

MOSFET Silicon N-Channel MOS



1. Applications

Synchronous rectification in SMPS,
Hard switching and High speed circuit
DC/DC in telecoms and industrial

2. Features

Low drain-source on-resistance:
TO220&TO220F RDS(on) = 5.6mΩ (typ.)
TO263 RDS(on) = 5.8mΩ (typ.)
TO252 RDS(on) = 5.9mΩ (typ.)
High speed power switching
Enhanced body diode dv/dt capability
Enhanced avalanche ruggedness



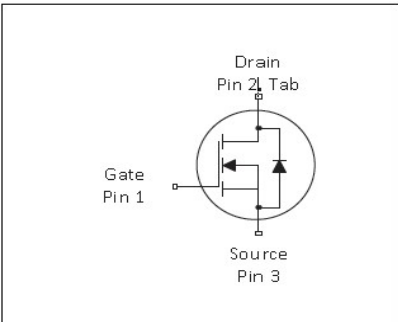
Table 1 Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	100	V
TO220,220F $R_{DS(on),max}$	6.5	mΩ
TO263,252 $R_{DS(on),max}$	6.9	mΩ
$Q_{g,typ}$	60.7	nC
$I_{D,pulse}$	464	A

3. Packaging and Internal Circuit

Part Name	Package	Marking
AUP065N10A	TO220	AUP065N10A
AUA065N10A	TO220F	AUA065N10A
AUB069N10A	TO263	AUB069N10A
AUD069N10A	TO252	AUD069N10A

TO220F	TO263	TO220	TO252



1 Maximum ratings

At $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D		-	116	A	$T_C = 25^\circ\text{C}$
Continuous drain current ¹⁾	I_D			91	A	$T_C = 100^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-		464	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	186	mJ	$T_C = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $I_D = 27.3\text{A}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$
Avalanche current, single pulse	I_{AR}	-	-	27.3	A	$T_C = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Power dissipation (TO263&TO252&TO220)	P_{tot}	-	-	161	W	$T_C = 25^\circ\text{C}$
Power dissipation (TO220F)	P_{tot}	-	-	30	W	$T_C = 25^\circ\text{C}$
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	
Operating junction temperature	T_j	-55	-	150	$^\circ\text{C}$	
Soldering Temperature Distance of 1.6mm from case for 10s	T_L			260	$^\circ\text{C}$	

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(TO220F)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	5	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	°C/W	device on PCB, minimal footprint

Table 4 Thermal characteristics(TO220&TO263&TO252)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	°C/W	device on PCB, minimal footprint

3 Electrical characteristics

at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$V_{GS}=0V$, $I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	2.5		3.4	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=95V$, $V_{GS}=0V$, $T_j=25^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=20V$, $V_{DS}=0V$
Drain-source on-state resistance T0220&T0220F	$R_{DS(on)}$	-	5.6	6.5	m Ω	$V_{GS}=10V$, $I_D=20A$, $T_j=25^{\circ}\text{C}$
Drain-source on-state resistance T0263	$R_{DS(on)}$	-	5.8	6.9	m Ω	$V_{GS}=10V$, $I_D=20A$, $T_j=25^{\circ}\text{C}$
Drain-source on-state resistance T0252	$R_{DS(on)}$	-	5.9	6.9	m Ω	$V_{GS}=10V$, $I_D=20A$, $T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	R_G	-	1.5	-	Ω	$f=1\text{MHz}$, open drain
Transconductance	G_{FS}	-	52	-	S	$V_{DS}=5V$ $I_{DS}=20A$

Table 5 Dynamic characteristics (by calculating)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	3861	-	pF	$V_{GS}=0V$, $V_{DS}=50V$, $f=1\text{MHz}$
Output capacitance	C_{oss}	-	375	-	pF	$V_{GS}=0V$, $V_{DS}=50V$, $f=1\text{MHz}$
Reverse transfer capacitance	C_{rss}	-	15.1	-	pF	$V_{GS}=0V$, $V_{DS}=50V$, $f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	-	30	-	ns	$V_{DD}=50V$, $V_{GS}=10V$, $I_D=20A$, $R_G=10\Omega$
Rise time	t_r	-	56	-	ns	$V_{DD}=50V$, $V_{GS}=10V$, $I_D=20A$, $R_G=10\Omega$
Turn-off delay time	$t_{d(off)}$	-	71	-	ns	$V_{DD}=50V$, $V_{GS}=10V$, $I_D=20A$, $R_G=10\Omega$
Fall time	t_f	-	44	-	ns	$V_{DD}=50V$, $V_{GS}=10V$, $I_D=20A$, $R_G=10\Omega$

