

## MOSFET Silicon N-Channel MOS



### 1. Applications

Boost PFC switch, single-ended flyback or two-transistor forward, HB or AHB or LLC topologies.

For PC power, PD Adaptor, LCD & PDP TV, LED Lighting, Server power, UPS application.

### 2. Features

Low drain-source on-resistance:  $R_{DS(ON)} = 0.278\Omega$  (typ.)

Easy to control Gate switching

Enhancement mode:  $V_{th} = 2.8$  to  $4.2$  V

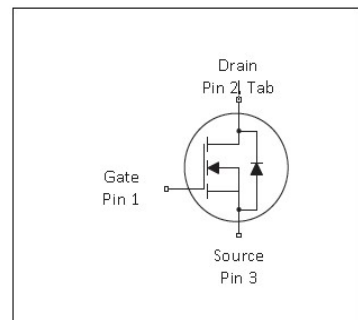
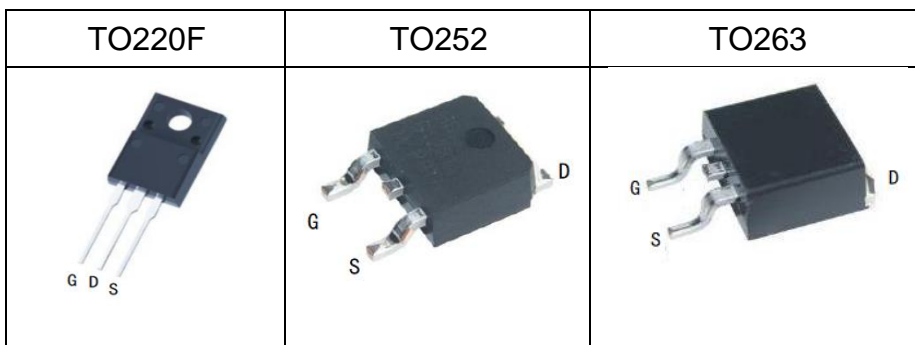


**Table 1 Key Performance Parameters**

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	700	V
$R_{DS(on),max}$	300	m $\Omega$
$Q_{g,typ}$	22.94	nC
$I_{D,pulse}$	45	A

### 3. Packaging and Internal Circuit

Part Name	Package	Marking
ASA65R300E	TO220F	ASA65R300E
ASD65R300E	TO252	ASD65R300E
ASB65R300E	TO263	ASB65R300E



**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 <sup>1)</sup>	$I_D$		-	15	A	$T_C=25^\circ\text{C}$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-	-	45	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse	$E_{AS}$	-	-	500	mJ	$T_C=25^\circ\text{C}, V_{DD}=50\text{V}, L=10\text{mH}, R_G=25\Omega$
MOSFET dv/dt ruggedness	dv/dt	-	-	124	V/ns	$V_{DS}=0\dots400\text{V}$
Gate source voltage (static)	$V_{GS}$	-20	-	20	V	static;
Gate source voltage (dynamic)	$V_{GS}$	-30	-	30	V	AC ( $f > 1\text{ Hz}$ )
Power dissipation(TO220F)	$P_{tot}$	-	-	32	W	$T_C=25^\circ\text{C}$
Power dissipation (TO252/263)	$P_{tot}$	-	-	118	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	$^\circ\text{C}$	
Reverse diode dv/dt <sup>3)</sup>	dv/dt	-	-	15	V/ns	$V_{DS}=0\dots400\text{V}, I_{SD} \leq I_S, T_j=25^\circ\text{C}$ see table 8

<sup>1)</sup>Limited by  $T_{j,max}$ . Maximum Duty Cycle  $D = 0.50$

<sup>2)</sup>Pulse width  $t_p$  limited by  $T_{j,max}$

<sup>3)</sup>Identical low side and high side switch with identical  $R_G$

## 2 Thermal characteristics

**Table 3 Thermal characteristics** (T0220 FullPAK)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{thJC}$	-	-	3.9	°C/W	-
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	80	°C/W	device on PCB, minimal footprint

