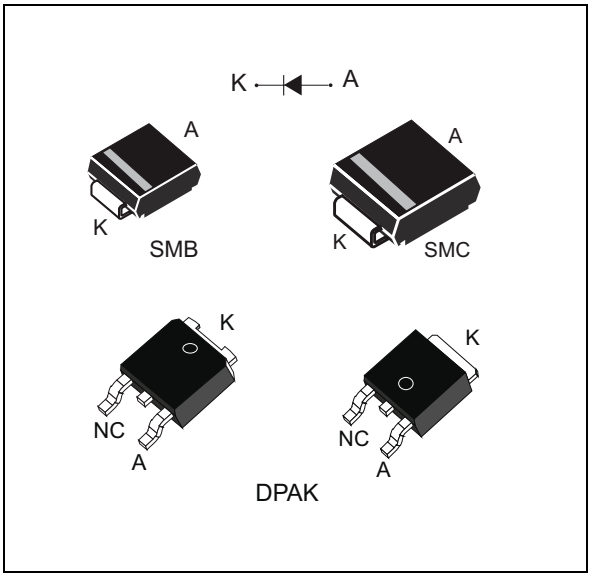
STTH4R02

Ultrafast recovery diode

Datasheet – production data



Features

- Negligible switching losses
- High junction temperature
- Very low conduction losses
- Low forward and reverse recovery times
- ECOPACK®2 compliant component for DPAK on demand

Description

The STTH4R02 uses ST's new 200 V planar Pt doping technology, and it is specially suited for switching mode base drive and transistor circuits.

Packaged in DPAK, SMB and SMC, this device is intended for use in low voltage, high frequency inverters, freewheeling and polarity protection.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	4 A
V_{RRM}	200 V
V_F (typ)	0.76 V
T_j (max)	175 °C
t_{rr} (typ)	16 ns

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(RMS)}$	Forward rms current	DPAK		10	A
		SMB / SMC		70	
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	DPAK	T_c = 160 °C	4	A
		SMB / SMC	T_L = 95 °C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		70	A
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature			175	°C

Table 3. Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	DPAK	3.5	°C/W
$R_{th(j-l)}$	Junction to lead	SMB / SMC	20	

Table 4. Static electrical characteristics

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 = 12 A	-	1.15	1.25	V
			I_F = 4 A	-	0.95	1.05	
		T_j = 150 °C		-	0.76	0.83	

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:

$P = 0.67 \times I_{F(AV)} + 0.04 \times I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A dI_F/dt = -50 A/µs V_R = 30 V	-	24	30	ns
			I_F = 1 A dI_F/dt = -100 A/µs V_R = 30 V	-	16	20	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 4 A dI_F/dt = -200 A/µs V_R = 160 V	-	4.4	5.5	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 4 A dI_F/dt = 50 A/µs V_{FR} = 1.1 x V_{Fmax}	-	80		ns
V_{FP}	Forward recovery voltage		I_F = 4 A dI_F/dt = 50 A/µs	-	1.6		V

Figure 1. Peak current versus duty cycle

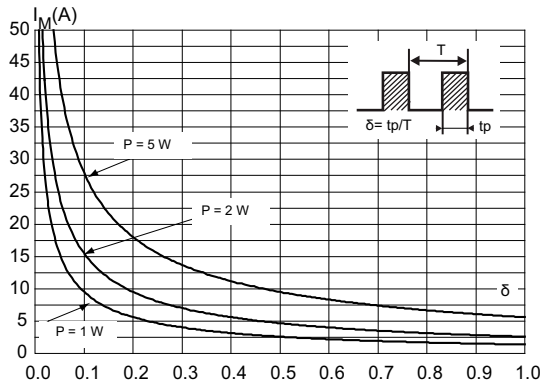


Figure 2. Forward voltage drop versus forward current (typical values)

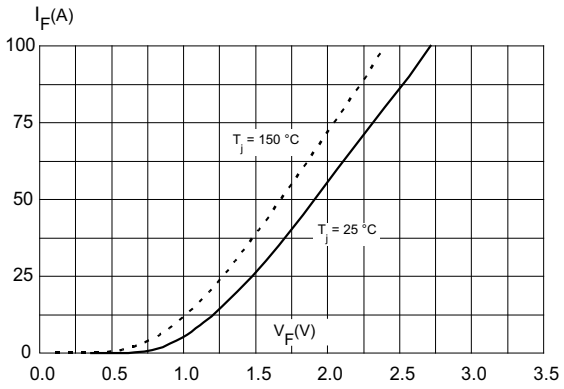


Figure 3. Forward voltage drop versus forward current (maximum values)

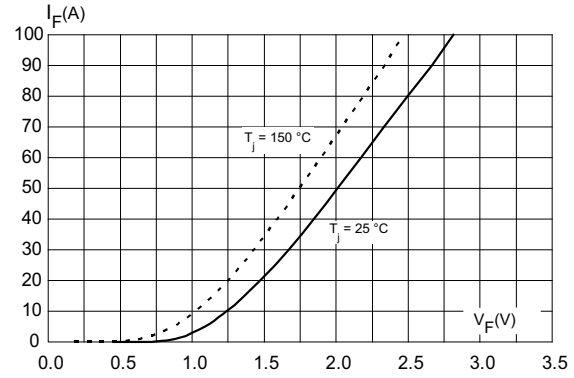


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

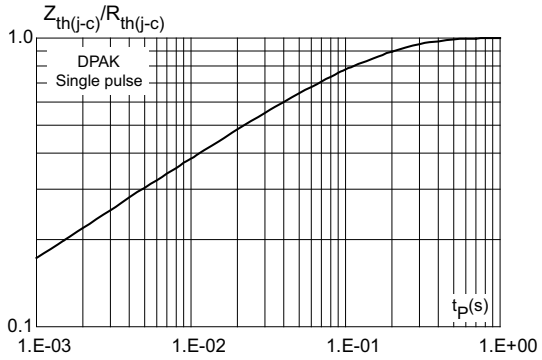


Figure 5. Relative variation of thermal impedance, junction to ambient, versus pulse duration (SMB)

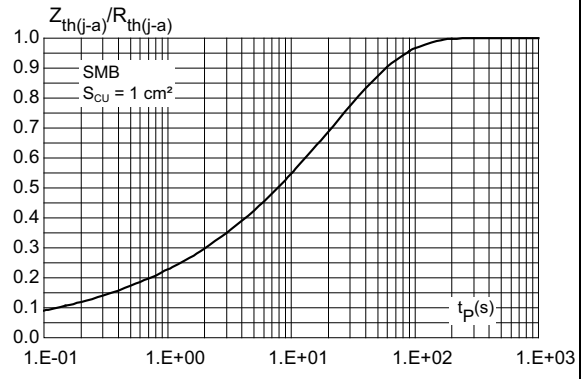


Figure 6. Relative variation of thermal impedance, junction to ambient, versus pulse duration (SMC)

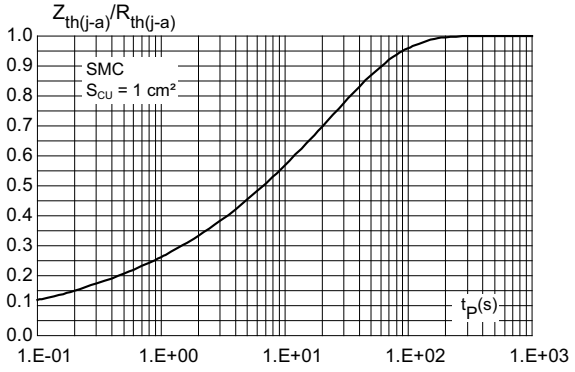


Figure 7. Junction capacitance versus reverse applied voltage (typical values)

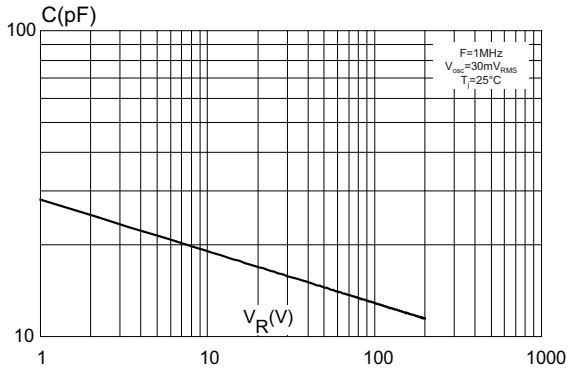


Figure 8. Reverse recovery charges versus dI_F/dt (typical values)

