TIP122-A
TIP127-A

Complementary power Darlington transistors

Features

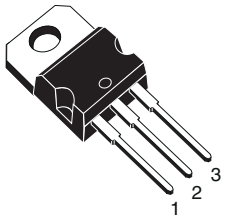
- The devices are qualified for automotive application
- Low collector-emitter saturation voltage
- Complementary NPN - PNP transistors

Application

- General purpose linear and switching

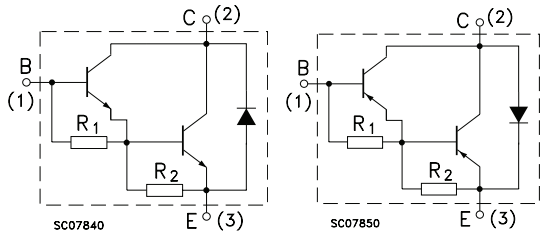
Description

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.



TO-220

Figure 1. Internal schematic diagrams



NPN: R_1 = 7 kΩ
R_2 = 70 Ω

PNP: R_1 = 16 kΩ
R_2 = 60 Ω

Table 1. Device summary

Order codes	Marking	Polarity	Package	Packaging
TIP122-A	TIP122	NPN	TO-220	Tube
TIP127-A	TIP127	PNP		

Contents

1 Electrical ratings

Table 2. Absolute maximum rating(1)

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage (I_E = 0)	100	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	100	V
V_{EBO}	Emitter-base voltage (I_C = 0)	5	V
I_C	Collector current	5	A
I_{CM}	Collector peak current	8	A
I_B	Base current	0.12	A
P_{TOT}	Total dissipation at $T_c \leq 25$ °C $T_{amb} \leq 25$ °C	65 2	W
T_{STG}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	

1. For PNP types voltage and current values are negative.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max.	1.92	°C/W
R_{thJA}	Thermal resistance junction-ambient max.	62.5	

2 Electrical characteristics

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

Table 4. Electrical characteristics(1)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 50 V	-	-	0.5	mA
I_{CBO}	Collector cut-off current (I_B = 0)	V_{CE} = 100 V	-	-	0.2	mA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 5 V	-	-	2	mA
$V_{CEO(sus)}$(2)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 30 mA	100	-		V
$V_{CE(sat)}$(2)	Collector-emitter saturation voltage	I_C = 3 A I_B = 12 mA I_C = 5 A I_B = 20 mA	-	-	2 4	V V
$V_{BE(on)}$(2)	Base-emitter on voltage	I_C = 3 A V_{CE} = 3 V	-	-	2.5	V
h_{FE}(2)	DC current gain	I_C = 0.5 A V_{CE} = 3 V I_C = 3 A V_{CE} = 3 V	1000 1000	-	-	

