FCCM60120B
1,200V 60A 40mΩ Silicon Carbide MOSFET

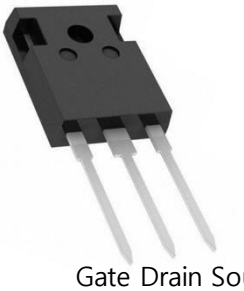
Features

- Low On-Resistance
- High-Speed Switching
- High-Frequency Operation
- Fast Reverse Recovery
- Easy to Parallel & Simple to Drive
- Halogen Free, RoHS Compliant

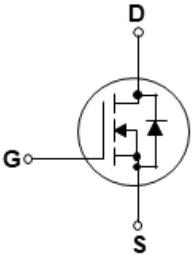
Applications

- Switch Mode Power Supplies
- Solar Inverters
- DC/DC Converters
- Battery Chargers
- Motor Drives
- Induction Heating

Package Outline



Gate Drain Source



TO-247-3

Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	1200	V
I_D	Drain Current - Continuous (T_C = 25℃)	60	A
	- Continuous (T_C = 100℃)	48	A
I_{DM}	Drain Current - Pulsed	120	A
V_{GSS_surge}	Gate-Source Voltage ($t_{\_surge}$ < 300ns)	-7 / +24	V
V_{GSS}	Gate-Source Voltage (DC)	-5 / +20	V
P_D	Power Dissipation (T_C = 25℃)	246	W
	- Derate above 25℃	1.64	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260	℃

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.61	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	℃/W

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	1200	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1200 V, V_{GS} = 0 V	--	--	200	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = 20 V, V_{DS} = 0 V	--	--	250	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 2.5 mA	1.5	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 20 V, I_D = 20 A	--	40	55	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 800 V, V_{GS} = 0 V, f = 1.0 MHz	--	2824	--	pF
C_{oss}	Output Capacitance		--	160	--	pF
C_{rss}	Reverse Transfer Capacitance		--	40	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 800 V, V_{GS} = -5 / 20 V, I_D = 20 A, R_L = 30 Ω, R_G = 4.7Ω	--	25	--	ns
t_r	Turn-On Rise Time		--	29	--	
$t_{d(off)}$	Turn-Off Delay Time		--	57	--	
t_f	Turn-Off Fall Time		--	19	--	
E_{on}	Turn-On Switching loss	V_{DD} = 800 V, V_{GS} = -5 / 20 V L = 0.3 mH. R_G = 4.7Ω	--	156	--	uJ
E_{off}	Turn-Off Switching loss		--	102	--	
Q_g	Total Gate Charge	V_{DS} = 800 V, I_D = 20 A, V_{GS} = -5 / 20 V	--	195	--	nC
Q_{gs}	Gate-Source Charge		--	23	--	
Q_{gd}	Gate-Drain Charge		--	83	--	
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	60	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	120	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 20 A	--	3.5	--	V
t_{rr}	Reverse Recovery Time	V_R = 800 V, V_{GS} = -5 / 20 V, I_S = 20 A, dI_F / dt = 1000 A/us	--	56	--	ns
Q_{rr}	Reverse Recovery Charge		--	230	--	nC

