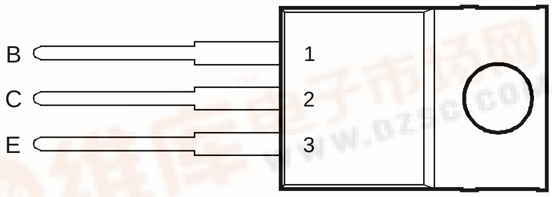
BUL770
NPN SILICON POWER TRANSISTOR

JULY 1991 - REVISED SEPTEMBER 1997

- **Designed Specifically for High Frequency Electronic Ballasts up to 50 W**
- **h_{FE} 7 to 21 at V_{CE} = 1 V, I_C = 800 mA**
- **Low Power Losses (On-state and Switching)**
- **Key Parameters Characterised at High Temperature**
- **Tight and Reproducible Parametric Distributions**

TO-220 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

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absolute maximum ratings at 25°C ambient temperature (unless otherwise noted)

RATING	SYMBOL	VALUE	UNIT
Collector-emitter voltage (V_{BE} = 0)	V_{CES}	700	V
Collector-base voltage (I_E = 0)	V_{CBO}	700	V
Collector-emitter voltage (I_B = 0)	V_{CEO}	400	V
Emitter-base voltage	V_{EBO}	9	V
Continuous collector current	I_C	2.5	A
Peak collector current (see Note 1)	I_{CM}	6	A
Peak collector current (see Note 2)	I_{CM}	8	A
Continuous base current	I_B	1.5	A
Peak base current (see Note 2)	I_{BM}	2.5	A
Continuous device dissipation at (or below) 25°C case temperature	P_{tot}	50	W
Operating junction temperature range	T_j	-65 to +150	°C
Storage temperature range	T_{stg}	-65 to +150	°C

NOTES: 1. This value applies for t_p = 10 ms, duty cycle ≤ 2%.
2. This value applies for t_p = 300 µs, duty cycle ≤ 2%.

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{CEO(sus)}$	Collector-emitter sustaining voltage	I_C = 100 mA	L = 25 mH	(see Note 3)	400			V
I_{CES}	Collector-emitter cut-off current	V_{CE} = 700 V V_{CE} = 700 V	V_{BE} = 0 V_{BE} = 0	 T_C = 90°C			10 200	μA
I_{EBO}	Emitter cut-off current	V_{EB} = 9 V	I_C = 0				1	mA
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = 160 mA I_B = 160 mA	I_C = 800 mA I_C = 800 mA	(see Notes 4 and 5) T_C = 90°C		0.83 0.75	0.9	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 160 mA I_B = 160 mA	I_C = 800 mA I_C = 800 mA	(see Notes 4 and 5) T_C = 90°C		0.18 0.22	0.25	V
h_{FE}	Forward current transfer ratio	V_{CE} = 1 V V_{CE} = 1 V V_{CE} = 5 V	I_C = 10 mA I_C = 800 mA I_C = 3.2 A		10 7 2	18.5 14.5 7.5	 21 14	
V_{FCB}	Collector-base forward bias diode voltage	I_{CB} = 60 mA				870		mV

NOTES: 3. Inductive loop switching measurement.
4. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 2%.
5. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts, and located within 3.2 mm from the device body.

thermal characteristics

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JA}$	Junction to free air thermal resistance			62.5	°C/W
$R_{\theta JC}$	Junction to case thermal resistance			2.5	°C/W

inductive-load switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
t_{sv}	Storage time	I_C = 800 mA L = 1 mH	$I_{B(on)}$ = 160 mA $I_{B(off)}$ = 320 mA	V_{CC} = 40 V V_{CLAMP} = 300 V		2.5	3	µs
t_{fi}	Current fall time					150	190	ns
t_{xo}	Cross over time					300	400	ns
t_{sv}	Storage time	I_C = 800 mA L = 1 mH	$I_{B(on)}$ = 160 mA $I_{B(off)}$ = 100 mA	V_{CC} = 40 V V_{CLAMP} = 300 V		4.3	5	µs
t_{fi}	Current fall time					140	200	ns

resistive-load switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{sv}	Storage time	I_C = 800 mA V_{CC} = 300 V	$I_{B(on)}$ = 160 mA $I_{B(off)}$ = 160 mA		2.5	3.4	µs
t_{fi}	Current fall time				150	250	ns

