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## Dual NPN high voltage transistors in a single package

Datasheet — production data

### Features

- Low  $V_{CE(sat)}$
- Simplified circuit design
- Reduced component count
- Fast switching speed

### Applications

- Compact fluorescent lamp (CFL) 220 V mains
- Electronic ballast for fluorescent lighting

### Description

The device is a dual NPN high voltage power transistor manufactured using multi-epitaxial planar technology. It is housed in dual-island DIP-8 package with separated terminals to provide a high degree of assembly flexibility.

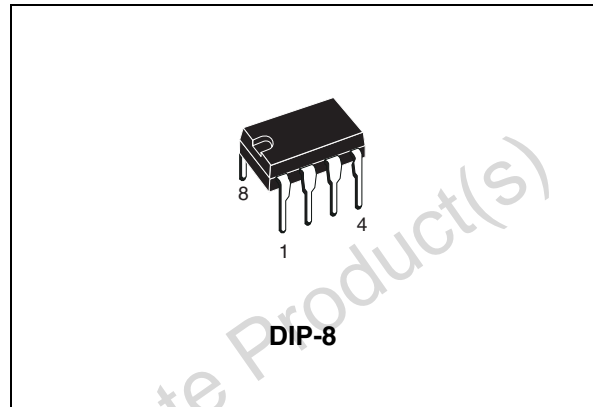


Figure 1. Internal schematic diagram

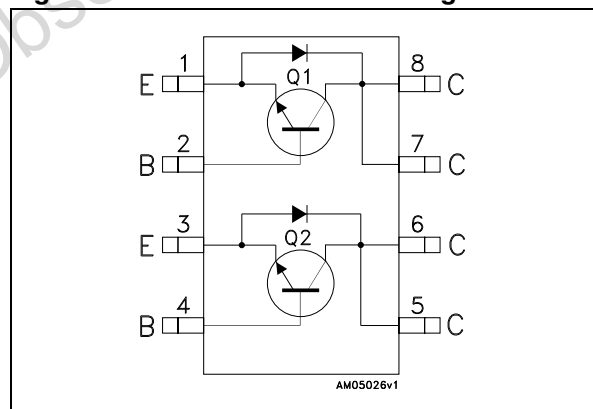


Table 1. Device summary

Order code	Marking	Package	Packaging
STD845DN40	D845DN40	DIP-8	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	700	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0, I_B = 2 \text{ A}, t_p < 10 \text{ ms}$ )	$V_{(BR)EBO}$	V
$I_C$	Collector current	4	A
$I_{CM}$	Collector peak current ( $t_p < 5 \text{ ms}$ )	8	A
$I_B$	Base current	2	A
$I_{BM}$	Base peak current ( $t_p < 5 \text{ ms}$ )	4	A
$P_{TOT}$	Total dissipation at $T_{amb} = 25 \text{ °C}$ single transistor	3	W
	Total dissipation at $T_{case} = 25 \text{ °C}$ single transistor	45	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
$R_{thJA}^{(1)}$	Thermal resistance junction-ambient (single transistor)	42	°C/W
$R_{thJC}$	Thermal resistance junction-case (single transistor)	2.7	°C/W

1. Device mounted on PCB area of 25 mm<sup>2</sup>.

## 2 Electrical characteristics

$T_{\text{case}} = 25\text{ °C}$  unless otherwise specified.

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 700\text{ V}$			100	$\mu\text{A}$
		$V_{\text{CE}} = 700\text{ V}$ $T_{\text{c}} = 125\text{ °C}$			500	$\mu\text{A}$
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 400\text{ V}$			250	$\mu\text{A}$
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 10\text{ mA}$	9		18	V
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 100\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$			0.7	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$			1	V
		$I_{\text{C}} = 2.5\text{ A}$ $I_{\text{B}} = 0.5\text{ A}$			1.5	V
		$I_{\text{C}} = 4\text{ A}$ $I_{\text{B}} = 1\text{ A}$		0.5		V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$			1.1	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$			1.2	V
		$I_{\text{C}} = 2.5\text{ A}$ $I_{\text{B}} = 0.5\text{ A}$			1.3	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 10\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$	10			
		$I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	12		32	
$V_{\text{F}}$	Diode forward voltage	$I_{\text{F}} = 2\text{ A}$			2.5	V
$t_{\text{s}}$ $t_{\text{f}}$	Resistive load	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 400\text{ mA}$ $V_{\text{CC}} = 125\text{ V}$ $t_{\text{p}} = 30\text{ }\mu\text{s}$				
	Storage time			2.5		$\mu\text{s}$
$t_{\text{s}}$ $t_{\text{f}}$	Inductive load	$I_{\text{C}} = 2\text{ A}$ , $V_{\text{CC}} = 200\text{ V}$ $V_{\text{BE(off)}} = -5\text{ V}$ $I_{\text{B(on)}} = 400\text{ mA}$ $R_{\text{BB}} = 0$ , $L = 200\text{ }\mu\text{H}$				
	Storage time			0.6		$\mu\text{s}$
$t_{\text{s}}$ $t_{\text{f}}$	Fall time			0.1		$\mu\text{s}$