1. For PNP types voltage and current values are negative.
2. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

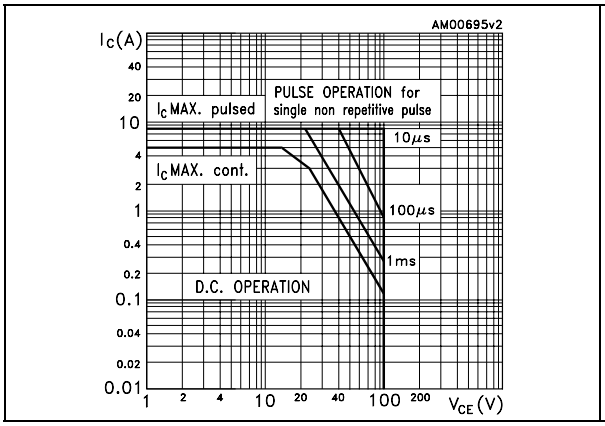


Figure 3. Derating curve

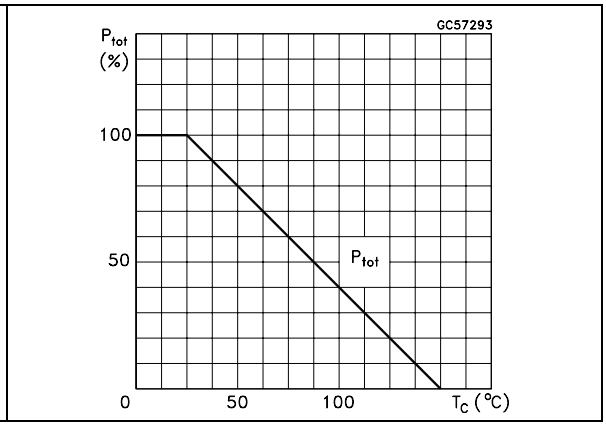


Figure 4. DC current gain for NPN type

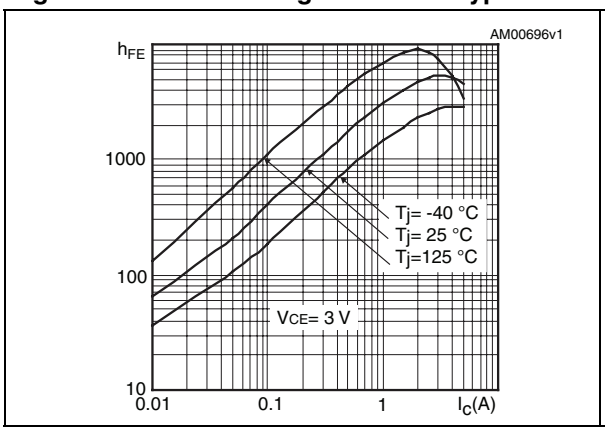


Figure 5. DC current gain for PNP type

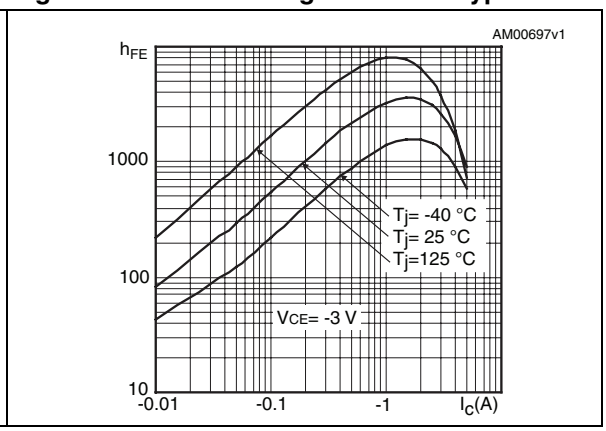


Figure 6. Collector-emitter saturation voltage for NPN type

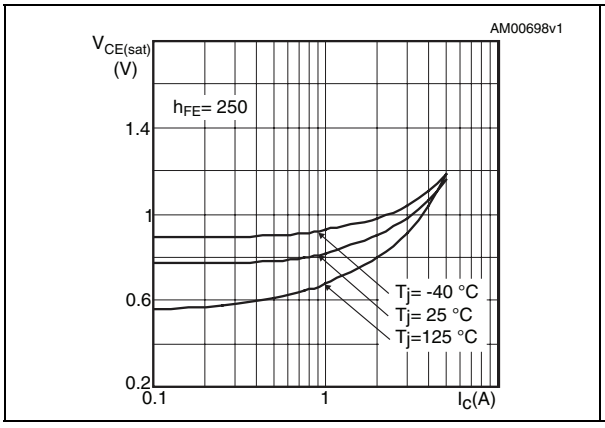


Figure 7. Collector-emitter saturation voltage for PNP type

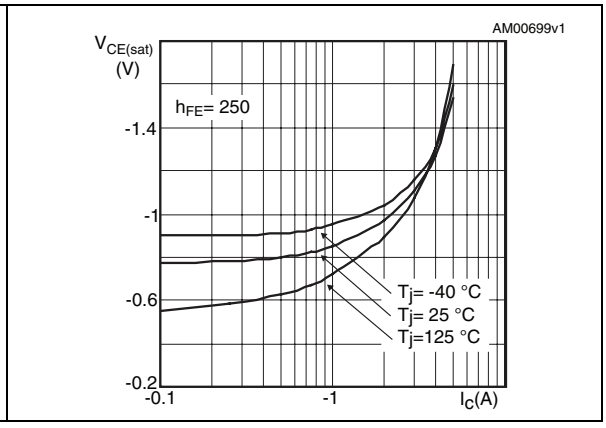


Figure 8. Base-emitter saturation voltage for NPN type

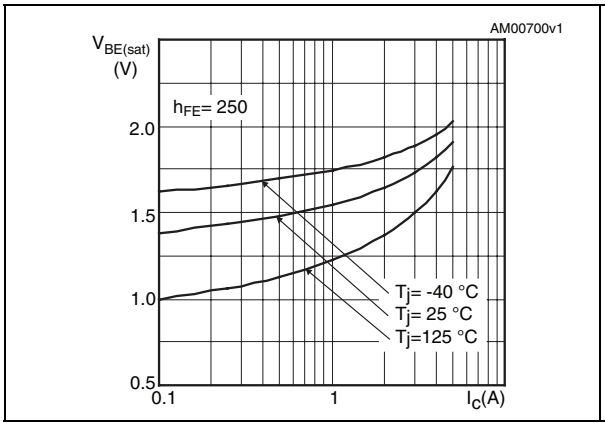


Figure 9. Base-emitter saturation voltage for PNP type

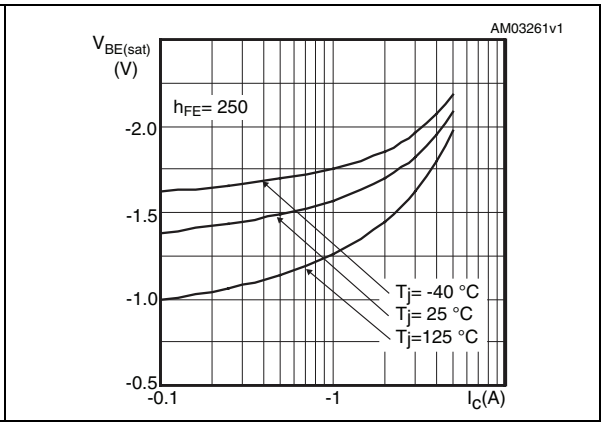


Figure 10. Base-emitter on voltage for NPN type

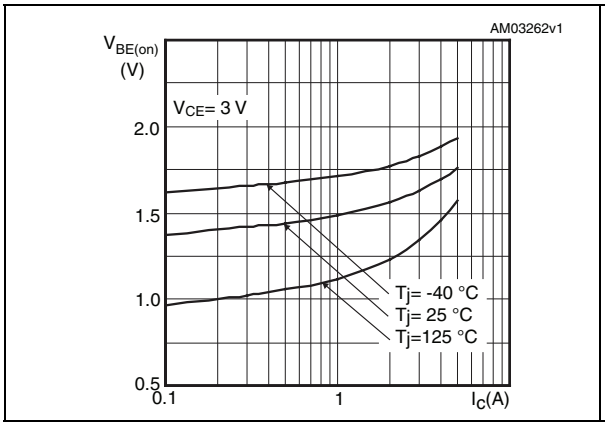


Figure 11. Base-emitter on voltage for PNP type

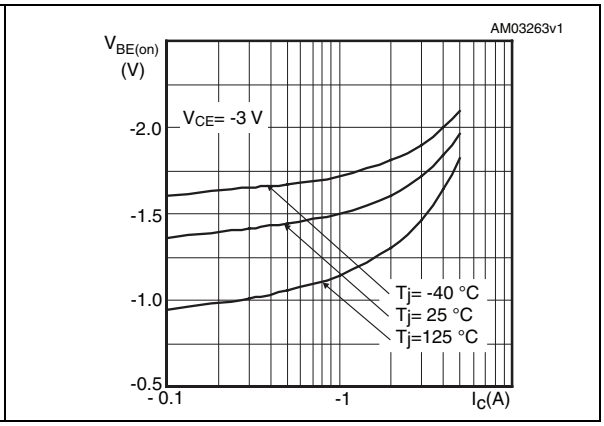


Figure 12. Switching time on resistive load for NPN type (on)