TYPICAL CHARACTERISTICS

FORWARD CURRENT TRANSFER RATIO vs COLLECTOR CURRENT

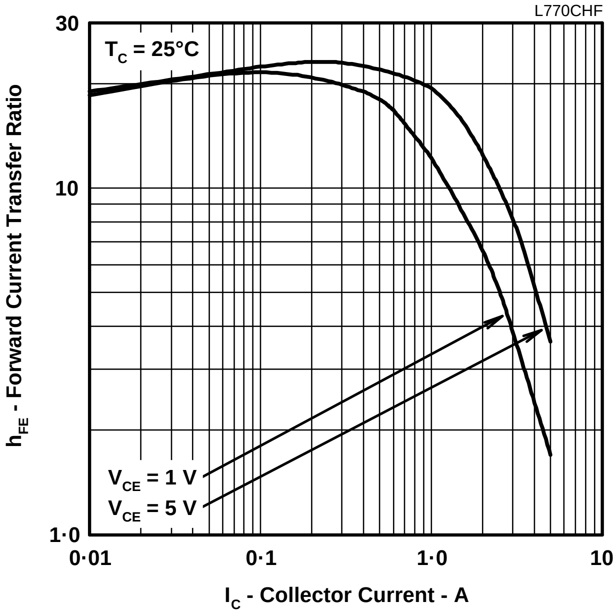


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

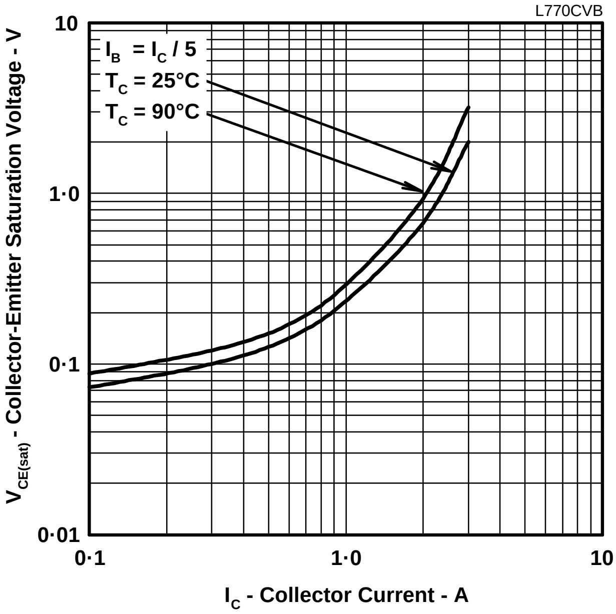


Figure 2.

INDUCTIVE SWITCHING TIMES vs COLLECTOR CURRENT

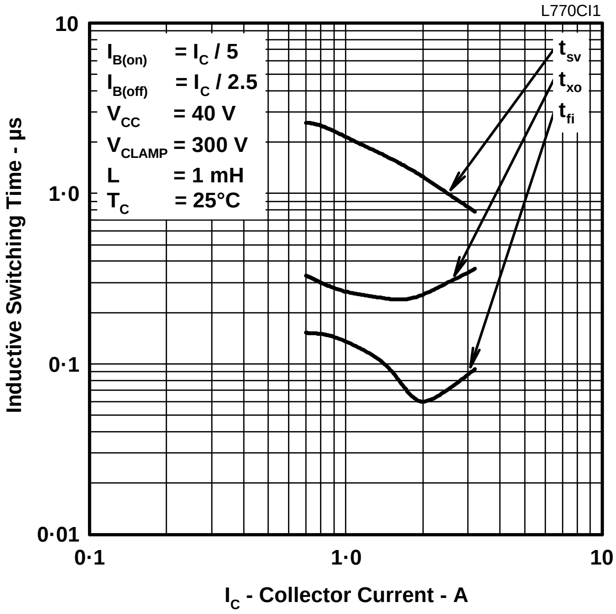


Figure 3.

INDUCTIVE SWITCHING TIMES vs CASE TEMPERATURE

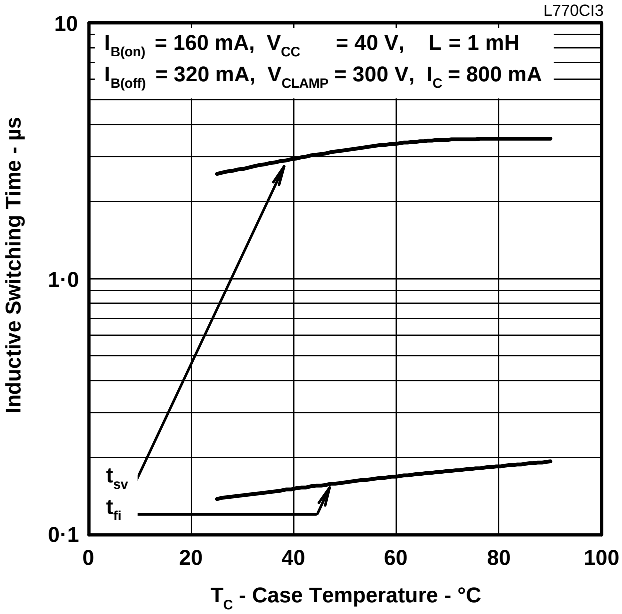


Figure 4.

