

### 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 D<sup>2</sup>PAK, 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
$V_F(\text{typ})$	0.34 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 <sub>RRM</sub>	Repetitive peak reverse voltage			45	V
I <sub>F(RMS)</sub>	Forward rms current			40	A
I <sub>F(AV)</sub>	Average forward current, δ = 0.5	T <sub>c</sub> = 150° C	Per diode	20	A
		T <sub>c</sub> = 140° C	Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal		275	A
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C
T <sub>j</sub>	Maximum operating junction temperature (1)	TO-220AB, D <sup>2</sup> PAK		175	°C
		D <sup>2</sup> 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 <sub>th(j-c)</sub>	Junction to case	Per diode	1.6	°C/W
		Total	1.1	
R <sub>th(c)</sub>	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 <sub>R</sub> (1)	Reverse leakage current	T <sub>j</sub> = 25° C	V <sub>R</sub> = V <sub>RRM</sub>			650	μA
		T <sub>j</sub> = 125° C			25	50	mA
V <sub>F</sub> (2)	Forward voltage drop	T <sub>j</sub> = 25° C	I <sub>F</sub> = 10 A		0.38	0.415	V
		T <sub>j</sub> = 125° C			0.34	0.37	
		T <sub>j</sub> = 25° C	I <sub>F</sub> = 20 A		0.46	0.50	
		T <sub>j</sub> = 125° C			0.46	0.50	

1. Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

2. Pulse test: t<sub>p</sub> = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation:

$$P = 0.31 \times I_{F(AV)} + 0.0095 I_{F(RMS)}^2$$



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

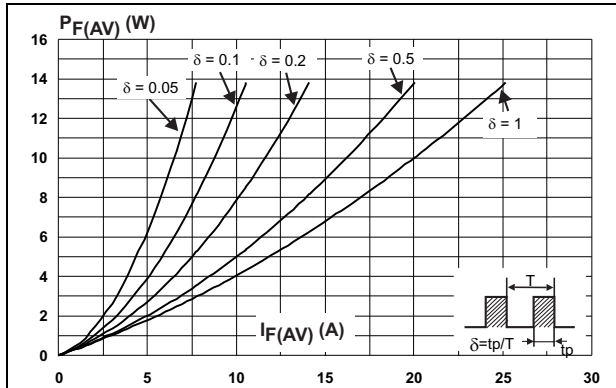


Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)

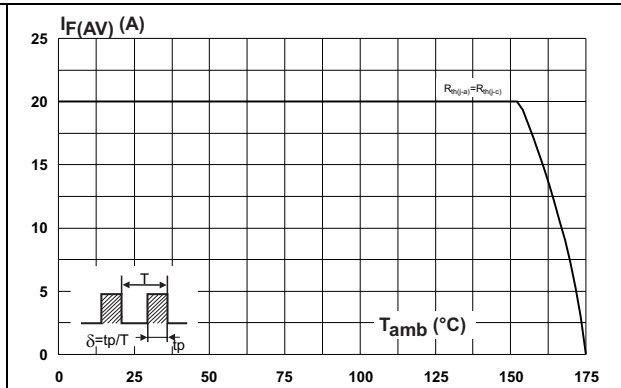


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

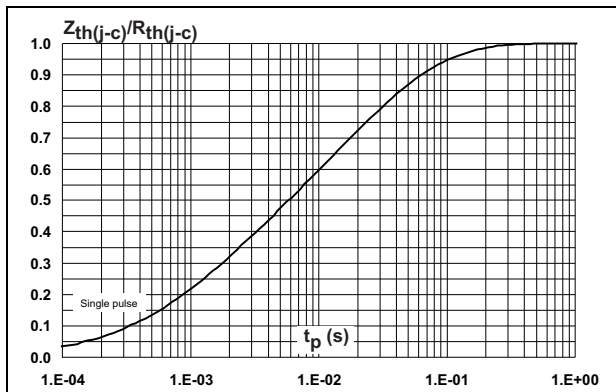


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

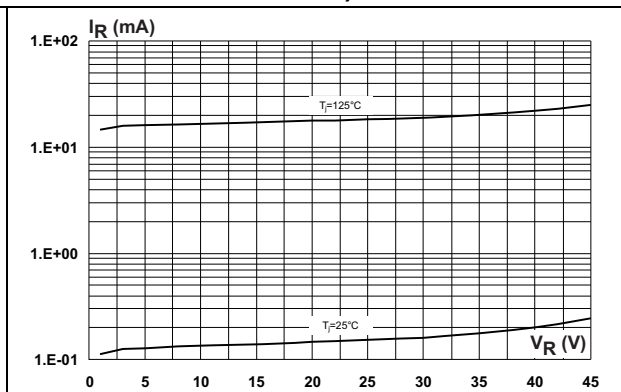


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

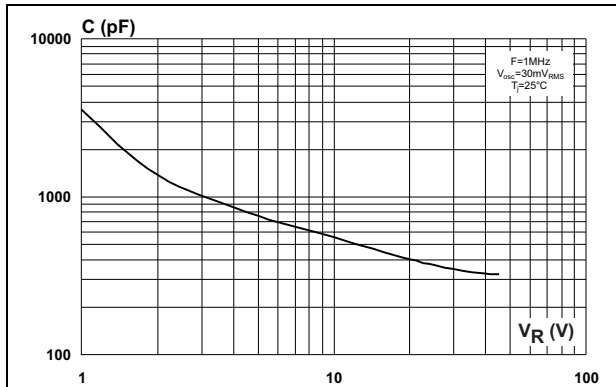


Figure 6. Forward voltage drop versus forward current (typical values, per diode)

