80V N-Ch Power MOSFET

Feature

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

V_{DS}		80	V
$R_{DS(on),typ}$	V_{GS}=10V	4.6	m
$R_{DS(on),typ}$	V_{GS}=4.5V	7.3	m
I_{D} (Sillicon Limited)		88	A

Application

Synchronous Rectification in SMPS
Hard Switching and High Speed Circuit
DC/DC in Telecoms and Inductrial

TO-252   TO-251

Drain Pin2
Gate Pin 1
Src Pin3
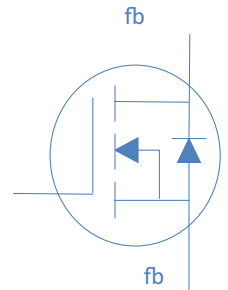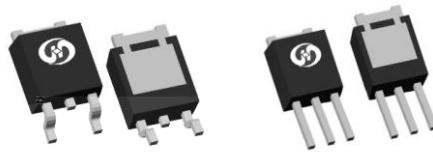
Part Number	Package	Marking
HGD059N08AL	TO-252	GD059N08AL
HGI059N08AL	TO-251	GI059N08AL

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℃	88	A
		T_C=100℃	62	
Drain to Source Voltage	V_{DS}	-	80	V
Gate to Source Voltage	V_{GS}	-	±20	V
Pulsed Drain Current	I_{DM}	-	280	A
Avalanche Energy, Single Pulse	E_{AS}	L=0.1mH, T_C=25℃	45	mJ
Power Dissipation	P_D	T_C=25℃	94	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to175	℃

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Ambient	R_{JA}	50	℃/W
Thermal Resistance Junction-Case	R_{JC}	1.6	℃/W

Electrical Characteristics at T_J=25℃ (unless otherwise specified)

Static Characteristics

Parameter	Symbol	Conditions	min	typ	max	Unit
			Value			
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250 A	80	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250 A	1.4	1.9	2.4	
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=80V, T_j=25℃	-	-	1	A
		V_{GS}=0V, V_{DS}=80V, 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	-	4.6	5.9	m
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=20A	-	7.3	9.5	m
Transconductance	g_{fs}	V_{DS}=5V, I_D=20A	-	45	-	S
Gate Resistance	R_G	V_{GS}=0V, V_{DS} Open, f=1MHz	-	1.1	-	

Dynamic Characteristics

Parameter	Symbol	Conditions	min	typ	max	Unit
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=40V, f=1MHz	-	2164	-	pF
Output Capacitance	C_{oss}		-	540	-	
Reverse Transfer Capacitance	C_{rss}		-	17	-	
Total Gate Charge	Q_g(10V)	V_{DD}=40V, I_D=20A, V_{GS}=10V	-	43	-	nC
Total Gate Charge	Q_g(4.5V)		-	22	-	
Gate to Source Charge	Q_{gs}		-	5	-	
Gate to Drain (Miller) Charge	Q_{gd}		-	14	-	
Turn on Delay Time	$t_{d(on)}$	V_{DD}=40V, I_D=20A, V_{GS}=10V, R_G=10	-	10	-	ns
Rise time	t_r		-	8	-	
Turn off Delay Time	$t_{d(off)}$		-	32	-	
Fall Time	t_f		-	10	-	

Reverse Diode Characteristics

Parameter	Symbol	Conditions	min	typ	max	Unit
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_F=20A	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R=40V, I_F=20A, dI_F/dt=400A/ s	-	33	-	ns
Reverse Recovery Charge	Q_{rr}		-	99	-	nC

