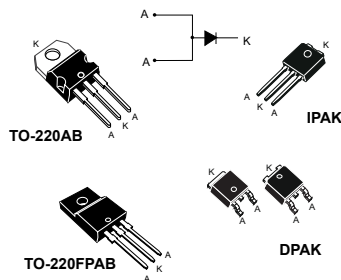


100 V, 20 A field-effect rectifier diode



Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Reduced leakage current
- Low forward voltage drop
- High frequency operation
- Insulated package TO-220FPAB:
 - Insulated voltage: 2000 V_{RMS} sine
- ECOPACK2 compliant component

Applications

- Switching diode
- Notebook adapter
- LED lighting
- DC/DC converter
- MPPT

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.

Product status	
FERD20H100S	
Product summary	
Symbol	Value
$I_{F(AV)}$	20 A
V_{RRM}	100 V
$V_F(max.)$	0.415 V
$I_R(max.)$	140 μ A
$T_{j(max.)}$	175 °C

1 Characteristics

Table 1. 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	TO-220AB, DPAK, IPAK	T _C = 155 °C	20	A
		TO-220FPAB	T _C = 110 °C		
I _{FSM}	Surge non repetitive forward current	DPAK, IPAK	t _p = 10 ms sinusoidal	150	A
		TO-220AB, TO-220FPAB		250	
T _{stg}	Storage temperature range			-65 to +175	°C
T _j	Maximum operating junction temperature ⁽¹⁾			+175	°C

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

Table 2. Thermal resistance parameter

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, DPAK, IPAK	1.0	°C/W
		TO-220FPAB	3.8	

Table 3. Static electrical characteristics (anode terminals short circuited)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		140	μA
		$T_j = 125\text{ °C}$		-	8	16	mA
		$T_j = 125\text{ °C}$	$V_R = 70\text{ V}$	-	4	7	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 2\text{ A}$	-	0.370	0.415	V
		$T_j = 125\text{ °C}$		-	0.315	0.365	
		$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	0.455	0.515	
		$T_j = 125\text{ °C}$		-	0.450	0.510	
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	0.580	0.655	
		$T_j = 125\text{ °C}$		-	0.550	0.605	
		$T_j = 125\text{ °C}$	$I_F = 20\text{ A}$	-	0.640	0.705	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ μs}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.415 \times I_{F(AV)} + 0.019 \times I_{F(RMS)}^2$$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier

- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

Figure 1. Average forward current versus ambient temperature ($\delta = 0.5$)

