ASA70R600E ASU70R600E ASD70R600E

MOSFET Silicon N-Channel MOS

1. Applications

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

2. Features

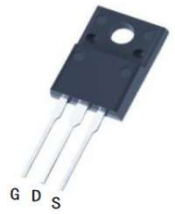
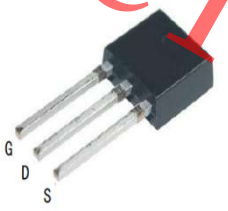
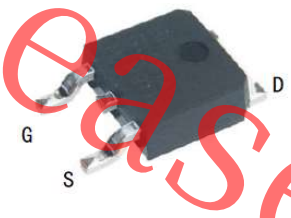
Low drain-source on-resistance: RDS(ON) = 0.540Ω (typ.)
Easy to control Gate switching
Enhancement mode: Vth = 2.8 to 4.2 V

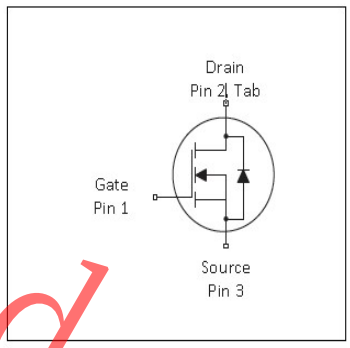
Table 1 Key PerformanceParameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	750	V
$R_{DS(on),max}$	600	mΩ
$Q_{g,typ}$	8.0	nC
$I_{D,pulse}$	24	A

3. Packaging and Internal Circuit

Part Name	Package	Marking
ASA70R600E	TO220F	ASA70R600E
ASU70R600E	TO251	ASU70R600E
ASD70R600E	TO252	ASD70R600E

TO220F	TO251	TO252
		



1 Maximumratings

at T_j = 25°C, unless otherwise specified

Table 2 Maximumratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current[1]	I_D		-	8	A	T_C=25°C
Pulsed drain current[2]	$I_{D,pulse}$	-	-	24	A	T_C=25°C
Avalanche energy, single pulse	E_{AS}	-	-	624	mJ	Tc=25°C,VDD=50V,L = 49.9mH, RG=25Ω
Avalanche current, single pulse	I_{AS}	-	-	5	A	Tc=25°C,VDD=50V,L = 49.9mH, RG=25Ω
MOSFET dv/dt ruggedness	dv/dt	-	-	15	V/ns	V_{DS}=0...400V
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Gate source voltage (dynamic)	V_{GS}	-30	-	30	V	AC (f>1 Hz)
Power dissipation(TO220F)	P_{tot}	-	-	28	W	T_C=25°C
Power dissipation(TO252& TO251)	P_{tot}	-	-	86	W	T_C=25°C
Storage temperature	T_{stg}	-55	-	150	°C	
Operating junction temperature	T_j	-55	-	150	°C	
Reverse diode dv/dt[3]	dv/dt	-	-	15	V/ns	V_{DS}=0...400V, I_{SD}<=48A, T_j=25°C see table 8

[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 Thermalcharacteristics

Table 3 Thermalcharacteristics（TO220F）

Parameter		Symbol	Values			Unit	Note / Test Condition
			Min.	Typ.	Max.		
Thermal resistance, junction	- case	R_{thJC}	-	-	4.5	°C/W	-
Thermal resistance, junction	- ambient	R_{thJA}	-	-	80	°C/W	device on PCB, minimal footprint

Thermalcharacteristics（TO251 and TO252）

Parameter		Symbol	Values			Unit	Note / Test Condition
			Min.	Typ.	Max.		
Thermal resistance, junction	- case	R_{thJC}	-	-	1.45	°C/W	-
Thermal resistance, junction	- ambient	R_{thJA}	-	-	62	°C/W	device on PCB, minimal footprint

