BRITISH STANDARDS INSTITUTION
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BS CECC 50 004-152
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Specification available from:-
CECC 00200 AND
TEXAS INSTRUMENTS LIMITED,
MANTON LANE, BEDFORD, MK41 7PA
TELEPHONE : BEDFORD 67466 TELEX : 82178

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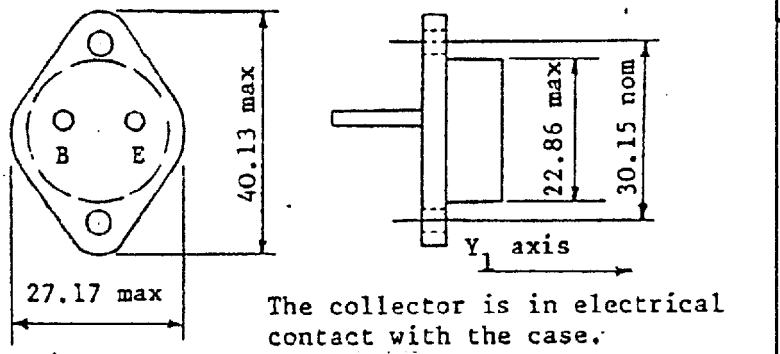
ELECTRONIC COMPONENTS OF ASSESSED QUALITY
DETAIL SPECIFICATION IN ACCORDANCE WITH
BS CECC 50 000 : 1981

MANUFACTURER'S TYPE NUMBER

TIPL777, TIPL777A, TIPL777B

SEE PD 9002 AND CECC 00200
For ordering information
see Clause 7

1. Outline and dimensions Third angle projection



The collector is in electrical contact with the case.

Outline BS 3934 SO-127A
IEC 191-2 C14A B18. Dimensions in millimetres.
Marking information - See Clause 6

2.
CASE RATED DARLINGTON CONNECTED POWER TRANSISTORS FOR HIGH VOLTAGE SWITCHING APPLICATIONS.

NPN TRIPLE DIFFUSED SILICON PLANAR TRANSISTORS IN HERMETICALLY SEALED METAL CASE

3. ASSESSMENT LEVEL F
+ ADDITIONAL TESTS

4. LIMITING VALUES (absolute maximum system)

These apply over the operating temperature range unless otherwise stated.

4.1.	T_{case}	Case operating temperature range	-65 °C to +200 °C
4.2.	T_{stg}	Storage temperature range	-65 °C to +200 °C

Voltage Ratings (T_{case} = -65 °C to +125 °C. See Fig. 6)

			TIPL777	TIPL777A	TIPL777B
4.3.	V_{CBO}	Collector-base continuous (direct) voltage. I_E = 0	950V	1050V	1150V
4.4.	V_{CES}	Collector-emitter continuous (direct) voltage. V_{BE} = 0	950V	1050V	1150V
4.4.	V_{CEO}	Collector-emitter continuous (direct) voltage. I_B = 0	600V	700V	800V
4.5.	V_{EBO}	Emitter-base continuous (direct) voltage. I_C = 0	6v	6v	6v

Refer to Qualified Products List PD 9002 and/or CECC 00200 for details of manufacturers approved to this specification.

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			TIPL777	TIPL777A	TIPL777B
4.6	I_C	Continuous collector current	20A	20A	20A
	I_{CM}	Peak collector current (note 1)	55A	55A	55A
4.9	Power Ratings				
4.9.1	P_{tot}	Maximum continuous power dissipation at 25°C (see Figs. 2, 3, 4, 5 & 7)	←	150W	→
4.10	F.B.S.O.A.	See figure 8.			

