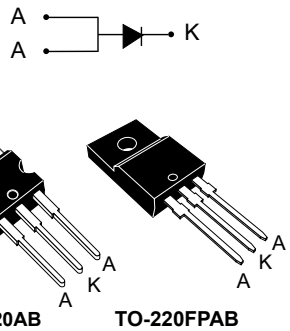
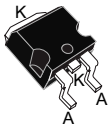
FERD40H100S

Datasheet

100 V, 40 A field-effect rectifier diode



TO-220AB TO-220FPAB



D²PAK

Features

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

Applications

- Adapter
- Gaming console power supply
- Battery charger
- DC / DC converter

Description

This single rectifier is based on a proprietary technology, enabling to achieve the best in class V_F/I_R for a given silicon surface.

Packaged in TO-220AB, TO-220FPAB and D^{2}PAK, the FERD40H100S is optimized for use in confined applications where both efficiency and thermal performance are key. With a lower dependency of leakage current (I_R) and forward voltage (V_F) in function of temperature, the thermal runaway risk is reduced. It is highly recommended to be used in adapters and chargers.

Product status
FERD40H100S

Product summary	
Symbol	**Value**
$I_{F(AV)}$	40 A
V_{RRM}	100 V
$T_{j(max.)}$	175 °C
$V_{F(typ.)}$	0.325 V

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		60	A
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave		40	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	440	A
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, D^2PAK	0.8	°C/W
		TO-220FPAB	3.3	

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 °C	$V_R = V_{RRM}$	-		190	µA
		T_j = 125 °C		-	12	24	mA
		T_j = 125 °C	V_R = 70 V	-	6	12	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 4 A	-	0.380	0.430	V
		T_j = 125 °C		-	0.325	0.375	
		T_j = 25 °C	I_F = 10 A	-	0.465	0.525	
		T_j = 125 °C		-	0.455	0.510	
		T_j = 25 °C	I_F = 20 A	-	0.600	0.675	
		T_j = 125 °C		-	0.550	0.600	
		T_j = 125 °C	I_F = 40 A	-	0.645	0.705	

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:

$P = 0.420 \times I_{F(AV)} + 0.009 \times I_F{}^2{}_{(RMS)}$

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 case temperature (δ = 0.5)

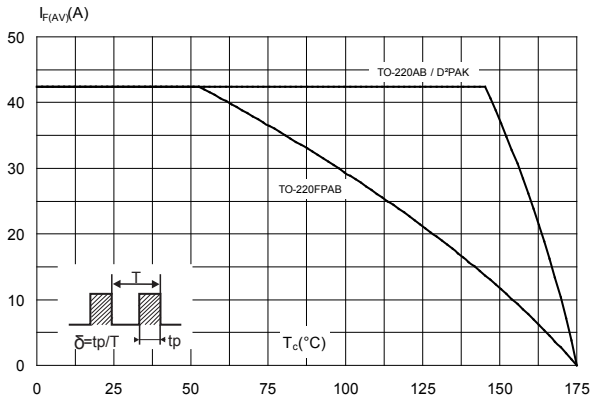


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK)

