AUP056N08BGL, AUD056N08BGL, AUN050N08BGL, AUA056N08BGL, AUB056N08BGL

ANHI Semiconductor

MOSFET Silicon N-Channel MOS

1. Applications

Single-ended flyback or two-transistor forward topologies.
PC power, PD Adaptor, LCD & PDP TV and LED lighting.

2. Features

Low drain-source on-resistance: RDS(ON) = 4.9mΩ (typ.)
Easy to control Gate switching
Enhancement mode: Vth = 1.2 to 2.5 V

## Table 1   Key Performance Parameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	85	V
$R_{DS(on),max}$	5.6	mΩ
$Q_{g,typ}$	63.7	nC
$I_{D,pulse}$	250	A

3. Packaging and Internal Circuit

Part Name	Package	Marking
AUP056N08BGL	TO220	AUP056N08BGL
AUD056N08BGL	TO252	AUD056N08BGL
AUN050N08BGL	DFN5X6	AUN050N08BGL
AUA056N08BGL	TO220F	AUA056N08BGL
AUB056N08BGL	TO263	AUB056N08BGL

TO220F	TO263	TO220	TO252	DFN5x6
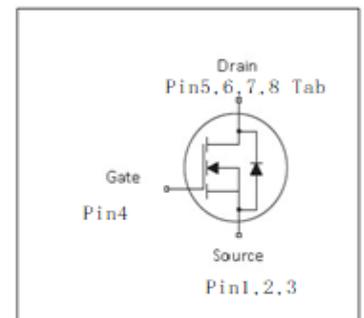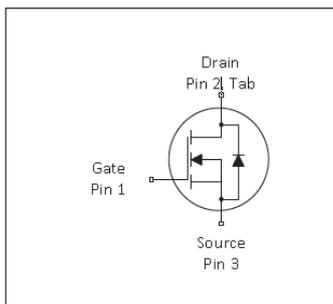
1   Maximum ratings

at T_j = 25°C, unless otherwise specified

Table 2   Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current[1]	I_D		-	65	A	T_C=25°C
Pulsed drain current[2]	$I_{D,pulse}$	-	-	250	A	T_C=25°C
Avalanche energy, single pulse	E_{AS}	-	-	319	mJ	Tc=25°C,VDD=50V,Id=35.7A, L=0.5mH, RG=25Ω
Avalanche current, single pulse	I_{AR}	-	-	35.7	A	Tc=25°C,VDD=50V,L=0.5mH, RG=25Ω
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Power dissipation (TO220)	P_{tot}	-	-	158	W	T_C=25°C
Power dissipation (TO252&TO263)	P_{tot}	-	-	135	W	T_C=25°C
Power dissipation (DFN5x6)	P_{tot}	-	-	151	W	T_C=25°C
Power dissipation (TO220F)	P_{tot}	-	-	30	W	T_C=25°C
Storage temperature	T_{stg}	-55	-	150	°C	
Operating junction temperature	T_j	-55	-	150	°C	
Soldering Temperature Distance of 1.6mm from case for 10s	T_L			260	°C	
Transconductance	GFS	-	58	-	S	VDS=5V IDS=20A

[1] Limited by $T_{j,max}$. Maximum Duty Cycle D = 0.50

[2] Pulse width t_p limited by $T_{j,max}$

[3] Identical low side and high side switch with identical R_G

2 Thermal characteristics

Table 3 Thermal characteristics (TO220)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.79	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	66	°C/W	device on PCB, minimal footprint

Thermal characteristics (TO252&TO263)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.93	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	47	°C/W	device on PCB, minimal footprint

Thermal characteristics (TO220F)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	4.2	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	°C/W	device on PCB, minimal footprint

Thermal characteristics (DFN5X6)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.83	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	50	°C/W	device on PCB, minimal footprint

3　Electrical characteristics

at T_j=25°C, unless otherwise specified

Table 4　Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	85	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{(GS)th}$	1.2	2.1	2.5	V	V_{DS}= V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	1	uA	V_{DS}=85V, V_{GS}=0V, T_j=25°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	VGS=±20V, VDS=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	4.9	5.6	mΩ	V_{GS}=10V, I_D=20A, T_j=25°C(TO220&TO220F)
Drain-source on-state resistance	$R_{DS(on)}$	-	4.8	5.6	mΩ	V_{GS}=10V, I_D=20A, T_j=25°C(TO252&TO263)
Drain-source on-state resistance	$R_{DS(on)}$	-	4.3	5.0	mΩ	V_{GS}=10V, I_D=20A, T_j=25°C(DFN5X6)
Gate resistance (Intrinsic)	R_G	-	1.5	-	Ω	f=1MHz, open drain

Table 5　Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	4553	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Output capacitance	C_{oss}	-	1215	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Reverse transfer capacitance	C_{rss}	-	107.1	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Turn-on delay time	$t_{d(on)}$	-	22.2	-	ns	V_{DD}=40V, V_{GS}=10V, I_D=2A, R_G=3Ω
Rise time	t_r	-	16.6	-	ns	V_{DD}=40V, V_{GS}=10V, I_D=2A, R_G=3Ω
Turn-off delay time	$t_{d(off)}$	-	44.2	-	ns	V_{DD}=40V, V_{GS}=10V, I_D=2A, R_G=3Ω
Fall time	t_f	-	46.6	-	ns	V_{DD}=40V, V_{GS}=10V, I_D=2A, R_G=3Ω