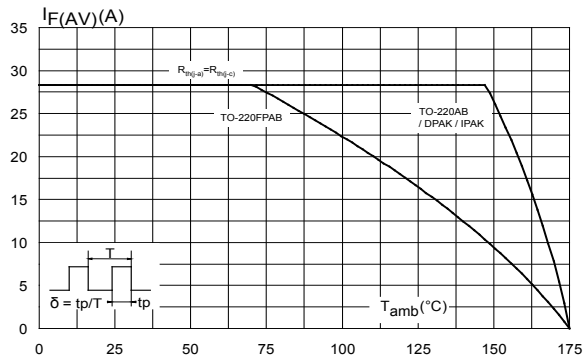


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

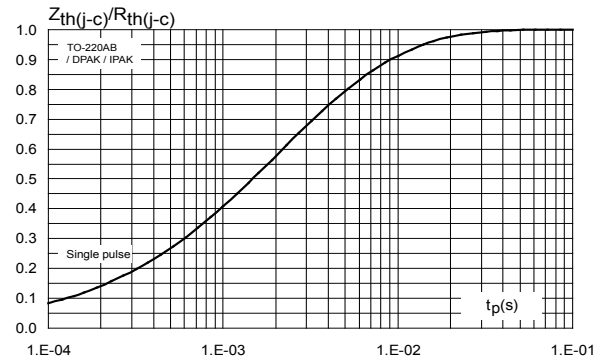


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

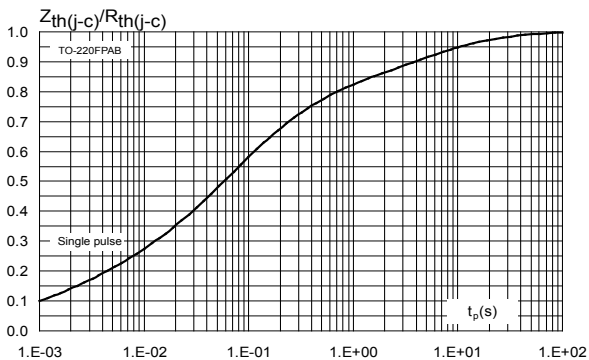


Figure 4. Reverse leakage current versus reverse voltage applied (typical values)

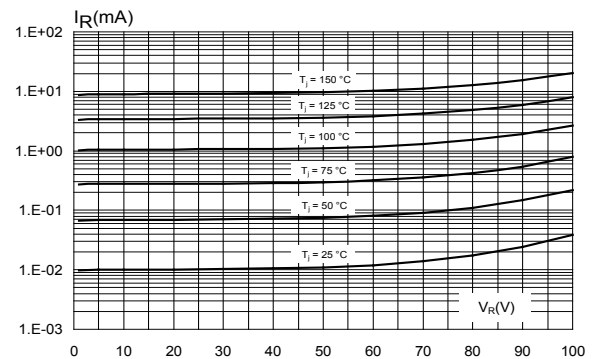
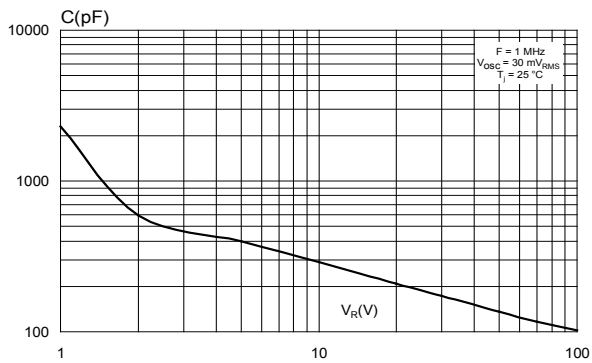
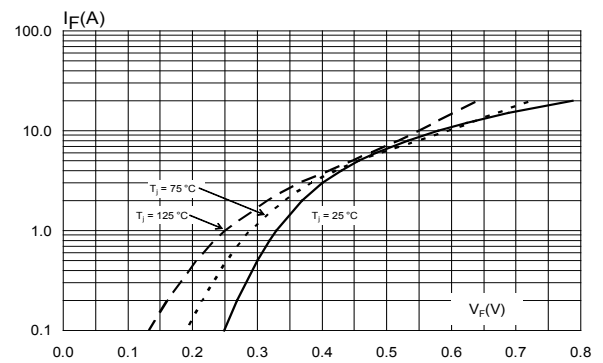
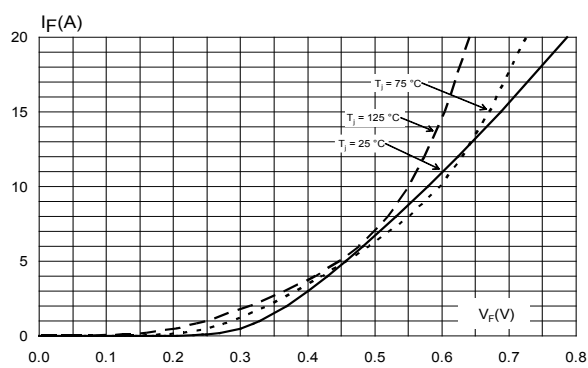
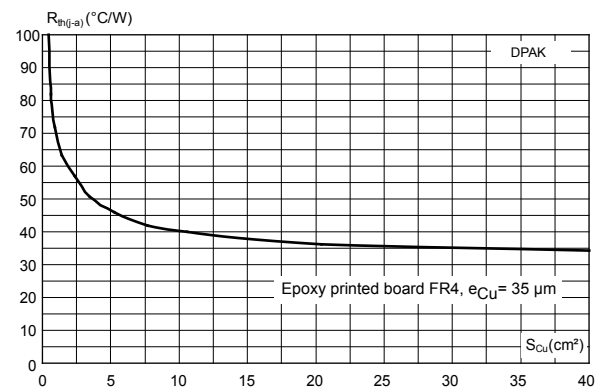


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

Figure 6. Forward voltage drop versus forward current (typical values)

Figure 7. Forward voltage drop versus forward current (typical values)

Figure 8. Thermal resistance junction to ambient versus copper surface under tab (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.

2.1 IPAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 9. IPAK package outline

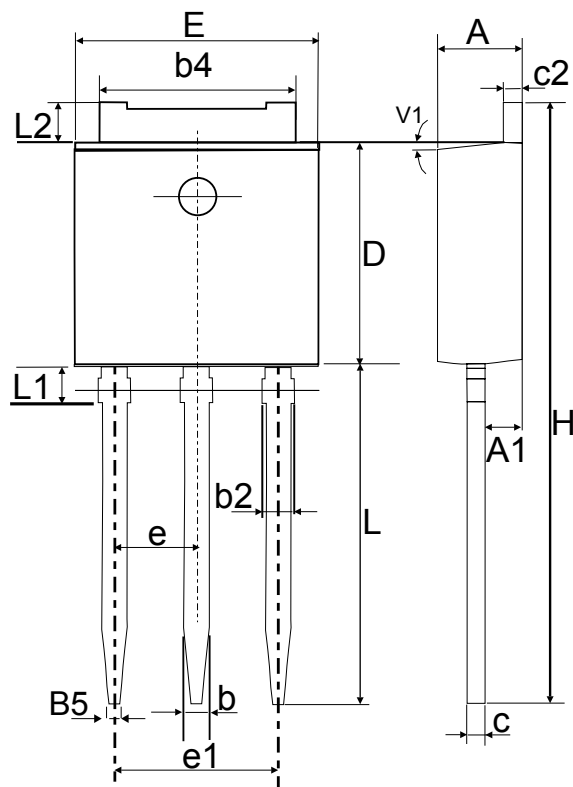


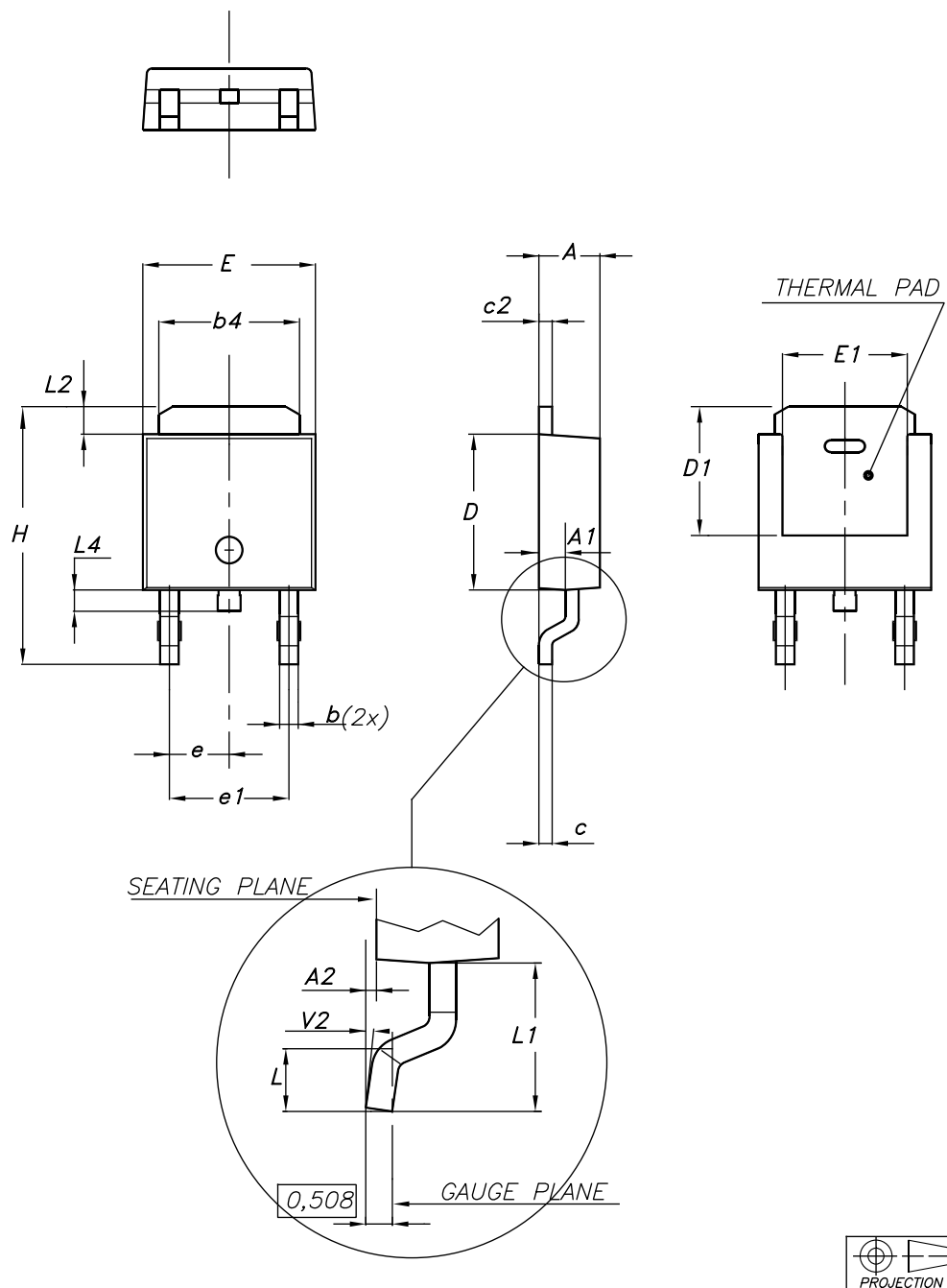
Table 4. IPAK package mechanical data

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

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 10. DPAK package outline

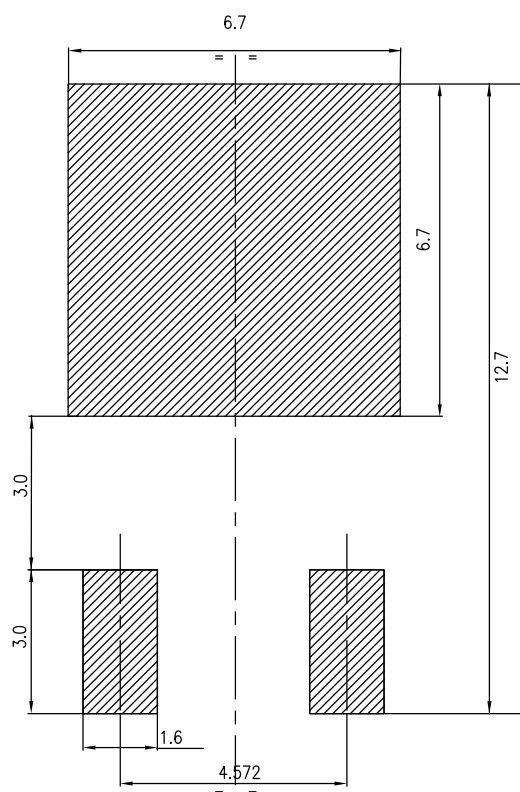


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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 11. DPAK recommended footprint (dimensions in mm)