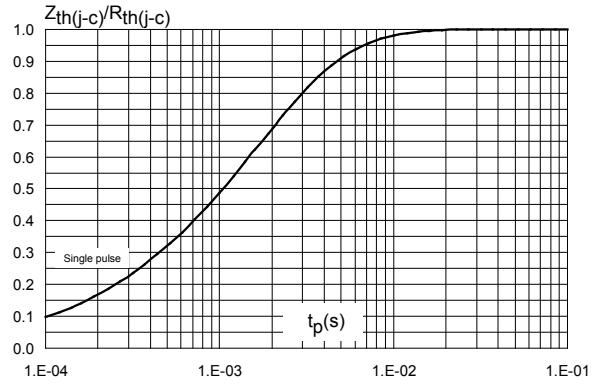


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

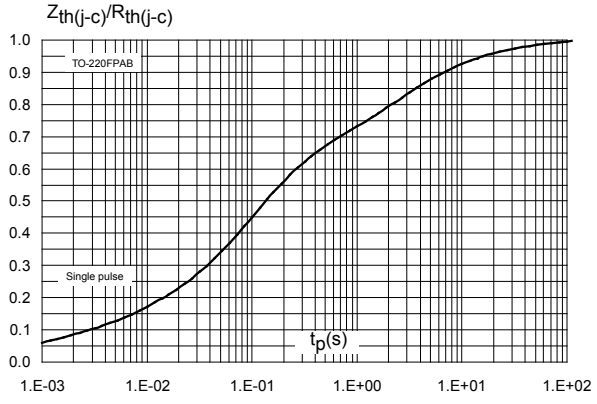


Figure 4. Reverse leakage current versus reverse voltage applied (typical values)

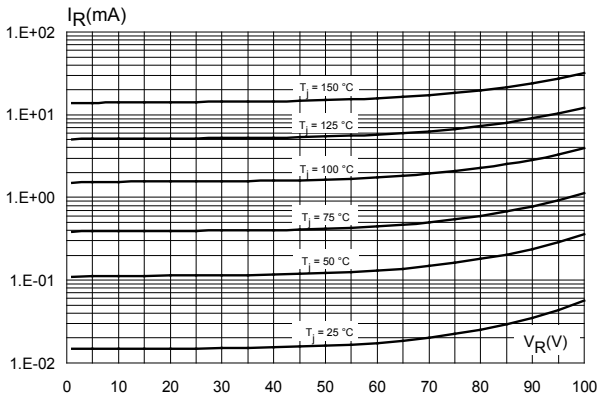


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

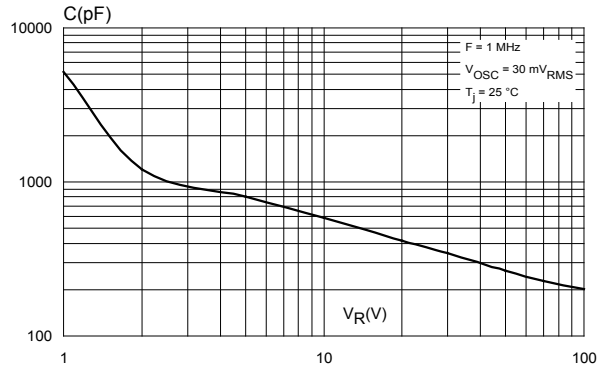


Figure 6. Forward voltage drop versus forward current (typical values)

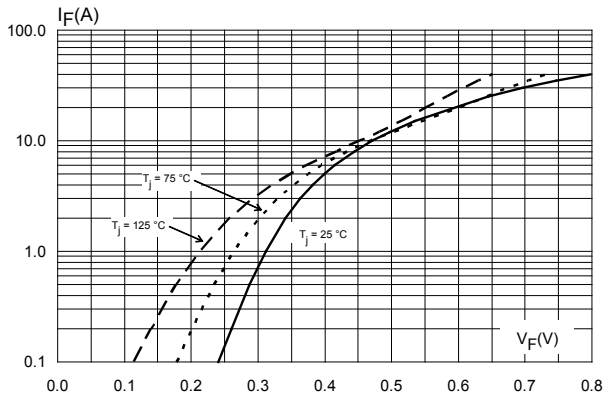


Figure 7. Forward voltage drop versus forward current (typical values)