Table 6 Gate charge characteristics(by calculating)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	16.1	-	nC	$V_{DD}=50V$, $I_D=20A$, $V_{GS}=0$ to $10V$
Gate to drain charge	Q_{gd}	-	18.3	-	nC	$V_{DD}=50V$, $I_D=20A$, $V_{GS}=0$ to $10V$
Gate charge total	Q_g	-	63.5	-	nC	$V_{DD}=50V$, $I_D=20A$, $V_{GS}=0$ to $10V$

Table 7 Reverse diode characteristics(by calculating)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.7	-	V	$V_{GS}=0V, I_F=1A, T_j=25^{\circ}C$
Reverse recovery time	t_{rr}	-	46	-	ns	$V_R=30V, I_F=20A, di_F/dt=300A/\mu s$
Reverse recovery charge	Q_{rr}	-	220	-	nC	$V_R=30V, I_F=20A, di_F/dt=300A/\mu s$
Peak reverse recovery current	I_{rrm}	-	8.6	-	A	$V_R=30V, I_F=20A, di_F/dt=300A/\mu s$

4 Electrical characteristics diagram

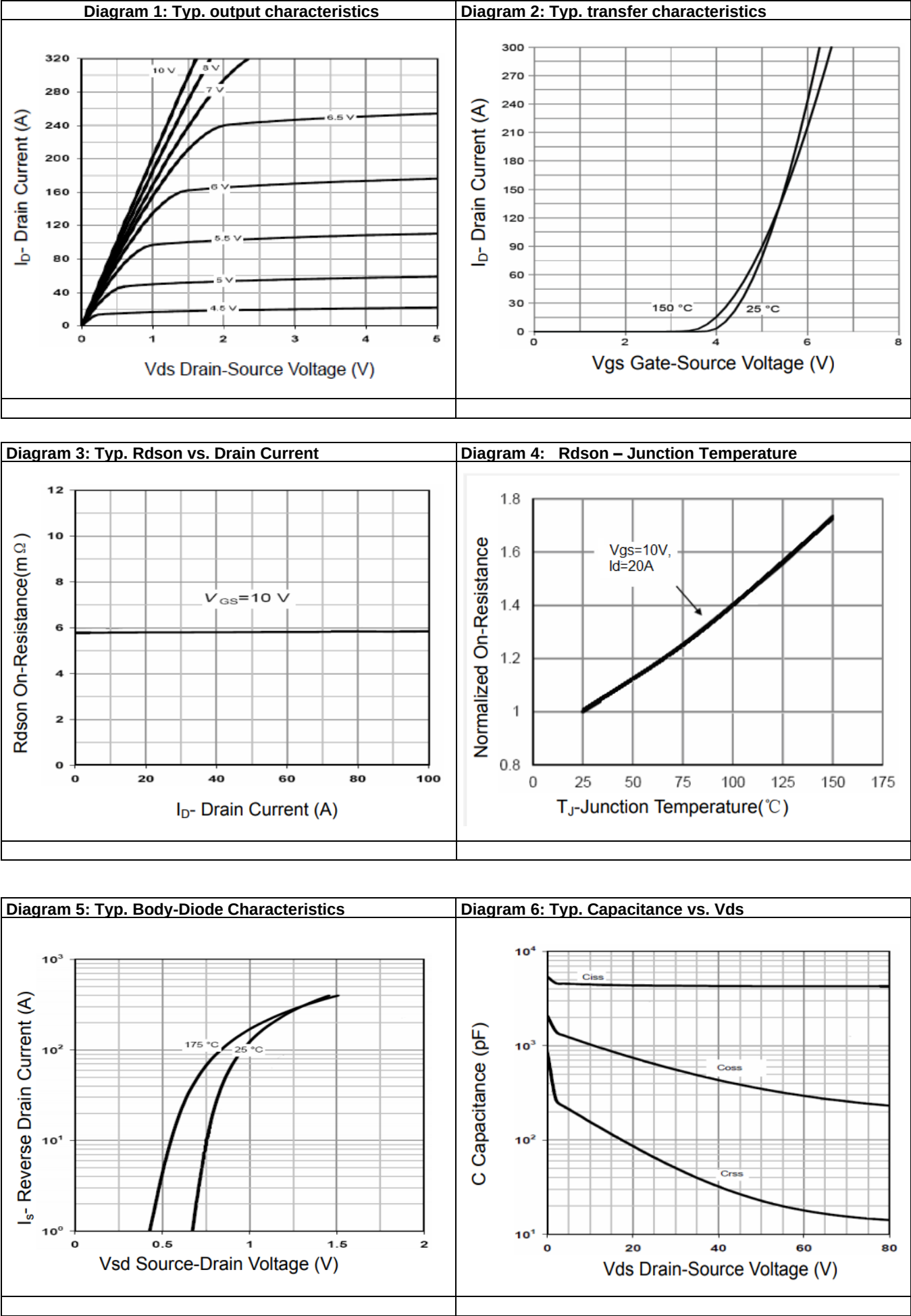


Diagram 7: Typ. Power Dissipation

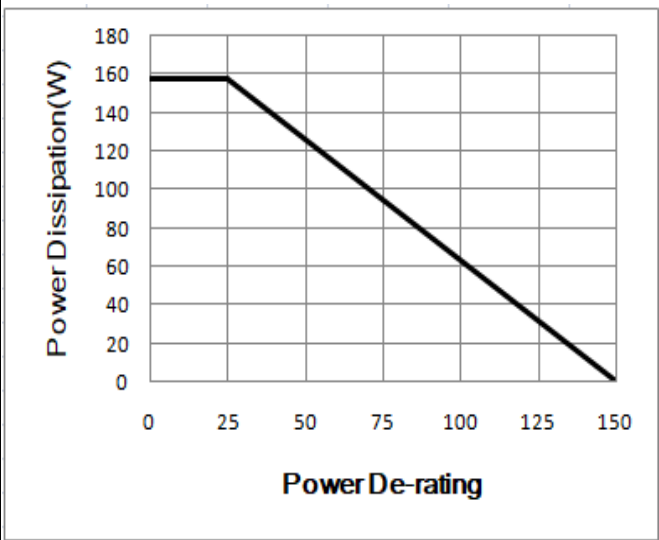


Diagram 8: Typ. Drain Current De-rating

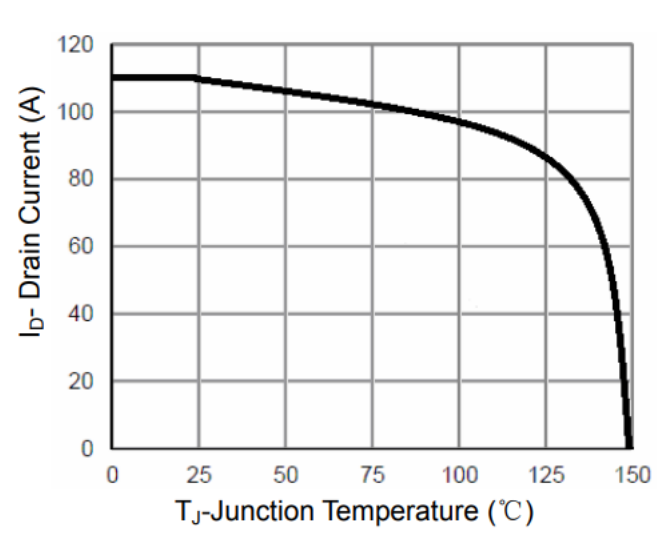


Diagram 9: Typ. Gate charge

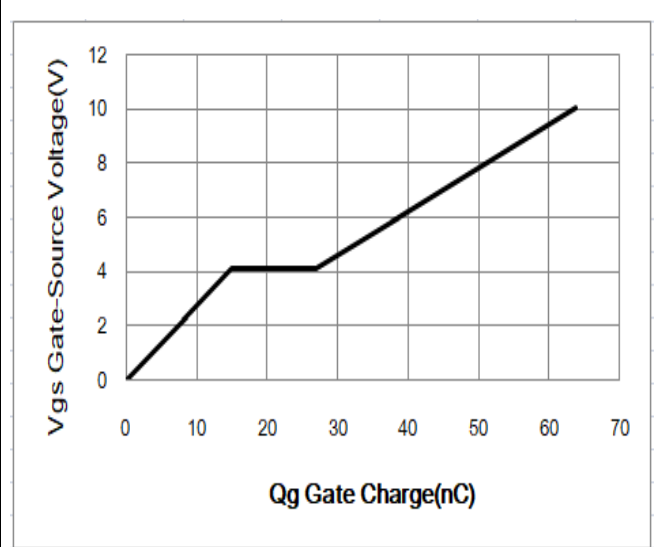


Diagram 10: Typ. Maximum Safe Operating Area

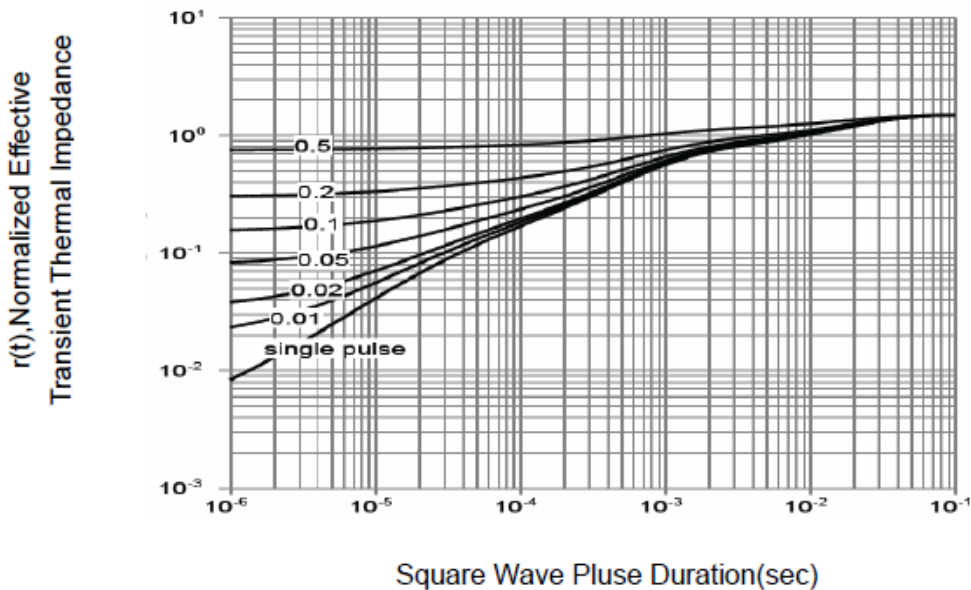
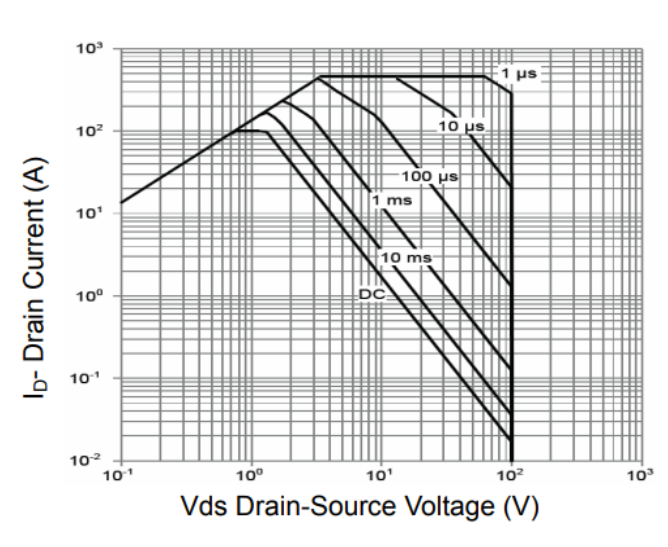


Figure 11 Normalized Maximum Transient Thermal Impedance

5 Test Circuits

Table 8 Diode characteristics

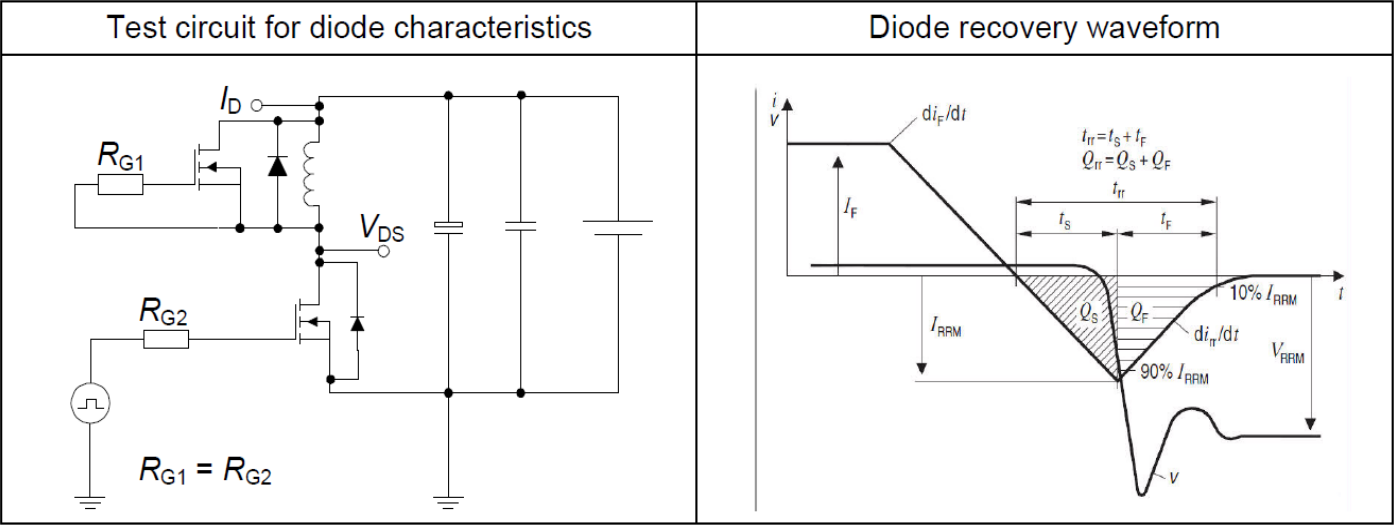


