

MOSFET Silicon N-Channel MOS

1. Applications

Boost PFC switch, single-ended flyback or two-transistor forward topologies.
PD Adaptor, LCD & PDP TV and LED lighting.



2. Features

Low drain-source on-resistance: $R_{DS(ON)} = 0.50\Omega$ (typ.)
Easy to control Gate switching
Enhancement mode: $V_{th} = 2.8$ to 4.2 V



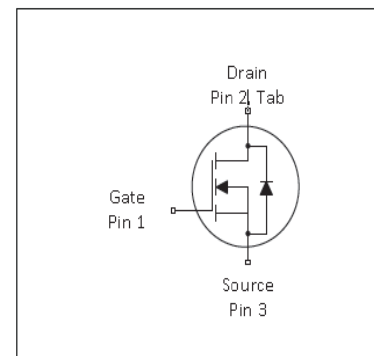
Table 1 Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	700	V
$R_{DS(on),max}$	550	m Ω
$Q_{g,typ}$	8.0	nC
$I_{D,pulse}$	40	A
Body diode dv/dt	3	V/ns

3. Packaging and Internal Circuit

Part Name	Package	Marking
ASA65R550E	TO220F	ASA65R550E
ASU65R550E	TO251	ASU65R550E
ASD65R550E	TO252	ASD65R550E

TO220F	TO251	TO252



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		-	8	A	$T_C=25^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	40	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	624	mJ	$V_{DD}=50\text{V}$; $L=49.9\text{mH}$
Avalanche energy, repetitive	E_{AR}	-	-	123	mJ	$V_{DD}=50\text{V}$; $L=49.9\text{mH}$
Avalanche current, single pulse	I_{AS}	-	-	5.0	A	-
MOSFET dv/dt ruggedness	dv/dt	-	-	11	V/ns	$V_{DS}=0\dots150\text{V}$
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	P_{tot}	-	-	178.1	W	$T_C=25^\circ\text{C}$
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	
Operating junction temperature	T_j	-55	-	150	$^\circ\text{C}$	
Mounting torque	-	-	-	-	Ncm	-
Continuous diode forward current	I_S	-	-	48	A	$T_C=25^\circ\text{C}$
Diode pulse current ²⁾	$I_{S,pulse}$	-	-	151	A	$T_C=25^\circ\text{C}$
Reverse diode dv/dt ³⁾	dv/dt	-	-	15	V/ns	$V_{DS}=0\dots400\text{V}$, $I_{SD}\leq 48\text{A}$, $T_j=25^\circ\text{C}$ see table 8
Maximum diode commutation speed	di_F/dt	-	-	50	A/ s	$V_{DS}=0\dots400\text{V}$, $I_{SD}\leq 48\text{A}$, $T_j=25^\circ\text{C}$ see table 8
Insulation withstand voltage	V_{ISO}	-	-	n.a.	V	V_{rms} , $T_C=25^\circ\text{C}$, $t=1\text{min}$

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 3 Thermal characteristics (T0220 FullPAK)

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	3.65	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	80	°C/W	device on PCB, minimal footprint

Thermal characteristics (T0251 and T0252)

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	$V_{GS}=0V, I_D=10mA$
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}	-	-	100	nA	$V_{DS}=650V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.50	0.55	Ω	$V_{GS}=10V, I_D=4A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	R_G	-	25	-		$f=1MHz, \text{open drain}$
Gate resistance (Integrated)	R_G	-	77	-		$f=1MHz, \text{open drain}$

Table 5 Dynamic characteristics

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_{riss}	-	3.55	-	pF	$V_{GS}=0V, V_{DS}=50V, f=10kHz$
Turn-on delay time	$t_{d(on)}$	-	26.8	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=3A, R_G=6.8\Omega$; see table 9
Rise time	t_r	-	24.8	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=3A, R_G=6.8\Omega$; see table 9
Turn-off delay time	$t_{d(off)}$	-	127.6	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=3A, R_G=6.8\Omega$; see table 9
Fall time	t_f	-	21.2	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=3A, R_G=6.8\Omega$; see table 9

Table 6 Gate charge characteristics

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

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.81	-	V	$V_{GS}=0V, I_F=3.8 A, T_J=25^{\circ}C$
Reverse recovery time	t_{rr}	-	174	-	ns	$V_R=400V, I_F=3 A, di_F/dt=100A/\mu s$; see table 8
Reverse recovery charge	Q_{rr}	-	1200	-	nC	$V_R=400V, I_F=3 A, di_F/dt=100A/\mu s$; see table 8
Peak reverse recovery current	I_{rrm}	-	13.5	-	A	$V_R=400V, I_F=3 A, di_F/dt=100A/\mu s$; see table 8

