

## 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:  $R_{DS(on)} = 3m\Omega$  (typ.)  
High speed power switching  
Enhanced body diode dv/dt capability Enhanced avalanche ruggedness

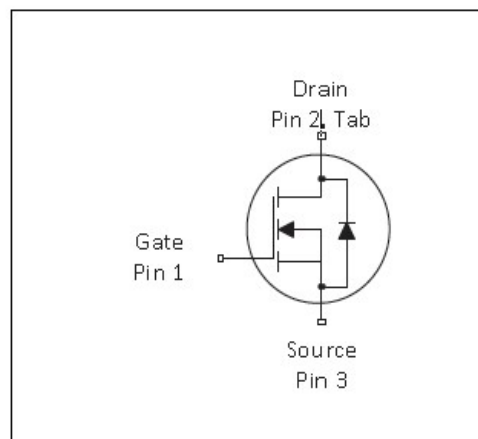


**Table 1 Key Performance Parameters**

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

### 3. Packaging and Internal Circuit

Part Name	Package	Marking
AUP034N06	TO220	AUP034N06



## 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 at silicon <sup>1)</sup>	$I_D$		-	210	A	$T_C = 25^\circ\text{C}$
Continuous drain current at package <sup>1)</sup>	$I_D$		-	168	A	$T_C = 25^\circ\text{C}$
Continuous drain current at silicon <sup>1)</sup>	$I_D$			150	A	$T_C = 100^\circ\text{C}$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-		840	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	$E_{AS}$	-	-	471	mJ	$T_C = 25^\circ\text{C}, V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, L = 0.5\text{mH}, R_G = 25\Omega$
Avalanche current, single pulse	$I_{AR}$	-	-	43.4	A	$T_C = 25^\circ\text{C}, V_{DD} = 50\text{V}, V_{GS} = 10\text{V}, L = 0.5\text{mH}, R_G = 25\Omega$
Gate source voltage (static)	$V_{GS}$	-20	-	20	V	static;
Power dissipation	$P_{tot}$	-	-	230	W	$T_C = 25^\circ\text{C}$
Storage temperature	$T_{stg}$	-55	-	175	$^\circ\text{C}$	
Operating junction temperature	$T_j$	-55	-	175	$^\circ\text{C}$	
Soldering Temperature Distance of 1.6mm from case for 10s	$T_L$			300	$^\circ\text{C}$	

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

**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

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	$V_{(BR)DSS}$	60	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	2.5	2.8	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=60V, V_{GS}=0V, T_j=25^\circ\text{C}$
Gate-source leakage current	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	3	3.4	m $\Omega$	$V_{GS}=10V, I_D=20A, T_j=25^\circ\text{C}$
Gate resistance (Intrinsic)	$R_G$	-	2	-	$\Omega$	$f=1\text{MHz}, V_{DS}=0V, V_{GS}=0V$
Transconductance	$G_{fs}$	-	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	$V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$
Output capacitance	$C_{oss}$	-	1406	-	pF	$V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$
Reverse transfer capacitance	$C_{rss}$	-	122.9	-	pF	$V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	$V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=3\Omega$
Rise time	$t_r$	-	29	-	ns	$V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=3\Omega$
Turn-off delay time	$t_{d(off)}$	-	45	-	ns	$V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=3\Omega$
Fall time	$t_f$	-	22	-	ns	$V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=3\Omega$

