

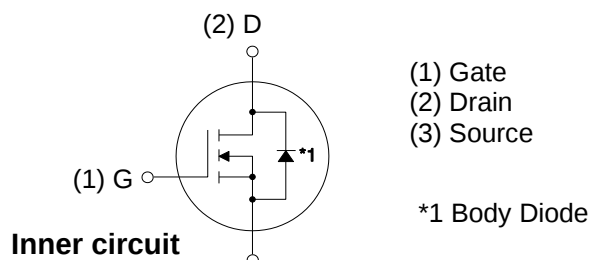
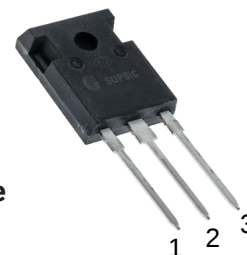
Features

- 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

Applications

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

TO-247-3
Package



Part Number	Marking	Package	V_{DS}	I_D @ 25°C	$R_{DS(on)}$
GC3M0040120D	GC3M0040120	TO-247-3	1200 V	66 A	40 mΩ

Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	1200	V	$V_{GS} = 0\text{ V}$, $I_D = 100\text{ }\mu\text{A}$
V_{GSmax}	Gate - Source Voltage (dynamic)	-8/+19	V	AC ($f > 1\text{ Hz}$)
V_{GSop}	Gate - Source Voltage (static)	-4/+15	V	Static
I_D	Continuous Drain Current	66	A	$V_{GS} = 15\text{ V}$, $T_C = 25^\circ\text{C}$
		48		$V_{GS} = 15\text{ V}$, $T_C = 100^\circ\text{C}$
$I_{D(pulse)}$	Pulsed Drain Current	100	A	Pulse width t_p limited by T_{jmax}
P_D	Power Dissipation	326	W	$T_C = 25^\circ\text{C}$, $T_J = 175^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature	-40 to +175	°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 $V_{GSmax} = -4\text{V}/+19\text{V}$

Note (2): MOSFET can also safely operate at 0/+15 V

Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	$V_{GS} = 0\text{ V}, I_D = 100\text{ }\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.7	3.6	V	$V_{DS} = V_{GS}, I_D = 9.5\text{ mA}$
			2.2		V	$V_{DS} = V_{GS}, I_D = 9.5\text{ mA}, T_J = 175^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current		1	50	μA	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$
I_{GSS}	Gate-Source Leakage Current		10	250	nA	$V_{GS} = 15\text{ V}, V_{DS} = 0\text{ V}$
$R_{DS(on)}$	Drain-Source On-State Resistance		40	53.5	m Ω	$V_{GS} = 15\text{ V}, I_D = 33.3\text{ A}$
			68			$V_{GS} = 15\text{ V}, I_D = 33.3\text{ A}, T_J = 175^\circ\text{C}$
g_{fs}	Transconductance		21		S	$V_{DS} = 20\text{ V}, I_{DS} = 33.3\text{ A}$
			20			$V_{DS} = 20\text{ V}, I_{DS} = 33.3\text{ A}, T_J = 175^\circ\text{C}$
C_{iss}	Input Capacitance		2906		pF	$V_{GS} = 0\text{ V}, V_{DS} = 1000\text{ V}$ $f = 100\text{ kHz}$ $V_{AC} = 25\text{ mV}$
C_{oss}	Output Capacitance		104			
C_{rss}	Reverse Transfer Capacitance		5			
E_{oss}	C_{oss} Stored Energy		60			
E_{ON}	Turn-On Switching Energy (SiC Diode FWD)		950		μJ	$V_{DS} = 800\text{ V}, V_{GS} = -4\text{ V}/+15\text{ V},$ $I_D = 33.3\text{ A},$ $R_{G(ext)} = 2.5\text{ }\Omega, L = 99\text{ }\mu\text{H}, T_J = 175^\circ\text{C}$
E_{OFF}	Turn Off Switching Energy (SiC Diode FWD)		346			
E_{ON}	Turn-On Switching Energy (Body Diode FWD)		1645		μJ	$V_{DS} = 800\text{ V}, V_{GS} = -4\text{ V}/+15\text{ V},$ $I_D = 33.3\text{ A},$ $R_{G(ext)} = 2.5\text{ }\Omega, L = 99\text{ }\mu\text{H}, T_J = 175^\circ\text{C}$
E_{OFF}	Turn Off Switching Energy (Body Diode FWD)		287			
$t_{d(on)}$	Turn-On Delay Time		15		ns	$V_{DD} = 800\text{ V}, V_{GS} = -4\text{ V}/15\text{ V}$ $R_{G(ext)} = 2.5\text{ }\Omega, I_D = 33.3\text{ A}$ Timing relative to V_{DS} , Inductive load $L = 99\text{ }\mu\text{H}$
t_r	Rise Time		60			
$t_{d(off)}$	Turn-Off Delay Time		25			
t_f	Fall Time		12			
$R_{G(int)}$	Internal Gate Resistance		3.5		Ω	$f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$
Q_{gs}	Gate to Source Charge		32		nC	$V_{DS} = 800\text{ V}, V_{GS} = -4\text{ V}/15\text{ V}$ $I_D = 33.3\text{ A}$ Per IEC60747-8-4 pg 21
Q_{gd}	Gate to Drain Charge		29			
Q_g	Total Gate Charge		101			