1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

## 2.1 Electrical characteristics (curves)

Figure 2. DC current gain ( $V_{CE} = 1.5\text{ V}$ )

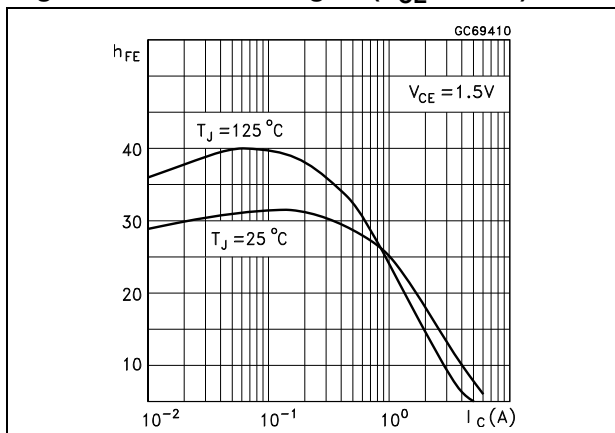


Figure 3. DC current gain ( $V_{CE} = 5\text{ V}$ )

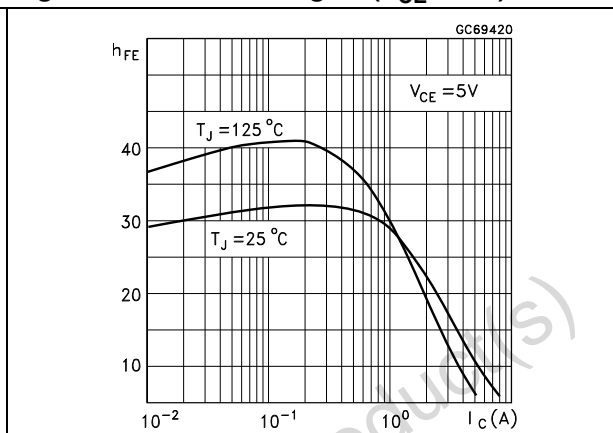


Figure 4. Collector-emitter saturation voltage Figure 5. Base-emitter saturation voltage

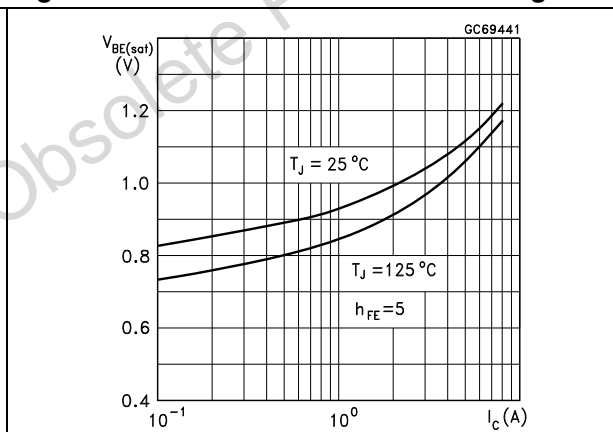
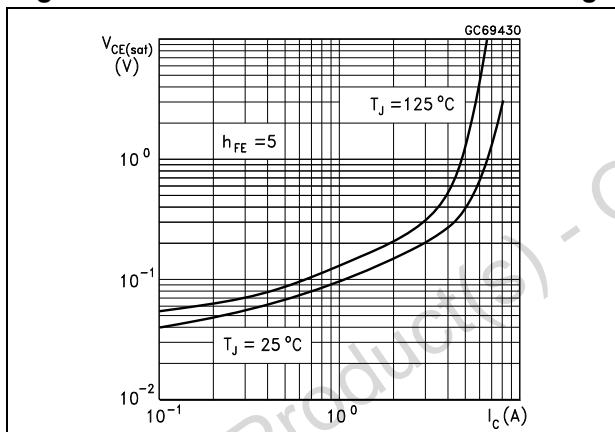


Figure 6. Inductive load fall time

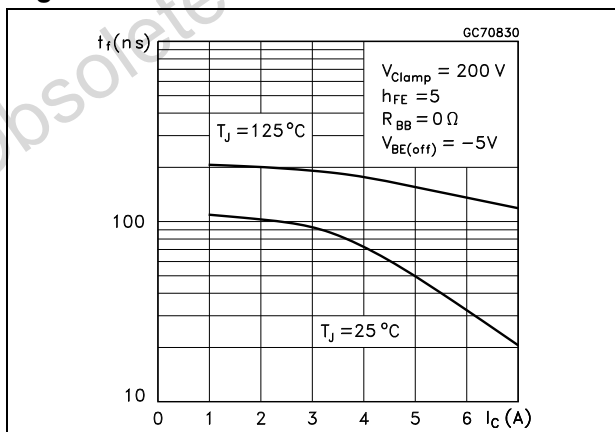


Figure 7. Inductive load storage time

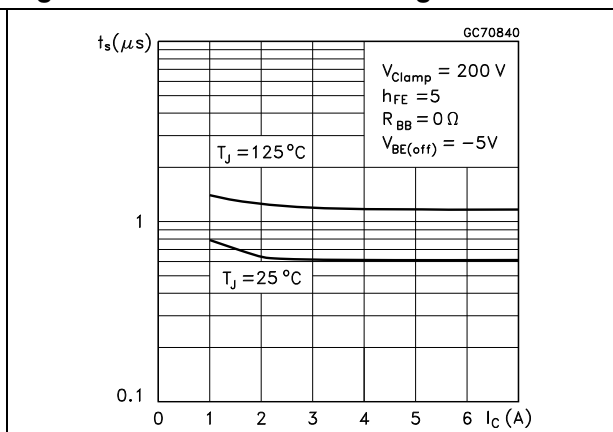


Figure 8. Resistive load fall time

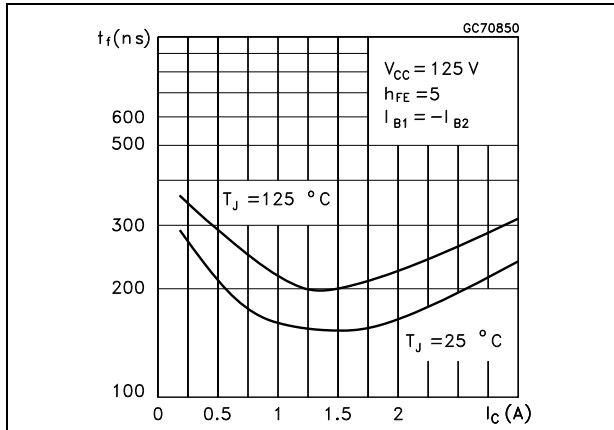


Figure 9. Resistive load storage time

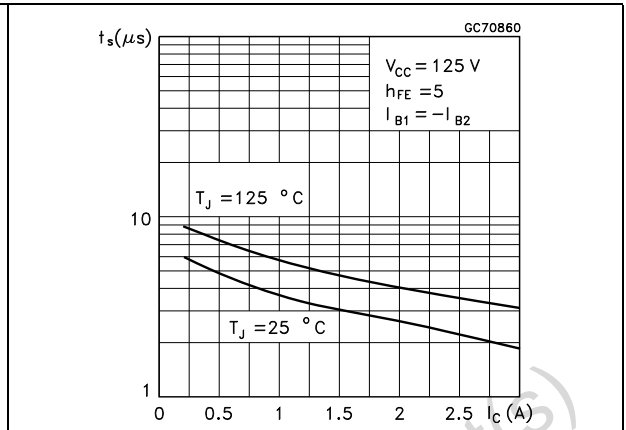
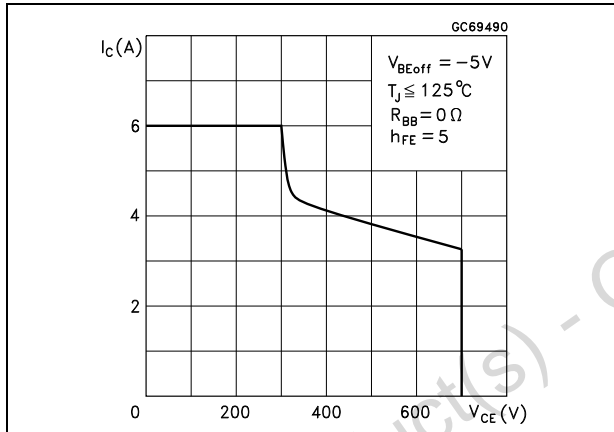
