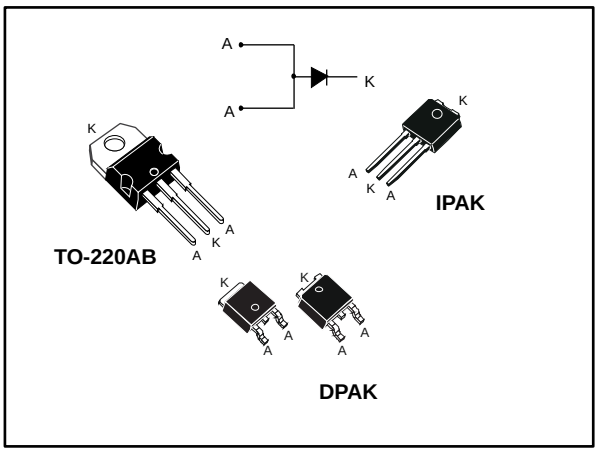
FERD20S100S

100 V field-effect rectifier diode

Datasheet - production data



Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Reduced leakage current
- Low forward voltage drop
- High frequency operation
- ECOPACK®2 compliant component

Description

The device is based on a proprietary technology that achieves the best in class V_F/I_R trade-off for a given silicon surface. This 100 V rectifier has been optimized for use in confined casing applications where both efficiency and thermal performance matter. With a lower dependency of leakage current (I_R) and forward voltage (V_F) in function of temperature, the thermal runaway risk is reduced. Therefore, it can advantageously replace 100 V Schottky diodes.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	20 A
V_{RRM}	100 V
V_F(max.)	0.415 V
I_R(max.)	110 µA
T_j(max.)	175 °C

This is information on a product in full production.

1 Characteristics

Table 2: Absolute ratings (limiting values at 25 °C, unless otherwise specified, anode terminals short-circuited)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			100	V
$I_{F(RMS)}$	Forward rms current			40	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave		T_C = 150 °C	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	TO-220AB	220	A
			DPAK, IPAK	150	A
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature (1)			175	°C

Notes:

(1)$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal resistance parameters

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°C/W

Table 4: Static electrical characteristics (anode terminals short circuited)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		110	µA
		T_j = 125 °C		-	6	12	mA
		T_j = 125 °C	V_R = 70 V	-	3	6	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 2 A	-	0.395	0.445	V
		T_j = 125 °C		-	0.36	0.415	
		T_j = 25 °C	I_F = 5 A	-	0.520	0.585	
		T_j = 125 °C		-	0.500	0.555	
		T_j = 25 °C	I_F = 10 A	-	0.680	0.780	
		T_j = 125 °C		-	0.600	0.660	
		T_j = 125 °C	I_F = 20 A	-	0.690	0.760	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.45 \times I_{F(AV)} + 0.021 \times I_{F^2(RMS)}$

1.1 Characteristics (curves)

Figure 1: Average forward current versus ambient temperature (δ = 0.5)

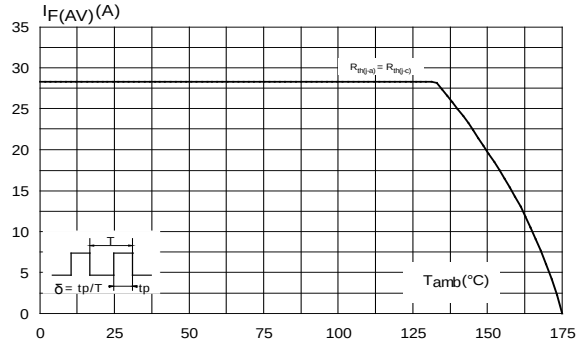


Figure 2: Relative variation of thermal impedance junction to case versus pulse duration

