Features

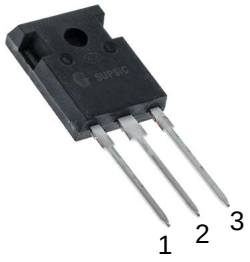
1) Low on-resistance
2) Fast switching speed
3) Fast reverse recovery
4) Easy to parallel
5) Simple to drive
6) Pb-free lead plating ; RoHS compliant

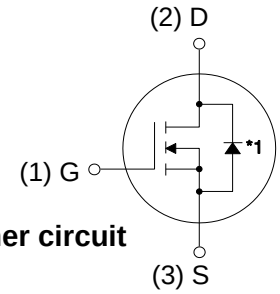
Parameter	Rating	Units
V_{DS}	**650**	V
$I_{D\ @\ 25^{\circ}C}$	**122**	A
$R_{DS(on)}$	**15**	m Ω

Applications

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

TO-247-3
Package





Inner circuit

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

*1 Body Diode

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	
I_D	Continuous Drain Current, V_{GS} = 15 V, T_C = 25˚C	122	A	
	Continuous Drain Current, V_{GS} = 15 V, T_C = 100˚C	98		
$I_{D(pulse)}$	Pulsed Drain Current, Pulse width t_P limited by T_{jmax}	430	A	
P_D	Power Dissipation, T_C=25˚C, T_J = 175 ˚C	420	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	Note
$V_{(BR)DSS}$	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	255	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		4960		pF	V_{GS} = 0 V, V_{DS} = 400 V f = 100 Khz V_{AC} = 25 mV	
C_{oss}	Output Capacitance		290				
C_{rss}	Reverse Transfer Capacitance		31				
$C_{o(er)}$	Effective Output Capacitance (Energy Related)		353				
$C_{o(tr)}$	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)		710				
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		128				
$t_{d(off)}$	Turn-Off Delay Time		60				
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		190				

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)

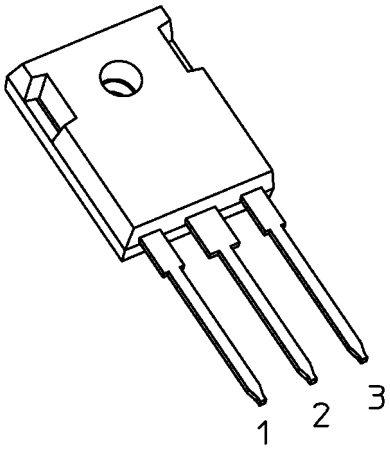
Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.7		V	V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 25 °C	
		4.2		V	V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 175 °C	
I_S	Continuous Diode Forward Current		80	A	V_{GS} = -4 V, T_C = 25˚C	
$I_{S,\ pulse}$	Diode pulse Current		420	A	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	670		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	580		nC		
I_{rrm}	Peak Reverse Recovery Current	14		A		

Thermal Characteristics

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

Package Dimensions

Unit: mm



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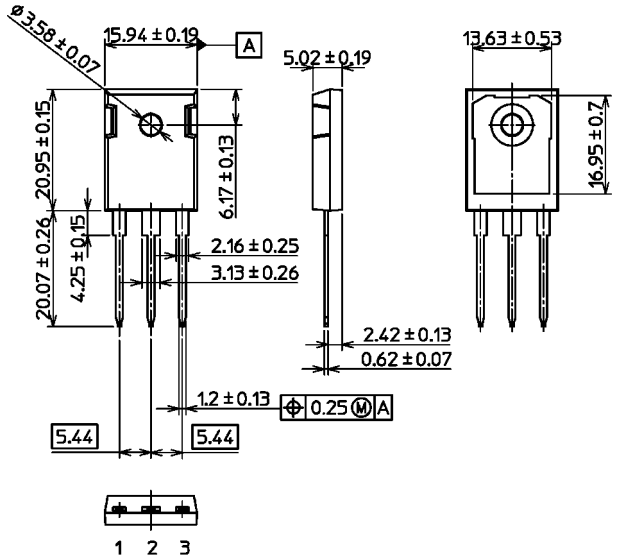
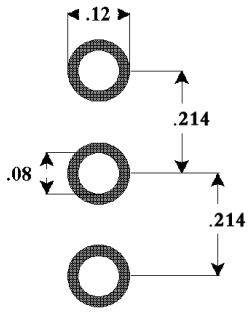


Recommended Solder Pad Layout



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