, HGP059N12S

Feature

- High Speed Power Smooth Switching
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- 100% UIS Tested, 100% Rg Tested
- Lead Free

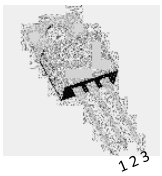
V_{DS}		120	V
$R_{DS(on),typ}$	TO-263	4.4	mΩ
$R_{DS(on),typ}$	TO-220	4.7	mΩ
$I_{D\ (Sillicon\ Limited)}$		160	A
$I_{D\ (Package\ Limited)}$		120	A

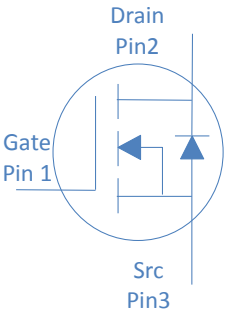
Application

- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit
- Power Tools
- UPS
- Motor Control

TO-263

TO-220





Part Number	Package	Marking
HGB059N12S	TO-263	GB059N12S
HGP059N12S	TO-220	GP059N12S

Continuous Drain Current (Package Limited)		T_C=25	120	
Drain to Source Voltage	V_{DS}	-	120	V
Gate to Source Voltage	V_{GS}	-	±20	V
Pulsed Drain Current	I_{DM}	-	500	A
Avalanche Energy, Single Pulse	E_{AS}	L=0.4mH, T_C=25	720	mJ
Power Dissipation				W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to175	

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\Theta JC}$	0.45	/W
Thermal Resistance Junction-Ambient	$R_{\Theta JA}$	60	/W

	$V_{(BR)DSS}$					
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA	2			
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=120V, T_j=25	-	-	1	μA
		V_{GS}=0V, V_{DS}=120V, T_j=100	-	-	100	
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=20A TO-263	-	4.4	5.6	mΩ
		TO-220	-	4.7	5.9	
Transconductance	g_{fs}	V_{DS}=5V, I_D=20A	-	80	-	S
Gate Resistance	R_G	V_{GS}=0V, V_{DS} Open, f=1MHz	-	0.7	-	Ω

Dynamic Characteristics

Input Capacitance	C_{iss}		-	7740	-	
Output Capacitance	C_{oss}	V_{GS}=0V, V_{DS}=60V, f=1MHz	-	450	-	pF
Reverse Transfer Capacitance	C_{rss}		-	16.5	-	
Total Gate Charge	Q_g		-	92	-	
Gate to Source Charge	Q_{gs}	V_{DD}=60V, I_D=20A, V_{GS}=10V	-	29	-	nC
Gate to Drain (Miller) Charge	Q_{gd}		-	13	-	
Turn on Delay Time	$t_{d(on)}$		-	30	-	
Rise time	t_r	V_{DD}=60V, I_D=20A, V_{GS}=10V,	-	23	-	ns
Turn off Delay Time	$t_{d(off)}$	R_G=10Ω,	-	50	-	
Fall Time	t_f		-	16	-	

Reverse Diode Characteristics

Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_F=20A	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R=60V, I_F=20A, dI_F/dt=500A/μs	-	70	-	ns
Reverse Recovery Charge	Q_{rr}		-	590	-	nC

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

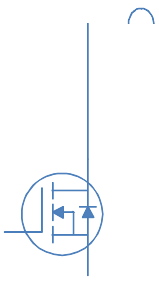
Figure 9. Maximum Safe Operating Area

Figure 10. Maximun Drain Current vs. Case Temperature

Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to

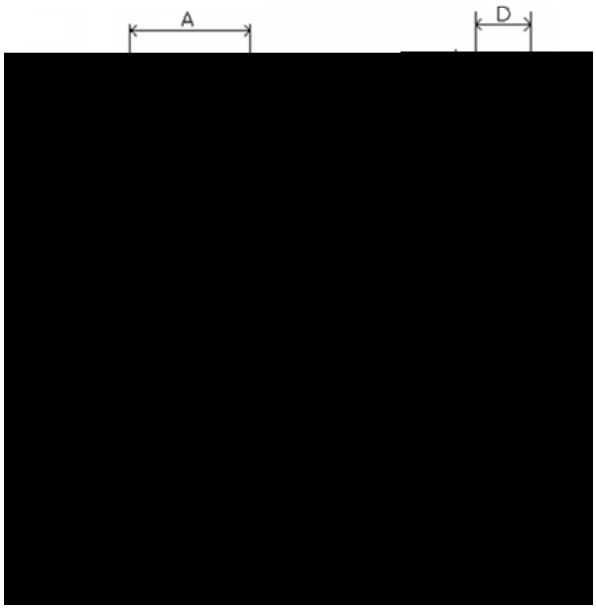
Inductive switching Test	

Gate Charge Test	

Uclamped Inductive Switching (UIS) Test	
	

Diode Recovery Test	

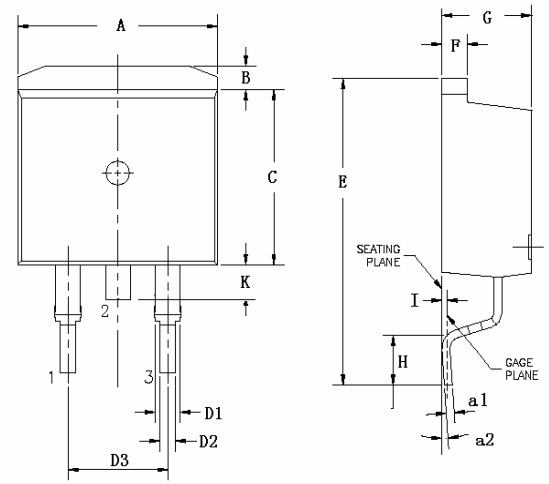
TO-220, 3 leads



Dimentions in mm unless otherwise specified

Symbol	Min	Nom	Max
A	9.66	9.97	10.28
A2	9.80	10.00	10.20
B	15.60	15.70	15.80
C	12.70	13.48	14.27
D	4.30	4.50	4.70
E	9.00	9.20	9.40
F		2.54	
G1	1.32	1.52	1.72
G2	0.70	0.82	0.95
G3	0.45	0.52	0.60
H	3.50	3.60	3.70
I	2.70	2.80	2.90
J	15.70	15.97	16.25
K	2.20	2.40	2.60
L	1.15	1.27	1.40
N	6.40	6.60	6.80

TO-263, 2 leads



Dimentions in mm unless otherwise specified

Symbol	Min	Nom	Max
A	9.66	9.97	10.28
B	1.02	1.17	1.32
C	8.59	9.00	9.40
D1	1.14	1.27	1.40
D2	0.70	0.83	0.95
D3		5.08	
E	15.09	15.24	15.39
F	1.15	1.28	1.40
G	4.30	4.50	4.70
H	2.29	2.54	2.79
I		0.25	
K	1.30	1.45	1.60
a1	0.45	0.55	0.65
a2(degree)	0°		8°