Typical Characteristics

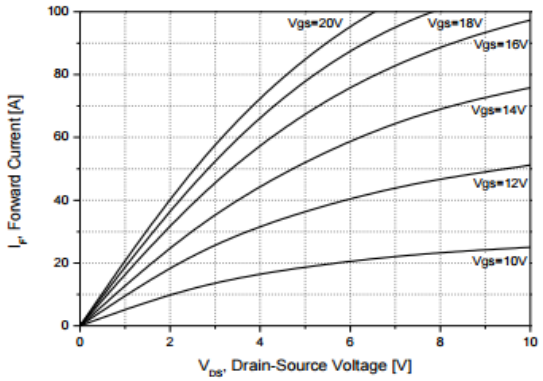


Figure 1. On-State Characteristics

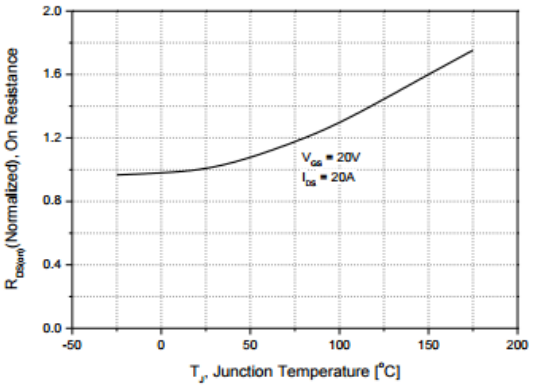


Figure 2. On Resistance Variation vs. Junction Temperature

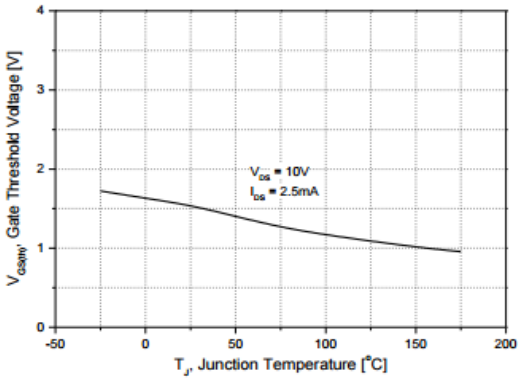


Figure 3. Gate Threshold Voltage vs. Junction Temperature

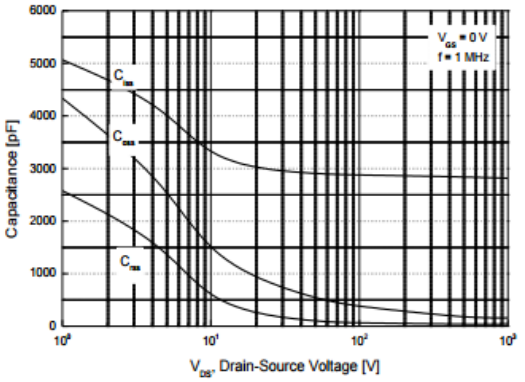


Figure 4. Capacitance Characteristics

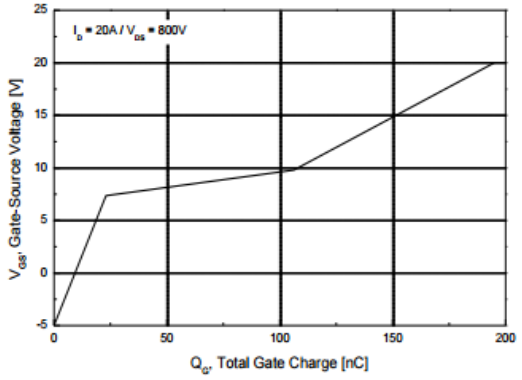


Figure 5. Gate Charge Characteristics

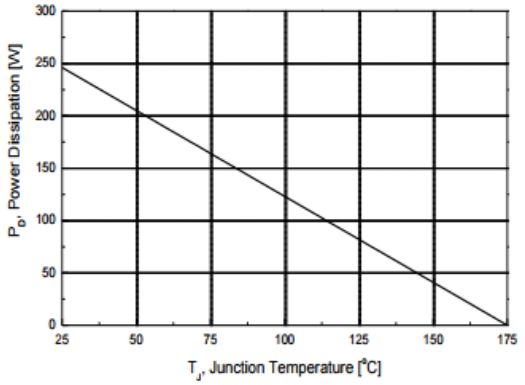