5. CHARACTERISTICS at 25°C unless otherwise specified (not for inspection purposes)

	$V_{CEO(SUS)}$	Collector-emitter sustaining (note 2)	600V	700V	800V min.
		I_C = 100mA, L = 25mH			
	$V_{CEX(SUS)}$	Collector-emitter sustaining voltage. (Fig. 1A)	710	860	970 min.
		I_{BOFF} = 1A, I_C = 6A			
5.1.	†$h_{21E(1)}$	Forward current transfer ratio.*	50	50	50 min.
		V_{CE} = 5V, I_C = 700mA			
5.2.	†$V_{CE(SAT)(1)}$	Collector-emitter saturation voltage*			
		I_C = 15A, I_B = 300mA	3.0V max.		
		I_C = 12.5A, I_B = 250mA		3.0V max.	
		I_C = 10.0A, I_B = 200mA			3.0V max.
	$V_{CE(SAT)(2)}$	I_C = 700mA, I_B = 250mA	3.0 V max	3.0V max	3.0V max.
5.3.	†$V_{BE(SAT)(1)}$	Base-emitter saturation voltage			
		I_C = 15A, I_B = 300mA	3.5V max.		
		I_C = 12.5A, I_B = 250mA		3.5V max.	
		I_C = 10.0A, I_B = 200mA			3.5V max.

† Measured in Groups A or C

* These parameters are measured using pulse techniques, pulse width < 300µs, Duty Cycle < 2%

Note 1: Pulse test, pulse duration = 10µS

Note 2: Inductive loop switching measurement.

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5. CHARACTERISTICS (Cont'd)		TIPL777	TIPL777A	TIPL777B
†$V_{CE(SAT)(3)}$	Collector-emitter saturation voltage*			
	I_C = 10A, I_B = 200mA	2.5V max.		
	I_C = 7.5A, I_B = 150mA		2.5V max.	
	I_C = 5.0A, I_B = 100mA			2.5V max.
†$V_{CE(SAT)(4)}$	I_C = 3A, I_B = 60mA	2.0V max.		
	I_C = 2.5A, I_B = 50mA		2.0V max.	
	I_C = 1.0A, I_B = 20mA			2.0V max.
†$V_{BE(SAT)(3)}$	Base-emitter saturation voltage*			
	I_C = 10A, I_B = 200mA	3.5V max.		
	I_C = 7.5A, I_B = 150mA		3.5V max.	
	I_C = 5.0A, I_B = 100mA			3.5V max.
†$V_{BE(SAT)(4)}$	I_C = 3A, I_B = 60mA	3.0V max.		
	I_C = 2.5A, I_B = 50mA		3.0V max.	
	I_C = 1.0A, I_B = 20mA			3.0V max.

5.5. Leakage Currents

†$I_{CES(1)}$	Collector-emitter cut-off current.			
	V_{BE} = 0			
	V_{CE} = 950V	100µA max.		
	V_{CE} = 1050V		100µA max.	
	V_{CE} = 1150V			100µA max.
†$I_{CEX(1)}$	Collector-emitter cut-off current.			
	1.5V < V_{EB} < 6V			
	V_{CE} = 950V	100µA max.		
	V_{CE} = 1050V		100µA max.	
	V_{CE} = 1150V			100µA max.

* These parameters are measured using pulse techniques, pulse width < 300µS, Duty Cycle < 2%

† Measured in Groups A or C

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5.5 CHARACTERISTICS (Cont'd)			TIPL777	TIPL777A	TIPL777B
†I_{CEO}	Collector cut-off current (I_B = 0)				
	V_{CE} = 600V		100µA max.		
	V_{CE} = 700V			100µA max.	
	V_{CE} = 800V				100µA max.
I_{EBO}	Emitter cut-off current				
	V_{EB} = 6V, I_C = 0		←	10mA max.	→
5.6. †$I_{CES(2)}$	Collector cut-off current T_{case} = 100°C				
	V_{CE} = 950V		1.0mA max.		
	V_{CE} = 1050V			1.0mA max.	
	V_{CE} = 1150V				1.0mA max.

