



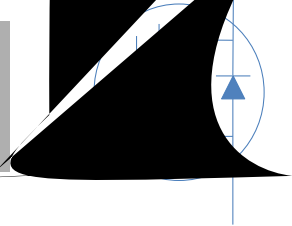
HGB039N12S , HGK039N12S HGP039N12S

120V N-Ch Po

V_{DS}
$R_{DS(on),TYP}$
I_D (Silicon Limited)
I_D (Package Limited)

- ◇
- ◇
- ◇
- ◇
- ◇
- ◇
- ◇
- ◇
- ◇
- ◇

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Part Number	Package	Marking
HGB039N12S	TO-263	GB039N12S
HGK039N12S	TO-247	GK039N12S
HGP039N12S	TO-220	GP039N12S



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

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	I_D	$T_C=25$	197	A
		$T_C=100$	139	
		$T_C=25$	180	
Continuous Drain Current (Package Limited)			180	
Drain to Source Voltage	V_{DS}	-	120	V
Gate to Source Voltage	V_{GS}	-	± 20	V
Pulsed Drain Current	I_{DM}	-	550	A
Avalanche Energy, Single Pulse	E_{AS}	$L=0.4mH, T_C=25$	720	mJ
Power Dissipation	P_D	$T_C=25$	357	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to 175	

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	R_{JC}	0.42	W^{-1}
Thermal Resistance Junction-Ambient	R_{JA}	60	W^{-1}



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

Parameter	Symbol		Value			Unit	
			min	typ	max		
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250 A$	120	-	-	V	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250 A$	2	3	4		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=120V, T_j=25$	-	-	1	A	
		$V_{GS}=0V, V_{DS}=120V, T_j=100$	-	-	100		
	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA	
Drain to Source on Resistance	$R_{DS(on)@.6}$	$V_{GS}=10V, I_D=20A$	TO-263	-	3.6	3.9	m
			TO-247	-	3.6	3.9	
			TO-220			4.2	
Source Leakage Current	I_S	$V_{DS}=5V, I_D=20A$	-	70	-	S	
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}$ Open, $f=1MHz$	-	2.9	-		

Dynamic Characteristics

Input Capacitance	C_{iss}		-	6427	-	pF
Output Capacitance	C_{oss}	$V_{GS}=0V, V_{DS}=60V, f=1MHz$	-	716	-	
	C_{rss-10}				-	
Total Gate Charge	Q_g		-	68	-	nC
Gate to Source Charge	Q_{gs}	$V_{DD}=60V, I_D=20A, V_{GS}=10V$	-	20	-	
Gate to Drain (Miller) Charge	Q_{gd}		-	8	-	
Turn on Delay Time	$t_{d(on)}$		-	27	-	ns
Rise time	t_r	$V_{DD}=60V, I_D=20A, V_{GS}=10V, R_G=10$	-	20	-	
Turn off Delay Time	$t_{d(off)}$		-	39	-	
Fall Time	t_f		-	12	-	

Reverse Diode Characteristics

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_F=20A$	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_R=60V, I_F=20A, di_F/dt=500A/s$	-	60	-	ns
Reverse Recovery Charge	Q_{rr}		-	420	-	nC