Table 6　Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	14.8	-	nC	V_{DD}=40V, I_D=20A, V_{GS}=0 to 10V
Gate to drain charge	Q_{gd}	-	12	-	nC	V_{DD}=40V, I_D=20A, V_{GS}=0 to 10V
Gate charge total	Q_g	-	63.7	-	nC	V_{DD}=40V, I_D=20A, V_{GS}=0 to 10V

Table 7   Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.7	-	V	V_{GS}=0V, I_F=1A, T_j=25°C
Reverse recovery time	t_{rr}	-	38.53	-	ns	V_R=40V, I_F=20A, di_F/dt=100A/µs
Reverse recovery charge	Q_{rr}	-	30.49	-	nC	V_R=40V, I_F=20A, di_F/dt=100A/µs
Peak reverse recovery current	I_{rrm}	-	1.38	-	A	V_R=40V, I_F=20A, di_F/dt=100A/µs

4. Electrical characteristics diagram

Diagram 1: Typ. Output characteristics
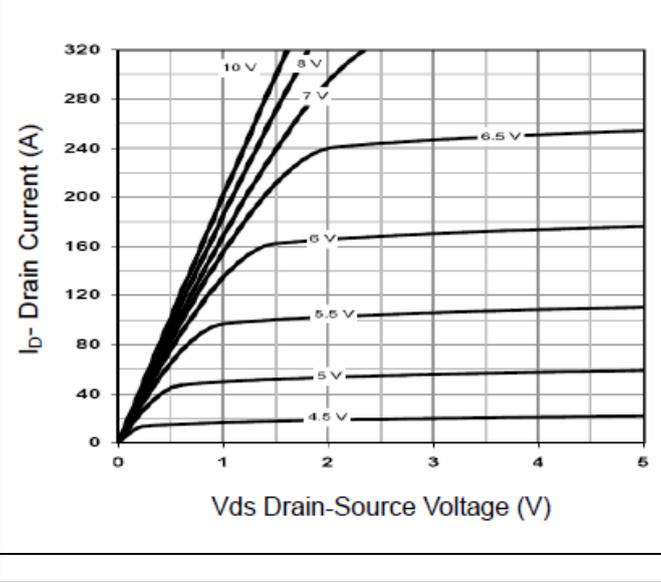
Diagram 2: Typ. Transfer characteristics
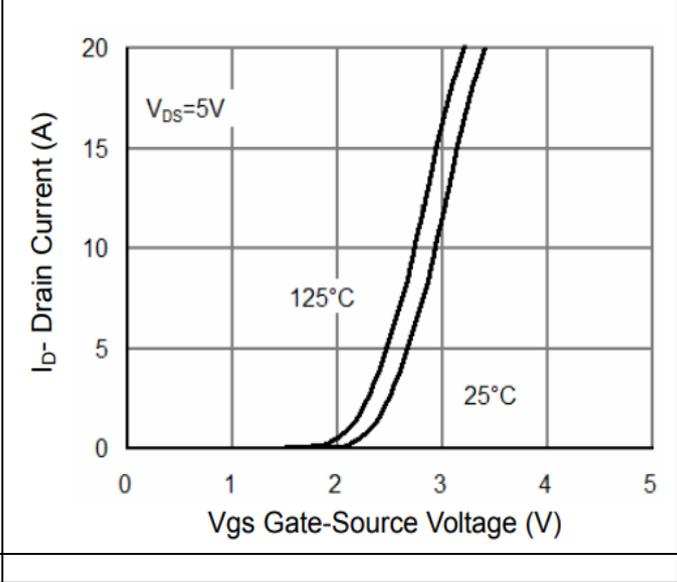
Diagram 3: Typ. Rdson vs. Drain Current
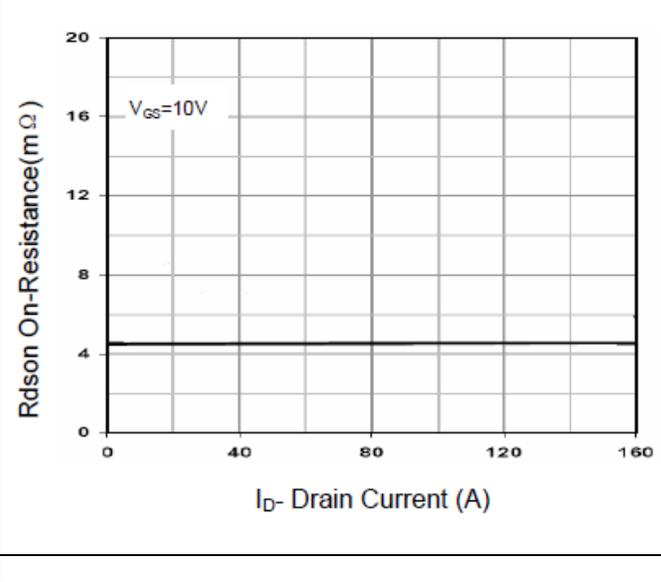
Diagram 4: Typ. Rdson – Junction Temperature
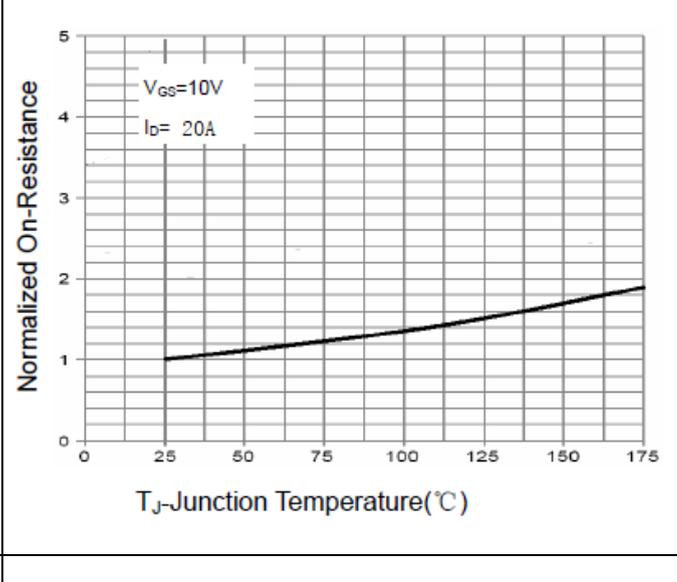
Diagram 5: Typ. Body-Diode Characteristics
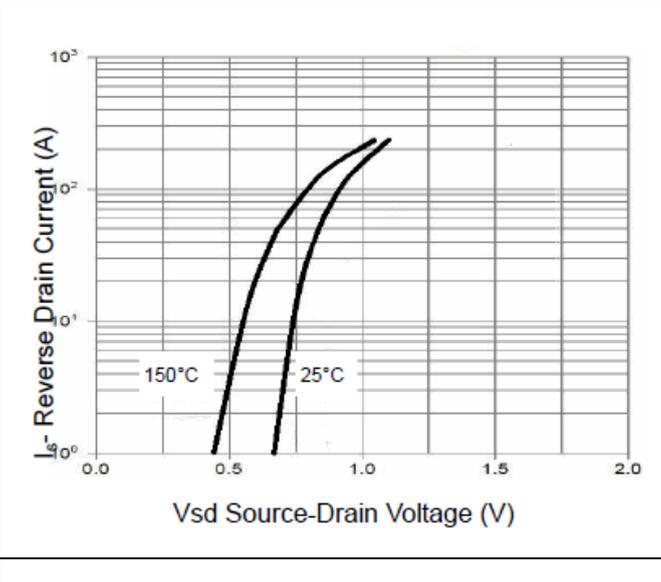
**Diagram 6: Typ. Capacitance vs. Vds**
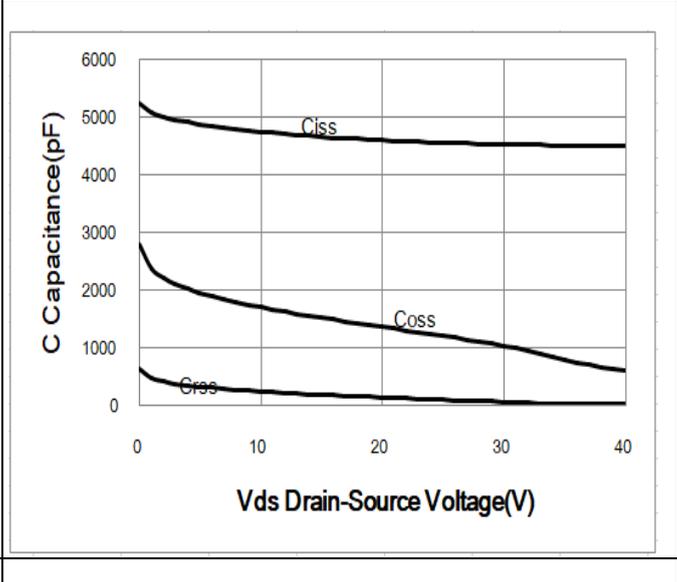
Diagram 7: Typ. Power Dissipation