5 Test Circuits

Table 8 Diode characteristics

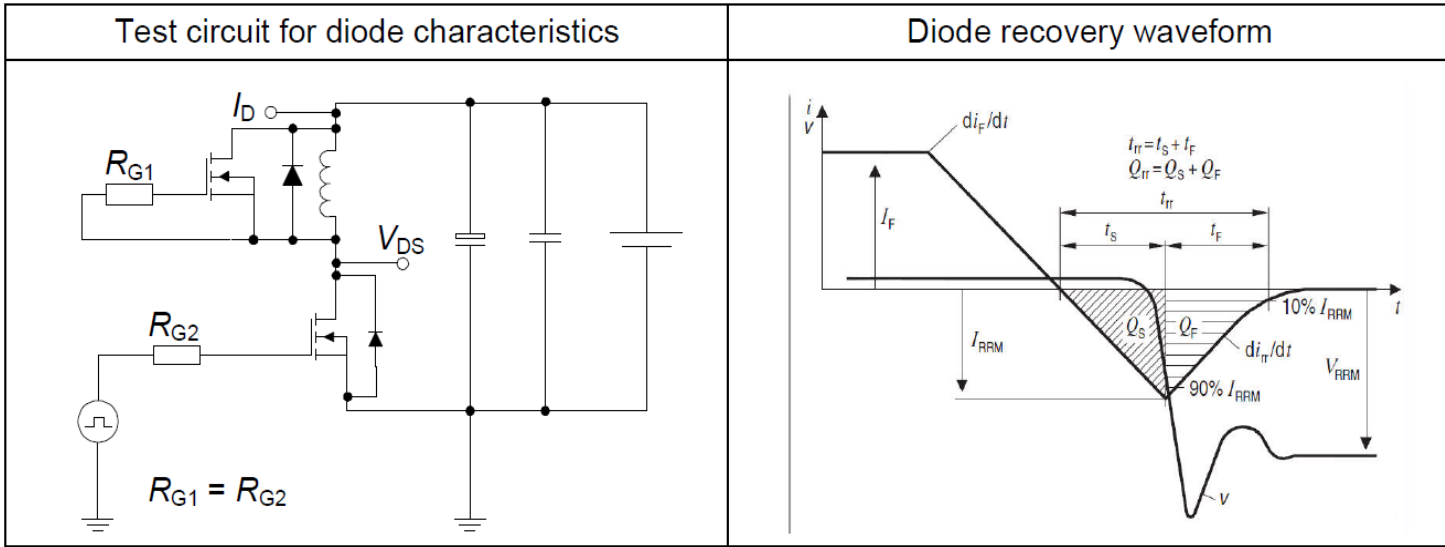


