



HGB320N20S , HGP320N20S HGK320N20S

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

V_{DS}		200	V
$R_{DS(on),typ}$	TO-263	28	mΩ
$R_{DS(on),typ}$	TO-247	28	mΩ
$R_{DS(on),typ}$	TO-220	28	mΩ
I_D		51	A

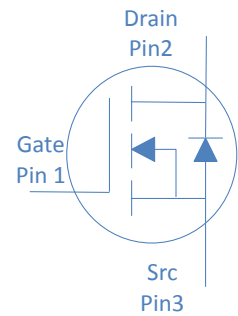
Application

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

TO-263



TO-247



Part Number	Package	Marking
HGB320N20S	TO-263	GB320N20S
HGK320N20S	TO-247	GK320N20S
HGP320N20S	TO-220	GP320N20S

Absolute Maximum Ratings at $T_J=25$ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current	I_D	$T_C=25$	51	A
		$T_C=100$	36	
Drain to Source Voltage	V_{DS}	-	200	V
Gate to Source Voltage	V_{GS}	-	±20	V
Pulsed Drain Current	I_{DM}	-	150	A
Avalanche Energy, Single Pulse	E_{AS}	$L=0.4mH, T_C=25$	180	mJ
Power Dissipation	P_D	$T_C=25$	214	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to 175	

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	R	0.7	/W
Thermal Resistance Junction-Ambient	R	60	/W

Electrical Characteristics at $T_j=25$ (unless otherwise specified)
Static Characteristics

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=200V, T_j=25$	-	-	1	μA
		$V_{GS}=0V, V_{DS}=200V, T_j=100$	-	-	100	
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$ TO-263	-	28	32	m Ω
	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$ TO-247	-	28	32	m Ω
	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$ TO-220	-	28	32	m Ω
Transconductance	g_{fs}	$V_{DS}=5V, I_D=10A$	-	31	-	S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}$ Open, $f=1MHz$	-	4.6	-	Ω

Dynamic Characteristics

Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=100V, f=1MHz$	-	1598	-	pF
Output Capacitance	C_{oss}		-	124	-	
Reverse Transfer Capacitance	C_{rss}		-	7.5	-	
Total Gate Charge	Q_g	$V_{DD}=100V, I_D=10A, V_{GS}=10V$	-	19	-	nC
Gate to Source Charge	Q_{gs}		-	7	-	
Gate to Drain (Miller) Charge	Q_{gd}		-	2	-	
Turn on Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=10A, V_{GS}=10V,$ $R_G=10\Omega,$	-	12	-	ns
Rise time	t_r		-	17	-	
Turn off Delay Time	$t_{d(off)}$		-	23	-	
Fall Time	t_f		-	10	-	

Reverse Diode Characteristics

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_F=10A$	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_R=100V, I_F=10A, di_F/dt=100A/\mu s$	-	90	-	ns
Reverse Recovery Charge	Q_{rr}		-	306	-	nC

Fig 1. Typical Output Characteristics

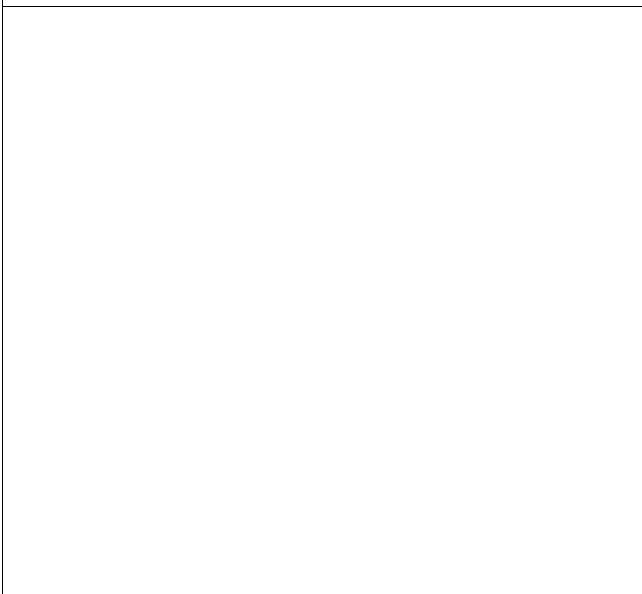


Figure 2. On-Resistance vs. Gate-Source Voltage

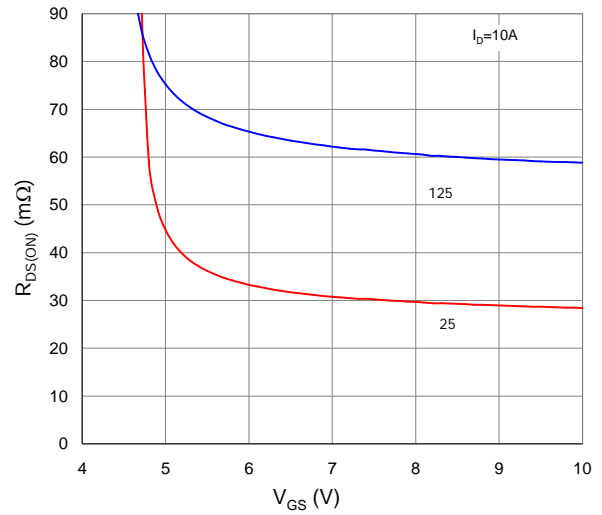


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

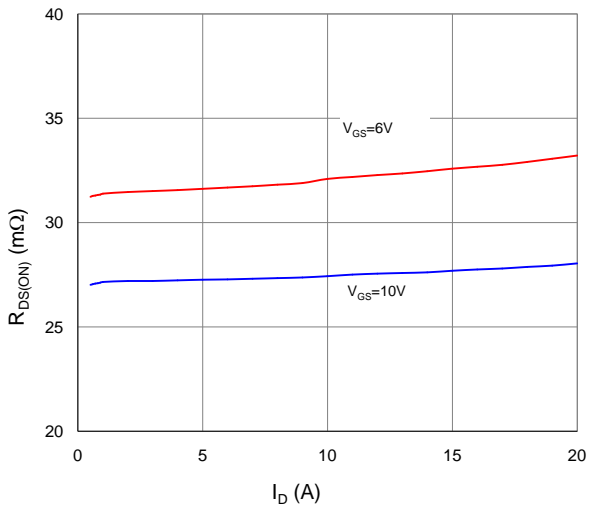


Figure 4. Normalized On-Resistance vs. Junction Temperature