**Table 6 Gate charge characteristics**

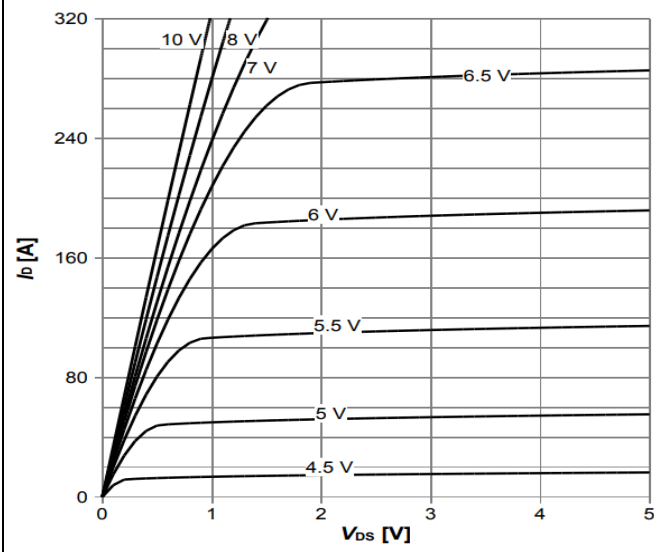
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	24.36	-	nC	$V_{DD}=30V, I_D=20A, V_{GS}=10V$
Gate to drain charge	$Q_{gd}$	-	17.79	-	nC	$V_{DD}=30V, I_D=20A, V_{GS}=10V$
Gate charge total	$Q_g$	-	85.34	-	nC	$V_{DD}=30V, I_D=20A, V_{GS}=10V$
Gate 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	$V_{gs}=0V, I_s=1A, T_j=25^\circ C$
Reverse recovery time	$t_{rr}$	-	66.67	-	ns	$V_{gs}=0V, I_f=50A, di_f/dt=100A/\mu s$
Reverse recovery charge	$Q_{rr}$	-	84	-	nC	$V_{gs}=0V, I_f=50A, di_f/dt=100A/\mu s$
Peak Reverse Recovery Current	$I_{rrm}$	-	1.93	-	A	$V_{gs}=0V, I_f=50A, di_f/dt=100A/\mu s$

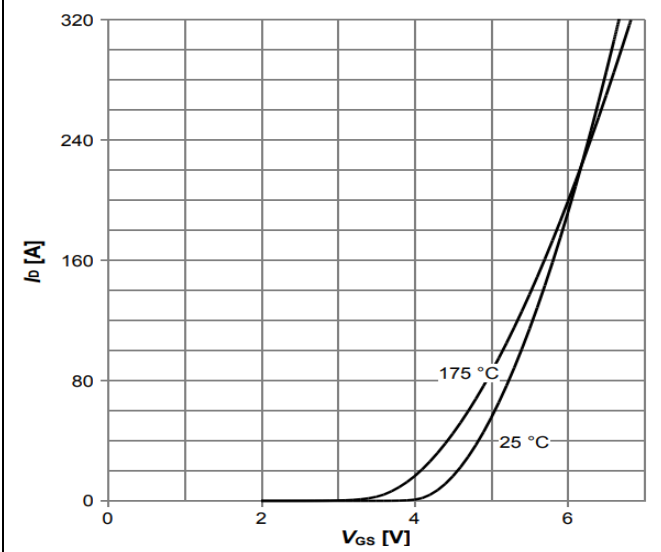
### 4 Electrical characteristics diagram

**Diagram 1: Typ. Output characteristics**



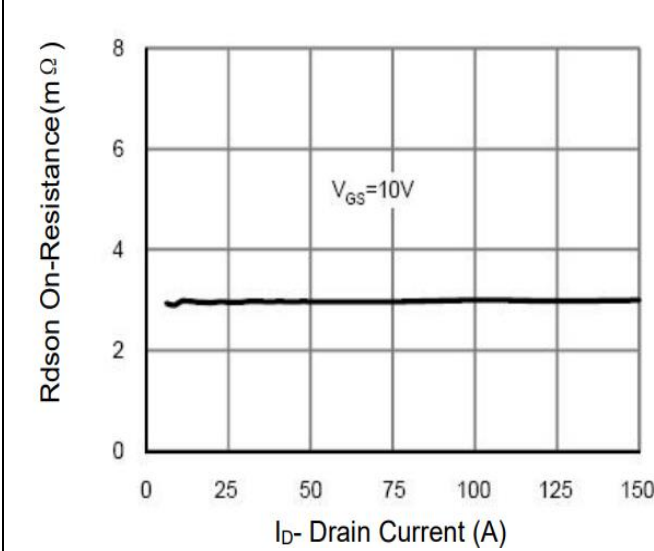
$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C};$  parameter:  $V_{GS}$