TYPICAL CHARACTERISTICS

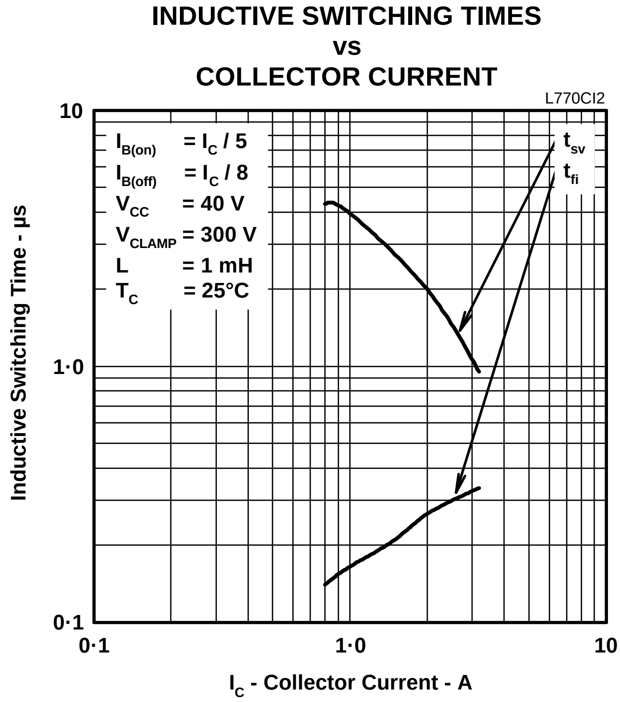


Figure 5.

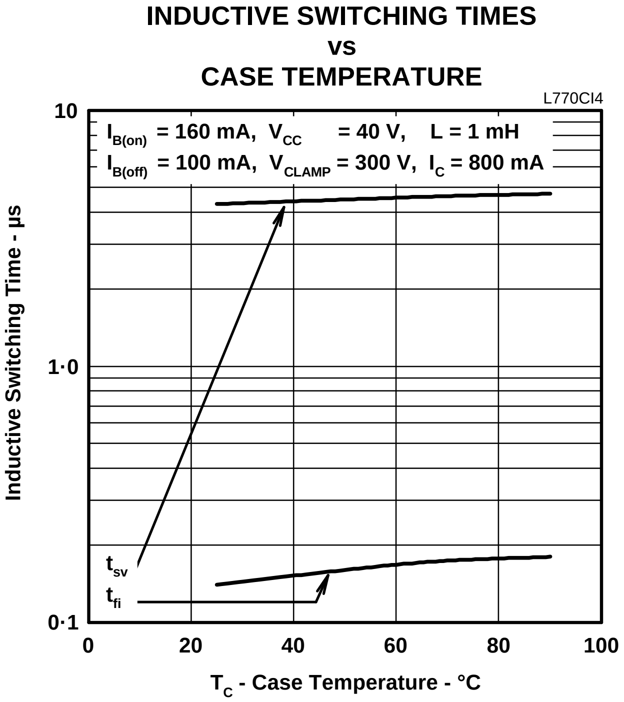


Figure 6.

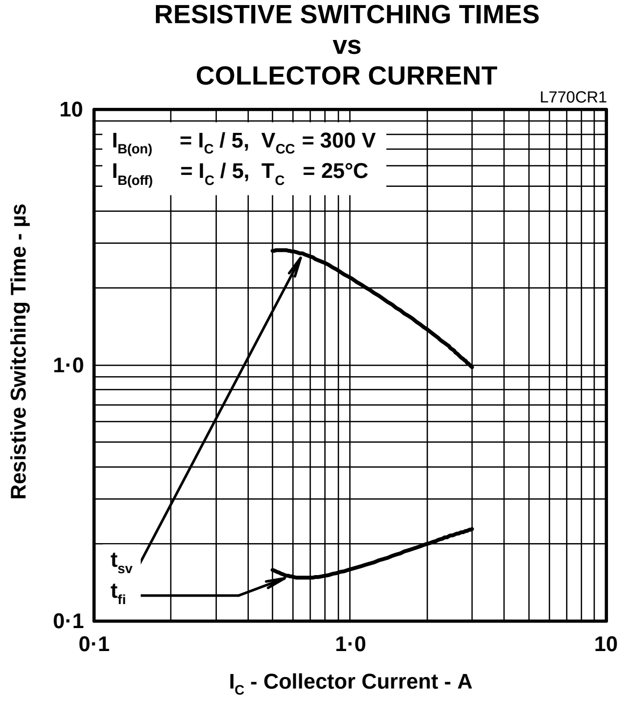


Figure 7.