Power Dissipation(W) vs Power De-rating
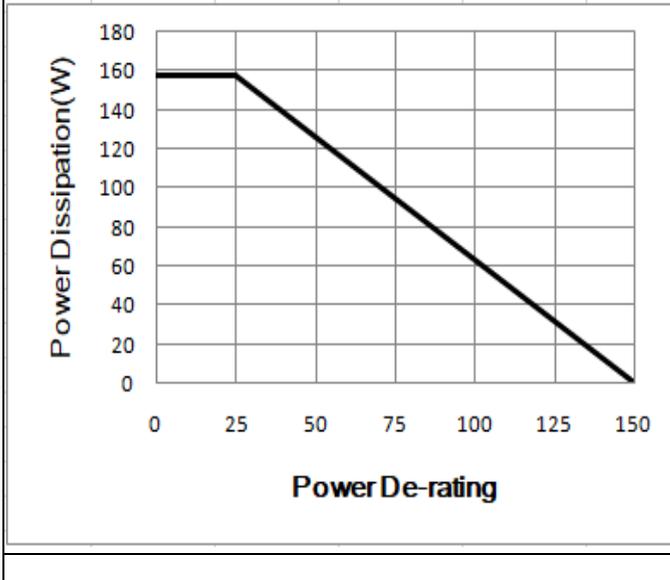
Diagram 8: Typ. Drain Current De-rating