**Diagram 2: Typ. transfer characteristics**



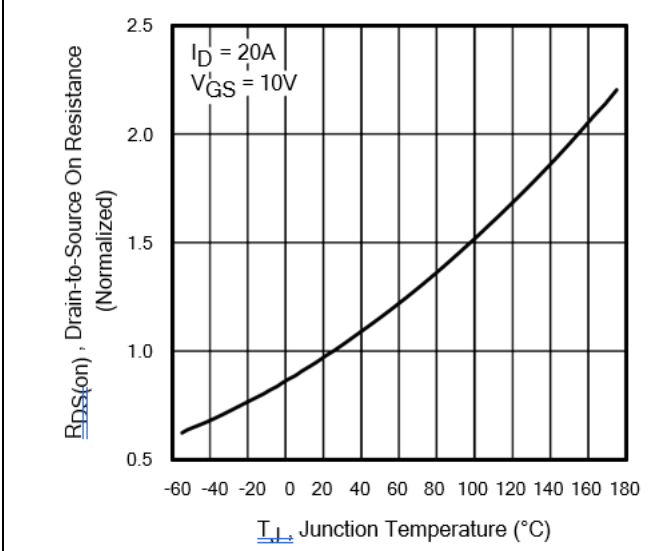
$I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max};$  parameter:  $T_j$

**Diagram 3: Typ. Rdson vs. Drain Current**



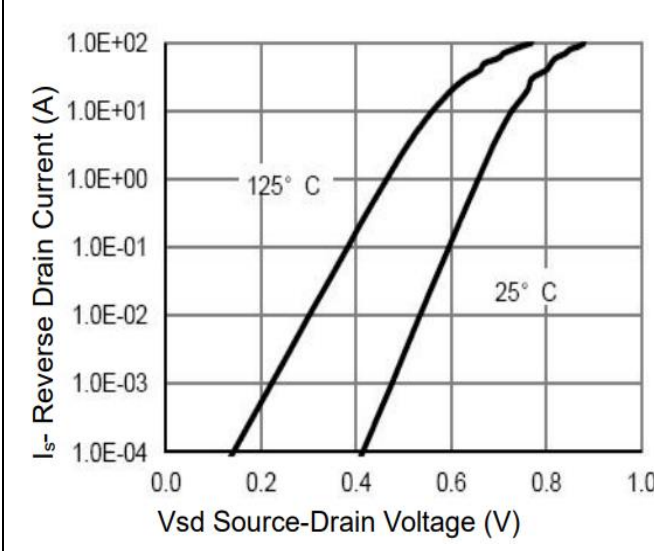
$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C};$  parameter:  $V_{GS}$