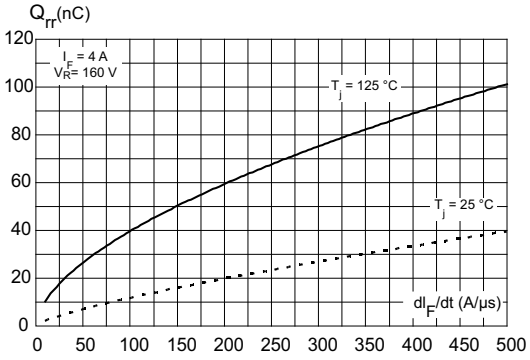


Figure 9. Reverse recovery time versus dI_F/dt (typical values)

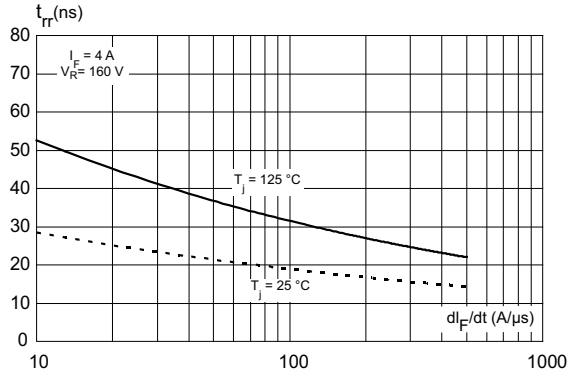


Figure 10. Peak reverse recovery current versus dI_F/dt (typical values)

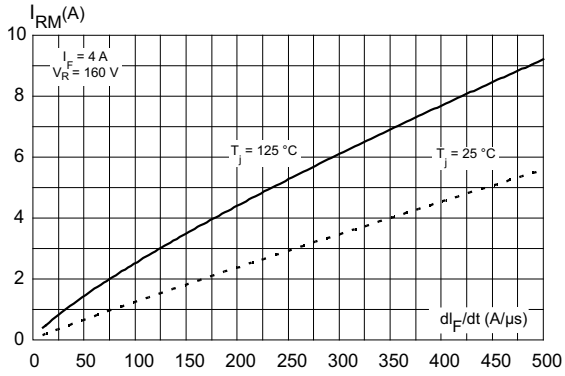


Figure 11. Dynamic parameters versus junction temperature (reference: T_j = 125 °C)

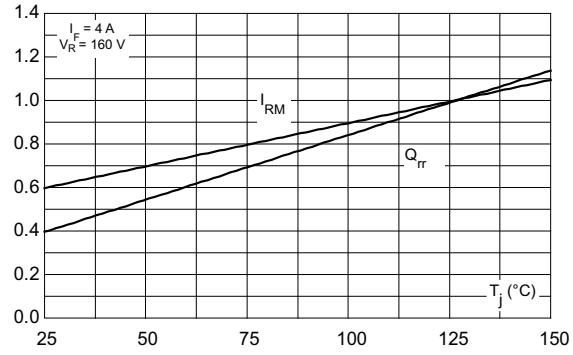


Figure 12. Thermal resistance, junction to ambient, versus copper surface under each lead

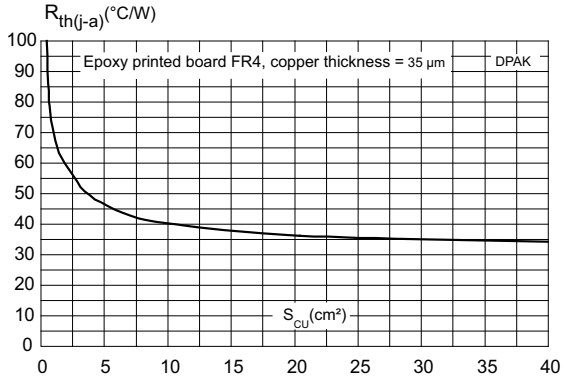


Figure 13. Thermal resistance, junction to ambient, versus copper surface under each lead

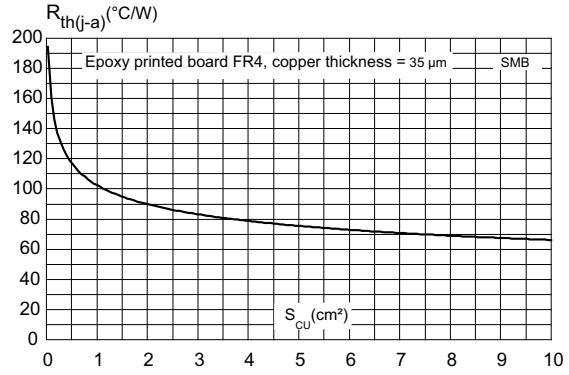
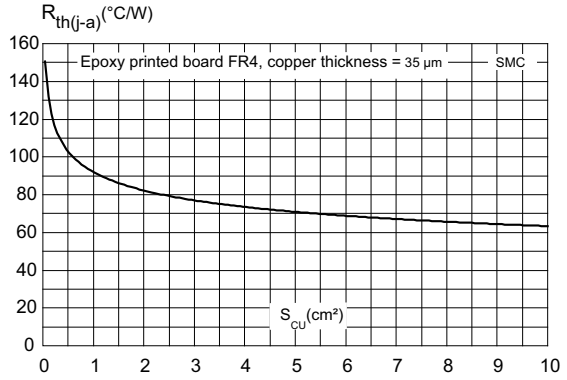


Figure 14. Thermal resistance, junction to ambient, versus copper surface under tab



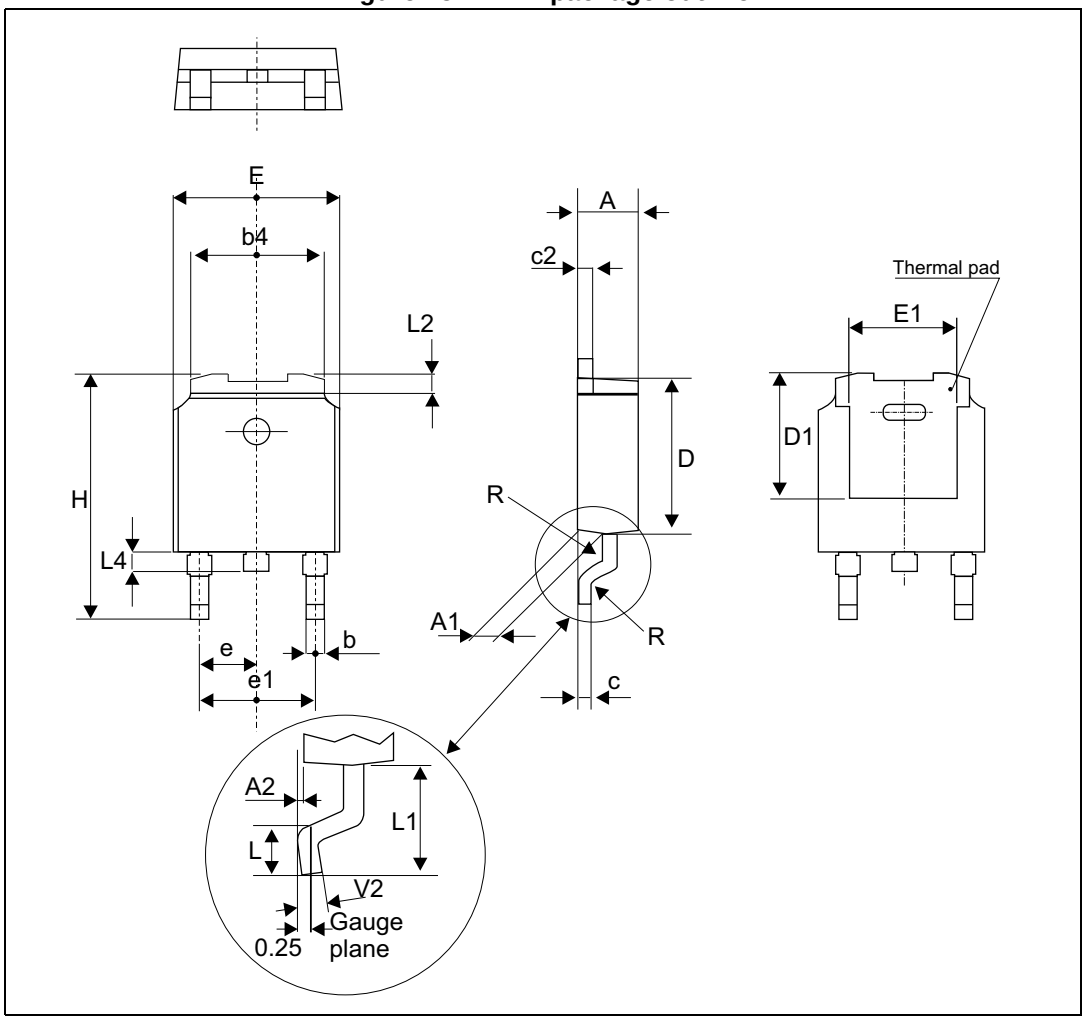
2 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Band indicates cathode