Drain Current rating I_D(A) vs Current De-rating
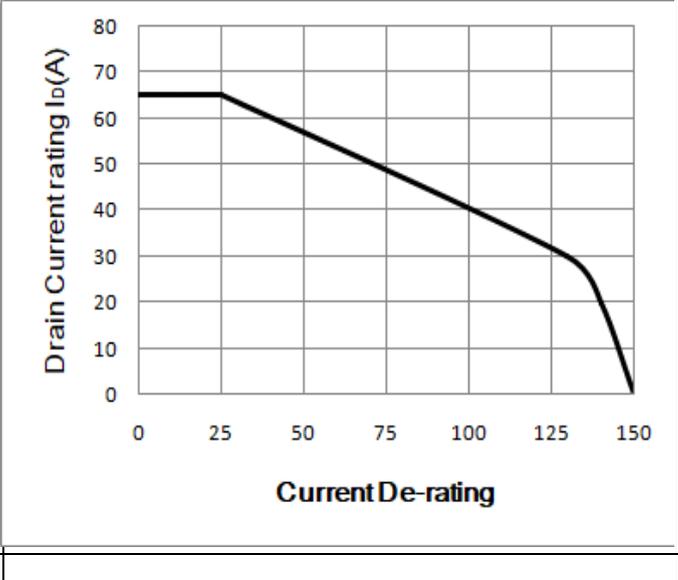
Diagram 9: Typ. Gate charge

Vgs Gate-Source Voltage(V) vs Qg Gate Charge(nC)
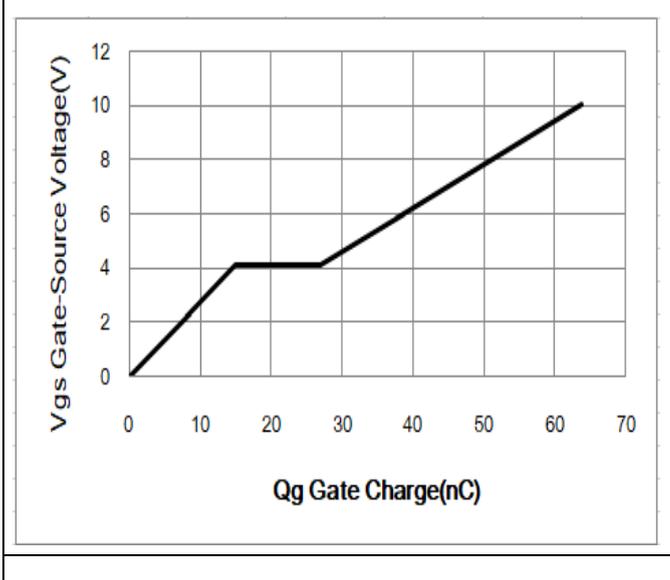
Diagram 10: Typ. Maximum Safe Operating Area

I_D- Drain Current (A) vs Vds Drain-Source Voltage (V)

$R_{DS(ON)}$ limited

10µs
100µs
1ms
DC
10ms

$T_{J(Max)}$=175° C
T_C=25° C

r(t),Normalized Effective Transient Thermal Impedance vs Square Wave Pluse Duration(sec)

0.5
0.2
0.1
0.05
0.02
0.01
single pulse
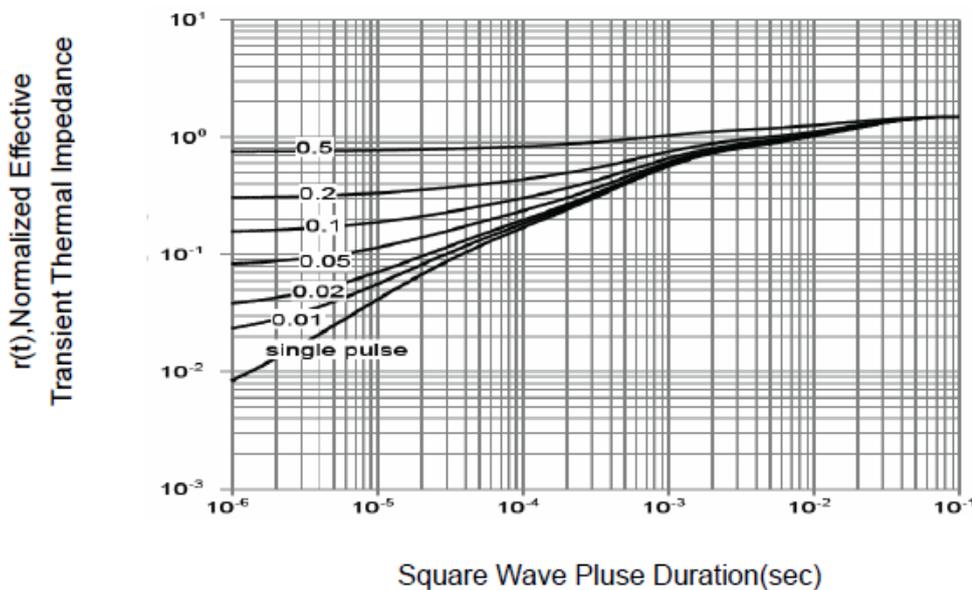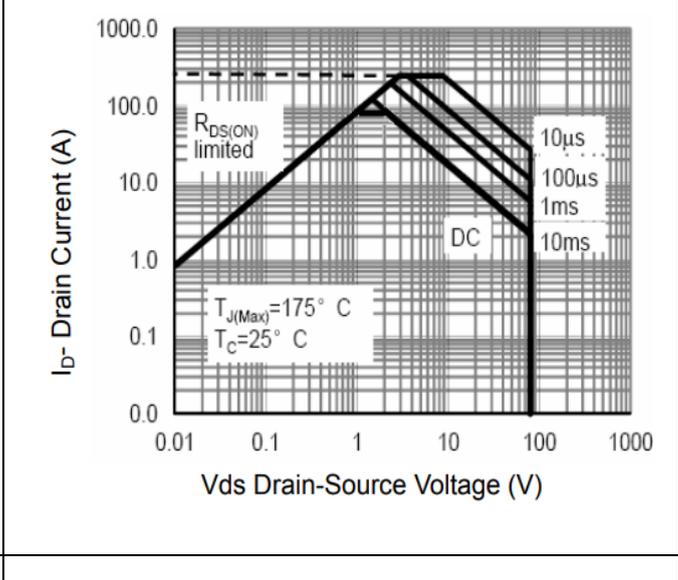
Figure 11 Normalized Maximum Transient Thermal Impedance

5 Test Circuits

Table 8 Diode characteristics

Test circuit for diode characteristics	Diode recovery waveform

Table 9 Switching times

Switching times test circuit for inductive load	Switching times waveform
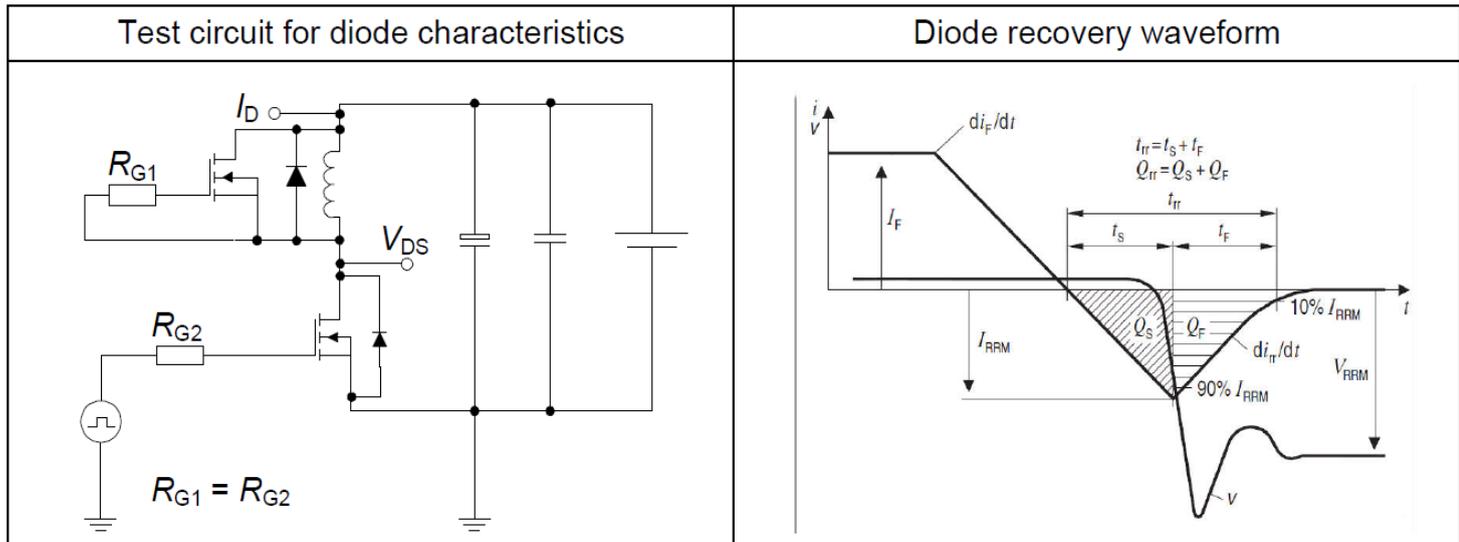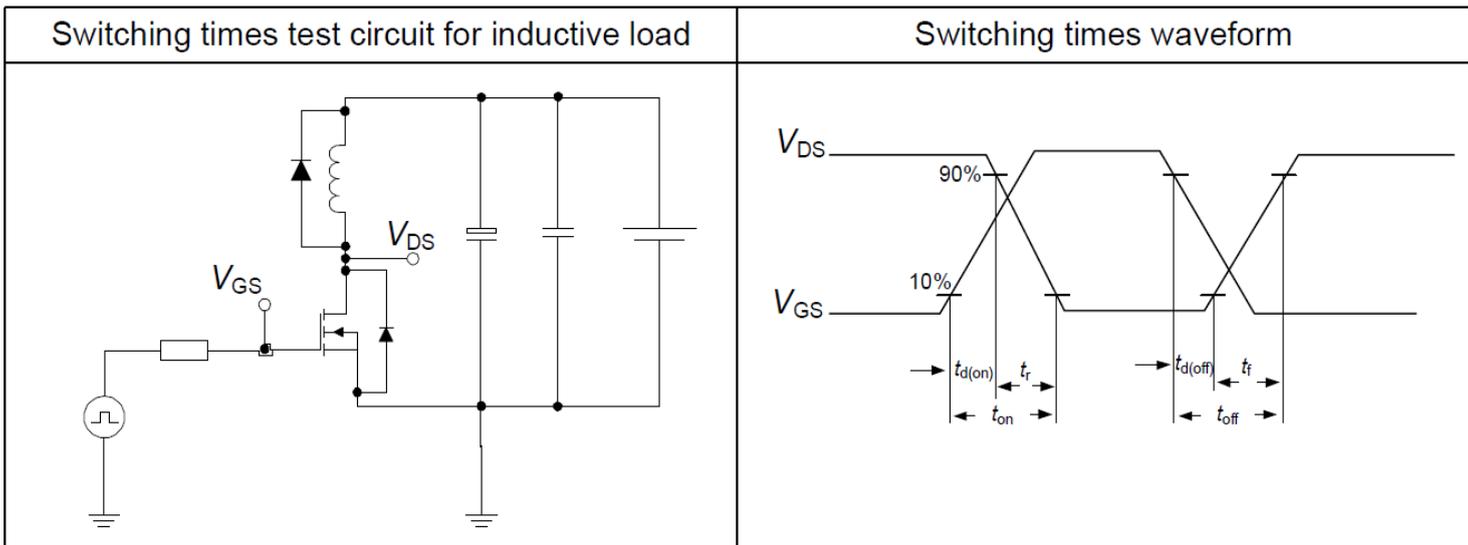
Table 10 Unclamped inductive load

