STW2040

High voltage fast-switching NPN power transistor

Features
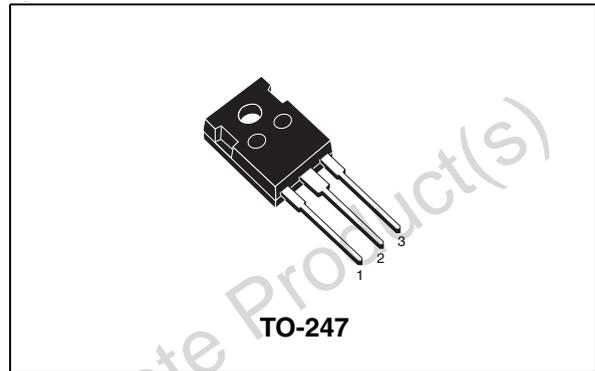
- ■ High voltage capability
- ■ High DC current gain
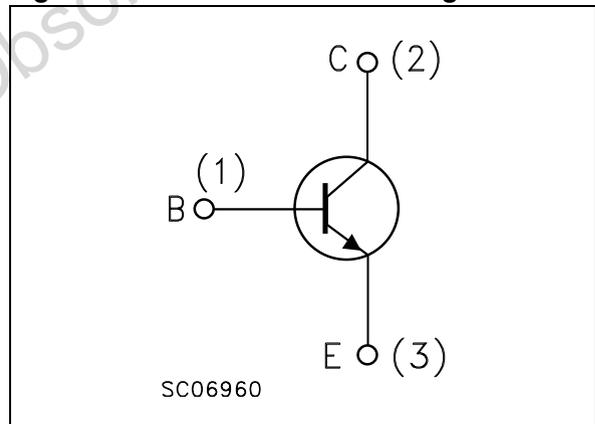- ■ Minimum lot to lot spread for reliable operation

Application

- ■ Switching mode power supplies

Description

The STW2040 is manufactured using diffused collector in planar technology adopting base island layout.

TO-247

Figure 1.   Internal schematic diagram

SC06960

Table 1.   Device summary

Order code	Marking	Package	Packaging
STW2040	W2040	TO-247	Tube

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{CE} = 0)	700	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	500	V
V_{EBO}	Emitter-base voltage (I_C = 0)	9	V
I_C	Collector current	20	A
I_{CM}	Collector peak current	30	A
I_B	Base current	7	A
I_{BM}	Base peak current	10	A
P_{TOT}	Total dissipation at T_c = 25 °C	125	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter		Value	Unit
R_{thJC}	Thermal resistance junction-case	max	1	°C/W

2   Electrical characteristics

(T_{case} = 25 °C; unless otherwise specified)

Table 4.   Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} = 700 V			250	µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 9 V			1	mA
$V_{(BR)CEO}$	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	500			V
$V_{CE(sat)}$[1]	Collector-emitter saturation voltage	I_C = 6 A $\quad$ I_B = 1.2 A I_C = 12 A $\quad$ I_B = 2.4 A I_C = 20 A $\quad$ I_B = 4 A		0.2 0.3 0.6	0.5	V V V
$V_{BE(sat)}$[1]	Base-emitter saturation voltage	I_C = 6 A $\quad$ I_B = 1.2 A I_C = 12 A $\quad$ I_B = 2.4 A			1.2 1.5	V V
h_{FE}[1]	DC current gain	I_C = 10 mA $\quad$ V_{CE} = 5 V I_C = 6 A $\quad$ V_{CE} = 5 V I_C = 12 A $\quad$ V_{CE} = 5 V	8 15 10	21	27	
t_{on} t_f t_s	Resistive load Turn-on time Fall time Storage time	V_{CC} = 200 V $V_{BE(off)}$ = -5 V $\quad$ I_C = 7.5 A $I_{B(on)}$ = 1.5 A $I_{B(off)}$ = -3 A		140 100 1.6		ns ns µs
t_s t_f	Inductive load Storage time Fall time	V_{CL} = 250 V $V_{BE(off)}$ = -5 V $\quad$ I_C = 7.5 A $I_{B(on)}$ = 1.5 A $I_{B(off)}$ = -3 A		1.8 30		µs ns

1.   Pulsed duration = 300 µs, duty cycle ≤ 1.5 %

2.1 Electrical characteristic (curves)

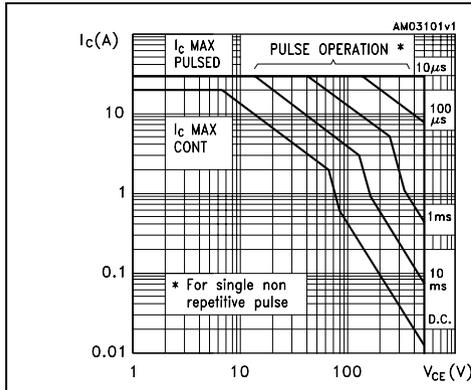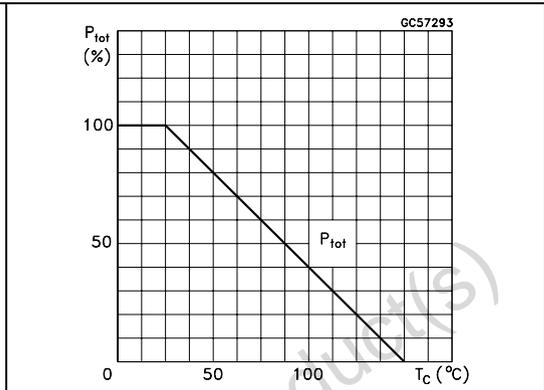Figure 2. Safe operating area

Figure 3. Derating curve
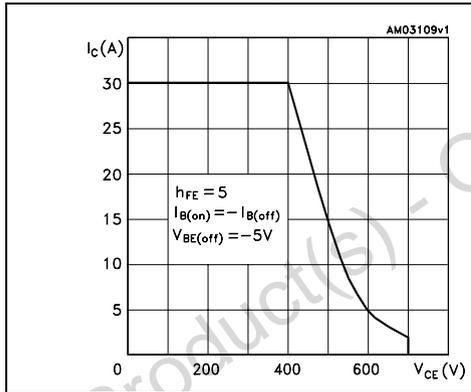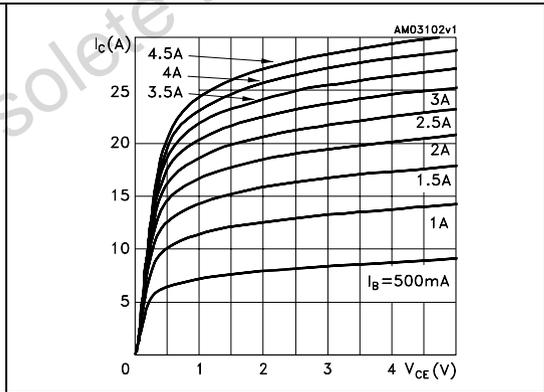

Figure 4. Reverse biased safe operating area

Figure 5. Output characteristics

Figure 6. DC current gain (V_{CE} = 1 V)
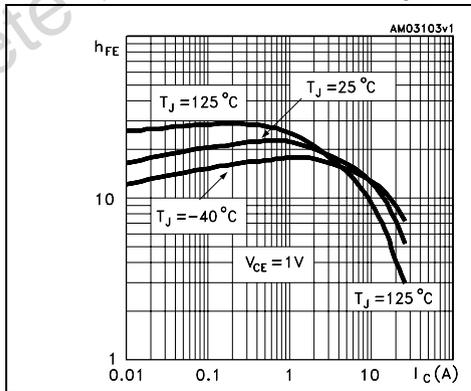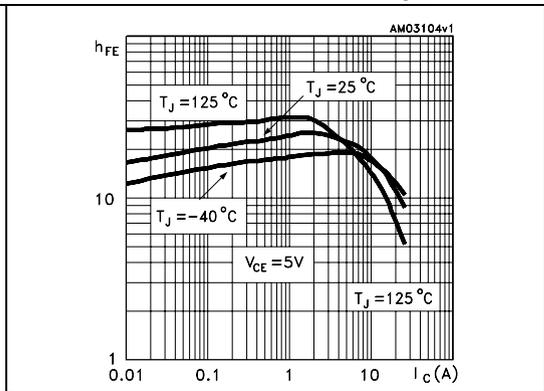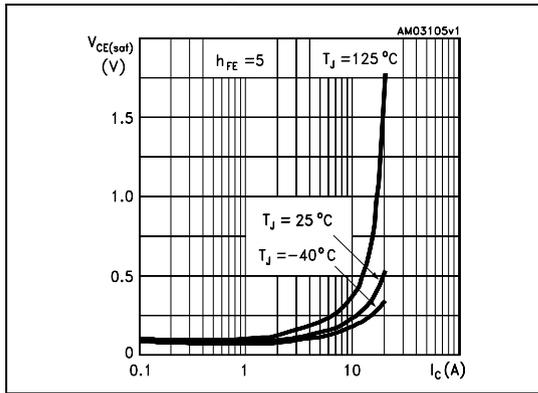

Figure 7. DC current gain (V_{CE} = 5 V)

