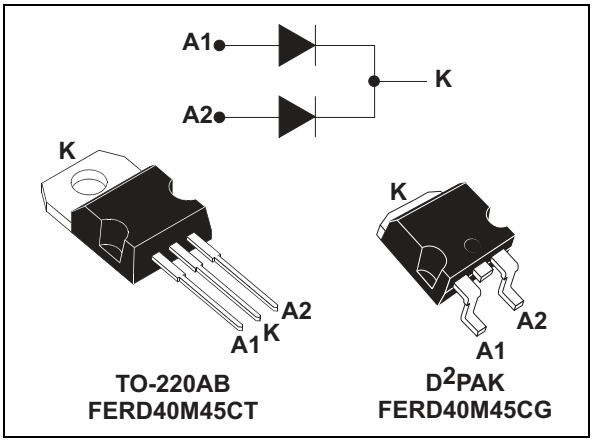
FERD40M45C

Field effect rectifier

Datasheet - production data



Features

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

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^2PAK, 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(typ)	0.34 V

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, δ = 0.5	T_c =150° C T_c =140° C	Per diode Per device	20 40	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		275	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature (1)	TO-220AB, D^2PAK		175	°C
		D^2PAK (DC forward current without reverse bias, t = 1 hour)		200	

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ 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 Total	1.6 1.1	°C/W
$R_{th(c)}$	Coupling		0.5	°C/W

When the diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode2) x $R_{th(c)}$.

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			650	µA
		T_j = 125° C			25	50	mA
V_F(2)	Forward voltage drop	T_j = 25° C	I_F = 10 A		0.38	0.415	V
		T_j = 125° C			0.34	0.37	
		T_j = 25° C	I_F = 20 A		0.46	0.50	
		T_j = 125° C			0.46	0.50	

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:

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

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

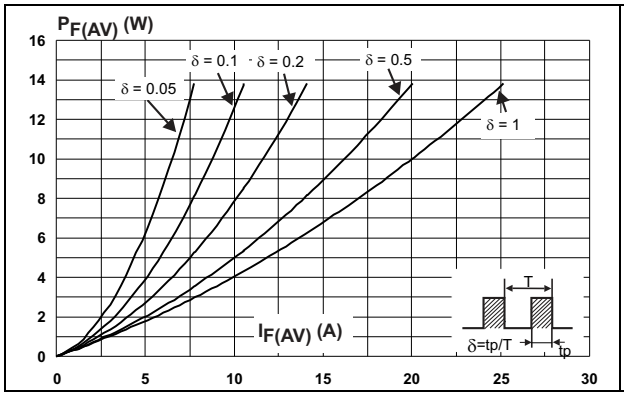


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

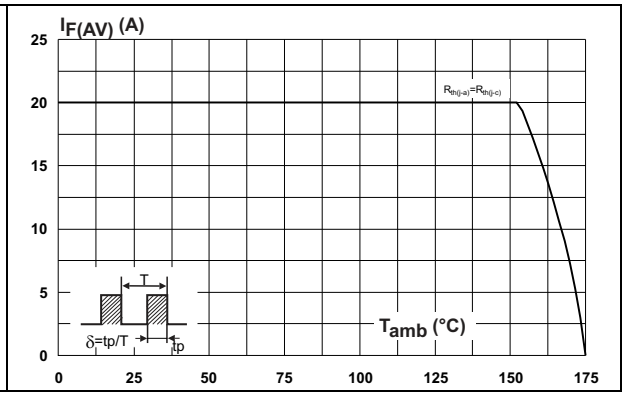


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

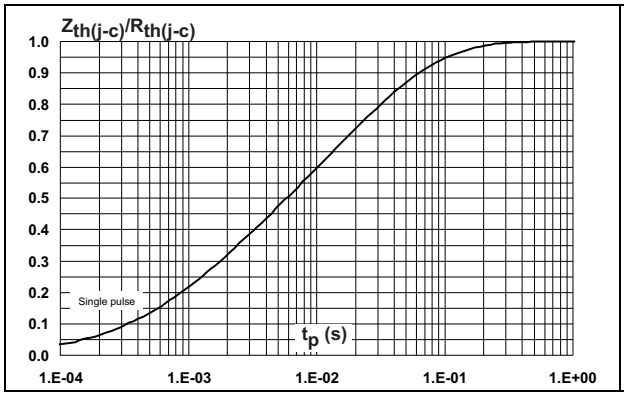


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

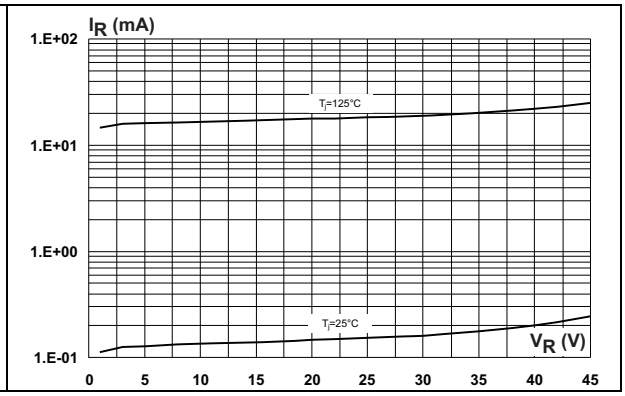


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

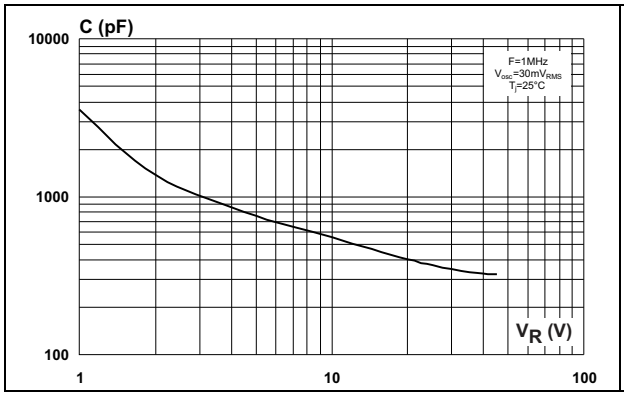


Figure 6. Forward voltage drop versus forward current (typical values, per diode)

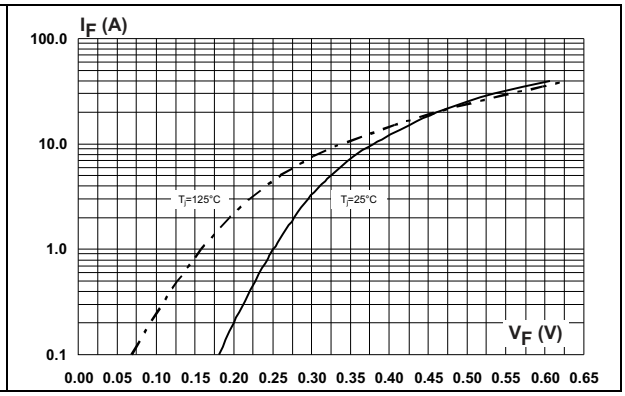
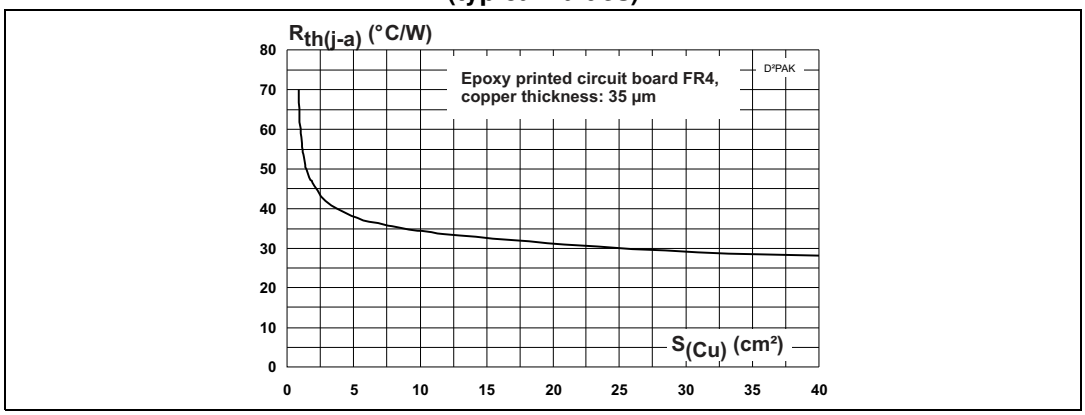