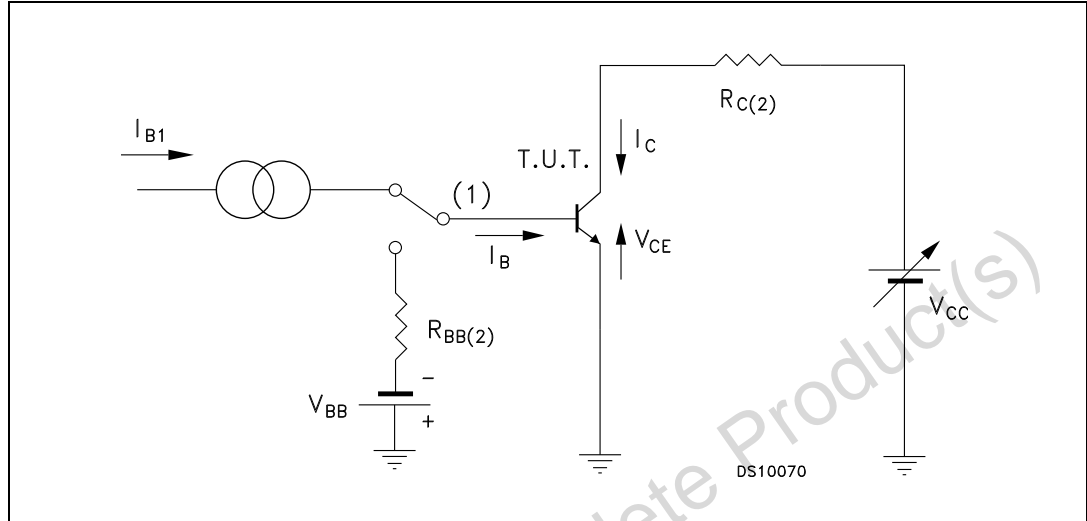


Figure 10. Reverse biased safe operating area



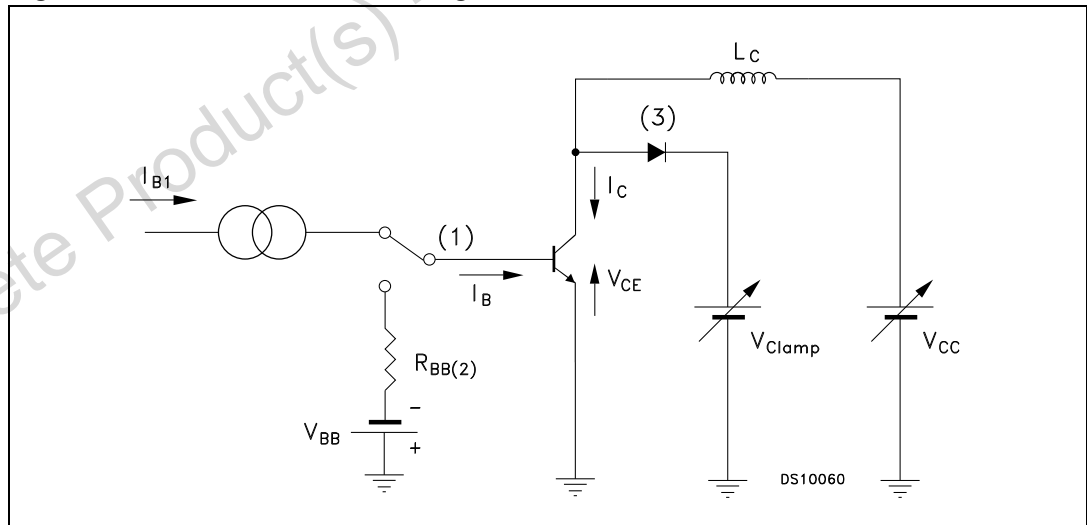
### 3 Test circuits

Figure 11. Resistive load switching test circuit



- 1. Fast electronic switch
- 2. Non-inductive resistor

Figure 12. Inductive load switching test circuit



- 1. Fast electronic switch
- 2. Non-inductive resistor
- 3. Fast recovery rectifier

## 4 Package mechanical data

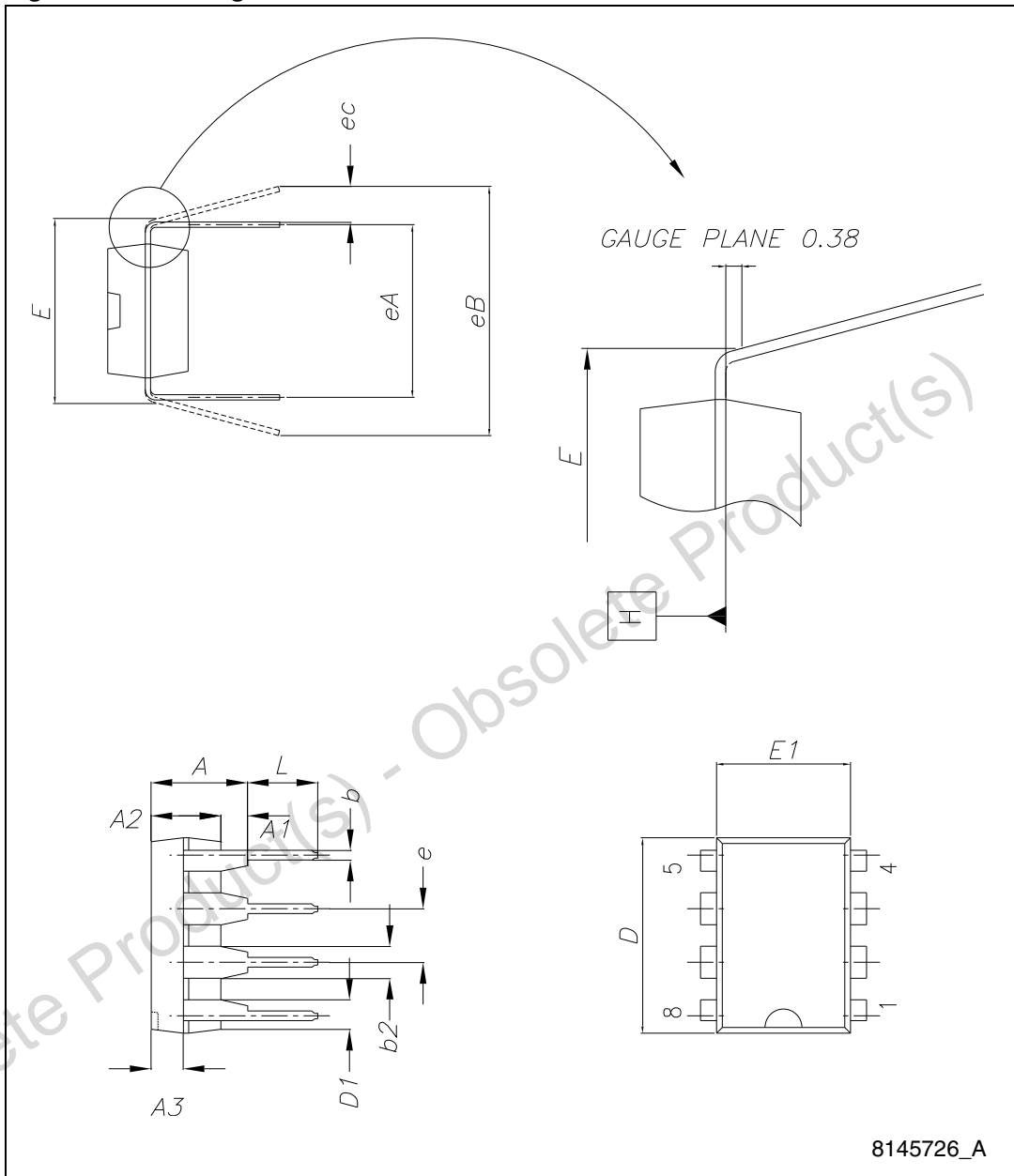
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**Table 5. DIP-8 mechanical data**

Dim.	mm.		
	Min.	Typ.	Max.
A			4.80
A1	0.50		
A2	3.10		3.50
A3	1.40		1.60
b	0.38		0.55
b1	0.38		0.51
b2	1.47		1.57
b3	0.89		1.09
c	0.21		0.35
c1	0.20		0.30
D	9.10		9.30
D1	0.13		
E	7.62		8.25
E1	6.25		6.45
e		2.54	
eA		7.62	
eB	7.62		10.90
eC	0		1.52
L	2.92		3.81



Figure 13. Drawing dimension DIP-8



## 5 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
03-Mar-2010	1	Initial release.
16-Apr-2010	2	Inserted $P_{TOT}$ and $R_{thJA}$ values <a href="#">Table 2</a> and <a href="#">Table 3 on page 2</a> .
23-Oct-2012	3	Modified $P_{TOT}$ and $R_{thJA}$ values in <a href="#">Table 2</a> and <a href="#">Table 3 on page 2</a> .

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