3 Electricalcharacteristics

at T_j=25°C, unless otherwise specified

Table 4 Staticcharacteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	705	-	-	V	V_{GS}=0V, I_D=10mA
Gate threshold voltage	$V_{(GS)th}$	2.8		4.2	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	100	nA	V_{DS}=700V, V_{GS}=0V, T_j=25°C
Gate-source leakage current	I_{GSS}	-	-	100	nA	V_{GS}=30V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	0.54	0.60	Ω	V_{GS}=10V, I_D=3A, T_j=25°C
Gate resistance (Intrinsic)	R_G	-	24	-	Ω	f=1MHz, open drain

Table 5 Dynamiccharacteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	599	-	pF	V_{GS}=0V, V_{DS}=50V, f=10kHz
Output capacitance	C_{oss}	-	76	-	pF	V_{GS}=0V, V_{DS}=50V, f=10kHz
Reverse transfer capacitance	C_{rss}	-	3.55	-	pF	V_{GS}=0V, V_{DS}=50V, f=10kHz
Turn-on delay time	$t_{d(on)}$	-	26.8	-	ns	V_{DD}=400V,V_{GS}=13V,I_D=3A, R_G=6.8Ω;see table 9
Rise time	t_r	-	24.8	-	ns	V_{DD}=400V,V_{GS}=13V,I_D=3A, R_G=6.8Ω;see table 9
Turn-off delay time	$t_{d(off)}$	-	127.6	-	ns	V_{DD}=400V,V_{GS}=13V,I_D=3A, R_G=6.8Ω;see table 9
Fall time	t_f	-	21.2	-	ns	V_{DD}=400V,V_{GS}=13V,I_D=3A, R_G=6.8Ω;see table 9

Table 6 Gate chargecharacteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	2.6	-	nC	V_{DD}=400V, I_D=3A, V_{GS}=0 to 10V
Gate to drain charge	Q_{gd}	-	1.7	-	nC	V_{DD}=400V, I_D=3A, V_{GS}=0 to 10V
Gate charge total	Q_g	-	8.0	-	nC	V_{DD}=400V, I_D=3A, V_{GS}=0 to 10V
Gate plateau voltage	$V_{plateau}$	-	6.6	-	V	V_{DD}=400V, I_D=3A, V_{GS}=0 to 10V

Table 7 Reverse diodecharacteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.76	-	V	V_{GS}=0V, I_F=1A, T_j=25°C
Reverse recovery time	t_{rr}	-	174	-	ns	V_R=400V, I_F=3A, di_F/dt=100A/μs; see table 8
Reverse recovery charge	Q_{rr}	-	1.2	-	uC	V_R=400V, I_F=3A, di_F/dt=100A/μs; see table 8
Peak reverse recovery current	I_{rrm}	-	13.5	-	A	V_R=400V, I_F=3A, di_F/dt=100A/μs; see table 8