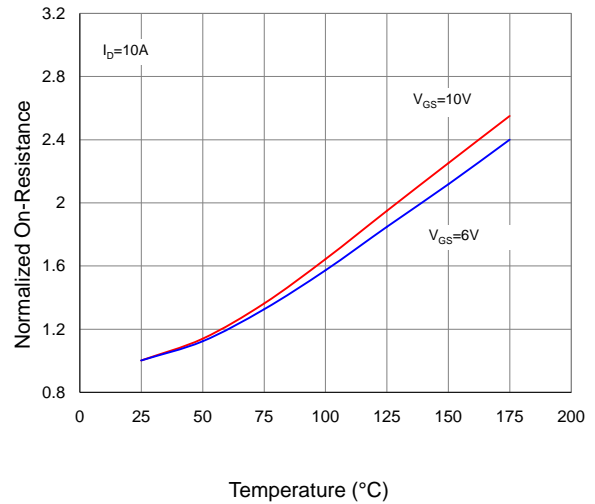


Figure 5. Typical Transfer Characteristics

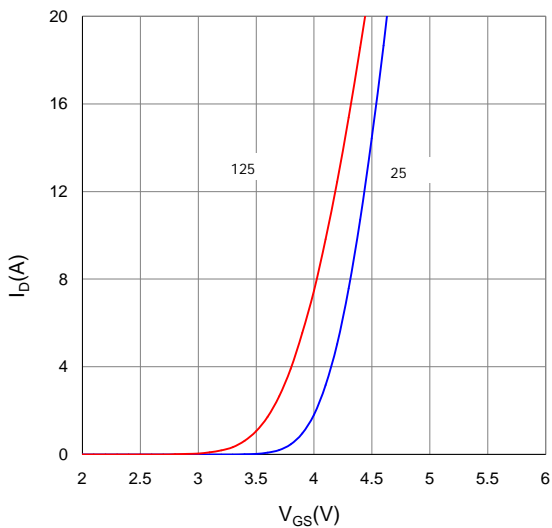


Figure 6. Typical Source-Drain Diode Forward Voltage

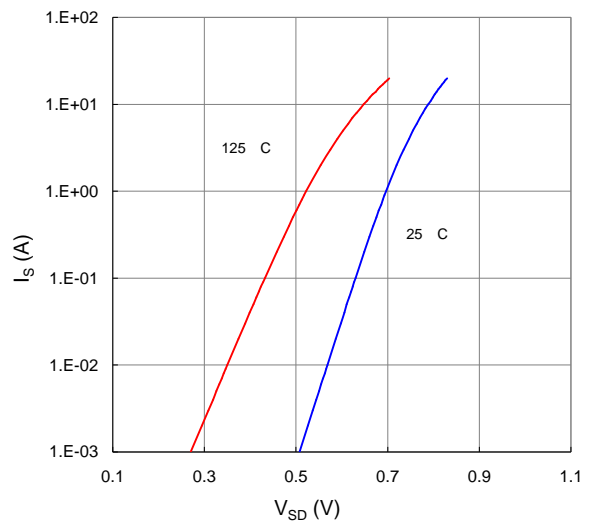


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

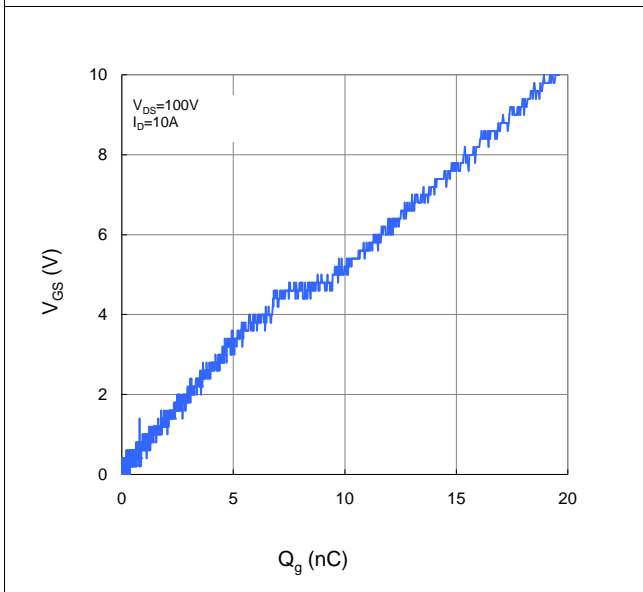


