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: RDS(on) = 3mΩ (typ.)
High speed power switching
Enhanced body diode dv/dt capability Enhanced avalanche ruggedness

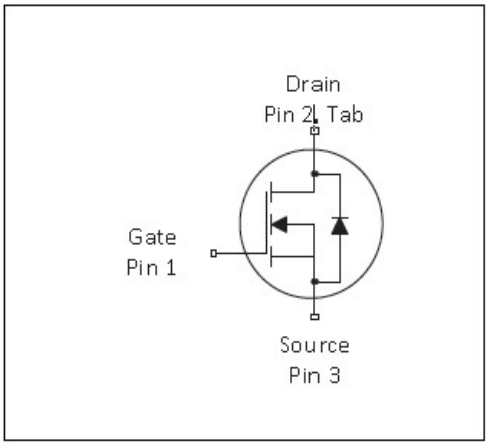
Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	60	V
$R_{DS(on),max}$	3.4	mΩ
$Q_{g,typ}$	85.34	nC
$I_{D,pulse}$	840	A

3. Packaging and Internal Circuit

Part Name	Package	Marking
AUP034N06	TO220	AUP034N06

TO220



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 at silicon[1)]	I_D		-	210	A	T_C=25°C
Continuous drain current at package[1)]	I_D		-	168	A	T_C=25°C
Continuous drain current at silicon[1)]	I_D			150	A	T_C=100°C
Pulsed drain current[2)]	$I_{D,pulse}$	-		840	A	T_C=25°C
Avalanche energy, single pulse	E_{AS}	-	-	471	mJ	Tc=25℃,VDD=50V,Vgs=10V, L=0.5mH, RG=25Ω
Avalanche current, single pulse	I_{AR}	-	-	43.4	A	Tc=25℃,VDD=50V,Vgs=10V, L=0.5mH, RG=25Ω
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Power dissipation	P_{tot}	-	-	230	W	T_C=25°C
Storage temperature	T_{stg}	-55	-	175	°C	
Operating junction temperature	T_j	-55	-	175	°C	
Soldering Temperature Distance of 1.6mm from case for 10s	T_L			300	°C	

1) Limited by Tj,max. Maximum Duty Cycle D = 0.50

2) Pulse width tp limited by Tj,max

3) Identical low side and high side switch with identical RG

2 Thermal characteristics

Table3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.65	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	°C/W	device on PCB, minimal footprint

3 Electrical characteristics

atT_j=25°C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{(GS)th}$	2.5	2.8	4.5	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	1	uA	V_{DS}=60V, V_{GS}=0V, T_j=25°C
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	3	3.4	mΩ	V_{GS}=10V, I_D=20A, T_j=25°C
Gate resistance (Intrinsic)	R_G	-	2	-	Ω	f=1MHz, V_{DS}=0V, V_{GS}=0V
Transconductance	Gfs	-	94.72	-	S	V_{DS}=10V, I_D=20A

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	5744	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Output capacitance	C_{oss}	-	1406	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Reverse transfer capacitance	C_{rss}	-	122.9	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	V_{DS}=30V,V_{GS}=10V,I_D=50A,R_G=3Ω
Rise time	t_r	-	29	-	ns	V_{DS}=30V,V_{GS}=10V,I_D=50A,R_G=3Ω
Turn-off delay time	$t_{d(off)}$	-	45	-	ns	V_{DS}=30V,V_{GS}=10V,I_D=50A,R_G=3Ω
Fall time	t_f	-	22	-	ns	V_{DS}=30V,V_{GS}=10V,I_D=50A,R_G=3Ω