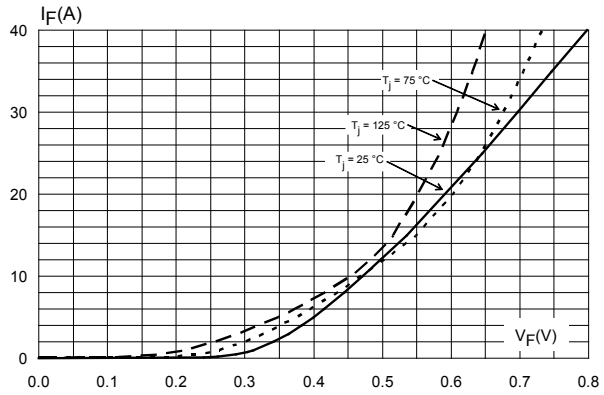
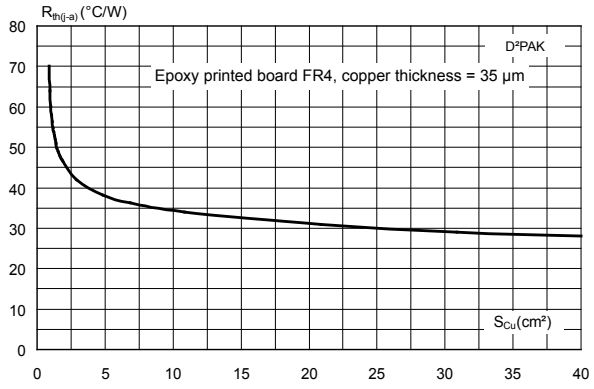


Figure 8. Thermal resistance junction to ambient versus copper surface under tab (typical values)



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 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 9. **TO-220AB package outline**

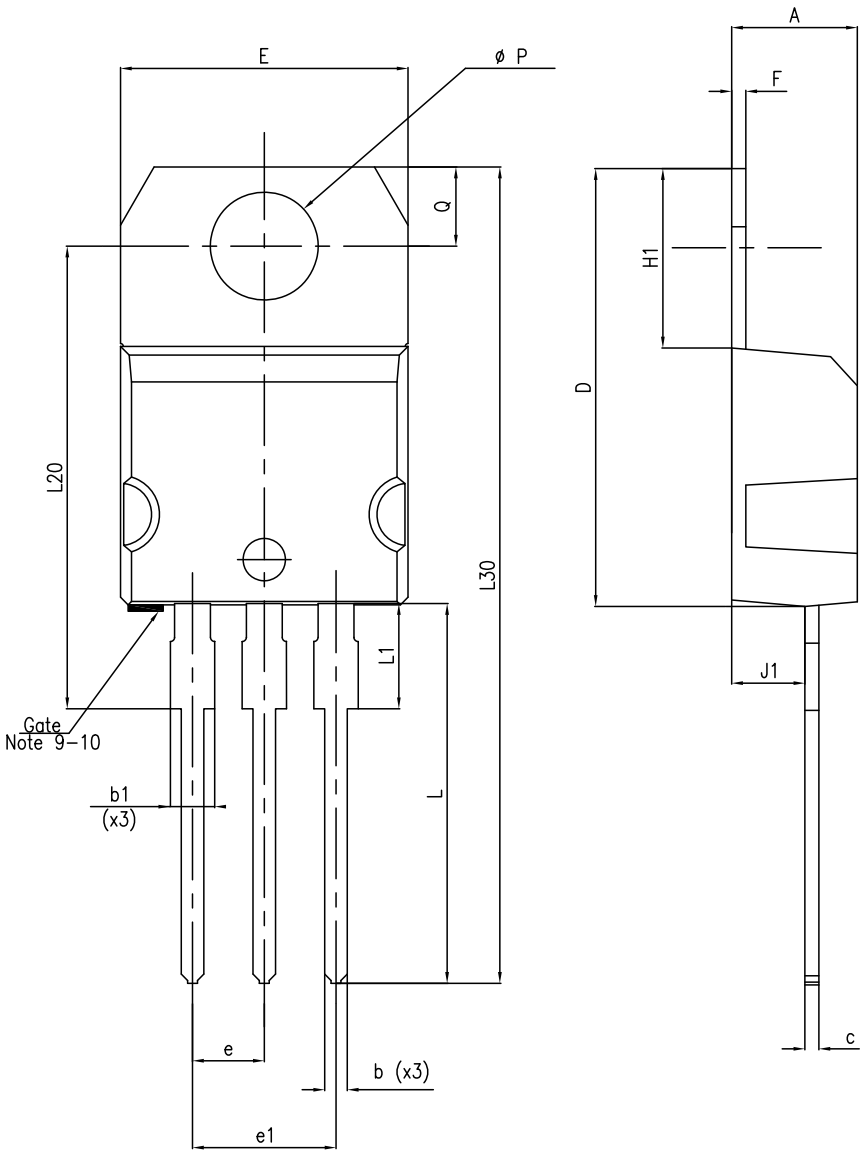


Table 4. TO-220AB package mechanical data

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

2.2 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 10. TO-220FPAB package outline