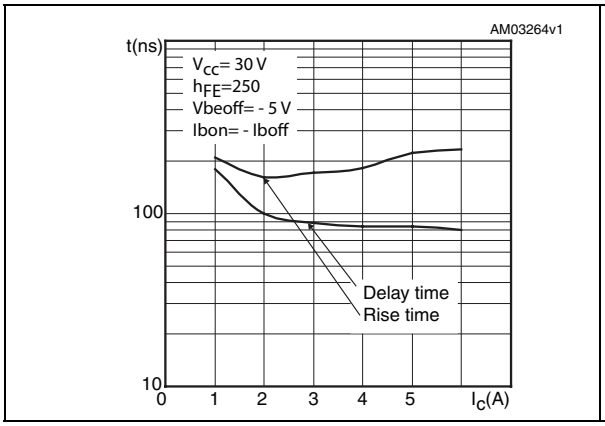


Figure 13. Switching time on resistive load for PNP type (on)

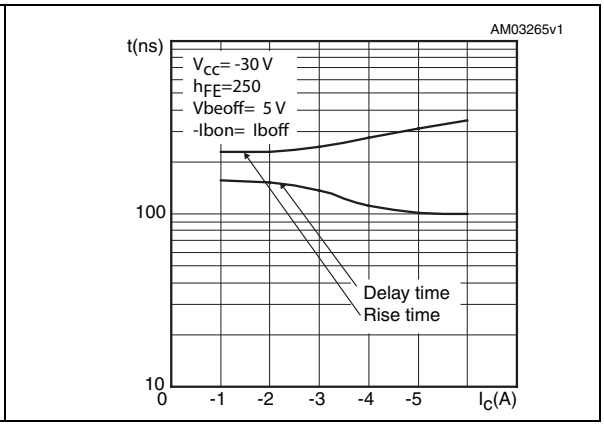


Figure 14. Switching time on resistive load for NPN type (off)

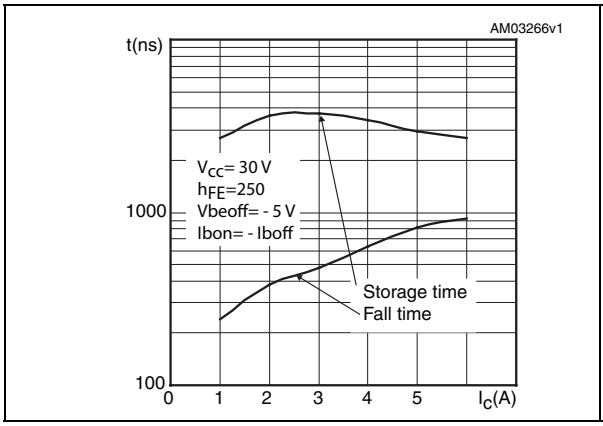


Figure 15. Switching time on resistive load for PNP type (off)