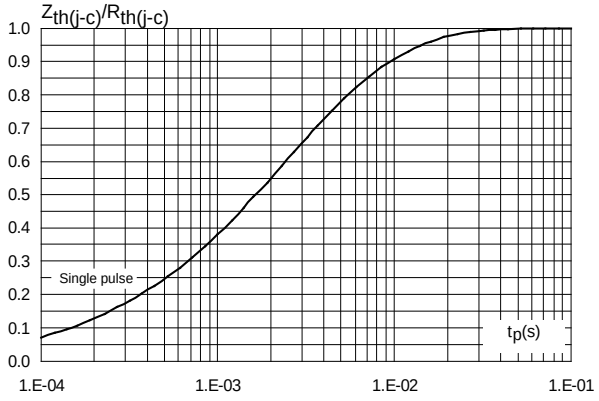


Figure 3: Reverse leakage current versus reverse voltage applied (typical values)

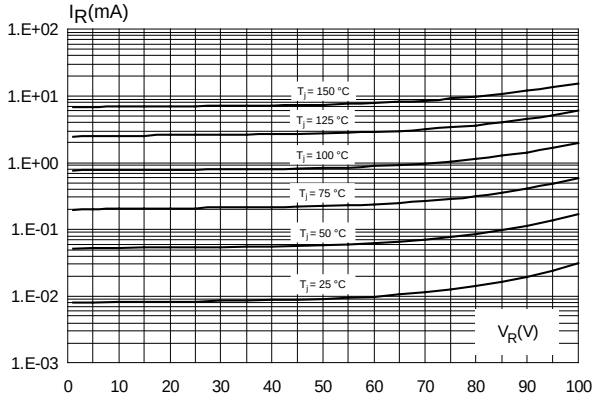


Figure 4: Junction capacitance versus reverse voltage applied (typical values)

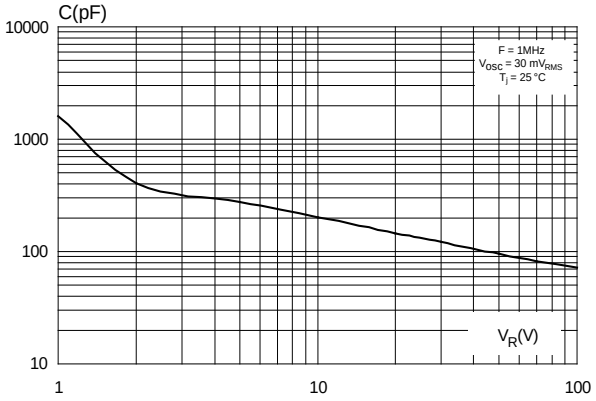


Figure 5: Forward voltage drop versus forward current (typical values, log scale)

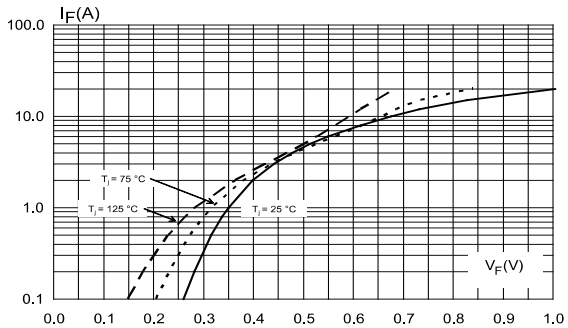


Figure 6: Forward voltage drop versus forward current (typical values, linear scale)

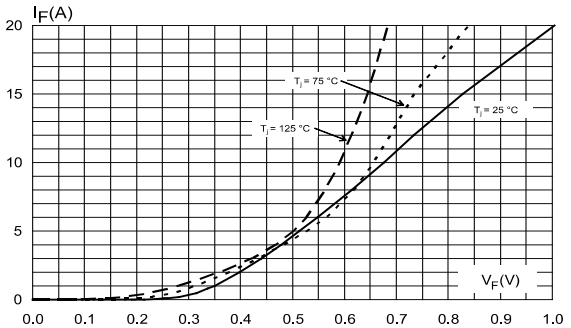
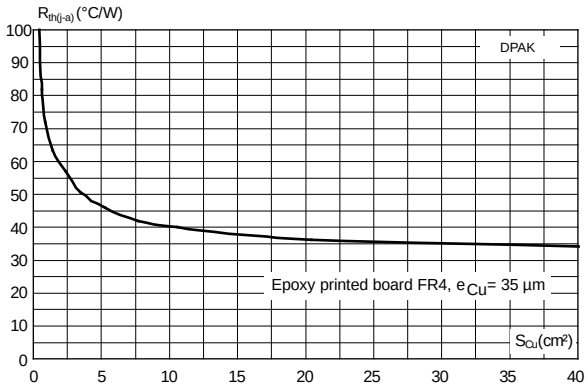


Figure 7: Thermal resistance junction to ambient versus copper surface under tab for DPAK (typical values)



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB)
- Maximum torque value: 0.6 N·m (for TO-220AB)

2.1 IPAK package information

Figure 8: IPAK package outline

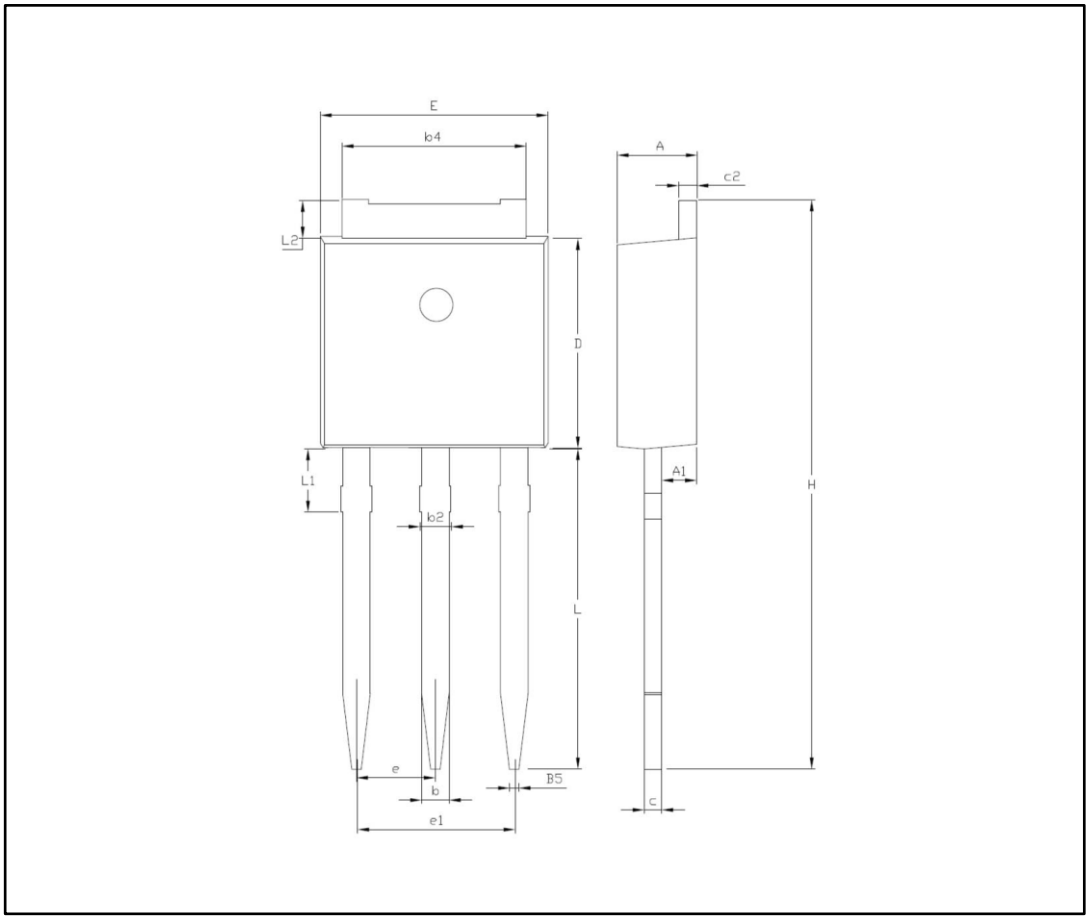
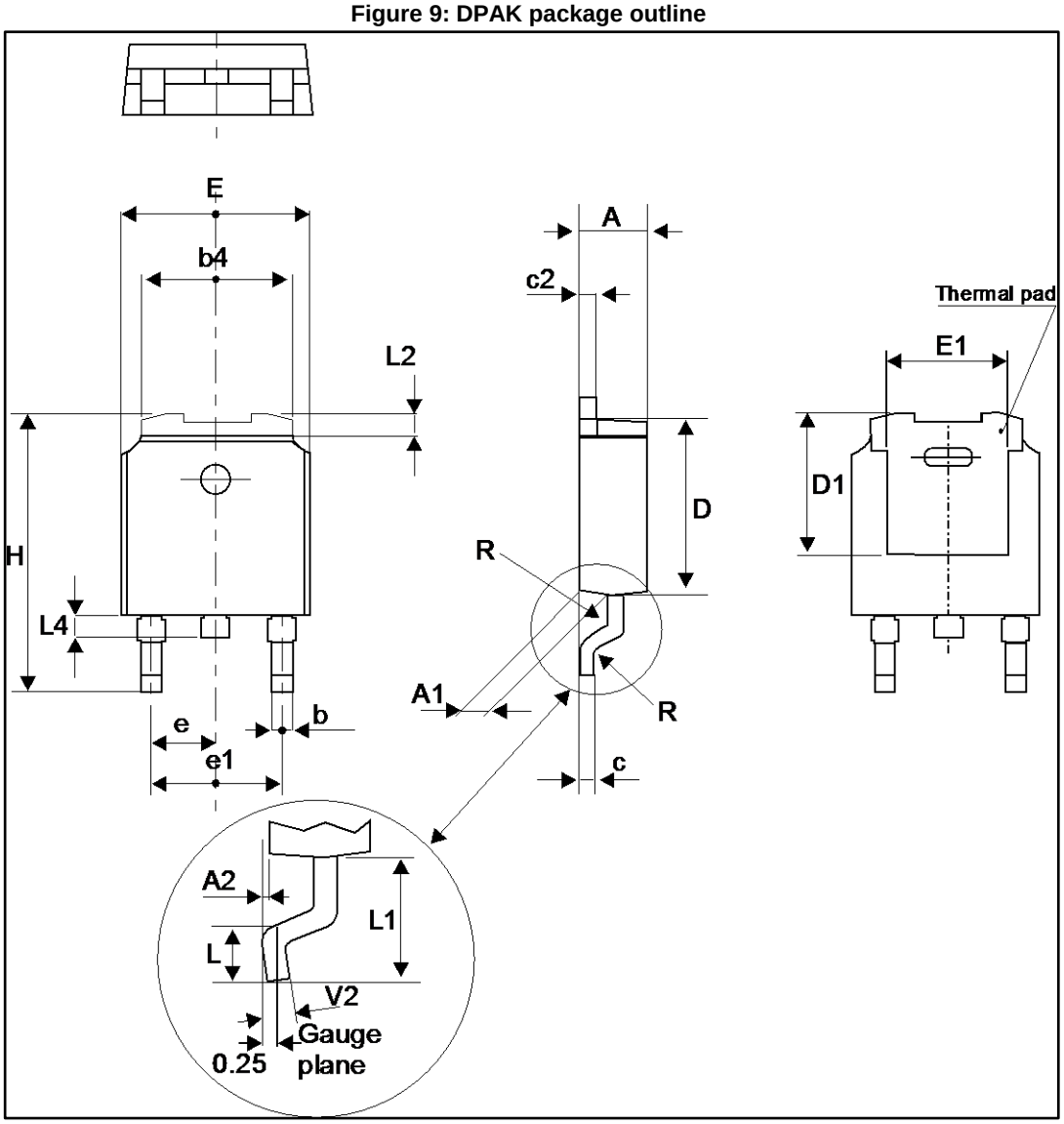


Table 5: IPAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.087	0.094
A1	0.90	1.10	0.035	0.043
b	0.64	0.90	0.025	0.035
b2		0.95		0.037
b4	5.20	5.43	0.205	0.214
B5	0.30 typ.		0.012 typ.	
c	0.45	0.60	0.018	0.024
c2	0.46	0.60	0.018	0.024
D	6.00	6.20	0.236	0.244
E	6.40	6.65	0.252	0.261
e	2.28 typ.		typ.0.090	
e1	4.40	4.60	0.173	0.181
H	16.10 typ.		0.634 typ.	
L	9.0	9.60	0.354	0.378
L1	0.80	1.20	0.031	0.047
L2	0.80 typ.	1.25	0.031 typ.	0.049
V1	+10°		+10	

2.2 DPAK package information

Figure 9: DPAK package outline

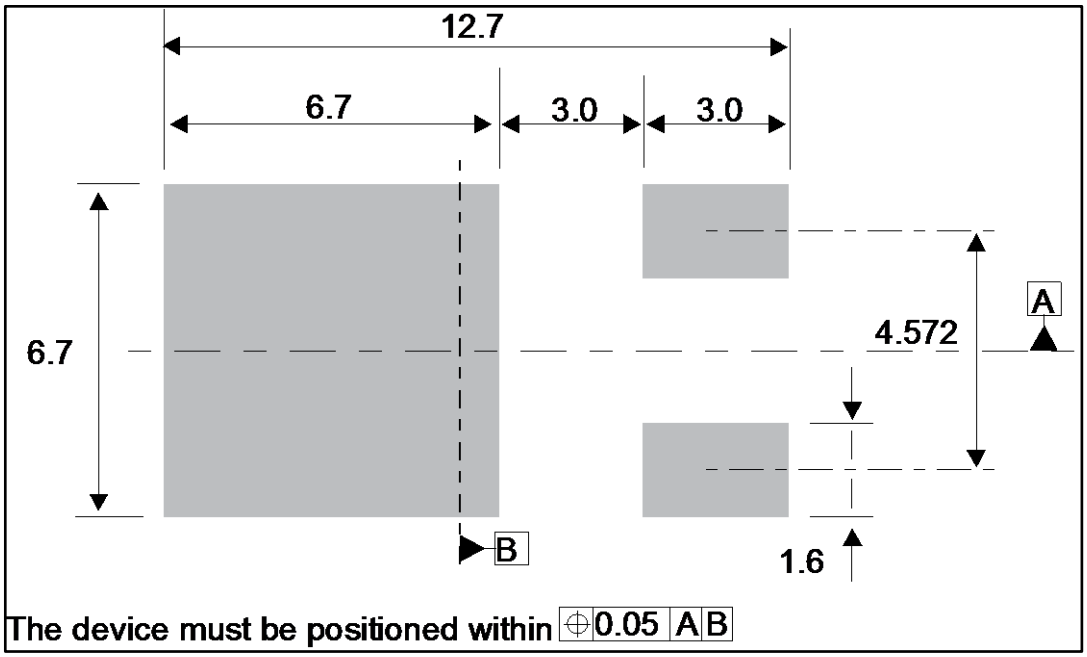


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: DPAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.40	0.085	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
b	0.64	0.90	0.025	0.035
b4	4.95	5.46	0.194	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.60	0.018	0.023
D	5.97	6.22	0.235	0.244
D1	4.95	5.60	0.194	0.220
E	6.35	6.73	0.250	0.265
E1	4.32	5.50	0.170	0.216
e	2.286 typ.		0.090 typ.	
e1	4.40	4.70	0.173	0.185
H	9.35	10.40	0.368	0.409
L	1.0	1.78	0.039	0.070
L2		1.27		0.050
L4	0.60	1.02	0.023	0.040
V2	-8°	+8°	-8°	+8°

Figure 10: DPAK recommended footprint (dimensions in mm)



2.3 TO-220AB package information

Figure 11: TO-220AB package outline

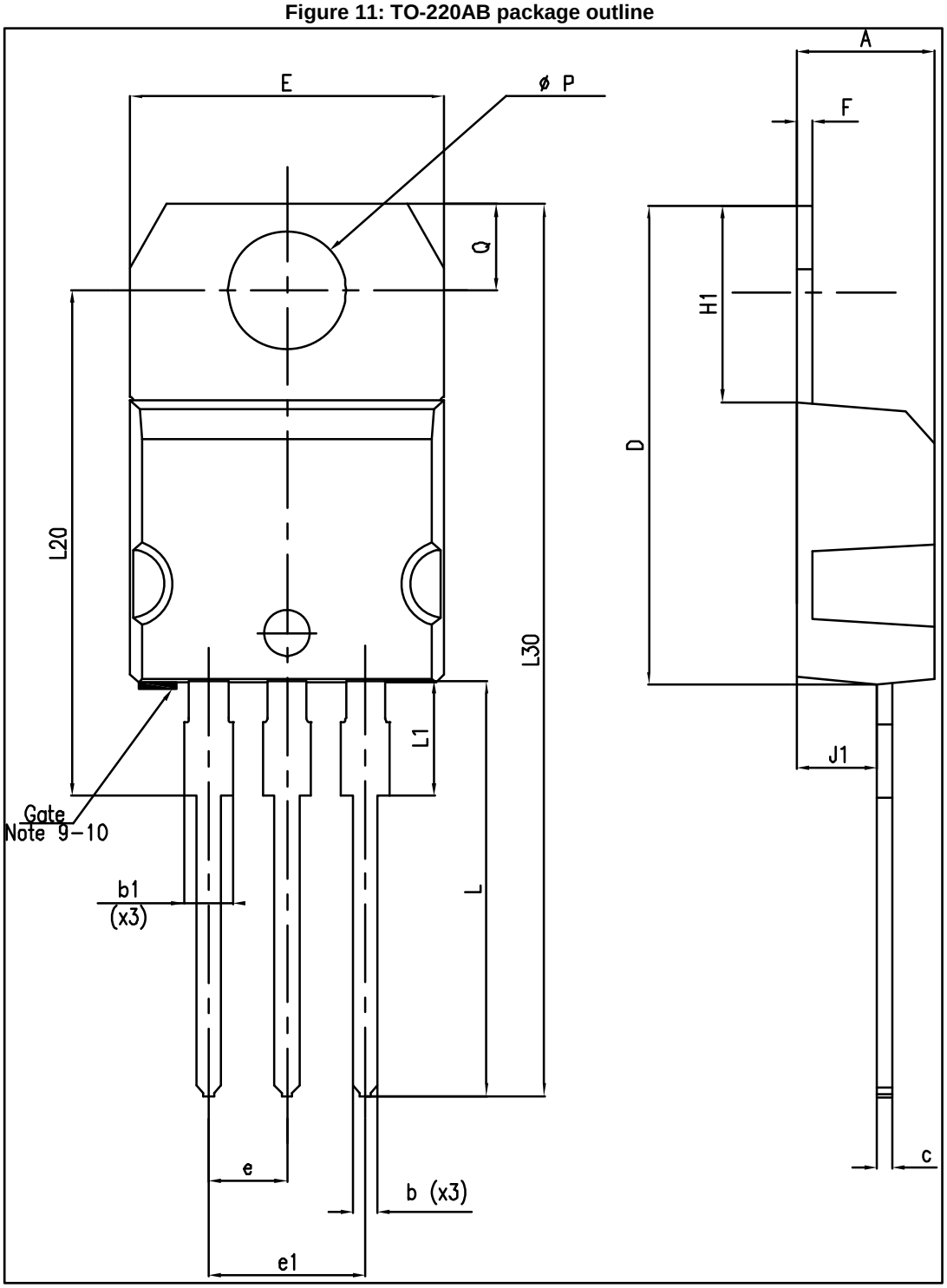


Table 7: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	0.51	0.60	0.020	0.024
J1	2.40	2.72	0.094	0.107
H1	6.20	6.60	0.244	0.256
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138	
Ø P	3.75	3.85	0.148	0.156
Q	2.65	2.95	0.104	0.116

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
FERD20S100STS	FD20S100STS	TO-220AB	1.38 g	50	Tube
FERD20S100SB-TR	FD20 S100S	DPAK	0.35 g	2500	Tape and reel
FERD20S100SH	FD20 S100S	IPAK	0.32 g	75	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
03-Jun-2016	1	Initial release.
14-Nov-2017	2	Updated cover page.

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