**Diagram 4: Typ. Rdson – Junction Temperature**



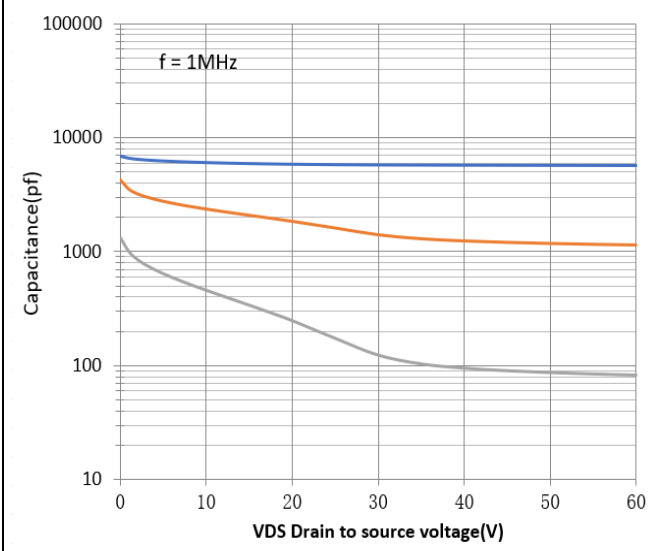
$R_{DS(on)}=f(T_j); V_{GS}=10V/I_D=20A$

**Diagram 5: Typ. Body-Diode Characteristics**



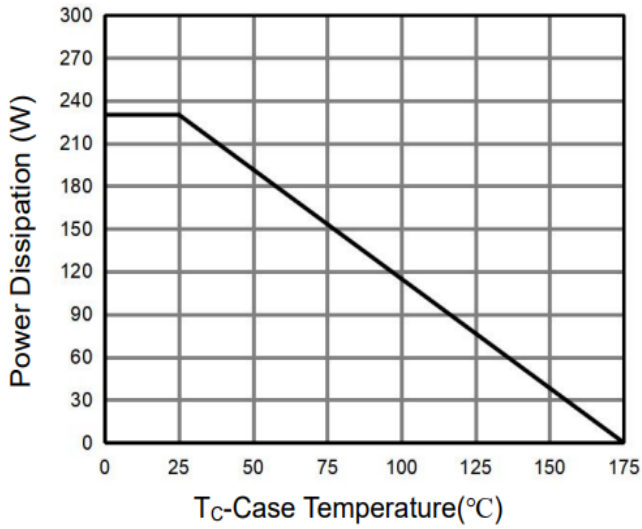
$I_F=f(V_{SD});$  parameter:  $T_j$

**Diagram 6: Typ. Capacitance vs. Vds**



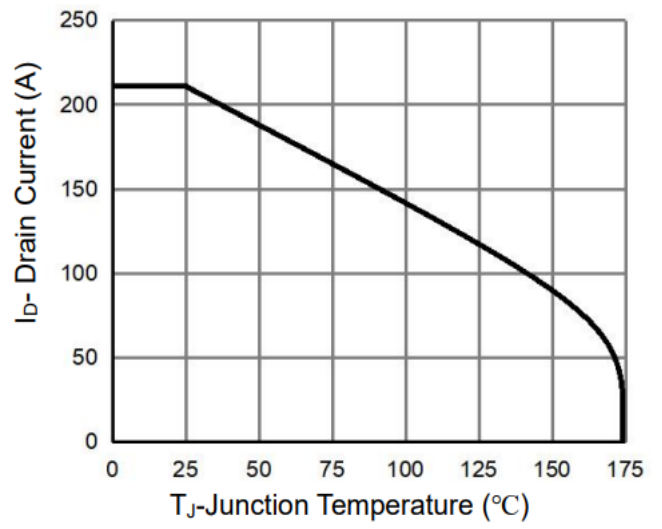
$C=f(V_{DS}); V_{GS}=0V; f=1MHz$

Diagram 7: Typ. Power Dissipation



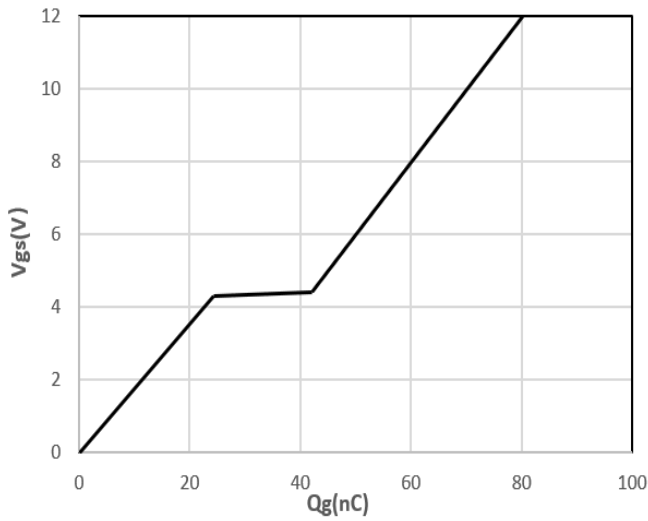