4 Electrical characteristics diagram

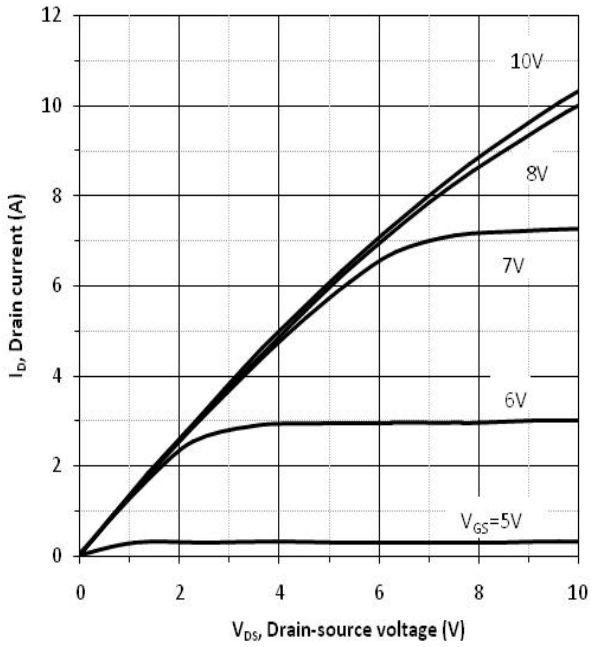
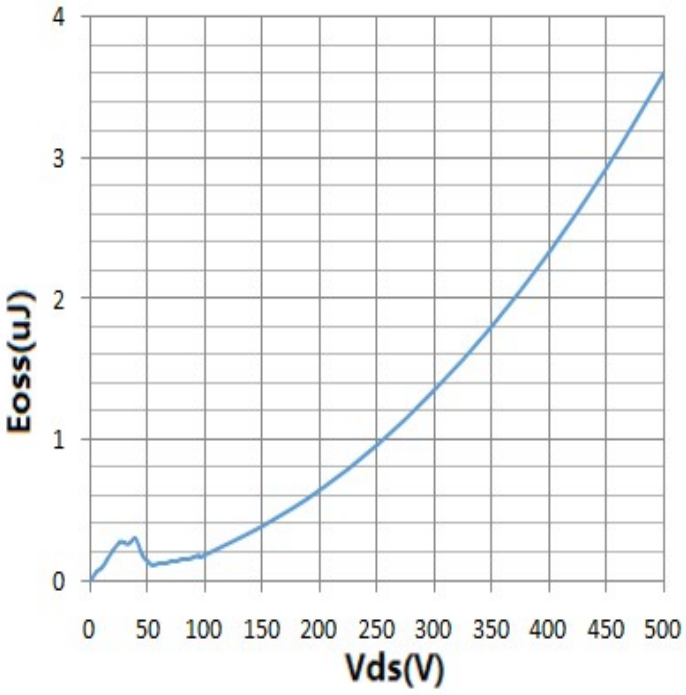
Diagram 1: Typ. output characteristics	Diagram 2: Typ. Coss stored energy
	