Fig 1. Typical Output Characteristics

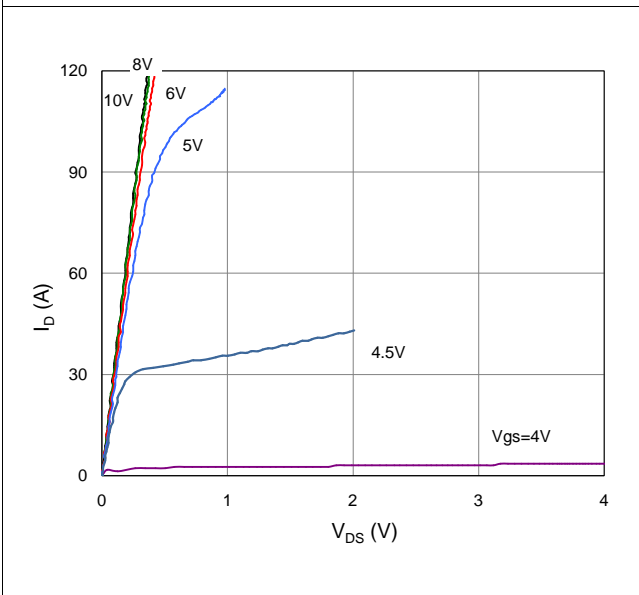


Figure 2. On-Resistance vs. Gate-Source Voltage

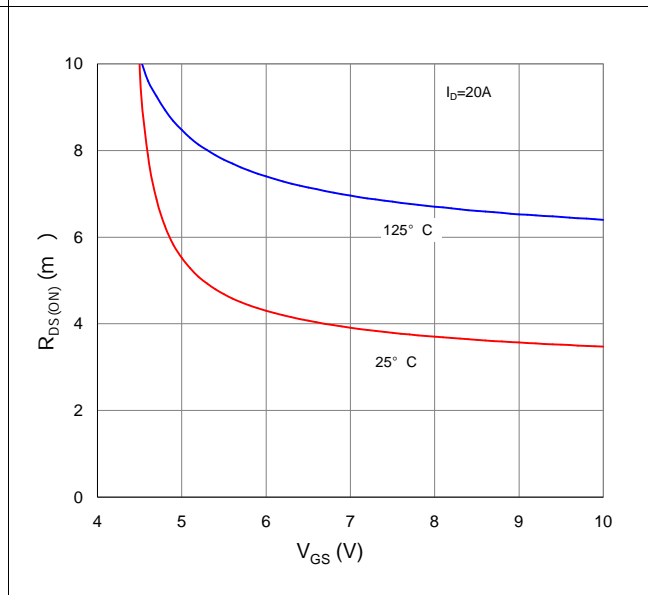


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

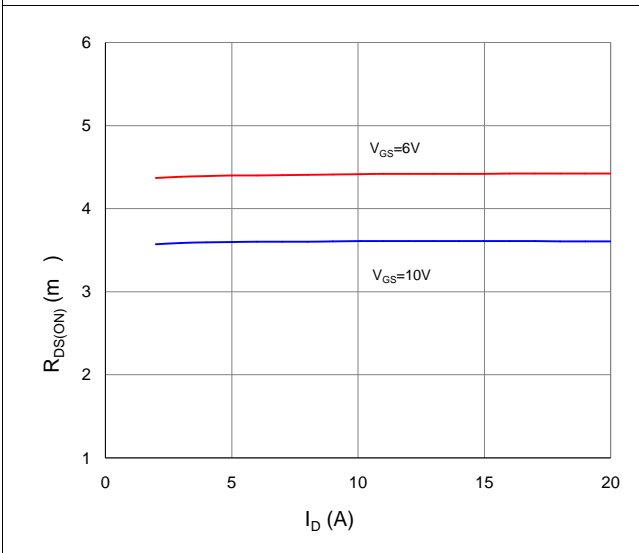


Figure 4. Normalized On-Resistance vs. Junction Temperature