$P_{tot} = f(T_C)$

Diagram 8: Typ. Drain Current De-rating



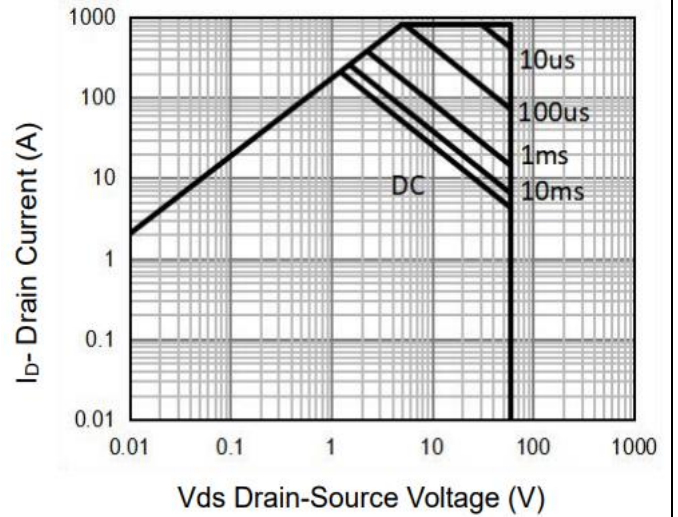
$I_D = f(T_J); V_{GS} \geq 10V$

Diagram 9: Typ. Gate charge



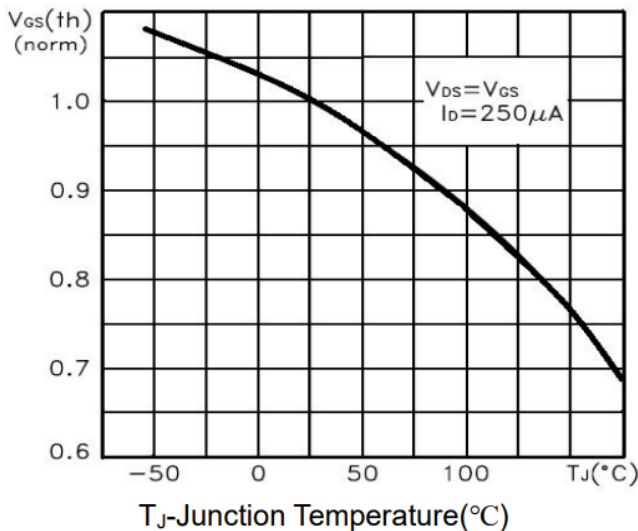
$V_{GS} = f(Q_{gate}); I_D = 20A \text{ pulsed}; \text{parameter: } V_{DD}$

Diagram 10: Typ. Maximum Safe Operating Area



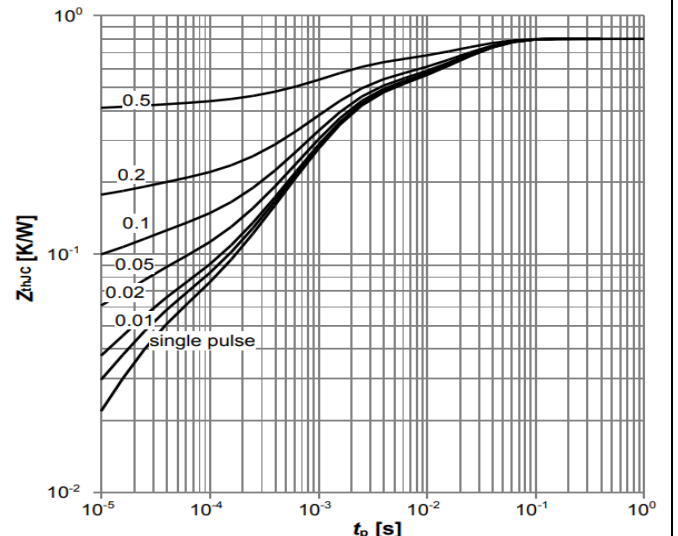
$I_D = f(V_{DS}); T_C = 25^\circ C; V_{GS} > 7V; D = 0; \text{parameter } t_p$

