

MOSFET Silicon N-Channel MOS for Automotive



1. Applications

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

2. Features

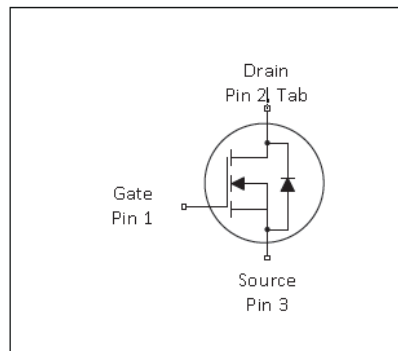
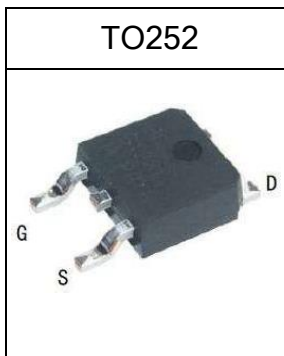
Low drain-source on-resistance:
RDS(ON) = 2.9mΩ (typ.)
Easy to control Gate switching
Enhancement mode: Vth = 1 to 2.3 V
175°C operating temperature
AEC-Q101 qualified



Table 1 Key Performance Parameters

Parameter	Value	Unit
V _{DS} @ T _{j,max}	40	V
R _{DS(on),max}	3.4	mΩ
Q _{g,typ}	156.7	nC
I _{D,pulse}	375	A

3. Packaging and Internal Circuit



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		-	125	A	$T_C=25^\circ\text{C}$
				88	A	$T_C=100^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	375	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	272	mJ	$T_C=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $I=33\text{A}$, $L=0.5\text{mH}$, $R_G=25\Omega$
Avalanche current, single pulse	I_{AR}	-	-	33	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	P_{tot}	-	-	105	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			260	$^\circ\text{C}$	
Transconductance	GFS	-	46.5	-	S	$V_{DS}=5\text{V}$ $I_{DS}=10\text{A}$

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 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.44	°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	$V_{(BR)DSS}$	40	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	1	1.7	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=40V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.9	3.4	m Ω	$V_{GS}=10V, I_D=20A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	R_G	-	1.1	-	Ω	$f=1\text{MHz}$, open drain

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	5451	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1\text{MHz}$
Output capacitance	C_{oss}	-	484	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1\text{MHz}$
Reverse transfer capacitance	C_{rss}	-	406	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	-	20.8	-	ns	$V_{DD}=25V, V_{GS}=10V, I_D=1A, R_G=6\Omega$
Rise time	t_r	-	26.2	-	ns	$V_{DD}=25V, V_{GS}=10V, I_D=1A, R_G=6\Omega$
Turn-off delay time	$t_{d(off)}$	-	213.1	-	ns	$V_{DD}=25V, V_{GS}=10V, I_D=1A, R_G=6\Omega$
Fall time	t_f	-	81.8	-	ns	$V_{DD}=25V, V_{GS}=10V, I_D=1A, R_G=6\Omega$

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	29.4	-	nC	$V_{DD}=20V, I_D=20A, V_{GS}=0$ to 10V
Gate to drain charge	Q_{gd}	-	26	-	nC	$V_{DD}=20V, I_D=20A, V_{GS}=0$ to 10V
Gate charge total	Q_g	-	156.7	-	nC	$V_{DD}=20V, I_D=20A, V_{GS}=0$ to 10V

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.7	1.1	V	$V_{GS}=0V, I_F=10A, T_j=25^{\circ}C$
Reverse recovery time	t_{rr}	-	31.2	-	ns	$V_R=20V, I_F=10A, di/dt=100A/\mu s$
Reverse recovery charge	Q_{rr}	-	32.1	-	nC	$V_R=20V, I_F=10A, di/dt=100A/\mu s$