**Thermal characteristics** (T0252/263)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{thJC}$	-	-	1.06	°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	$V_{(BR)DSS}$	655	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	2.8		4.2	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=650V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	$I_{GSS}$	-	-	100	nA	$V_{GS}=20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.278	0.30	$\Omega$	$V_{GS}=10V, I_D=7.5A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	$R_G$	-	5.7	-		$f=1\text{MHz}$ , open drain

**Table 5 Dynamic characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	1020	-	pF	$V_{GS}=0V, V_{DS}=50V, f=10\text{kHz}$
Output capacitance	$C_{oss}$	-	108	-	pF	$V_{GS}=0V, V_{DS}=50V, f=10\text{kHz}$
Reverse transfer capacitance	$C_{rss}$	-	5.11	-	pF	$V_{GS}=0V, V_{DS}=50V, f=10\text{kHz}$
Turn-on delay time	$t_{d(on)}$	-	8.4	-	ns	$V_{DD}=400V, I_D=3.8A, R_G=10\Omega$ ; see table 9
Rise time	$t_r$	-	21.2	-	ns	$V_{DD}=400V, I_D=3.8A, R_G=10\Omega$ ; see table 9
Turn-off delay time	$t_{d(off)}$	-	32.4	-	ns	$V_{DD}=400V, I_D=3.8A, R_G=10\Omega$ ; see table 9
Fall time	$t_f$	-	20.8	-	ns	$V_{DD}=400V, I_D=3.8A, R_G=10\Omega$ ; see table 9

**Table 6 Gate charge characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	5.7	-	nC	$V_{DD}=400V, I_D=3.8A, V_{GS}=10V$
Gate to drain charge	$Q_{gd}$	-	13.6	-	nC	$V_{DD}=400V, I_D=3.8A, V_{GS}=10V$
Gate charge total	$Q_g$	-	22.94	-	nC	$V_{DD}=400V, I_D=3.8A, V_{GS}=10V$
Gate plateau voltage	$V_{plateau}$	-	5.4	-	V	$V_{DD}=400V, I_D=3.8A, V_{GS}=10V$

**Table 7 Reverse diode characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	$V_{SD}$	-	0.74	-	V	$V_{GS}=0V, I_F=1 A, T_j=25^{\circ}C$
Reverse recovery time	$t_{rr}$	-	216	-	ns	$V_R=400V, I_F=2A, di_F/dt=100A/\mu s$ ; see table 8
Reverse recovery charge	$Q_{rr}$	-	1.3	-	$\mu C$	$V_R=400V, I_F=2A, di_F/dt=100A/\mu s$ ; see table 8
Peak reverse recovery current	$I_{rrm}$	-	16.7	-	A	$V_R=400V, I_F=2A, di_F/dt=100A/\mu s$ ; see table 8