Diagram 11: Typ. Gate Threshold Voltage vs. Junction Temperature



$V_{GS(th)} = f(T_J); V_{GS} = V_{DS}; \text{parameter: } I_D$

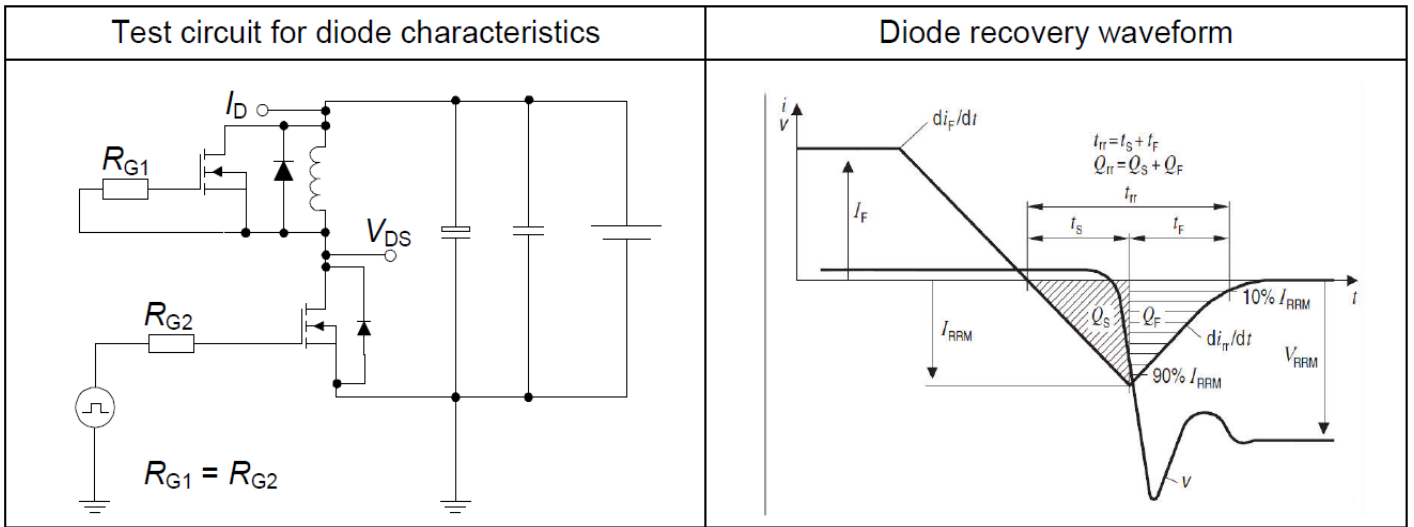
Diagram 12: Typ. Normalized Maximum Transient Thermal Impedance