4 Electrical characteristics diagram

Diagram 1: Typ. output characteristics

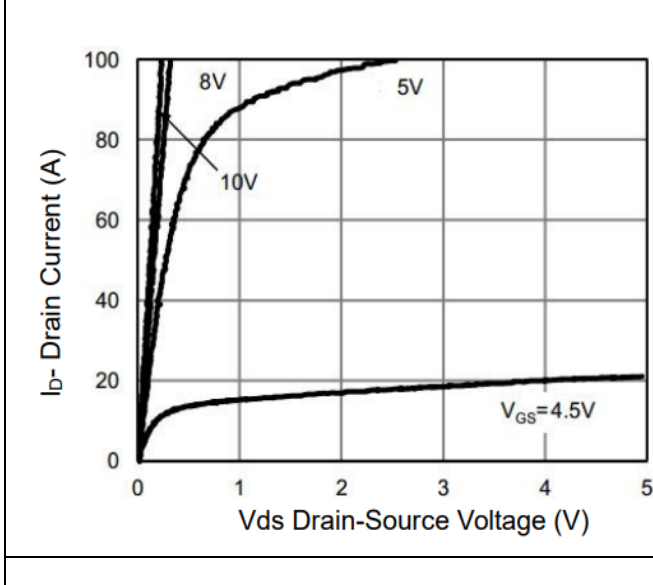


Diagram 2: Typ. transfer characteristics

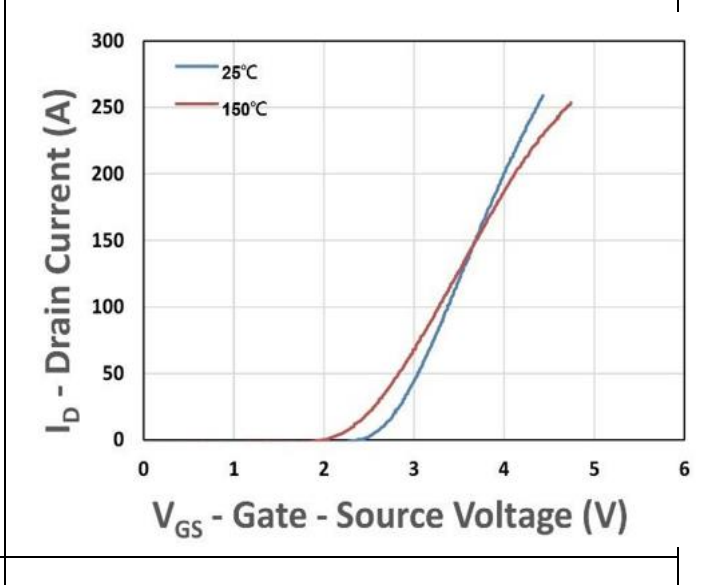


Diagram 3: Typ. Rdson vs. Drain Current