Unclamped inductive load test circuit	Unclamped inductive waveform
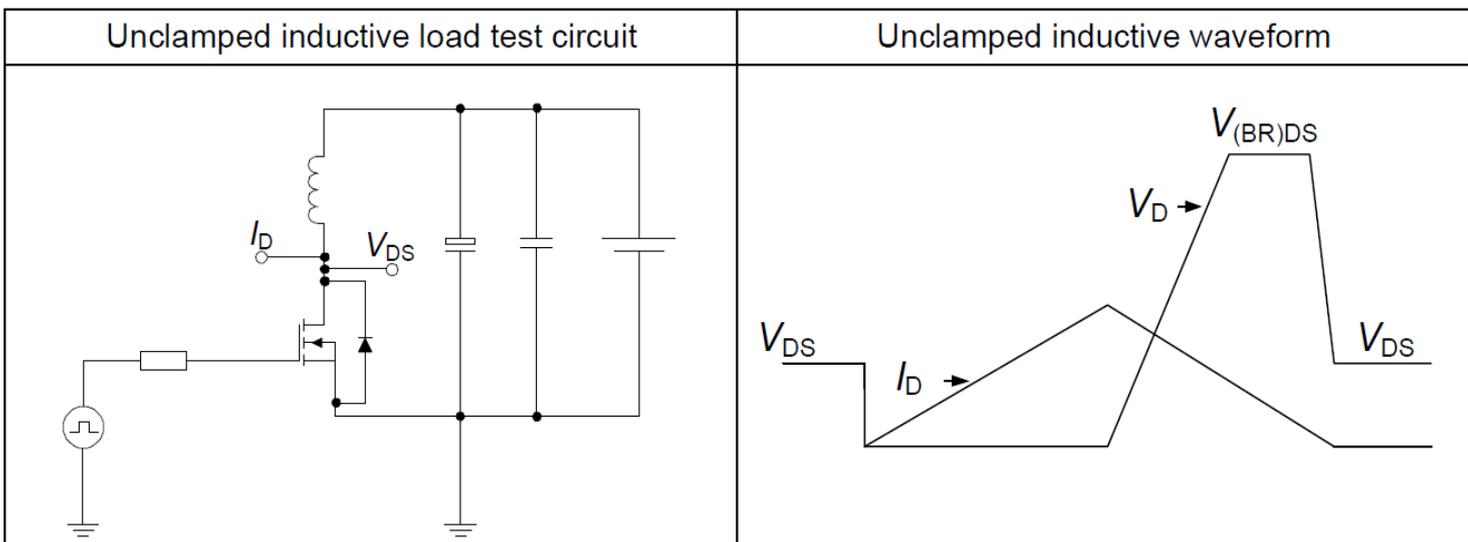
4 Package Outlines
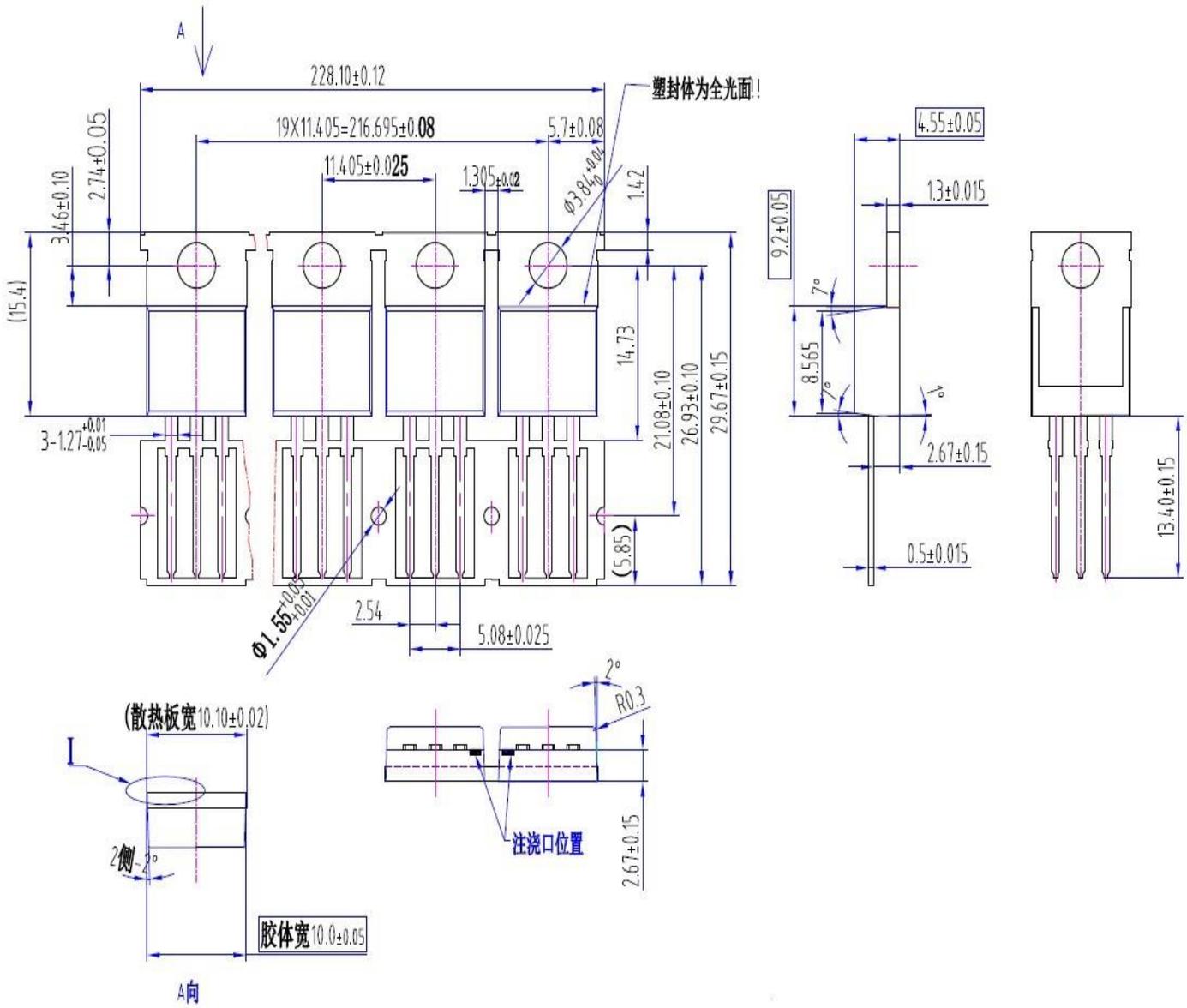
Figure1：Outline PG-TO220
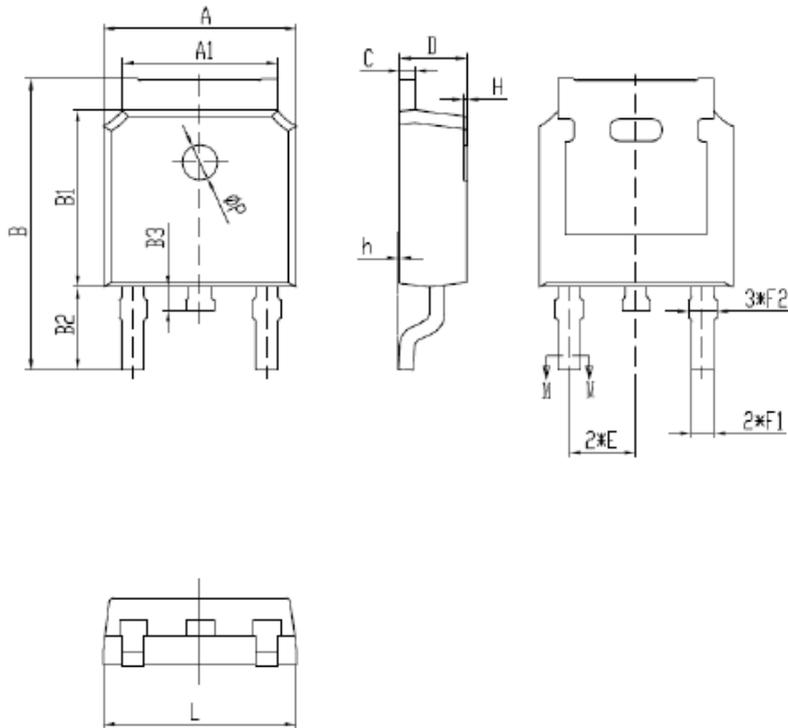
项目	规范(mm)	
	MIN	MAX
A	6.50	6.70
A1	5.16	5.46
B	9.77	10.17
B1	6.00	6.20
B2	2.60	3.00
B3	0.70	0.90
C	0.45	0.61
D	2.20	2.40
E	2.186	2.386
F1	0.67	0.87
F2	0.76	0.96
H	0.00	0.30
h	0.00	0.127
L	6.50	6.70
Φ P	1.10	1.30

