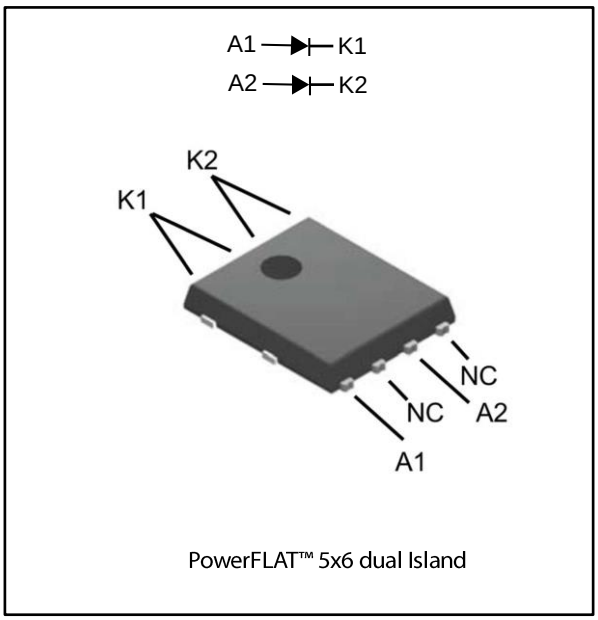
STTH8R02D-Y

Automotive ultrafast rectifier

Datasheet - production data



PowerFLAT™ 5x6 dual Island

Description

The STTH8R02D-Y is especially suited for switching mode base drive and transistor circuits.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications in automotive functions.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 4 A
V_{RRM}	200 V
T_j (max.)	175 °C
V_F (typ.)	0.71 V
t_{rr} (typ.)	16 ns

Features

- AEC-Q101 qualified
- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature
- ECOPACK®2 compliant component
- PPAP capable
- Dual Island package
- Wettable flanks for automatic visual inspection

This is information on a product in full production.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_j = -40 °C to +175 °C	200	V
$I_{F(AV)}$	Average forward current	T_c = 150 °C , δ = 0.5 square pulse	4	A
$I_{F(RMS)}$	Forward rms current		10	A
I_{FSM}	Surge non repetitive forward current	t_p = 8.3 ms sinusoidal	75	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature(1)		-40 to +175	°C

Notes:

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

Table 3: Thermal resistance parameters

Symbol	Parameter		Maximum	Unit
$R_{th(j-c)}$	Junction to case	Per diode	5	°C/W
		Total	3	
		Coupling	1	

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	$V_R = V_{RRM}$	-		3	µA
		T_j = 125 °C		-	2	20	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 3 A	-	0.90	1.05	V
		T_j = 125 °C		-		0.87	
		T_j = 150 °C		-	0.71	0.83	
		T_j = 25 °C	I_F = 4 A	-	0.94	1.10	
		T_j = 125 °C		-		0.92	
		T_j = 150 °C		-	0.76	0.88	
		T_j = 25 °C	I_F = 8 A	-	1.05	1.22	
		T_j = 125 °C		-		1.07	
		T_j = 150 °C		-	0.89	1.04	

Notes:

(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:

$P = 0.72 \times I_{F(AV)} + 0.040 \times I_{F^2(RMS)}$

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 in a power diode

Table 5: Dynamic electrical characteristics per diode (T_j = 25 °C, unless otherwise specified)

Symbol	Parameters	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A dI_F/dt = -50 A/µs V_R = 30 V	-	23	30	ns
		I_F = 1 A dI_F/dt = -100 A/µs V_R = 30 V	-	15	20	
I_{RM}	Reverse recovery current	I_F = 4 A dI_F/dt = -200 A/µs V_R = 160 V T_j = 125 °C	-	4.6	6.0	A
Q_{rr}	Reverse recovery charge		-	65		nC
V_{FP}	Forward recovery voltage	I_F = 4 A dI_F/dt = 50 A/µs V_{FR} = 1.1 x V_F (max)	-	1.6		V
t_{fr}	Forward recovery time		-	80		ns