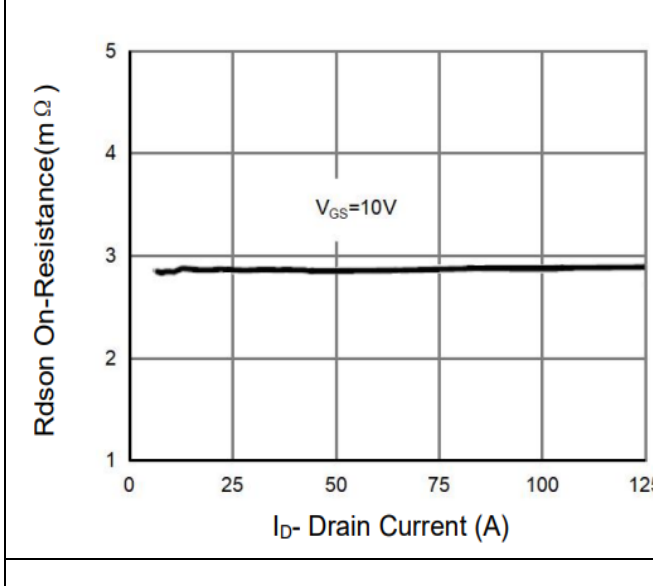


Diagram 4: Rdson – Junction Temperature

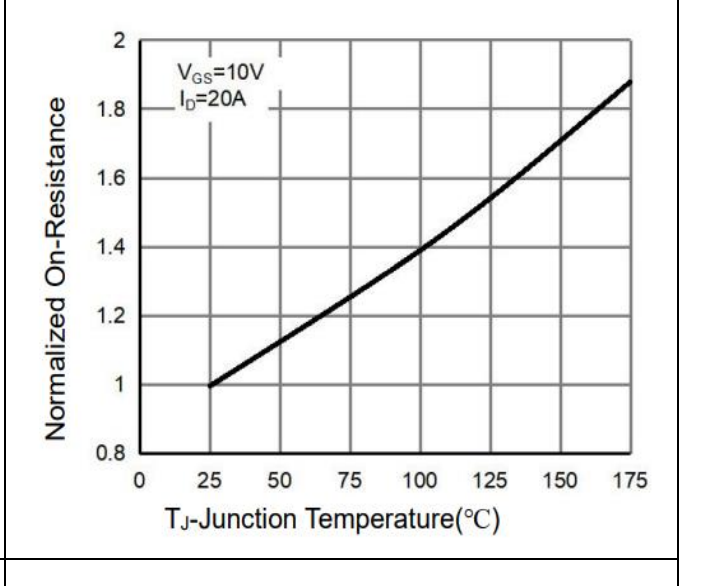


Diagram 5: Typ. Body-Diode Characteristics

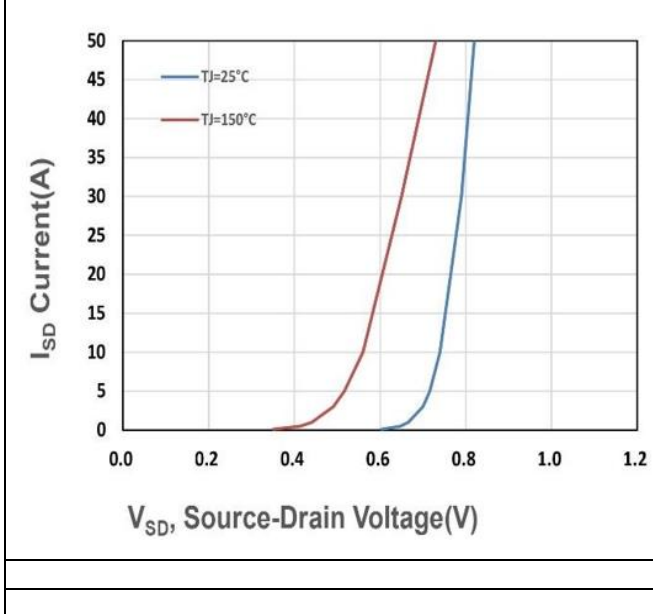


Diagram 6: Typ. Capacitance vs. Vds