Table 6 Gate charge characteristics

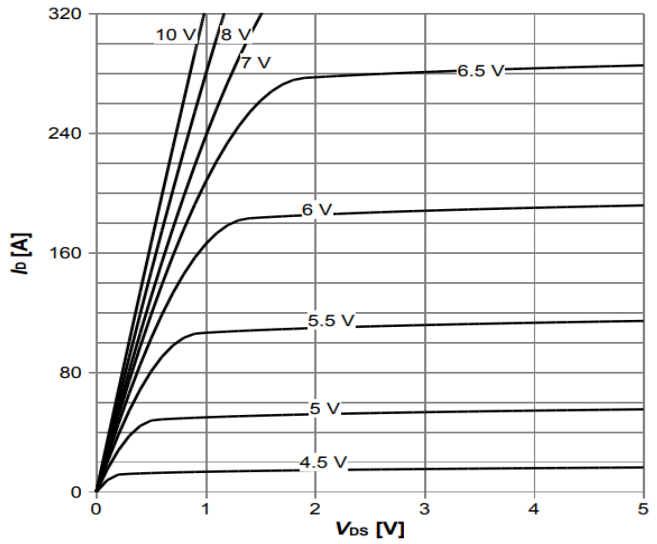
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	24.36	-	nC	V_{DD}=30V, I_D=20A, V_{GS}=10V
Gate to drain charge	Q_{gd}	-	17.79	-	nC	V_{DD}=30V, I_D=20A, V_{GS}=10V
Gate charge total	Q_g	-	85.34	-	nC	V_{DD}=30V, I_D=20A, V_{GS}=10V
Gate plateau voltage	$V_{plateau}$	-	4.39	-	V	V_{DD}=30V, I_D=20A, V_{GS}=10V

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous Source Current at silicon	I_{SD}	-	-	210	A	*Maximum Ratings*
Diode forward voltage	V_{SD}	-	0.69		V	*Vgs=0V*， I_S=1A, T_j=25°C
Reverse recovery time	t_{rr}	-	66.67	-	ns	*Vgs=0V*, I_F=50A, di_F/d*t*=100A/μs
Reverse recovery charge	Q_{rr}	-	84	-	nC	*Vgs=0V*, I_F=50A, di_F/d*t*=100A/μs
Peak Reverse Recovery Current	I_{rrm}	-	1.93	-	A	*Vgs=0V*, I_F=50A, di_F/d*t*=100A/μs

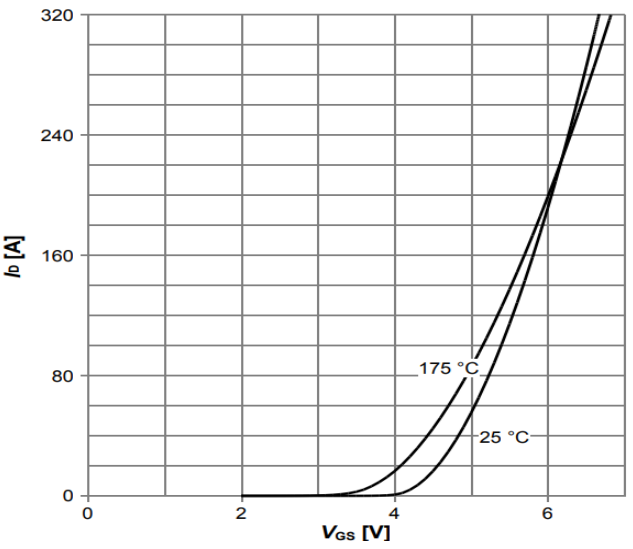
4 Electrical characteristics diagram

Diagram 1: Typ. Output characteristics



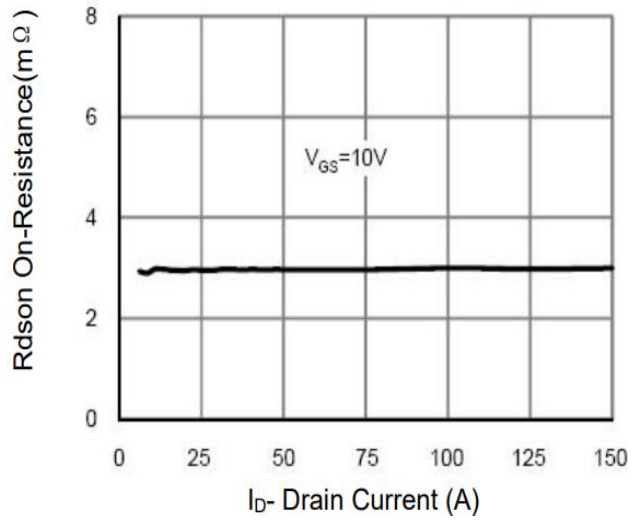
I_D=f(V_{DS});T_j=25 °C; parameter: V_{GS}

Diagram 2: Typ. transfer characteristics



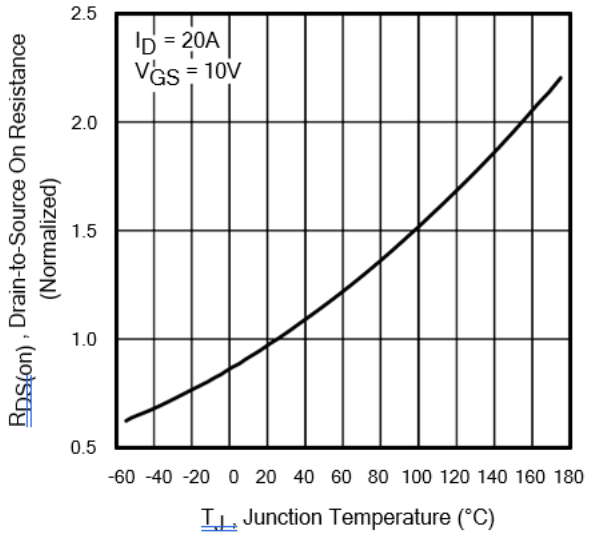
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 3: Typ. Rdson vs. Drain Current



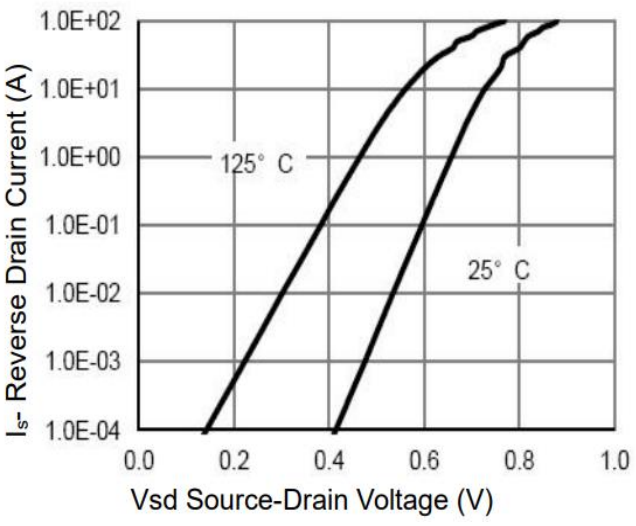
$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}

Diagram 4: Typ. Rdson – Junction Temperature



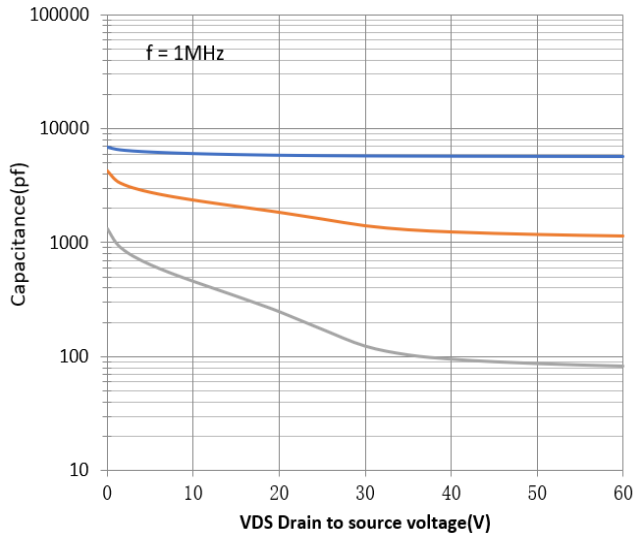
$R_{ds(on)}$=f(T_j);Vgs=10V/I_D=20A

Diagram 5: Typ. Body-Diode Characteristics



I_F=f(V_{SD}); parameter: T_j

Diagram 6: Typ. Capacitance vs. Vds



C=f(V_{DS});V_{GS}=0V; f=1MHz

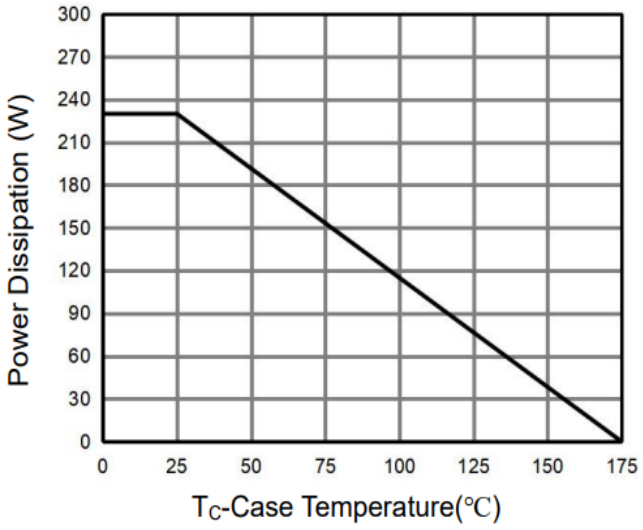
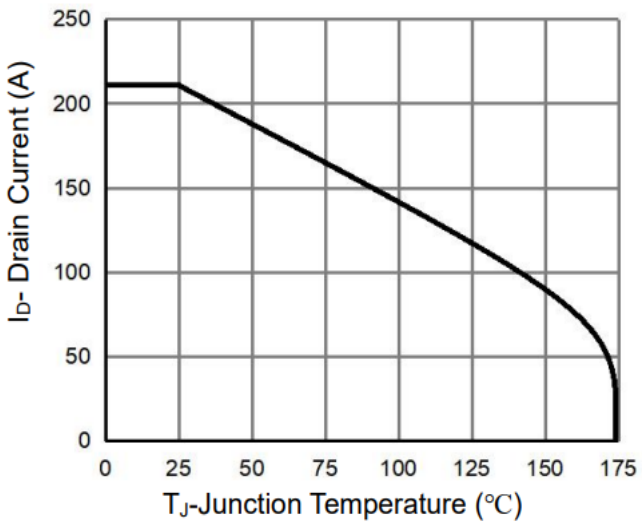
Diagram 7: Typ. Power Dissipation	Diagram 8: Typ. Drain Current De-rating
	
P_{tot}=f(T_C);	I_D=f(T_C); V_{GS}≥10 V

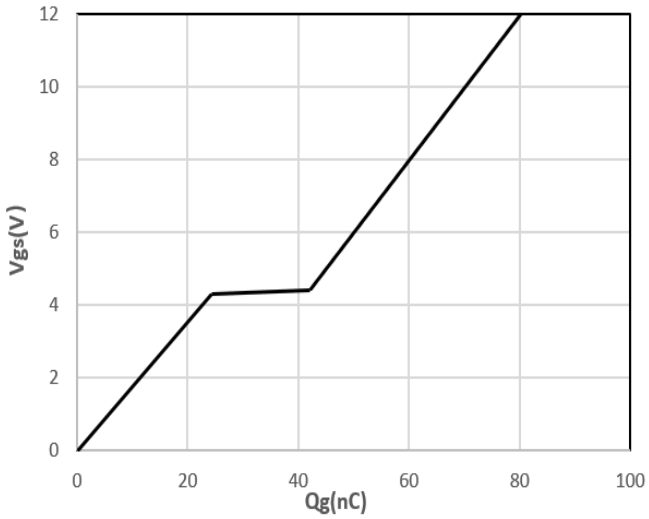
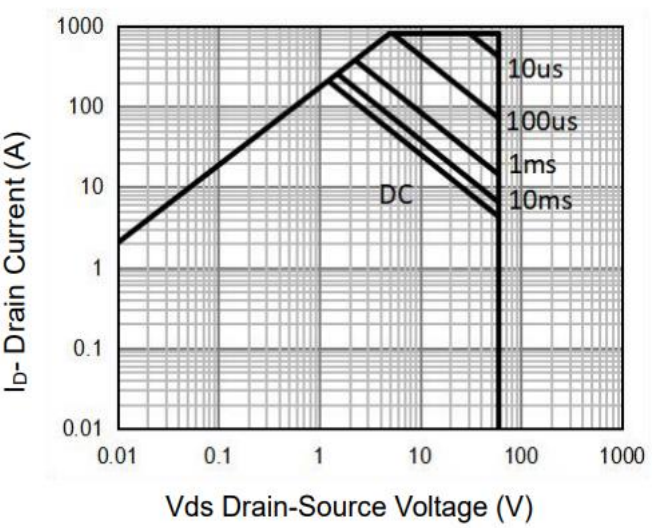
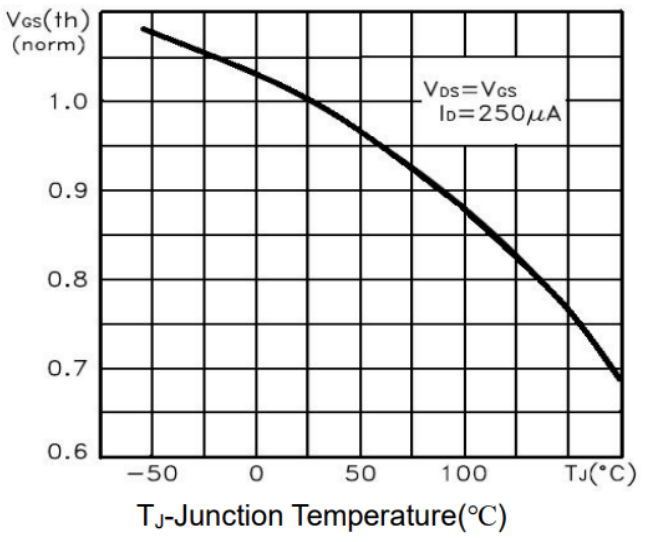
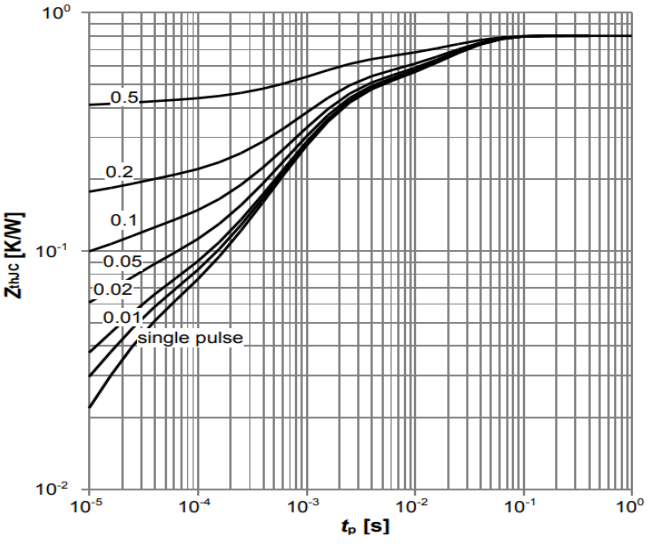
Diagram 9: Typ. Gate charge	Diagram 10: Typ. Maximum Safe Operating Area
	
V_{GS}=f(Q_{gate});I_D=20A pulsed; parameter: V_{DD}	I_D=f(V_{DS}); T_C=25 °C; V_{GS}> 7V; D=0; parameter tp

Diagram 11: Typ. Gate Threshold Voltage vs. Junction Temperature	Diagram 12: Typ. Normalized Maximum Transient Thermal Impedance
	
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; parameter: I_D	Z_{thJC}=f(t_p); parameter: D=t_p/T

5. Test Circuits

Table 8 Diode characteristics

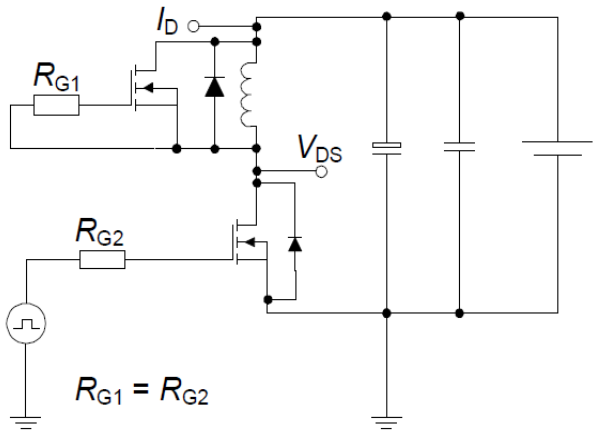
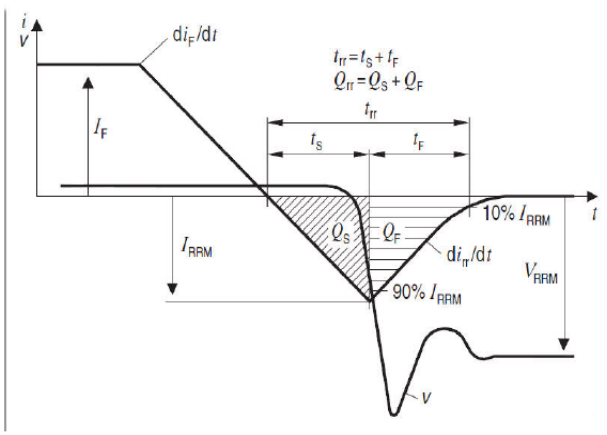
Test circuit for diode characteristics	Diode recovery waveform
	