2.3 TO-220FPAB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 12. TO-220FPAB package outline

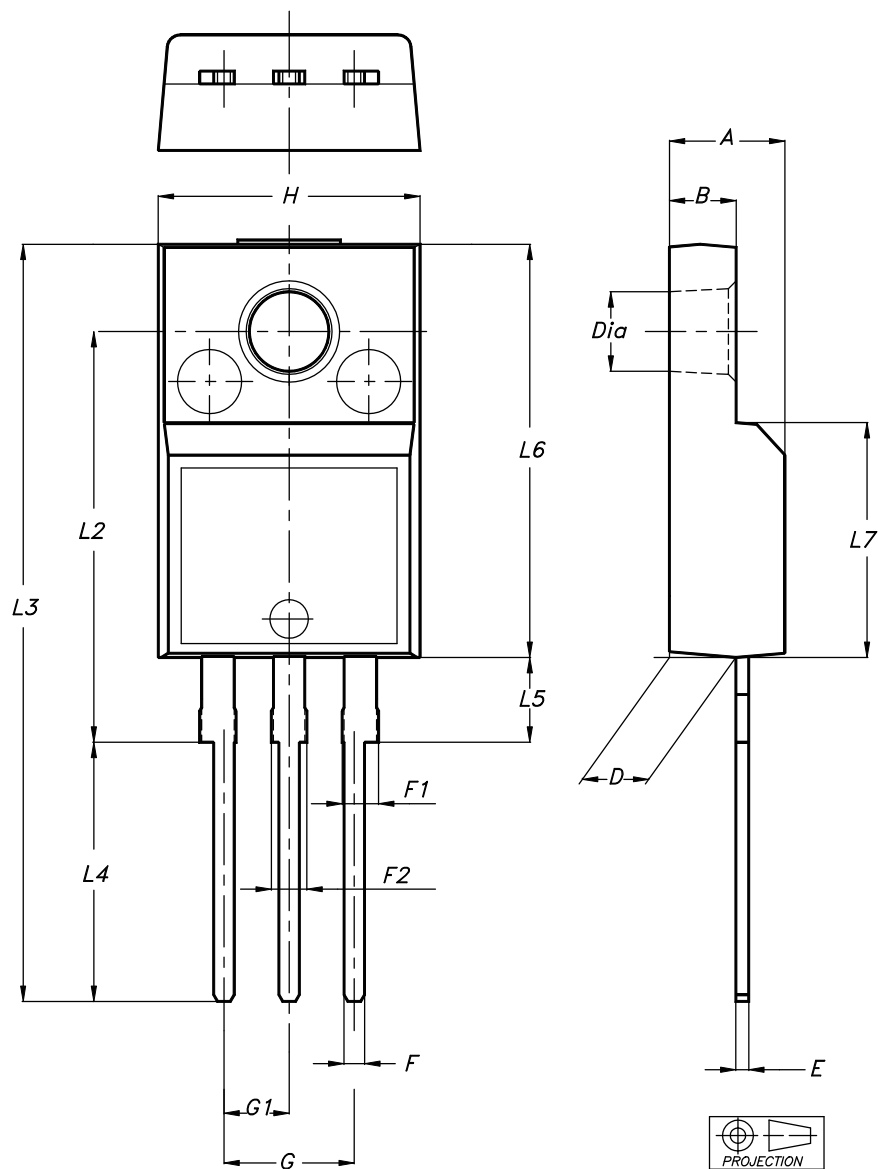


Table 6. TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.50	2.70	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.00	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.60	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.00	3.20	0.1186	0.1265