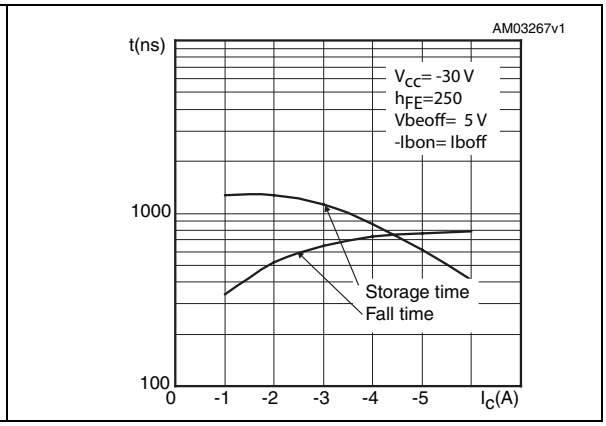


Figure 16. Capacitances for NPN type

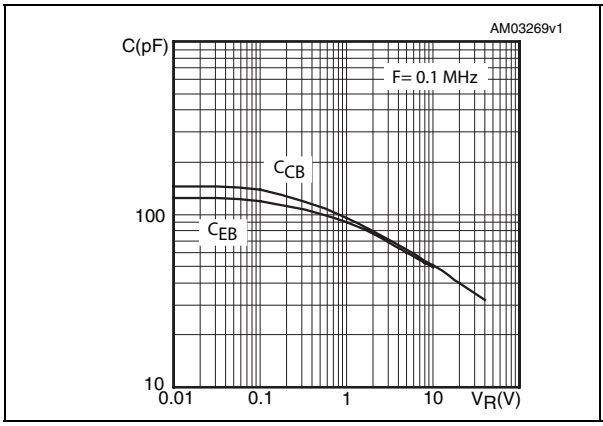
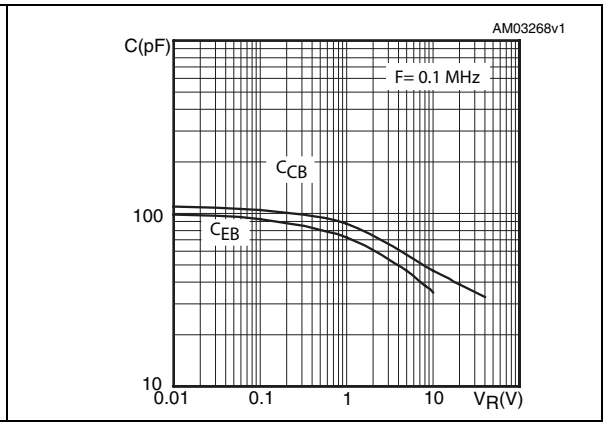
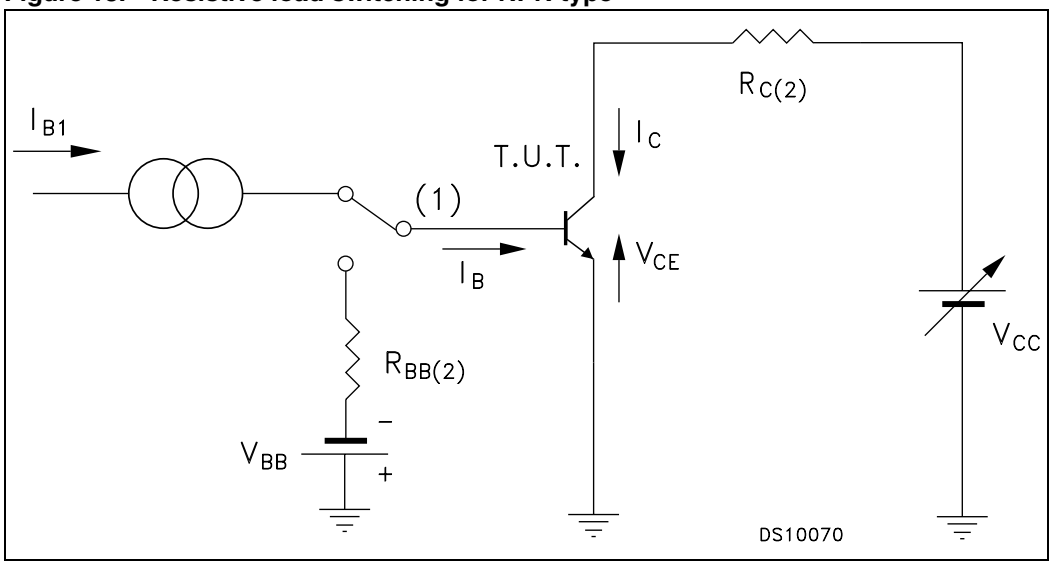