Figure 8.   **Collector-emitter saturation voltage**

Figure 9.   **Base-emitter saturation voltage**
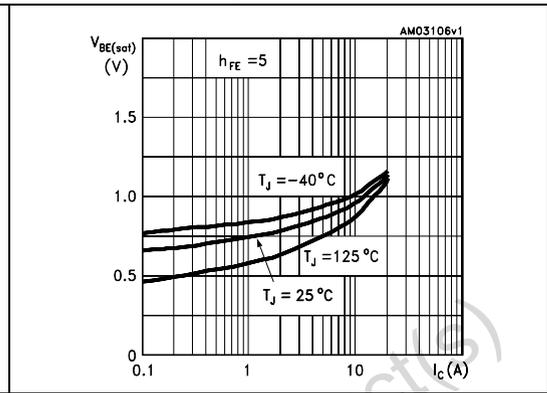
Figure 10.   **Inductive load switching time**
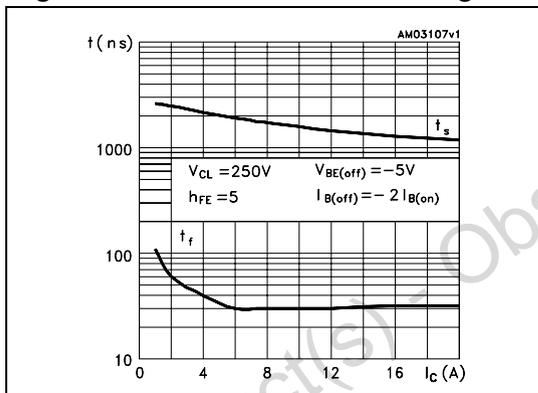
Figure 11.   **Resistive load switching time**
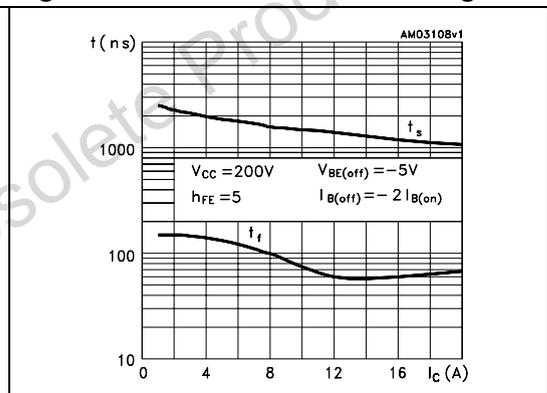
2.2   Test circuits

Figure 12.   **Inductive load switching test circuit**
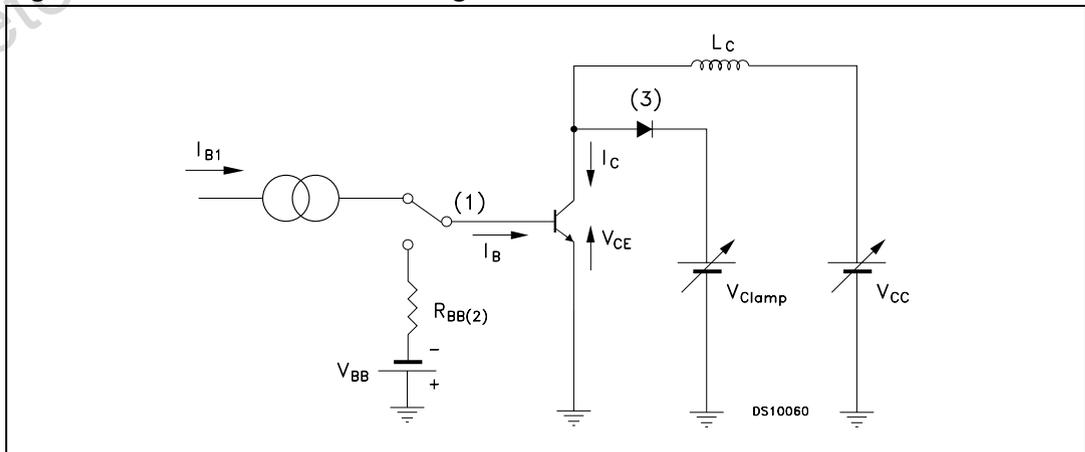
1. Fast electronic switch

2. Non-inductive resistor

3. Fast recovery rectifier

Figure 13. Resistive load switching test circuit
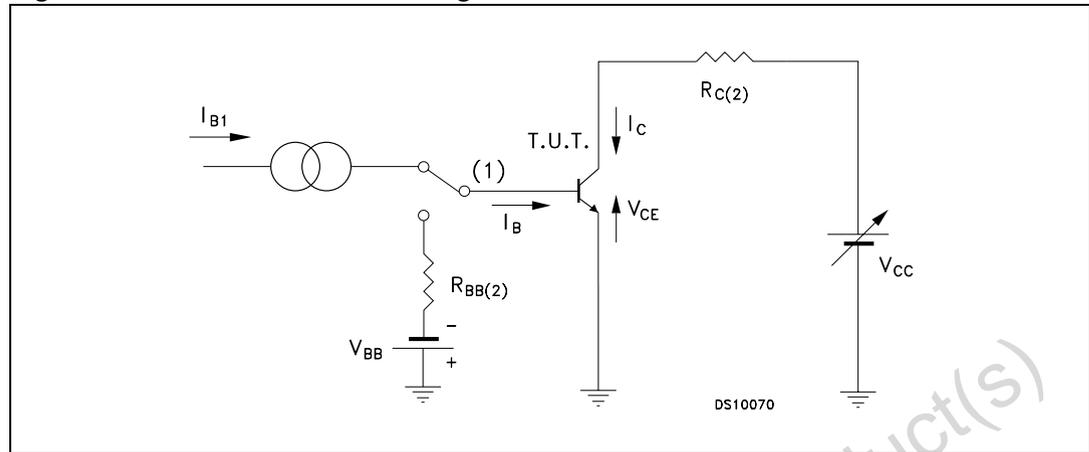
1. Fast electronic switch
2. Non-inductive resistor

3 Package mechanical data

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TO-247 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
øP	3.55		3.65
øR	4.50		5.50
S		5.50	
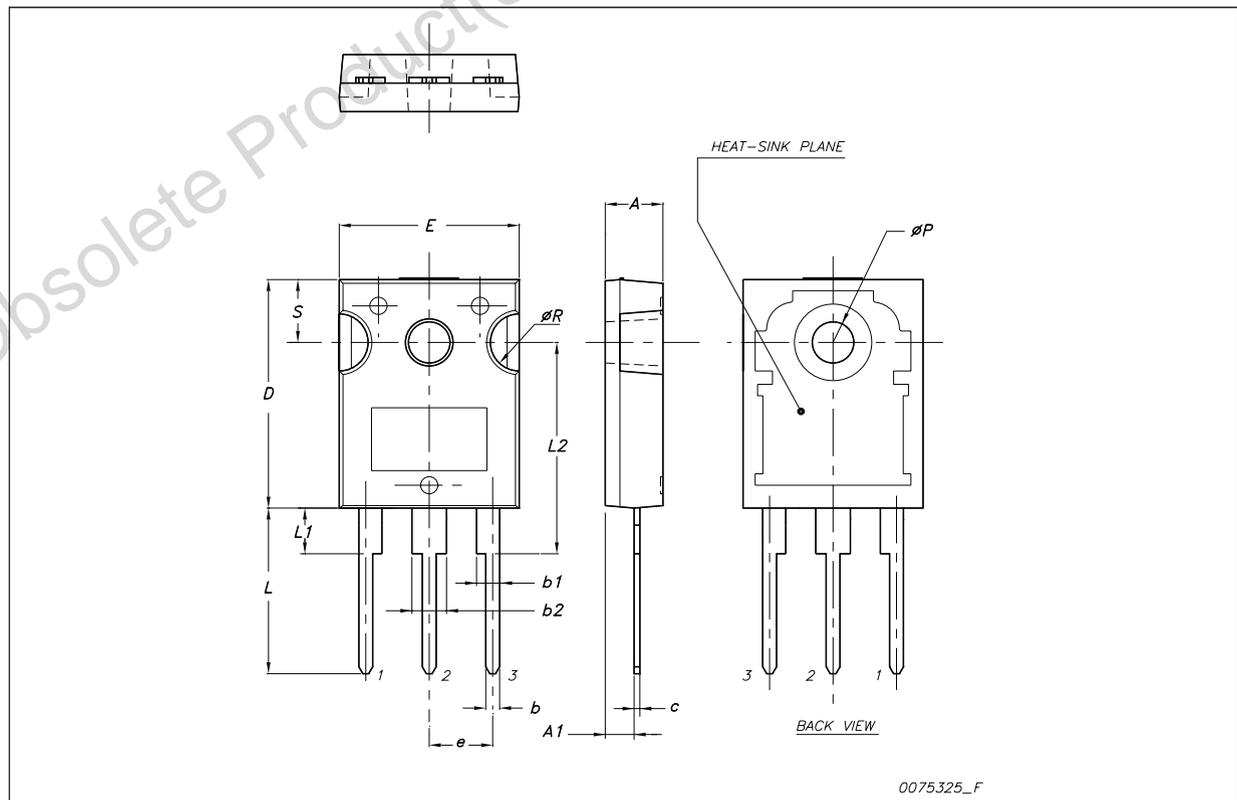
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4   Revision history

Table 5.   Document revision history

Date	Revision	Changes
07-Nov-2008	1	Initial release.
10-Jun-2009	2	Document status promoted from preliminary data to datasheet.

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