current		418	A	V_{GS} = -4 V, pulse width t_P limited by T_{jmax}
t_{rr}	Reverse Recovery time	85		ns	V_{GS} = -4 V, I_{SD} = 55.8 A, V_R = 400 V dif/dt = 1500 A/µs, T_J = 175 °C
Q_{rr}	Reverse Recovery Charge	667		nC	
I_{rrm}	Peak Reverse Recovery Current	17		A	
t_{rr}	Reverse Recovery time	74		ns	V_{GS} = -4 V, I_{SD} = 55.8 A, V_R = 400 V dif/dt = 1000 A/µs, T_J = 175 °C
Q_{rr}	Reverse Recovery Charge	562		nC	
I_{rrm}	Peak Reverse Recovery Current	14		A	

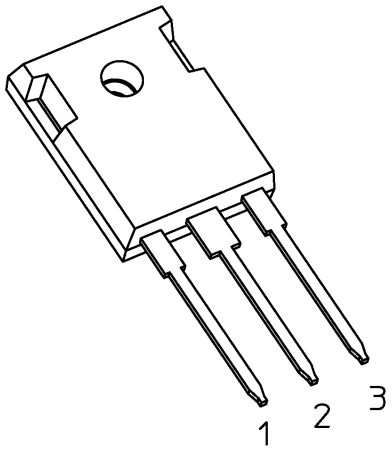
Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.35	°C/W	
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40		

Package Dimensions

Package TO-247-3

Unit: mm



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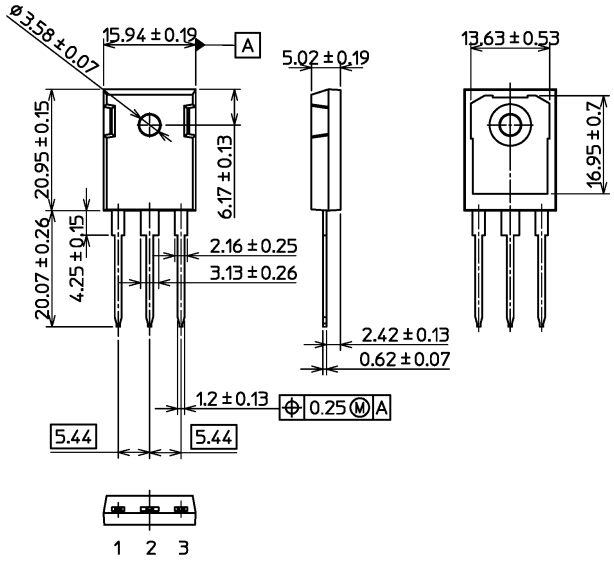
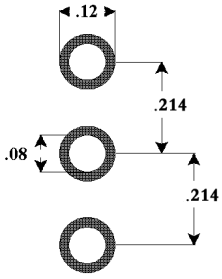


Recommended Solder Pad Layout



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