Table 9 Switching times

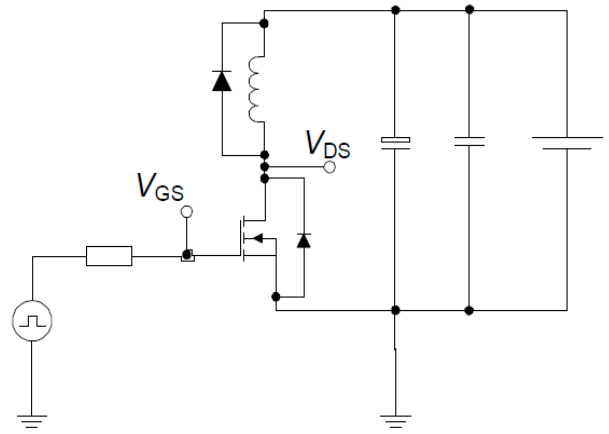
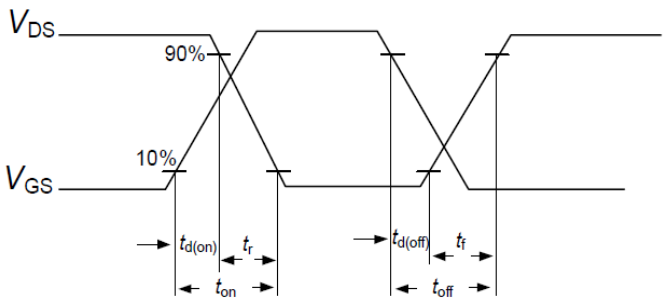
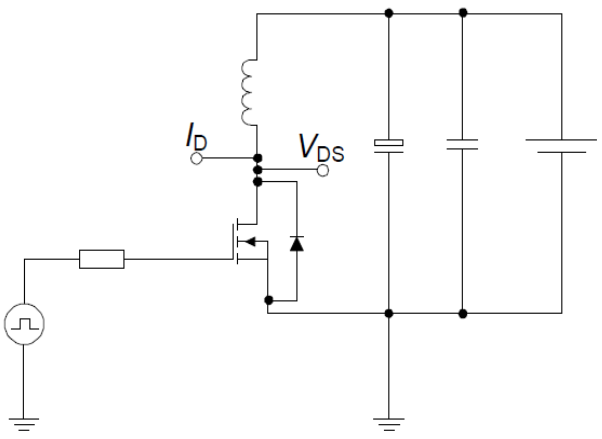
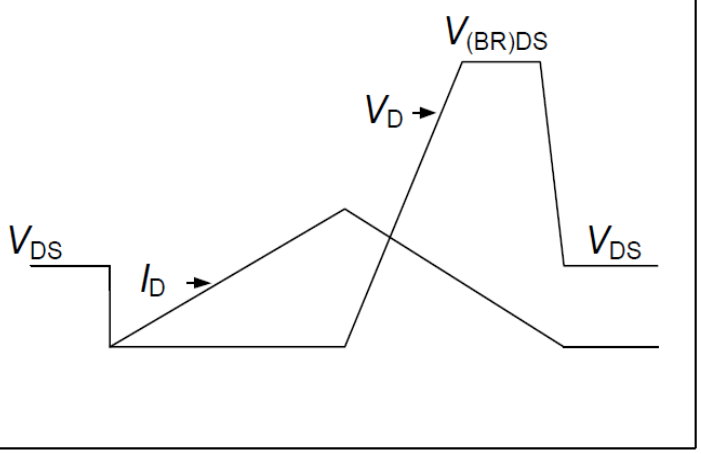
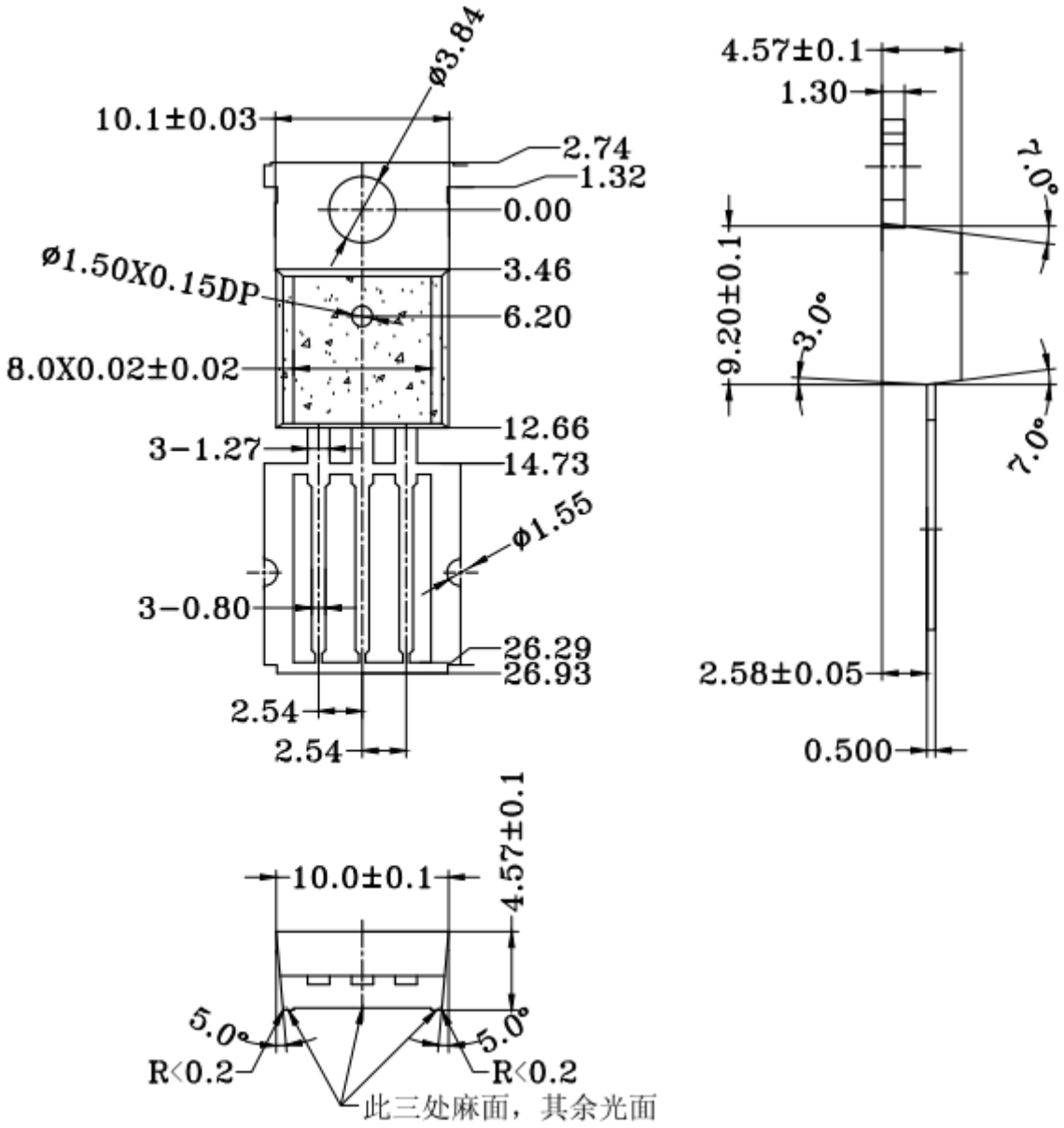
Switching times test circuit for inductive load	Switching times waveform
	

Table 10 Unclamped inductive load

Unclamped inductive load test circuit	Unclamped inductive waveform
	

6. Package Outlines



Outline PG-TO220(HT)

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2023-07-28	Preliminary version

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