GC3M0015065K
Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

Features

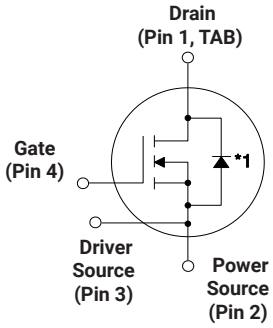
1) Low on-resistance
2) Fast switching speed
3) Fast reverse recovery
4) Easy to parallel
5) Simple to drive
6) Pb-free lead plating ; RoHS compliant

TO-247-4
Package

Applications

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

Inner circuit



(1) Drain
(2) Power Source
(3) Driver Source
(4) Gate

*1 Body Diode

Part Number	Marking	Package	V_{DS}	$I_{D\ @\ 25°C}$	$R_{DS(on)}$
GC3M0015065K	GC3M0015065	TO 247-4	650	120A	15mΩ

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

Symbol	Parameter	Value	Unit
V_{DSmax}	Drain - Source Voltage	650	V
V_{GSmax}	Gate - Source voltage	-8/+19	V
I_D	Continuous Drain Current, V_{GS} = 15 V, T_C = 25˚C	120	A
	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
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)

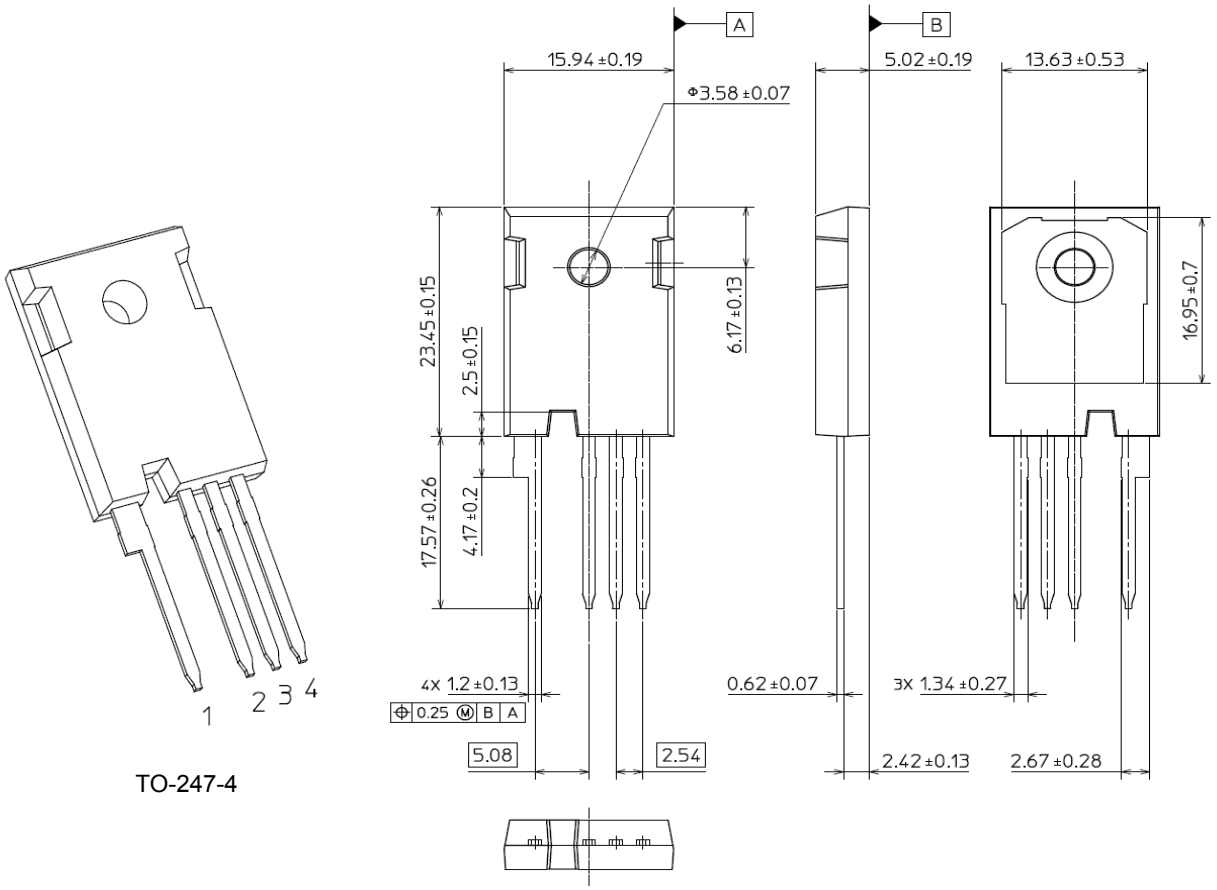
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	V_{GS} = 0 V, I_D = 100 µA
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.3	3.6	V	V_{DS} = V_{GS}, I_D = 15.5 mA
			1.9		V	V_{DS} = V_{GS}, I_D = 15.5 mA, T_J = 175ºC
I_{DSS}	Zero Gate Voltage Drain Current		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)		401		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)		254			
E_{ON}	Turn-On Switching Energy (External Diode)		234		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)		303			
$t_{d(on)}$	Turn-On Delay Time		23		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		32			
$t_{d(off)}$	Turn-Off Delay Time		57			
t_f	Fall Time		15			
$R_{G(int)}$	Internal Gate Resistance		1.5		Ω	f = 1 MHz, V_{AC} = 25 mV
Q_{gs}	Gate to Source Charge		53		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		58			
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

Package Dimensions

TO-247-4L

Unit: mm



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Recommended Solder Pad Layout