5.7. †Switching Characteristics (See Figs. 1 & 2)

Inductive Load (See Fig. 1b)

5.7.1. TIPL777

t_{rv}	Turn on time	(I_C = 15.0A, V_{CE} = 300V)	0.50 µs	max.
t_{sv}	Storage time	(I_{BOFF} = 1.5A)	2.80 µs	max.
t_{fi}	Fall time	(T_{case} = 25°C) (I_{BON} = 150mA Nominal*)	0.30 µs	max.
t_{rv}	Turn on time	(I_C = 15.0A, V_{CE} = 300V)	1.50 µs	max.
t_{sv}	Storage time	(I_{BOFF} = 1.5A)	4.80 µs	max.
t_{fi}	Fall time	(T_{case} = 100°C) (I_{BON} = 150mA Nominal *)	0.50 µs	max.

* See Figures 1a and 1b

† Measured in Groups A or C

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5. CHARACTERISTICS (Cont'd)

5.7.1. TIPL777A

t_{rv}	Turn on time	(I_C = 12.5A, V_{CE} = 300V)	0.50 µs max.
t_{sv}	Storage time	(I_{BOFF} = 1,5A)	3.00 µs max.
t_{fi}	Fall time	(T_{case} = 25°C)	0.30 µs max.
		(I_{BON} = 150mA Nominal *)	
t_{rv}	Turn on time	(I_C = 12.5A, V_{CE} = 300V)	1.50 µs max.
t_{sv}	Storage time	(I_{BOFF} = 1.5A)	5.00 µs max.
t_{fi}	Fall time	(T_{case} = 100°C	0.50 µs max.
		(I_{BON} = 150mA Nominal *)	

TIPL777B

t_{rv}	Turn on time	(I_C = 10A, V_{CE} = 300V)	0.50 µs max.
t_{sv}	Storage time	(I_{BOFF} = 1.5A)	3.20 µs max.
t_{fi}	Fall time	(T_{case} = 25°C)	0.30 µs max.
		(I_{BON} = 150mA Nominal *)	
t_{rv}	Turn on time	(I_C = 10A, V_{CE} = 300V)	1.50 µs max.
t_{sv}	Storage time	(I_{BOFF} = 1.5A)	5.20 µs max.
t_{fi}	Fall time	(T_{case} = 100°C	0.50 µs max.
		(I_{BON} = 150mA Nominal *)	

5.8 $R_{\theta jc}$ Thermal resistance junction-case

TIPL777, TIPL777A, TIPL777B	0.97°C/W

* See figures 1a and 1b

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6.0 MARKING

6.1. Each device shall bear the following markings:-

(a) Terminal identification

(b) Type Number

(c) Date Code

(d) Manufacturer's trade mark or factory identification code.

6.2. Each package containing one or more of these transistors shall bear the above markings b, c and d, and in addition, this detail specification number BS CECC 50 004-152

7.0 ORDERING INFORMATION

The following minimum information is necessary to order a specific device, unless otherwise specified.

- precise type number
- CECC reference of detail specification with issue number and/or date when relevant.
- level of quality assessment as defined in Appendix IIA of CECC 50 000, and, if required, screening sequence as defined in Appendix VI of CECC 50 000.
- any other particulars

Example:- Type number-Detail specification number-Issue number-Level

RELATED DOCUMENTS

BS 2011/IEC 68	Methods for the environmental testing of electronic components and electronic equipment.
BS 3934/IEC 191	Dimensions of semiconductor devices.
BS E9000/ CECC 00 100 to 00 113	General requirements for electronic components of assessed quality.
BS E9007/CECC 00 007	Sampling plans and procedures for inspection by attributes.
BS/CECC 50 000	Harmonised generic specification for discrete semiconductor devices.
IEC 147-2	General principles of measuring methods.
PD 9002/CECC 00 200	Component selection guide.