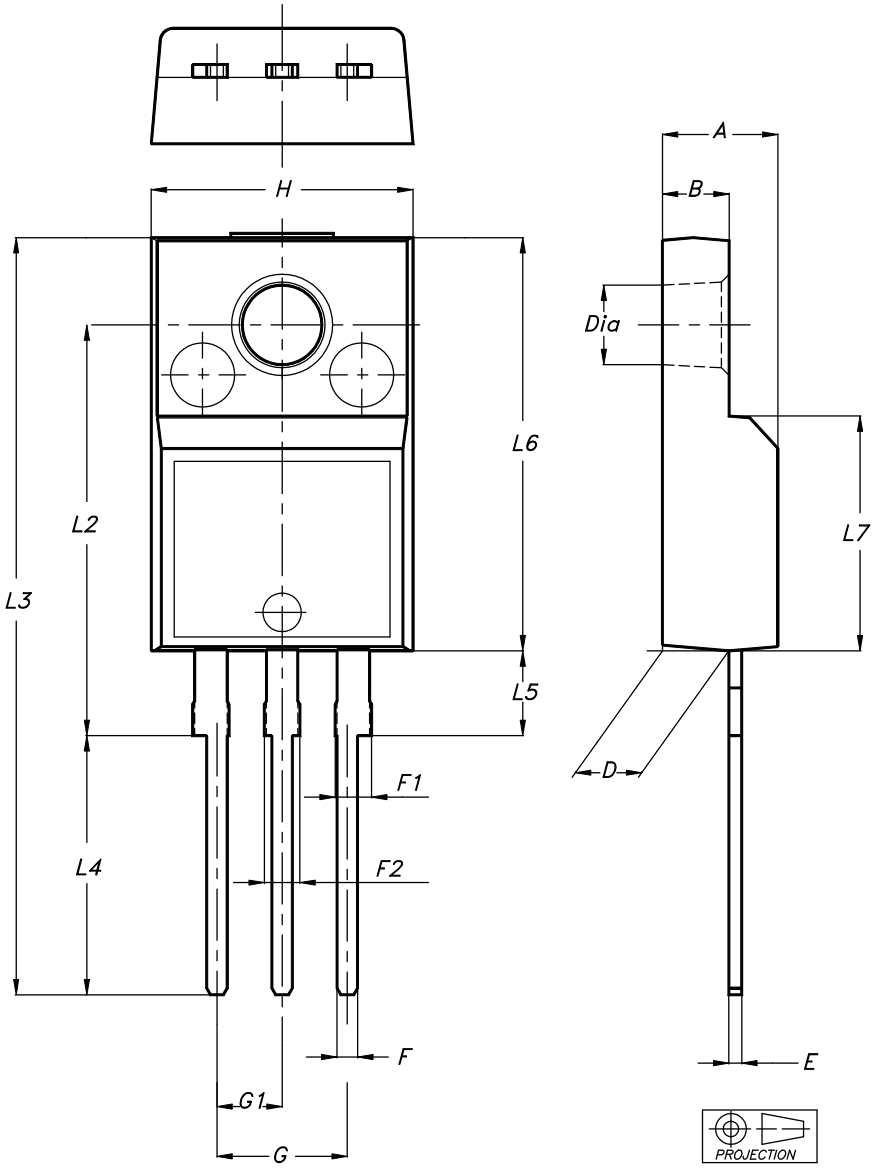


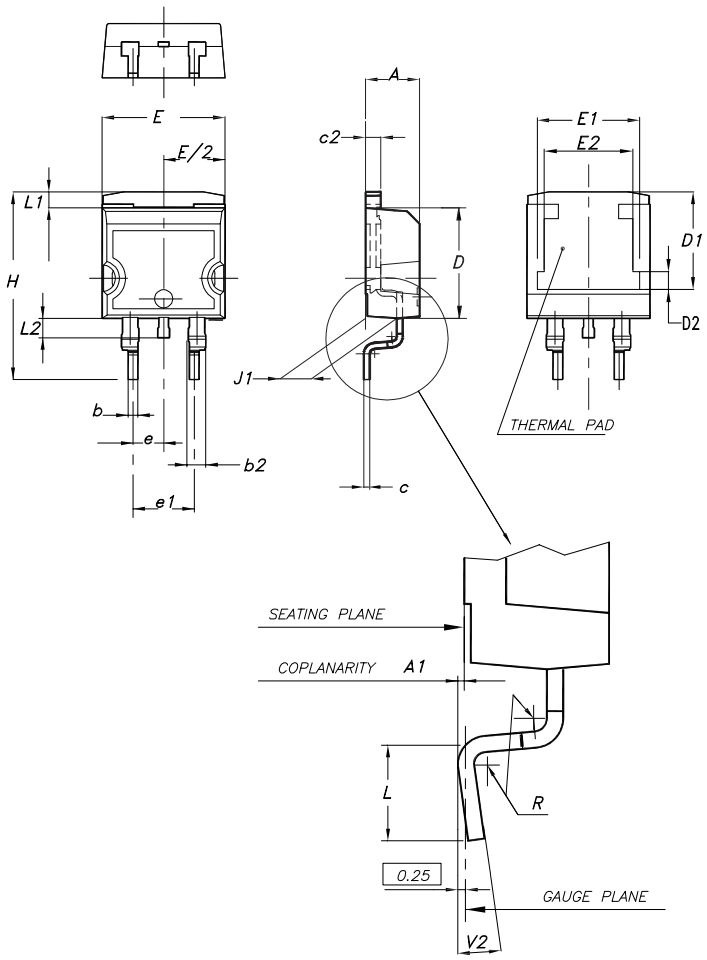
Table 5. **TO-220FPAB package mechanical data**

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

2.3 D²PAK package information

- Epoxy meets UL94, V0.
- Cooling method: by conduction (C)

Figure 11. D²PAK package outline

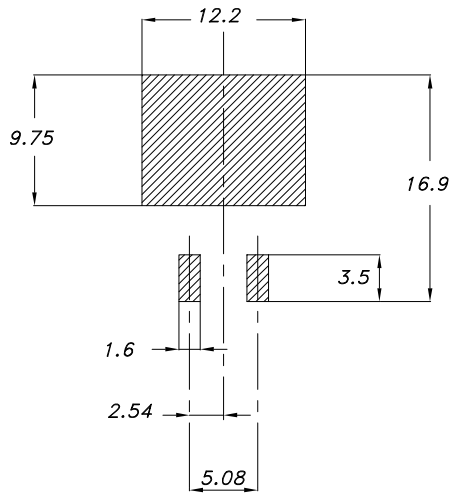


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. **D²PAK package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.028		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.018		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50	7.75	8.00	0.295	0.305	0.315
D2	1.10	1.30	1.50	0.043	0.051	0.060
E	10.00		10.40	0.394		0.409
E1	8.30	8.50	8.70	0.335	0.343	0.346
E2	6.85	7.05	7.25	0.266	0.278	0.282
e		2.54			0.100	
e1	4.88		5.28	0.190		0.205
H	15.00		15.85	0.591		0.624
J1	2.49		2.69	0.097		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.049		0.055
L2	1.30		1.75	0.050		0.069
R		0.40			0.015	
V2	0°		8°	0°		8°

Figure 12. **D²PAK recommended footprint (dimensions are in mm)**



3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
FERD40H100STS	FD40H100STS	TO-220AB	1.38 g	50	Tube
FERD40H100SG-TR	FD40H100SG	D²PAK	1.48 g	1000	Tape and reel
FERD40H100SFP	FD40H100SFP	TO-220FPAB	1.90 g	50	Tube

Revision history

Table 8. **Document revision history**

Date	Version	Changes
08-Apr-2016	1	Initial release.
06-Mar-2019	2	Added TO-220FPAB data information.