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 DPAK package information

Figure 15. DPAK package outline

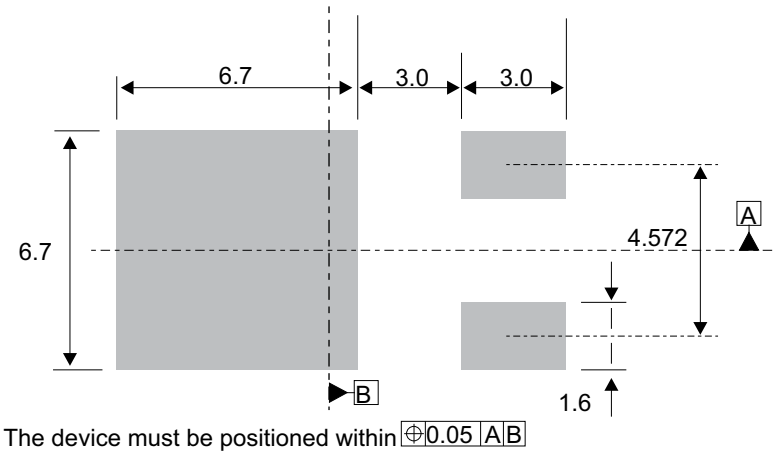


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.085		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.194		0.214
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	4.95		5.60	0.194		0.220
E	6.35		6.73	0.250		0.264
E1	4.32		5.50	0.170		0.216
e		2.28			0.090	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		1.78	0.039		0.070
L2			1.27			0.050
L4	0.60		1.02	0.023		0.040
V2	-8°		+8°	-8°		8°

Figure 16. DPAK footprint dimensions (in mm)