Table 9 Switching times

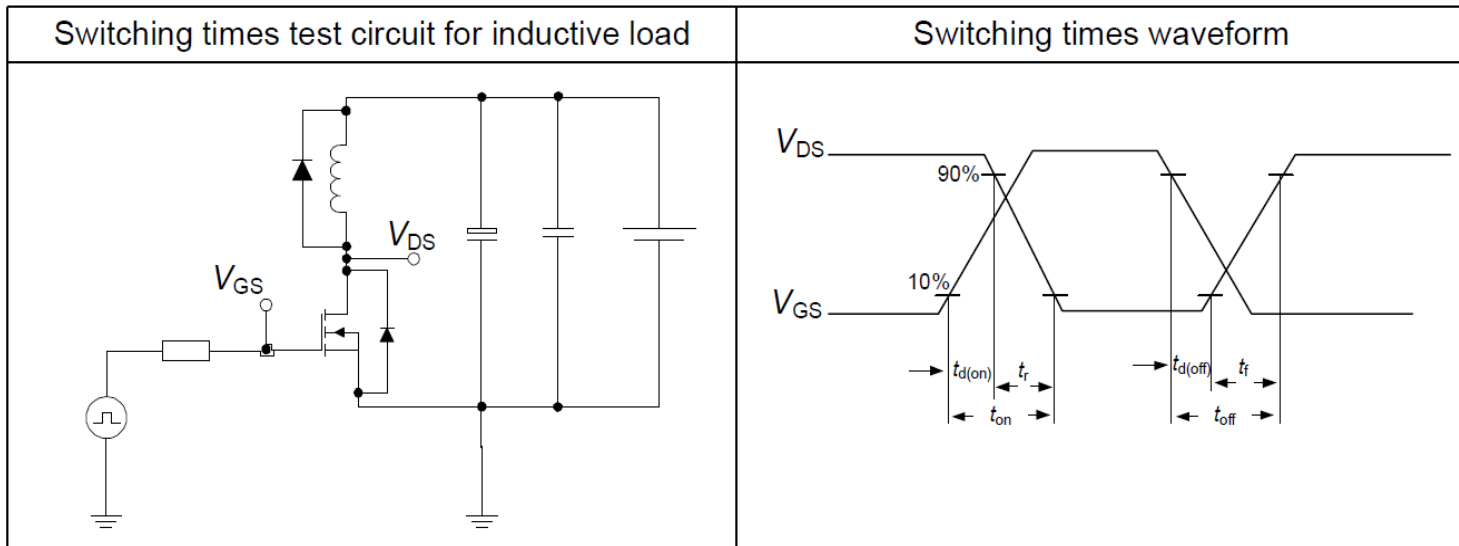
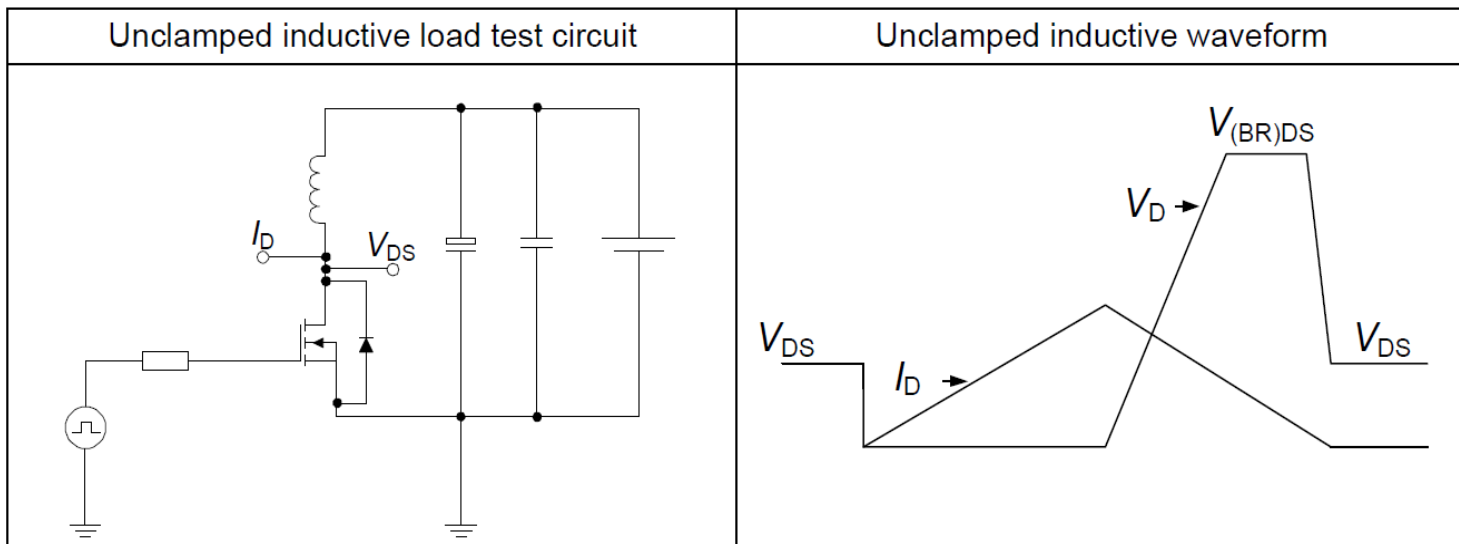