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8. INSPECTION REQUIREMENTS

ALL GROUP A TESTS ARE NON-DESTRUCTIVE

GROUP A

Lot by Lot

EXAMINATION OR TEST	BS CECC 50000 REF	CONDITIONS at T_{amb} = 25°C unless otherwise stated	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL OF ASSMT F	
			MIN	MAX	UNIT	IL	AQL
SUBGROUP A1 Visual Inspection	4.2.1					I	1.5
SUBGROUP A2a Non-operatives Open Circuit Short Circuit	4.3.4	A device is considered to be open circuit if $h_{21E(1)} < 5$ A device is considered to be short circuit if $I_{CES(1)} > 10$ mA				II	0.15
SUBGROUP A2b Collector-emitter cut-off current $I_{CES(1)}$	4.3.4 T.009	V_{BE} = 0 V_{CE} = 950V TIPL777 V_{CE} = 1050V TIPL777A V_{CE} = 1150V TIPL777B		100.0 100.0 100.0	µA µA µA	II	0.65
Collector-emitter cut-off current $I_{CEX(1)}$	T.009	V_{EB} = 6.0V V_{CE} = 950V TIPL777 V_{CE} = 1050V TIPL777A V_{CE} = 1150V TIPL777B		100.0 100.0 100.0	µA µA µA		

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GROUP A

Lot by Lot

EXAMINATION OR TEST	BS CECC 50000 REF	CONDITIONS at T_{amb} = 25 °C unless otherwise stated		INSPECTION REQUIREMENTS				
				LIMITS			LEVEL OF ASSMT F	
				MIN	MAX	UNIT	IL	AQL
SUBGROUP A2b (Cont'd)	4.3.4 T.009						II	0.65%
Collector-emitter cut-off current		I_B = 0						
$I_{CEO(1)}$		V_{CE} = 600V	TIPL777		100.0	µA		
		V_{CE} = 700V	TIPL777A		100.0	µA		
		V_{CE} = 800V	TIPL777B		100.0	µA		
Collector-emitter saturation voltage	4.3.4. T.003	I_C = 15A, I_B = 300mA	TIPL777		3.0	V		
$V_{CE(SAT)(1)}$		I_C = 12.5A, I_B = 250mA	TIPL777A		3.0	V		
		I_C = 10.0A, I_B = 200mA	TIPL777B		3.0	V		
SUBGROUP A3							I	2.5%
Static forward current transfer ratio	4.3.4 T.006	V_{CE} = 5.0V, I_C = 700mA		50.0		-		
$h_{21E(1)}$								
Collector-emitter saturation voltage	4.3.4							
$V_{CE(SAT)(2)}$	4.3.4	I_C = 700mA, I_B = 250mA	TIPL777/A/B		3.0	V		
$V_{CE(SAT)(3)}$		I_C = 10.0A, I_B = 200mA	TIPL777		2.5	V		
		I_C = 7.5A, I_B = 150 mA	TIPL777A		2.5	V		
		I_C = 5.0A, I_B = 100mA	TIPL777B		2.5	V		

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ALL GROUP A TESTS ARE NON-DESTRUCTIVE

GROUP A

Lot by Lot

EXAMINATION OR TEST	BS CECC 50000 REF	CONDITIONS at T_{amb} = 25°C unless otherwise stated	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL OF ASSMT F	
			MIN	MAX	UNIT	IL	AQL
SUBGROUP A3 (Cont'd)							
Collector-emitter sustaining voltage V_{CEX}		I_{BOFF} = 1A, I_C = 6A: TIPL777	710		V		
		TIPL777A	860		V		
		TIPL777B	970		V		
Collector-emitter saturation voltage $V_{CE(SAT)}$ (4)	4.3.4 T.003	I_C = 3A, I_B = 60mA: TIPL777		2.0	V		
		I_C = 2.5A, I_B = 50mA: TIPL777A		2.0	V		
		I_C = 1.0A, I_B = 20mA: TIPL777B		2.0	V		
Base-emitter saturation voltage $V_{BE(SAT)}$ (3)	T.004	I_C = 10A, I_B = 200mA: TIPL777		3.5	V		
		I_C = 7.5A, I_B = 150mA: TIPL777A		3.5	V		
		I_C = 5.0A, I_B = 100mA: TIPL777B		3.5	V		
$V_{BE(SAT)}$ (4)	T.004	I_C = 3.0A, I_B = 60mA: TIPL777		3.0	V		
		I_C = 2.5A, I_B = 50mA: TIPL777A		3.0	V		
		I_C = 1 A, I_B = 20mA: TIPL777B		3.0	V		

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