2.2 SMB package information

Figure 17. SMB package outline

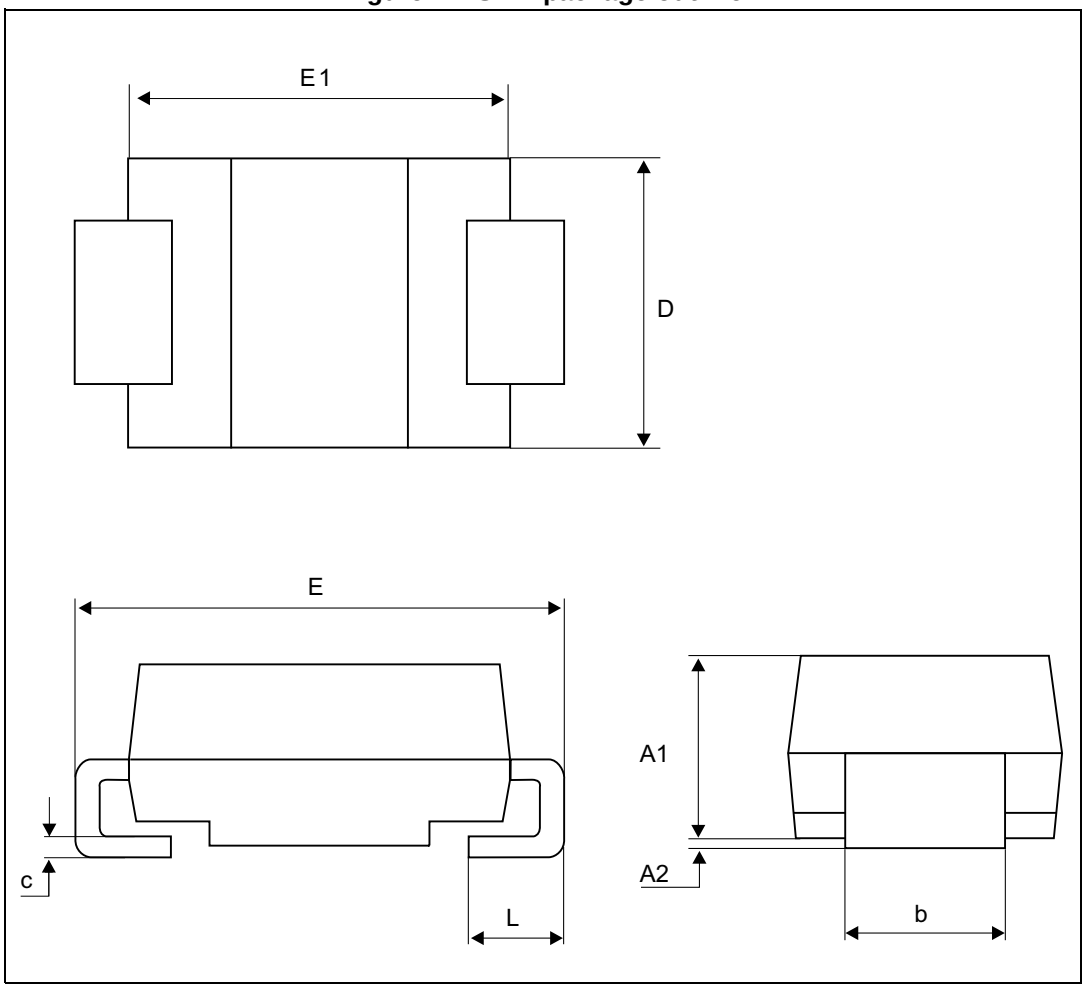
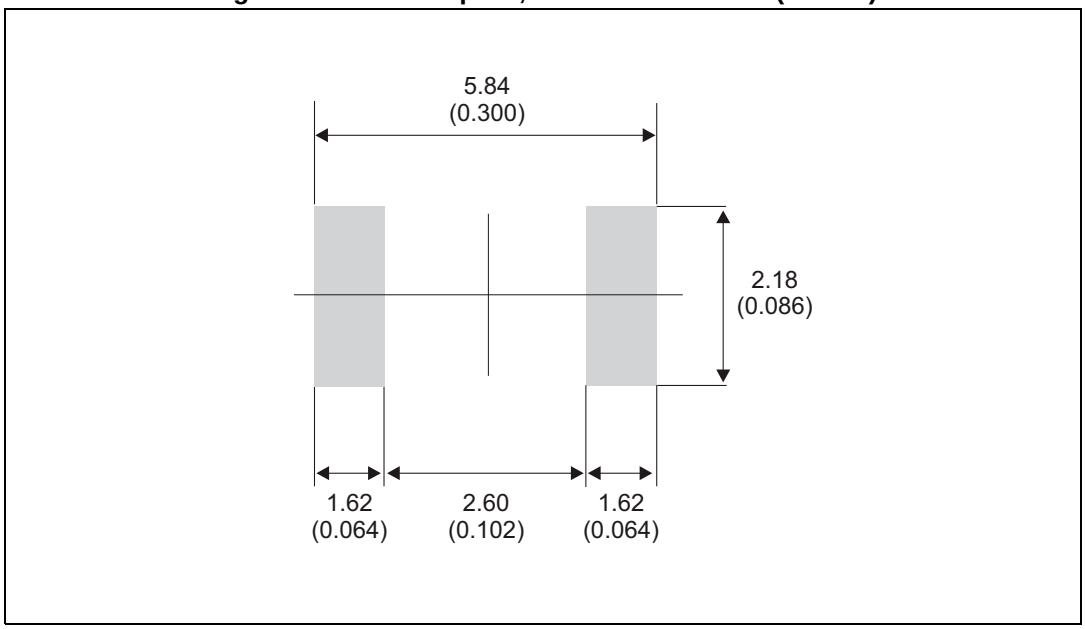


Table 7. SMB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 18. SMB footprint, dimensions in mm (inches)