I_D=f(V_{DS});T_j=25 °C; parameter: V_{GS}	*Eoss=f(VDS)*

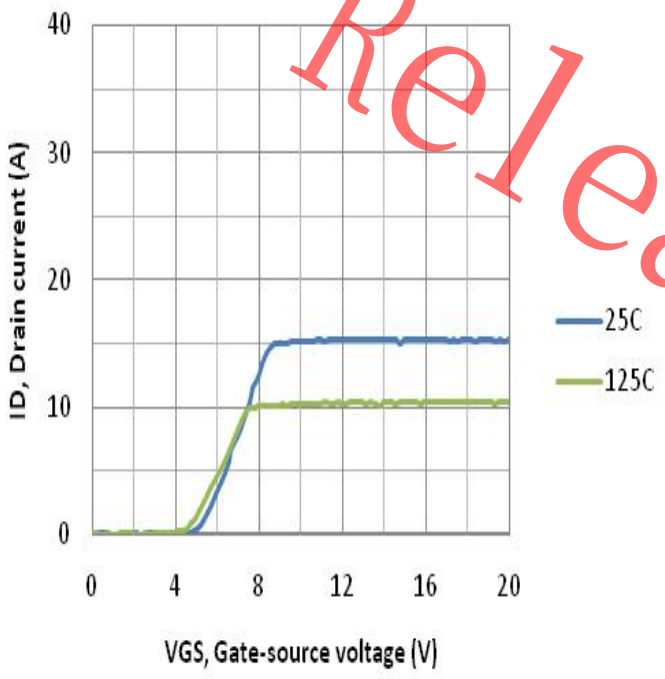
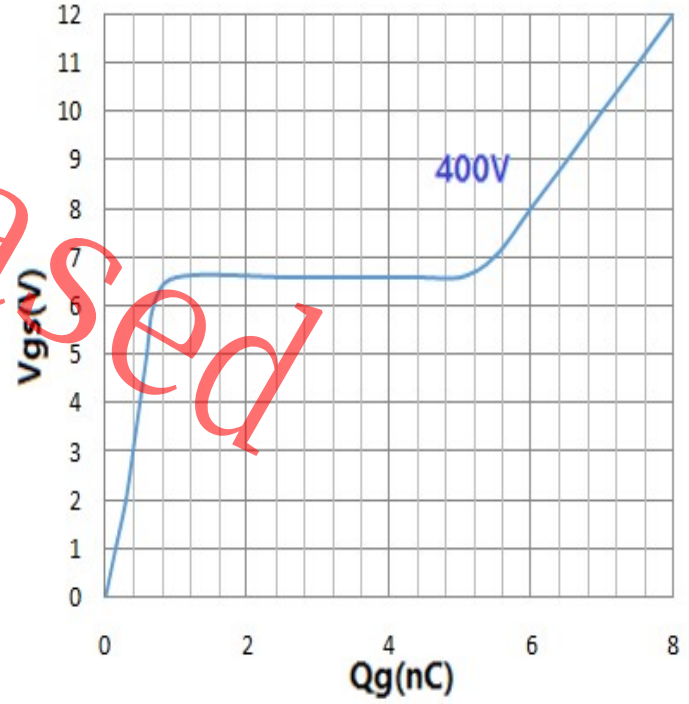
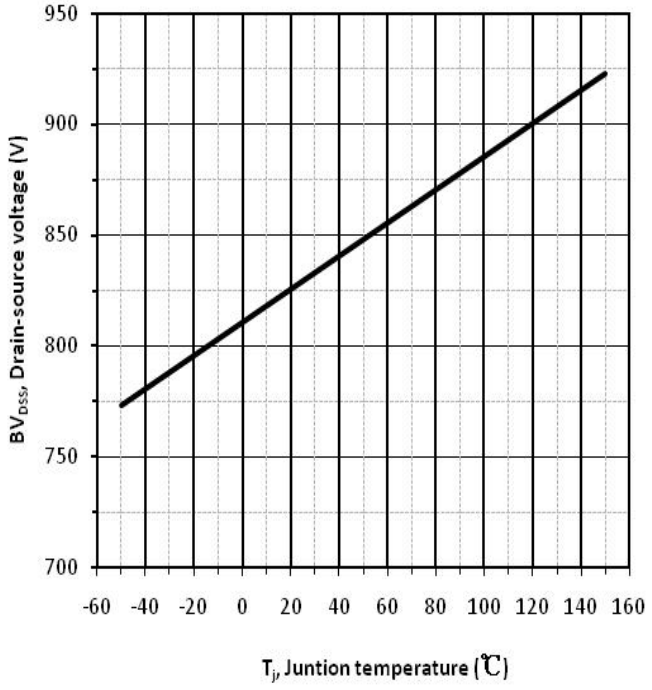
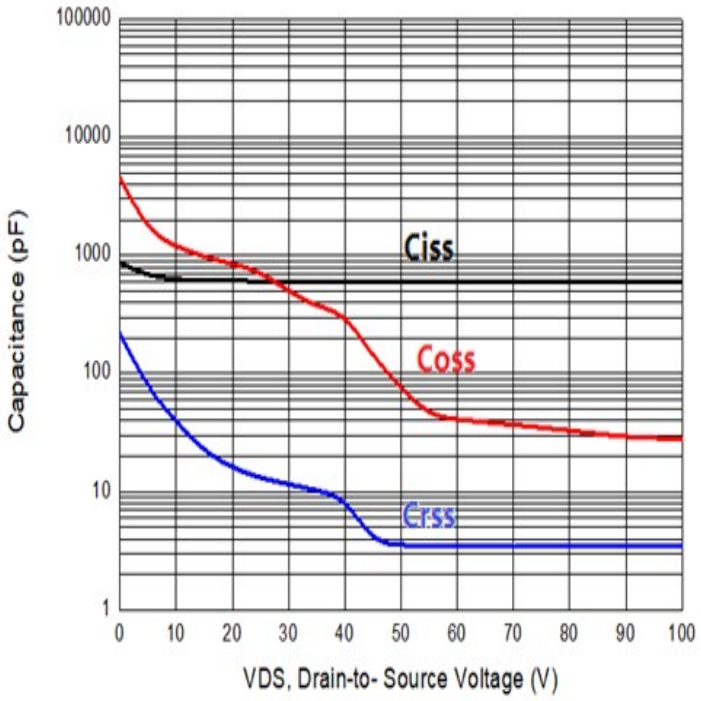
Diagram 3: Typ. transfer characteristics	Diagram 4: Typ. gate charge	Diag
		