Figure2：Outline PG-TO252(HT)
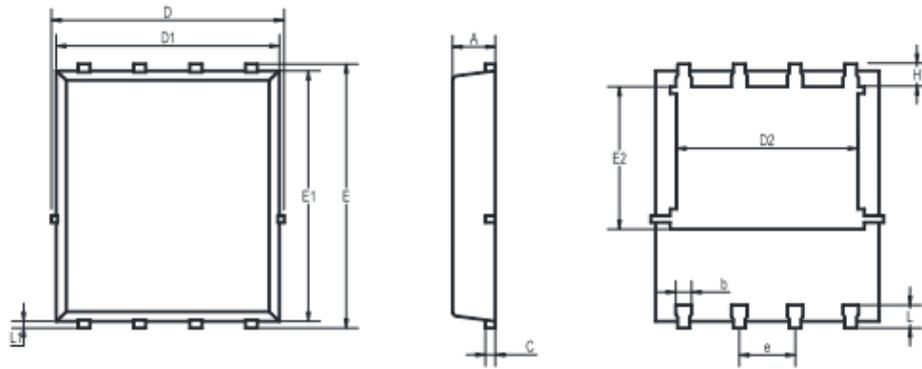
UNIT	A	b	C	D	D1	D2	E	E1	E2	e	L	L1	H
mm	1.12	0.51	0.34	5.26	5.1	4.5	6.25	6	3.66	1.37	0.71	0.2	0.71
	0.9	0.33	0.11	4.7	4.7	3.56	5.75	5.6	3.18	1.17	0.35	0.06	0.35