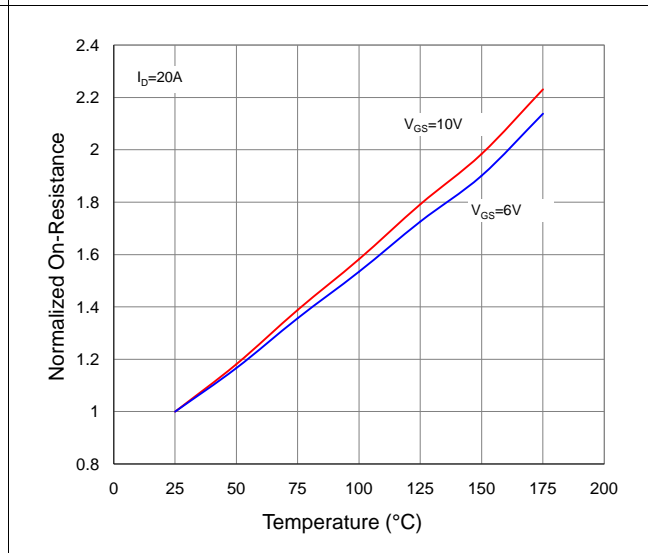


Figure 5. Typical Transfer Characteristics

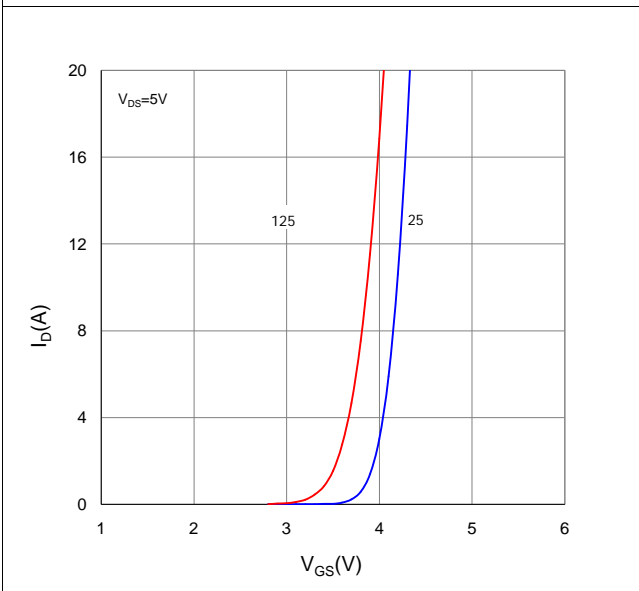


Figure 6. Typical Source-Drain Diode Forward Voltage

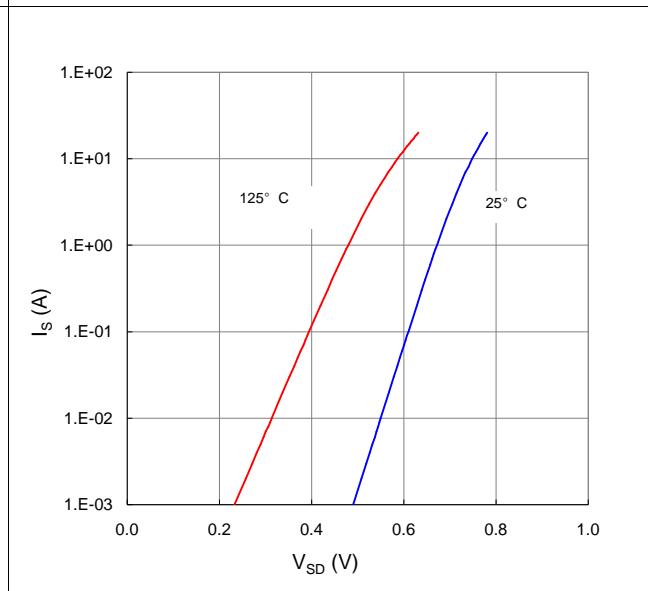


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

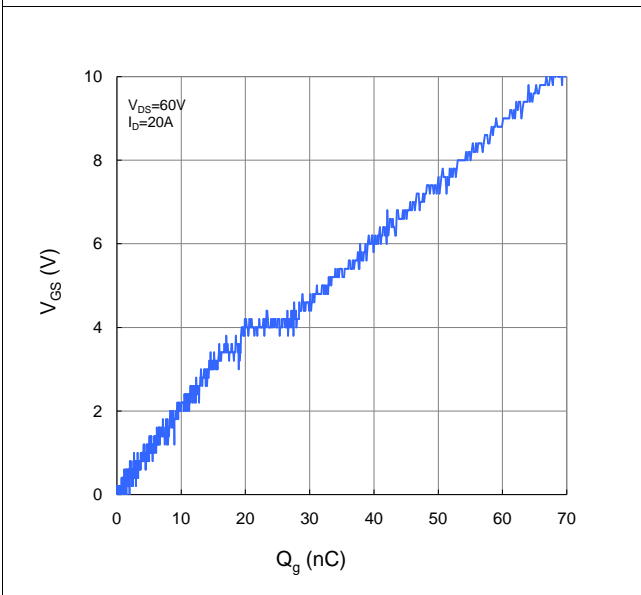


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

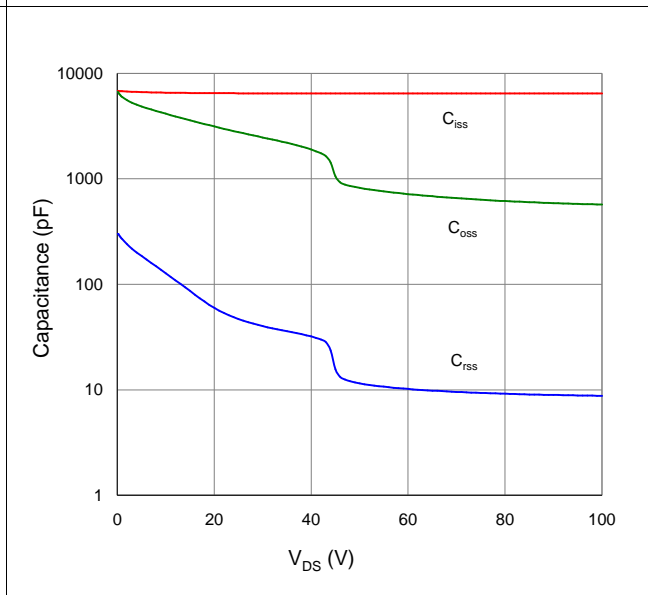


Figure 9. Maximum Safe Operating Area

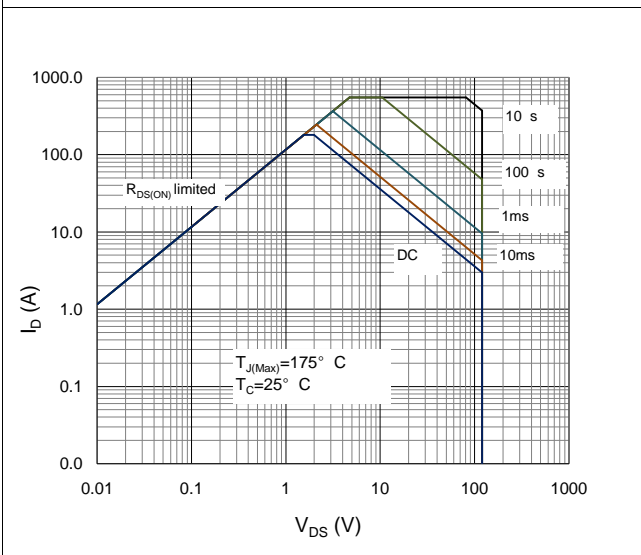


Figure 10. Maximum Drain Current vs. Case Temperature

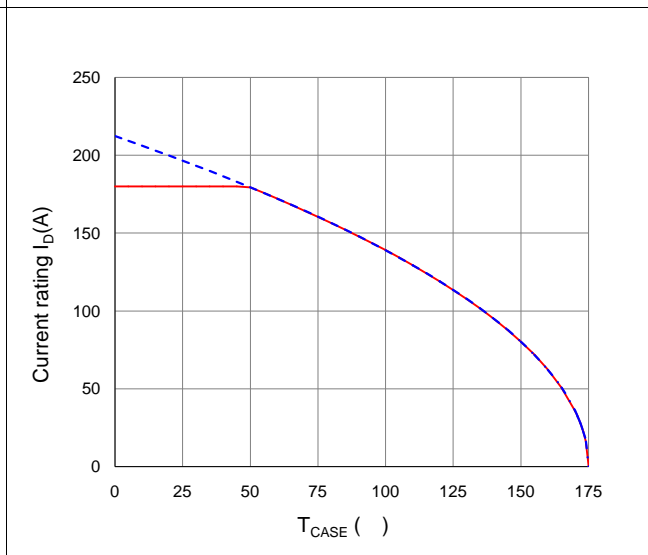
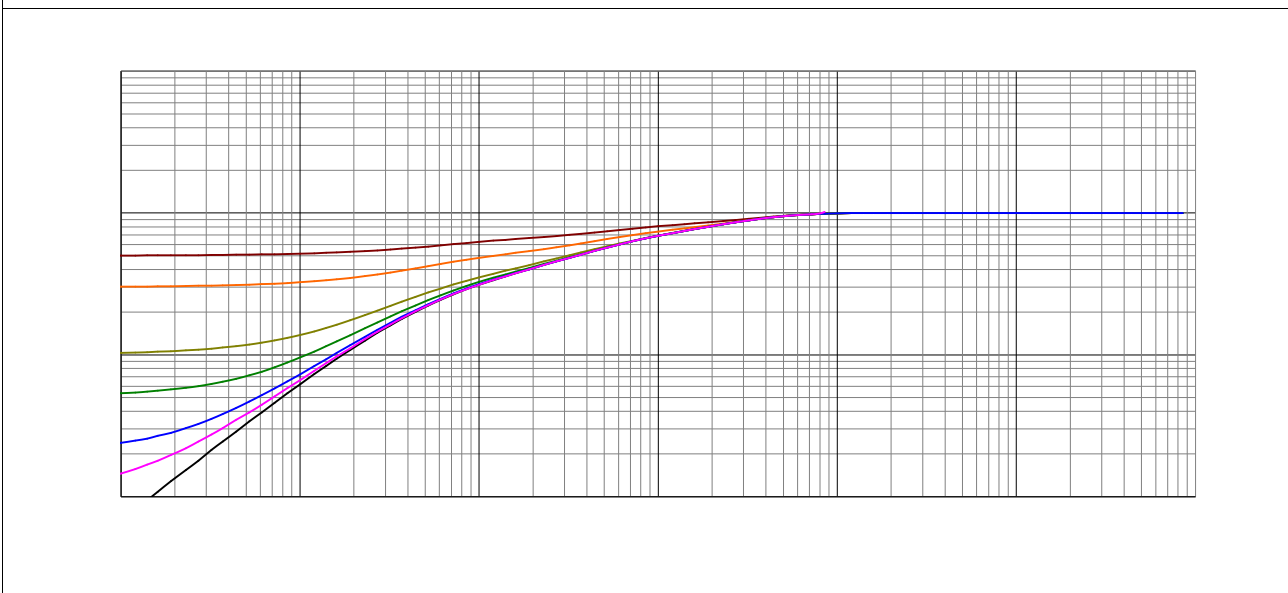