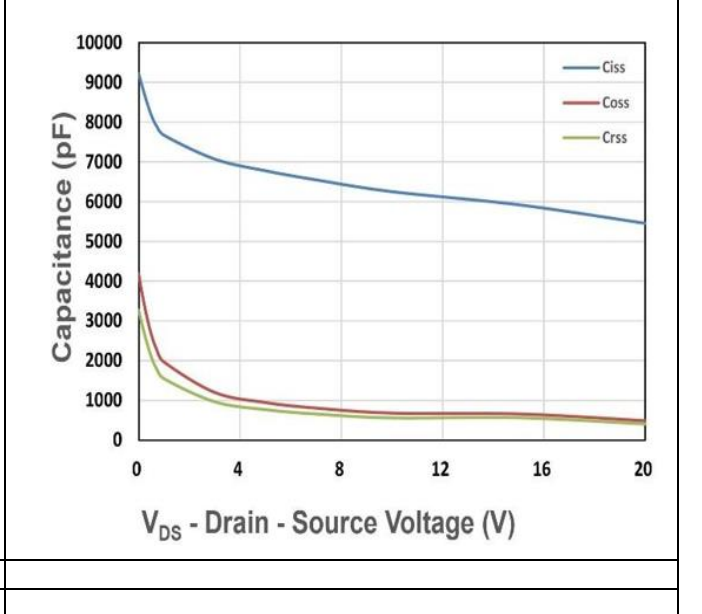


Diagram 7: Typ. Power Dissipation

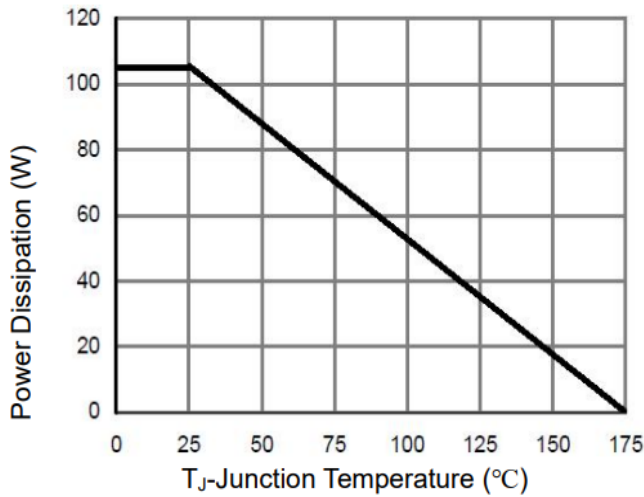


Diagram 8: Typ. Drain Current De-rating

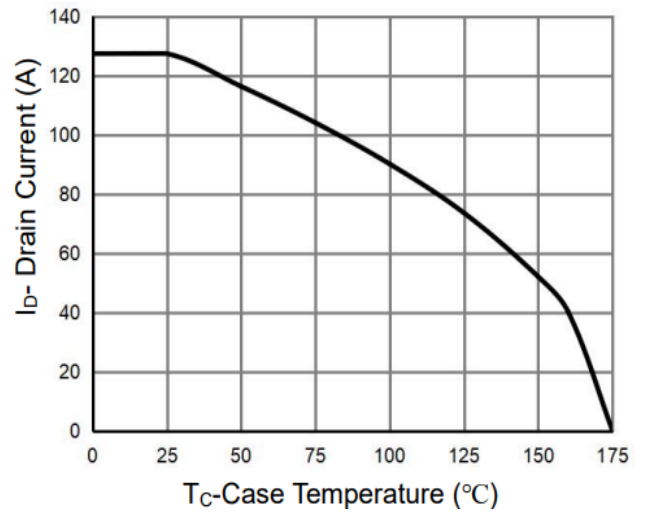


Diagram 9: Typ. Gate charge

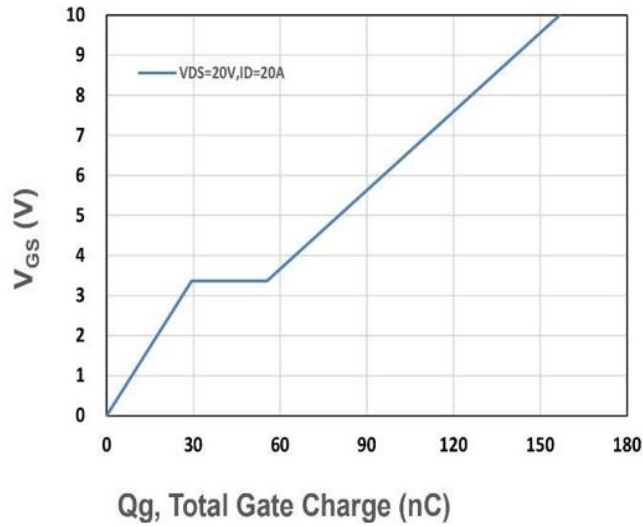