### 4 Electrical characteristics diagram

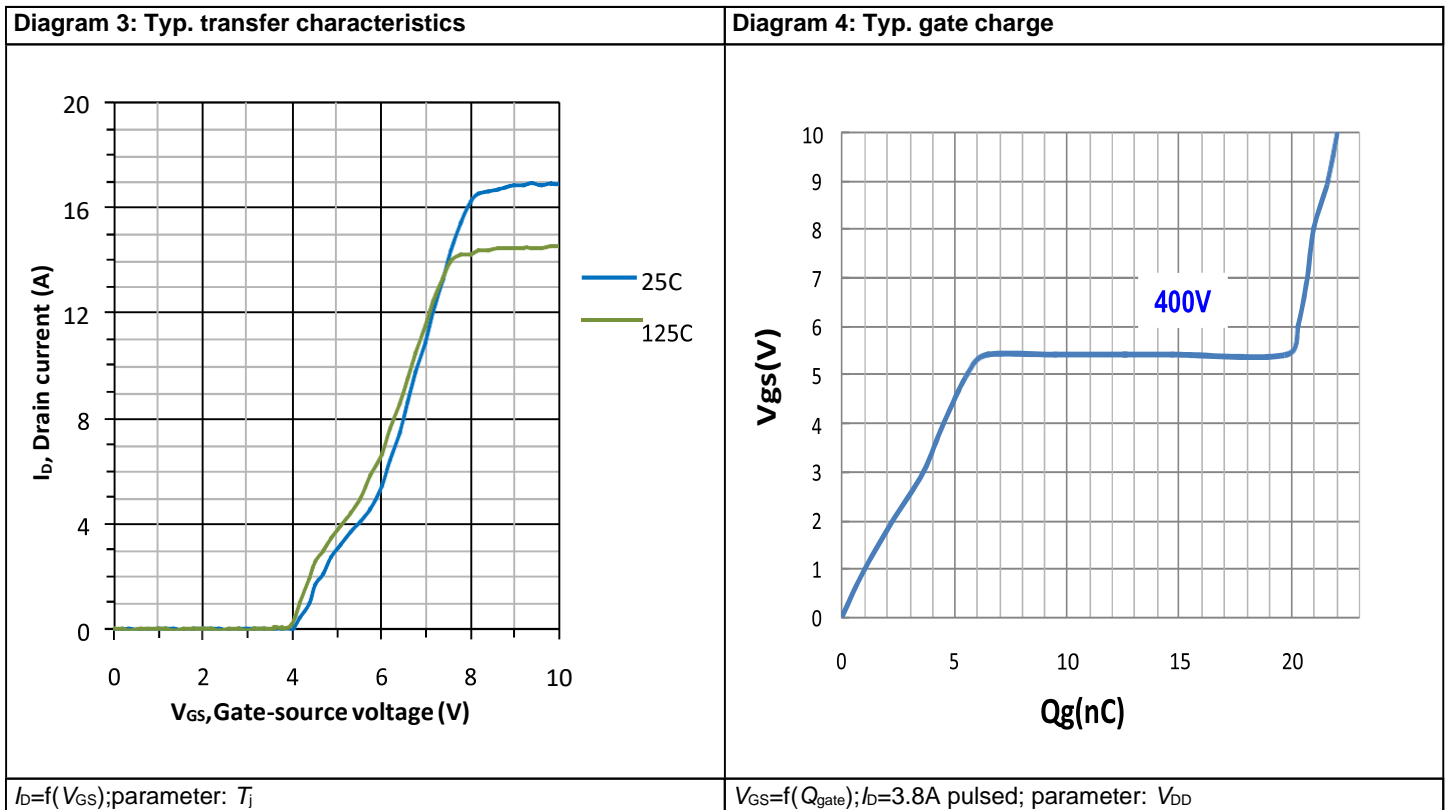
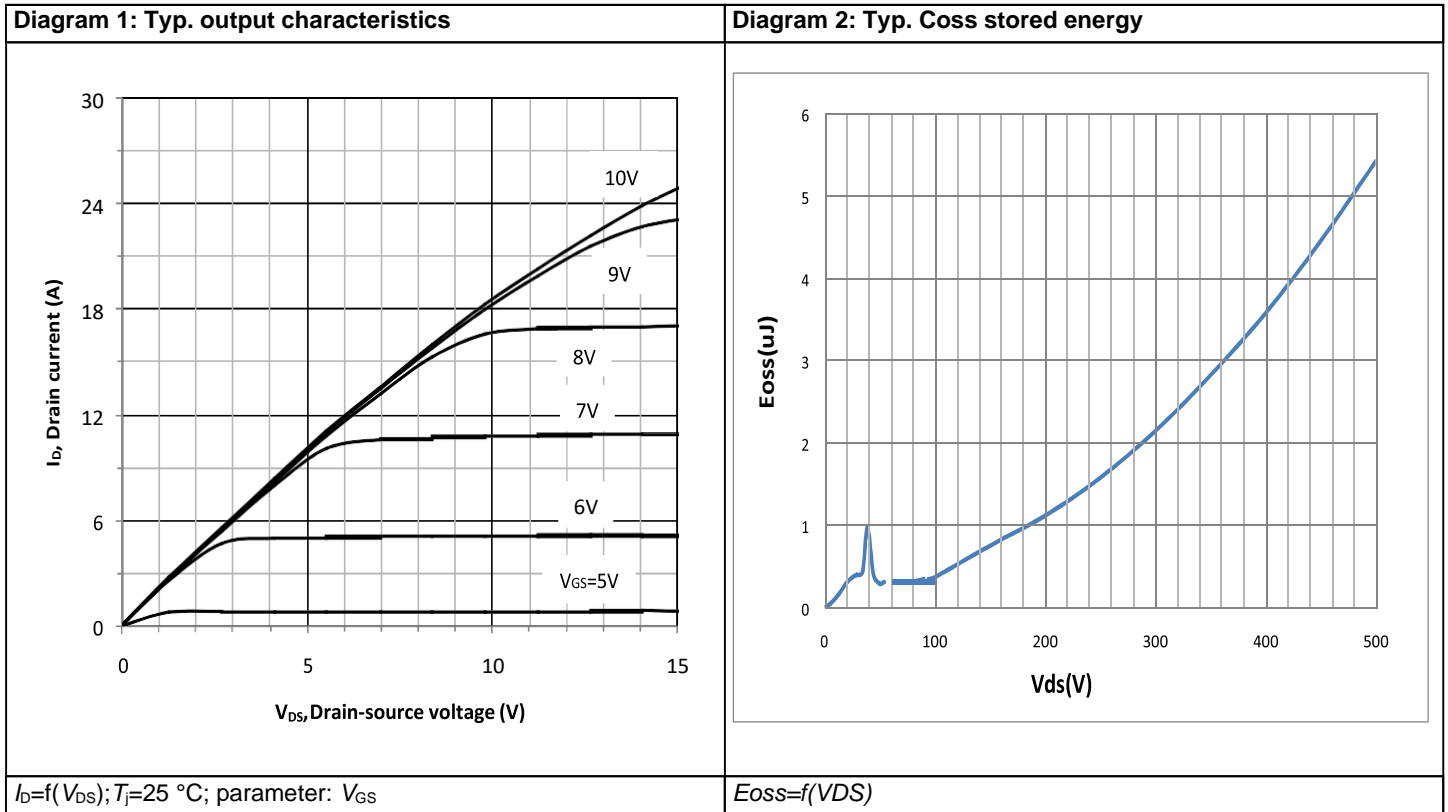
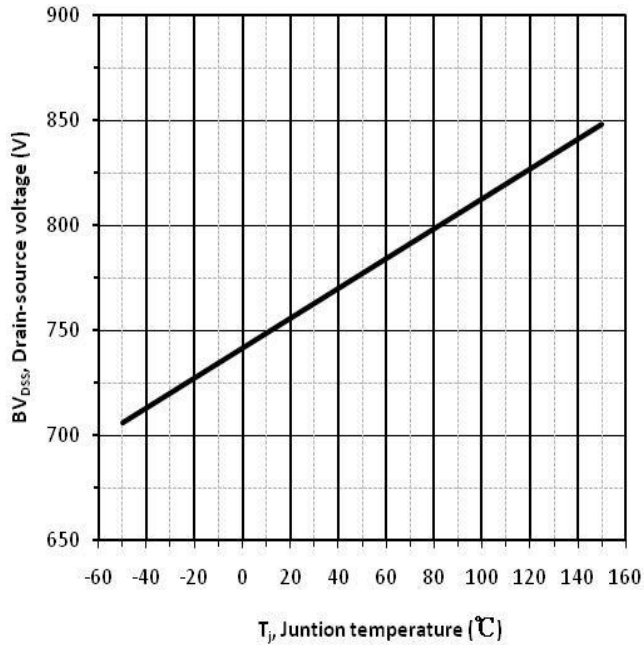
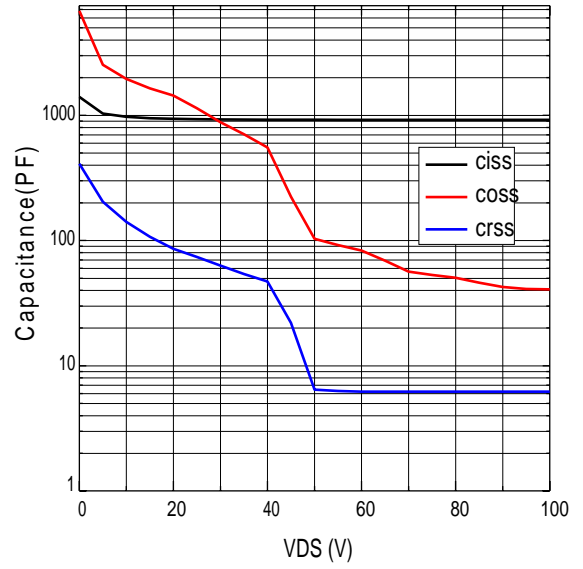