Reverse Diode Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

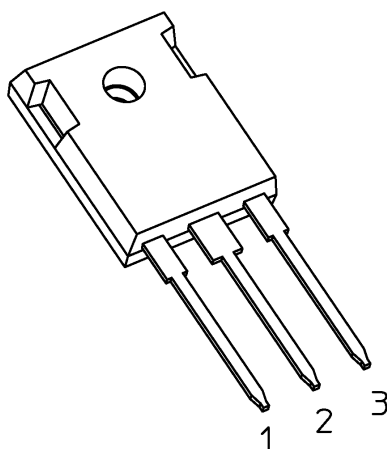
Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	5.5		V	$V_{GS} = -4\text{ V}, I_{SD} = 20\text{ A}, T_J = 25^\circ\text{C}$	Fig. 8, 9, 10
		4.9		V	$V_{GS} = -4\text{ V}, I_{SD} = 20\text{ A}, T_J = 175^\circ\text{C}$	
I_S	Continuous Diode Forward Current		51	A	$V_{GS} = -4\text{ V}, T_c = 25^\circ\text{C}$	Note 1
$I_{S, \text{pulse}}$	Diode pulse Current		100	A	$V_{GS} = -4\text{ V}$, pulse width t_p limited by T_{jmax}	Note 1
t_{rr}	Reverse Recover time	45		ns	$V_{GS} = -4\text{ V}, I_{SD} = 33.3\text{ A}, V_R = 800\text{ V}$ $\text{dif}/\text{dt} = 1150\text{ A}/\mu\text{s}, T_J = 175^\circ\text{C}$	Note 1
Q_{rr}	Reverse Recovery Charge	697		nC		
I_{rrm}	Peak Reverse Recovery Current	26		A		
t_{rr}	Reverse Recover time	53		ns	$V_{GS} = -4\text{ V}, I_{SD} = 33.3\text{ A}, V_R = 800\text{ V}$ $\text{dif}/\text{dt} = 800\text{ A}/\mu\text{s}, T_J = 175^\circ\text{C}$	
Q_{rr}	Reverse Recovery Charge	624		nC		
I_{rrm}	Peak Reverse Recovery Current	17		A		

Thermal Characteristics

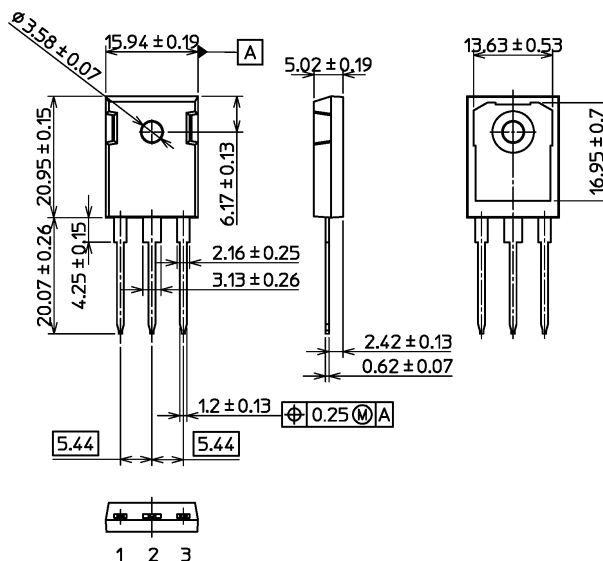
Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.46	$^\circ\text{C}/\text{W}$		Fig. 21
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40			

Package Dimensions

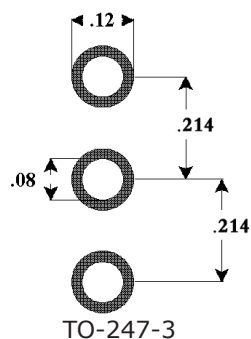
Unit: mm



TO-247-3



Recommended Solder Pad Layout



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