Table 10 Unclamped inductive load



6 Package Outlines

TO-220F

单位: mm

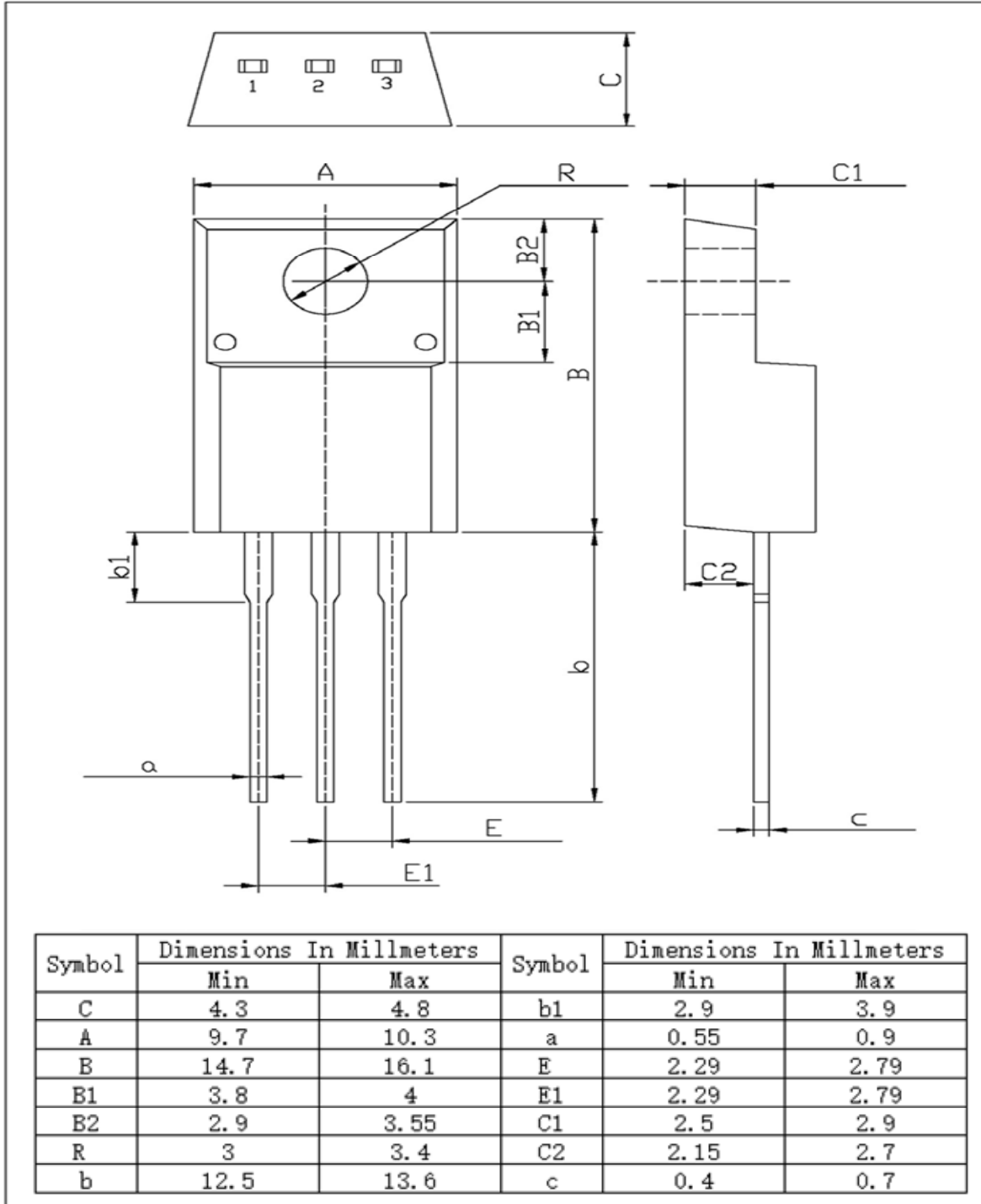
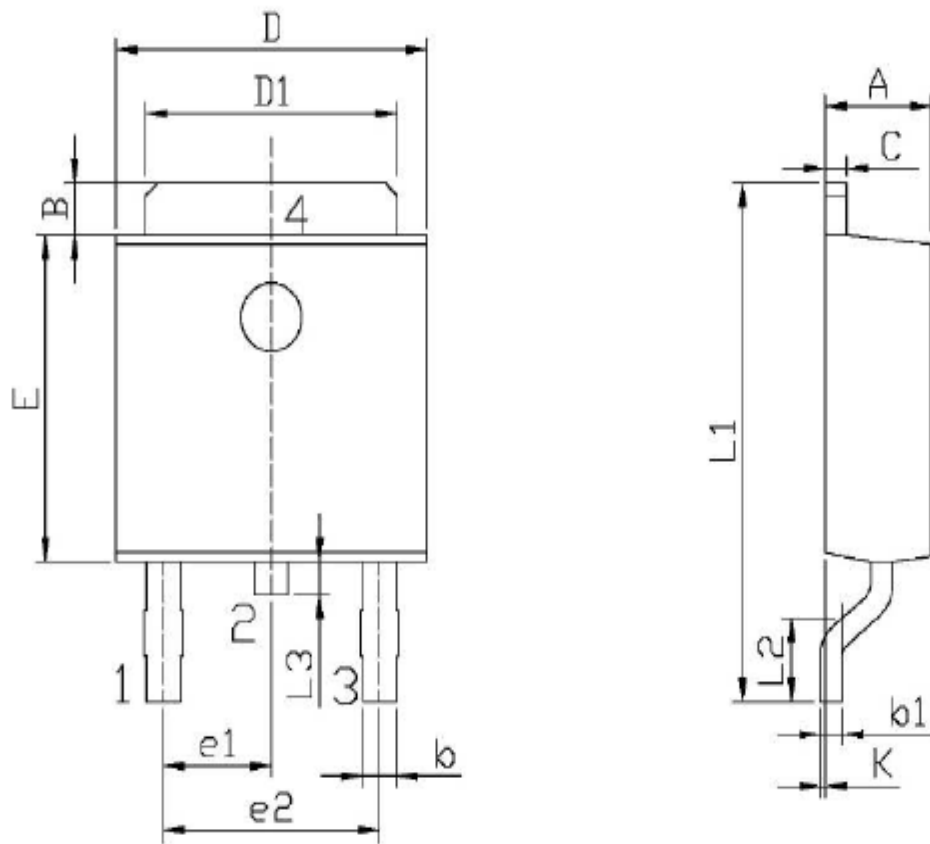


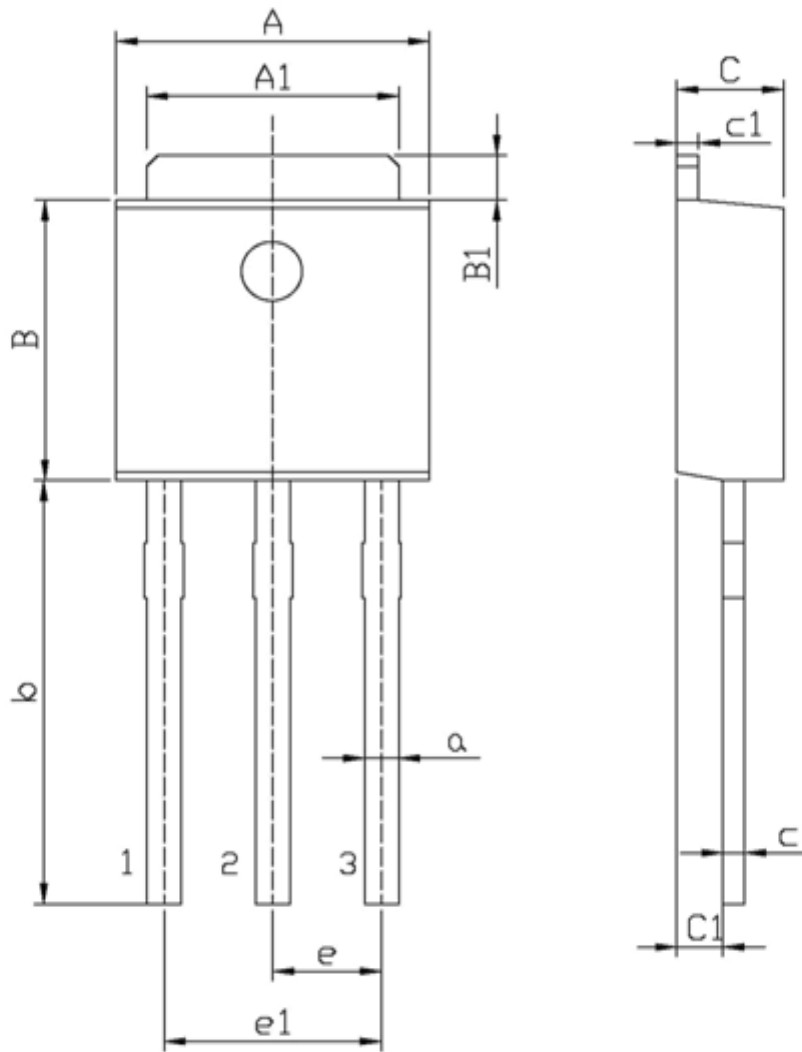
Figure3: Outline PG-TO220F



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

Figure2: Outline PG-T0252



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

Figure3: Outline PG-T0251

Revision History

ASA65R550E

Revision	Date	Subjects (major changes since last revision)
1.0	2019-04-11	Preliminary version
2.0	2019-11-07	Fine tune outline and add Crss test data.etc

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