Diagram 10: Typ. Maximum Safe Operating Area

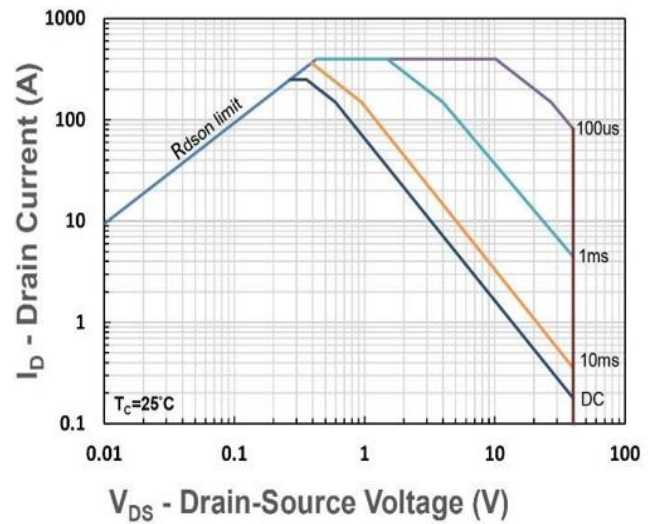


Diagram 11: Typ. Gate Threshold Voltage Vs. Temperature

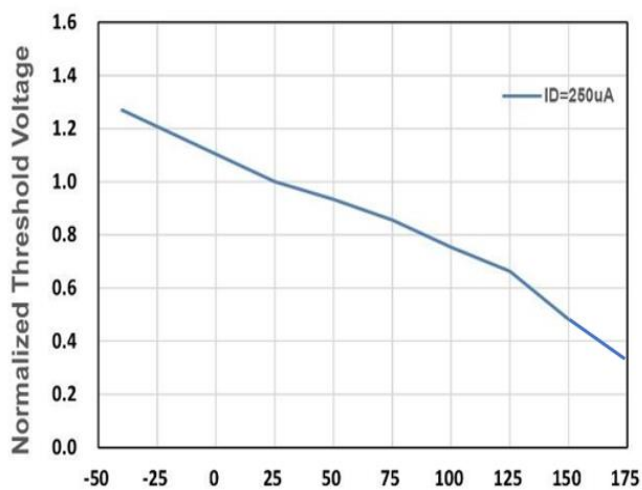
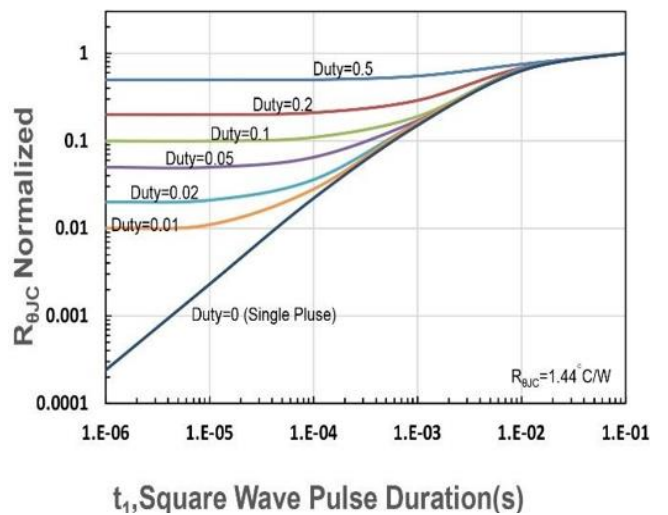


Diagram 12: Typ. Maximum Safe Operating Area



5 Test Circuits

Table 8 Diode characteristics

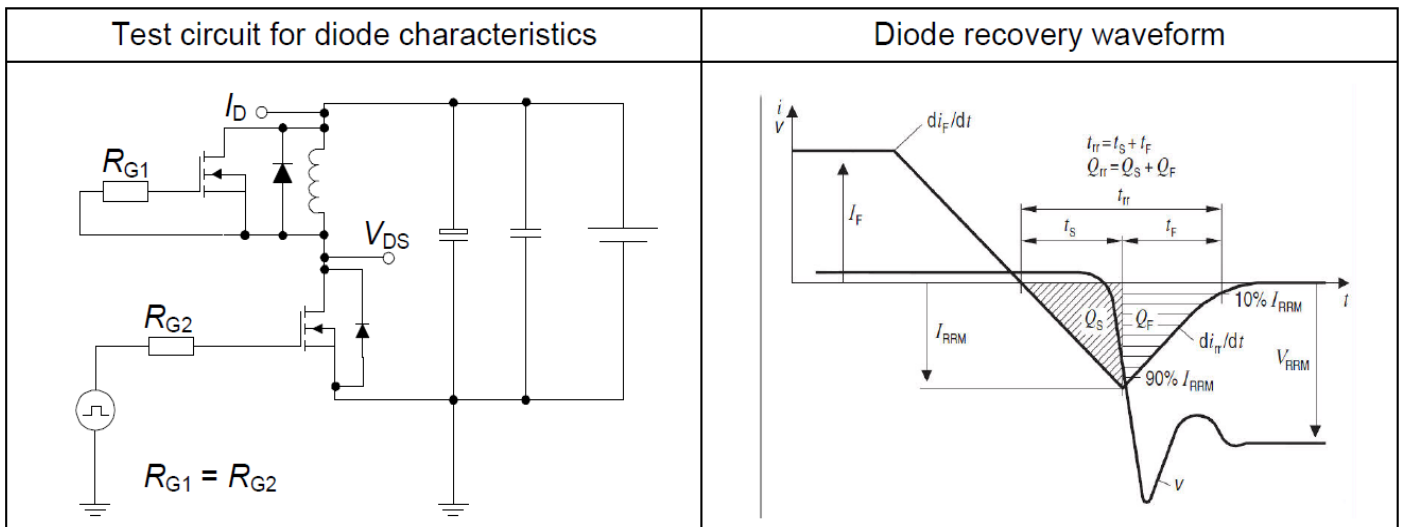


Table 9 Switching times

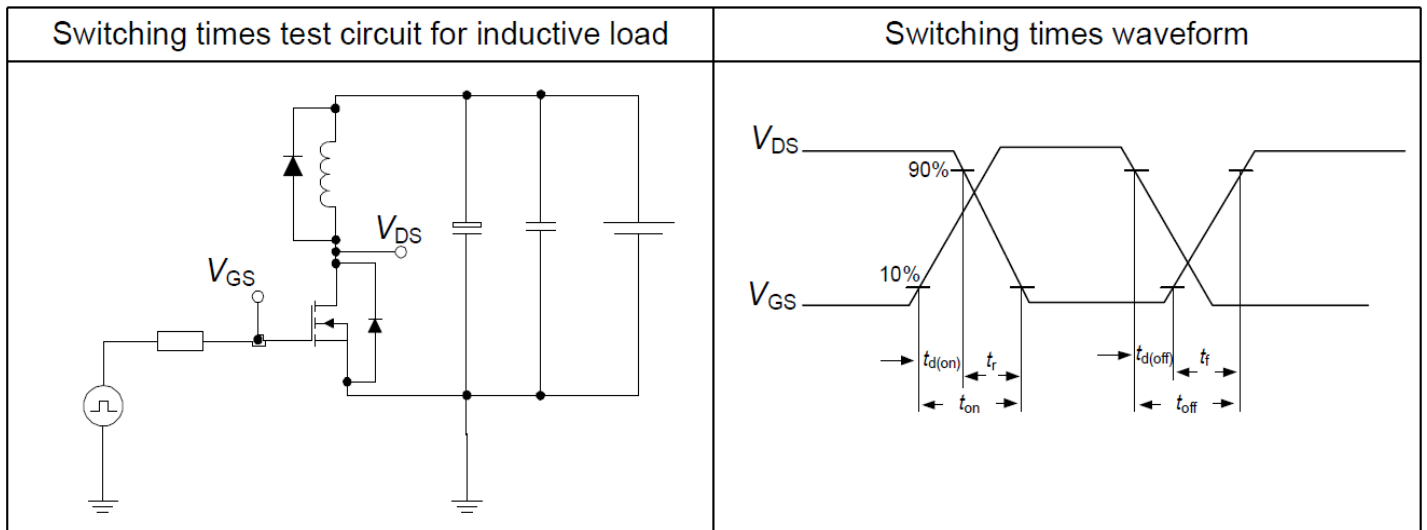
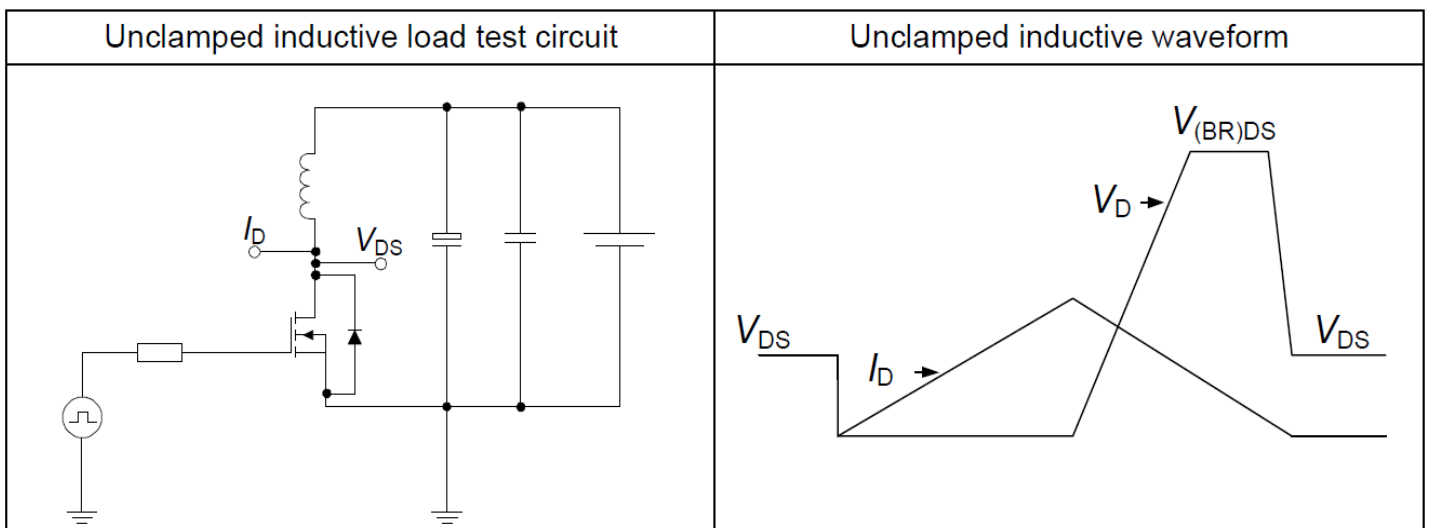