1.1 Characteristics (curves)

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

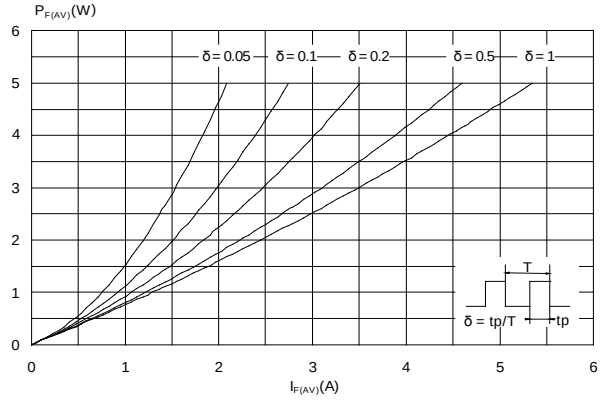


Figure 2: Forward voltage drop versus forward current (typical values)

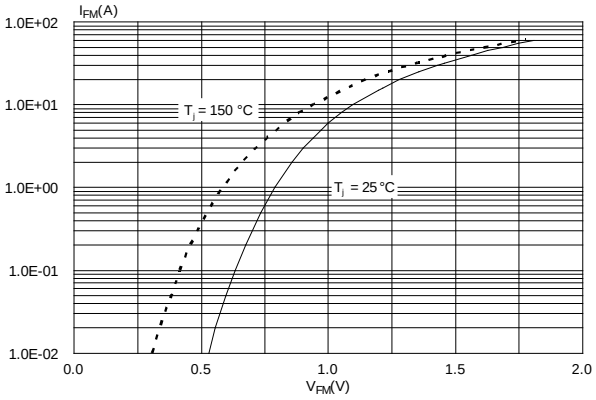


Figure 3: Forward voltage drop versus forward current (maximum values)

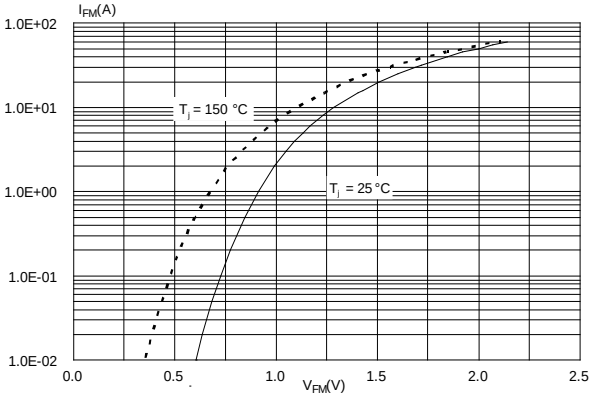


Figure 4: Junction capacitance versus reverse voltage applied (typical values, per diode)

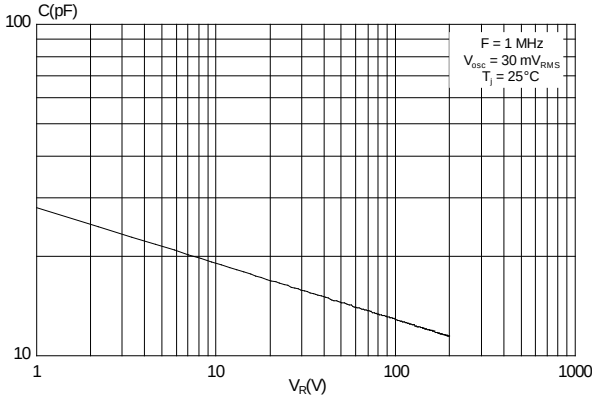


Figure 5: Reverse recovery charges versus dI_F / dt (typical values, per diode)

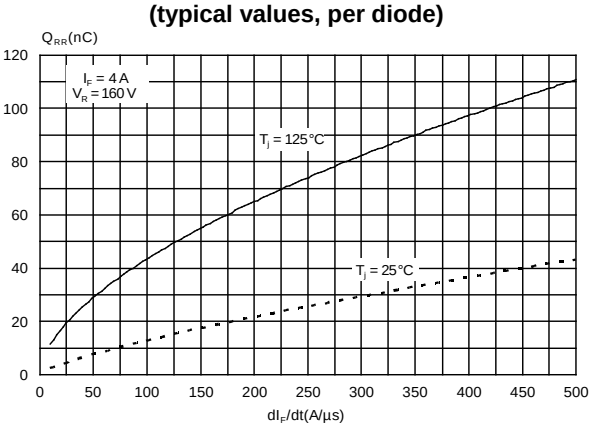


Figure 6: Reverse recovery time versus dI_F / dt (typical values, per diode)

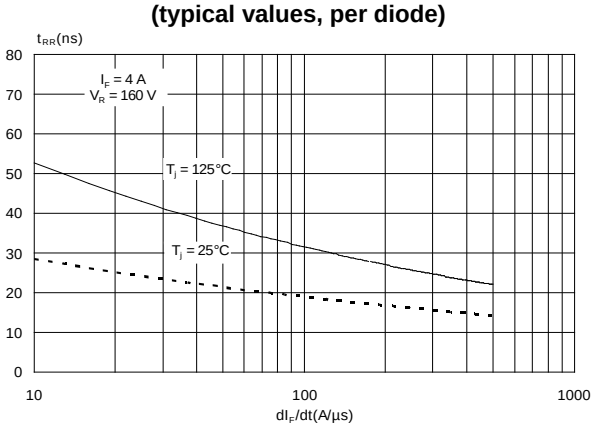


Figure 7: Peak reverse recovery current versus dI_F / dt (typical values, per diode)

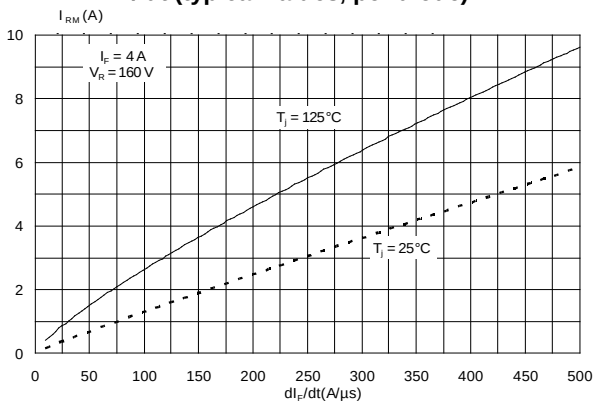


Figure 8: Dynamic parameters versus junction temperature (per diode)

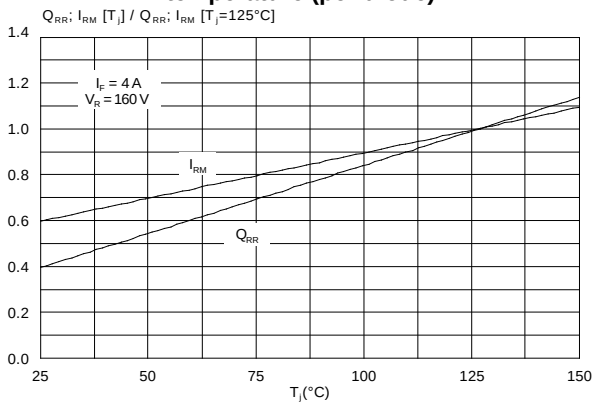


Figure 9: Relative variation of thermal impedance junction to case total versus pulse duration

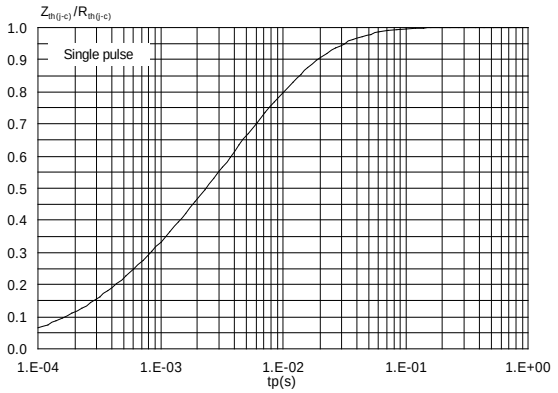
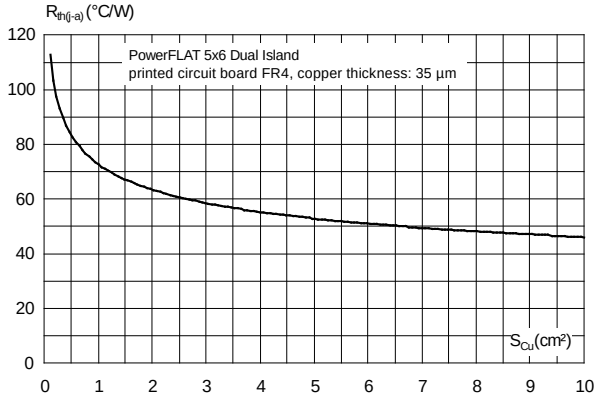


Figure 10: Thermal resistance junction to ambient total versus copper surface under each tab (typical values, per diode)



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 PowerFLAT5x6 dual pad package information

Figure 11: PowerFLAT™ 5x6 dual pad package outline

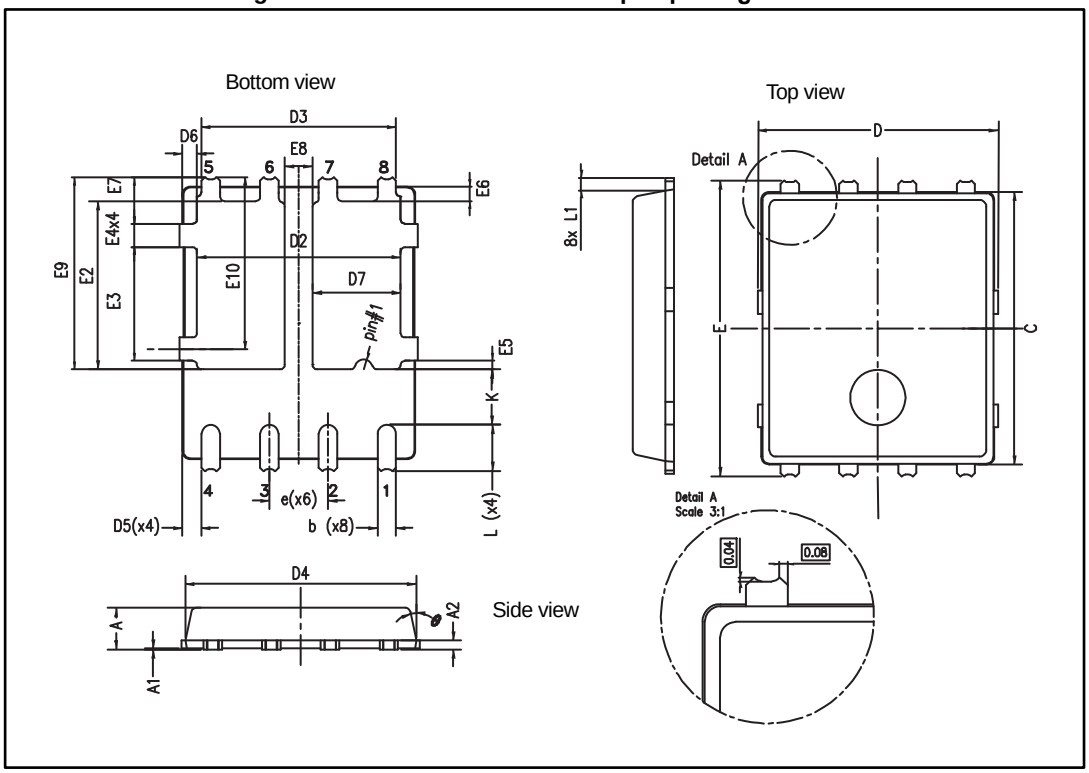
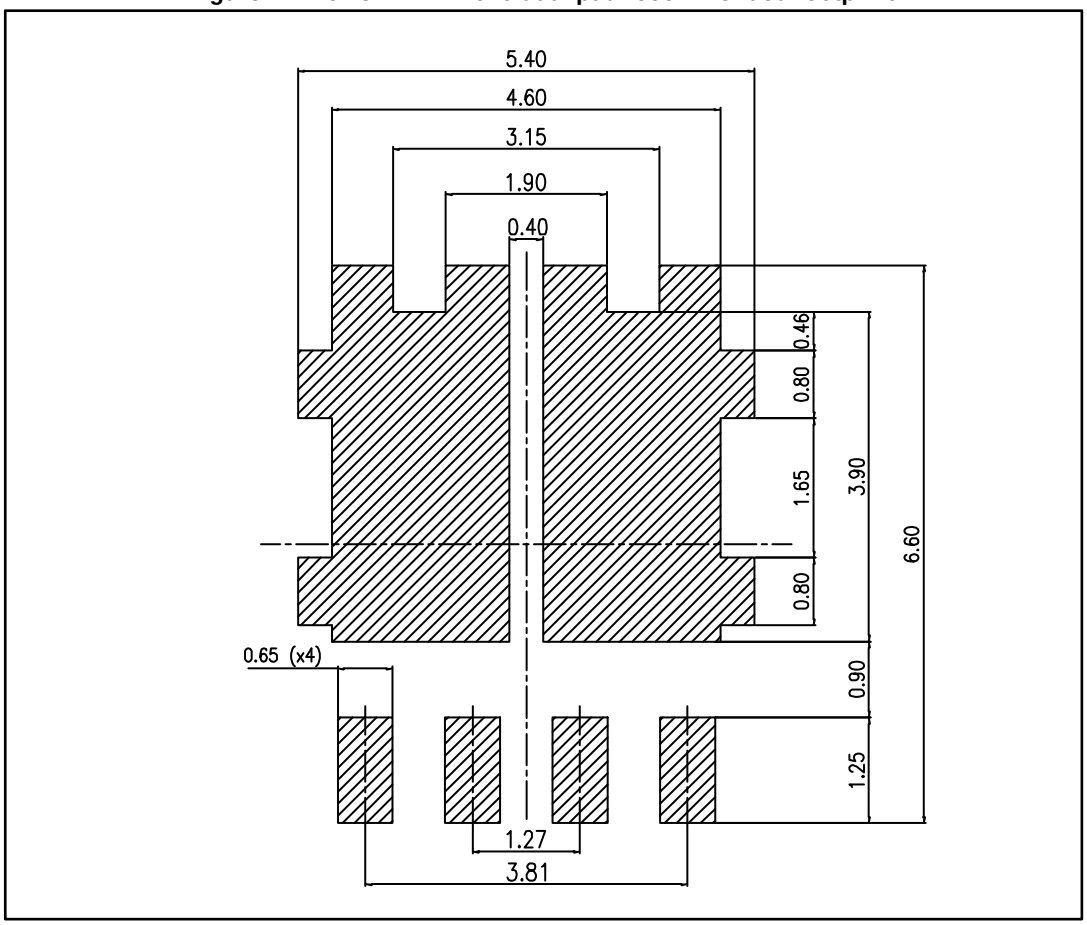