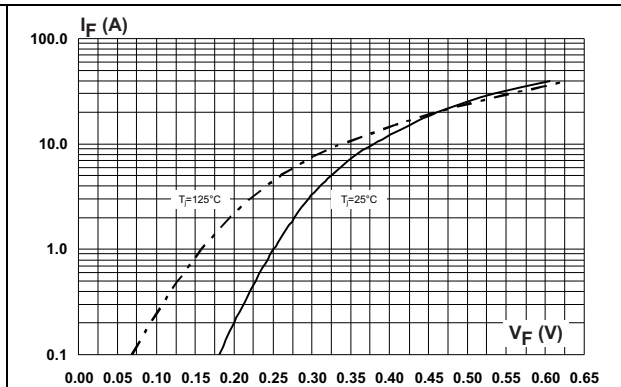
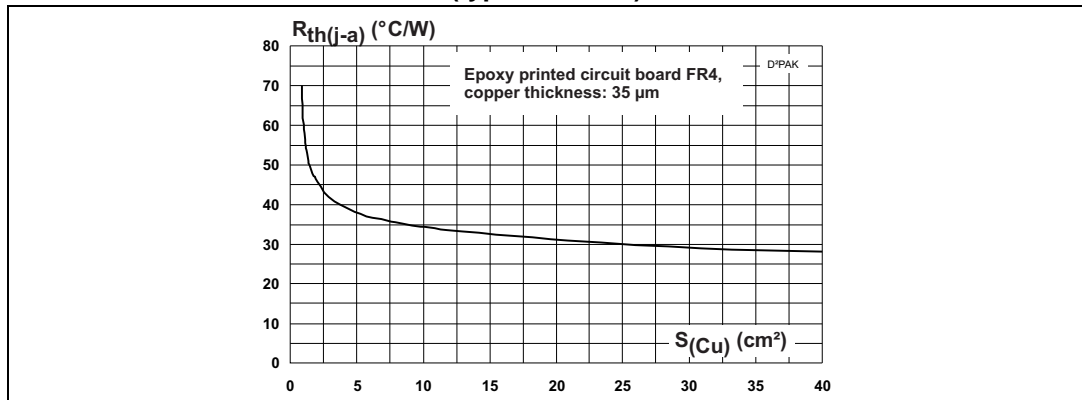


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values)



## 2 Package Information

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

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Figure 8. TO-220AB dimension definitions

