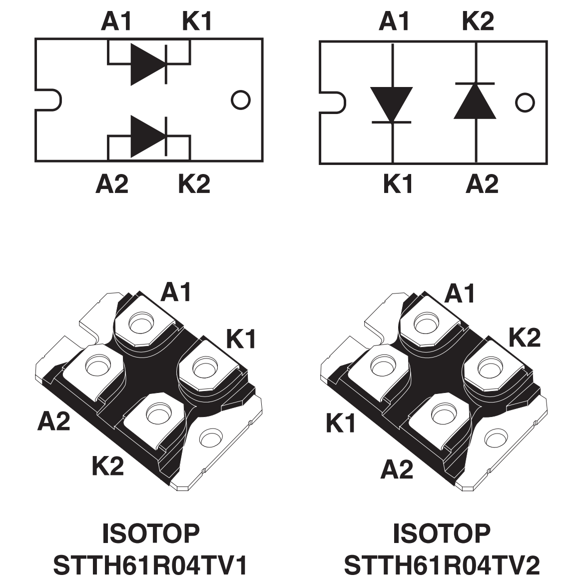
STTH61R04TV

Ultrafast recovery diode

Main product characteristics

$I_{F(AV)}$	2 x 30 A
V_{RRM}	400 V
T_j	150° C
$V_{F\ (typ)}$	0.95 V
$t_{rr\ (typ)}$	24 ns



Features and benefits

- Ultrafast
- Very low switching losses
- High frequency and high pulsed current operation
- Low leakage current
- Insulated package:
  - ISOTOP
    Electrical insulation = 2500 V_{RMS}
    Capacitance = 45 pF

Description

The STTH61R04TV series uses ST's new 400 V planar Pt doping technology. The STTH61R04 is specially suited for switching mode base drive and transistor circuits, such as welding equipment.

Order codes

Part Number	Marking
STTH61R04TV1	STTH61R04TV1
STTH61R04TV2	STTH61R04TV2

1 Characteristics

Table 1. Absolute ratings (limiting values per diode at 25° C, unless otherwise specified)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				400	V
V_{RSM}	Non repetitive peak reverse voltage				400	V
$I_{F(RMS)}$	RMS forward current				60	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	Per diode		$T_c = 80°$ C	30	A
I_{FRM}	Repetitive peak forward current	$t_p = 5$ µs, F = 1 kHz square			900	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms Sinusoidal			350	A
T_{stg}	Storage temperature range				-65 to + 150	°C
T_j	Maximum operating junction temperature				150	°C

Table 2. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.5	° C/W
		Total	0.8	
$R_{th(c)}$	Coupling thermal resistance		0.1	

When the diodes are used simultaneously:
$\Delta T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) $+ P_{(diode2)} \times R_{th(c)}$

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	$T_j = 25°$ C	$V_R = V_{RRM}$			15	µA
		$T_j = 125°$ C			15	150	
V_F(2)	Forward voltage drop	$T_j = 25°$ C	$I_F = 30$ A			1.45	V
		$T_j = 100°$ C			1.05	1.3	
		$T_j = 150°$ C			0.95	1.20	

1. Pulse test: $t_p = 5$ ms, $\delta < 2$ %
2. Pulse test: $t_p = 380$ µs, $\delta < 2$ %

To evaluate the conduction losses use the following equation:
$P = 0.9 \times I_{F(AV)} + 0.01 \times I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

Symbol	Parameter	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, T_j = 25° C			65	ns
		I_F = 1 A, dI_F/dt = -100 A/µs, V_R = 30 V, T_j = 25° C		31	45	
		I_F = 1 A, dI_F/dt = -200 A/µs, V_R = 30 V, T_j = 25° C		24	35	
I_{RM}	Reverse recovery current	I_F = 30 A, dI_F/dt = -200 A/µs, V_R = 320 V, T_j = 125° C		10	14	A
S	Softness factor	I_F = 30 A, dI_F/dt = -200 A/µs, V_R = 320 V, T_j = 125° C		0.4		
t_{fr}	Forward recovery time	I_F = 30 A dI_F/dt = 100 A/µs V_{FR} = 1.5 x V_{Fmax}, T_j = 25° C		250		ns
V_{FP}	Forward recovery voltage	I_F = 30 A, dI_F/dt = 100 A/µs, T_j = 25° C		2.9		V