I_D=f(V_{GS});parameter: T_j	V_{GS}=f(Q_{gate});I_D=3A pulsed; parameter: V_{DD}	V_{GS}=

Diagram 5: Drain-source breakdown voltage	Diagram 6: Typ. capacitances
	
$V_{BR(DSS)}$=f(T_j);I_D=10mA	C=f(V_{DS});V_{GS}=0V; f=10 kHz

5 TestCircuits

Table 8 Diodecharacteristics

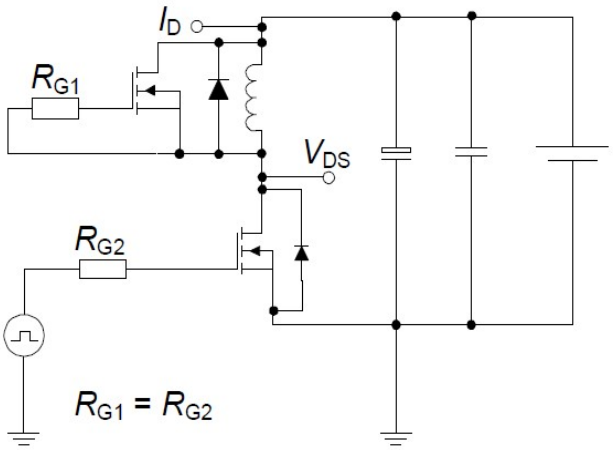
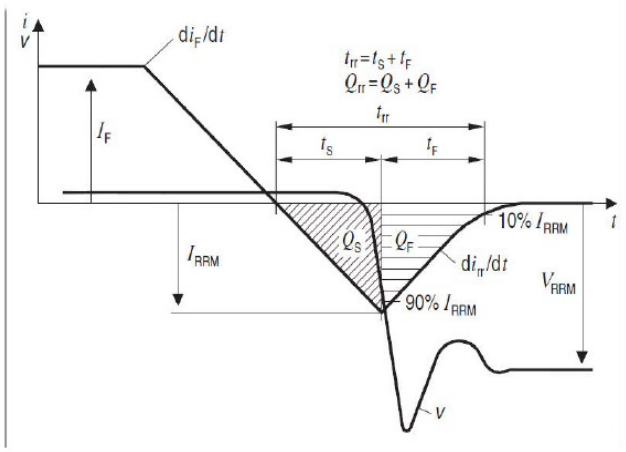
Test circuit for diode characteristics	Diode recovery waveform
	