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case





Inductive switching Test

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Gate Charge Test

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Uclamped Inductive Switching (UIS) Test

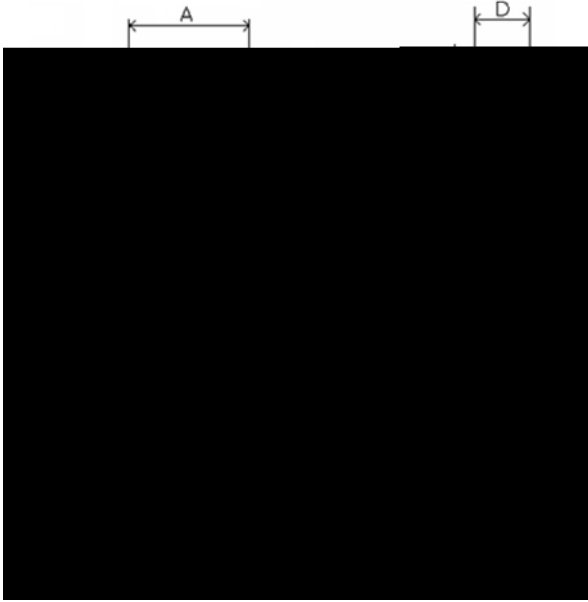
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Diode Recovery Test

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TO-220, 3 leads

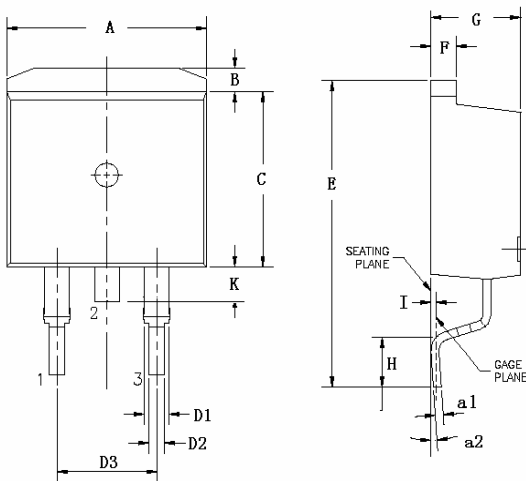
Dimensions in mm unless otherwise specified



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

Dimensions 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°



HGB039N12S , HGK039N12S
HGP039N12S

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TO-247, 3 leads