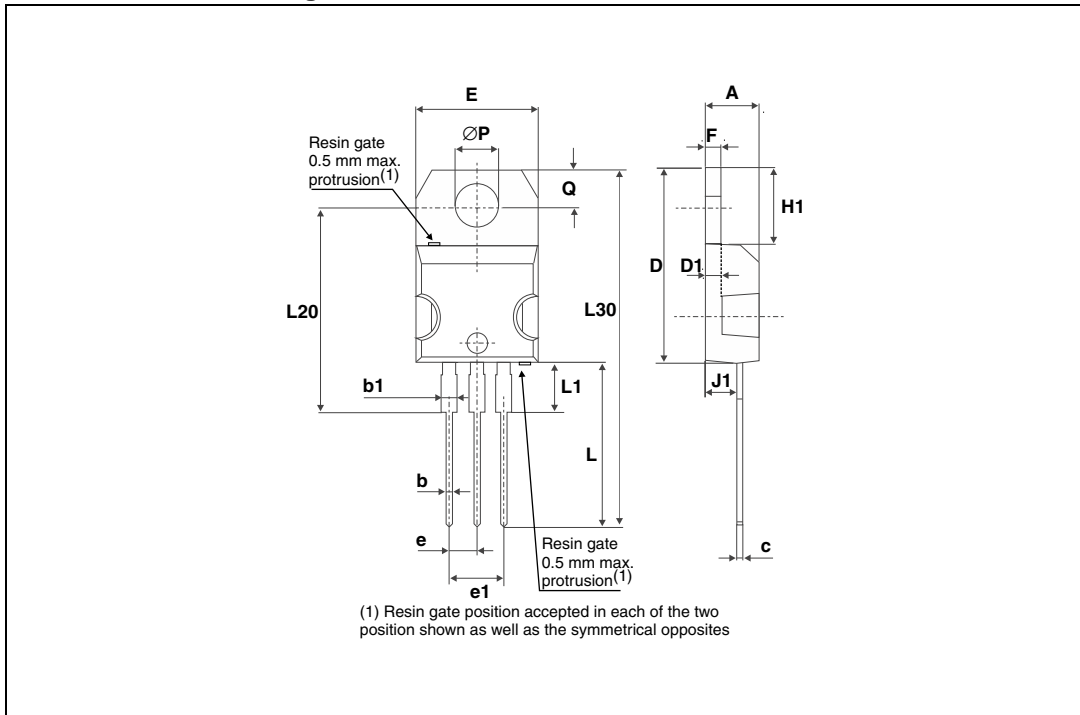


Table 5. TO-220AB dimension values

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. D<sup>2</sup>PAK dimension definitions

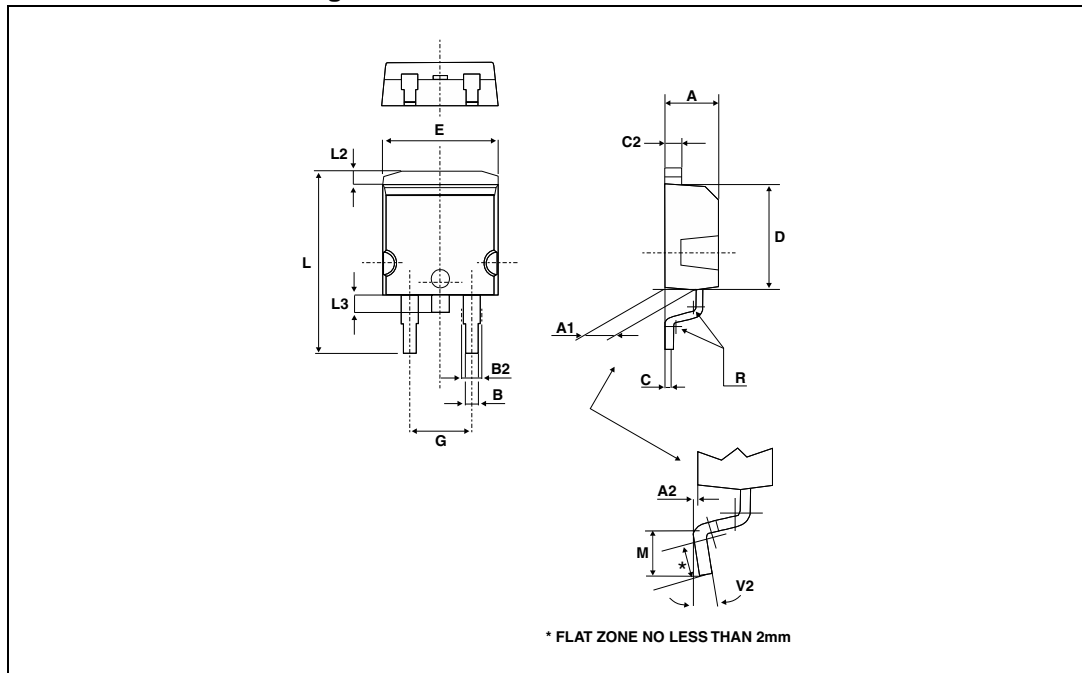
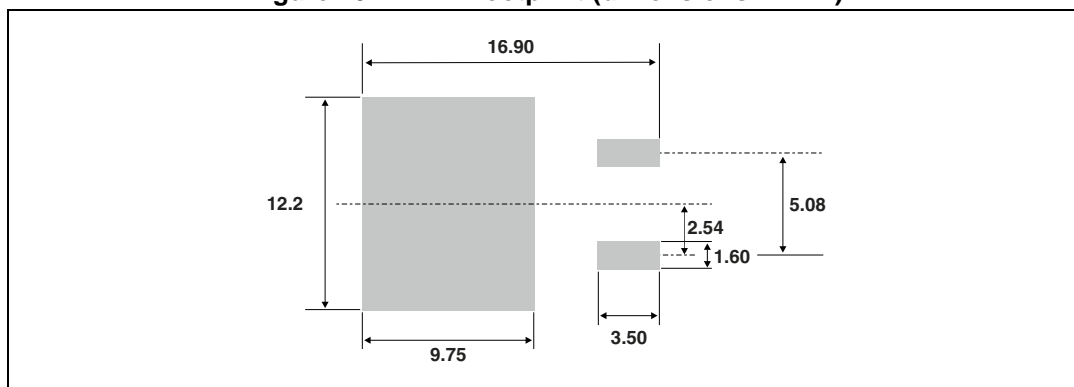


Table 6. D<sup>2</sup>PAK dimension values

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. D<sup>2</sup>PAK footprint (dimensions in mm)





### 3 Ordering Information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
FERD40M45CT	FERD40M45CT	TO-220AB	2.2 g	50	Tube
FERD40M45CG-TR	FERD40M45CG	D <sup>2</sup> 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	Initial release

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