Table 9 Switching times

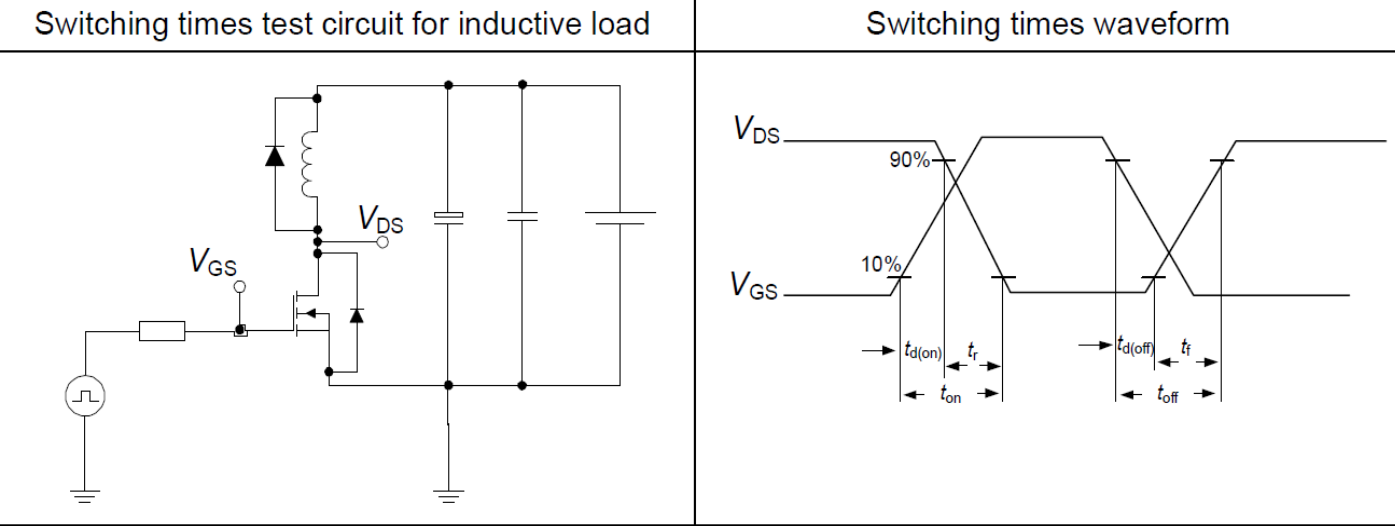
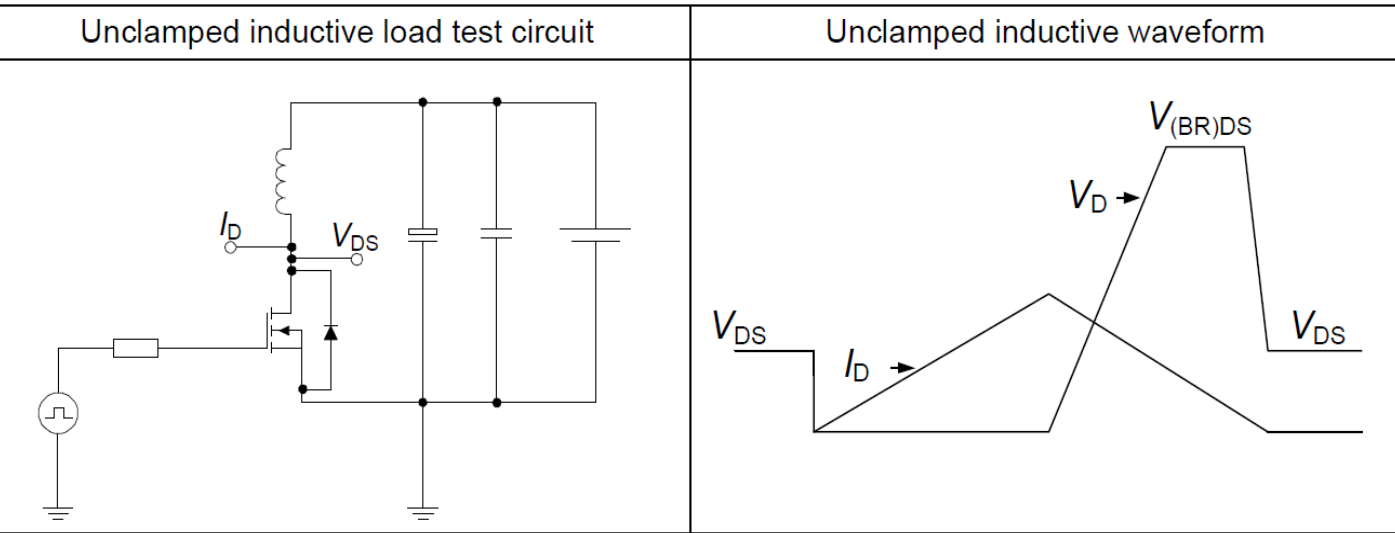
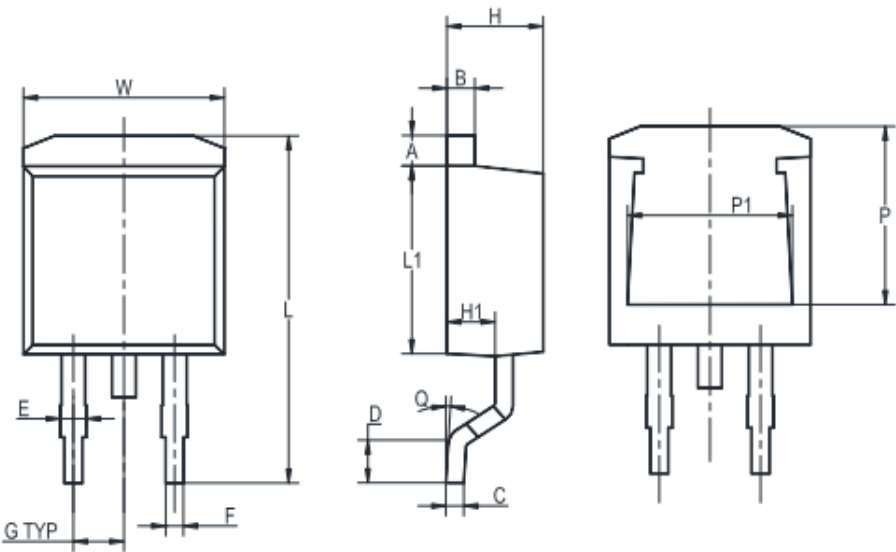