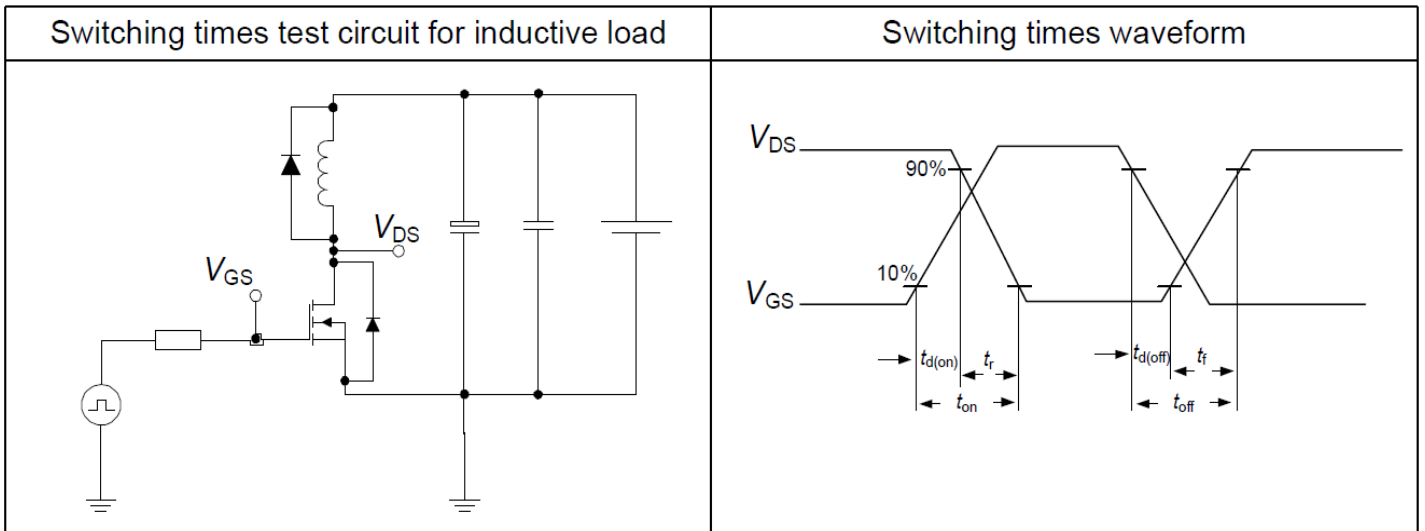
$Z_{thJC} = f(t_p); \text{parameter: } D = t_p/T$

