

# MJD122 MJD127

## Complementary power Darlington transistors

### Features

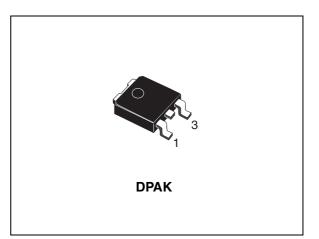
- Low collector-emitter saturation voltage
- Integrated antiparallel collector-emitter diode

### Applications

■ General purpose linear and switching

### Description

The devices are manufactured in planar technology with "base island" layout and monolithic Darlington configuration. The resulting transistors show exceptional high gain performance coupled with very low saturation voltage.



#### Figure 1. Internal schematic diagrams

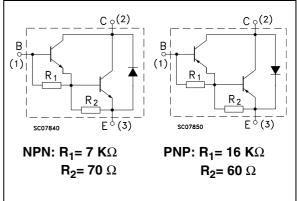


Table 1.	Device	summary
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Order codes	Marking	Polarity	Package	Packaging
MJD122T4	MJD122	NPN	DPAK	Tape and reel
MJD127T4	MJD127	PNP	DFAR	Tape and teel

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## 1 Electrical ratings

Table 2. Absolute	maximum	ratings
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Symbol	Parameter	Value	
V <sub>CBO</sub>	Collector-base voltage ( $I_E = 0$ )	100	V
$V_{CEO}$	Collector-emitter voltage (I <sub>B</sub> = 0)	100	V
$V_{\text{EBO}}$	Emitter-base voltage ( $I_C = 0$ )	5	V
Ι <sub>C</sub>	Collector current	8	А
I <sub>CM</sub>	Collector peak current	16	A
Ι <sub>Β</sub>	Base current	0.12	А
P <sub>TOT</sub>	Total dissipation at $T_{case} = 25^{\circ}C$	20	W
T <sub>stg</sub>	Storage temperature	-65 to 150	°C
Τ <sub>J</sub>	Max. operating junction temperature	150	°C

Note: For PNP types voltage and current values are negative.

#### Table 3.Thermal data

Symbol	Parameter	Value	Unit
R <sub>thj-c</sub>	Thermal resistance junction-case max.	6.25	°C/W



## 2 Electrical characteristics

(T<sub>case</sub> = 25 °C; unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I <sub>CBO</sub>	Collector cut-off current $(I_E = 0)$	V <sub>CB</sub> = 100 V		-	10	μA
I <sub>CEO</sub>	Collector cut-off current $(I_B = 0)$	V <sub>CE</sub> = 50 V		-	10	μA
I <sub>EBO</sub>	Emitter cut-off current $(I_{\rm C} = 0)$	V <sub>EB</sub> = 5 V		-	2	mA
V <sub>CEO(sus)</sub> <sup>(1)</sup>	Collector-emitter sustaining voltage $(I_B = 0)$	I <sub>C</sub> = 30 mA	100	-		V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	$I_{C} = 4 A \qquad I_{B} = 16 mA$ $I_{C} = 8 A \qquad I_{B} = 80 mA$		-	2 4	V V
V <sub>BE(sat)</sub> <sup>(1)</sup>	Base-emitter saturation voltage	I <sub>C</sub> = 8 A I <sub>B</sub> = 80 mA		-	4.5	V
V <sub>BE(on)</sub> <sup>(1)</sup>	Base-emitter on voltage	$I_{C} = 4 A$ $V_{CE} = 4 V$		-	2.8	V
h <sub>FE</sub> <sup>(1)</sup>	DC current gain	$I_{C} = 4A \qquad V_{CE} = 4 V$ $I_{C} = 8 A \qquad V_{CE} = 4 V$	1000 100	-	12000	

 Table 4.
 Electrical characteristics

1. Pulsed duration = 300  $\mu s,$  duty cycle  ${\leq}1.5\%$ 

Note:

For PNP types voltage and current values are negative.



Figure 2.

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### 2.1 Electrical characteristics (curves)

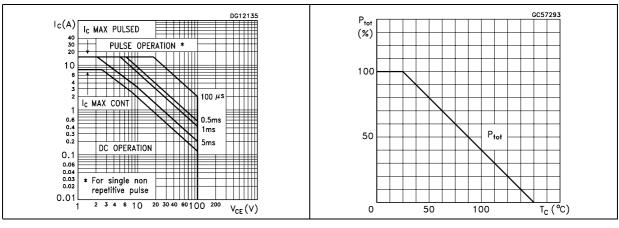


Figure 3.

#### Figure 4. DC current gain for NPN type

Safe operating area



**Derating curve** 

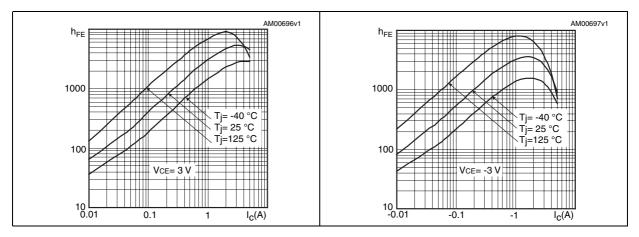
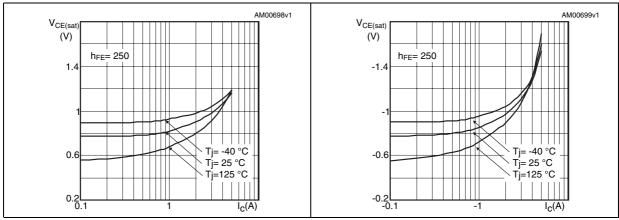


Figure 6. Collector-emitter saturation voltage Figure 7. Collector-emitter saturation voltage for NPN type for PNP type





V<sub>BE(sat)</sub>

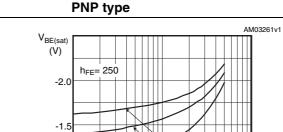
 $I_{C}(A)$ 

Tj= -40 °C

Tj= 25 °C Tj=125 °C

# Figure 8. Base-emitter saturation voltage for Figure 9. Base-emitter saturation voltage for NPN type PNP type

AM00700v1



-1.0

-0.5L -0.1

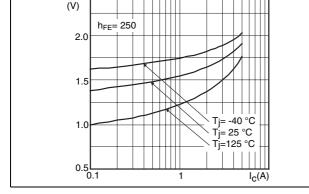


Figure 10. Base-emitter on voltage for NPN type

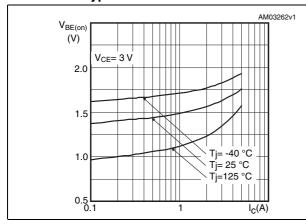


Figure 11. Base-emitter on voltage for PNP type

-1

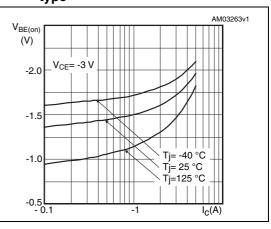
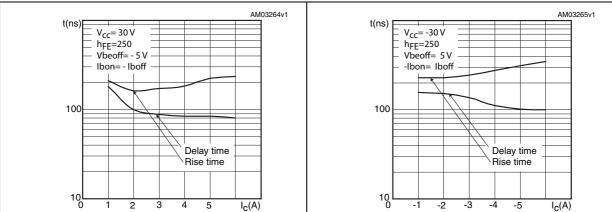


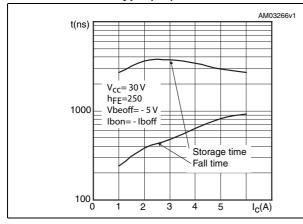
Figure 12. Resistive load switching times for Fi NPN type (on)

Figure 13. Resistive load switching times for PNP type (on)





# Figure 14. Resistive load switching times for NPN type (off)





# Figure 15. Resistive load switching times for PNP type (off)

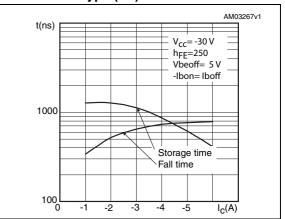
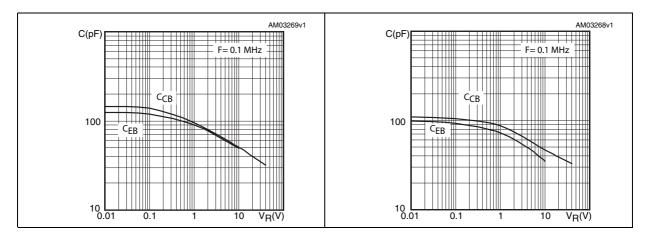


Figure 17. Capacitances for PNP type





## 3 Test circuits

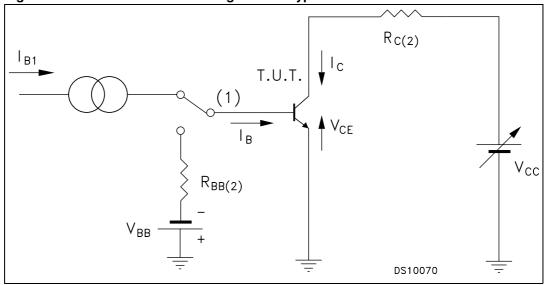
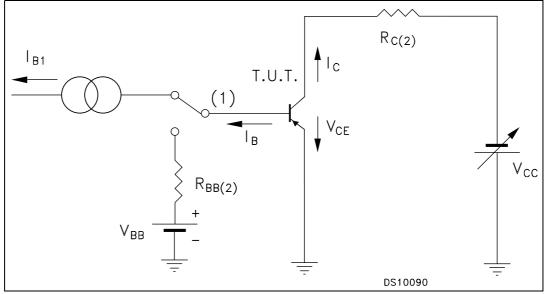


Figure 18. Resistive load switching for NPN type

1. Fast electronic switch

2. Non-inductive resistor

#### Figure 19. Resistive load switching for PNP type



1. Fast electronic switch

2. Non-inductive resistor



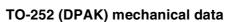
## 4 Package mechanical data

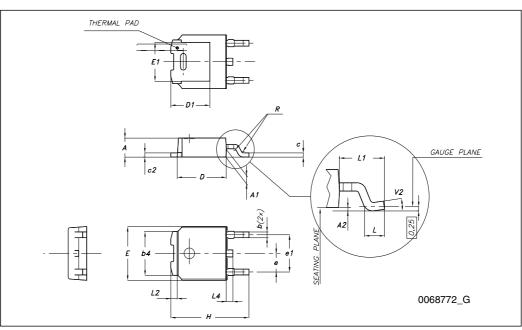
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.



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		mm.	
DIM	min.	typ	max.
A	2.20		2.40
\1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
с	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
н	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0 °		8 °







## 5 Revision history

#### Table 5.Document revision history

Date	Revision	Changes
01-Aug-2002	8	
01-Oct-2007	9	Collector current limits have been improved
03-Oct-2007	10	Package mechanical data updated
21-Apr-2009	11	The device MJD127 has been inserted Section 2.1: Electrical characteristics (curves) has been updated



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