Table 10 Unclamped inductive load

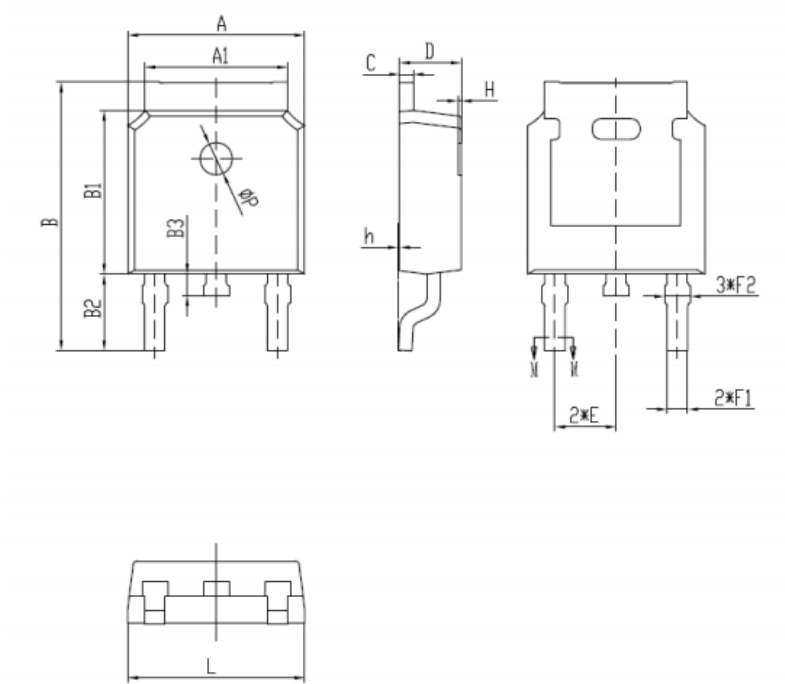


6 Package Outlines



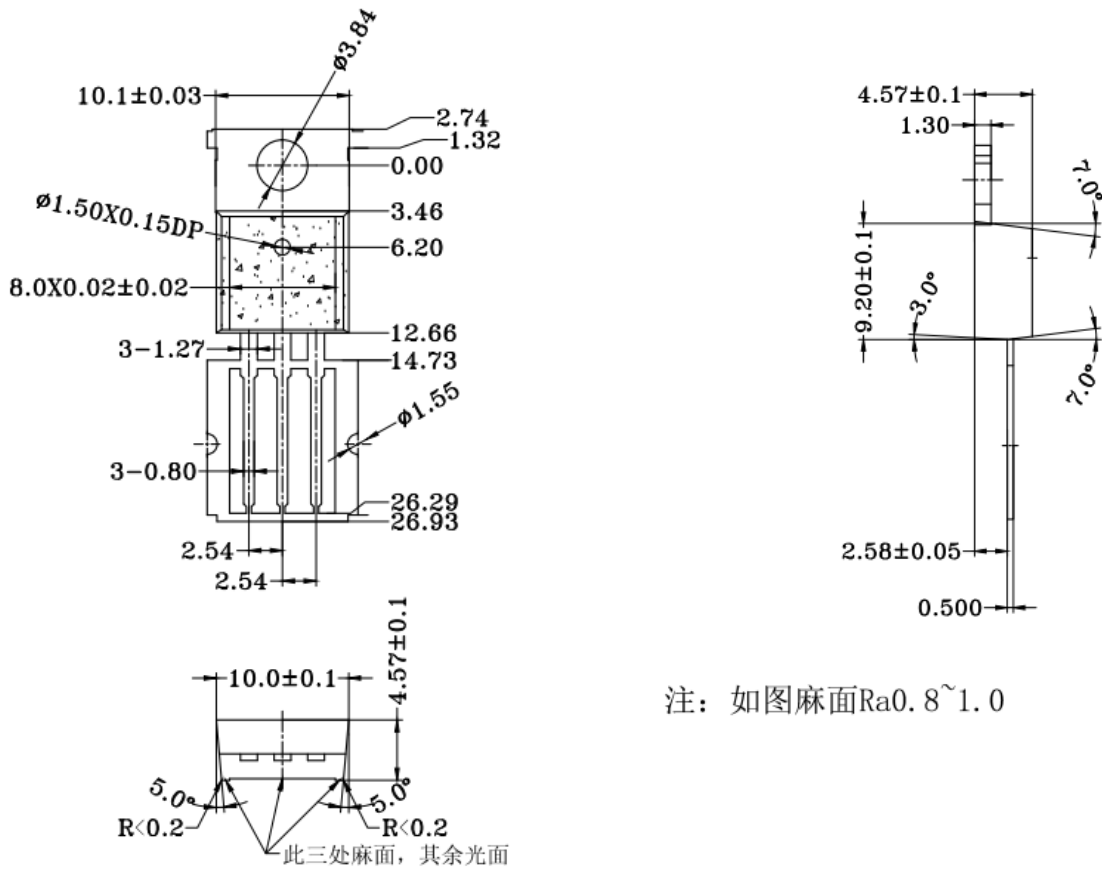
UNIT	A	B	C	D	E	F	G	W	H	H1	L	L1	Q	P	P1
mm	1.5	1.5	0.5	2.60	1.6	0.94	2.54	10.5	4.8	2.9	16.5	8.7	8°	7.6	8.2
	1.1	1.1	0.3	2.15	1.1	0.68	TYP	9.6	4.4	2.5	14.5	8.2	MAX	7.1	7.4

Figure1: Outline PG-T0263(HC)



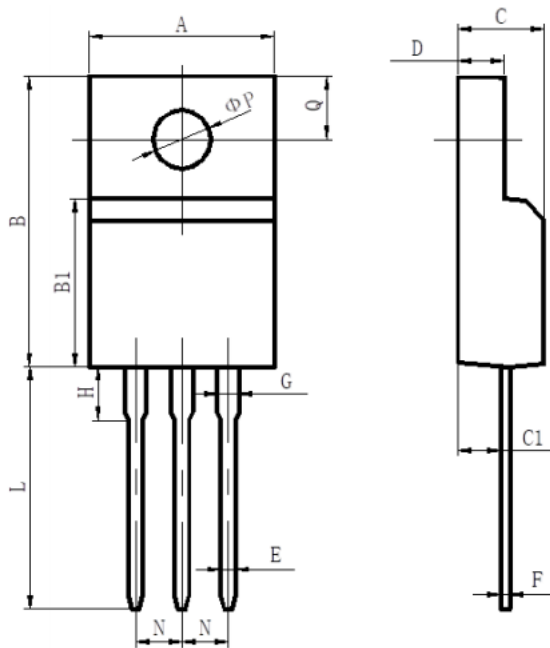
项目	规范(mm)	
	MIN	MAX
A	6.50	6.70
A1	5.16	5.46
B	9.77	10.17
B1	6.00	6.20
B2	2.60	3.00
B3	0.70	0.90
C	0.45	0.61
D	2.20	2.40
E	2.186	2.386
F1	0.67	0.87
F2	0.76	0.96
H	0.00	0.30
h	0.00	0.127
L	6.50	6.70
φ P	1.10	1.30

Figure2: Outline PG-T0252(HT)



注：如图麻面Ra0.8~1.0

Figure3: Outline PG-T0220(HT)



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
ΦP	3.00	3.30

Figure4: Outline PG-T0220F(HT)

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2022-04-03	Preliminary version
1.1	2022-04-18	Added package for TO220,TO220F
1.2	2022-05-01	Added electrical characteristics diagram