Table 6: PowerFLAT™ 5x6 dual pad package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80		1.00	0.0315		0.0394
A1	0.02		0.05	0.0008		0.0020
A2		0.25			0.0098	
b	0.30		0.50	0.0118		0.0197
C	5.80	6.00	6.10	0.2283	0.2362	0.2402
D	5.00	5.20	5.40	0.1969	0.2047	0.2126
D2	4.15		4.45	0.1634		0.1752
D3	4.05	4.20	4.35	0.1594	0.1654	0.1713
D4	4.80	5.00	5.10	0.1890	0.1969	0.2008
D5	0.25	0.40	0.55	0.0098	0.0157	0.0217
D6	0.15	0.30	0.45	0.0059	0.0118	0.0177
D7	1.68		1.98	0.0661		0.0780
e		1.27			0.0500	
E	6.20	6.40	6.60	0.2441	0.2520	0.2598
E2	3.50		3.70	0.1378		0.1457
E3	2.35		2.55	0.0925		0.1004
E4	0.40		0.60	0.0157		0.0236
E5	0.08		0.28	0.031		0.0110
E6	0.20	0.325	0.45	0.0079	0.0128	0.0177
E7	0.85	1.00	1.15	0.0335	0.0394	0.0453
E8	0.55		0.75	0.0217		0.0295
E9	4.00	4.20	4.40	0.1575	0.1654	0.1732
E10	3.55	3.70	3.85	0.1398	0.1457	0.1516
K	1.05		1.35	0.0502		0.0620
L	0.90	1.00	1.10	0.0285	0.0325	0.0364
L1	0.175	0.275	0.375	0.0069	0.0108	0.0148
Θ	0°		12°	0°		12°

Figure 12: PowerFLAT™ 5x6 dual pad recommended footprint



3 Ordering information

Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH8R02DDJFY-TR	TH8R02DY	PowerFLAT™ 5x6 dual Island	95 mg	3000	Tape and reel

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
11-Oct-2016	1	First issue
03-Jul-2017	2	Updated *Figure 10: "Thermal resistance junction to ambient total versus copper surface under each tab (typical values, per diode)"*.

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