Figure 17. Capacitances for PNP type



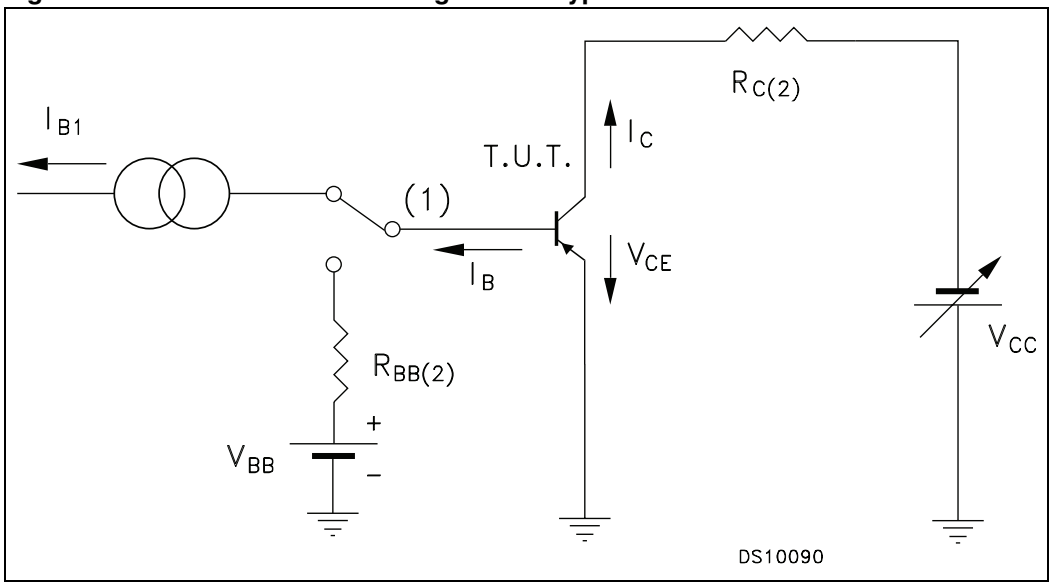
3 Test circuits

Figure 18. Resistive load switching for NPN type



1. Fast electronic switch
2. Fast electronic switch

Figure 19. Resistive load switching for PNP type



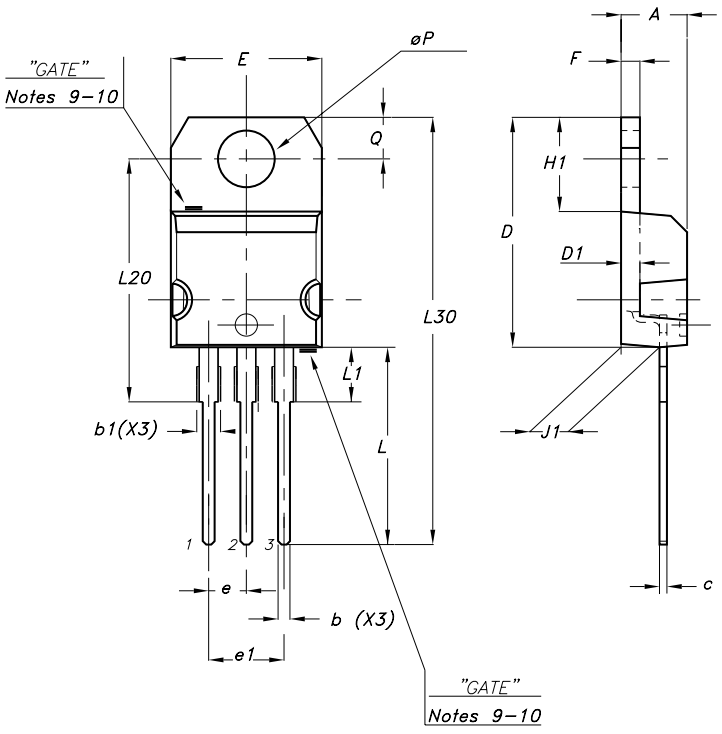
1. Fast electronic switch
2. Non-inductive resistor

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® 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.

TO-220 mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.051
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
ØP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



5 Revision history

Table 5. Document revision history

Date	Revision	Changes
13-Jul-2009	1	First release.