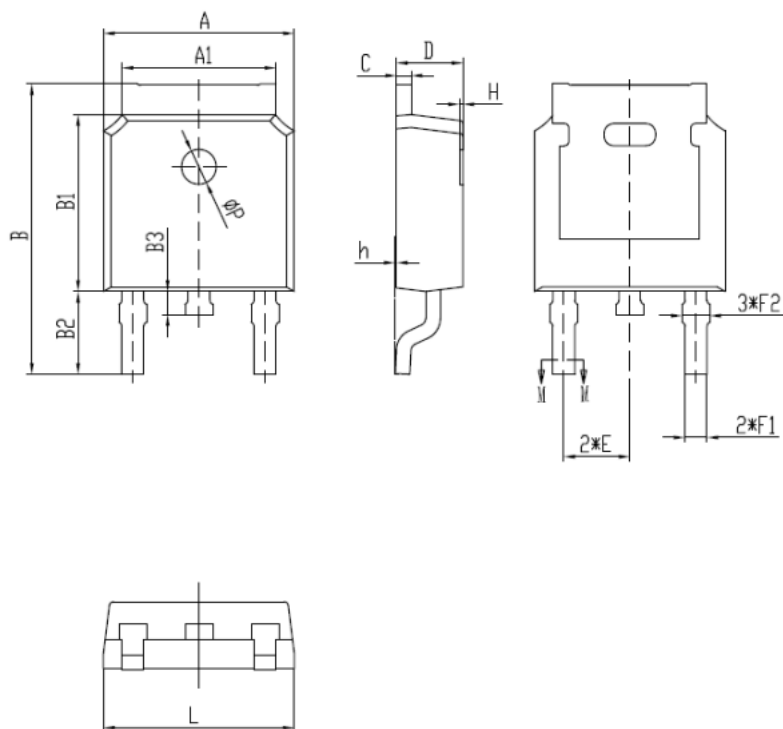


Table 10 Unclamped inductive load



5 Package Outlines



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
ϕP	1.10	1.30

Outline PG-T0252(HT)

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2023-05-08	Preliminary version