Figure 1. Conduction losses versus average current

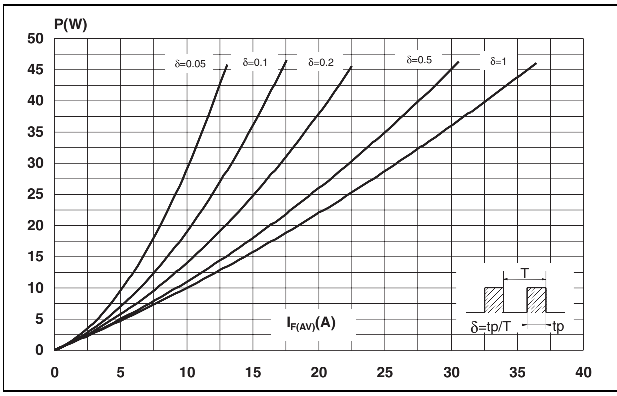


Figure 2. Forward voltage drop versus forward current

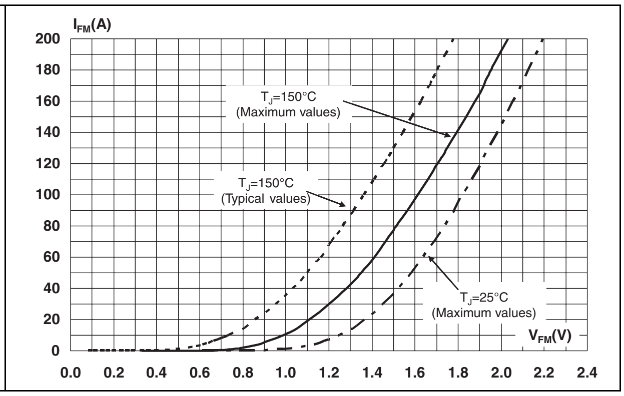


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

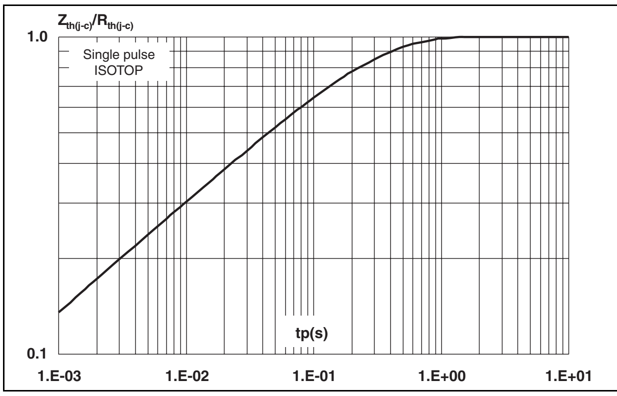


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

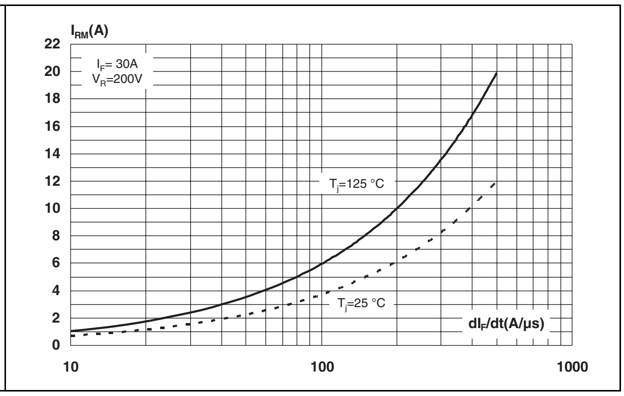


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

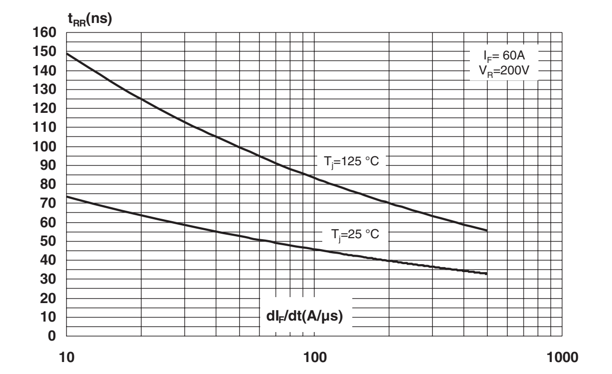


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

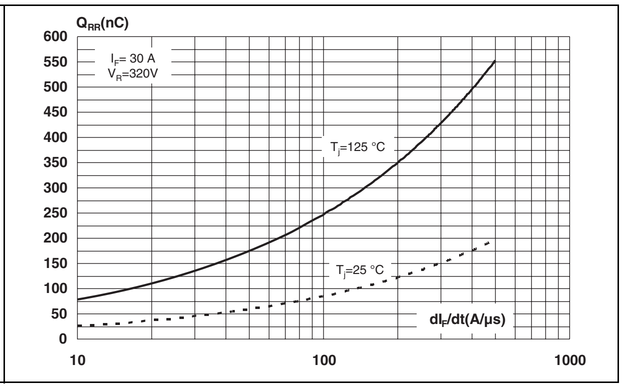


Figure 7. Relative variations of dynamic parameters versus junction temperature

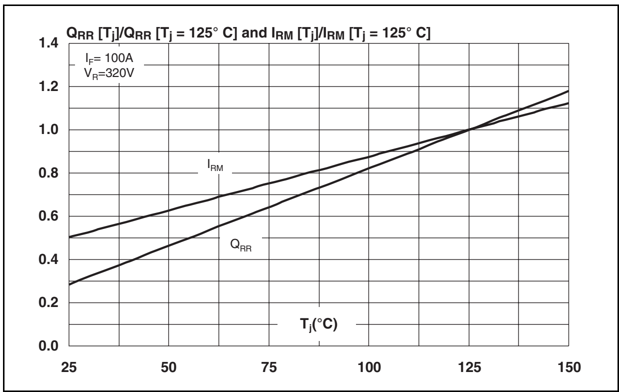


Figure 8. Transient peak forward voltage versus dI_F/dt (typical values)