Table 9 Switchingtimes

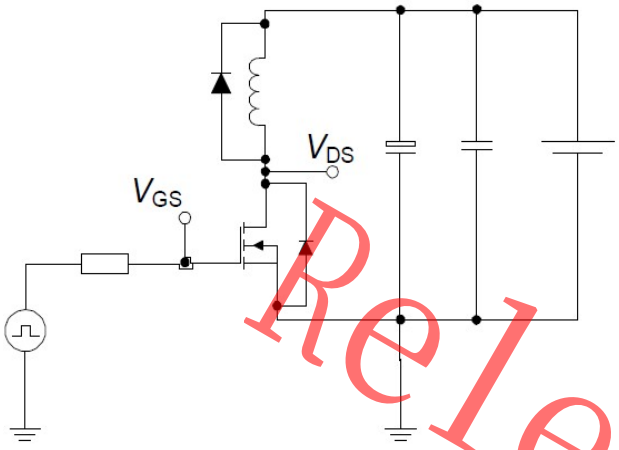
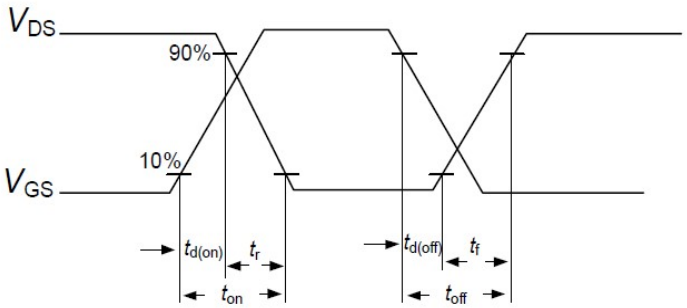
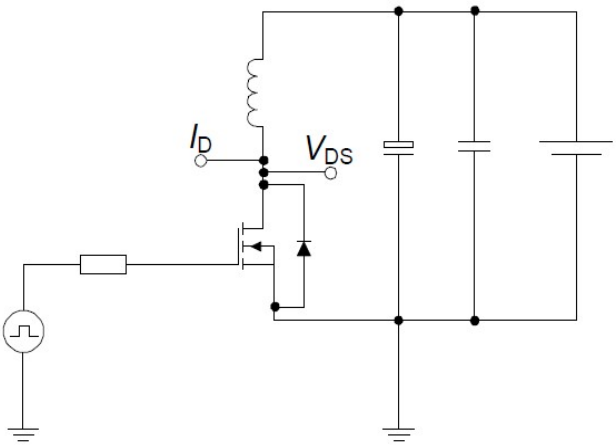
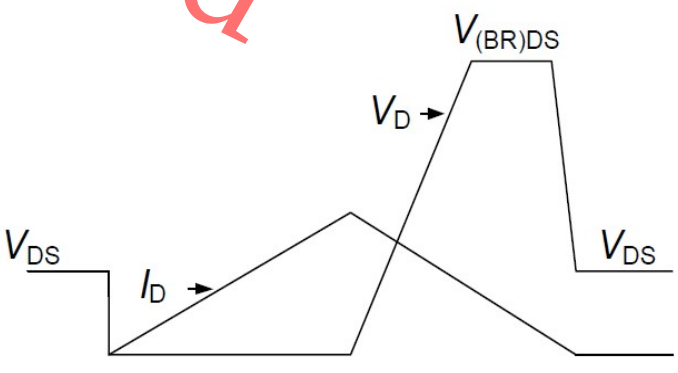
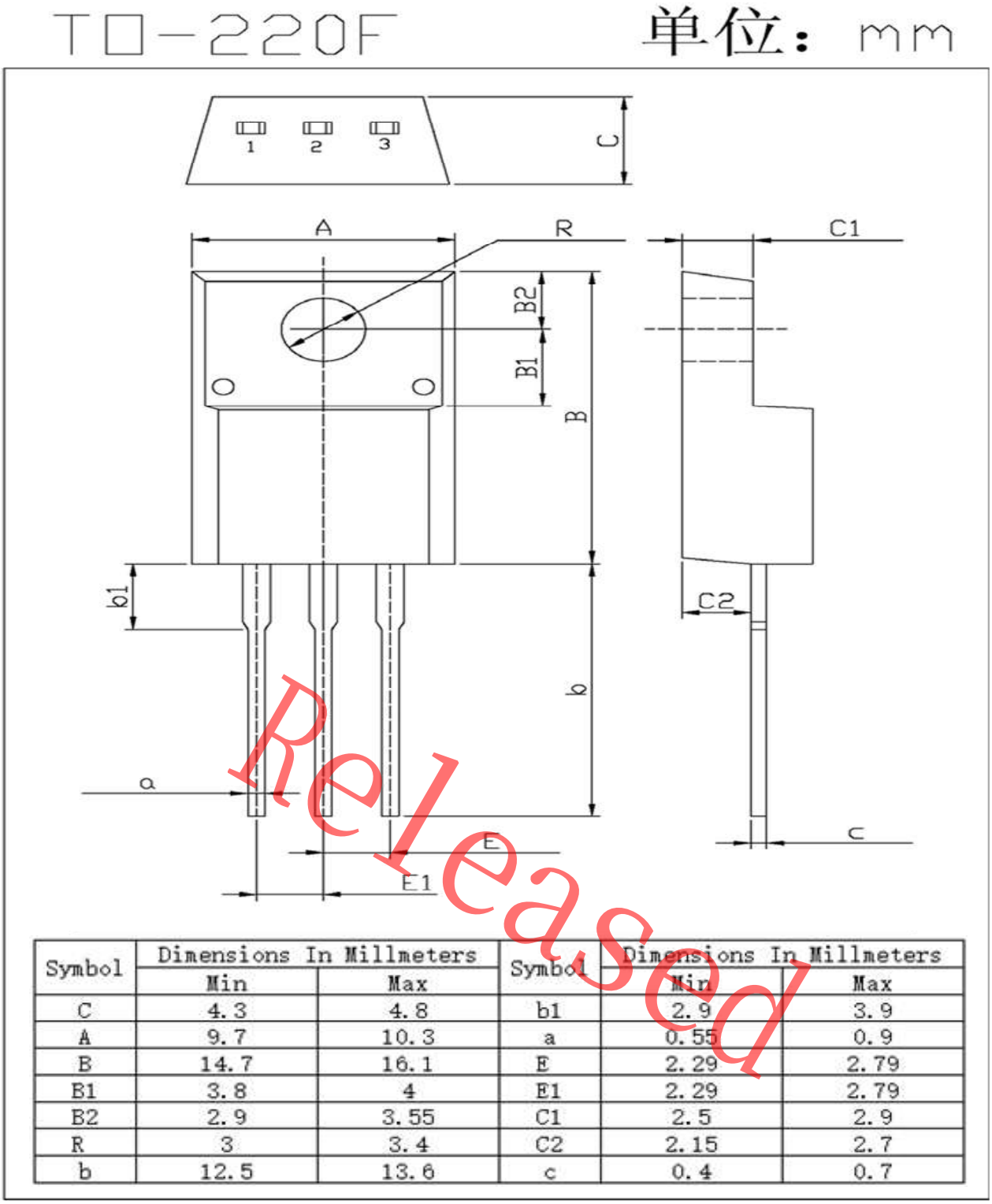
Switching times test circuit for inductive load	Switching times waveform
	

Table10 Unclamped inductiveload

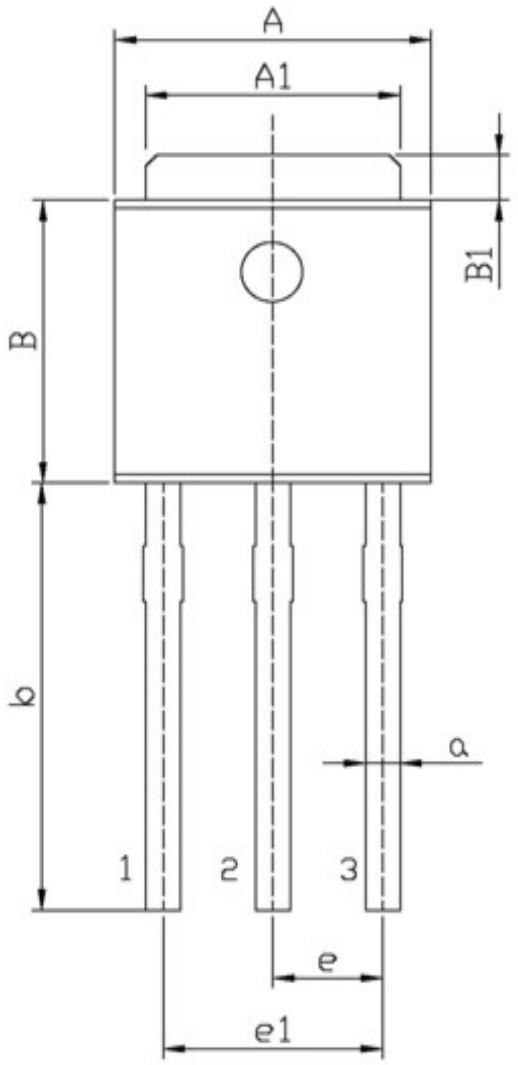
Unclamped inductive load test circuit	Unclamped inductive waveform
	