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

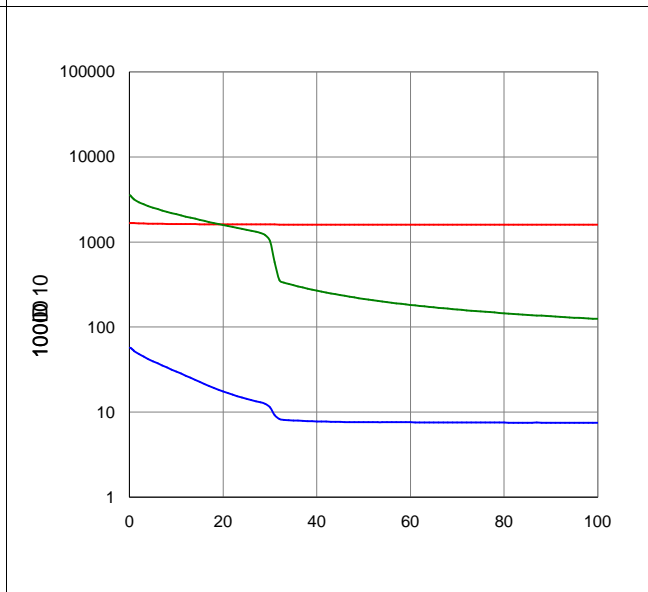


Figure 9. Maximum Safe Operating Area

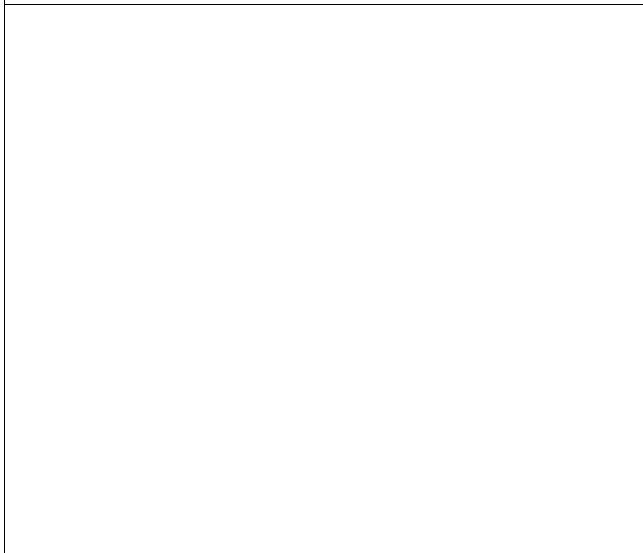


Figure 10. Maximum Drain Current vs. Case Temperature

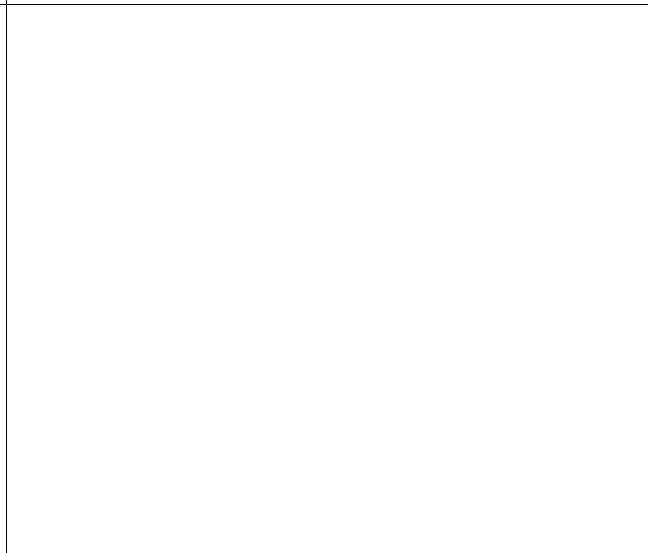
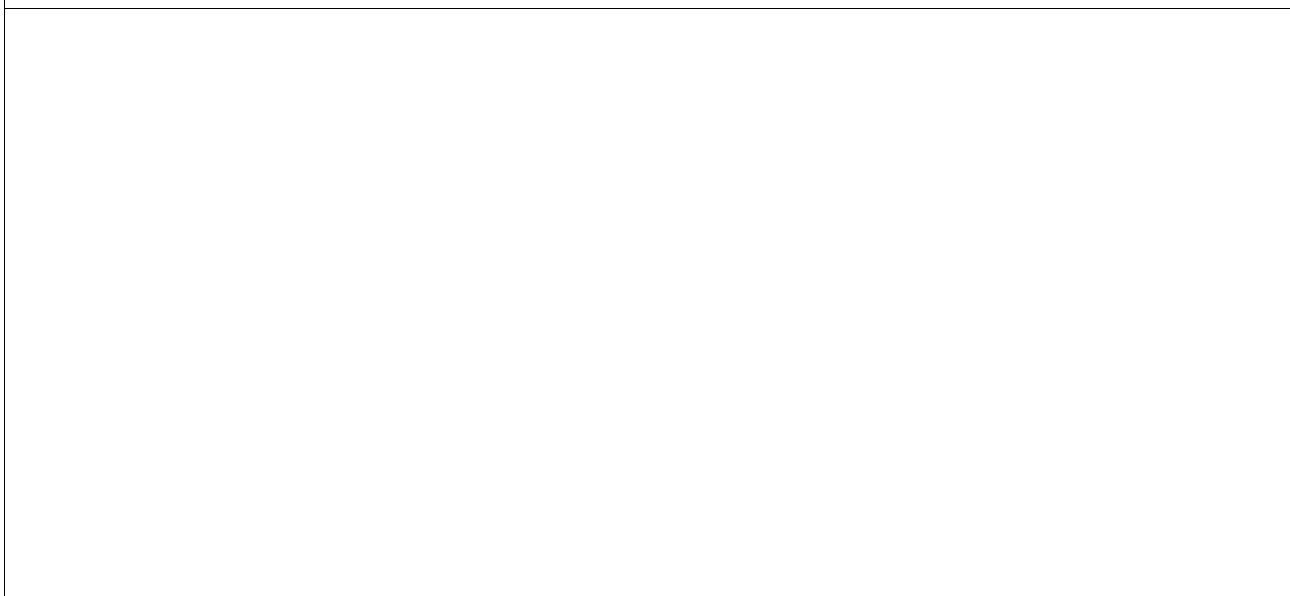