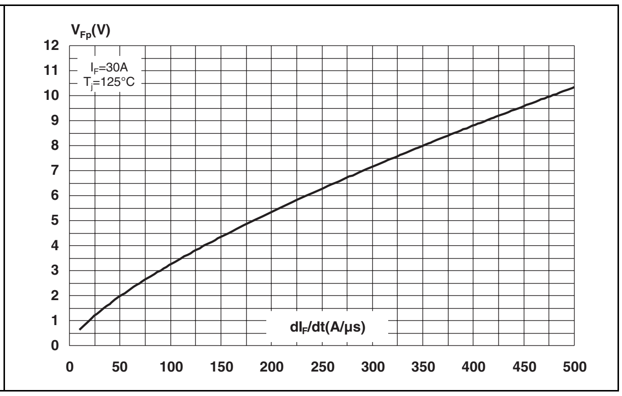


Figure 9. Forward recovery time versus dI_F/dt (typical values)

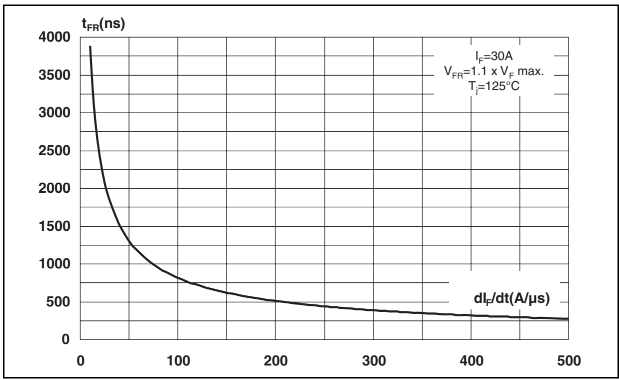
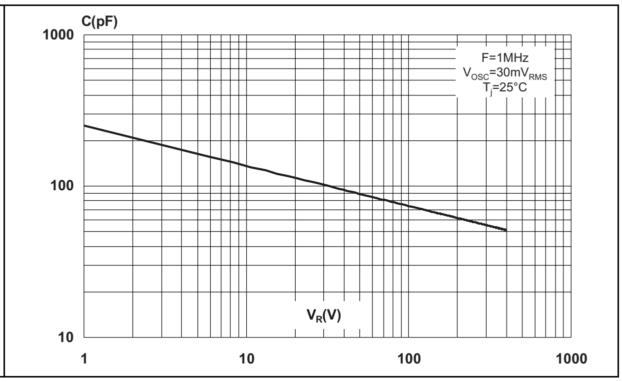


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

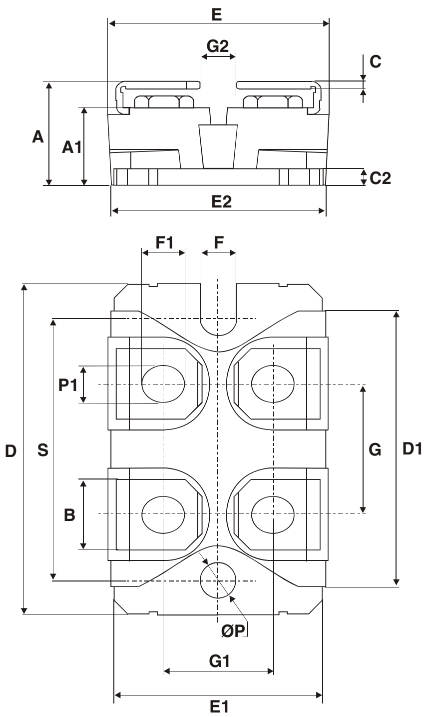


2 Package information

Epoxy meets UL94, V0

Cooling method: by conduction (C)

Table 5. ISOTOP dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.465	0.480
A1	8.90	9.10	0.350	0.358
B	7.8	8.20	0.307	0.323
C	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
E	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80 typ.		0.976 typ.	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
P	4.00	4.30	0.157	0.69
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH61R04TV1	STTH61R04TV1	ISOTOP	27 g	10	Tube
STTH61R04TV2	STTH61R04TV2	ISOTOP	27 g	10	Tube

4 Revision history

Date	Revision	Description of Changes
31-Mar-2007	1	First issue

Please Read Carefully: