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
$I_{D\ @\ 25^{\circ}C}$	**50**	A
$R_{DS(on)}$	**45**	m Ω

Applications

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

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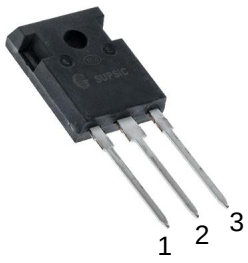
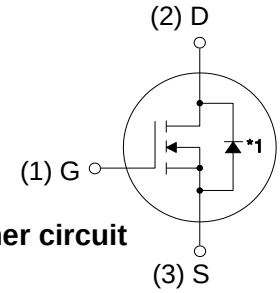
Package





Inner circuit

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

*1 Body Diode

Maximum Ratings

Symbol	Parameter	Value	Unit	Note
V_{DSS}	Drain - Source Voltage, T_C = 25 ˚C	650	V	
V_{GS}	Gate - Source voltage (Under transient events < 100 ns)	-8/+19	V	
I_D	Continuous Drain Current, V_{GS} = 15 V, T_C = 25˚C	50	A	
	Continuous Drain Current, V_{GS} = 15 V, T_C = 100˚C	35		
$I_{D(pulse)}$	Pulsed Drain Current, Pulse width t_P limited by T_{jmax}	134	A	
P_D	Power Dissipation, T_C=25˚C, T_J = 175 ˚C	178	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	

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_{GSon}	Gate-Source Recommended Turn-On Voltage		15		V	Static	
V_{GSoff}	Gate-Source Recommended Turn-Off Voltage		-4		V		
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.6	3.6	V	V_{DS} = V_{GS}, I_D = 4.84 mA	
			2.2		V	V_{DS} = V_{GS}, I_D = 4.84 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		45	60	mΩ	V_{GS} = 15 V, I_D = 17.6 A	
			60			V_{GS} = 15 V, I_D = 17.6 A, T_J = 175ºC	
g_{fs}	Transconductance		12		S	V_{DS}= 20 V, I_{DS}= 17.6 A	
			11			V_{DS}= 20 V, I_{DS}= 17.6 A, T_J = 175ºC	
C_{iss}	Input Capacitance		1520		pF	V_{GS} = 0 V, V_{DS} = 400 V F = 1 Mhz V_{AC} = 25 mV	
C_{oss}	Output Capacitance		182				
C_{rss}	Reverse Transfer Capacitance		8				
$C_{o(er)}$	Effective Output Capacitance (Energy Related)		126			V_{GS} = 0 V, V_{DS} = 0V to 400 V	
$C_{o(tr)}$	Effective Output Capacitance (Time Related)		182				
E_{oss}	C_{oss} Stored Energy		20		µJ	V_{DS} = 600 V, F = 1 Mhz	
E_{ON}	Turn-On Switching Energy (Body Diode)		210		µJ	V_{DS} = 400 V, V_{GS} = -4 V/15 V, I_D = 17.6 A, $R_{G(ext)}$ = 2.5 Ω, L= 99 µH, T_J = 175ºC FWD = Internal Body Diode of MOSFET	
E_{OFF}	Turn Off Switching Energy (Body Diode)		42				
E_{ON}	Turn-On Switching Energy (External Diode)		163		µJ	V_{DS} = 400 V, V_{GS} = -4 V/15 V, I_D = 17.6 A, $R_{G(ext)}$ = 2.5 Ω, L= 99 µH, T_J = 175ºC FWD = External SiC DIODE	
E_{OFF}	Turn Off Switching Energy (External Diode)		42				
$t_{d(on)}$	Turn-On Delay Time		11		ns	V_{DD} = 400 V, V_{GS} = -4 V/15 V I_D = 17.6 A, $R_{G(ext)}$ = 2.5 Ω, L= 99 µH Timing relative to V_{DS} Inductive load	
t_r	Rise Time		32				
$t_{d(off)}$	Turn-Off Delay Time		20				
t_f	Fall Time		8				
$R_{G(int)}$	Internal Gate Resistance		3		Ω	f = 1 MHz, V_{AC} = 25 mV	
Q_{gs}	Gate to Source Charge		21		nC	V_{DS} = 400 V, V_{GS} = -4 V/15 V I_D = 17.6 A Per IEC60747-8-4 pg 21	
Q_{gd}	Gate to Drain Charge		20				
Q_g	Total Gate Charge		61				

Note (1): $C_{o(er)}$, 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)

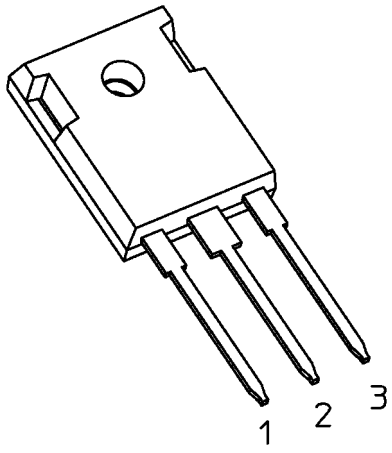
Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.8		V	V_{GS} = -4 V, I_{SD} = 8.8 A, T_J = 25 °C	
		4.2		V	V_{GS} = -4 V, I_{SD} = 8.8 A, T_J = 175 °C	
I_S	Continuous Diode Forward Current		29	A	V_{GS} = -4 V, T_C = 25˚C	
$I_{S,\ pulse}$	Diode pulse Current		132	A	V_{GS} = -4 V, pulse width t_P limited by T_{jmax}	
t_{rr}	Reverse Recover time	26		ns	V_{GS} = -4 V, I_{SD} = 17.6 A, V_R = 400 V dif/dt = 1220 A/µs, T_J = 175 °C	
Q_{rr}	Reverse Recovery Charge	171		nC		
I_{rrm}	Peak Reverse Recovery Current	11		A		
t_{rr}	Reverse Recover time	34		ns	V_{GS} = -4 V, I_{SD} = 17.6 A, V_R = 400 V dif/dt = 850 A/µs, T_J = 175 °C	
Q_{rr}	Reverse Recovery Charge	158		nC		
I_{rrm}	Peak Reverse Recovery Current	8		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.85	°C/W		
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40			

Package Dimensions

Unit: mm



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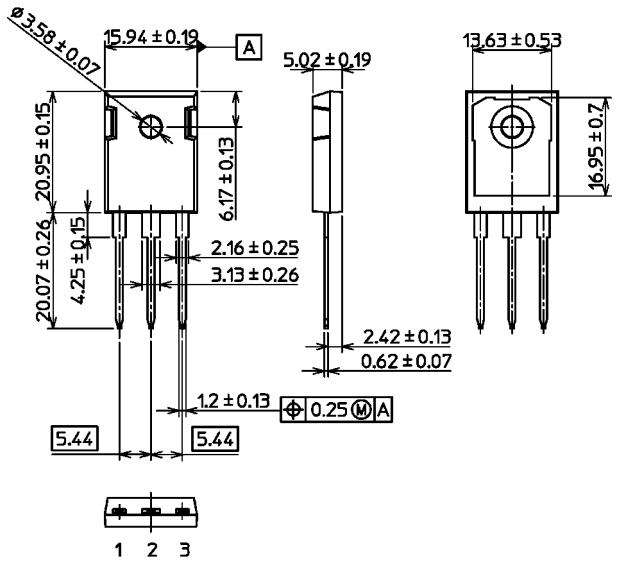
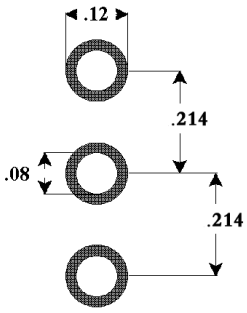


Recommended Solder Pad Layout



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