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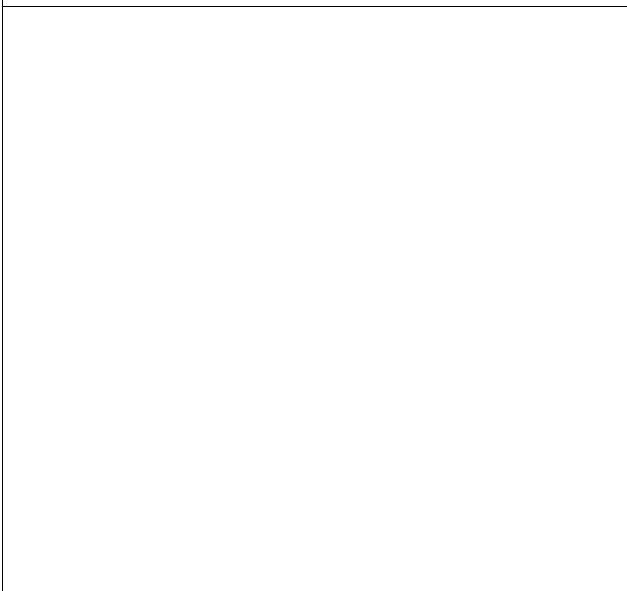
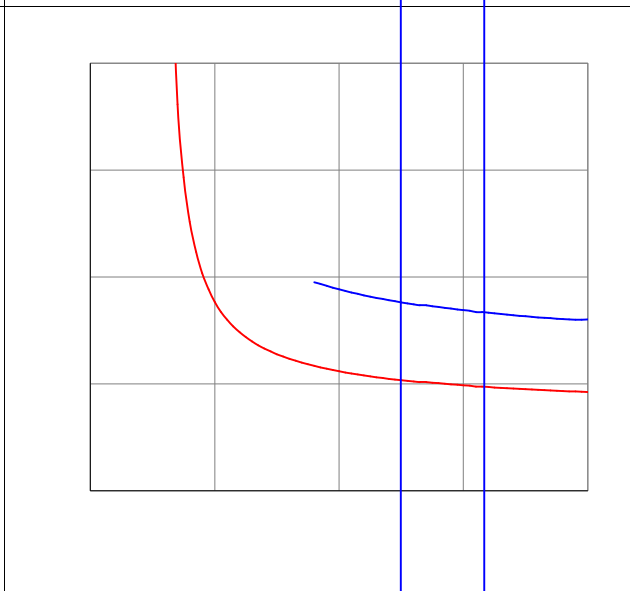| Fig 1. Typical Output Characteristics	Figure 2. On-Resistance vs. Gate-Source Voltage

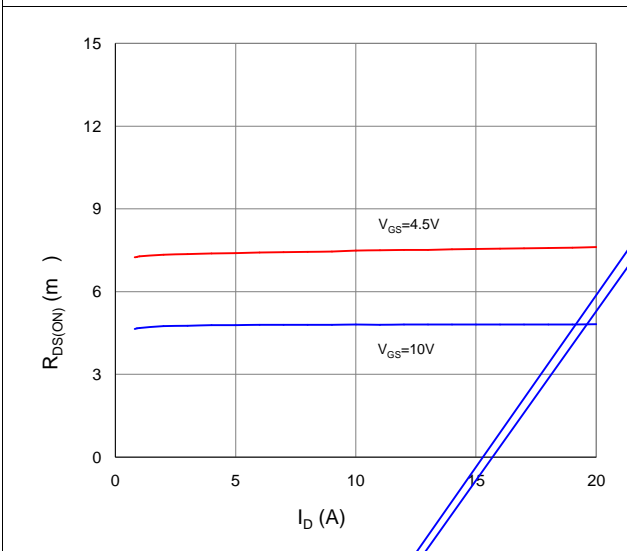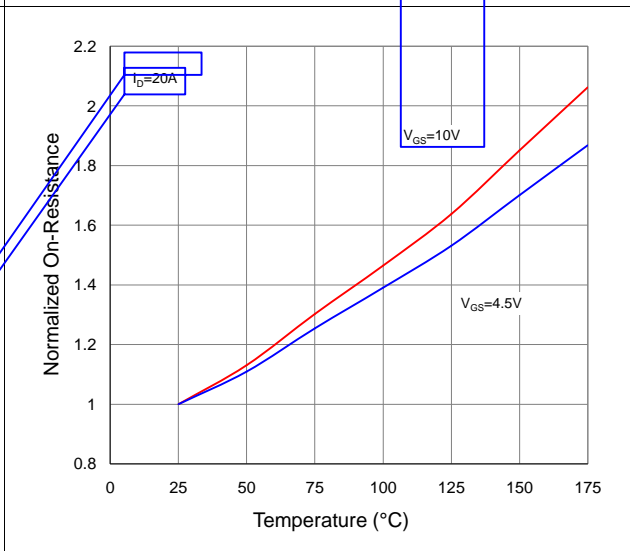| Figure 3. On-Resistance vs. Drain Current and Gate Voltage	Figure 4. Normalized On-Resistance vs. Junction Temperature