Diagram 5: Drain-source breakdown voltage



$V_{BR(DSS)} = f(T_j); I_b = 10\text{mA}$

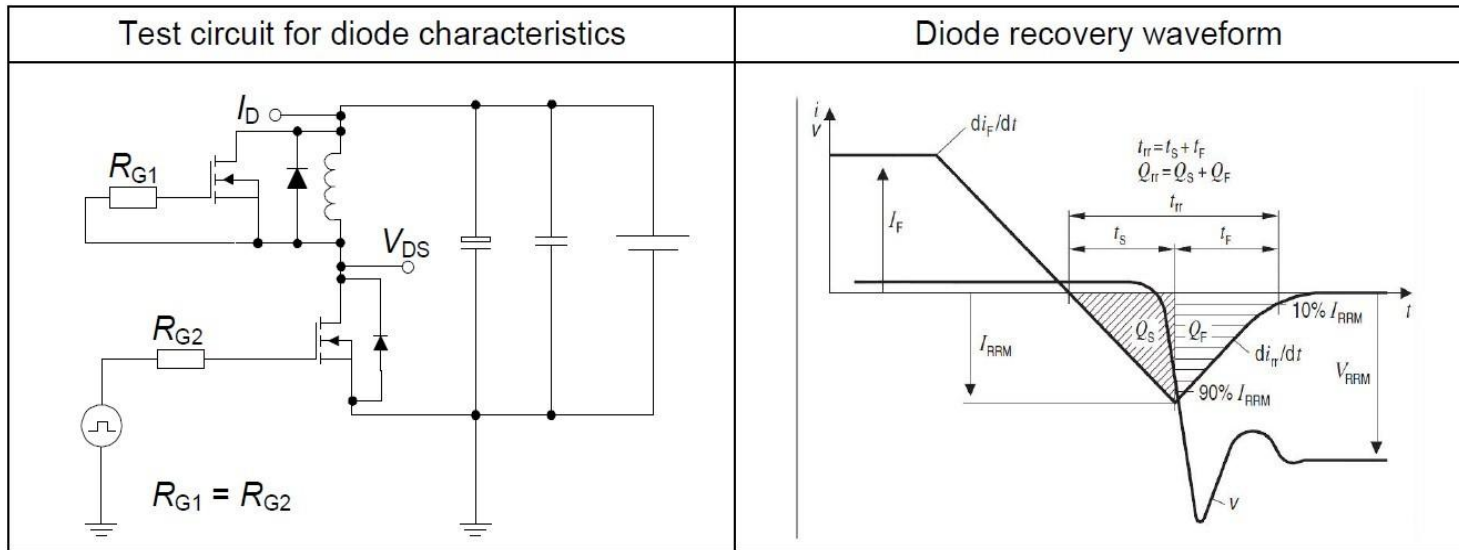
Diagram 6: Typ. Capacitances



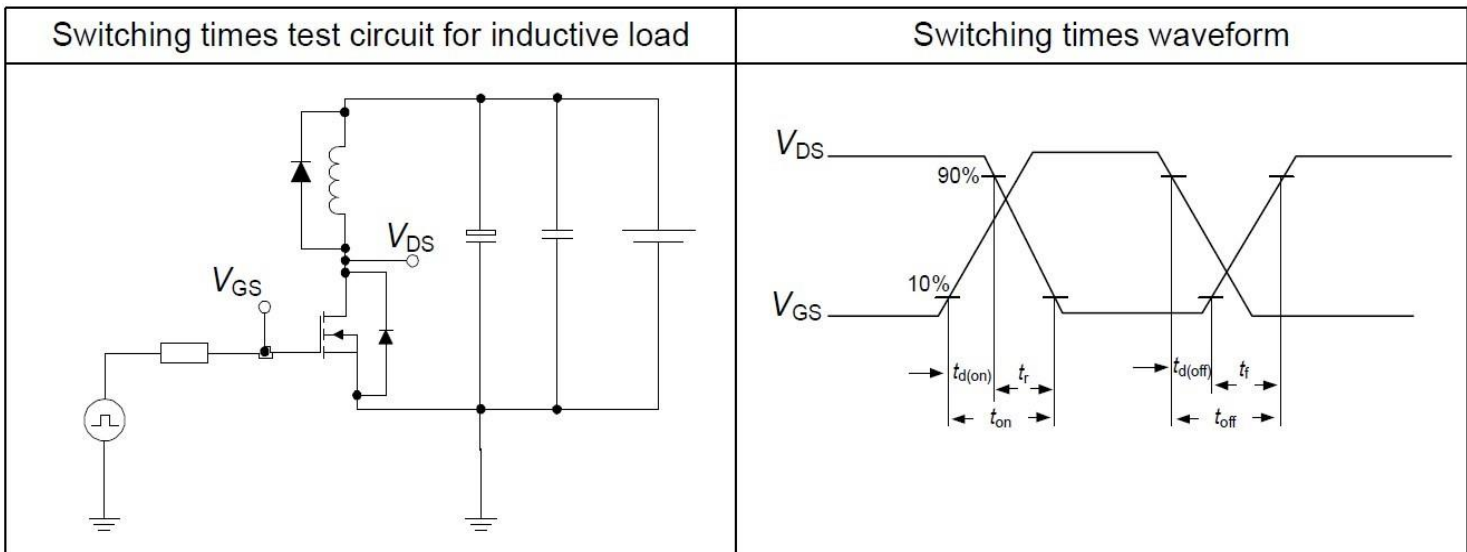
$C = f(V_{DS}); V_{GS} = 0\text{V}; f = 10\text{ kHz}$

## 5 Test Circuits

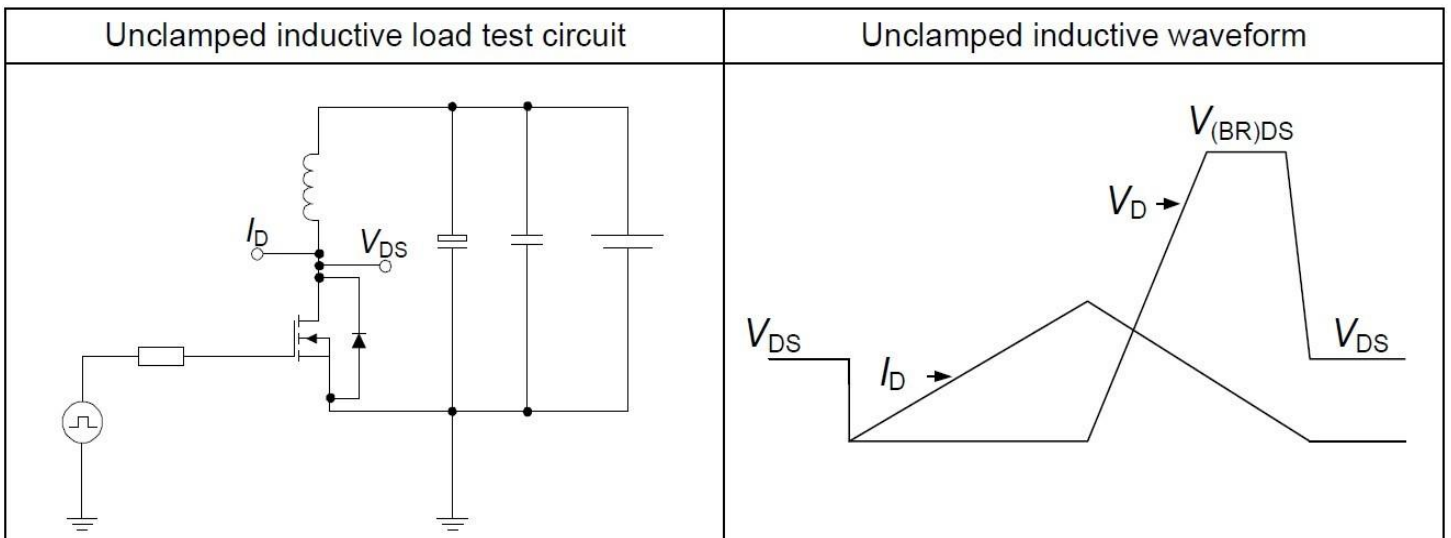
**Table 8 Diode characteristics**



**Table 9 Switching times**

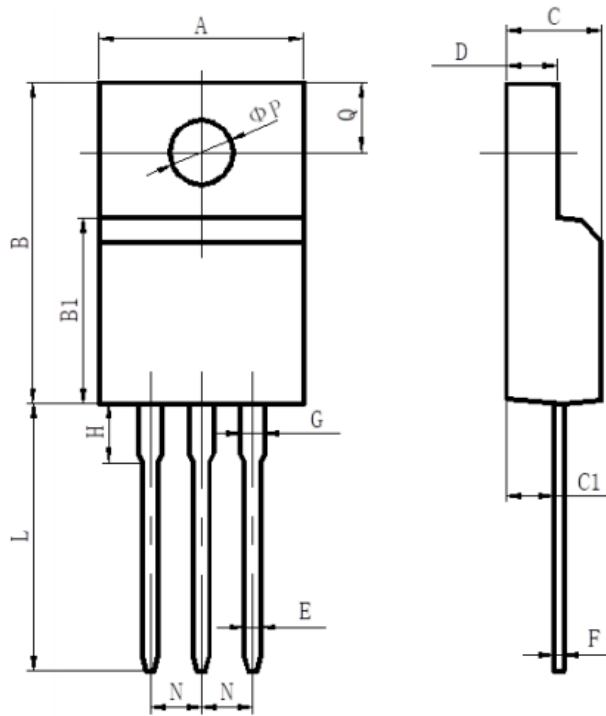


**Table 10 Unclamped inductive load**



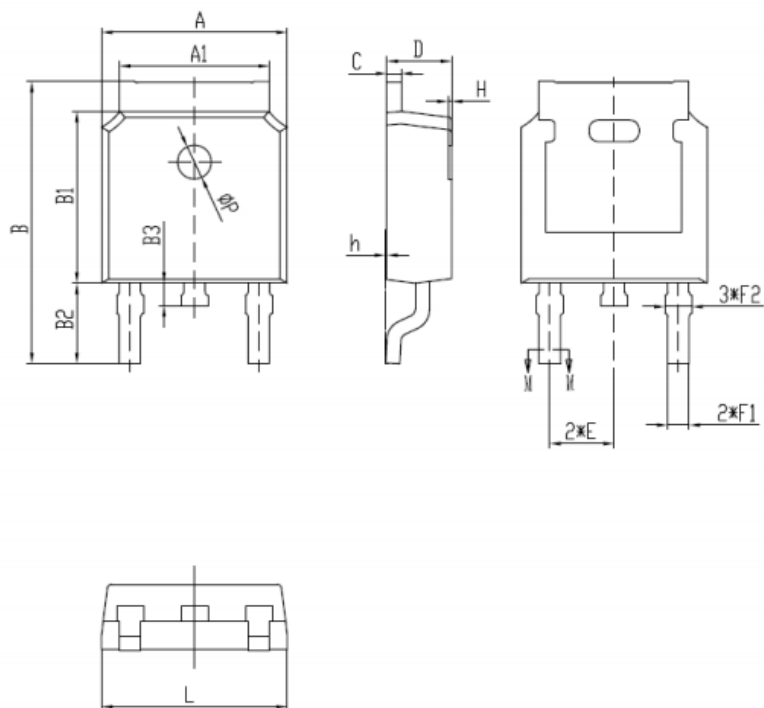


## 6 Package Outlines



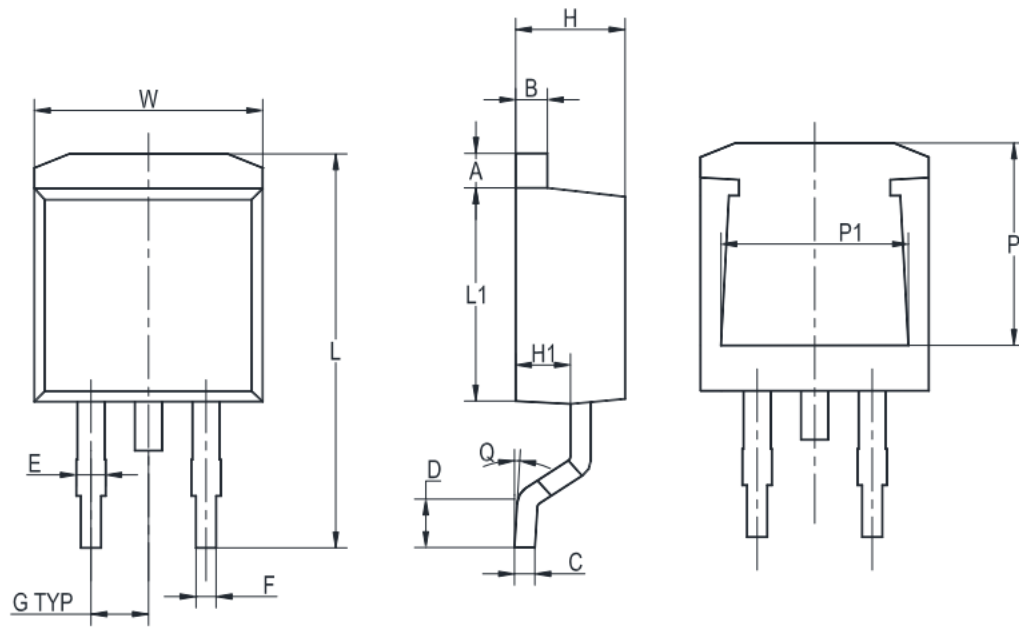
项目	规范(mm)	
	MIN	MAX
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.50	2.90
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.40	3.80
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
$\phi P$	3.00	3.30

Figure1: Outline PG-TO220F(HT)



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
$\phi P$	1.10	1.30

Figure2: OutlinePG-T0252(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

Figure3: OutlinePG-TO263(HC)

## Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2020-07-24	Preliminary version
1.1	2022-06-19	Updated TO220F&TO252 POD to HT
1.2	2022-11-16	Added TO263 package

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