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values)

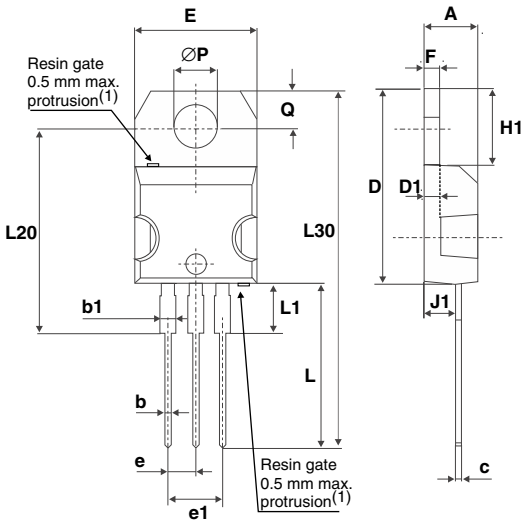


2 Package Information

- 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



(1) Resin gate position accepted in each of the two position shown as well as the symmetrical opposites

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.	
∅P	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Figure 9. D²PAK dimension definitions

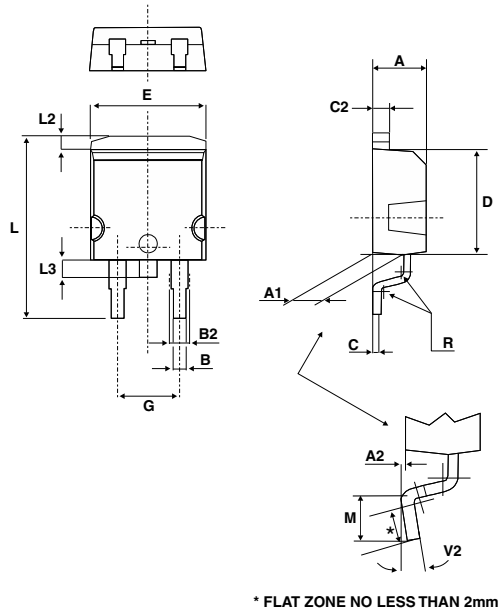
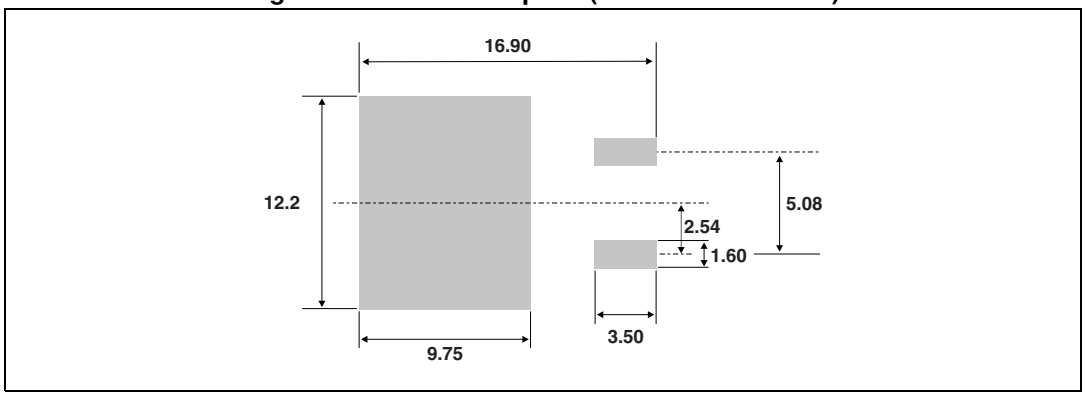


Table 6. D²PAK dimension values

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. D^{2}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^2PAK	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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