Figure3：Outline PG-DFN5X6(HC)

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项目	规范(mm)	
	MIN	MAX
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.50	2.90
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.40	3.80
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
Φ P	3.00	3.30
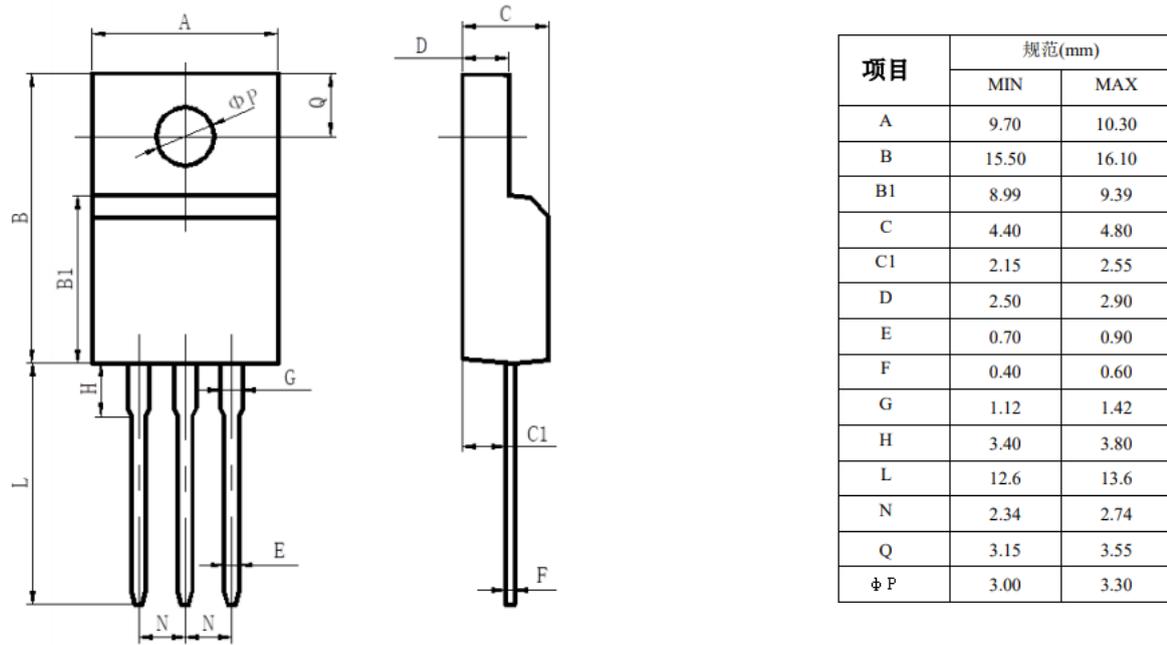
Figure4：Outline PG-TO220F(HT)
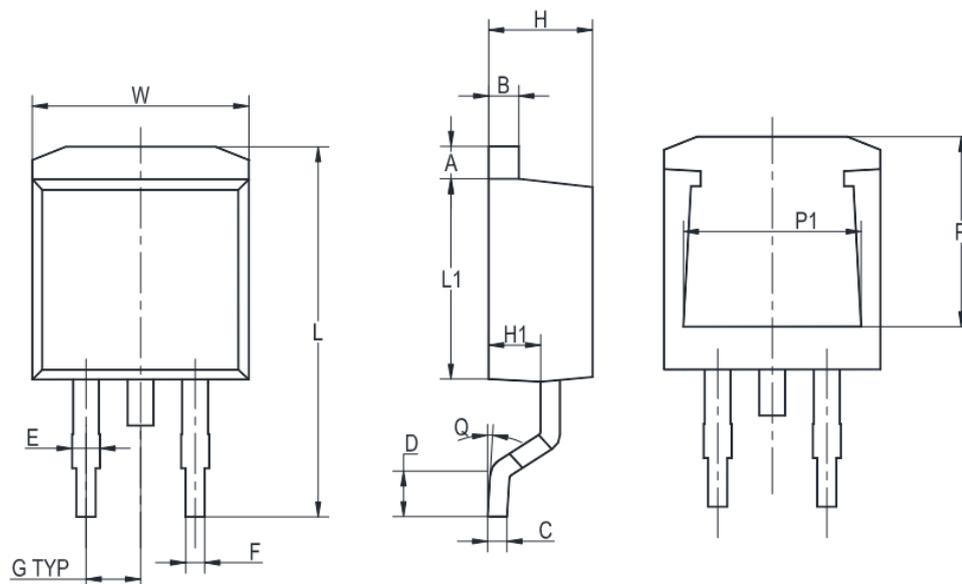
UNIT	A	B	C	D	E	F	G	W	H	H1	L	L1	Q	P	P1
mm	1.5	1.5	0.5	2.60	1.6	0.94	2.54	10.5	4.8	2.9	16.5	8.7	8°	7.6	8.2
	1.1	1.1	0.3	2.15	1.1	0.68	TYP	9.6	4.4	2.5	14.5	8.2	MAX	7.1	7.4

Figure5：Outline PG-TO263(HC)

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2021-11-4	Preliminary version
1.1	2021-11-18	Updated EAS L=0.5mH
1.2	2022-01-11	Added DFN5X6 package and Electrical characteristics diagram
1.3	2022-06-13	Added TO220F package
1.4	2022-09-09	Updated Vth limit
1.5	2022-10-18	Added TO263 package，and updated diagram2.