Figure 6. Power Dissipation

Typical Characteristics

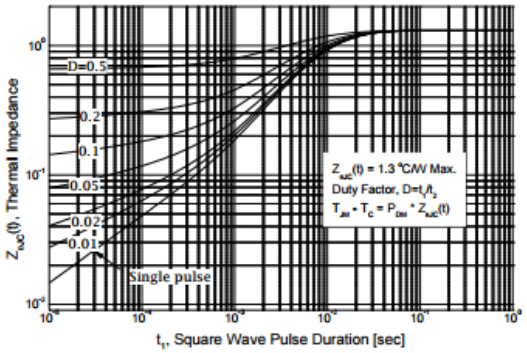


Figure 7. Transient Thermal Response

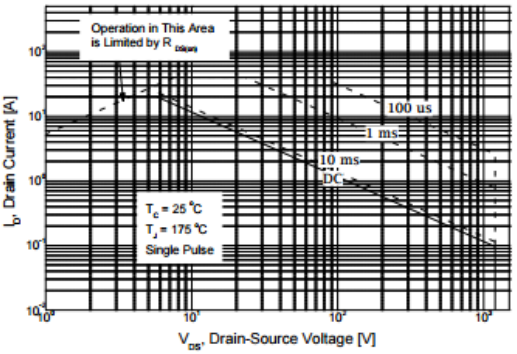
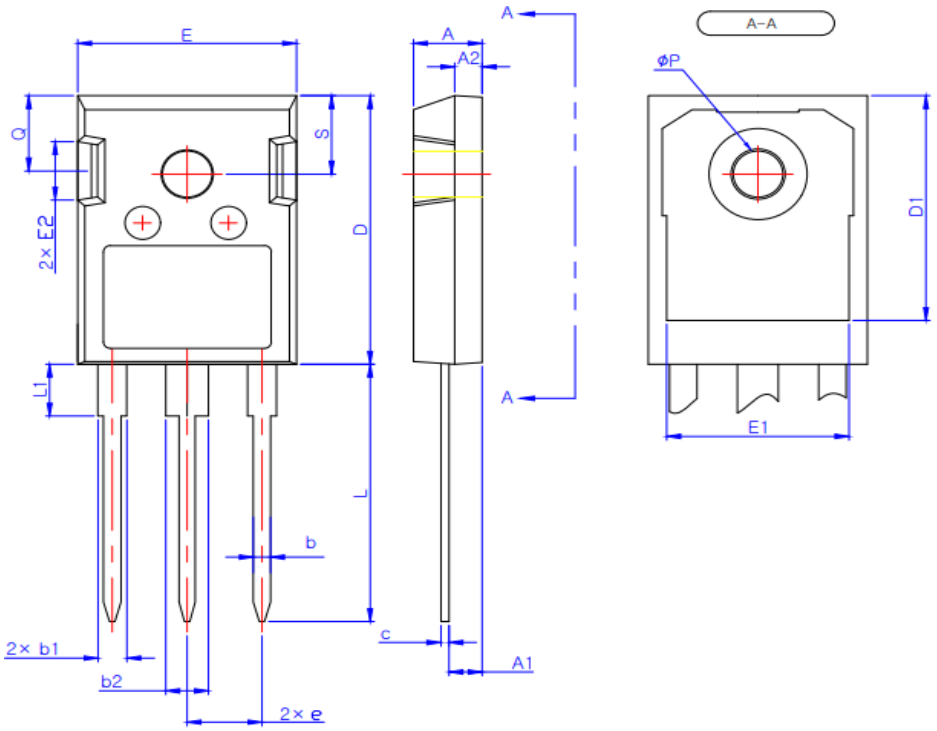


Figure 8. Maximum Safe Operating Area

Package Information



SYMBOL	MIN	MAX
A	4.80	5.20
A1	2.29	2.54
A2	1.90	2.10
b	1.10	1.30
b1	1.91	2.20
b2	2.92	3.20
c	0.50	0.70
D	20.80	21.34
D1	17.43	17.83
E	15.75	16.13
E1	13.06	13.46
E2	4.32	4.83
e	5.45 BSC	
L	19.85	20.25
L1	–	4.49
ΦP	3.55	3.65
Q	5.59	6.19
S	6.15 BSC	