

Description

This dual rectifier is based on a proprietary technology that achieves the best in class V_F/I_R for a given silicon surface.

Packaged in TO-220AB, and D²PAK, this device is intended to be used in switch mode power supplies, or automotive applications

Table 1. Device summary

$I_{F(AV)}$	2 x 20 A
V_{RRM}	45 V
$V_F(\text{typ})$	0.31 V

Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Low forward voltage drop
- High frequency operation

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode at 25° C, unless otherwise stated)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			40	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 150^\circ\text{C}$	Per diode	20	A
		$T_c = 145^\circ\text{C}$	Per device	40	
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms sinusoidal}$	275	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature ⁽¹⁾	TO-220AB, D ² PAK		175	°C
		D ² PAK (DC forward current without reverse bias, t = 1 hour)		200	

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

Table 3. Thermal resistances

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.6	°C/W
		Total	1.1	
$R_{th(c)}$	Coupling		0.5	°C/W

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			1800	μA
		$T_j = 125^\circ\text{C}$			50	100	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 10\text{ A}$		0.35	0.385	V
		$T_j = 125^\circ\text{C}$			0.31	0.34	
		$T_j = 25^\circ\text{C}$	$I_F = 20\text{ A}$		0.42	0.46	
		$T_j = 125^\circ\text{C}$			0.42	0.46	

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:

$$P = 0.28 \times I_{F(AV)} + 0.009 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current (per diode)

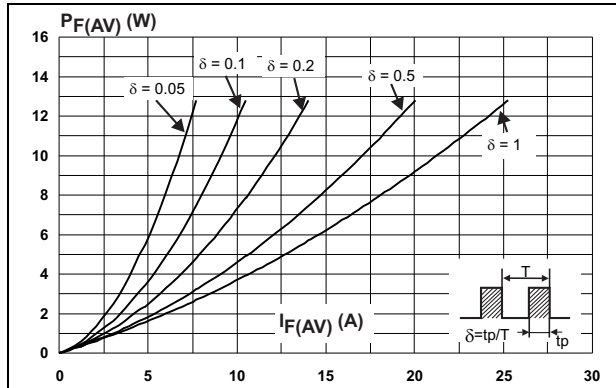


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

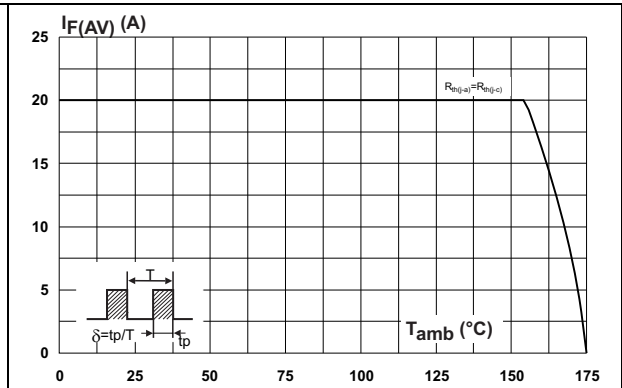


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

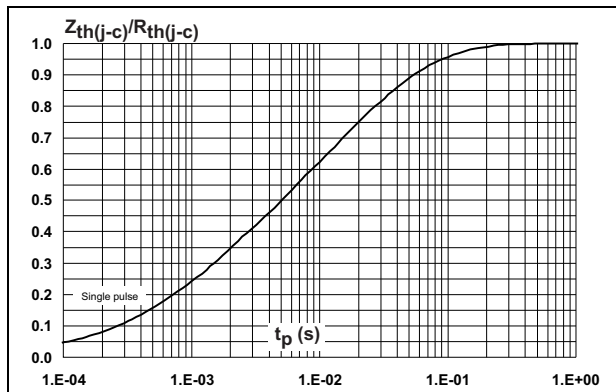


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

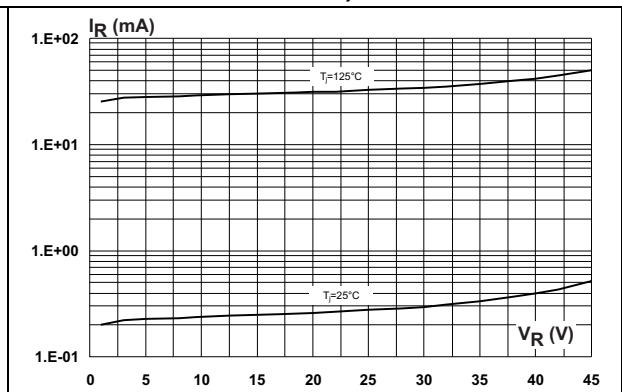


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

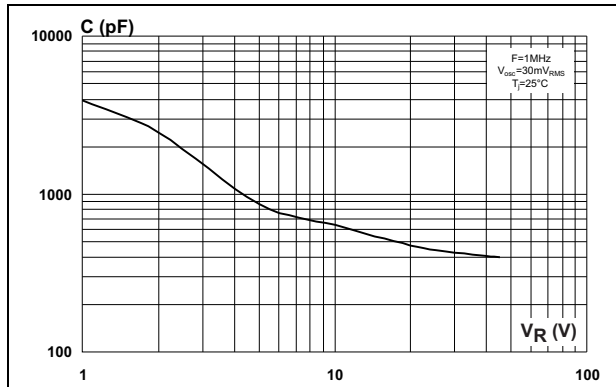


Figure 6. Forward voltage drop versus forward current (typical values, per diode)

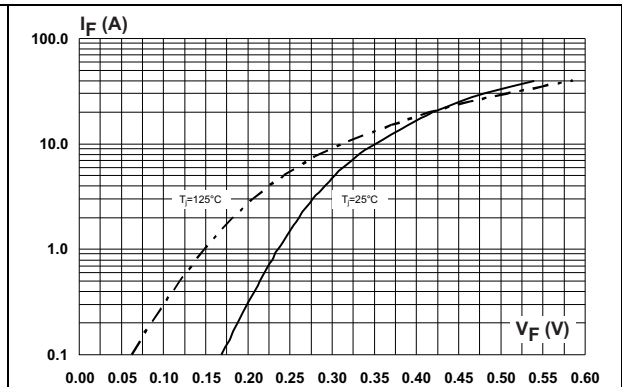
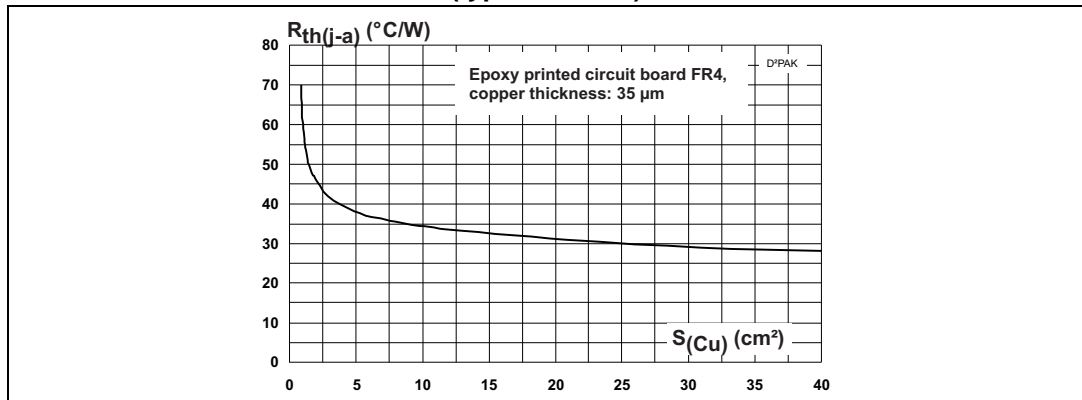


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values)



2 Package Information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m (TO-220AB)

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.

Figure 8. TO-220AB dimension definitions

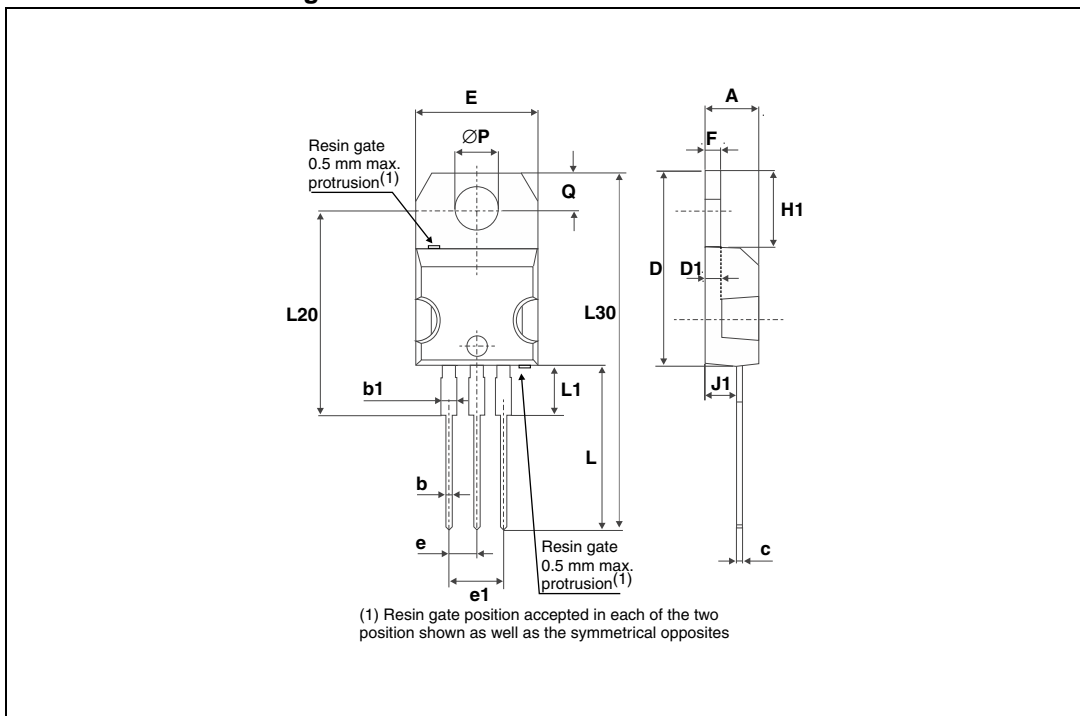


Table 5. TO-220AB dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
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	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64 typ.	
L30	28.90 typ.		1.13 typ.	
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Figure 9. D²PAK dimension definitions