6 PackageOutlines



Symbol	Dimensions In Millmeters		Symbol	Dimensions In Millmeters	
	Min	Max		Min	Max
C	4.3	4.8	b1	2.9	3.9
A	9.7	10.3	a	0.55	0.9
B	14.7	16.1	E	2.29	2.79
B1	3.8	4	E1	2.29	2.79
B2	2.9	3.55	C1	2.5	2.9
R	3	3.4	C2	2.15	2.7
b	12.5	13.6	c	0.4	0.7

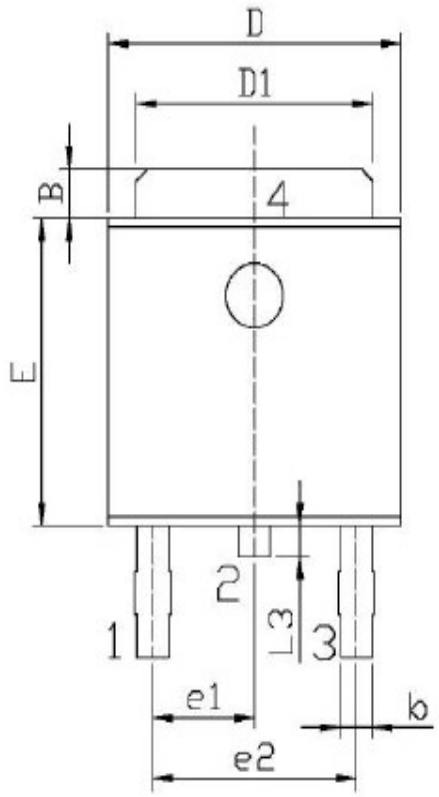
Figure1：Outline PG-TO220F

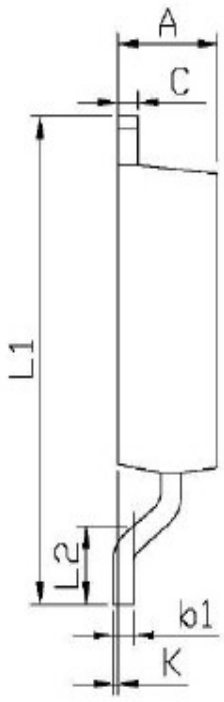


单位：mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.45	6.75	a	0.50	0.70
A1	5.10	5.50	b	9.00	9.40
B	5.95	6.25	c	0.45	0.55
B1	0.95	1.25	c1	0.45	0.55
C	2.20	2.40	e	2.24	2.34
C1	0.95	1.15	e1	4.43	4.73

Figure2：OutlinePG-TO251





单位：mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.50	0.70	e2	4.43	4.73
b1	0.45	0.55	L1	9.45	9.95
C	0.45	0.55	L2	1.25	1.75
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	K	0.00	0.10

Figure3：OutlinePG-TO252

Revision History

Revision	Date	Subjects (major changes since last revision)
0.1	2019-04-16	Preliminary version
1.0	2019-11-07	Fine tune outline and add Crss test data.etc
1.1	2020-04-05	Add Electrical characteristics Curve
1.2	2020-04-29	1. Add avalanche energy test condition, avalanche current data and test condition. Update Rg data 2. Add TO251 and TO252 Package, Maximum ratings, Thermal characteristics data.