Figure 3: $R_{DS(ON)}$ (mΩ) vs I_D (A), with curves for $V_{GS}=4.5V$ and $V_{GS}=10V$.

Figure 4: Normalized On-Resistance vs Temperature (°C), $I_D=20A$, with curves for $V_{GS}=10V$ and $V_{GS}=4.5V$.

Figure 5. Typical Transfer Characteristics	Figure 6. Typical Source-Drain Diode Forward Voltage
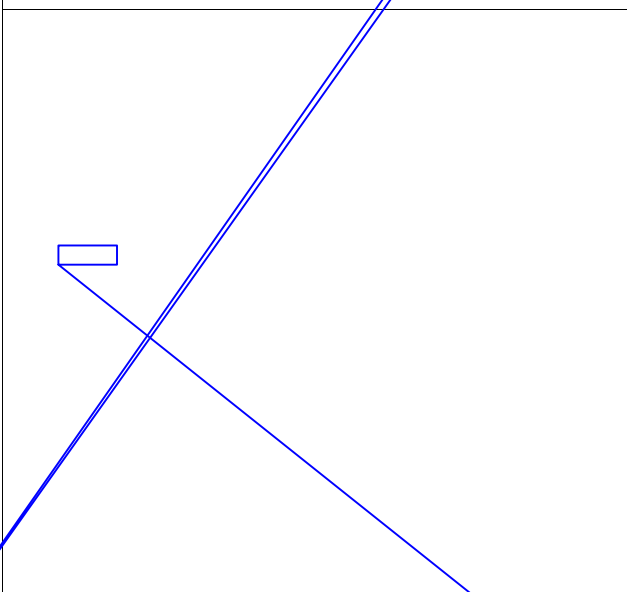
Figure 6: I_S (A) vs V_{SD} (V), with curves for 125°C and 25°C.

Ver 1.0   Nov. 2019
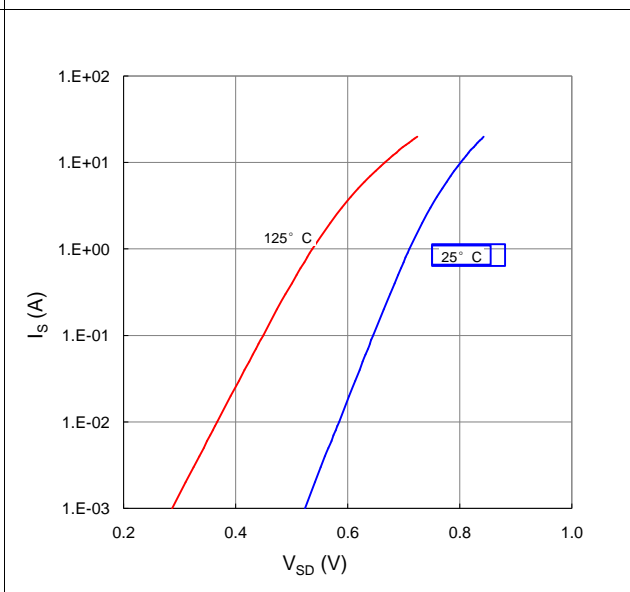
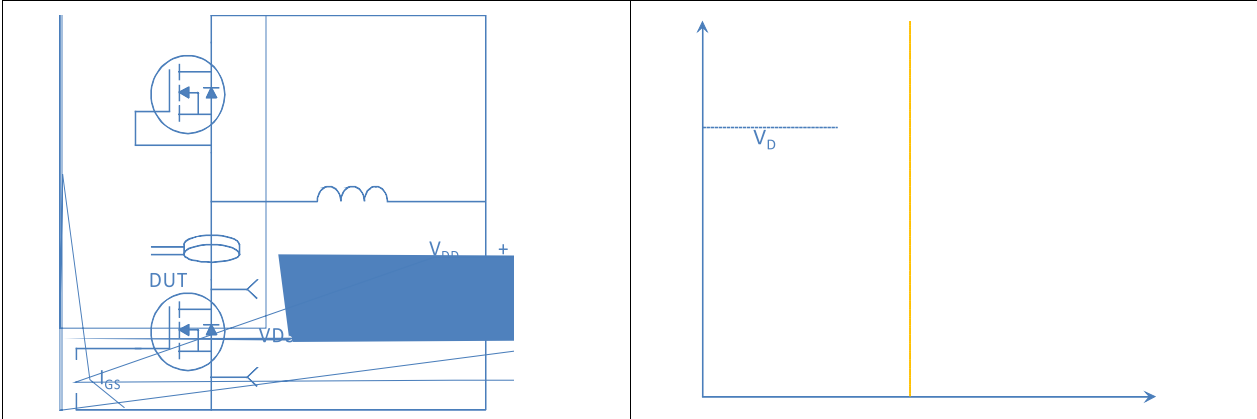| Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage	Figure 8. Typical Capacitance vs. Drain-to-Source Voltage
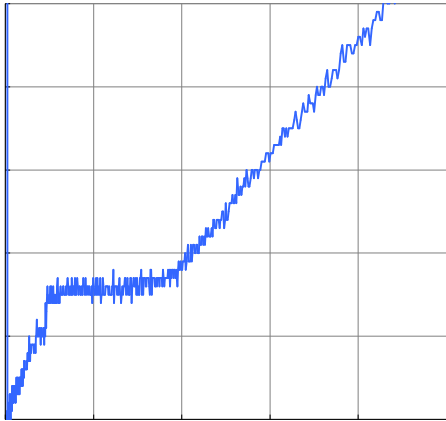
Figure 9. Maximum Safe Operating Area	Figure 10. Maximun Drain Current vs. Case Temperature

Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient
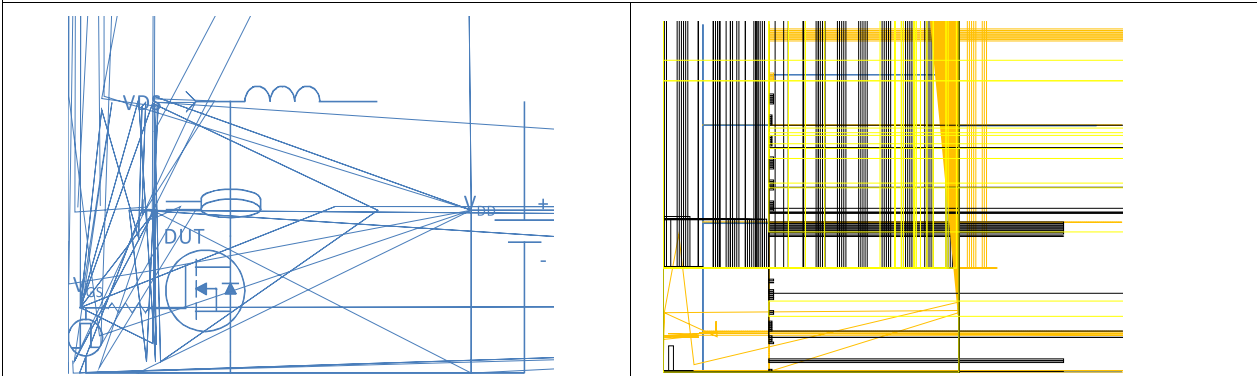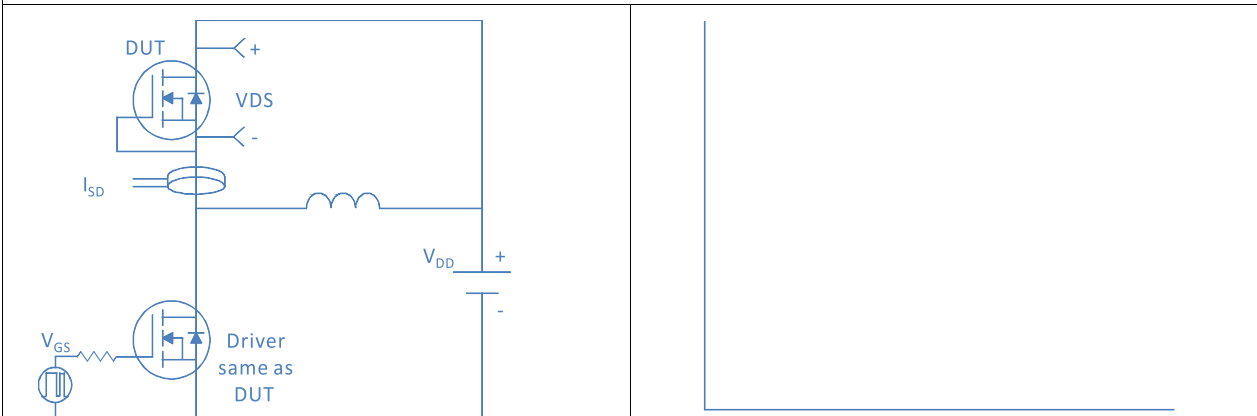
Inductive switching Test
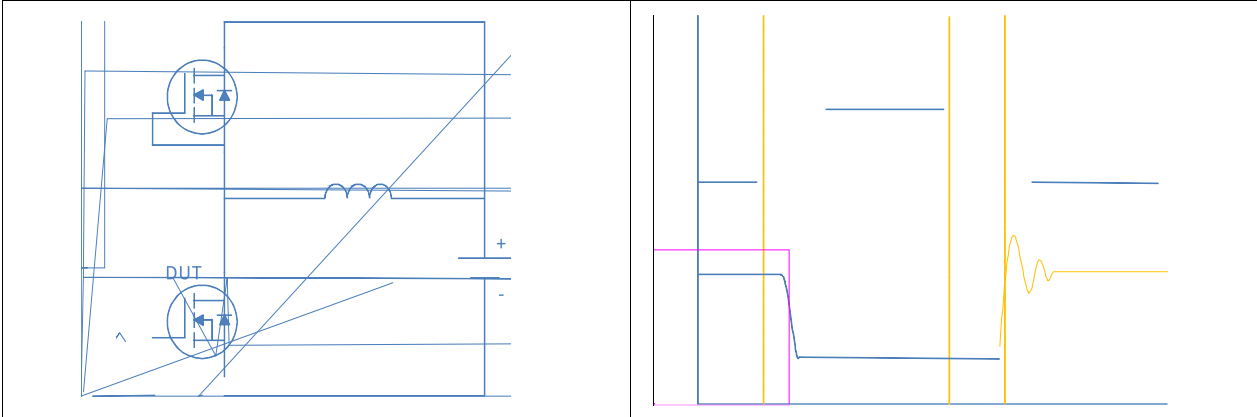
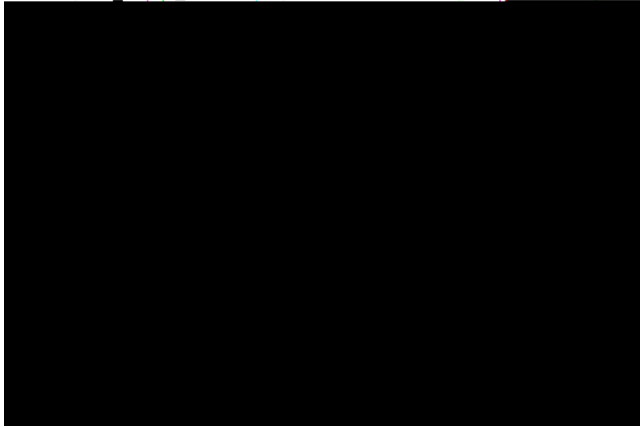
Gate Charge Test