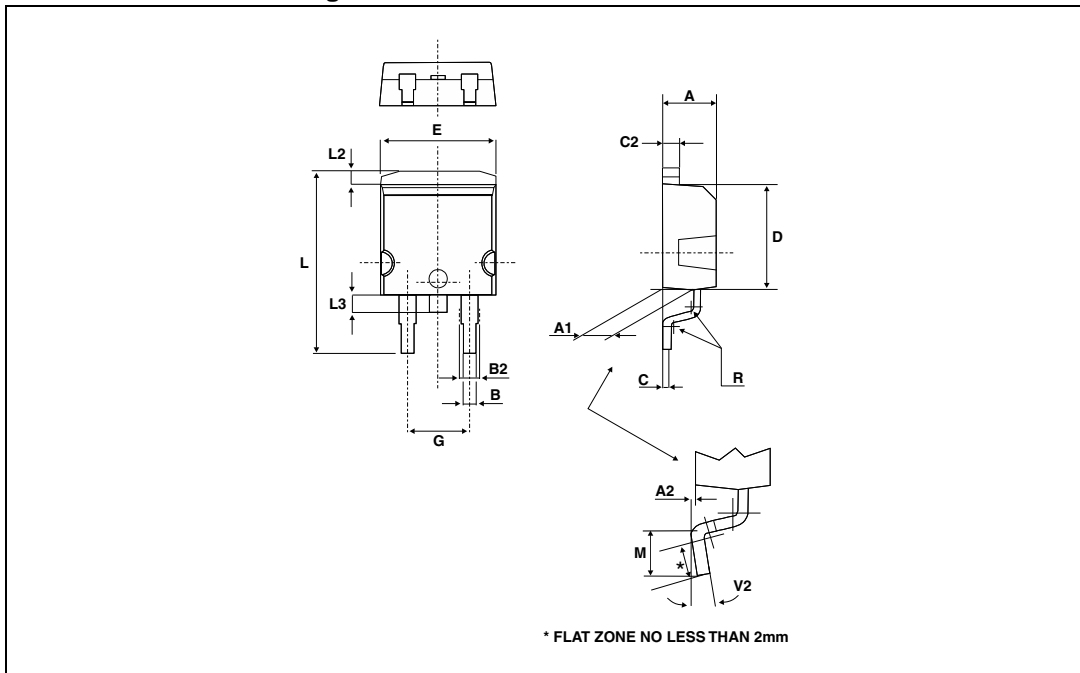
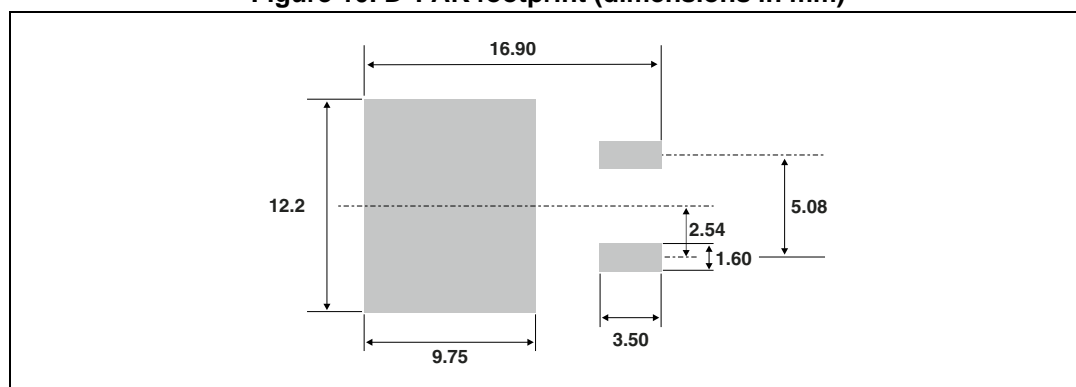


Table 6. D²PAK dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.30	1.75	0.051	0.069
M	2.29	2.79	0.090	0.110
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 10. D²PAK footprint (dimensions in mm)



3 Ordering Information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
FERD40U45CT	FERD40U45CT	TO-220AB	2.2 g	50	Tube
FERD40U45CG-TR	FERD40U45CG	D ² PAK	1.8 g	500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Description of Changes
13-Nov-2013	1	Previous version

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