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case




Inductive switching Test

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Gate Charge Test

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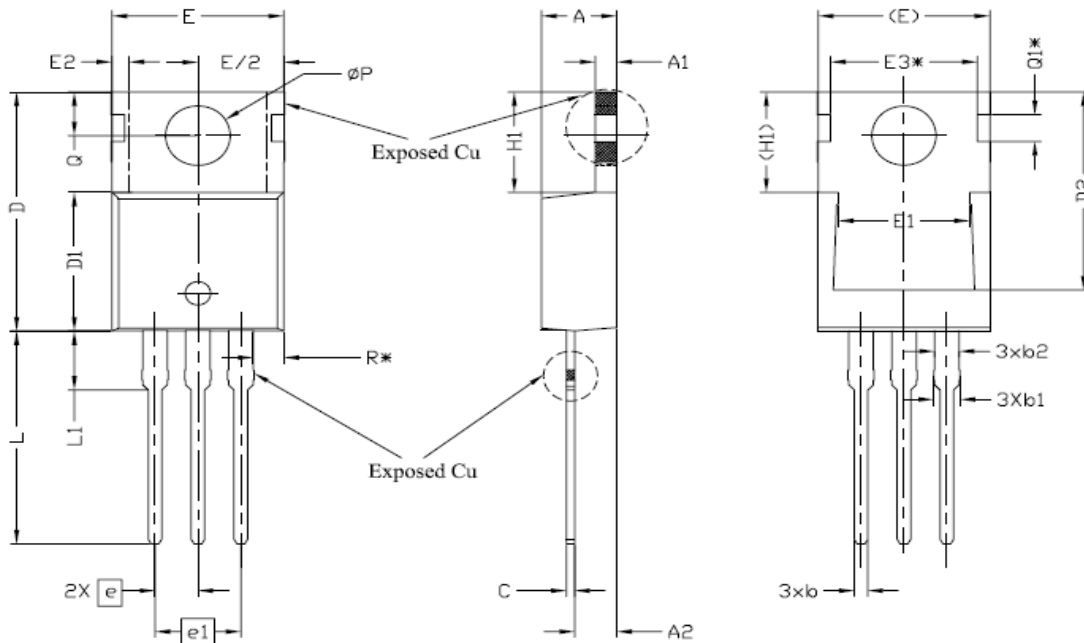
Uclamped Inductive Switching (UIS) Test

 A circular symbol representing Uclamped Inductive Switching (UIS) test, showing a diode and a transistor in a switching configuration.	
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Diode Recovery Test

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TO-220, 3 leads



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4,24	4,44	4,64	
A1	1,15	1,27	1,40	
A2	2,30	2,48	2,70	
b	0,70	0,80	0,90	
b1	1,20	1,55	1,75	
b2	1,20	1,45	1,70	
c	0,40	0,50	0,60	
D	14,70	15,37	16,00	4
D1	8,82	8,92	9,02	
D2	12,63	12,73	12,83	5
E	9,96	10,16	10,36	4,5
E1	6,86	7,77	8,89	5
E2	-	-	0,76	6
E3*	8,70REF.			
e	2,54BSC			
e1	5,08BSC			
H1	6,30	6,45	6,60	5,6
L	13,47	13,72	13,97	
L1	3,60	3,80	4,00	
ϕP	3,75	3,84	3,93	
Q	2,60	2,80	3,00	
Q1*	1,73REF.			
R*	1,82REF.			



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TO-263, 3 leads



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TO-247, 3 leads