2.3 SMC package information

Figure 19. SMC package outline

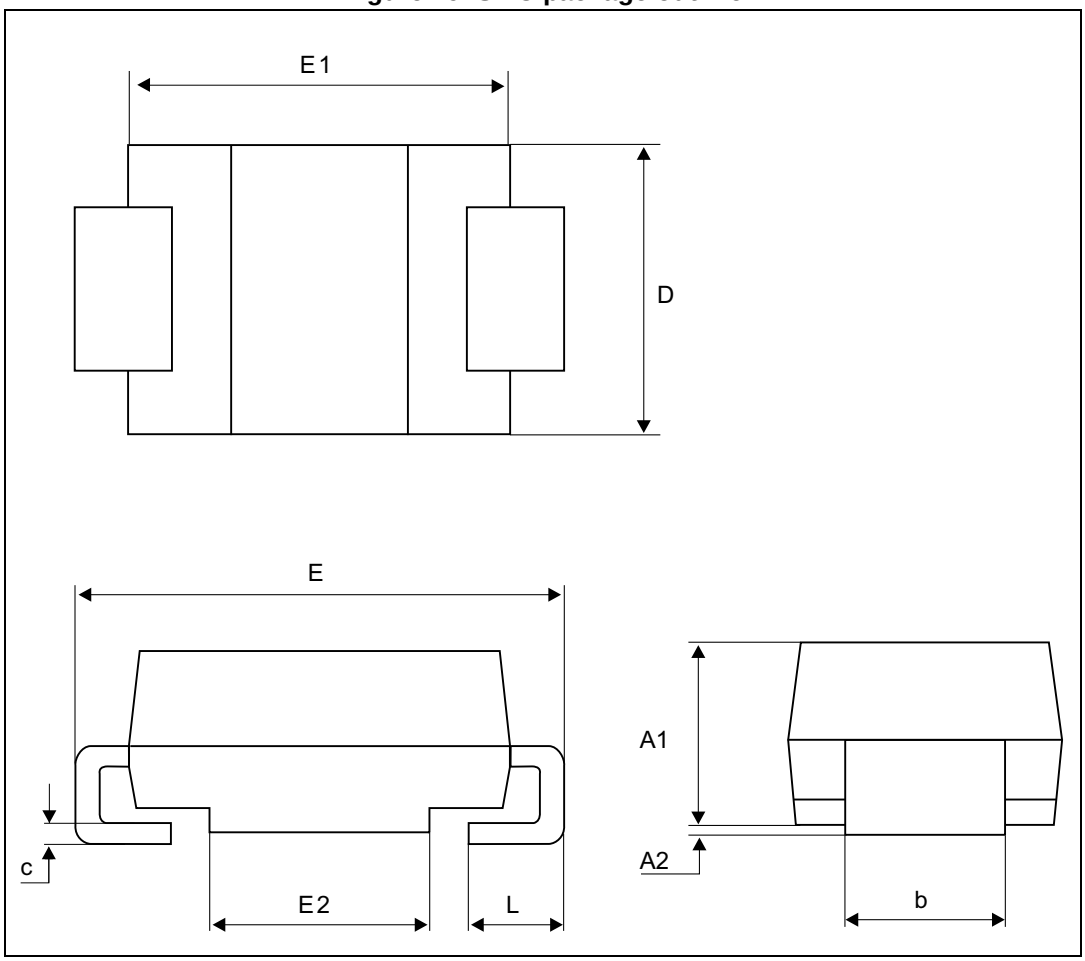
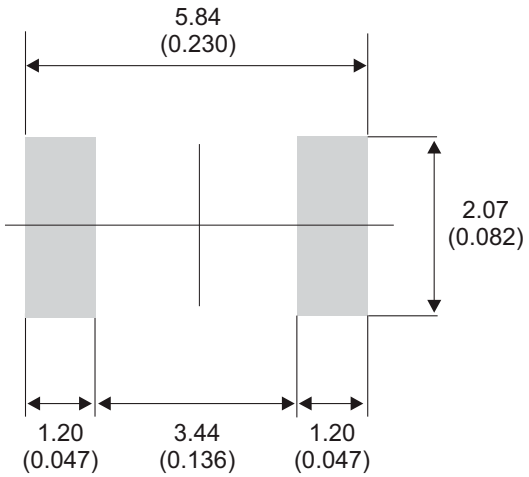


Table 8. SMC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b(1)	2.90	3.20	0.114	0.126
c(1)	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

Figure 20. SMC footprint, dimensions in mm (inches)



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH4R02B-TR	STTH 4R02	DPAK	0.32 g	2500	Tape and reel
STTH4R02U	4R2U	SMB	0.110 g	2500	Tape and reel
STTH4R02S	4R2S	SMC	0.243 g	2500	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
03-May-2006	1	First issue.
10-Oct-2006	2	Added SMC package
13-Apr-2010	3	Updated ECOPACK statement. Updated dimensions tables for SMB and SMC.
01-Jul-2010	4	Separated junction to lead values from junction to case values in *Table 3.*
20-Nov-2014	5	Removed TO-220AC, TO-220FPAC and DO-201AB package informations.
02-Nov-2016	6	Updated DPAK package information and reformatted to current standard.

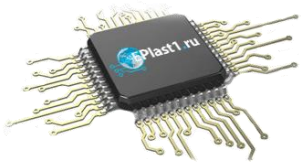
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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