2.4 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.60 N·m

Figure 13. TO-220AB package outline

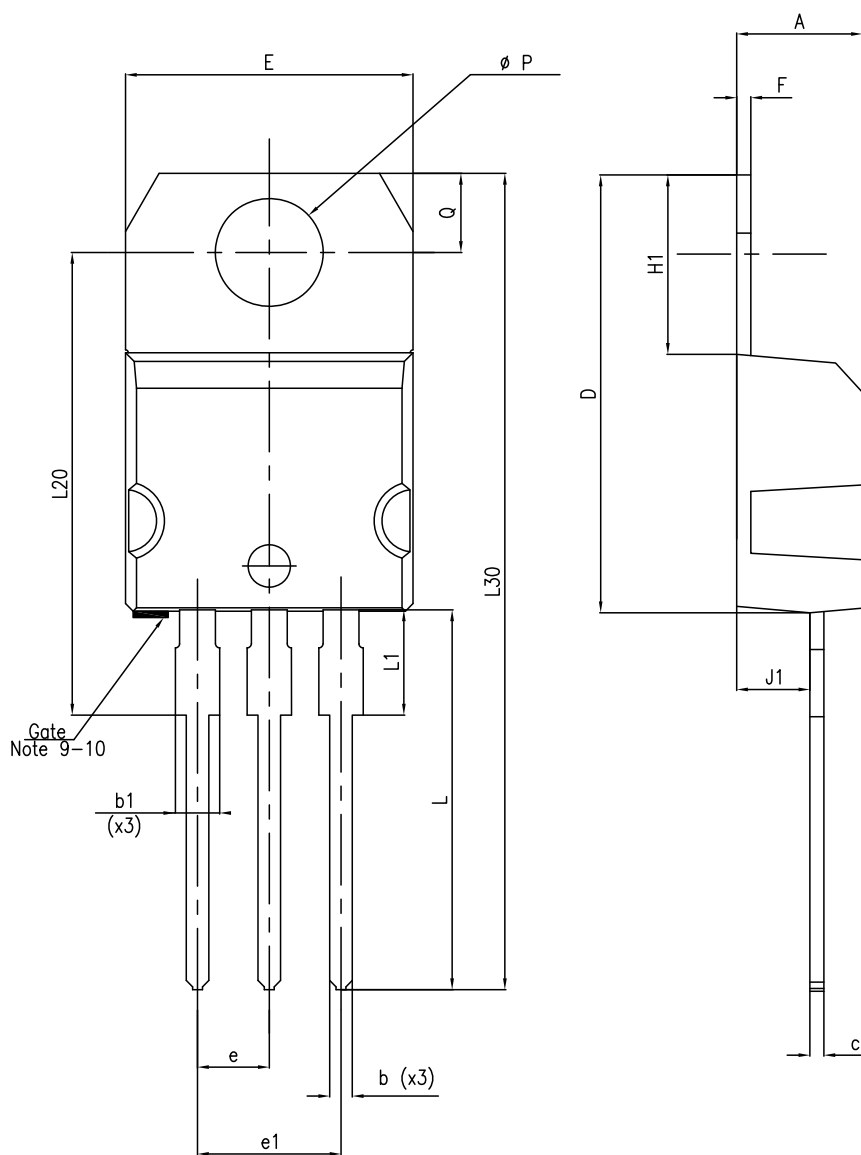


Table 7. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
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 typ.	
θP	3.75	3.85	0.148	0.152
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
FERD20H100STS	FD20H100STS	TO-220AB	1.38 g	50	Tube
FERD20H100SFP	FD20H100SFP	TO-220FPAB	1.7 g	50	Tube
FERD20H100SB-TR	FD20 H100S	DPAK	0.35 g	2500	Tape and reel
FERD20H100SH	FD20 H100S	IPAK	0.32 g	75	Tube

Revision history

Table 9. Document revision history

Date	Revision	Changes
08-Mar-2016	1	Initial release.
09-May-2016	2	Update of document title.
13-Nov-2017	3	Updated cover page and Table 8. Ordering information .
22-Jun-2020	4	Updated Section 2.2 DPAK package information .

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