### 5. Test Circuits

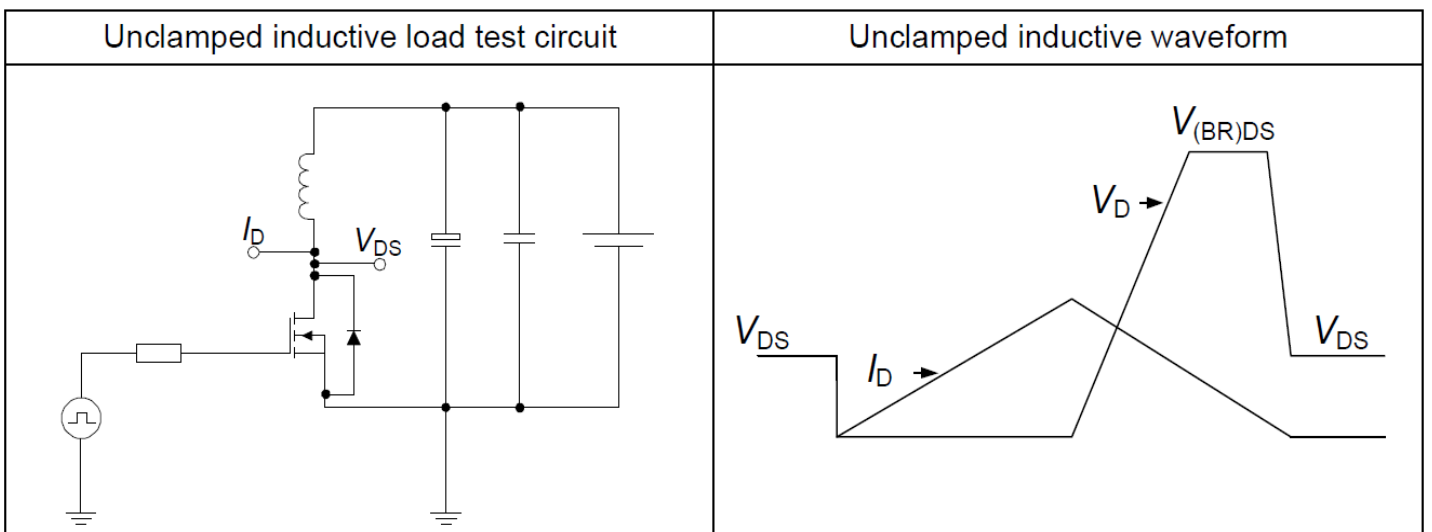
**Table 8 Diode characteristics**



**Table 9 Switching times**

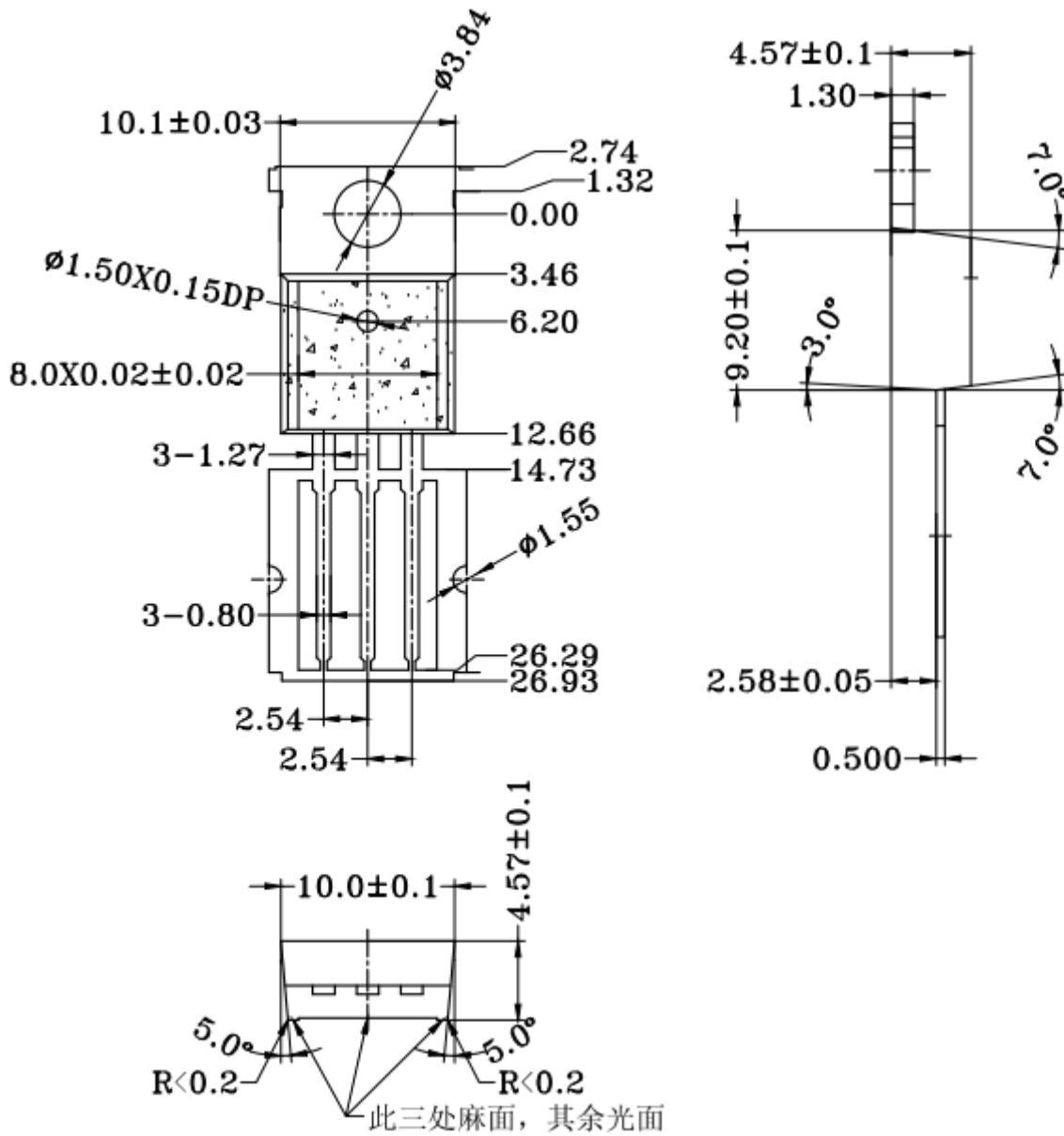


**Table 10 Unclamped inductive load**





6. Package Outlines



Outline PG-TO220(HT)

## Revision History

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