Uclamped Inductive Switching (UIS) Test

Diode Recovery Test

Package Outline

TO-252, 2 leads

SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	6.40	6.60	6.731
L	1.40	1.52	1.77
L1	2.743 REF		
L2	0.508 BSC		
L3	0.89	--	1.27
L4	0.64	--	1.01
L5	--	--	--
D	6.00	6.10	6.223

SINGLE ROW(NEW)   MATRIX L/F

COPPER
EXPOSITION
AREA

Package Outline

TO-251, 3leads
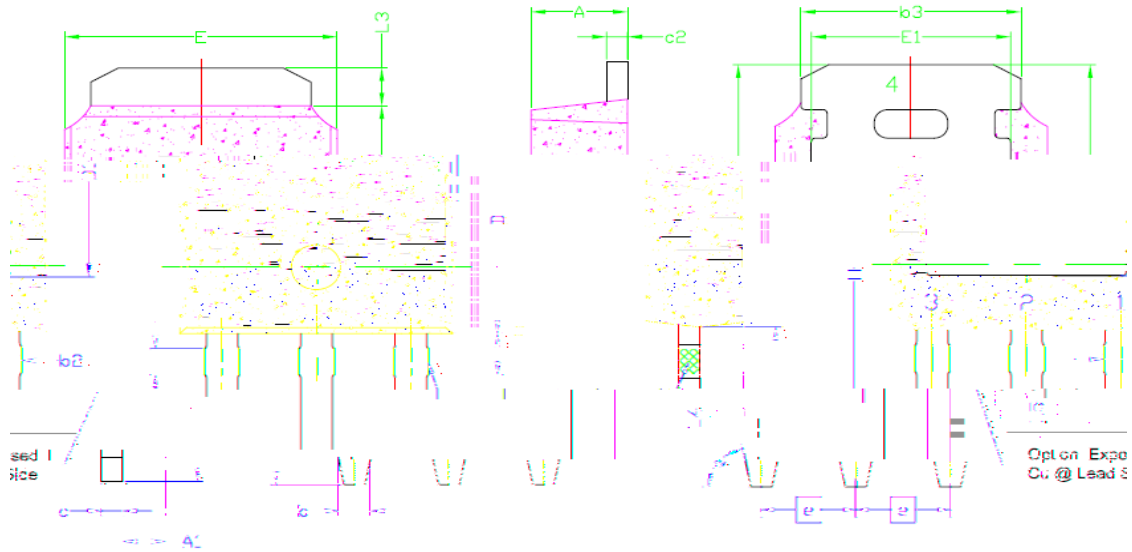
SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	6.40	6.60	6.731
L	3.98	4.13	4.28
L3	0.89	——	1.27
L4	0.698 REF		
L5	0.972	1.099	1.226
D	6.00	6.10	6.223
H	11.05	11.25	11.45
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
e	2.286 BSC		
A	2.20	2.30	2.38
A1	0.89	1.04	1.15
c	0.46	0.50	0.60
c2	0.46	0.50	0.60
D1	5.10	——	——
E1	4.40	——	——
α	79° REF		