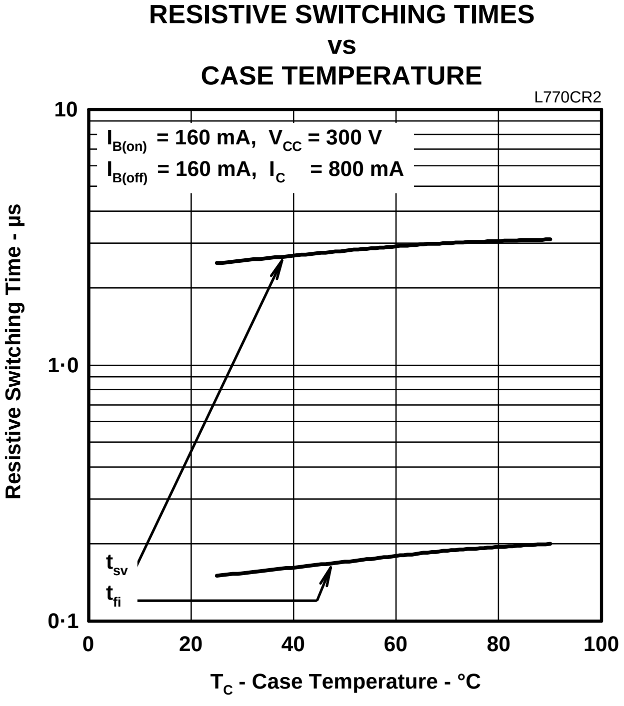


Figure 8.

MAXIMUM SAFE OPERATING REGIONS

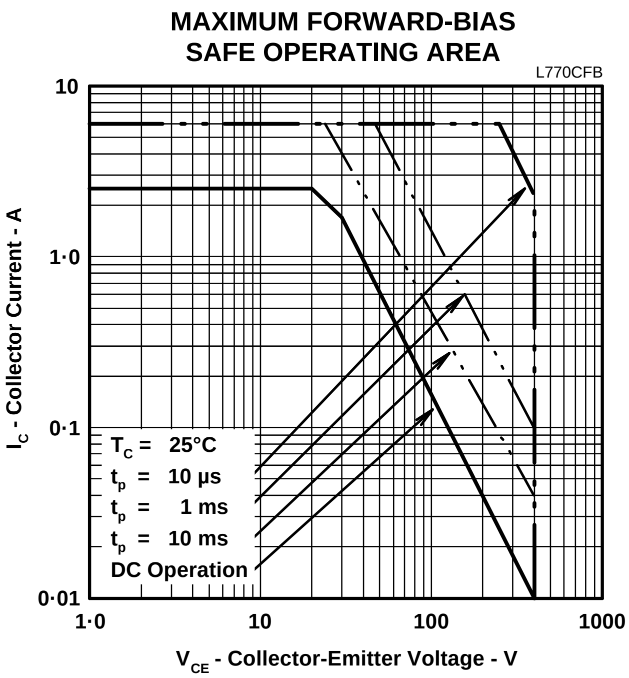


Figure 9.

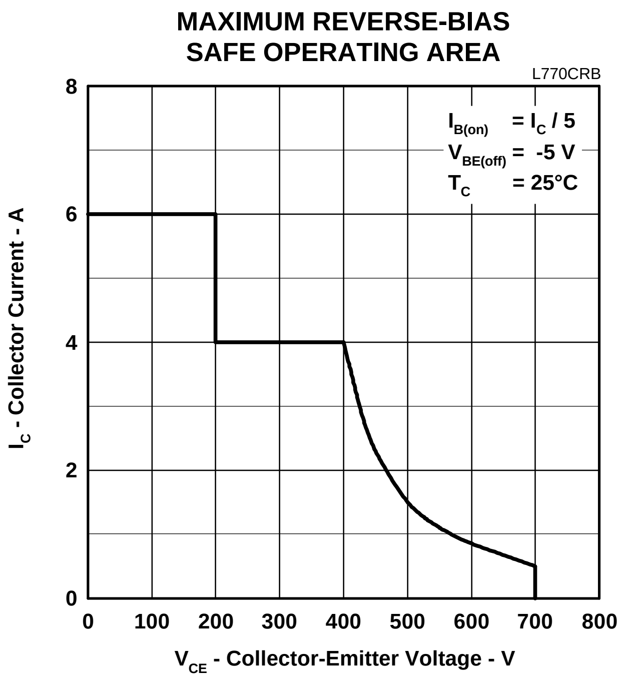
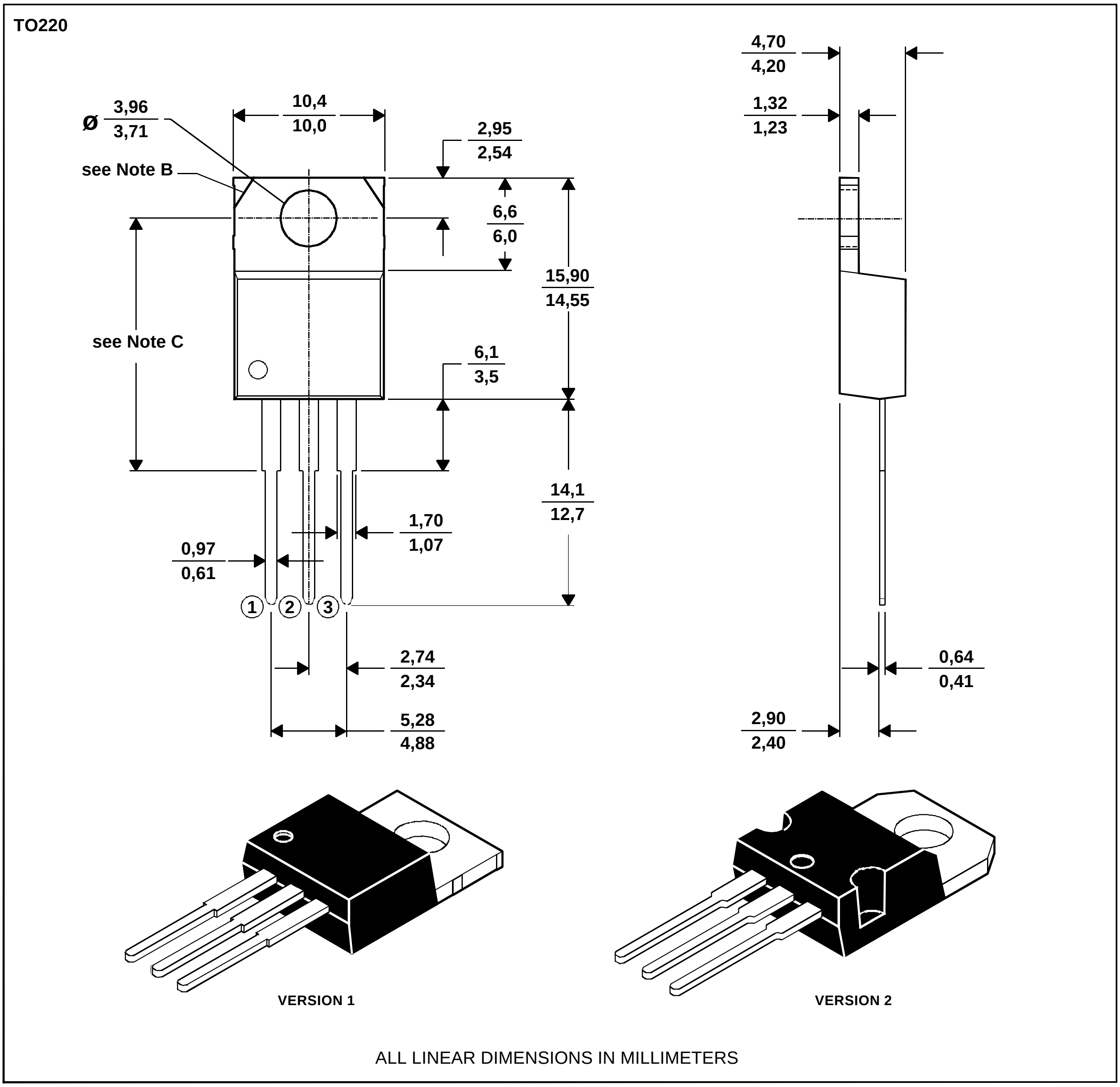


Figure 10.

MECHANICAL DATA

TO-220
3-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTES: A. The centre pin is in electrical contact with the mounting tab.
B. Mounting tab corner profile according to package version.
C. Typical fixing hole centre stand off height according to package version.
Version 1, 18.0 mm. Version 2, 17.6 mm.

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